

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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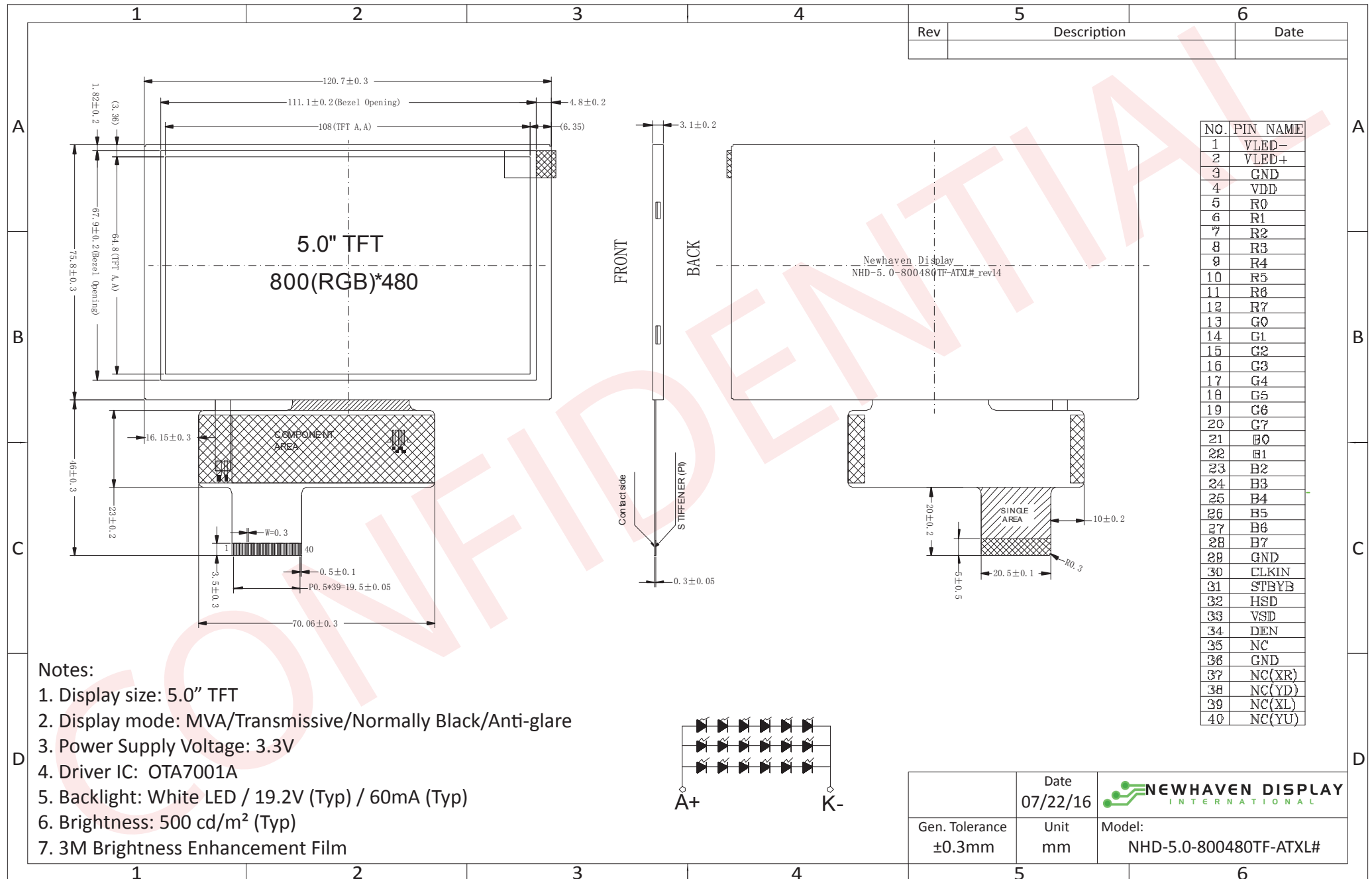
Document Revision History

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

Functions and Features

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

Mechanical Drawing



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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	

Driver Information

Built-in OTA7001A Source Driver: http://www.newhavendisplay.com/app_notes/OTA7001A_V04.pdf

Built in OTD9960A Gate Driver: http://www.newhavendisplay.com/app_notes/OTD9960A_V03.pdf

Timing Characteristics

Horizontal input timing

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Horizontal display area	thd	800			DCLK
DCLK frequency	fclk	-	30	50	MHz
1 Horizontal Line	th	928			DCLK
HSD pulse width	Min.	1			
	Typ.	48			
	Max.	-			
HSD Back Porch (Blanking)	thb	-	88	-	
HSD Front Porch	thfp	-	40	-	

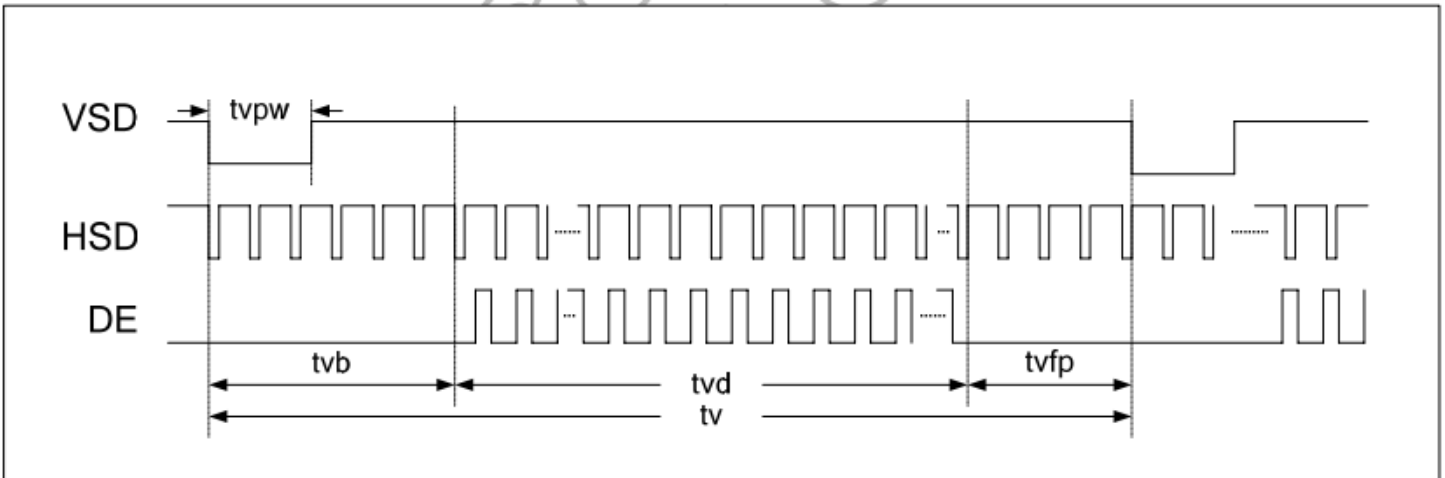
Vertical input timing

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	480			H
VSD period time	tv	-	525	-	H
VSD pulse width	tpw	-	3	-	H
VSD Back Porch (Blanking)	tvb	-	32	-	H
VSD Front Porch	tvfp	-	13	-	H

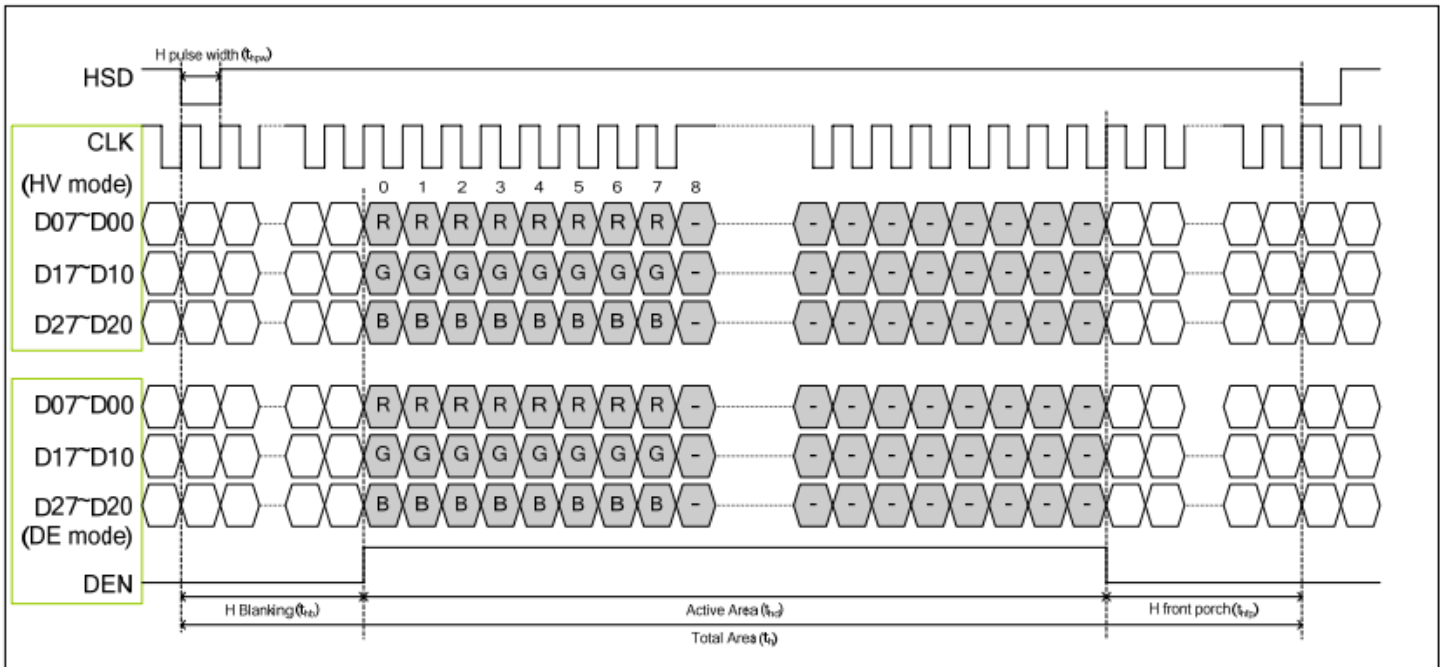
Parameter	Symbol	MIN.	Typ.	MAX.	UNIT	Conditions
VDD Power On Slew rate	T	-	-	20	ms	From 0V to 90% VDD
RSTB pulse width	T	10	-	-	us	CLKIN = 45MHz
CLKIN cycle time	Tcph	20	-	-	ns	
CLKIN pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	8	-	-	ns	
VSD hold time	Tvhd	8	-	-	ns	
HSD setup time	Thst	8	-	-	ns	
HSD hold time	Thhd	8	-	-	ns	
Data set-up time	Tdsu	8	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to CLKIN
Data hold time	Tdhd	8	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to CLKIN
DE set-up time	Tesu	8	-	-	ns	
DE hold time	Tehd	8	-	-	ns	
Output stable time	Tsst	-	-	6	us	10% to 90% target voltage. CL=120pF, R=10K ohm

Parameter	Symbol	MIN.	Typ.	MAX.	UNIT	Conditions
CLKIN Frequency	Fclk	-	33	50	MHz	VDDD = 2.3V ~ 3.6V
CLKIN Cycle Time	Tclk	20	30	-	ns	
CLKIN Pulse Duty	Tcwh	40	50	60	%	Tclk
Time from HSD to Source Output	Thso	-	Tld		CLKIN	
Time from HSD to LD	Thld	-	Tld		CLKIN	
Time from HSD to STV	Thstv	-	2		CLKIN	
Time from HSD to CKV	Thckv	-	20		CLKIN	
Time from HSD to OEV	Thoev	-	4		CLKIN	
LD Pulse	Twd	-	10		CLKIN	
CKV Pulse Width	Twckv	-	66		CLKIN	
OEV Pulse Width	Twoev	-	Tld+10		CLKIN	

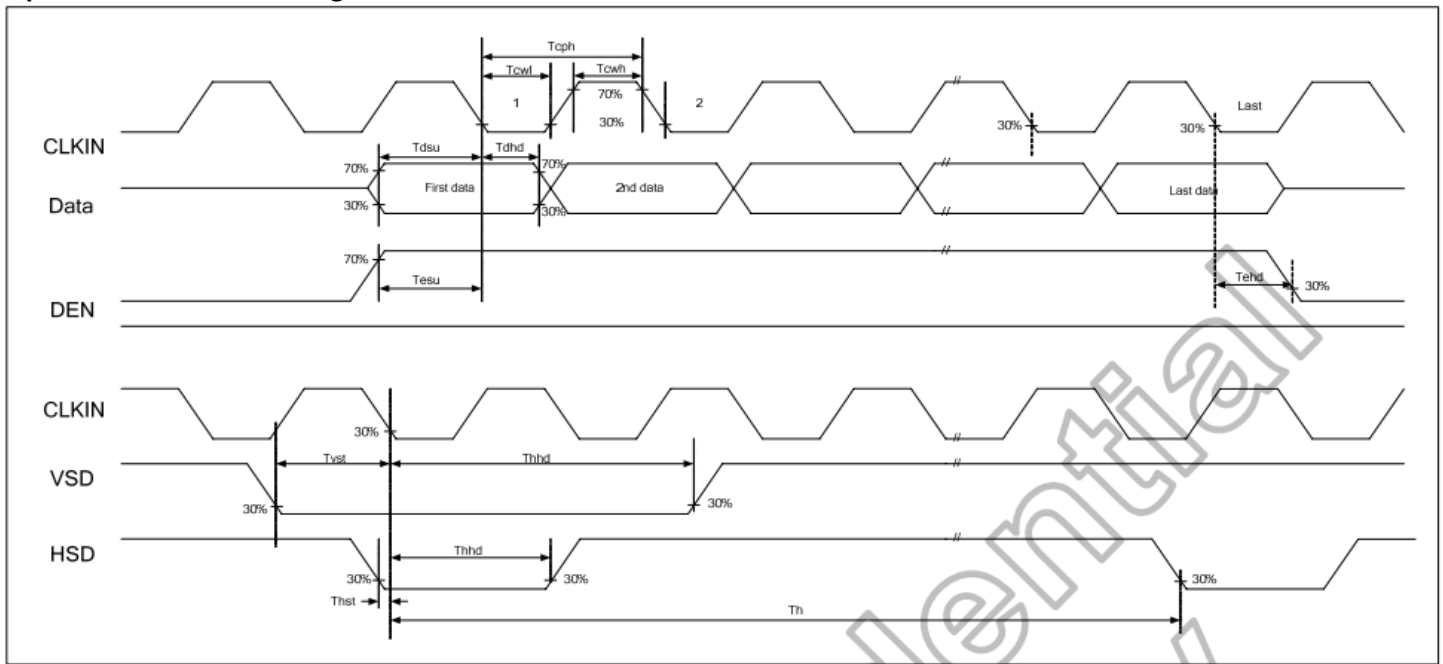
Vertical Input Timing



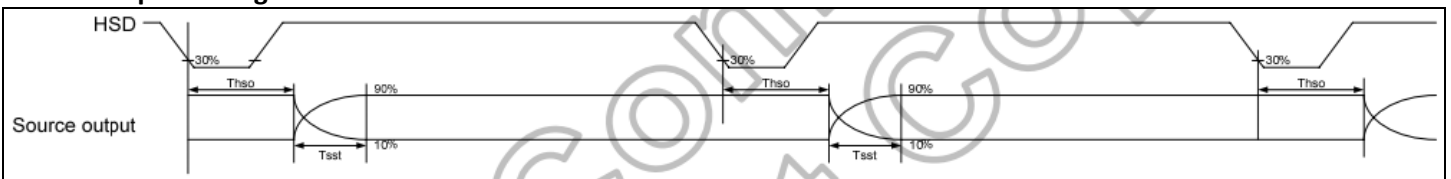
Horizontal Input Timing



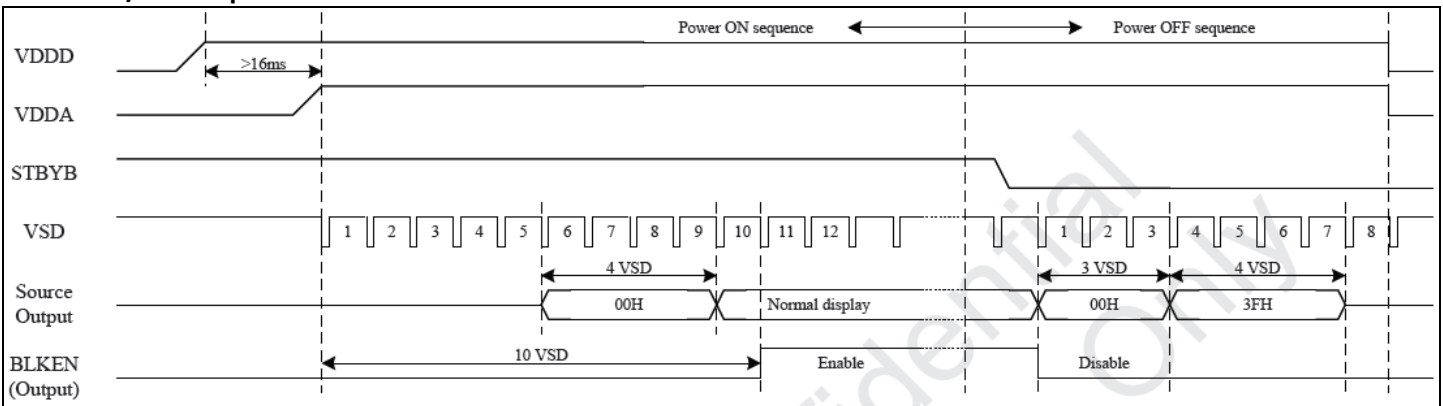
Input Clock and Data Timing



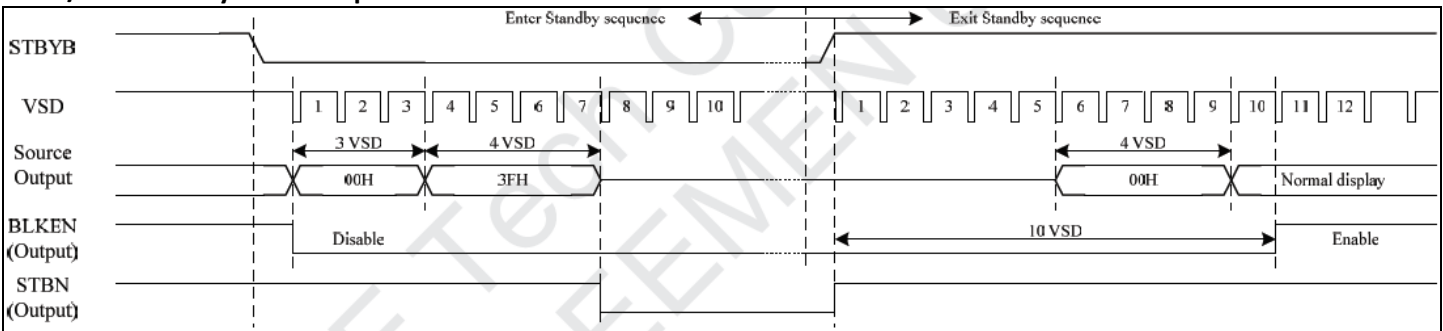
Source Output Timing



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

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