NODKA INDUSTRIAL CO.,LTD

Product Specification

Customer	
Model Name	ND-070PCAP
Description	7.0" TFT LCD Module 1024(RGB)x600 Dots FT5306DE4 Solution
Date	2016/9/13
Revision	4.0

Engineering			
Check	**Date**	**Prepared**	**Date**
Borger	2016/09/13	Jack Guo	2016/09/13

Customer Approval	
Date	

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1. Record of Revision

Rev	Issued Date	Description	Editor
1.0	2015/3/3	First Release.	Rich liang
2.0	2016/6/30	Update LCD	Gary guo
3.0	2016/8/30	Update LED&Increase CTP	Jack Guo
4.0	2016/9/13	Update P/N	Jack Guo

2 General Specifications

Feature		Spec
Characteristics	Size	7 inch
	Resolution	**1024(Horizontal)*600(Vertical)**
	Interface	LVDS
	Connect type	Connector
	Color Depth	262K
	Technology type	a-Si
	Display Spec. Pixel pitch (mm)	0.05 x 0.15
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally White
	Driver IC	NT52002+NT51008
	Surface Treatment	HC
	Viewing Direction	6 O'clock
Mechanical	LCM (W x H x D) (mm)	165.25*104.89*4.63
	Active Area(mm)	153.6 x 90
	With /Without TSP	With
	Weight (g)	TBD
	LED Numbers	27 LEDs

Note : Requirements on Environmental Protection: RoHS compliant.

3 .Input/Output Terminals

3.1 Module interface description

No.	Symbol	Description
1	VCOM	Common Voltage

2	VDD	Power Voltage for digital circuit
3	VDD	Power Voltage for digital circuit
4	NC	No connection
5	RESET	Global reset pin
6	STBYB	Standby mode Normally pulled high STBYB=1,normal operation STBYB=0,timing contrller,source Driver will turn off,all output are High-Z
7	GND	Ground
8	RXIN0-	-LVDS differential data input
9	RXIN0+	+LVDS differential data input
10	GND	Ground
11	RXIN1-	-LVDS differential data input
12	RXIN1+	+LVDS differential data input
13	GND	Ground
14	RXIN2-	-LVDS differential data input
15	RXIN2+	+LVDS differential data input
16	GND	Ground
17	RXCLKIN-	-LVDS differential clock input
18	RXCLKIN+	+LVDS differential clock input
19	GND	Ground
20	RXIN3-	-LVDS differential data input
21	RXIN3+	-LVDS differential data input
22	GND	Ground
23	NC	No connection
24	NC	No connection
25	GND	Ground
26	NC	No connection
27	DIMO	Backlight CABC controller signal output
28	SELB	6bit/8bit mode select (Note 1)
29	AVDD	Power for Analog Circuit
30	GND	Ground
31	LED-	LED Cathode
32	LED-	LED Cathode
33	L/R	Horizontal inversion (Note 3)
34	U/D	Vertical inversion (Note 3)
35	VGL	Gate oFF Voltage
36	CABCEN1	CABC H/W enable (Note 2)
37	CABCEN0	CABC H/W enable (Note 2)
38	VGH	Gate ON Voltage
39	LED+	LED Anode

40	LED+	LED Anode

Note 1: if LVDS input data is 6bit,selb must be set to high;
if LVDS input data is 8bit,selb must be set to low;
Note 2:When CABC_EN=00,CABC OFF.
When CABC_EN=01,user interface image.
When CABC_EN=10,still picture.
When CABC_EN=11,moving image
When CABC off,don't connect DIMO,else connect it to backlight
Note 3: when L/R=0 set right to left scan direction
when L/R=1 set left to right scan direction
when U/D=0 set top to bottom scan direction
when U/D=1 set bottom to top scan direction

3.2 CTP interface description

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

4 Absolute Maximum Ratings

Driving TFT LCD Panel

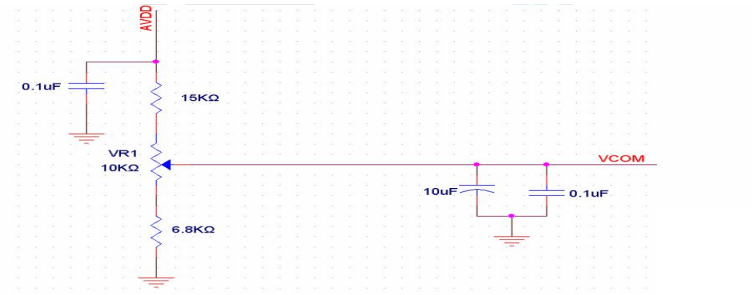
Item	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	V_{CC}	-0.3	5	V	
Input logic Voltage	Vi	-0.3	Vcc+0.3	V	

5 Electrical Characteristics

5.1 .1Driving TFT LCD Panel

Item	Symbol	MIN	MAX	Unit	Remark
Power voltage	V_{DD}	-0.5	5.0	V	Note 2
	AVDD	-0.5	15	V	
	VGH	-0.3	42	V	
	VGL	-20	0.3	V	
Operating Temperature	T_{OPR}	-20	70	℃	
Storage Temperature	T_{STG}	-30	80	℃	

Ta = 25 °C



5.1.2 Current Consumption

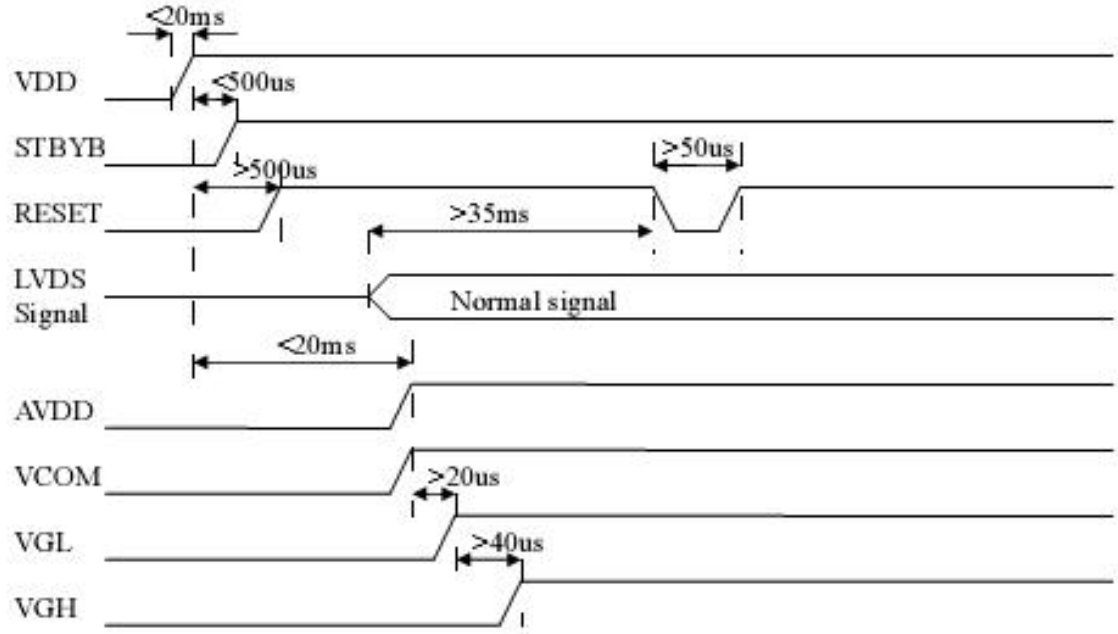
(GND=AV_{SS}=0V, Note 1)

Item	Symbol	Values			Unit	Remark
		Min	Type.	Max		
Input signal voltage	VCOM	3.56	3.76	3.96	V	Note 1
Power voltage	DVDD	3	3.3	3.6	V	Note 2
	AVDD	10.8	11	11.2	V	
	VGL	-10	-7	-4	V	
	VGH	16	20	24	V	
Low level input voltage	VIL	0	-	0.3xVDD	V	
High level input voltage	VIH	0.7xVDD	-	VDD	V	

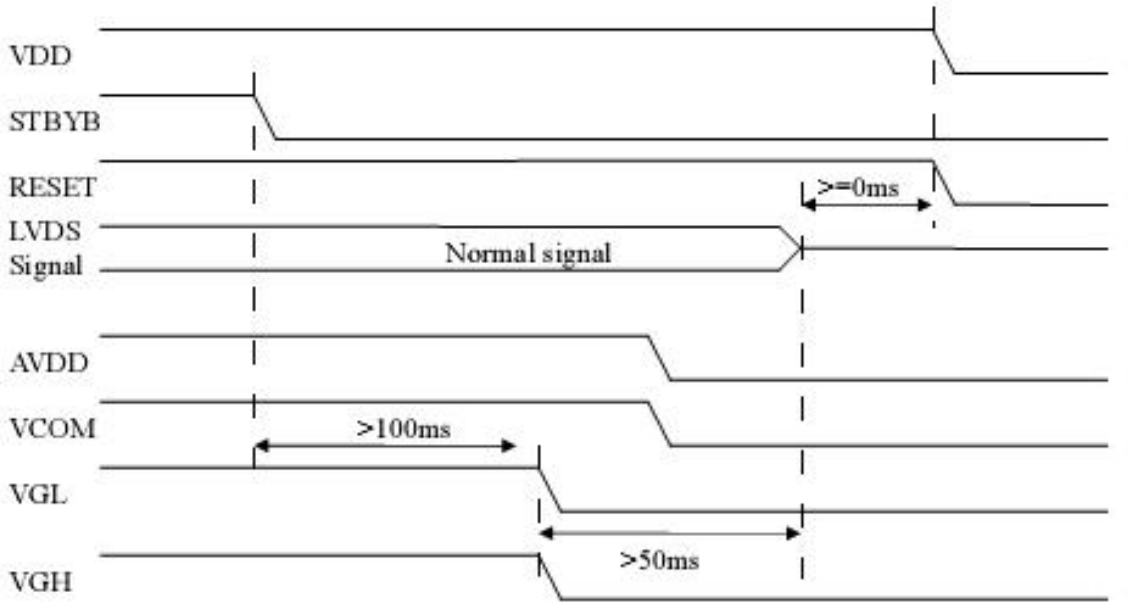
Item	Symbol	Values			Unit	Remark
		Min	Type.	Max		
Current for Drive	IGH	-	0.25	1	mA	VGH=20V
	IGL	-	0.25	1	mA	VGL=-7V
	IDVDD	-	38	60	mA	DVDD=3.3V
	IAVDD	-	20	30	mA	AVDD=11V

5.2 Power Seqence

a. Power on:



b. Power off:

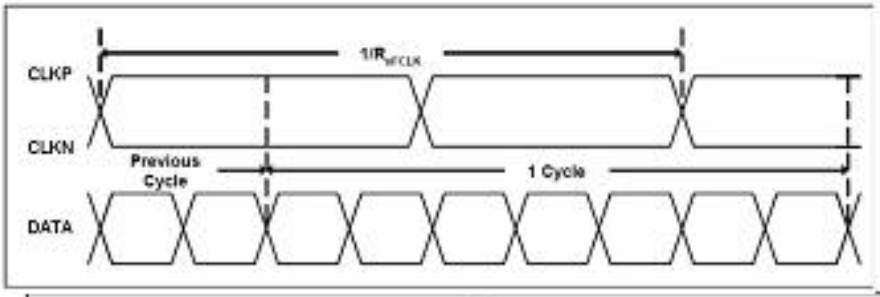


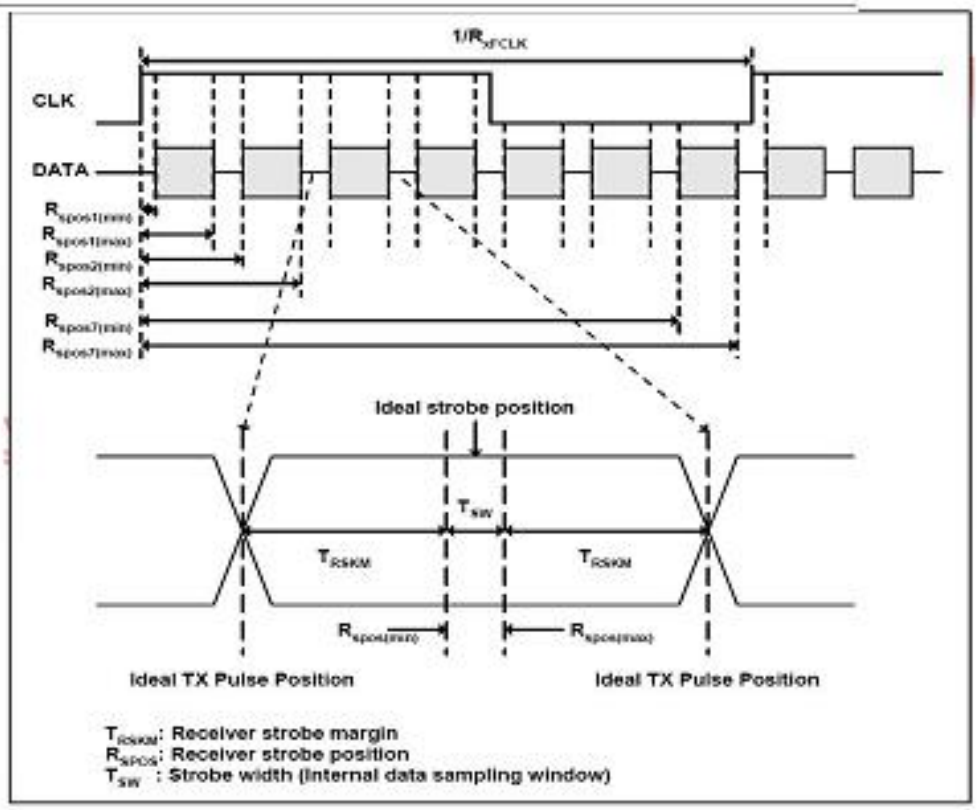
5.3 Timing Characteristics

3.3.1. AC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock frequency	R_{xFCLK}	40.8	51.2	67.2	MHz	
Input data skew margin	T_{RSKM}	500	-	-	ps	
Clock high time	T_{LVCH}	-	4/(7* R_{xFCLK})	-	ns	
Clock low time	T_{LVCL}	-	3/(7* R_{xFCLK})	-	ns	

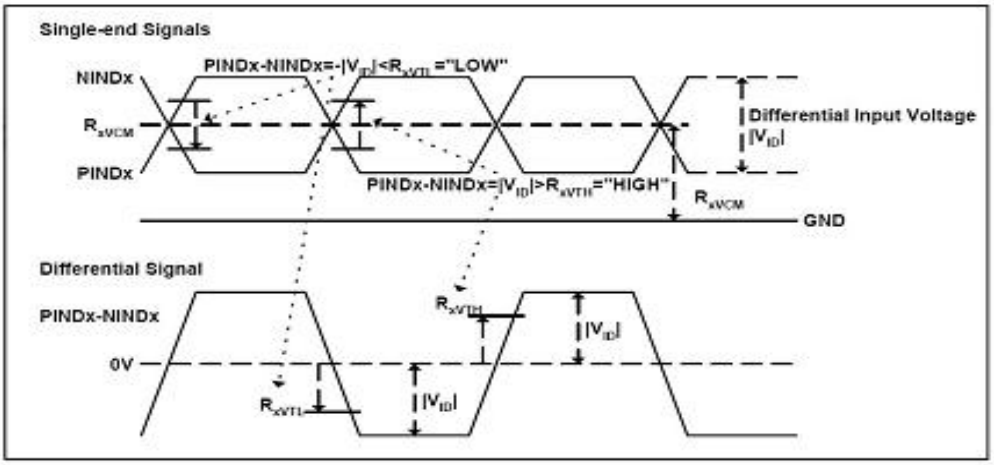
3.3.2. Input Clock and Data Timing Diagram





3.3.3. DC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Differential input high Threshold voltage	R_{xVTH}	-	-	+0.1	V	R_{xVCM}=1.2V
Differential input low Threshold voltage	R_{xVTL}	-0.1	-	-	V	
Input voltage range (singled-end)	R_{xVIN}	0	-	2.4	V	
Differential input common mode voltage	R_{xVCM}	$\|V_{ID}\|/2$	-	$2.4-\|V_{ID}\|/2$	V	
Differential voltage	$\|V_{ID}\|$	0.2	-	0.6	V	
Differential input leakage current	RV_{xIlz}	-10	-	+10	uA	

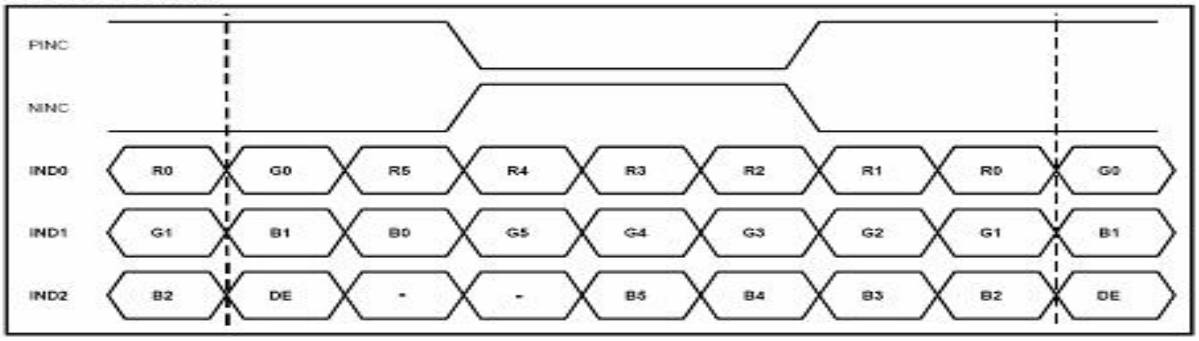


3.3.4. Timing

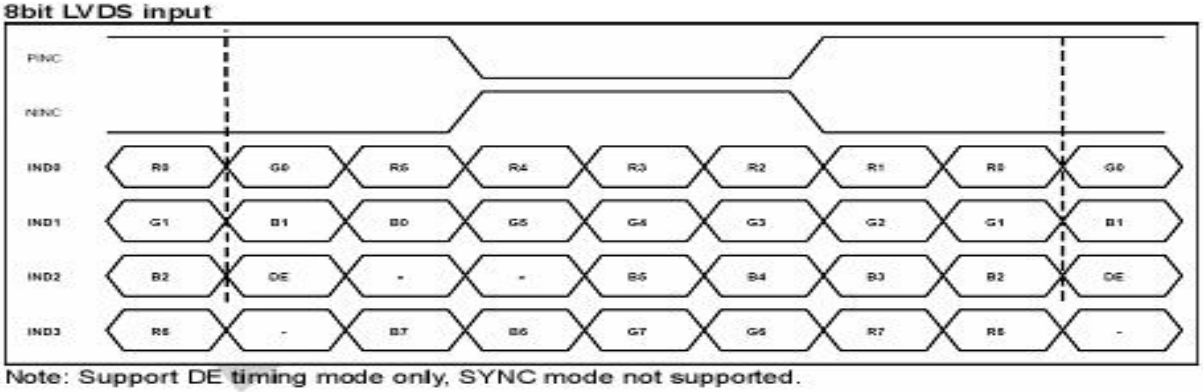
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	fclk	40.8	51.2	67.2	MHz	Frame rate =60Hz
Horizontal display area	thd		1024		DCLK	
HS period time	th	1114	1344	1400	DCLK	
HS Blanking	thb	90	320	376	DCLK	
Vertical display area	tvd		600		H	
VS period time	tv	610	635	800	H	
VS Blanking	thb	10	35	200	H	

3.3.5. Data Input Format

6bit LVDS input



8bit LVDS input



Note: Support DE timing mode only, SYNC mode not supported.

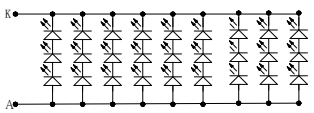
5.4 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	180	-	mA	
Forward Voltage	V_F	9.3	9.6	9.9	V	
Backlight Power consumption	W_{BL}	-	1.726	-	W	
LED Life Time		25000	-	-	Hrs	

Note 1: Each LED : IF =20 mA, VF =3.2V.

Note 2: Optical performance should be evaluated at Ta=25℃ 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.



27LEDs

Backlight Circuit diagram

6. Capacitive touch panel characteristics

6.1 Panel touch characteristics (Ta=25℃)

FPC Design	Item	Description	Note
COF	IC solution on TP Model	FT5306DE4	
	Touch Count Max	5 point	
	Display Resolution	1024*600	
	Interface Type	I2C	
	I2C Slave Address	0X5D	
	Origin of Coordinate	Top left corner	
	Power supply	2.8-3.3V	
	Transmittance	≥85%	
	Hard Coating	≥6H	
	Operation environment	-20 ºC~+70 ºC,≤90%RH	
	Storage environment	-30 ºC~+80 ºC,≤90%RH	
	Structure	Cover GLASS (AGC) + LOCA+ ITO GLASS + FPC (COF)	

6.2.1 I2C Communication

The I2C is always configured in the Slave mode. The data transfer format is shown in Figure 2-4.

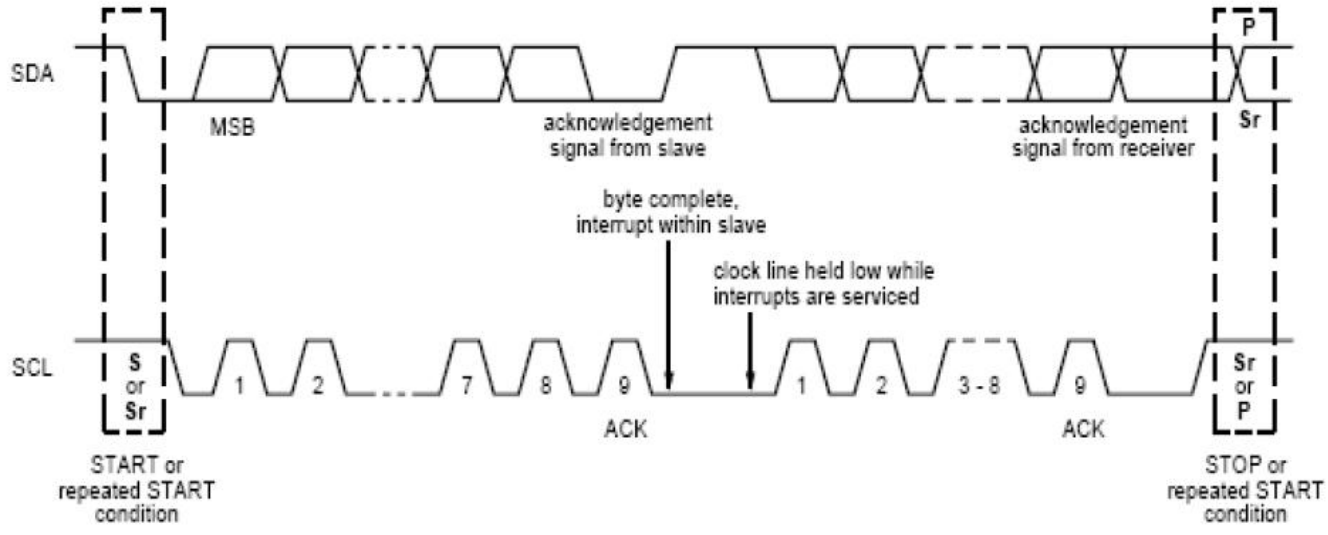


Figure 2-4 I2C Serial Data Transfer Format

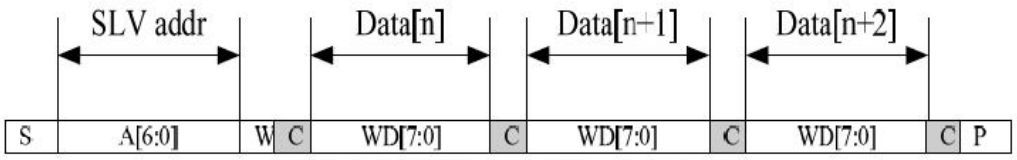


Figure 2-5 I2C master write, slave read

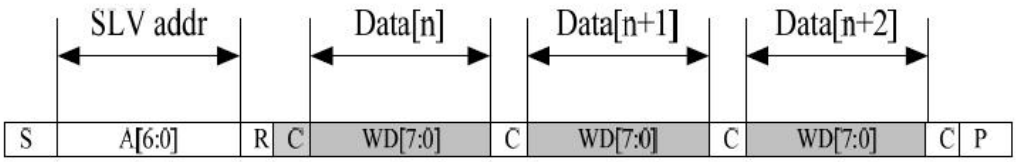


Figure 2-6 I2C master read, slave write

Table 2-1 lists the meanings of the mnemonics used in the above figures.

Table 2-1 Mnemonics Description

Mnemonics	Description
S	I2C Start or I2C Restart
A[6:0]	Slave address A[6:4]: 3'b011 A[3:0]: data bits are identical to those of I2CCON[7:4] register.
W	1'b0: Write
R	1'b1: Read
C	ACK
P	STOP: the indication of the end of a packet (if this bit is missing, S will indicate the end of the current packet and the beginning of the next packet)

I2C Interface Timing Characteristics is shown in Table 2-2.

Table 2-2 I2C Timing Characteristics

Parameter	Unit	Min	Max
SCL frequency	KHz	0	400
Bus free time between a STOP and START condition	us	4.7	\
Hold time (repeated) START condition	us	4.0	\
Data setup time	ns	250	\
Setup time for a repeated START condition	us	4.7	\
Setup Time for STOP condition	us	4.0	\

6.2.2 ELECTRICAL SPECIFICATIONS

Item	Symbol	Unit	Value	Note
Power Supply Voltage 1	VDDA - VSSA	V	-0.3 ~ +3.6	1, 2
Power Supply Voltage 2	VDD3 – VSS	V	-0.3 ~ +3.6	1, 3
I/O Power Supply Voltage	Vt	V	-0.3 ~ IOVCC + 0.3	1,4
Operating Temperature	Topr	℃	-40 ~ +85	1
Storage Temperature	Tstg	℃	-55 ~ +110	1

Notes

1、If used beyond the absolute maximum ratings, FT5x06 may be permanently damaged. It is strongly recommended that the device be used within the electrical characteristics in normal operations. If exposed to the condition not within the electrical characteristics, it may affect the reliability of the device.

2、Make sure VDDA(high)≥VSSA (low)

3、Make sure VDD (high)≥VSS (low)

4、IOVCC is set to VDD3 or VDDD by software configuration.

Item	Symbol	Unit	Test Condition	Min.	Typ.	Max.	Note
Input high-level voltage	VIH	V		0.7 x IOVCC	--	IOVCC	
Input low -level voltage	VIL	V		-0.3	--	0.3 x IOVCC	
Output high -level voltage	VOH	V	IOH=-0.1mA	0.7 x IOVCC	--	--	
Output low -level voltage	VOL	V	IOH=0.1mA	--	--	0.3 x IOVCC	
I/O leakage current	ILI	μA	Vin=0~VDDA	-1	--	1	
Current consumption (Normal operation mode)	Iopr	mA	VDDA=VDD3 = 2.8V Ta=25℃ MCLK=24MHz	--	6	--	
Current consumption (Monitor mode)	Imon	mA	VDDA=VDD3 = 2.8V Ta=25℃ MCLK=24MHz	--	4	--	
Current consumption (Sleep mode)	Islp	mA	VDDA=VDD3 = 2.8V Ta=25℃ MCLK=24MHz	--	0.03	--	
Step-up output voltage	VDD5	V	VDDA=VDD3= 2.8V	5	5.25	5.6	
Power Supply voltage	VDDA VDD3	V		2.8	--	3.6	

3.3 AC Characteristics

Table 3-3 AC Characteristics of Oscillators

Item	Symbol	Unit	Test Condition	Min.	Typ.	Max.	Note
OSC clock 1	fosc1	MHz	VDD3 = 2.8V Ta=25℃	43	48	52	
OSC clock 2	fosc2	KHz	VDD3 = 2.8V Ta=25℃	29	32	36	

Table 3-4 AC Characteristics of TX & RX

Item	Symbol	Unit	Test Condition	Min	Typ	Max	Note
TX acceptable clock	ftx	KHz		100	150	270	
TX output rise time	Ttxr	nS		--	20	--	
TX output fall time	Ttxf	nS		--	20	--	
RX input voltage	Trxi	V		1.2	--	1.6	

7. Optical Characteristics

7.1 Module Test Characteristics

NODKA INDUSTRIAL CO.,LTD

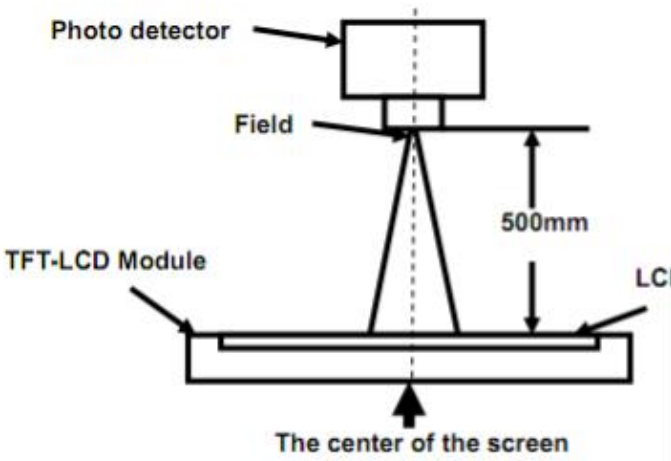
Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles		θ_T	Center CR≥10	40	50	-	Degree.	Note2
		θ_B		60	70	-		
		θ_L		60	70	-		
		θ_R		60	70	-		
Contrast Ratio		CR	Θ =0	500	700	-	-	Note1, Note3
Response Time		T_{ON}	25°C	-	10	20	ms	Note1, Note4
		T_{OFF}		-	15	30		
Chromaticity	White	X_W		-0.015	0.309	+0.015	-	Note1, Note5
		Y_W			0.327		-	
	Red	X_R			0.649		-	
		Y_R			0.331		-	
	Green	X_G			0.288		-	
		Y_G			0.585		-	
	Blue	X_B			0.140		-	
		Y_B			0.089		-	
Uniformity		U		-	70	-	%	Note1, Note6
Luminance		L		-	380			Note1, Note7

Test Conditions:

1. IF= 20mA(one channel),the ambient temperature is 25℃
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.



Item	Photo detector	Field
Contrast Ratio	BM-7A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	SR-3A	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).

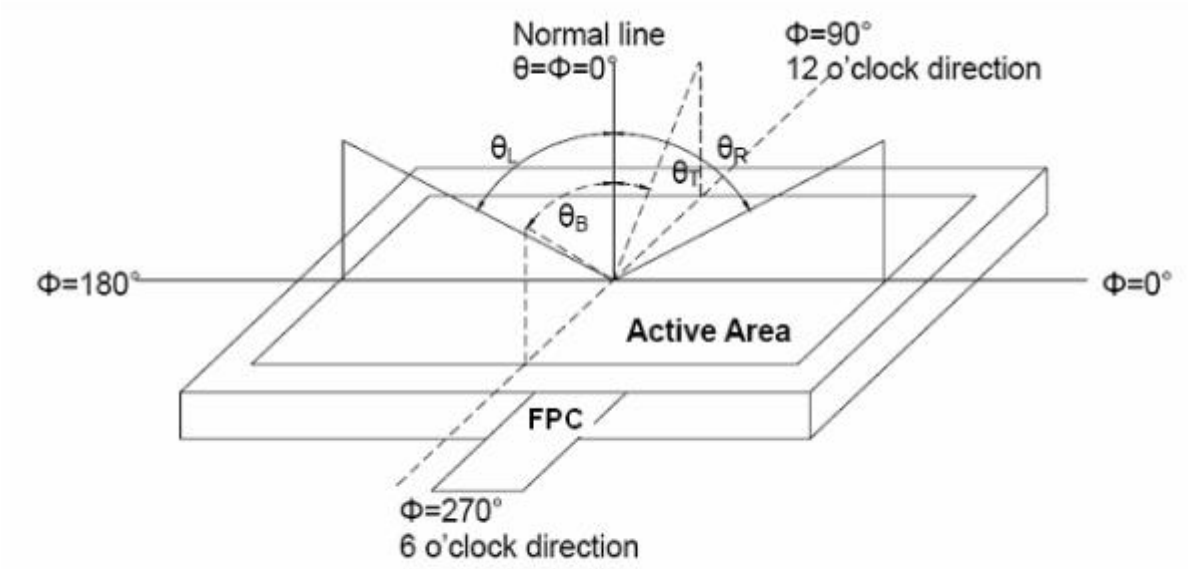


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

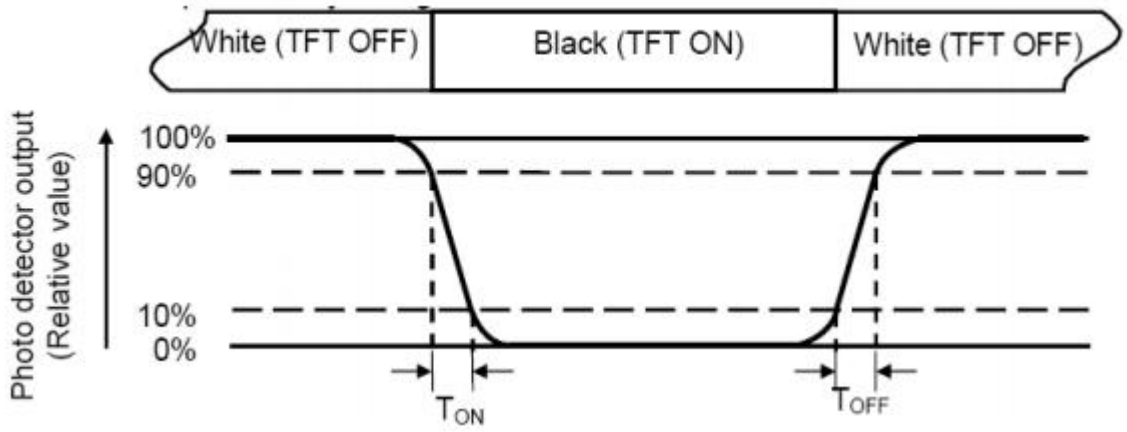
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

"White state ":The state is that the LCD should driven by Vwhite.

"Black state": The state is that the LCD should driven by Vblack.

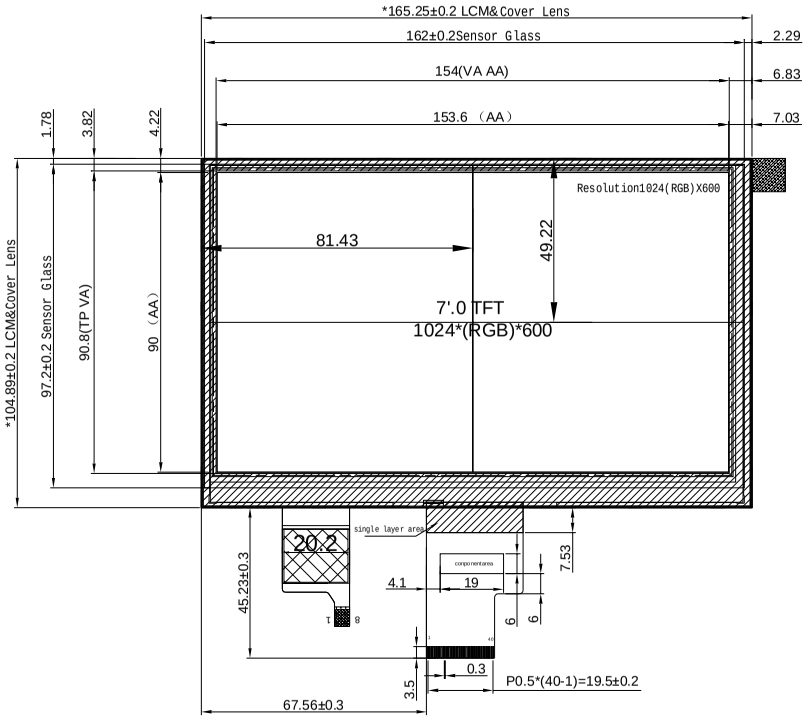
Vwhite: To be determined Vblack: To be determined.

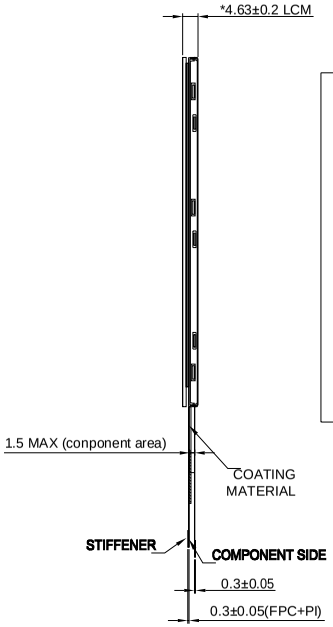
Note 4: Definition of Response time
The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.

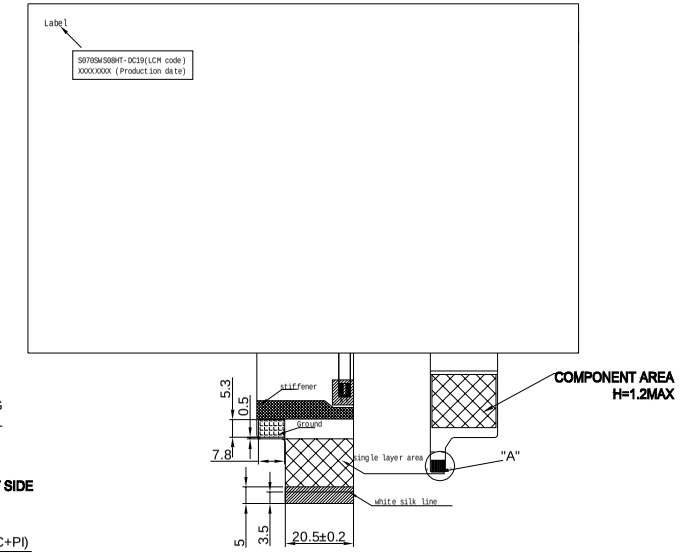


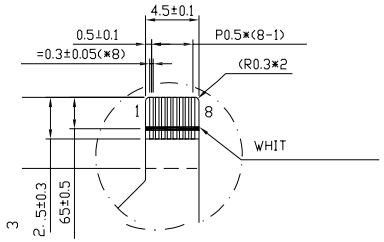
Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.
Note 6: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity(U) = Lmin/ Lmax x100%
L-------Active area length W----- Active area width





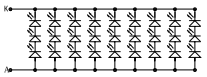




DETAIL"A"

PIN	NAME
1	VCOM
2	VDD
3	VDD
4	NC
5	RESET
6	STBYB
7	GND
8	RXIN0-
9	RXIN0+
10	GND
11	RXIN1-
12	RXIN1+
13	GND
14	RXIN2-
15	RXIN2+
16	GND
17	RXCLKIN-
18	RXCLKIN+
19	GND
20	RXIN3-
21	RXIN3+
22	GND
23	NC
24	NC
25	GND
26	NC
27	DIMO
28	SELB
29	AVDD
30	GND
31	LED-
32	LED-
33	L/R
34	U/D
35	VGL
36	CABCEN1
37	CABCEN0
38	VGH
39	LED+
40	LED+

Pin	Pin Name
1	GND
2	VDD
3	SDA
4	SCL
5	/RST
6	INT
7	TEST
8	VSS



27LEDs

Backlight Circuit diagram

LCM NOTES:
1. DISPLAY TYPE: 7.0 INCH TFT /TRANSMISSIVE
2. BACKLIGHT: 27 CHIP WHITE LED, 3S9P
   IF =9.6±0.6V;IV =180mA
3. OPERATING TEMP: -20°C~+70°C
4. STORAGE TEMP: -30°c~+80°c
7. Capacitive Touch Panel IC:FT5306DE4(COF)
   (Channels 20*12).Support touch: 5 points;
6.Luminance:380cd/m2(TYP)
7. "( )"reference dimension."*"critical dimension
8. RoHS Compliant

REV.	DATE	MODIFICATION
4.0	2016.09.13	Update P/N
3.0	2016.08.03	更新背光LED及测试条件为：27LEDpcs/180MA
2.0	2015/12/11	Update format
1.0	2014/12/04	First issue

INTERFACE	RGB Interface / FPC Connector (FH12-40S-0.5SH)
VIEWING DIRECTION	12 O'clock
Gray DIRECTION	6 O'clock

NODKA INDUSTRIAL CO.,LTD.

File NO: ND-070PCAP	PART NO. ND-070PCAP
DWN Li Huang 2016.09.13	REV. 4.0 / SHEET OF 1/1
CHKD Li Huang 2016.09.13	TOLERANCE UNLESS SPECIFIED ±0.2
PROJECTION 3rd ANGLE	UNIT mm / SCALE 1:1

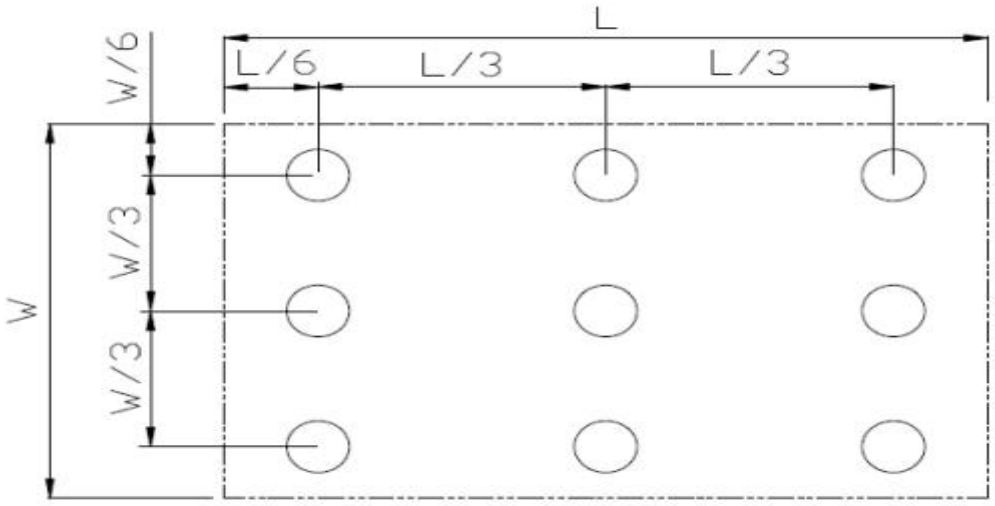


Fig. 2 Definition of uniformity

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.

8.Reliability Tests

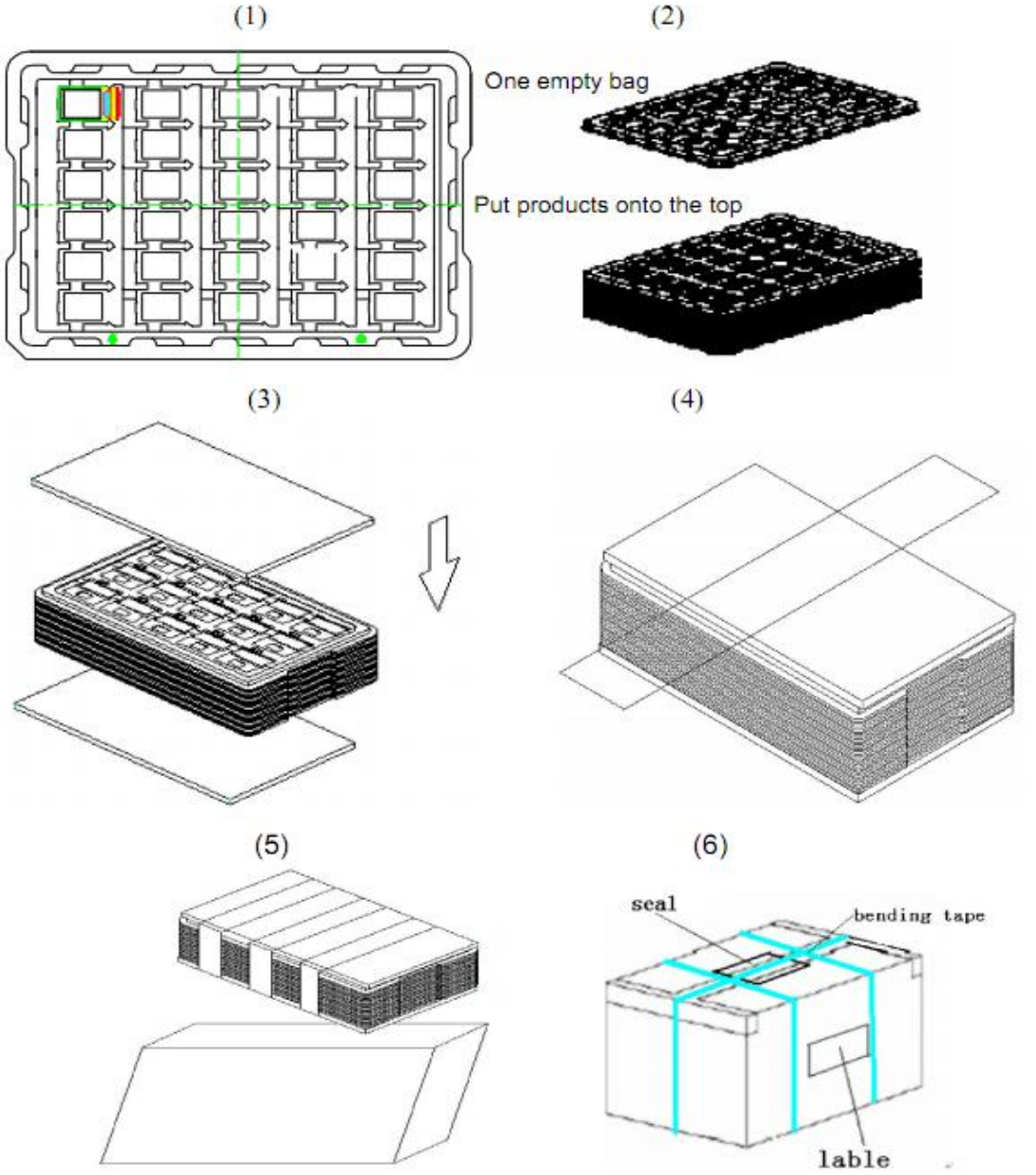
No	Test Item	Condition	Remarks
1	High Temperature Operation	+70℃, 96hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	-20℃, 96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	+80℃, 120hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	-30℃, 120hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	+40℃, 90% RH max, 120 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30℃ 30 min ~ +70℃ 30 min Change time: 5min, 100 Cycle	Start with cold temperature,end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Static Discharge (Operation)	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 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, ± X, ±Y , ± Z 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

Note: The sample size for each test 5pcs.

9 Mechanical Drawing

10 Packing

Packing Method



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
- Ketone
- 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.

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