

SPECIFICATION

[] Preliminary Specification

[●] Final Specification

Description **5.7" 320xRGBx240 TFT-LCD Module**
Part Number **P0567VQF1ME00**

Customer		Industrial Product Dept, PDBU Tianma Microelectronics Co., Ltd.	
Signatures	Date	Approved By	Date
_____	_____	Kevin Kim	2023/8/30
_____	_____	Reviewed By	
		Longping Deng	2023/8/30
		Prepared By	
		Gang Li	2023/8/30
Comments:			

* This cover page is for your Comments and Signatures back to TIANMA.

REVISION HISTORY

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1. Summary

1.1 General Description

This is a 5.7 inch a-Si TFT-LCD module with Normal-Black technology. It is composed of a TFT-LCD panel, a driver circuit, FPC, and a LED backlight unit.

1.2 Features

- Ultra-wide viewing angle (SFT, Normally black)
- Wide view angle(85/85/85/85)
- Interface(RGB888)
- Surface treatment(AG)
- Compliant with the European RoHS Directive (2011/65/EU) and Delegated Directive (2015/863/EU, Amending Annex II of 2011/65/EU)

2. General Specifications

Feature		Spec	Unit
Display Spec	Size	5.7 inches	
	Resolution	320(RGB)x240	
	Pixel Pitch	0.36x0.36	mm
	TFT Active Area	115.20x86.40	mm
	Technology Type	a-Si	
	Pixel Configuration	R.G.B Vertical Stripe	
	Display Mode	SFT, Normally Black	
	Surface Treatment	Anti-Glare	
	Viewing Direction	all	
Mechanical Characteristics	LCM (W x H x D)	144.00x104.60x5.10(without FPC)	mm
	Weight	122	g
Optical Characteristics	Luminance	500	cd/m ²
	Contrast Ratio	1000:1	
	NTSC	65	%
	Viewing Angle	85/85/85/85	degree
Electrical Characteristics	Interface	RGB 24bits	
	Color Depth	16.7M	color
	Power Consumption	LCD: 280.5 Backlight: 1080	mW

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

Connector Information	
Matching connector	FH12A-50S-0.5SH (HIROSE) or equivalent

Table 3.1.1 Connector information

PIN	Symbol	I/O	Description	Remark
1	LED+	P	LED Anode	
2	LED+	P	LED Anode	
3	LED-	P	LED cathode	
4	LED-	P	LED cathode	
5	GND	P	Ground	
6	NC	N	No connection	
7	VCC	P	Power supply(+3.3V)	
8	NC	N	No connection	
9	DE	I	Data enable, active high	
10	VS	I	Vertical SYNC signal input, active low.	
11	HS	I	Horizontal SYNC signal input, active low	
12	GND	P	Ground	
13	B7	I	Blue data Input(MSB)	
14	B6	I	Blue data Input	
15	B5	I	Blue data Input	
16	B4	I	Blue data Input	
17	B3	I	Blue data Input	
18	B2	I	Blue data Input	
19	B1	I	Blue data Input	
20	B0	I	Blue data Input(LSB)	
21	G7	I	Green data Input(MSB)	
22	G6	I	Green data Input	
23	G5	I	Green data Input	
24	G4	I	Green data Input	
25	G3	I	Green data Input	
26	G2	I	Green data Input	
27	G1	I	Green data Input	
28	G0	I	Green data Input(LSB)	
29	R7	I	Red data Input(MSB)	
30	R6	I	Red data Input	
31	R5	I	Red data Input	
32	R4	I	Red data Input	
33	R3	I	Red data Input	
34	R2	I	Red data Input	
35	R1	I	Red data Input	
36	R0	I	Red data Input(LSB)	
37	GND	P	Ground	
38	DCLK	I	Clock input(latch data at falling edge)	
39	GND	P	Ground	
40	L/R	I	Left/right scan control signal.	
41	U/D	I	Up/down scan control signal.	

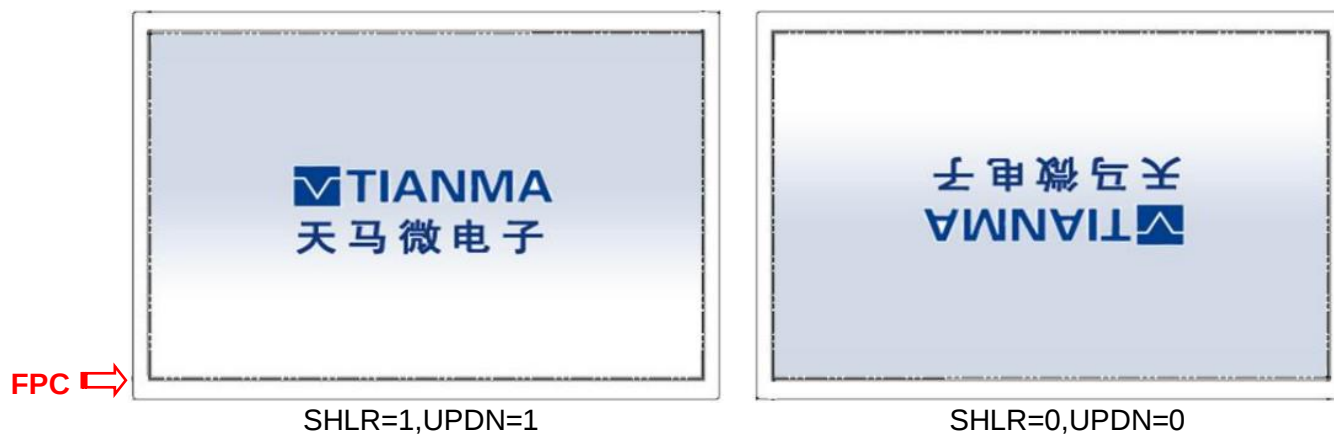
42	NC	-	No connection (For internal use, leave it open.)	
43	VCC	P	Power supply(+3.3V)	
44	NC	N	No connection (For internal use, leave it open.)	
45	RESET	I	Reset signal, active low.	
46	NC	N	No connection (For internal use, leave it open.)	
47	NC	N	No connection (For internal use, leave it open.)	
48	NC	N	No connection (For internal use, leave it open.)	
49	GND	P	Ground	
50	NC	N	No connection	

Table 3.1.2 Pin Assignment for LCD Interface

Note1: I/O definition: I---Input, O---Output, P---Power/Ground, N---No connection

Note2: All of the GND pins should be connected to the system ground.

Note3: Scan direction is shown as below(FPC at down side):



4. Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.3	6.0	V	Note1
Input voltage	VIN	-0.3	6.0	V	
Operating Temperature	Top	-20	70	°C	
Storage Temperature	Tst	-30	80	°C	
Relative Humidity Note2	RH	--	≤95	%	Ta≤40°C
		--	≤85	%	40°C<Ta≤50°C
		--	≤55	%	50°C<Ta≤60°C
		--	≤36	%	60°C<Ta≤70°C
		--	≤24	%	70°C<Ta≤80°C
Absolute Humidity	AH	--	≤70	g/m ³	Ta>70°C

Table 4.1 Absolute Maximum Ratings

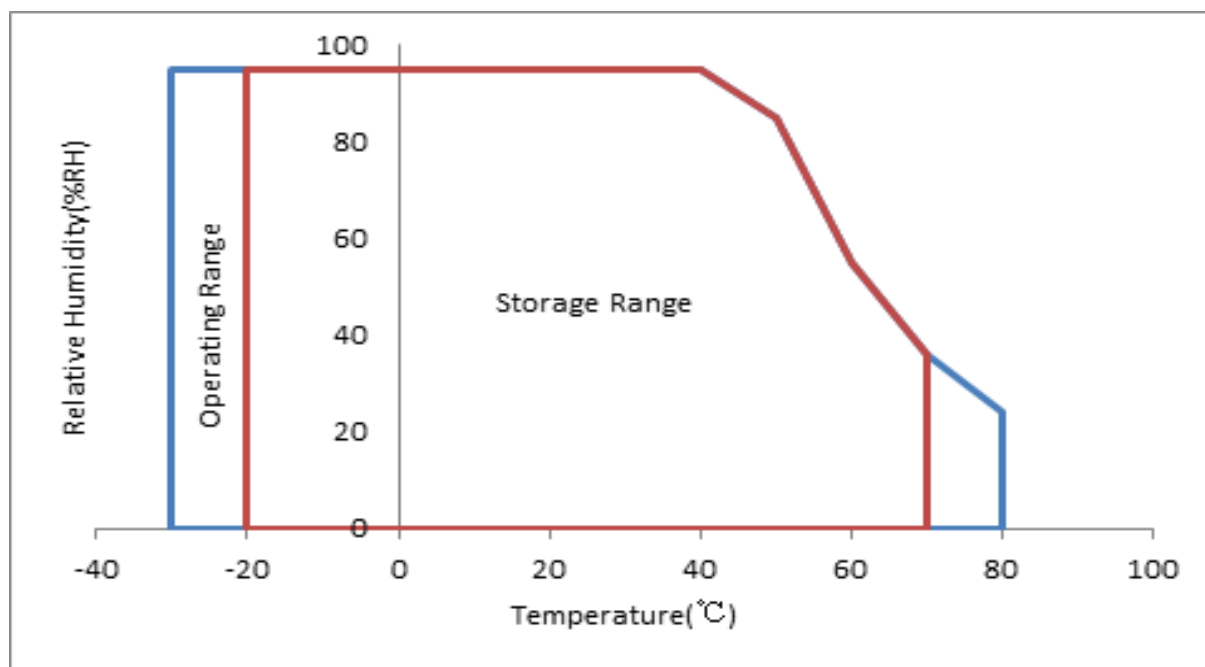


Table 4.2 Absolute Maximum Ratings chart

Note1: Input voltage include all input data(R[0:7],G[0:7],B[0:7],DCLK,DE,HS,VS,RESET,L/R,U/D).

Note2: Ta means the ambient temperature. It is necessary to limit the relative humidity to the specified temperature range. Condensation on the module is not allowed.

Note3: The absolute maximum rating values of this product are not allowed to be exceeded at any times. A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed.

5. Electrical Characteristics

5.1 DC Characteristics for Panel Driving

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Supply Voltage		VCC	3.2	3.3	3.4	V	without ripple
Input Signal Voltage	Low Level	VIL	0	--	0.3×VCC	V	
	High Level	VIH	0.7×VCC	--	VCC	V	
VDD current	60Hz	I	--	85	--	mA	White pattern
Power Consumption		P	--	280.5	--	mW	

Table 5.1.1 Operating Voltages

Note1: Input voltage include R[0:7],G[0:7],B[0:7],DCLK,DE,HS,VS,RESET,L/R,U/D.

5.2 DC Characteristics for Backlight Driving

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IF	--	60	--	mA	
Forward Current Voltage	VF	--	18	--	V	
Backlight Power Consumption	WBL	--	1080	--	mW	
LED life time	--	30000	50000	--	Hrs	

Table 5.2.1 LED Backlight Characteristics

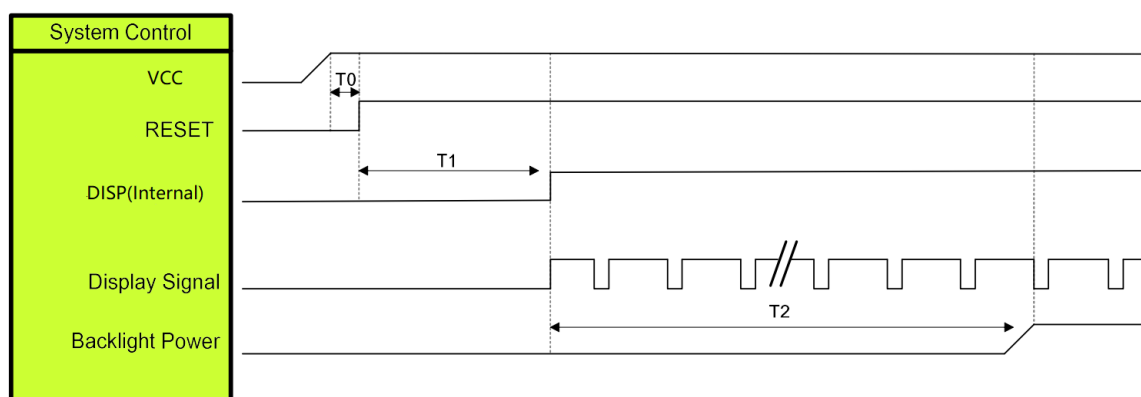
Note1: I_F is defined for total channel. A proper constant current circuit should be designed for LED driving.

Note2: Optical performance should be evaluated at $T_a=25^{\circ}\text{C}$ only.

Note3: If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced.

Note4: Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is an estimated data.

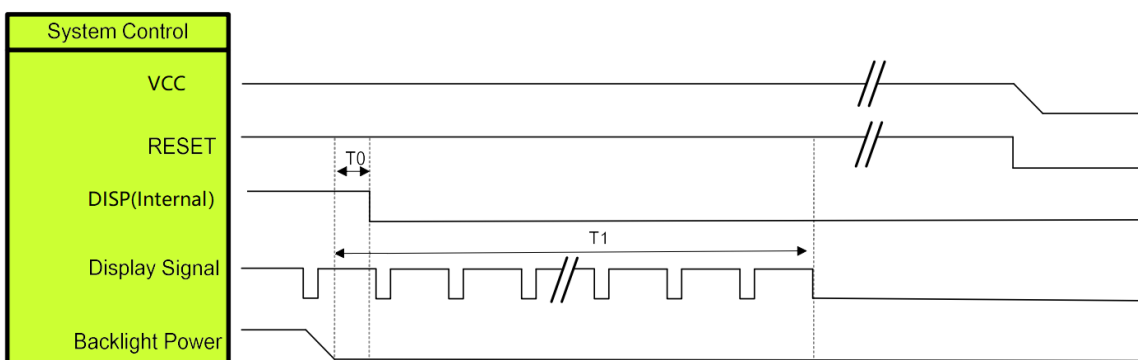
5.3 Recommended Power ON/OFF Sequence



Symbol	Description	Min. Time	Unit
T0	System power stability to GRB RESET signal	0	ms
T1	GRB RESET= "High" to DISP="High"	10	ms
T2	Display Signal output to Backlight Power on	250	ms

Note1: Display signal: R[0:7],G[0:7],B[0:7],DCLK,DE,HS,VS.

Figure 5.3.1 Power on sequence



Symbol	Description	Min. Time	Unit
T0	Backlight Power off to DISP="Low"	5	ms
T1	DISP="Low" to IC internal voltage discharge complete	80	ms

Figure 5.3.2 Power on/off sequence

Note1: Display signal: R[0:7],G[0:7],B[0:7],DCLK,DE,HS,VS.

5.4 LCD Module Block Diagram

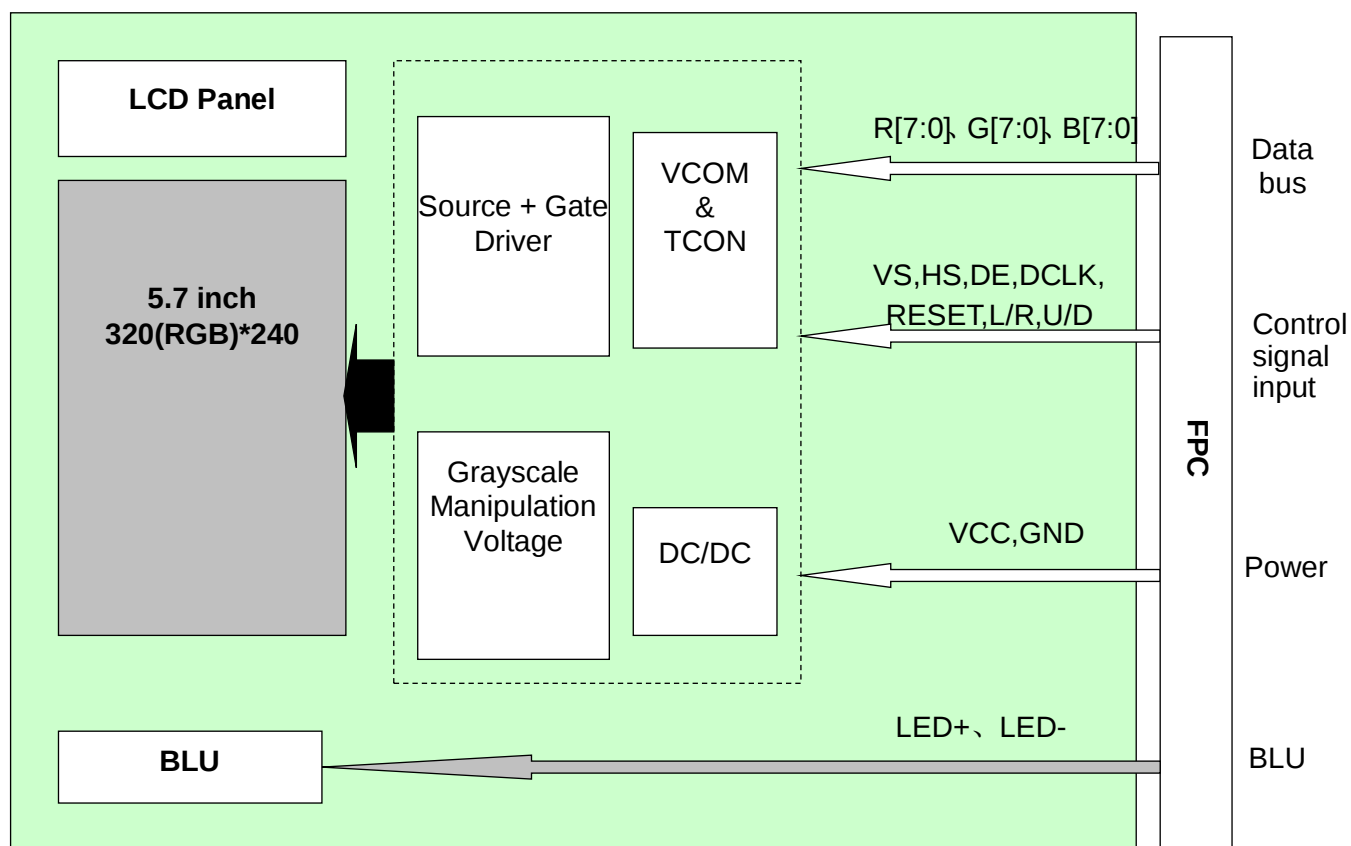


Figure 5.4 LCD Module Block Diagram

6. Timing Characteristics

6.1 AC characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK Pulse Duty	T_{clk}	40	50	60	%	
HS Width	T_{hw}	2			DCLK	
VS Setup Time	T_{vst}	12	-	-	ns	
VS Hold Time	T_{vhd}	12	-	-	ns	
HS Setup Time	T_{hst}	12	-	-	ns	
HS Hold Time	T_{hhd}	12	-	-	ns	
Data Setup Time	T_{dsu}	12	-	-	ns	
Data Hold Time	T_{dhd}	12	-	-	ns	
DE Setup Time	T_{dest}	12	-	-	ns	
DE Hold Time	T_{dehd}	12	-	-	ns	

Table 6.1 Input Setup Timing Parameters Requirement

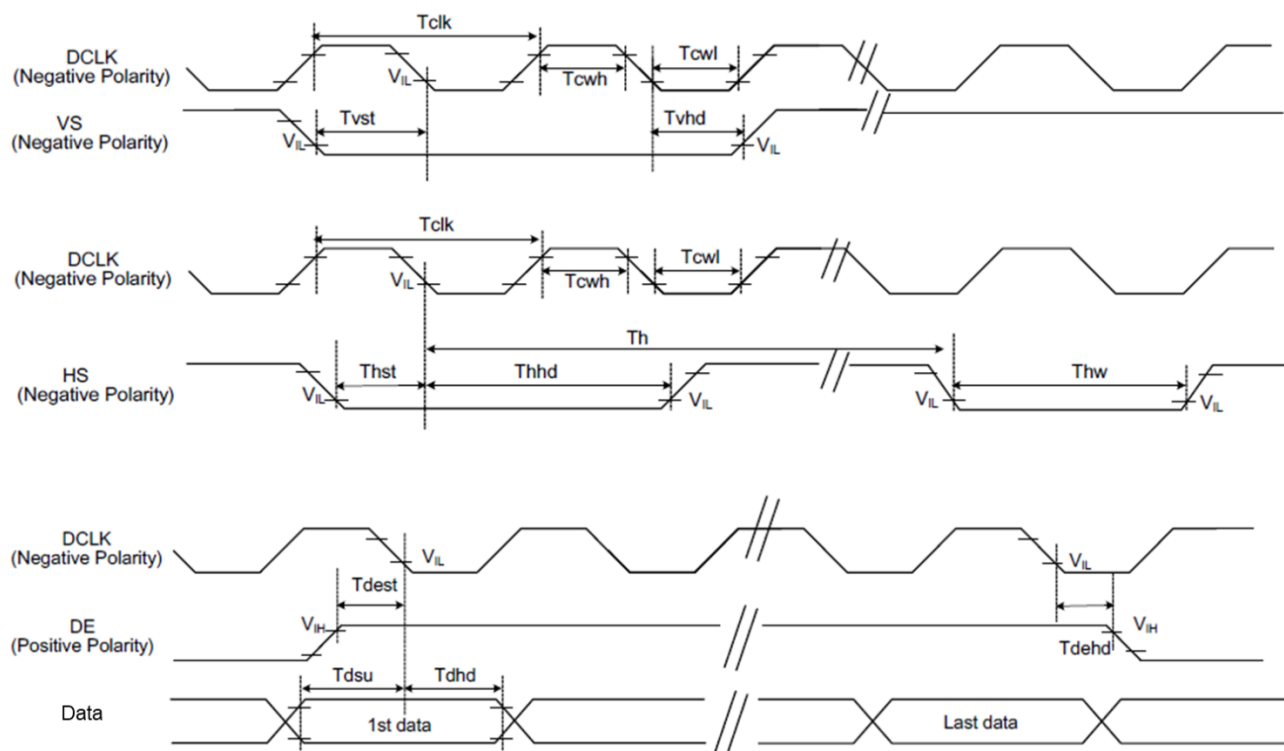


Figure 6.1 Clock and Data Input Timing Diagram

6.2 Data Input Timing Parameter Setting

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK frequency	Fclk	5	6	8	MHz	
DCLK Period	Tclk	125	167	200	ns	
HS Period Time	Th	325	371	438	DCLK	
HS Display Period	Thdisp	320	320	320	DCLK	
HS Back Porch	Thbp	3	43	43	DCLK	
HS Front Porch	Thfp	2	8	75	DCLK	
HS Pulse Width	Thw	2	4	43	DCLK	
VS Period Time	Tv	244	260	289	HSYNC	
VS Display Period	Tvdisp	240	240	240	HSYNC	
VS Back Porch	Tvbp	2	12	12	HSYNC	
VS Front Porch	Tvfp	2	8	37	HSYNC	
VS Pulse Width	Tvw	2	4	12	HSYNC	
Frame Rate	F	--	60	--	Hz	

Table 6.2 Data Input Timing Parameters

6.3 Timing Diagram

RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC – DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

6.3.1 Parallel RGB SYNC Mode

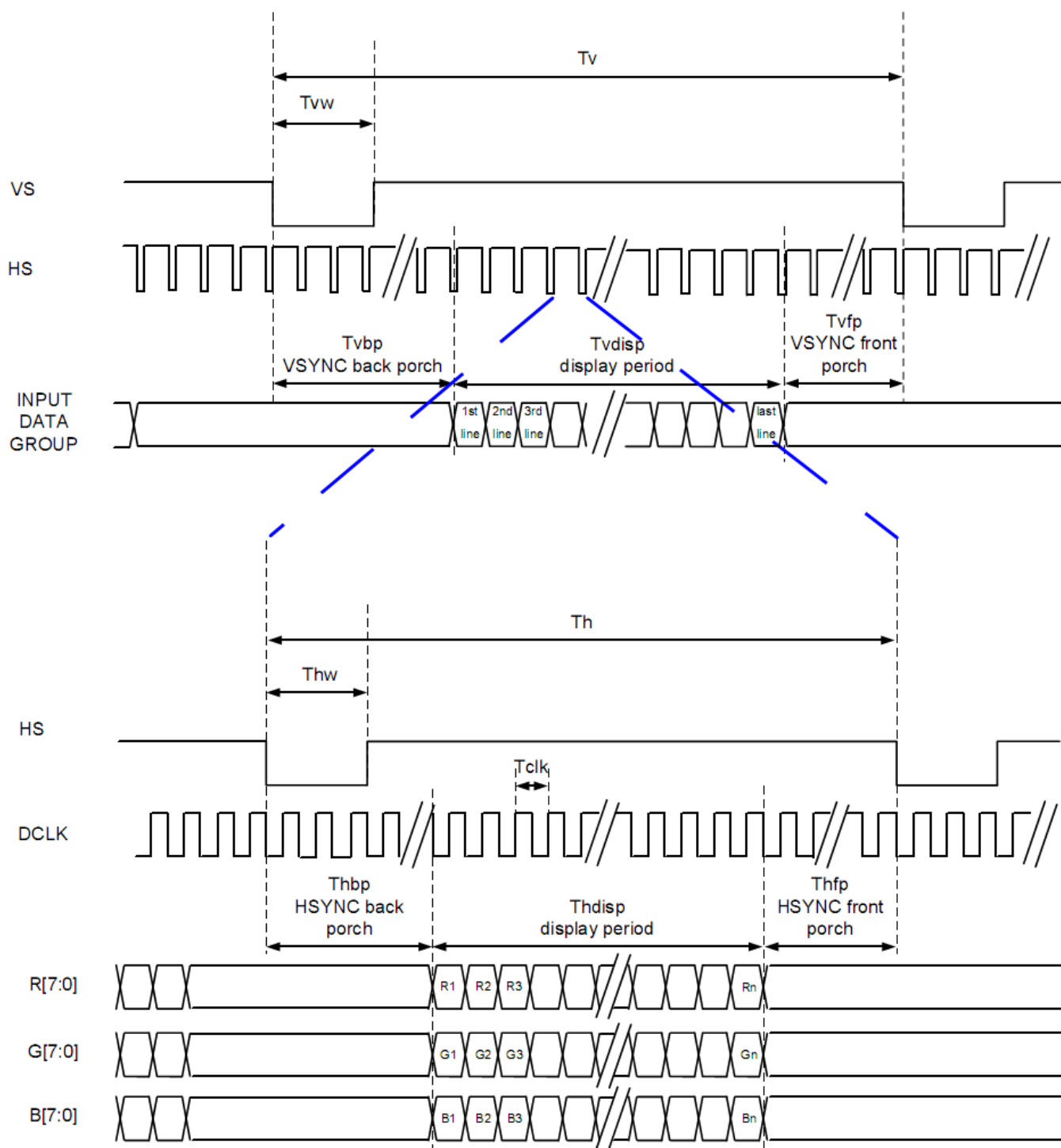


Figure 6.3.1 SYNC Mode

6.3.2 Parallel RGB SYNC-DE Mode

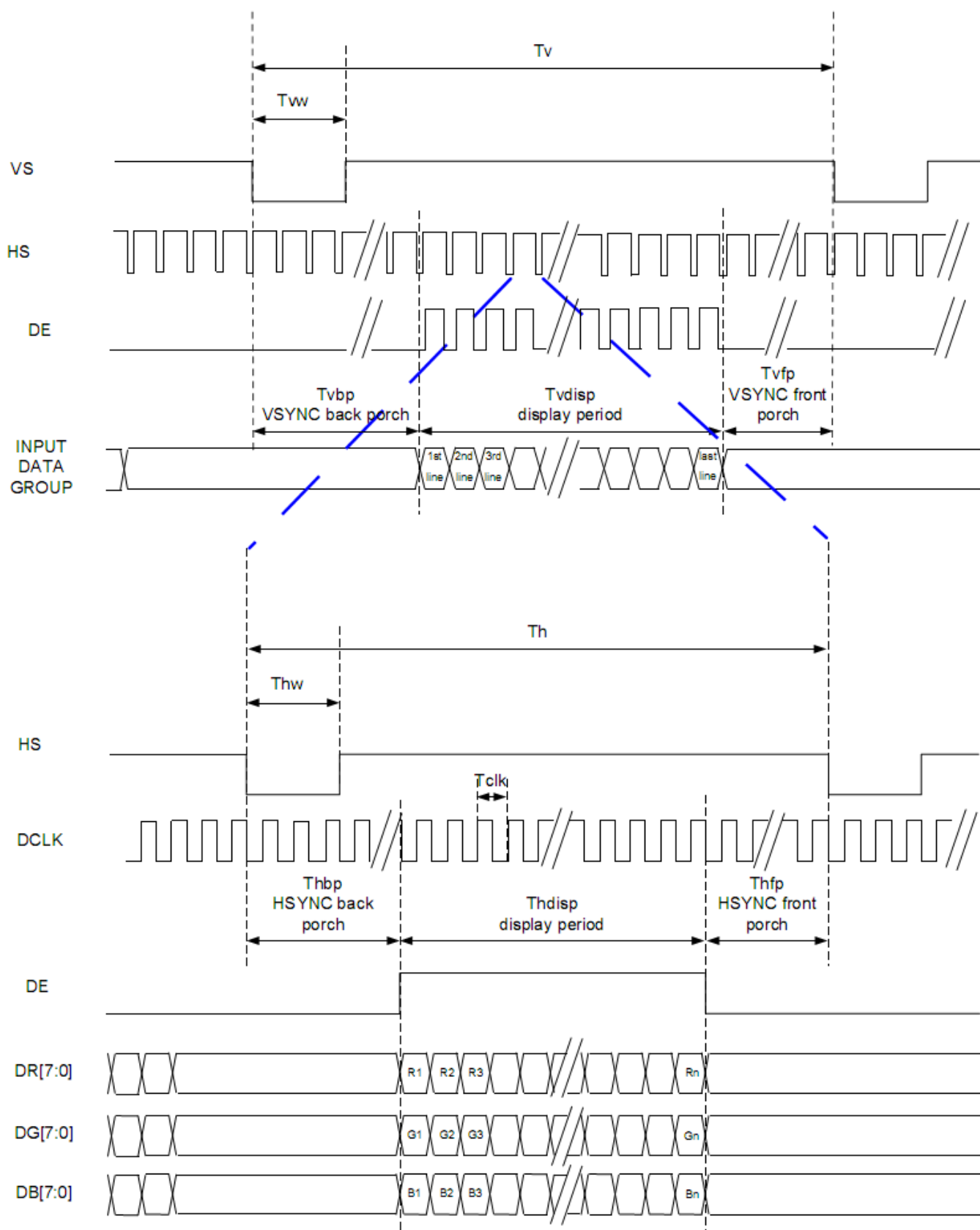


Figure 6.3.2 SYNC-DE Mode

6.3.3 Parallel RGB DE Mode

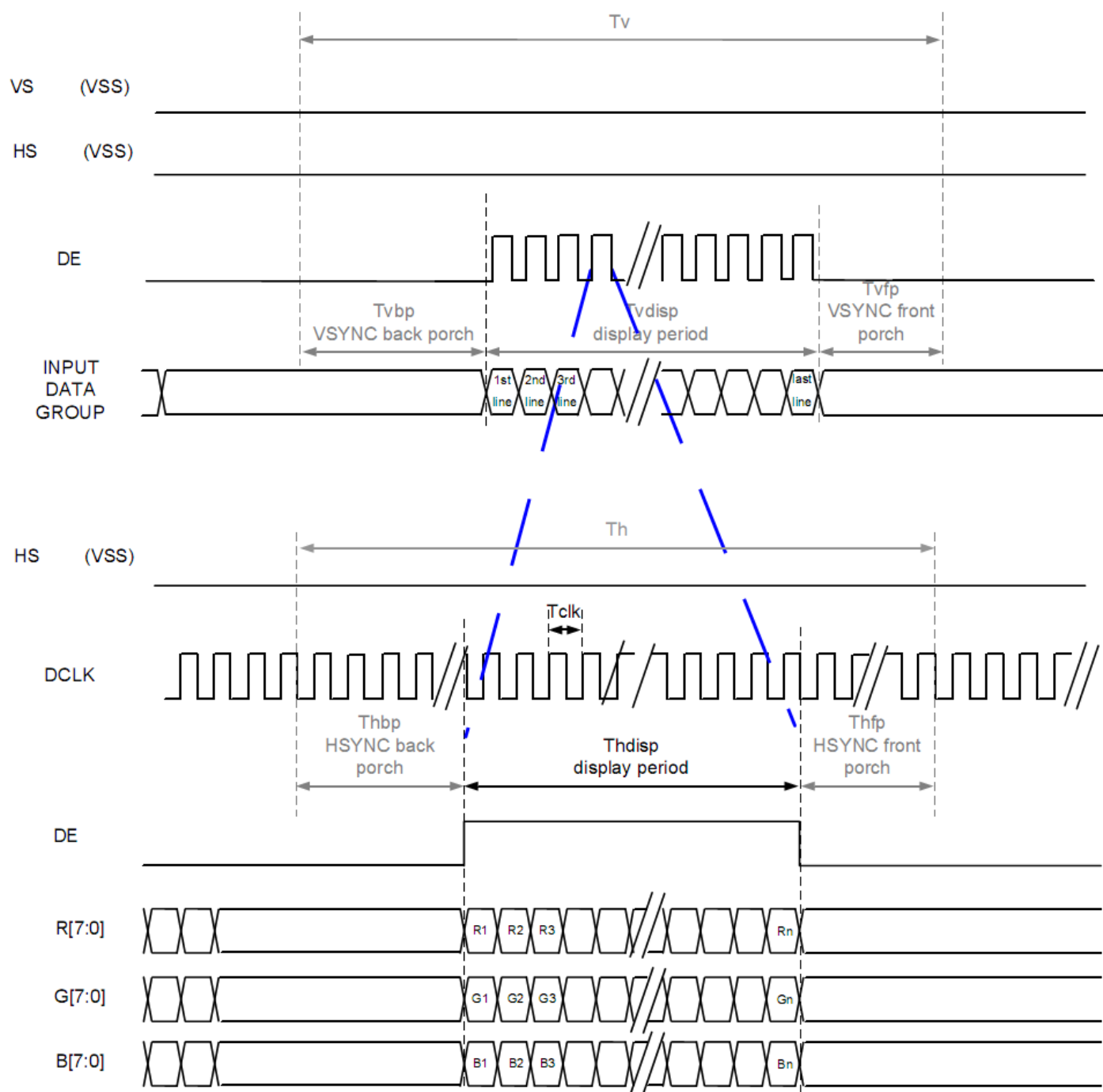


Figure 6.3.2 DE Mode

7. Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	80	85	-	Degree	Note 2
		θB		80	85	-		
		θL		80	85	-		
		θR		80	85	-		
Contrast Ratio		CR	θ=0°	700	1000	-		Note1 Note3
Response Time		T _{ON}	25℃	-	35	45	ms	Note1 Note4
		T _{OFF}						
Chromaticity	White	x	Backlight is on	0.263	0.313	0.363		Note1 Note5
		y		0.279	0.329	0.379		
	Red	x		0.547	0.597	0.647		
		y		0.266	0.316	0.366		
	Green	x		0.276	0.326	0.376		
		y		0.556	0.606	0.656		
	Blue	x		0.107	0.157	0.207		
		y		0.007	0.057	0.107		
Uniformity		U		75	80	-	%	Note1 Note6
NTSC		N		60	65	-	%	Note 5
Luminance (Without TP)		L		400	500	-	cd/m ²	Note1 Note7

Table 7.1 Optical Parameters

Test Conditions:

1. $I_F = 60$ mA, and the ambient temperature is $25^\circ C$.
2. The test systems refer to Note1 and Note2.

Note1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical characteristics are measured at the center point of the LCD screen.

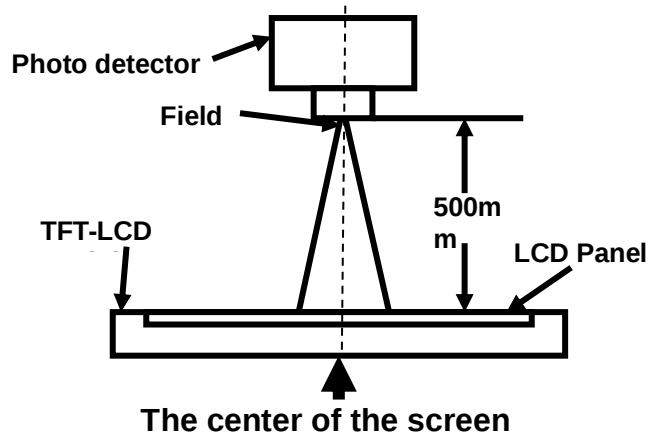


Fig1. Measurement Set Up

Note2: Definition of viewing angle range and measurement system. Viewing angle is measured at the center point of the LCD .

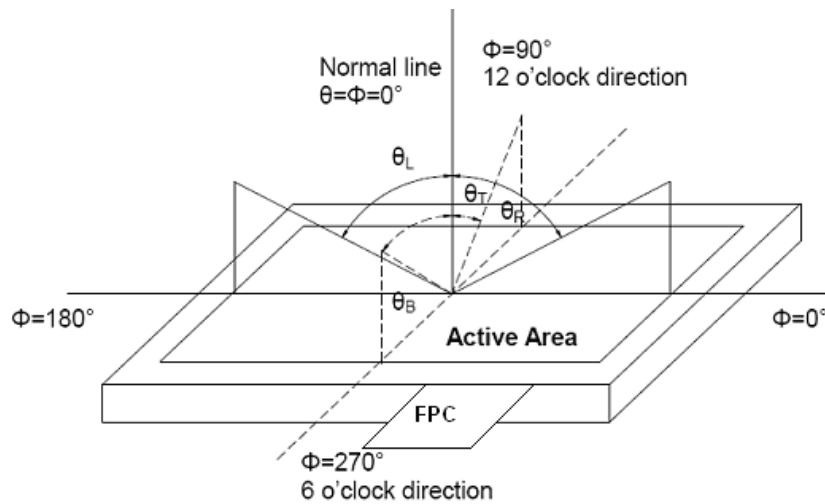


Fig2. Measurement viewing angle

Note3: Definition of contrast ratio

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

Note4: Definition of Response time

For SFT LCM, the response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_r) is the time between photo detector output intensity changed from 10% to 90%. And fall time (T_f) is the time between photo detector output intensity changed from 90% to 10%.

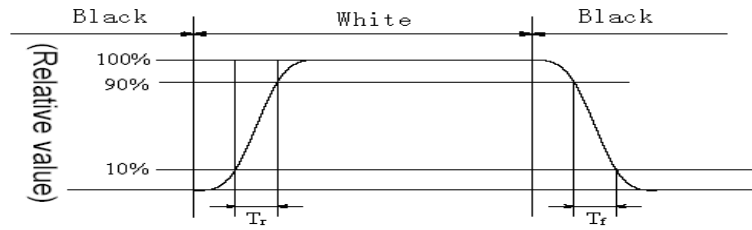


Fig3. Response Time Testing(SFT)

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig.5). Every measuring point is placed at the center of each measuring area.

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

L_{max} : The measured Maximum luminance of all measurement position.

L_{min} : The measured Minimum luminance of all measurement position.

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

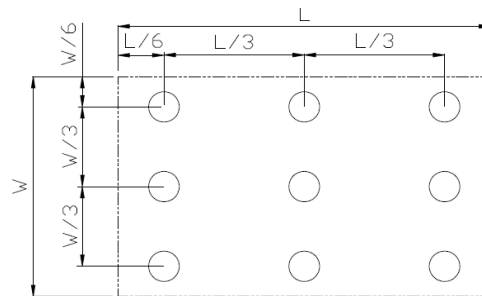


Fig4. Luminance Uniformity Measurement Locations(9 points)

Note7: Definition of Luminance:

Measure the luminance of white state at center point.

8. Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	+70℃ , 240H	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	-20℃ , 240H	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	+80℃ , 240H	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	-30℃ , 240H	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity(non-operation)	+60℃ , 90%RH , 240H	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ , 30min~80℃ , 30min , change time : 5min , 100cycle	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2002
7	ESD	C=150pF , R=330Ω , 5point/panel Air : ±15kv , 5times ; Contact : ±8kv , 5times ; (Environment : 15℃~35℃ , 30%~60% , 86Kpa~106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration Test (non-operation)	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total)	GB/T 2423.10-2008 ; GB/T 2423.56-2006
9	Shock Test	Half Sine Wave 60G 6ms, ±X,±Y,±Z 3times for each direction	GB/T 2423.5-1995
10	Package Vibration	5-20-200HZ , PSD : 0.01-0.01-0.001 Total:0.781g ² /HZ, x/y/z 30min)	GB/T 4857.5-1992
11	Package Drop Test	Height: 60 cm,1 corner, 3edges, 6 surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

Table 8.1 RA test condition

Note1: Temperature is the ambient temperature of sample

Note2: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product's function only be guaranteed, but not for all of the cosmetic specification.



10. Packing Instruction

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM	P0567VQF1ME00	144.00x104.60x5.10	0.122	56	
2	Tray	PET	485×330×17.5	0.19	16	
3	BOX	CORRUGATED PAPER	520×345×111	0.6	2	
4	Dust-proof Bag	LD-PE	700x545x0.05	0.046	1	
5	Lable	tagboard	100×52	0.002	1	
6	EPE	EPE	485×330×5	0.08	2	
7	Carton	CORRUGATED PAPER	544×365×250	1.01	1	
8	Total weight	12.29Kg ± 5%				

Table 10.1 Packing instruction

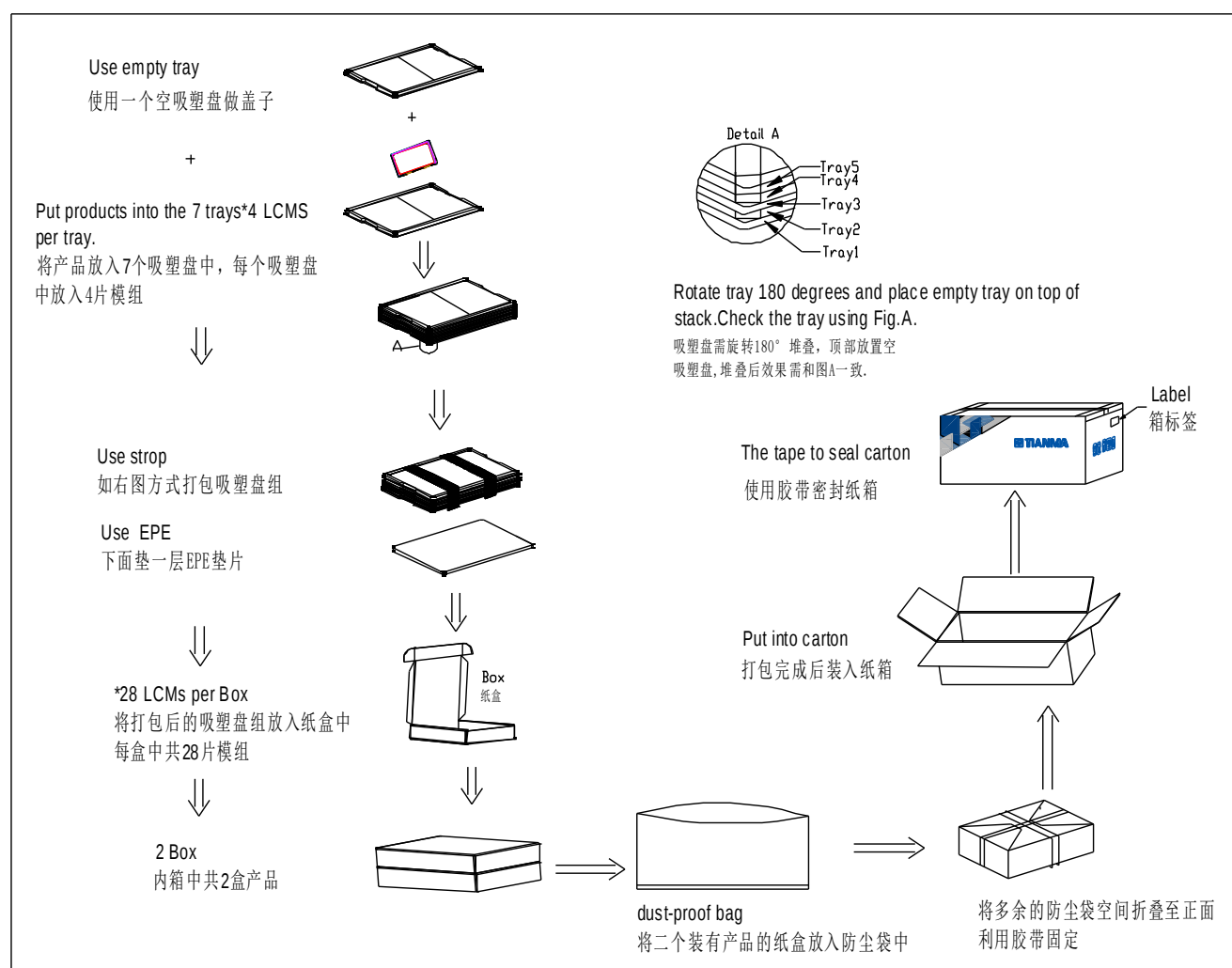


Figure10.1 Packing details

11. Precautions for Use of LCD Modules

11.1 Handling Precautions

- (1) The display panel is made of glass. Do not subject it to mechanical shock by dropping it, etc.
- (2) If the display panel is damaged and the liquid crystal fluid inside it leaks out be sure not to get any in your mouth. If the fluid comes into contact with your skin or clothes promptly wash it off using soap and water.
- (3) Do not apply excessive force to the display surface or the bezel since this may cause the color tone to vary.
- (4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle the polarizer carefully.
- (5) If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is still not completely clear use a moist cloth with one of the following solvents:
 - Isopropyl alcohol
 - Ethyl alcohol
 Solvents other than those mentioned above may damage the polarizer. Specifically, do not use the following:
 - Water
 - Ketone
 - Aromatic solvents
- (6) Do not disassemble the LCD Module.
- (7) If powered off, do not apply the input signals.
- (8) To prevent destruction of the module by static electricity, be careful to maintain an optimum work environment.
- (9) Be sure to ground your body when handling the LCD Modules.
- (10) Tools used for assembly, must be properly grounded.
- (11) To reduce the amount of static electricity generated, do not conduct assembly or other work under very low humidity conditions.
- (12) The LCD Module is covered with a film to protect the display surface, remove film slowly under the ionizer.

11.2 Storage precautions

- (1) When storing the LCD modules avoid exposure to direct sunlight or to the light of fluorescent lamps.
- (2) The LCD modules should be stored within the rated storage temperature range. The recommend condition is: Temperature: 0 ~ 35 °C at normal humidity.
- (3) The LCD modules should be stored in a room without acid, alkali or other harmful gas.

11.3 Transportation Precautions

The LCD modules should not be dropped or subject to violent mechanical shock during transportation. Also they should avoid excessive pressure, water, high humidity and direct sunlight.

11.4 Screen saver Precautions

Not display the fixed pattern for a long time. Use a screen saver, if the fixed pattern is displayed on the screen

11.5 Safety Precautions

- (1) When you waste damaged or unnecessary LCDs, it is recommended to crush LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned
- (2) Be sure to turn off the power supply when inserting or disconnecting the LED backlight cable.
- (3) LED driver should be designed to limit or stop its function when over current is detected on the LED.