



# Winstar Display Co., LTD

## 華凌光電股份有限公司



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### SPECIFICATION

**CUSTOMER :** \_\_\_\_\_

**MODULE NO.:** **WF57CTLECD0#**

<b>APPROVED BY:</b>  ( FOR CUSTOMER USE ONLY )	<b>PCB VERSION:</b> _____ <b>DATA:</b> _____
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SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

VERSION	DATE	REVISED PAGE NO.	SUMMARY
B	2009.03.16	15	Add Optical Characteristics



**DOC. FIRST ISSUE**

## VERSION

DATE \_\_\_\_\_

REVISED  
PAGE NO.

## SUMMARY

0

2008.05.23

A

2008.06.06

15

## First issue

# Move off Optical Characteristics

B

2009.03.16

15

## Add Optical Characteristics

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# 1.Module Classification Information

W F    57    C    T    L    E    C D 0 #  
① ②       ③       ④       ⑤       ⑥       ⑦       ⑧ ⑨ ⑩ 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            A→Reflective, N.T, 6:00            H→Transflective, W.T,6:00  
Type/ Temperature    D→Reflective, N.T, 12:00            K→Transflective, W.T,12:00  
range/ View            G→Reflective, W. T, 6:00            C→Transmissive, N.T,6:00  
direction               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

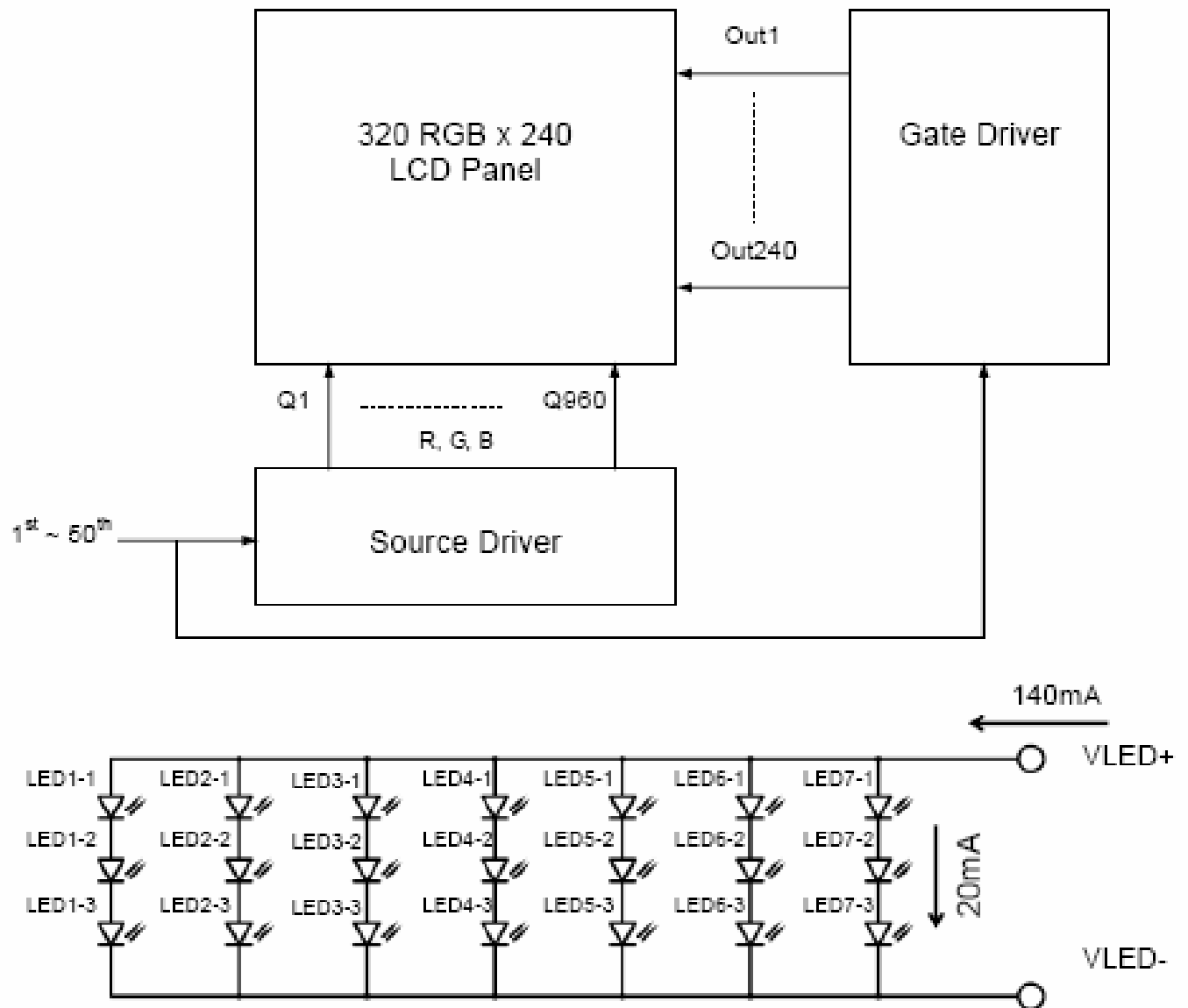
This technical specification applies to 5.7" color TFT-LCD panel. The 5.7" color TFT-LCD panel is designed for industry, vehicle application and other electronic products which require high quality flat panel displays. This module follows RoHS.

## 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-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	

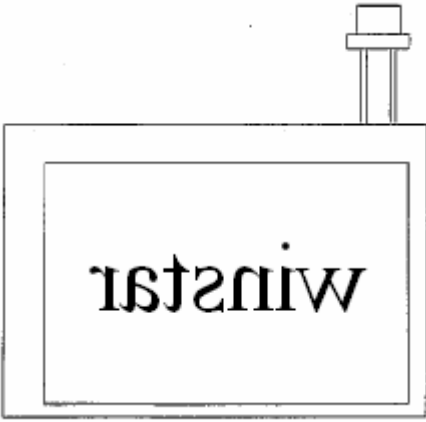


Note 1: The horizontal display start timing is settled in accordance with a rising timing of ENAB signal. In case ENAB is fixed “Low”, the horizontal start timing is determined as described in 6-4 . Don’t keep ENAB “High” during operation.

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

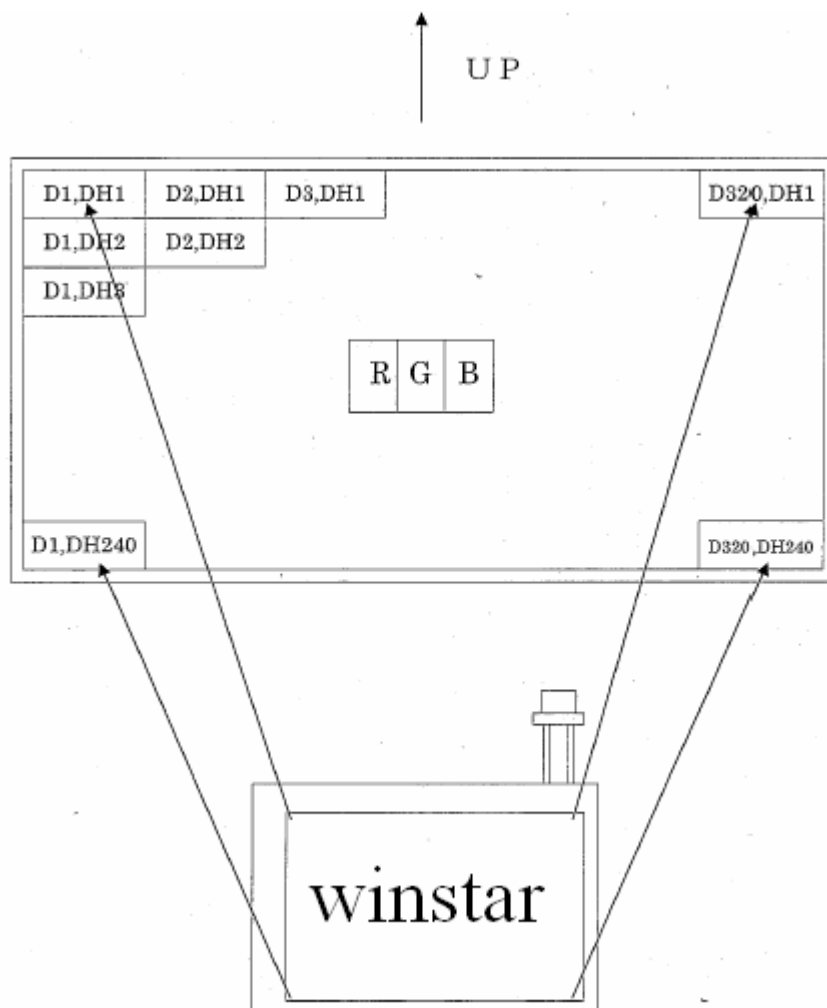
## 6. Timing Characteristics of input signals

### 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	$\mu s$
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	-	$T_H$

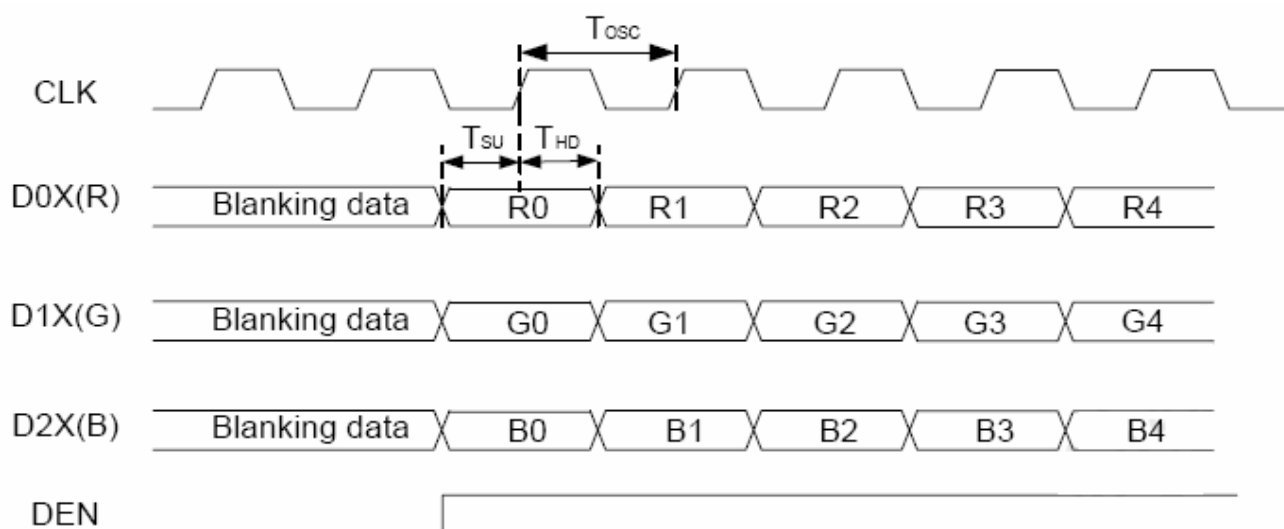
Note When SYNC mode is used, 1<sup>ST</sup> data start from 204<sup>th</sup> CLK after HIS falling.

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



Display position of input data (H,V)

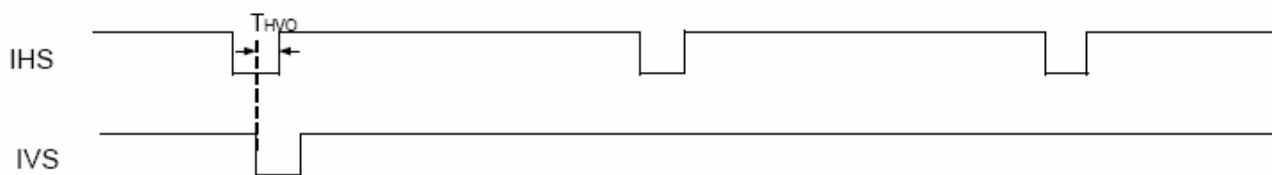
## 6-3 Digital Parallel RGB



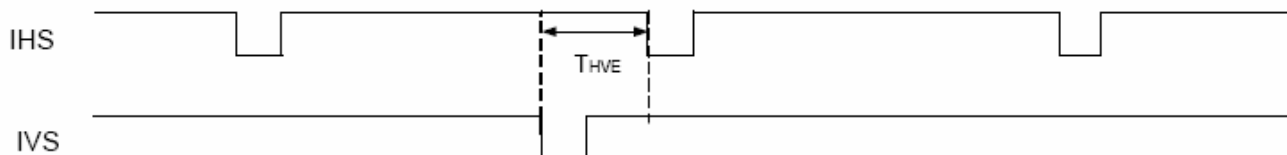
## 6-4 Digital/Analog RGB timing waveform

### HIS and IVS timing

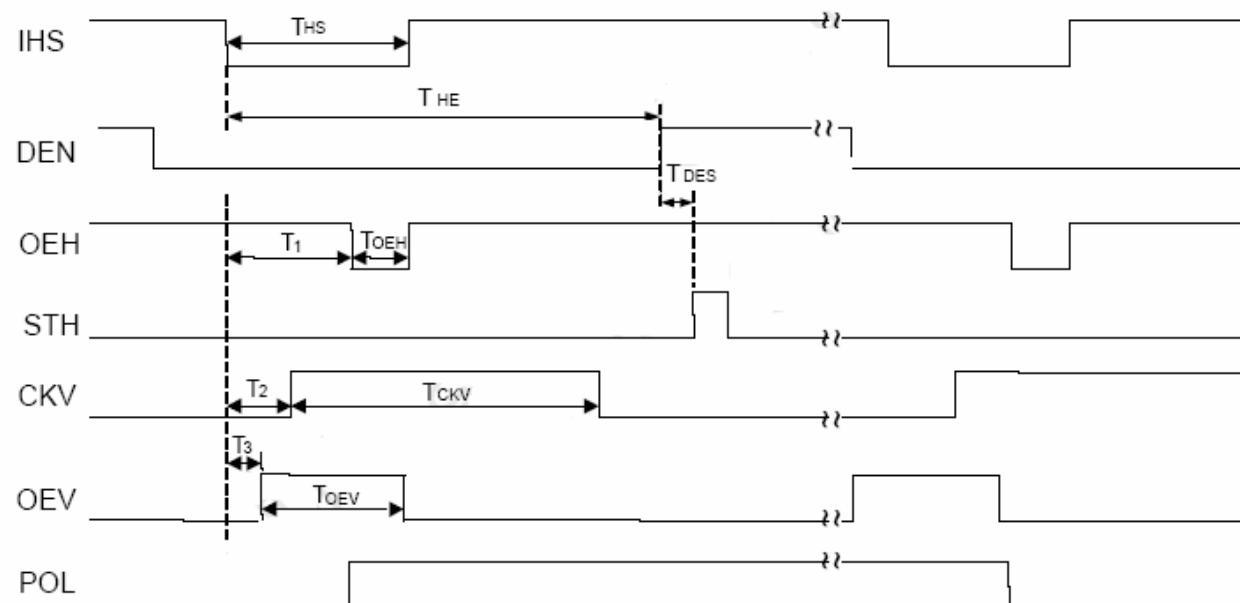
#### ● Odd field



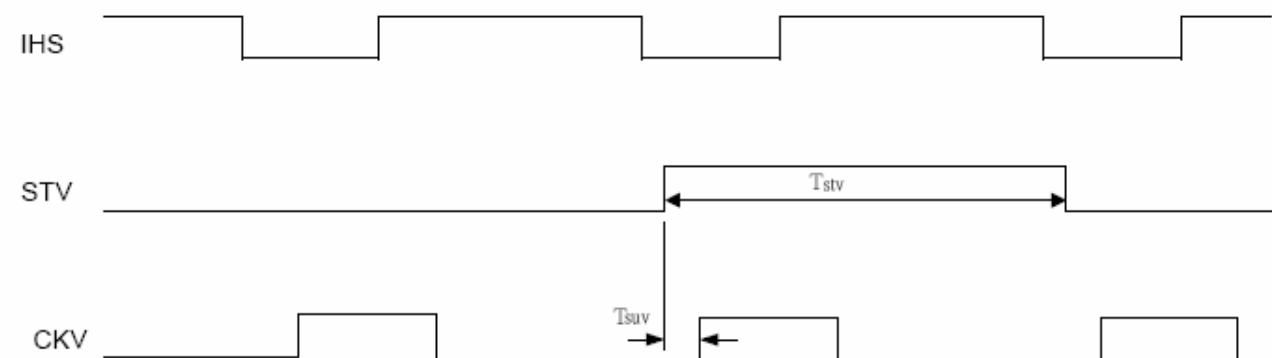
#### ● Even field



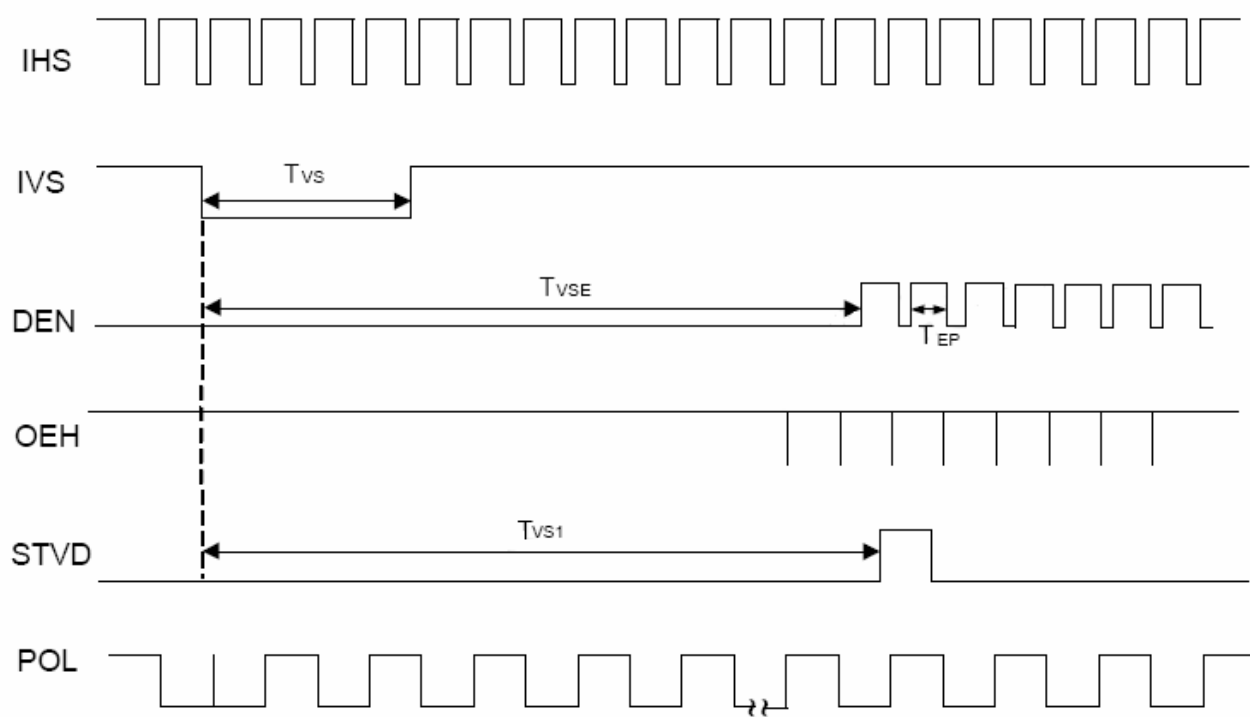
### HIS and horizontal control timing waveform



### 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 &	Data signal																		
	Gray scale	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.Optical characteristics

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remarks
Viewing angle range		$\theta_{21}, \theta_{22}$	$CR \geq 5$	60	65	—	°(degree)	[Note 1]
		$\theta_{11}$		60	65	—	°(degree)	
		$\theta_{12}$		35	40	—	°(degree)	
Contrast ratio		CRmax	Optimal viewing angle	250	350	—		[Note 2]
Response time	Rise	$\tau_r$	$\theta = 0^\circ$	—	8	20	ms	[Note 3]
	Fall	$\tau_d$		—	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.

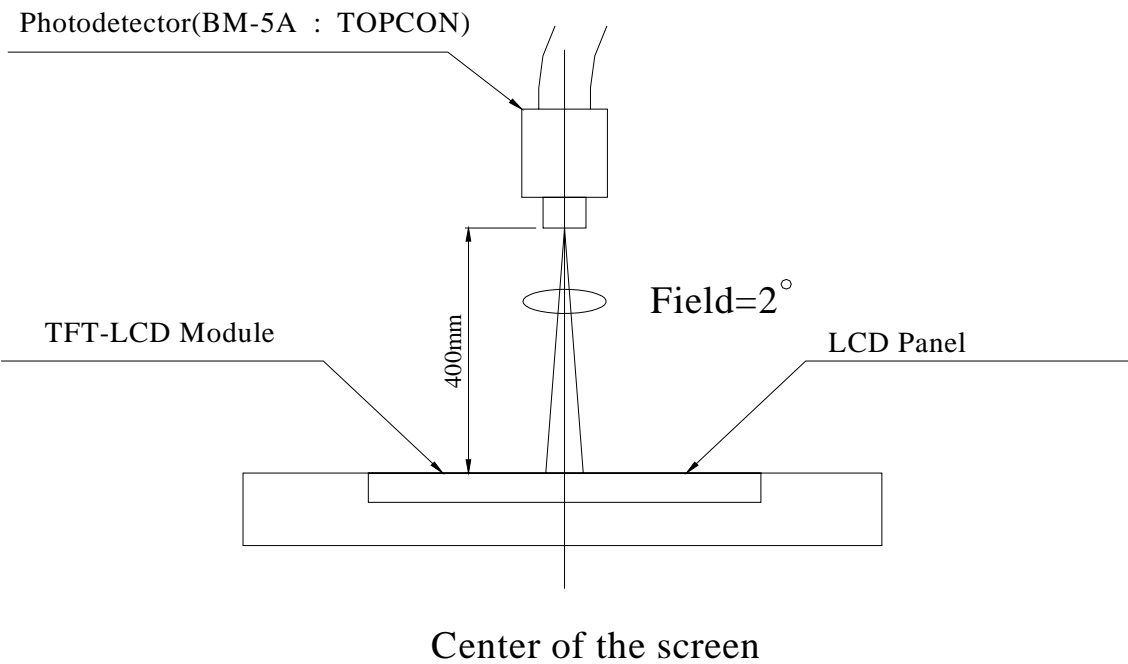
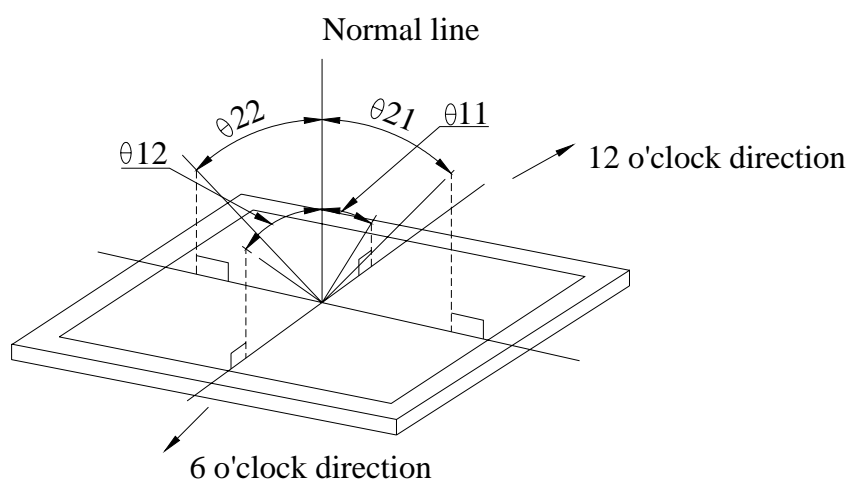


Fig 2 Optical characteristics measurement method

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  $\theta_{11} > \theta_{\max}$ , gray scale is reversed partially.

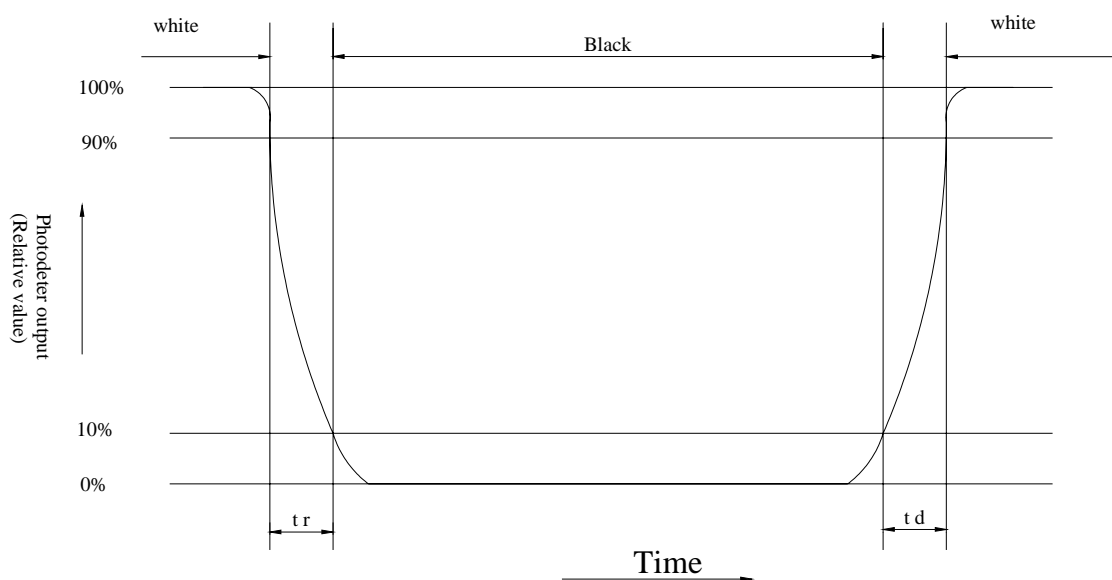
Where  $\theta_{11} > \theta_{\max}$ , or in  $\theta_{12}$  direction, gray scale isn't reversed.

[Note 2] Contrast ratio is defined as follows:

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

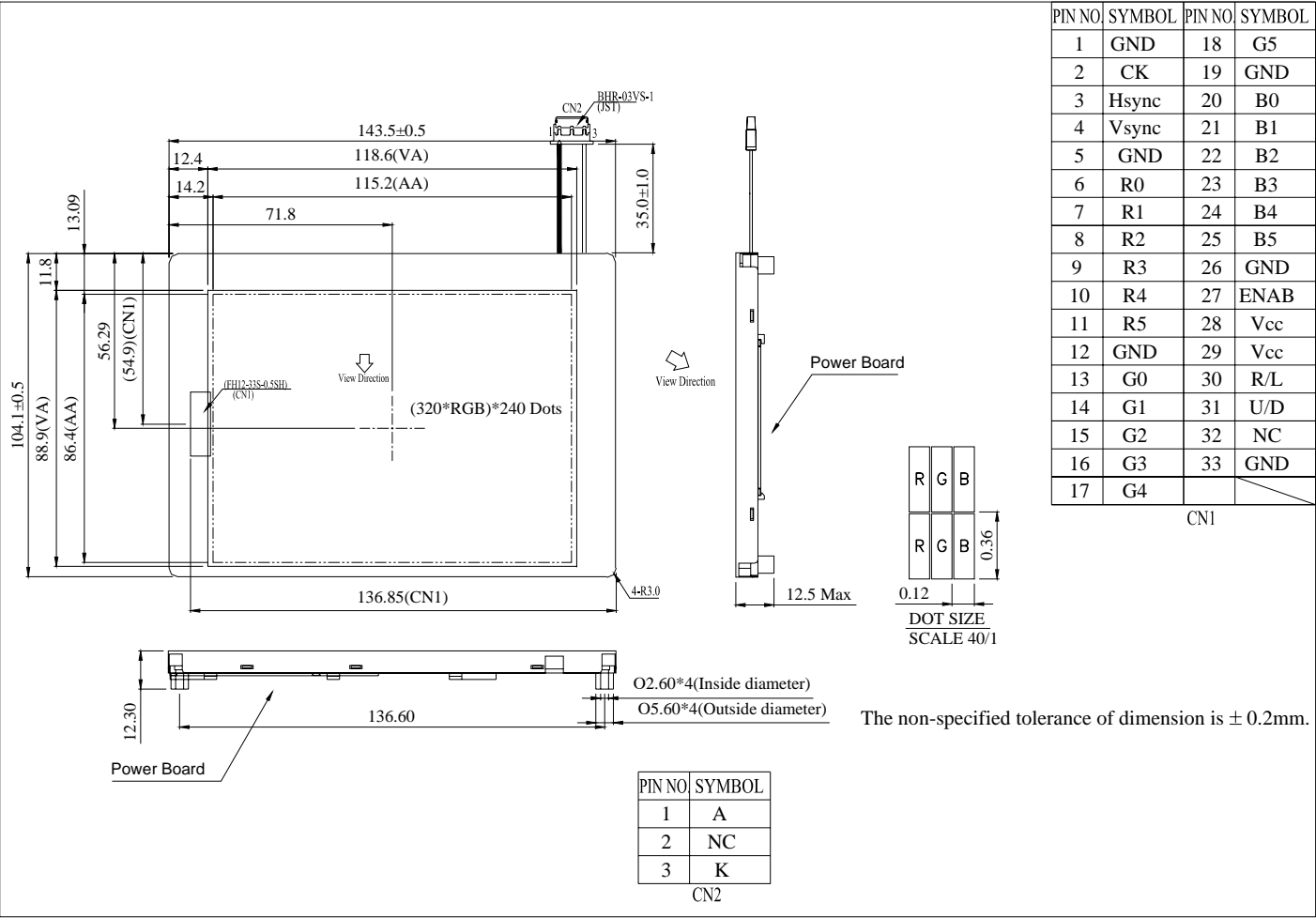
※ Measurement point :Center of the active area

[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”.





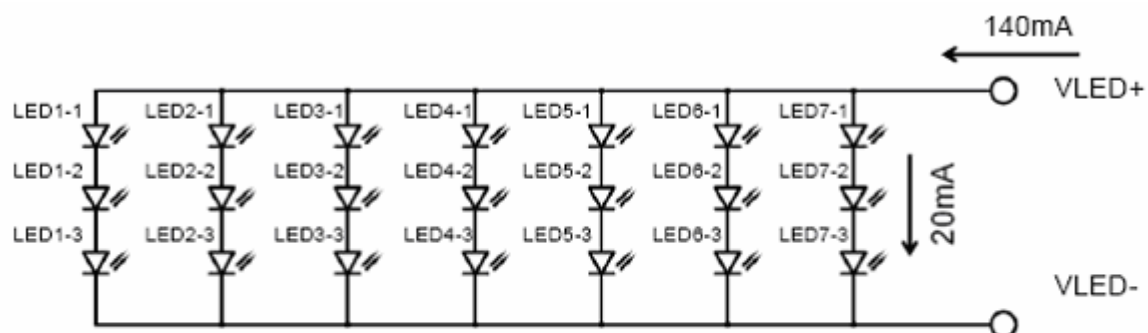
8.Contour Drawing



## 9.LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
<b>LED Current</b>	$I_{LED}$	----	140	210	mA	Note1
<b>LED voltage</b>	$V_{LED}$	9.0	----	10.5	V	
<b>LED life Time</b>	-	(10,000)	----	----	-	Note 2,3
<b>Luminous Intensity</b>	IV	210.2	262.8	----	CD/M <sup>2</sup>	Note 4

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

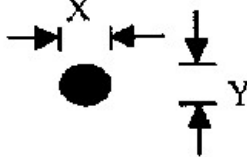



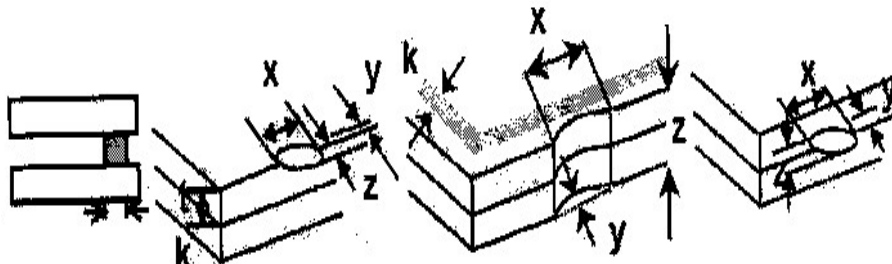
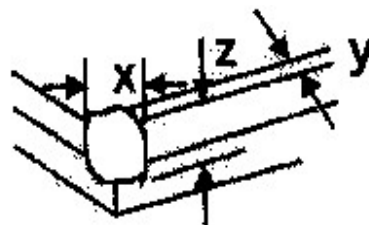
Note 2 :  $T_a = 25^{\circ}\text{C}$  ,

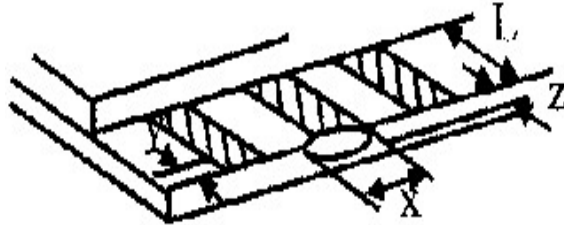
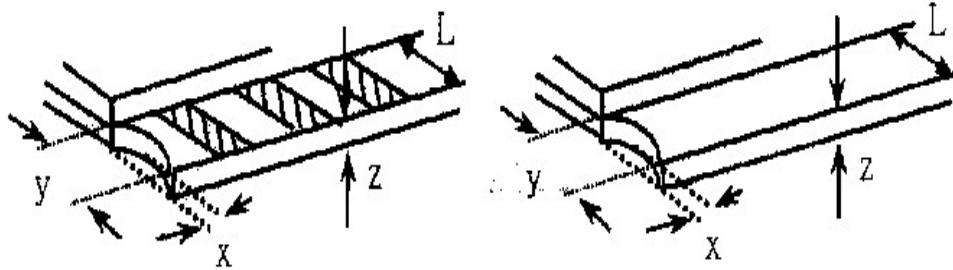
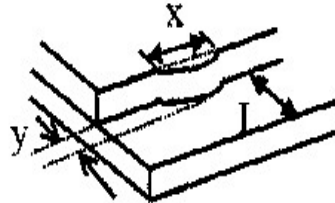
Note 3 : Brightness to be decreased to 50% of the initial value.

Note 4: The luminous is measured through LCD panel.

## 10. Inspection specification

NO	Item	Criterion	AQL														
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character , dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect. 1.7 Mixed product types. 1.8 Contrast defect.	0.65														
02	Black or white spots on LCD (display only)	2.1 White and black spots on display $\leq 0.25\text{mm}$ , no more than three white or black spots present. 2.2 Densely spaced: No more than two spots or lines within 3mm	2.5														
03	LCD black spots, white spots, contamination (non-display)	3.1 Round type : As following drawing $\Phi=(x+y)/2$ 	<table><tr><th>SIZE</th><th>Acceptable Q TY</th></tr><tr><td><math>\Phi \leq 0.10</math></td><td>Accept no dense</td></tr><tr><td><math>0.10 &lt; \Phi \leq 0.20</math></td><td>2</td></tr><tr><td><math>0.20 &lt; \Phi \leq 0.25</math></td><td>1</td></tr><tr><td><math>0.25 &lt; \Phi</math></td><td>0</td></tr></table>	SIZE	Acceptable Q TY	$\Phi \leq 0.10$	Accept no dense	$0.10 < \Phi \leq 0.20$	2	$0.20 < \Phi \leq 0.25$	1	$0.25 < \Phi$	0				
		SIZE	Acceptable Q TY														
$\Phi \leq 0.10$	Accept no dense																
$0.10 < \Phi \leq 0.20$	2																
$0.20 < \Phi \leq 0.25$	1																
$0.25 < \Phi$	0																
		3.2 Line type : (As following drawing) 	<table><tr><th>Length</th><th>Width</th><th>Acceptable Q TY</th></tr><tr><td>---</td><td><math>W \leq 0.02</math></td><td>Accept no dense</td></tr><tr><td><math>L \leq 3.0</math></td><td><math>0.02 &lt; W \leq 0.03</math></td><td rowspan="2">2</td></tr><tr><td><math>L \leq 2.5</math></td><td><math>0.03 &lt; W \leq 0.05</math></td></tr><tr><td>---</td><td><math>0.05 &lt; W</math></td><td>As round type</td></tr></table>	Length	Width	Acceptable Q TY	---	$W \leq 0.02$	Accept no dense	$L \leq 3.0$	$0.02 < W \leq 0.03$	2	$L \leq 2.5$	$0.03 < W \leq 0.05$	---	$0.05 < W$	As round type
Length	Width	Acceptable Q TY															
---	$W \leq 0.02$	Accept no dense															
$L \leq 3.0$	$0.02 < W \leq 0.03$	2															
$L \leq 2.5$	$0.03 < W \leq 0.05$																
---	$0.05 < W$	As round type															
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction. <table><tr><th>Size <math>\Phi</math></th><th>Acceptable Q TY</th></tr><tr><td><math>\Phi \leq 0.20</math></td><td>Accept no dense</td></tr><tr><td><math>0.20 &lt; \Phi \leq 0.50</math></td><td>3</td></tr><tr><td><math>0.50 &lt; \Phi \leq 1.00</math></td><td>2</td></tr><tr><td><math>1.00 &lt; \Phi</math></td><td>0</td></tr><tr><td>Total Q TY</td><td>3</td></tr></table>	Size $\Phi$	Acceptable Q TY	$\Phi \leq 0.20$	Accept no dense	$0.20 < \Phi \leq 0.50$	3	$0.50 < \Phi \leq 1.00$	2	$1.00 < \Phi$	0	Total Q TY	3	2.5		
Size $\Phi$	Acceptable Q TY																
$\Phi \leq 0.20$	Accept no dense																
$0.20 < \Phi \leq 0.50$	3																
$0.50 < \Phi \leq 1.00$	2																
$1.00 < \Phi$	0																
Total Q TY	3																

NO	Item	Criterion	AQL																		
05	Scratches	Follow NO.3 LCD black spots, white spots, contamination																			
06	Chipped glass	<p>Symbols Define: x: Chip length                      y: Chip width                      z: Chip thickness k: Seal width                      t: Glass thickness                      a: LCD side length L: Electrode pad length:</p> <p>6.1 General glass chip : 6.1.1 Chip on panel surface and crack between panels:</p>  <table><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td><math>Z \leq 1/2t</math></td><td>Not over viewing area</td><td><math>x \leq 1/8a</math></td></tr><tr><td><math>1/2t &lt; z \leq 2t</math></td><td>Not exceed 1/3k</td><td><math>x \leq 1/8a</math></td></tr></table> <p>⊙If there are 2 or more chips, x is total length of each chip.</p> <p>6.1.2 Corner crack:</p>  <table><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td><math>Z \leq 1/2t</math></td><td>Not over viewing area</td><td><math>x \leq 1/8a</math></td></tr><tr><td><math>1/2t &lt; z \leq 2t</math></td><td>Not exceed 1/3k</td><td><math>x \leq 1/8a</math></td></tr></table> <p>⊙If there are 2 or more chips, x is the total length of each chip.</p>	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	2.5
		z: Chip thickness	y: Chip width	x: Chip length																	
$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$																			
$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$																			
z: Chip thickness	y: Chip width	x: Chip length																			
$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$																			
$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$																			

NO	Item	Criterion	AQL						
06	Glass crack	Symbols : x: Chip length      y: Chip width      z: Chip thickness k: Seal width      t: Glass thickness      a: LCD side length L: Electrode pad length 6.2 Protrusion over terminal : 6.2.1 Chip on electrode pad :	2.5						
		 <table border="1" data-bbox="351 654 1262 741"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td><math>y \leq 0.5\text{mm}</math></td> <td><math>x \leq 1/8a</math></td> <td><math>0 &lt; z \leq t</math></td> </tr> </table>		y: Chip width	x: Chip length	z: Chip thickness	$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$
		y: Chip width		x: Chip length	z: Chip thickness				
		$y \leq 0.5\text{mm}$		$x \leq 1/8a$	$0 < z \leq t$				
6.2.2 Non-conductive portion:									
 <table border="1" data-bbox="424 1072 1262 1160"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td><math>y \leq L</math></td> <td><math>x \leq 1/8a</math></td> <td><math>0 &lt; z \leq t</math></td> </tr> </table> <p>           ⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.            ⊙ If the product will be heat sealed by the customer, the alignment mark not be damaged.         </p>	y: Chip width	x: Chip length	z: Chip thickness	$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$			
y: Chip width	x: Chip length	z: Chip thickness							
$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$							
		6.2.3 Substrate protuberance and internal crack.							
		 <table border="1" data-bbox="761 1382 1270 1469"> <tr> <td>y: width</td> <td>x: length</td> </tr> <tr> <td><math>y \leq 1/3L</math></td> <td><math>x \leq a</math></td> </tr> </table>	y: width	x: length	$y \leq 1/3L$	$x \leq a$			
y: width	x: length								
$y \leq 1/3L$	$x \leq a$								

NO	Item	Criterion	AQL
07	Cracked glass	The LCD with extensive crack is not acceptable.	2.5
08	Backlight elements	8.1 Illumination source flickers when lit. 8.2 Spots or scratched that appear when lit must be judged. Using LCD spot, lines and contamination standards. 8.3 Backlight doesn't light or color wrong.	0.65 2.5 0.65
09	Bezel	9.1 Bezel may not have rust, be deformed or have fingerprints, stains or other contamination. 9.2 Bezel must comply with job specifications.	2.5 0.65
10	PCB 、 COB	10.1 COB seal may not have pinholes larger than 0.2mm or contamination. 10.2 COB seal surface may not have pinholes through to the IC. 10.3 The height of the COB should not exceed the height indicated in the assembly diagram. 10.4 There may not be more than 2mm of sealant outside the seal area on the PCB. And there should be no more than three places. 10.5 No oxidation or contamination PCB terminals. 10.6 Parts on PCB must be the same as on the production characteristic chart. There should be no wrong parts, missing parts or excess parts. 10.7 The jumper on the PCB should conform to the product characteristic chart. 10.8 If solder gets on bezel tab pads, LED pad, zebra pad or screw hold pad, make sure it is smoothed down.	2.5 2.5 0.65 2.5 2.5 0.65 0.65 2.5
11	Soldering	11.1 No un-melted solder paste may be present on the PCB. 11.2 No cold solder joints, missing solder connections, oxidation or icicle. 11.3 No residue or solder balls on PCB. 11.4 No short circuits in components on PCB.	2.5 2.5 2.5 0.65

NO	Item	Criterion	AQL
12	General appearance	12.1 No oxidation, contamination, curves or, bends on interface Pin (OLB) of TCP.	2.5
		12.2 No cracks on interface pin (OLB) of TCP.	0.65
		12.3 No contamination, solder residue or solder balls on product.	2.5
		12.4 The IC on the TCP may not be damaged, circuits.	2.5
		12.5 The uppermost edge of the protective strip on the interface pin must be present or look as if it cause the interface pin to sever.	2.5
		12.6 The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color.	2.5
		12.7 Sealant on top of the ITO circuit has not hardened.	0.65
		12.8 Pin type must match type in specification sheet.	0.65
		12.9 LCD pin loose or missing pins.	0.65
		12.10 Product packaging must the same as specified on packaging specification sheet.	0.65
		12.11 Product dimension and structure must conform to product specification sheet.	

# 11. Material List of Components for RoHs

1. WINSTAR Display Co., Ltd hereby declares that all of or part of products (with the mark “#”in code), including, but not limited to, the LCM, accessories or packages, manufactured and/or delivered to your company (including your subsidiaries and affiliated company) directly or indirectly by our company (including our subsidiaries or affiliated companies) do not intentionally contain any of the substances listed in all applicable EU directives and regulations, including the following substances.

## Exhibit A : The Harmful Material List

Material	(Cd)	(Pb)	(Hg)	(Cr6+)	PBBs	PBDEs
Limited Value	100 ppm	1000 ppm	1000 ppm	1000 ppm	1000 ppm	1000 ppm
Above limited value is set up according to RoHS.						

## 2.Process for RoHS requirement :

(1) Use the Sn/Ag/Cu soldering surface ; the surface of Pb-free solder is rougher than we used before.

(2) Heat-resistance temp. :

Reflow : 250℃,30 seconds Max. ;

Connector soldering wave or hand soldering : 320℃, 10 seconds max.

(3) Temp. curve of reflow, max. Temp. : 235±5℃ ;

Recommended customer's soldering temp. of connector : 280℃, 3 seconds.





winstar

## LCM Sample Estimate Feedback Sheet

Module Number : \_\_\_\_\_

Page: 1

### **1、Panel Specification :**

- |                            |                               |                                     |
|----------------------------|-------------------------------|-------------------------------------|
| 1. Panel Type :            | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. View Direction :        | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. Numbers of Dots :       | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. View Area :             | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. Active Area :           | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6. Operating Temperature : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 7. Storage Temperature :   | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 8. Others :                | _____                         |                                     |

### **2、Mechanical Specification :**

- |                             |                               |                                     |
|-----------------------------|-------------------------------|-------------------------------------|
| 1. PCB Size :               | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. Frame Size :             | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. Material of Frame :      | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. Connector Position :     | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. Fix Hole Position :      | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6. Backlight Position :     | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 7. Thickness of PCB :       | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 8. Height of Frame to PCB : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 9. Height of Module :       | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 10. Others :                | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |

### **3、Relative Hole Size :**

- |                             |                               |                                     |
|-----------------------------|-------------------------------|-------------------------------------|
| 1. Pitch of Connector :     | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. Hole size of Connector : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. Mounting Hole size :     | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. Mounting Hole Type :     | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. Others :                 | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |

### **4、Backlight Specification :**

- |   |                               |                                     |
|---|-------------------------------|-------------------------------------|
| 1. B/L Type :                                     | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. B/L Color :                                    | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. B/L Driving Voltage (Reference for LED Type) : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. B/L Driving Current :                          | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. Brightness of B/L :                            | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6. B/L Solder Method :                            | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 7. Others :                                       | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |

>> Go to page 2 <<

Module Number : \_\_\_\_\_

Page: 2

**5、Electronic Characteristics of Module :**

- |                              |                               |                                     |
|------------------------------|-------------------------------|-------------------------------------|
| 1. Input Voltage :           | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. Supply Current :          | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. Driving Voltage for LCD : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. Contrast for LCD :        | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. B/L Driving Method :      | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6. Negative Voltage Output : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 7. Interface Function :      | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 8. LCD Uniformity :          | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 9. ESD test :                | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 10. Others :                 | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |

**6、Summary :**

Sales signature : \_\_\_\_\_

Customer Signature : \_\_\_\_\_

Date : \_\_\_\_ / \_\_\_\_ / \_\_\_\_