



Product *Specification*

Customer: _____

Product No.: TM070RLZ00

Date: 2009.5.27

Version: 1.0

☒ **Preliminary Specification**

☐ **Final Specification**

For Customer's Comment

Approved	Customer's Comment

Prepared By	Checked By	Approved By

Table of Contents

Table of Contents	2
Record of Revision.....	3
1. General Specifications	4
2. Input/Output Terminals	5
3. Absolute Maximum Ratings	6
4. Electrical Characteristics.....	6
5. Timing Chart.....	8
6. Optical Characteristics	11
7. Environmental / Reliability Test	14
8. Mechanical Drawing	15
9. Precautions For Use Of LCD Modules.....	16

Record of Revision

Rev	Issued Date	Description	Editor
1.0	2009-05-27	Initial release	Yuliang Wu

1. General Specifications

This specification applies to 6.95" color TFT-LCD module, This product is composed of a color TFT-LCD panel, driver ICs, T-CON board and backlight unit

Feature		Spec
Display Spec.	Size	6.95 inch
	Resolution	800(RGB) x 480
	Interface	TTL RGB 6 bits
	Color Depth	262K
	Technology Type	a-Si
	Pixel Pitch (mm)	0.1965x0.1715
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	TM with Normally White
	Surface Treatment(Up Polarizer)	Anti-Glare
	Viewing Direction	12 o'clock
	Gray Scale Inversion Direction	6 o'clock
Mechanical Characteristics	LCM (W x H x D) (mm)	167.00x93.00
	Active Area(mm)	157.20x82.32
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	30 LEDs

Note 1 : Viewing direction for best image quality is different from TFT definition, there is a 180 degree shift.

Note 2 : Requirements on Environmental Protection: RoHS

Note 3 : LCM weight tolerance : +/- 5%

2. Input/Output Terminals

TFT-LCD Panel Driving

PIN NO.	SYMBOL	FUNCTION
1	NC	-
2	NC	-
3	NC	-
4	NC	-
5	NC	-
6	VDD	power supply
7	VDD	power supply
8	MODE	DE OR HV MODE SELECT
9	DE	
10	VS	Vertical Sync
11	HS	Horizontal Sync
12	GND	GND
13	B5	Blue Data Signal
14	B4	Blue Data Signal
15	B3	Blue Data Signal
16	GND	GND
17	B2	Blue Data Signal
18	B1	Blue Data Signal
19	B0	Blue Data Signal
20	GND	GND
21	G5	Green Data Signal
22	G4	Green Data Signal
23	G3	Green Data Signal
24	GND	GND
25	G2	Green Data Signal
26	G1	Green Data Signal
27	G0	Green Data Signal
28	GND	GND
29	R5	Red Data Signal
30	R4	Red Data Signal
31	R3	Red Data Signal
32	GND	GND
33	R2	Red Data Signal
34	R1	Red Data Signal
35	R0	Red Data Signal
36	GND	GND
37	DCLK	Clock Signal For Sampling Each Data Signal
38	GND	GND
39	L/R	Scan control
40	U/D	Scan control

Note1: I/O definition.

I---Input pin; O---Output pin; P--- Power/Ground

Note2:

Scan control input		Scanning direction
U/D	R/L	
GND	VCC	Down to up, left to right
VCC	GND	Up to down, right to left
GND	GND	Down to up, right to left
VCC	VCC	Up to down, left to right

3. Absolute Maximum Ratings

VSS1=VSS2=GND=0V, Ta = 25℃

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VDD	-0.5	5.0	V	
Backlight Forward Current	I _F	--	25.0	mA	For each LED
Operating Temperature	Top	-20	70	℃	
Storage Temperature	Tst	-30	80	℃	

4. Electrical Characteristics

4.1. Driving TFT LCD Panel

GND=0V, Ta = 25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Digital supply Voltage	VDD	3.0	3.3	3.6	V	
Input Signal Voltage	Low Level	V _{IL}	0	--	0.3xVDD	V
	High Level	V _{IH}	0.7xVDD	--	VDD	V
Output Signal Voltage	Low Level	V _{OL}	GND	--	0.2xVDD	V
	High Level	V _{OH}	0.8xVDD	--	--	V
Current of digital supply voltage	I _{VDD}	--	TBD.	--	mA	VDD=3.3V

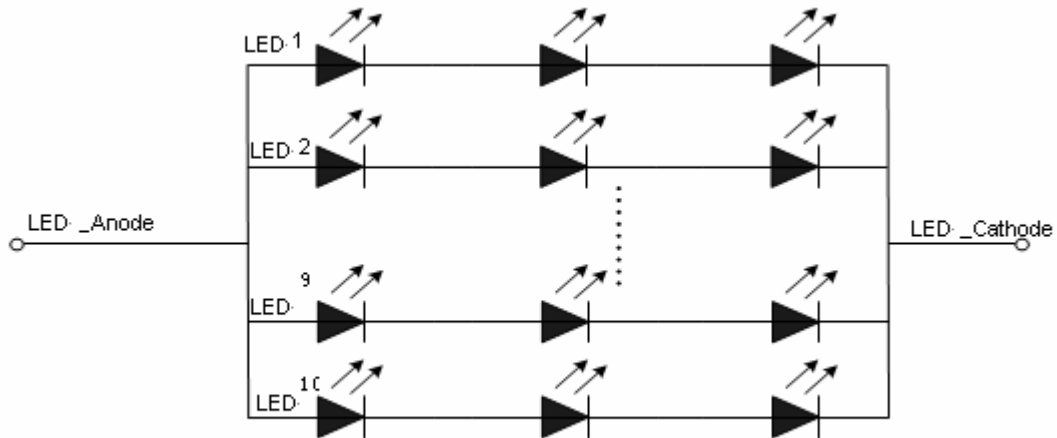
Note1: the value is for design stage only.

4.2. Driving Backlight

Ta=25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I _F	--	200	--	mA	Note 1,2
Forward Current Voltage	V _F	--	9.6	--	V	
Backlight Power Consumption	W _{BL}	--	1.92	--	W	

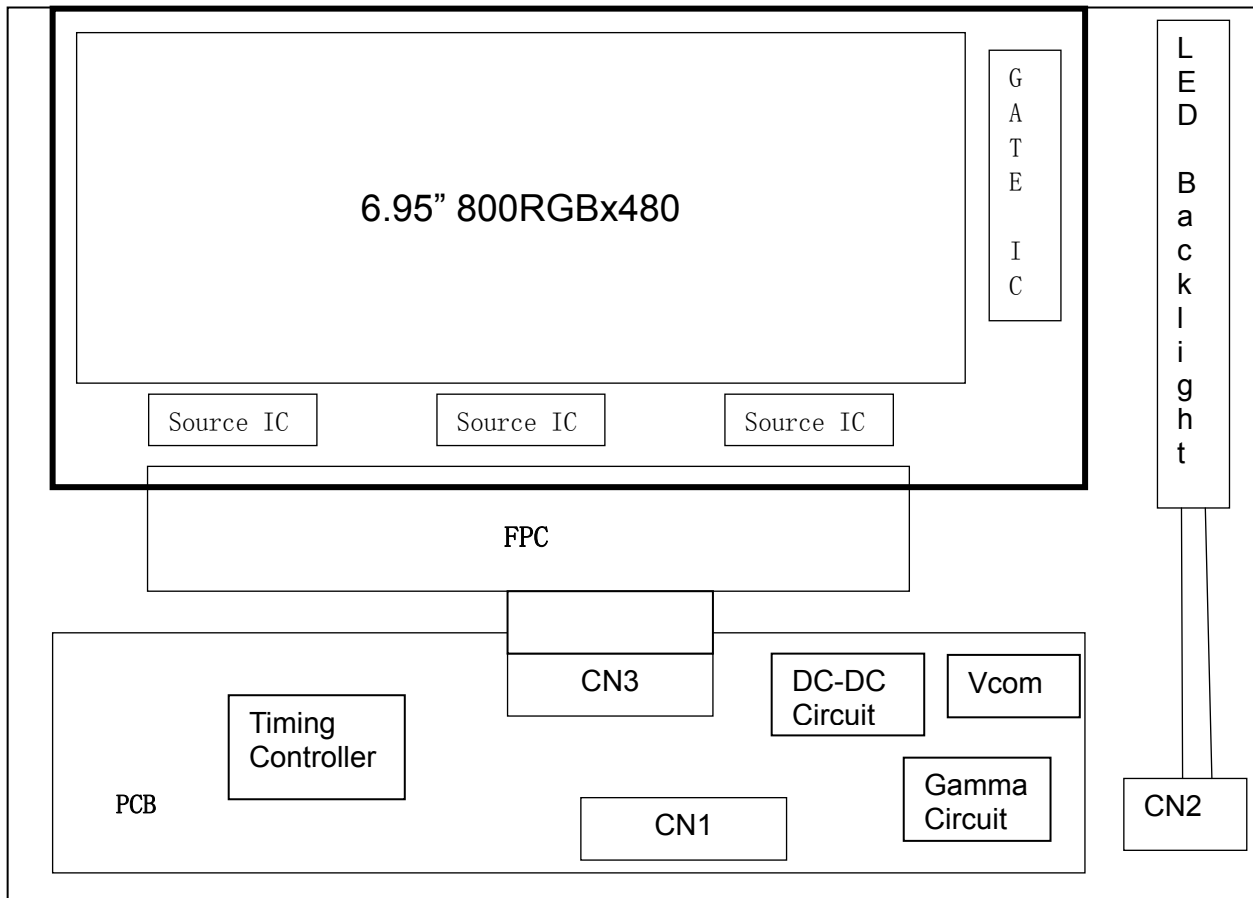
Note 1 :The LED driving condition is defined for each LED module （3 LED Serial） .



Note 2 :BLU connector:

Pin	Symbol	I/O	Description	Remark
1	LED+	P	LED anode	
2	LED-	P	LED cathode	

4.3. Block Diagram



5. Timing Chart

5.1. Input Timing Setting (DCLK,Hsync,Vsync)

5.1.1 HV mode timing setting

(VDD=3.3V, GND=0V, Ta=25℃)

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	Fclk	26.4	33.3	40.0	MHZ	
	Tclk	37.9	30.0	25.0	ns	
Hsync	th	862	1056	1200	Tclk	
	thd	800	800	800	Tclk	
	thpw	1	-	40	Tclk	
	thb	46	46	46	Tclk	
	thfp	16	210	354	Tclk	
Vsync	tv	510	525	650	th	
	tvd	480	480	480	th	
	tvpw	1	-	20	th	
	tvb	23	23	23	th	
	tvfp	7	22	147	th	

Note: Base on TCON NT39703-5

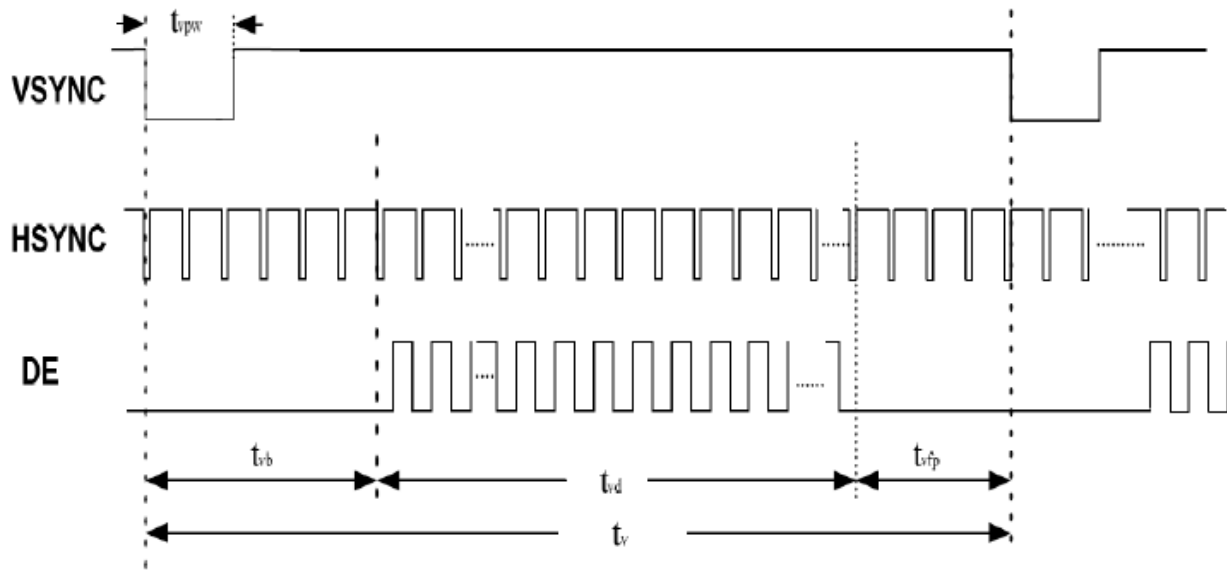
5.1.2 DE mode timing setting

(VDD=3.3V, GND=0V, Ta=25℃)

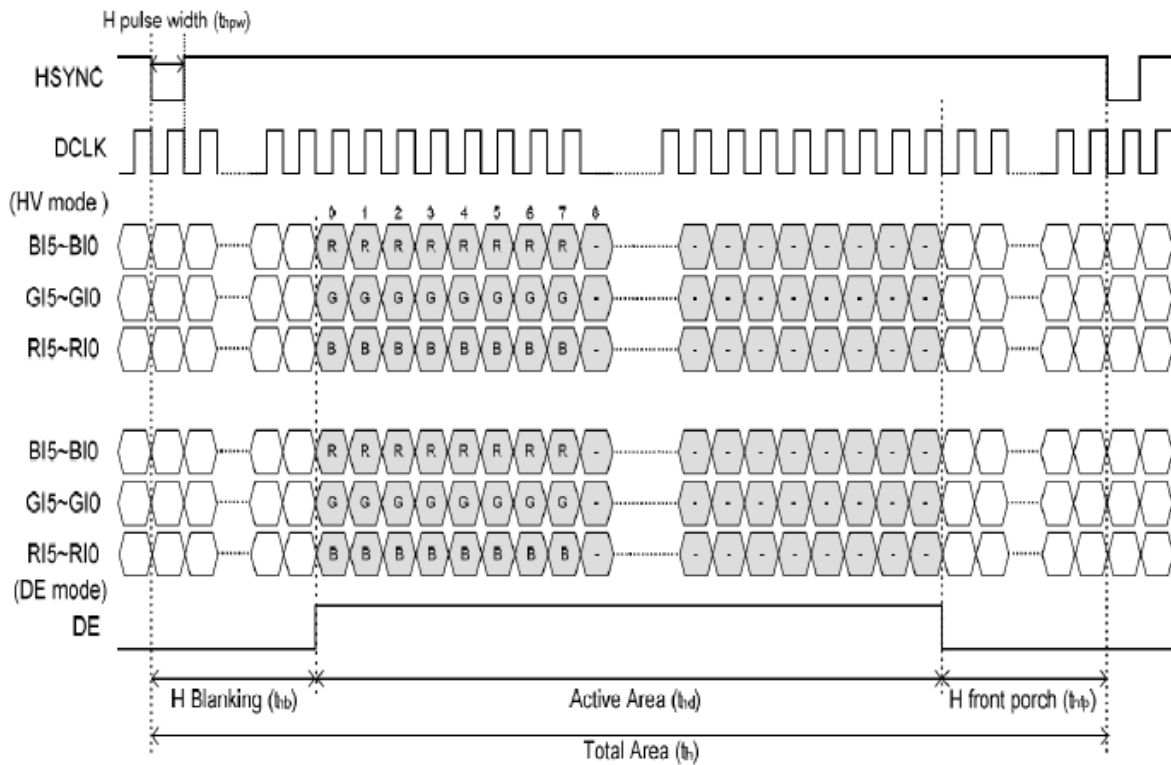
Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	Fclk	24.4	33.3	40.0	MHZ	
	Tclk	41.0	30.0	25.0	ns	
Hsync	th	840	1056	1300	Tclk	
	thd	800	800	800	Tclk	
	Thb+thfp	40	256	500	Tclk	
Vsync	tv	485	525	700	th	
	tvd	480	480	480	th	
	Tvb+tvfp	5	45	220	th	

Note: Base on TCON NT39703-5

5.1.3 Vertical input timing



5.1.4 Horizontal input timing



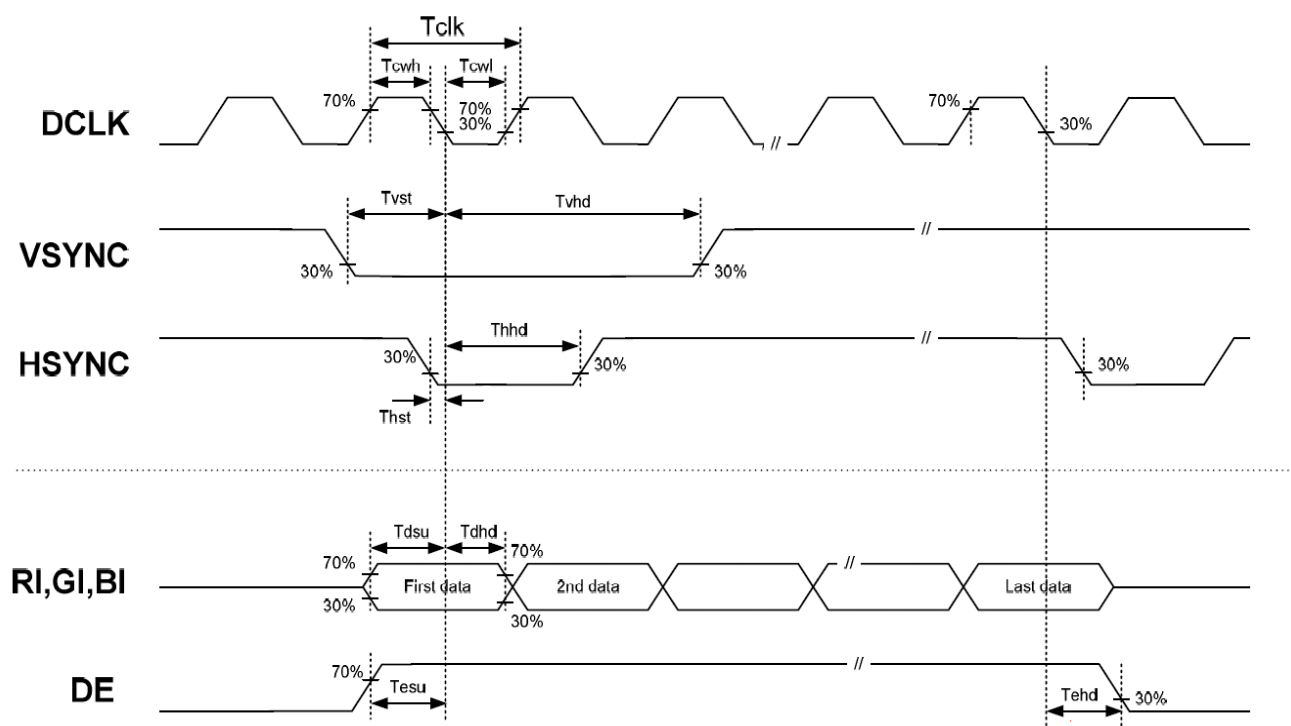
5.2 Input Timing AC Characteristics

5.2.1 Input Timing AC Characteristics

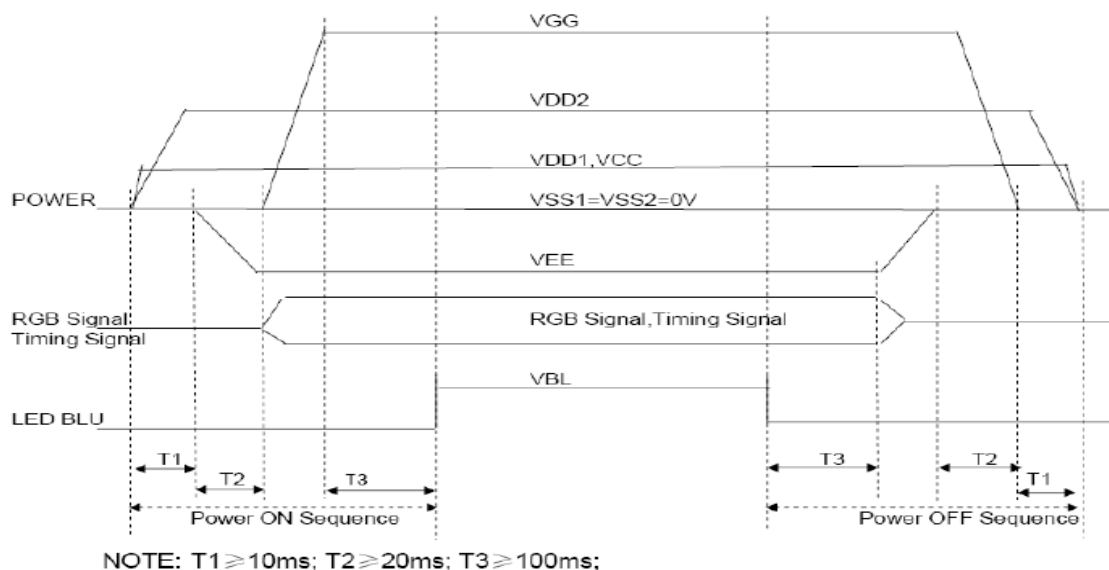
Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	fclk	24.4	33.3	40.0	MHZ	
	Tclk	41.0	30.0	25.0	ns	
	Tcwh	40	50	60	%	
Hsync	Thst	4	-	-	ns	
	Thhd	4	-	-	ns	
Vsync	Tvst	4	-	-	ns	
	Tvhd	4	-	-	ns	
DE	Tesu	4	-	-	ns	
	Tesd	4	-	-	ns	
DATA (RI,GI,BI)	Tdsu	4	-	-	ns	
	Tdhd	4	-	-	ns	

Note: Base on TCON NT39703-5

5.2.2 Input Timing



5.3 Power On/Off Sequence



6 Optical Characteristics

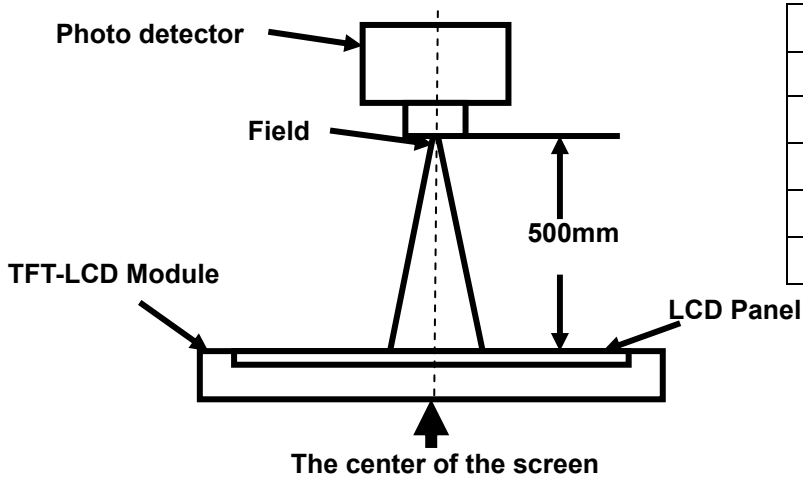
Ta=25℃

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles	θT	CR ≥ 10	50	60		Degree	Note2,3
	θB		50	60			
	θL		60	70			
	θR		60	70			
Contrast Ratio	CR	θ=0°	300	400			Note 3
Response Time	Ton	25℃		25	40	ms	Note 4
	Toff						
Chromaticity	White	Backlight is on	x	0.260	0.310	0.360	Note 1,5
			y	0.280	0.330	0.380	
Uniformity	U		75	80		%	Note 6
NTSC				50		%	Note 5
Luminance	L		280	350		cd/m ²	Note 7

Test Conditions:

1. $V_F = 3.2V$, $I_F = 20mA$ (one LED current),The ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.
3. Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

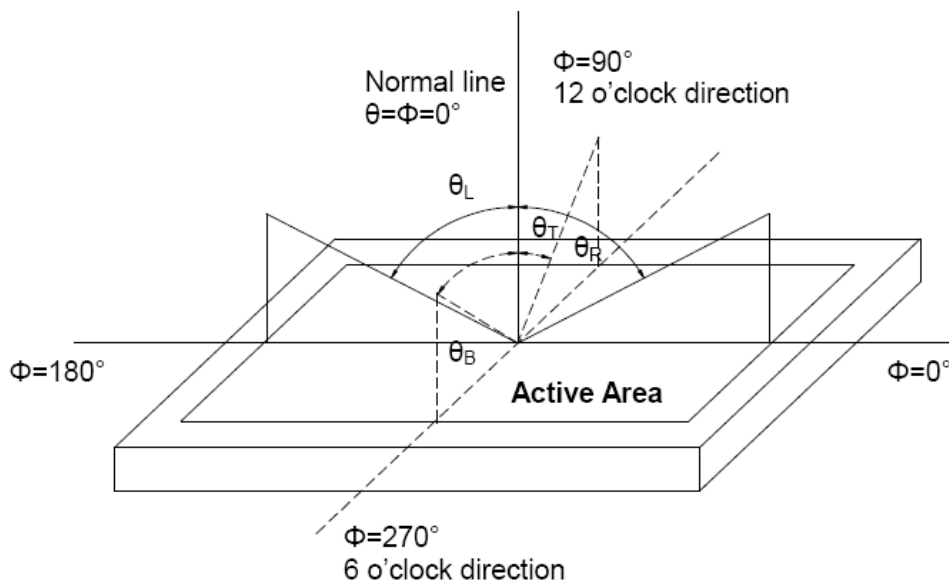


Fig. 6.1 Definition of viewing angle

Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

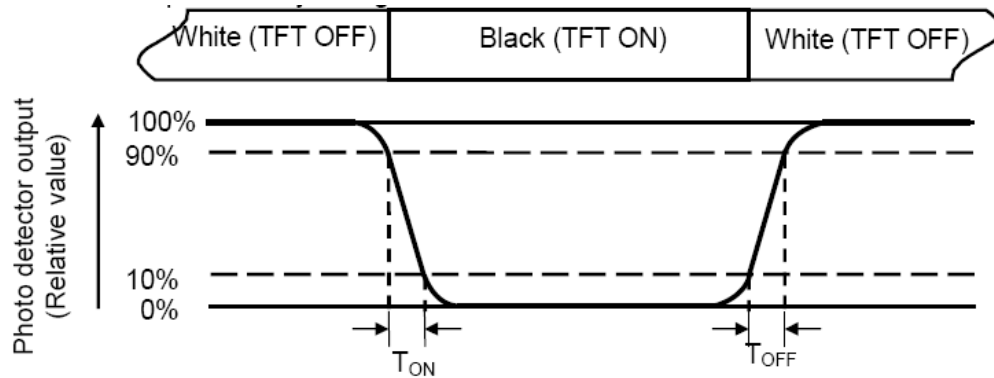
“White state “:The state is that the LCD should driven by Vwhite.

“Black state”: The state is that the LCD should driven by Vblack.

Vwhite: To be determined Vblack: To be determined.

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity}(U) = L_{\min} / L_{\max}$$

L-----Active area length W----- Active area width

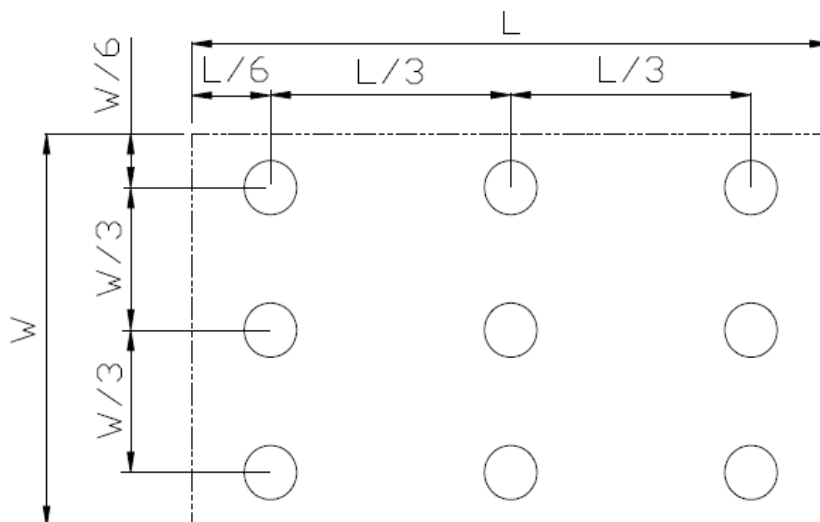


Fig. 6.2 Definition of uniformity

$L_{\max}$: The measured maximum luminance of all measurement position.

$L_{\min}$: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance :

Measure the luminance of white state at center point.

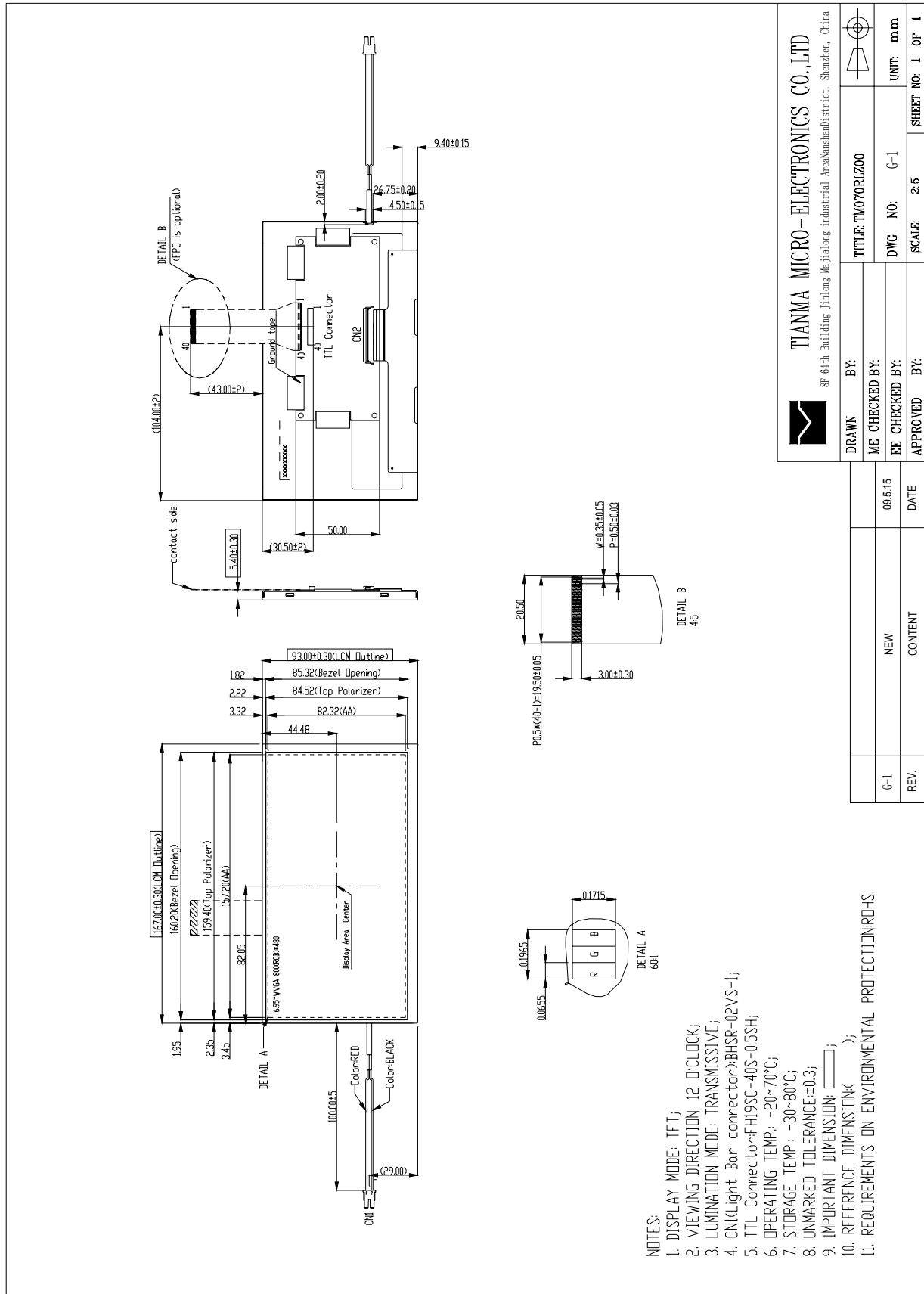
7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-2-2
2	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-2-1
3	High Temperature Operation	Ts = +70℃, 240 hours	IEC60068-2-2
4	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1
5	Operation at High Temperature and Humidity	Ta = +60℃, 90% RH max, 240 hours	IEC60068-2-3
6	Thermal Shock (non-operation)	-20℃ 30 min ~ +70℃ 30 min, Change time: 5min, 100 Cycle	IEC60068-2-14
7	Vibration Test	Sine Wave Frequency range: 10~55Hz Stroke: 1.5mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total)	IEC60068-2-6 JISC7021, A-10 condition A
8	Mechanical Shock (Non Op)	Half Sine Wave 60G 6ms, ±X, ±Y, ±Z 3 times for each direction	IEC60068-2-27 JISC7021, A-10 condition C
9	Package Drop Test	Height: 60cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32
10	ESD	C=150pF, R=330Ω, 5 point/panel Air: ±8Kv, 10 times; Contact: ±4Kv, 10 times	ISO10605

Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of samples.

8 Mechanical Drawing



9 Precautions For Use Of LCD Modules

a) Handling Precautions

- i. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- ii. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
- iii. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- iv. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- v. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:
 - Isopropyl alcohol、
 - Ethyl alcohol
- vi. Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:
 - Water
 - Ketone
 - Aromatic solvents
- vii. Do not attempt to disassemble the LCD Module.
- viii. If the logic circuit power is off, do not apply the input signals.
- ix. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - b) Be sure to ground the body when handling the LCD Modules.
 - c) Tools required for assembly, such as soldering irons, must be properly ground.
 - d) To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 - e) The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.
 - f) Storage precautions
 - i. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
 - ii. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:
 - g) Temperature : 0℃ ~ 40℃ Relatively humidity: ≤80%
 - i. The LCD modules should be stored in the room without acid, alkali and harmful gas.
 - ii. Transportation Precautions
 - h) The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.