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SPECIFICATION

CUSTOMER ： _____

MODULE NO.: WF57CTLECD0#

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

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

VERSION	DATE	REVISED PAGE NO.	SUMMARY
H	2012.01.17	5	Add Gray Scale Inversion Direction.

MODLE NO：

DOC. FIRST ISSUE

RECORDS OF REVISION

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2008.05.23		First issue
A	2008.06.06	15	Move off Optical Characteristics
B	2009.03.16	15	Add Optical Characteristics
C	2009/8/12	18	Modify LED Life Time
D	2009.09.18	18	Modify Luminous Intensity
E	2010.01.06	17	Correct Contour Drawing
F	2010.01.12	17	Correct Contour Drawing
G	2010.12.22	10	Correct Timing Characteristics
H	2012.01.17	5	Add Gray Scale Inversion Direction.

Contents

1.Module Classification Information

W F 57 C T L E C D 0 #
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨⑩ ⑪

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

A→Reflective, N.T, 6:00	H→Transflective, W.T,6:00
D→Reflective, N.T, 12:00	K→Transflective, W.T,12:00
G→Reflective, W. T, 6:00	C→Transmissive, N.T,6:00
J→Reflective, W. T, 12:00	F→Transmissive, N.T,12:00
B→Transflective, N.T,6:00	I→Transmissive, W. T, 6:00
E→Transflective, N.T.12:00	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(DC TO DC)
⑧ Solution: A: 128160 B:320234 C:320240 D:480234

⑨ D: Digital A: Analog

⑩ Version

⑪ Special Code #:Fit in with ROHS directive regulations

SUMMARY

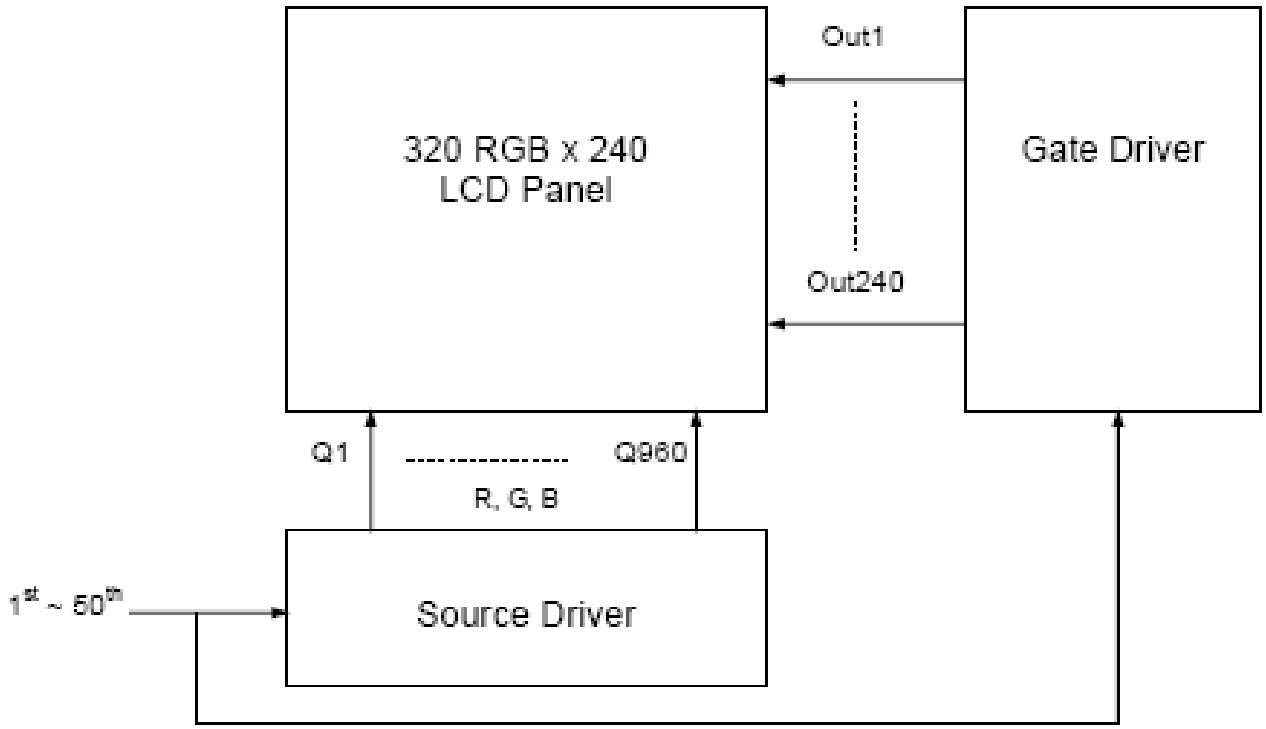
This technical specification applies to 5.7“ color TFT-LCD panel. The 5.7“ color TFT-LCD panel is designed for industry, vehicle application and other electronic products which require high quality flat panel displays. This module follows RoHS.

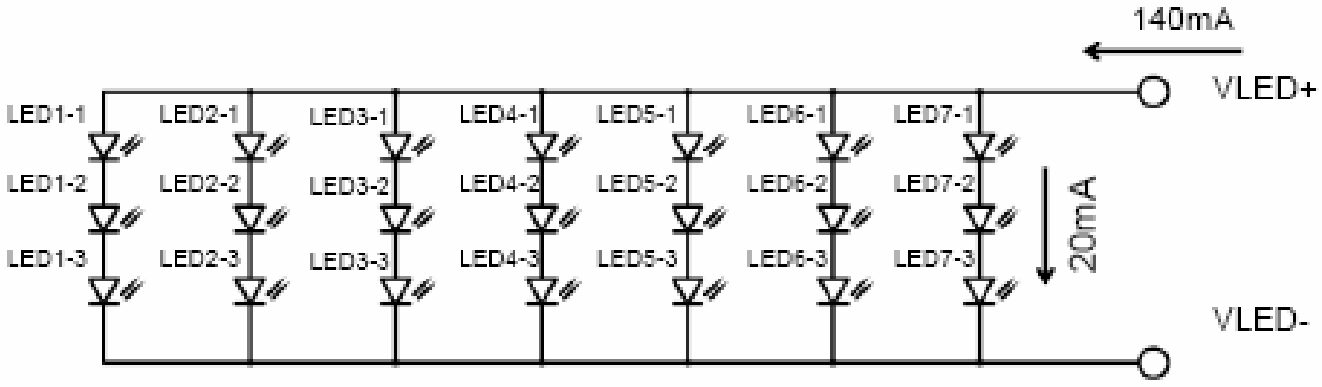
FEATURES

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 12.5(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+HX8615 (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	6 o’clock	
Gray Scale Inversion Direction	12o’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}	Ta=25℃	10		30	V
	V_{GL}	Ta=25℃	-17		-5	V
Supply Current	I_{VDD}	V_{DD}=3.3V	—	5	8	mA

4.Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T_{OP}	-20	—	+70	℃
Storage Temperature	T_{ST}	-30	—	+80	℃
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

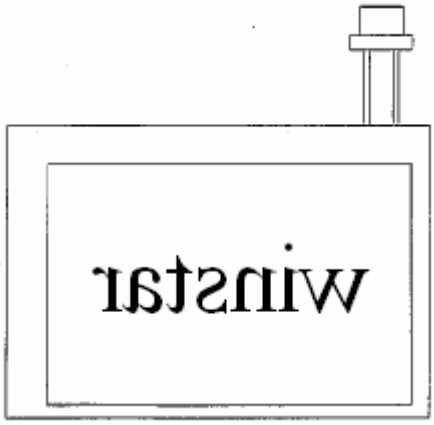
5-1 LCM PIN Definition

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

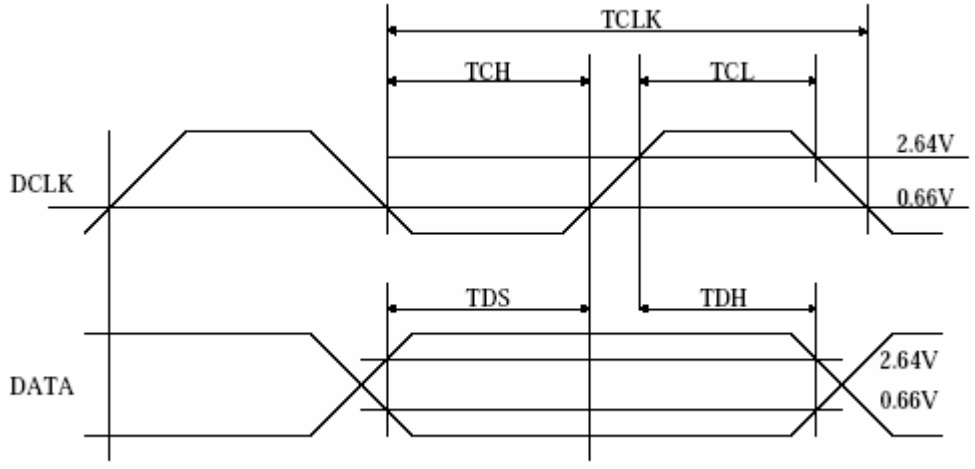
R/L=H,UD=L

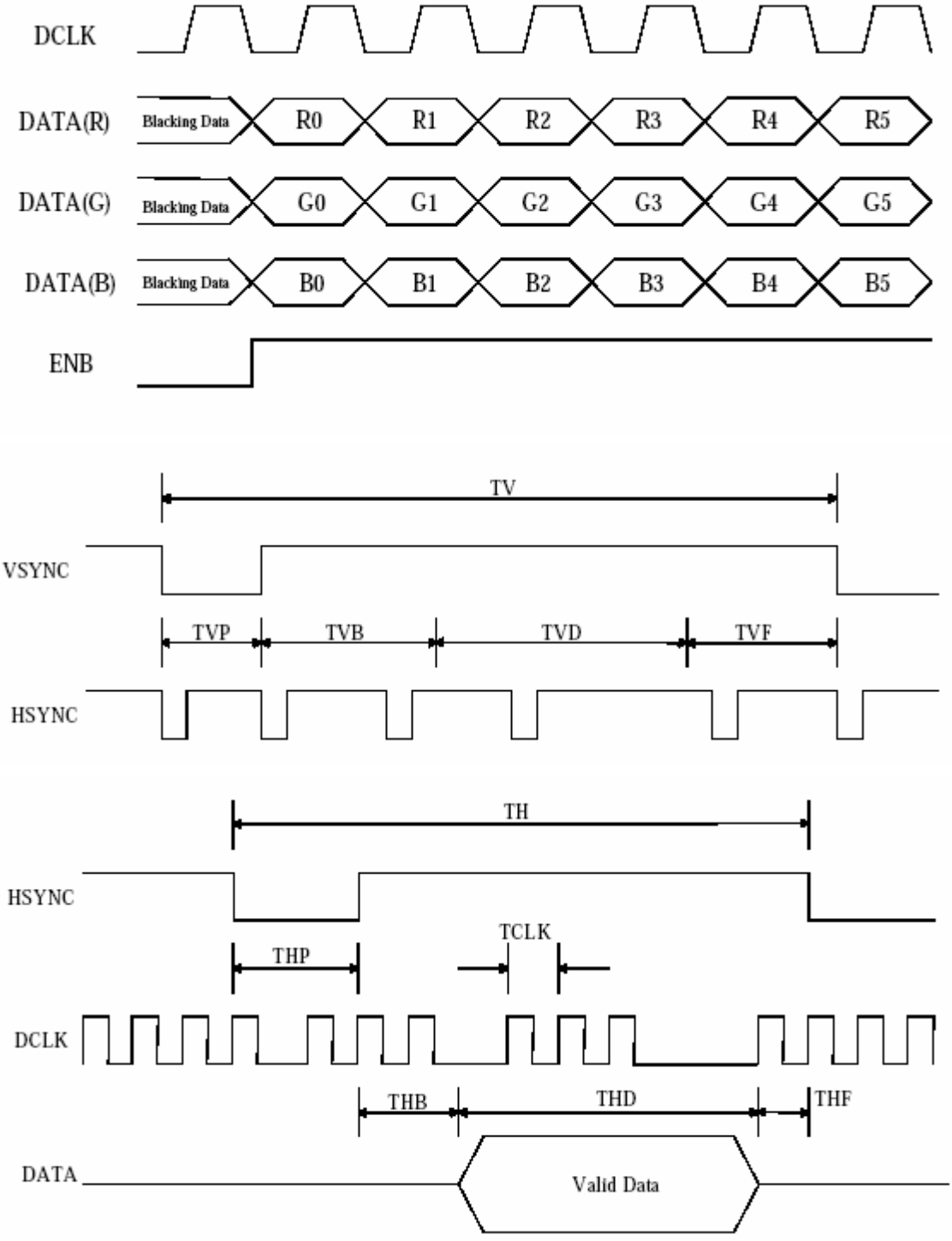
5.2 Backlight PIN Definition

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

Signal	Item		Symbol	Min.	Typ.	Max.	Unit
Dclk	Frequency		Dclk		6.4		MHz
	High Time		Tch		78		ns
	Low Time		Tcl		78		ns
Data	Setup Time		Tds	12			ns
	Hold Time		Tdh	12			ns
Hsync	Period		TH		408		DCLK
	Pulse Width		Thp		30		DCLK
	Back-Porch		Thb		38		DCLK
	Display Period		Thd		320		DCLK
	Front-Porch		Thf		20		DCLK
Vsync	Period	NTSC	Tv		262.5		TH
		PAL			31.25		
	Pulse Width		Tvp	1	3	5	TH
	Back-Porch	NTSC	Tvb		15		TH
		PAL			23		
	Display Period		Tvd		240		TH
	Front-Porch	NTSC	Tvf		4.5		TH
		PAL			46.5		




DCLK
DATA(R)
Blacking Data
R0
R1
R2
R3
R4
R5
DATA(G)
Blacking Data
G0
G1
G2
G3
G4
G5
DATA(B)
Blacking Data
B0
B1
B2
B3
B4
B5
ENB
TV
VSYNC
TVP
TVB
TVD
TVF
HSYNC
TH
HSYNC
TCLK
THP
DCLK
THB
THD
THF
DATA
Valid Data

Color Data Assignment

COLOR	INPUT DATA	R DATA								G DATA								B DATA							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
		MSB							LSB	MSB							LSB	MSB							LSB
BASIC COLOR	BLACK	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	RED(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	GREEN(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	BLUE(255)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	CYAN	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MAGENTA	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	YELLOW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	WHITE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RED	RED(0)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	RED(1)	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	RED(2)	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	RED(254)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	RED(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
GREEN	GREEN(0)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	GREEN(1)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1
	GREEN(2)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1
	GREEN(254)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
	GREEN(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
BLUE	BLUE(0)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	BLUE(1)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
	BLUE(2)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
	BLUE(254)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1
	BLUE(255)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0

[Note]

(1) Definition of gray scale

Color (n) : n means level of gray scale

Larger n means brighter level

(2)Data:1-High,0-Low

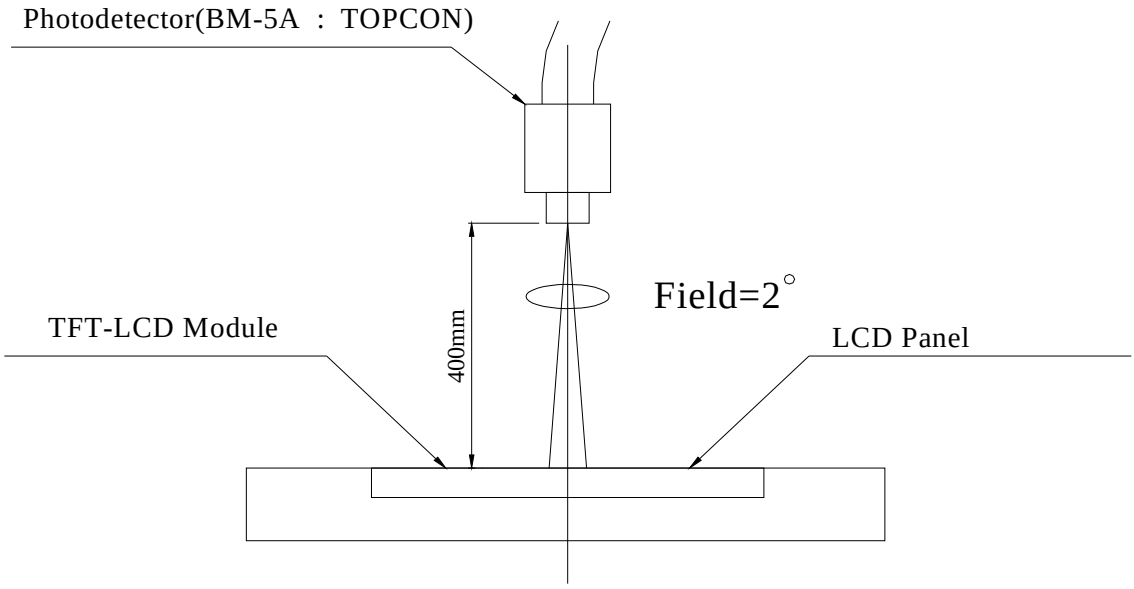
7.Optical characteristics

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remarks
Viewing angle range		θ 21, θ 22	CR≧5	60	65	—	°(degree)	[Note 1]
		θ 11		60	65	—	°(degree)	
		θ 12		35	40	—	°(degree)	
Contrast ratio		CRmax	Optimal viewing angle	250	350	—		[Note 2]
Response time	Rise	τ r	θ =0°	—	8	20	ms	[Note 3]
	Fall	τ d		—	21	40	ms	

Lamp test in the module is made with the following inverter.

HIU-288[Output condenser :22pF] TOSHIBA HARISON LIGHTING co.Ltd.

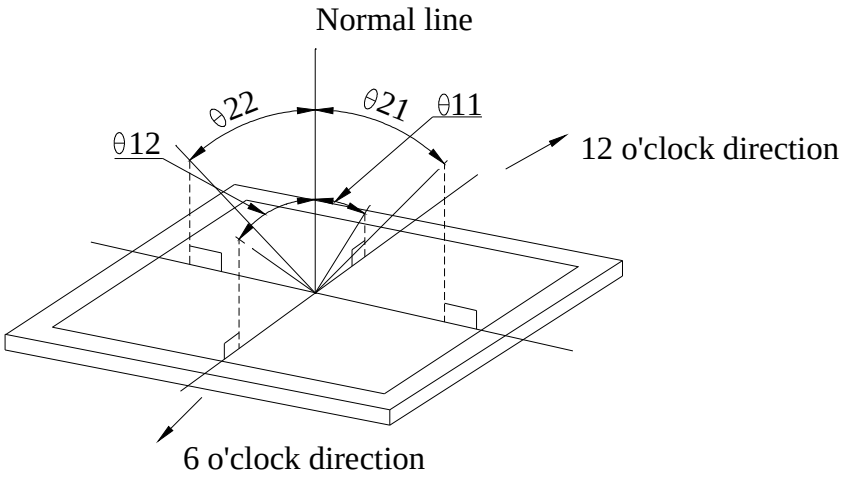
The optical specifications are measured 30 minute after tturing lamp on and in a dark room or equivalent condition, according to the method shown in Fig2.



Center of the screen

Fig 2 Optical characteristics measurement method

Note 1　Viewing angle range is defined as follows.



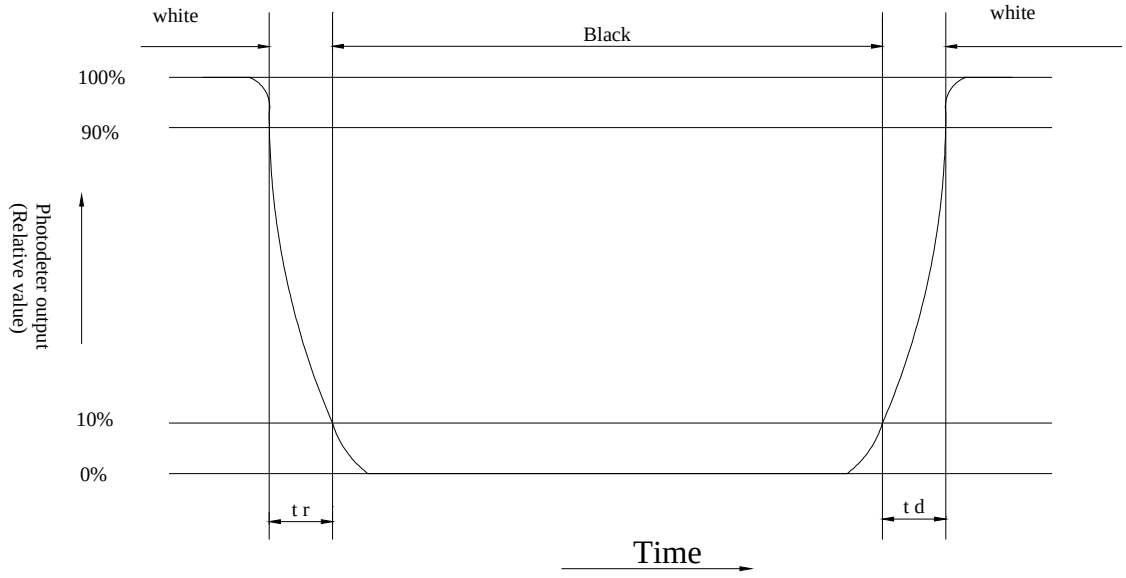
The best viewing angle of this slightly leaned to 12 o'clock from normal line.
Where θ 11> θ max ,gray scale is reversed partially.
Where θ 11> θ max ,or in θ 12 direction, gray scale isn't reversed.

[Note 2] Contrast ratio is defined as follows:

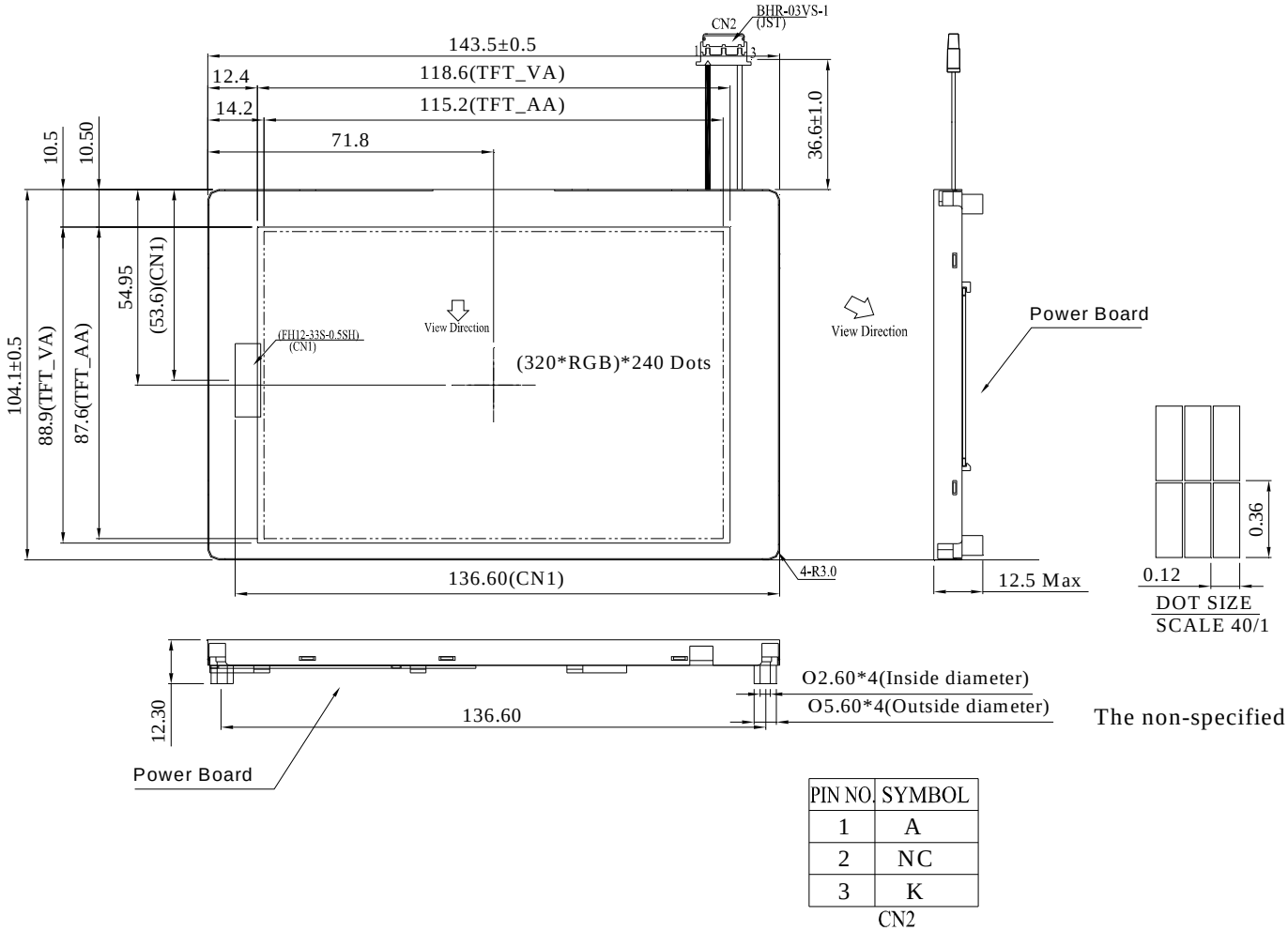
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance (brightness) with all pixels white}}{\text{Luminance (brightness) with all pixels black}}$$

※ Measurement point :Center of the active area

[Note 3] Response time is obtained by measuring the transition time of photo detector output, when input signals are so are applied so are to make the area "black" to and from "white".



8.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	A
2	NC
3	K

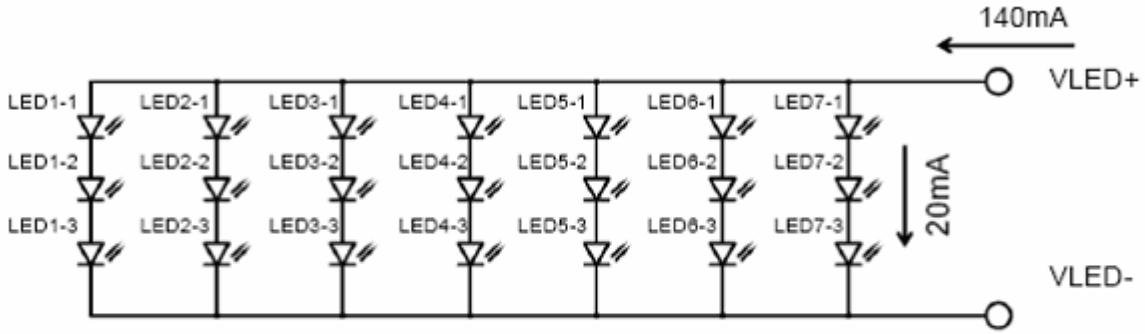
CN2

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

9.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 : Ta = 25℃ ,
Note 3 : Brightess 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.

10.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

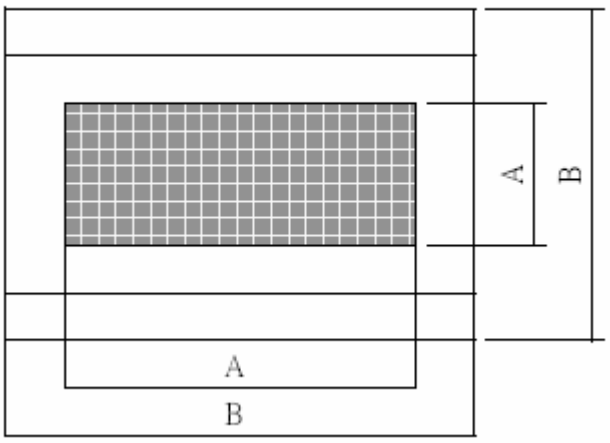
4-2 Inspection Standard

	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

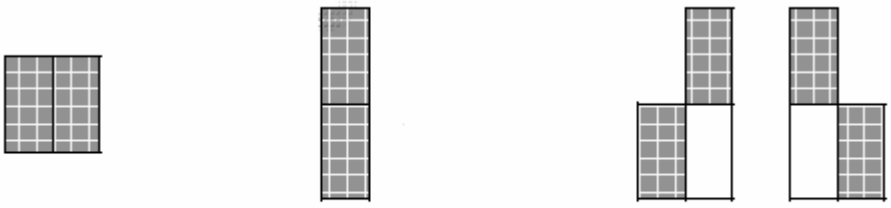
a) The definition of dot : The size of a defective dot over 1/2 of whole dot is regarded as one defective dot

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 dot adjacent　　2 dot adjacent (vertical)　　2 dot adjacent (slant)

(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.

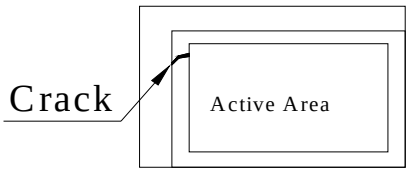


Fig 2.

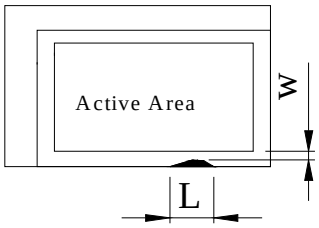


Fig 3.

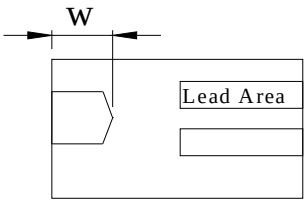


Fig 4.

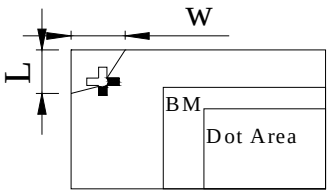


Fig 5.

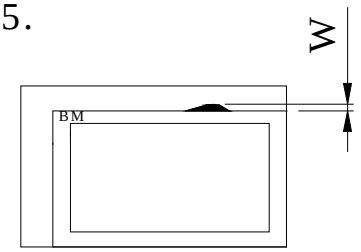
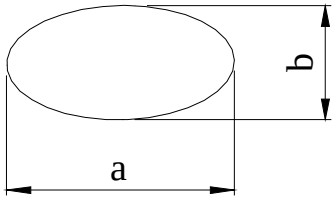


Fig 6.



D=(a+b)/2

Fig 7.

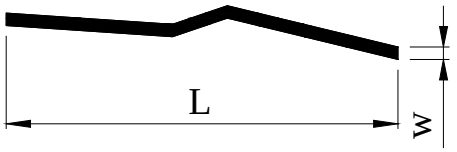
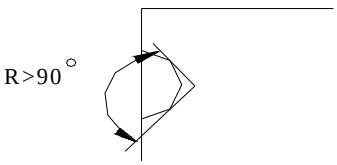


Fig8.



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.