

Product Specification

Model Name	S070HWX93HN-FC102
Description	280(RGB)x1424 Dots 7" TFT LCD
Date	2021/08/31
Revision	2.0

Approved by/Date	Check by/Date	Prepared by/Date
ZHP 2021/08/31	HL 2021/08/31	ZWF 2021/08/31

Customer Approval	
Date	



深圳市思迪科科技有限公司

SHENZHEN CDTECH ELECTRONICS

Table of Contents

1. Record of Revision	3
2 General Specifications	4
3 Input/Output Terminals	5
4 Absolute Maximum Ratings	6
5 Electrical Characteristics	7
6 Optical Characteristics	16
7 Environmental / Reliability Tests	20
8 Mechanical Drawing	22
9 Packing	23
10. Precautions for Use of LCD modules	24



深圳市思迪科科技有限公司

SHENZHEN CDTECH ELECTRONICS

1. Record of Revision

Rev	Issued Date	Description	Editor
1.0	2021/07/23	First Release.	ZWF
2.0	2021/08/31	Update brightness	ZWF

2 General Specifications

Feature		Spec
Characteristics	Size	7 inch
	Resolution	280(Horizontal)*1424(Vertical)
	Interface	MIPI
	Connect type	Connector
	Color Depth	16.7M
	Technology type	a-Si
	Display Spec. Pixel pitch (mm)	0.12(H)*0.12(V)
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally Black
	Driver IC	OTA7290B
	CTP Driver IC	FT5446IDQQ
	Viewing Direction	full view
Mechanical	LCM (W x H x D) (mm)	43.30(W)*201.00(H)*5.23 (D)
	Active Area(mm)	33.60(H)x 170.88(V)
	With /Without TSP	With CTP
	Weight (g)	TBD
	LED Numbers	16 LEDs

Note 1: Viewing direction is follow the data which measured by optics equipment.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%

3 Input/Output Terminals

LCD PIN-MAP

No	Symbol	Description
1	GND	GROUND
2	MIPI_3N	MIPI Negative data signal(-)
3	MIPI_3P	MIPI Positive data signal(+)
4	GND	GROUND
5	MIPI_D2N	MIPI Negative data signal(-)
6	MIPI_D2P	MIPI Positive data signal(+)
7	GND	GROUND
8	MIPI_CKN	MIPI Negative clock signal(-)
9	MIPI_CKP	MIPI Positive clock signal(+)
10	GND	GROUND
11	MIPI_D1N	MIPI Negative data signal(-)
12	MIPI_D1P	MIPI Positive data signal(+)
13	GND	GROUND
14	MIPI_D0N	MIPI Negative data signal(-)
15	MIPI_D0P	MIPI Positive data signal(+)
16	GND	GROUND
17	GND	GROUND
18	TE	Sync signal for touch panel
19	RESET	Device reset signal
20	GND	GROUND
21-23	VCI	Power supply for logic operation
24	GND	GROUND
25-26	NC	No connect
27-28	LEDK	LED Cathode
29-30	LEDA	LED anode

CTP PIN-MAP

Pin	Signal	Description
1	GND	Ground
2	INT	Interrupt request to the host
3	RST	Reset Pin for CTP
4	SDA	I2C data input and output
5	SCL	I2C clock input
6	VDD	Power supply for CTP

4 Absolute Maximum Ratings

Item	Symbol	MIN	Typ	MAX	Unit	Remark
Supply Voltage	VDD	-0.3	-	5.0	V	-
Operating Temperature	TOPR	-20	-	70	°C	-
Storage Temperature	TSTG	-30	-	80	°C	

5 Electrical Characteristics

5.1 Driving TFT LCD Panel

Item	Symbol	MIN	Typ	MAX	Unit	Remark
Supply Voltage	VCI	3.0	3.3	3.6	V	-
Input voltage “H”level	VIH	0.7VDD	-	VDD	V	-
Input voltage “L”level	VIL	0	-	0.3VDD	V	

5.2 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	40	-	mA	
Forward Voltage	V_F	21.6		27.2	V	
Backlight Power consumption	W_{BL}	0.864		1.09	W	
LED Lifetime		-	50000	-	Hrs	

Note 1: Each LED : $I_F = 20\text{ mA}$, $V_F = 2.7 \sim 3.4\text{V}$.

Note 2: Optical performance should be evaluated at $T_a = 25^\circ\text{C}$ only.

Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

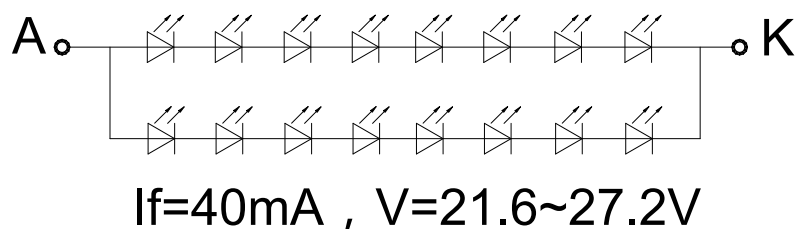
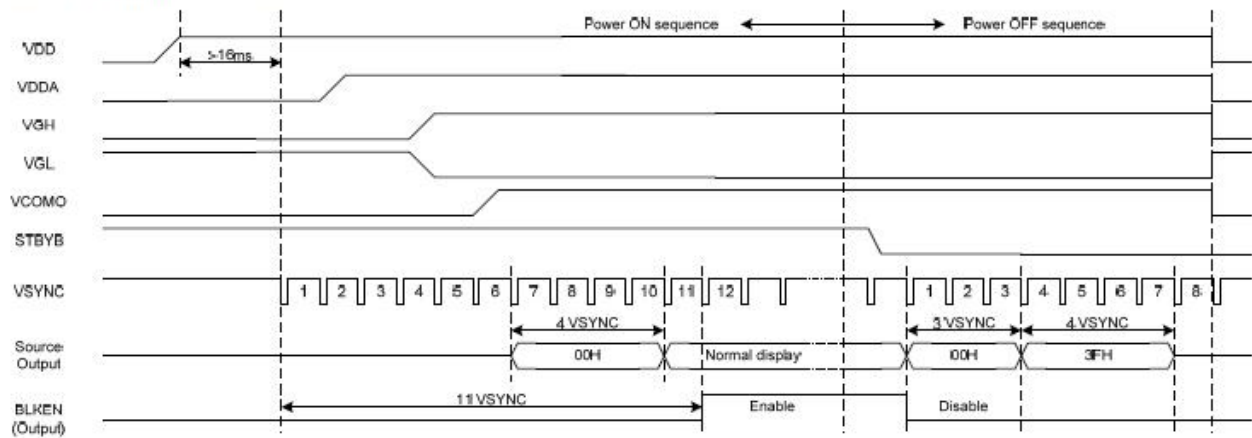


Figure : LED connection of backlight

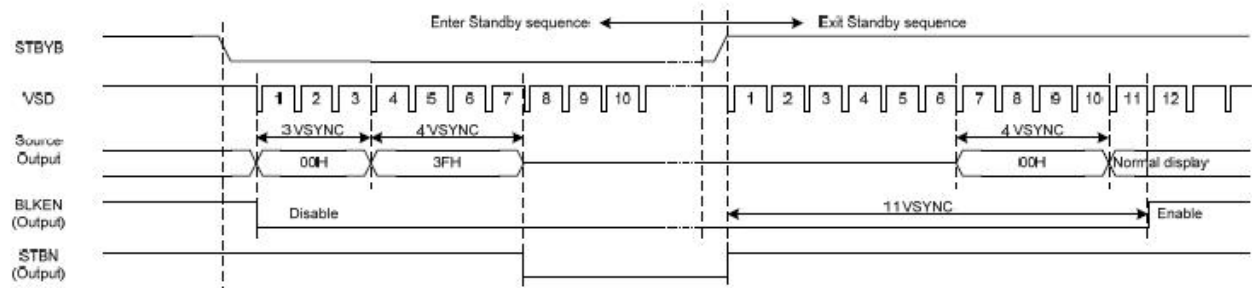
5.3 POWER ON/OFF SEQUENCE

In order to prevent IC from power on reset fail, the rising time (T_{POR}) of the digital power supply VDD should be maintained within the given specifications. Refer to "AC Characteristics" for more detail on timing.

Power-On/Off Timing Sequence:

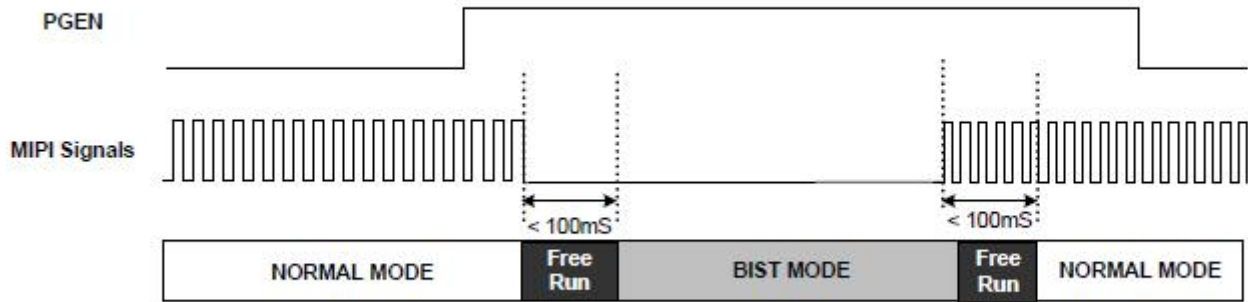
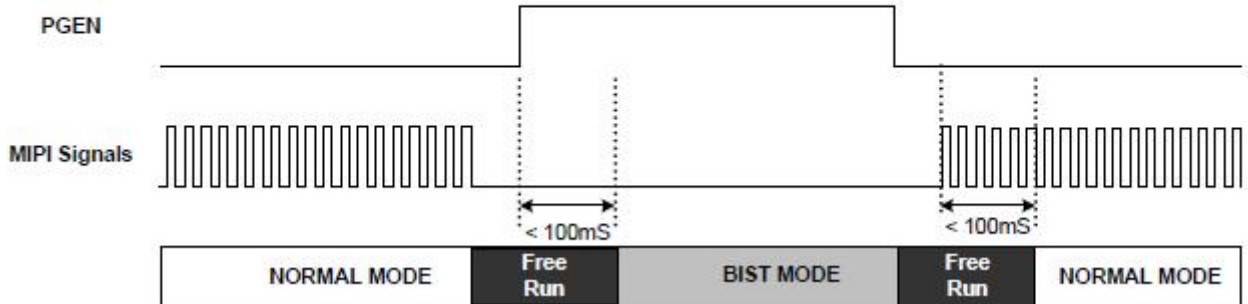


Enter and Exit Standby Mode Sequence:



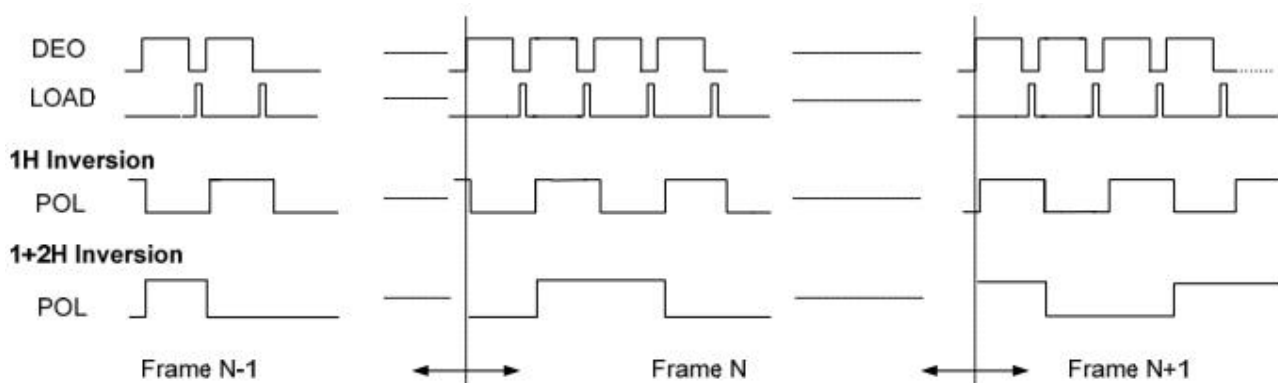
5.4 RESET TIMING CHARACTERISTICS

BIST Timing

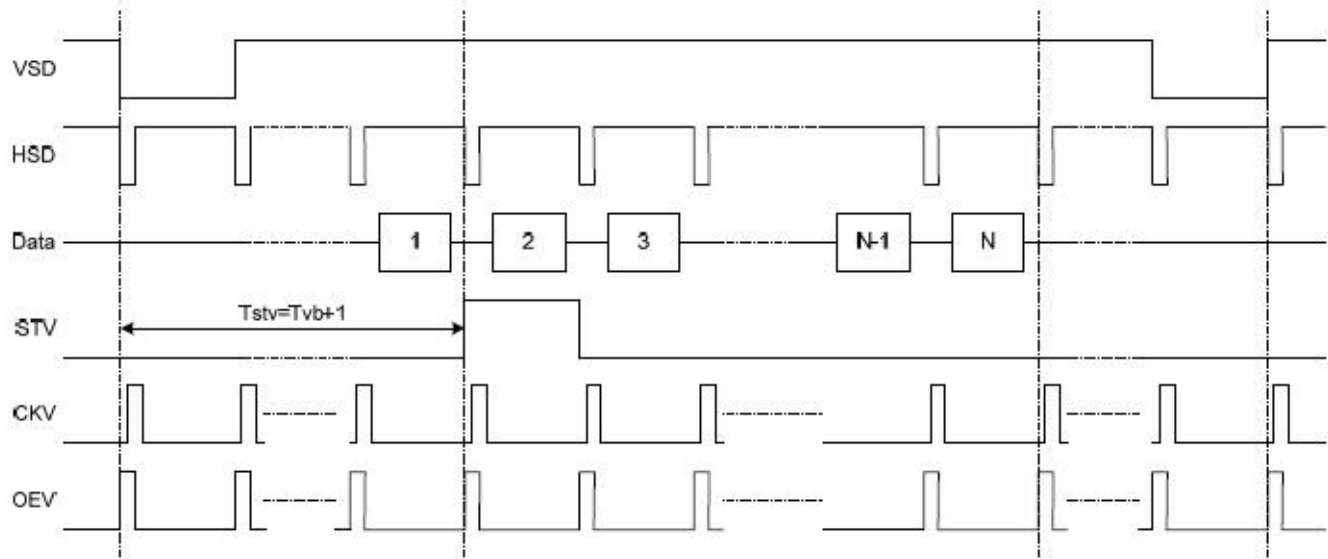


TCON Timing

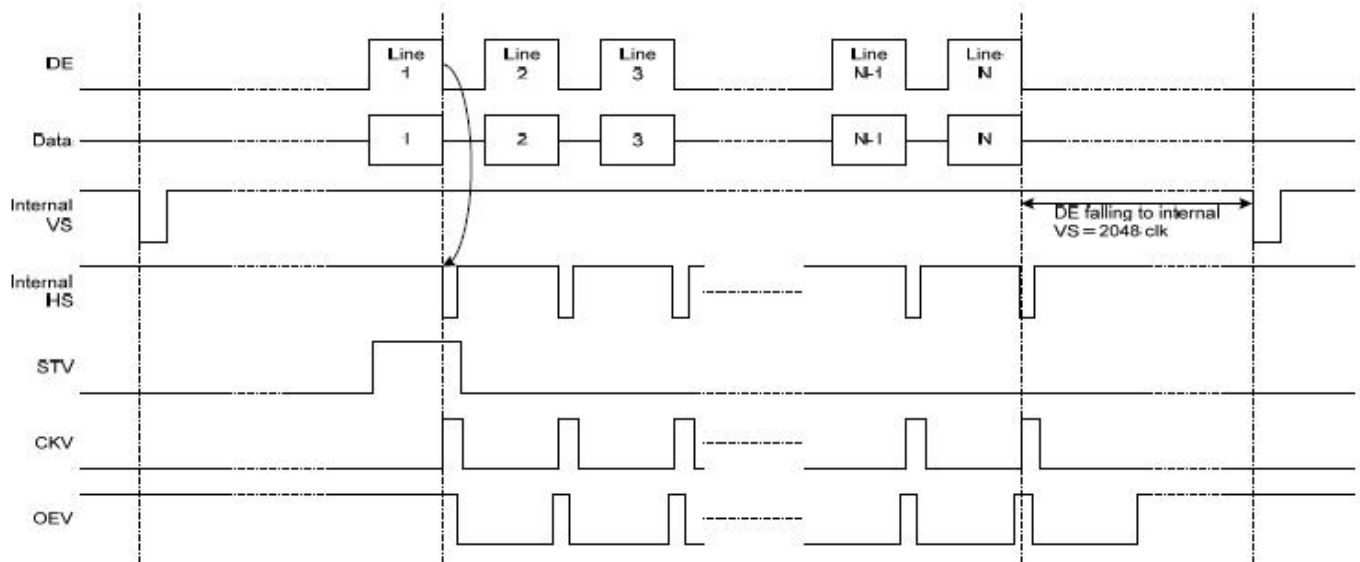
Polarity Control



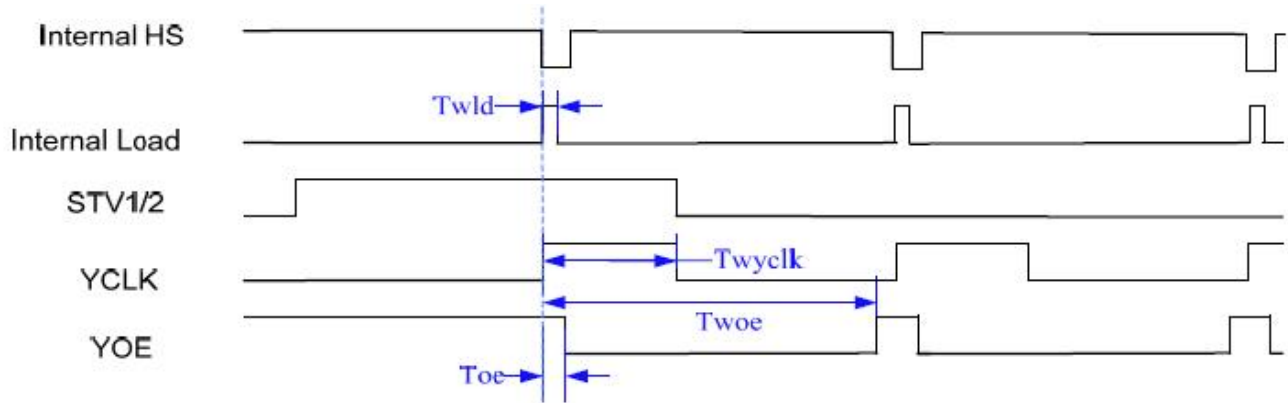
Vertical Timing Diagram HV (Cascade)



Vertical Timing Diagram DE (Cascade)



Gate output timing diagram (Cascade)



MIPI DC Characteristics

HS Receiver DC Specification

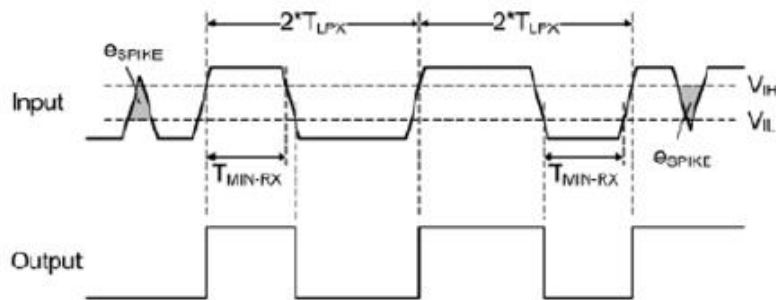
Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Operation Voltage	VDD	1.5-10%	1.5	1.5+10%	mV	
Differential Input Voltage	VID	70	200	260	mV	
Common Mode Voltage	V _{CMRX(DC)}	70	-	330	mV	
Differential Input High Threshold Voltage	V _{TH}	-	-	70	mV	
Differential Input Low Threshold Voltage	V _{TL}	-70	-	-	mV	
Singled-ended input high voltage	V _{IHS}	-	-	460	mV	
Singled-ended input low voltage	V _{ILHS}	-40	-	-	mV	
Singled-ended threshold for HS termination enable	V _{TERM-EN}	-	-	450	mV	
Differential input impedance	Z _{ID}	80	100	125	ohm	
Pin leakage current	I _{LEAK}	-10	-	10	uA	
Common-mode interference beyond 450MHz	ΔV _{CMRX(HF)}	-	-	100	mV	
Common-mode interference 50MHz - 450MHz	ΔV _{CMRX(LF)}	-50	-	50	mV	
Common-mode termination	C _{CM}	-	-	60	pF	
Embedded Termination	R _T	90	100	110	ohm	2bits RT_SEL[1: 0] for termination resistor selection 00 → 200ohm 10, 01 → 150ohm 11 → 100ohm (default) 1bit ERMEN for termination resistor enable TERMEN=0, termr disable R=(OPEN) TERMEN=1, termr enable

Note:

- (1) Excluding possible additional RF interference of 100mV peak sine wave beyond 450MHz.
- (2) This table value includes a ground difference of 50mV between the transmitter and the receiver, the static common-mode level tolerance and variations below 450MHz.

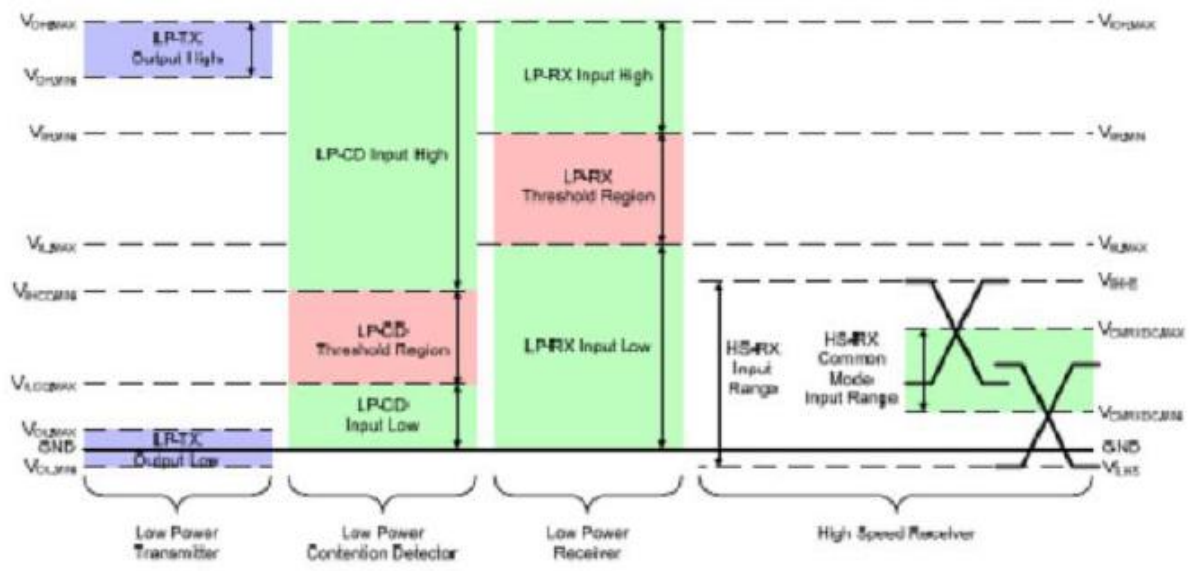
LP Receiver DC Specification

Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Logic 1 input voltage	V_{IH}	880	-	-	mV	
Logic 0 input voltage, not in ULP State	V_{IL}	-	-	550	mV	
Input hysteresis	V_{HYST}	25	-	-	mV	



Line Contention Detection

Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Logic 1 contention threshold	V_{IHCD}	450	-	-	mV	
Logic 0 contention threshold	V_{ILCD}	-	-	200	mV	



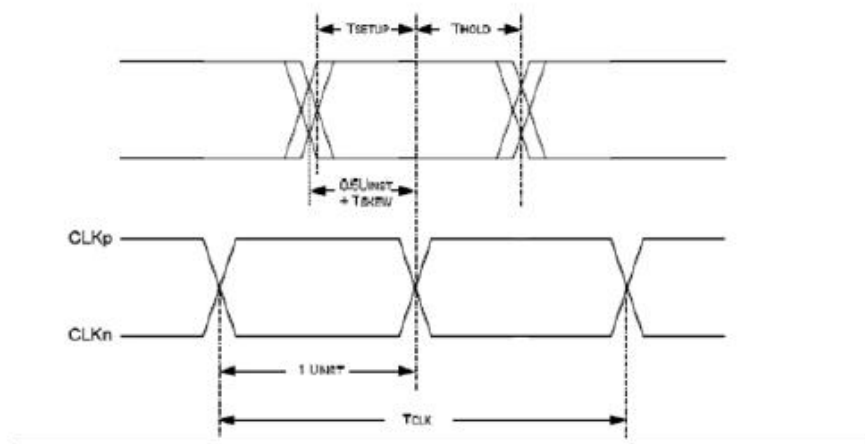
MIPI AC Characteristics

HS Receiver AC Timing Characteristics

Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Bandwidth per lane	-	-	-	1000	Mbps	Bandwidth selected by register 'speedup' Speedup=0 → Max=550Mbps Speedup=1 → Max=1000Mbps
Operation frequency	-	-	-	500	MHz	
UI instantaneous	U_{INST}	1	-	12.5	ns	1
Data to Clock Skew	T_{skew}	-0.15	-	0.15	U_{INST}	
Inter-lane static skew	$T_{skew-lane}$	-	-	$U_{INST}/50$	U_{INST}	
Data to Clock Setup Time	T_{SETUP}	0.25	-	-	U_{INST}	2
Data to Clock Hold Time	T_{HOLD}	0.25	-	-	U_{INST}	
Common-mode interference beyond 450MHz	$\Delta V_{CMRX(HF)}$	-	-	100	mV	4
Common-mode interference 50MHz- 450MHz	$\Delta V_{CMRX(LF)}$	-50	-	50	mV	3,6
Common-mode termination	C_{CM}	-	-	60	pF	5

Note:

- (1) Total silicon and package delay budget of $0.3 \cdot U_{INST}$
- (2) Total setup and hold window for receiver of $0.3 \cdot U_{INST}$
- (3) Excluding 'static' ground shift of 50mV
- (4) $\Delta V_{CMRX(HF)}$ is the peak amplitude of a sine wave superimposed on the receiver input
- (5) For higher bit rates a 14pF capacitor will be needed to meet the common-mode return loss specification.
- (6) Voltage difference compared to the DC average common-mode potential.



5.5 CTP Electrical Characteristics

FPC Design	Item	Description	Remark
COF	IC solution on TP Model	FT5446iDQQ	
	Touch Count Max	-	
	Display Resolution	280*1424	
	Interface Type	I2C	
	I2C Slave Address	0x70	
	Origin of Coordinate	Top left corner	

CTP Operating characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Interface Signal Voltage	VDDI	-	3.3	-	V
Power Voltage	VDD	-	3.3	-	V

6 Optical Characteristics

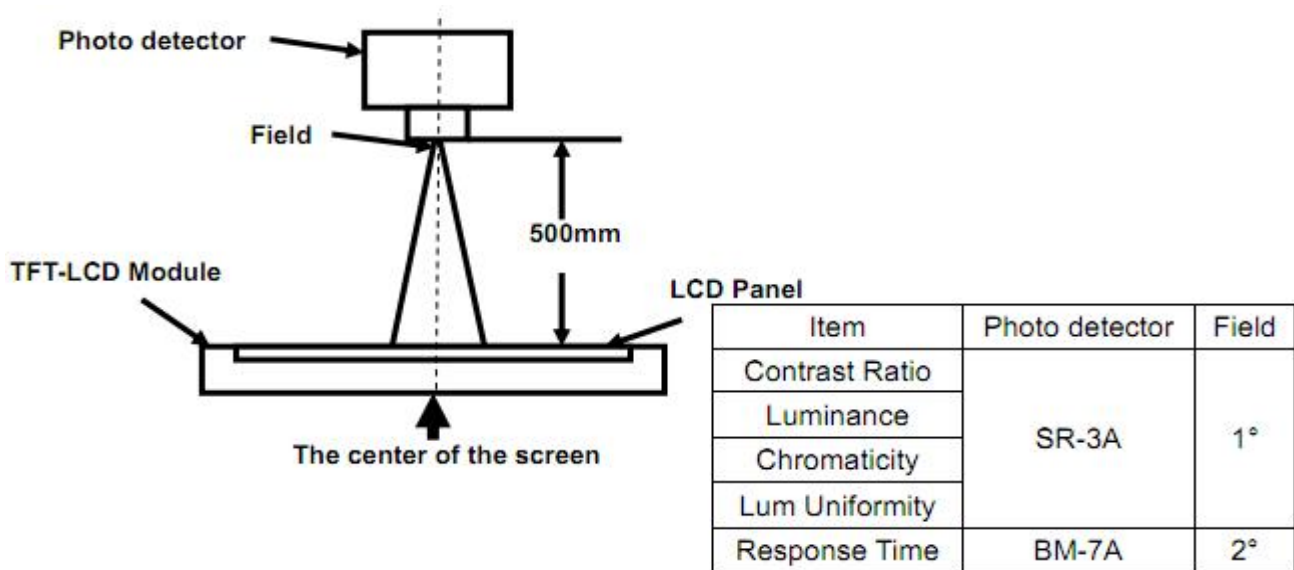
Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles		θ_T	Center CR≥10	75	80	-	Degree.	Note2
		θ_B		75	80	-		
		θ_L		75	80	-		
		θ_R		75	80	-		
Contrast Ratio		CR	$\Theta =0$	800	1000	-	-	Note1, Note3
Response Time		T _{ON}	25°C	-	30	40	ms	Note1, Note4
		T _{OFF}						
Chromaticity	White	X _W	Backlight is on	TBD	TBD	TBD	-	Note1, Note5
		Y _W		TBD	TBD	TBD	-	
	Red	X _R		0.594	0.644	0.694	-	
		Y _R		0.282	0.332	0.382	-	
	Green	X _G		0.274	0.324	0.374	-	
		Y _G		0.516	0.566	0.612	-	
	Blue	X _B		0.087	0.137	0.187	-	
		Y _B		0.075	0.125	0.175	-	
Luminance Uniformity		LU		70	75	-	%	Note1, Note6
Luminance		L		400	500		cd/m2	Note1, Note7

Test Conditions:

1. IF= 20mA(one channel),the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

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).

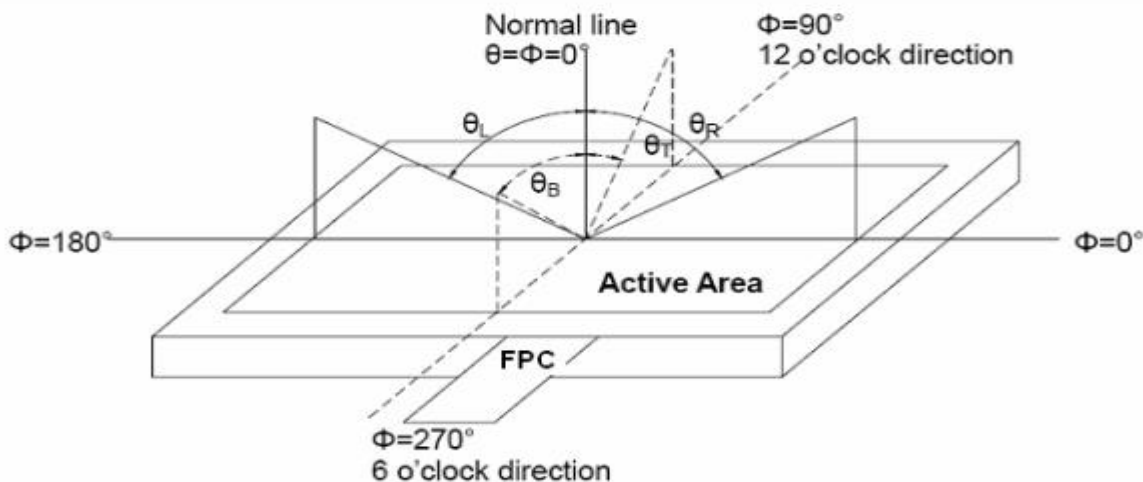


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

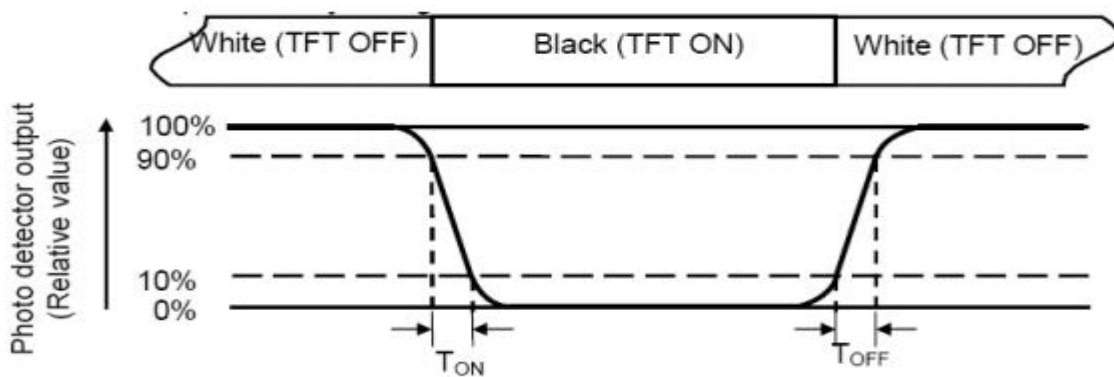
“White state”: The state is that the LCD should driven by V_{white} .

“Black state”: The state is that the LCD should driven by V_{black} .

V_{white} : To be determined V_{black} : To be determined.

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

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity}(U) = L_{min} / L_{max} \times 100\%$$

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

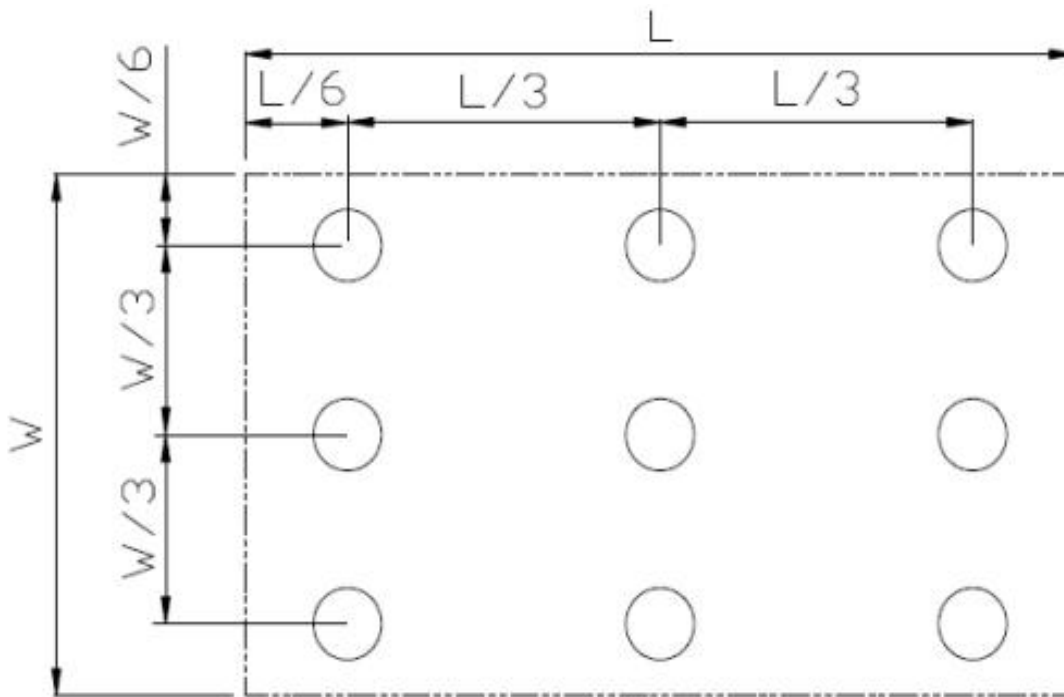


Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance :

Measure the luminance of white state at center point.

7 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70℃, 96hrs	IEC60068-2-1:2007 GB2423. 2-2008
2	Low Temperature Operation	Ta= -20℃, 96hrs	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta= +80℃, 96hrs	IEC60068-2-1:2007 GB2423. 2-2008
4	Low Temperature Storage	Ta= -30℃, 96hrs	IEC60068-2-1:2007 GB2423.1-2008
5	High Temperature & Humidity Operation	Ta= +60℃, 90% RH max, 240 hours	IEC60068-2-78:2001 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30℃ 30 min ~ +80℃ 30 min Change time: 5min, 20 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14:1984, GB2423.22-2002
7	ESD	C=150pF, R=330 Ω, 5 points/panel , Air:±8KV, 5 times Contact: ±4KV, 5 times (Environment: 15℃ ~ 35℃, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.5mm , Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (6 hours for total)	IEC60068-2-6:1982 GB/T2423.10-1995
9	Mechanical Shock (Non-operation)	Half Sine Wave 60G ,6ms,±X,±Y,±Z 3times for each direction	IEC60068-2-27:1987 GB/T2423.5—1995
10	Package Drop Test	Height: 60 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32:1990 GB/T2423.8-1995



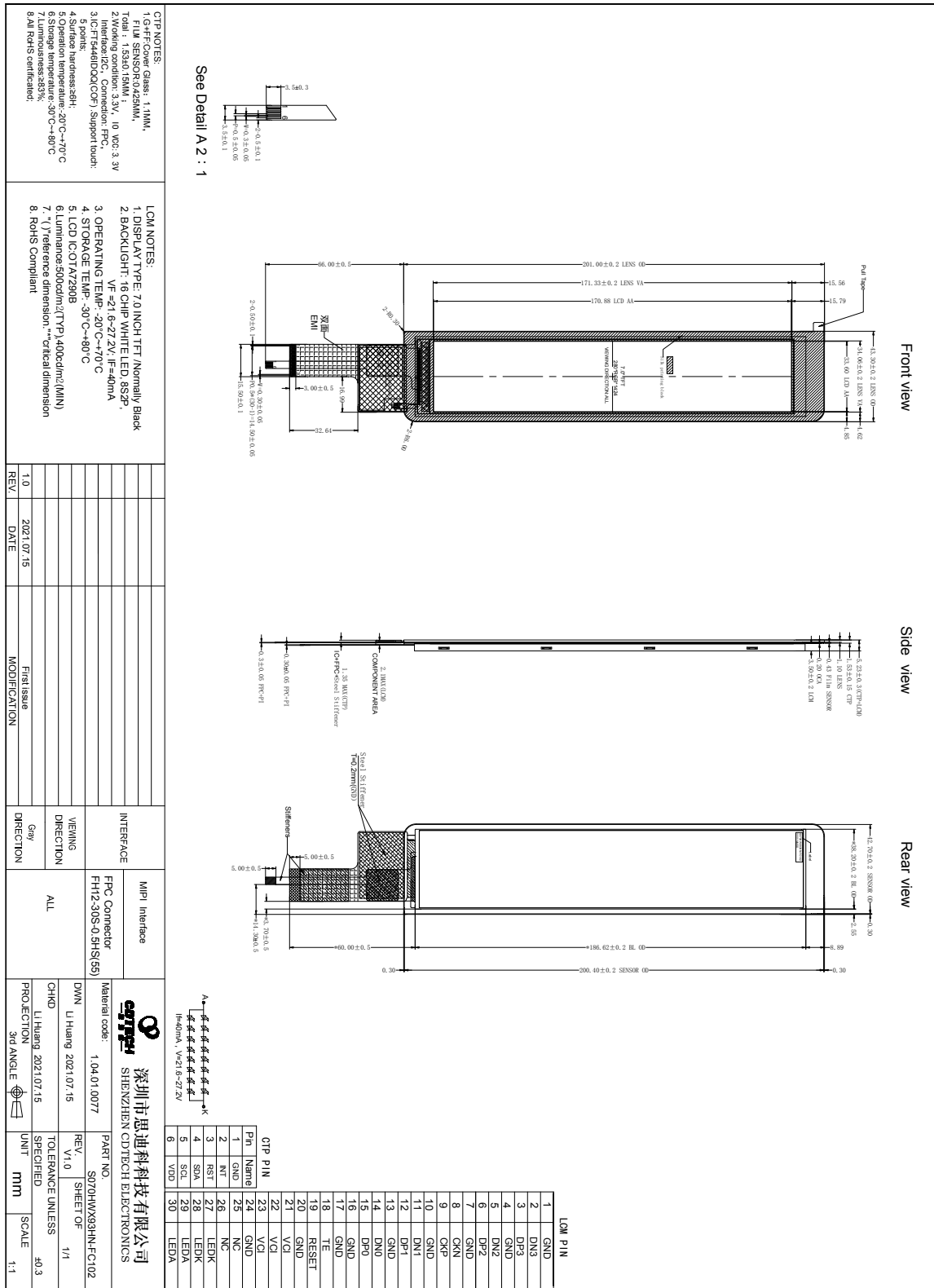
深圳市思迪科科技有限公司

SHENZHEN CDTECH ELECTRONICS

Notes:

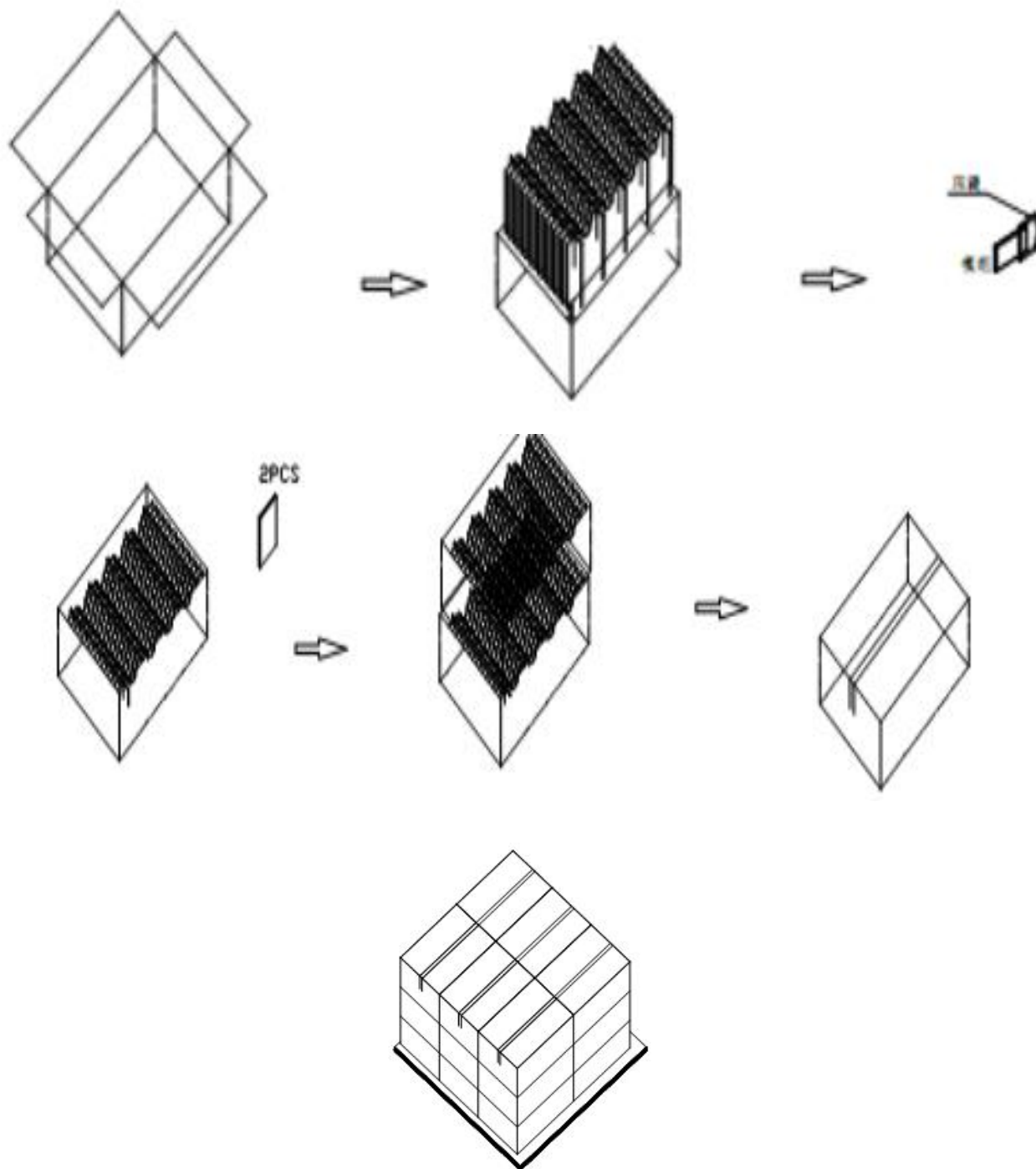
1. The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:
 - 1).Air bubble in the LCD;
 - 2).Seal leak
 - 3).Non-display
 - 4).missing segments
 - 5).Glass crack
 - 6).CR reduction >40%
 - 7).IDD increase >100%
 - 8).Brightness reduction >50%
 - 9).Color coordinate tolerance >0.05
2. ≤ 7.0 inch: The size of sample is 5pcs;
 > 7.0 inch: The size of sample is 2pcs;
3. One test sample must complete each test item;
4. In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
5. In the test of High Temperature Operation and High Temperature & Humidity Operation ,the operation temperature is the surface temperature of module.

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

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.



深圳市思迪科科技有限公司

SHENZHEN CDTECH ELECTRONICS

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.