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TFT | CHARACTER | LWVD | FSC | SEGMENT | CUSTOM | REPLACEMENT

TFT Display Module

Part Number

E35RB-B-RW600-N

Overview:

- 3.5-inch TFT: 480x640 (64x85)
- 3 SPI+16/18- bit RGB
- White LED back-light
- Transflective/ Normally Black
- No Touch Panel
- 600 NITS
- Controller: ILI9806E
- RoHS Compliant

Description

This is a color active matrix TFT (Thin Film Transistor) LCD (Liquid Crystal Display) that uses amorphous silicon TFT as a switching device. This model is composed of a Transflective type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 3.5" TFT-LCD contains 480x640 pixels, and can display up to 65K/262K/16.7M colors.

Features

Low Input Voltage: 3.3V (TYP)

Display Colors of TFT LCD: 65K/262K/16.7M colors

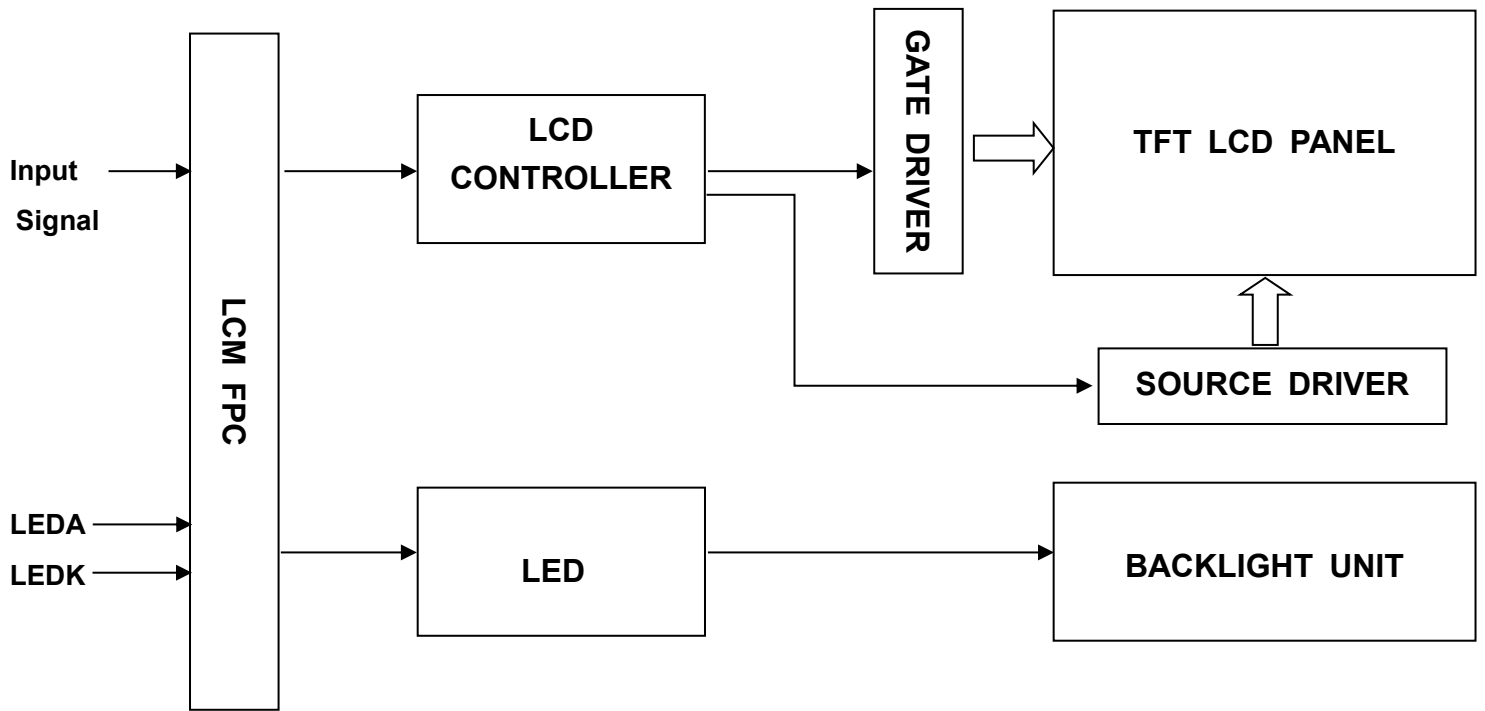
TFT Interface: 3 SPI+16/18Bit RGB

General Information Items	Specification	Unit	Note
	Main Panel		
Display area (AA)	53.28(H)*71.04(V) (3.5 inch)	mm	-
Driver element	TFT active matrix	-	-
Display colors	65K/262K/16.7M	colors	-
Number of pixels	480(RGB)*640	dots	-
TFT Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.111(H)*0.111(V)	mm	-
Viewing angle	All	-	-
TFT Controller IC	ILI9806E	-	-
Display mode	Transflective/Normally Black	-	-
Operating temperature	-20~+70	°C	-
Storage temperature	-30~+80	°C	-

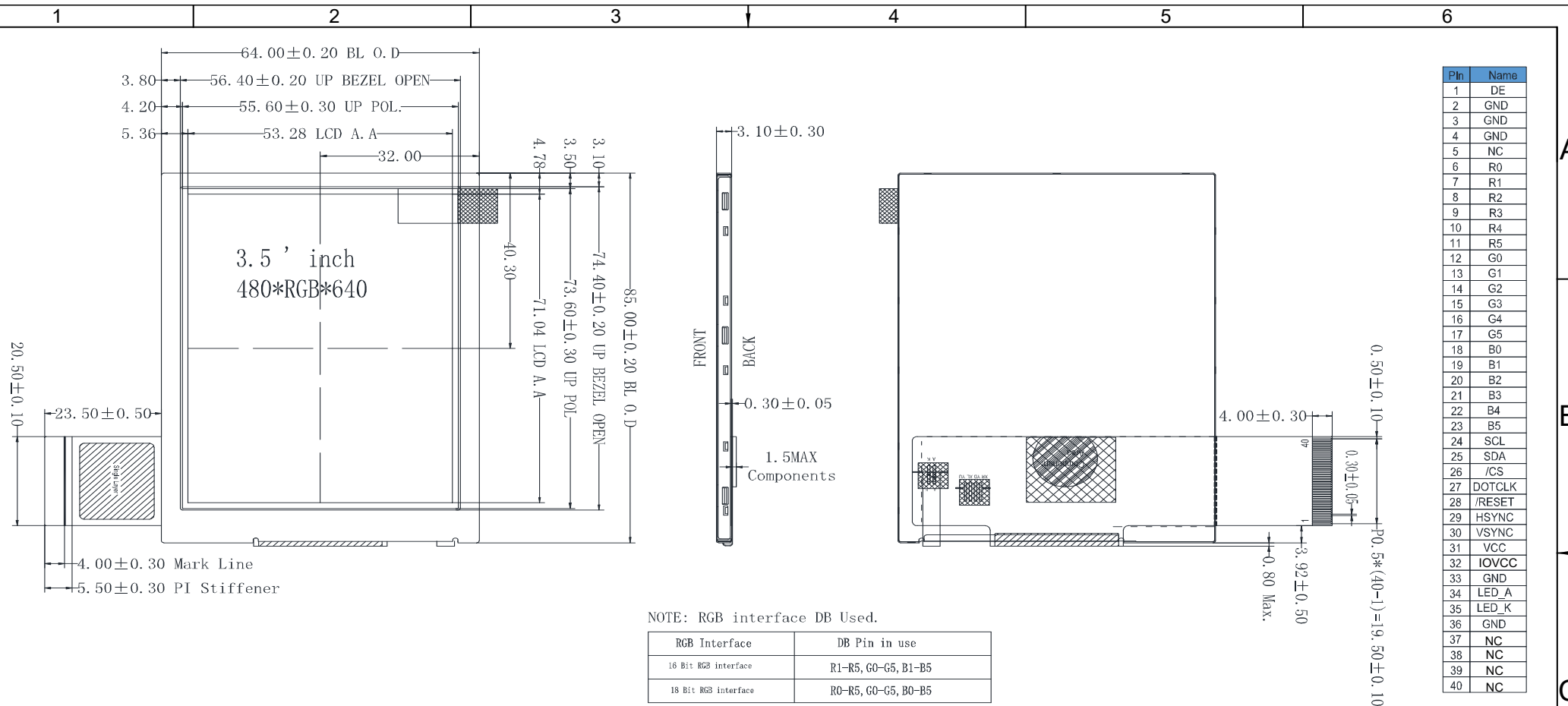
Mechanical Information

Item		Min	Typ.	Max	Unit	Note
Module size	Horizontal(H)		64.0		mm	-
	Vertical(V)		85.0		mm	-
	Depth(D)		3.1		mm	-
Weight			TBD		g	-

1. Block Diagram



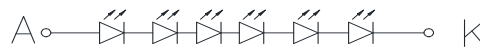
2. Outline dimensions



NOTE: RGB interface DB Used.

RGB Interface	DB Pin in use
16 Bit RGB interface	R1-R5, G0-G5, B1-B5
18 Bit RGB interface	R0-R5, G0-G5, B0-B5

NOTE: If used RGB mode must select serial interface!



BL CIRCUIT DIAGRAM

NOTES:

1. DISPLAY TYPE: 3.5", TFT-LCD, 65K/262K/16.7M COLORS
2. DISPLAY MODE: VA TFT, NORMALLY BLACK
3. VIEWING DIRECTION: ALL
4. LCM DRIVER IC: ILI9806E(COG)
5. LCM Interface: 3SPI+16/18BIT RGB
6. VCC: 3.3V;IOVCC:1.65~3.3V
7. OPERATING TEMP: -20°C TO 70°C
STORAGE TEMP: -30°C TO 80°C
8. BACK LIGHT: LED WHITE, 6 LED, 20mA, 18.0~20.4V
9. RoHS and REACH COMPLIANT.

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Model Name: E35RB-B-RW600-N		 LCDs MADE SIMPLE®	
General Tol: ± 0.2			
Approvals	Date	Drawing No.:	Scale:
DWN:		Size:	Unit: mm Page: 1/1
CHK:			
APP:			

3. Input Terminal Pin Assignment

Recommended Connector: FH12S-40S-0.5SH(55)

NO.	Symbol	Description	I/O
1	DE	Data enable signal in RGB I/F mode. Fixed to GND in MPU interface mode.	I
2	GND	Ground	P
3	GND	Ground	P
4	GND	Ground	P
5	NC	Not Connected	
6-11	R0-R5	Red data bus	I/O
12-17	G0-G5	Green data bus	I/O
18-23	B0-B5	Blue data bus	I/O
24	SCL	Serves as a write signal and writes data at the rising edge. When operate in serial interface, it serves as SCL (Serial Clock). If not used, let it open or connected to VCC	I
25	SDA	Serial data input pin in serial interface operation	I
26	CS	Chip select input pin ("Low" enable). Fix this pin at VCI or GND when not in use.	I
27	DOTCLK	Dot clock signal. Must be connected to GND or VCC if not used.	I
28	RESET	Reset pin. Setting either pin low initializes the LSI. Must be reset after power is supplied (Must be connected to GND or VCC). (Latch type)	I
29	HSYNC	Line synchronizing signal. Must be connected to GND or VCC if not used.	I
30	VSYNC	Frame synchronizing signal. Must be connected to GND or VCC if not used.	I
31	VCC	Supply voltage	I
32	IOVCC	A power supply for the I/O circuit.	I
33	GND	Ground	O
34	LED_A	Anode pin of backlight	P
35	LED_K	Cathode pin of backlight	P
36	GND	Ground	P
37	XR	Not Connected	A/D
38	YD	Not Connected	A/D
39	XL	Not Connected	A/D
40	YU	Not Connected	A/D

4. LCD Optical Characteristics

4.1 Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio	CR	$\Theta=0$	500	700	--		2
Response time	Rising	Normal viewing angle	--	25	--	msec	3
	Falling						
Uniformity	S(%)		38	43	--	%	
Color Filter Chromaticity	White	W_x	0.2594	0.2994	0.3394		
		W_y	0.2899	0.3299	0.3699		
	Red	R_x	0.4975	0.5375	0.5775		
		R_y	0.2928	0.3328	0.3728		
	Green	G_x	0.2970	0.3370	0.3770		
		G_y	0.5346	0.5746	0.6146		
	Blue	B_x	0.1139	0.1539	0.1939		
		B_y	0.0746	0.1146	0.1546		
Viewing angle	Hor.	Θ_L	--	80	--		
		Θ_R	--	80	--		
	Ver.	Θ_U	--	80	--		
		Θ_D	--	80	--		
Option View Direction	All						

4.2 Measuring Conditions

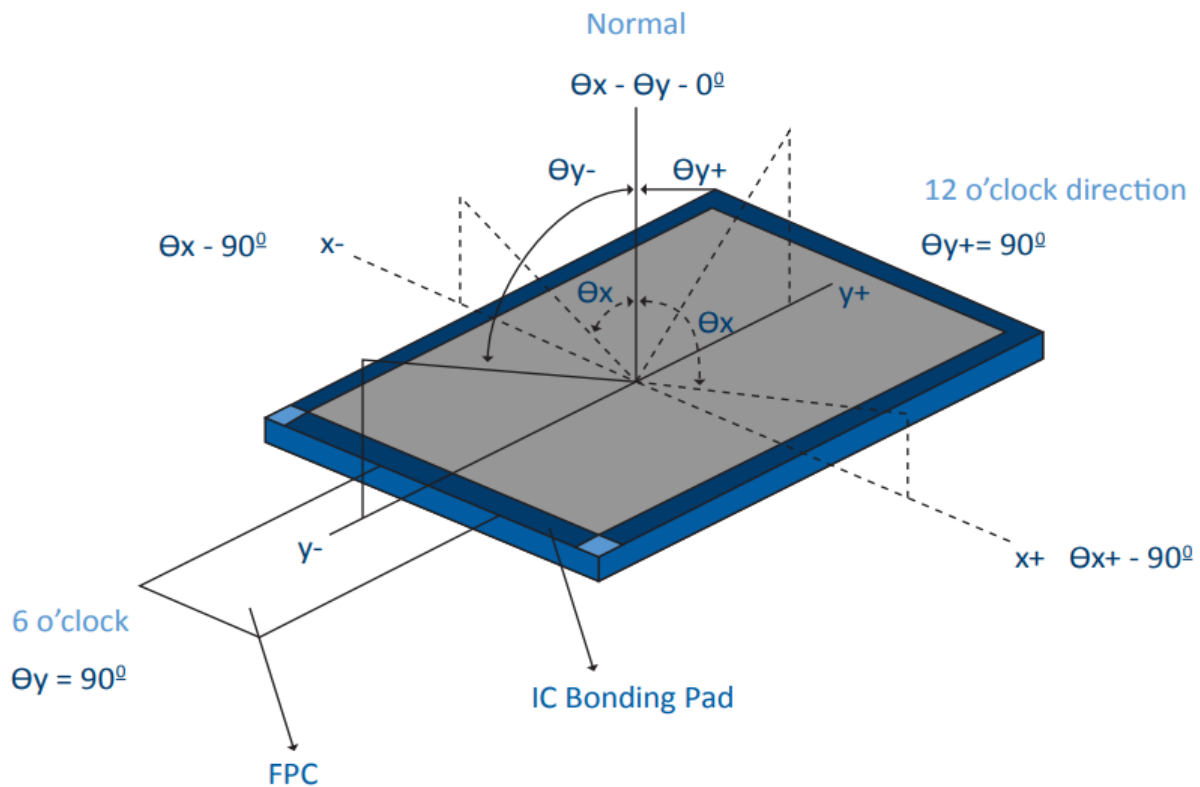
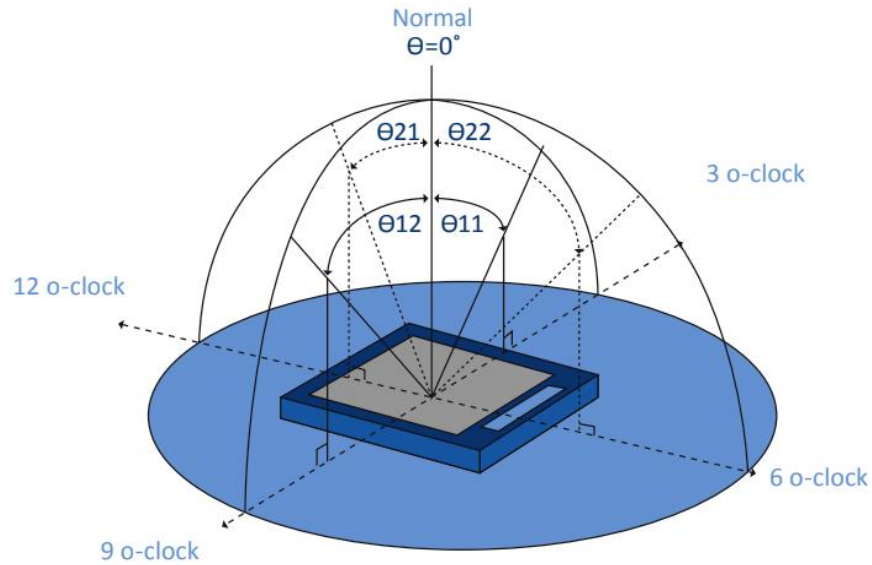
Measuring surrounding: dark room

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

15min. warm-up time

Optical Specification Reference Notes:

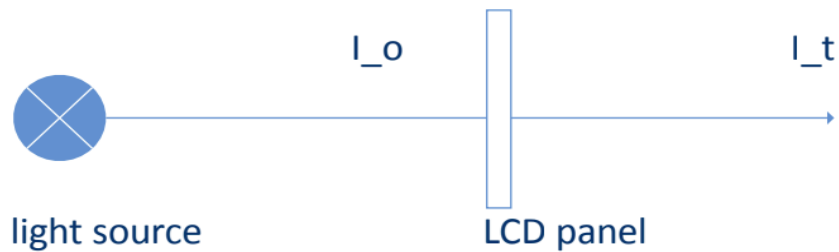
(1) Definition of Viewing Angle: The viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3,9 o'clock direction and the vertical or 6,12 o'clock direction with respect to the optical axis which is normal to the LCD surface.



(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.



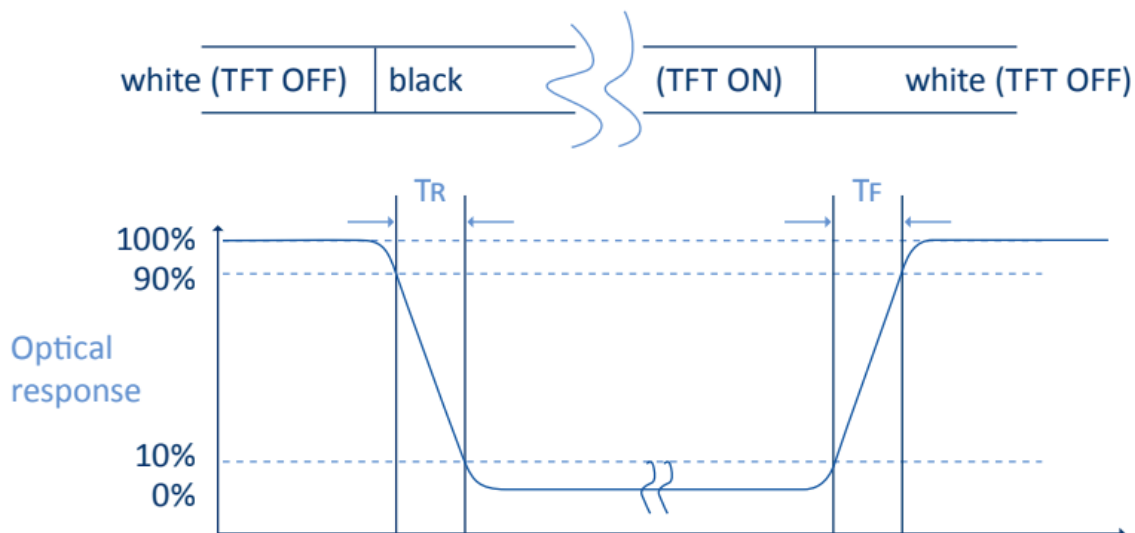
The transmittance is defined as:

$$Tr = \frac{I_t}{I_o} \times 100\%$$

I_o = the brightness of the light source.

I_t = 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.

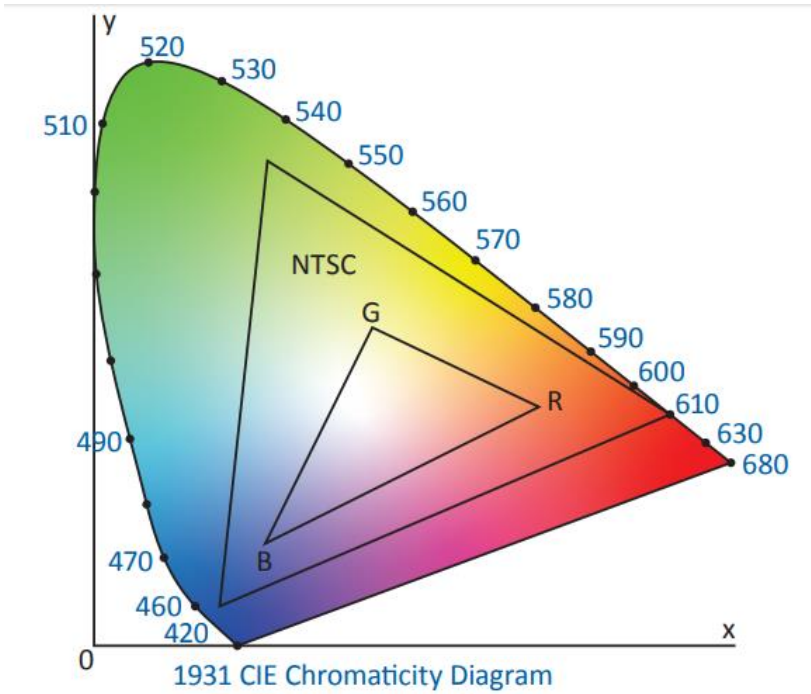
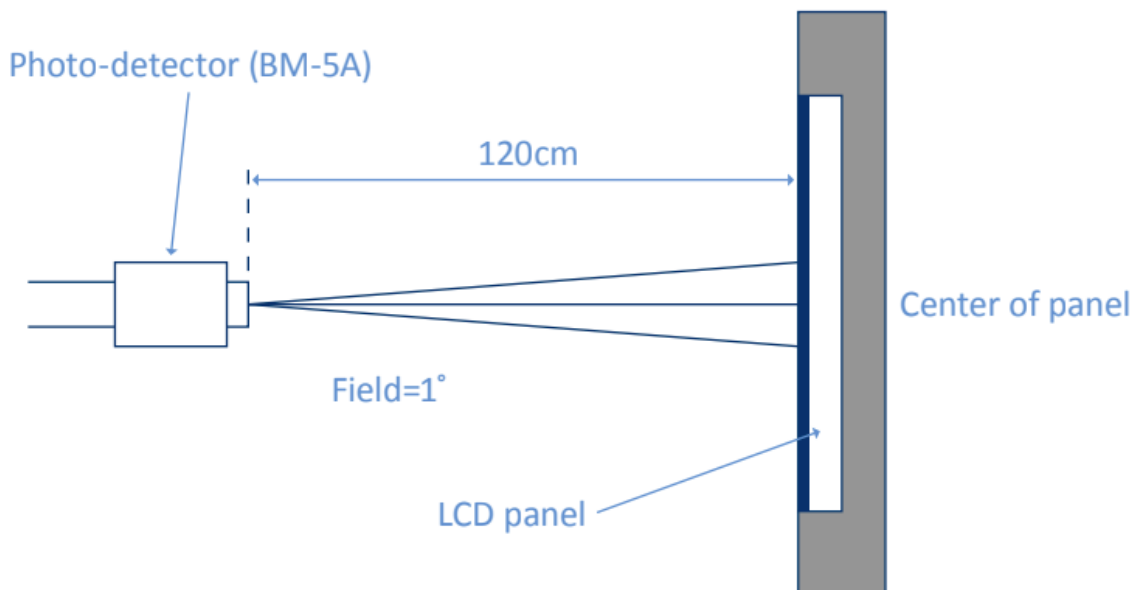


Fig. 1931 CIE chromacity diagram

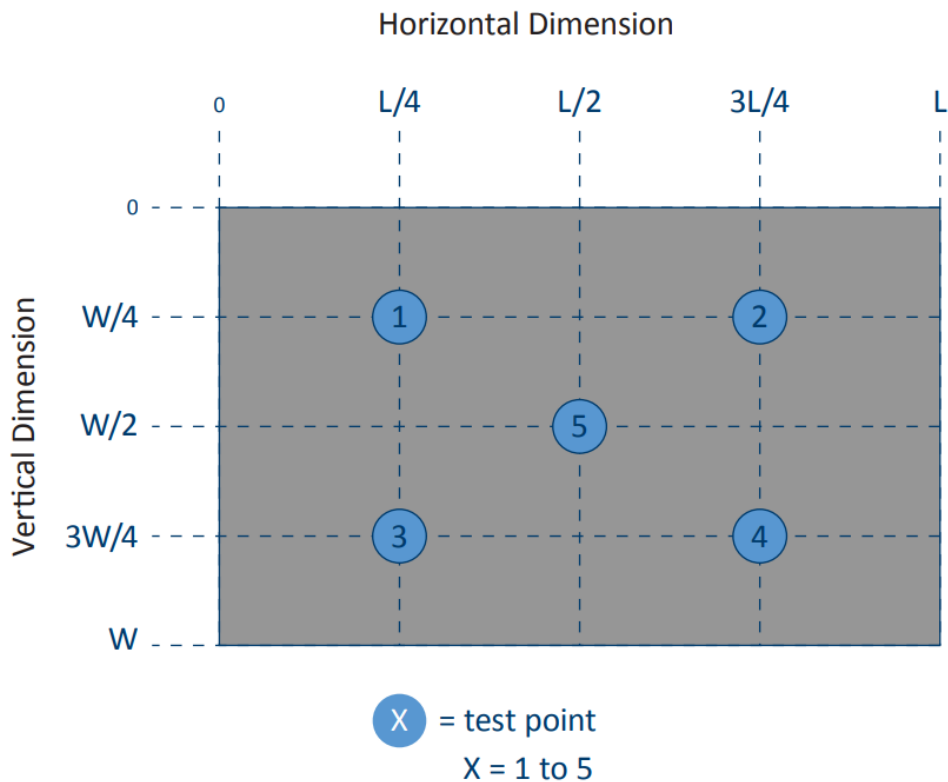
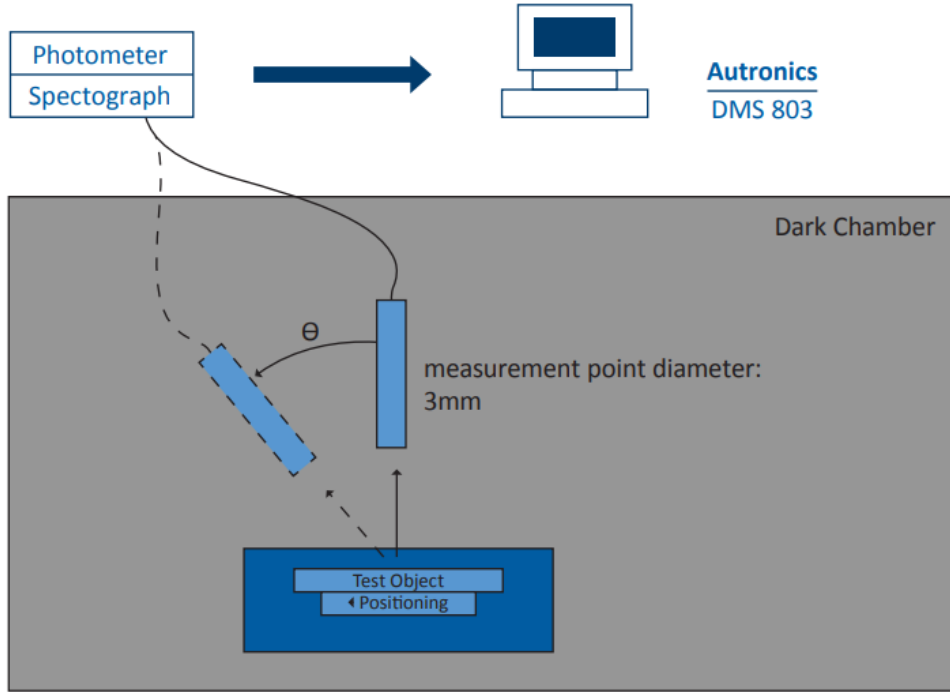
$$\text{Color gamut: } S = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}} \times 100\%$$

(6) Definition of Optical Measurement Setup:



(6) 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. Electrical Characteristics

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

Characteristics	Symbol	Min	Max	Unit
Digital Supply Voltage	VCC	-0.3	4.6	V
Interface Operation Voltage	IOVCC	-0.3	4.6	V
Operating temperature	TOP	-20	+70	°C
Storage temperature	TST	-30	+80	°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	3.6	V	
Interface Operation Voltage	IOVCC	1.65	1.8	3.3	V	
Normal Mode Current Consumption	IVCC+IIOVCC	--	30	60	mA	
Level input voltage	VIH	0.7 IOVCC		IOVCC	V	
	VIL	GND		0.3 IOVCC	V	
Level output voltage	VOH	0.8 IOVCC		IOVCC	V	
	VOL	GND		0.2 IOVCC	V	

5.3 LED Backlight Characteristics

Item	Symbol	Min	Typ.	Max	Unit	Note
Forward Current	IF	15	20	--	mA	
Forward Voltage	VF	16.8	18.6	20.4	V	
LCM Luminance	LV	550	600	--	cd/m ²	Note 3
LED lifetime	Hr	50000	--	--	hour	Note1 & 2
Uniformity	AVg	80	--	--	%	Note 3

The back-light system is edge-lighting type with 6 chips White LED

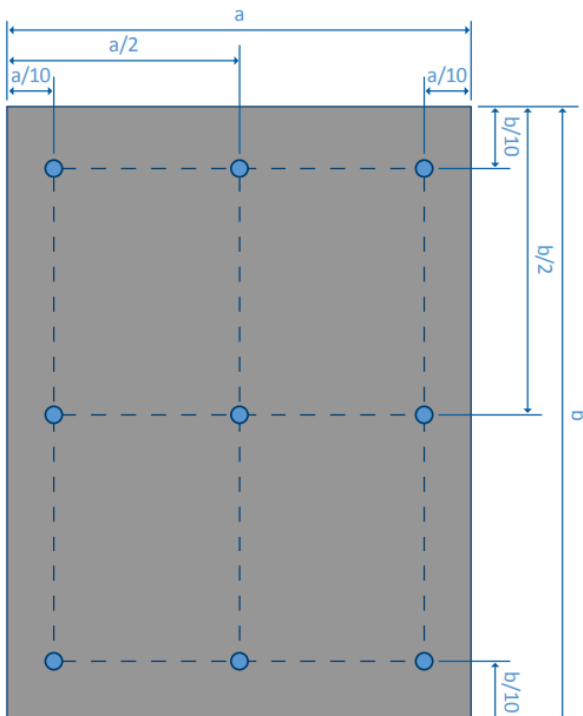
Note 1: LED lifetime (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25 ±3 °C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note 2: The “LED lifetime” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL=20mA. The LED lifetime could be decreased if operating IL is larger than 20mA. The constant current driving method is suggested.



B/L Circuit

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. Timing Characteristics

For more information on the timing characteristics of this module, please refer to controller specification for controller ILI9806E

7. Quality Inspection Characteristics

For more information on the quality inspection procedure, please refer to the LCD Quality Inspections infographic:
<https://focuslcds.com/content/LCD%20Quality%20Inspection%20Standards.pdf>

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 CMOS ICs.
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.