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SPECIFICATION

CUSTOMER : _____

MODULE NO.: **WF57CTLECD0#000**

APPROVED BY: (FOR CUSTOMER USE ONLY)	PCB VERSION:	DATA:

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

VERSION	DATE	REVISED PAGE NO.	SUMMARY
E	2010/04/20	9	Modify Touch Panel Specifications

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RECORDS OF REVISION

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2008/12/5		First issue
A	2009/8/12	16	Modify LED Life Time
B	2009.09.18	16	Modify Luminous Intensity
C	2010.01.04	15	Correct contour drawing
D	2010.01.12	15	Correct contour drawing
E	2010/04/20	9	Modify Touch Panel Specifications

Contents

- 1. Module Classification Information**
- 2. Block Diagram**
- 3. Electrical Characteristics**
- 4. Absolute Maximum Ratings**
- 5. Interface Pin Function**
- 6. Timing Characteristics of input signals**
- 7. Contour Drawing**
- 8. LED driving conditions**
- 9. Touch panel Information**
- 10. Reliability Test**

SUMMARY

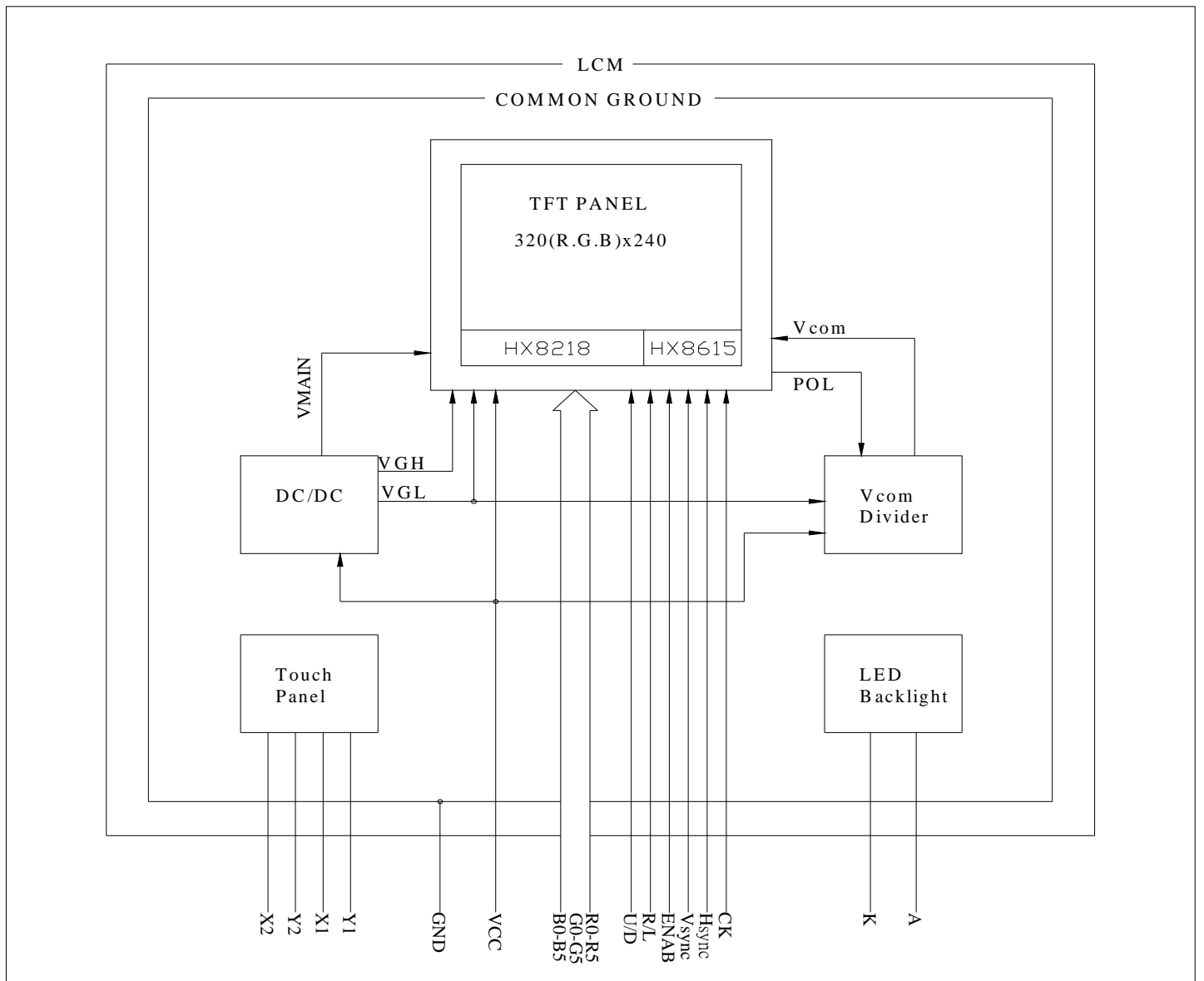
This technical specification applies to 5.7" color TFT-LCD panel. The 5.7" color TFT-LCD panel is designed for industry, vehicle application and other electronic products which require high quality flat panel displays. This module follows RoHS.

FEATURES

High Resolution: 230,400 Dots (320 RGB x 240). Image Reversion: Up/Down and Left/Right.

Item	Dimension	Unit
Dot Matrix	320 RGBx240(TFT)	dots
Screen size (inch)	5.7 inch	
Module dimension	143.5x 104.1 x 14.0(Max)	mm
Active area	115.25 x 86.4	mm
Dot pitch	0.12 x 0.36	mm
Color configuration	RGB-Strip	
Controller/driver IC	HX8218-A+HZ8615A (or compatible)	
LCD type	TFT, Negative, Transmissive (In LCD production, It will occur slightly color difference. We can only guarantee the same color in the same batch.)	
View direction	12 o'clock	
Backlight Type	LED,Normally White	

2. Block Diagram



3. Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	V_{DD}	—	3.0	3.3	3.6	V
Input High Volt.	V_{IH}	—	$0.7 V_{DD}$	—	+5.5	V
Input Low Volt.	V_{IL}	—	0	—	$0.3 V_{DD}$	V
Power Supply Voltage	V_{GH}	$T_a=25^{\circ}\text{C}$	10		30	V
	V_{GL}	$T_a=25^{\circ}\text{C}$	-17		-5	V
Supply Current	I_{VDD}	$V_{DD}=3.3\text{V}$	—	5	8	mA

4. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T_{OP}	-20	—	+70	$^{\circ}\text{C}$
Storage Temperature	T_{ST}	-30	—	+80	$^{\circ}\text{C}$
Power Supply Voltage	V_{GH}	-0.3	—	32.0	V
	V_{GL}	-22	—	0.3	V
	$V_{GH} - V_{GL}$	-0.3	—	+45	V

5.Interface Pin Function

5-1 LCM PIN Definition

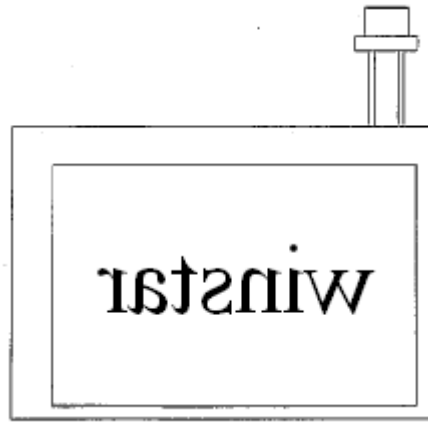
Pin No.	Symbol	I/O	Description	Remark
1	GND	I	Ground	
2	CK	I	Clock signal for sampling each data signal	
3	Hsync	I	Horizontal synchronous signal	
4	Vsync	I	Vertical synchronous signal	
5	GND	I	Ground	
6	R0	I	Red Data bit(LSB)	
7	R1	I	Red Data bit	
8	R2	I	Red Data bit	
9	R3	I	Red Data bit	
10	R4	I	Red Data bit	
11	R5	I	Red Data bit(MSB)	
12	GND	I	Ground	
13	G0	I	Green Data bit(LSB)	
14	G1	I	Green Data bit	
15	G2	I	Green Data bit	
16	G3	I	Green Data bit	
17	G4	I	Green Data bit	
18	G5	I	Green Data bit(MSB)	
19	GND	I	Ground	
20	B0	I	Blue Data bit(LSB)	
21	B1	I	Blue Data bit	
22	B2	I	Blue Data bit	
23	B3	I	Blue Data bit	
24	B4	I	Blue Data bit	
25	B5	I	Blue Data bit(MSB)	
26	GND	I	Ground	
27	ENAB	I	Signal to settle the horizontal display position	Note 1
28	Vcc	I	+3.3V power supply	
29	Vcc	I	+3.3V power supply	
30	R/L	I	Selection signal for horizontal scanning direction (L: Normally H: Right-and-left reversal)	Note 2
31	U/D	I	Selection signal for vertical scanning direction (H: Normally L: Up-and-Down reversal)	Note 2
32	NC	I	No connection	
33	GND	I	ground	

Note 1: The horizontal display start timing is settled in accordance with a rising timing of ENAB signal. In case ENAB is fixed "Low", the horizontal start timing is determined as described in 6-4 . Don't keep ENAB "High" during operation.

Note2



R/L =L ,UD=H



R/L=H,UD=H



R/L =L ,UD=L



R/L=H,UD=L

5.2 Backlight PIN Definition

Pin No.	Symbol	I/O	Description
1	VLED-	I	White, LED_ Cathode
2	NC		No connection
3	VLED+	I	Red, LED_ Anode

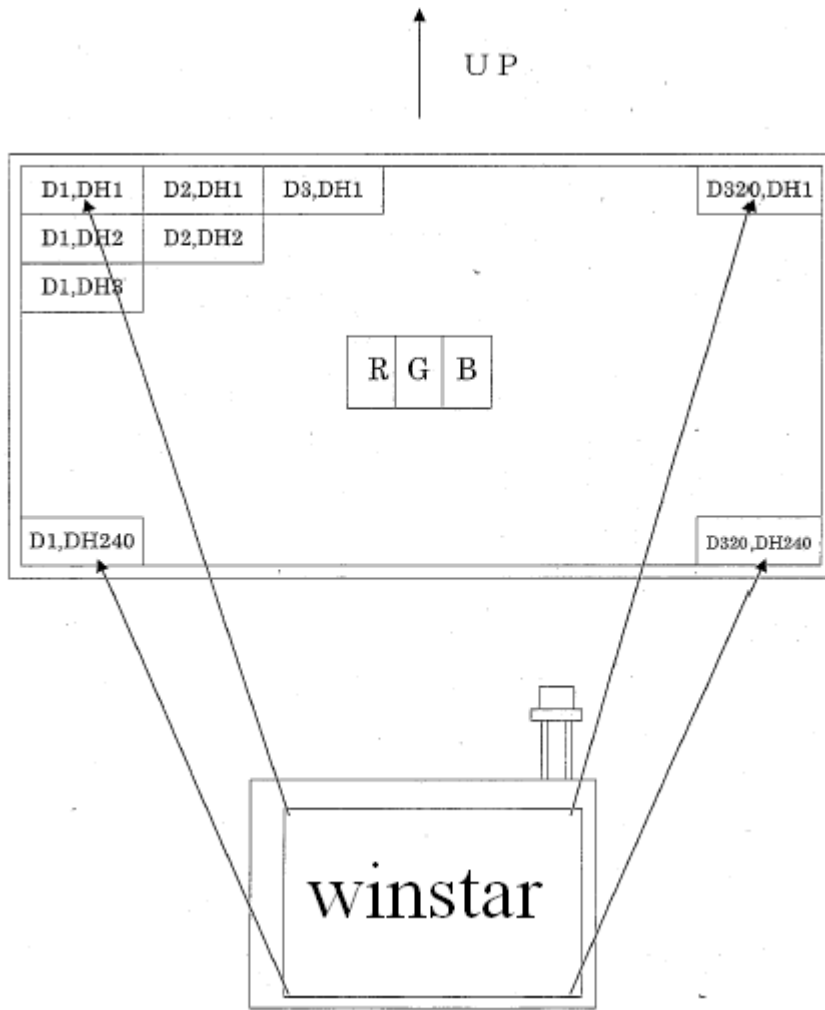
6. Timing Characteristics of input signals

6-1 Digital Parallel RGB interface

PARAMETER		Symbol	Min.	Typ.	Max.	Unit
CLK period		T_{OSC}	-	156	-	ns
Data setup time		T_{SU}	12	-	-	ns
Data hold time		T_{HD}	12	-	-	ns
IHS period		T_H	-	408	-	T_{OSC}
IHS pulse width		T_{HS}	5	30	-	T_{OSC}
IHS rising time		T_{Cr}	-	-	700	ns
IHS falling time		T_{Cf}	-	-	300	ns
IVS pulse width		T_{VS}	1	3	5	T_H
IVS rising time		T_{Vr}	-	-	700	ns
IVS falling time		T_{Vf}	-	-	1.5	μs
IVS falling to IHS rising time for odd field		T_{HVO}	1	-	-	T_{OSC}
IVS falling to IHS falling time for even field		T_{HVE}	1	-	-	T_{OSC}
IVS-DEN time	NTSC	T_{VSE}	-	18	-	T_H
	PAL	T_{VSE}	-	26	-	T_H
IHS-DEN time		T_{HE}	36	68	88	T_{OSC}
DEN pulse width		T_{EP}	-	320	-	T_{OSC}
DEN-STH time		T_{DES}	-	1	-	T_{OSC}
IVS period	NTSC		-	262.5	-	T_H
	PAL		-	312.5	-	T_H

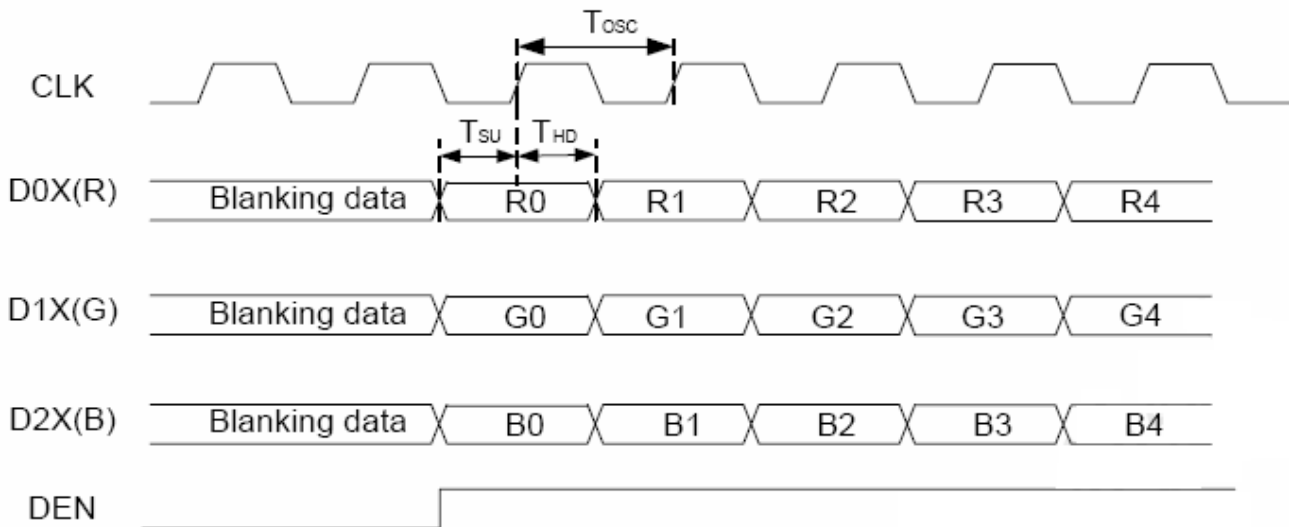
Note When SYNC mode is used, 1ST data start from 204th CLK after HIS falling.

6-2 Input Data Signals and Display Position on the screen



Display position of input data (H,V)

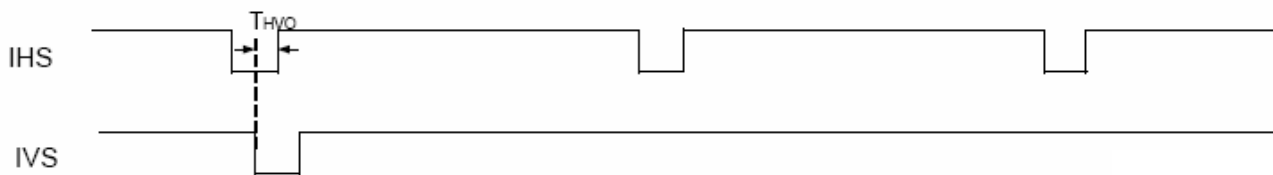
6-3 Digital Parallel RGB



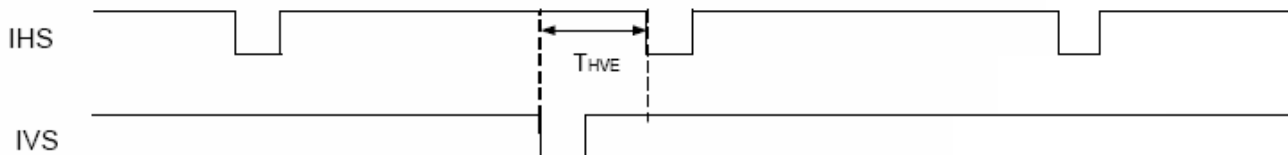
6-4 Digital/Analog RGB timing waveform

HIS and IVS timing

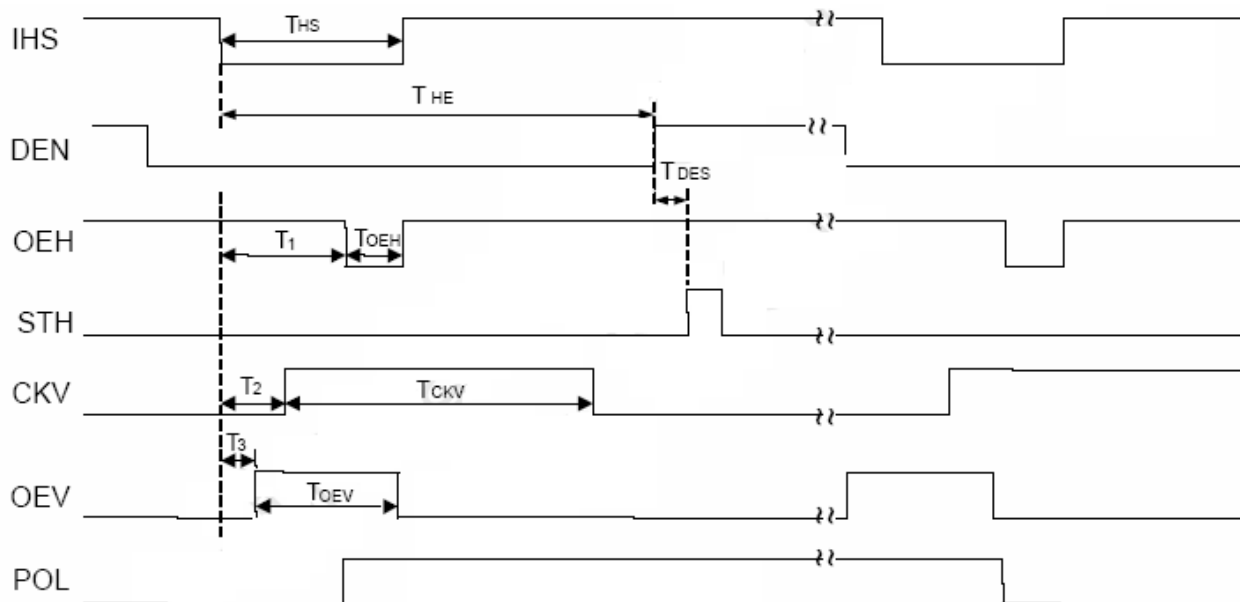
- Odd field



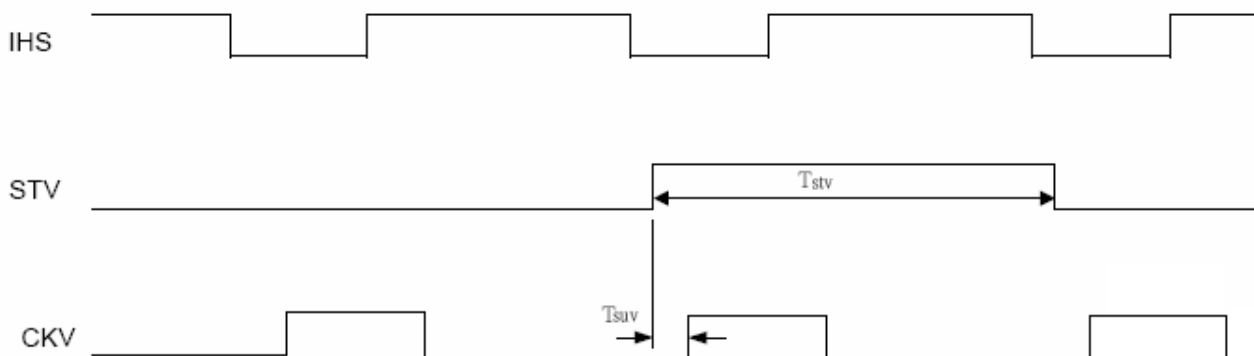
- Even field



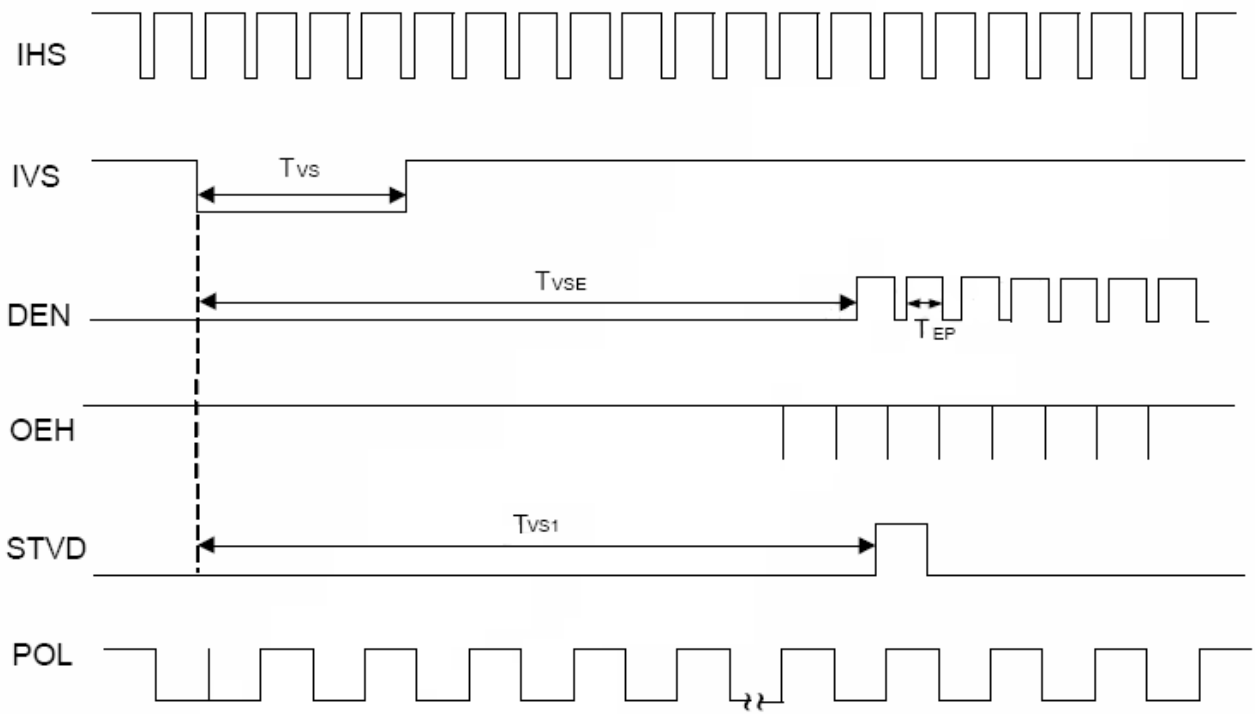
HIS and horizontal control timing waveform



HIS and vertical shift clock timing waveform



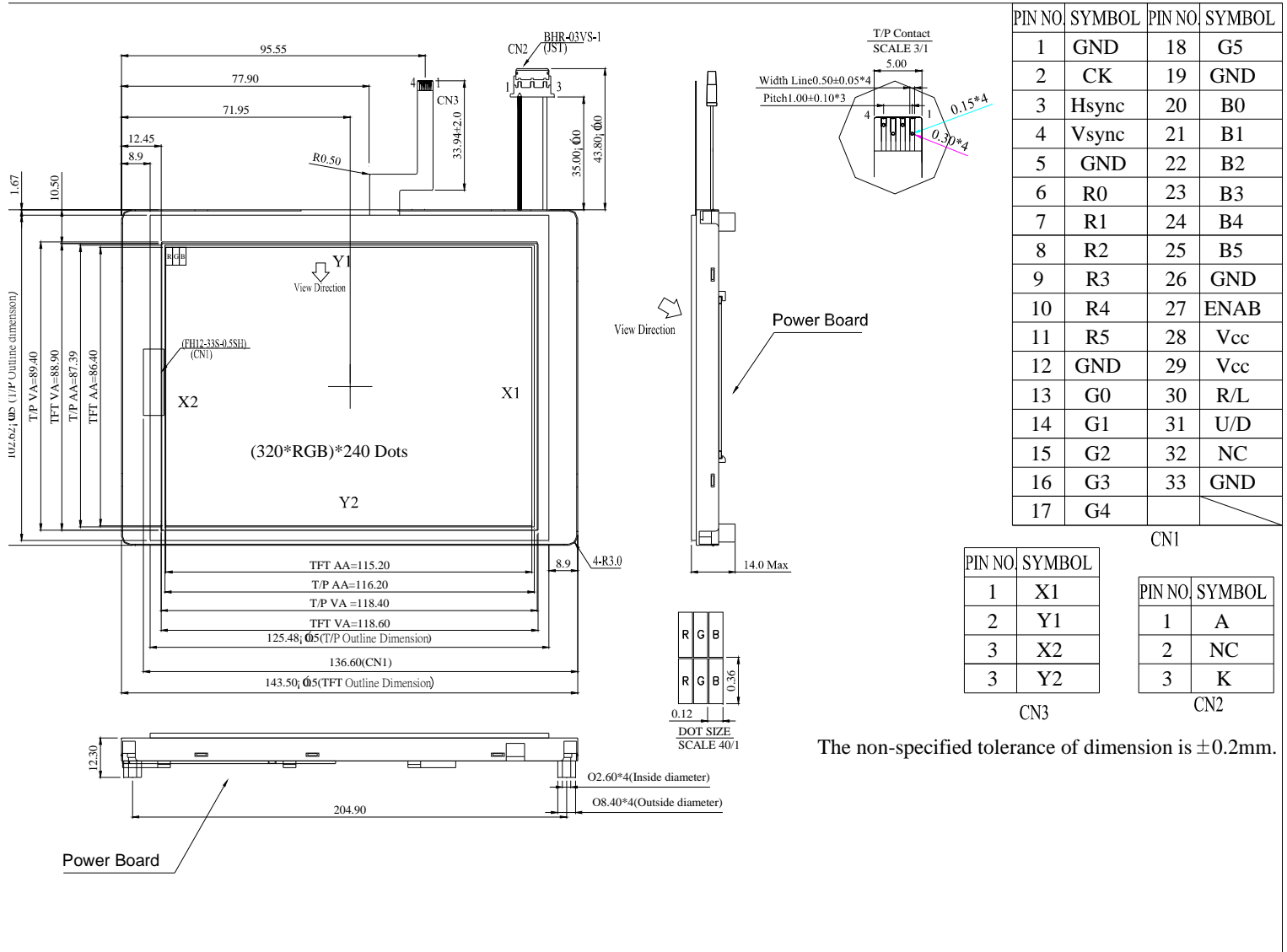
HIS and vertical control timing waveform



Input Signals, Basic Display Color and Gray Scale of Each Color

	Colors & Gray scale	Data signal																		
		Gray Scale	R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
Basic color	Black	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	-	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	-	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	-	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	-	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	-	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	-	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of red	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	☺	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	☺	↓				↓					↓							↓		
	☺	↓				↓					↓							↓		
	Brighter	GS61	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	☺	GS62	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS63	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	☺	GS1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	☺	↓				↓					↓							↓		
	☺	↓				↓					↓							↓		
	Brighter	GS61	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	☺	GS62	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	GS63	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale of blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	☺	GS1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	☺	↓				↓					↓							↓		
	☺	↓				↓					↓							↓		
	Brighter	GS61	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	☺	GS62	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Blue	GS63	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

7. Contour Drawing



PIN NO	SYMBOL	PIN NO	SYMBOL
1	GND	18	G5
2	CK	19	GND
3	Hsync	20	B0
4	Vsync	21	B1
5	GND	22	B2
6	R0	23	B3
7	R1	24	B4
8	R2	25	B5
9	R3	26	GND
10	R4	27	ENAB
11	R5	28	Vcc
12	GND	29	Vcc
13	G0	30	R/L
14	G1	31	U/D
15	G2	32	NC
16	G3	33	GND
17	G4		

CN1

PIN NO	SYMBOL
1	X1
2	Y1
3	X2
3	Y2

PIN NO	SYMBOL
1	A
2	NC
3	K

CN3

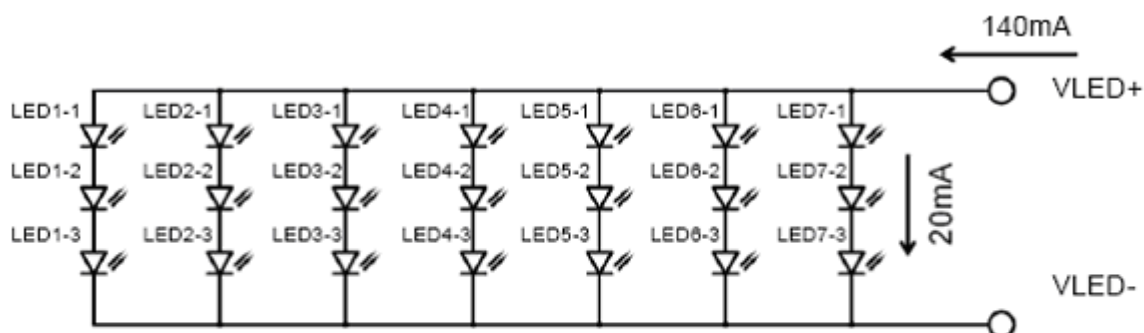
CN2

The non-specified tolerance of dimension is ±0.2mm.

8.LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Current	I_{LED}	----	140	210	mA	Note1
LED voltage	V_{LED}	9.0	----	10.5	V	
LED life Time	-	----	50K	----	-	Note 2,3,5
Luminous Intensity	IV	320	400	----	CD/M ²	Note 4

Note 1: There are 7 Groups LED shown as below, =9.9 V(Min)



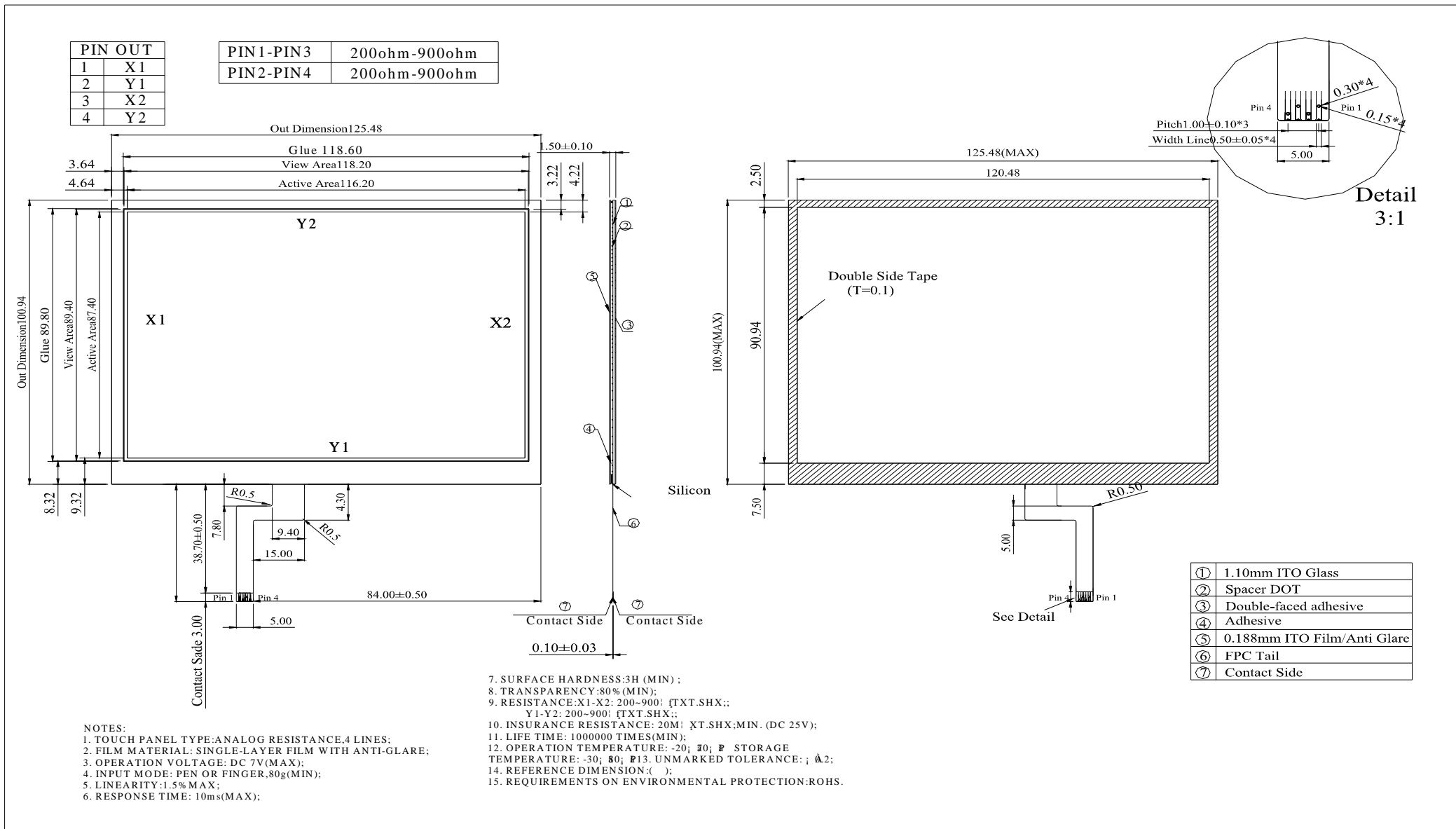
Note 2 : $T_a = 25^{\circ}\text{C}$,

Note 3 : Brightness to be decreased to 50% of the initial value.

Note 4: The luminous is measured through LCD panel.

Note 5:50K hours is only an estimate for reference.

9. Touch panel Information



Non-Proper Ways to handle the touch screen

1. Do not pull or crease the tail of the touch screen.

Tails, unless the drawing calls out for a bend, are to be free of permanent creases in the polyester, slight crease lines in the adhesive tail cover are allowed

10. Reliability Test

WIDE TEMPERATURE RELIABILITY TEST

N O.	ITEM	CONDITION			STANDARD	NOTE
1	High Temp. Storage	80°C	240 Hrs		Appearance without defect	
2	Low Temp. Storage	-30°C	240 Hrs		Appearance without defect	
3	High Temp. & High Humi. Storage	60 °C 90%RH	240 Hrs		Appearance without defect	
4	High Temp. Operating Display	70°C	240 Hrs		Appearance without defect	
5	Low Temp. Operating Display	-20°C	240 Hrs		Appearance without defect	
6	Thermal Shock	-20 °C, 30min. → 70□, 30min. ↑ (1cycle) ↓			Appearance without defect	10 cycles

Inspection Provision

1. Purpose

The WINSTAR inspection provision provides outgoing inspection provision and its expected quality level based on our outgoing inspection of WINSTAR LCD produces.

2. Applicable Scope

The WINSTAR inspection provision is applicable to the arrangement in regard to outgoing inspection and quality assurance after outgoing.

3. Technical Terms

3-1 WINSTAR Technical Terms



4. Outgoing Inspection

4-1 Inspection Method

MIL-STD-105E Level Regular inspection

4-2 Inspection Standard

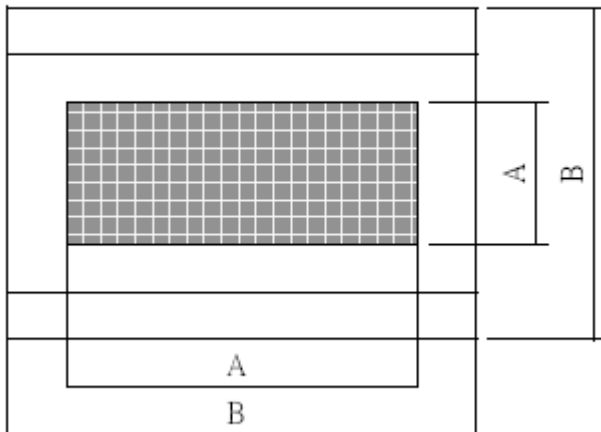
	Item		AQL(%)	Remarks
Major Defect	Dots	Opens Shorts Erroneous operation	0.4	Faults which substantially lower the practicality and the initial purpose difficult to achieve
	Solder appearance	Shorts Loose		
	Cracks	Display surface cracks		

	Dimensions	External from Dimensions	0.4	
Minor Defect	Inside the glass	Black spots	0.65	Faults which appear to pose almost no obstacle to the practicality, effective use, and operation
	Polarizing plate	Scratches, foreign Matter, air bubbles, and peeling		
	Dots	Pinhole, deformation		
	Color tone	Color unevenness		
	Solder appearance	Cold solder Solder projections		

4-3 Inspection Provisions

*Viewing Area Definition

Fig. 1



A : Zone Viewing Area

B : Zone Glass Plate Outline

*Inspection place to be 500 to 1000 lux illuminance uniformly without glaring.

The distance between luminous source (daylight fluorescent lamp and cool white fluorescent lamp) and sample to be 30 cm to 50 cm.

*Test and measurement are performed under the following conditions, unless otherwise specified.

Temperature $20 \pm 15^{\circ}\text{C}$

Humidity $65 \pm 20\% \text{R.H.}$

Pressure 860~1060hPa (mmbar)

In case of doubtful judgment, it is performed under the following conditions.

Temperature $20 \pm 2^{\circ}\text{C}$

Humidity $65 \pm 5\% \text{R.H.}$

Pressure 860~1060hPa (mmbar)

5.Specification for quality check

5-1-1 Electrical characteristics :

NO.	Item	Criterion
1	Non operational	Fail
2	Miss operating	Fail
3	Contrast irregular	Fail
4	Response time	Within Specified value

5-1-2 Components soldering :

Should be no defective soldering such as shorting, loose terminal cold solder, peeling of printed circuit board pattern, improper mounting position, etc.

5-2 Inspection Standard for TFT panel

5-2-1 The environmental condition of inspection :

The environmental condition and visual inspection shall be conducted as below.

(1) Ambient temperature : $25\pm 5^{\circ}\text{C}$

(2) Humidity : 25~75% RH

(3) External appearance inspection shall be conducted by using a single 20W fluorescent lamp or equivalent illumination.

(4) Visual inspection on the operation condition for cosmetic shall be conducted at the distance 30cm or more between the LCD panels and eyes of inspector. The viewing angle shall be 90 degree to the front surface of display panel.

(5) Ambient Illumination : 300~500 Lux for external appearance inspection.

(6) Ambient Illumination : 100~200 Lux for light on inspection.

5-2-2 Inspection Criteria

(1) Definition of dot defect induced from the panel inside

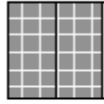
a) The definition of dot : The size of a defective dot over 1/2 of whole dot is regarded as one defective dot

b) Bright dot : Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

c) Dark dot : Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue pattern.

d) 2 dot adjacent = 1 pair = 2 dots

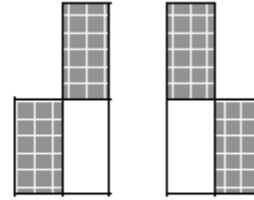
Picture :



2 dot adjacent



2 dot adjacent (vertical)



2 dot adjacent (slant)

(2) Display Inspection

NO.	Item		Acceptable Count	
1	Dot defect	Bright Dot	Random	$N \leq 2$
			2 dots adjacent	$N \leq 0$
		Dark Dot	Random	$N \leq 3$
			2 dots adjacent	$N \leq 1$
	Total bright and dark dot			$N \leq 4$
Functional failure (V-line/ H-line/Cross line etc.)			Not allowable	
	Mura	It's OK if mura is slight visible through 6% ND filter. (Judged by limit sample if it is necessary)		
2	Newton ring (touch panel)	Orbicular of interference fringes is not allowed in the optimum contrast within the active area under viewing angle.		

(3) Appearance inspection

NO.	Item	Standards
1	Panel Crack	Not allow. It is shown in Fig.1.
2	Broken CF Non -lead Side of TFT	The broken in the area of $W > 2\text{mm}$ is ignored, L is ignored. It is shown in Fig.2.
3	Broken Lead Side of TFT	FPC lead, electrical line or alignment mark can't be damaged. It is shown in Fig.3.
4	Broken Corner of TFT at Lead Side	FPC lead. electrical line or alignment mark can't be damaged. It is shown in Fig.4.
5	Burr of TFT / CF Edge	The distance of burr from the edge of TFT / CF, $W \leq 0.3\text{mm}$. It is shown in Fig.5.
6	Foreign Black / White/Bright Spot	(1) $0.15 < D \leq 0.5 \text{ mm}$, $N \leq 4$; (2) $D \leq 0.15\text{mm}$, Ignore. It is shown in Fig.6.
7	Foreign Black / White/Bright Line	(1) $0.05 < W \leq 0.1 \text{ mm}$, $0.3 < L \leq 2 \text{ mm}$, $N \leq 4$.
		(2) $W \leq 0.05\text{mm}$ and $L \leq 0.3\text{mm}$ Ignore. It is shown in Fig.7.
8	Color irregular	Not remarkable color irregular.

Fig 1.

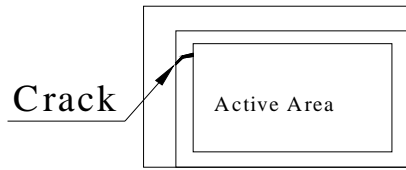


Fig 2.

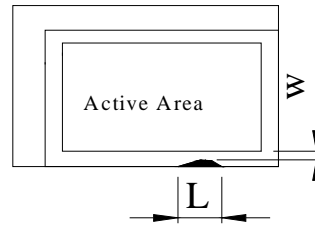


Fig 3.

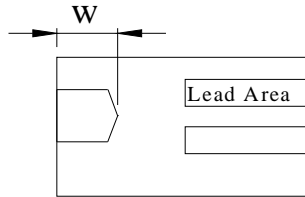


Fig 4.

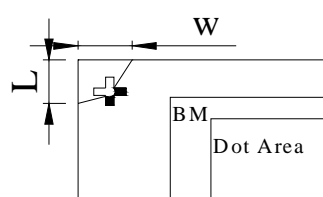


Fig 5.

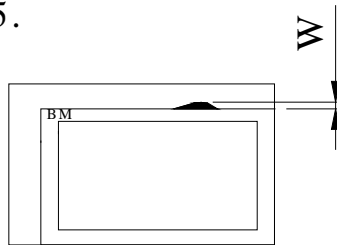
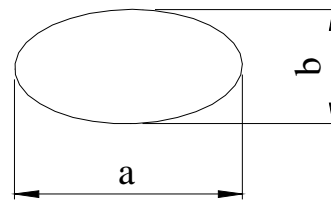


Fig 6.

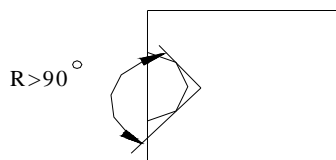


$$D = (a+b)/2$$

Fig 7.



Fig8.



Notes

- 1.W:Width
- 2.Length
- 3.D:Average Diameter
- 4.N:Count
- 5.All the angle of the broken must be larger than 90; It is shown in Fig.8.($R > 90$;)

NOTICE:

SAFETY

1. If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.
2. If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

HANDLING

1. Avoid static electricity which can damage the CMOS LSI.
2. Do not remove the panel or frame from the module.
3. The polarizing plate of the display is very fragile. So, please handle it very carefully.
4. Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
5. Do not use ketonics solvent & Aromatic solvent. Use a soft cloth soaked with a cleaning naphtha solvent.

STORAGE

1. Store the panel or module in a dark place where the temperature is $25\pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.
2. Do not place the module near organics solvents or corrosive gases.
3. Do not crush, shake, or jolt the module.

TERMS OF WARRANTY

1. Acceptance inspection period

The period is within one month after the arrival of contracted commodity at the buyer's factory site.

2. Applicable warrant period

The period is within twelve months since the date of shipping out under normal using and storage conditions.