Product Specification

NHD-4.0-480480AF-MSXP-CTP

TFT Liquid Crystal Display

NHD-	Newhaven Display
4.0-	4.0" Diagonal
480480-	480xRGBx480 Pixels
AF-	Model
M-	MIPI Interface
S-	White LED Backlight
X-	TFT
P-	IPS, Wide Temperature
CTP-	Capacitive Touch Panel

REACH
Compliant

RoHS
Compliant

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
-	09/03/2025	Initial Release	KL
1	02/18/2026	Recommended Connector Information Updated	KL

Mechanical Drawing

(Front View)

77.86±0.2 LCM.OD
77.86±0.2 CTP.OD
72.86±0.2 CTP.VA
71.86 LCD.AA
2.45±0.15
(2.95)
2.50±0.15
(3.00)
4*R0.30(CTP)

(0,0)

3.95" TFT
480(RGB)*480
ALL VIEW DIRECTION

81.84±0.2 LCM.OD
81.84±0.2 CTP.OD
71.18±0.2 CTP.VA
70.18 LCD.AA

30.00±0.5 LCM/TP FPC
(9.63)
(3.89)
3.60±0.5

(4.50)

PULL TAPE

Insulation tape
Component Area

10.75±0.5
32.68±0.5
3.50±0.3
0.50±0.1
0.35±0.03
11.50±0.07
12.50±0.1
sh layer)

(Side View)

4.15±0.3 OD
1.40±0.1 CTP
0.30 3M5909
2.45±0.2 LCM

1.2 MAX COMPONENT
1.60 MAX
CONTACT SIDE
STIFFENER
0.30±0.03
STIFFENER
CONTACT SIDE
0.30±0.03

(Back View)

NEWHAVEN DISPLAY
NHD-4.0-480480AF-MSXP-CTP
YYWW

NEWHAVEN DISPLAY
NHD-4.0-480480AF-MSXP_Rev1A
LOT YYWW

480480AF-MSXP
YYWW

(17.61)
(17.61)
Double sides EMI
Component area and stiffener will be covered by yellow insulation tape
Insulation tape
IC
24
1
5.50±0.5
2.70±0.3
1.00±0.1
W=0.70±0.05
P=1.00±0.05
5.00±0.07
7.00±0.1

CIRCUIT DIAGRAM

A
K

TFT

1	LED_K
2	LED_A
3	NC
4	VDD
5	GND
6	DN0
7	DP0
8	GND
9	CN
10	CP
11	GND
12	DN1
13	DP1
14	GND
15	RESETX
16	CSX
17	SCL
18	SDA
19	SDO
20	TE_L
21	IM0
22	IM1
23	IM3
24	LANSEL

CTP

1	VDD
2	GND
3	SCL
4	SDA
5	INT
6	RST
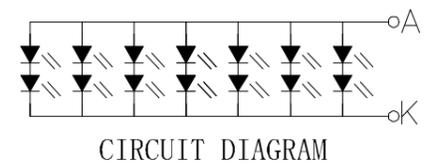
Product Description: 4.0" 480x480 IPS TFT w/ Capacitive Touch

1. Driver IC: ST7701SN TFT, FT5426G CTP

2. Interface: 2-lane MIPI DSI, I²C CTP

3. Power Requirement: 3.3V TFT, 6.1V/140mA Backlight, 3.3V CTP

4. Optical Features: Normally Black, Transmissive, 850cd/m²

5. Recommended FFC Connector:

   TFT: 24pin 0.5mm pitch; Ex. Molex 524352471

   CTP: 6pin 1.0mm pitch; Ex. Molex 52271-0679

6. Key Features: Builit-in EMI Shielding, 10-point Multitouch

Pin Description

TFT:

Pin No.	Symbol	External Connection	Function Description
1	LED_K	Power Supply	Backlight Cathode (Ground)
2	LED_A	Power Supply	Backlight Anode (140mA @ 6.1V)
3	NC	-	No Connect
4	VDD	Power Supply	Supply Voltage for LCD and Logic (3.3V)
5	GND	Power Supply	Ground
6	DN0	MPU	MIPI DSI Differential Data signal
7	DP0	MPU	MIPI DSI Differential Data signal
8	GND	Power Supply	Ground
9	CN	MPU	MIPI DSI Differential clock signal
10	CP	MPU	MIPI DSI Differential clock signal
11	GND	Power Supply	Ground
12	DN1	MPU	MIPI DSI Differential Data signal
13	DP1	MPU	MIPI DSI Differential Data signal
14	GND	Power Supply	Ground
15	RESETX	MPU	Active LOW Reset signal
16	CSX	MPU	Active LOW Chip Select signal
17	SCL	MPU	Serial Clock signal for SPI interface
18	SDA	MPU	Serial Data Input signal for SPI interface
19	SD0	MPU	Serial Data Output signal for SPI interface
20	TE_L	MPU	Tearing Effect Output signal (active low)
21	IM0	MPU	Interface Mode Selection
22	IM1	MPU	Interface Mode Selection
23	IM3	MPU	Interface Mode Selection
24	LANSEL	MPU	Interface Mode Selection

Recommended LCD connector: 24pin 0.5mm pitch FFC; Ex. Molex 524352471

Capacitive Touch Panel:

Pin No.	Symbol	External Connection	Function Description
1	VDD	Power Supply	Supply voltage for Logic (3.3V)
2	GND	Power Supply	Ground
3	SCL	MPU	Serial I2C Clock (Requires 4.7KΩ pull-up resistor)
4	SDA	MPU	Serial I2C Data (Requires 4.7kΩ pull-up resistor)
5	INT	MPU	Interrupt signal from touch panel module to host
6	RST	MPU	Active LOW Reset signal

Recommended connector: 6pin, 1.0mm pitch, FFC connector. Molex P/N 52271-0679

Interface Selection

Pin Name	MIPI DSI	MIPI + 16b_SPI (fall)	MIPI + 16b_SPI (Rise)
IM0	1	0	0
IM1	0	1	1
IM3	0/1	1	0

.

Electrical Characteristics

TFT:

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	3.3	3.6	V
Supply Current	I_{DD}	V_{DD} = 3.3V	-	43	65	mA
"H" Level input	V_{IH}	-	0.7*V_{DD}	-	V_{DD}	V
"L" Level input	V_{IL}	-	V_{SS}	-	0.3*V_{DD}	V
"H" Level output	V_{OH}	-	0.8*V_{DD}	-	V_{DD}	V
"L" Level output	V_{OL}	-	V_{SS}	-	0.2*V_{DD}	V
Backlight Supply Current	I_{LED}	-	117	140	168	mA
Backlight Supply Voltage	V_{LED}	I_{LED} = 140mA	5.4	6.1	6.8	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.

Capacitive Touch Panel:

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}	-	2.7	3.3	3.6	V
Supply Current – Operating	I_{DD}	-	-	15.85	-	mA
"H" Level input	V_{IH}	-	0.7*V_{DD}	-	V_{DD}	V
"L" Level input	V_{IL}	-	V_{SS}	-	0.3*V_{DD}	V
"H" Level output	V_{OH}	-	0.7*V_{DD}	-	V_{DD}	V
"L" Level output	V_{OL}	-	V_{SS}	-	0.3*V_{DD}	V

Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Optimal Viewing Angles	Top	φY+	CR ≥ 10	-	80	-	º
	Bottom	φY-		-	80	-	º
	Left	θX-		-	80	-	º
	Right	θX+		-	80	-	º
Contrast Ratio		CR	-	640	800	-	-
Luminance		L_V	I_{LED} =140mA	595	850	1275	cd/m²
Response Time (Rise + Fall)		$T_R + T_F$	T_{OP} = 25°C	-	25	35	ms
Chromaticity	Red	X_R	-	0.58	0.61	0.64	-
		Y_R	-	0.32	0.35	0.38	-
	Green	X_G	-	0.28	0.31	0.34	-
		Y_G	-	0.55	0.58	0.61	-
	Blue	X_B	-	0.11	0.14	0.17	-
		Y_B	-	0.06	0.09	0.12	-
	White	X_W	-	0.26	0.29	0.32	-
		Y_W	-	0.29	0.32	0.35	-

Driver/Controller Information

TFT Display:

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

Capacitive Touch Panel:

Built-in FT5426G Controller: https://support.newhavendisplay.com/hc/en-us/articles/17688730921367-FT5426G

Recommended Timing Values

Recommended MIPI Timing Values:

HS Total	HFP	HBP	HS Pulse	VS Total	VFP	VBP	VS Pulse	PCLK Freq
790	150	150	10	530	20	20	10	25 MHz

Capacitive Touch Panel Registers

Register No.	Access	Register Name	Bits	Value	Description
01h	RO	Gesture ID	[7:0]	1Ch 14h 10 18 48 49 00	Swipe Up Swipe Down Swipe Left Swipe Right Zoom In Zoom Out No gesture
02h	RO	Touch Points	[7:0]	0-Ah	0: No touch detected A: 10 touch points detected
03h	RO	TOUCH1_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
03h	RO	TOUCH1_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
04h	RO	TOUCH1_XL	[7:0]	00 – FFh	Lower 8 bits of X touch coordinate
05h	RO	TOUCH1_YH	[3:0]	0 -1	Upper 4 bits of Y touch coordinate
06h	RO	TOUCH1_YL	[7:0]	00 – FFh	Lower 8 bits of Y touch coordinate
07h	RO	TOUCH1_Weight	[7:0]		Touch Weight
08h	RO	TOUCH1_Misc	[3:0]	00-0Fh	Touch Area
09h	RO	TOUCH2_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
09h	RO	TOUCH1_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
0Ah	RO	TOUCH2_XL	[7:0]	00 – FFh	Lower 8 bits of X touch coordinate
0Bh	RO	TOUCH2_YH	[3:0]	0 -1	Upper 4 bits of Y touch coordinate
0Ch	RO	TOUCH2_YL	[7:0]	00 – FFh	Lower 8 bits of Y touch coordinate
0Dh	RO	TOUCH2_Weight	[7:0]		Touch Weight
0Eh	RO	TOUCH2_Misc	[3:0]	00-0Fh	Touch Area
0Fh	RO	TOUCH3_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
0Fh	RO	TOUCH3_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
10	RO	TOUCH3_XL	[7:0]	00 – FFh	Lower 8 bits of X touch coordinate
11h	RO	TOUCH3_YH	[3:0]	0 -1	Upper 4 bits of Y touch coordinate
12h	RO	TOUCH3_YL	[7:0]	00 – FFh	Lower 8 bits of Y touch coordinate
13h	RO	TOUCH3_Weight	[7:0]		Touch Weight
14h	RO	TOUCH3_Misc	[3:0]	00-0Fh	Touch Area
15h	RO	TOUCH4_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
15h	RO	TOUCH4_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
16h	RO	TOUCH4_XL	[7:0]	00 – FFh	Lower 8 bits of X touch coordinate
17h	RO	TOUCH4_YH	[3:0]	0 -1	Upper 4 bits of Y touch coordinate
18h	RO	TOUCH4_YL	[7:0]	00 – FFh	Lower 8 bits of Y touch coordinate
1Ah	RO	TOUCH4_Misc	[3:0]	00-0Fh	Touch Area
1Bh	RO	TOUCH5_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved

Register No.	Access	Register Name	Bits	Value	Description
1Bh	RO	TOUCH5_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
1Ch	RO	TOUCH5_XL	[7:0]	00 – FFh	Lower 8 bits of X touch coordinate
1Dh	RO	TOUCH5_YH	[3:0]	0 -1	Upper 4 bits of Y touch coordinate
1Eh	RO	TOUCH5_YL	[7:0]	00 – FFh	Lower 8 bits of Y touch coordinate
1Fh	RO	TOUCH5_Weight	[7:0]		Touch Weight
20	RO	TOUCH5_Misc	[3:0]	00-0Fh	Touch Area
21h	RO	TOUCH6_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
21h	RO	TOUCH6_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
22h	RO	TOUCH6_XL	[7:0]	00 – FFh	Lower 8 bits of X touch coordinate
23h	RO	TOUCH6_YH	[3:0]	0 -1	Upper 4 bits of Y touch coordinate
24h	RO	TOUCH6_YL	[7:0]	00 – FFh	Lower 8 bits of Y touch coordinate
25h	RO	TOUCH6_Weight	[7:0]		Touch Weight
26h	RO	TOUCH6_Misc	[3:0]	00-0Fh	Touch Area
27h	RO	TOUCH7_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
27h	RO	TOUCH7_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
28h	RO	TOUCH7_XL	[7:0]	00 – FFh	Lower 8 bits of X touch coordinate
29h	RO	TOUCH7_YH	[3:0]	0 – 1	Upper 4 bits of Y touch coordinate
2Ah	RO	TOUCH7_YL	[7:0]	00 – FFh	Lower 8 bits of Y touch coordinate
2Bh	RO	TOUCH7_Weight	[7:0]		Touch Weight
2Ch	RO	TOUCH7_Misc	[3:0]	00-0Fh	Touch Area
2Dh	RO	TOUCH8_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
2Dh	RO	TOUCH8_XH	[3:0]	0 – 1	Upper 4 bits of X touch coordinate
2Eh	RO	TOUCH8_XL	[7:0]	00 – FFh	Lower 8 bits of X touch coordinate
2Fh	RO	TOUCH8_YH	[3:0]	0 – 1	Upper 4 bits of Y touch coordinate
30	RO	TOUCH8_YL	[7:0]	00 – FFh	Lower 8 bits of Y touch coordinate
31h	RO	TOUCH8_Weight	[7:0]		Touch Weight
32h	RO	TOUCH8_Misc	[3:0]	00-0Fh	Touch Area
33h	RO	TOUCH9_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
33h	RO	TOUCH9_XH	[3:0]	0 – 1	Upper 4 bits of X touch coordinate
34h	RO	TOUCH9_XL	[7:0]	00 – FFh	Lower 8 bits of X touch coordinate
35h	RO	TOUCH9_YH	[3:0]	0 – 1	Upper 4 bits of Y touch coordinate
36h	RO	TOUCH9_YL	[7:0]	00 – FFh	Lower 8 bits of Y touch coordinate
37h	RO	TOUCH9_Weight	[7:0]		Touch Weight
38h	RO	TOUCH9_Misc	[3:0]	00 – 0Fh	Touch Area
39h	RO	TOUCH10_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
39h	RO	TOUCH10_XH	[3:0]	0 – 1	Upper 4 bits of X touch coordinate
3Ah	RO	TOUCH10_XL	[7:0]	00 – FFh	Lower 8 bits of X touch coordinate
3Bh	RO	TOUCH10_YH	[3:0]	0 – 1	Upper 4 bits of Y touch coordinate
3Ch	RO	TOUCH10_YL	[7:0]	00 - FFh	Lower 8 bits of Y touch coordinate

Register No.	Access	Register Name	Bits	Value	Description
3Dh	RO	TOUCH10_Weight	[7:0]	00-FFh	Touch Weight
3Eh	RO	TOUCH10_Misc	[3:0]	00-0Fh	Touch Area
A1h	RO	ID_G_LIB_VERSION_H	[7:0]	00-FFh	App library version high-byte Default: 0
A2h	RO	ID_G_LIB_VERSION_L	[7:0]	00-FFh	App library version low-byte Default: 1h
A3h	RO	ID_G_CHIPER_HIGH	[7:0]	00-FFh	Chip Vendor ID Default: 54
A6h	RO	ID_G_FIRMID	[7:0]	00-FFh	Firmware ID Number Default: 2
A8h	RO	ID_G_VENODRID	[7:0]	00-FFh	CTPM Vendor's Chip ID Default: 79h

Timing Characteristics- TFT

MIPI DSI Interface Characteristics

High Speed Mode
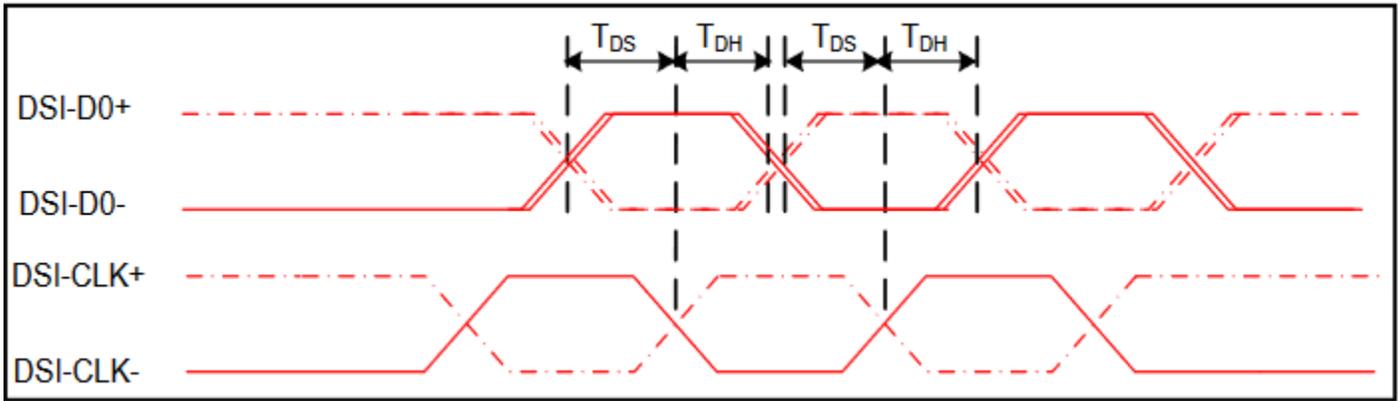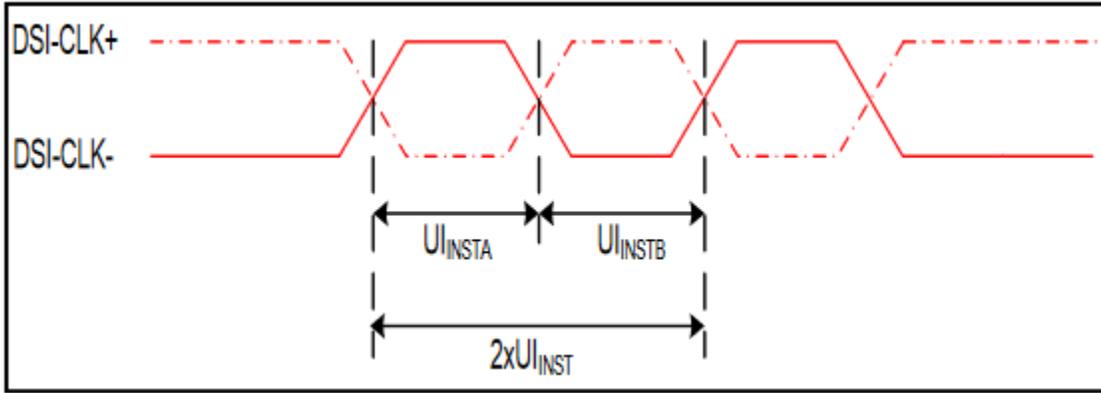
DSI timing characteristics

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-CLK+/-	$2\times UI_{INSTA}$	Double UI instantaneous	2.5	25	ns	
DSI-CLK+/-	UI_{INSTA} UI_{INSTB}	UI instantaneous halfs	1.25	12.5	ns	$UI = UI_{INSTA} = UI_{INSTB}$
DSI-Dn+/-	tDS	Data to clock setup time	0.15	-	UI	
DSI-Dn+/-	tDH	Data to clock hold time	0.15	-	UI	

Table 7 Mipi Interface- High Speed Mode Timing Characteristics

Low Power Mode
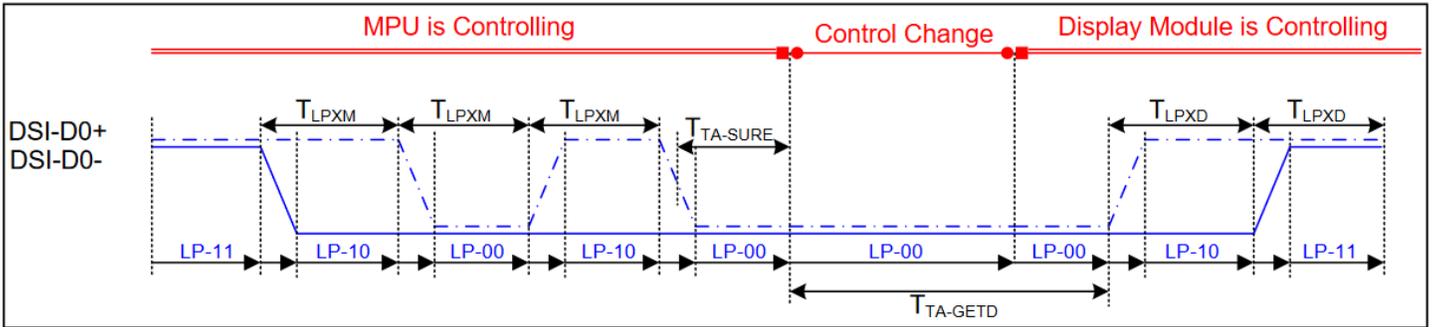
Figure 6 Bus Turnaround (BTA) from display module to MPU Timing
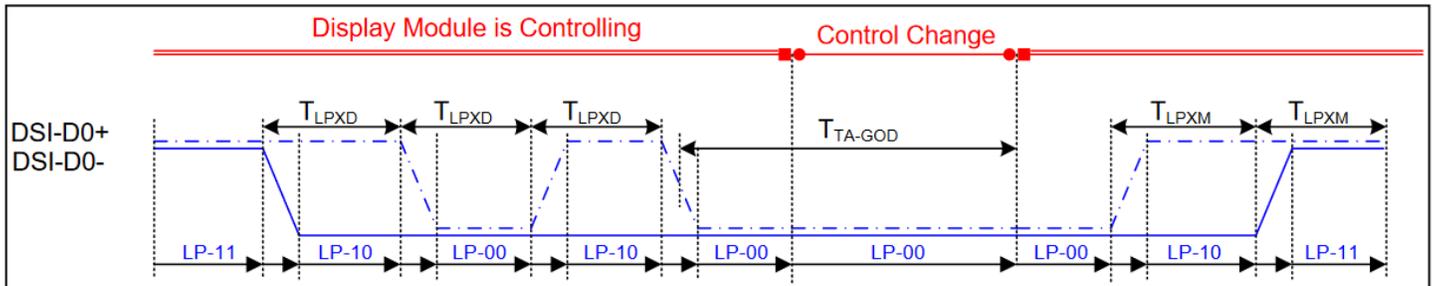
Figure 7 Bus Turnaround (BTA) from MPU to display module Timing

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-D0+/-	TLPXM	Length of LP-00,LP-01, LP-10 or LP-11 periods MPU→Display Module	50	75	ns	Input
DSI-D0+/-	TLPXD	Length of LP-00,LP-01, LP-10 or LP-11 periods MPU→Display Module	50	75	ns	Output
DSI-D0+/-	TTA-SURED	Time-out before the MPU start driving	T_{LPXD}	$2xT_{LPXD}$	ns	Output
DSI-D0+/-	TTA-GETD	Time to drive LP-00 by display module	$5xT_{LPXD}$		ns	Input
DSI-D0+/-	TTA-GOD	Time to drive LP-00 after turnaround request-MPU	$4xT_{LPXD}$		ns	Output

Table 8 Mipi Interface Low Power Mode Timing Characteristics

DSI Burst Mode
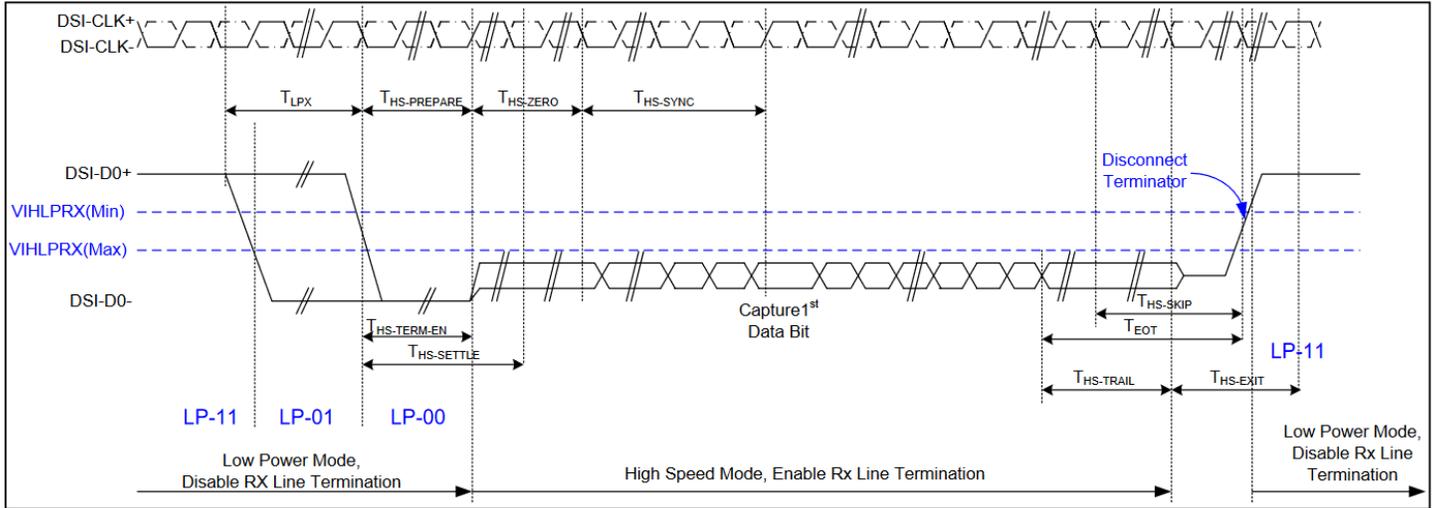
Figure 7 Data lanes-Low Power Mode to/from High Speed Mode Timing

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
Low Power Mode to High Speed Mode Timing						
DSI-Dn+/-	TLPX	Length of any low power state period	50	-	ns	Input
DSI-Dn+/-	THS-PREPARE	Time to drive LP-00 to prepare for HS transmission	40+4 UI	85+6 UI	ns	Input
DSI-Dn+/-	THS-TERM-EN	Time to enable data receiver line termination measured from when Dn crosses VILMAX	-	35+4 UI	ns	Input
DSI-Dn+/-	THS-PREPARE + THS-ZERO	THS-PREPARE + time to drive HS-0 before the sync sequence	140+ 10UI	-	ns	Input
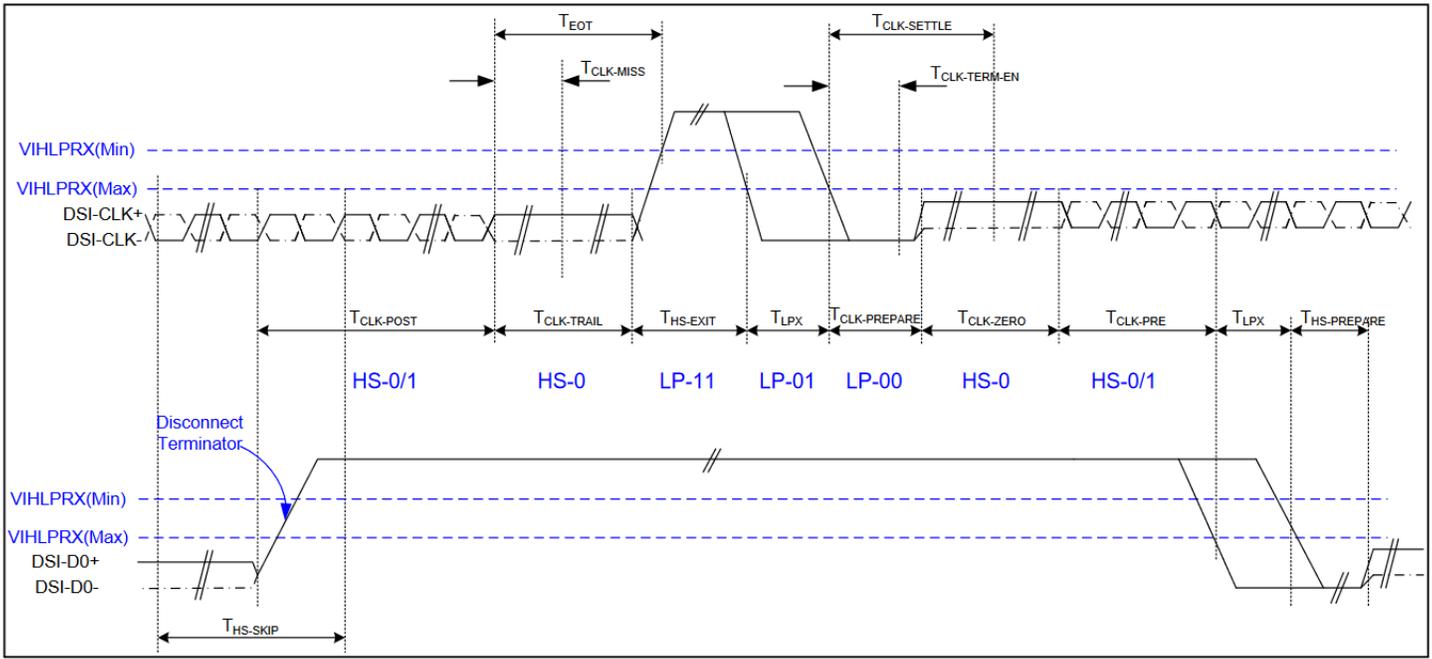
Figure 8 Clock lanes- High Speed Mode to/from Low Power Mode Timing

| High Speed Mode to/from Low Power Mode Timing						
DSI-CLK+/-	TCLK-POS	Time that the MPU shall continue sending HS clock after the last associated data lane has transition to LP mode	60+5 2UI	-	ns	Input
DSI-CLK+/-	TCLK-TRAIL	Time to drive HS differential state after last payload clock bit of a HS transmission burst	60	-	ns	Input
DSI-CLK+/-	THS-EXIT	Time to drive LP-11 after HS burst	100	-	ns	Input
DSI-CLK+/-	TCLK-PREPARE	Time to drive LP-00 to prepare for HS transmission	38	95	ns	Input
DSI-CLK+/-	TCLK-TERM-EN	Time-out at clock lan display module to enable HS transmission	--	38	ns	Input
DSI-CLK+/-	TCLK-PREPARE + TCLK-ZERO	Minimum lead HS-0 drive period before starting clock	300	-	ns	Input
DSI-CLK+/-	TCLK-PRE	Time that the HS clock shall be driven prior to any associated data lane beginning the transition from LP to HS mode	8UI	-	ns	Input
DSI-CLK+/-	TEOT	Time form start of TCLK-TRAIL period to start of LP-11 state	-	105ns+12 UI	ns	Input

Reset Input Timing
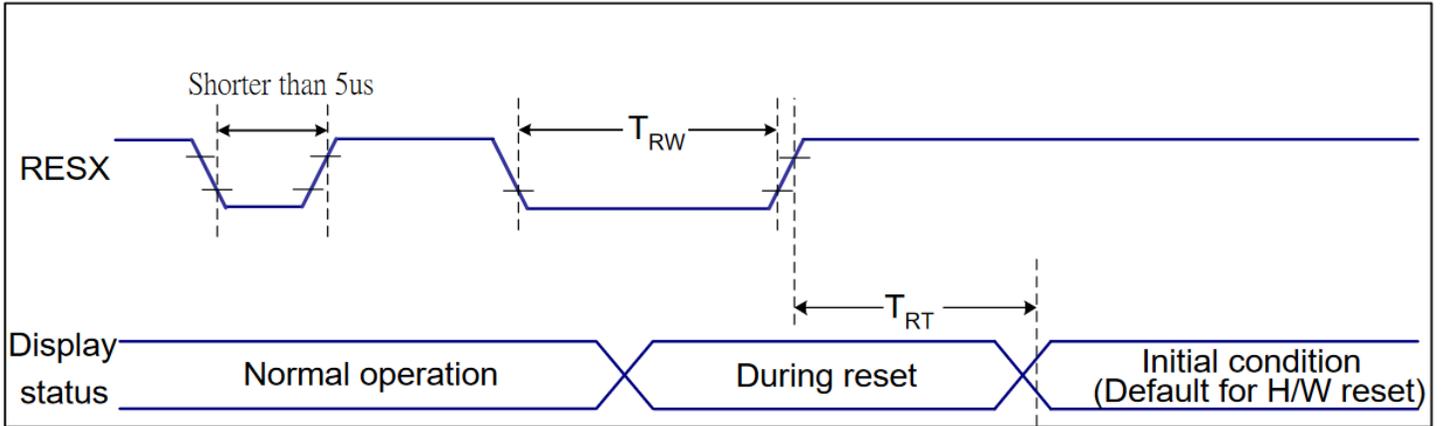
Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120(Note 1, 6, 7)	ms

Timing Characteristics- Capacitive Touch Panel

Data Transfer Format
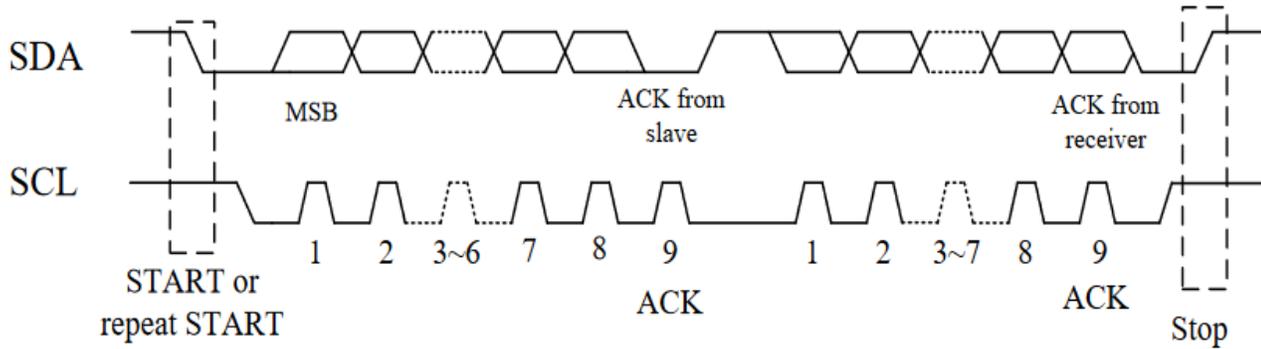
Parameter	Min	Max	Unit
SCL frequency	0	400	KHz
Bus free time between a STOP and START condition	1.3		us
Hold time (repeated) START condition	0.6		us
Data setup time	100		ns
Setup time for a repeated START condition	0.6		us
Setup Time for STOP condition	0.6		us
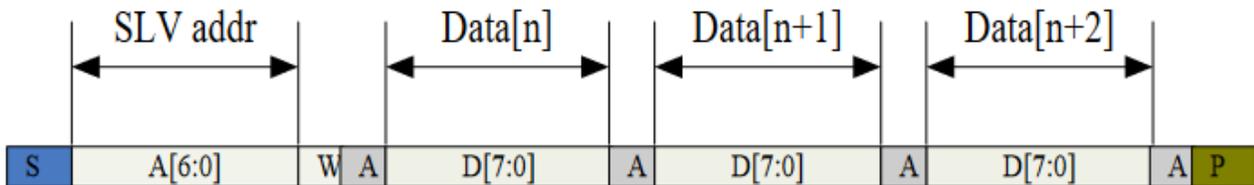
Figure 2-5 I2C master write, slave read
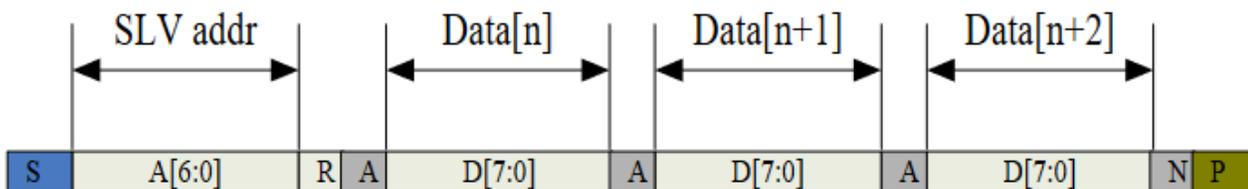
Figure 2-6 I2C master read, slave write
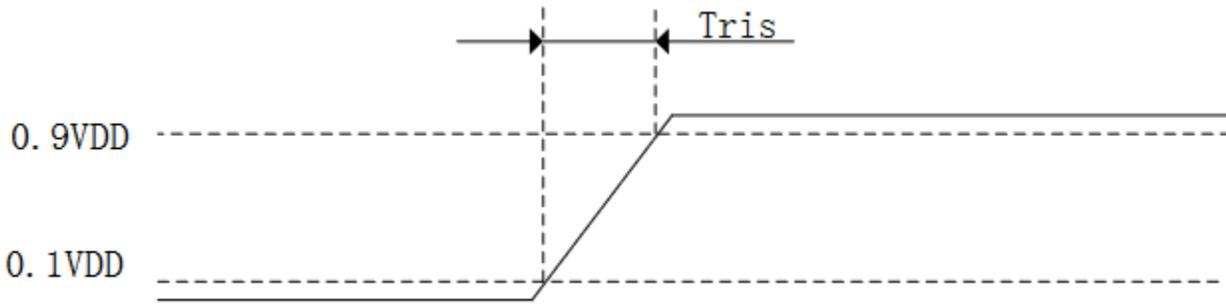
Power ON/Reset Sequence

Figure 3-3 Power on time
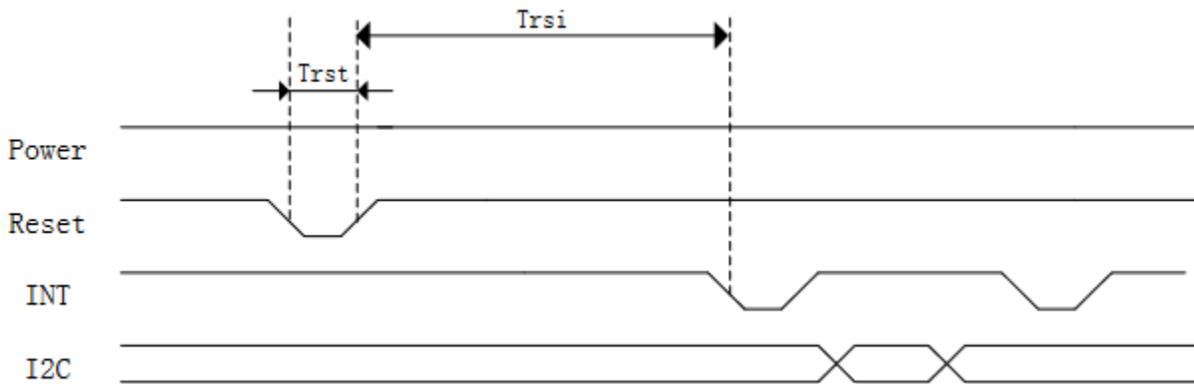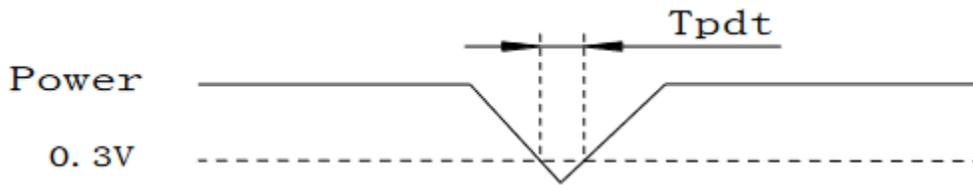
Parameter	Description	Min	Max	Units
Tris	Rise time from 0.1VDD to 0.9VDD	--	5	ms
Tpdt	Time of the voltage of supply being below 0.3V	5	--	ms
Trtp	Time of resetting to be low before powering on	100	--	µs
Tivd	Delay time of VDD powering on after IOVCC	10		µs
Tvdr	Reset time after VDD powering on	1	--	ms
Trsi	Time of starting to report point after resetting	200	--	ms
Trst	Reset time	1	--	ms

Sample code to read touch data:

```
i2c_start();
i2c_tx(0x70);           //Slave Address (Write)
i2c_tx(0x00);           //Start reading address
i2c_stop();

i2c_start();
i2c_tx(0x71);           //Slave Address (Read)
for(i=0x00;i<0x1F;i++)
{touchdata_buffer[i] = i2c_rx(1);}
i2c_stop();
```

Sample code to overwrite default register values:

```
i2c_start();
i2c_tx(0x70);           //Slave Address (Write)
i2c_tx(0xA4);           //ID_G_Mode
i2c_tx(0x01);           //Disable interrupt status to host
```

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% 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,10min -> 80°C,30min 10 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	Frequency range:250r/min Amplitude: 1 inch Time: 45min	3
Static electricity test	Endurance test applying electric static discharge.	Air: Vs=±8kV 10 Times	
		Contact: Vs= ±4kV 10 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.