TFT LCD Tentative Specification

MODEL NO.: G070Y2-L01

Customer: _____

Approved by: _____

Note:

Liquid Crystal Display Division	
QRA Division.	OA Head Division.
Approval	Approval

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REVISION HISTORY

Version	Date	Section	Description
Ver 0.0	Mar. 24, '09	All	G070Y2-L01 Tentative specification was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

G070Y2-L01 is a 7inch TFT Liquid Crystal Display module with a LED backlight unit and a-20pin 6/8bit LVDS interface controller board. This module supports 800 (R.G.B)x 480 WVGA mode which main application is the automotive display and industrial field.

1.2 FEATURES

- Wide viewing angle.
- Fast response time
- Wide operating temperature
- Reversible scan function
- 6/8 bit convertible
-High Color gamut (NTSC：72%)

1.3 APPLICATION

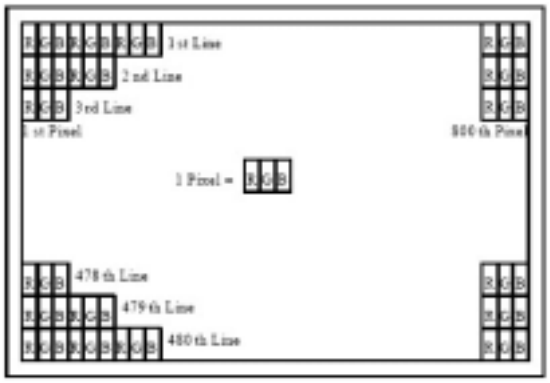
- Automotive Display
- Industry Application

1.4 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Diagonal Size	7	inch	
Active Area	152.4x91.44	mm	(1)
Bezel Opening Area	154.6x93.64	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	800 x R.G.B. x 480	pixel	-
Pixel Pitch	0.2168 x 0.2168	mm	-
Pixel Arrangement	RGB vertical stripe	-	(2)
Display Colors	262k or 16.2M	color	-
Display Mode	Normal White	-	-
Surface Treatment	Anti-glare, Hard Coating (3H)	-	-
Weight	(180)	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)	8.97	9.27	9.57	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	95℃, 240 hours	(1) (2)
2	Low Temperature Storage	-40℃, 240 hours	
3	Thermal Shock Storage	{(-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	
7	Shock (Non-Operating)	100G, 6ms, half sine wave, 1 time for ± X, ± Y, ± Z.	(3)(5)
8	Vibration (Non-Operating)	3G, 10 ~ 200 Hz, 10min/cycle, 3 cycles each X, Y, Z	(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 95℃ Max.

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

2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Ta = 25 ± 2 ºC

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V_{CC}	(-0.3)	(+4.0)	V	(1)
Logic Input Voltage	V_{IN}	(-0.3)	(V_{CC}+0.3)	V	

2.2.2 BACKLIGHT UNIT

Ta = 25 ± 2 ºC

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Converter Voltage	V_i	(10.8)	(13.2)	V	(1) , (2)
Converter Current	I_i	-	(1.0)	A	(1) , (2)

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 LED (Refer to 3.2 for further information).

3. ELECTRICAL CHARACTERISTICS

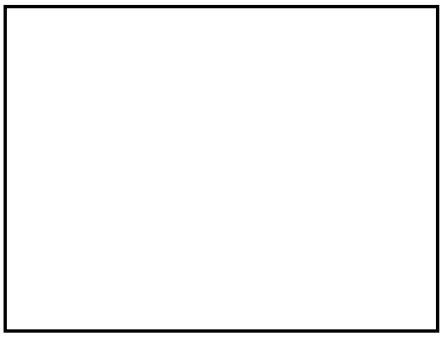
3.1 RECOMMENDED OPERATION CONDITION (GND = AVSS = 0V)

Ta = 25 ± 2 ºC

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	(3.0)	(3.3)	(3.6)	V	-
Permissive Ripple Voltage		V_{RP}		(50)		mV	-
Rush Current		I_{RUSH}			(1.5)	A	(2)
Initial Stage Current		I_{IS}			(1.0)	A	(2)
Power Supply Current	White	Icc		TBD	TBD	mA	(3)a
	Black			TBD	TBD	mA	(3)b
LVDS Differential Input High Threshold		$V_{TH(LVDS)}$			(+100)	mV	(4), V_{CM}=1.2V
LVDS Differential Input Low Threshold		$V_{TL(LVDS)}$	(-100)			mV	(4) V_{CM}=1.2V
LVDS Common Mode Voltage		V_{CM}	(1.125)	(1.25)	(1.375)	V	(4)
LVDS Differential Input Voltage		$\|V_{ID}\|$	TBD		TBD	mV	(4)

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.

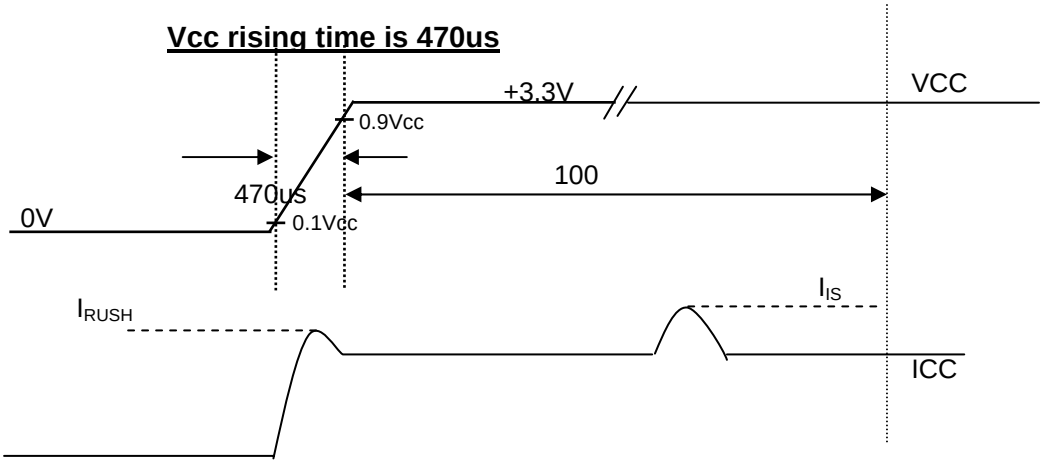
White Pattern



Active Area

Black Pattern

Active Area

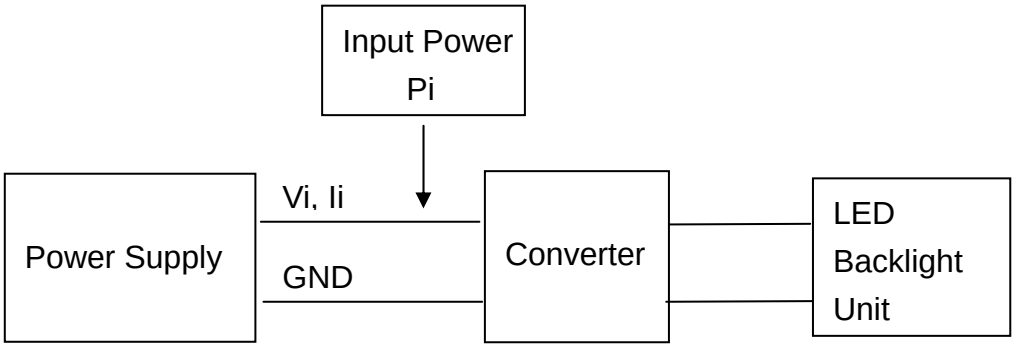


3.2 BACKLIGHT UNIT

Ta = 25 ± 2 ºC

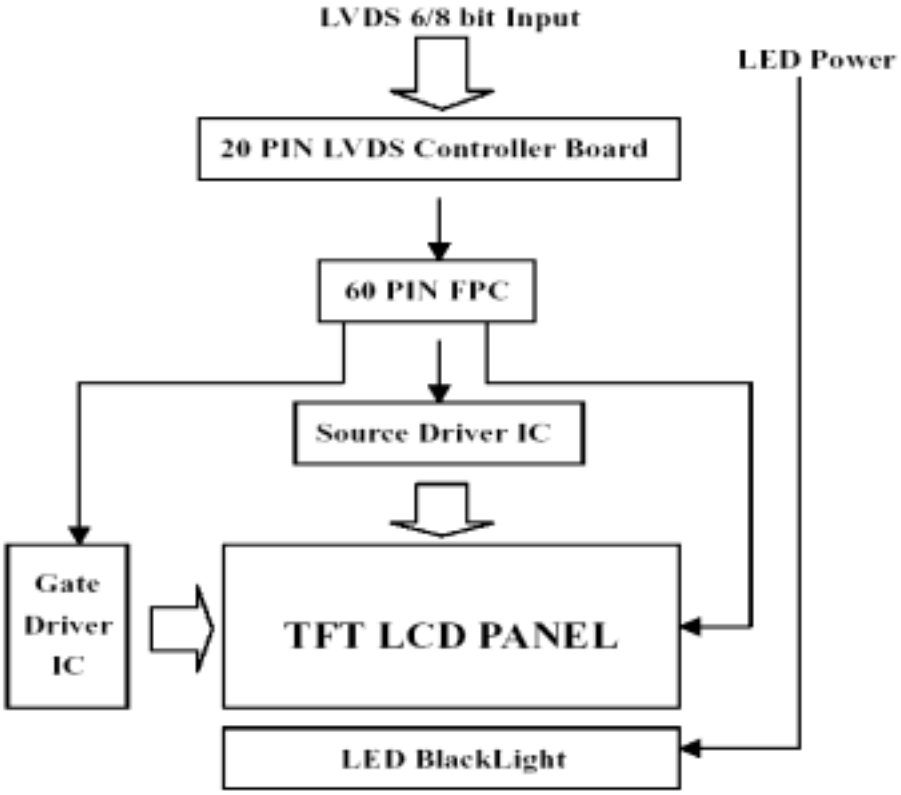
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Converter Voltage	V_i	(10.8)	(12)	(13.2)	V_{DC}	(Duty 100%)
Converter Current	I_i	---	---	(1.0)	mA_{DC}	(Duty 100%)
LED life time	L_{BL}	(50,000)			hr	
Power Consumption	P_L	---	(3.9)		W	

Note (1) LED current is measured by utilizing a high frequency current meter as shown below:

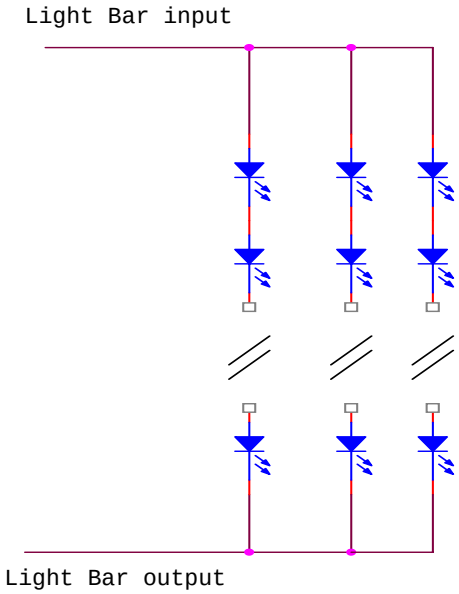


4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



4.2 BACKLIGHT UNIT



5. INPUT TERMINAL PIN ASSIGNMENT

5.1 LVDS I/O PIN ASSIGNMENT

Pin	Name	I/O	Description
1	RX3+	I	LVDS differential data input Pair 3.
2	RX3-	I	
3	NC	I	No Connected
4	FRC	I	Dithering control setting When FRC=H, the width of data input 8 bits When FRC=L, the width of data input 6 bits and set Dx0 and Dx1 to logical low (Default pull low)
5	GND	I	Ground
6	RXC+	I	LVDS differential Clock input Pair
7	RXC-	I	
8	GND	I	Ground
9	RX2+	I	LVDS differential data input Pair 2
10	RX2-	I	
11	GND	I	Ground
12	RX1+	I	LVDS differential data input Pair 1
13	RX1-	I	
14	GND	I	Ground
15	RX0+	I	LVDS differential data input Pair 0
16	RX0-	I	
17	LR	I	Shift direction of Source Driver IC internal shift register is controlled by this pin as show below: LR=H SO1→ ……SO1200 (Default pull high) LR=L SO1200→…….SO1
18	UD	I	Gate Driver Up/down scan setting When UD=H, reverse scan When UD=L, normal scan (Default pull low)
19	VCC_IN	I	Digital power supply (+5V)
20	VCC_IN	I	Digital power supply (+5V)

Note (1) User's connector Part No:

5.2 BACKLIGHT Driving Section

No	Symbol	I/O	Description
1	PIN 1	I	12V
2	PIN 2	I	PWM
3	PIN 3	I	EN_BL
4	PIN 4		GND

Note (1) User's connector Part No:

5.3 SCANNING DIRECTION

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

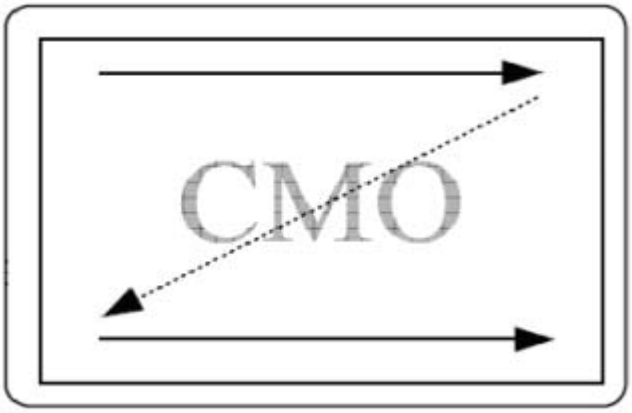


Figure1.Normal scan

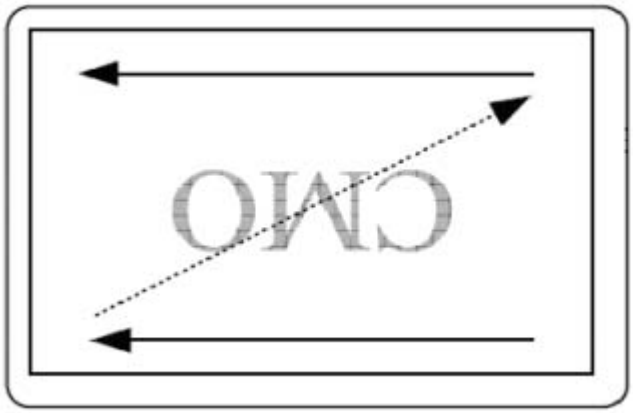


Figure 2. Reverse scan

Note : (1) Normal Scan

LR	UD	Shift
1	0	Up to down Left to right

(2) Reverse Scan

LR	UD	Shift
0	1	Down to Up Right to left

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

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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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

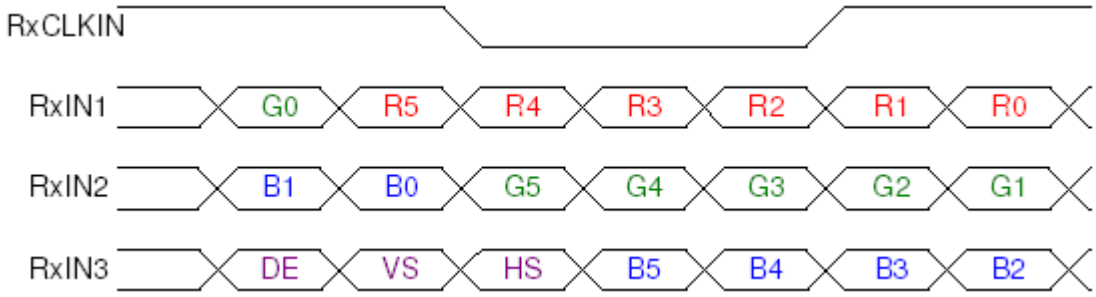
6. INTERFACE TIMING

6.1 Timing CHARACTERISTICS

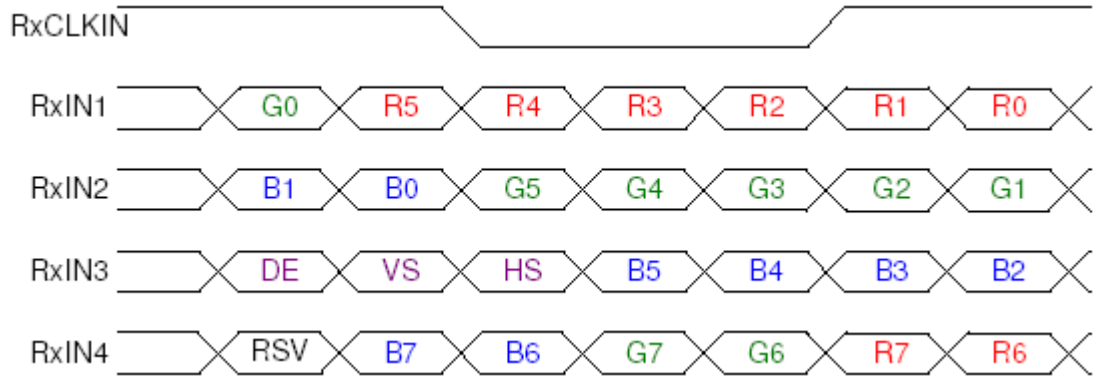
LVDS Input Signal及Input Timing Diagram

LVDS Input Signal

6 bits LVDS Input



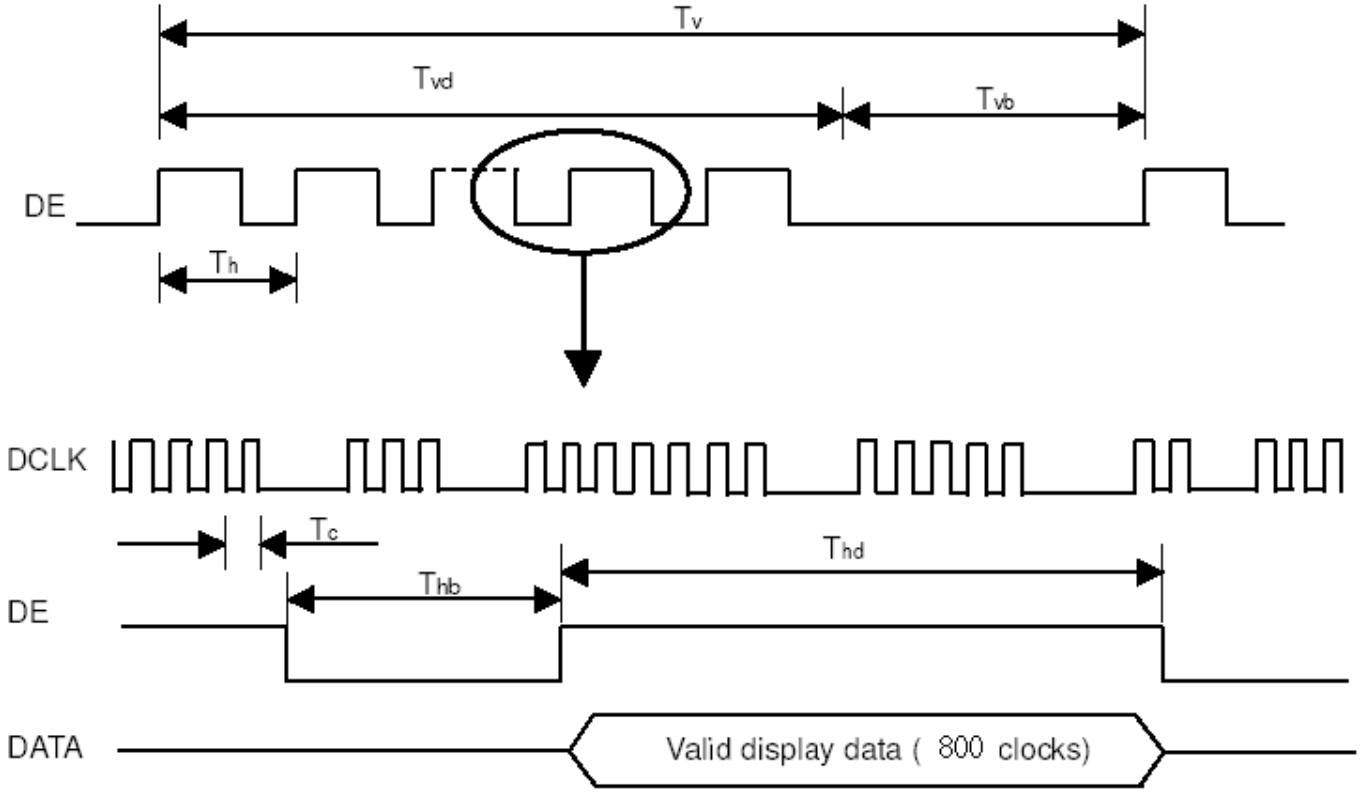
8 bits LVDS Input



DE mode

Parameter		Symbol	Value			Unit	Condition
			Min.	Typ.	Max.		
Vertical Display	Period	Tv	TBD	(508)	TBD	T_h	
	Active	Tvd	TBD	(480)	TBD	T_h	
	Blanking	Tvb	TBD	(28)	TBD	T_h	
Horizontal Display	Period	T_h	TBD	(1058)	TBD	Tclock	
	Active	T_{hd}	TBD	(800)	TBD	Tclock	
	Blanking	T_{hb}	TBD	(256)	TBD	Tclock	
Clock Frequency		$1/T_{clock}$	TBD	(32.18)	TBD	MHz	

Input Timing Diagram (DE mode)

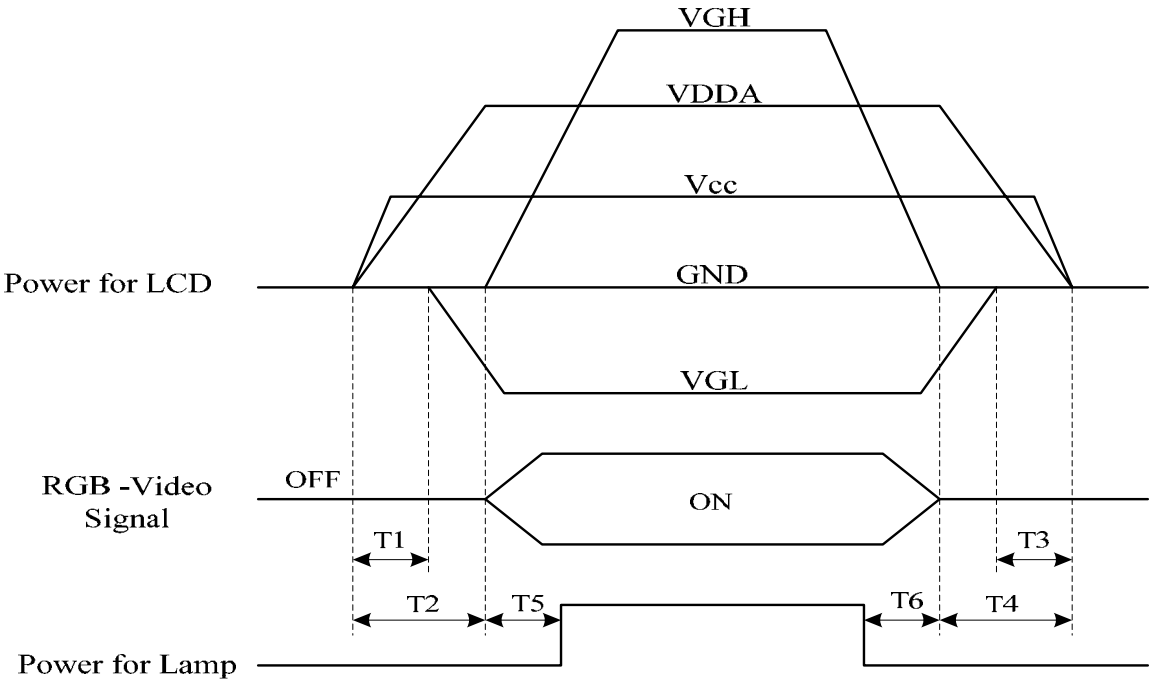


6.2 POWER ON/OFF SEQUENCE

To prevent the device from damage due to latch up, the power ON/OFF sequence shown below must be followed.

Power on sequence: Vcc➔VGL➔VGH

Power off sequence: VGH➔VGL➔Vcc



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"		
Current	I_f	20	mA

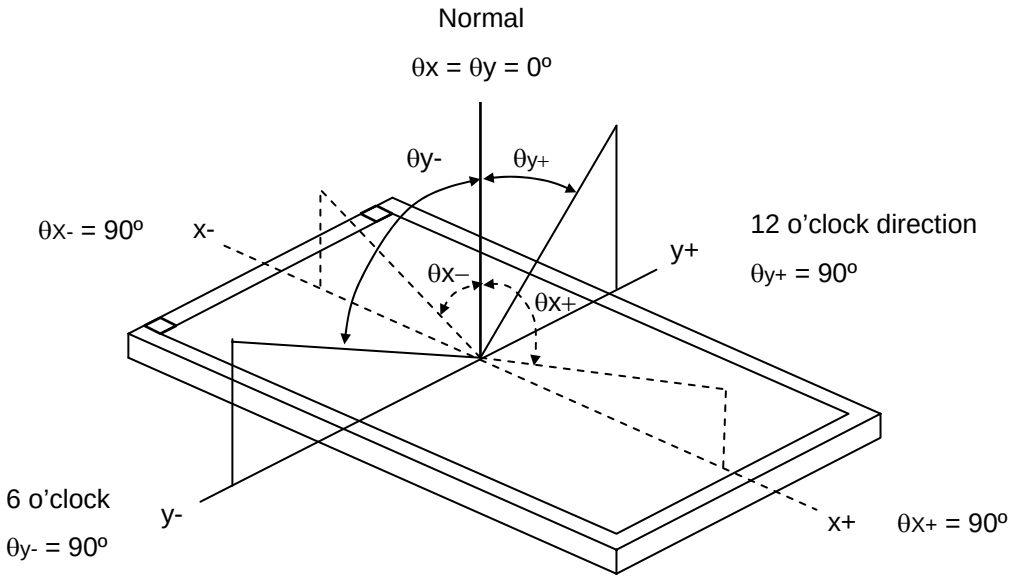
Note (1) I_f means the forward current of each channel

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	TBD	Typ + 0.03		(1), (6)
		Ry			TBD			
	Green	Gx			TBD			
		Gy			TBD			
	Blue	Bx			TBD			
		By			TBD			
	White	Wx			(0.313)			
		Wy			(0.329)			
Center Luminance of White		L_C			(500)		cd/m^2	(4), (6)
Contrast Ratio		CR			(600)		-	(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

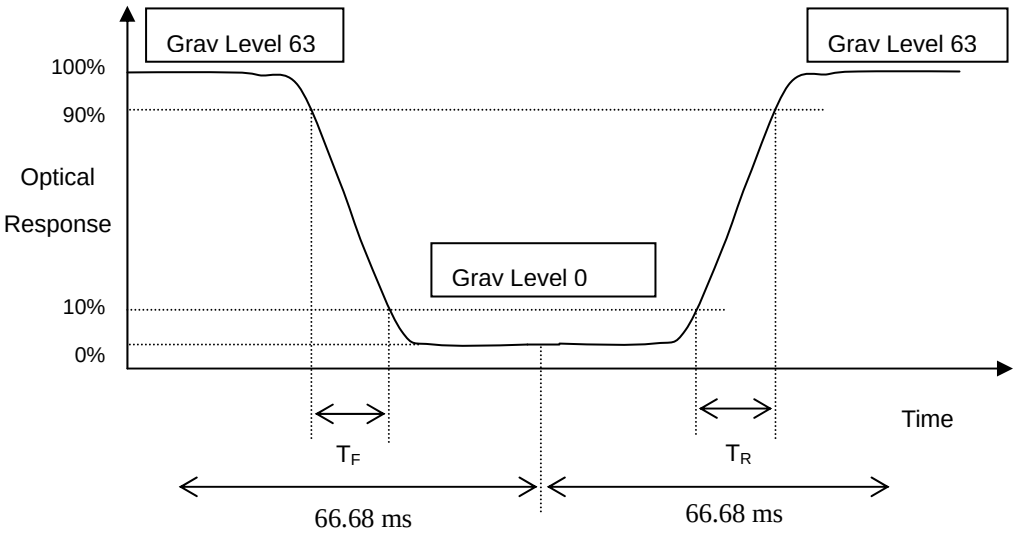
L63: Luminance of gray level 63

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

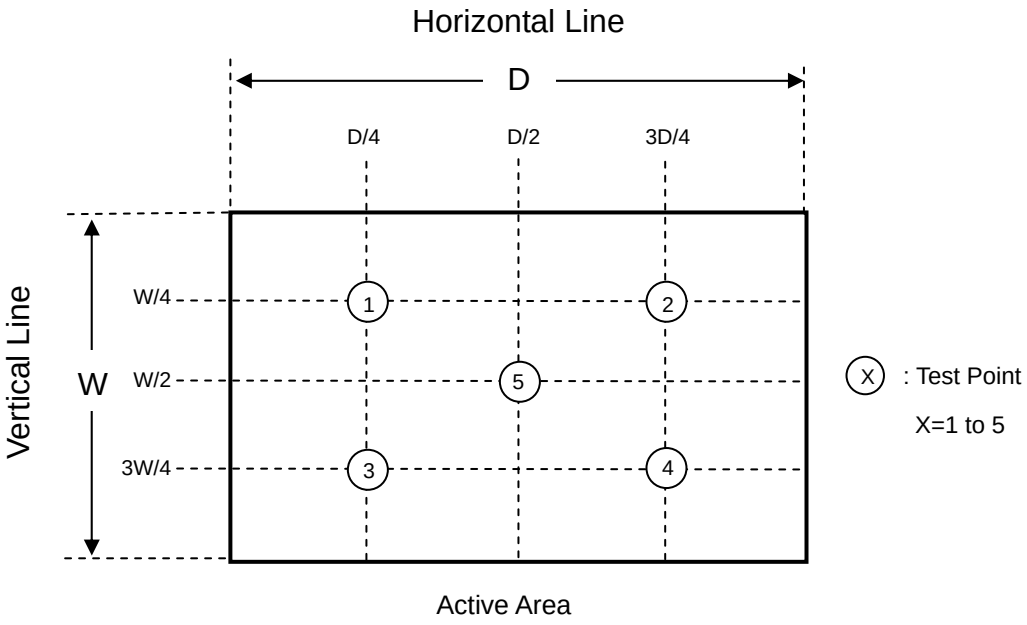
L_C = L (5)

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

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

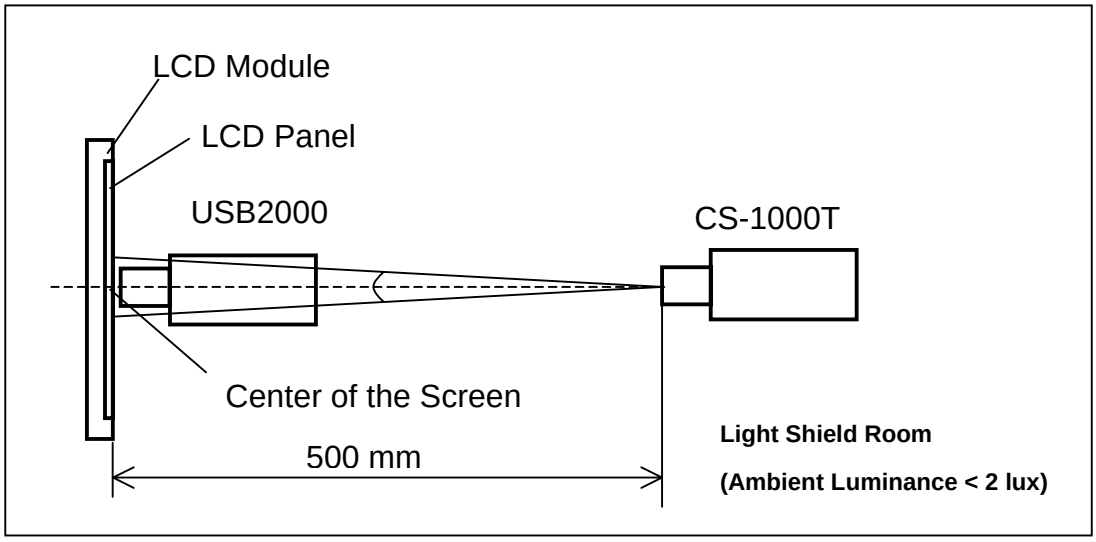
Measure the luminance of gray level 63 at 5 points

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.



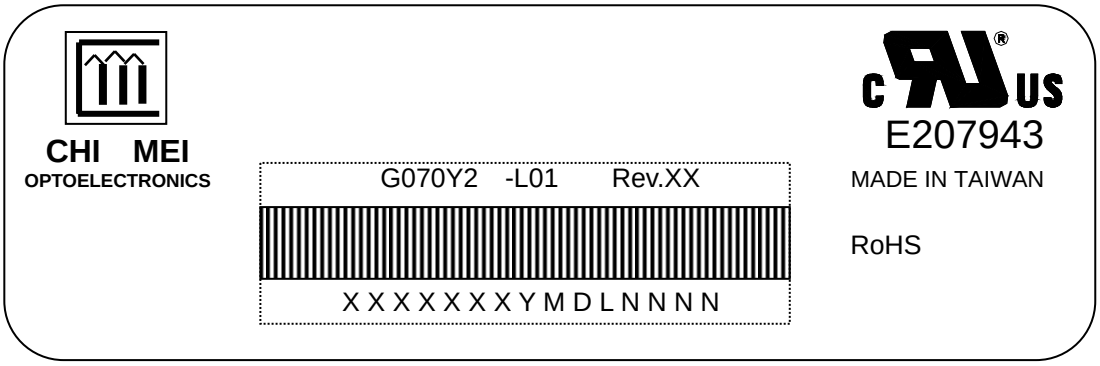
8. PACKAGING

TBD

9. DEFINITION OF LABELS

9.1 CMO MODULE LABEL

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



(a) Model Name: G070Y2 -L01

(b) Revision: Rev. XX, for example: A1, …, C1, C2 …etc.

(c) Serial ID: X X X X X X X Y M D X N N N N

- Serial No.
- CMO Internal Use
- Year, Month, Date
- CMO Internal Use
- Revision
- CMO Internal Use

Serial ID includes the information as below:

(a) Manufactured Date: Year: 1~9, for 2001~2009

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I , O and U

(b) Revision Code: cover all the change

Serial No.: Manufacturing sequence of product

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.

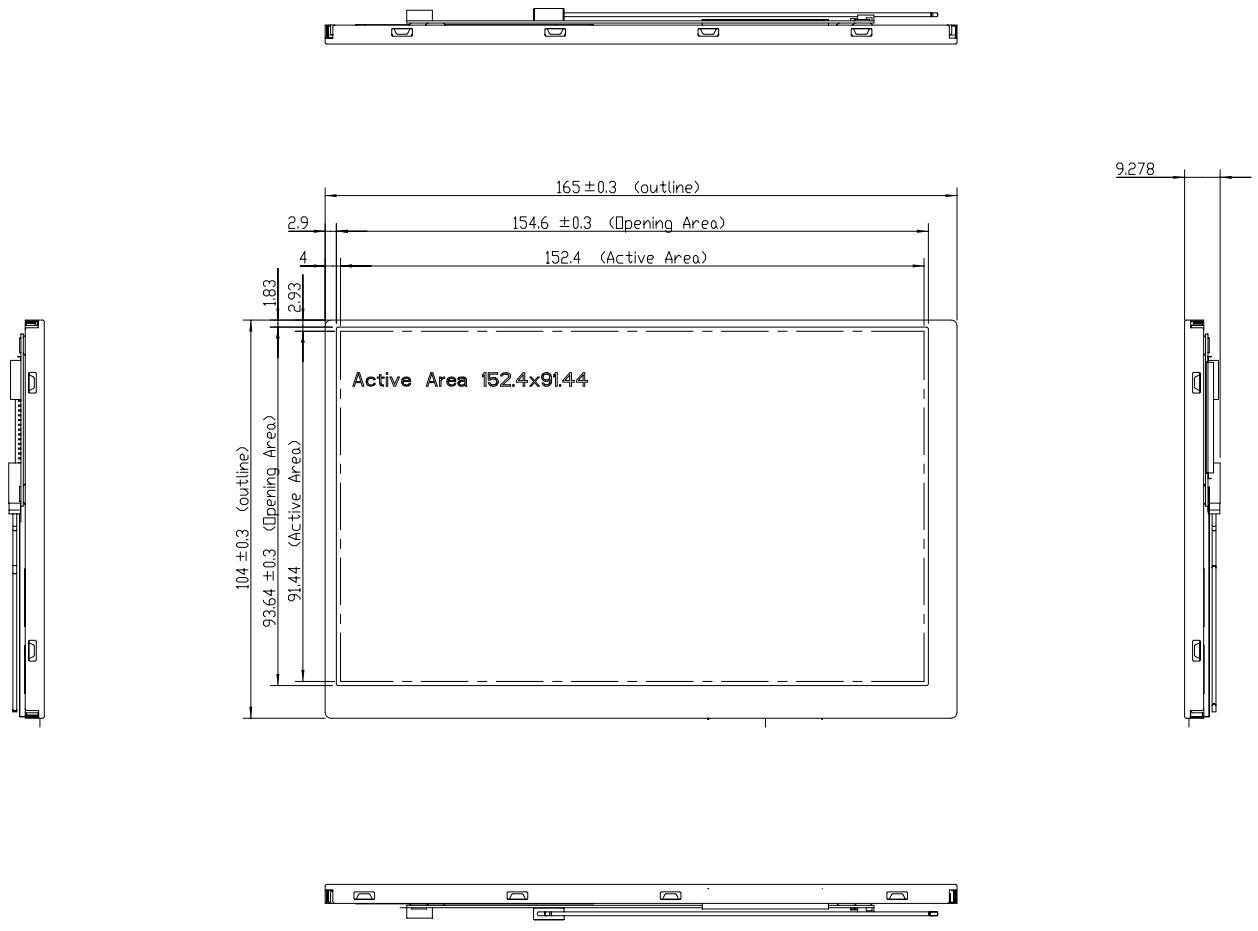
(11) Do not keep same pattern in a long period of time. It may cause image sticking on LCD

10.2 SAFETY PRECAUTIONS

(1) Do not disassemble the module or insert anything into the Backlight unit to prevent electrical shock.

(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.



NOTES:
1.OUTLINE TOLERANCE: ±0.3mm.

Mark	Description	Date	Changed_By	Approved_By	ECN No.	Remark

TITLE	ASSY_MODULE_G070Y2-L01					2D REV.	1.0
						3D REV.	1.16+
Approved	TBD	Drawing No.	G070241011				
Checked	TBD	Part No.	TBD				
Drawer	MIROR_CHEN	Material	TBD		Sheet	1 / 2	A2
Designer	MIROR_CHEN	Date	04-Feb-2009	Scale	1:1	Unit:mm	

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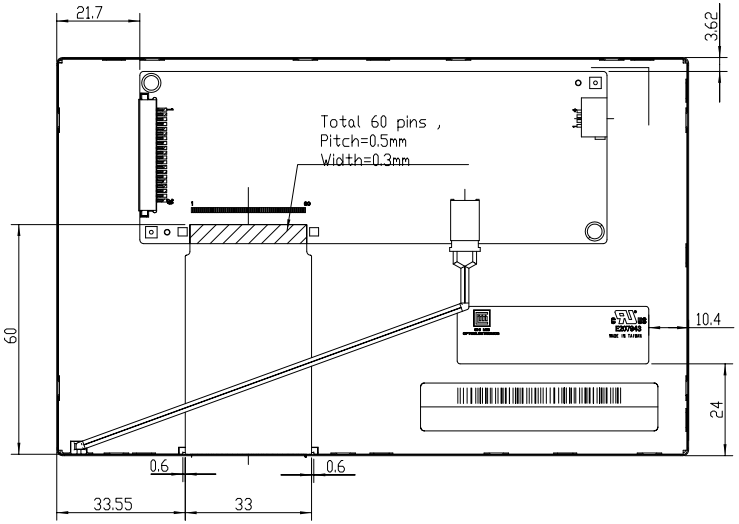

Mark	Description	Date	Changed_By	Approved_By	ECN No.	Remark

TITLE	ASSY_MODULE_G070Y2-L01					2D REV.	
						3D REV.	1.16+
Approved	TBD	Drawing No.	G070241011				
Checked	TBD	Part No.	TBD				
Drawer	MIRDR_CHEN	Material	TBD		Sheet	2 / 2	A2
Designer	MIRDR_CHEN	Date	02-Mar-2009	Scale	1:1	Unit:mm	

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