

FU GANG ELECTRONIC (KUNSHAN) CO., LTD.



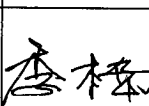
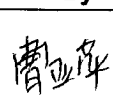
PRODUCT SPECIFICATION

RoHS

10.1" a-Si TFT LCD MODULE MODEL: FLA10WSL09-A0T

- < ◇ > Preliminary Specification
< ◆ > Engineering Specification
< ◇ > Approval Specification

CUSTOMER'S APPROVAL	
CUSTOMER :	
SIGNATURE:	DATE:

APPROVED BY	PM REVIEWED	PD REVIEWED	PREPARED By
 7/22/10	 7/22/10	 2010/7/22	 2010.7.22

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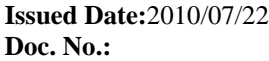
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1. General Description

1.1 Description

The specifications is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, driver ICs, FPC ,PCBA, TP and a backlight unit.The following table described the features of FLA10WSL09-A0T.

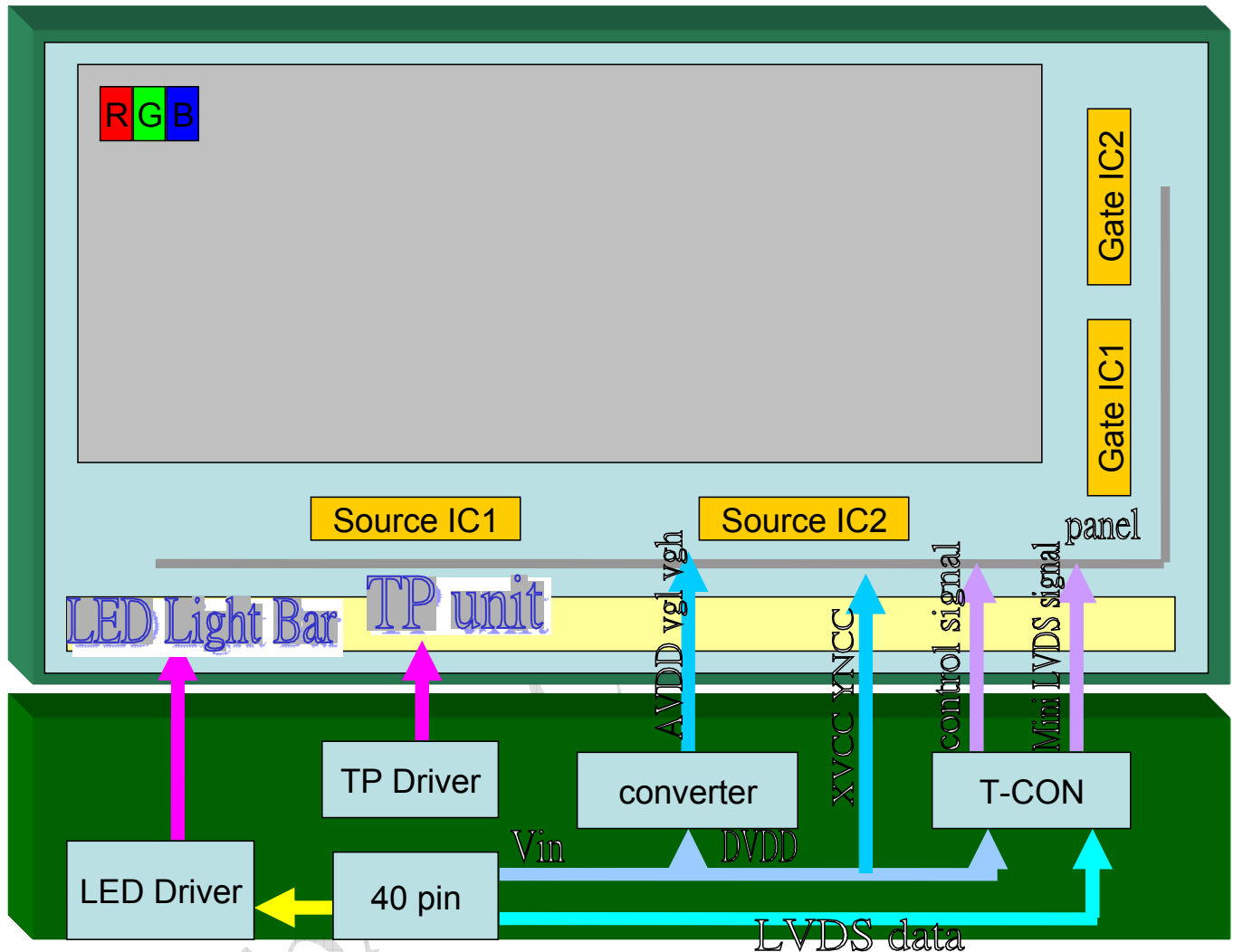
1.2 Features:

- 10.1"WSVGA TFT LCD Panel
- LED Light-bar Backlight System
- Supported WSVGA (H:1024 lines, V:600 pixels) resolution
- Compatible with RoHS Standard

1.3 Product Summary

No.	Item	Specification	Unit
1	Panel Size	10.1	inch
2	Number of Pixels	1024(H)×RGB×600(V)	Pixels
3	Active Area	222.72(H) × 125.28(V)	mm
4	Pixel Pitch	0.2175(H) x 0.2088(V)	mm
5	Outline Dimension	235(W) x 143(H) x5.3 (D)	mm
6	Number of Colors	262k	-
7	Pixel Arrangement	RGB Vertical Stripe	-
8	Display Mode	Normally White	-
9	Brightness	200(Typ.)	cd/m ²
10	Contrast Ratio	500(Typ.)	-
11	Response time (Tr+Tr)	16(Typ.)	ms
12	Viewing Direction	6 o'clock	-
13	Electrical Interface (Logic)	LVDS	-
14	Driver IC	Source IC: HX8285-A x 2 Gate IC HX8677-E x 2	-
15	Panel	IVO10.1	-
16	Viewing Angle	45/45,15/35	degree
17	Backlight unit	LED*(3X9)	-
18	Surface Treatment(PLZ)	HC	-
19	Touch Panel	Electromagnetic T/P	-
20	Weight	187.6	g

2. Functional Block Diagram



4. Pin Description

Pin #	Signal Name	Description	Remarks
1	NC	Not connected(Reserve)	
2	VDD	Power supply 3.3V(Typ.)	
3	VDD	Power supply 3.3V(Typ.)	
4	VDD_EDID	EDID_EEPROM power supply(3.3V)	
5	NC	Not connected(Reserve)	
6	SCL	EDID_EEPROM clock	
7	SDA	EDID_EEPROM data	
8	RX_0-	LVDS differential data input	
9	RX_0+	LVDS differential data input	
10	GND	Ground	
11	RX_1-	LVDS differential data input	
12	RX_1+	LVDS differential data input	
13	GND	Ground	
14	RX_2-	LVDS differential data input	
15	RX_2+	LVDS differential data input	
16	GND	Ground	
17	RX_CLK-	LVDS differential clock input	
18	RX_CLK+	LVDS differential clock input	
19	GND	Ground	
20	NC	Not connected(Reserve)	
21	NC	Not connected(Reserve)	
22	GND	Ground	
23	NC	Not connected(Reserve)	
24	USB_KEY	Not connected(Reserve)	
25	GND	Ground	
26	USB_D+	USBD+ line	
27	USB_D-	USBD- line	
28	GND	Ground	
29	USB_VDD	USB function power supply	
30	USB_GND	USB function ground	
31	GND_VLED	LED Ground	
32	GND_VLED	LED Ground	
33	GND_VLED	LED Ground	
34	BIST	Not connected(Reserve)	LCD selftest enable
35	PWM_LED	System PWM signal input	
36	EN_LED	LED enable pin(+3V input)	
37	NC	Not connected(Reserve)	
38	V_LED	LED Power Supply 5V	
39	V_LED	LED Power Supply 5V	
40	V_LED	LED Power Supply 5V	

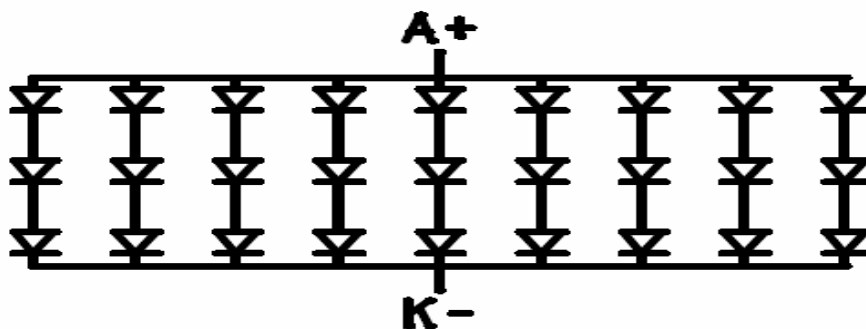
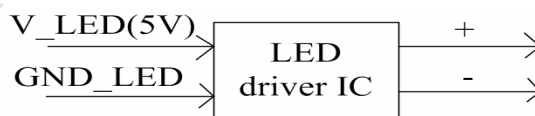
5. Absolute Maximum Ratings

5.1 Absolute Maximum Ratings

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Supply Voltages	VDD	-0.3	3.3	4.0	V	GND=0
VDD current	I_{VDD}	-	160	-	A	Black pattern
VDD Power Consumption	P_{VDD}	-	-	0.57	W	Black pattern
LVDS input signal		0.3	-	2.7	V	
Operating Temperature	TOP	0	-	50	°C	
Operating Humidity	HOP	10	-	80	%RH	
Storage Temperature	TST	-20	-	60	°C	
Storage Humidity	HST	10	-	90	%RH	

5.2 Backlight Characteristics

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
LED driver IC input	V_LED	4.5	5.0	5.5	V	
LED Forward Voltage	V_F	2.9	3.2	3.4	V	One LED
LED Forward Current	I_F		20		mA	One LED
LED Voltage	V_{LED}	-	9.6	-	V	
LED Current	I_{LED}	-	180	-	mA	
LED Power Consumption	P_{LED}	-	1786	2000	mW	
LED life time	LT	10000			Hours	
PWM Signal Voltage	PWM_LED	2.0	3.3	3.6	V	
		0		0.5	V	
LED Enable Voltage	EN_LED	2.0	3.3	3.6	V	
		0		0.5	V	
PWM Duty Ratio	PWM	5		100	%	



5.3 Signal Electrical Characteristics

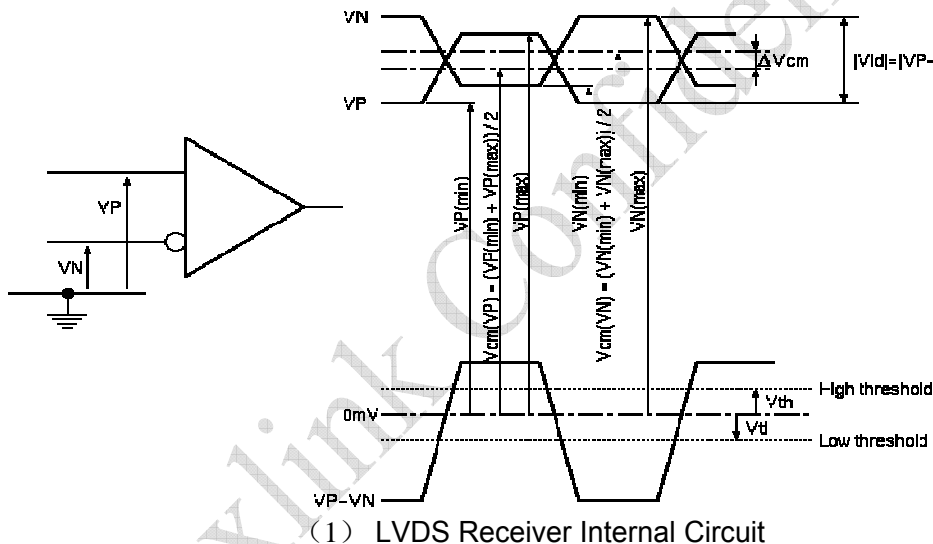
Input signals shall be low or High-impedance state when VDD is off. Signal electrical characteristics are as follows.

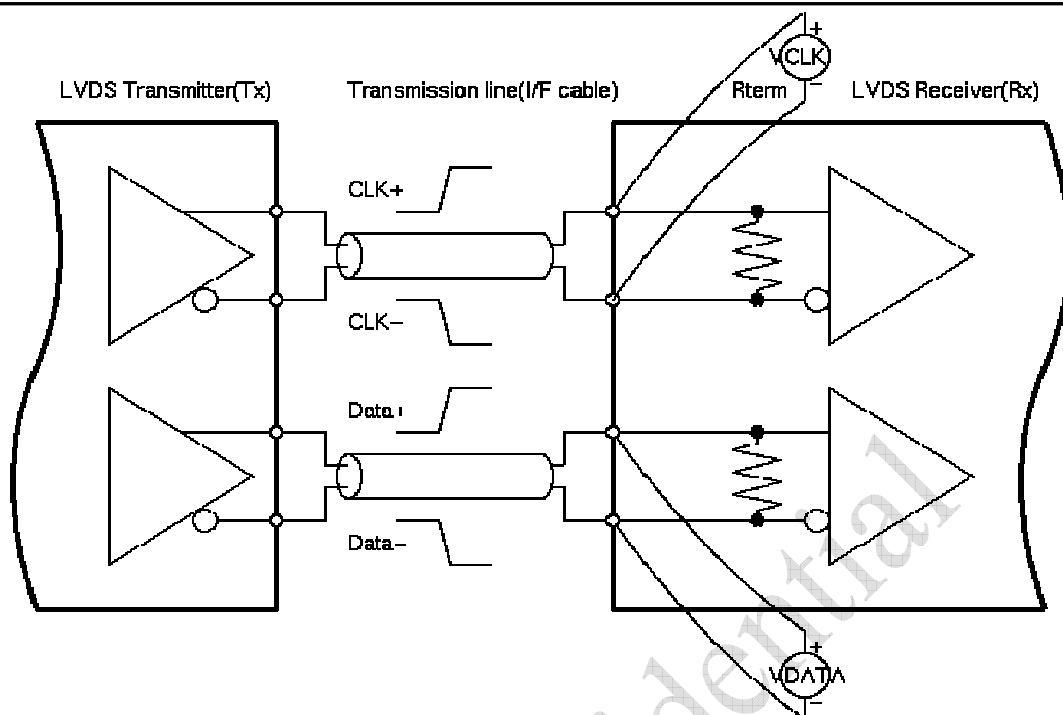
Item	Symbol	Min	Typ	Max.	Unit	Remark
Differential input high threshold	V_{th}	-	-	100	mV	$V_{cm}=1.2V$
Differential input low threshold	V_{tl}	-100			mV	$V_{cm}=1.2V$
Magnitude differential input voltage	$ V_{id} $	100		600	mV	
Common mode voltage	V_{cm}	1.0	1.2	1.4	V	
Common mode voltage offset	ΔV_{cm}	-50		50	mV	$V_{cm}=1.2V$

NOTE:

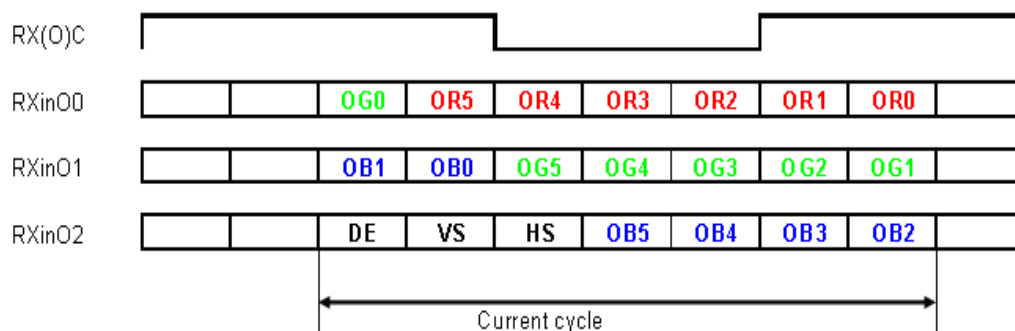
A. Input signals shall be low or Hi-Z state when VDD is off.

B. All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.





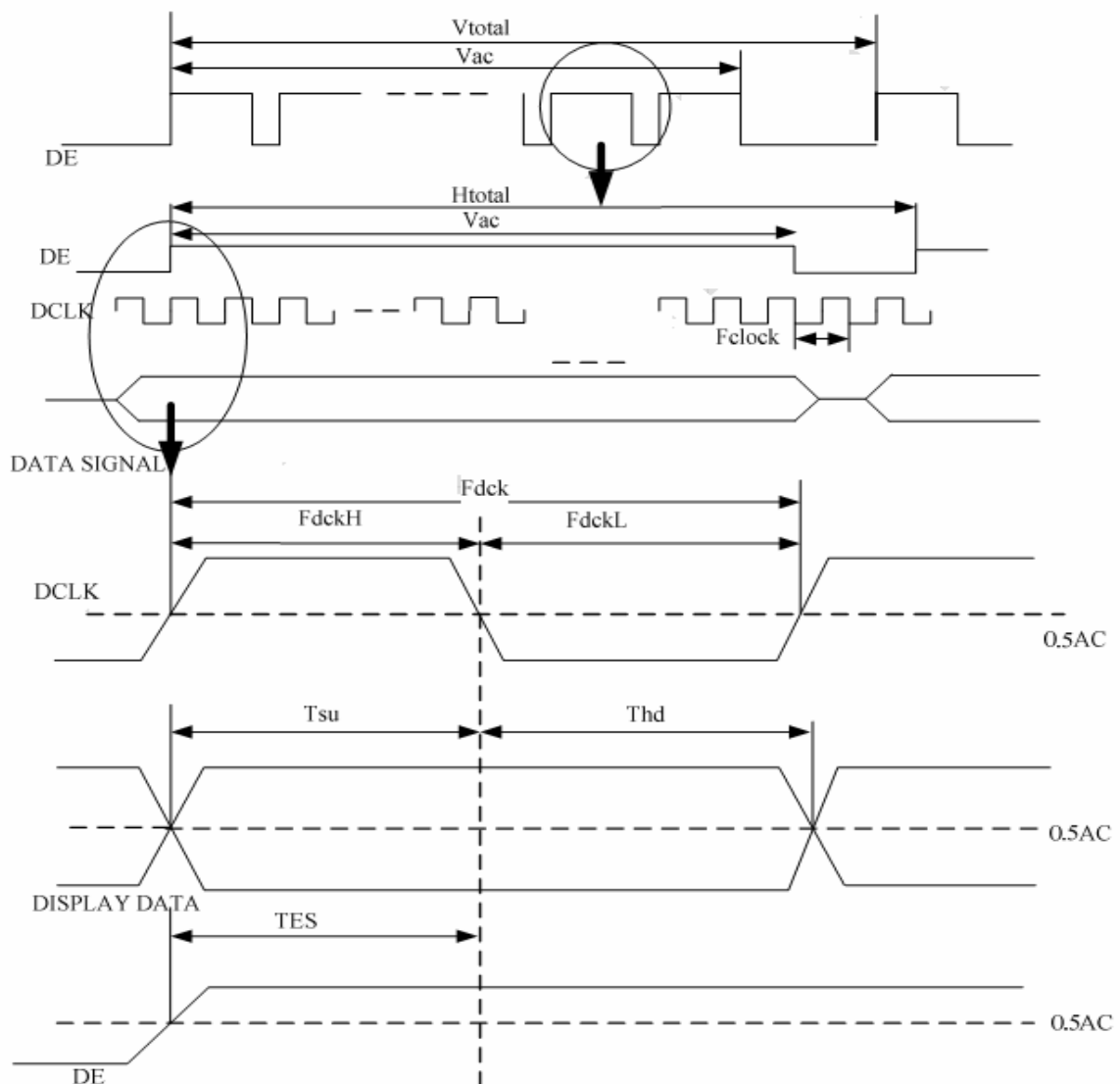
(2) Measument System



(3) Data mapping

5.4 Timing Characteristics

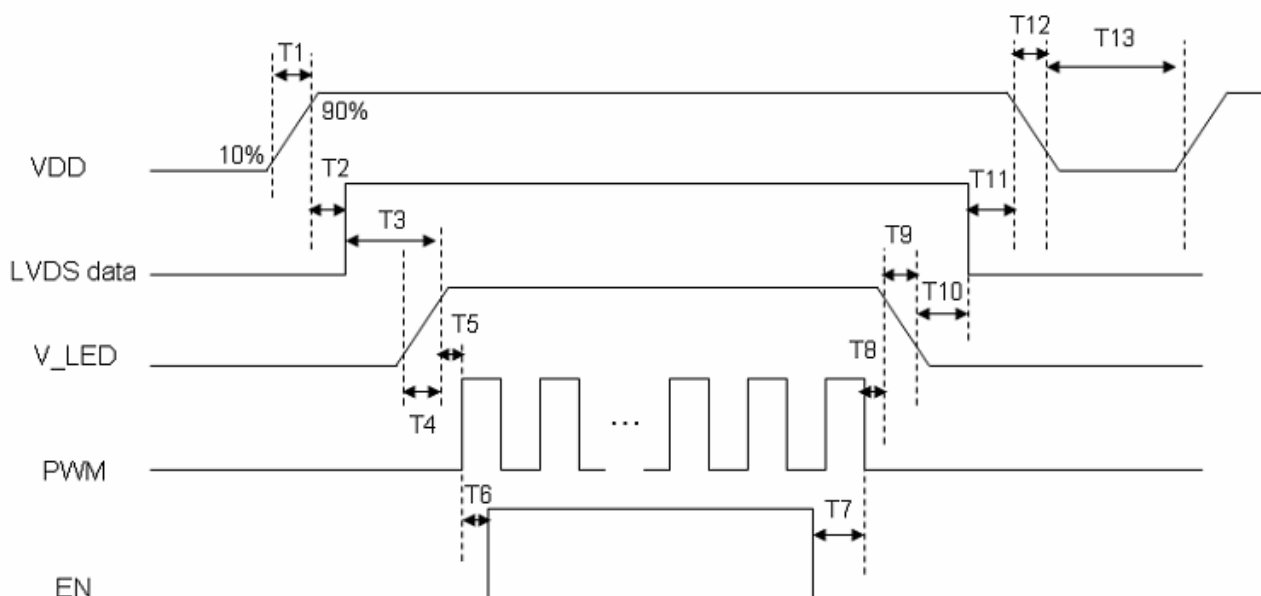
Parameter	Symbol	Unit	min	Typ.	Max
LVDS Clock Frequency(single)	Fdck	MHz	35.9	50.4	88.8
H Total Time	Htotal	clocks	1,076	1,344	2,022
H Active Time	Hac	clocks	1,024	1,024	1,024
V Total Time	Vtotal	lines	606	625	676
V Active Time	Vac	lines	600	600	600
Frame Rate	Vsync	Hz	55	60	65



5.5 Power ON/OFF Sequence

5.5.1 VDD power on/off sequence

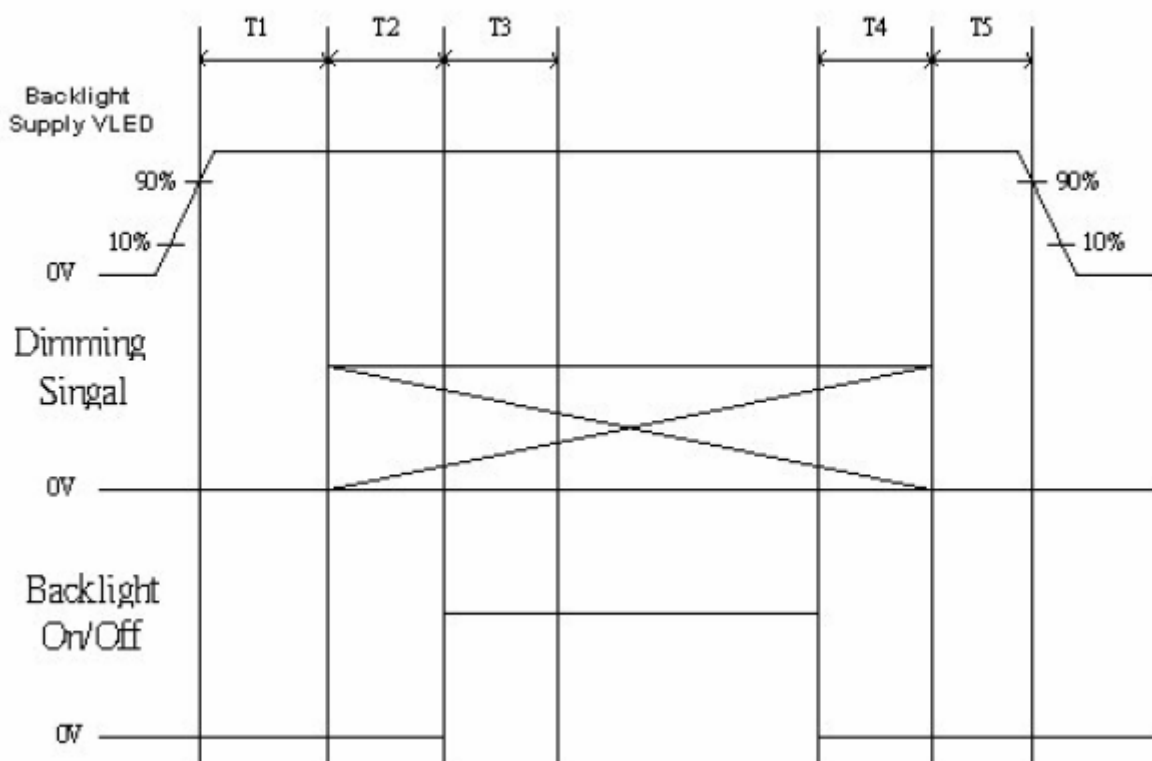
VDD power on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Parameter	Symbol	Unit	min	typ	max
VDD Rise Time	T1	ms	0.5	--	10
VDD 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 B/L Power Disable	T8	ms	10	--	--
Backlight Power Off Time	T9	ms	--	10	30
Backlight Off to Signal Disable	T10	ms	200	--	--
Signal Disable to Power Down	T11	ms	0	--	50
VDD Fall Time	T12	ms	--	10	30
Power Off	T13	ms	500	--	--

5.5.2 LED power on/off sequence

LED on/off sequence is as follows. Interface signals are also shown in the chart.



Symbol	Values			Unit
	Min	Typ	Max	
T1	10	---	---	ms
T2	10	---	---	
T3	50	---	---	
T4	0	---	---	
T5	10	---	---	

Note: The duty of LED dimming signal should be more than 20% in T2 and T3

6. Optical Characteristics

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note.

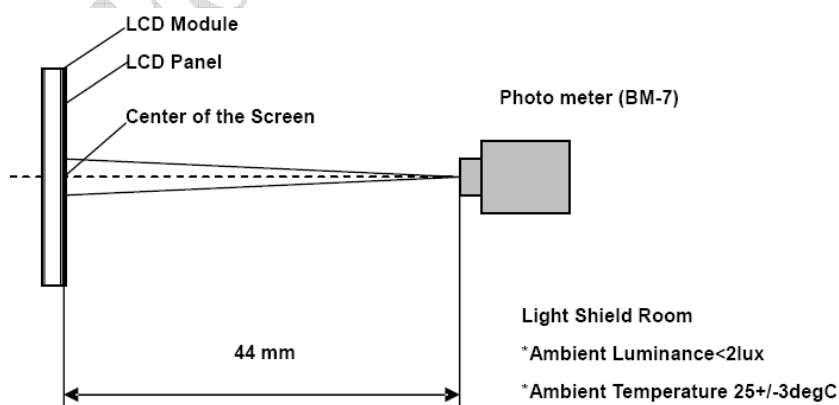
6.1 Main LCD Optical Characteristics(Including TouchPanel)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Top	ΦH	CR≥ 10	-	35	-	degree	A,B,C
	Bottom	ΦL		-	15	-		
	Left	ΘL		-	45	-		
	Right	ΘR		-	45	-		
Response time(Tr+Tf)			Θ=0	-	16	-	ms	A,B,E
Uniformity		Δ B	5points	-	80	-	%	A,B,G
			13points	-	67	-	%	
Brightness			Center	150	200	-	cd/m ²	5point A,B,F
Contrast Ratio		CR	At optimized viewing angle	450	500	-	-	A,B,D
Color Chromaticity	White	X _w	Viewing normal angle Φ,Θ=0	0.250	0.300	0.350	-	A,B
		Y _w		0.278	0.337	0.387		
	Red	X _R		0.549	0.599	0.649	-	A,B
		Y _R		0.315	0.365	0.415		
	Green	X _G		0.297	0.347	0.397	-	A,B
		Y _G		0.533	0.583	0.633		
	Blue	X _B		0.106	0.156	0.206	-	A,B
		Y _B		0.082	0.132	0.182		

Note:

A. Measurement Setup:

The LCD module should be stabilized at given temperature for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.

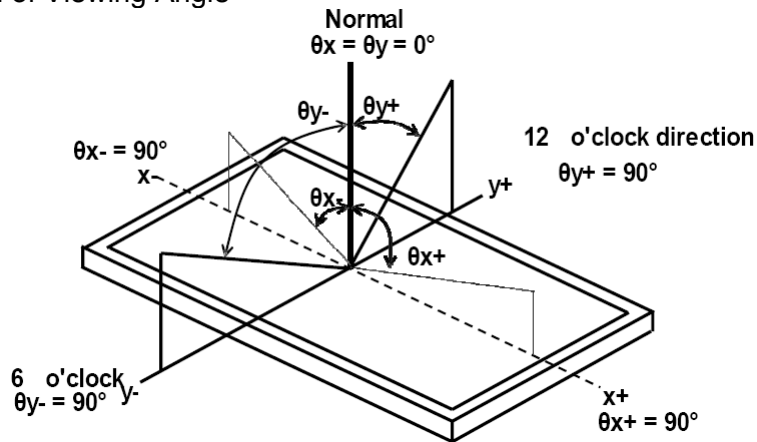


B. The LED input parameter setting as:

V_LED: 5V ($\pm 0.1V$)

PWM_LED: duty 100 %

C. Definition of Viewing Angle



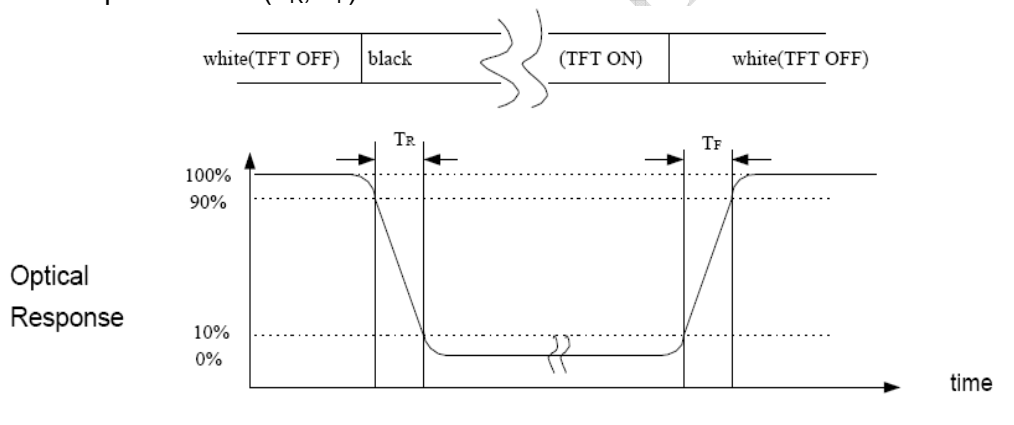
D. Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L_{63} / L_0

L_{63} : Luminance of gray level 63, L_0 : Luminance of gray level 0

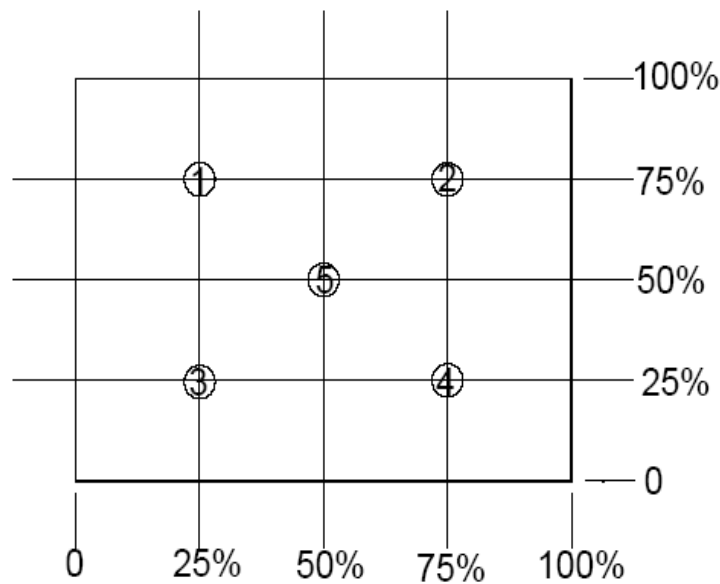
E. Definition of Response Time (T_R , T_F)



F. Definition of Luminance White

Measure the luminance of gray level 63 at center point

$$\text{Display Luminance} = \frac{1 + 2 + 3 + 4 + 5}{5}$$

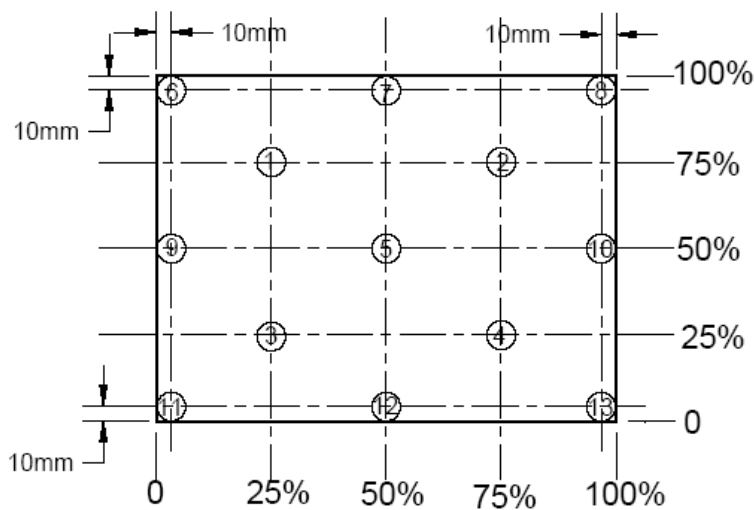


Screen Luminance Measurement Points (5)

G. Definition of Luminance Uniformity(Variation)

Measure the luminance of gray level 63 at 13 points.

$$UNF(13pts) = \frac{\min(L1, L2, \dots, L13)}{\max(L1, L2, \dots, L13)}$$



Screen Uniformity Measurement Points (13)

7. Reliability

T.B.D

8. Cosmetic Criteria of LCD Screen

T.B.D

9. Package

T.B.D

10. Precautions for Use

10.1 Safety

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

10.2 Storage Conditions

- (1) Store the panel or module in a dark place where the temperature is $23\pm5^{\circ}\text{C}$ and the humidity is below $50\pm20\%\text{RH}$.
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.

10.3 Handling Precautions

- (1) Avoid static electricity which can damage the CMOS LSI.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (5) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (6) Do not operate it above the absolute maximum rating.
- (7) Do not remove the panel or frame from the module.
- (8) Please wear clean finger sacks, gloves and mask to protect the products from fingerprint or stain attach, and also hold the portion outside the view area when handling the panel.
- (9) Do not put one product on the other. Otherwise, it may cause the product to be scratched and/or change on cosmetic occur (ex. Newton ring).
- (10) Do not put a heavy, hard or sharp object on the product.

10.4 Warranty

- (1) The period is within twelve months since the date of shipping out under normal using and storage conditions.
- (2) All process and material comply ROHS.