Ohmite Component Selector

Catalog 4000K

Rev. March 2016

OHMITE®

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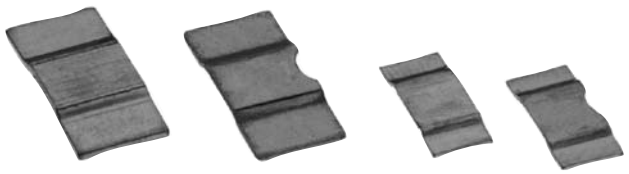
EBW Series

Manganin/NiCr Current Sense

The EBW Series are manufactured using electron beam welding technology. This allows the joining of different alloys with great accuracy and tolerance. The EBW Series have heavy copper connectors, excellent long term stability and low inductance. These components can tolerate soldering temperatures of 350C for 30 seconds or 250C for 10min. These can be mounted using re-flow soldering or welding on copper. The EBWA can handle a power of 5W up to 100A at 0.5mΩ. The EBWB can handle a constant power of 7W at 0.2mΩ and a continuous load of 180A at 0.2mΩ.



CERTIFICATIONS

BN ES ISO 9001: 2008
ISO/TS 16949: 2009

APPLICATIONS

- Current sensors for hybrid power sources
- Frequency converters
- High current automotive applications.

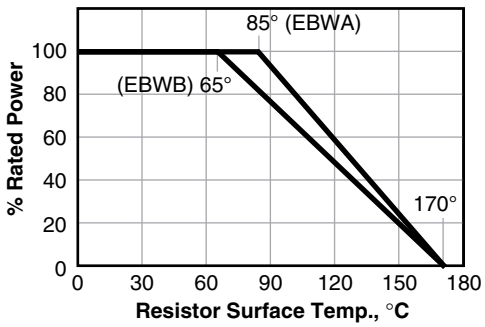
SERIES SPECIFICATIONS

Model	Power (W)	Resistance (mΩ)	Material	TCR (20°C - 150°C)	Weight (g)
EBWA-M	5	0.5	Manganin	±75ppm/°C	0.4081
	4	1	Manganin	±60ppm/°C	0.1994
EBWA-N	4	2	NiCr Alloy	±100ppm/°C	0.2726
	3	3	NiCr Alloy	±100ppm/°C	0.1832
	2.5	4	NiCr Alloy	±100ppm/°C	0.1363
EBWB-M	7	0.2	Manganin	±100ppm/°C	1.5138
	6	0.5	Manganin	±100ppm/°C	0.5652
EBWB-N	6	1	NiCr Alloy	±120ppm/°C	0.8573
	4	2	NiCr Alloy	±120ppm/°C	0.4287
	3.5	3	NiCr Alloy	±120ppm/°C	0.2858

CHARACTERISTICS

Tolerance	±1(F), ±2(G), ±5(J)
TCR	20°C-150°C Max. ±100ppm/°C (EBWA) Max. ±120ppm/°C (EBWB)
Operating Temperature	-55°C to 170°C

Derating



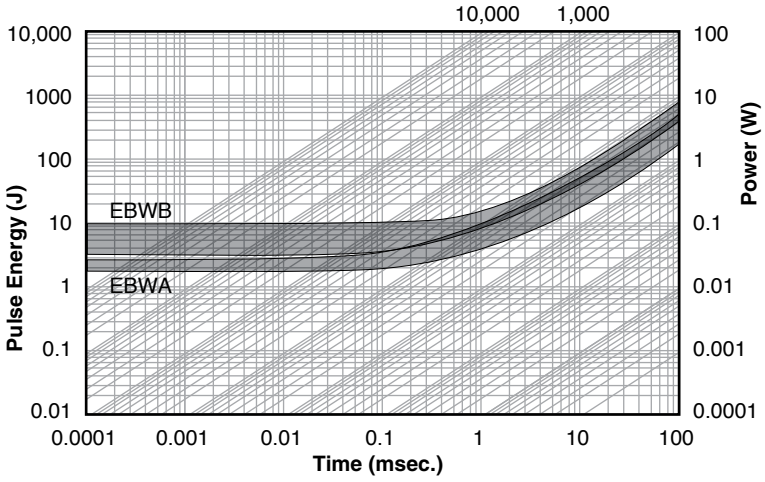
PERFORMANCE DATA

Thermal Shock	-65°C, 25°C, 125°C, 25°C 25cycles	**±0.1%**
Short Time Overload	Rated Power X 5 for 5 secs.	±0.2%
Resistance to Soldering Heat	350°C 30 sec. or 250°C 10 min.	±0.2%
Moisture Resistance	90~98%RH,+25°C,+65°C,-10°C 10 cycles	±0.2%
High Temperature Exposure	140°C for 250 hours	±0.2%
Vibration High Frequency	15g 10 to 2000Hz 36 cycles	±0.2%
Inductance		<3nH
Load Life	90 min “ON” 30 min “OFF” for 2000 hours	±1.0%

EBW Series

Manganin/NiCr Current Sense

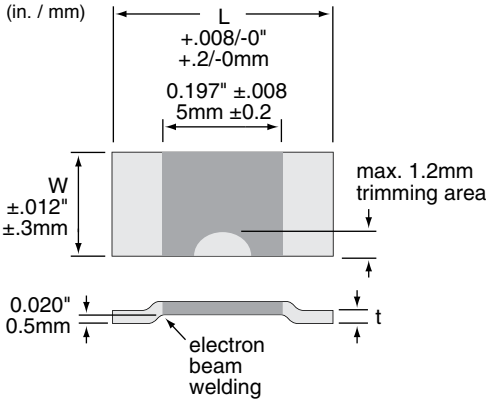
PULSE ENERGY/POWER FOR CONTINUOUS OPERATION



EBWA: Max. curve is only valid for the resistance value 0.5m. The min. curve is only valid for the resistance value 4m. For other resistance values the area in between the max. and the min. curve is valid

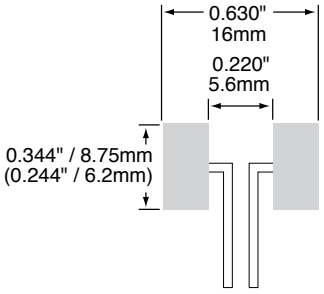
EBWB: Max. curve is only valid for the resistance value 0.2m. The min. curve is only valid for the resistance value 2m. For other resistance values the area in between the max. and the min. curve is valid

DIMENSIONS



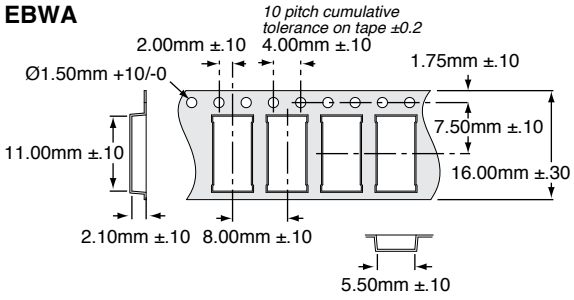
	Ohm Value	L	W	Thickness "t"
EBWA-M	0.5mΩ 1mΩ	0.413 / 10.5	0.197 / 5	0.035 / 0.88 0.017 / 0.43
EBWA-N	2mΩ 3mΩ 4mΩ	0.413 / 10.5	0.197 / 5	0.025 / 0.64 0.017 / 0.43 0.013 / 0.32
EBWB-M	0.2mΩ 0.5mΩ	0.598 / 15.2	0.295 / 7.5	0.059 / 1.5 0.022 / 0.56
EBWB-N	1mΩ 2mΩ 3mΩ	0.598 / 15.2	0.295 / 7.5	0.035 / 0.9 0.018 / 0.45 0.012 / 0.3

Land Pattern

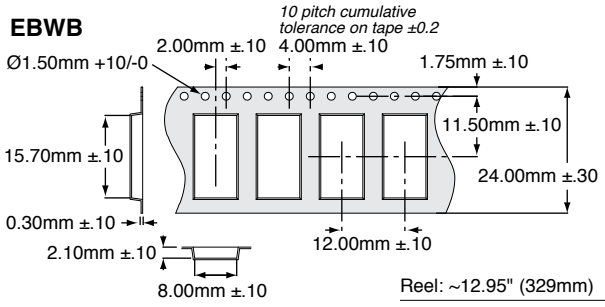


Tape and Reel

EBWA



EBWB



Reel: ~12.95" (329mm)

Qty. per reel: EBWA: 3000pcs
EBWB: 2000pcs

ORDERING INFORMATION

Standard Part Numbers

EBWA-MR0005FE
EBWA-MR0010FE
EBWA-NR0020FE
EBWA-NR0030FE
EBWA-NR0040FE
EBWB-MR0002FE
EBWB-MR0005FE
EBWB-NR0010FE
EBWB-NR0020FE
EBWB-NR0030FE

RoHS Compliant

E B W A - M R 0 0 2 0 F E T

Series	Size	Alloy	Resistance	Tolerance	Tape and reel
Electron Beam Weld		M = Maganin N = NiCr		F = 1% G = 2% J = 5%	EBWA: 3000 pc/reel EBWB: 2000 pc/reel

FCSL Series

Metal Foil Current Sense

Ohmite continues to add to its complement of Current Sense offerings with the FCSL Series. FCSL incorporates proven metal foil technology to produce the ultimate in a current sense resistor. FCSL features the effective combination of very low and stable TCRs (Temperature Coefficient of Resistance) available in a wide selection of very low ohmic values. Power ratings up to 10 Watts makes FCSL the ideal choice for your current sensing applications.

FEATURES

- Foil Construction ensures a very stable TCR (Temperature Coefficient of Resistance)
- Designed for automatic insertion
- Industry standard sizes
- High heat resistant use
- Low heat electromotive use
- Color: white (top) and green (bottom)

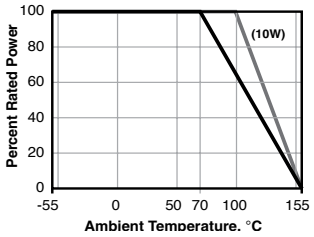
SERIES SPECIFICATIONS

Series	Power Rating	Resistance Range (mΩ)	Tol.	TCR (ppm/°C)	Weight (g)
FCSL64	2.0W	1m	±5%	±150	0.036
		2m	±2%	±100	
		3m ~ 100m	±1%	±50	
		10m ~ 50mΩ	±0.5%	±50	
FCSL76	3.0W	1m	±5%	±150	0.050
		2m	±2%	±100	
		3m ~ 100m	±1%	±50	
FCSL90	4.0W	1m	±5%	±150	0.071
		2m	±2%	±100	
		3m ~ 100m	±1%	±50	
FCSL110	5.0W	1m	±5%	±150	0.096
		2m	±2%	±100	
		3m ~ 100m	±1%	±50	
		10m ~ 50mΩ	±0.5%	±50	
FCSL150	10.0W	1m	±5%	±100	0.316
		2m	±2%	±100	
		3m ~ 100m	±1%	±100 (>9m:±50)	

CHARACTERISTICS

Test	Condition	Maximum ΔR
Overload	(10W) Rated power x1.5, 5s	±(1.0%+0.0005Ω)
Max. temperature for rated power	70°C (10W: 100°C)	
Operating temp. range	-55°C ~ +155°C	
Rated voltage	√(Rated power x Resistance value) V	
In-rush current*	Rated current 10 msec ON, 60 sec OFF, 10 cycles* (see table below)	±(1.0% +0.0005Ω)
Rapid change of temperature	-55°C (30min.)/+155°C (30min.), 100 cy.	±(1.0% +0.0005Ω)
	-40°C (30min), Room temp (3min), +125°C (30min), Room temp (3min), 1000 cy., **FCSL150 only**	±0.6%
Solderability	245°C ±5°C for 3 ±0.5 sec.	Min. 90% coverage
Endurance at 70°C	70°C ±3°C, Rated voltage 1.5h ON, 0.5h OFF, 1000h	±(1.0% +0.0005Ω)
Resistance to soldering heat	260°C ±5°C for 10 ±1 sec.	±(0.5% +0.0005Ω)
Moisture resistance	60°C ±2°C, 90~95% RH, Rated voltage 1.5h ON, 0.5h OFF, 1000h	±(2.0% +0.0005Ω)
Terminal strength	**10W:** Bending width: 2mm for 10s±1s, Glass epoxy substrate 1.6mm thick	±(1.0%+0.0005Ω)

Derating

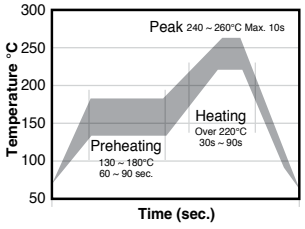


Recommended Reflow Temperature Profile

For lead free soldering (Sn-Ag-Cu solder)

Preheating:	130° ~ 180°	60s ~ 90s
Heating:	Over 220°	30s ~ 90s
Peak:	240° ~ 260°	Max. 10s

Max. number of reflow: 2



*In-rush Current

Series	Rated Wattage	1mΩ~10mΩ In-rush Power	1mΩ~10mΩ Max. Current	12mΩ~100mΩ In-rush Power	12mΩ~100mΩ Max. Current
FCSL64	2W	225W	125A	150W	70A
FCSL76	3W	325W	150A	210W	80A
FCSL90	4W	440W	180A	300W	100A
FCSL110	5W	600W	240A	440W	120A
FCSL150	10W	700W	270A	470W	140A

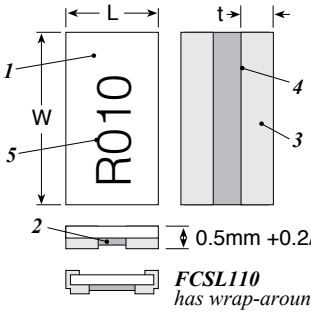
In-rush current = √(in-rush power/resistance value), or max. current, whichever is smaller

FCSL Series

Metal Foil Current Sense

DIMENSIONS

(in.±.008/mm ±0.20)

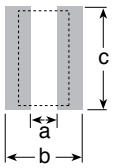


1. *Alumina substrate*
2. *Resistive element (Ni-Cu-Mn alloy)*
3. *Electrode (Ni, Sn)*
4. *Protective coating (Epoxy resin)*
5. *Marking (Epoxy resin)*

FCSL110
has wrap-around terminals

Series	Power Rating	L	W	t
FCSL64	2.0W	0.122/3.1	0.248/6.3	0.047/1.2 0.020/0.5 0.020/0.5
FCSL76	3.0W	0.15/3.8	0.3/7.6	0.053/1.35 0.024/0.6 0.024/0.6
FCSL90	4.0W	0.177/4.5	0.35/8.9	0.063/1.6 0.028/0.7 0.028/0.7
FCSL110	5.0W	0.197/5.0	0.43/11.0	0.071/1.8 0.031/0.8 0.031/0.8
FCSL150	10W	0.295/7.5	0.591/15.0	0.043/1.1

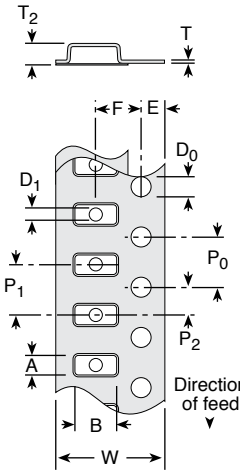
Land Pattern



(mm)	Value range	a	b	c
FCSL64	1mΩ	0.9	4.2	6.6
	2mΩ~100mΩ	2.2	4.2	6.6
FCSL76	1mΩ	1.1	4.6	7.8
	2mΩ~100mΩ	2.6	4.6	7.8
FCSL90	1mΩ	1.3	5.1	9.2
	2mΩ~100mΩ	3.1	5.1	9.2
FCSL110	1mΩ	1.5	5.6	11.2
	2mΩ~100mΩ	3.6	5.6	11.2
FCSL150	1mΩ	2.0	8.4	15.2
	2mΩ~100mΩ	5.0	8.4	15.2

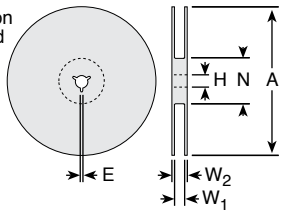
PACKAGING SPECIFICATIONS

Tape (in./mm)



	FCSL64	FCSL76	FCSL90	FCSL110	FCSL150
A	0.135 *(3.43 ±0.2)*	0.163 (4.15 ±0.10)	0.191 (4.85 ±0.10)	0.213 (5.40 ±0.10)	0.327 (8.30 ±0.1)
B	0.261 *(6.63 ±0.2)*	0.313 (7.95 ±0.10)	0.368 (9.35 ±0.10)	0.453 (11.50 ±0.10)	0.614 (15.60 ±0.1)
W	0.472 *(12.0 ±0.3)*	0.630 (16.00 ±0.30)	0.630 (16.00 ±0.30)	0.945 (24.00 ±0.30)	0.945 (24.00 ±0.2)
E	0.069 *(1.75 ±0.1)*	0.295 (7.50 ±0.10)	0.295 (7.50 ±0.10)	0.453 (11.50 ±0.10)	0.069 (1.75 ±0.1)
F	0.217 *(5.5 ±0.05)*	0.069 (1.75 ±0.10)	0.069 (1.7 ±0.10)	0.069 (1.75 ±0.10)	0.453 (11.50 ±0.1)
P_0	0.157 *(4.0 ±0.1)*	0.157 (4.00 ±0.10)	0.157 (4.00 ±0.10)	0.157 (4.00 ±0.10)	0.157 (4.00 ±0.1)
P_1	0.157 *(4.0 ±0.1)*	0.315 (8.00 ±0.10)	0.315 (8.00 ±0.10)	0.315 (8.00 ±0.10)	0.472 (12.00 ±0.1)
P_2	0.079 *(2.0 ±0.05)*	0.079 (2.00 ±0.10)	0.079 (2.00 ±0.10)	0.079 (2.00 ±0.10)	0.079 (2.00 ±0.1)
D_0	0.059 *(1.5 +0.1/-0)*	0.059 (1.50 ±0.10)	0.059 (1.50 ±0.10)	0.059 (1.50 ±0.10)	0.059 (1.50 +0.05/-0)
D_1	0.059 *(1.5 +0.2/-0)*	0.059 (1.50 ±0.10)	0.059 (1.50 ±0.10)	0.059 (1.50 ±0.10)	0.059 (1.50 +0.05/-0)
T	0.008 *(0.2 ±0.05)*	0.012 (0.30 ±0.05)	0.012 (0.30 ±0.05)	0.012 (0.30 ±0.05)	0.012 (0.30 ±0.05)
T_2	0.059 *(1.5 max.)*	0.047 (1.2 ±0.15)	0.047 (1.2 ±0.15)	0.047 (1.2 ±0.15)	0.091 (2.3 ±0.1)

Reel (in./mm)



	FCSL64	FCSL76/90	FCSL110	FCSL150
A	7.087 *(180 +0/-3)*	7.087 *(180 +0/-3)*	7.087 *(180 ±2.0)*	12.992 (330±2.0)
H	0.512 *(13 ±0.2)*	0.512 *(13 ±0.2)*	0.512 *(13 ±0.2)*	0.512 (13±0.2)
E	0.079 *(2.0 ±0.5)*	0.079 *(2.0 ±0.5)*	0.079 *(2.0 ±0.5)*	0.079 (2.0 ±0.5)
N	0.236 *(60 +1/-0)*	0.236 *(60 +1/-0)*	0.827 *(21 ±0.8)*	3.937 (100±1.0)
W_1	0.518 *(13.0 ±0.3)*	0.669 *(17.0 ±0.3)*	1.000 *(25.4 ±1.0)*	1.000 (25.4 ±1.0)
W_2	0.669 *(17.0 ±1.4)*	0.764 *(19.4 ±1.0)*	1.157 *(29.4 ±1.0)*	1.157 (29.4 ±1.0)

ORDERING INFORMATION

RoHS Compliant

F C S L 6 4 R 0 0 5 J E R

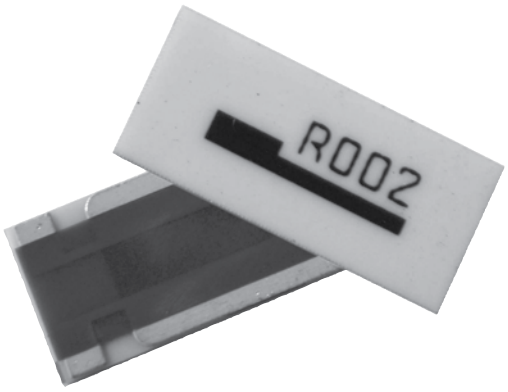
Series	Package Size	Ohms	Tolerance	Taping Code
	64=6432=2W	R005 =0.005Ω	J = 5%	1,000 pc/reel
	76=7638=3W	R050 =0.050Ω	G = 2%	(10W: 500pc/reel)
	90=9045=4W		F = 1%	
	110=11050=5W		D = 0.5%	
	150=15075=10W			

Standard Part Numbers

Ohms	2 Watts	3 Watts	4 Watts	5 Watts	10 Watt
0.0010	FCSL64R001JE	FCSL76R001JE	FCSL90R001JE	FCSL110R001JE	FCSL150R001JE
0.0020	FCSL64R002GE	FCSL76R002GE	FCSL90R002GE	FCSL110R002GE	FCSL150R002GE
0.0050	FCSL64R005FE	FCSL76R005FE	FCSL90R005FE	FCSL110R005FE	FCSL150R005FE
0.0100	FCSL64R010FE	FCSL76R010FE	FCSL90R010FE	FCSL110R010FE	FCSL150R010FE
0.0250	FCSL64R025FE	FCSL76R025FE	FCSL90R025FE	FCSL110R025FE	FCSL150R025FE
0.0500	FCSL64R050FE	FCSL76R050FE	FCSL90R050FE	FCSL110R050FE	FCSL150R050FE
0.0150	FCSL64R015FE	FCSL76R015FE	FCSL90R015FE	FCSL110R015FE	FCSL150R015FE
0.0200	FCSL64R020FE	FCSL76R020FE	FCSL90R020FE	FCSL110R020FE	FCSL150R020FE
0.0300	FCSL64R030FE	FCSL76R030FE	FCSL90R030FE	FCSL110R030FE	FCSL150R030FE
0.1000	FCSL64R100FE	FCSL76R100FE	FCSL90R100FE	FCSL110R100FE	FCSL150R100FE

FC4L Series

FC4L Four Terminal Current Sense Metal Foil Construction



FEATURES

- Foil Construction ensures a very stable TCR (Temperature Coefficient of Resistance)
- Designed for automatic insertion
- Industry standard sizes
- High heat resistant use
- Low heat electromotive use
- Color: white (top) and green (bottom)

Ohmite extends its FC4L Series with this 4-terminal Kelvin type FC4L derivative in 2 watt and 5 watt package sizes. Employing the same Ni-Cu-Mn resistive element this product affords the user an added advantage of a built in 4-terminal design with 2 larger electrodes for current management and 2 smaller electrodes for current measurement.

SERIES SPECIFICATIONS

Series	Power Rating	Resistance Range	Tol.	TCR (ppm/°C)	Weight (g)
FC4L16	0.25W	5m, 10m, 20m, 50mΩ ~ 100mΩ	±1%	±50	0.004
FC4L32	1W	1mΩ	±5%	±100	0.015
		2mΩ	±2%	±100	
		3mΩ	±1%	±100	
		4mΩ ~ 500mΩ	±1%	±50	

Series	Power Rating	Resistance Range	Tol.	TCR (ppm/°C)	Weight (g)
FC4L64	2W	1mΩ	±5%	±100	0.038
		2mΩ	±2%	±100	
		3mΩ	±1%	±100	
		4m ~ 100mΩ	±1%	±50	
		10m ~ 50mΩ	±0.5%	±50	
FC4L110	5W	1mΩ	±5%	±100	0.110
		2mΩ	±2%	±50	
		3mΩ ~ 100mΩ	±1%	±50	
		10m ~ 50mΩ	±0.5%	±50	

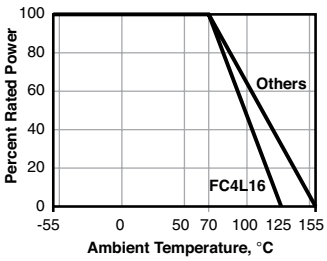
CHARACTERISTICS

Test	Condition	Maximum ΔR
Max. temperature for rated power	70°C	
Operating temperature range	-55°C ~ +155°C (FC4L16: -40°C ~ +125°C)	
Rated voltage	√(Rated power x Resistance value) V	
Overload (FC4L16 only)	Rated power x 1.5 for 5s	±(0.5%+0.0005Ω)
In-rush current	Rated current 10 msec ON, 60 sec OFF, 10 cycles.	±(1.0% +0.0005Ω)
Rapid change of temperature	-55°C (30min.)/+155°C (30min.), 100 cycles 1000 cycles, FC4L16 only	±(1.0% +0.0005Ω) ±(2.0%+0.0005Ω)
Solderability	245°C ±5°C for 3 ±0.5 sec.	Min. 90% coverage
Endurance at 70°C	70°C ±3°C, Rated voltage 1.5h ON, 0.5h OFF, 1000h	±(1.0% +0.0005Ω)
Resistance to soldering heat	260°C ±5°C for 10 ±1 sec.	±(1.0% +0.0005Ω) (±0.5% FC4L16)
Moisture resistance	60°C ±2°C, 90~95% RH, Rated voltage 1.5h ON, 0.5h OFF, 1000h	±(2.0% +0.0005Ω) (±1.0% FC4L16)

Series	Power Rating	Resistance Range	In-rush Power	Max. Current
FC4L16	0.25 watt	5m, 10mΩ	2.5W	5A
FC4L32	1 watt	1mΩ~9mΩ 10mΩ~500mΩ	25W 12.5W	45A 24A
FC4L64	2 watt	1mΩ~9mΩ 10mΩ~100mΩ	100W 50W	85A 35A
FC4L110	5 watt	1mΩ~50mΩ	100W	100A

In-rush current = √(in-rush power/resistance value), or max. current, whichever is smaller

Derating

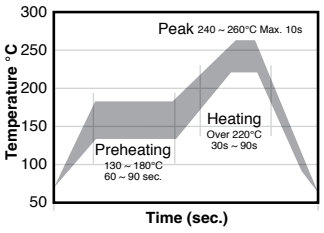


Recommended Reflow Temperature Profile

For lead free soldering (Sn-Ag-Cu solder)

Preheating:	130° ~ 180°	60s ~ 90s
Heating:	Over 220°	30s ~ 90s
Peak:	240° ~ 260°	Max. 10s

Max. number of reflow: 2



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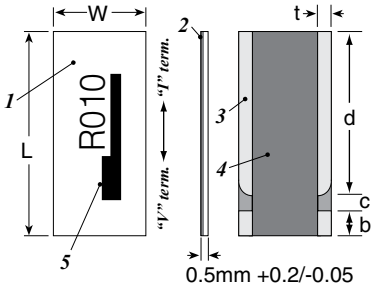
FC4L Series

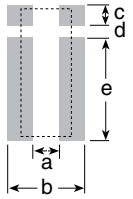
FC4L Four Terminal Current Sense
Metal Foil Construction

DIMENSIONS



1. *Alumina substrate*
2. *Resistive element (Ni-Cu-Mn alloy)*
3. *Electrode (Ni, Sn)*
4. *Protective coating (Epoxy resin)*
5. *Marking (Epoxy resin): **wider mark indicates "V" term.***

Land Pattern



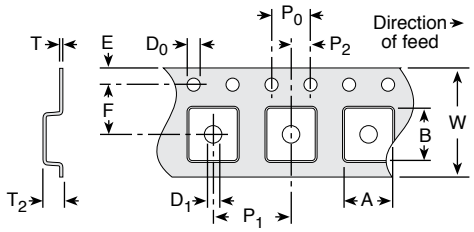
	Rating	L (in.±.008/mm ±0.20)	W	t (in./mm)	b mm ±0.15	c mm ±0.1	d mm ±0.15
FC4L16	0.25 watt	0.063 / 1.60	0.031 / 0.8	0.010 / 0.26	0.30 ±.2	0.3 ±.2	1.0 ±.2
FC4L32	1 watt	0.126 / 3.20	0.063 / 1.6	0.014 / 0.35	0.35	0.2	2.6
FC4L64	2 watt	0.251 / 6.40	0.126 / 3.2	0.020 / 0.5	0.7	0.5	5.2
FC4L110	5 watt	0.433 / 11.0	0.197 / 5.0	0.028 / 0.7	1.4	1.1	8.5

(mm)	a	b	c	d	e
FC4L16	0.25	1.2	0.40	0.30	1.2
FC4L32	0.4	2.7	0.35	0.3	2.7
FC4L64	2.0	4.4	0.7	0.5	5.4
FC4L110	3.2	5.6	1.6	1.1	8.7

PACKAGING SPECIFICATIONS

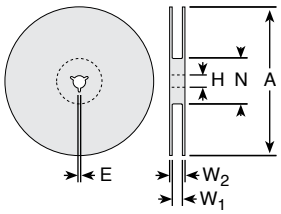
Tape

inches (mm)



	FC4L16	FC4L32	FC4L64	FC4L110
A	0.037 (0.95±0.05)	0.075 (1.90 ±0.1)	0.135 (3.43 ±0.2)	0.213 (5.40 ±0.10)
B	0.073 (1.85±0.05)	0.138 (3.50 ±0.1)	0.261 (6.63 ±0.2)	0.453 (11.50 ±0.10)
W	0.315 (8.00±0.10)	0.315 (8.00 ±0.2)	0.472 (12.0 ±0.3)	0.945 (24.00 ±0.30)
F	0.138 (3.50±0.05)	0.138 (3.50 ±0.05)	0.069 (1.75 ±0.1)	0.069 (1.75 ±0.10)
E	0.069 (1.75±0.10)	0.069 (1.75 ±0.1)	0.217 (5.5 ±0.05)	0.453 (11.50 ±0.10)
P_0	0.157 (4.00±0.10)	0.157 (4.0 ±0.1)	0.157 (4.0 ±0.1)	0.157 (4.00 ±0.10)
P_1	0.157 (4.00±0.10)	0.157 (4.0 ±0.1)	0.157 (4.0 ±0.1)	0.315 (8.00 ±0.10)
P_2	0.079 (2.00±0.05)	0.079 (2.0 ±0.05)	0.079 (2.0 ±0.05)	0.079 (2.00 ±0.10)
D_0	0.059 (1.50+0.10/-0)	0.059 (1.50 +0.1/-0)	0.059 (1.5 +0.1/-0)	0.059 (1.50 ±0.10)
D_1	0.024 (0.60±0.05)	0.039 (1.00 +0.2/-0)	0.059 (1.5 +0.2/-0)	0.059 (1.50 ±0.10)
T	0.008 (0.20±0.05)	0.008 (0.20 ±0.05)	0.008 (0.20 ±0.05)	0.012 (0.30 ±0.05)
T_2	0.022 (0.55±0.05)	0.039 (1.00 ±0.2)	0.059 (1.5) max.	0.047 (1.2 ±0.15)

Reel



	FC4L16	FC4L32 & 64	FC4L110
A	7.087 (180 +0/-3)	7.087 (180 +0/-3)	7.087 *(180 ±2.0)*
H	0.512 (13 ±0.2)	0.512 (13 ±0.2)	0.512 (13 ±0.2)
E	0.079 (2.0 ±0.5)	0.079 (2.0 ±0.5)	0.079 (2.0 ±0.5)
N	2.362 (60 +1/-0)	2.362 (60 +1/-0)	0.827 *(21 ±0.8)*
W_1	0.354 (9.0 ±0.3)	0.512 (13.0 ±0.3)	1.000 (25.4 ±1.0)
W_2	0.512 (13.0 ±0.3)	0.669 (17.0 ±1.4)	1.157 (29.4 ±1.0)

ORDERING INFORMATION

Ohms
R005=0.005Ω
R050=0.050Ω

RoHS Compliant

F C 4 L 1 1 0 R 0 0 5 F E R

Series	TCR* (ppm)	Package Size	Tolerance	Taping Code
	W= 25	110=11050=5W	J = 5%	1,000 pc/reel
	V = 50	64=6432=2W	G=2%	FC4L16: 5,000 pc/reel
	L = *per chart above*	32=3216=1W	F = 1%	
		16=1608=0.25W	D = 0.5%	

**FC4L32 and FC4L64 values over 0.100Ω only*

Standard Part Numbers for FC4L series

0.25 watt	1 watt	2 watt	5 watt
	FC4L32R001JER	FC4L64R001JER	FC4L110R001JER
	FC4L32R002GER	FC4L64R002GER	FC4L110R002GER
	FC4L32R003FER	FC4L64R003FER	FC4L110R003FER
FC4L16R005FER	FC4L32R005FER	FC4L64R005FER	FC4L110R005FER
		FC4L64R010DER	FC4L110R010DER
FC4L16R010FER	FC4L32R010FER	FC4L64R010FER	FC4L110R010FER
		FC4L64R015DER	FC4L110R015DER
FC4L16R015FER	FC4L32R015FER	FC4L64R015FER	FC4L110R015FER
		FC4L64R020DER	FC4L110R020DER
FC4L16R020FER	FC4L32R020FER	FC4L64R020FER	FC4L110R020FER
		FC4L64R025DER	FC4L110R025DER
FC4L16R025FER	FC4L32R025FER	FC4L64R025FER	FC4L110R025FER
		FC4L64R030DER	FC4L110R030DER
FC4L16R030FER	FC4L32R030FER	FC4L64R030FER	FC4L110R030FER
		FC4L64R050DER	FC4L110R050DER
FC4L16R050FER	FC4L32R050FER	FC4L64R050FER	FC4L110R050FER
FC4L16R100FER	FC4L32R100FER	FC4L64R100FER	FC4L110R100FER

LVC Series

Low Value Chip

Ohmite's LVC Series low value chip resistors are ideal for today's current sense applications requiring low profile, low cost solutions. Available in 0.5, 0.75, and 1 watt sizes, footprints are 1206, 2010, and 2512 size respectively. These resistors are offered in ohmic ranges from 0.10 to 4.7 ohms in standard 1% and 2% in E12 values depending on value.

The LVC Series resistors are well suited for a variety of industrial and commercial applications.

APPLICATIONS

- Switching Power Supplies
- Cellular
- Telecom and Wireless
- Computer
- RF

FEATURES

- Industry Standard Sizes
- Terminal Barrier Resists Ag Migration
- Working Temperature Range is from -40°C to +125°C
- Designed for Automatic Insertion

SERIES SPECIFICATIONS

Series	Power Rating	Max. Current	Resistance Range*	TCR ppm/°C
LVC06	0.5W	32A	10m-15m	500
			18m-27m	350
			33m-47m	200
			50m- 4.7	100
LVC20	0.75W	40A	10m-15m	500
			18m-27m	350
			33m-47m	200
			50m- 4.7	100
LVC25	1.0W	45A	10m-15m	500
			18m-27m	350
			33m-47m	200
			50m- 4.7	100

Resistance Tolerance	
10mΩ ~ 22mΩ	2%
27mΩ ~ 4.7Ω	1%

* E-12 values and 20, 25, 50

CHARACTERISTICS

Substrate	Alumina 96%
Resistor	Thick Film, Ni-Cr Alloy
Electrode	Sn, Ni, Cu
Coating	Epoxy resin
Max. Working Volts	V = √PR (P = Rated Watts, R = Resistance Value)
Derating	100% @ 70°C, Derates Linearly to Zero @ 125°C
Operating temp. range	-40°C ~ +125°C
Soldering	The recommended soldering condition for both reflow and wave soldering is as follows: Preheating: 150° ~ 180°C 60 ~ 120 sec. Soldering: min. 230°C 30 ~ 40 sec. Max. temp.: max. 260°C max. 10 sec.

PERFORMANCE DATA

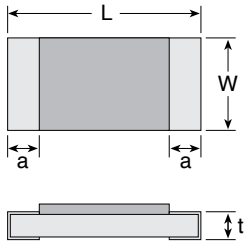
Moisture resistance	60°C±2°C, 90%~95% RH, Rated voltage 1.5h ON, 0.5h OFF, 1000h	±(0.5%+0.0005Ω)
Temperature Cycle	-40°C (30min.)/+125°C (30min.), 5 cycles	±(0.5%+0.0005Ω)
Short Time Overload	Rated voltage x 2.5 for 5s	±(0.5%+0.0005Ω)
Endurance	70°C±3°C, Rated voltage 1.5h ON, 0.5h OFF, 1000h	±(0.5%+0.0005Ω)
Resistance to Solder Heat	260°C±5°C for 10±1s	±(0.5%+0.0005Ω)
Terminal strength	Bending width: 2mm for 10s±1s, Glass epoxy substrate with thickness of 1.6mm	±(0.5%+0.0005Ω)
Solderability	245°C±5°C for 3s±0.5s	Min. 90% coverage
Max. Overload Current	(A) Time applied: max. 10msec Interval: min. 60sec	LVC06 I=√(32/R) LVC20 I=√(50/R) LVC25 I=√(64/R)

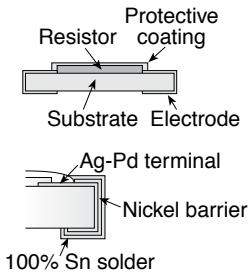
LVC Series

Low Value Chip

DIMENSIONS

(mm)

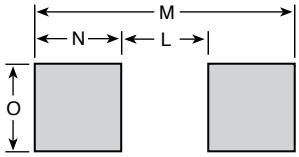




Size	L ±0.2	W ±0.2	t ±0.15	a ±0.15
LVC06 (EIA size 1206)	3.2	1.6	0.5	1.0
LVC20 (EIA size 2010)	5.0	2.5	0.5	1.7
LVC25 (EIA size 2512)	6.4	3.2	0.5	2.0

Land Pattern

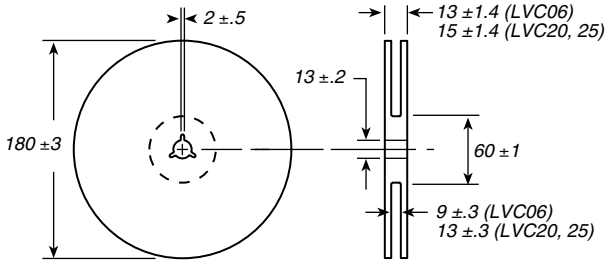
Land pattern dimensions are for reference only



Size	M	N	O	L
LVC06	0.146	0.040	0.080	0.066
LVC20	0.229	0.056	0.120	0.117
LVC25	0.288	0.068	0.150	0.152

REEL SPECIFICATIONS

5,000 pc/reel



ORDERING INFORMATION

RoHS Compliant

L V C 0 6 F R 5 6 0 E V

Low Value Chip Series	Case Size	Tolerance	Ohms	Taping Code
	06 = 1206 20 = 2010 25 = 2512	F = 1% G = 2%	R249 = 0.249 1R00 = 1.0	blank = bulk package V = reel taped

Ohm range	Tol.	Available Ohm Values
0.027 ~ 4.7	1%	0.027, 0.033, 0.039, 0.047, 0.050, 0.056, 0.068, 0.082, 0.10, 0.12, 0.15, 0.18, 0.20, 0.22, 0.25, 0.27, 0.33, 0.39, 0.47, 0.50, 0.56, 0.68, 0.82, 1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.5, 2.7, 3.3, 3.9, 4.7
0.010 ~ 0.022	2%	0.010, 0.012, 0.015, 0.018, 0.020, 0.022

Only E12 values plus 20, 25, 50

LVK Series

Four Terminal High Precision Current Sense

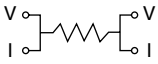
Current sense resistors enable the measurement of current flow in a circuit by monitoring a voltage drop across a precisely calibrated resistance. The LVK chip features four terminals, also known as a "Kelvin" configuration. This configuration enables current to be applied through two opposite terminals and a sensing voltage to be measured across the other two terminals, eliminating the resistance and temperature coefficient of the terminals for a more accurate current measurement.

Isolating the voltage and current terminals (see schematic) facilitates a very accurate current measurement. Ohmite's proprietary technology offers an excellent Temperature Coefficient of Resistance (TCR) even for very low resistance values. The resistive element consists of a durable, anti-corrosive metal alloy that combines reliable performance with the ability to withstand harsh environments.

FEATURES

- Designed for automatic insertion
- Industry standard sizes
- High-precision Kelvin connect capability in a small package

Schematic



V = sensing terminal (voltage)
I = current terminal

SERIES SPECIFICATIONS

Series	Pkg. Size	Power Rating (W @70°C)	Resistance Range (Ω)	TCR (ppm/°C)	Tolerance	Available Values	Max. Over Current Max. Power	Max. Over Current Max. Current
LVK12	1206	0.5W	0.01-0.100	50ppm	0.5%, 1%	E12	20W	20A
LVK20	2010	0.75W	0.01-0.05	50ppm	0.5%, 1%	E12	29W	23A
LVK24	2412	1.0W	0.01-0.100	50ppm	0.5%, 1%	E12	38W	27A
LVK25	1224	2.0W	0.001 0.002-0.004 0.005-0.01	300ppm 200ppm 100ppm	1%	1, 2, 3, 5, 9,10mΩ	150W	200A

CHARACTERISTICS

Res. Range	0.001Ω - 0.010Ω
Operating Temp. Range	-40°C to +125°C
Rated Ambient Temperature	+70°C
Resistance Tolerance	0.5% and 1% standard
Temperature Coefficient	*LVK12, LVK20, LVK24:* 50ppm standard *LVK25:* 100ppm, 200ppm, or 300ppm based on resistance value
Coating Material	epoxy resin
Terminals	100% matte tin
Max. Over Current	Time applied: 10ms max. Interval: 60sec min. Max. over current = √(Max. power÷ Resistance value) or max. current, whichever is smaller.

LVK Series

Four Terminal High Precision Current Sense

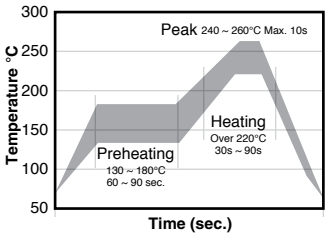
PERFORMANCE CHARACTERISTICS

Test Items	Performance Requirements	Test Methods / standard: JIS C 5201.1
Overload	±(0.5%+0.0005Ω)	Rated voltage x 1.5 for 5s
Endurance at 70°C	±(0.5%+0.0005Ω)	70°C±3°C, Rated voltage 1.5h ON, 0.5h OFF, 1000h
Moisture resistance	±(0.5%+0.0005Ω)	60°C±2°C, 90%~95% RH, Rated voltage 1.5h ON, 0.5h OFF, 1000h
Rapid change of temperature	±(0.5%+0.0005Ω)	-40°C (30min.)/+125°C (30min.), 5 cycles
Resistance to soldering heat	±(0.5%+0.0005Ω)	260°C±5°C for 10s±1s
Substrate bending	±(0.5%+0.0005Ω)	Bending width: 2mm for 10s±1s, Glass epoxy substrate with thickness of 1.6mm
Solderability	95% or more of the electrode surface shall be covered with new solder	245°C±5°C for 3s±0.5s

Reflow Temperature Profile

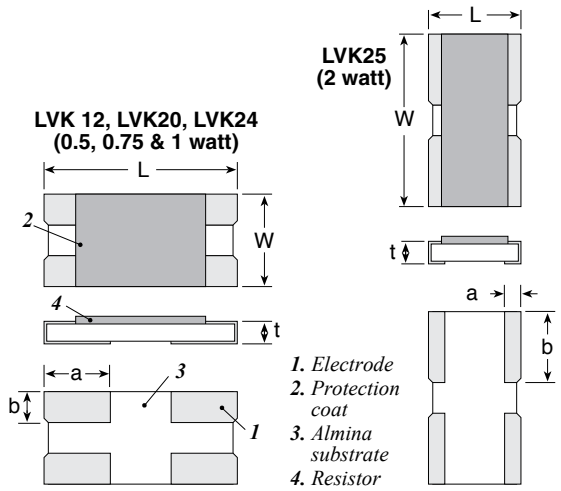
For lead free soldering (Sn-Ag-Cu solder)

Preheating:	130° ~ 180°	60s ~ 90s	Ramp-up rate:	max 3°C/sec.
Heating:	Over 220°	30s ~ 90s	Time above liquidous:	60 – 150 sec.
Peak:	240° ~ 260°	Max. 10s	Ramp-down rate:	max 6°C/sec.
			Max. number of reflow:	2



DIMENSIONS

(mm)



Size	L	W	t	a	b
LVK12 (1206)	3.2 ±0.2	1.6 ±0.2	0.5 ±0.15	1.0 ±0.2	0.55 ±0.2
LVK20 (2010)	5.0 ±0.2	2.5 ±0.2	0.5 ±0.15	1.7 ±0.2	0.9 ±0.2
LVK24 (2412)	6.4 ±0.2	3.2 ±0.2	0.5 ±0.15	2.1 ±0.2	1.2 ±0.2
LVK25 (1224)	3.2 ±0.2	6.4 ±0.2	0.5 ±0.2	0.4 ±0.2	2.7 ±0.2

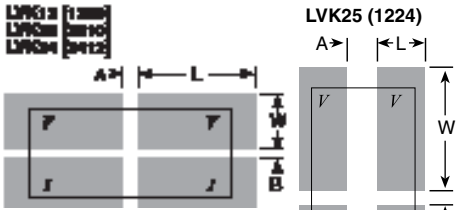
LVK Series

Four Terminal High Precision Current Sense

DIMENSIONS

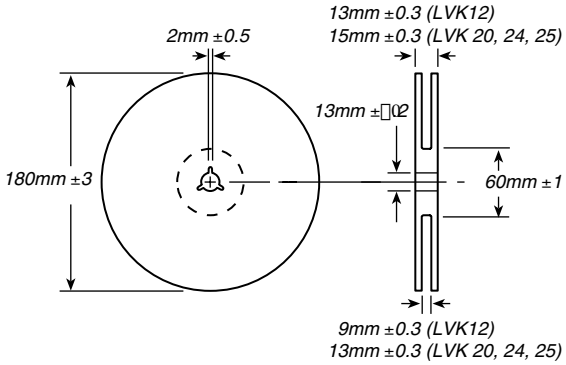
(mm, continued)

Land Pattern

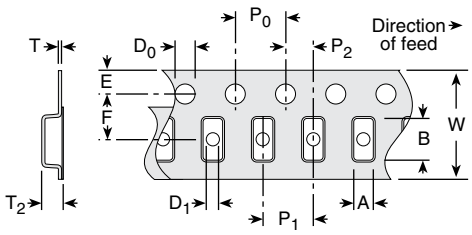


Series	L	W	A	B
LVK12	1.75	1.10	1.00	0.30
LVK20	2.55	1.55	1.40	0.50
LVK24	3.25	1.90	2.00	0.60
LVK25	1.40	3.30	2.20	1.00

Reel



Tape



	LVK12	LVK20	LVK24	LVK25
A	1.90 ±0.10	2.90 ±0.1	3.43 ±0.2	3.43 ±0.2
B	3.50 ±0.10	5.35 ±0.1	6.63 ±0.2	6.63 ±0.2
W	8.0 ±0.2	12.0 ±0.2	12.0 ±0.3	12.0 ±0.3
F	3.5 ±0.05	5.5 ±0.05	5.5 ±0.05	5.5 ±0.05
E	1.75 ±0.1	1.75 ±0.1	1.75 ±0.1	1.75 ±0.1
P_0	4.0 ±0.1	4.0 ±0.1	4.0 ±0.1	4.0 ±0.1
P_1	4.0 ±0.1	4.0 ±0.1	4.0 ±0.1	4.0 ±0.1
P_2	2.0 ±0.05	2.0 ±0.05	2.0 ±0.05	2.0 ±0.05
D_0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0
D_1	1.0 +0.20/-0	1.5 +0.2/-0	1.5 +0.2/-0	1.5 +0.2/-0
T	0.2 ±0.05	0.2 ±0.05	0.2 ±0.05	0.2 ±0.05
T_2	1.0 ±0.2	1.0 ±0.2	1.0 ±0.2	1.0 ±0.2

ORDERING INFORMATION

RoHS Compliant

L V K 2 5 R 0 0 5 F E R

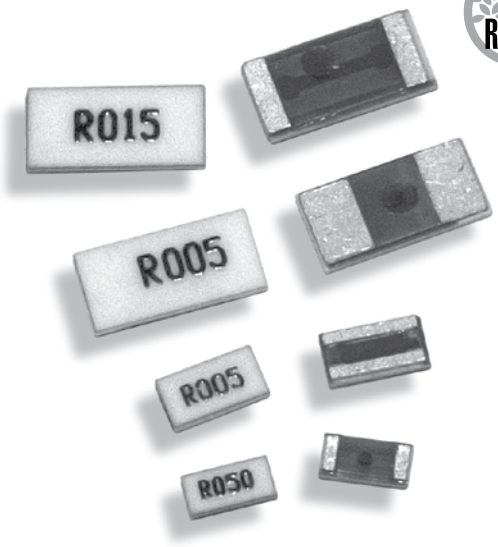
Series	Case Size	Ohms	Tolerance	Taping Code
	12 = 1206 20 = 2010 24 = 2412 25 = 1224	R005 = 0.005	D = 0.5% F = 1%	R = 1,000 pc/reel

Standard values

LVK12	LVK20	LVK24	LVK25	LVK12	LVK20	LVK24	LVK25
1% Tolerance				0.5% Tolerance			
0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.001
0.012		0.012	0.002		0.015	0.015	0.002
	0.015	0.015	0.003	0.02	0.02	0.02	0.003
			0.005		0.025	0.025	0.005
0.02	0.02	0.02	0.01	0.03	0.03	0.03	0.010
0.024	0.027	0.025		0.033		0.033	
0.03	0.03	0.03		0.039			
0.033		0.033		0.05	0.05	0.05	
0.039	0.039	0.039		0.075			
0.047		0.047		0.10		0.10	
0.05	0.05	0.05					
0.075		0.075					
0.10		0.10					

MCS Series

Metal Element Current Sense Resistive Metal Alloy mOhm Technology, SMD



FEATURES

- NiCu or MnCu resistive alloy; material TCR ±10ppm/°K
- Marking epoxy UL-94-V0 conformal
- 96% alumina substrate thermo dissipation protective layer
- Cu Terminal Electrode with Pb Free termination (60% Sn, 40% Ni)
- Flame-retardant epoxy protective coat (UL-94-V0)
- Ultra low resistance value (0.005Ω ~ 0.050Ω)
- Precision resistance alloy (NiCr20AlSi, or CuMnNi); material selected for low TCR (<50ppm/°C)
- Superior temperature coefficient characteristics; resistance vs. temp. change from 25°C to 125°C within 10ppm/°C ~ 50ppm/°C
- Low inductance, low thermo EMF (<50µV/°C)

APPLICATIONS

- Industrial electronics, power electronics: power supply, DC/DC converter, AC/DC converter, motor controller, automotive electronics
- Battery charger, PC, PDA, 3C products, Telecommunications, instruments, white goods

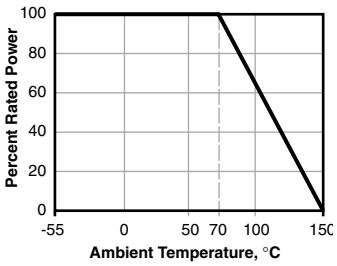
SERIES SPECIFICATIONS

Series	Power Rating (@70°C)	Resistance TCR (ppm/°C) 5mΩ	10mΩ	15mΩ	20mΩ	25mΩ	30mΩ	40mΩ	50mΩ
MCS1632	1W	<200	<70	<40	<40	<40	<40	<40	<40
MCS3264	2W	<200	<70	<40	<40	<40	<40	<40	<40

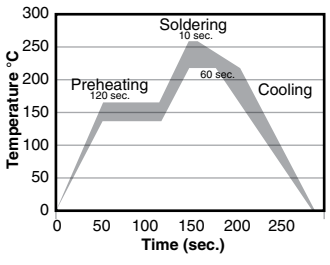
CHARACTERISTICS

Resistance Range	0.005Ω - 0.05Ω
Color	white (top) / green (bottom)
Power	1 and 2 watts at 70°C
Standard resistance values (mΩ)	5, 10, 15, 20, 25, 30, 35, 50
TCR	±50ppm/°C (two standard series of temperatures: 25°C, 0°C, -15°C, -55°C and 25°C, 50°C, 75°C, 125°C, 150°C; temp. tolerance ±3°C; TCR = (R2-R1)/R1(T2-T1)x10^6)
Tolerance	1%, 3%, 5%
Rated voltage	$(PxR)^{1/2}$

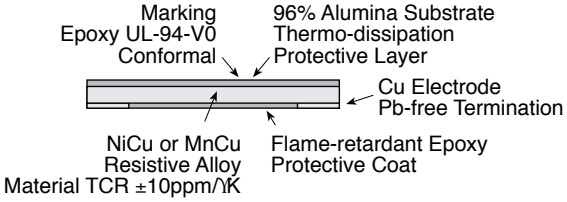
Derating



Recommended Solder Profile



Preheating: 145°C ±15°, max. 120 sec.
Soldering: min. 220°C, max. 60 sec.
Max. Temp.: 260°C ±5°, 10 sec.



MCS Series

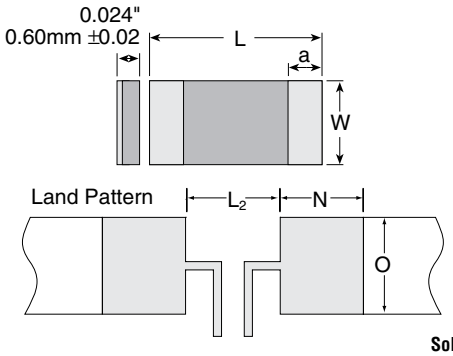
Metal Element Current Sense
Resistive Metal Alloy mOhm Technology, SMD

PERFORMANCE CHARACTERISTICS

Test	Condition	Maximum ΔR
Short Time Overload	JIS C 5201 4.13; Overload voltage 2.5x rated voltage for 5 sec.	±(0.5% +0.0005Ω)
High Temp. Exposure	JIS C 5202 7.11; Test chamber 155 ±3°C for 1000 +48/-0 hours	±(0.5% +0.0005Ω)
Low Temp. Storage	JIS C 5202 7.1; Test chamber -55 ±3°C for 96 ±4 hours	±(0.5% +0.0005Ω)
Endurance under Damp and Load	JIS C 5202 7.9; Temp. 60 ±2°C, relative humidity 90-95%, rated DC voltage applied 90 min. on, 30 min. off for 1000 +48/-0 hours	±(0.5% +0.0005Ω)
Thermal Shock	JIS C 5202 7.4; -55 ±3°C for 30 min. to room temp for 2-3 min. to +150 ±2°C for 30 min. to room temp for 2-3 min., 100 cycles	±(0.5% +0.0005Ω)
Load Life	JIS C 5202 7.10; Temp. 70 ±2°C, rated DC voltage applied 90 min. on, 30 min. off for 1000 +48/-0 hours	±(1% +0.0005Ω)
Solderability	JIS C 5202 6.5; Solder temp. 235 ±5°C, 2 ±0.5 sec. immersion	New solder min. 90% of terminal
Resistance to Solder Heat	JIS C 5202 6.4; Solder temp. 260 ±5°C, 10 ±1 sec. immersion	±(0.5% +0.0005Ω)
Mechanical Shock	JIS C 5202 6.2; Load 10N (1.02kgf) for 10 ±1 sec., middle of specimen pressurized	±(0.5% +0.0005Ω)
Insulation Resistance	JIS C 5202 5.6; DC 100 ±15V for 1 min.	>102MΩ

DIMENSIONS

(in./mm±0.2)



Size	L	W	a	Solder Thickness (µm)
MCS1632	0.126/3.20	0.063/1.60	0.020/0.50	105
MCS3264	0.252/6.40	0.126/3.20	0.040/1.00	105
MCS3264R005FER			0.075/1.9 ±.2	

Size	Resistance	L2	O	N	Solder Thickness	Loading
MCS1632	≤8mΩ	0.60mm	1.84mm	2.80mm	105µm	1.0w
	>8mΩ	1.20mm	1.84mm	2.50mm	105µm	1.0w
MCS3264	≤8mΩ	1.60mm	3.57mm	3.85mm	105µm	2.0w
	>8mΩ	3.10mm	3.57mm	3.10mm	105µm	2.0w

Packaging

(in./mm)

Size	Tape width ±0.30mm	Reel diam. ±0.50mm	Pc/Reel	Weight (g ±10)
MCS1632	0.315/8.00	7.00/178.0	5000	131
MCS3264	0.472/12.00	7.00/178.0	4000	291

ORDERING INFORMATION

RoHS Compliant

M C S 1 6 3 2 R 0 0 5 F E R

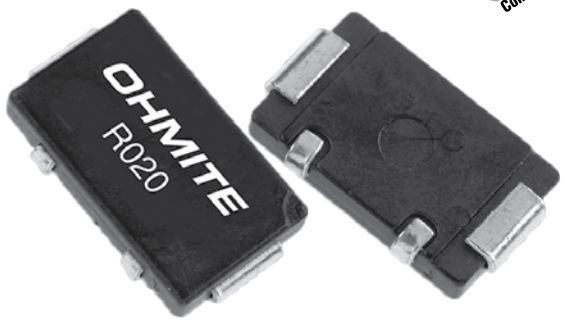
Series	Case Size	Ohms	Tolerance	Taping Code
Metal Alloy Current Sense	1632 = 1w 3264 = 2w	R005 = 0.005‰	F = 1%	1632 = 5,000 pc/reel 3264 = 4,000 pc/reel

Part Number	Power Rating	Ohm Value	Qty./ Reel
MCS1632R010FER	1W	0.01Ω	5000
MCS1632R015FER	1W	0.015Ω	5000
MCS1632R020FER	1W	0.02Ω	5000
MCS1632R025FER	1W	0.025Ω	5000
MCS1632R050FER	1W	0.05Ω	5000
MCS3264R005FER	2W	0.005Ω	4000
MCS3264R010FER	2W	0.01Ω	4000
MCS3264R015FER	2W	0.015Ω	4000
MCS3264R020FER	2W	0.02Ω	4000
MCS3264R025FER	2W	0.025Ω	4000
MCS3264R050FER	2W	0.05Ω	4000

RW1/RW2 Series

Surface Mount Four Terminal Current Sense

RoHS Compliant



FEATURES

- Extremely low resistance and high precision tolerance
- Low T.C.R. achieved (±50ppm/°C)
- Flameproof UL94-V-0
- Marking: Black body color with white marking

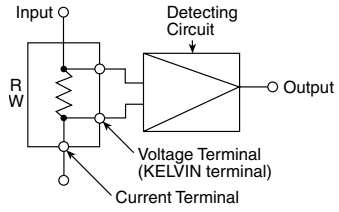
SERIES SPECIFICATIONS

Type	Power Rating (watts)	Resistance Range E-12 (mΩ)	Resistance Tolerance	Dielectric Withstanding Voltage	TCR (max. ppm/°C)	Qty./Reel
RW1S0CK	1	5mΩ - 50mΩ	1%	500V	±50	1000
RW2S0DK	2	5mΩ - 50mΩ	1%	500V	±50	1000

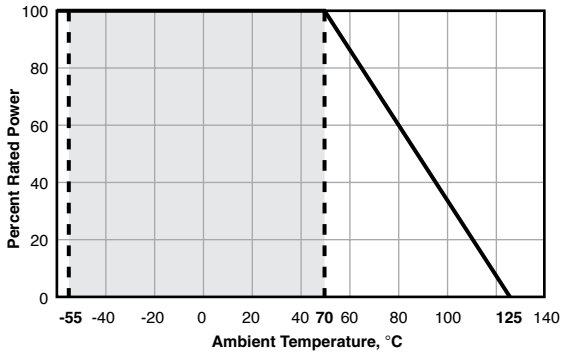
CHARACTERISTICS

TCR max.	±50 ppm/°C
Rated Ambient Temp.	+70°C
Operating Temp. Range	-55°C - +125°C

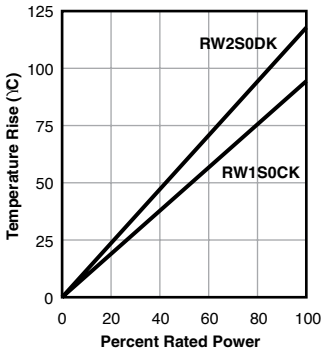
Typical Schematic



Derating



Surface Temperature Rise



PERFORMANCE DATA

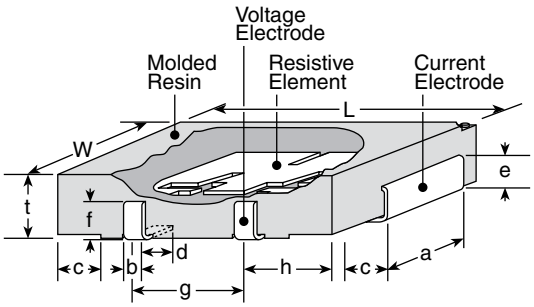
Parameter	Requirement ΔR Limit	Typical	Test Method
Resistance	Within regulated tolerance	—	25°C
T.C.R.	Within specified T.C.R.	—	+25°C/-55°C and +25°C/+125°C
Overload	±1.0%	±1.0%	Rated power x 5 for 5 seconds
Resistance to Solder Heat	±1.0%	±1.0%	260°C ± 5°C, 10 seconds ±1 second
Rapid Change of Temperature	±1.0%	±0.5%	-55°C (30 minutes), +125°C (30 minutes), 500 cycles
Moisture Resistance	±2.0%	±0.5%	40°C ± 2°C, 90 - 95% RH, 1000 hours, 1.5 hr ON, 0.5 hr OFF cycle
Endurance at 70°C	±1.0%	±0.5%	70°C ± 2°C, 1000 hours, 1.5 hr ON, 0.5 hr OFF cycle
Low Temperature Operation	±0.5%	±0.25%	-55°C, 1 hour
High Temperature Exposure	±0.5%	±0.25%	+125°C, 100 hours

RW1/RW2 Series

Surface Mount Four Terminal Current Sense

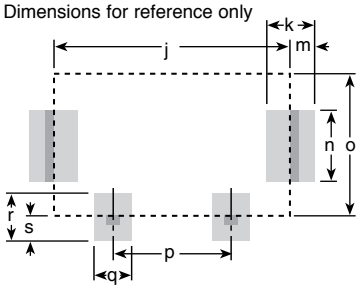
DIMENSIONS

(in./mm)



Land Pattern

Dimensions for reference only



	RW1S0CK	RW2S0DK
L	0.425±.02 (10.8±0.5)	0.504±.02 (12.8±0.5)
W	0.244±.012 (6.2±0.3)	0.323±.012 (8.2±0.3)
t	0.083±.008 (2.1±0.2)	0.122±.008 (3.1±0.2)
a	0.118±.012 (3.0±0.3)	0.197±.012 (5.0±0.3)
b	0.031±.008 (0.8±0.2)	0.039±.008) (1.0±0.2)
c	0.055±.02 (1.4±0.5)	0.079±.02 (2.0±0.5)
d	0.047±.02 (1.2±0.5)	0.079±.02 (2.0±0.5)
e	0.051±.012 (1.3±0.3)	0.087±.012 (2.2±0.3)
f	0.051±.012 (1.3±0.3)	0.087±.012 (2.2±0.3)
g	0.197±.004 (5.0±0.1)	0.236±.004 (6.0±0.1)
h	0.098±.004 (2.5±0.1)	0.118±.004 (3.0±0.1)
j	0.39 (10.0)	0.47 (12.0)
k	0.08 (2.0)	0.09 (2.3)
m	0.04 (1.0)	0.05 (1.15)
n	0.12 (3.0)	0.21 (5.3)
o	0.24 (6.0)	0.31 (8.0)
p	0.20 (5.0)	0.24 (6.0)
q	0.06 (1.6)	0.09 (2.2)
r	0.08 (2.0)	0.13 (3.2)
s	0.04 (1.0)	0.06 (1.6)

ORDERING INFORMATION

RoHS Compliant

RW1S0CKR005FET

Type & Power Rating
RW1S0CK = 1 watt
RW2S0DK = 2 watt

Ohms
R005 = 0.005Ω
R050 = 0.05Ω

Tolerance
F = 1%
D = 0.5%

Packaging
T = tape and reel (optional)

The part itself will be marked as follows:

Current Sense Resistor — **Power Rating** (watts)

CSR1
10m ohms D

Tolerance
F = 1%
D = 0.5%

Ohms
10m ohms = 0.01Ω

Standard Part Numbers for RW Series

Wattage:		1 watt		2 watt
Tolerance:		1%	0.5%	1%
Ohms	Series:	RW1S0CK----FET	RW1S0CK----DET	RW2S0DK----FET
0.00500		RW1S0CKR005FET	RW1S0CKR005DET	RW2S0DKR005FET
0.01000		RW1S0CKR010FET	RW1S0CKR010DET	RW2S0DKR010FET
0.02500		RW1S0CKR025FET	RW1S0CKR025DET	RW2S0DKR025FET
0.05000		RW1S0CKR050FET	RW1S0CKR050DET	RW2S0DKR050FET

60S Series

Surface Mount
Metal Plate Current Sense

FEATURES

- Superior thermal expansion cycling
- Inductance less than 10 nanohenries
- Flameproof
- Solderable pads: Tin (Sn) plate
- Lead flexible for thermal expansion
- Low termination stress ("J" terminals)
- Shape provides cooler operation
- Custom values available

APPLICATIONS

- Current sensing
- Low inductance
- AC applications
- Feedback

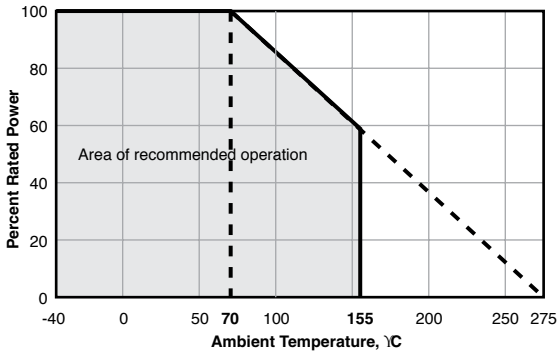
SERIES SPECIFICATIONS

Type	Tolerance	TCR (ppm/C°)	Power Rating (watts)	Resistance Values (Ω)	Rated Ambient Temp. (°C)	Operating Temp. Range (°C)	Qty./ Reel
602SJR	±5%	±100	0.25	0.003, 0.005	+70°C	-40 - +155	2000
605SJR	±5%	±100	0.5	0.002, 0.0375, 0.005, 0.008	+70°C	-40 - +155	2000
610SJR	±5%	±350	1	0.002, 0.003	+85°C	-40 - +155	1500

CHARACTERISTICS

Parameter	Requirement	Test Method (JIS C 5202)
Resistance	Within regulated tolerance	25°C
T.C.R.	Within specified T.C.R.	Room temperature/100°C up
Resistance to Solder Heat	±2.0%	350°C ± 10°C, 3 seconds
Solderability	95% coverage minimum	235°C ± 5°C, 5 seconds
Moisture Resistance	±3.0%	40°C, 90 - 95% RH, 1000 hours, no load
Moisture Resistance	±5.0%	Power rating x 1/10, 40°C, 90 - 95% RH, 1000 hours, 1.5 hr ON, 0.5 hr OFF cycle
Load Life	±5.0%	Rating voltage, 1000 hours, 1.5 hr ON, 0.5 hr OFF cycle

Derating



60S Series

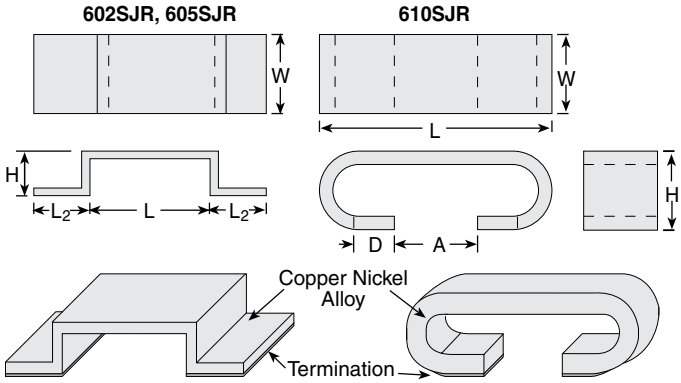
Surface Mount
Metal Plate Current Sense

DIMENSIONS

inches (mm)

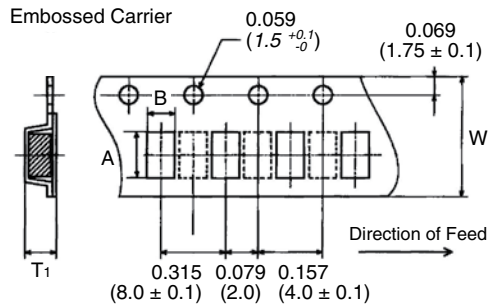
	L	L2	H	W
602SJR	0.39 ± .008 *(10.0 ± 0.2)*	0.018 ± .008 *(2 ± 0.2)*	0.024 *(0.6 ± 0.1)*	0.118 ± .008 *(3.0 ± 0.2)*
605SJR	0.39 ± .008 *(10.0 ± 0.2)*	0.018 ± .008 *(2 ± 0.2)*	0.079 *(2 max.)*	0.20 ± .008 *(5.2 ± 0.2)*

	L	H	D	A	W
610SJR	0.44 ± .016 *(11.2 ± 0.4)*	0.137 ± .016 *(3.5 ± 0.4)*	0.095 ± .010 *(2.35 ± 0.25)*	0.189 ± .030 *(4.8 ± .75)*	0.126 ± .016 *(3.2 ± 0.40)*



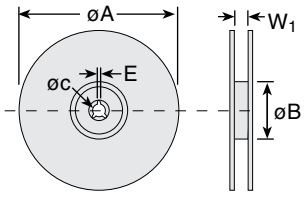
PACKAGING SPECIFICATIONS

inches (mm)



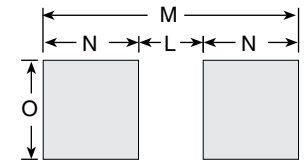
Tape

Type	A	B	W	T1
602SJR	0.057 *(1.45 ± 0.2)*	0.134 *(3.4 ± 0.2)*	0.079 *(2.0)*	0.098 *(2.5 ± 0.2)*
605SJR	0.057 *(1.45 ± 0.2)*	0.224 *(5.7 ± 0.2)*	0.079 *(2.0)*	0.091 *(2.3 ± 0.2)*
610SJR	0.461 *(11.7 ± 0.1)*	0.169 *(4.3 ± 0.1)*	0.945 *(24.0 ± 0.2)*	___ ___



Reel

Type	A	B	C	E	W1	qty./reel
602SJR 605SJR	10.0 *(255 +0.0 -3.0)*	3.15 *(80 +1.0 -0)*	0.511 *(13.0 ±0.2)*	0.079 *(2.0 ±0.5)*	1.0 *(25.5 ± 2.0)*	2000
610SJR	12.99 *(330 ± 2.0)*	3.94 *(100 ± 2.0)*	0.511 *(13.0 ± 0.2)*	0.079 *(2.0 ± 0.5)*	1.0 *(25.5 ± 2.0)*	1500



Land pattern

Type	M	N	O	L
602SJR	0.622 *(16.0)*	0.118 *(3.0)*	0.150 *(3.8)*	0.394 *(10.0)*
605SJR	0.622 *(16.0)*	0.118 *(3.0)*	0.236 (6.0)	0.394 *(10.0)*
610SJR	0.369 *(9.36)*	0.121 *(3.07)*	0.142 *(3.60)*	0.127 *(3.22)*

Land pattern dimensions are for reference only

ORDERING INFORMATION

Standard Part Numbers for 60S Series

	Wattage:	0.25 watt	0.5 watt	1 watt
Ohms	**Series:**	602SJR	605SJR	610SJR
0.00200Ω			605SJR00200E-T	610SJR00200E-T
0.00300Ω		602SJR00300E-T		610SJR00300E-T
0.00375Ω			605SJR00375E-T	
0.00500Ω		602SJR00500E-T	605SJR00500E-T	
0.00800Ω			605SJR00800E-T	

RoHS Compliant

602SJR00300E-T

Type & Power Rating
602S = 0.25 watt
605S = 0.5 watt
610S = 1 watt

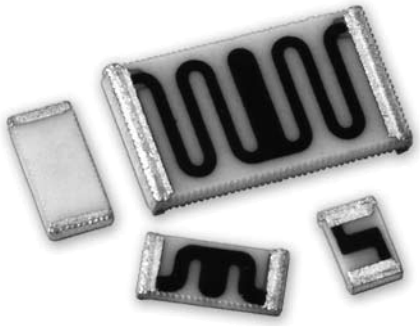
Tolerance
J = 5%

Ohms
R00200 = 0.00200Ω
R00300 = 0.00300Ω
R00375 = 0.00375Ω

Packaging
T = tape and reel (optional)

HVC Series

Precision High-Value High-voltage Wraparound Chip



FEATURES

- High value chip resistors in thick film technology
- Low temperature and voltage dependency (low TCR and VCR)
- High working voltage up to 3000V
- Suitable for high vacuum applications—no organics
- Contact areas: Nickel-barrier/matte tin
- Wraparound terminals

SERIES SPECIFICATIONS

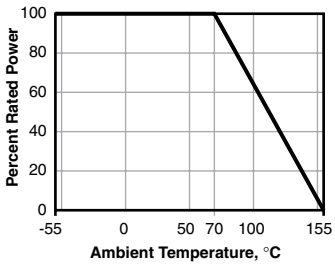
Series	Type	Wattage[1] P_{70} (mW)	Oper. Voltage (V) std.	Oper. Voltage (V) untrimmed (≥5%)	Resistance Range	Tolerance	TCR[2,3] (ppm)	VCR[2] (ppm)
HVC0402---	0402	50	30	60	100k-100M	5-10%	50, 100	500
					>100M-1G	5-20%	250, 500	1000
					>1G-10G	10-30%	1000, 2000	2000
HVC0603---	0603	100	75	150	100k-100M	1-10%	50, 100	500
					>100M-1G	5-20%	250, 500	1000
					>1G-10G	5-20%	500, 1000	2000
HVC0805---	0805	125	200	400	100K-100M	0.5-10%	25, 50, 100	100
					>100M-1G	2-20%	50, 100, 250	250
					>1G-10G	5-20%	250, 500	500
					>10G-100G	10-30%	1000, 2000	2000
HVC1206---	1206	250	600	1000	100K-100M	0.5-10%	25, 50, 100	50
					>100M-1G	2-20%	50, 100, 250	100
					>1G-10G	5-20%	50, 100, 250	250
					>10G-100G	10-30%	250, 500, 1000	1000
HVC2512---	2512	1000	2000	3000	100K-100M	0.5-10%	25, 50, 100	10
					>100M-1G	1-20%	25, 50, 100	25
					>1G-10G	2-20%	25, 50, 100	50
					>10G-100G	5-30%	100, 250, 500	100
HVC4020---	4020	1500	4000	6000	100k-100M	0.25-10%	25, 50, 100	5
					>100M-1G	0.5-20%	25, 50, 100	10
					>1G-10G	1-20%	25, 50, 100	10
					>10G-100G	2-30%	50, 100, 250	50
					>100G-1T	5-30%	250/500	250

1. At continuous power dissipation the dimensions of the solder pads have to be capable of sufficient heat conduction.
2. Not all TCR/VCR combinations available in all resistance values
3. HVC2512 and HVC4020 10M-10G TCR's available: 10ppm and 15ppm

CHARACTERISTICS

Operating temperature range	-55°C ~ +155°C			
Climatic category	55/155/56, acc. to EN 60068-1			
Solderability	250°C, 3s, acc. to EN 60068-2-58			
Max. soldering temperature	260°C, 10s, acc. to IEC 68-2-58			
Long Term Stability		<1G	<10G	≥10G
	Load Life 70°C/1000h	<0.25%	<0.5%	<1%
	Storage 125°C/1000h	<0.5%	<1%	<2%
	Max. Voltage/1000h	<0.5%	<1%	<2%

Derating



Data not specified according to EN 140401-802 (CECC 40401-802)

HVC Series

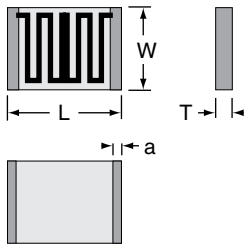
Precision High-Value High-voltage Wraparound Chip

TERMINAL DETAILS

Base Metal	PdAg
Termination Finish	100% electroplated matte Sn100
Thickness of Finish	5 microns
Barrier Material between Base Metal and Finish	Porosity-free Ni (5-8 microns thickness)
Baking/Annealing Process after Sn Plating	150°C; > 4 hours
Peak Process Body Temperature (Classification Temperature) and Maximum Time	260°C for 10 seconds

DIMENSIONS

(mm)



Size	Power Rating (mW)	L	W	T	a
0402	50	1.04 ±.05	0.50 ±.05	0.30 ±.05	0.1 +.1/-.05
0603	100	1.50 +.15/-.05	0.80 +.15/-.05	0.40 +.15/-.05	0.2 +.2/-.1
0805	125	2.00 +.15/-.05	1.25 +.15/-.05	0.40 +.15/-.05	0.3 +.2/-.1
1206	250	3.20 +.15/-.05	1.50 +.2/-.05	0.40 +.15/-.05	0.3 +.2/-.1
2512	1000	6.30 +.15/-.05	3.50 +.2/-.05	0.60 +.15/-.05	0.9 ±.2
4020	1500	10.20 +.20/-.05	5.10 +.2/-.05	0.60 +.20/-.1	0.9 ±.2

HOW TO ORDER

RoHS Compliant

H V C 1 2 0 6 T 1 0 0 4 J E T

Series
High Voltage
Wrap Around Chip

Package Size

(ppm) TCR
W = 25
V = 50
T = 100
Z = 250
E = 500
N = 1000
U = 2000

Ohms
1004 = 1MΩ
5006 = 500MΩ

Tolerance
D = 0.50%
F = 1%
G = 2%
J = 5%
K = 10%
M = 20%
P = 30%

Tape & Reel
500 pc/reel

Standard Part Numbers

HVC0402E5006KET	HVC0603N1007KET	HVC0805E1008KET	HVC1206T1004JET	HVC2512T1004JET	HVC4020V1004JET
HVC0402N5007KET	HVC0603N5007KET	HVC0805T1004JET	HVC1206T1005JET	HVC2512T1005JET	HVC4020V1005JET
HVC0402T1004JET	HVC0603T1004FET	HVC0805T1005JET	HVC1206T1006JET	HVC2512T1006JET	HVC4020V1006JET
HVC0402T1005JET	HVC0603T1005FET	HVC0805T1006JET	HVC1206Z2504JET	HVC2512T1007JET	HVC4020V1007JET
HVC0402T1006JET	HVC0603T1006FET	HVC0805T2504JET	HVC1206T2505JET	HVC2512T1008KET	HVC4020V1008KET
HVC0402T2504JET	HVC0603T2504FET	HVC0805T2505JET	HVC1206Z2506JET	HVC2512T2504JET	HVC4020V2504JET
HVC0402T2505JET	HVC0603T2505FET	HVC0805Z2506JET	HVC1206T5004JET	HVC2512T2505JET	HVC4020V2505JET
HVC0402Z2506JET	HVC0603T5004FET	HVC0805T5004JET	HVC1206T5005JET	HVC2512T2506JET	HVC4020V2506JET
HVC0402T5004JET	HVC0603T5005FET	HVC0805T5005JET	HVC1206Z5007KET	HVC2512T5004JET	HVC4020Z2508KET
HVC0402T5005JET	HVC0603Z5006JET	HVC0805E5007JET	HVC1206Z1007JET	HVC2512T5005JET	HVC4020V5004JET
		HVC0805Z1007JET	HVC1206Z1008KET	HVC2512T5006JET	HVC4020V5005JET
		HVC0805Z5006JET	HVC1206Z5006JET	HVC2512T5007JET	HVC4020V5006JET
					HVC4020V5007JET

HVF Series

High Voltage Flip Chip Film

RoHS Compliant

Ohmite's High Voltage Flip Chip Series incorporates high accuracy screen printing technology to achieve high voltage capability in a stable flip chip SMD chip resistor package. The HVF Series offers unmatched performance in comparison to standard chip resistors. Its unique design provides lower voltage and temperature coefficients, less noise, tighter tolerances, better stability, higher resistance values, and higher voltage ratings. HVF is available in convenient 1206 and 2512 footprints.

FEATURES

- High voltage up to 3,000 volts
- Industry standard sizes
- Working temperature range –55°C to 200°C
- Designed for automatic insertion
- Non-magnetic construction

SERIES SPECIFICATIONS

Series	Resistance Range	Tol.	Power Rating (mW)	Voltage Rating*
HVF1206	1K-100M	1% std.	300	1,500
	100M-10G	5%		
	10G-100G	10%		
HVF2512	1K-100G	1% std.	1000	3,000

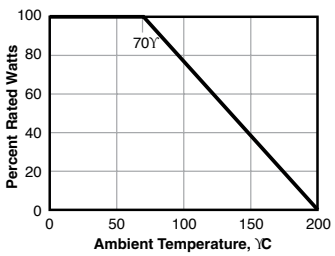
*Use Ohm's Law (V= √P*R) to calculate maximum working voltage.

**Maximum available quantity per reel is 3,500 for 1206 size and 2,000 for 2512 size; call 1-866-9-OHMITE for details.

CHARACTERISTICS

Resistance Range	1KΩ to 100GΩ
Resistance Tolerance	±1% std.; 5% for HVF1206 100MΩ-10GΩ more; 10% for 10GΩ+
Temperature Coefficient	±100ppm std.
Coating	Silicone
Solder Pad Material	Silver (PdAg) **Note:** HVF Series should not be used with tin-lead based solder compositions. Only silver-based solder compositions are recommended. Care should be taken in the selection of the solder flux contained in the solder paste. Some pastes are "corrosive" and can damage the coating and also the resistive layer during the soldering process at high temperature. PCBs must be properly cleaned to remove any layers of moisture containing halides below the resistor. We recommend Halide Free (or Halogen Free) solder pastes, containing for example ROL0 or similar. It is advisable for the PCB layout to provide a slot, or air gap, underneath the downward facing resistor element, thereby increasing insulation resistance and reducing the possibility of capacitive coupling to the PCB. Under no circumstances should any copper trace be present in the layout directly under the resistive element.

Derating



Voltage coefficient of Resistance

Series	Resistance Range	VCR (-ppm/V)*
1206	1K ..10MΩ	<3.20
	10M ..100MΩ	<15.00
	100M ..1GΩ	<29.00
	1GΩ .. 5GΩ	<40.00
2512	1K ..30MΩ	<0.80
	30M ..300MΩ	<4.00
	300M ..3GΩ	<7.00
	3GΩ .. 5GΩ	<10.00

*Typical values. Voltage coefficient of resistance strongly depends on the resistance value. Contact Ohmite for details.

HVF Series

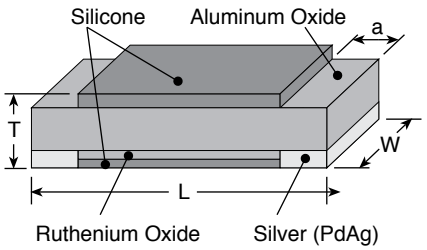
High Voltage
Flip Chip Film

PERFORMANCE DATA

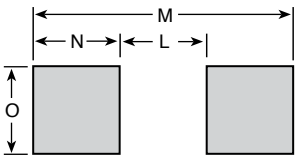
Insulation Resistance	>10,000 MΩ	500 Volt 25 °C 75% relative humidity
Dielectric Strength	>1,000 Volt	25 °C 75% relative humidity
Thermal Shock	Δ R/R < 0.1% typ., 0.50% max.	MIL Std. 202, method 107, Cond. C (IEC 68 -2 -14)
Overload	Δ R/R < 0.1% typ., 0.50% max.	1,5 x Pnom, 5 sec (do not exceed max. voltage)
Moisture Resistance	Δ R/R < 0.1% typ., 0.50% max.	MIL Std. 202, method 106 (IEC 68 -2 -3)
Load Life	Δ R/R < 0.1% typ., 0.50% max.	1000 hours at rated power (IEC 115 -1)

DIMENSIONS

(in. ±0.008)



Land pattern



Land pattern dimensions are for reference only

Series	L	W	a	T (max.)	M	N	O	L
HVF1206	0.128	0.063	0.018	0.028	0.150	0.040	0.080	0.070
HVF2512	0.252	0.126	0.026	0.032	0.288	0.062	0.140	0.164

ORDERING INFORMATION

RoHS Compliant

Taping Code
blank = bulk package
T = tape & reel

H V F 1 2 0 6 T 1 0 0 4 J E T

High Voltage Flip Chip Series

Case Size
1206
2512

TCR
T = 100 ppm
V = 50 ppm*

Ohms
First 3 digits are significant; last digit specifies number of zeros to follow. Example: 1006 = 100MΩ

Tolerance
F = 1%
G = 2%
J = 5%

**Not available for all resistance values; consult factory*

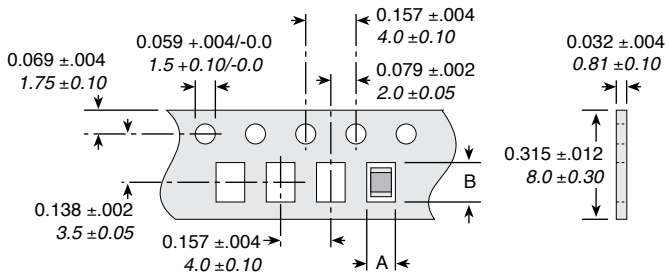
Standard part numbers

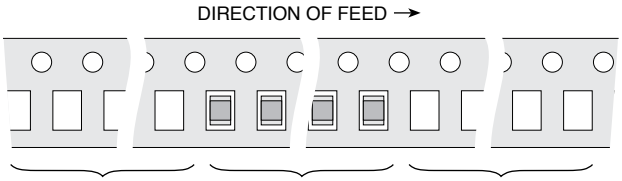
Ohms	HVF1206---	HVF2512---
25K	---T2502FE	---T2502FE
50K	---T5002FE	---T5002FE
75K	---T7502FE	---T7502FE
100K	---T1003FE	---T1003FE
250K	---T2503FE	---T2503FE
500K	---T5003FE	---T5003FE
1000K	---T1004FE	---T1004FE
1500K	---T1504FE	---T1504FE
2000K	---T2004FE	---T2004FE
2500K	---T2504FE	---T2504FE
5000K	---T5004FE	---T5004FE
7500K	---T7504FE	---T7504FE
1G	---T1007JE	---T1007FE
5G		---T5007FE
10G	---T1008JE	

TAPE AND REEL

Per EIA Std. RS-481

Tape



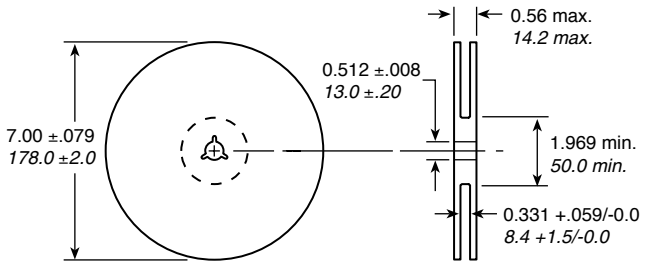


Trailer
230mm min.–560mm max. May consist of carrier and/or cover tape followed by a minimum of 160mm of carrier with sealed cover tape

Components

Leader
Minimum of 40 empty component pockets sealed with cover tape

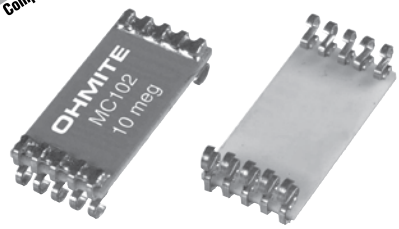
Reel



Standard Qty/Reel is 1000; maximum available quantity per reel is 3,500 for 1206 size and 2,000 for 2512 size; call 1-866-9-OHMITE for details.

Macrochip Series

High Voltage/High Resistance Precision Thick Film Surface Mount



Ohmite's MacroChip resistors bring precision high voltage capabilities to surface mount applications. Designed with thick film on alumina substrate technology, the resistors can be provided in precision tolerances, high voltage ratings, and high resistance values. The planar package design is low profile for easy use with instrumentation, medical equipment, voltage regulators, and power supplies.

FEATURES

- Non-inductive design (less than 50 nanohenries)
- Low voltage coefficient
- Surface mount
- Pd Ag terminations
- J-bend terminals for applications involving shock and vibration

APPLICATIONS

- Medical instrumentation
- Power Supplies
- Avionics
- Light Magnification Systems

SERIES SPECIFICATIONS

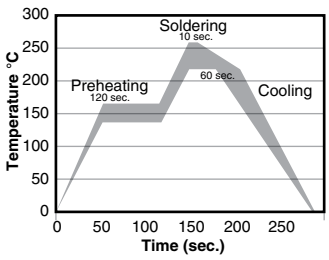
Series	Resistance Range (Ohms)	Power @25°C	Voltage Rating	Standard Temp. Coefficient 85°-125°C 50PPM/°C	100PPM/°C
MC101	100Ω to 1,000M	0.75W	2.0KV	100Ω-100M	101M-1,000M
MC102	200Ω to 5,000M	1.50W	5.0KV	200Ω-250M	251M-5,000M
MC103	250Ω to 5,000M	2.00W	7.5KV	250Ω-100M	101M-5,000M
MC104	1K to 5,000M	2.50W	10.0KV	500Ω-450M	451M-5,000M
MC202	500Ω to 5,000M	2.50W	5.0KV	500Ω-200M	201M-5,000M
MC204	1K to 5,000M	3.25W	10.0KV	1K-375M	376M-5,000M

Contact Ohmite for custom configurations.

CHARACTERISTICS

Resistor	Thick film on Alumina
Resistance Range	100 Ohms to 5,000M
Power Rating	0.75W to 3.25W
Voltage Rating	2.0KV to 10.0KV
Tolerance	0.5% to 20%
Operating Temperature	-55°C to +180°C
TCR and VCR	See chart below
Solder	Silver solder is recommended for Macrochip resistors. Leaching of the silver in the termination will occur if non-silver solder is used. 60/40 tin-lead solders are not recommended for use with the Macrochip product.

Recommended Solder Profile



Preheating: 145°C ±15°, max. 120 sec.

Soldering: min. 220°C, max. 60 sec.

Max. Temp.: 260°C ±5°, 10 sec.

PERFORMANCE DATA

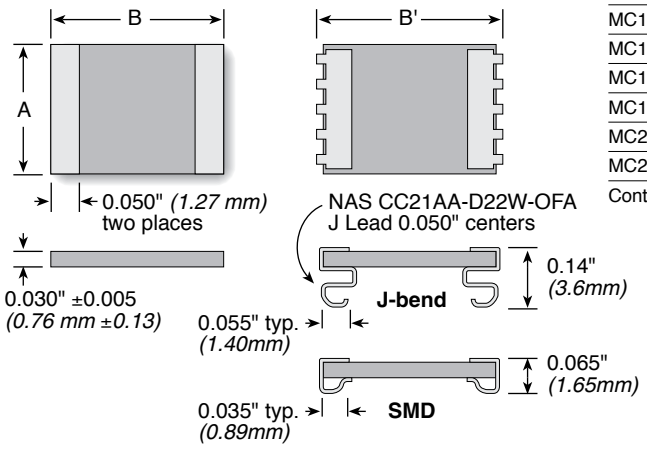
Characteristic	Test Method	Specification
Humidity	MIL-STD-202, Method 103B, Condition B	±0.25%
Dielectric Withstanding Voltage	MIL-STD-202, Method 301, 750V	±0.25%
Insulation Resistance	MIL-STD-202, Method 302, Condition A or B	>10,000M or greater dry
Thermal Shock	MIL-STD-202, Method 107G, Condition B, B-1, or F	±0.20%
Load Life	MIL-STD-202, Method 108A, Condition D	±1.0%
Resistance to Solvents	MIL-STD-202, Method 215G	No degradation of coating or marking
Shock (Specified Pulse)	MIL-STD-202, Method 213B, Condition I	±0.25%
Vibration, High Frequency	MIL-STD-202, Method 204D, Condition D	±.020%
Power Conditioning	MIL-R-49462A, Par 4.8	±0.50%

Macrochip Series

High Voltage/High Resistance
Precision Thick Film Surface Mount

DIMENSIONS

(in./mm)

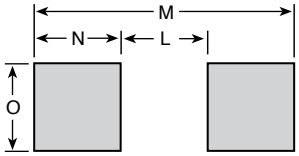


Series	Power	A ±.01"	B ±.01"	B' max. (J-bend)	Qty./Reel w/J-bend	Qty./Reel w/o J-bend
MC101	0.75W	0.25" (6.35)	0.25" (6.35)	0.29" (7.37)	1000	2500
MC102	1.50W	0.25" (6.35)	0.50" (12.70)	0.54" (13.72)	1000	2500
MC103	2.00W	0.25" (6.35)	0.75" (19.05)	0.79" (20.07)	1000	2500
MC104	2.50W	0.25" (6.35)	1.00" (25.40)	1.04" (26.42)		
MC202	2.50W	0.50" (12.70)	0.50" (12.70)			
MC204	3.25W	0.50" (12.70)	1.00" (25.40)			

Contact Ohmite for custom configurations.

Land Pattern

Land pattern dimensions are for reference only.



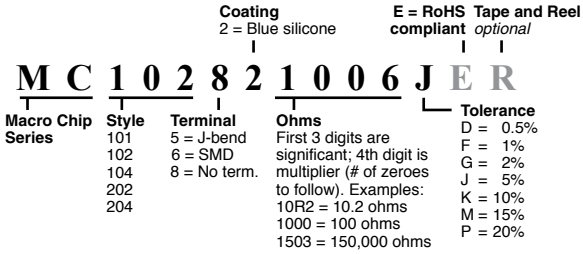
Size	M	N	O	L
MC101	0.280	0.080	0.278	0.120
MC102	0.530	0.080	0.278	0.370
MC103	0.780	0.080	0.278	0.620
MC104	1.030	0.080	0.278	0.870
MC202	0.530	0.080	0.556	0.370
MC204	1.030	0.080	0.556	0.870

TEMP./VOLTAGE COEFFICIENTS OF RESISTANCE

Resistor Series	Temp. Coeff. of Resistance* 0°C-85°C 25 PPM/°C	85°C-125°C 50 PPM/°C	85°C-125°C 100 PPM/°C	Voltage Coeff. of Resistance** < 2PPM/Volt	Voltage Coeff. of Resistance** < 5PPM/Volt
MC101	100 to 800M	100Ω to 100M	101M to 1,000M	100Ω to 270M	271M to 1,000M
MC102	200 to 1,500M	200Ω to 250M	251M to 5,000M	200Ω to 640M	641M to 5,000M
MC103	250 to 800M	250Ω to 440M	441M to 5,000M	250Ω to 1,100M	1,101M to 5,000M
MC104	500 to 2,500M	500Ω to 450M	451M to 5,000M	500Ω to 1,100M	1,101M to 5,000M
MC202	500 to 1,500M	500Ω to 200M	201M to 5,000M	500Ω to 520M	521M to 5,000M
MC204	1K to 1,750M	1K to 375M	376M to 5,000M	1K to 950M	951M to 5,000M

*TCR of 25ppm for temperature range of 0°C-85°C. TCR of 50ppm and 100ppm for -55°C to 125°C. Consult factory for TCR values operating higher than 125°C
**VC's of <2PPM/Volt are available. Contact Ohmite with your requirement.

ORDERING INFORMATION



Standard Part Numbers

Series: MC10282 **Tolerance:** 5% **Watts:** 1W

Ohms	Part Number	Ohms	Part Number	Ohms	Part Number
1K	MC102821001JE	50K	MC102825002JE	1.25M	MC102821254JE
2.5K	MC102822501JE	75K	MC102827502JE	1.5M	MC102821504JE
5K	MC102825001JE	100K	MC102821003JE	1.75M	MC102821754JE
7.5K	MC102827501JE	125K	MC102821253JE	2M	MC102822004JE
10K	MC102821002JE	150K	MC102821503JE	2.5M	MC102822504JE
12.5K	MC102821252JE	200K	MC102822003JE	5M	MC102825004JE
15K	MC102821502JE	250K	MC102822503JE	10M	MC102821005JE
17.5K	MC102821752JE	500K	MC102825003JE	25M	MC102822505JE
20K	MC102822002JE	750K	MC102827503JE	50M	MC102825005JE
25K	MC102822502JE	1M	MC102821004JE		

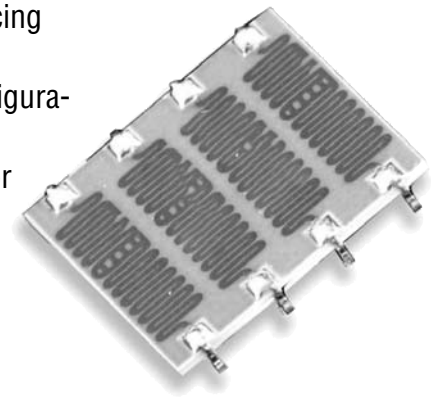
MC4 Series

High Voltage 4-Resistor SMD DIP Package

Ohmite's MC4 Series offers 4 high voltage SMD resistors in a single DIP package, supplied on tape and reel for automated placement. Each resistor provides a rating of 0.75W with a maximum voltage of 2500 VDC. Designers can specify up to 4 different resistor value/tolerance combinations and connect then individually, in series, or parallel to derive countless results. The flexible S-Bend terminals provide solder joint integrity while leaving space between the resistor pack and the PCB. Standard parts are available in single resistance values for immediate delivery.

FEATURES

- Unique terminals allow spacing between board and resistor
- Design allows multiple configurations
- 2,500 volts max. per resistor per pack; 10KV total
- Supplied on tape & reel for automated placement



SERIES SPECIFICATIONS

Series	Resistance Range (Ohms)	Power @25°C per resistor	Max. Operating Voltage	Standard Temperature Coefficient 50PPM/°C	100PPM/°C
MC4	200Ω to 5,000M	0.75W	2,500	200Ω-250M	251M-5,000M

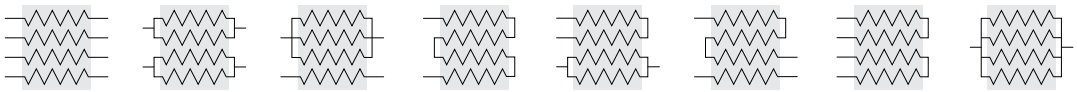
CHARACTERISTICS

Resistor	Thick film on Alumina
Resistance Range	200 ohms to 5,000M
Power Rating	0.75W per resistor, 3.0W total
Voltage Rating	2500 VDC per resistor
Tolerance	5% to 20%
Operating Temperature	-55°C to +180°C
TCR and VCR	see Slim Mox
Solder	Silver solder is recommended for MC4 resistors. Leaching of the silver in the termination will occur if non-silver solder is used. 60/40 tin-lead solders are not recommended for use with the MC4 product.

PERFORMANCE DATA

Characteristic	Test Method	Specification
Humidity	MIL-STD-202, Method 103B, Condition B	±0.25%
Dielectric Withstanding Voltage	MIL-STD-202, Method 301, 750V	±0.25%
Insulation Resistance	MIL-STD-202, Method 302, Condition A or B	>10,000M or greater dry
Thermal Shock	MIL-STD-202, Method 107G, Condition B, B-1, or F	±0.20%
Load Life	MIL-STD-202, Method 108A, Condition D	±1.0%
Resistance to Solvents	MIL-STD-202, Method 215G	No degradation of coating or marking
Shock (Specified Pulse)	MIL-STD-202, Method 213B, Condition I	±0.25%
Vibration, High Frequency	MIL-STD-202, Method 204D, Condition D	±.020%
Power Conditioning	MIL-R-49462A, Par 4.8	±0.50%

POSSIBLE CONFIGURATIONS



4 individual
0.75W each
2500 VDC each

2 pairs in parallel
1.5W each
2500 VDC each

3 in parallel
2.25W
2500 VDC

1 individual
0.75W
2500 VDC

4 in series
3W
10,000 VDC

2 in series
1.5W
5000 VDC

2 in parallel
1.5W
2500 VDC

3 in series
2.25W
7500 VDC

1 individual
0.75W
2500 VDC

2 pairs in series
1.5W each
5000 VDC each

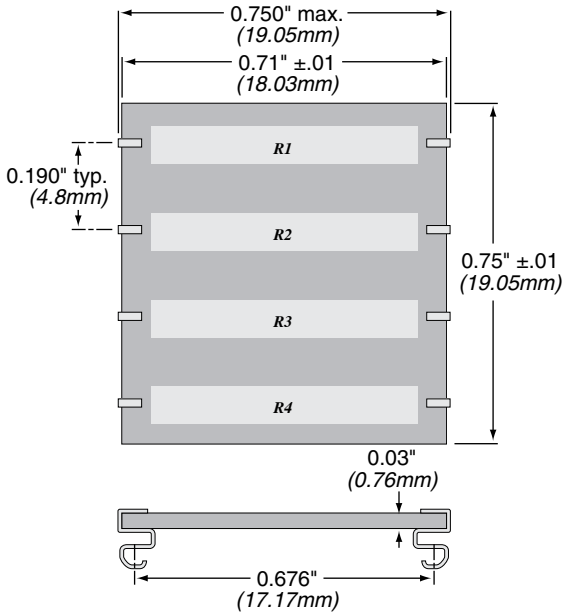
4 in parallel
3W
2500 VDC

MC4 Series

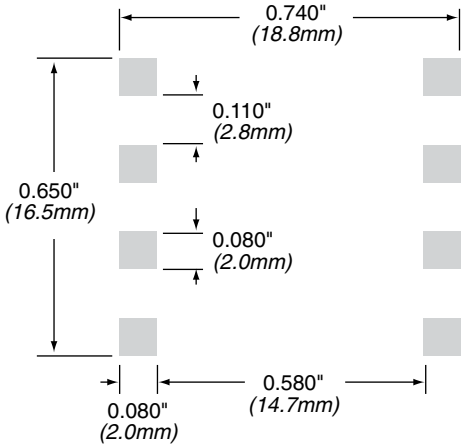
High Voltage 4-Resistor SMD DIP Package

DIMENSIONS

(in./mm)



Land Pattern



ORDERING INFORMATION

Tape and Reel *optional* *250 per reel*

E = RoHS compliant

M C 4 - 1 0 0 2 F E R

MC4 Series

Ohms
First 3 digits are significant; 4th digit is multiplier (# of zeroes to follow). Examples:
1003 = 100KΩ
5004 = 5MΩ
1007 = 1GΩ

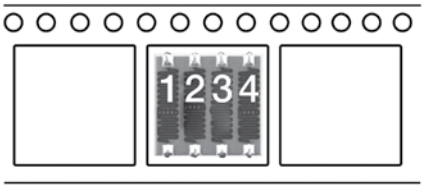
Tolerance
J = 5%
K = 10%
P = 20%

Standard Part Numbers

Part	Description
MC4-1003JER	100K ohms per resistor, 5%
MC4-5003JER	500K ohms per resistor, 5%
MC4-1004JER	1M ohms per resistor, 5%
MC4-5004JER	5M ohms per resistor, 5%
MC4-1005JER	10M ohms per resistor, 5%
MC4-5005JER	50M ohms per resistor, 5%
MC4-1006JER	100M ohms per resistor, 5%
MC4-5006JER	500M ohms per resistor, 5%
MC4-1007KER	1G ohms per resistor, 10%
MC4-5007KER	5G ohms per resistor, 10%

*Custom part numbers are assigned sequentially. MC4-SP0001, MC4-SP0002, etc. Go to this link to design your own MC4 resistor and have a unique part number assigned. www.ohmite.com/mc4sp/

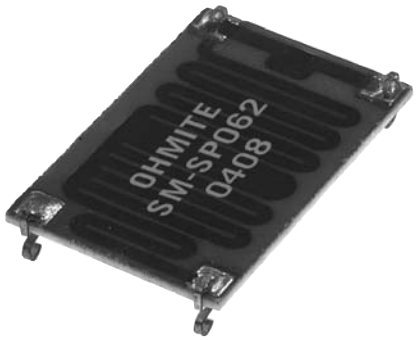
Tape and Reel Orientation



Design online at:
www.ohmite.com/mc4sp/

MC1RD Series

SMT-MOX Divider

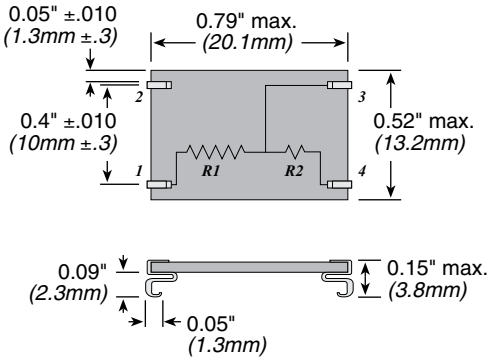


CHARACTERISTICS

Terminal	"J" terminal 0.018" wide tin-plated copper
Resistor	Thick film on Alumina
Resistance range	1MΩ- 5,000MΩ
Max. working voltage	5KV
Wattage	1.5W
Maximum ratio	5,000:1
Ratio TCR	100ppm; 25ppm and 10ppm available
Ratio tolerances	0.5% to 5%

DIMENSIONS

(in./mm)



ORDERING INFORMATION

A complete description of the MC1RD Divider is required. EXAMPLE:

RT = 500MΩ 5%
R1 = 499.5MΩ 5%
R2 = 500KΩ 1%
Ratio = RT / R2 = 1,000: 1, 1%

To specify MC1RD Dividers, please see our website at **www.ohmite.com/dividers**. Contact Ohmite for custom configurations.

Design online at:
www.ohmite.com/dividers/

Mini Macro Chip Series

High Voltage Thick Film SMD Chip

RoHS Compliant

FEATURES

- High Voltage Ratings
- Smaller Package Sizes
- Low Cost
- Wraparound Terminals

SERIES SPECIFICATIONS

Series (Size in./met.)	Resistance Range		TCR ppm/°C	Power Rating (W) @70°C	Voltage Rating*	Isolation Voltage
MMC06	470Ω~10MΩ		±100	0.1	200	100
(0603/1608)	47Ω~464Ω		±200			
MMC08	100Ω~10MΩ	±1% & ±2%	±100	0.125	300	500
(0805/2012)	100Ω~51MΩ	±5% & ±10%	±100			
	47Ω~97.6Ω		±200			
MMC12	100Ω~10MΩ	±1% & ±2%	±100	0.25	400	500
(1206/3216)	100Ω~51MΩ	±5% & ±10%	±100			
	47Ω~97.6Ω		±200			
MMC25	560Ω~20MΩ	±1% & ±2%	±100	1.0	800	500
(2512/6332)	560Ω~51MΩ	±5% & ±10%	±100			
	100Ω~549Ω		±200			
	47Ω~97.6Ω		±500~-200			

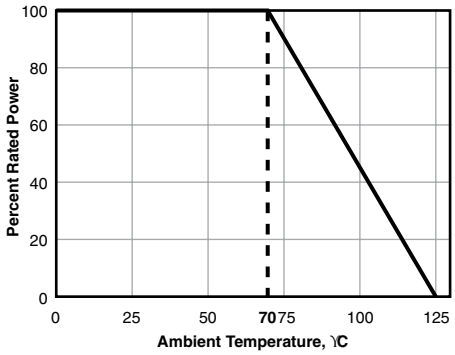
*Use Ohm's Law (V= √ P*R) to calculate maximum working voltage.

Note: Limiting Element Voltage can only be applied to resistors when the resistance is equal to or higher than the critical resistance value.

CHARACTERISTICS

Prefered Number Series for Resistors	±1%, 2%: E96, E24 ±5%, 10%: E24
Substrate	Alumina
Resistor	Thick Film
Coating	glass overcoat
Terminal	100% nickel barrier inner layer with 100% matte tin outer layer
Tolerance	1-10%
Derating	Linearly from 100% at 70°C to 0% at 125°C
Isolation Voltage	500V (ex. MMC06: 100V)
Operating Temp. Range	-55°~+125°

Derating



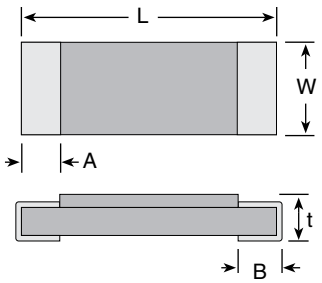
(continued)

Mini Macro Chip Series

High Voltage Thick Film SMD Chip

DIMENSIONS

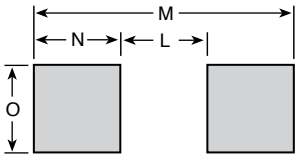
(in./mm)



	L	W	t	A	B	Qty./Reel
MMC06	0.063 ±.004 1.6 ±0.1	0.031 ±.006 0.8 ±0.15	0.018 ±.004 0.45 ±0.1	0.012 ±.004 0.3 ±0.1	0.012 ±.004 0.3 ±0.1	5000
MMC08	0.079 ±.004 2.0 ±0.1	0.049 ±.004 1.25 ±0.10	0.022 ±.004 0.55 ±0.1	0.016 ±.008 0.4 ±0.2	0.016 ±.008 0.4 ±0.2	5000
MMC12	0.126 ±.004 3.2 ±0.1	0.063 ±.006 1.6 ±0.15	0.022 ±.004 0.55 ±0.1	0.020 ±.01 0.5 ±0.25	0.020 ±.01 0.5 ±0.25	5000
MMC25	0.248 ±.004 6.3 ±0.1	0.126 ±.006 3.2 ±0.15	0.022 ±.004 0.55 ±0.1	0.024 ±.008 0.6 ±0.2	0.024 ±.008 0.6 ±0.2	4000

Land Pattern

(in.) Dimensions are for reference only



Size	M	N	O	L
MMC06	0.075	0.024	0.041	0.027
MMC08	0.095	0.032	0.069	0.031
MMC12	0.146	0.040	0.080	0.066
MMC25	0.272	0.048	0.150	0.176

ORDERING INFORMATION

RoHS Compliant

M M C 1 2 J 4 7 0 4 E T P

Type

Wattage
06 = 0.1
08 = 0.125
12 = 0.25
25 = 1.0

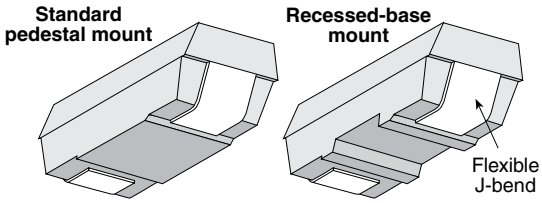
Tolerance
F = 1%
G = 2%
J = 5%
K = 10%

Resistance
First 3 digits are significant; 4th digit is multiplier (# of zeroes to follow).
Examples:
4704 = 4,700,000
1214 = 1,210,000
Use E96 values for 1%
Use E24 values for 5%

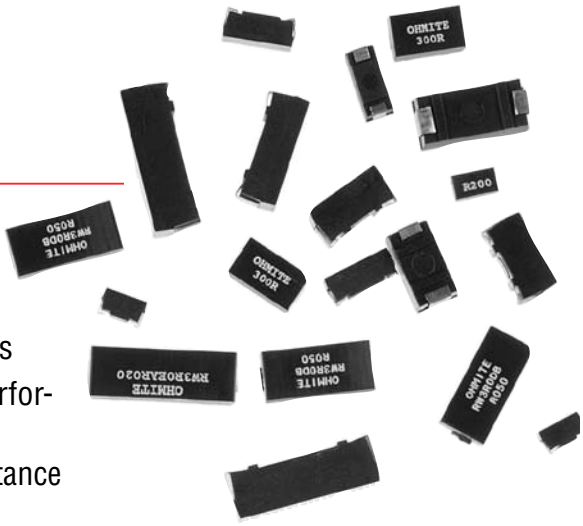
Packaging
TP = Paper tape (use on MMC06, MMC08, MMC12)
TR = Embossed tape (use on MMC25)

Note: Units are marked with 3-digit (E24 Series) or 4-digit (E96 Series). 4-digit marking not available on MMC06 sizes.

Surface Mount Power



RC Series: carbon composition (1/4 & 1/2 watt)
RC Series: ceramic composition (above 1/2 watt)
RF Series: metal film
RW Series: wirewound
RP Series: power film
RM Series: high voltage thick film



FEATURES

- Tolerance 1%, 5%, 10%, depending on construction
- Twelve wattage ratings
- Seven package sizes
- Two mounting designs to accommodate your soldering process
- Five power resistor technologies to optimize your operating performance:
  1. Carbon and Ceramic composition for surge and low inductance
  2. Metal film for high ohmic value and low T.C.
  3. Wire element for inrush current combined with low ohmic values. Resistance values as low as 0.005Ω
  4. Power film for high ohmic value and high wattage
  5. High Voltage thick film for high voltage applications
- Flexible J-bend terminations
- Working Temperature Range: -55°C to +150°C

SERIES SPECIFICATIONS

Part Number	Power (watts)*	Maximum voltage	Resistance range 1% tol.	5% tol.	10% tol.	Temp. Coefficient 0.1Ω–1Ω	1Ω–10Ω	10Ω+	Dielectric Withstanding	Tape Size 13" reels	Quantity per reel
RC0S2CA———	0.25	250	—	—	2.2Ω–5.6M	—	±400	±400	1000V	16mm	1500
RC0R5DB———	0.50	350	—	—	2.2Ω–20M	—	±400	±400	1000V	24mm	1000
RW0S6BB———	0.6	50	0.010Ω–1K	0.005Ω–1K		±90	±50	±20	1000V	12mm	2500
RF0S8BA———	0.8	200	1Ω–5M	—		—	±100	±100	1000V	12mm	2000
RW1S0BA———	1.0	50	0.005Ω–1K	0.005Ω–1K		±90	±50	±20	1000V	12mm	2000
RF1S0CA———	1.0	350	10Ω–1M	1Ω–10M		—	±200	±100	1000V	16mm	1500
RC1R0EA———	1.0	500	3.3-100K (10% tol only)					-1300	1000V	32mm	750
RP1S3CA———	1.25	350	—	1Ω–1M		—	±250	±250	1000V	16mm	1500
RP1S5CA———	1.5	75	0.005Ω–1.5K	0.005Ω–1.5K		±90	±250	±250	1000V	16mm	1500
RP1S5CB——— RP1R5CB———	1.5	350	—	1Ω–1M		—	±250	±250	1000V	16mm	1000
RW2S0CB——— RW2R0CB———	2.0	100	0.005Ω–5K	0.005Ω–5K		±90	±50	±20	1000V	16mm	1000
RP2S0DA——— RP2R0DA———	2.0	500	—	1Ω–1M		—	±250	±250	1000V	24mm	1000
RW2S0DA——— RW2R0DA———	2.0	100	0.005Ω–5K	0.005Ω–5K		±90	±50	±20	1000V	24mm	1000
RP2R5DB———	2.5	500	—	1Ω–1M		—	±250	±250	1000V	24mm	1000
RW3R0DB———	3.0	200	0.005Ω–13K	0.005Ω–13K		±90	±50	±20	1000V	24mm	1000
RP3R0EA———	3.0	750	—	1Ω–1M		—	±250	±250	1000V	32mm	750
RW3R5EA———	3.5	350	0.005Ω–25K	0.005Ω–25K		±90	±50	±20	1000V	32mm	750
RM0R7EA———	0.75	2500	1KΩ–1000M	1KΩ–1000M		—	—	±50	1000V	32mm	750

*25°C ambient

(continued)

Surface Mount Power

PERFORMANCE DATA

	Construction	Temp. cycle (-55°C to 125°C, 1000 cycles)	Load Life (1000 hours at 25°C)	Immersion (260°C for 10 sec.)	Momentary Overload
RC	Carbon/Ceramic Comp.	±4.0%+.05Ω	±10.0%+.05Ω	±3.0%+.05Ω	6.3x rated power for 5 sec.
RF	Metal Film	±0.5%+.05Ω	±0.5%+.05Ω	±0.1%+.05Ω	2x rated power for 0.1 sec.
RW	Wirewound	±0.5%+.05Ω	±3.0%+.05Ω	±0.1%+.05Ω	5x rated power for 5 sec.
RP	Power Film	±3.0%+.05Ω	±5.0%+.05Ω	±0.5%+.05Ω	2x rated power for 0.1 sec.
RN	Wirewound, Non-inductive	±0.5%+.05Ω	±3.0%+.05Ω	±0.1%+.05Ω	5x rated power for 5 sec.

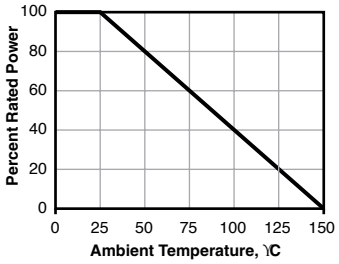
ALL models:

Leaching (260°C Solder immersion, 60 sec.)..... No visible leaching

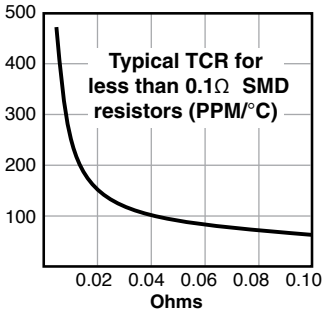
Thermal Shock (Units at -55°C, then rated power applied).. No mechanical damage

Flammability ..... UL Material rating, UL94V0

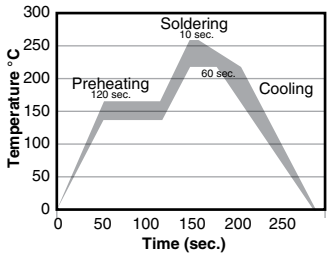
Derating



TCR



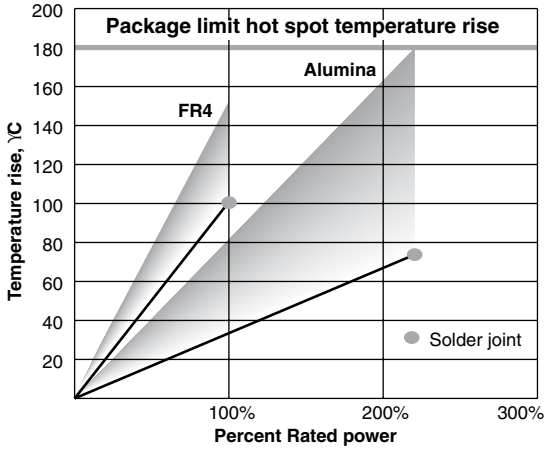
Recommended Solder Profile



Preheating: 145°C ±15°, max. 120 sec.

Soldering: min. 220°C, max. 60 sec.

Max. Temp.: 260°C ±5°, 10 sec.



The temperature rise graph data was obtained by a selection of test substrate size and trace width for each resistor size to limit operating temperatures to safe values.

The operating temperature safe rises are either 100°C substrate temperature rise or 180°C package hot spot temperature rise at 25°C ambient.

FR4: 0.062 in. thick; 0.062 in. traces

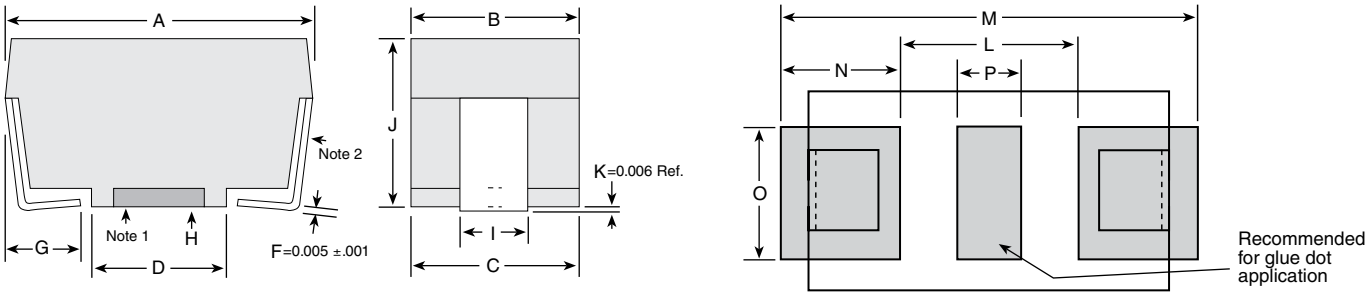
Alumina: 0.040 in. thick; 0.010 in. traces

Molding material rated at 205°C continuous.

Surface Mount Power

DIMENSIONS

(in./mm)

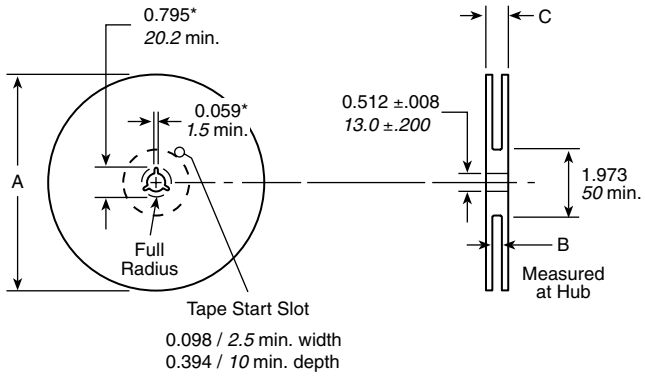


		Package Outline Dimensions							PC Board Land Pattern				
Packages		**A**	**B**	**C**	**D**	**G**	**I**	**J**	**L**	**M**	**N**	**O**	**P**
BA	(in.)	0.246±.020	0.136±.005	0.133 REF	0.110±.010	0.047 ±0.020	0.054±.012	0.136±.005	0.150	0.346	0.098	0.126	0.050
	(mm)	*6.248±.508*	*3.454±.127*	*3.378 REF*	*2.794±.254*	*1.194 ±0.508*	*1.372±.305*	*3.454±.127*	*3.81*	*8.79*	*2.49*	*3.20*	*1.27*
CA	(in.)	0.394±.020	0.159±.005	0.156 REF	0.220±.010	0.062 Nom.	0.078±.012	0.159±.005	0.256	0.524	0.134	0.126	0.060
	(mm)	*10.008±.508*	*4.039±.127*	*3.962 REF*	*5.588±.254*	*1.575 Nom.*	*1.981±.305*	*4.038±.127*	*6.50*	*13.31*	*3.40*	*3.20*	*1.52*
CB	(in.)	0.407±.020	0.226±.005	0.222 REF	0.260±.010	0.062 Nom.	0.084±.012	0.222±.005	0.276	0.537	0.131	0.126	0.093
	(mm)	*10.338±.508*	*5.74±.127*	*5.639 REF*	*6.604±.254*	*1.575 Nom.*	*2.134±.305*	*5.639±.127*	*7.01*	*13.64*	*3.33*	*3.20*	*2.36*
DA	(in.)	0.455±.020	0.240±.005	0.236 REF	0.260±.010	0.062 Nom.	0.143±.012	0.226±.005	0.317	0.585	0.134	0.155	0.093
	(mm)	*11.557±.508*	*6.096±.127*	*5.994 REF*	*6.604±.254*	*1.575 Nom.*	*3.632±.305*	*5.740±.127*	*8.05*	*14.86*	*3.40*	*3.94*	*2.36*
DB	(in.)	0.625±.020	0.273±.005	0.268 REF	0.417±.010	0.062 Nom.	0.143±.012	0.226±.005	0.474	0.742	0.134	0.155	0.093
	(mm)	*15.875±.508*	*6.934±.127*	*6.807 REF*	*10.592±.254*	*1.575 Nom.*	*3.632±.305*	*5.740±.127*	*12.040*	*18.85*	*3.40*	*3.94*	*2.36*
EA	(in.)	0.811±.020	0.273±.005	0.268 REF	0.572±.010	0.093 Nom.	0.143±.012	0.273±.005	0.611	1.000	0.195	0.155	0.093
	(mm)	*20.599±.508*	*6.934±.127*	*6.807 REF*	*14.529±.254*	*2.362 Nom.*	*3.632±.305*	*6.934±.127*	*15.52*	*25.4*	*4.95*	*3.94*	*2.36*
BB	(in.)	0.202±.010	0.10±.010	0.095 REF	0.079±.010	0.050 Nom.	0.065±.012	0.135±.005	0.078	0.328	0.125	0.126	0.026
	(mm)	*5.140±.508*	*2.54±.127*	*2.41 REF*	*2.00±.254*	*1.280 Nom.*	*1.640±.305*	*3.420±.127*	*1.98*	*8.33*	*3.18*	*3.20*	*0.66*

Note 1: Packages BA and CA are only available with a pedestal base. Packages CB and DA are available in either pedestal or recessed base. Packages DB and EA are only available in a recessed base.
Note 2: Test point is .020 above PCB.
Note 3: Tape and reel dimensions per EIA 481 A except "EA" size which is 12 mm component pitch versus 16mm pitch.

Land pattern dimensions are for reference only

Reel Dimensions



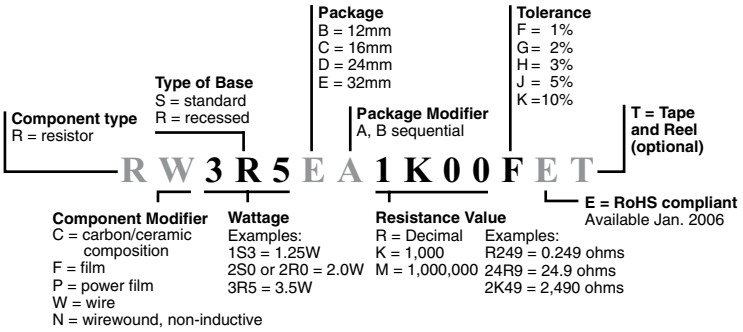
Size	A nom.	B	C max.	Quantity
12mm	13"	0.488" +0.078, –0.00	0.724"	2000 pcs. BA or
		12.4mm +2.0, –0.0	*18.4mm*	2500 pcs. BB
16mm	13"	0.646" +0.078, –0.00	0.882"	1500 pcs. CA or
		16.4mm +2.0, –0.0	*22.4mm*	1000 pcs. CB
24mm	13"	0.961" +0.078, –0.00	1.196"	1000 pcs. DA or DB
		24.4mm +2.0, –0.0	*30.4mm*	
32mm	13"	1.276" +0.078, –0.00	1.52"	750 pcs. EA
		32.4mm +2.0, –0.0	*38.4mm*	

All reels are compatible with major pick-and-place machines and made in accordance with EIA 481 A (except EA size, which is 12mm component pitch versus 16mm pitch).

(continued)

Surface Mount Power

ORDERING INFORMATION



(For example, the part number shown is a wire-wound resistor, 3.5 watt, recessed base, 32mm tape size, first case size [A], 1000 ohms 1% tolerance.)

Standard Part Numbers for Surface Mount Power Resistors

		Wirewound									
Package style ➤		BA	CA	CB	CB	DA	DA	DB	EA	BB	EA
Base: standard or recessed ➤		S	S	S	R	S	R	R	R	S	R
Wattage ➤		1.0	1.5	2.0	2.0	2.0	2.0	3.0	3.5	0.6	1.0
Ohmic value	Part No. Prefix ➤	RW1S0BA	RW1S5CA	RW2S0CB	RW2R0CB	RW2S0DA	RW2R0DA	RW3R0DB	RW3R5EA	RW0S6BB	RC1R0EA
	Suffix ▼	Tolerance suffix: F = 1% J = 5% K=10%									
0.005	R005		J	J		F/J					
0.010	R010	F/J	J		J	F	J	J	J	F	
0.015	R015	F/J	J							F	
0.020	R020	J		J		F	J		J	F	
0.025	R025	J									
0.027	R027	J									
0.030	R030	F	J	J					J	F	
0.033	R033	J									
0.036	R036	J									
0.050	R050	F/J		J		J	F	J	J	F	
0.056	R056	J									
0.075	R075	J								F	
0.080	R080		J						J		
0.100	R100	F/J	J		J	F	J	J	J	F	
0.150	R150		J		J	J					
0.200	R200		J	J					J		
0.220	R220			J							
0.240	R240	J		J						F	
0.300	R300	J			J						
0.330	R330				J						
0.400	R040		J								
0.400	R400				J						
0.470	R470	J		J			J			F	
0.500	R500	J	J			J			J		
0.750	R750	J								F	
1.00	1R00	F/J	J	J			J	J		F	
2.00	2R00									F	

		Wirewound									
Package style ➤		BA	CA	CB	CB	DA	DA	DB	EA	BB	EA
Base: standard or recessed ➤		S	S	S	R	S	R	R	R	S	R
Wattage ➤		1.0	1.5	2.0	2.0	2.0	2.0	3.0	3.5	0.6	1.0
Ohmic value	Part No. Prefix ➤	RW1S0BA	RW1S5CA	RW2S0CB	RW2R0CB	RW2S0DA	RW2R0DA	RW3R0DB	RW3R5EA	RW0S6BB	RC1R0EA
	Suffix ▼	Tolerance suffix: F = 1% J = 5% K=10%									
3.30	3R30										K
4.70	4R70										K
5.00	5R00									F	
5.60	5R60	J									
6.80	6R80										K
7.50	7R50								J	F	
10.00	10R0	J		J			J			F	K
15.00	15R0	J	J							F	K
20.00	20R0			J							
22.00	22R0									F	K
24.90	24R9									F	
33.00	33R0									F	K
36.00	36R0									F	
47.00	47R0	J							J	F	K
50.00	50R0								J		
51.00	51R0	J									
68.00	68R0										K
82.00	82R0				J						
100.00	100R			J						F	K
120.00	120R		J								
180.00	180R	J									
300.00	300R	J									
470.00	470R					J					
1K	1K00							J			K
4.7K	4K70				J						
5K	5K00								J		

RW Series

High Power SMD Wirewound Resistors
5 and 7 watt

Ohmite has used its thermal management expertise to produce a unique resistor design. The resistor body incorporates fins identical to a heatsink. These fins, as with a heatsink, increase the surface area of the part and allow for greater power dissipation. This unique design allows a small footprint for the SMD device and a high power dissipation. These 5 and 7 watt resistors are extremely stable with a load life drift of only 1%. A special flat has been designed in to the part for pick and place operations.

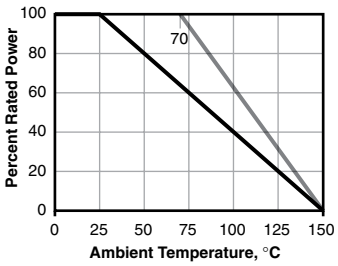
FEATURES

- Finned design facilitates cooling
- High Power Density
- Wide Resistance Range
- Tight Tolerance
- Low TCR

CHARACTERISTICS

		RW5S0	RW7S0
Power	at 25°C	7 watts	10 watts
	at 70°C	5 watts	7 watts
Resistance range		0.1Ω ~ 50K	0.1Ω ~ 100K
Non-inductive range		0.1Ω ~ 12.5K	0.1Ω ~ 20K
Tolerance		0.5%, 1%, 5%	
Temperature Coefficient		0.1Ω ~ 0.99Ω: ±90ppm 1Ω ~ 10Ω: ±50ppm 10Ω+: ±20ppm	
Operating temp. range		-55°C ~ +155°C	
Max. working voltage		$(PxR)^{1/2}$	
Weight		5.67g	11.34g

Derating



PERFORMANCE DATA

Temp. cycle	(-55°C to 125°C, 1000 cycles)	±0.5%+.05Ω
Load Life	(1000 hours at 25°C)	±1.0%+.05Ω
Immersion	(260°C for 10 sec.)	±0.1%+.05Ω
Leaching	(260°C Solder immersion, 60 sec.)	No visible leaching
Thermal Shock	(Units at -55°C, then rated power applied)	No mechanical damage
Flammability	UL Material rating	UL94V0

(continued)

RW Series

High Power SMD Wirewound Resistors
5 and 7 watt

DIMENSIONS

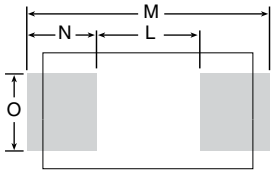
±0.020 in. / ±0.51 mm

Overall Dimensions

	Length	Width	Height
RW5S0	0.806 / 20.47	0.365 / 9.27	0.406 / 10.31
RW7S0	1.128 / 28.65	0.471 / 11.96	0.51 / 12.95

Land Pattern

	L	M	N	O
5S0 (FA)	0.600 / 15.24	1.000 / 25.40	0.200 / 5.08	0.450 / 11.43
7S0 (FB)	0.890 / 22.61	1.330 / 29.59	0.220 / 5.59	0.520 / 13.21



Power Rating and Temperature Rise data based on the recommended Land Patterns using 10 oz. copper PCB. FR-4 material. 0.062" thick. 4 layer.

Tape and Reel

	FA (5S0)	FB (7S0)
Reel Hub Diameter	77mm	77mm
Reel Outer Diameter	560mm	560mm
Reel Width	46mm	46mm
Tape Width	44mm	44mm
Pitch	20mm	24mm

ORDERING INFORMATION

Component type
R = resistor

Type of Base
S = standard

Package
FA = 5W
FB = 7W

Package Modifier
A, B sequential

Tolerance
D = 0.50%
F = 1%
J = 5%

T = Tape and Reel
(optional)
5W=300/reel
7W=250/reel

R W 5 S 0 F A 1 K 0 0 F E T

E = RoHS compliant

Component Modifier
W = wirewound

Wattage

	70°C	25°C
5S0 =	5W	7W
7S0 =	7W	10W

Resistance Value
R = Decimal
K = 1,000
M = 1,000,000

Examples:
R249 = 0.249 ohms
24R9 = 24.9 ohms
2K49 = 2,490 ohms

Standard part numbers For RW Series

Resistance	Tolerance	Part Number
0.10	1%	RW5S0FAR100FE
1.0	1%	RW5S0FA1R00FE
10	5%	RW5S0FA10R0JE
20	5%	RW5S0FA20R0JE
47	5%	RW5S0FA47R0JE
100	5%	RW5S0FA100RJE
470	5%	RW5S0FA470RJE
1000	5%	RW5S0FA1K00JE
4700	5%	RW5S0FA4K70JE
10,000	5%	RW5S0FA10K0JE
1.0	1%	RW7S0FB1R00FE
10	1%	RW7S0FB10R0FE
100	1%	RW7S0FB100RFE
1000	1%	RW7S0FB1K00FE
10,000	1%	RW7S0FB10K0FE
100,000	1%	RW7S0FB100KFE

TDH Series

35 Watt DPAK Package
Thick Film Power Surface Mount

Ohmite's TDH resistor is an economical solution to intermediate power application design requirements. TDH's reliable thick film on alumina substrate construction can be easily heat sinked for higher power performance. TDH resistors are ideal for pulse-loading, pre-charge, bleeder, and snubber applications.

FEATURES

- 35 Watt power rating at 25°C
- SMD - DPAK package configuration
- Heat resistance to cooling plate: Rth <4.28°C/W
- A molded case for environmental protection.
- Resistor element is electrically insulated from the metal sink tab.

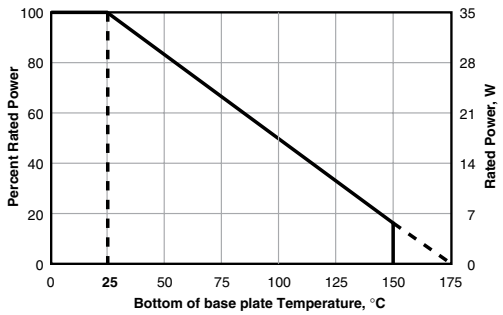
CHARACTERISTICS

Terminal	Copper
Terminal Plating	Lead Free Solder (97% Tin, 3% Silver)
Resistance Range	0.05Ω to 10KΩ other values on request
Tolerance	±1% to ±10% (0.5% on request)
Max. Operating Voltage	350V
Insulation Resistance	10GΩ min.
Power Rating	Depends upon case temperature. See derating curve. DPAK style power package for surface mounting applications; 35W power rating at 25°C case temperature.
Working Temperature Range	-55°C to +175°C
Solder Process	The TDH35P cannot exceed 220°C (260°C for the TDH35H) for more than 10 seconds during soldering process.
Derating	100% @ 25°C to 0% @ 150°C curve referenced to case temperature
Dielectric Strength	1,800VAC
Operating Temperature Range	-55°C to +150°C
Temperature Coefficient	10Ω and above, ±50ppm/°C, referenced to 25°C, ΔR taken at +105°C. Between 1 and 10Ω, ±(100ppm+0.002Ω)/°C, referenced to 25°C, ΔR taken at +105°C. For under 10Ω: 0R6 - 9R9: 100PPM 0R4 - 0R59: 150PPM 0R2 - 0R39: 250PPM 0R1 - 0R19: 500PPM 0R05 - 0R09: 1000PPM
Inductance	less than 20 nanohenries
Flatness	less than 0.1mm tolerance

Soldering note: During surface mount soldering the soldering temperature profile must not cause the metal tab of this device to exceed 220°C (260°C for the TDH35H)!

Test	Condition	Result
Load Life	MIL–R–39009, 2,000 hours	ΔR ±(1.0% +0.01Ω)
Moisture Resistance	MIL–Std–202, Method 106	ΔR =(0.5% +0.01Ω) max.
Short Time Overload	2 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds	ΔR ±(0.3% +0.01Ω) max.
Thermal Shock	MIL–Std–202, Method 107, Cond. F	ΔR =(0.3% +0.01Ω) max.
Terminal Strength	MIL–Std–202, Method 211, Cond. A (Pull Test) 2.4N	ΔR =(0.2% +0.01Ω) max.
Vibration, High Frequency	MIL-Std-202, Method 204, Cond. D	ΔR =(0.2% +0.01Ω) max.

Derating



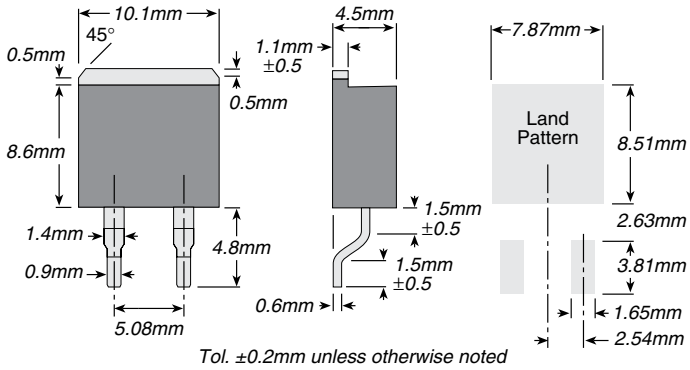
Derating (thermal resistance): 0.23W/°C (4.28°C/W). The case temperature is to be used for purposes of establishing the applied power limit. The case temperature measurement must be made with a thermocouple contacting the center of the component mounted on the designed heat sink. Thermal grease should be applied propperly.

(continued)

TDH Series

35 Watt DPAK Package
Thick Film Power Surface Mount

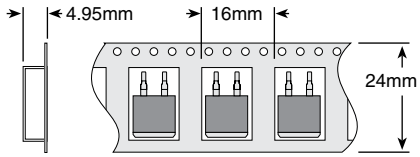
DIMENSIONS



Tol. ±0.2mm unless otherwise noted

Tape Dimensions

750 pc./reel



ORDERING INFORMATION

T D H 3 5 P R 1 0 0 J E -TR

- **Style**
- **Package Modifier**: P = low temp., H = high temp.
- **Ohms**: R = Decimal. Example: R100 = 0.10, 1R00 = 1.0, 10K0 = 10,000
- **Tolerance**: F = 1%, J = 5%, K = 10%
- **RoHS Compliant**: Non-compliant version unavailable
- **Tape and reel** (optional): 750 per reel

Standard Part Numbers

Ohms	Part Number 5% Tolerance
0.10	TDH35PR100JE
0.15	TDH35PR150JE
0.20	TDH35PR200JE
0.25	TDH35PR250JE
0.30	TDH35PR300JE
0.36	TDH35PR360JE
0.47	TDH35PR470JE
0.50	TDH35PR500JE
0.75	TDH35PR750JE
1.0	TDH35P1R00JE
2.0	TDH35P2R00JE
3.0	TDH35P3R00JE
5.0	TDH35P5R00JE
7.5	TDH35P7R50JE
10	TDH35P10R0JE
15	TDH35P15R0JE
20	TDH35P20R0JE

Ohms	Part Number 5% Tolerance
25	TDH35P25R0JE
33	TDH35P33R0JE
39	TDH35P39R0JE
47	TDH35P47R0JE
68	TDH35P68R0JE
75	TDH35P75R0JE
100	TDH35P100RJE
150	TDH35P150RJE
200	TDH35P200RJE
250	TDH35P250RJE
300	TDH35P300RJE
500	TDH35P500RJE
750	TDH35P750RJE
1000	TDH35P1K00JE
1500	TDH35P1K50JE
2500	TDH35P2K50JE
3000	TDH35P3K00JE
5000	TDH35P5K00JE

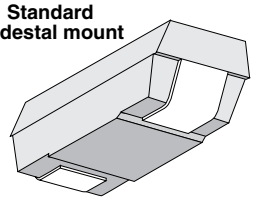
THIS PRODUCT IS DESIGNED FOR USE WITH PROPER HEATSINKING.

Maximum base plate temperature of the resistor must be monitored and kept within specified limits to establish the power rating. Best technique is to attach a thermocouple to the side of the base plate of the resistor. Temperature of plastic housing or heat sink cannot be used to establish rating of the resistor.

2010 SMD

0.6 Watt Wirewound Surface Mount Power

2010 Package



FEATURES

- 1% Tolerance standard
- Smallest wirewound on the market
- Available in low ohmic values

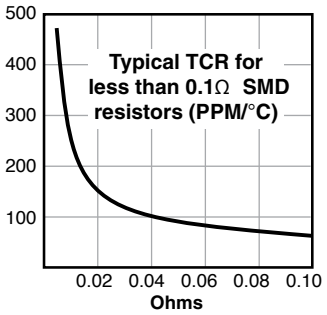
SERIES SPECIFICATIONS

Series	Wattage	Ohms	Voltage
RW0S6BB	0.6	0.01-1K	50

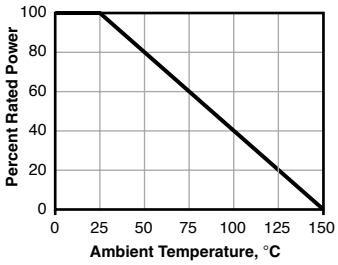
CHARACTERISTICS

Power	0.6 watts at 25°C ambient
Voltage	50V max.
Tolerance	1%
Resistance range	0.010Ω–1KΩ
Temperature Coefficient	0.1Ω–1Ω: ±90ppm 1Ω–10Ω: ±50ppm 10Ω+: ±20ppm
Dielectric Withstanding Voltage	1000V
Tape Size	12mm, 13" reel, 2500 pcs. per reel

TCR

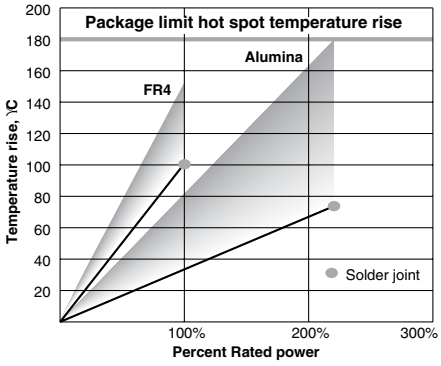


Derating



PERFORMANCE DATA

Temp. cycle	(-55°C to 125°C, 1000 cycles)	±0.5%+.05Ω
Load Life	(1000 hours at 25°C)	±3.0%+.05Ω
Immersion	(260°C for 10 sec.)	±0.1%+.05Ω
Leaching	(260°C Solder immersion, 60 sec.)	No visible leaching
Thermal Shock	(Units at -55°C, then rated power applied)	No mechanical damage
Flammability	UL Material rating	UL94V0



The temperature rise graph data was obtained by a selection of test substrate size and trace width for each resistor size to limit operating temperatures to safe values.

The operating temperature safe rises are either 100°C substrate temperature rise or 180°C package hot spot temperature rise at 25°C ambient.

FR4: 0.062 in. thick; 0.062 in. traces

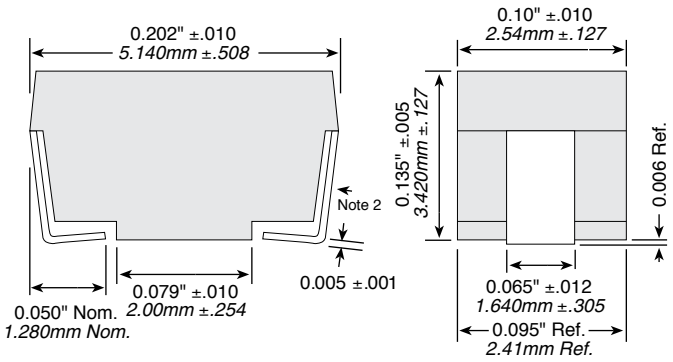
Alumina: 0.040 in. thick; 0.010 in. traces

(continued)

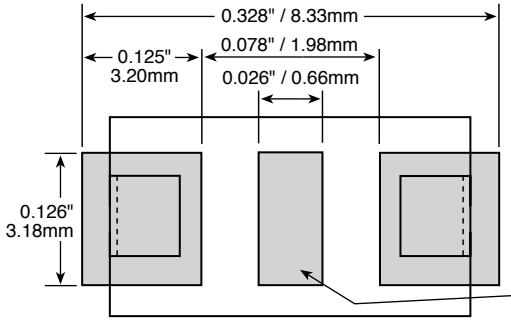
2010 SMD

0.6 Watt Wirewound Surface Mount Power

DIMENSIONS



Land Pattern

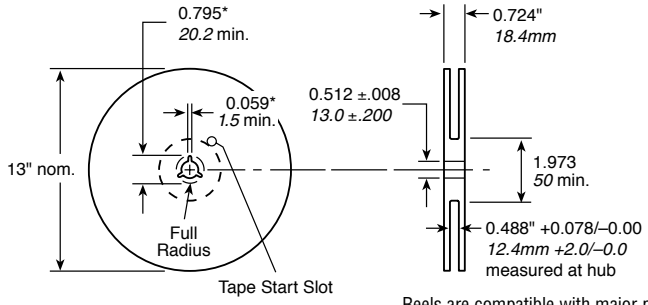


Note 2: Test point is .020 above PCB.

Note 3: Tape and reel dimensions per EIA 481 A except "EA" size which is 12 mm component pitch versus 16mm pitch.

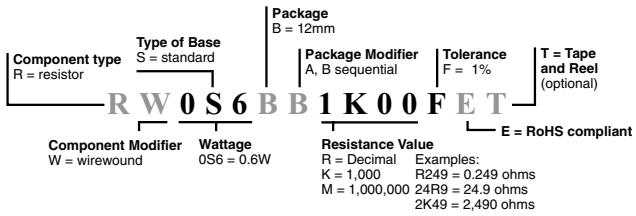
Land pattern dimensions are for reference only

TAPE AND REEL



Reels are compatible with major pick-and-place machines and made in accordance with EIA 481 A.

ORDERING INFORMATION



Standard Part Numbers for 2010 SMD

Ohms	Part Number	Ohms	Part Number
0.010	RW0S6BBR010FE	1.00	RW0S6BB1R00FE
0.015	RW0S6BBR015FE	2.00	RW0S6BB2R00FE
0.020	RW0S6BBR020FE	5.00	RW0S6BB5R00FE
0.030	RW0S6BBR030FE	7.50	RW0S6BB7R50FE
0.050	RW0S6BBR050FE	10.00	RW0S6BB10R0FE
0.075	RW0S6BBR075FE	15.00	RW0S6BB15R0FE
0.100	RW0S6BBR100FE	24.00	RW0S6BB24R0FE
0.240	RW0S6BBR240FE	36.00	RW0S6BB36R0FE
0.470	RW0S6BBR470FE	47.00	RW0S6BB47R0FE
0.750	RW0S6BBR750FE	100.00	RW0S6BB100RFE

CS3 Series

Wire Element Four Terminal Precision Current Sense

The CS3 Series utilizes state of the art technology to achieve highly reliable non-inductive performance. The CS3 is ideal for current monitoring and control applications.

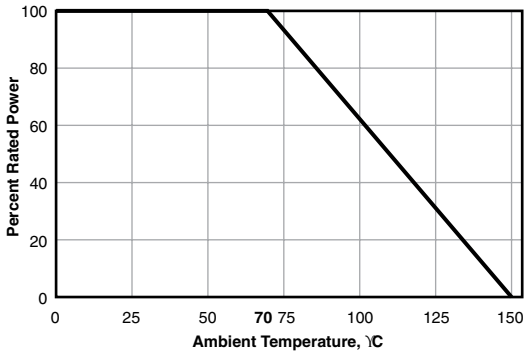
FEATURES

- Values beginning at 1 miliohm
- Non Inductive Design
- Four terminal Kelvin connection

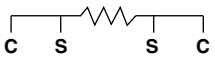
CHARACTERISTICS

Terminal Material	Kelvin Terminals; 97% Sn / 3% Ag solder over copper
Encapsulation	Polyester over resistance element
Standard Resistance Values	1 mΩ - 50 mΩ
Resistance Tolerances	1%, 2%, 5%
Temperature Coefficient	TC referenced to 25°C, ΔR taken at -15°C and +105°C, 60ppm/°C
Power Rating	3W at 70°C max. 40Amp permanent
Operating Temp.	-55°C to 150°C
Storage Temp.	-40°C to 85°C

Derating



Internal Circuit



C = current
S = sense voltage

PERFORMANCE DATA

Load Life	(1,000 hours at rated power at 70°C)	ΔR 0.2% max.
Moisture Resistance	(Mil-Std-202, Method 106, Cond. A)	ΔR 0.2% max.
Thermal Shock	(Mil-Std-202, Method 107)	ΔR 0.2% max.

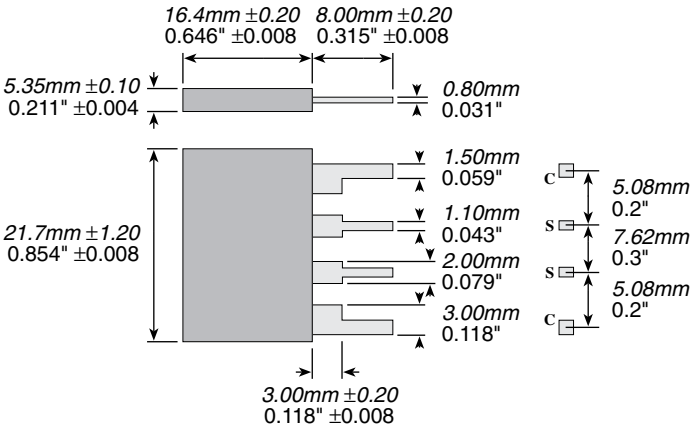
(continued)

CS3 Series

Wire Element Four Terminal
Precision Current Sense

DIMENSIONS

(mm/in.)



Center of lead spacing measured at resistor body

ORDERING INFORMATION

C S 3 J R 0 5 0 E

Style	Tolerance	Ohms	RoHS Compliant
	F = 1% G = 2% J = 5%	R = Decimal Example: R010 = 0.010 R005 = 0.005	Non-compliant version not recommended for new designs

Standard part numbers for CS3 series

Series Tolerance	CS3F 1%	Series Tolerance	CS3F 1%
Ohms		**Ohms**	
0.001	CS3FR001E	**0.015**	CS3FR015E
0.002	CS3FR002E	**0.02**	CS3FR020E
0.003	CS3FR003E	**0.025**	CS3FR025E
0.005	CS3FR005E	**0.03**	CS3FR030E
0.01	CS3FR010E	**0.036**	CS3FR036E
		0.05	CS3FR050E

10 Series

Axial Wire Element Current Sense
Two Terminal Axial

FEATURES

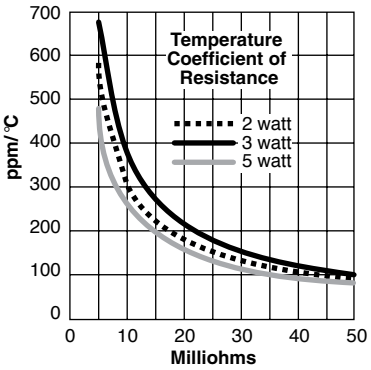
- Ideal for current sensing applications
- 1% Tolerance standard, others available
- Fixed resistance measuring point “M”
- Low inductance (non-inductive below 0.25Ω)
- RoHS compliant product available; add “E” suffix to part number to specify

SERIES SPECIFICATIONS

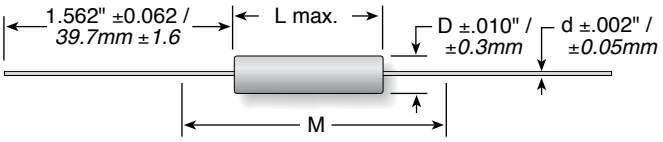
Series	Wattage	Ohms
12	2	0.005-0.10
13	3	0.005-0.20
15	5	0.005-0.25

CHARACTERISTICS

Terminals	Solder-plated copper terminals or copper clad steel depending on ohmic value. RoHS solder is 96% Sn, 3.5% Ag, 0.5% Cu
Encapsulation	Silicone molding compound
Derating	Linearly from 100% @ +25°C to 0% @ +275°C
Tolerance	±1% standard; Others available
Power rating	Based on 25°C free air rating
Overload	5 times rated wattage for 5 seconds
Dielectric withstanding voltage	1000 VRMS for 3 and 5 watt; 500 VRMS for 2 watt
Insulation resistance	Not less than 1000MΩ
Thermal EMF	Less than ±2µV/°C
Temperature range	-55°C to 275°C



DIMENSIONS



Series	Wattage	Length “L”	Diam. “D”	“M”	“d” (lead ga.)
12	2	0.416 / 10.6	0.094 / 2.4	1.156 / 29.4	20
13	3	0.570 / 14.5	0.205 / 5.2	1.310 / 33.3	20
15	5	0.935 / 23.8	0.330 / 8.4	1.675 / 42.5	18

ORDERING INFORMATION

Standard part numbers

Ohmic value	2 watt	3 watt	5 watt
0.005	12FR005E	13FR005E	15FR005E
0.010	12FR010E	13FR010E	15FR010E
0.015	12FR015E	13FR015E	15FR015E
0.020	12FR020E	13FR020E	15FR020E
0.025	12FR025E	13FR025E	15FR025E
0.030	12FR030E	13FR030E	15FR030E
0.040	12FR040E	13FR040E	15FR040E
0.050	12FR050E	13FR050E	15FR050E
0.060	12FR060E	13FR060E	15FR060E
0.070	12FR070E	13FR070E	15FR070E
0.080	12FR080E	13FR080E	15FR080E
0.090	12FR090E	13FR090E	15FR090E
0.100	12FR100E	13FR100E	15FR100E
0.150		13FR150E	15FR150E
0.200		13FR200E	15FR200E
0.250			15FR250E

Wattage — RoHS Compliant

1 3 F R 0 5 0 E

10 Series — **Tolerance** F = 1%, D= 0.5% — **Ohm Value** Example: R050= 0.05Ω

(continued)

10 Series

Axial Wire Element Current Sense Four Terminal Axial

Ohmite's Four-terminal Current-sense Resistors are specifically designed for low-resistance applications requiring the highest accuracy and temperature stability. This four-terminal version of Ohmite's 10 Series resistor is specially designed for use in a Kelvin configuration, in which a current is applied through two opposite terminals and sensing voltage is measured across the other two terminals .

The Kelvin configuration enables the resistance and temperature coefficient of the terminals to be effectively eliminated. The four terminal design also results in a lower temperature coefficient of resistance and lower self-heating drift which may be experienced on two-terminal resistors. The requirement to connect to the terminals at precise test points is eliminated, allowing for tighter tolerancing on the end application.

FEATURES

- Ideal for current sensing applications
- 1% Tolerance standard, others available
- Low Inductance (non-inductive below 0.25Ω)
- Tinned Copper Leads
- RoHS Compliant

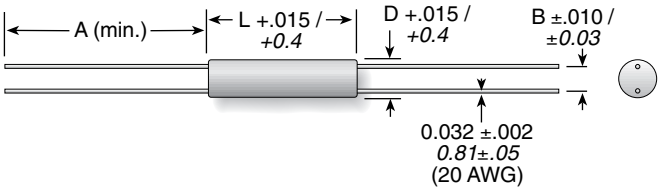
SERIES SPECIFICATIONS

Series	Wattage	Ohms
13	3	0.005-0.1
14	4.5	0.005-0.1
17	7	0.005-0.1

CHARACTERISTICS

Terminals	Tinned Copper Leads
Encapsulation	Silicone Molding Compound
Derating	Linearly from 100% at +25°C to 0% at +200°C
Resistance Range	0.005Ω to 0.100Ω standard
Standard Tolerance	±1%; others available
Operating Temp. Range	-55°C to +200°C
Temperature Coefficient of Resistance	(0°C to 85°C) ≥0.015Ω: ±50 PPM/°C; <0.015Ω: ±100 PPM/°C
Environmental Performance	Exceeds the requirements of MIL-PRF-49465
Power rating	Based on 25°C free air rating.
Overload	5 times rated wattage for 5 seconds
Max. Current	22 amps
Dialectric withstanding voltage	1500 VAC for 4.5 and 7 watt; 1000 VAC for 3 watt
Insulation resistance	Not less than 1000 MΩ
Thermal EMF	Less than ±2μV/°C

DIMENSIONS



Series	Wattage	Length	Diam.	A	B
13	3	0.625/15.9	0.200/5.08	1.25/31.8	0.125/3.18
14	4.5	1.060/26.9	0.335/8.51	1.50/38.1	0.200/5.08
17	7	1.500/38.1	0.375/9.53	1.50/38.1	0.200/5.08

ORDERING INFORMATION

Wattage — Terminals: Blank = 2 terminals, P = 4 terminals — RoHS Compliant

1 3 F P R 0 5 0 E

- 10 Series
- Tolerance: F = 1%, D = 0.5%
- Ohm Value: Example: R050 = 0.05Ω

Standard part numbers

Ohmic value	3 watt	4.5 watt	7 watt
0.005	13FPR005E	14FPR005E	17FPR005E
0.010	13FPR010E	14FPR010E	17FPR010E
0.015	13FPR015E	14FPR015E	17FPR015E
0.020	13FPR020E	14FPR020E	17FPR020E
0.025	13FPR025E	14FPR025E	17FPR025E
0.030	13FPR030E	14FPR030E	17FPR030E
0.040	13FPR040E	14FPR040E	17FPR040E
0.050	13FPR050E	14FPR050E	17FPR050E
0.060	13FPR060E	14FPR060E	17FPR060E
0.070	13FPR070E	14FPR070E	17FPR070E
0.075	13FPR075E	14FPR075E	17FPR075E
0.080	13FPR080E	14FPR080E	17FPR080E
0.090	13FPR090E	14FPR090E	17FPR090E
0.100	13FPR100E	14FPR100E	17FPR100E

14A Series

Alumina Body Current Sense

FEATURES

- Ideal for current sensing applications
- 1% Tolerance standard
- Fixed resistance measuring point
- Low inductance
- RoHS compliant

14AFR Current Sense resistors feature a high temperature ceramic body which affords the user higher power densities than similar products which utilize silicone based epoxy molding compounds. The internal construction involves a straight, low inductance, 3-piece welded metal element at 1% tolerance. This series is stocked in 9 popular resistance values for easy accessibility.

SERIES SPECIFICATIONS

Series	Wattage	Ohms
14A	4	0.004-0.051

CHARACTERISTICS

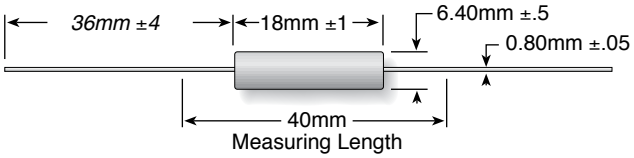
Terminals	Solder-plated copper terminals or copper clad steel depending on ohmic value.
Encapsulation	Ceramic cased body
Derating	Linearly from 4W@70°C to 0W@250°C
Max.Voltage	√(PxR) RMS
Climatic Category	55/200/56
TCR	Varies from +150 to +1100ppm/°C based on resistance value. TCR increases as resistance value reduces from 51 to 4milliohms. TCR is tested as per IEC Specification 115-1 Clause 4.8.4.2
Tolerance	±1% standard. Others available.
Power rating	4W@70°C
Dielectric withstanding voltage	1000 VRMS for 3 and 5 watt; 500 VRMS for 2 watt.
Insulation resistance	Not less than 1000MΩ.
Thermal EMF	Less than ±2μV/°C.
Temperature range	-55°C to 275°C.

(continued)

14A Series

Alumina Body Current Sense

DIMENSIONS

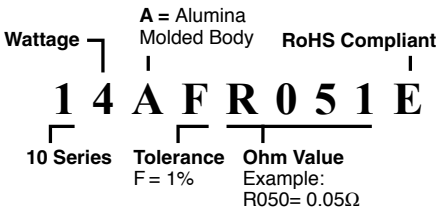


Series	Wattage	Length	Diam.	"M"	Lead
14A	4	0.709 / 18	0.252 / 6.40	1.575 / 40	0.031/0.80

PERFORMANCE CHARACTERISTICS

Test	Condition	Maximum ΔR
Endurance at Rated Power	1000hrs Test	ΔR <5%
Terminal Strength	Pull Strength of 50N for 10sec, IEC115-1, Clause 4.16 Test Ua1	
Solderability	95% Coverage as per MIL STD 202F, Test 208	
Resistance to Solder Heat	260°C for 10sec as per IEC115-1, Clause 4.18	ΔR <0.5%
Long Term Damp Heat	90-95% RH @40°C for 56 Days, IEC115-1, Clause 4.24	ΔR <5%
Climatic Sequence	As per IEC 115-1, Clause 4.23	ΔR <5%
Overload	5 times rated wattage for 5 seconds	

ORDERING INFORMATION

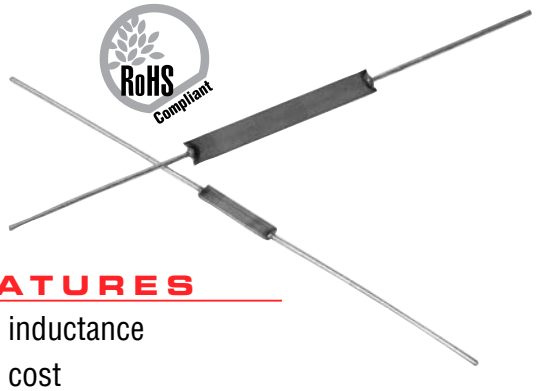


Standard part numbers

Ohmic value	Part Number
0.004	14AFR004E
0.005	14AFR005E
0.008	14AFR008E
0.010	14AFR010E
0.015	14AFR015E
0.022	14AFR022E
0.033	14AFR033E
0.047	14AFR047E
0.051	14AFR051E

60 Series

Two Terminal Metal Element Current Sense



These non-inductive, 3-piece welded element resistors offer a reliable low-cost alternative to conventional current sense products. With resistance values as low as 0.005Ω, and wattages from 0.1w to 3w, the 60 Series offers a wide variety of design choices.

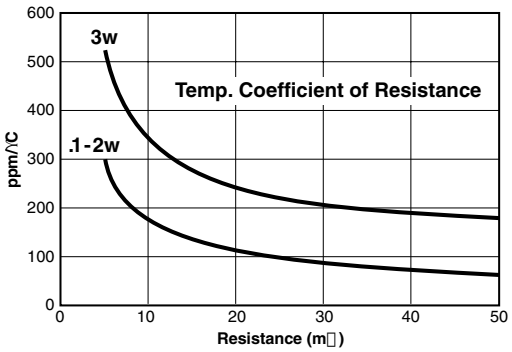
FEATURES

- Low inductance
- Low cost
- Wirewound performance
- Flameproof

CHARACTERISTICS

Resistor	Nichrome resistive element
Terminals	Copper clad steel or copper depending on style. RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Derating	Linearly from 100% @ +25°C to 0% @ +275°C
Tolerance	±3% standard, others available
Power rating	Based on 25°C ambient
Overload	5x rated power for 5 seconds
Inductance	<10nh
To calculate max amps	use the formula √(P/R)

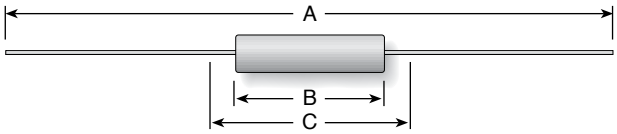
TCR as a function of resistance



ORDERING INFORMATION

(Partial listing; contact Ohmite for others)

Part Number	Watts	Ohms	Tolerance	Dimensions A (ref.)	B (max.)	C (±0.010)	Lead Ga.
600HR050E	0.1	0.05	3%	2.440	0.155	0.655	24
600HR033E	0.1	0.033	3%	2.440	0.155	0.655	24
600HR036E	0.1	0.036	3%	2.440	0.155	0.655	24
601HR027E	0.125	0.027	3%	2.440	0.155	0.655	24
601HR030E	0.125	0.03	3%	2.440	0.155	0.655	24
601HR025E	0.125	0.025	3%	2.440	0.155	0.655	24
602HR050E	0.2	0.05	3%	3.530	0.250	0.559	22
603HR005E	0.25	0.005	3%	2.440	0.155	0.655	24
603HR010E	0.25	0.01	3%	2.440	0.155	0.655	24
603HR015E	0.25	0.015	3%	2.440	0.155	0.655	24
603HR050E	0.25	0.05	3%	3.685	0.330	1.310	20
604HR010E	0.375	0.01	3%	3.530	0.250	0.559	22
604HR020E	0.375	0.02	3%	3.530	0.250	0.559	22
604HR025E	0.375	0.025	3%	3.530	0.250	0.559	22
604HR100E	0.375	0.01	3%	3.587	0.65	1.125	20
605HR010E	0.5	0.01	3%	3.685	0.355	1.310	20
605HR020E	0.5	0.02	3%	3.685	0.330	1.310	20
605HR030E	0.5	0.03	3%	3.685	0.330	1.310	20
605HR100E	0.5	0.1	3%	3.981	0.750	1.675	18
607HR050E	0.75	0.05	3%	3.587	0.630	1.106	20
607HR005E	0.75	0.005	3%	3.674	0.320	1.310	20
610HR005E	1	0.005	3%	3.587	0.650	1.125	20
610HR010E	1	0.01	3%	3.587	0.630	1.106	20
610HR020E	1	0.02	3%	3.587	0.630	1.106	20
610HR030E	1	0.03	3%	3.587	0.650	1.106	20
610HR050E	1	0.05	3%	3.981	0.750	1.675	18
615HR010E	1.5	0.01	3%	3.981	0.750	1.675	18
615HR020E	1.5	0.02	3%	3.981	0.750	1.675	18
615HR030E	1.5	0.03	3%	3.981	0.750	1.675	18
620HR005E	2	0.005	3%	3.981	0.750	1.675	18
630HR010E	3	0.01	3%	4.125	0.781	1.68*	18
630HR015E	3	0.015	3%	4.125	1.11	2	18
630HR025E	3	0.025	3%	4.125	1.279	2.125	18
630HR050E	3	0.05	3%	4.125	1.664	2.375	18



E = RoHS compliant

6 0 5 H R 0 2 0 E

- **Series**
- **Wattage**: 00 = 1/10, 01 = 1/8, 02 = 1/5, 03 = 1/4, 04 = 3/8, 05 = 1/2, 07 = 3/4, 10 = 1.0, 15 = 1.5, 20 = 2.0, 30 = 3.0
- **Tolerance**: F = 1%, H = 3%, J = 5%
- **Ohms**: R005 = .005, R010 = .01, R020 = .02, R050 = .05, R100 = 0.10

*Reference dimensions; contact Ohmite for details

60 Series

Four Terminal Bare Element

Ohmite's Four Terminal Bare Element Resistors provide ultra low resistance values (to 0.0005Ω) for relatively high current requirements, with the advantages of a Kelvin configuration and PC Board mounting capability.

These shunt resistors are specifically designed for low resistance applications requiring the highest accuracy and temperature stability. This Four Terminal version of Ohmite's 60 Series Resistor is specially designed for use in a Kelvin configuration, in which a current is applied through two opposite terminals and sensing voltage is measured across the other two terminals.

The Kelvin configuration enables the resistance and temperature coefficient of the terminals to be effectively eliminated. The four terminal design also results in a lower Temperature Coefficient of Resistance and lower self heating drift which may be experienced on two terminal resistors. The requirement to connect to the terminals at precise test points is eliminated, allowing for tighter tolerancing on the end application.

FEATURES

- Ideal for current sensing applications
- 1% tolerance standard, others available
- Low inductance (non-inductive below 0.05Ω)
- RoHS compliant
- Radial, self-supporting, design is ideal for PC board mounting
- High Power-to-size ratio
- Decimal marked, silicone coated (650 Series only)

SERIES SPECIFICATIONS

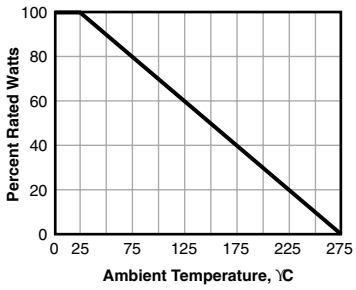
Series	Wattage	Resistance Range (Ω)*	Amps max.	Tolerance*
610	1W	0.002-0.050	32	1%
650	5W	0.002-0.005	100	1%

*Standard; others available

CHARACTERISTICS

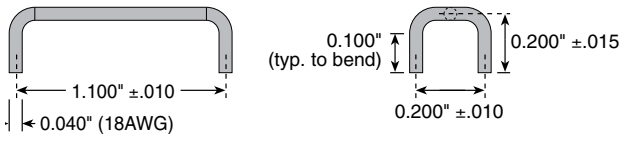
Terminals	Tinned Copper
Resistive element	Manganin Alloy
Operating Temperature Range	-55°C to +275°C.
Temperature Coefficient of Resistance	0°C to 85°C: ±50 PPM/°C, .015Ω and higher; ±100 PPM/°C, .015Ω and lower
Environmental Performance	Exceeds the requirements of MIL-PRF-49465
Power rating	Based on 25°C free air rating
Overload	5 times rated wattage for 5 seconds
Thermal EMF	Less than ±3μV/°C
Derating	Linearly from 100% @ +25°C to 0% @ 275°C

Derating

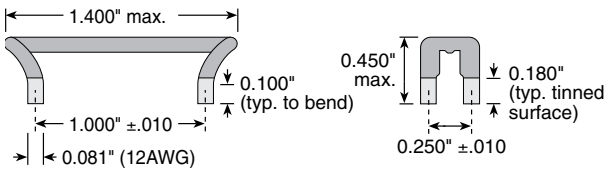


DIMENSIONS

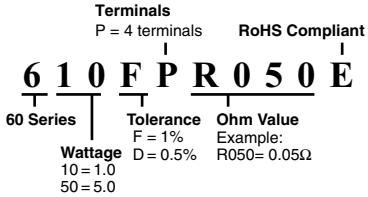
610 Series (1 watt)



650 Series (5 watt)



ORDERING INFORMATION

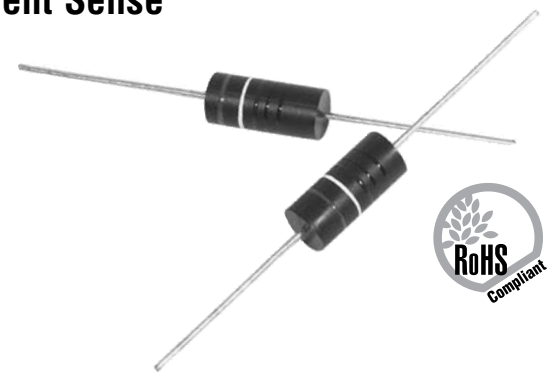


Stdandard part numbers

Ohmic value	610 Series 1 watt	650 Series 5 watt
0.002	610FPR002E	650FPR002E
0.005	610FPR005E	650FPR005E
0.010	610FPR010E	–
0.015	610FPR015E	–
0.020	610FPR020E	–
0.025	610FPR025E	–
0.036	610FPR036E	–
0.050	610FPR050E	–

WL Series

Miniature Wirewound Current Sense



FEATURES

- Ultra-low ohmic value series for Current Sensing applications
- Very low inductance (<1nH at 1MHz Test)
- Miniaturized dimensions, Better power to dimension ratios
- Use of the highest quality standard (96% Alumina) ceramic core
- Manufacturing process–Wire winding/Spot Welding–by Computer Numerical Control (CNC) machine tools to ensure consistency of product quality.
- Encapsulated by epoxy molding compound
- Advanced IC encapsulation mold/die technologies

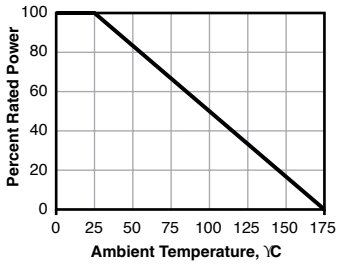
SERIES SPECIFICATIONS

Type	Power Rating (watts)	Resistance Range (Ω)
WLA	0.5	0.005-0.100
WLB	1	0.005-0.100
WLC	2	0.010-0.100

CHARACTERISTICS

Ceramic Core	CeramTec Rubalit® 96% alumina
End Caps	Stainless steel, precision formed
Leads	Copper wire, 100% Sn (Lead Free) coated
Resistance Wire	CN49W alloy TC ±20ppm/°C
Encapsulation	SUMICON 1100/1200 Epoxy molding compound for IC encapsulation
Standard Tolerance	F (1.0%), J (5.0%)
Temperature Coefficient	±300ppm/°C for ≤0.03Ω; ±100ppm/°C for ≥0.033Ω
Maximum Working Voltage	√PxR

Derating



PERFORMANCE DATA

Test	Conditions Of Test	Performance
Thermal Shock	Rated power applied until thermal stability, -55°C +0°C,-5°C,15min.	±2.0%
Short-time Overload	5 times rated wattage for 5 seconds	±2.0%
Solderability	Method 208 of MIL-STD-202	±2.0%
Terminal Strength	Pull test:10 pounds, 5 to10 seconds, Twist test: 1080°, 5 second/rotation	±1.0%
Dielectric Withstanding Voltage	500 Volts rms for 1W. 1 minute	±1.0%
High Temperature Exposure	Exposed to an ambient temperature of 275 +5/-0°C for 250 ±8 hours,	±5.0%
Moisture Resistance	MIL-STD-202 Method 106, 7b not applicable	±2.0%
Low Temperature Storage	Cold chamber at a temperature of -65 ±2°C for 24 ±4 hours	±2.0%
Vibration, High Frequency	Frequency varied 10 to 2000Hz, 200G peak, 2 directions 6 hours each	±1.0%
Load Life	1000/2000 hours at rated power, +25°C, 1.5 hours “On”, 0.5 hours “Off”	±5.0%

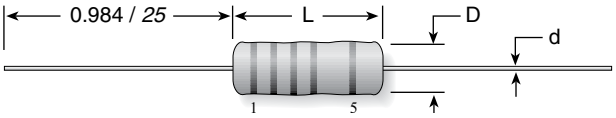
(continued)

WL Series

Miniature Wirewound Current Sense

DIMENSIONS

(in./mm)



Type	Power Rating (watts)	L	D	d
WLA	0.5	5.08 / 0.200	2.54 / 0.100	0.60 / 0.024
WLB	1	7.00 / 0.276	3.30 / 0.130	0.60 / 0.024
WLC	2	11.4 / 0.450	4.57 / 0.180	0.80 / 0.031

ORDERING INFORMATION

RoHS compliant

W L A R 0 1 0 F E - T

Series	Power	Ohms	Tolerance	Package
	A = 0.5 B = 1 C = 2		F = 1% J = 5%	T = Tape blank = 25pc Pack

Standard Part Numbers for WL Series

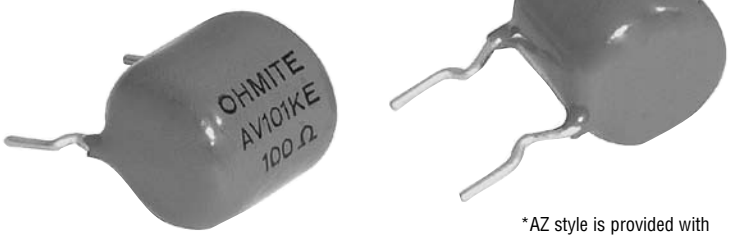
Wattage:	0.5	1.0	2.0
Series:	WLA	WLB	WLC
Ohms			
0.005	WLAR005FE	WLBR005FE	
0.01	WLAR010FE	WLBR010FE	WLCR010FE
0.015	WLAR015FE	WLBR015FE	WLCR015FE
0.02	WLAR020FE	WLBR020FE	WLCR020FE
0.025	WLAR025FE	WLBR025FE	WLCR025FE
0.03	WLAR030FE	WLBR030FE	WLCR030FE
0.05	WLAR050FE	WLBR050FE	WLCR050FE
0.10	WLAR100FE	WLBR100FE	WLCR100FE

Key to five-band code

Band	1	2	3		4		5	
Color		Digit			Multiplier		Tolerance	
Black	0	0	0	x	1Ω			
Brown	1	1	1	x	10Ω	±	1%	(F)
Red	2	2	2	x	100Ω	±	2%	(G)
Orange	3	3	3	x	1KΩ			
Yellow	4	4	4	x	10KΩ			
Green	5	5	5	x	100KΩ	±	0.5%	(D)
Blue	6	6	6	x	1MΩ	±	0.25%	(C)
Violet	7	7	7	x	10MΩ	±	0.10%	(B)
Grey	8	8	8			±	0.05%	
White	9	9	9	x	0.001Ω			
Gold				x	0.1Ω	±	5%	(J)
Silver				x	0.01Ω	±	10%	(K)

A Series

PulsEater® Ceramic Composition Available in E12 Ohmic values



*AZ style is provided with dual terminal wires

The "A" Series non-inductive, ceramic composite resistors are designed for a variety of applications where high energy handling capabilities are crucial. These resistors are ideal for any application which is subject to surges, high peak power, or impulse energy.

Their unique design allows uniform distribution of energy throughout their structure which results in low thermal stress. The high-temperature, solvent-resistant epoxy coating carries a UL94V0 flammability rating which is suitable for almost any environment.

FEATURES

- High Surge Energy
- Non-Inductive
- Small Size

APPLICATIONS

- Motor Drives
- Power Supplies, UPS
- Power Conversion
- In-Rush Current Limiting

SERIES SPECIFICATIONS

Series	Resistance[1] (ohms)	P avg.[2] (watts)	Impulse Voltage[3] (volts)	Energy[4] (joule)
AV	3.3 to 10K	2.0	1000	250
AW	4.7 to 15K	2.5	1500	400
AX	1.0 to 3.3K	3.5	1000	700
AY	2.2 to 6.8K	4.5	2000	1400
AZ	1.5 to 4.7K	5.5	2500	2800

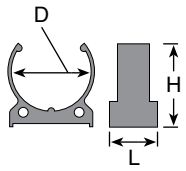
[1]E12 Standard Values ±10%; [2]Free Air 40°C Ambient; [3]In Air; [4]Single Impulse

CHARACTERITICS

Resistance Element	Bulk Ceramic
Terminals	Radial; 100% Sn solder coated radial (60/40 solder available upon request)
Coating	UL94V0, solvent resistant epoxy
Tolerance	±10% Standard
Operating Temp. Range	-55°C to 150°C
Derating	Derates linearly from 100% @ 50°C to 0% @ 150°C
Temperature Rise	100°C @ 100% rated power, 50°C ambient

Parameter	Max. ΔR	Test Method
Life Test	+5%	MIL-STD-202F, method 108A. except 50°C, 1000 hrs. @ rated power; 1.5 hrs. ON, 0.5 hrs. OFF
Single Pulse Energy	±1.5%	Single pulse, capacitor discharge at Rated Energy; 350VDC for AW and AX sizes; 650VDC for AY and AZ sizes.
Repetitive HV Pulsing	±2.0%	10 joules @ 5.OKV, 10,000 cycles
Short-time Overload	±1.5%	10x rated power. 5 sec. ON, 5 sec. OFF, 5 cycles
Short-term High Temp	±1.5%	250°C for 30 seconds
Long-term High Temp	±2.0%	1000 hours @ 150°C
Thermal Shock Cycle	±2.0%	MIL-STD-202F, method 107D. -55°C to +125°C, 5 cycles
Moisture Resistance	±1.0%	90% to 95% rh @ 40°C, 1000 hrs.

Mounting clip



Part No.	Dim. (mm) D	H	L	for Series	Color
5911E	20	23	13	AX and AY	White
5910E	25	26	15	AZ	Black

This saddle clip conforms to the configuration of Ohmite's A Series resistor to provide secure mounting. Made of a durable thermoplastic polyester, the saddle clip is designed to secure the A Series in place while safely withstanding its operating temperatures. Use (2) saddle clips per resistor for extra stability.

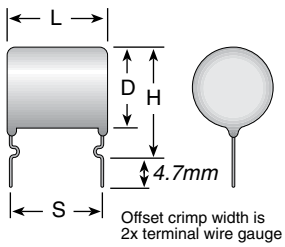
(continued)

A Series

PulsEater® Ceramic Composition
Available in E12 Ohmic values

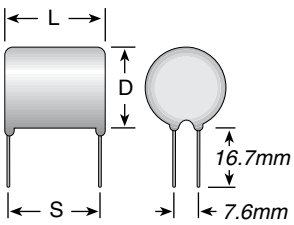
DIMENSIONS

AV - AY



Offset crimp width is 2x terminal wire gauge

AZ



AZ series also available with crimps upon request

Series	P avg.2 (watts)	L max. (mm)	D max. (mm)	H max. (mm)	S norm. (mm)	Term. wire gauge (AWG)	Weight (g)
AV	2.0	15	13	22	12.5	20	3.9
AW	2.5	20	13	19	17.5	20	5.4
AX	3.5	15	21	26	12.5	18	10
AY	4.5	25	21	26	22.5	18	19
AZ	5.5	30	26		27	18	33

ORDERING INFORMATION

RoHS compliant

A W 5 6 G K E

Size — **Ohm Value** — **Tolerance**

Ohm Value Example:
33G = 3.3 Ohms
330 = 33 Ohms
331 = 330 Ohms

Tolerance
K = 10% std.
M = 20%

Standard Values

Ohmic value	Part No. Prefix ➤ Suffix ▼	AV	AW	AX	AY	AZ
1.0	10GK			✔		
1.2	12GK					✔
1.5	15GK					✔
1.8	18GK				✔	
2.2	22GK			✔	✔	
2.7	27GK					
3.3	33GK	✔		✔	✔	✔
3.9	39GK			✔		✔
4.7	47GK	✔	✔		✔	
5.6	56GK					
6.8	68GK		✔			
8.2	82GK				✔	
10	100K	✔	✔	✔	✔	✔
12	120K					
15	150K	✔	✔		✔	
18	180K					
22	220K	✔	✔	✔	✔	✔
27	270K		✔			
33	330K		✔	✔	✔	✔
39	390K	✔	✔		✔	✔
47	470K	✔	✔		✔	
56	560K		✔		✔	
68	680K		✔		✔	✔
82	820K				✔	
100	101K	✔	✔	✔	✔	✔
120	121K					
150	151K	✔	✔		✔	
180	181K					
220	221K	✔	✔			✔
270	271K					
330	331K			✔	✔	✔
470	471K	✔	✔		✔	
560	561K					
680	681K		✔		✔	
820	821K		✔		✔	
1000	102K	✔	✔	✔	✔	✔

Check product availability at **www.ohmite.com**

✔ = Standard values Non-standard values subject to a minimum handling charge per item.

EY Series

Ceramic Composition
10% Tolerance

FEATURES

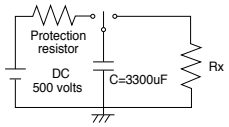
- Suitable for automatic machine insertion
- Ideal for high energy/high peak power applications
- Products with lead-free terminations meet EU RoHS requirements
- Higher reliability against disconnection compared to wirewound resistors and film resistors

SERIES SPECIFICATIONS

Series	Watts max.*	Resistance range	Tolerance	Joules max.**	Max. working volts
EY	2.5	10Ω - 390KΩ	±10%	400	550

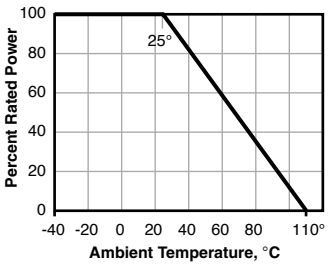
* at 25°C. **For a single impulse.

CHARACTERITICS

Test	Condition	Requirement ΔR ±(+0.05Ω)
Resistance	**Resistance** / **Measurement voltage** (25°C) 3.3Ω~8.2Ω 0.3V 10Ω~82Ω 1.0V 100Ω~390kΩ 3.0V	Within regulated to tolerance
TCR	+25°C/-40°C and +25°C/+125°C	<100Ω: -900+/- 300ppm ≥100Ω: -1200+/-300ppm
Voltage Coefficient	Rated voltage and rated voltage x 10% (Apply for over 1kΩ)	0~-0.05%/V
Overload	Rated voltage x 2.5 or maximum overload voltage for 5s, whichever less	±2% limit; 0.4% typical
Single impulse rating	The resistor mounted to the test circuit at right. Single impulse test of 10 ohm resistor resulting in 3.3ms.	±5% 
Resistance to soldering heat	350°C±10°C, 3.5s±0.5s	±2% limit; 0.8% typical
Rapid change of temperature	-40°C(30min.)/+85°C(30min.), 5 cycles	±2% limit; 0.4% typical
Moisture resistance	40°C±2°C, 90%~95%RH, 1000h, 1.5h ON/0, 5h OFF cycles	±5% limit; 0.6% typical
Load life	40°C±2°C, 1000h, 1.5h ON/0, 5h OFF cycles	±5% limit; 0.4% typical
Resistance to Solvent	Dipping in IPA or Xylene for 3 minutes and leaving for 10 minutes after removing drops, then brushing 10 times.	No abnormality in appearance. Marking shall be easily legible.
Pulse Tolerance	200V, 112 Joules, 10000 cycles, 5600uf capacitor discharge, 26 second rest time	±2%

Power Rating	Based on 25°C free air rating
TCR	-900±300: R<100Ω -1200±300: R≥100Ω
Voltage	Abs. max. working: 550V Abs. max. overload: 1100V Abs. max. pulse: 25kV
Operating Temp. Range	-40°C to +110°C
Tolerance	±10% standard

Derating



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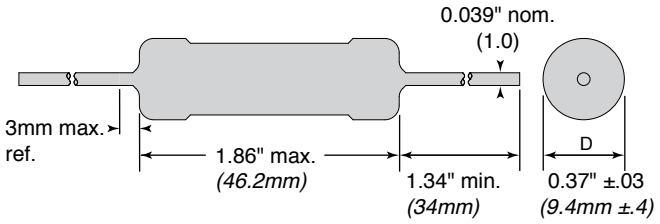
EY Series

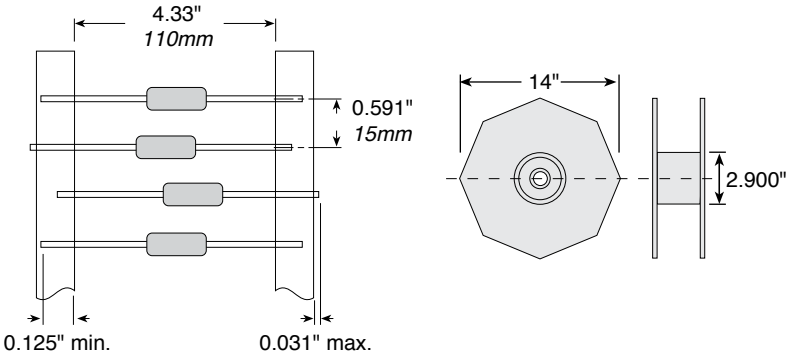
Ceramic Composition
10% Tolerance

DIMENSIONS

in./mm



Tape and Reel Dimensions



ORDERING INFORMATION

Packaging
TR = tape & reel
B = bulk

RoHS Compliant

E Y 1 0 1 K E -TR

Series

Ohm Value
Example:
100 = 10Ω
101 = 100Ω
102 = 1,000Ω

Tolerance
K= 10% Standard

Standard values

EY100KE	EY471KE
EY150KE	EY681KE
EY180KE	EY102KE
EY270KE	EY152KE
EY330KE	EY272KE
EY470KE	EY472KE
EY680KE	EY103KE
EY101KE	EY153KE
EY151KE	EY473KE
EY271KE	EY104KE

OX/OY Series

Ceramic Composition
10% Tolerance

The OX/OY Series of fixed ceramic resistors are ideal for circuitry associated with surges, high peak power or high energy. They offer enhanced performance in high voltage power supplies, R-C snubber circuits, and inrush limiters. The OX/OY resistors can often replace carbon composition resistors which can be difficult to source.

FEATURES

- Replaces 1 and 2 watt carbon composition resistors
- Meets high energy density demands
- High peak power
- 10% Tolerance

SERIES SPECIFICATIONS

Series	Watts max.*	Resistance range	Joules max.**	Max. working volts
OX	1	3.3Ω-100K	50	300
OY	2	3.3Ω-1M	80	400

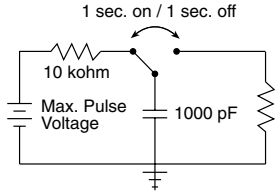
* at 70°C. **For a single impulse.

CHARACTERITICS

Terminals	Pb-free solder-coated axial
Coating	Silicone ceramic
Derating	Linear from 100% @ +70°C to 0% @ +200°C
Operating Temp. Range	-40°C to +220°C
Tolerance	±10% standard
Power Rating	Based on 70°C free air rating
Temperature Coefficient	-1300 ±300ppm/°C.

	OX	OY
Max Working Voltage	300V	400V
Dielectric Strength	500V	700V
Max Overload Voltage	600V	800V
Max Pulse Voltage[1]	14KV	20KV
Pulse Tolerance, 100 pulses	1240V @ 52µF, 40J/ 35 sec.	1640V @ 52µF, 70J/35 sec.

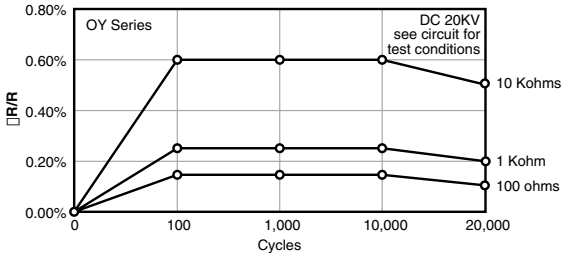
[1]See figures

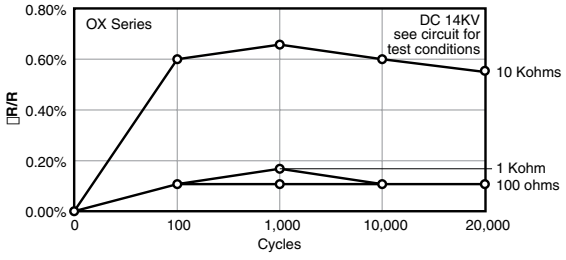


14KV and 20KV values used in circuit as shown; full voltage not applied directly to resistor.

Test	Condition	Maximum ΔR
Life Test	MIL-STD-202, Method 108	±5%
Short Time Overload	2x rated V, 5 sec ON @ 70°C	±(2% +0.05Ω)
Resistance to Pulse[1]	20,000 cycles. See circuit for test conditions	±5%
Thermal Shock	MIL-STD-202, Method 107	±(2% ±0.05Ω)
Moisture Resistance	1000 hrs @ 40°C, 90 - 95% RH	±5%

Resistance to Pulse





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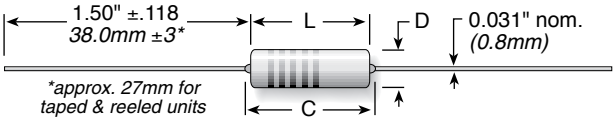
OX/OY Series

Ceramic Composition
10% Tolerance

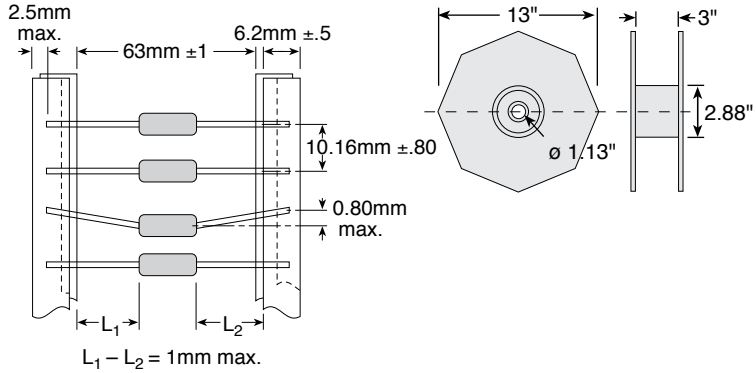
DIMENSIONS

in./mm



Series	Length L ±.039 (±1.0)	Length C max.	Diameter D ±.039 (±1.0)	Qty. per reel
OX	0.65 / 16.5	0.748 / 19.0	0.217 / 5.5	1000
OY	0.748 / 19.0	0.886 / 22.5	0.276 / 7.0	500

Tape and Reel Dimensions



ORDERING INFORMATION

Standard part numbers for OX/OY Series

Ohmic value	Part No. Prefix ➤ Suffix ▼	Wattage 1 OX–	Wattage 2 OY–
3.3	—33GKE	✔	✔
3.9	—39GKE	✔	✔
4.7	—47GKE	✔	✔
5.6	—56GKE	✔	✔
6.8	—68GKE	✔	✔
8.2	—82GKE	✔	✔
10	—100KE	✔	✔
12	—120KE	✔	✔
15	—150KE	✔	✔
18	—180KE	✔	✔
22	—220KE	✔	✔
27	—270KE	✔	✔
33	—330KE	✔	✔
39	—390KE	✔	✔
47	—470KE	✔	✔
56	—560KE	✔	✔
68	—680KE	✔	✔
82	—820KE	✔	✔
100	—101KE	✔	✔
120	—121KE	✔	✔
150	—151KE	✔	✔
180	—181KE	✔	✔
220	—221KE	✔	✔
270	—271KE	✔	✔
330	—331KE	✔	✔
390	—391KE	✔	✔
470	—471KE	✔	✔
560	—561KE	✔	✔
680	—681KE	✔	✔
820	—821KE	✔	✔
1000	—102KE	✔	✔
1200	—122KE	✔	✔
1500	—152KE	✔	✔
1800	—182KE	✔	✔
2200	—222KE	✔	✔
2700	—272KE	✔	✔
3300	—332KE	✔	✔
3900	—392KE	✔	✔
4700	—472KE	✔	✔
5600	—562KE	✔	✔
6800	—682KE	✔	✔
8200	—822KE	✔	✔
10000	—103KE	✔	✔
12000	—123KE	✔	✔
15000	—153KE	✔	✔
18000	—183KE	✔	✔
22000	—223KE	✔	✔
27000	—273KE	✔	✔
33000	—333KE	✔	✔
39000	—393KE	✔	✔
47000	—473KE	✔	✔
56000	—563KE	✔	✔
68000	—683KE	✔	✔
82000	—823KE	✔	✔
100000	—104KE	✔	✔
120000	—124KE		✔
150000	—154KE		✔
180000	—184KE		✔
220000	—224KE		✔
270000	—274KE		✔
330000	—334KE		✔
390000	—394KE		✔
470000	—474KE		✔
560000	—564KE		✔
680000	—684KE		✔
820000	—824KE		✔
1 MEG	—105KE		✔

Packaging
TR = tape & reel
B = bulk

RoHS Compliant

O X 8 2 G K E -TR

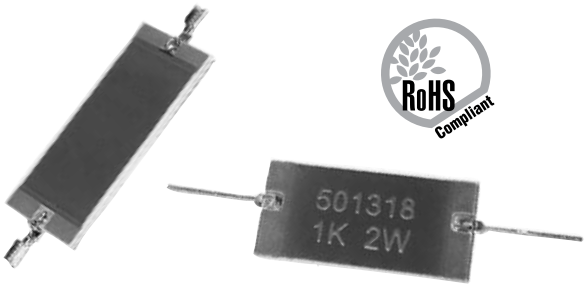
Size
OX = 1W
OY = 2W

Ohm Value
Example:
33G = 3.3 Ohms
330 = 33 Ohms
331 = 330 Ohms

Tolerance
K = 10% Standard

TFS Series

Surge Capable
Thick Film Non Inductive



RoHS Compliant

FEATURES

- Appropriate for medical surge protection applications
- Ideal to replace standard carbon composition resistors
- Custom dimensions, values, tolerances and characteristics available

The TFS Series has been specifically developed to absorb large amounts of energy by efficient use of its compact mass. Ideal for medical surge protection applications, these thick film resistors offer non-inductive performance in an axial package.

Uses include power supply conversion, electron microscopes, X-ray systems, high-resolution CRT displays, and geophysical instrument related products.

SERIES SPECIFICATIONS

Type	U (KV)	Energy* (J)	Power (W)
TFSA	3	6	0.5
TFSB	3.5	9	0.5
TFSC	4	11	0.75
TFSD	7	33	1
TFSE	7	44	1.5
TFSF	11	55	2

*Published energy rating is for 10ms pulse. For shorter pulses energy rating has to be derated according to Max. Individual Pulse Rating chart and Single Pulse Energy Rating considerations.

CHARACTERISTICS

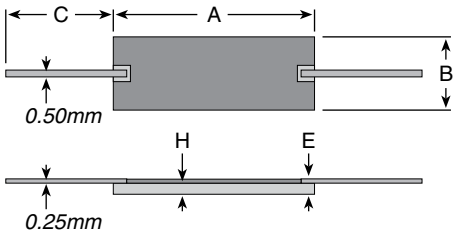
Resistive Element	Thick Film
Encapsulation	Screen Printed Glass
Resistance Value	100Ω up to 100KΩ
Temperature Coefficient	100ppm/°C
Tolerance	1%, 2%, 5%, 10%
Operating Temperature	-55°C to +200°C
Test	VDE 0750 (Pulse Duration 10 msec)

Notes

- Momentary overload capability is 5 times rated power for 1 second or 2 times rated power for 5 seconds. Always verify designs with pulse and surge conditions through thorough testing of the design at maximum operating temperature and maximum pulse loading (or some margin above maximum pulse loading).
- Damage to the resistor by excessive pulse loading is generally indicated by an increasing resistance of the resistor.
- Energy ratings are based on single pulses (at least 1 minute between pulses).
- For multiple pulse applications the energy pulse rating should be reduced and the average power should not exceed the nominal power rating of the selected model.
- See Single Pulse Energy section for more information

DIMENSIONS

mm



Type	Watts	A	B	C	H	E
TFSA	0.5	9	5.5	10	0.7	1.1
TFSB	0.5	11	5.5	10	0.7	1.1
TFSC	0.75	13	5.5	10	0.7	1.1
TFSD	1	21	8	10	0.9	1.3
TFSE	1.5	21	10.5	10	0.9	1.3
TFSF	2	26	10.5	10	0.9	1.3

(continued)

TFS Series

Surge Capable
Thick Film Non Inductive

SINGLE PULSE ENERGY RATING

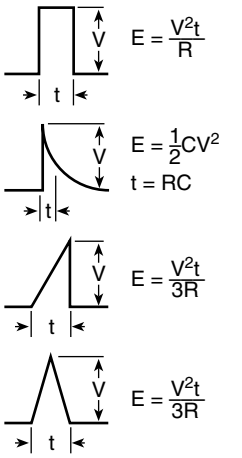
Although Ohmite's TFS Series resistors have been specially designed and developed to absorb much more energy than standard resistors, pulses and transients require special consideration since they cause an instantaneous temperature rise in the resistor film. This application note can guide you through these considerations.

For applications with transients, pulses or surges the following must be considered:

1. Do not exceed the normal rated operating voltage of the device.
2. Using the figure at right, estimate the energy (E_a) and the pulse duration (t_a) for a single pulse in your application.
3. Calculate the energy ratio in percent (E_r) between the nominal energy rating of the model you have chosen (see table) and the single pulse energy in your application (E_a from step 2) using the formula:

$$E_r = \frac{E_a}{E_{nominal}} \times 100$$

4. Refer to the Pulse Chart. On this chart find the point where the energy ratio (E_r), found at step 3, and time (t_a) coincide. Qualify that this point falls below the maximum pulse energy curve. If the point is above the curve a bigger model should be chosen.



E = Energy (joules)
t = Time (seconds)
V = Voltage (volts)
R = Resistance (ohms)
C = Capacitance (farads)

Example

A 1μF capacitor is charged to 3.5kV and model TFSC, 1KOhm has been selected. Model TFSC is rated for 4kV, so the peak voltage of 3.5kV is acceptable.

$$E_a = \frac{1}{2}CV^2 = 6.1J$$

$$t_a = R\,C = 1\text{ ms}$$

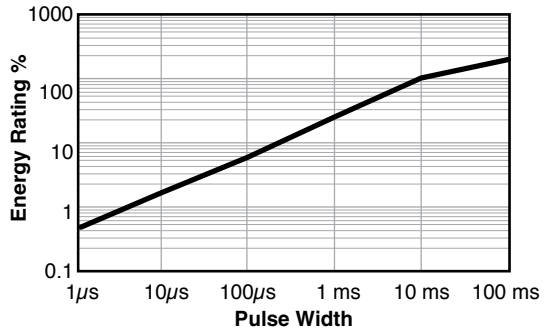
$$E_r = \frac{6.1J}{11J} \times 100 = 55\%$$

According to the pulse chart, an energy ratio of 55% for a pulse width of 1ms falls well above the energy curve. The limit is actually located around 25-30%. Model TFSC cannot be used for this application.

A bigger model should be chosen, for example TFSD. Model TFSD, 1KOhm, can be used for this application because we have an energy ratio E_r of 18%, which is below the energy curve.

$$E_r = \frac{6.1J}{33J} \times 100 = 18\%$$

Maximum Individual Pulse Rating



ORDERING INFORMATION

RoHS Compliant

T F S A 1 0 0 K J E

Series	Energy Rating (joules)	Ohm Value	Tolerance
	A = 6 D = 33	Example:	F = 1%
	B = 9 E = 44	100R = 100Ω	G = 2%
	C = 11 F = 55	2K40 = 2400Ω	J = 5%
			K = 10%

Standard Part Numbers for TFS Series

Ohms	Tol.	6 Joules 0.5 Watts	9 Joules 0.5 Watts	11 Joules 0.75 Watts	33 Joules 1 Watts	44 Joules 1.5 Watts	55 Joules 2 Watts
100	1%	TFSA100RFE					
100	5%		TFSB100RJE		TFSD100RJE		TFSF100RJE
220	1%	TFSA220RFE					
270	5%	TFSA270RJE		TFSC270RJE	TFSD270RJE		TFSF270RJE
470	1%	TFSA470RFE					
470	5%		TFSB470RJE			TFSE470RJE	
680	5%	TFSA680RJE		TFSC680RJE		TFSE680RJE	TFSF680RJE
750	5%		TFSB750RJE		TFSD750RJE		TFSF750RJE
1,000	1%	TFSA1K00FE					
1,000	5%	TFSA1K00JE	TFSB1K00JE	TFSC1K00JE	TFSD1K00JE	TFSE1K00JE	TFSF1K00JE
1,500	5%	TFSA1K50JE		TFSC1K50JE	TFSD1K50JE		TFSF1K50JE
2,200	1%	TFSA2K20FE					
2,700	5%		TFSB2K70JE			TFSE2K70JE	
4,700	1%	TFSA4K70FE					
4,700	5%	TFSA4K70JE		TFSC4K70JE	TFSD4K70JE		
4,990	1%	TFSA4K99FE					
5,000	5%	TFSA75K0JE					
6,800	5%		TFSB6K80JE			TFSE6K80JE	
10,000	1%	TFSA10K0FE					
10,000	5%	TFSA10K0JE	TFSB10K0JE	TFSC10K0JE	TFSD10K0JE		TFSF10K0JE
16,000	5%						TFSF16K0JE
20,000	1%	TFSA20K0FE					TFSF20K0JE
20,000	5%		TFSB20K0JE		TFSD20K0JE		
22,000	1%	TFSA22K0FE					
27,000	5%	TFSA27K0JE		TFSC27K0JE		TFSE27K0JE	
47,000	1%	TFSA47K0FE					
50,000	5%	TFSA50K0JE					TFSF51K0JE
51,000	5%		TFSB51K0JE	TFSC51K0JE	TFSD51K0JE		
75,000	5%					TFSE75K0JE	
100,000	1%	TFSA100KFE					
100,000	5%		TFSB100KJE	TFSC100KJE	TFSD100KJE		TFSF100KJE

TP Series

High Energy
Thick Film on Alumina Substrate

TP Series high energy resistors offer the user the benefits of non-inductive performance and high power density. As an added feature, they provide the impulse energy capability normally associated with wirewound or composition resistors. Double-sided screen printing of pulse-tolerant thick film ink, coupled with a sophisticated scan-cut laser trimming process, maximize the energy withstanding capabilities of the TP Series.

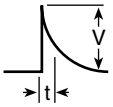
FEATURES

- High-Temp Terminal Construction
- Wide Resistance Range
- Low Inductance (50nH-100nH)
- High Power Density
- Easy to install. PC-mountable

CHARACTERISTICS

Substrate	Alumina
Resistor	Thick Film
Coating	Glass
Terminals	Solder Plated Phosphor Bronze
Thermal Conductivity	20 Watts/Meter/°C
Temperature Coefficient	1 to 100Ω: 100 ppm/°C 101Ω and up: 50 ppm/°C
Tolerance	±1%, ±5% and ±10%
Power Rating	Based on 25°C free air
Resistance Range	10 ohms to 1M ohm. Consult factory for other values
Maximum Operating Voltage	350 VAC, 500 VDC through glass
Energy Rating	100J: 100ms pulse with 100uF capacitor, not to exceed 1500 volts
Derating	100% @ 25°C to 0% @ 180°C ambient.

Pulse



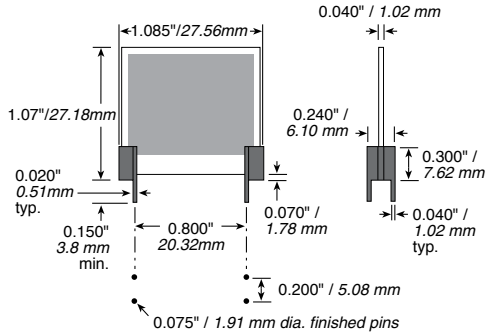
$E = \frac{1}{2}CV^2$

$t = RC$

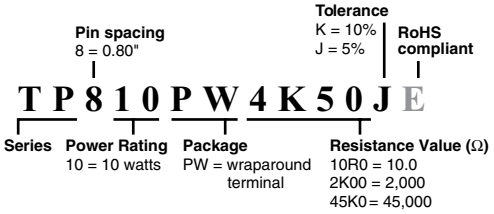
E = Energy (joules)
t = Time (seconds)
V = Voltage (volts)
R = Resistance (ohms)
C = Capacitance (farads)

DIMENSIONS

(±.020 in. / ±.508mm)



ORDERING INFORMATION



Standard part numbers for TP series

TP810PW10R0JE
TP810PW20R0JE
TP810PW50R0JE
TP810PW100RJE
TP810PW470RJE
TP810PW1K00JE
TP810PW4K70JE
TP810PW10K0JE

High Energy Wirewound

Axial Terminal / Surface Mount / Heat Sinkable Packaging

Ohmite Manufacturing's family of High Energy Wirewound Resistors employ special winding techniques to maximize the effective joule rating of each resistor. Most wirewound resistors are wound with the objective of meeting the stated power (wattage) rating and keeping cost low through the use of automatic winding equipment. Typically, manufacturers will allow substitution of resistance wire, depending on material availability. On tight tolerance wirewounds some type of abrasive adjustment to the resistance wire is often used to maximize production yields. Both of these procedures can adversely affect the joule rating and fusing current of a wirewound resistor, and this is often the reason that the manufacturer does not publish a fixed joule rating.

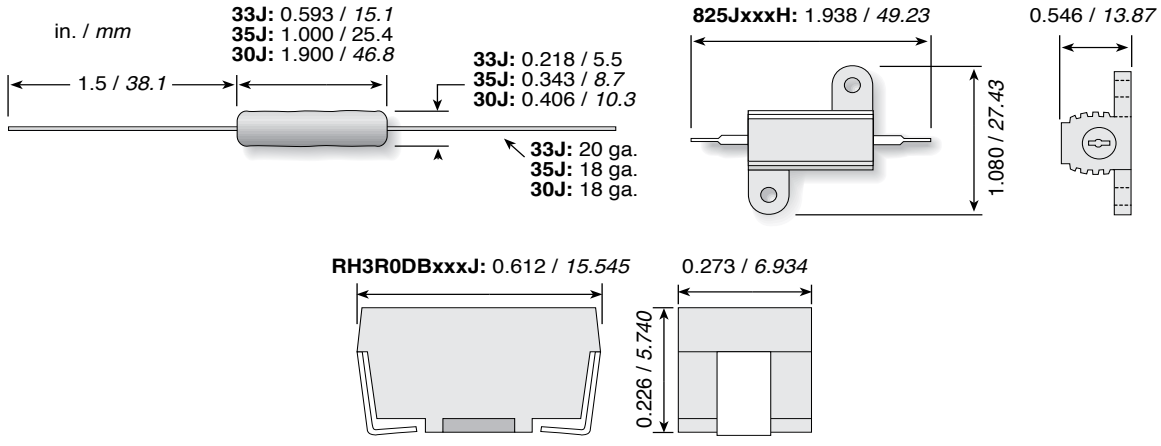
Ohmite High Energy Wirewounds are hand wound in order to maintain the tightest possible pitch (space between windings) and thereby maximize the mass of the resistive element. Since no wire substitutions are allowed, and no abrasive adjusting is permitted in this family, Ohmite can publish a fixed joule rating and fusing current for each part number in the series.

This technique can be applied to any wirewound product. In order to provide the broadest selection of packaging, Ohmite has developed standard offerings in three different package types-axial, SMD, and heat sinkable. Other sizes and types can be quoted on request, such as tubular power resistors.

SERIES SPECIFICATIONS

Series	Type	Watts	Tolerance	Voltage
33Jxxx	Axial	3	5%	200
35Jxxx	Axial	5	5%	460
30Jxxx	Axial	10	5%	1000
825JxxxH	Heat Sinkable	25	5%	520
RH3R0DBxxxJ	Surface Mount	3	5%	200

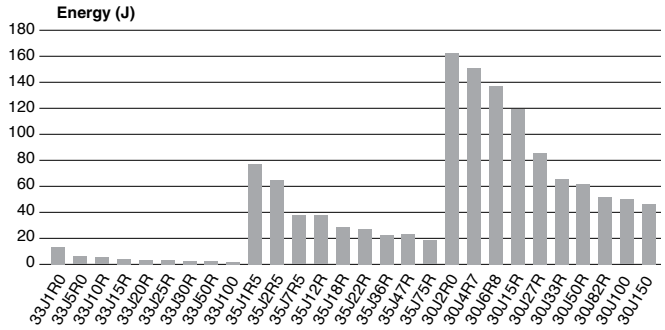
DIMENSIONS

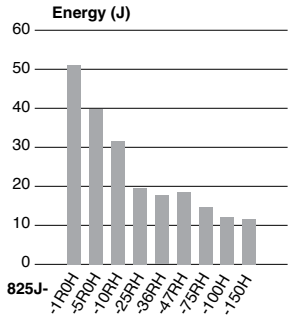


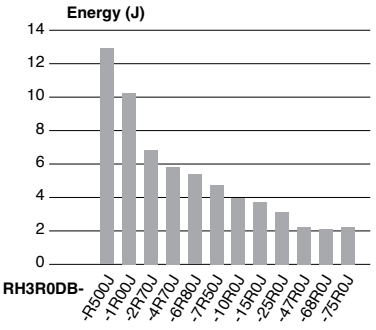
High Energy Wirewound

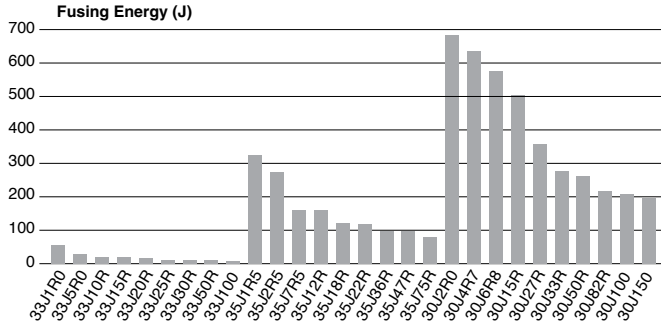
Axial Terminal / Surface Mount / Heat Sinkable Packaging

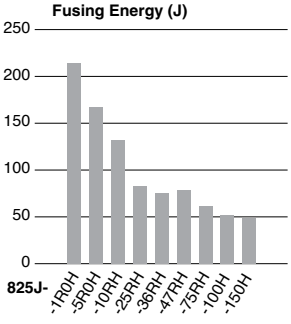
PERFORMANCE CHARACTERISICS

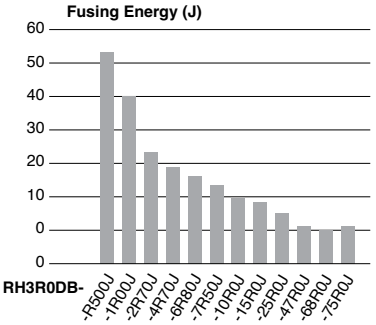


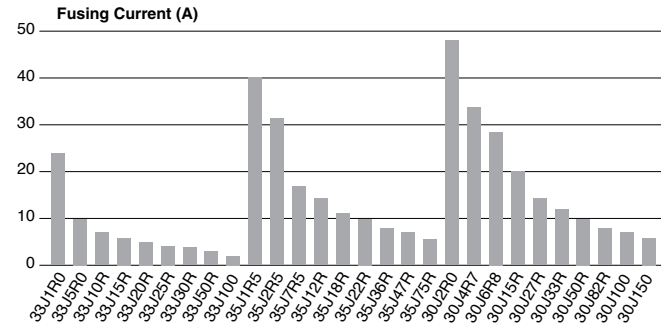


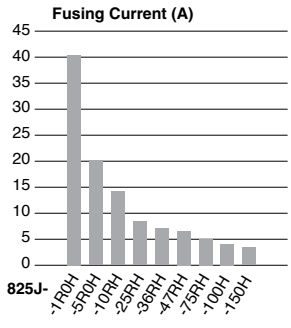


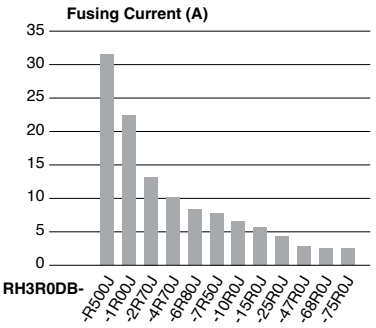












(continued)

High Energy Wirewound

Axial Terminal / Surface Mount / Heat Sinkable Packaging

ORDERING INFORMATION

Standard Part Numbers

Part Number	Ohms	Power	Energy (J)	Fusing Energy (J)	Current to fuse (A)	Power to fuse (W)
33J1R0	1	3	12.70	53.26	23.93	572.60
33J5R0	5	3	6.25	26.20	10.03	502.96
33J10R	10	3	4.94	20.73	7.08	501.70
33J15R	15	3	4.66	19.55	5.95	531.47
33J20R	20	3	3.91	16.40	5.00	500.45
33J25R	25	3	3.07	12.89	4.20	441.79
33J30R	30	3	2.97	12.46	3.92	460.80
33J50R	50	3	2.43	10.20	2.97	440.68
33J100	100	3	1.92	8.07	2.10	439.58
35J1R5	1.5	5	76.55	321.19	40.32	2438.48
35J2R5	2.5	5	64.65	271.23	31.59	2494.75
35J7R5	7.5	5	37.66	158.01	16.90	2141.89
35J12R	12	5	37.90	158.99	14.20	2420.25
35J18R	18	5	28.80	120.84	11.13	2228.50
35J22R	22	5	27.48	115.29	10.03	2213.02
35J36R	36	5	22.78	95.59	7.86	2222.93
35J47R	47	5	23.22	97.42	7.08	2358.00
35J75R	75	5	18.77	78.77	5.55	2309.77
30J2R0	2	10	162.30	680.93	47.98	4603.79
30J4R7	4.7	10	150.86	632.92	33.88	5395.94
30J6R8	6.8	10	137.27	575.91	28.47	5513.41
30J15R	15	10	119.76	502.47	20.11	6065.77
30J27R	27	10	85.27	357.74	14.20	5445.56
30J33R	33	10	65.54	274.98	11.93	4700.40
30J50R	50	10	62.45	262.03	10.03	5029.59
30J82R	82	10	51.90	217.74	7.86	5063.34
30J100	100	10	49.41	207.28	7.08	5017.03
30J150	150	10	46.61	195.54	5.95	5314.71
825J1R0H	1	25	51.04	214.12	40.32	1625.65
825J5R0H	5	25	39.92	167.49	20.11	2021.92
825J10RH	10	25	31.58	132.50	14.20	2016.87
825J25RH	25	25	19.64	82.40	8.43	1776.01
825J36RH	36	25	17.79	74.62	7.08	1806.13
825J47RH	47	25	18.71	78.49	6.60	2049.57
825J75RH	75	25	14.66	61.49	5.00	1876.69
825J100H	100	25	12.29	51.56	4.20	1767.15
825J150H	150	25	11.59	48.64	3.53	1872.00
RH3R0DBR500J	0.5	3	12.93	54.25	31.59	498.95
RH3R0DB1R00J	1	3	10.23	42.91	22.31	497.70
RH3R0DB2R70J	2.7	3	6.87	28.82	13.24	473.33
RH3R0DB4R70J	4.7	3	5.87	24.63	10.03	472.78
RH3R0DB6R80J	6.8	3	5.34	22.41	8.43	483.07
RH3R0DB7R50J	7.5	3	4.75	19.91	7.86	463.11
RH3R0DB10R0J	10	3	3.98	16.70	6.60	436.08
RH3R0DB15R0J	15	3	3.75	15.75	5.55	461.95
RH3R0DB25R0J	25	3	3.07	12.89	4.20	441.79
RH3R0DB47R0J	47	3	2.28	9.59	2.97	414.24
RH3R0DB68R0J	68	3	2.08	8.72	2.49	423.26
RH3R0DB75R0J	75	3	2.29	9.62	2.49	466.83

RoHS compliant product available; Add “E” suffix to part number to specify.

Other values available, contact Ohmite for details.

G Series

Capacitor Discharge & Symmetry

FEATURES

- High Power Dissipation up to 13W @25°C
- Specially Designed to meet Repetitive Pulse Loading
- Corrosion Resistant Terminals for long life
- Superior Vibration Resistance
- IEC 115-1 Reference Standard

SERIES SPECIFICATIONS

Series	Wattage @25°C	Wattage @70°C	Limiting Voltage	Critical Value	Ohmic Range
GW10	10	8.5	685	47KΩ	1Ω-82K
GW13	13	11	940	68KΩ	1Ω-120K

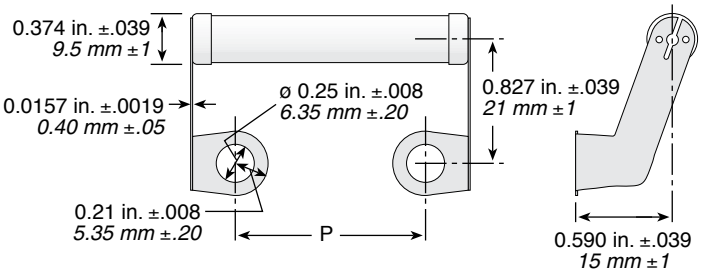
CHARACTERISTICS

Temperature Range	-55°C to 200°C
Terminal Strength	>25N
Derating	25°C to 350°C, Linearly
TCR	±100 ppm/°C
Tolerance	1%, ±2%, ±5%, ±10%

PERFORMANCE DATA

Endurance at Rated Temperature	Full Rated Power for 1000hrs, (1.5hrs ON,0.5hrs OFF) at 25°C	ΔR < 5% + 0R05
Short Term Overload	10 x Rated Power for 5 secs, IEC115-1, Clause 4.1.3	ΔR < 2% + 0R05
Damp Heat	90-95% RH, 40°C, 56 Days,	ΔR < 5% + 0R05
Steady State	IEC 115-1, Clause 4.17.3	
Climatic Sequence	As per IEC 115-1,Clause 4.23	ΔR < 5% + 0R05
Solderability	Not Applicable-Resistor is Designed for Screw Mounting Only	
Terminal Strength	25 N Pull Test for 10 Seconds, IEC 115-1, Clause 4.16	ΔR < 0.5% + 0R05

DIMENSIONS



Series	Length P (in. ±.039 / mm±1)
GW10	0.866 / 22.0
GW13	1.252 / 31.8

(continued)

G Series

Capacitor Discharge & Symmetry

COMPATIBILITY

BHC

GW10 Series	Case Sizes	GW13 Series	Case Sizes
ALS30/31	KE, KF	ALS30/31	ND, NF, NP, NT, RD, RH, RP

Cornell Dubilier

GW10 Series	Case Sizes	GW13 Series	Case Sizes
3186	EA, EB, EC, ED, EE, EF, EG, EH	3186	GC, GD, GE, GF, GG, GH, GJ, DN
3188	EA, EB, EC, ED, EE, EF, EG, EH	3188	GC, GD, GE, GF, GG, GH, GJ, DN
520C	BA, BH, BB, BJ, BC, BD, BE, BF	520C	DB, DJ, DC, DD, DE, DF, DP, DN, DG, FC, FD, FE, FF, FP, FN, FG
DCMC	BA, BH, BB, BJ, BC, BD, BE, BF	DCMC	DB, DJ, DC, DD, DE, DF, DP, DN, DG, FC, FD, FE, FF, FP, FN, FG
OTB	All		
MPF	All		
PF	BA, BH, BB, BJ, BC, BD, BE, BF		
SCR	A		
SF	All		
T	A		

Epcos

GW10 Series	Case Sizes	GW13 Series	Case Sizes
B41456	51.6	B41456	76.9
B41458	51.6	B41458	76.9
B43456	51.6	B43456	76.9, 91
B43458	51.6	B43458	76.9, 91

ILL Capacitor

GW10 Series	Case Sizes	GW13 Series	Case Sizes
LKP	51	LKP	77, 90
LRP	51		

Nichicon UK

GW10 Series	Case Sizes	GW13 Series	Case Sizes
NR	51	NR	76.2, 90
NT	51	NT	76.2, 90
NW	51	NW	76.2, 90
NX	51	NX	76.2, 90
QR	51	QR	76.2, 90

Panasonic

GW10 Series	Case Sizes	GW13 Series	Case Sizes
G	FB, FC, FE, FG, FH, FK, FL, FN, FP	G	HG, HH, HK, HL, HN, HP, HW

United Chemi-Con

GW10 Series	Case Sizes	GW13 Series	Case Sizes
KMH	50	LXA	76, 89
LXA	50	LXR	76, 89
RWE	50	KMH	76, 89
RWF	50	RWE	76, 89
RWY	50	RWF	76, 89
SME	50	RWL	76, 89
		RWY	76, 89
		SME	76, 89
		UTOR	76

Vishay

GW10 Series	Case Sizes	GW13 Series	Case Sizes
36D, 36DE, 36DX	BY, BA, BM, BB, BL, BC, BD, BE, BF	36D, 36DE, 36DX	DB, DJ, DC, DD, DE, DF

ORDERING INFORMATION

G Series — G W 1 0 J 5 K 0 0 E — E = RoHS compliant

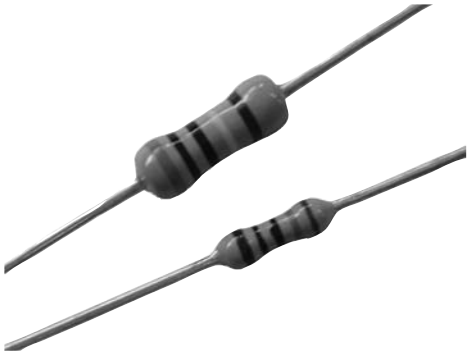
Component Modifier	Wattage	Tolerance	Resistance Value	
W = wirewound	10 watts	K = 10%	R = Decimal	Examples:
	13 watts	J = 5%	K = 1,000	1K00 = 1,000Ω
		G = 2%		10K0 = 10,000Ω
		F = 1%		82K0 = 82,000Ω
				120K = 120,000Ω

Standard part numbers

Ohms	10 watt	13 watt
1K	GW10J1K00E	GW13J1K00E
2.5K	GW10J2K50E	GW13J2K50E
5K	GW10J5K00E	GW13J5K00E
7.5K	GW10J7K50E	GW13J7K50E
10K	GW10J10K0E	GW13J10K0E
15K	GW10J15K0E	GW13J15K0E
20K	GW10J20K0E	GW13J20K0E
25K	GW10J25K0E	GW13J25K0E
40K	GW10J40K0E	GW13J40K0E
50K	GW10J50K0E	GW13J50K0E
75K	GW10J75K0E	GW13J75K0E

Mini-Mox

0.25 Watt and 0.5 Watt Precision Thick Film Axial Terminal High Voltage/High Resistance



FEATURES

- RoHS compliant
- Wide resistance ranges
- Epoxy coating
- Metal oxide resistive element

APPLICATIONS

- Avionics
- Medical electronics
- High gain feedback applications
- Current pulse limiters
- Vacuum and space application

The Mini-Mox resistor is very versatile, covering a wide resistance range as well as a wide range of operating voltages. Provided with tolerances down to 1%, the Mini-Mox resistor works well in precision circuits.

SERIES SPECIFICATIONS

Ohmite Series	Resistance Range (Ohms)	Power @25°C	Voltage Rating	Available Tolerances*
MOX200	500K to 1,500M	0.25W	500V	0.1% to 20%
MOX300	500K to 2,500M	0.50W	1,000V	0.1% to 20%

*Some tolerances are not available over the entire resistance range.

CHARACTERISTICS

Resistor	Metal Oxide
Coating	Epoxy
Core	Alumina
Terminals	Solder-coated axial. RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Resistance Range	500K to 1,500MΩ
Power Rating	0.25W to 0.5W
Voltage Rating	500V to 1,000V
Tolerance	0.1% to 20%

Tolerance	Maximum Value Available MOX200	MOX300
0.10%	10MΩ	10MΩ
0.25%	20MΩ	20MΩ
0.50%	30MΩ	30MΩ
1%-20%	1500MΩ	2500MΩ

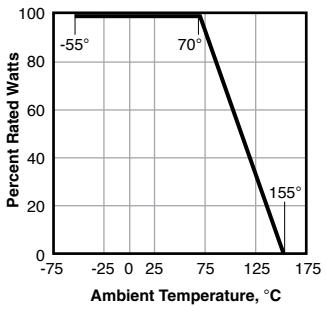
Operating Temperature	-55°C to +155°C
Max. Overload Voltage	1,000V (MOX200); 1,500V (MOX300)
Max. Pulse Voltage	1,500V (MOX200); 3,000V (MOX300)

Temp. Coeff. of Resistance

Series	100 PPM/°C	200 PPM/°C	300 PPM/°C
MOX200	500K-100MΩ	101M-1000MΩ	1001M-1500MΩ
MOX300	500K-100MΩ	101M-1000MΩ	1001M-2500MΩ

Characteristic	Test Method	Specification
Short time overload	Rated Power x2.5, 5 sec.	±0.5% max.
Resistance to soldering heat	260°C ±5°C, 10 ±1 sec.	±0.5% max.
Temperature cycling	-55°C/+155°C, 5 cycles	±0.5% max.
Withstanding voltage	500 VDC, 60 ±10 sec.	±0.5% max.
Insulation resistance	500 VDC	10,000MΩ or more
Moisture resistance	40°C ±2°C, 90-95%RH, 1000 hr.	±1.5% max.
Load life	70°C ±3°C, 1000 hr.	±2% max.

Derating



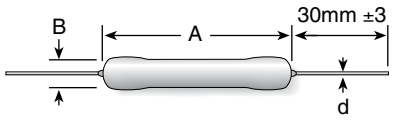
(continued)

Mini-Mox

0.25 Watt and 0.5 Watt
Precision Thick Film Axial Terminal
High Voltage/High Resistance

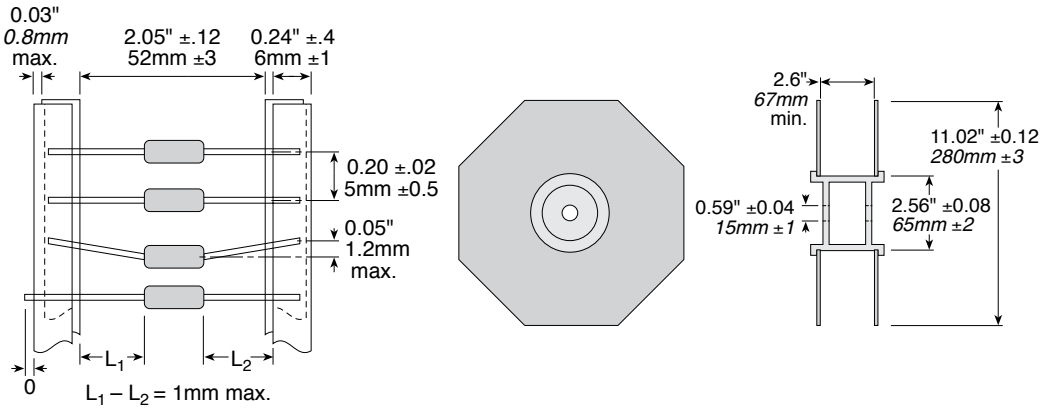
DIMENSIONS

(mm)



Series	Power Rating	A max. (in/mm)	B ±0.5mm (in/mm)	d ±0.05mm (in/mm)
MOX200	0.25W	0.26" / 6.5	0.09" / 2.2	0.024" / 0.6
MOX300	0.50W	0. 35" / 9	0.13" / 3.3	0.025" / 0.65

Tape and reel



HOW TO ORDER

RoHS Compliant — **Tape and reel** 2500 qty./reel std.

M O X 2 0 0 0 0 1 0 0 3 F E R

Mini Mox Series
MOX-20000 or
MOX-30000

Ohms
First 3 digits are significant; 4th digit is multiplier (# of zeroes to follow). Examples:
10R2 = 10.2 ohms
1000 = 100 ohms
1503 = 150,000 ohms

Tolerance

B =	0.10%	G =	2%
C =	0.25%	J =	5%
D =	0.5%	K =	10%
F =	1%	M =	15%
		P =	20%

Mini-Mox

Precision Thick Film Axial Terminal High Voltage/High Resistance

FEATURES

- Wide resistance ranges
- Silicone or epoxy coating
- Metal oxide resistive element

APPLICATIONS

- Avionics
- Medical electronics
- High gain feedback applications
- Current pulse limiters
- Vacuum and space application

The Mini-Mox resistor is very versatile, covering a wide resistance range as well as a wide range of operating voltages. Provided with tolerances down to 0.5%, the Mini-Mox resistor works well in precision circuits.

SERIES SPECIFICATIONS

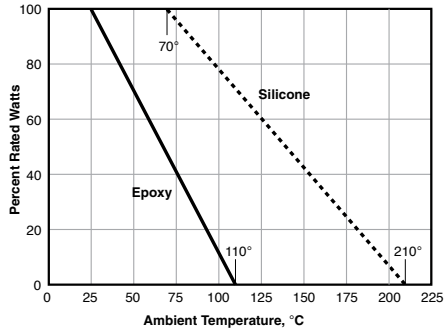
Ohmite Series	Resistance Range (Ohms)	Power	Voltage Rating	Available Tolerances*	Capacitance (pf)
• High-temperature (silicone coated)		**@70°C**			
MOX-400-22	500Ω to 300,000M	0.35W	2,500V	1% to 20%	1.00
MOX-750-22	750Ω to 600,000M	0.70W	5,000V	1% to 20%	0.75
MOX1125-22	1K to 1,000,000M	1.40W	7,500V	1% to 20%	0.25
• Standard (epoxy coated)		**@25°C**			
MOX-400-23	500Ω to 300,000M	0.75W	2,500V	0.5% to 20%	1.00
MOX-750-23	1K to 600,000M	1.00W	5,000V	0.5% to 20%	0.75
MOX1125-23	1K to 1,000,000M	1.50W	7,500V	0.5% to 20%	0.25

*Some tolerances are not available over the entire resistance range.

CHARACTERISTICS

Resistor	Metal Oxide
Coating	Silicone or Epoxy
Core	Alumina
Terminals	Solder-coated axial. RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Resistance Range	500Ω to 1 Teraohm
Power Rating	0.35W to 1.5W
Voltage Rating	2500V to 7.5KV
Tolerance	0.5% to 20%; not all tolerances available in all values
Operating Temperature	-55°C to +220°C
Temp. Coefficient	25ppm/°C 0° to 85°C available

Derating



Performance Data

Characteristic	Test Method	Specification
Humidity	MIL-STD-202, Method 103B, Condition B	±0.25%
Dielectric Withstanding Voltage	MIL-STD-202, Method 301, 750V	±0.25%
Insulation Resistance	MIL-STD-202, Method 302, Condition A or B	>10,000M or greater dry
Thermal Shock	MIL-STD-202, Method 107G, Condition B, B-1, or F	±0.20%
Load Life	MIL-STD-202, Method 108A, Condition D	±2.0%
Resistance to Solvents	MIL-STD-202, Method 215G	Acceptable for the Standard Series Only
Terminal Strength	MIL-STD-202, Method 211A, Condition A or B	±0.25%
Shock (Specified Pulse)	MIL-STD-202, Method 213B, Condition I	±0.25%
Vibration, High Frequency	MIL-STD-202, Method 204D, Condition D	±.020%
Power Conditioning	MIL-R-49462A, Par 4.8	±0.50%
Solderability	MIL-STD-202, Method 208F	>95% Coverage

(continued)

Mini-Mox

Precision Thick Film Axial Terminal
High Voltage/High Resistance

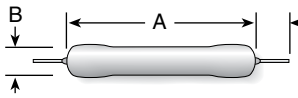
STANDARD TEMP./VOLTAGE COEFFICIENTS OF RESISTANCE

Resistor Series	Temp. Coeff. of Resistance 25 PPM/°C	50 PPM/°C	Voltage Coeff. of Resistance** 100 PPM/°C	< 2PPM/Volt	< 5PPM/Volt
MOX-400	1K-99M	100M-450M	451M-30,000M	1K-1,000M	1,001M-100,000M
MOX-750	1K-199M	200M-900M	901M-70,000M	1K-2,000M	2,001M-100,000M
MOX1125	1K-299M	300M-1,350M	1,351M-100,000M	1K-3,000M	3,001M-100,000M

*TCR of 25ppm for temperature range of 0°C-85°C. TCR of 50ppm and 100ppm for -55°C to 125°C. Consult factory for TCR values operating higher than 125°C
**For tighter VCs please contact Ohmite.

DIMENSIONS

(in./mm)



Series	Power	A max.	B max.
• High-temperature (silicone coated)		@70°C	
MOX-400-22	0.35W	0.510" / 12.95	0.140" / 3.56
MOX-750-22	0.70W	0.820" / 20.83	0.140" / 3.56
MOX1125-22	1.40W	1.210" / 30.73	0.140" / 3.56
• Standard (epoxy coated)		@25°C	
MOX-400-23	0.75W	0.580" / 14.78	0.165" / 4.19
MOX-750-23	1.00W	0.880" / 22.35	0.165" / 4.19
MOX1125-23	1.50W	1.270" / 32.26	0.165" / 4.19

HOW TO ORDER

Style
200, 300, 400, 750, 1125

Coating
2 = Black silicone
3 = Epoxy
6 = No coating

E = RoHS Compliant

M O X 1 1 2 5 2 3 1 0 0 6 F E

Mini Mox Series

Terminal
0 = MOX-200 or 300; MOX-200 Z or 300 Z = 50ppm
2 = 0.020"
7 = 0.032"

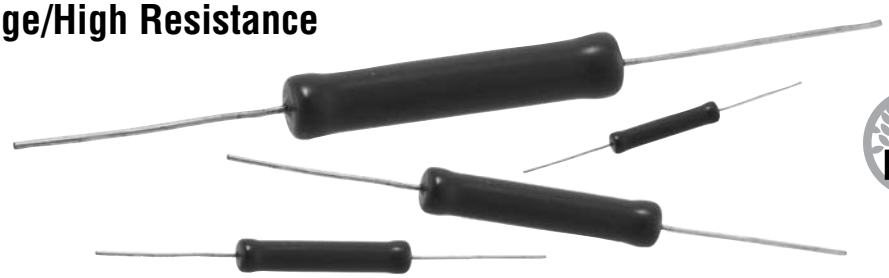
Ohms
First 3 digits are significant; 4th digit is multiplier (# of zeroes to follow). Examples:
10R2 = 10.2 ohms
1000 = 100 ohms
1503 = 150,000 ohms

Tolerance
D = 0.5%
F = 1%
G = 2%
J = 5%
K = 10%
M = 15%
P = 20%

Not all tolerances available in all values.

Maxi-Mox

Precision Thick Film Axial Terminal High Voltage/High Resistance



Maxi-Mox resistors are also versatile. Suitable for industrial applications requiring still more power for high voltage switching, industrial control, and high voltage current limiting.

FEATURES

- Wide resistance ranges
- Voltage rating to 50KV
- Power rating to 12.5 watts
- Silicone or epoxy coating
- Non-inductive available

APPLICATIONS

- HV power supplies
- Power distribution
- Medical instrumentation
- Avionics

SERIES SPECIFICATIONS

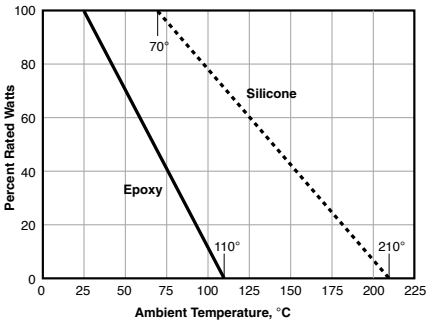
Ohmite Series	Resistance Range (Ω)	Power @70°C	Voltage Rating	Available Tolerances*	Capacitance (pf)
• High-temperature (silicone coated)					
MOX-1-12	250Ω to 300,000M	2.5W	10.0KV	1% to 20%	0.75
MOX-2-12	500Ω to 700,000M	5.0W	20.0KV	1% to 20%	0.60
MOX-3-12	750Ω to 1,000,000M	7.5W	30.0KV	1% to 20%	0.50
MOX-4-12	1K to 1,000,000M	10.0W	40.0KV	1% to 20%	0.40
MOX-5-12	1.25K to 1,000,000M	12.5W	50.0KV	1% to 20%	0.30
• Standard (epoxy coated)		**@25°C**			
MOX-1-13	250Ω to 300,000M	2.0W	10.0KV	0.1% to 20%	0.75
MOX-2-13	500Ω to 700,000M	3.0W	20.0KV	0.1% to 20%	0.60
MOX-3-13	750Ω to 1,000,000M	4.0W	30.0KV	0.1% to 20%	0.50
MOX-4-13	1K to 1,000,000M	5.0W	40.0KV	0.1% to 20%	0.40
MOX-5-13	1.25K to 1,000,000M	6.0W	50.0KV	0.1% to 20%	0.30

*Some tolerances are not available over the entire resistance range.

CHARACTERISTICS

Core	Alumina
Resistor	Thick Film
Terminal	RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Resistance Range	250Ω to 1 Teraohm
Power Rating	2.0W to 12.5W
Voltage Rating	10KV to 50KV
Tolerance	0.5% to 20%; not all tolerances available in all values
Operating Temperature	-55°C to +210°C
Temperature Coefficient	25ppm/°C 0° to 85°C available

DERATING



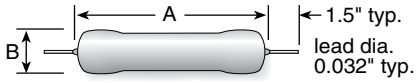
(continued)

Maxi-Mox

Precision Thick Film Axial Terminal
High Voltage/High Resistance

DIMENSIONS

Ohmite Series	Power	A max. (in/mm)	B max. (in/mm)
• High-temperature (silicone coated)			
MOX-1-12	2.5W	1.120” / 28.45	0.310” / 7.87
MOX-2-12	5.0W	2.120” / 53.85	0.310” / 7.87
MOX-3-12	7.5W	3.120” / 79.24	0.310” / 7.87
MOX-4-12	10.0W	4.120” / 104.65	0.310” / 7.87
MOX-5-12	12.5W	5.120” / 130.05	0.310” / 7.87
• Standard (epoxy coated)			
MOX-1-13	2.0W	1.140” / 28.96	0.345” / 8.76
MOX-2-13	3.0W	2.140” / 54.36	0.345” / 8.76
MOX-3-13	4.0W	3.140” / 79.76	0.345” / 8.76
MOX-4-13	5.0W	4.140” / 105.16	0.345” / 8.76
MOX-5-13	6.0W	5.140” / 130.56	0.345” / 8.76



PERFORMANCE DATA

Characteristic	Test Method	Specification
Humidity	MIL-STD-202, Method 103B, Condition B	±0.25%
Dielectric Withstanding Voltage	MIL-STD-202, Method 301, 750V	±0.25%
Insulation Resistance	MIL-STD-202, Method 302, Condition A or B	>10,000 M or greater dry
Thermal Shock	MIL-STD-202, Method 107G, Condition B, B-1, or F	±0.20%
Load Life	MIL-STD-202, Method 108A, Condition D	±1.0%
Resistance to Solvents	MIL-STD-202, Method 215G	Acceptable for High Reliability Series only
Terminal Strength	MIL-STD-202, Method 211A, Condition A or B	±0.25%
Shock (Specified Pulse)	MIL-STD-202, Method 213B, Condition I	±0.25%
Vibration High Frequency	MIL-STD-202, Method 204D, Condition D	±0.20%
Power Conditioning	MIL-R-49462A, Par 4.8	±0.50%
Solderability	MIL-STD-202, Method 208F	>95% Coverage

TEMP. AND VOLTAGE COEFFICIENTS OF RESISTANCE

Resistor Series	Temp. Coeff. of Resistance* 25 PPM/°C	50 PPM/°C	100 PPM/°C	Voltage Coeff. of Resistance** < 2PPM/Volt	< 5PPM/Volt
MOX-1	1K-99M	100M-450M	451M-30,000M	250Ω-1,000M	1,001M-100,000M
MOX-2	1K-199M	200M-1,000M	1,001M-60,000M	500Ω-2,600M	2,601M-200,000M
MOX-3	1K-299M	300M-1,500M	1,501M-90,000M	750Ω-4,000M	4,001M-300,000M
MOX-4	1K-399M	400M-2,000M	2,001M-120,000M	1K-5,300M	5,301M-400,000M
MOX-5	1K-499M	500M-2,500M	2,501M-150,000M	1.25K-6,700M	6,701M-500,000M

*TCR of 25ppm for temperature range of 0°C-85°C. TCR of 50ppm and 100ppm for -55°C to 125°C. Consult factory for TCR values operating higher than 125°C

**For tighter VCs please contact Ohmite.

ORDERING INFORMATION

Coating
2 = Black silicone
3 = Epoxy
6 = No coating

Non-inductive *optional*

RoHS Compliant

M O X - 1 N - 1 3 1 0 0 6 F E

- **Maxi Mox Series**
- **Style** 1,2,3,4,5,8
- **Terminal** 1 = 0.032"
- **Ohms** First 3 digits are significant; 4th digit is multiplier (# of zeroes to follow). Examples: 1000 = 100Ω; 1503 = 150,000Ω; 5005 = 50,000,000Ω
- **Tolerance** D = 0.5%, F = 1%, G = 2%, J = 5%, K = 10%, M = 15%, P = 20%

Not all tolerances available in all values.

RX-1M Hi-Meg

Ultra High Resistance
High Stability Hermetically Sealed

These Hi-Meg resistors are designed for use in electrometer circuits where a high order of performance is required. These resistors achieve a high degree of accuracy and stability, and operate at this high performance level for an extended period of time. By being vacuum sealed in a glass envelope, these Hi-Megs are suitable for ultra-high vacuum applications.

FEATURES

- Glass sealed hermetric resistors
- Improved temperature stability
- Improved voltage stability
- Metal oxide resistive elements
- No outgassing
- RoHS compliant
- Calibration available

APPLICATIONS

- Ultra high vacuum
- Medical instrumentation
- Current pulse limiters
- Avionics

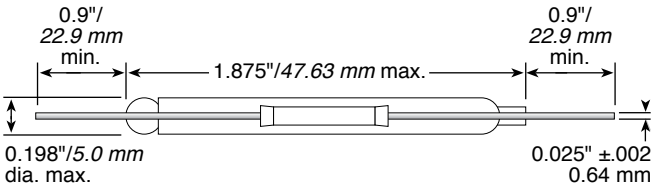
CHARACTERISTICS

Resistance Range	1M to 10,000,000M
Power Rating	0.5W at 25°C
Voltage Rating	1.0KV
Temperature Coefficient	as low as 50PPM/°C

Handling and Cleaning of RX-1M Resistors:

These glass encapsulated resistors, especially those of higher resistance value, require extraordinary cleanliness. These resistors should be handled by the terminals, unless gloves are worn. Fingerprints on the surface of the resistor will attract contaminants and moisture, which will cause a parallel resistance path, reducing the resistance value of the device. If cleaning should become necessary, use isopropyl alcohol and lightly wipe dry with lint free tissues such as Kimwipes.

DIMENSIONS



ORDERING INFORMATION

RX-1M1006FE – RoHS Compliant

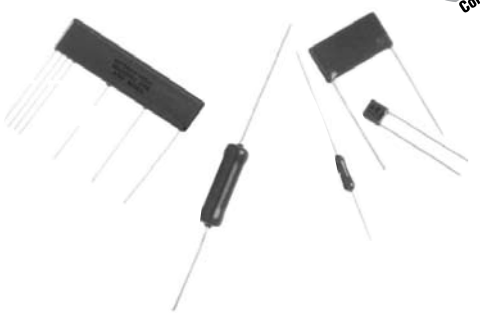
Hi-Meg Series

Ohms
First 3 digits are significant; 4th digit is multiplier (# of zeroes to follow). Examples:
1506 = 150 MΩ
1509 = 150 GΩ
150A = 1.5 TΩ
100B = 10 TΩ

Tolerance
D = 0.5%
F = 1%
G = 2%
J = 5%
K = 10%
M = 15%
P = 20%

Slim-Mox

Precision Thick Film Planar



APPLICATIONS

- HV power supplies
- Medical instrumentation
- Current pulse limiters
- Ionization chambers

FEATURES

- High dielectric & low out-gassing epoxy coating
- Low resistor noise
- Non inductive
- RoHS compliant
- Radial terminals

SERIES SPECIFICATIONS

Ohmite Series	Resistance Range (Ohms)	Power @25°C	Max. Operating Voltage	Capac-itance (pf)
SLIM-MOX10003	100Ω to 500M	0.25W	1.5KV	1.00
SLIM-MOX10103	100Ω to 1,000M	0.50W	2.0KV	1.00
SLIM-MOX10203	200Ω to 5,000M	1.00W	5.0KV	0.90
SLIM-MOX10303	250Ω to 5,000M	1.25W	7.5KV	0.75
SLIM-MOX10403	500Ω to 5,000M	1.50W	10.0KV	0.70
SLIM-MOX10603	750Ωto 5,000M	2.00W	15.0KV	0.65
SLIM-MOX10803	1K to 5,000M	2.50W	20.0KV	0.60
SLIM-MOX20203	500Ω to 5,000M	1.50W	5.0KV	1.10
SLIM-MOX20403	1K to 5,000M	2.00W	10.0KV	0.80
SLIM-MOX20603	2K to 5,000M	2.50W	15.0KV	0.75
SLIM-MOX20803	2K to 5,000M	3.00W	20.0KV	0.65
SLIM-MOX21003	3K to 5,000M	3.50W	25.0KV	0.60
SLIM-MOX30603	3K to 5,000M	3.50W	15.0KV	0.75
SLIM-MOX30803	4K to 5,000M	4.00W	20.0KV	0.50
SLIM-MOX31003	5K to 5,000M	4.50W	25.0KV	0.40
SLIM-MOX40403	3K to 5,000M	3.00W	10.0KV	1.00
SLIM-MOX40803	5K to 5,000M	5.00W	20.0KV	0.80
SLIM-MOX41003	5K to 5,000M	5.50W	25.0KV	0.50

Contact Ohmite for custom configurations. *Maximum voltage and power rating determined by Ohm's law: $P=V^2/R$

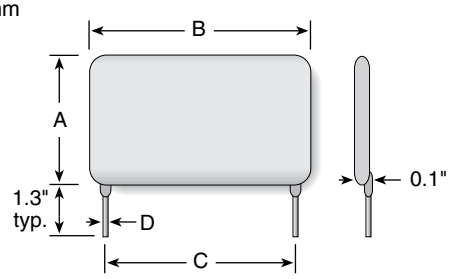
Ohmite's Slim-Mox provides stable performance for a wide range of resistance values, with voltage ratings up to 25K. Low temperature coefficients are available for high stability circuit applications. The space-saving planar package offers and alternative to traditional high voltage resistors.

CHARACTERISTICS

Resistor Element	Thick film on Alumina
Coating	Epoxy or Silicone
Terminals	RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Resistance Range	100 Ohms to 5,000M
Power Rating	0.25W to 5.5W
Voltage Rating	1.5KV to 25KV
Tolerance	0.5% to 20%; not all tolerances available in all values
Operating Temperature	-55°C to +110°C
Temperature Coefficient	See table

DIMENSIONS

in./mm



Series	Power @25°C	A max.	B max.	C ±0.025	D ±0.002
SLIM-MOX10003	0.25W	0.30" / 7.62	0.30" / 7.62	0.10" / 2.54	0.025" / 0.635
SLIM-MOX10103	0.50W	0.34" / 8.64	0.33" / 8.38	0.20" / 5.08	0.025" / 0.635
SLIM-MOX10203	1.00W	0.34" / 8.64	0.58" / 14.73	0.40" / 10.16	0.032" / 0.813
SLIM-MOX10303	1.25W	0.34" / 8.64	0.83" / 21.08	0.60" / 15.24	0.032" / 0.813
SLIM-MOX10403	1.50W	0.34" / 8.64	1.08" / 27.43	0.90" / 22.86	0.032" / 0.813
SLIM-MOX10603	2.00W	0.34" / 8.64	1.58" / 40.13	1.40" / 35.56	0.032" / 0.813
SLIM-MOX10803	2.50W	0.34" / 8.64	2.08" / 52.83	1.90" / 48.26	0.032" / 0.813
SLIM-MOX20203	1.50W	0.59" / 14.99	0.58" / 14.73	0.40" / 10.16	0.032" / 0.813
SLIM-MOX20403	2.00W	0.59" / 14.99	1.08" / 27.43	0.90" / 22.86	0.032" / 0.813
SLIM-MOX20603	2.50W	0.59" / 14.99	1.58" / 40.13	1.40" / 35.56	0.032" / 0.813
SLIM-MOX20803	3.00W	0.59" / 14.99	2.08" / 52.83	1.90" / 48.26	0.032" / 0.813
SLIM-MOX21003	3.50W	0.59" / 14.99	2.58" / 65.53	2.40" / 60.96	0.032" / 0.813
SLIM-MOX30603	3.50W	0.84" / 21.34	1.58" / 40.13	1.40" / 35.56	0.032" / 0.813
SLIM-MOX30803	4.00W	0.84" / 21.34	2.08" / 52.83	1.90" / 48.26	0.032" / 0.813
SLIM-MOX31003	4.50W	0.84" / 21.34	2.58" / 65.53	2.40" / 60.96	0.032" / 0.813
SLIM-MOX40403	3.00W	1.09" / 27.69	1.08" / 27.43	0.90" / 22.86	0.032" / 0.813
SLIM-MOX40803	5.00W	1.09" / 27.69	2.08" / 52.83	1.90" / 48.26	0.032" / 0.813
SLIM-MOX41003	5.50W	1.09" / 27.69	2.58" / 65.53	2.40" / 60.96	0.032" / 0.813

Slim-Mox Divider

Precision Thick Film Voltage

Multiple taps are provided on the Slim-Mox RD for use in advanced circuit designs. Tight ratio tolerances make these resistors ideal for precision applications requiring consistent performance.

FEATURES

- Custom configurations are available. Contact Ohmite with your specifications
- RoHS compliant

CHARACTERISTICS

Resistance range	1M to 5,000M ohms
Resistance ratio	100:1 - 5000 : 1 To specify dividers outside this range, please see our website at: **www.ohmite.com/dividers** A complete description of the SLIM-MOX Divider is required. EXAMPLE: R_T = 500MΩ 5% R_1 = 499.5MΩ 5% R_2 = 500KΩ 1% Ratio = R_T / R_2 = 1,000: 1, 1%
Resistor element	Thick film on Alumina
Ratio tolerances	0.5% to 5%
Temperature Coefficient Tracking	TCR tracking to 10ppm and VCR tracking to 1ppm

SERIES SPECIFICATIONS

Ohmite Series	Power @25°C	Operating Voltage
SLIM-MOX103RD	0.75W	5.0KV
SLIM-MOX104RD	1.00W	10.0KV
SLIM-MOX106RD	1.50W	12.0KV
SLIM-MOX108RD	2.00W	15.0KV
SLIM-MOX204RD	1.50W	10.0KV
SLIM-MOX206RD	2.00W	12.0KV
SLIM-MOX208RD	2.50W	20.0KV
SLIM-MOX210RD	3.00W	25.0KV
SLIM-MOX306RD	3.00W	12.0KV
SLIM-MOX308RD	3.50W	20.0KV
SLIM-MOX310RD	4.00W	25.0KV
SLIM-MOX408RD	4.50W	20.0KV
SLIM-MOX410RD	5.00W	25.0KV

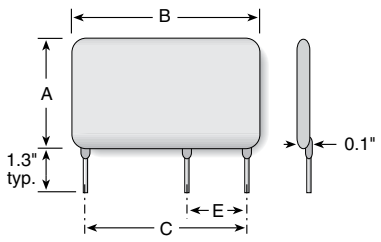
Contact Ohmite for custom configurations.

To specify Slim-Mox Dividers, please see our website at:

www.ohmite.com/dividers

DIMENSIONS

in. ±.025 /mm



Series	C	E
SLIM-MOX103RD	0.60”/ 15.24	0.20”/ 5.08
SLIM-MOX104RD	0.90”/ 22.86	0.20”/ 5.08
SLIM-MOX106RD	1.40”/ 35.56	0.20”/ 5.08
SLIM-MOX108RD	1.90”/ 48.26	0.60”/ 15.24
SLIM-MOX204RD	0.90”/ 22.86	0.20”/ 5.08
SLIM-MOX206RD	1.40”/ 35.56	0.20”/ 5.08
SLIM-MOX208RD	1.90”/ 48.26	0.40”/ 10.16
SLIM-MOX210RD	2.40”/ 60.96	0.20”/ 5.08
SLIM-MOX306RD	1.40”/ 35.56	0.30”/ 7.62
SLIM-MOX308RD	1.90”/ 48.26	0.30”/ 7.62
SLIM-MOX310RD	2.40”/ 60.96	0.20”/ 5.08
SLIM-MOX408RD	1.90”/ 48.26	0.30”/ 7.62
SLIM-MOX410RD	2.40”/ 60.96	0.20”/ 5.08

Slim-Mox HT

High Temperature Thick Film Precision

The Slim-Mox HT provides a higher power rating for high ambient temperature environments. Appropriate for mounting near heat generating components. The Slim-Mox HT is finished with a rugged silicone coating suitable for most environments.

APPLICATIONS

- HV power supplies
- Medical instrumentation
- Current pulse limiters
- Ionization chambers

FEATURES

- Outstanding voltage coefficient
- High temperature silicone coating
- Low resistor noise
- Noninductive
- Custom configurations are available. Contact Ohmite with your specifications
- RoHS compliant
- Radial Terminals

SERIES SPECIFICATIONS

Ohmite Series	Resistance Range (Ohms)	Power @25°C	Voltage Rating
SLIM-MOX10002	100Ω to 500M	0.40W	1.5KV
SLIM-MOX10102	100Ω to 1,000M	0.75W	2.0KV
SLIM-MOX10202	200Ω to 5,000M	1.50W	5.0KV
SLIM-MOX10302	250Ω to 5,000M	2.00W	7.5KV
SLIM-MOX10402	500Ω to 5,000M	2.50W	10.0KV
SLIM-MOX10602	750Ω to 5,000M	3.25W	15.0KV
SLIM-MOX10802	1K to 5,000M	4.25W	20.0KV
SLIM-MOX20202	500Ω to 5,000M	2.50W	5.0KV
SLIM-MOX20402	1K to 5,000M	3.25W	10.0KV
SLIM-MOX20602	2K to 5,000M	4.25W	15.0KV
SLIM-MOX20802	2K to 5,000M	5.00W	20.0KV
SLIM-MOX21002	3K to 5,000M	5.75W	25.0KV
SLIM-MOX30602	3K to 5,000M	5.50W	15.0KV
SLIM-MOX30802	4K to 5,000M	6.75W	20.0KV
SLIM-MOX31002	5K to 5,000M	7.50W	25.0KV
SLIM-MOX40402	3K to 5,000M	5.00W	10.0KV
SLIM-MOX40802	5K to 5,000M	8.25W	20.0KV
SLIM-MOX41002	5K to 5,000M	9.00W	25.0KV

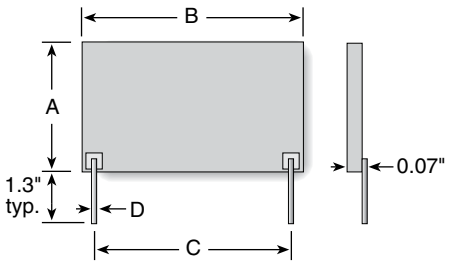
Contact Ohmite for custom configurations.

CHARACTERISTICS

Resistor Element	Thick film on Alumina
Coating	Silicone
Resistance Range	100Ω to 5,000M
Power Rating	0.25W to 9.0W
Voltage Rating	1.5KV to 25KV
Tolerance	0.5% to 20%; not all tolerances available in all values
Operating Temperature	-55°C to +180°C

DIMENSIONS

in. /mm



Series	Power @25°C	A max.	B max.	C ±0.025	D ±0.002
SLIM-MOX10002	0.40W	0.20" / 5.08	0.20" / 5.08	0.10" / 2.54	0.025" / 0.635
SLIM-MOX10102	0.75W	0.25" / 6.35	0.25" / 6.35	0.20" / 5.08	0.025" / 0.635
SLIM-MOX10202	1.50W	0.25" / 6.35	0.50" / 12.70	0.40" / 10.16	0.032" / 0.813
SLIM-MOX10302	2.00W	0.25" / 6.35	0.75" / 19.05	0.60" / 15.24	0.032" / 0.813
SLIM-MOX10402	2.50W	0.25" / 6.35	1.00" / 25.40	0.90" / 22.86	0.032" / 0.813
SLIM-MOX10602	3.25W	0.25" / 6.35	1.50" / 38.10	1.40" / 35.56	0.032" / 0.813
SLIM-MOX10802	4.25W	0.25" / 6.35	2.00" / 50.80	1.90" / 48.26	0.032" / 0.813
SLIM-MOX20202	2.50W	0.50" / 12.70	0.50" / 12.70	0.40" / 10.16	0.032" / 0.813
SLIM-MOX20402	3.25W	0.50" / 12.70	1.00" / 38.10	0.90" / 22.86	0.032" / 0.813
SLIM-MOX20602	4.25W	0.50" / 12.70	1.50" / 38.10	1.40" / 35.56	0.032" / 0.813
SLIM-MOX20802	5.00W	0.50" / 12.70	2.00" / 50.80	1.90" / 48.26	0.032" / 0.813
SLIM-MOX21002	5.75W	0.50" / 12.70	2.50" / 63.50	2.40" / 60.96	0.032" / 0.813
SLIM-MOX30602	5.50W	0.75" / 19.05	1.50" / 38.10	1.40" / 35.56	0.032" / 0.813
SLIM-MOX30802	6.75W	0.75" / 19.05	2.00" / 50.80	1.90" / 48.26	0.032" / 0.813
SLIM-MOX31002	7.50W	0.75" / 19.05	2.50" / 63.50	2.40" / 60.96	0.032" / 0.813
SLIM-MOX40402	5.00W	1.00" / 25.40	1.00" / 25.40	0.90" / 22.86	0.032" / 0.813
SLIM-MOX40802	8.25W	1.00" / 25.40	2.00" / 50.80	1.90" / 48.26	0.032" / 0.813
SLIM-MOX41002	9.00W	1.00" / 25.40	2.50" / 63.50	2.40" / 60.96	0.032" / 0.813

Slim-Mox HT Divider

High Temperature Thick Film Voltage Divider

Slim-Mox HT RD resistor dividers complete the Slim-Mox family with the high temperature divider configuration. These resistors are useful wherever multiple voltage drops are needed in a circuit. Designed to customer specifications, the Slim-Mox HT RD resistor utilizes our thick film on alumina technology to offer flexible termination schemes.

FEATURES

- High Temperature Operation
- RoHS compliant
- Radial Terminals

SERIES SPECIFICATIONS

Ohmite Series	Power @25°C	Operating Voltage
SLIM-MOX103RD	1.25W	5.0KV
SLIM-MOX104RD	1.50W	10.0KV
SLIM-MOX106RD	2.50W	12.0KV
SLIM-MOX108RD	3.25W	15.0KV
SLIM-MOX204RD	2.50W	10.0KV
SLIM-MOX206RD	3.25W	12.0KV
SLIM-MOX208RD	4.25W	20.0KV
SLIM-MOX210RD	5.00W	25.0KV
SLIM-MOX306RD	4.50W	12.0KV
SLIM-MOX308RD	5.00W	20.0KV
SLIM-MOX310RD	5.75W	25.0KV
SLIM-MOX408RD	6.75W	20.0KV
SLIM-MOX410RD	7.50W	25.0KV

Contact Ohmite for custom configurations.

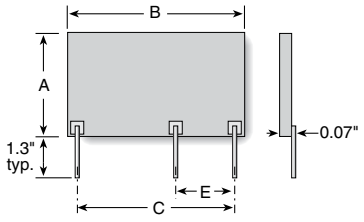
CHARACTERISTICS

Resistance range	1M to 5,000M ohms
Resistance ratio	100:1 - 5000 : 1 To specify dividers outside this range, please see our website at: **www.ohmite.com/dividers** A complete description of the SLIM-MOX Divider is required. EXAMPLE: R_T = 500MΩ 5% R_1 = 499.5MΩ 5% R_2 = 500KΩ 1% Ratio = R_T / R_2 = 1,000: 1, 1%
Resistor element	Thick film on Alumina
Ratio tolerances	0.5% to 5%
Temperature Coefficient Tracking	TCR tracking to 10ppm and VCR tracking to 1ppm

To specify Slim-Mox Dividers, please see our website at:
www.ohmite.com/dividers

DIMENSIONS

in. ±0.025 /mm



Series	Power Rating	C	E
SLIM-MOX103RD	1.25W	0.60" / 15.24	0.20" / 5.08
SLIM-MOX104RD	1.50W	0.90" / 22.86	0.20" / 5.08
SLIM-MOX106RD	2.50W	1.40" / 35.56	0.20" / 5.08
SLIM-MOX108RD	3.25W	0.90" / 22.86	0.60" / 15.24
SLIM-MOX204RD	2.50W	0.90" / 22.86	0.20" / 5.08
SLIM-MOX206RD	3.25W	1.40" / 35.56	0.20" / 5.08
SLIM-MOX208RD	4.25W	1.90" / 48.26	0.40" / 10.16
SLIM-MOX210RD	5.00W	2.40" / 60.96	0.20" / 5.08
SLIM-MOX306RD	4.50W	1.40" / 35.56	0.30" / 7.62
SLIM-MOX308RD	5.00W	1.90" / 48.26	0.30" / 7.62
SLIM-MOX310RD	5.75W	2.40" / 60.96	0.20" / 5.08
SLIM-MOX408RD	6.75W	1.90" / 48.26	0.30" / 7.62
SLIM-MOX410RD	7.50W	2.40" / 60.96	0.20" / 5.08

(continued)

Slim-Mox

All products

TEMPERATURE/VOLTAGE COEFFICIENTS OF RESISTANCE

Resistor Series	Temp. Coeff. of Resistance* 0°C-85°C 25 PPM/°C	85°C-125°C 50 PPM/°C	85°C-125°C 100 PPM/°C	Voltage Coeff. of Resistance** < 2PPM/Volt	< 5PPM/Volt
SLIM-MOX100	100 to 300M	100Ω to 50M	51M to 500M	100Ω to 140M	141M to 500M
SLIM-MOX101	100 to 800M	100Ω to 100M	101M to 1,000M	100Ω to 270M	271M to 1,000M
SLIM-MOX102	200 to 1,500M	200Ω to 250M	251M to 5,000M	200Ω to 640M	641M to 5,000M
SLIM-MOX103	250 to 800M	250Ω to 440M	441M to 5,000M	250Ω to 1,100M	1,101M to 5,000M
SLIM-MOX104	500 to 2,500M	500Ω to 450M	451M to 5,000M	500Ω to 1,100M	1,101M to 5,000M
SLIM-MOX106	750 to 5,000M	750Ω to 675M	676M to 5,000M	750Ω to 1,600M	1,601M to 5,000M
SLIM-MOX108	1K to 2,500M	1K to 375M	376M to 5,000M	1K to 940M	941M to 5,000M
SLIM-MOX202	500 to 1,500M	500Ω to 200M	201M to 5,000M	500Ω to 520M	521M to 5,000M
SLIM-MOX204	1K to 1,750M	1K to 375M	376M to 5,000M	1K to 950M	951M to 5,000M
SLIM-MOX206	2K to 4,500M	2K to 600M	601M to 5,000M	2K to 1,500M	1,501M to 5,000M
SLIM-MOX208	2K to 5,000M	2K to 1,000M	1,001M to 5,000M	2K to 2,500M	2,501M to 5,000M
SLIM-MOX210	3K to 5,000M	3K to 1,000M	1,001M to 5,000M	3K to 2,600M	2,601M to 5,000M
SLIM-MOX306	3K to 5,000M	3K to 1,000M	1,001M to 5,000M	3K to 2,600M	2,601M to 5,000M
SLIM-MOX308	4K to 5,000M	4K to 1,200M	1,201M to 5,000M	4K to 3,000M	3,001M to 5,000M
SLIM-MOX310	5K to 5,000M	5K to 1,500M	1,501M to 5,000M	5K to 4,000M	4,001M to 5,000M
SLIM-MOX404	3K to 5,000M	3K to 1,100M	1,101M to 5,000M	3K to 2,800M	2,801M to 5,000M
SLIM-MOX408	5K to 5,000M	5K to 1,250M	1,251M to 5,000M	5K to 3,000M	3,001M to 5,000M
SLIM-MOX410	5K to 5,000M	5K to 1,200M	1,201M to 5,000M	5K to 3,000M	3,001M to 5,000M
SLIM-MOX103RD	1M to 800M	1M to 70M	71M to 5,000M	1M to 185M	186M to 5,000M
SLIM-MOX104RD	1M to 2,500M	1M to 275M	276M to 5,000M	1M to 720M	721M to 5,000M
SLIM-MOX106RD	1M to 5,000M	1M to 250M	251M to 5,000M	1M to 640M	641M to 5,000M
SLIM-MOX108RD	1M to 2,500M	1M to 350M	351M to 5,000M	1M to 875M	876M to 5,000M
SLIM-MOX204RD	1M to 1,750M	1M to 300M	301M to 5,000M	1M to 750M	751M to 5,000M
SLIM-MOX206RD	1M to 4,500M	1M to 1,750M	1,751M to 5,000M	1M to 4,500M	4,501M to 5,000M
SLIM-MOX208RD	1M to 5,000M	1M to 625M	626M to 5,000M	1M to 1,550M	1,551M to 5,000M
SLIM-MOX210RD	1M to 5,000M	1M to 950M	951M to 5,000M	1M to 2,400M	2,401M to 5,000M
SLIM-MOX306RD	1M to 5,000M	1M to 800M	801M to 5,000M	1M to 2,000M	2,001M to 5,000M
SLIM-MOX308RD	1M to 5,000M	1M to 1,200M	1,201M to 5,000M	1M to 2,600M	2,601M to 5,000M
SLIM-MOX310RD	1M to 5,000M	1M to 1,000M	1,001M to 5,000M	1M to 3,900M	3,901M to 5,000M
SLIM-MOX408RD	1M to 5,000M	1M to 1,600M	1,601M to 5,000M	1M to 4,000M	4,001M to 5,000M
SLIM-MOX410RD	1M to 5,000M	1M to 1,200M	1,201M to 5,000M	1M to 3,000M	3,001M to 5,000M

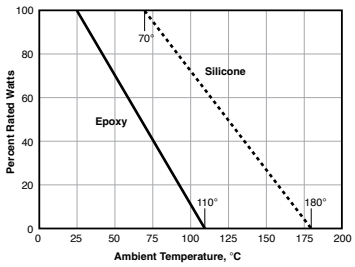
*TCR of 25ppm for temperature range of 0°C-85°C. TCR of 50ppm and 100ppm for -55°C to 125°C. Consult factory for TCR values operating higher than 125°C

**VC's of <2PPM/Volt are available. Contact Ohmite with your requirement.

PERFORMANCE DATA

Characteristic	Test Method	Specification
Humidity	MIL-STD-202, Method 103B, Condition B	±0.25%
Dielectric Withstanding Voltage	MIL-STD-202, Method 301, 750V	±0.25%
Insulation Resistance	MIL-STD-202, Method 302, Condition A or B	>10,000M or greater dry
Thermal Shock	MIL-STD-202, Method 107G, Condition B, B-1, or F	±0.20%
Load Life	MIL-STD-202, Method 108A, Condition D	±1.0%
Resistance to Solvents	MIL-STD-202, Method 215G	No degradation of coating or marking
Terminal Strength	MIL-STD-202, Method 211A, Condition A or B	±0.25%
Shock (Specified Pulse)	MIL-STD-202, Method 213B, Condition I	±0.25%
Vibration, High Frequency	MIL-STD-202, Method 204D, Condition D	±.020%
Power Conditioning	MIL-R-49462A, Par 4.8	±0.50%
Solderability	MIL-STD-202, Method 208F	>95% Coverage

DERATING



ORDERING INFORMATION

Coating
2 = Blue silicone (high temp.)
3 = Epoxy (standard)
6 = No coating

Style
100 to 410

Tape & Reel

RoHS Compliant

S M 1 0 2 0 3 1 0 0 6 F T E

Slim Mox Series

Terminal
0 = 0.032" std. (for SM102 - 410)
0 = 0.025" std. (SM100 and 101)

Ohms
First 3 digits are significant; 4th digit is multiplier (# of zeroes to follow). Examples:
1000 = 100Ω
1503 = 150,000Ω
5005 = 50,000,000Ω

Tolerance
D = 0.5%
F = 1%
G = 2%
J = 5%
K = 10%
M = 15%
P = 20%

Not all tolerances available in all values. To specify Slim-Mox Dividers, please see our website at:
www.ohmite.com/dividers

Super Mox Series

High Voltage

High-voltage Super Mox resistors have been developed to meet the precision temperature stability requirements of high-accuracy and high-voltage systems. Super Mox combines proprietary non-inductive resistance system and design to achieve low temperature coefficient, low voltage coefficients, high stability and increased high operating voltages. These resistors are designed to meet the demanding requirements of high voltage power supplies, electron microscopes, X-ray systems, high resolution CRT displays and geophysical instruments.

Uncoated resistor element pictured for demonstration purposes only. Finished product is coated with silicone.

SERIES SPECIFICATIONS

Series	Power Rating (W)	Max. Oper. Voltage	Res. Range (Ω)	VCR*
MOX910	3.80	15,000	1K-500M	0.40
			500M-5G	0.75
MOX920	5.00	21,000	1K-1G	0.20
			1G-10G	0.40
MOX930	7.50	30,000	1K-1G5	0.15
			1G5-15G	0.30
MOX940	10.00	45,000	1K-2G5	0.10
			2G5-25G	0.15
MOX950	13.50	60,000	1K-3G	0.08
			3G-30G	0.12
MOX960	16.00	72,000	1K-4G	0.06
			4G-40G	0.10
MOX970	20.00	90,000	1K-5G	0.04
			5G-50G	0.08

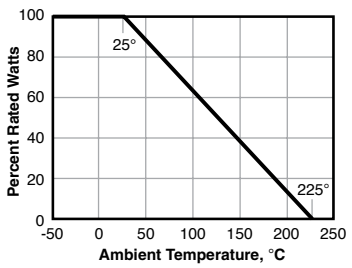
* typical values, contact factory for details

CHARACTERISTICS

Resistance Range	from 1KΩ to 50GΩ on all models (contact Ohmite for 51G to 1TΩ)
Tolerances	0.05%, 0.1%, 0.25%, 0.5%, 1%, 2%, 5%, 10% (0.05% avail. to 10G, 0.25% to 100G, other on request)
Temperature Coefficients	5, 10, 15, 25, 50 and 100ppm/°C (10ppm/°C available to 10G, 25ppm/°C to 100G, other on request. Temperature coefficient referenced to 25°C, ΔR taken at +125°C.
Encapsulation	Silicone Conformal Coating
Terminal Material	Gold Plated
Core Material	Al_2O_3 (96%)
Resistor Material	Ruthenium Oxide
Operating Temperature	-55°C to 225°C (extended temperature range to 350°C available)

Insulation Resistance	>10,000 MΩ	500 Volt 25 °C 75% relative humidity
Dielectric Strength	>1,000 Volt	25 °C 75% relative humidity
Thermal Shock	Δ R/R < 0.1% typ., 0.20% max.	MIL Std. 202, method 107 Cond. C (IEC 68 -2 -14)
Overload	Δ R/R < 0.1% typ., 0.25% max.	1,5 x Pnom, 5 sec (do not exceed max. voltage)
Moisture Resistance	Δ R/R < 0.1% typ., 0.25% max.	MIL Std. 202, method 106 (IEC 68 -2 -3)
Load Life	Δ R/R < 0.1% typ., 0.25% max.	1000 hours at rated power (IEC 115 -1)

Derating



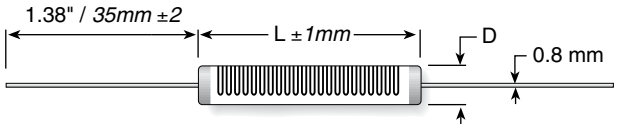
(continued)

Super Mox Series

High Voltage

DIMENSIONS

(iin./mm)



Series	L	D
MOX910	1.07/ 27.00	0.32/8.00
MOX920	1.46/ 37.00	0.32/8.00
MOX930	2.05/ 52.00	0.32/8.00
MOX940	3.03/ 77.00	0.32/8.00
MOX950	4.02/102.00	0.33/8.30
MOX960	4.80/122.00	0.34/8.50
MOX970	5.98/152.00	0.34/8.50

ORDERING INFORMATION

Coating
2 = conformal silicone standard
3 = conformal silicone high temp. with 350°C burn in

E = RoHS compliant

M O X 9 1 0 2 1 0 0 6 J T E

Super Mox Series
see chart for wattage

***Extremely tight tolerances not available across the full resistance range. Consult factory.**

Ohms
First 3 digits are significant; 4th digit is multiplier (# of zeroes to follow). Examples:
1001 = 1000Ω
1503 = 150,000Ω
1006 = 100 MΩ

Tolerance*
A = 0.05%
B = 0.10%
C = 0.25%
D = 0.5%
F = 1%
G = 2%
J = 5%
K = 10%

TCR
T = 100ppm
V = 50ppm
W = 25ppm
X = 15ppm
Y = 10ppm

Part Number	Watts	Ohms 1% tol.	TCR
MOX91021004FVE	3.8W	1M	50ppm
MOX91025004FVE	3.8W	5M	50ppm
MOX91021005FVE	3.8W	10M	50ppm
MOX91022505FTE	3.8W	25M	100ppm
MOX92021005FVE	5W	10M	50ppm
MOX92025005FVE	5W	50M	50ppm
MOX92021006FVE	5W	100M	50ppm
MOX92021007FTE	5W	1000M	100ppm
MOX93021004FVE	7.5W	1M	50ppm
MOX93025004FVE	7.5W	5M	50ppm
MOX93021005FVE	7.5W	10M	50ppm
MOX93022505FTE	7.5W	25M	100ppm
MOX94021005FVE	10W	10M	50ppm
MOX94025005FVE	10W	50M	50ppm
MOX94021006FVE	10W	100M	50ppm
MOX94021007FTE	10W	1000M	100ppm
MOX95021004FVE	13.5W	1M	50ppm
MOX95025004FVE	13.5W	5M	50ppm
MOX95021005FVE	13.5W	10M	50ppm
MOX95022505FTE	13.5W	25M	100ppm
MOX96021005FVE	16W	10M	50ppm
MOX96025005FVE	16W	50M	50ppm
MOX96021006FVE	16W	100M	50ppm
MOX96021007FTE	16W	1000M	100ppm
MOX97021004FVE	20W	1M	50ppm
MOX97025004FVE	20W	5M	50ppm
MOX97021005FVE	20W	10M	50ppm
MOX97022505FTE	20W	25M	100ppm

20 Series

Vitreous Enamel Conformal Axial Terminal Wirewound, 5% Tolerance Std.

The 20 Series axial terminal resistors are both durable and economical. They have all the electrical attributes of the more expensive 90 Series resistors, including all-welded construction.

They offer the durability of a lead free conformal vitreous enamel coating and are ideal for computer, communications and industrial applications in which cost, quality, and reliability are key considerations.

FEATURES

- Rugged vitreous enamel coating withstands high humidity and temperature cycling.
- Durable construction, recommended for industrial applications where reliability is paramount.
- All-welded construction.
- Flame resistant lead free vitreous enamel coating.
- RoHS compliant; Add "E" suffix to part number to specify.

SERIES SPECIFICATIONS

Series	Wattage	Ohms	Max. Voltage*
21	1	1.0-3.0K	75
22	2	1.0-3.0K	65
23	3	0.1-10K	135
25	5	0.1-28K	330
27	7	0.1-25K	450
20	10	0.1-100K	720

12.5 watt size available on special order

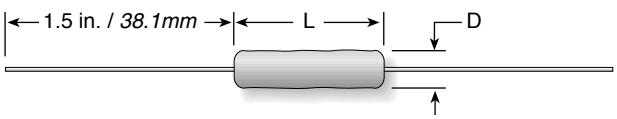
*Maximum Voltage is based on Ohm's Law [$V=\sqrt{(P*R)}$] as limited by the resistance value of specified product

CHARACTERISTICS

Coating	Conformal lead free vitreous enamel
Core	Ceramic.
Terminals	Solder-coated axial. RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Derating	Linearly from 100% @ +25°C to 0% @ +350°C
Tolerance	±5% standard; other tolerances available
Power rating	Based on 25°C free air rating (other wattages available)
Overload	Under 7 watts: 5 times rated wattage for 5 seconds; 7 watts and over: 10 times rated wattage for 5 seconds
Temperature coefficient	1 to 9.99 ohms: ±50 ppm/°C; 10 ohms and over: ±30 ppm/°C

DIMENSIONS

(in./mm max.)



Series	Wattage	Length* (max.)	Diam.* (max.)	Lead ga.
21	1	0.421 / 10.7	0.156 / 4.0	24
22	2	0.421 / 10.7	0.219 / 5.6	20
23	3	0.515 / 13.1	0.220 / 5.6	20
25	5	1.015 / 25.8	0.276 / 7.0	20
27	7	1.265 / 32.1	0.394 / 10.0	20
20	10	1.859 / 47.2	0.394 / 10.0	20

*For units below 1Ω, add 15% to body diameter, 10% to body length.

(continued)

20 Series

Vitreous Enamel Conformal Axial Terminal Wirewound, 5% Tolerance Std.

ORDERING INFORMATION

Standard part numbers

Ohmic value	Part No. Prefix ➤ Suffix ▼	Wattage 1 (21J)	2 (22J)	3 (23J)	5 (25J)	7 (27J)	10 (20J)
0.10	R10			✔	✔		✔
0.13	R13			✔	✔		✔
0.15	R15			✔	✔		✔
0.20	R20			✔	✔		✔
0.25	R25			✔	✔		✔
0.30	R30			✔	✔		✔
0.33	R33			✔	✔		✔
0.50	R50			✔	✔		✔
0.75	R75			✔	✔		✔
1	1R0	✔	✔	✔	✔	✔	✔
1.5	1R5	✔	✔	✔	✔	✔	✔
2	2R0	✔	✔	✔	✔	✣	✔
2.2	2R2	✔	✔	✔	✔	✣	✔
3	3R0	✔	✔	✔	✔	✔	✔
4	4R0	✔	✣	✔	✔	✣	✔
5	5R0	✔	✔	✔	✔	✣	✔
7.5	7R5	✔	✔	✔	✔	✣	✔
10	10R	✔	✔	✔	✔	✣	✔
12	12R	✣	✣	✔	✔	✣	✔
15	15R	✔	✣	✔	✣	✔	✔
18	18R	✔	✣	✔	✔	✣	✔
20	20R	✔	✔	✔	✔	✣	✔
22	22R	✔	✔	✔	✔	✣	✔
25	25R	✣	✔	✔	✔	✣	✔
27	27R	✔	✔	✔	✔	✣	✣
30	30R	✔	✔	✔	✔	✣	✔
33	33R	✔	✔	✔	✔	✔	✔
35	35R	✣	✣	✣	✔	✣	✣
39	39R	✔	✔	✔	✣	✣	✔
40	40R	✔	✣	✔	✔	✣	✔
47	47R	✔	✔	✔	✔	✣	✔
50	50R	✔	✔	✔	✔	✔	✔
56	56R	✣	✔	✔	✔	✣	✣
62	62R	✣	✣	✔	✔	✣	✔
68	68R	✔	✔	✔	✔	✣	✔
75	75R	✔	✔	✔	✔	✣	✔
82	82R	✔	✔	✔	✔	✣	✔
100	100	✔	✣	✔	✔	✔	✔
120	120	✔	✔	✔	✔	✣	✔
125	125	✣	✣	✔	✔	✔	✔
150	150	✔	✔	✔	✔	✣	✔
180	180	✔	✔	✔	✔	✣	✔
200	200	✔	✔	✔	✔	✔	✔
220	220	✔	✔	✔	✔	✣	✔
225	225	✣	✣	✣	✣	✣	✣
250	250	✔	✔	✔	✔	✣	✔
270	270	✔	✔	✔	✔	✣	✣
300	300	✔	✔	✔	✔	✣	✔
330	330	✔	✔	✔	✔	✣	✔
350	350	✣	✔	✣	✔	✣	✔
390	390	✔	✣	✔	✣	✣	✣
400	400	✣	✣	✔	✔	✣	✔
450	450	✣	✣	✣	✔	✣	✔
470	470	✔	✔	✔	✔	✣	✔
500	500	✔	✔	✔	✔	✔	✔
560	560	✔	✔	✔	✔	✣	✣
600	600	✔	✔	✔	✔	✣	✔
680	680	✔	✣	✔	✔	✣	✔
750	750	✔	✔	✔	✔	✣	✔
800	800	✔	✣	✔	✔	✣	✣
820	820	✔	✔	✔	✔	✣	✔
900	900	✣	✔	✔	✔	✣	✣
1,000	1K0	✔	✔	✔	✔	✔	✔
1,100	1K1	✣	✣	✔	✔	✣	✔
1,200	1K2	✔	✔	✔	✔	✣	✔
1,500	1K5	✔	✔	✔	✔	✣	✔
1,800	1K8	✔	✔	✔	✣	✣	✣
2,000	2K0	✣	✔	✔	✔	✣	✔
2,200	2K2	✔	✔	✔	✔	✣	✔
2,500	2K5	✔	✔	✔	✔	✣	✔
2,700	2K7	✔	✔	✔	✣	✣	✔
3,000	3K0	✔	✔	✔	✔	✣	✔
3,300	3K3			✔	✔	✣	✣
3,500	3K5			✣	✔	✣	✣
3,900	3K9			✔	✔	✣	✔
4,000	4K0			✔	✔	✣	✔
4,500	4K5			✣	✔	✣	✣
4,700	4K7			✔	✔	✣	✔
5,000	5K0			✔	✔	✔	✔
6,000	6K0			✔	✔	✔	✔
6,800	6K8			✔	✔	✣	✣
7,000	7K0			✔	✔	✣	✣
7,500	7K5			✔	✔	✣	✔
8,000	8K0			✔	✔	✣	✔
9,000	9K0			✔	✣	✣	✣
10,000	10K			✔	✔	✣	✔
12,000	12K				✔	✣	✔
13,000	13K					✣	✔
15,000	15K				✔	✣	✔
17,000	17K					✣	✣
20,000	20K				✔	✔	✔
22,000	22K				✔	✣	✣
25,000	25K				✔	✣	✔
30,000	30K						✔
33,000	33K						✣
35,000	35K						✣
40,000	40K						✔
50,000	50K						✔

✔ = Standard values

✣ = Non-standard values subject to minimum handling charge per item

Shaded values involve very fine resistance wire and should not be used in critical applications without burn-in and/or thermal cycling.

RoHS Compliant

21JR10E

20 Series	Wattage	Tolerance	Resistance Value
Vitreous Enamel Axial Lead Wirewound	1 = 1W 2 3 5 7 0 = 10W	J = 5%	R10 = 0.10Ω 1R0 = 1.0Ω 10R = 10.0Ω 250 = 250Ω 1K0 = 1,000Ω 4K5 = 4,500Ω 50K = 50,000Ω

200 Series

Brown Devil® Vitreous Enamel Power

Ohmite's Brown Devil® is a small, exceptionally durable power resistor. It features all-welded construction and rugged, flame resistant conformal lead free vitreous enamel coating to ensure successful performance under high temperatures.

The wirewound 200 Series has a hollow-core construction, which accommodates rigid mounting with brackets or thru bolts.

Mounting brackets not included with resistors.

FEATURES

- Rugged lead free vitreous enamel coating
- All-welded construction.
- Self supporting terminal mounting option.
- Higher power ratings.
- Flame-resistant lead free vitreous enamel coating.
- RoHS compliant product available. Add "E" suffix to part number to specify.

SERIES SPECIFICATIONS

Series	Wattage	Ohms	Lead Gauge	Max. Voltage*
B5	5.25	0.1-20K	20	187
B8	8.0	0.03-25K	18	250
B12	12.0	0.08-51K	18	625
B20	20.0	0.1-100K	18	750

Non-Inductive versions available. Insert "N" before tolerance code.
Example: B5NJ10RE

Also available in low cost Centohm or Silicone coating. Consult Ohmite.

* Maximum Voltage is based on Ohm's Law [$V=\sqrt{P*R}$] as limited by the resistance value of specified product

CHARACTERISTICS

Coating	lead-free vitreous enamel
Core	Ceramic
Terminals	Tinned axial; RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Derating	Linearly from 100% @ +25°C to 0% @ +350°C
Tolerance	1Ω+: ±5% under 1Ω: ±10%
Power rating	Based on 25°C free air rating
Overload	10 times rated wattage for 5 seconds
Temperature coefficient	5Ω and under: ±400 ppm/°C Above 5Ω: ±260 ppm/°C
Max. amps	To calculate, use the formula $\sqrt{P/R}$

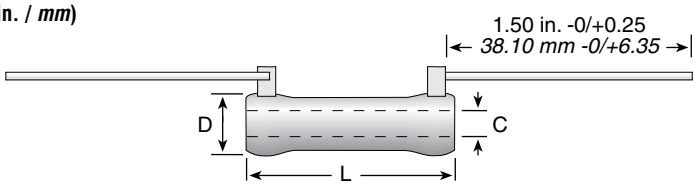
(continued)

200 Series

Brown Devil® Vitreous Enamel Power

DIMENSIONS

(in. / *mm*)



Series	Wattage	L	D	C	Lead Gauge
B5	5.25	0.625 / 15.88	0.250 / 6.35	0.135 / 3.43	20
B8	8.0	1.000 / 25.40	0.313 / 7.94	0.188 / 4.76	18
B12	12.0	1.750 / 44.45	0.313 / 7.94	0.188 / 4.76	18
B20	20.0	2.000 / 50.80	0.438 / 11.11	0.250 / 6.35	18

ORDERING INFORMATION

Standard Values

Ohmic value	Part No. Prefix ➤ / Suffix ▼	Wattage 5.25 B5J	8 B8J	12 B12J	20 B20J
0.5	R50E			✔	✔
1	1R0E	✔	✔	✔	✔
1.1	1R1E				
1.2	1R2E				
1.3	1R3E				
1.5	1R5E	✔	✔	✔	
1.6	1R6E	✔			
1.8	1R8E	✔			
2	2R0E	✔	✔	✔	✔
2.2	2R2E				
2.4	2R4E	✔			
2.7	2R7E	✔			
3	3R0E	✔	✔	✔	✔
3.3	3R3E	✔			
3.6	3R6E	✔			
3.9	3R9E	✔			
4	4R0E		✔	✔	✔
4.3	4R3E	✔			
4.7	4R7E	✔			
5	5R0E		✔	✔	✔
5.1	5R1E	✔			
5.6	5R6E	✔			
6.2	6R2E	✔			
6.8	6R8E	✔			
7.5	7R5E	✔	✔	✔	
8.2	8R2E	✔			
9.1	9R1E	✔			
10	10RE	✔	✔	✔	✔
11	11RE				
12	12RE	✔	✔	✔	
13	13RE				
15	15RE	✔	✔	✔	
16	16RE				
18	18RE				
20	20RE	✔	✔	✔	
22	22RE	✔			
24	24RE	✔			
25	25RE		✔	✔	✔
27	27RE	✔			
30	30RE	✔	✔	✔	
33	33RE	✔			
35	35RE		✔	✔	
36	36RE				
39	39RE	✔			
40	40RE		✔	✔	✔
43	43RE	✔			
47	47RE	✔			
50	50RE		✔	✔	✔
51	51RE	✔			
56	56RE	✔			
62	62RE	✔			
68	68RE	✔			
75	75RE	✔	✔	✔	✔
82	82RE	✔			
91	91RE	✔			
100	100E	✔	✔	✔	✔
110	110E				
120	120E	✔			
125	125E		✔	✔	✔
130	130E			✔	
150	150E	✔	✔		✔
160	160E	✔			
180	180E	✔			
200	200E	✔	✔	✔	✔
220	220E	✔			
225	225E			✔	
240	240E	✔			
250	250E		✔	✔	✔
270	270E	✔			
300	300E		✔	✔	✔
330	330E	✔			
350	350E		✔	✔	✔
360	360E				
390	390E	✔			
400	400E		✔	✔	✔
430	430E				
450	450E		✔	✔	
470	470E	✔			
500	500E		✔	✔	✔
510	510E	✔			
560	560E	✔			
600	600E		✔	✔	
620	620E	✔			
650	650E				✔
680	680E	✔			
700	700E		✔	✔	
750	750E	✔	✔	✔	✔
800	800E		✔	✔	✔
820	820E	✔			
900	900E		✔	✔	
910	910E				
1,000	1K0E	✔	✔	✔	✔
1,100	1K1E	✔	✔		
1,200	1K2E	✔		✔	✔
1,250	1K25E	✔	✔	✔	
1,300	1K3E	✔			
1,500	1K5E	✔	✔	✔	✔
1,600	1K6E				
1,750	1K75E	✔	✔	✔	
1,800	1K8E				
2,000	2K0E	✔	✔	✔	✔
2,200	2K2E	✔			
2,250	2K25E		✔	✔	
2,400	2K4E				
2,500	2K5E		✔	✔	✔
2,700	2K7E	✔			
2,750	2K75E				✔
3,000	3K0E	✔	✔	✔	✔
3,300	3K3E	✔			
3,500	3K5E		✔	✔	✔
3,600	3K6E				
3,900	3K9E	✔			
4,000	4K0E		✔	✔	✔
4,300	4K3E				
4,500	4K5E	✔	✔	✔	
4,700	4K7E	✔			
5,000	5K0E		✔	✔	✔
5,100	5K1E	✔			
5,600	5K6E	✔			
6,000	6K0E		✔	✔	✔
6,200	6K2E	✔			
6,800	6K8E	✔			
7,000	7K0E		✔	✔	✔
7,500	7K5E	✔	✔	✔	✔
8,000	8K0E		✔	✔	✔
8,200	8K2E	✔			
8,500	8K5E				
9,000	9K0E		✔		✔
9,100	9K1E				
10,000	10KE	✔	✔	✔	✔
11,000	11KE			✔	
12,000	12KE	✔		✔	
12,500	12K5E	✔	✔	✔	
13,000	13KE	✔			
13,500	13K5E			✔	
15,000	15KE	✔	✔	✔	✔
16,000	16KE			✔	
17,500	17K5E	✔	✔		
18,000	18KE			✔	
20,000	20KE	✔	✔	✔	✔
22,500	22K5E			✔	
25,000	25KE	✔	✔	✔	
30,000	30KE			✔	✔
35,000	35KE			✔	✔
40,000	40KE			✔	✔
45,000	45KE			✔	
50,000	50KE			✔	✔
55,000	55KE				
60,000	60KE				
65,000	65KE				
70,000	70KE				
75,000	75KE				
80,000	80KE				✔
85,000	85KE				
90,000	90KE				
95,000	95KE				
100,000	100KE				

✔ = Standard values; check availability at www.ohmite.com

These values involve very fine resistance wire and should not be used in critical applications without burn-in and/or thermal cycling:

B5: 6.8K-20KΩ
B8: 12.5K-25KΩ
B12: 30K-51KΩ
B20: 22.5K-100KΩ

Coating
Blank = Vitreous
C = Centohm
S = Silicone

Wattage

Non-Inductive Winding
Optional (blank = std. winding)

RoHS Compliant

■ **B 8 N J 5 R 0 E**

Series

Tolerance
F = 1%
H = 3%
J = 5%
K = 10%

Ohms
1R0 = 1Ω
250 = 250Ω
1K0 = 1,000Ω
25K = 25,000Ω
25K5 = 25,500Ω

Made-to-order Parts

Non-Inductive Winding
Optional (blank = std. winding)

Core Diameter
See "Core and Terminal Selection"

RoHS Compliant

2 0 0 N 8 D 5 R 0 0 0 J E

Coating
200 = Vitreous
400 = Silicone Ceramic

Wattage
3
5.25
8
12
20

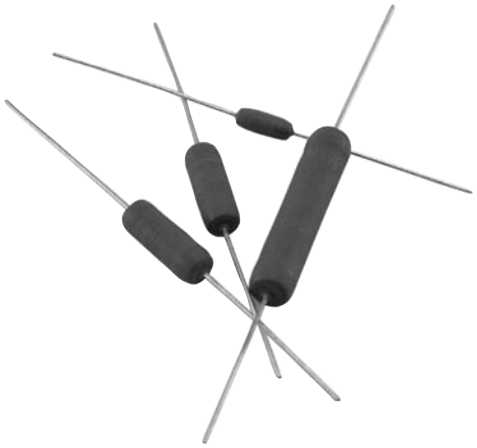
Ohms
R500 = 0.500Ω
1R00 = 1Ω
250R = 250Ω
1K00 = 1,000Ω
25K0 = 25,000Ω
25K5 = 25,500Ω

Tolerance
F = 1%
H = 3%
J = 5%
K = 10%

See web-site for custom core info

40 Series

Ohmicone® Silicone-Ceramic Conformal Axial Terminal Wirewound 1% and 5% Tolerance Standard



Ohmite 40 Series resistors are the most economical conformal silicone-ceramic coated resistors offered. These all-welded units are characterized by their low temperature coefficients and resistance to thermal shock, making them ideal for a wide range of electrical and electronic applications.
Units with 1% and 5% tolerances are identical in construction and electrical specifications. Durable but economical 40 Series resistors exceed industry requirements for quality.

FEATURES

- Economical
- Applications include commercial, industrial and communications equipment
- Stability under high temperature conditions
- All-welded construction
- RoHS compliant; add “E” suffix to part number to specify.

SERIES SPECIFICATIONS

Series	Wattage	Ohms	Voltage
41	1.0	0.10-6K	150
42	2.0	0.10-8K	100
43	3.0	0.10-20K	200
45	5.0	0.10-70K	460
47	7.0	0.10-80K	670
40	10.0	0.10-150K	1000

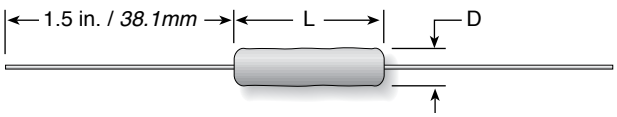
Non-Inductive versions available. Insert “N” before tolerance code.
Example: 42NJ27R

CHARACTERISTICS

Coating	Conformal silicone-ceramic.
Core	Ceramic.
Terminals	Solder-coated copper clad axial. RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Derating	Linearly from 100% @ +25°C to 0% @ +275°C.
Tolerance	±5% (J type), ±1% (F type) (other tolerances available).
Power rating	Based on 25°C free air rating
Overload	Under 5 watts: 5 times rated wattage for 5 seconds. 5 watts and over: 10 times rated wattage for 5 seconds.
Temperature coefficient	Under 1Ω: ±90 ppm/°C; 1Ω to 9.99Ω: ±50 ppm/°C; 10Ω and over: ±20 ppm/°C

DIMENSIONS

(in./mm max.)



Series	Wattage	Length	Diam.	Lead ga.
41	1.0	0.437 / *11.1*	0.125 / *3.2*	24
42	2.0	0.406 / *10.3*	0.219 / *5.6*	20
43	3.0	0.593 / *15.1*	0.219 / *5.6*	20
45	5.0	0.937 / *23.8*	0.343 / *8.7*	18
47	7.0	1.280 / *32.5*	0.343 / *8.7*	18
40	10.0	1.900 / *48.3*	0.406 / *10.3*	18

(continued)

40 Series

Ohmicone® Silicone-Ceramic Conformal Axial Terminal Wirewound 1% and 5% Tolerance Standard

ORDERING INFORMATION

Standard part numbers

Ohmic value	Part No. Prefix ➤ Suffix ▼	Wattage and Tolerance: 1% Tolerance 1	3	5	10	5% Tolerance 1	2	3	5	10
		41F	43F	45F	40F	41J	42J	43J	45J	40J
0.1	R10	✔	✔	✔	✔	✔	✔	✔	✔	✔
0.15	R15	✔	✔	✔	✔	✔	✔	✔	✔	✔
0.2	R20	✔	✔	✔	✔	✔	✔	✔	✔	✔
0.25	R25					✔		✔	✔	
0.3	R30	✔	✔	✔	✔	✔	✔	✔	✔	✔
0.33	R33					✔		✔	✔	
0.4	R40		✔	✔	✔	✔	✔	✔	✔	✔
0.5	R50	✔	✔	✔	✔	✔	✔	✔	✔	✔
0.75	R75	✔	✤	✔	✔	✔	✔	✔	✔	✔
1	1R0	✔	✔	✔	✔	✔	✔	✔	✔	✔
1.5	1R5	✔	✔	✔	✔	✔	✔	✔	✔	✔
2	2R0	✔	✔	✔	✔	✔	✔	✔	✔	✔
2.2	2R2	✔	✔	✔	✔	✔	✔	✔	✔	✔
3	3R0	✔	✔	✔	✤	✔	✔	✔	✔	✔
4	4R0	✔	✔	✔	✔	✔	✔	✔	✔	✔
5	5R0	✔	✔	✔	✔	✔	✔	✔	✔	✔
7.5	7R5	✔	✔	✔	✔	✤	✔	✔	✔	✔
10	10R	✔	✔	✔	✔	✔	✔	✔	✔	✔
12	12R	✤	✔	✤	✔	✔	✔	✔	✔	✔
15	15R	✔	✔	✔	✤	✔	✤	✔	✔	✔
18	18R	✤	✔	✤	✤	✤	✤	✔	✔	✔
20	20R	✔	✔	✔	✔	✤	✔	✔	✔	✔
22	22R	✔	✔	✔	✤	✔	✔	✔	✔	✔
25	25R	✔	✔	✔	✤	✤	✔	✔	✔	✔
27	27R	✤	✔	✔	✔	✤	✔	✔	✔	✔
30	30R	✔	✔	✔	✔	✤	✔	✤	✔	✔
33	33R	✔	✔	✤	✔	✤	✔	✔	✔	✔
35	35R	✔	✤	✔	✔	✔	✔	✤	✔	✤
39	39R	✔	✔	✤	✤	✤	✔	✔	✔	✤
40	40R	✔	✔	✔	✔	✤	✤	✤	✔	✔
47	47R	✔	✔	✤	✤	✔	✔	✔	✔	✔
50	50R	✔	✔	✔	✔	✔	✔	✔	✔	✔
56	56R	✔	✔	✤	✔	✔	✔	✔	✔	✔
62	62R	✔	✔	✔	✔	✤	✔	✤	✔	✔
68	68R	✔	✔	✔	✔	✔	✔	✔	✔	✤
75	75R	✔	✔	✤	✔	✔	✔	✔	✔	✔
82	82R	✤	✔	✔	✔	✔	✔	✔	✔	✤
100	100	✔	✔	✔	✔	✔	✔	✔	✔	✔
120	120	✤	✔	✔	✔	✤	✔	✔	✔	✤
125	125	✔	✤	✤	✔	✔	✤	✔	✔	✔
150	150	✔	✔	✔	✤	✔	✔	✔	✔	✔
180	180	✔	✔	✤	✔	✤	✔	✔	✔	✤
200	200	✔	✔	✔	✔	✔	✔	✔	✔	✔
220	220	✔	✔	✤	✤	✔	✤	✔	✔	✔
225	225	✤	✤	✤	✔	✤	✤	✤	✔	✤
250	250	✔	✔	✔	✔	✔	✔	✔	✔	✔
270	270	✔	✔	✤	✔	✔	✔	✤	✔	✔
300	300	✔	✤	✔	✔	✔	✔	✔	✔	✔
330	330	✔	✤	✤	✤	✤	✔	✔	✔	✔
350	350	✤	✔	✤	✔	✤	✤	✔	✔	✤
390	390	✤	✔	✤	✤	✔	✔	✔	✔	✔
400	400	✔	✔	✔	✤	✔	✤	✔	✔	✔
450	450	✤	✔	✔	✤	✤	✤	✤	✤	✤
470	470	✔	✔	✔	✤	✔	✔	✔	✔	✤
500	500	✔	✔	✔	✔	✤	✔	✔	✔	✤
560	560	✔	✔	✔	✔	✔	✤	✤	✔	✔
600	600	✔	✔	✔	✔	✤	✤	✔	✔	✔
680	680	✔	✔	✤	✔	✔	✔	✔	✔	✤
750	750	✔	✔	✔	✔	✔	✤	✔	✔	✤
800	800	✔	✔	✔	✔	✤	✤	✔	✤	✤
820	820	✔	✔	✔	✤	✔	✔	✔	✔	✤
900	900	✔	✔	✤	✤	✤	✤	✔	✔	✤
1,000	1K0	✔	✔	✔	✔	✔	✔	✔	✔	✔
1,100	1K1	✤	✤	✔	✔	✤	✔	✤	✔	✤
1,200	1K2	✔	✤	✔	✔	✤	✤	✔	✔	✔
1,500	1K5	✔	✔	✔	✤	✔	✔	✔	✤	✔
1,800	1K8	✔	✤	✤	✔	✔	✤	✔	✔	✤
2,000	2K0	✔	✔	✔	✔	✤	✤	✔	✔	✔
2,200	2K2	✔	✔	✔	✔	✤	✤	✔	✔	✔
2,500	2K5	✔	✔	✔	✔	✔	✤	✔	✔	✔
2,700	2K7	✤	✤	✔	✔	✤	✤	✔	✔	✤
3,000	3K0	✔	✔	✔	✔	✤	✔	✔	✔	✔
3,300	3K3		✤	✤	✤			✔	✔	✤
3,500	3K5		✔	✔	✤			✤	✔	✤
3,900	3K9		✔	✔	✔			✔	✔	✔
4,000	4K0		✔	✤	✔			✤	✔	✤
4,500	4K5		✤	✤	✔			✤	✔	✤
4,700	4K7		✔	✔	✤			✤	✔	✤
5,000	5K0		✔	✔	✔			✔	✔	✔
6,000	6K0		✤	✔	✤			✔	✔	✤
6,800	6K8		✔	✔	✤			✔	✔	✤
7,000	7K0		✔	✔	✤			✤	✤	✤
7,500	7K5		✔	✔	✤			✔	✔	✔
8,000	8K0		✔	✤	✔			✤	✔	✤
9,000	9K0		✤	✔	✤			✤	✤	✤
10,000	10K		✔	✔	✔			✔	✔	✔
12,000	12K			✤	✔					
13,000	13K			✔	✤					
15,000	15K			✔	✔					
17,000	17K			✔	✤					
20,000	20K			✔	✔					
22,000	22K			✔	✔					
25,000	25K			✔	✔					
30,000	30K			✔	✤					
33,000	33K				✔					
35,000	35K				✤					
40,000	40K				✔					
50,000	50K				✔					

Shaded values involve very fine resistance wire and should not be used in critical applications without burn-in and/or thermal cycling.

✔ = Standard values

✤ = Non-standard values subject to minimum handling charge per item

40 Series
Ohmicone® Silicone Ceramic Conformal Axial Term. Wirewound

Non-Inductive Winding
Optional (blank = std. winding)

RoHS Compliant

41NJR10E

Wattage
1 = 1W
2
3
5
7
0 = 10W

Tolerance
F = 1%
J = 5%

Resistance Value
R10 = 0.10Ω
1R0 = 1.0Ω
10R = 10.0Ω
250 = 250Ω
1K0 = 1,000Ω
4K5 = 4,500Ω
50K = 50,000Ω

80 Series

Commercial Grade Acrasil®, Silicone-Ceramic Conformal Axial Terminal Wirewound 1% Tolerance (5% available)

RW Series

Military Grade 80 Series MIL-R-26 Qualified

Ohmite's highest quality conformal axial terminal silicone-ceramic coated resistors for applications requiring high precision and stability. These resistors have a low temperature coefficient and maintain a high degree of stability under demanding conditions.

FEATURES

- Designed for precision power applications
- All-welded construction
- RW Series "Mil" value resistors marked with "Mil" in accordance with MIL-R-26 specifications

SERIES SPECIFICATIONS

Commercial Grade	Military Grade	Watts	Ohms	Voltage
81F	RW70U	1	0.1-6K	150
82		2	0.1-8K	100
83F 83J	RW79U RW69V	3	0.1-20K	200
85F 85J	RW74U RW67V	5	0.1-75K	460
80F 80J	RW78U RW68V	10	0.1-150K	1000

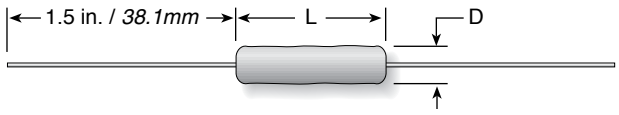
Non-Inductive versions available. Insert "N" before tolerance code. Example: 83NF2K21

CHARACTERISTICS

Coating	Silicone-ceramic
Core	Ceramic
Terminals	Solder-coated copper clad axial
Derating	Linearly from 100% @ +25°C to 0% @ +275°C.
Tolerance	±5% (J type), ±1% (F type) (other tolerances available)
Power rating	Based on 25°C free air rating
Maximum ohmic values	See chart
Overload	Under 5 watts: 5 times rated wattage for 5 seconds. 5 watts and over: 10 times rated wattage for 5 seconds
Temperature coefficient	Under 1Ω; ±90 ppm/°C 1 to 9.99Ω: ±50 ppm/°C 10Ω and over; ±20 ppm/°C
Dielectric withstanding voltage	500 VAC: 1 watt rating; 1000 VAC: 2, 3, 5, 7, and 10 watt rating

DIMENSIONS

(in./mm max.)



		Watts	Length	Diam.	Lead gauge
81F	RW70U	1	0.437 / 11.1	0.125 / 3.2	24
82		2	0.406 / 10.3	0.219 / 5.6	20
83F 83J	RW79U RW69V	3	0.593 / 15.1	0.218 / 5.5	20
85F 85J	RW74U RW67V	5	0.937 / 23.8	0.343 / 8.7	18
80F 80J	RW78U RW68V	10	1.842 / 46.8	0.406 /10.3	18

(continued)

80 Series

Commercial Grade Acrasil®, Silicone-Ceramic Conformal Axial Terminal Wirewound 1% Tolerance (5% available)

RW Series

Military Grade 80 Series MIL-R-26 Qualified

ORDERING INFORMATION

Commercial Grade (80 Series) Part Numbers

Ohmic value	Part No. Prefix ➤ Suffix ▼	Wattage 1 — 81F	3 — 83F	5 — 85F	10 — 80F
0.1	R10	✔	✔	✔	✔
0.11	R11		✔	✔	✔
0.121	R121	✔	✔	✔	✔
0.133	R133		✔	✤	✔
0.15	R15	✔	✔	✔	✔
0.162	R162		✤	✤	✔
0.182	R182	✔	✔	✔	✔
0.2	R20	✔	✔	✔	✔
0.221	R221		✔	✔	✔
0.249	R249	✔	✔	✔	✔
0.274	R274		✔	✔	✔
0.301	R301	✔	✔	✔	✔
0.332	R332		✔	✤	✔
0.374	R374		✔	✤	✔
0.392	R392		✔	✔	✔
0.402	R402	✔	✔	✔	✔
0.453	R453		✔	✔	✔
0.499	R499	✔	✔	✔	✔
0.511	R511		✔	✤	✤
0.562	R562	✔	✔	✔	✔
0.619	R619		✔	✔	✔
0.681	R681	✔	✔	✔	✔
0.75	R75		✤	✔	✔
0.825	R825	✔	✔	✔	✔
0.909	R909		✔	✤	✔
1	1R0	✔	✔	✔	✔
1.1	1R1		✔	✔	✔
1.21	1R21	✔	✔	✔	✔
1.330	1R33		✤	✔	✔
1.5	1R5	✔	✔	✔	✔
1.62	1R62		✤	✔	✔
1.82	1R82	✔	✔	✔	✔
2	2R0	✔	✔	✔	✔
2.21	2R21		✔	✔	✔
2.49	2R49	✔	✔	✔	✔
2.74	2R74		✔	✔	✔
3.01	3R01	✔	✔	✔	✔
3.32	3R32		✔	✔	✔
3.74	3R74		✔	✔	✔
4.02	4R02	✔	✔	✔	✔
4.53	4R53		✔	✔	✔
4.99	4R99	✔	✔	✔	✔
5.11	5R11		✔	✔	✔
5.62	5R62	✔	✔	✔	✔
6.19	6R19		✔	✔	✔
6.81	6R81	✔	✔	✔	✔
7.5	7R5		✔	✔	✔
8.25	8R25	✔	✔	✤	✔
9.09	9R09		✔	✔	✔
10	10R	✔	✔	✔	✔
11	11R		✔	✔	✔
12.1	12R1	✔	✔	✔	✔
13.3	13R3		✤	✤	✤
15	15R	✔	✔	✔	✤
16.2	16R2		✤	✤	✤
18.2	18R2	✔	✔	✔	✔
20	20R	✔	✔	✔	✔
22.1	22R1		✔	✔	✔
24.9	24R9	✔	✔	✔	✔
27.4	27R4		✔	✔	✔
30.1	30R1	✔	✔	✔	✔
33.2	33R2		✔	✔	✔
37.4	37R4		✔	✤	✔
40.2	40R2	✔	✔	✔	✔
45.3	45R3		✔	✔	✔
49.9	49R9	✔	✔	✔	✔
51.1	51R1		✔	✔	✔
56.2	56R2	✔	✔	✔	✔
61.9	61R9		✔	✔	✔
68.1	68R1	✔	✔	✔	✔
75	75R		✔	✤	✔
82.5	82R5	✔	✔	✔	✔
90.9	90R9		✔	✔	✔
100	100	✔	✔	✔	✔
110	110		✔	✔	✔
121	121	✔	✔	✔	✔
133	133		✤	✔	✤
150	150	✔	✔	✔	✤
162	162		✔	✔	✔
182	182	✔	✔	✔	✔
200	200	✔	✔	✔	✔
221	221		✔	✔	✔
249	249	✔	✔	✔	✔
274	274		✔	✤	✔
301	301	✔	✔	✔	✔
332	332		✔	✔	✔
374	374		✔	✔	✔
402	402	✔	✔	✔	✔
453	453		✔	✔	✔
499	499	✔	✔	✔	✔
511	511		✔	✔	✔
562	562	✔	✔	✔	✔
619	619		✔	✔	✔
681	681	✔	✔	✔	✔
750	750		✔	✔	✔
825	825	✔	✔	✔	✔
909	909		✔	✔	✔
1,000	1K0	✔	✔	✔	✔
1,100	1K1		✤	✔	✔
1,210	1K21	✔	✔	✔	✔
1,330	1K33		✤	✔	✤
1,500	1K5	✔	✔	✔	✤
1,620	1K62		✔	✤	✤
1,820	1K82	✔	✔	✔	✔
2,000	2K0	✔	✔	✔	✔
2,210	2K21		✔	✔	✔
2,490	2K49	✔	✔	✔	✔
2,740	2K74		✔	✔	✔
3,010	3K01	✔	✔	✔	✔
3,320	3K32		✔	✔	✔
3,740	3K74		✔	✔	✔
4,020	4K02		✔	✔	✔
4,530	4K53		✔	✤	✔
4,990	4K99		✔	✔	✔
5,110	5K11		✔	✔	✔
5,620	5K62		✔	✔	✔
6,190	6K19		✔	✔	✔
6,810	6K81		✔	✔	✔
7,500	7K5		✔	✔	✤
8,250	8K25		✔	✔	✔
9,090	9K09		✤	✔	✤
10,000	10K		✔	✔	✔
10,500	10K5		✔	✤	✤
11,000	11K		✔	✤	✤
12,100	12K1		✤	✤	✤
13,300	13K3		✤	✔	✤
15,000	15K		✔	✔	✔
16,200	16K2		✤	✔	✤
18,200	18K2		✤	✔	✤
20,000	20K		✔	✔	✔
22,100	22K1			✔	✔
24,900	24K9			✔	✔
27,400	27K4			✔	✔
30,100	30K1			✔	✔
33,200	33K2			✔	✔
37,400	37K4			✤	✤
38,300	38K3			✔	✤
40,200	40K2			✔	✔
45,300	45K3			✔	✔
49,900	49K9			✔	✔
51,100	51K1			✔	✔
56,200	56K2			✔	✔
61,900	61K9			✔	✤
68,100	68K1			✔	✔
75,000	75K			✔	✔
82,500	82K5				✔
90,900	90K9				✔
100,000	100K				✔
150,000	150K				✔
200,000	200K				✔

Ohmic value	Part No. Prefix ➤ Suffix ▼	Wattage 5 — 85F	10 — 80F
27,400	27K4	✔	✔
30,100	30K1	✔	✔
33,200	33K2	✔	✔
37,400	37K4	✤	✤
38,300	38K3	✔	✤
40,200	40K2	✔	✔
45,300	45K3	✔	✔
49,900	49K9	✔	✔
51,100	51K1	✔	✔
56,200	56K2	✔	✔
61,900	61K9	✔	✤
68,100	68K1	✔	✔
75,000	75K	✔	✔
82,500	82K5		✔
90,900	90K9		✔
100,000	100K		✔
150,000	150K		✔
200,000	200K		✔

✔ = Standard values

✤ = Non-standard values subject to minimum handling charge per item

Shaded values involve very fine resistance wire and should not be used in critical applications without burn-in and/or thermal cycling.

Commercial Grade

Non-Inductive Winding
Optional (blank = std. winding)

81 N JR10

80 Series
Acrasil®
Silicone Ceramic
Conformal Axial
Term. Wirewound

Wattage
1 = 1W
2
3
5
0 = 10W

Tolerance
F = 1%
J = 5%

Resistance Value
R10 = 0.10Ω
1R0 = 1.0Ω
10R = 10.0Ω
250 = 250Ω
1K0 = 1,000Ω
4K5 = 4,500Ω
50K = 50,000Ω

Military Grade

RW74U1001F

RW Series
Military grade

Resistance Value
R100 = 0.1Ω
1R00 = 1.0Ω
10R0 = 10.0Ω
1000 = 100Ω
1001 = 1000Ω
1002 = 10KΩ
1503 = 150KΩ

Tolerance
F = 1%
J = 5%

This product will not be made available as RoHS Compliant.

For RoHS Compliant equivalent, see **40 Series.**

90 Series

Lead Free Vitreous Enamel Molded Axial Term. Wirewound, 5% Tolerance Standard

When you need the highest quality wirewound axial terminal resistors available, choose Ohmite's 90 Series resistors.

They are manufactured by a unique process that molds the vitreous enamel over the resistive element, helping to ensure consistent dimensions. This uniformity permits 90 Series resistors to be mounted in clips, creating a heat-sinking benefit (see next page).

The durable vitreous enamel coating, which is totally lead free, permits the 90 Series resistors to maintain a hard coating while operating at high temperatures. Mechanical integrity is enhanced by the all-welded construction.

FEATURES

- Molded Construction provides consistent shape and size (Permits mounting in clips which extends power rating).
- Meets MIL-R-26 requirements for insulated resistors.
- All-welded construction.
- Flame resistant lead free vitreous enamel coating.
- Higher ratings in smaller sizes.
- Heat sink mounting clips available.
- RoHS compliant; add "E" suffix to part number to specify.

SERIES SPECIFICATIONS

Series	Wattage*	Ohms	Voltage
91	1.5	0.1Ω-3.6K	150
92	2.25	0.1Ω-3.5K	85
93	3.25	0.1Ω-10.5K	200
95	5.0	0.1Ω-25K	495
96	6.5	0.1Ω-50K	625
90	11.0	0.1Ω-91K	1080

* 2x power ratings by using heat-sink mounting clips shown on following page.

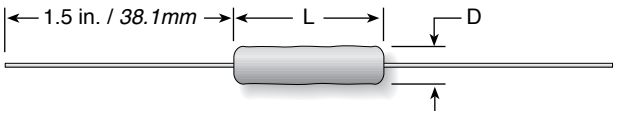
Note: Due to space restrictions, parts are stamped with wattage ratings reduced to the nearest whole number. The actual wattage ratings are as published in this catalog.

CHARACTERISTICS

Coating	Molded lead free vitreous enamel
Core	Ceramic
Terminals	Solder-coated copper clad axial. RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Derating	Linearly from 100% @ +25°C to 0% @ +350°C
Tolerance	±5% (other tolerances available)
Power rating	Based on 25°C free air rating (other wattages available*)
Maximum ohmic values	See chart
Overload	Under 11 watts: 5 times rated wattage for 5 seconds. 11 watts: 10 times rated wattage for 5 seconds
Temperature coefficient	1 to 9.99Ω: ±100 ppm/°C; 10Ω and over: ±30 ppm/°C
Dielectric withstanding voltage	500 VAC: 1W rating; 1000 VAC: 2, 3, 5 and 11W

DIMENSIONS

(in./mm max.)



Series	Wattage	Length	Diameter	Lead gauge
91	1.5	0.452 / 11.5	0.140 / 3.6	24
92	2.25	0.405 / 10.3	0.219 / 5.6	20
93	3.25	0.577 / 14.7	0.234 / 5.9	20
95	5.0	0.968 / 24.6	0.265 / 6.7	20
96	6.5	0.952 / 24.2	0.343 / 8.7	20
90	11.0	1.811 / 46.0	0.343 / 8.7	20

(continued)

90 Series

Lead Free Vitreous Enamel Molded Axial Term. Wirewound, 5% Tolerance Standard

ORDERING INFORMATION

Non-Inductive Winding
Optional (blank = std. winding)

RoHS Compliant

91NJR10E

90 Series	Wattage	Tolerance	Resistance Value
Series-Lead Free Vitreous Enamel Molded Axial Term. Wirewound	1 = 1.5W 2 = 2.25W 3 = 3.25W 5 = 5W 0 = 11W	J = 5%	1R0 = 1.0Ω 10R = 10.0Ω 250 = 250Ω 1K0 = 1,000Ω 4K5 = 4,500Ω 51K = 51,000Ω

Standard part numbers for 90 series

Ohmic value	Part No. Prefix ➤ Suffix ▼	Wattage 1.5 (91J)	2.25 (92J)	3.25 (93J)	5 (95J)	11 (90J)
1	1R0	✔	✔	✔	✔	✣
1.1	1R1	✔	✣	✣	✔	✣
1.2	1R2	✔	✔	✔	✔	✣
1.3	1R3	✣	✔	✔	✣	✔
1.5	1R5	✔	✔	✔	✔	✔
1.6	1R6	✣	✣	✣	✣	✣
1.8	1R8	✔	✣	✣	✔	✔
2	2R0	✔	✔	✔	✔	✔
2.2	2R2	✔	✔	✔	✔	✔
2.4	2R4	✔	✣	✔	✔	✔
2.7	2R7	✔	✔	✔	✔	✔
3	3R0	✔	✔	✔	✔	✔
3.3	3R3	✔	✔	✔	✔	✔
3.6	3R6	✣	✣	✣	✔	✣
3.9	3R9	✔	✔	✔	✔	✔
4	4R0	✔	✔	✔	✔	✔
4.3	4R3	✣	✔	✣	✔	✔
4.7	4R7	✔	✔	✔	✔	✔
5	5R0	✔	✔	✔	✔	✔
5.1	5R1	✣	✔	✔	✣	✣
5.6	5R6	✔	✔	✔	✔	✔
6.2	6R2	✣	✔	✔	✔	✔
6.8	6R8	✔	✣	✔	✔	✔
7.5	7R5	✣	✔	✔	✔	✔
8.2	8R2	✣	✔	✔	✔	✔
9.1	9R1	✣	✣	✔	✔	✣
10	10R	✔	✔	✔	✔	✔
11	11R	✣	✣	✣	✔	✔
12	12R	✔	✔	✔	✔	✔
13	13R	✣	✣	✔	✔	✣
15	15R	✔	✔	✔	✔	✔
16	16R	✔	✣	✔	✔	✔
18	18R	✔	✔	✔	✔	✔
20	20R	✔	✔	✔	✔	✔
22	22R	✔	✔	✔	✔	✔
24	24R	✣	✣	✔	✔	✣
25	25R	✣	✔	✔	✔	✔
27	27R	✔	✔	✔	✔	✔
30	30R	✔	✔	✔	✔	✔
33	33R	✔	✣	✔	✔	✔
35	35R	✔	✣	✔	✔	✔
36	36R	✔	✣	✣	✔	✣
39	39R	✔	✔	✔	✔	✔
40	40R	✣	✔	✔	✔	✔
43	43R	✣	✔	✔	✔	✔
47	47R	✔	✔	✔	✔	✔
50	50R	✔	✔	✔	✔	✔
51	51R	✣	✣	✔	✔	✣
56	56R	✔	✔	✔	✔	✔
62	62R	✔	✔		✔	✔
68	68R	✔	✔	✔	✔	✔
75	75R	✔	✔	✔	✔	✔
82	82R	✔	✔	✔	✔	✔
91	91R	✔	✣	✔	✔	✔
100	100	✔	✔	✔	✔	✔
110	110	✔	✔	✔	✔	✔
120	120	✔	✔	✔	✔	✔
130	130	✣	✔	✔	✔	✔
150	150	✔	✔	✔	✔	✔
160	160	✔	✣	✔	✔	✔
180	180	✔	✔	✔	✔	✔
200	200	✔	✔	✔	✔	✔
220	220	✔	✔	✔	✔	✔
240	240	✣	✣	✔	✔	✣
250	250	✔	✔	✔	✔	✔
270	270	✔	✔	✔	✔	✔
300	300	✔	✔	✔	✔	✔
330	330	✔	✔	✔	✔	✔
350	350	✔	✔	✔	✔	✣
360	360	✔	✔	✔	✔	✔
390	390	✔	✔	✔	✔	✔
400	400	✔	✔	✔	✔	✔
430	430	✔	✔	✔	✔	✣
450	450	✣	✔	✔	✣	✣
470	470	✔	✔	✔	✔	✔
500	500	✔	✔	✔	✔	✔
510	510	✣	✔	✔	✔	✣
560	560	✔	✔	✔	✔	✔
600	600	✔	✣	✔	✔	✔
620	620	✔	✣	✔	✣	✣
680	680	✔	✔	✔	✔	✔
700	700	✣	✔	✔	✔	✣
750	750	✔	✔	✔	✔	✔
800	800	✔	✣	✔	✔	✔
820	820	✔	✔	✔	✔	✔
900	900	✣	✣	✔	✔	✣
910	910	✣	✣	✔	✣	✣
1,000	1K0	✔	✔	✔	✔	✔
1,100	1K1	✣	✔	✔	✔	✣
1,200	1K2	✔	✔	✔	✔	✔
1,300	1K3	✔	✔	✔	✔	✔
1,400	1K4	✣	✔	✣	✣	✔
1,500	1K5	✔	✔	✔	✔	✔
1,600	1K6	✣	✣	✔	✔	✔
1,800	1K8	✔	✔	✔	✔	✔
2,000	2K0	✔	✔	✔	✔	✔
2,200	2K2	✔	✔	✔	✔	✔
2,400	2K4	✔	✔	✔	✔	✣
2,500	2K5	✔	✔	✔	✔	✔
2,700	2K7	✣	✔	✔	✔	✔
3,000	3K0	✔	✔	✔	✔	✔
3,300	3K3			✔	✔	✔
3,500	3K5			✔	✔	✔
3,600	3K6			✔	✔	✔
3,900	3K9			✔	✔	✔
4,000	4K0			✔	✔	✔
4,300	4K3			✣	✔	✔
4,500	4K5			✔	✔	✔
4,700	4K7			✔	✔	✔
5,000	5K0			✔	✔	✔
5,100	5K1			✣	✔	✔
5,600	5K6			✔	✔	✔
6,000	6K0			✔	✔	✔
6,200	6K2			✔	✔	✣
6,800	6K8			✔	✔	✔
7,000	7K0			✔	✔	✔
7,500	7K5			✔	✔	✔
8,000	8K0			✔	✔	✔
8,200	8K2			✔	✔	✔
9,000	9K0			✔	✔	✣
9,100	9K1			✔		✣
10,000	10K			✔	✔	✔
11,000	11K				✔	✣
12,000	12K				✔	✔
13,000	13K				✔	✣
14,000	14K				✔	✣
15,000	15K				✔	✔
16,000	16K				✔	✣
17,000	17K				✣	✣
18,000	18K				✔	✔
20,000	20K				✔	✔
22,000	22K				✔	✔
24,000	24K				✣	✣
25,000	25K				✔	✔
27,000	27K					✔
30,000	30K					✔
33,000	33K					✔
35,000	35K					✣
36,000	36K					✔
39,000	39K					✔
40,000	40K					✔
43,000	43K					✔
45,000	45K					✣
47,000	47K					✔
50,000	50K					✔
51,000	51K					✣

✔ = Standard values

✣ = Non-standard values subject to minimum handling charge per item

Shaded values involve very fine resistance wire and should not be used in critical applications without burn-in and/or thermal cycling.

MOUNTING CLIP

FEATURES

- Prevents severe vibration or mechanical shock to resistor
- Increases resistor wattage up to 100% when mounted on metal surface (1.5 sq. in. by 0.040 in. thick min. per watt dissipated)
- Holes in clip base permit fastening to chassis surface with machine screws, eyelets or rivets
- Sold in bags of ten (10)

Standard part numbers for mounting clip

Part No.	Resistor rating (watts)	Clip length (in./*mm*)	Clip width (in./*mm*)	Clip height (in./*mm*)	No. of holes	Hole centers (in./*mm*)	Hole diameter (in./*mm*)
✔ 5900	1.5	0.40 / *10.319*	0.150 / *3.810*	0.250 / *6.350*	1		0.71 / *1.803*
✔ 5902	2.25	0.35 / *8.890*	0.217 / *5.500*	0.275 / *6.980*	2	0.156 / *3.969*	0.71 / *1.803*
✙ 5904	3.25	0.50 / *12.700*	0.257 / *6.500*	0.319 / *8.103*	2	0.250 / *6.350*	0.093 / *2.362*
✙ 5906	5.0	0.90 / *22.860*	0.237 / *6.019*	0.284 / *7.214*	2	0.400 / *10.160*	0.103 / *2.616*
✙ 5908	11.0	1.75 / *44.450*	0.333 / *8.458*	0.377 / *9.576*	2	0.800 / *20.320*	0.103 / *2.616*

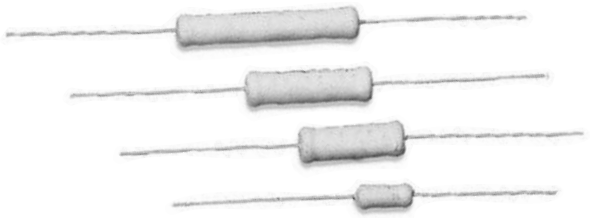
✙ = Most popular standard values

✔ = Standard values

✣ = Non-standard values subject to minimum handling charge per item

Axiohm

Centohm Coated
Axial Terminal Wirewound



Ohmite's Axiohm resistors are Centohm coated for maximum reliability. These all-welded units are characterized by their low temperature coefficients and resistance to thermal shock, making them ideal for a wide range of electrical and electronic applications.

FEATURES

- Welded construction
- Inorganic and non-hygroscopic, Centohm coating seals and protects the resistance wire.
- Exceeds MIL-R-26 moisture requirements
- Centohm Resistors are designed to meet and exceed performance characteristics of vitreous enamel resistors.
- Centohm is more cost effective than vitreous enamel.
- ±5% resistance tolerance

OPTIONS

Noninductive: This specially designed version is wound using the Ayrton-Perry method.

Resistance Tolerances: Options include 5%, 1%, 0.5%, 0.25%, and 0.1% resistors.

Terminal Sizes: Alternate terminal diameters available.

Tape and Reel: Resistors taped for automatic insertion. Contact Ohmite for size, quantity and ordering information

SERIES SPECIFICATIONS

Watt Rating Form	Resistance Range (Ω) Min.	Max.	Standard Resistance Tolerance	Dielectric Withstanding Voltage	Maximum Voltage Rating
1C	0.1	4K	±5%	500	100
2C	0.1	10K	±5%	500	300
3C	0.1	20K	±5%	500	450
4C	0.1	30K	±5%	500	600
5C	0.1	40K	±5%	500	800
7C	0.1	50K	±5%	500	875
10C	0.1	90K	±5%	500	1600

CHARACTERISTICS

Coating	Flameproof proprietary Centohm
Core	Ceramic
Element	Copper-nickel alloy or nickel-chrome alloy depending on resistance value
End Cap	Stainless steel
Terminals	Tinned Copper weld. RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Derating	Linearly from 100% @ +25°C to 0% @ +350°C.
Tolerance	±5% (Std) down to 0.1% available.
Power rating	Based on 25°C free air rating (other wattages available).
Overload	Under 5 watts: 5 times rated wattage for 5 seconds. 5 watts and over: 10 times rated wattage for 5 seconds.
Temperature coefficient	±30ppm /°C above 10Ω ±100ppm/°C 1 to 10Ω ±200ppm/°C below 1Ω

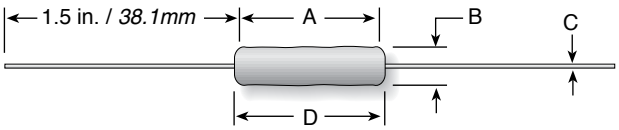
(continued)

Axiohm

Centohm Coated
Axial Terminal Wirewound

DIMENSIONS

(in./mm)



Watt Rating Form	A ±.063"/±1.60mm	B ±.031"/0.79mm	C Wire Gauge (dia.)	D max. clean term. to clean term. in./mm
1C	0.313±.031 / 7.95±.79	0.094 / 2.39	#24 (.020")	0.406 / 10.31
2C	0.375 / 9.53	0.219 / 5.56	#20 (.032")	0.469 / 11.91
3C	0.5 / 12.7	0.219 / 5.56	#20 (.032")	0.594 / 15.09
4C	0.688 / 17.48	0.219 / 5.56	#20 (.032")	0.813 / 20.65
5C	0.938 / 23.83	0.219 / 5.56	#20 (.032")	1.063 / 27.00
7C	1 / 25.4	0.313 / 7.95	#20 (.032")	1.125 / 28.58
10C	1.563 / 39.7	0.313 / 7.95	#20 (.032")	1.688 / 42.67

PERFORMANCE DATA

Test	Maximum
Temperature Coefficient	±30ppm/°C above 10Ω ±100ppm/°C 1 to 10Ω ±200ppm/°C below 1Ω
Thermal Shock	± (2% + .05Ω)ΔR
Short Time Overload	± (2% + .05Ω)ΔR
Dielectric	± (0.1% + .05Ω)ΔR
Low Temperature Storage	± (2% + .05Ω)ΔR
High Temperature Exposure	± (2% + .05Ω)ΔR
Moisture Resistance	± (2% + .05Ω)ΔR
Shock	± (2% + .05Ω)ΔR
Vibration	± (2% + .05Ω)ΔR
Load Life	± (3% + .05Ω)ΔR
Terminal Strength	± (1% + .05Ω)ΔR

ΔR values are maximums based on MIL-R-26 testing requirements at 350°C.

ORDERING INFORMATION

Non-Inductive Option (Add N)

E = RoHS compliant

Example:
Std 3 watt,
10K ± 5% = 3CJ10K

5 N C J 1 0 K E

Wattage

Coating
"C" for Centohm

Tolerance
J = 5% (standard)
H = 3%
F = 1%
D = .5%
Q = .25%
B = .1%

Resistance (Ω)
use "K" for 1000 multiplier; use "R" for decimal point

OD/OF/OA Series

Little Demon® Carbon Composition Molded OD/OF Series (5% Tol.) OA Series (10%)

Discontinuance Notice: OA series is not recommended for new designs. The OA series will no longer be available for new orders after 8-30-14. After this date existing stock will be sold until depleted.

FEATURES

- Molded insulation for high dielectric strength
- Rugged construction
- High surge capabilities
- Comparable to "Mil" RC07, RC20, and RC32 types
- OD/OF Series available in E24 values
- OA Series available in E12 values

Ohmite's Little Demons are small, reliable carbon composition resistors with exceptional strength. They are made tough by a molding process that combines the terminals, insulation and resistive element into an integrated unit. Along with their small size, Little Demons perform with low noise, dissipate heat rapidly and offer high temperature stability.

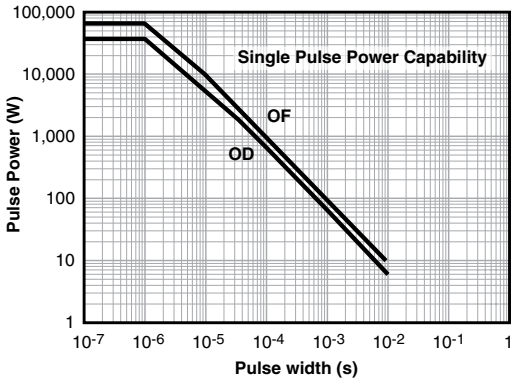
Color codes are readable even after prolonged use thanks to a very durable coating that resists abrasions and chipping normally associated with automatic insertion equipment.

SERIES SPECIFICATIONS

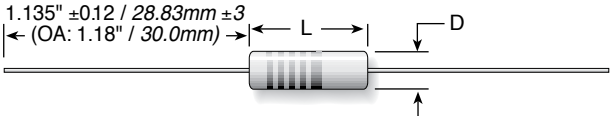
Series	Wattage	Ohms	Tolerance	Max. Voltage	Dielectric VAC
OD	0.25	2.2-5.6M	±5%	250	500
OF	0.50	2.2-20M	±5%	350	700
OA	1.00	2.2-1M	±10%	500	1000

CHARACTERISTICS

Terminals	Solder-coated copper terminal.
Body	Molded Phenolic
Tolerance	±5% (OD/OF); ±10% (OA)
Derating	Linearly from 100% @ +70°C to 0% @ 130°C



DIMENSIONS



Series	Length max.	Diam. max.	Lead Dia.
OD	0.276 / 7.0	0.098 / 2.5	0.024/0.60
OF	0.406 /10.3	0.150 / 3.8	0.028/0.70
OA	0.591 /15.0	0.236 / 6.0	0.035/0.92

(continued)

OD/OF/OA Series

Little Demon® Carbon Composition Molded
OD/OF Series (5% Tol.) OA Series (10%)

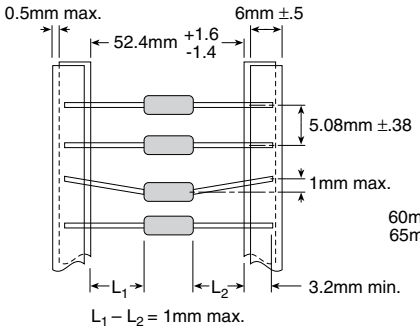
PACKAGING

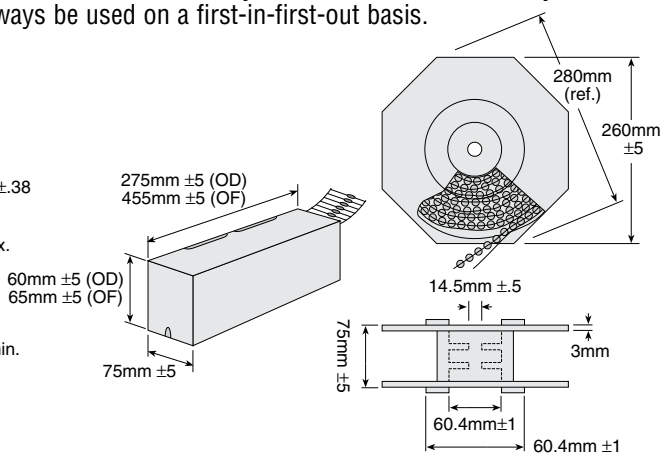
All resistors are packaged in sealed poly bags with desiccant to maintain a consistent humidity during storage. If parts are removed from the protective plastic bag they should be used as soon as possible or resealed in the plastic bag.

Storage: Ohmite recommends storing carbon composition resistors in a controlled environment at a temperature of 5° to 35°C and relative humidity of less than 60%. Inventory should always be used on a first-in-first-out basis.

Tape/Reel	OD	OF
Qty./reel	5000	3000
Reel size (mm)	260	260
Qty./carton	40,000	24,000
Gross carton wt. (kg)	12	13
Carton size (m^3)	0.04	0.04

Ammo Box	OD	OF
Tape width (mm)	52	52
Qty./box	2000	2000
Qty./carton	30,000	30,000
Gross carton wt. (kg)	10	16
Carton size (m3)	0.03	0.05





RESISTOR USE GUIDELINES

Carbon composition resistors are manufactured by extruding a blend of carbon and organic binders inside a phenolic outer body. The extrusion is cut to length, leads inserted, cured, and marked to form a finished resistor. The carbon and binder mixture is adjusted to produce different resistance values. The resistors are sorted for 5%, 10%, and 20% tolerance values.

Carbon composition resistors are able to withstand larger short-term pulses and higher voltages than film resistors and are virtually impervious to ESD events (Electro-static discharge). Carbon composition resistors are also sensitive to moisture and, therefore, storage recommendations should be adhered to. Generally, any moisture absorbed during storage will be "baked out" during the soldering operation. If the product is stored properly the resistance shift during the soldering operation will be minimal, less than 2% or 3%.

Carbon composition resistors are highly hygroscopic and changes in resistance value can occur if too much moisture is absorbed. For this reason, it is recommended not to use water or water-soluble solvents to clean these components. Alcohol or hydrocarbon solvents are recommended for rinsing.

BAKE PROCEDURE

A. Heat Treatment

110°C ±10°C
15 hours

B. Frequency of heat treatment

1 time only

C. Solder heat test after treatment

Type	Solder Temp.	Dip Time	Evaluation
OD	300°C	3 sec	within ±3%
OF	350°C	3 sec	within ±3%

*Depth of Immersion: 3mm from the resistor body

D. Cautions

Solderability: may be affected due to oxidization of lead wire

Resistance value: some units may not completely recover to original value.

Soldering heat: some treated product may have substantial resistance change during soldering operation. It is recommended that parts be tested to evaluate soldering heat effects.

ORDERING INFORMATION

- OD/OF Series available in E24 values
- OA Series available in E12 values

RoHS compliant | **Tape & reel** *optional*

O D 6 8 3 J E -TR

Series
OD 68G = 6.8
OF 680 = 68
OA 681 = 680
682 = 6,800
683 = 68,000
684 = 680,000

Ohms

Tolerance
OD, OF: J = 5%
OA: K = 10%

Little Rebel®

Carbon Film Resistors, 5% Tolerance Available in E24 Ohmic values

Little Rebels are one of Ohmite's more economical lines of low wattage resistors. Constructed of a pure carbon film deposited on a high-grade ceramic body, these units offer better stability performance than comparable carbon composition resistors.
Little Rebels are designed for electrical and electronic applications that demand small sizes and small power ratings plus high performance and reliability.

FEATURES

- High stability, low noise level, long life.
- Ideal for applications requiring a steady low power drop.
- Available in Resistor Cabinet Assortments.
- 24 Values per decade.

SERIES SPECIFICATIONS

Series	Wattage	Ohms	Max. Working Voltage
OJ	0.125	1.0- 1M	200
OK	0.250	1.0-10M	250
OL	0.500	1.0-10M	350
OM	1.00	1.0-10M	500
ON	2.00	1.0-10M	500

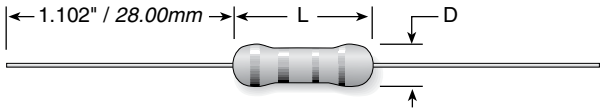
*Available in Cabinet Assortments

CHARACTERISTICS

Core	High-grade ceramic.
Terminals	Solder-coated copper lead.
Derating	Linearly from 100% @ +70°C to 0% @ 155°C.
Tolerance	±5%.
Temperature Coefficient	1Ω to 10: ±350 ppm/°C 11Ω to 91K: -450 ppm/°C 100K to 1M: -700 ppm/°C 1.1M to 10M: -800 to 1500 ppm/°C
Maximum Overload Voltage	OJ: 400 Volts OK: 500 Volts OL: 700 Volts OM: 1000 Volts ON: 1000 Volts
Quantity per reel	OJ: 5000 OK: 5000 OL: 4000 OM: 2500 ON: 1000

DIMENSIONS

(iin./mm)



Series	Wattage	Max. Length	Max. Diam.	Lead ga.
OJ	0.125	0.138 / 3.5	0.073 / 1.85	24
OK	0.250	0.268 / 6.8	0.099 / 2.5	22
OL	0.500	0.355 / 9.0	0.118 / 3.0	22
OM	1.00	0.473 /12.0	0.197 / 5.0	20
ON	2.00	0.630 / 16.0	0.217 / 5.5	20

(continued)

Little Rebel®

Carbon Film Resistors, 5% Tolerance
Available in E24 Ohmic values

ORDERING INFORMATION

Standard part numbers for standard resistance values

Ohmic value	Part No. Prefix ➤ / Suffix ▼	Wattage 0.125 OJ	0.25 OK	0.50 OL	1.0 OM	2.0 ON
1	10G5	✔	✔	✔	✔	✔
1.1	11G5	✔	✔	✔	✔	✔
1.2	12G5	✔	✔	✔	✔	✔
1.3	13G5	✔	✔	✔	✔	✔
1.5	15G5	✔	✔	✔	✔	✔
1.6	16G5	✔	✔	✔	✔	✔
1.8	18G5	✔	✔	✔	✔	✔
2.0	20G5	✔	✔	✔	✔	✔
2.2	22G5	✔	✔	✔	✔	✔
2.4	24G5	✔	✔	✔	✔	✔
2.7	27G5	✔	✔	✔	✔	✔
3.0	30G5	✔	✔	✔	✔	✔
3.3	33G5	✔	✔	✔	✔	✔
3.6	36G5	✔	✔	✔	✔	✔
3.9	39G5	✔	✔	✔	✔	✔
4.3	43G5	✔	✔	✔	✔	✔
4.7	47G5	✔	✔	✔	✔	✔
5.1	51G5	✔	✔	✔	✔	✔
5.6	56G5	✔	✔	✔	✔	✔
6.2	62G5	✔	✔	✔	✔	✔
6.8	68G5	✔	✔	✔	✔	✔
7.5	75G5	✔	✔	✔	✔	✔
8.2	82G5	✔	✔	✔	✔	✔
9.1	91G5	✔	✔	✔	✔	✔
10	1005	✔	✔	✔	✔	✔
11	1105	✔	✔	✔	✔	✔
12	1205	✔	✔	✔	✔	✔
13	1305	✔	✔	✔	✔	✔
15	1505	✔	✔	✔	✔	✔
16	1605	✔	✔	✔	✔	✔
18	1805	✔	✔	✔	✔	✔
20	2005	✔	✔	✔	✔	✔
22	2205	✔	✔	✔	✔	✔
24	2405	✔	✔	✔	✔	✔
27	2705	✔	✔	✔	✔	✔
30	3005	✔	✔	✔	✔	✔
33	3305	✔	✔	✔	✔	✔
36	3605	✔	✔	✔	✔	✔
39	3905	✔	✔	✔	✔	✔
43	4305	✔	✔	✔	✔	✔
47	4705	✔	✔	✔	✔	✔
51	5105	✔	✔	✔	✔	✔
56	5605	✔	✔	✔	✔	✔
62	6205	✔	✔	✔	✔	✔
68	6805	✔	✔	✔	✔	✔
75	7505	✔	✔	✔	✔	✔
82	8205	✔	✔	✔	✔	✔
91	9105	✔	✔	✔	✔	✔
100	1015	✔	✔	✔	✔	✔
110	1115	✔	✔	✔	✔	✔
120	1215	✔	✔	✔	✔	✔
130	1315	✔	✔	✔	✔	✔
150	1515	✔	✔	✔	✔	✔
160	1615	✔	✔	✔	✔	✔
180	1815	✔	✔	✔	✔	✔
200	2015	✔	✔	✔	✔	✔
220	2215	✔	✔	✔	✔	✔
240	2415	✔	✔	✔	✔	✔
270	2715	✔	✔	✔	✔	✔
330	3315	✔	✔	✔	✔	✔
350	3515	✔	✔	✔	✔	✔
360	3615	✔	✔	✔	✔	✔
390	3915	✔	✔	✔	✔	✔
430	4315	✔	✔	✔	✔	✔
470	4715	✔	✔	✔	✔	✔
510	5115	✔	✔	✔	✔	✔
560	5615	✔	✔	✔	✔	✔
620	6215	✔	✔	✔	✔	✔
680	6815	✔	✔	✔	✔	✔
750	7515	✔	✔	✔	✔	✔
820	8215	✔	✔	✔	✔	✔
910	9115	✔	✔	✔	✔	✔
1,000	1025	✔	✔	✔	✔	✔
1,100	1125	✔	✔	✔	✔	✔
1,200	1225	✔	✔	✔	✔	✔
1,300	1325	✔	✔	✔	✔	✔
1,500	1525	✔	✔	✔	✔	✔
1,600	1625	✔	✔	✔	✔	✔
1,800	1825	✔	✔	✔	✔	✔
2,000	2025	✔	✔	✔	✔	✔
2,200	2225	✔	✔	✔	✔	✔
2,400	2425	✔	✔	✔	✔	✔
2,700	2725	✔	✔	✔	✔	✔
3,000	3025	✔	✔	✔	✔	✔
3,300	3325	✔	✔	✔	✔	✔
3,600	3625	✔	✔	✔	✔	✔
3,900	3925	✔	✔	✔	✔	✔
4,300	4325	✔	✔	✔	✔	✔
4,700	4725	✔	✔	✔	✔	✔
5,100	5125	✔	✔	✔	✔	✔
5,600	5625	✔	✔	✔	✔	✔
6,200	6225	✔	✔	✔	✔	✔
6,800	6825	✔	✔	✔	✔	✔
7,500	7525	✔	✔	✔	✔	✔
8,200	8225	✔	✔	✔	✔	✔
9,100	9125	✔	✔	✔	✔	✔
10,000	1035	✔	✔	✔	✔	✔
11,000	1135	✔	✔	✔	✔	✔
12,000	1235	✔	✔	✔	✔	✔
13,000	1335	✔	✔	✔	✔	✔
15,000	1535	✔	✔	✔	✔	✔
16,000	1635	✔	✔	✔	✔	✔
18,000	1835	✔	✔	✔	✔	✔
20,000	2035	✔	✔	✔	✔	✔
22,000	2235	✔	✔	✔	✔	✔
24,000	2435	✔	✔	✔	✔	✔
27,000	2735	✔	✔	✔	✔	✔
30,000	3035	✔	✔	✔	✔	✔
33,000	3335	✔	✔	✔	✔	✔
36,000	3635	✔	✔	✔	✔	✔
39,000	3935	✔	✔	✔	✔	✔
43,000	4335	✔	✔	✔	✔	✔
47,000	4735	✔	✔	✔	✔	✔
51,000	5135	✔	✔	✔	✔	✔
56,000	5635	✔	✔	✔	✔	✔
62,000	6235	✔	✔	✔	✔	✔
68,000	6835	✔	✔	✔	✔	✔
75,000	7535	✔	✔	✔	✔	✔
82,000	8235	✔	✔	✔	✔	✔
91,000	9135	✔	✔	✔	✔	✔
100,000	1045	✔	✔	✔	✔	✔
110,000	1145	✔	✔	✔	✔	✔
120,000	1245	✔	✔	✔	✔	✔
130,000	1345	✔	✔	✔	✔	✔
150,000	1545	✔	✔	✔	✔	✔
160,000	1645	✔	✔	✔	✔	✔
180,000	1845	✔	✔	✔	✔	✔
200,000	2045	✔	✔	✔	✔	✔
220,000	2245	✔	✔	✔	✔	✔
240,000	2445	✔	✔	✔	✔	✔
270,000	2745	✔	✔	✔	✔	✔
300,000	3045	✔	✔	✔	✔	✔
330,000	3345	✔	✔	✔	✔	✔
360,000	3645	✔	✔	✔	✔	✔
390,000	3945	✔	✔	✔	✔	✔
430,000	4345	✔	✔	✔	✔	✔
470,000	4745	✔	✔	✔	✔	✔
510,000	5145	✔	✔	✔	✔	✔
560,000	5645	✔	✔	✔	✔	✔
620,000	6245	✔	✔	✔	✔	✔
680,000	6845	✔	✔	✔	✔	✔
750,000	7545	✔	✔	✔	✔	✔
820,000	8245	✔	✔	✔	✔	✔
910,000	9145	✔	✔	✔	✔	✔
1 MEG	1055	✔	✔	✔	✔	✔
1.1 MEG	1155		✔	✔	✔	✔
1.2 MEG	1255		✔	✔	✔	✔
1.3 MEG	1355		✔	✔	✔	✔
1.5 MEG	1555		✔	✔	✔	✔
1.6 MEG	1655		✔	✔	✔	✔
1.8 MEG	1855		✔	✔	✔	✔
2.0 MEG	2055		✔	✔	✔	✔
2.2 MEG	2255		✔	✔	✔	✔
2.4 MEG	2455		✔	✔	✔	✔
2.7 MEG	2755		✔	✔	✔	✔
3.0 MEG	3055		✔	✔	✔	✔
3.3 MEG	3355		✔	✔	✔	✔
3.6 MEG	3655		✔	✔	✔	✔
3.9 MEG	3955		✔	✔	✔	✔
4.3 MEG	4355		✔	✔	✔	✔
4.7 MEG	4755		✔	✔	✔	✔
5.1 MEG	5155		✔	✔	✔	✔
5.6 MEG	5655		✔	✔	✔	✔
6.2 MEG	6255		✔	✔	✔	✔
6.8 MEG	6855		✔	✔	✔	✔
7.5 MEG	7555		✔	✔	✔	✔
8.2 MEG	8255		✔	✔	✔	✔
9.1 MEG	9155		✔	✔	✔	✔
10 MEG	1065		✔	✔	✔	✔

Tolerance
5 = 5% (Std.)
1 = 10%

RoHS Compliant

O J 1 0 3 5 E - R 5 2

Series
Selected from Specification Chart

Ohms
3 Digit IEC Code
("G" as 3rd digit = 0.1)
11G=1.1Ω
101=100Ω
102=1000Ω
103=10,000Ω
104=100,000Ω
105=1 MΩ
106=10 MΩ

Packaging Code
R52 = Tape & Reel 52mm
(except ON: R58 = Tape & Reel 58mm)
A52(26) = Ammo Pac 52mm (26mm)

TWM/TWW Series

Ceramic Housed Radial Terminal Power

The TWM/TWW series radial terminal power resistors offer significant board space savings over axial terminal products. Generated heat is also kept away from the circuit board.

They are recommended for commercial applications requiring low cost.

FEATURES

- Economical Commercial Grade for general purpose use
- Wirewound and Metal Oxide construction
- Wide resistance range
- Flameproof inorganic construction

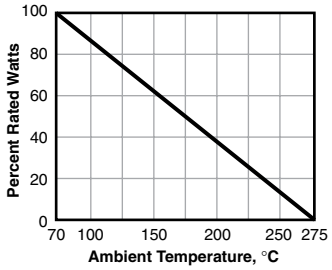
SERIES SPECIFICATIONS

Series	Wattage	Resistance	Voltage	Element
TWW3	3	0.01-39Ω	250	Wire
TWW5	5	0.01-47Ω	350	Wire
TWW10	10	0.04-990Ω	750	Wire
TWM3	3	43-50KΩ	250	Metal oxide
TWM5	5	51-50KΩ	350	Metal oxide
TWM10	10	1000-50KΩ	750	Metal oxide

CHARACTERISTICS

Housing	Ceramic
Core	Fiberglass
Filling	Cement based
Tolerance	5% standard
Temperature coefficient	0.01-20Ω ±400ppm/°C; >20-10Ω ±350ppm/°C
Dielectric withstanding voltage	1,000VAC
Short time overload	TWW: 10x rated power for 5 sec.; TWM: 5x rated power for 5 sec.
Operating Temperature	-55°C to 275°C
Storage Temperature	15°C-35°C, humidity: 25%-75%

Derating

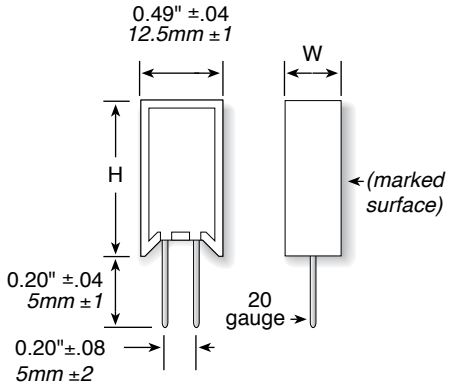


(continued)

TWM/TWW Series

Ceramic Housed Radial Terminal Power

DIMENSIONS



Series	Height (in./mm)	Width ±1mm
TWW3	0.98 / 25	0.33 / 8.5
TWW5	0.98 / 25	0.35 / 9
TWW10	1.97 / 50	0.35 / 9
TWM3	0.98 / 25	0.33 / 8.5
TWM5	0.98 / 25	0.35 / 9
TWM10	1.97 / 50	0.35 / 9

HOW TO ORDER

Tolerance: J = 5% | E = RoHS compliant

T W W 3 J R 0 5 E

Series
TWM = Ceramic housed metal oxide radial
TWW = Ceramic housed wirewound radial

Wattage
3
5
10

Resistance Value
Example:
R05 = 0.05Ω
R56 = 0.56Ω
1R0 = 1Ω
8R2 = 8.2Ω
270 = 270Ω
1K0 = 1,000Ω
8K2 = 8,200Ω
10K = 10,000Ω

Standard part numbers for TWW series

Ohmic value	Part No. Prefix ➤ / Suffix ▼	Wattage 3 TWW3J–	Wattage 5 TWW5J–	Wattage 10 TWW10J–
0.01	R01E	✔	✔	
0.02	R02E	✔	✔	
0.03	R03E	✔	✔	
0.04	R04E	✔	✔	✔
0.05	R05E	✔	✔	✔
0.10	R10E	✔	✔	✔
0.15	R15E	✔	✔	✔
0.20	R20E	✔	✔	✔
0.27	R27E	✔	✔	✔
0.30	R30E	✔	✔	✔
0.33	R33E	✔	✔	✔
0.39	R39E	✔	✔	✔
0.43	R43E	✔	✔	✔
0.47	R47E	✔	✔	✔
0.56	R56E	✔	✔	✔
0.68	R68E	✔	✔	✔
0.75	R75E	✔	✔	✔
0.82	R82E	✔	✔	✔
1.0	1R0E	✔	✔	✔
1.5	1R5E	✔	✔	✔
2.0	2R0E	✔	✔	✔
2.7	2R7E	✔	✔	✔
3.0	3R0E	✔	✔	✔
3.3	3R3E	✔	✔	✔
3.9	3R9E	✔	✔	✔
4.3	4R3E	✔	✔	✔
4.7	4R7E	✔	✔	✔
5.6	5R6E	✔	✔	✔
6.8	6R8E	✔	✔	✔
7.5	7R5E	✔	✔	✔
8.2	8R2E	✔	✔	✔
10	10RE	✔	✔	✔
15	15RE	✔	✔	✔
20	20RE	✔	✔	✔
22	22RE			✔
27	27RE	✔	✔	✔
30	30RE	✔	✔	✔
33	33RE	✔	✔	✔
39	39RE	✔	✔	✔
43	43RE		✔	✔
47	47RE		✔	✔
56	56RE			✔
68	68RE			✔
75	75RE			✔
82	82RE			✔
100	100E			✔
150	150E			✔
200	200E			✔
270	270E			✔
300	300E			✔
330	330E			✔
390	390E			✔
430	430E			✔
470	470E			✔
560	560E			✔
680	680E			✔
750	750E			✔
820	820E			✔

Standard part numbers for TWM series

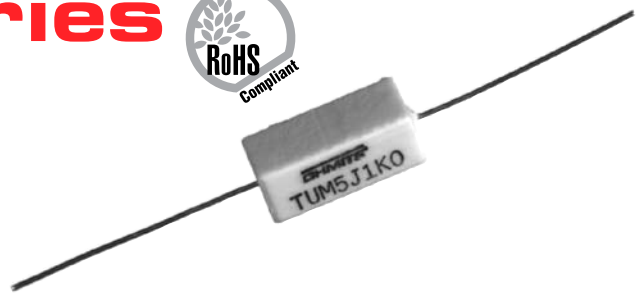
Ohmic value	Part No. Prefix ➤ / Suffix ▼	Wattage 3 TWM3J–	Wattage 5 TWM5J–	Wattage 10 TWM10J–
43	43RE	✔		
47	47RE	✔		
56	56RE	✔	✔	
68	68RE	✔	✔	
75	75RE	✔	✔	
82	82RE	✔	✔	
100	100E	✔	✔	
150	150E	✔	✔	
200	200E	✔	✔	
270	270E	✔	✔	
300	300E	✔	✔	
330	330E	✔	✔	
390	390E	✔	✔	
430	430E	✔	✔	
470	470E	✔	✔	
560	560E	✔	✔	
680	680E	✔	✔	
750	750E	✔	✔	
820	820E	✔	✔	
1000	1K0	✔	✔	✔
1500	1K5	✔	✔	✔
2000	2K0	✔	✔	✔
2700	2K7	✔	✔	✔
3000	3K0	✔	✔	✔
3300	3K3	✔	✔	✔
3900	3K9	✔	✔	✔
4300	4K3	✔	✔	✔
4700	4K7	✔	✔	✔
5600	5K6	✔	✔	✔
6800	6K8	✔	✔	✔
7500	7K5	✔	✔	✔
8200	8K2	✔	✔	✔
10000	10K	✔	✔	✔

TUM/TUW Series

Ceramic Housed Axial Terminal Power

The TUM/TUW Series resistors are our most economical power resistors. They are recommended for commercial applications where low cost is critical.

They are available in small standard packs for standard values, or bulk packaged for even lower costs.



FEATURES

- Economical Commercial Grade for general purpose use
- Wirewound and Metal Oxide construction
- Wide resistance range
- Flameproof inorganic construction

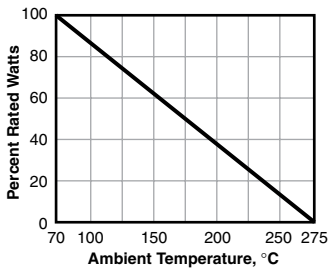
SERIES SPECIFICATIONS

Series	Wattage	Ohms	Voltage	Element
TUW3	3	0.01-39	350	Wirewound
TUW5	5	0.01-47	350	Wirewound
TUW7	7	0.10-680	500	Wirewound
TUW10	10	0.10-990	750	Wirewound
TUW15	15	0.10-1000	1000	Wirewound
TUM3	3	180-33K	350	Metal oxide
TUM5	5	220-50	350	Metal oxide
TUM7	7	910-50K	500	Metal oxide
TUM10	10	1000-50K	750	Metal oxide
TUM15	15	1100-150K	1000	Metal oxide

CHARACTERISTICS

Housing	Ceramic
Core	Fiberglass or metal oxide
Filling	Cement based
Tolerance	5% standard
TCR	0.01-20Ω ±400ppm/°C 20-150KΩ ±350ppm/°C
Dielectric withstanding voltage	1,000VAC
Short time overload	TUW: 10x rated power for 5 sec. TUM: 5x rated power for 5 sec.

Derating Curve



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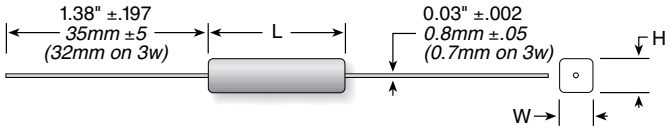
TUM/TUW Series

Ceramic Housed Axial Terminal Power

DIMENSIONS

(in./mm)



Series	Wattage	Length (±1mm)	Height (±1mm)	Width (±1mm)
TUW3	3	0.87 / 22	0.31 / 8	0.31 / 8
TUW5	5	0.87 / 22	0.35 / 9	0.39 / 10
TUW7	7	1.48 / 35	0.35 / 9	0.39 / 10
TUW10	10	1.93 / 49	0.35 / 9	0.39 / 10
TUW15	15	1.93 / 49	0.45/11.5	0.49 / 12.5
TUM3	3	0.87 / 22	0.31 / 8	0.31 / 8
TUM5	5	0.87 / 22	0.35 / 9	0.39 / 10
TUM7	7	1.48 / 35	0.35 / 9	0.39 / 10
TUM10	10	1.93 / 49	0.35 / 9	0.39 / 10
TUM15	15	1.93 / 49	0.45/11.5	0.49 / 12.5

ORDERING INFORMATION

Tolerance: J = 5% | E = RoHS compliant

T U M 3 J 8 R 2 E

Series
TUM = Ceramic Housed Metal Oxide
TUW = Ceramic Housed Wirewound

Wattage
3
5
7
10
15

Resistance Value
Example:
R50=0.50Ω
1R0=1Ω
8R2=8.2Ω
250=250Ω
1K0=1,000Ω
8K2=8,200Ω
10K=10,000Ω

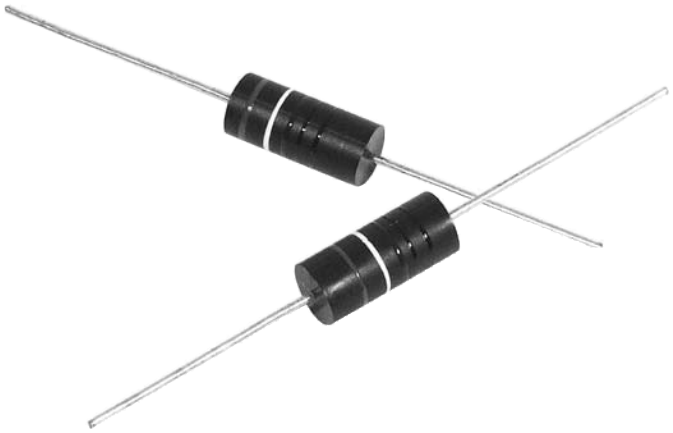
Standard part numbers for TUW/TUM series

Ohmic value	Part No. Prefix ➤ Suffix ▼	Wattage 3 TUW3J–	5 TUW5J–	7 TUW7J–	10 TUW10J–	15 TUW15J–
0.01	R01E	✔	✔			
0.01	R01E	✔	✔			
0.02	R02E	✔	✔			
0.04	R04E	✔	✔			
0.05	R05E	✔	✔			
0.10	R10E	✔	✔	✔	✔	✔
0.15	R15E	✔	✔	✔	✔	✔
0.20	R20E	✔	✔	✔	✔	✔
0.27	R27E	✔	✔	✔	✔	✔
0.30	R30E	✔	✔	✔	✔	✔
0.33	R33E	✔	✔	✔	✔	✔
0.39	R39E	✔	✔	✔	✔	✔
0.43	R43E	✔	✔	✔	✔	✔
0.47	R47E	✔	✔	✔	✔	✔
0.56	R56E	✔	✔	✔	✔	✔
0.68	R68E	✔	✔	✔	✔	✔
0.75	R75E	✔	✔	✔	✔	✔
0.82	R82E	✔	✔	✔	✔	✔
1.0	1R0E	✔	✔	✔	✔	✔
1.5	1R5E	✔	✔	✔	✔	✔
2.0	2R0E	✔	✔	✔	✔	✔
2.7	2R7E	✔	✔	✔	✔	✔
3.0	3R0E	✔	✔	✔	✔	✔
3.3	3R3E	✔	✔	✔	✔	✔
3.9	3R9E	✔	✔	✔	✔	✔
4.3	4R3E	✔	✔	✔	✔	✔
4.7	4R7E	✔	✔	✔	✔	✔
5.6	5R6E	✔	✔	✔	✔	✔
6.8	6R8E	✔	✔	✔	✔	✔
7.5	7R5E	✔	✔	✔	✔	✔
8.2	8R2E	✔	✔	✔	✔	✔
10	10RE	✔	✔	✔	✔	✔
15	15RE	✔	✔	✔	✔	✔
20	20RE	✔	✔	✔	✔	✔
27	27RE	✔	✔	✔	✔	✔
30	30RE	✔	✔	✔	✔	✔
33	33RE	✔	✔	✔	✔	✔
39	39RE	✔	✔	✔	✔	✔
43	43RE	✔	✔	✔	✔	✔
47	47RE	✔	✔	✔	✔	✔
56	56RE	✔	✔	✔	✔	✔
68	68RE	✔	✔	✔	✔	✔
75	75RE	✔	✔	✔	✔	✔
82	82RE	✔	✔	✔	✔	✔
100	100E	✔	✔	✔	✔	✔
150	150E	✔	✔	✔	✔	✔
200	200E	✔	✔	✔	✔	✔
270	270E	✔	✔	✔	✔	✔
300	300E	✔	✔	✔	✔	✔
330	330E	✔	✔	✔	✔	✔
390	390E	✔	✔	✔	✔	✔
430	430E	✔	✔	✔	✔	✔
470	470E	✔	✔	✔	✔	✔
560	560E	✔	✔	✔	✔	✔
680	680E	✔	✔	✔	✔	✔
750	750E	✔	✔	✔	✔	✔
820	820E	✔	✔	✔	✔	✔
1000	1K0	✔	✔	✔	✔	✔
1500	1K5	✔	✔	✔	✔	✔
2000	2K0	✔	✔	✔	✔	✔
2700	2K7	✔	✔	✔	✔	✔
3000	3K0	✔	✔	✔	✔	✔
3300	3K3	✔	✔	✔	✔	✔
3900	3K9	✔	✔	✔	✔	✔
4300	4K3	✔	✔	✔	✔	✔
4700	4K7	✔	✔	✔	✔	✔
5600	5K6	✔	✔	✔	✔	✔
6800	6K8	✔	✔	✔	✔	✔
7500	7K5	✔	✔	✔	✔	✔
8200	8K2	✔	✔	✔	✔	✔
10000	10K	✔	✔	✔	✔	✔

Shaded area: change prefix to TUM

WH/WN Series

Miniature Molded Wirewound



FEATURES

- WH precision series
- WN Aryton Perry winding Non-Inductive series: Inductance <1nH at 1MHZ test,
- Designed to meet MIL-R-26F, MIL-STD-202 standard requirements
- Manufacturing process -Wire winding/ Spot Welding- by Computer Numerical Control (CNC) machine tools to ensure consistency of product quality.
- Encapsulated by epoxy molding compound
- Advanced IC encapsulation mold/die technologies

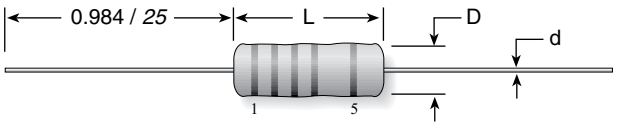
SERIES SPECIFICATIONS

Type	Power Rating (watts)	Resistance Range (Ω)	Weight (g/1000pc)
WHA	0.5	0.100 - 1.0K	216
WNA		0.100 - 250	
WHB	1	0.100 - 4.0K	296
WNB		0.100 - 1.0K	
WHC	2	0.10 - 8.0K	712
WNC		0.10 - 2.0K	
WHD	3	0.10 - 25K	1160
WND		0.10 - 5.0K	
WHE	5	0.10 - 50K	2920
WNE		0.10 - 10K	

CHARACTERISTICS

Ceramic Core	CeramTec Rubalit® 85% alumina
End Caps	Stainless steel, precision formed
Leads	Copper wire,100% Sn (lead free) coated
Resistance Wire	ISAOHM® wire TC ±20ppm/°C
Encapsulation	SUMICON 1100/1200 Epoxy molding compound for IC encapsulation
Standard Tolerance	D (0.5%), F (1.0%), J (5.0%)
Temperature Coefficient (ppm/°C)	±90 for 0.100Ω-0.99Ω, ±50 for 1.00Ω-10.00Ω, ±20 for >10.00Ω
Maximum Working Voltage	$(PxR)^{1/2}$
Derating	Linearly from 100% @ +70°C to 0% @ +150°C.
Operating Temp	-55°C to +150°C

DIMENSIONS



Type	Wattage	L	D	d
WH/N**A**	0.5	5.08 / 0.200	2.54 / 0.100	0.60 / 0.024
WH/N**B**	1	7.00 / 0.276	3.30 / 0.130	0.60 / 0.024
WH/N**C**	2	11.4 / 0.450	4.57 / 0.180	0.80 / 0.031
WH/N**D**	3	13.54 / 0.530	5.50 / 0.216	0.80 / 0.031
WH/N**E**	5	20.00 / 0.790	7.50 / 0.295	1.00 / 0.039

Packaging

Tape Width	Pitch	Reel Diam.	Pc/ reel
64 / 2.520	5.0 / 0.197	290 / 11.41	1000
64 / 2.520	5.0 / 0.197	290 / 11.41	1000
64 / 2.520	10 / 0.393	290 / 11.41	1000
84 / 3.307	10 / 0.393	290 / 11.41	500
84 / 3.307	10 / 0.393	290 / 11.41	500

(continued)

WH/WN Series

Miniature Molded Wirewound

PERFORMANCE CHARACTERISTICS

Test	Conditions of Test	Performance
Thermal shock	Environmental chamber, -55°C +0°C, -3°C to 150°C +3°C, -0°C, 5 cycles, minimum 15 min. at each extreme	±(1.0% + 0.5mΩ)ΔR
Short-time overload	Overload voltage 5x rated wattage for 5 sec.	±(0.5% + 0.5mΩ)ΔR
Solderability	Bath temp. 260°C ±5°, immersion time 5 sec. ±0.5, JIS C 5201 4.18	>90% of contact face covered new solder
Resistance to solder heat	Bath temp. 260°C ±5°, immersion time 5 sec. ±0.5, JIS C 5201 4.18	±(0.5% + 0.5mΩ)ΔR
Dielectric withstanding voltage	Magnitude of test voltage >500 volts rms.; duration 1 min.	Pass
Insulation resistance	Magnitude of test voltage 500 volts rms. ±10%; duration 1 min.	$>10^9\Omega$
High Temperature Exposure	Exposed to an ambient temperature of 175°C +5°/-0° for 250 ±8 hours	±(1.0% + 0.5mΩ)ΔR
Low Temperature Storage	At a temperature of -65°C ±2° for a period of 24 hours ±4	±(0.5% + 0.5mΩ)ΔR
Life	Test temp. at 70°C ±2°, rated DC continuous working voltage applied, 1.5 hours on and 0.5 hours off, 1000 hours	±(2.0% + 0.5mΩ)ΔR

HOW TO ORDER

H = Inductive
N = Non Inductive

RoHS compliant

W H A 1 0 R F E - T

Series | **Power** | **Ohms** | **Tolerance** | **Package**

Power:
A = 0.5
B =1
C = 2
D = 3
E = 5

Tolerance:
F = 1%
J = 5%
D = 0.5%

Package:
T = Tape
blank = 25pc pack

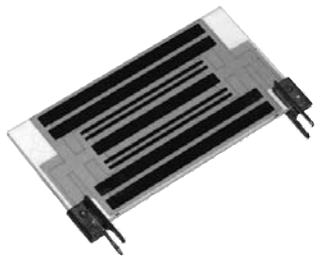
Part marking:
0.50, 1.0, 2.0 watt parts marked with 5-band color code, 3.0 and 5.0 watt parts marked with part number stamping

Standard part numbers

Wattage: / **Series:**	0.5 **WHA**	0.5 **WNA**	1.0 **WHB**	1.0 **WNB**	2.0 **WHC**	2.0 **WNC**	3.0 **WHD**	3.0 **WND**	5.0 **WHE**	5.0 **WNE**
Ohms										
0.1	WHAR10FE	WNAR10FE	WHBR10FE	WNBR10FE	WHCR10FE	WNCR10FE	WHDR10FE	WNDR10FE	WHER10FE	WNER10FE
0.25	WHAR25FE	WNAR25FE	WHBR25FE	WNBR25FE	WHCR25FE	WNCR25FE				
0.5	WHAR50FE	WNAR50FE	WHBR50FE	WNBR50FE	WHCR50FE	WNCR50FE	WHDR50FE	WNDR50FE	WHER50FE	WNER50FE
0.75	WHAR75FE	WNAR75FE	WHBR75FE	WNBR75FE	WHCR75FE	WNCR75FE				
1	WHA1R0FE	WNA1R0FE	WHB1R0FE	WNB1R0FE	WHC1R0FE	WNC1R0FE	WHD1R0FE	WND1R0FE	WHE1R0FE	WNE1R0FE
2	WHA2R0FE	WNA2R0FE	WHB2R0FE	WNB2R0FE	WHC2R0FE	WNC2R0FE				
4	WHA4R0FE	WNA4R0FE	WHB4R0FE	WNB4R0FE	WHC4R0FE	WNC4R0FE				
5	WHA5R0FE	WNA5R0FE	WHB5R0FE	WNB5R0FE	WHC5R0FE	WNC5R0FE	WHD5R0FE	WND5R0FE	WHE5R0FE	WNE5R0FE
10	WHA10RFE	WNA10RFE	WHB10RFE	WNB10RFE	WHC10RFE	WNC10RFE	WHD10RFE	WND10RFE	WHE10RFE	WNE10RFE
15	WHA15RFE	WNA15RFE	WHB15RFE	WNB15RFE	WHC15RFE	WNC15RFE	WHD15RFE	WND15RFE	WHE15RFE	WNE15RFE
25	WHA25RFE	WNA25RFE	WHB25RFE	WNB25RFE	WHC25RFE	WNC25RFE				
51	WHA51RFE	WNA51RFE	WHB51RFE	WNB51RFE	WHC51RFE	WNC51RFE				
75	WHA75RFE	WNA75RFE	WHB75RFE	WNB75RFE	WHC75RFE	WNC75RFE				
100	WHA100FE	WNA100FE	WHB100FE	WNB100FE	WHC100FE	WNC100FE	WHD100FE	WND100FE	WHE100FE	WNE100FE
150	WHA150FE	WNA150FE	WHB150FE	WNB150FE	WHC150FE	WNC150FE				
200	WHA200FE	WNA200FE	WHB200FE	WNB200FE	WHC200FE	WNC200FE				
250	WHA250FE	WNA250FE	WHB250FE	WNB250FE	WHC250FE	WNC250FE	WHD250FE	WND250FE	WHE250FE	WNE250FE
330	WHA330FE		WHB330FE	WNB330FE	WHC330FE	WNC330FE				
470	WHA470FE		WHB470FE	WNB470FE	WHC470FE	WNC470FE				
560	WHA560FE		WHB560FE	WNB560FE	WHC560FE	WNC560FE	WHD560FE	WND560FE	WHE560FE	WNE560FE
750	WHA750FE		WHB750FE	WNB750FE	WHC750FE	WNC750FE				
1K	WHA1K0FE		WHB1K0FE	WNB1K0FE	WHC1K0FE	WNC1K0FE	WHD1K0FE	WND1K0FE	WHE1K0FE	WNE1K0FE
2.5K			WHB2K5FE		WHC2K5FE			WND2K5FE		
5K							WHD5K0FE		WHE5K0FE	WNE5K0FE
10K							WHD10KFE		WHE10KFE	WNE10KFE
25K									WHE25KFE	

TA Series

Power Chip
Thick Film on Alumina Substrate



Ohmite's original Power Chip resistors feature our thick film on alumina substrate technology. These planar packages yield space saving, 10W/in^2 power densities that require over 50% less board space than other radial packages. Convection cooling is maximized by the planar package configuration which dissipates heat well above board level.

Ohmite's power chip resistors have a 125% higher operating temperature range than competitive product of similar design. High temperature solder and in-process plating keep terminations secure under self-heating effects by preventing re-flow from full power operation.

Flexible packaging schemes make these resistors ideal for power supplies, audio amplifiers, video flyback, and other power control applications.

FEATURES

- High-Temp Terminal Construction
- Wide Resistance Range
- Low Inductance (50nH-100nH)
- High Power Density
- Easy to install. PC-mountable

SERIES SPECIFICATIONS

Series	Wattage
TA203	3.0
TA303	3.0

Series	Wattage
TA205	5.0
TA305	5.0
TA605	5.0
TA805	5.0

Series	Wattage
TA207	7.5
TA307	7.5

Series	Wattage
TA310	10.0
TA810	10.0

Series	Wattage
TA025	25.0
TA050	50.0
TA100	100.0

CHARACTERISTICS

Substrate	Alumina
Resistor	Thick Film
Coating	Glass
Terminals	Solder Plated Phosphor Bronze
Temperature Coefficient	1 ohm: 450 ppm/°C 1 to 100Ω: 100 ppm/°C 101Ω and up: 50 ppm/°C
Tolerance	±1%, ±5% and ±10%
Power Rating	Based on 25°C free air
Resistance Range	0.25 ohm to 10M ohm. Consult factory for other values
Maximum Operating Voltage	350 VAC, 500 VDC through glass, 1000 VAC, 1500 VDC through substrate, not to exceed power rating
Overload	Five times rated power, as long as the one second average dissipation does not exceed the wattage rating. ΔR: ±2%, 2000 hours
Derating	100% @ 25°C to 0% @ 180°C ambient.
Equivalent Parallel Capacitance	1.0pf (100 MHz)
Withstanding Voltage	5000V thru back side
Operating Temperature Range	-55°C to +180°C
Overload Current	20 x rated current up to 8 ms (ΔR ± 0.5%)

Test	Test Condition MILR83401	Specification
Life (Rated Power)	40°C, rated power, 90 min ON 30 min OFF, 1000 hrs.	ΔR ±(1.0% + 0.05Ω)
Life (Moisture Load)	60°C, 90 - 95% RH, rated power, 90 min ON 30 min OFF, 1000 hrs.	ΔR ±(1.0% + 0.05Ω)
Temperature Cycling	Room temp > -55°C 30 min > RT 10 min ± 120°C 30 min > RT10 min 5 cycles	ΔR ±(0.25% + 0.05Ω)
Flammability	UL94V-O rated (not recognized)	
Soldering Heat	350°C Solderpot, 3 secs.	ΔR ±(0.25% + 0.05Ω)
Insulation Resistance	DC 100V, 1 min	Over 1000M ohm

(continued)

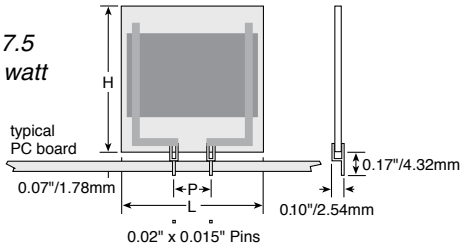
TA Series

Power Chip
Thick Film on Alumina Substrate

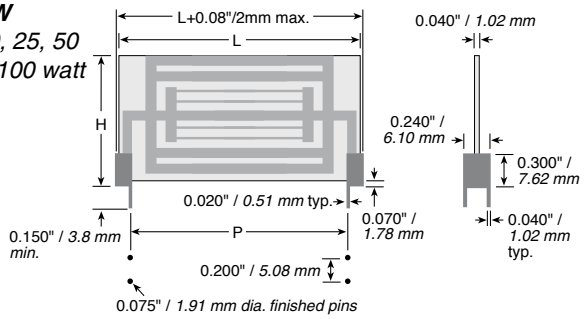
DIMENSIONS

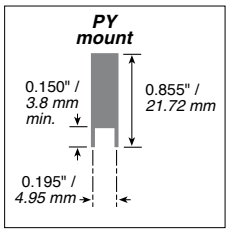
(±.020 in. / ±.508mm)

PA
3, 5, 7.5 & 10 watt



PW
10, 25, 50 & 100 watt





Series	Wattage	P	Length L	Height H
TA203PA	3.0	0.200 / 5.08	0.50 / 12.70	0.60 / 15.24
TA303PA	3.0	0.300 / 7.62	0.50 / 12.70	0.60 / 15.24
TA205PA	5.0	0.200 / 5.08	0.50 / 12.70	1.00 / 25.40
TA305PA	5.0	0.300 / 7.62	0.50 / 12.70	1.00 / 25.40
TA605PA	5.0	0.600 / 15.24	1.00 / 25.40	0.50 / 12.70
TA805PA	5.0	0.800 / 20.32	1.00 / 25.40	0.50 / 12.70
TA207PA	7.5	0.200 / 5.08	0.75 / 19.05	1.00 / 25.40
TA307PA	7.5	0.300 / 7.62	0.75 / 19.05	1.00 / 25.40
TA310PA	10.0	0.300 / 7.62	1.00 / 25.40	1.00 / 25.40
TA310PW*	10.0	0.300 / 7.62	1.085 / 27.56	1.00 / 25.40
TA810PA	10.0	0.800 / 20.32	1.00 / 25.40	1.00 / 25.40
TA810PW*	10.0	0.800 / 20.32	1.085 / 27.56	1.00 / 25.40
TA025PA	25.0	1.90 / 48.3	2.220 / 56.39	1.170 / 29.70
TA025PY*	25.0	1.90 / 48.3	2.220 / 56.39	1.170 / 29.70
TA050PA	50.0	1.90 / 48.3	2.220 / 56.39	2.270 / 57.60
TA050PY*	50.0	1.90 / 48.3	2.220 / 56.39	2.270 / 57.60
TA100PA	100.0	4.10 / 104.1	4.420 / 112.27	2.270 / 57.60
TA100PY*	100.0	4.10 / 104.1	4.420 / 112.27	2.270 / 57.60

*10-100 watts available in PW,PA, and PY packages.

ORDERING INFORMATION

Pin spacing *(on 3-10W models only)*
2 = .2"
3 = .3"
8 = .8"

Tolerance
K = 10%
J = 5%
F = 1%

RoHS compliant

T A 3 0 5 P A 4 K 5 0 J E

Series

Power Rating:
03 = 3 W
05 = 5
07 = 7.5
10 = 10
025 = 25
050 = 50
100 = 100

Package:
PA = pin terminals, std. for 3-10 W
PW = wraparound, std. for 10-100 W
PY = high-stability wraparound

Resistance Value (Ω)
R250 = 0.25
10R0 = 10.0
2K00 = 2,000
45K0 = 45,000

Standard part numbers for TA series

Ohmic value	Part No. Prefix ➤ Suffix ▼	TA203PA	TA303PA	TA205PA	TA305PA	TA207PA	TA310PA	TA810PW	TA025PW	TA050PW	TA100PW
0.25	R250J	✚	✔	✔	✔						
1.00	1R00J	✚	✚	✚	✔	✔	✚	✚	✚	✚	✚
1.50	1R50J	✔	✔	✔	✔	✔	✚	✔	✔	✔	✔
2.00	2R00J	✚	✔	✚	✔	✔	✚	✔	✔	✔	✔
4.70	4R70J	✔	✔	✚	✚	✔	✔	✔	✔	✔	✔
5.00	5R00J	✚	✔	✔	✔	✔	✔	✚	✚	✚	✚
5.10	5R10J	✔	✔	✔	✚	✔	✔	✔	✔	✔	✔
7.50	7R50J	✔	✔	✔	✔	✚	✔	✔	✔	✔	✔
8.20	8R20J	✔	✔	✔	✚	✔	✔	✔	✔	✔	✔
10.00	10R0J	✚	✚	✚	✚	✚	✚	✚	✚	✚	✚
11.00	11R0J	✔	✔	✚	✔	✔	✔	✔	✔	✔	✔
12.00	12R0J	✚	✔	✔	✔	✔	✔	✔	✔	✔	✔
15.00	15R0J	✚	✔	✔	✚	✔	✔	✔	✔	✔	✔
20.00	20R0J	✚	✔	✚	✚	✚	✚	✔	✔	✔	✔
24.00	24R0J	✔	✔	✔	✚	✔	✔	✔	✔	✔	✔
27.00	27R0J	✚	✔	✔	✔	✔	✚	✔	✔	✔	✔
33.00	33R0J	✔	✔	✔	✔	✚	✔	✔	✔	✔	✔
47.00	47R0J	✚	✔	✚	✔	✔	✔	✔	✔	✔	✔

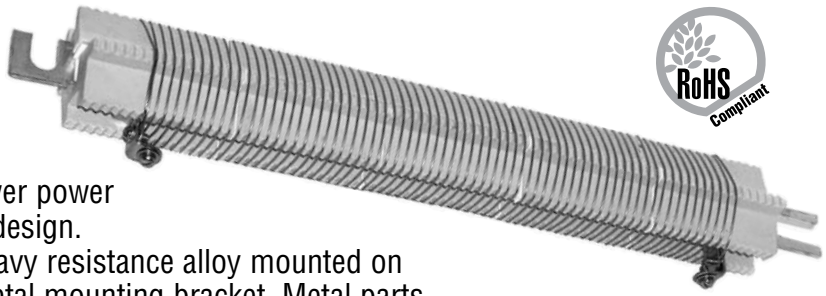
Ohmic value	Part No. Prefix ➤ Suffix ▼	TA203PA	TA303PA	TA205PA	TA305PA	TA207PA	TA310PA	TA810PW	TA025PW	TA050PW	TA100PW
50.00	50R0J	✚	✚	✚	✚	✔	✔	✚	✚	✚	✚
62.00	62R0J	✔	✔	✔	✚	✔	✔	✔	✔	✔	✔
68.00	68R0J	✔	✔	✚	✔	✔	✚	✔	✔	✔	✔
75.00	75R0J	✔	✔	✔	✚	✔	✔	✔	✔	✔	✔
100.00	100RJ	✚	✔	✚	✚	✔	✚	✚	✚	✚	✚
150.00	150RJ	✔	✔	✚	✔	✔	✔	✔	✔	✔	✔
200.00	200RJ	✚	✚	✚	✚	✚	✔	✔	✔	✔	✔
250.00	250RJ	✔	✔	✔	✚	✔	✔	✔	✔	✔	✔
270.00	270RJ	✔	✔	✔	✔	✔	✚	✔	✔	✔	✔
300.00	300RJ	✚	✔	✚	✔	✔	✔	✔	✔	✔	✔
470.00	470RJ	✚	✔	✚	✔	✚	✚	✔	✔	✔	✔
500.00	560	✚	✔	✚	✔	✔	✔	✚	✚	✚	✚
620.00	620RJ	✔	✔	✔	✚	✔	✔	✔	✔	✔	✔
680.00	680RJ	✔	✔	✚	✔	✔	✔	✔	✔	✔	✔
1,000.00	1K00J	✚	✔	✚	✔	✔	✚	✚	✚	✚	✚
1,500.00	1K50J	✔	✔	✚	✚	✔	✚	✔	✔	✔	✔
1,800.00	1K80J	✔	✔	✚	✔	✔	✔	✔	✔	✔	✔
2,000.00	2K00J	✚	✔	✔	✚	✔	✔	✔	✔	✔	✔

Ohmic value	Part No. Prefix ➤ Suffix ▼	TA203PA	TA303PA	TA205PA	TA305PA	TA207PA	TA310PA	TA810PW	TA025PW	TA050PW	TA100PW
2,500.00	2K50J	✔	✔	✚	✔	✔	✔	✔	✔	✔	✔
3,000.00	3K00J	✔	✔	✚	✔	✔	✚	✔	✔	✔	✔
4,000.00	4K00J	✔	✔	✔	✚	✔	✔	✔	✔	✔	✔
4,700.00	4K70J	✔	✔	✚	✚	✚	✔	✔	✔	✔	✔
5,000.00	5K00J	✔	✔	✔	✚	✔	✔	✔	✔	✔	✔
5,100.00	5K10J	✔	✔	✚	✔	✔	✚	✔	✔	✔	✔
7,500.00	7K50J	✔	✔	✚	✔	✔	✚	✔	✔	✔	✔
10,000.00	10K0J	✚	✔	✚	✚	✚	✚	✔	✔	✔	✔
15,000.00	15K0J	✔	✔	✔	✚	✔	✔	✔	✔	✔	✔
18,000.00	18K0J	✔	✚	✔	✚	✔	✔	✔	✔	✔	✔
20,000.00	20K0J	✔	✔	✚	✔	✚	✚	✔	✔	✔	✔
30,000.00	30K0J	✔	✔	✚	✔	✔	✔	✔	✔	✔	✔
39,000.00	39K0J	✔	✔	✔	✚	✔	✔	✔	✔	✔	✔
50,000.00	50K0J	✔	✔	✔	✚	✔	✔	✔	✔	✔	✔
75,000.00	75K0J	✔	✔	✚	✔	✔	✔	✔	✔	✔	✔
100,000	100KJ	✚	✚	✚	✔	✔	✔	✔	✔	✔	✔
150,000	150KJ	✚	✔	✔	✔	✔	✔	✔	✔	✔	✔
200,000	200KJ	✔	✚	✔	✔	✔	✔	✔	✔	✔	✔

✚ = Most popular standard values, ✔ = Stock values

PFE and PFR Series

Powr-Rib® Edgewound
Edgewound and Round Wire



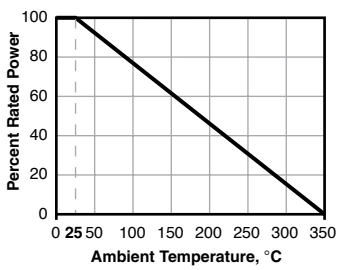
Designed in both Edgewound and Round Wire formats, these rugged resistors can handle 700 to 1000 Watts of power. Specify our Edgewound design for very low resistance and high power capacity. When higher resistance with lower power capacity is required use our Round Wire design.

These resistors are constructed of a heavy resistance alloy mounted on ceramic insulators and supported by a metal mounting bracket. Metal parts, except for the resistance element, are heavily plated to prevent oxidation at high operating temperatures and to prevent corrosion. The mounting bar is slotted on each end to facilitate installation. Edgewound units provide clamp-type terminals, permitting a reliable connection which can be moved along the resistive element to obtain intermediate values.

CHARACTERISTICS

Current Rating	Continuous duty as listed on following page.
Wattage Rating	700 to 1,000 (up to 1,600 watts on special order)
Resistance Tolerance	±10% standard, ±5% available
Terminals	Clamps, movable along resistor wire for setting intermediate resistance values on Edgewound units (current must be derated in proportion).
Temperature Coefficient	±300 ppm/°C for resistors 50 amps and more; ±500 ppm/°C for resistors 47 amps or less
Ohmic Values	See chart on following page
Mounting	Metal mounting bar is slotted on each end to facilitate installation.
Short Term Overload	10x rated wattage for five seconds

Derating



Size* (No. of Insulator-Sections Long)		2	3	4	5 (std.)	6	7	8
Dimension A	in.	8.875	11.875	14.875	17.875	20.875	23.875	26.875
	mm	(225.43)	(301.63)	(377.83)	(454.03)	(530.23)	(606.43)	(682.63)
Dimension B	in.	7.250	10.250	13.250	16.250	19.250	22.250	25.250
	mm	(184.15)	(260.35)	(336.55)	(412.75)	(488.95)	(565.15)	(641.35)
	Max. Amps	**Ohms**	**Ohms**	**Ohms**	**Ohms**	**Ohms**	**Ohms**	**Ohms**
PFE Edgewound								
	100	0.033	0.057	0.080	0.100	0.120	0.140	0.160
	91	0.040	0.070	0.100	0.120	0.140	0.160	0.180
	89	0.046	0.078	0.110	0.140	0.170	0.200	0.230
	78	0.052	0.088	0.120	0.160	0.190	0.220	0.250
	75	0.060	0.100	0.140	0.180	0.210	0.250	0.300
	68	0.070	0.120	0.180	0.220	0.260	0.300	0.340
	63	0.080	0.130	0.190	0.250	0.300	0.350	0.400
	57	0.100	0.160	0.230	0.300	0.360	0.420	0.480
	54	0.110	0.180	0.250	0.330	0.400	0.470	0.540
	50	0.120	0.200	0.280	0.370	0.450	0.530	0.610
	47	0.170	0.280	0.380	0.500	0.600	0.700	0.800
	43	0.210	0.330	0.460	0.600	0.720	0.850	0.980
	41	0.230	0.360	0.510	0.670	0.800	0.930	1.06
	39	0.260	0.420	0.580	0.750	0.900	1.05	1.20
	33	0.350	0.560	0.770	1.00	1.20	1.40	1.60
	29	0.450	0.730	1.00	1.30	1.50	1.75	2.00
	26	0.560	0.900	1.20	1.60	1.90	2.20	2.50
	18.4	0.690	1.20	1.70	2.20	2.70	3.10	3.50
	16.3	0.880	1.50	2.20	2.80	3.40	4.00	4.60
	14.6	1.10	1.90	2.70	3.50	4.30	5.10	5.90
	12.7	1.40	2.40	3.50	4.50	5.50	6.50	7.50
	11.8	1.70	2.90	4.20	5.40	6.60	7.80	9.00
	10.3	2.10	3.70	5.30	6.80	8.30	9.80	11.3
	9.4	2.70	4.60	6.50	8.50	10.40	12.3	14.2
PFR Round-Wire								
	8.3	3.4	5.9	8.5	11.0	13.5	16.0	18.5
	7.6	4.1	7.1	10.0	13.0	15.9	18.8	21.7
	6.6	5.3	9.2	13.0	17.0	20.8	24.6	28.4
	5.9	6.3	10.9	15.4	20.0	24.5	29.0	33.5
	5.1	7.9	13.6	19.3	25.0	30.7	36.4	42.1

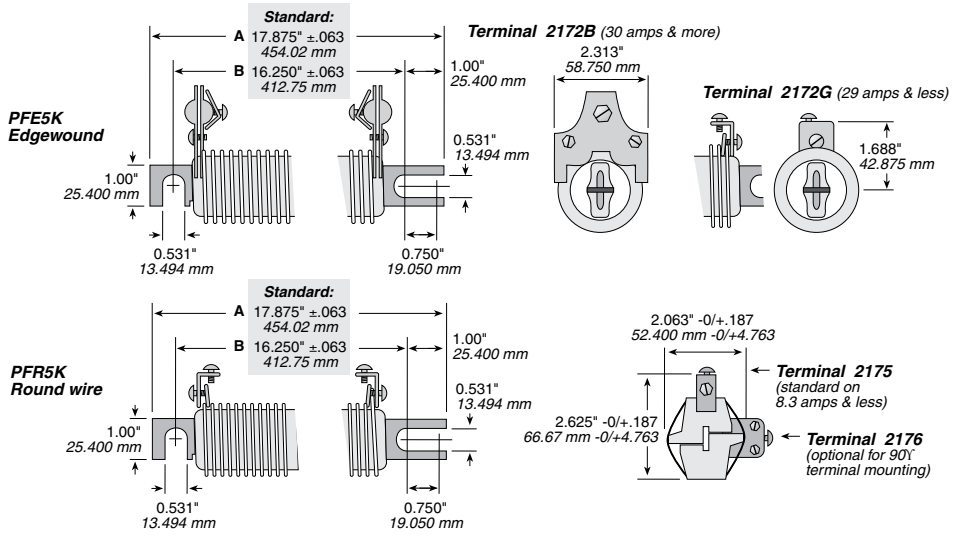
*Standard 5-section units are stocked; part numbers are listed on the following page.

(continued)

PFE and PFR Series

Powr-Rib® Edgewound
Edgewound and Round Wire

DIMENSIONS



All values for reference only; Consult factory for details.

Size (No. of Insulator-Sections Long)		2	3	4	5 (std.)	6	7	8
Dimension A	in.	8.875	11.875	14.875	17.875	20.875	23.875	26.875
	mm	(225.43)	(301.63)	(377.83)	(454.03)	(530.23)	(606.43)	(682.63)
Dimension B	in.	7.250	10.250	13.250	16.250	19.250	22.250	25.250
	mm	(184.15)	(260.35)	(336.55)	(412.75)	(488.95)	(565.15)	(641.35)

HOW TO ORDER

RoHS Compliant

P F E 5 K R 1 0 0 E

Style	# of Sections	Tolerance	Ohms
PFE = Edgewound	2 5	K = 10%	R100 = 0.10
PFR = Roundwire	3 6		1R00 = 1.0
	4 7		10R0 = 10
	8		

EDGEWOUND

Ohms		Part #	Watts	Amps
0.1	✔	PFE5KR100E	1000	100
0.12	✤	PFE5KR120E	994	91
0.14	✔	PFE5KR140E	1100	89
0.16	✤	PFE5KR160E	973	78
0.18	✤	PFE5KR180E	1012	75
0.22	✔	PFE5KR220E	1017	68
0.25	✔	PFE5KR250E	992	63
0.3	✤	PFE5KR300E	975	57
0.33	✔	PFE5KR330E	962	54
0.37	✔	PFE5KR370E	925	50
0.5	✔	PFE5KR500E	1105	47
0.6	✔	PFE5KR600E	1109	43
0.67	✔	PFE5KR670E	1126	41
0.75	✔	PFE5KR750E	1141	39
1	✔	PFE5K1R00E	1089	33
1.3	✔	PFE5K1R30E	1093	29
1.6	✔	PFE5K1R60E	1082	26
2.2	✔	PFE5K2R20E	745	18.4
2.8	✔	PFE5K2R80E	744	16.3
3.5	✔	PFE5K3R50E	746	14.6
4.5	✔	PFE5K4R50E	726	12.7
5.4	✔	PFE5K5R40E	752	11.8
6.8	✔	PFE5K6R80E	721	10.3
8.5	✔	PFE5K8R50E	751	9.4

ROUNDWIRE

Ohms		Part #	Watts	Amps
11	✔	PFR5K11R0E	757	8.3
13	✔	PFR5K13R0E	750	7.6
17	✔	PFR5K17R0E	740	6.6
20	✔	PFR5K20R0E	696	5.9
25	✔	PFR5K25R0E	650	5.1

✔ = Standard values
✤ = Non-standard values subject to minimum handling charge per item.

14984 Series

High Current Round Edgewound

These high current round edgewound resistors handle a variety of applications including dynamic braking, load banks, motor starting, and plugging. They are available in a variety of ohm and current ratings common to transit use.

A sturdy welded steel frame supports the refractory insulators. The frame is finished with a zinc chromate conversion for corrosion resistance. The ceramic insulators separate turns of the resistance elements from each other and the frame. The resistance element is a stainless steel strip, used for its corrosion resistance, negligible temperature coefficient, and Ohms per foot vs. current carrying capacity. The resistance element is created by edge-winding a stainless strip into a continuous coil of the proper length. Zinc plated terminals welded to the resistance element complete the assembly.

Contact us with your specific needs.

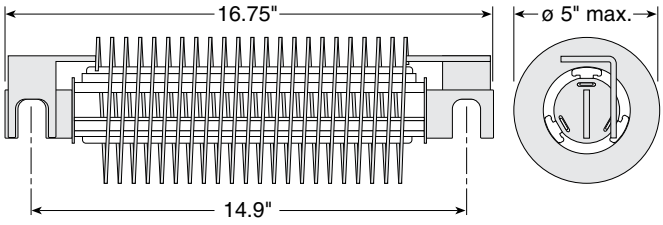
SERIES SPECIFICATIONS

Ohmite Part Number	Continuous Amps	Ohms	Watts	Ward Leonard Part Number	Westinghouse Style Number
76021-R118	160	0.118	3021	14984-10-01	1796207
76021-R157	140	0.157	3077	14984-10-03	1796206
76021-R171	130	0.171	2889	14984-10-04	31D2615A05
76021-R285	100	0.285	2850	14984-10-07	31D2614A03

CHARACTERISTICS

Current Rating	Continuous current ratings are based on a maximum temperature rise of 375°C as specified by NEMA Industrial Control Standards for bare element resistors.
Wattage Rating	Can be found from I^2R.
Resistance Tolerance	±10%
Special Engineering Services	Available for ohmic values other than those listed, mountings, other terminal styles, all stainless frame and terminal construction.
Ordering Information	Order using the Ward Leonard part number from the table.

DIMENSIONS



210 Series

Dividohm® Vitreous Enamel Adjustable Power

FEATURES

- Terminals suitable for soldering or bolt connection.
- Adjustable lug supplied
- High wattage applications
- All-welded construction
- Rugged lead free vitreous enamel coating.
- Flame resistant coating
- Additional adjustable lugs available
- RoHS compliant product available. Add “E” suffix to part number to specify

Choose Ohmite’s 210 Type adjustable resistors for applications requiring settings at different resistance values. These wirewound resistors are equipped with an adjustable lug, making them ideal for adjusting circuits, obtaining odd resistance values and setting equip ment to meet various line voltages. 210 Type resistors feature a hollow core to permit secure fastening with spring-type clips or thru bolts with washers. They also offer the durability of lead free vitreous enamel coating and all-welded construction. Mounting brackets not included with resistors.

SERIES SPECIFICATIONS

Series	Wattage	Ohms	Core Code	Voltage	Standard Terminal
D12	12	1.0-10K	D	565	57
D25	25	1.0-25K	K	625	40
D50	50	1.0-100K	K	1625	40
D75	75	1.0-100K	K	2625	40
D100	100	1.0-100K	M	2845	40
D175	175	1.0-100K	P	3595	46
D225	225	1.0-100K	P	4595	46
D500	500	1.5-15K	S	4970	45
D1000	1000	3.0-27.7K	S	8900	45

Other sizes available; contact Ohmite. Also available in low cost Centohm or Silicone coating; contact Ohmite.

CHARACTERISTICS

Adjustability	10% to 90% of full value. Wattage is proportional to this adjusted resistance value.
Coating	Lead free vitreous enamel. Large models (500 watts and up) are supplied in Silicone Ceramic. Also available in low-cost Centohm coating; Consult factory.
Core	Tubular ceramic.
Terminals	Solder coated radial lug. RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Adjustable terminal	Nickel plated steel. (Screwdriver type adjustable lug supplied standard. Other types, including silver contact units, available.)
Derating	Linearly from 100% @ +25°C to 0% @ +350°C.
Tolerance	±10% (K)
Power rating	Based on 25°C free air rating. The stated wattage rating applies only when the entire resistance is in the circuit. Setting the lug at an intermediate point reduces the wattage rating by approximately the same proportion. Example: If the lug is set at half resistance, the wattage is reduced by approx. one-half.
Overload	10 times rated wattage for 5 seconds.
Temperature coefficient	±260 ppm/°C
Dielectric withstanding voltage	1000 VAC: 12 to 100 watt rating. 3000 VAC: 175 and 225 watt rating (measured from terminal to mounting bracket)
Max. amps	To calculate, use the formula $\sqrt{P/R}$.

Power limitations for high resistance values: When resistance exceeds the resistance values listed below, derate the Power Rating by 25% to improve reliability:

Power rating	Resistance value
12W	4,500Ω
25W	9,000Ω
50W	20,000Ω
75W	35,000Ω
100W	50,000Ω

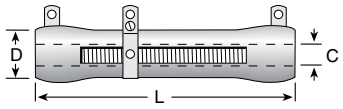
No power derating necessary for ratings higher than 100W.

210 Series

Dividohm® Vitreous Enamel
Adjustable Power

DIMENSIONS

(in. / *mm*)



Series	Wattage	L	D	C	Core Code	Standard Terminal
D12	12	1.75 / 44.4	0.313 / 7.94	0.188 / 4.76	D	57
D25	25	2.0 / 50.8	0.562 / 14.3	0.313 / 7.94	K	40
D50	50	4.0 / 101.6	0.562 / 14.3	0.313 / 7.94	K	40
D75	75	6.0 / 152.4	0.562 / 14.3	0.313 / 7.94	K	40
D100	100	6.5 / 165.1	0.750 / 19.1	0.50 / 12.7	M	40
D175	175	8.5 / 215.9	1.125 / 28.6	0.75 / 19.1	P	46
D225	225	10.5 / 266.7	1.125 / 28.6	0.75 / 19.1	P	46
D500	500	12.0 / 304.8	2.50 / 63.5	1.75 / 44.5	S	45
D1000	1000	20.0 / 508.0	2.50 / 63.5	1.75 / 44.5	S	45

ORDERING INFORMATION

Coating
Blank = Vitreous
C = Centohm
S = Silicone

RoHS Compliant

D 2 5 K 1 0 0 E

Series — **Wattage** — **Tolerance**: J = 5%, K = 10% — **Ohms**: 1R0 = 1Ω, 250 = 250Ω, 1K0 = 1,000Ω, 25K = 25,000Ω, 25K5 = 25,500Ω

Made-to-order Parts

Core Diameter See "Core and Terminal Selection" — **Terminal Type** See "Resistor Terminals for Tubular Cores" — **RoHS Compliant**

2 1 0 5 0 K 4 0 5 R 0 0 J E

Coating: 210 = Vitreous, 410 = Silicone Ceramic, 610 = Centohm
Wattage
Ohms: R500 = 0.500Ω, 1R00 = 1Ω, 250R = 250Ω, 1K00 = 1,000Ω, 25K0 = 25,000Ω, 25K5 = 25,500Ω
Tolerance: J = 5%, K = 10%

See 270 series custom core and terminal info

Standard Values

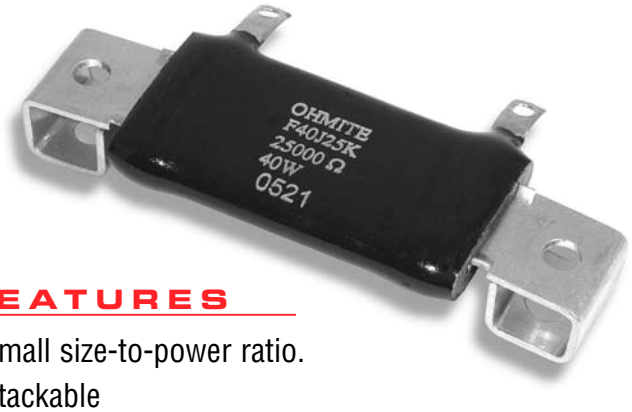
Ohmic value	Part No. Prefix ➤ Suffix ▼	D12K (12)	D25K (25)	D50K (50)	D75K (75)	D100K (100)	D175K (175)	D225K (225)	D500K (500)	D1000K (1000)
1.0	1R0E	✔	✔	✔	✔	✔	✔	✔		
2	2R0E	✔	✔	✔	✔	✔	✔	✔		
3	3R0E		✔	✔	✔	✔	✔	✔		
4	4R0E			✔		✔	✔	✔		
5	5R0E	✔	✔	✔	✔	✔	✔	✔	✔	✔
7.5	7R5E	✔	✔							
10	10RE	✔	✔	✔	✔	✔	✔	✔		
15	15RE	✔	✔		✔					
20	20RE	✔	✔							
25	25RE	✔	✔	✔	✔	✔	✔	✔		
50	50RE	✔	✔	✔	✔	✔	✔	✔		
75	75RE	✔	✔	✔						
100	100E	✔	✔	✔	✔	✔	✔	✔		
150	150E	✔	✔	✔						
200	200E	✔	✔	✔	✔					
250	250E	✔	✔	✔	✔	✔	✔	✔		
300	300E	✔	✔	✔	✔					
400	400E	✔	✔	✔	✔					
500	500E	✔	✔	✔	✔	✔	✔	✔	✔	✔
750	750E	✔	✔	✔	✔					
800	800E		✔	✔						
1,000	1K0E	✔	✔	✔	✔	✔	✔	✔	✔	✔
1,250	1K25E	✔	✔							
1,500	1K5E	✔	✔	✔	✔	✔	✔	✔		
2,000	2K0E	✔	✔	✔	✔					
2,500	2K5E	✔	✔	✔		✔	✔	✔		
3,000	3K0E	✔	✔	✔						
4,000	4K0E	✔								
5,000	5K0E	✔	✔	✔		✔	✔	✔		
6,000	6K0E		✔							
7,000	7K0E	✔	✔							
7,500	7K5E	✔	✔	✔						
10,000	10KE	✔	✔	✔	✔	✔	✔			
12,000	12KE									
15,000	15KE		✔	✔						
20,000	20KE		✔	✔	✔					
25,000	25KE		✔	✔						
50,000	50KE			✔		✔				
100,000	100KE			✔		✔	✔			

✔ = Standard values; check availability at www.ohmite.com

50KΩ and 100KΩ resistance values involve very fine resistance wire and should not be used in critical applications without burn-in and/or thermal cycling.

250 Series

'Thin' Stackohm®
Vitreous Enamel Power



When limited space is a consideration, choose Ohmite's "thin" stackable 250 Type resistors. These oval-shaped ceramic-core resistors feature a low profile to permit installation in spaces with height restrictions. They are also equipped with integral mounting brackets so they can be fastened to a chassis and stacked in locations with limited surface area.

When properly fastened, the mounting brackets add a heat sinking benefit resulting in a smaller size per watt. Durable 250 Type resistors are fully welded and coated with lead free vitreous enamel.

FEATURES

- Small size-to-power ratio.
- Stackable
- Integral mounting bracket conducts heat to mounting surface.
- Low profile for use in equipment where space is limited.
- All-welded construction.
- RoHS compliant product available. Add "E" suffix to part number to specify.

SERIES SPECIFICATIONS

Series	Wattage	Ohms	Max. Voltage*
F10	10	1.0-15K	187
F20	20	1.0-50K	815
F30	30	1.0-10K	281
F40	40	1.0-25K	655
F55	55	1.0-30K	1405

Adjustable versions and other sizes available; Consult Ohmite Also available in low cost Centohm or Silicone coating; Consult Ohmite.

* Maximum Voltage is based on Ohm's Law [V=√P*R] as limited by the resistance value of specified product

CHARACTERISTICS

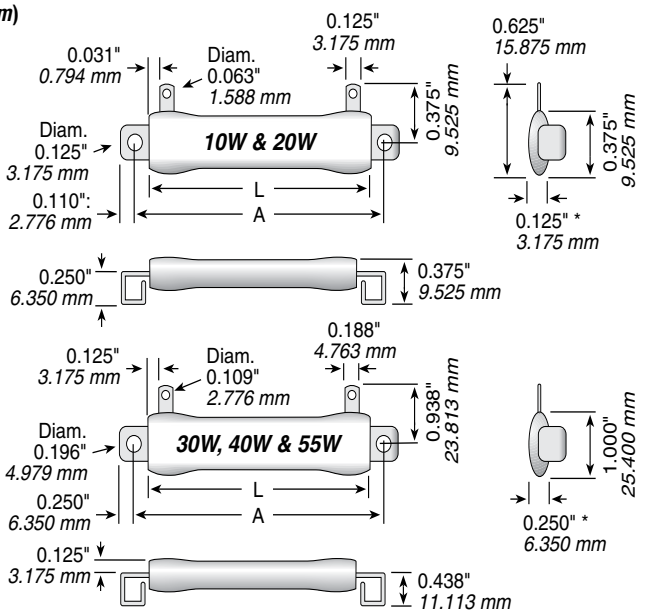
Coating	Lead free vitreous enamel
Core	Ceramic
Terminals	Tinned lug with hole. RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Derating	Linearly from 100% @ +25°C to 0% @ +350°C
Tolerance	±5% (J)
Power rating	Based on mounting a single resistor on a metal surface measuring 10" (254mm) square by 0.04" (1.016mm) thick. Reduce rating by 15% when mounting on non-metallic surface
Overload	10x rated wattage for 5 seconds if max. voltage is not exceeded
Temperature coefficient	1 to 20Ω: ±400 ppm/°C Over 20Ω: ±260 ppm/°C
Dielectric withstanding voltage	500 VAC: 10 and 20 watt rating. 1000 VAC: 30, 40 and 55 watt rating (measured from lug to mounting bracket)
Max. amps	To calculate, use the formula √P/R

250 Series

'Thin' Stackohm®
Vitreous Enamel Power

DIMENSIONS

(in. / *mm*)



Series	Wattage	Length L	Length A
F10	10	0.750 / 19.050	1.000 / 25.400
F20	20	2.000 / 50.800	2.313 / 58.750
F30	30	1.250 / 31.750	2.000 / 50.800
F40	40	2.000 / 50.800	2.750 / 69.850
F55	55	3.500 / 88.900	4.250 / 107.950

*Reference dimension only; varies according to resistance value.

Note: When resistors are stacked, use washers or spacers as required to insure clearance and improve power dissipation.

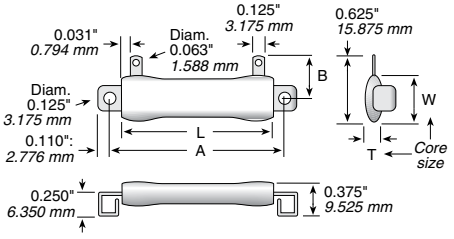
MOUNTING

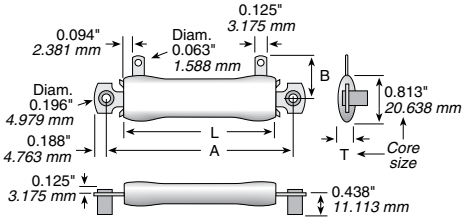
In addition to the standard box bracket, stud type brackets are available for stacking the standard size resistors. Stud type brackets are available in two heights: standard (SS, 0.437"/11.113mm) and high (SSH, 0.531"/13.494mm). The SSH stud is recommended when stacking the adjustable Type 260, as it assures clearance for the adjustable lugs to pass eachother. Spacer washer No. 6027 (O.D. 0.219"/5.556mm, I.D. 0.125"/3.175mm, thickness 0.094"/2.381mm) is recommended for use with the miniature adjustable and fixed resistors to provide clearance, as explained above, or increased wattage. See chart.

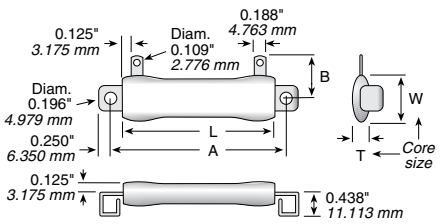
Derating for stacked mounting

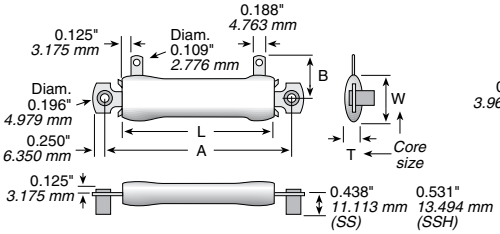
Stacked resistors should be derated to prevent excessive temperatures due to proximity. Approximate ratings are given in the table.

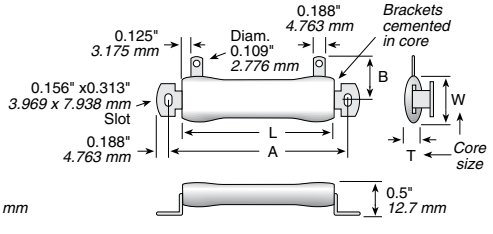
No. of Resistors	Percent of Single Unit Rating		
	Std. or Inter.	Miniature	Miniature with 0.094" (2.381 mm) Spacer Washer
2	70	70	75
3	60	60	69
4	50	50	60











(continued)

250 Series

'Thin' Stackohm®
Vitreous Enamel Power

CORE AND TERMINAL SELECTION

For Made to Order Type 250 Stackohm Resistors

Free Air Wattage Rating*	Core Dimensions† Length L	Width W	Thickness T	Min. Ohms	Max. Practical Ohms	Code for Core Dia.	Fig. No.	Dimension A	Dimension B	Standard Terminal
Miniature										
10	0.750" (19.050mm)	0.375" (9.525mm)	0.125" (3.175mm)	1	15,000	TA	1	1.000" (25.400mm)	0.375" (9.525mm)	51
15	1.000" (25.400mm)	0.375" (9.525mm)	0.125" (3.175mm)	1	25,000	TA	1	1.250" (31.750mm)	0.375" (9.525mm)	51
20	2.000" (50.800mm)	0.375" (9.525mm)	0.125" (3.175mm)	1	50,000	TA	1	2.313" (58.750mm)	0.375" (9.525mm)	51
12	0.688" (17.463mm)	0.594" (15.081mm)	0.234" (5.953mm)	1	20,000	TB	**			51
Intermediate										
21	1.000" (25.400mm)	0.813" (20.638mm)	0.250" (6.350mm)	1	8,000	TD	2	1.313" (33.350mm)	0.594" (15.081mm)	51
25	1.500" (38.100mm)	0.813" (20.638mm)	0.250" (6.350mm)	1	15,000	TD	2	1.813" (46.050mm)	0.594" (15.081mm)	51
Standard										
30	1.250" (31.750mm)	1.000" (25.400mm)	0.250" (6.350mm)	1	10,000	TE	5 3, 4	1.750" (44.450mm) 2.000" (50.800mm)	0.938" (23.813mm)	57
40	2.000" (50.800mm)	1.000" (25.400mm)	0.250" (6.350mm)	1	25,000	TE	5 3, 4	2.500" (63.500mm) 2.750" (69.850mm)	0.938" (23.813mm)	57
55	3.500" (88.900mm)	1.000" (25.400mm)	0.250" (6.350mm)	1	30,000	TE	5 3, 4	4.000" (1.1.600mm) 4.250" (107.950mm)	0.938" (23.813mm)	57
70	4.750" (120.650mm)	1.000" (25.400mm)	0.250" (6.350mm)	1	120,000‡	TE	5 3, 4	5.250" (133.350mm) 5.500" (139.700mm)	0.938" (23.813mm)	57
95	6.000" (152.400mm)	1.000" (25.400mm)	0.250" (6.350mm)	1	150,000‡	TE	5 3, 4	6.500" (165.100mm) 6.750" (171,450mm)	0.938" (23.813mm)	57

*Based on mounting on steeel panel 10" (254mm) x 10" x 0.040" (1.016mm).

†Inside dimensions of core are: 0.250" (6.350mm) x 0.047" (1.191mm) for TA; 0.406" (10.319mm) x 0.047" (1.191mm) for TB; 0.438" (11.113mm) x 0.063" (1.588mm) for TD; 0.672" (17.069mm) x 0.063" (1.588mm) for TE.

‡These sizes are Ohmicone (silicone-ceramic) coated–type 450-460.

**User supplies brackets.

ORDERING INFORMATION

Series — RoHS Compliant

F 2 0 J 1 R 0 E

Coating
Blank = Vitreous
C = Centohm
S = Silicone

Wattage

Tolerance
F = 1%
H = 3%
J = 5%
K = 10%

Ohms
1R0 = 1Ω
250 = 250Ω
1K0 = 1,000Ω
25K = 25,000Ω
25K5 = 25,500Ω

Made-to-order Parts

See web-site for custom core info

Terminal Type
See "Resistor Terminals for Tubular Cores"

Tolerance
J = 5%

RoHS Compliant

2 5 3 0 T E 5 7 B 1 R 0 0 J E

Series
Vitreous enamel:
25 = 250 Fixed
26 = 260 Adjustable
Silicone ceramic:
45 = 450 Fixed
46 = 460 Adjustable

Wattage & Core Code
See "Core and Terminal Selection"

Mounting Brackets
(user supplies bracket for core TB)
B = Stacking box
S = Stacking stud, std. height
H = Stacking stud high
U = Unit type

Ohms
Example:
1R00 = 1Ω
250R = 250Ω
1K00 = 1,000Ω
25K0 = 25,000Ω
25K5 = 25,500Ω

Standard Values

Ohmic value	Part No. Prefix ➤ Suffix ▼	Wattage 10 F10J	20 F20J	30 F30J	40 F40J	55 F55J
1	1R0E	✔	✔	✔	✔	✔
1.5	1R5E			✔	✔	✔
2	2R0E	✔	✔	✔	✔	✔
3	3R0E			✔	✔	✔
4	4R0E				✔	✔
5	5R0E	✔	✔	✔	✔	✔
7.5	7R5E	✔			✔	✔
10	10RE	✔	✔		✔	✔
15	15RE	✔	✔	✔		
20	20RE	✔				
25	25RE	✔	✔	✔	✔	✔
30	30RE	✔				
40	40RE					✔

Ohmic value	Part No. Prefix ➤ Suffix ▼	Wattage 10 F10J	20 F20J	30 F30J	40 F40J	55 F55J
50	50RE	✔		✔	✔	✔
75	75RE			✔		✔
100	100E	✔	✔	✔	✔	✔
150	150E		✔			
200	200E	✔		✔	✔	✔
250	250E		✔	✔	✔	✔
300	300E		✔			
400	400E	✔			✔	✔
500	500E	✔	✔	✔	✔	✔
750	750E			✔	✔	
800	800E		✔			
1,000	1K0E	✔	✔	✔	✔	✔
1,250	1K25E	✔	✔			

Ohmic value	Part No. Prefix ➤ Suffix ▼	Wattage 10 F10J	20 F20J	30 F30J	40 F40J	55 F55J
1,500	1K5E	✔	✔	✔		✔
2,000	2K0E		✔		✔	✔
2,500	2K5E	✔	✔	✔	✔	✔
3,000	3K0E	✔		✔	✔	✔
4,000	4K0E			✔		✔
5,000	5K0E		✔			
6,000	6K0E					
7,500	7K5E		✔			
10,000	10KE				✔	✔
15,000	15KE				✔	
20,000	20KE				✔	
25,000	25KE				✔	
40,000	40KE		✔			

✔ = Standard values; check availability at www.ohmite.com

270 Series

Vitreous Enamel Power

Select 270 Type fixed resistors for applications requiring wattage ratings from 12 to 1000 watts. The 270 Type resistors are equipped with lug terminals suitable for soldering or sturdy bolt connection. When secure mounting is required, the hollow core of these resistors permit fastening with spring-type brackets, thru bolts or thru bolts with slotted-steel brackets.

Suitable for rugged applications, the 270 Type resistors feature all-welded construction and durable lead free vitreous enamel coating. Mounting brackets not included with resistors.

FEATURES

- Terminals suitable for soldering or bolt connection
- High wattage applications
- Rugged lead free vitreous enamel coating
- Flame resistant coating
- All-welded construction
- RoHS compliant available
- "Fast on" option – see terminal 538, http://www.ohmite.com/techdata/terminals.pdf

SERIES SPECIFICATIONS

Series	Wattage	Ohms	Core Code	Voltage	Std. Terminal
L12	12	0.1-51K	D	565	57
L25	25	0.15-100K	K	625	40
L50	50	0.38-260K	K	1625	40
L100	100	0.23-101K	M	2845	40
L175	175	0.13-101K	P	3595	46
L225	225	0.16-129K	P	4595	46
L500	500	0.38-218K	S	4970	45
L1000	1000	0.69-392K	S	8900	45

Non-Inductive versions available; Other sizes available; Also available in low cost Centohm or Silicone coating; Consult Ohmite.

* Maximum Voltage is based on Ohm's Law [$V=\sqrt{P*R}$] as limited by the resistance value of specified product

CHARACTERISTICS

Coating	Lead free vitreous enamel. Large models (500 watts and up) are supplied in Silicone Ceramic. Also available in low-cost Centohm coating; Consult factory.
Core	Tubular ceramic.
Terminals	Solder coated radial lug. RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Derating	Linearly from 100% @ +25°C to 0% @ +350°C.
Tolerance	±5% 1Ω and over (J); ±10% under 1Ω (K)
Power rating	Based on 25°C free air rating.
Overload	10 times rated wattage for 5 seconds.
Temperature coefficient	1 to 20Ω: ±400 ppm/°C; Above 20Ω: ±260 ppm/°C
Dielectric withstanding voltage	1000 VAC: 12 to 100 watt rating. 3000 VAC: 175 to 225 watt rating (Measured from terminal to mounting bracket)
Max. amps	use the formula $\sqrt{P/R}$
Power limitations for high resistance values	When resistance exceeds the resistance values listed, derate the Power Rating by 25% to improve reliability. *No power derating necessary for ratings higher than 100W.*

Power rating	Resistance value
12W	3,900Ω
25W	12,000Ω
50W	35,000Ω
100W	75,000Ω

Mounting Hardware	see http://www.ohmite.com/techdata/lug-mounting.php

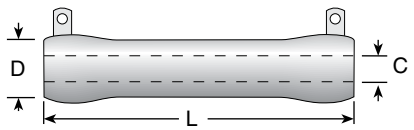
(continued)

270 Series

Vitreous Enamel Power

DIMENSIONS

in./mm



Series	Wattage	L	D	C	Core Code*	Std. Term.**
L12	12	1.75 / 44.4	0.313 / 7.94	0.188 / 4.76	D	57
L25	25	2.0 / 50.8	0.562 / 14.3	0.313 / 7.94	K	40
L50	50	4.0 / 101.6	0.562 / 14.3	0.313 / 7.94	K	40
L100	100	6.5 / 165.1	0.750 / 19.1	0.50 / 12.7	M	40
L175	175	8.5 / 215.9	1.125 / 28.6	0.75 / 19.1	P	46
L225	225	10.5 / 266.7	1.125 / 28.6	0.75 / 19.1	P	46
L500	500	12.0 / 304.8	2.50 / 63.5	1.75 / 44.5	S	45
L1000	1000	20.0 / 508.0	2.50 / 63.5	1.75 / 44.5	S	45

* http://www.ohmite.com/techdata/200-210-270-custom.pdf

** http://www.ohmite.com/techdata/terminals.pdf

ORDERING INFORMATION

Standard

F = Fast on (optional) | Non-inductive: Blank = Standard, N = Non-inductive | RoHS Compliant

L 25 J 100 E

- Coating: Blank = Vitreous, C = Centohm, S = Silicone
- Series: L
- Wattage: 25
- Tolerance: J = 5%, K = 10%
- Ohms: 1R0 = 1Ω, 250 = 250Ω, 1K0 = 1,000Ω, 25K = 25,000Ω, 25K5 = 25,500Ω

Made-to-order

Non-inductive: Blank = Standard, N = Non-inductive | Core Diameter: See "Core and Terminal Selection" | RoHS Compliant

270 50K 405R00 JE

- Coating: 270 = Vitreous, 470 = Silicone Ceramic
- Wattage: 50
- Terminal Type: See "Resistor Terminals for Tubular Cores"
- Ohms: R500 = 0.500Ω, 1R00 = 1Ω, 250R = 250Ω, 1K00 = 1,000Ω, 25K0 = 25,000Ω, 25K5 = 25,500Ω
- Tolerance: J = 5%, K = 10%

See website for custom core and terminal info

Standard part numbers for 270 series

Ohmic value		12 Watt	Ohmic value		12 Watt
0.51	✔	L12JKR51E	180	✔	L12J180E
1	✔	L12J1R0E	270	✔	L12J270E
3.3	✔	L12J3R3E	330	✔	L12J330E
4.7	✔	L12J4R7E	390	✔	L12J390E
10	✔	L12J10RE	470	✔	L12J470E
12	✔	L12J12RE	560	✔	L12J560E
15	✔	L12J15RE	1000	✔	L12J1K0E
22	✔	L12J22RE	1200	✔	L12J1K2E
27	✔	L12J27RE	1500	✔	L12J1K5E
33	✔	L12J33RE	2200	✔	L12J2K2E
47	✔	L12J47RE	2700	✔	L12J2K7E
68	✔	L12J68RE	4700	✔	L12J4K7E
82	✔	L12J82RE	10000	✔	L12J10KE
100	✔	L12J100E	18000	✔	L12J18KE
150	✔	L12J150E	22000	✔	L12J22KE
			51000	✔	L12J51KE

✔ = Standard values; check availability using the worldwide inventory search at www.ohmite.com

Red outlined values supplied in Silicone-Ceramic coatings instead of vitreous enamel.

Ohmic value	Part No. Prefix ➤ / Suffix ▼	Wattage 25 L25J	50 L50J	100 L100J	175 L175J	225 L225J	500 L500J	1000 L1000J
1	1R0E	✔	✔	✔	✔	✔		
2	2R0E	✔	✔	✔	✔	✔		
3	3R0E	✔	✔	✔	✔	✔		
4	4R0E	✔	✔	✔	✔	✔		
5	5R0E	✔	✔	✔	✔	✔		
10	10RE	✔	✔	✔	✔	✔		
15	15RE	✔						
25	25RE	✔	✔	✔	✔	✔		
50	50RE	✔	✔	✔	✔	✔		
75	75RE	✔	✔	✔	✔	✔		
100	100E	✔	✔	✔	✔	✔		
125	125E			✔	✔			
150	150E	✔	✔	✔	✔	✔		
200	200E	✔	✔					
250	250E	✔	✔	✔	✔	✔		
500	500E	✔	✔	✔	✔	✔		
750	750E	✔	✔	✔		✔		
800	800E	✔	✔					
1,000	1K0E	✔	✔	✔	✔	✔		
1,500	1K5E	✔	✔	✔		✔		
2,000	2K0E	✔	✔	✔	✔	✔		

Ohmic value	Part No. Prefix ➤ / Suffix ▼	Wattage 25 L25J	50 L50J	100 L100J	175 L175J	225 L225J	500 L500J	1000 L1000J
2,500	2K5E	✔	✔	✔		✔		
3,000	3K0E	✔	✔	✔	✔	✔		
3,500	3K5E	✔						
4,000	4K0E	✔	✔					
5,000	5K0E	✔	✔	✔	✔	✔		
6,000	6K0E	✔						
7,500	7K5E	✔	✔	✔		✔		
10,000	10KE	✔	✔	✔	✔	✔		
12,000	12KE	✔						
15,000	15KE	✔	✔	✔		✔		
20,000	20KE	✔	✔	✔		✔		
25,000	25KE	✔	✔			✔		
30,000	30KE			✔		✔		
35,000	35KE		✔					
40,000	40KE	✔				✔		
50,000	50KE	✔	✔	✔		✔		
60,000	60KE					✔		
75,000	75KE		✔		✔	✔		
100,000	100KE	✔	✔	✔	✔	✔		
150,000	150KE		✔					
200,000	200KE		✔					
250,000	250KE		✔					

280 Series

Corrib® Fixed and Adjustable Vitreous Enamel Power

Corrib® resistors are ideal for applications involving high currents at very low resistance values—as low as 0.1Ω for the 300 Watt unit. These large, heavy-duty resistors are designed to withstand frequent start-stop cycles characteristic of motor starting, dynamic braking and other similar applications. Special order units are available to accommodate up to 1500 watts.

Corribs® are manufactured with corrugated resistive wire. To accelerate cooling, the wire is securely fused to the ceramic core by the protective vitreous enamel coating to improve durability. Corrib resistors are hollow-core units which can be securely fastened to chassis surfaces with thru bolts and brackets.

FEATURES

- Also available in Centohm or Silicone coating. Consult Ohmite.
- Ribbed construction aids in rapid cooling.
- Designed for equipment requiring low resistance loads at low ohmic values and high current capacity.
- Especially constructed for motor starting, dynamic braking, etc.
- RoHS compliant product available. Add “E” suffix to part number to specify.

CHARACTERISTICS

Coating	Lead free vitreous enamel except for extreme low resistance 35 watt models, and very large models (750 watts and up), which are supplied in Silicone Ceramic
Core	Tubular Ceramic
Terminals	Tinned lug with hole. RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu
Adjustable Lug	Supplied with adjustable 300 watt models. Part No. 1974-A or 1974-B
Resistance	Max. 63Ω for 300W version
Tolerance	±10% (K)
Power rating	Based on 25°C free air rating
Derating	Linearly from 100% @ +25°C to 0% @ +400°C
Overload	10 times rated wattage for 5 seconds
Temperature coefficient	±400 ppm/°C
Dielectric withstanding voltage	1000 VAC measured from terminal to mounting bracket
To calculate max. amps	use the formula √P/R

RESISTOR HARDWARE

Thru Bolts Mounting Brackets for 300 Watt Corrib

Includes two each bracket, bolt, washers (centering, mica, lock) and nut. Note: Single unit mounting contains one each bolt and nut; two each all washers.

Part No. Slotted	Part No. Elongated	No. of Resistors	Moun. Derat. %
6110-81/2	6126-P-81/2	1	100%
-	6127-P-81/2	2	83%
-	6128-P-81/2	3	80%
-	6129-P-81/2	4	80%

Lugs for 300 Watt Adjustable Corrib

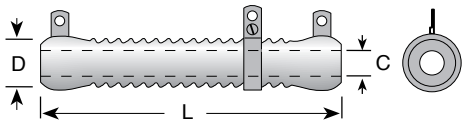
Part No.	Res.	Part No.	Res.
1974-A 1/16 wire	0.40	**1974-B** 1/8 wire	0.10
	0.50		0.12
	0.63		0.16
	1.00		0.20
	1.50		0.25
	1.60		0.31
	2.00		0.80
	2.50		1.20
	3.10		
	4.00		
	5.00		
	6.30		
	8.00		
	10.00		
	12.00		
	16.00		
	20.00		
	25.00		
	30.00		
	48.00		
	50.00		

(continued)

280 Series

Corrib® Fixed and Adjustable Vitreous Enamel Power

DIMENSIONS



Core and Terminal Selection for Made to Order Type

Free Air Wattage Rating	Core Dimensions D: OD	C: ID	L: Length	Code for Core Dia.	Ohms Min.	Ohms Max.	Term. Type
1500	2.50" (63.5mm)	1.75" (44.45mm)	20.0" (508.00mm)	S	0.56	358	45
1000			15.0" (381.00mm)	S	0.41	258	
750			12.0" (304.80mm)	S	0.31	198	
380			6.0" (152.40mm)	S	0.13	78	
550	1.625" (41.28mm)	1.125" (28.58mm)	11.75" (298.45mm)	R	0.21	133	45
500			10.50" (266.70mm)	R	0.19	117	
400			8.5" (215.90mm)	R	0.14	91	
270	1.50" (38.10mm)	1.125" (28.58mm)	5.0" (127.00mm)	Q	0.065	41	45
395	1.125" (28.58mm)	0.75" (19.05mm)	11.25" (285.75mm)	P	0.14	87	45
375			10.5" (266.70mm)	P	0.13	80	
300			8.5" (215.90mm)	P	0.099	63	
220			6.0" (152.40mm)	P	0.063	39	
185			5.0" (127.00mm)	P	0.05	30	
155			4.25" (107.95mm)	P	0.038	25	
140			4.0" (101.6mm)	P	0.04	20	

Free Air Wattage Rating	Core Dimensions D: OD	C: ID	L: Length	Code for Core Dia.	Ohms Min.	Ohms Max.	Term. Type
315	1.00" (25.40mm)	0.625" (15.88mm)	10.0" (254.00mm)	N	0.11	67	45
215			7.0" (177.60mm)	N	0.068	43	
190			6.0" (152.40mm)	N	0.056	35	
150			5.0" (127.00mm)	N	0.043	27	
125			4.0" (101.60mm)	N	0.031	19	
180	0.75" (19.05mm)	0.50" (12.70mm)	6.5" (165.10mm)	M	0.031	29	45
160			6.0" (152.40mm)	M	0.038	26	
140			5.0" (127.00mm)	M	0.028	20	
105			4.0" (101.60mm)	M	0.020	14	
100			3.5" (88.90mm)	M	0.021	11	
135	0.563" (14.30mm)	0.313" (7.95mm)	6.0" (152.40mm)	K	0.028	21	46
110			5.0" (127.00mm)	K	0.029	16	
90			4.0" (101.60mm)	K	0.021	12	46
35			2.0" (50.80mm)	K	0.0097	0.11	
35	0.563" (14.30mm)	0.313" (7.95mm)	2.0" (50.80mm)	K	0.12	5.6	40

ORDERING INFORMATION

Standard

Coating
Blank = Vitreous
C = Centohm
S = Silicone

RoHS Compliant

C 3 0 0 K R 1 0 E

Series
C = Fixed
E = Adjustable

Wattage

Tolerance
K = 10%

Ohms
example:
1R0 = 1Ω
250 = 250Ω
1K0 = 1,000Ω
25K = 25,000Ω
25K5 = 25,500Ω

Made-to-order

See website for custom core info

2 8 0 3 0 0 P 4 5 1 2 R 0 0 K

Series
230 = Adjustable
280 = Fixed
480 = Silicone fixed
680 = Centohm fixed

Wattage & Core Code
See "Core and Terminal Selection"

Terminal Type
See "Resistor Terminals for Tubular Cores"

Ohms
Example:
R0200 = 0.02 Ω
R2000 = 0.2 Ω
2R500 = 2.5 Ω
10R00 = 10 Ω

Tolerance
F = 1%
H = 3%
J = 5%
K = 10% *(std.)*

NOTE: Wattages above 750 watts come with silicone coating.

Standard part numbers for 280 series

C300KR10E	C300K2R0E	E300K10RE	E300K6R3E
C300KR12E	C300K2R5E	E300K12RE	E300K8R0E
C300KR20E	C300K3R1E	E300K16RE	E300KR10E
C300KR25E	C300K4R0E	E300K1R0E	E300KR12E
C300KR31E	C300K5R0E	E300K1R6E	E300KR16E
C300KR40E	C300K6R3E	E300K20RE	E300KR20E
C300KR50E	C300K8R0E	E300K2R0E	E300KR25E
C300KR63E	C300K10RE	E300K2R5E	E300KR31E
C300K1R0E	C300K12RE	E300K3R1E	E300KR40E
C300K1R2E	C300K16RE	E300K4R0E	E300KR50E
C300K1R6E	C300K20RE	E300K5R0E	E300KR63E
			E300KR80E

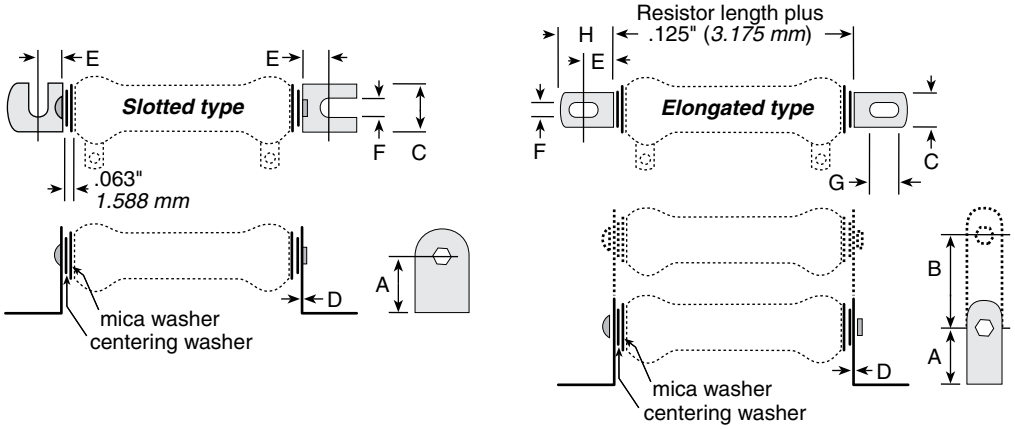
Mounting Hardware

For 200, 210, 270 and 280 Series

THRU-BOLTS AND MOUNTING BRACKETS

Sturdy plated steel brackets, along with thru-bolts, centering washers and insulating washers (included), allow for secure mounting of 210 type and 270 type resistors. Mounting brackets are available in either slotted (one with end-slot/one with side-slot) or elongated styles.

Type Slotted	Dimensions A	B	C	D	E	F	G	H	Std. Core Length	Bolt Length
6101—E	0.781"	—	0.75"	0.031"	0.438"	0.25"	—	—	1 3/4"	2 1/4"
6104—E	0.781"	—	0.75"	0.031"	0.438"	0.25"	—	—	2"	2 1/2"
6110—E	1"	—	1.125"	0.063"	0.813"	0.313"	—	—	2 1/4"	2 3/4"
Elongated										
6120—E	1"	—	0.5"	0.031"	0.422"	0.219"	.438	.750	4"	4 3/4"
6126—E	1.5"	—	1.25"	0.063"	0.438"	0.281"	.563	.875	6"	6 5/8"
6127—E	1.5"	2"	1.25"	0.063"	0.438"	0.281"	.563	.875	6 1/2"	7"
6128—E	1.5"	2"	1.25"	0.063"	0.438"	0.281"	.563	.875	8 1/2"	9 1/8"
6129—E	1.5"	2"	1.25"	0.063"	0.438"	0.281"	.563	.875	10 1/2	11 1/8



ORDERING INFORMATION

Slotted — Euro lug — RoHS Compliant

6104 - EM - 6 1/2 - E

No. of Resistors	Bracket	Core Code	Std. Core Length in.	Std. Core Length mm
1	6101		2	
2	6102	K	4	
3	6103		6	
1	6104		2	119
2	6105	M	4	119
3	6106		6 1/2	119
1	6110A		4	170
2	6111A	N	6	170
3	6112A			170
1	6110		8 1/2	252
2	6111	P	10 1/2	252
3	6112			252
1	6113B		8 1/2	375
		R	10 1/2	
			11 3/4	
1	6114		12	
		S	15	
			20	

Euro lug

Elongated — RoHS Compliant

6121 - D - 1 3/4 - E

No. of Resistors	Bracket	Core Code	Standard Core Length (in)
1	6120		1
2	6121	D	1 3/4
		H	2
		K	2 1/4
			4
1	6122		2
2	6123	M	4
3	6124	N	6 1/2
4	6125		
1	6126		8 1/2
2	6127	P	10 1/2
3	6128		
4	6129		

More detailed information at http://www.ohmite.com/techdata/lug-mounting.php

✙ = Most popular Standard values
✔ = Standard values
✜ = Non-Standard values subject to minimum handling charge per item

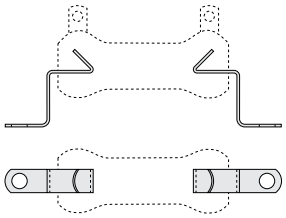
(continued)

Mounting Hardware

For 200, 210, 270 and 280 Series

MOUNTING BRACKETS

Brackets fit inside cores of 200, 210 and 270 type resistors and remain in place by spring tension. Standard brackets are plated steel and have no suffix to part number. Spring steel brackets are indicated with an "S" suffix following part number.



Part number Standard	Spring steel	Mtg screw size (max.)	For resistors (power ratings)
✙ 5E	✜ 5SE	6	8, 12 watt
✔ 7E	✜ 7SE	6	20 watt
✙ 9E	✜ 9SE	6	25, 50, 75 watt
✙ 12E	✙ 12SE	10	100 watt
✙ 18E	✙ 18SE	10	175, 225 watt

WASHERS

Metal Centering

Part No.	Diameter Outer	Inner	For max. screw size	For resistors (power ratings)
✙ 6000E	0.563"	0.313	#10	25, 50, 75 watt
✙ 6001E	0.75"	0.5	#10	100 watt
✙ 6003E	1.125"	0.75	0.25"	175, 225 watt

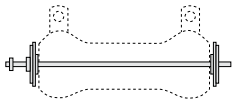
Mica insulating

Part No.	Diameter Outer	Inner	For resistors (power ratings)
✙ 6010E	0.75"	0.625"	25, 50, 75 watt
✙ 6011E*	0.75"	0.313"	25, 50, 75 watt
✜ 6012E	1"	0.625"	100 watt
✔ 6013E*	1"	0.5"	100 watt
✜ 6014E	1.25"	0.625"	core 1" O.D. x 0.625" I.D.
✙ 6015E*	1.25"	0.625"	core 1" O.D. x 0.625" I.D.
✔ 6016E	1.5"	0.625"	175, 225 watt
✙ 6017E*	1.5"	0.75"	175, 225 watt

* Use with centering washers.

THRU BOLTS

Thru-Bolts, with centering washers and mica insulating washers, permit perpendicular mounting of 200, 210 and 270 type resistors to panels up to 0.25" thick.



Part No.	Bolt size Length	No.	For resistors (power rating)
✜ 7PA5E	1.75"	8	8 watt
✙ 7PA10E	2.5"	8	12 watt
✜ 7PA20E	2.75"	8	20 watt
✙ 7PA25E	2.75"	10	25 watt
✙ 7PA50E	4.75"	10	50 watt
✜ 7PA75E	6.75"	10	75 watt
✙ 7PA100E	7.313"	10	100 watt
✙ 7PA160E	9.5"	0.25"	175 watt
✙ 7PA200E	11.5"	0.25"	225 watt

ADJUSTABLE LUGS

FOR 210 SERIES

One standard screwdriver type adjustable lug is supplied with each unit.

Two types of lugs can be ordered separately: standard or with a silver contact button; both types are available with a screwdriver type lug.

Resistor core diam. (O.D., in. / *mm*)	Standard part numbers Standard	Silver
0.313 / *7.94*	✜ 2115E	✜ 2116E
0.563 / *14.3*	✙ 2121E	✔ 2123E
0.750 / *19.05*	✙ 2125E	✜ 2127E
1.125 / *28.58*	✔ 2133E	✜ 2135E

Double thumb screw Lug (Part Number 2160E)

The double thumb screw adjustable lug permits easier adjustment and less chance of damage to resistance wire. Available for 1.125" cores only.

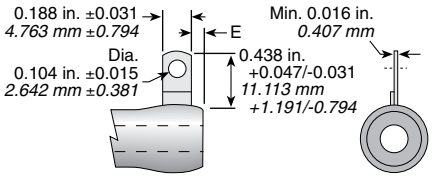
More detailed information at http://www.ohmite.com/techdata/lug-mounting.php

✙ = Most popular Standard values
✔ = Standard values
✜ = Non-Standard values subject to minimum handling charge per item

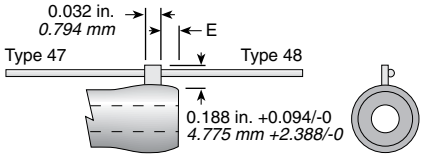
Resistor Terminals

Resistor Terminals for Tubular Cores

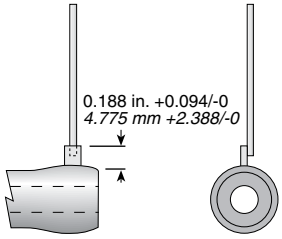
Type 57



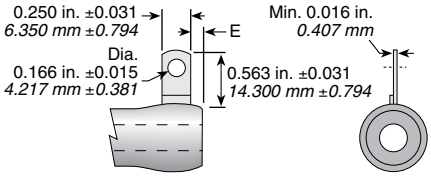
Type 47 and 48



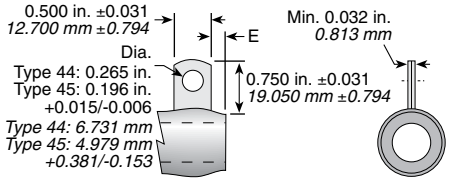
Type 48R



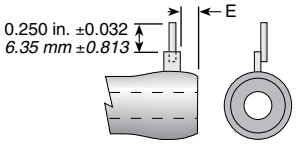
Type 40 and 40A



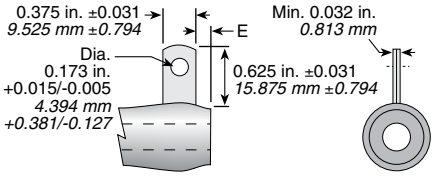
Type 44, 44A, 45, 45A, 45B



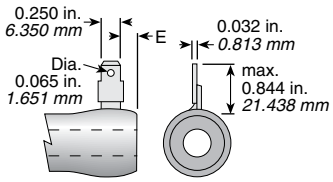
Type 58



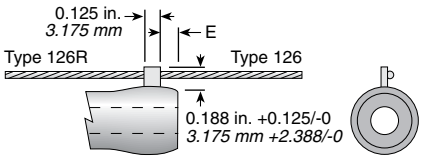
Type 46 and 46A



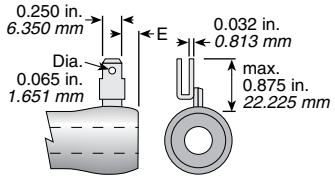
Type 538



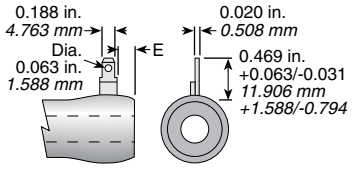
Type 126 and 126R



Type 535

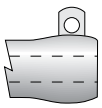


Type 532

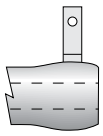


Other Terminals

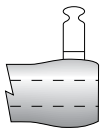
Type 49
.250 *(6.35mm)* wide x 0.313 *(7.950mm)* .166 *(4.217mm)* dia. hole. Solder coated.



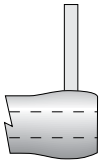
Type 51
.125 *(3.175mm)* wide x height as specified. 0.072 *(1.829mm)* hole. Solder coated.



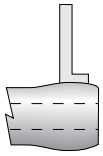
Type 68
.188 *(4.775mm)* wide x 0.531 *(13.488mm)* high. Solder coated.



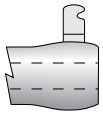
Type 50
Untinned lug intended for welded connection. 0.063 *(1.600mm)* x height as specified.



Type 52
For “wire wrap” (Keller, Gardner-Denver T.M.)



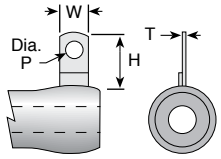
Type 69
.125 *(3.175mm)* wide x 0.375 *(9.525mm)* high. Solder coated.



(continued)

Resistor Terminals

Resistor Terminals for Tubular Cores



Terminal Dimensions

Terminal Type	W in.	W *(mm)*	H in.	H *(mm)*	T in.	T *(mm)*	P in.	P *(mm)*	Core Diameter Range in.	Core Diameter Range *(mm)*
40, 40A	0.25 ± 0.031	*(6.35 ± 0.794)*	0.563 ± 0.031	*(14.3 ± 0.794)*	min 0.016	*(0.407)*	0.166 ± 0.015	*(4.217 ± 0.381)*	0.313-1.125	*(7.95-28.575)*
44, 44A	0.5 ± 0.031	*(12.7 ± 0.794)*	0.750 ± 0.031	*(19.05 ± 0.794)*	min 0.032	*(8.13)*	0.265 +0.015/ -0.006	*(6.731 +0.381/ -0.153)*	0.75-1.125	*(19.05-28.575)*
45, 45A, 45B	0.5 ± 0.031	*(12.7 ± 0.794)*	0.750 ± 0.031	*(19.05 ± 0.794)*	min 0.032	*(8.13)*	0.196 +0.015/ -0.006	*(4.979 +0.381/ -0.153)*	0.75-1.125	*(19.05-28.575)*
46, 46A	0.375 ± 0.031	*(9.525 ± 0.794)*	0.625 ± 0.031	*(15.875 ± 0.794)*	min 0.032	*(8.13)*	0.173 +0.015/ -0.005	*(4.394 +0.381/ -0.127)*	0.563-1.50	*(14.3-38.1)*
47, 48, 48R	0.125 ± 0.031	*(3.175 ± 0.794)*	0.188 +0.094/-0	*(4.775+2.38/-0)*	N/A		N/A		0.0210-0.563	*(5.25-14.3)*
57	0.188 ± 0.031	*(4.763 ± 0.794)*	0.438 +0.047/-0.031	*(11.113 +1.191/-0.794)*	min 0.016	*(0.407)*	N/A		0.25-0.75	*(6.35-19.05)*
58	0.125 ± 0.031	*(3.175 ± 0.794)*	0.188 +0.094/-0	*(4.775+2.38/-0)*	N/A		N/A		0.0210-0.563	*(5.25-14.3)*
126, 126R	0.125 ± 0.031	*(3.175 ± 0.794)*	0.188 +0.094/-0	*(4.775+2.38/-0)*	N/A		N/A		0.313-1.125	*(7.95-28.575)*
532	0.188 ± 0.031	*(4.763 ± 0.794)*	0.469 +0.063/-0.031	*(11.906 +1.588/-0.794)*	0.020	*(0.508)*	0.063	*(1.588)*	0.313-1.125	*(7.95-28.575)*
535	0.25 ± 0.031	*(6.35 ± 0.794)*	max 0.875	*(22.225)*	0.032	*(8.13)*	0.065	*(1.651)*	0.313-2.5	*(7.95-63.5)*
538	0.25 ± 0.031	*(6.35 ± 0.794)*	max 0.844	*(21.438)*	0.032	*(8.13)*	0.065	*(1.651)*	0.313-2.5	*(7.95-63.5)*

40A- Has screw #6-32 x .5 with 2 nuts and washers, 44A- Has screw 20 x .625 with 2 nuts and washers, 45A- Has screw #8-32 x .625 with 2 nuts and washers, 45B- Has screw #10-32 x .625 with 2 nuts and washers, 46A- Has screw #8-32 x .625 with 2 nuts and washers

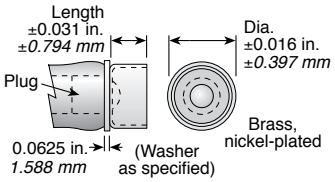
Edge Distance—Dimension "E"

	Core O.D.																			
	in.	*mm*	in.	*mm*	in.	*mm*	in.	*mm*	in.	*mm*	in.	*mm*	in.	*mm*	in.	*mm*	in.	*mm*	in.	*mm*
Terminals	.250	*6.350*	.313	*7.938*	.438	*11.113*	.563	*14.288*	.750	*19.050*	1.00	*25.40*	1.125	*28.575*	1.500	*38.100*	1.625	*41.275*	2.500	*63.500*
40-40A-49-50-57-68-69-126-126R-532	.031	*.794*	.094	*2.381*	.094	*2.381*	.094	*2.381*	.125	*3.175*	.156	*3.969*	.219	5.556	—	—	—	—	—	—
44-44A-45-45A-45B-46-46A	—	—	—	—	—	—	.250	6.350	.250	6.350	.250	6.350	.250	6.350	—	—	—	—	—	—
535-538	—	—	.125	*3.175*	.125	*3.175*	.125	*3.175*	.125	*3.175*	.156	*3.969*	.219	*5.556*	.250	*6.350*	.250	*6.350*	.500	*12.700*

Dimension "E" can be varied and is often reduced for cores 2.00 *(50.80mm)* or less in length or sometimes increased for greater leakage distance to ground. Tolerance on "E" is ± 0.016 *(.397mm)* up to 0.125 *(3.175mm)* and ± 0.063 *(1.588mm)* above.

Type 140

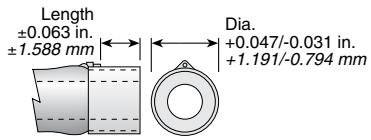
For Cores 0.438 (11.113mm) to 1.125 (28.575mm) O.D.



Ferrule Diameter In.	Ferrule Diameter *mm*	Ferrule Length In.	Ferrule Length *mm*	Catalog No. No Washer	Catalog No. With Washer
.563	*14.288*	.500	*12.700*	140/9*	140/19
.688	*17.463*	.563	*14.288*	140/11*	140/01
.813	*20.638*	.500	*12.700*	140/13†	140/03
1.125	*28.575*	.500	*12.700*		140/18

* Up thru 0.563 *(14.288mm)* D core.
†Up thru 0.750 *(19.050mm)*

Type 141

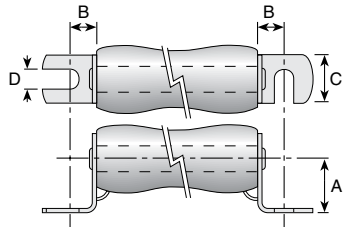


Ferrule Diameter In.	Ferrule Diameter *mm*	Ferrule Length In.	Ferrule Length *mm*	Catalog No.	Core O.D. In.	Core O.D. mm
.625	*15.875*	.625	*15.875*	141/10	.563	*14.288*
.813	*20.638*	.688	*17.463*	141/13	.750	*19.050*
1.062	*26.988*	.688	*17.463*	141/17	1.000	*25.400*
1.188	*30.163*	.688	*17.463*	141/19	1.125	*28.575*

Ferrules are brass, natural finish.

Type 63

Cores 0.563 *(14.288mm)* to 0.750 *(19.050mm)* O.D.--- Cat No. 63/12
Cores 1.000 *(25.400mm)* to 1.125 *(28.575mm)* O.D --- Cat No. 63/18



Cat. No.	A ±.031 *(.794)* In.	A ±.031 *(.794)* *mm*	B ± .031 *(.794)* In.	B ± .031 *(.794)* *mm*	C ±.031 *(.794)* In.	C ±.031 *(.794)* *mm*	D (Min.) In.	D (Min.) *mm*
63/12	.781	*19.844*	.438	*11.113*	.750	*19.050*	.250	*6.350*
63/18	.875	*22.225*	.813	*20.638*	1.125	*28.575*	.313	*7.938*

Resistor Cores

Core and Terminal Selection for Type 200, 270, 400 and 470 Tubular Resistors

Free Air Wattage Rating	Nominal Core Dimensions: Length	Outside Diameter	Inside Diameter	Code for Core Dia.	VITREOUS ENAMEL COATED: Critical Resistance Limiting Factors: Min. Ohms	For Ohms Over	Limit Watts and Working Voltage to	Max. Possible Ohms	Standard Terminal**	OHMICONE® SILICONE COATED: Critical Resistance Limiting Factors: Min. Ohms	For Ohms Over	Limit Working Voltage to	Max. Possible Ohms
3*	0.438" (11.1mm)	0.210" (5.25mm)	0.130" (3.17mm)	AA	0.13	Limits controlled by free air watts and max. possible ohms		3.48K	48, 58	0.1	8.0K	155	15.8K
5.25*	0.625" (15.9mm)	0.250" (6.35mm)	0.135" (3.43mm)	CA	0.19			7.06K	48, 58	0.1	15.0K	281	34.0K
6.5	1.0" (25.4mm)	0.250" (6.35mm)	0.125" (3.18mm)	CA	0.10	2.30K		27.3K	57		21.6K	375	45.4K
8*	1.0" (25.4mm)	0.313" (7.95mm)	0.188" (4.76mm)	D	0.10	2.16K		17.1K	48, 57	0.1	9.87K	281	42.8K
12*	1.75" (44.5mm)	0.313" (7.95mm)	0.188" (4.76mm)	D	0.10	6.52K		51.6K	48, 57		50.0K	775	50.4K
11	1.0" (25.4mm)	0.438" (11.1mm)	0.250" (6.35mm)	H	0.10	3.02K		28.2K	57	0.1	7.18K	281	35.3K
15	1.5" (38.1mm)				0.10	6.03K		56.4K	40		21.1K	563	70.5K
20*	2.0" (50.8mm)				0.11	10.1K		94.0K	48-40		44.0K	938	118.0K
26	3.0" (76.2mm)				0.21	18.1K		169.0K	40		110.0K	1690	212.0K
25*	2.0" (50.8mm)	0.563" (14.3mm)	0.313" (7.95mm)	K	0.15	12.9K		100.0K	40	0.1	35.2K	938	151.0K
35	3.0" (76.2mm)				0.26	23.2K		180.0K			81.6K	1690	272.0K
50*	4.0" (101.6mm)				0.38	33.5K		260.0K			119.0K	2440	393.0K
60	5.0" (127.0mm)				0.50	43.8K		340.0K			170.0K	3190	340.0K
75*	6.0" (152.4mm)				0.61	54.1K		420.0K			207.0K	3940	420.0K
24	1.5" (38.1mm)	0.750" (19.1mm)	0.50" (12.7mm)	M	0.10	9.49K	Limit wattage to 78% of free air watts and working volts to 500V per inch of winding space between terminal edges	12.2K	40	0.1	11.1K	516	73.6K
30	2.0" (50.8mm)				0.10	16.4K		21.1K			26.6K	893	127.0K
45	3.0" (76.2mm)				0.10	30.2K		38.8K			59.8K	1640	234.0K
51	3.5" (88.9mm)				0.11	37.1K		47.6K			80.0K	2020	288.0K
61	4.0" (101.6mm)				0.13	44.0K		56.5K			93.6K	2390	341.0K
65	4.5" (114.3mm)				0.15	50.9K		65.3K			118.0K	2770	395.0K
76	5.0" (127.0mm)				0.17	57.8K		74.2K			130.0K	3140	448.0K
90	6.0" (152.4mm)				0.21	71.6K		91.9K			168.0K	3890	555.0K
100*	6.5" (165.1mm)				0.23	78.5K		101.0K			182.0K	4270	609.0K
52	3.0" (76.2mm)	1.0" (25.4mm)	0.625" (15.9mm)	N	0.11	Limits controlled by free air watts and working volts to 500V per inch of winding space between terminal edges		25.3K	40	0.1	49.2K	1600	305.0K
70	4.0" (101.6mm)				0.17			37.2K			78.9K	2350	448.0K
85	5.0" (127.0mm)				0.22			49.1K			113.0K	3100	591.0K
105	6.0" (152.4mm)				0.27			61.0K			141.0K	3850	734.0K
112	6.5" (165.1mm)				0.30			67.1K			159.0K	4220	805.0K
120	7.0" (177.8mm)				0.33			72.9K			176.0K	4600	877.0K
140	8.0" (203.2mm)				0.38			84.8K			204.0K	5350	1.02M
176	10.0" (254.0mm)				0.49			109.0K			267.0K	6850	1.31M
40	2.0" (50.8mm)	1.125" (28.6mm)	0.75" (19.1mm)	P	0.10			9.63K	46	0.1	6.66K	516	89.3K
80	4.0" (101.6mm)				0.10			37.7K			51.0K	2020	328.0K
95	5.0" (127.0mm)				0.10			51.7K			80.8K	2770	450.0K
121	6.0" (152.4mm)				0.10			65.7K			102.0K	3520	572.0K
130	6.5" (165.1mm)				0.10			72.7K			116.0K	3890	633.0K
160	8.0" (203.2mm)				0.12			93.7K			158.0K	5020	816.0K
175*	8.5" (215.9mm)				0.13			101.0K			166.0K	5390	877.0K
225*	10.5" (266.7mm)				0.16			129.0K			211.0K	6890	1.12M
235	11.25" (285.8mm)				0.18			139.0K			237.0K	7460	1.21M
251	12.0" (304.8mm)				0.19			150.0K			257.0K	8030	1.31M
150	5.0" (127.0mm)	1.5" (38.1mm)	1.125" (28.6mm)	Q	0.10			34.2K	45	0.1	44.4K	2580	433.0K
220	8.5" (215.9mm)	1.625" (41.3mm)	1.125" (28.6mm)	R	0.18			75.0K	45	0.1	123.0K	5210	351.0K
275	10.5" (266.7mm)				0.23			96.6K			164.0K	6710	452.0K
300	11.75" (298.5mm)				0.26			110.0K			195.0K	7650	516.0K
250	6.0" (152.4mm)	2.5" (63.5mm)	1.75" (44.5mm)	S	0.15			6.11K	45	0.1	35.0K	2960	86.3K
500	12.0" (304.8mm)				0.38			15.4K			111.0K	7460	218.0K
750	15.0" (381.0mm)				0.50			20.0K			125.0K	9680	283.0K
1000	20.0" (508.0mm)				0.69			27.7K			180.0K	13400	392.0K

*These core sizes are used for the standard items. See the listing of the resistance values under Types 200, 210 and 270

**See Application Note "Resistor Terminals for Tubular Cores," page 35.

Tolerance on Nominal Core Dimensions

Length	Tolerance
0.438 (11.113mm) to 4.00 (101.60mm)	±0.031 (0.794mm)
Over 4.00 (101.60mm) to 6.50 (165.10mm)	±0.047 (1.191mm)
Over 6.50 (165.10mm) to 11.25 (285.575mm)	+0.063 (1.588mm) / -0.094 (2.381mm)
Over 11.25 (285.575mm) to 20.0 (0.508mm)	±0.125 (3.175mm)

Tolerances do not include effect of longitudinal camber.

I.D.	Tolerance
To 0.500 (12.700mm)	±0.016 (0.397mm)
Over 0.500 (12.700mm) to 1.125 (28.575mm)	±0.031 (0.794mm)
Over 1.125 (28.575mm) to 1.750 (44.450mm)	±0.063 (1.588mm)

Maximum Diameter Over Coating: The overall diameter of a finished resistor includes the build-up due to wire diameter, coating and terminal material. This results in a possible maximum increase in diameter of 0.188 (4.763mm) for low resistance, 1.125 (28.575mm) O.D. core resistors and larger; 0.156 (3.969mm) for resistors with smaller diameter cores. On all high resistance units the increase is generally less than 0.125 (3.175mm).

Other Core Sizes: Many other specials are available including cores with special inside diameter listed at right.

Cores with Non-standard I.D. (or O.D.)

O.D.	I.D.	Code
0.313" (7.938mm)	0.219" (5.556mm)	DA
0.438" (11.113mm)	0.313" (7.938mm)	HA
0.563" (14.288mm)	0.391" (9.922mm)	KA
0.625" (15.875mm)	0.453" (11.509mm)	LA
0.750" (19.050mm)	0.547" (13.891mm)	MA
0.938" (23.813mm)	0.563" (14.288mm)	UA
1.125" (28.575mm)	0.875" (22.225mm)	PA

Power-Mox

Precision Power Thick Film
High Voltage/High Resistance Tubular

RoHS Compliant

The heavy duty construction of the Power-Mox series make them durable in most high voltage industrial applications. This product is well known for its high voltage ratings, low voltage coefficients, very high ohmic values, and resistor divider options. Terminations can be selected to adapt to most mounting schemes.

APPLICATIONS

- Power Transmitters
- Pollution Control Systems
- Industrial Control Systems
- Current pulse limiters
- Vacuum and space application

FEATURES

- Wide resistance ranges
- Outstanding voltage coefficient
- 0.4" diameter ferrule, 0.25"-20 threaded end cap, or radial bands available
- Metal oxide resistive elements

SERIES SPECIFICATIONS

Ohmite Series	Resistance Range (Ohms)	Power @25°C	Voltage Rating	Available Tolerances*
MOX-F	1K to 800,000M	25W	20KV	0.5, 1, 2, 5%
MOX-G	1.5K to 1,000,000M	40W	30KV	0.5, 1, 2, 5%
MOX-H	2K to 1,000,000M	50W	45KV	0.5, 1, 2, 5%
MOX-J	3K to 1,000,000M	75W	60KV	0.5, 1, 2, 5%

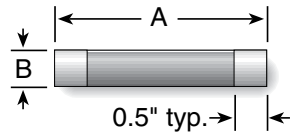
*Some tolerances are not available over the entire resistance range

CHARACTERISTICS

Core	Ceramic
Coating	Varnish
Resistance Range	1K to 1,000,000M
Power Rating	to 75W
Voltage Rating	to 60KV
Operating Temperature	-65°C to +180°C
Temperature Coefficient	25ppm: 0° to 85°C; 50ppm: -55° to 180°C

DIMENSIONS

(in./mm)



Ohmite Series	Power @25°C	A ± 0.05	B Max
MOX-F	25W	3.0" / *76.2*	0.770" / *19.56*
MOX-G	40W	4.5" / *114.3*	0.770" / *19.56*
MOX-H	50W	6.0" / *152.4*	0.770" / *19.56*
MOX-J	75W	8.0" / *203.2*	0.770" / *19.56*

ORDERING INFORMATION

Style F, G, H, J — **Non-inductive** — **E = RoHS Compliant**

M O X - J N - 0 4 1 0 0 6 F E

Power Mox Series

Terminal
01 = Silver termination only
02 = Radial band
03 = 0.4" Ferrule
04 = 1/4 X 20 threaded Ferrule cap

Ohms
First 3 digits are significant; 4th digit is multiplier (# of zeroes to follow). Examples:
10R2 = 10.2 ohms
1000 = 100 ohms
1503 = 150,000 ohms

Tolerance
D = 0.5%
F = 1%
G = 2%
J = 5%
K = 10%
M = 15%
P = 20%

Power-Mox Dividers

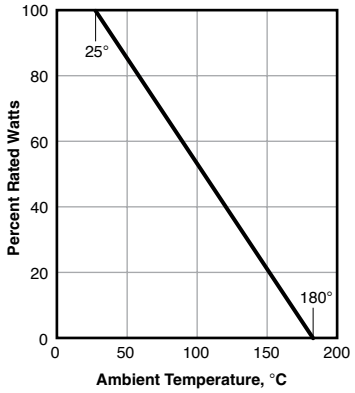
Precision Power Thick Film
High Voltage/High Resistance Tubular Dividers

SERIES SPECIFICATIONS

(dimensions as for Power-Mox)

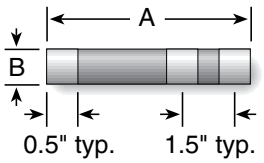
Ohmite Series	Resistance Range (Ohms)	Power @25°C	Voltage Rating	Maximum Ratio	Ratio Tolerances
MOX-FRD	20K to 2,500M	15W	15KV	5,000:1	1, 2, 5%
MOX-GRD	20K to 4,000M	30W	25KV	5,000:1	1, 2, 5%
MOX-HRD	20K to 6,000M	40W	35KV	5,000:1	1, 2, 5%
MOX-JRD	20K to 6,000M	60W	50KV	5,000:1	1, 2, 5%

DERATING

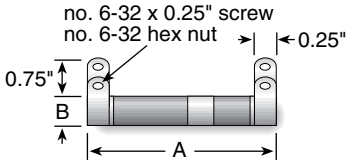


POWER-MOX ALTERNATE TERMINALS

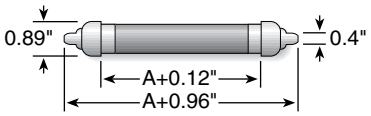
"01" Lead
"Power-Mox RD" Series
with silver terminations



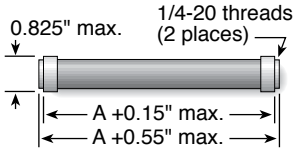
"02" Lead
"Power-Mox" Series with
radial band option



"03" Lead
"Power-Mox" Series
with Ferrule end caps



"04" Lead
"Power-Mox" Series with
1/4 - 20 threaded end caps



To specify Power-Mox Dividers, please see our website at:
www.ohmite.com/dividers

ORDERING INFORMATION

A complete description of the Power-MOX Divider is required. EXAMPLE:
RT = 500MΩ 5%
R1 = 499.5MΩ 5%
R2 = 500KΩ 1%
Ratio = RT / R2 = 1,000: 1, 1%
To specify Power-Mox Dividers, please see our website at **www.ohmite.com/dividers**. Contact Ohmite for custom configurations.

HSP Series

Hermetically Sealed, Precision, Ultra-High Stability, Axial Terminals

FEATURES

- Accuracy to ±0.001% absolute
- Shelf life to 10 ppm/year
- Temperature coefficient to ±3 ppm/°C, -10°C to +80°C
- Low voltage coefficient
- Low noise
- Extremely low thermal EMF
- Available in 4-terminal on HS500 series
- Oil-filled version available

ULTRONIX® A Division of Ohmite Mfg. Co.

SERIES SPECIFICATIONS

Model	Max. Resistance* (ohms)	Power Rating @ 25°C (watts)	Max. Voltage (volts)
HS185A	1.0M	0.125	300
HS205A	1.4M	0.25	300
HS207A	2.8M	0.40	600
HS210A	3.0M	0.50	600
HS308A	5.6M	0.60	600
HS310A	7.6M	0.80	600
HS510A	24M	1.00	600
HS515A	35M	1.25	600
HS520A	43M	1.50	900

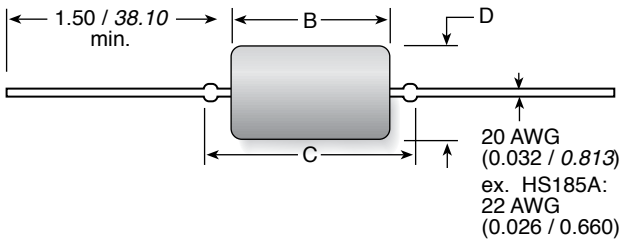
*Minimum Value = 10Ω

Part Marking

- Ohmite
- Model
- Resistance value
- Resistance tolerance
- Date code

DIMENSIONS

(in./mm)



Model	Power Rating	D ±0.010/0.254*	B ±0.020/0.508	C ±0.030/0.762
HS185A	0.125	0.187 / 4.75	0.500 / 12.70	0.625 / 15.88
HS205A	0.25	0.250 / 6.35	0.500 / 12.70	0.562 / 14.27
HS207A	0.40	0.250 / 6.35	0.750 / 19.05	0.812 / 20.62
HS210A	0.50	0.250 / 6.35	1.00 / 25.40	1.063 / 27.00
HS308A	0.60	0.375 / 9.52	0.820 / 20.80	0.920 / 23.35
HS310A	0.80	0.375 / 9.52	1.00 / 25.40	1.050 / 26.67
HS510A	1.00	0.500 / 12.70	1.05 / 25.40	1.220 / 30.99
HS515A	1.25	0.500 / 12.70	1.50 / 38.10	1.605 / 40.77
HS520A	1.50	0.500 / 12.70	2.00 / 50.80	2.160 / 54.86

*Clear sleeving available, add 0.040"/ 1.016mm to body diam.

ORDERING INFORMATION

H S 1 8 5 A S L 1 M 0 0 0 T

Type

Wattage
185 = 0.125W
205 = 0.25
207 = 0.40
210 = 0.50
308 = 0.60
310 = 0.80
510 = 1.00
515 = 1.25
520 = 1.50

Oil-Filled
A = Non oil-filled
F = Oil-filled

Sleeving
SL = with sleeving
blank = without

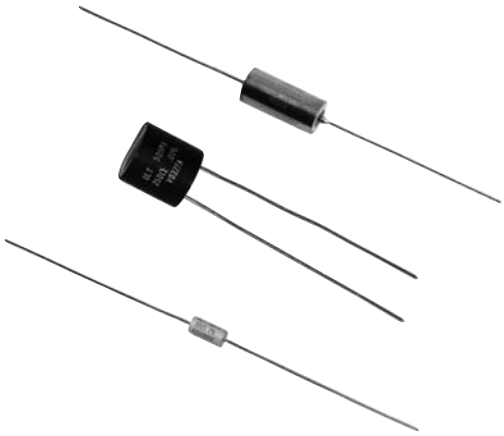
Resistance
1R000 = 1 Ω
10R00 = 10 Ω
100R0 = 100 Ω
1K000 = 1000 Ω
10K00 = 10 KΩ
100K0 = 100 KΩ
1M000 = 1 MΩ

Tolerance
T = 0.01%
Q = 0.02%
A = 0.05%
B = 0.1%
C = 0.25%
D = 0.5%
F = 1.0%

OHMITE®

HPW Series

High Precision Welded Axial and Radial Commercial Resistors Tested to Mil-PRF-39005



ULTRONIX®
A Division of Ohmite Mfg. Co.

FEATURES

- Group A testing in accordance with MIL-PRF-39005 specifications available
- High precision
- All welded construction
- Molded thermosetting plastic bobbin
- Wide ohmic range combined with tight tolerance
- Excellent long-term stability
- Inherent low temperature coefficient
- Extremely low Thermal EMF
- Low voltage coefficient
- Low noise

SERIES SPECIFICATIONS

Type	Max. Ohms	Power Rating @125°C (Watts)	Max. Volts
118A	192k	0.05	150
102A	334k	0.10	150
101A	410k	0.10	300
153A	435k	0.10	
103A	633k	0.10	150
105A	820k	0.125	
184A	820k	0.125	300
185A*	961k	0.125	300
202A	968k	0.25	200
203A	1.7 M	0.25	200
205A*	1.93 M	0.33	400
207A*	3.0 M	0.50	800
308A	3.0 M	0.60	800
210A*	4.10 M	0.50	800
307A	5.63 M	0.60	
310A	7.68 M	1.00	800
505A	10 M	1.00	
510A*	24 M	1.25	800
515A*	35 M	1.50	1200
517A	43 M	1.75	1200
520A*	43 M	2.00	1200
203PA	1.48 M	0.25	150
305PA	3.3 M	0.50	

*Available in hermetically sealed

CHARACTERISTICS

Minimum Values	0.1Ω for ±1% and ±0.5%; 10Ω for ±0.1% and tighter
Resistance Tolerance	±0.005%, ±0.01%, ± 0.02%, ±0.05%, ±0.1%, ±0.5%, and ±1%, depending on style and value
Temperature Coefficient (TCR	±10ppm/°C standard for 10Ω and above. Higher TC's on low ohmic values. TC match to ±1ppm/°C. High TC's upto +6000ppm/°C are available
Working temperature range	–60°C to +150°C
All Welded Construction	The combination of all welded construction and compatible materials provide the most reliable means of interconnects possible.
Butt Weld of Tab to Terminal	A tab material of 800 ohm alloy (the same as the resistance wire) is butt welded to the terminal and molded deep into the resistor bobbin. This design parameter assures the least possible DC transients due to thermal EMF.
Bobbin Design	The ratio of the height of the Pi wall to the width of the Pi and to the diameter of the bobbin mandrel are critical to the basic stability of a wirewound resistor. These parameters are optimized for each wire size, wattage size and range of resistor values.
Encapsulation Material	Both the bobbin and the final encapsulation material are thermosetting alkyd polyester. The resulting resistor is virtually a homogeneous mass with an identical coefficient of expansion which is unaffected by the most violent of temperature cycling. All types are unaffected by application of solvents.
Terminal Materials	The standard terminal material is hot solder dipped copper (C5N).
Military Group A	MIL-PRF-39005 testing Burn In/Conditioning including Thermal Shock DC Resistance Visual/Mechanical Inspection Short Time Overload

(continued)

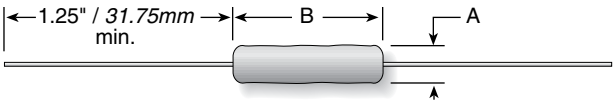
HPW Series

High Precision Welded Axial and Radial Commercial Resistors Tested to Mil-PRF-39005

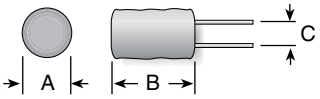
DIMENSIONS

(±.020 in./ ±.508 mm)

Axial



Round Radial



Model	Dim. C
203PA	0.200 / *5.08*
305PA	0.200 / *5.08*
505PA	0.300 / *7.62*

Type	Power Rating	A	B	AWG	Lead Diam.
118A	0.05	0.130 / 3.30	0.180 / 4.57	26	0.016 / 0.406
102A	0.10	0.110 / 2.79	0.250 / 6.35	24	0.020 / 0.508
101A	0.10	0.130 / 3.30	0.375 / 9.53	22	0.026 / 0.660
153A	0.10	0.150 / 3.81	0.245 / 6.22	22	0.026 / 0.660
103A	0.10	0.150 / 3.81	0.300 / 7.62	22	0.026 / 0.660
105A	0.125	0.160 / 4.06	0.500 / 12.70	22	0.026 / 0.660
184A	0.125	0.187 / 4.75	0.375 / 9.53	22	0.026 / 0.660
185A*	0.125	0.187 / 4.75	0.500 / 12.70	22	0.026 / 0.660
202A	0.25	0.250 / 6.35	0.310 / 7.87	22	0.026 / 0.660
203A	0.25	0.250 / 6.35	0.343 / 8.71	20	0.032 / 0.813
205A*	0.33	0.250 / 6.35	0.500 / 12.70	20	0.032 / 0.813
207A*	0.50	0.250 / 6.35	0.750 / 19.05	20	0.032 / 0.813
308A	0.60	0.312 / 7.93	0.810 / 20.57	20	0.032 / 0.813
210A*	0.50	0.250 / 6.35	1.00 / 25.40	20	0.032 / 0.813
307A	0.60	0.375 / 9.53	0.750 / 19.05	20	0.032 / 0.813
310A	1.00	0.375 / 9.53	1.00 / 25.40	20	0.032 / 0.813
505A	1.00	0.500 / 12.70	0.500 / 12.70	20	0.032 / 0.813
510A*	1.25	0.500 / 12.70	1.00 / 25.40	20	0.032 / 0.813
515A*	1.50	0.500 / 12.70	1.50 / 38.10	20	0.032 / 0.813
517A	1.75	0.500 / 12.70	1.75 / 44.45	20	0.032 / 0.813
520A*	2.00	0.500 / 12.70	2.00 / 50.8	20	0.032 / 0.813
203PA	0.25	0.270 / 6.86	0.320 / 8.13	22	0.026 / 0.660
305PA	0.50	0.375 / 9.53	0.500 / 12.70	20	0.032 / 0.813

*Available in hermetically sealed

HOW TO ORDER

2 0 3 M A 1 M 7 0 0 T

Type — 203

Military — Group A
"M" characteristic does not indicate product is QPL to Mil-PRF-39005

Format* — A = axial; PA = round radial
**All formats and tolerances not available in all values*

Resistance
1R000 = 1 Ω
10R00 = 10 Ω
100R0 = 100 Ω
1K000 = 1000 Ω
10K00 = 10 KΩ
100K0 = 100 KΩ
1M700 = 1.7 MΩ

Tolerance*
V = 0.005%
T = 0.01%
Q = 0.02%
A = 0.05%
B = 0.1%
C = 0.25%
D = 0.5%
F = 1.0%

Conversion of RBR to Commercially-tested Product

RBR52	310MAxxxxxx
RBR53	307MAxxxxxx
RBR54	207MAxxxxxx
RBR55	205MAxxxxxx
RBR56	203MAxxxxxx
RBR71	203MPAxxxxxx

89 Series

Metal-Mite® Aluminum Housed Axial Terminal Wirewound, 1% Tolerance

The 89 Series is a high-performance axial type resistor. These molded-construction metal-housed resistors are available in higher power ratings than standard axial resistors and are better suited to withstanding vibration, shock and harsh environmental conditions.

The 89 Series Metal-Mite® resistors are aluminum housed to maintain high stability during operation and to permit secure mounting to chassis surfaces.

The metal housing also provides heat-sinking capabilities.

FEATURES

- High Stability: ±0.5% ΔR
- High power to size ratio
- Metal housing allows chassis mounting and provides heat sink capability

SERIES SPECIFICATIONS

Series	Wattage	Ohms	Voltage
805	5	0.10-25K	210
810	10	0.10-50K	320
825	25	0.010-75K	520
850	50	0.005-100K	1170

Non-Inductive versions available. Insert “N” before tolerance code.
Example: 850NF560

CHARACTERISTICS

Housing	Metal, anodized aluminum
Internal Coating	Silicone
Core	Ceramic
Terminals	Solder-coated axial
Derating	Linearly from 100% @ +25°C to 0% @ +275°C.
Tolerance	±1% and ±5% (other tolerances available).
Power rating	Rating is based on chassis mounting area and temperature stability. Proper heat sink as follows: 5W and 10W units, 4” x 6” x 2” x .040” Aluminum chassis; 25W units, 5” x 7” x 2” x .040” Aluminum chassis; 50W units, 12” x 12” x .059” Aluminum panel.
Maximum ohmic values	See chart.
Overload	5 times rated wattage for 5 seconds.
Temperature coefficient	Under 1Ω: ±90 ppm/°C; 1 to 9.99Ω: ±50 ppm/°C; 10Ω and over: ±20 ppm/°C.
Dielectric withstanding voltage	5W and 10W rating,1000 VAC; 25 and 50W ratings, 2250 VAC.

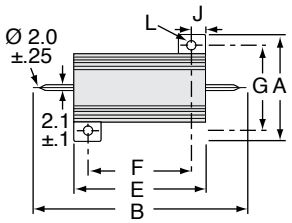
(continued)

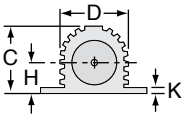
89 Series

Metal-Mite® Aluminum Housed
Axial Terminal Wirewound, 1% Tolerance

DIMENSIONS

(in./mm)





Dimensions have changed as of August 2015

	A max.	B max.	C max.	D max.	E max.	F ±.3mm	G ±.3mm	H max.	J max.	K max.	L ±.25mm
805	0.65" / 16.5	1.18" / 30.0	0.35" / 8.8	0.33" / 8.5	0.63" / 15.9	0.44" / 11.3	0.49" / 12.4	0.18" / 4.5	0.09" / 2.4	0.07" / 1.8	0.09" / 2.4
810	0.83" / 21.0	1.44" / 36.5	0.43" / 11.0	0.44" / 11.2	0.78" / 19.9	0.56" / 14.3	0.63" / 15.9	0.22" / 5.5	0.11" / 2.8	0.07" / 1.8	0.09" / 2.4
825	1.10" / 28.0	2.01" / 51.0	0.58" / 14.8	0.56" / 14.2	1.07" / 27.3	0.72" / 18.3	0.78" / 19.8	0.30" / 7.7	0.20" / 5.2	0.10" / 2.6	0.13" / 3.2
850	1.10" / 28.0	2.85" / 72.5	0.58" / 14.8	0.56" / 14.2	1.93" / 49.1	1.56" / 39.7	0.84" / 21.4	0.33" / 8.4	0.20" / 5.2	0.10" / 2.6	0.13" / 3.2

ORDERING INFORMATION

Ohmic value	Part No. Prefix ➤ Suffix ▼	Wattage 5 805F	10 810F	25 825F	50 850F
0.005	R005			✔	✔
0.010	R010			✔	✔
0.025	R025			✔	✔
0.1	R10			✔	✔
0.3	R30			✔	✤
0.5	R50			✔	✤
0.7	R70			✤	✤
1.0	1R0	✔	✔	✔	✔
1.5	1R5	✤	✔		
2.0	2R0	✤	✔	✔	✔
3.0	3R0	✔	✔	✔	✔
4.0	4R0	✤	✔		
5.0	5R0	✔	✔	✔	✔
10.0	10R	✔	✔	✔	✔
15.0	15R	✔	✔	✔	✔

Ohmic value	Part No. Prefix ➤ Suffix ▼	Wattage 5 805F	10 810F	25 825F	50 850F
20	20R	✔	✔		
25	25R	✔	✔	✔	✔
30	30R	✤	✤		
40	40R	✤	✔		
50	50R	✔	✔	✔	✔
75	75R	✔	✤	✔	✔
100	100	✔	✔	✔	✔
150	150	✔	✔	✔	✔
200	200	✤	✤	✔	✔
250	250	✔	✔	✔	✔
300	300	✔	✤		
400	400	✤	✤		
500	500	✔	✤	✔	✔
750	750	✤	✤	✔	✔
1,000	1K0	✤	✔	✔	✔

Ohmic value	Part No. Prefix ➤ Suffix ▼	Wattage 5 805F	10 810F	25 825F	50 850F
1,500	1K5	✔	✤	✤	✔
2,000	2K0	✔	✔	✤	✤
2,500	2K5	✔	✔		
3,000	3K0	✤	✔	✔	✤
3,500	3K5	✤	✤		
4,000	4K0	✔	✔		
4,500	4K5	✤	✤		
5,000	5K0	✔	✔	✔	✔
6,000	6K0	✤	✤		
10,000	10K	✔	✤	✔	✔
15,000	15K	✔	✔	✤	✤
20,000	20K	✤	✤		
25,000	25K	✔	✤	✤	✤
50,000	50K		✤		
75,000	75K			✤	
100,000	100K				✤

Non-Inductive Winding Optional (blank = std. winding)

RoHS Compliant

805 N F 5R0 E

Series	Tolerance	Ohms
805 = 5 Watt	F = 1%	R005= 0.005Ω
810 = 10 watt	J = 5%	R10 = 0.1Ω
825 = 25 watt		1R0 = 1.0Ω
850 = 50 watt		250 = 250Ω
		1K0 = 1,000Ω
		1K5 = 1,500Ω
		25K = 25,000Ω

✔ = Standard values

✤ = Non-standard values subject to minimum handling charge per item

Shaded values involve very fine resistance wire and should not be used in critical applications without burn-in and/or thermal cycling.

As of September 2006, the 89 Series is no longer offered as Mil. Spec.

BA Series

Aluminum Cased Resistor

FEATURES

- Three extrusion forms available
- Heatsinkable
- Rugged design
- Up to 1000 watts
- Thermal cut-off available
- Scalable, custom lengths available
- Custom leads available

APPLICATIONS

- Dynamic Braking
- Motor Starting
- Power Control

SERIES SPECIFICATIONS

Series	Wattage*	Resistance range	Tolerance	Length
BA1160	500	0.5Ω - 18KΩ	±10%	160mm
BA2320	700	10Ω - 10KΩ	±10%	320mm
BA3266	1000	10Ω - 10KΩ	±10%	266mm

* Free air rating

CHARACTERISTICS

Overload	5 times rated wattage for 10 sec.
Power Rating	Free air; greater with heatsink
Dielectric Withstanding Voltage	2.5KV, 1 min., 50/60 Hz
Insulation Resistance	≥100MΩ
Working Voltage	≥800V
Max. Surface Temp.	385°C
Wire	UL listed 3199

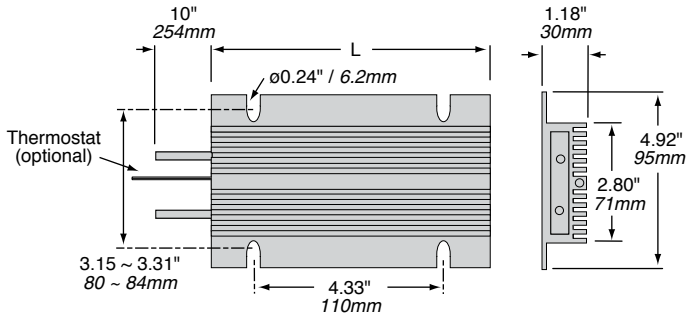
(continued)

BA Series

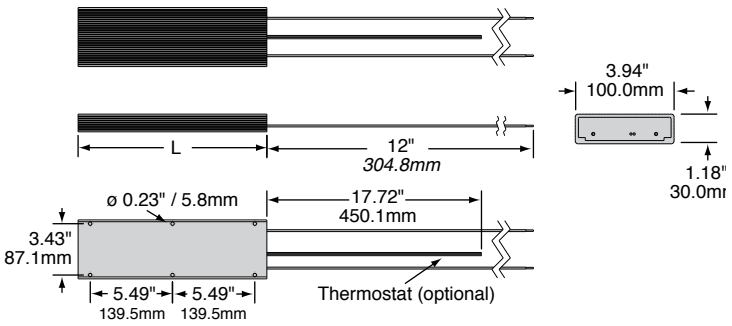
Aluminum Cased Resistor

DIMENSIONS

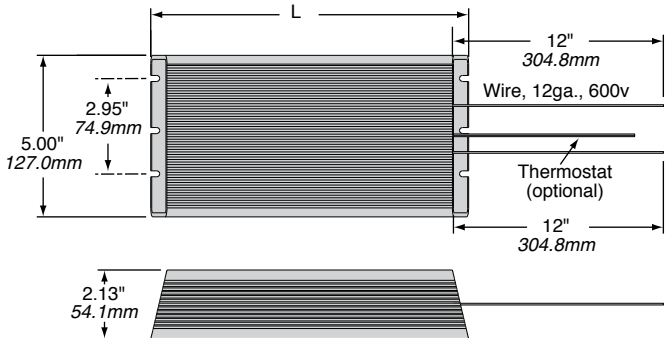
BA1



BA2



BA3

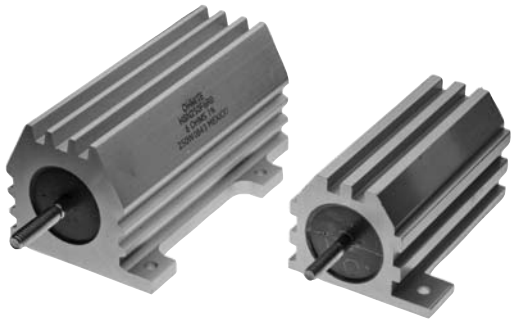


ORDERING INFORMATION

Thermal switch (optional)	Form						RoHS Compliant		
B	A	C	1	1	6	0	1	0	0	R	K	E
Series B = block aluminum	**Termination** A = wire leads B = solid terminals		**Length** (mm)				**Resistance**				**Tolerance** K = ±10%	

HS/HSN Series

Aluminum Housed Axial Terminal Wirewound, Industrial/Commercial Grade



The HS/HSN Series offers greater power capacity (100 and 250 watts) in the same design format as Ohmite's 89 Series.

HS/HSN Series maintains the same construction, materials, and manufacturing techniques as the 89 Series. As a made-to-order product, it is recommended for higher volume applications.

FEATURES

- Standard winding (Model HS)
- Non-inductive winding (Model HSN)
- Molded construction for total environmental protection
- Complete welded construction
- Mounts on chassis to utilize heat-sink effect
- High stability at conventional power ratings
- Flat marking surface for easy identification
- RoHS compliant; add "E" suffix to part number to specify.

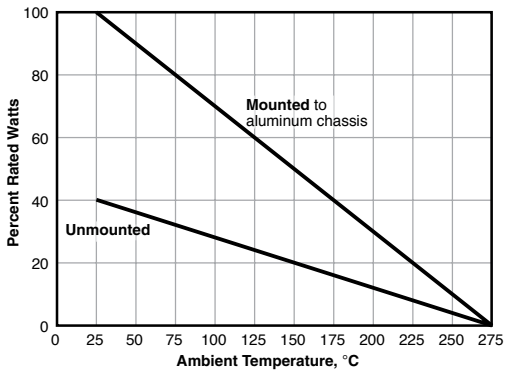
SERIES SPECIFICATIONS

Series	Power Rating (Watts)	Resistance Range (Ohms)	Max. Working Voltage
HS100	100	0.05 - 29.4K	1900
HSN100	100	1.0 - 14.7K	1350
HS250	250	0.10 - 35.7K	2300
HSN250	250	1.0 - 17.4K	1625

CHARACTERISTICS

Housing	Aluminum with hard anodic coating
Internal Coating	Silicone
Core	Ceramic
Terminals	Solder-coated axial
Derating	Linearly from 100% @ +25°C to 0% @ +275°C.
Tolerance	±1% and ±5% (other tolerances available)
Power rating	Rating is based on chassis mounting area and temperature stability. Proper heat sink: 12" x 12" x 0.125 Aluminum panel
Overload	5 times rated wattage for 5 seconds
Temperature coefficient	Under 1Ω: ±90 ppm/°C; 1 to 9.99Ω: ±50 ppm/°C; 10Ω and over: ±30 ppm/°C
Dielectric withstanding voltage	4500VAC

Derating Curve



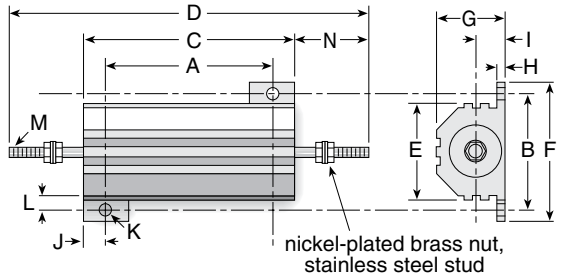
(continued)

HS/HSN Series

Aluminum Housed Axial Terminal
Wirewound, Industrial/Commercial Grade

DIMENSIONS

in. (mm)



	HS100 / HSN100 100 watt	HS250 / HSN250 250 watt
Dim. A	2.75 ± .010 (69.85 ± .254)	3.875 ± .010 (98.425 ± .254)
Dim. B	2.25 ± .010 (57.15 ± .254)	2.5 ± .010 (63.50 ± .254)
Dim. C	3.50 ± .031 (88.90 ± .787)	4.5 ± .031 (114.30 ± .787)
Dim. D	5.478 ± .093 (139.14 ± 2.36)	6.73 ± .093 (170.94 ± 2.36)
Dim. E	1.812 ± .031 (46.02 ± .787)	2.125 ± .031 (53.98 ± .787)
Dim. F	2.812 ± .031 (71.42 ± .787)	3.0 ± .031 (76.20 ± .787)
Dim. G	1.75 ± .031 (44.45 ± .787)	2.188 ± .031 (55.58 ± .787)
Dim. H	1.88 ± .031 (4.78 ± .787)	0.250 ± .031 (6.35 ± .787)
Dim. I	0.770 ± .015 (19.56 ± .381)	0.955 ± .015 (24.26 ± .381)
Dim. J	0.375 ± .031 (9.52 ± .787)	0.312 ± .031 (7.92 ± .787)
Dim. K	0.188 ± .010 (4.78 ± .254)	0.188 ± .010 (4.78 ± .254)
Dim. L	0.219 ± .031 (5.56 ± .787)	0.25 ± .031 (6.35 ± .787)
Dim. M	12 - 24 UNC - 2A THD	1/4 - 20 UNC - 2A THD
Dim. N	0.989 ± .031 (25.12 ± .787)	1.25 ± .031 (31.75 ± .787)

ORDERING INFORMATION

Non-Inductive Winding
Optional (blank = std. winding)

H S N 1 0 0 J R 0 5 E

Series	Wattage	Tolerance	Ohms	RoHS Compliant
	100 250	F = 1% J = 5% K=10%	R05 = 0.05Ω 1R0 = 1.0Ω 10R = 10Ω 100 = 100Ω 10K = 10,000Ω 14K7 = 14,700Ω	

WFH Series

Aluminum Housed Wirewound Power

Ohmite's new flat core winding technology allows for wirewound heatsinkable resistors affording a very low profile, and superior thermal transfer characteristics when compared to conventional aluminum housed wirewound resistors.

Close mounting of heat sensitive components is possible due to only a slight rise of the temperature on the aluminum profile.

No heat sink compound is required because of large mounting surface.

FEATURES

- Solder lug, wire, and "Fast-on" amp terminations
- Multiple resistors in one profile possible
- Custom wire lengths available

SERIES SPECIFICATIONS

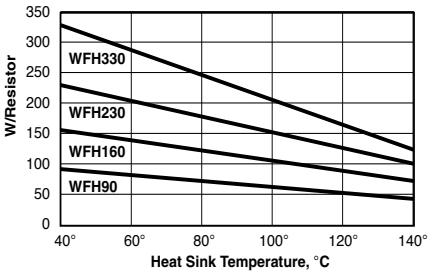
Type	Power Rating* (watts)	Resistance Range (Ω)
WFH90	90	0.22Ω – 6.8K
WFH160	160	0.47Ω-18K
WFH230	230	0.82Ω-27K
WFH330	330	1Ω - 39K

*at 40°C base plate temperature

CHARACTERISTICS

Power rating	90W-330W
Resistance tolerance	±5%, ±10%
Temperature Coefficients	Normal: 50ppm - 150ppm Low ohmic values: 400ppm
Dielectric strength	2500 VAC peak
Working voltage	1200 VAC
Test voltage	6000 VAC
Lead wire	(wire terminal version only): XLPE, 600V, 125C, 18 AWG stranded
Insulation	Silicone Rubber & Mica. The Silicone is UL-recognised (UL 94 HB) to a working temperature of 220°C. Temperatures of up to 300°C can be endured for shorter periods. This may however cause an expansion of the silicone rubber with a possibility of reducing the dielectric strength.
Min. Storage & Operating Temp.	-40°C

Power Dissipation

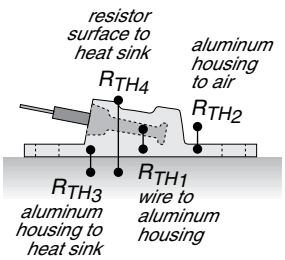


This graph shows the maximum wattage rating for each possible resistor of standard size corresponding to the heat sink temperature. It is assumed that all resistors are equally loaded.

Thermal Resistances

Thermal Resistance (°C/W) between different measuring points

	WFH90	WFH160	WFH230	WFH330
R_{TH_1}	2	1	0.75	0.5
R_{TH_2}	6.8	3.9	2.75	2
R_{TH_3}	0.1	0.05	0.03	0.02
R_{TH_4}	0.3	0.17	0.1	0.085



THIS PRODUCT IS DESIGNED FOR USE WITH PROPER HEATSINKING.

Maximum base plate temperature of the resistor must be monitored and kept within specified limits to establish the power rating. Best technique is to attach a thermocouple to the side of the base plate of the resistor. Temperature of plastic housing or heat sink cannot be used to establish rating of the resistor.

(continued)

WFH Series

Aluminum Housed Wirewound Power

DESIGN INFORMATION

The following equations are applied in the dimensioning of the resistors at stationary load. If more information is required please consult Ohmite. It is assumed that the air around the resistors is stationary (worst case). **See ohmite.com for more examples.**

1. WFH is mounted on a heat sink:

A. The thermal resistance R_{TH} of the heat sink is known,

$T = W_{MAX} \times (R_{TH4} + R_{TH})$

Check that:

$T_{MAX} = W_{MAX} \times (R_{TH} + R_{TH3} + R_{TH1}) + T_{AMB} < 220°C$

B. The Temperature of the Heat Sink is known,

$T = W_{MAX} \times R_{TH4} + T_H$

Check that:

$T_{MAX} = W_{MAX} \times (R_{TH1} + R_{TH3}) + T_H < 220°C$

2. WFH is mounted without a heat sink:

Check that:

$T_{MAX} = W_{MAX} \times (R_{TH1} + R_{TH2}) + T_{AMB} < 220°C$

Where:

W_{MAX} = Maximum reguired load in resistor

T_{MAX} = Maximum hot spot temperature reguested in resistor (T_{MAX} <220°C)
The lower T_{MAX} the higher reliability and lifetime.

T_{AMB} = Ambient temperature

R_{TH} = Thermal resistance. Refer to table Thermal resistances

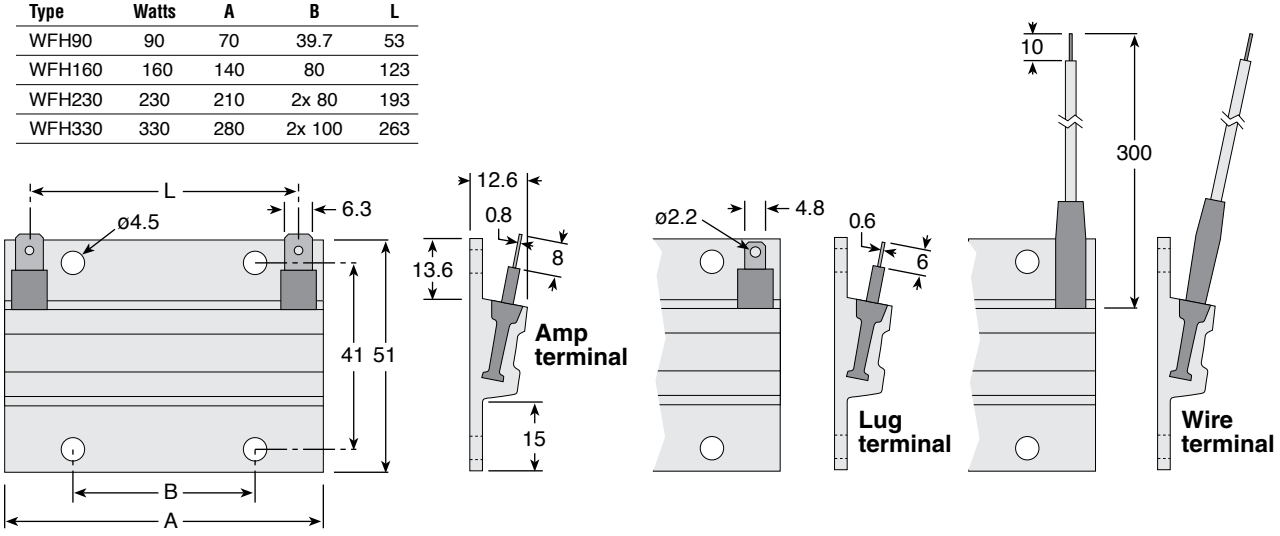
T_H = Heat sink temperature (chassis).

T = Temperature on top of the Aluminum profile.

DIMENSIONS

(mm)

Type	Watts	A	B	L
WFH90	90	70	39.7	53
WFH160	160	140	80	123
WFH230	230	210	2x 80	193
WFH330	330	280	2x 100	263



ORDERING INFORMATION

W F H 1 6 0 L R 4 7 K E – RoHS Compliant

Series	Wattage	Terminal Type	Ohms	Tolerance
	at 40°C base plate temp.	L = lug terminals A = amp terminals W= 30cm insulated wire cable 18AWG	R47= 0.47Ω	J = 5% K = 10%

Standard part numbers

WFH90L4R7KE	WFH160LR47KE	WFH160L1K0JE	WFH230L100JE	WFH330L50RJE
WFH90L10RKE	WFH160L1R0KE	WFH160L5K0JE	WFH230L150JE	WFH330L75RJE
WFH90L25RJE	WFH160L2R0KE	WFH160L10KJE	WFH230L250JE	WFH330L100JE
WFH90L50RJE	WFH160L10RKE	WFH230L1R0KE	WFH230L1K0JE	WFH330L150JE
WFH90L100JE	WFH160L27RJE	WFH230L2R0KE	WFH230L1K5JE	WFH330L250JE
WFH90L470JE	WFH160L50RJE	WFH230L5R0KE	WFH230L2K5JE	WFH330L1K0JE
WFH90L750JE	WFH160L75RJE	WFH230L10RKE	WFH330L1R0KE	WFH330L5K0JE
WFH90L1K0JE	WFH160L100JE	WFH230L27RJE	WFH330L2R0KE	WFH330L10KJE
WFH90L2K7JE	WFH160L150JE	WFH230L50RJE	WFH330L10RKE	
WFH90L5K0JE	WFH160L250JE	WFH230L75RJE	WFH330L27RJE	

Metalohm Series

Cold Rolled Steel Encased Wirewound Heatsinkable Radial Terminal

FEATURES

- Flameproof and inorganic
- Higher power rating due to heat sink capacity
- All welded construction
- Nonhygroscopic
- High surge construction

OPTIONS

- Noninductive versions (Aryton-Perry windings)
- Terminal sleeves to increase dielectric strength and maximize creepage distance
- Variety of terminal choices
- Potted or soldered wire terminals including quick connect, ring, spade terminals
- Tapped models

SERIES SPECIFICATIONS

Style	Watts w/o heat sink	Watts w/ heat sink*	Ohmic range**
20/45M	20	45	0.05-6K
40/70M	40	70	1.0-25K
HV40-70M	40	70	1.0-25K
50/100M	50	100	1.5-47.5K
60/115M	60	115	2.5-81K
85/150M	85	150	4.5-100K

*Based on a 12”x12”x0.125” aluminum heat sink, using a thermal compound, in a 25°C ambient

**Standard winding ranges only listed, other values available; contact Ohmite.

CHARACTERISTICS

Wattage	Based on a 275°C “U” characteristic derating curve
Temperature coefficient	≥18 ohm: 0 ±90ppm/°C 8 < 18 ohm: 0 ±50ppm/°C <8 ohm: 0 ±180ppm/°C (TC for some watt/ohm combinations may be lower)
Dielectric strength	Terminal to case, depends on terminal style (1500V min.)
Creepage	term. style 277: 1.2” term. style 278: 0.4” term. style 276: 0.7” term. styles 211/252/279: 0.15”
Termination Wires	• Stranded, available in any insulation rated 125°C or higher (may require term. style 297). • 12" standard length for term. 297 & 298 (custom lengths available) • Can be potted or pre-soldered to terminal styles 211 or 252 • Quick connect (fully or partially insulated), ring or spade terminations available
Dielectric Sleeves	• Steatite construction • Style 276 meets UL/NEMA 2500V RMS for one minute requirement • Available as terminal styles 276, 277, 278, 297

Dielectric Strength/Terminal Availability

Terminal Type	211	252, 279	276	278	277	297	298
Style	Dielectric Strength						
20/45M	1500	N/A	N/A	N/A	N/A	2500V	2500V
40/70M	1500	1500	2500	2500	N/A	2500V	2500V
HV40/70M	N/A	N/A	N/A	N/A	4250	N/A	N/A
50/100M	1500	1500	2500	2500	N/A	2500V	2500V
60/115M	1500	1500	2500	2500	N/A	2500V	2500V
85/150M	1500	1500	2500	2500	N/A	2500V	2500V

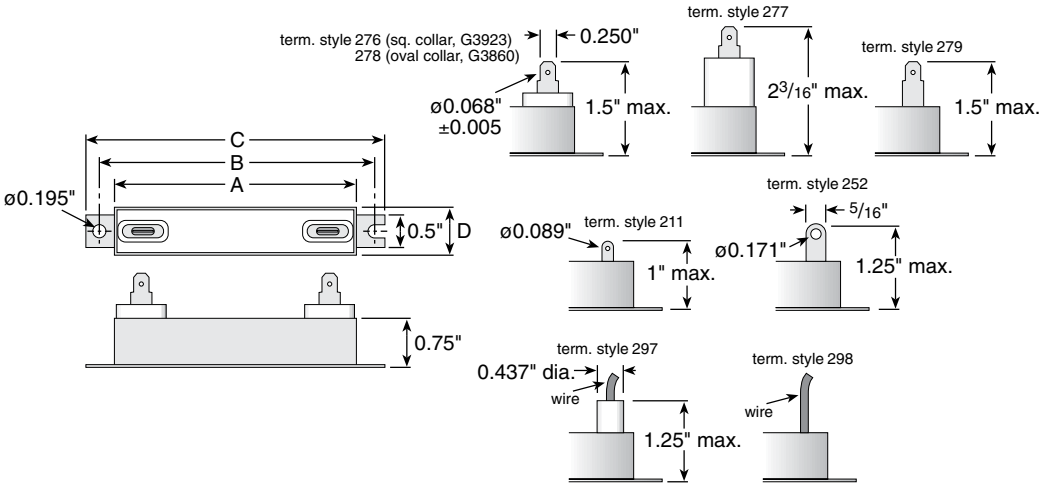
(continued)

Metalohm Series

Cold Rolled Steel Encased Wirewound Heatsinkable Radial Terminal

DIMENSIONS

(in.)



Style	A	B	C	D
20/45M	1	1 7/16	1 7/8	3/4
40/70M	2 9/16	3	3 7/16	3/4
HV40-70M	2 9/16	3	3 7/16	7/8
50/100M	3 11/16	4 1/8	4 9/16	3/4
60/115M	5 9/16	6	6 7/16	3/4
85/150M	7 1/2	8	8 1/2	3/4

ORDERING INFORMATION

Not all terminal types available for all Metalohm sizes

RoHS Compliant

40/70MNJ10K50AE

Style

Non-inductive (optional) N

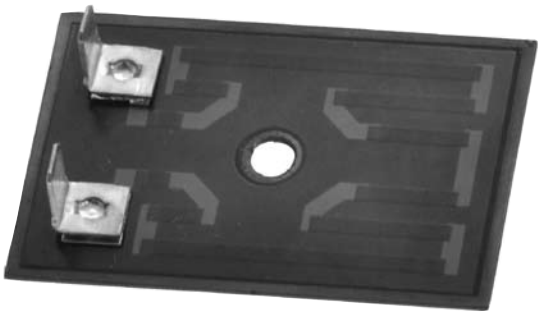
Tolerance
K = 10%
J = 5%

Ohms
00R05 = 0.05
00R50 = 0.50
1R000 = 1.00
1K000 = 1,000
10K50 = 10,500

Terminal Type
A = 211 E = 277
B = 252 F = 278
C = 279 G = 297
D = 276 H = 298

IS Series

Ultra Low Profile Power Resistors



FEATURES

- Heatsinkable
- Low profile
- High power
- Pulse handling capability
- Non-flammable
- Low inductances
- Available with fast-on terminals or wire leads
- Rugged construction
- Ultra low profile thick-film on steel
- 175W to 270W sizes
- Single fixing heatsink mountable

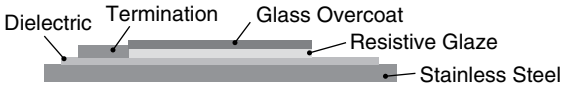
USES

- Braking resistors
- In-rush current limiter
- Bleeder resistor
- Power switching
- Soft charging

SERIES SPECIFICATIONS

Type	Power Rating (watts)	Resistance Range (Ω)	Tolerance
IS175	175	5Ω to 10KΩ	10%, 20%
IS200	200	5Ω to 10KΩ	10%, 20%
IS250	250	5Ω to 10KΩ	10%, 20%
IS270	270	5Ω to 10KΩ	10%, 20%

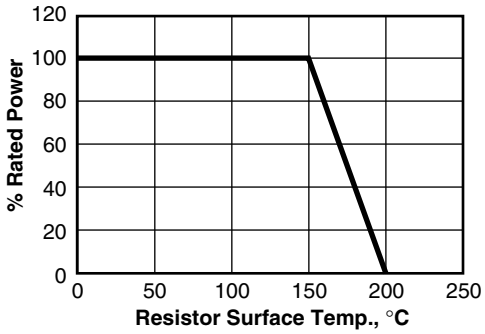
Construction



CHARACTERISTICS

TCR	<250ppm (surface temp less than 150°C)
Maximum element temperature	365°C
Working voltage	Not to exceed 300V
Over-voltage rating	5X rated power for up to for up to 1 second
Resistive element	Thick Film
Derating	element surface temp. at 100% to 0% power at 200°C surface temp.
Power rating	dependent on mounting and heatsink thermal capacity
Hot spot surface temperature	200°C max.
Pulsed load at full pulse power rating 1,000 cycles	Max. 1%ΔR; (see Fig 1) Mounted on a 0.06°C/W heatsink with forced air cooling, air temperature 25°C (ref AH32430 12" long)
Solder	Silver solder is recommended for IS Series resistors. Leaching of the silver in the termination will occur if non-silver solder is used. 60/40 tin-lead solders are not recommended for use with the IS Series product.
Screw torque	3.5 Nm

Derating



THIS PRODUCT IS DESIGNED FOR USE WITH PROPER HEATSINKING.

Maximum base plate temperature of the resistor must be monitored and kept within specified limits to establish the power rating. Best technique is to attach a thermocouple to the side of the base plate of the resistor.

(continued)

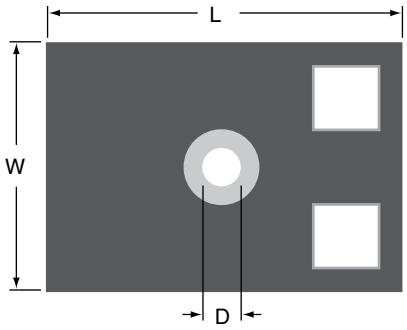
IS Series

Ultra Low Profile Power Resistors

DIMENSIONS

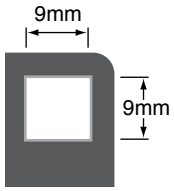
(in/mm)
Thickness: 0.040 in. / 1.02mm ±.1

Type	Wattage	L ±0.2mm	W ±0.2mm	ØD nom.	Wt. nom (oz/g)
IS175	175	1.94/49.30	1.41/35.90	0.13/3.20	0.44/12.60
IS200	200	2.40/61.00	1.60/40.60	0.21/5.30	0.60/17.10
IS250	250	4.00/101.60	2.76/70.00	0.21/5.30	1.78/50.80
IS270	270	4.80/122.00	2.76/70.00	0.21/5.30	2.12/60.70

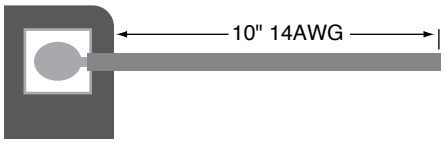


TERMINATION OPTIONS

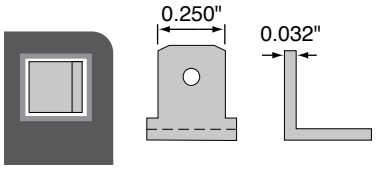
Solder pad only
SnAg (96S)



Flying leads



Push-on connectors



ORDERING INFORMATION

Tolerance
K = 10%
M = 20%
RoHS Compliant

I S 2 0 0 C 4 7 R K E

Series	Wattage	Termination	Resistance
Insulated Steel	175	A = Tinned pad	*3 digits*
	200	B = Soldered lead	47R = 47Ω
	250	C = Fast on terminal	
	270		

TAP600 Series

600 Watt Heat Sinkable Planar

Ohmite's TAP600 delivers 600 watts of reliable power to a variety of power conditioning, power transmission, and power control applications. These resistors can be designed for liquid or air cooled heat sink systems. Applications include variable speed drives, power supplies, robotics, motor control, and other control devices.

FEATURES

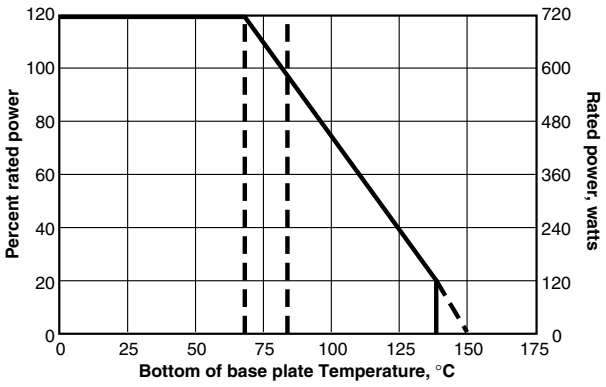
- Dielectric Strength up to 12KV
- Special Design for Low Inductance and Capacitance Values
- Contacts allow for easy load connection with M5 screws (not included) available with M4 as special request. Thread depth 7mm
- Encapsulated with a special resin filled epoxy casing with a large creepage distance to mass, large air distance between terminals, and a high insulation resistance (CTI 600).
- Materials meet the requirements of UL94-V0

CHARACTERISTICS

Resistance Values	0.25Ω to 100KΩ
Resistance Tolerance	±10% Std., 5% available on request.
Temperature Coefficient	±150ppm/°C (others upon request)
Maximum Working Voltage	5,000V DC, higher voltage on request, not exceeding max. power
Power Rating	600W at 70°C heat sink temperature or 85°C bottom case temperature. This value is only valid by using a thermal conduction to the heat sink Rth -cs<0.025°C/W. The value can be reached by using thermal transfer compound with a heat conductivity of 1w/mk. The flatness of the cooling plate must be better than 0.05mm overall. The roughness of the surface should not exceed 6.4µm.
Dielectric Strength Voltage	6k Vrms, 50Hz, 1min standard; up to 12k Vrms available
Single Shot Voltage	Up to 12KV Normwave (1.5/50 µsec)
Insulation Resistance	10GΩ min. at 500V
Creeping Distance	42mm min.
Air Distance	14mm min.
Inductance	≤80nH
Capacitance/Mass	≤110pF
Capacitance/Parallel	≤40pF
Operation Temperature	-55°C to +150°C
Max. Torque for Contacts	2 Nm
Max. Torque for Mounting	1.8 Nm
Derating (thermal resist.)	8.73W/°C (0.115°C/W)

Test	Method	Typical Results - ΔR
Short Time Overload	1000 W/10 Sec. @ 70°C	0.4%
Humidity Steady State	56 Days/40°C/ 95°C	0.25%
Temp. Cycling	-55/+125/5 Cycles	0.20%
Shock	40g/4,000 Times	0.25%
Vibrations	2 - 500Hz/10g	0.25%
Load Life 1,000 Cycles	Pn 30 min. ON/30 min. OFF	0.40%
Terminal Strength of Contacts	200N	0.05%

Derating



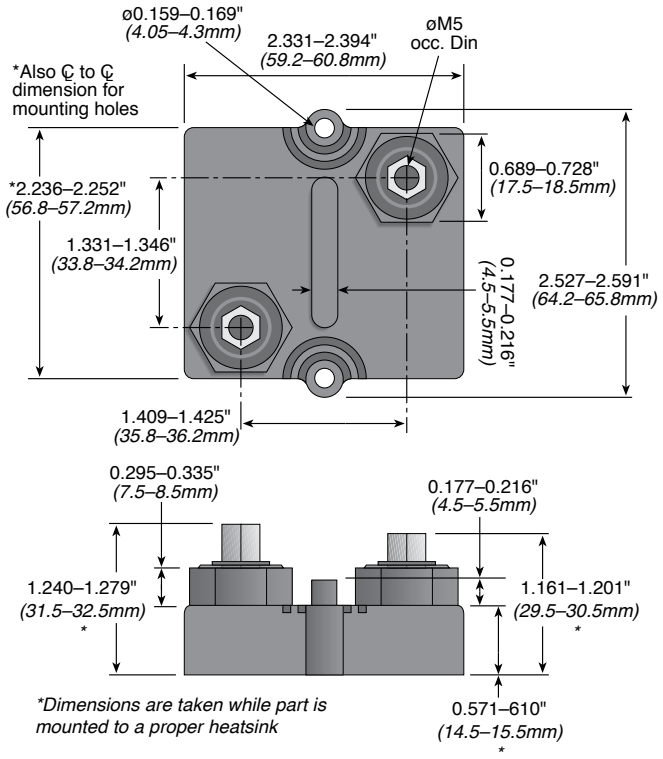
(continued)

TAP600 Series

600 Watt Heat Sinkable Planar

DIMENSIONS

(iin./mm)



ORDERING INFORMATION

RoHS compliant
Non-compliant version unavailable

TAP600K5R0E

Style

Tolerance
J = 5%
K = 10%, Std.
L = 20%

Resistance
1 Ohm = 1R0
10 Ohm = 10R
1000 Ohm = 1K0

Standard Values

10% tol.			5% tol.
TAP600KR25E	TAP600K4R0E	TAP600K5R0E	TAP600J1R0E
TAP600KR33E	TAP600K40RE	TAP600K7K5E	TAP600J10RE
TAP600KR50E	TAP600K20RE	TAP600K7R5E	TAP600J50RE
TAP600K100E	TAP600K200E	TAP600K75RE	TAP600J100E
TAP600K10KE	TAP600K22RE	TAP600K750E	TAP600J500E
TAP600K10RE	TAP600K2R0E	TAP600K30RE	TAP600J1K0E
TAP600K1K0E	TAP600K3R0E	TAP600K500E	
TAP600K1R0E	TAP600K50RE		

THIS PRODUCT IS DESIGNED FOR USE WITH PROPER HEATSINKING.

Maximum base plate temperature of the resistor must be monitored and kept within specified limits to establish the power rating. Best technique is to attach a thermocouple to the side of the base plate of the resistor. Temperature of plastic housing or heat sink cannot be used to establish rating of the resistor.

The Ohmite CP4 (http://www.ohmite.com/cat/sink_cp4.pdf) is an example of properly designed heat sink.

TAP800 Series

800 Watt Heat Sinkable Planar

FEATURES

- Electric support is high alumina content ceramic metallized on the bottom for ideal heat transfer and optimum discharge.
- Encapsulated with a special resin filled epoxy casing with a large creepage distance to mass, large air distance between terminals, and a high insulation resistance (CTI 600).
- Resistive element is specially designed for low inductance and capacitance. The element provides stable performance in addition to high wattage and pulse loading capability.
- Contacts allow for easy load connecting with M4 or M5 screws (not included).
- Materials meet the requirements of UL94-V0

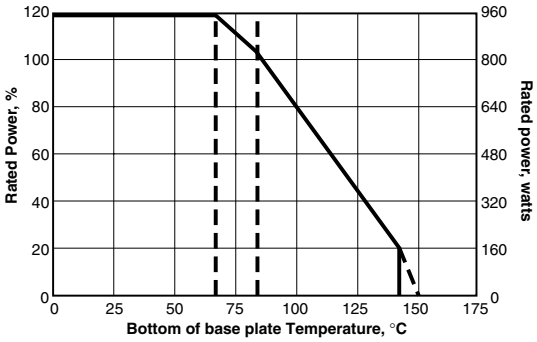
Ohmite's TAP800 Series dissipates 800 watts of power when used with a liquid or air cooled heat sink system. The Ohmite CP4 (http://www.ohmite.com/cat/sink_cp4.pdf) is an example of properly designed heat sink. The TAP800 rounds out 600 watt (TAP600) and 1000 watt (TAP1000) product offerings. Applications include variable speed drives, power supplies, robotics, motor control, control devices, and other power designs.

CHARACTERISTICS

Resistance Values	1Ω to 10KΩ
Resistance Tolerance	±5% to ±10%
Temperature Coefficient	±150ppm/°C (others upon request)
Maximum Working Voltage	5,000V DC, higher voltage on request, not exceeding max. power
Short Time Overload	1,200W at 70°C for 10sec., ΔR=0.4% max.
Power Rating	800W at 85°C Bottom case temperature.
Peak Current	up to 1500 amp. depending on pulse length and frequency Please ask for details
Electric Strength Voltage	6kVrms, 50Hz,upto 12kVrms on special request
Single Shot Voltage	up to 12kV Normwave (1.5/50 µsec)
Partial Discharge	4KVrms, <10pC, up to 7kV on special request
Insulation Resistance	10GΩ min. at 500V
Creeping Distance	42mm min.
Air Distance	14mm min.
Inductance	80nH
Capacity/Mass	110pF
Capacity/Parallel	40pF
Operation Temperature	-55°C to +150°C
Max. Torque for Contacts	2 Nm
Max. Torque for Mounting	1.8 Nm M4 screws (not included)
Derating	9.09W/°K (0.11°K/W)
Power Rating	800W at 85°C bottom case temp. This value is only valid by using a thermal conduction to the heatsink Rth-cs<0.025°K/W. This value can be reached by using thermal transfer compound with a heat conductivity of 1W/mK. The flatness of the cooling plate must be better than 0.05mm overall. The roughness of the surface should not exceed 6.4µm.

Test	Method	Typical Results ΔR
Short time overload	1,000 W/10sec	0.4%
Humidity Steady State	56 days/40°C/95%	0.25%
Temp. Cycling	-55/+125/5 cycles	0.20%
Shock	40g/4,000 times	0.25%
Vibration	2-500Hz/10g	0.25%
Load Life	Pn 30 min. on/30 min off, 1,000cyl	0.40%
Terminal Strength	200N	0.05%

Derating



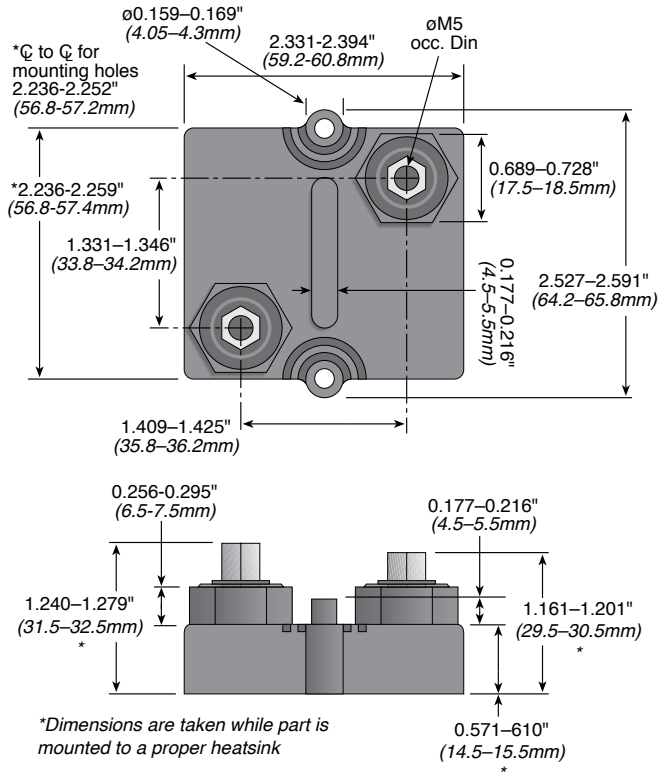
(continued)

TAP800 Series

800 Watt Heat Sinkable Planar

DIMENSIONS

(in./mm)



ORDERING INFORMATION

RoHS compliant
Non-compliant version
unavailable

TAP800K5R0E

Style

Wattage
800 watts

Tolerance
J = 5%
K = 10%, Std.
L = 20%

Resistance
1 Ohm = 1R0
10 Ohm = 10R
1000 Ohm = 1K0

Standard Values

TAP1000 & 2000

1000 & 2000 Watt Heat Sinkable Planar

The TAP series delivers 1000W or 2000W of continuous power when properly mounted to a liquid cooled heat sink (based on 85°C mounting plate temperature)

Applications include power conditioning, power distribution, power conversion, and power control.

RoHS Compliant

FEATURES

- High Energy Rating
- Low Inductance
- Resistor Element Electrically Isolated
- High Dielectric Strength
- Small Footprint

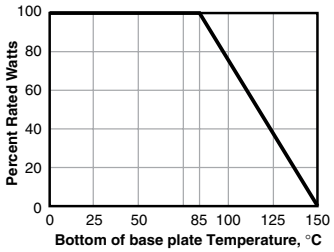
APPLICATIONS

- Power semiconductor balancing
- Motor control
- Inrush Current Limiting

CHARACTERISTICS

Resistor Element	Thick Film on Alumina Substrate
Power Rating	1000W or 2000W at 85°C mounting plate
Resistance Values	0.5Ω to 1000Ω
Resistance Tolerance	+10% std.
Max Operating Voltage	2000VDC
Temperature Coefficient	± 250 PPM/°C
Dielectric Strength	6KV standard
Operating Temperature Range	-55°C to 85°C
Terminal Screws	#10-32
Max Contacts Torque	10 in-lb
Mounting Screws	#8-32
Max Mounting Torque	15 in-lb
Creepage Distance	50mm ± 1mm (min)

Derating



Test	Rating Continuous	Pulse
Rated Power, max. current and heat sink plate temperature limited	(TA1K0) 1000W (TA2K0) 2000W	
Operating Voltage	√P*R	N/A
Max. Applied Voltage, ohms law limited	223V	2000VDC
Max. Current	10A	53.33A
Critical Resistance; below this resistance max power has to be de-rated due to exceeding max current	(TA1K0) 10Ω (TA2K0) 20Ω	

Test	Method	Maximum ΔR
Short Time Overload	1.14 x √P*R / 10 sec @ 70°C	Max % ΔRsto = ±(2% + 0.05Ω)
Moisture Resistance	(TA1K0) 1000 hrs @ 40°C, 90-95% RH (TA2K0) 1750 hrs @ 40°C, 90-95% RH	≤1% ≤1%
Thermal Shock	MIL-STD-202, Method 107	MIL-STD-202, Method 107
Vibration, elec.	MIL-STD-202, Method 201	±2% Resistance
Vibration, mech.	MIL-STD-202, Method 201	No Loose Terminal Screws
Load Life	(TA1K0) 1000 Hrs 90 min ON / 30 min OFF (TA2K0) 1750 Hrs 90 min ON / 30 min OFF	≤1% ≤1%
Pulse Tolerance	52µF @ 2KV / 60 sec intervals, 104J, 20,000 Pulses	≤1%
Dielectric Strength	6KVDC for 1 minute	≤1%

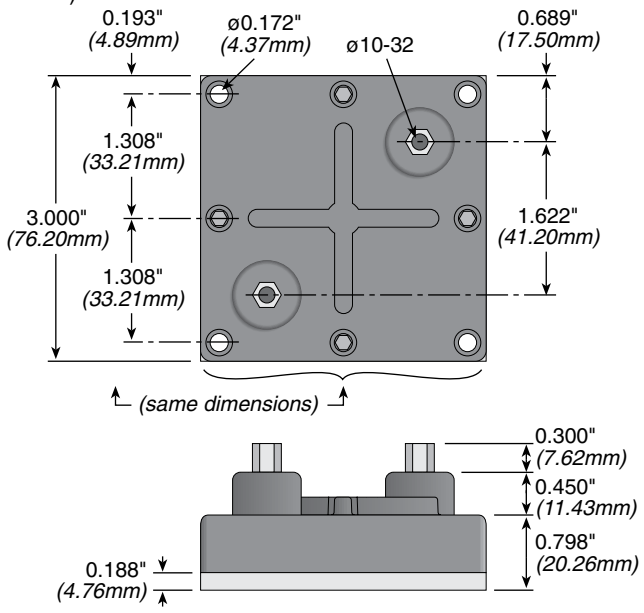
(continued)

TAP1000 & 2000

1000 & 2000 Watt Heat Sinkable Planar

DIMENSIONS

(in./mm)



APPLICATION NOTES

Proper heat sinking techniques are essential to performance of a TAP resistor. Pleased follow these guidelines when designing TAP system:

- Heats sink plate (base plate of the resistor) temperature must be monitored to establish proper de-rating. Best technique is to attach a thermocouple to the side of the base plate of the resistor. Temperature of plastic housing or heat sink cannot be used to establish rating of the resistor. Usage of laser thermometers should be avoided.
- To obtain a power rating of 1000W or 2000W, the bottom case temp must not exceed 85°C. This can only be achieved if the thermal conduction to the heatsink Rth-cs<0.025°K/W. This value can be reached by using thermal transfer compound with a heat conductivity of 1W/mK. The flatness of the cooling plate must be better than 0.05mm overall. The roughness of the surface should not exceed 6.4µm.
- Due to very high power density, only liquid cooled heat sinks are recommended for applications when >300W power rating is desired.
- Properly designed heat sink should have more than 2 cooling pipes under the surface of the TAP resistor. The Ohmite CP4 heat sink (http://www.ohmite.com/cat/sink_cp4.pdf) is an example of properly designed heat sink.

ORDERING INFORMATION

RoHS Compliant

TA 1K0 PH 2R50 K E

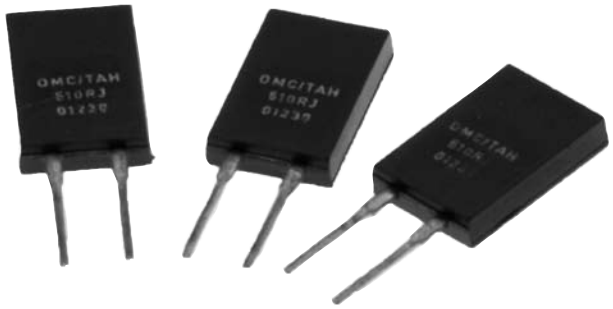
Style	Wattage	Package Type	Resistance	Tolerance
			2.5Ω = 2R50 50Ω = 50R0	K = 10% (standard) L = 20%

Standard Part Numbers

Ohms	1000 Watt 10% Tolerance	Ohms	2000 Watt 10% Tolerance
0.5	TA1K0PHR500KE	0.5	TA2K0PHR500KE
1	TA1K0PH1R00KE	1	TA2K0PH1R00KE
2.5	TA1K0PH2R50KE	2.5	TA2K0PH2R50KE
5	TA1K0PH5R00KE	5	TA2K0PH5R00KE
7.5	TA1K0PH7R50KE	7.5	TA2K0PH7R50KE
10	TA1K0PH10R0KE	10	TA2K0PH10R0KE
15	TA1K0PH15R0KE	15	TA2K0PH15R0KE
25	TA1K0PH25R0KE	25	TA2K0PH25R0KE
50	TA1K0PH50R0KE	50	TA2K0PH50R0KE
100	TA1K0PH100RKE	100	TA2K0PH100RKE
250	TA1K0PH250RKE	250	TA2K0PH250RKE
500	TA1K0PH500RKE	500	TA2K0PH500RKE
750	TA1K0PH750RKE	750	TA2K0PH750RKE
1000	TA1K0PH1K00KE	1000	TA2K0PH1K00KE

TAH Series

20 Watt TO220 Package
Thick Film Power



The TAH20 is a completely encapsulated thick film resistor in the TO220 package outline. Rated for 20 watts @ 25°C case temperature, these resistors are electrically isolated, and molded in a high temperature case.

Designed for heat sink mounting, the symmetrical package is ready for use with snap-on style heat sinks (we recommend use of thermal grease). The TAH20 Series has very low inductance, and available in a wide range of resistance values in standard 5% tolerance. 1% tolerance available by special order.

FEATURES

- 20 Watt Power Rating at 25°C Case Temperature
- High Pulse Tolerant Design
- Quick-snap Molded Package
- Very Low Inductance Design
- Resistor Package Electrically Isolated from Heat Sink
- Low Thermal Resistance to Heat Sink @ RTH<6.25°C/W
- Tube Packaging Available

APPLICATIONS

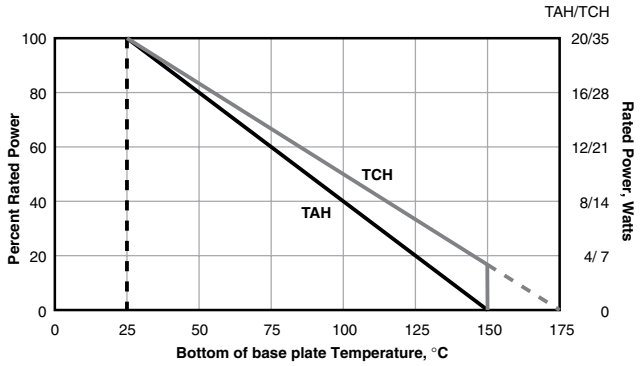
- Frequency Conversion
- High Frequency Balancing
- Snubbers

CHARACTERISTICS

Resistance Range	0.05Ω to 10KΩ, other values available upon request
Tolerance	<0.1Ω: 5% only 0.1Ω-1MΩ: 5% std.; 1% available
Temperature Coefficient	Referenced to 25°C, ΔR taken at +105°C; 1 to 10Ω: ±(100ppm+0.002Ω)/°C 10Ω & up: ±50ppm/°C
Max Operating Voltage	350V
Dielectric Strength	1,800 VAC
Power Rating	20W @ 25°C case temperature; see derating curve, below
Insulation Resistance	10GΩ min.
Momentary Overload	2x rated power for 5 seconds where applied voltage ≤1.5 times max. operating voltage. ΔR ±(0.3% + 0.001Ω) max.
Case Material	KMC-125 epoxy
Terminal Material	Copper
Terminal Plating	Lead Free Solder (97% Tin, 3% Silver)
Mounting	Requires the use of a snap-on style heat sink. A thermal compound should be properly applied.
Solder Process	The TAH20 cannot exceed 260°C for more than 10 seconds during soldering process.

Load Life	MIL-R-39009, 2000 Hours @ Rated Pwr	ΔR = ±(1.0% + 0.001) Ω
Thermal Shock	MIL-R-STD-202, Method 107, Cond. F	ΔR = ±(0.3% + 0.001) Ω max
High Freq Vibration	MIL-R-STD-202, Method 204, Cond. D	ΔR = ±(0.2% + 0.001) Ω max
Terminal Strength	MIL-R-STD-202, Method 211, Cond. A (Pull Test) 2.4N	ΔR = ±(0.2% + 0.001) Ω max
Moisture Resistance	MIL-R-STD-202, Method 106	ΔR = ±(0.5% + 0.01) Ω max

Derating



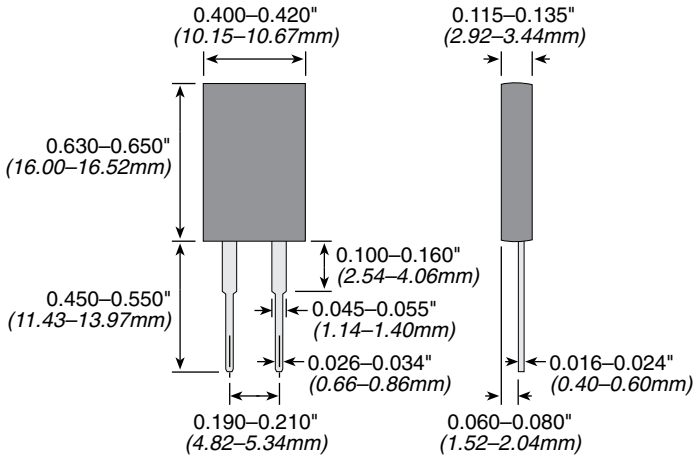
(continued)

TAH Series

20 Watt TO220 Package
Thick Film Power

DIMENSIONS

(iin./mm)



ORDERING INFORMATION

Tolerance
F = 1%
J = 5% Standard

Package Code

T A H 2 0 P 1 0 R 0 J E

Series

Ohm Value
Example:
2R40 = 2.4 Ohms
2K40 = 2400 Ohms

RoHS Compliant
Non-compliant
version unavailable

Standard Part Numbers

TAH20P100RJE	TAH20P220RJE	TAH20P33R0JE	TAH20P4R70JE	TAH20PR100JE
TAH20P10K0JE	TAH20P22R0JE	TAH20P390RJE	TAH20P510RJE	TAH20PR150JE
TAH20P10R0JE	TAH20P240RJE	TAH20P39R0JE	TAH20P51R0JE	TAH20PR200JE
TAH20P150RJE	TAH20P24R0JE	TAH20P3K30JE	TAH20P5K10JE	TAH20PR220JE
TAH20P15R0JE	TAH20P2K00JE	TAH20P3K90JE	TAH20P5R10JE	TAH20PR240JE
TAH20P1K00JE	TAH20P2K20JE	TAH20P3R30JE	TAH20P750RJE	TAH20PR330JE
TAH20P1K50JE	TAH20P2K40JE	TAH20P3R90JE	TAH20P75R0JE	TAH20PR390JE
TAH20P1R00JE	TAH20P2R00JE	TAH20P470RJE	TAH20P7K50JE	TAH20PR470JE
TAH20P1R50JE	TAH20P2R20JE	TAH20P47R0JE	TAH20P7R50JE	TAH20PR510JE
TAH20P200RJE	TAH20P2R40JE	TAH20P4K70JE	TAH20PR050JE	TAH20PR750JE
TAH20P20R0JE	TAH20P330RJE			

THIS PRODUCT IS DESIGNED FOR USE WITH PROPER HEATSINKING.

Maximum base plate temperature of the resistor must be monitored and kept within specified limits to establish the power rating. Best technique is to attach a thermocouple to the side of the base plate of the resistor. Temperature of plastic housing or heat sink cannot be used to establish rating of the resistor.

TBH Series

25 Watt TO220 Package Thick Film Power

Ohmite's TBH25 TO220 style resistors are designed for a variety of uses that require intermediate heatsinkable power at an economical price. Engineered for industrial applications, these resistors deliver reliable performance to traditional high-quality Ohmite standards.

FEATURES

- 25 Watts, @ 25°C case temperature
- Non-Inductive Performance
- Low Thermal Resistance
- Anti-static tube packaging available
- Economically priced
- Resistance element is electrically insulated from metal heat sink mounting tab

APPLICATIONS

- Power Supplies
- Industrial Controls
- Automotive Steering
- Pre-load/Damping
- Snubber/Bleeder
- Current Sensing

CHARACTERISTICS

Resistor	Thick film element above 1Ω, Ni-Cu metal element below 1Ω
Case	High Temperature Plastic
Terminals	Solder coated phospher bronze
Derating	100% @ 25°C to 0% @ 150°C curve referenced to case temperature
Dielectric Strength	1000 VDC
Max. Mounting Torque	0.9Nm
Operating Temperature Range	-55°C to +150°C
Temperature Coefficient	0.03-10Ω @ ±100ppm 11Ω-10KΩ @ ±50ppm
Thermal Resistance	5°C/W
Tolerance	5%
Power	25 Watts. Rating based on 25°C case temperature. The case temperature is to be used for the purposes of establishing the applied power limit. The case temperature must be made with thermocouple contacting the center of the component's mounting tab mounted on designated heat sink.
Resistance Range	0.03Ω - 10KΩ. Standard values listed at left, others available upon special request.
Max. Operating Voltage	350V

Test	Condition	Result
Load Life	(1000hrs @ rated power)	max. ΔR ±1%
Moisture Resistance	(MIL-STD-202, method 106)	max. ΔR ±0.5%
Short Time Overload	(2x rated power, not to exceed 1.5x max. operating voltage)	max. ΔR ±0.3%
Solderability	(MIL-STD-202, method 208)	
Thermal Shock	(MIL-STD-202, method 107, cond. F)	max. ΔR ±0.3%
Terminal Strength	(MIL-STD-202, method 211, cond. A (pull test) 2.4N)	max. ΔR ±0.2%
Vibration	(MIL-STD-202, method 204, cond. D)	max. ΔR ±0.2%

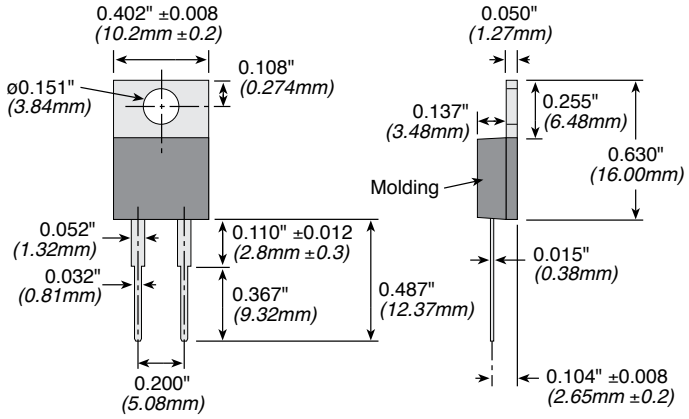
(continued)

TBH Series

25 Watt TO220 Package Thick Film Power

DIMENSIONS

(iin./mm)



Note: These dimensions apply to TBH products manufactured after March 2007

ORDERING INFORMATION

RoHS compliant
Non-RoHS version unavailable

T B H 2 5 P 2 R 0 0 J E

Series

Ohm Value
Example:
R030 = 0.030Ω
10R0 = 10Ω
1K50 = 1500Ω

Tolerance
J = 5%, standard

Standard Part Numbers

Ohms	Part Number 5% Tolerance
0.030	TBH25PR030JE
0.036	TBH25PR036JE
0.040	TBH25PR040JE
0.047	TBH25PR047JE
0.050	TBH25PR050JE
0.075	TBH25PR075JE
2	TBH25P2R00JE
7.5	TBH25P7R50JE
10	TBH25P10R0JE
15	TBH25P15R0JE
22	TBH25P22R0JE
30	TBH25P30R0JE
33	TBH25P33R0JE
47	TBH25P47R0JE
51	TBH25P51R0JE
75	TBH25P75R0JE

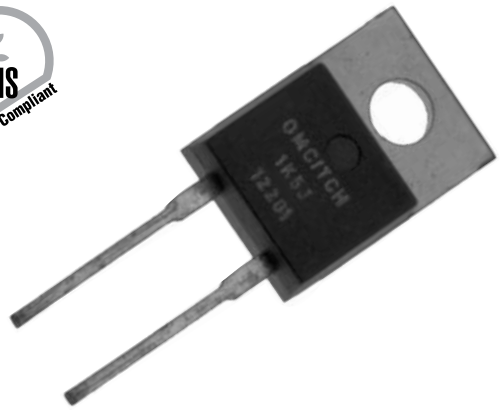
Ohms	Part Number 5% Tolerance
100	TBH25P100RJE
150	TBH25P150RJE
220	TBH25P220RJE
240	TBH25P240RJE
330	TBH25P330RJE
470	TBH25P470RJE
510	TBH25P510RJE
1000	TBH25P1K00JE
1500	TBH25P1K50JE
2000	TBH25P2K00JE
2700	TBH25P2K70JE
10,000	TBH25P10K0JE

THIS PRODUCT IS DESIGNED FOR USE WITH PROPER HEATSINKING.

Maximum base plate temperature of the resistor must be monitored and kept within specified limits to establish the power rating. Best technique is to attach a thermocouple to the side of the base plate of the resistor. Temperature of plastic housing or heat sink cannot be used to establish rating of the resistor.

TCH Series

35 Watt TO220 Package Thick Film Power



Ohmite's TCH35 TO220 package resistor provides 35W of steady state power when properly used in today's well defined heat sink applications.

These very low induction resistors are built under proprietary processes that deliver more power handling capability than other TO220 package resistors of similar size.

Standard terminal forms are provided for manual or automatic insertion.

A single screw mounting tab connects to the heat sink and should be accompanied by the use of a thermal compound. The TCH35 Series offers a low thermal resistance to the heat sink of <4.28°C/W.

FEATURES

- 35W Power Rating @ 25°C
- Very Low Inductance Design
- Single Screw Mounting
- Low Thermal Resistance to Heat Sink @ RTH<4.28°C/W
- Resistance Element is Electrically Insulated from Metal Heat Sink Mounting Tab

APPLICATIONS

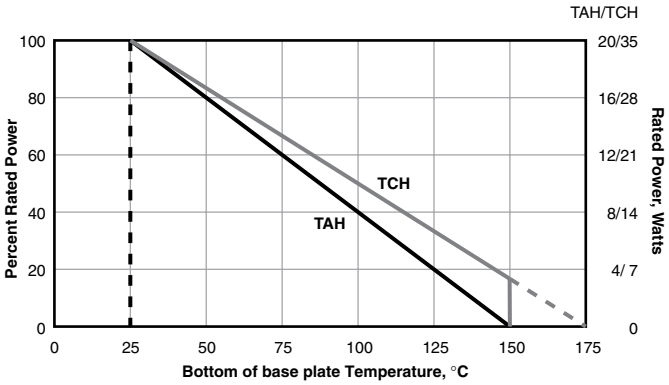
- Switching Power Supplies
- Snubbers
- High Frequency
- Voltage Regulation
- Low Energy Pulse Loading

CHARACTERISTICS

Resistance Range	0.1Ω to 10KΩ (higher values on request subject to derating)
Resistance Tolerance:	± 5% standard; ± 1% available on request
Temperature Coefficient	Referenced to 25°C, ΔR taken at +105°C 10Ω and above: ±50 ppm°C For under 10Ω: 0R6 - 9R9: 100PPM 0R4 - 0R59: 150PPM 0R2 - 0R39: 250PPM 0R1 - 0R19: 500PPM 0R05 - 0R09: 1000PPM
Max. Operating Voltage	350V
Dielectric Strength	1800 VAC
Insulation Resistance	10GΩ min.
Momentary Overload	2x rated power for 5 seconds as long as the applied voltage ≤1.5 times the continuous operating voltage, where ΔR ±(0.3% + 0.01Ω) max
Terminal Material	Copper
Terminal Plating	Lead Free Solder (97% Tin, 3% Silver)
Maximum Torque	0.9 Nm
Power Rating	35 Watts @ 25°C case temperature; see derating curve, below
Working Temperature Range	-55°C to +175°C
Solder Process	The TCH35 cannot exceed 260°C for more than 10 seconds during soldering process

Test	Condition	Result ΔR
Load Life	MIL-R-39009, 2000 Hours @ Rated Pwr	±(1.0% +0.01) Ω
Thermal Shock	MIL-R-STD-202, Method 107, Cond. F	±(0.3% +0.01) Ω max
High Freq Vibration	MIL-R-STD-202, Method 204, Cond. D	±(0.2% +0.01) Ω max
Terminal Strength	MIL-R-STD-202, Method 211, Cond. A (Pull Test) 2.4N	±(0.2% +0.01) Ω max
Moisture Resistance	MIL-R-STD-202, Method 106	± (0.5% +0.01) Ω max

Derating



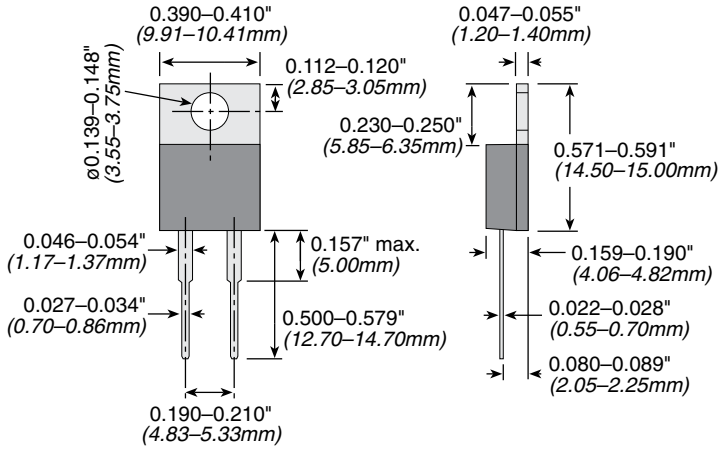
(continued)

TCH Series

35 Watt TO220 Package Thick Film Power

DIMENSIONS

(in./mm)



ORDERING INFORMATION

Tolerance
F = 1%
J = 5% Standard

Package Code

T C H 3 5 P 1 0 R 0 J E

Series

Ohm Value
Example:
2R40 = 2.4 Ohms
2K40 = 2400 Ohms

RoHS Compliant
Non-compliant version unavailable

Standard Part Numbers

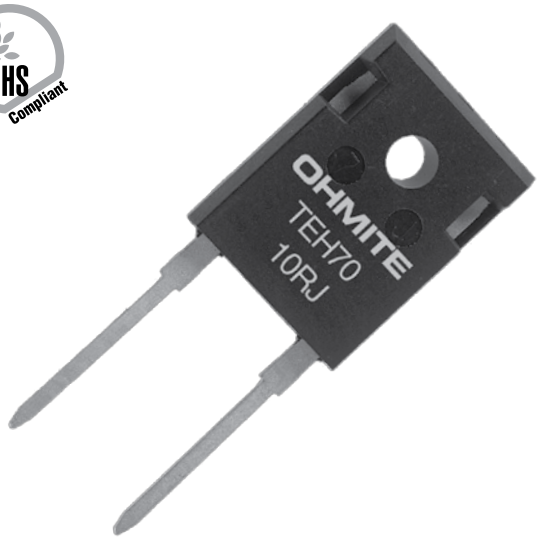
TCH35P100RJE	TCH35P220RJE	TCH35P33R0JE	TCH35P510RJE	TCH35PR200JE
TCH35P10K0JE	TCH35P22R0JE	TCH35P390RJE	TCH35P51R0JE	TCH35PR220JE
TCH35P10R0JE	TCH35P240RJE	TCH35P39R0JE	TCH35P5K10JE	TCH35PR240JE
TCH35P150RJE	TCH35P24R0JE	TCH35P3K30JE	TCH35P5R10JE	TCH35PR330JE
TCH35P15R0JE	TCH35P2K00JE	TCH35P3K90JE	TCH35P5R60JE	TCH35PR390JE
TCH35P1K00JE	TCH35P2K20JE	TCH35P3R30JE	TCH35P750RJE	TCH35PR470JE
TCH35P1K50JE	TCH35P2K40JE	TCH35P3R90JE	TCH35P75R0JE	TCH35PR510JE
TCH35P1R00JE	TCH35P2R00JE	TCH35P470RJE	TCH35P7K50JE	TCH35PR560JE
TCH35P1R50JE	TCH35P2R20JE	TCH35P47R0JE	TCH35P7R50JE	TCH35PR750JE
TCH35P200RJE	TCH35P2R40JE	TCH35P4K70JE	TCH35PR100JE	TCH35PRO50JE
TCH35P20R0JE	TCH35P330RJE	TCH35P4R70JE	TCH35PR150JE	

THIS PRODUCT IS DESIGNED FOR USE WITH PROPER HEATSINKING.

Maximum base plate temperature of the resistor must be monitored and kept within specified limits to establish the power rating. Best technique is to attach a thermocouple to the side of the base plate of the resistor. Temperature of plastic housing or heat sink cannot be used to establish rating of the resistor.

TEH70 Series

70 Watt TO247 Package
Thick Film Power



FEATURES

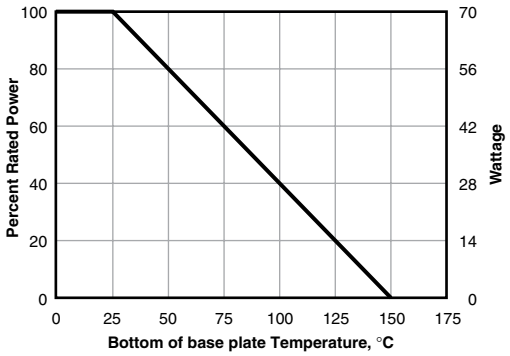
- 70 Watt power rating at 25°C case temperature
- Non-inductive performance
- Low thermal resistance
- RoHS compliant design
- Two or three terminal versions available
- Heat sink can be grounded through middle terminal (P style)

CHARACTERISTICS

Resistor	thick film on alumina
Lead	solder coated phosphor bronze
Solder	100% Sn
Case	high temperature plastic
P Package	middle terminal is electrically connected to header and insulated from left and right terminals
M Package	no middle terminal
Derating	linear, 100% at 25°C to 0% at 150°C
Resistance range	2Ω-10KΩ
Max. working voltage	500V or Ohm's Law limited
Thermal Resistance	1.79°C/W
Temperature Coefficient	2Ω-10Ω: ±100ppm 10Ω-10KΩ: ±50ppm
Insulation Resistance	400 MΩ
Short time overload	2x rated power for 5 sec., not to exceed 1.5x max. working voltage
Dielectric Strength	2000 VDC

Test	Conditions Of Test	Performance
Load life	1000 hrs @ rated power	±1% ΔR
Moisture resistance	MIL -STD-202, method 106	±0.5% ΔR
Short time overload	2x rated power for 5 sec., not to exceed 1.5x max. working voltage	±0.3% ΔR
Solderability	MIL-STD-202, method 208	
Thermal shock	MIL-STD-202, method 170, cond. F	±0.2% ΔR

Derating



THIS PRODUCT IS DESIGNED FOR USE WITH PROPER HEATSINKING.

Maximum base plate temperature of the resistor must be monitored and kept within specified limits to establish the power rating. Best technique is to attach a thermocouple to the side of the base plate of the resistor. Temperature of plastic housing or heat sink cannot be used to establish rating of the resistor.

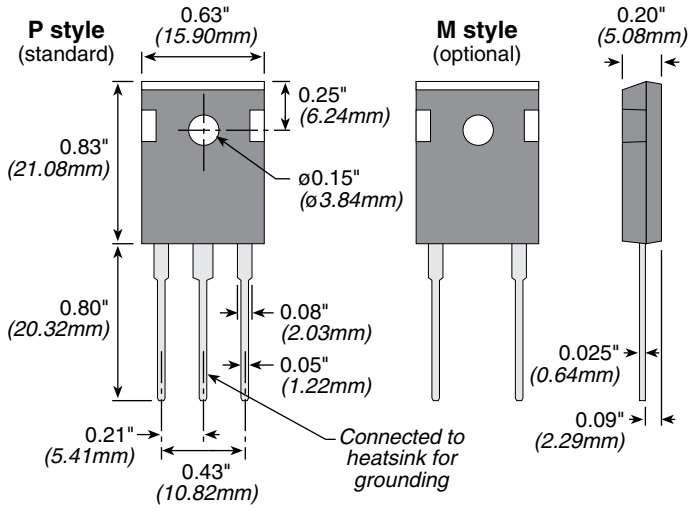
(continued)

TEH70 Series

70 Watt TO247 Package
Thick Film Power

DIMENSIONS

(in./mm)



ORDERING INFORMATION

Package Code
P = three terminals
M = two terminals

RoHS Compliant
Non-compliant
version unavailble

T E H 7 0 P 1 0 R 0 J E

Series

Ohms
R = Decimal
Example:
10R2 = 10.2 ohms
100R = 100 ohms
15K0 = 15,000 ohms

Tolerance
J = 5%

Standard Part Numbers

Ohms	P-type 3-terminal	M-type 2-terminal
2	TEH70P2R00JE	TEH70M2R00JE
3	TEH70P3R00JE	TEH70M3R00JE
4	TEH70P4R00JE	
5	TEH70P5R00JE	TEH70M5R00JE
7.5	TEH70P7R50JE	TEH70M7R50JE
10	TEH70P10R0JE	TEH70M10R0JE
15	TEH70P15R0JE	TEH70M15R0JE
20	TEH70P20R0JE	
24	TEH70P24R0JE	TEH70M24R0JE
33		TEH70M33R0JE
39		TEH70M39R0JE
47	TEH70P47R0JE	TEH70M47R0JE
68	TEH70P68R0JE	TEH70M68R0JE
75		TEH70M75R0JE
100	TEH70P100RJE	TEH70M100RJE
150	TEH70P150RJE	TEH70M150RJE
270	TEH70P270RJE	TEH70M270RJE
470	TEH70P470RJE	TEH70M470RJE
680		TEH70M680RJE
750	TEH70P750RJE	TEH70M750RJE
1000	TEH70P1K00JE	TEH70M1K00JE
1500	TEH70P1K50JE	TEH70M1K50JE
2000	TEH70P2K00JE	TEH70M2K00JE
3000		TEH70M3K00JE
5000	TEH70P5K00JE	TEH70M5K00JE
7500	TEH70P7K50JE	
10000		TEH70M10K0JE

TEH100 Series

100 Watt Thick Film Power Resistors for High Frequency and Pulse Loading Applications

Ohmite offers the totally encapsulated and insulated TO-247 package for low ohmic value and non-inductive design for high-frequency and pulsing applications. Ideal use is for power supplies. This series is rated at 100 Watts mounted to a heat sink.

FEATURES

- 100 Watt power rating at 25°C case temperature
- Non-inductive performance
- Low thermal resistance
- RoHS compliant design
- TO-247 package configuration
- Single screw mounting simplifies attach-ment to the heat sink
- A totally molded housing for enviromental protection
- Non-Inductive design
- Resistor package totally insulated from heat sink

CHARACTERISTICS

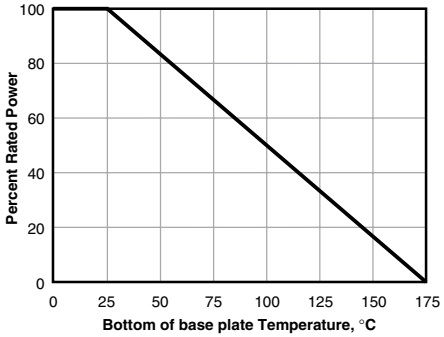
Resistor	thick film on alumina
Case	high temperature plastic
Lead Material	Tinned Copper
Installation, max. Torque	0.9 Nm using an M3 screw and a compression washer
Derating	linear, 100% at 25°C to 0% at 175°C
Resistance range	0.05Ω to 1MΩ, other values on request
Resistance tol.	±1%, ±2%, ±5%, ±10%
Max. working voltage	350V
Temperature Coefficient	3R to 10R: 100ppm/°C 1R to 2R99: 250ppm/°C Below 1R: 500-1000+ppm/°C (Contact factory for exact values below 1R)
Insulation Resistance	10GΩ min.
Dielectric Strength	1,800 VAC

Test	Conditions Of Test	Performance
Load life	MIL-R-39009D 4.8.13 , 2,000 hours at rated power	ΔR ≤ ±(1.0% + 0.0005Ω)
Moisture resistance	-10°C - +65°C, RH>90%, cycle 240 h	ΔR ≤ ±(0.50% + 0.0005Ω)
Short time overload	1.5 times rated power and V(DC) ≤1.5Vmax for 5 seconds	ΔR ≤ ± (0.50% + 0.0005Ω)
Thermal shock	GJB360A-96 method 107, Cond. F	ΔR ≤ ±(0.50% + 0.0005Ω)
Dielectric strength	GJB360A-96 method 301, (1,800V AC, 60s)	ΔR ≤ ± (0.15% + 0.0005Ω)
Terminal strength	GJB360A-96 method 211, Cond. A (Pull Test) 2.4N	ΔR ≤ ±(0.20% + 0.0005Ω)
High frequency vibration	GJB360A-96 method 204, Cond. D	ΔR ≤ ±(0.40% + 0.0005Ω)

THIS PRODUCT IS DESIGNED FOR USE WITH PROPER HEATSINKING.

Maximum base plate temperature of the resistor must be monitored and kept within specified limits to establish the power rating. Best technique is to attach a thermocouple to the side of the base plate of the resistor. Temperature of plastic housing or heat sink cannot be used to establish rating of the resistor.

Derating



Derating (thermal resistance): 0.666W/°K (1.5K/W). Without a heatsink, when in free air at 25°C, the TEH100 is rated for 3.5W. Derating for temp. above 25°C is 0.0234W/°K.

Graphed value is only valid when using a thermal conduction to the heatsink Rth-cs<0.025°K/W. This value can be reached by using thermal transfer compound with a heat conductivity of 1W/mK. The flatness of the cooling plate must be better than 0.05mm overall. The roughness of the surface should not exceed 6.4μm. The case temperature is to be used for the definitiion of the applied power limit. The case temperature measurement must be made with a thermocouple contacting the center of the component mounted on the designed heat sink. Thermal grease should be applied properly

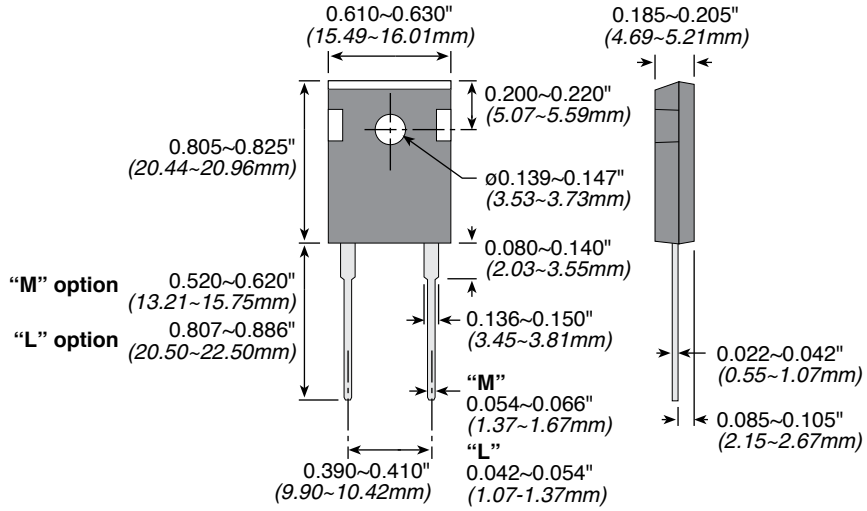
(continued)

TEH100 Series

100 Watt Thick Film Power Resistors for High Frequency and Pulse Loading Applications

DIMENSIONS

(in./mm)



ORDERING INFORMATION

Package Code
M = standard
L = long terminals

RoHS Compliant
Non-compliant version unavailble

T E H 1 0 0 M 1 0 R 0 J E

Series

Ohms
R = Decimal
Example:
2R50 = 2.50Ω
25R0 = 25Ω
100R = 100Ω
1K00 = 1000Ω

Tolerance
F = 1%
J = 5%

Standard part numbers

Ohms	5% tolerance	1% tolerance
0.05	TEH100MR050JE	
0.075	TEH100MR075JE	
0.1	TEH100MR100JE	
0.2	TEH100MR200JE	
0.5	TEH100MR500JE	
1	TEH100M1R00JE	TEH100M1R00FE
2	TEH100M2R00JE	TEH100M2R00FE
2.5	TEH100M2R50JE	TEH100M2R50FE
3	TEH100M3R00JE	TEH100M3R00FE
5	TEH100M5R00JE	TEH100M5R00FE
7.5	TEH100M7R50JE	TEH100M7R50FE
10	TEH100M10R0JE	TEH100M10R0FE
15	TEH100M15R0JE	TEH100M15R0FE
20	TEH100M20R0JE	TEH100M20R0FE
25	TEH100M25R0JE	TEH100M25R0FE
50	TEH100M50R0JE	TEH100M50R0FE
100	TEH100M100RJE	TEH100M100RFE
270	TEH100M270RJE	
470	TEH100M470RJE	
750	TEH100M750RJE	
1K	TEH100M1K00JE	
5K	TEH100M5K00JE	
7.5K	TEH100M7K50JE	

TGH Series

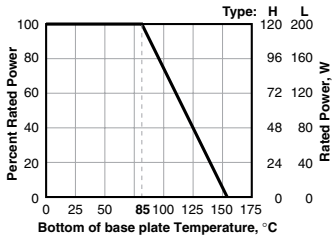
120 and 200 Watt SOT227Package Thick Film Power

Due to their non-inductive design, these resistors are ideally suited for high-frequency and pulse-load applications. Available in 120- or 200-watt sizes, this resistor is designed for direct mounting onto a heatsink. Popular applications include variable speed drives, power supplies, control devices, telecom, robotics, motor controls, and other switching designs.

CHARACTERISTICS

Heat Sink	Nickel-plated copper
Contacts	Nickel-plated copper
Substrate	Al203 (96%)
Molding Compound	High-performance epoxy, compliant to UL94-V0
Terminal Nuts	American standard 303 stainless steel
Resistance Range	0.1Ω to 1MΩ
Tolerance	±5%; other tolerances available on request
Temperature coefficient:	±250ppm (at +105°C ref. to +25°C)
Max. Work.Voltage	500V (up to 1,000V on special request)
Power Rating at 85°C	120W (see derating)
Partial Discharge	up to 2,000Vrms/80 pC
Voltage Proof	Dielectric Strength up to 4,000V DC against ground
Heat Resistance to Cooling Plate	R_{th} <0.35 K/W
Capacitance/Mass	45pF
Working Temp. Range	-55°C to +155°C
Max. Torque for Base Plate (static)	1.5 Nm
Max. Torque for Contacts (static)	1.3 Nm. M4 screws (not included)
Derating (thermal resistance)	2.86W/°K (0.35°K/W)

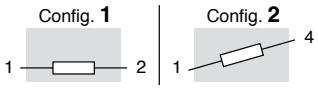
Derating



Best results can be reached by using a thermal transfer compound with a heat conductivity of better than 1W/mK

Configurations

(per package)



PERFORMANCE DATA

Test	Method	ΔR
Moisture Resistance	MIL-Std-202, Method 106	(0.5% + 0.001W) max
Thermal shock	Mil-Std-202, Method 107, Cond F	(0.3% + 0.01W) max
Terminal Strength	MIL-Std-202, Method 211, Cond A (pull test) 2.4N	(0.2% = 0.01W) max
Vibration, High Frequency	MIL-Std-202, Method 204, Cond D	(0.2% + 0.01W) max
Life	20 years (120,000 hours) Operating failure rate of 8.3 x 10-7 fail/hour.	

Requirements to be achieved under the following conditions: T_{amb}=25°C, T_{HS}=70°C, $P_{applied}$=Pn

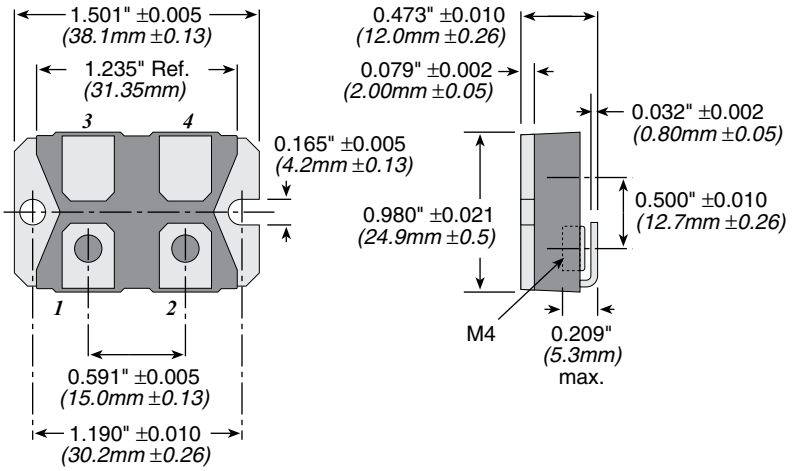
(continued)

TGH Series

120 and 200 Watt SOT227 Package
Thick Film Power

DIMENSIONS

(iin./mm)



ORDERING INFORMATION

Configuration
V = config. 1
X = config. 2

E = RoHS compliant

T G H H V 1 R 0 0 J E

SOT 227 Series	Wattage	Resistance Value	Tolerance
	H = 120W L = 200W	Example: R500 = 0.500Ω 1R00 = 1Ω 250R = 250Ω 1K00 = 1,000Ω 10K0 = 10,000Ω	J = 5%

Standard Part Numbers

Ohms	120 Watt TGHH	200 Watt TGHL
0.1	TGHHVR100JE	TGHLVR100JE
0.5		TGHLVR500JE
1	TGHHV1R00JE	TGHLV1R00JE
5	TGHHV5R00JE	
10	TGHHV10R0JE	TGHLV10R0JE
25		TGHLV25R0JE
33	TGHHV33R0JE	TGHLV33R0JE
50	TGHHV50R0JE	
100	TGHHV100RJE	TGHLV100RJE
150	TGHHV150RJE	TGHLV150RJE
500	TGHHV500RJE	TGHLV500RJE
680	TGHHV680RJE	TGHLV680RJE
1K	TGHHV1K00JE	TGHLV1K00JE
5K	TGHHV5K00JE	TGHLV5K00JE
10K	TGHHV10K0JE	TGHLV10K0JE

THIS PRODUCT IS DESIGNED FOR USE WITH PROPER HEATSINKING.

Maximum base plate temperature of the resistor must be monitored and kept within specified limits to establish the power rating. Best technique is to attach a thermocouple to the side of the base plate of the resistor. Temperature of plastic housing or heat sink cannot be used to establish rating of the resistor.

TGHG Series

Precision Current Sense Resistors

The TGHG Series uses state of the art technology to provide highly reliable, non inductive performance. This resistor is ideal for many current monitoring and controls applications.

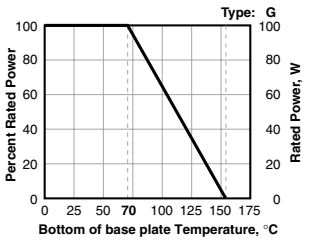
FEATURES

- Resistance values beginning at 0.5mΩ
- Non Inductive
- Four terminal Kelvin connection
- SOT 227 Package
- Four terminals to isolate measurement path from current flow path
- Accuracy in a high power package

CHARACTERISTICS

Heat Sink	Nickel-plated copper
Terminal Nuts	American standard 303 stainless steel
Standard Resistance Values	0.5mΩ-1Ω, others on request
Resistance Tolerances	0.5% (0.0005 thru 0.022Ω), 1%, 5%
Temperature Coefficient	referenced to 25°C, ΔR taken at -15°C and +105°C, <60ppm/°C; <500ppm/°C for resistance range 27mΩ-49mΩ)
Power Rating	100W at 70°C case temperature; 50Amp permanent (higher on request)
Dielectric strength	1000VDC, higher value on request
Heat Resistance	R_{th} <0.56K/W
Protection class	acc. to IEC 950/CSA22.2 950/M -89 and EN 60950.88:2
Working Temp. Range	-55°C to +155°C
Max. Torque for Contacts	1.3Nm 8 (static)
Max Torque for Base Plate	1.5 Nm (static)
Maximum Cont. Amperage	200 amps depending on ohmic value; only available in 10%

Derating



Best results can be reached by using a thermal transfer compound with a heat conductivity of better than 1W/mK

THIS PRODUCT IS DESIGNED FOR USE WITH PROPER HEATSINKING.

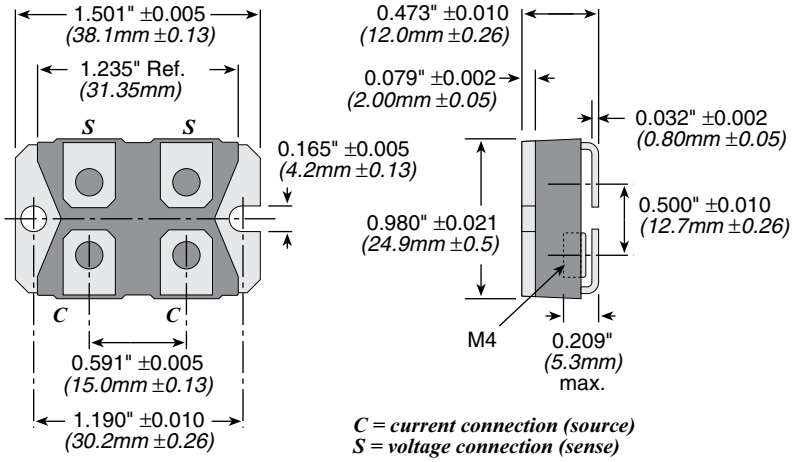
Maximum base plate temperature of the resistor must be monitored and kept within specified limits to establish the power rating. Best technique is to attach a thermocouple to the side of the base plate of the resistor. Temperature of plastic housing or heat sink cannot be used to establish rating of the resistor.

(continued)

TGHG Series

Precision Current Sense Resistors

DIMENSIONS



ORDERING INFORMATION

Configuration
C = current sense

E = RoHS compliant

T G H G C R 0 2 0 0 F E

TGH = series

Wattage
G = 100W

Resistance Value
Example:
R0200=0.02 ohms

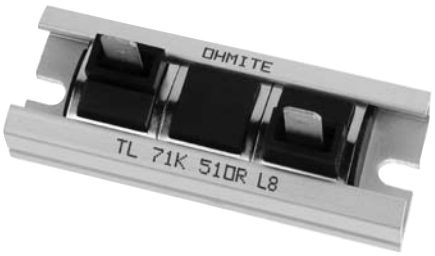
Tolerance
D= 0.5%
F= 1%
J= 5%

Standard part numbers

Ohms	100 Watt TGHG
0.00050	TGHGCR0005FE
0.00100	TGHGCR0010FE
0.00200	TGHGCR0020FE
0.00500	TGHGCR0050FE
0.01000	TGHGCR0100FE
0.01500	TGHGCR0150FE
0.02000	TGHGCR0200FE
0.02500	TGHGCR0250FE
0.05000	TGHGCR0500FE
0.0750	TGHGCR0750FE
0.1000	TGHGCR1000FE

TL Series

Modular Heat Sinkable Thick Film Power



The TL Series add heat sinkable options to the thick film resistor family. The resistor element is packaged with plastic insulators, and quick-connect terminals in a symmetrical aluminum profile for easy heat sink mounting. Special tapped configurations are offered to reduce on board component count.

Efficient thermal packaging provides improved heat conduction to the heat sink. Self-insulating package design increases voltage withstanding characteristics when compared to traditional aluminum housings. The in line mounting profile makes the TL Series easily adaptable to most heat sink systems. Thermal compound is always recommended when heat sinking.

FEATURES

- Very low inductance
- Low profile design
- In-Line Mounting Profile
- 1/4" Quick connect terminals
- Consult factory for common, isolated, or special multiple tap options.

APPLICATIONS

- Semiconductor Balancing
- Frequency Converters
- Snubber
- In-Rush Current Limiter
- Bleeder Resistor
- Power Switching
- Voltage Dividers

SERIES SPECIFICATIONS

Series	Ultra* Wattage	Std** Wattage	Nominal Power	Surge Load (10 sec.)	Max. Voltage between terminals	Ohm Range	Thermal Resistance Ultra (10% tol.)	Thermal Resistance Std. (3%-5% tol.)
TL54	35	27	18	72	1000	0.3Ω - 1MΩ	1.26	1.67
TL71	96	71	48	192	2000	1.0Ω - 2MΩ	0.53	0.70
TL88	155	114	78	312	2500	1.5Ω - 3MΩ	0.34	0.45
TL104	215	158	108	432	2500	2.0Ω - 4MΩ	0.25	0.33
†TL122	275	202	137	548	2500	2.0Ω - 4MΩ		

* For properly heat sinked, untrimmed resistors - see chart
** For properly heat sinked, trimmed resistors - see chart
† Power Ratings are theoretical. Consult Factory for details.

CHARACTERISTICS

Operating voltage	1200 VAC
Dielectric Withstanding Voltage	2500 VAC
Resistive Element	Thick Film on Alumina
Housing	Aluminum
Insulators	Glass reinforced high temperature Valox®
Terminals	Tinned brass
Power Range	27 – 275 watts
Resistance Range	0.3Ω – 4MΩ
Tolerance	Ultra Power (U Style): ±10% std. Standard Power: ±10% std.; 5% and 1% available
Temperature Coefficient	±250 PPM
Test Voltage for 1 Minute	6000 VDC/2500 VAC
Working Voltage	1200 VAC
External Creeping Distance	12mm
Temperature Limits	-40°C to +125°C
Insulation	>1002 MΩ/500V
Air Distance, Terminal to Ground	7mm
Inductance	50-100 nH

THIS PRODUCT IS DESIGNED FOR USE WITH PROPER HEATSINKING.
Maximum base plate temperature of the resistor must be monitored and kept within specified limits to establish the power rating. Best technique is to attach a thermocouple to the side of the base plate of the resistor. Temperature of plastic housing or heat sink cannot be used to establish rating of the resistor.

(continued)

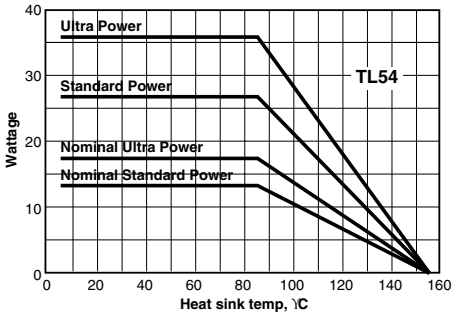
TL Series

Modular Heat Sinkable Thick Film Power

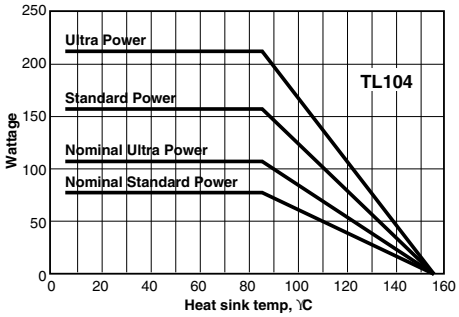
POWER RATINGS

Maximum and nominal power ratings for Ultra Power and Standard Power resistors

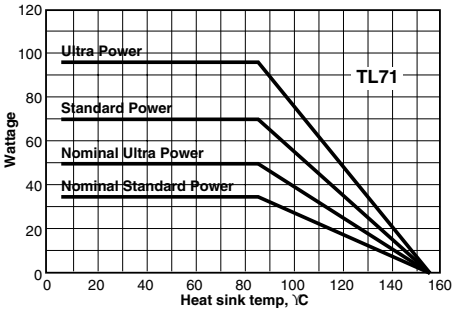
TL54



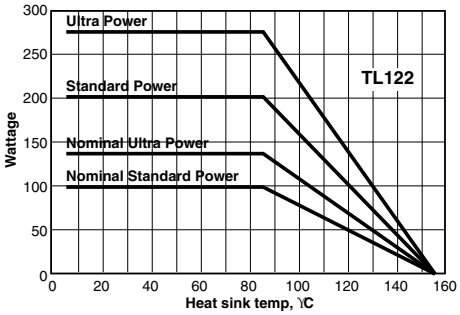
TL104



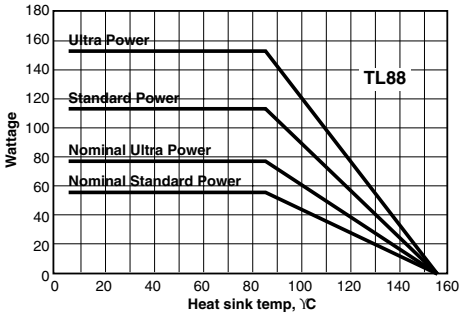
TL71



TL122



TL88



ORDERING INFORMATION

E = RoHS compliant

T L 1 0 4 K U R 5 0 0 C E

Size	Tolerance	Power	Ohms	Center tap
TL54 = 54 mm	F = 1%	U = ultra	R500 = 0.50	*(optional)*
TL71 = 71 mm	J = 5%	*(optional)*	10R0 = 10.0	
TL88 = 88 mm	K= 10%		1K00 = 1,000	
TL104 = 104 mm			1M00 = 1,000,000	
TL122 = 122 mm				

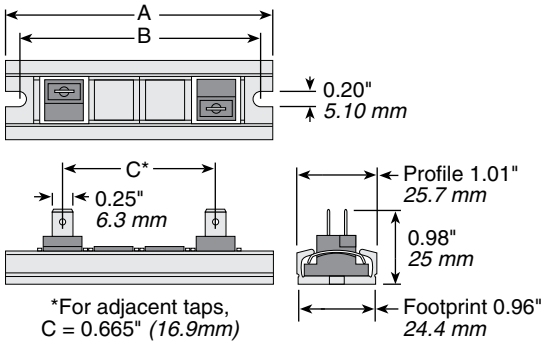
Standard part numbers

Ohmic value	Part No. Prefix ➤ Suffix ▼	TL54K	TL71K	TL88K	TL104K	TL122K
0.5	R50	✔				
1.0	1R0	✔	✔	✔	✔	
1.5	1R5			✔		
2.0	2R0	✔	✔	✔	✔	✔
3.0	3R0	✔	✔	✔	✔	
4.0	4R0	✔	✔	✔	✔	✔
5.1	5R1	✔	✔	✔	✔	
10.0	10R	✔	✔	✔	✔	✔
15.0	15R	✔	✔	✔	✔	
22.0	22R	✔	✔	✔	✔	✔
47.0	47R	✔	✔	✔	✔	✔
75.0	75R	✔	✔	✔	✔	✔
100.0	100	✔	✔	✔	✔	✔
150.0	150	✔	✔	✔	✔	
220.0	220	✔	✔	✔	✔	✔
240.0	240	✔	✔	✔	✔	
470.0	470	✔	✔	✔	✔	✔
510.0	510	✔	✔	✔	✔	
750.0	750	✔	✔	✔	✔	✔
1,000.0	1K0	✔	✔	✔	✔	✔
1,100.0	1K1	✔	✔	✔	✔	
2,200.0	2K2	✔	✔	✔	✔	✔
4,700.0	4K7	✣	✣	✣	✣	
5,100.0	5K1	✣	✣	✣	✣	
10,000.0	10K	✣	✣	✣	✣	
22,000.0	22K	✣	✣	✣	✣	
51,000.0	51K	✣	✣	✣	✣	

✔ = Standard values

✣ = Non-standard values subject to minimum handling charge per item

DIMENSIONS



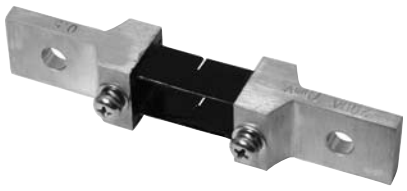
*For adjacent taps, C = 0.665" *(16.9mm)*

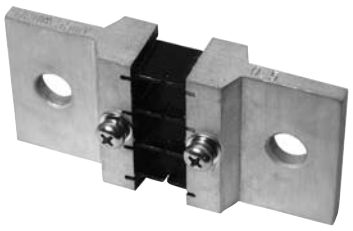
		TL54	TL71	TL88	TL104	TL122
A	mm	*54*	*71*	*88*	*104*	*122*
B	mm	*46*	*63*	*80*	*96*	*114*
C	mm	*16.9*	*33.8*	*50.7*	*67.6*	*84.5*
Weight	g	26	33	44	55	65

Consult factory for multiple tap options in common, isolated, and special configurations.

S Series

High Current Shunts





FEATURES

- 100-1200A ratings
- 60mv and 75mv versions
- 0.5% accuracy class
- Manganin (6J13) plate resistive element construction
- T, L, and DIN type terminals
- H59-1 (UNS 37700) Brass Terminal Construction

SERIES SPECIFICATIONS

Series	Terminal Type	Construction	Rated Current	Voltage (mV)	Accuracy Class
SHD1-100C060DE	DIN	Plate	100	60	0.50%
SHT1-250C060DE	T	Plate	250	60	0.50%
SHL1-600C060DE	L	Plate	600	60	0.50%
SHL1-1K2C060DE	L	Plate	1200	60	0.50%
SHD1-100C075DE	DIN	Plate	100	75	0.50%
SHT1-200C075DE	T	Plate	200	75	0.50%
SHT1-500C075DE	T	Plate	500	75	0.50%
SHL1-1K0C075DE	L	Plate	1000	75	0.50%
SHT1-500C100DE	T	Plate	500	100	0.50%

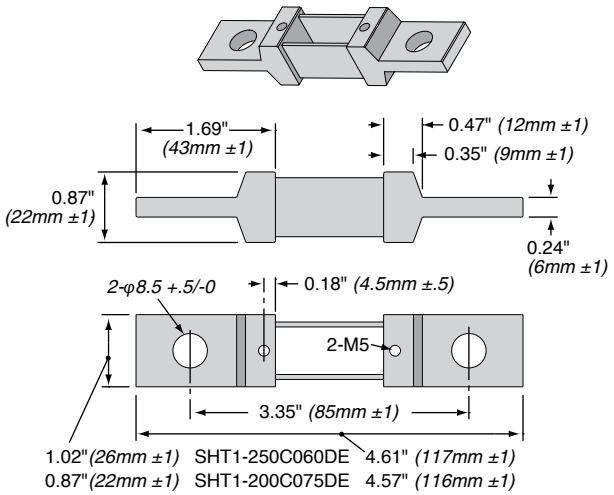
CHARACTERISTICS

Terminal Surface Coating	Acid Wash and Passivation
Resistor plate surface coating	Acid Wash and Passivation
Method of measurement	Null Balance Resistance Bridge
National standard	GB/T7676-1998 (Direct acting indicating analog electrical measuring instruments and their accessories)
Safety standard	IEC610101-1: 1890 (Safety requirements for electrical equipment for measurement, control, and laboratory use-Part I: General requirements)
Environmental standard	SJ/T11363-2006 (Requirements for concentration limits for certain hazardous substances in electronic information products)
Derating	linearly from 25°C to 85°C

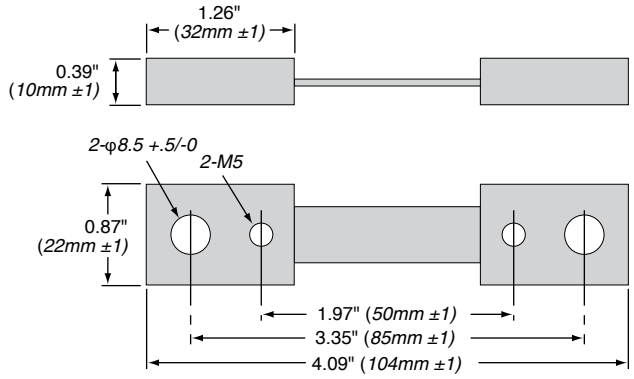
DIMENSIONS

in./mm

SHT1-250C060DE
SHT1-200C075DE



SHD1-100C060DE
SHD1-100C075DE



(continued)

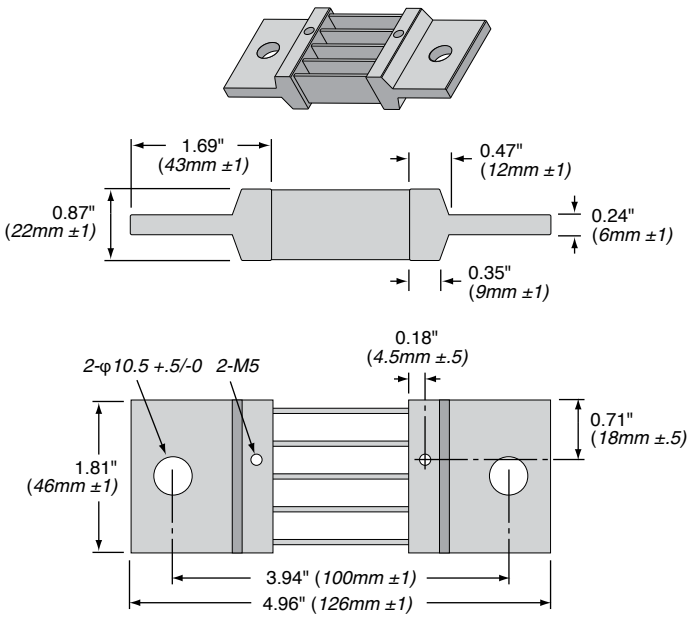
S Series

High Current Laboratory Shunts

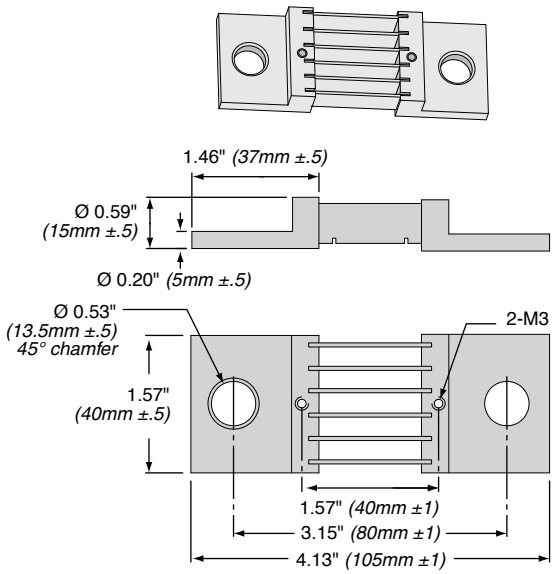
DIMENSIONS

(continued) in./mm

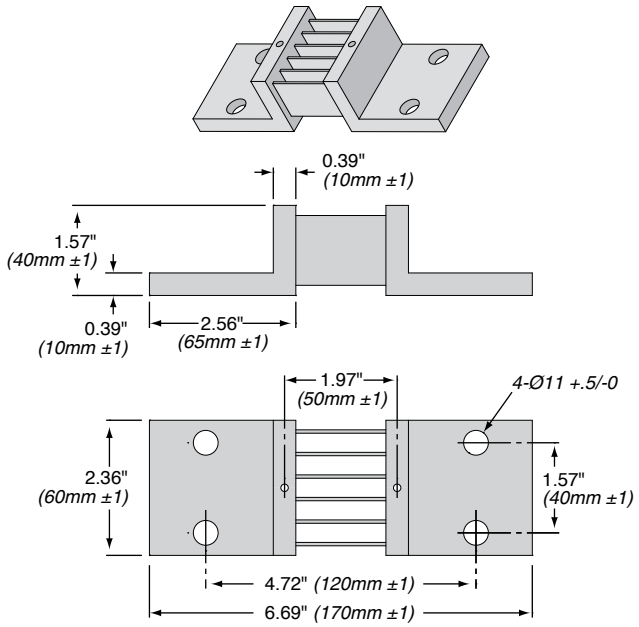
SHT1-500C075DE



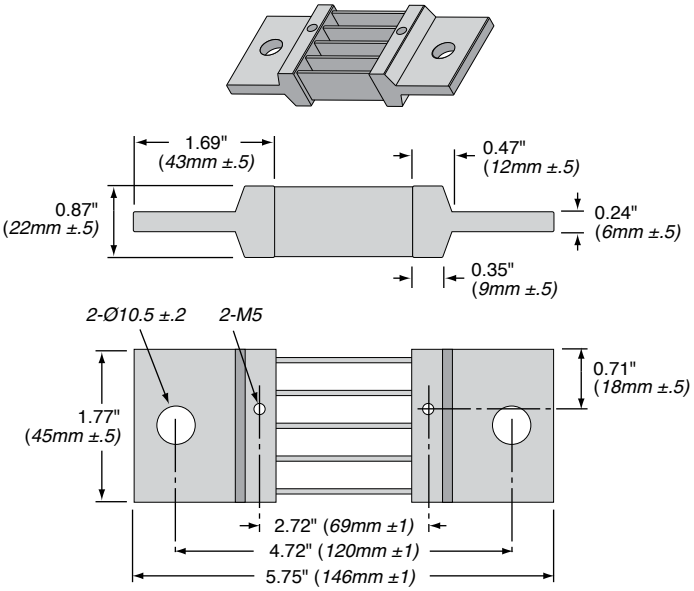
SHL1-600C060DE



SHL1-1K2C060DE
SHL1-1K0C075DE



SHT1-500C100DE



HOW TO ORDER

Current
1K0 = 1000 amps
500 = 500 amps
200 = 200 amps
100 = 100 amps

RoHS Compliant

S H L 1 - 1 K 0 C 0 7 5 D E

Series	Terminal Type	Terminal Material	mV	Tolerance
	T = T-type	C = copper surface	075 = 75mV	D = ±0.5%
	D = DIN-type	treatment (std.)	025 = 25mV	F = ±1%
	L = L-type	N = nickel plating	050 = 50mV	
			060 = 60mV	

SH Series

Precision Metal-Clad Shunts

Precision metal clad resistors designed in four-terminal technique, are distinguished by high load capacity as well as excellent accuracy. Isolated voltage and current connections making them suitable for very precise current measurements. The simple four port Kelvin design ensures easy installationon large current bus bars. Units have a low inductance, heavy copper terminals.Applications include: battery testing, current detection in precise power sources, constant current sources, industrial power conversion circuits, HEVs, fuel cells and constant electronic loads.

CERTIFICATIONS

BN ES ISO 9001: 2008

ISO/TS 16949: 2009

SERIES SPECIFICATIONS

Series	Rated Current (A)	Rated Voltage (mV)	Resistance (mΩ)
SH2	100	100	1.0000
	150	100	0.6666
	200	100	0.5000
SH3	250	100	0.4000
	300	100	0.3333

CHARACTERISTICS

Test	Method	Maximum ΔR
Short Time Overload	5x Power rating 5 sec.	±0.3%
Moisture Resistance	40°C, 95% RH, DC100V case to terminal, 500 hours	±0.5%
Thermal Shock	-65°C 30 minutes, +90°C 30 minutes 25 cycles	±0.2%
Vibration	10Hz-55Hz-10Hz (1min.), 2 hours each direction	±0.2%
Moisture Load Life	40°C, 95% RH, 0.1XPower rating 1.5 hours on, 30 minutes off, 500 hours	±0.5%
Load Life	Power rating 1.5 hours on, 30 min. off, 500 hours	±0.5%

Temp. Range	-55°C ~ +110°C
Insulation Resist.	100MΩ min.
Dielectric Withstanding Voltage	AC 500V for 1 minute
Temp. Coefficient	Max. 30ppm/°C [20°C and 60°C]
Lead Wire	UL1331 AWG 16 with red insulation

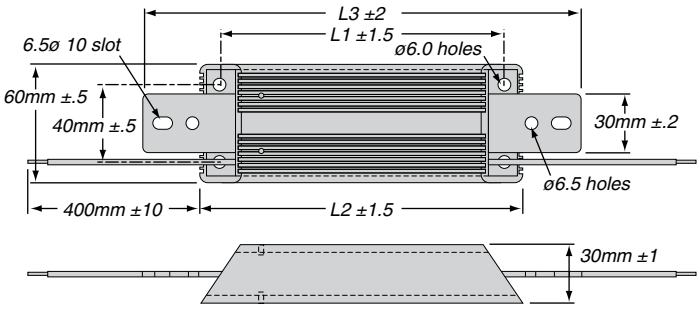
(continued)

SH Series

Precision Metal-Clad Shunts

DIMENSIONS

(mm)



Series	Current (A)	Mass (g)	L1 ±1.5	L2 ±2	L3 ±2
SH2	100	650	146	165	225
	150	650	146	165	225
	200	650	146	165	225
SH3	250	1100	196	215	275
	300	1100	196	215	275

ORDERING INFORMATION

RoHS Compliant

S H 2 - 2 0 0 R 0 0 0 5 D E

- **Series**
- **Size**
- **Current**
- **Resistance** *see table*
- **Tolerance** B = ±0.1%, D = ±0.5%

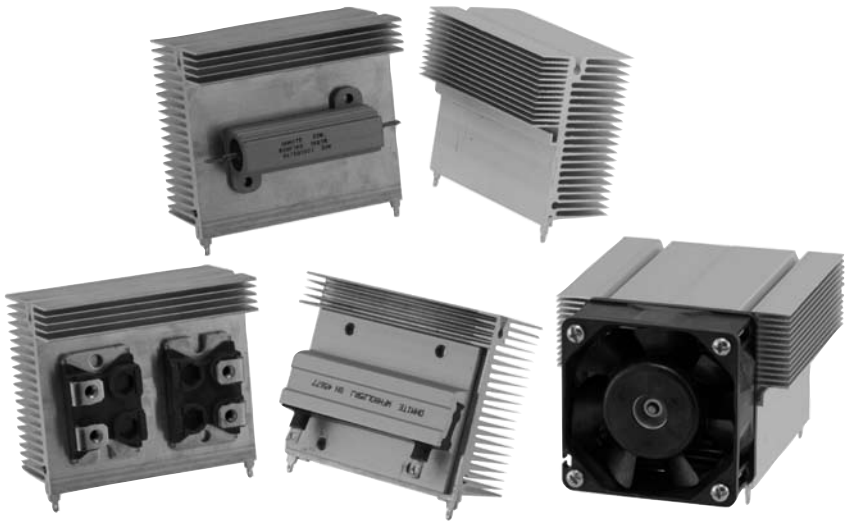
Standard part numbers

Part	Rated Current (A)	Rated Voltage (mV)	Resistance (mΩ)	Resistance Tolerance
SH2-100R0010DE	100	100	1.0000	0.5%
SH2-150R0006DE	150	100	0.6666	0.5%
SH2-200R0005DE	200	100	0.5000	0.5%
SH3-250R0004DE	250	100	0.4000	0.5%
SH3-300R0003DE	300	100	0.3333	0.5%

B60/C60 Series

Heat Sink System

Ohmite introduces the powerful B60/C60 series heatsink with cam clip (Pat. Pending) or custom mounting. This series offers flexible, high performance and compact heat sink with exchangeable cam clip system for TO-247 and TO-264 devices. The built in lip is provided for mounting ease. The optional B series can be tapped for popular Ohmite resistors or other devices. These powerful heat sinks can be thru-hole soldered as a single or dual unit. The dual unit can be mated to a 60mm fan for greater thermal performance. It is the ideal type of heat sink for high power density and small size (3U or 4U) electronic packaging with forced convection.



SERIES SPECIFICATIONS

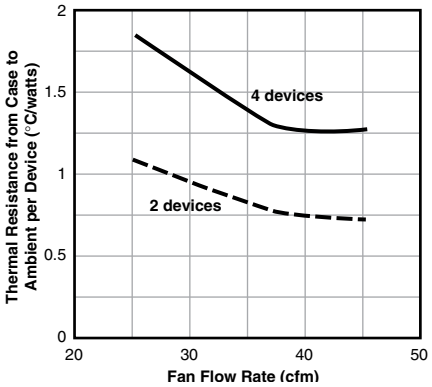
Heatsink Part Number	Surface Area (in^2 / mm^2)	Weight (oz / g)	Length L (mm)
C60-075-VE C60-075-AE	177 / 114,300	5.7 / 163	75
B60-075-VE B60-075-AE	177 / 114,300	5.7 / 163	75

consult factory for alternate lengths and clip combinations

CHARACTERISTICS

Heat Sink	Aluminum Alloy 6063-T5 or Equivalent with either degreased or black anodized finish.
Spring Clip	Music Wire, Per ASTM A228 with bright nickel plating
Solder Foot	Cold-rolled Steel, Per ASTM A-366 with pure tin over copper strike. RoHS compliant.
Fan	60mm fan with 4 self-tapping M3.5 screws
Interface Thermal Resistance	For improvement, use thermal joint compound, 0.005 Grafoil (TGon 800 by Laird), or phase change material (Hi-Flow by Bergquist) Insulator (Optional) Sil-Pad 900-S, K6 800-S and K10 by Bergquist

Heat Dissipation



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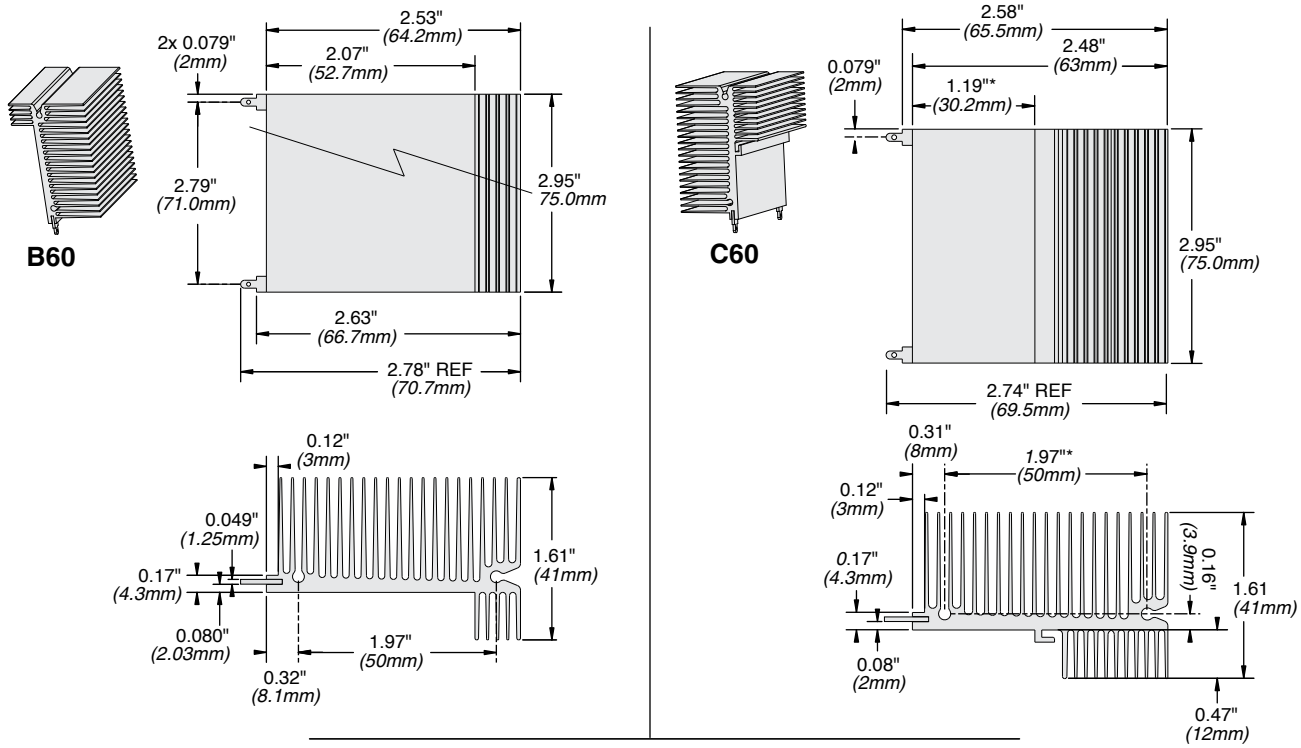
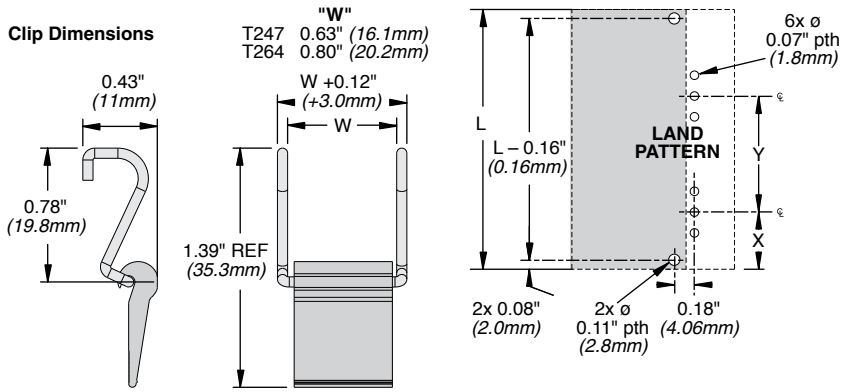
B60/C60 Series

Heat Sink System

DIMENSIONS



NOTE: Due to possible screw torquing on long extrusions, Customer should check for coplanarity prior to final assembly or soldering.



HOW TO ORDER

Heatsink

RoHS compliant

C 6 0 XX - 0 5 8 - A E

Series	Hole pattern	Length	Finish
B = without lip C = with lip	*(optional)*	(mm)	A = black anodized V = degreased

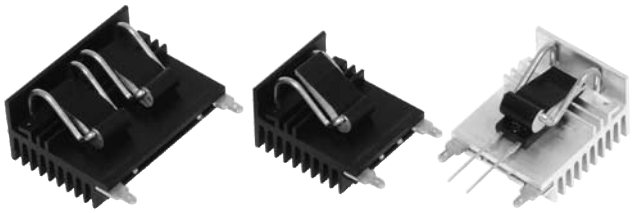
Clip

C L A - T 2 4 7 - 2 1 E

Clip series	Device type	Standard configuration	RoHS compliant
	T247 = TO-247 T264 = TO-264		

C Series

TO-126, TO-247, TO-220 and TO-264 Package Heatsinks



Ohmite introduces the C series (Pat. Pending). This series offers high performance, low cost and a compact heat sink with an integrated camming clip system for TO-126, TO-220, TO-247 and TO-264 devices. This powerful heat sink provides tool and fixture free assembly operation, largest surface areas and smallest space occupation. It is the ideal type of heat sink for high power density and small size (1U or 2U) electronic packaging with forced convection cooling.

FEATURES

- Minimum assembly cost and labor Spring Clips make the mounting holes, fasteners, tools and fixtures obsolete in assembly operations & reduce costs.
- Maximum Thermal Transfer Maximum surface area per unit volume, efficient cooling fins & consistent mounting force reduces thermal resistance.
- Maximum Repeatability Constant spring force over repeated assembly/disassembly.
- Maximum Reliability Resilient spring action locks electronic component in place. Fewer parts in assembly and no fasteners and washers required. Prevent short circuit by eliminating metal particles generated from hardware or thread tapping.
- Design Flexibility Maximum flexibility for dynamic device locations and power upgrading. "Configure-to-Fit" gives designers total freedom to configure heat sink needed to fit into a multitude design environments.

SERIES SPECIFICATIONS

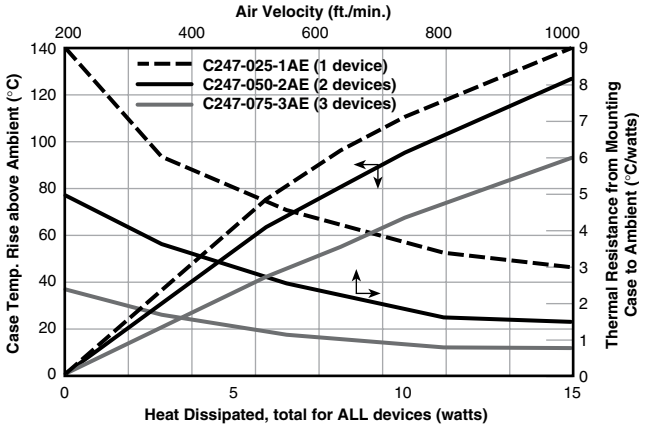
Heatsink Part Number	Surface Area (in^2/mm^2)	Weight (oz/g)	Length "L" (mm)
C247-025	11 / 7,312	0.5 / 15	25
C247-050	23 / 14,858	1.1 / 31	50
C247-075	34 / 21,655	1.6 / 45	75
C264-030	13 / 8,774	0.7 / 19	30
C264-058	25 / 16,963	1.35 / 37	58
C264-085	37 / 24,861	1.97 / 54	85
C220-025	11 / 7,312	0.5 / 15	25
C220-050	23 / 14,858	1.1 / 31	50
C220-075	34 / 21,655	1.6 / 45	75
C126-025	10.2 / 6,559	0.45 / 12.7	25
C126-040	16.3 / 10,495	0.72 / 20.3	40
C126-050	20.4 / 13,119	0.90 / 25.4	50
C126-075	30.6 / 21,655	1.35 / 38.1	75

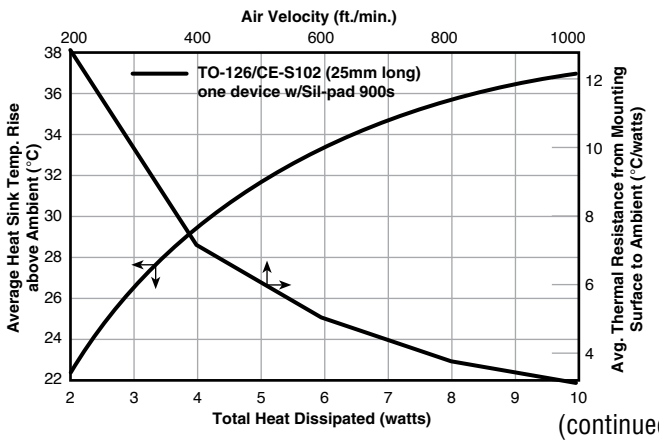
CHARACTERISTICS

Heat Sink	Aluminum Alloy 6063-T5 or Equivalent with either degreased or black anodized finish.
Spring Clip	Music Wire, Per ASTM A228 with bright nickel plating
Solder Foot	Cold-rolled Steel, Per ASTM A-366 with pure tin over copper strike. RoHS compliant.
Interface Thermal Resistance	for improvement, use thermal joint compound, 0.005 Grafoil (TGon 800 by Laird), or phase change material (Hi-Flow by Bergquist)
Insulator	(Optional) Sil-Pad 900-S, K6 800-S and K10 by Bergquist

HEAT DISSIPATION

Heat dissipation is the total for ALL DEVICES attached to heatsink.



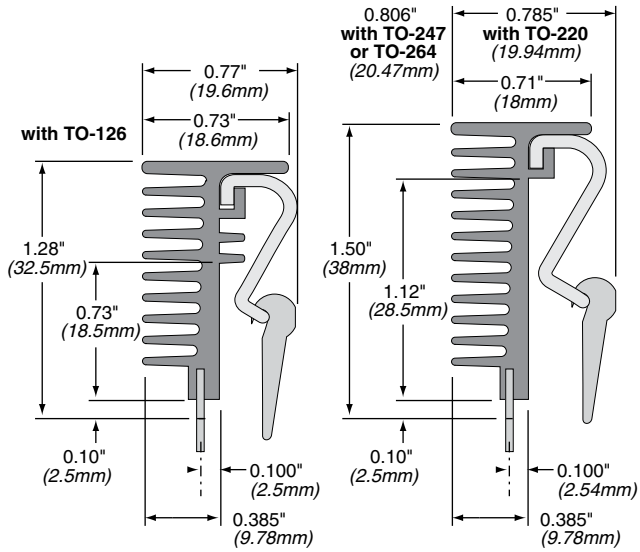


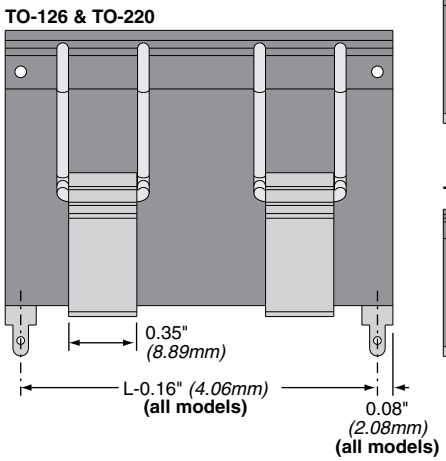
(continued)

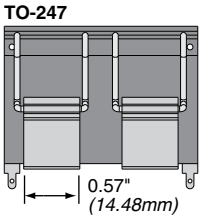
C Series

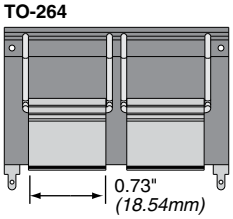
TO-126, TO-247, TO-220 and TO-264 Package Heatsinks

DIMENSIONS



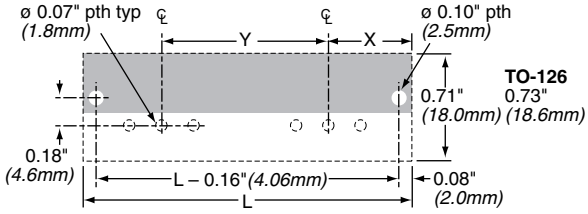






Land Pattern

X and Y dimensions at user discretion



HOW TO ORDER

RoHS Compliant

C 2 4 7 - 0 2 5 - 1 A E

- C — Series
- 247 — Clip size
- 025 — Length (mm)
- 1 — No. of clips
- A — Finish: A = black anodized, V = degreased
- E — RoHS Compliant

Standard part numbers

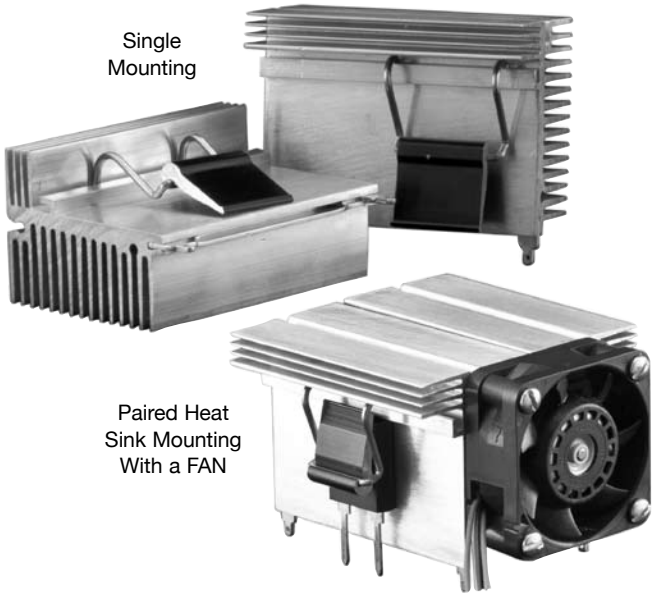
No Finish (degreased)	Black Anodized	No. of Clips
C247-025-1VE	C247-025-1AE	1
C247-050-2VE	C247-050-2AE	2
C247-075-3VE	C247-075-3AE	3
C264-030-1VE	C264-030-1AE	1
C264-058-2VE	C264-058-2AE	2
C264-085-3VE	C264-085-3AE	3
C220-025-1VE	C220-025-1AE	1
C220-050-2VE	C220-050-2AE	2
C220-075-3VE	C220-075-3AE	3
C126-025-1VE	C126-025-1AE	1
C126-040-2VE	C126-040-2AE	2

Packaging: Bulk

C40 Heat Sink System

For TO-247, TO-264 and SOT-227 Packages

The C40 Series Heat Sink System (Patent Pending) offers flexible, high performance and compact heat sinks with an exchangeable cam clip system for TO-247, TO-264 and SOT-227 (clip in development) devices. This powerful heat sink can be thru-hole soldered in single or paired configurations. The paired unit has mounting holes to accomodate a 40mm x 40mm fan. It is the ideal type of heat sink for high power density and small size (1U or 2U) electronic packaging with forced convection.



SERIES SPECIFICATIONS

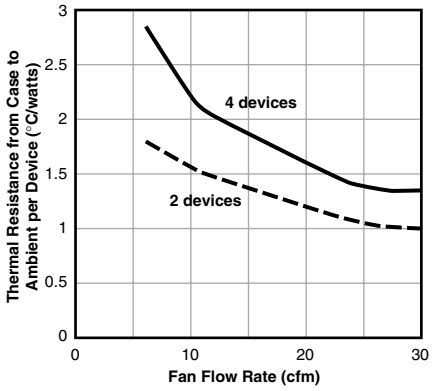
Heatsink Part Number	Surface Area (in^2 / mm^2)	Weight (oz / g)	Length L (mm)
C40-058-VE C40-058-AE	63.8 / 41,180	2.5/ 71	58

consult factory for alternate lengths and clip combinations

CHARACTERISTICS

Heat Sink	Aluminum Alloy 6063-T5 or Equivalent with either degreased or black anodized finish.
Spring Clip	Music Wire, Per ASTM A228 with bright nickel plating
Solder Foot	Cold-rolled Steel, Per ASTM A-366 with pure tin over copper strike. RoHS compliant.
Fan	40mm fan with 4 self-tapping M3 screws
Interface Thermal Resistance	For improvement, use thermal joint compound, 0.005 Grafoil (TGon 800 by Laird), or phase change material (Hi-Flow by Bergquist) Insulator (Optional) Sil-Pad 900-S, K6 800-S and K10 by Bergquist

Heat Dissipation

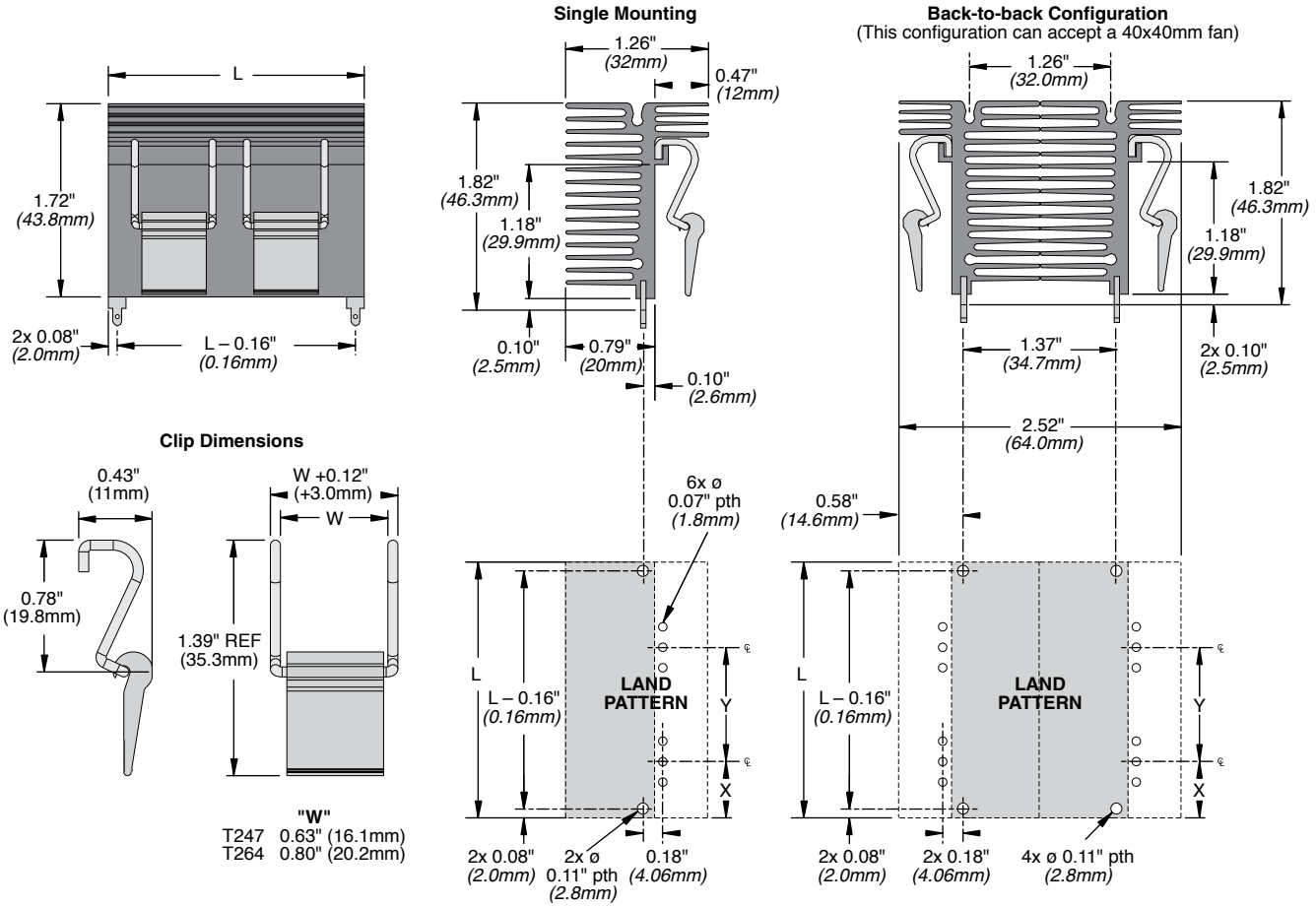


(continued)

C40 Heat Sink System

For TO-247, TO-264 and SOT-227 Packages

DIMENSIONS



NOTE: Due to possible screw torquing on long extrusions, Customer should check for coplanarity prior to final assembly or soldering.

HOW TO ORDER

Heatsink

C 4 0 - 0 5 8 - A E

- **Series**
- **Length** (mm)
- **Finish**
  - A = black anodized
  - V = degreased
- **RoHS compliant**

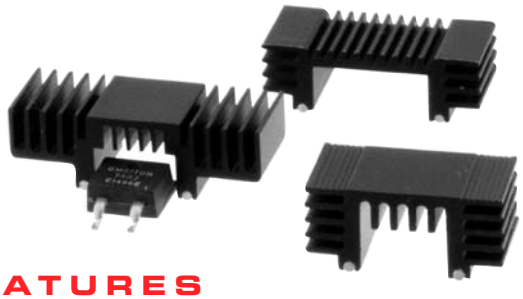
Clip

C L A - T 2 4 7 - 2 1 E

- **Clip series**
- **Device type**
  - T247 = TO-247
  - T264 = TO-264
  - S227 = SOT-227
  - *(in development)*
- **Standard configuration**
- **RoHS compliant**

D Series

Heatsink For TO-252, TO-263 and TO-268 devices



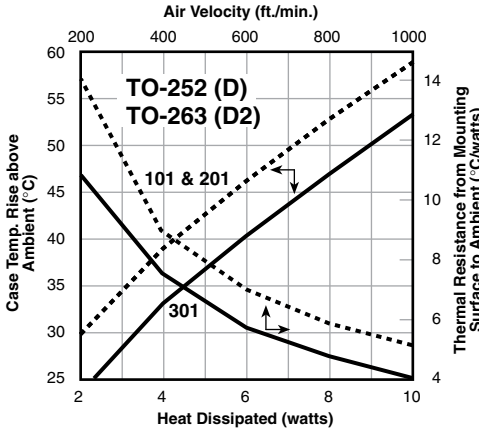
Ohmite D Series heatsinks provide an innovative solution for SMT compatible semiconductors and resistors. The unique design (Patent Pending) combines tin plated, solderable rods with an aluminum extruded heat sink body. These rods (or "rollers") are mated mechanically to the heatsink by forging to reduce the thermal resistance between the heatsink body and the solderable feet.

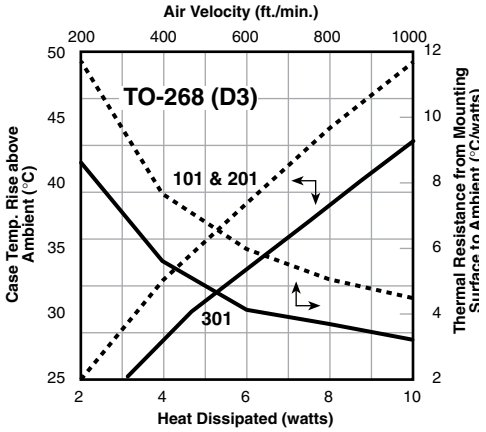
Specifically designed for use with the increasingly popular TO-252, TO-263 and TO-268 packages, the D Series affords the user superior thermal performance over the more common stamped aluminum heatsinks. By eliminating the staking joint typically used in stamped heatsinks, the resulting air gap and thermal "bottle-neck" is also eliminated, while surface area for cooling is maximized with the extruded fins of the D Series body.

FEATURES

- Increased surface areas by 3 times therefore thermal performance up to 300% over the aluminum stamped heat sinks on markets
- Light weight aluminum construction allows faster pick and place assembly reducing the manufacturing cycle time
- Radius mounted "Rollers" are designed for maximizing heat transfer from the component and avoiding the thermal "bottle-neck" seen in stamped and staked heatsinks.
- Available in bulk packaging or tape & reel (250 units per reel
- RoHS Compliant

HEAT DISSIPATION

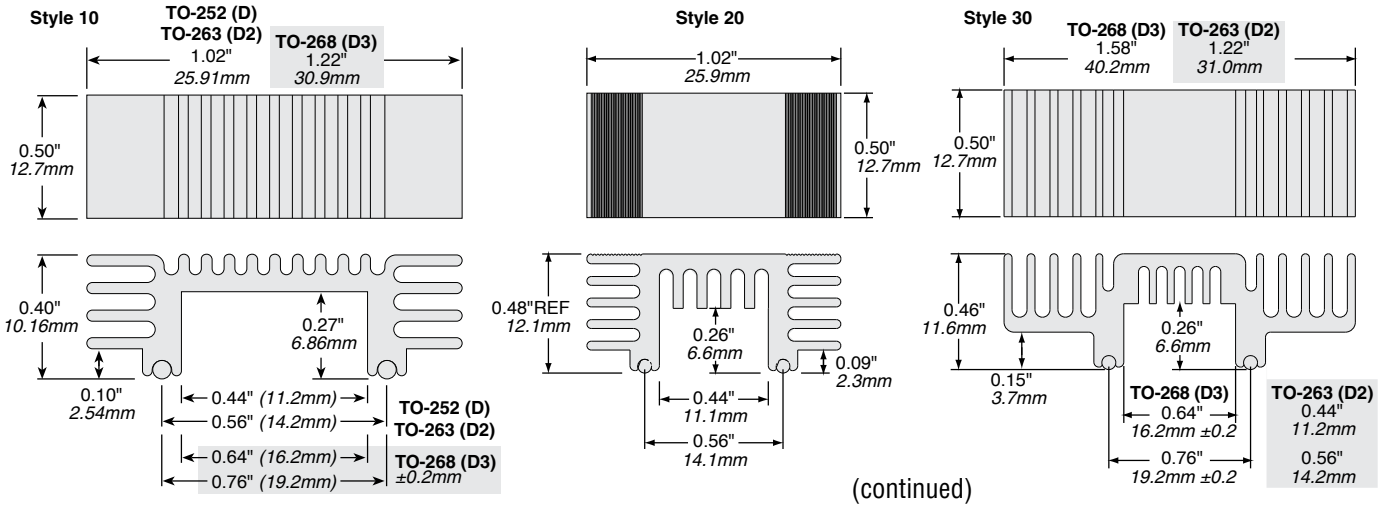




Final thermal performance is highly dependent on the thermal characteristics of the PCB. It is possible to see a 50% drop in temp rise in natural convection with a thermally improved PCB.

DIMENSIONS

±0.012" / ±0.30mm



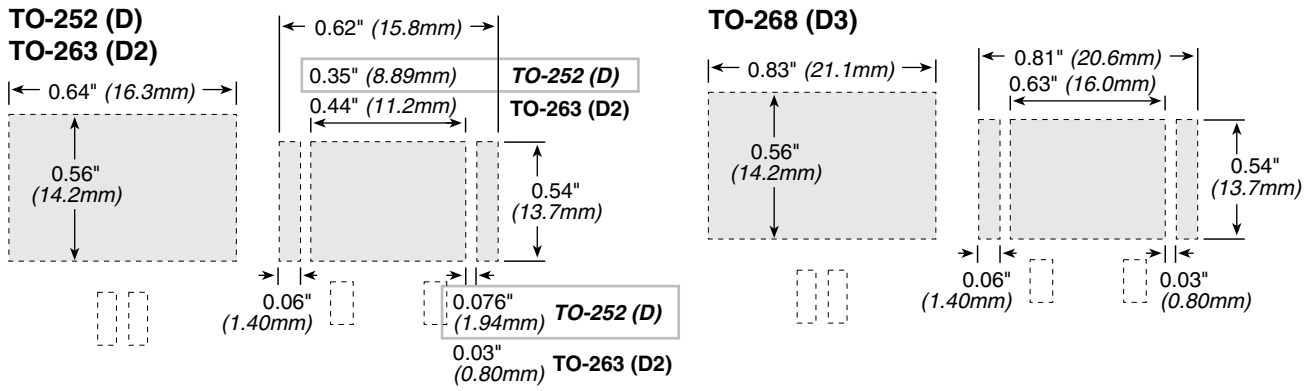
(continued)

D Series

Heatsink For TO-252, TO-263 and TO-268 devices

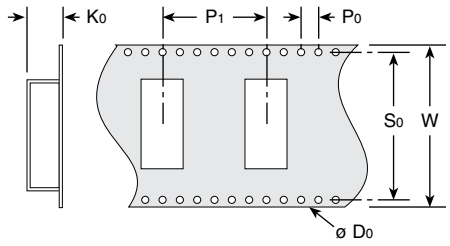
LAND PATTERNS

Land Patterns for D, D2 and D3

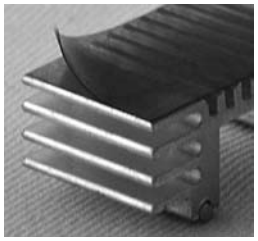


TAPE AND REEL

Reel diameter: 13.00" (330.00mm)
200 pcs. per



	Style 10	Style 20	Style 30
D_0	1.55mm	1.5mm	1.5mm
K_0	10.5mm	12.20mm	11.50mm
P_0	4mm	4.0mm	4.0mm
P_1	24mm	24mm	24.0mm
S_0	40.4mm	40.4mm	52.4mm
W	44mm	44mm	56mm



Removable Kapton tape on each part facilitates handling by automatic pick and place equipment. **Style 10 tape and reel only.**

ORDERING INFORMATION

Style (10, 20 or 30) | RoHS Compliant

D A - T 2 6 3 - 2 0 1 E - T R

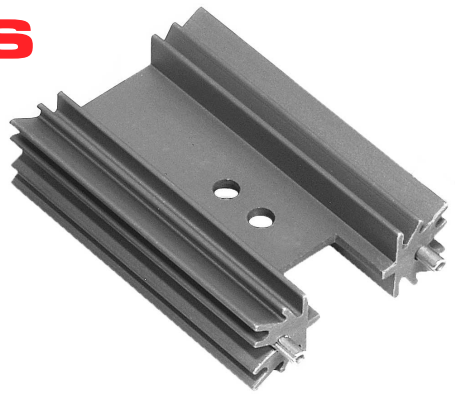
- **Series**: D
- **Finish**: A = black anodized; V = degreased
- **Package**: T263 = TO-263 (or TO-252); T268 = TO-268
- **Length**: 1 = 0.50"; 2, 3, 4 = optional lengths assigned sequentially on customer request
- **Tape & Reel**

Standard part numbers For D Series

Part Number	Description	Packaging	Weight
DV-T263-101E	for D2 pack, degreased	Bulk	3.8 g
DA-T263-101E	for D2 pack, black anodized	Bulk	3.8 g
DV-T263-101E-TR	for D2 pack, degreased	Reel	3.8 g
DA-T263-101E-TR	for D2 pack, black anodized	Reel	3.8 g
DV-T268-101E	for D3 pack, degreased	Bulk	4.1 g
DA-T268-101E	for D3 pack, black anodized	Bulk	4.1 g
DV-T268-101E-TR	for D3 pack, degreased	Reel	4.1 g
DA-T268-101E-TR	for D3 pack, black anodized	Reel	4.1 g
DV-T263-201E	for D or D2 pack, degreased	Bulk	
DA-T263-201E	for D or D2 pack, black anodized	Bulk	
DV-T263-201E-TR	for D or D2 pack, degreased	Reel	
DA-T263-201E-TR	for D or D2 pack, black anodized	Reel	
DV-T268-301E	for D3 pack, degreased	Bulk	
DA-T268-301E	for D3 pack, black anodized	Bulk	
DV-T268-301E-TR	for D3 pack, degreased	Reel	
DA-T268-301E-TR	for D3 pack, black anodized	Reel	
DV-T263-301E	for D2 pack, degreased	Bulk	
DA-T263-301E	for D2 pack, black anodized	Bulk	
DV-T263-301E-TR	for D2 pack, degreased	Reel	
DA-T263-301E-TR	for D2 pack, black anodized	Reel	

E Series Heatsinks

For TO-220 devices



FEATURES

- Vertical through-hole PCB mounting
- 0.142 in. diameter mounting holes (3)

SERIES SPECIFICATIONS

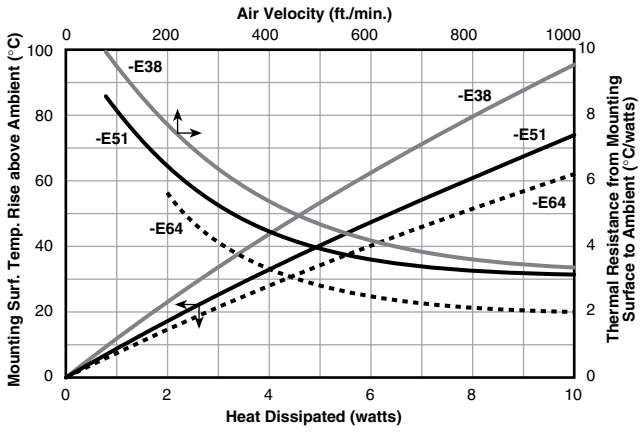
Heatsink Part Number	For Package Type	Ohmite Resistor Series	Surface Area (in^2)	Weight	Thermal Resistance* (°C/W)
EV-T220-38E EA-T220-38E	TO-220	TBH25, TCH35	11.5	0.63 oz/18g	11.4 9.5
EV-T220-51E EA-T220-51E	TO-220	TBH25, TCH35	15.2	0.85 oz/24g	9.0 7.5
EV-T220-64E EA-T220-64E	TO-220	TBH25, TCH35	18.8	1.06 oz/30g	7.4 6.2

*Natural convection at 10W dissipation

CHARACTERISTICS

Heat sink	Aluminum 6063-T5 or equivalent with either black anodized or degreased finish
Solder feet	Tin plated brass
Interface thermal resistance	for improvement, use thermal joint compound or 0.005 Grafoil (TGon 800 by Laird)
Interface electrical isolation	Sil-Pad 900S by Bergquist or equivalent

Heat Dissipation



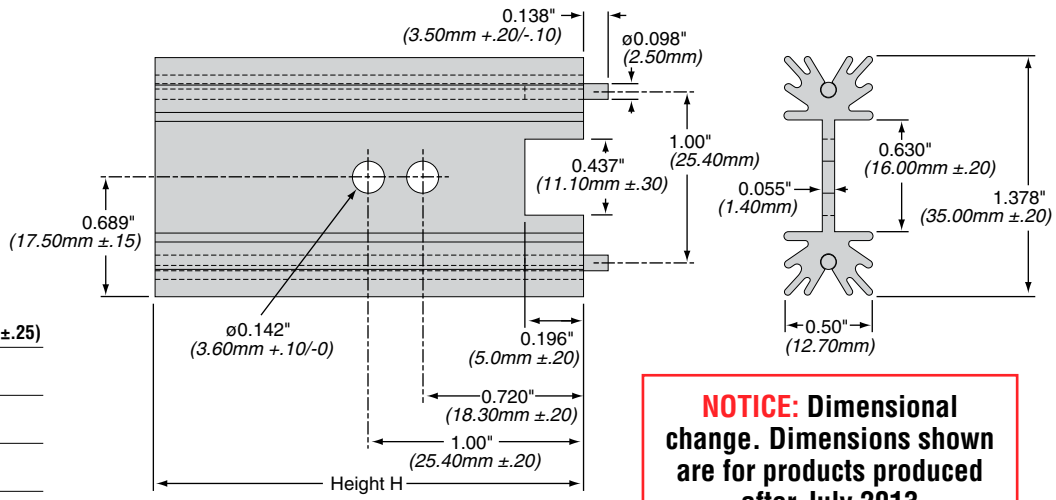
(continued)

E Series Heatsinks

For TO-220 devices

DIMENSIONS

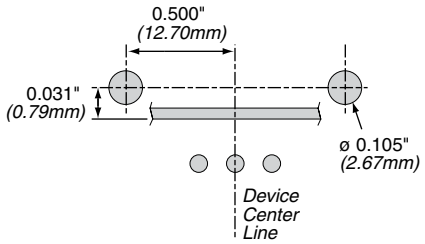
(in./mm)



Part Number	Height (in. ±.010 / mm ±.25)
EV-T220-38E EA-T220-38E	1.5 / 38.10
EV-T220-51E EA-T220-51E	2.0 / 50.80
EV-T220-64E EA-T220-64E	2.5 / 63.50

NOTICE: Dimensional change. Dimensions shown are for products produced after July 2013

Land Pattern



ORDERING INFORMATION

Series | **Package type** to be heatsinked | **RoHS Compliant**

E V - T 2 2 0 - 5 1 E

Finish
A = black anodized
V = degreased

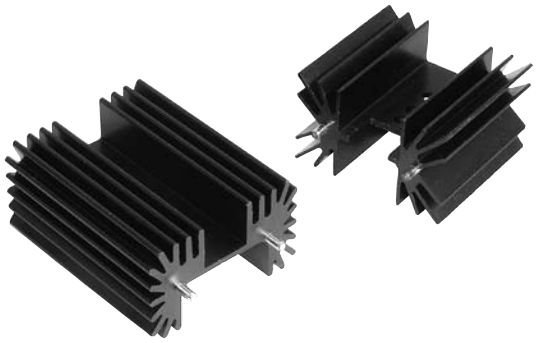
Height (mm)

Standard part numbers

Part Number	Description	Packaging
EV-T220-38E	Heat sink for TO-220, no finish (degreased)	Bulk
EA-T220-38E	Heat sink for TO-220, black anodized	Bulk
EV-T220-51E	Heat sink for TO-220, no finish (degreased)	Bulk
EA-T220-51E	Heat sink for TO-220, black anodized	Bulk
EV-T220-64E	Heat sink for TO-220, no finish (degreased)	Bulk
EA-T220-64E	Heat sink for TO-220, black anodized	Bulk

F and R Series Heatsinks

For TO-218, TO-220 and TO-247 devices



FEATURES

- For vertical mounting with solderable pins
- For TO-220, TO-218, TO-247

SERIES SPECIFICATIONS

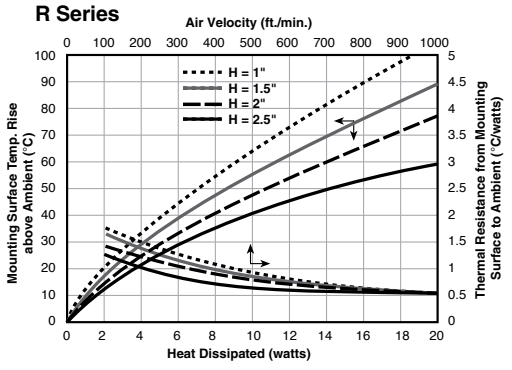
Heatsink Part Number	Height (in. ±.010 / *mm ±.25*)	For Package Type	Ohmite Resistor Series	Surface Area (mm^2)	Weight (g)	Thermal Res.* (°C/W)
RA-T2X-25E	1.0/25.4	TO-220, -218, -247	TBH25,TCH35, TEH70, TEH100	8,901	25	4.8
RA-T2X-38E	1.5/38.1	TO-220, -218, -247	TBH25,TCH35, TEH70, TEH100	12,983	38	3.9
RA-T2X-51E	2.0/50.8	TO-220, -218, -247	TBH25,TCH35, TEH70, TEH100	17,065	51	3.5
RA-T2X-64E	2.5/63.5	TO-220, -218, -247	TBH25,TCH35, TEH70, TEH100	21,148	63	3.1
FA-T220-25E	1.0 / 25.4	TO-220, -218, -247	TBH25,TCH35, TEH70, TEH100	9,285	18	4.7
FA-T220-38E	1.5 / 38.1	TO-220, -218, -247	TBH25,TCH35, TEH70, TEH100	13,756	27	3.8
FA-T220-51E	2.0 / 50.8	TO-220, -218, -247	TBH25,TCH35, TEH70, TEH100	18,222	37	3.4
FA-T220-64E	2.5 / 63.5	TO-220, -218, -247	TBH25,TCH35, TEH70, TEH100	22,814	46	3

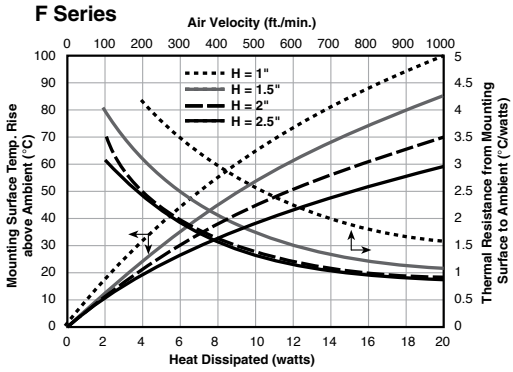
*Natural convection

CHARACTERISTICS

Finish	Black anodized
Material	6063-T5 aluminum
Solder	100% Tin (Sn)
PC board attachement	0.091” dia. pre-tinned pins.

Heat Dissipation





(continued)

F and R Series Heatsinks

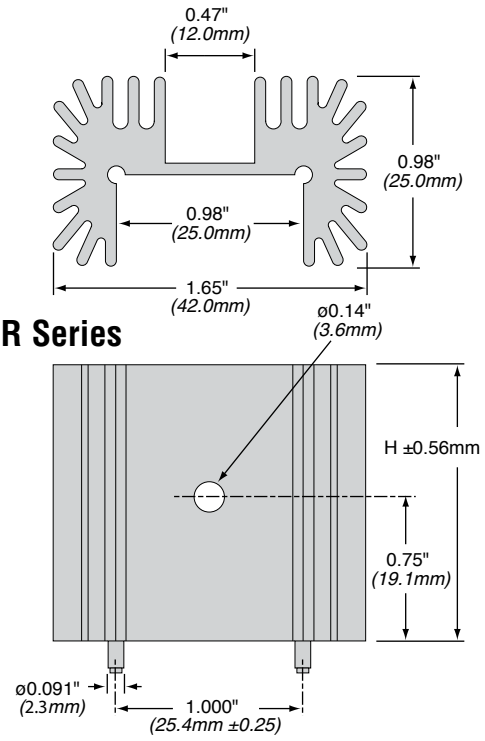
For TO-218, TO-220 and TO-247 devices

DIMENSIONS

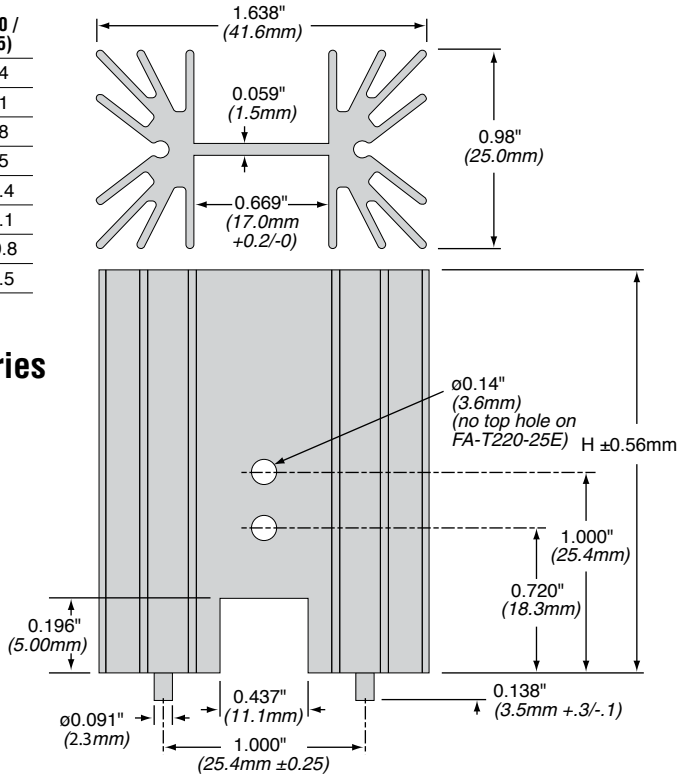
(in./mm)

Part Number	Height (in. ±.010 / mm ±.25)
RA-T2X-25E	1.0/25.4
RA-T2X-38E	1.5/38.1
RA-T2X-51E	2.0/50.8
RA-T2X-64E	2.5/63.5
FA-T220-25E	1.0 / 25.4
FA-T220-38E	1.5 / 38.1
FA-T220-51E	2.0 / 50.8
FA-T220-64E	2.5 / 63.5

R Series



F Series



NOTICE:
Dimensional change. Dimensions shown are for products produced after September 2012

ORDERING INFORMATION

Series
F or R

T2X = R Series
T220 = F Series

RoHS Compliant

R A - T 2 X - 2 5 E

Finish
A = black anodized
V = degreased

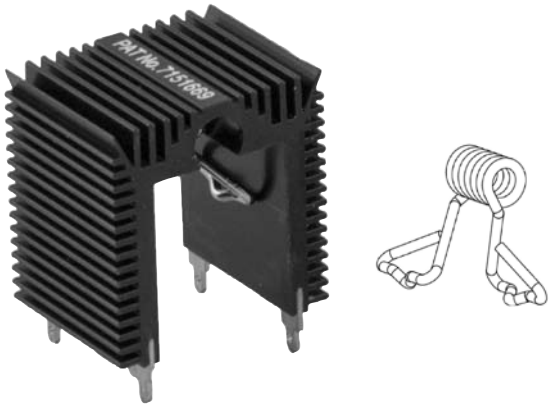
Height
(mm)

Standard part numbers

Part Number	Description	Packaging
RA-T2X-25E	Heat sink for TO-220, TO-218, TO-247, Black Anodized	Bulk
RA-T2X-38E	Heat sink for TO-220, TO-218, TO-247, Black Anodized	Bulk
RA-T2X-51E	Heat sink for TO-220, TO-218, TO-247, Black Anodized	Bulk
RA-T2X-64E	Heat sink for TO-220, TO-218, TO-247, Black Anodized	Bulk
FA-T220-25E	Heat sink for TO-220, TO-218, TO-247, Black Anodized	Bulk
FA-T220-38E	Heat sink for TO-220, TO-218, TO-247, Black Anodized	Bulk
FA-T220-51E	Heat sink for TO-220, TO-218, TO-247, Black Anodized	Bulk
FA-T220-64E	Heat sink for TO-220, TO-218, TO-247, Black Anodized	Bulk

M Series Heatsinks

Heatsink with clips for TO-264 and TO-247



Ohmite introduces the M series, patented (Pat. No. 7,151,669), high performance, low cost, configurable, scalable and compact heat sink with matrix clip system for TO-247 and TO-264 packages. This powerful heat sink provides the easiest assembly, largest surface area and smallest footprint. It is the ideal type of heat sink for high power density and small size (1U or 2U) electronic packaging with forced convection cooling.

FEATURES

- Minimum assembly cost and labor. Spring Clips make the mounting holes and fasteners obsolete in assembly operations & reduce costs.
- Maximum Thermal Transfer. Maximum surface area per unit volume, efficient cooling fins & consistent mounting force reduces thermal resistance
- Maximum Repeatability. Constant spring force over repeated assembly/disassembly
- Maximum Reliability. Resilient spring action locks electronic component in place. Fewer parts in assembly and no fasteners and washers required. Prevent short circuit by eliminating metal particles generated from hardware or thread tapping
- Design Flexibility. Maximum flexibility for dynamic device locations and power up grading. “Configure-to-Fit” & “Scale-to-Meet” options give designers the total freedom to configure the heat sink to fit their packaging designs and to scale the heat sink to meet their power dissipations.

SERIES SPECIFICATIONS

Part No.	Surface Area (in^2/mm^2)	Weight (oz./g)	Thermal Resistance (°c/w)*
MV-102-55E	45 / 29,097	2.2 / 63	6.0
MA-102-55E	45 / 29,097	2.2 / 63	5.2
MV-101-27E	22 / 14,284	1.1 / 31	9.6
MA-101-27E	22 / 14,284	1.1 / 31	8.0
MV-302-55E	76 / 49,218	4.7 / 134	3.6
MA-302-55E	76 / 49,218	4.7 / 134	3.0
MV-301-27E	37.3 / 24,161	2.3 / 66	5.5
MA-301-27E	37.3 / 24,161	2.3 / 66	4.6

* $R\text{-theta}_{c\text{-}a}$ for 18W dissipation total for two devices in natural convection

CHARACTERISTICS

Heat Sink	Aluminum Alloy 6063-T5 or Equivalent with either degreased or black anodized finish.
Spring Clip	Music Wire, Per ASTM A228 with bright nickel plating
Solder Foot	Cold-rolled Steel, Per ASTM A-366 with pure tin over copper strike. RoHS compliant.
Interface thermal resistance	Thermal joint compound or 0.005 Grafoil (TGon 800 by Laird)
Interface electrical isolation	Sil-Pad 900S by Bergquist or equivalent

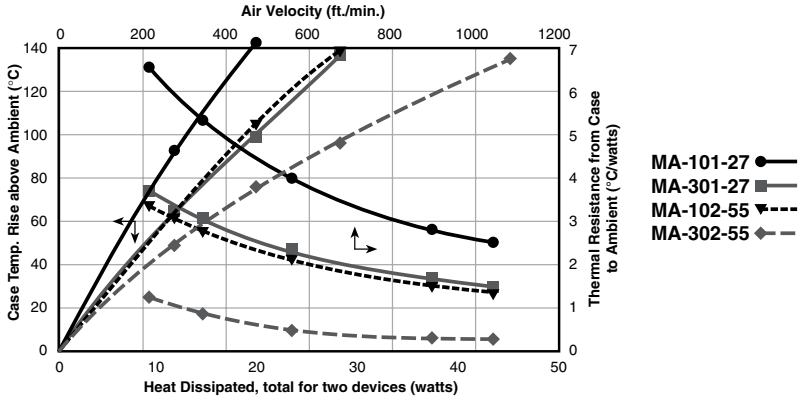
(continued)

M Series Heatsinks

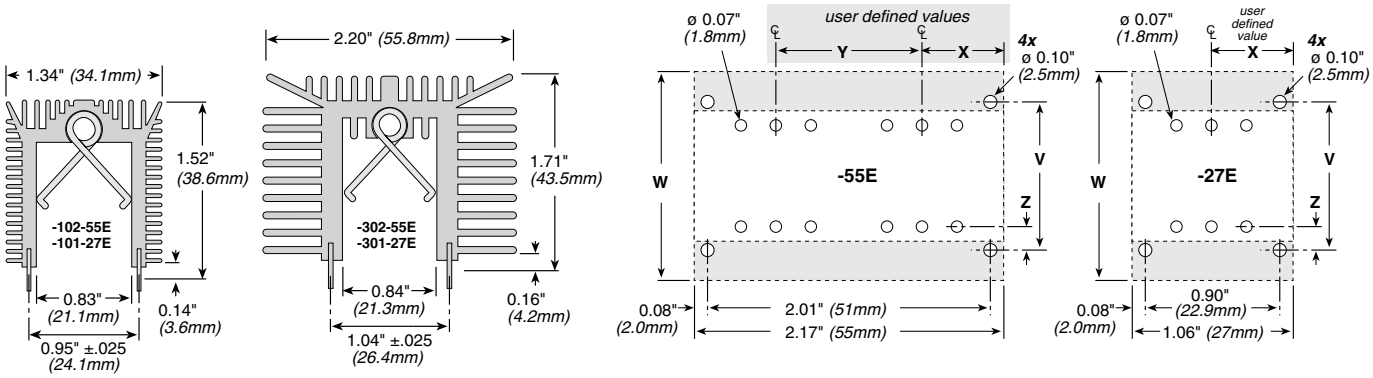
Heatsink with clips for TO-264 and TO-247

HEAT DISSIPATION

For two devices



DIMENSIONS



Part Number	W	V	Z*
MV-102-55E MA-102-55E MA-101-27E MA-101-27E	1.35" / 34.3	0.95" / 24.1	0.18" / 4.6
MV-302-55E MA-302-55E MA-301-27E MA-301-27E	2.20" / 55.9	1.04" / 26.4	0.21" / 5.3

**Device package dimensions can vary. Customer should verify this dimension.*

HOW TO ORDER

No. of clips — RoHS Compliant

M V - 1 0 2 - 5 5 E

- **Series**
- **Finish**: A = black anodized; V = degreased
- **Length** (mm)

Standard Part Numbers

Part Number	Description	Packaging
MV-102-55E	55mm No finish (degreased)	Bulk
MA-102-55E	55mm Black anodized	Bulk
MV-101-27E	27mm No finish (degreased)	Bulk
MA-101-27E	27mm Black anodized	Bulk
MV-302-55E	55mm No finish (degreased)	Bulk
MA-302-55E	55mm Black anodized	Bulk
MV-301-27E	27mm No finish (degreased)	Bulk
MA-301-27E	27mm Black anodized	Bulk

R2 Series

For TO-220, TO-247, and TO-264

Ohmite's R2 Series (patent pending) heatsink provides a large surface area along with our C Series clipping mechanism to attach to a TO-220, TO-247, or TO-264 package. The self-aligning features of the clip assure secure attachment and enhanced thermal performance. Because no screws are required for device mounting, additional fins can be added to the rear side of the heatsink for increased total surface area in a more compact space.

FEATURES

- **Reduced Assembly Cost:** C Series camming clips make fasteners and fixtures obsolete, along with stray metal filings from tapped holes.
- **Maximum Repeatability:** clamping force of the clip is not degraded by repeated loading and unloading.
- **Maximum Heat Transfer per Unit Space:** maximum surface area per unit volume and consistent mounting force reduces thermal resistance
- **Maximum Resistance to Shock and Vibration:** light weight, resilient clips lock the component in place and are highly resistant to shock and vibration
- **Maximum Reliability:** helps prevent short circuits by eliminating metal particles from thread tapping
- **RoHS compliant**

SERIES SPECIFICATIONS

Heatsink Part Number	Surface Area (in^2/mm^2)	Weight (oz/g)	Thermal Resistance* (°C/W)
R2V-CT2-38E	21 / 13,579	0.92 / 26	9.8
R2A-CT2-38E	21 / 13,579	0.92 / 26	8.6
R2V-CT4-38E	21 / 13,579	1.02 / 29	9.8
R2A-CT4-38E	21 / 13,579	1.02 / 29	8.6
R2V-CT6-38E	21 / 13,579	1.02 / 29	9.8
R2A-CT6-38E	21 / 13,579	1.02 / 29	8.6

*Free convection at 15W

CHARACTERISTICS

Heat Sink	Aluminum Alloy 6063-T5 or Equivalent with either degreased or black anodized finish
Spring Clip	Music Wire, Per ASTM A228 with bright nickel plating
Solder Foot	Cold-rolled Steel, Per ASTM A-366 with pure tin over copper strike. RoHS compliant
Interface Thermal Resistance	for improvement, use thermal joint compound, 0.005 Grafoil (TGon 800 by Laird), or phase change material (Hi-Flow by Bergquist)
Insulator	(Optional) Sil-Pad 900-S, K6 800-S and K10

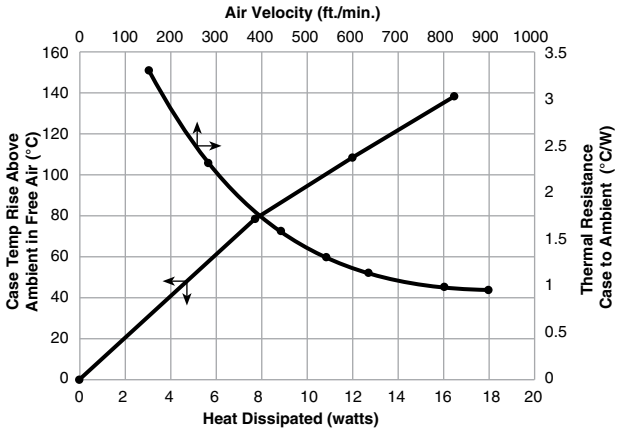
(continued)

R2 Series

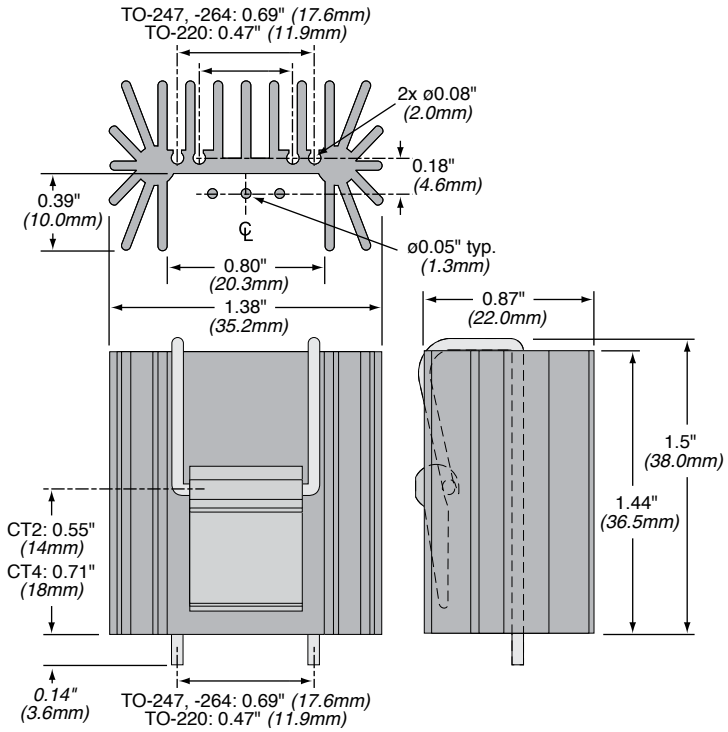
For TO-220, TO-247, and TO-264

HEAT DISSIPATION

TO-247 with no thermal interface material



DIMENSIONS



HOW TO ORDER

Series R2 | **Clip** C = camming clip | **RoHS** Compliant

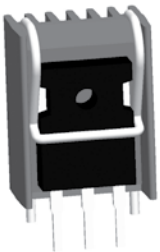
R 2 V - C T 2 - 3 8 E

Finish A = black anodized, V = degreased | **Package** T2 = TO220, T4 = TO247, T6 = TO264 | **Height** (mm)

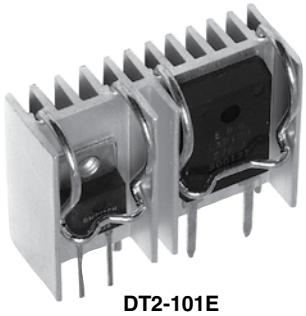
W Series Heatsinks

For TO-220, TO-247, and TO-264 devices

T220-101E



T247-101E
T264-101E



DT2-101E

The unique design (patent pending) of the W Series heat sinks combines a tin plated, solderable, integral spring clip with an extruded aluminum heat sink body for an all-in-one solution to through-hole mounting of TO-220, TO-247, and TO-264 packages. These self-aligning heat sinks feature solderable feet and an integrated clip with 13.2 (lbf) of force on the center of the device to enhance thermal performance.

FEATURES

- Reduced Assembly Cost: spring clip and auto-align feature makes fasteners and fixtures obsolete, along with stray metal filings from tapped holes
- Maximum Repeatability: clamping force of the spring clip is not degraded by repeated loading and unloading
- Maximum Heat Transfer per Unit Space: maximum surface area per unit volume and consistent mounting force reduces thermal resistance
- Maximum Resistance to Shock and Vibration: light weight, resilient spring clip locks the component in place and is highly resistant to shock and vibration
- Maximum Reliability: helps prevent short circuits by eliminating metal particles from thread tapping
- RoHS Compliant

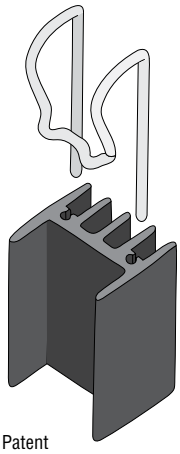
SERIES SPECIFICATIONS

Heatsink Part Number	For Package Type	Ohmite Resistor Series	Surface Area (in^2)	Weight	Thermal Resistance*
WA-T220-101E WV-T220-101E	TO-220	TBH25, TCH35	6.5	0.35 oz/10g	Rs-a=12°C/W Rs-a=13°C/W
WA-T247-101E WV-T247-101E	TO-247	TEH70, TEH100	8.4	0.42 oz/12g	Rs-a=11°C/W Rs-a=12°C/W
WA-T264-101E WV-T264-101E	TO-264	TFH85	8.4	0.42 oz/12g	Rs-a=11°C/W Rs-a=12°C/W
WA-DT2-101E WV-DT2-101E	TO-220 & TO-247	TBH25, TCH35, TEH70, TEH100	15.1	0.79 oz/22g	Rs-a=7°C/W Rs-a=8°C/W

*Natural convection at 10W heat dissipation

CHARACTERISTICS

Heat Sink	Aluminum alloy 6063-T5 or equivalent.
Spring Clip	Music wire, per ASTM A228
Pin	Solderable 100% tin over copper strike
Interface thermal resistance	for improvement, use thermal joint compound or 0.005 Grafoil (TGon 800 by Laird)
Interface electrical isolation	Sil-Pad 900S by Bergquist or equivalent
Mounting	Vertical thru-hole mount
Clip Force	13.2 lbf.



Patent Pending

(continued)

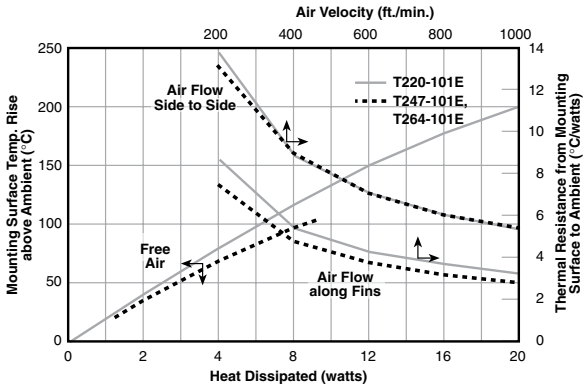
W Series Heatsinks

For TO-220, TO-247, and TO-264 devices

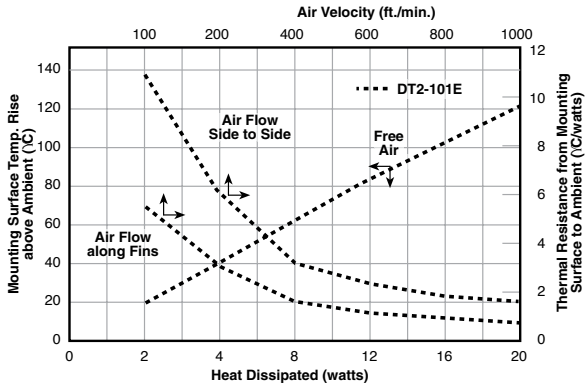
CHARACTERISTICS

Heat Dissipation

T220-101E, T247-101E and T264-101E

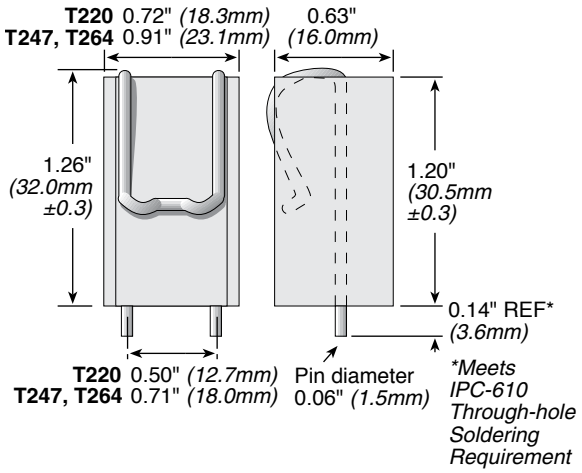


DT2-101E

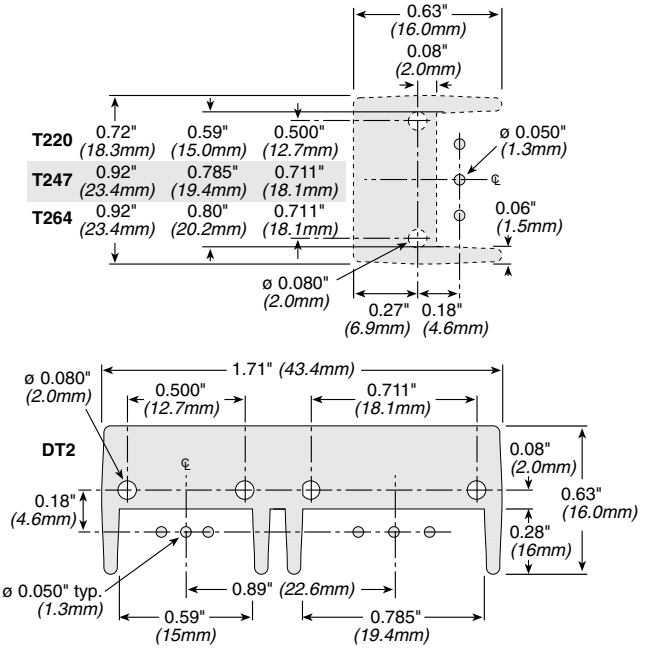


DIMENSIONS

(in./*mm ±0.3mm)*



Land pattern



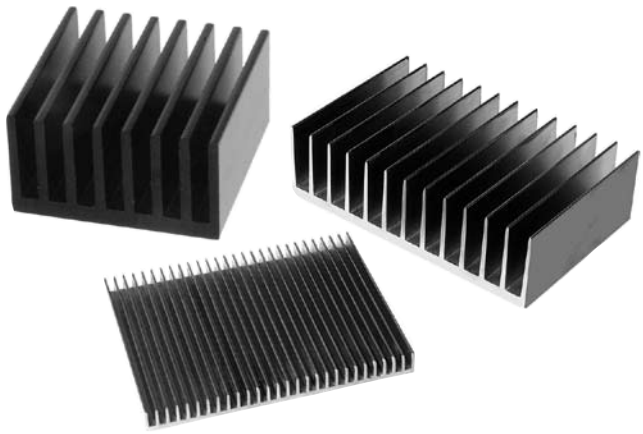
ORDERING INFORMATION

Standard part numbers

Part Number	Description	Packaging
WA-T220-101E	Heat sink for TO-220, black anodized	Bulk
WV-T220-101E	Heat sink for TO-220, no finish (degreased)	Bulk
WA-T247-101E	Heat sink for TO-247, black anodized	Bulk
WV-T247-101E	Heat sink for TO-247, no finish (degreased)	Bulk
WA-T264-101E	Heat sink for TO-264, black anodized	Bulk
WV-T264-101E	Heat sink for TO-264, no finish (degreased)	Bulk
WA-DT2-101E	Heat sink for TO-247 &TO-220, black anodized	Bulk
WV-DT2-101E	Heat sink for TO-247 &TO-220, no finish (degreased)	Bulk

AH Series

Extrusion Heatsinks



FEATURES

- Many other extrusion profiles available. Contact Ohmite with your requirements
- Multiple finishes available
- Modifications available: screw holes, bolt patterns, milling per customer specifications

SERIES SPECIFICATIONS

Part	Width (in. - mm)	Height (in. - mm)	Base Thickness (in. - mm)	Weight (lb./ft. - kg/m)	Rθ (°C/W)	Surface area ($in.^2/in.$ - mm^2/mm)
AH33000	0.75 / 19.05	0.6 / 15.24	0.09 / 2.29	0.278 / 0.413	8	9.633 / 244.68
AH54100	0.94 / 23.88	0.41 / 10.41	0.06 / 1.52	0.262 / 0.389	6.2	11.49 / 291.85
AH80126	1.095 / 27.81	1.15 / 29.21	0.2 / 5.08	0.6 / 0.891	7.1	9.881 / 250.98
AH17500	1.5 / 38.10	0.44 / 11.18	0.09 / 2.29	0.42 / 0.624	4.8	26.539 / 674.09
AH10564	1.875 / 47.63	1 / 25.40	0.188 / 4.78	1.049 / 1.558	2.3	16.174 / 410.82
AH10551	1.92 / 48.77	1.25 / 31.75	0.25 / 6.35	1.08 / 1.604	3.8	18.005 / 457.33
AH40000	2.1 / 53.34	1 / 25.40	0.12 / 3.05	1.184 / 1.758	3.7	22.576 / 573.43
AH29300	2.28 / 57.91	0.38 / 9.65	0.06 / 1.52	0.466 / 0.692	3.6	14.274 / 362.56
AH10719	2.312 / 58.72	1.5 / 38.10	0.156 / 3.96	1.327 / 1.971	3	23.288 / 591.52
AH67200	2.892 / 73.46	1.062 / 26.97	0.306 / 7.77	1.855 / 2.755	3.1	22.315 / 566.80
AH48600	3 / 76.20	2.25 / 57.15	0.28 / 7.11	2.968 / 4.407	1.8	47.494 / 1,206.35
AH64100	3.12 / 79.25	1.25 / 31.75	0.312 / 7.92	2.125 / 3.156	2.7	24.613 / 625.17
AH80015	3.356 / 85.24	3.136 / 79.65	0.216 / 5.49	3.326 / 4.939	0.9	64.702 / 1,643.43
AH80000	3.5 / 88.90	0.85 / 21.59	0.2 / 5.08	1.432 / 2.127	2.2	24.973 / 634.31
AH12153	3.6 / 91.44	1.15 / 29.21	0.22 / 5.59	2.23 / 3.312	1.9	32.46 / 824.48
AH11600	3.682 / 93.52	0.774 / 19.66	0.1 / 2.54	1.18 / 1.752	2.2	26.8 / 680.72
AH16000	3.79 / 96.27	2 / 50.80	0.2 / 5.08	2.66 / 3.950	1.8	39.631 / 1,006.63
AH50600	3.924 / 99.67	1.21 / 30.73	0.215 / 5.46	2.34 / 3.475	1.7	33.27 / 845.06
AH12310	4.125 / 104.78	1.75 / 44.45	0.25 / 6.35	3.49 / 5.183	1.3	38.75 / 984.25
AH11958	4.4 / 111.76	1.32 / 33.53	0.22 / 5.59	2.846 / 4.226	1.6	42.936 / 1,090.57
AH32530	4.5 / 114.30	1.4 / 35.56	0.2 / 5.08	2.382 / 3.537	1.7	36.973 / 939.11
AH73900	4.527 / 114.99	0.733 / 18.62	0.149 / 3.78	1.692 / 2.513	1.6	49.614 / 1,260.20
AH13184	4.75 / 120.65	1.25 / 31.75	0.125 / 3.18	1.418 / 2.106	2	31.182 / 792.02
AH80125	4.8 / 121.92	2.22 / 56.39	0.22 / 5.59	3.947 / 5.861	1.4	64.95 / 1,649.73
AH14315	4.997 / 126.92	1.75 / 44.45	0.25 / 6.35	4.044 / 6.005	1.3	44.286 / 1,124.86
AH12700	5 / 127.00	0.49 / 12.45	0.12 / 3.05	1.4 / 2.079	2.4	29.3 / 744.22
AH80167	5 / 127.00	1.75 / 44.45	0.25 / 6.35	3.093 / 4.593	1.3	54.713 / 1,389.71
AH12118	5.5 / 139.70	2 / 50.80	0.25 / 6.35	4.11 / 6.103	1.2	55.664 / 1,413.87
AH13070	6.08 / 154.43	1.75 / 44.45	0.25 / 6.35	4.088 / 6.071	1.2	50.258 / 1,276.55
AH10578	6.5 / 165.10	1.6 / 40.64	0.2 / 5.08	3.558 / 5.284	1.3	54.414 / 1,382.12
AH61409	7.2 / 182.88	2.39 / 60.71	0.27 / 6.86	4.678 / 6.947	0.8	78.198 / 1,986.23
AH11945	7.34 / 186.44	1.312 / 33.32	0.312 / 7.92	5.042 / 7.487	1.1	61.861 / 1,571.27
AH10928	9.75 / 247.65	2.28 / 57.91	0.28 / 7.11	6.878 / 10.214	0.6	101.705 / 2,583.31
AH62430	12.25 / 311.15	2.3 / 58.42	0.3 / 7.62	10.3 / 15.296	0.6	96.972 / 2,463.09

CHARACTERISTICS

Rθ (°C/W) The thermal resistance is based on a 76 mm (3 inch) extrusion length in natural convection, black anodized finish, and 75°C mounting surface temperature rise.

Material Aluminum alloy 6063-T5

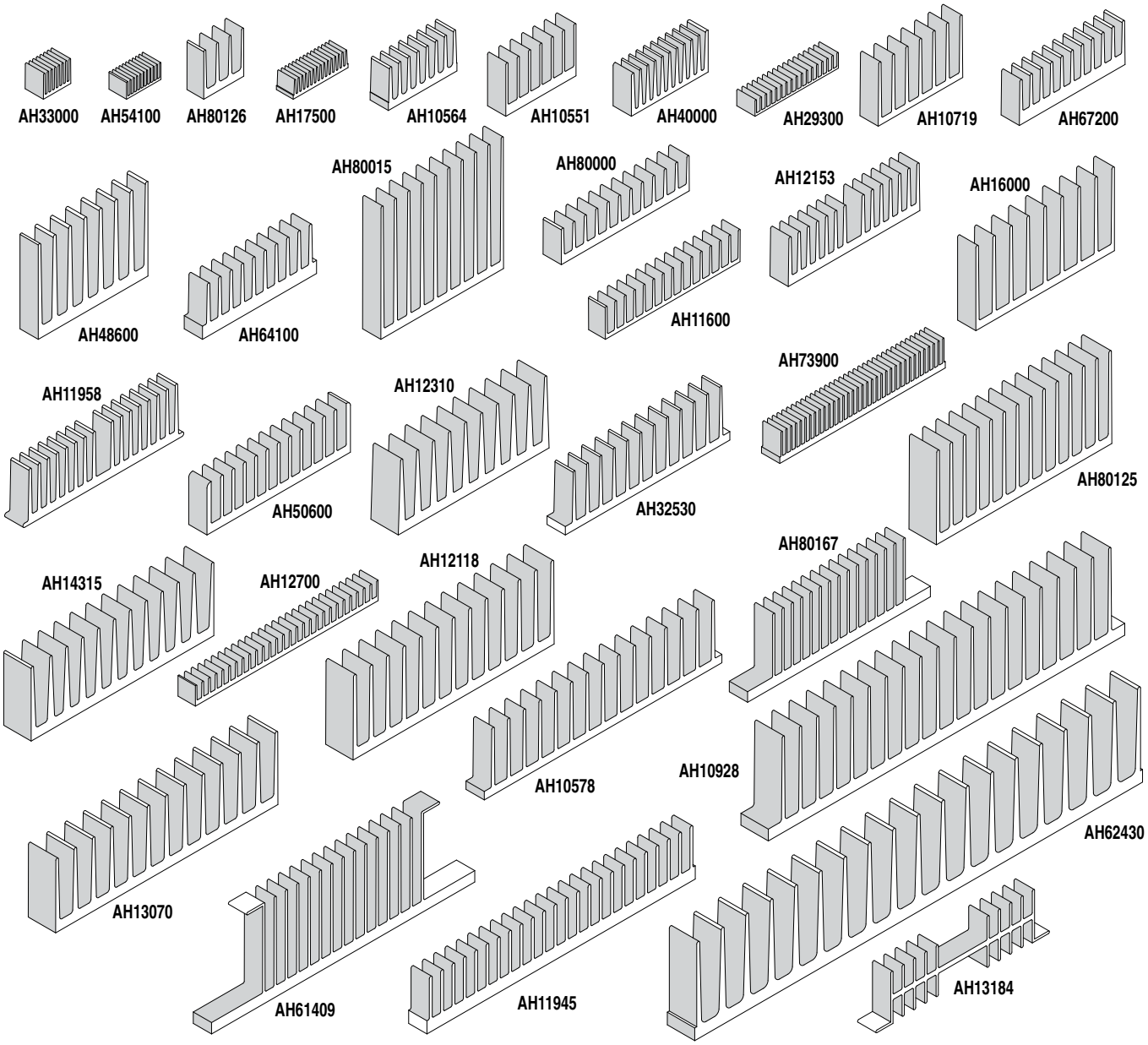
(continued)

AH Series

Extrusion Heatsinks

EXTRUSION PROFILES

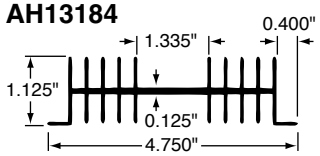
Not to scale. *See chart for dimensions.*



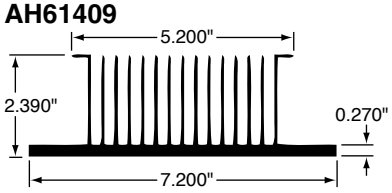
Not to scale.

ADDITIONAL DIMENSIONS

AH13184



AH61409



HOW TO ORDER

RoHS Compliant

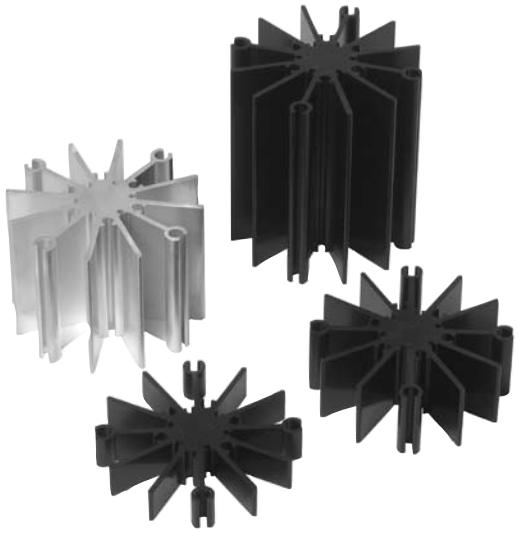
A H 8 0 1 2 6 A 1 2 3 0 0 N E

Series	Extrusion Style	Finish	Length	Modification
		A = black anodized C = gold chromate F = clear chromate G = green anodized K = clear anodized R = red anodized V = unfinished, degreased	(in.) to three decimals 12300 = 12.3"	N = none X = consult factory for options

S Series

LED Heatsinks

Ohmite S Series LED Heatsinks are low cost and easy assembly heat sinks for “Star” LED packages supplied by Cree, Lumileds, Osram and others. This simple heat sink can hold LED modules and can be mounted simply with some thread forming screws. The heat sink has two types of surface finish and can be used in either natural (free) or forced convection cooling applications.



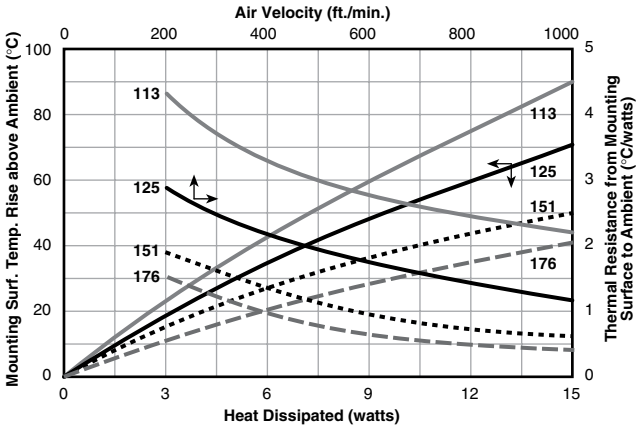
SERIES SPECIFICATIONS

Heatsink Part Number	Height (in/mm)	Surface area (in^2/mm^2)	Weight (oz/g)	Thermal resistance (°C/W) Free conv.	Forced conv.
SV-LED-113E SA-LED-113E	0.50 / 12.7	18 / 11,739	0.077 / 35	6.67 5.33	4.33
SV-LED-125E SA-LED-125E	1.00 / 25.4	36 / 23,478	0.154 / 70	5.33 4.27	2.88
SV-LED-151E SA-LED-151E	2.00 / 50.8	72 / 46,956	0.308 / 140	4.00 3.20	1.89
SV-LED-176E SA-LED-176E	3.00 / 76.2	108 / 70,434	0.462 / 210	3.11 2.49	1.55

CHARACTERISTICS

Heat Sink	Aluminum Alloy 6063-T5 or Equivalent with either degreased or black anodized finish.
Mounting Hardware	1/4, #10, and #4 thread forming SS screws are preferred
Compliance	Either degreased or black anodized finished parts are RoHS compliant.

Heat Dissipation



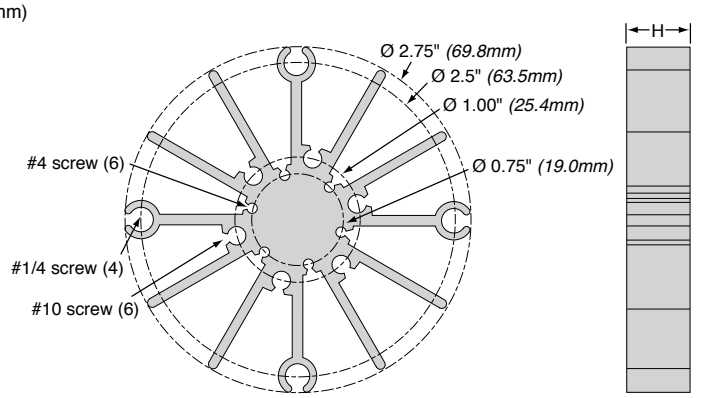
(continued)

S Series

LED Heatsinks

DIMENSIONS

(in./mm)



Part Number	Height H (in/mm)	Surface area (in^2/mm^2)	Weight (oz/g)
SV-LED-113E SA-LED-113E	0.50 / 12.7	18 / 11,739	0.077 / 35
SV-LED-125E SA-LED-125E	1.00 / 25.4	36 / 23,478	0.154 / 70
SV-LED-151E SA-LED-151E	2.00 / 50.8	72 / 46,956	0.308 / 140
SV-LED-176E SA-LED-176E	3.00 / 76.2	108 / 70,434	0.462 / 210

ORDERING INFORMATION

RoHS Compliant

S V - L E D - 1 1 3 E

Series **Coating** **Height**

A = black anodized
V = degreased

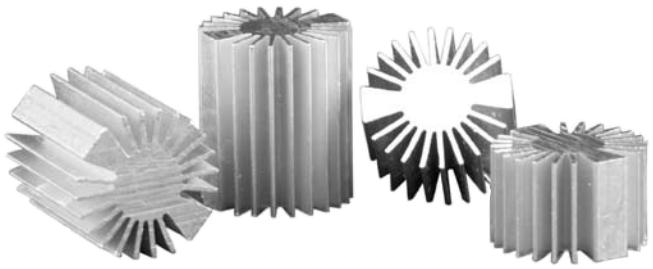
Standard part numbers

Part Number	Description	Packaging
SV-LED-113E	12.7mm, no finish (degreased)	Bulk
SA-LED-113E	Black Anodized, 12.7mm	Bulk
SV-LED-125E	25.4mm, no finish (degreased)	Bulk
SA-LED-125E	Black Anodized, 25.4mm	Bulk
SV-LED-151E	50.8mm, no finish (degreased)	Bulk
SA-LED-151E	Black Anodized, 50.8mm	Bulk
SV-LED-176E	76.2mm, no finish (degreased)	Bulk
SA-LED-176E	Black Anodized, 76.2mm	Bulk

SV-LED Series

Heatsinks For Power LED Modules

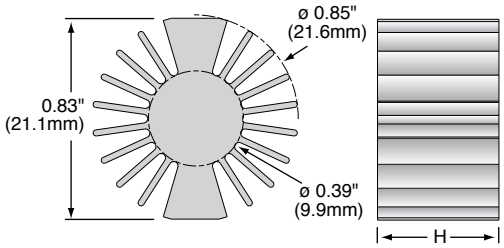
Ohmite introduces the SV-LED Series, high performance, low cost, configurable, scalable and compact power heatsink for LED modules. This powerful, high aspect ratio heatsink comes in two standard heights. It can be configured to customer specifications for length, surface finish, mounting holes, and custom machining.



SERIES SPECIFICATIONS

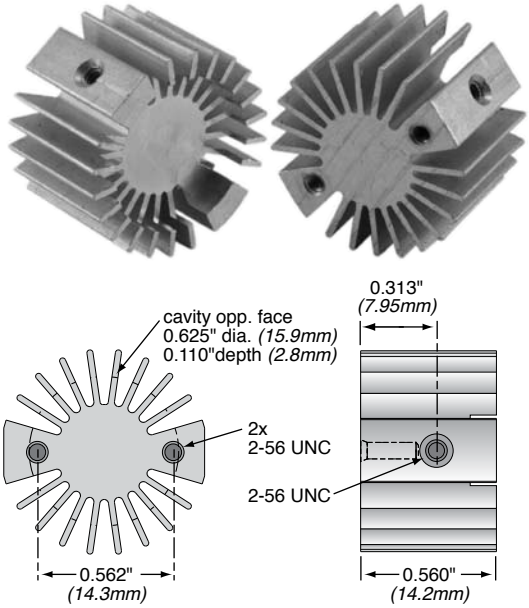
Heatsink Part Number	Surface Area (in^2/mm^2)	Weight (oz/g)	Thermal Resistance (°C/W)	Height H (in./mm)
SV-LED-314E	5.3 / 3,419	0.23 / 6.5	9.0	0.55/14
SV-LED-325E	9.5 / 6,129	0.41/11.6	5.6	0.98/25

DIMENSIONS



CUSTOMIZED VERSION

With mounting holes and milled surface SV-LED-214E



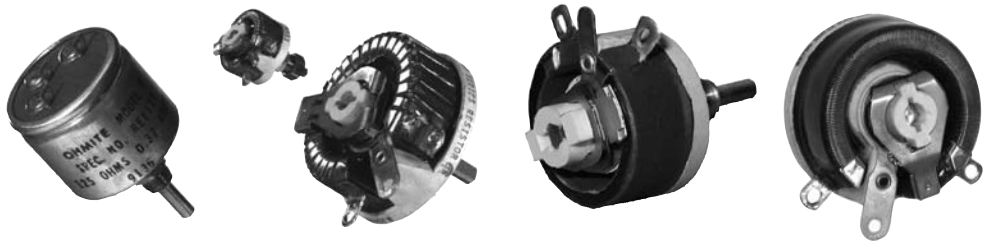
HOW TO ORDER

Standard part numbers for SV-LED heatsinks

Part Number	Description	Packaging
SV-LED-314E	Heatsink, degreased, 14mm height	Bulk
SV-LED-325E	Heatsink degreased, 25mm height	Bulk

Rheostats

(Potentiometers) Wirewound

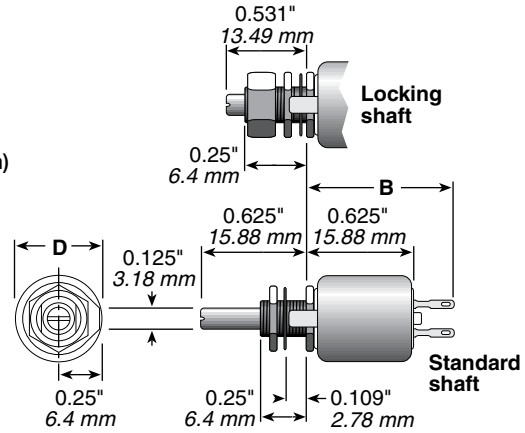


MODEL C

Model	Type	Watts	Ohmic range	Core	Max. Voltage (RMS)*	Behind panel "B" (in./mm Ref.)	Diameter "D" (in./mm Ref.)	Dimension "C" (in./mm Ref.)	Shaft torque	Rotation (±5°)
C	RCS/RCL	7.5	10.0-5K	enclosed	305	0.875/22.23	0.515/ 13.08	—	0.25-3 oz. in.	300°

• See Catalog #203 for complete details.

Mounting: Panels to 0.125" (3.18mm) thick with 1/4-32 bushing and hex nut (1/16" thick).

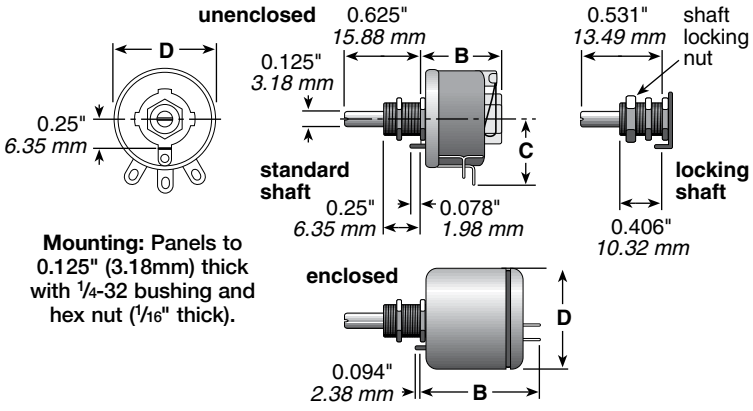


MODEL E

Model	Type	Watts	Ohmic range	Core	Max. Voltage (RMS)*	Behind panel "B" (in./mm Ref.)	Diameter "D" (in./mm Ref.)	Dimension "C" (in./mm Ref.)	Shaft torque	Rotation (±5°)
E	RES/REL	12.5	1.0-15K	open	305	0.688/17.46	0.875/ 22.23	0.594/15.08	1-6 oz. in.	300°
E	REE	12.5	1.0-15K	enclosed	305	1.219/30.96	1.047/ 26.59	—	1-6 oz. in.	300°

• See Catalog #203 for complete details.

Mounting: Panels to 0.125" (3.18mm) thick with 1/4-32 bushing and hex nut (1/16" thick).



Dimensions for reference only; consult factory for details.

Since all rheostats/potentiometers are electro-mechanical devices, they are subject to mechanical wear and, therefore, have a finite life.

Models H, J, K, L and N are listed under UL File No. E-10946 and CSA File No. 21309 unless noted otherwise.

All rheostats are 10% tolerance.

Rheostats

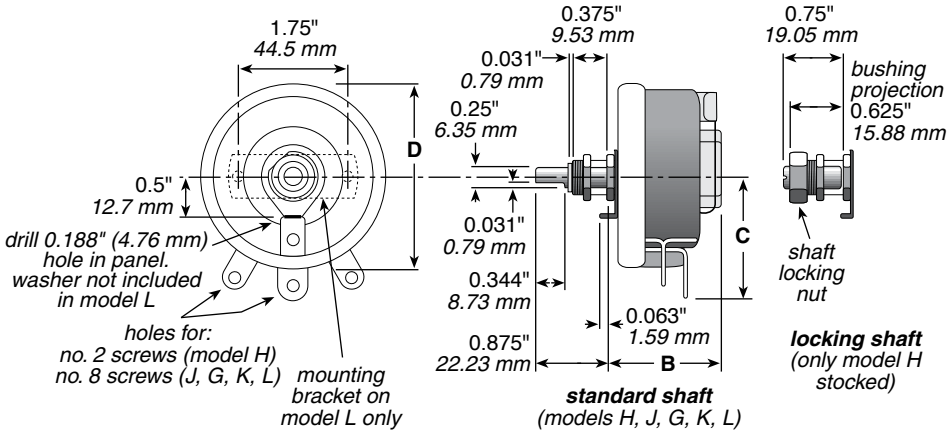
(Potentiometers) Wirewound

MODELS H, J, G, K, L

Model	Type	Watts	Ohmic range	Core	Max. Voltage (RMS)*	Behind panel "B" (in./mm Ref.)	Diameter "D" (in./mm Ref.)	Dimension "C" (in./mm Ref.)	Shaft torque	Rotation (±5°)
H	RHS/RHL	25	1.0-25K	open	500	1.375/34.93	1.560/ 39.62	0.940/23.88	0.25-0.5 lb. in.	300°
J	RJS	50	0.5-50K	open	750	1.375/34.93	2.31 / 58.67	1.56 /39.62	0.25-2 lb. in.	300°
G	RGS	75	0.5-50K	open	900	1.750/44.45	2.75 / 69.25	1.78 /45.21	0.5-2 lb. in.	300°
K	RKS	100	0.5-50K	open	1000	1.750/44.45	3.125/ 79.38	1.91 /48.51	0.5-2 lb. in.	300°
L	RLS	150	0.5-50K	open	1200	2.000 / 50.8	4.00 /101.60	2.28 /57.91	0.5-3 lb. in.	300°

• Models H, J, G, and K also available in enclosed versions.

• See Catalog #203 for complete details.



Mounting: Panels to 0.25" (6.35mm) thick with 3/8-32 bushing and hex nut (3/32" thick) (or with 10-32 x 0.75 flat-head screws for model L only).

MODELS P, N, R, U

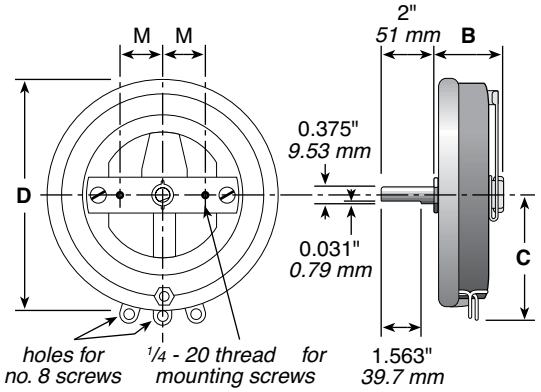
Model	Type	Watts	Ohmic range	Core	Max. Voltage (RMS)*	Behind panel "B" (in./mm Ref.)	Diameter "D" (in./mm Ref.)	Dimension "C" (in./mm Ref.)	Shaft torque	Rotation (±5°)
P	RPS	225	1.0-30K	open	1300	2.125/53.98	5.00 /127.00	2.97 /75.44	2.5-4 lb. in.	310°
N	RNS	300	1.0-50K	open	1225	2.375/60.33	6.00 /152.40	3.44 /87.38	2.5-5 lb. in.	320°
R	RRS	500	1.0-20K	open	1450	2.125/53.98	8.00 /203.20	4.31/109.47	4.5-7 lb. in.	325°
U	RUS	1000	1.0-20K	open	1600	3.000 / 76.2	12.00 /304.80	6.38/162.05	3.5-7 lb. in.	335°

• See Catalog #203 for complete details.

Dimension "M"

P	0.875"	22.23 mm
N	1.188"	30.16 mm
R	1.5"	38.1 mm
U	3"	76.2 mm

Mounting: Panels to 1.25" (31.75mm) thick with 1/4-20 flat-head screws.



(continued)

Rheostats

(Potentiometers) Wirewound

ORDERING INFORMATION

Code	Watts	Model	Shaft	Core
CL =	7.5	C	Locking	Enclosed
CS =	7.5	C	Standard	Enclosed
EE =	12.5	E	Standard	Enclosed
EL =	12.5	E	Locking	Open
ES =	12.5	E	Standard	Open
GS =	75	G	Standard	Open
HL =	25	H	Locking	Open
HS =	25	H	Standard	Open
JS =	50	J	Standard	Open
KS =	100	K	Standard	Open
LS =	150	L	Standard	Open
NS =	300	N	Standard	Open
PS =	225	P	Standard	Open
RS =	500	R	Standard	Open
US =	1000	U	Standard	Open

Series
Rheostats
Wirewound
Potentiometers

E = RoHS compliant

R C S R 5 0 E

**Check table for standard resistance values and maximum current values*

Resistance Value*
Example:
R50 = 0.50Ω
1R0 = 1Ω
7R5 = 7.5Ω
250 = 250Ω
1K0 = 1,000Ω
1K75 = 1,750Ω
4K5 = 4,500Ω
50K = 50,000Ω

- RoHS compliant product available. Add "E" suffix to part number to specify.
- Made-to-order rheostats available: Contact nearest Ohmite sales office.

* Voltage rating dependent on resistance value.

Ohmic value	Part No. Prefix ➤ Suffix ▼	7.5W Model C			12.5W Model E				25W Model H			50W Model J		75W Model G		100W Model K		150W Model L		225W Model P		300W Model N		500W Model R		1000W Model U	
		Std. shaft	Locking		Std. shaft	Locking	Enclosed		Std. shaft	Locking																	
		RCS	RCL	Amps max.	RES	REL	REE	Amps max.	RHS	RHL	Amps max.	RJS	Amps max.	RGS	Amps max.	RKS	Amps max.	RLS	Amps max.	RPS	Amps max.	RNS	Amps max.	RRS	Amps max.	RUS	Amps max.
0.5	R50											✔	10.0	✔	12.3	✔	14.1	✔	17.3								
1	1R0				✔	✔	✔	3.53	✔	✔	5.00	✔	7.07	✔	8.66	✔	10	✔	12.3	✔	15.0	✔	17.32	✔	22.3	✔	31.6
1.5	1R5																							✔	18.2	✔	25.8
2	2R0				✔	✔	✔	2.50	✔	✔	3.54	✔	5.00	✔	6.12	✔	7.07	✔	8.65	✔	10.6	✔	12.24	✔	15.8	✔	22.4
2.5	2R5				✔	✔	✔	2.24																✔	14.1	✔	20.0
3	3R0				✔	✔	✔	2.04	✔	✔	2.88			✔	5.00	✔	5.75	✔	7.07	✔	8.66	✔	10.00	✔	12.9	✔	18.3
4	4R0											✔	3.53							✔	7.50	✔	8.66	✔	11.2	✔	15.8
5	5R0				✔	✔	✔	1.58						✔	3.88	✔	4.47	✔	5.48	✔	6.71	✔	7.75	✔	10.0	✔	14.1
6	6R0				✔	✔	✔	1.44	✔	✔	2.04	✔	2.88														
7.5	7R5													✔	3.16	✔	3.65	✔	4.47	✔	5.49	✔	6.32				
8	8R0				✔	✔	✔	1.25	✔	✔	1.77	✔	2.50											✔	7.90	✔	11.2
10	10R	✔	✔	0.86	✔	✔	✔	1.12	✔	✔	1.58			✔	2.74	✔	3.16	✔	3.88	✔	4.74	✔	5.48			✔	10.0
12	12R											✔	2.04														
12.5	12R5																							✔	6.30	✔	8.95
15	15R	✔	✔	0.71	✔	✔	✔	0.91	✔	✔	1.29							✔	3.163	✔	3.87	✔	4.47				
16	16R											✔	1.76	✔	2.17	✔	2.50							✔	5.60	✔	7.90
22	22R											✔	1.50														
25	25R	✔	✔	0.55	✔	✔	✔	0.71	✔	✔	1.00			✔	1.73	✔	2.0	✔	2.450	✔	3.00	✔	3.46	✔	4.47	✔	6.33
35	35R	✔	✔	0.46	✔	✔	✔	0.60	✔	✔	0.845	✔	1.19					✔	2.070								
40	40R																							✔	3.54		
50	50R	✔	✔	0.39	✔	✔	✔	0.50	✔	✔	0.707	✔	1.00	✔	1.23	✔	1.41	✔	1.735	✔	2.12	✔	2.45	✔	3.16	✔	4.47
75	75R	✔	✔	0.32	✔	✔	✔	0.40	✔	✔	0.575			✔	1.00	✔	1.15	✔	1.415	✔	1.73	✔	2.00			✔	3.65
80	80R											✔	0.790											✔	2.52		
100	100	✔	✔	0.27	✔	✔	✔	0.36	✔	✔	0.500			✔	0.866	✔	1.00	✔	1.225	✔	1.50	✔	1.73			✔	3.16
125	125				✔	✔	✔	0.32	✔	✔	0.445	✔	0.630											✔	2.00		
150	150	✔	✔	0.22	✔	✔	✔	0.29				✔	0.575					✔	1.000	✔	1.22	✔	1.41				
160	160																										
175	175				✔	✔	✔	0.27	✔	✔	0.375													✔	1.69	✔	2.39
200	200	✔	✔	0.19	✔	✔	✔	0.25						✔	0.612	✔	0.707	✔	0.865	✔	1.06	✔	1.22				
225	225											✔	0.470													✔	2.11
250	250	✔	✔	0.17	✔	✔	✔	0.22	✔	✔	0.316							✔	0.775					✔	1.41		
300	300											✔	0.408	✔	0.500	✔	0.575			✔	0.866	✔	1.00			✔	1.83
325	325																							✔	1.24		
350	350	✔	✔	0.15	✔	✔	✔	0.19	✔	✔	0.267							✔	0.655								
400	400													✔	0.433	✔	0.500			✔	0.750	✔	0.866			✔	1.48
500	500	✔	✔	0.12	✔	✔	✔	0.16	✔	✔	0.222	✔	0.316	✔	0.388	✔	0.447	✔	0.548					✔	1.00	✔	1.41
600	600																										
700	700																			✔	0.567	✔	0.655				
750	750	✔	✔	0.10	✔	✔	✔	0.13	✔	✔	0.182			✔	0.316	✔	0.365	✔	0.447					✔	0.817	✔	1.15
800	800											✔	0.250														
900	900																			✔	0.500	✔	0.578				
1000	1K0	✔	✔	0.086	✔	✔	✔	0.10	✔	✔	0.155	✔	0.224	✔	0.274	✔	0.316							✔	0.707	✔	1.00
1200	1K2																			✔	0.433	✔	0.500				
1250	1K25																	✔	0.346								
1500	1K5	✔	✔	0.071	✔	✔	✔	0.090	✔	✔	0.129			✔	0.224	✔	0.258			✔	0.387	✔	0.447	✔	0.577	✔	0.816
1600	1K6											✔	0.176														
1750	1K75																			✔	0.358	✔	0.414				
1800	1K8																	✔	0.288								
2000	2K0													✔	0.194	✔	0.224			✔	0.336	✔	0.387	✔	0.500		
2250	2K25																	✔	0.259								
2500	2K5	✔	✔	0.055	✔	✔	✔	0.070	✔	✔	0.100	✔	0.141	✔	0.173	✔	0.200			✔	0.300	✔	0.346	✔	0.447	✔	0.633
3000	3K0																	✔	0.224								
3500	3K5	✔	✔	0.046	✔	✔	✔	0.060	✔	✔	0.084	✔	0.119														
4500	4K5																	✔	0.182								
5000	5K0	✔	✔	0.039	✔	✔	✔	0.050	✔	✔	0.070	✔	0.100	✔	0.123	✔	0.141										
7500	7K5				✔	✔	✔	0.041	✔	✔	0.058			✔	0.100	✔	0.115	✔	0.141								
8000	8K0											✔	0.079														
10000	10K				✔	✔	✔	0.035	✔	✔	0.050	✔	0.070	✔	0.087	✔	0.100	✔	0.122								
12500	12K5				✔	✔	✔	0.031																			
15000	15K				✔	✔	✔	0.029	✔	✔	0.041	✔	0.058														
20000	20K								✔	✔	0.035	✔	0.050														
25000	25K								✔	✔	0.032	✔	0.045														
30000	30K											✔	0.041														
40000	40K											✔	0.035														
50000	50K											✔	0.032														

✔ = Standard values; check availability

Rheostats are silicone-ceramic coated at and above the following ohmic values:

Model C: all
Model E: 750Ω
Model H: 2000Ω
Model J: 5000Ω
Model G: 5000Ω
Model K: 5000Ω
Model L: 7500Ω

Potentiometers

Molded composition

Ohmite molded composition potentiometers are available in various models for applications in military devices, industrial equipment and in equipment requiring a convenient resistance control device.

FEATURES

- Low noise, smooth operation
- In accordance with "Mil" RV4N, RV4L, RV6L, RV6N, 2RV7N types
- RoHS compliant; non-RoHS version unavailable.

SERIES SPECIFICATIONS

Model	Watts	Ohmic range	Behind panel (in./mm)	Diameter (in./mm)	Rotation	Voltage (RMS)
AS	0.5	50-5M	0.703/17.9	0.50/12.7	295° ±5°	350
ASM	0.5	50-5M	0.703/17.9	0.50/12.7	295° ±5°	350
CA	2.0	50-5M	0.625/15.9	1.16/29.4	312° ±3°	500
CB	2.0	50-5M	0.625/15.9	1.16/29.4	312° ±3°	500
CU	2.0	50-5M	0.625/15.9	1.16/29.4	312° ±3°	500
CCU	2.0	50-5M	1.266/32.1	1.16/29.4	312° ±3°	500
CLU	2.0	50-5M	0.625/15.9	1.16/29.4	312° ±3°	500
CMU	2.0	50-5M	0.625/15.9	1.16/29.4	312° ±3°	500

CHARACTERISTICS

Derating	linear from 100% at +70°C to 0% at +120°C
Operating temp. range	-55°C to 120°C
Construction	Elements molded into a single, integral structure. Metal cover protects and shields the internal parts.
Sealing	synthetic resin containing non-mercurial fungicide
Product life	Since all rheostats/potentiometers are electro-mechanical devices, they are subject to mechanical wear and, therefore, have a finite life.

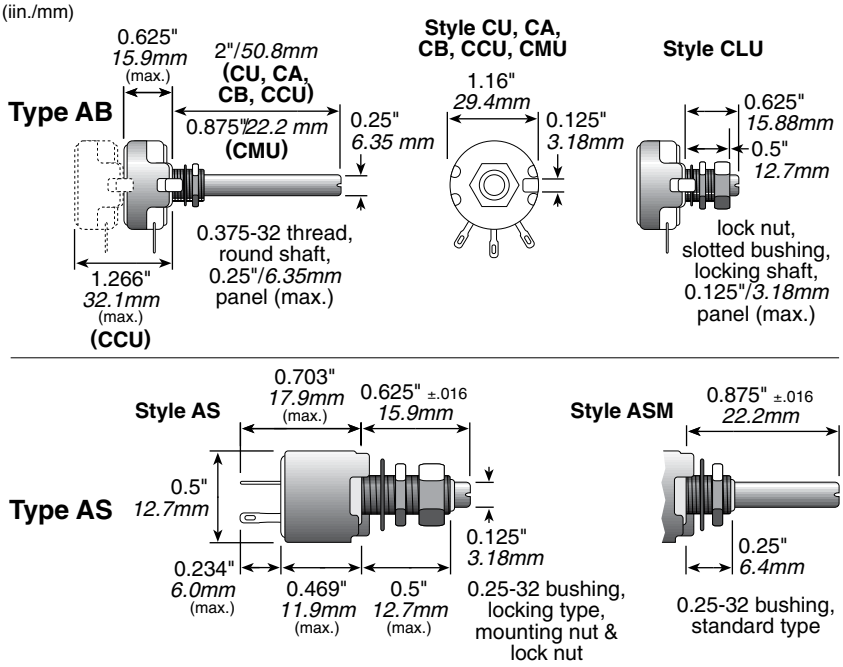
(continued)

Potentiometers

Molded composition

DIMENSIONS

(iin./mm)



Model	Watts	Behind panel	Diameter	Rotation
AS	0.5	0.703/17.9	0.50/12.7	295° ±5°
ASM	0.5	0.703/17.9	0.50/12.7	295° ±5°
CA	2.0	0.625/15.9	1.16/29.4	312° ±3°
CB	2.0	0.625/15.9	1.16/29.4	312° ±3°
CU	2.0	0.625/15.9	1.16/29.4	312° ±3°
CCU	2.0	1.266/32.1	1.16/29.4	312° ±3°
CLU	2.0	0.625/15.9	1.16/29.4	312° ±3°
CMU	2.0	0.625/15.9	1.16/29.4	312° ±3°

ORDERING INFORMATION

Ohmic value	MIL Designation Prefix / Suffix	Part No. Prefix / Suffix	CMU RV4NAYSD Linear	CU RV4NAYSJ Linear	CA RV4NAYSJ CW log	CB RV4NAYSJ CCW log	CLU RV4LAYSA Linear	CCU 2RV7NYSJ Linear Dual*	RV6LAYSA Linear	RV6NAYSD Linear
50	500A	5001	✔	✔			✔			
100	101A	1011	✔	✔			✔		✔ **AS**3601E	✔ **ASM**6661E
150	151A	1511	✔	✔			✔			
250	251A	2511	✔	✔			✔		✔ **AS**3602E	✔ **ASM**6662E
350	351A	3511	✔	✔			✔			
500	501A	5011	✔	✔			✔		✔ **AS**3603E	✔ **ASM**6663E
750	751A	7511	✔	✔			✔			
1,000	102A	1021	✔	✔			✔		✔ **AS**3604E	✔ **ASM**6664E
1,500	152A	1521	✔	✔			✔			
2,500	252A	2521	✔	✔			✔		✔ **AS**3605E	✔ **ASM**6665E
3,500	352A	3521	✔	✔			✔			
5,000	502A	5021	✔	✔			✔		✔ **AS**3606E	✔ **ASM**6666E
7,500	752A	7521	✔	✔			✔			
10,000	103A	1031	✔	✔		✔	✔	✔	✔ **AS**3607E	✔ **ASM**6667E
15,000	153A	1531	✔	✔			✔			
25,000	253A	2531	✔	✔		✔	✔	✔	✔ **AS**3608E	✔ **ASM**6668E
35,000	353A	3531	✔	✔			✔			
50,000	503A	5031	✔	✔		✔	✔	✔	✔ **AS**3609E	✔ **ASM**6669E
75,000	753A	7531	✔	✔			✔			
100,000	104A	1041	✔	✔	✔		✔	✔	✔ **AS**3610E	✔ **ASM**6670E
150,000	154A	1541	✔	✔			✔			
250,000	254A	2541	✔	✔	✔		✔	✔	✔ **AS**3611E	✔ **ASM**6671E
350,000	354A	3541	✔	✔			✔			
500,000	504A	5041	✔	✔	✔		✔	✔	✔ **AS**3612E	✔ **ASM**6672E
750,000	754B	7542	✔	✔			✔			
1,000,000	105B	1052	✔	✔	✔		✔	✔	✔ **AS**3613E	✔ **ASM**6673E
1,500,000	155B	1552	✔	✔			✔			
2,000,000	205B	2052	✔	✔			✔		✔ **AS**3684E	✔ **ASM**6674E
2,500,000	255B	2552	✔	✔	✔		✔		✔ **AS**3614E	✔ **ASM**6675E
3,500,000	355B	3552	✔	✔			✔			
5,000,000	505B	5052	✔	✔			✔		✔ **AS**3615E	✔ **ASM**6676E

✔ = Standard values; check availability

* add "-E" for RoHS-compliant lead-free zinc-nickel plated product

Rheostat and Tap Switch Hardware

Knobs, Dials, Mounting Fasteners

KNOBS

Finger grip with pointer

Finger grip without pointer

Handwheel with pointer

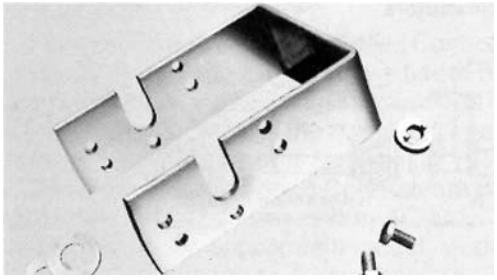
Handwheel without pointer

Finger grip

Any knob can be used with any rheostat and tap switch model which has the corresponding shaft diameter. Knobs are fastened to shafts with slotted set screws.

Slotted set screw		Hex socket set socket		Description	Knob dia.	Hole dia.	Fits model
✣	5102		—	Bar knob, 2 1/4" long	—	1/4"	H, J, G, K, L
✔	5103	✔	5103A	Bar knob, 1 1/4" long	—	1/4"	H, J, G, K, L
✔	5104	✔	5104A	Handwheel with pointer	3 1/4"	3/8"	P, N, R, U
✔	5105		—	Handwheel without pointer	3 1/4"	3/8"	P, N, R, U
✔	5106	✣	5106A	Handwheel with pointer	3 1/4"	1/4"	H, J, G, K, L
✣	5107		—	Handwheel without pointer	3 1/4"	1/4"	H, J, G, K, L
✔	5109	✔	5109A	Finger-grip with pointer	1 5/8"	1/4"	H, J, G, K, L
✔	5110	✣	5110A	Finger-grip without pointer	1 5/8"	1/4"	H, J, G, K, L
✔	5111	✔	5111A	Finger-grip with pointer	2 3/8"	1/4"	H, J, G, K, L
✣	5112	✣	5112A	Finger-grip without pointer	2 3/8"	1/4"	H, J, G, K, L
✔	5150	✣	5150A	Finger-grip	1 1/2"	1/4"	H, J, G, K, L
✔	5151		—	Finger-grip	3/4"	1/8"	C, E
	—	✔	5152A	Like 5104 (shorter pointer)	3 1/4"	1/4"	H, J, G, K, L

RHEOSTAT TANDEM COUPLING KITS



Ohmite coupling kits permit tandem mounting of two rheostat units. A coupling fastens to the shaft of the back unit; projections on the coupling engage the recesses in the driving hub of the front unit.

Each kit consists of a steel “U” frame, a coupling with set screw, mica washer, allen wrench and instructions.

Part No.	Front mount models	Rear mount models	Max. panel thickness
✔ 6532	H, J	H, J, G, K, L	5/32"
✔ 6533	G, K, L	H, J, G, K, L	1/8"
✣ 6591	E	E	1/16"

✔ = Standard values
✣ = Non-standard values subject to minimum handling charge per item

(continued)

Rheostat and Tap Switch Hardware

Knobs, Dials, Mounting Fasteners

DIALS

For rheostats

For tap switches

Handsomely finished, black-enameled, aluminum dials for Ohmite rheostats and tap switches. Figures and lines are etched on a black background for contrast and ease of readability. On rheostat dials, divisions indicating approximate percentage of rheostat resistance in circuit are marked from 0 to 100. On tap switch dials, Number of dial positions are identical with number of switch positions.

Part No.	For model	For knob	Dial dia.
✔ 5007	C, E	5151	1 1/4"
✔ 5000	H, J, G, K, L	5150, 5116, 5103	2 3/16"
✔ 5001	P, N, R, U	5104, 5106	5 1/2"
✔ 5002-*	111, 212 (single), 312 (single)	5109, 5116, 5150	2 3/4"
✔ 5003-*	212 (tandem), 312 (tandem), 412	5111, 5152A	3 3/4"
✔ 5004-*	608	5104	5 1/2"

* Specify number of positions as suffix.

RHEOSTAT REPAIR KITS

Electrical contact replacement kit. Kit includes contact/slip ring assemblies (for round and ribbon wire rheostats), copper graphite washer, spring arm and hub. Instructions included.

Part No.	Rheostat model
✔ 7070	P
✔ 7071	N
✔ 7072	R
✔ 7074	U

EXTRA MOUNTING HARDWARE

Kit contains 25 each, nuts and lock washers for panel mounting units.

Part No.	For model
✔ 7090	E
✔ 7091	H, J, G, K, L, 111, 212, 711

✔ = Standard values
✣ = Non-standard values subject to minimum handling charge per item

Resistor Selection

Application Notes

RESISTOR FACTS AND FACTORS

A resistor is a device connected into an electrical circuit to introduce a specified resistance. The resistance is measured in ohms. As stated by Ohm's Law, the current through the resistor will be directly proportional to the voltage across it and inversely proportional to the resistance.

The passage of current through the resistance produces heat. The heat produces a rise in temperature of the resistor above the ambient temperature. The physical ability of the resistor to withstand, without deterioration, the temperature attained, limits the operating temperature which can be permitted. Resistors are rated to dissipate a given wattage without exceeding a specified standard "hot spot" temperature and the physical size is made large enough to accomplish this.

Deviations from the standard conditions ("Free Air Watt Rating") affect the temperature rise and therefore affect the wattage at which the resistor may be used in a specific application.

SELECTION REQUIRES 3 STEPS

Simple short-cut graphs and charts in this catalog permit rapid determination of electrical parameters. Calculation of each parameter is also explained. To select a resistor for a specific application, the following steps are recommended:

1. (a) Determine the Resistance.
   (b) Determine the Watts to be dissipated by the Resistor.
2. Determine the proper "Watt Size" (physical size) as controlled by watts, volts, permissible temperatures, mounting conditions and circuit conditions.
3. Choose the most suitable kind of unit, including type, terminals and mounting.

STEP 1 DETERMINE RESISTANCE AND WATTS

Ohm's Law

(a) $R = \frac{V}{I}$ or $I = \frac{V}{R}$ or $V = IR$

Ohm's Law, shown in formula form above, enables determination of the resistance when the required voltage and current are known. When the current and voltage are unknown, or the best values not decided on, at least two of the three terms in Ohm's Law must be measured in a trial circuit.

(b) $P = I^2R$ or $P = VI$ or $P = \frac{V^2}{R}$

Power in watts, can be determined from the formulas above, which stem from Ohm's Law. R is measured in ohms, V in volts,I in amperes and P in watts.

Why Watts Must Be Accurately Known

Stated non-technically, any change in current or voltage produces a much larger change in the wattage (heat to be dissipated by the resistor). Therefore, the effect of apparently small increases in current or voltage must be investigated because the increase in wattage may be large enough to be significant. Mathematically, the wattage varies as the square of the current, or voltage, as stated in the formulas (b). For example, an increase of 20% in current or voltage will increase the wattage 44%. Figure 1 below graphically illustrates the square law relation. Hence, the actual current must be used in figuring the wattage and the increase in wattage due to apparently small changes, then determined in order to select the proper size resistor. Allowance should be made for maximum possible line voltage.

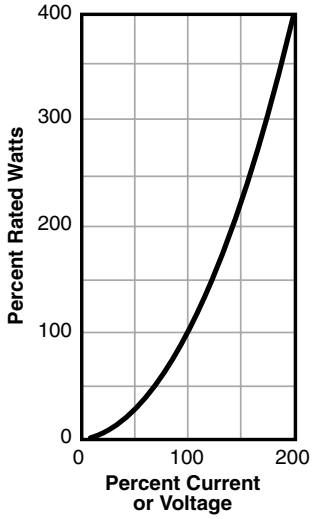


Fig. 1: Rapid increase of wattage with current or voltage.

STEP 2 POWER RATING OR PHYSICAL SIZE OF RESISTOR

A resistor operated at a constant wattage will attain a steady temperature which is determined largely by the ratio between the size (surface area) and the wattage dissipated, The temperature stabilizes when the sum of the heat loss rates (by radiation, convection and conduction) equals the heat input rate (proportional to wattage). The greater the resistor area per watt to be dissipated, the greater the heat loss rate and therefore the lower the temperature rise. The relation between the losses varies for different resistors.

Free Air Watt Rating

The wattage rating of resistors, as established under specified standard conditions, is defined as the "Free Air Rating" ("Full Rating" or "Maximum Power Rating"). Several standard methods of rating are in use based on different service conditions. The method of both the "National Electrical Manufacturers Association" (NEMA) and the "Underwriters' Laboratories, Inc." (UL) can be described as follows:

The relation of the "Free Air Watt Rating" of tubular type, vitreous enameled resistors to the physical size, is to be set at such a figure that when operated at their rated watts, the temperature rise of the hottest spot shall not exceed 300°C (540°F) as measured by a thermocouple when the temperature of the surrounding air does not exceed 40°C (104°F). The temperature is to be measured at the hottest point of a two-terminal resistor suspended in free still air space with at least one foot of clearance to the nearest object, and with unrestricted circulation of air.

A slightly different definition of temperature limit used as a basis for wattage rating, and which results in a slightly higher attained temperature, was originally established in military specification MIL-

Application Notes

R-26 for wirewound resistors.

Characteristic V resistors are required to dissipate rated wattage in an ambient of 25°C without exceeding a maximum operating temperature of 350°C at the hottest spot. This corresponds to a temperature rise of 325°C in a 25°C ambient. Although MIL-R-26 permits a 25°C greater temperature rise than NEMA or UL, the reference ambient for the latter two is 15°C higher. Consequently, the difference in attained temperature between the two systems is only 10°C. The curves in Fig. 2 show the relation between temperature rise and wattage for various specifications. Note the differences in the permissible rise for

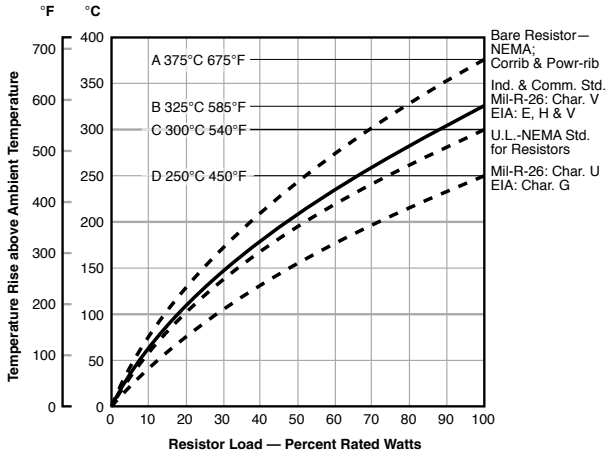


Fig. 2: Approximate hot spot temperature rise of a resistor in free air for various specifications.

each specification.

The absolute temperature rise for a specific resistor is roughly related to the area of its radiating surface. It is also dependent upon a number of other factors, however, such as thermal conductivity of the core and coating materials, emissivity factor of the outer surfaces, ratio of length to diameter, heat-sink effect of mountings, and other minor factors.

The maximum permissible operating temperature for a given resistor is basically determined by the temperature limitations imposed by the materials used in its construction. Generally speaking, these limits cannot be sharply defined in terms of temperature alone. Other factors such as resistance stability versus time, deterioration rates of insulation and moisture-resistance characteristics, type and size of resistance wire, all enter into consideration of "acceptable service life."

For these reasons, the precise temperature limits corresponding to 100% rated wattage are somewhat arbitrary and serve primarily as design targets. In the last analysis, once a wattage rating has been assigned on the basis of an empirical hot spot limit, the verification of its correctness must be established through long term load-life tests based on performance and stability standards rather than the measurement of hot spot temperature. Maximum limits are stipulated for parameter changes as a result of various tests, including a 2000 hour load-life test.

It is also assumed that the temperature rise at a given wattage is independent of the ambient temperature in which this wattage is being dissipated. Therefore, for high ambient temperatures, the operating wattage should be limited in accordance with the curves of Fig. 3. Although the assumption that temperature rise is independent of ambient is not exactly true, the approximation is sufficiently close for all practical purposes and, therefore, has been adopted for

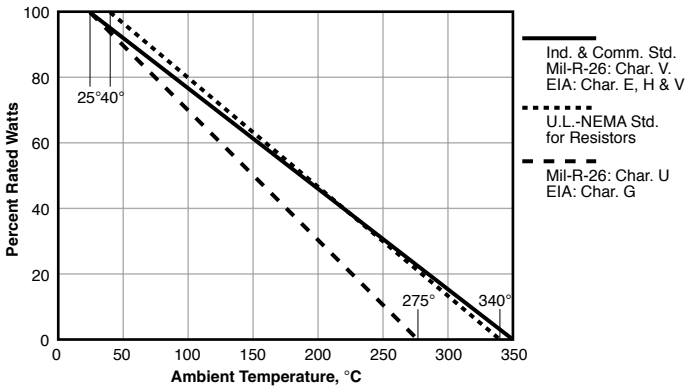


Fig. 3: Derating for ambient temperature.

derating purposes.

Despite the above variables, figures may be cited in terms of "watts dissipated per square inch of winding surface" for a given temperature rise. For power type resistors operating at 300°C rise above ambient, this figure varies between approximately 6.3 watts per square inch for large resistors (175 watt) to about 9 watts per square inch for smaller resistors (12 watt). It should also be observed from Fig. 2 that temperature rise is not directly proportional to wattage dissipated. Note, for example, that at 50% rated wattage, the temperature rise still remains about 70% of that at full rating.

The wattage ratings used in this catalog, unless otherwise stated for certain types, are on the basis of a nominal operating temperature of 350°C at full rating. There are two general categories of power resistors for which the 350°C nominal temperature limit does not apply. One is that class of power-precision resistors where high stability is a salient feature, in which case the operating temperature is nominally limited to 275°C. The other category includes all exposed ribbon wire resistors (see description of Corrib® and Powr-Rib®) which are rated for 375°C (675°F) maximum temperature rise when measured on the wire per NEMA standards.

Temperature Distribution on a Resistor

The temperature rise varies (following a curve) along the length of the resistor with the hot spot at the center-top (of a horizontal tube) and the ends at approximately 60% of the maximum temperature rise. The terminals themselves are still cooler. When the resistor is vertical, the hot spot shifts upwards a little and the top end is hotter than the bottom. The standard "Free Air Watt Rating," however, is used regardless of position.

Resistor Selection

Application Notes

STEPS 3 SELECT A RESISTOR

Choose the most suitable resistor meeting the requirements of the application. Standard resistors carried in stock should be considered first. If a suitable resistor cannot be found in the standard sizes or resistance values, then select a non-standard resistor from the range on available sizes (consult factory).

APPLICATION WATT RATING

To allow for the differences between the actual service conditions and the "Free Air Watt Rating" it is a general engineering practice to operate resistors at more or less than the nominal rating. The details by which such ratings can be estimated are given in the following pages. Most thermal calculations, however, involve so many factors which are usually not accurately known, that at best they are only approximations.

The most accurate method of determining or checking the rating is to measure the temperature rise in a trial installation. A thermocouple (made of #30 B & S gage wire) is recommended for the measuring element. Even measurements made with a thermocouple will vary slightly with different samples and techniques. The factors which affect the temperature rise act independently of each other and are summarized as follows:

1. Ambient Temperature
As the maximum permissible operating temperature is a set amount, any increase in the ambient temperature subtracts from the permissible temperature rise and therefore reduces the permissible watt load.

2. Enclosure
Enclosure limits the removal of heat by convection currents in the air and by radiation. The walls of the enclosure also introduce a thermal barrier between the air contacting the resistor and the outside cooling air. Hence, size, shape, orientation, amount of ventilating openings, wall thickness, material and finish all affect the temperature rise of the enclosed resistor.

3. Grouping
When resistors are close to each other they will show an increased hot spot temperature rise for a given wattage because of the heat received by radiation from each other and the increased heat per unit volume of air available for convection cooling.

4. Altitude
The amount of heat which air will absorb varies with the density, and therefore with the altitude above sea level. At altitudes above 100,000 feet, the air is so rare that the resistor loses heat practically only by radiation.

5. Pulse Operation
This is not an environmental condition but a circuit condition. As a pulse of power, when averaged over the total on and off time, results in less heat per unit time than for continuous duty, the temperature rise is affected. This may permit higher power during the pulses. The conditions must be expertly considered for conservative rating. The open-wound "Powr-Rib®" resistor construction is most suitable.

6. Cooling Air
Forced circulation of air over a resistor removes more heat per unit time than natural convection does and therefore permits an increased watt dissipation. Liquid cooling and special conduction mountings also can increase the rating.

7. Limited Temperature Rise
It is sometimes desirable to operate a resistor at a fraction of the Free Air Watt Rating in order to keep the temperature rise low. This may be to protect adjacent heat sensitive apparatus, to hold the resistance value very precisely both with changing load and over long periods of time and to insure maximum life.

8. Other Considerations
High Resistance. High resistance units, which require the use of very small diameter wire, generally should operate at reduced temperature for maximum reliability.

High Voltage
A maximum voltage gradient of 500 volts R.M.S. (705 volts peak) per inch of winding length is recommended under normal conditions. For higher gradients in pulse applications or for other special conditions such as oil immersion, consult factory.

High Frequency
Non-inductively wound resistors are generally required for use at high frequencies.

Military and Other Specifications
The special physical operating and test requirements of the applicable industrial or military specification must be considered. Military specification resistors should be ordered by their MIL numbers.

Resistor Selection

Application Notes

ENVIRONMENTAL FACTORS—EFFECT ON THE POWER RATING OF COMPONENTS

All the components of an electrical apparatus — resistors, rheostats, capacitors, transformers, chokes, wiring, terminal boards, rectifiers, transistors, electronic tubes, etc.—have their own limitations as to the maximum temperature at which they can reliably operate. The attained temperature in service is the sum of the ambient temperature plus the temperature rise due to the heat dissipated in the apparatus.

The temperature rise of a component is affected by a number of factors. The graphs and discussions which follow, amplify and supplement the factors on the previous page.

Note that the Multiplying Factors given on the Short Cut Chart, on page 96 are the reciprocals of the "Percent Load Ratings" shown on the graphs in this section. The percent figures are, of course, expressed as decimals before finding the reciprocals.

Ambient Temperature Derating

Fig. 4 shows the percent of full load which power resistors can dissipate for various high ambient temperatures.

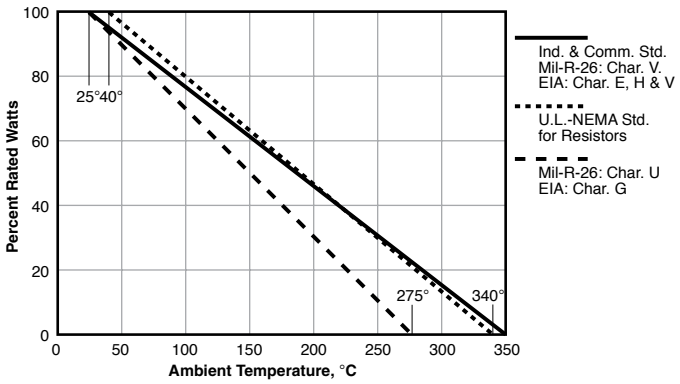


Fig. 4: Derating of Resistors for High Ambient Temperatures.

Derating Due to Enclosure

The amount of derating required, if any, because of enclosure is affected by a number of factors, most of which are hard to determine accurately. The watts per square inch of surface, size, shape, orientation, wall thickness, material, finish and amount and location of ventilating openings all play a part. Fig. 5 serves to indicate for a particular set of conditions how the temperatures varied with the size of enclosure for a moderate size power resistor.

Derating Due to Grouping

The temperature rise of a component is affected by the nearby presence of other heat-producing units, such as resistors, electronic tubes, etc. The curves in Fig. 6 show the power rating for groups of resistors with various spacings between the closest points of the resistors, assuming operation at maximum permissible hot spot temperature. If resistors are to be operated at lower hot spot temperatures, the amount of derating for grouping can be reduced.

Derating for Altitude

The curve in Fig. 7 shows the proportional watts for various altitudes, assuming standard atmospheric conditions.

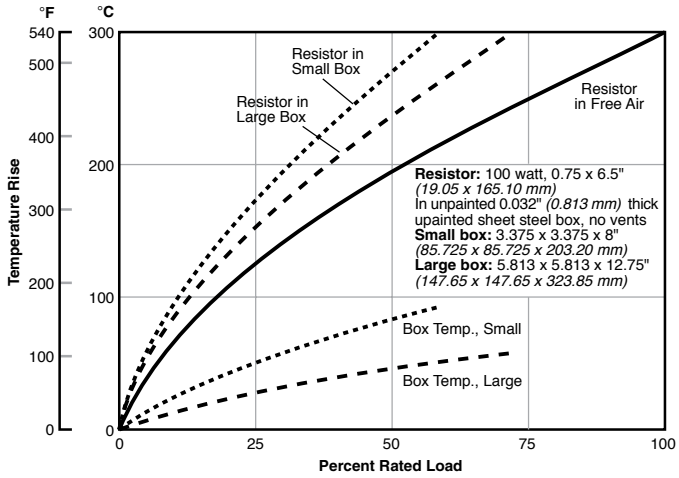


Fig.5: Example of Effect of Size of Enclosure on Temperature Rise of An Enclosed Resistor.

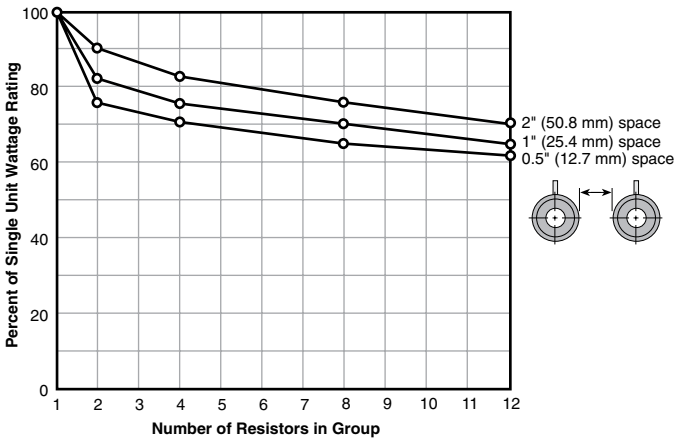


Fig.6: Derating of Resistors to Allow for Grouping

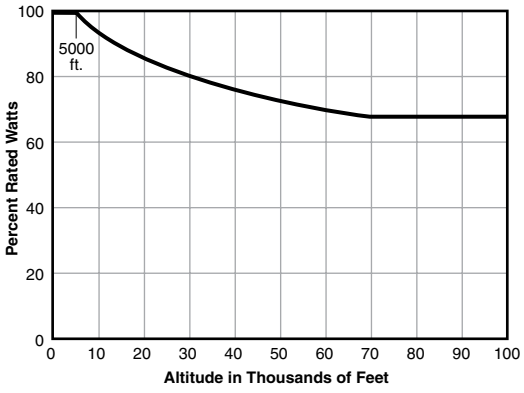


Fig. 7: Derating for Altitude

Resistor Selection

Application Notes

Pulse Operation

Unlike the environmental factors, which result in reduction of the watt rating, pulse operation may permit higher power in the pulses than the continuous duty rating.

The NEMA has set up certain standard duty cycles for motor control resistors and the resistor ratings for some of these conditions are shown in Fig. 8.

The curves in Figures 10,11,12 and 13 illustrate the more general case of various combinations of on and off time for specified loads up to 1000% for a continuous series of pulses. Intermediate loads can be approximated by interpolation. The "on-time" at which each curve flattens out also indicates the maximum on-time for single pulses (with enough off-time for cooling to ambient). Additional data on single pulses is given by Fig. 9. Resistors will reach about 75% of the rated maximum temperature rise in approximately 5 to 8 pulses and level off at maximum rise in another 10 to 20 cycles, depending on percent load, size, type, etc. Any curve passing above the intersection of the designated on and off-times indicates a percent load which can be used. A resistor operated at the rating of an interpolated curve through the point of intersection would operate at maximum rated temperature rise.

The exact temperature rise, of course, varies with each resistor, depending on size, ohms winding, etc. The curves shown indicate the approximate rise for typical units only, as a band or range of values actually exists for each percent load.

Ratings at over 1000% are not recommended except for Powr-Rib® resistors. Curves for intermediate size resistors can be roughly estimated by comparison with the sizes given.

Ratings for single pulses in the milli-second range (and up to 1 to 2 seconds) require individual calculation. This is because the ratings vary greatly with the resistance, or more specifically with the actual weight and specific heat of the resistance alloy used. Calculation is based on the assumption that all of the heat generated in the pulse goes to raise the temperature of the resistance wire.

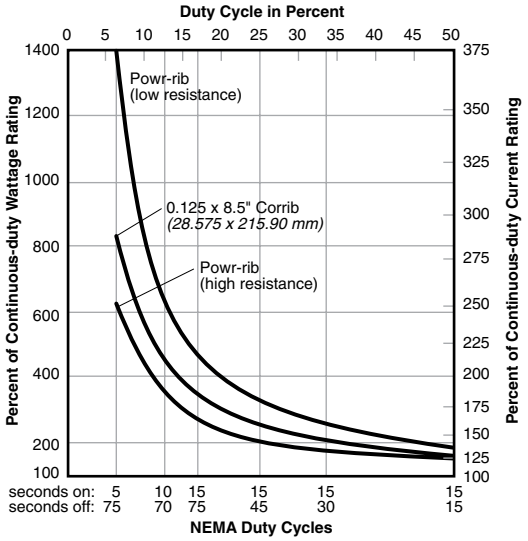


Fig. 8: Percent of Continuous Duty Rating for Resistors for Typical NEMA Duty Cycles.

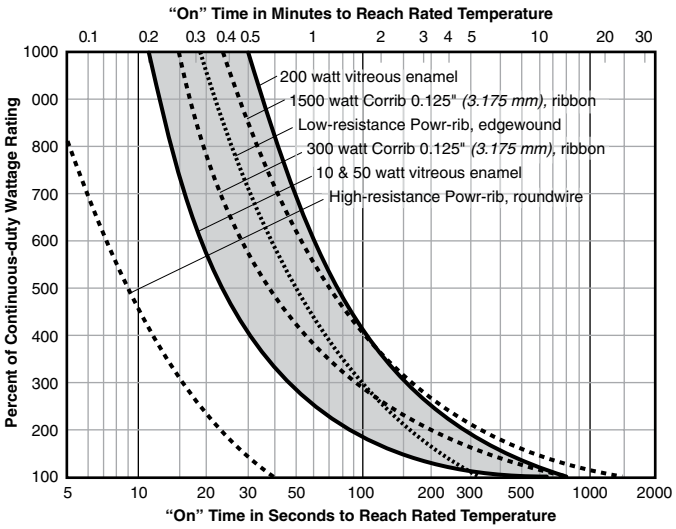


Fig. 9: Time Required for Typical Resistors to Reach Rated Operating Temperatures at Various Watt Loads.

Resistor Selection

Application Notes

PULSE OPERATION — COOLING — LIMITED TEMPERATURES

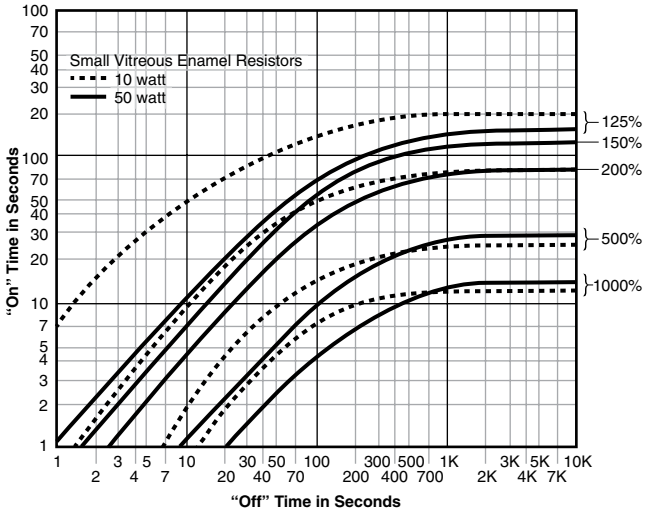


Fig. 10: 10 Percent of Continuous Duty Rating for Pulse Operation of small to Medium Size Vitreous Enameled Resistors.

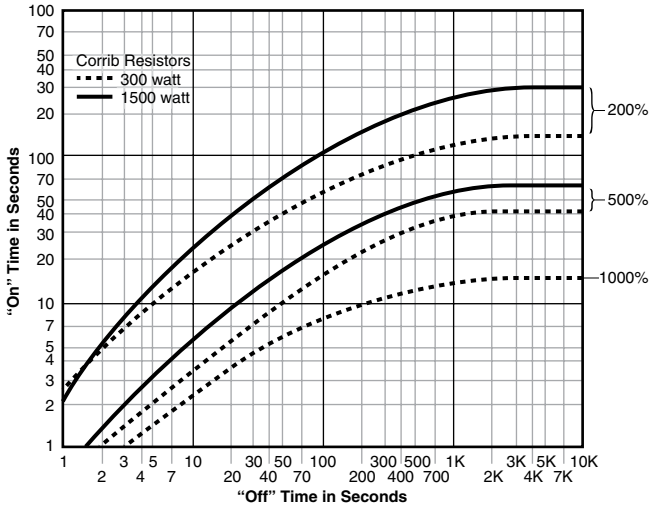


Fig.12: Percent of Continuous Duty Rating for Pulse Operation of CORRIB®, Corrugated Ribbon Resistors.

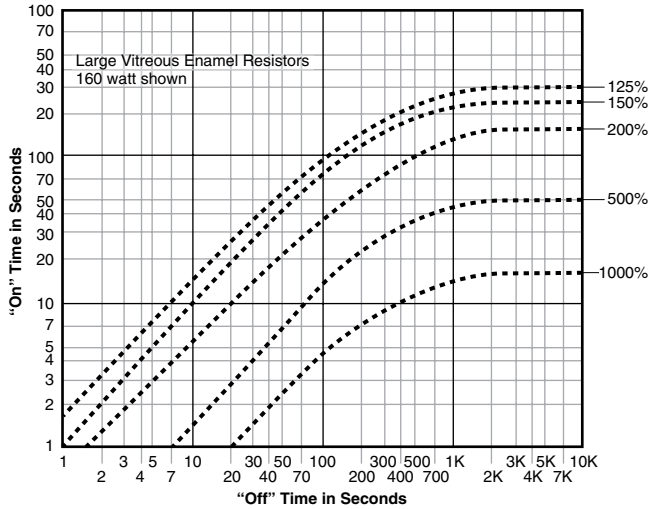


Fig. 11: Percent of Continuous Duty Rating for Pulse Operation of Large Vitreous Enameled Resistors.

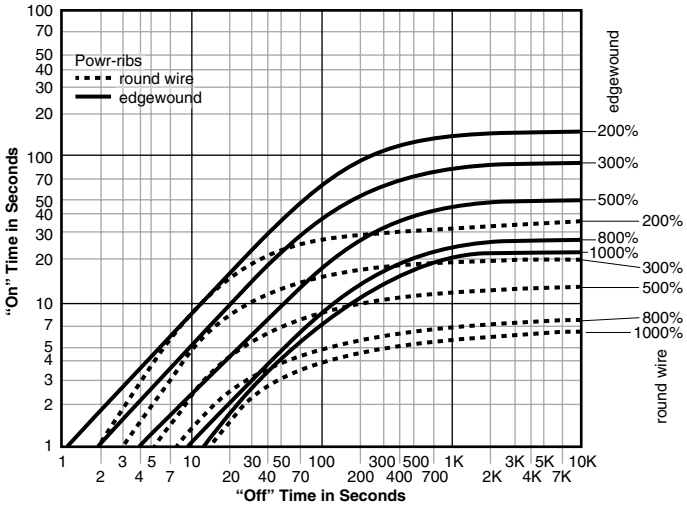


Fig. 13: Percent of Continuous Duty Rating for Pulse Operation of Powr-Rib®, Bare Resistors

Cooling Air

Resistors can be operated at higher than rated wattage when cooled by forced circulation of air. A typical curve is illustrated in Fig 14. The curve tends to level off at higher velocities as excessive hot spots develop where the air flow does not reach all parts uniformly.

Limited Temperature Rise

When it is desired to operate a resistor at less than maximum temperature rise, the percent watts for a given rise can be read from "Temperature Rise vs. Resistor Load" Fig 2 graph on page 91.

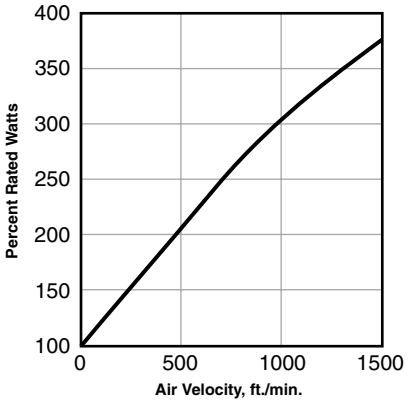


Fig. 14: Percent of Free Air Rating for Typical Resistor Cooled by Forced Air Circulation.

Resistor Selection

Application Notes

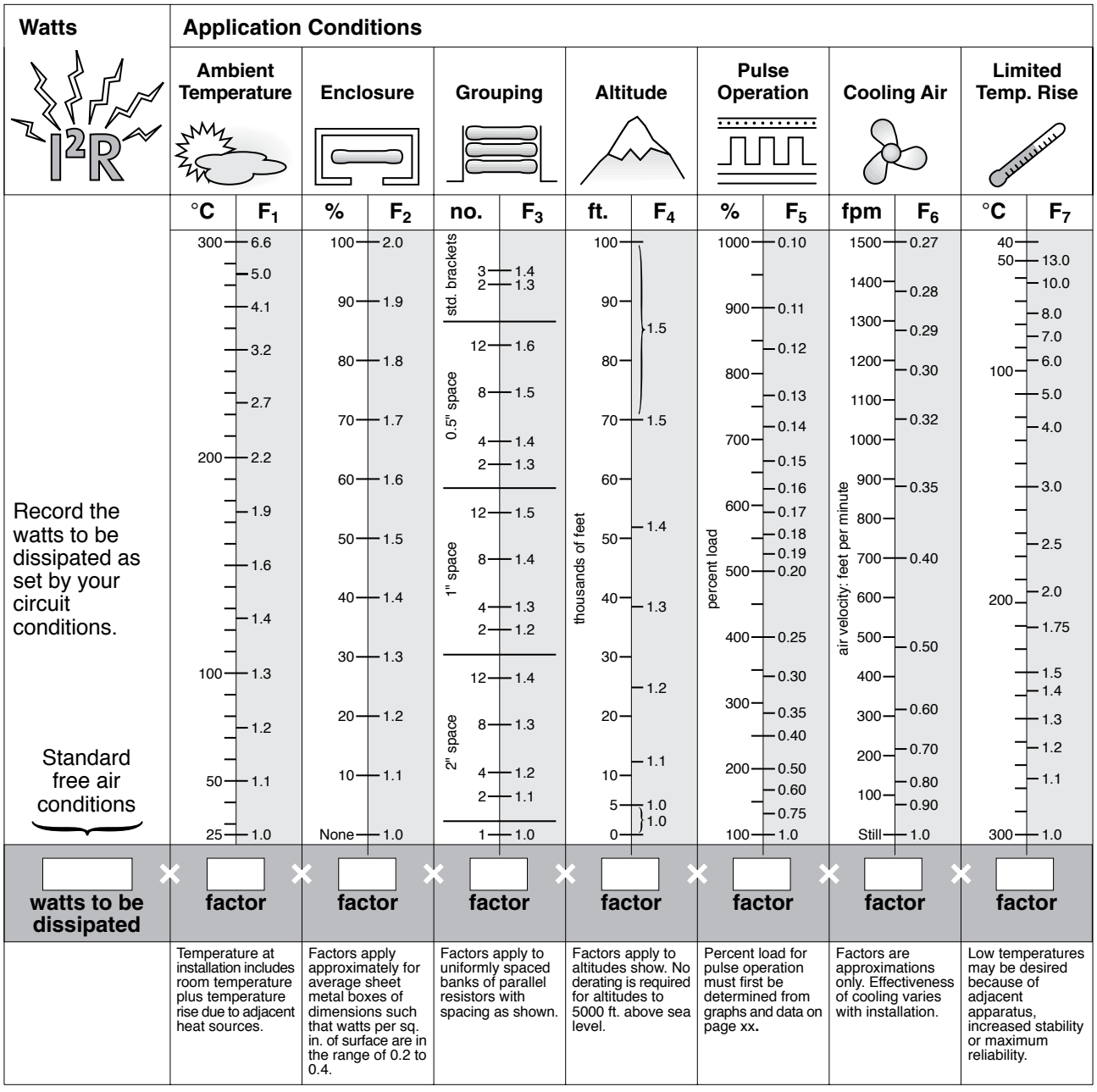
SHORT-CUT CHART METHOD TO FIND REQUIRED SIZE

(as affected by application conditions)

1. For each Condition, locate the relevant value on the scales below and record the corresponding Factor (F_1 to F_7). Note: The Standard Free Air Condition Factor is always 1.

2. Multiply the Factors together.

3. Multiply the Watts by the product obtained from 2 above.



EXAMPLE

Four resistors, each dissipating 115 watts, are to be mounted in a group. Spacing is to be 2" surface to surface. Ambient to be 50°C (122°F). Enclosure to be total. Other factors standard. Determine Watt Size required.

Operation (1) On Ambient Temperature scale locate 50°C. Note and record F_1 = 1.1 as shown. Locate and record the other factors.

F_1		F_2		F_3		F_4		F_5		F_6		F_7
50°		100%		4@2"				Standard Conditions				
1.1	x	2.0	x	1.2	x	1	x	1	x	1		1

Operation (2) Multiply the factors together = 2.64

Operation (3) 115 Watts x 2.64 = 304 Watts Free Air Watt Size Rating required for each resistor.

Resistor Selection

Application Notes

TEMPERATURE COEFFICIENT OF RESISTANCE

The resistance alloys used for all except the lowest ohmic values show such little change with temperature that in most power circuits the resistance is considered constant. Actually there may be changes at full load of -4% to +8% of the initial resistance. The change is attributed in most part to the "temperature coefficient of resistance" (TCR) which is the change in resistance expressed as "parts per million per degree centigrade of temperature" (ppm/°C).

For special applications which require very constant resistance, it may be necessary to specify the maximum permissible TCR for the range of temperature involved. This would limit the choice of wire to only certain types of resistance alloys. The commonly known low TCR alloys in the 800 ohms per circular-mil-foot class consist largely of nickel and chromium alloyed with small amounts of aluminum and either copper or iron. Other low resistivity alloys, 294 ohms per circular-mil-foot, consist primarily of nickel and copper with only traces of other metals.

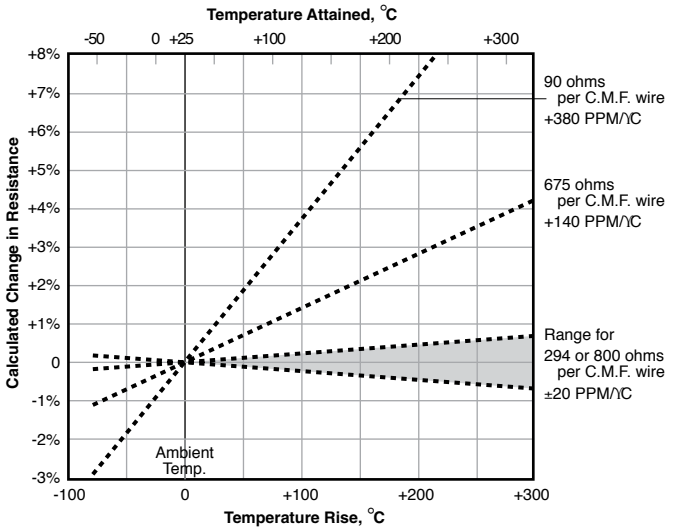


Fig. 15: Calculated change in resistance with nominal TC assumed constant.

Both of these wire classes are rated by the wire manufacturers as having a TCR of 0±20ppm/°C. The expression "0±20ppm/°C" implies that, although the nominal value of the TCR is zero, the actual value may lie anywhere within the tolerance range of –20ppm/°C to +20ppm/°C.

For other resistance wires such as the widely used nickel-chromium-iron, for example, a nominal value of +140ppm/°C is given. Actually, however, a tolerance of ±30ppm is applicable so that the TCR may range between the limits of +110 to +170ppm/°C.

Unfortunately, the TCR of a completed power resistor is generally somewhat different from that of the original wire. This is because the TCR may be affected by such factors as heat treatment during processing, and materials and methods of construction. Without special controls and precautions, the TCR over the range of 25°C to 300°C rise may increase to as much as

0±80ppm from the original 0±20ppm for certain types of wire on vitreous enameled resistors. Theoretical changes in resistance with temperature are shown in Fig. 15.

The circuit designer should carefully consider the actual needs of the circuit before specifying limits on the TCR of a desired resistor. Wherever possible it is best to select a resistor for a critical application so that it operates at a low temperature rise. This will also provide the maximum stability over a long period. For low TCR (and other) applications, Ohmite can provide resistors with an "Ohmicone" (silicone-ceramic) coating. "Ohmicone" is processed at much lower temperatures than vitreous enamel and therefore makes control of TCR and tolerance easier. Data on the TCR and other properties of various alloys is given on page 98.

Resistor Selection

Application Notes

RESISTANCE ALLOYS AND USES

A number of different resistance alloys are used in winding resistors and rheostats as shown in Fig. 16. The general use for each alloy is indicated by the column headed, "Resistance Range for Which Used." Whether a particular alloy can be used on a specific resistor can be estimated by dividing the given resistance by the area of the given winding space and determining whether the quotient falls within the limits given hereafter. The "high resistance" alloys cover the range from approximately 10 to 25,000 ohms per square inch of winding area, the "low to medium" type from 5 to 400 ohms and the "very low resistance" alloys from less than an ohm to 250 ohms. It should be noted that the "Ohms per Square Inch" ranges overlap considerably, indicating that in many instances a given resistor could use any of several alloys. Both the upper and lower limits of the ranges are only approximate and in general can be extended somewhat when necessary.

The actual temperature coefficient of a complete resistor is generally greater than the nominal for the wire alone. The approximate change in overall resistance at full load is shown in the table.

Other Alloys

In addition to the alloys tabulated which show small changes in resistance with temperature, there are others which sometimes have to be used for very low resistance units. These alloys have higher temperature coefficients, which limit their use to applications where the change in resistance with load is not important. An example is No. 60 alloy, which has a resistance of 60 ohms per circular-mil-foot and a temperature coefficient of +700ppm/°C.

Ballast Wire

There are other alloys which are selected especially for their high temperature coefficient of resistance. These are used for so-called "ballast" resistors where a large change in resistance is desired with a change in load. A typical ballast wire is Nickel, which has 58 ohms/cmf and a temperature coefficient of +4800ppm/°C. Others are "Hytemco" and "Balco" at 120 ohms/CMF and a TC of +4500pp /°C.

ASTM Alloy Class*	Alloy Composition (Approximate)	Ohms per CMF	Trade Names	Mean Temp Coeff. of Res. ppm/°C	Temperature Range for TCR °C	Resistance Range for Which Used	Average Resistance Change at Full Load**
1a	Nickel base, non-magnetic Ni 75%, Cr 20% plus Al, Cu, Fe, etc.	800	Evanohm Karma Moleculoy Nikrothal L	0 ± 20	-65 to + 250	Very high, Medium and up, for low temp. coeff.	Under ± 1% to ± 2%
1b		800		0 ± 10	-65 to + 150		
2a	Iron base, magnetic Fe 73%, Cr 22.5%, Al 4.5% (plus Co in one alloy)	800	Alloy 815-R Kanthall Dr Mesaloy	0 ± 20	-65 to + 200	Alternate sometimes for Class 1	Under ± 1% to ± 2%
2b		800		0 ± 10	0 to + 150		
3a	Nickel-Chromium 80% — 20%	650	Chromel A Nichrome V Nikrothal B Protoloy A Tophet C	+ 80 ± 20	-65 to + 250	High and medium	+ 4 to + 5%
3b		675		+ 60 ± 20			
4	Nickel-Chromium-Iron 60%—16%—24%	675	Chromel C Electroloy Nichrome Nikrothal 6 Tophet C	+ 140 ± 30	-65 to + 200	High and medium	+ 5 to + 8%
5a	Copper-Nickel 55% — 45%	300	Advance Copel Cupron Cuprothal 294 Neutroloy	0 ± 20	-65 to + 150	Low and low to medium for low temp. coeff.	Under ± 1% to ± 2%
5b				0 ± 40			
6	Manganin 13% Mn, 87% Cu	290	Manganin	0 ± 15	+ 15 to + 35	Low and low to medium for low TC near 25°C	Under ± 1% to ± 2%**
7	Copper-Nickel 77% — 23%	180	180 Alloy Cuprothal 180 Midohm	+ 180 ± 30	-65 to + 150	Very low	+ 5% to + 8%
9	Copper-Nickel 90% — 10%	90	90 Alloy 95 Alloy Cuprothal 90	+ 450 ± 50	-65 to + 150	Very low	+ 5% to + 10%

*American Society for Testing Materials. Tentative Specification B267-68.

**For resistor with 300°C hot spot rise from 25°C ambient except 54°C rise for Manganin.

Fig. 16: Table of Resistance Alloys Generally Used for Resistors and Rheostats.

Resistance Values

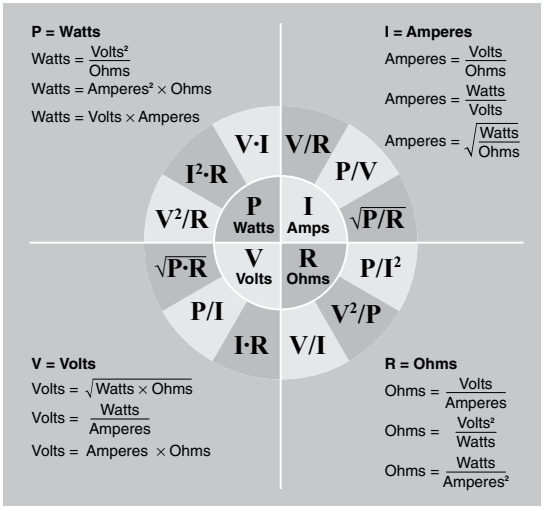
Preferred Standard Resistance Values

The resistance values listed below and their decimal multiples have been designated as standard by the International Electrotechnical Commission (IEC). This listing ensures that every possible resistance value within its respective tolerance range is represented. The omission of a resistance value does not necessarily mean that Ohmite cannot manufacture the desired value.

Please contact Ohmite at 866-964-6483 or sales@ohmite.com for resistance values not shown in this table.

1% Tol. **E96 Values** (Plus 250Ω and 500Ω)	5% Tol. **E24 Values** (Plus 25Ω and 50Ω)	10% Tol. **E12 Values** (Plus 25Ω and 50Ω)	20% Tol. **E6 Values** (Plus 25Ω and 50Ω)	1% Tol. **E96 Values** (Plus 250Ω and 500Ω)	5% Tol. **E24 Values** (Plus 25Ω and 50Ω)	10% Tol. **E12 Values** (Plus 25Ω and 50Ω)	20% Tol. **E6 Values** (Plus 25Ω and 50Ω)	1% Tol. **E96 Values** (Plus 250Ω and 500Ω)	5% Tol. **E24 Values** (Plus 25Ω and 50Ω)	10% Tol. **E12 Values** (Plus 25Ω and 50Ω)	20% Tol. **E6 Values** (Plus 25Ω and 50Ω)
100	10	10	10	255				523			
102				261				536			
105				267				549			
107					27	27			56	56	
110	11			274				562			
113				280				576			
115				287				590			
118				294				604			
	12	12			30			619			
121				301					62		
124				309				634			
127				316				649			
130	13			324				665			
133					33	33	33		68	68	68
137				332				681			
140				340				698			
143				348				715			
147				357				732			
150	15	15	15		36			750	75		
154				365				768			
158				374				787			
	16			383				806			
162					39	39			82	82	
165				392				825			
169				402				845			
174				412				866			
178				422				887			
	18	18			43			909			
182				432					91		
187				442				931			
191				453				953			
196				464				976			
200	20				47	47	47				
205				475							
210				487							
215				499							
	22	22	22	500	50	50	50				
221					51						
226				511							
232											
237											
	24										
243											
249											
250	25	25	25								

OHM'S LAW



Ohm's Law defines the relationships between (P) power, (V) voltage, (I) current, and (R) resistance. One ohm is the resistance value through which one volt will maintain a current of one ampere.

I Current is what flows on a wire or conductor like water flowing down a river. Current flows from negative to positive on the surface of a conductor. Current is measured in (A) amperes or amps.

V Voltage is the difference in electrical potential between two points in a circuit. It's the push or pressure behind current flow through a circuit, and is measured in (V) volts.

R Resistance determines how much current will flow through a component. Resistors are used to control voltage and current levels. A very high resistance allows a small amount of current to flow. A very low resistance allows a large amount of current to flow. Resistance is measured in ohms.

P Power is the amount of current times the voltage level at a given point measured in wattage or watts.

Resistor Terminology

Adjustable Resistor: A resistor so constructed that its resistance can be readily changed.*

Alternating Current: A periodic current the average value of which over a period is zero. The equation for alternating current is the same as that for a periodic current except that I_0=O*

Ambient Temperature: The temperature of the surrounding coiling medium, such as gas or liquid, which comes into contact with heated parts of the apparatus.*

Ampere: The unit of constant current which, maintained in two parallel rectilinear conductors of infinite length separated by a distance of one meter, produces between these conductors a force equal to $2x10^{-7}$ mks (meter-kilogram-second) units of force per meter of length.

Armature Resistor: A resistor connected in series with the armature of a motor either to limit the inrush current on starting, the gradual short circuiting of which brings the motor to normal speed, or to regulate the speed by armature-voltage control.

Axiohm†: Centohm® Coated axial terminal wirewound resistor.

Bracket Terminal Resistor: A resistor equipped with slotted metal end j brackets that serve as a means of mounting and connecting to the resistor.

Capacitance: That property of a system of conductors and dielectrics which permits the storage of electricity when potential differences exist between the conductors. Its value is expressed as the ratio of a quantity of electricity to a potential difference. A capacitance value is always positive.*

Capacitor: A device, the primary purpose of which is to introduce capacitance into an electric circuit. Capacitors are usually classified, according to their dielectrics, as air capacitors, mica capacitors, paper capacitors, etc.*

Clearance: The shortest distance through space between two live parts, between live parts and supports or other objects, or between any live part and grounded part.

Conduction: The transmission of heat or electricity through, or by means of, a conductor.

Conductor: A body so constructed from conducting material that it may be used as a carrier of electric current.*

Continuous Duty: A requirement of service that demands operation at a substantially constant load for un indefinitely long time.*

Continuous-Duty Resistor: A resistor that is capable of carrying continuously the current for which it is designed without exceeding the specified temperature rise.

Continuous Rating: Continuous rating is the rating that defines the load which can be carried for an indefinitely long time.*

Convection: Convection is the motion resulting in a fluid owing to differences of density and the action of gravity.

Corrib®†: A tubular resistor consisting of an alloy resistance ribbon, crimped and edge-wound on a ceramic core, the ribbon being securely and permanently fastened to the core by vitreous enamel or cement.

Creepage Distance: The shortest distance between conductors of opposite polarity or between a live part and ground as measured over the surface of the supporting material.

Current-limiting Resistor: A resistor inserted into an electric circuit to limit the flow of current to some predetermined value. Note: A current-limiting resistor, usually in series with a fuse or circuit breaker, may be employed to limit the flow of circuit or system energy at the time of a fault or short-circuit.*

Dielectric Strength: The dielectric strength of an insulating material is the maximum potential gradient that the material can withstand without rupture.* It is usually specified in volts per unit thickness.

Dielectric Test: A test which consists of the application of a voltage higher than the rated voltage for a specified time for the purpose of determining the adequacy against breakdown of insulating materials and spacings under normal conditions.*

Direct Current: A unidirectional current in which the changes in value are either zero or so small that they may be neglected. A given current would be considered a direct current in some applications, but would not necessarily be so considered in other applications.*

Dividohm®†: A resistor with a bare side and clamp for adjustment.

Edgeohm†: A high-current resistor made of an alloy resistance ribbon wound on edge forming an oval-shaped coil supported by grooved insulators which space adjacent turns and insulate them from the support bars. Support bars are secured to steel end pieces forming a sturdy resistor suitable for continuous-and-intermittent-duty applications.

EIA: Electronic Industries Alliance.

Electromotive Force: The electromotive force is the agency causing the flow of current in a circuit. It is the electrical pressure (or drop) measured in volts.

Farad: The unit of capacitance of an electric condenser in which a charge of one coulomb produces a difference of potential of one volt between the poles of the capacitor.

Ferrule Resistor: A resistor supplied with ferrule terminals for mounting in standard fuse clips.

Field Discharge Switch: A switch usually of the knife blade type having auxiliary contacts for connecting the field of a generator or motor across a resistor (field discharge) at the instant preceding the opening of the switch.

Fixed Resistor: A resistor designed to introduce only one set amount of resistance into an electrical circuit.

Henry: The unit of inductance of a closed circuit in which an electromotive force of one volt is produced when the electric current traversing the circuit varies uniformly at the rate of one ampere per second.

Hot Spot: The point or location of maximum temperature on the external surface of a resistor.

Inductance: The (scalar) property of an electric circuit or of two neighboring circuits which determines the electromotive force induced in one of the circuits by a change of current in either of them.*

Impedance: The apparent resistance of an AC circuit, being the combination of both the resistance and reactance. It is equal to the ratio of the value of the EMF between the terminals to the current, there being no source of power in the portion under consideration. The unit of impedance is the ohm and is represented by Z.

Intermittent Duty: A requirement of service that demands operation for alternate intervals of (1) load and no-load; or (2) load and rest; or (3) load, no-load and rest; such alternate intervals being definitely specified.*

Intermittent-Duty Resistor: A resistor capable of carrying for a short period of time the high overload current for which it is designed without exceeding the specified temperature rise.

Machine-Duty Resistor: A resistor for use in the armature or rotor circuit of a motor in which the armature current is almost constant.

Mega Ohm: A unit of resistance equal to one million ohms.

MIL Resistor: A resistor built in accordance with Joint Army-Navy specifications.

Multi-Section Resistor: A resistor having two or more electrically independent sections.

NEC: The National Electrical Code is the standard of the National Board of Fire Underwriters for electric wiring and apparatus as recommended by the National Fire Protection Association and approved by the American Standards Association.

NEDA: National Electronic Distributors Association.

NEMA: The National Electrical Manufacturers Association, a non-profit trade association, supported by the manufacturers of electrical apparatus and supplies. NEMA is engaged in standardization to facilitate understanding between the manufacturers and users of electrical products.

Nominal Diameter: As applied to tubular resistors, this is the diameter of the ceramic tube expressed in inches and/or fractions thereof.

Nominal Length: As applied to tubular resistors, this is the length of the resistor base or core expressed in inches and/or fractions thereof.

Non-Inductive Resistor: A non-inductive power resistor is one in which the inductance and distributed capacitance are reduced to an absolute minimum.

Ohm: A unit of resistance defined as the resistance at 0°C of a column of mercury of uniform cross-section having a length of 106.3 centimeters and a mass of 14.4 grams.

Ohmmeter: An instrument for measuring electric resistance that is provided with a scale graduated in ohms.

Periodic Duty: A type of intermittent duty in which the load conditions are regularly recurrent.*

Periodic Rating: The rating which defines the load which can be carried for the alternate periods of load and rest specified in the rating, the apparatus starting cold and for the total time specified in the rating without causing any of the specified limitations to be exceeded.*

Power: The time rate of transferring or transforming energy; the rate of doing work or expending energy.

Power Resistor: A resistor capable of dissipating 5 watts or more.

Rating: A designated limit of operating characteristics of a machine, apparatus or device, based on definite conditions.

Resistor Terminology

Note 1: Such operating characteristics as load, voltage, frequency, etc., may be given in the rating.

*Note 2: The rating of control apparatus in general is expressed in volts, amperes, horsepower or kilowatts as may be appropriate, except that resistors are rated in ohms, amperes and class of service.**

Reactor: A device used for introducing reactance into a circuit for purposes such as motor starting, paralleling transformers and control of current.*

Rectifier: A device which converts alternating current to unidirectional current by virtue of a characteristic permitting appreciable flow of current in only one direction.*

Resistance: The (scalar) property of an electric circuit or of any body which may be used as part of an electric circuit which determines for a given current the rate at which electric energy is converted into heat or radiant energy and which has a value such that the product of the resistance and the square of the current gives the rate of conversion of energy. In the general case, resistance is a function of the current, but the term is most commonly used in connection with circuits where the resistance is independent of the current.*

Resistance Tolerance: The resistance tolerance of a power resistor is the extent to which its resistance may be permitted to deviate above or below the specified resistance. Resistance tolerance is usually expressed in percent.

Resistance Method of Temperature Determination: This method consists in the determination of temperature by comparison of the resistance of the winding at the temperature to be determined with the resistance at a known temperature.**

Resistive Conductor: A resistive conductor is a conductor used primarily because it possesses the property of high electric resistance.*

Resistivity: The resistivity of a material is the resistance of a sample of the material having specified dimensions.

Resistor: A device, the primary purpose of which is to introduce resistance into an electric circuit.*

Resistor Core: The resistor core or base of a power resistor is the insulating support on which the resistive conductor is wound.

Rheostat: An adjustable resistor so constructed that its resistance may be changed without opening the circuit in which it may be connected.*

Screw-Base Resistor: A power-type resistor equipped with Edison-type screw-base terminals for quick interchangeability.

Short-Time Rating: The rating that defines the load which can be carried for a short and definitely specified time, the machine, apparatus or device being at approximately room temperature at the time the load is applied.*

Silicone: A silicone coating meeting MIL-R-26 used on power type wirewound resistors.

Slim Mox A flat style resistor Ohmite manufactures. They are available in a variety of sizes and values.

Single-Wound Resistor: A resistor that has only one layer of resistance wire or ribbon wound around the insulating base or core.

Stackohm®†: A resistor consisting of a hollow ceramic core, oval in shape, about which resistance wire is wound and completely embedded in an insulating and heat conducting coating.

Still Air: Still air is considered air having no circulation except that created by the heat of the resistor which is being operated.

Tapped Resistor: A resistor with two or more steps.

Temperature Coefficient of Resistance: A measure of the increase or decrease in resistance of a resistive conductor due to change in temperature in parts per million (ppm).

$$R_T = R_r + [R_r(\alpha T - \alpha T_r)]$$

Where,

R_T = Resistance of conductor at temperature T

R_r = Resistance of conductor at reference temperature T_r

α = Temperature coefficient of resistance at reference temperature T_r

Temperature Rise: Temperature rise is the difference in temperature between the initial and final temperature of a resistor. Temperature rise is expressed in degrees C or F, usually referred to an ambient temperature. Temperature rise equals the hot spot temperature minus the ambient temperature.

Thermal Shock: Thermal shock consists of a sudden marked change in the temperature of the medium in which the device operates.

Thermocouple: A device for converting heat energy into electrical energy consisting of a pair of dissimilar conductors so joined as to produce a thermo-electric effect. It is used with a millivoltmeter to measure temperature rise in apparatus.

Thermometer Method of Temperature Determination: This method consists in the determination of the temperature by a mercury or alcohol thermometer, by a resistance thermometer, or by a thermocouple, any of these instruments being applied to the hottest part of the apparatus accessible to a mercury or alcohol thermometer.**

Tolerance (%) The tolerance is the allowable deviation from teh nominal resistance value.

Varying Duty: A requirement of service that demands operation at loads, and for intervals of time, both of which may be subject to wide variation.*

Voltage (V or E): The unit of measure is the volt. A unit of electrical pressure, EMF or potential difference. Ohmite's voltage rating is the voltage that can be applied to the resistor without arcing or degrading the resistor.

Voltage Coefficient (VCR) The unit of measure is in parts per million (ppm). Voltage coefficient defines the change in the value of the resistor that occurs as the voltage changes. The resistor is measured at two voltages and the deviation is then calculated. VCR is usually states as the change per volt (ex. 2ppm/v).

Watt: A unit of electric power. It is the power expended when one ampere of direct current flows through a resistor of one ohm.

Winding Pitch: The distance from any point on a turn of a resistive conductor to the corresponding point on an adjacent turn measured parallel to the long axis of the winding.

* ASA Standard

** NEMA Standard

† Ohmite trade name

RESISTANCE VALUES

Abbreviations and Part Numbering Structure

Prefix	Abbreviation		Part Numbering Structure	Numeric Value		Description	Scientific Notation
Milli	*m*	*Thousandth*	*R001*	*0.001*	*1*	*Milli Ohm*	*1.0 x 10^{-3}*
Centi	*c*	*Hundredth*	*R010*	*0.01*	*1*	*Centi Ohm*	*1.0 x 10^{-2}*
Deci	*d*	*Tenth*	*R100*	*0.1*	*1*	*Deci Ohm*	*1.0 x 10^{-1}*
—	*—*	*One*	*1R00*	*1*	*1*	*Ohm*	*1.0 x 10^{0}*
Deca, Deka	*da*	*Ten*	*10R0*	*10*	*1*	*Deca Ohm*	*1.0 x 10^{1}*
Hecto	*h*	*Hundred*	*1000**	*100*	*1*	*Hecto Ohm*	*1.0 x 10^{2}*
Kilo	*k*	*Thousand*	*1001**	*1,000*	*1*	*Kilo Ohm*	*1.0 x 10^{3}*
			*1002**	*10,000*	*10*	*Kilo Ohms*	*1.0 x 10^{4}*
			*1003**	*100,000*	*100*	*Kilo Ohms*	*1.0 x 10^{5}*
Mega	*M*	*Million*	*1004**	*1,000,000*	*1*	*Mega Ohm*	*1.0 x 10^{6}*
			*1504**	*1,500,000*	*1.5*	*Mega Ohms*	*1.5 x 10^{6}*
			*1005**	*10,000,000*	*10*	*Mega Ohms*	*1.0 x 10^{7}*
			*1006**	*100,000,000*	*100*	*Mega Ohms*	*1.0 x 10^{8}*
			*1506**	*150,000,000*	*150*	*Mega Ohms*	*1.5 x 10^{8}*
Giga	*G*	*Billion*	*1007*	*1,000,000,000*	*1*	*Giga Ohm*	*1.0 x 10^{9}*
			1507	*1,500,000,000*	*1.5*	*Giga Ohms*	*1.5 x 10^{9}*
			1008	*10,000,000,000*	*10*	*Giga Ohms*	*1.0 x 10^{10}*
			1009	*100,000,000,000*	*100*	*Giga Ohms*	*1.0 x 10^{11}*
			1509	*150,000,000,000*	*150*	*Giga Ohms*	*1.5 x 10^{11}*
Tera	*T*	*Trillion*	*100A*	*1,000,000,000,000*	*1*	*Tera Ohm*	*1.0 x 10^{12}*
			150A	*1,500,000,000,000*	*1.5*	*Tera Ohms*	*1.5 x 10^{12}*
			100B	*10,000,000,000,000*	*10*	*Tera Ohms*	*1.0 x 10^{13}*

**Part Numbering Structure may vary by product line*