

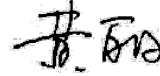
PRODUCT SPECIFICATION

CDTECH Model: **S043BWQ99HD-DR12**

CUSTOMER Model: **-**

Description: **4.3 " TFT-LCD Module with RTP**

Version: **1.0**

CDTECH	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE			
DATE	2024.4.25	2024.4.25	2024.4.25

CUSTOMER APPROVAL	SIGNATURE	DATE



Record of Revisions

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1. General Specifications

1.1 LCM General Information

Item	Specification	Unit
LCD Size	4.3	inch
Number of Pixels	480 (H) RGB x 272 (V)	pixels
Display Mode	Normally Black	-
Viewing Direction	Free	o' clock
Interface	MCU	-
Display Colors	65K	colors
Outline Dimension	105.50 (H) x 67.20 (V) x 4.10 (D)	mm
Active Area	95.04 (H) x 53.86 (V)	mm
Pixel Pitch	0.198 (H) x 0.198 (V)	mm
Driver IC	NV3041A	-
Operation Temperature	-30~85	°C
Storage Temperature	-30~85	°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
Digital supply voltage	IOVCC	-0.3	3.6	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

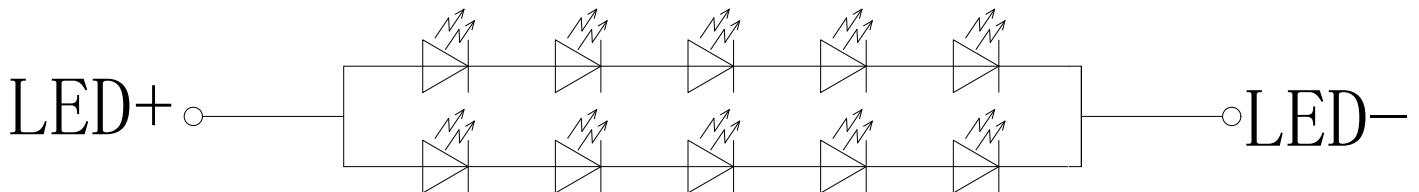
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Analog Supply voltage	V _{CI}	3.0	3.3	3.6	V	
Analog supply current	I _{VCI}	-	TBD	-	mA	V _{CI} =3.3V
Logic supply voltage	IOVCC	1.65	1.8	3.3	V	
Logic supply current	I _{IOVCC}	-	TBD	-	mA	IOVCC=1.8V
• Logic input voltage	V _{IH}	0.7*IOVCC	-	IOVCC	V	
	V _{IL}	GND	-	0.3*IOVCC	V	

3.2 Recommended Driving Condition for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Driving Current	I _F	-	40	-	mA	
Driving Voltage	V _F	13.5	-	17.0	V	
Power consumption	W _{BL}	0.54	-	0.68	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

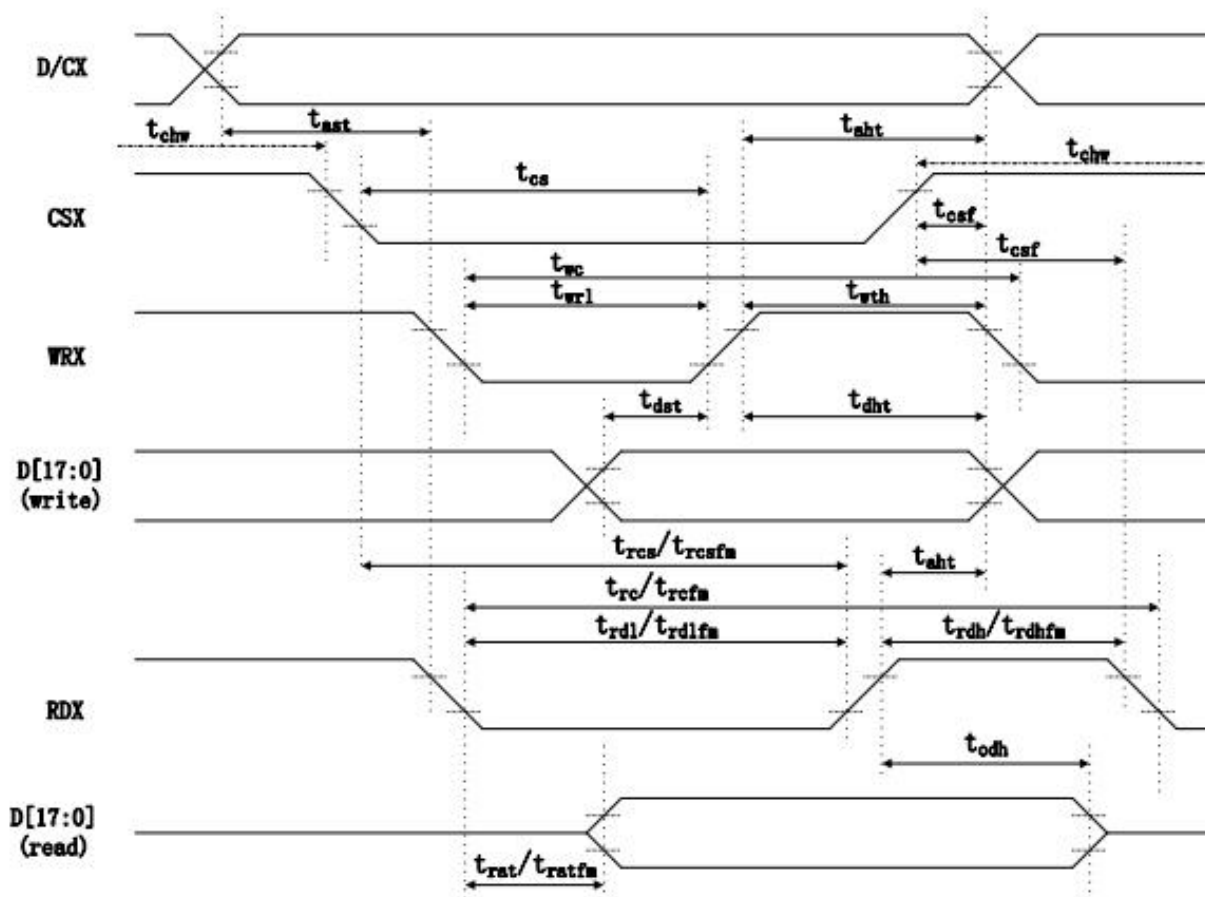
4.1 LCM Pin Assignment

No.	Symbol	Description
1	LED A	Power for LED backlight (Anode)
2	LED A	Power for LED backlight (Anode)
3	LED K	Power for LED backlight (Cathode)
4	LED K	Power for LED backlight (Cathode)
5	VCI	Power supply for analog circuit
6	IOVCC	Power supply for digital interface I/O pins
7	GND	Ground
8	RESET	Global reset pin
9	GND	Ground
10	CS	Chip select input signal
11	WRX	WRX pin, serves as a write signal
12	RXD	serve as a read signal
13	DCX	Data/Command Selection pin
14	GND	Ground
15	D0	Data bus
16	D1	Data bus
17	D2	Data bus
18	D3	Data bus
19	D4	Data bus
20	D5	Data bus
21	D6	Data bus
22	D7	Data bus
23	GND	Ground
24	TE	Tearing effect output pin is used to synchronize MCU frame writing, activated by S/W command. When this pin is not activated (TE function OFF), this pin is VSS level
25	XR	The right side signal of TP
26	YD	The down side signal of TP
27	XL	The left side signal of TP
28	YU	The up side signal of TP
29	NC	No connection
30	NC	No connection

5. Interface Characteristics

5.1 AC Characteristics

Parallel MCU 18/16/9/8-bit BUS



Note: Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

Table 16.3.1 AC characteristics of parallel MCU I/F in asynchronous mode

Signal	Symbol	Parameter	MIN	MAX	UNIT	Description
D/CX	TAST	Address Setup Time	0		ns	
	THAT	Address Hold Time (W/R)	10		ns	
CSX	TCHW	“S” “H” Pulse Width	0		ns	
	TCS	Chip Select Setup Time(W)	10		ns	
	TRCS	Chip Select Setup Time (Read ID)	45		ns	
	TRCSFM	Chip Select Setup Time (Read FM)	355		ns	
	TCSF	Chip Select Wait Time (W/R)	10		ns	
WRX	TWC	Write Cycle	66		ns	
	TWRH	Control Pulse H Duration	25		ns	
	TWRL	Control Pulse L Duration	25		ns	
RDX	TRC	Read Cycle(ID)	160		ns	When Read ID
	TRDH	Control Pulse H Duration(ID)	90		ns	

	TRDL	Control Pulse L Duration(ID)	45		ns	
RDX	TRCFM	Read Cycle(FM)	450		ns	When Read From Frame Memory
	TRDHFM	Control Pulse H Duration(FM)	90		ns	
	TRDLFM	Control Pulse L Duration(FM)	355		ns	
D[17:0]	TDST	Data Setup Time	10		ns	CLmax=30pF Clmin=8pF
	TDHT	Data Hold Time	10		ns	
	TRAT	Read Access Time(ID)		40	ns	
	TRATFM	Read Access Time(FM)		340	ns	
	TODH	Output Disable Time	20	80	ns	

Note 1: IOVCC 1.65 to 3.3V, VCI=2.6 to 3.3V, AGND=GND=0V, Ta=-30 to 70 °C (to +85°C no damage)

Note 2: This input signal rise time and fall time (tr, tf) is specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of IOVCC for input signals

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)	80	85	-	deg	Note2
	θ_B	$\Phi=270^\circ$ (6 o'clock)	80	85	-	deg	Note2
	θ_L	$\Phi=180^\circ$ (9 o'clock)	80	85	-	deg	Note2
	θ_R	$\Phi=0^\circ$ (3 o'clock)	80	85	-	deg	Note2
Response Time	T_{ON}	Normal $\theta=\Phi=0^\circ$	-	15	17	msec	Note4
	T_{OFF}		-	15	17	msec	Note4
Contrast Ratio	CR		800	1000	-	-	Note1 Note3
Color Chromaticity	W_X		0.2644	0.2944	0.3244	-	Note1 Note5
	W_Y		0.3053	0.3353	0.3653	-	Note1 Note5
Luminance	L		300	350	-	cd/m ²	Note1 Note7
Luminance Uniformity	Y_U		75	80	-	%	Note1 Note6
NTSC	-		40	50	-	%	-

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.

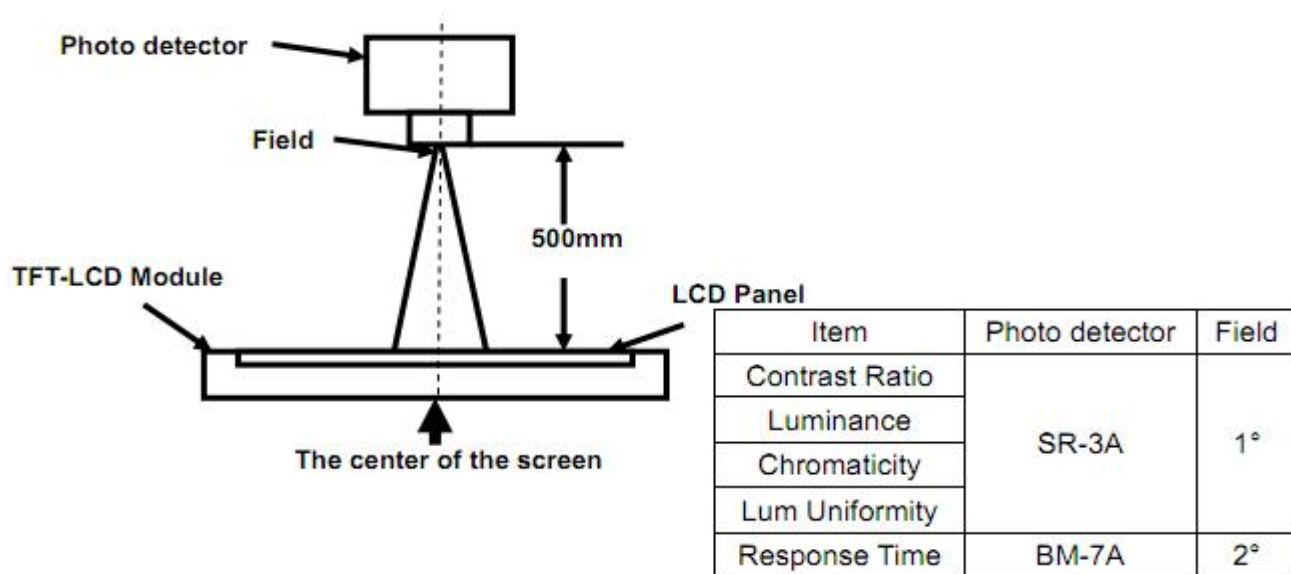


Fig 1

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).

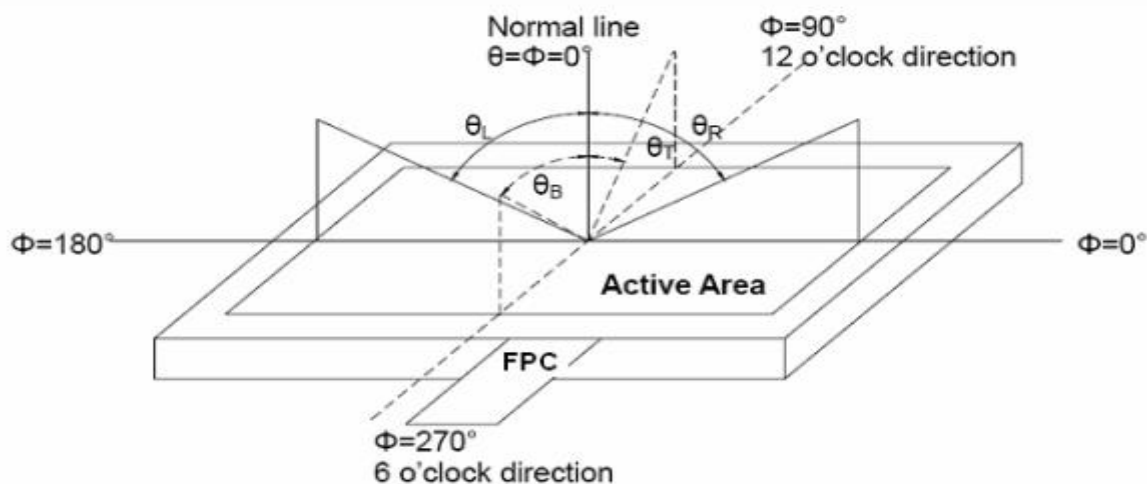


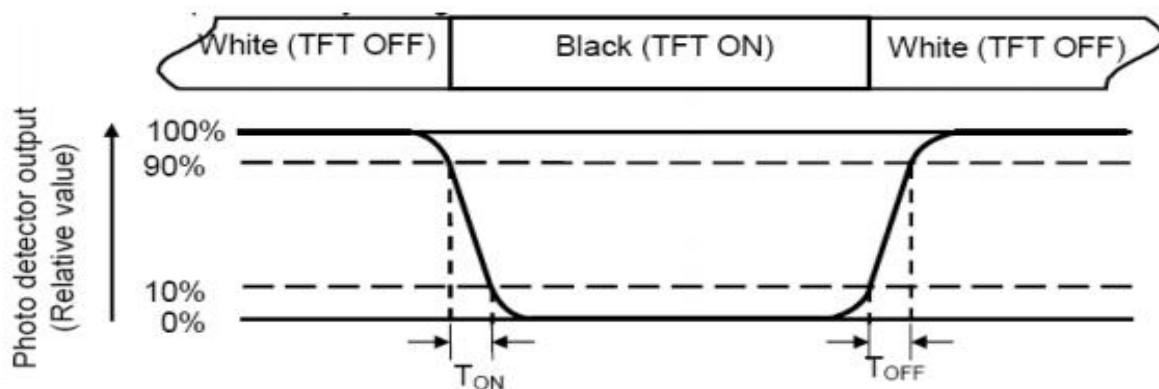
Fig 2 Definition of viewing angle

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).

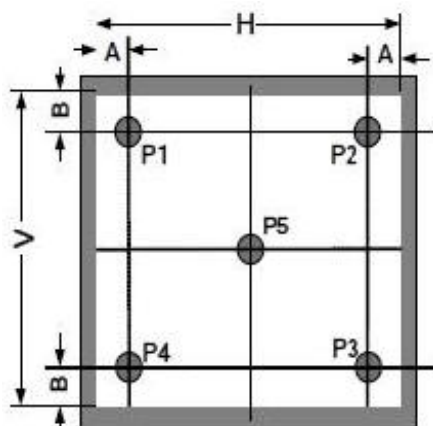


Fig. 3-a Definition of points

$5'' < S \leq 12.3''$ (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).

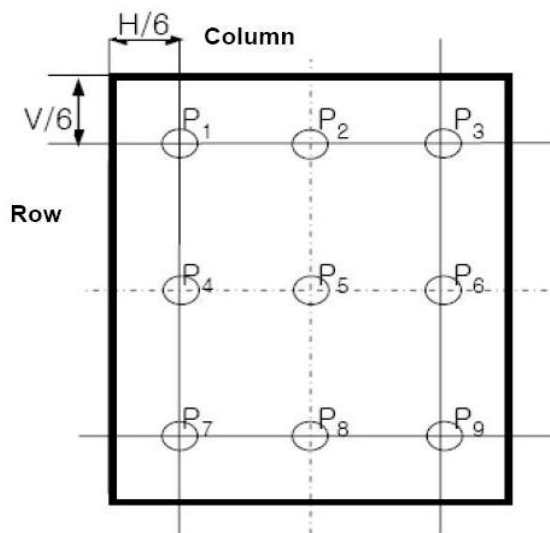


Fig. 3-b Definition of points

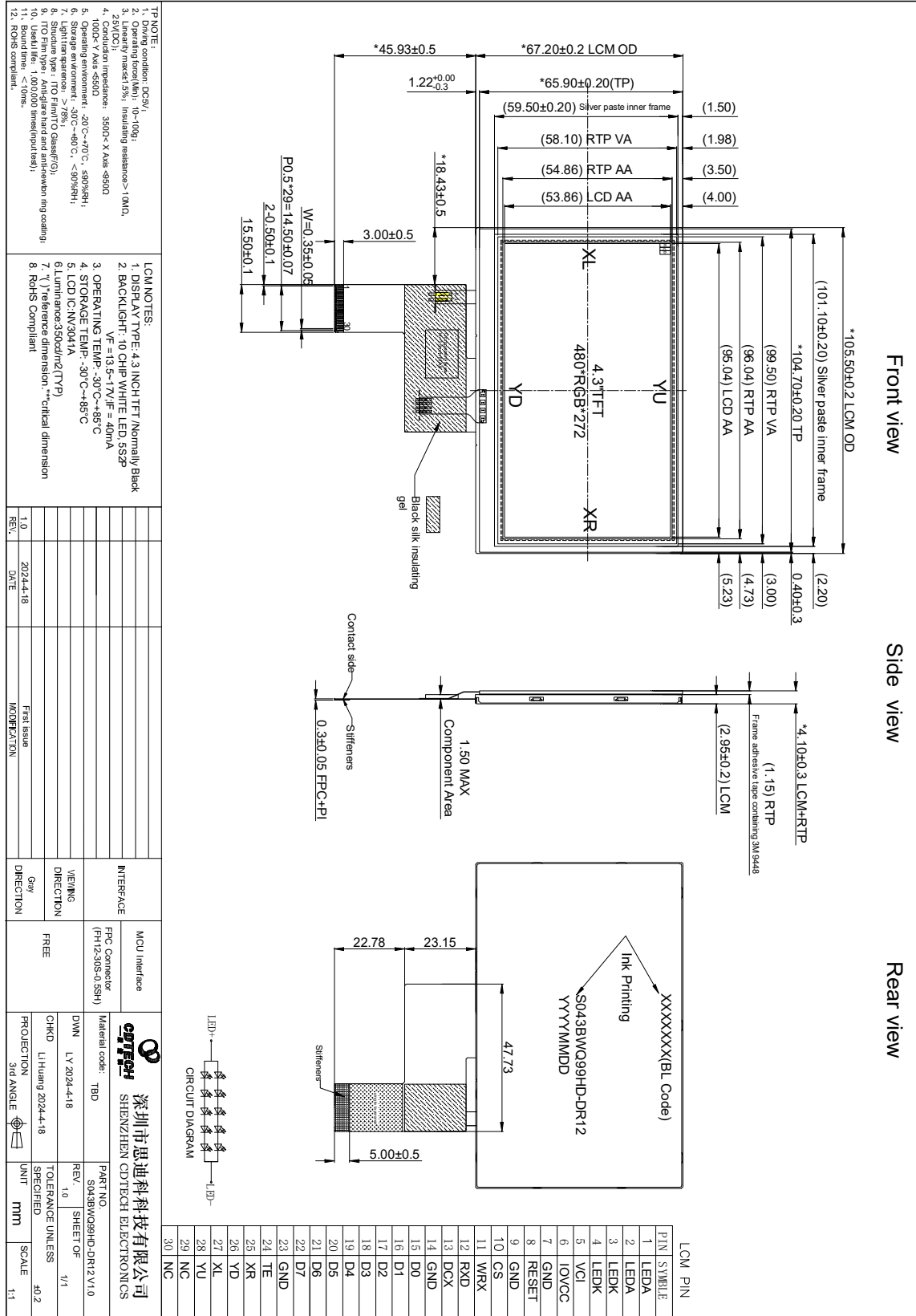
7. Reliability Test Items

Test Item	Test Conditions
High Temperature Storage	Ta= +85℃ 96hrs
Low Temperature Storage	Ta= -30℃ 96hrs
High Temperature Operation	Ta= +85℃ 96hrs
Low Temperature Operation	Ta= -30℃ 96hrs
High Temperature and Humidity Storage	Ta= +60℃, 90% RH 96hrs
Thermal Shock (Non-operation)	-30℃/30 min ~ +85℃/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:

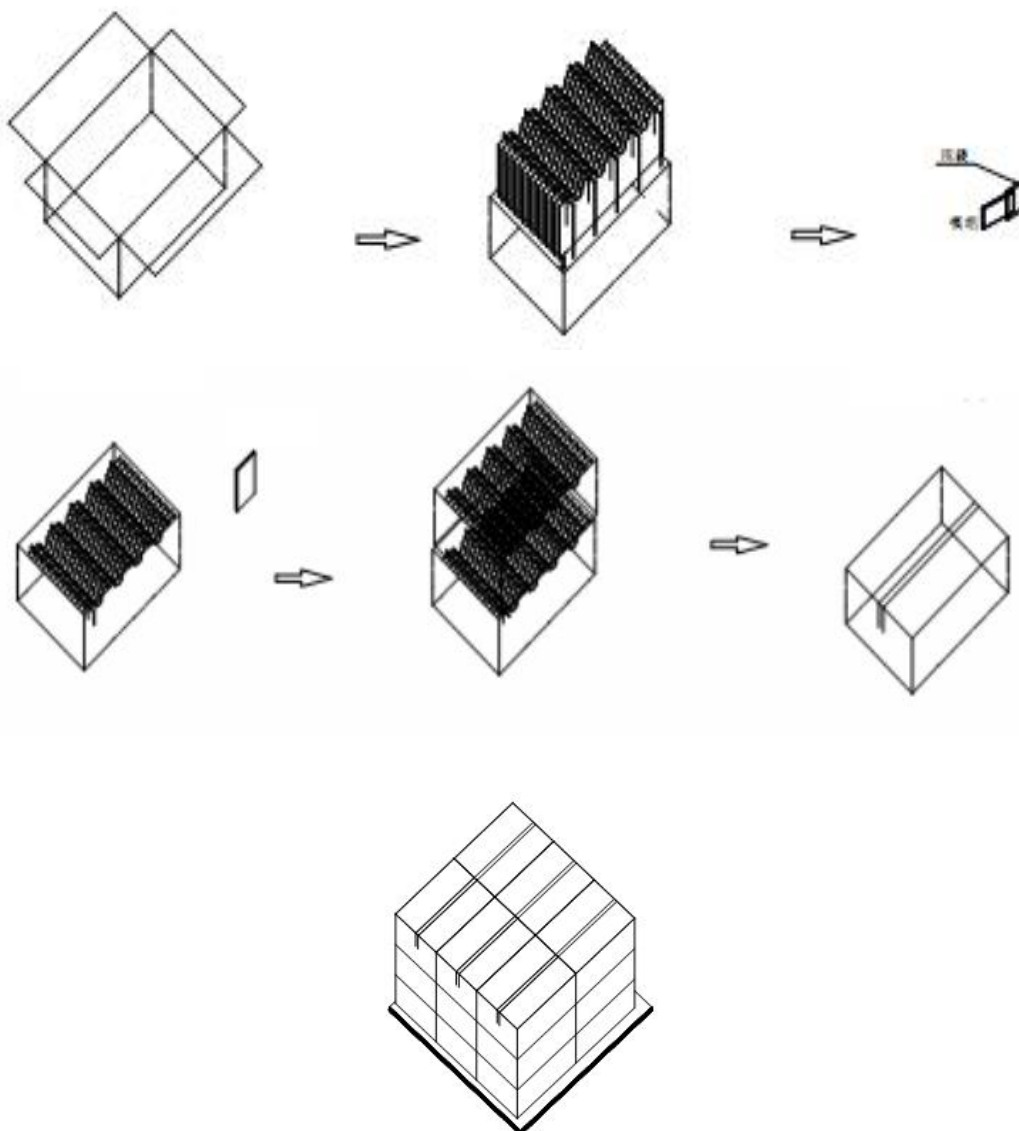
- 1). Air bubble in the LCD
- 2). Seal leak or Glass crack
- 3). Non display or abnormal display
- 4). Brightness reduction >50%

8. Mechanical Drawing



9. Packing

Packing Method



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.