深圳市智诚光电发展有限公司

LCD MODULE

SPECIFICATION

Customer: _____

Model Name: ZC070NA02-LUX

Date: 2021/4/27

Version: 01

☐Preliminary Specification

■ Final Specification

Remark

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by

Record of Revision

Version	Revise Date	Page	Content
Pre-spec.01	2021/4/27		Initial Release.

1. General Specifications

No.	Item	Specification	Remark
1	LCD size	7.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1024 × RGB ×600	
4	Display mode	Normally White, Transmissive	
5	Dot pitch	0.1506(W) × 0.1432(H) mm	
6	Active area	154.214(W) × 85.92(H) mm	
7	Module size	164.9(W) × 100(H) × 5.7(D) mm	
8	Surface treatment	Hard Coating	
9	Color arrangement	RGB-stripe	
10	Interface	Digital	
11	Backlight Power consumption		
12	Panel Power consumption		
13	Weight		

2. Pin Assignment

2.1. TFT LCD Panel Driving Section

FPC connector is used for the module electronics interface. The recommended model is "FH26G-67S-0.3SHBW(05)" manufactured by Hirose.

Pin No.	Symbol	I/O	Function	Remark
1	V_{LED+}	P	Power for LED backlight anode	
2	V_{LED+}	P	Power for LED backlight anode	
3	V_{LED-}	P	Power for LED backlight cathode	
4	V_{LED-}	P	Power for LED backlight cathode	
5	GND	P	Power ground	
6	VCOM	I	Common voltage	
7	DVDD	P	Power for Digital Circuit	
8	MODE	I	DE/SYNC mode select	
9	DE	I	Data Input Enable	
10	VS	I	Vertical Sync Input	
11	HS	I	Horizontal Sync Input	
12	B7	I	Blue data(MSB)	
13	B6	I	Blue data	
14	B5	I	Blue data	
15	B4	I	Blue data	
16	B3	I	Blue data	
17	B2	I	Blue data	
18	B1	I	Blue data	
19	B0	I	Blue data(LSB)	
20	G7	I	Green data(MSB)	

21	G6	I	Green data	
22	G5	I	Green data	
23	G4	I	Green data	
24	G3	I	Green data	
25	G2	I	Green data	
26	G1	I	Green data	
27	G0	I	Green data(LSB)	
28	R7	I	Red data(MSB)	
29	R6	I	Red data	
30	R5	I	Red data	
31	R4	I	Red data	
32	R3	I	Red data	
33	R2	I	Red data	
34	R1	I	Red data	
35	R0	I	Red data	
36	GND	P	Power Ground	
37	DCLK	I	Sample clock	
38	GND	P	Power Ground	
39	L/R	I	Left / right selection	
40	U/D	I	Up/down selection	
41	VGH	P	Gate ON Voltage	
42	VGL	P	Gate OFF Voltage	
43	AVDD	P	Power for Analog Circuit	
44	RESET	I	Global reset pin.	
45	NC	-	No connection	

46	VCOM	I	Common Voltage	
47	DITHB	I	Dithering function	
48	GND	P	Power Ground	
49	NC	-	No connection	
50	NC	-	No connection	

I: Input, O: Output, P: Power

3. Operation Specifications

3.1. Absolute Maximum Ratings

ELECTRICAL SPECIFICATION

Item	Symbol	Specification			Unit	Note
		Min.	Typ.	Max.		
Digital power	VDD	2.8	3.3	3.5	V	(1)
Analog power	AVDD	11.9	12	12.1	V	(1)
TFT gate on voltage	VGH	14.5	15	15.5	V	(2)
TFT gate on voltage	VGL	-10.5	-10	-9.5	V	(3)
TFT common electrode voltage	Vcom(DC)	4.05	4.55	5.05	V	(4)

Note: (1) The VDD and AVDD voltage is for HX8282-A. For the other compatible IC, please refer to the IC datasheet, respectively.

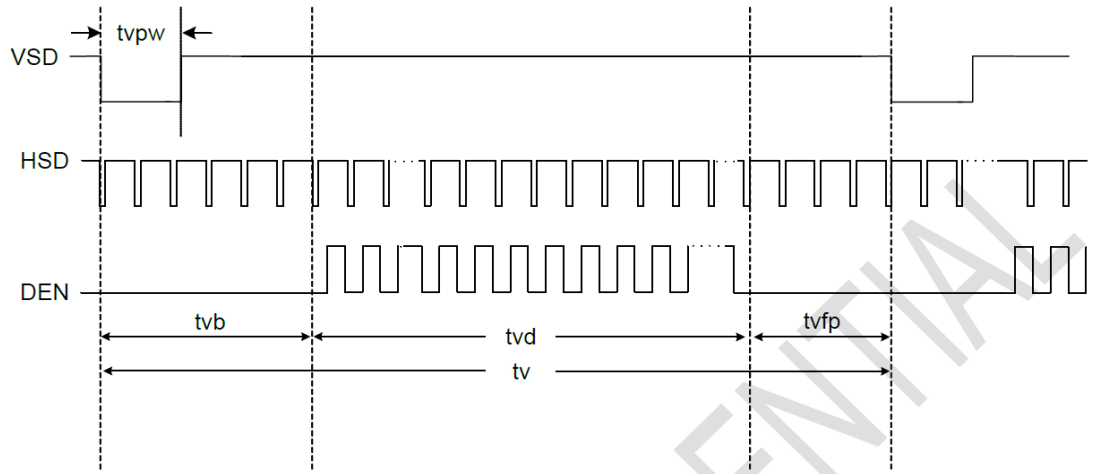
(2) VGH is TFT gate operating voltage

(3) VGL is TFT gate operating voltage

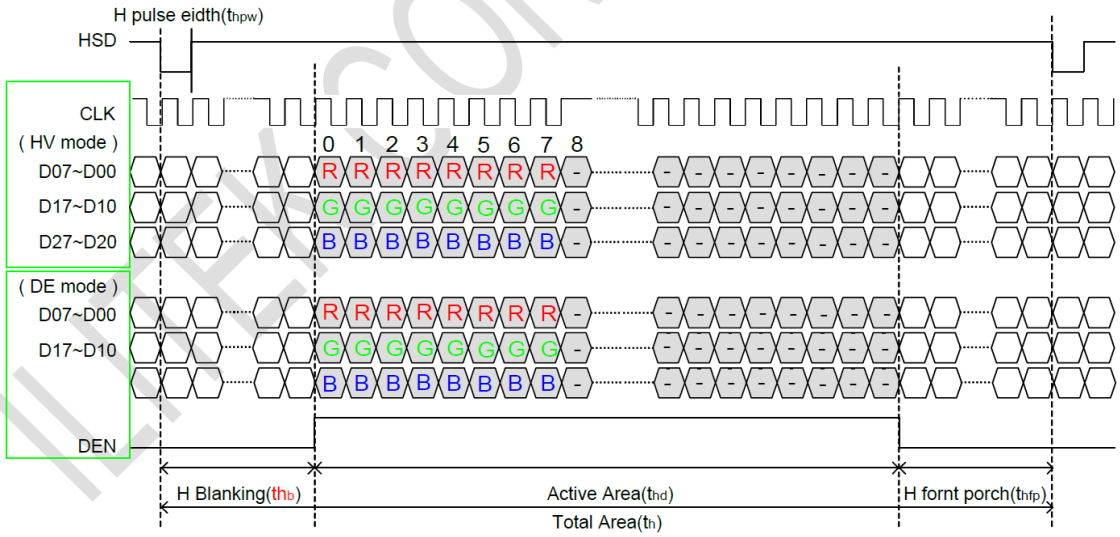
(4) Vcom must be adjusted to optimize display quality: cross-talk, contrast ratio and etc.

(5) Environmental condition: 25±5

Vertical input timing



Horizontal input timing



2. 1024x600 panel

DE Mode

Parameter	Symbol	Value			Unit
		Min	Typ.	Max	
DCLK frequency Frame rate = 60Hz	fclk	42.6	51.2	67.2	MHz
Horizontal display area	thd		1024		DCLK
HSYNC period time	th	1164	1344	1400	DCLK
HSYNC blanking	thb+thfp	140	320	376	DCLK
Vertical display area	tvd		600		H
VSYNC period time	tv	610	635	800	H
VSYNC blanking	tvb+tvfp	10	35	200	H

HV Mode

a. Horizontal input timing

Parameter		Symbol	Value			Unit
Horizontal display area		thd	1024			DCLK
DCLK frequency Frame rate = 60Hz		fclk	Min	Typ.	Max	
			44.9	51.2	63	MHz
1 Horizontal Line		th	1200	1344	1400	DCLK
HSYNC pulse width	Min	thpw	1			DCLK
	Typ.		-			
	Max		140			
HSYNC blanking		thb	160	160	160	
HSYNC front porch		thfp	16	160	216	

b. Vertical input timing

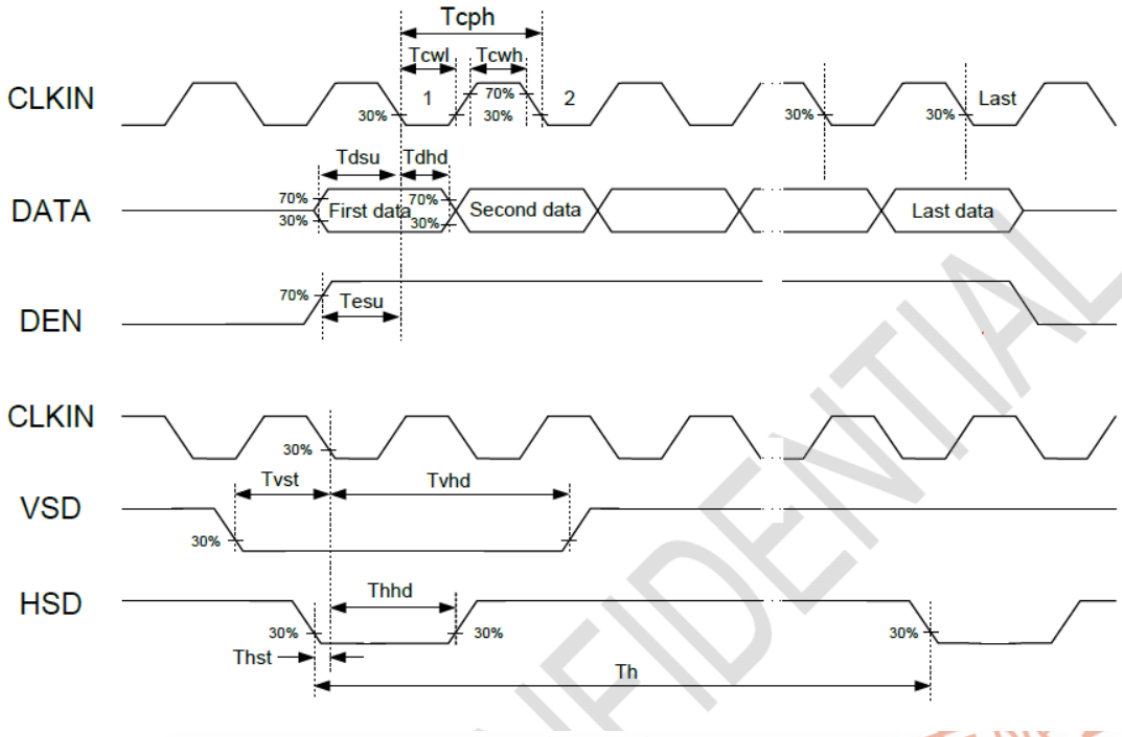
Parameter	Symbol	Value			Unit
		Min	Typ.	Max	
Vertical display area	tvd	600			H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tvpw	1	-	20	H
VSYNC blanking	tvb	23	23	23	H
VSYNC front porch	tvfp	1	12	127	H

11.2 AC Electrical Characteristics

TTL mode(VDD= 2.3 to 3.6V, AVDD= 8 to 13.5V, GND=AGND= 0V, TA= -20 to +85°C)

Parameter	Symbol	Min	Typ.	Max	Unit	Conditions
VDD power on Slew rate	TPOR	-	-	20	ms	From 0V to 0.9VDD
RSTB pulse width	TRst	50	-	-	us	DCLK=65MHz
DCLK cycle time	Tcph	14			ns	
DCLK pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	5	-	-	ns	
VSD hold time	Tvhd	5	-	-	ns	
HSD setup time	Thst	5	-	-	ns	
HSD hold time	Thhd	5	-	-	ns	
Data setup time	Tdsu	5	-	-	ns	D0[7:0],D1[7:0],D2[7:0] to DCLK
Data hold time	Tdhu	5	-	-	ns	D0[7:0],D1[7:0],D2[7:0] to DCLK
OE setup time	Tesu	5	-	-	ns	
OE hold time	Tehd	5	-	-	ns	
Output stable time	Tsst	-	-	6	us	10% to 90% target Voltage. CL=90pF,R=10K ohm (Cascade)
				3		Dual gate

12.1 input Clock and Data Timing Diagram



(Note 1)

3.2 Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_L	-	9.6	-	V	Note 2
Current for LED Backlight	I_L	–	180	–	mA	
LED life time	-	20,000	-	-	Hr	Note 1

Note 1: The “LED life time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25℃ and I_L =270mA. The LED lifetime could be decreased if operating I_L is lager than 270 mA.

Note 2: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and I_L =270mA.

Note1: External Reset(RESET)

To prevent from abnormal reset condition, a glitch filter for RESET is embedded in this

5. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180°(9 o'clock)	65	80	-	degree	Note 1
	θ_R	Φ=0°(3 o'clock)	65	80	-		
	θ_T	Φ=90°(12 o'clock)	60	60	-		
	θ_B	Φ=270°(6 o'clock)	65	70	-		
Response time	T_{ON}	Normal θ=Φ=0°	-	10	20	msec	Note 3
	T_{OFF}		-	15	30	msec	Note 3
Contrast ratio	CR		500	800	-	-	Note 4
Color chromaticity	W_X		0.27	0.31	0.36	-	Note 2 Note 5 Note 6
	W_Y		0.28	0.33	0.38	-	
	R_X		0.52	0.56	0.60	-	
	R_Y		0.26	0.31	0.37	-	
	G_X		0.30	0.34	0.38	-	
	G_Y		0.55	0.59	0.63	-	
	B_X		0.10	0.14	0.18	-	
	B_Y		0.04	0.08	0.12	-	
Luminance	L		350	400	-	cd/m²	Note 6
Luminance uniformity	Y_U		70	75	-	%	Note 7
NTSC			45	50	-	%	
Flicker			-	-	-30	dB	Note 8

Test Conditions:

1. DV_{DD}=3.1V, I_L=270mA (Backlight current), the ambient temperature is 25℃.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

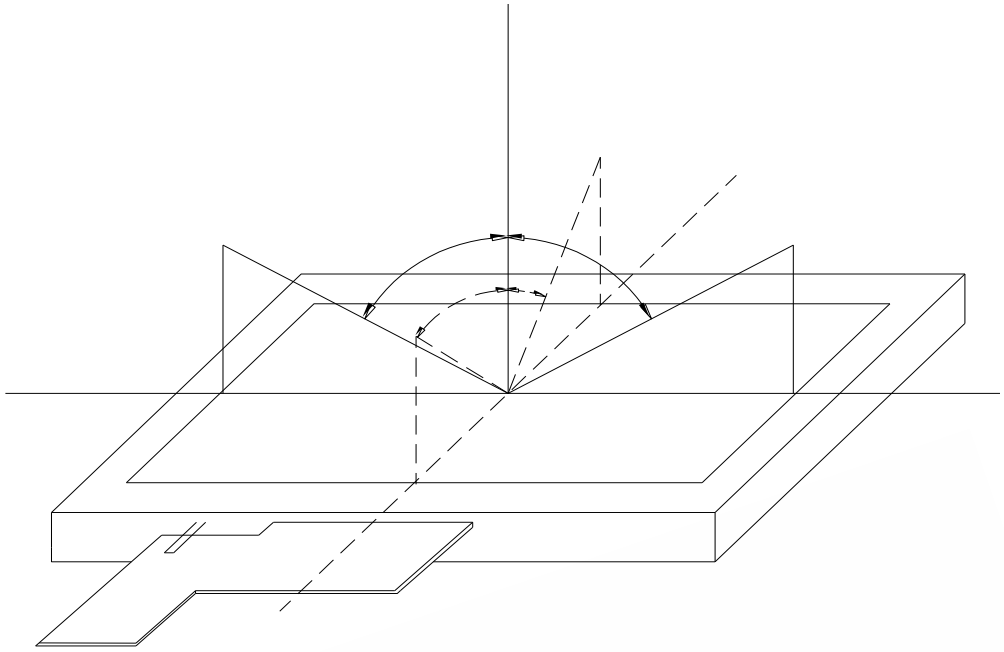


Fig. 4-1 Definition of viewing angle

Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 10 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)

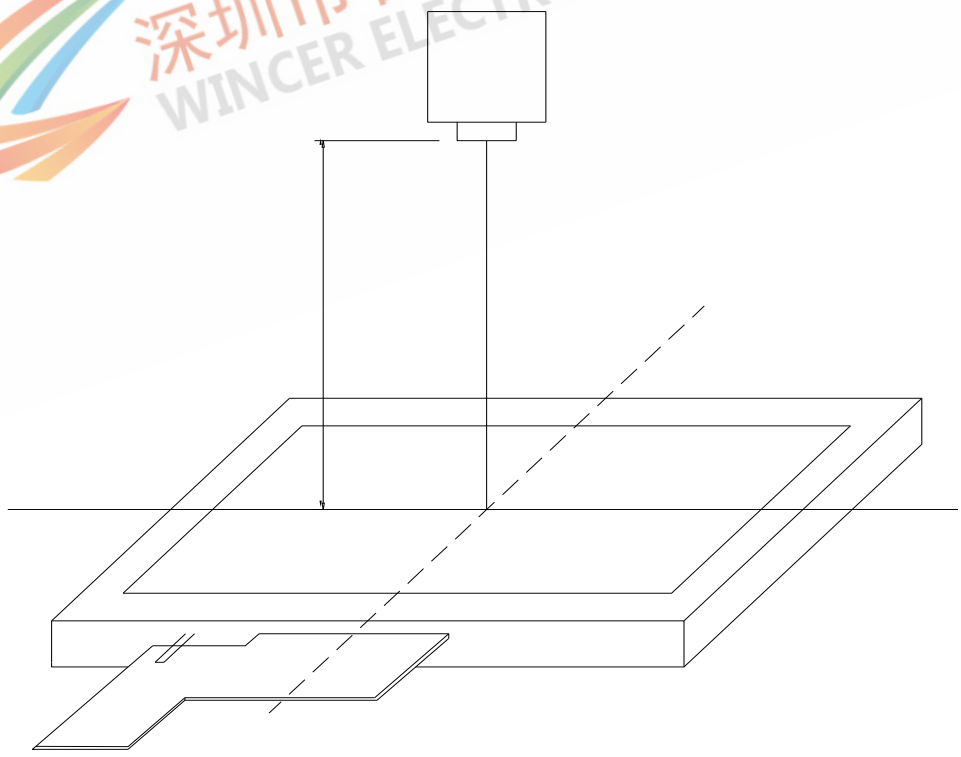


Fig. 4-2 Optical measurement system setup

Note 3: 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%.

Fig. 4-3 Definition of response time

Note 4: Definition of contrast ratio

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

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance

$$\text{Luminance} = \frac{\text{Summation of the 9 measuring point luminance}}{9}$$

This shall be measured on the 9 measuring point as shown in the Fig.4-4. The LED driving condition is I_L=40mA .

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$Luminance\ Uniformity(Y) = \frac{B_{min}}{B_{max}}$$

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

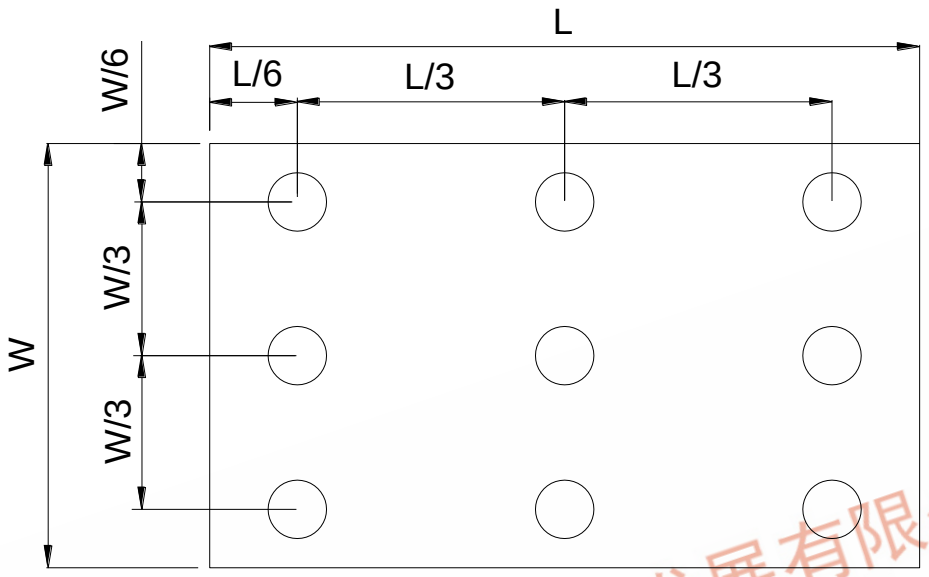


Fig. 4-4 Definition of measuring points

B_{max}: The measured maximum luminance of all measurement position.
B_{min}: The measured minimum luminance of all measurement position.

Note 8: Measured the center of panel by Photo detector K8.

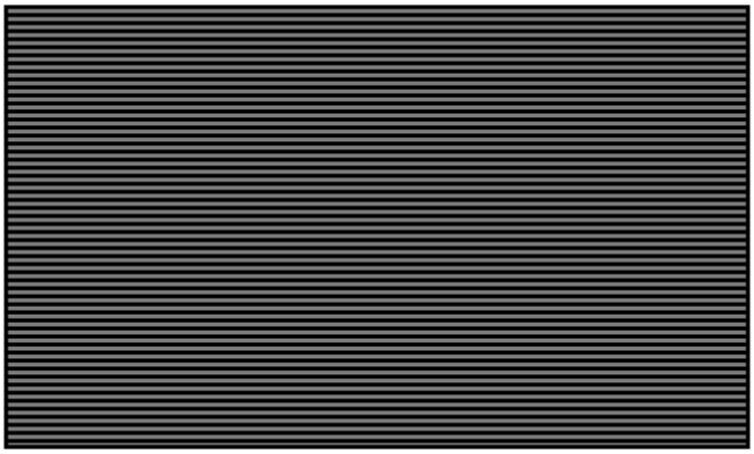


Fig. 4-5 Definition of flicker

6. Reliability Test Items

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = 70℃ 240hrs	Note 1,Note 4
Low Temperature Storage	Ta = -20℃ 240hrs	Note 1,Note 4
High Temperature Operation	Ts = 70℃ 240hrs	Note 2,Note 6
	Ts = 70℃ 72hrs	Note 2,Note 7
Low Temperature Operation	Ta = -20℃ 240hrs	Note 1,Note 4
Operate at High Temperature and Humidity	-	Note 5
Thermal Shock	-20℃/30 min ~ +60℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature	Note 4
Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	

Note 1: Ta is the ambient temperature of samples.
Note 2: Ts is the temperature of panel's surface.
Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but doesn't guarantee all the cosmetic specification.
Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.
Note 5: Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.
Note 6: Before cosmetic tests, the product must have enough recovery time, at least 2 hours at room temperature.
Note 7: After the reliability test, the product only guarantees operation. Before the cosmetic and linearity of touch screen panel test, the product must have enough recovery time, at least 24 hours at room temperature.

7. General Precautions

7.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

7.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

7.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

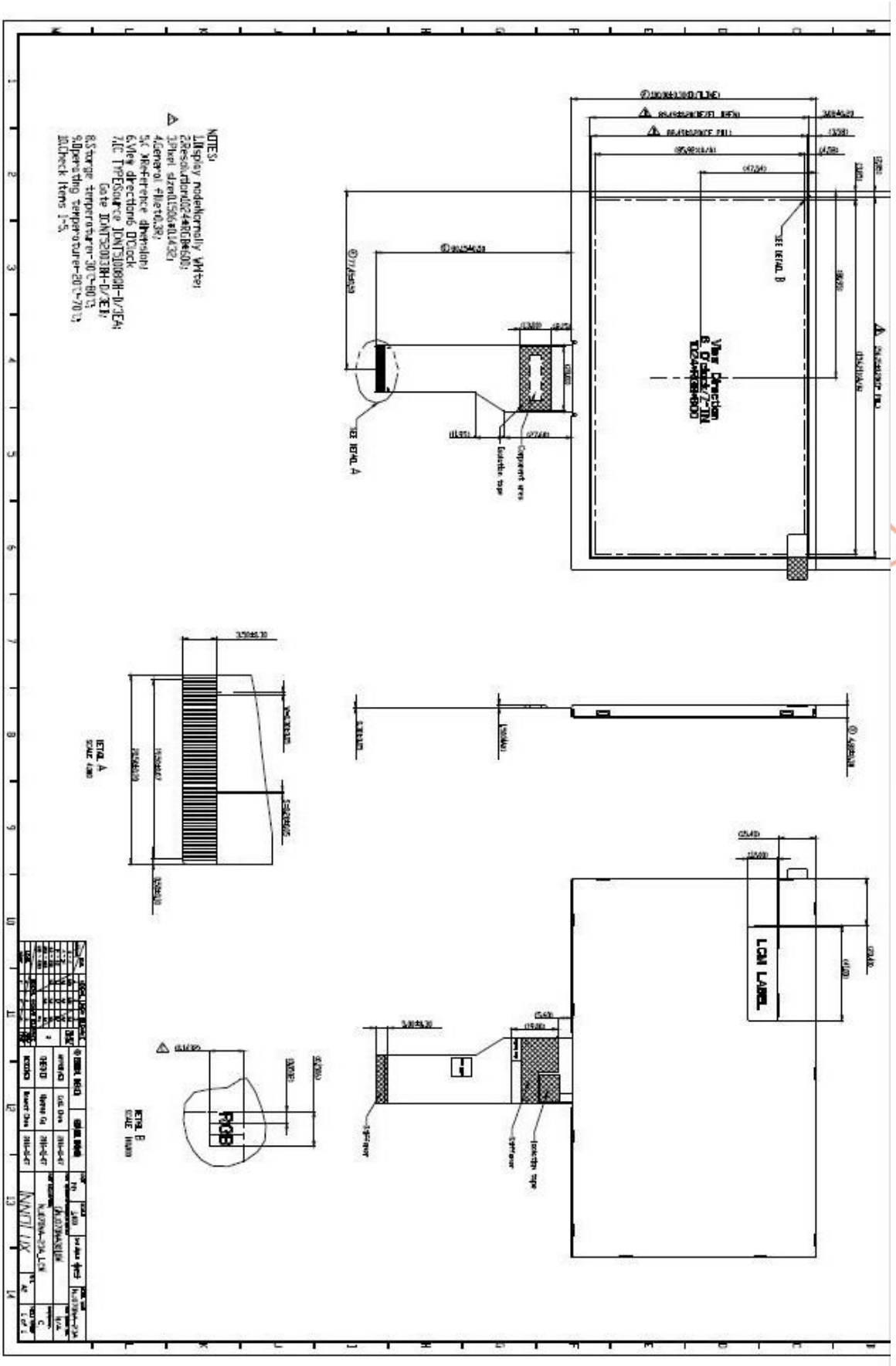
7.4. Storage

1. Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

7.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

8. Mechanical Drawing



9. Package Drawing

9.1. Packaging Material Table

No	Item	Model (Material)	Dimensions(mm)	Unit Weight (Kg)	Quantity (pcs)	Remark
1						
2						
4						
5				0.041	1	
7				0.810	1	
8						