PRODUCT SPECIFICATION

CDTECH Model: **S128HWU01HP-FC01**

CUSTOMER Model: -

Description: **12.8” TFT-LCD Module with CTP**

Version: **1.0**

CDTECH	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE			
DATE	2023.9.19	2023.9.19	2023.9.19

CUSTOMER APPROVAL	SIGNATURE	DATE

Record of Revisions

Version	Revise Date	Description	Page
1.0	2023-9-19	First Release	-

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1. General Specifications

1.1 LCM General Information

Item	Specification	Unit
LCD Size	12.8	inch
Number of Pixels	1920 (H) RGB x 1080 (V)	pixels
Display Mode	Normally Black	-
Viewing Direction	Free	o' clock
Interface	LVDS	-
Display Colors	16.7M	colors
Outline Dimension	303.20 (H) x 181.8 (V) x 9.0 (D)	mm
Active Area	283.39 (H) x 159.41 (V)	mm
Pixel Pitch	0.1475 (H) x 0.1476 (V)	mm
Driver IC	-	-
Operation Temperature	-30~85	℃
Storage Temperature	-40~90	℃

1.2 Touch Panel Information

Item	Specification
Touch Structure	G+G
Bonding Type with LCM	OCA Optical Bonding
Driver IC	GA6572
Interface	I²C
Touch Count Max	5 Points
Surface treatment	-
Surface hardness	6H
I2C slave address	0×28
Origin of coordinate	Top Left Corner

Note1:Requirements on environmental protection RoHS compliant.

2. Absolute Maximum Ratings

Item	Symbol	MIN.	MAX.	Unit	Note
Analog Supply voltage	VCC	-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. Elecrical Characteristics

3.1 Recommended Operating Condition for TFT LCD

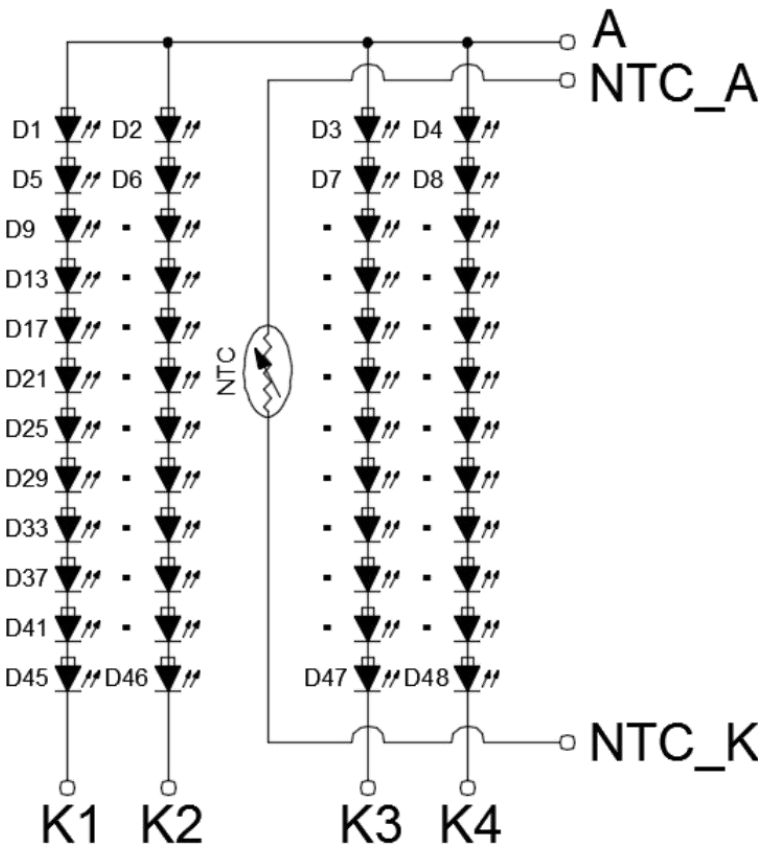
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Analog Supply voltage	VCC	3.0	3.3	3.6	V	
Analog supply current	I_{VCC}	-	TBD	-	mA	VCC=3.3V
Logic input voltage	VIH	0.7*VCC	-	VCC	V	
	VIL	GND	-	0.3*VCC	V	

3.2 Recommended Driving Condition for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Driving Current	I_F	-	380	-	mA	
Driving Voltage	V_F	38.4	-	40.8	V	
Power consumption	W_{BL}	14.592	-	15.504	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 :



3.3 Touch Panel

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply voltage	VCC	-	3.3	-	V	
Analog supply current	I_{VCC}	-	TBD	-	mA	VCC=3.3V
Input high-level voltage	VIH	0.7*VCC	-	VCC	V	
Input low -level voltage	VIL	GND	-	0.3*VCC	V	

4. Interface Pin Assignment

4.1 LCM Pin Assignment

Recommended connector：F31L-1A7H1-21050

No.	Symbol	Description
1	GND	Ground
2	NC/BIST	No connector(BIST Pin)
3	VCC	Digital Power/Vin = 3.3V
4	VCC	Digital Power/Vin = 3.3V
5	GND	Ground
6	GND	Ground
7	NC	No connection
8	NC	No connection
9	GND	Ground
10	ORXIN0-	Negative LVDS differential data input (Odd data)
11	ORXIN0+	Positive LVDS differential data input (Odd data)
12	ORXIN1-	Negative LVDS differential data input (Odd data)
13	ORXIN1+	Positive LVDS differential data input (Odd data)
14	ORXIN2-	Negative LVDS differential data input (Odd data)
15	ORXIN2+	Positive LVDS differential data input (Odd data)
16	ORXCLKIN-	Negative LVDS differential clock input (Odd clock)
17	ORXCLKIN+	Positive LVDS differential clock input (Odd clock)
18	ORXIN3-	Negative LVDS differential data input (Odd data)
19	ORXIN3+	Positive LVDS differential data input (Odd data)
20	ERXIN0-	Negative LVDS differential data input (Even data)
21	ERXIN0+	Positive LVDS differential data input (Even data)
22	ERXIN1-	Negative LVDS differential data input (Even data)
23	ERXIN1+	Positive LVDS differential data input (Even data)
24	ERXIN2-	Negative LVDS differential data input (Even data)
25	ERXIN2+	Positive LVDS differential data input (Even data)
26	ERXCLKIN-	Negative LVDS differential clock input (Even clock)
27	ERXCLKIN+	Positive LVDS differential clock input (Even clock)
28	ERXIN3-	Negative LVDS differential data input (Even data)
29	ERXIN3+	Positive LVDS differential data input (Even data)
30	GND	Ground
31	FAULT	FAULT signal output(normal=H,abnormal=L) （Note 1）
32	RESET	Global reset pin, active low
33	STBYB	Standby mode setting pin, active low
34	NC	No connector(Serial interface chip enable.CSB)
35	NC	No connector(Serial interface clock input.SCL)

36	NC	No connector(Serial interface data input/output.CDA)	
37	NC	No connector(Serial interface data input/output.CDA)	
38	GND	Ground	
39	GND	Ground	
40	NC	No connection	
41	LEDA	Power for LED backlight (Anode)	
42	LEDA	Power for LED backlight (Anode)	
43	LEDA	Power for LED backlight (Anode)	
44	NC	No connection	
45	LEDK	Power for LED backlight (Cathode1)	
46	LEDK	Power for LED backlight (Cathode2)	
47	LEDK	Power for LED backlight (Cathode3)	
48	LEDK	Power for LED backlight (Cathode4)	
49	NTC_A	NTC_Anode	(Note 2)
50	NTC_K	NTC_Cathode	(Note 2)

Note 1:IC Enter self protection mode. (No HS/VS/DE/CLK)[Lower than 40Hz]
Note 2:Murata NCU15XH103F6SRC

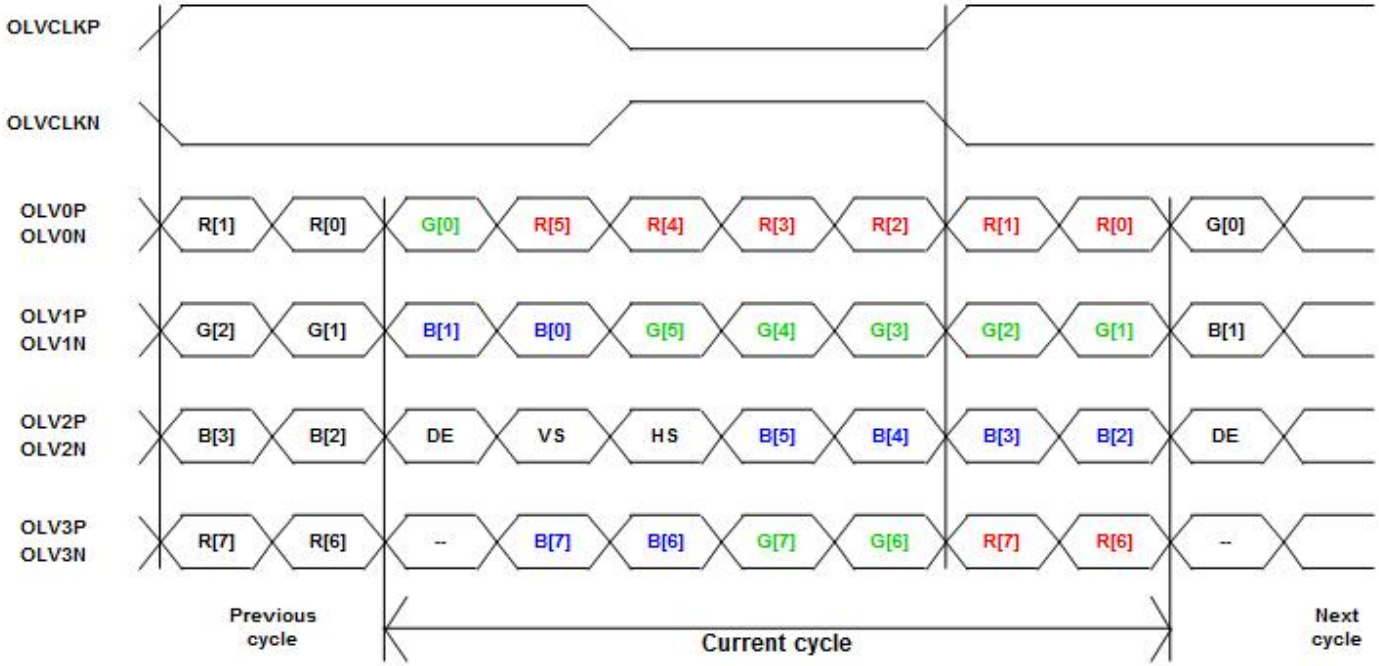
4.2 Touch FPC Pin Assignment

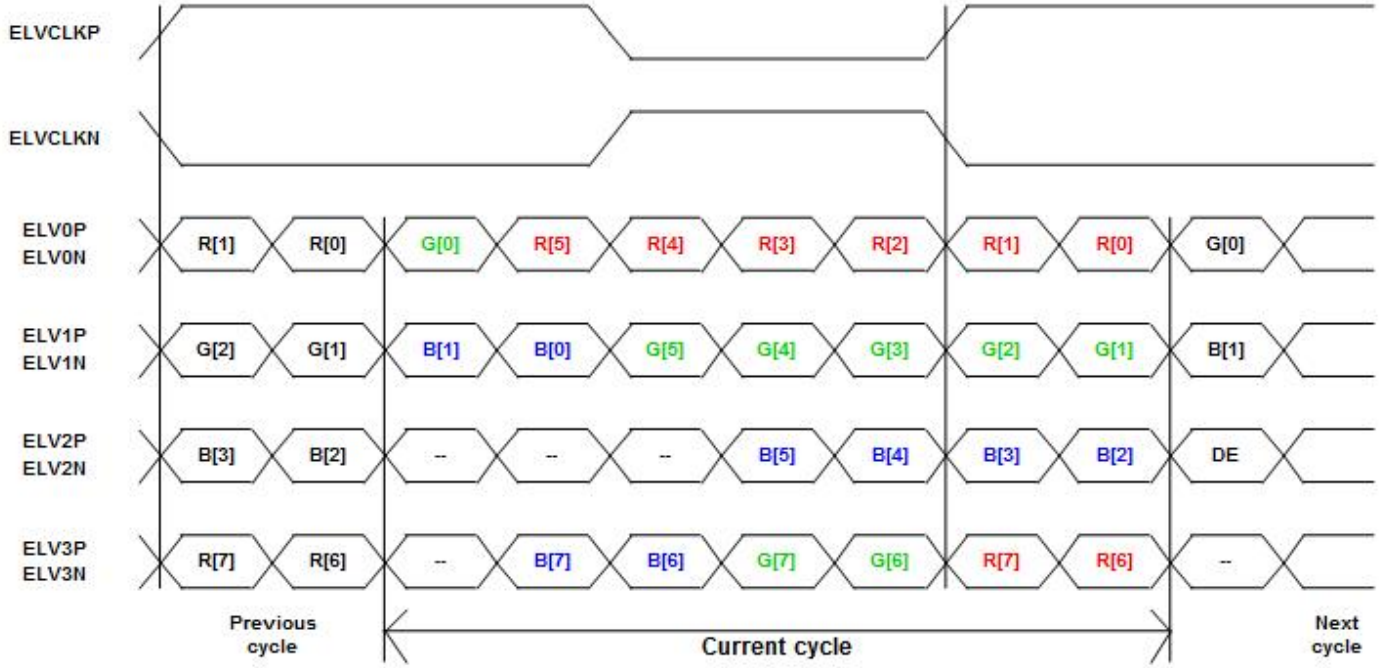
No.	Symbol	Description
1	SCL	I2C clock input
2	SDA	I2C data input and output
3	INT	Interrupt request to the host
4	GND	Ground
5	VCC	Power supply
6	RST	Wake-up request from the host
7	NC	No connection
8	NC	No connection
9	NC	No connection
10	NC	No connection

5. Interface Characteristics

5.1 Bit LVDS input

5.1.1 8Bit LVDS input



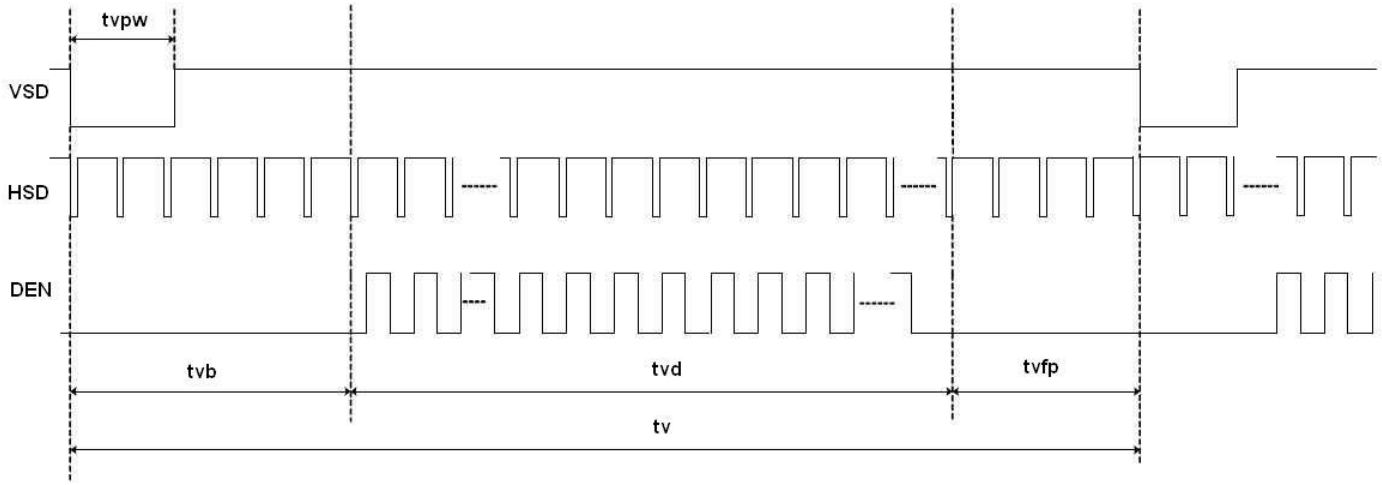


5.2 Interface Timing (DE mode)

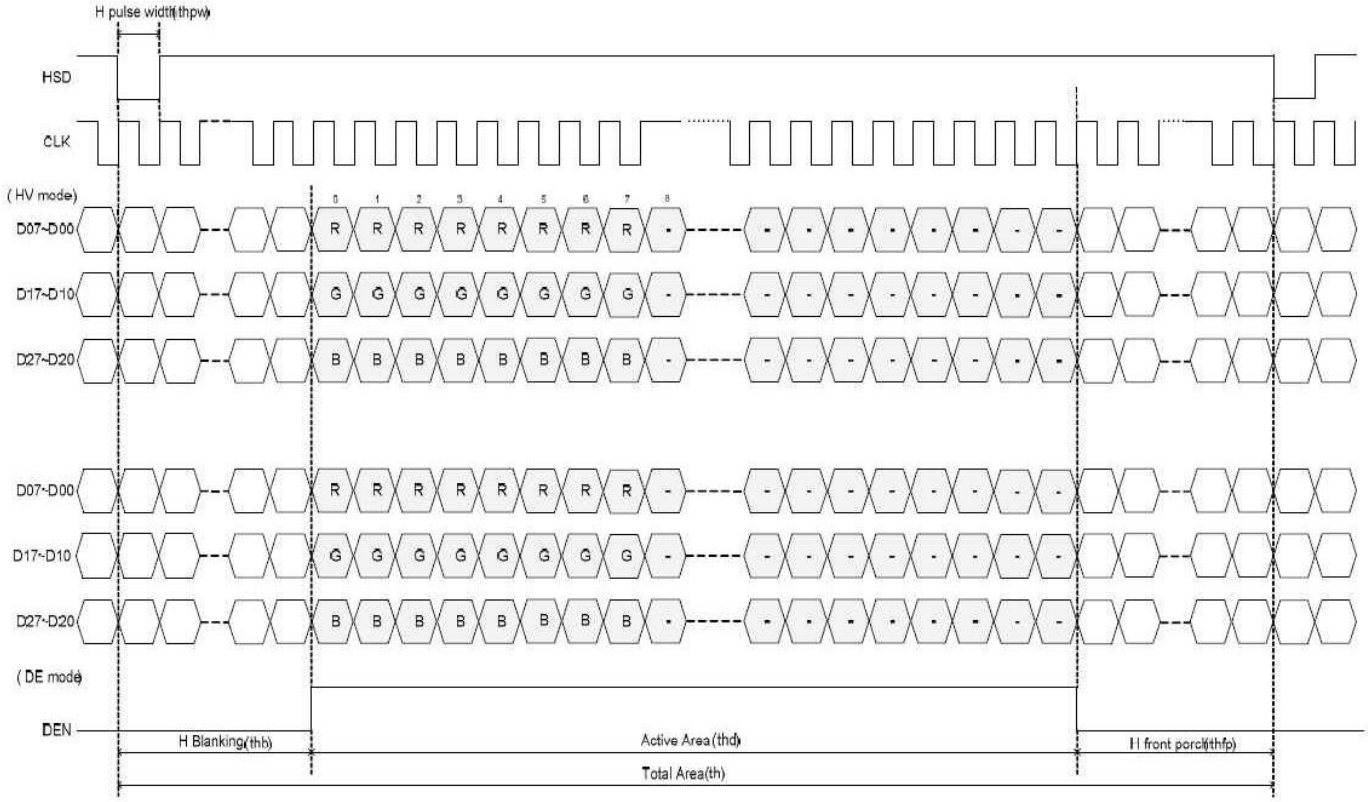
Interface Timing (DE mode) Two Port LVDS Timing.(1920xRGBx1080)					
Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	FR	55	60	65	Hz
Vertical Display Time	T_{vd}		1080		H
Vertical pulse width	T_{vpw}	1	3	20	H
Vertical back porch	T_{vbp}	2	24	200	H
Vertical front porch	T_{vfp}	5	8	200	H
Frame Period	T_v	1087	1112	1404	H
Horizontal Display Time	T_{hd}		960		DCLK
Horizontal pulse width	T_{hpw}	10	12	200	DCLK
Horizontal back porch	T_{hbp}	5	16	200	DCLK
Horizontal front porch	T_{hfp}	24	26	200	DCLK
1 Horizontal line	T_v	989	1012	1248	DCLK
Clock Rate	F_{DCLK}	64.5	66.9	80	MHz

5.3 Timing Diagram of Interface Signal (DE mode)

5.3.1 Vertical input timing

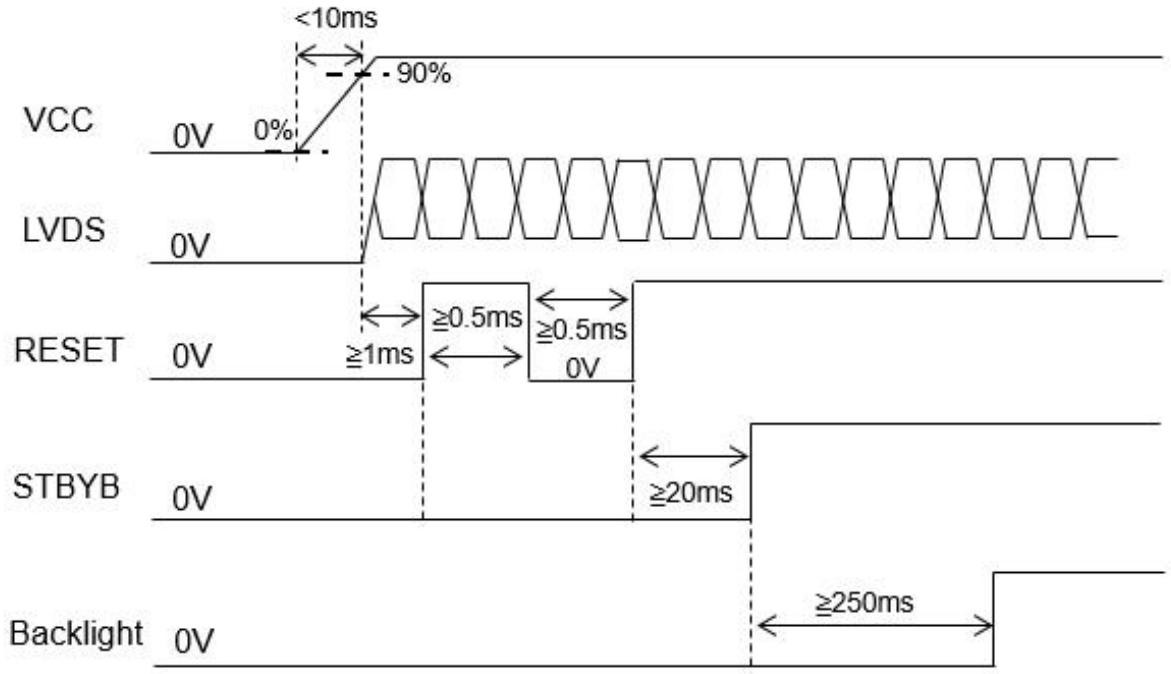


5.3.2 Horizontal Vertical input timing

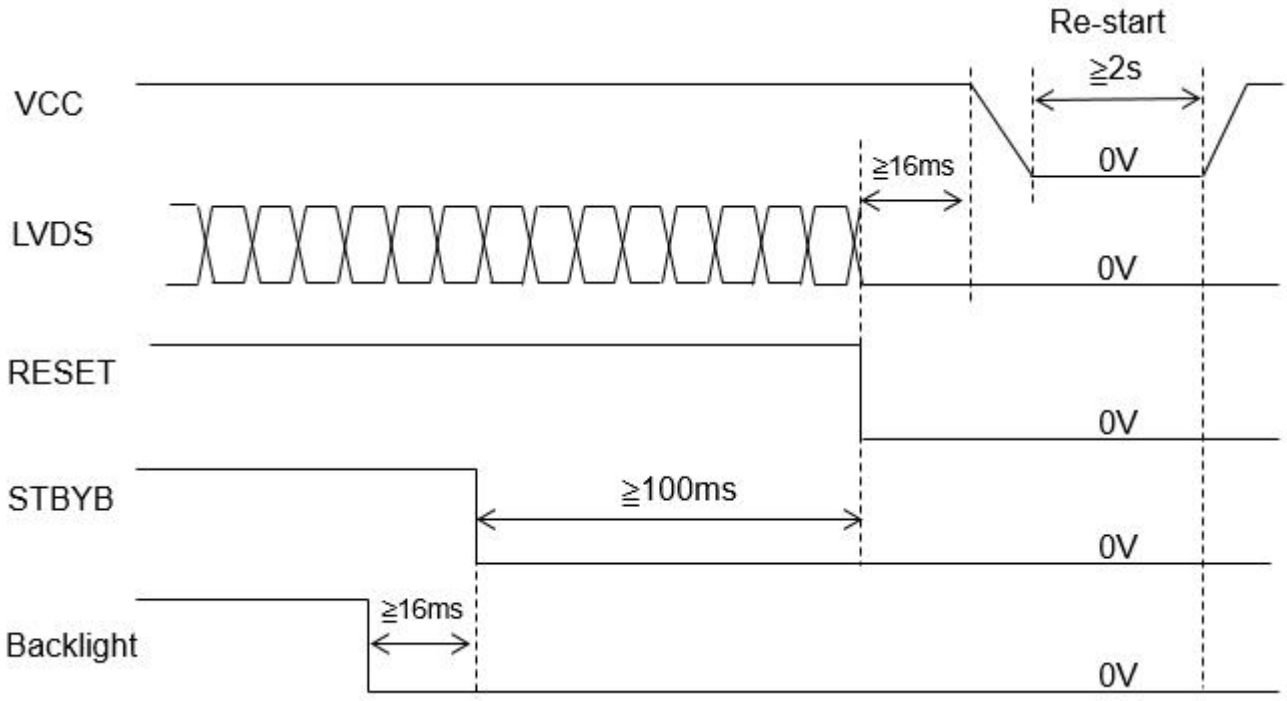


5.4 Power On / Off Sequence

5.4.1 Power On Sequence



5.4.2 Power Off Sequence

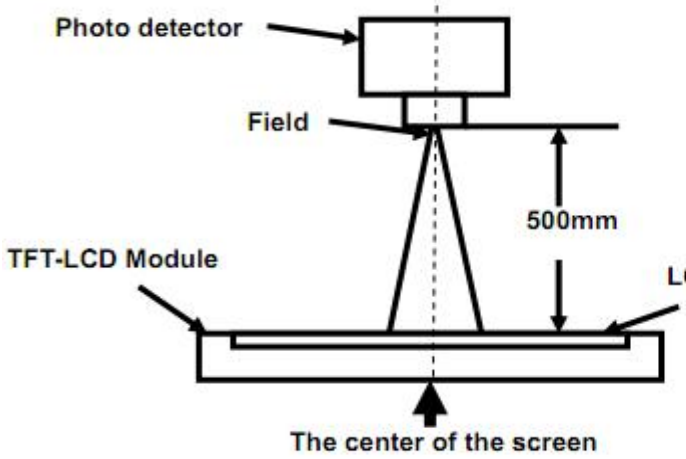


6. Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR≥10) B/L ON	θ_T	Φ=90°(12 o'clock)	80	85	-	deg	Note2
	θ_B	Φ=270°(6 o'clock)	80	85	-	deg	Note2
	θ_L	Φ=180°(9 o'clock)	80	85	-	deg	Note2
	θ_R	Φ=0°(3 o'clock)	80	85	-	deg	Note2
Response Time	T_{ON}	Normal θ=Φ=0°	-	13	16	msec	Note4
	T_{OFF}		-	12	14	msec	Note4
Contrast Ratio	CR		530	700	-	-	Note1 Note3
Color Chromaticity	W_X		0.244	0.294	0.344	-	Note1 Note5
	W_Y		0.259	0.309	TBD	-	Note1 Note5
Luminance	L		450	600	-	cd/m²	Note1 Note7
Luminance Uniformity	Y_U		70	80	-	%	Note1 Note6
NTSC	-		-	75	-	%	-

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-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

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).

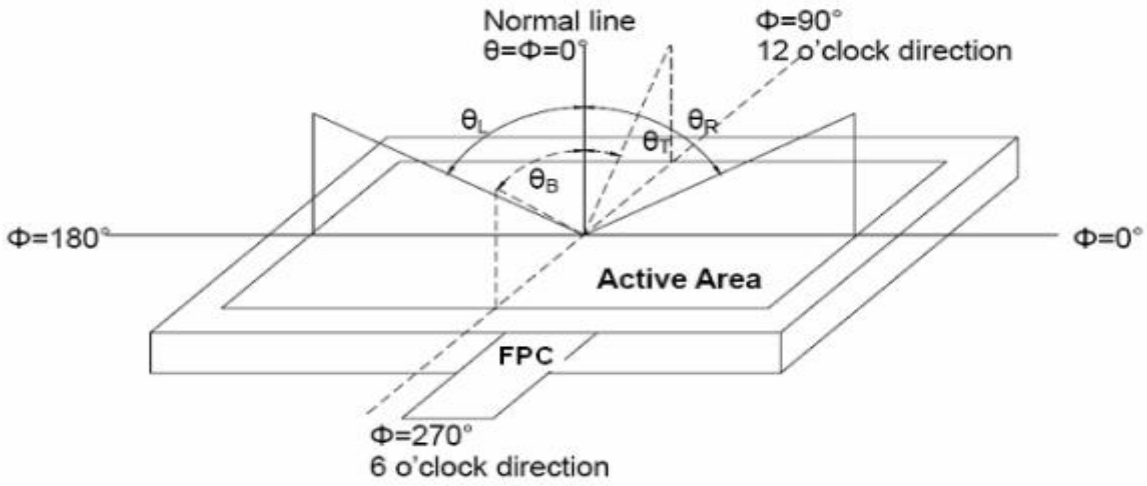


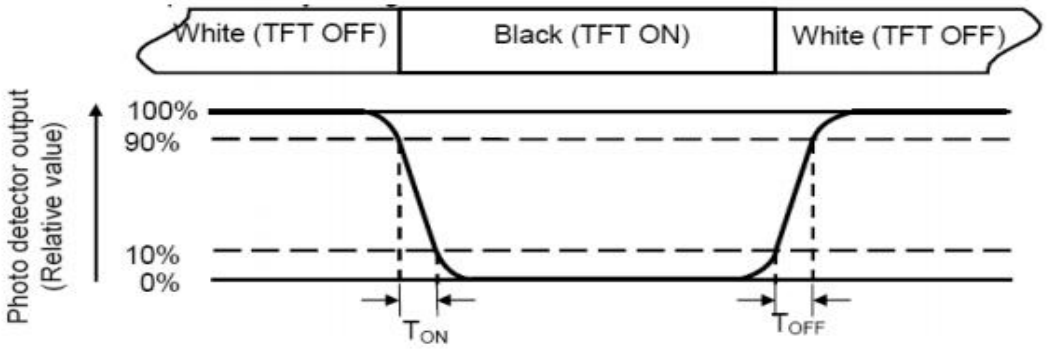
Fig. 1 Definition of viewing angle

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.

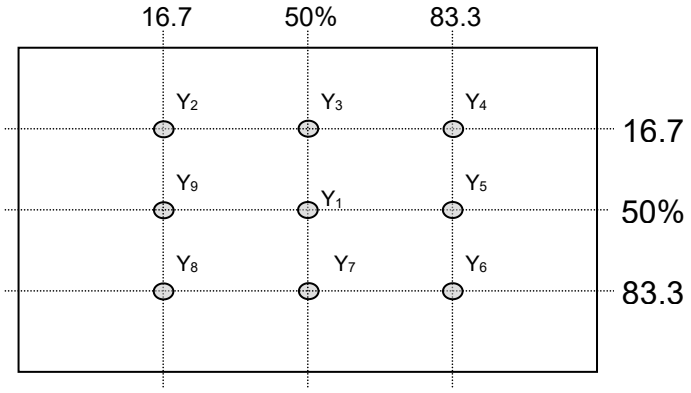


Fig. 2 Definition of points

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

Surface luminance is the luminance with all pixels displaying white.

Lv = Average Surface Luminance with all white pixels(P1,P2,P3, ...,Pn).

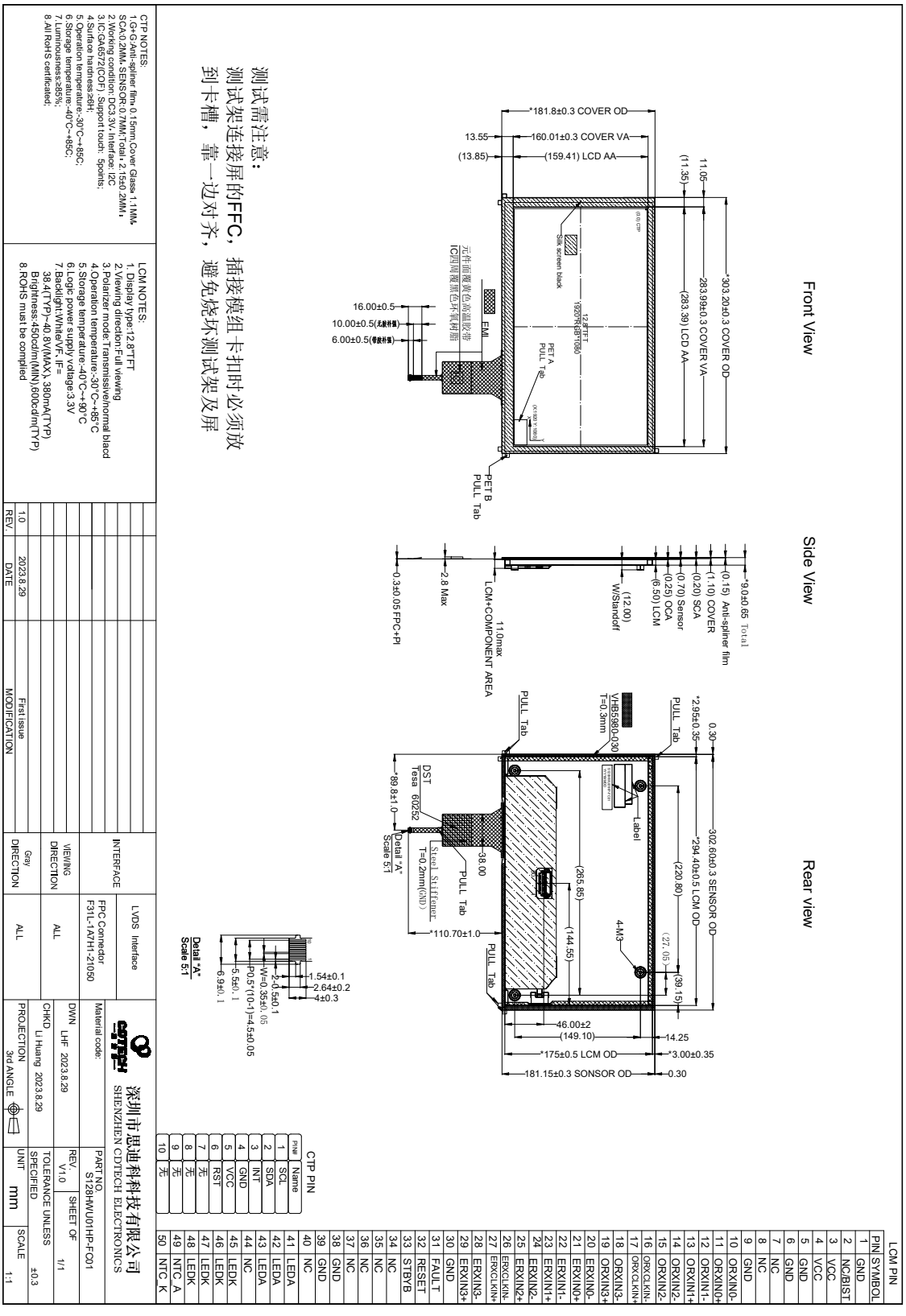
7. Reliability Test Items

Test Item	Test Conditions	
High Temperature Storage	Ta= +90℃	96hrs
Low Temperature Storage	Ta= -40℃	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 ~ +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:

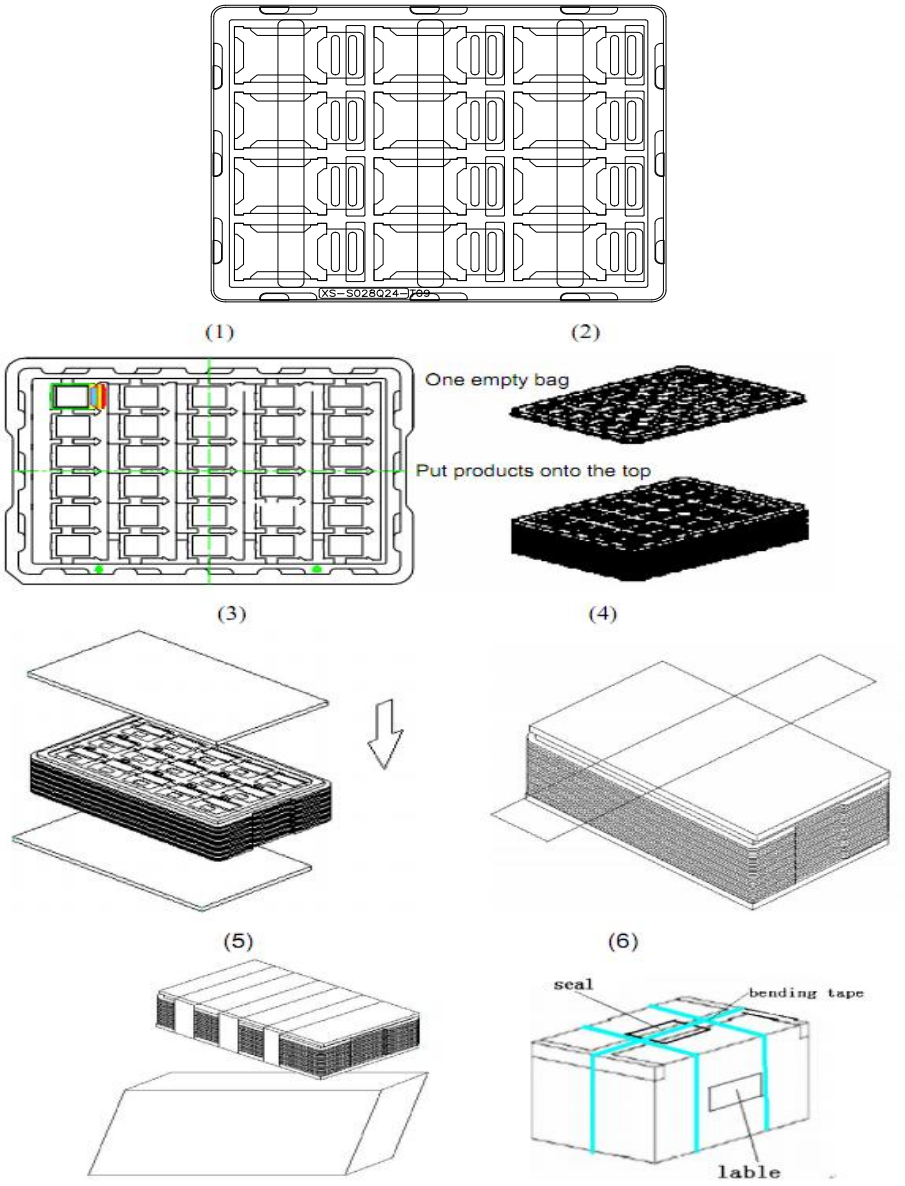
1). Air bubble in the LCD
2). Seal leak or Glass crack
3). Non display or abnormal display
4). Brightness reduction >50%

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.