

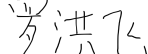
PRODUCT SPECIFICATION

CDTECH Model: **S121QXG06HD-C86**

CUSTOMER Model: **-**

Description: **12.1 " TFT-LCD Module**

Version: **1.0**

CDTECH	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE			
DATE	2023.10.28	2023.10.28	2023.10.28

CUSTOMER APPROVAL	SIGNATURE	DATE



Record of Revisions

[illegible]



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1. General Specifications

1.1 LCM General Information

Item	Specification	Unit
LCD Size	12.1	inch
Number of Pixels	1024 (H) RGB x 768 (V)	pixels
Display Mode	Normally Black	-
Viewing Direction	Free	o' clock
Interface	LVDS	-
Display Colors	16.7M	colors
Outline Dimension	260.50 (H) x 204.00 (V) x 8.60 (D)	mm
Active Area	245.76 (H) x 184.32 (V)	mm
Pixel Pitch	0.08 (H) x 0.08 (V)	mm
Driver IC	-	-
Operation Temperature	-20~70	°C
Storage Temperature	-30~80	°C

Note1:Requirements on environmental protection RoHS compliant.

2. Absolute Maximum Ratings

Item	Symbol	MIN.	MAX.	Unit	Note
Analog Supply voltage	VDD	-0.3	5.0	V	Note 1

Note 1:Permanent damage may occur to the LCD module if beyond this specification.

Functional operation should be restricted to the conditions described under normal operating conditions.

3. Electrical Characteristics

3.1 Recommended Operating Condition for TFT LCD

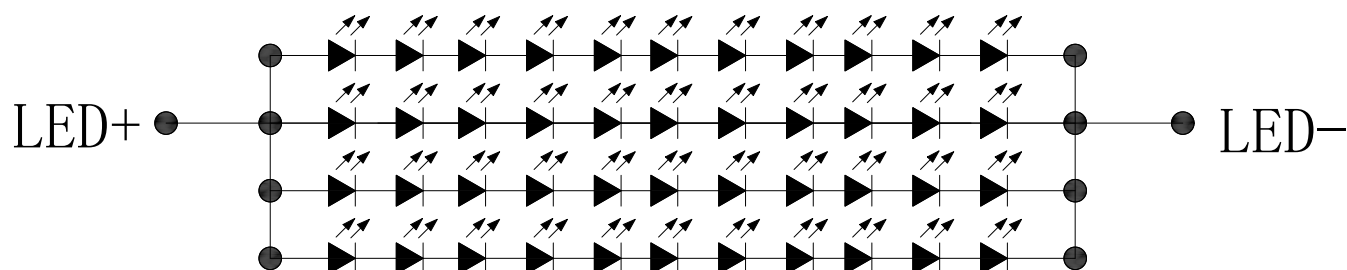
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Analog Supply voltage	VDD	3.0	3.3	3.6	V	
Analog supply current	I _{VDD}	-	TBD	-	mA	VDD=3.3V
Logic input voltage	VIH	0.7*VDD	-	VDD	V	
	VIL	GND	-	0.3*VDD	V	

3.2 Recommended Driving Condition for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Driving Current	I _F	530	760	990	mA	
Driving Voltage	V _F	-	12	-	V	
Power consumption	W _{BL}	-	10.2	-	W	
LED Life-Time	N/A	-	50,000	-	Hours	Ta=25℃ Note 1

Note 1: LED lifetime is defined as the module brightness decay 50% of original brightness at Ta=25 degree, typical current.

Note 2: LED circuit :



4. Interface Pin Assignment

4.1 LCM Pin Assignment

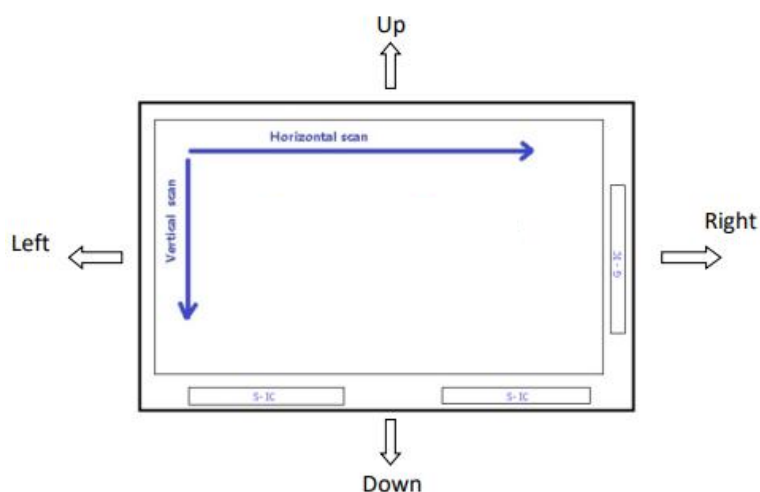
No.	Symbol	Description
1	RX3+	+ LVDS differential data input
2	RX3-	- LVDS differential data input
3	BIST	Normal operation/BIST pattern select BIST=0: Normal operation (NOTE 1) BIST=1: BIST mode
4	SEL68	LVDS 6/8 bit select function control SEL68=1: LVDS input data is 8 bit (NOTE 2) SEL68=0: LVDS input data is 6 bit
5	GND	Ground
6	RXC+	+LVDS differential clock input
7	RXC-	-LVDS differential clock input
8	GND	Ground
9	RX2+	+ LVDS differential data input
10	RX2-	- LVDS differential data input
11	GND	Ground
12	RX1+	+ LVDS differential data input
13	RX1-	- LVDS differential data input
14	GND	Ground
15	RX0+	+ LVDS differential data input
16	RX0-	- LVDS differential data input
17	reLR	Left or right display control LR=1: Left-->Right (NOTE 3) LR=0: Right--> Left
18	reuD	Up or Down display control LR=1: Up-->Down (NOTE 3) LR=0: Down--> Up
19	VDD(3.3V)	Power supply
20	VDD(3.3V)	Power supply

Note:

1. Pin1 is reversed as BIST function for test, don't connect signal to this pin, keep floating.
2. SEL68 is used for selecting 6bit/8bit LVDS data input, 1: connect to VDD -->8bit; 0:connect to GND-->6bit.

3. reLR & reUD are used for selecting scanning direction. 0: connect to GND, 1: connect to VDD.

Setting of scan control input		Scanning direction
reLR	reUD	
1	1	left to right ,up to down
1	0	left to right, down to up
0	1	right to left ,up to down
0	0	right to left ,down to up



4.2 Backlight LED FPC Pin Assignment

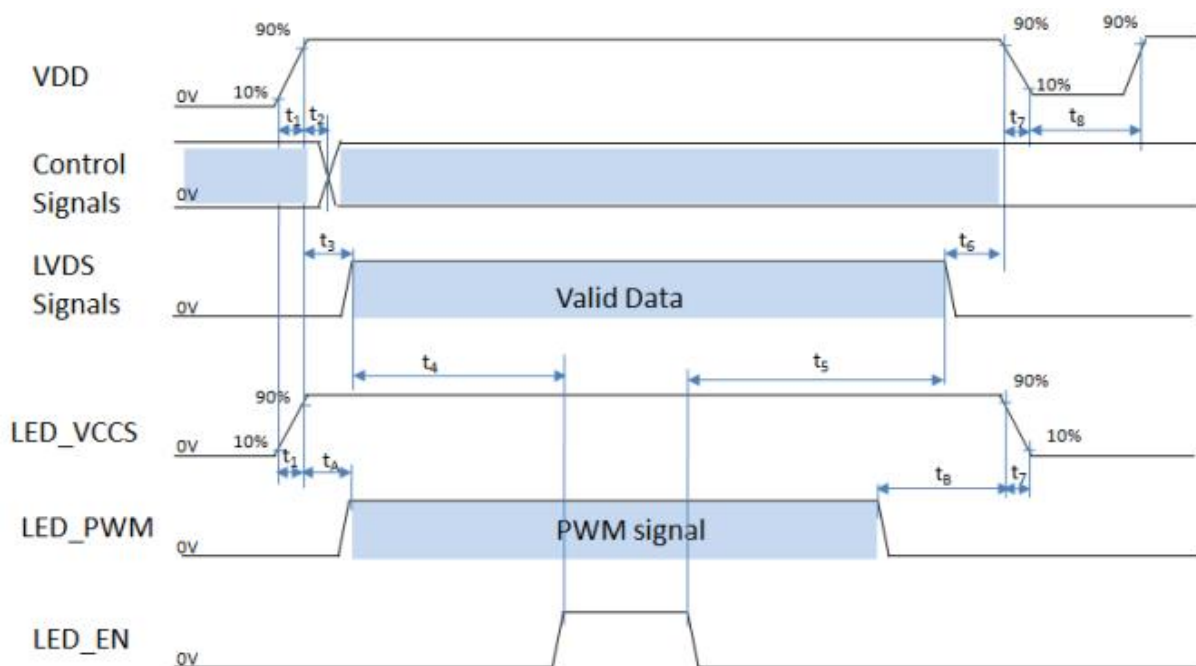
No.	Symbol	Description
1	VI(12V)	Power supply (12V)
2	VI(12V)	Power supply (12V)
3	VI(12V)	Power supply (12V)
4	VI(12V)	Power supply (12V)
5	VGND	Ground
6	VGND	Ground
7	VGND	Ground
8	VGND	Ground
9	EN	Converter power IC output Enable (Active High)
10	ADJ	PWM control signal for LED convertor

5. Interface Characteristics

5.1 Power Sequence

The power sequence specifications are shown as the following table and diagram.

Symbol	Value		Unit
	Min.	Max.	
t_1	1	20	ms
t_2	1	5	ms
t_3	10	50	ms
t_4	200	500	ms
t_5	200	500	ms
t_6	50	200	ms
t_7	0	20	ms
t_8	500	-	ms
t_A	0	50	ms
t_B	0	50	ms



Note 1: Please don't plug the interface cable of on when system is turned on.

Note 2: Please avoid floating state of the interface signal during signal invalid period.

Note 3: It is recommended that the backlight power must be turned on after the power supply for LCD and the interface signal is valid.

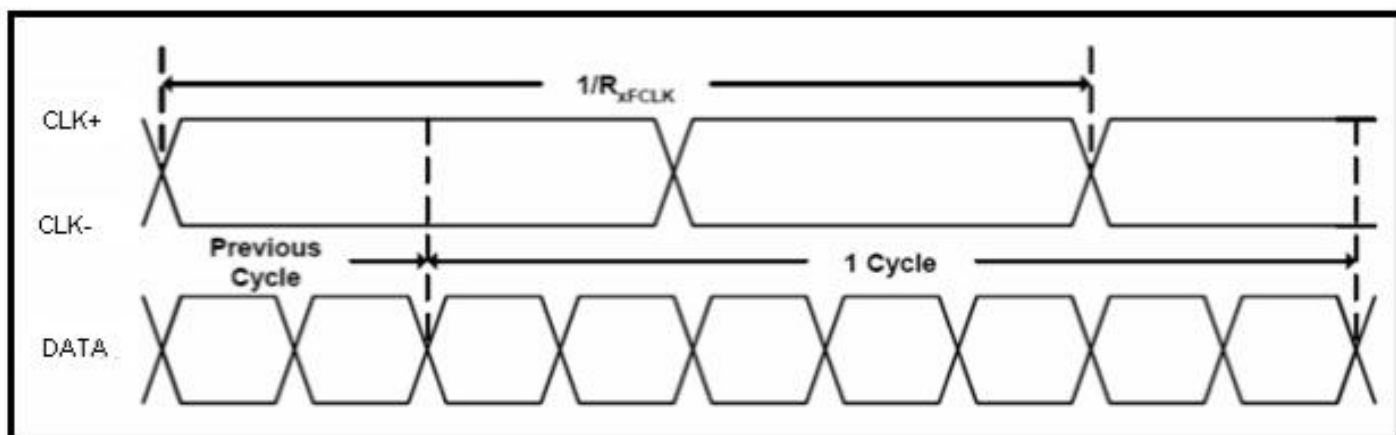
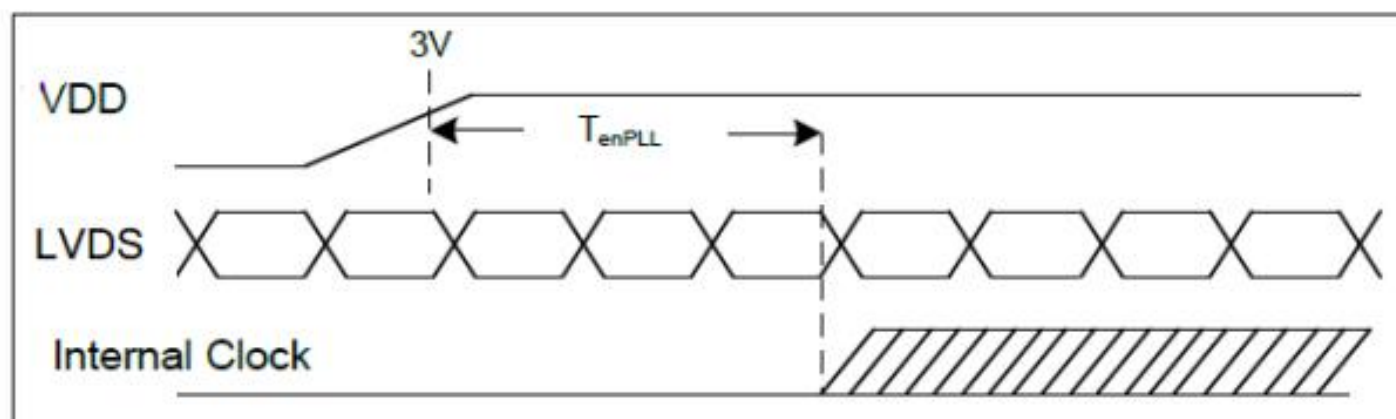
Note 4: Control signals include BIST, SEL68 , reUD & reLR.

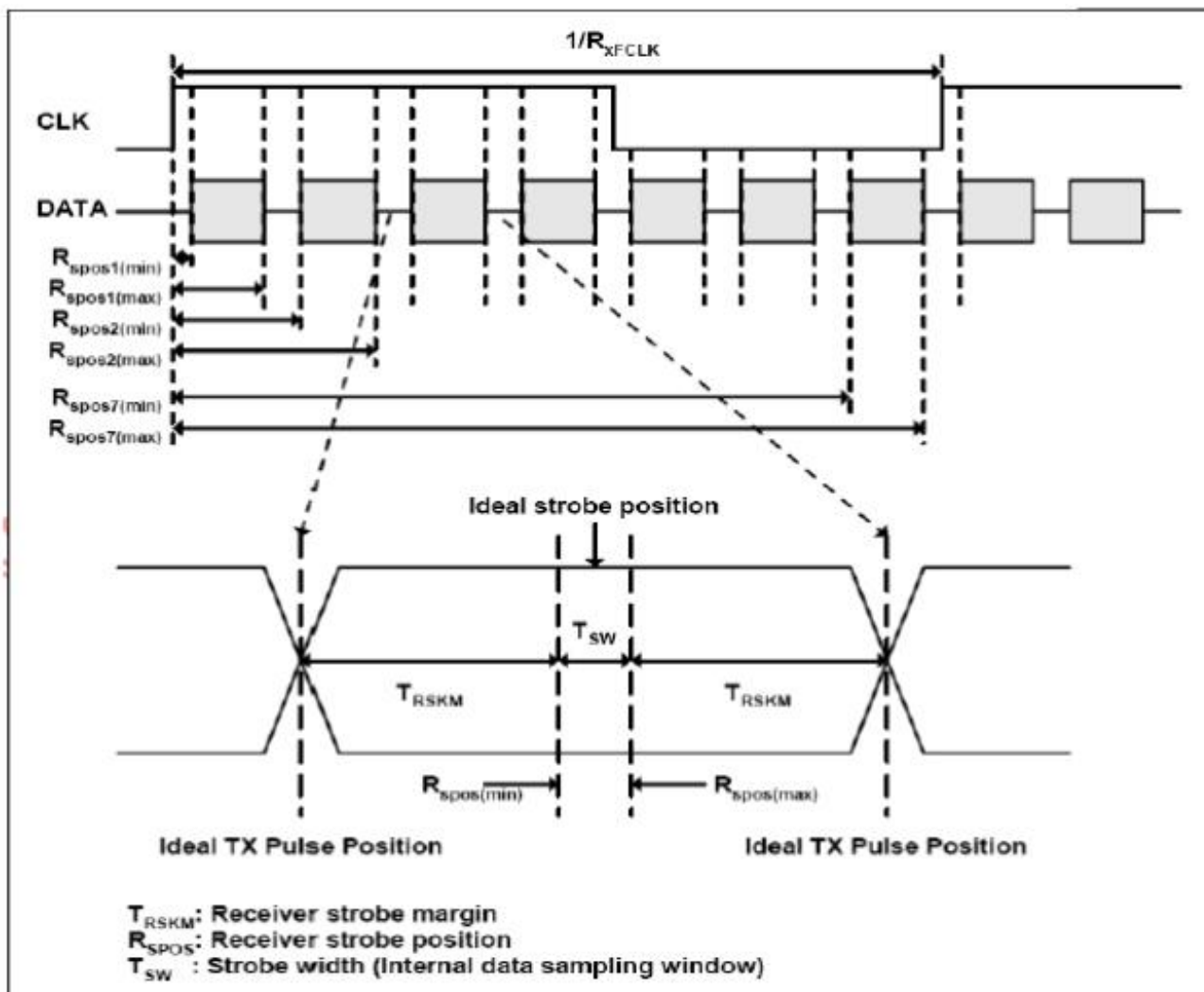
5.2 LVDS SIGNAL TIMING CHARACTERISTICS

5.2.1 AC Electrical characteristics

Parameter	Symbol	Min	Typ	Max	Units	Condition
Clock frequency	RxFCLK	26.2	-	71	MHz	
Input data skew margin	TRSKM	500	-	-	ps	VID = 400mV RxVCM=1.2V RxFCLK=71MHz
Clock high time	TLVCH	-	$4/(7 \times RxFCLK)$	-	ns	
Clock low time	TLVCL	-	$3/(7 \times RxFCLK)$	-	ns	
PLL wake-up time	TenPLL	-	-	150	us	

5.2.2 Input clock and data timing diagram

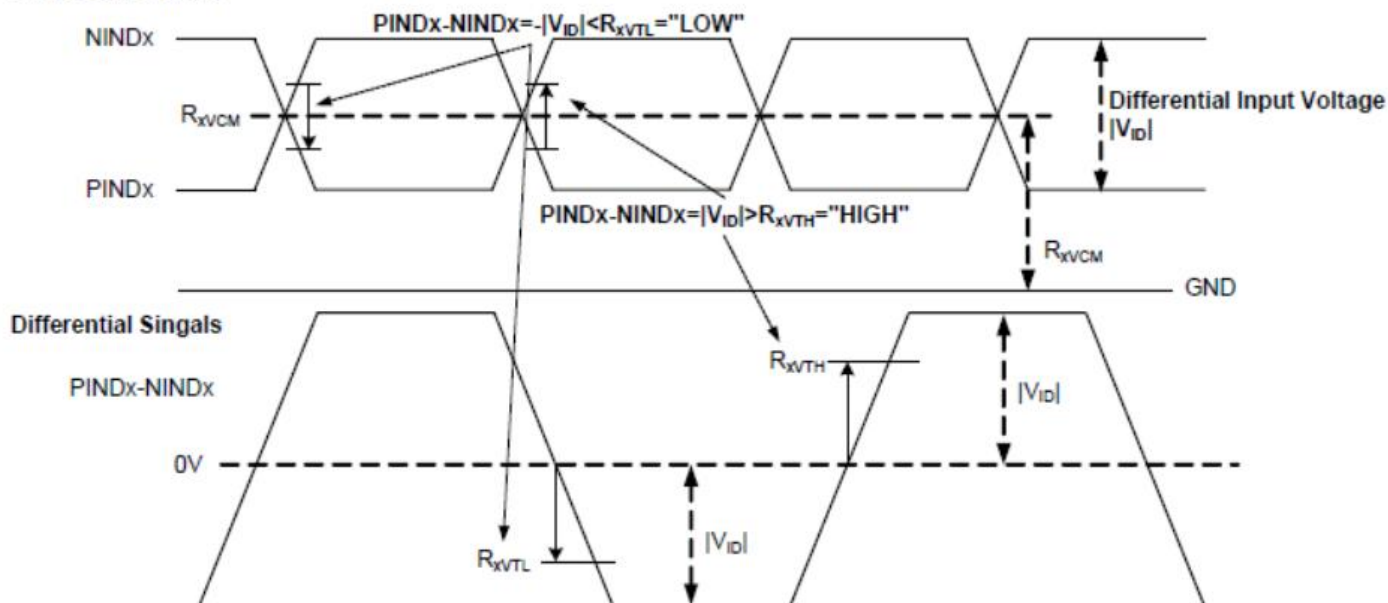




5.2.3 DC electrical characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	R_{XVTH}	-	-	+100	mV	$R_{XVCM}=1.2V$
LVDS Differential input low Threshold voltage	R_{XVTL}	-100	-	-	mV	
Input Voltage range (Singled-end)	R_{XVIN}	0	-	2.4	V	
LVDS Differential input common mode voltage	R_{XVCM}	$ V_{ID} /2$	-	$2.4- V_{ID} /2$	V	
LVDS Differential input voltage	$ V_{ID} $	0.2	-	0.6	V	

Single-end Signals

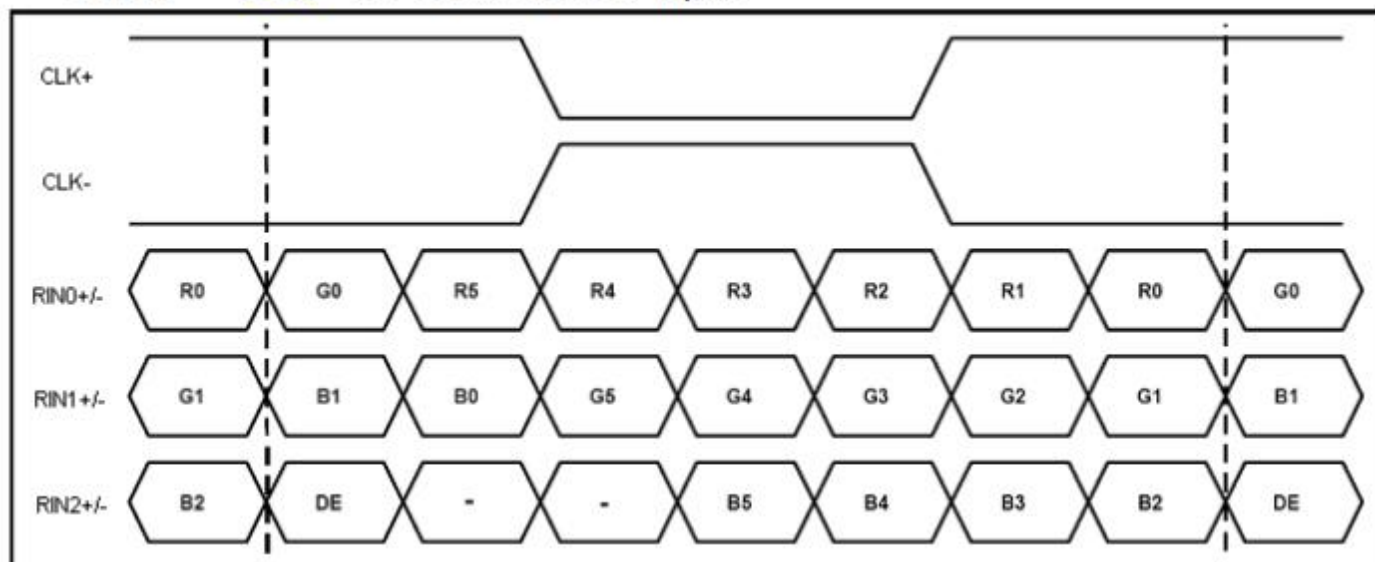


5.2.4 data timing

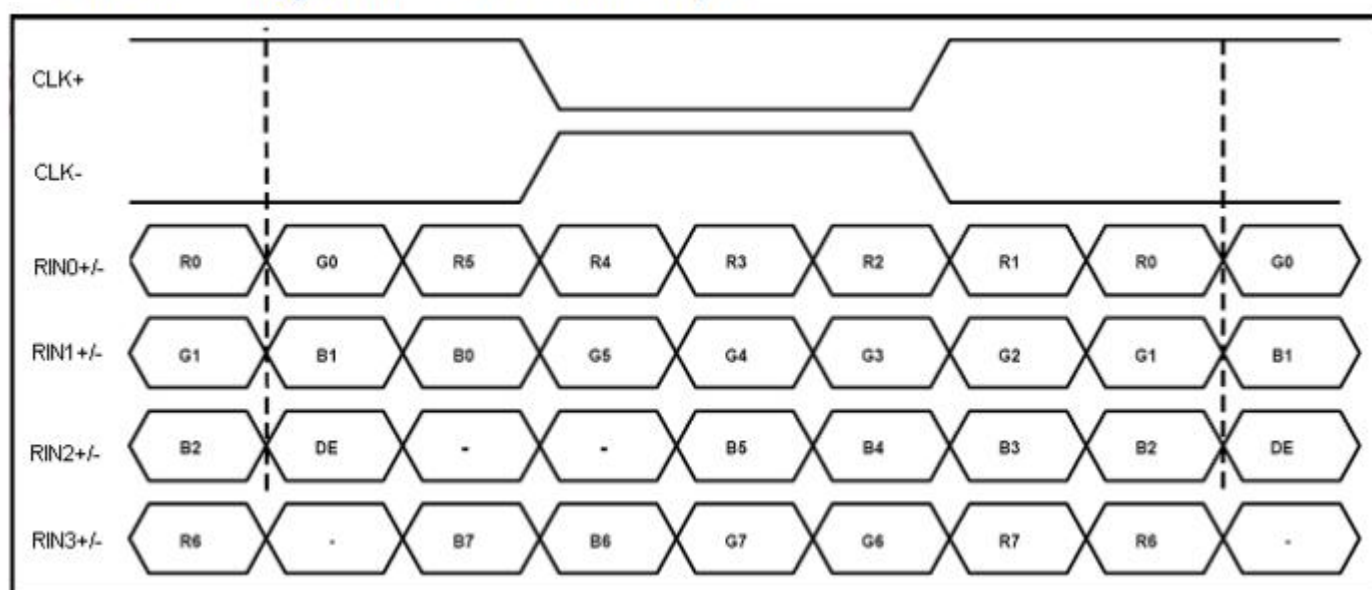
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	52	65	71	MHz
Horizontal display area	thd	1024			DCLK
HSD period	th	1114	1344	1400	DCLK
HSD blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd	768			T_H
VSD period	tv	778	806	845	T_H
VSD blanking	tvbp+tvfp	10	38	77	T_H

5.2.5 LVDS data input format

SEL68 = "Low" for 6 bits LVDS Input



SEL68 = "High" for 8 bits LVDS Input



6. Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR≥10) B/L ON	θ_T	$\Phi=90^\circ$ (12 o'clock)	85	89	-	deg	Note2
	θ_B	$\Phi=270^\circ$ (6 o'clock)	85	89	-	deg	Note2
	θ_L	$\Phi=180^\circ$ (9 o'clock)	85	89	-	deg	Note2
	θ_R	$\Phi=0^\circ$ (3 o'clock)	85	89	-	deg	Note2
Response Time	T_{ON}	Normal $\theta=\Phi=0^\circ$	-	12	17	msec	Note4
	T_{OFF}		-	15	17	msec	Note4
Contrast Ratio	CR		700	1000	-	-	Note1 Note3
Color Chromaticity	W_X		0.28	0.31	0.34	-	Note1 Note5
	W_Y		0.31	0.34	0.37	-	Note1 Note5
Luminance	L		450	500	-	cd/m ²	Note1 Note7
Luminance Uniformity	Y_U		70	80	-	%	Note1 Note6
NTSC	-		-	-	-	%	-

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.

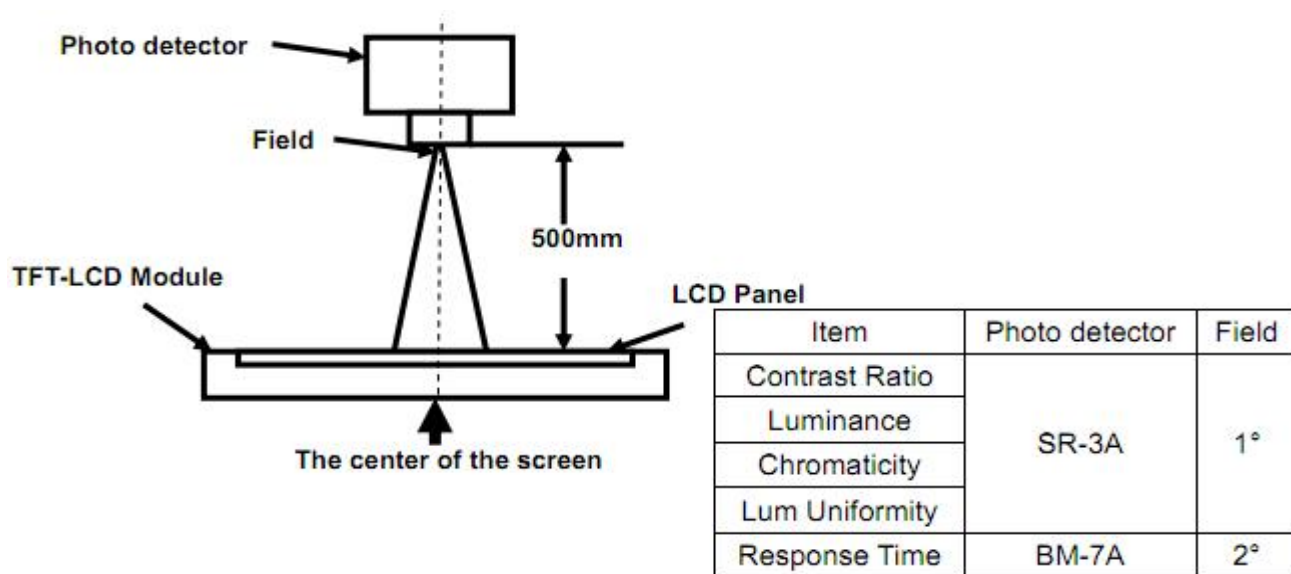


Fig 1

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).

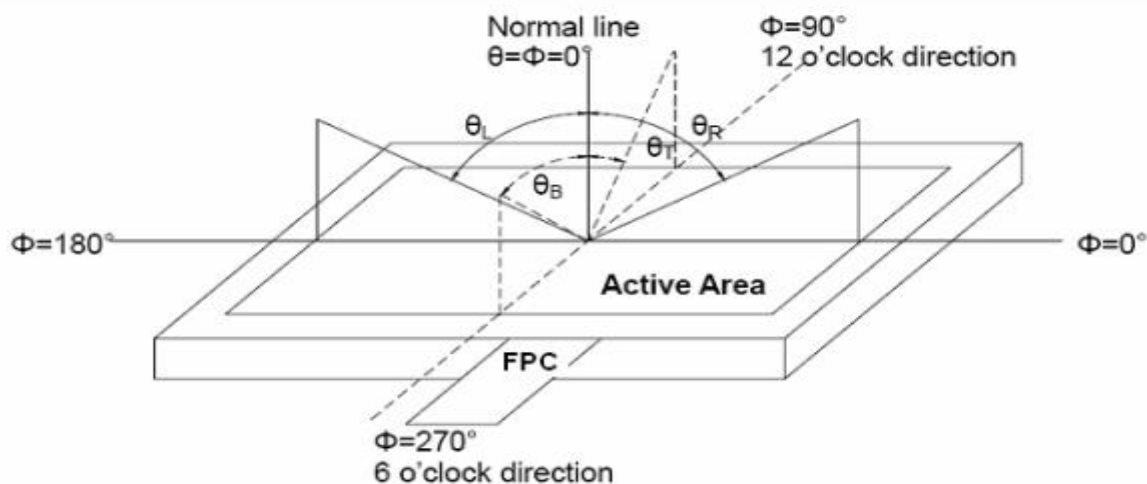


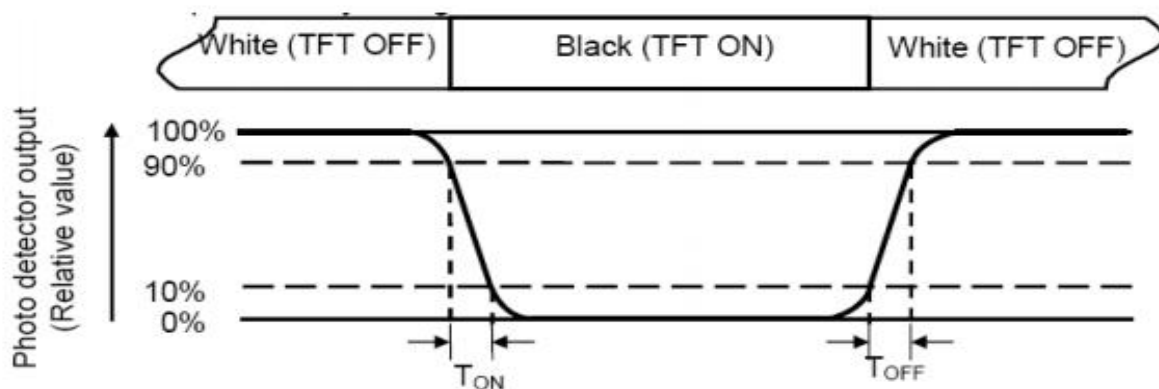
Fig 2 Definition of viewing angle

Note 3: Definition of contrast ratio

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance. For more information see FIG.3-a/b

Note 7: Surface luminance is the luminance with all pixels displaying white.

L_v = Average Surface Luminance with all white pixels ($P_1, P_2, P_3, \dots, P_n$)

For more information see FIG.3-a/b

Note 8: Size : $S \leq 5"$ (see Figure a) A : 5 mm B : 5 mm. H, V : Active area

Light spot size $\varnothing = 5\text{mm}$ (BM-5) or $\varnothing = 7.7\text{mm}$ (BM-7) 50cm distance or test spot position : see Figure a.

measurement instrument : TOPCON's luminance meter SR-3A or BM-7 or compatible (see Figure 1).

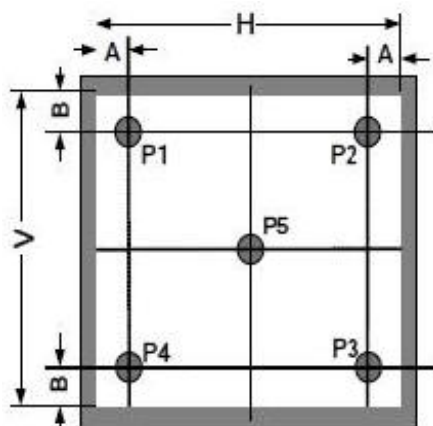


Fig. 3-a Definition of points

$5'' < S \leq 12.3''$ (see Figure b) . H,V : Active area

Light spot size $\varnothing = 5\text{mm}$ (BM-5) or $\varnothing = 7.7\text{mm}$ (BM-7) 50cm distance or compatible distance from the LCD surface to detector lens. test spot position : see Figure b.

measurement instrument : TOPCON's luminance meter SR-3A or BM-7 or compatible (see Figure 1).

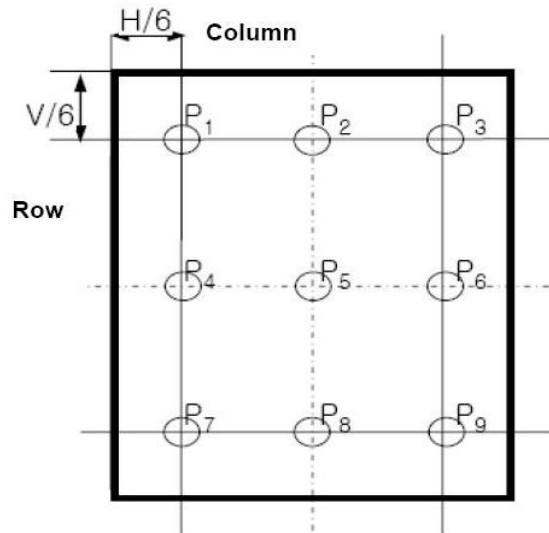


Fig. 3-b Definition of points

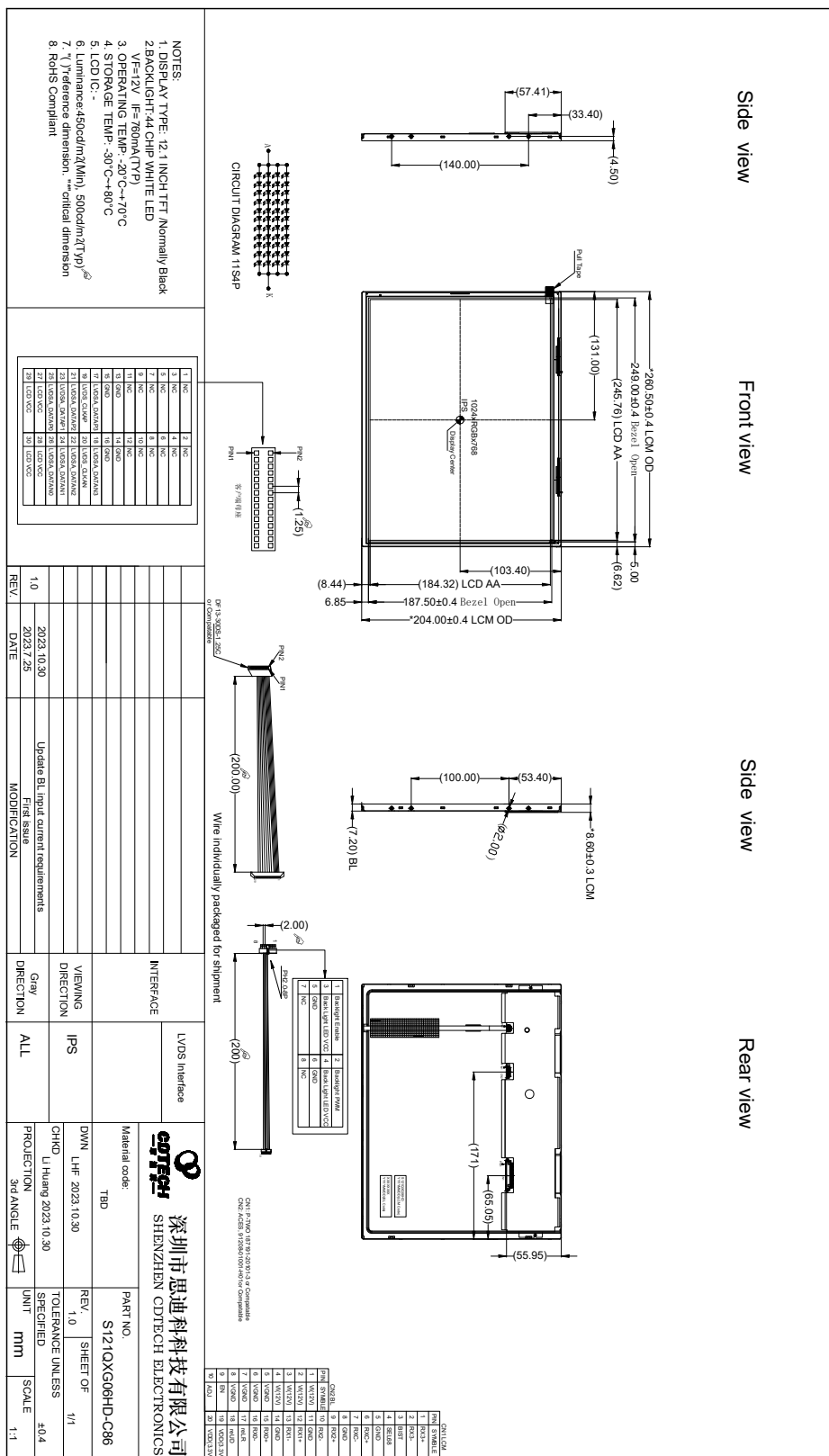
7. Reliability Test Items

Test Item	Test Conditions
High Temperature Storage	Ta= +80℃ 96hrs
Low Temperature Storage	Ta= -30℃ 96hrs
High Temperature Operation	Ta= +70℃ 96hrs
Low Temperature Operation	Ta= -20℃ 96hrs
High Temperature and Humidity Storage	Ta= +60℃, 90% RH 96hrs
Thermal Shock (Non-operation)	-30℃/30 min ~ +80℃/30 min for 20 cycles Start with cold temperature end with high temperature
Electro Static Discharge	Contact = ± 4 kV, class B Air = ± 8 kV, class B R=330Ω,C=150pF
Vibration	Sweep: 10Hz~55Hz~10Hz Stroke: 1.5mm 2 hrs for each direction of X .Y. Z.
Mechanical Shock	60G 6ms,±X,±Y,±Z 3 times for each direction
Package Drop Test	Height: 60 cm 1 corner, 3 edges, 6 surfaces

Notes: The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:

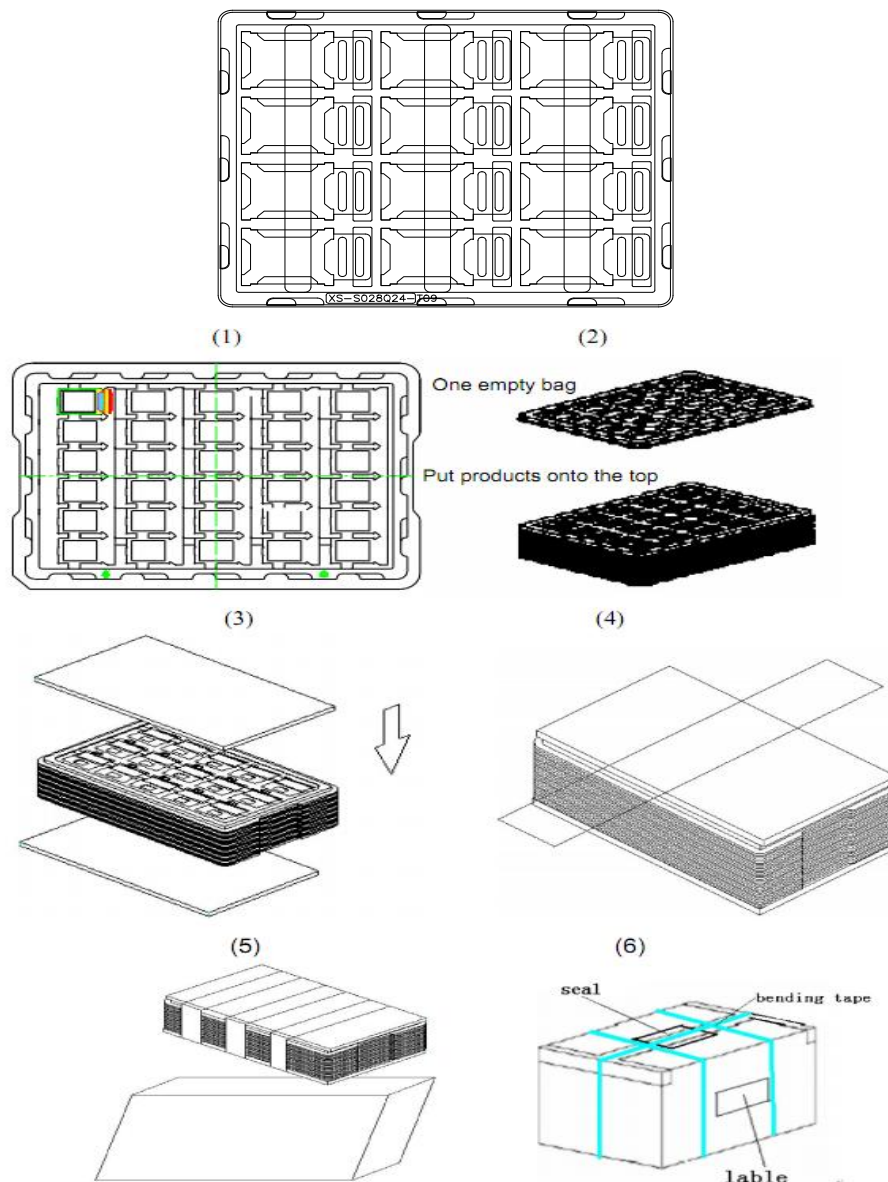
- 1). Air bubble in the LCD
- 2). Seal leak or Glass crack
- 3). Non display or abnormal display
- 4). Brightness reduction >50%

8. Mechanical Drawing



9. Packing

Packing Method



Steps:

1. Put module into tray cavity
2. Tray stacking
3. Put 1 cardboard under the tray stack and 1 cardboard above
4. Fix the cardboard to the tray stack with adhesive tape
5. Put the tray stack into carton
6. Carton sealing with adhesive tape

10. Precautions for Use of LCD modules

10.1 Handling Precautions

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

10.1.2. 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.

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

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

10.1.5. 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
- Ketene
- Aromatic solvents

10.1.6. Do not attempt to disassemble the LCD Module.

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

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

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

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

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

10.1.8.4. 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.

10.2 Storage Precautions

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

10.2.2. 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%

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

10.3 Transportation Precautions

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