CHI MEI
OPTOELECTRONICS CORP.

TFT-LCD Specification

Model No: N141X203

Customer : _____

Approved by : _____

Note :

Liquid Crystal Division		
QRA Dept.	RD Dept.	System Dept.
Approval	Approval	Approval

Version 3.0

CONTENTS

Version 3.0

REVISION HISTORY

| VERSION	Date	DESCRIPTION
Ver 1.0	Apr, 25.00	Issue Preliminary Specification.
Ver 2.0	Apr,26.00	Page 4/20 - To revise " BLOCK DIAGRAM
	Apr. 26.00	To revise attached Drawing
Ver 2.1	May.15.00	Page 5/20 - To revise " Operating Frequency " on ELECTRICAL SPECIFICATIONS. Old: 40(Min.)/55(Typ.)/70(Max.) → New: 45(Min.)/60(Typ.)/80(Max.) Page 6/20 - Add " Measure conditions " on Note 2. - To revise Note 3. Old: Hot(White)/GND(Black) → New: Hot(Red)/GND(White) Page 20/20 - Add " DEFINITION OF SHIPPING LABEL ON MODULE. To change attached Drawing from" N14124114A" to " N14124110A ".
Ver 2.2	May.22.00	Page 5/20 - Update The connector information of Black light unit. Old: Pin1 - White / Pin 2 - Black New: Pin 1 - Red / Pin 2 - White.
Ver 3.0	Oct.05.00	Page 16/20 - Update 6. PRECAUTION. Page 18/20 - Update Figure 7-1 Packing method. Page 20/20 - Update shipping label. Change Attached Drawing from "N14124110A" to "N14124110C"

Version 3.0

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GENERAL DESCRIPTION

OVERVIEW

This product is a 14.1" TFT Liquid Crystal Display Module with a Backlight unit and 20 pins LVDS (Low Voltage Differential Signal) interface. This module supports 1024 x 768 XGA mode and can display 262,144 colors. The inverter module for Backlight is not built in.

BLOCK DIAGRAM
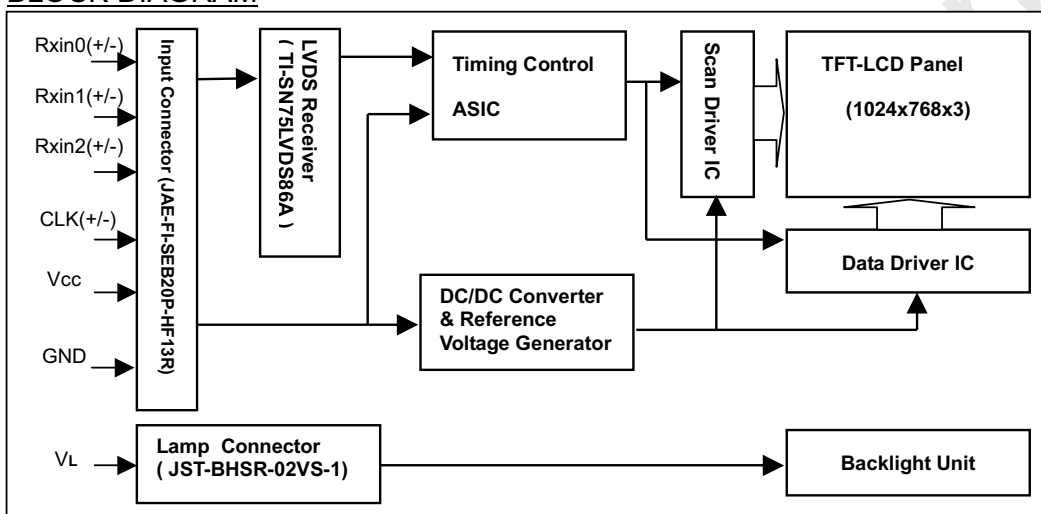
APPLICATION

-Note Book PC

GENERAL SPECIFICATI0NS

Item	Specifications	Unit
Screen Size	14.1 Diagonal	inch
Bezel opening area	288.8(W)x217.4(H)	mm
Effective display area	285.7(W)x214.3(H)	mm
Pixel number	1024 x R.G.Bx768	pixel
Pixel pitch	0.279(H)x0.279(V)	mm
Pixel Arrangement	R.G.B Vertical Stripe	-
Display Color	6 bits, 262,144	color
Transmissive mode	Normally white	-
Surface treatments	Hard coating(3H) and anti-glare	-

MECHANICAL SPECIFICATIONS

ITEM		MIN.	TYP.	MAX.	Unit
Module size	Horizontal	298	298.5	299	mm
	Vertical	227	227.5	228	mm
	Depth	-	5.8	6.1	mm
Weight		-	570	590	g

Version 3.0

Doc. No.:14005159
Issue Date: Oct. 05, 2000
Model: N141X203
Approval

1. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Values Min.	Values Max.	Unit	Remarks
Power supply voltage	V_{CC}	-0.3	+4.0	V	
Logic input voltage	V_{IN}	-0.3	V_{CC}+0.3	V	Ta=25℃
Operating temperature	Top	0	+50	℃	Note
Storage temperature	Tst	-20	+60	℃	

Note : 90% RH MAX. (at Ta ≤ 40 ℃)

Maximum wet-bulb temperature : 39 ^{0}C or lower (at Ta > 40 ℃)

2. ELECTRICAL SPECIFICATIONS

MODULE						
Parameter	Symbol	Value Min.	Value Typ.	Value Max.	Unit	Notes
Power Supply Voltage	V_{CC}	3.0	3.3	3.6	V	(1)
"H" level LVDS signal input	V_{IH}	-	-	+100	mV	(1
"L" level LVDS signal input	V_{IL}	-100	-	-	mV	(1)
Power Supply Current	I_{CC}	-	400	500	mA	(1)
Rush Current	I_{RUSH}	-	1.6	1.8	A	(1), (2)
Ripple voltage	V_{RP}	-	50	-	mV	(1)
Terminating resistor	Rt	-	100	-	Ohm	(1)

BACKLIGHT (1 Lamp)						Ta=25±2℃
Parameter	Symbol	Value Min.	Value Typ.	Value Max.	Unit	Notes
Lamp Voltage	V_L	-	700	-	V_{RMS}	I_L=6.0mA
Lamp Current	I_L	2.0	6.0	7.0	mA	(3)
Startup Voltage	V_S	-	860	1030 (25°C)	V_{RMS}	(4)
		-	1075	1300 (0 ^{o}C)	V_{RMS}	(5)
Operating Frequency	F_L	45	60	80	KHz	(6)
Power Consumption	P_L	-	4.2	-	W	(7), I_L=6.0mA
Lamp Life time	L_{BL}	10000	15000	-	Hrs	(8)

The connector information of Black light unit.

Pin	Symbol	Description	Remark
1	HV	Lamp power input	Red
2	LV	Ground	White

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

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

Note (1) The operating temperature range is 0 ~ 50 ℃, and the typical value of Power Supply

Current is measured in black pattern.

Version 3.0

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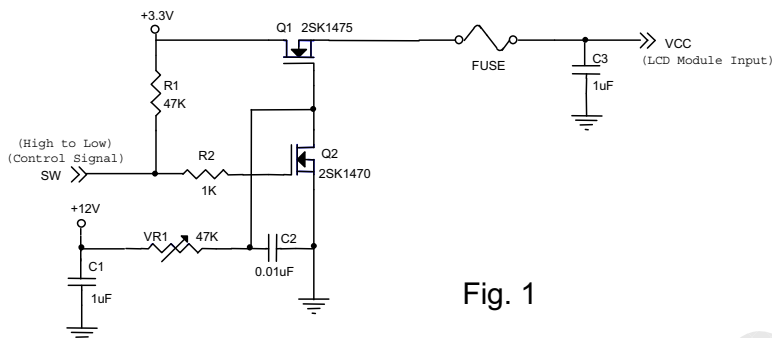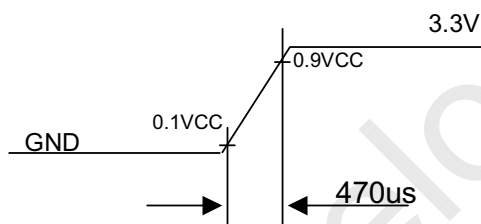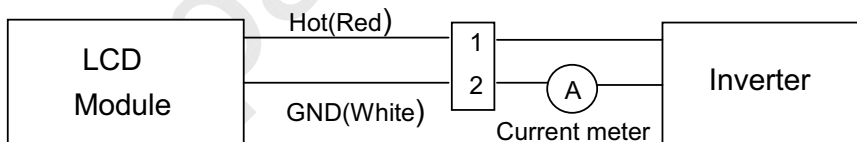
Note (2) Measure conditions

Fig. 1

VCC rising time is 470us

Note (3) Lamp current is measured by utilizing a current meter for high frequency as shown

below:

Note (4) 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 (5) 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 (6) $P_L = I_L \times V_L$.

Note (7) The lifetime (Hr) of a lamp can be defined as the time in which it continues to operate under the condition Ta = $25\pm2^{\circ}$C and I_L = 6.0 mArms until one of the following event occurs:

(1) When the brightness becomes 50% or lower than its original,

(2) When the effective ignition length becomes 80% or lower than 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 (8) 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 designed with care so as not to produce 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. When the above situation is confirmed, the module should be operated in the same manners as it is installed in your instrument.

Version 3.0

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3. INTERFACE SPECIFICATIONS

3.1 THE PIN ASSIGNMENT OF INTERFACE CONNECTOR.

Pin	Symbol	Description	Notes
1	V_{CC}	Power supply +3.3 v	
2	V_{CC}	Power supply +3.3 v	
3	Vss	Ground	
4	Vss	Ground	
5	Rxin0-	LVDS differential data input (Negative)	R0~R5,G0
6	Rxin0+	LVDS differential data input (Positive)	
7	Vss	Ground	
8	Rxin1-	LVDS differential data input (Negative)	G1~G5,B0,B1
9	Rxin1+	LVDS differential data input (Positive)	
10	Vss	Ground	
11	Rxin2-	LVDS differential data input (Negative)	B2~B5,DE,Hsync, Vsync
12	Rxin2+	LVDS differential data input (Positive)	
13	Vss	Ground	
14	CLK-	LVDS Clock Data input (Negative)	LVDS level
15	CLK+	LVDS Clock Data input (Negative)	
16	Vss	Ground	
17	NC	Non-connection	
18	NC	Non-connection	
19	Vss	Ground	
20	Vss	Ground	

Connector Part No.: FI-SEB20P-HF13R (JAE) or Equivalent

User's connector Part No: FI-S20S or FI-SE20M (JAE)

Version 3.0

3.2 INPUT SIGNAL TIMING SPECIFICATIONS

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

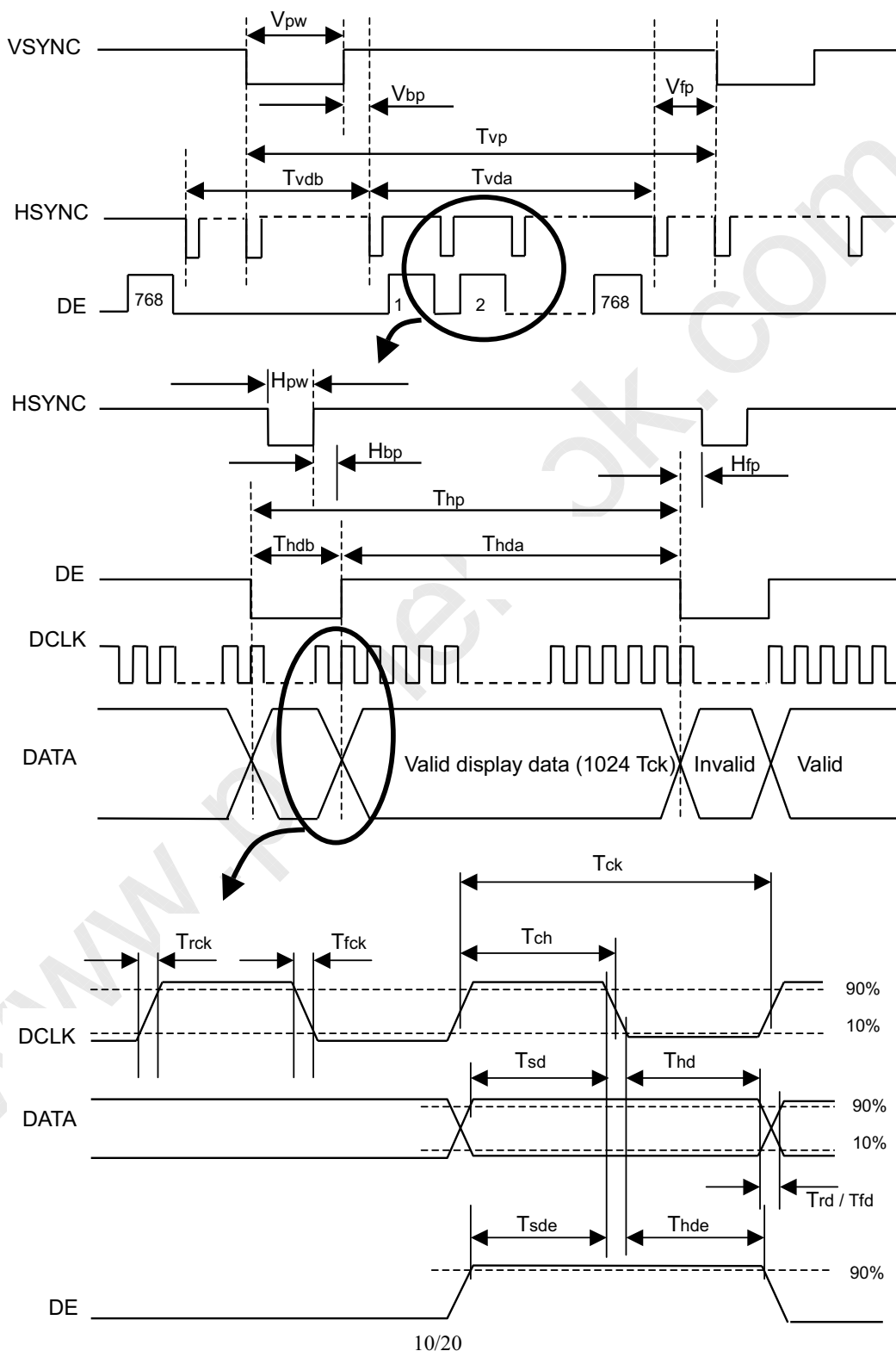| Signal	Parameter	Symbol	Min	Typ	Max	Unit	Remarks
DCLK	Pixel clock period	Tck	-	15	-	ns	
	Duty ratio (%Tch)	-	40	50	60	%	Tch/Tck
	Rise time	Trck	-	4.9	-	ns	
	Fall time	Tfck	-	4.7	-	ns	
DATA	Setup time	Tsd	-	4.8	-	ns	
	Hold time	Thd	-	4.2	-	ns	
	Rise time	Trd	-	5.5	-	ns	
	Fall time	Tfd	-	5.5	-	ns	
DE	Setup time	Tsde	3.5	4.0	-	ns	
	Hold time	Thde	3.5	4.2	-	ns	
VSYNC	Vertical period	Tvp	771	806	812	Thp	
	Vertical display blank period	Tvdb	3	38	44	Thp	
	Vertical display active period	Tvda	768	768	768	Thp	
	Vertical sync. back porch	Vbp	0	29	44	Thp	
	Vertical sync. front porch	Vfp	0	3	43	Thp	
	Vertical sync. pulse width	Vpw	1	6	44	Thp	
HSYNC	Horizontal period	Thp	1340	1344	1366	Tck	
	Horizontal display blank period	Thdb	178	320	342	Tck	
	Horizontal display active period	Thda	1024	1024	1024	Tck	
	Horizontal sync. back porch	Hbp	0	160	342	Tck	
	Horizontal sync. front porch	Hfb	0	24	319	Tck	
	Horizontal sync. pulse width	Hpw	23	145	342	Tck	

Version 3.0

INPUT SIGNAL TIMING DIAGRAM

VSYNC V_{pw} V_{bp} V_{fp}

T_{vp}

T_{vdb} T_{vda}

HSYNC

DE 768 1 2 768

HSYNC H_{pw}

H_{bp} H_{fp}

T_{hp}

T_{hdb} T_{hda}

DE

DCLK

DATA   Valid display data (1024 Tck)   Invalid   Valid

T_{ck}

T_{rck} T_{fck} T_{ch}

DCLK 90% 10%

T_{sd} T_{hd}

DATA 90% 10%

T_{rd} / T_{fd}

T_{sde} T_{hde}

DE 90%

10/20

3.3 COLOR DATA INPUT ASSIGNMENT

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

Version 3.0

3.4 POWER UP/DOWN SEQUENCE
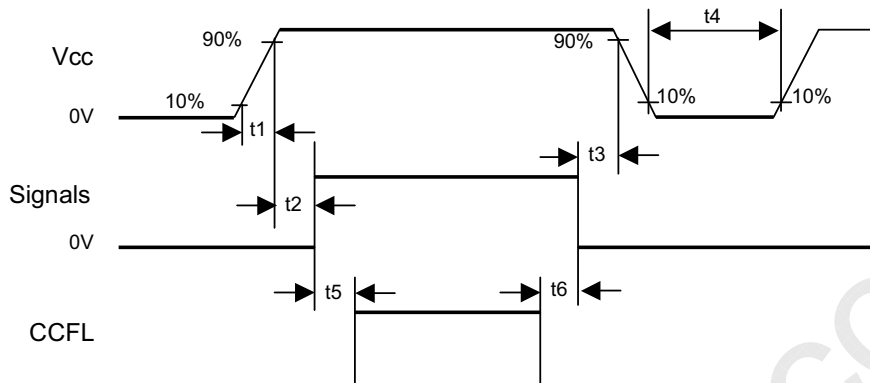
Timing Specifications:

$0 \leq t1 \leq 10mS$

$0 \leq t2 \leq 50mS$

$0 \leq t3 \leq 50mS$

$t4 \geq 1S$

$t5 \geq 170mS$

$t6 \geq 200mS$ (min.)

Notes: 1. Please avoid floating state of interface signal at invalid period.

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

4. OPTICAL SPECIFICATIONS

The following optical specifications shall be measured in a dark room or equivalent state (ambient luminance ≤1 lux, and at room temperature). The measurement must be taken after backlight warming up for 20 minutes. The operation temperature is 25°℃ ± 2℃. The measurement method is shown in Note (1).

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Central Luminance		L	Center,I_L =6.0mA	120	150	-	cd/m^2	(1), (2), (4)
Contrast ratio		CR	Center	150	200	-	-	(1), (3)
Viewing Angle	Horizontal	$\theta x+$	Center CR ≥10	40	45	50	degree	(1), (4)
		$\theta x-$		40	45	50		
	Vertical	$\theta y+$		10	15	20		
		$\theta y-$		30	35	40		
Average Luminance		L_{AVE}	I_L = 6.0mA	110	140	-	cd/m^2	(1), (5)
Brightness Uniformity		Buni	$\theta x = \theta y = 0^o$	1.0	1.4	1.6		(1), (6)
Response Time	Rising	T_R	Center	-	15	30	ms	(1), (7)
	Falling	T_F	$\theta x = \theta y = 0^o$	-	35	50	ms	
Chromaticity		Xw	Center $\theta x = \theta y = 0^o$	0.290	0.310	0.330		(1), (8)
		Yw		0.310	0.330	0.350		
		X_R		0.546	0.566	0.586		
		Y_R		0.308	0.328	0.348		
		X_G		0.280	0.300	0.320		
		Y_G		0.547	0.567	0.587		
		X_B		0.126	0.146	0.166		
		Y_B		0.104	0.124	0.144		

Note (1) The method of optical measurement:

Photodetector
(TOPCON BM-5A)

50 cm

Field=2°

TFT-LCD Module

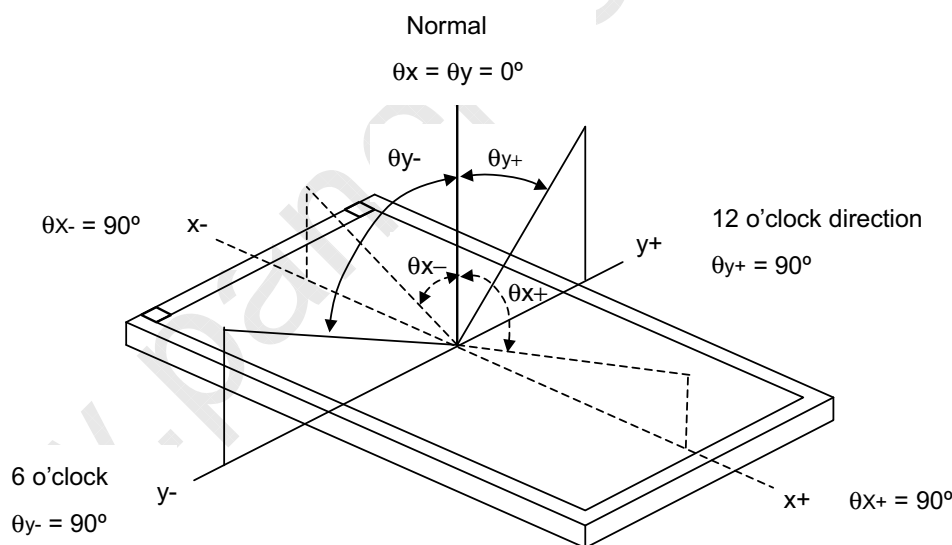Version 3.0
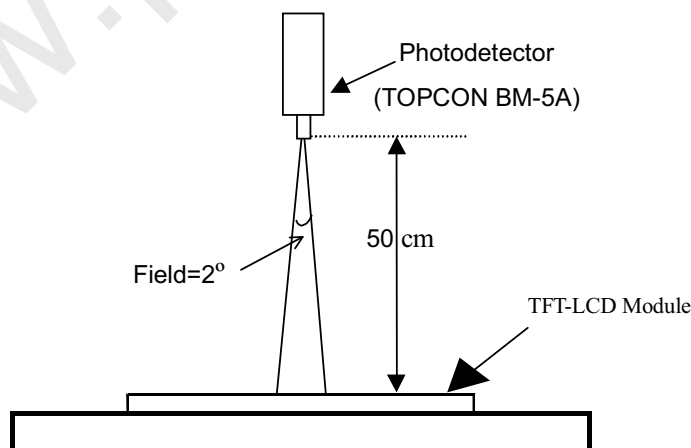
Note (2) Definition of Central Luminance (L):

Central Luminance must be measured at the central point of the LCD module and at the viewing angle of the $\theta x = \theta y = 0^\circ$ (Note 4).

Note (3) Definition of Contrast Ratio (CR):

Contrast ratio measurement must be made at the viewing angle of the $\theta x = \theta y = 0^\circ$ (Note 4) and at the central point of the LCD module. The Luminance (Note 2) shall be measured with all pixels in the viewing field set initially to be white state, then black state.

$$CR = \frac{\text{Luminance with all pixels in white state}}{\text{Luminance with all pixels in black state}}$$

Note (4) Definitions of Viewing Angle (CR $\geq$ 10):

Normal
$\theta x = \theta y = 0^\circ$

$\theta y-$ $\theta y+$

$\theta x- = 90^\circ$ x-   12 o'clock direction
$\theta y+ = 90^\circ$

y+

$\theta x-$

$\theta x+$

6 o'clock   y-   x+ $\theta x+ = 90^\circ$
$\theta y- = 90^\circ$

Note (5) Definition of Average Luminance:

The Average Luminance is defined as arithmetic mean value of five spots across the LCD surface at white state. The Luminance (Note 2) shall be measured with all pixels in the viewing field at white state. The measuring spots must be taken at the locations shown in the following figure, where a = b = 15mm.
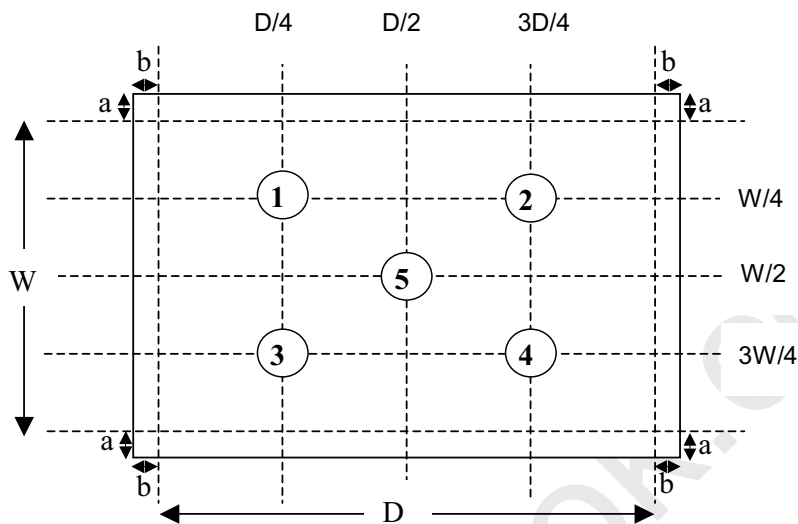
$$L_{AVE} = \frac{L1 + L2 + L3 + L4 + L5}{5}$$

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Luminance Measuring Points

Note (6) Definition of Brightness Uniformity (B_{uni}):

$$B_{uni}= \frac{\text{Maximum luminance of 5 points}}{\text{Minimum luminance of 5 points}} \quad \text{(Note 5).}$$

Note (7) Definition of Response Time:

The Response Time is set initially by defining the " Rising Time (T_R)" and the " Falling Time (T_F)" respectively. T_R and T_F are defined as following figure.

15/20
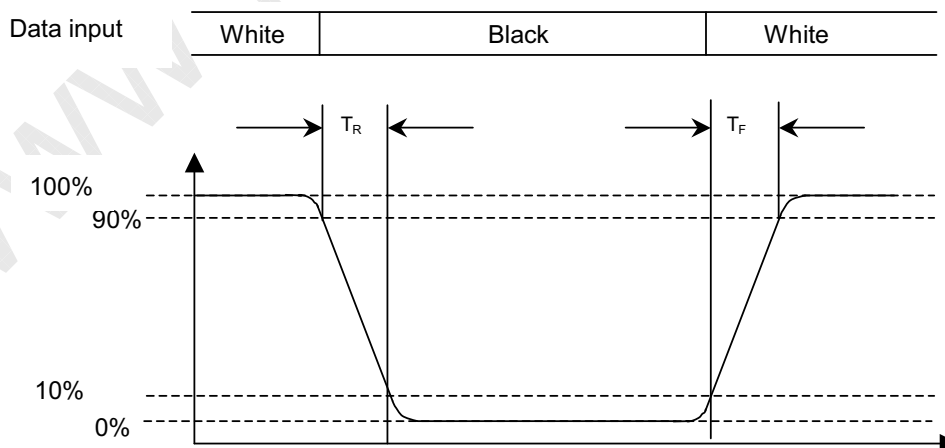
Note (8) Definition of Chromaticity:

The color coordinates (Xw, Yw), (XR,YR), (XG,YG), and (XB,YB) are obtained with all pixels in the viewing field at white, red, green, and blue states, respectively.

5. MECHNICAL DRAWING

Please refer to the attached drawings.

6. PRECAUTION

6. 1 ASSEMBLY AND HANDLING PRECAUTION

(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 latchup.

(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.
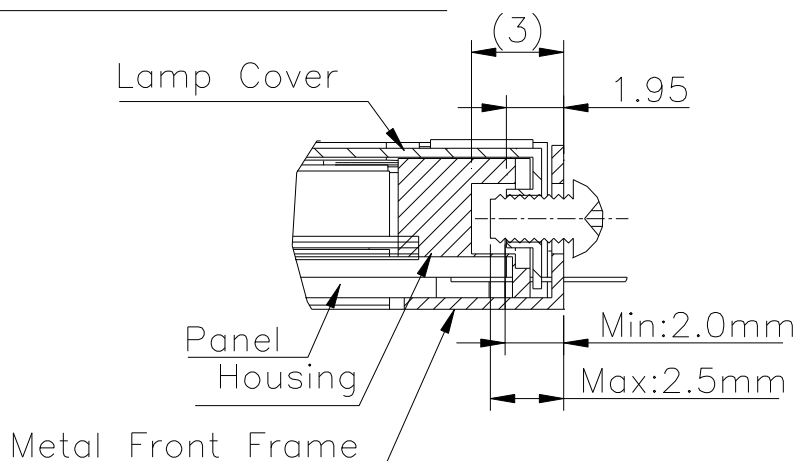
6.2 SAFTY PRECAUTION

(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.

Version 3.0

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Structure of joint

Lamp Cover

(3)

1.95

Panel

Housing

Metal Front Frame

Min:2.0mm

Max:2.5mm

*Mounting Screw depth:2.0[mm]Min.2.5[mm]Max.
*Torque:1.3~1.5[Kgf.cm]

Figure 6.1 : Mounting Screw Method

7. PACKAGING

7.1 PACKING SPECIFICATIONS

(1) 10 LCD modules / 1 Box

(2) Box dimensions : 422(L) X 337(W) X 345(H) mm

(3) Weight : approximately 7.0Kg (10 modules per box)

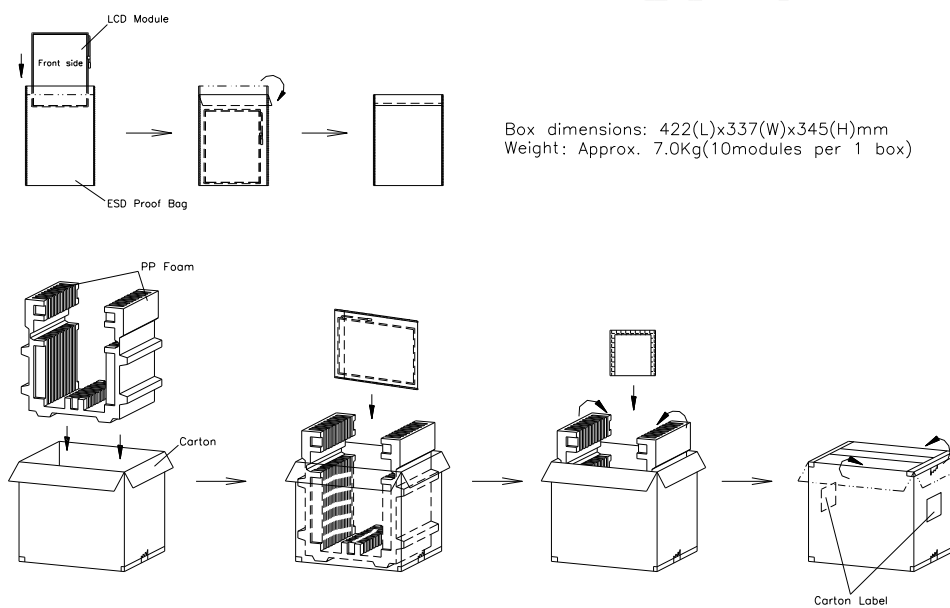### 7.2 PACKING Method

The Figure. 7-1, 2 show the packing method.

Box dimensions: 422(L)x337(W)x345(H)mm
Weight: Approx. 7.0Kg(10modules per 1 box)

Figure. 7-1 Packing method

Version 3.0

Upper Board: L1100*W1100*H8mm
Corrugated Carton: L422*W337*H345mm
Carton Angle: L1853*W100*T5mm

Upper Board

Corrugated Carton

Carton Angle

PP Belt

Warp Film

Label

50

1100

100

1100

10

100

10
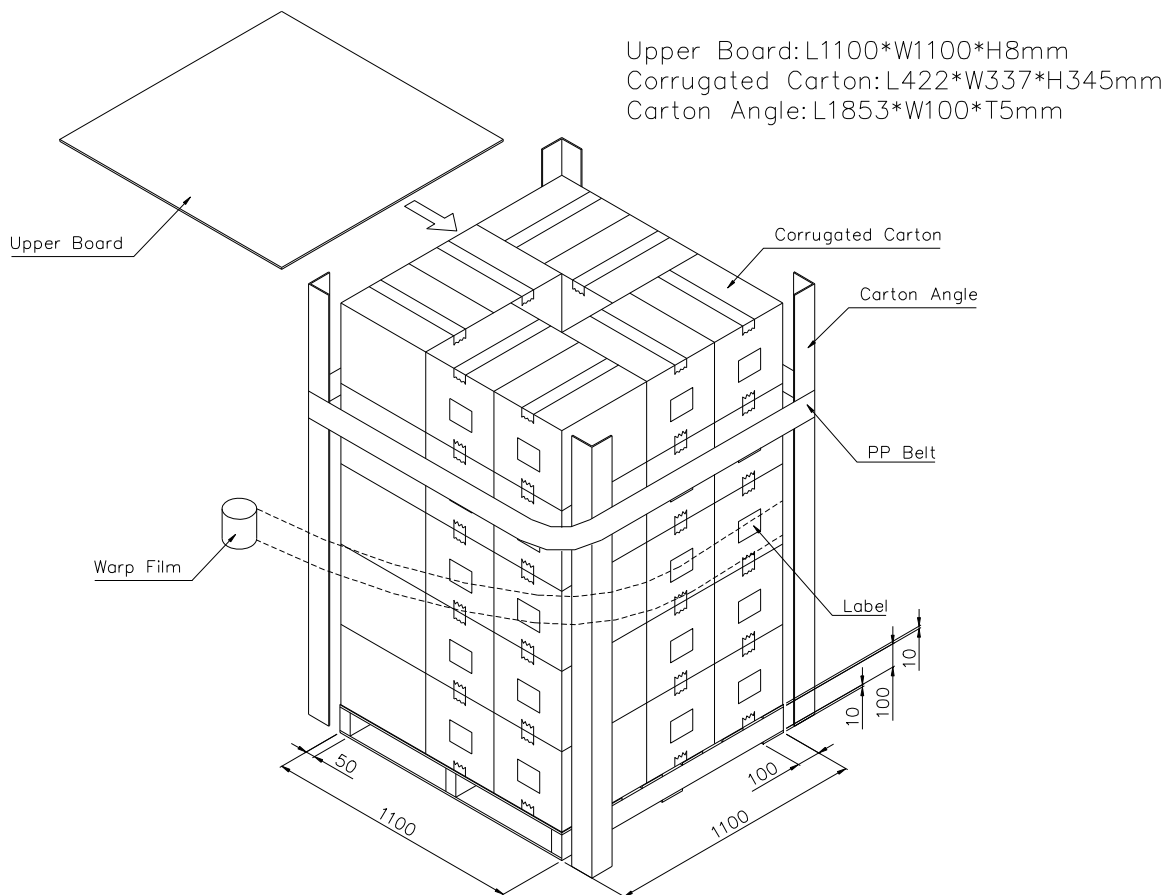
Figure. 7-2　Packing method

Version 3.0

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8. DEFINITION OF SHIPPING LABEL ON MODULE

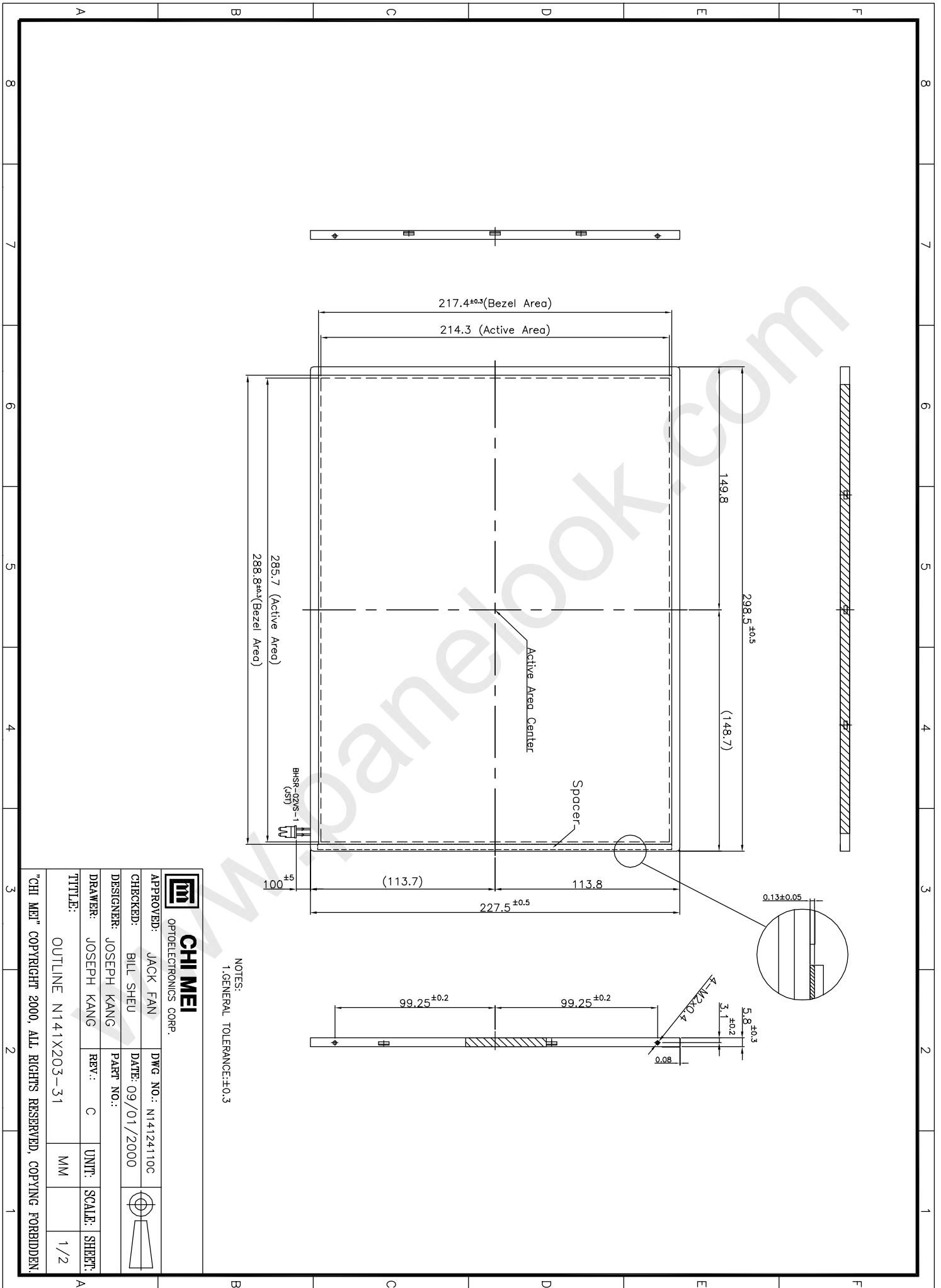The barcode nameplate is pasted on each module as illustration, and its efinitions are as following explanation.

```
     ┌─────────────────────────────────────────┐
     │  ┌───┐   N 1 4 1 X 2 0 3      Rev. XX     │
     │  │▲▲▲│   ‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖          │
     │  └───┘   0 4 C 1 0 3 1 0 3 9 1 0 0 0 1    │
     │  CHI MEI                                   │
     │  OPTOELECTRONICS         MADE IN TAIWAN    │
     └─────────────────────────────────────────┘
```
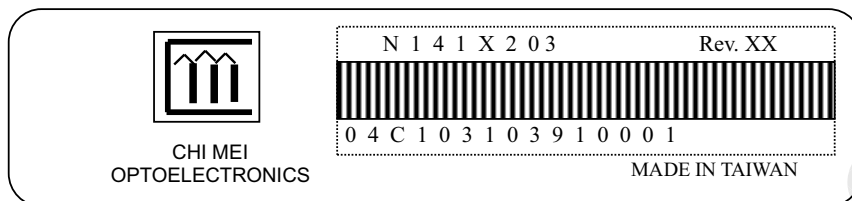
(1) Model Name : N141X203

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

(3) Serial ID Example : 0 4 C 1 0 3 1 0 3 9 1 0 0 0 1

- Serial No.
- Product Line
- Year, Month, Date
- CMO Internal Use
- Revision
- Model Code
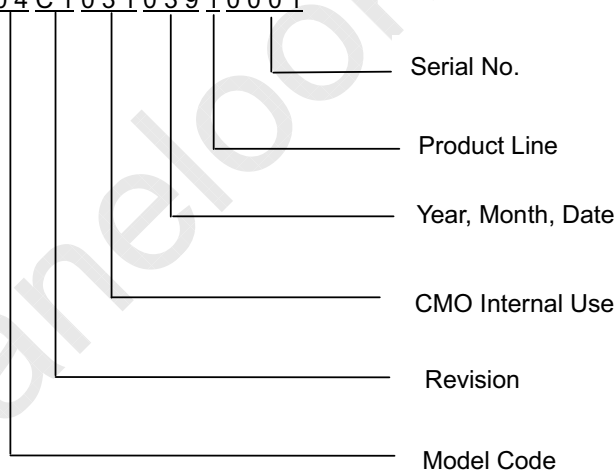
Serial ID include the information as list.

1. Manufactured Date : Year : 0~9, for 2000~2009

   Month : 0~9, A~C, for Jan. ~ Dec.

   Day : 0~9, A~Y, for 1st to 31th, exclude I and O

2. Revision Code : cover all the change

3. Model code

4. Serial No. : Manufacturing sequence of product

5. Product Line : 1 -> Line1, 2 -> Line 2 …,etc.

217.4±0.3(Bezel Area)

214.3 (Active Area)

149.8

298.5 ±0.5

(148.7)

285.7 (Active Area)

288.8±0.3(Bezel Area)

Active Area Center

Spacer

BHSR-02VS-1
(JST)

100 ±5

(113.7)

113.8

227.5 ±0.5

0.13±0.05

99.25 ±0.2

99.25 ±0.2

A-M3×0.4

5.8 ±0.3

3.1 ±0.2

0.08

NOTES:
1.GENERAL TOLERANCE:±0.3

CHI MEI
OPTOELECTRONICS CORP.

APPROVED:	JACK FAN
CHECKED:	BILL SHEU
DESIGNER:	JOSEPH KANG
DRAWER:	JOSEPH KANG
TITLE:	

DWG NO.: N141241I0C

DATE: 09/01/2000

PART NO.:

REV.: C

TITLE: OUTLINE N141X203-31

UNIT: MM

SCALE:

SHEET: 1/2

Model: N141X203
Rearing: 3.3Vdc 400mA
E207943
Chi Mei Optoelectronics Corp.

HIGH VOLTAGE
CAUTION

>PC<

N141X201

CAUTION
DON'T PRESS HERE

45 ±0.5

57.7 ±0.5

CHI MEI
OPTOELECTRONICS CORP.

APPROVED:	JACK FAN	DWG NO.:	N141241110C
CHECKED:	BILL SHEU	DATE:	09/01/2000
DESIGNER:	JOSEPH KANG	PART NO.:	
DRAWER:	JOSEPH KANG	REV.:	C
TITLE:	OUTLINE N141X203-31	UNIT:	MM	SCALE:		SHEET:	2/2

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