

Product Specification

NHD-2.9-376960AF-ASXP

TFT Liquid Crystal Display

NHD-	Newhaven Display
2.9-	2.9" Diagonal
376960-	376xRGBx960 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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Additional Resources

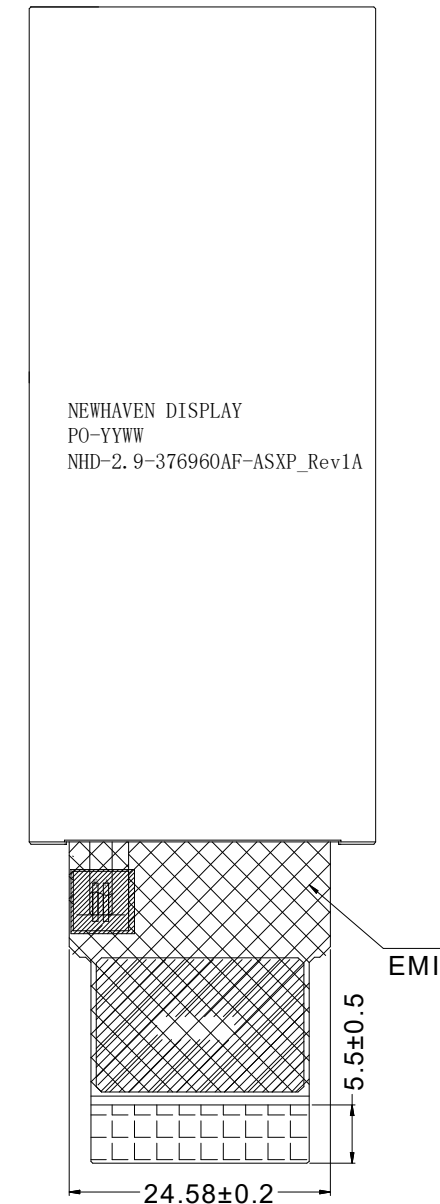
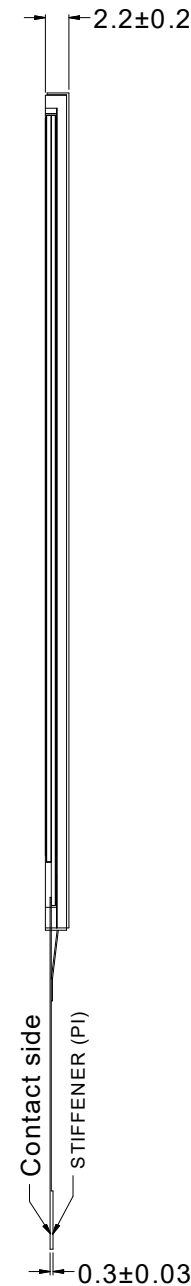
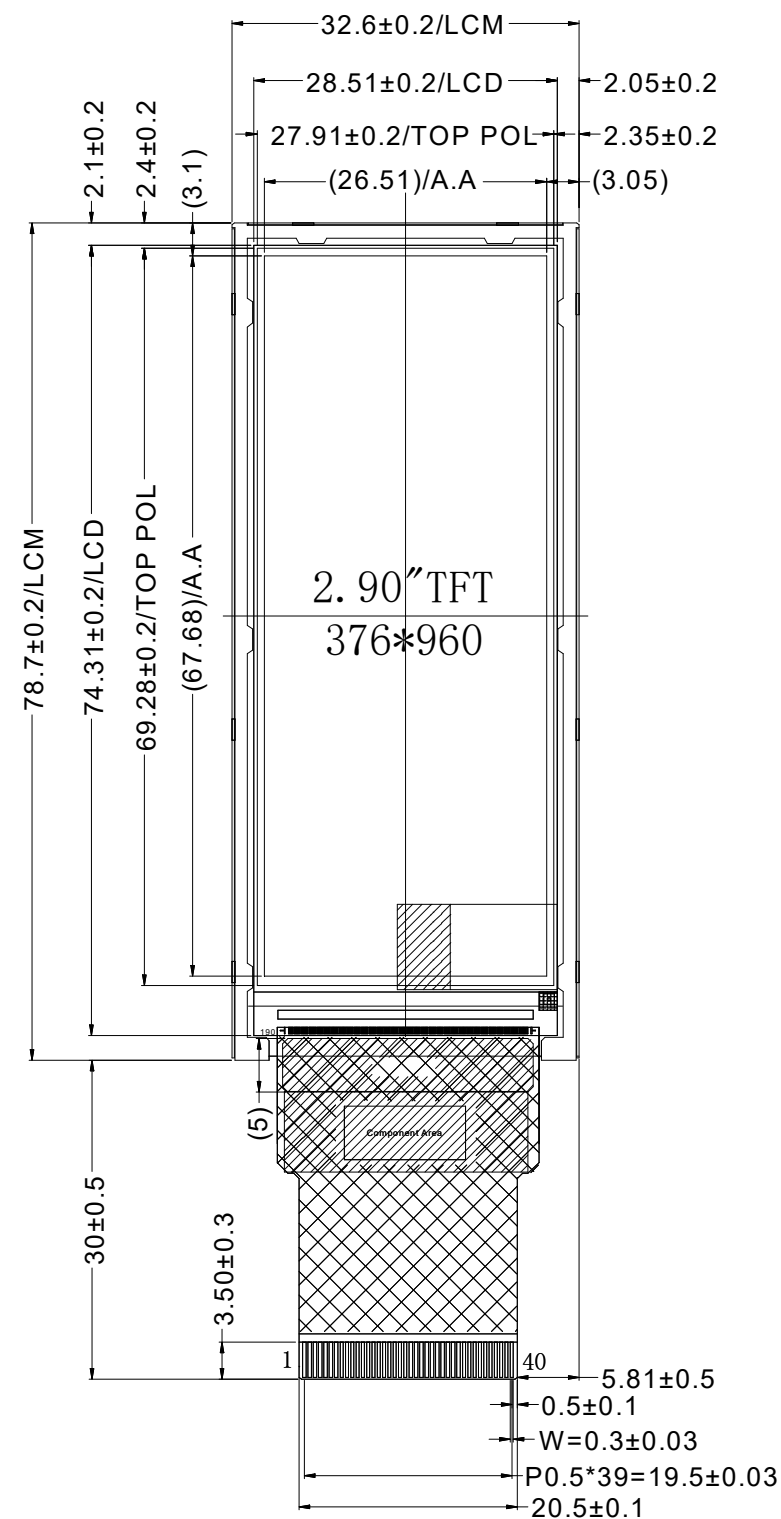
- **Support Forum:** <https://support.newhavendisplay.com/hc/en-us/community/topics>
- **GitHub:** <https://github.com/newhavendisplay>
- **Example Code:** <https://support.newhavendisplay.com/hc/en-us/categories/4409527834135-Example-Code/>
- **Knowledge Center:** https://www.newhavendisplay.com/knowledge_center.html
- **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
-	07/30/2025	Initial Release	KL

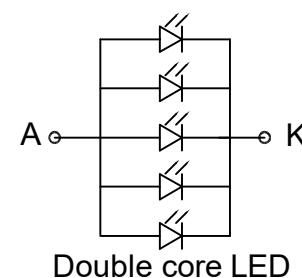
Mechanical Drawing



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	PCLK
31	RESETX
32	HS
33	VS
34	DE
35	NC
36	GND
37	CSX
38	DCX
39	SCL
40	SDA

Product Description: 2.9" 376x960 IPS TFT

1. Driver IC: ST7701SN
2. Interface: 24-bit Parallel RGB, 4-wire SPI
3. Power Requirement: 3.0V TFT, 6.0V/100mA Backlight
4. Optical Features: Normally Black, Transmissive, Anti-Glare, 1050cd/m²
5. Recommended FFC Connector: 40pin 0.5mm pitch; Ex. Molex 54104-4031
6. Built-in EMI Shielding



Standard Tolerance: (Unless otherwise specified) Linear: ±0.3mm	 NEWHAVEN DISPLAY INTERNATIONAL	
	Drawing/Part Number: NHD-2.9-376960AF-ASXP	Revision: 1A
Unless otherwise specified: • Dimensions are in Millimeters • Third Angle Projection 	Drawn By: K. Lewis	Approved By: K. Lewis
	Drawn Date: 07/30/2025	Approved Date: 07/30/2025
This drawing is solely the property of Newhaven Display International, Inc. The information it contains is not to be disclosed, reproduced or copied in whole or part without written approval from Newhaven Display.		

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 (100mA @ 6.0V)
3	GND	Power Supply	Ground
4	V _{DD}	Power Supply	Power supply for LCD and logic (3.0V)
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	PCLK	MPU	Pixel Clock signal for input data (Rising edge)
31	RESETX	MPU	Active LOW Reset signal
32	HS	MPU	Horizontal (Line) synchronization signal
33	VS	MPU	Vertical (Frame) synchronization signal
34	DE	MPU	Data Enable signal
35	NC	-	No Connect
36	GND	Power Supply	Ground
37	CSX	MPU	Active LOW Chip Select signal
38	DCX	MPU	Data/Command selection: '1' = Data; '0' = Command
39	SCL	MPU	Serial Clock Input signal
40	SDA	MPU	Serial Data Input signal

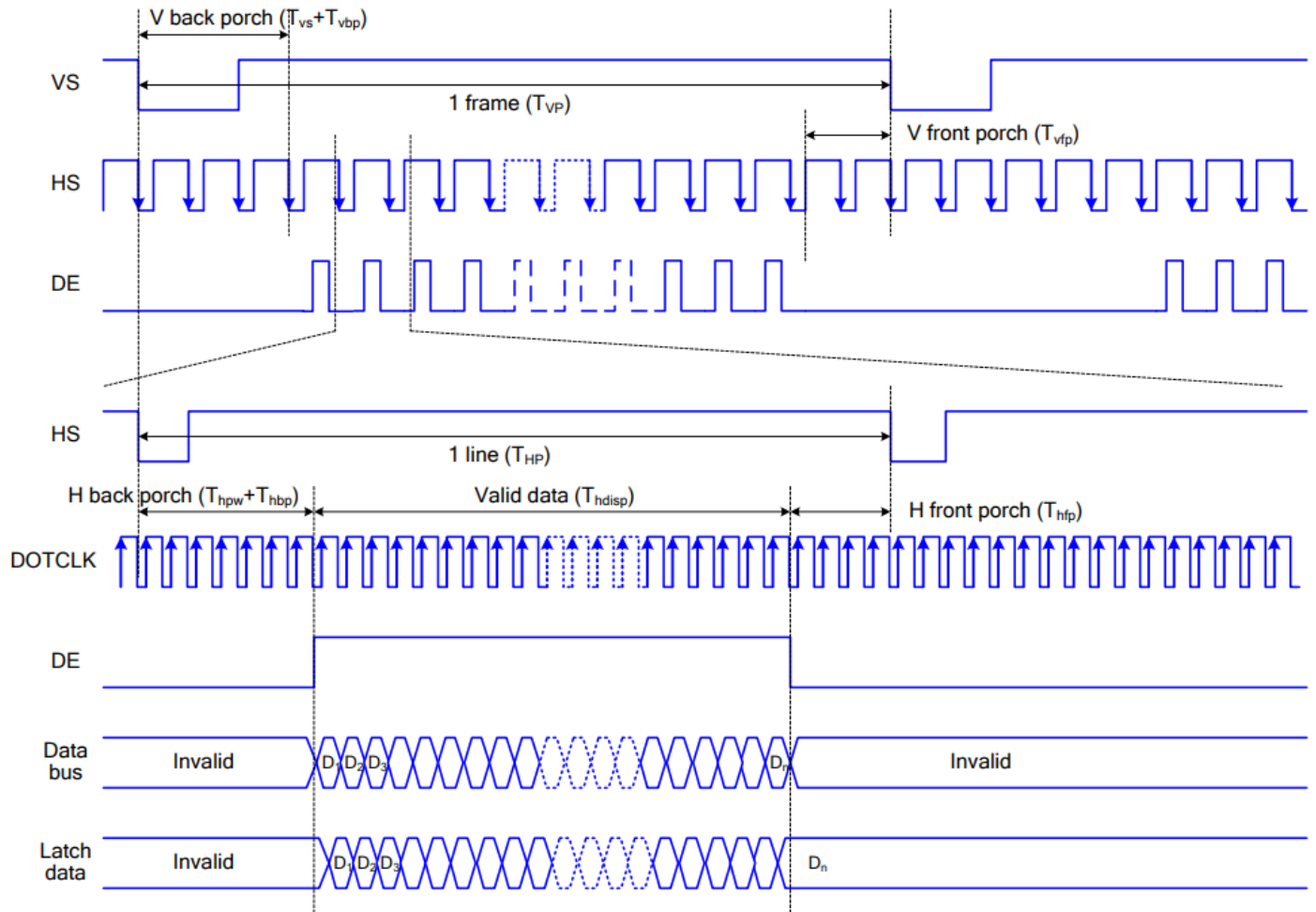
Recommended LCD connector: 0.5mm pitch 40-Conductor FFC. Molex p/n: 54104-4031 (top contact)

RGB Interface Mode

The ST7701SN driver IC is user configurable for DE Mode (mode 1) and HV Mode (mode 2) RGB interface.

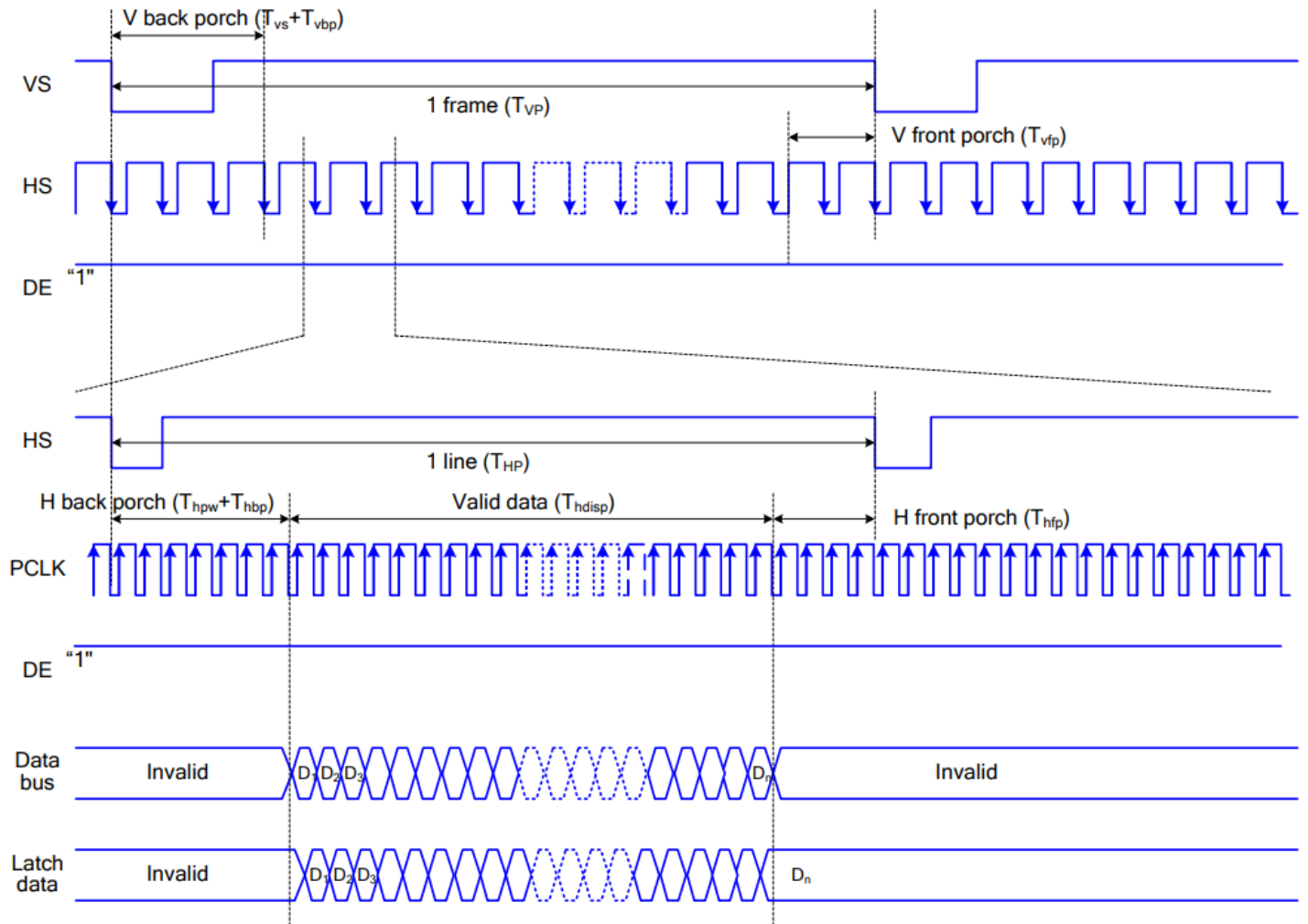
RGB Interface Mode	PCLK	DE	VS	HS	Blanking Porch Setting
DE Mode (mode 1)	Used	Used	Used	Used	Not used
HV Mode (mode 2)	Used	Not used	Used	Used	Used

DE Mode is enabled when the DE/HV bit of RGBCTR (0xC3) command is set to “0”, and DE signal is high for valid pixel data. The PCLK, HS, and VS signals are used for clocking the display data and must always be used by host controller.



Note: The setting of front porch and back porch in host must match that in IC as this mode.

HV Mode is enabled when the DE/HV bit of RGBCTR (0xC3) command is set to “1”, DE signal is ignored. VS back porch is defined by VBP_HVRGB [7:0] of RGBCTR command, and HS back porch is defined by HBP_HVRGB [7:0] of RGBCTR command. VS front porch is not used in this mode.



RGB Input Timing:

Parameter	Symbol	Min.	Typ.	Max.	Unit
Horizontal Sync. Width	hpw	2	-	255	Clock
Horizontal Sync. Back Porch	hbp	2	-	255	Clock
Horizontal Sync. Front Porch	hfp	2	-	-	Clock
Vertical Sync. Width	vs	2	-	255	Line
Vertical Sync. Back Porch	vbp	2	-	255	Line
Vertical Sync. Front Porch	vfp	2	-	-	Line

VIPF[2:0] bits of Interface Pixel Format (0x3A) command can be used to select the pixel format.

Bit	NAME	DESCRIPTION
VIPF[2:0]	Pixel Format for RGB Interface	"101"=16-bit/pixel "110"=18-bit/pixel "111"=24-bit/pixel The others=not defined

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}	-	2.5	3.0	3.3	V
Supply Current	I _{DD}	V _{DD} = 3.0V	25	50	75	mA
"H" Level input	V _{IH}	-	0.7 * V _{DD}	-	V _{DD}	V
"L" Level input	V _{IL}	-	V _{SS}	-	0.3V _{DD}	V
"H" Level output	V _{OH}	-	0.8V _{DD}	-	V _{DD}	V
"L" Level output	V _{OL}	-	V _{SS}	-	0.2V _{DD}	V
Backlight Supply Current	I _{LED}	-	75	100	125	mA
Backlight Supply Voltage	V _{LED}	I _{LED} = 100mA T _{OP} = 25°C	5.5	6.0	6.5	V
Backlight Lifetime*	-		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	-	°
	Bottom	φY-		-	85	-	°
	Left	θX-		-	85	-	°
	Right	θX+		-	85	-	°
Contrast Ratio		CR	-	1000	1500	-	-
Luminance		L _V	I _{LED} = 100 mA	840	1050	-	cd/m ²
Response Time (Rise + Fall)		T _R + T _F	T _{OP} = 25°C	-	30	35	ms
Chromaticity	Red	X _R	-	0.561	0.611	0.661	-
		Y _R	-	0.276	0.326	0.376	-
	Green	X _G	-	0.291	0.341	0.391	-
		Y _G	-	0.552	0.602	0.652	-
	Blue	X _B	-	0.070	0.120	0.170	-
		Y _B	-	0.023	0.073	0.123	-
	White	X _W	-	0.242	0.292	0.342	-
		Y _W	-	0.260	0.310	0.360	-

Driver Information

Built-in ST7701SN Source Driver: <https://support.newhavendisplay.com/hc/en-us/articles/14147699906711-ST7701SN>

Recommended Timing Values

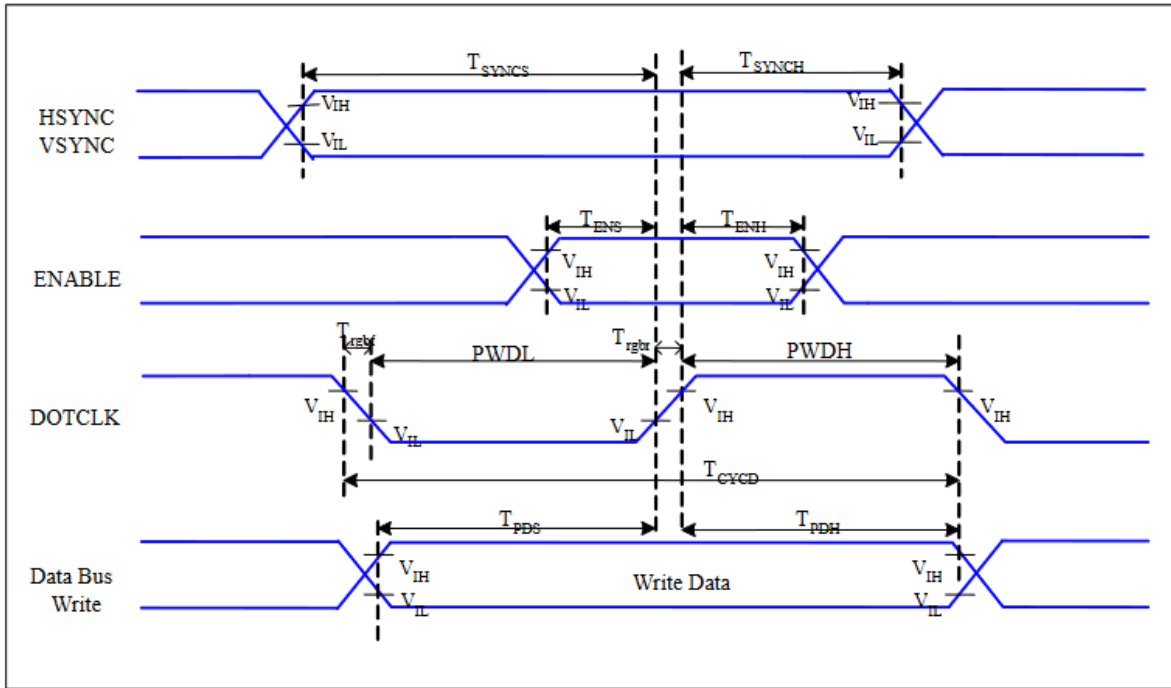
Recommended RGB Timing Values:

HS Total	HFP	HBP	HS Pulse	VS Total	VFP	VBP	VS Pulse	PCLK Freq
536	60	90	10	1090	60	60	10	60 MHz



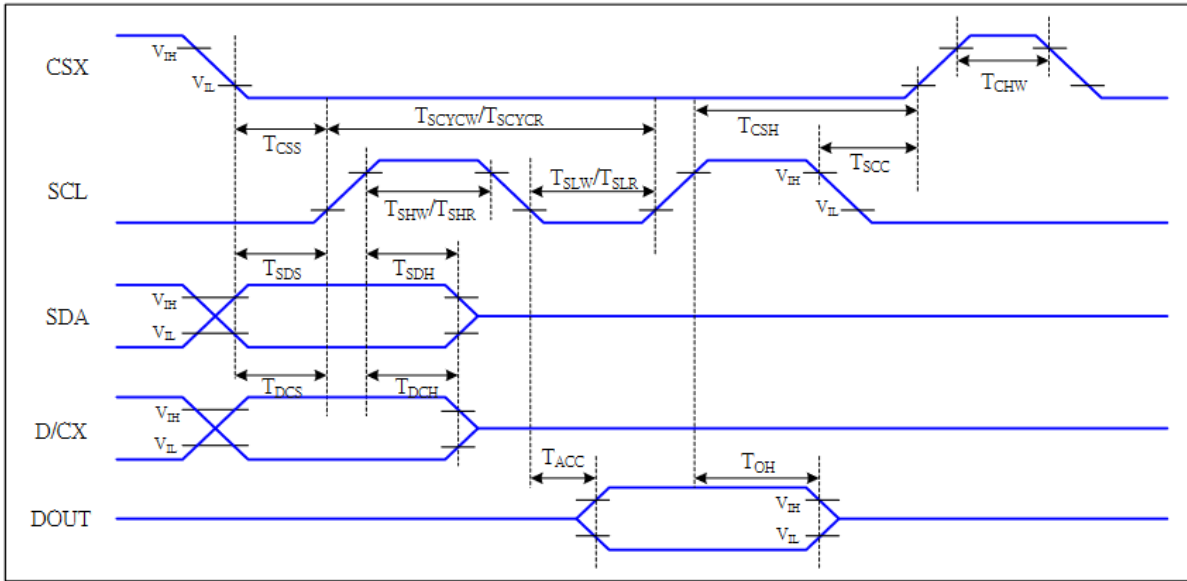
Timing Characteristics

RGB Interface Characteristics



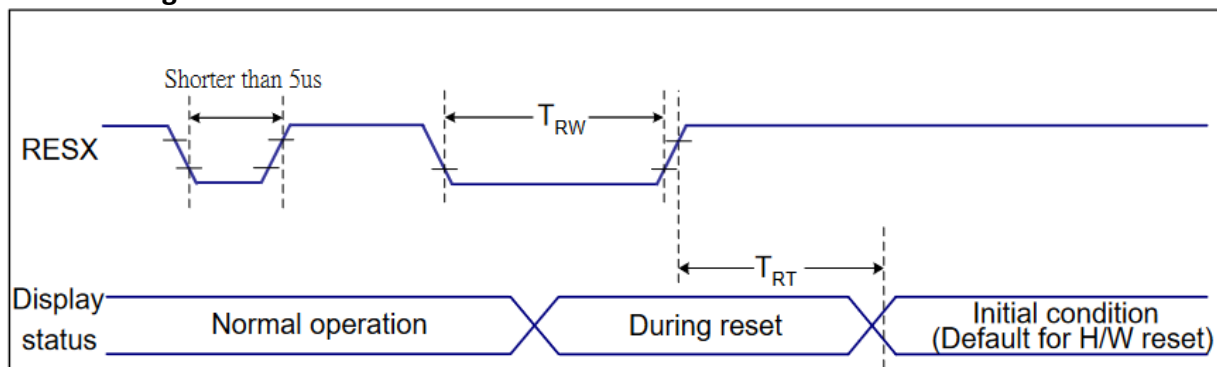
Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNC, VSYNC	T_{SYNCS}	VSYNC, HSYNC Setup Time	5	-	ns	
ENABLE	T_{ENS}	Enable Setup Time	5	-	ns	
	T_{ENH}	Enable Hold Time	5	-	ns	
DOTCLK	$PWDH$	DOTCLK High-level Pulse Width	15	-	ns	
	$PWDL$	DOTCLK Low-level Pulse Width	15	-	ns	
	T_{CYCD}	DOTCLK Cycle Time	33	-	ns	
	T_{rghr}, T_{rgfh}	DOTCLK Rise/Fall time	-	15	ns	
DB	T_{PDS}	PD Data Setup Time	5	-	ns	
	T_{PDH}	PD Data Hold Time	5	-	ns	

4-wire Serial Interface Timing Characteristics



Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	65		ns	
	T_{CHW}	Chip select "H" pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	66		ns	-write command
	T_{SHW}	SCL "H" pulse width (Write)	15		ns	
	T_{SLW}	SCL "L" pulse width (Write)	15		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	-read command
	T_{SHR}	SCL "H" pulse width (Read)	60		ns	
	T_{SLR}	SCL "L" pulse width (Read)	60		ns	
D/CX	T_{DCS}	D/CX setup time	10		ns	
	T_{DCH}	D/CX hold time	10		ns	
SDA (DIN)	T_{SDS}	Data setup time	10		ns	
	T_{SDH}	Data hold time	10		ns	
SDO (DOUT)	T_{ACC}	Access time	20	50	ns	Max: CL=30pF Min: CL=8pF
	T_{OH}	Output disable time	50	50	ns	

Reset Timing



Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120 (Note 1, 6, 7)	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: ±4kV 150pF/330Ω ; Contact: ±2kV 150pF/330Ω 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.