



Winstar Display Co., LTD

華凌光電股份有限公司



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SPECIFICATION

CUSTOMER : _____

MODULE NO.: WF57DTIBCDC#000

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

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2009/10/12		First issue



RECORDS OF REVISION

DOC. FIRST ISSUE

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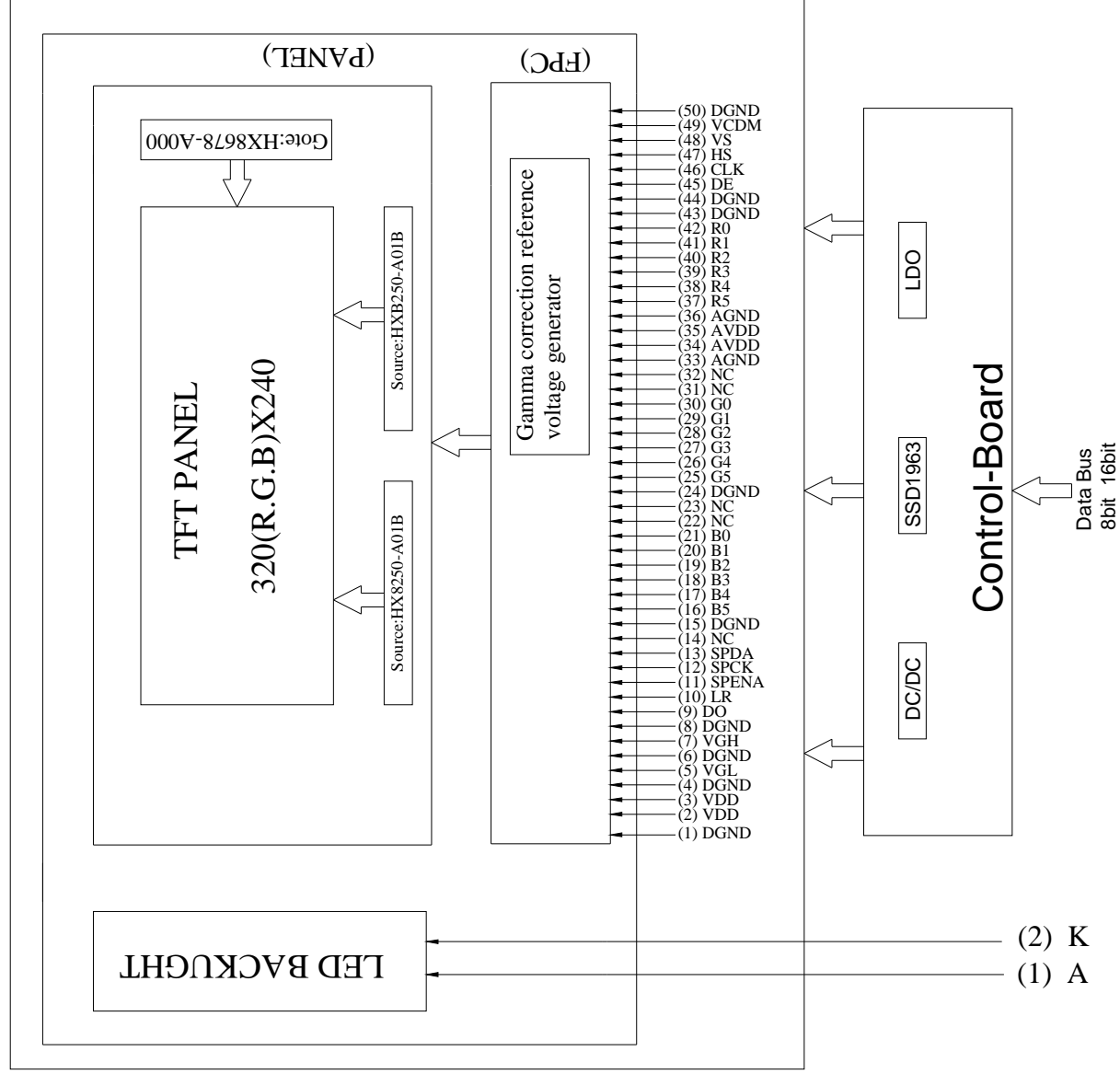
This product is composed of a TFT LCD panel, driver ICs, FPC, Control Board and a backlight unit. The following table described the features of WF57DTIBCDC#000

Item	Dimension	Unit
Dot Matrix	320 x RGBx240(TFT)	dots
Module dimension	126.0x 101.55 x 7.3 (max)	mm
View area	117.9x 89.1	mm
Dot pitch	0.12 x 0.36	mm
Driving IC package	COG	
LCD type	TFT, Negative, Transmissive	
View direction	6 o'clock	
Backlight Type	LED, Normally White	
Controller IC	SSD1963	

*Expose the IC number blaze (Luminosity over than 1 cd) when using the LCM may cause IC operating failure.

*Color tone slight changed by temperature and driving voltage.

2. Block Diagram (16 BITS Mode)



3. Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	VCC	—	3.0	3.3	3.6	V
Input High Volt.	V _{IH}	—	0.8VDD IO	—	VDDIO + 0.5	V
Input Low Volt.	V _{IL}	—	—	—	0.2VDDIO	V
LCD Driving Supply Voltage	V _{GH} *1	Ta=25°C		15		V *3
	V _{GL} *2			-10		V
	Vcom		—	3.7	—	
Supply Current	I _{VDD}	V _{DD} =3.3V	—	121	—	mA

Notes:

*1) VGH is TFT Gate on operating Voltage.

*2) VGL is TFT Gate off operating Voltage, VGL signal must be fluctuates with same phase as Vcom when Storage on Gate structure.

*3) Vcom must be adjusted to optimize display quality_Crosstalk, Contrast Ratio and etc.

4. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T _{OP}	-20	—	+70	°C
Storage Temperature	T _{ST}	-30	—	+80	°C
Power Supply Voltage	V _{GH}	-0.3	—	18	V
	V _{GL}	-15	—	0.3	V
	VCC	-0.3	—	6.0	V

5.Interface Pin Function

5-1 Pins Connection To Control Board

P/N	Symbol	16BIT Function	P/N	Symbol	16BIT Function
1	GND	Ground	26	RST	Reset
2	VCC	Power supply for Logic	27	RL	Scan direction
3	NC	No connection	28	UD	Scan direction
4	RS		29	NC	No connection
5	WR	8080 family MPU interface : Write signal	30	NC	No connection
6	RD	8080 family MPU interface: Read signal	31	NC	No connection
7	DB0	Data bus	32	NC	No connection
8	DB1				
9	DB2				
10	DB3				
11	DB4				
12	DB5				
13	DB6				
14	DB7				
15	DB8				
16	DB9				
17	DB10				
18	DB11				
19	DB12				
20	DB13				
21	DB14				
22	DB15				
23	NC	No connection			
24	NC	No connection			
25	CS	Chip select			

6. DC CHARACTERISTICS

Conditions:

Voltage referenced to VSS

VDDD, VDDPLL = 1.2V

VDDIO, VDDLCD = 3.3V

TA = 25°C

DC Characteristics

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
PSTY	Quiescent Power			300		uW
IIZ	Input leakage current		-1		1	uA
IOZ	Output leakage current		-1		1	uA
VOH	Output high voltage		0.8VDDIO			V
VOL	Output low voltage				0.2VDDIO	V
VIH	Input high voltage		0.8VDDIO		VDDIO + 0.5	V
VIL	Input low voltage				0.2VDDIO	V

7. AC Characteristics

Conditions:

Voltage referenced to V_{SS}

V_{DDD}, V_{DDPLL} = 1.2V

V_{DDIO}, V_{DDLCD} = 3.3V

T_A = 25°C

C_L = 50pF (Bus/CPU Interface)

C_L = 0pF (LCD Panel Interface)

7.1 Clock Timing

Clock Input Requirements for CLK (PLL-bypass)

Symbol	Parameter	Min	Max	Units
FCLK	Input Clock Frequency (CLK)		120	MHz
TCLK	Input Clock period (CLK)	1/fCLK		ns

Clock Input Requirements for CLK (Using PLL)

Symbol	Parameter	Min	Max	Units
FCLK	Input Clock Frequency (CLK)	2.5	50	MHz
TCLK	Input Clock period (CLK)	1/fCLK		ns

Clock Input Requirements for crystal oscillator XTAL (Using PLL)

Symbol	Parameter	Min	Max	Units
FXTAL	Input Clock Frequency	2.5	10	MHz
TXTAL	Input Clock period	1/fXTAL		ns

7.2 MCU Interface Timing

7.2.1 6800 Mode

Table 7-4: 6800 Mode Timing

Symbol	Parameter	Min	Typ	Max	Unit
tcyc	Reference Clock Cycle Time	9	-	-	ns
tPWCSL	Pulse width CS# or E low	1	-	-	tCYC
tPWCSH	Pulse width CS# or E high	1	-	-	tCYC
tFDRD	First Data Read Delay	5	-	-	tCYC
tAS	Address Setup Time	1	-	-	ns
tAH	Address Hold Time	1	-	-	ns
tDSW	Data Setup Time	4	-	-	ns
tDHW	Data Hold Time	1	-	-	ns
tDSR	Data Access Time	-	-	5	ns
tDHR	Output Hold time	1	-	-	ns

Figure 7-1: 6800 Mode Timing Diagram (Use CS# as Clock)

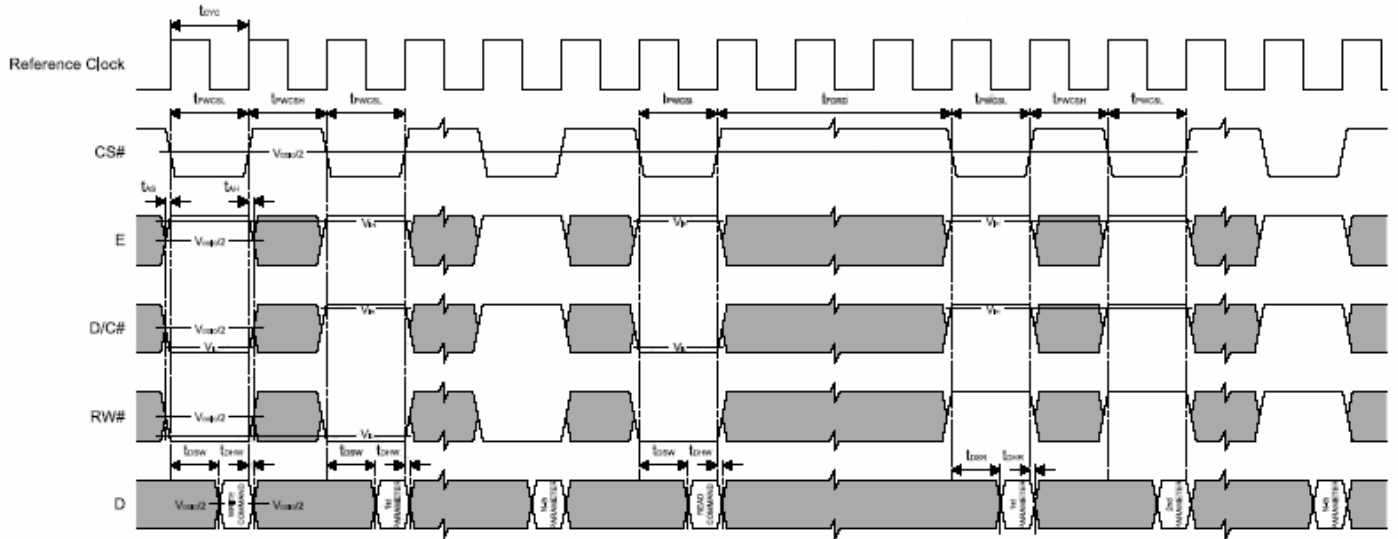
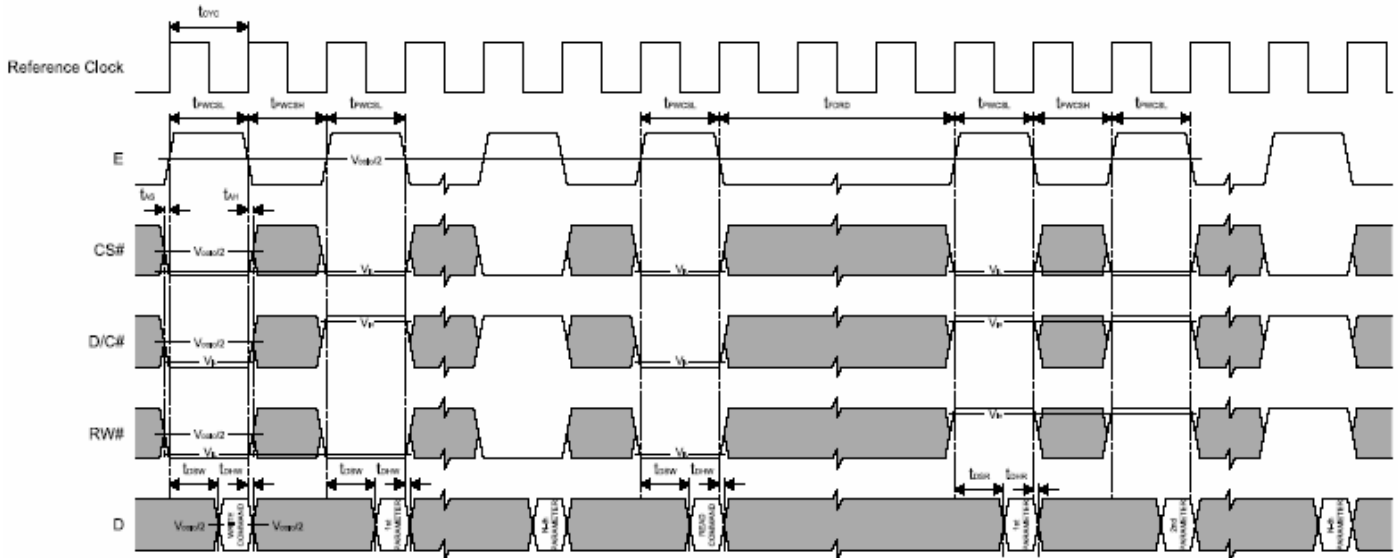


Figure 7-2: 6800 Mode Timing Diagram (Use E as Clock)

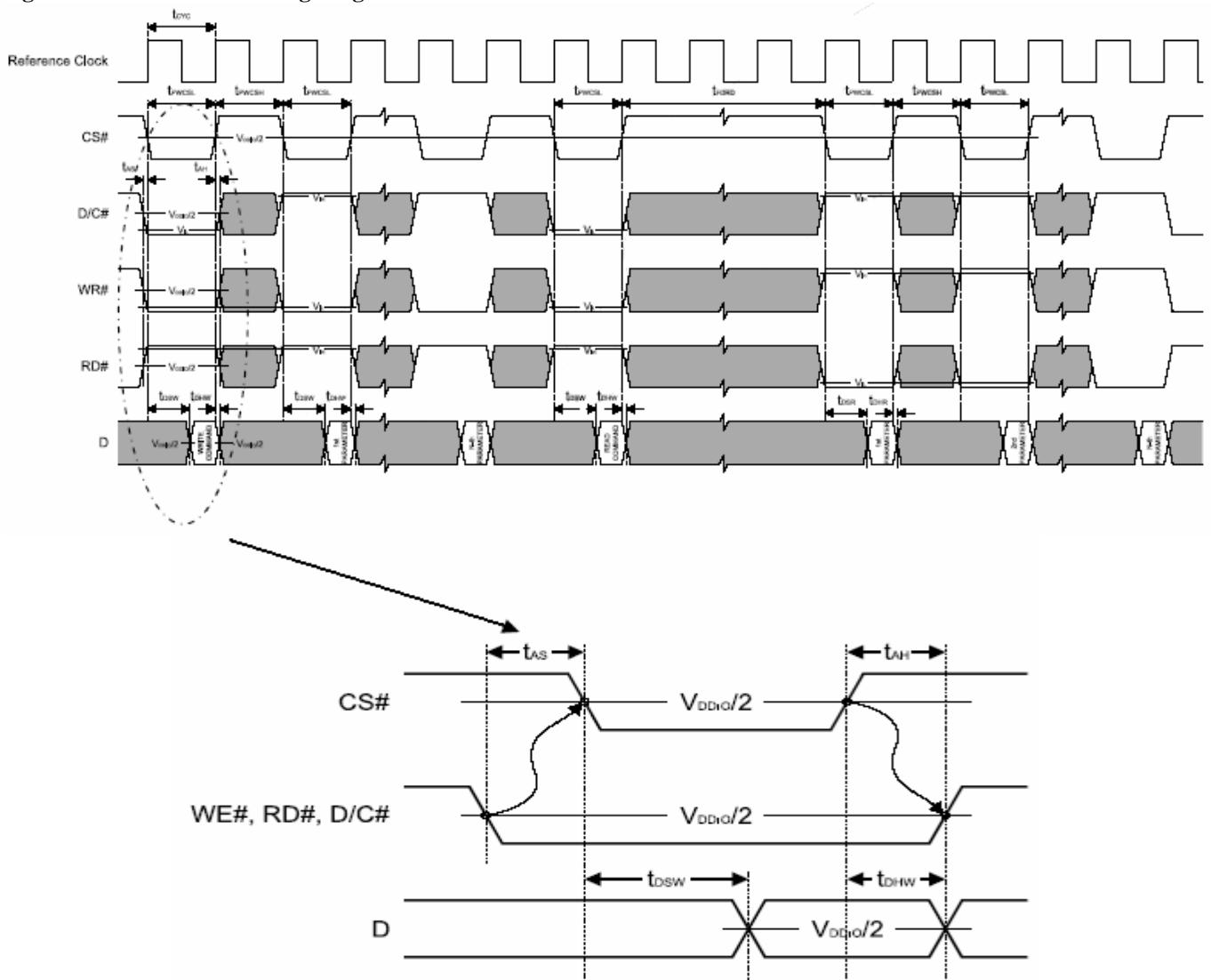


7.2.2 8080 Mode Write Cycle

Table 7-5: 8080 Mode Timing

Symbol	Parameter	Min	Typ	Max	Unit
tcyc	Reference Clock Cycle Time	9	-	-	ns
tPWCSL	Pulse width CS# low	1	-	-	tCYC
tPWCSH	Pulse width CS# high	1	-	-	tCYC
tFDRD	First Read Data Delay	5	-	-	tCYC
tAS	Address Setup Time	1	-	-	ns
tAH	Address Hold Time	1	-	-	ns
tDSW	Data Setup Time	4	-	-	ns
tDHW	Data Hold Time	1	-	-	ns
tDSR	Data Access Time	-	-	5	ns
tDHR	Output Hold time	1	-	-	ns

Figure 7-3: 8080 Mode Timing Diagram



8. Data transfer order Setting

Pixel Data Format

Both 6800 and 8080 support 8-bit, 9-bit, 16-bit, 18-bit and 24-bit data bus. Depending on the width of the data bus, the display data are packed into the data bus in different ways.

Pixel Data Format :

Interface	Cycle	D[23]	D[22]	D[21]	D[20]	D[19]	D[18]	D[17]	D[16]	D[15]	D[14]	D[13]	D[12]	D[11]	D[10]	D[9]	D[8]	D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]	
24 bits	1 st	R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0	
18 bits	1 st							R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0	
16 bits (565 format)	1 st									R5	R4	R3	R2	R1	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	
16 bits	1 st									R5	R4	R3	R2	R1	R0	X	X	G5	G4	G3	G2	G1	G0	X	X	
	2 nd									B5	B4	B3	B2	B1	B0	X	X	R5	R4	R3	R2	R1	R0	X	X	
	3 rd									G5	G4	G3	G2	G1	G0	X	X	B5	B4	B3	B2	B1	B0	X	X	
9 bits	1 st																	R5	R4	R3	R2	R1	R0	G5	G4	G3
	2 nd																	G2	G1	G0	B5	B4	B3	B2	B1	B0
8 bits	1 st																	R5	R4	R3	R2	R1	R0	X	X	
	2 nd																	G5	G4	G3	G2	G1	G0	X	X	
	3 rd																	B5	B4	B3	B2	B1	B0	X	X	

X: Don't Care

9 Register Depiction

Please consult the spec of SSD1963

10. OPTICAL CHARACTERISTIC

Ta=25±2°C, ILED=20mA

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time	Tr	$\theta = 0^\circ, \phi = 0^\circ$	-	10		ms	Note 3,5
	Tf		-	15		ms	
Contrast ratio	CR	At optimized viewing angle	300	400	-	-	Note 4,5
Color Chromaticity	White	Wx	$\theta = 0^\circ, \phi = 0^\circ$	(0.26)	(0.31)	(0.36)	Note 2,6,7
		Wy		(0.28)	(0.33)	(0.38)	
	Red	Rx	$\theta = 0^\circ, \phi = 0^\circ$				
		Ry					
	Green	Gx	$\theta = 0^\circ, \phi = 0^\circ$				
		Gy					
Blue	Bx	$\theta = 0^\circ, \phi = 0^\circ$					
	By						
Viewing angle	Hor.	Θ_R	CR ≥ 10	(50)	(60)	Deg.	Note 1
		Θ_L		(50)	(60)		
	Ver.	Φ_T		(40)	(50)		
		Φ_B		(45)	(55)		
Brightness	-	-	200	250	-	cd/m ²	Center of display

Ta=25±2°C, IL=20mA

Note 1: Definition of viewing angle range

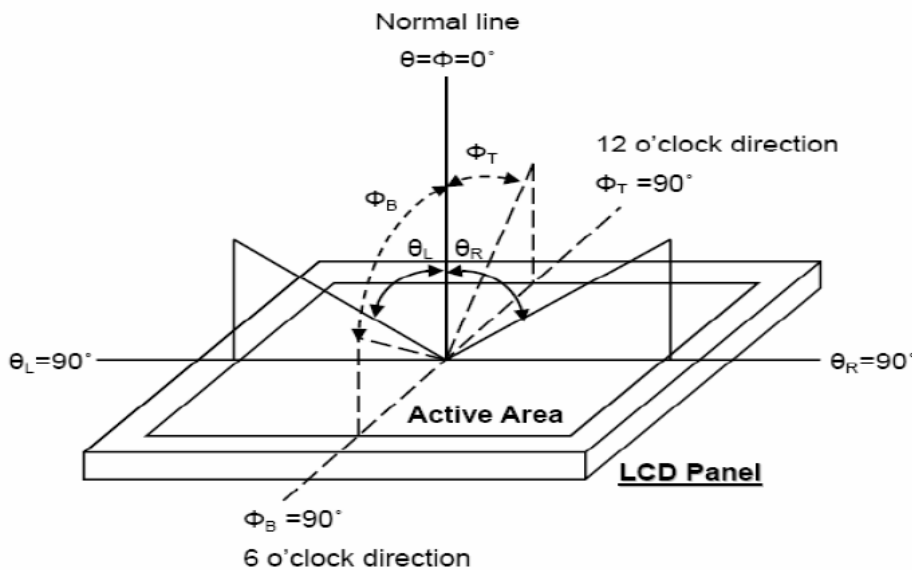


Fig. 8-1 Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

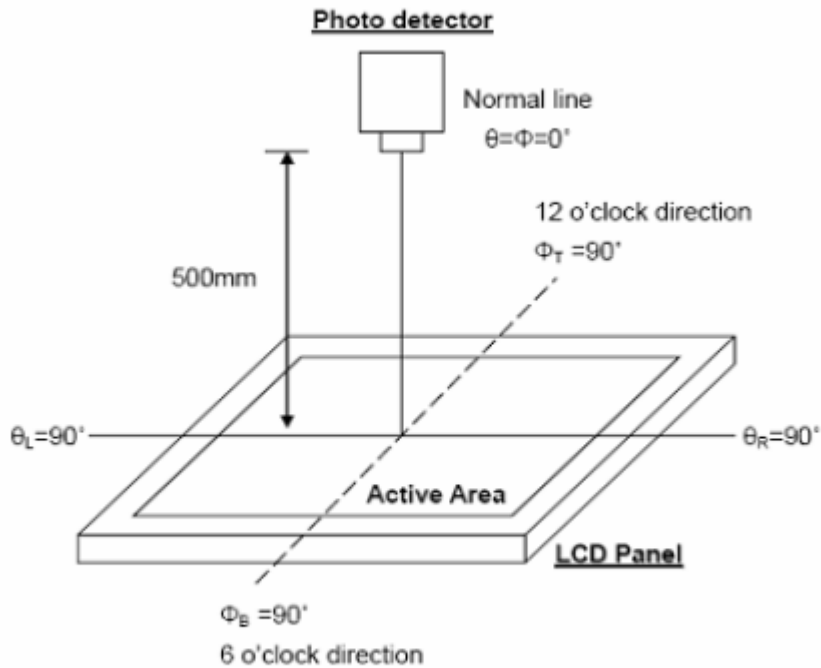


Fig. 8-2 Optical measurement system setup

Note 3: 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_r , is the time between photo detector output intensity changed from 90% to 10% . And fall time, T_f , is the time between photo detector output intensity changed from 10% to 90% .

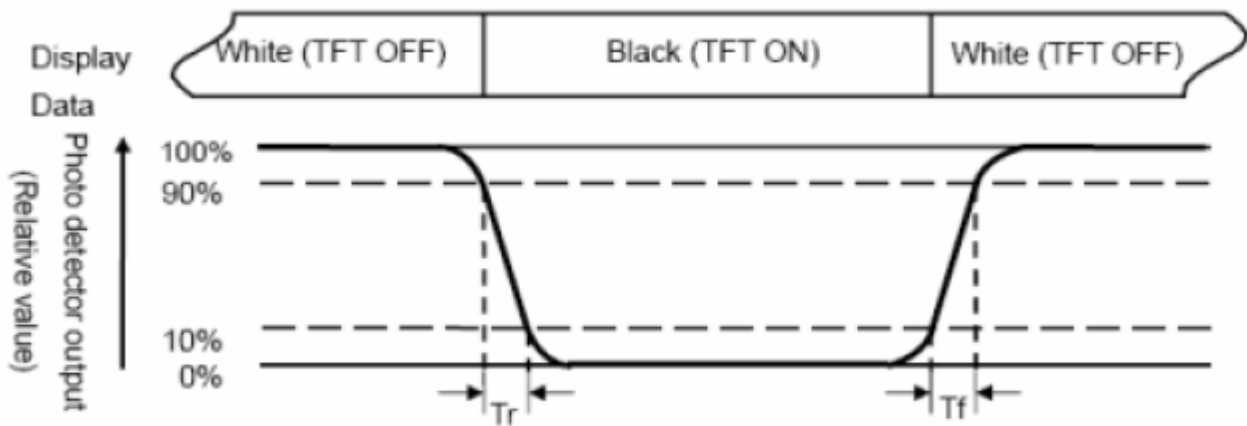


Fig. 3-3 Definition of response time

Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

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

Note 5: White $V_i = V_{i50} \pm 1.5V$

Black $V_i = V_{i50} \pm 2.0V$

“±” means that the analog input signal swings in phase with VCOM signal.

“±” means that the analog input signal swings out of phase with VCOM signal.

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of

module are electrically opened.

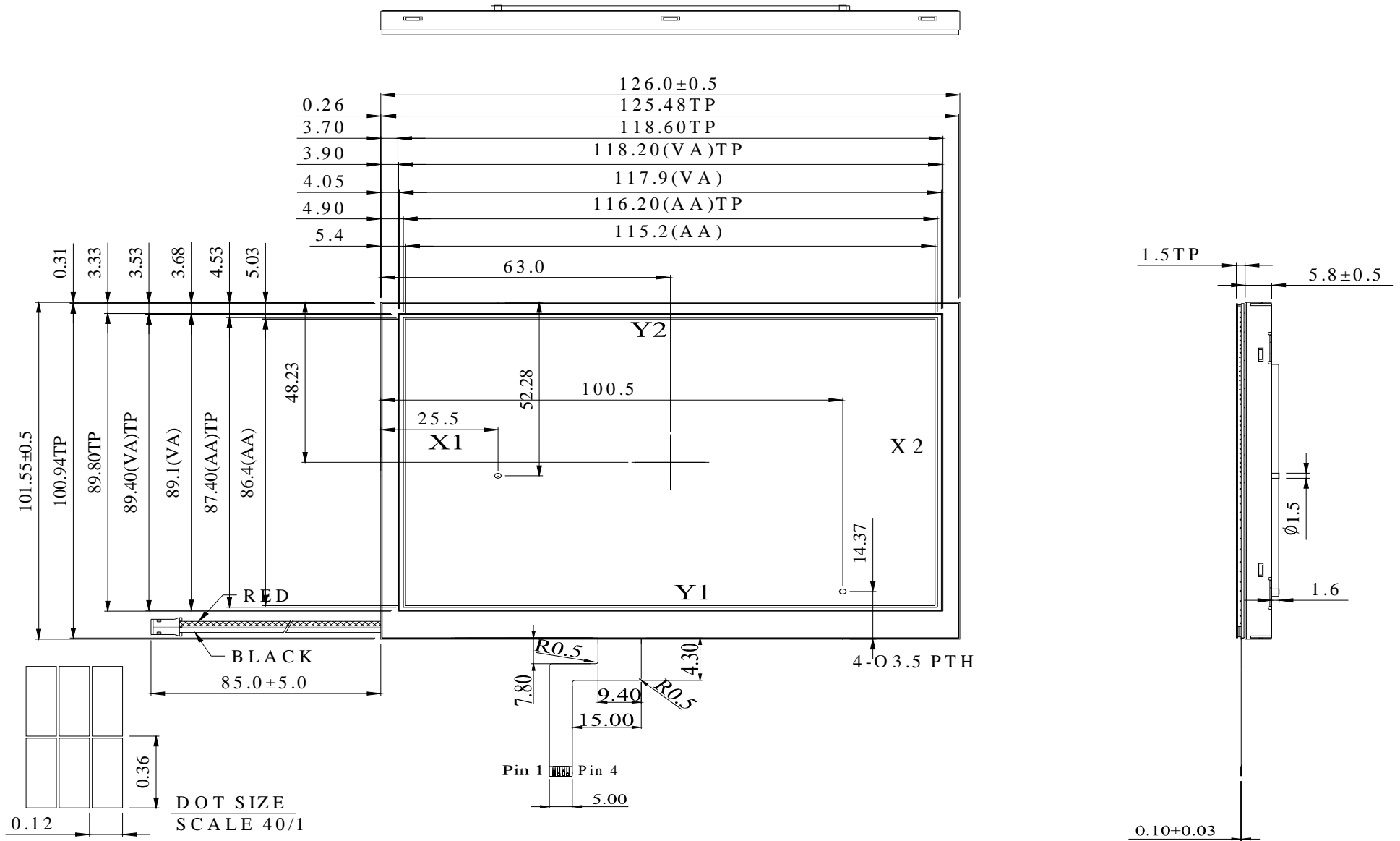
Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

$$\text{Note 8 : Uniformity (U)} = \frac{\text{Brightness (min)}}{\text{Brightness (max)}} \times 100\%$$

11. Contour Drawing

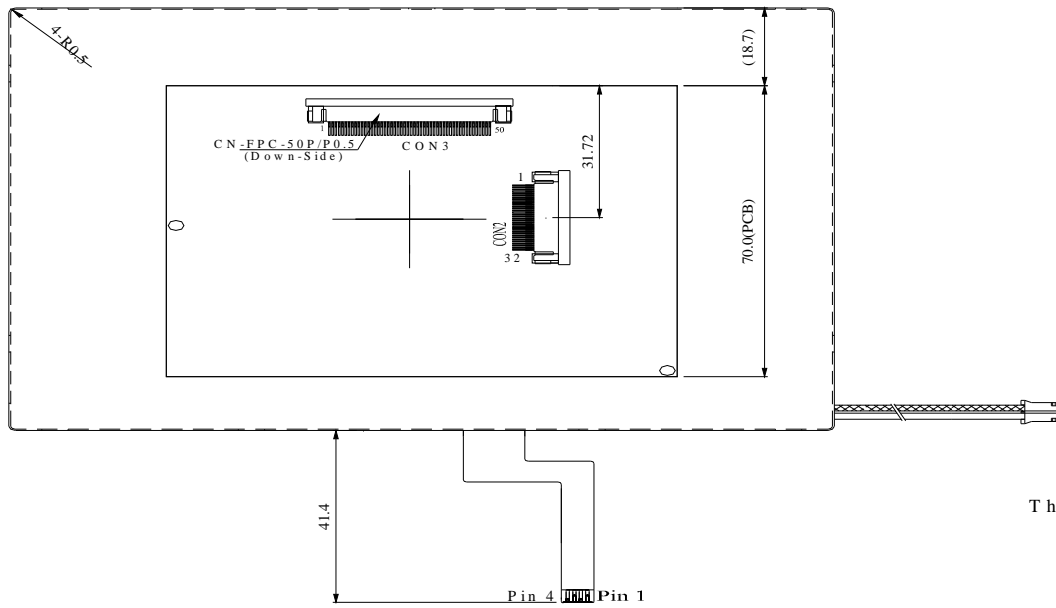


CON 2

16 bit mode

PIN NO	SYMBOL	PIN NO	SYMBOL
1	GND	18	DB 11
2	VCC	19	DB 12
3	NC	20	DB 13
4	RS	21	DB 14
5	WR	22	DB 15
6	RD	23	NC
7	DB 0	24	NC
8	DB 1	25	CS
9	DB 2	26	RST
10	DB 3	27	RL
11	DB 4	28	UD
12	DB 5	29	NC
13	DB 6	30	NC
14	DB 7	31	NC
15	DB 8	32	NC
16	DB 9		
17	DB 10		

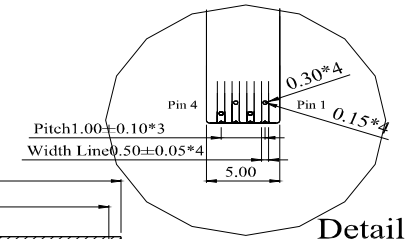
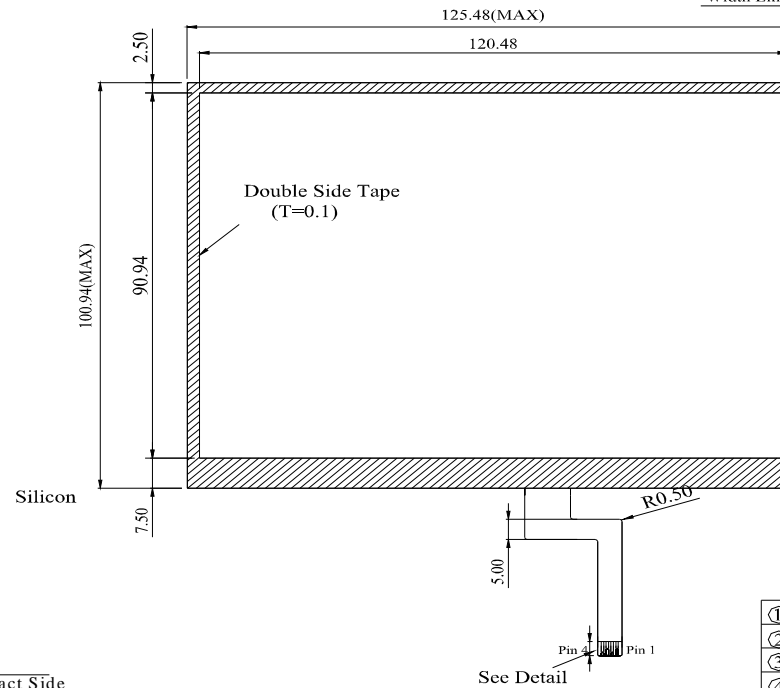
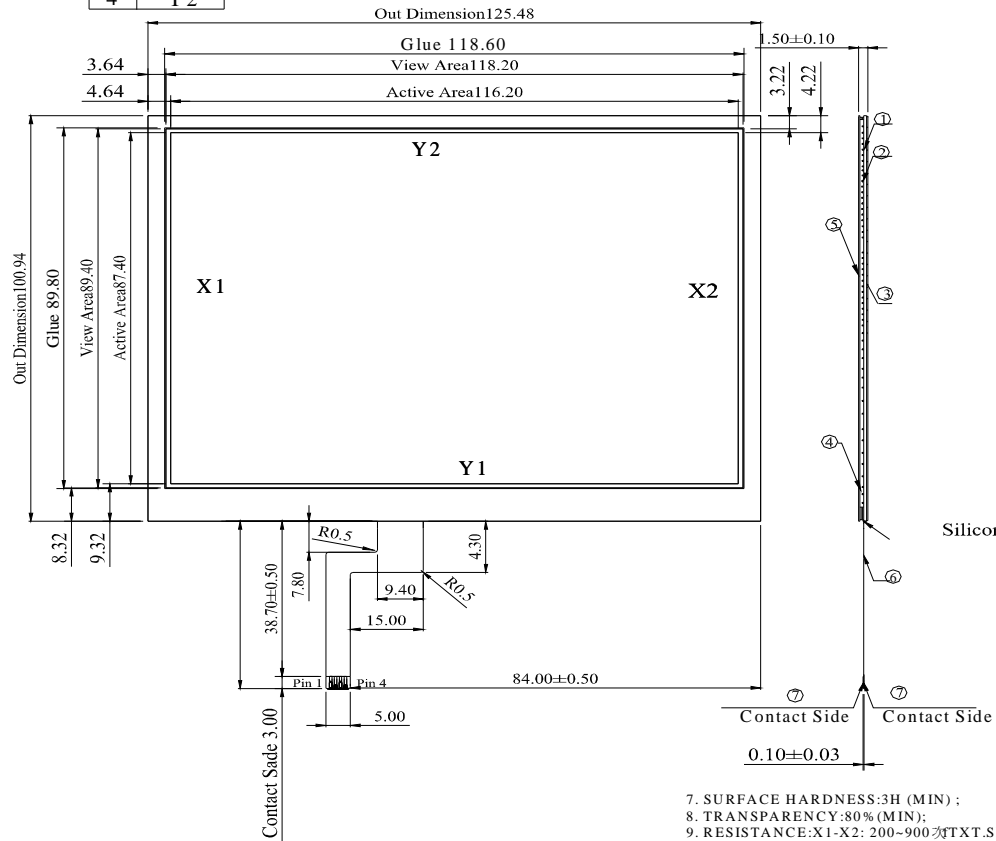
The non-specified tolerance of dimension is ± 0.2 mm.



12. Touch panel Information

PIN OUT	
1	X1
2	Y1
3	X2
4	Y2

PIN 1-PIN 3	200ohm-900ohm
PIN 2-PIN 4	200ohm-900ohm



Detail 3:1

①	1.10mm ITO Glass
②	Spacer DOT
③	Double-faced adhesive
④	Adhesive
⑤	0.188mm ITO Film/Anti Glare
⑥	FPC Tail
⑦	Contact Side

NOTES:

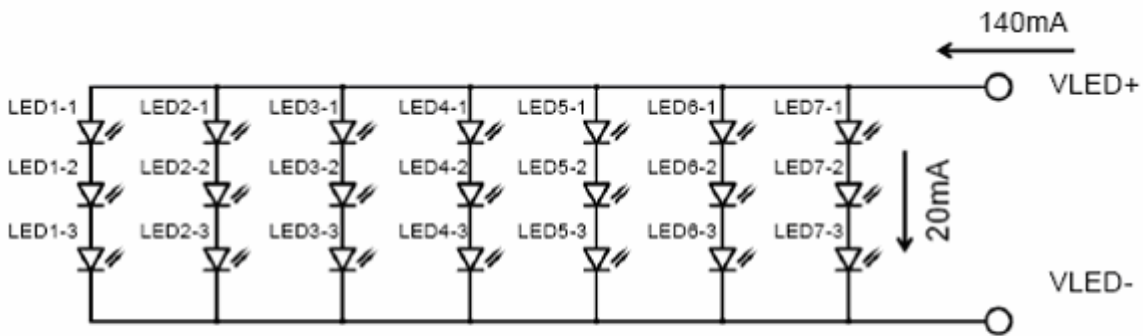
- TOUCH PANEL TYPE: ANALOG RESISTANCE, 4 LINES;
- FILM MATERIAL: SINGLE-LAYER FILM WITH ANTI-GLARE;
- OPERATION VOLTAGE: DC 7V(MAX);
- INPUT MODE: PEN OR FINGER, 80g(MIN);
- LINEARITY: 1.5% MAX;
- RESPONSE TIME: 10ms(MAX);

- SURFACE HARDNESS: 3H (MIN);
- TRANSPARENCY: 80% (MIN);
- RESISTANCE: X1-X2: 200~900Ω/TXT.SHX;; Y1-Y2: 200~900Ω/TXT.SHX;;
- INSURANCE RESISTANCE: 20M次/TXT.SHX:MIN. (DC 25V);
- LIFE TIME: 1000000 TIMES(MIN);
- OPERATION TEMPERATURE: -20~70~P STORAGE TEMPERATURE: -30~80~P13. UNMARKED TOLERANCE: Ⓜ0.2;
- REFERENCE DIMENSION: () ;
- REQUIREMENTS ON ENVIRONMENTAL PROTECTION: ROHS.

13. LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Current	I_{LED}	----	140	210	mA	Note1
LED voltage	V_{LED}	9.0	10.2	10.5	V	
LED life Time	-	----	50K	----	-	Note 2,3,5
Luminous Intensity	IV	----	300	----	CD/M ²	Note 4

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



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

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

Note 4: The luminous is measured through LCD panel.

Note5:50K hours is only an estimate for reference.

14. 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°C , 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 II Regular inspection

4-2 Inspection Standard

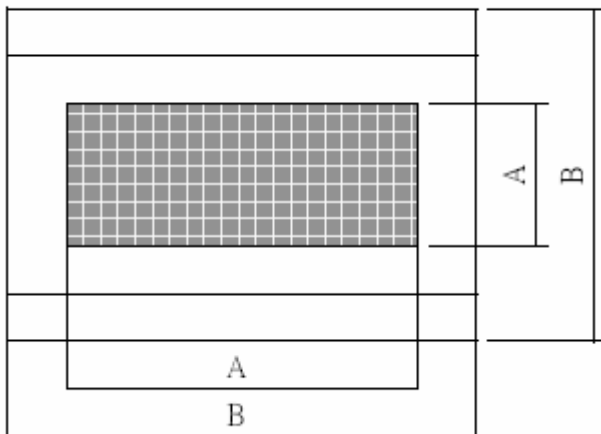
	Item	AQL(%)	Remarks
Major Defect	Dots Opens Shorts Erroneous operation	0.4	Faults which substantially lower the practicality and the initial purpose difficult to achieve
	Solder appearance Shorts Loose		
	Cracks Display surface cracks		

	Dimensions	External from Dimensions	AQL	Remarks
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

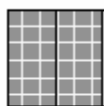
a) The definition of dot : The size of a defective dot over 1/2 of whole dot is regarded as one defective dot

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

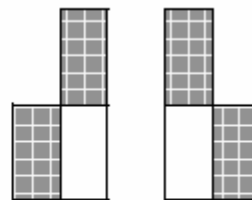
Picture :



2 dot adjacent



2 dot adjacent (vertical)



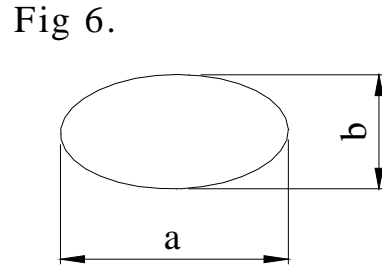
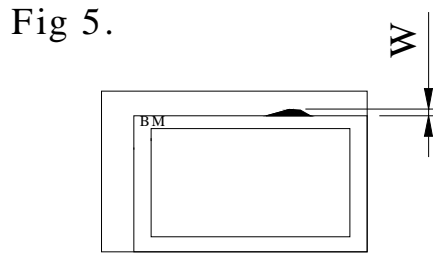
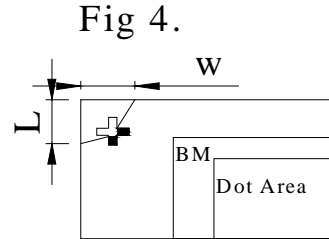
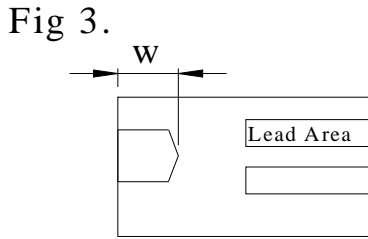
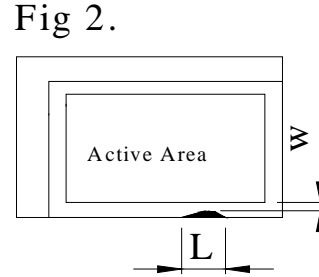
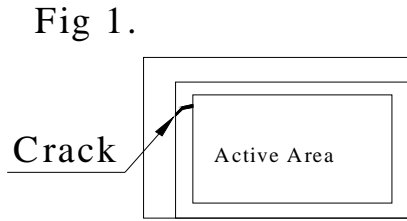
2 dot adjacent (slant)

(2) Display Inspection

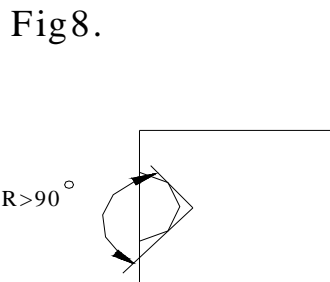
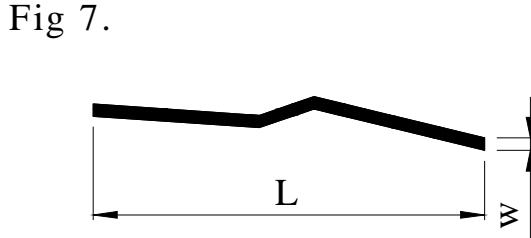
NO.	Item		Acceptable Count	
1	Dot defect	Bright Dot	Random	$N \leq 2$
			2 dots adjacent	$N \leq 0$
		Dark Dot	Random	$N \leq 3$
			2 dots adjacent	$N \leq 1$
		Total bright and dark dot		$N \leq 4$
	Functional failure (V-line/ H-line/Cross line etc.)		Not allowable	
Mura	It's OK if mura is slight visible 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.



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



Notes

- 1.W:Width
- 2.Length
- 3.D:Average Diameter
- 4.N:Count
- 5.All the anhle 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 WARRANT

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.