深圳显旸光电科技有限公司

Shenzhen Xianyang Optoelectronic Technology Co., Ltd

LCD MODULE SPECIFICATION

Customer: _____

Module No.: XY043BSH9041-A0

Date: 2021-09-27

Version: 1.0

For Customer's Acceptance:

Approved by	Comment

Approved by	Checked by	Prepared by

Table of Contents

Record of Revision

Rev.	Date	Description	Editor
1.0	2021-09-27	First release	Yang

3. GENERAL DESCRIPTION:

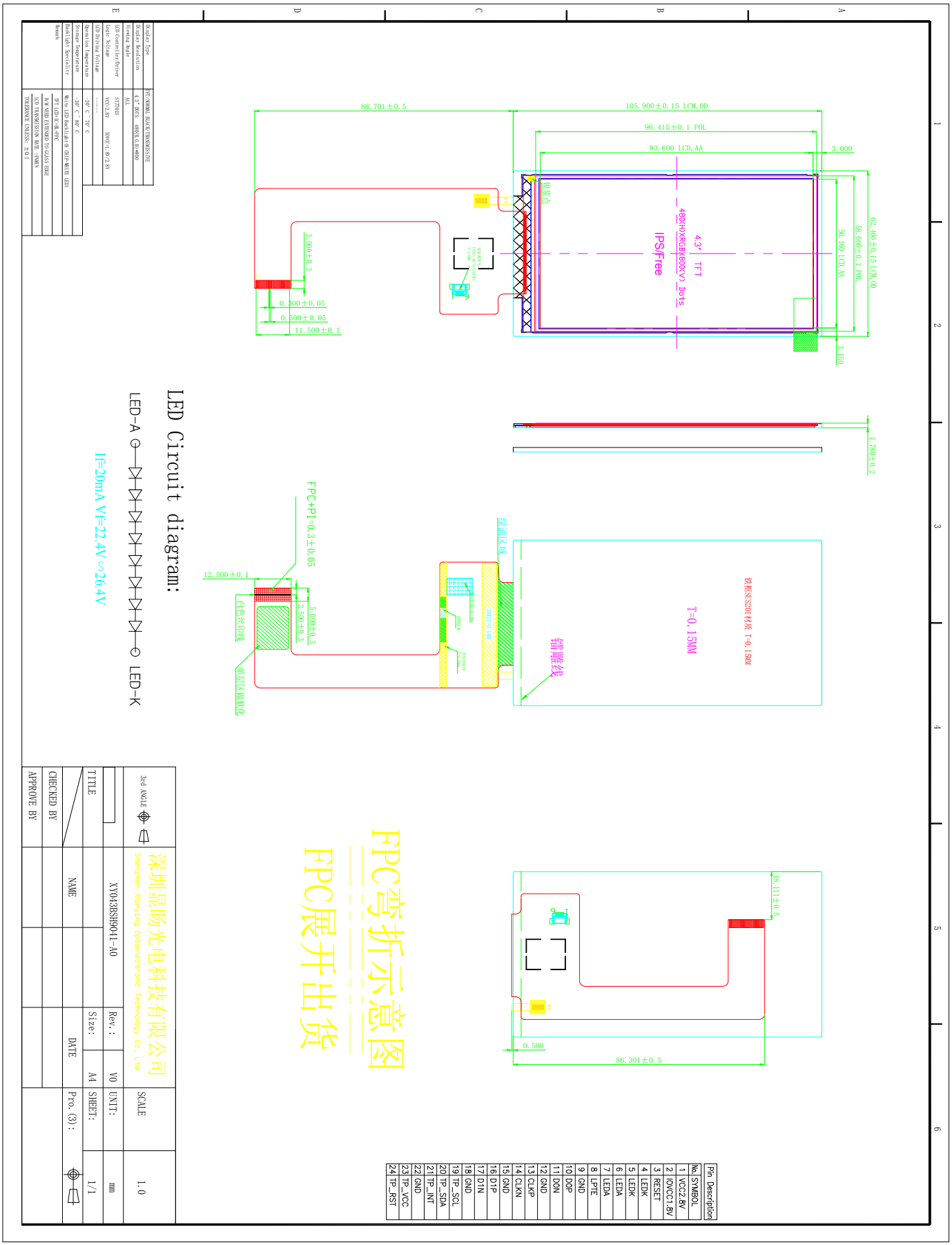
- 4.3”(diagonal), 480 x3 RGB x800 dots, 16.7M colors, Transmissive, TFT LCD module.
- Viewing Direction: ALL.
- Driving IC:ST7701S
- MIPI Interface
- Logic voltage: 2.8V (typ.).
- With touch panel.

4. MECHANICAL SPECIFICATIONS:

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below. Table 1

Parameter		Specifications	Unit
主屏 Color TFT 480xRGBx800	Outline dimensions	102.46 (W) x126.5(H) x 3.83 (D)	mm
	TP view area	56.76*94.2	mm
	LCM Outline dimensions	62.46(W)*105.9(H)*1.78(D)	mm
	LCD active area	56.16(W) x 93.6(H)	mm
	Display format	480 x3 RGB x 800	dots
	Color configuration	RGB stripes	-
	Pxiel pitch	0.039 x 0.117	mm
Weight		TBD	grams

5.DIMENSIONAL OUTLINE:



6. PIN DESCRIPTION:

NO.	PIN NAME	Description
1	VCC	Power supply
2	IOVCC	Power Supply for I/O System.
3	RESET	This signal will reset the device and it must be applied to properly initialize the chip.
4	LEDK	LED Cathode
5	LEDK	LED Cathode
6	LED-A	LED Anode
7	LED-A	LED Anode
8	LPTE	Tearing effect signal is used to synchronize MCU to frame memory
9	GND	Ground
10	D0P	MIPI DSI differential data pair.
11	D0N	MIPI DSI differential data pair.
12	GND	Ground
13	CLKP	MIPI DSI differential clock pair.
14	CLKN	MIPI DSI differential clock pair.
15	GND	Ground
16	D1P	MIPI DSI differential data pair.
17	D1N	MIPI DSI differential data pair.
18	GND	Ground
19	TP_SCL	TP Pin
20	TP_SDA	TP Pin
21	TP_INT	TP Pin
22	GND	Ground
23	TP_VCC	TP Pin
24	TP_RST	TP Pin

7. MAXIMUM ABSOLTE LIMIT:

Item	Symbol	Value	Unit
Power supply voltage for logic	V_{DD}	1.6~3.3	V
Input voltage	Vin	V_{DD}+0.3	V
Operating temperature	Topr	-20 to 70	。C
Storage temperature	Tstg	-30 to 80	。C

Note: Note1: Absolute maximum rating is the limit value beyond which the IC maybe broken. They do not assure operations.

Note2: Background color changes slightly depending on ambient temperature. This Phenomenon is reversible.

Ta≦70℃: 75%RH max

Ta>70℃: absolute humidity must be lower than the humidity of75%RH at 70℃ Note3: Ta at -30℃ will be <48hrs, at 80 ℃ will be <120hrs

7. ELECTRICAL CHARACTERISTICS

7-1 DC Characteristics (V_{DD}=2.8V,Ta=25。C)

Item	Symbol	Min	Type	Max	Unit	Test condition
Operating voltage	V_{DD}	2.6	2.8	3.3	V	-
Supply current	I_{DD}	-	-	5	mA	V_{DD}=2.8V,Ta=25。C
Input voltage	V_{IH}	0.8VDD	-	VDD	V	-
	V_{IL}	0	-	0.2VDD	V	
Input leakage current	I_{IL}	-1.0	-	1.0	μA	V_{IN}=V_{DD} or V_{SS}

Note: Voltage greater than above may damage the module.

All voltages are specified relative to V_{SS}=0V.

7-2 Backlight Electrical-optical Characteristics

1. Stander Lamp Styles (Edge Lighting Type):

The LED chips are distributed over the edge light area of the illumination unit, which gives the less power consumption:

2. The Main Advantages of the LED Backlight are as following:

2.1 The brightness of the backlight can simply be adjusted by a resistor or a potentiometer.

3. Data About LED Backlight:

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition	Note
Supply Voltage	Vf	**22.4**	**24**	**26.4**	V	If=20 mA	-
Supply Current	If	-	**20**	-	mA	-	-
Reverse Voltage	Vr	-	-	5	V	-	
Power dissipation	Pd	-	288	-	mW	-	
Luminous Intensity for LCM	-	-	400	-	Cd/m²	If=20mA	-
Uniformity for LCM	-	80	-	-	%	If=20 mA	-
Backlight Color	White						

NOTE:

1. Uniformity = Min/Max * 100%
2. LED life time defined as follows:
   The final brightness is at 70% of original brightness; Measured Method: (X*Y: Light Area);

8. AC CHARACTERISTICS (V_{DD}=2.8V, TA=25。C)

8.5.4 MIPI Interface Characteristics:

8.5.4.1 High Speed Mode

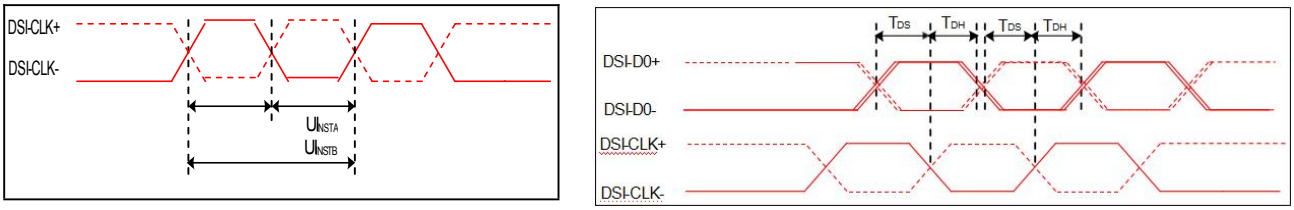


Figure 4 DSI clock channel timing

Figure 5 Rising and falling time on clock and data channel

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-CLK+/-	2xUIINSTA	Double UI instantaneous	4	25	ns	
DSI-CLK+/-	UIINSTA UIINSTB	UI instantaneous halfs	2	12.5	ns	UI = UIINSTA= UIINSTB
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

8.5.4.2 Lowe Power Mode

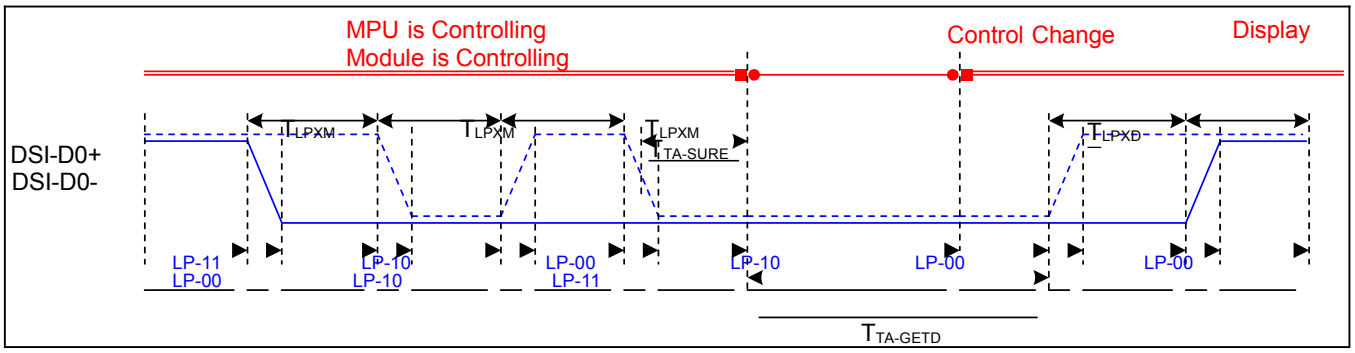


Figure 6 Bus Turnaround (BTA) from display module to MPU Timing

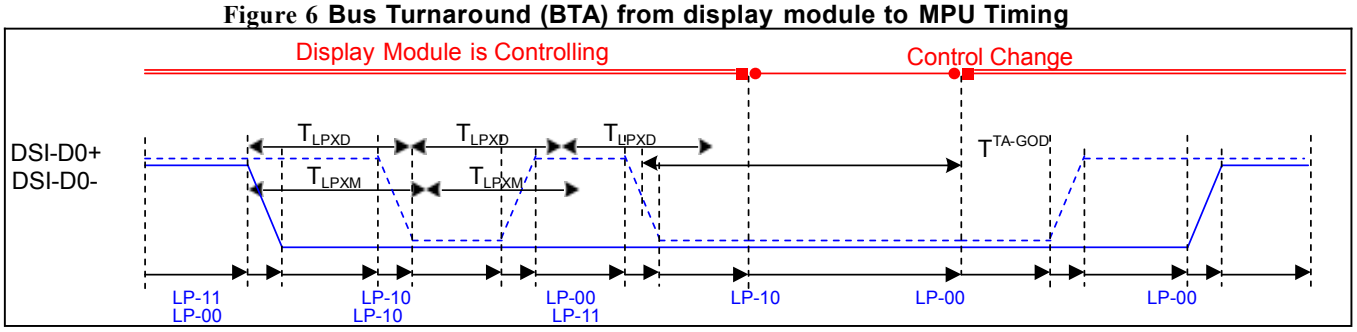


Figure 7 Bus Turnaround (BTA) from MPU to display module Timing

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

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

8.5.4.3 DSI Bursts Mode

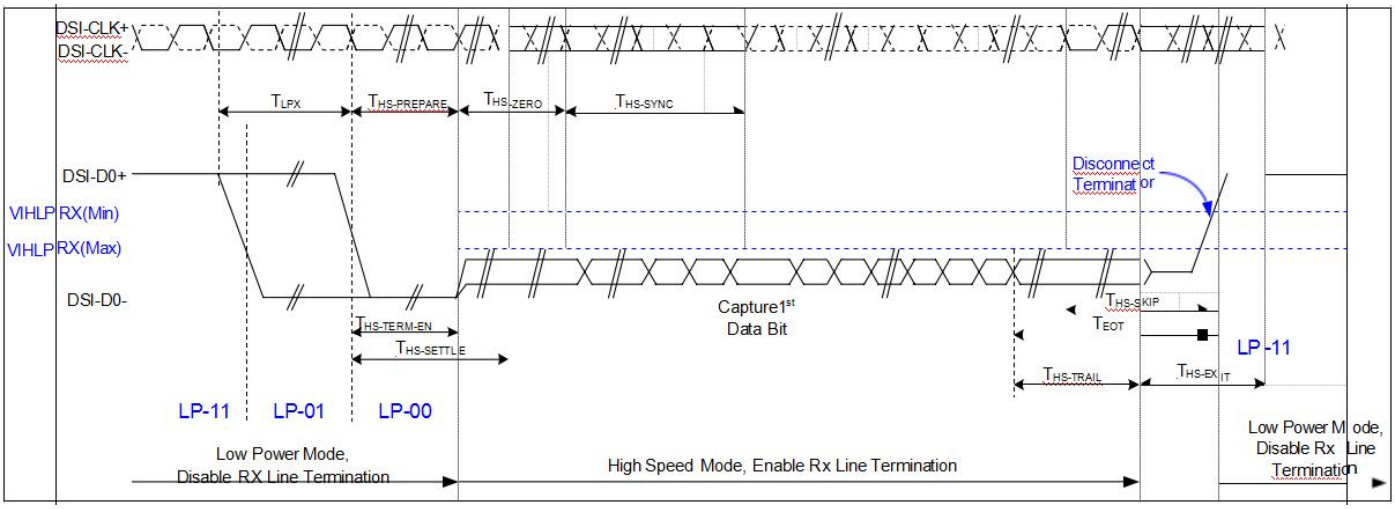


Figure 7 Data lanes-Low Power Mode to/from High Speed Mode Timing

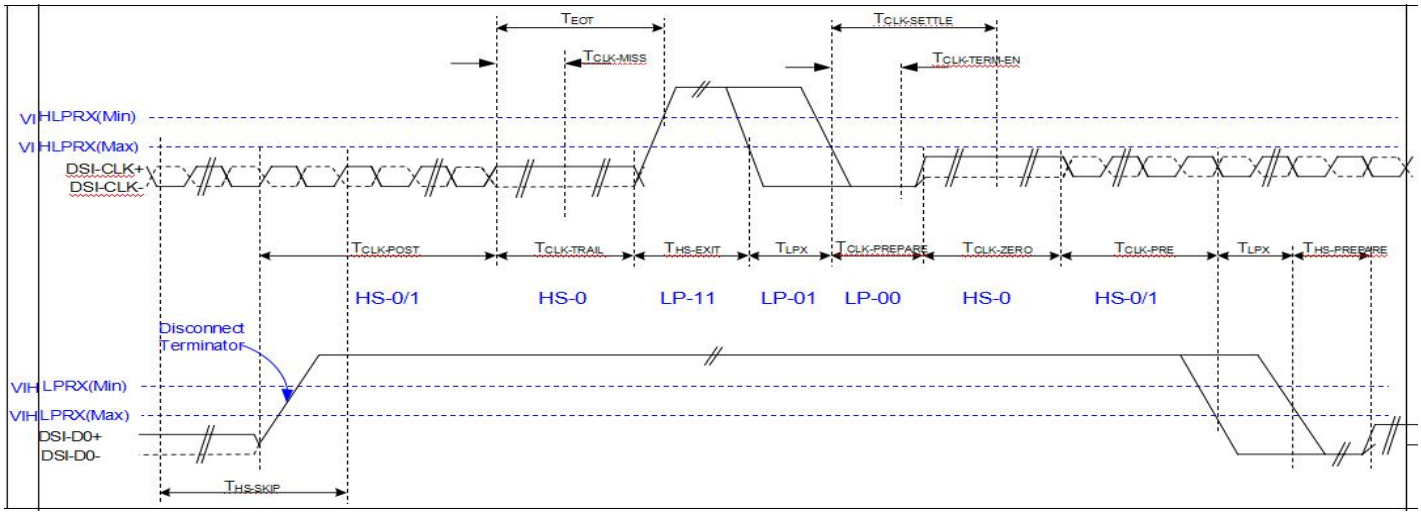


Figure 8 Clock lanes- High Speed Mode to/from Low Power Mode Timing

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
Low Power Mode to High Speed Mode Timing						
DSI-Dn+/-	TL PX	Le pe ngth of any low power state riod	50			Input
DSI-Dn+/-	TH S-PREPARE	Time to drive LP-00 to prepare for HS transmission	40 +4 UI	85+6 UI		Input
DSI-Dn+/-	TH S-TERM-EN	Time to enable data lin receiver e termination when measured from Dn crosses VILMAX	-	35+4		Input
DSI-Dn+/-	TH S-PREPARE T-THS-ZERO	THS-PREPARE + time to drive HS-0 before the sync sequence	140+ 10 UI			Input
High Speed Mode to Low Power Mode Timing						
DSI-Dn+/-	TH S-SKIP	Time -out at display module to ig nore transition period of EoT	40	55+4		Input
DSI-Dn+/-	TH S-EXIT	Time to drive LP-11 after HS b urst	100			Input
DSI-Dn+/-	TH S-TRAIL	Time to drive flipped differential state after last payload data bit of a HS transmission burst	60 +4 UI			Input
High Speed Mode to/from Low Power Mode Timing						
DSI-CLK+/-	TC LK-POS	Time that the MPU shall co ntinue sending HS clock after the last associated data lane has transition to LP mode	60 +5 2UI			Input
DSI-CLK+/-	TC LK-TRAIL	Time to drive HS differential state after last payload clock bit of a HS transmission burst	60			Input
DSI-CLK+/-	TH S-EXIT	Time to drive LP-11 after HS burst	100			Input
DSI-CLK+/-	TC LK-PREPARE	Time to drive LP-00 to prepare for HS transmission	38			Input
DSI-CLK+/-	TC LK-TERM-EN	Time -out at clock lan display m odule to enable HS tra nsmission	--			Input
DSI-CLK+/-	LK-PREPARE TCLK-ZERO	Mi pe nimum lead HS-0 drive riod before starting clock	300			Input
DSI-CLK+/-	TC LK-PRE	Time that the HS clock shall be dr iven prior to any associated data lane beginning the transition from LP to HS mode	8UI			Input
DSI-CLK+/-	TE OT	Ti me form start of TCLK-TRAIL period to start of LP-11 state	-	105n s+12		Input

8.5.5 Reset Timing:

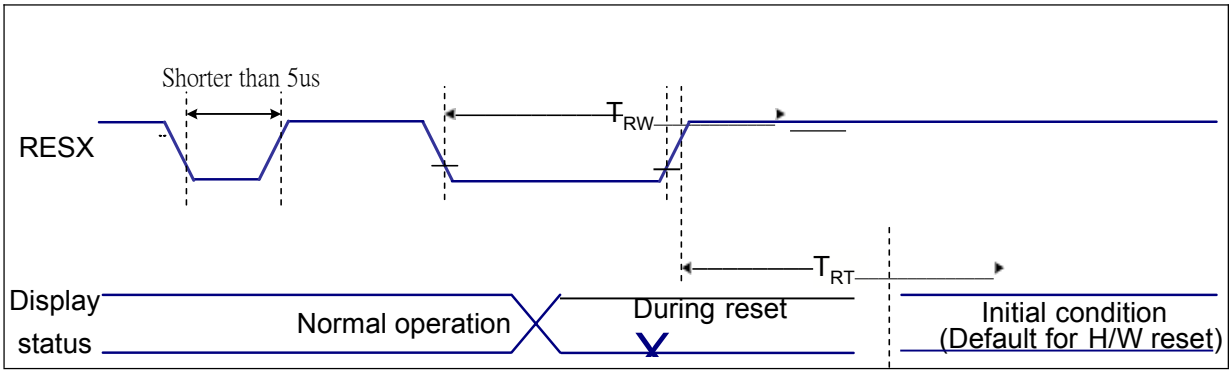


Figure 9 Reset Timing

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

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

Table 9 Reset Timing

Notes:

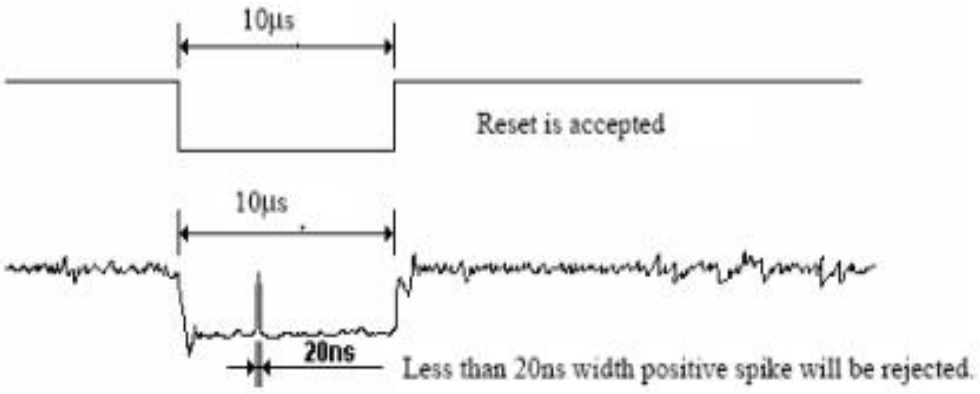
1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out -mode. The display remains the blank state in Sleep In -mode.) and then return to Default condition for Hardware Reset.

4. Spike Rejection also applies during a valid reset pulse as shown below:



5. When Reset applied during Sleep In Mode.

6. When Reset applied during Sleep Out Mode.

7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

9. OPTICAL CHARACTERISTICS:

<Table 4. Optical Specifications >

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	Θ3	CR>10	70	80	-	Deg.	Note1
		Θ9		70	80	-	Deg.	
	Vertical	Θ12		70	80	-	Deg.	
		Θ6		70	80	-	Deg.	
Contrast ratio		CR	Θ = 0。	1000	1500	-		Note2
Transmittance		Tr		3.7	4.3		%	Note3
Color Gamut		CG		65	70		%	
Reproduction of color	Red	Rx	Θ = 0。	0.63	0.645	0.66		Note4 (Based on C Light)
		Ry		0.304	0.319	0.334		
	Green	Gx		0.256	0.271	0.286		
		Gy		0.579	0.594	0.609		
	Blue	Bx		0.123	0.138	0.153		
		By		0.083	0.098	0.113		

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
White Chromaticity	Wx	Θ = 0°	0.284	0.299	0.314		
	Wy		0.309	0.324	0.339		
Response Time (Rising + Falling)	$T_r + T_f$	Ta= 25° C Θ = 0°		35	40	ms	Note 5

Note:

1.Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o' clock direction and the vertical or 6, 12 o' clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2.Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGUR 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3.Transmittance is the Value without APF and without CG.

4.The color chromaticity coordinates specified in the above table shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

5.The electro-optical response time measurements shall be made as FIGURE 2 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Tf.

Figure1 Measurement Set Up

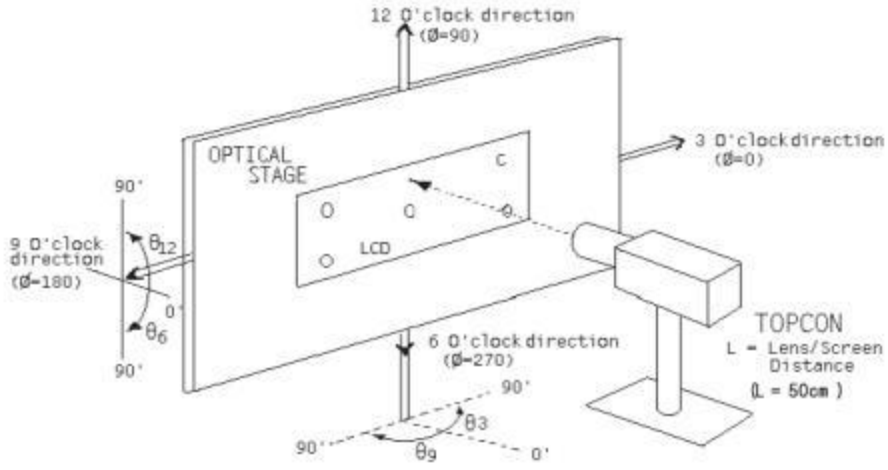
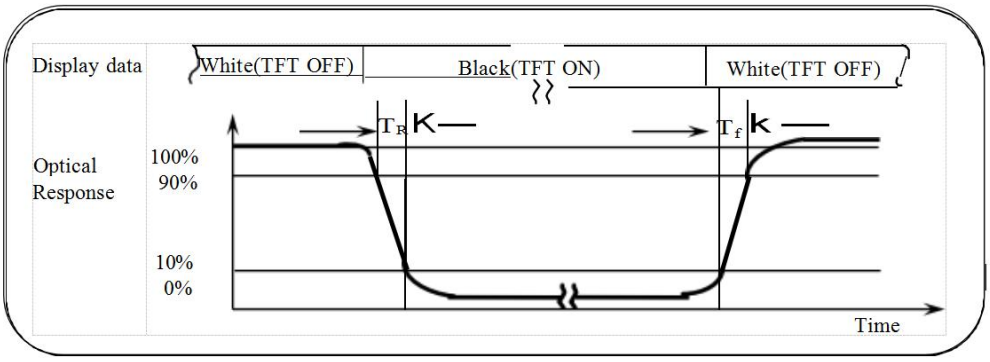


Figure2 Response Time Testing



10. STANDARD SPECIFICATION FOR RELIABILITY:

Item	Condition	Time (hrs)	Assessment
High temp. Storage	80。C	120	No abnormalities in functions and appearance
High temp. Operating	70。C	120	
Low temp. Storage	-30。C	120	
Low temp. Operating	-20。C	120	
Humidity	40。C/ 90%RH	120	
Thermal Shock Temp. Cycle	-20。C ←25。C →70。C (0.5 hour ← 5 min → 0.5 hour)	10cycles	

Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (25±10℃), normal humidity (45±20% RH), and in area not exposed to direct sun light. (Life time of backlight, please refer to Data about backlight.)

Testing Conditions and Inspection Criteria:

For the final test the testing sample must be stored at room temperature for 24 hours, after the tests listed in up Table, Standard specifications for Reliability have been executed in order to ensure stability.

Item	Test Model	In section Criteria
Current Consumption	Refer To Specification	The current consumption should conform to the product specification.
Contrast	Refer To Specification	After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests.
Appearance	Visual inspection	Defect free.

11. GENERAL PRECAUTIONS

(1) Mounting Method

The panel of the LCD Module consists of two thin glass plates with polarizers which easily get damaged since the Module is fixed by utilizing fitting holes in the printed circuit board. Extreme care should be taken when handling

the LCD Modules.

(2) Caution ofLCD handling & cleaning

When cleaning the display surface, use soft cloth with solvent (recommended below) and wipe lightly.

- Isopropyl alcohol
- Ethyl alcohol
- Trichlorotrifloroethane

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface. Do not use the following solvent:

- Water
- Ketone
- Aromatics

(3) Caution against static charge

The LCD Module use C-MOS LSI drivers, so we recommend that you connect any unused input terminal to VDD or VSS, do not input any signals before power is turned on. And ground your body, Work/assembly table. And assembly

equipment to protect against static electricity.

(4) Packaging

Modules use LCD elements, and must be treated as such. Avoid intense shock and falls from a height.

- To prevent modules from degradation. Do not operate or store them exposed directly to sunshine or high temperature/humidity.

(5) Caution for operation

- It is indispensable to drive LCD's within the specified voltage limit since the higher voltage than the limit shorten LCD life. An electrochemical reaction due to direct current causes

  LCD deterioration, Avoid the use of direct current drive.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them.

However those phenomena do not mean malfunction or out of order with LCD's which will

come back in the specified operating temperature range.

- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.

- As light dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the relative condition of40。C, 50%RH or less is required.

(6) Storage

In the case of storing for a long period of time (for instance, for years) for the purpose or replacement use, The following ways are recommended.

- Storage in a polyethylene bag with sealed so as not to enter fresh air outside in it, And with no desiccant.

- Placing in a dark place where neither exposure to direct sunlight nor light is. Keeping temperature in the specified storage temperature range.

- Storing with no touch on polarizer surface by the anything else. (It is recommended to store them as they have been contained in the inner container at the time of delivery)

(7) Safety

- It is recommendable to crash damaged or unnecessary LCD into pieces and wash off liquid crystal by using solvents such as acetone and ethanol which should be burned up later.

- When any liquid crystal leaked out of a damaged glass cell comes in contact with your hands, please washit off well with soap and water.

- END -