

NHD-5.0-800480TF-ATXL#

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

NHD-	Newhaven Display
5.0-	5.0" Diagonal
800480-	800xRGBx480 Pixels
TF-	Model
A-	Built-in Driver / No Controller
T-	White LED Backlight
X-	TFT
L-	MVA, Enhanced Optical Characteristics, Wide Temperature
#	RoHS Compliant

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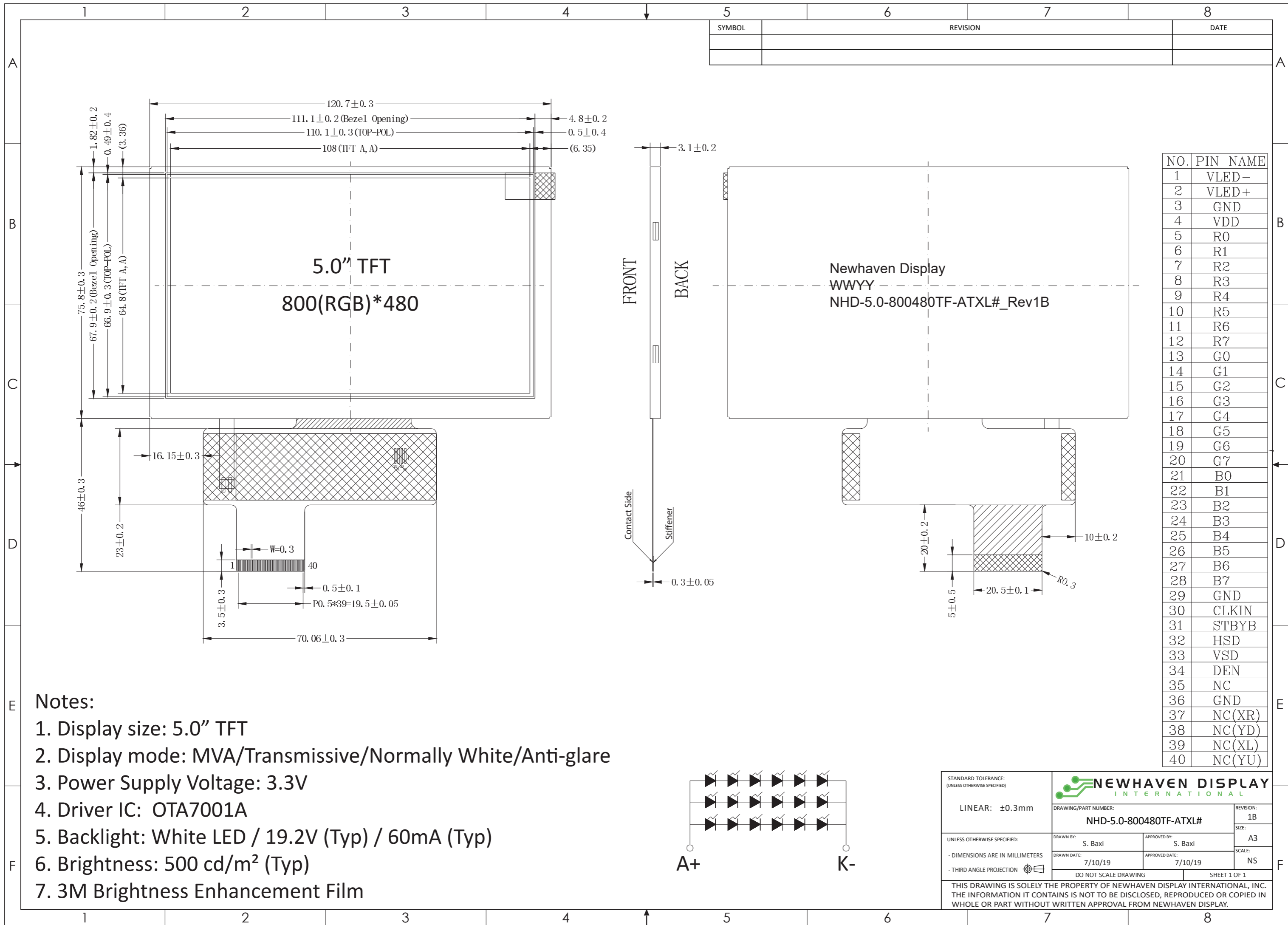
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Document Revision History

Revision	Date	Description	Changed by
0	3/20/2013	Initial Release	AK
1	8/28/2013	Electrical characteristics updated	AK
2	9/16/2014	Electrical characteristics updated	ML
3	9/2/15	Driver, Electrical, Optical characteristics updated	AK
4	10/30/15	Backlight lifetime rating added, Datasheet Reformat	SB
5	2/23/16	Corrected Notes on Drawing	SB
6	4/5/16	Brightness Updated	SB
7	7/22/16	Updated Mechanical Drawing, Electrical Characteristics	TM
8	4/14/17	Supply Current Updated	SB
9	10/5/18	Driver IC Updated & Chromaticity Added	SB
10	7/10/19	Timing Characteristics Updated	SB

Functions and Features

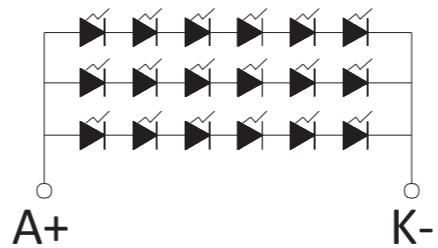
- 800xRGBx480 resolution, up to 16.7M colors
- 18-LED backlight
- 24-bit RGB interface
- Enhanced Optical Characteristics
- Wide Viewing Angles



SYMBOL	REVISION	DATE

NO.	PIN NAME
1	VLED-
2	VLED+
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	CLKIN
31	STBYB
32	HSD
33	VSD
34	DEN
35	NC
36	GND
37	NC(XR)
38	NC(YD)
39	NC(XL)
40	NC(YU)

- Notes:**
1. Display size: 5.0" TFT
 2. Display mode: MVA/Transmissive/Normally White/Anti-glare
 3. Power Supply Voltage: 3.3V
 4. Driver IC: OTA7001A
 5. Backlight: White LED / 19.2V (Typ) / 60mA (Typ)
 6. Brightness: 500 cd/m² (Typ)
 7. 3M Brightness Enhancement Film



STANDARD TOLERANCE:
(UNLESS OTHERWISE SPECIFIED)

LINEAR: ±0.3mm

UNLESS OTHERWISE SPECIFIED:
- DIMENSIONS ARE IN MILLIMETERS
- THIRD ANGLE PROJECTION

NEWHAVEN DISPLAY INTERNATIONAL

DRAWING/PART NUMBER:
NHD-5.0-800480TF-ATXL#

REVISION:
1B

SIZE:
A3

SCALE:
NS

DO NOT SCALE DRAWING

SHEET 1 OF 1

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Pin Description

Pin No.	Symbol	External Connection	Function Description
1	LED-	LED Power Supply	Ground for Backlight
2	LED+	LED Power Supply	Backlight Power Supply (60mA @ 19.2V)
3	GND	Power Supply	Ground
4	V _{DD}	Power Supply	Power supply 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	CLKIN	MPU	Clock for input data (Rising Edge)
31	STBYB	MPU	1: Normal Operation; 0: Standby Mode
32	HSD	MPU	Line synchronization signal
33	VSD	MPU	Frame synchronization signal
34	DEN	MPU	Data Enable signal
35	NC	-	No Connect
36	GND	Power Supply	Ground
37	XR	-	No Connect
38	YD	-	No Connect
39	XL	-	No Connect
40	YU	-	No Connect

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

Backlight connector: on LCD connector

Mates with: ---

Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	T _{OP}	Absolute Max	-20	-	+70	°C
Storage Temperature Range	T _{ST}	Absolute Max	-30	-	+80	°C
Supply Voltage	V _{DD}	-	3.0	3.3	3.6	V
Supply Current	I _{DD}	V _{DD} = 3.3V	50	100	170	mA
"H" Level input	V _{IH}	-	0.7 * V _{DD}	-	V _{DD}	V
"L" Level input	V _{IL}	-	GND	-	0.3 * V _{DD}	V
"H" Level output	V _{OH}	-	V _{DD} - 0.4	-	V _{DD}	V
"L" Level output	V _{OL}	-	GND	-	GND + 0.4	V
Backlight Supply Current	I _{LED}	-	-	60	75	mA
Backlight Supply Voltage	V _{LED}	I _{LED} = 60mA	17.4	19.2	19.8	V
Backlight Lifetime*	-	I _{LED} = 60mA T _{OP} = 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	60	75	-	°
	Bottom	φY-		60	75	-	°
	Left	θX-		60	75	-	°
	Right	θX+		60	75	-	°
Contrast Ratio	CR	-	-	350	-	-	
Luminance	L _V	I _{LED} = 60 mA	400	500	-	cd/m ²	
Response Time	T _R + T _F	T _{OP} = 25°C	-	20	30	ms	
Chromaticity	Red	X _R	-	0.558	0.608	0.658	-
		Y _R	-	0.311	0.361	0.411	-
	Green	X _G	-	0.287	0.337	0.387	-
		Y _G	-	0.562	0.612	0.662	-
	Blue	X _B	-	0.103	0.153	0.203	-
		Y _B	-	0.060	0.110	0.160	-
White	X _W	-	0.250	0.300	0.350	-	
	Y _W	-	0.286	0.336	0.386	-	

Driver Information

Built-in ILI6126C Source Driver: <http://www.newhavendisplay.com/appnotes/datasheets/LCDs/ILI6126C.pdf>

Built-in ILI5960D Gate Driver: <http://www.newhavendisplay.com/appnotes/datasheets/LCDs/ILI5960D.pdf>

Timing Characteristics

Horizontal Input Timing

Parameter	Symbol	Value			Unit	Note
Horizontal Display Area	thd	800			MHz	
DCLK Frequency	fclk	Min	Typ	Max	MHz	
		-	33.3	50		
1 Horizontal Line	th	908	928	1010	DCLK	thb + thpw = 88 DCLK is fixed
HSD Pulse Width	thpw	4	48	64		
HSD Back Porch (Blanking)	thb	20	40	84		
HSD Front Porch	thfp	20	40	122		

Vertical Input Timing

Parameter	Symbol	Min	Typ	Max	Unit	Note
Vertical Display Area	tvd	480			H	tvpw + tvb = 32H is fixed
VSD Period Tim	tv	515	525	-		
VSD Pulse Width	tvpw	1	3	31		
VSD Back Porch (Blanking)	tvb	1	29	31		
VSD Front Porch	tvfp	3	13	-		

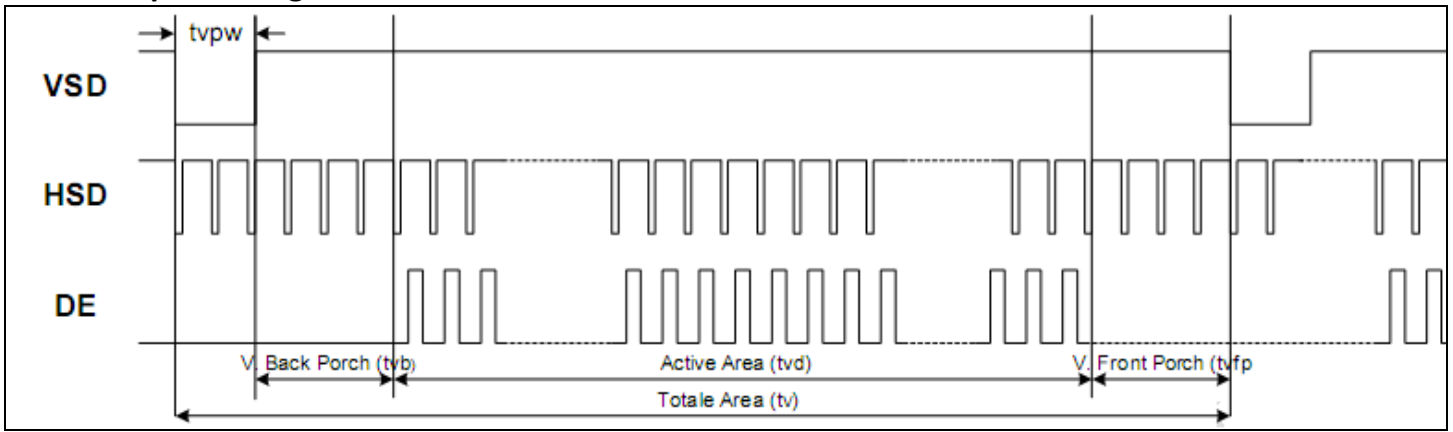
AC Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
V _{DD} Power ON Slew Rate	T _{POR}	-	-	20	ms	From 0V to 90% V _{DD}
RSTB Pulse Width	T _{RST}	10	-	-	μs	CLKIN = 45MHz
CLKIN cycle time	T _{cph}	20	-	-	ns	
CLKIN pulse duty	T _{cwh}	40	50	60	%	
VSD setup time	T _{vst}	8	-	-	ns	
VSD hold time	T _{vhd}	8	-	-	ns	
HSD setup time	T _{hst}	8	-	-	ns	
HSD hold time	T _{hhd}	8	-	-	ns	
Data set-up time	T _{dsu}	8	-	-	ns	DOR[7:0], D1G[7:0], D2B[7:0] to CLKIN
Data hold time	T _{dhd}	8	-	-	ns	DOR[7:0], D1G[7:0], D2B[7:0] to CLKIN
DE setup time	T _{esu}	8	-	-	ns	
DE hold time	T _{ehd}	8	-	-	ns	
Output stable time	T _{sst}	-	-	6	μs	10%-90% target voltage C _L = 120pf, R = 10kΩ

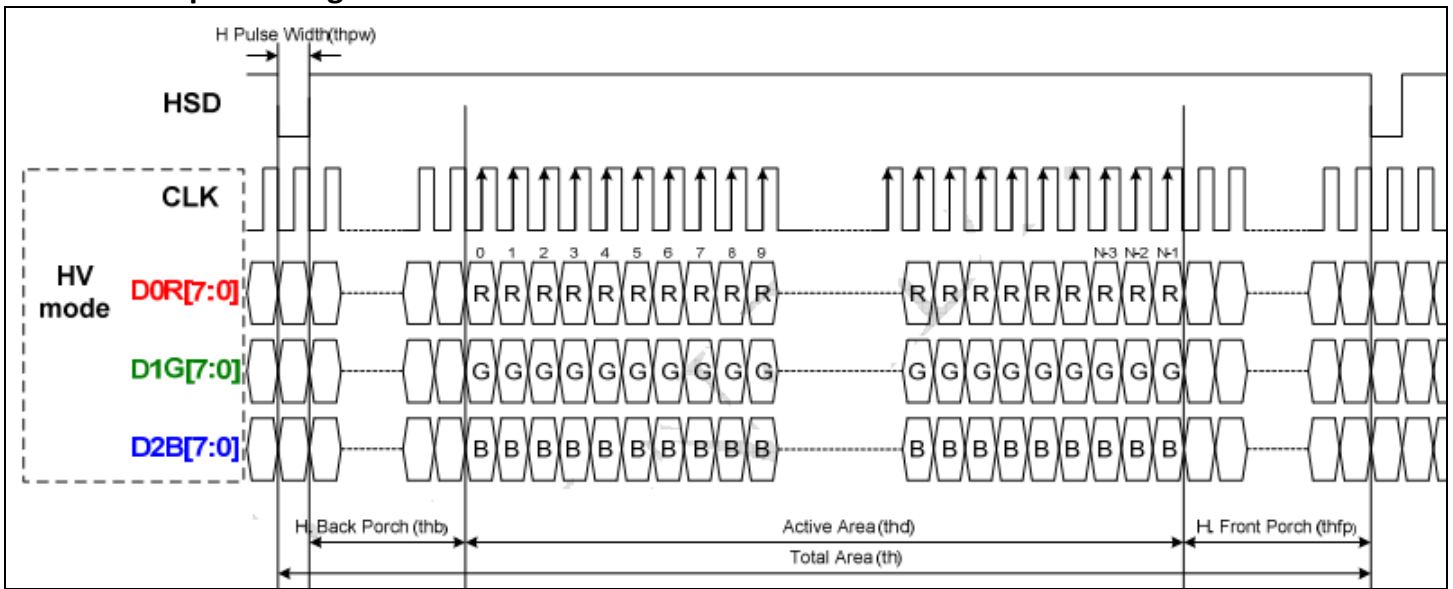
Parallel 24-Bit RGB Mode Timing

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
CLKIN Frequency	F _{clk}	-	33	50	MHz	V _{DD} = 2.7V ~ 3.6V
CLKIN time	T _{clk}	20	30	-	Ns	
CLKIN Pulse Duty	T _{cwh}	40	50	60	%	T _{clk}
Time from HSD to Source Output	T _{hso}	-	64	-	CLKIN	
Time from HSD to LD	T _{hld}	-	64	-	CLKIN	
Time from HSD to STV	T _{hstv}	-	2	-	CLKIN	
Time from HSD to CKV	T _{hckv}	-	20	-	CLKIN	
Time from HSD to OEV	T _{hoev}	-	4	-	CLKIN	
LD Pulse Width	T _{wld}	-	10	-	CLKIN	
CKV Pulse Width	T _{wckv}	-	66	-	CLKIN	
OEV Puse Width	T _{woev}	-	92	-	CLKIN	

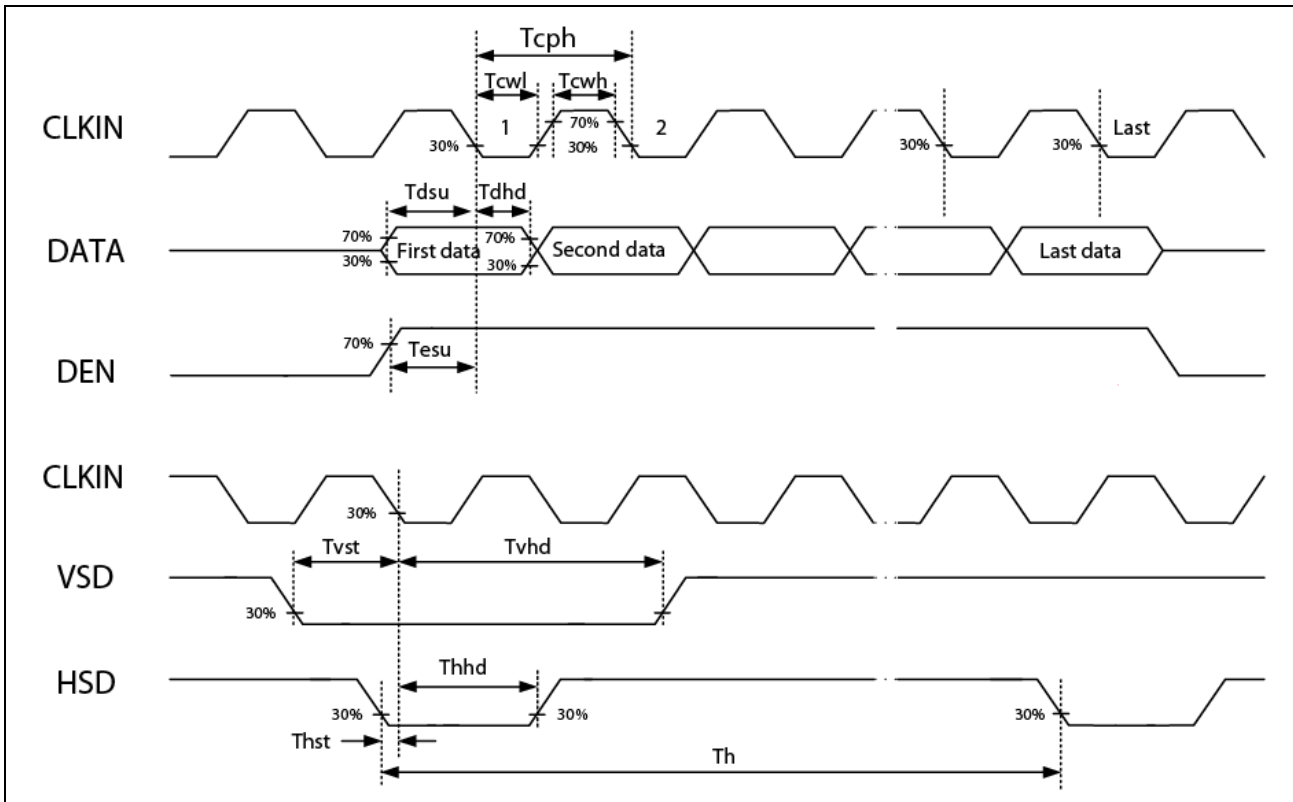
Vertical Input Timing



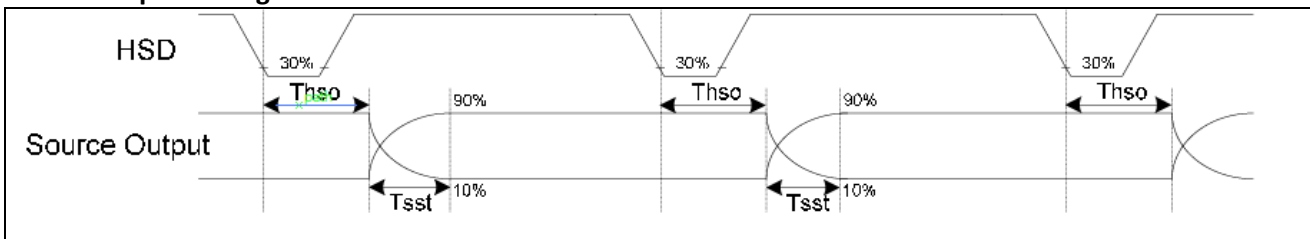
Horizontal Input Timing



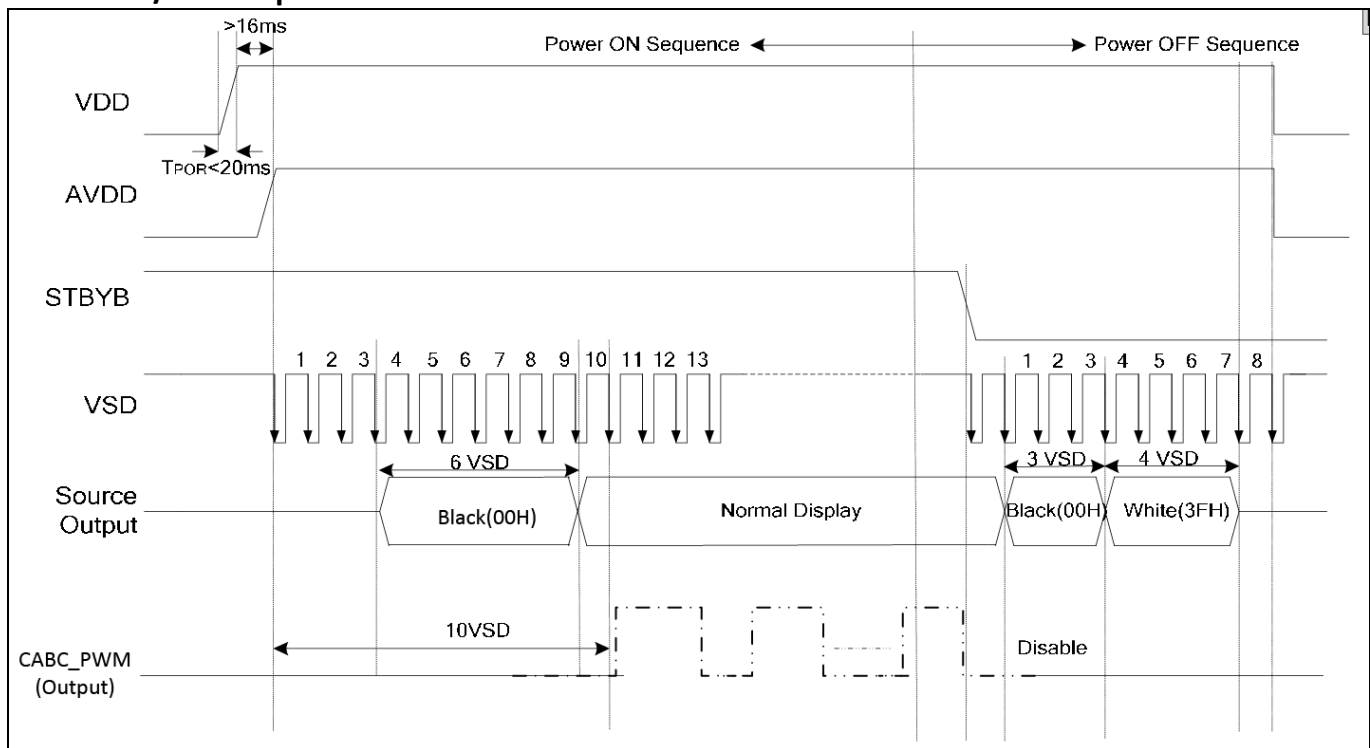
Input Clock and Data Timing



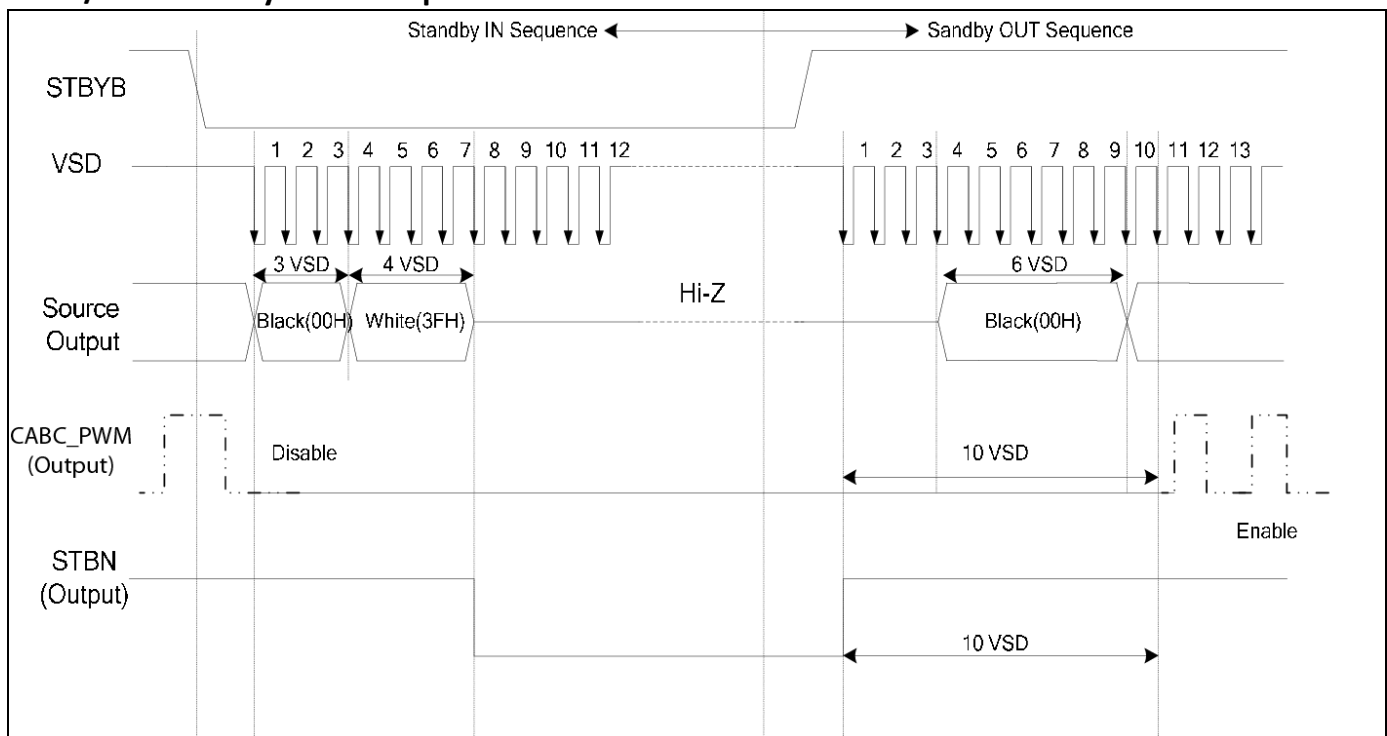
Source Output Timing



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.	-20°C, 60min -> 70°C, 60min = 1 Cycle for 20 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	10-50Hz, 5G in each of 3 directions X,Y,Z For 30 minutes each direction	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

Warranty Information and Terms & Conditions

http://www.newhavendisplay.com/index.php?main_page=terms