TFT LCD Approval Specification

MODEL NO.: N141XB -L04

Customer : IBM / PCD

Approved by : _____

Note :

Liquid Crystal Display Division	
QRA Division.	OA Head Division.
Approval	Approval
陳 93. 8. 30 永一	林 93. 8. 26 添仁

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REVISION HISTORY

Version	Date	Page (New)	Section	Description
Ver 0.0	Feb. 27. '04	All	All	Tentative specification first issued.
Ver 1.0	Apr. 01. '04	All	All	Preliminary specification first issued.
Ver 2.0	Jul. 19. '04	5	2.1	Modify table 2.1 and Note (3)
		6	2.2	Add 2.2 Image Sticking
		17	7.2	Modify the Specification of White Variation from Max/Min to Min/Max
				Add White Variation of 13 points spec
				Add Gamma Corrected Gray Scale Spec
		20		Note (7) Modify the Definition of White Variation
		24	11	Add National Test Lab Requirement
		last	Outline	Update Outline Drawing - Add two Sponges
Ver 3.0	Jul. 20. '04	All	All	Issue Approval Specification for IBM/PCD
Ver 3.1	Aug. 16. '04	16	6.3	Modify the Min. Specification of t1 from 470us to 100us
		17	7.2	Modify the Typ. Specification of Color Chromaticity Ry
				from 0.345 to 0.335
		23	10	Modify the Definition of Label
		last	Outline	Modify Outline Drawing (S/N Label change)
Ver 3.2	Aug. 25. '04	15	6.1	Modify Min/Max value of vertical addressing time and horizontal
				addressing time to blank
		16	6.3	Minimum value of t4 change from 500 msec to 100 msec
				Minimum value of t6 change from 200 msec to 0 msec
		last	Outline	Add thickness spec of the sponges on rear surface

1. GENERAL DESCRIPTION

1.1 OVERVIEW

N141XB -L04 is a 14.1" TFT Liquid Crystal Display module with single CCFL Backlight unit and 30 pins LVDS interface. This module supports 1024 x 768 XGA mode and can display 262,144 colors. The optimum viewing angle is at 6 o'clock direction. The inverter module for Backlight is not built in.

1.2 FEATURES

- Thin and light weight
- XGA (1024 x 768 pixels) resolution
- DE (Data Enable) only mode
- 3.3V LVDS (Low Voltage Differential Signaling) interface with 1 pixel/clock
- SPWG (Standard Panel Working Group) Style B compatible

1.3 APPLICATION

- TFT LCD Notebook

1.4 GENERAL SPECIFICATI0NS

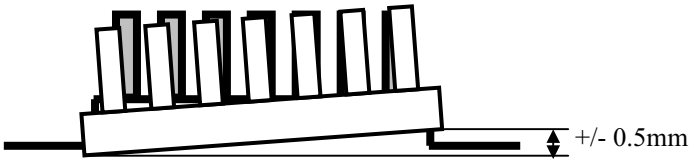
Item	Specification	Unit	Note
Active Area	285.7 (H) x 214.3 (V) (14.1" diagonal)	mm	(1)
Bezel Opening Area	288.9 (H) x 217.5 (V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1024 x R.G.B. x 768	pixel	-
Pixel Pitch	0.279 (H) x 0.279 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	262,144	color	-
Transmissive Mode	Normally white	-	-
Surface Treatment	Hard coating (3H), Anti-glare (Haze 40), Low-Reflection(less 3%)	-	-

1.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	298.5	299.0	299.5	mm	(1)
	Vertical(V)	227.5	228.0	228.5	mm	
	Depth(D)	-	5.2	5.5	mm	
Weight		-	420	430	g	-
I/F connector mounting position		The mounting inclination of the connector makes the screen center within ±0.5mm as the horizontal.				(2)

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

(2) Connector mounting position



2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

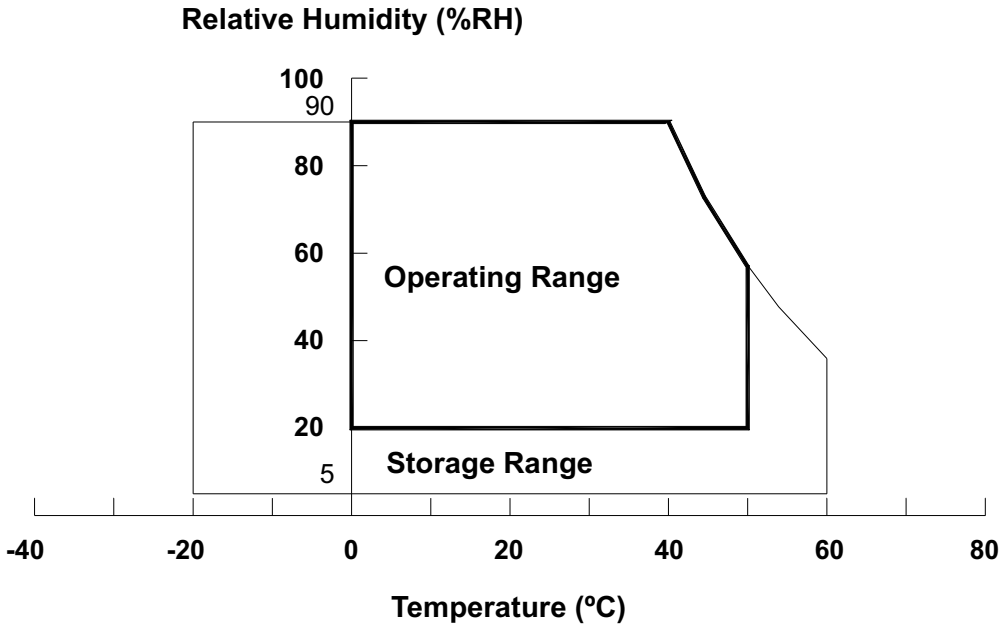
Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	ºC	(1)
Operating Ambient Temperature	T_{OP}	0	+50	ºC	(1), (2)
Shock (Non-Operating)	S_{NOP}	-	50 18 220 2	G ms G ms	(3), (4), (5)
Vibration (Non-Operating)	V_{NOP}	-	1.5 10-200	G Hz	(4), (5)

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).

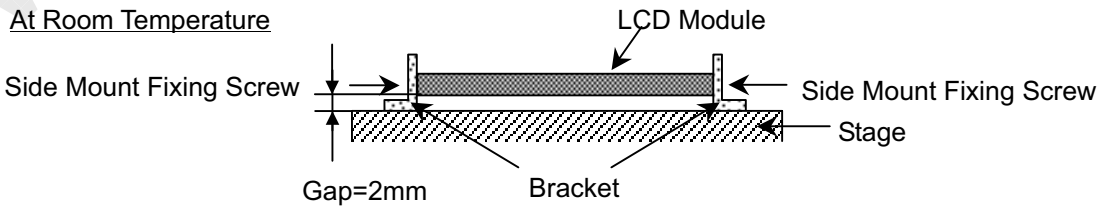
(c) No condensation .



Note (2) The temperature of panel surface should be 0 ºC Min. and 50 ºC Max.

Note (3) Condition for 50G 18ms is Rectangle Wave. Condition for 220G 2ms is Half Sine Wave.

Note (4) 10 ~ 200 Hz, 0.5 Hr / Cycle, 1 cycles for each X, Y, Z. The fixing condition is shown as below:



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.

2.2 IMAGE STICKING

No image sticking appears to anywhere of the display area after 10 hours kept with static images, 25degC (30degC with LCD Module stand alone)

2.3 ELECTRICAL ABSOLUTE RATINGS

2.3.1 TFT LCD MODULE

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

2.3.2 BACKLIGHT UNIT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Lamp Voltage	V_L	-	2.5K	V_{RMS}	(1), (2), I_L = (6.0) mA
Lamp Current	I_L	-	7.0	mA_{RMS}	(1), (2)
Lamp Frequency	F_L	-	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 Section 3.2 for further information).

3. ELECTRICAL CHARACTERISTICS

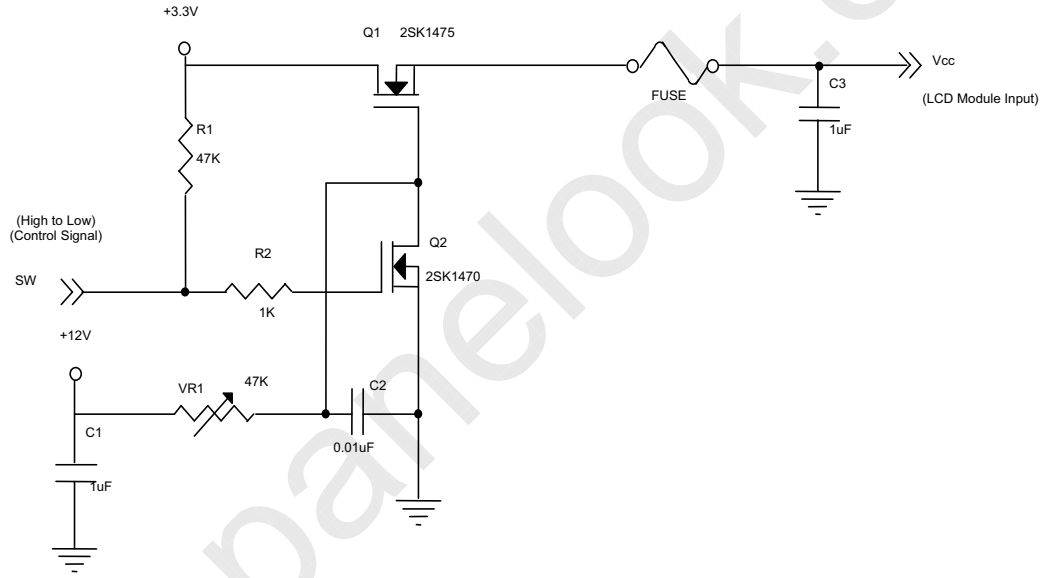
3.1 TFT LCD MODULE

Ta = 25 ± 2 ºC

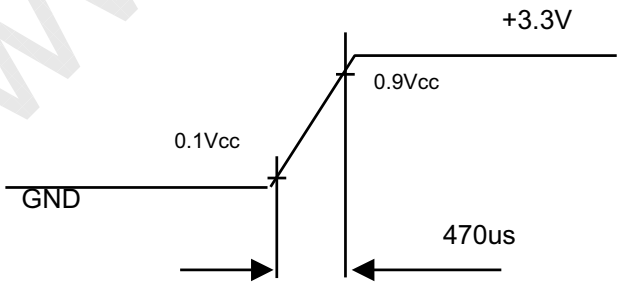
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	3.0	3.3	3.6	V	-
Ripple Voltage		V_{RP}	-	-	100	mV	-
Rush Current		I_{RUSH}	-	-	1.5	A	(2)
Power Supply Current	White	Icc	-	350	380	mA	(3)a
	Black		-	400	480	mA	(3)b
	Vertical Stripe		-	400	480	mA	(3)c
Differential Input Voltage for LVDS Receiver Threshold	"H" Level	V_{IH}	-	-	+100	mV	-
	"L" Level	V_{IL}	-100	-	-	mV	-
Terminating Resistor		R_T	-	100	-	Ohm	-

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

Note (2) Measurement Conditions:

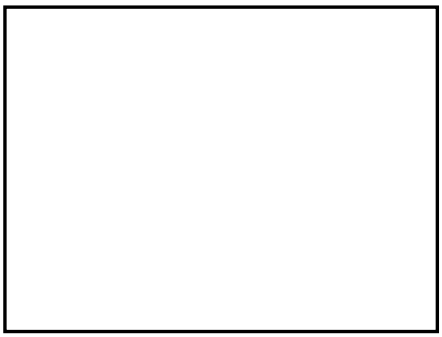


Vcc rising time is 470us



Note (3) The specified power supply current is under the conditions at Vcc = 3.3 V, Ta = 25 ± 2 ºC, DC Current and f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern

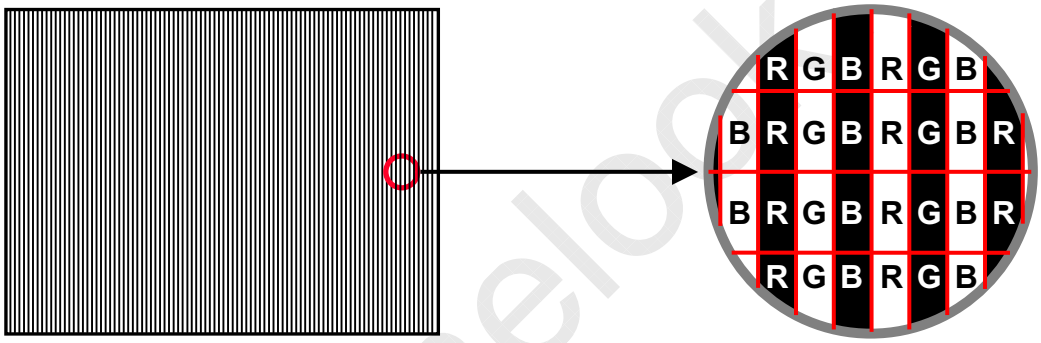


Active Area

b. Black Pattern

Active Area

c. Vertical Stripe Pattern



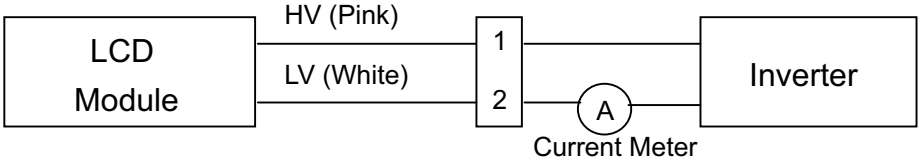
Active Area

3.2 BACKLIGHT UNIT

Ta = 25 ± 2 ºC

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Input Voltage	V_L	576	640	704	V_{RMS}	I_L = 6.0 mA
Lamp Current	I_L	2.0	6.0	6.5	mA_{RMS}	(1) , (8)
Lamp Turn On Voltage	V_S	-	-	1360 (25 °C)	V_{RMS}	(2)
		-	-	1450 (0 °C)	V_{RMS}	(2)
Operating Frequency	F_L	50	-	80	KHz	(3)
Power Consumption	P_L	-	3.84	-	W	(4), I_L = 6.0 mA
Lamp Life Time	L_{BL}	10,000	15,000	-	Hrs	(5)
Leakage Current	I_{IN}-I_{OUT}	-	-	1.0	mA	(7)

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



Note (2) The voltage shown above 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 generate 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) $P_L = I_L \times V_L$

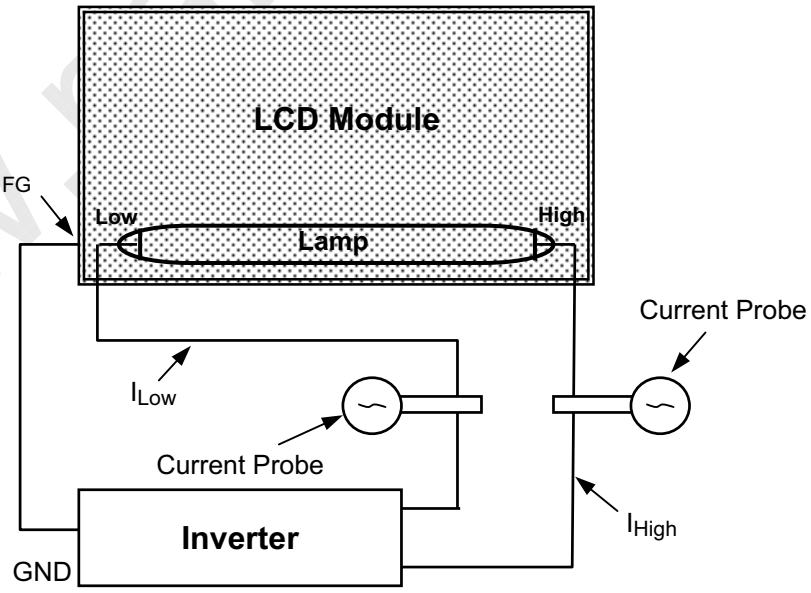
Note (5) The lifetime of lamp is defined as the time when it continues to operate under the conditions at Ta = 25 ± 2 °C and I_L = 2.0~6.5 mA_{RMS} until one of the following events occurs:

(a) When the brightness becomes ≤ 50% of its original value.

(b) When the effective ignition length becomes ≤ 80% of its original value. (Effective ignition length is defined as an area that the brightness is less than 70% compared to 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 generating 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.

Note (7) The lamp leakage current is measured by the current difference between in and out. And the measurement condition is as below:



$$I_{Leak(RMS)} = I_{High(RMS)} - I_{Low(RMS)}$$

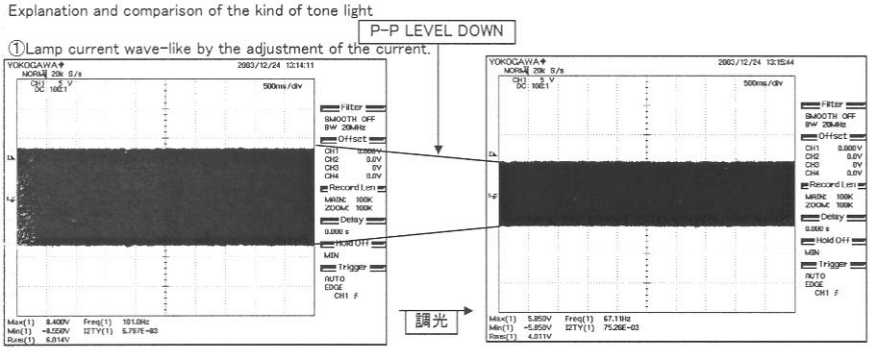
Note (8) About operating current min 2.0mA , lamp maker has some advice as below

(Reference)Light quantity adjustment

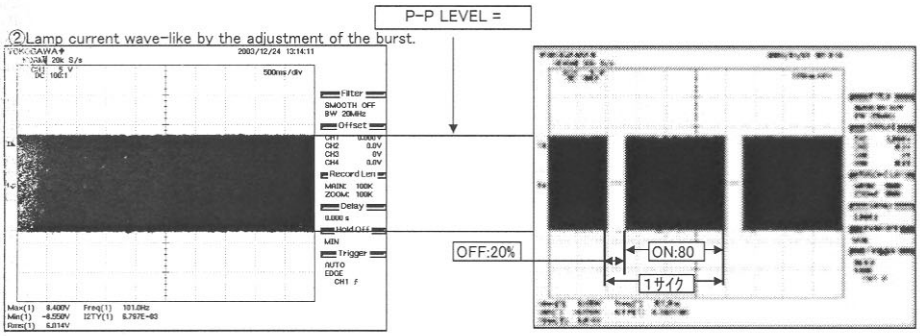
2003年12月25日
バックライトSBU開発グループ
山 口

Explanation and comparison of the kind of tone light

①Lamp current wave-like by the adjustment of the current.



②Lamp current wave-like by the adjustment of the burst.



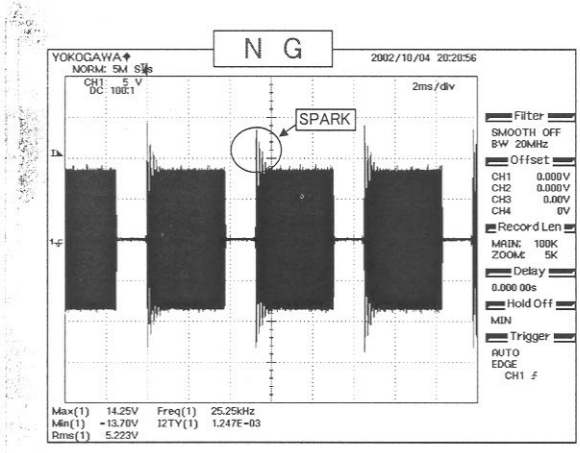
Comparative table

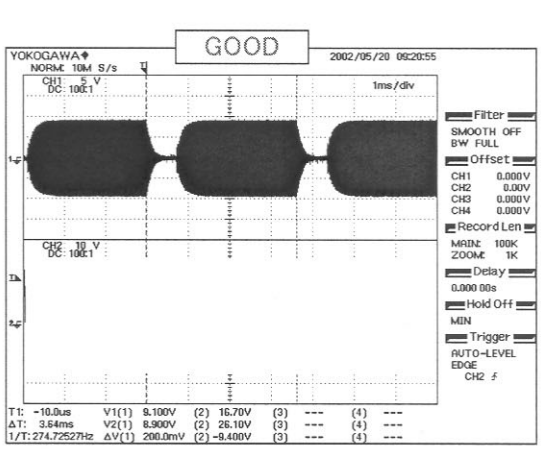
Method	Backlight efficiency (INV+LAMP)	Tone light rate (%	Circuitry
① current	Good(75%~85%)	58	Complicated
②burst	Bad(65%~75%)	10	Easy

Method of case that Lamp current MIN2.0mA is controlled.

It is the setting of minimum 2mA (MIN) to Lamp current 6mA (TYP) in the lamp specification.
The burst is excellent for circuitry.
I propose that pays attention to the following contents.

The attention point of the light with a touch of the burst
①Do not to be SPARK at start.

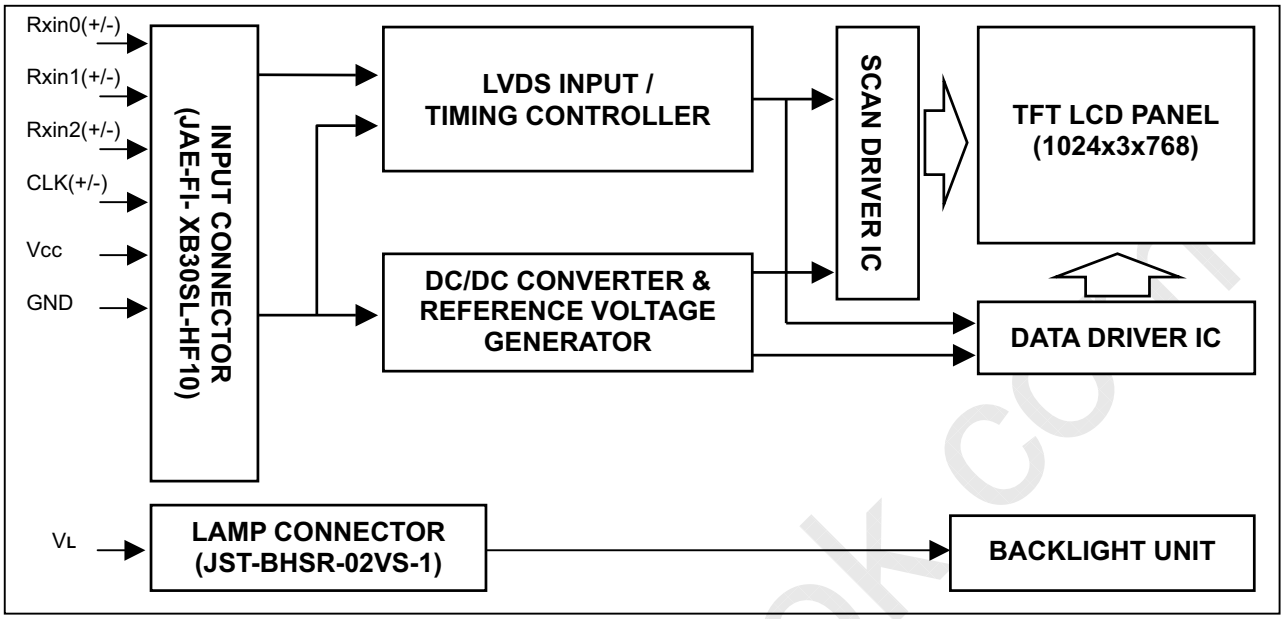




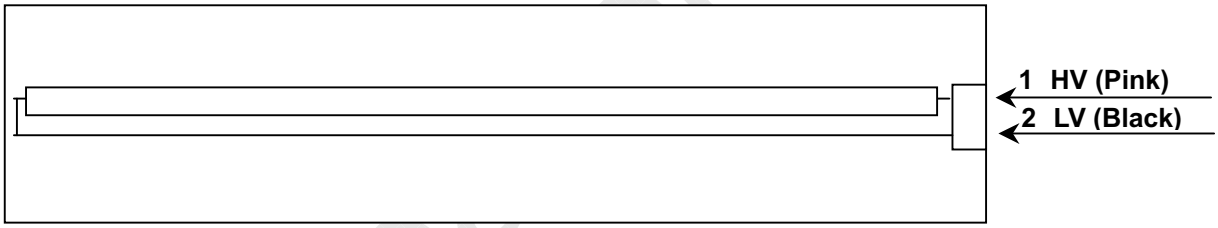
②PWM frequency does so that the frequency that is not able to divide the fixed number time, fixed number to lamp drive frequency is selected.
(It is due to resonance noise occurrence prevention.)
Even the frequency that is using it for LCD avoids selecting it.

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



4.2 BACKLIGHT UNIT



5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

Pin	Symbol	Description	Polarity	Remark
1	Vss	Ground		
2	Vcc	Power Supply +3.3 V (typical)		
3	Vcc	Power Supply +3.3 V (typical)		
4	NC	Non-Connection		
5	NC	Non-Connection		
6	NC	Non-Connection		
7	NC	Non-Connection		
8	Rxin0-	LVDS Differential Data Input	Negative	R0~R5,G0
9	Rxin0+	LVDS Differential Data Input	Positive	-
10	Vss	Ground		
11	Rxin1-	LVDS Differential Data Input	Negative	G1~G5,B0,B1
12	Rxin1+	LVDS Differential Data Input	Positive	-
13	Vss	Ground		
14	Rxin2-	LVDS Differential Data Input	Negative	B2~B5,DE,Hsync,Vsync
15	Rxin2+	LVDS Differential Data Input	Positive	
16	Vss	Ground		
17	CLK-	LVDS Clock Data Input	Negative	LVDS Level Clock
18	CLK+	LVDS Clock Data Input	Positive	
19	Vss	Ground		
20	NC	Non-Connection		
21	NC	Non-Connection		
22	Vss	Ground		
23	NC	Non-Connection		
24	NC	Non-Connection		
25	Vss	Ground		
26	NC	Non-Connection		
27	NC	Non-Connection		
28	Vss	Ground		
29	NC	Non-Connection		
30	NC	Non-Connection		

Note (1) The first pixel is even.

Note (2) Connector Part No.: JAE-FI-XB30SL-HF10 or equivalent

Note (3) User's connector Part No: JAE-FI-X30C2L or equivalent

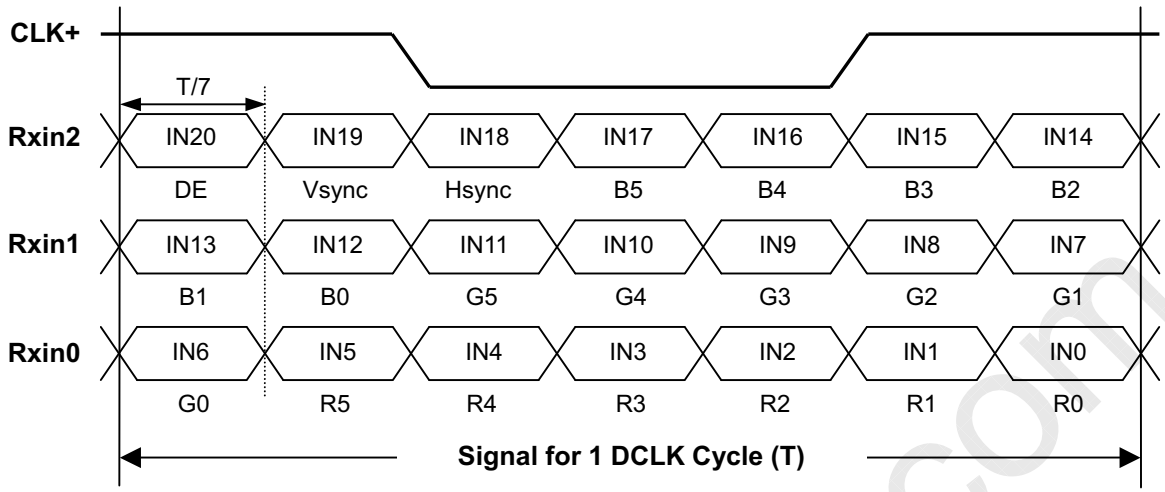
5.2 BACKLIGHT UNIT

Pin	Symbol	Description	Color
1	HV	High Voltage	Pink
2	LV	Ground	Black

Note (1) Connector Part No.: JST-BHSR-02VS-1 or equivalent

Note (2) User's connector Part No.: JST-SM02B-BHSS-1-TB or equivalent

5.3 TIMING DIAGRAM OF LVDS INPUT SIGNAL



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

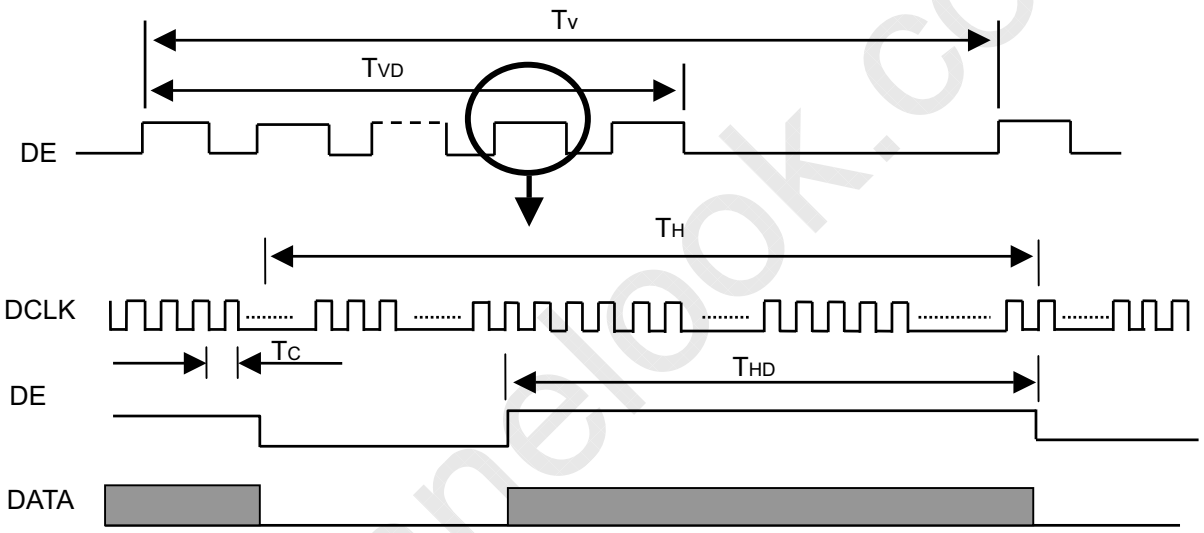
6. INTERFACE TIMING

6.1 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
DCLK	Frequency	1/Tc	50	65	68	MHz	-
DE	Vertical Total Time	TV	771	806	850	TH	-
	Vertical Addressing Time	TVD	-	768	-	TH	-
	Horizontal Total Time	TH	1200	1344	1500	Tc	-
	Horizontal Addressing Time	THD	-	1024	-	Tc	-

INPUT SIGNAL TIMING DIAGRAM



6.2 Self-Protection Mode

There are two kind of conditions that timing controller will go to the self-protection mode.

(1) Clock Stop Detection

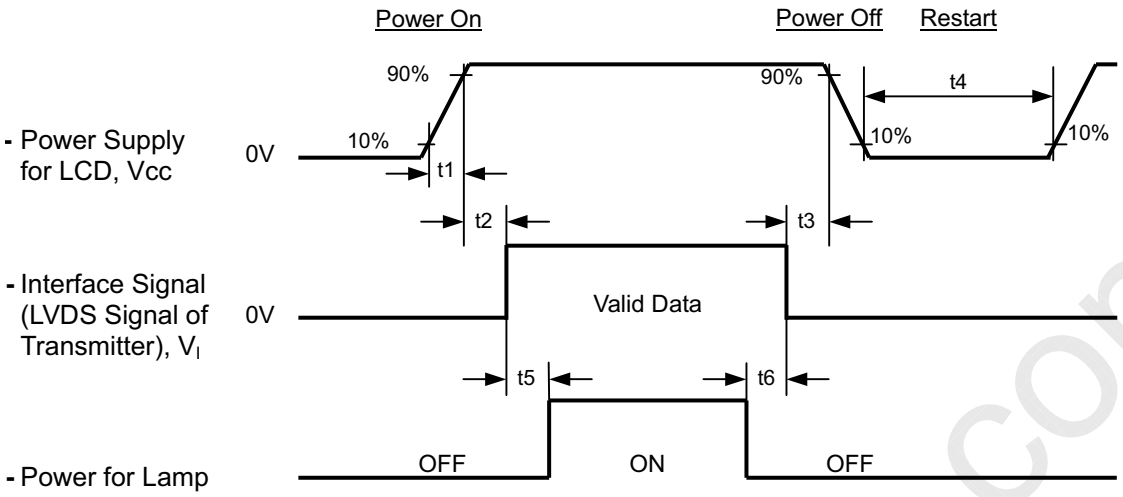
If dot clock stops still about 100ms, timing controller goes into the self-protection mode.

(2) DE Signal Detection

If the time of DE as low is longer than 1 frame, timing controller goes into the self-protection mode.

Once the self-protection mode is active, the panel will display black pattern.

6.3 POWER ON/OFF SEQUENCE



Timing Specifications:

100us ≤ t1 ≤ 10 msec

0 < t2 ≤ 50 msec

0 < t3 ≤ 50 msec

t4 ≥ 100 msec

t5 ≥ 200 msec

t6 ≥ 0 msec

Note (1) Please avoid floating state of interface signal at invalid period.

Note (2) When the interface signal is invalid, be sure to pull down the power supply of LCD Vcc to 0 V.

Note (3) The Backlight inverter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight inverter power must be turned off before the power supply for the logic and the interface signal is invalid.

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

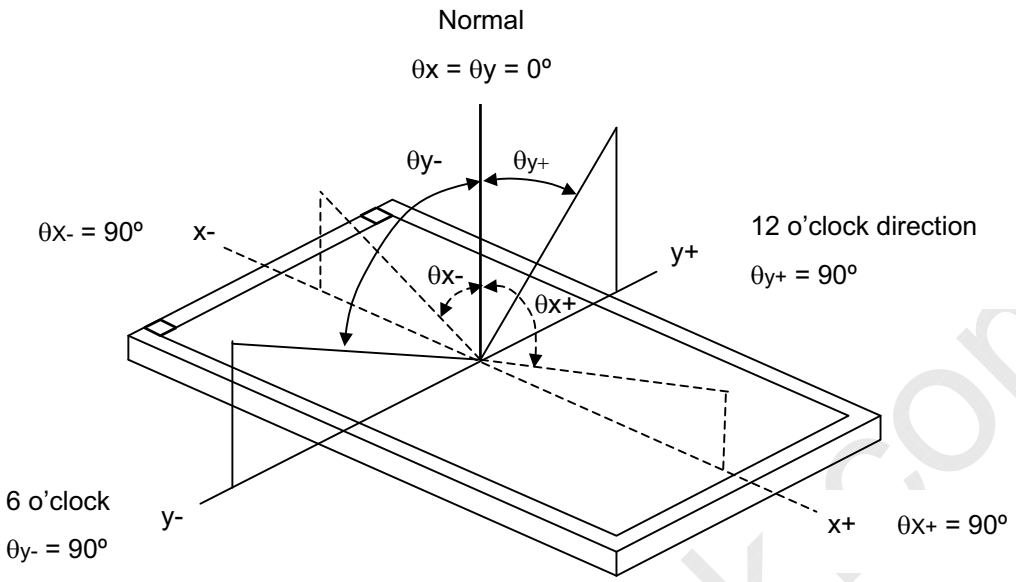
Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	3.3	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Inverter Current	I_L	6.0	mA
Inverter Driving Frequency	F_L	55	KHz
Inverter	Sumida-H05-4783B		

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

7.2 OPTICAL SPECIFICATIONS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_x=0°, θ_Y =0° Viewing Normal Angle	150	250	-	-	(2), (6)
Response Time		T_R		-	6	10	ms	(3)
		T_F		-	17	25	ms	
Average Luminance of White		L_{AVE}		130	150	-	cd/m^2	(4), (6)
White Variation of 5 Points		δW_{5p}		80	-	-	%	(6), (7)
White Variation of 13 Points		δW_{13p}		65	-	-	&	(6), (7)
Cross Talk		CT		-	-	4.0	%	(5), (6)
Color Chromaticity	Red	Rx		Typ. -0.03	0.570	Typ. +0.03	-	(1), (6)
		Ry			0.335		-	
	Green	Gx			0.325		-	
		Gy			0.570		-	
	Blue	Bx			0.150		-	
		By			0.125		-	
	White	Wx		0.285	0.313	0.341	-	
		Wy		0.309	0.329	0.349	-	
	Color Gamut	C.G%			45	-	%	(8)
Viewing Angle	Horizontal	θ_x+	CR≥10	40	45	-	Deg.	(1), (6)
		θ_x-		40	45	-		
	Vertical	θ_Y+		10	15	-		
		θ_Y-		25	35	-		
Gamma Corrected Gray Scale		L0 L7 L15 L23 L31 L39 L47 L55 L63	θ_x=0°, θ_Y =0° Viewing Normal Angle	-	0 2 5 10 22 36 53 75 100	-	%	6bit

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

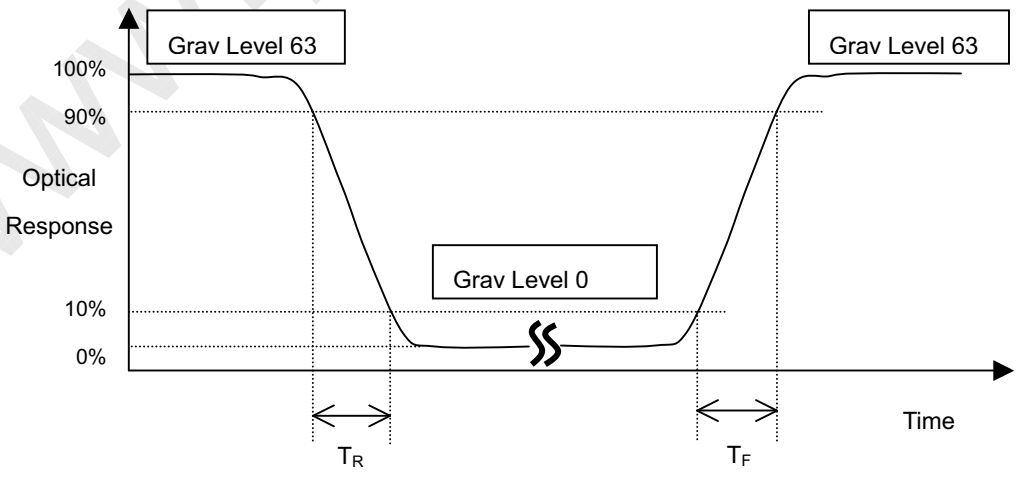
L63: Luminance of gray level 63

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 (7).

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



Note (4) Definition of Average Luminance of White (L_{AVE}):

Measure the luminance of gray level 63 at 5 points

L_{AVE} = [L (1)+ L (2)+ L (3)+ L (4)+ L (5)] / 5

L (x) is corresponding to the luminance of the point X at Figure in Note (7).

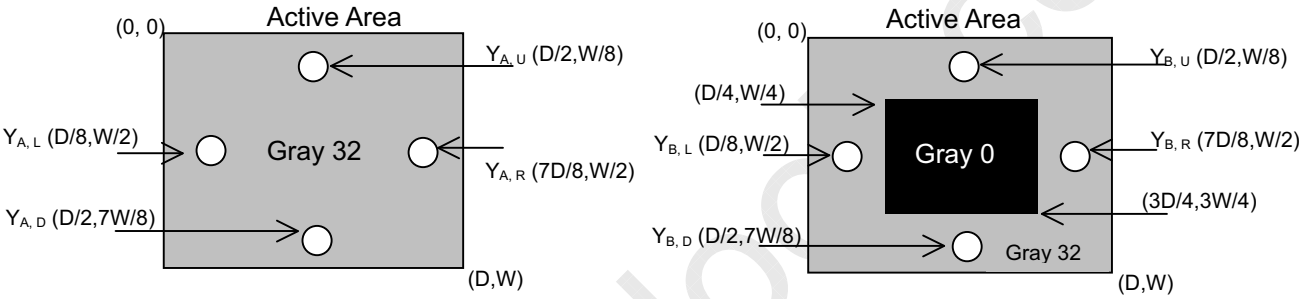
Note (5) Definition of Cross Talk (CT):

$CT = | Y_B – Y_A | / Y_A \times 100$ (%)

Where:

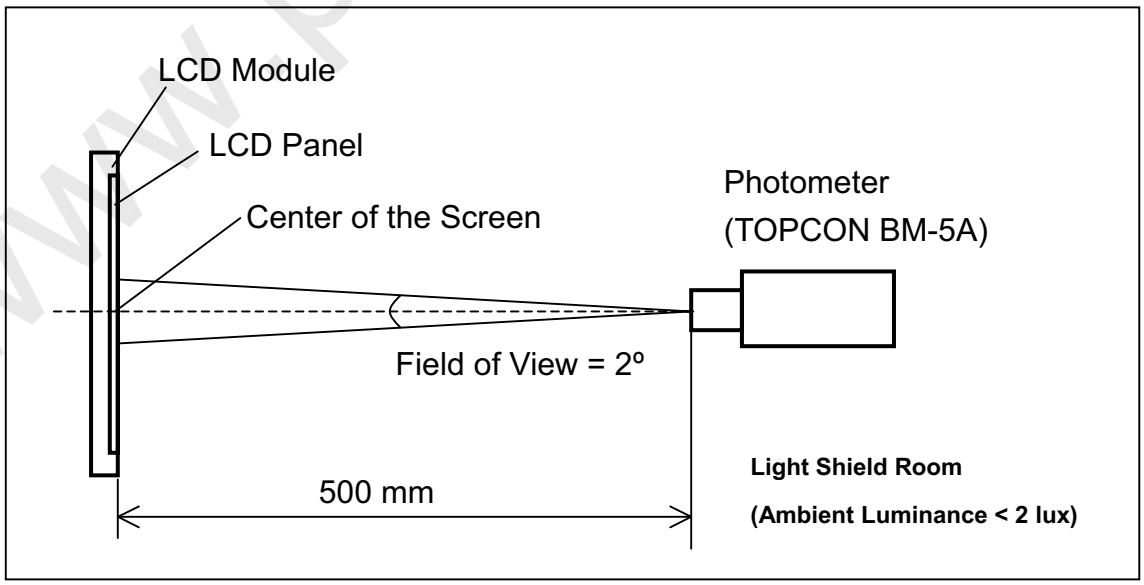
Y_A = Luminance of measured location without gray level 0 pattern (cd/m^2)

Y_B = Luminance of measured location with gray level 0 pattern (cd/m^2)



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.

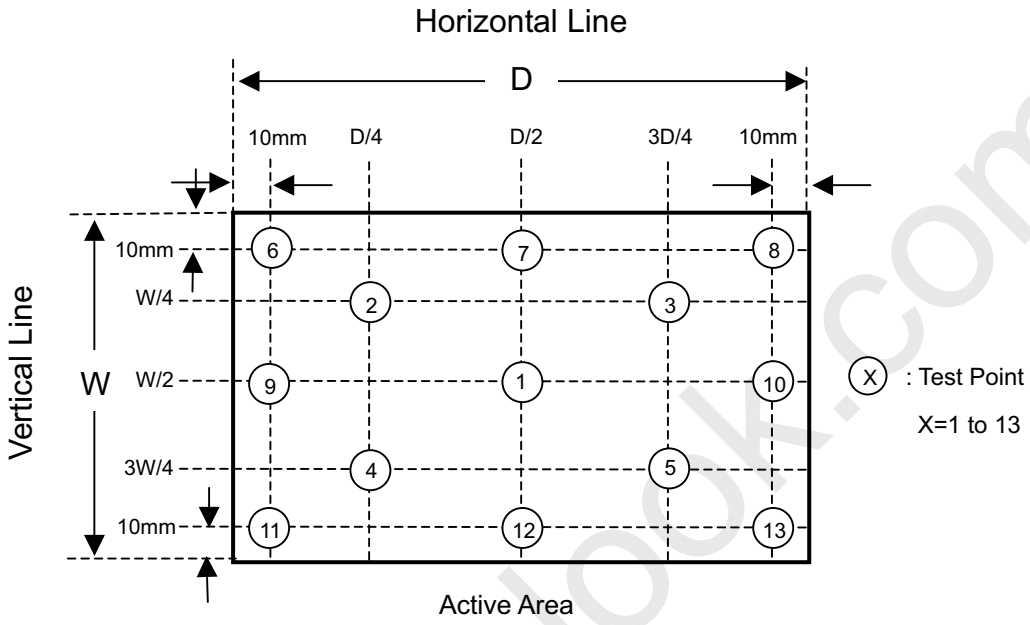


Note (7) Definition of White Variation (δW):

Measure the luminance of gray level 63 at 13 points

δW_{5p} = Minimum [L (1), L (2), L (3), L (4), L (5)] / Maximum [L (1), L (2), L (3), L (4), L (5)]

δW_{13p} = Minimum [L (1) ~ L (13)] / Maximum [L (1) ~ L (13)]



Note (8) Definition of color gamut (C.G%):

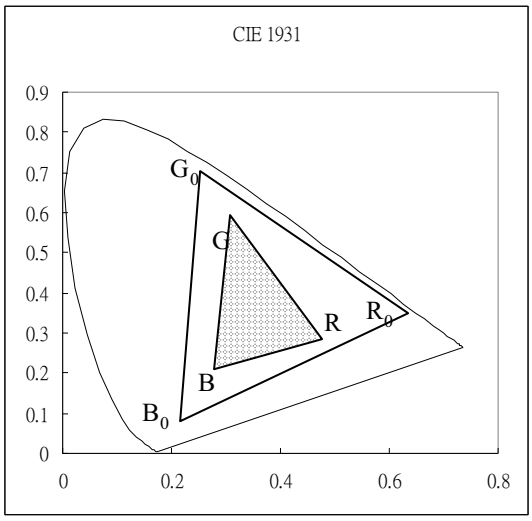
C.G%= ΔR G B /ΔR_0 G_0 B_0,*100%

R_0, G_0, B_0 : color coordinates of red, green, and blue defined by NTSC, respectively.

R, G, B : color coordinates of module on 63 gray levels of red, green, and blue, respectively.

ΔR_0 G_0 B_0 : area of triangle defined by R_0, G_0, B_0

ΔR G B: area of triangle defined by R, G, B



8. PRECAUTIONS

8.1 HANDLING PRECAUTIONS

(1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.

(2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.

(3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.

(4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.

(5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.

(6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.

(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.

(8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.

(9) Do not disassemble the module.

(10) Do not pull or fold the lamp wire.

(11) Pins of I/F connector should not be touched directly with bare hands.

8.2 STORAGE PRECAUTIONS

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

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

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

8.3 OPERATION PRECAUTIONS

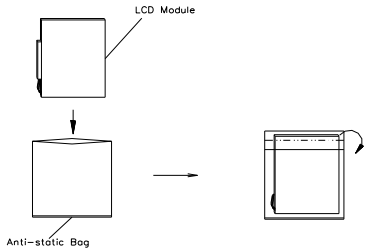
(1) Do not pull the I/F connector in or out while the module is operating.

(2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.

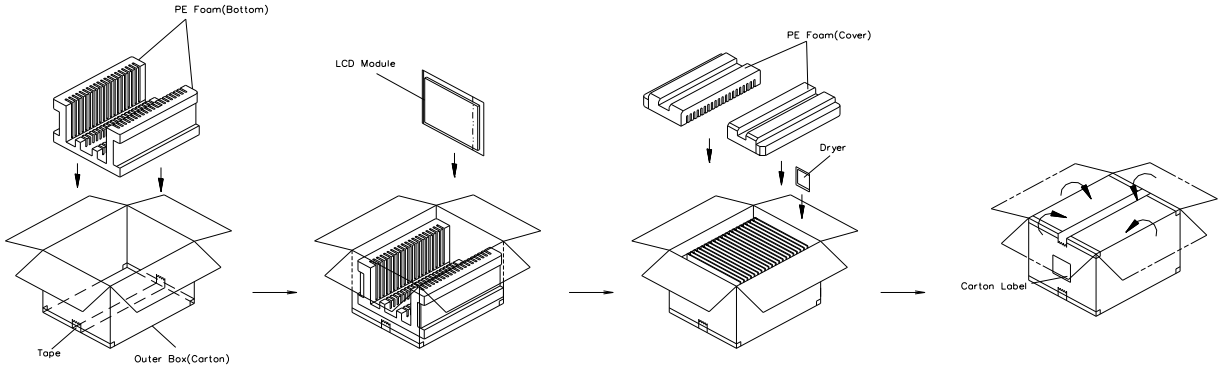
(3) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with inverter. Do not disassemble the module or insert anything into the Backlight unit.

9. PACKING

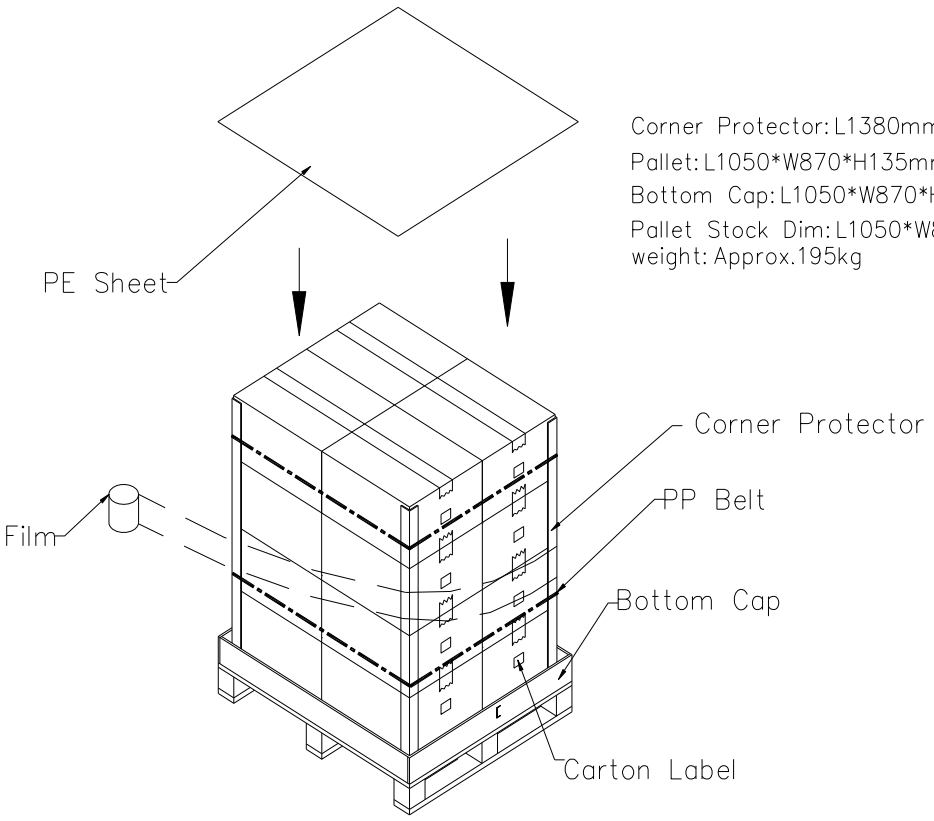
9.1 CARTON



Box dimesions: 511(L)x420(W)x360(H)mm
Weight: 11.3kg (20module. per 1 box)



9.2 PALLET

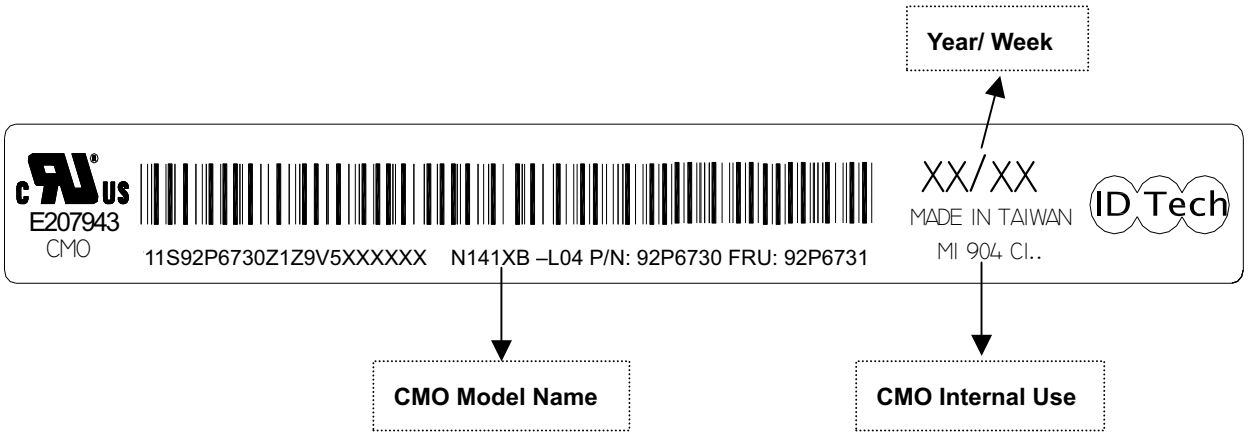


Corner Protector: L1380mm*50mm*50mm
Pallet: L1050*W870*H135mm
Bottom Cap: L1050*W870*H120mm
Pallet Stock Dim: L1050*W870*H1585mm
weight: Approx.195kg

10. DEFINITION OF LABELS

10.1 CMO MODULE LABEL

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



10.2 CARTON LABEL

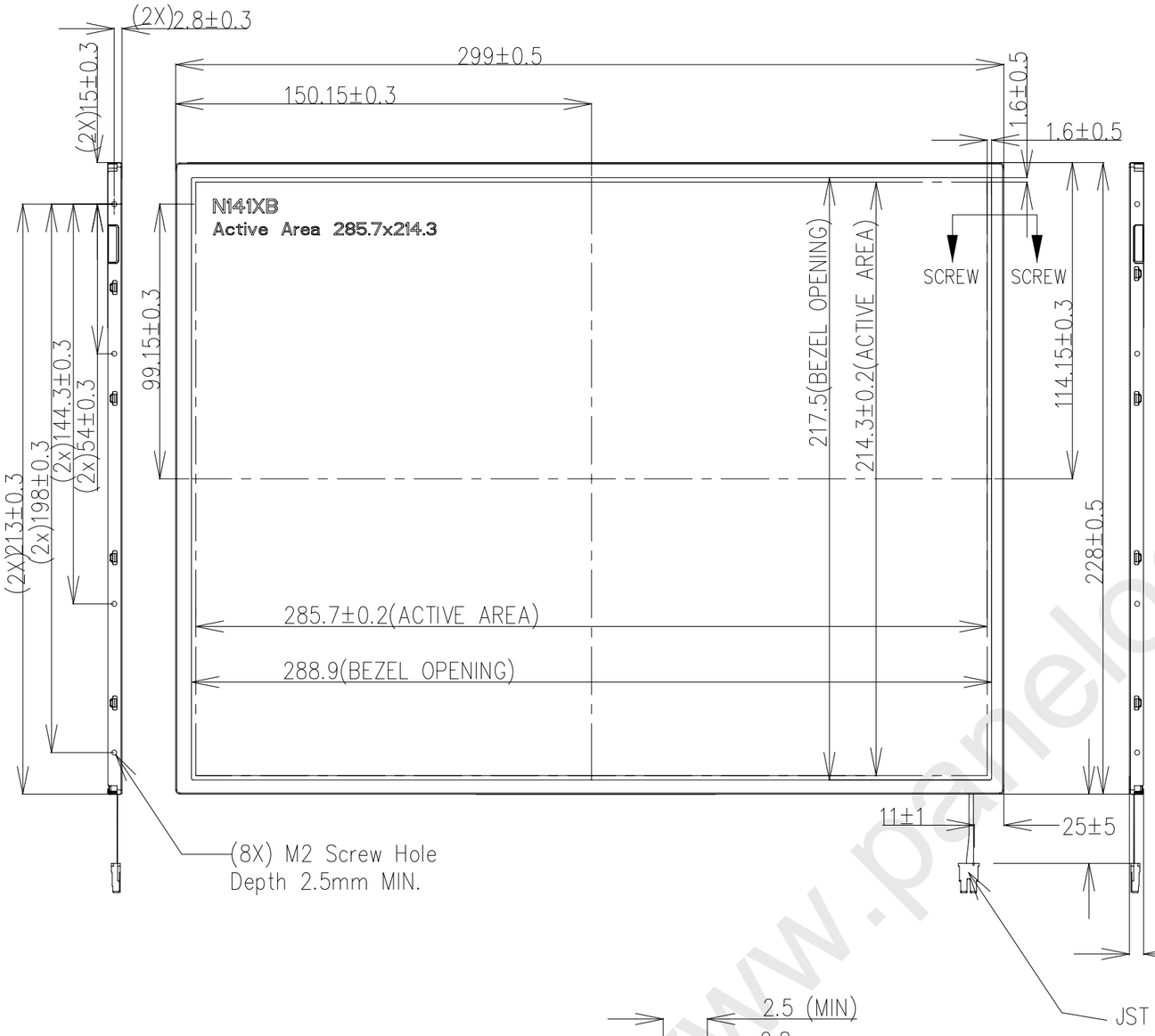
11. NATIONAL TEST LAB REQUIREMENT

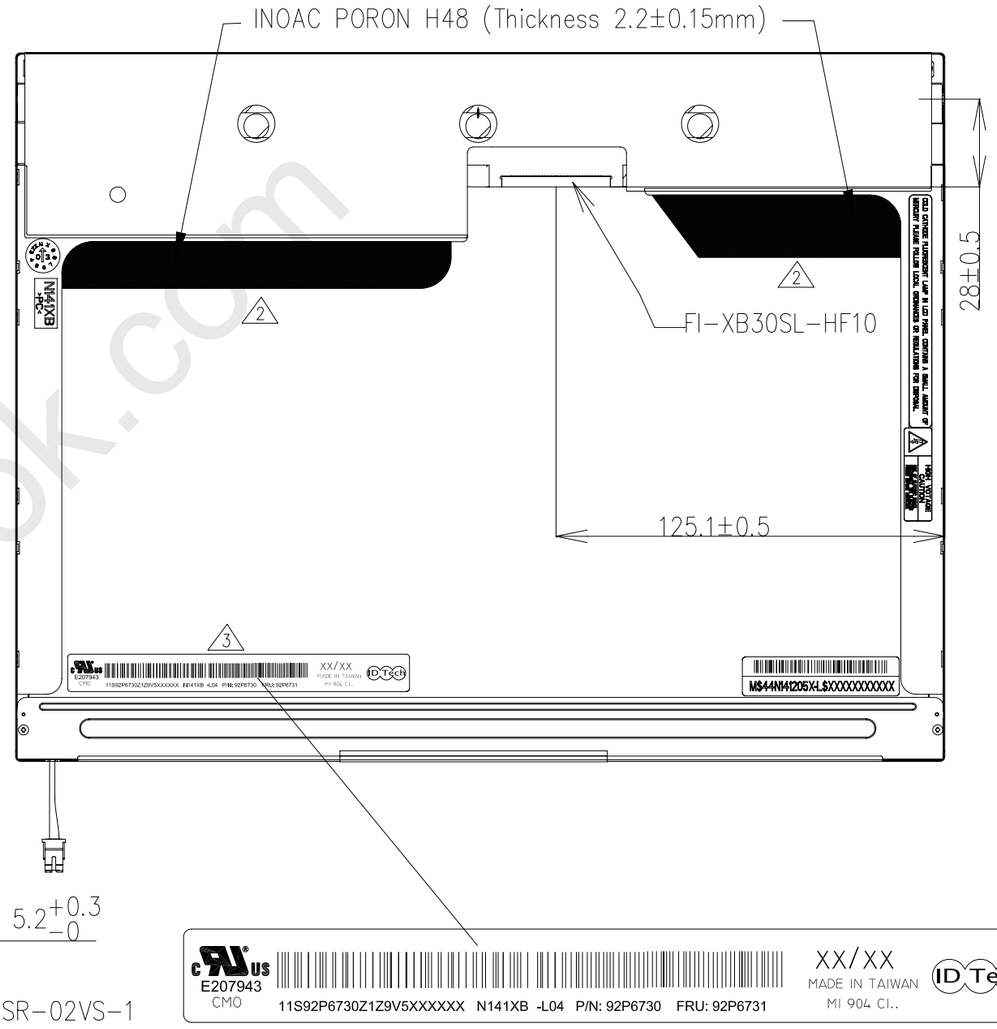
The display module is authorized to Apply the UL Recognized Mark.

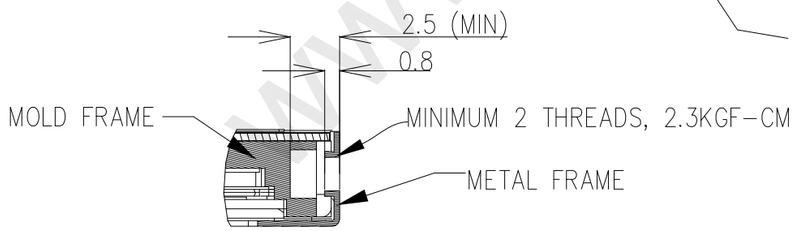
Conditions of Acceptability

Conditions of Acceptability - When installed on the end-product, consideration shall be given to the following;

1. This component has been judged on the basis of the required spacings in the Standard for Safety of Information Technology Equipment, CSA/UL60950, which would cover the component itself if submitted for Listing.
2. The unit is intended to be supplied by SELV and Limited Power Source. Also separated from electrical parts, which may produce high temperature that could cause ignition by as least 13mm of air or by a solid barrier of material of V-1 minimum.
3. The terminals and connectors are suitable for factory wiring only.
4. A suitable electrical enclosure shall be provided.







SECTION SCREW-SCREW
SCALE 3:1

MARK	DESCRIPTION	DATE	CHANGE BY	APPROVAL BY	ECN NO.
3	Customer Lable Changed	2004/08/16	CHI TSAI	BILL SHEU	
2	Sponge Added	2004/07/13	CHI TSAI	BILL SHEU	

TITLE	OUTLINE DRAWING N141XB-L04			REV.	3	VER.	
Approved	BILL SHEU	Drawing No.	N141C41043				
Checked	YULE LIN	Part No.					
Drawer	CHI TSAI	Material		Sheet	1/1	A3	
Designer	CHI TSAI	Date	16-AUG-2004	Scale	1:1	Unit: mm	

CHI MEI OPTOELECTRONICS CORP.