Ver.: 1.1

MODEL NO. : TS070OAAAD02-00
ISSUED DATE: 2007-12-12
VERSION : Ver 1.1

☐ **Preliminary Product Specification**
■ **Final Product Specification**

Customer Approval		
Customer Name	**Checked & Approved by**	**Date**

SHANGHAI TIANMA Confirmed :

prepared by	Checked by	Approved by
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2007-12-12	2007-12-14	2007-12-14

This technical specification is subjected to change without notice

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Record of Revision

Rev	Issued Date	Description
1.00	Dec,12, 2007	Product specification release
1.10	Jan,28,2008	1, Modify the timing parameter; 2, Modify the power on & off sequence;

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1. GENERAL SPECIFICATIONS

Feature		Spec
Display Spec.	Size	7”
	Resolution	480*RGB*234
	Interface	Analog RGB
	Technology type	α-Si TFT
	Pixel pitch (mm)	0.321*0.370
	Display colors	Full color
	Pixel Configuration	RGB vertical stripe
	Display Mode	TM , NW
	Surface Treatment	Anti-Glare
	Gray Scale Inversion	6 o’clock
Mechanical Characteristics	LCM (W x H x D) (mm)	164.9*100*5.7
	Active Area(mm)	154.08*86.58
	With /Without TSP	Without TSP
	Weight (gram)	TBD.
	LED Numbers	18 LEDs

Note 1: Requirements on Environmental Protection: RoHS

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2. ABSOLUTE MAXIMUM RATINGS

GND=0V, Ta = 25℃

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.3	7.0	V	
	AVDD	-0.3	7.0	V	
	VGH	-0.3	18.0	V	
	VGL	-15.0	0.3	V	
	VGH-VGL	-	33.0	V	
Input signal voltage	V_I	-0.2	AVDD+0.2	V	Note 1
	V_L	-0.3	AVDD+0.3	V	Note 2
Operating Temperature	Top	-20	70	℃	
Storage Temperature	Tst	-30	80	℃	

Table 2.1 absolute maximum rating

Note 1: VR, VG, VB

Note 2: STHL, STHR, OEH, L/R, CPH1-3, STVL, STVR, OEV, CKV, U/D

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3. ELECTRICAL CHARACTERISTICS

3.1 LCD module

GND=0V,Ta=25℃

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Logic supply voltage		VCC	4.8	5.0	5.2	V	
Analog supply voltage		AVDD	4.8	5.0	5.2	V	
Negative power for scan driver		VGL	-10.5	-10.0	-9.5	V	
Positive power for scan driver		VGH	14.3	15.0	15.7	V	
Input Signal Voltage	Low Level	VIL	0	-	0.3VCC	V	Note 1
	High Level	VIH	0.7VCC	-	VCC	V	
Video Signal Amplitude		V_{IA}	0.2	-	AVDD-0.2	V	Note 2
		V_{IAC}	-	3	-	V	Note 3
		V_{IDC}	-	AVDD/2	-	V	
VCOM		V_{CAC}	3.5	5.6	6.5	V	
		V_{CDC}	1.55	-	1.95	V	
Power Consumption		I_{VCC}	-	TBD	-	mA	
		I_{AVDD}	-	TBD	-	mA	
		I_{VGH}	-	TBD	-	mA	
		I_{VGL}	-	TBD	-	mA	

Table 3.1 LCD module electrical characteristics

Note 1: STHL, STHR, OEH, L/R, CPH1-3, STVL, STVR, OEV, CKV, U/D

Note 2: the amplitude of VR,VG,VB blank to blank.

Note 3: the amplitude of VR,VG,VB black to white.

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3.2 Backlight Unit

Ta=25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	180	-	mA	
Forward Current Voltage	V_F	-	6.4	-	V	
Backlight Power Consumption	W_{BL}	-	1,152	-	mW	
LED Life Time			20,000		hours	Note1

Note 1: The "LED Life Time" is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25℃,and LED current I_L=20mA.

Table 3.2 Backlight unit electrical characteristics

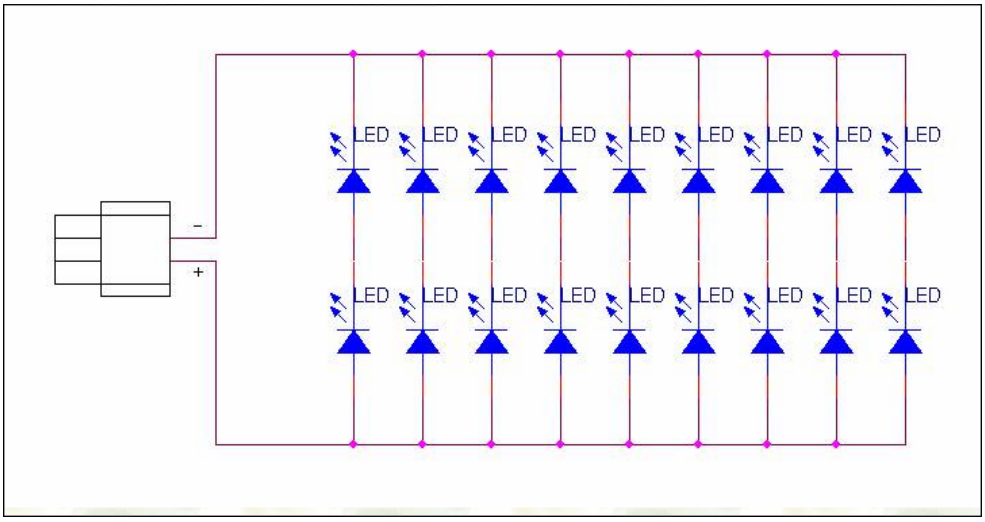


Figure 3.1 LED driver circuit

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4. BLOCK DIAGRAM

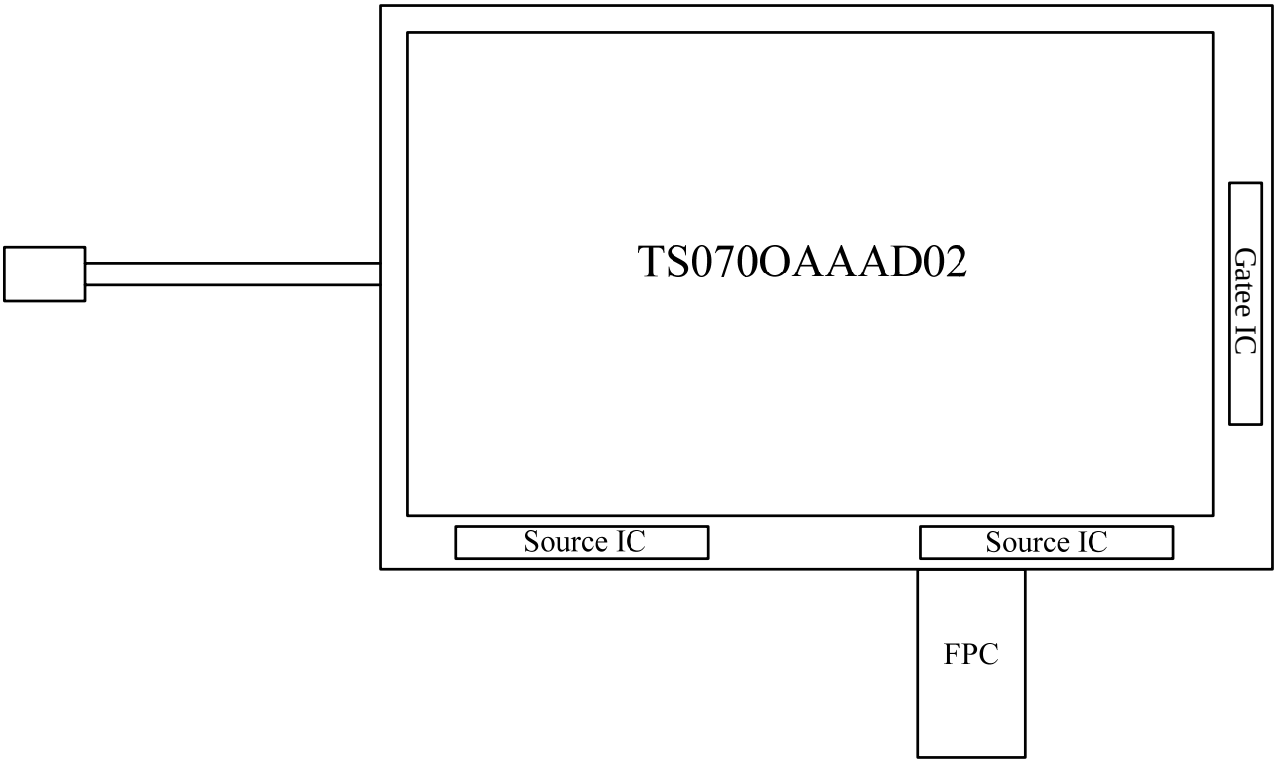


Figure 4.1 LCD module diagram

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5. INPUT TERMINALS PIN ASSIGNMENT

5.1 TFT LCD panel driving section

No	Symbol	I/O	Description	Remark
1	GND	P	Ground	
2	VCC	P	Supply voltage for scan driver	
3	VGL	P	Negative power for scan driver	
4	VGH	P	Positive power for scan driver	
5	STVD	I/O	Vertical start pulse down side	Note 1
6	STVU	I/O	Vertical start pulse up side	Note 1
7	CKV	I	Shift clock input	
8	U/D	I	UP/DOWN scan control input	Note 1
9	OEV	I	Output enable control for scan	
10	VCOM	I	Common electrode driving signal	
11	VCOM	I	Common electrode driving signal	
12	L/R	I	LEFT/RIGHT scan control input	Note 1
13	MOD	I	Sequential sampling and simultaneous sampling setting	Note 2
14	OEH	I	Output enable control for data driver	
15	STHL	I/O	Start pulse for horizontal scan line left side	Note 1
16	STHR	I/O	Start pulse for horizontal scan line right side	Note 1
17	CPH3	I	Sampling and shifting clock pulse for data driver	Note 2
18	CPH2	I	Sampling and shifting clock pulse for data driver	Note 2
19	CPH1	I	Sampling and shifting clock pulse for data driver	Note 2
20	VCC	P	Supply voltage for data driver	
21	GND	P	Ground	
22	VR	I	Alternated video signal(Red)	
23	VG	I	Alternated video signal(Green)	
24	VB	I	Alternated video signal(Blue)	
25	AVDD	P	Supply voltage for analog circuit	
26	AVSS	P	Ground for analog circuit	

Table 5.1 input terminal pin assignment

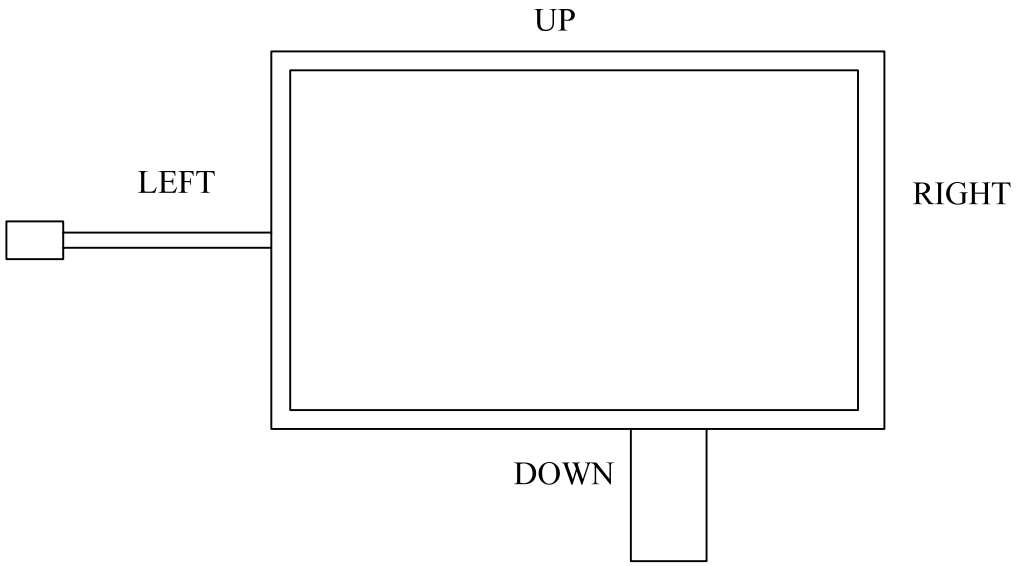
P: Power/GND; I: input pin; I/O: input/output pin;

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Note 1: select of scanning mode

Setting of scan control input		In/out state for start pulse				Scanning direction
U/D	L/R	STVD	STVU	STHR	STHL	
GND	VCC	O	I	O	I	Up to down, left to right
VCC	GND	I	O	I	O	Down to up, right to left
GND	GND	O	I	I	O	Up to down, right to left
VCC	VCC	I	O	O	I	Down to up, left to right

Refer to the figure as below



Note 2: MOD=H, simultaneous sampling.

MOD=L, sequential sampling.

Please set CPH2 and CPH3 to GND when MOD=H.

5.2 Backlight unit section

Pin No.	Symbol	I/O	Function	Remark
1	HI	P	Power supply for backlight unit	Pink
2	GND	P	Ground for backlight unit	White

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6. INTERFACE TIMING

6.1 Timing Parameter

Parameter	Symbol	Min.	Typ.	Max.	Unit.	Remark
Rising time	t_r	-	-	60	ns	Note 1
Falling time	t_f	-	-	60	ns	Note 1
High and low level pulse width	t_{CPH}	94	104	114	ns	CPH1-3
CPH pulse width	t_{CWH}	40	50	60	ns	CPH1-3
CPH pulse delay	t_{12}	30	$t_{CPH}/3$	$t_{CPH}/2$	ns	CPH1-3
	t_{23}					
	t_{31}					
STH setup time	t_{SUH}	20	-	-	ns	STHL/R
STH hold time	t_{HDH}	20	-	-	ns	STHL/R
STH pulse width	t_{STH}	-	1	-	t_{CPH}	STHL/R
STH period	t_H	61.5	63.5	65.5	us	STHL/R
OEH pulse width	t_{OEH}	-	7	-	us	
Sample and hold disable time	t_{DIS1}	-	55	-	us	
OEV pulse width	t_{OEV}	-	27	-	us	
CKV pulse width	t_{CKV}	16	-	40	us	
Clean enable time	t_{DIS2}	-	16	-	us	
Horizontal display time range	t_{DH}	-	1440	-	t_{CPH}	
STV setup time	t_{SUV}	400	-	-	ns	STVD/U
STV hold time	t_{HDV}	400	-	-	ns	STVD/U
STV pulse width	t_{STV}	-	-	1	t_H	STVD/U
Horizontal line per field	t_V	256	262.5	268	t_H	Note 2
Vertical display start	t_{SV}	-	3	-	t_H	
Vertical display range	t_{DV}	-	234	-	t_H	
Vertical start line	t_{SLV}	-	-	21	t_H	
VCOM rising time	t_{rCOM}	-	-	5	us	
VCOM falling time	t_{fCOM}	-	-	5	us	
VCOM delay time	t_{DCOM}	-	-	3	us	
RGB delay time	t_{DRGB}	-	-	1	us	

Note 1: For all of logic signal.

Note 2: Please don't use odd horizontal lines to drive LCD panel for both odd and even field simultaneously.

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6.2 Timing Diagram

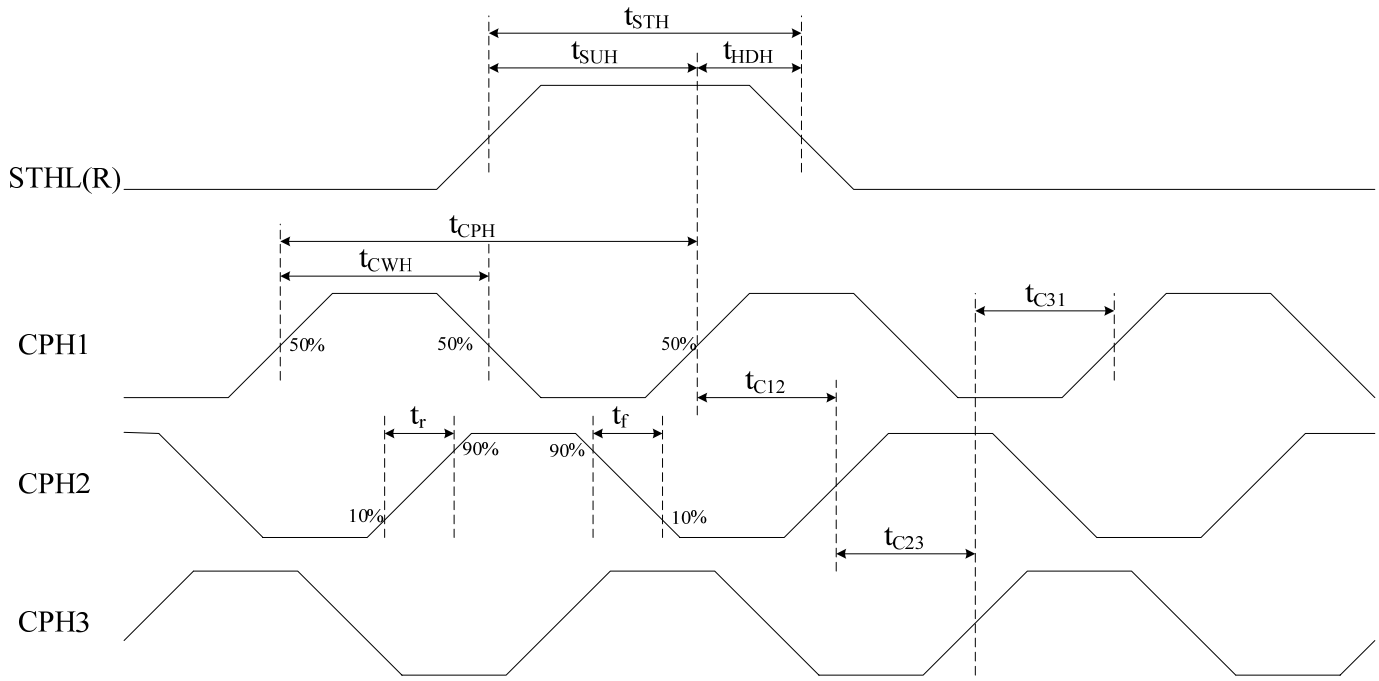


Figure 6.1: Sampling clock timing

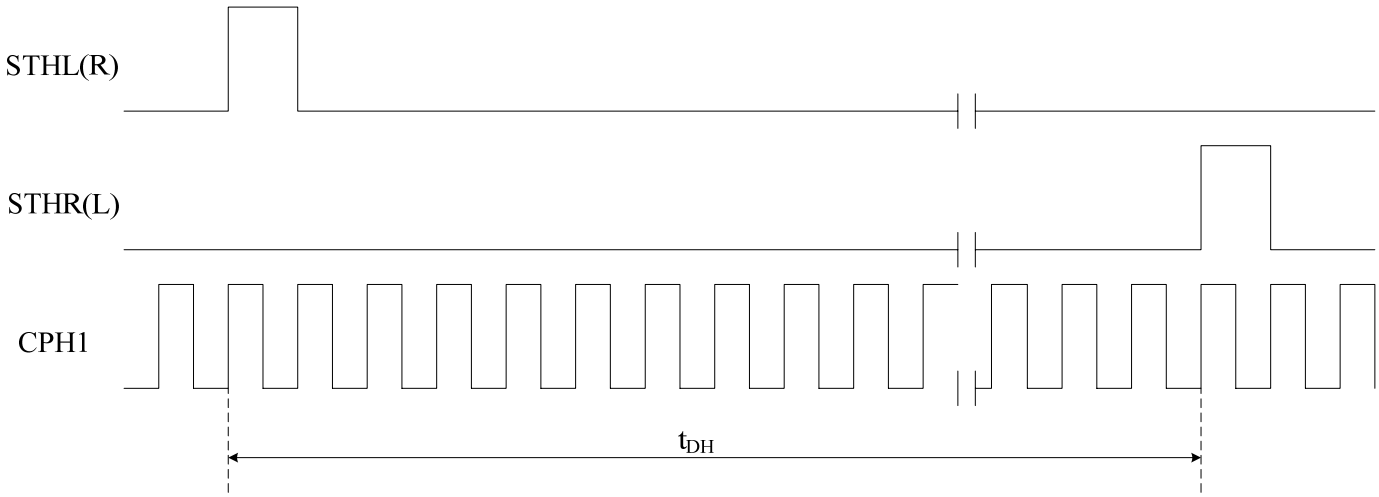


Figure 6.2: Horizontal display range timing

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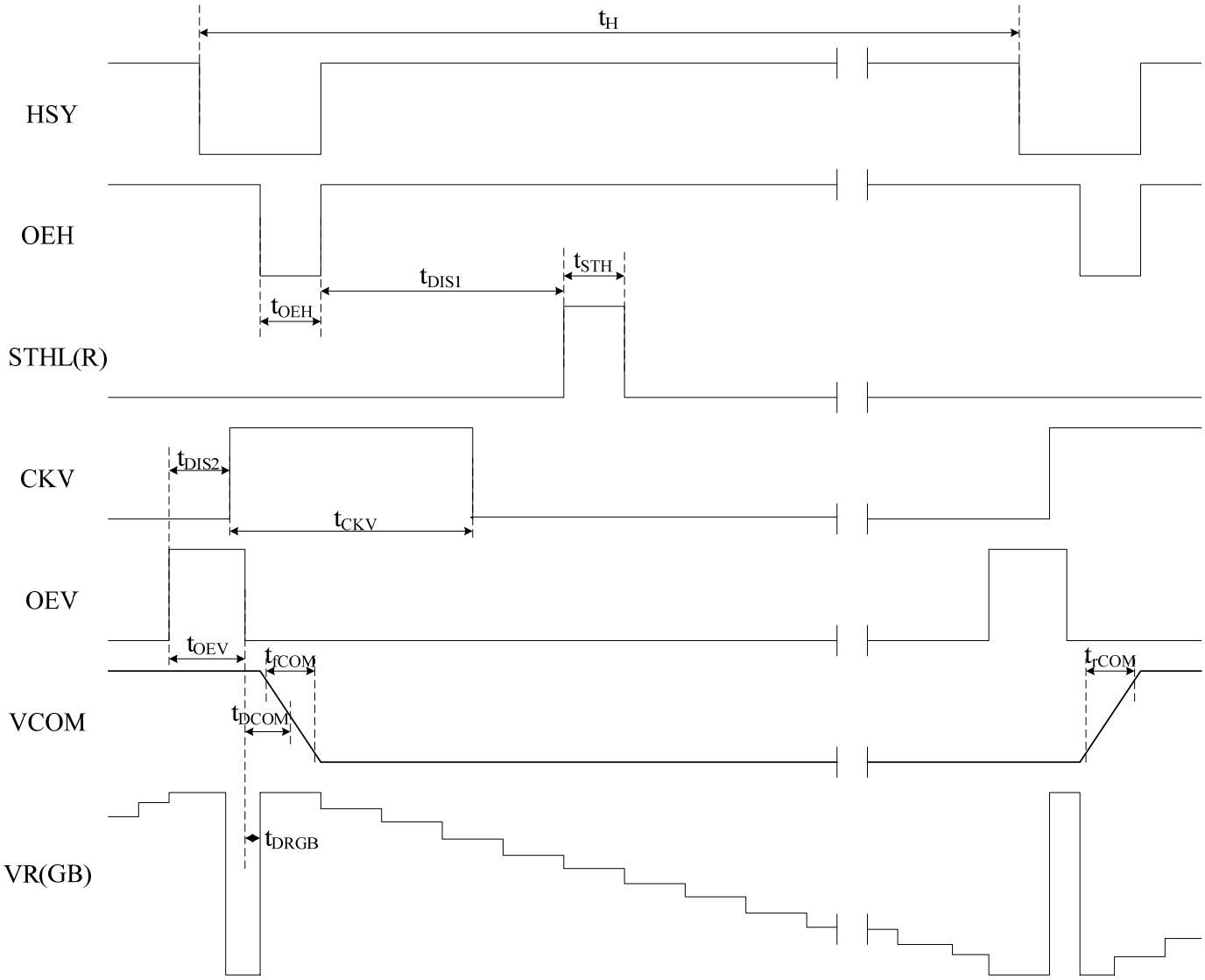


Figure 6.3: Horizontal display timing

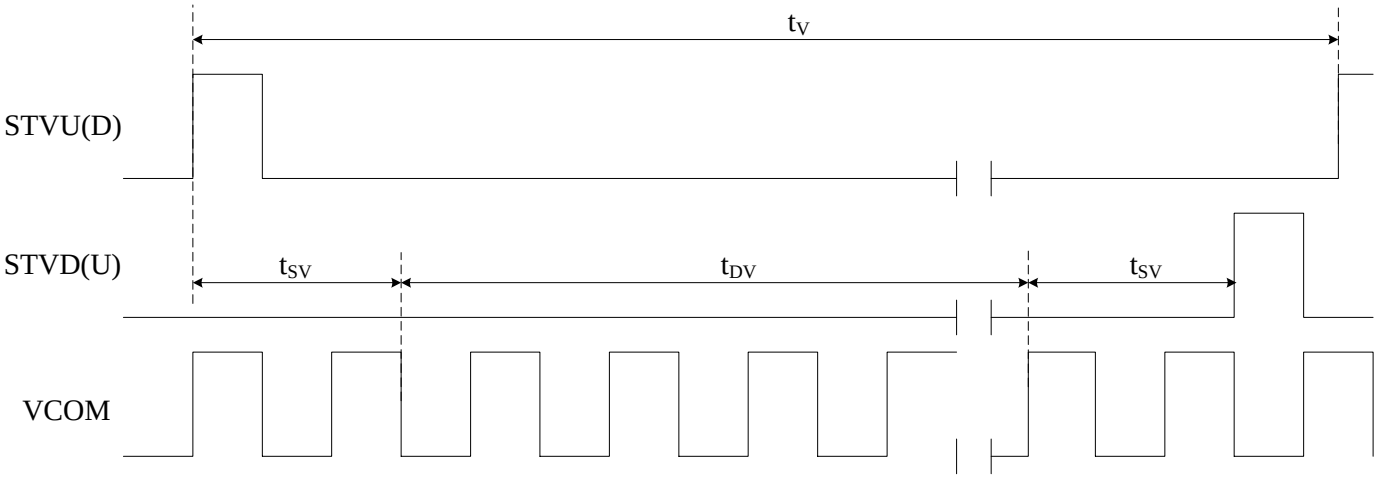


Figure 6.4: Vertical display timing

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7. POWER ON/OFF SEQUENCE

7.1 Power on Sequence

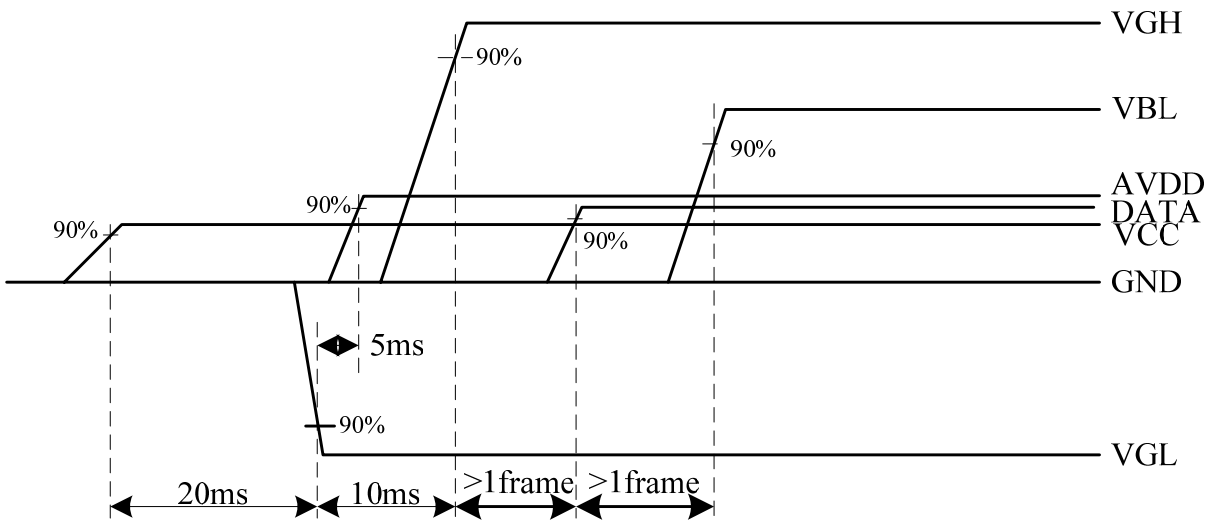


Figure 7.1 Power on sequence

Note: the interval time should more than the label

7.2 Power off Sequence

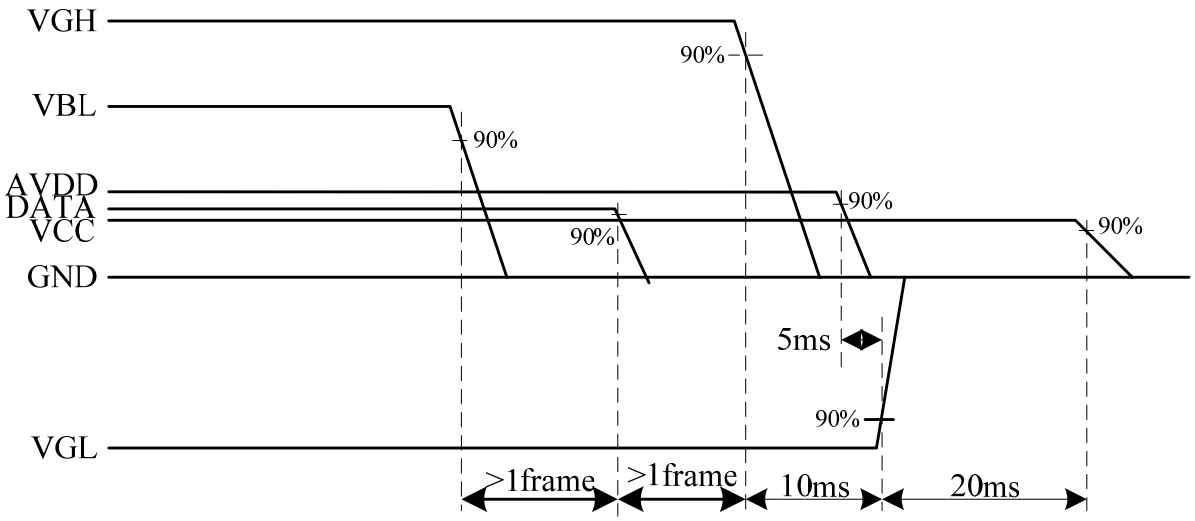


Figure 7.2 Power off sequence

Note: the interval time should more than the label

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8. OPTICAL CHARACTERISTICS

Ta=25℃

Item		Symbol	Condition	Min	Typ.	Max.	Unit	Remark
View Angles		ΘL	CR≧10	55	65		Degree	Note2,3
		ΘR		55	65			
		ΘT		35	45			
		θB		55	65			
Contrast Ratio		CR	θ=0°	300	400			Note 3
Response Time		Tr	25℃		25	50	ms	Note 4
		Tf						
Chromaticity	White	x	Backlight on	0.260	0.310	0.360		Note 1,5
		y		0.280	0.330	0.380		
	RED	x						
		y						
	GREEN	x						
		y						
	BLUE	x						
		y						
Uniformity		U		70	75		%	Note 6
NTSC		(x,y)			50		%	Note 5
Luminance		L		160	200		cd/m^2	Note 7

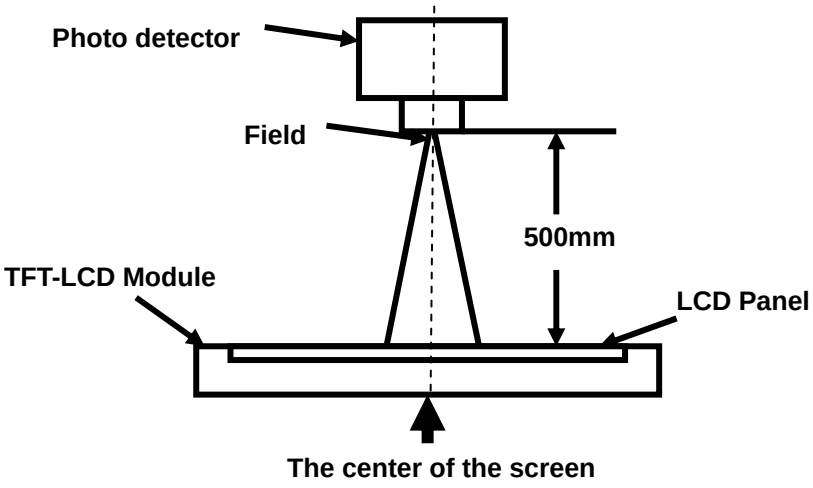
Test Conditions:

1. The ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

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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-3	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	

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

viewing angle is measured at the center point of the LCD by conoscope。

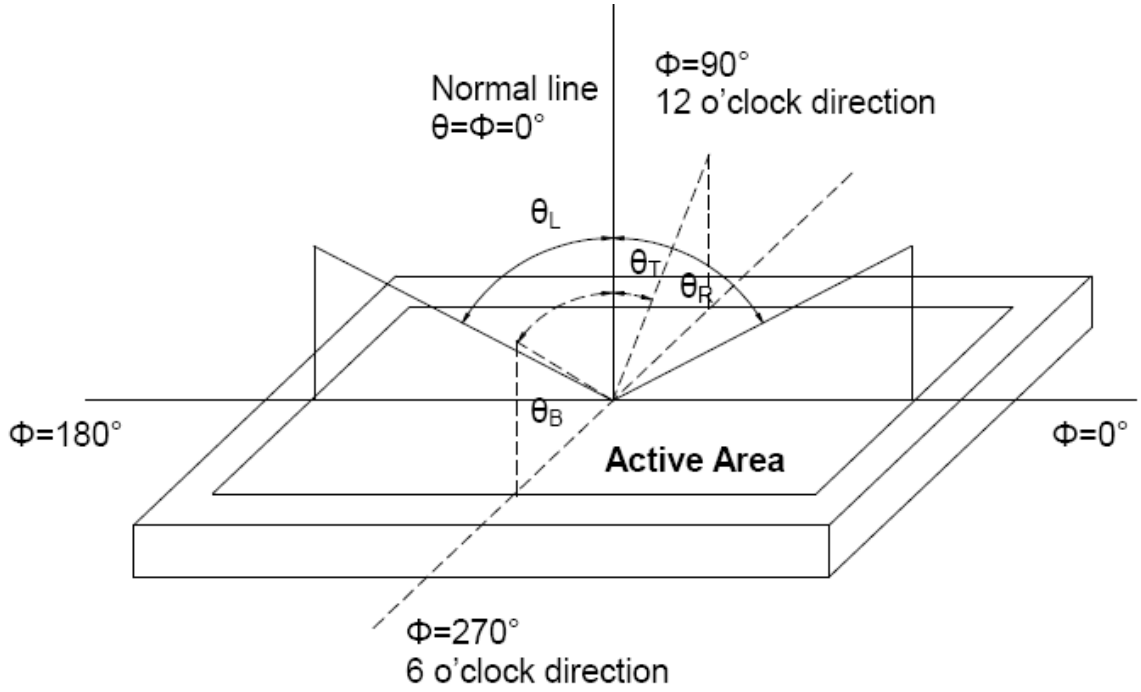


Figure 8.1 Definition of viewing angle

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Note 3: Definition of contrast ratio

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

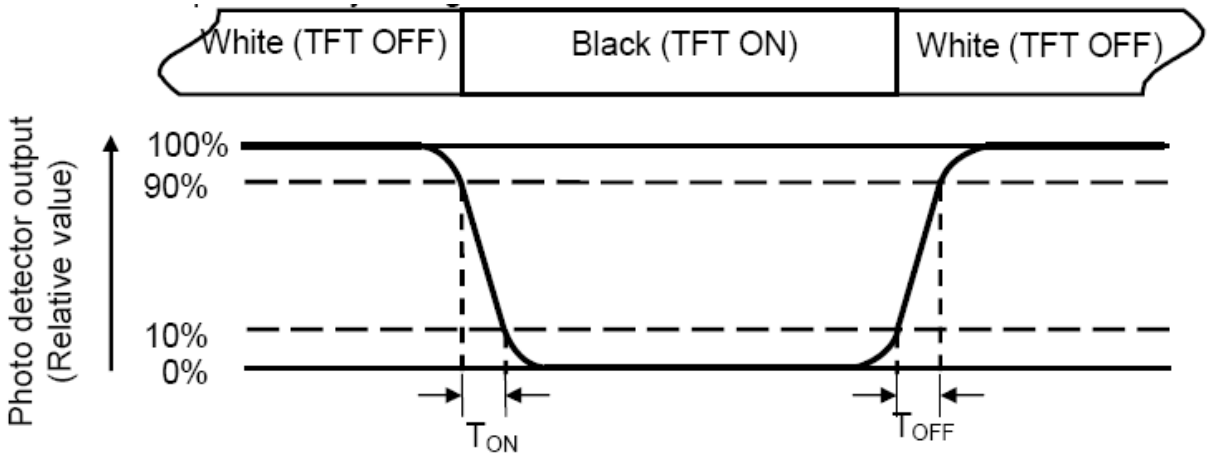
"White state ":The state is which the LCD is driven by $\mathbf{V}_{white}$.

"Black state": The state is which the LCD is driven by $\mathbf{V}_{black}$.

$\mathbf{V}_{white}$: To be determined $\mathbf{V}_{black}$: 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 (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) 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.

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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.

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

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

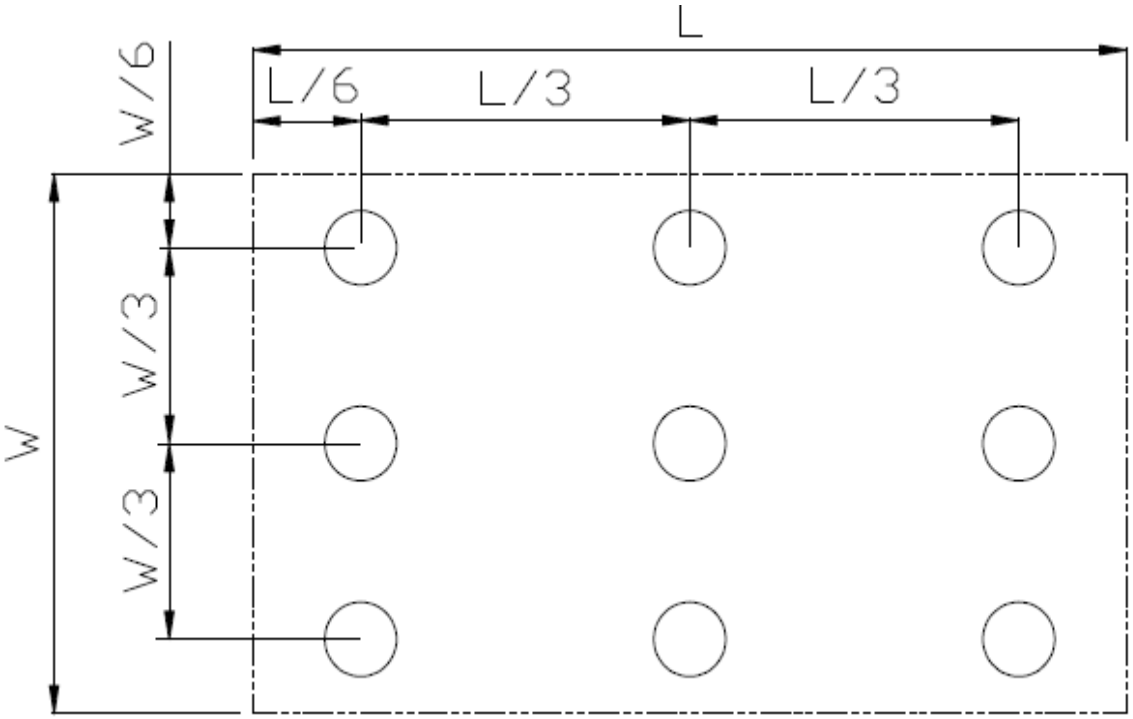


Figure 8.2 Definition of uniformity

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

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9. Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts=+70℃, 240hrs	Note1 IEC60068-2-2,GB2423.2—89
2	Low Temperature Operation	Ta=-20℃, 240hrs	IEC60068-2-1 GB2423.1—89
3	High Temperature Storage (non-operation)	Ta=+80℃, 240hrs	IEC60068-2-2, GB2423.2—89
4	Low Temperature Storage (non-operation)	Ta=-30℃, 240hrs	IEC60068-2-1 GB2423.1—89
5	High Temperature & High Humidity Operation	Ta = +60℃, 90% RH max,240 hours	Note2 IEC60068-2-3, GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min, 100 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14,GB2423.22—87
7	Electro Static Discharge (operation)	±2KV,Human Body Mode, 100pF/1500Ω	IEC61000-4-2 GB/T17626.2—1998
8	Vibration (non-operation)	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 GB/T2423.10—1995
9	Shock (non-operation)	100G 6ms, ±X,±Y,±Z 3times for each direction	IEC60068-2-27 GB/T2423.5—1995
10	Package Drop Test	Height:80 cm，1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/2423.8—1995
11	Package Vibration Test	Random Vibration: 0.015G*G/Hz for 5-200Hz, -6dB/Octave from 200-500Hz 2 hours for each direction of X,Y,Z (6 hours for total)	IEC60068-2-34

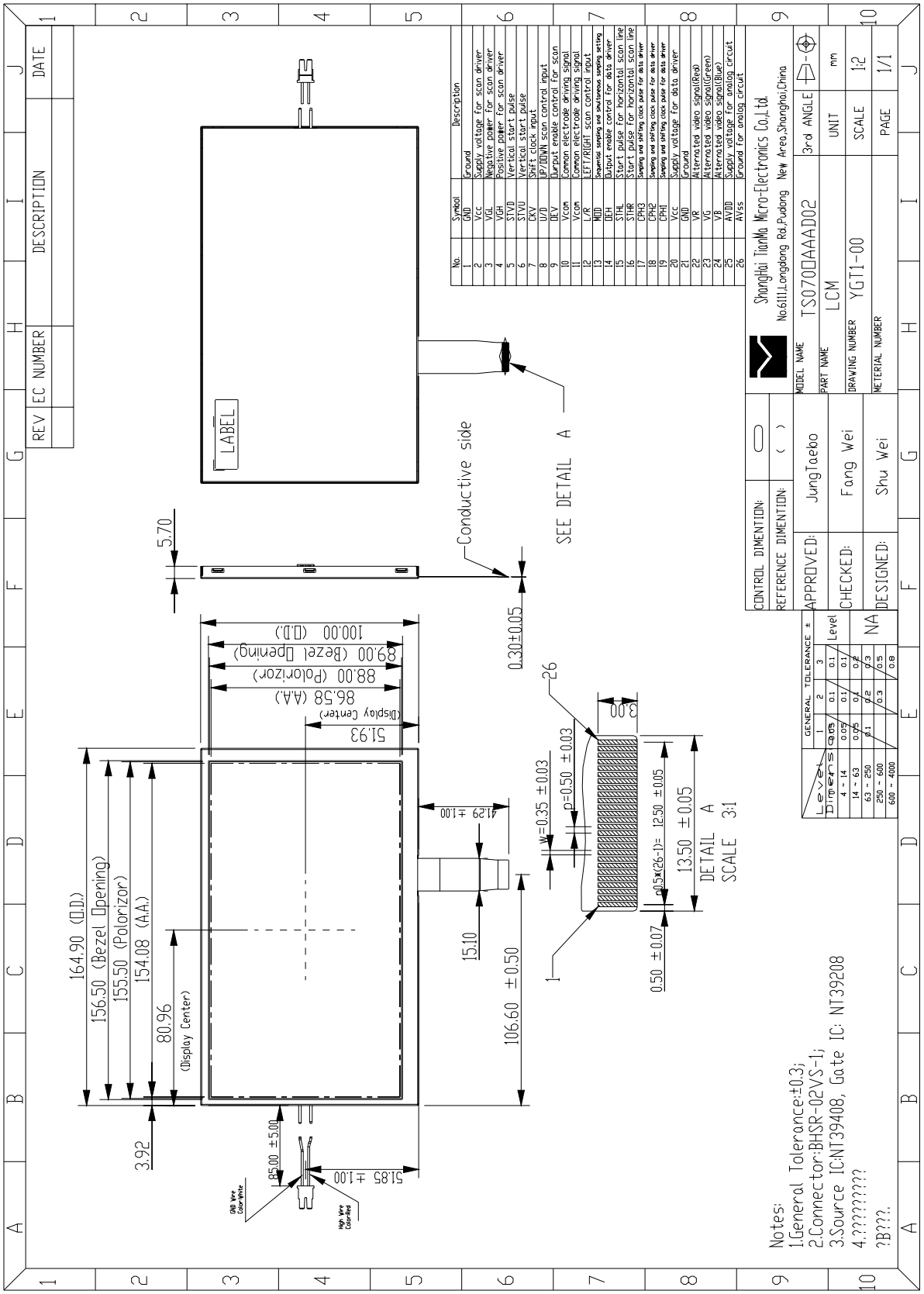
Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of samples.

Note3: In the standard condition, there shall be no practical problem that affect the display function.

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10. MECHANICAL DRAWING



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11. Packing Drawing

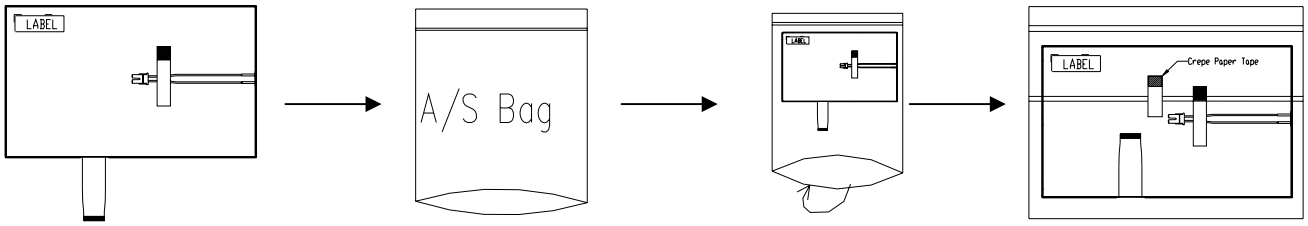
11.1 Packing Material Table

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TS070OAAAD02	164.90*100.00*5.70 (including the dimensions of all parts)		50	
2	Partition_1	Corrugated Paper	513*333*215		1	
3.	Anti-Static Bag	PE	160mm*178mm*0.05mm		50	Anti-static
4	Dust-Proof Bag	PE	----------	0.0600	1	
5	Partition_2	Corrugated Paper	505*332*4.00		2	
6	Corrugated Bar	Corrugated Paper	513*162*4		4	
7	Carton	Corrugated Paper	530*350*250	1.1000	1	
8	Total weight	TBD±5%				

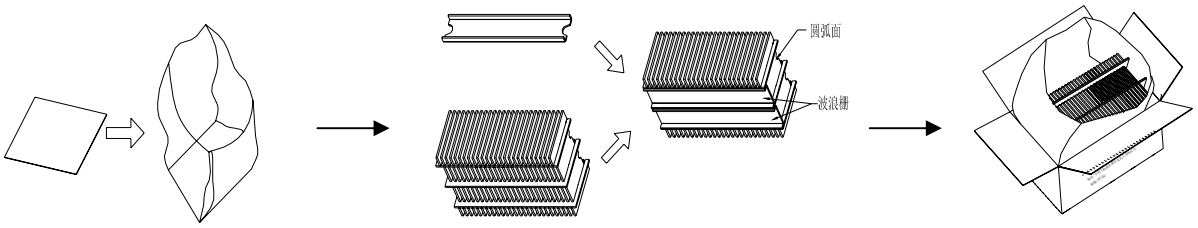
11.2 Packing Quantity

Total LCM Quantity in Carton: no of Partition 2 Rows x quantity per row 25 =50

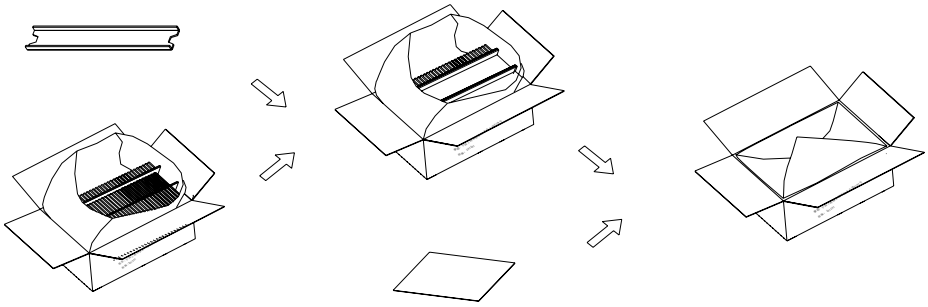
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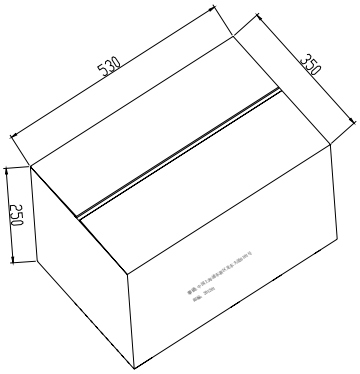


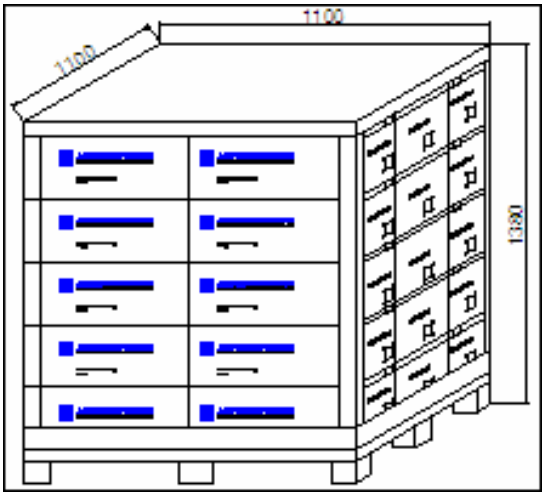
1. LED Light Bar wire to LCM backside
2. Fix with crepe paper tape
3. Put LCM into A/S BAG



DUST-PROOF-BAG







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12. Precautions for Use of LCD Modules

12.1 Handling Precautions

12.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

12.1.2. 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.

12.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

12.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

12.1.5. 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

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

— Water

— Ketone

— Aromatic solvents

12.1.6. Do not attempt to disassemble the LCD Module.

12.1.7. If the logic circuit power is off, do not apply the input signals.

12.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

a. Be sure to ground the body when handling the LCD Modules.

b. Tools required for assembly, such as soldering irons, must be properly ground.

c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

d. 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.

12.2 Storage precautions

12.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

12.2.2. 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:

Temperature : 0℃ ～ 40℃ Relatively humidity: ≤80%

12.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

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12.3Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

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