

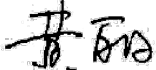
PRODUCT SPECIFICATION

CDTECH Model: **S101QWS68HD**

CUSTOMER Model: **-**

Description: **10.1" TFT-LCD Module**

Version: **1.0**

CDTECH	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE			
DATE	2023.3.27	2023.3.27	2023.3.27

CUSTOMER APPROVAL	SIGNATURE	DATE



Record of Revisions

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1. General Specifications

1.1 LCM General Information

Item	Specification	Unit
LCD Size	10.1	inch
Number of Pixels	1024 (H) RGB x 600 (V)	pixels
Display Mode	Normally Black	-
Viewing Direction	Free	o' clock
Interface	RGB	-
Display Colors	16.7M	colors
Outline Dimension	235.00 (H) x 143.00 (V) x 4.70 (D)	mm
Active Area	222.72 (H) x 125.28 (V)	mm
Pixel Pitch	0.2175 (H) x 0.2088 (V)	mm
Driver IC	HX8282-A11+HX8696-A00	-
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

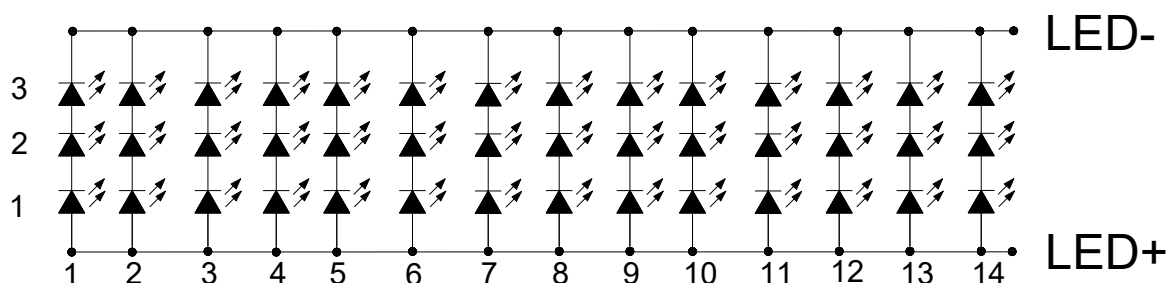
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Analog Supply voltage	VDD	3.0	3.3	3.6	V	
Analog supply current	I _{VDD}	-	TBD	-	mA	VDD=3.3V
Power supply for LCD	AVDD	9.0	9.8	10.5	V	
	VGH	19.0	22.0	25.0	V	
	VGL	-13.0	-10.0	-7.0	V	
	VCOM	4.39	5.39	6.39	V	
Logic input voltage	VIH	0.7*VDD	-	VDD	V	
	VIL	GND	-	0.3*VDD	V	

3.2 Recommended Driving Condition for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Driving Current	I _F	-	280	-	mA	
Driving Voltage	V _F	8.1	-	10.2	V	
Power consumption	W _{BL}	2.268	-	2.856	W	
LED Life-Time	N/A	-	50,000	-	Hours	Ta=25°C 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
1-2	VLED+	Power for LED backlight (Anode)
3-4	VLED-	Power for LED backlight (Cathode)
5	GND	Ground
6	VCOM	Common Voltage
7	VDD	Power supply
8	MODE	DE/SYNC mode select (Note 1)
9	DE	Data enable input. Active high to enable the input data bus under “DE Mode”
10	VS	Vertical sync input. Negative polarity
11	HS	Horizontal sync input. Negative polarity
12-19	B7-B0	Blue data
20-27	G7-G0	Green data
28-35	R7-R0	Red data
36	GND	Ground
37	DCLK	Clock input
38	GND	Ground
39	L/R	Right/ left selection (Note 2)
40	U/D	Up/down selection (Note 3)
41	VGH	Gate ON Voltage
42	VGL	Gate OFF Voltage Power supply
43	AVDD	Power for Analog Circuit
44	RESET	Global reset pin
45	NC	No connection
46	VCOM	Common Voltage
47	DITHB	Dithering function (Note 4)

48	GND	Ground
49-50	NC	No connection

Note1: DE/SYNC mode select, Normally pull high.

When MODE=H, DE mode

When MODE=L, SYNC mode

Note2: Source Driver internal shift register is controlled by this pin as shown below: Normally pull high.

SHLR=H: SO1→SO2→SO3→...→SO1536 (Default)

SHLR=L: SO1536→SO1535→SO1534→...→SO1

Note3: Gate Driver Up/down scan setting. Normally pull low.

When UPDN=H, reverse scan.

STV1 output vertical start pulse and UD pin output "H" to Gate driver

When UPDN=L, normal scan. (Default)

STV2 output vertical start pulse and UD pin output "L" to Gate driver

Note4: Dithering function enable control. Normally pull low.

When DITHER=H, Enable internal dithering function

When DITHER=L, Disable internal dithering function

5. Interface Characteristics

5.1 Module Timing for 24 bit RGB Interface

- DE mode

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	40.8	51.2	67.2	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	600			T _H
VSD Period	tv	610	635	800	T _H
VSD Blanking	tvbp+ tvfp	10	35	200	T _H

Table 10.4: DE mode (1024x600)

- HV mode

Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	44.9	51.2	63	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1200	1344	1400	DCLK
HSD Pulse Width	thpw	1	-	140	DCLK
HSD Back Porch	thbp	160			DCLK
HSD Front Porch	thfp	16	160	216	DCLK

Table 10.5: HV mode horizontal timing (1024x600)

5.2 Input clock and data timing diagram

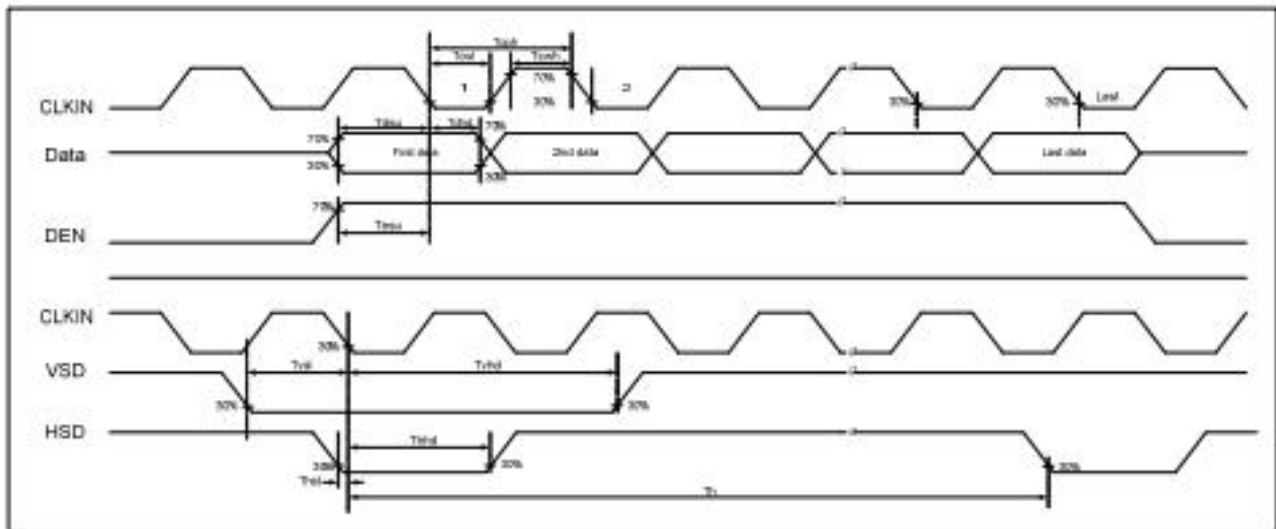


Figure 11.1: Input clock and data timing diagram

Source output timing diagram (Cascade)

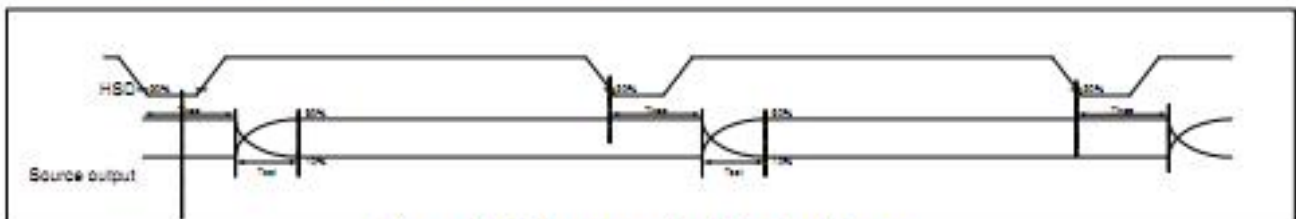


Figure 11.2: Source output timing diagram

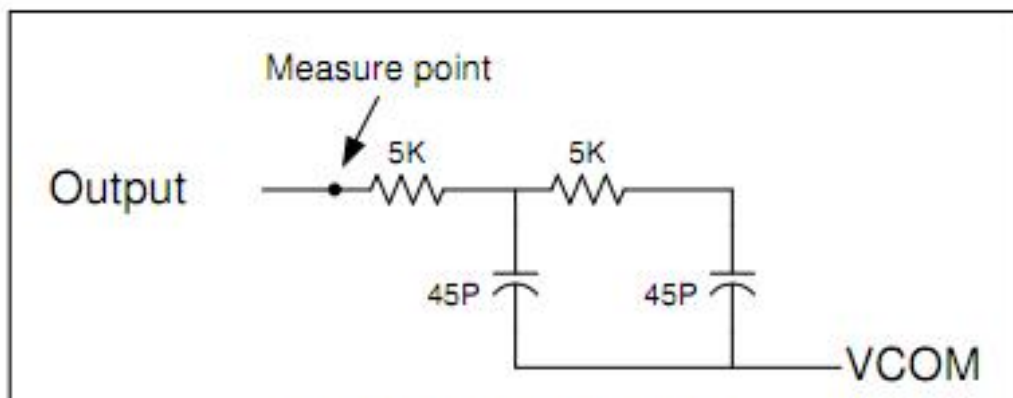


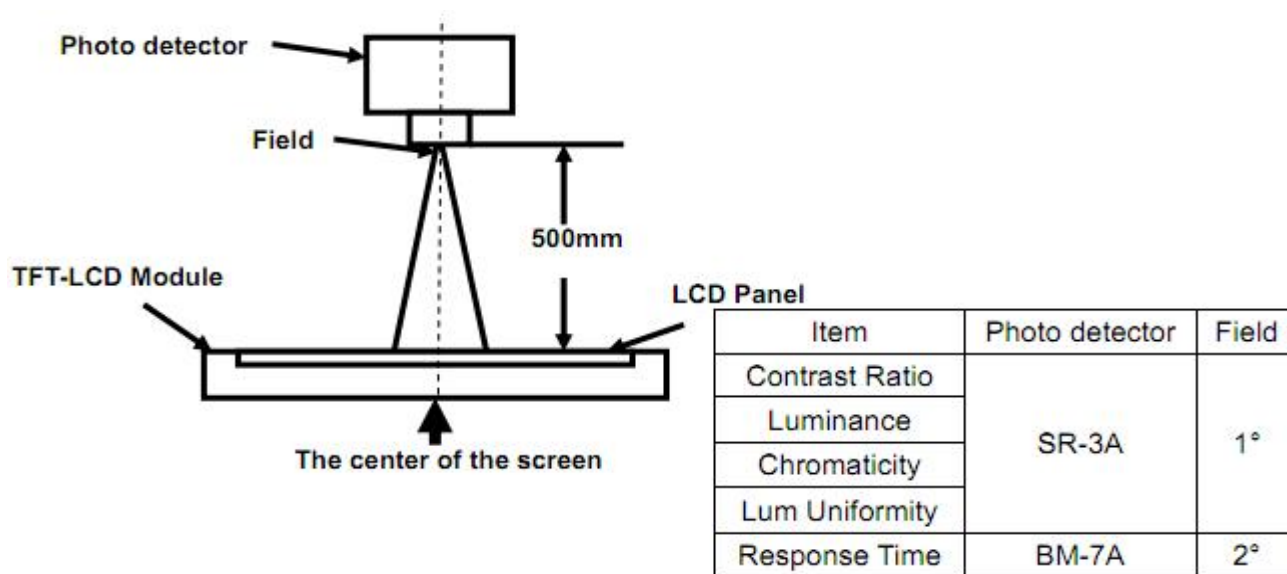
Figure 11.3: Output load condition

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	-	-	deg	Note2
	θ_B	$\Phi=270^\circ$ (6 o'clock)	80	-	-	deg	Note2
	θ_L	$\Phi=180^\circ$ (9 o'clock)	80	-	-	deg	Note2
	θ_R	$\Phi=0^\circ$ (3 o'clock)	80	-	-	deg	Note2
Response Time	T_{ON}	Normal $\theta=\Phi=0^\circ$	-	12	17	msec	Note4
	T_{OFF}		-	12	17	msec	Note4
Contrast Ratio	CR		800	1000	-	-	Note1 Note3
Color Chromaticity	W_X		0.267	0.317	0.367	-	Note1 Note5
	W_Y		0.276	0.326	0.376	-	Note1 Note5
Luminance	L		400	500	-	cd/m ²	Note1 Note7
Luminance Uniformity	Y_U		75	80	-	%	Note1 Note6
NTSC	-		-	50.81	-	%	-

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.



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).

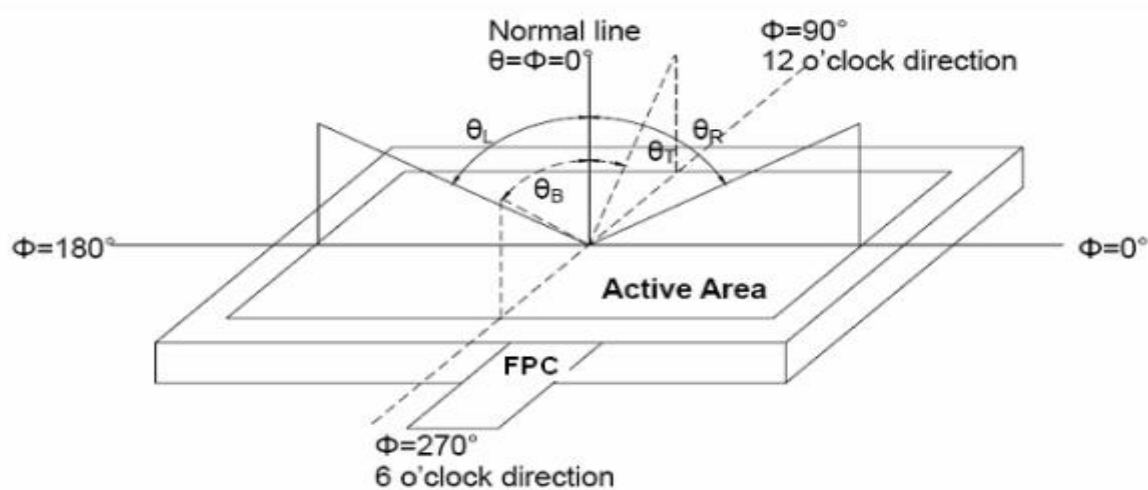


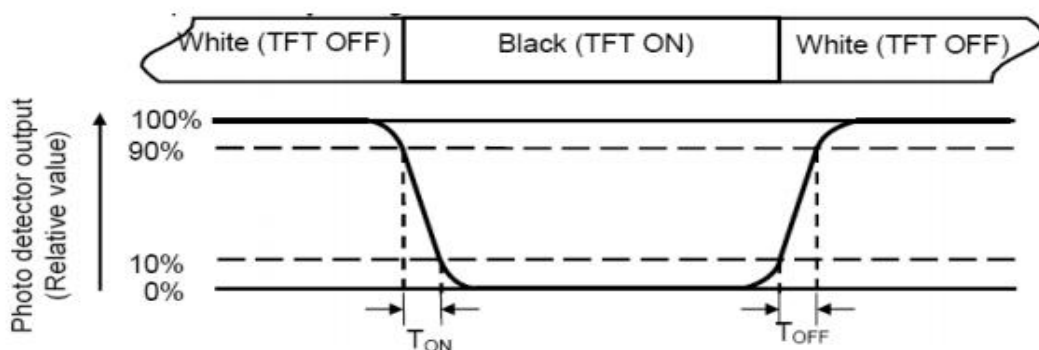
Fig. 1 Definition of viewing angle

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 (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.

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.2.

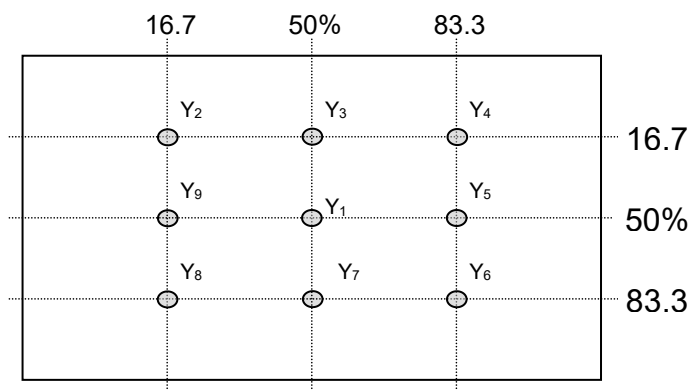


Fig. 2 Definition of points

Note 7: Definition of Luminance (Refer Fig. 2)

Surface luminance is the luminance with all pixels displaying white.

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

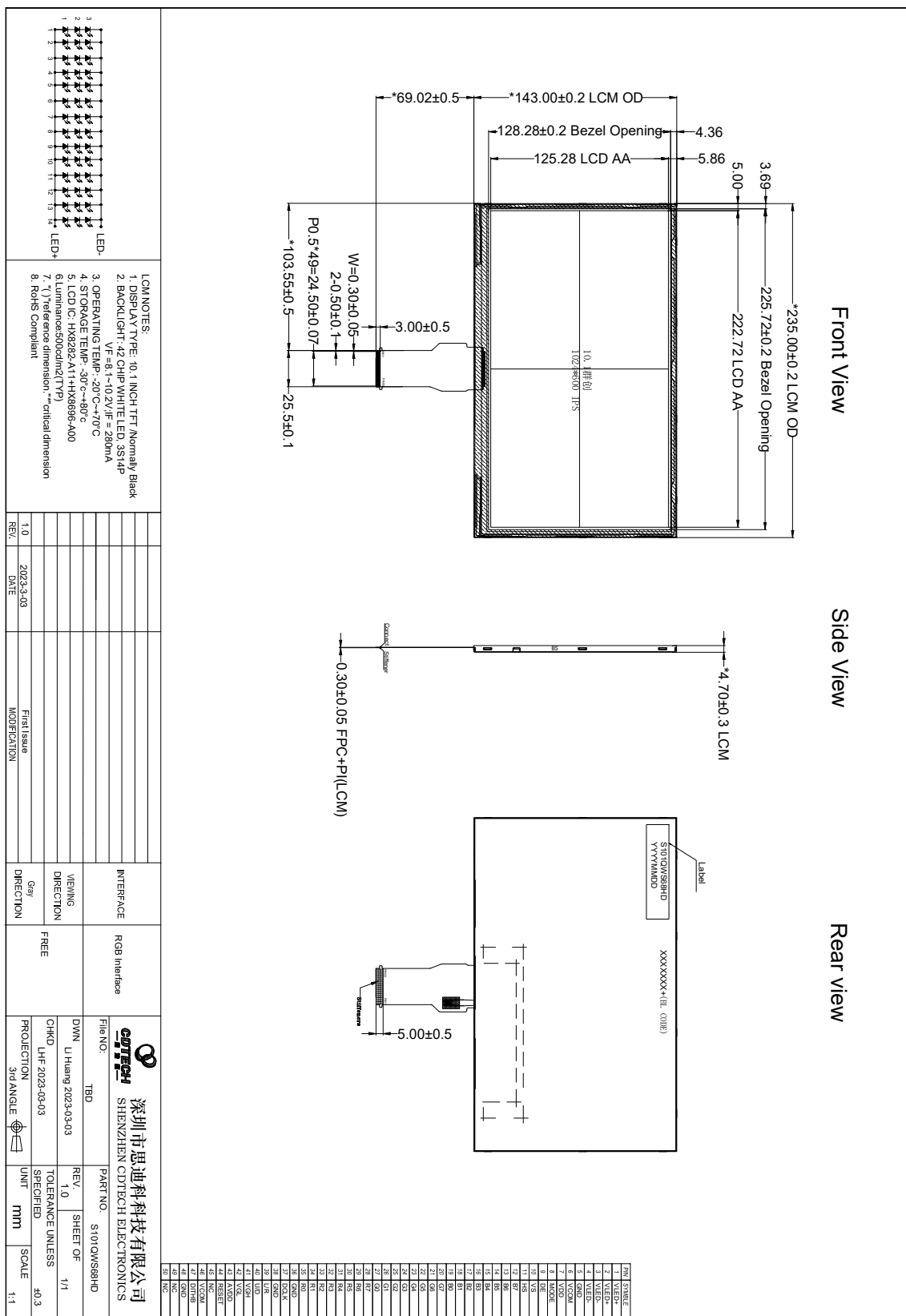
7. Reliability Test Items

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:

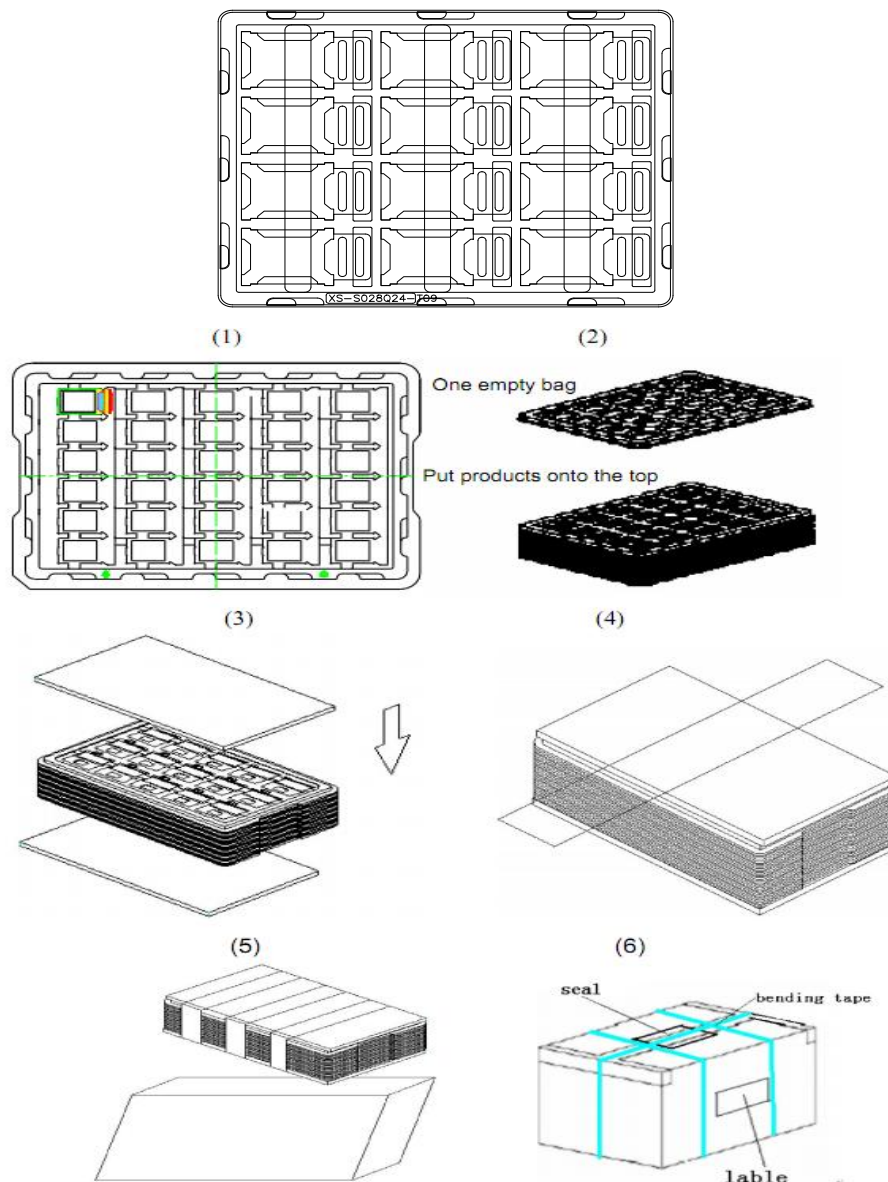
- 1). Air bubble in the LCD
- 2). Seal leak or Glass crack
- 3). Non display or abnormal display
- 4). Brightness reduction >50%

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.