

# NHD-4.3-480272EF-ASXN#

## TFT (Thin-Film-Transistor) Color Liquid Crystal Display Module

NHD-	Newhaven Display
4.3-	4.3" Diagonal
480272-	480xRGBx272 Pixels
EF-	Model
A-	Built-in Driver / No Controller
S-	Sunlight Readable
X-	TFT
N-	TN, 6:00 Optimal View, Wide Temperature
#-	<b>RoHS Compliant</b>

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## Document Revision History

Revision	Date	Description	Changed by
0	9/22/15	Initial Release	SB
1	1/10/17	Mechanical Drawing, Electrical & Optical Char. Updated	SB
2	3/31/17	Driver IC Updated	SB

## Functions and Features

- 480xRGBx272 resolution, up to 16.7M colors
- 12-LED backlight
- 24-Bit RGB interface
- Resistive and Capacitive touch panel available



## Pin Description

Pin No.	Symbol	External Connection	Function Description
1	LED-	Power Supply	Backlight Cathode (Ground)
2	LED+	Power Supply	Backlight Anode (25.6V @ 40 mA)
3	GND	Power Supply	Ground
4	V <sub>DD</sub>	Power Supply	Supply Voltage for LCD and logic (3.3V)
5-12	[R0-R7]	MPU	Red Data signals
13-20	[G0-G7]	MPU	Green Data signals
21-28	[B0-B7]	MPU	Blue Data signals
29	GND	Power Supply	Ground
30	CLK	MPU	Data sample Clock signal
31	DISP	MPU	Display ON/OFF signal
32	HSYNC	MPU	Line synchronization signal
33	VSYNC	MPU	Frame synchronization signal
34	DEN	MPU	Data Enable signal
35	NC	-	No Connect
36	GND	Power Supply	Ground
37	NC	-	No Connect
38	NC	-	No Connect
39	NC	-	No Connect
40	NC	-	No Connect

**Recommended LCD connector:** 0.5mm pitch 40-Conductor FFC. Molex p/n: 54132-4062

**Backlight connector:** on LCD connector      **Mates with:** ---

## Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	T <sub>OP</sub>	Absolute Max	-20	-	+70	°C
Storage Temperature Range	T <sub>ST</sub>	Absolute Max	-30	-	+80	°C
Supply Voltage	V <sub>DD</sub>	-	3.0	3.3	3.6	V
Supply Current	I <sub>DD</sub>	V <sub>DD</sub> = 3.3V	12	25	50	mA
"H" level input	V <sub>IH</sub>	-	0.7 * V <sub>DD</sub>	-	V <sub>DD</sub>	V
"L" level input	V <sub>IL</sub>	-	V <sub>SS</sub>	-	0.3 * V <sub>DD</sub>	V
Backlight Supply Current	I <sub>LED</sub>	-	-	40	50	mA
Backlight Supply Voltage	I <sub>LED</sub>	I <sub>LED</sub> = 40mA	22.4	25.6	27.2	mV
Backlight Lifetime*	-	I <sub>LED</sub> = 40mA T <sub>OP</sub> = 25°C	20,000	50,000	-	Hrs.

\*Backlight lifetime is rated as Hours until **half-brightness**, under normal operating conditions. The LED of the backlight is driven by current drain; drive voltage is for reference only. Drive voltage must be selected to ensure backlight current drain is below MAX level stated.

## Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	
Optimal Viewing Angles	Top	φY+	CR ≥ 10	-	55	-	°
	Bottom	φY-		-	75	-	°
	Left	θX-		-	75	-	°
	Right	θX+		-	75	-	°
Contrast Ratio	CR	-	400	500	-	-	
Luminance	L <sub>V</sub>	I <sub>LED</sub> = 40 mA	800	1000	-	cd/m <sup>2</sup>	
Response Time	Rise + Fall	T <sub>R</sub> +T <sub>F</sub>	T <sub>OP</sub> = 25°C	-	20	30	ms
Chromaticity	Red	X <sub>R</sub>	-	0.531	0.581	0.631	-
		Y <sub>R</sub>	-	0.300	0.350	0.400	-
	Green	X <sub>G</sub>	-	0.263	0.313	0.363	-
		Y <sub>G</sub>	-	0.568	0.618	0.668	-
	Blue	X <sub>B</sub>	-	0.093	0.143	0.193	-
		Y <sub>B</sub>	-	0.050	0.100	0.150	-
White	X <sub>W</sub>	-	0.233	0.283	0.333	-	
	Y <sub>W</sub>	-	0.286	0.336	0.386	-	

\* Luminance is directly related to Backlight Supply Current.

## Driver Information

Built-in Sitronix ST7282T2 Driver.

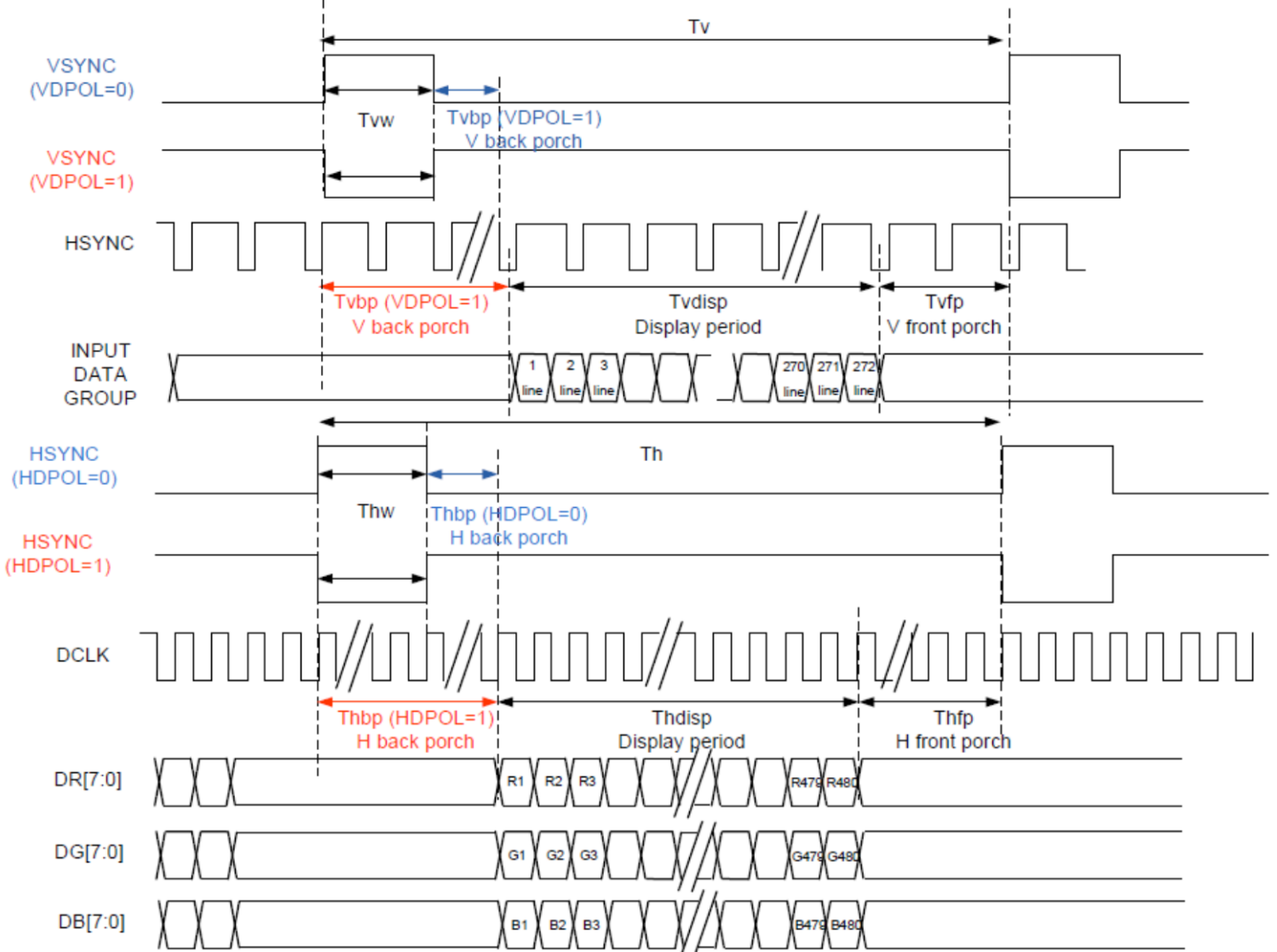
Please download specification at <http://www.newhavendisplay.com/appnotes/datasheets/LCDs/ST7282T2.pdf>

# Timing Characteristics

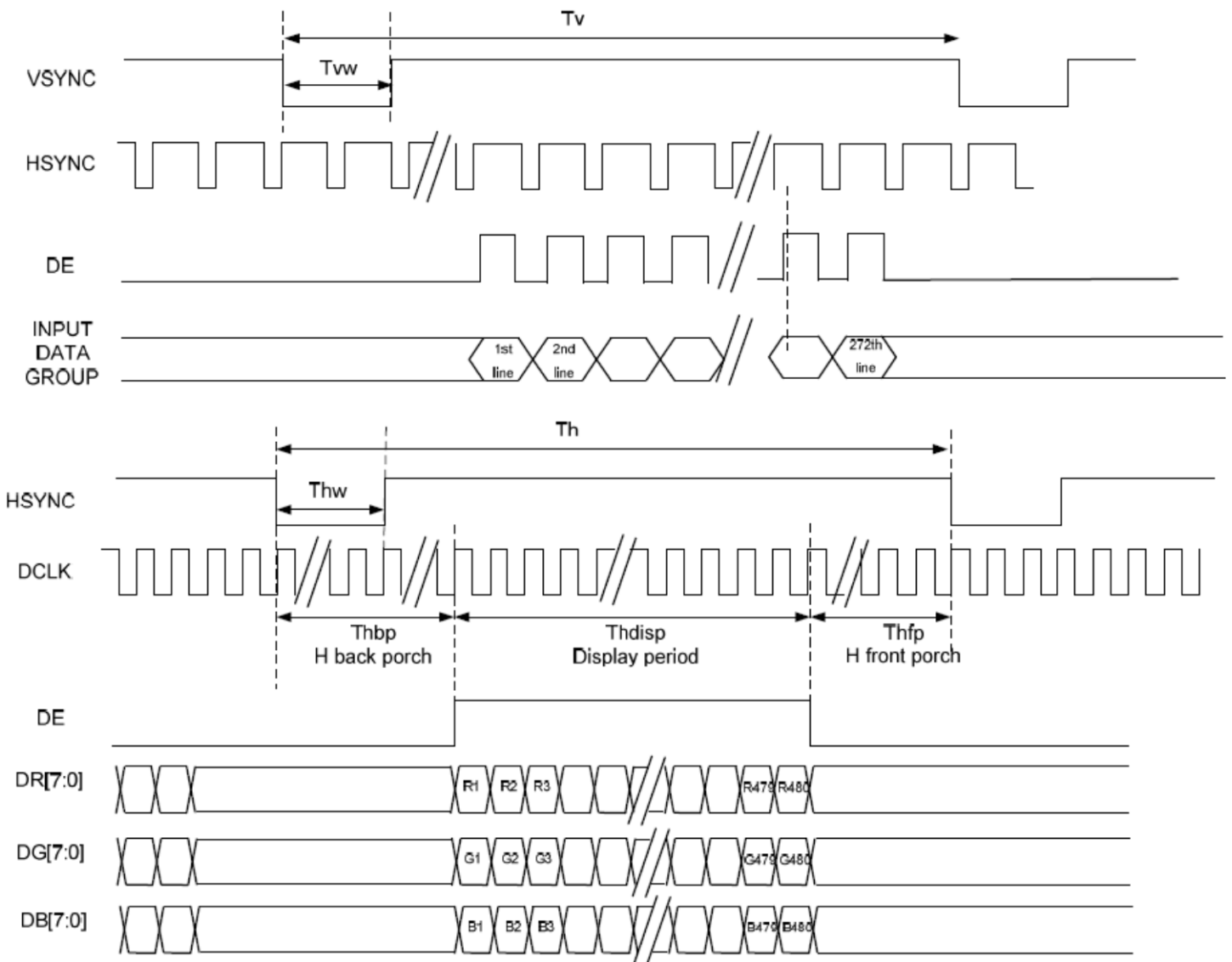
## Parallel RGB input timing requirement

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		FCLK	9	12	15	MHz	
DCLK Period		TCLK	10	50	-	μS	R=10KΩ, 1μF
HSYNC	Period Time	Th	485	525	532	DCLK	
	Display Period	Thdisp	-	480	-	DCLK	
	Back Porch	Thbp	3	43	50	DCLK	By H_Blanking Setting
	Front Porch	Thfp	2	2	2	DCLK	
	Pulse Width	Thw	1	1	1	DCLK	
VSYNC	Period Time	Tv	275	285	303	H	
	Display Period	Tvdisp	-	272	-	H	
	Back Porch	Tvbp	2	12	30	H	By V_Blanking Setting
	Front Porch	Tvfp	1	1	1	H	
	Pulse Width	Tvw	1	1	1	H	

- SYNC Mode Timing



- SYNC-DE Mode Timing

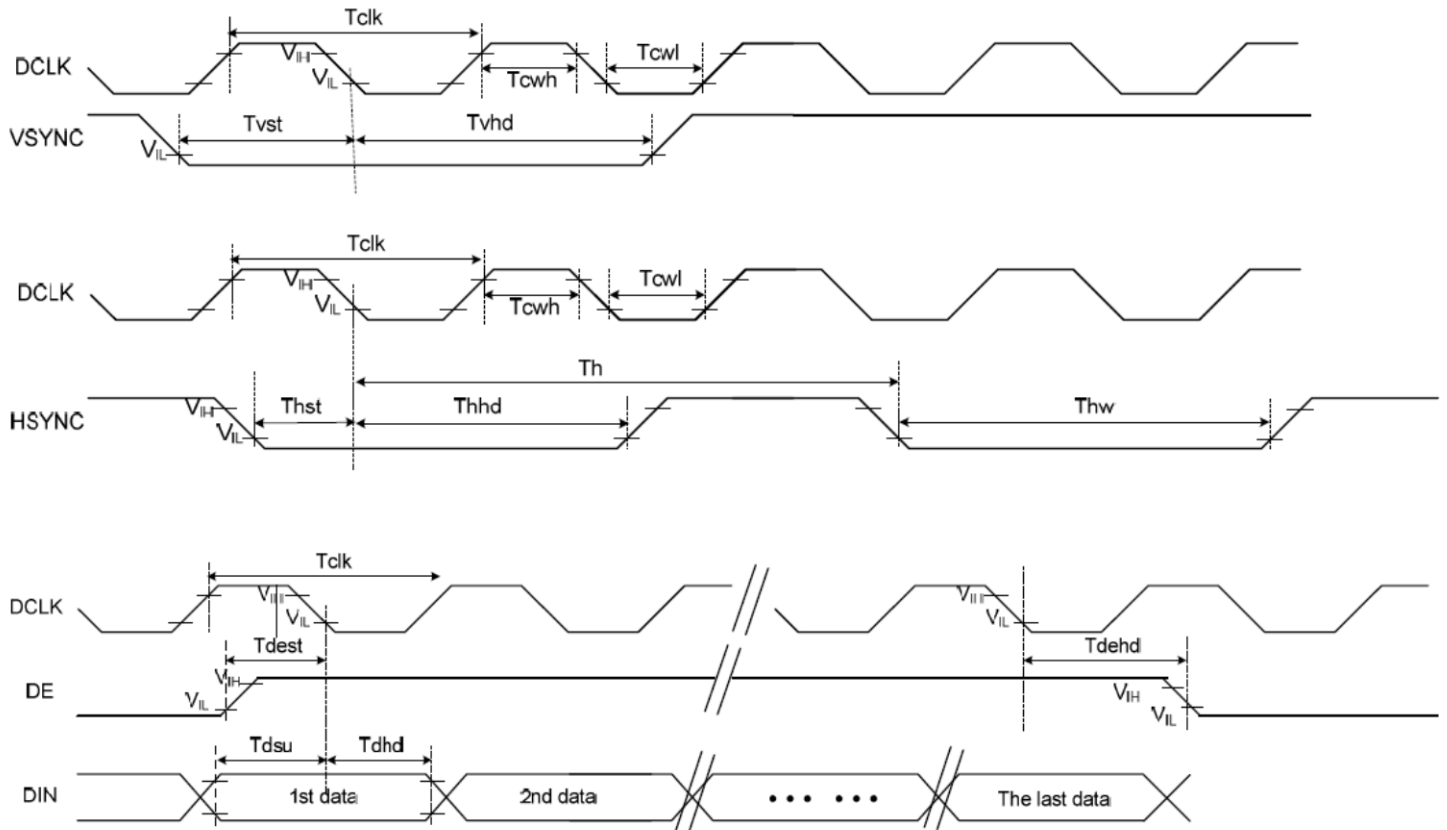




## Input setup timing requirement

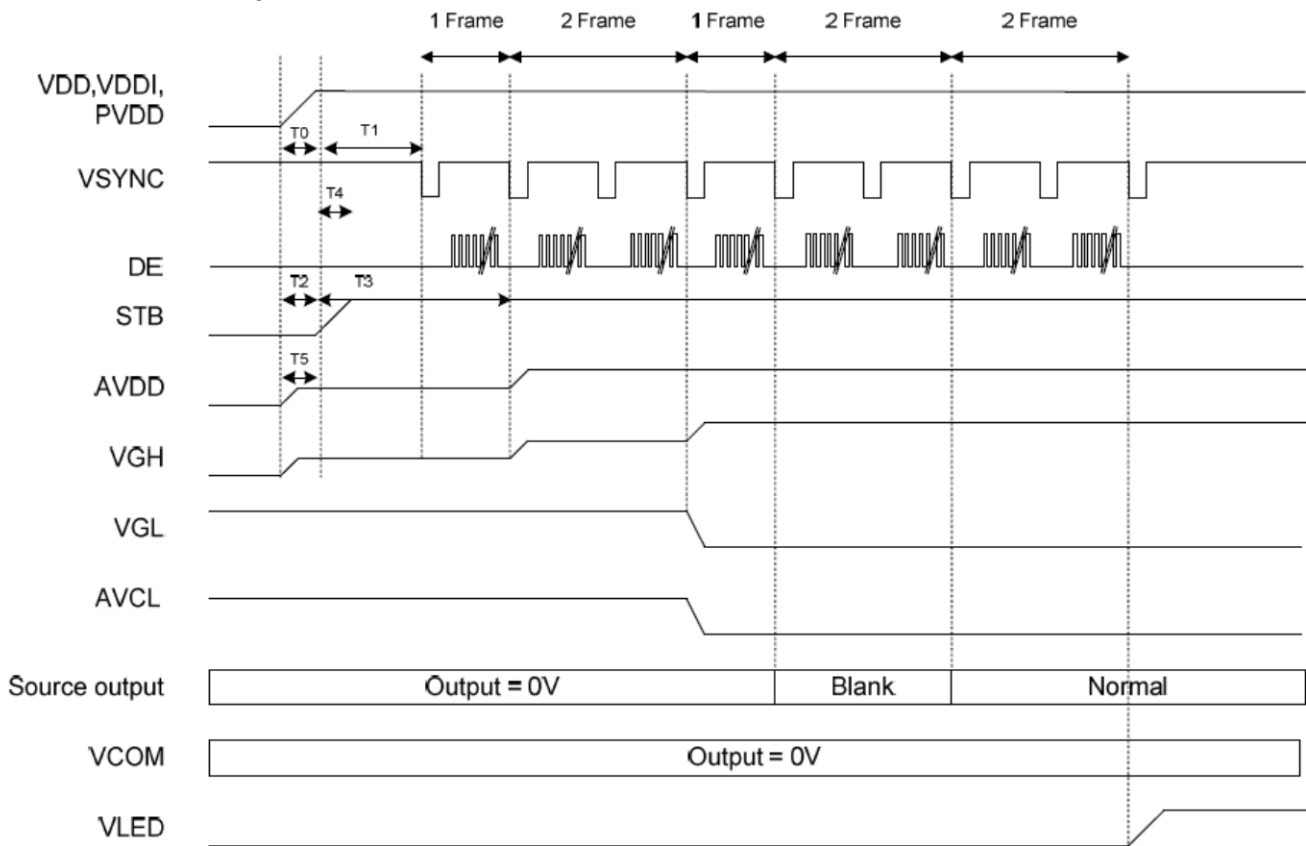
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
System Operation Timing						
V <sub>DD</sub> Power Source Slew Time	TPOR	-	-	20	ms	From 0V to 99% V <sub>DD</sub>
GRB Pulse Width	tRSTW	10	50	-	μS	R=10KΩ, 1μF
Input / Output Timing						
CLK pulse Duty	TCW	40	50	60	%	
Hsync Width	Thw	1	-	-	DCLK	
Hsync Period	Th	50	60	65	μS	
Vsync setup time	Tvst	12	-	-	ns	
Vsync hold time	Tvhd	12	-	-	ns	
Hsync setup time	Thst	12	-	-	ns	
Hsync hold time	Thhd	12	-	-	ns	
Data setup time	Tdsu	12	-	-	ns	
Data hold time	Tdhd	12	-	-	ns	
SD output stable time	Tst	-	-	12	μS	Output settled within +20mV Loading = 6.8k+28.2pF
GD output rise and fall time	Tgst	-	-	6	μS	Output settled (5%~95%) Loading = 4.7k+29.8pF

### - Clock And Data Input Timing Diagram



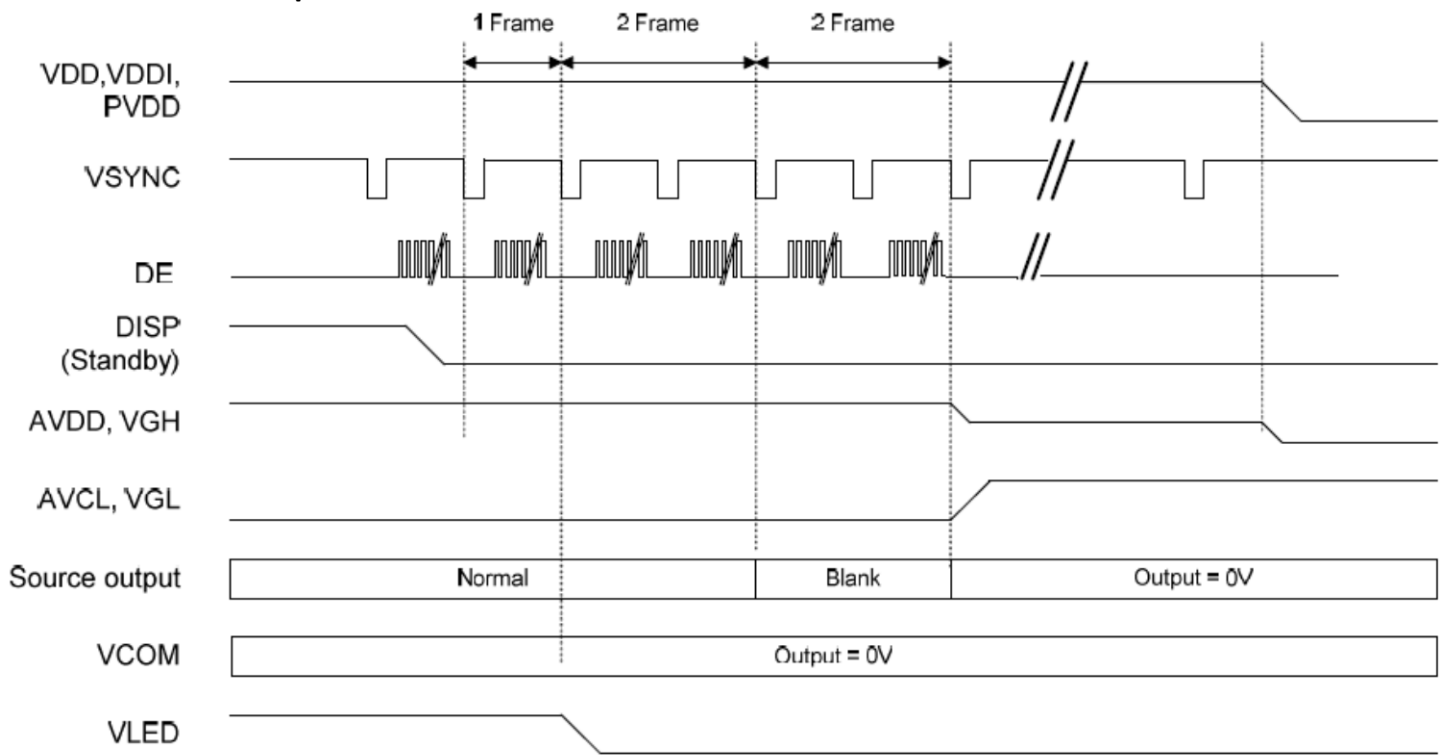
# Power On/Off Sequence

## - Power On Sequence



	Description	Min. Time
T0	Determined by the external power	
T1	Time from stable VDD, VDDI, PVDD set-up to the first VSYNC	T1=0
T2	Time from AVDD=0V to AVDD=3.3V	T2=T0
T3	Time from AVDD=3.3V to AVDD=6.0V	T3=T1+ (1*Frame)
T4	Time from stable VDD, VDDI, PVDD set-up to DISP asserted	T4=0
T5	Time from VGH=0V to VGH=3.3V	T5=T0

- **Power Off Sequence**



## Quality Information

Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	+80°C , 96 Hrs.	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C , 96 Hrs.	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C , 96 Hrs.	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C , 96 Hrs.	1,2
High Temperature / Humidity Operation	Endurance test applying the electric stress (voltage & current) and the high thermal with high humidity stress for a long time.	+50°C , 90% RH , 96 Hrs.	1,2
Thermal Shock resistance	Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.	-20°C,60min -> 25°C,5min ->70°C,60min = 1 cycle 20 cycles	-
Vibration test	Endurance test applying vibration to simulate transportation and use.	10-50Hz , 15mm amplitude. 30 Min. Each Direction X,Y,Z	3
Static electricity test	Endurance test applying electric static discharge.	Air: V <sub>S</sub> =±8KV, Contact: V <sub>S</sub> =±4KV R <sub>S</sub> =330Ω C <sub>S</sub> =150pF 5 Times	-

**Note 1:** No condensation to be observed.

**Note 2:** Conducted after 4 hours of storage at 25°C, 0%RH.

**Note 3:** Test performed on product itself, not inside a container.

## Precautions for using LCDs/LCMs

See Precautions at [www.newhavendisplay.com/specs/precautions.pdf](http://www.newhavendisplay.com/specs/precautions.pdf)

## Warranty Information

See Terms & Conditions at [http://www.newhavendisplay.com/index.php?main\\_page=terms](http://www.newhavendisplay.com/index.php?main_page=terms)