

# NHD-7.0-800480EF-ASXV#-T

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

NHD-	Newhaven Display
7.0-	7.0" Diagonal
800480-	800x480 Pixels
EF-	Model
A-	Built-in Driver / No Controller
S-	High Brightness, White LED Backlight
X-	TFT
V-	MVA, Wide Temperature
#-	<b>RoHS Compliant</b>
T-	Resistive Touch Panel

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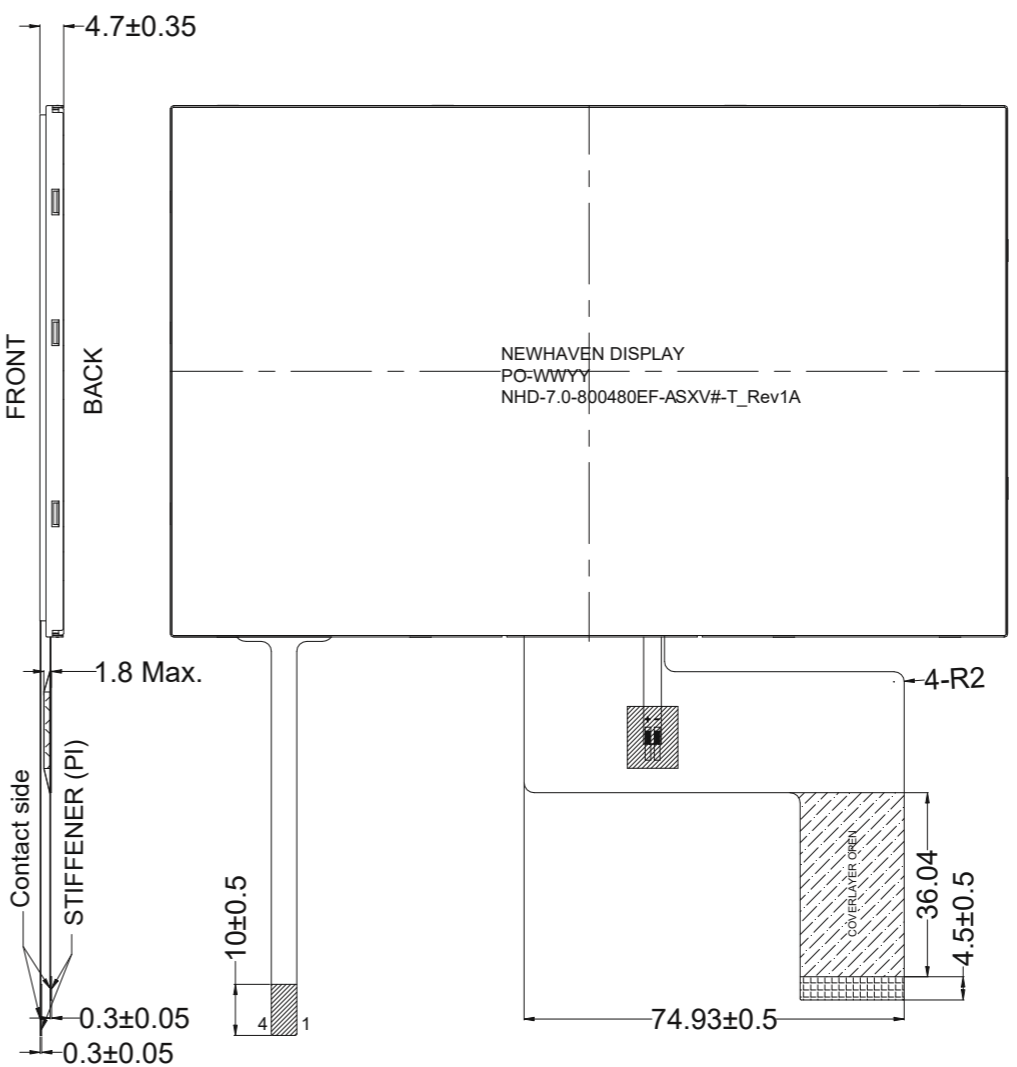
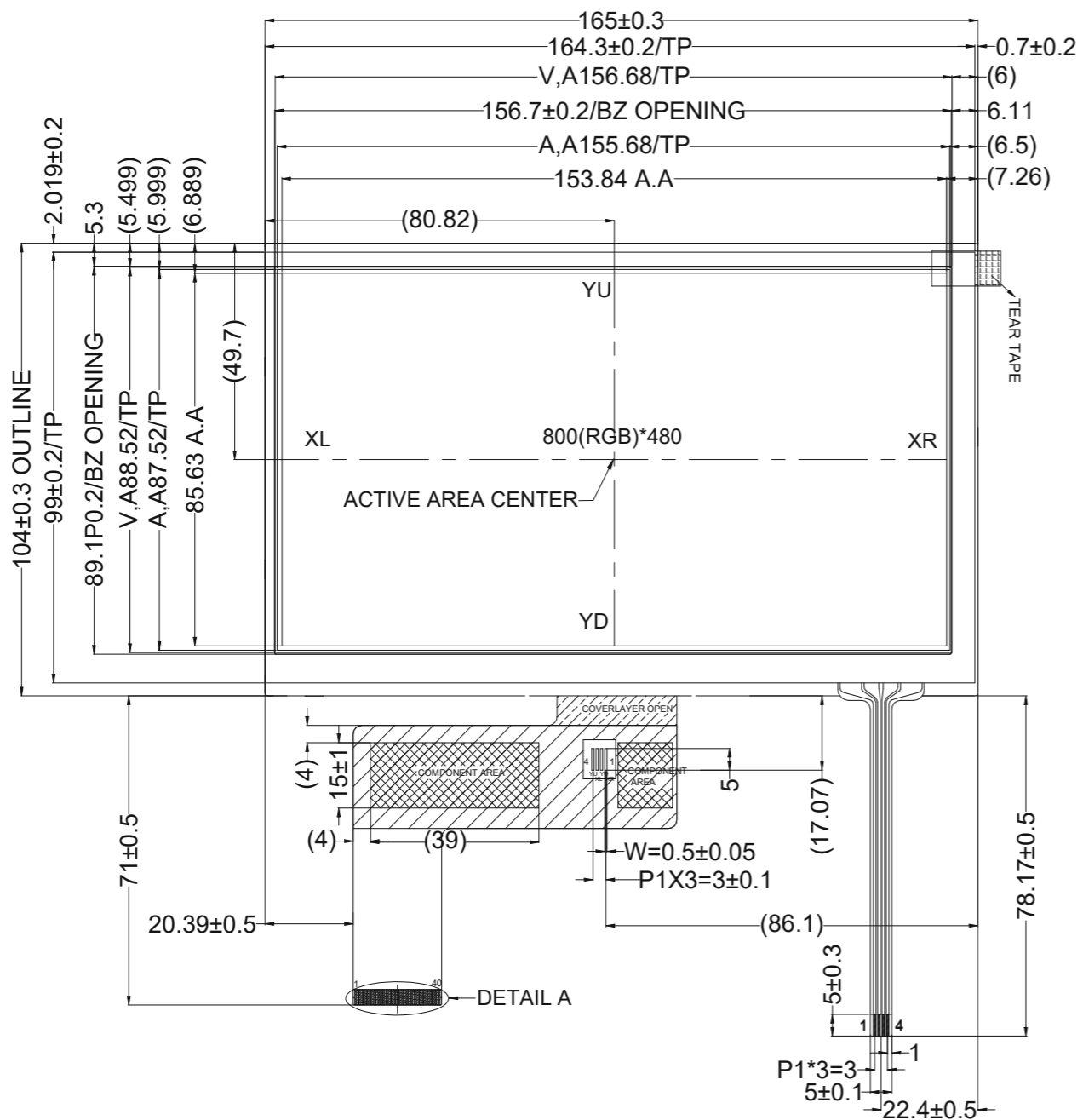
## Document Revision History

Revision	Date	Description	Changed by
0	3/10/16	Initial Release	SB
1	7/5/16	Chromaticity Added, Touch Panel Characteristics Updated	SB
2	3/9/20	LCD Driver Changed to EK9716	SB

## Functions and Features

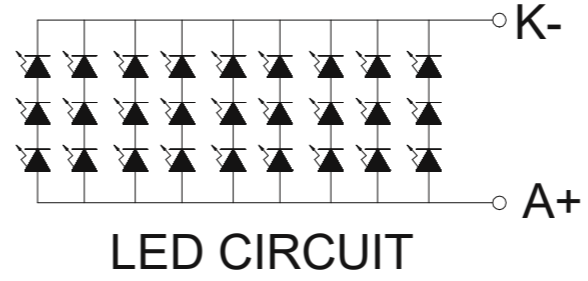
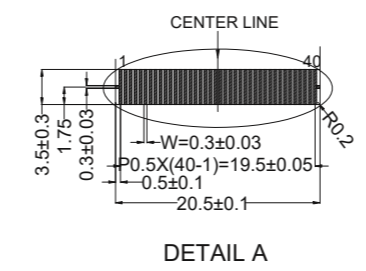
- 800x480 resolution
- LED backlight
- 24-bit digital RGB interface
- 16.7M colors
- Premium high brightness display
- 4-wire resistive Touch Panel

SYMBOL	REVISION	DATE



PIN	SYMBOL
1	LED-K
2	LED-A
3	GND
4	VDD
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	DCLK
31	DISP
32	HSYNC
33	VSYNC
34	DEN
35	NC
36	GND
37	NC(XR)
38	NC(YD)
39	NC(XL)
40	NC(YU)

- Notes:**
1. Display Size: 7.0" TFT
  2. Optimal View: Full View
  3. Display Mode: Transmissive / Normally White / Anti-Glare
  4. Driver IC: EK9716 & EK73002
  5. Supply Voltage: 3.3V
  6. Backlight: White LED / 9.3 V / 180 mA (Typ)
  7. Brightness: 780cd/m<sup>2</sup> (Typ)
  8. Touch Panel: 4-Wire Resistive
  9. 3M Brightness Enhancement Film



1.	XL
2.	YD
3.	XR
4.	YU

STANDARD TOLERANCE: (UNLESS OTHERWISE SPECIFIED)	<b>NEWHAVEN DISPLAY</b> INTERNATIONAL	
LINEAR: ±0.3mm	DRAWING/PART NUMBER: <b>NHD-7.0-800480EF-ASXV#-T</b>	REVISION: 1A
UNLESS OTHERWISE SPECIFIED: - DIMENSIONS ARE IN MILLIMETERS - THIRD ANGLE PROJECTION	DRAWN BY: S. Baxi	APPROVED BY: S. Baxi
	DRAWN DATE: xx/xx/xx	APPROVED DATE: xx/xx/xx
	DO NOT SCALE DRAWING	
	SHEET 1 OF 1	
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## Pin Description

### TFT:

Pin No.	Symbol	Connection	Function Description
1	LED-K	Power Supply	Backlight Cathode (Ground)
2	LED-A	Power Supply	Backlight Anode (180mA @ 9.6V)
3	GND	Power Supply	Ground
4	VDD	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	DCLK	MPU	Dot data Clock
31	DISP	MPU	Display on/off DISP=1: Display on
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(XR)	-	No Connect
38	NC(YD)	-	No Connect
39	NC(XL)	-	No Connect
40	NC(YU)	-	No Connect

**Recommended connector:** 0.5mm pitch 40-Conductor FFC. Molex p/n: 54104-4031 (top contact)

### Resistive Touch Panel:

Pin No.	Symbol	Connection	Function Description
1	XL	Touch Controller	Touch Panel – Left
2	YD	Touch Controller	Touch Panel – Down
3	XR	Touch Controller	Touch Panel – Right
4	YU	Touch Controller	Touch Panel – Up

**Recommended connector:** 1.0mm pitch 4-Conductor FFC. Molex p/n: 52207-0485 (top contact)

## Driver/Controller Information

Built-in EK9716B Source Driver: [https://www.newhavendisplay.com/appnotes/datasheets/LCDs/EK9716B\\_v1-1.pdf](https://www.newhavendisplay.com/appnotes/datasheets/LCDs/EK9716B_v1-1.pdf)

Built-in EK73002AB2 Gate Driver: <https://www.newhavendisplay.com/appnotes/datasheets/LCDs/EK73002AB2.pdf>

## 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>	VDD=3.3V 25°C	45	90	135	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
"H" Level Output	V <sub>OH</sub>	-	V <sub>DD</sub> -0.4	-	-	V
"L" Level Output	V <sub>OL</sub>	-	V <sub>SS</sub>	-	V <sub>SS</sub> +0.4	V
Backlight Supply Current	I <sub>LED</sub>	-	-	180	225	mA
Backlight Supply Voltage	V <sub>LED</sub>	I <sub>LED</sub> = 180 mA	8.4	9.3	10.2	V
Backlight Lifetime*	-	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	CR ≥ 10	-	70	-	°	
	Bottom		-	70	-	°	
	Left		-	70	-	°	
	Right		-	70	-	°	
Contrast Ratio	CR	-	-	500	-	-	
Luminance	L <sub>V</sub>	I <sub>LED</sub> = 180 mA	480	600	-	cd/m <sup>2</sup>	
Response Time (rise)	T <sub>R</sub> + T <sub>F</sub>	T <sub>OP</sub> = 25°C	-	25	35	ms	
Chromaticity	Red	X <sub>R</sub>	-	0.532	0.582	0.632	-
		Y <sub>R</sub>	-	0.292	0.342	0.392	-
	Green	X <sub>G</sub>	-	0.285	0.335	0.385	-
		Y <sub>G</sub>	-	0.574	0.624	0.674	-
	Blue	X <sub>B</sub>	-	0.104	0.154	0.204	-
		Y <sub>B</sub>	-	0.092	0.142	0.192	-
	White	X <sub>W</sub>	-	0.257	0.307	0.357	-
		Y <sub>W</sub>	-	0.334	0.384	0.434	-

## Touch Panel Characteristics

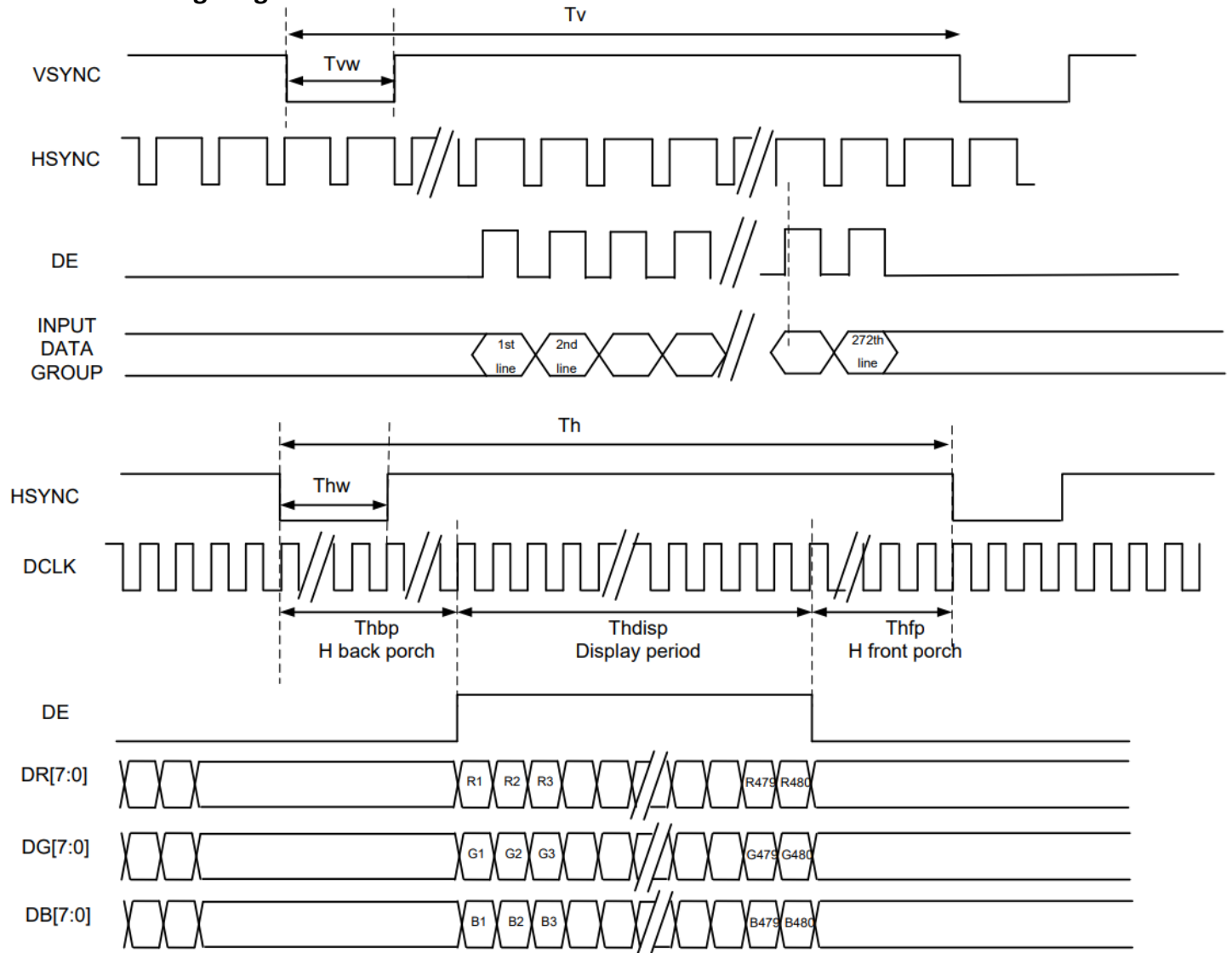
Item	Min.	Typ.	Max.	Unit
Linearity	-3	-	3	%
Terminal Resistance – X-Axis	50	-	400	Ω
Terminal Resistance – Y-Axis	350	-	1100	Ω
Insulation Resistance	20	-	-	MΩ
Operating Voltage	-	-	5	V
Chattering	-	-	15	ms
Activation Force	30	-	100	g
Pen Writing Durability	50,000	-	-	Characters
Pitting Durability	1,000,000	-	-	Touches
Surface Hardness	3	-	-	H

# Timing Characteristics

## Parallel RGB Input Timing Requirements

Item	Symbol	Min.	Typ.	Max.	Unit	Remark	
DCLK Frequency	$F_{clk}$	28.2	29.2	40	MHz	-	
DLCK Period	$T_{clk}$	25	34	-	ns	-	
HSYNC	Period Time	$T_h$	908	928	1088	DCLK	Thw + Thbp = 88 DCLK is fixed
	Display Period	$T_{ndisp}$	800			DCLK	
	Pulse Width	$T_{hw}$	1	48	87	DCLK	
	Back Porch	$T_{hbp}$	87	40	1	DCLK	
	Front Porch	$T_{hfp}$	20	40	200	DCLK	
VSYNC	Display Period	$T_{vdisp}$	480			H	Tv + Tvbp = 32 H is fixed
	Period Time	$T_v$	517	525	613	H	
	Pulse Width	$T_{vw}$	1	1	3	H	
	Back Porch	$T_{vbp}$	31	31	29	H	
	Front Porch	$T_{vfp}$	5	13	101	H	

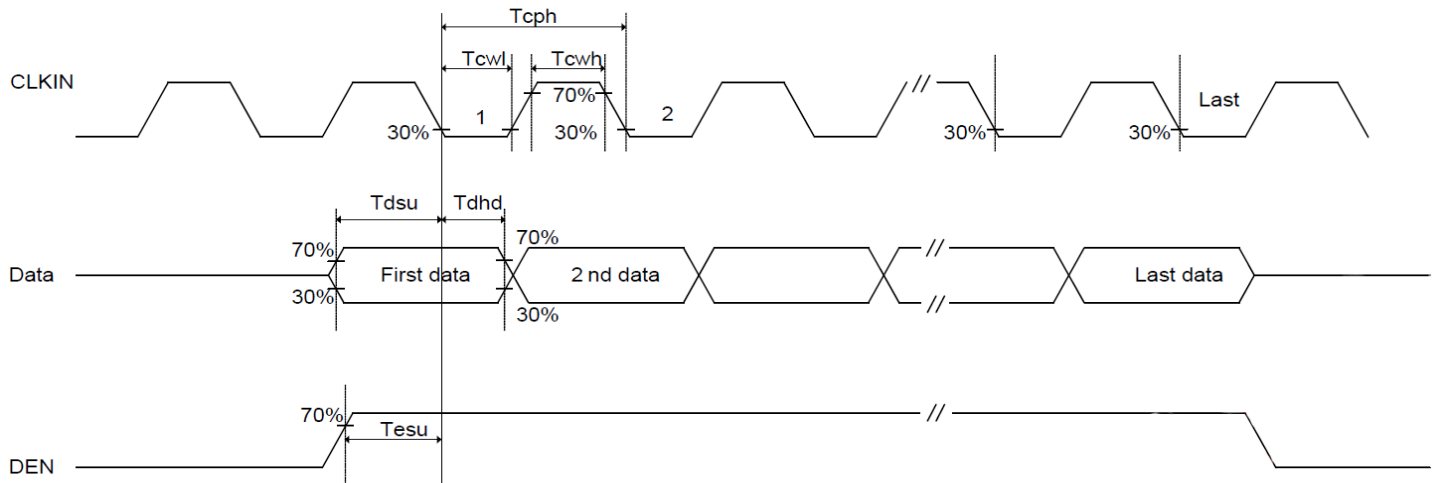
## DE Mode Timing Diagram



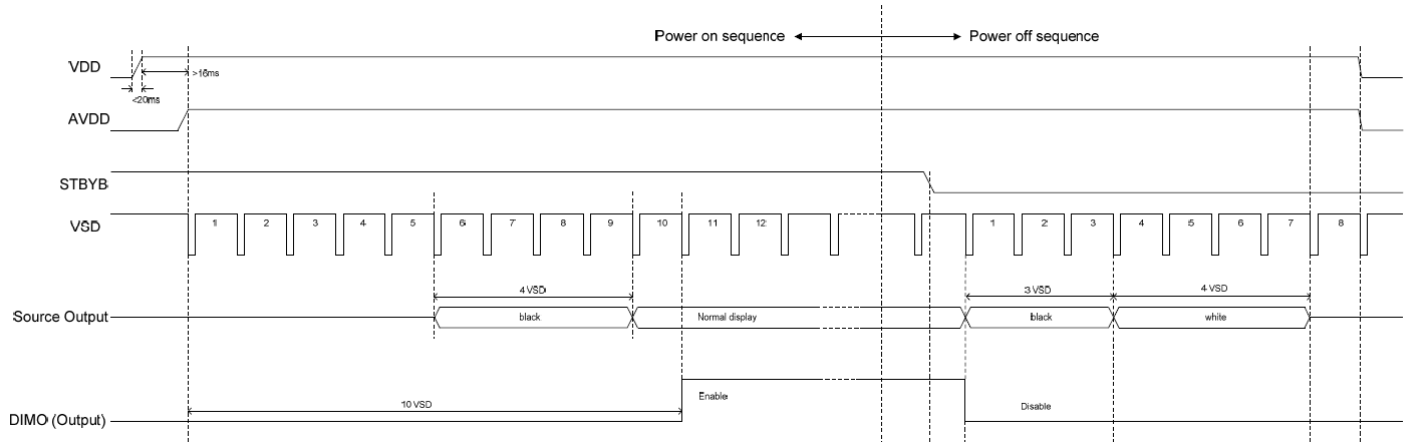
## Input Setup Timing Requirements

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
V <sub>DD</sub> Power Source Slew Time	T <sub>por</sub>	-	-	20	ms	From 0V to 90% V <sub>DD</sub>
CLK cycle time	T <sub>cph</sub>	20	-	-	ns	-
CLK pulse duty	T <sub>cwh</sub>	40	50	60	%	-
Data setup time	T <sub>dsu</sub>	8	-	-	ns	-
Data hold time	T <sub>dhd</sub>	8	-	-	ns	-
DEN setup time	T <sub>esu</sub>	8	-	-	ns	-
DEN hold time	T <sub>ehd</sub>	8	-	-	ns	-

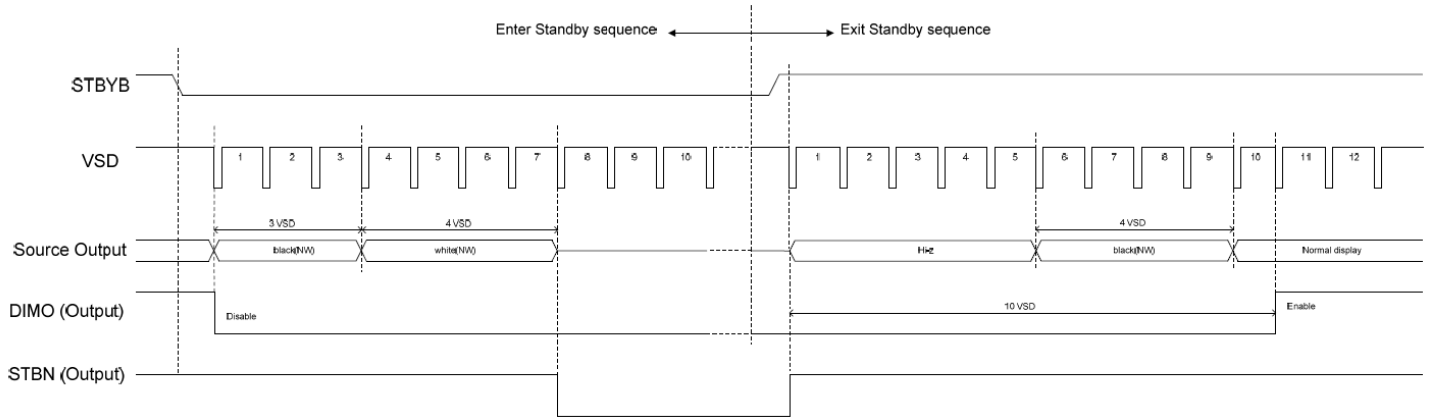
## Input Setup Timing Diagram



## Power ON/OFF Sequence



## Enter/Exit Standby Mode 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, 96hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C, 96hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C, 96hrs	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C, 96hrs	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, 96hrs	1,2
Thermal Shock resistance	Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.	-30°C, 30min -> 80°C, 30min, Change time 5min, 10 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	10-55Hz, 1.5mm amplitude. 60 sec in each of 3 directions: X, Y, Z For 15 minutes	3
Static electricity test	Endurance test applying electric static discharge.	Air: ±8KV 150pf/330Ω 5 Times	
		Contact: ±4KV 150pf/330Ω 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 and Terms & Conditions

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