CHI MEI OPTOELECTRONICS CORP.

Issued Date: May. 9, 2006
Model No.: M190E6-L01
Preliminary

TFT LCD Preliminary Specification

MODEL NO.: M190E6-L01

Customer: _____

Approved by: _____

Note:

Liquid Crystal Display Division	
QRA Division.	OA Head Division.
Approval	Approval
陳 95.5.9 永一	林 95.5.9 添仁

Version 1.0

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REVISION HISTORY

Version	Date	Section	Description
Ver. 1.0	May, 9, 06'	All	1.M190E6 -L01 Preliminary specifications was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

M190E6-L01 is a 19.0" TFT Liquid Crystal Display module with LED Backlight unit and 30 pins 2ch-LVDS interface. This module supports 1280 x 1024 SXGA mode and can display 16.2M colors. The converter module for Backlight is not built in. LED Backlight unit is designed by Red, Green, and Blue color LED devise packed into single chip, and a Photo Sensor is built in the Backlight unit to feedback chromaticity for dynamically adjusting white balance.

1.2 FEATURES

- LED Backlight
- High color saturation
- Wide viewing angle.
- High contrast ratio
- Super fast response time
- DE (Data Enable) only mode
- RoHS Compliance

1.3 APPLICATION

- TFT LCD Monitor

1.4 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Active Area	376.32 (H) x 301.056 (V) (19.0" diagonal)	mm	(1)
Bezel Opening Area	380.2(H) x 305(V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1280 x R.G.B. x 1024	pixel	-
Pixel Pitch	0.294 (H) x 0.294 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	16.2M	color	-
Transmissive Mode	Normally White	-	-
Surface Treatment	Hard coating (3H), Anti-glare (Haze 25)	-	-

1.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	395.5	396.0	396.5	mm	(1)
	Vertical(V)	323.5	324.0	324.5	mm	
	Depth(D)	16.0	16.5	17.0	mm	
Weight		-		TBD	g	-

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

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	60	ºC	(1)
Operating Ambient Temperature	T_{OP}	0	50	ºC	(1), (2)
Shock (Non-Operating)	S_{NOP}	-	50	G	(3), (5)
Vibration (Non-Operating)	V_{NOP}	-	1.5	G	(4), (5)

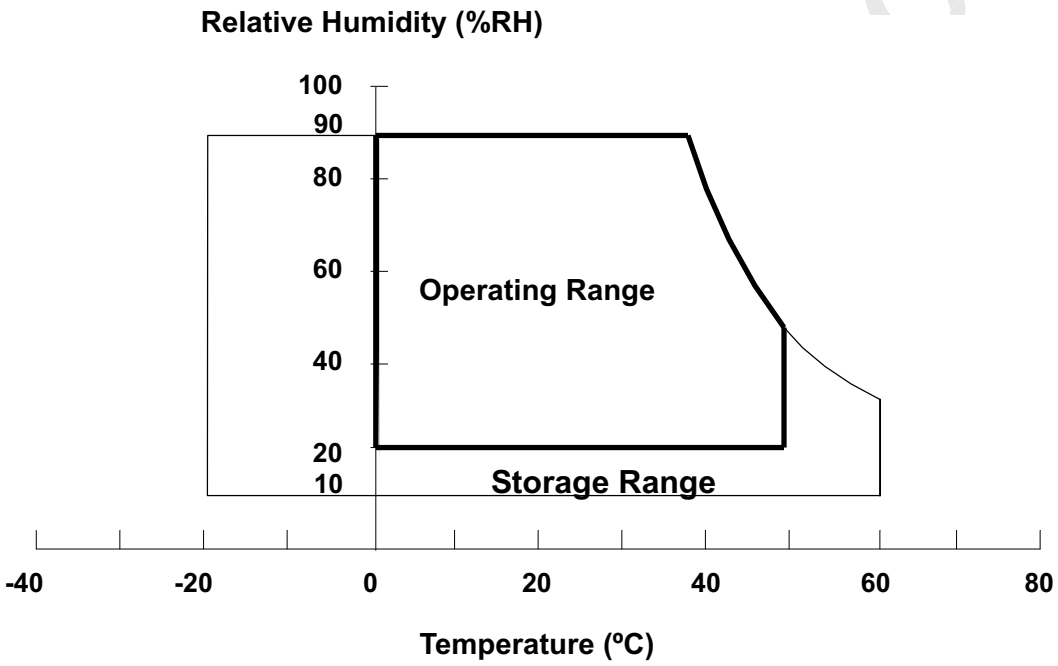
Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. (Ta ≦ 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

(c) No condensation.

Note (2) The temperature of panel display surface area should be 0 ºC Min. and 60 ºC Max.

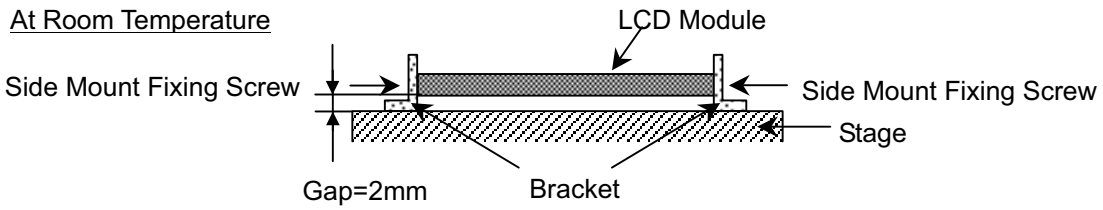


Note (3) 11ms, half sine wave, 1 time for ± X, ± Y, ± Z.

Note (4) 10 ~ 300 Hz, 10min/cycle, 3 cycles each X, Y, Z.

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.

The fixing condition is shown as below:



2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	Vcc	-0.3	+6.0	V	(1), (2)
Logic Input Voltage	V_{IN}	-0.3	4.3	V	

2.2.2 BACKLIGHT UNIT

Item	Max. Value			Unit	Note
	Red	Green	Blue		
LED DC Forward Current	120	120	80	mA	(1), (2)
LED Peak Pulse Current	480	400	400	mA	

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) Testing Environment Temperature = 25ºC , Duty Ratio=1/10, Pulse Width=0.1ms.

3. ELECTRICAL CHARACTERISTICS

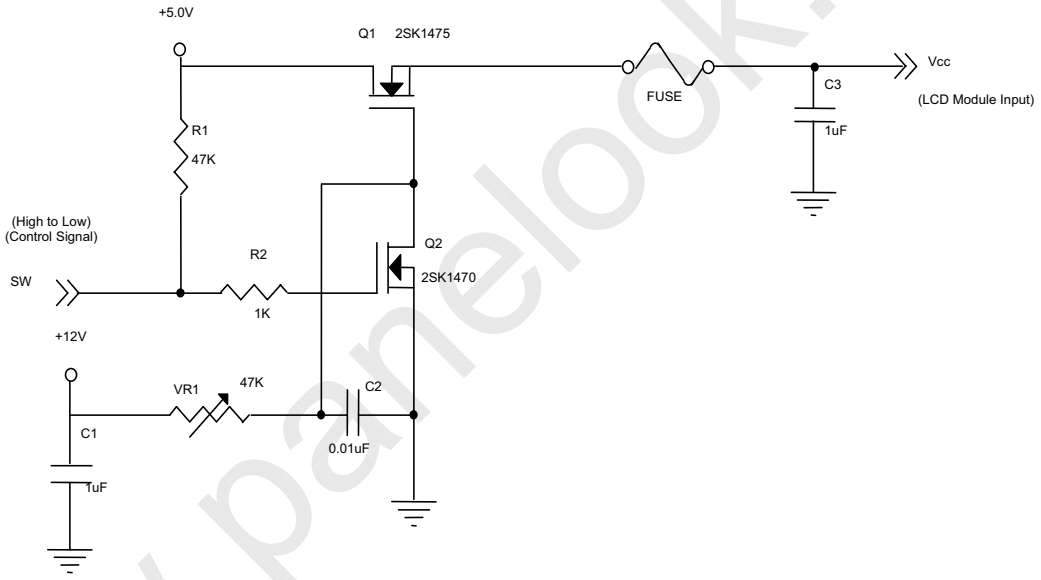
3.1 TFT LCD MODULE

Ta = 25 ± 2 ºC

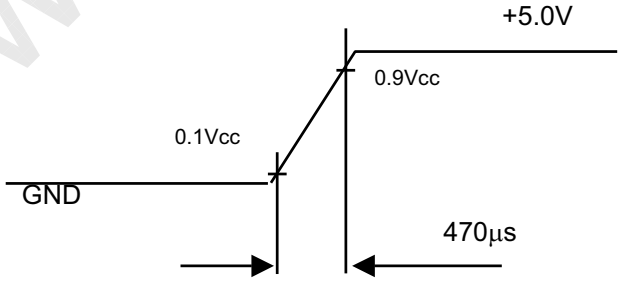
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	4.5	5.0	5.5	V	-
Ripple Voltage		V_{RP}	-	-	100	mV	-
Rush Current		I_{RUSH}	-	2	3	A	(2)
Power Supply Current	White	-		0.5	0.8	A	(3)a
	Black	-		1.3	1.5	A	(3)b
	Vertical Stripe	-		0.9	1.3	A	(3)c
LVDS differential input voltage		Vid	100	-	600	mV	
LVDS common input voltage		Vic	-	1.2	-	V	
Logic “L” input voltage		Vil	Vss	-	0.8	V	

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Conditions:



Vcc rising time is 470μs



Note (3) The specified power supply current is under the conditions at Vcc = 5.0 V, Ta = 25 ± 2 ºC, f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

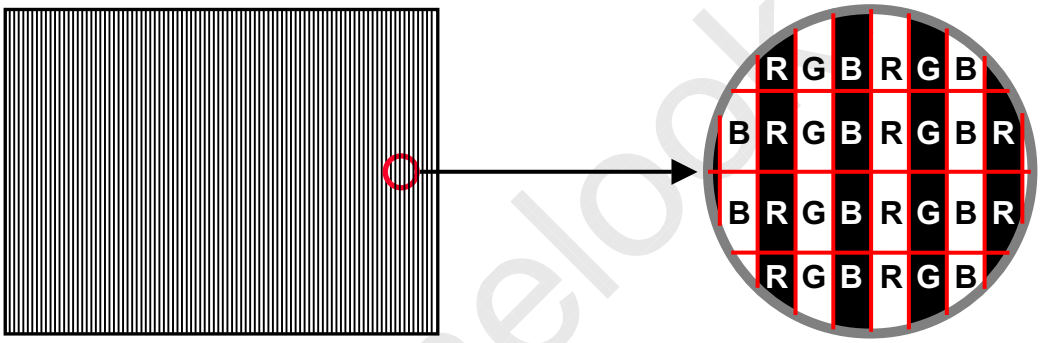
a. White Pattern

Active Area

b. Black Pattern

Active Area

c. Vertical Stripe Pattern



Active Area

3.2 BACKLIGHT UNIT

Ta = 25 ± 2 ºC

3.2.1 LED DRIVER SPEC

Parameter	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
Red LED Driver	RD1, RD2	28.8	35.2	44.8	V	
Green LED Driver	GD1, GD2	44	54.4	58	V	
Blue LED Driver	BD1, BD2	44	54.4	56	V	
Red return	RR1, RR2	-	76	480	mA	
Green return	GR1, GR2	-	118	400	mA	
Blue return	BR1, BR2	-	45	400	mA	

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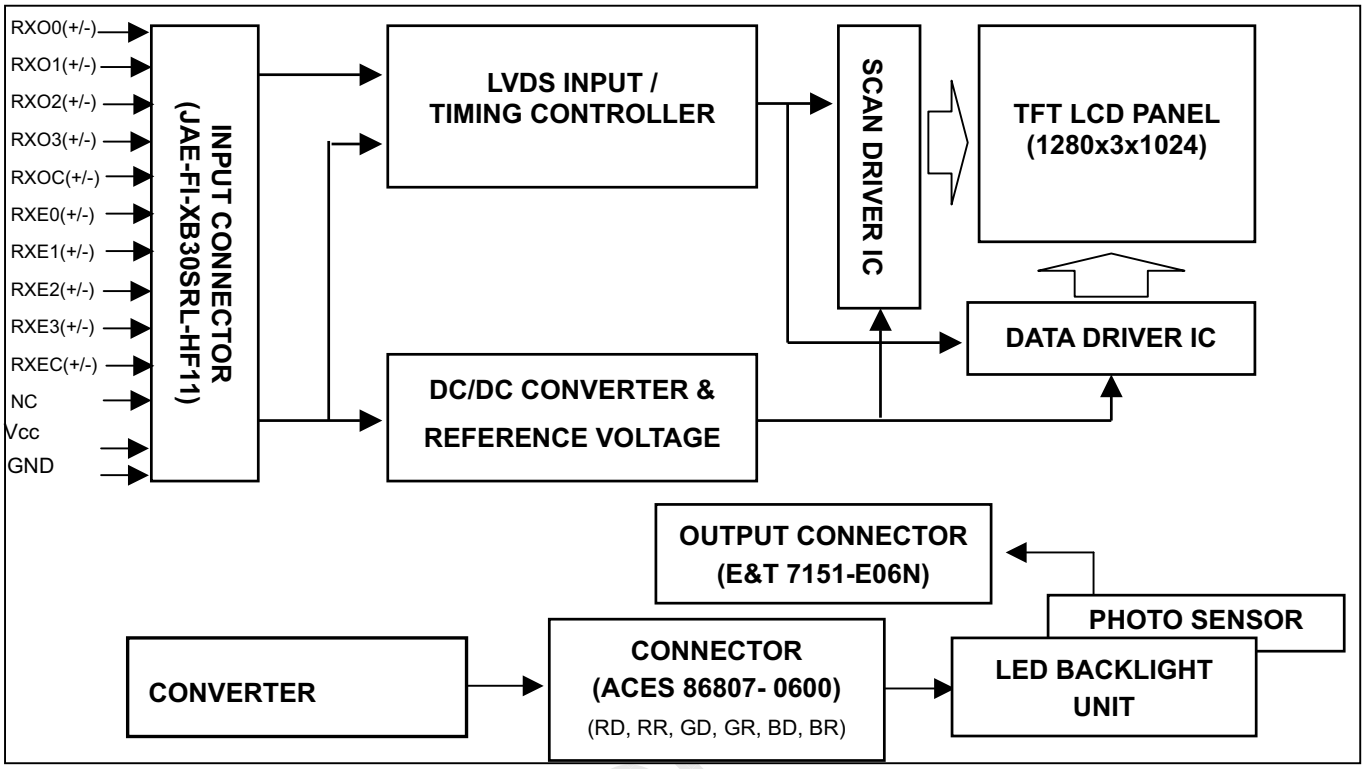
3.2.2 PHOTO SENSOR SPEC

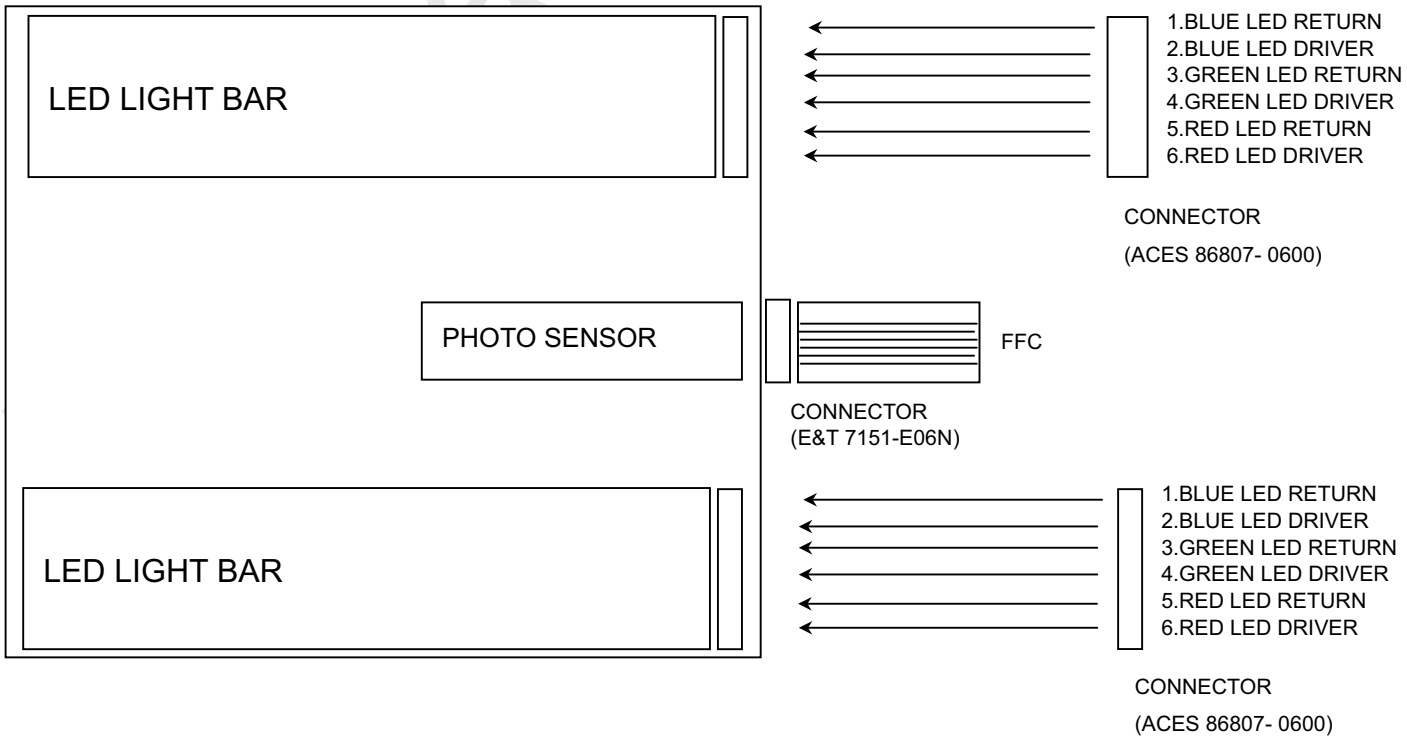
Parameter	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
RGB Sensor power supply	VCC	-	3.3	5	V	
R Sensor voltage output	Rout	-	-	3.3	V	
G Sensor voltage output	Gout	-	-	3.3	V	
B Sensor voltage output	Bout	-	-	3.3	V	

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



4.2 BACKLIGHT UNIT



5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

1	RXO0-	Negative LVDS differential data input. Channel O0 (odd)
2	RXO0+	Positive LVDS differential data input. Channel O0 (odd)
3	RXO1-	Negative LVDS differential data input. Channel O1 (odd)
4	RXO1+	Positive LVDS differential data input. Channel O1 (odd)
5	RXO2-	Negative LVDS differential data input. Channel O2 (odd)
6	RXO2+	Positive LVDS differential data input. Channel O2 (odd)
7	GND	Ground
8	RXOC-	Negative LVDS differential clock input. (odd)
9	RXOC+	Positive LVDS differential clock input. (odd)
10	RXO3-	Negative LVDS differential data input. Channel O3(odd)
11	RXO3+	Positive LVDS differential data input. Channel O3 (odd)
12	RXE0-	Negative LVDS differential data input. Channel E0 (even)
13	RXE0+	Positive LVDS differential data input. Channel E0 (even)
14	GND	Ground
15	RXE1-	Negative LVDS differential data input. Channel E1 (even)
16	RXE1+	Positive LVDS differential data input. Channel E1 (even)
17	GND	Ground
18	RXE2-	Negative LVDS differential data input. Channel E2 (even)
19	RXE2+	Positive LVDS differential data input. Channel E2 (even)
20	RXEC-	Negative LVDS differential clock input. (even)
21	RXEC+	Positive LVDS differential clock input. (even)
22	RXE3-	Negative LVDS differential data input. Channel E3 (even)
23	RXE3+	Positive LVDS differential data input. Channel E3 (even)
24	GND	Ground
25	TEST	Test pin should be tied to ground.
26	NC	Not connection.
27	NC	Not connection.
28	VCC	+5.0V power supply
29	VCC	+5.0V power supply
30	VCC	+5.0V power supply

Note (1) Connector Part No.: JAE-FI-XB30SRL-HF11 or equivalent.

Note (2) The first pixel is odd.

Note (3) Input signal of even and odd clock should be the same timing.

LVDS Channel E0	LVDS output	D7	D6	D4	D3	D2	D1	D0
	Data order	EG0	ER5	ER4	ER3	ER2	ER1	ER0
LVDS Channel E1	LVDS output	D18	D15	D14	D13	D12	D9	D8
	Data order	EB1	EB0	EG5	EG4	EG3	EG2	EG1
LVDS Channel E2	LVDS output	D26	D25	D24	D22	D21	D20	D19
	Data order	DE	NA	NA	EB5	EB4	EB3	EB2
LVDS Channel E3	LVDS output	D23	D17	D16	D11	D10	D5	D27
	Data order	NA	EB7	EB6	EG7	EG6	ER7	ER6
LVDS Channel O0	LVDS output	D7	D6	D4	D3	D2	D1	D0
	Data order	OG0	OR5	OR4	OR3	OR2	OR1	OR0
LVDS Channel O1	LVDS output	D18	D15	D14	D13	D12	D9	D8
	Data order	OB1	OB0	OG5	OG4	OG3	OG2	OG1
LVDS Channel O2	LVDS output	D26	D25	D24	D22	D21	D20	D19
	Data order	DE	NA	NA	OB5	OB4	OB3	OB2
LVDS Channel O3	LVDS output	D23	D17	D16	D11	D10	D5	D27
	Data order	NA	OB7	OB6	OG7	OG6	OR7	OR6

5.2 BACKLIGHT UNIT

5.2.1 LED DRIVER

Pin No.	Symbol	Description
1	BR1	Blue LED Return (cathode side)
2	BD1	Blue LED Driver (anode side)
3	GR1	Green LED Return (cathode side)
4	GD1	Green LED Driver (anode side)
5	RR1	Red LED Return (cathode side)
6	RD1	Red LED Driver (anode side)

Pin No.	Symbol	Description
1	BR2	Blue LED Return (cathode side)
2	BD2	Blue LED Driver (anode side)
3	GR2	Green LED Return (cathode side)
4	GD2	Green LED Driver (anode side)
5	RR2	Red LED Return (cathode side)
6	RD2	Red LED Driver (anode side)

Note (1) Connector Part No.: ACES 86807- 0600 or equivalent

5.2.2 PHOTO SENSOR

Pin No.	Symbol	Description
1	VCC	RGB Sensor power supply
2	GND	GND
3	Rout	R Sensor voltage output
4	Gout	G Sensor voltage output
5	Bout	B Sensor voltage output
6	NC	

Note (1) Connector Part No.: E&T 7151-E06N or equivalent

5.3 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-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							
		R7	R6	R5	R4	R3	R2	R1	R0	R7	R6	G5	G4	G3	G2	G1	G0	R7	R6	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	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	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	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	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	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	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	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	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	0	0	0	0	0	0	1	0
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	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

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

6. INTERFACE TIMING

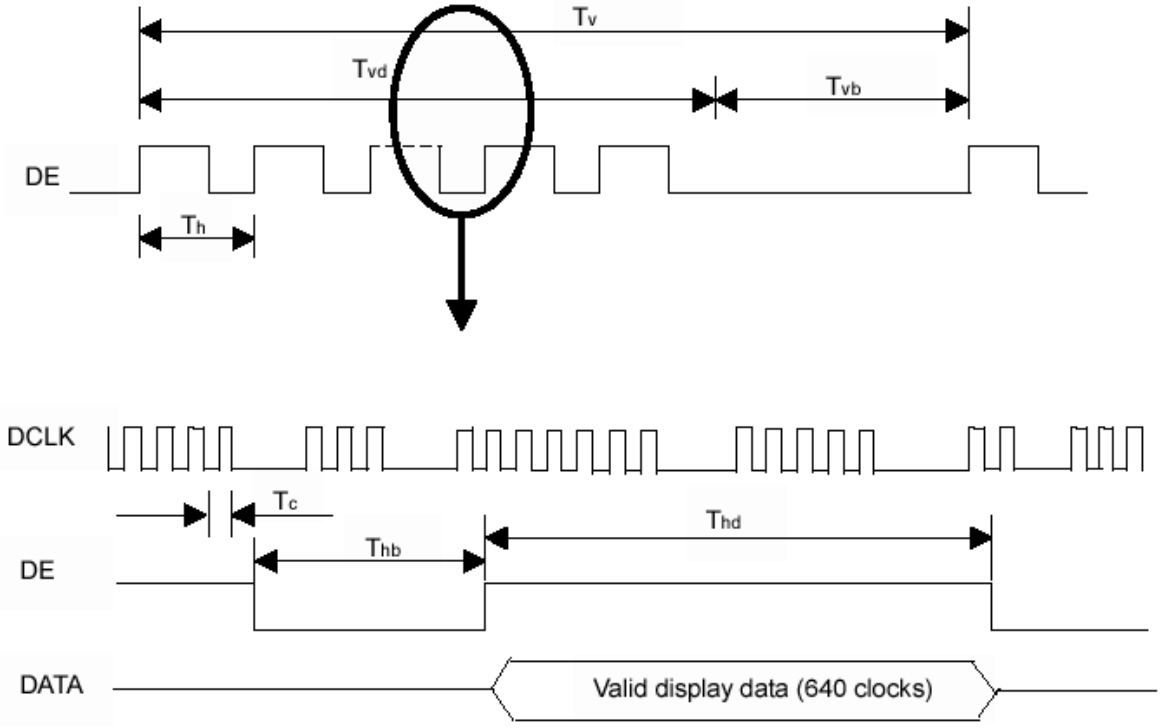
6.1 INPUT SIGNAL TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Clock	Frequency	Fc	-	54	67.5	MHz	-
	Period	Tc	-	18.5	-	ns	
	High Time	Tch	-	4/7	-	Tc	-
	Low Time	Tcl	-	3/7	-	Tc	-
LVDS Data	Setup Time	Tlvs	600	-	-	ps	-
	Hold Time	Tlvh	600	-	-	ps	-
Vertical Active Display Term	Frame Rate	Fr	56	60	75	Hz	Tv=Tvd+Tvb
	Total	Tv	1034	1066	1274	Th	-
	Display	Tvd	1024	1024	1024	Th	-
	Blank	Tvb	10	42	Tv-Tvd	Th	-
Horizontal Active Display Term	Total	Th	740	844	960	Tc	Th=Thd+Thb
	Display	Thd	640	640	640	Tc	-
	Blank	Thb	100	204	Th-Thd	Tc	-

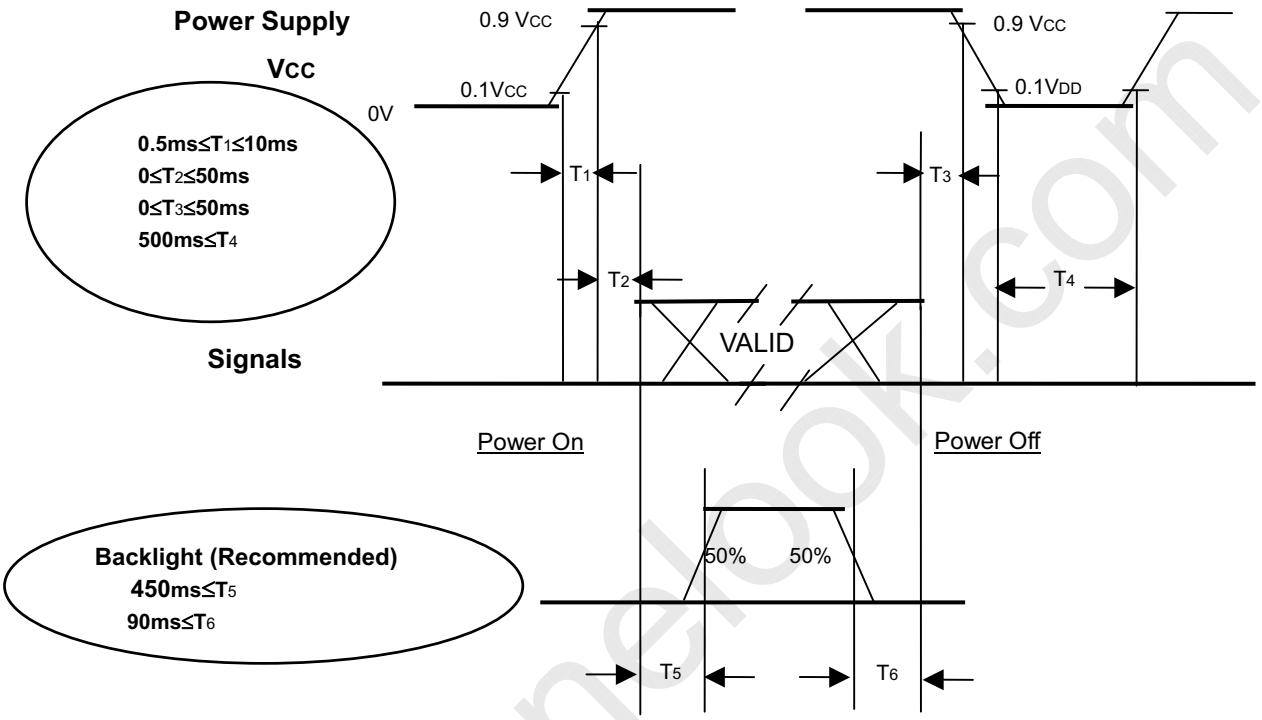
Note: Because this module is operated by DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this module would operate abnormally.

INPUT SIGNAL TIMING DIAGRAM



6.2 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.



Power ON/OFF Sequence

Note.

(1) The supply voltage of the external system for the module input should be the same as the definition of Vcc.

(2) Apply the lamp voltage within the LCD operation range. When the backlight turns on before the LCD operation of the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.

(3) In case of VCC = off level, please keep the level of input signals on the low or keep a high impedance.

(4) T4 should be measured after the module has been fully discharged between power of and on period.

(5) Interface signal shall not be kept at high impedance when the power is on.

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

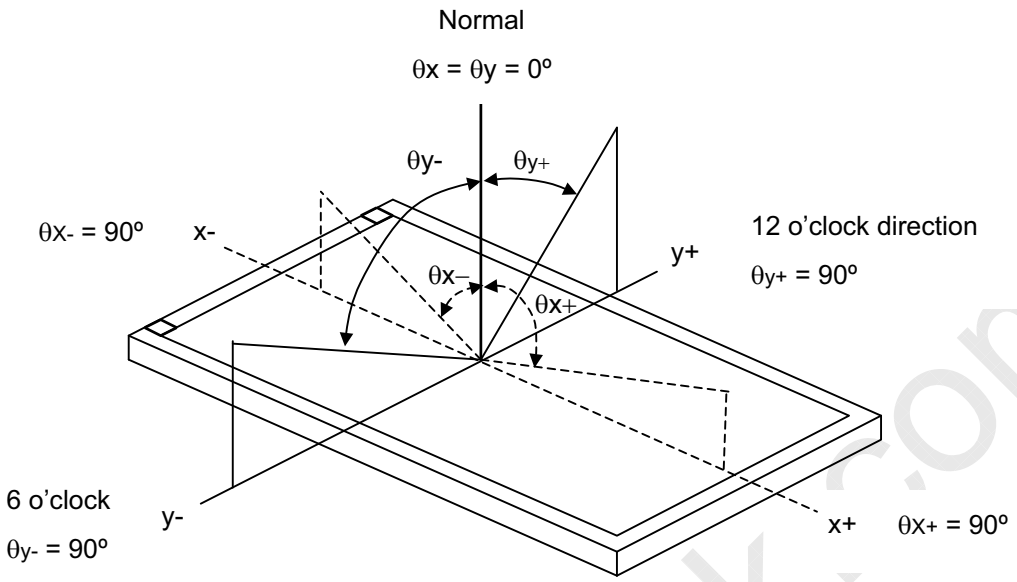
Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	5.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		

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 (CIE 1931)	Red	Rx	θ_x=0°, θ_Y =0° CS-1000T R=G=B=255 Grayscale	Typ. -0.05	0.686	Typ. +0.05	---	(1), (5)
		Ry			0.297			
	Green	Gx			0.194			
		Gy			0.700			
	Blue	Bx			0.158			
		By			0.082			
	White	Wx			0.313			
		Wy			0.329			
Color Chromaticity (CIE 1976)	Red	Ru'		0.411	0.433	---		
		Rv'		0.503	0.531	---		
	Green	Gu'		---	0.122	0.140		
		Gv'		0.548	0.559	---		
	Blue	Bu'		0.150	0.158	---		
		Bv'		---	0.187	0.224		
Center Luminance of White		L_C		190	250	---	cd/m^2	(4), (5)
Contrast Ratio		CR	θ_x=0°, θ_Y =0° CS-1000T	400	700	---	-	(2), (5)
Response Time		T_R	θ_x=0°, θ_Y =0°	---	1.3	6	ms	(3)
		T_F		---	3.7	8		
Luminance Uniformity (9 points)		δW	θ_x=0°, θ_Y =0° BM-5A	---	1.5	1.66	-	(5), (6)
Viewing Angle	Horizontal	θ_x+	CR ≧ 10 BM-5A	75	85	---	Deg.	(1), (5)
		θ_x-		75	85	---		
	Vertical	θ_Y+		70	80	---		
		θ_Y-		70	80	---		
Safety	Luminance uniformity – Angular dependence		CS-1000T R=G=B= 255 Grayscale R=G=B= 0 Grayscale	---	---	1.7	---	(7)
	Luminance contrast – Angular dependence			0.8	---	---	---	(8)
	Colour uniformity – Angular dependence			---	---	0.025	---	(7)(9)

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) = L255 / L0

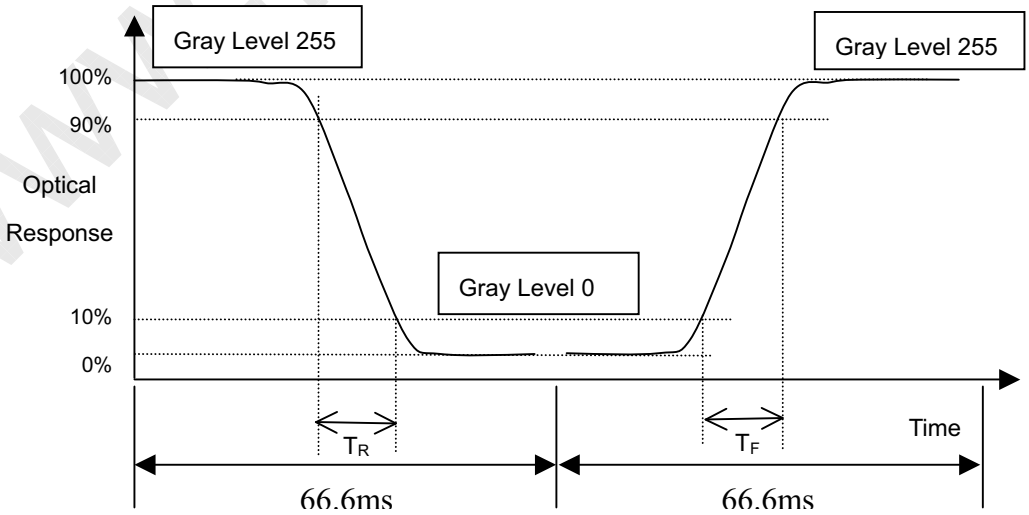
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (7)

CR X is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

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



Note (4) Definition of Luminance of White L_C:

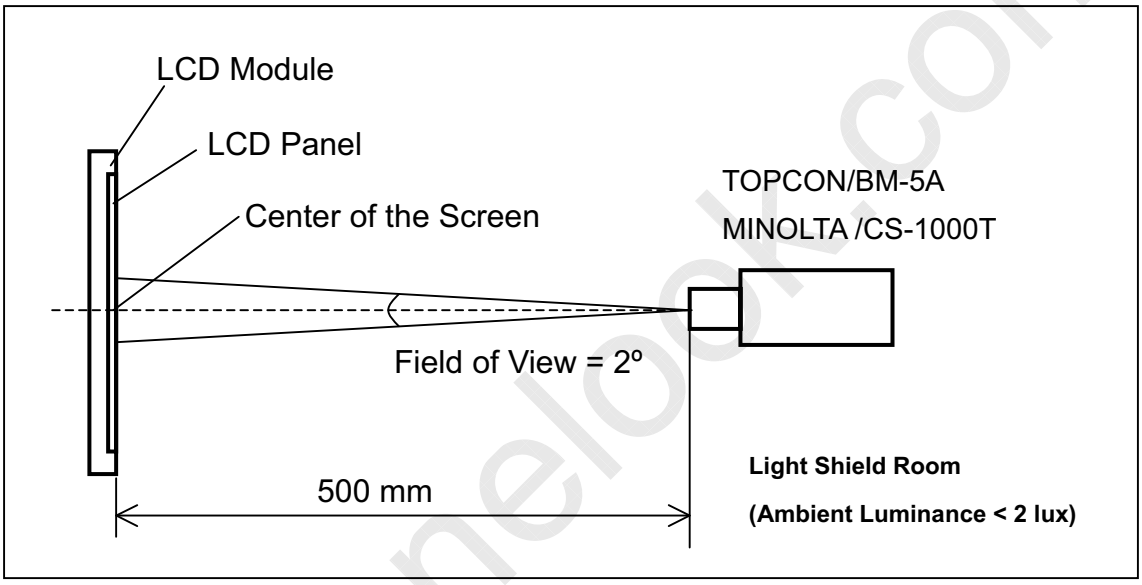
Measure the luminance of gray level 255 at center point

$L_C = L(7)$

L x is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

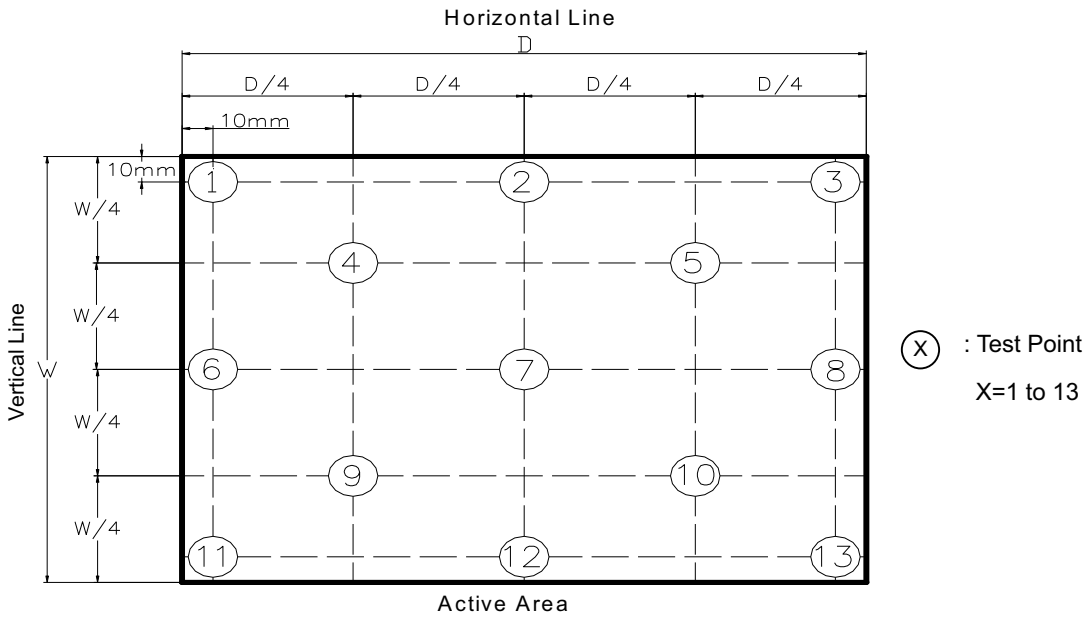
The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



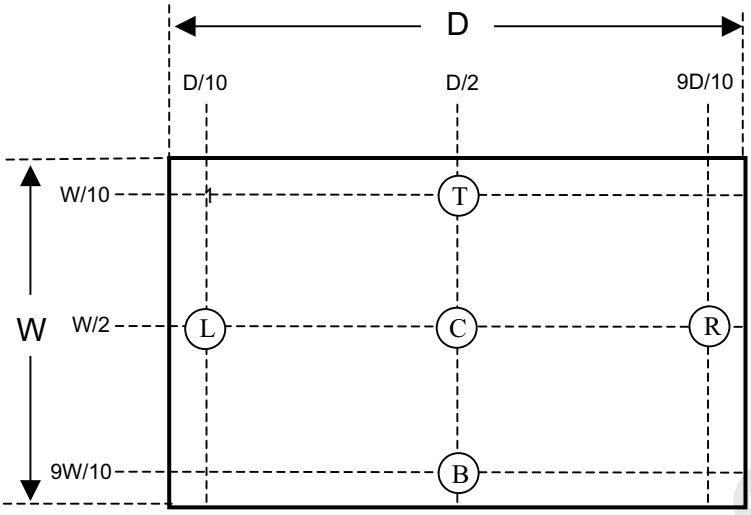
Note (6) Definition of White Variation δW:

Measure the luminance of gray level 255 at 13 points

δW = Maximum [(L 1), (L 2) ……(L 12), (L 13)] / Minimum [(L 1), (L 2) …… (L 12), (L 13)]



Note (7) Definition of Luminance Uniformity – Angular dependent：

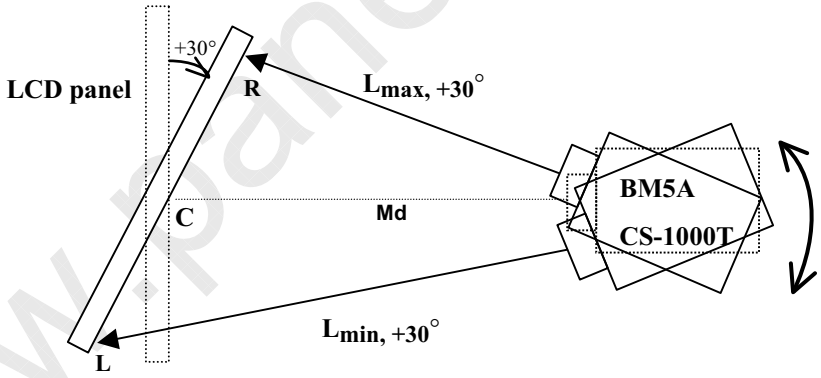


Active Area

Luminance is measured at the center measurement position “C” on the LCD panel. The optical axis of meter shall be aligned with the normal of the panel surface. The measuring distance between the meter and the surface of the panel is defined as:

Md (cm) = diagonal of the panel (cm) X 1.5 with minimum distance 50 cm.

a. Horizontal - mode

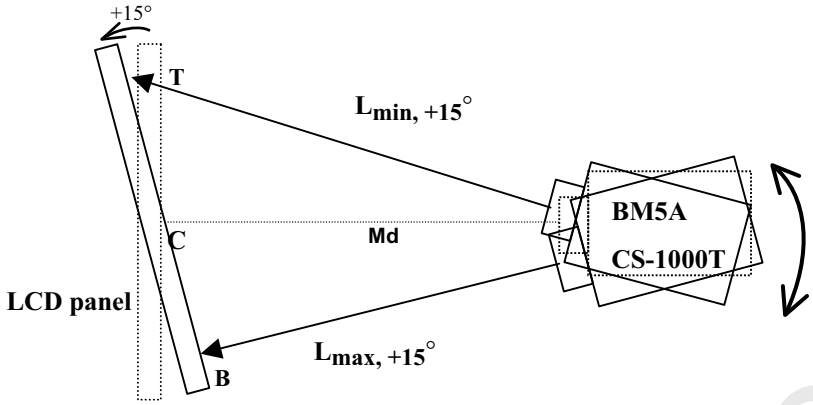


The LCD panel is then rotated to another azimuthal angle to -30°; and $L_{min, -30°}$ and $L_{max, -30°}$ are obtained by using the same procedure.

The Luminance Uniformity is calculated as follow:

$$((L_{max, +30°}/ L_{min, +30°})+(L_{max, -30°}/ L_{min, -30°})) / 2.$$

b. Vertical - mode



The LCD panel is then rotated to another azimuthal angle to -15°; and $L_{min, -15°}$ and $L_{max, -15°}$ are obtained by using the same procedure.

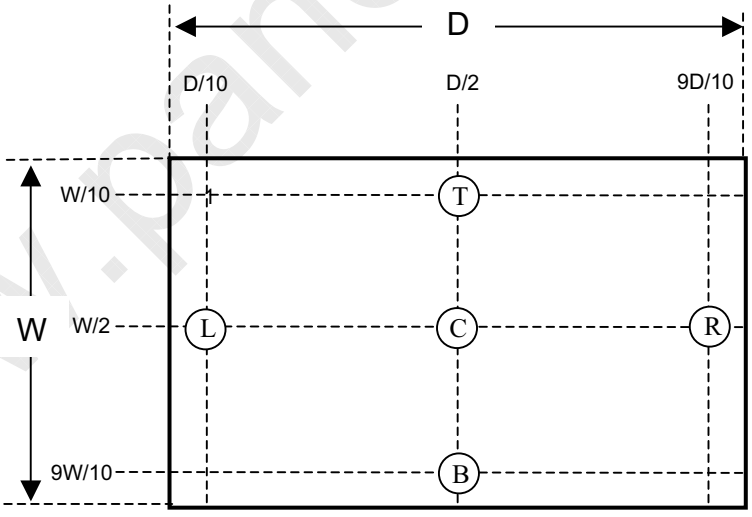
The Luminance Uniformity is calculated as follow:

$L_{max, +15°}/ L_{min, +15°}$

$L_{max, -15°}/ L_{min, -15°}$

The largest value shall be reported.

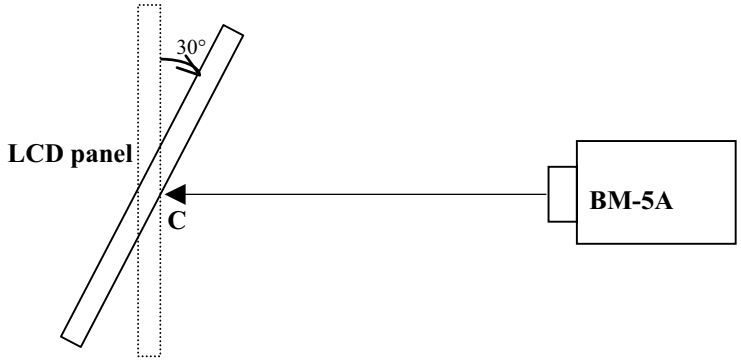
Note (8) Definition of Luminance Contrast – Angular dependent：



Active Area

Luminance contrast is measured at the center point of the LCD panel “C” along with the normal of the display with the same distance described in Note 7. The display is then rotated around the vertical axis by changing its azimuthal axis to +30°; and this gives:

$L_{255\ G.L.,\ +30^\circ}$ and $L_{0\ G.L.,\ +30^\circ}$.



The LCD panel is then rotated to azimuthal angle to -30°; and $L_{0\ G.\ L.,\ -30^\circ}$ and $L_{63\ G.L.,\ -30^\circ}$ are obtained by using the same procedure. The Luminance Contrast is calculated:

$$(L_{255\ G.\ L.} - L_{0\ G.L.}) / (L_{255\ G.\ L.} + L_{0\ G.L.})$$

For both +30° and -30°. The lowest value shall be reported.

Note (9) Definition of Colour uniformity – Angular dependence：

From Note (7), it can measure the data as below chart.

	Measuring point R		Measuring point L		△u'v'
	u'_R	v'_R	u'_L	v'_L	
+30°					
-30°					

$$\Delta u'v' = \sqrt{(u'_R - u'_L)^2 + (v'_R - v'_L)^2}$$

For both +30° and -30°. The largest value in △u'v' shall be reported.

8. PACKAGING

8.1 PACKING SPECIFICATIONS

(1) 5 LCD modules / 1 Box

(2) Box dimensions: 537(L) X 316(W) X 462(H) mm

(3) Weight: approximately 15Kg (5 modules per box)

8.2 PACKING METHOD

(1) Carton Packing should have no failure in the following reliability test items.

Test Item	Test Conditions	Note
Vibration	ISTA STANDARD Random, Frequency Range: 1 – 200 Hz Top & Bottom: 30 minutes (+Z), 10 min (-Z), Right & Left: 10 minutes (X) Back & Forth 10 minutes (Y)	Non Operation
Dropping Test	1 Angle, 3 Edge, 6 Face, 60cm	Non Operation

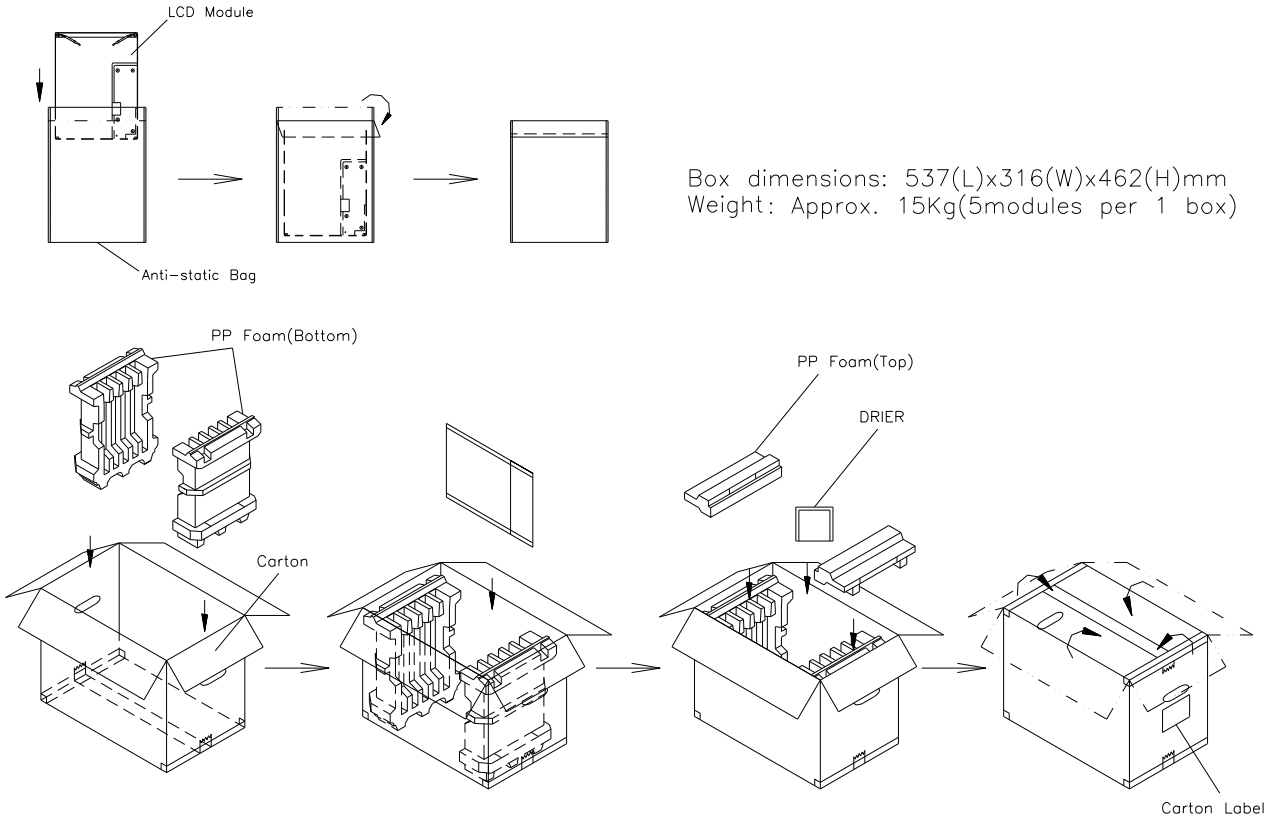


Figure. 8-1 Packing method

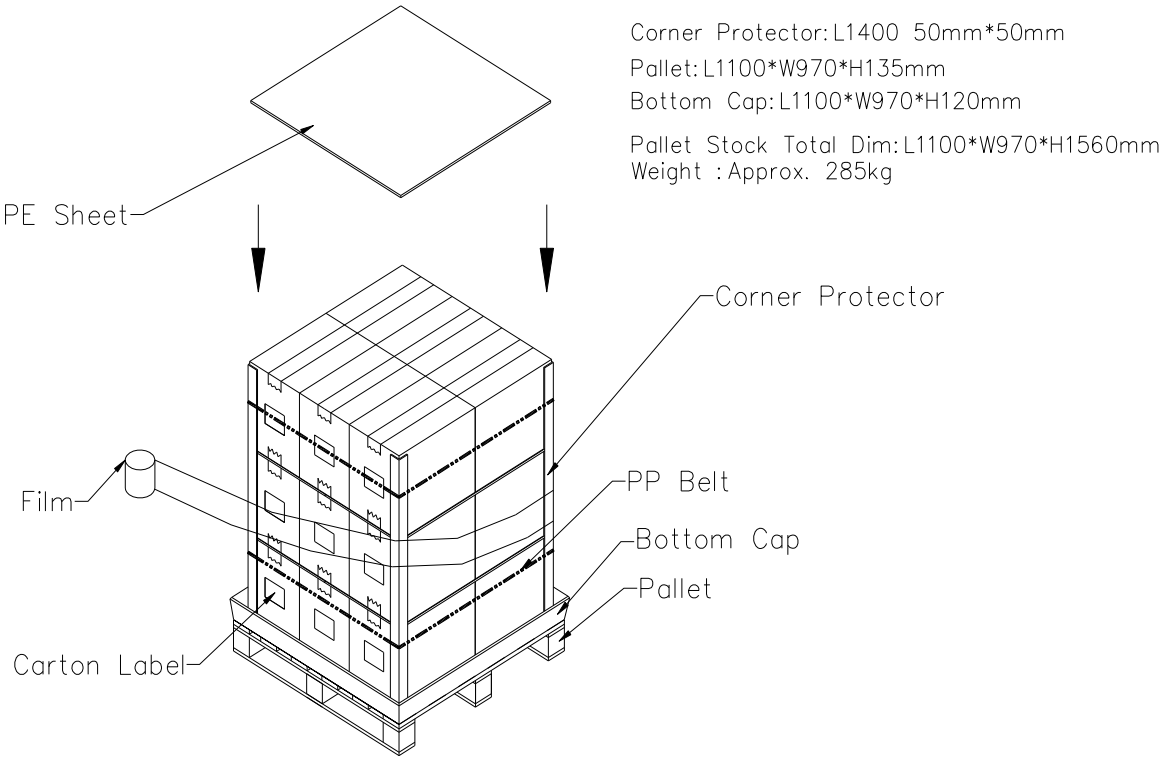


Figure. 8-2 Packing method

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: M190E6-L01

(b) Revision: Rev. XX, for example: A0, A1… B1, B2… or C1, C2…etc.

(c) CMO barcode definition:

Serial ID: XX-XX-X-XX-YMD-L-NNNN

Code	Meaning	Description
XX	CMO internal use	-
XX	Revision	Cover all the change
X	CMO internal use	-
YMD	Year, month, day	Year: 2001=1, 2002=2, 2003=3, 2004=4… Month: 1~12=1, 2, 3, ~, 9, A, B, C Day: 1~31=1, 2, 3, ~, 9, A, B, C, ~, W, X, Y, exclude I, O, and U.
L	Product line #	Line 1=1, Line 2=2, Line 3=3, …
NNNN	Serial number	Manufacturing sequence of product

(d) Customer's barcode definition:

Serial ID: CM-19E61-X-X-X-XX-L-XX-L-YMD-NNNN

Code	Meaning	Description
CM	Supplier code	CMO=CM
19E5A	Model number	M190E5-L0A=19E5A
X	Revision code	Non ZBD: 0~9, ZBD: A~Z
X	Source driver IC code	Century=1, CLL=2, Demos=3, Epson=4, Fujitsu=5, Himax=6, Hitachi=7, Hynix=8, LDI=9, Matsushita=A, NEC=B, Novatec=C, OKI=D, Philips=E, Renasas=F, Samsung=G, Sanyo=H, Sharp=I, TI=J, Topro=K, Toshiba=L, Windbond=M
X	Gate driver IC code	
XX	Cell location	Tainan, Taiwan=TN
L	Cell line #	1~12=0~C
XX	Module location	Tainan, Taiwan=TN
L	Module line #	1~12=0~C
YMD	Year, month, day	Year: 2001=1, 2002=2, 2003=3, 2004=4… Month: 1~12=1, 2, 3, ~, 9, A, B, C Day: 1~31=1, 2, 3, ~, 9, A, B, C, ~, T, U, V
NNNN	Serial number	By LCD supplier

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.

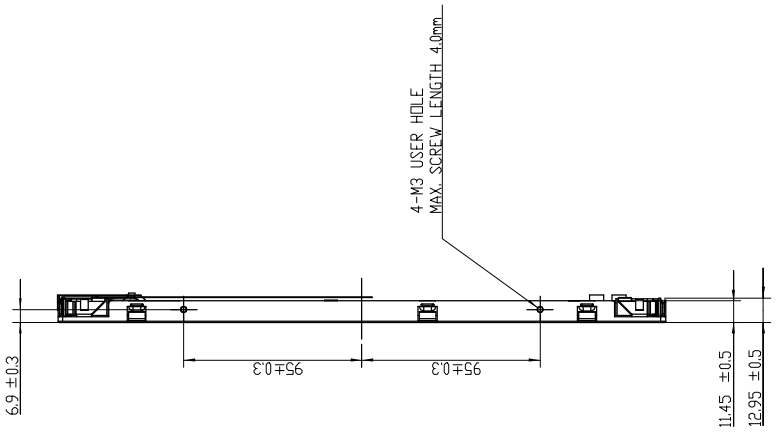
(10) When ambient temperature is lower than 10ºC may reduce the display quality. For example, the response time will become slowly.

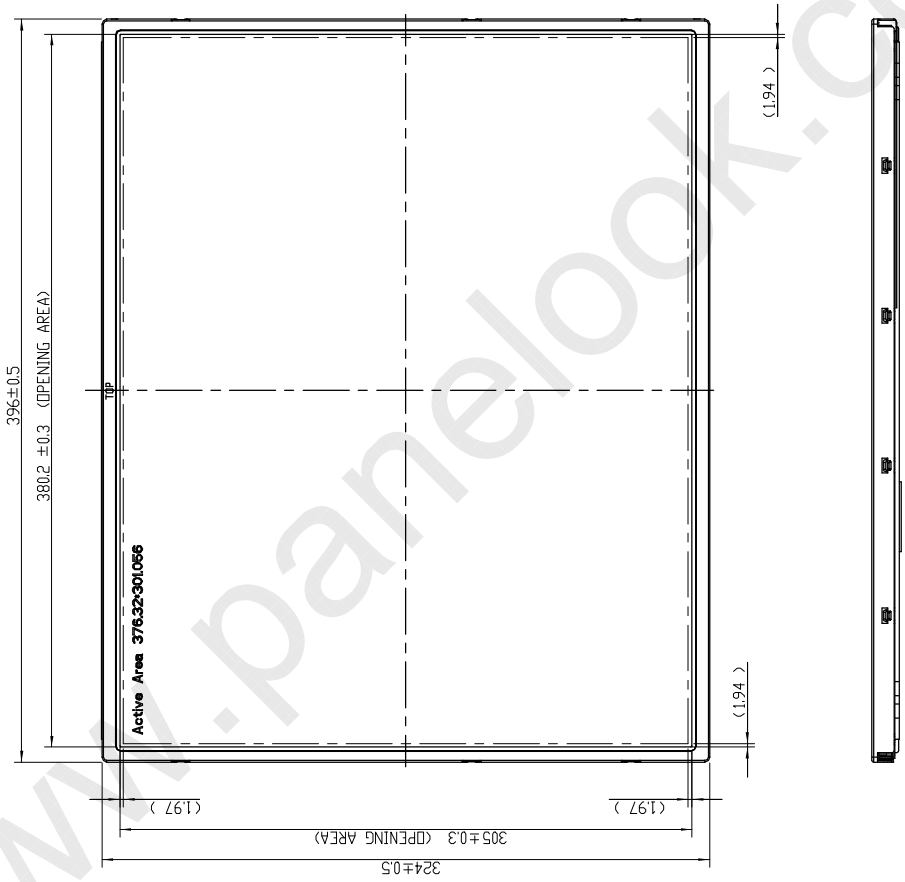
10.2 SAFETY PRECAUTIONS

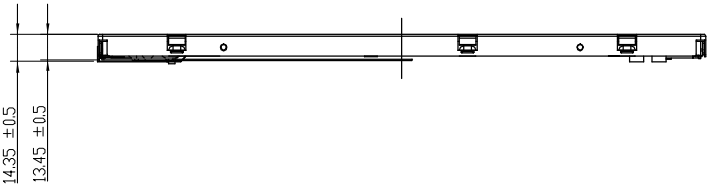
(1) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with inverter. Do not disassemble the module or insert anything into the Backlight unit.

(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.





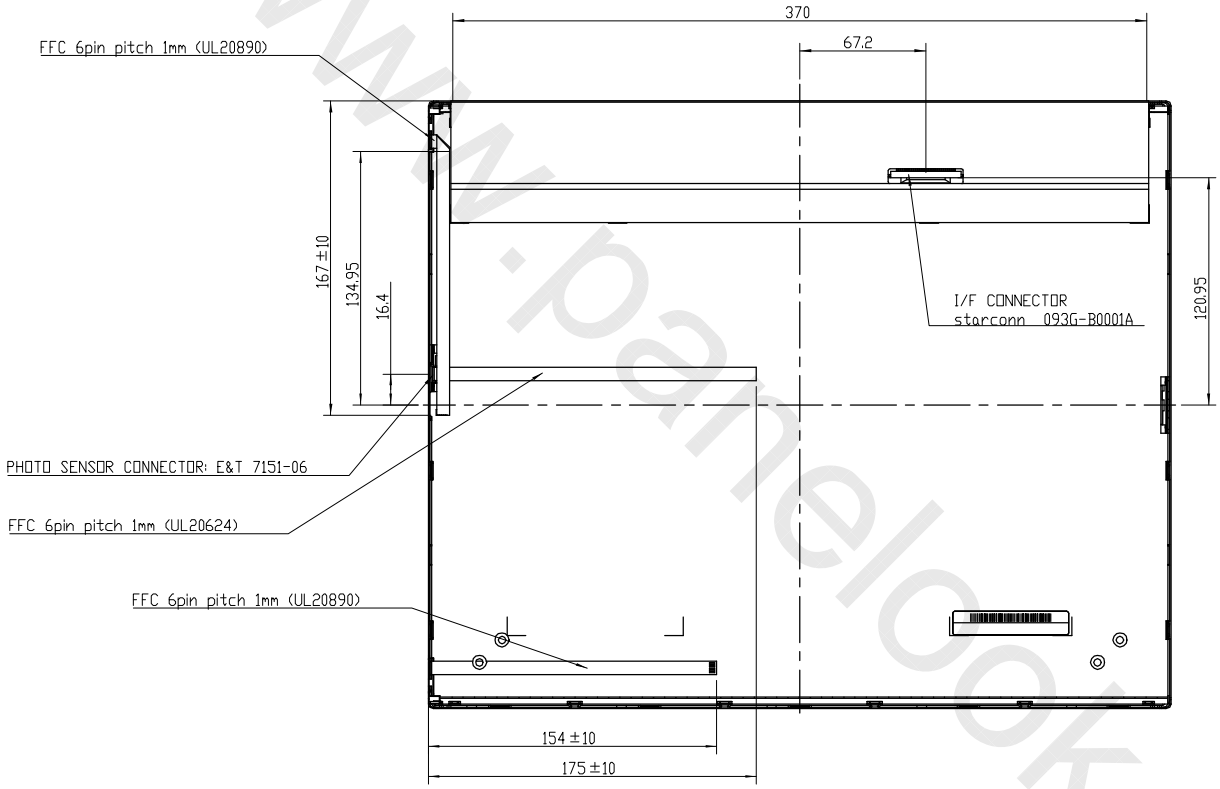


NOTES:
1.OUTLINE TOLERANCE: ±0.5mm
2.SIDE MOUNT HOLE ROTATIONAL TORQUE MUST BE MAX. 5kgf-cm.

TITLE	ASSY_MODULE_M190E6-L01			2D REV.			
Approved	Joseph Kang	Drawing No.	TBD	3D REV.	1.10		
Checked	Terry Wu	Part No.	TBD				
Drawer	Josephine Lo	Material	ASSY	Sheet	1 / 2	A2	
Designer	Josephine Lo	Date	21-MAR-2006	Scale	1/2	Unit:mm	

CHI MEI OPTOELECTRONICS CORP.

Mark	Description	Date	Changed_By	Approved_By	ECN No.	Remark



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Designer	Josephine Lo	Date	21-MAR-2006	Scale	1:2 Unit:mm

CHI MEI OPTOELECTRONICS CORP.