SPECIFICATION

TFT LCD MODULE

MODEL NO:	TM043NVHG01
CUSTOMER:	
CUSTOMER P/N.	
VERSION	V0.1
CUSTOMER APPROVED	

■Preliminary specification
□Final specification

PREPARED BY	CHECKED BY	VERIFIED BY QA DEPT.	APPROVED BY

TIANMA MICRO-ELECTRONICS CO., LTD
Address: 8F，64th Building，Jinlong，Majialong Industrial Area, Nanshan District, Shenzhen, China Tel: +86-755-26094288 Fax: +86-755-86225774 Web: www.tianma.cn www.tianma.com

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

REVISION RECORD

Version	Page	Revision Items	Name	Date
0.1		First release	JIM	2013.03.21

Company confidential. Duplication or disclosure prohibited. All rights reserved

RoHS

Table of Contents

1. General Specifications 3
2. Input/Output Terminals 5
2.1 TFTLCD pin assignment 5
2.2 CTP pin assignment..... 6
3. Absolute Maximum Ratings..... 6
4. Electrical Characteristics..... 7
41 Driving TFT LCD..... 7
4.2 Driving CTP..... 7
4.3 Driving Backlight.... 8
5. Block diagram.....t 9
6. TFT Timing Chart 10
7. CTP Timing 16
8. Optical Characteristics 20
9. Reliability Test 23
10. Mechanical Drawing..... 25
11.Product Inspection Criteria 26
12.Precautions for Use of LCD Modules 31
13.Packing..... 33
14.Product part number system 34

Company confidential. Duplication or disclosure prohibited. All rights reserved

RoHS

1 General Specifications

TM043NVHG01 is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver IC, FPC, a back light unit and CTP (Capacitive Touch Panel) with Multi-Touch function. The mounting method is with tape bonding . This product accords with RoHS environmental criterion.

Item	Feature	Spec	Unit	Note
TFT LCD Module	Size	4.3	inch	
	LCD Resolution	480(RGB) x 272	--	
	Interface	TFT LCD : RGB 24 bits	--	
		CTP:I2C		
	Color Depth	16.7M	--	
	LCD Technology Type	a-Si TFT	--	
	Pixel Pitch	0.198x0.198	mm	
	Pixel Configuration	R.G.B. Vertical Stripe	--	
	LCD display Mode	TM with Normally White	--	
	Surface Treatment	CTP:6H hardness	--	
		LCD Up Polarizer:AG(3H)		
	Viewing Direction	6 o'clock	--	
	Gray Scale Inversion Direction	12 o'clock	--	
	Active Area	TFT LCD: 95.04(W)x53.86(H)	mm	
		CTP:97.44(W) x 56.26(H)	mm	
	LCM (W x H x D)	113.44x71.46x4.55	mm	
	Control IC	CTP: FT5306	--	
		TFT LCD:HX8257A	--	
	CTP Touch Method	Bare finger	--	
	Number of simultaneous touches	5 points	--	
	Minimum Touch Area	Φ6	mm	
	Finger Touch Pitch	13	mm	
	CTP Structure	Glass Lens - Glass Sensor	--	
	LED Numbers	10 LEDs	pcs	

Company confidential. Duplication or disclosure prohibited. All rights reserved

RoHS

	Weight	TBD	g	

2. Input/Output Terminals

2.1 TFT LCD Pin Assignment

Connector type: FH28-40S-0.5SH

No	Symbol	I/O	Description	Remark
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	DCLK	I	Clock for input data. Data latched at rising edge of this signal.	
31	DISP	I	Standby mode. DISP =“1”: Normally operation. DISP =“0”: Standby mode.	
32	HSYNC	I	Horizontal sync input with negative polarity. If unused, please pull high level.	
33	VSYNC	I	Vertical sync input with negative polarity. If unused, please pull high level.	
34	DE	I	Data input enable. If unused, please pull low level.	
35	NC	--	No connection	
36	GND	P	Ground.	
37	X_R	--	No connection	

Company confidential. Duplication or disclosure prohibited. All rights reserved

RoHS

38	Y_B	--	No connection	
39	X_L	--	No connection	
40	Y_T	--	No connection	

Note1: I/O definition.
I---Input, O---Output, P--- Power/Ground, N--- No connection

2.2 CTP Pin Assignment

Connector type: FH28-10S-0.5SH

Pin No.	Symbol	I/O	Description	Remark
1~5	GND	P	Groud	
6	VCC	P	CTP power supply	
7	INT	O	External interrupt to the host	
8	WAKEUP	I	External interrupt from the host	
9	SCL	I/O	I2C clock input	
10	SDA	I/O	I2C data input and output	

Note: I/O definition.
I---Input, O---Output, P--- Power/Ground, N--- No connection

3. Absolute Maximum Ratings

Ta = 25℃

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VDD(LCD)	-0.3	4	V	
	VCC(CTP)	-0.3	3.6	V	
	VLED+ (backlight)	0	18	V	VLED- =0V
Operating Temperature	TOPR	-20	70	℃	
Storage Temperature	TSTG	-30	80	℃	Note1

Table 3.1 absolute maximum rating

Note1: 80℃ is the surface temperature of module

Company confidential. Duplication or disclosure prohibited. All rights reserved

RoHS

Electrical Characteristics

4.1 .1 Driving TFT LCD

Ta = 25℃

Item		Symbol	Min	Typ	Max	Unit	Remark
Voltage for logic circuit		VDD	3.00	3.30	3.60	V	
Power supply current		IDD		13	20	mA	
Input Signal Voltage	Low Level	VIL	0	-	0.3xVDD	V	R0~R7, G0~G7, B0~B7, DCLK, DISP, HSYNC, VSYNC, DE
	High Level	VIH	0.7xVDD	-	VDD	V	

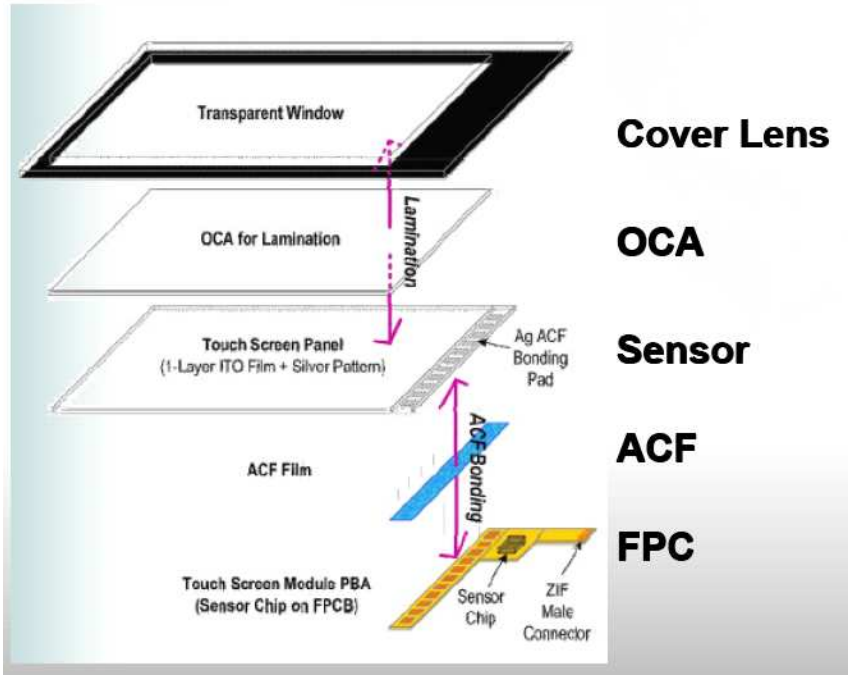
Table 4.1 LCD module electrical characteristics

Note: To test the current dissipation, use “all Black Pattern”.

4.1 .2 Driving CTP

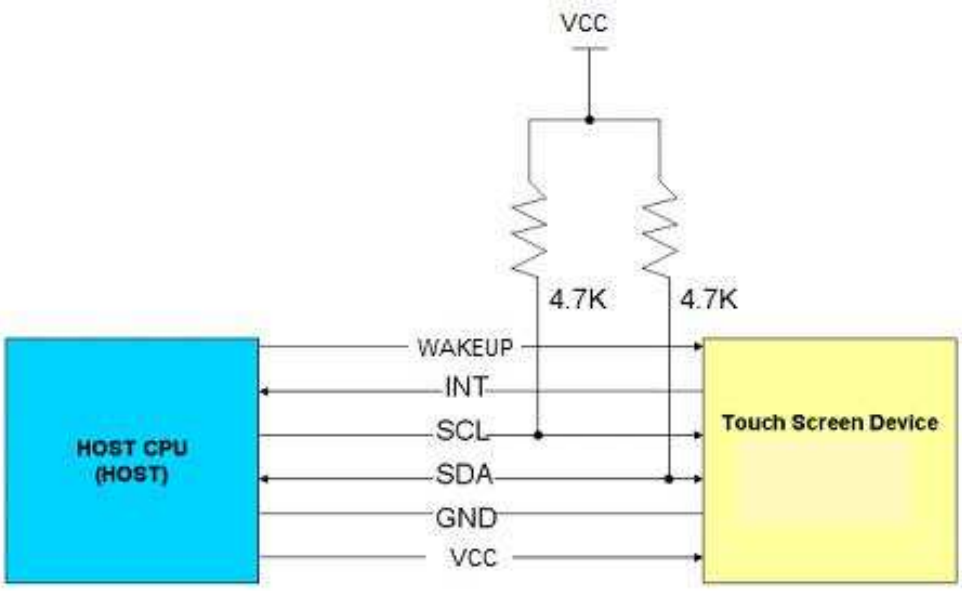
Ta = 25℃

Item		Min	Typ	Max	Unit	Note
power supply voltage		2.8	3.3	3.6	V	DC(noise should be under 100mV)
Power supply current		--	6	10	mA	
Input Signal Voltage	Low Level	0	-	0.3xVCC	V	INT,WAKEUP,SCL,SDA
	High Level	0.7xVCC	-	VCC	V	



Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

Structure of touch lens



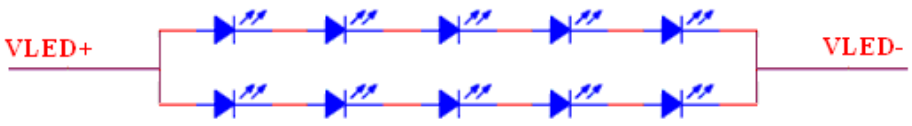
Interface application

4.1.3 Driving Backlight

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Forward Voltage	VLED	I_F=20mA	15	16	18	V	Note 1
Forward Current	I_F	-	-	20	25	mA	
Backlight Power Consumption	WBL	I_F=20mA	--	640	900	mW	
Life Time	-	I_F=20mA	10,000	-	-	Hrs	Note 3

Table 4.1.3 LED backlight characteristics

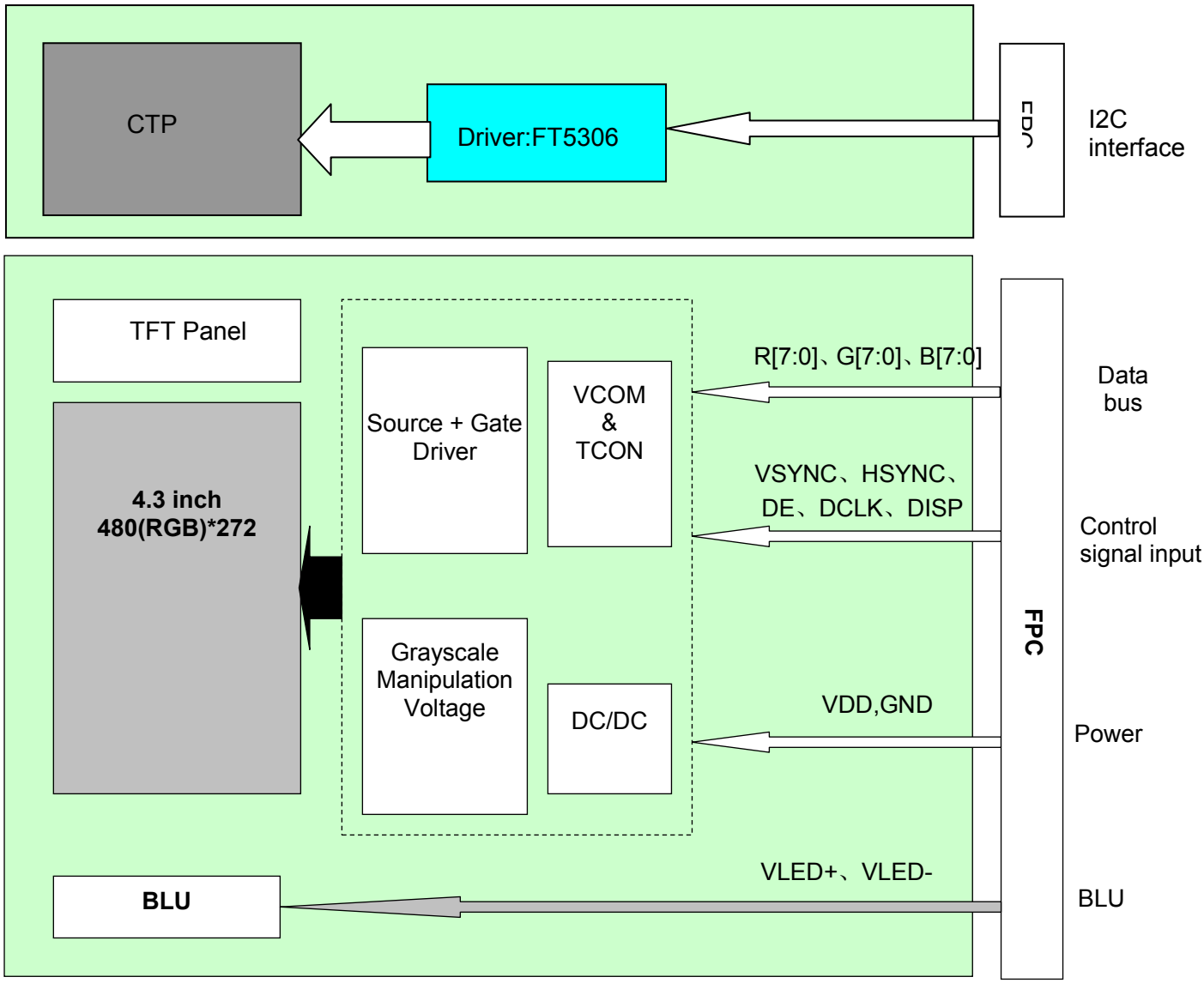
Note 1: I_F is defined for one channel LED. There are total three LED channels in back light unit.Under LCM operating, the stable forward current should be inputted.
Note 2: Optical performance should be evaluated at Ta=25℃ only.
Note 3: If LED is driven by high current, high ambient temperature & humidity 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.



LED connection of backlight

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

5 .Block Diagram



Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

6.TFT LCDTiming Chart

6.1 TFT LCD input timing

6.1.1 Input Setup Timing Parameter Setting

VDD=3.3V Ta=25℃

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK Cycle Time	T_{pw}	66.7	-	-	ns	
DCLK Pulse High Width	T_{pwh}	26.7	-	-	ns	
DCLK Pulse Low Width	T_{pwl}	26.7	-	-	ns	
DE Setup Time	T_{des}	10	-	-	ns	
DE Hold Time	T_{deh}	10	-	-	ns	
HSYNC Setup Time	T_{hs}	10	-	-	ns	
HSYNC Hold Time	T_{hh}	10	-	-	ns	
VSYNC Setup Time	T_{vhs}	10	-	-	ns	
VSYNC Hold Time	T_{vhh}	10	-	-	ns	
Data Setup Time	T_{ds}	10	-	-	ns	
Data Hold Time	T_{dh}	10	-	-	ns	
DISP Setup Time	T_{diss}	10	-	-	us	
DISP Hold Time	T_{dish}	10	-	-	ms	

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 6.1.1 Input Setup Timing Parameters Requirement

6.1.2 Input Setup Timing Diagram

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

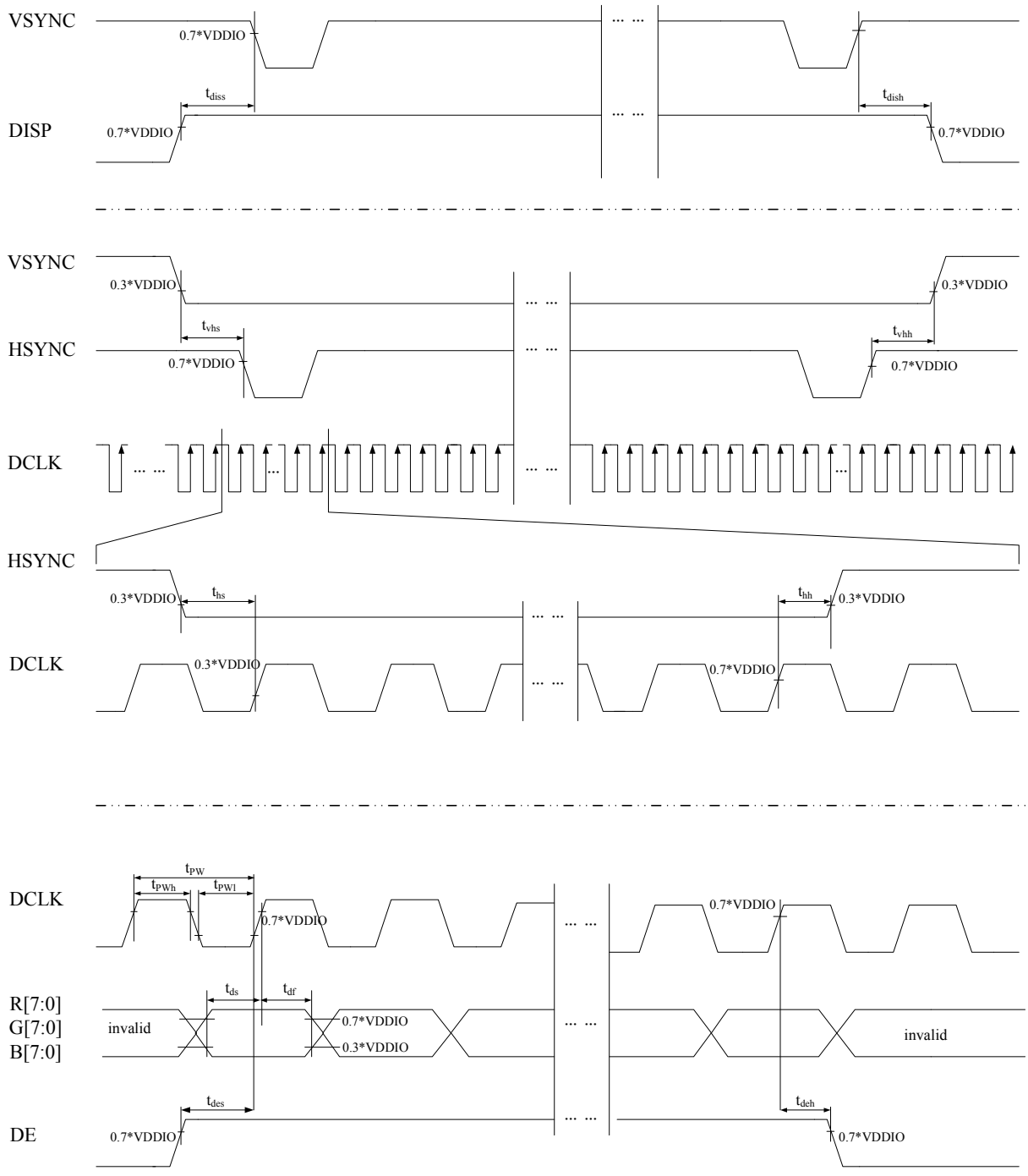


Figure 6.1.2 Input Setup Timing Diagram

6.1.3 Data Input Timing Parameter Setting

Parameter	Symbol	Min	Typ	Max	Unit	Remark

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

DCLK frequency	f_{clk}	--	9	15	MHZ	
HSYNC frequency	$1/t_h$	--	17.14	--	KHz	
VSYNC frequency	$1/t_v$	--	59.94	--	Hz	
Horizontal cycle	t_h		525	605	DCLK	
Horizontal display period	t_{hd}		480		DCLK	
Horizontal pulse width	t_{hp}	2	41	41	DCLK	
Horizontal back porch	t_{hb}	2	2	41	DCLK	
Horizontal front porch	t_{hf}	2	2	82	DCLK	
Vertical cycle	t_v	285	286	399	HSYNC	
Vertical display period	t_{vd}		272		HSYNC	
Vertical pulse width	t_{vp}	1	10	11	HSYNC	
Vertical back porch	t_{vb}	1	2	11	HSYNC	
Vertical front porch	t_{vf}	1	2	227	HSYNC	

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 6.1.3 Data Input Timing Parameters Requirement

6.2 Data Input Timing Diagram

6.2.1 Data Input Timing Diagram under SYNC Mode

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

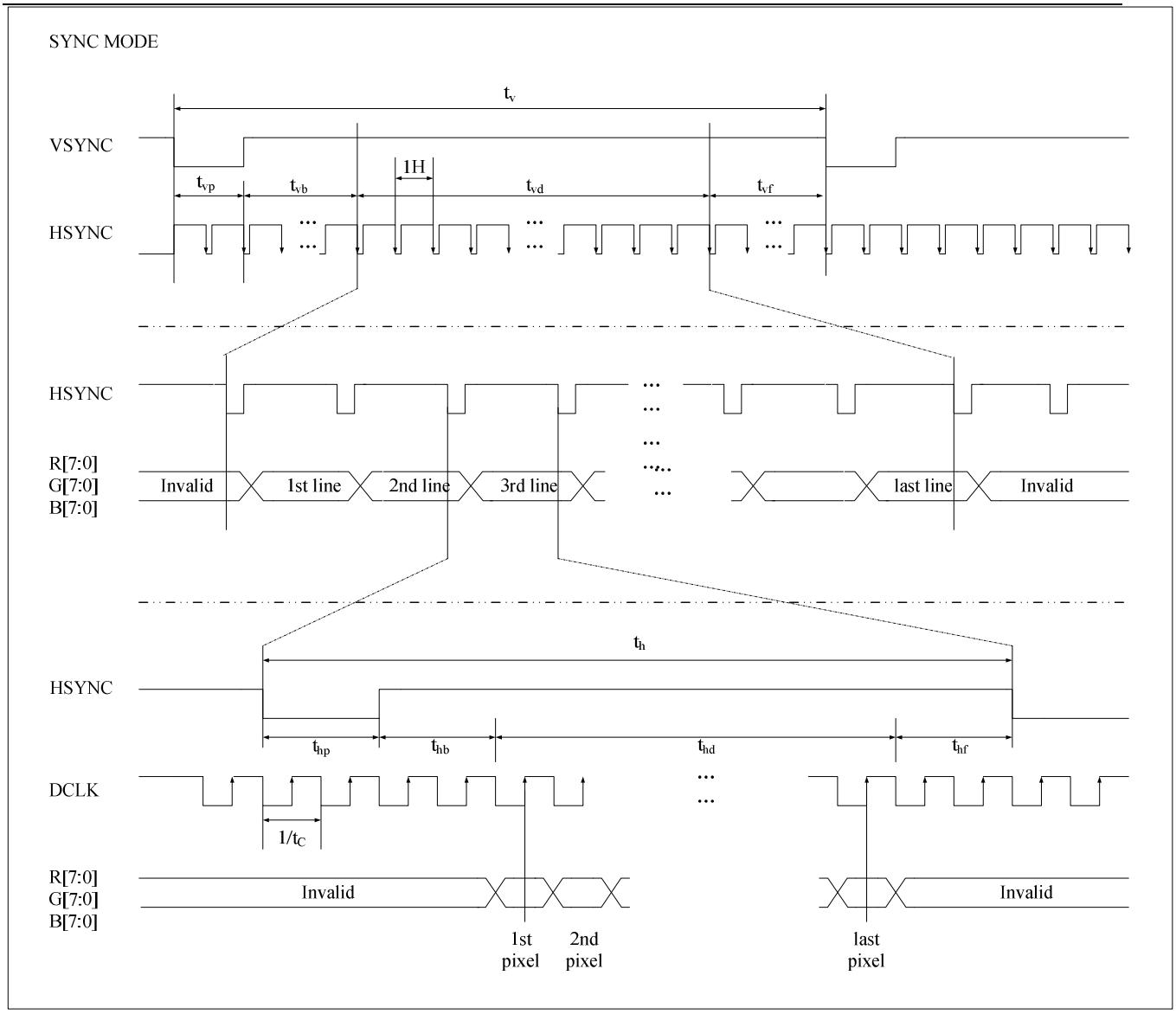


Figure 6.2.1 Data Input Timing Diagram Under SYNC Mode(DE="L")

6.2.2 Data Input Timing Diagram under DE Mode

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

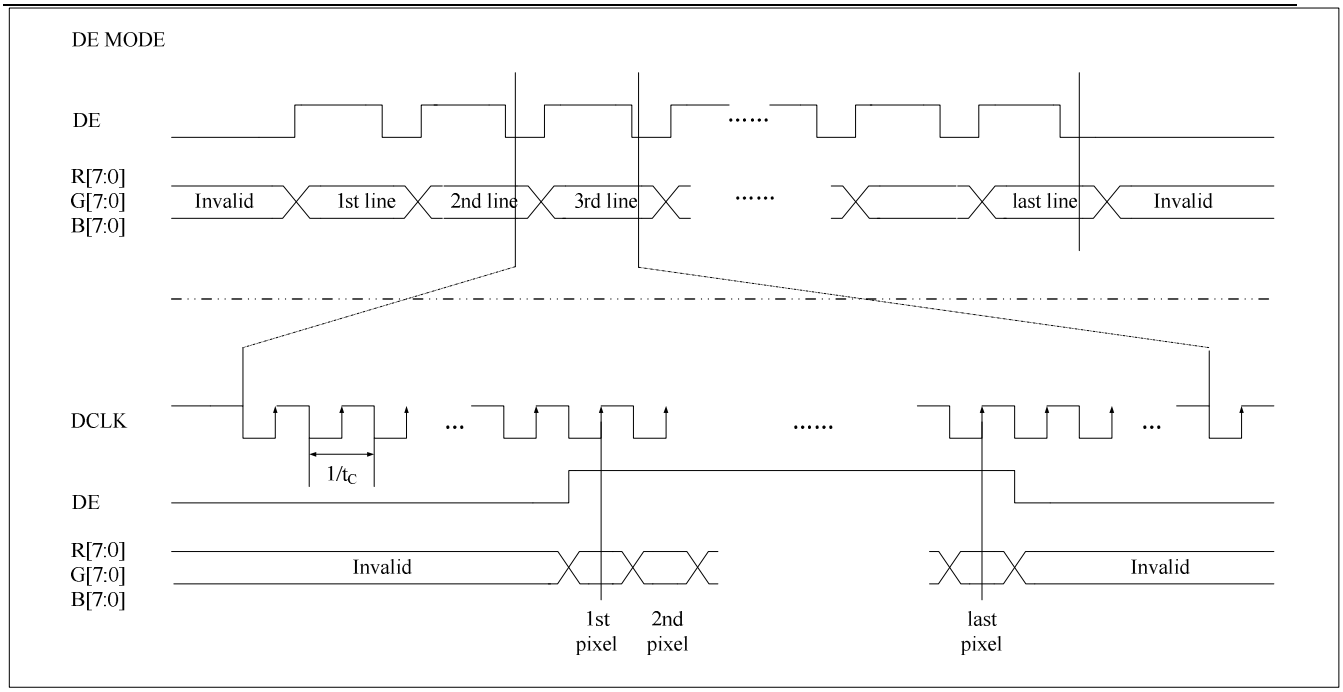


Figure 6.2.2 Data Input Timing Diagram Under DE Mode(VSYNC/HSYNC="H")

6.3 Power ON/OFF Sequence

6.3.1 Power ON Sequence

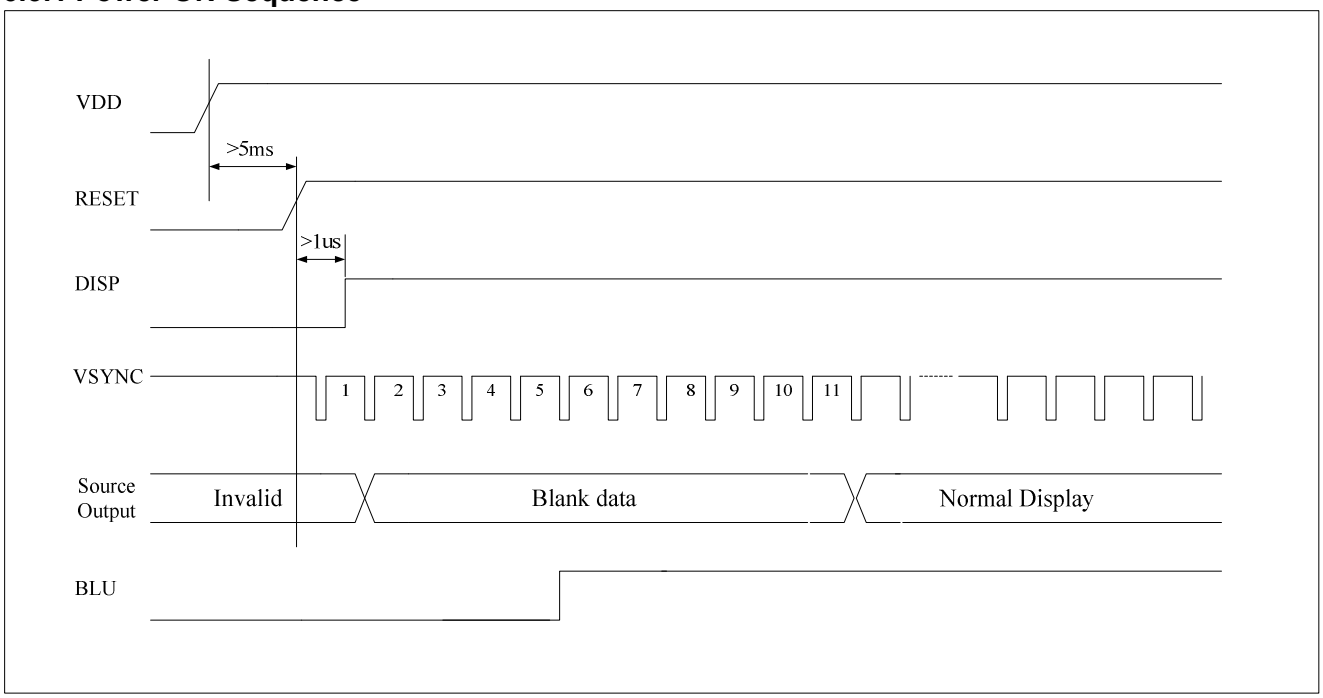


Figure 6.3.1 Power on sequence

6.3.2 Power OFF Sequence

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

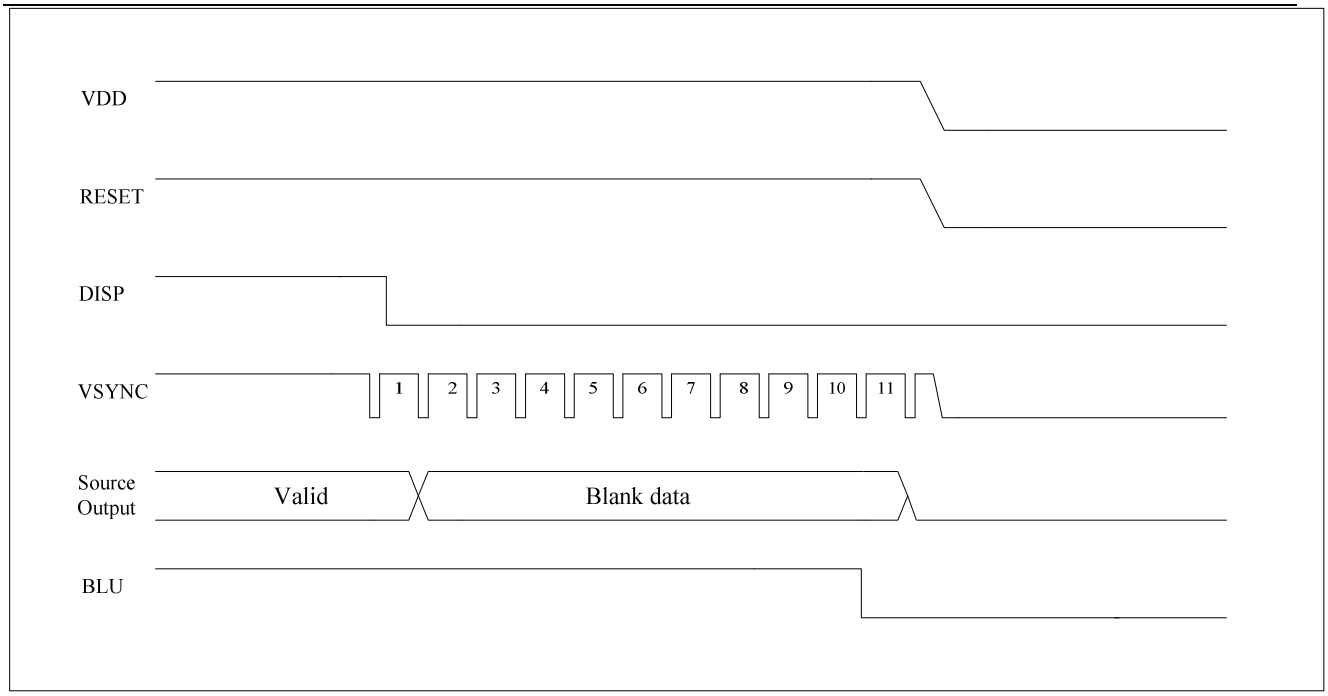


Figure 6.3.2 Power off sequence

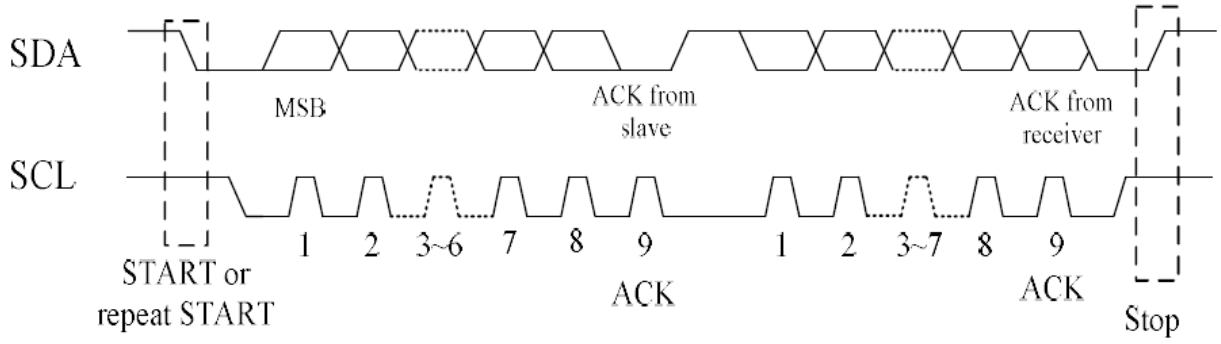
7. CTP Timing

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

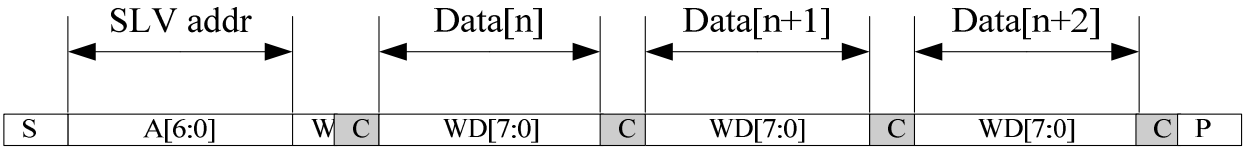
7.1 I2C interface

FT5306iGMJ supports the I2C interfaces, which can be used by a host processor or other devices.

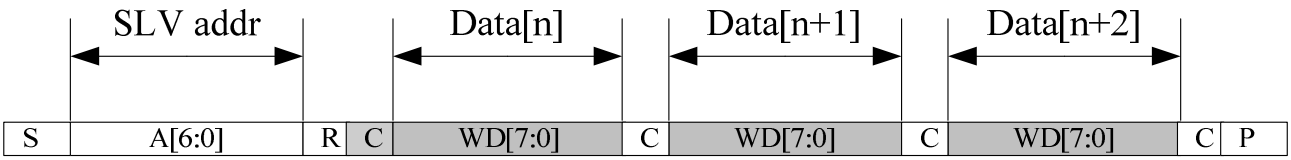
The I2C is always configured in the Slave mode. The data transfer format is shown in Figure 2-4.



I2C serial data transfer format



I2C master write, slave read



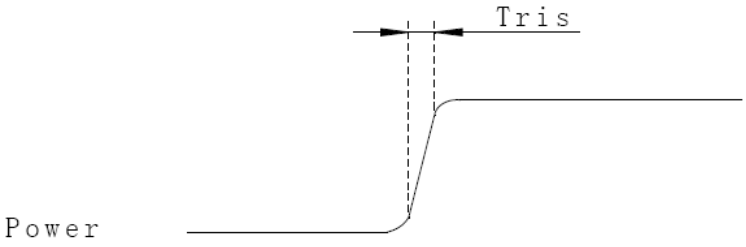
I2C master read, slave write

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	\

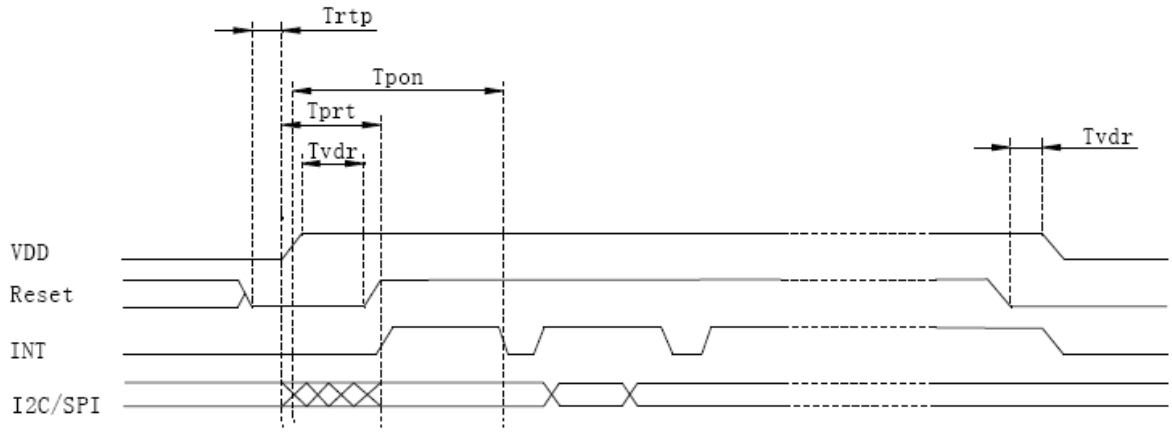
7.2 Power ON/RESET Sequence

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

Reset should be pulled down to be low before powering on and powering down. I2C shouldn't be used by other devices during Reset time after IOVCC powering on (Tprt). INT signal will be sent to the host after initializing all parameters and then start to report points to the host.

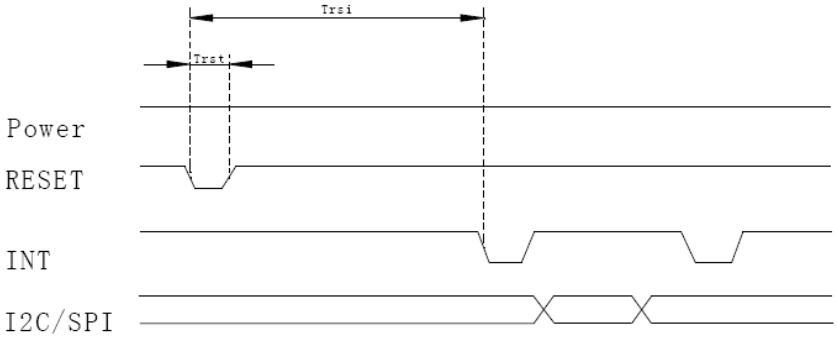


Power on Time



Power on sequence

Reset time must be enough to guarantee reliable reset, the time of starting to report point after resetting approach to the time of starting to report point after powering on.



Reset sequence

Parameter	Description	Min	Max	Units
Tris	Rise time from 0.1VDD to 0.9VDD	--	5	ms
Trtp	Time of resetting to be low before powering on	100	--	μs
Tpon	Time of starting to report point after powering on	300	--	ms
Tvdr	Reset time after VDD powering on	1	--	ms
Tprt	Reset time after IOVCC powering on	2Tris +Tvdr	--	ms
Trsi	Time of starting to report point after resetting	300	--	ms
Trst	Reset time	5	--	ms

7.3 CTP INSTRUCTION DESCRIPTION(More information refer to FT5306 datasheet)

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

Address	Name	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Host Access
Op,00h	DEVIDE_MODE		Device Mode[2:0]							RW
Op,01h	GEST_ID	Gesture ID[7:0]								R
Op,02h	TD_STATUS					Number of touch points[3:0]				R
Op,03h	TOUCH1_XH	1st Event Flag				1st Touch X Position[11:8]				R
Op,04h	TOUCH1_XL	1st Touch X Position[7:0]								R
Op,05h	TOUCH1_YH	1st Touch ID[3:0]				1st Touch Y Position[11:8]				R
Op,06h	TOUCH1_YL	1st Touch Y Position[7:0]								R
Op,07h	Reserved									
Op,08h	Reserved									
Op,09h	TOUCH2_XH	2nd Event Flag				2nd touch X Position[11:8]				R
Op,0Ah	TOUCH2_XL	2nd touch X Position[7:0]								R
Op,0Bh	TOUCH2_YH	2nd Touch ID[3:0]				2nd Touch Y Position[11:8]				R
Op,0Ch	TOUCH2_YL	2nd Touch Y Position[7:0]								R
Op,0Dh	Reserved									
Op,0Eh	Reserved									R
Op,0Fh	TOUCH3_XH	3st Event Flag				3st Touch X Position[11:8]				R
Op,10h	TOUCH3_XL	3st Touch X Position[7:0]								R
Op,11h	TOUCH3_YH	3st Touch ID[3:0]				3st Touch Y Position[11:8]				R
Op,12h	TOUCH3_YL	3st Touch Y Position[7:0]								R
Op,13h	Reserved									
Op,14h	Reserved									
Op,15h	TOUCH4_XH	4st Event Flag				4st Touch X Position[11:8]				R
Op,16h	TOUCH4_XL	4st Touch X Position[7:0]								R
Op,17h	TOUCH4_YH	4st Touch ID[3:0]				4st Touch Y Position[11:8]				R
Op,18h	TOUCH4_YL	4st Touch Y Position[7:0]								R
Op,19h	Reserved									
Op,1Ah	Reserved									
Op,1Bh	TOUCH5_XH	5st Event Flag				5st Touch X Position[11:8]				R
Op,1Ch	TOUCH5_XL	5st Touch X Position[7:0]								R
Op,1Dh	TOUCH5_YH	5st Touch ID[3:0]				5st Touch Y Position[11:8]				R
Op,1Eh	TOUCH5_YL	5st Touch Y Position[7:0]								R

Company confidential. Duplication or disclosure prohibited. All rights reserved

RoHS

Op,1Fh	Reserved			
Op,20h	Reserved			
Op,21h	TOUCH6_XH	6st Event Flag	6st Touch X Position[11:8]	R
Op,22h	TOUCH6_XL	6st Touch X Position[7:0]		R
Op,23h	TOUCH6_YH	6st Touch ID[3:0]	6st Touch Y Position[11:8]	R
Op,24h	TOUCH6_YL	6st Touch Y Position[7:0]		R
Op,25h	Reserved			
Op,26h	Reserved			
Op,27h	TOUCH7_XH	7st Event Flag	7st Touch X Position[11:8]	R
Op,28h	TOUCH7_XL	7st Touch X Position[7:0]		R
Op,29h	TOUCH7_YH	7st Touch ID[3:0]	7st Touch Y Position[11:8]	R
Op,2Ah	TOUCH7_YL	7st Touch Y Position[7:0]		R
Op,2Bh	Reserved			
Op,2Ch	Reserved			
Op,2Dh	TOUCH8_XH	8st Event Flag	8st Touch X Position[11:8]	R
Op,2Eh	TOUCH8_XL	8st Touch X Position[7:0]		R
Op,2Fh	TOUCH8_YH	8st Touch ID[3:0]	8st Touch Y Position[11:8]	R
Op,30h	TOUCH8_YL	8st Touch Y Position[7:0]		R
Op,31h	Reserved			
Op,32h	Reserved			
Op,33h	TOUCH9_XH	9st Event Flag	9st Touch X Position[11:8]	R
Op,34h	TOUCH9_XL	9st Touch X Position[7:0]		R
Op,35h	TOUCH9_YH	9st Touch ID[3:0]	9st Touch Y Position[11:8]	R
Op,36h	TOUCH9_YL	9st Touch Y Position[7:0]		R
Op,37h	Reserved			
Op,38h	Reserved			
Op,39h	TOUCH10_XH	10st Event Flag	10st Touch X Position[11:8]	R
Op,3Ah	TOUCH10_XL	10st Touch X Position[7:0]		R
Op,3Bh	TOUCH10_YH	10st Touch ID[3:0]	10st Touch Y Position[11:8]	R
Op,3Ch	TOUCH10_YL	10st Touch Y Position[7:0]		R
Op,3Dh	Reserved			
Op,3Eh	Reserved			
…	…	…		…
Op,FEh	LOG_MSG_CNT	The log MSG count		R
Op,FFh	LOG_CUR_CHA	Current character of log message, will point to the next character when one character is read.		R

Company confidential. Duplication or disclosure prohibited. All rights reserved

RoHS

8.Optical Characteristics

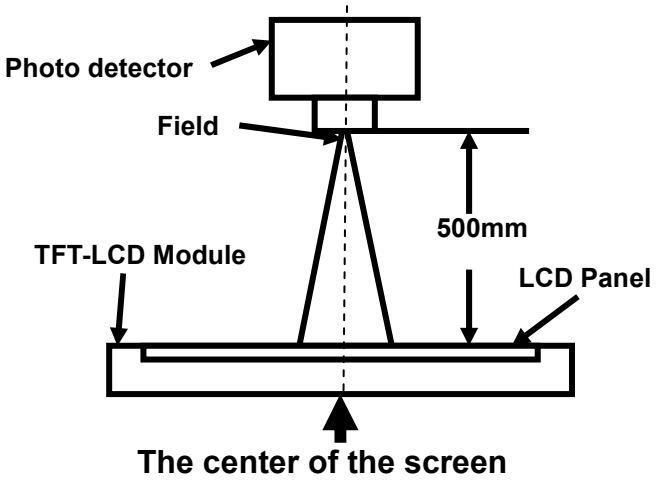
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	60	70	--	Degree	Note 2
		θB		40	50	--		
		θL		60	70	--		
		θR		60	70	--		
Contrast Ratio		CR	θ=0°	400	500	--		Note1 Note3
Response Time		T_{ON}	25℃	--	20	30	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.265	0.315	0.365		Note5 Note1
		y		0.285	0.335	0.385		
	Red	x		0.531	0.581	0.631		
		y		0.295	0.345	0.395		
	Green	x		0.298	0.348	0.398		
		y		0.531	0.581	0.631		
	Blue	x		0.103	0.153	0.203		
		y		0.045	0.095	0.145		
Uniformity		U		75	80	--	%	Note1、Note6
NTSC				45	50	--	%	
Luminance		L		150	200	--	cd/m^2	Note7
Reflectivity						4	%	Note8
HAZE						2	%	Note8

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 10 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.

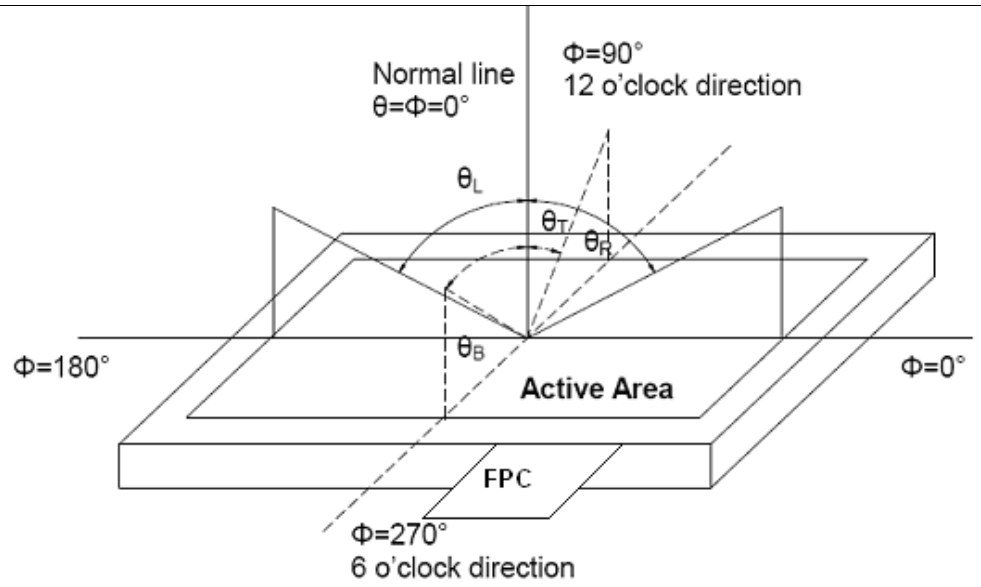


Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

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)。

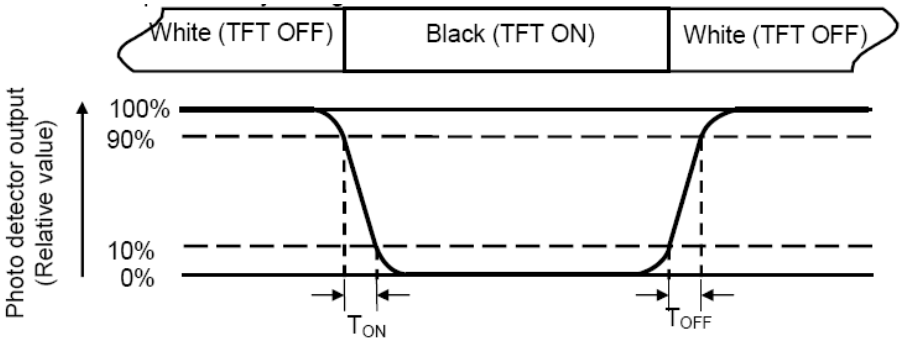
Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS



Note 3: Definition of contrast ratio

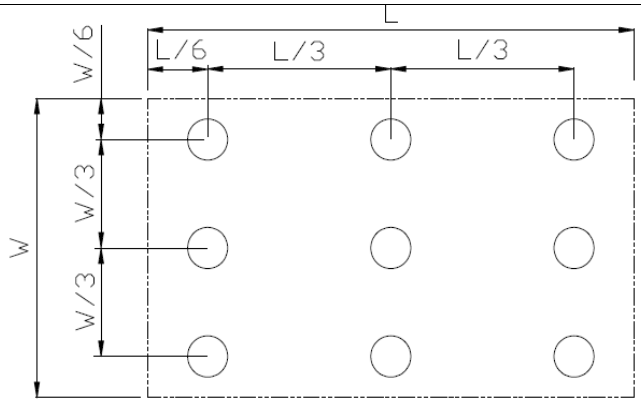
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

"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%.



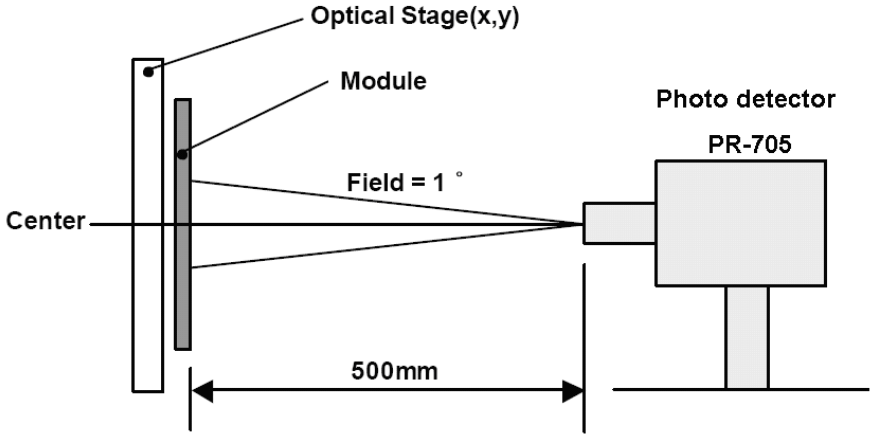
Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.
Note 6: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.
Luminance Uniformity (U) = Lmin/ Lmax
L-------Active area length W----- Active area width

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS



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 on the CTP

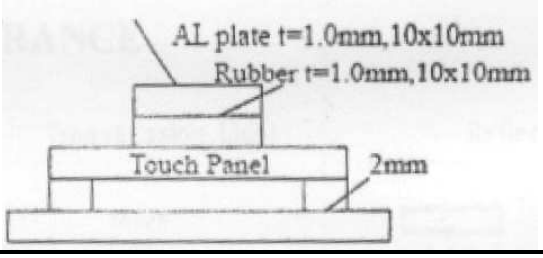
Note8: Measuring equipments: DMS-501, PR-705. @550nm
Measuring condition:
- After stabilizing and leaving the panel alone at a given temperature for 30 min, the measurement should be executed,
- Measuring surroundings: a stable, windless and dark room,
- Measuring temperature: Ta=25°C,
- 30 min after lighting the back-light.



Note2: conform to National standard GB2410—80 /ASTM D1003—61(1997)

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

9. Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ta = +70℃, 120 hours	Note1,Note6,Note7 IEC60068-2-1,GB2423.2
2	Low Temperature Operation	Ta = -20℃, 120 hours	Note1, Note7,IEC60068-2-1 GB2423.1
3	High Temperature Storage	Ta = +80℃, 120 hours	Note1, Note7,Note8 IEC60068-2-1 GB2423.2
4	Low Temperature Storage	Ta = -30℃, 96 hours	Note1, Note7,EC60068-2-1 GB2423.1
5	High Temperature & Humidity Storage	Ta=+65℃、RH=90%, 120 hours	Note1,Note3, Note4,Note7 IEC60068-2-78 GB/T2423.3
6	Thermal Shock/ Solder Joint Life Test	-30℃（30min）⇔80℃（30min）,Change Time:5min,100cycle	Note1,Note9 Start with cold temperature End with high temperature, IEC60068-2-14,GB2423.22
12	ESD	C=150pF、R=330Ω Air: ±8KV Contact:±4KV 5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	Note2,Note5, IEC61000-4-2 GB/T17626.2
13	Shock Test	Half Sine Wave 60G ,6ms,±X,±Y,±Z 3times for each direction	Note2
14	Drop Test(package state)	Height:60cm, 1corner,3edges,6surfaces	Note2,IEC60068-2-32 GB/T2423.8
15	Surface hardness	6H	JIS-K5600
16	Static Load Resistance Test	After 4.5Kg load for 1min is applied to the center area (1.0cm2) of the Touch panel, the requirements in optical characteristic and electrical characteristics shall be satisfied. 	No crack after test.

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

17	Drop ball test	Use the 64g steel (¢ 25) ball is dropped on the Glass surface from 70cm height at 1time(Glass side)	No crack after test.
18	Terminal Pull Test	±90° direction, weight:500g, non-operation	Function is OK

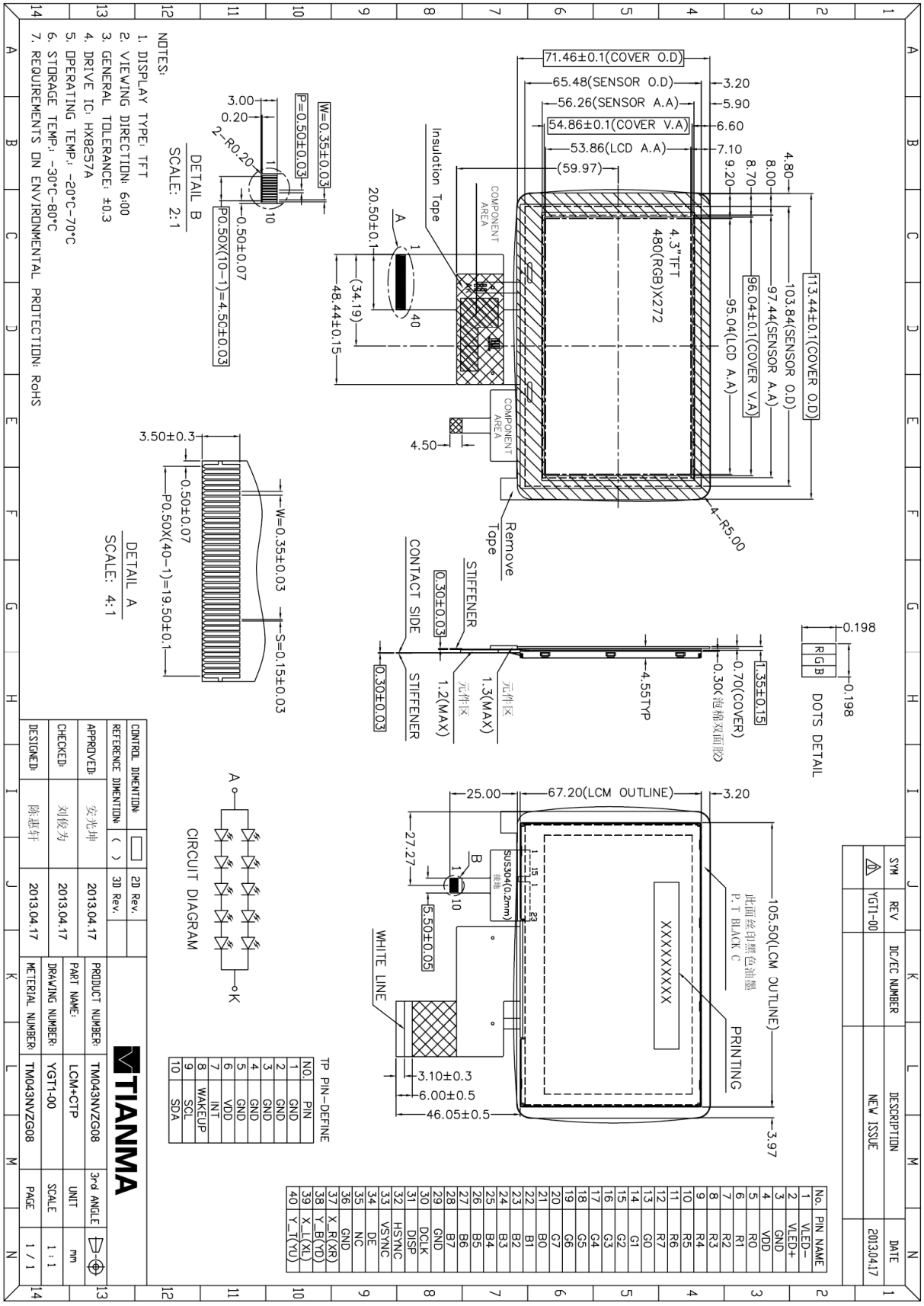
Notes:

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. The samples of these tests 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
3. Each test item applies for a test sample only once, The test sample can not be used again in any other test item.
4. For Damp Proof Test, Pure water(Resistance＞10MΩ) should be used.
5. 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.
6 In the test of High Temperature Operation and High Temperature & Humidity Operation ,the operation temperature is the surface temperature of module
7 High Temperature Operation、Low Temperature Operation、High Temperature Storage、Low Temperature Storage、High Temperature & Humidity Operation、High Temperature & Humidity Storage will be increased the test time to 1000hours in the same conditions to test out the ability of module, and we can not guarantee that the module will not fail during 1000hours.These items test only once
8. Thermal Shock will be changed the cycle to 1000cycles to test out the ability of module, and we can not guarantee that the module will not fail after the test. This item test only once

Company confidential. Duplication or disclosure prohibited. All rights reserved

RoHS

10. Mechanical Drawing



Company confidential. Duplication or disclosure prohibited. All rights reserved

RoHS

11.Product Inspection Criteria

11.1 Classification of defects

Major defects (MA): A major defect refers to a defect that may substantially degrade usability for product applications, including all functional defects(such as no display, abnormal display, open or missing segment, short circuit, missing component), outline dimension beyond the drawing, progressive defects and those affecting reliability.

Minor defects (MI): A minor defect refers to a defect which is not considered to be able to substantially degrade the product application or a defect that deviates from existing standards almost unrelated to the effective use of the product or its operation, such as black spot, white spot, bright spot, pinhole, black line, white line, contrast variation, glass defect, polarizer defect, etc.

11.2 Definition of inspection range

For dot defect of TFT LCD which is not smaller than 3 inches, dividing three areas to make a judgment (according to figure 1).

A area : center of viewing area
B area : periphery of viewing area
C area : Outside viewing area

For other defects, dividing two areas to make a judgment (according figure 2).

A zone : Inside Viewing area
B zone : Outside Viewing area
X1(A.A~V.A): 0mm X2(A.A~V.A): 0mm
Y1(A.A~V.A): 0mm Y2(A.A~V.A): 0mm

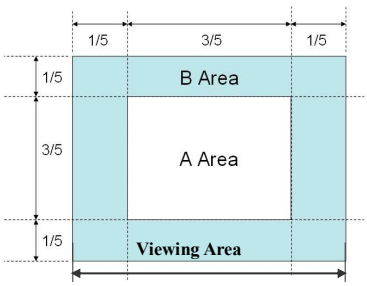


Figure 1

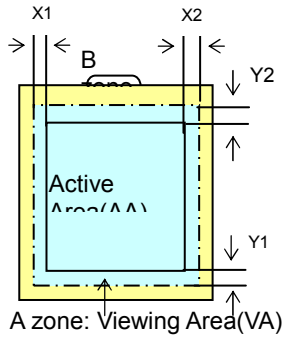


Figure 2

11.3 Inspection items and general notes

General notes	①Should any defects which are not specified in this standard happen, additional standard shall be determined by mutual agreement between customer and TIANMA. ②Viewing area should be the area which TIANMA guarantees. ③Limit sample should be prior to this Inspection standard. ④Viewing judgment should be under static pattern. ⑤Inspection conditions Inspection distance: 250 mm (from the sample) Temperature : 25±5 ºC Inspection angle : 45 degrees in 12 o′clock direction (all defects in viewing area should be inspected from this direction)	
Inspection items	Pinhole, Bright spot, Black spot, White spot, Black line, White Line, Foreign particle, Bubble	The color of a small area is different from the remainder. The phenomenon doesn't change with voltage
	Contrast variation	The color of a small area is different from the remainder. The phenomenon changes with voltage
	Polarizer defect	Scratch, Dirt, Particle, Bubble on polarizer or between polarizer and glass
	Dot defect (TFT LCD)	The pixel appears bright or dark abnormally when display
	Functional defect	No display, Abnormal display, Open or missing segment, Short circuit, False viewing direction

Company confidential. Duplication or disclosure prohibited. All rights reserved

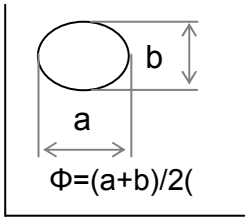
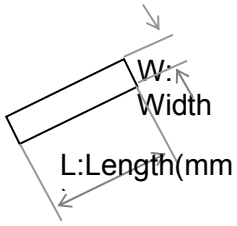
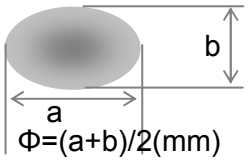
RoHS

	Glass defect	Glass crack, Shaved corner of glass, Surplus glass
	PCB defect	Components assembly defect

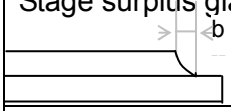
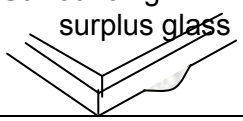
11.4 Outgoing Inspection level

Outgoing Inspection standard	Inspection conditions	Inspection				
		Min.	Max.	Unit	IL	AQL
Major Defects	See 9.3 general notes	See 11.5			II	0.65
Minor Defects	See 9.3 general notes	See 11.5			II	1.5
Note：Sampling standard conforms to GB2828						

11.5 Inspection Items and Criteria

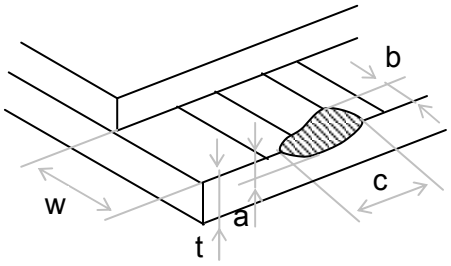
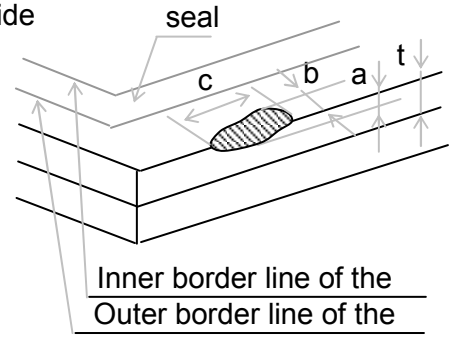
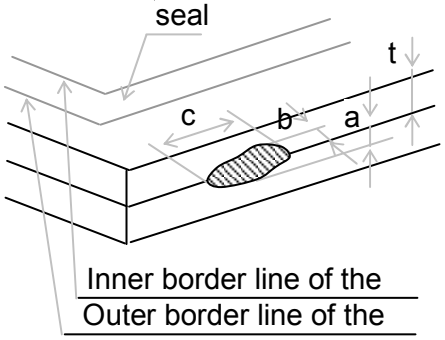
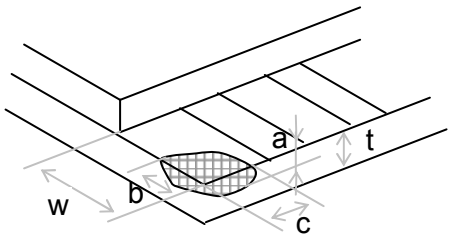
Inspection items			Judgment standard			
			Category		Acceptable number	
					A zone	B zone
1	Black spot, White spot, Bright Spot, Pinhole, Foreign Particle, Particle in or on glass, Scratch on glass		A	Φ≦0.10	Neglected	Neglected
			B	0.10<Φ≦0.15	2	
			C	0.15<Φ≦0.20	1	
			D	0.20<Φ	0	
			Total defective point(B,C)		3	
2	Black line, White line, and Particle Between Polarizer and glass, Scratch on glass		A	W≦0.01	Neglected	Neglected
			B	0.01<W≦0.03 L≦3.0	2	
			C	0.03<W≦0.05 L≦3.0	1	
			D	0.05<W	0	
			Total defective point(B,C)		3	
3	Contrast variation		A	Φ≦0.2	Neglected	Neglected
			B	0.2<Φ≦0.3	2	
			C	0.3<Φ≦0.4	1	
			D	0.4<Φ	0	
			Total defective point(B,C)		3	
4	Dot defect (if TFT LCD is	TFT LCD is smaller than 3 inches	LCD Class	Defect	A area	B area
			A	Bright dot	1	Neglecte

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

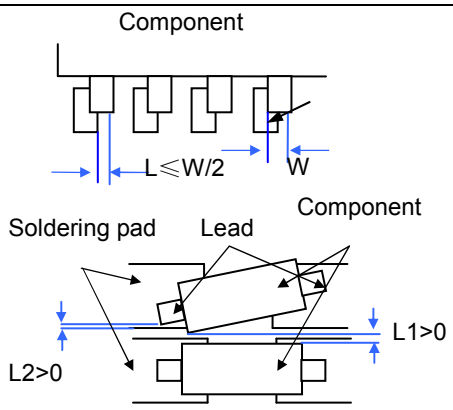
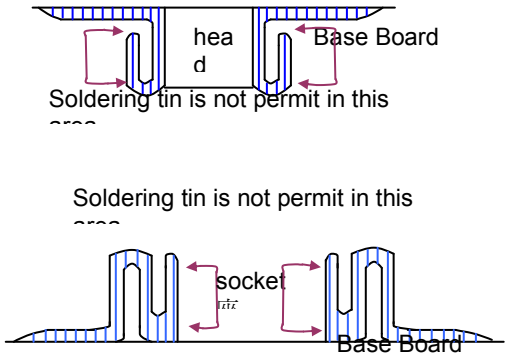
<table>
<tr><td rowspan="11"></td><td rowspan="11">used)</td><td rowspan="4"></td><td rowspan="2"></td><td>Dark dot</td><td colspan="2">2</td><td>d</td></tr>
<tr><td>Total</td><td colspan="2">2</td></tr>
<tr><td rowspan="3">B</td><td>Bright dot</td><td colspan="2">2</td><td rowspan="3">d</td></tr>
<tr><td>Dark dot</td><td colspan="2">3</td></tr>
<tr><td>Total</td><td colspan="2">4</td></tr>
<tr><td rowspan="7">TFT LCD between 3~10.4 inches</td><td>LCD Class</td><td>Defect</td><td>A area</td><td>B area</td><td>C area</td></tr>
<tr><td rowspan="3">A</td><td>Bright dot</td><td>1</td><td>1</td><td rowspan="6">Neglected</td></tr>
<tr><td>Dark dot</td><td>1</td><td>2</td></tr>
<tr><td>Total</td><td colspan="2">4</td></tr>
<tr><td rowspan="3">B</td><td>Bright dot</td><td>2</td><td>2</td></tr>
<tr><td>Dark dot</td><td>2</td><td>3</td></tr>
<tr><td>Total</td><td colspan="2">6</td></tr>
<tr><td colspan="6">Notes:
Bright dot: in R、G、B or dark display figure, the pixel appears bright.
Dark dot: in R、G、B or white display figure, the pixel appears dark.
Defect area must be less than an half size of the dot.</td></tr>
<tr><td>5</td><td colspan="2">Bubble inside cell</td><td colspan="3">any size</td><td>none</td><td>none</td></tr>
<tr><td rowspan="4">6</td><td rowspan="4">Polarizer defect (if Polarizer is used)</td><td>Scratch ,damage on polarizer, Particle on polarizer or between polarizer and glass.</td><td colspan="5">Refer to item 1 and item 2.</td></tr>
<tr><td rowspan="3">Bubble, dent and convex</td><td>A</td><td>Φ≦0.3</td><td>Neglected</td><td rowspan="3">Neglected</td></tr>
<tr><td>B</td><td>0.3<Φ≦0.7</td><td>2</td></tr>
<tr><td>C</td><td>0.7<Φ</td><td>0</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Surplus glass</td><td>Stage surplus glass
 
</td><td colspan="5">b≦0.3mm</td></tr>
<tr><td>Surrounding surplus glass
  </td><td colspan="5">Should not influence outline dimension and assembling.</td></tr>
<tr><td>8</td><td colspan="2">Open segment or open common</td><td colspan="5">Not permitted</td></tr>
<tr><td>9</td><td colspan="2">Short circuit</td><td colspan="5">Not permitted</td></tr>
<tr><td>10</td><td colspan="2">False viewing direction</td><td colspan="5">Not permitted</td></tr>
<tr><td>11</td><td colspan="2">Contrast ratio uneven</td><td colspan="5">According to the limit specimen</td></tr>
<tr><td>12</td><td colspan="2">Crosstalk</td><td colspan="5">According to the limit specimen</td></tr>
<tr><td>13</td><td colspan="2">Black /White spot(display)</td><td colspan="5">Refer to item 1</td></tr>
<tr><td>14</td><td colspan="2">Black /White line(display)</td><td colspan="5">Refer to item 2</td></tr>
</table>

Company confidential. Duplication or disclosure prohibited. All rights reserved

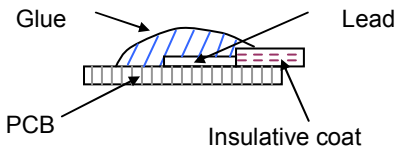
RoHS

Inspection items			Judgment standard		
			Category(application: B zone)		Acceptable number
15	Glass defect crack	①The front of lead terminals 	A	a≤ t, b≤1/5W, c≤3mm	Max.3 defects allowed
			B	Crack at two sides of lead terminals should not cover patterns and alignment mark	
		②Surrounding crack—non-contact side 	b < Inner borderline of the seal		
		③ Surrounding crack— contact side 	b < Outer borderline of the seal		
		④Corner 	A	a ≦ t, b ≦ 3.0, c ≦ 3.0	
			B	Glass crack should not cover patterns u and alignment mark and patterns.	

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

Inspection items			Judgment standard Category(application: B zone)
16	PCB defect	Component soldering: No cold soldering、short、open circuit、burr、tin ball The flat encapsulation component position deviation must be less than 1/3 width of the pin (Pic.1)； the sheet component deviation: Pin deviates from the pad and contact with the near components is not permitted（Pic.2）	
		lead defect: The lead lack must be less than 1/3 of its width; The lead burr must be less than 1/3 of the seam; Impurities connect with the near leads is not permitted	
		Connector soldering: Soldering tin is at contact position of the plug and socket is not permitted No foundation is scald Serious cave distortion on plug and socket contact pin is not permitted	

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

		Glue on root of the speaker receiver and motor lead: The insulative coat of the lead must join into the PCB; the protected glue must envelop to the insulative coat.	

12. Precautions for Use of LCD Modules

12.1 Handling Precautions

12.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

12.1.2 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.

12.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

12.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

12.1.5 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

12.1.6 Do not attempt to disassemble the LCD Module.

12.1.7 If the logic circuit power is off, do not apply the input signals.

12.1.8 To prevent destruction of the elements by static electricity, be careful to maintain

Company confidential. Duplication or disclosure prohibited. All rights reserved

RoHS

an optimum work environment.

a. Be sure to ground the body when handling the LCD Modules.

b. Tools required for assembly, such as soldering irons, must be properly ground.

c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

d. 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.

12.2 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.

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

Company confidential. Duplication or disclosure prohibited. All rights reserved

RoHS

13.Packing Drawing(Reference)

Company confidential. Duplication or disclosure prohibited. All rights reserved

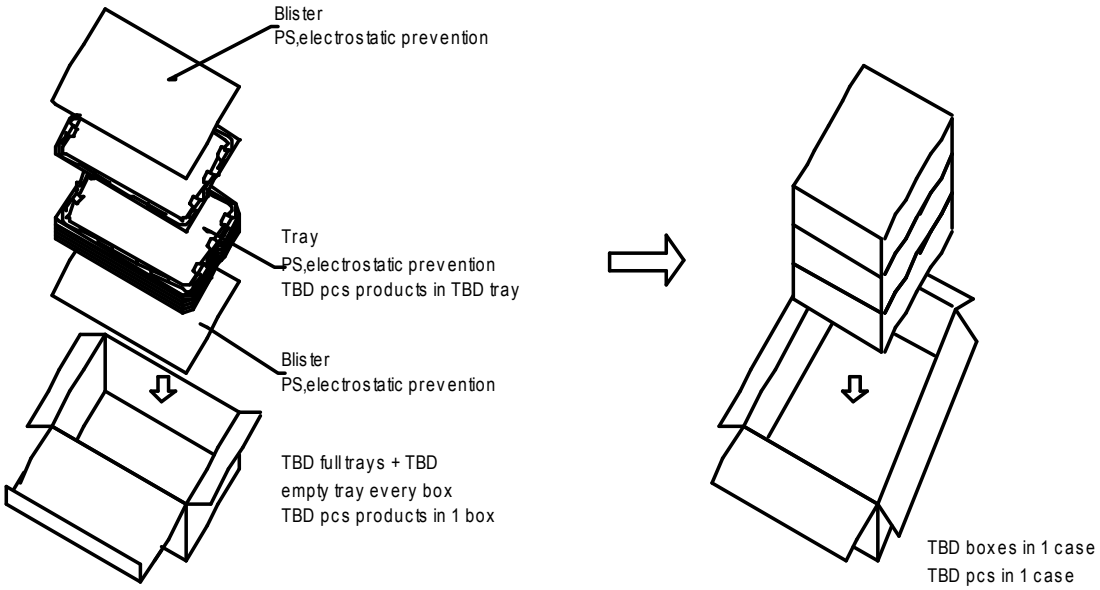
RoHS

TIANMA MICROELECTRONICS CO.

Packing Standards:

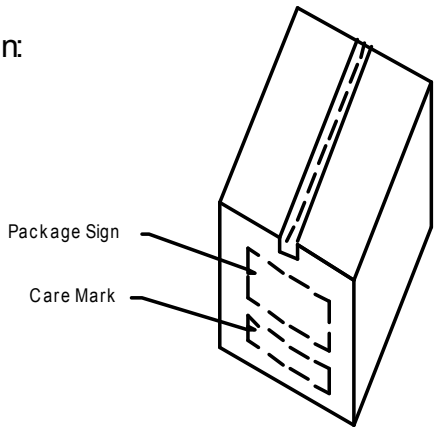
Quantity of products to be packa ged in a case: TBD pcs

Outlook size(Carton size):TBD



Package Sign:

Case Mark
Remark
BMS
P.O.No.
Part No.
QTY
CTN.No.
TTL.CTN.No.
MADE IN CHINA



Care Mark

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

14. Module Part Numbering System

TM	043	N	V	Z	G	08
①	②	③	④	⑤	⑥	⑦

NO.	Explanation
①	**TIANMA module indicating**
②	**Screen inch:043=4.3inch 057=5.7inch 070=7inch 102=10.2inch**
③	**Resolution:** 480x240(Delta) A 640x240(Delta) B 960x240(Delta) C 96x64 (Stripe) D 128x128(Stripe) E 128x160(Stripe) F 176x220(Stripe) G 240x320(Stripe) H 240x240(Stripe) V 320x320(Stripe) J 320x240(Stripe) K 240x400(Stripe) L 400x240(Stripe) M 480x272(Stripe) N 480x234(Stripe) O 320x480(Stripe) P 480x640(Stripe) Q 800x480(Stripe) R 800x600(Stripe) S 1024x768(Stripe) T others X

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS

④

Product structure:

TSP+BL(CCFL)+FPC+M4	A
TSP+	B
BL(CCFL)+FPC+M4	C
BL(LED)+FPC+M4	D
BL(LED)+FPC+M4.Dual Display	E
FPC+M4	F
M4	G
M3	H
M2	Y
M1	J
BL(CCFL)+FPC+M4+PCB	K
BL(LED)+FPC+M4+PCB	L
TSP+BL(CCFL)+FPC+M4+PCB	M
TSP+BL(LED)+FPC+M4+PCB	N
CTP+BL(LED)+FPC+M4	V
Others	X

M1:Panel(array+CF)
M2:Panel(array+CF+LC)
M3:Panel(array+CF+LC+PLZ)
M4:Panel(array+CF+LC+PLZ+Driver)

⑤

Product assembly location:

Shenzheng Z
Shanghai H
Chengdu C
Wuhan W

⑥

Product appliction:

Industry and Automotive: G
Consume: NA

⑦

Series Number:

00,01,02,03.....

Company confidential. Duplication or disclosure prohibited. All rights reserved
RoHS