NEWHAVEN DISPLAY INTERNATIONAL

Product Specification

NHD-7.0-800480AF-ASXP

TFT Liquid Crystal Display

NHD-	Newhaven Display
7.0-	7.0" Diagonal
800480-	800xRGBX480 Pixels
AF-	Model
A-	Built-in Driver / No Controller
S-	High Brightness, White LED Backlight
X-	TFT
P-	IPS, Wide Temperature

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REACH Compliant

RoHS Compliant

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Table of Contents

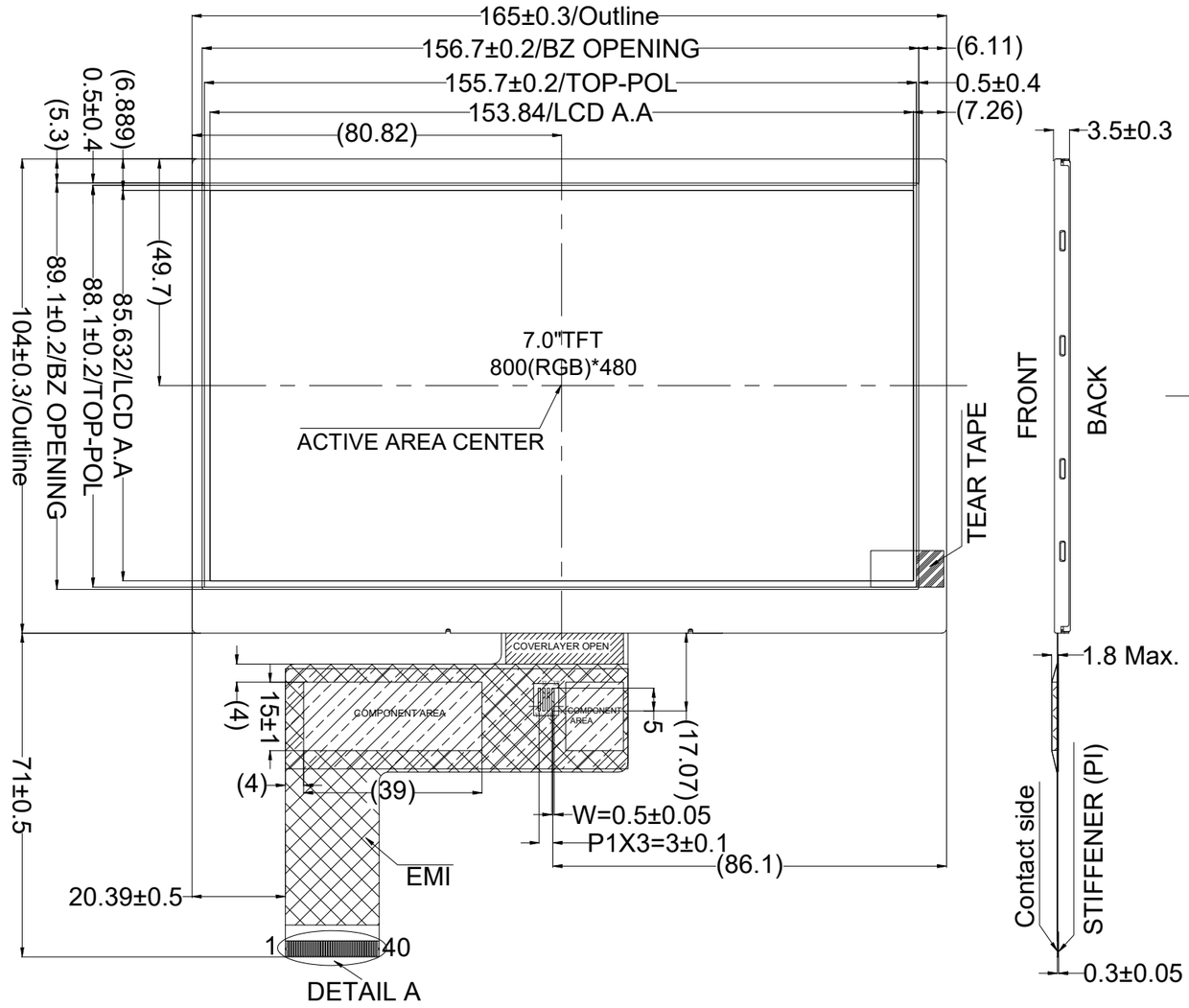
Additional Resources

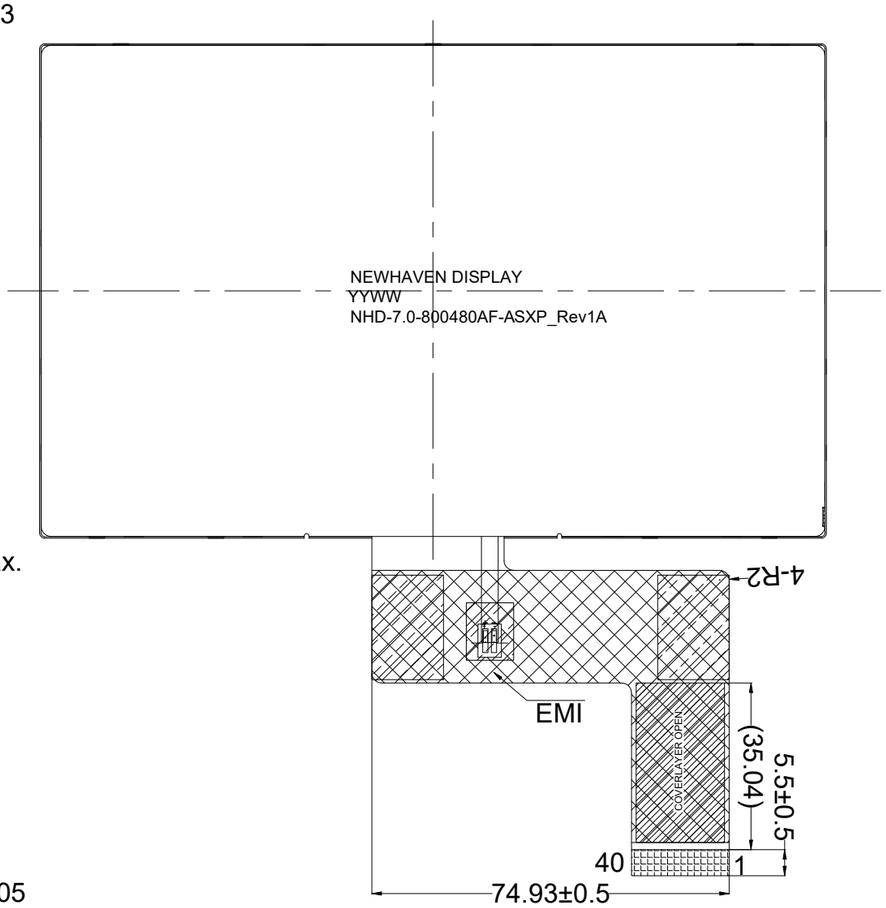
- **Support Forum:** https://support.newhavendisplay.com/hc/en-us/community/topics
- **GitHub:** https://github.com/newhavendisplay
- **Example Code:** https://support.newhavendisplay.com/hc/en-us/categories/4409527834135-Example-Code/
- **Knowledge Center:** https://www.newhavendisplay.com/knowledge_center.html
- **Quality Center:** https://www.newhavendisplay.com/quality_center.html
- **Precautions for using LCDs/LCMs:** https://www.newhavendisplay.com/specs/precautions.pdf
- **Warranty / Terms & Conditions:** https://www.newhavendisplay.com/terms.html

Document Revision History

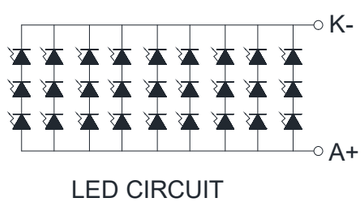
Revision	Date	Description	Changed By
-	08/01/2024	Initial Release	KL

Mechanical Drawing

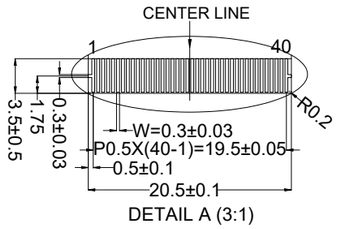




PIN	SYMBOL
1	LED-K
2	LED-A
3	GND
4	VDD
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	DCLKP
31	DISP
32	HSYNC
33	VSYNC
34	DE
35	BIST_EN
36	GND
37	NC(XR)
38	NC(YD)
39	NC(XL)
40	NC(YU)



LED CIRCUIT



DETAIL A (3:1)

Product Description: 7.0” 800x480 IPS TFT

1. Driver IC: ST7277 TFT
2. Interface: 24-bit Parallel RGB
3. Power Requirement: 3.3V TFT, 9.3V/180mA Backlight
4. Optical Features: Normally Black, Transmissive, Anit-Glare, 1000cd/m²
5. Recommended FFC Connector: 40pin 0.5mm pitch; Ex. Molex 54104-4031
6. EMI Shielded FPC

Standard Tolerance:
(Unless otherwise specified)
Linear: ±0.3mm

NEWHAVEN DISPLAY INTERNATIONAL

Drawing/Part Number:	Revision:
NHD-7.0-800480AF-ASXP	1A

Unless otherwise specified:
• Dimensions are in Millimeters
• Third Angle Projection

Drawn By:	Approved By:
K. Lewis	K. Lewis
Drawn Date: 08/01/2024	Approved Date: 08/01/2024

Pin Description

Pin No.	Symbol	External Connection	Function Description
1	LED-K	LED Power Supply	Ground for Backlight
2	LED-A	LED Power Supply	Backlight Power Supply (180mA @ 9.3V)
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	DCLK	MPU	Pixel Clock signal for input data (Falling Edge)
31	DISP	MPU	H: Normal Operation; L: Standby Mode
32	HSYNC	MPU	Horizontal (Line) synchronization signal
33	VSYNC	MPU	Vertical (Frame) synchronization signal
34	DE	MPU	Data Enable signal
35	BIST_EN	MPU	Built in Self-Test BIST_EN=H: Self-Test Enabled BIST_EN-L: Normal Operation (Default)
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)

RGB Interface Mode Selection

The Sitronix ST7277 driver IC is user configurable for DE Mode, SYNC mode, or SYNC-DE mode RGB interface.

DE Mode is enabled when HSYNC and VSYNC signals are set to logic-low state, and DE signal is toggled high for valid pixel data. Data is clocked in using DCLK signal. DE mode is recommended to enable the ST7277 driver IC to synchronize the display image on TFT panel without depending on specific horizontal and vertical sync timing from host controller.

SYNC mode is enabled when the DE signal is set to logic-low state, and HSYNC and VSYNC signals are used to explicitly define the horizontal and vertical sync timing to synchronize the display image on TFT panel. Data is clocked in using DCLK signal. Any change to the HSYNC or VSYNC values may prevent the image from correctly appearing on the display.

SYNC-DE Mode is enabled when HSYNC and VSYNC signals are used to explicitly define the horizontal and vertical sync timing to synchronize the display image on TFT panel. DE signal is used as an additional indicator for transmission of valid pixel data. Data is clocked in using DCLK signal. Any change to the HSYNC or VSYNC values may prevent the image from correctly appearing on the display.

RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC-DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

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}	-	3.1	3.3	3.6	V
Supply Current	I_{DD}	V_{DD} = 3.3V	28	55	83	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}	-	135	180	225	mA
Backlight Supply Voltage	V_{LED}	I_{LED} = 180mA	8.3	9.3	10.2	V
Backlight Lifetime*	-	T_{OP} = 25°C	30,000	-	-	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+	-	-	85	-	º
	Bottom	φY-		-	85	-	º
	Left	θX-		-	85	-	º
	Right	θX+		-	85	-	º
Contrast Ratio		CR	-	800	1000	-	-
Luminance		L_V	I_{LED} = 180 mA	800	1000	-	cd/m²
Response Time (Rise + Fall)		$T_R + T_F$	T_{OP} = 25°C	-	25	-	ms
Chromaticity	Red	X_R	-	0.569	0.619	0.669	-
		Y_R	-	0.289	0.339	0.389	-
	Green	X_G	-	0.284	0.334	0.384	-
		Y_G	-	0.535	0.585	0.635	-
	Blue	X_B	-	0.077	0.127	0.177	-
		Y_B	-	0.078	0.128	0.178	-
	White	X_W	-	0.246	0.296	0.346	-
		Y_W	-	0.286	0.336	0.36	-

Driver Information

Built-in ST7277 Source Driver: https://support.newhavendisplay.com/hc/en-us/articles/22014397027991-ST7277

Timing Characteristics – TFT Display

Horizontal Input Timing

Parameter	Symbol	Min	Typ	Max	Unit	Note
HSYNC Display period	T_{HDISP}		800		DCLK	
DCLK Frequency	F_{CLK}	23	25	27	MHz	
HSYNC Period Time	T_H	808	816	848	DCLK	
HSYNC Pulse Width	T_{HW}	2	4	8		
HSYNC Back Porch (Blanking)	T_{HBP}	4	8	24		
HSYNC Front Porch	T_{HFP}	4	8	24		

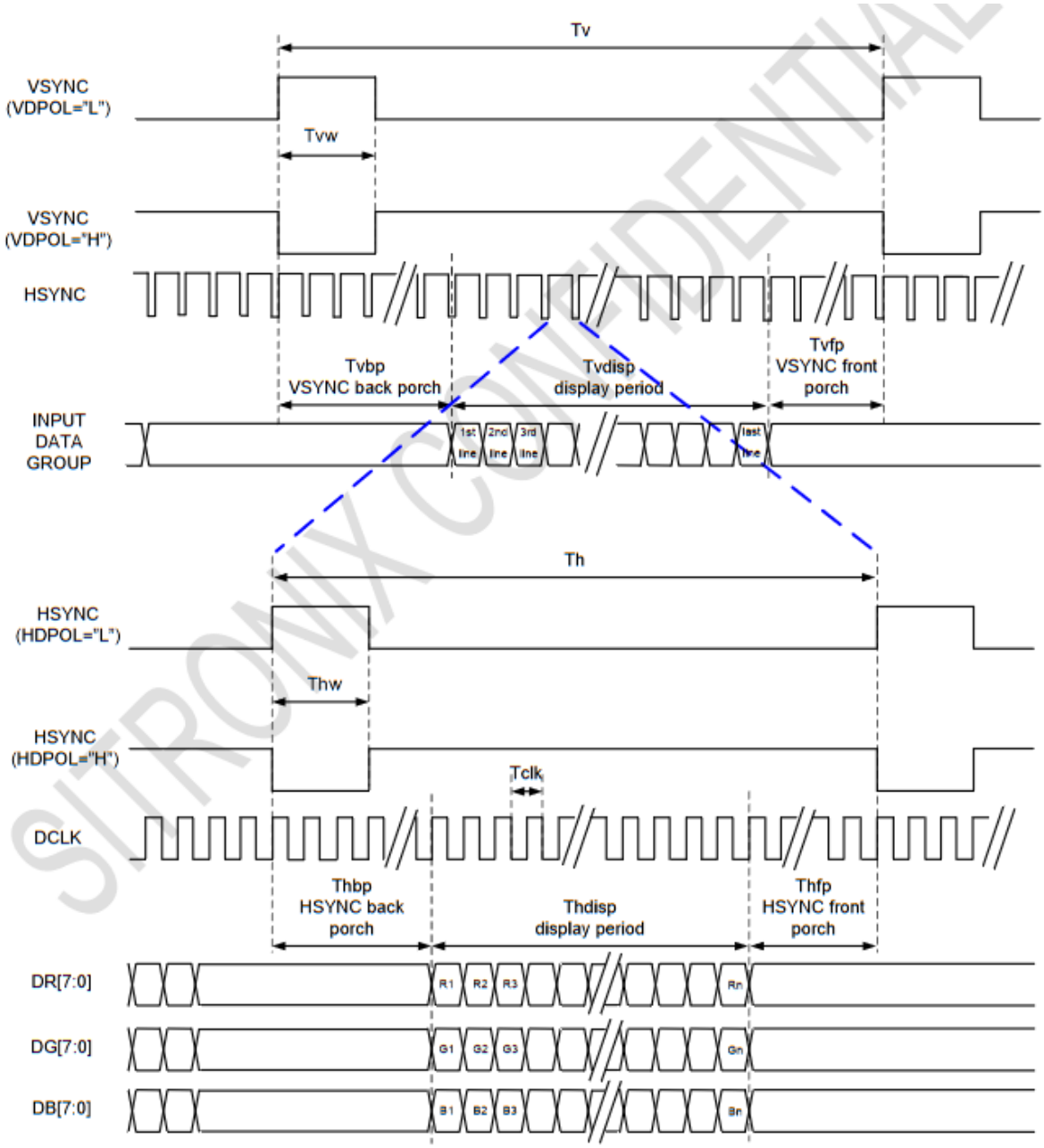
Vertical Input Timing

Parameter	Symbol	Min	Typ	Max	Unit	Note
VSYNC Display period	T_{VDISP}		480		HSYNC	
VSYNC Period Time	T_V	496	512	528		
VSYNC Pulse Width	T_{VW}	2	4	8		
VSYNC Back Porch (Blanking)	T_{VBP}	8	16	24		
VSYNC Front Porch	T_{VFP}	8	16	24		

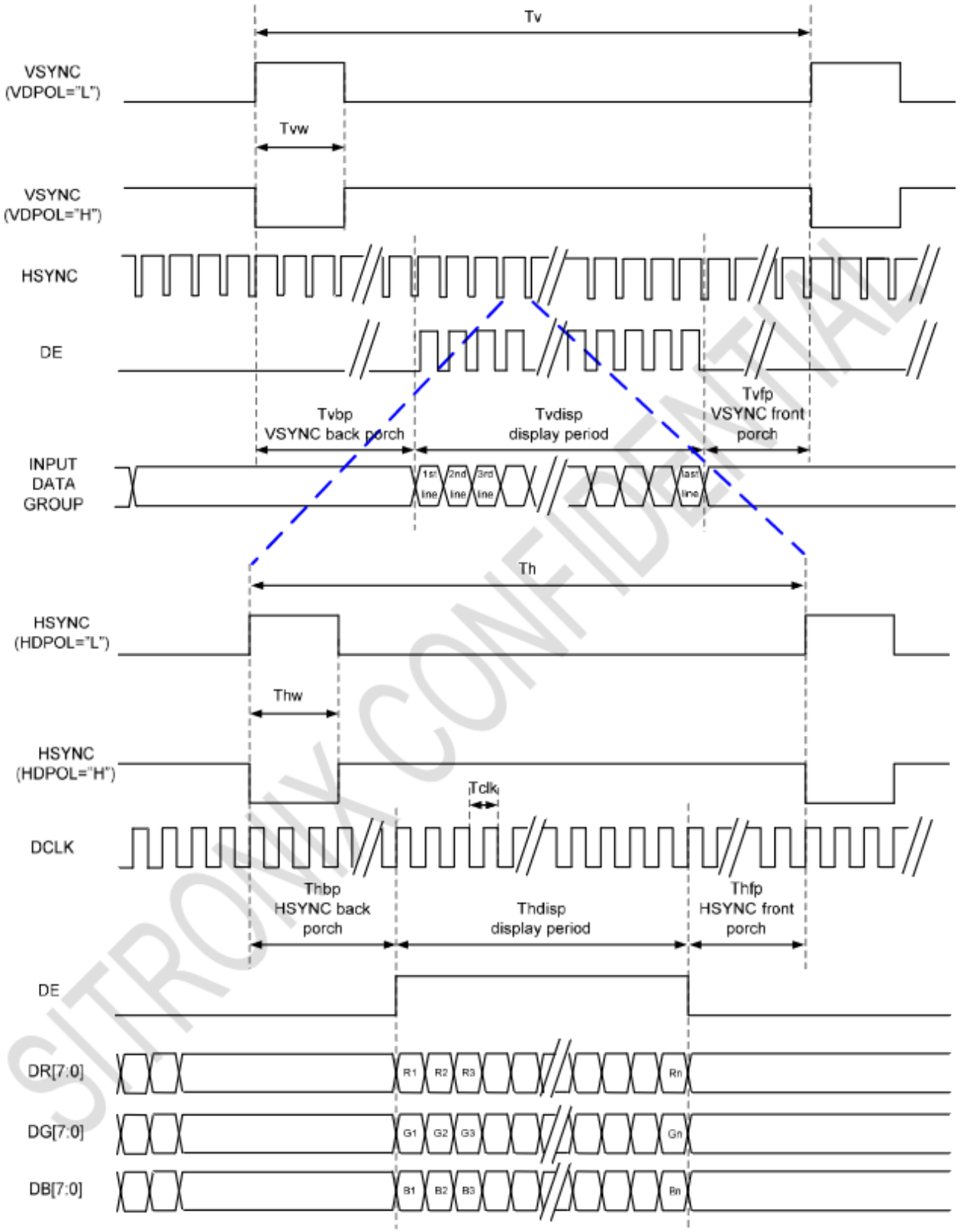
AC Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
CLK pulse duty	T_{cw}	40	50	60	%	
VSYNC setup time	T_{vst}	10	-	-	ns	
VSYNC hold time	T_{vhd}	10	-	-	ns	
HSYNC setup time	T_{hst}	10	-	-	ns	
HSYNC hold time	T_{hhd}	10	-	-	ns	
Data set-up time	T_{dsu}	10	-	-	ns	
Data hold time	T_{dhd}	10	-	-	ns	
DE setup time	T_{dest}	10	-	-	ns	
DE hold time	T_{dhd}	10	-	-	ns	
Output stable time	T_{sst}	-	-	TBD	µs	

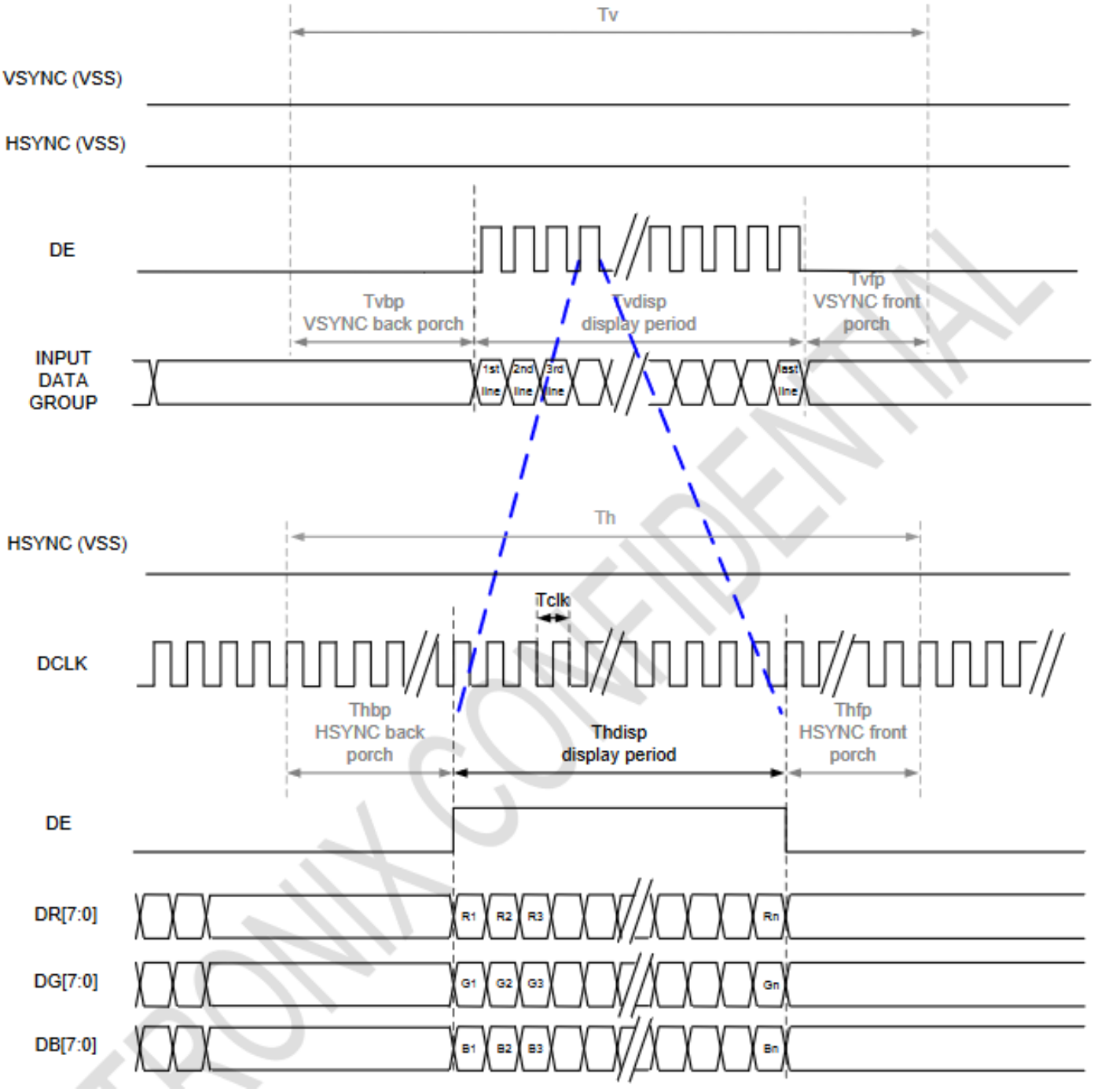
SYNC Mode



SYNC-DE Mode

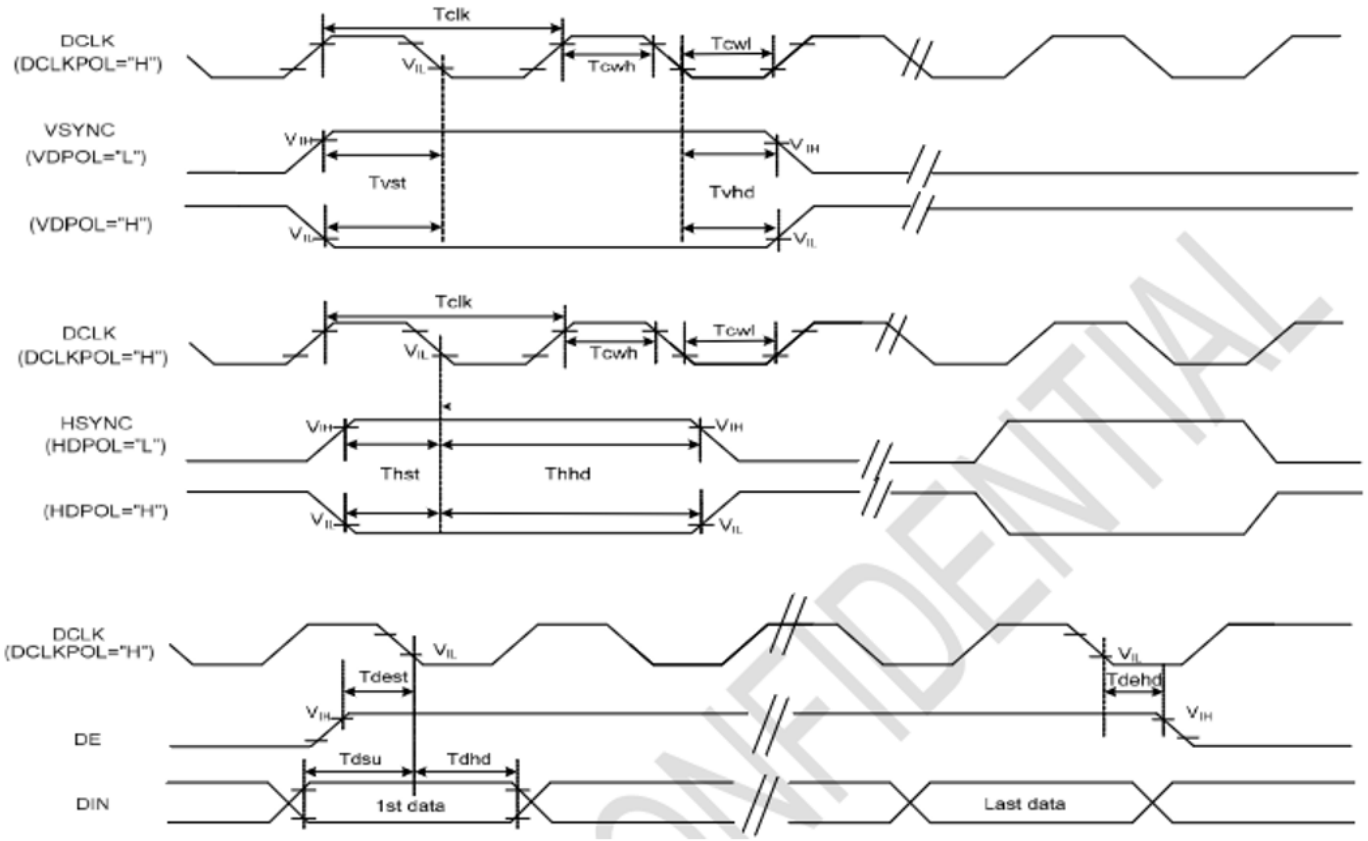


DE Mode

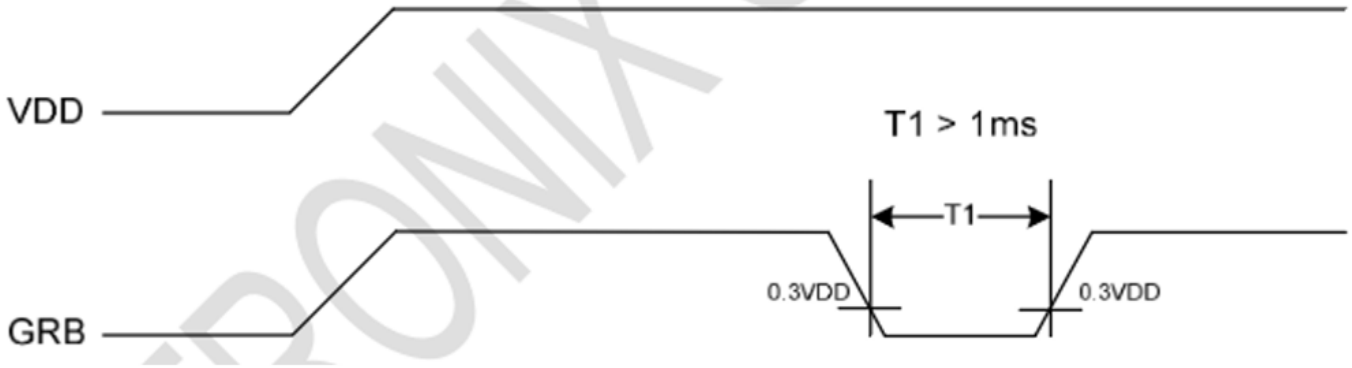


System Bus Timing for RGB Interface

DCLK Negative Polarity (DCLKPOL="H")

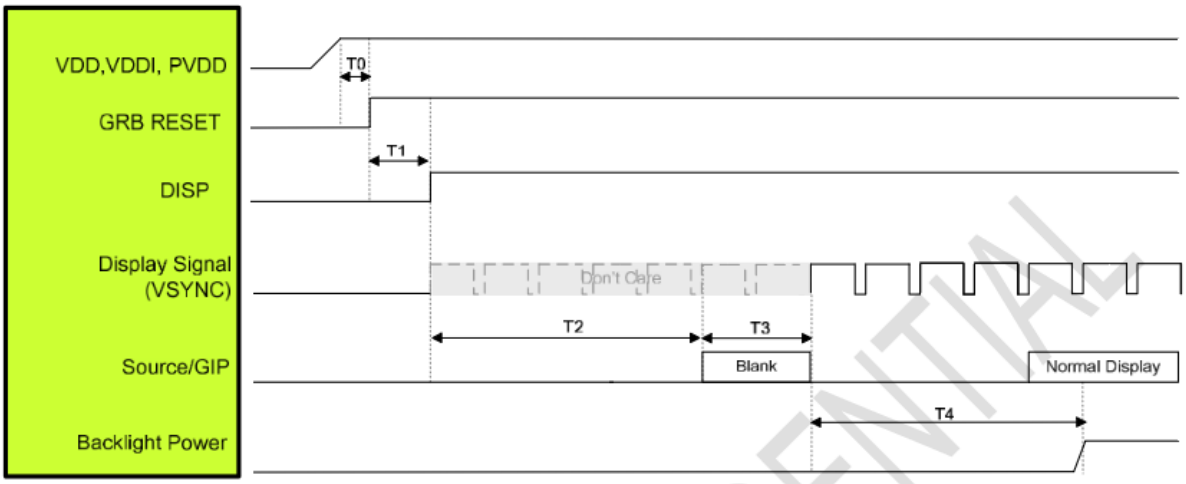


Reset Timing



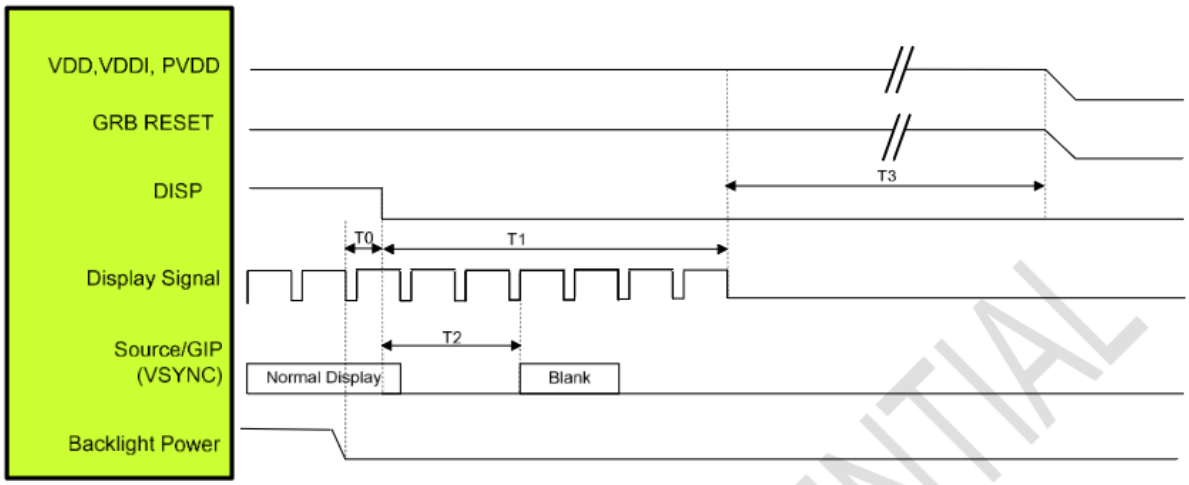
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
VDD Power Source Slew Time	TPOR	-	-	20	ms	From 0V to 99% VDD
GRB Pulse Width	tRSTW	10	50	-	us	R=10Kohm, C=1uF

Power On Sequence



Symbol	Description	Time	Unit
T0	System power stability to GRB RESET signal	≥1	ms
T1	GRB RESET= "High" to DISP="High"	≥10	ms
T2	DISP="High" to Source/GIP scan blank	85	ms
T3	IC scan blanking signal	≥33	ms
T4	Display signal input to Backlight power on (base on Display Signal Frame Rate 60Hz)	≥100	ms

Power Off Sequence



Symbol	Description	Time	Unit
T0	Backlight Power off to DISP="Low"	≥1	ms
T1	DISP="Low" to IC internal voltage discharge complete	≥100	ms
T2	DISP="Low" to Source/GIP scan blank (base on Display Signal Frame Rate 60Hz)	≤50	ms
T3	IC internal voltage discharge is completed to VDD/VDDI/PVDD off	≥0	ms

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 Storage	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,60 min =20 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	Frequency range:10Hz~50Hz Acceleration of gravity:5G X, Y, Z 30 min for each direction	3
Static electricity test	Endurance test applying electric static discharge.	Air: ±8kV ; Contact: ±4kV For 5 times each.	

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.