

Segmented Photodiodes (SPOT Series)

Position Sensing Detector (PSD)

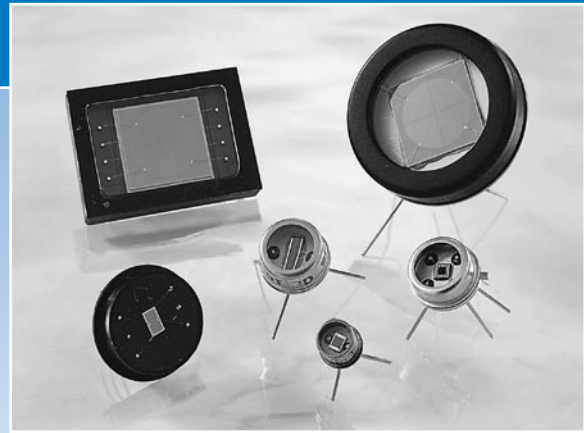
The SPOT Series are common substrate photodetectors segmented into either two (2) or four (4) separate active areas. They are available with either a 0.005" or 0.0004" well defined gap between the adjacent elements resulting in high response uniformity between the elements. The SPOT series are ideal for very accurate nulling or centering applications. Position information can be obtained when the light spot diameter is larger than the spacing between the cells.

Spectral response range is from 350-1100nm. Notch or bandpass filters can be added to achieve specific spectral responses.

These detectors exhibit excellent stability over time and temperature, fast response times necessary for high speed or pulse operation, and position resolutions of better than 0.1 μm .

Maximum recommended power density is 10 mW / cm² and typical uniformity of response for a 1 mm diameter spot is $\pm 2\%$.

The circuit on the opposite page represents a typical biasing and detection circuit set up for both bi-cells and quad-cells. For position calculations and further details, refer to "Photodiode Characteristics" section of the catalog.



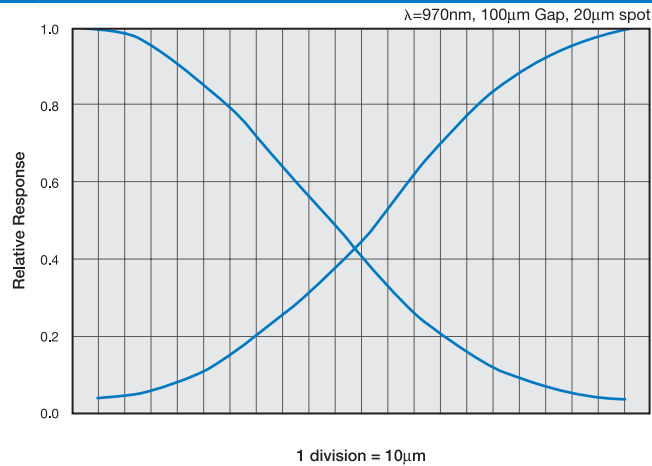
APPLICATIONS

- Machine Tool Alignment
- Position Measuring
- Beam Centering
- Surface Profiling
- Targeting
- Guidance Systems

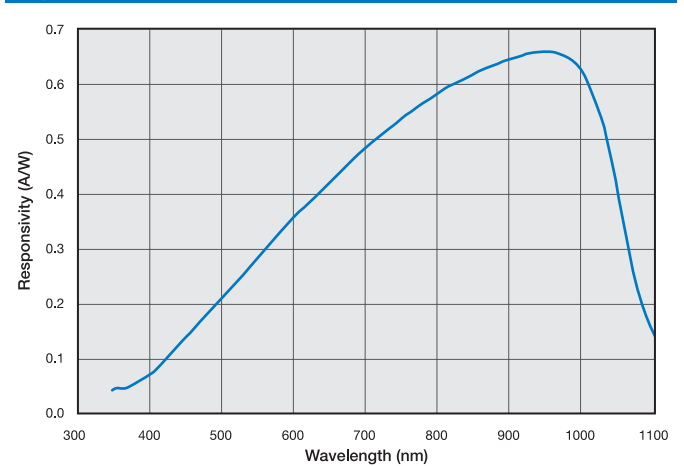
FEATURES

- High Accuracy
- Excellent Resolution
- High-Speed Response
- Ultra Low Dark Current
- Excellent Response Match
- High Stability over Time and Temperature

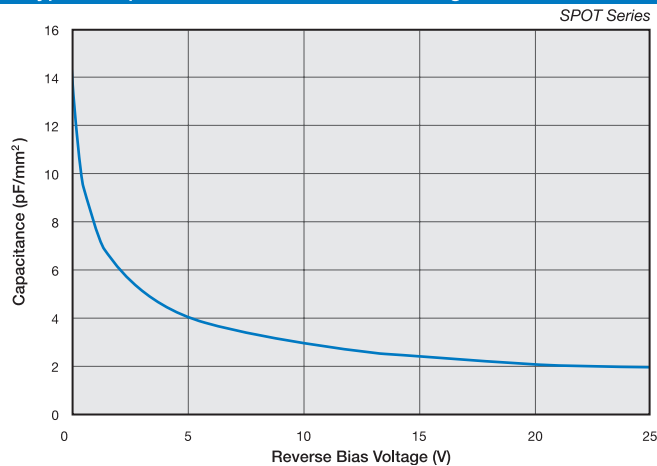
Typical Cross-Over Characteristics



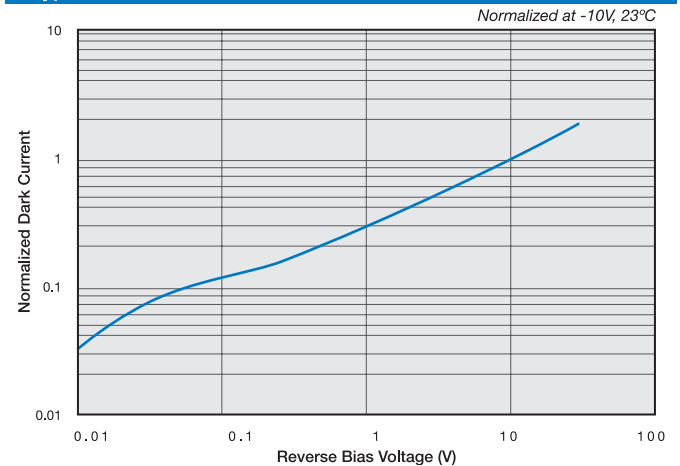
Typical Spectral Response



Typical Capacitance vs. Reverse Bias Voltage



Typical Dark Current vs. Reverse Bias



Segmented Photodiodes (SPOT Series)

Typical Electro-Optical Specifications at $T_A=23^{\circ}\text{C}$

Model Number	Active Area Per Element		Element Gap (mm)	Responsivity (A/W)		Capacitance (pF)	Dark Current (nA)		NEP (W/√Hz)	Reverse Voltage (V)	Rise Time (ns)	Temp Range (°C)		Package Style †
	Area (mm ²)	Dimensions (mm)		970 nm		-10 V	-10 V		-10 V 970 nm		-10 V 780 nm	Operating	Storage	
				min.	typ.	typ.	typ.	max.	typ.		typ.			

Two-Element Series, Metal Package

Model Number	Area (mm ²)	Dimensions (mm)	Element Gap (mm)	Responsivity (A/W) min.	Responsivity (A/W) typ.	Capacitance (pF) 50@ -15V	Capacitance (pF) 20@ -15V	NEP (W/√Hz) 1.1 e-14	Reverse Voltage (V) 30	Rise Time (ns) 300@ -15V	Temp Range (°C) Operating	Temp Range (°C) Storage	Package Style †
CD-25T	2.3	4.6 x 0.5	0.2								-40 ~ +100	-55 ~ +125	2 / TO-5
SPOT-2D	3.3	1.3 x 2.5	0.127			11	0.15	2.0		5			41 / TO-5
SPOT-2DMI	0.7	0.6 x 1.2	0.013			3	0.05	1.0		7			40 / TO-18
SPOT-3D	2.8	0.6 x 4.6	0.025			7	0.13	2.0		4			41 / TO-5

Four Element Series, Metal Package

Model Number	Area (mm ²)	Dimensions (mm)	Element Gap (mm)	Responsivity (A/W) min.	Responsivity (A/W) typ.	Capacitance (pF) 5	Capacitance (pF) 1	Capacitance (pF) 60	NEP (W/√Hz) 8.7 e-15	NEP (W/√Hz) 2.8 e-15	NEP (W/√Hz) 1.9 e-14	Reverse Voltage (V) 30	Rise Time (ns) 3	Temp Range (°C) Operating	Temp Range (°C) Storage	Package Style †
SPOT-4D	1.61	1.3 sq	0.127											-40 ~ +100	-55 ~ +125	41 / TO-5
SPOT-4DMI	0.25	0.5 sq	0.013													
SPOT-9D	19.6	10 φ ‡	0.102													
SPOT-9DMI	19.6		0.010													

Model Number	Active Area Per Element		Element Gap (mm)	Responsivity 257 nm		Capacitance 0 V	Shunt Resistance (MΩ)		NEP	Reverse Voltage (V)	Rise Time 0 V, 257 nm	Package Style †
	Area (mm ²)	Dimensions (mm)		A/W		pF	MΩ		(W/√Hz)		μs	
				min.	typ.	typ.	min.	max.	typ.		max.	

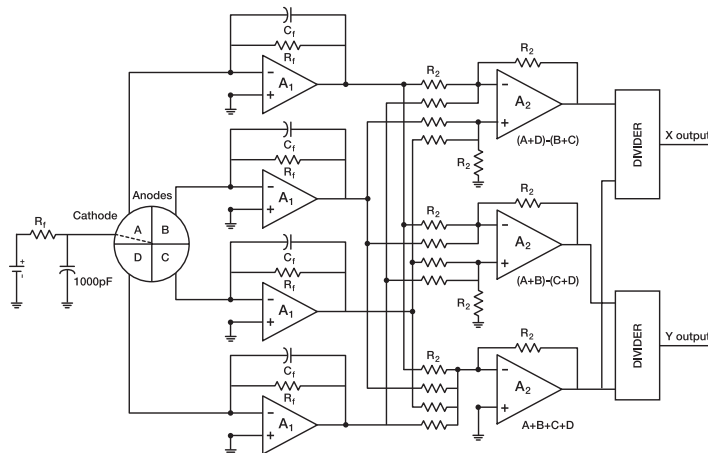
UV-Enhanced Four Elements, Metal Package §

Model Number	Area (mm ²)	Dimensions (mm)	Element Gap (mm)	Responsivity (A/W) min.	Responsivity (A/W) typ.	Capacitance (pF) 40	Shunt Resistance (MΩ) 100	Shunt Resistance (MΩ) 500	NEP (W/√Hz) 1.3 e-13	Reverse Voltage (V) 5	Rise Time (ns) 10	Temp Range (°C) Operating	Temp Range (°C) Storage	Package Style †
SPOT-4DUV	1.61	1.3 sq	0.127	0.08	0.10							-10 ~ +60	-20 ~ +70	41 / TO-5

‡ Overall Diameter (All four Quads)

† For mechanical drawings please refer to pages 58 thru 69.

Chip centering within ±0.010".



1. Parameter Definitions:

A = Distance from top of chip to top of glass.

a = Photodiode Anode.

B = Distance from top of glass to bottom of case.

c = Photodiode Cathode

(Note: cathode is common to case in metal package products unless otherwise noted).

W = Window Diameter.

F.O.V. = Field of View (see definition below).

2. Dimensions are in inches (1 inch = 25.4 mm).

3. Pin diameters are 0.018 ± 0.002" unless otherwise specified.

4. Tolerances (unless otherwise noted)

General: 0.XX ±0.01"

0.XXX ±0.005"

Chip Centering: ±0.010"

Dimension 'A': ±0.015"

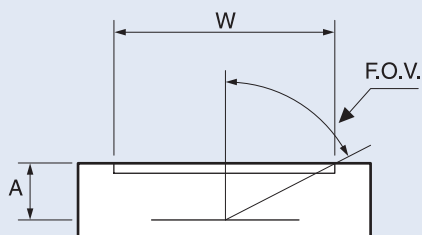
5. Windows

All '**UV**' Enhanced products are provided with QUARTZ glass windows, 0.027 ± 0.002" thick.

All '**XUV**' products are provided with removable windows.

All '**DLS**' PSD products are provided with A/R coated glass windows.

All '**FIL**' photoconductive and photovoltaic products are epoxy filled instead of glass windows.



$$F.O.V. = \tan^{-1} \left(\frac{W}{2A} \right)$$



For Further Assistance
Please Call One of Our Experienced
Sales and Applications Engineers

310-978-0516



- Or -
On the Internet at

www.osioptoelectronics.com

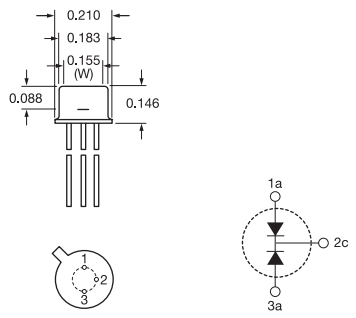
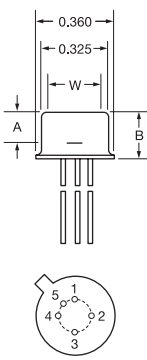
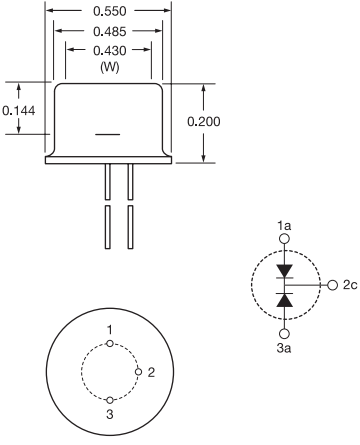
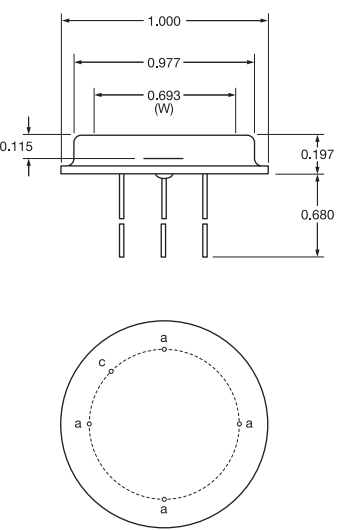
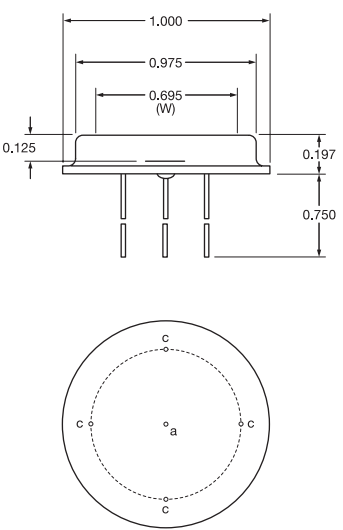
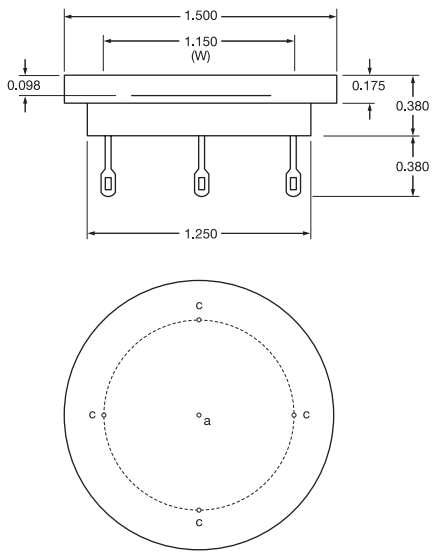
Mechanical Specifications

All units in inches. Pinouts are bottom view.

1 TO-18	2 TO-5	3 TO-8																																		
<p>Products:</p> <p>PIN-020A PIN-040A PIN-040-DP/SB</p> <p>Pin Circle Dia.=0.100</p> <table border="1"> <thead> <tr> <th>P/N</th> <th>A</th> <th>B</th> <th>W</th> </tr> </thead> <tbody> <tr> <td>PIN-020A</td> <td>0.075</td> <td>0.200</td> <td>0.155</td> </tr> <tr> <td>PIN-040A</td> <td>0.075</td> <td>0.200</td> <td>0.155</td> </tr> </tbody> </table>	P/N	A	B	W	PIN-020A	0.075	0.200	0.155	PIN-040A	0.075	0.200	0.155	<p>Products:</p> <p>PIN-5DI PIN-5DPI PIN-13DI PIN-13DPI PIN-5-YAG CD-25T</p> <p>Pin Circle Dia.=0.200</p> <table border="1"> <thead> <tr> <th>P/N</th> <th>A</th> <th>B</th> <th>W</th> </tr> </thead> <tbody> <tr> <td>All Others</td> <td>0.094</td> <td>0.180</td> <td>0.240</td> </tr> <tr> <td>CD-25T</td> <td>0.050</td> <td>0.130</td> <td>0.23</td> </tr> </tbody> </table>	P/N	A	B	W	All Others	0.094	0.180	0.240	CD-25T	0.050	0.130	0.23	<p>Products:</p> <p>PIN-6DI PIN-6DPI PIN-44DI PIN-44DPI OSD35-0 OSD35-7Q</p> <p>Pin Circle Dia.=0.295</p> <table border="1"> <thead> <tr> <th>P/N</th> <th>A</th> </tr> </thead> <tbody> <tr> <td>PIN-6DI/6DPI</td> <td>0.115</td> </tr> <tr> <td>PIN-44DI/44DPI</td> <td>0.125</td> </tr> <tr> <td>OSD35-0</td> <td>0.130</td> </tr> <tr> <td>OSD35-7Q</td> <td>0.130 Quartz Window</td> </tr> </tbody> </table>	P/N	A	PIN-6DI/6DPI	0.115	PIN-44DI/44DPI	0.125	OSD35-0	0.130	OSD35-7Q	0.130 Quartz Window
P/N	A	B	W																																	
PIN-020A	0.075	0.200	0.155																																	
PIN-040A	0.075	0.200	0.155																																	
P/N	A	B	W																																	
All Others	0.094	0.180	0.240																																	
CD-25T	0.050	0.130	0.23																																	
P/N	A																																			
PIN-6DI/6DPI	0.115																																			
PIN-44DI/44DPI	0.125																																			
OSD35-0	0.130																																			
OSD35-7Q	0.130 Quartz Window																																			
<p>Products:</p> <p>PIN-2DI PIN-2DPI PIN-3CDP PIN-3CDPI BPX-65R</p> <p>Pin Circle Dia.=0.100</p> <table border="1"> <thead> <tr> <th>P/N</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>BPX-65R</td> <td>0.070</td> <td>0.200</td> </tr> <tr> <td>All Others</td> <td>0.090</td> <td>0.150</td> </tr> </tbody> </table>	P/N	A	B	BPX-65R	0.070	0.200	All Others	0.090	0.150	<p>Products:</p> <p>PIN-5D PIN-5DP PIN-5DP/SB PIN-13D PIN-13DP PIN-005E-550F UV-001 UV-005 UV-005D UV-005E UV-013D UV-013E UV-015 OSD-5-0 OSD15-0 OSD5-5T OSD15-5T OSD5.8-7Q OSD5.8-7U</p> <p>Pin Circle Dia.=0.200</p> <table border="1"> <thead> <tr> <th>P/N</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>OSD-Prefix Devices</td> <td>0.050</td> <td>0.130</td> </tr> <tr> <td>All Others</td> <td>0.102</td> <td>0.180</td> </tr> </tbody> </table> <p>Quartz Window: OSD5.8-7Q UV Transmissive Window: OSD5.8-7U</p>	P/N	A	B	OSD-Prefix Devices	0.050	0.130	All Others	0.102	0.180	<p>Products:</p> <p>PIN-6D PIN-6DP PIN-44D PIN-44DP UV-020 UV-035D UV-035E UV-035</p> <p>Pin Circle Dia.=0.295</p>																
P/N	A	B																																		
BPX-65R	0.070	0.200																																		
All Others	0.090	0.150																																		
P/N	A	B																																		
OSD-Prefix Devices	0.050	0.130																																		
All Others	0.102	0.180																																		
<p>Products:</p> <p>PIN-3CD PIN-3CDP BPX-65 OSD1-0 OSD1-5T OSD3-5T OSD1.2-7Q OSD1.2-7U</p> <p>Pin Circle Dia.=0.100</p> <table border="1"> <thead> <tr> <th>P/N</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>PIN-3CD / 3CDP</td> <td>0.087</td> <td>0.146</td> </tr> <tr> <td>BPX-65</td> <td>0.075</td> <td>0.200</td> </tr> <tr> <td>OSD-Prefix Devices</td> <td>0.080</td> <td>0.200</td> </tr> </tbody> </table> <p>Quartz Window: OSD1.2-7Q UV Transmissive Window: OSD1.2-7U</p>	P/N	A	B	PIN-3CD / 3CDP	0.087	0.146	BPX-65	0.075	0.200	OSD-Prefix Devices	0.080	0.200	<p>Products:</p> <p>PIN-125DPL</p> <p>Pin Circle Dia.=0.100</p>	<p>Products:</p> <p>PIN-HR005 PIN-HR008 PIN-HR020 PIN-HR026 PIN-HR040</p> <p>Pin Circle Dia.=0.100</p>																						
P/N	A	B																																		
PIN-3CD / 3CDP	0.087	0.146																																		
BPX-65	0.075	0.200																																		
OSD-Prefix Devices	0.080	0.200																																		

Mechanical Specifications

All units in inches. Pinouts are bottom view.

40 TO-18	41 TO-5	42 TO-8																																																																																										
Products:	Products:	Products:																																																																																										
<p data-bbox="430 247 516 268">SPOT-2DMI</p>  <p data-bbox="194 651 349 672">Pin Circle Dia.=0.100</p>	<p data-bbox="909 247 998 420">SC-4D SL3-1 SPOT-2D SPOT-3D SPOT-4D SPOT-4DMI SPOT-4DUV QD7-0</p>  <p data-bbox="649 630 803 651">Pin Circle Dia.=0.200</p> <table border="1" data-bbox="592 682 1031 913"> <caption>Dimensions</caption> <thead> <tr> <th>P/N</th> <th>A</th> <th>B</th> <th>W</th> </tr> </thead> <tbody> <tr><td>SC-4D</td><td>0.071</td><td>0.142</td><td>0.240</td></tr> <tr><td>SL3-1</td><td>0.106</td><td>0.195</td><td>0.217</td></tr> <tr><td>SPOT-2D</td><td>0.063</td><td>0.114</td><td>0.240</td></tr> <tr><td>SPOT-3D</td><td>0.104</td><td>0.138</td><td>0.240</td></tr> <tr><td>SPOT-4D</td><td>0.063</td><td>0.142</td><td>0.240</td></tr> <tr><td>SPOT-4DMI</td><td>0.063</td><td>0.142</td><td>0.240</td></tr> <tr><td>SPOT-4DUV</td><td>0.063</td><td>0.142</td><td>0.240</td></tr> <tr><td>QD7-0</td><td>0.050</td><td>0.130</td><td>0.230</td></tr> </tbody> </table> <table border="1" data-bbox="592 934 1031 1176"> <caption>Pinouts</caption> <thead> <tr> <th>P/N</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr><td>SC-4D</td><td>c</td><td>c</td><td>c</td><td>c</td><td>a</td></tr> <tr><td>SL3-1</td><td>a</td><td>c</td><td>a</td><td>--</td><td>--</td></tr> <tr><td>SPOT-2D</td><td>a</td><td>c</td><td>a</td><td>--</td><td>--</td></tr> <tr><td>SPOT-3D</td><td>a</td><td>c</td><td>a</td><td>--</td><td>--</td></tr> <tr><td>SPOT-4D</td><td>a</td><td>a</td><td>a</td><td>a</td><td>c</td></tr> <tr><td>SPOT-4DMI</td><td>a</td><td>a</td><td>a</td><td>a</td><td>c</td></tr> <tr><td>SPOT-4DUV</td><td>a</td><td>a</td><td>a</td><td>a</td><td>c</td></tr> <tr><td>QD7-0</td><td>a</td><td>a</td><td>a</td><td>a</td><td>c</td></tr> </tbody> </table>	P/N	A	B	W	SC-4D	0.071	0.142	0.240	SL3-1	0.106	0.195	0.217	SPOT-2D	0.063	0.114	0.240	SPOT-3D	0.104	0.138	0.240	SPOT-4D	0.063	0.142	0.240	SPOT-4DMI	0.063	0.142	0.240	SPOT-4DUV	0.063	0.142	0.240	QD7-0	0.050	0.130	0.230	P/N	1	2	3	4	5	SC-4D	c	c	c	c	a	SL3-1	a	c	a	--	--	SPOT-2D	a	c	a	--	--	SPOT-3D	a	c	a	--	--	SPOT-4D	a	a	a	a	c	SPOT-4DMI	a	a	a	a	c	SPOT-4DUV	a	a	a	a	c	QD7-0	a	a	a	a	c	<p data-bbox="1388 247 1437 268">SL5-1</p>  <p data-bbox="1161 724 1307 745">Pin Circle Dia.=0.300</p>
P/N	A	B	W																																																																																									
SC-4D	0.071	0.142	0.240																																																																																									
SL3-1	0.106	0.195	0.217																																																																																									
SPOT-2D	0.063	0.114	0.240																																																																																									
SPOT-3D	0.104	0.138	0.240																																																																																									
SPOT-4D	0.063	0.142	0.240																																																																																									
SPOT-4DMI	0.063	0.142	0.240																																																																																									
SPOT-4DUV	0.063	0.142	0.240																																																																																									
QD7-0	0.050	0.130	0.230																																																																																									
P/N	1	2	3	4	5																																																																																							
SC-4D	c	c	c	c	a																																																																																							
SL3-1	a	c	a	--	--																																																																																							
SPOT-2D	a	c	a	--	--																																																																																							
SPOT-3D	a	c	a	--	--																																																																																							
SPOT-4D	a	a	a	a	c																																																																																							
SPOT-4DMI	a	a	a	a	c																																																																																							
SPOT-4DUV	a	a	a	a	c																																																																																							
QD7-0	a	a	a	a	c																																																																																							
43 Low Profile	44 Special	45 Special																																																																																										
Products:	Products:	Products:																																																																																										
<p data-bbox="430 1270 516 1312">SPOT-9D SPOT-9DMI</p>  <p data-bbox="235 1858 389 1879">Pin Circle Dia.=0.730</p>	<p data-bbox="909 1270 966 1291">SC-10D</p>  <p data-bbox="722 1858 876 1879">Pin Circle Dia.=0.730</p>	<p data-bbox="1388 1270 1453 1291">SC-25D</p>  <p data-bbox="1193 1890 1347 1911">Pin Circle Dia.=0.950</p>																																																																																										