MODEL NO.   :   TM050RVHG01-00

ISSUED DATE: 2013-11-22

VERSION   :   Ver 1.0

■**Preliminary Specification**
□**Final Product Specification**

Customer :_____

Approved by	Notes

SHANGHAI TIANMA Confirmed :

Prepared by	Checked by	Approved by
蒋华 2013/11/22	丁俊良 2013/11/22	刘金权 2013/11/22

This technical specification is subjected to change without notice

Table of Contents

Record of Revision

Rev	Issued Date	Description	Editor
1.0	2013-11-22	Preliminary Specification release	Wallace.Jiang

1. General Specifications

Feature		Spec
Display Spec.	Size	5.0 inch
	Resolution	800(RGB)×480
	Interface	RGB 24 bits
		CTP:I2C
	Color Depth	16.7M
	Technology Type	a-Si
	Pixel Pitch (mm)	0.135x0.135
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	TM with Normally White
	Surface Treatment	CTP:6H
		Up Polarizer:Clear(3H)
	Viewing Direction	12 o'clock
	Gray Scale Inversion Direction	6 o'clock
	Active Area(mm)	LCD:108.00x64.80
		CTP:97.44(W) x 56.26(H)
	LCM (W x H x D) (mm)	123.26x80.06x4.75
	CTP Structure	Glass Lens－Glass Sensor
	CTP Touch Method	Bare finger
	Number of simultaneous touches	5 points
	Minimum Touch Area(mm)	Φ6
	Finger Touch Pitch(mm)	13
	Control IC	CTP:NT11002QG-48/A
		TFT LCD:HX8264-D+HX8664-B
	LED Numbers	15LEDs

Note 1: Viewing direction for best image quality is different from TFT definition, there is a 180 degree shift.
Note 2: Requirements on Environmental Protection: Q/S0002
Note 3: LCM weight tolerance: ± 5%

2. Input/Output Terminals
2.1 TFT LCD Pin Assignment

No	Symbol	I/O	Description	Comment
1	VLED-	P	Back light cathode	
2	VLED+	P	Back light anode	
3	GND	P	Ground	
4	VDD	P	Power supply	
5	R0	I	Data input	
6	R1	I	Data input	
7	R2	I	Data input	
8	R3	I	Data input	
9	R4	I	Data input	
10	R5	I	Data input	
11	R6	I	Data input	
12	R7	I	Data input	
13	G0	I	Data input	
14	G1	I	Data input	
15	G2	I	Data input	
16	G3	I	Data input	
17	G4	I	Data input	
18	G5	I	Data input	
19	G6	I	Data input	
20	G7	I	Data input	
21	B0	I	Data input	
22	B1	I	Data input	
23	B2	I	Data input	
24	B3	I	Data input	
25	B4	I	Data input	
26	B5	I	Data input	
27	B6	I	Data input	
28	B7	I	Data input	
29	GND	P	Ground	
30	CLKIN	I	Clock for input data. Data latched at falling edge of this signal.	
31	STBYB	I	Standby mode. STBYB="1": Normally operation. STBYB="0": Standby mode .Timing controller, source driver will turn off, all output are High-Z.	
32	HSD	I	Horizontal sync input.	
33	VSD	I	Vertical sync input	
34	DEN	I	Data input enable. Active high to enable the data input bus under "DE Mode ".	
35	NC	--	No connection	
36	GND	P	Ground	
37	XR	--	NC	
38	YD	--	NC	
39	XL	--	NC	
40	YU	--	NC	

Note：I--Input，O--Output，P--Power/Ground

Table 2.1 Input Terminal Pin Assignment

2.2 CTP Pin Assignment

Pin No.	Symbol	I/O	Description	Remark
1	GND	P	Ground	
2	RESET	I/O	Active Low	
3	VDD	P	Power	
4	INT	P	Active Low	
5	SCL	I/O	CLOCK	
6	SDA	I/O	Data I/O	
7	TP_SYNC	I/O	GPIO from LCD	
8	NC	-	No connection	
9	NC	-	No connection	
10	NC	-	No connection	

3 Absolute Maximum Ratings
3.1 Driving TFT LCD Panel

GND=0V,Ta=25℃

Item	Symbol	Min	Max	Unit	Remark
Supply Voltage	VDD	-0.5	5.0	V	
Back Light Forward Current	I_{LED}	--	25	mA	For each LED
Operating Temperature	T_{OPR}	-20	70	℃	
Storage Temperature	T_{STG}	-30	80	℃	

Note1: The parameter is for driver IC (gate driver, source driver) only.
Note2: Signals include R0~R5, G0~G5, B0~B5, DCLK, DISP, HSYNC, VSYNC, DE
Table 3.1 absolute maximum rating

4 Electrical Characteristics

4.1 Driving TFT LCD Panel

GND=0V, Ta=25℃

Item		Symbol	Min	Typ	Max	Unit	Remark
Supply Voltage		VDD	3.0	3.3	3.6	V	
Input Signal Voltage	Low Level	V_{IL}	0	--	0.3xVDD	V	
	High Level	V_{IH}	0.7xVDD	--	VDD	V	
Output Signal	Low Level	V_{OL}	--	--	GND+0.4	V	
	High Level	V_{OH}	VDD-0.4	--	--	V	

Voltage						
(Panel+LSI)	Black Mode (60Hz)		400		mW	
Power Consumption	Standby Mode		5		mW	

Note1: To test the current dissipation, use "all Black Pattern".

Table 4.1 LCD module electrical characteristics

4.2 Driving CTP

(T_A= 25℃,VDD=3.3V)

Item	Min	Typ	Max	Unit	Note
power supply voltage	2.7		3.6	V	
Power supply current		---	4.0	mA	One finger on sensor

Note1: All current measurement is average current.

4.3 Driving Backlight

Item	Symbol	Min	Typ	Max	Unit	Remark
Channel1	I_F	-	20	-	mA	Note 1
Forward Voltage	V_F	-	9.6V	-	V	
Backlight Power Consumption	W_{BL}	-	960	-	mW	
Life Time	-	10,000	20,000		Hrs	Note 3

Note 1: I_F is defined for one channel LED. There are total five LED channels in back light unit
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.
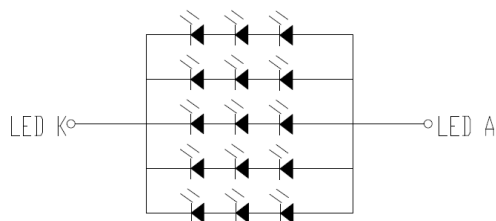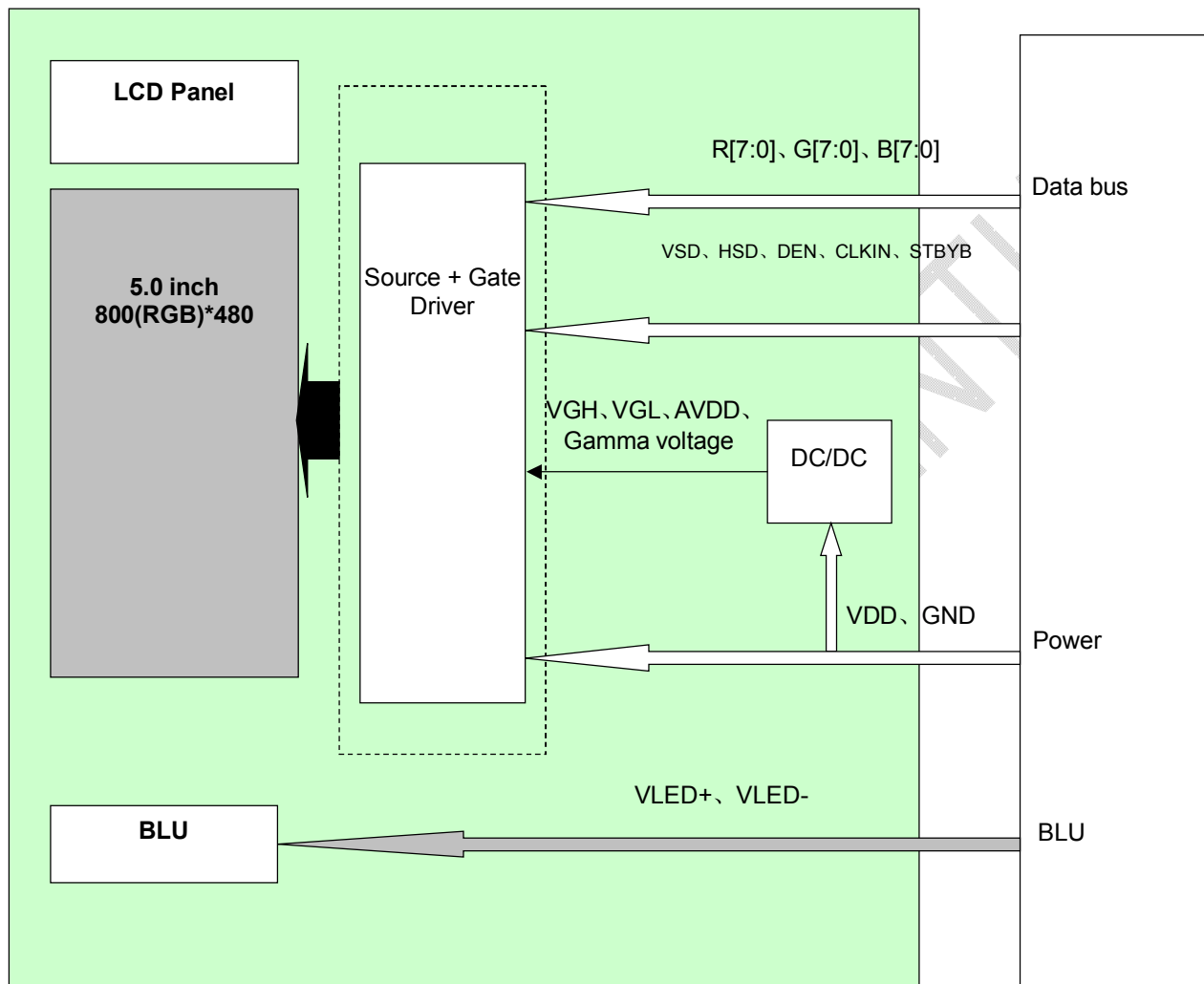
Table 4.2 LED backlight characteristics
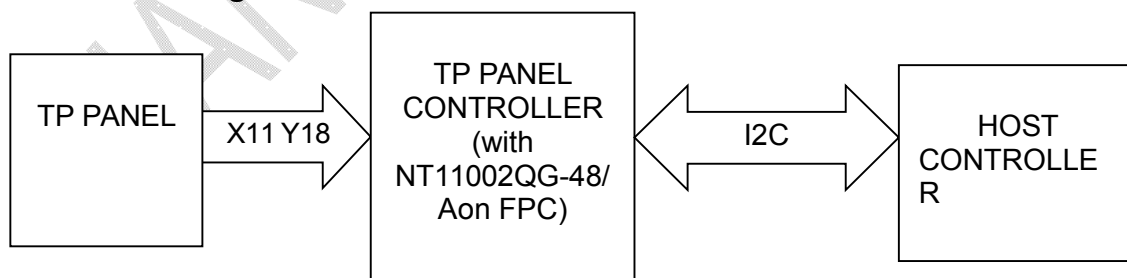

Figure 4.2 LED connection of backlight

4.4 Block Diagram

LCM Block Diagram

CTP Block Diagram

5. Interface timing
5.1 Input Setup Timing Setting

5.1.1 Input Setup Timing Parameter Setting

VDD=3.3V   Ta=25℃

Normal Write Mode

Parameter	Symbol	Min	Typ	Max	Unit	Remark
HSD Setup Time	T_{hst}	8			ns	
HSD Hold Time	T_{hhd}	8	-	-	ns	
VSD Setup Time	T_{vst}	8			ns	
VSD Hold Time	T_{vhd}	8	-	-	ns	
Data Setup Time	T_{dsu}	8			ns	
Data Hold Time	T_{dhd}	8	-	-	ns	
DE Setup Time	T_{esu}	8			ns	
DE Hold Time	T_{ehd}	8	-	-	ns	
CLKIN Cycle Time	T_{cph}	20	-	-	ns	
CLKIN Pulse Width	T_{cwh}	40	50	60	%	
Output stable time	Tsst	-	-	6	us	
VDD Power ON Slew rate	Tpor			20	ms	
RSTB pulse width	TRst	10	-	-	us	

Note 1：$t_r=t_f=2ns.t_r$, t_f is defined 10% to 90% of signal amplitude.
Note 2：For parallel interface, maximum clock frequency is 15MHz.

Table 5.1 Input Setup Timing Parameters Requirement
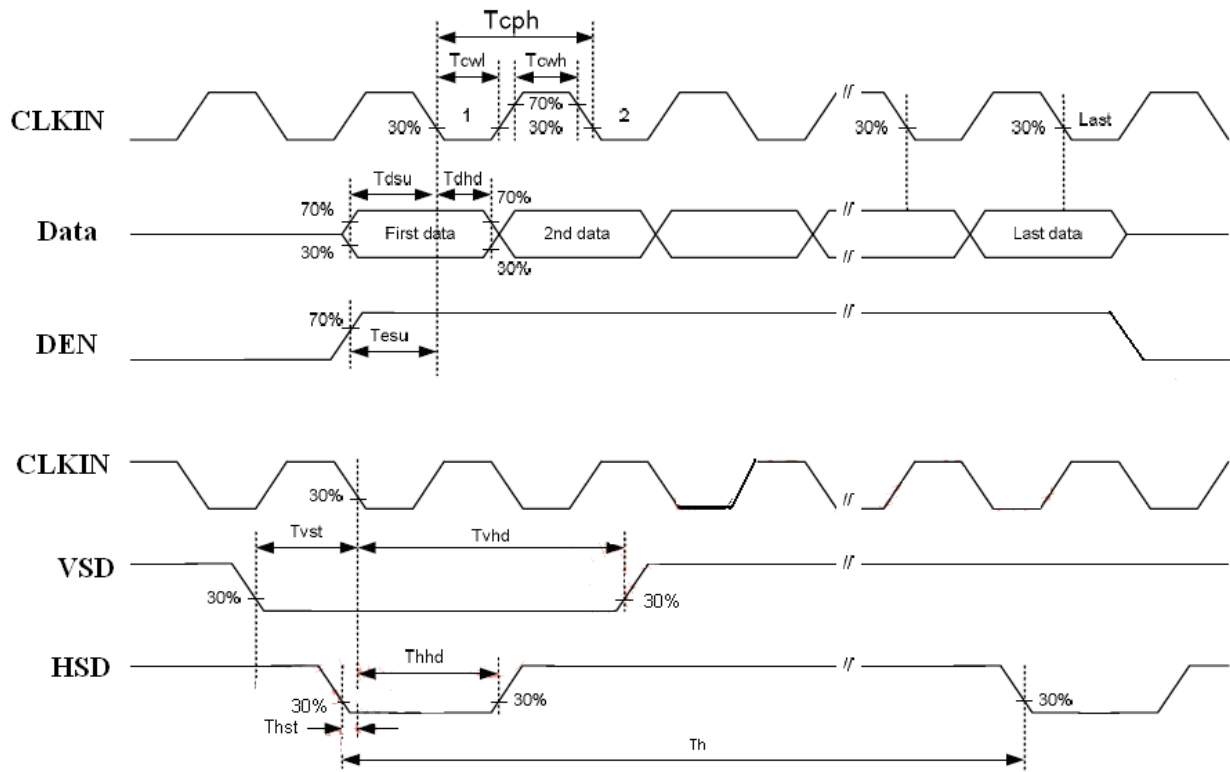
5.1.2 Input Setup Timing Diagram

Figure 5.1.2 Input Setup Timing Diagram

5.2 Data Input Format

5.2.1 Data Input Timing Parameter Setting

Parameter	Symbol	Spec			Unit
		Min	Typ	Max	
Horizontal display area	t_{hd}		800		CLKIN
CLKIN frequency (60Hz)	f_{clk}	-	30	50	MHZ
One Horizontal Line	t_h	889	928	1143	CLKIN
HSD pulse width	t_{hpw}	1	48	255	CLKIN
HSD blanking	t_{hb}		88		CLKIN
HSD front porch	t_{hfp}	1	40	255	CLKIN
Vertical display area	t_{vd}		480		T_H
VSD period time	t_v	513	525	767	T_H
VSD pulse width	t_{vpw}	3	3	255	T_H
VSD Blanking(tvb)	t_{vb}		32		T_H
VSD Front porch (tvfp)	t_{vfp}	1	13	255	T_H

Note 1：Unit: CLK=1/ f_{CLK} , H= t_h,

Note 2：It is necessary to keep $t_{vp}+t_{vb}=12$ and $t_{hp}+t_{hb}= 43$ in sync mode. DE mode is unnecessary to keep it.

Table 5.2.2 Data Input Timing Parameters Requirement

5.2.2 Data Input Timing Diagram
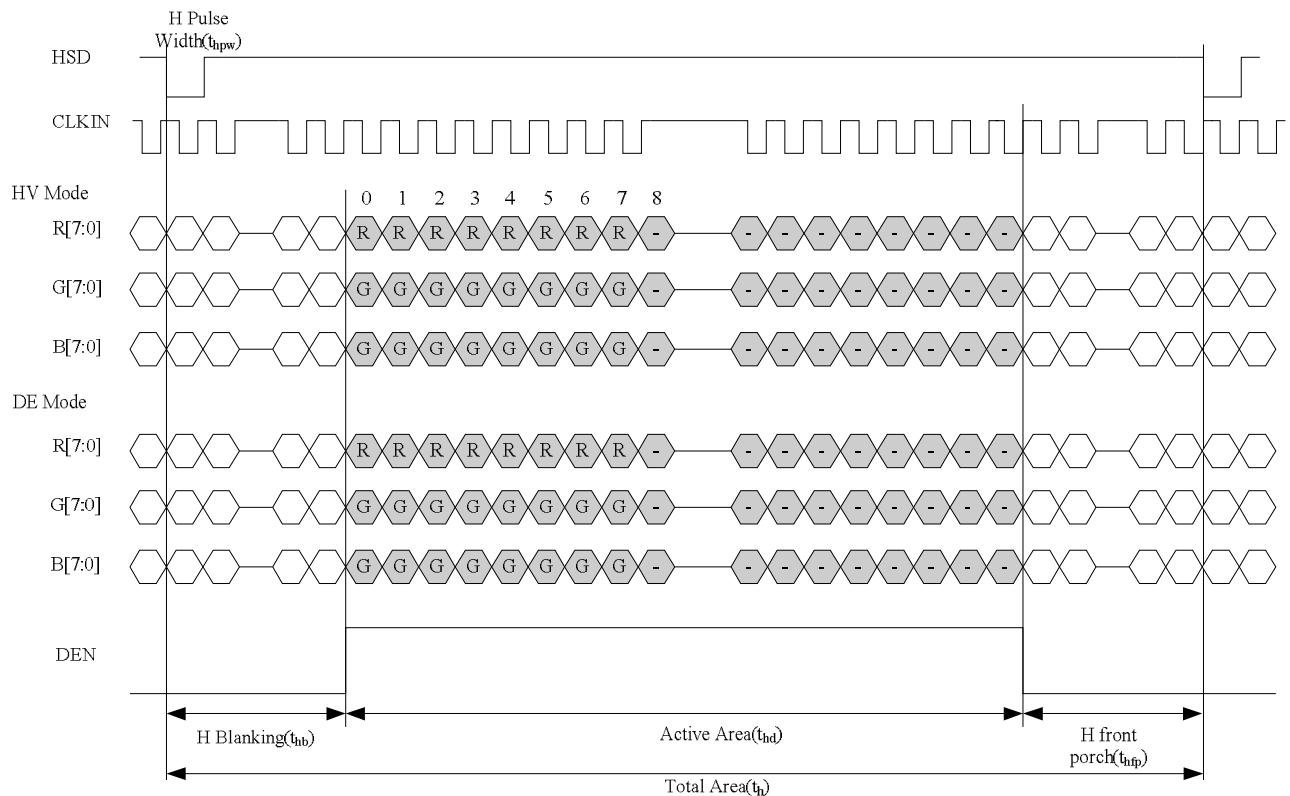## 5.2.2.1Horizontal Input Timing Diagram

Figure 5.2.2.1 Horizontal Input Timing Diagram
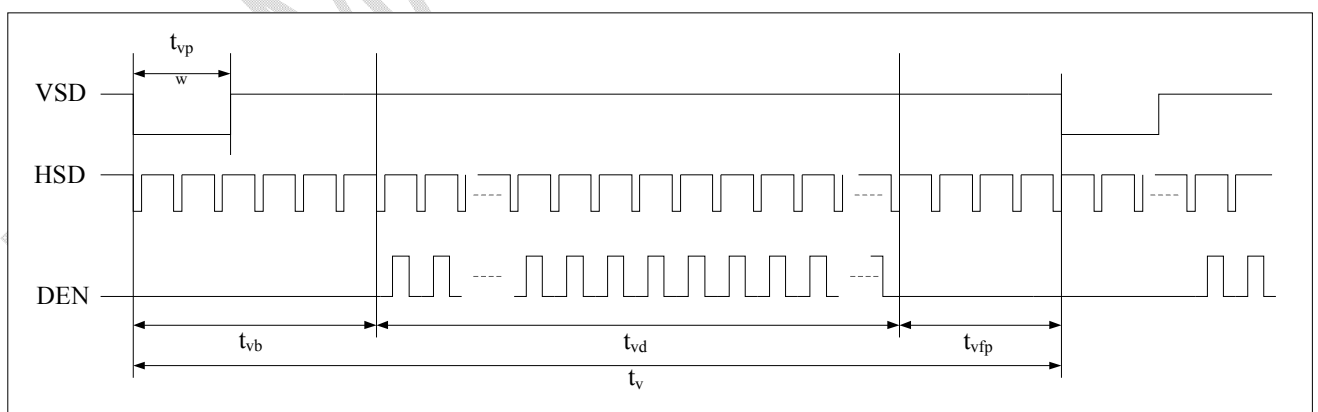
5.2.2.2 Vertical Input Timing Diagram

Figure 5.2.2.2 Vertical Input Timing Diagram
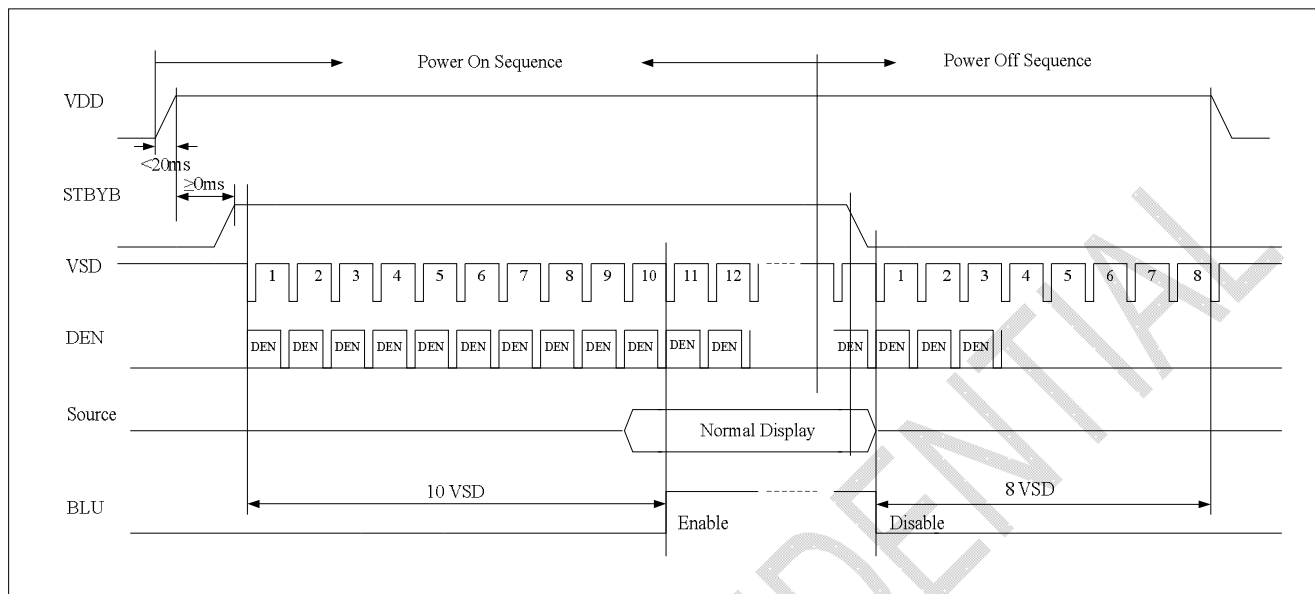
5.3 Power ON/OFF Sequence

Figure 5.3.1 Power on/OFF sequence
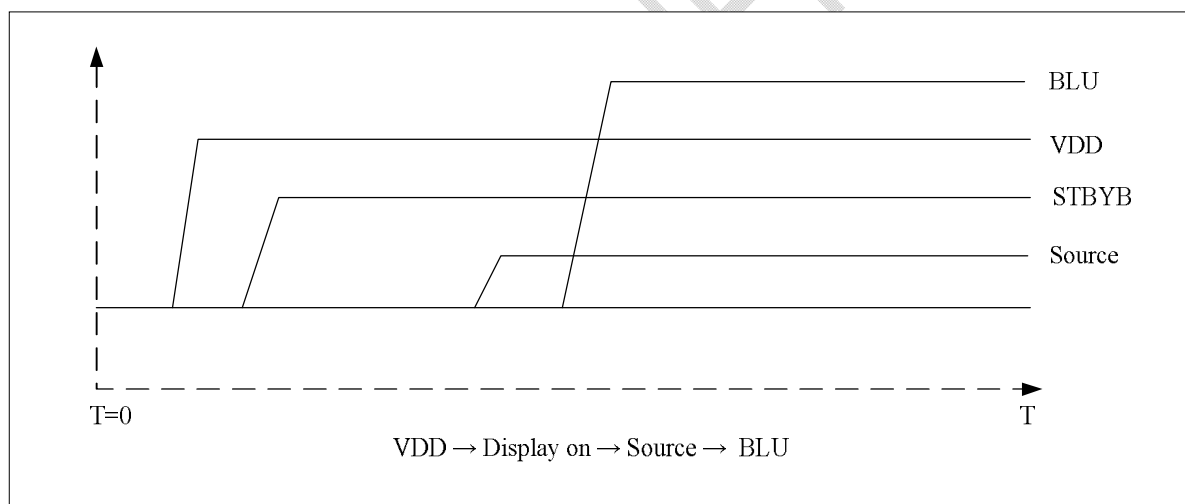
Figure 5.3.2 Power On sequence
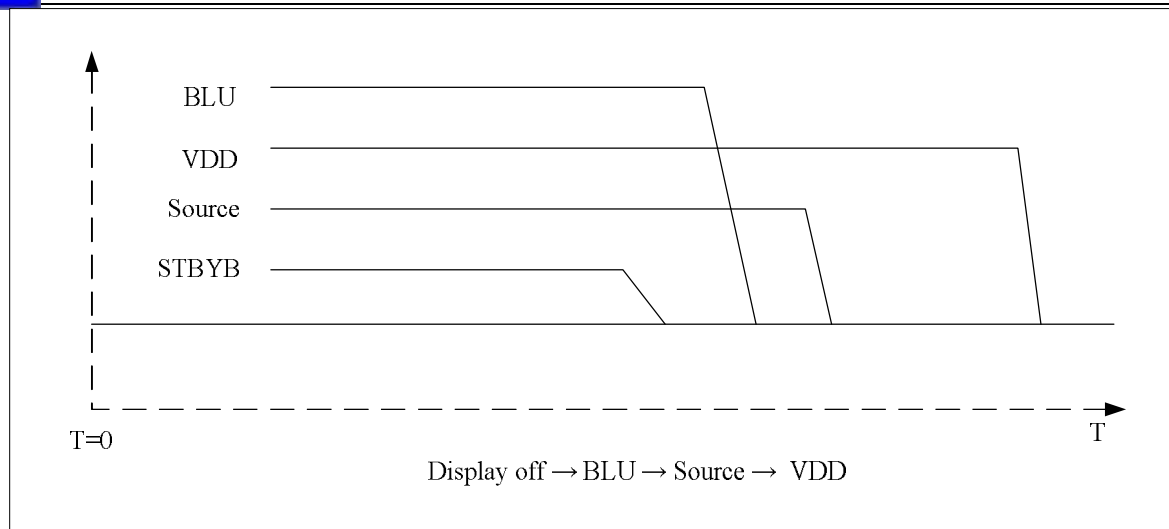
Figure 5.3.3 Power OFF sequence

5.4 CTP Timing
5.4.1 IIC Timing
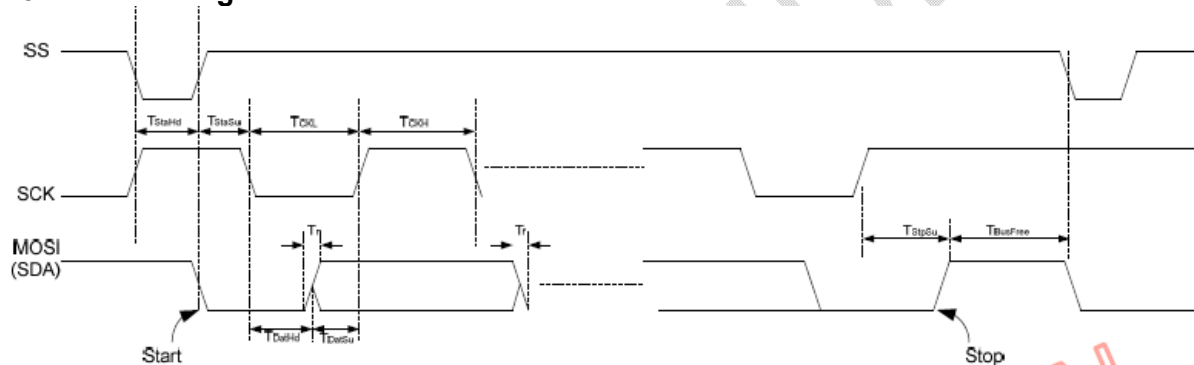
IIC Timing

The IIC Timing Table as follows.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Working Frequency	Fclk	0		400	KHz	
I2C Clock Low	TCKL	1250			ns	VDD =3.3V, TA=25 .
I2C Clock High	TCKH	1250			ns	VDD =3.3V, TA=25 .
I2C Data Rising Time	Tr			300	ns	VDD =3.3V, TA=25 .
I2C Data Falling Time	Tf			300	ns	VDD =3.3V, TA=25 .

I2C Data Hold Time	TDatHd	0			ns	VDD = 3.3V, TA=25 .
I2C Data Setup Time	TDatSu	100			ns	VDD = 3.3V, TA=25 .
I2C Start Condition Hold Time	TStaHd	600			ns	VDD = 3.3V, TA=25 . VDD =3.3V, TA=25℃.
I2C Start Condition Setup Time	TStaSu	600			ns	VDD = 3.3V, TA=25 .
I2C Stop Condition Setup Time	TStpSu	600			ns	VDD = 3.3V, TA=25 .
I2C Bus Free Time	TBusFree	1300			ns	VDD = 3.3V, TA=25 .

5.4.2 Register Definition

We reserve 42 bytes I2C buffer for recording gesture information and 4 bytes system control register for system designer to control touch panel appropriate for your requirement.

Address	I2C Buffer Definition						
00H	GID 1	GID 2	P1_D1	P1_D2	P1_D3	P1_D4	P2_D1	P2_D2
08H	P2_D3	P2_D4	P3_D1	P3_D2	P3_D3	P3_D4	P4_D1	P4_D2
10H	P4_D3	P4_D4	P5_D1	P5_D2	P5_D3	P5_D4	P6_D1	P6_D2
18H	P6_D3	P6_D4	P7_D1	P7_D2	P7_D3	P7_D4	P8_D1	P8_D2
20H	P8_D3	P8D4	P9_D1	P9_D2	P9_D3	P9_D4	P10_D1	P10_D2
28H	P10_D3	P10_D4	F/W Ver.	Pwr_Ctl_1	Pwr_Ctl_2	Read_Pnt	Reserve	Reserve

6. Optical Characteristics

| Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	40	50	--	Degree	Note 2
		θB		60	70	--		
		θL		60	70	--		
		θR		60	70	--		
Contrast Ratio		CR	θ=0°	400	600	--		Note1、Note3
Response Time		T_{ON}	25℃	--	20	30	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.260	0.310	0.360		Note5 Note1
		y		0.280	0.330	0.380		
	Red	x		0.540	0.590	0.640		
		y		0.300	0.350	0.400		
	Green	x		0.298	0.348	0.398		
		y		0.520	0.570	0.620		
	Blue	x		0.095	0.145	0.195		
		y		0.060	0.110	0.160		
Uniformity		U		75	80	--	%	Note1、Note6
NTSC				--	50	--	%	Note 5
Luminance		L		250	300	--	cd/m²	Note1、Note7

Test Conditions:
1. I_F= 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.
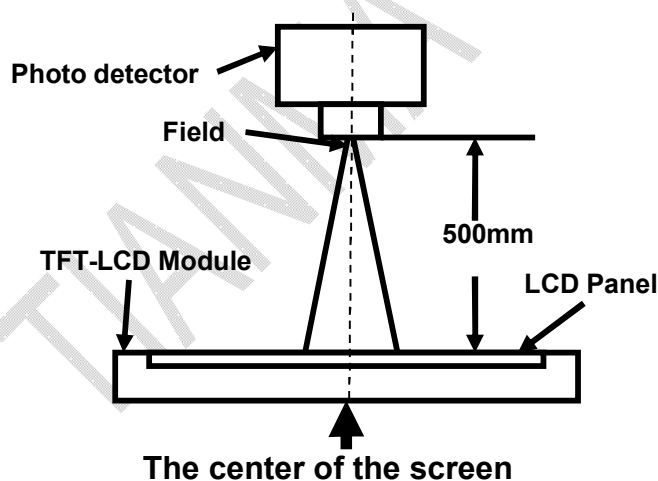
Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

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)。

SHANGHAI TIANMA MICRO-ELECTRONICS　　　　**TM050RVHG01-00**

Normal line
θ=Φ=0°

Φ=90°
12 o'clock direction

θ_L

θ_T

θ_R

Φ=180°

θ_B

Active Area

Φ=0°

FPC

Φ=270°
6 o'clock direction
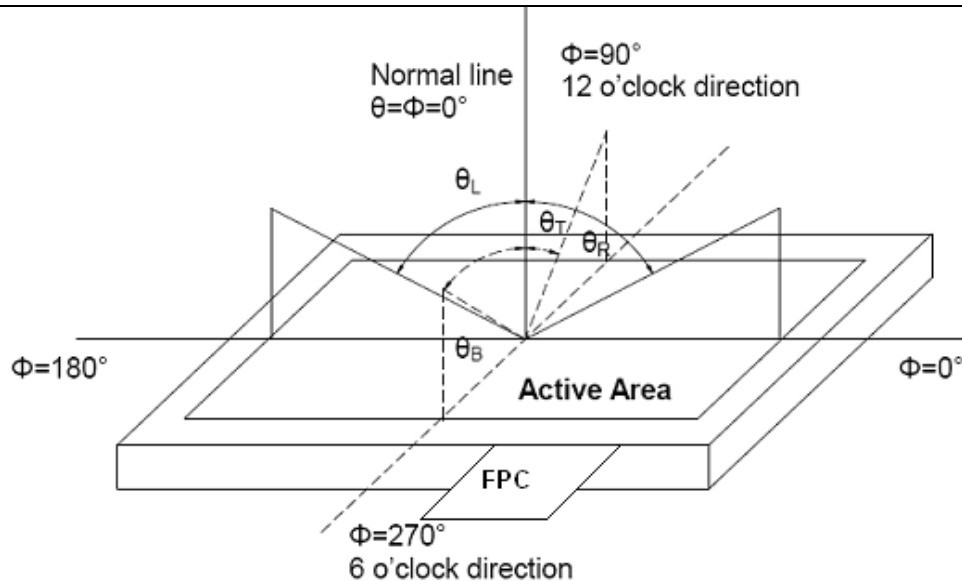
Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$
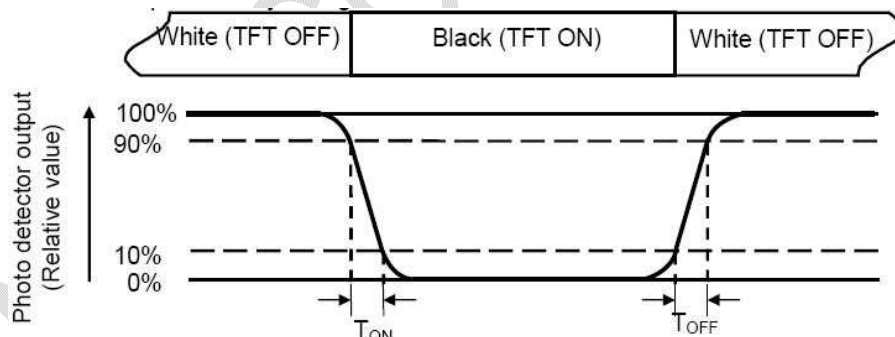
"White state ": The state is that the LCD should drive by Vwhite.
"Black state": The state is that the LCD should drive by Vblack.
Vwhite: To be determined   Vblack: To be determined.
Note 4: Definition of Response time
The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (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%.

White (TFT OFF)　　Black (TFT ON)　　White (TFT OFF)

Photo detector output (Relative value)

100%
90%

10%
0%

T_{ON}

T_{OFF}

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
　　L-------Active area length W----- Active area width
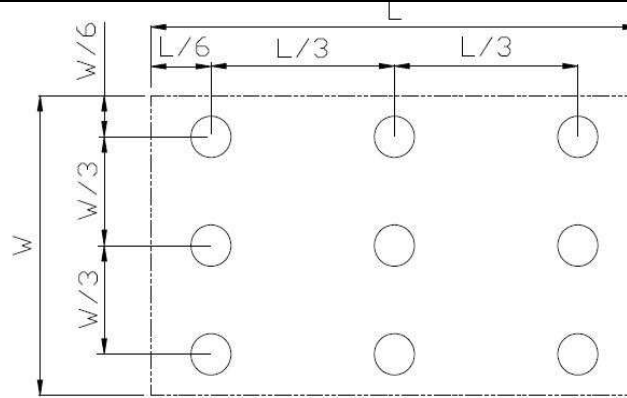
Lmax: The measured Maximum luminance of all measurement position.
Lmin: The measured Minimum luminance of all measurement position.
Note 7: Definition of Luminance:
Measure the luminance of white state at center point.

7. Environmental / Reliability Test

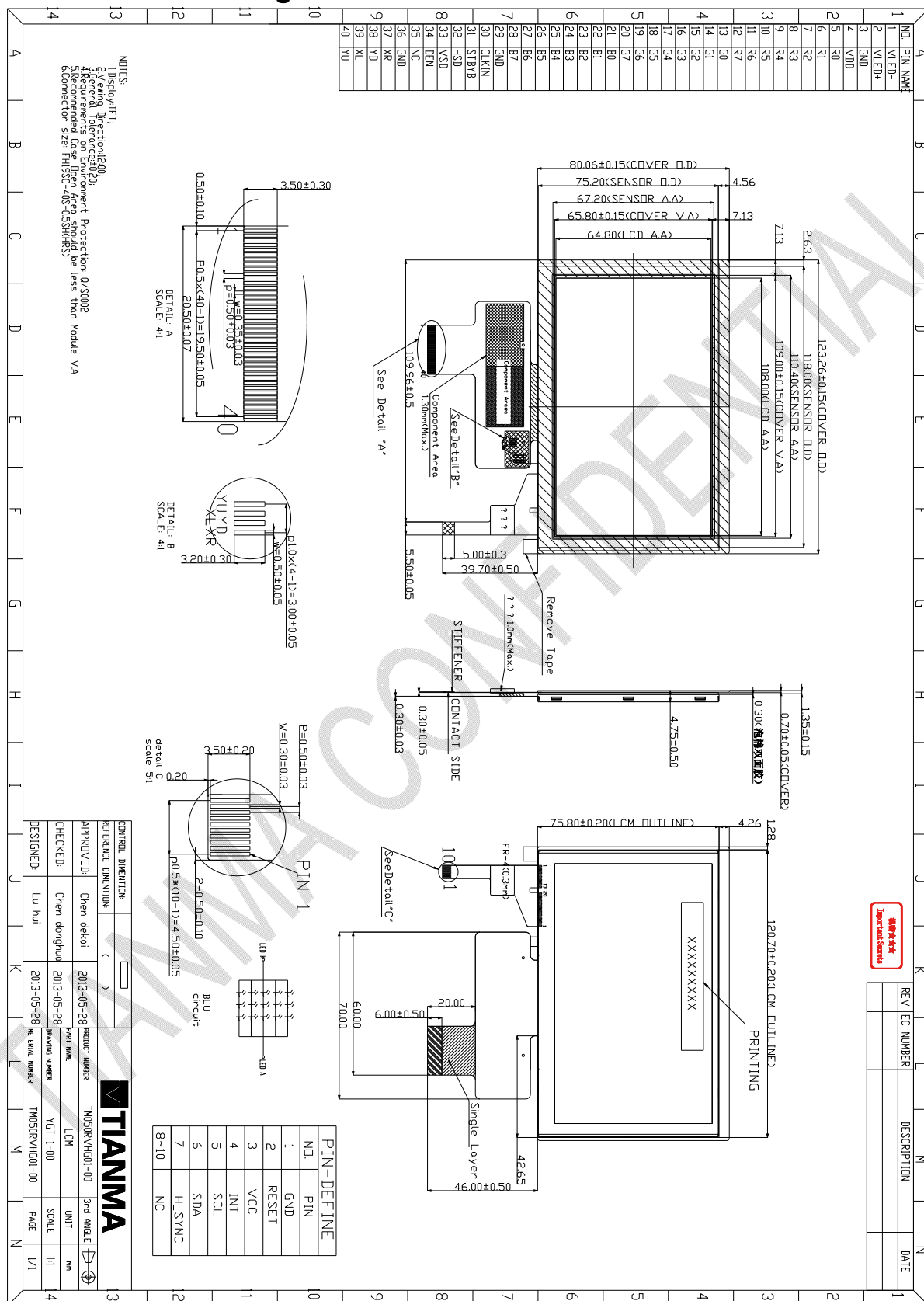| No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70℃, 240 hours	Note1 IEC60068-2-1,GB2423.2
2	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1 GB2423.1
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-2-1 GB2423.2
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-2-1 GB2423.1
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max,240hours	Note2 IEC60068-2-78 GB/T2423.3
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
7	ESD	C=150pF,R=330Ω,5point/panel Air:±8Kv,5times; Contact:±4Kv,5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-4-2 GB/T17626.2
8	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)	IEC60068-2-6 GB/T2423.10
9	Mechanical Shock (Non Op)	Half Sine Wave 60G 6ms, ±X,±Y,±Z 3times for each direction	IEC60068-2-27 GB/T2423.5
10	Package Drop Test	Height:60cm, 1corner,3edges,6surfaces	IEC60068-2-32 GB/T2423.8
11	Package Vibration Test	Random Vibration: 0.015G*G/Hz for 5-200Hz, -6dB/Octave from 200-500Hz 2 hours for each direction of X,Y,Z (6 hours for total)	IEC60068-2-34 GB/T2423.11

Note1:   Ts is the temperature of panel's surface.
Note2:   Ta is the ambient temperature of samples.

8. Mechanical Drawing

PIN-DEFINE

NO.	PIN
1	GND
2	RESET
3	VCC
4	INT
5	SCL
6	SDA
7	H-SYNC
8-10	NC

NOTES:
1.Display:TFT;
2.Viewing Direction:12:00;
3.General Tolerance:±0.2;
4.Requirements on Environment Protection: Q/S0002
5.Requirements on circuit.
5.Recommended Case Open Area should be less than Module V.A
6.Connector size: FH19SC-40S-0.5SH(HRS)

DETAIL: A SCALE: 4:1
DETAIL: B SCALE: 4:1
detail C scale 5:1

80.06±0.15(COVER O.D)
75.20(SENSOR O.D)
67.20(SENSOR A.A)
65.80±0.15(COVER V.A)
64.80(LCD A.A)
123.26±0.15(COVER O.D)
118.00(SENSOR O.D)
110.40(SENSOR A.A)
109.00±0.15(COVER V.A)
108.00(LCD A.A)

75.80±0.20(LCM OUTLINE)
120.70±0.20(LCM OUTLINE)

PIN 1

XXXXXXXXXX
PRINTING

CONTROL DIMENTION:			REV	EC NUMBER	DESCRIPTION	DATE
REFERENCE DIMENTION:						
APPROVED:	Chen dekai	2013-05-28				
CHECKED:	Chen donghua	2013-05-28	PRODUCT NUMBER TM050RVHG01-00			
DESIGNED:			PART NAME LCM			
	Lu hui	2013-05-28	PRODUCT NAME YGT 1-00	DRAWING NUMBER	MATERIAL NUMBER	
			DRAWING NUMBER TM050RVHG01-00	3rd ANGLE	UNIT mm	SCALE 1:1	PAGE 1/1

9.   Packing Drawing

9.1 Packaging Material

No	Item	Model(Material)	Dimensions (mm)	Unit Weigt (Kg)	Quantity	Remark
1	LCM	TM050RVHG01-00	123.26×80.06×4.75	TBD	108	
2	Tray	PET	485X330X13.8	0.172	21	
3	EPE	EPE	485×330×5	0.183	3	
4	Dust-Proof Bag	PE	700×545	0.046	1	
5	Box	CORRUGATED PAPER	520×345×74	0.3879	3	
6	Desiccant	Desiccant	45X35	0.002	6	
7	Carton	CORRUGATED PAPER	544x365x250	1.01	1	
8	Total weight	TBD±5% Kg				

Note: Packaging Specification and Quantity
Module quantity in a carton：*No. of PET trays 18× quantity per tray 6= 108 pcs*

9.2 Packing Instruaction

2 Desiccants
＋
Use empty tray
+
Put products into
the 6 trays
×6 LCMs per tray
A

Use strop bind the
trays
＋
EPE

36 LCMs per Box

3 Boxs

Dust-proof bag

Detail A
Tray 4
Tray 3
Tray 2
Tray 1

Rotate tray 180 degrees and place on
top of stack, Check the tray using Fig.A

Use the tape to seal
Carton

Put into Carton

3×6×6=108
LCMs per Carton

Use strop
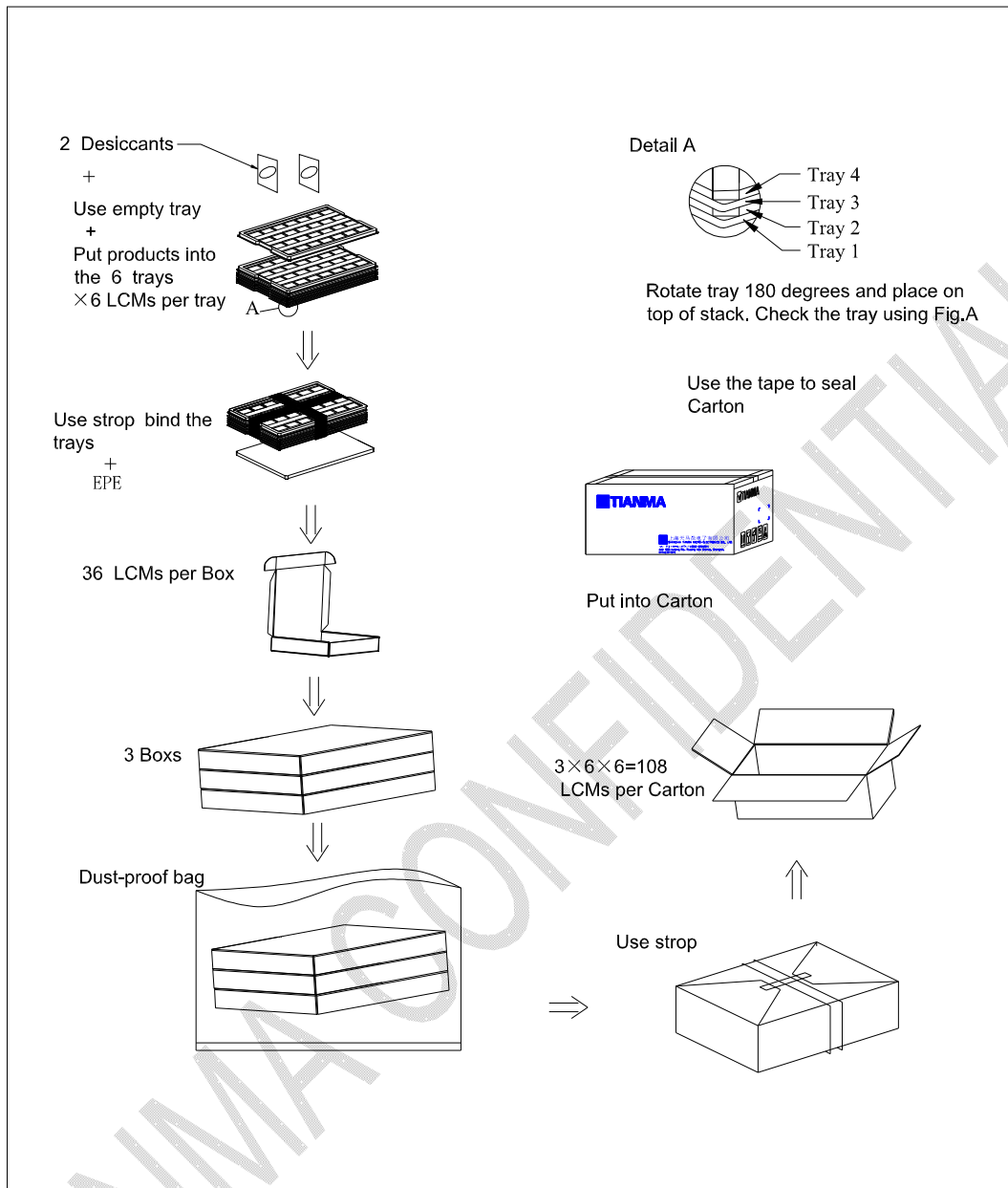
10. Precautions for Use of LCD Modules
10.1 Handling Precautions
    10.1.1   The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

    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

    10.3.1   The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.