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TFT | CHARACTER | UWVD | FSC | SEGMENT | CUSTOM | REPLACEMENT

TFT Display Module

Part Number

E80RA-I-MS400-C

- 8.0-inch TFT: 800x1280 (107x172)
- 16/18/24-bit RGB Interface
- 3.3V
- CTP I2C Interface
- White LED back-light
- Transmissive/ Normally Black
- Capacitive Touch Screen
- 400 NITS
- Controllers: ILI9881C
- RoHS Compliant

Description

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Features

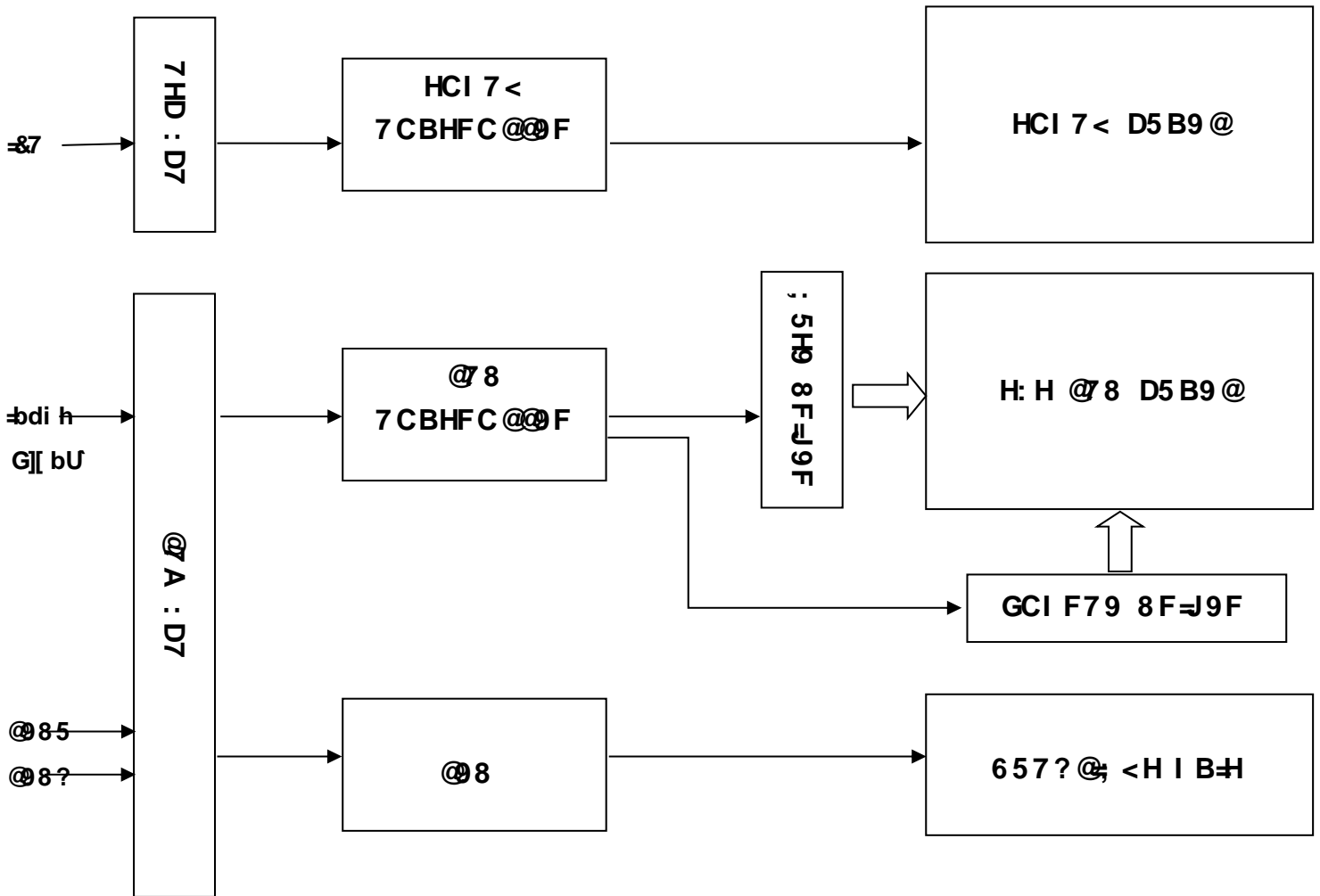
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Mechanical Information

Item		Min	Typ.	Max	Unit	Note
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1. Block Diagram



3. Input Terminal Pin Assignment

3.1 TFT

NO.	SYMBOL	DESCRIPTION	I/O
1	NC	No connected	
2	IOVCC	A power supply for the I/O circuit.	P
3	VCI	A power supply for DC/DC circuit.	P
4	GND	Ground	P
5	RESET	Device reset signal.	I
6	NC	No connected	--
7	GND	Ground	P
8	MIPI_ON	MIPI Negative data signal (-)	I/O
9	MIPI_OP	MIPI Positive data signal (+)	I/O
10	GND	Ground	P
11	MIPI_1N	MIPI Negative data signal (-)	I/O
12	MIPI_1P	MIPI Positive data signal (+)	I/O
13	GND	Ground	P
14	MIPI_CKN	MIPI Negative clock signal (-)	I/O
15	MIPI_CKP	MIPI Positive clock signal (+)	I/O
16	GND	Ground	P
17	MIPI_2N	MIPI Negative data signal (-)	I/O
18	MIPI_2P	MIPI Positive data signal (+)	I/O
19	GND	Ground	P
20	MIPI_3N	MIPI Negative data signal (-)	I/O
21	MIPI_3P	MIPI Positive data signal (+)	I/O
22	GND	Ground	P
23	NC	No connected	
24	NC	No connected	
25	GND	Ground	P
26	NC	No connected	
27	PWMO	PWM Control Signal of LED Convert(3.3)	O
28	NC	No connected	
29	NC	No connected	
30	GND	Ground	P
31	LED-	LED Cathode	P
32	LED-	LED Cathode	P
33	NC	No connected	
34	NC	No connected	
35	NC	No connected	
36	NC	No connected	
37	NC	No connected	
38	NC	No connected	
39	LED+	LED anode	P
40	LED+	LED anode	P

Notes 2.) Selection of scanning mode.

Setting of scan control input mode		Scanning Direction
U/D	R/L	
GND	VCC	Up to down, Left to Right
VCC	GND	Down to up, right to left
GND	GND	Up to down, right to left
VCC	VCC	Down to up, left to right

Note 3.) DE/SYNC mode select. Normally pull high.

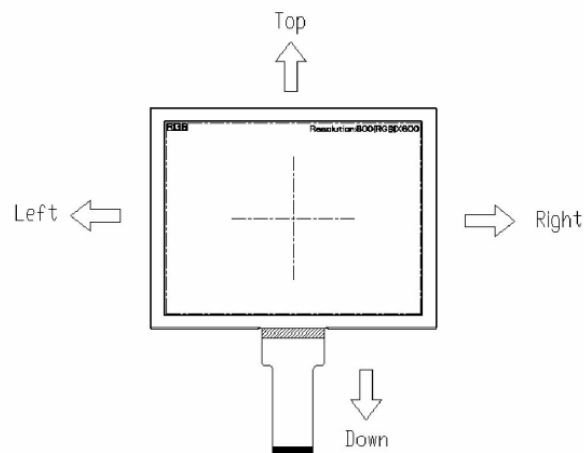
H: DE mode

L: HS/VS mode

Note 4.) Dithering function enable control. Normally pull high.

DITHB='1', Disable internal dithering function. For 18-bit RGB interface, connect two LSB's of all RGB data buses to ground.

Note 5.) Definition of scanning direction:



3.2 CTP

NO.	SYMBOL	DESCRIPTION	I/O
1	NC	No Connection	-
2	NC	No Connection	-
3	NC	No Connection	-
4	NC	No Connection	-
5	GND	Ground	P
6	NC	No Connection	-
7	VDD	Supply voltage	P
8	SCL	I2C clock input	I
9	SDA	I2C data input and output	I
10	INT	External interrupt to the host	I
11	RST	External Reset, Low is active	I
12	GND	Ground	P

4. LCD Optical Characteristics

4.1 Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio	CR	$\Theta=0$	900	1200	--		(1)(2)
Response time	Rising	T_{R+T_F}	Normal viewing angle	--	--	35	msec
	Falling						
Color Gamut	S(%)		50	55	--	%	
Color Filter Chromaticity	White	W_X	0.2562	0.2962	0.3362	CF glass	(1)(4)
		W_Y	0.2872	0.3272	0.3672		
	Red	R_X	0.5946	0.6146	0.6346		
		R_Y	0.3508	0.3708	0.3908		
	Green	G_X	0.2937	0.3137	0.3337		
		G_Y	0.5516	0.5716	0.5916		
	Blue	B_X	0.1303	0.1503	0.1703		
		B_Y	0.0817	0.1017	0.1217		
Viewing angle	Hor.	Θ_L	CR>10	--	80	--	(1)(4)
		Θ_R		--	80	--	
	Ver.	Θ_U		--	80	--	
		Θ_D		--	80	--	
Option View Direction	Free						

4.2 Measuring Condition

Measuring Condition

Measuring surrounding : dark room

Ambient temperature : $25\pm 2^\circ\text{C}$

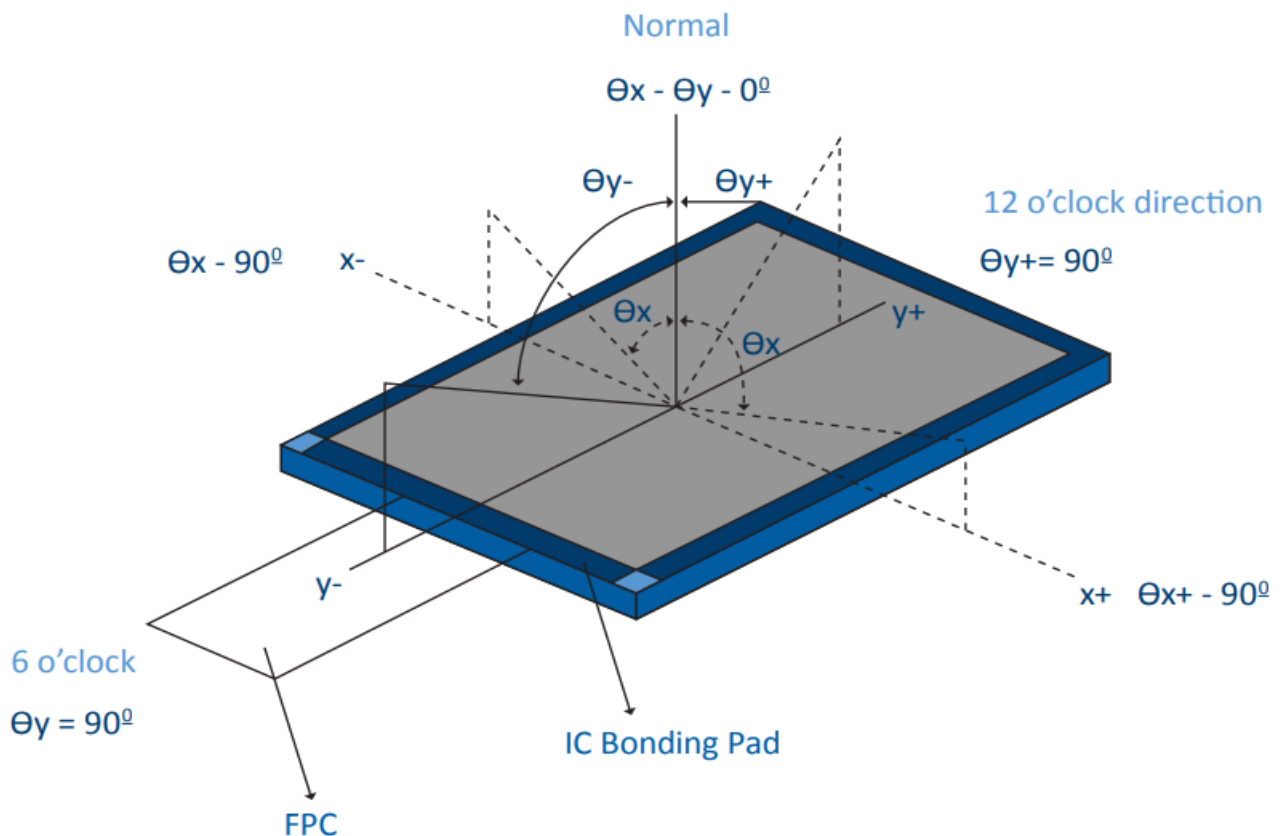
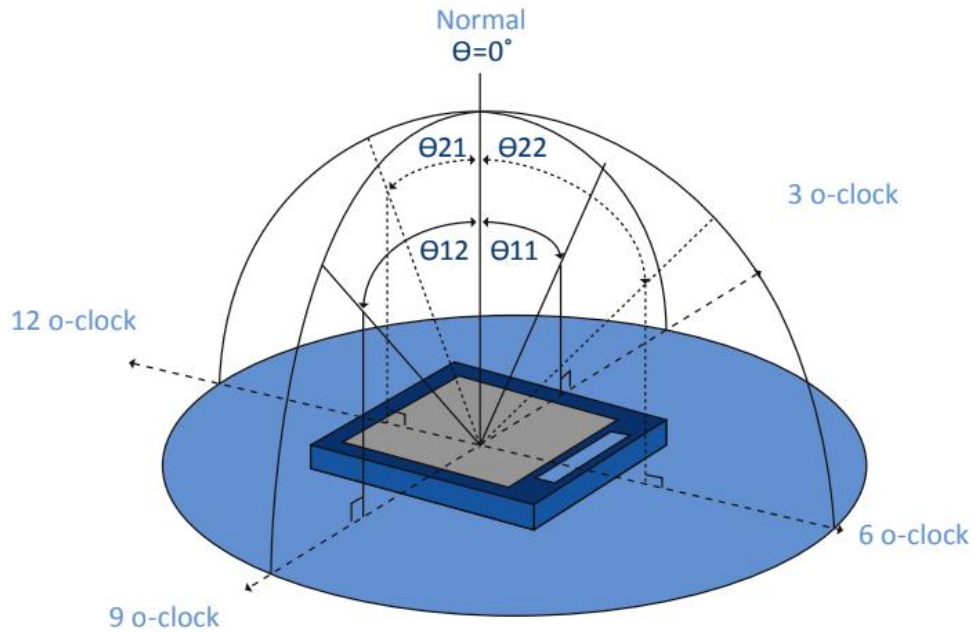
15min. warm-up time.

Measuring Equipment

FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

Optical Specification Reference Notes:

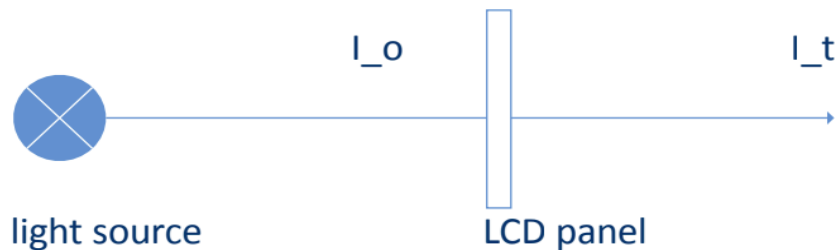
(1) Definition of Viewing Angle: The viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3,9 o'clock direction and the vertical or 6,12 o'clock direction with respect to the optical axis which is normal to the LCD surface.



(2) Definition of Contrast Ratio (Cr): measured at the center point of panel. The contrast ratio (Cr) measured on a module, is the ratio between the luminance (Lw) in a full white area (R=G=B=1) and the luminance (Ld) in a dark area (R=G=B=0).

$$Cr = \frac{Lw}{Ld}$$

(3) Definition of transmittance (T%): The transmittance of the panel including the polarizers is measured with electrical driving.



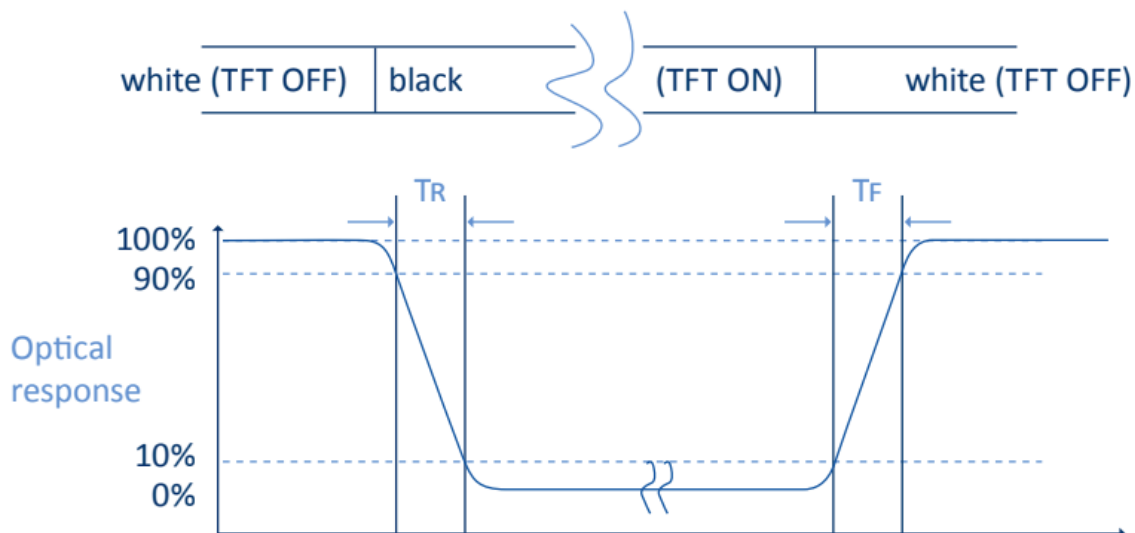
The transmittance is defined as:

$$Tr = \frac{It}{Io} \times 100\%$$

Io = the brightness of the light source.

It = the brightness after panel transmission

(4) Definition of Response Time (Tr, Tf): The rise time 'Tr' is defined as the time for luminance to change from 90% to 10% as a result of a change of the electrical condition. The fall time 'Tf' is defined as the time for luminance to change from 10% to 90% as a result of a change of the electrical condition.



(5) Definition of Color Gamut: Measuring machine CFT-01. NTSC's Primaries: R(x,y,Y),G(x,y,Y), B(x,y,Y). FPM520 of Westar Display Technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics. The color chromaticity 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.

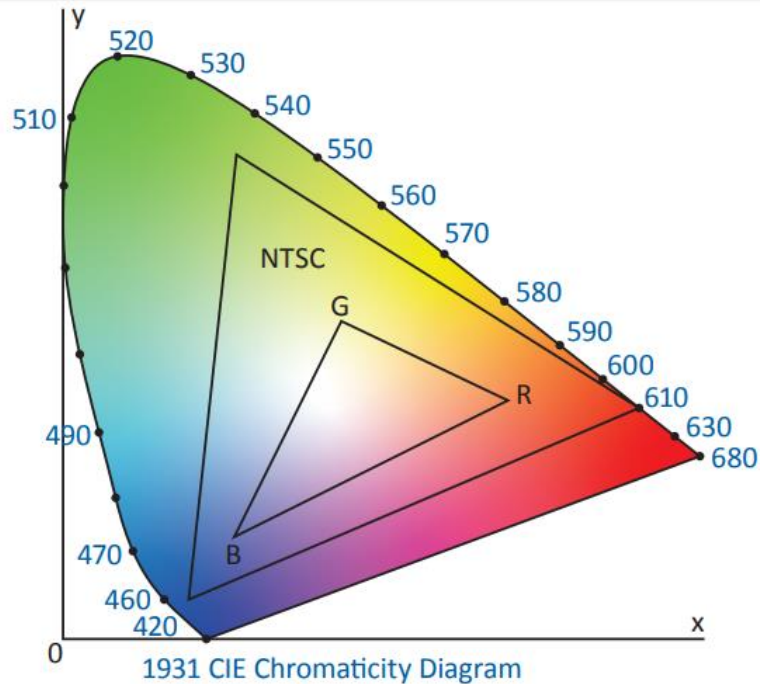
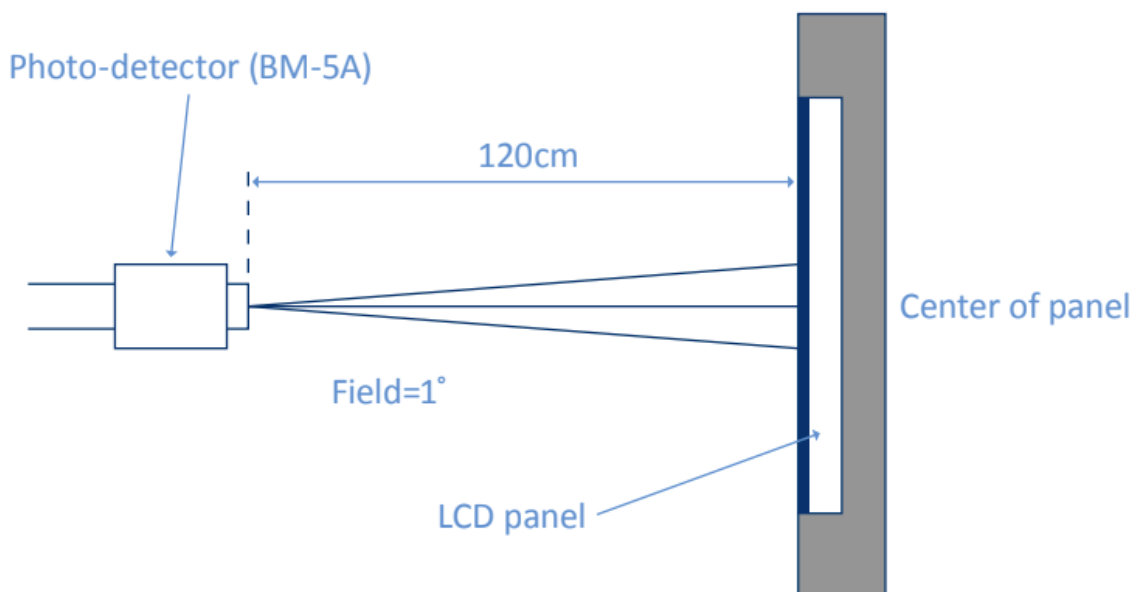


Fig. 1931 CIE chromacity diagram

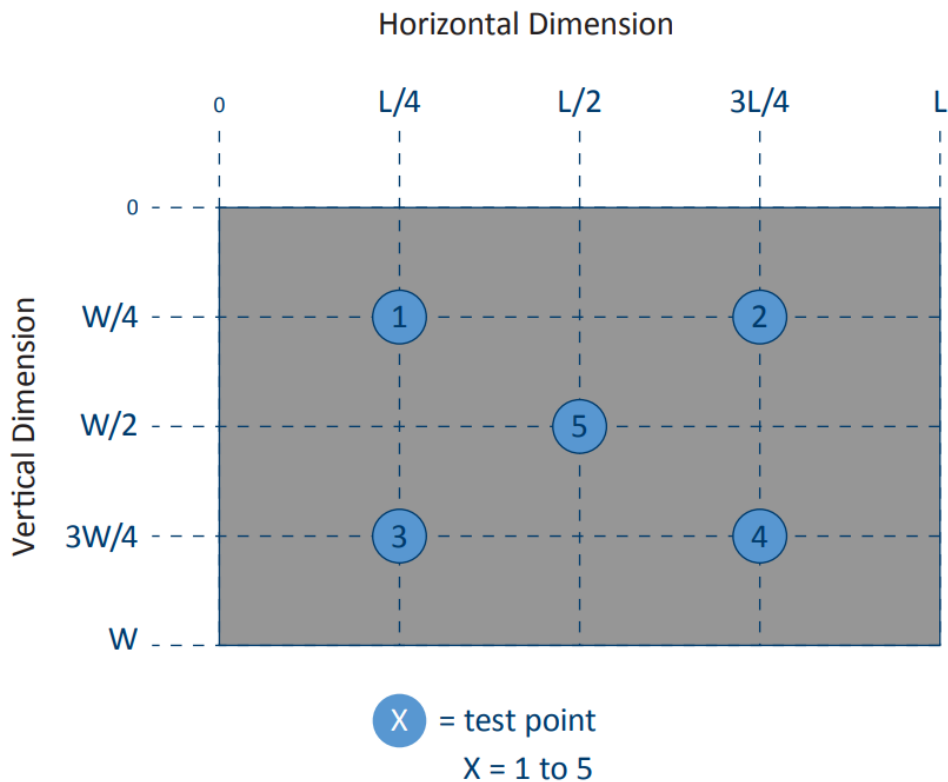
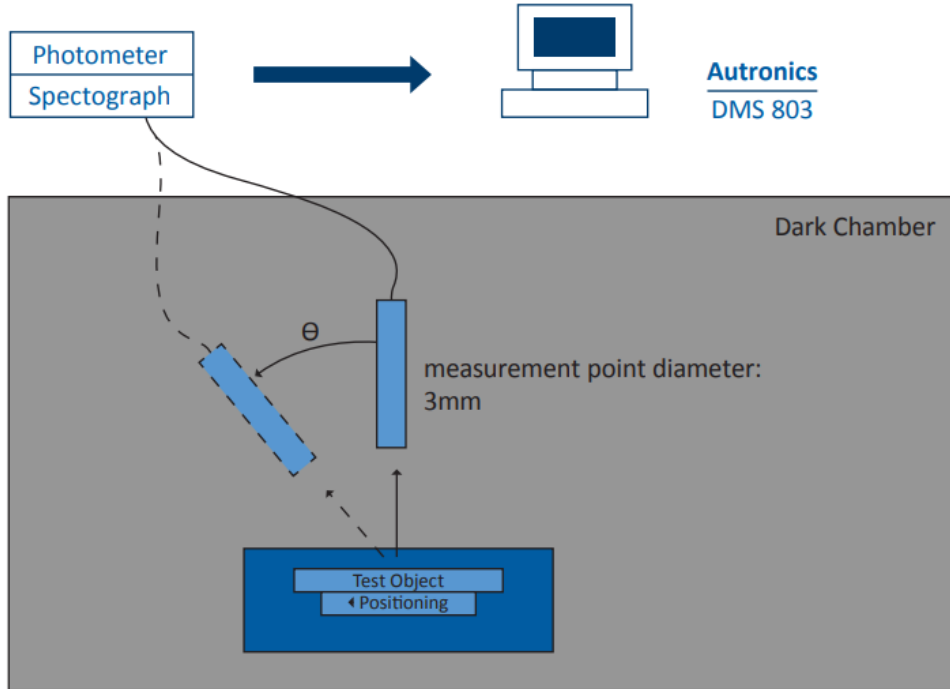
$$\text{Color gamut: } S = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}} \times 100\%$$

Definition of Optical Measurement Setup:



Optical Measurement Setup Continued:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 20 minutes.



5. TFT LCM Electrical Characteristics

5.1 Absolute Maximum Rating (Ta=25 °C, VSS=0V)

Characteristics	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	VCI	-0.3	7.0	V	Note1
Digital interface supply Voltage	IOVCC	-0.3	3.8	V	Note1
Operating temperature	TOP	-20	+60	°C	
Storage temperature	TST	-20	+60	°C	

NOTE: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

5.2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VCI	2.5	3.3	6.6	V	--
Digital interface supply Voltage	IOVCC	1.65	1.8	3.6	V	--
Normal mode Current consumption	IDD	--	44	88	mA	--
Level input voltage	VIH	0.7 IOVCC	--	IOVCC	V	--
	VIL	-0.3	--	0.3 IOVCC	V	--
Level output voltage	VOH	0.8* IOVCC	--	IOVCC	V	--
	VOL	GND	--	0.2 IOVCC	V	--

5.3 LED Backlight Characteristics

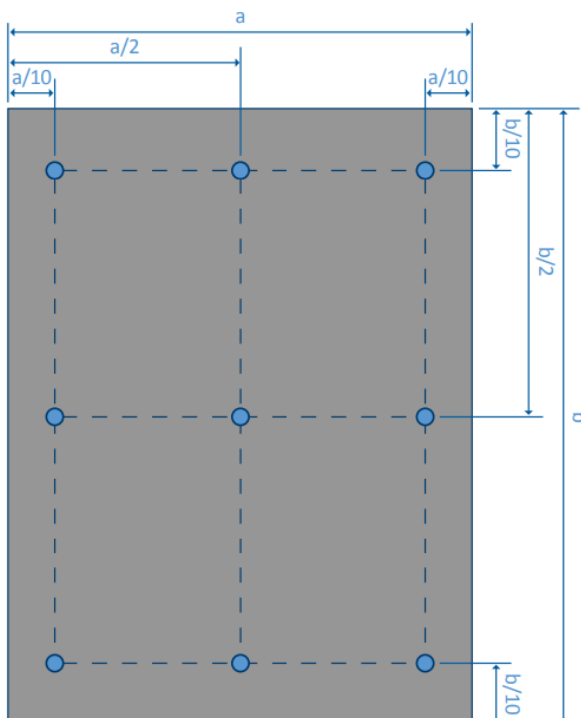
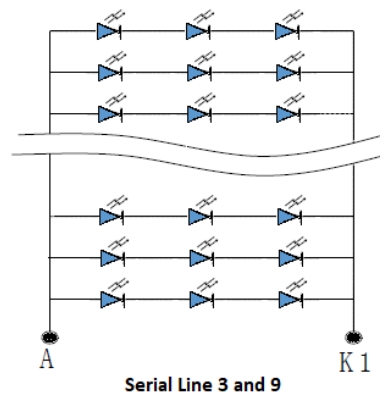
The backlight system is edge lighting type with 27 chips LED.

Item	Symbol	Min	Typ.	Max	Unit	Note
Forward Current	IF	45	60	-	mA	
Forward Voltage	VF	-	25.6	-	V	
LCM Luminance	LV	350	-400-	--	cd/m ²	Note 3
LED lifetime	Hr	50000	--	--	hour	Note1 & 2
Uniformity	AVg	80	--	--	%	Note 3

Note 1: LED lifetime (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25 ±3 °C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note 2: The "LED lifetime" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL = 60mA. The LED lifetime could be decreased if operating IL is larger than 60mA. The constant current driving method is suggested.

Note 3: Luminance Uniformity of these 9 points is defined as below:



$$\text{Luminance} = \frac{\text{(Total Luminance of 9 points)}}{9}$$

$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points(1-9)}}{\text{maximum luminance in 9 points(1-9)}}$$

6. MIPI Interface Characteristics

6.1 High Speed Mode – Clock Channel Timing

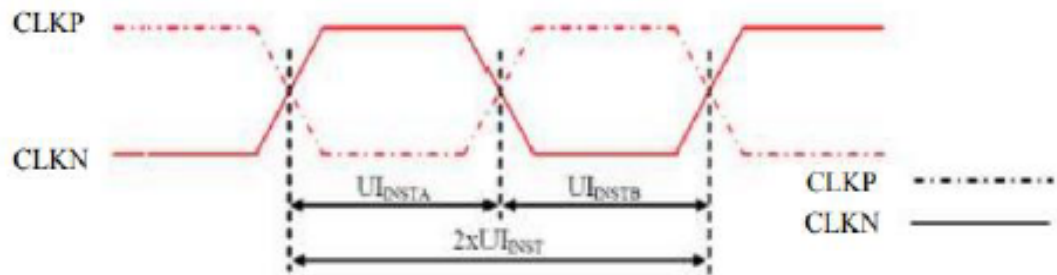


Figure 116: DSI Clock Channel Timing

Table 38: DSI Clock Channel Timing

Signal	Symbol	Parameter	Min	Max	Unit
CLKP/N	$2xUI_{INST}$	Double UI instantaneous	Note 2	25	ns
CLKP/N	UI_{INSTA}, UI_{INSTB} (Note 1)	UI instantaneous Half	Note 2	12.5	ns

Notes:

- $UI = UI_{INSTA} = UI_{INSTB}$
- Define the minimum value, see Table 39.

Table 39: Limited Clock Channel Speed

Data type	Two Lanes speed	Three Lanes speed	Four Lanes speed
Data Type = 00 1110 (0Eh), RGB 565, 16 UI per Pixel	566 Mbps	466 Mbps	366 Mbps
Data Type = 01 1110 (1Eh), RGB 666, 18 UI per Pixel	637 Mbps	525 Mbps	412 Mbps
Data Type = 10 1110 (2Eh), RGB 666 Loosely, 24 UI per Pixel	850 Mbps	700 Mbps	550 Mbps
Data Type = 11 1110 (3Eh), RGB 888, 24 UI per Pixel	850 Mbps	700 Mbps	550 Mbps

6.2 High Speed Mode – Data Clock Channel Timing

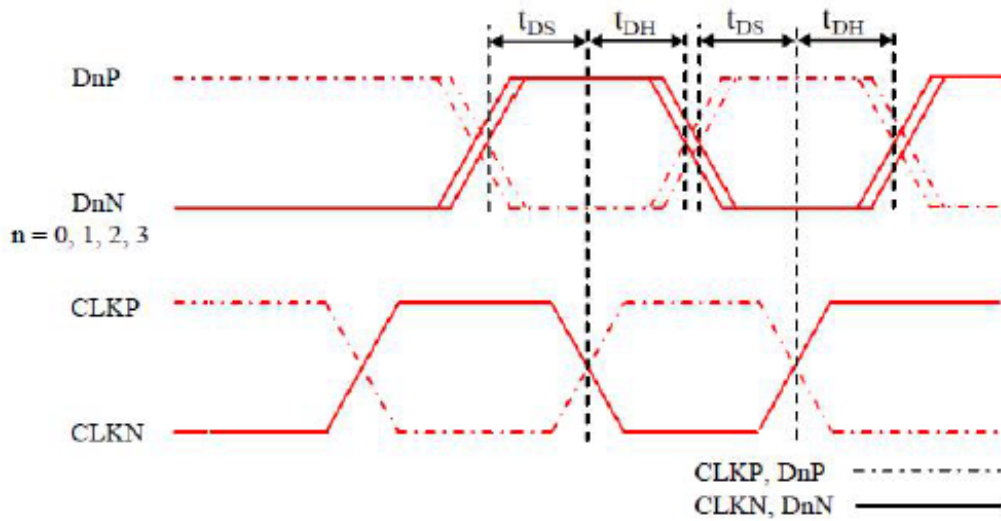


Figure 119: DSI Data to Clock Channel Timings

Table 40: DSI Data to Clock Channel Timings

Signal	Symbol	Parameter	Min	Max
DnP/N, n=0 and 1	t_{DS}	Data to Clock Setup time	0.15xUI	-
	t_{DH}	Clock to Data Hold Time	0.15xUI	-

[See ILI9881C Specification for more details](#)

7. CTP Specification

7.1 Absolute Maximum Rating

Item	Symbol	Min	Max	Unit	Note
Power Supply Voltage	VDD	-0.3	3.47	V	1
I/O Digital Voltage	VDDIO	-0.3	3.47	V	1
Operating Temperature	T	-20	+70	°C	-
Storage Temperature	T _{ST}	-30	+80	°C	-

Table 7.1: CTP Absolute Maximum Rating Characteristics

Note 1: If used beyond the absolute maximum ratings, GT9271 may permanently damage. It is strongly recommended that the device be used within the electrical characteristics in normal operations. If exposed to the condition not within the electrical characteristics, it may affect the reliability of the device.

7.2 DC Electrical Characteristics (TA=25°C)

Item	Symbol	Condition	Min	Typ.	Max	Unit	Note
Digital supply voltage	VDD		2.8		3.3	V	
I/O Digital supply voltage	VDDIO		1.8		3.3	V	
Normal operation mode current consumption	I _{opr}	VDD=2.8V Ta=25°C MCLK=17.5 MHz		13	--	mA	
Monitor mode current consumption	I _{mon}			4.5		mA	
Sleep mode current consumption	I _{sip}		70		120	uA	
Level input voltage	V _{IH}		0.75VDDIO		VDDIO+0.3	V	
	V _{IL}		-0.3		0.25VDDIO	V	
Level output voltage	V _{OH}	I _{OH} =-0.1mA	0.85VDDIO			V	
	V _{OL}	I _{OL} =0.1mA			0.15VDDIO	V	

Table 7.2: CTP DC Electrical Characteristics

7.3 I2C Interface Characteristics

[For more information on CTP interface, see GT911 Specification](#)

8. Cautions and Handling Precautions

8.1 Handling and Operating the Module

1. When the module is assembled, it should be attached to the system firmly. Do not warp or twist the module during assembly work.
2. Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
3. Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
4. Do not allow drops of water or chemicals to remain on the display surface. If you have the droplets for a long time, staining and discoloration may occur.
5. If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
6. The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
7. If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.
8. Protect the module from static; it may cause damage to the CMOSICs.
9. Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
10. Do not disassemble the module.
11. Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
12. Pins of I/F connector shall not be touched directly with bare hands.
13. Do not connect, disconnect the module in the "Power ON" condition.
14. Power supply should always be turned on/off by the item Power On Sequence & Power Off Sequence

8.2 Storage and Transportation.

1. Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35 °C and relative humidity of less than 70%
2. Do not store the TFT-LCD module in direct sunlight.
3. The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
4. It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module. In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.
5. This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.