



曜凌光電股份有限公司

住址: 42878 台中市大雅区科雅路 25 號 5F WEB: <http://www.Raystar-Optronics.com>
5F., No.25, Keya Rd., Daya Dist., Taichung E-mail: sales@raystar-optronics.com
City 428, Taiwan Tel:886-4-2565-0761 Fax : 886-4-2565-0760

RFF1020A-AIW-DNN

SPECIFICATION

CUSTOMER:

APPROVED BY	
PCB VERSION	
DATE	

FOR CUSTOMER USE ONLY

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

Release DATE:

Revision History

VERSION	DATE	REVISED PAGE NO.	Note
0 A B	2012/12/13 2014/08/22 2015/07/15		First issue Update Rev. Add size & Surface. Modify Block Diagram Modify Reliability.

Contents

1.Module Classification Information

2.Summary

3.General Specification

4.Interface

5.Contour Drawing

6.Block Diagram

7.Absolute Maximum Ratings

8.Electrical Characteristics

9.DC Characteristics

10.Interface Timing Characteristics

11.Optical Characteristics

12.Reliability

13.Other

1.Module Classification Information

R	F	F	102	0A	-	A	I	W	-	D	N	N
1	2	3	4	5	-	6	7	8	-	9	10	11

Item	Description	
1	R : Raystar Optronics Inc.	
2	Display Type : F→TFT Type, J→ Custom TFT	
3	Solution: A: 128x160 B:320x234 C:320x240 D:480x234 E:480x272 F:800x480 G:640x480 H:1204x600 I:320x480 J:320x400 K:1280x800 L:240x400 M:1024x768 N:128x128 O:480x800	
4	Display Size : 10.2" TFT	
5	Version Code.	
6	Model Type: A : TFT LCD E : TFT+FR+CONTROL BOARD J : TFT+FR+A/D BOARD N : TFT+FR+A/D BOARD+CONTROL BOARD S : TFT+FR+POWER BOARD (DC TO DC) 1 : TFT+CONTROL BOARD	6 : TFT+FR H : TFT+D/V BOARD I : TFT+FR+D/V BOARD B : TFT+POWER BD
7	Polarizer Type, Temperature range, View direction	I→Transmissive, W. T, 6:00 ; C→Transmissive, N. T, 6:00
		L→Transmissive, W.T,12:00 ; F→Transmissive, N.T,12:00
		Y→Transmissive, W.T, Wide View
		Z→Transmissive, W.T, Wide Viewing Angle for O-FILM
		V→Transmissive, Super W.T, VA TFT
8	Backlight	W : LED, White H : LED, High Light White
		F : CCFL, White
9	Driver Method	D: Digital A: Analog L : LVDS
10	Interface	N : without control board A : 8Bit B : 16Bit
11	TS	N : Without TS S : resistive touch panel C : capacitive touch panel

2.Summary

This technical specification applies to 10.2' color TFT-LCD panel. The 10.2' color TFT-LCD panel is designed for camcorder, digital camera application and other electronic products which require high quality flat panel displays. This module follows RoHS.

RAYSTAR OPTRONICS

3.General Specifications

- Size: 10.2 inch
- Dot Matrix: 800 x RGBx480(TFT) dots
- Module dimension: 235 x 145.8 x 6.1 mm
- Active area: 222 x 132.48 mm
- Dot pitch: 0.0925 x 0.2775 mm
- LCD type: TFT, Normally White, Transmissive
- View Direction: 12 o'clock
- Gray Scale Inversion Direction: 6 o'clock
- Backlight Type: LED ,Normally White
- With /Without TP: Without TP
- Surface: Anti-Glare

*Color tone slight changed by temperature and driving voltage.

4.Interface

4.1. TFT LCD Panel Driving Section

FPC connector is used for the module electronics interface. The recommended model is "AF 730L-A2G1T" manufactured by P-TWO.

Pin No.	Symbol	I/O	Function	Remark
1	POL	I	Polarity selection	
2	STVD	I/O	Vertical start pulse input when U/D= H	Note 1
3	OEV	I	Output enable	
4	CKV	I	Vertical clock	
5	STVU	I/O	Vertical start pulse input when U/D= L	Note 1
6	GND	P	Power ground	
7	EDGSL	I	Select rising edge or rising/falling edge	
8	V _{CC}	P	Power supply for digital circuit	
9	V ₉	I	Gamma voltage level 9	
10	V _{GL}	P	Gate OFF voltage	
11	V ₂	I	Gamma voltage level 2	
12	V _{GH}	P	Gate ON voltage	
13	V ₆	I	Gamma voltage level 6	
14	U/D	I	Up/down selection	Note 1,2
15	V _{COM}	I	Common voltage	
16	GND	P	Power ground	
17	AV _{DD}	P	Power supply for analog circuit	
18	V ₁₄	I	Gamma voltage level 14	
19	V ₁₁	I	Gamma voltage level 11	
20	V ₈	I	Gamma voltage level 8	
21	V ₅	I	Gamma voltage level 5	
22	V ₃	I	Gamma voltage level 3	
23	GND	P	Power ground	
24	R ₅	I	Red data(MSB)	
25	R ₄	I	Red data	
26	R ₃	I	Red data	
27	R ₂	I	Red data	
28	R ₁	I	Red data	
29	R ₀	I	Red data(LSB)	
30	GND	P	Power ground	

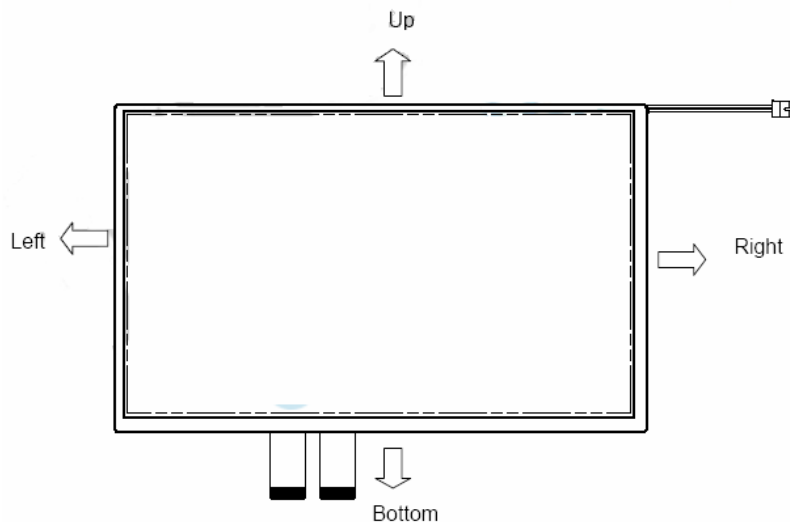
31	GND	P	Power ground	
32	G5	I	Green data(MSB)	
33	G4	I	Green data	
34	G3	I	Green data	
35	G2	I	Green data	
36	G1	I	Green data	
37	G0	I	Green data(LSB)	
38	STHL	I/O	Horizontal start pulse input when R/L = L	Note 1
39	REV	P	Control signal are inverted or not	Note 3
40	GND	I	Power ground	
41	DCLK	I	Sample clock	
42	VCC	P	Power supply for digital circuit	
43	STHR	I/O	Horizontal start pulse input when R/L = H	Note 1
44	LD	I	Latches the polarity of outputs and switches the new data to outputs	
45	B5	I	Blue data (MSB)	
46	B4	I	Blue data	
47	B3	I	Blue data	
48	B2	I	Blue data	
49	B1	I	Blue data	
50	B0	I	Blue data (LSB)	
51	R/L	I	Right/ left selection	Note 1,2
52	V1	I	Gamma voltage level 1	
53	V4	I	Gamma voltage level 4	
54	V7	I	Gamma voltage level 7	
55	V10	I	Gamma voltage level 10	
56	V12	I	Gamma voltage level 12	
57	V13	I	Gamma voltage level 13	
58	AVDD	P	Voltage for analog circuit	
59	GND	P	Power ground	
60	VCOM	I	Common voltage	

I: input, O: output, P: Power

Note 1: Selection of scanning mode

Setting of scan control input		IN/OUT state for start pulse				Scanning direction
U/D	R/L	STVD	STVU	STHR	STHL	
GND	V _{CC}	O	I	I	O	Up to down, left to right
V _{CC}	GND	I	O	O	I	Down to up, right to left
GND	GND	O	I	O	I	Up to down, right to left
V _{CC}	V _{CC}	I	O	I	O	Down to up, left to right

Note 2: Definition of scanning direction.
Refer to the figure as below:



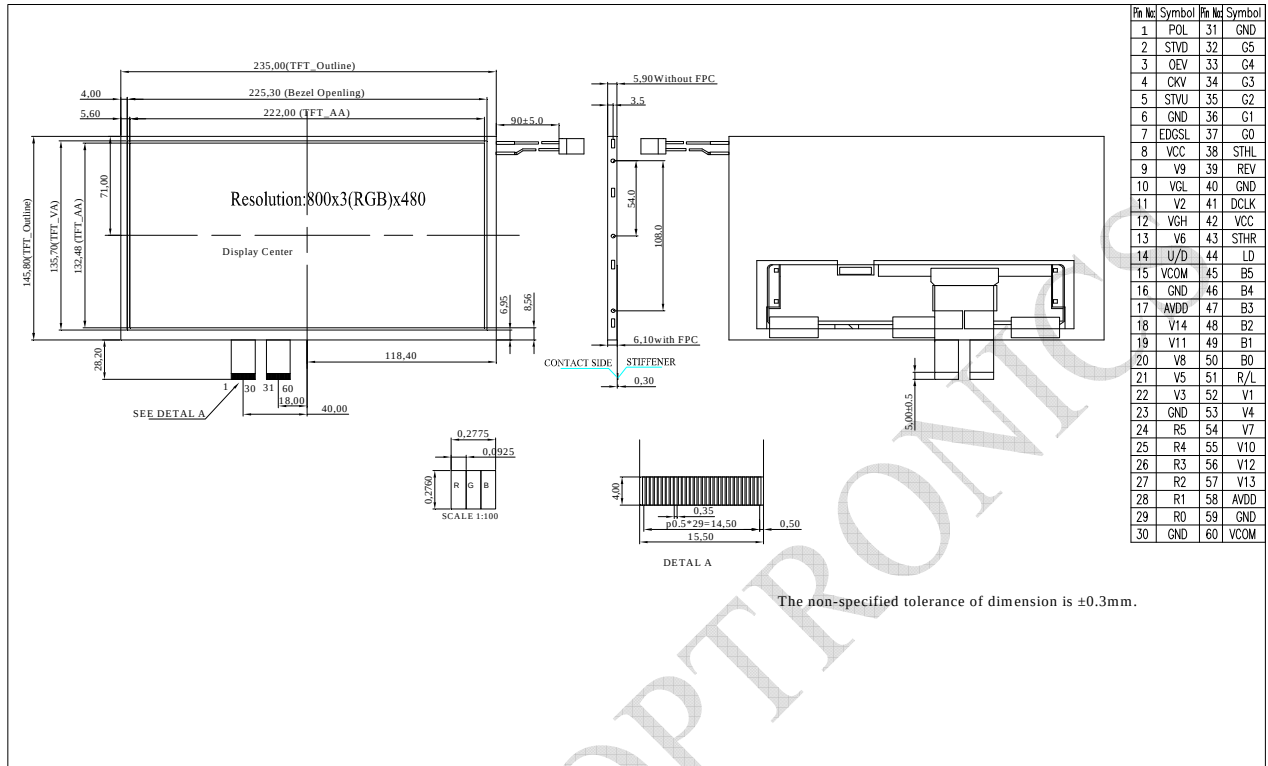
Note 3: When REV="L", normally REV="H", these data will be inverted.

4.2. Backlight Unit Section

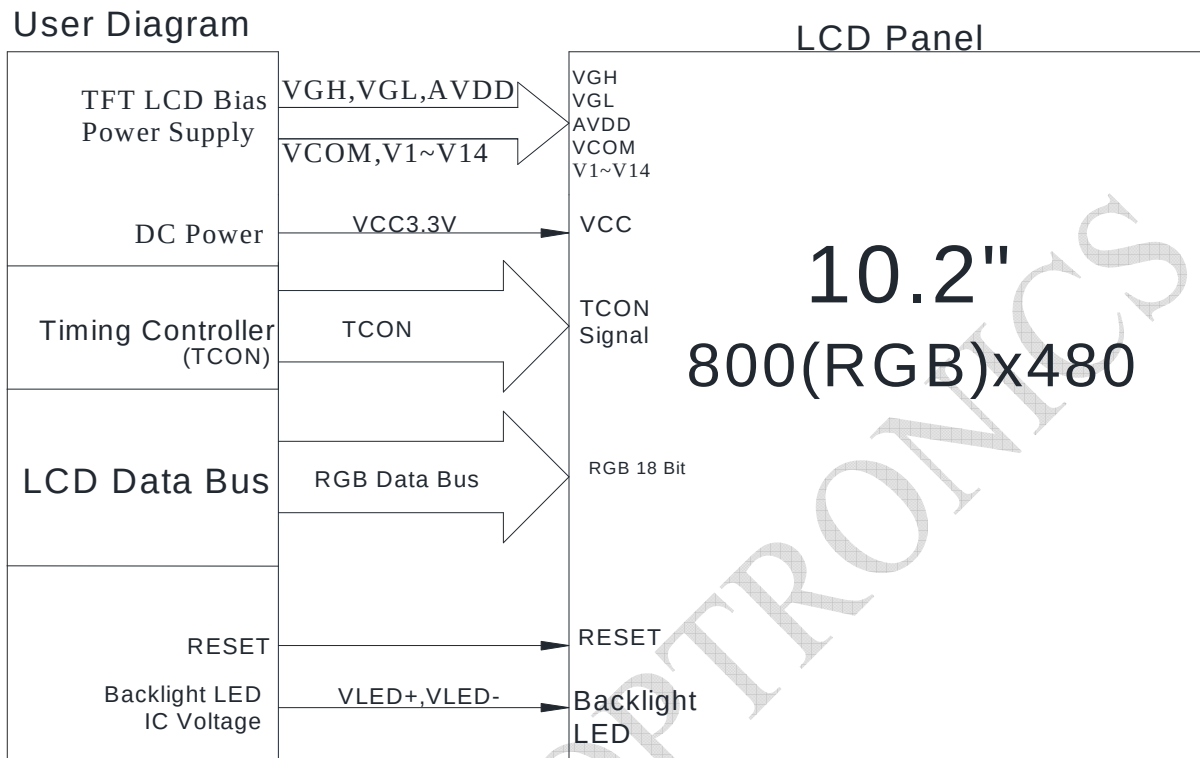
LED Light Bar connector is used for the the integral backlight system. The recommended model is "BHSR-02VS-1" manufactured by JST.

Pin No.	Symbol	I/O	Function	Remark
1	V _{LED+}	P	Power for LED backlight anode	Pink
2	V _{LED-}	P	Power for LED backlight cathode	White

5. Contour Drawing



6. Block Diagram

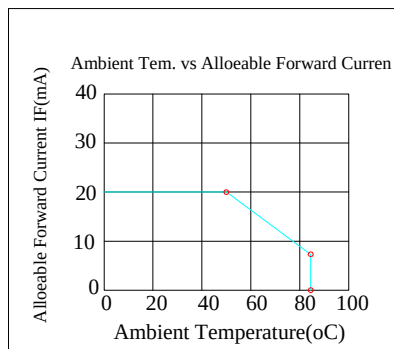


7. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-30	—	+85	°C
Storage Temperature	TST	-30	—	+85	°C

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

- Temp. $\leq 60^{\circ}\text{C}$, 90% RH MAX. Temp. $> 60^{\circ}\text{C}$, Absolute humidity shall be less than 90% RH at 60°C



8. Electrical Characteristics

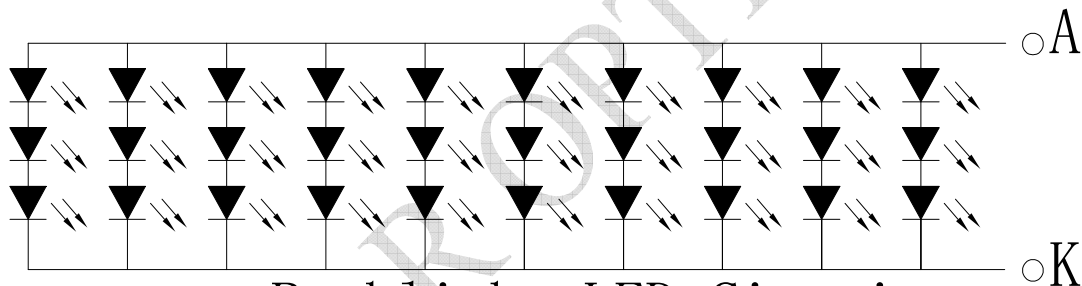
8.1. Operating conditions:

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage	VCC	—	3.0	3.3	3.6	V
	AVDD	—	9.0	9.2	9.4	V
	VGH	—	15.3	16	16.7	V
	VGL	—	-7.7	-7.0	-6.3	V
Input signal voltage	VCOM	—	3.65	3.85	4.05	V
	V1~V7	—	0.4	—	AVDD-0.1	V
	V8~V14	—	0.1	—	0.6AVDD	V

8.2. LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	-	180	200	220	mA	-
Power Consumption	-	1512	1860	2310	mW	-
LED voltage	-	8.4	9.3	10.5	V	Note 1
LED Life Time	-	20,000	-	-	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED



Backlight LED Circuit

Note 2 : Ta = 25 °C

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

Note 4 : The single LED lamp case

9.DC CHARATERISTICS

Parameter	Symbol	Rating			Unit	Condition
		Min	Typ	Max		
Low level input voltage	V_{IL}	0	-	0.3VCC	V	
High level input voltage	V_{IH}	0.7VCC	-	VCC	V	

10. Timing Characteristics

10.1. Timing Conditions

Symbol	Parameter	Min	Typ	Max	Unit
F _{dclk}	DCLK frequency	-	40	45	MHz
T _{cph}	DCLK cycle	22	25	-	ns
T _{cw}	DCLK pulse width	8	-	-	ns
T _{su}	Data set-up time	4	-	-	ns
T _{hd}	Data hold time	2	-	-	ns
T _{ld}	Time that the last data to LD	1	-	-	Tcph
T _{wld}	Pulse width of LD	2	-	-	Tcph
T _{lds}	Time that LD to STHL/R	5	-	-	Tcph
T _{psu}	POL set-up time	6	-	-	ns
T _{phd}	POL hold time	6	-	-	ns
F _{vclk}	CKV frequency	-	-	200	KHz
T _{rck}	CKV rise time	-	-	100	ns
T _{fck}	CKV falling time	-	-	100	ns
P _{WCLK}	CKV pulse width	500	-	-	ns
T _{dh}	Horizontal display timing range	-	800	-	Tcph
T _h	Horizontal timing range	-	1056	-	Tcph
T _{suv}	STVU/D setup time	200	-	-	ns
T _{hdv}	STVU/D hold time	300	-	-	ns
T _{dt}	STVU/D delay time	-	-	500	ns
T _{do}	Driver output delay time	-	-	900	ns
T _{tth}	Output rise time	-	500	1000	ns
T _{thl}	Output falling time	-	400	800	ns
T _{wcl}	OEV pulse width	1	-	-	ns
T _{oe}	OEV to Driver output delay time	-	-	900	us
T _v	Horizontal lines per field	512	525	610	Line
T _{vd}	Vertical display timing range	-	480	-	Line

10.2. Timing Diagram1

<EDGSL="0",Default>

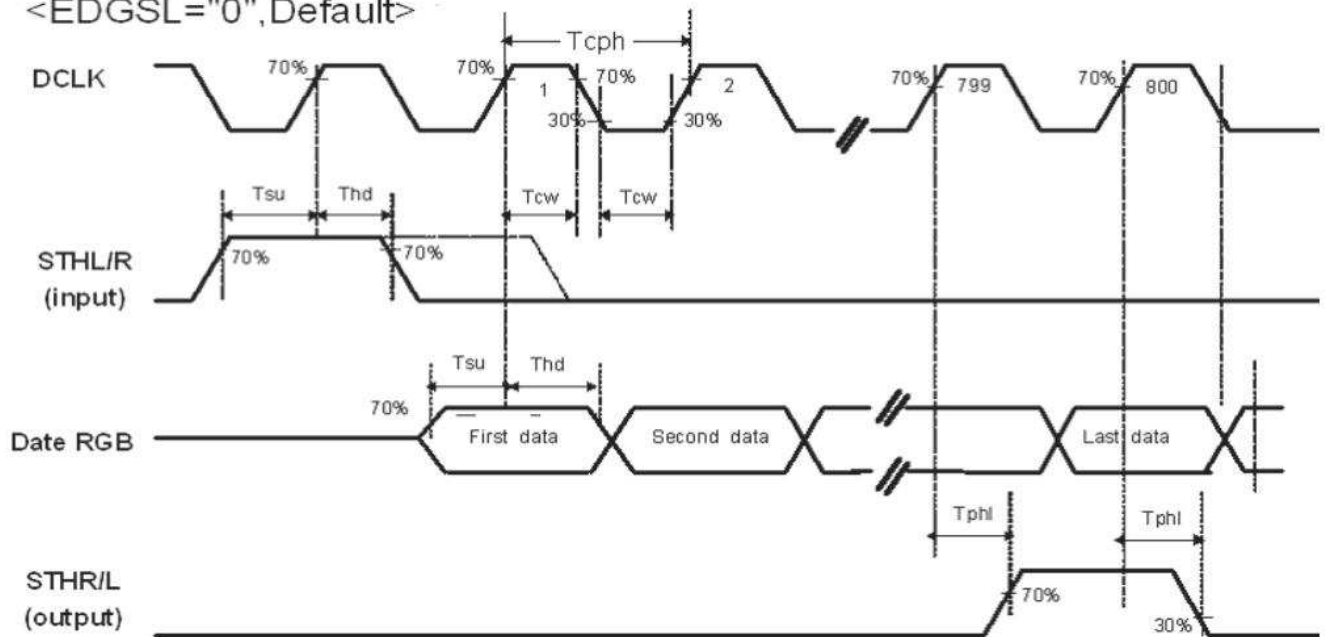


Fig.1 operation model 1

< EDGSL ="1">

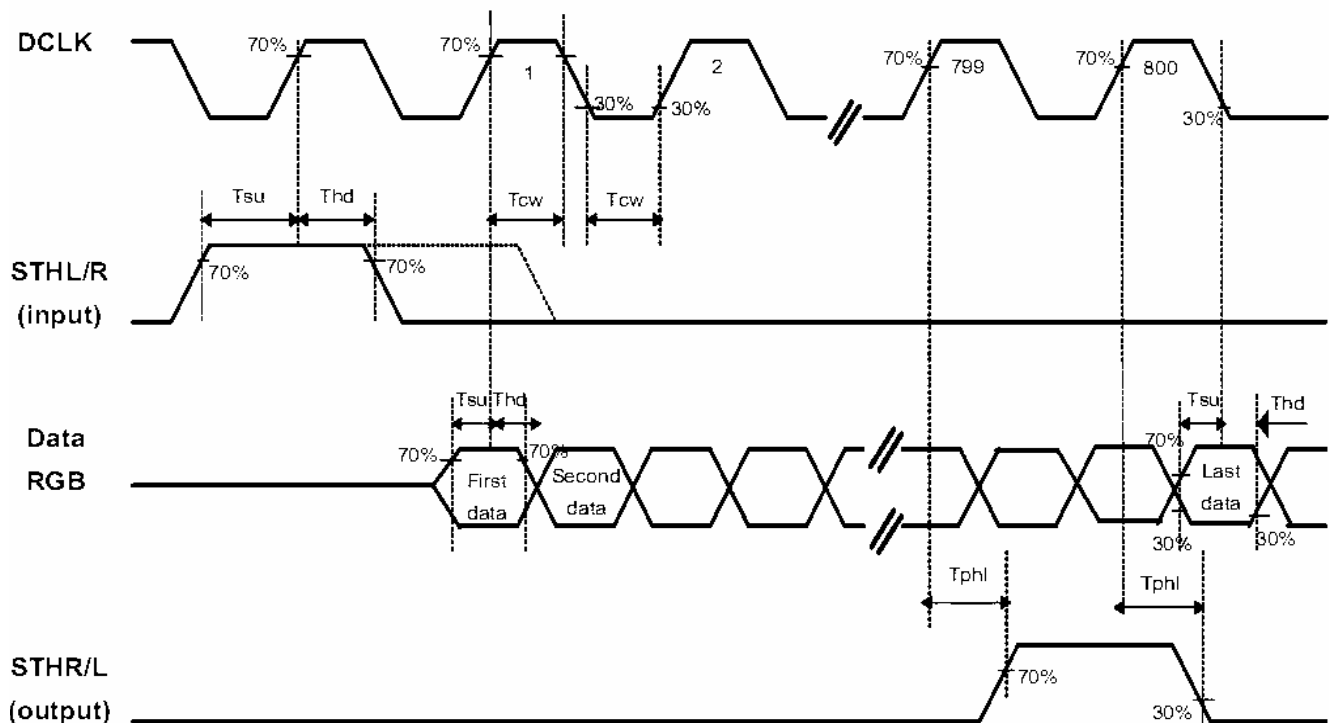


Fig.2 operation model 2

10.3. Timing Diagram2

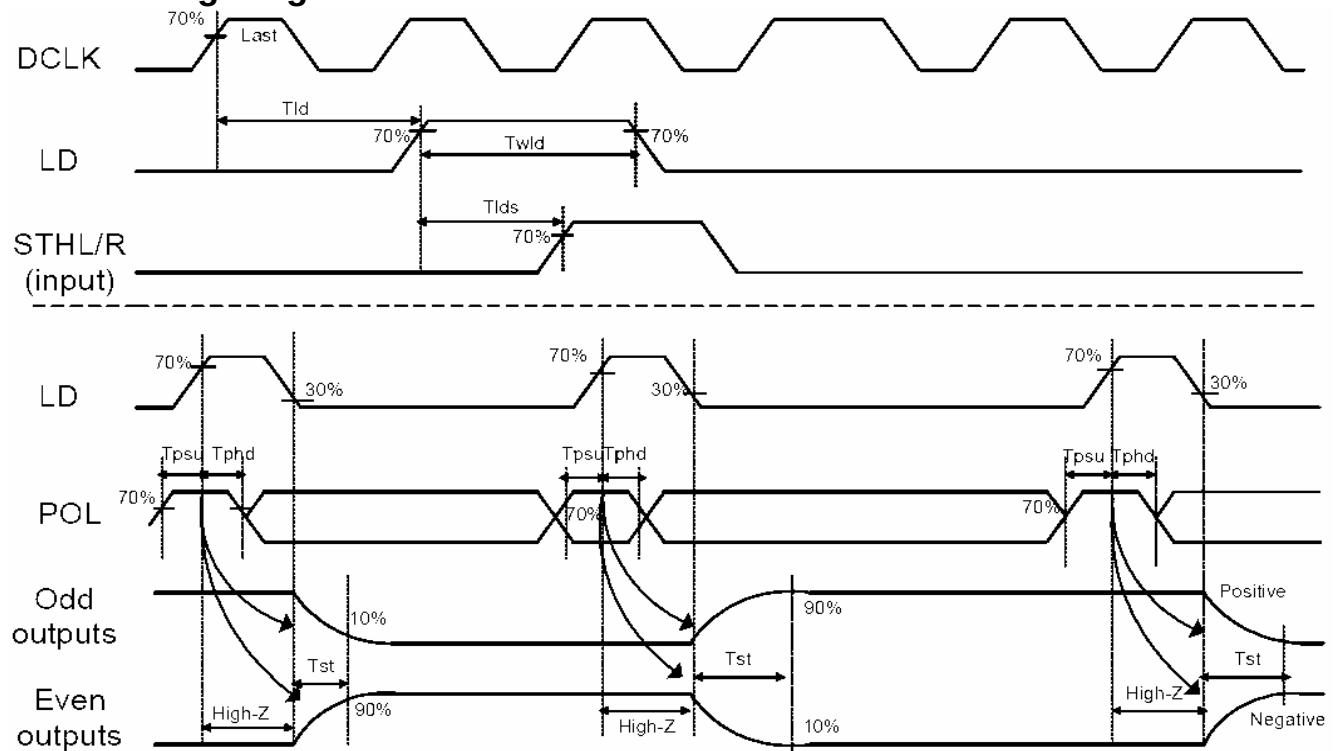


Fig.3 Horizontal timing 1

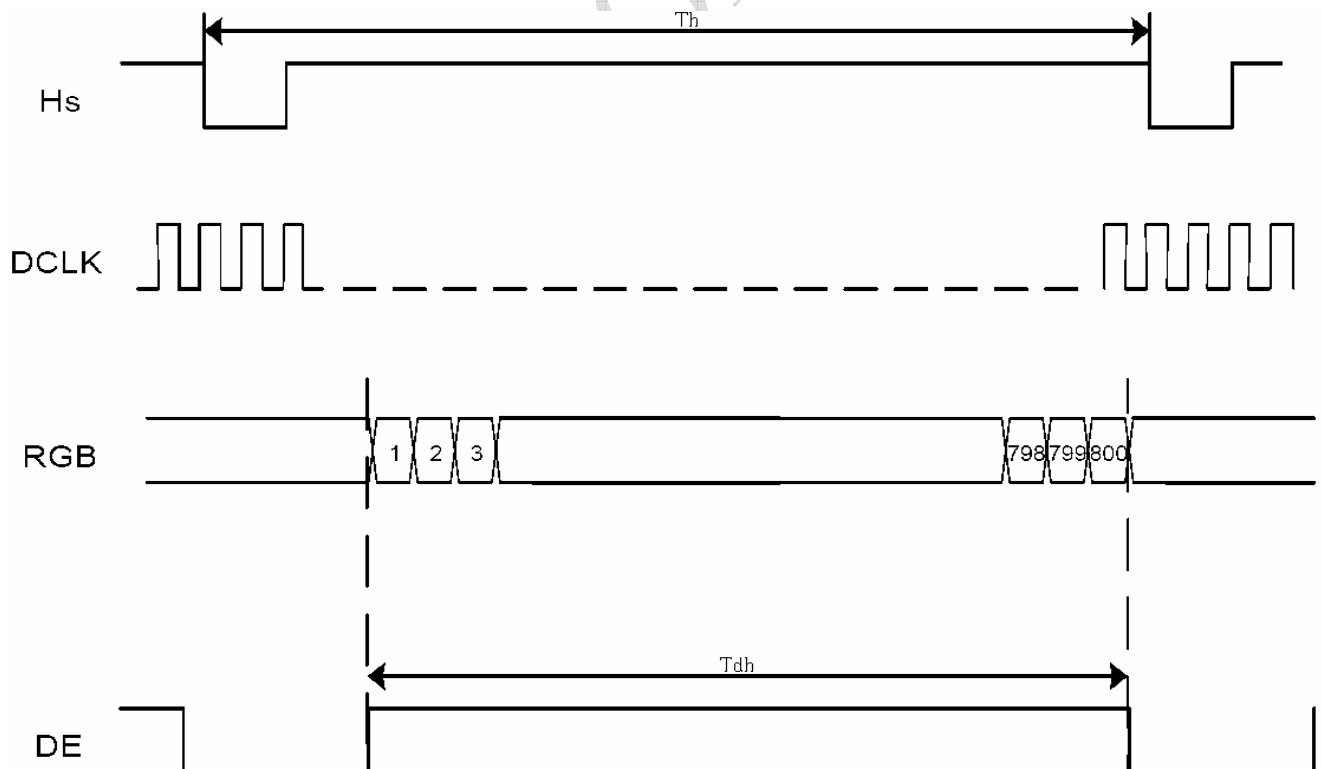
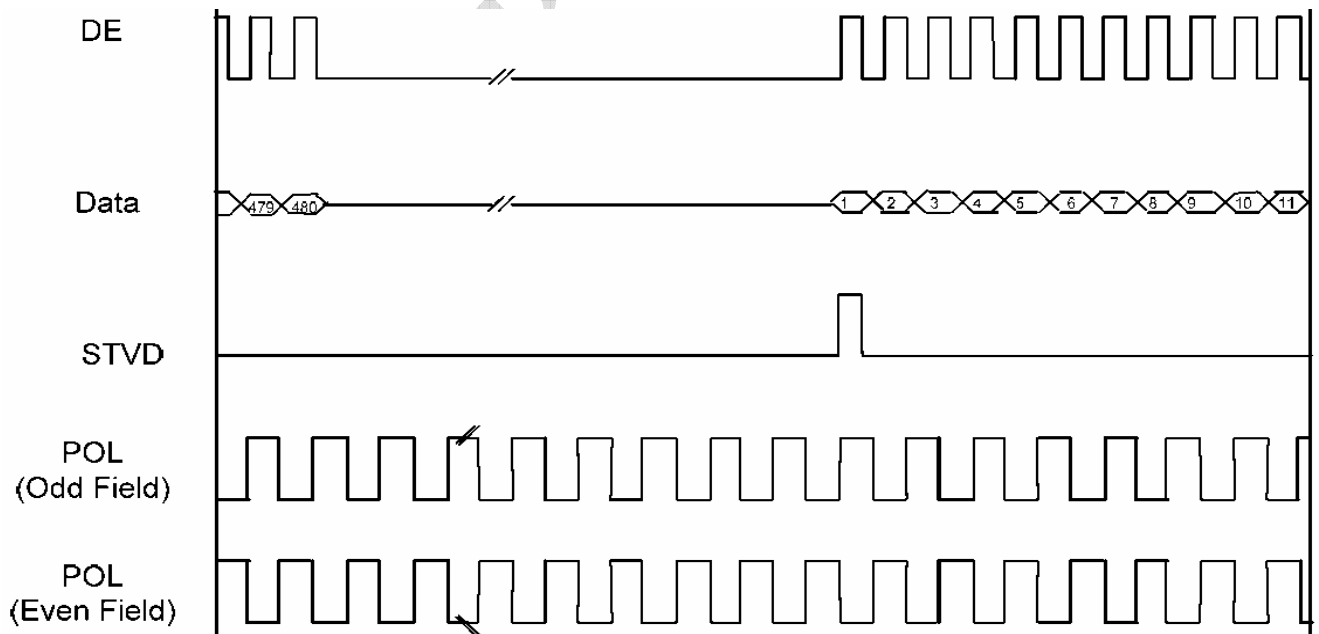
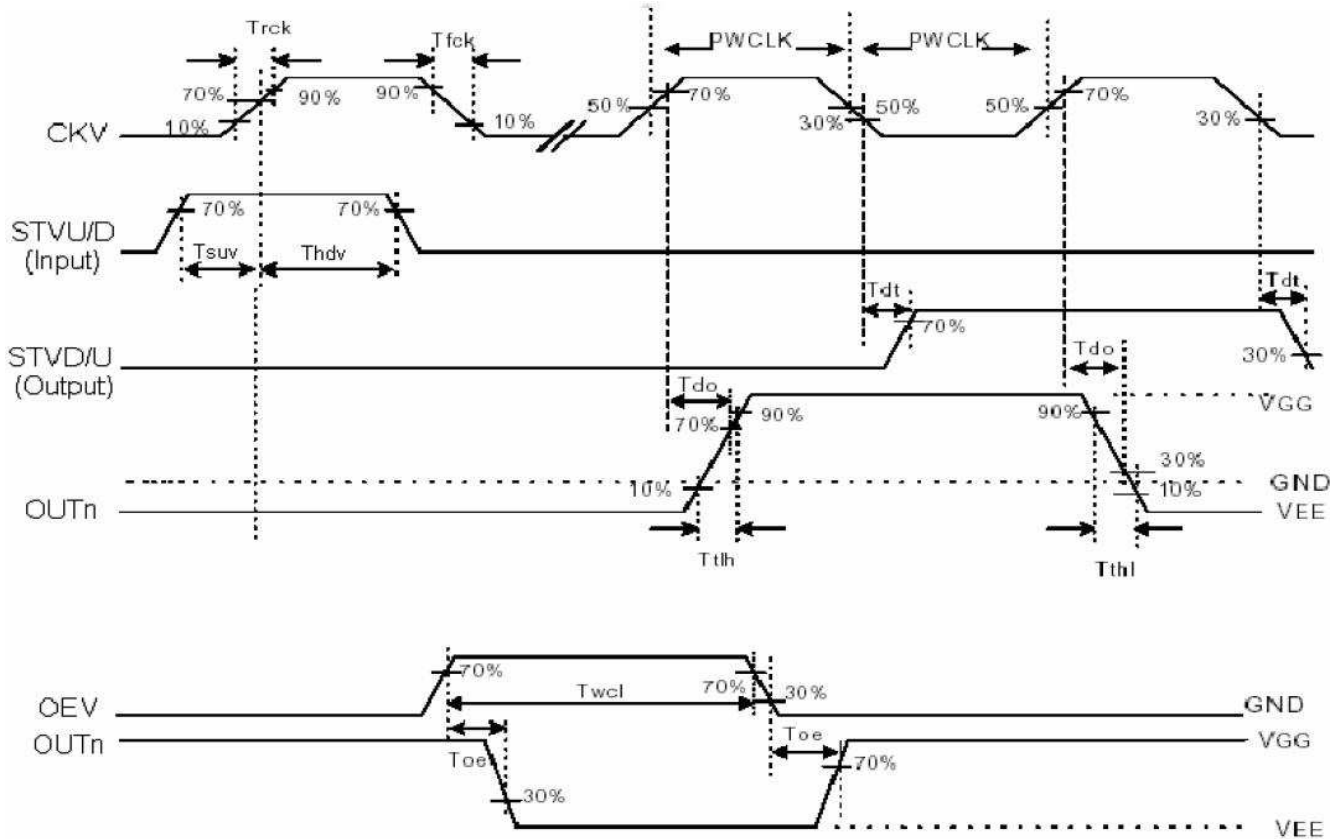


Fig.4 Horizontal timing 2



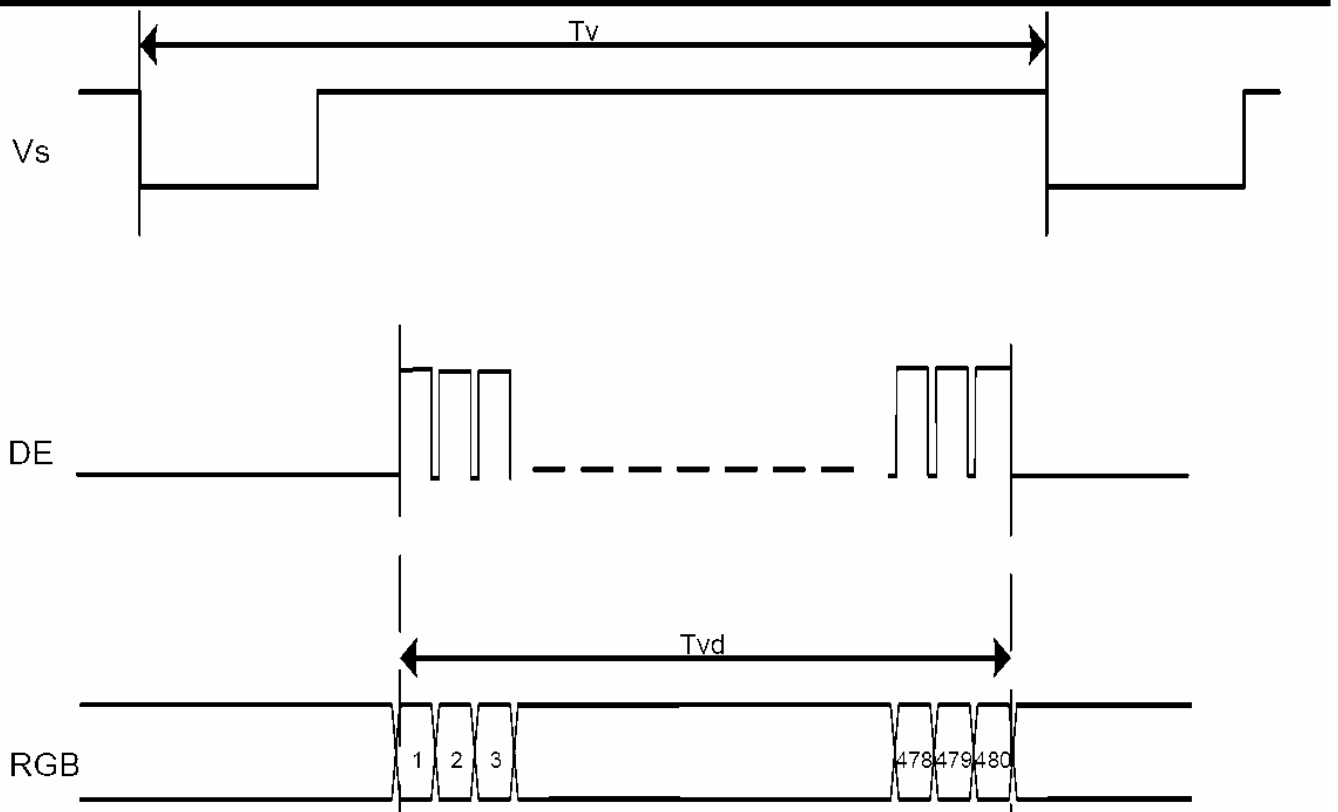


Fig.7 Vertical timing

11. Optical Characteristics

TFT LCD characteristic (Without Capacitive Touch Panel)

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time	Tr	$\theta=0^\circ$ 、 $\phi=0^\circ$	-	15	30	ms	Note 3,5
	Tf		-	20	40	ms	
Contrast ratio	CR	At optimized viewing angle	250	300	-	-	Note 4,5
Color Chromaticity	White	$\theta=0^\circ$ 、 $\phi=0^\circ$	0.26	0.31	0.36	-	Note 2,6,7
	Wy		0.28	0.33	0.38	-	-
Viewing angle (Gray Scale Inversion Direction)	Hor.	θ_R	55	65	-	Deg.	Note 1
		θ_L	55	65	-		
	Ver.	ϕ_T	35	45	-		
		ϕ_B	55	65	-		
Brightness	-	-	280	350	-	cd/m ²	Center of display

Ta=25±2°C, IL=200mA, LED+= 8.4V/180mA (VDD=3.3V)

Note 1: Definition of viewing angle range

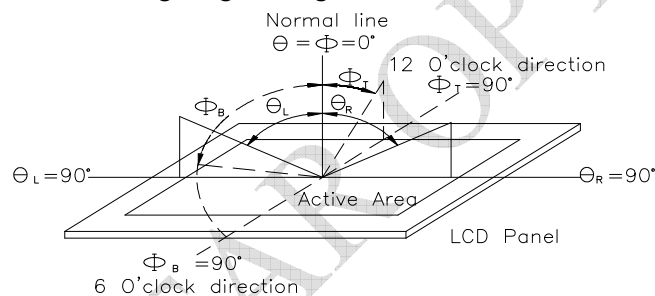


Fig.11.1. Definition of viewing angle

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-7orBM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

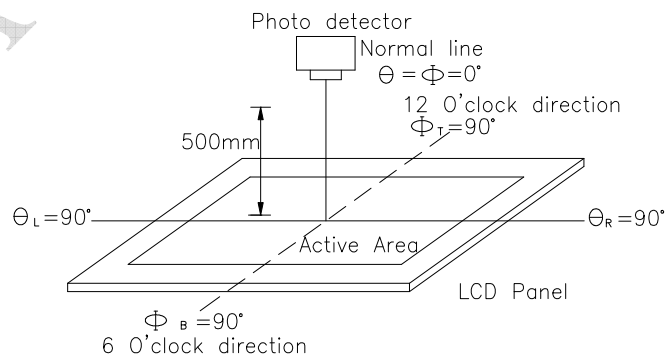
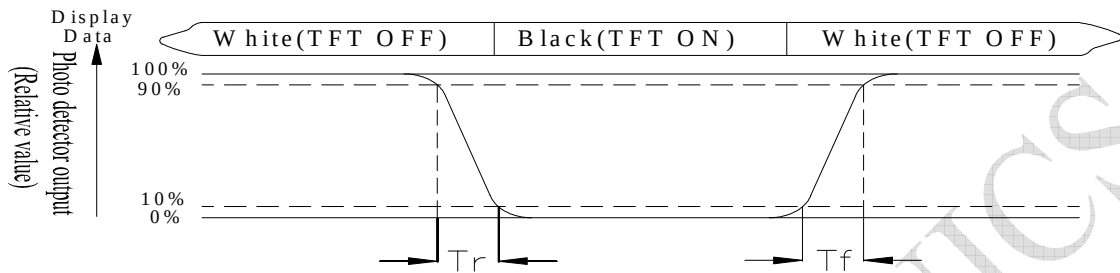


Fig. 11.2. Optical measurement system setup

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%



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

" $\pm$ " means that the analog input signal swings in phase with VCOM signal.

" $\pm$ " 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.

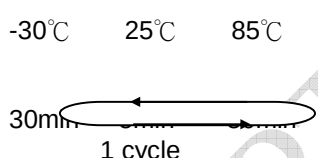
Note 6: Definition of color chromaticity (CIE 1931)

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.

12. Reliability

Content of Reliability Test (Super Wide temperature, -30°C ~85°C)

Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	85°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	85°C 200hrs	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-30°C 200hrs	1
High Temperature/ Humidity storage	The module should be allowed to stand at 60°C, 90%RH max	60°C, 90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation 	-30°C/85°C 10 cycles	—
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 15mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V, RS=1.5kΩ CS=100pF 1 time	—

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: The packing have to including into the vibration testing.

LCM Sample Estimate Feedback Sheet		
Module Number : _____		
1 、 <u>Panel Specification</u> :		
1. Panel Type :	☐ Pass	☐ NG , _____
2. View Direction :	☐ Pass	☐ NG , _____
3. Numbers of Dots :	☐ Pass	☐ NG , _____
4. View Area :	☐ Pass	☐ NG , _____
5. Active Area :	☐ Pass	☐ NG , _____
6. Operating Temperature :	☐ Pass	☐ NG , _____
7. Storage Temperature :	☐ Pass	☐ NG , _____
8. Others : _____		
2 、 <u>Mechanical Specification</u> :		
1. PCB Size :	☐ Pass	☐ NG , _____
2. Frame Size :	☐ Pass	☐ NG , _____
3. Material of Frame :	☐ Pass	☐ NG , _____
4. Connector Position :	☐ Pass	☐ NG , _____
5. Fix Hole Position :	☐ Pass	☐ NG , _____
6. Backlight Position :	☐ Pass	☐ NG , _____
7. Thickness of PCB :	☐ Pass	☐ NG , _____
8. Height of Frame to PCB :	☐ Pass	☐ NG , _____
9. Height of Module :	☐ Pass	☐ NG , _____
10. Others :	☐ Pass	☐ NG , _____
3 、 <u>Relative Hole Size</u> :		
1. Pitch of Connector :	☐ Pass	☐ NG , _____
2. Hole size of Connector :	☐ Pass	☐ NG , _____
3. Mounting Hole size :	☐ Pass	☐ NG , _____
4. Mounting Hole Type :	☐ Pass	☐ NG , _____
5. Others :	☐ Pass	☐ NG , _____
4 、 <u>Backlight Specification</u> :		
1. B/L Type :	☐ Pass	☐ NG , _____
2. B/L Color :	☐ Pass	☐ NG , _____
3. B/L Driving Voltage (Reference for LED Type) : ☐ Pass ☐ NG , _____		
4. B/L Driving Current :	☐ Pass	☐ NG , _____
5. Brightness of B/L :	☐ Pass	☐ NG , _____
6. B/L Solder Method :	☐ Pass	☐ NG , _____
7. Others :	☐ Pass	☐ NG , _____

>> Go to page 2 <<

Module Number : _____

5 、 Electronic Characteristics of Module :

1.Input Voltage :	☐ Pass	☐ NG , _____
2.Supply Current :	☐ Pass	☐ NG , _____
3.Driving Voltage for LCD :	☐ Pass	☐ NG , _____
4.Contrast for LCD :	☐ Pass	☐ NG , _____
5.B/L Driving Method :	☐ Pass	☐ NG , _____
6.Negative Voltage Output :	☐ Pass	☐ NG , _____
7.Interface Function :	☐ Pass	☐ NG , _____
8.LCD Uniformity :	☐ Pass	☐ NG , _____
9.ESD test :	☐ Pass	☐ NG , _____
10.Others :	☐ Pass	☐ NG , _____

6 、 Summary :
Sales signature : _____

Customer Signature : _____

Date : / /