PRODUCT SPECIFICATION

MODEL NAME: PV07046P0140X

Date: 2022/08/01

Version: 1.0

■ **Preliminary Specification**
□ **Final Specification**

FOR CUSTOMER	
CUSTOMER APPROVED	

PREPARED BY	CHECKED BY	APPROVED BY	DATE

Record of Revision

Version	Revise Date	Page	Content
V1.0	2022/03/01		Initial release.

Contents

1. General Specifications

No.	Item	Specification	Remark
1	LCD size	7.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	800X3(RGB)X480	
4	Display mode	Normally Black	
5	Dot pitch	0.0635(W)X0.1905(H) mm	
6	Active area	152.4 (W)X91.44 (H) mm	
7	Module size	165(W)X104.09(H)X5.3 (D) mm	Note 1
8	Surface treatment	Glare	
9	Color arrangement	RGB-stripe	
10	Interface	Digital (TTL)	
11	Backlight power consumption	1.6W (Typ.)	Note 2
12	Panel power consumption	0.66 W (Typ.)	Note 3
13	Weight	T.B.D.	

Note 1: Refer to Mechanical Drawing.
Note 2: Including LED Driver power consumption.
Note 3: Including T-con Board power consumption.

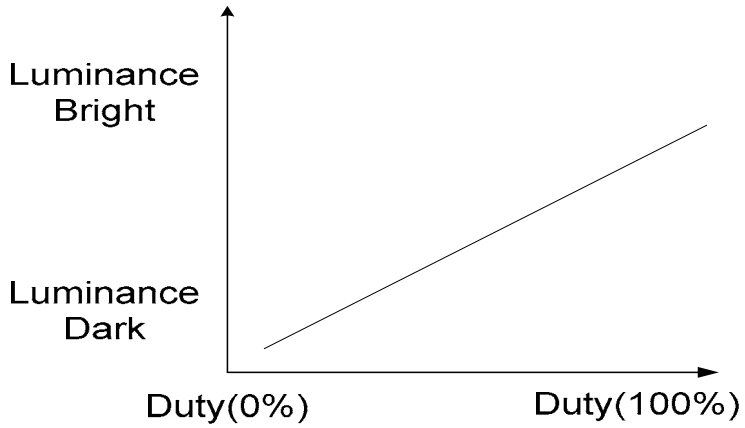
2. Pin Assignment

TTL Connector is used for the module electronic interface. The recommended model is "FH33-40S-0.5SH(10)", manufactured by Hirose.

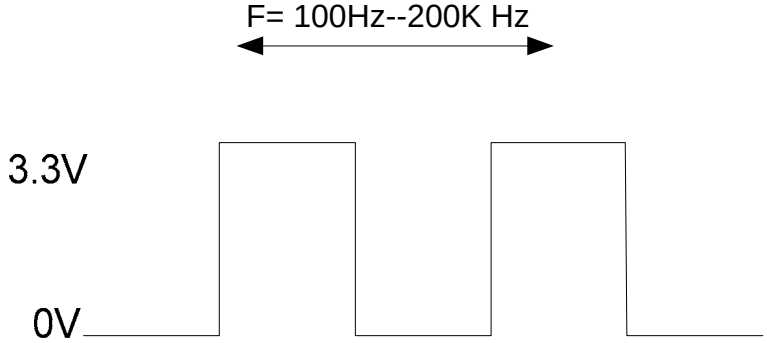
Pin No.	Symbol	I/O	Function	Remark
1	V_{LED}	P	Power supply for LED Driver	
2	V_{LED}	P	Power supply for LED Driver	
3	ADJ	I	Adjust the led brightness with PWM Pulse	Note 1,2
4	G_{LED}	P	Ground for LED circuit	
5	G_{LED}	P	Ground for LED circuit	
6	V_{CC}	P	Power supply for digital circuit	
7	V_{CC}	P	Power supply for digital circuit	
8	MODE	I	DE or HV mode control	Note 3
9	DE	I	Data enable	
10	NC		No connection	
11	NC		No connection	
12	GND	P	Power ground	
13	B5	I	Blue data input (MSB)	
14	B4	I	Blue data input	
15	B3	I	Blue data input	
16	GND	P	Power ground	
17	B2	I	Blue data input	
18	B1	I	Blue data input	
19	B0	I	Blue data input(LSB)	
20	GND	P	Power ground	
21	G5	I	Green data input(MSB)	
22	G4	I	Green data input	
23	G3	I	Green data input	
24	GND	P	Power ground	
25	G2	I	Green data input	
26	G1	I	Green data input	

27	G0	I	Green data input(LSB)	
28	GND	P	Power ground	
29	R5	I	Red data input(MSB)	
30	R4	I	Red data input	
31	R3	I	Red data input	
32	GND	P	Power ground	
33	R2	I	Red data input	
34	R1	I	Red data input	
35	R0	I	Red data input(LSB)	
36	GND	P	Power ground	
37	DCLK	I	Sample clock	
38	GND	P	Power ground	
39	L/R	I	Select left or right scanning direction	Note 4,5
40	U/D	I	Select up or down scanning direction	Note 4,5

Note1: Pin3. is used to adjust brightness.



Note 2: ADJ signal=0 ~3.3V; Operating frequency:100 Hz --200K Hz

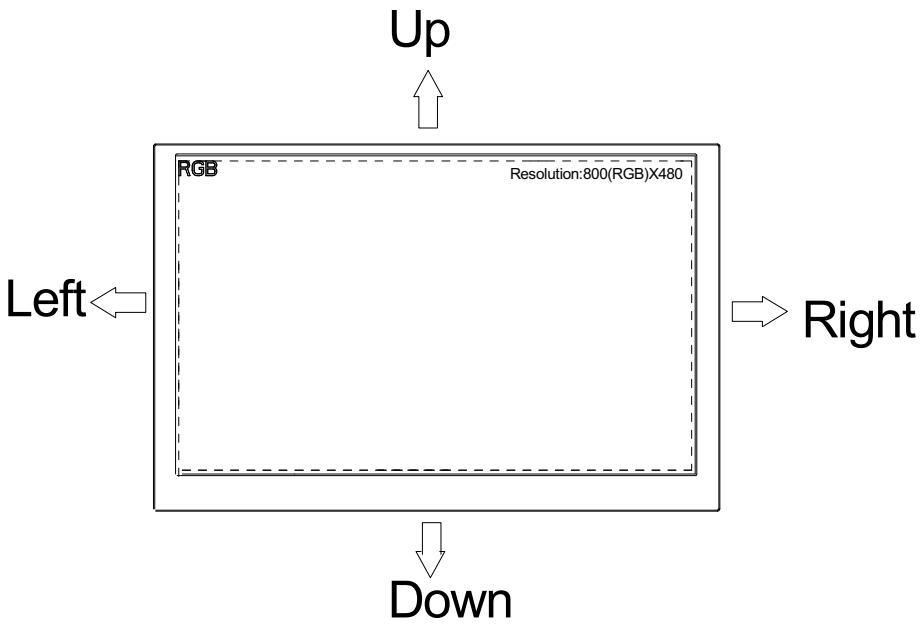


Note 3: DE Mode: Mode="H",HS floating and VS floating.
HV Mode: Mode="L" and DE floating.

Note 4: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	V_{CC}	Up to down, left to right
V_{CC}	GND	Down to up, right to left
GND	GND	Up to down, right to left
V_{CC}	V_{CC}	Down to up, left to right

Note 5: Scanning direction refer to the figure below.



3. Operation Specifications

3.1. Absolute Maximum Ratings

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	V_{CC}	-0.3	6.0	V	
	V_{LED}	-	5.5	V	
Input signal voltage	V_I	-0.3	6.3	V	
Operation Temperature	T_{OP}	-30	85	℃	
Storage Temperature	T_{ST}	-40	90	℃	

3.2. Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V_{CC}	3.1	3.3	3.5	V	Note 1
	V_{LED}	4.8	5.0	5.2	V	Note 2
Current consumption	Icc	-	250	500	mA	
	I_{LED}		500	550	mA	Note 3
Input logic high voltage	V_{IH}	$0.7V_{CC}$	-	V	V	Note 4
Input logic low voltage	V_{IL}	0	-	0.3V	V	
LED life time	-	20,000	-	-	Hr	Note 5

Note1: V_{CC} setting should match the signals output voltage (refer to Note 4) of customer's system board.
Note 2: LED driving voltage.
Note 3: LED driving current.
Note 4: DCLK,DE, HS, VS, R0~ R5,,G0~ G5,B0~ B5.
Note 5: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25 and V_{LED}=5.0V. The LED lifetime could be decreased if operating V_{LED} is larger than 5.0V.

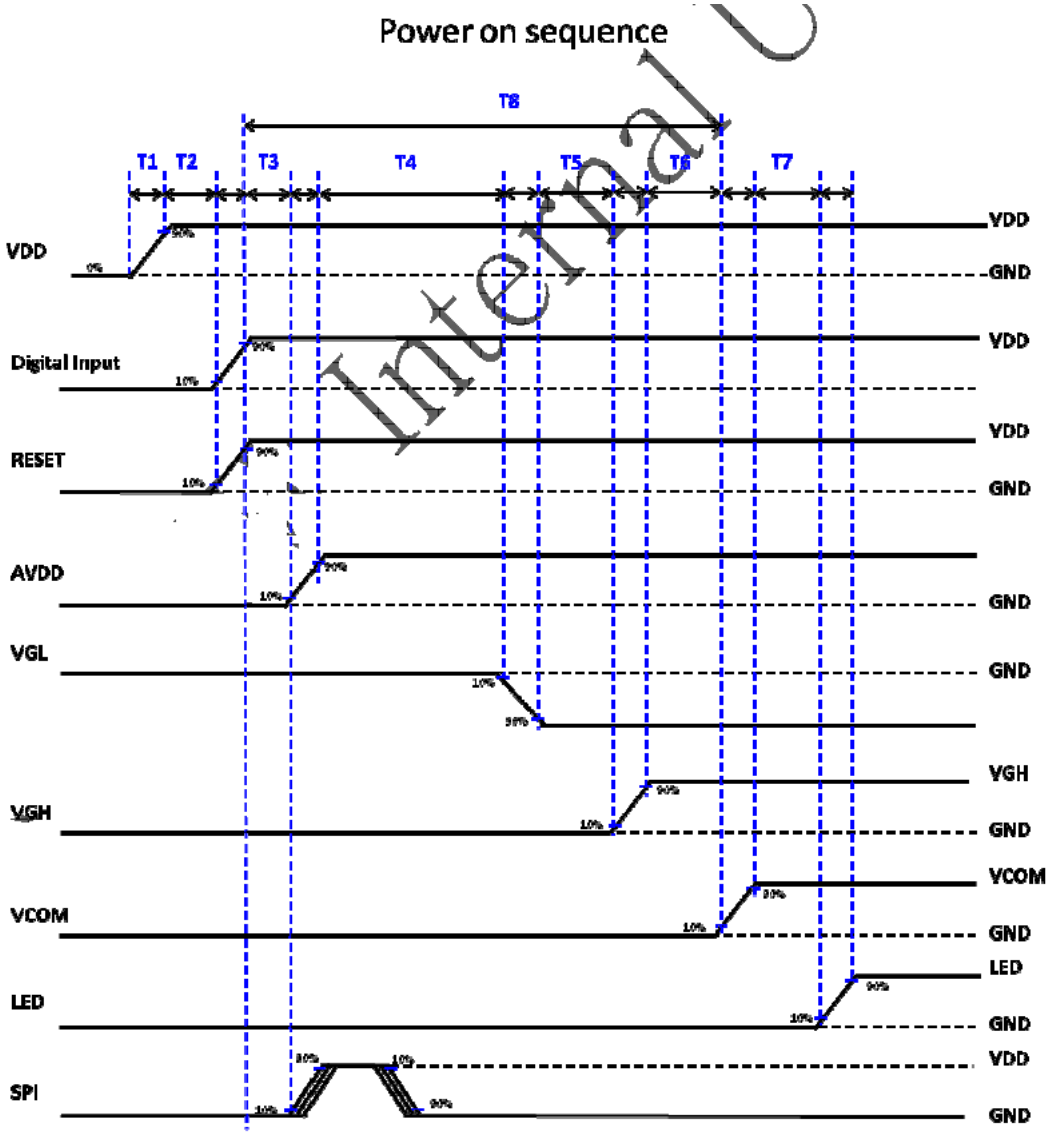
3.3. Power Sequence

The LCD adopts high voltage driver IC, so it could be permanently damaged under a wrong power on/off sequence. The suggested LCD power sequence is below:

Panel Power on sequence:

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	--	--	20	ms
T2	1	--	--	ms
T3	20	--	--	ms
T4	1	--	--	ms
T5	1	--	--	ms
T6	1	--	--	ms
T7	1	--	--	ms
T8	--	--	80	ms

VDD → Di ital Input &RESET→ AVDD&SPI → VGL → VGH →VCOM →LED

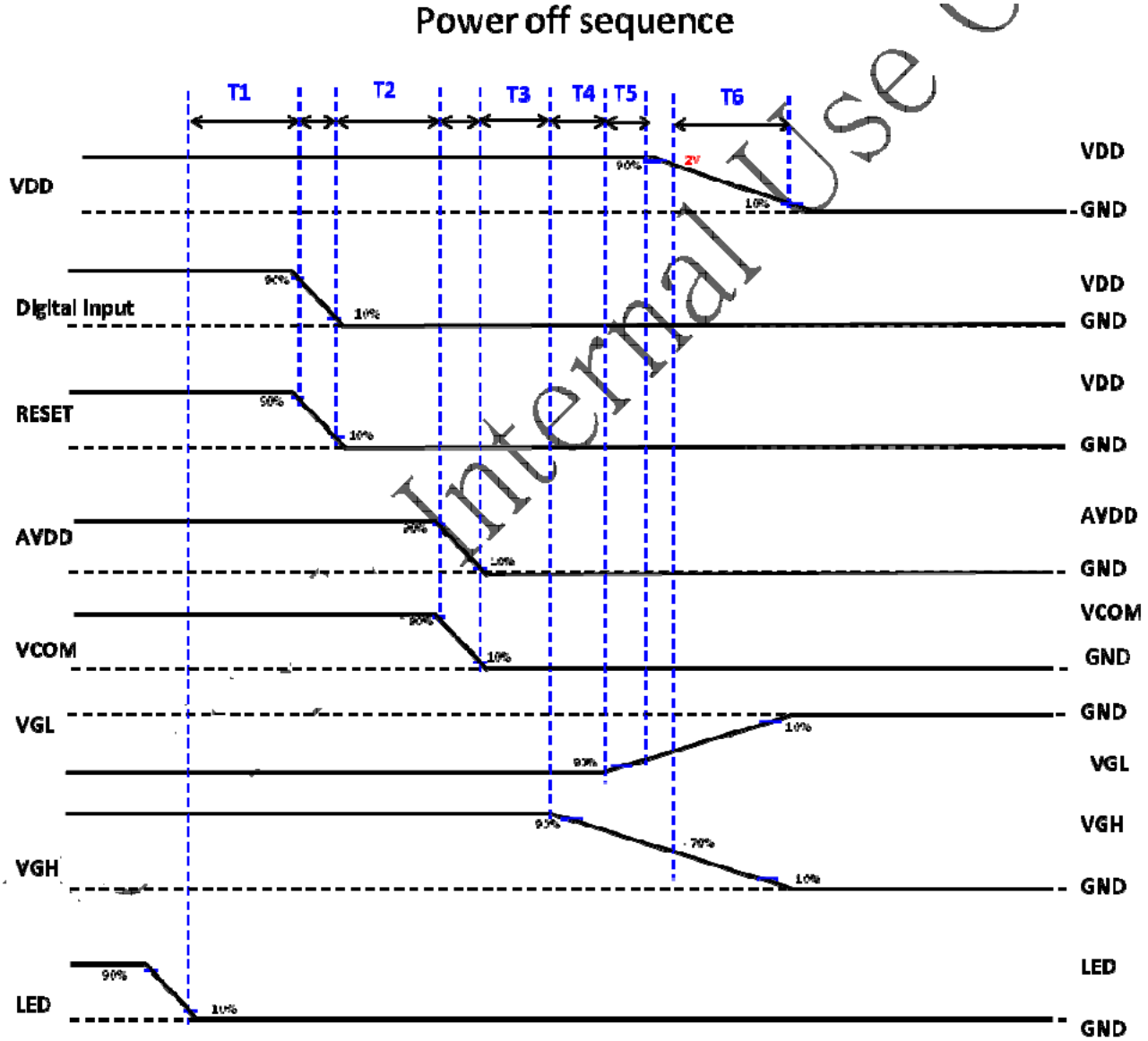


Note: Reset signal must rising after VDD signal

Panel Power off sequence:

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0	--	-	ms
T2	0	--	16	ms
T3	0	--	16	ms
T4	0	--	1	ms
T5	0	--	1	ms
T6	40	--	--	ms

LED → Di ital in ut&RESET→AVDD&VCOM→VGH→VGL→VDD



Note: VDD=2V,VGH > 70%
All signal must be discharge to zero voltage when power off.

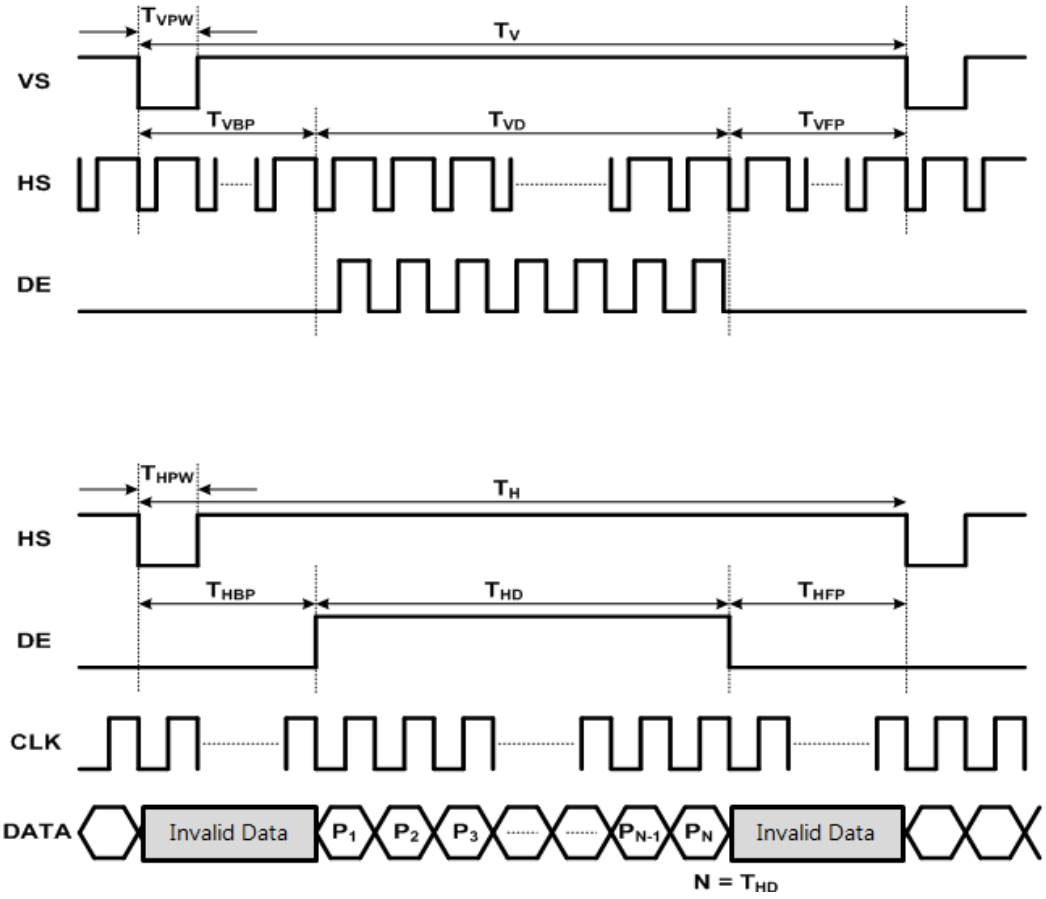
3.4. Timing Characteristics

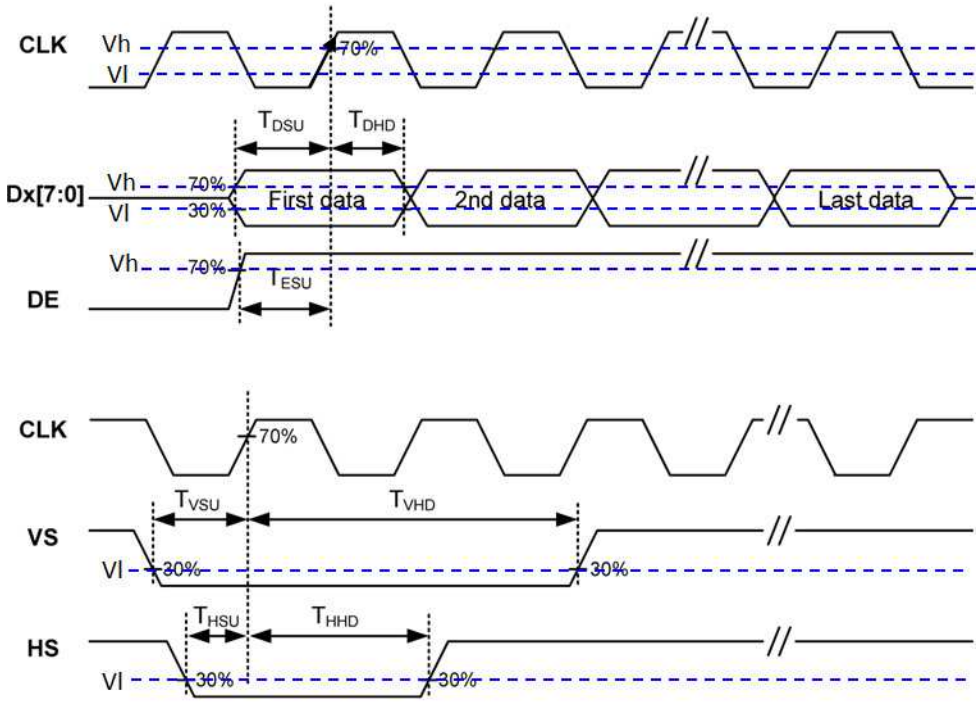
3.4.1. Timing Conditions

Item	Symbol	Min	Typ	Max	Unit	Remark
Clock frequency	F_{CLK}	27.027	29.988	40.0	MHz	
Vertical display area	T_{VD}		480		H	
Vertical period area	T_V	525	525	530	H	
Vertical blanking area	T_{VB}	45	45	50	H	Note1
Vertical pulse width	T_{VPW}		3		H	
Vertical back porch	T_{VBP}		20		H	
Vertical front porch	T_{VFP}	25	25	30	H	
Horizontal display area	T_{HD}		800		dclk	
Horizontal period area	T_H	858	952	1258	dclk	
Horizontal blanking area	T_{HB}	58	152	458	dclk	Note2
Horizontal pulse width	T_{HPW}		3		dclk	
Horizontal back porch	T_{HBP}		48		dclk	
Horizontal front porch	T_{HFP}	10	104	410	dclk	
HS setup time	T_{HSU}	6	-	-	ns	
HS hold time	T_{HHD}	6	-	-	ns	
VS setup time	T_{VSU}	6	-	-	ns	
VS hold time	T_{VHD}	6	-	-	ns	
Data setup time	T_{DSU}	6	-	-	ns	
Data hold time	T_{DHU}	6	-	-	ns	
DE setup time	T_{ESU}	6	-	-	ns	

Note1: $T_{VB} = T_V - T_{VD}$
Note2: $T_{HB} = T_H - T_{HD}$

3.4.2. Timing Diagram





Note : Latch data at CLK Rising Edge.

4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180°(9 o'clock)	70	80	-	degree	Note 1
	θ_R	Φ=0°(3 o'clock)	70	80	-		
	θ_T	Φ=90°(12 o'clock)	70	80	-		
	θ_B	Φ=270°(6 o'clock)	70	80	-		
Response time	T_{ON}	Normal θ=Φ=0°	-	11	-	msec	Note 3
	T_{OFF}		-	9	-	msec	Note 3
Contrast ratio	CR		800	1000	-	-	Note 4
Color chromaticity	W_X		0.270	0.0290	0.350		Note 2 Note 5 Note 6
	W_Y		0.280	0.0300	0.360		
Luminance	L		450	500	-	cd/m^2	Note 6
Luminance uniformity	Y_U		70	75	-	%	Note 7

Test Conditions:

1. V_{CC}=3.3V, V_{LED}=5.0V.The ambient temperature is 25℃.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

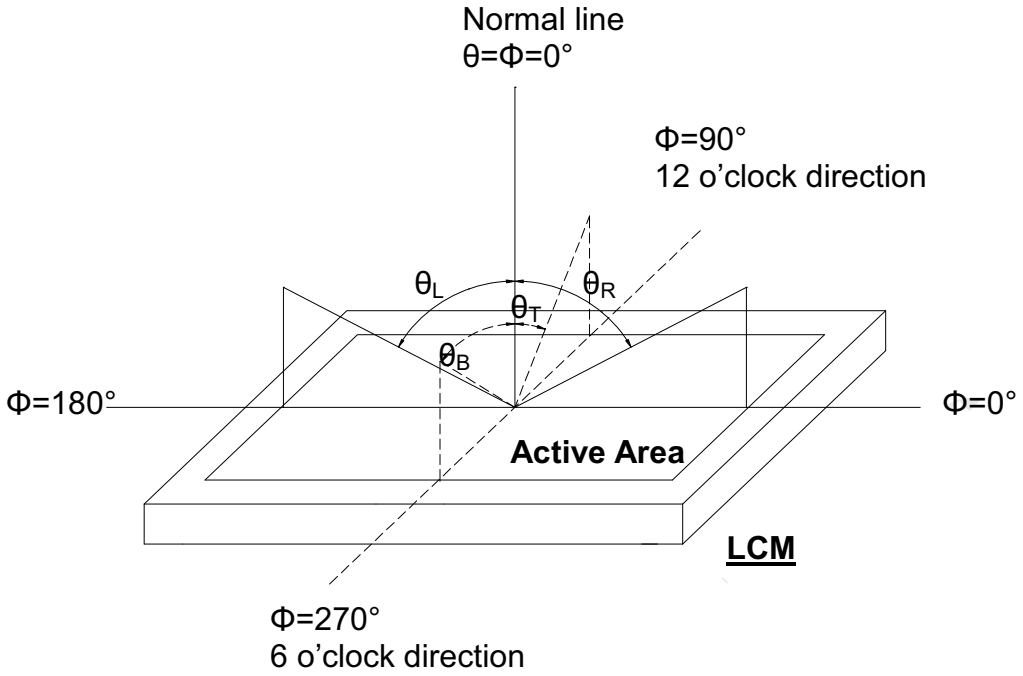


Fig. 4-1 Definition of viewing angle

Note 2: Definition of optical measurement system.
The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)

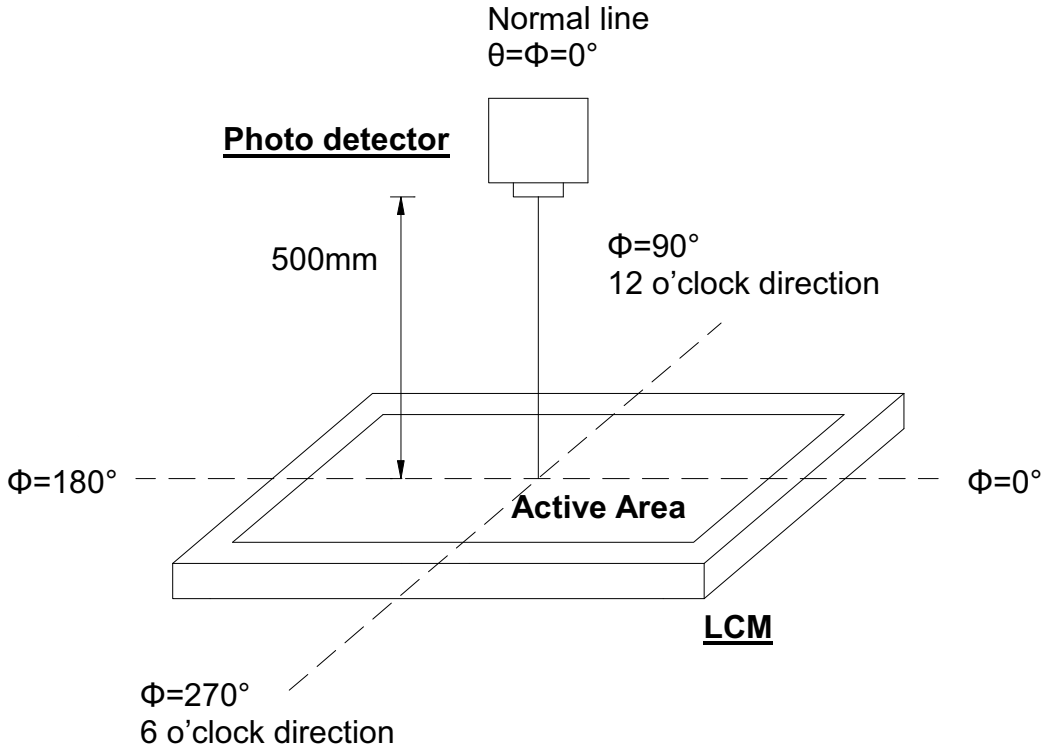


Fig. 4-2 Optical measurement system setup

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_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

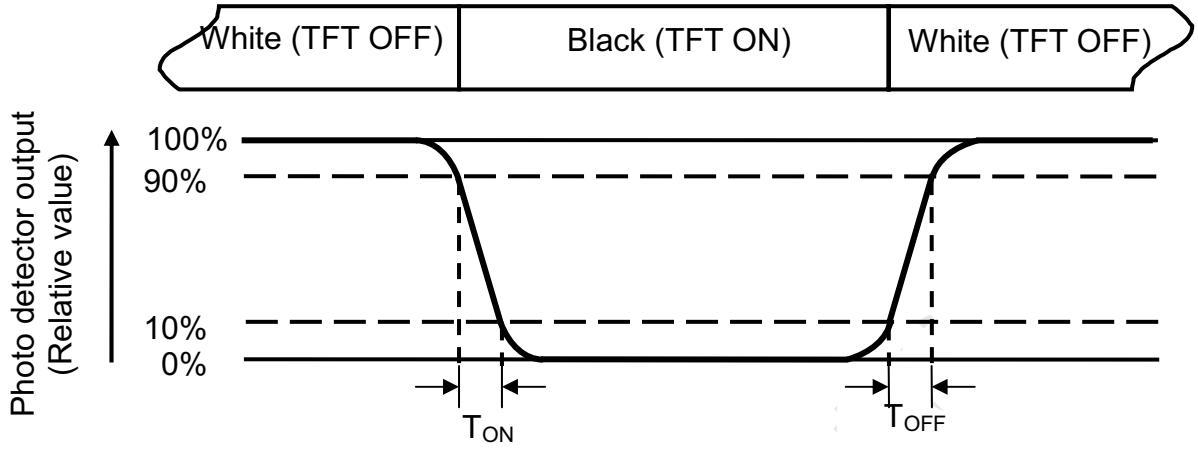


Fig. 4-3 Definition of response time

Note 4: Definition of contrast ratio

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

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is V_{LED}=5.0V.

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$Luminance\ \ Uniformity\ (Yu) = \frac{B_{min}}{B_{max}}$$

L-------Active area length W----- Active area width

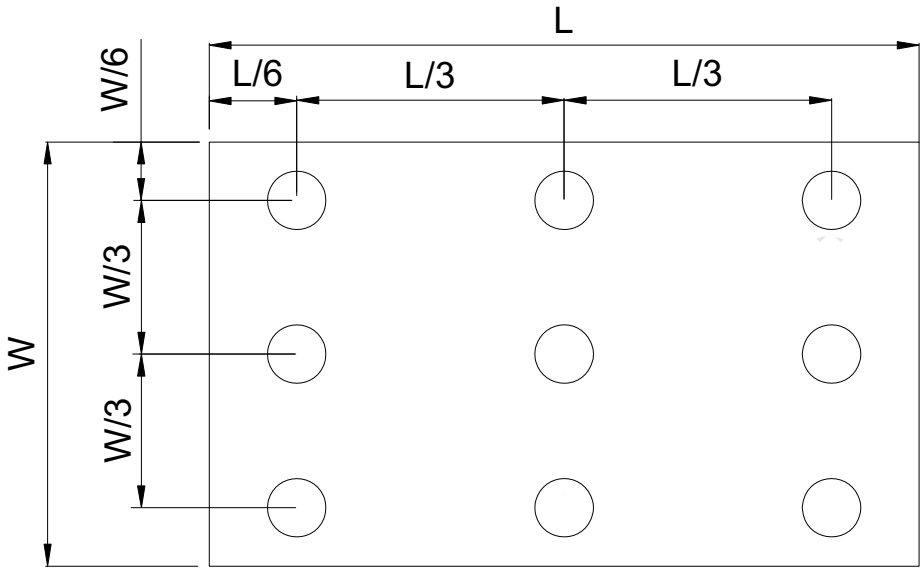


Fig. 4-4 Definition of measuring points

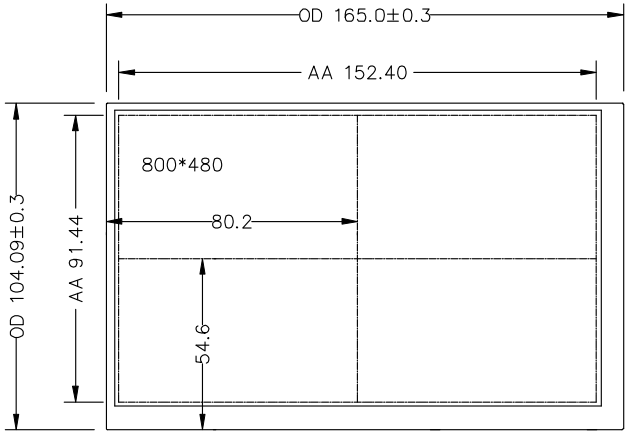
$\mathbf{B_{max}}$: The measured maximum luminance of all measurement position.
$\mathbf{B_{min}}$: The measured minimum luminance of all measurement position.

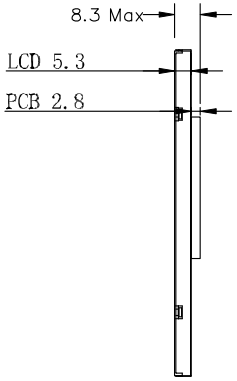
5. Reliability Test Items

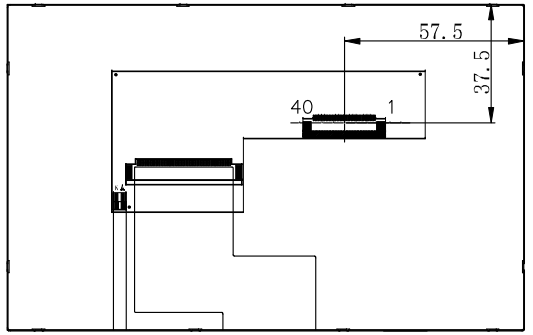
Item	Test Conditions	Remark
High Temperature Storage	Ta = 90℃ 96 hrs	Note 1
Low Temperature Storage	Ta = -40℃ 96 hrs	Note 1
High Temperature Operation	Ta = -30℃ 96 hrs	Note 2
Low Temperature Operation	Ta = 85℃ 96 hrs	Note 1,Note 4
High Temperature and Humidity Non-operation	+60℃, 90%RH max. 96 hrs	Note 4
Thermal Shock	-30℃/30 min ~ +80℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Note 4
Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	

Note 1: Ta is the ambient temperature of samples.
Note 2: Ts is the temperature of panel's surface.
: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but doesn't guarantee all the cosmetic specification.
Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

6. Mechanical Drawing







1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		16	17	18	19	20
VLED 5V	VLED 5V	ADJ	GLED	GLED	VCC	VCC	MODE	DE	NC	NC	GND	B5	B4	B3		GND	B2	B1	B0	GND
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35		36	37	38	39	40
G5	G4	G3	GND	G2	G1	G0	GND	R5	R4	R3	GND	R2	R1	R0		GND	DCLK	GND	L/R	U/D

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
Center luminance	Lv		500		cd/m²	中心点
Color ranks	X	0.270	0.0290	0.350		IF=20mA/SMD
	Y	0.280	0.0300	0.360		IF=20mA/SMD
Forward Voltage	VF	8.4	9	9.6	V	IF=160mA, 3※8=24
Luminance uniformity	/	70	80		%	(Min/MAX)*100%

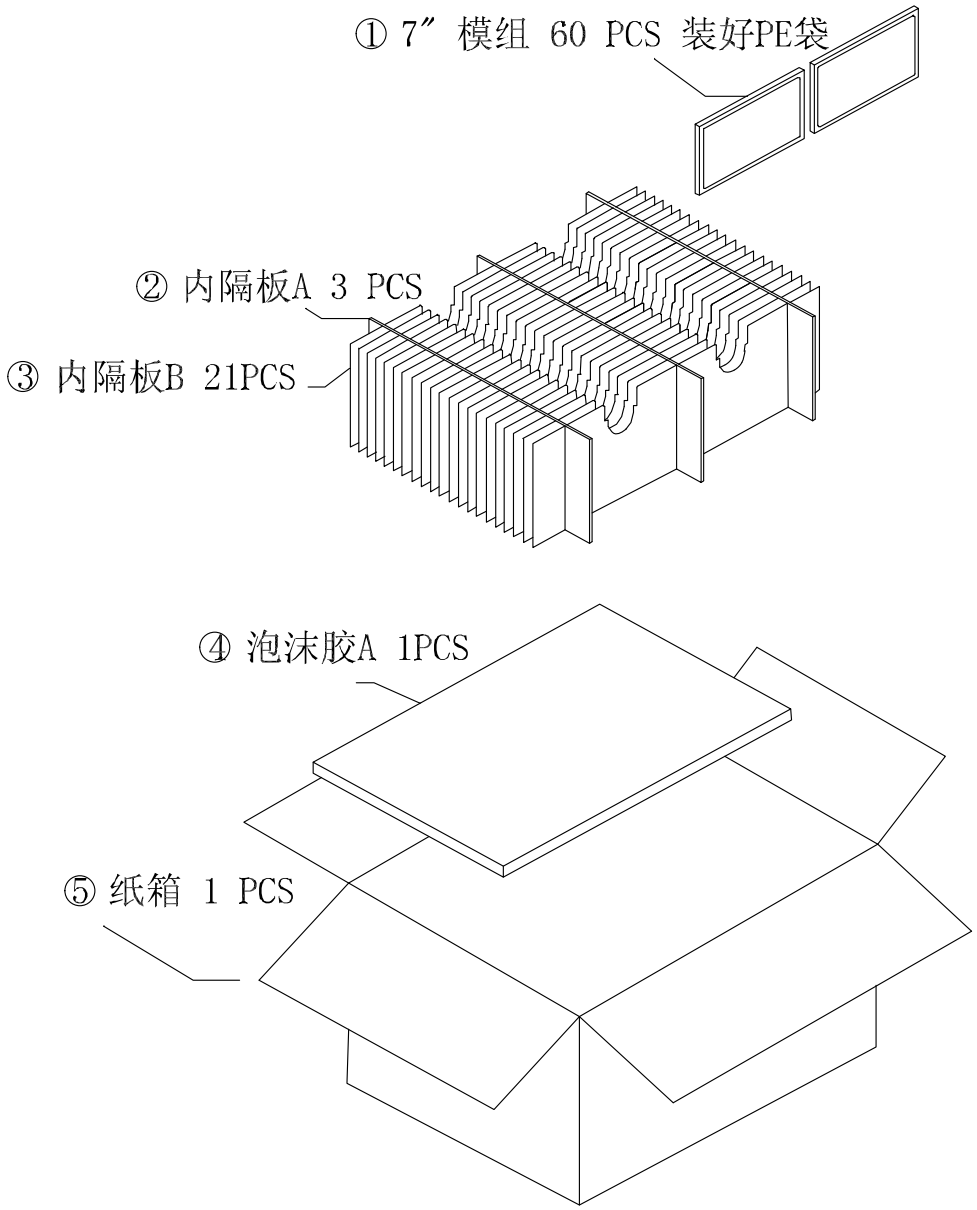
Measuring Instument:BM-7(测试镜头与产品距离500±10mm);测量视场度为1i W;温度25iA3i W;环境照度不大於1LUX;测试点为9点.

UNIT 单 位	mm	EDITION 版 本	01
THIRD ANGLE PROJECTION 第三角法		SCALE 比 例	1:1
		DATE 日 期	2021.08.24
		PAGE 页 码	1/1

PART NO.: PV07046P0140X

7. Package Drawing

7″模组纸箱外形成套包材包装示意



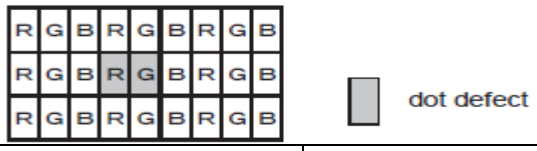
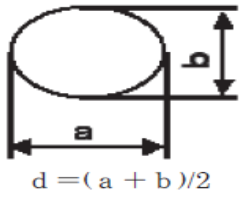
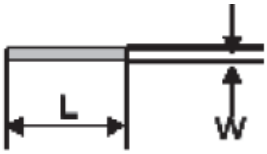
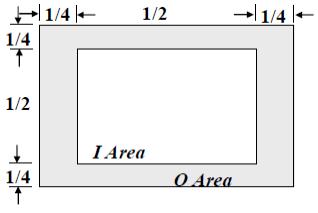
备注:
1. 必须正确填写<外箱标签>中的内容
2. 必须认真检查是否有少装、多装、错装等现象
3. 必须认真检查有无漏贴标签
4. 每箱装60PCS。

序号	日 期	修 改 内 容	修订者

包装方式示意图

模组号		版本	01	核准	
				检查	
客户代码		日期		设计	

8 .Visuals Specification: 1)Note

General	1. Customer identified anomalies not defined within this inspection standard shall be reviewed by Duobond, and an additional standard shall be determined by mutual consent. 2. This inspection standard about the image quality shall be applied to any defect within the effective viewing area and shall not be applicable to outside of the area. 3. Inspection conditions Luminance : 500 Lux min. Inspection distance : 300 mm. Temperature : 25±5°C Direction : Directly above		
Definition of inspection item	Dot defect	Bright dot defect	The dot is constantly "on" when power applied to the LCD, even when all "Black" data sent to the screen. Inspection tool: 5% Transparency neutral density filter.Count dot: If the dot is visible through the filter. Don't count dot: If the dot is not visible through the filter. 
		Black dot defect	The dot is constantly "off" when power applied to the LCD, even when all "White" data sent to the screen.
		Adjacent dot	Adjacent dot defect is defined as two or more bright dot defects or black dot defects. 
	External inspection	Bubble ,scratch(foreign Particle polarizer, Cell, Backlight)	Visible operating (all pixels "Black" or "White") and non operating.
		Appearance inspection	Does not satisfy the value at the spec.
	Others	LED wires	Damaged to the LED wires, connector, pin, functional failure or appearance failure.
	Definition of Size	Definition of circle : 	definition of linear size 	definition Area I/O 

2) Standard

Classification		Inspection item			Judgment Standard	
Defect (in LCD glass)	Dot defect	Area			I	O
		Bright dots(Note: Visible under:ND5%) 1:D≤0.15mm:No count); D>0.15mm acceptable: 2			N≤0	N≤2
		Dark dots (0.15mm<D≤0.3mm), D>0.3mm Not allowable			N≤3	
		Bright dot-2Adjacent			N≤0	
		Dark dot-2Adjacent			N≤0	
		Dark or bright dots-3 and more adjacent(note6)			N≤0	
		Total bright and dark dots			N≤5	
		Minimum distance between bright dots			5mm	
		Minimum distance between dark dots			5mm	
		Minimum distance between bright and bright dots			5mm	
	Other	White dot ,dark dot (circle)	Size (mm)	Acceptable number		
			d≤0.2	Neglected		
			0.2mm<D≤0.3mm	N≤4		
			0.3mm<D≤0.4mm	N≤2		
			D>0.4mm	Not allowable		
Visual defect		Foreign partial	Circular foreign material: dark/bright sport	Visible under:ND5% 1:D≤0.15mm:No count 2:0.15mm<D≤0.3mm,N≤4 3:D>0.3mm:Not allowable		
			Linear foreign material: bright or dark line	Invisible under ND5% 0.1mm<W≤0.3mm, 0.3mm<L≤1.5mm,N≤4 Visible under ND5% 0.05mm≤w≤0.1mm, 0.3mm≤L≤0.7mm,N≤4		
		Polarizer	Linear scratch	1:BM:No Count 2:Pixel area 0.05mm≤w≤0.2mm, 1.0mm≤L≤5.0mm,N≤4		
			Bubble peeling	1:BM:No Count 2:Pixel area 0.15mm≤D<0.3mm,N≤4		
		Mura & leak		ND5%		

9.0 GENERAL PRECAUTION

9.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life threatening or otherwise catastrophic.

9.2 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. does not warrant the module, if customers disassemble or modify the module.

9.3 Breakage of LCD Panel

9.3.1.If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

9.3.2. If liquid crystal contacts mouth or eyes, rinse out with water immediately.

9.3.3. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

9.3.4. Handle carefully with chips of glass that may cause injury, when the glass is broken.

9.4 Electric Shock

9.4.1. Disconnect power supply before handling LCD module.

9.4.2. Do not pull or fold the LED cable.

9.4.3. Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

9.5 Absolute Maximum Ratings and Power Protection Circuit

9.5.1. Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged. 9.5.2. Please do not leave LCD module in the environment of high humidity and high temperature for a long time. 11.5.3. It's recommended to employ protection circuit for power supply.

9.6 Operation

9.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

9.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

9.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.
9.6.4 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.
9.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

9.7 Mechanism

Please mount LCD module by using mouting holes arranged in four corners tightly.

9.8 Static Electricity

9.8.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.
9.8.2. Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

9.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

9.10 Disposal

When disposing LCD module, obey the local environmental regulations.