TFT LCD Approval Specification

MODEL NO.: N141XB -L02
Toshiba Model Name: G33C0001Z110

NOTICE of RECEIPT

We accepted this specification. **OME Operations, TOSHIBA Corp.**

Purchasing dept.	Eng.	Senr. Eng.	Senr. Mgr.
PC Hardware dept.	Eng.	Senr. Eng.	Senr. Mgr.

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

REVISION HISTORY

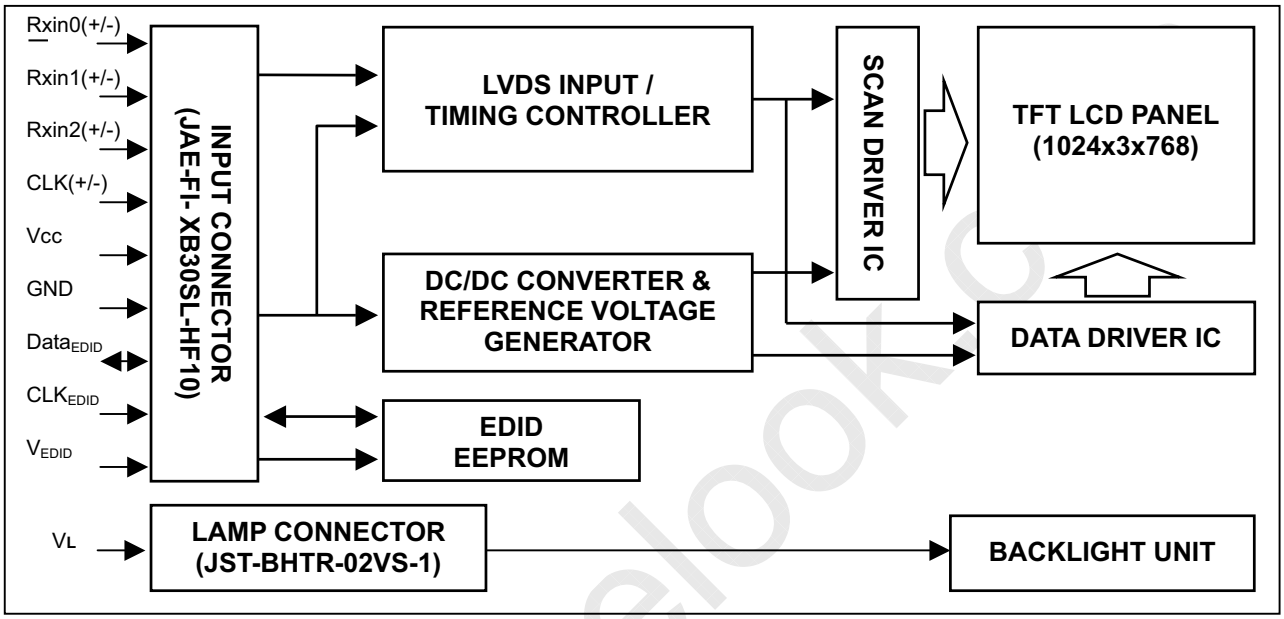
Version	Date	Page (New)	Section	Description
Ver 1.0	Feb. 10,'04	All	All	Preliminary Specification was first issued.
Ver 3.0	Mar. 30,'04	9	2.2	Startup Voltage 1760 → 1500 Vrms
				Added Leak current
		11		Added Note(8)
		12	3.1	Pin 4~7 Non Connection
		15	3.4.1	Added power off timing specifications t7
Ver 3.1	Apr. 19,'04	4	-	Modify Block Diagram
				Modify Mechanical specification
				Module Size Horizontal 299.0 ± 0.3 mm , Vertical 228.0 ± 0.3 mm
				Added min value of depth and weight
		7	1.3	Delete Note(4)
		9	2.1	Update Power Supply Current Specifications
				Revised Note(10) in page 11
				Delete "Leakage Current"
		12	3.1	Revised Pin 4~7
				Delete " or equivalent " in Note(2) and Note(3)
		15	3.4.1	Change t5 ≧200 msec to t5 ≧100 msec
				Change t6 ≧200 msec to t6 ≧100 msec
				Delete power off timing specifications t7
		17	4.2	Average luminance of white(5 points) : 160 Typ → 170 Typ
		18		Add Gamma Specification Min and Max Value
		Last	Drawing	Modify outline dimension tolerance ± 0.5 → ± 0.3
				Delete Active Area dimension tolerance ± 0.2

GENERAL DESCRIPTION

OVERVIEW

This 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.

BLOCK DIAGRAM



APPLICATION

-Note Book PC

GENERAL SPECIFICATI0NS

Item	Specifications	Unit
Screen Size	14.1 Diagonal	inch
Bezel opening area	288.9 (H) x 217.5 (V)	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	Hardness (3H), Anti-glare (Haze 25)	-

MECHANICAL SPECIFICATIONS

ITEM		MIN.	TYP.	MAX.	Unit	Note
Module Size	Horizontal	298.7	299.0	299.3	mm	-
	Vertical	227.7	228.0	228.3	mm	-
	Depth	4.9	5.2	5.5	mm	(1)
Weight		405	420	430	g	-

Note 1: The maximum thickness of I/O connector area is 5.5mm.

1. ABSOLUTE MAXIMUM RATINGS

1.1 ABSOLUTE RATING OF ENVIRONMENT

Item	Symbol	Min.	Max.	Unit	Note
Operating Ambient Temperature	T_{OP}	0	+50	°C	-
Operating Temperature for Panel	-	0	+60	°C	(2)
Storage Temperature	T_{STG}	-20	+60	°C	-
Operating Ambient Humidity	H_{OP}	20	90	%RH	(1)
Storage Humidity	H_{STG}	10	90	%RH	(1)
Air Pressure	-	70.0	-	kPa	Operation
Air Pressure	-	12.0	-	kPa	Non-Operation
Altitude	-	-	4572	m	Operation
Altitude	-	-	15240	m	Non-Operation

Note. (1) Wet bulb temperature should be 39°C Max, and no condensation of water.

(2) The surface temperature caused by self-heat radiation of cell itself is specified on this item.

1.2 ELECTRICAL ABSOLUTE RATINGS

(1) TFT LCD Module

Parameter	Symbol	Values		Unit	Remarks
		Min.	Max.		
Power supply voltage	V_{CC}	-0.3	+4.0	V	Ta=0~50ºC
Logic input voltage	V_{IN}	-0.3	V_{CC}+0.3	V	

(2) Backlight Unit

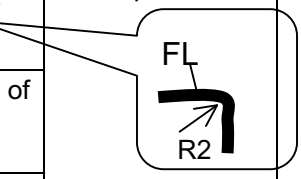
Parameter	Symbol	Values		Unit	Remarks
		Min.	Max.		
Lamp voltage	V_L	-	2.5K	V_{rms}	Note (1)
Lamp current	I_L	3.0	6.5	mA_{rms}	-
Lamp frequency	f_L	-	80	kHz	-

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.

1.3 MECHANICAL RATINGS

LCD shall have no failure in the following reliability items.

Item	Test Conditions		Note
Mechanical Vibration	Frequency Range 5 – 500 Hz, 14.7m/s^2 (1.5G) constant, 0.5Hrs each axis (X, Y, Z direction)		Non Operation
	Frequency Range 5 – 500 Hz, 4.9m/s^2 (0.5G) constant, 0.5Hrs each axis (X, Y, Z direction)		Operation
Mechanical Shock	2548m/s^2(260G), Pulse width 2ms, Half-Sine Wave, ±X, ±Y, ±Z direction, each 1 time		Operation & Non Operation
	686m/s^2(70G), Pulse width 11 ms, Half-Sine Wave, ±X, ±Y, ±Z direction, each 3 times.		Non Operation
Pressure Resistance	No Destruction with the force 196 N (20 kgf, 16 mm in diameter) to the display surface at the vertical direction		Non Operation Fig 1-3-1 Fig 1-3-2 Fig 1-3-3
	No Destruction with the force 294.2 N (30 kgf, 30 mm in diameter) to the back of the display surface at the vertical direction		
Strength of FL Cable	Strength of rotation force	Cable : No disconnection of cable to the 5 trial of 360 degree rotation. See a bent state of cable.	Non Operation
		Connector : No disconnection of cable to 10 trial of 180 degree rotation. See a bent state of cable.	
	Lead pull test	Soldering portion : 14.7N (1.5kgf), 1min	
		Connector : 14.7N (1.5kgf), 1 sec	
Connector tension test	Input connector : With 50 times of connector trial there must be no damage to the shape and functional.		Non Operation
	Back light connector : With 50 times of connector trial there must be no damage to the shape and functional.		
Assured torque value at side-mount part	245 mN·m (2.5 kgf·cm)		Non Operation
Rescrewed test	10 times under 245.0 mN·m (2.5 kgf·cm)		Non Operation
Tapping test	Test “ Ripple “ Phenomenon.		Operation



Definitions of failure for judgment shall be as follows:

1) Function of the module should be maintained.

2) Current consumption should be smaller than the specified value.

3) Appearance and display quality should not have distinguished degradation.

4) Luminance should be larger than the minimum value specified in optical specification.

NOTE

(1) The compression condition of front side

(a) Compression point : 12 points (refer to Fig 1-3-1)

(b) Compression condition: Time 3 sec, Tool diameter: 16 mm in diameter (refer to Fig 1-3-3)

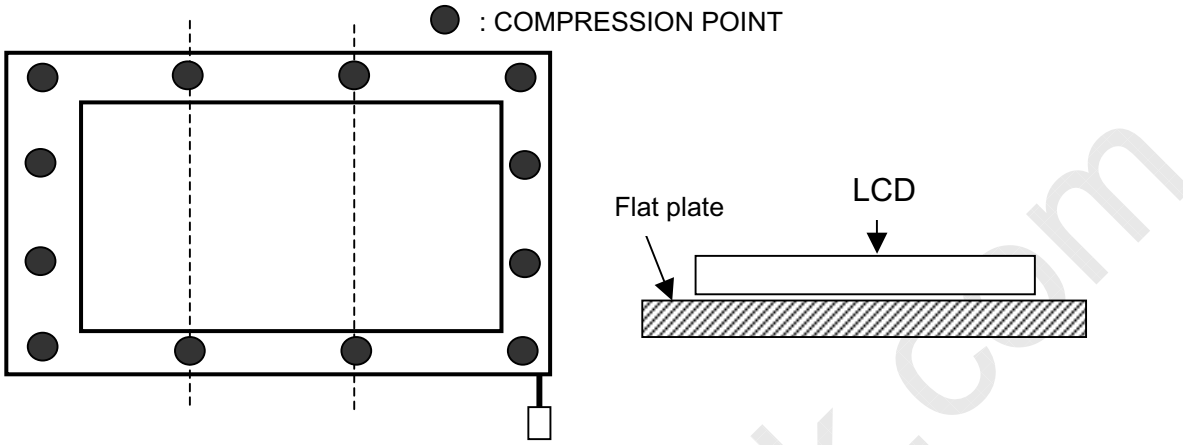


Fig 1-3-1

(2) The compression condition of rear side

(a) Compression point : 21 points (refer to Fig 1-3-2)

(b) Compression condition : Time 3 sec, Tool redius: 30 mm in diameter (refer to Fig 1-3-3)

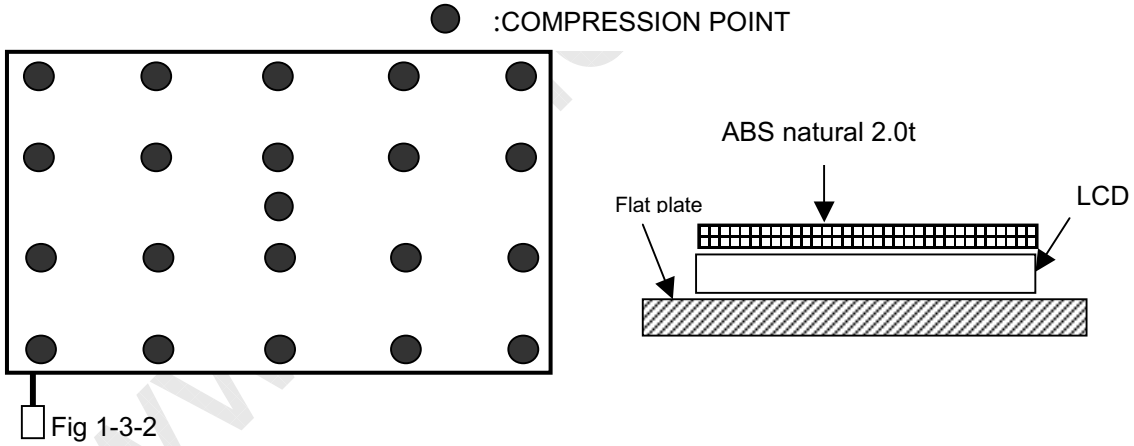


Fig 1-3-2

(3) Dimension of the compression jig

(a) compression jig for front side A = 16 mm in diameter

B = 16 mm in diameter

(b) compression jig for rear side A = 30 mm in diameter

B = 28 mm in diameter

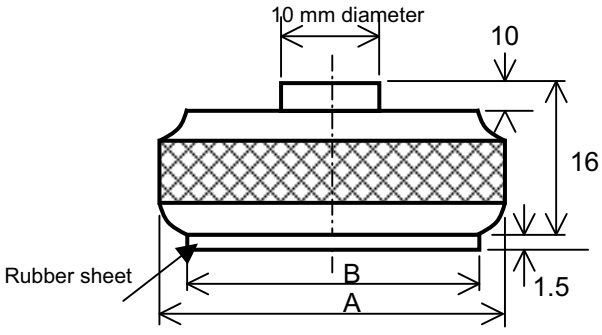


Fig 1-3-3

1.4 THE OTHERS

(1)Static electricity pressure resistance

Items	Testing conditions	Operation	Non Operation
Contact discharge	150pF, 330 ohm	±10 kV	±10 kV
Air discharge	150pF, 330 ohm	±20 kV	±20 kV

ESD Acceptance Definition:

Temporary performance degradation. Recovery by operator is acceptable. No hardware failure.

(2) Sound noise

There should be no uncomfortable noise.

Being used under whatever surrounds, when power on/off, the panel should not generate uncomfortable noise.

(3) Open / Short

No smoke, no firery at any open/ short test

(4) MTBF : 50000 Hr (except for backlight lamp)

2. ELECTRICAL SPECIFICATIONS

2.1 TFT LCD MODULE

MODULE							
Parameter		Symbol	Value			Unit	Notes
			Min.	Typ.	Max.		
Power Supply Voltage		V_{CC}	3.0	3.3	3.6	V	(1)
"H" level LVDS signal input		V_{IH}	-	-	+100	mV	
"L" level LVDS signal input		V_{IL}	-100	-	-	mV	
Power Supply Current	White	I_{CC}	300	330	380	mA	(10)
	Black		400	450	500		
	Maximum		450	500	550		
Rush Current		I_{RUSH}	-	1.0	1.5	A	(2)
Ripple voltage		V_{RP}	-	-	100	mV	(1)
Terminating resistor		Rt	-	100	-	Ohm	

LCD Fuse name: Kamaya(manufacturer)

2.2 BACKLIGHT UNIT

LAMP : West, K-CB292-K-82KH

BACKLIGHT (1 Lamp)						
Parameter	Symbol	Value			Unit	Notes
		Min.	Typ.	Max.		
Lamp Voltage	V_L	576	640	704	V_{RMS}	I_L=6.0mA
Lamp Current	I_L	3.0	6.0	6.5	mA	(3)
Startup Voltage	V_S	-	-	1360 (25°C)	V_{RMS}	(4)
		-	-	1500 (0 °C)	V_{RMS}	(4)
Operating Frequency	F_L	50	-	80	KHz	(5)
Power Consumption	P_L	-	3.84	-	W	(6), I_L=6.0mA
Lamp Life time	L_{BL}	10000	15000	-	Hrs	(7)

The connector information of Black light unit.

Pin	Symbol	Description	Remark
1	HV	Lamp power input	Pink
2	LV	Ground	Black

Connector Part No.: BHTR-02VS

User's connector Part No.: SM02B-BHTS-B-TB

2.3 MATERIAL LIST CONCERNING EMI REGULATIONS

(1) EMI Regulations:

"N141XB-L02" which is assembled inside Toshiba's Satellite model should be met to the regulations as below:

CISPR: Pub.22 Class B

FCC : Part 15 Class B

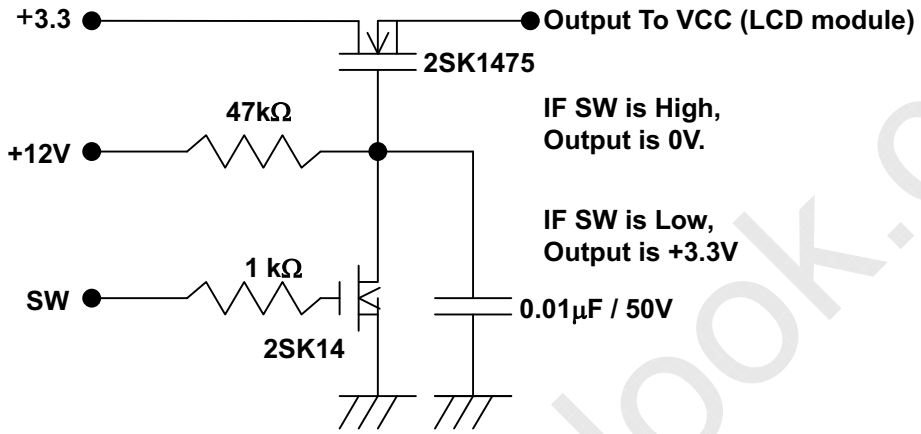
VCCI : Class B

(2) Safety regulation (CMO TFT-LCD module only): UL 1950

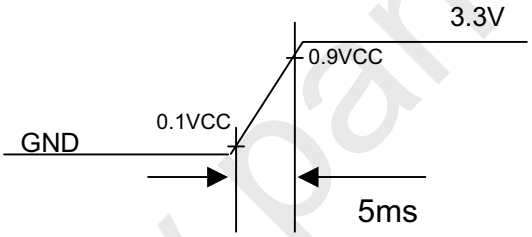
1. EMI Filter	Silk	Product Code	Rating	Maker
Bead	L1,	CMD5D11-100MC	10uH,+-20%,0.54 A,H=1.2mm(Max)	Sumida
Chip Resistor	L101,L102,R211, L401,L201	N/A	0 Ohm	
2. DC/DC Converter	**Silk**	**Osc. Freq.**		**Maker**
PWM IC	U9	Typ 1.2 MHz.		Maxim Technology

Note (1) Operating Temp. range is 0 ~ 50 ºC

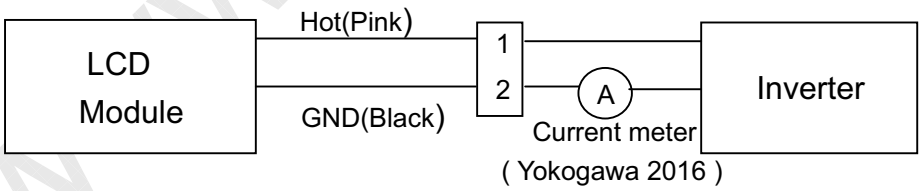
Note (2) Measurement Conditions



VCC rising time is 5ms



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±2℃ 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.

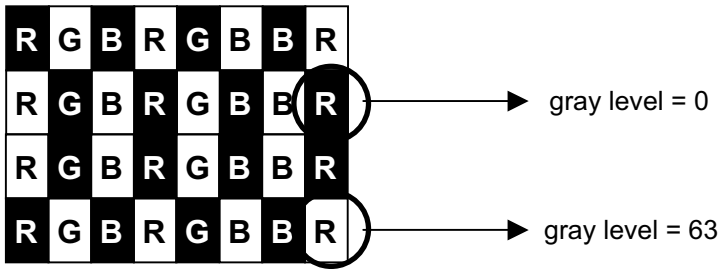
Note (9) Vcc drop voltage that caused by rush current when sw-on (refer to Note(2) test circuit) is max.=0.5V

Note (10) The specified power supply current is under the conditions, Ta = 25 ± 2 ºC, fv = 60 Hz, whereas a power dissipation check pattern below is displayed. The maximum value is measured when VCC=3.0V, the typical value is measured when VCC=3.3V and the minimum value is measured when VCC=3.6V.

a. White Pattern

b. Black Pattern

c. Maximum pattern (Zoom in)



• • • expend to whole active area

3. INTERFACE SPECIFICATIONS

3.1 THE PIN ASSIGNMENT OF LVDS INTERFACE CONNECTOR.

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	V_{EDID}	DDC 3.3V Power		DDC 3.3V Power
5	NC	Non-Connection		
6	CLK_{EDID}	DDC Clock		DDC Clock
7	$DATA_{EDID}$	DDC Data		DDC Data
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

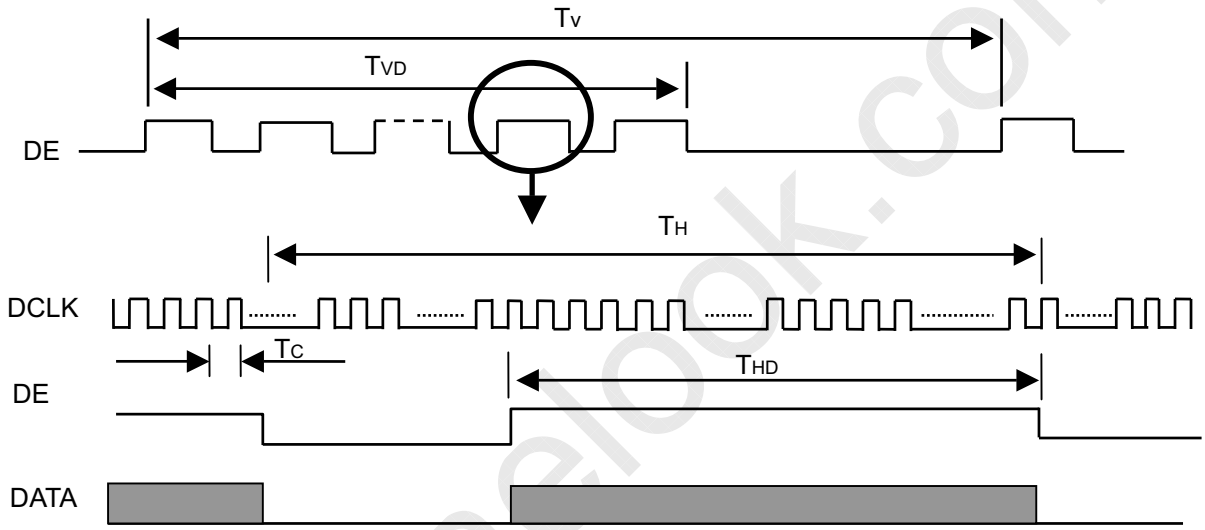
Note (3) User's connector Part No: JAE-FI-X30C2L

3.2 INPUT SIGNAL TIMING SPECIFICATIONS

The specifications of input signal timing are 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	768	768	TH	-
	Horizontal Total Time	TH	1200	1344	1500	Tc	-
	Horizontal Addressing Time	THD	1024	1024	1024	Tc	-

INPUT SIGNAL TIMING DIAGRAM



3.3 COLOR DATA INPUT ASSIGNMENT

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

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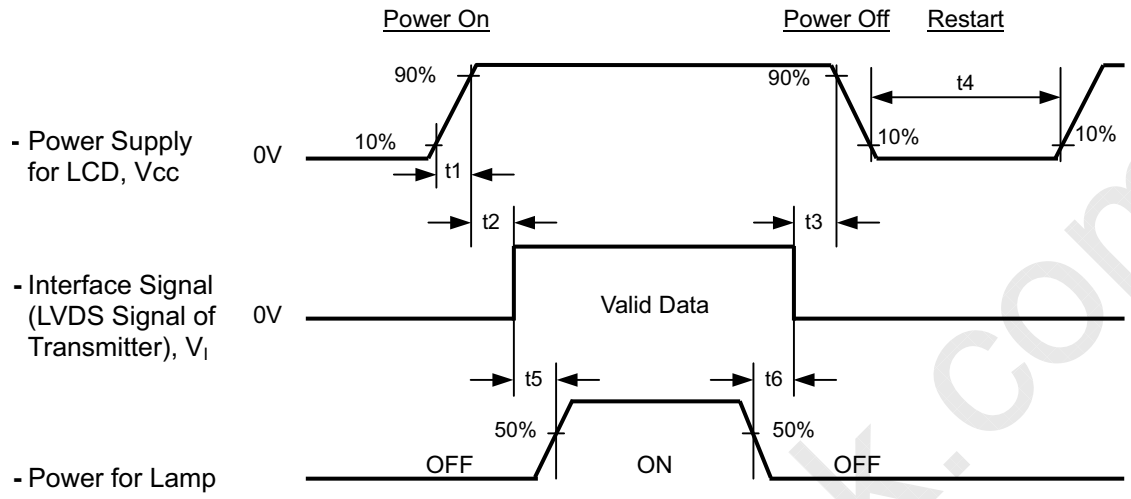
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

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

3.4 POWER UP/DOWN SEQUENCE & VCC DIP CONDITIONS

3.4.1 POWER UP/DOWN SEQUENCE



Timing Specifications:

470us ≦ t1 ≦ 10 msec

0 < t2 ≦ 50 msec

0 < t3 ≦ 50 msec

t4 ≧ 500 msec

t5 ≧ 100 msec

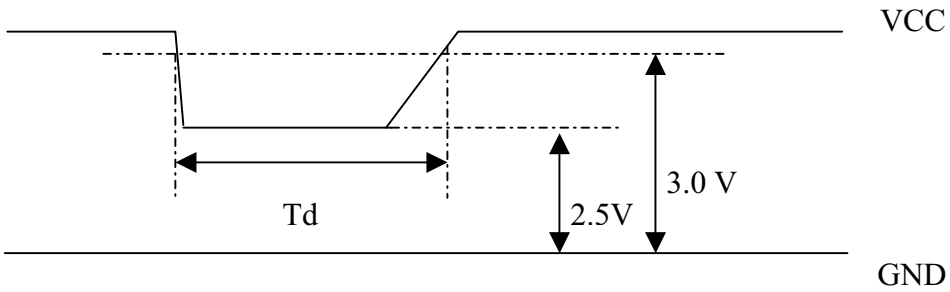
t6 ≧ 100 msec

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.

3.4.2 VCC DIP CONDITIONS



(1) 2.5V≦ VCC< 3.0V

Td≦20 ms

(2) VCC< 2.5V

Vcc-Dip conditions also follow the power up/down conditions for supply voltage.

4. OPTICAL SPECIFICATIONS

4.1 TEST CONDITIONS

Ambient Temperature : T_a = 25±2°C
Ambient Humidity : H_a 50±10%RH
Supply Voltage : V_{DD} = 3.3V
Input Signal : According to typical value in "Electrical Characteristics"
FL Input Current : I_{FL} =6.0mArms
FL Driving Frequency : f_{FL} = 60 kHz
FL Inverter : H05-4783B (Sumida)

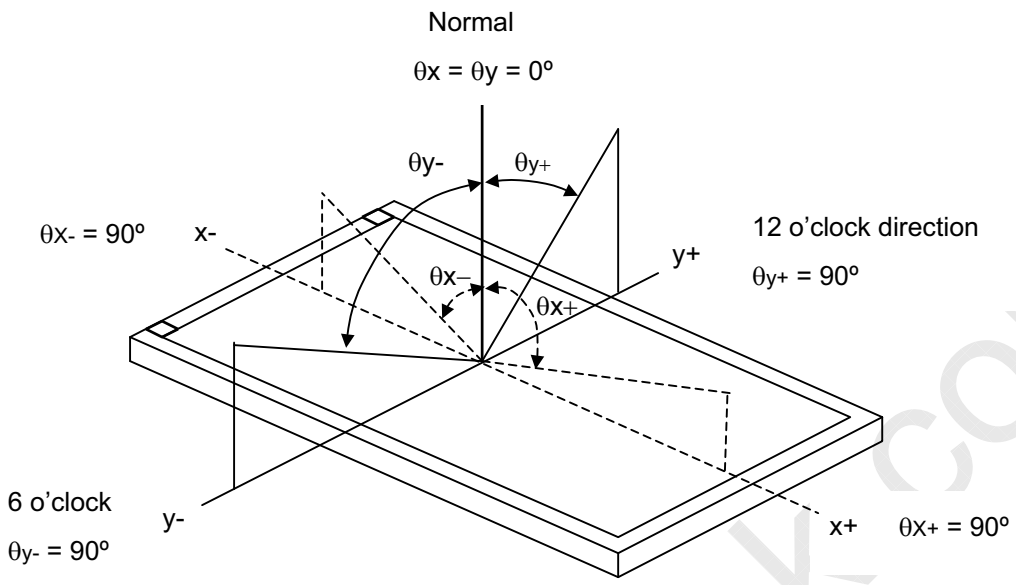
The measuring method is shown in 4.2. The following items are measured under stable conditions. The optical characteristics should be measured in a dark room (Screen luminance < 2-lx) or equivalent state with the methods shown in Note (6).

4.2 OPTICAL SPECIFICATIONS

Item		Symbol	Conditions	Specifications Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR_{AVE}	$\theta_X = \theta_Y$ =0° Viewing normal angle	200	300	-	-	(2),(6)
Response Time		T_R		-	6	10	ms	(3)
		T_F		-	17	25	ms	
Average luminance of white (5 points)		$Y_{L,AVE}$		130	170	-	cd/m^2	I_{FL}=6.0mArms * Gray Scale Level=L63 (White) (4)
Cross Modulation		D_{SHA}		-	-	1.0	%	(5)
Luminance Uniformity 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		0.283	0.313	0.343	-	
		Wy		0.299	0.329	0.359	-	
Viewing Angle	Hor.	θ_{X+}	Center CR>=10	40	45	-	deg.	
		θ_{X-}		40	45	-		
	Ver.	θ_{Y+}		15	20	-		
		θ_{Y-}		35	40	-		
	Hor.	θ_{X+}	Center CR>=5	50	55	-		
		θ_{X-}		50	55	-		
	Ver.	θ_{Y+}		25	30	-		
		θ_{Y-}		40	45	-		
13 Points White Variation		δ W	$\theta_X = \theta_Y$ =0° Viewing normal angle	-	1.3	1.6	-	(7)
13 Points CR Variation		δC_R		-	2.0	2.5	-	(7)
White Variation		dL		-	-	1.5	%/mm	(8)

Item	Symbol	Conditions	Specifications			Unit	Note
			Min.	Typ.	Max.		
Gamma	63	$\theta_X = \theta_Y = 0°$ Viewing normal angle	100	100	100	%	(1) (6) at center of Viewing area center only
	60		83.4	89.8	96.9		
	56		65.6	77.2	91.3		
	52		51.7	65.6	83.6		
	48		40.4	55.0	74.8		
	44		32.1	45.4	66.4		
	40		25.0	36.8	57.5		
	36		19.1	29.2	48.4		
	32		14.2	22.5	39.4		
	28		10.5	16.8	31.4		
	24		7.4	12.0	23.6		
	20		4.8	8.0	16.4		
	16		2.8	4.9	10.1		
	12		1.4	2.6	5.3		
	8		0.5	1.1	1.9		
	4		0.1	0.2	0.4		
	0		0	0	0		

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



Note (2) Definition of Contrast Ratio :

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63 / L0

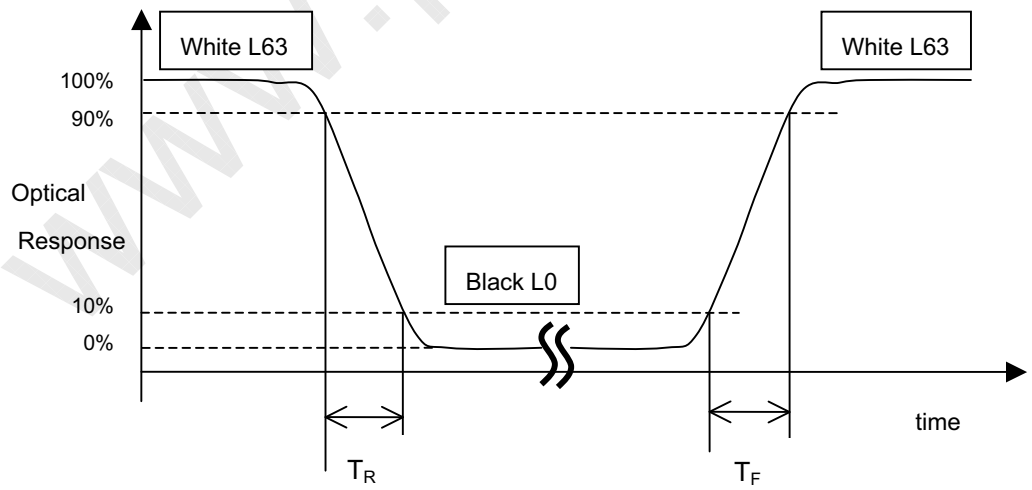
L63 : Luminance on the white raster (gray scale level L63)

L 0 : Luminance on the black raster (gray scale level L0)

CR_{AVE} = (CR(4)+CR(5)+CR(7)+CR(9)+CR(10))/ 5

CR(X) is correspond to the Contrast Ratio of a point of X at Figure of Note (7).

Note (3) Definition of Response time :



Note (4) Definition of Average Luminance of White :
measure the luminance of white at 5 points.
Average Luminance of White $Y_{L,AVE}$

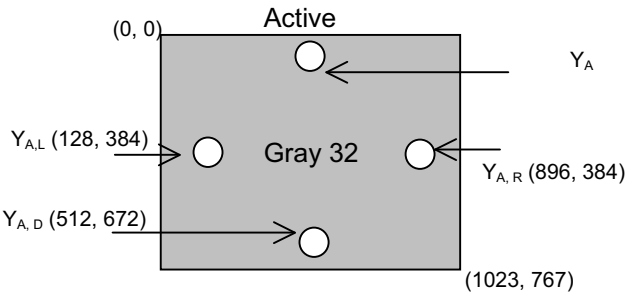
$$Y_{L,AVE} = (Y_{L4} + Y_{L5} + Y_{L7} + Y_{L9} + Y_{L10}) / 5$$

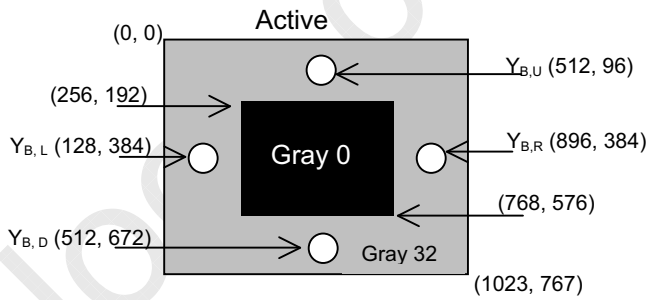
Y_{LX} is correspond to the Luminance of a point of X at Figure of Note (7).

Note (5) Definition of Cross Modulation (D_{SHA})

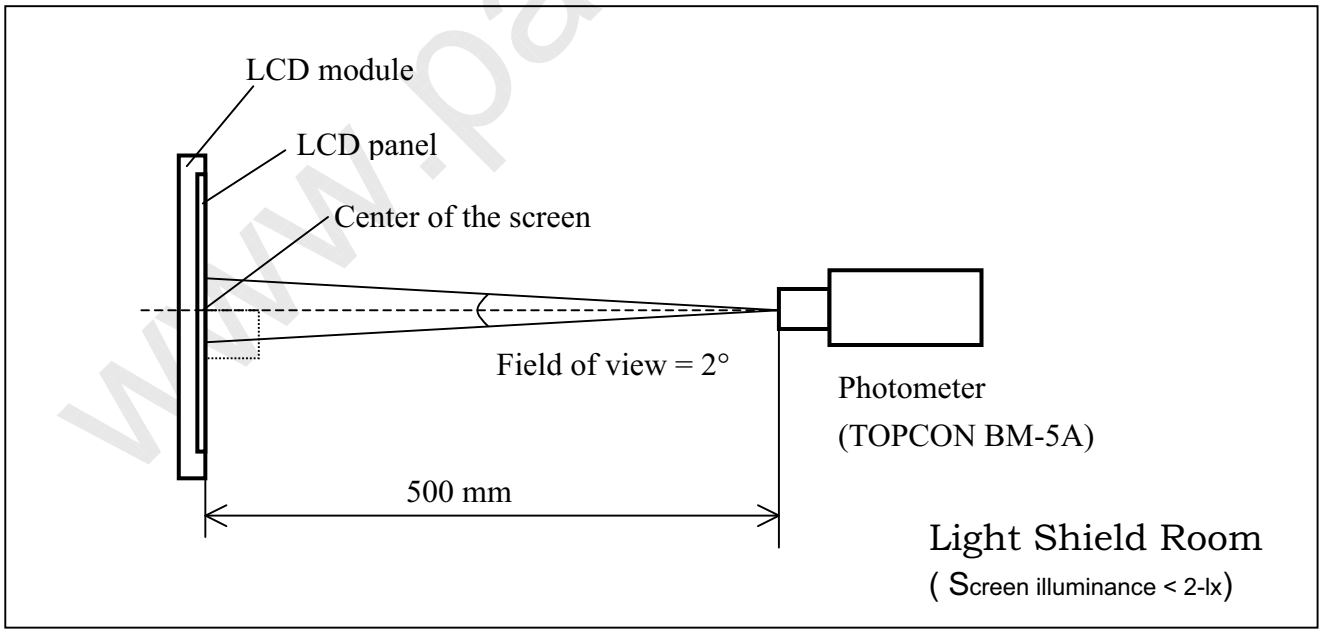
$$D_{SHA} = | Y_B - Y_A | / Y_A \times 100 \ (\%)$$

Where :
Y_A = Luminance of measured location without darkest gray pattern (cd/m^2)
Y_B = Luminance of measured location with darkest gray pattern (cd/m^2)





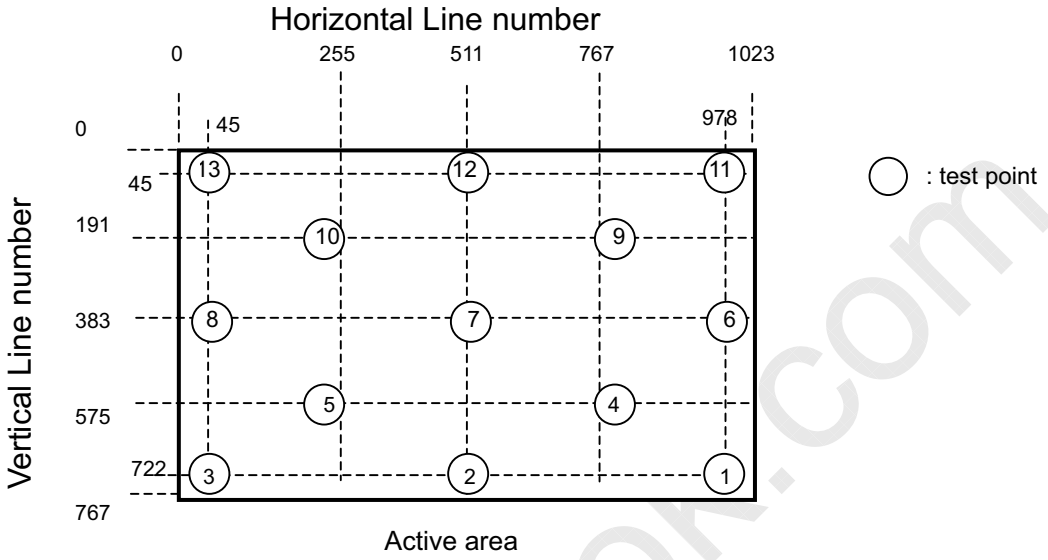
Note (6) Measuring setup :
The measurement suppose to be executed after stabilized the panel at given temperature during 30min. in the case of abrupt temperature change. The measurement shall be executed 30 minutes after lighting at rating. The luminance of white should be typical luminance (Typical Condition IL=6.0mA). In order to stable the luminance, LCD shall not be gotten winds.



Note (7) Definition of 13 points white variation δW, CR variation δC_R

δW = Maximum luminance of 13 points / Minimum luminance of 13 points

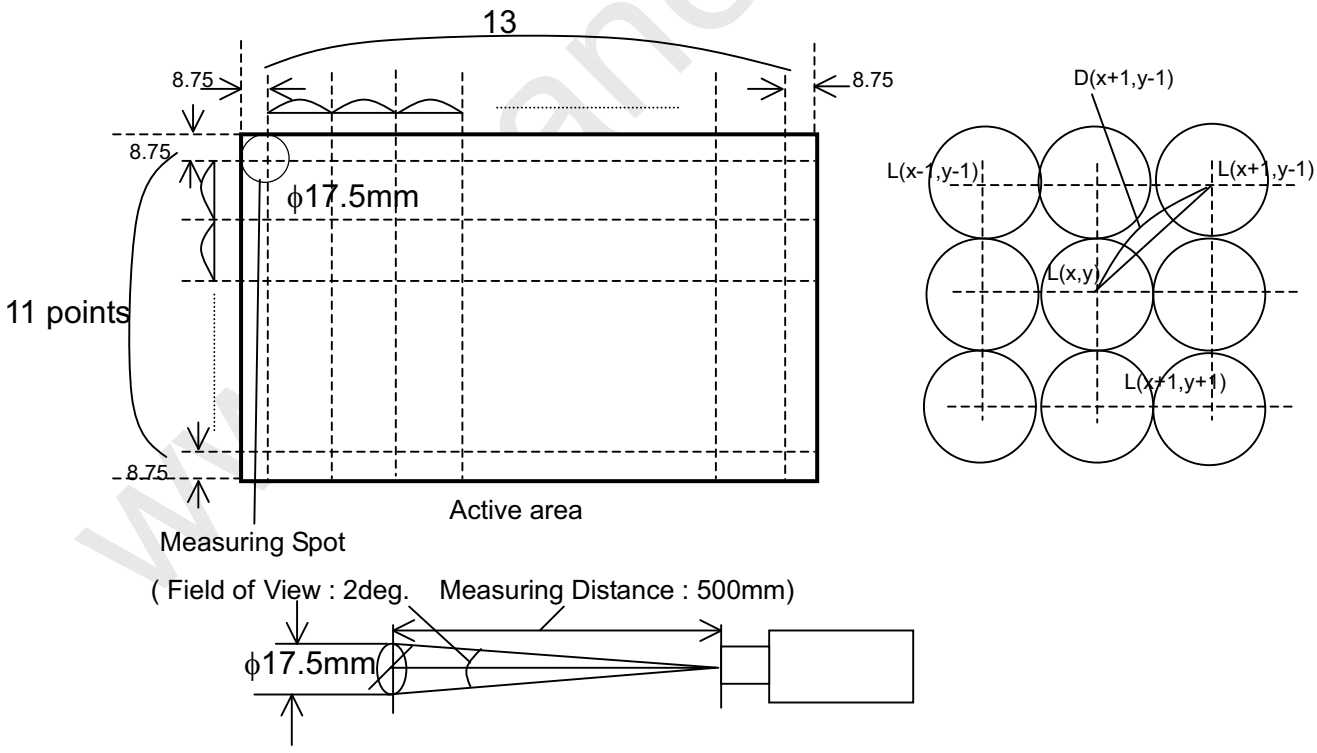
δC_R = Maximum CR 13 points / Minimum CR of 13 points



Note (8) Definition of White Variation dL : measure the luminance of white at 13 ×11 points.

$$dL = | L(x,y) - L(x+I, y+j)| / (L(x,y) \times D(x+I, y+j)) \times 100 \quad (\%/mm)$$

where $2 \le x \le 12$, $2 \le y \le 10$, $I = \pm 1$, $j = \pm 1$



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.

7. PACKAGING

7.1 PACKING SPECIFICATIONS

(1) 20 LCD modules / 1 Box

(2) Box dimensions : 511(L) X 420(W) X 360(H) mm

(3) Weight : approximately 11.3Kg (20 modules per box)

7.2 PACKING METHOD

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

Test Item	Test Conditions	Note
Vibration	Frequency Range: 5 – 50 Hz, Degree of acceleration 9.8 m/s^2(1G). Sweep rate 3 minutes Top & Bottom 60 minutes, Right & Left 15 minutes, Back & Forth 15 minutes	Non Operation
Dropping Test	1 Angle, 3 Edge, 6 Face, 60cm	Non Operation

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

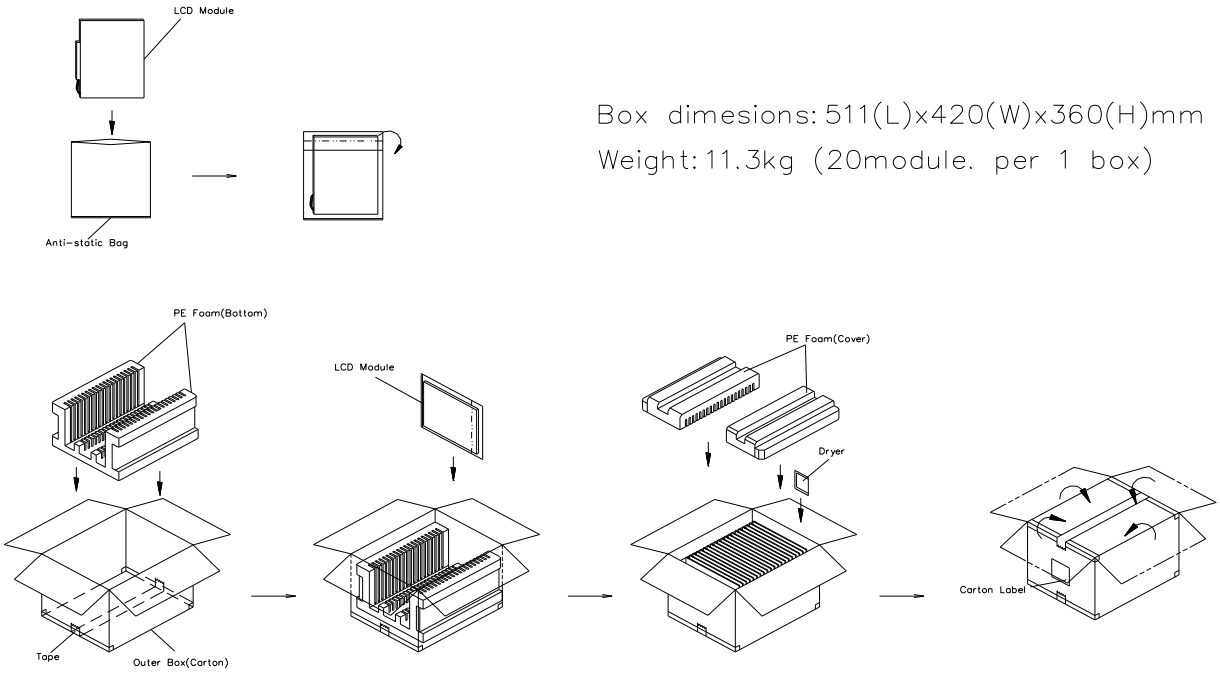


Figure. 7-1 Packing method (Carton)

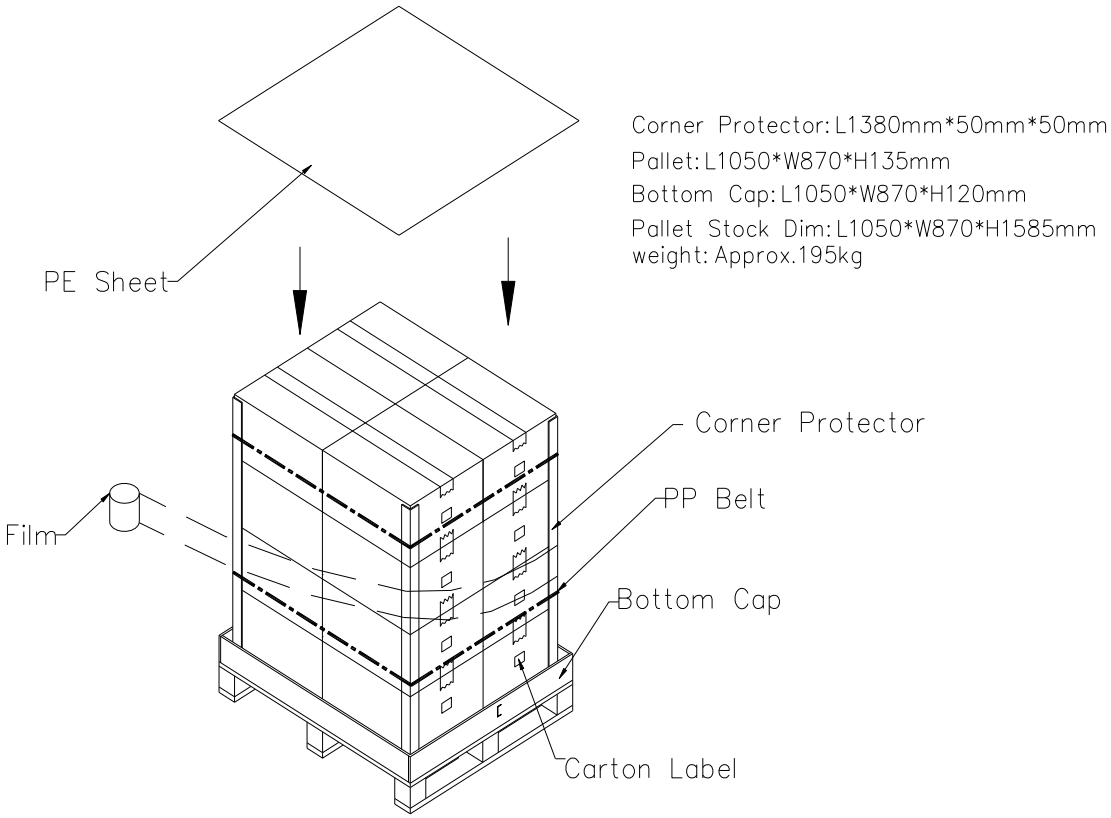


Figure. 7-2 Packing method (Pallet)

8. DEFINITION OF SHIPPING LABEL ON MODULE

(1) CMO Label

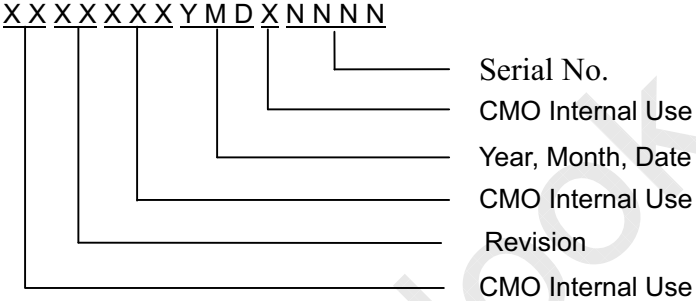
The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.

(70mm x 24mm)

(a) Model Name: N141XB - L02

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

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



Serial ID includes the information as below:

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

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

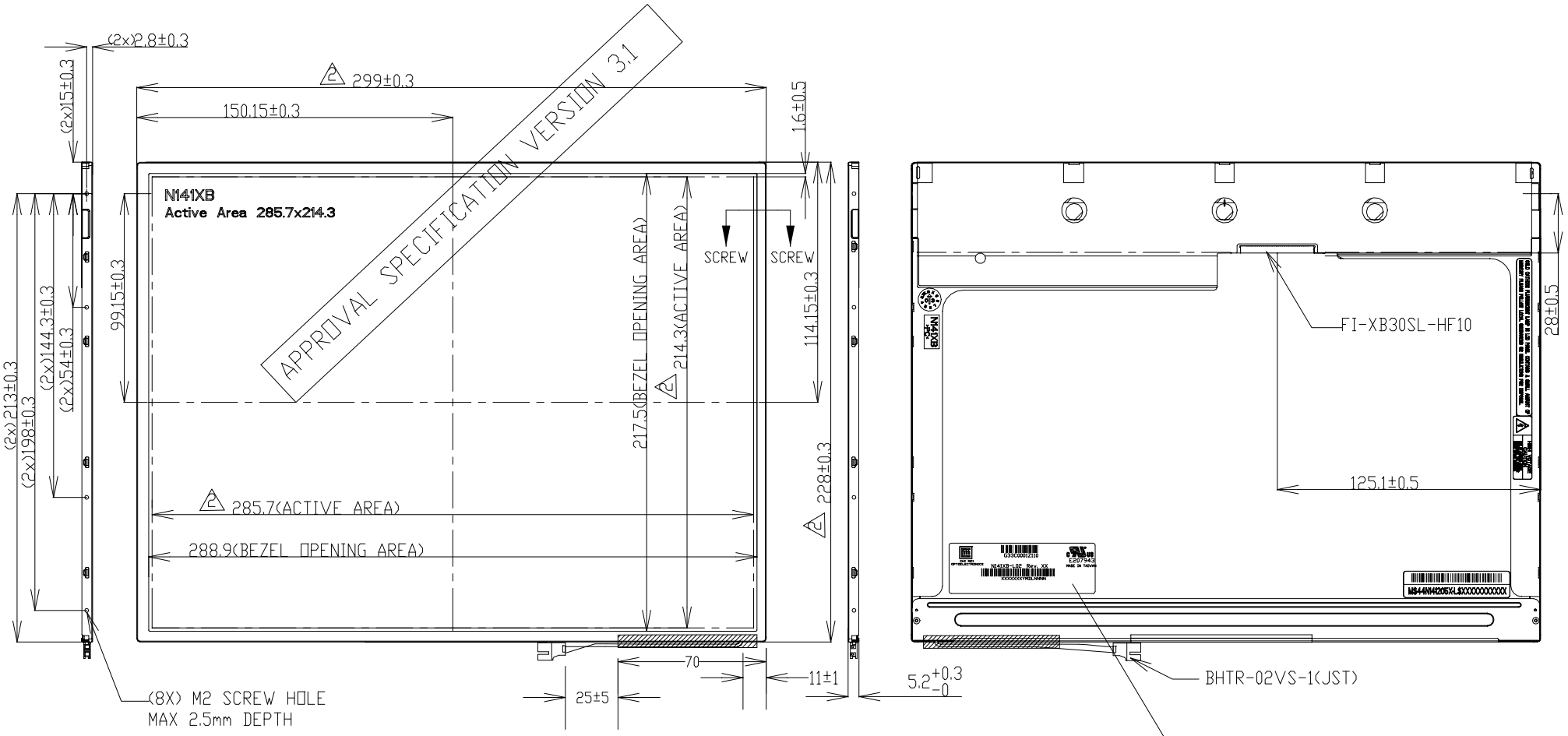
Day: 1~9, A~Y, for 1st to 31st, exclude I , O and U

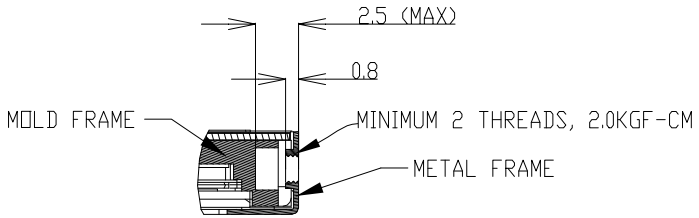
(b) Revision Code: cover all the change

(c) Serial No.: Manufacturing sequence of product

(2) Carton Label

(3) Pallet Label





SECTION SCREW-SCREW
SCALE 3:1

MARK	DESCRIPTION	DATE	CHANGE BY	APPROVAL BY	ECN NO.
2	Modify Dimension	4/15	YULE LIN	YULE LIN	

TITLE	OUTLINE DRAWING N141XB-L02		REV. 2	VER.	
Approved	BILL SHEU	Drawing No.	N141C41022		
Checked	YULE LIN	Part No.			
Drawer	YULE LIN	Material		Sheet 1/1	A3
Designer	CHI TSAI	Date 15-APR-2004	Scale 1:1	Unit:mm	

CHI MEI OPTOELECTRONICS CORP.