Specification

G070Y1-T01

Version September 2007

- CONTENTS -

REVISION HISTORY

Version	Date	Section	Description
Ver 0.0	Aug 08 2006	All	G070Y1-T01 Specifications was first issued.
Ver 1.0	May 17 2007	All	G070Y1-T01 Preliminary Specifications was first issued.
Ver 2.0	Sep 18 2007	All	G070Y1-T01 Approval Specifications was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

G070Y1-T01 is a 7inch TFT Liquid Crystal Display module with a CCFL Backlight unit and a-50-pin-and-1ch-TTL interface. This module supports 800 (R.G.B)x 480 WVGA mode which main application is the Automotive Monitor and Industrial field.

1.2 FEATURES

- Wide viewing angle.
- Fast response time
- WVGA (800 x 480 pixels) resolution
- Wide operating temperature
- Reversible - scan function

1.3 APPLICATION

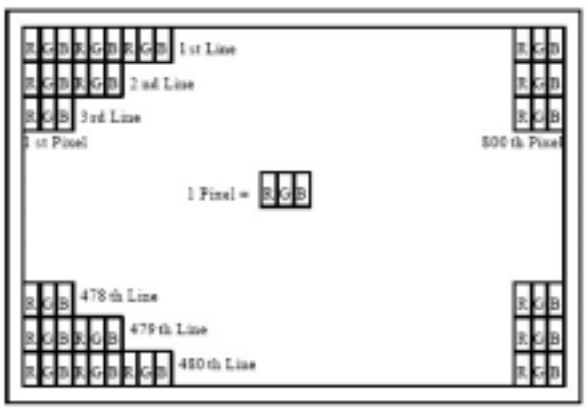
- Automotive Monitor
- Factory Application

1.4 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Diagonal Size	177.7 (7 Inch)	mm	
Active Area	152.4x91.44	mm	(1)
Bezel Opening Area	155x94.04	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	800xR.G.B.x480	pixel	-
Pixel Pitch	0.1905x0.1905	mm	-
Pixel Arrangement	RGB vertical stripe	-	(2)
Display Colors	262.144 (6 bits)	color	-
Display Mode	Normal White	-	-
Surface Treatment	Hard Coating (3H), AG (Haze 25 %)	-	-
Weight	170(Typ)	g	

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

Note (2)



1.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	164.7	165	165.3	mm	(1)
	Vertical(V)	103.7	104	104.3	mm	
	Depth(D)	-	5.5	5.8	mm	

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

No.	Test Item	Test Condition	Note
1	High Temperature Storage	90℃, 240 hours	(1) (2)
2	Low Temperature Storage	-40℃, 240 hours	
3	Heat Shock Operating	{(-40℃, 0.5 hour) (85℃, 0.5 hour)}, 100 cycles	
4	High Temperature Operating	85℃, 240 hours	
5	Low Temperature Operating	-30℃, 240 hours	
6	High Temperature & High Humidity Operating	60℃, 90%RH, 240hours	
8	Shock (Non-Operating)	100G, 6ms, +/-XYZ 3 times	(3)(5)
9	Vibration (Non-Operating)	3G, 10 to 200 Hz, sine wave	(4)(5)

Note (1) There should be no condensation on the surface of panel during test.

Note (2) The temperature of panel display surface area should be 90℃ Max.

Note (3) 6ms, half sine wave, 3 times for +/-X, +/-Y, and +/-Z.

Note (4) 3 directions: X, Y and Z axes, 60min per each direction; 6 cycles; sweep time = 5 minutes; peak acceleration = 3G; frequency = 10 to 200 Hz; sine wave.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture

Note (6) In the standard conditions, there is no function failure issue occurred. All the cosmetic specification is judged before the reliability test

Note (7) During module operating test, the lamp current is 5.5 mA

2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	Vcc	-0.3	-	5	V	-
	AVDD	-0.5	-	13.5	V	-
	VGH	-0.3	-	42	V	-
	VGL	VGH-42	-	0.3	V	-
Input Signal Voltage	Vi	-0.3	-	Vcc+0.3	V	-
	V1~V5	0.4AVDD	-	AVDD+0.3	V	-
	V6~V10	-0.3	-	0.6AVDD	V	-
	VCOM	-	4.58	-	V	-

2.2.2 BACKLIGHT UNIT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Lamp Voltage	V_L	-	2.5K	V_{RMS}	(1), (2), I_L = (5.5)mA
Lamp Current	I_L	3.0	8.0	mA_{RMS}	(1), (2)
Lamp Frequency	F_L	40	80	KHz	

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for lamp (Refer to 3.2 for further I_L information).

3. ELECTRICAL CHARACTERISTIC

3.1 Recommended Operation condition (GND = AVSS = 0V)

Ta = 25 ± 2 ºC

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	3.0	3.3	3.6	V	
		AVDD	11.43	11.6	11.78	V	
		VGH	17.5	18	18.5	V	
		VGL	-7.5	-7	-6.5	V	
Input Signal Voltage		V1~V5	0.4AVDD	-	AVDD-0.1	V	(1)
		V6~V10	0.1	-	0.6AVDD	V	(1)
		VCOM	-	4.584	-	V	
Digital Input Voltage	High Level	VIH	0.7Vcc	-	Vcc	V	
	Low Level	VIL	0	-	0.3Vcc	V	

Note：(1) Please refer to application notes

3.2 Current Consumption (GND = AVSS =0V)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Supply Current for Source/Gate Driver (Digital)	I_{CC}	-	2.78	3.0	mA	(1)
Supply Current for Source Driver (Analog)	I_{DD}	-	24.8	27.0	mA	(1)
Supply Current for Gate Driver (High Level)	I_{GG}	-	0.16	0.2	mA	(1)
Supply Current for Gate Driver (Low Level)	I_{EE}	-	0.16	0.2	mA	(1)

Note: (1) The specified power supply current is under the conditions at Vcc = 3.3 V, Ta = 25 ± 2 ºC, f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

Black Pattern

Active Area

3.3 BACKLIGHT UNIT Ta = 25 ± 2 ºC

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Input Voltage	V_L	740	630	550	V_{RMS}	(1), I_L = (5.5) mA
Lamp Current	I_L	3.0	5.5	8.0	mA_{RMS}	(1)
Lamp Turn On Voltage	V_S	-	-	970 (25 °C)	V_{RMS}	(2)
		-	-	1260 (0 °C)	V_{RMS}	(2)
		-	-	1460 (-35°C)	V_{RMS}	(2)
Operating Frequency	F_L	40	-	80	KHz	(3)
Lamp Life Time	L_{BL}	35000	-	-	Hrs	(5)
Power Consumption	P_L	-	3.46	-	W	(4), I_L = (5.5) mA

Note (1) I_L means the lamp current of one lamp.

Note (2) The voltage that must be larger than Vs should be applied to the lamp for more than 1 second after startup. Otherwise the lamp may not be turned on.

Note (3) The lamp frequency may produce interference with horizontal synchronous frequency from the display, and this may cause line flow on the display. In order to avoid interference, the lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible.

Note (4) $P_L = I_L \times V_L$

Note (5) The lifetime of lamp can be defined as the time in which it continues to operate under the condition Ta = 25 ±2 °C and I_L = (5.5) mArms until one of the following events occurs:

(a) When the brightness becomes or lower than 50% of its original value.

(b) When the effective ignition length becomes or lower than 80% of its original value. (Effective ignition length is defined as an area that has less than 70% brightness compared to the brightness in the center point.)

Note (6) The waveform of the voltage output of inverter must be area-symmetric and the design of the inverter must have specifications for the modularized lamp. The performance of the Backlight, such as lifetime or brightness, is greatly influenced by the characteristics of the DC-AC inverter for the lamp. All the parameters of an inverter should be carefully designed to avoid producing too much current leakage from high voltage output of the inverter. When designing or ordering the inverter please make sure that a poor lighting caused by the mismatch of the Backlight and the inverter (miss-lighting, flicker, etc.) never occurs. If the above situation is confirmed, the module should be operated in the same manners when it is installed in your instrument.

The output of the inverter must have symmetrical (negative and positive) voltage waveform and symmetrical current waveform.(Unsymmetrical ratio is less than 10%) Please do not use the inverter which has unsymmetrical voltage and unsymmetrical current and spike wave. Lamp frequency may produce interface with horizontal synchronous frequency and as a result this may cause beat on the display. Therefore lamp frequency shall be as away possible from the horizontal synchronous frequency and from its harmonics in order to prevent interference.

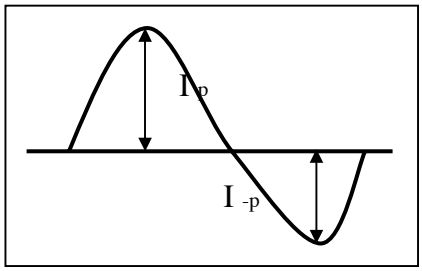
Requirements for a system inverter design, which is intended to have a better display performance, a better power efficiency and a more reliable lamp. It shall help increase the lamp lifetime and reduce its

leakage current.

a. The asymmetry rate of the inverter waveform should be 10% below;

b. The distortion rate of the waveform should be within $\sqrt{2} \pm 10\%$;

c. The ideal sine wave form shall be symmetric in positive and negative polarities.



* Asymmetry rate:

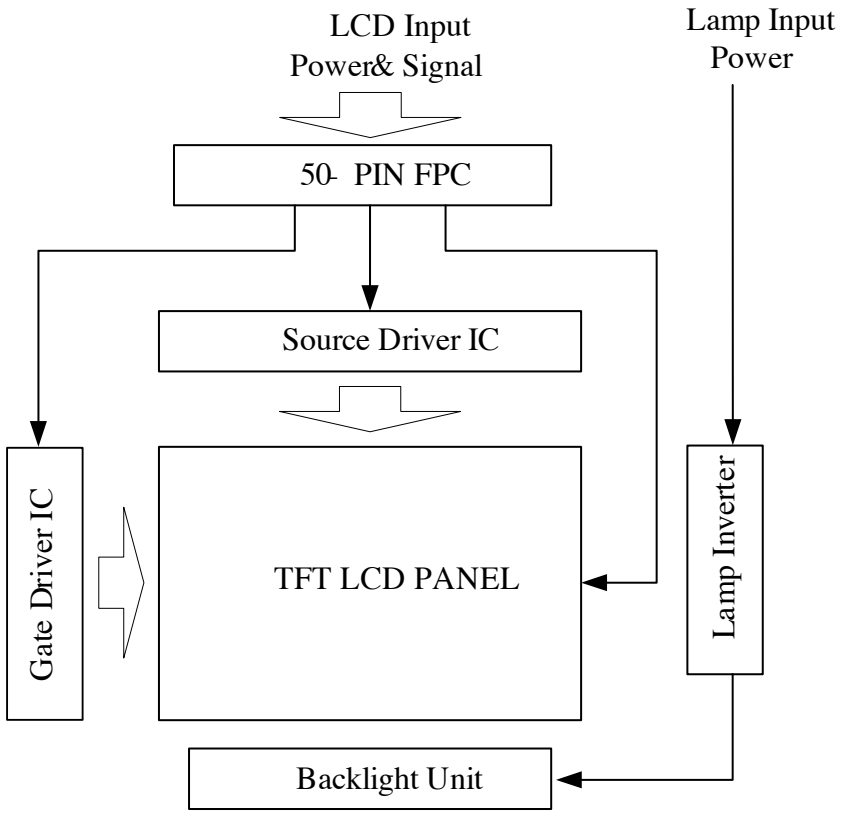
$$| I_p - I_{-p} | / I_{rms} * 100\%$$

* Distortion rate

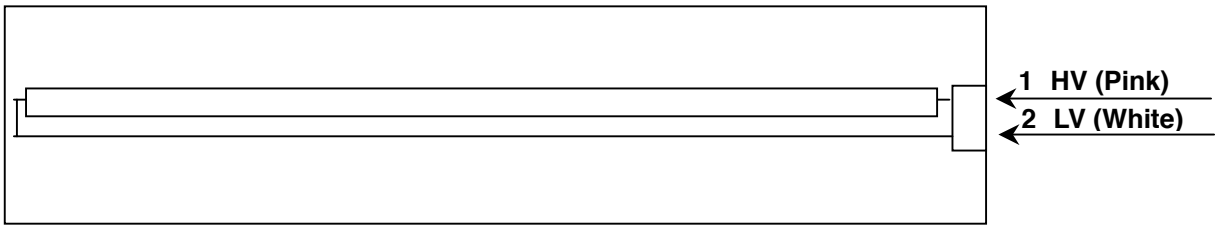
$$I_p \text{ (or } I_{-p}) / I_{rms}$$

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



4.2 BACKLIGHT UNIT



5. INPUT TERMINAL PIN ASSIGNMENT

5.1 FPC I/O Pin Assignment

Pin	Name	I/O	Description
1	GND	I	Ground
2	Vcc	I	Digital Voltage
3	VGL	I	TFT Low Voltage
4	VGH	I	TFT High Voltage
5	STVD	I/O	Start Pulse Signal Input / Output (Vertical)
6	STVU	I/O	Start Pulse Signal Input / Output (Vertical)
7	CKV	I	Gate Driver Shift Clock Input
8	U/D	I	Up / Down Scan Selection
9	OE	I	Gate Driver Output Enable Control
10	VCOM	I	VCOM Voltage
11	DIO1	I/O	Start Pulse Signal Input / Output (Horizontal)
12	AVDD	I	Source Driver Analog Voltage
13	GND	I	Ground
14	GND	I	Ground
15	Vcc	I	Digital Voltage
16	EDGSL	I	Source Driver Clock Edge Select Input
17	CLK	I	Source Driver Shift Clock Input
18	SHL	I	Source Driver Shift Direction Control Input
19	R0	I	Red Data
20	R1	I	Red Data
21	R2	I	Red Data
22	R3	I	Red Data
23	R4	I	Red Data
24	R5	I	Red Data
25	G0	I	Green Data
26	G1	I	Green Data
27	G2	I	Green Data
28	G3	I	Green Data
29	G4	I	Green Data
30	G5	I	Green Data
31	V1	I	Gamma Voltage 1
32	V2	I	Gamma Voltage 2
33	V3	I	Gamma Voltage 3
34	V4	I	Gamma Voltage 4
35	V5	I	Gamma Voltage 5
36	V6	I	Gamma Voltage 6
37	V7	I	Gamma Voltage 7
38	V8	I	Gamma Voltage 8
39	V9	I	Gamma Voltage 9
40	V10	I	Gamma Voltage 10

41	B0	I	Blue Data
42	B1	I	Blue Data
43	B2	I	Blue Data
44	B3	I	Blue Data
45	B4	I	Blue Data
46	B5	I	Blue Data
47	LD	I	Latching and Data Switching input
48	REV	I	Data Inversion Input
49	POL	I	Polarity Inverting Input
50	DIO2	I/O	Start Pulse Signal Input / Output (Horizontal)

Note (1) User's connector Part No: (FH12-50S-0.5 (Hiroses)) or equivalent

5.2 SCANNING DIRECTION

The following figures are seen from a front view and the arrow shows the direction of scan.

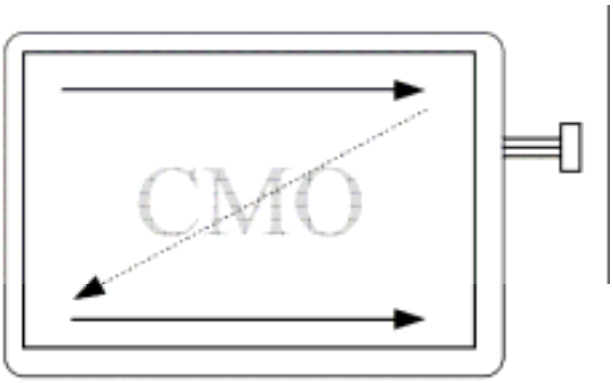


Figure1.Normal scan

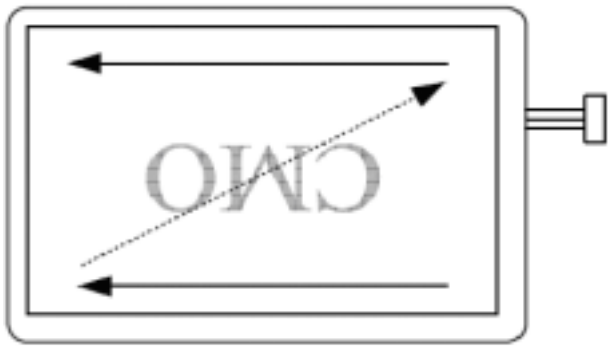


Figure 2. Reverse scan

Note : (1) Normal Scan

SHL	U/D	DIO1	DIO2	STVU	STVD	Shift
1	0	Input	Output	Input	Output	Up to down Left to right

(2) Reverse Scan

SHL	U/D	DIO1	DIO2	STVU	STVD	Shift
0	1	Output	Input	Output	Input	Down to Up Right to left

5.3 BACKLIGHT UNIT

Pin	Symbol	Description	Remark
1	HV1	High Voltage	Pink
2	N/A	N/A	N/A
3	LV	Low Voltage	White-

Note (1) Connector Part No.: BHR-03VS-1 (J.S.T Mfg,Co,Ltd)

5.4 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 6-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																	
		Red						Green						Blue					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	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
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	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	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
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	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
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	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

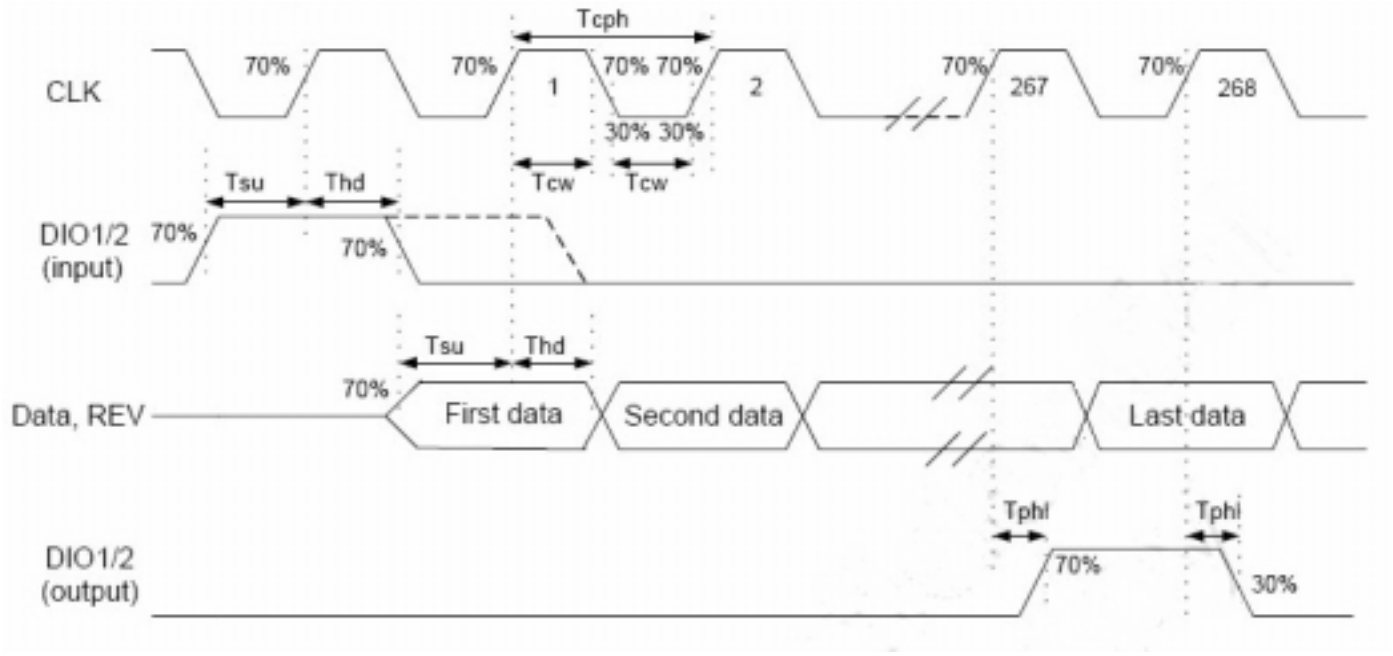
6. INTERFACE TIMING

6.1 AC Electrical Characteristics (Vcc = 3.3V, AVDD = 8.4V, AVSS = GND = 0V, Ta = 25℃)

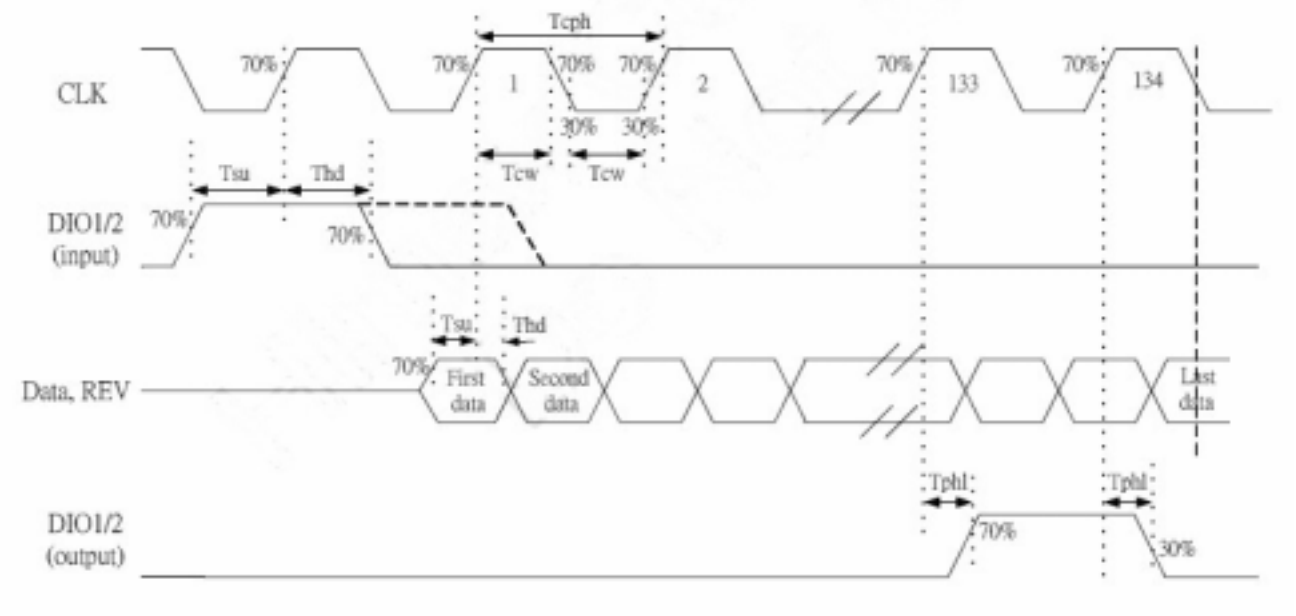
Parameter	Symbol	Value			Unit	Condition
		Min.	Typ.	Max.		
CLK frequency	Fclk	-	40	47	MHz	-
CLK Pulse width	Tcw	6	-	-	ns	-
Data setup time	Tsu	4	-	-	ns	D00~D55, REV and DIO1/2 to CLK
Data hold time	Thd	2	-	-	ns	D00~D55, REV and DIO1/2 to CLK
Propagation delay of DIO2/1	Tphl	6	10	15	ns	CL = 25pF (Output)
Time that the last data to LD	Tld	1	-	-	Tcph	-
Pulse width of LD	Twld	2	-	-	Tcph	-
Time that LD to DIO1/2	Tlds	5	-	-	Tcph	-
POL setup time	Tpsu	6	-	-	ns	POL to LD
POL hold time	Tphd	6	-	-	ns	POL to LD
Output stable time	Tst	-	-	12	us	10% or 90% target voltage, CL = 60pF, R = 2KΩ
CKV period	t_{CPV}	5	-	-	us	-
CKV pulse width	t_{CPVH},t_{CPVL}	2.5	-	-	us	50% duty cycle
OE pulse width	t_{WOE}	1	-	-	us	-
STV setup time	t_{SU}	700	-	-	ns	-
STV hold time	t_{HD}	700	-	-	ns	-

■Timing Diagram 1

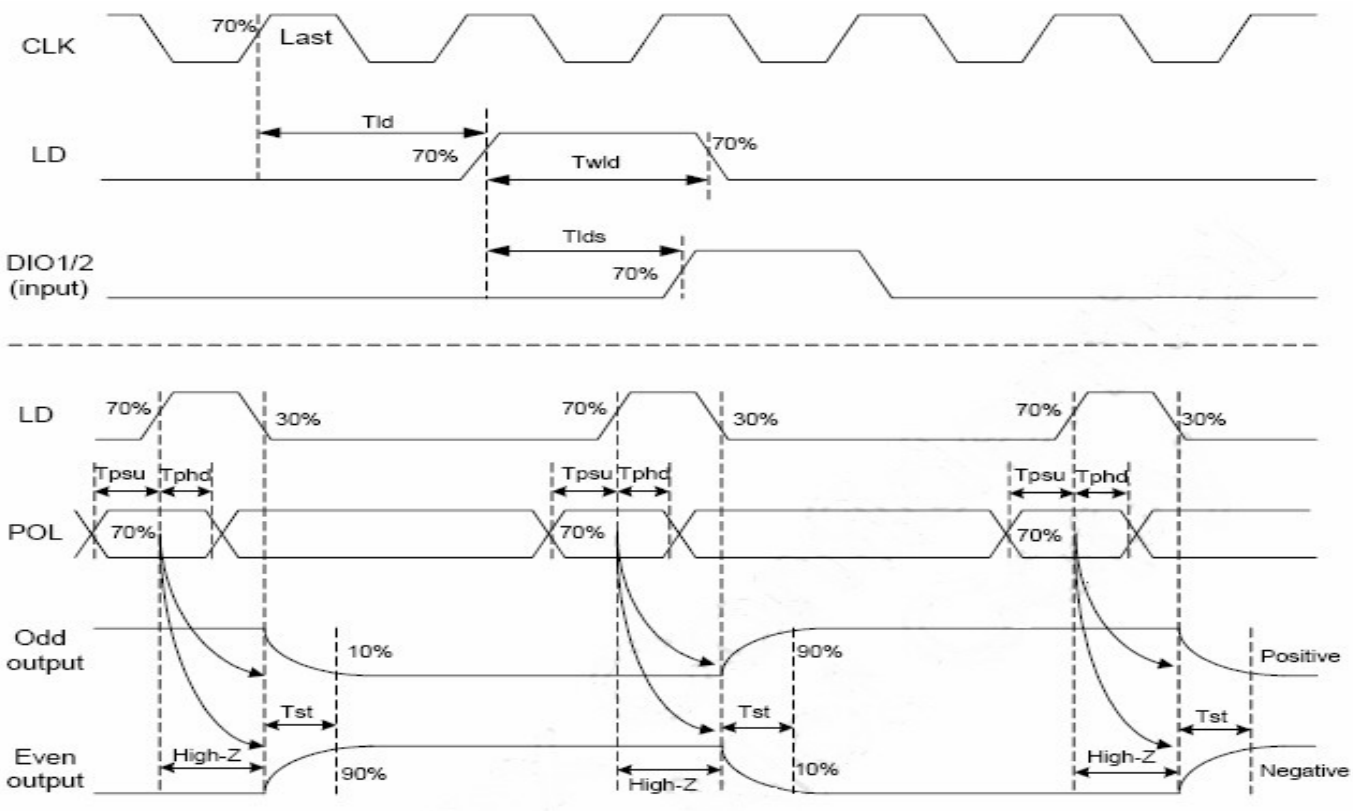
●EDGSL = “0” or open



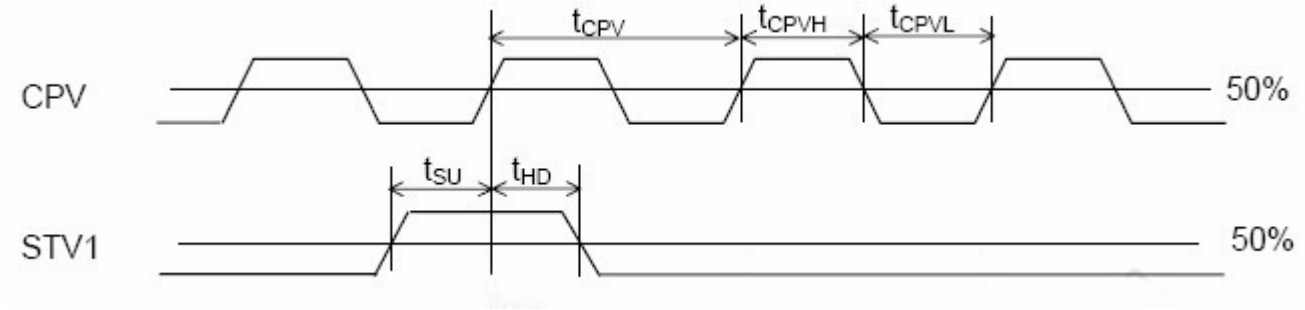
●EDGSL = “1”



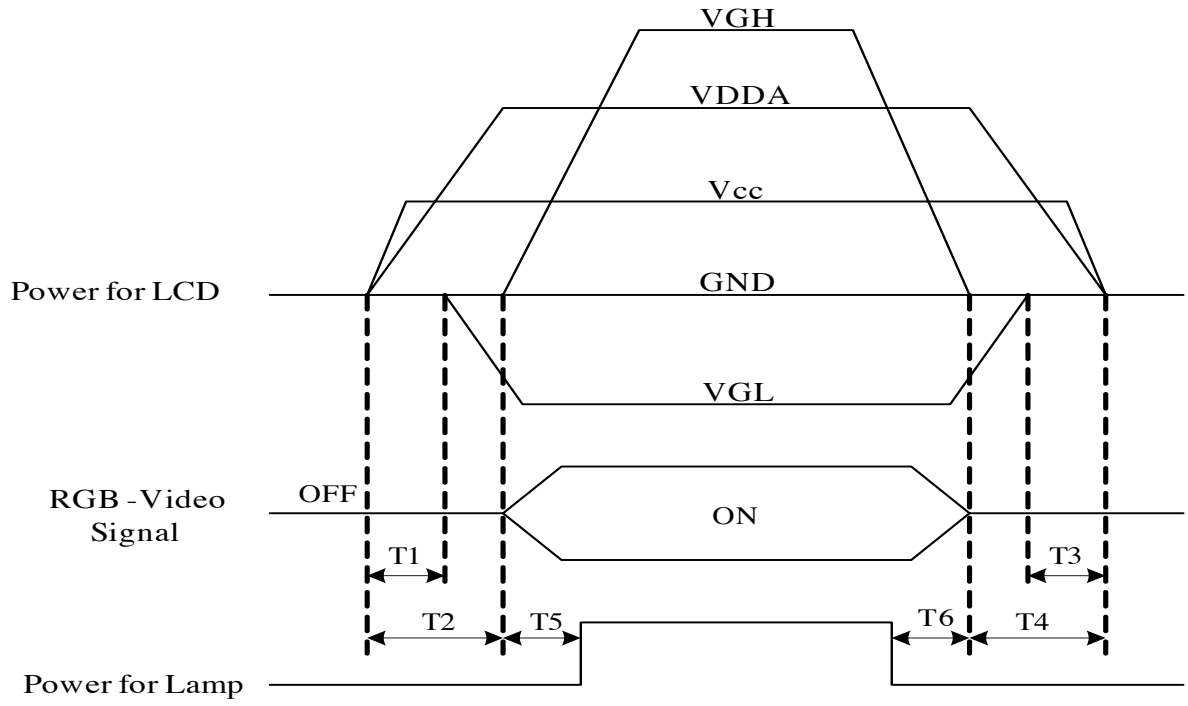
■Timing Diagram 2



■Timing Diagram 3



6.2 POWER ON/OFF SEQUENCE



Timing Specifications:

0ms ≦ T1 ＜ T2

0ms ＜ T3 ≦ T4

0ms ≦ T5

0ms ≦ T6

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	3.3	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Lamp Current	I_L	5.5	mA_{RMS}
Inverter Operating Frequency	F_L	61	KHz
Inverter	(Sumida IV40090T/B2)		

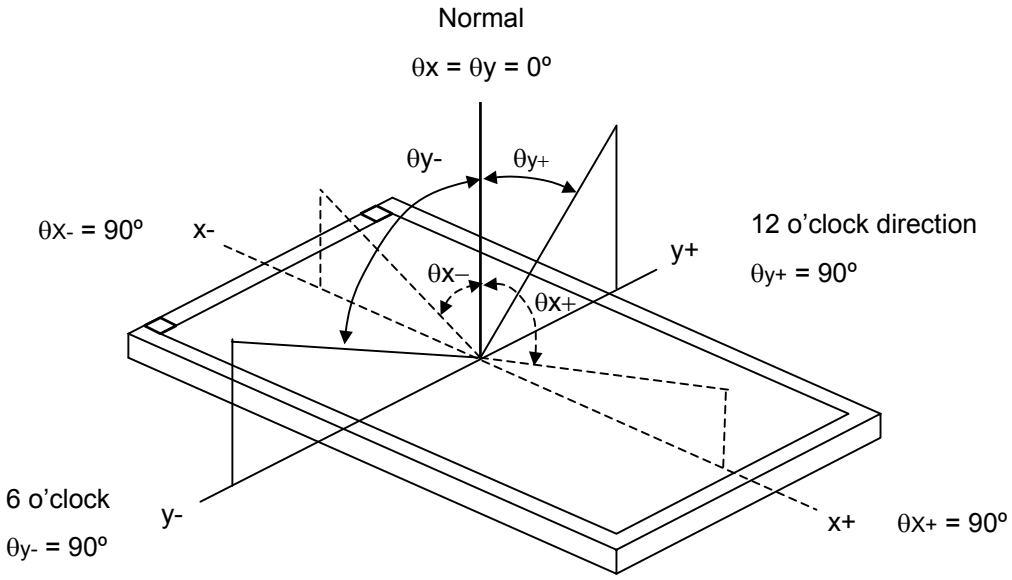
Note (1) I_L means the lamp current of one lamp.

7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity	Red	Rx	θ_x=0°, θ_Y =0° Viewing Normal Angle	Typ – 0.03	0.607	Typ + 0.03		(1), (6)
		Ry			0.342			
	Green	Gx			0.316			
		Gy			0.550			
	Blue	Bx			0.150			
		By			0.124			
	White	Wx			0.313			
		Wy			0.329			
Center Luminance of White		L_C		330	450	-	cd/m^2	(4), (6)
Contrast Ratio		CR		350	500	-	-	(2), (6)
Response Time		T_R		-	5	10	Ms	(3)
		T_F		-	11	16	Ms	
White Variation		δW		-	1.25	1.4	-	(5), (6)
Viewing Angle	Horizontal	θ_x+	CR ≧ 10	60	70	-	Deg.	(1), (6)
		θ_x-		60	70	-		
	Vertical	θ_Y+		50	60	-		
		θ_Y-		50	60	-		

Note (1) Definition of Viewing Angle (θx, θy):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63 / L0

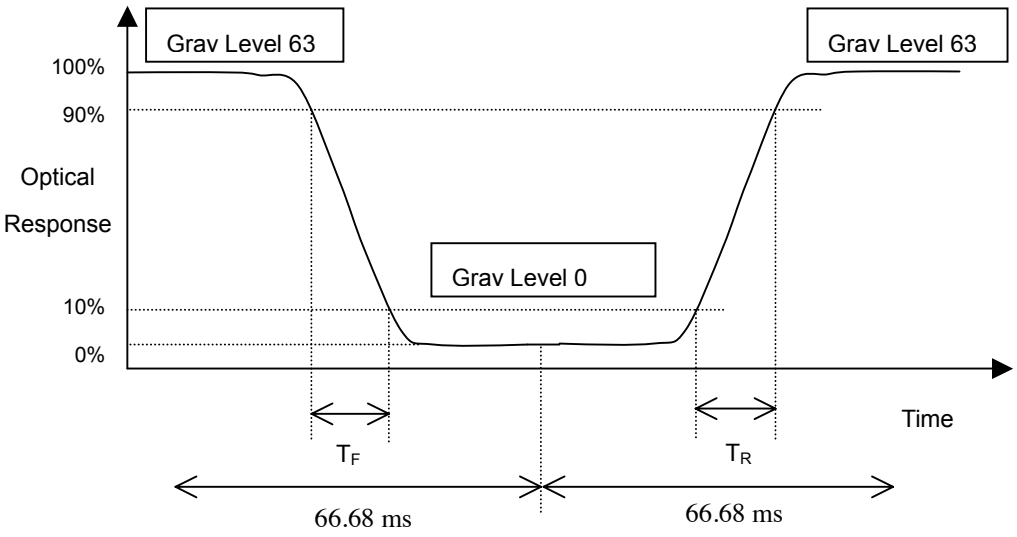
L63: Luminance of gray level 63

L 0: Luminance of gray level 0

CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

Note (3) Definition of Response Time (T_R, T_F) and measurement method:



Note (4) Definition of Luminance of White (L_C):

Measure the luminance of gray level 63 at center point

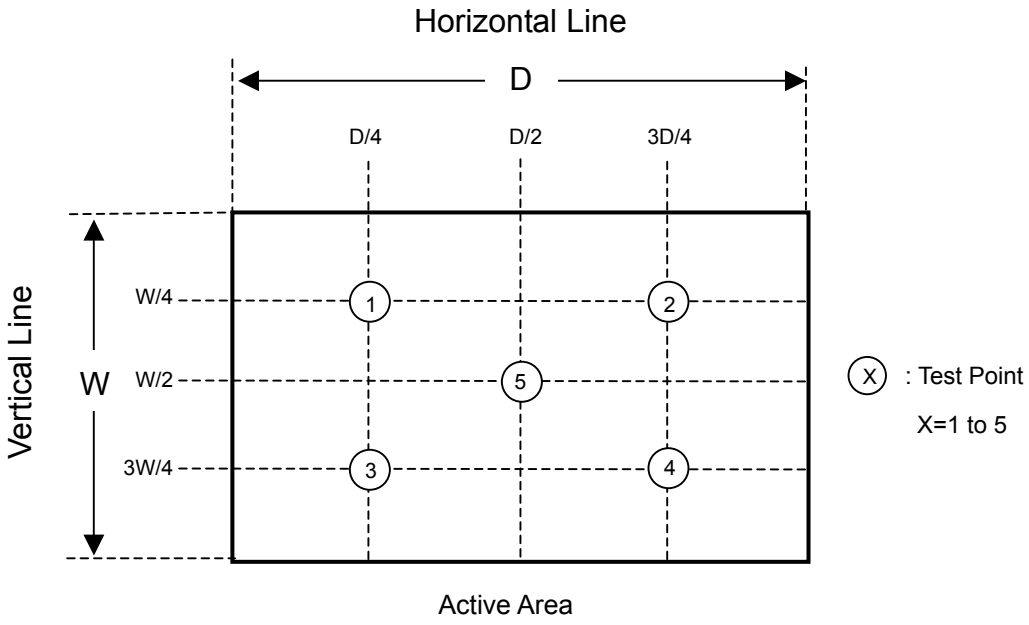
L_C = L (5)

L (x) is corresponding to the luminance of the point X at Figure in Note (5).

Note (5) Definition of White Variation (δW):

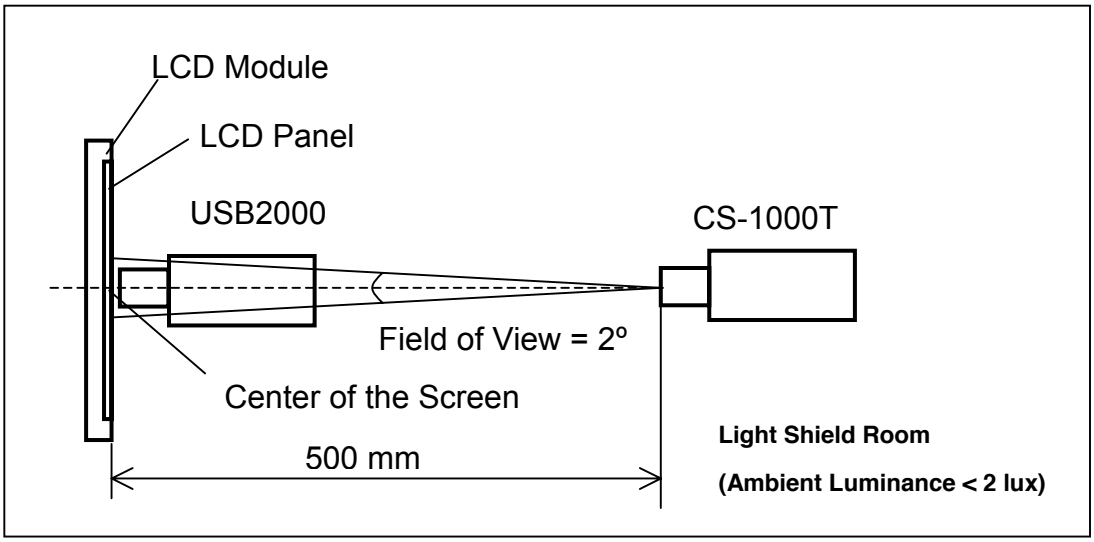
Measure the luminance of gray level 63 at 5 points

δW = Maximum [L (1), L (2), L (3), L (4), L (5)] / Minimum [L (1), L (2), L (3), L (4), L (5)]

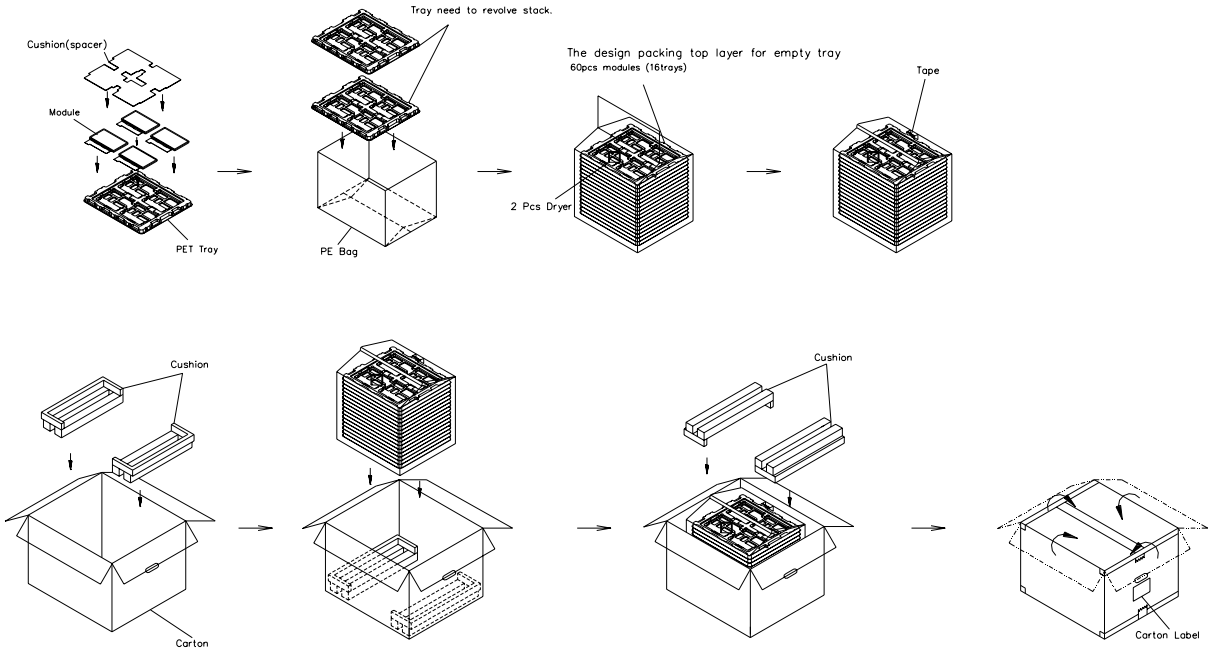


Note (6) Measurement Setup:

The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



8. PACKAGING

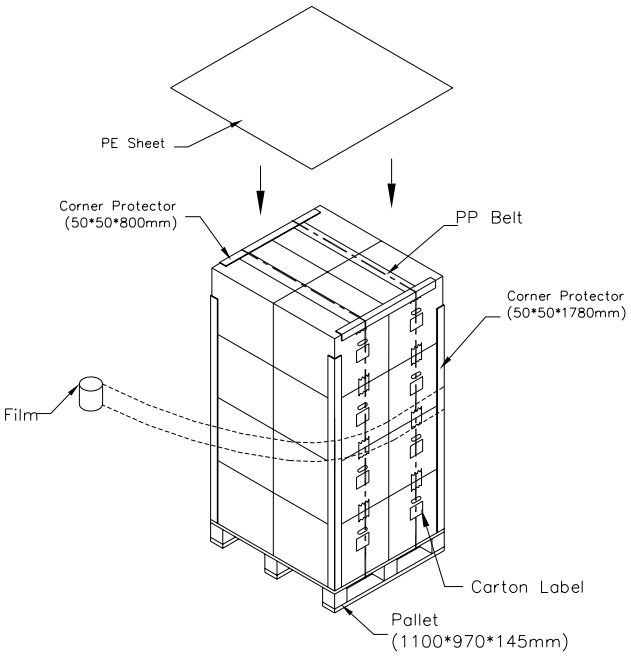


(1) 60 LCM Modules/1 box

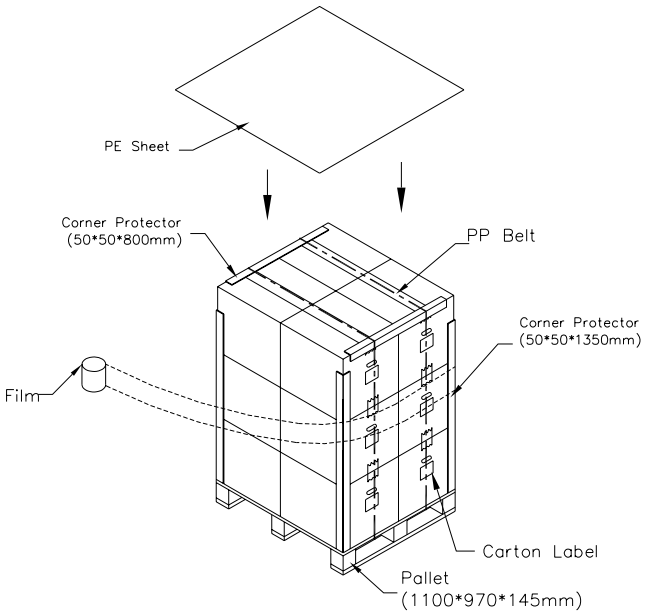
(2) Carton dimensions : 545(L)x480(W)x485(H)mm

(3) Weight :approximately 16.2 kg(60 modules per Carton).

Sea Transportation



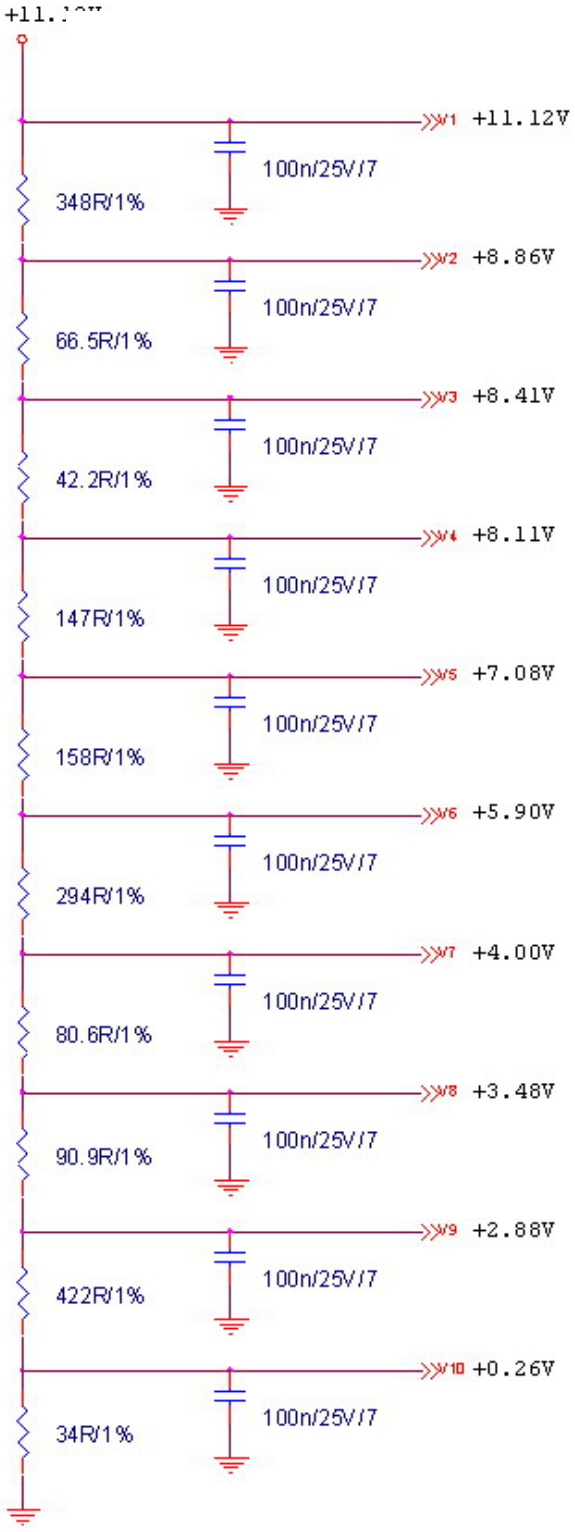
Air Transportation



11. APPLICATION NOTES

11.1 GAMMA CIRCUIT

AVDD	11.60
V1	11.12
V2	8.86
V3	8.41
V4	8.11
V5	7.08
V6	5.90
V7	4.00
V8	3.48
V9	2.88
V10	0.26
VCOM	4.584



10. PRECAUTIONS

10.1 ASSEMBLY AND HANDLING PRECAUTIONS

(1) Do not apply rough force such as bending or twisting to the module during assembly.

(2) To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

(3) It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.

(4) Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.

(5) Do not pull the I/F connector in or out while the module is operating.

(6) Do not disassemble the module.

(7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

(8) It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.

(9) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.

(10) When ambient temperature is lower than 10ºC may reduce the display quality. For example, the response time will become slowly, and the starting voltage of CCFL will be higher than room temperature.

10.2 SAFETY PRECAUTIONS

(1) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with inverter. Do not disassemble the module or insert anything into the Backlight unit.

(2) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

(3) After the module's end of life, it is not harmful in case of normal operation and storage.

11. APPLICATION NOTES

11.1 GAMMA CIRCUIT

AVDD	11.60
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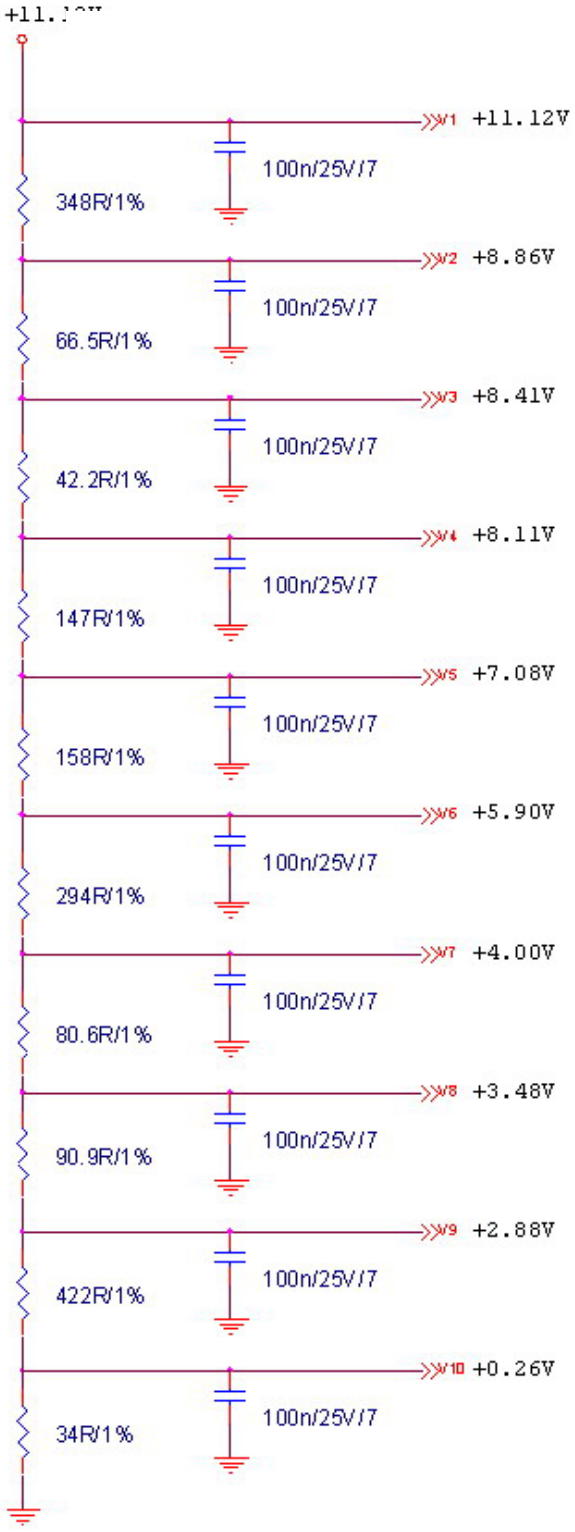
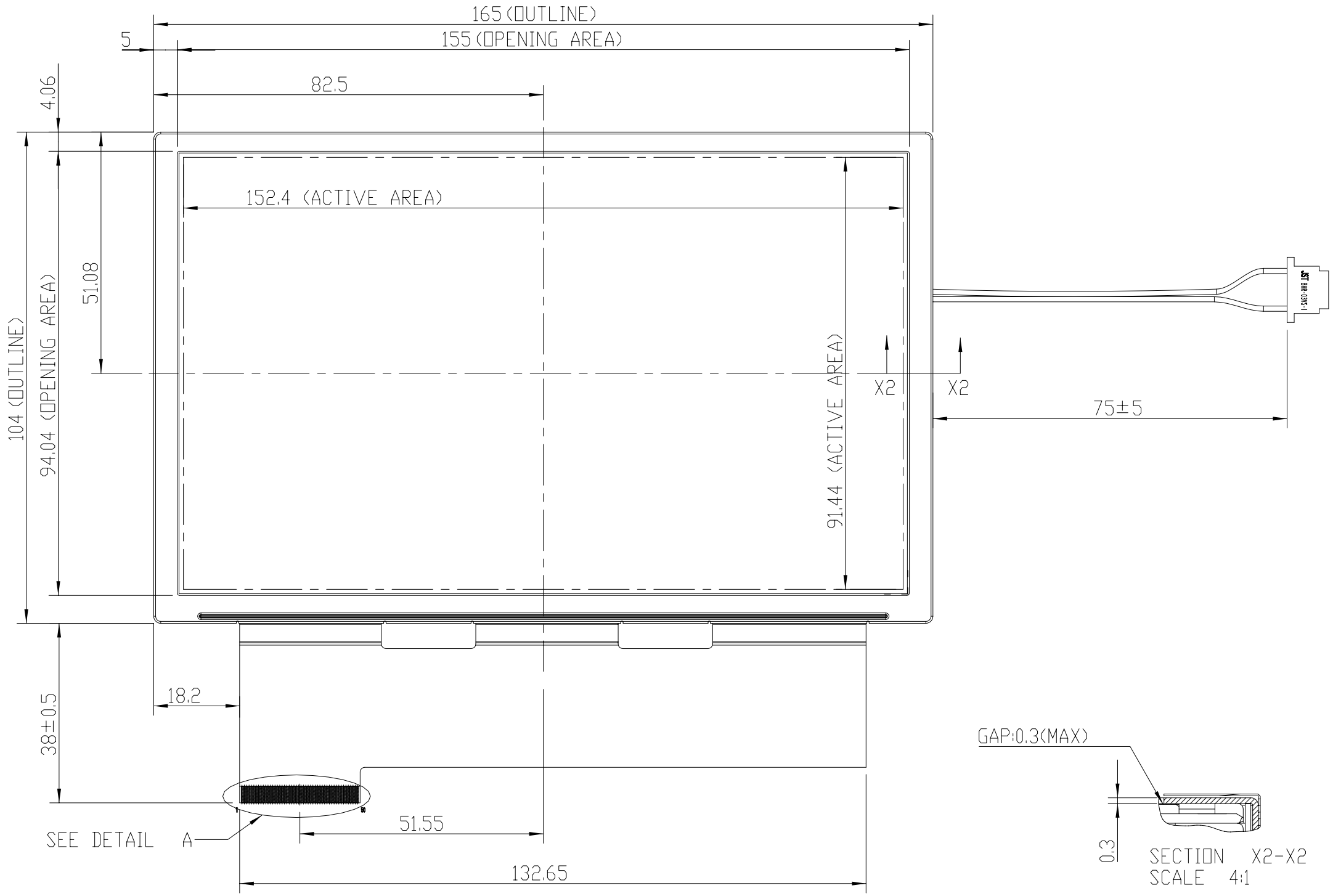
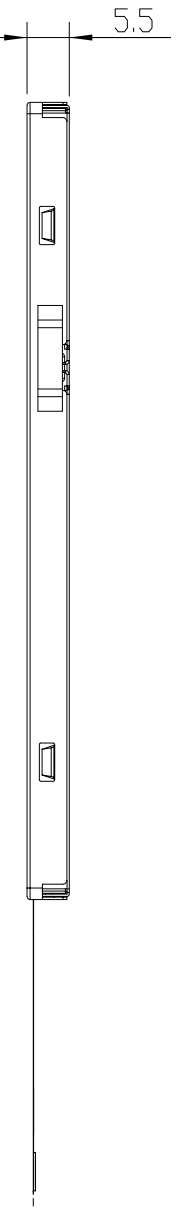
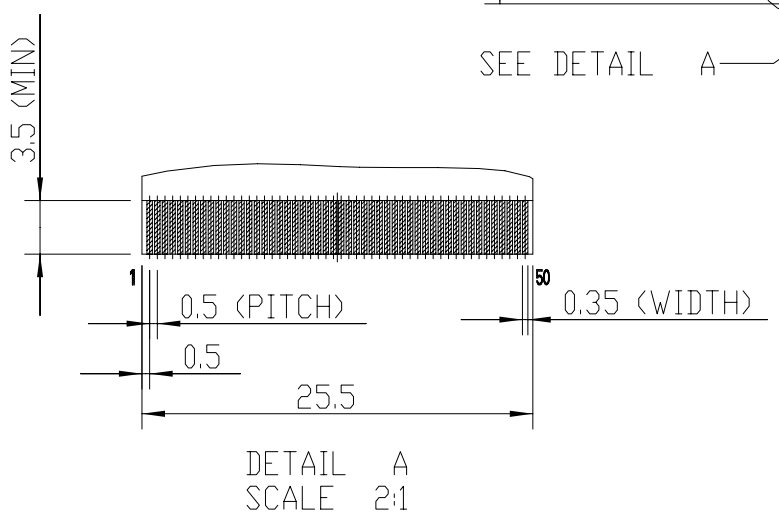




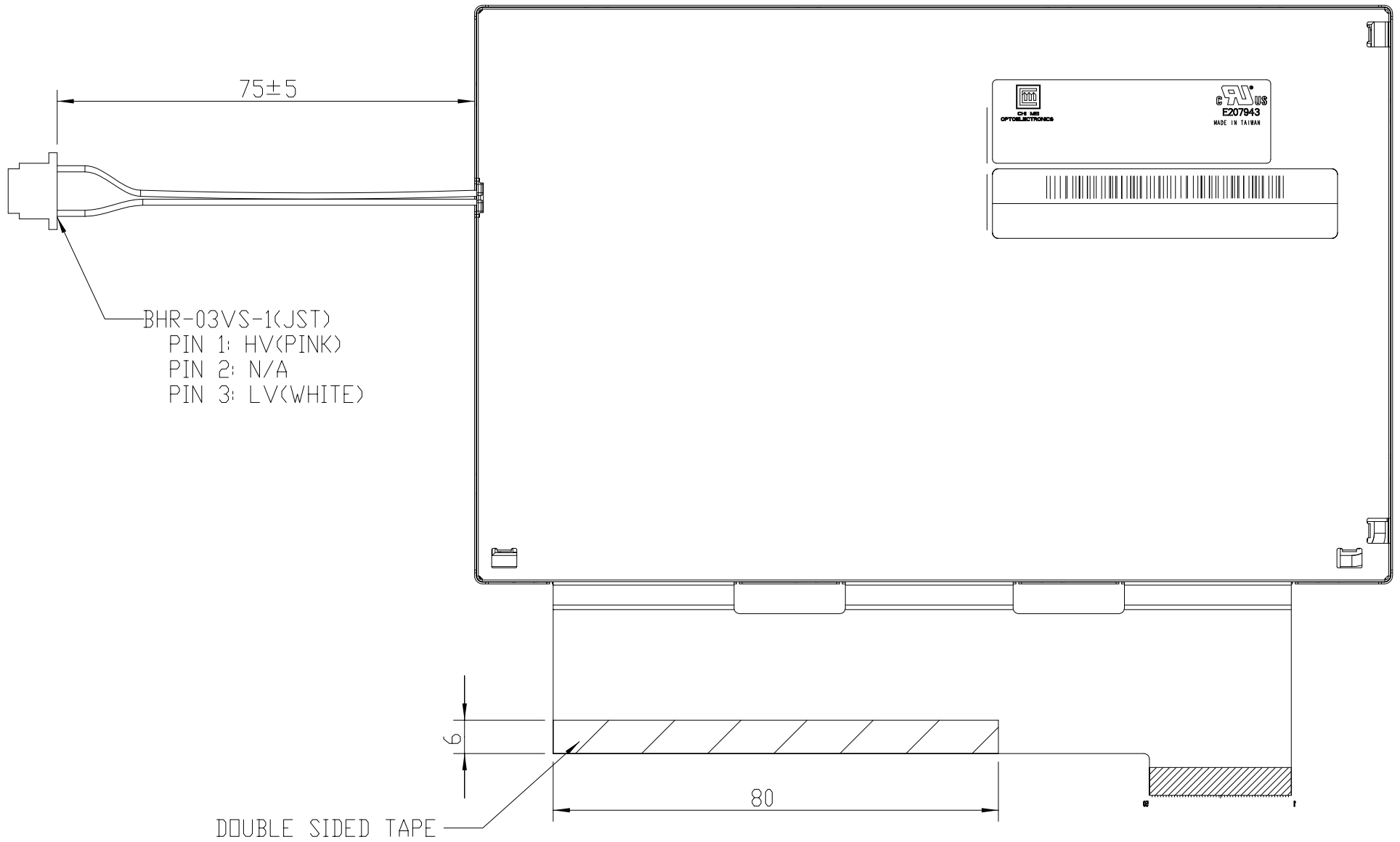




NOTES:
1.OUTLINE TOLERANCE: ±0.3mm.
2.LAMP CONNECTOR: BHR-03V-1(JST)
3.FPC MATING CONNECTOR :
FH12-50S-0.5SH(55) (HIROSE)

Mark	Description	Date	Changed_By	Approved_By	ECN No.	Remark

TITLE	ASSY_MODULE_G070Y1-T01					2D REV.	1
						3D REV.	1.3+
Approved	BILL_SHEU	Drawing No.	G070141011				
Checked	JEMMY_CHANG	Part No.	TBD				
Drawer	TIGER_CHANG	Material	TBD		Sheet	1 / 2	A3
Designer	TIGER_CHANG	Date	23-Aug-2006	Scale 1:1	Unit:mm		



Mark	Description	Date	Changed_By	Approved_By	ECN No.	Remark

TITLE	ASSY_MODULE_G070Y1-T01					2D REV.	1
						3D REV.	1.3+
Approved	BILL_SHEU	Drawing No.	G070141011				
Checked	JEMMY_CHANG	Part No.	TBD				
Drawer	TIGER_CHANG	Material	TBD	Sheet	2 / 2	A3	
Designer	TIGER_CHANG	Date	23-Aug-2006	Scale	1:1	Unit:mm	