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

TFT Display Module

Part Number

E101RGL1912LB6M350-N

Overview:

- 10.1-inch TFT (228.46x149.1mm)
- LVDS Interface
- 1280x800 pixels
- 3.3V
- White LED back-light
- Transmissive/ Normally Black
- No Touch Panel
- 350 NITS
- Controller: FT5826QSL
- 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 transmissive type TFT-LCD Panel, driver circuit and backlight unit. The resolution of the 10.1" TFT-LCD contains 1280x800 pixels and can display up to 16.7M colors.

Features

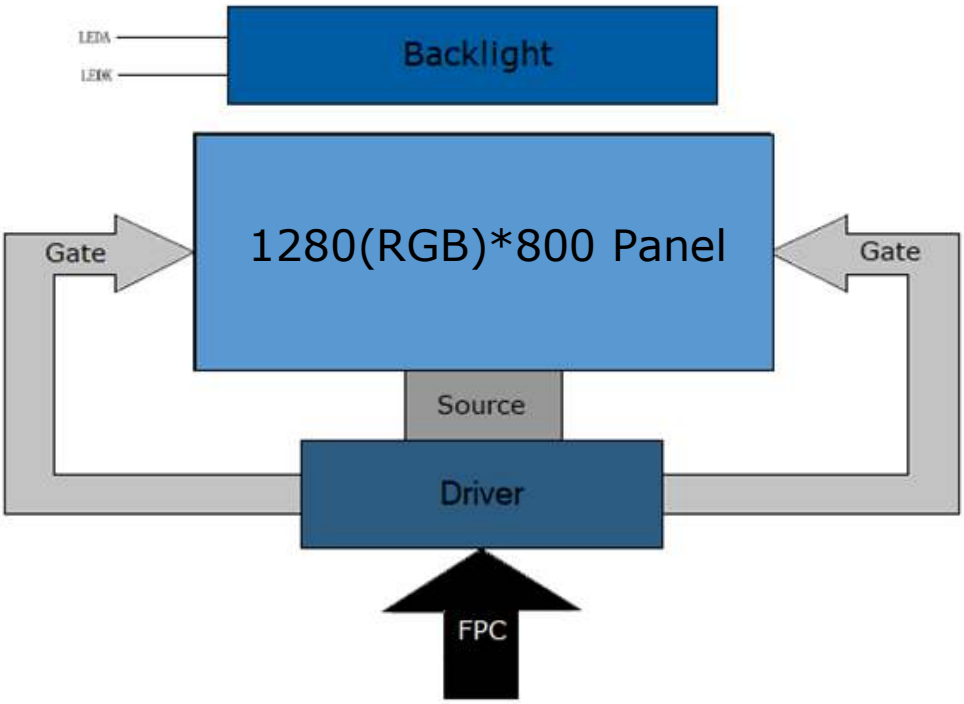
Low Input Voltage: 3.3V (TYP)
Display Colors of TFT LCD: 16.7M colors
TFT Interface: LVDS

General Information Items	Specification	Unit	Note
	Main Panel		
TFT Display area (AA)	216.96(W) x 135.60(H) (10.1 inch)	mm	-
Driver element	TFT active matrix	-	-
Display colors	16.7M	colors	-
Number of pixels	1280(RGB)x800	dots	-
TFT Pixel arrangement	RGB stripe	-	-
Pixel pitch	0.1695 (H) x 0.1695 (V)	mm	-
Viewing angle	ALL	o'clock	-
CTP Driver IC	FT5826QSL	-	-
Display mode	Transmissive/ Normally Black	-	-
Operating temperature	-20～+70	℃	-
Storage temperature	-30～+80	℃	-

Mechanical Information

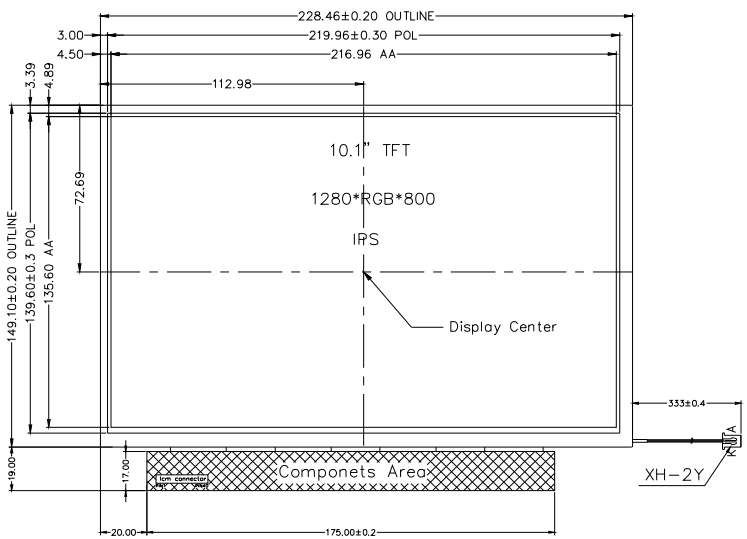
Item		Min	Typ.	Max	Unit	Note
Module size	Height (H)		228.46		mm	-
	Vertical (V)		149.10		mm	-
	Depth (D)		4.5		mm	-
Weight			TBD		g	-

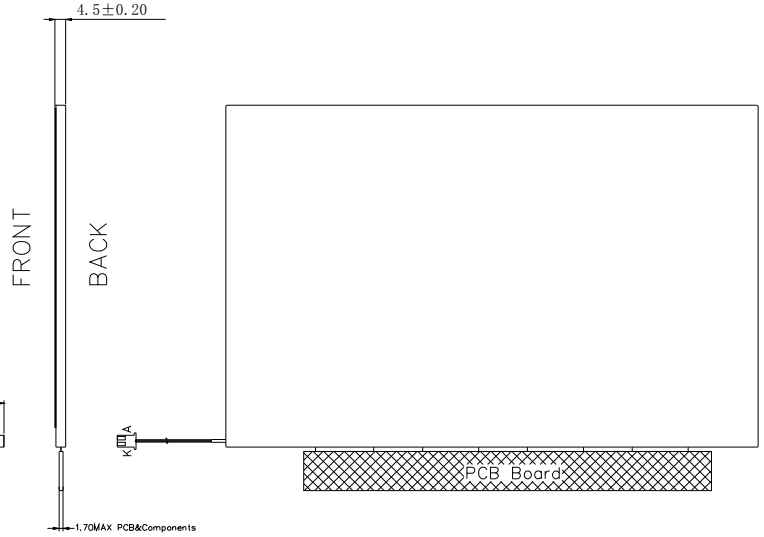
1. Block Diagram



2. Outline Dimensions

Rev.	Revision content description	Date
A	FIRST	2017.11.08

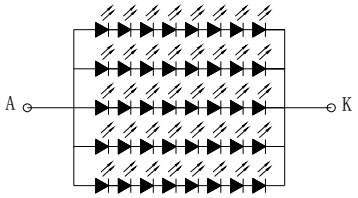




NO.	Pin Name
1	NC
2	VDD
3	VDD
4	NC
5	NC
6	NC
7	NC
8	LV0N
9	LV0P
10	GND
11	LV1N
12	LV1P
13	GND
14	LV2N
15	LV2P
16	GND
17	LVCLKN
18	LVCLKP
19	GND
20	LV3N
21	LV3P
22	GND
23	NC
24	NC
25	NC
26	NC
27	NC
28	NC
29	NC
30	NC
31	NC
32	NC
33	NC
34	NC
35	BIST
36	NC
37	NC
38	NC
39	NC
40	NC

NOTES:

1. DISPLAY TYPE: 10.1", TFT-LCD, 16.7M COLORS
2. DISPLAY MODE:NORMALLY BLACK
3. VIEWING DIRECTION: ALL
4. VDD: 3.3V
5. OPERATING TEMP: -20°C TO 70°C
   STORAGE TEMP: -30°C TO 80°C
6. BACK LIGHT: LED WHITE, 40 LED, 225mA, 25.6±0.3V
7. RoHS COMPLIANT.



Backlight LED Circuit

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TOLERANCE( )	DRAWING NAME	E101RGL1912LB6M350-N	
	PARTS NO.		
TOLERANCE UNLESS OTHERWISE SPECIFIED X.X±0.3 X.XX±0.2	Drawn		Unit
	Checked		mm
Scale 1:1	Approve		Page 1/1

3. Input Terminal Pin Assignment

NO.	Symbol	Description	I/O
1	NC	--	--
2	VDD	Power supply	P
3	VDD	Power supply	P
4	NC	--	--
5	NC	--	--
6	NC	--	--
7	NC	--	--
8	LV0N	-LVDS differential data input	I
9	LV0P	+LVDS differential data input	I
10	GND	Ground	P
11	LV1N	-LVDS differential data input	I
12	LV1P	+LVDS differential data input	I
13	GND	Ground	P
14	LV2N	-LVDS differential data input	I
15	LV2P	+LVDS differential data input	I
16	GND	Ground	P
17	LVCLKN	-LVDS differential clock input	I
18	LVCLKP	+LVDS differential clock input	I
19	GND	Ground	P
20	LV3N	-LVDS differential data input	I
21	LV3P	+LVDS differential data input	I
22	GND	Ground	P
23	NC	--	
24	NC	--	
25	NC	--	
26	NC	--	
27	NC	--	
28	NC	--	
29	NC	--	
30	NC	--	
31	NC	--	
32	NC	--	
33	NC	--	
34	NC	--	
35	BIST	BIST pin. Active high.	I
36	NC	--	
37	NC	--	
38	NC	--	
39	NC	--	
40	NC	--	

I: Input, O: Output, P: Power

4. LCD Optical Characteristics

4.1 Optical Specifications

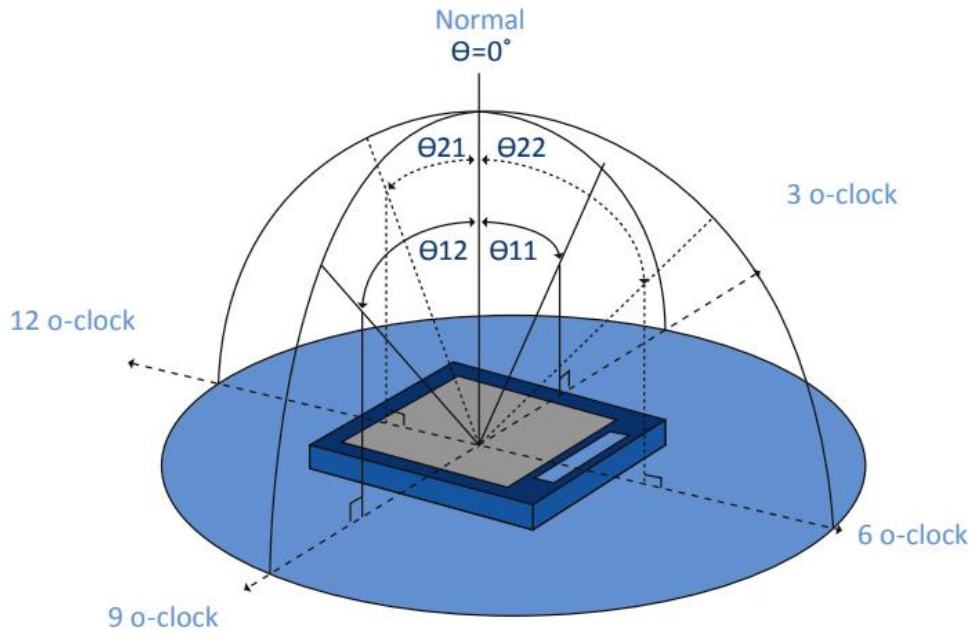
Item		Symbol	Condition	Min	Typ.	Max	Unit	Note
Contrast Ratio		CR	Θ = ϕ = 0 Normal viewing angle	600	800	--	--	(2)
Response time	Rising	TR+TF		--	25	50	msec	(4)
	Falling							
NTSC		--		42	45	--	%	(5)
Uniformity		Yu		70	75	--	%	
Color Filter Chromaticity	White	W_X		0.267	0.307	0.347		(5)(6)
		W_Y		0.307	0.347	0.387		
	Red	R_X		0.622	0.642	0.662		
		R_Y		0.315	0.335	0.355		
	Green	G_X		0.306	0.326	0.346		
		G_Y		0.577	0.597	0.617		
	Blue	B_X		0.126	0.146	0.166		
		B_Y		0.046	0.066	0.086		
Viewing angle	Hor.	ΘL	ϕ=180˚ (9 o'clock)	75	85	--	degree	(1)(6)
		ΘR	ϕ=0˚ (3 o'clock)	75	85	--		
	Ver.	ΘT	ϕ=90˚ (12 o'clock)	75	85	--		
		ΘB	ϕ=270˚ (6 o'clock)	75	85	--		
Option View Direction		ALL						(1)

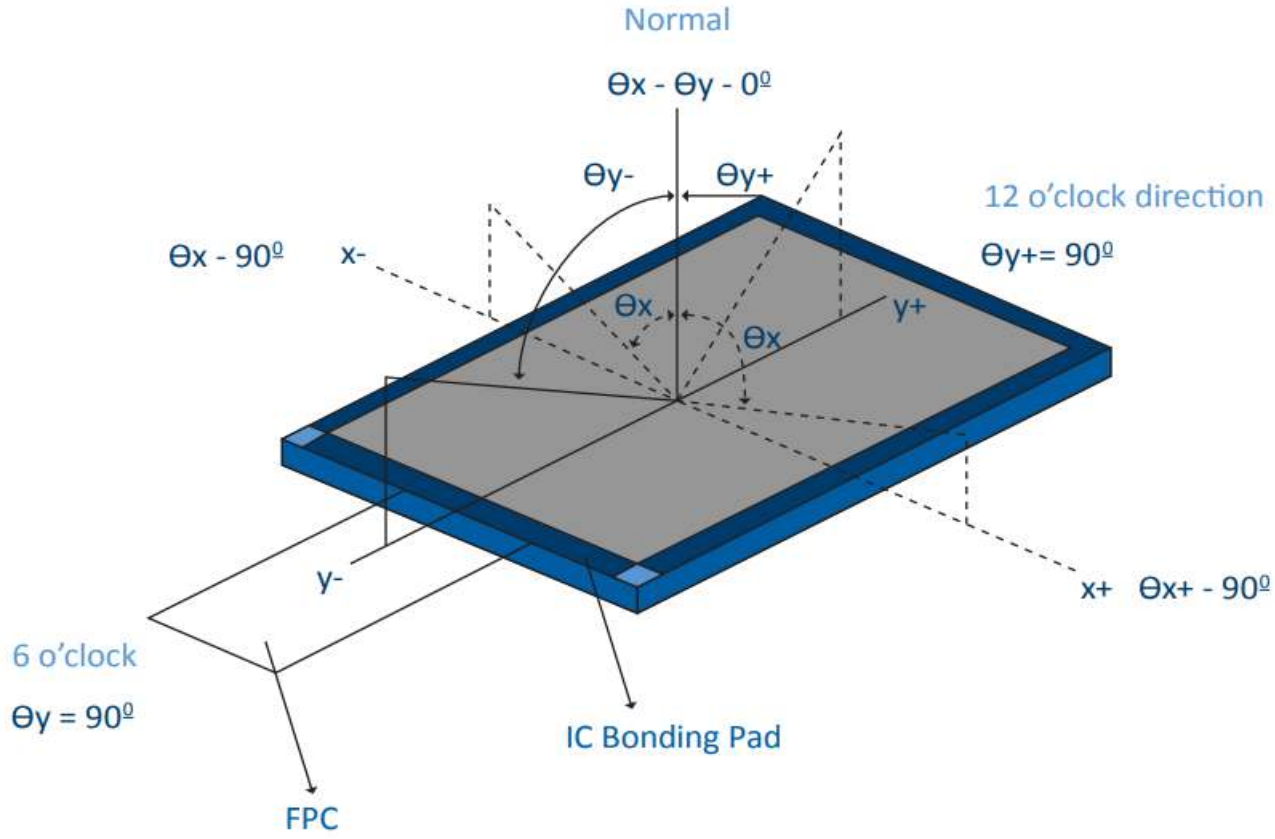
4.2 Measuring Condition

VDD = 3.3V, IL = 260mA (Backlight current)
Ambient temperature: 25 ± 2℃
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.

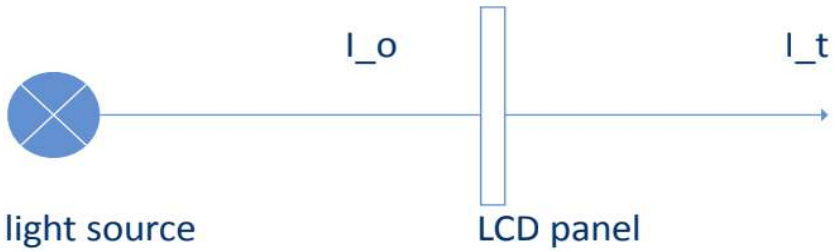




(2) Definition of Contrast Ratio (Cr): measured at the center point of panel. The contrast ratio (Cr) measured on a module, is the ratio between the luminance (Lw) in a full white area (R=G=B=1) and the luminance (Ld) in a dark area (R=G=B=0).

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

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

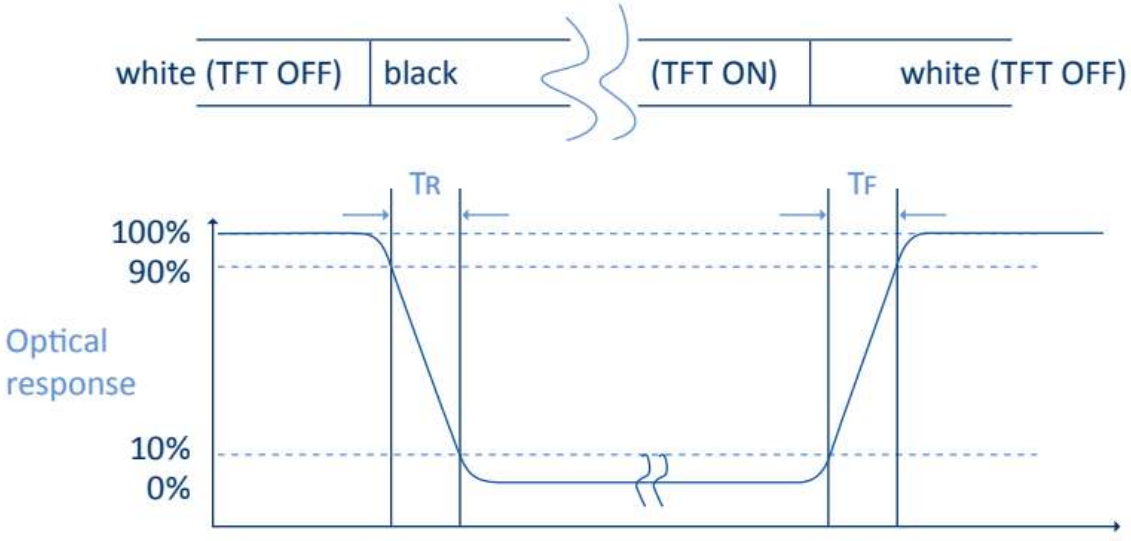


The transmittance is defined as:

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

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.

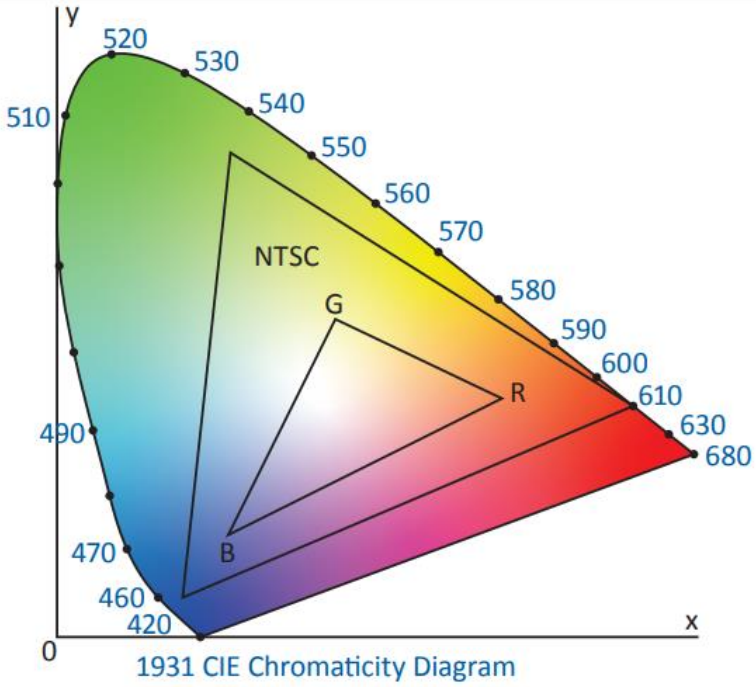
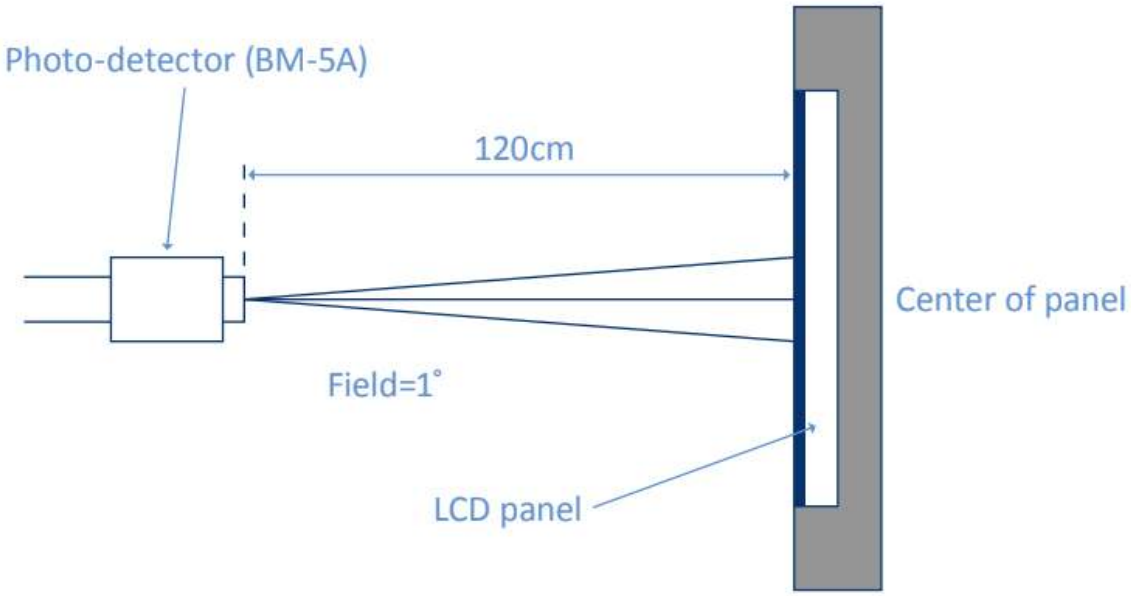


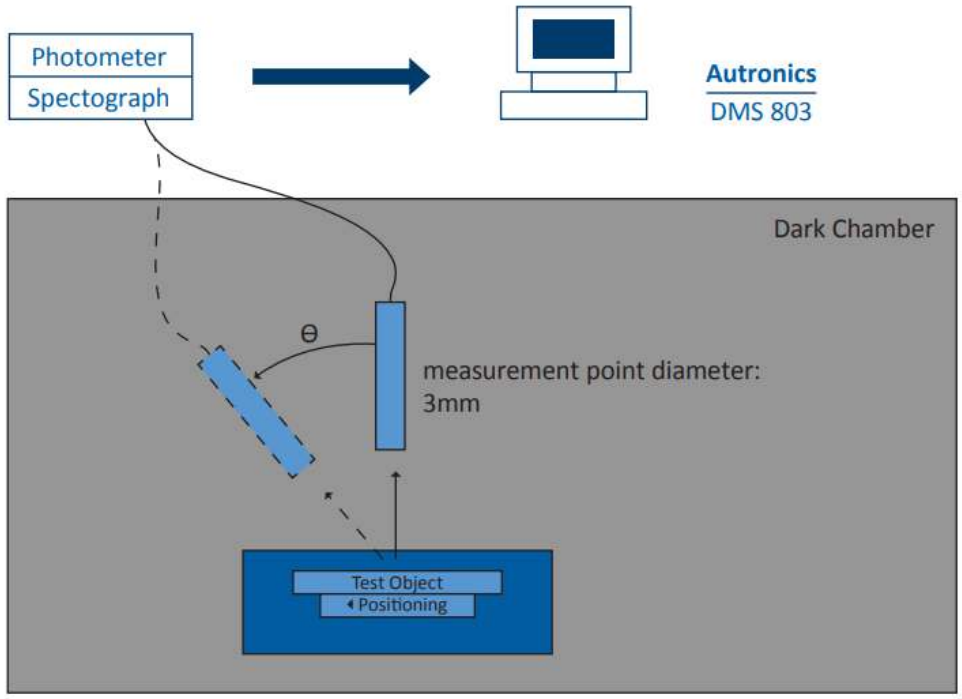
Fig. 1931 CIE chromacity diagram

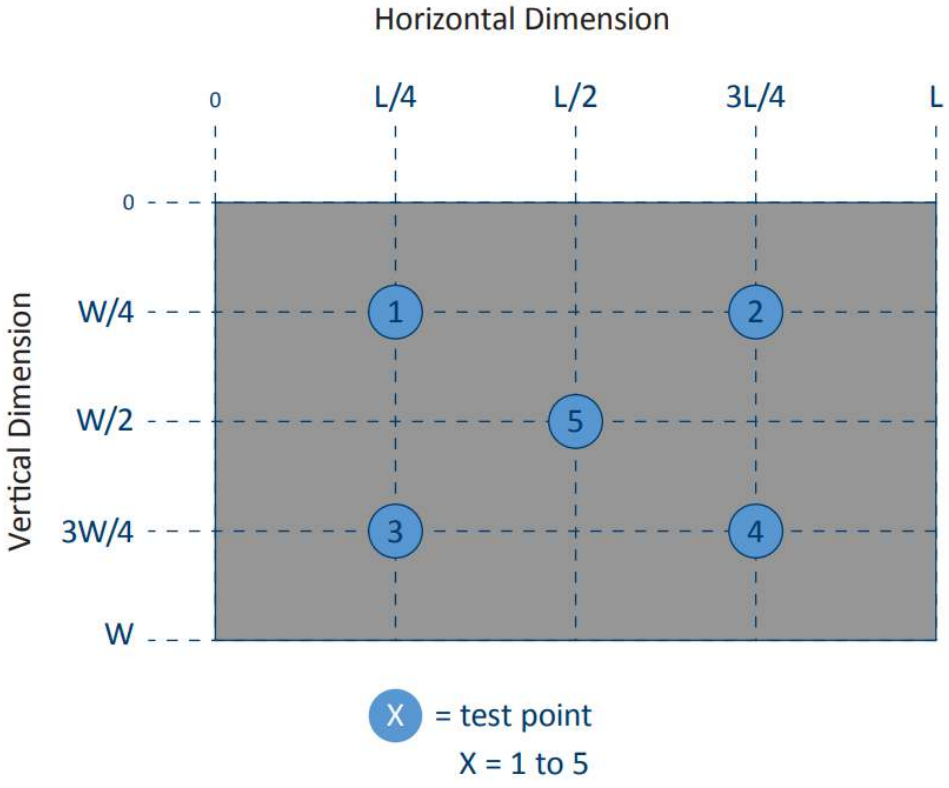
$$\text{Color gamut: } S = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}} \times 100\%$$

(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 ˚C, VSS=0V)

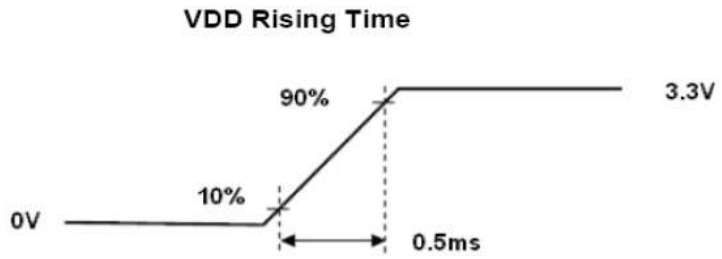
Characteristics	Symbol	Min	Max	Unit
Logic Supply Voltage	VDD	-0.3	4.0	V
Operating Temperature	TOP	0	+50	℃
Storage Temperature	TST	-20	+60	℃

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.

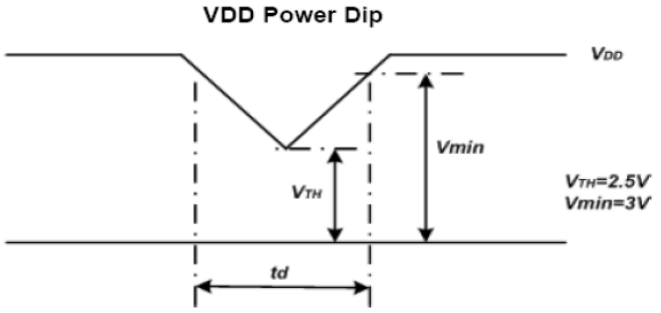
5.2 Typical Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit	Note
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	(2)(4)
Normal Mode Current Consumption	IDD	--	295	--	mA	(3)(4)
Level Input Voltage	VIH	0.7VDD		VDD	V	
	VIL	GND		0.3VDD	V	
Level Output Voltage	VOH	0.8VDD		VDD	V	
	VOL	GND		0.2VDD	V	

Note 1.) Measuring Condition:



Note 2.) VDD Power Dip Condition: VTH < VDD ≤ Vmin, td ≤ 10ms (time for the voltage to return to normal)



Note 3.) Frame Rate =60Hz, VDD=3.3V, DC Current

Note 4.) Operating temperature 25˚C, humidity 55%RH

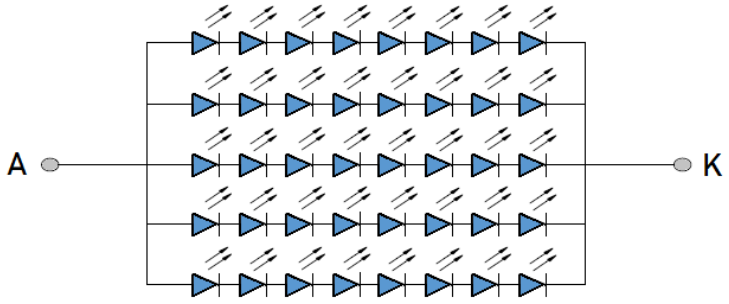
5.3 LED Backlight Characteristics

The backlight system is edge lighting type with 40 chips LED.

Item	Symbol	Min	Typ.	Max	Unit	Note
Forward Current	I_F	--	260	--	mA	
Forward Voltage	V_F	8.7	9.3	9.9	V	
LCM Luminance	LV	300	350	400	cd/m2	Note 3
LED lifetime	Hr	15,000	20,000	--	hour	Note1 & 2
Uniformity	AVg	70	75	--	%	Note 3

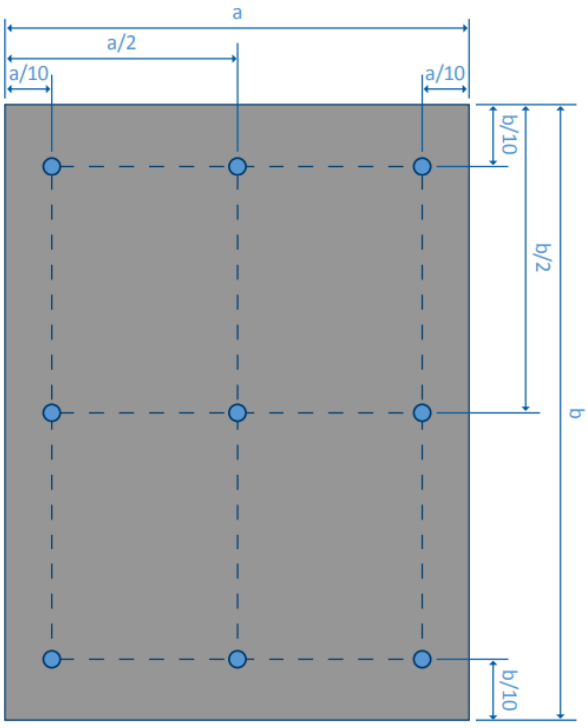
Note 1: LED lifetime (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25 ±3 ℃, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note 2: The "LED lifetime" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL = 260mA. The LED lifetime could be decreased if operating IL is larger than 260mA. The constant current driving method is suggested.



Backlight LED 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. AC Timing Characteristics

6.1 LVDS Receiver Electrical Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit	Note
Differential Input High Threshold Voltage	V_{th}	--	--	+100	mV	V_{CM}=+1.2V
Differential Input Low Threshold Voltage	V_{tl}	-100	--	--	mV	
Magnitude Differential Input Voltage	$\|V_{ID}\|$	100	--	600	mV	
Common Mode Voltage	V_{CM}	$\|V_{ID}\|/2$	--	2.4-$\|V_{ID}\|/2$	V	

Table 6.1: LVDS Receiver Differential Input Timing Characteristics

Note: Input signals shall be low or high resistance state when VDD is off. All electrical characteristics for LVDS signals are defined and shall be measured at the interface connector of the LCD.

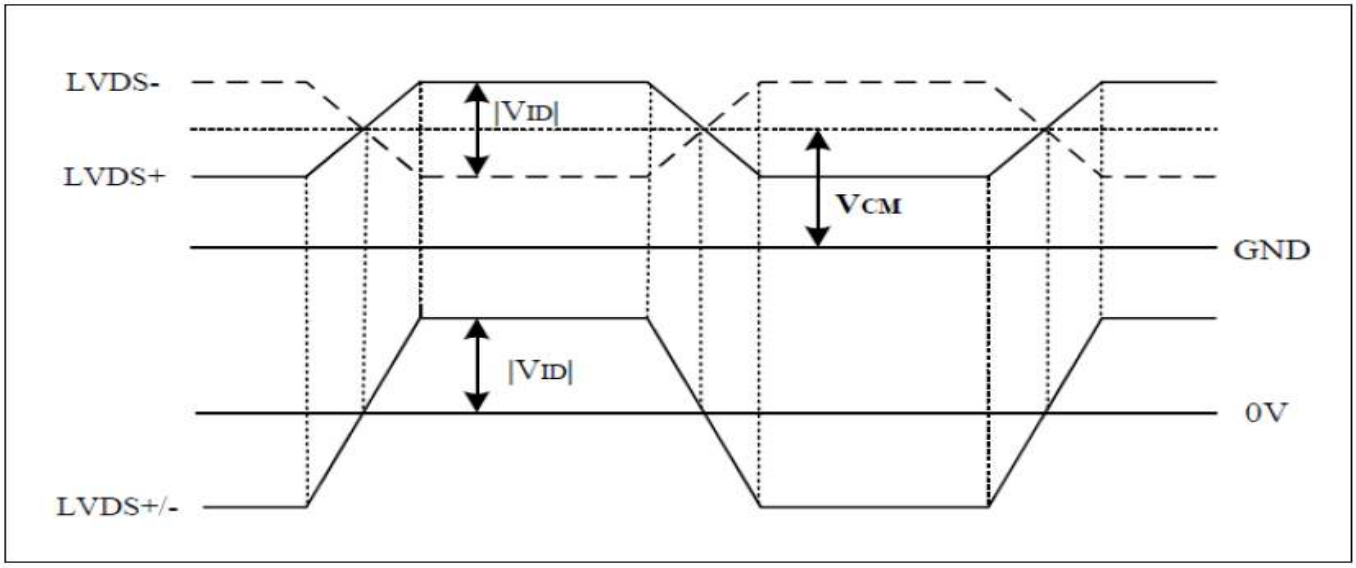


Figure 6.1: LVDS Receiver Differential Input Timing Diagram

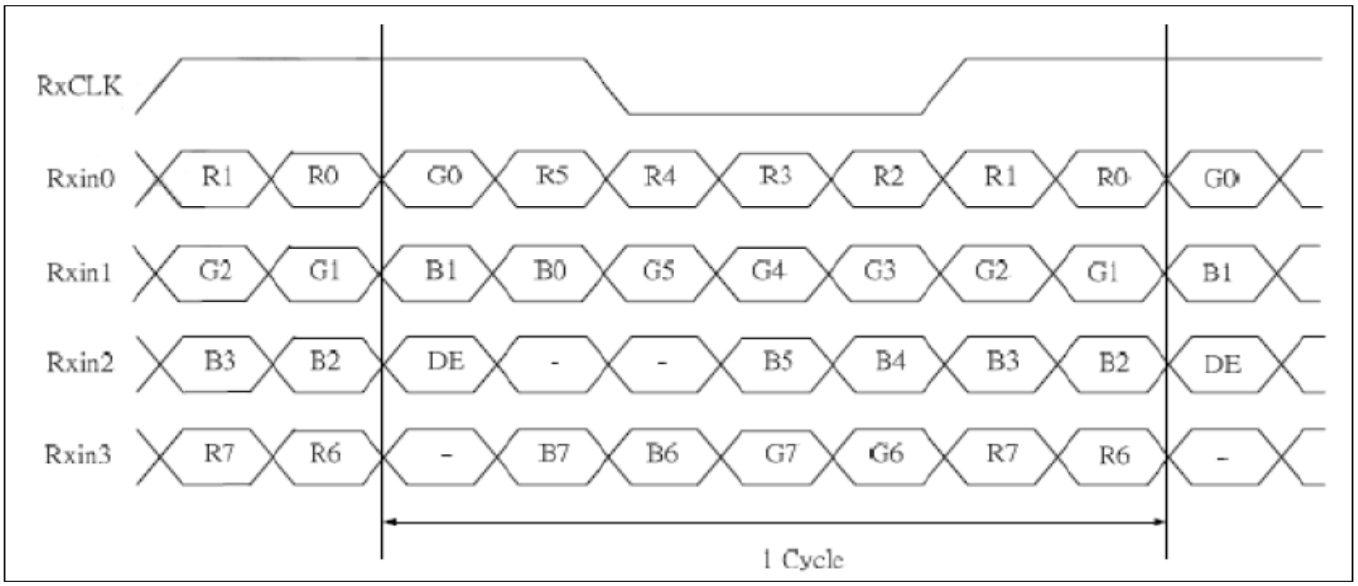


Figure 6.2: RGB Input Data Mapping Timing Diagram

6.2 Clock and Data Interface Timing Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit	Note
Frame Rate	--	--	60	--	Hz	
Frame Period	t_V	815	823	1023	line	
Vertical Display Time	t_{VD}	800	800	800	line	
Vertical Blanking Time	$t_{VW}+t_{VBP}+t_{VFP}$	15	23	33	line	
1 Line Scanning Time	t_H	1410	1440	1470	clock	
Horizontal Display Time	t_{HD}	1280	1280	1280	clock	
Horizontal Blanking Time	$t_{HW}+t_{HBP}+t_{HFP}$	60	160	190	clock	
Clock Rate	1/Tc	68.9	71.1	73.4	MHz	

Table 6.2: Interface Data Timing Characteristics

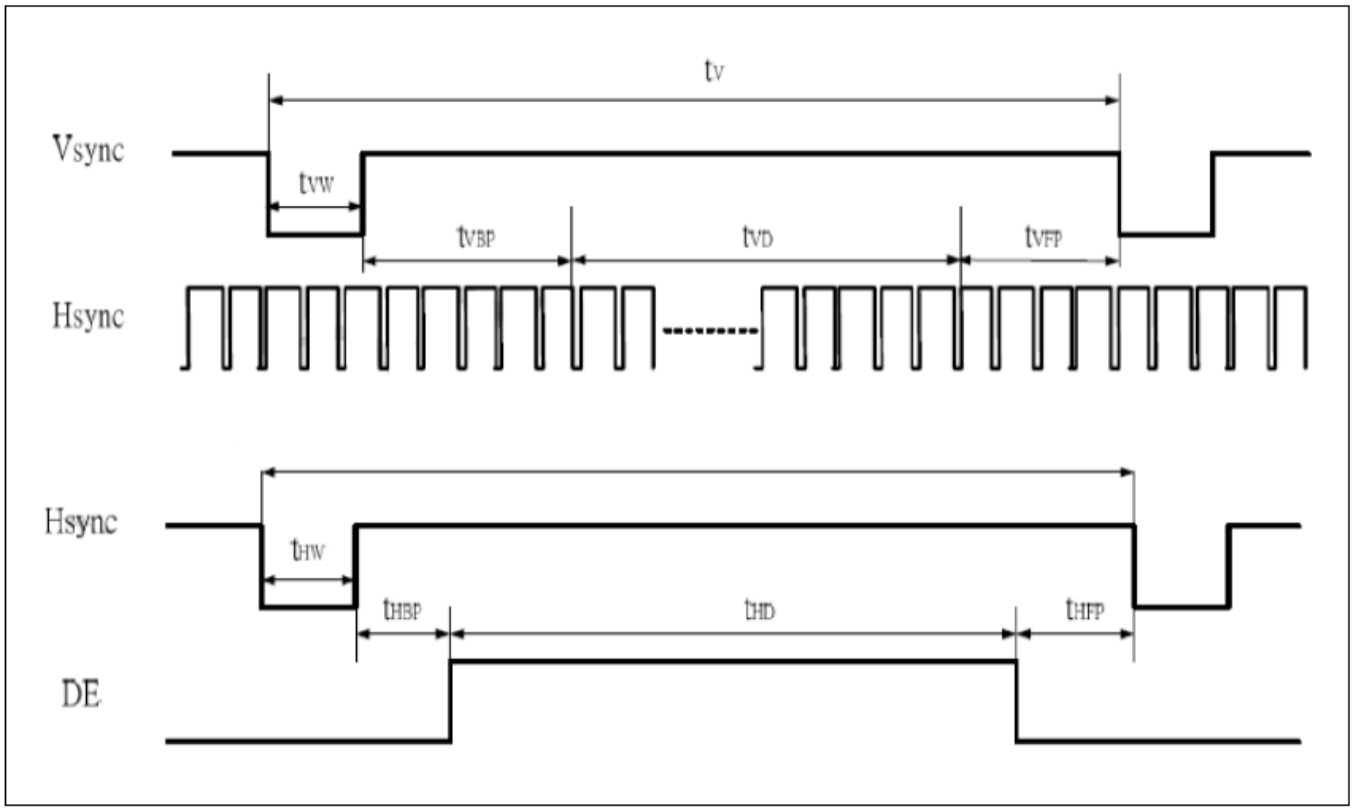


Figure 6.3: Interface Sync (DE Mode) Input Timing Diagram

6.3 Power ON/OFF Sequence Timing

The interface signals are shown below. Signals from any system shall be in high resistance state or low level when VDD is off.

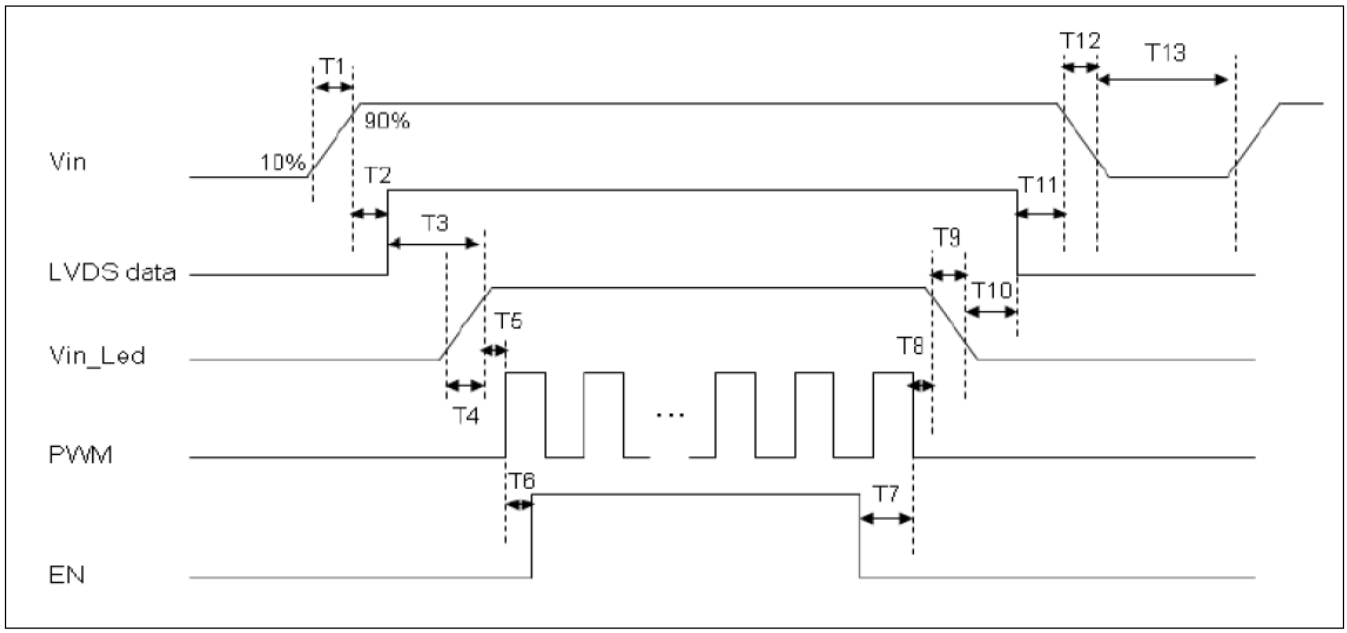


Figure 6.4: Power On/OFF Sequence Timing Diagram

Parameter	Symbol	Unit	Min	Typ.	Max
VIN rise time	T1	ms	0.5	--	10
VIN good to signal valid	T2	ms	30	--	90
Signal valid to backlight on	T3	ms	200	--	--
Backlight power on time	T4	ms	0.5	--	--
Backlight VDD good to system PWM on	T5	ms	10	--	--
System PWM on to backlight enable on	T6	ms	10	--	--
Backlight enable off to system PWM off	T7	ms	0	--	--
System PWM off to backlight power disable	T8	ms	200	--	--
Backlight power off time	T9	ms	0.5	10	30
Backlight off to signal disable	T10	ms	200	--	--
Signal disable to power down	T11	ms	0	--	50
VIN fall time	T12	ms	0.5	10	30
Power off	T13	ms	500	--	--

Table 6.3: Power On/OFF Sequence Timing Characteristics

7. Cautions and Handling Precautions

7.1 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.

7.2 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 ℃ 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.