

Product Specification

NHD-5.0-800480AF-ASXP

TFT Liquid Crystal Display

NHD -	Newhaven Display
5.0 -	5.0" Diagonal
800480 -	800xRGBx480 Pixels
AF -	Model
A -	Built-In Driver / Controller
S -	High Brightness, White LED Backlight
X -	TFT
P -	IPS, Wide Temperature

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Additional Resources

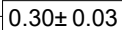
- **Support Forum:** <http://www.nhdforum.newhavendisplay.com>
- **Github:** <https://github.com/newhavendisplay>
- **Example Code:** https://www.newhavendisplay.com/example_code.html
- **Knowledge Center:** https://www.newhavendisplay.com/knowledge_center.html
- **Quality Center:** https://www.newhavendisplay.com/quality_center.html
- **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
0	02/14/2022	Initial Release	JT
1	04/13/2022	Include SYNC, SYNC-DE, & DE Information	ZP
2	06/09/2022	RGB Interface Mode Selection Included	JT

F

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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)	

1. TFT Driver IC: ST7262
2. TFT Interface: 24 bit RGB
3. TFT Power Requirements: 3.3V, Backlight: 60mA / 21.1V (Typ)
4. Optical Features: Transmissive, Normally Black, 1100 cd/m²
5. TFT Mating Connector: 40pin, 0.5mm pitch; Ex. Molex 54104-4031



Standard Tolerance: (Unless otherwise specified) Linear: $\pm 0.3\text{mm}$	 NEWHAVEN DISPLAY INTERNATIONAL		Drawing/Part Number:	Revision:
			NHD-5.0-800480AF-ASXP	2A
Unless otherwise specified: • Dimensions are in Millimeters • Third Angle Projection 	Drawn By: J.Thomas	Approved By: J.Thomas	Size:	A3
	Drawn Date: 01/26/2022	Approved Date: 01/26/2022	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 @ 21.7V)
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: ---

RGB Interface Mode Selection

The Sitronix ST7262 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 ST7262 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}	-	3.0	3.3	3.6	V
Supply Current	I _{DD}	V _{DD} = 3.3V	41	62	93	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}	-	50	60	72	mA
Backlight Supply Voltage	V _{LED}	I _{LED} = 60mA	19.6	21.1	23.1	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+	-	70	80	-	°
	Bottom	φY-		70	80	-	°
	Left	θX-		70	80	-	°
	Right	θX+		70	80	-	°
Contrast Ratio		CR	-	800	1000	-	-
Luminance		L _V	I _{LED} = 60 mA	800	1100	1500	cd/m ²
Response Time (Rise + Fall)		T _R + T _F	T _{OP} = 25°C	-	30	45	ms
Chromaticity	Red	X _R	-	-0.03	0.6001	+0.03	-
		Y _R	-		0.3535		-
	Green	X _G	-		0.3732		-
		Y _G	-		0.5492		-
	Blue	X _B	-		0.1388		-
		Y _B	-		0.1073		-
	White	X _W	-		0.3100		-
		Y _W	-		0.3300		-

Driver Information

Built-in ST7262 Source Driver: https://www.newhavendisplay.com/resources_dataFiles/datasheets/LCDs/ST7262.pdf

Timing Characteristics – TFT Display

Horizontal Input Timing

Parameter	Symbol	Value			Unit	Note
Horizontal Display Area	T_{HDISP}	800			DCLK	
DCLK Frequency	F_{CLK}	Min	Typ	Max		
		23	25	27	MHz	
1 Horizontal Line	T_H	808	816	896	DCLK	
HSYNC Pulse Width	T_{HW}	2	4	8		
HSYNC Back Porch (Blanking)	T_{HBP}	4	8	48		
HSYNC Front Porch	T_{HFP}	4	8	48		

Vertical Input Timing

Parameter	Symbol	Min	Typ	Max	Unit	Note
Vertical Display Area	$T_{V DISP}$	480			HSYNC	
VSNC Period Tim	T_V	488	496	504		
VSNC Pulse Width	T_{VW}	2	4	8		
VSNC Back Porch (Blanking)	T_{VBP}	4	8	12		
VSNC Front Porch	T_{VFP}	4	8	12		

AC Characteristics

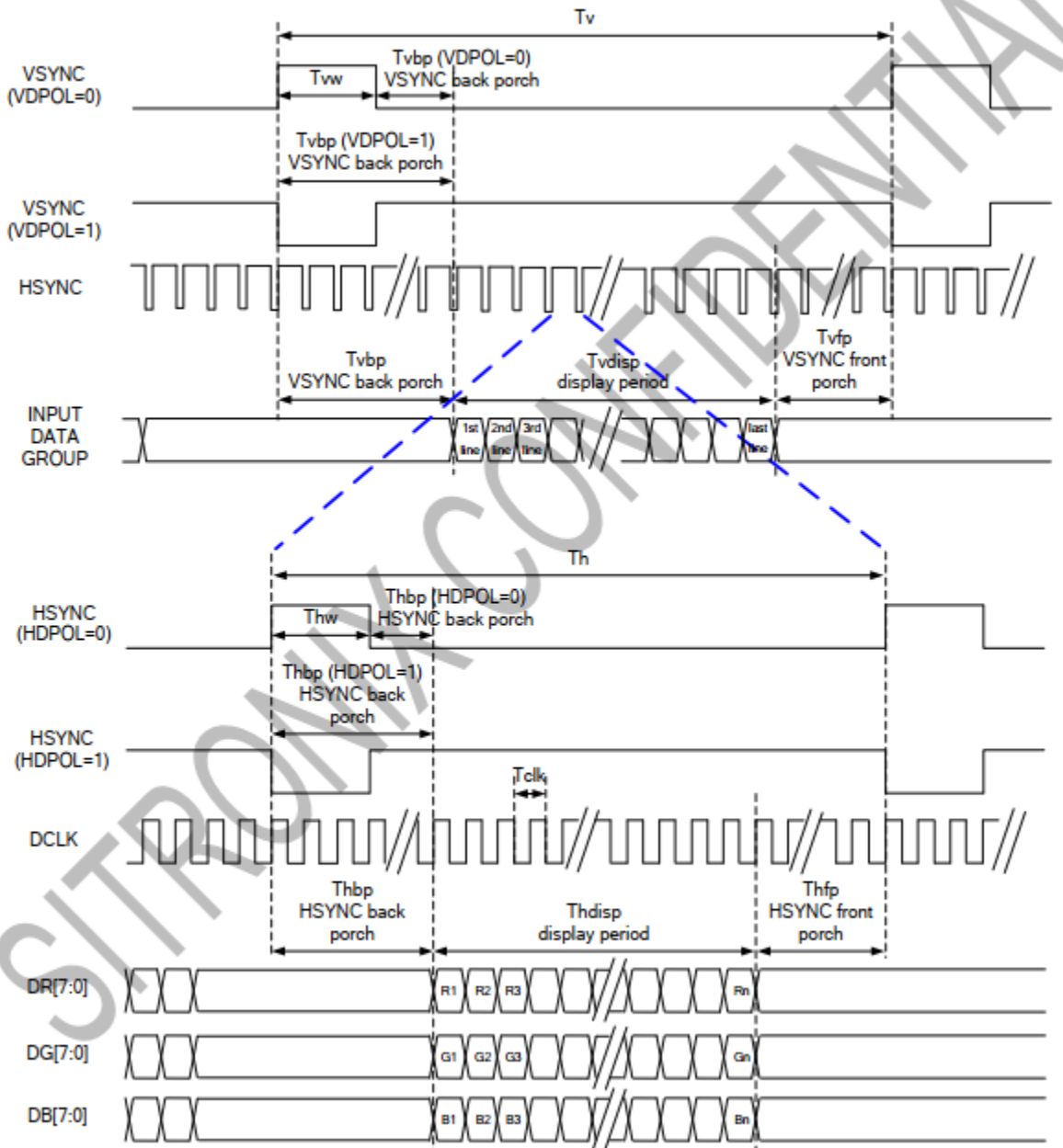
Parameter	Symbol	Min	Typ	Max	Unit	Conditions
V_{DD} Power ON Slew Rate	T_{POR}	-	-	20	ms	From 0V to 99% V_{DD}
CLKIN pulse duty	T_{cwh}	40	50	60	%	
HSYNC Width	T_{hw}	2	-	-	DCLK	
HSYNC Period	T_h	55	60	65	μs	
VSNC setup time	T_{vst}	10	-	-	ns	
VSNC hold time	T_{vhd}	10	-	-	ns	
HSYNC setup time	T_{hst}	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_{esu}	10	-	-	ns	
DE hold time	T_{ehd}	10	-	-	ns	
Output stable time	T_{sst}	-	-	TBD	μs	

RGB Interface

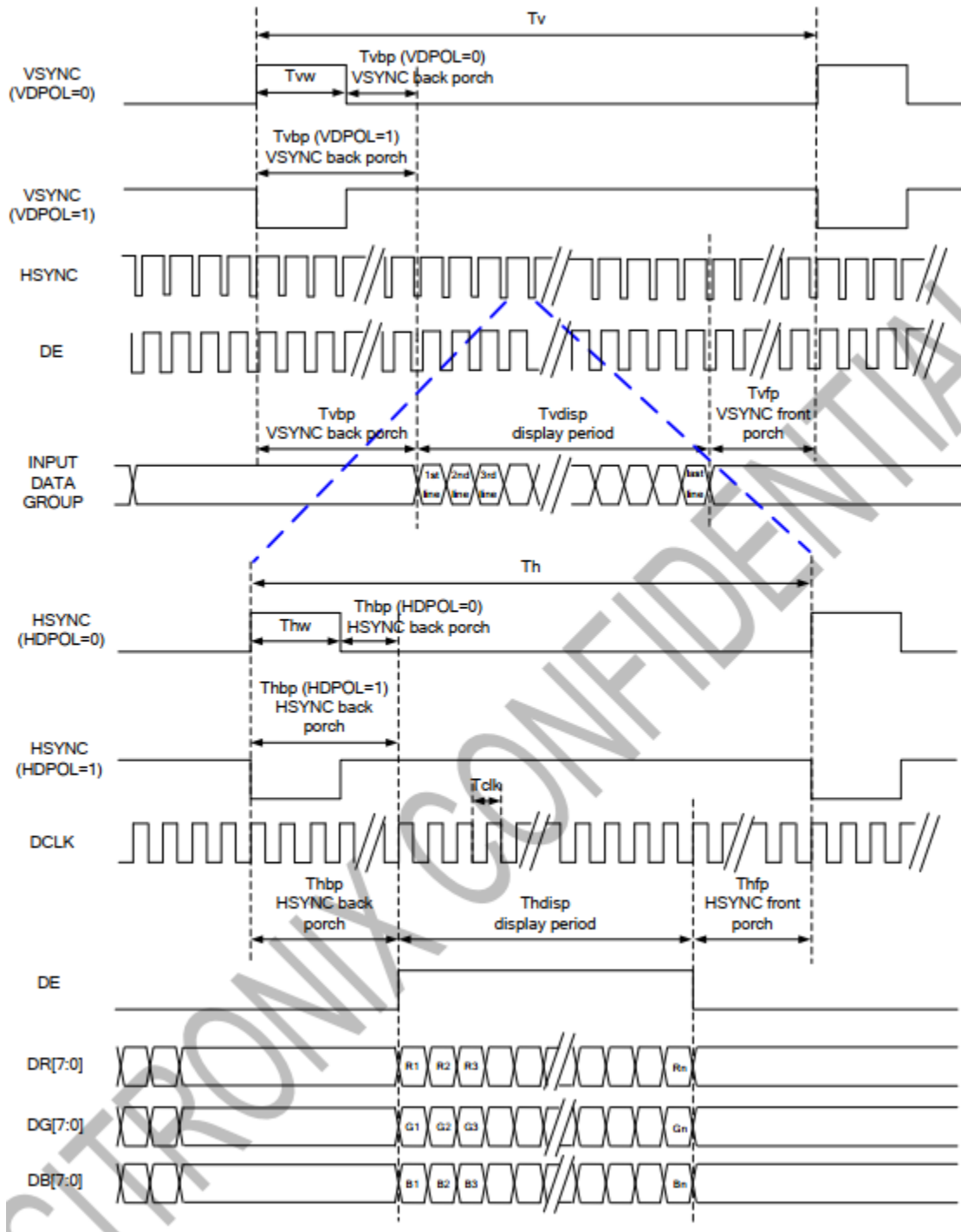
RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

Note: "Input" means these signals are driven by host side

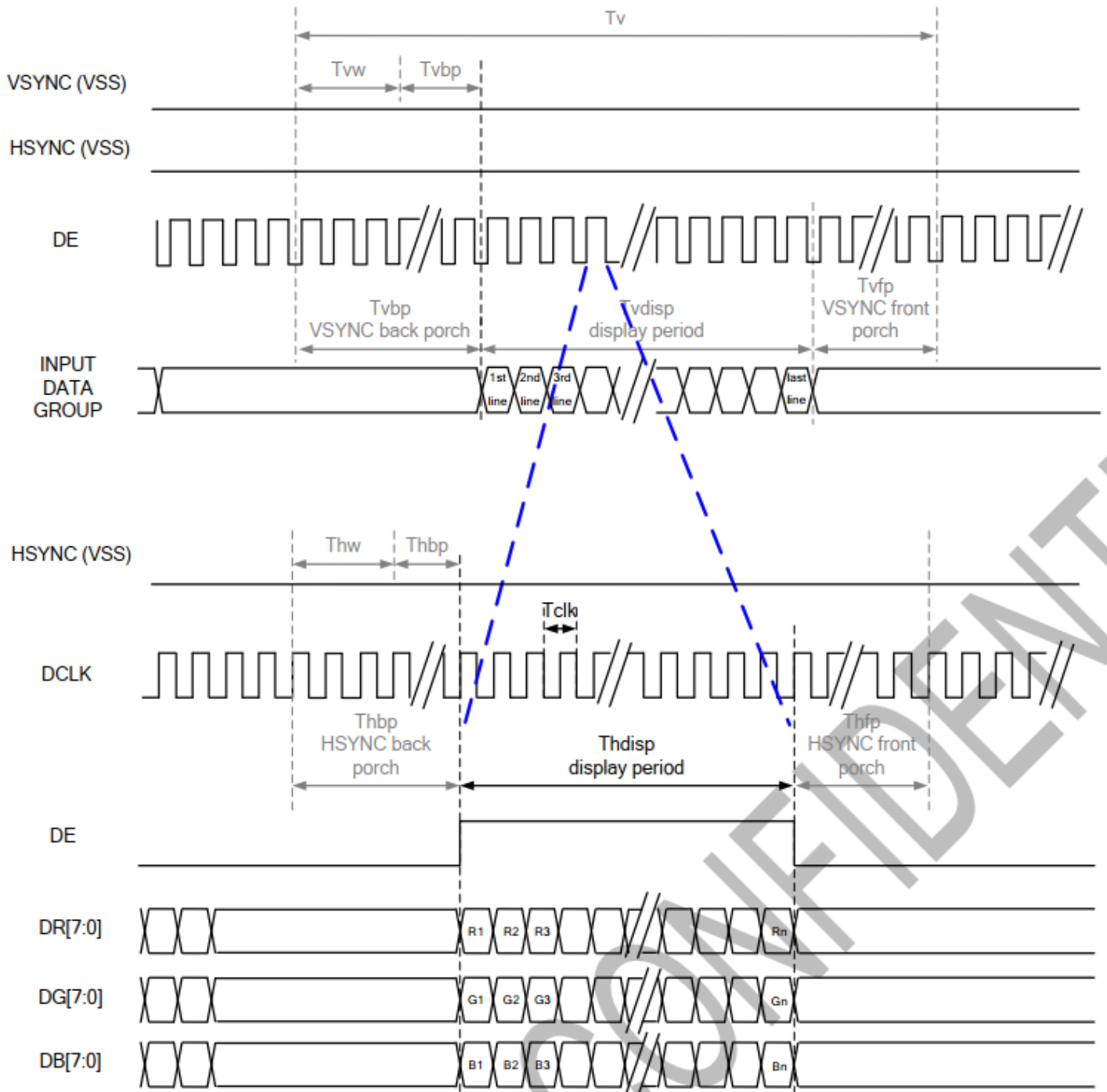
SYNC Mode



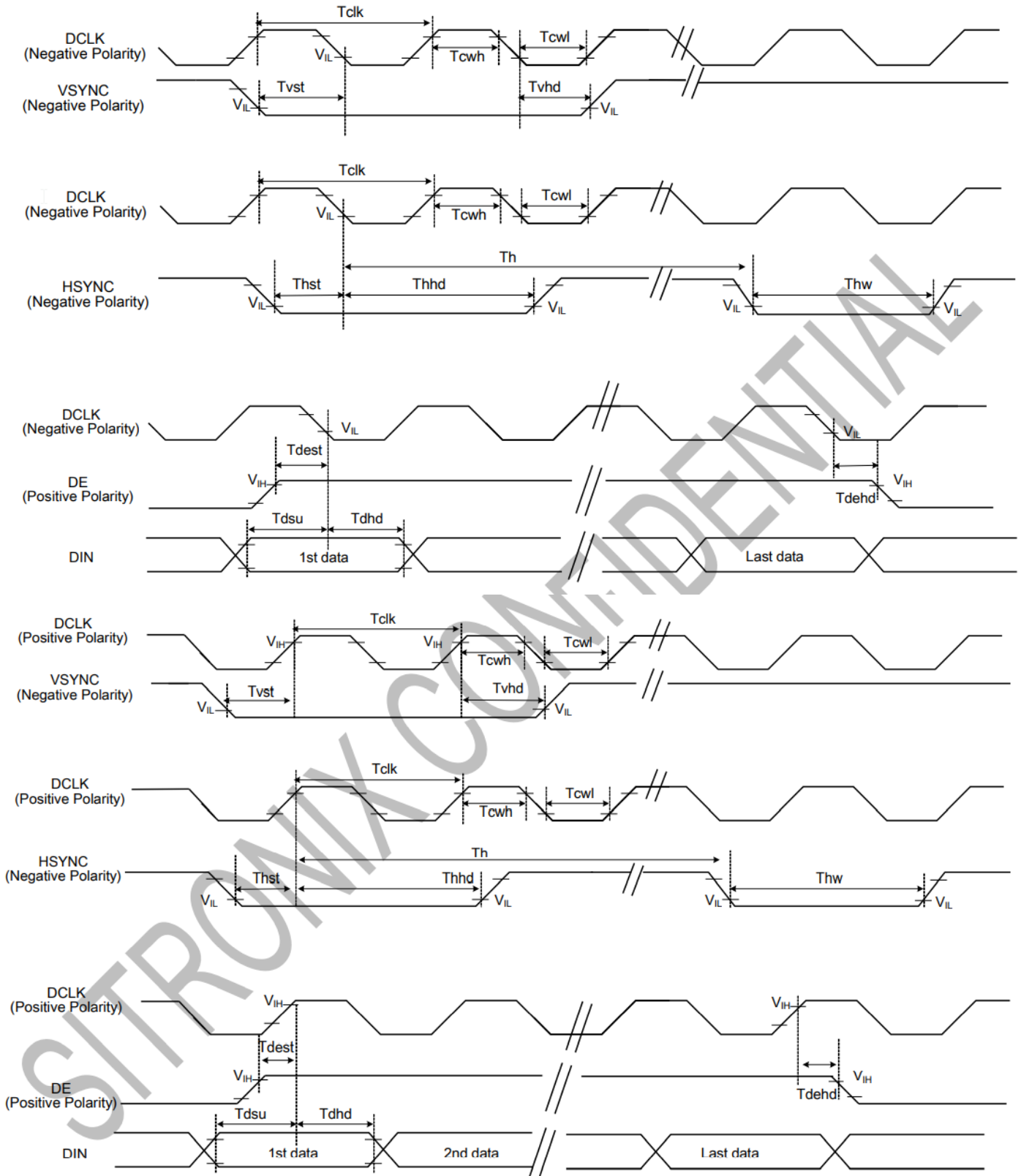
SYNC-DE Mode



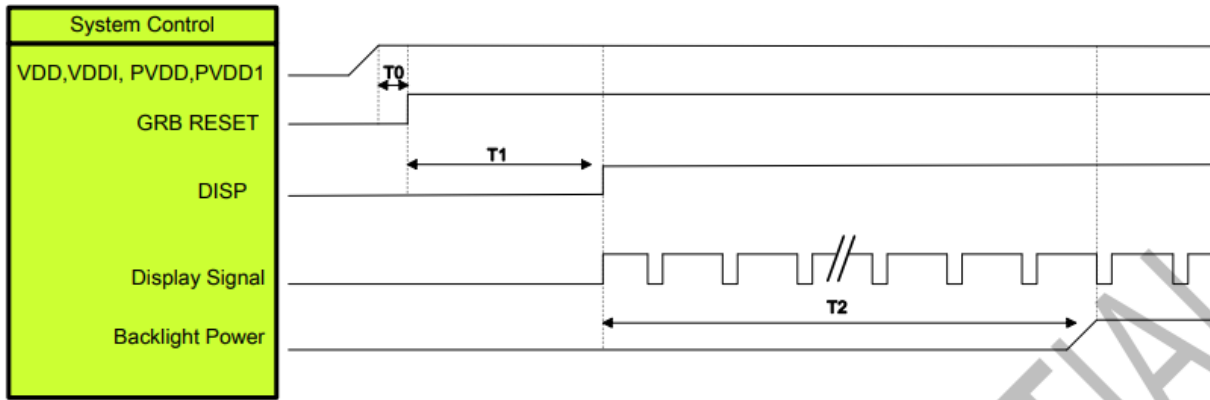
DE Mode



System Bus Timing for RGB Interface



Power On Sequence



Symbol	Description	Min. Time	Unit
T0	System power stability to GRB RESET signal	0	ms
T1	GRB RESET= "High" to DISP="High"	10	ms
T2	Display Signal output to Backlight Power on	250	ms

Note: RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

Power Off Sequence



Symbol	Description	Min. Time	Unit
T0	Backlight Power off to DISP="Low"	5	ms
T1	DISP="Low" to IC internal voltage discharge complete	100	ms

Note: RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

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 , 240hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C , 240hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C 120hrs	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C , 120hrs	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 , 90-95% RH , 120hrs	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 -> 25°C,5min - >80°C,30min = 1 cycle 10 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	Frequency: 250 r/min Amplitude: 1 inch Time: 45 min	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.