TIANMA

MODEL　NO.　:　　**TM070DVHG01**

ISSUED　DATE:　　**2015-02-02**

VERSION　　:　　**V1.4**

■Preliminary Specification
□Final Product Specification

Customer :

Approved by	Notes

TIANMA Confirmed :

Prepared by	Checked by	Approved by

This technical specification is subjected to change without notice

Table of Contents

Record of Revision

Rev	Issued Date	Description	Editor
1.0	2013-05-27	First release	Chengfeng Tao
1.1	2013-11-08	Update LCM Drawing, format, etc	Fen He
1.2	2013-12-25	Update RA test criteria	Fen He
1.3	2014-05-14	Update LCM Drawing	Fen He
1.4	2015-02-02	Update the CTP IC to SSD2543QN4	Fen He

1 General Specifications

Feature		Spec
Display Spec.	Size	7.0 inch
	Resolution	1024 RGB (H)×600(V)
	Technology Type	a-si TFT
	Pixel Configuration	RGB stripe
	Pixel pitch(mm)	0.150×0.150
	Display Mode	Normally White
	Surface Treatment	Anti-Glare(3H)
	Viewing Direction	12 o'clock
	Gray Scale Inversion Direction	6 o'clock
TP Spec	Operation Technology	Projected capacitive(Mutual mode)
	Control IC	SSD2543QN4
	Input Method	Bare finger
	Number of simultaneous touches	2 points multi-touch
	Minimum Touch Area(mm)	Φ6
	Finger Pitch(mm)	13
	Product structure	Glass Lens－Glass Sensor
	Interface	I2C
Mechanical Characteristics	LCM (W x H x D) (mm)	171.50(w)×110.30(H)×5.05 (D)
	Active Area(mm)	153.60(H)×90.0(V)(TFT)
	View Area(mm)	155.20(W) x 91.40(H)(TP)
	With /Without TSP	With CTP
	Connection Type	ZIF
	LED Numbers	18LEDs
	Weight (g)	TBD
Electrical Characteristics	Interface	LVDS 40 Pin
	Color Depth	16.7 M
	Driver IC	HX8282 and HX8677

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 CN1 pin assignment

Pin No.	Symbol	I/O	function	Remarks
1	VCOM	P	Common Voltage	
2	VDD	P	Power Voltage for digital circuit	
3	VDD	P	Power Voltage for digital circuit	
4	NC	---	No connection	
5	Reset	I	Global reset pin	Active Low to enter Reset State
6	STBYB	I	Standby mode, Normally pulled high	STBYB="1",Normally operation STBYB="0",Timing controller, source driver will turn off, all output are High-Z
7	GND	P	Ground	
8	RXIN0-	I	- LVDS differential data input	
9	RXIN0+	I	+LVDS differential data input	
10	GND	P	Ground	
11	RXIN1-	I	-LVDS differential data input	
12	RXIN1+	I	+LVDS differential data input	
13	GND	P	Ground	
14	RXIN2-	I	-LVDS differential data input	
15	RXIN2+	I	+LVDS differential data input	
16	GND	P	Ground	
17	RXCLKIN-	I	-LVDS differential clock input	
18	RXCLKIN+	I	+LVDS differential clock input	
19	GND	P	Ground	
20	RXIN3-	I	-LVDS differential data input	
21	RXIN3+	I	+LVDS differential data input	
22	GND	P	Ground	
23	NC	---	No connection	
24	NC	---	No connection	
25	GND	P	Ground	
26	NC	---	No connection	
27	DIMO	O	Backlight CABC controller signal output	Normally Pull High
28	SELB	I	6bit/8bit mode select	Note 2
29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	
31	LED-	P	LED Cathode	
32	LED-	P	LED Cathode	
33	L/R	P	Horizontal inversion	L/R=1, from left to right; L/R=0, from right to left
34	U/D	P	Vertical inversion	U/D=0, from up to down; U/D=1, from down to up.
35	VGL	---	Gate OFF Voltage	
36	CABCEN1	---	CABC H/W enable	Note 3

37	CABCEN2	P	CABC H/W enable	Note 3
38	VGH	P	Gate ON Voltage	
39	LED+	P	LED Anode	
40	LED+	P	LED Anode	

Note 1:   I/O definition.

I---Input pin,   O---Output pin,   P--- Power/Ground,   N--- No Connection

Note2: If LVDS input data is 6 bits ,SELB must be set to High;
        If LVDS input data is 8 bits ,SELB must be set to Low.

Note3: 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.

Note4:

Scan Control Input		Scanning Direction
UPDN	**SHLR**	
GND	VDD	Up to Down, Left to Right
VDD	GND	Down to Up, Right to Left
GND	GND	Up to Down, Right to Left
VDD	VDD	Down to Up, Left to Right

2.2 TP pin assignment

Pin No.	Symbol	I/O	Description	Remark
1	SCL	P	I2C clock input	
2	SDA	I/O	I2C data input and output	
3	GND	P	Groud	
4	GND	P	Groud	
5	ATTN	I/O	Interrupt to the host	
6	GND	P	Groud	
7	VPP	I/O	Reset from the host	
8	VDD	P	CTP power supply	
9	GND	P	Groud	
10	GND	P	Groud	

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3 Absolute Maximum Ratings

Ta = 25℃

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VDD	-0.3	5.0	V	
	AVDD	6.5	13.5	V	
	VGH	-0.3	20.0	V	
	VGL	-20.0	0.3	V	
Backlight Forward Current	I_{LED}	–	25	mA	For each LED
Operating Temperature	T_{OPR}	-20	70	℃	
Storage Temperature	T_{STG}	-30	80	℃	

Table 3.1 absolute maximum rating

Note1: The parameter is for driver IC (gate driver, source driver) only
Note2: 80℃ is the surface temperature of module

4 Electrical Characteristics

4.1 .1Driving TFT LCD Panel

Item	Symbol	Min	Typ	Max	Unit	Remark
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	
Analog Supply Voltage	AVDD	10.8	11.0	11.2	V	
Gate On Voltage	VGH	15.7	16.0	16.3	V	
Gate Off Voltage	VGL	-7.1	-6.8	-6.5	V	
Common Electrode Driving Signal	VCOM	3.45	3.55	3.65	V	With the VR Knob

Ta = 25℃

Table 4.1 LCD module electrical characteristics

Note1: For different LCM, the value may have a bit of difference.

4.1.2 TFT Driving Backlight

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Forward Current	I_F	-	120	-	mA	V	18 LEDs (3 LED Serial, 6 LED Parallel)
Forward Voltage	V_F	-	9.3	-	V	mA	
Operating Life Time		15000	-	-	Hrs	mW	

Table 4.2 LED backlight characteristics

Note1: The LED driving condition is defined for each LED module (3 LED Serial, 6 LED Parallel).For each LED: I_F (1/6) =20mA, V_F (1/3) =3.3V.

Note2: Under LCM operating, the stable forward current should be inputted. And forward voltage is for reference only.

Note3: I_F is defined for one channel LED. Optical performance should be evaluated at Ta=25℃ only 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.

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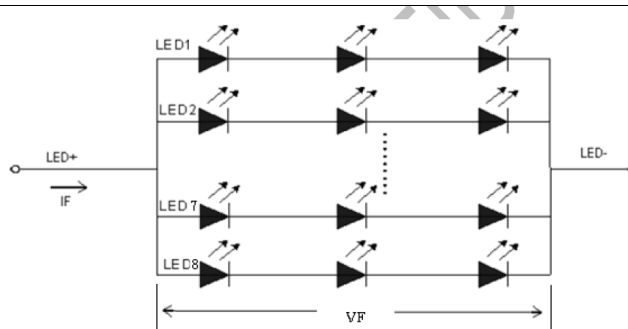
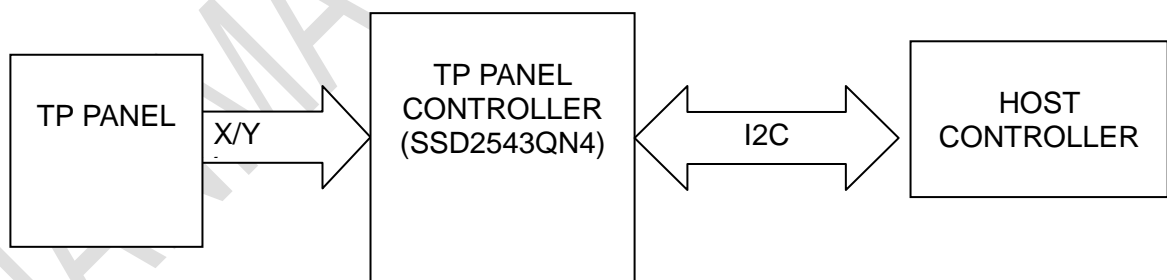**Figure 4.2 LED connection of backlight**

4.2 TP DC Characteristics

(T_A= 25℃,VDD=3.3V)

Item	Min	Typ	Max	Unit	Note
power supply voltage	2.5	--	3.3	V	
IO voltage	1.65	--	3.3	V	
Power supply current		13		mA	Operating mode

4.3.1 TFT Block Diagram
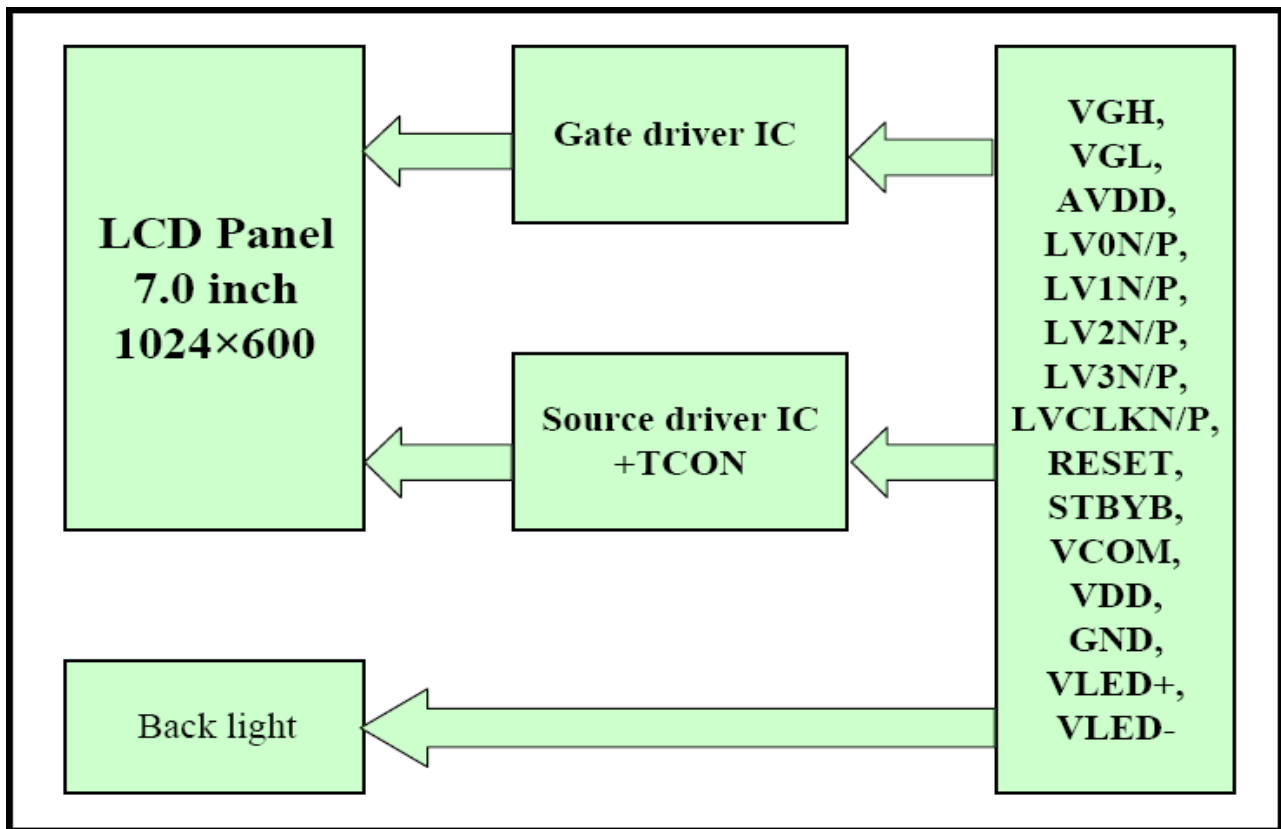
4.3.2 TP Circuit Block Diagram

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5 Timing Chart

5.1 AC Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Clock Frequency	R_{xFCLK}	40.8	51.2	71	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	
PLL wake-up time	T_{enPLL}	–	–	150	us	

T_{RSKM} : Receiver strobe margin
R_{SPOS} : Receiver strobe position
T_{SW} : Strobe width (Internal data sampling window)
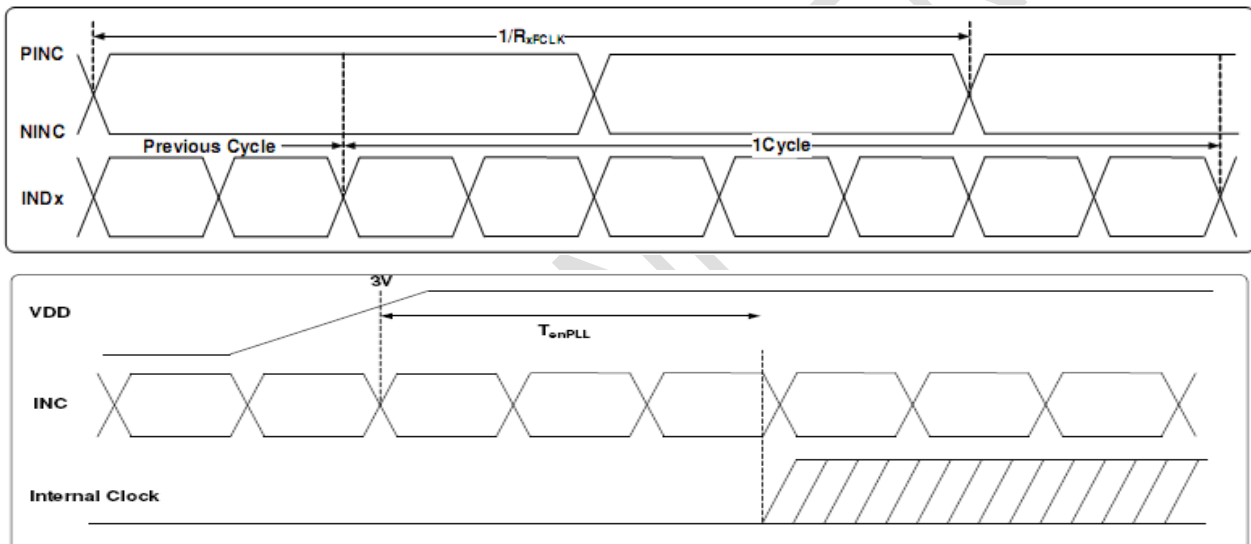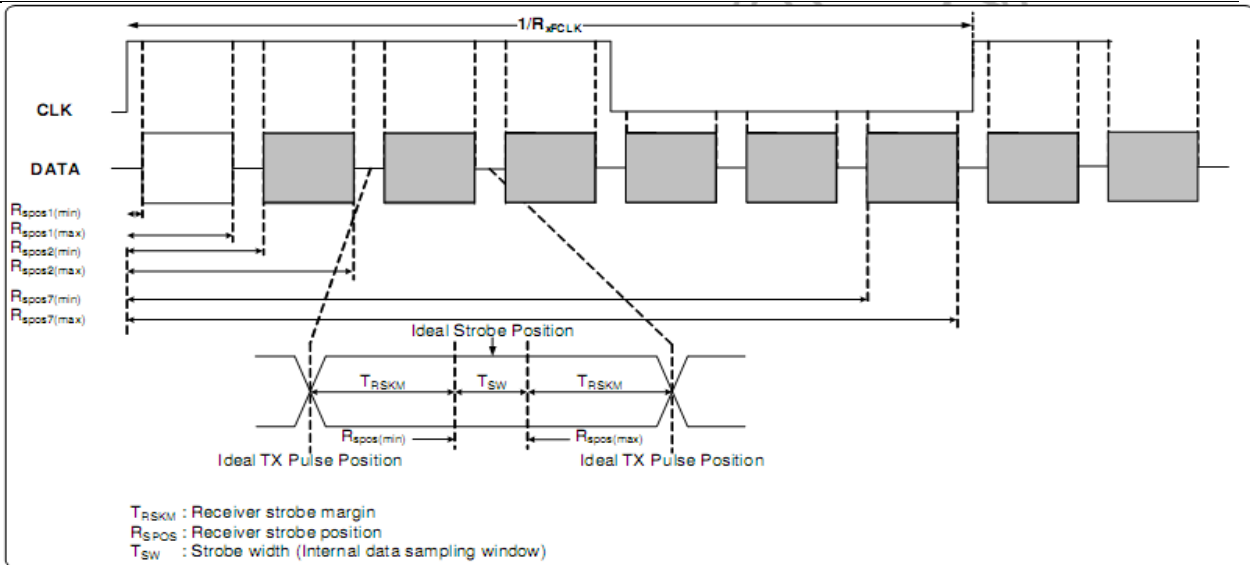
5.2 DC Electrical Characteristics

VDD=3.3V, AVDD=11V, AGND=GND=0V, Ta=25℃

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Differential input high Threshold voltage	R_{XVTH}	–	–	+0.1	V	
Differential input Low Threshold voltage	R_{XVTL}	-0.1	–	–	V	
Input voltage range	R_{XVIN}	0	–	VDD-1.2+ $\|V_{ID}\|$/2	V	
Differential input common Mode voltage	R_{XVCM}	$\|V_{ID}\|$/2	–	VDD-1.2	V	
Differential input voltage	$\|V_{ID}\|$	0.2	v	0.6	V	
Differential input leakage Current	RV_{Xliz}	-10	v	+10	uA	
LVDS Digital Operating Current	Iddlvds	–	（15）	（30）	mA	Fclk=65MHz,VDD=3.3V
LVDS Digital Stand-by Current	Istlvds	–	（10）	（50）	uA	Clock & all functions are stopped

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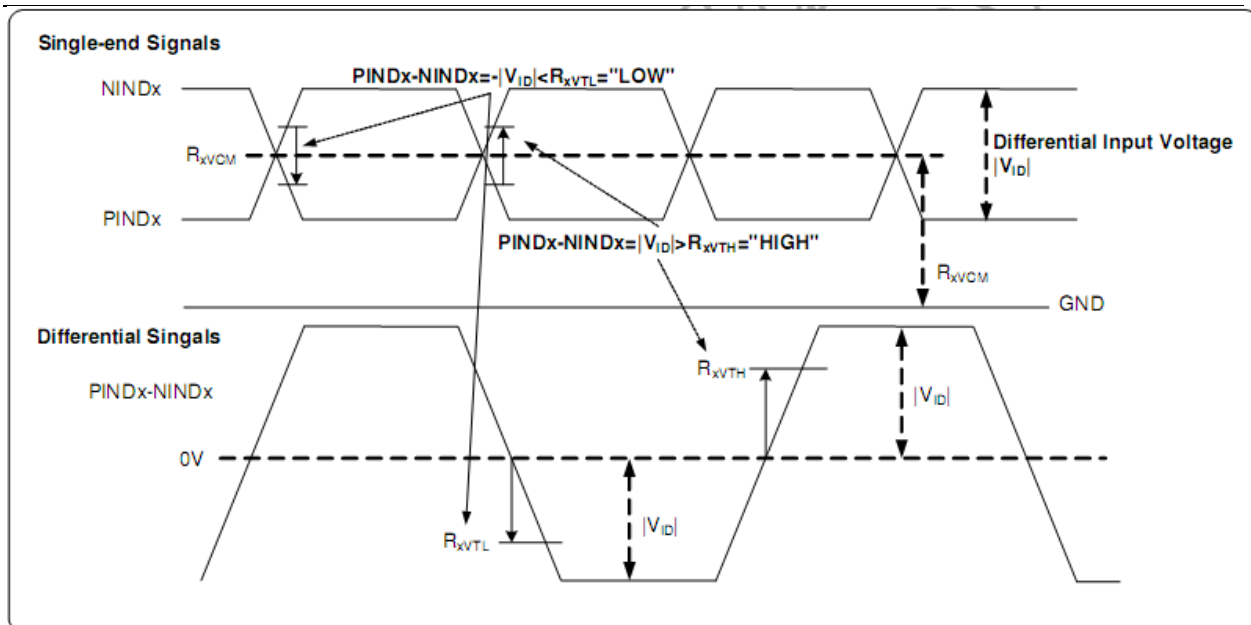
5.3 Timing

Parameter	Symbol	Min	Typ	Max	Unit	Remark
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	thbp+thfp	90	320	376	DCLK	
Vertical display area	tvd		600		H	
VS period time	tv	610	635	800	H	
VS Blanking	tvbp+tvfp	10	35	200	H	

5.4 Data Input Format
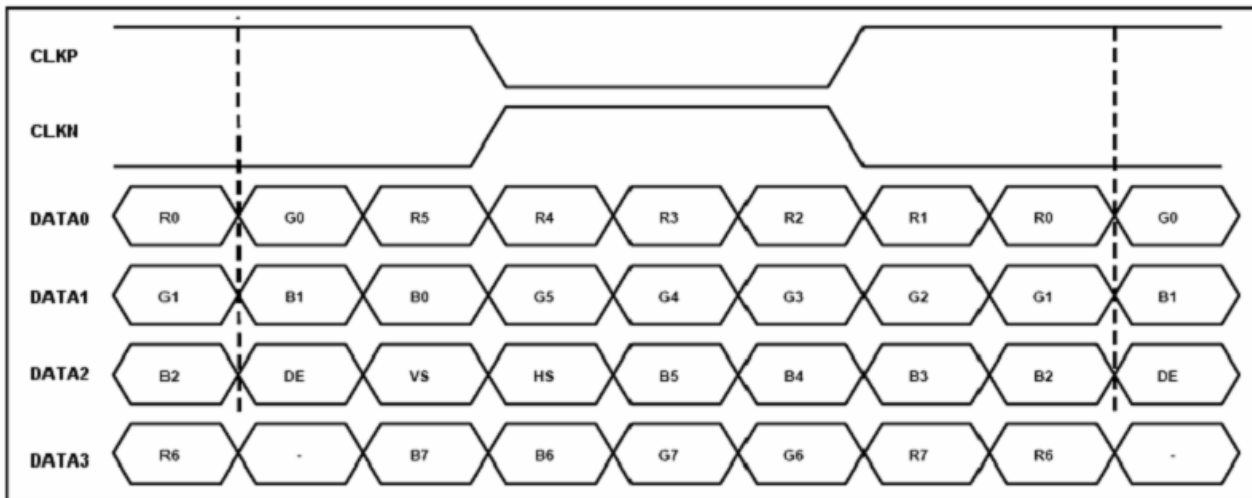
5.5 Input Clock and Data Timing Diagram

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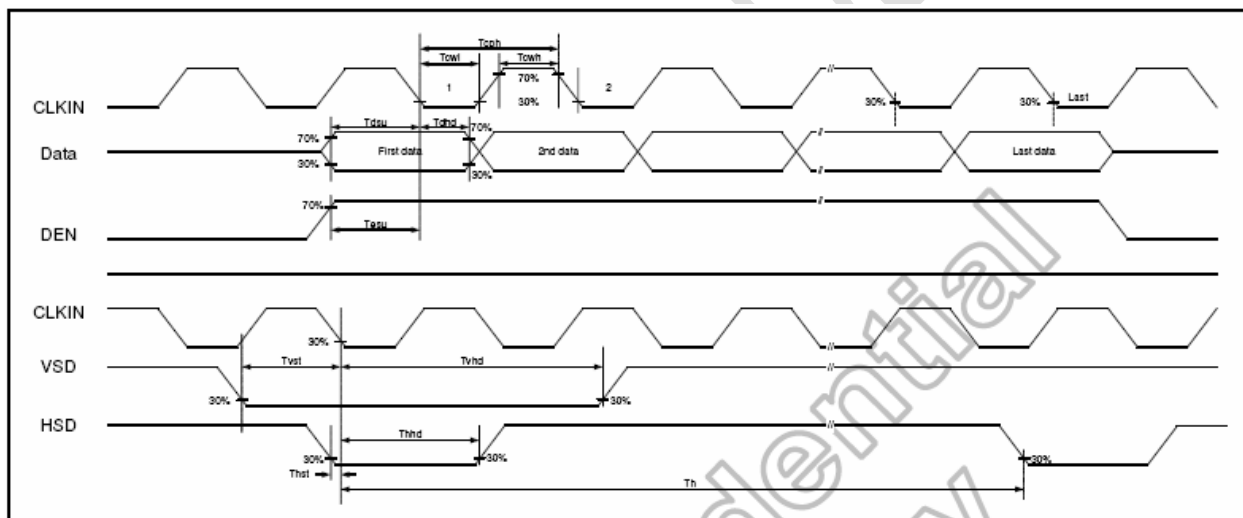
6 Optical Characteristics

6.1 TFT Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	60	70	-	Degree	Note 2
		θB		65	75	-		
		θL		65	75	-		
		θR		65	75	-		
Contrast Ratio		CR	θ=0°	400	500	-		Left/right 0° Top/bottom 5°
Response Time		T_{ON}	25℃	-	20	30	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	0.260 0.280 0.539 0.298 0.291 0.533 0.102 0.057	0.260	0.310	0.360		Note5 Note1
		y		0.280	0.330	0.380		
	Red	x		0.539	0.589	0.639		
		y		0.298	0.348	0.398		
	Green	x		0.291	0.341	0.391		
		y		0.533	0.583	0.633		
	Blue	x		0.102	0.152	0.202		
		y		0.057	0.107	0.157		
Uniformity		U		70	75	-	%	Note1、Note6
NTSC				45	50	-	%	
Luminance		L		240	270	-	cd/m^2	Note7

Test Conditions:

1. I_F= 20 mA, and 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.
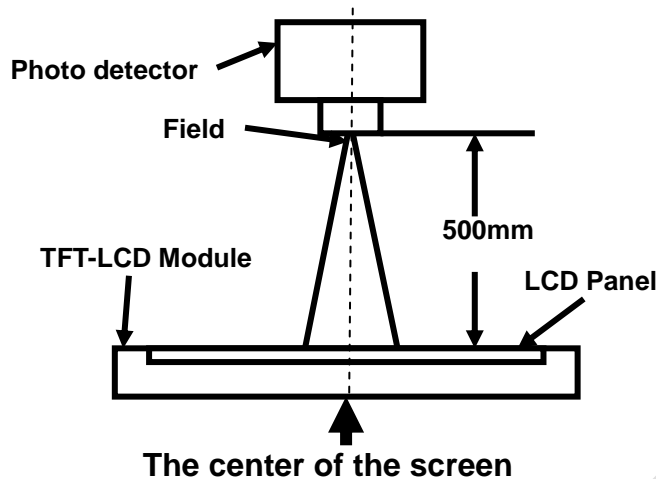
Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

Photo detector

Field

500mm

TFT-LCD Module

LCD Panel

The center of the screen

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)。

Φ=90°
12 o'clock direction

Normal line
θ=Φ=0°

θ_L

θ_T

θ_R

Φ=180°

θ_B

Active Area

Φ=0°

FPC

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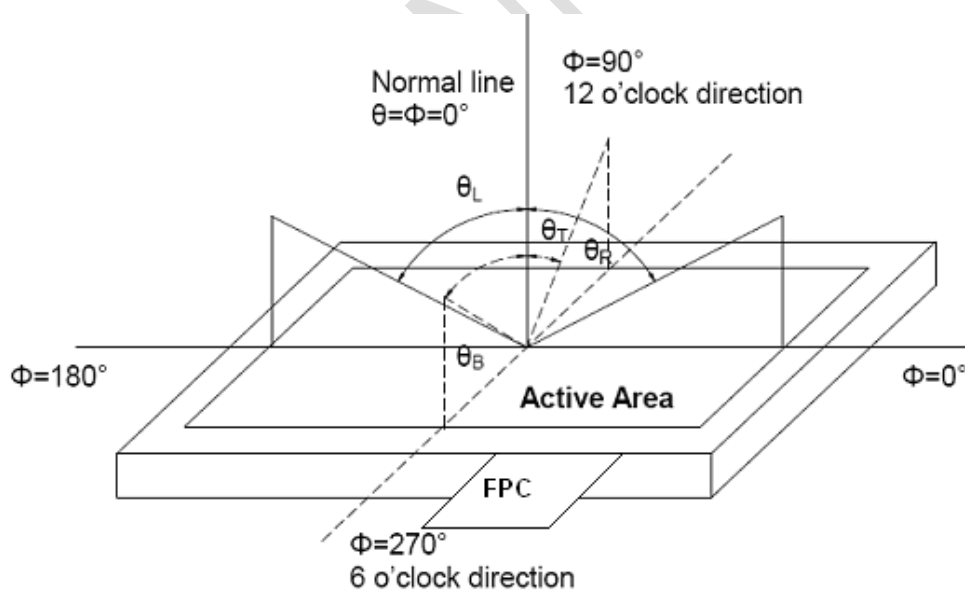
Note 3:   Definition of contrast ratio

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

"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%.
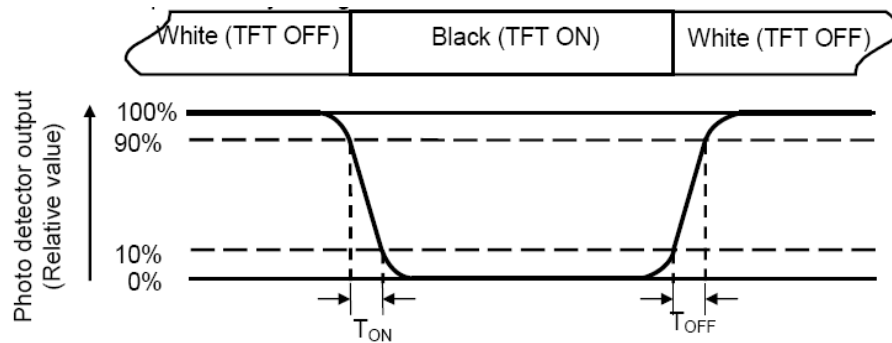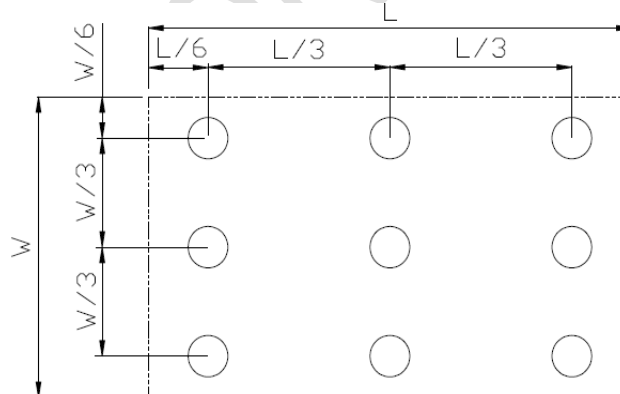

Note 5:   Definition of color chromaticity (CIE1931)

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.

6.2 TP Optical Characteristics

(Ta = 25　C)

No.	Item	Min.	Typ.	Max.	Unit	Remark
1	Transmission		88		%	Note 1
2	Reflectivity				%	Note 1,Note 2
3	HAZE				%	

Note1: 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.
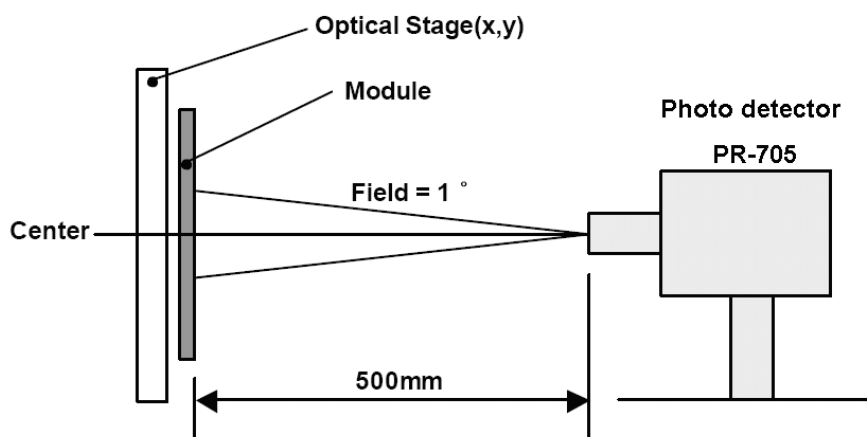
Note2:　conform to National standard GB2410－80 /ASTM D1003－61(1997)

7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ta = +70℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	Ta=+60℃、RH=90％, 240 hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃（30min）⇔80℃（30min）,Change Time:5min,20cycle	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2002
7	ESD	C=150pF、R=330Ω Air: ±8KV Contact:±4KV 5point/panel, 5times (Environment:15℃~35℃、30%~60%.86Kpa~106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006
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)	IEC60068-2-6:1982 GB/T2423.10—1995
9	Mechanical Shock (Non OP)	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:60cm, 1corner,3edges,6surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of sample.

Note3: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note 4: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

8 Mechanical Drawing

9 Packing Drawing
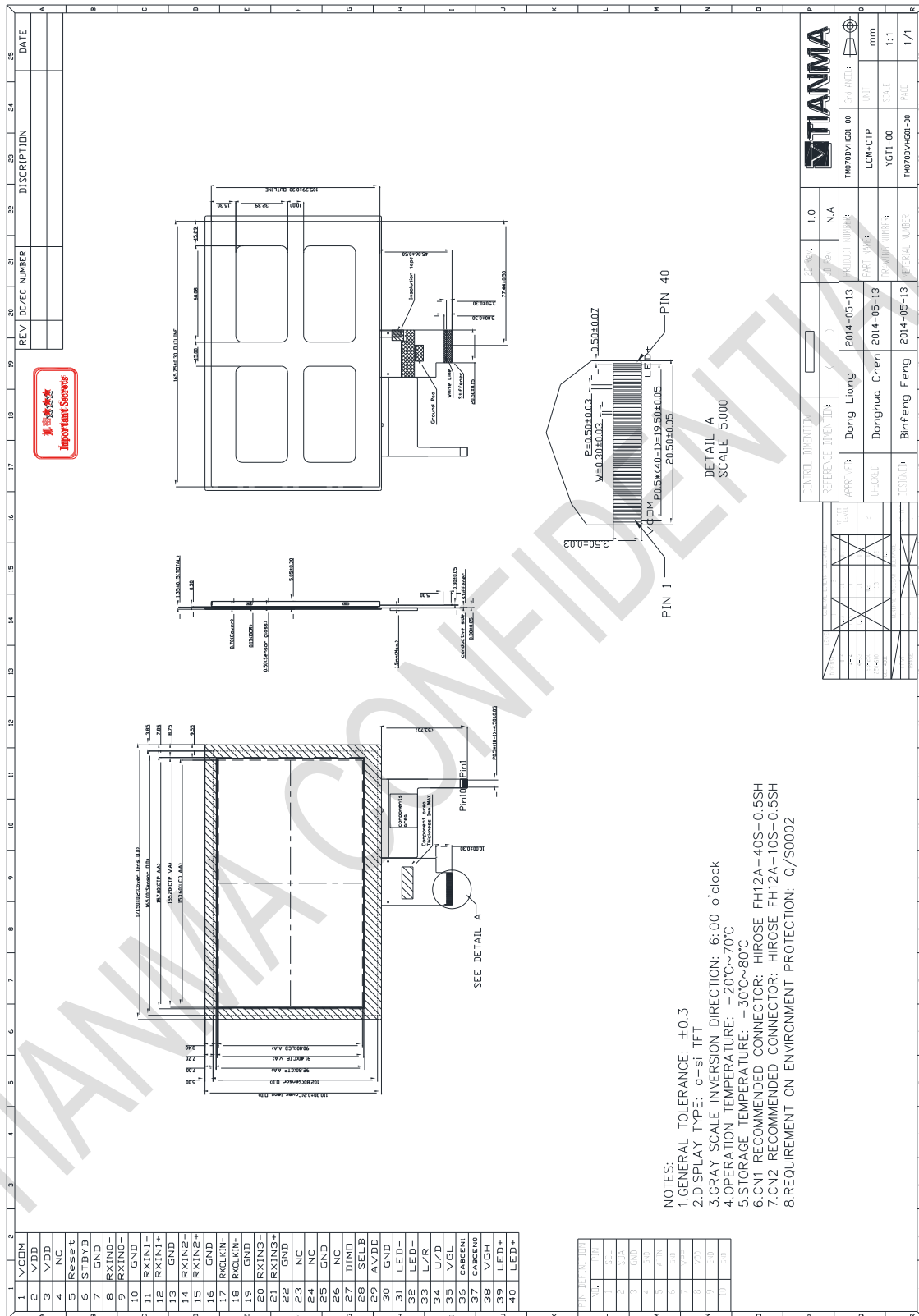
Per Carton

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	Cell	TM070DVHG01-00	171.5×110.3×5.05	---	56	
2	EPE(TOP&Bottom)	EPE	516×416×20	0.11	2	
3	EPE(Left&Right)	EPE	416×196×20	0.04	2	
4	EPE(Front&Back)	EPE	476×196×20	0.05	2	
5	Dust-Proof Bag	PE	700×545×0.1	0.015	1	
6	Drier	---	40×35	0.002	4	
7	Plastic-Board	PP	476×376×5	0.05	1	
8	Tray	PET	476×376×17	---	15	
9	Pink EPE	EPE	371x319x2	0.003	14	
10	Carton	Corrugated paper	530×430×274	1.30	1	
11	Total weight	**TBD±5%kg**				
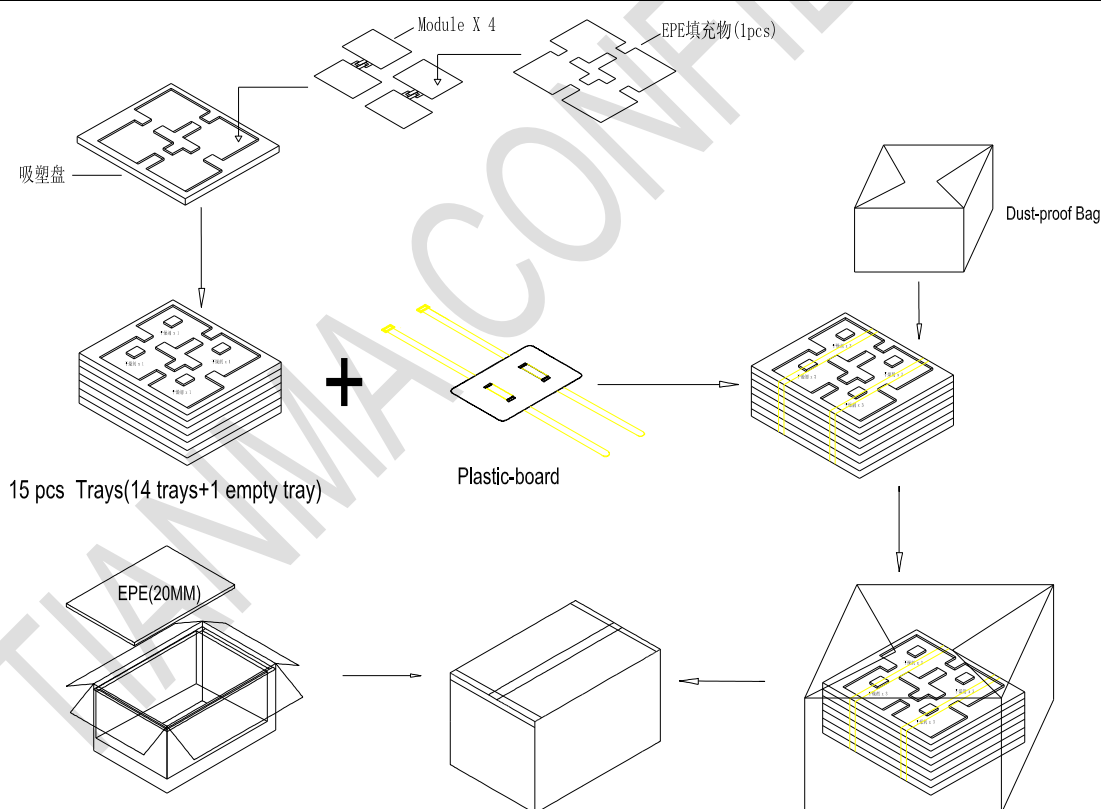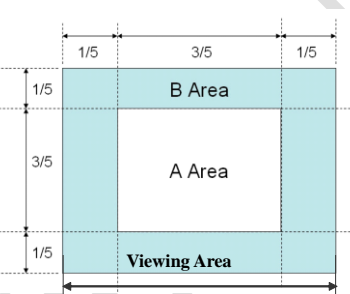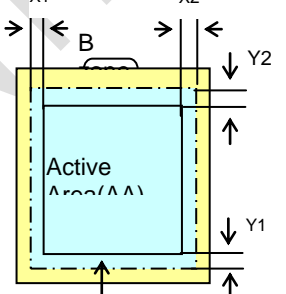
10   Product Inspection Criteria

10.1 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.

10.2 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

10.3 Inspection items and general notes

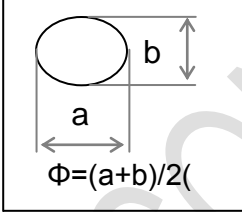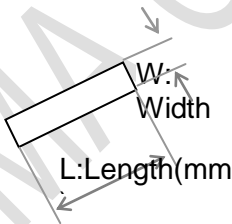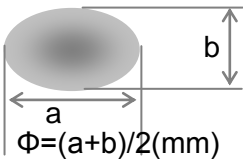|		

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 ⁰C
	  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

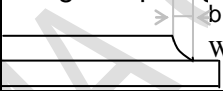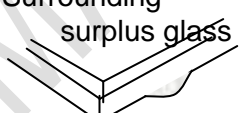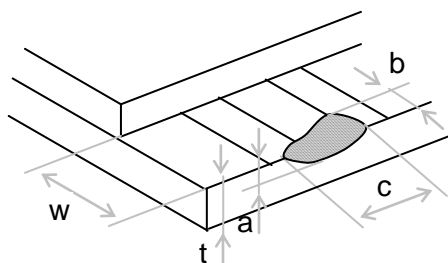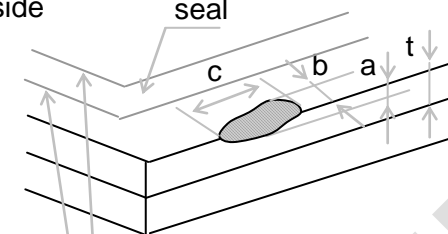| Functional defect	No display, Abnormal display, Open or missing segment, Short circuit, False viewing direction
Glass defect	Glass crack, Shaved corner of glass, Surplus glass
PCB defect	Components assembly defect

10.4 Outgoing Inspection level
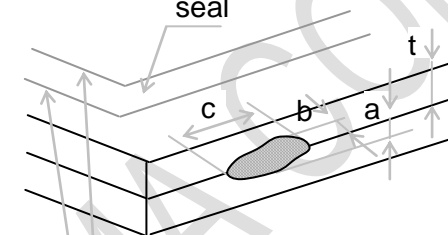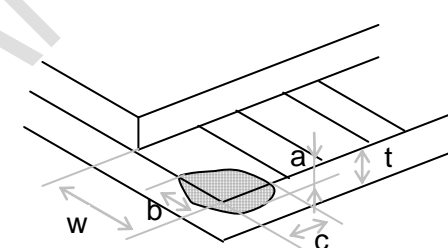
Outgoing Inspection standard	Inspection conditions	Inspection				
		Min.	Max.	Unit	IL	AQL
Major Defects	See 9.3 general notes	See 9.5			II	0.65
Minor Defects	See 9.3 general notes	See 9.5			II	1.5
Note：Sampling standard conforms to GB2828						
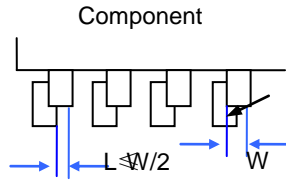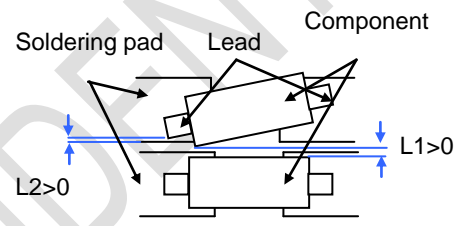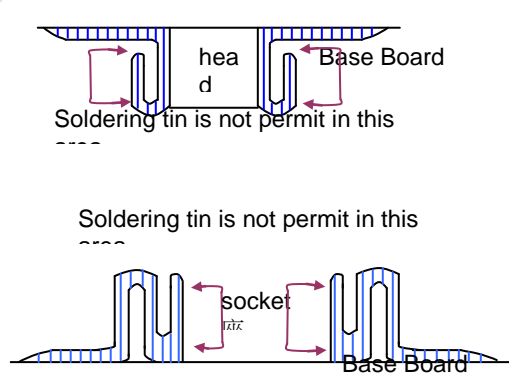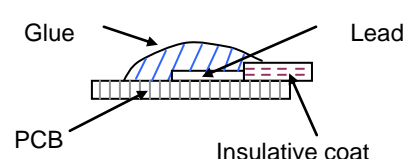
10.5 Inspection Items and Criteria

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	$\Phi=(a+b)/2($	A	$\Phi \leqq 0.10$	Neglected	Neglected
			B	$0.10<\Phi \leqq 0.15$	2	
			C	$0.15<\Phi \leqq 0.20$	1	
			D	$0.20<\Phi$	0	
			Total defective point(B,C)		3	
2	Black line, White line, and Particle Between Polarizer and glass, Scratch on glass	W: Width L:Length(mm)	A	$W \leqq 0.01$	Neglected	Neglected
			B	$0.01<W \leqq 0.03$ $L \leqq 3.0$	2	
			C	$0.03<W \leqq 0.05$ $L \leqq 3.0$	1	
			D	$0.05<W$	0	
			Total defective point(B,C)		3	
3	Contrast variation	$\Phi=(a+b)/2(mm)$	A	$\Phi \leqq 0.2$	Neglected	Neglected
			B	$0.2<\Phi \leqq 0.3$	2	
			C	$0.3<\Phi \leqq 0.4$	1	
			D	$0.4<\Phi$	0	
			Total defective point(B,C)		3	

4	Dot defect (if TFT LCD is used)	TFT LCD is smaller than 3 inches	LCD Class	Defect	A area		B area
			A	Bright dot	1		Neglected
				Dark dot	2		
				Total	2		
			B	Bright dot	2		
				Dark dot	3		
				Total	4		
		TFT LCD between 3~10.4 inches	LCD Class	Defect	A area	B area	C area
			A	Bright dot	1	1	Neglected
				Dark dot	1	2	
				Total	4		
			B	Bright dot	2	2	
				Dark dot	2	3	
				Total	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.

5	Bubble inside cell		any size	none	none

6	Polarizer defect (if Polarizer is used)	Scratch ,damage on polarizer, Particle on polarizer or between polarizer and glass.	Refer to item 1 and item 2.		
		Bubble, dent and convex	A	$\Phi \leqq 0.3$	Neglected	Neglected
			B	$0.3<\Phi \leqq 0.7$	2	
			C	$0.7<\Phi$	0	

7	Surplus glass	Stage surplus glass	$b \leqq 0.3mm$
		Surrounding surplus glass	Should not influence outline dimension and assembling.

8	Open segment or open common	Not permitted
9	Short circuit	Not permitted
10	False viewing direction	Not permitted
11	Contrast ratio uneven	According to the limit specimen
12	Crosstalk	According to the limit specimen
13	Black /White spot(display)	Refer to item 1
14	Black /White line(display)	Refer to item 2

		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	
			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	Max.3 defects allowed
		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.	

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）	Component L≤W/2 W
		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	Component Soldering pad Lead L1>0 L2>0
		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	head Base Board Soldering tin is not permit in this area Soldering tin is not permit in this area socket Base Board
		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.	Glue Lead PCB Insulative coat

11 Precautions for Use of LCD Modules

11.1 Handling Precautions

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

11.1.2 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.

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

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

11.1.5 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

11.1.6 Do not attempt to disassemble the LCD Module.

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

11.1.8 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.

11.2 Storage precautions

11.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

11.2.2 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%

11.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

11.3 Transportation Precautions

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