Winstar Display Co., LTD
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SPECIFICATION

CUSTOMER : _____

MODULE NO.: WF57FTLFFDBN0#

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

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2013/1/28		First issue

MODLE NO：

DOC. FIRST ISSUE

RECORDS OF REVISION

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2013/1/28		First issue

Contents

1.Module Classification Information

W	F	57	F	T	L	F	F	D	B	N	0	#
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬

① Brand：WINSTAR DISPLAY CORPORATION
② Display Type：H→Character Type, G→Graphic Type F→TFT Type
③ Display Size：5.7” TFT
④ Model serials no.
⑤ Backlight Type： F→CCFL, White T→LED, White

⑥ LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction
I→Transmissive, W. T, 6:00
L→Transmissive, W.T,12:00

⑦ A：TFT LCD
B：TFT+FR+CONTROL BOARD
C：TFT+FR+A/D BOARD
D：TFT+FR+A/D BOARD+CONTROL BOARD
E: TFT+FR+POWER BOARD
F: TFT+CONTROL BOARD
G: TFT+FR
H: TFT+D/V BOARD
I: TFT+FR+D/V BOARD

⑧ Solution:
A: 128160 B:320234 C:320240 D:480234 E:480272 F: 640480 G: 800480
H:1024600 I:320480 J:240320 K:800600 L:240400 M :1024768

⑨ D: Digital L：LVDS

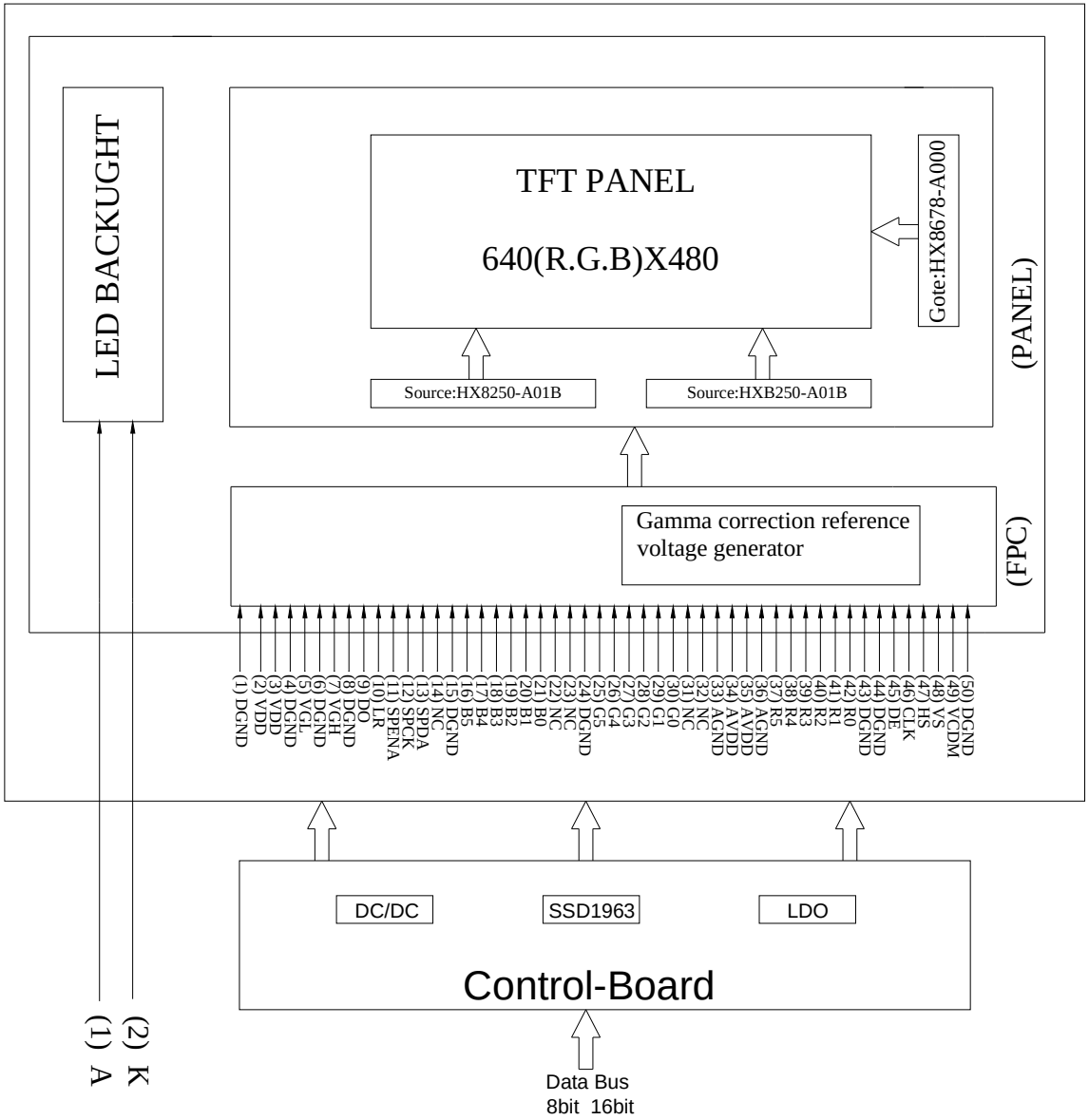
⑩ Interface： N：without control board A：8Bit B：16Bit

⑪ TS： N：Without TS T：resistive touch panel C：capacitive touch panel
⑫ Version
⑬ Special Code #:Fit in with ROHS directive regulations

2.General Specification

NO.	ITEM	CONTENTS	UNIT
1	Module Size	125.00(W) x 98.8(H) x Max.8.3(D) Without FPC	mm
2	Pixel Size	0.18(W) x 0.18 (H)	mm
3	Active Area	115.2(W) x 86.40 (H)	mm
4	Number of Dots	640 RGB (W) x 480 (H)	Dot
5	LCD Display Mode	TFT 5.7',Normally White / Positive Image	—
6	Rear Polarizer	Color Transmissive Type	—
7	View Direction	6 o'clock	O'clock
	Gray Scale Inversion Direction	12o'clock	O'clock
8	Backlight	LED	—
9	Driver IC	Source:HX8250-A01B(DOG);Gate:HX8678-A000(COG)	—
10	Weight	125 (Approx)	g

3.Block Diagram



4.Electrical Characteristics

4-1. ELECTRICAL CHARACTERISTICS OF LCM

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Power supply for logic	VDD	VDD-DGND	3.0	3.3	3.6	V
Output voltage	VOH	Output high voltage	0.8VDD			
	VOL	Output low voltage			0.2VDD	
Input Voltage	VIH	Input high voltage	0.8VDD	—	VDD +0.5	V
	VIL	Input low voltage			0.2VDD	
Recommended TFT Driving Current for 25℃	I_{VDD}	VDD=3.3V	—	190	250	mA
Brightness	L	$I_{AK=}$60mA Pattern :All on (White Color)	250.0	300.0	—	cd/m2

5.Absolute Maximum Ratings

5-1.ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	WIDE TEMP			
	OPERSTING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature(℃)	-20	70	-30	80
Humidity (Without Condensation)	Note 2,4		Note 3,4	

Note 2 Ta ≦70℃:75%RH MAX.

Note 3 Please refer to item of reliability test.

Note 4 Background color will change slightly depending on ambient temperature.
That phenomenon is reversible.

6.Interface Pin Function

LCD (CON3)

Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol
1	VDD	16	DB13	31	NC
2	VDD	17	DB14	32	GND
3	DB0	18	DB15		
4	DB1	19	CS		
5	DB2	20	A0		
6	DB3	21	E		
7	DB4	22	R/W		
8	DB5	23	SPENA		
9	DB6	24	RST		
10	DB7	25	UD		
11	DB8	26	LR		
12	DB9	27	NC		
13	DB10	28	NC		
14	DB11	29	NC		
15	DB12	30	NC		

LED BACKLIGHT (CN2): JST BHSR-02VS-1

Pin No.	Symbol
1	A
2	K

CORRESPONDABLE BACKLIGHT CONNECTOR : SM 02B-BHSS-1

7. OPTICAL CHARACTERISTICS

7-1 Optical Char. of LCD Panel

Parameter	SYMBOL		Values			Uint	Note
			Min.	Typ.	Max.		
Response Time	$T_r + T_f$		—	50	80	ms	NOTE 2,3
Contrast Ratio	C/R		150	250	—	—	*a)
θ （Viewing Angle）	CR =10	12 O'Clock	—	60	—	—	NOTE3,5
		6 O'Clock	—	40	—	—	
ϕ （Viewing Angle）		9 O'Clock	—	60	—	—	
		3 O'Clock	—	60	—	—	
Degree of Saturation	NTSC		—	53	—	%	

*a) Contrast Ratio (CR) is define mathematically as:

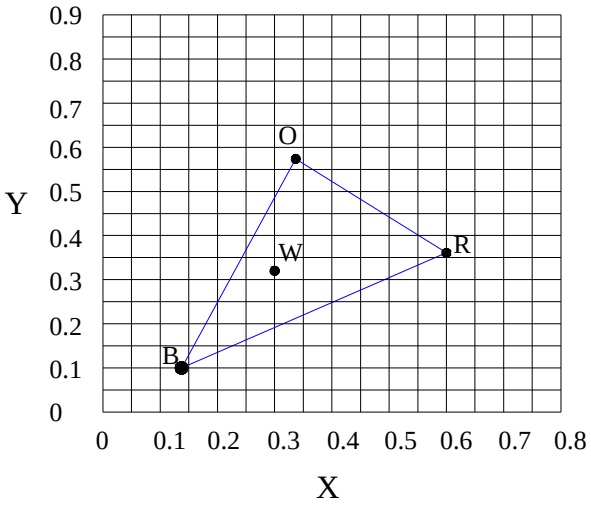
$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

7-2.Coloe of CIE Coordinate Ta=25℃

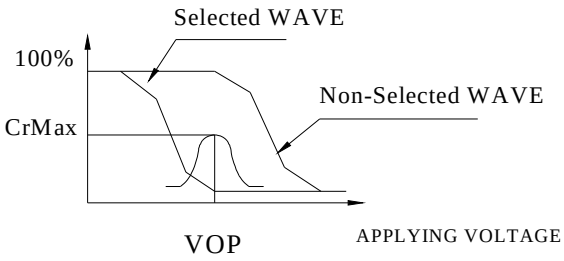
ITEM		SYMBOL	CONDITION	VALUE			NOTE
				MIN.	TYP.	MAX.	
Color of CIE Coordinate	Red	x	ϕ=0°, θ=0°	0.55	0.6	0.65	Note※
		y		0.31	0.36	0.41	
	Green	x	ϕ=0°, θ=0°	0.29	0.34	0.39	
		y		0.53	0.58	0.63	
	Blue	x	ϕ=0°, θ=0°	0.09	0.14	0.19	
		y		0.05	0.1	0.15	
	White	x	ϕ=0°, θ=0°	0.25	0.3	0.35	
		y		0.27	0.32	0.37	

Note※ Measuring at position 3 on Fig.1 CIE chromaticity diagram.
Base on Winstar Backlight (CIE X =0.30± 0.03, Y=0.30± 0.03)

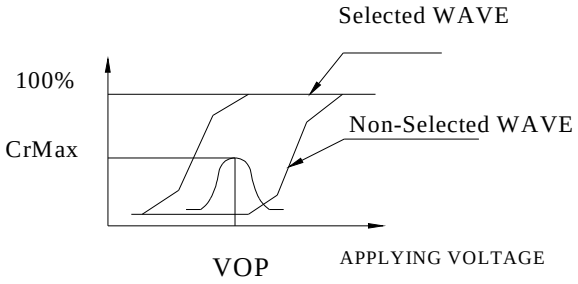
Fig.1



(NOTE 1)
Definition of Operation Voltage(Vop)



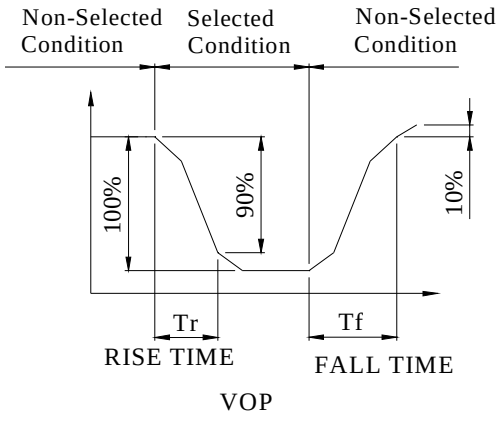
(positive type)



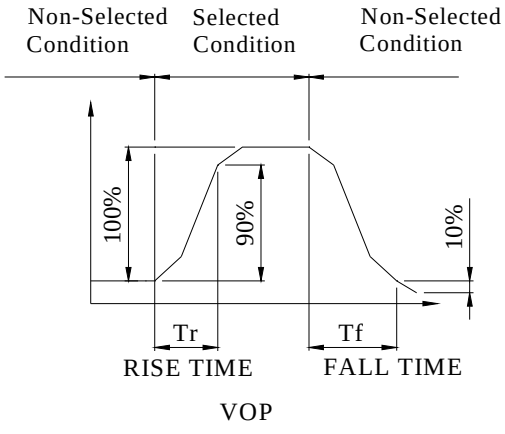
(negative type)

*Conditions
Viewing Angle: 0
Farme Frequency :70 Hz
Applying Waveform : 1/N duty , 1/a bias

(NOTE 2)
Definition of Response Time(Tr.Tf)



(positive type)

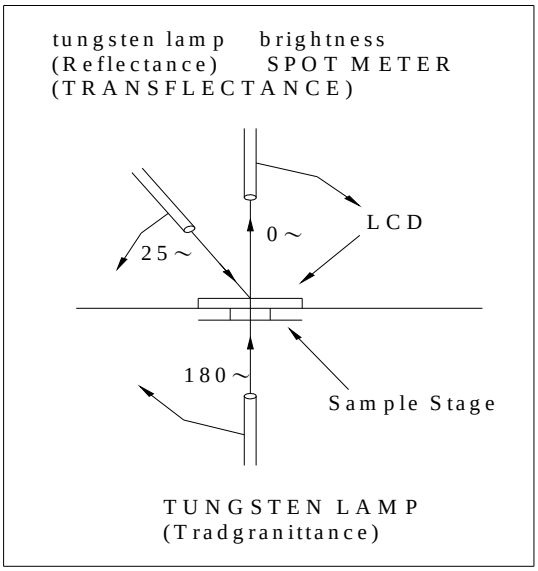


(negative type)

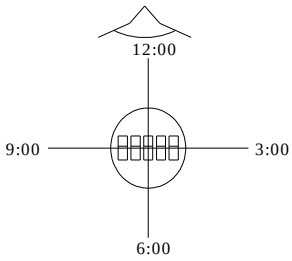
Operating Voltage:Vop
Viewing Arigle:(牟 乙 耳)(0.0)
Frams Frequency:70Hz
Applying Waveform:1/N duty 1/a bias

(NOTE 3)

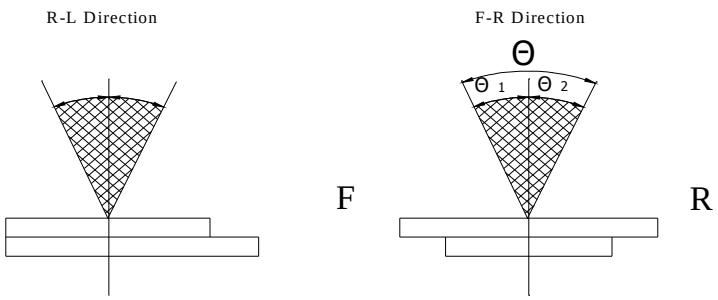
Descrlption of Measuring Equipment and Driving Waveforms

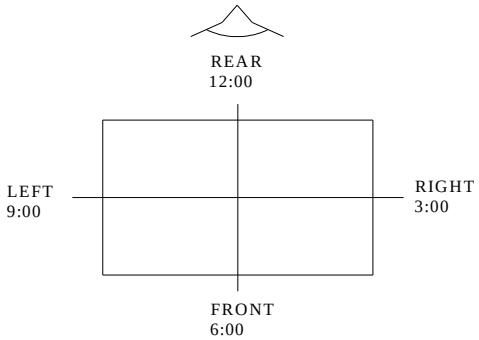


(Note 4)
Definition of Viewing Direction



(Note 4)
Definition of Viewing Angle



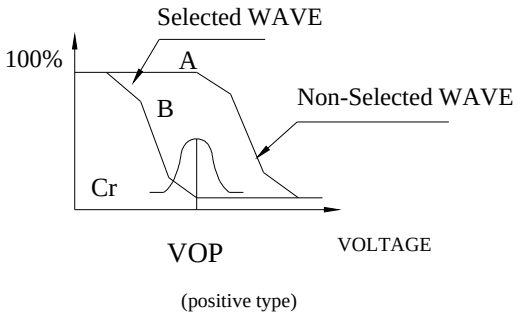


$\Theta = \Theta_1 + \Theta_2$

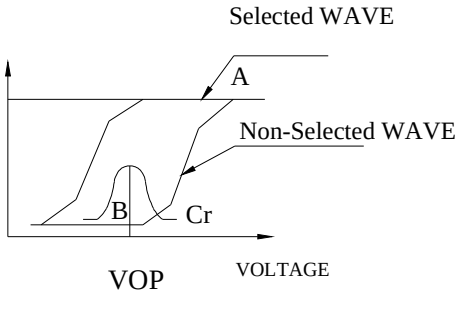
*Condition

Operating Voltage :Vop
Frarne Frequency : 70Hz
Applying Waveform :1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)
Definition of Contrast Ratio (Cr)



(positive type)

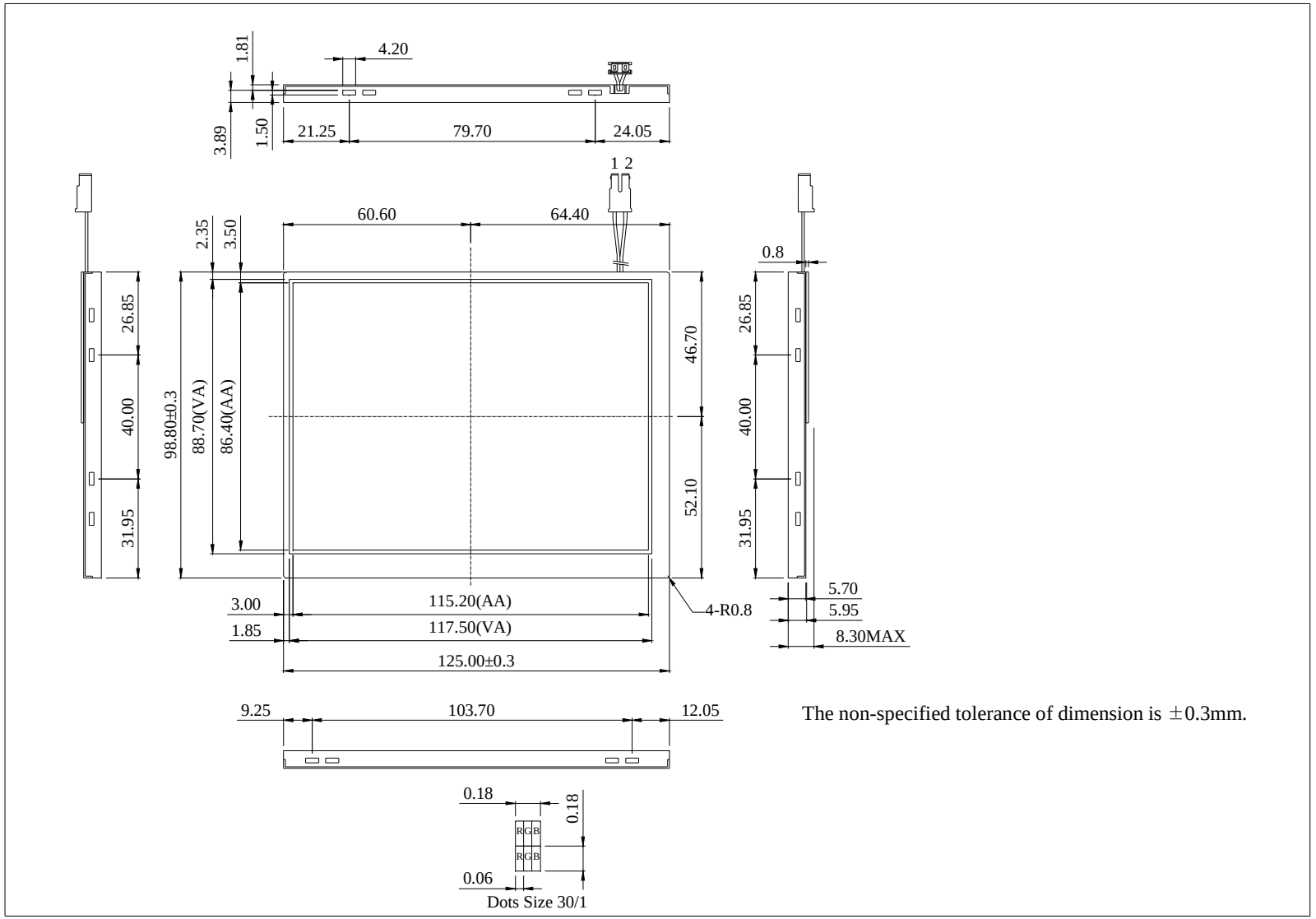


(negative type)

Contrast Ratio : Cr=A/B

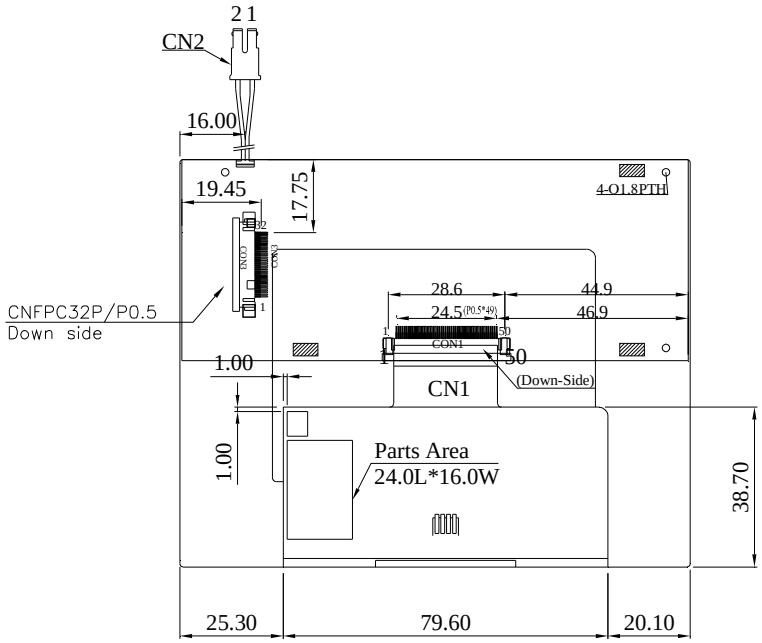
*Conditions
Viewing Angle :0
Frarne Frequency : 70Hz
Applying Waveform :1/N duty 1/a bias

8. Contour Drawing



The non-specified tolerance of dimension is ±0.3mm.

CON3



PIN NO.	SYMBOL
1	VDD
2	VDD
3	DB0
4	DB1
5	DB2
6	DB3
7	DB4
8	DB5
9	DB6
10	DB7
11	DB8
12	DB9
13	DB10
14	DB11
15	DB12
16	DB13
17	DB14
18	DB15
19	CS
20	A0
21	E
22	R/W
23	SPENA
24	RST
25	UD

PIN NO.	SYMBOL
26	LR
27	NC
28	NC
29	NC
30	NC
31	NC
32	GND

The non-specified tolerance of dimension is ±0.3mm.

9. TIMING CHARCTERISTICS

9-1 · AC TIMING CHARACTERISTICS

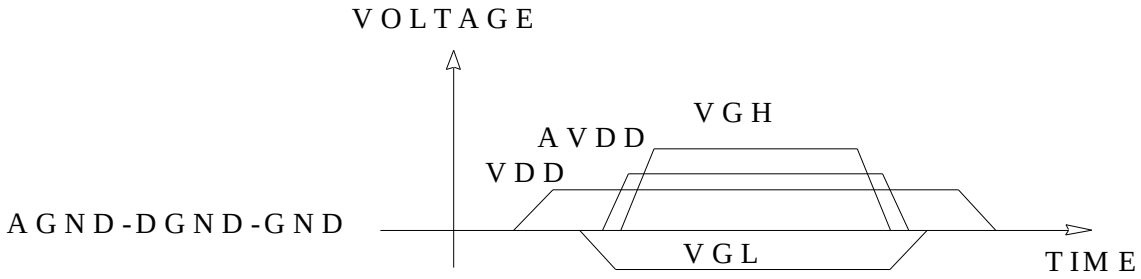
Please refer to the IC SPEC :(Himax) HX8250-A01B

(Himax) HX8678-A000

(Himax Technologies, Inc)

9-2 POWER ON/OFF SEQUENCE

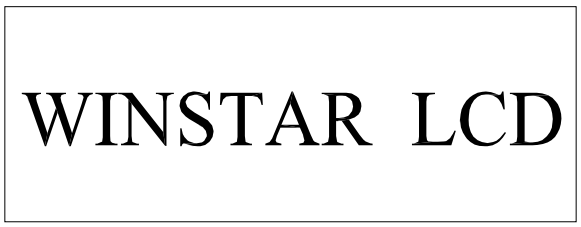
To prevent the devlce damage from latch up, the power ON/OFF sequence shown below must be followed.



(NOET) DISPAY DIRECTION OF THE PANEL

The UD and LR control the Display direction of the panel .

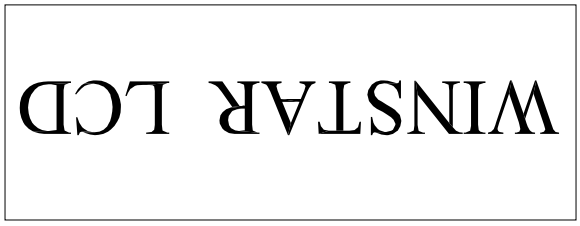
The settings of UD and LR are or following:



(1) UD=VDD and LR=DGND

(2) UD=VDD and LR=VDD

(3) UD= DGND and LR=DGND

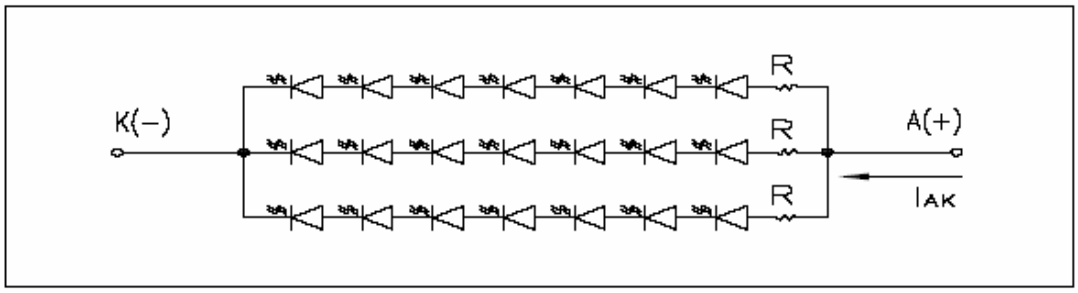


(4) UD= DGND and LR= VDD

10. LED driving conditions

ITEM	SYMBAL	MIN	TYP	MAX	UNIT	REMARK
Peak forward current	I_P	—	—	210	mA	—
Maximum reverse voltage	V_R	—	—	15	V	—
Applied forward voltage	V_{AK}	—	23.1	24.5	V	—
Applied forward current	I_{AK}	—	60	—	mA	—
LED power consumption	PF	—	1.4	—	W	—
LED life time	LL	—	25000	—	Hrs	at $I_{AK=}$60mA (*1)

(*1) LED life time is defined as follow: The final brightness is at 50% of original brightness.



11. Timing Characteristics

Please consult the spec of SSD1963

12.Reliability Test

WIDE TEMPERATURE RELIABILITY TEST

NO.	ITEM	CONDITION			STANDARD	NOTE
1	High Temp. Storage	80℃	240 Hrs		Appearance without defect	
2	Low Temp. Storage	-30℃	240 Hrs		Appearance without defect	
3	High Temp. & High Humi. Storage	60 ℃ 90%RH	240 Hrs		Appearance without defect	
4	High Temp. Operating Display	70℃	240 Hrs		Appearance without defect	
5	Low Temp. Operating Display	-20℃	240 Hrs		Appearance without defect	
6	Thermal Shock	-20 ℃, 30min. → 70℃, 30min. (1cycle)			Appearance without defect	10 cycles

Inspection Provision

1.Purpose

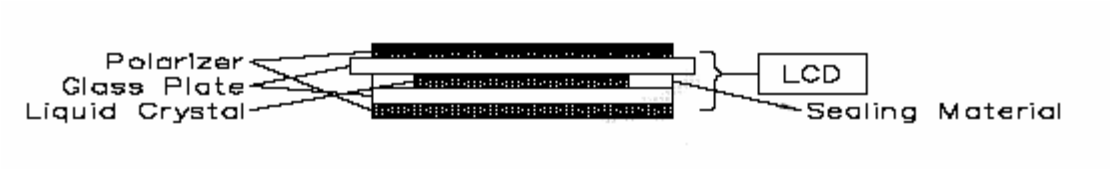
The WINSTAR inspection provision provides outgoing inspection provision and its expected quality level based on our outgoing inspection of WINSTAR LCD produces.

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 Ⅱ Regular inspection

4-2 Inspection Standard

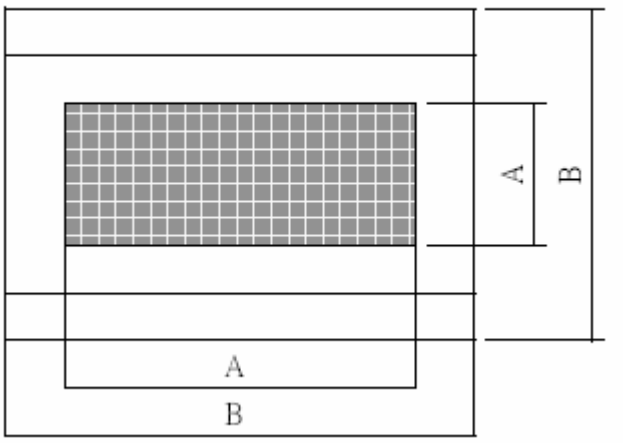
	Item		AQL(%)	Remarks
Major Defect	Dots	Opens Shorts Erroneous operation	0.4	Faults which substantially lower the practicality and the initial purpose difficult to achieve
	Solder appearance	Shorts Loose		
	Cracks	Display surface cracks		

	Dimensions	External from Dimensions	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 ± 15℃

Humidity 65 ± 20%R.H.

Pressure 860~1060hPa(mmbar)

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

Temperature 20 ± 2℃

Humidity 65 ±5%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±5℃

(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 degreeto 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

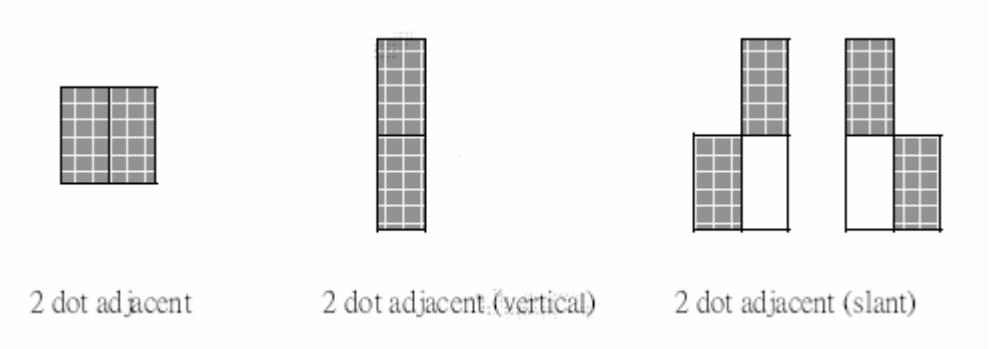
a) The definition of dot : The size of a defective dot over 1/2 of whole dot is regarded as one defective dot

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) Display Inspection

NO.	Item			Acceptable Count
1	Dot defect	Bright Dot	Random	N ≦ 2
			2 dots adjacent	N ≦ 0
		Dark Dot	Random	N ≦ 3
			2 dots adjacent	N ≦ 1
		Total bright and dark dot		N ≦ 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 > 2mm 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 ≦ 0.3mm. It is shown in Fig.5.
6	Foreign Black / White/Bright Spot	(1) 0.15 < D ≦ 0.5 mm, N≦ 4 ; (2) D ≦ 0.15mm, Ignore. It is shown in Fig.6.
7	Foreign Black / White/Bright Line	(1) 0.05<W≦ 0.1 mm, 0.3<L≦2 mm, N≦ 4.
		(2) W ≦ 0.05mm and L≦ 0.3mm Ignore.
		It is shown in Fig.7.
8	Color irregular	Not remarkable color irregular.

Fig 1.

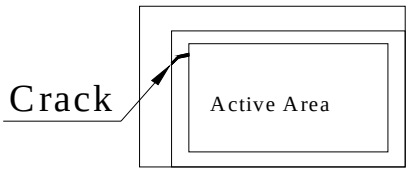


Fig 2.

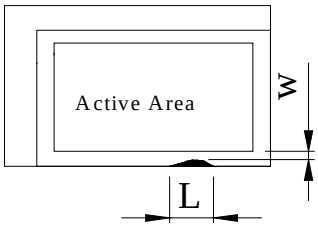


Fig 3.

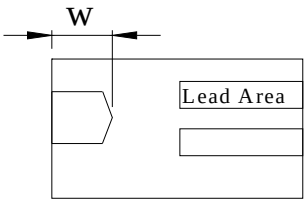


Fig 4.

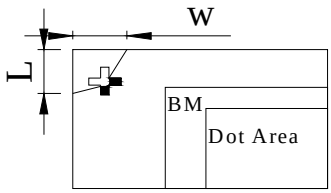


Fig 5.

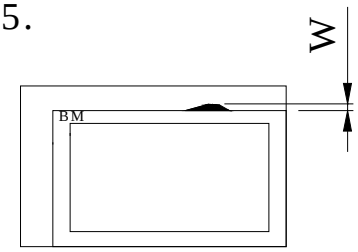
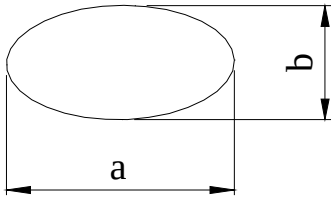


Fig 6.



D=(a+b)/2

Fig 7.

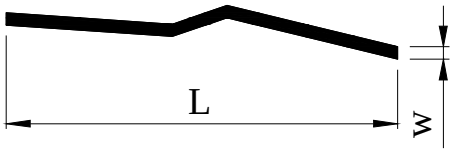
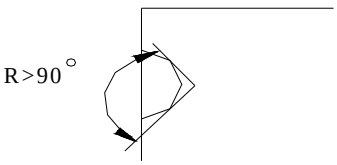


Fig8.



Notes
1.W:Widh
2.Lengh
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±5℃ 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.