TO: **TOSHIBA CORPORATION**

DATE: **'04.05.31.**

Specification of 15.0" TFT/LCD
MODEL: LP150X10(A3)

Prepared	Checked	Approved	
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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

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Record of Revision

Date	Rev. No.	Sheet(New)	Item	Old	New	Reason
04.06.02	0.1	All				

1. Scope

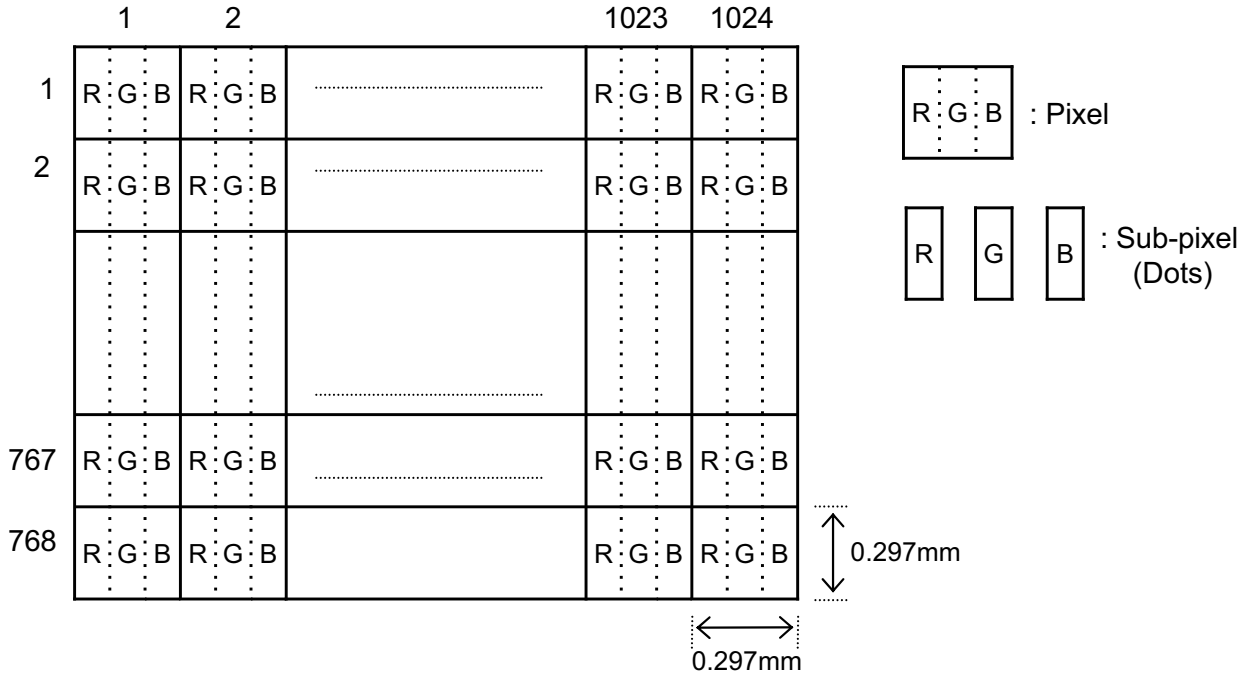
This specification is applicable to LCD manufacturer's 38.1cm (15.0") diagonal size TFT-LCD module "LP150X10(A3)" designed for Personal Computer.

2. General Specification

2.1. Features

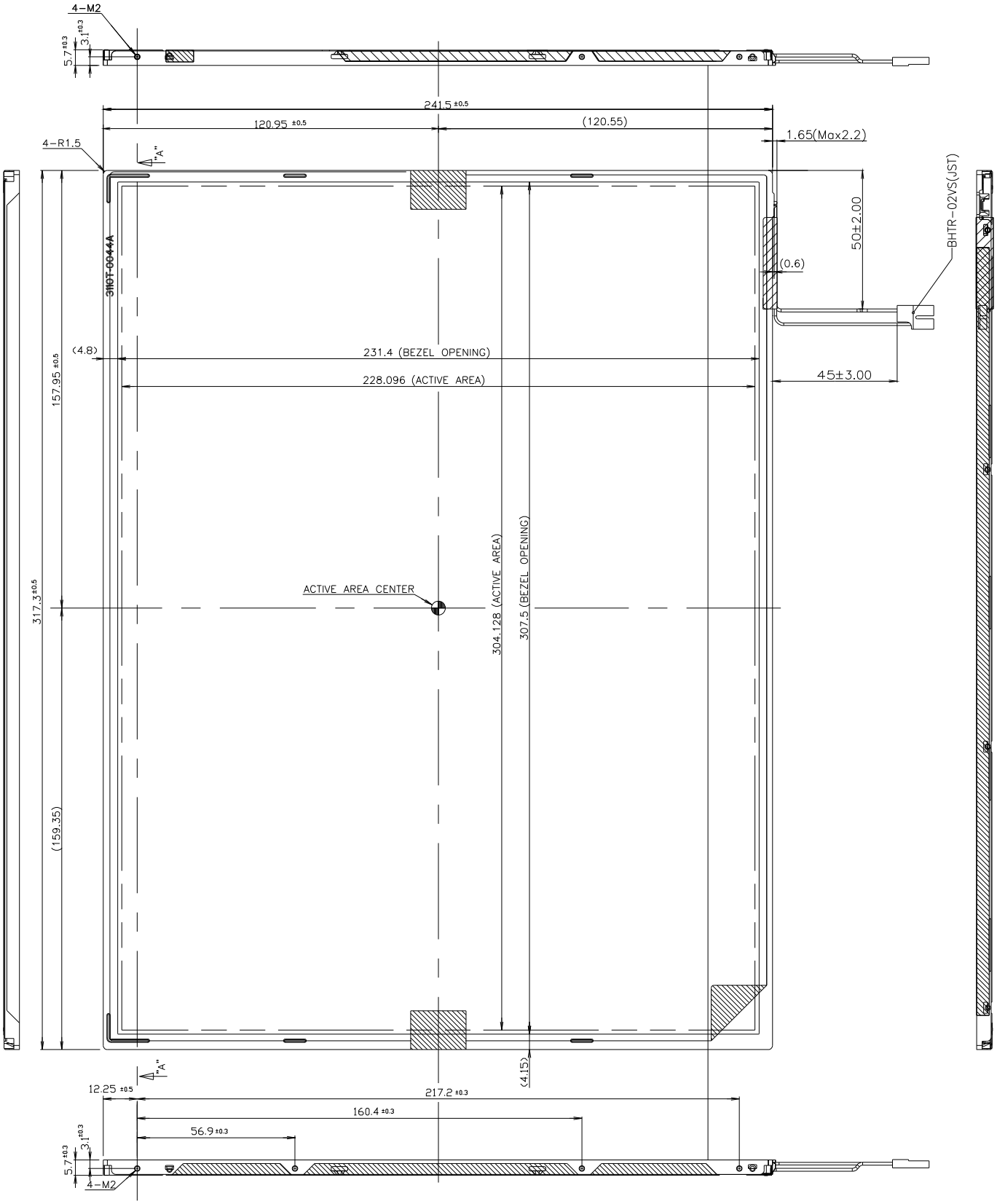
Item	Specifications
Display area (Active area)	304.128 (W) × 228.096 (H) (mm) (15.0 " diagonal)
Driving Method	TFT active matrix
Number of Pixels	1024 (W) × 768 (H) × R,G,B (XGA) (pixels) 1)
Pixel pitch	0.297 (H) × 0.297 (V) (mm) 1)
Pixel Arrangement	RGB vertical stripes 1)
Display color	262,144 (colors)
Display Mode	Transmissive mode, Normally white
Viewing Direction	6 o'clock (in direction of maximum contrast)
Surface Treatment	Anti – reflect & hard coating(2H) & Glare
Interface	LVDS
Backlight	Single cold-cathode fluorescent lamp for side-lighting
Dimensional Outline	317.3±0.5 (W) × 241.5±0.5 (H) × 6.5±0.3 (D) (mm)
Bezel Opening	307.5±0.5 (W) × 231.4±0.5 (H) (mm)
Weight	565g(Typ.) 580g(Max.)

Note 1)

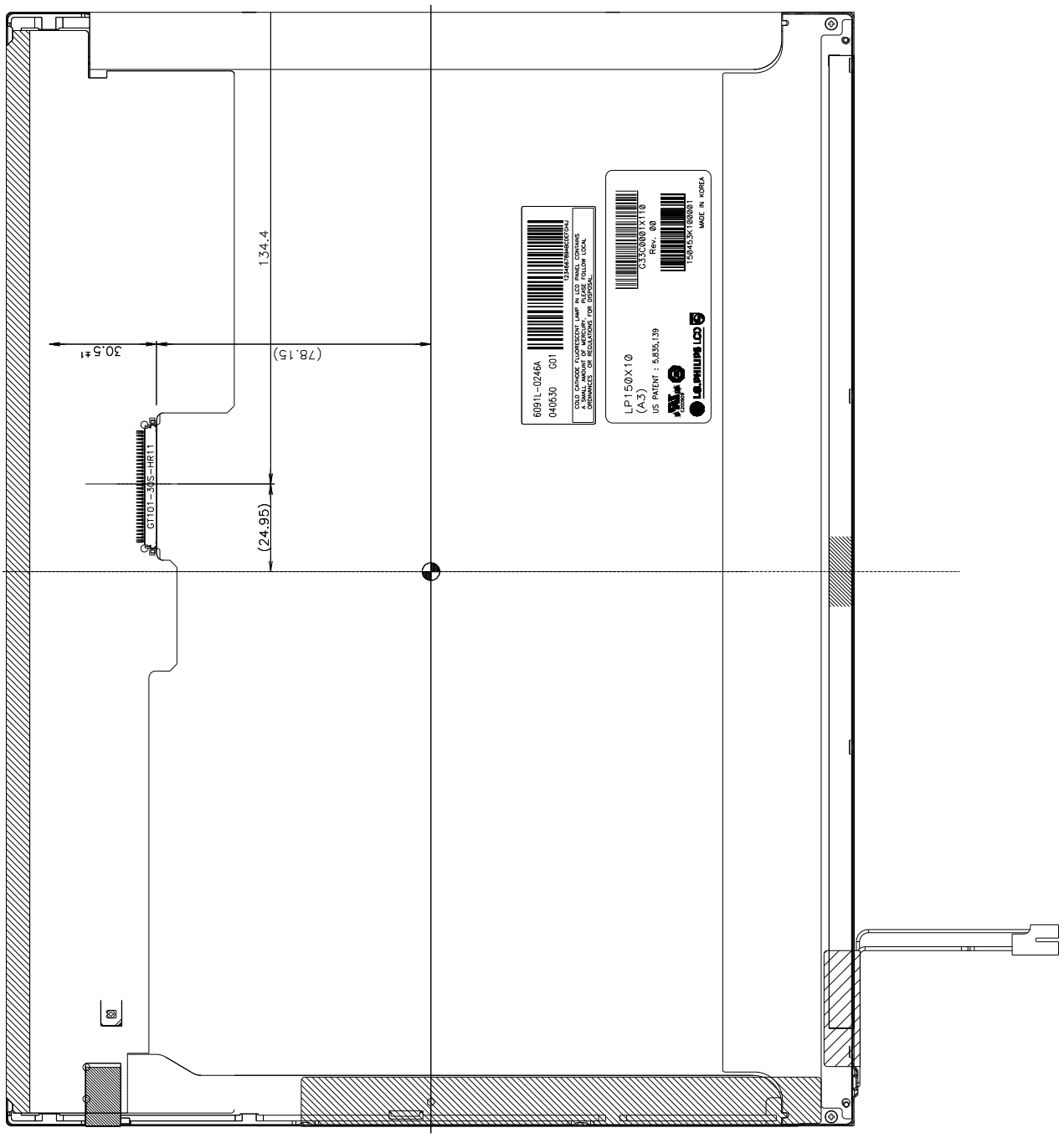


2.2. Dimensional Outline

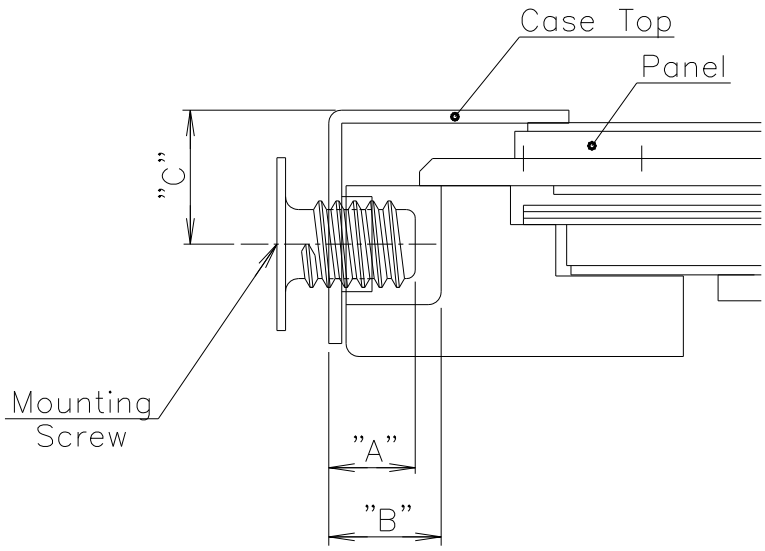
(Front figure)



(Back figure)

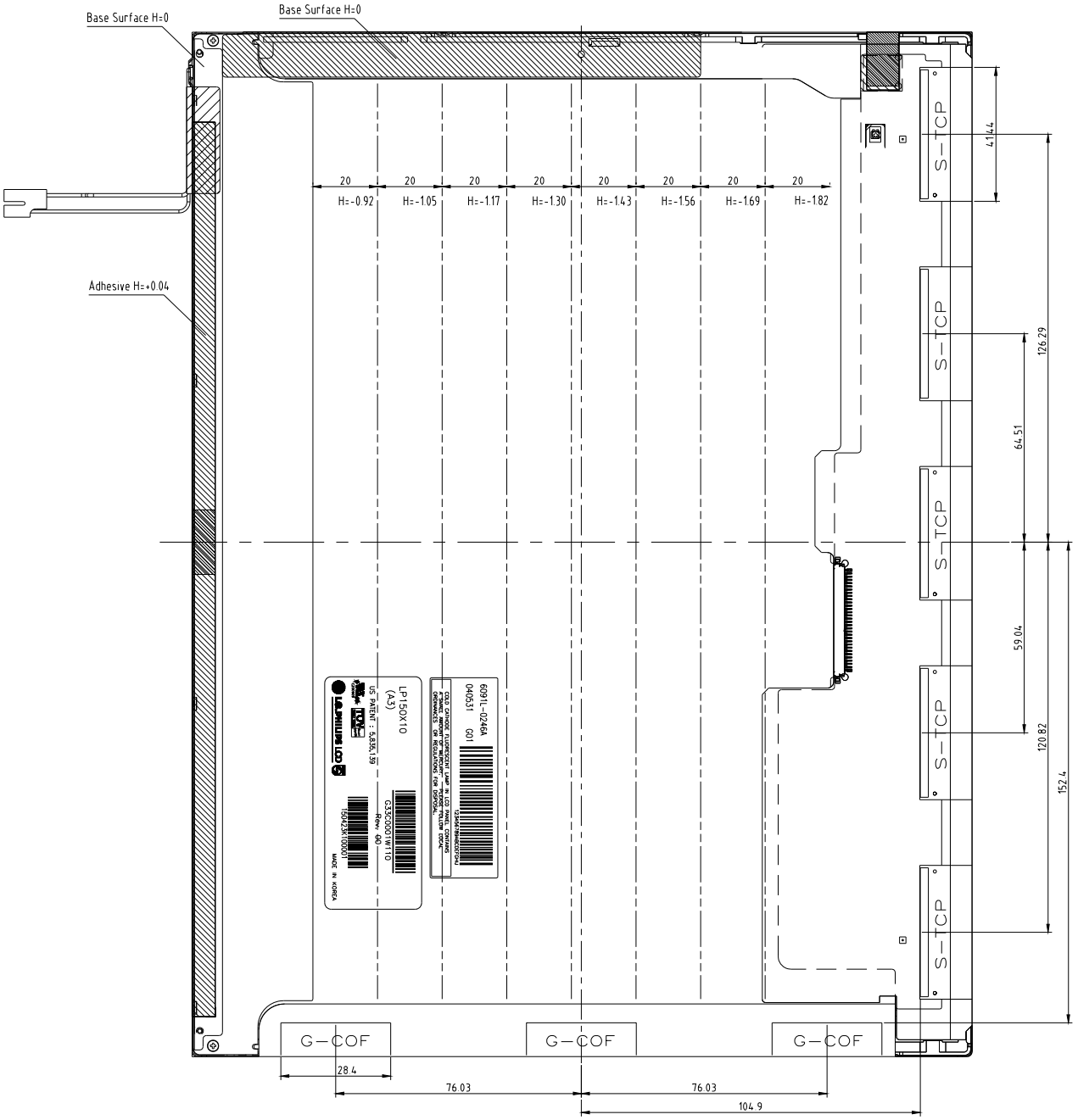


(Detail description of side mounting screw)



* Mounting Screw depth
  depth Min. : "A" =2.0
  depth Max : "B" =2.5
* Mounting hole location : "C" = 3.1(Typ.)
*Torque : 2 kgf.cm(Max.)
 (Measurement gauge : torque meter)

(Detail description of height of LCM back side & TAB Zone)

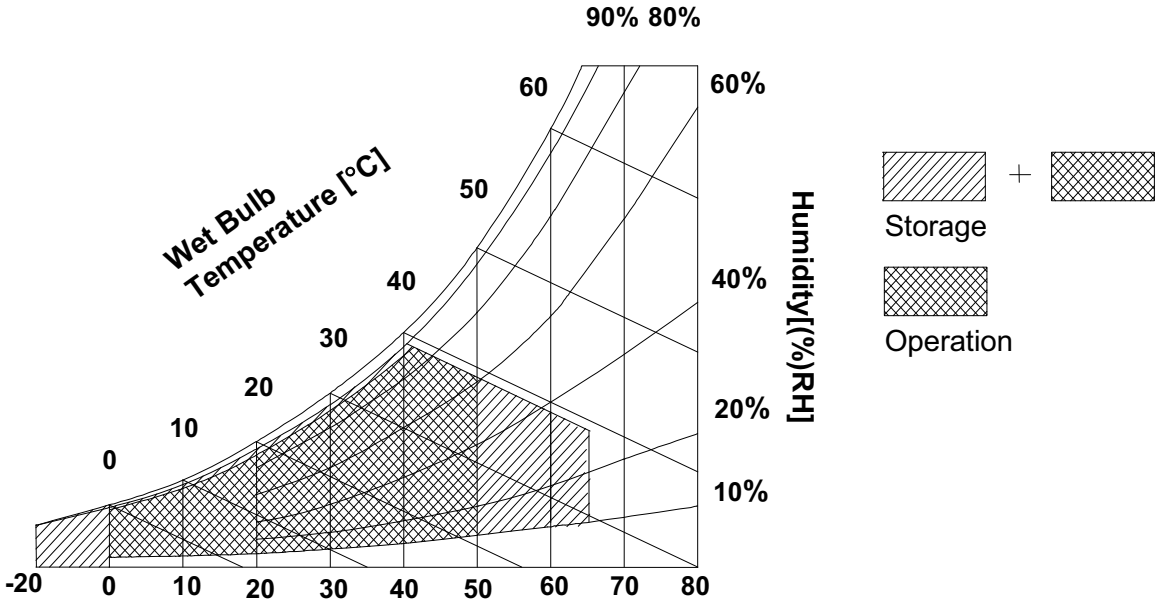


3. Absolute Maximum Ratings

3.1. Absolute Ratings of Environment

Item	Symbol	Min	Max	Unit	Note
Operating Ambient Temperature	TOP	0	+50	°C	(1)
Operating Temperature for Panel	-	0	+60	°C	(2)
Storage Temperature	TSTG	-20	+65	°C	(1)
Operating Ambient Humidity	HOP	10	90	%RH	(1)
Storage Humidity	HSTG	10	90	%RH	(1)
Air Pressure	-	57	101.3	kPa	Operation
Air Pressure	-	12	101.3	kPa	Non-operation
Altitude	-	-	3	Km	Operation
Altitude	-	-	12	Km	Non-operation

Note 1) Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39°C Max, and no condensation of water.



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

3.2. Electrical Absolute Maximum

(1) TFT LCD Module

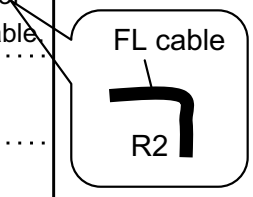
Item	Symbol	Min	Max	Unit	Note
Power Supply Voltage	V_{DD}	-0.3	+4.0	V	at 25 ± 5°C
Logic Input Voltage	V_{IN}	-0.3	VDD+0.3	V	LVDS interface

(2) Back Light Unit

Item	Symbol	Min	Max	Unit	Note
Lamp Voltage	V_L	-	5000	V_{RMS}	Broken lamp Max Voltage
Lamp Current	I_L	3.0	6.8	mA_{RMS}	
Lamp Frequency	F_L	40	70	KHz	

3.3. Mechanical Ratings

Test 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 LCD fix condition -> See Note (2)	* 240G, Pulse width 2 ms, Sine Wave, ±X, ±Y, ±Z direction. 70G, Pulse width 11ms, Sine Wave ±X, ±Y, ±Z direction. * Note) Normal function is only checking points.		Non Operation
	98 m/s^2 (10G), Pulse width 11 ms, Sine Wave, ±X, ±Y, ±Z direction.		Operation
Pressure Resistanace -> See Note (1)	No Destruction with the force 196 N (20 kgf, 16 mm in diameter) to the display surface at the vertical direction.		Non Operation Fig 1-1 Fig 1-2 Fig 1-3
	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. Only the breakage of below items will not happen after test. (Glass.Lamp & Circuit parts)		
Strength of FL Cable	Strength of Rotation force	Cable : No disconnection of cable to the 5 trial of 360 degree rotation. See a bended state of cable.	Non Operation
		Connector : No disconnection of cable to 10 trial of 180 degree rotation. See a bended state of cable.	
	Lead Pull Test	Soldering portion 29.4N(3.0kgf) 10mins *1.08mm Wire applied	
		Connector : 12.9N (1.32kgf) 1 sec *1.08mm Wire applied	
Connector tension test	Input connector : With 50 times of connector trial there must be no damage to the shape and functionaly.		Non Operation
	Back light connector : With 50 times of connector trial there must be no damage to the shape and functionaly.		
Assured torque value at side-mout part	M2 : Max 3.0 kgf		Non Operation
Rescrewed test	15 times under Max. torque		Non Operation
Tapping test	Tapping area : All bezel(Metal cover) side, LCD: Full-screen gray (L32). “Ripple (Pooling)” can not be seen in Active Area Tapping Force: Max 3kgf.cm		Operation



Definitions of failure for judgment shall be as follows:

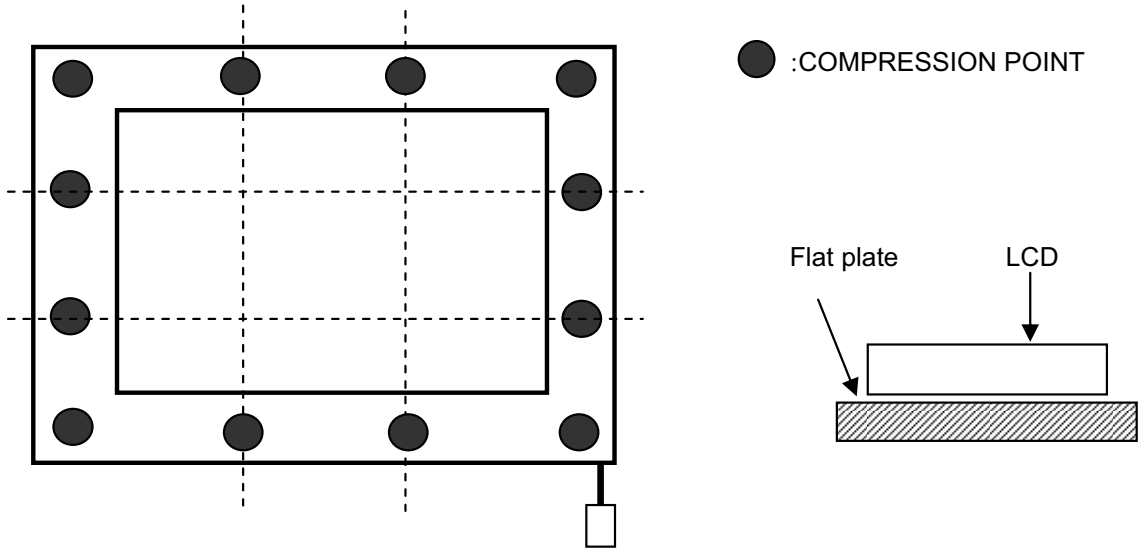
(1) Function of the module should be maintained.
(2) Current consumption should be smaller than the specified value.
(3) Appearance and display quality should not have distinguished degradation.
(4) Luminance should be larger than the minimum value specified in optical specification.

Note 1)

(1) The compression condition of front side

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

(b) Compression condition: 20kgf, 3 sec, Tool diameter: 16 mm in diameter (refer to Fig 1-3)

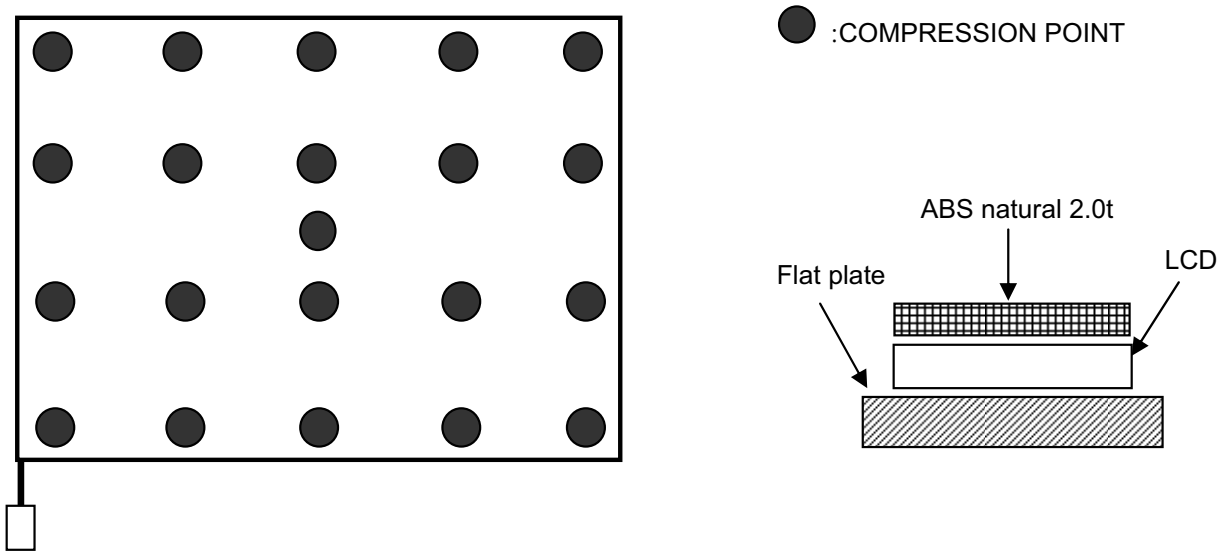


[Fig 1-1]

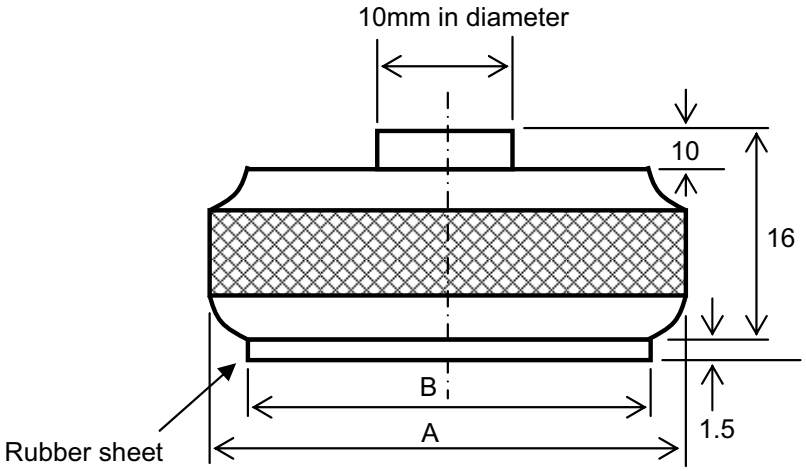
(2) The compression condition of rear side

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

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



[Fig 1-2]



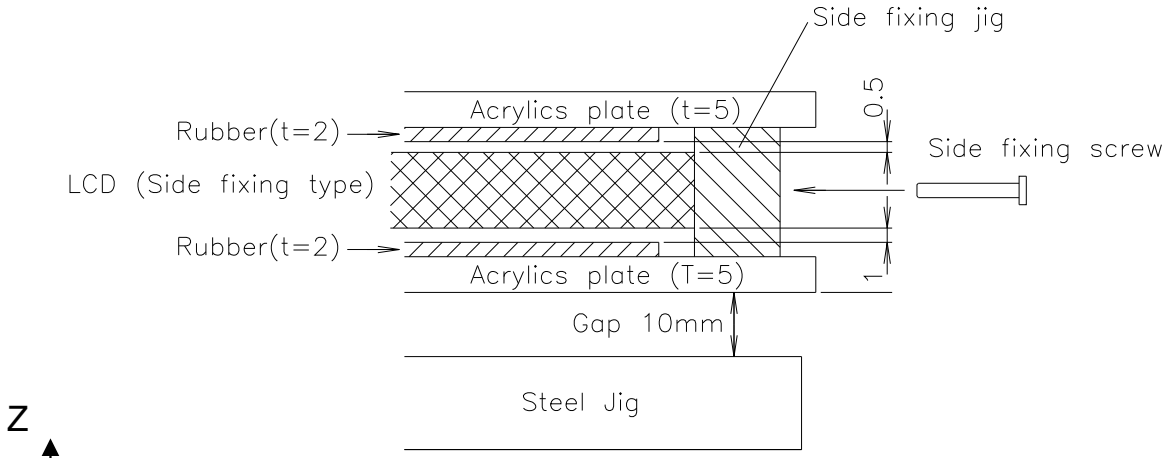
[Fig 1-3]

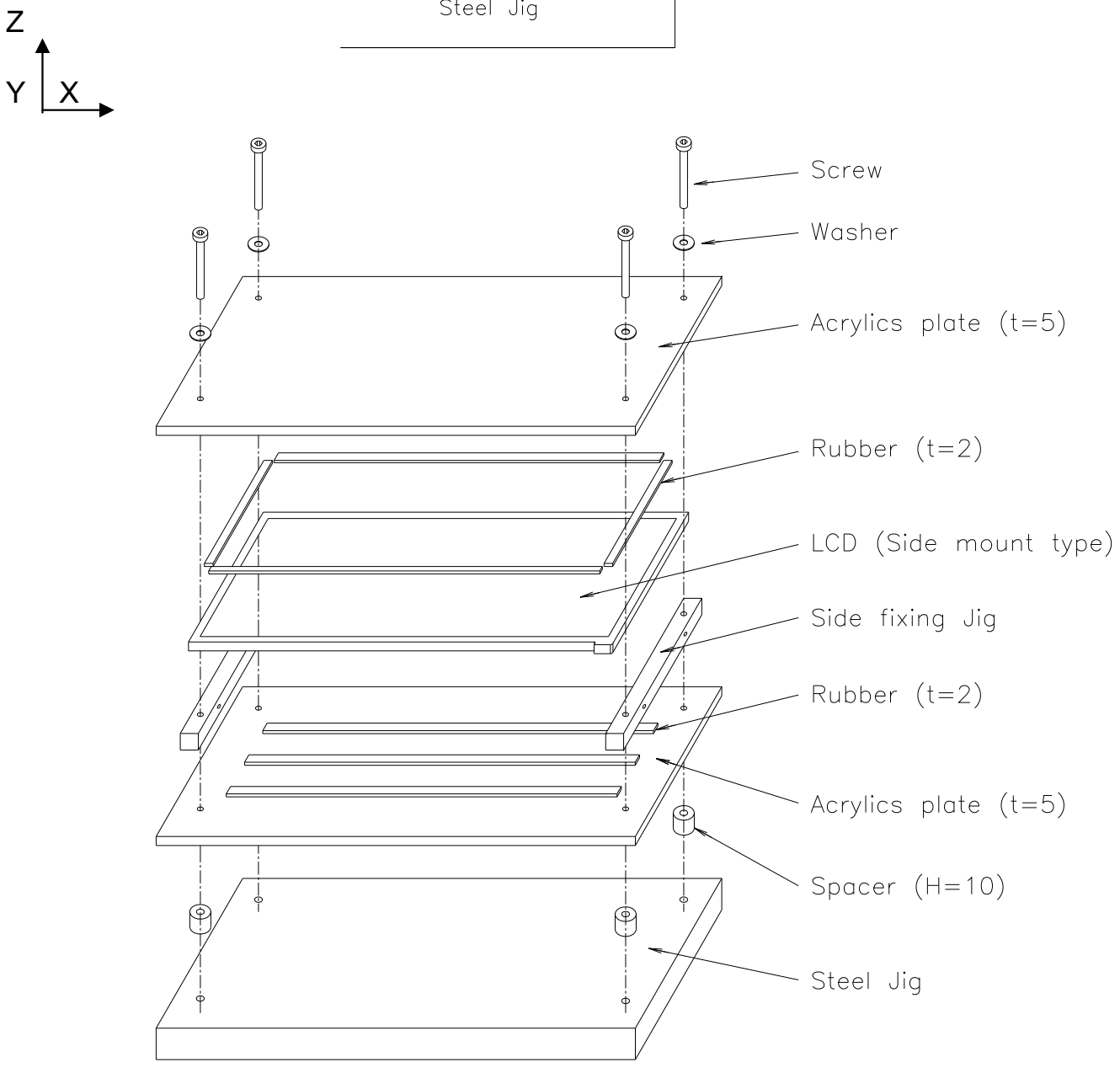
(3) Dimension of the compression jig

(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

Note 2) LCD fixing condition for z direction.





3.4. The Others

(1) Static electricity pressure resistance

Item	Testing conditions	Operation	Non Operation
Contact discharge	150pF, 330 ohm	±8KV	± 10 kV
Air discharge	150pF, 330 ohm	±15KV	±20 KV

(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. And regarding specified values are negotiated if it is needed.

(3) Open / Short

No smoke, no fiery at any open/ short test

(4) MTBF : 50,000 Hr (except for backlight lamp)

4. Optical Characteristics

4.1. Test Conditions

Ambient Temperature : T_a 25±5°C
Ambient Humidity : H_a 65±20%RH
Supply Voltage : V_{DD} 3.3V
Input Signal : According to typical value in "Electrical Characteristics"
FL Input Current : I_L = 6.5mA_{RMS}
FL Driving Frequency : f_{LF} = (60±5 kHz)
FL Inverter : LG Inverter (6632Z-1301A)

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 illuminance < 2 lx) or equivalent state with the methods shown in Note (6).

4.2. Optical Specifications

Item		Symbol	Conditions		Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center 1 Point)		CR			400	700	-	-	(2), (6)
Response Time		t_{ON}			-	5	15	ms	(3)
		t_{OFF}			-	20	30	ms	
Average luminance (1 Point Center)		Y_L	θ=0°, ϕ=0°		330	400	-	cd/m^2	*I_{FL}=6.5mA_{RMS} F_L=60±5kHz Gray Scale Level = L63 (White)
Cross Modulation		D_{SHA}	Viewing normal angle		-	-	2.0	%	(5)
Luminance Uniformity Chromaticity	Red	Rx			0.560	0.590	0.620	-	(1), (6) PR650 Only for Color Coordinate
		Ry			0.315	0.345	0.375		
	Green	Gx			0.293	0.323	0.353		
		Gy			0.510	0.540	0.570		
	Blue	Bx			0.129	0.159	0.189		
		By			0.109	0.139	0.169		
	White	Wx			0.283	0.313	0.343		
		Wy			0.299	0.329	0.359		
Viewing Angle	Hor.	θ_L	CR>=10	ϕ = 180	60	65	-	deg.	(Color Coordinate of the R,G,B is based on LPL's equipment, and Color Coordinate of the W is based on LPL's equipment)
		θ_R		ϕ = 0°	60	65	-		
	Ver.	θ_{up}		ϕ = 90°	50	55	-		
		θ_{Low}		ϕ = -90°	50	55	-		
	Hor.	θ_L	CR>=5	ϕ = 180	65	70	-		
		θ_R		ϕ = 0°	65	70	-		
	Ver.	θ_{up}		ϕ = 90°	55	60	-		
		θ_{Low}		ϕ = -90°	55	60	-		
13 Points White Variation		δ W	θ=0°, ϕ=0° Viewing normal angle		-	-	2.2		(7)
13 Points CR Variation		δC_R			-	-	2.0		(7), A
White Variation		dL			-	-	2.2		(8)

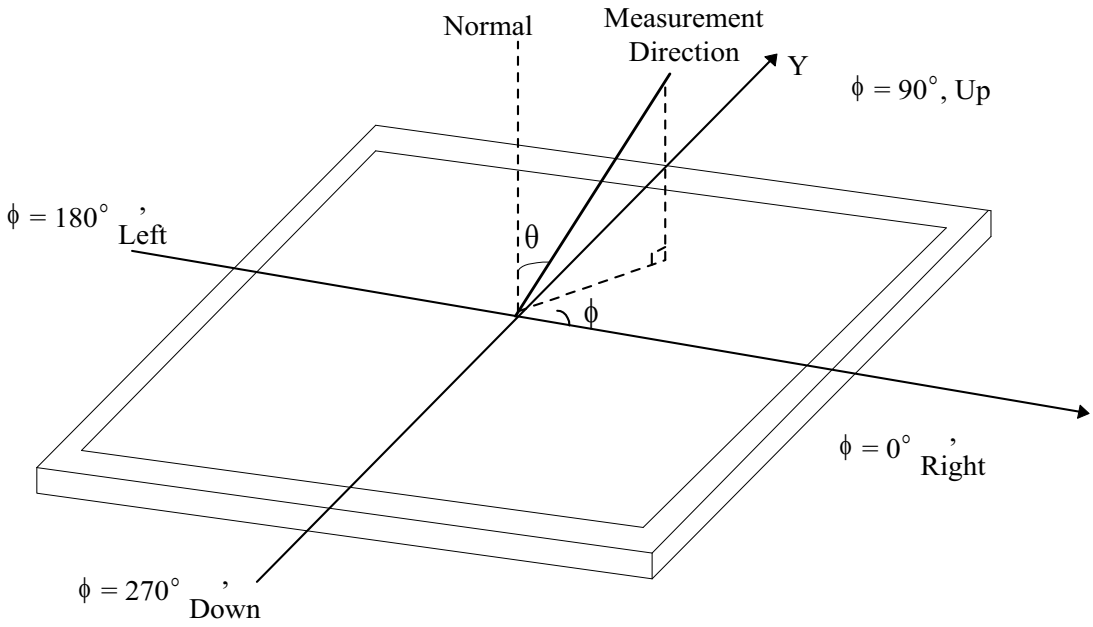
Attach the Lamp current – Luminance characteristics. The range of lamp current is shown in 3.2 (2)

A. Present CR Variation(13Point) Spec is based on PR-880 Equipment and can be changed by the measuring equipment.

Item	Gray level	Conditions	Min.	Typ.	Max.	Unit	Note
Normalized luminance at each gray level	63	θ=0°, ϕ=0° Viewing normal angle	100	100	100	%	(1), (6) (Center 1 Point)
	55		62.6	80.0	93.20		
	47		36.4.	57.5	76.20		
	39		19.6	38.0	55.60		
	31		8.60	22.0	34.80		
	23		3.00	11.3	18.30		
	15		1.10	4.50	7.78		
	7		0.10	1.20	2.38		
	0		0.00	0.39	0.80		

At normal viewing direction, during displaying the L0-L63 gray scale bar, luminance intensity inversion can not be seen.

Note 1) Definition of viewing angle θ and ϕ



Note 2) LCD fixing condition for z direction.

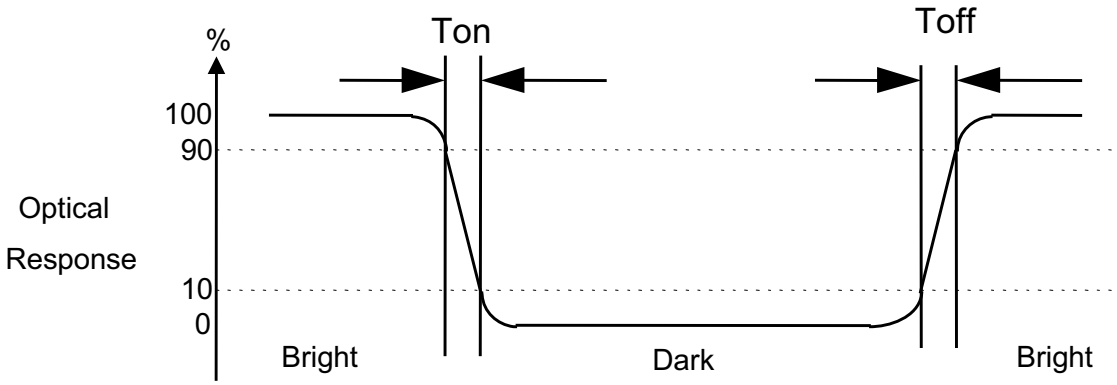
The contrast ratio can be calculated by the following expression.

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)

Note 3) Definition of response time



Note 4) Definition of surface luminance of white

Measure the luminance of white at Center point. Surface luminance of white Y_L

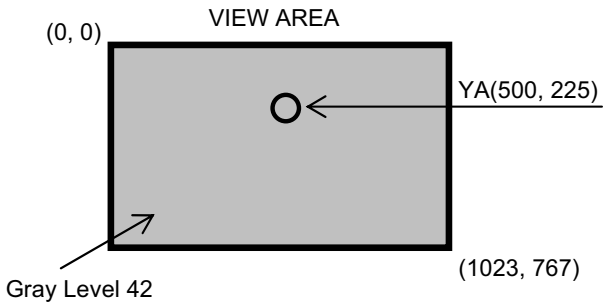
Note 5) Definition of Cross Modulation (D_{SHA})

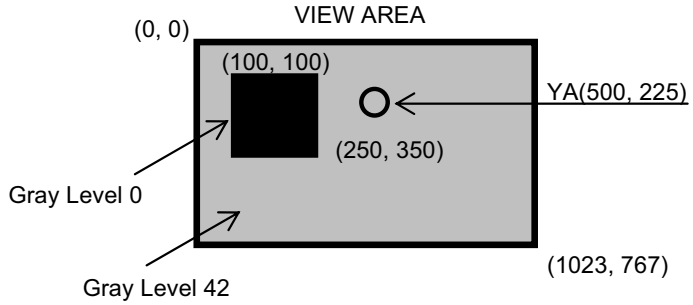
$$D_{SHA} = | Y_B - Y_A | / Y_A \times 100\ (\%)$$

Where:

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

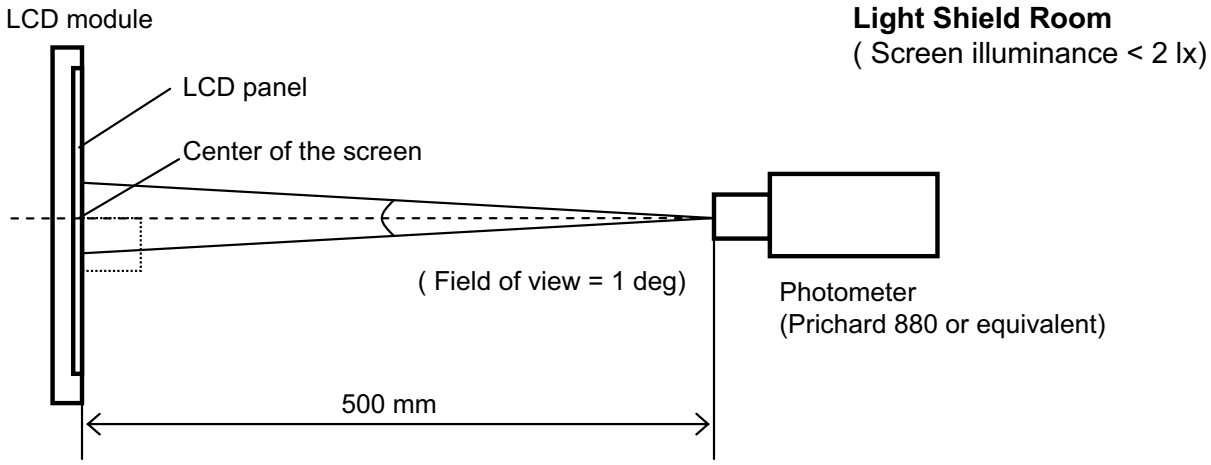
Y_B = Luminance of measured location with darkest gray pattern (cd/m^2)





Note 6) Measuring setup

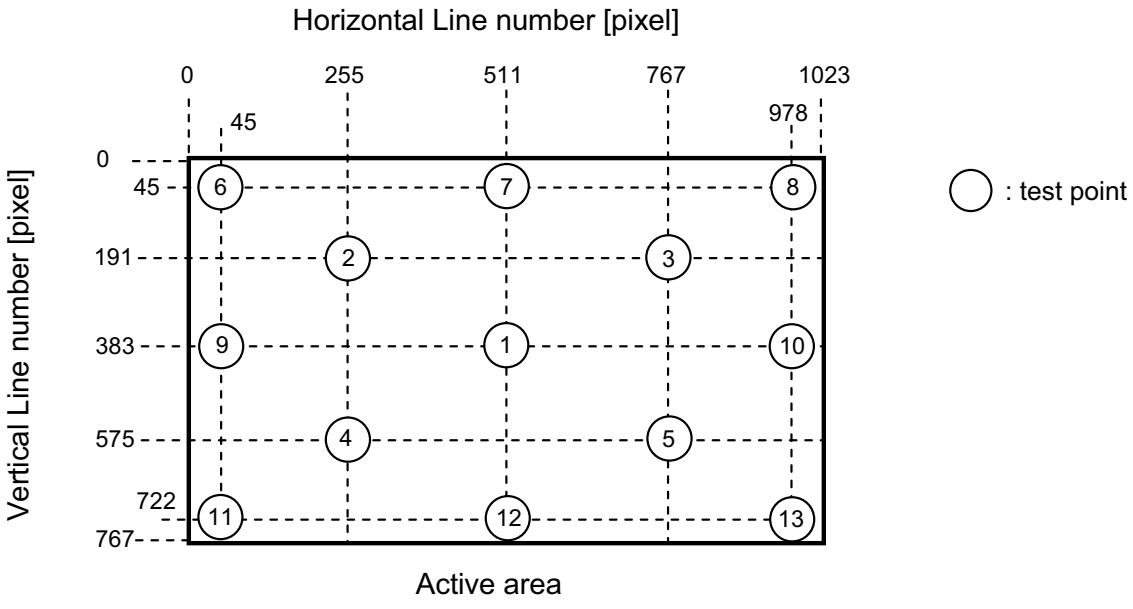
The measurement suppose to be executed after stabilized the panel at given temperature during 30 min. The measurement shall be executed 30 minutes after lighting at rating. The luminance of white should be typical luminance (Typical Condition IL=6.0mA). In order to stable the luminance, LCD s hall not be got 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

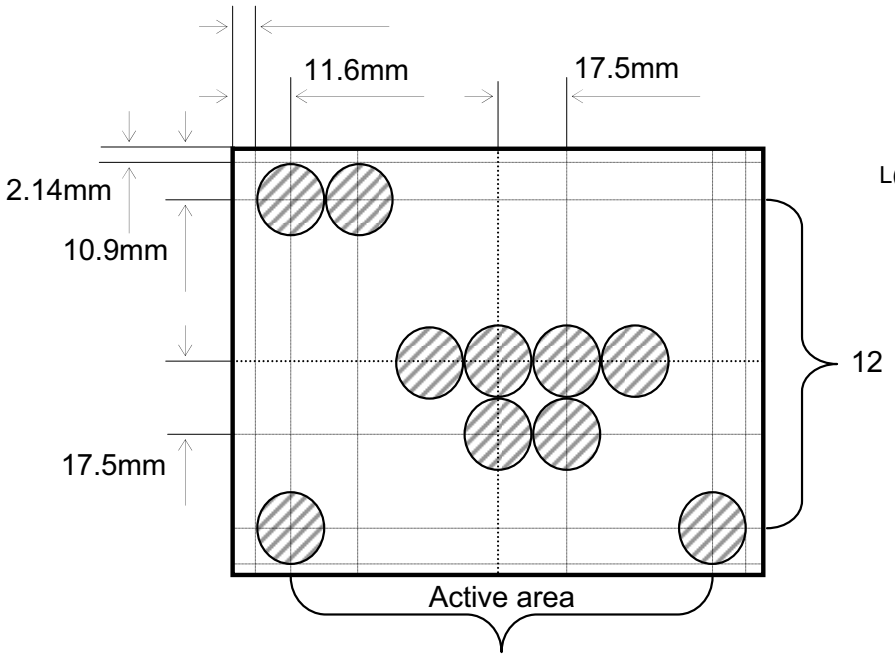
δC_R = Maximum CR 13 points / Minimum CR of 13 points

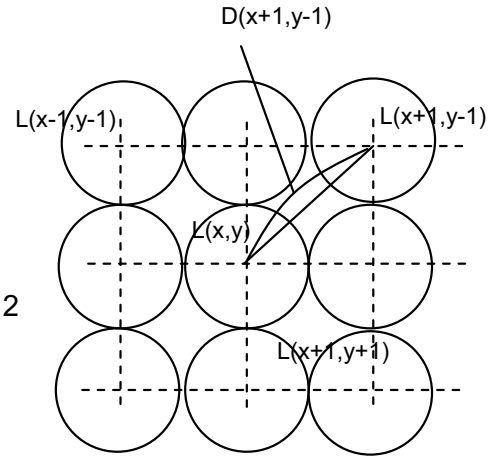


Note 8) Definition of White Variation dL : measure the luminance of white at 13 ×11 points.

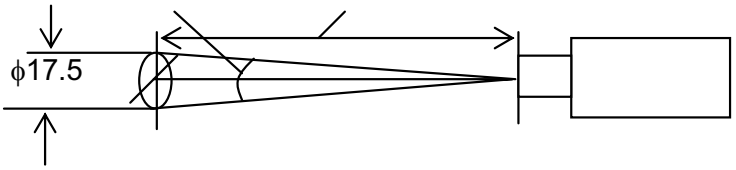
$$dL = [\ |\ L(x,y) - L(x+I,\ y+j)\ |\ /\ (\ L(x,y) \times D(x+I,\ y+j)\ )\ ] \times 100 \quad (\%/mm)$$

where $2 \le x \le 15$, $2 \le y \le 11$, $I = \pm 1$, $j = \pm 1$





Measuring Spot 16
(Field of View : 2deg. Measuring Distance : 500 mm)



5. Electrical Characteristics

5.1. TFT LCD module

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage		V_{DD}	3.0	3.3	3.6	V	
Differential Input Threshold Voltage	High	Vth	-	-	+100	mV	
	Low	Vtl	-100	-	-	mV	
Rush Current		I_{RUSH}	-	-	1.8	A	(5)
Power Supply Current	White(L63)	I_{DD}	180	220	260	mA	(3), (4) (a)
	Mosaic		220	260	300		(3), (4) (b)
	Max. Pattern		270	320	370		(3), (4) (c)

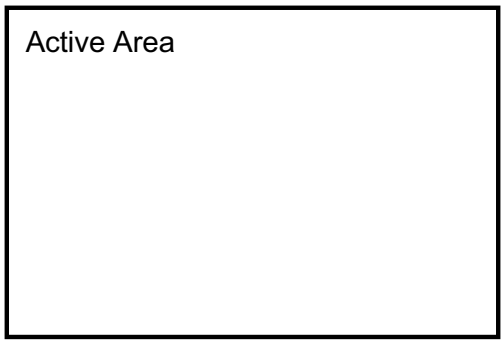
Note 1) The module should be always operated within these ranges. The "Typ." shows the recommendable value.

Note 2) Recommended LVDS transmitter : SN75LVDS84 made by TI.
LVDS receiver included in this module is SN75LVDS86.(1 chip)

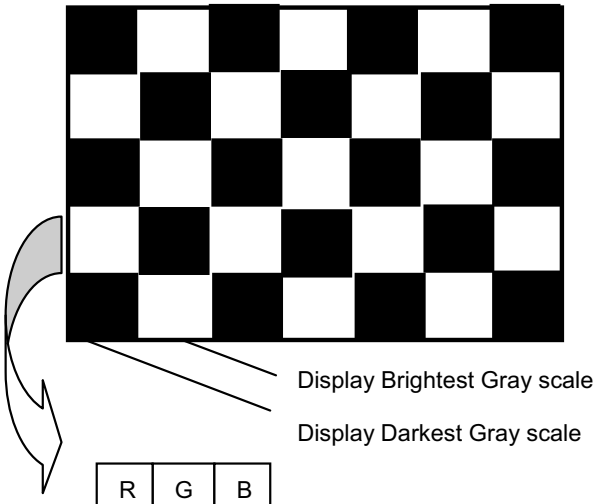
Note 3) Typical condition as follows. : fV= 60Hz, fDCLK = 65 MHz, V_{DD}= 3.3V, DC current.

Note 4) Power dissipation check pattern.

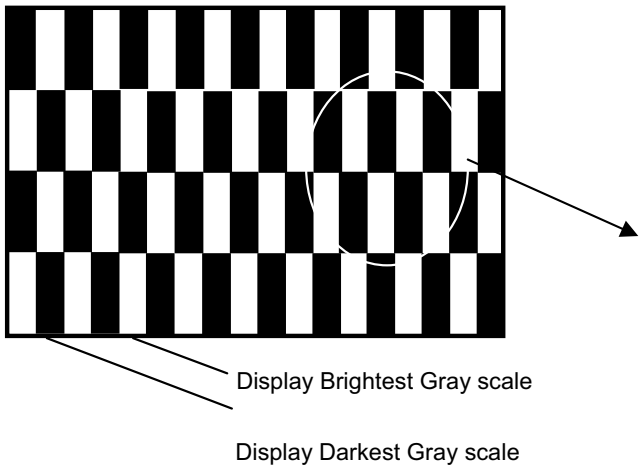
(a) White pattern



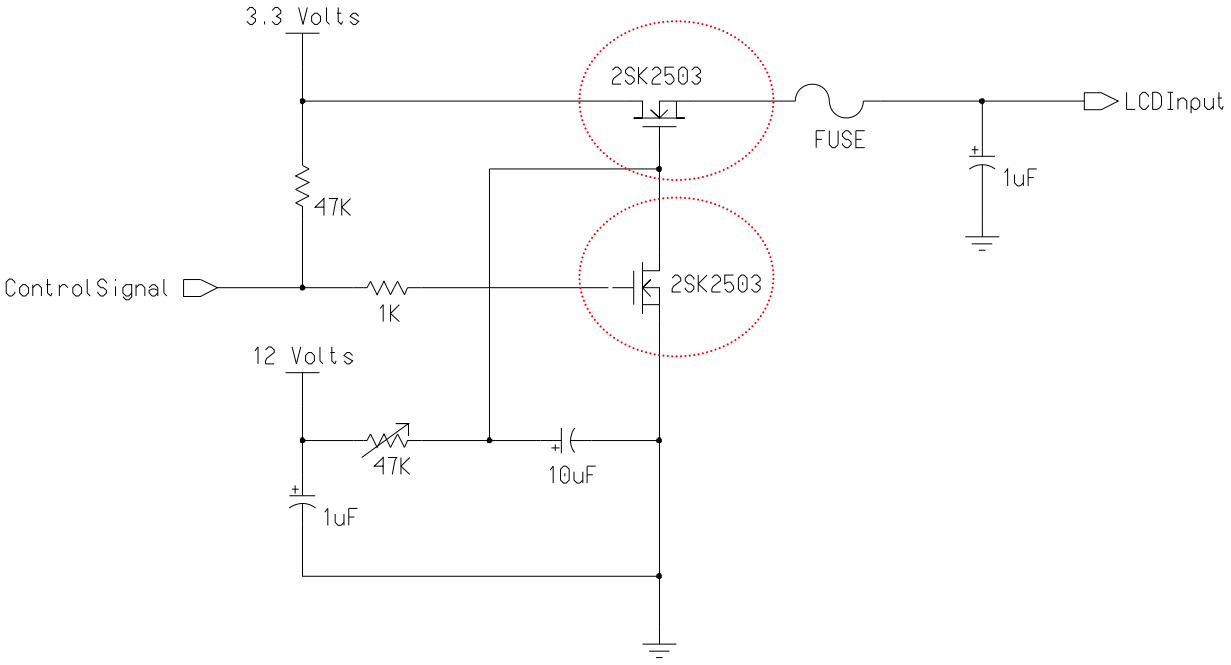
(b) Mosaic pattern



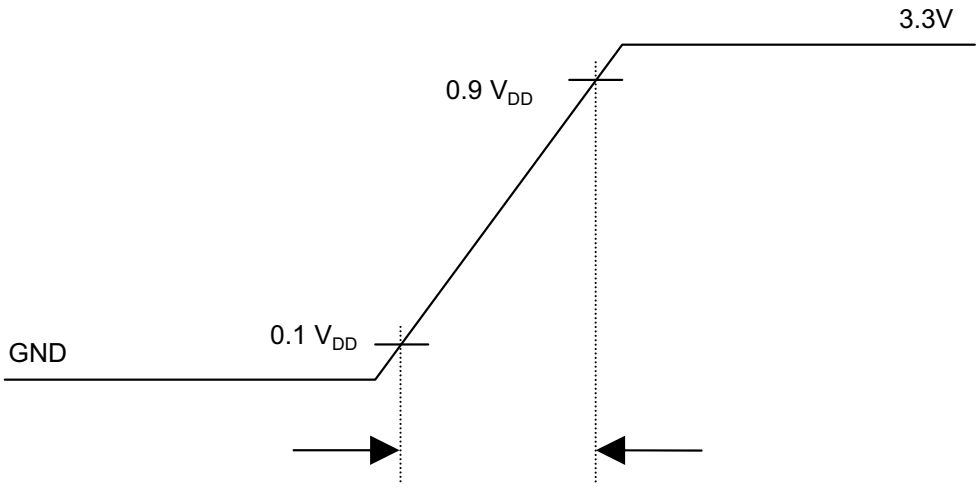
(C) Max. pattern



Note 5) Measuring condition of rush current.



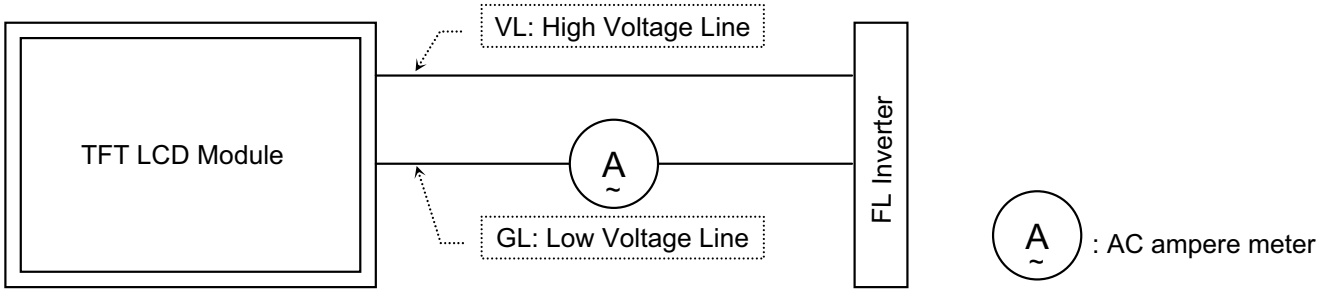
V_{DD} rising time is 470us



5.2. Backlignt Unit

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Lamp Current	I_L	3.0	6.5	6.8	mA_{RMS}	(1)
Lamp Voltage	V_L	620	630	770	V_{RMS}	
Power Consumption	P_L	-	4.1	4.5	W	(2)
Frequency	f_{FL}	40	60	70	kHz	
Operating Life Time	Hr	10,000	-	-	Hour	(3)
Ignition Voltage at 0°C	V_{IV}	-	-	1370	V_{RMS}	(5)
		-	-	-		(4)
Ignition Voltage at 25°C	V_{IV}	-	-	1140		(5)
		-	-	-		(4)
Creepage Distance	-	5.15	5.25	5.35	mm	
Mercury Qt'y of CCFL	-	1.0	-	2.5	mg	

Note 1) Lamp current is measured with a high frequency current as shown below.



Note 2) Refer to I_L X V_L to calculate.

Note 3) Life time of Lamp can be defined as the time in which it continues to operate under the condition T = 25°C ± 2°C and IL= 6.5 mArms until one of the following events occurs.

1. When the brightness becomes 50% or lower than it's original.
2. When the Effective ignition length becomes 80% or lower than it's original value.

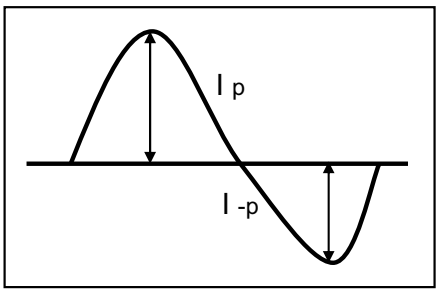
(Effective ignition length is defined as an area that has less than 70% brightness compared to the brightness in the center point.)

Note 4) The discharge shall be connected uniformly. Slide up method shall be used for voltage application. Above voltage is applied voltage to both ends of the lamp as the starting voltage.
(Above value is not out put voltage of inverter.)

Note 5) The lamp shall be lighted stably. Slide up method shall be used for voltage application. Above voltage is applied voltage to both ends of the lamp as the established starting voltage.
(Above value is not out put voltage of inverter)

*** Requirements for a system inverter design, which is intended to have a better display performance, a better power efficiency and a more reliable lamp, are following.
It shall help increase the lamp lifetime and reduce leakage current.

a. The asymmetry rate of the inverter waveform should be less than 10%.
b. The distortion rate of the waveform should be within $\sqrt{2}$ ±10%.
* Inverter output waveform had better be more similar to ideal sine wave.



* Asymmetry rate:

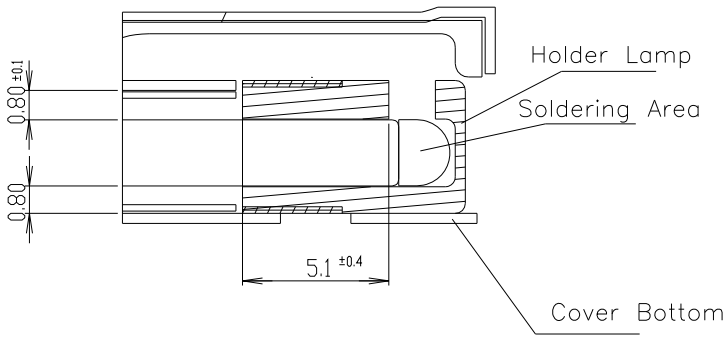
$| I_p - I_{-p} | / I_{rms} * 100\%$

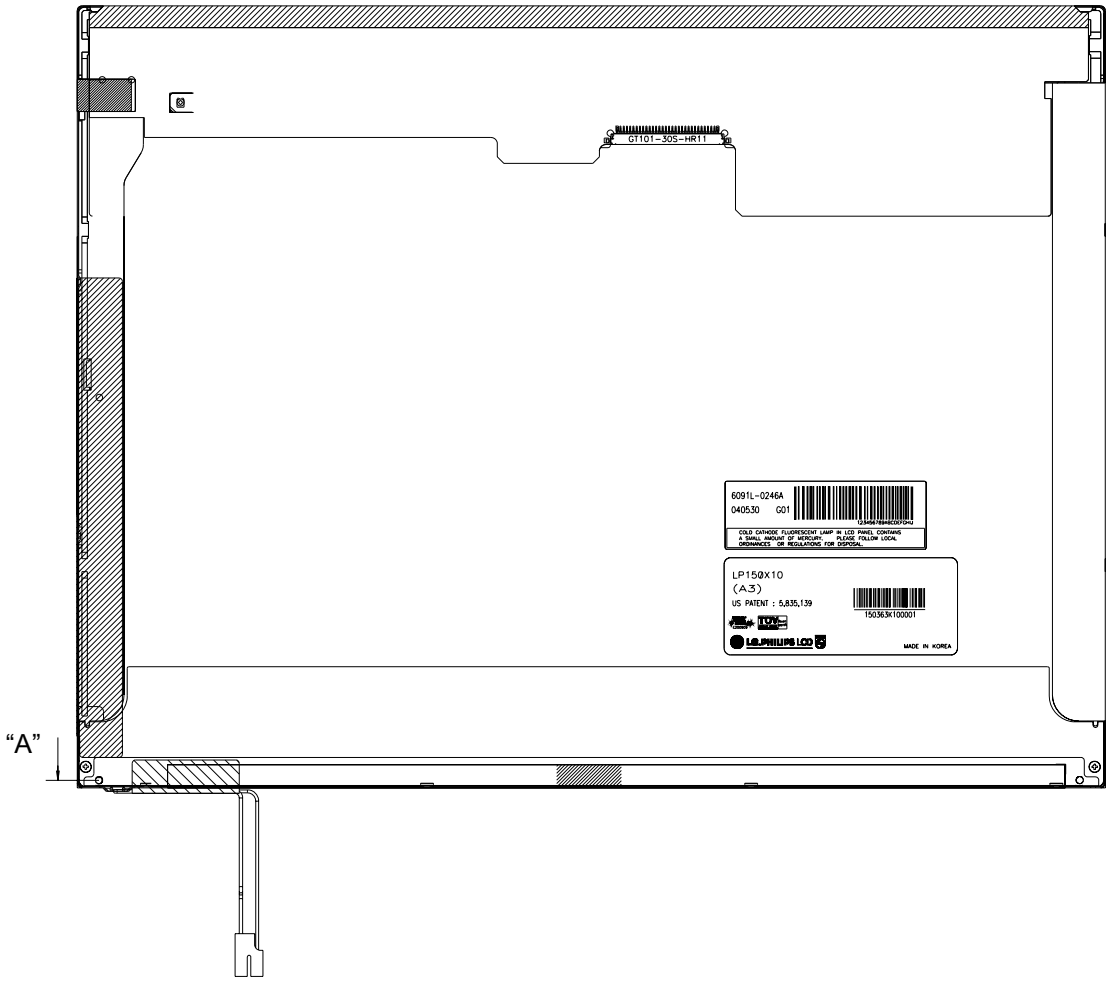
* Distortion rate

I_p (or I_{-p}) / I_{rms}

Note 6) Detail description of creepage distance

[Section 'A']





5.3. Regulation

The set (which LCD module is assembled into) should conform to the regulations below.

(1) EMI Regulations.

CISPR : Pub.22 CLASS B
FCC : PART15 CLASS B
VCCI : CLASS B

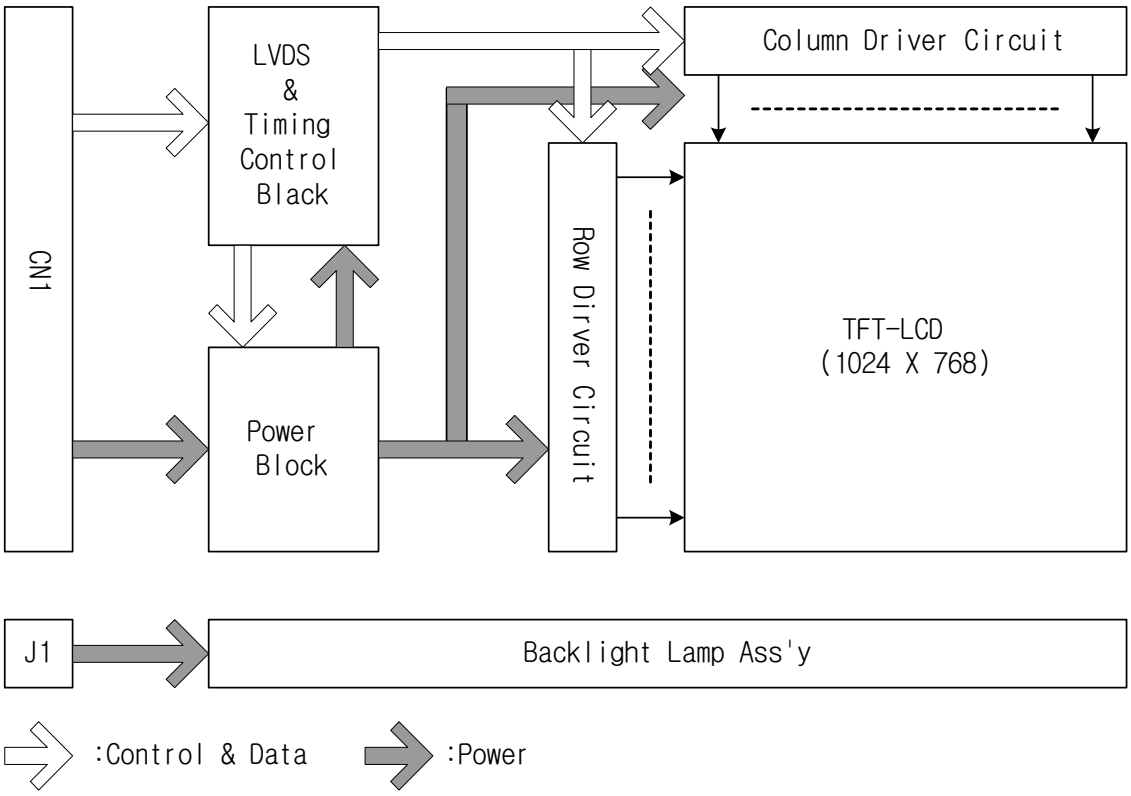
(2) Safety Regulations (Only LCD)

IEC 60950
UL 60950

(3) Material list concerning

Item		Silk	Product	Rating	Maker
EMI Filter	ASIC (Data Output)	AR1,2,3,4,5,6,7,8,9	Array Resistor	47Ω 1/16W 5% 3216 R/TP	
		AC1,2,3,4,5,6,7,8,9	Array Capacitor	open	
	ASIC (Clock Output)	FB1	BLM18BD221SN	220Ω 1608	MURATA
		C61	Chip Capacitor	82pF 1608	
	Power V_{DD}(2.5V)	U5	LDO	LP3982IMM-2.5, 8Pin, MSOP	National Semicon ductor
DC/DC	Control IC for Power supply	U1	LM2622MMX	8p, MSOP R/TP PWM	National Semicon ductor
	Switching Diode	D1,D2,D3,D5	BAV99		DIODES
	Zener Diode	ZD1	BZT52C5V6S	5.6V	DIODES
	Schottky Barrier Diode	D4	BAT750	0.75A	DIODES
	Inductor	L1	PLN6012T-100MR80	10 uH±20% (Inductance) 0.24Ω ±20%(DC Resistance) 0.9A Max(Rated DC Current)	TDK

6. Block Diagram



Lamp: CFL57E284271Y310F3U20 (NEC)

1. Hot (Pink)
2. Cold (Green)

7. Input Terminal Pin Assignment

7.1. TFT LCD module

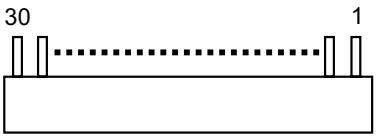
Pin	Symbol	Description	Notes
1	VSS	Ground	
2	VCC	Power Supply, 3.3V Typ.	
3	VCC	Power Supply, 3.3V Typ.	
4	V_{EDID}	DDC 3.3V power	
5	NC	No Connection	
6	Clk_{EDID}	DDC Clock	
7	$DATA_{EDID}$	DDC Data	
8	R_{IN} 0 -	- LVDS differential data input (R0-R5, G0)	
9	R_{IN} 0 +	+ LVDS differential data input (R0-R5, G0)	
10	VSS	Ground	
11	R_{IN} 1 -	- LVDS differential data input (G1-G5, B0-B1)	
12	R_{IN} 1 +	+ LVDS differential data input (G1-G5, B0-B1)	
13	VSS	Ground	
14	R_{IN} 2 -	- LVDS differential data input (B2-B5, HS, VS, DE)	
15	R_{IN} 2 +	+ LVDS differential data input (B2-B5, HS, VS, DE)	
16	VSS	Ground	
17	ClkIN -	- LVDS differential clock input	
18	ClkIN +	+ LVDS differential clock input	
19	VSS	Ground	
20	NC	No Connection	
21	NC	No Connection	
22	VSS	Ground	
23	NC	No Connection	
24	NC	No Connection	
25	VSS	Ground	
26	NC	No Connection	
27	NC	No Connection	
28	VSS	Ground	
29	NC	No Connection	
30	NC	No Connection	

[LVDS Transmitter]
TI, SN75LVDS84 or equivalent

[LVDS Receiver]
THINE, THC63LVDF64A

[Connector]
LCD : GT101-30S-HR11, LG Cable
* JAE FI-XB30Sx-HFxx or
JAE FI-XB30S-HF or equivalent.
Matching : JAE FI-X30M or
equivalent

[Connector pin arrangement]



< LCD rear view >

7.2. Backlight Unit

Using Connector : BHTR-02VS (Maker : JST)
(Contact Pin of VL : SBHT-002T-P0.5 (Maker :JST))
(Contact Pin of GL : SBHT-002T-P0.5 (Maker :JST))

Pin	Symbol	Cable Color	Function
1	VL	Pink	High Voltage
2	GL	Green	Low Voltage

7.3. LVDS Transmitter

LVDS Transmitter : SN75LVDS84 (made by TI) or compatible.

Pin #	Pin Name	Require Signals	Pin #	Pin Name	Require Signals
1	D4	R4	48	D3	R3
2	Vcc	Vcc	47	D2	R2
3	D5	R5	46	GND	GND
4	D6	G0	45	D1	R1
5	DND	GND	44	D0	R0
6	D7	G1	43	NC	NC
7	D8	G2	42	LVDS GND	LVDS GND
8	Vcc	Vcc	41	Y0M	A0M
9	D9	G3	40	Y0P	A0P
10	D10	G4	39	Y1M	A1M
11	GND	GND	38	Y1P	A1P
12	D11	G5	37	LVDS Vcc	LVDS Vcc
13	D12	B0	36	LVDS GND	LVDS GND
14	NC	NC	35	Y2M	A2M
15	D13	B1	34	Y2P	A2P
16	D14	B2	33	CLKOUTM	CLKM
17	GND	GND	32	CLKOUTP	CLKP
18	D15	B3	31	LVDS GND	LVDS GND
19	D16	B4	30	PLL GND	PLL GND
20	D17	B5	29	PLL Vcc	PLL Vcc
21	Vcc	Vcc	28	PLL GND	PLL GND
22	D18	HSYNC	27	SHDN	SHDN
23	D19	VSYNC	26	CLKIN	Dclk
24	GND	GND	25	D20	DE(Data Enable)

7.4. Timing Diagrams of LVDS Transmission

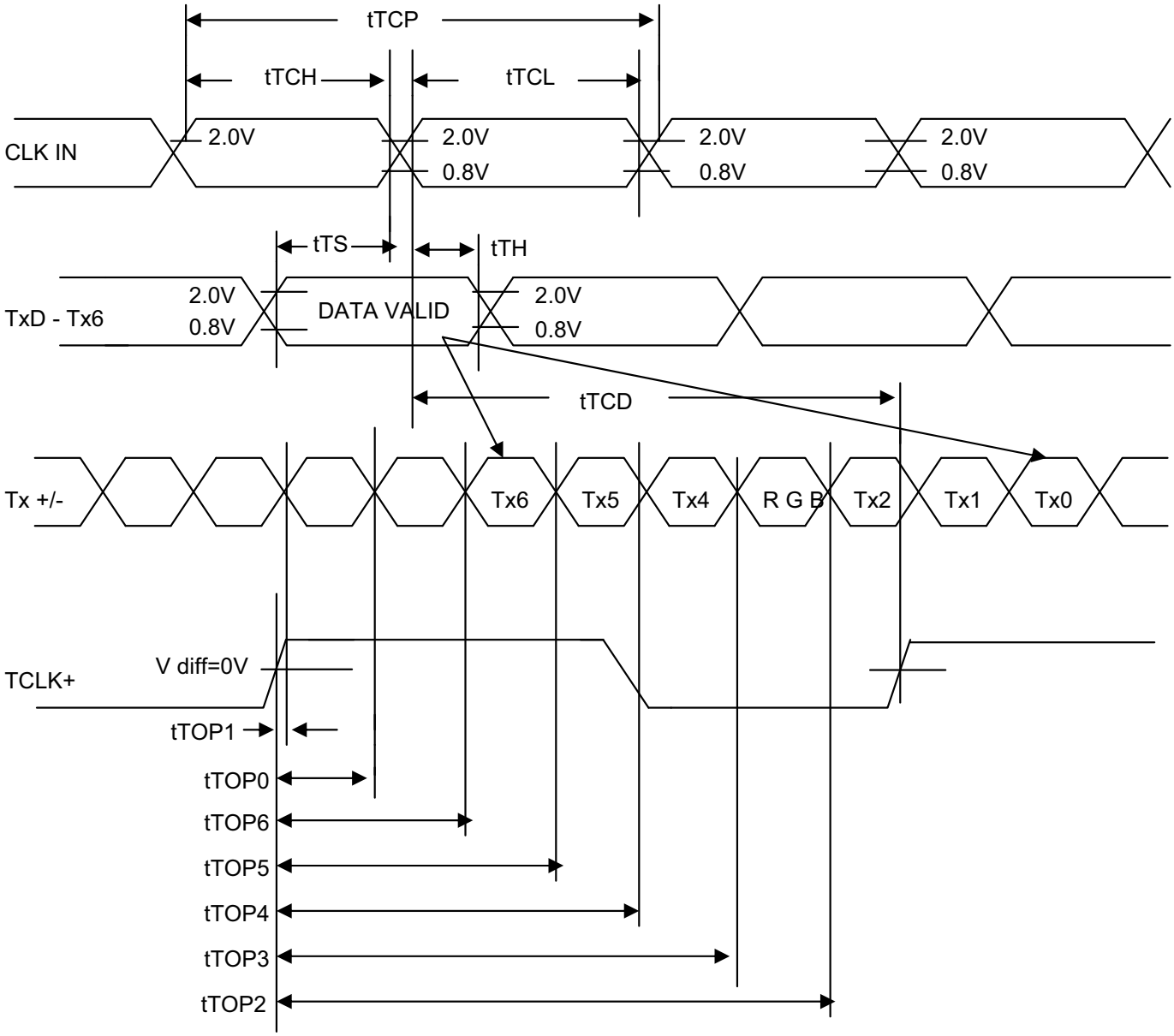
Switching Characteristic

VCC = 3.0 ~ 3.6V, Ta = -10 ~ +70°C

Transmitter

Symbol	Parameter	Min.	Typ.	Max.	Unit
tTCIT	CLK IN Transition Time	-	-	5	ns
tTCP	CLK IN Period	14.7	T	32.4	ns
tTCH	CLK IN High Time	0.4T	0.5T	0.6T	ns
tTCL	CLK IN Low Time	0.4T	0.5T	0.6T	ns
tTCD	CLK IN to TCLK +/- Delay	-	14.2	-	ns
tTS	TTL Data Setup to CLK IN	3.0	-	-	ns
tTH	TTL Data Hold from CLK IN	1.5	-	-	ns
tLVT	LVDS Transition Time	0.26	0.7	1.5	ns
tTOP1	Output Data Position 0 (T= 15.38ns)	-0.2	0	0.2	ns
tTOP0	Output Data Position 1 (T= 15.38ns)	T/7 - 0.2	T/7	T/7 + 0.2	ns
tTOP2	Output Data Position 2 (T= 15.38ns)	2T/7 - 0.2	2T/7	2T/7 + 0.2	ns
tTOP3	Output Data Position 3 (T= 15.38ns)	3T/7 - 0.2	3T/7	3T/7 + 0.2	ns
tTOP4	Output Data Position 4 (T= 15.38ns)	4T/7 - 0.2	4T/7	4T/7 + 0.2	ns
tTOP5	Output Data Position 5 (T= 15.38ns)	5T/7 - 0.2	5T/7	5T/7 + 0.2	ns
tTOP6	Output Data Position 6 (T= 15.38ns)	6T/7 - 0.2	6T/7	6T/7 + 0.2	ns
tTPLL	Phase Lock Loop Set	-	-	10	ns

AC Timing Diagrams
Transmitter Device



7.5. Input Signal, Basic Display Colors and Gray Scale of each Color

Color		Input Color Data																	
		RED						GREEN						BLUE					
		MSB					LSB	MSB					LSB	MSB					LSB
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Color	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
RED	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(Dark)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	…			…						…						…			
	RED(Bright)	1	1	1	1	1	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	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(Dark)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	...			...						...						...			
	GREEN(Bright)	0	0	0	0	0	0	1	1	1	1	1	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	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(Dark)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	…			…						…						…			
	BLUE(Bright)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	BLUE	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

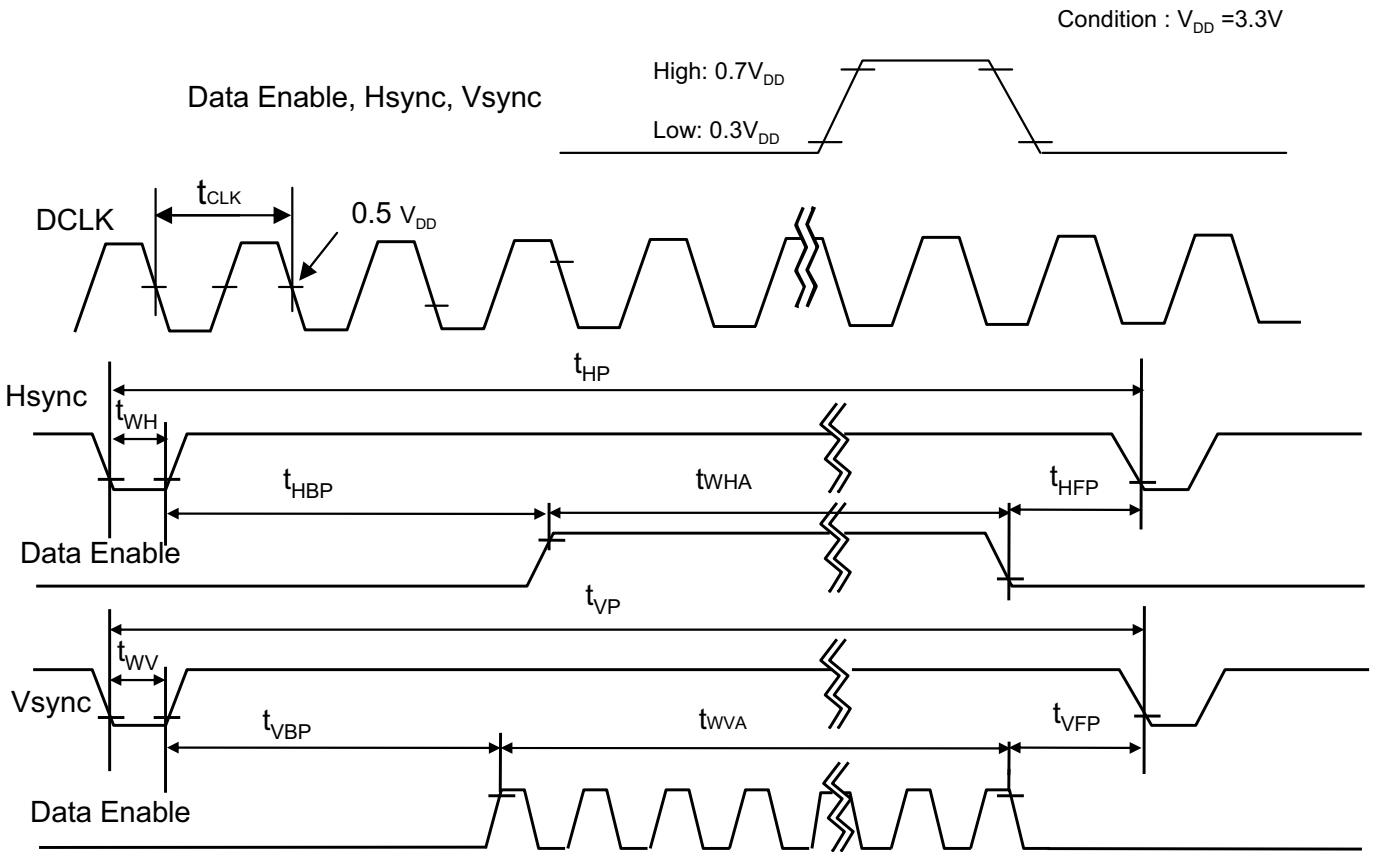
8. Interface Timing

8.1. Timing Parameters

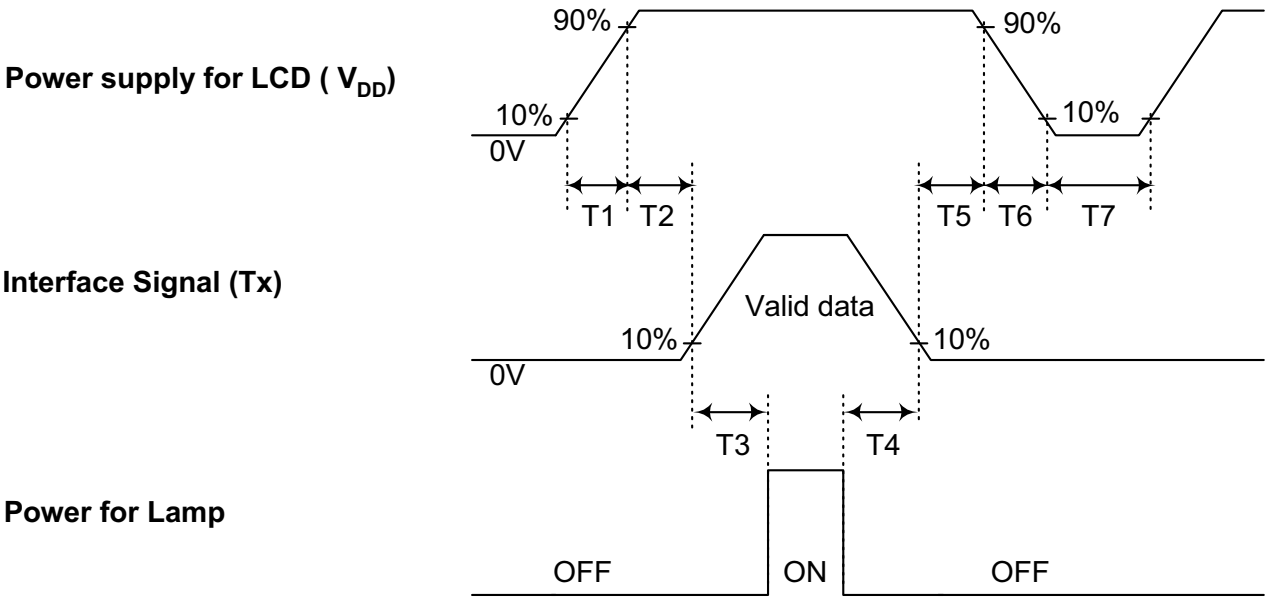
This is the signal timing required at the input of the LVDS Transmitter. All of the interface signal timing should be satisfied with the following specifications for its proper operation.

Item	Symbol		Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	fCLK	65	65	65	MHz	
Hsync	Period	tHP	1206	1344	1364	tCLK	
	Width	tWH	8	136	-		
Vsync	Period	tVP	780	806	830	tHP	
	Width	tWV	1	6	24		
Data Enable	Horizontal back porch	tHBP	16	160	-	tCLK	
	Horizontal front porch	tHFP	16	24	-		
	Vertical back porch	tVBP	7	29	-	tHP	
	Vertical front porch	tVFP	1	3	-		

8.2. Timing Diagrams of LVDS Transmission



8.3. Power On/Off Sequence



Parameter	Min.	Typ.	Max.	Unit
T_1	-	-	10	(ms)
T_2	0	-	50	(ms)
T_3	200	-	-	(ms)
T_4	200	-	-	(ms)
T_5	0	-	50	(ms)
T_6	-	-	10	(ms)
T_7	200	-	-	(ms)

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 for LCD V_{CC} to 0V.
Note 3) Lamp power must be turn on after power supply for LCD and interface signal are valid.

9. Cosmetic Specification

9.1. Sampling

A.Q.L (Acceptable Quality Level): MIL-STD, 105E Level II,
Major: 0.65 , Minor: 1.5

9.2. Conditions of Inspections

(1) Ambient Temperature : 25±5°C
(2) Ambient Humidity : 65±20%RH
(3) Illumination : 200 – 500 Lux (nominal 350 Lux) under the fluorescent lamp
(4) Viewing Distance: Approximately 30cm by the eyes of the inspector from the module
(5) Viewing angle : The surface of the module and the inspector's line shall be at 90 ± 45 degrees.
(6) Display pattern: Pure Red, Green, Blue, Black, White, Gray level 0 - 63

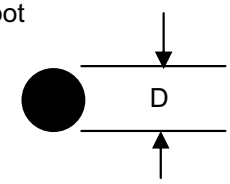
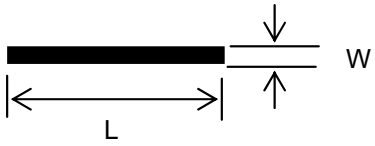
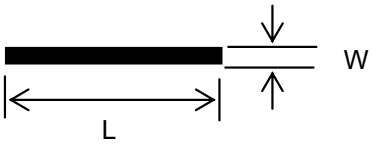
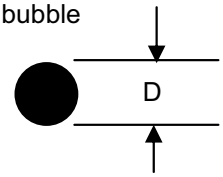
9.3. Defect modes

Defect Mode	Description
Dark / Bright spots	Points on the display which appear dark / bright and remain unchanged in size
Dark / Bright lines	Lines on the display which appear dark / bright and remain unchanged in size
Polarizer scratch	When the unit is lit a light , line is seen across a darker background; line does not vary in size
Polarizer dent	When the unit is lit a light, light (white) spots appear against a darker background, and do not vary in size
Bright / dark dot	A sub-pixel (R,G,B dot) stuck off / on
Rubbing line	Diagonal lines that appear gray with the display patterns dark and vary in size
Dim line	When the unit lights, lines in the minor (Vertical) or major (Horizontal) axis appear dim
Cross line	When the unit lights, lines in the both minor and major axis do not appear
Interference	Interference can not be seen with any bright plane display at any viewing angle
Flicker	When displaying sub-pexel checker(gray level and darkest gray), flicker can not be seen
Ripple (Pooling)	Tapping Test, Tapping area : All bezel(Metal cover) side, LCD: Full-screen gray (L32) "Ripple (Pooling)" can not be seen in Active Area

9.4. Mechanical Inspection

(1) Light leakage: No light leakage between metal chassis (bezel) and glass
(2) No sharp edge
(3) The mounting holes: No Changed (Side fixed type)
(4) PCB Appearance: No pattern peeling snapping / No electrically short
If there are repair portions, the repair portions on PCB is covered by epoxy resign
(5) Soldering: No cold solder joint, lead move when pulled
(6) Bezel, Frame, Connectors: No distinct stain, rust or scratch, no pin bending

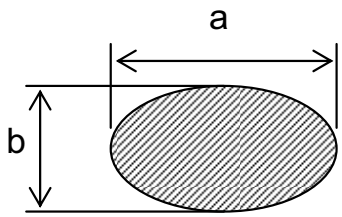
9.5. Visual Inspection

Defect type	Count (mm)	Reject (mm)
Dark / bright spot 	0.2 < D ≤ 0.5 N ≤ 3	D > 0.5
Dark / Bright lines 	0.05 < W ≤ 0.07 0.3 < L ≤ 3.0 N ≤ 3	W > 0.07 L > 3.0
Polarizer scratch 	0.01 < W ≤ 0.1 0.3 < L ≤ 0.5 N ≤ 3	W > 0.1 L > 0.5
Polarizer dent / bubble 	0.2 ≤ D ≤ 0.5 N ≤ 3	D > 0.5
Maximum allowable number of defects	N ≤ 7	N > 7
Rubbing defect	Not allowed	
Dim line	Not allowed	

[D : diameter, W : width, L : length, N : count]

Note 1) Inspection area should be within bezel opening.
Note 2) Dusts which are bigger not less than 0.10mm (0.1≤W) shall be judged by "Average Diameter".
Note 3) Scratches which are bigger not less than 0.05mm (0.05≤W) shall be judged by "Average Diameter".

Average Diameter D = (a+b)/2 (mm)

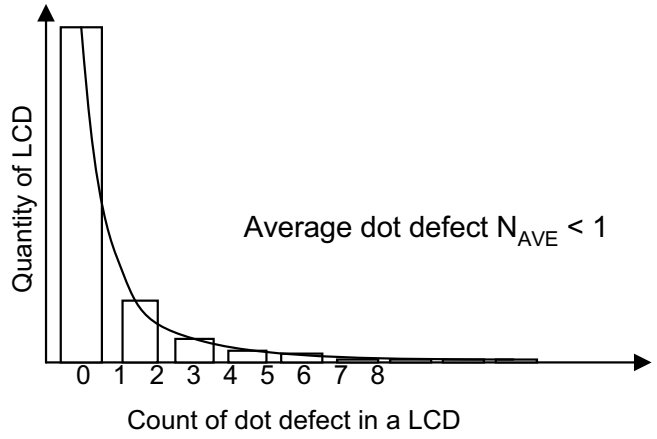


9.6. Electrical Inspection

(1) Dot defect

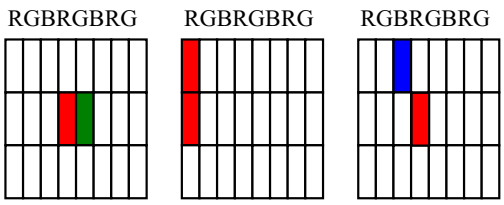
Defect type		Count	Reject
Bright dots	Random	N ≤ 5 (Green ≤ 3)	N > 5 (Green > 3)
	Two adjacent	N = 0	N > 0
	Three or more adjacent	Not allowed	
Dark dots	Random	N ≤ 5	N > 5
	Two adjacent	N = 1	N > 1
	Three or more adjacent	Not allowed	
Maximum allowable number of dot defect		N ≤ 8	N > 8
Maximum distance between defects	Bright - to - bright dot		L<15mm
	Dark - to - dark dot		L<10mm

1) Inspection patterns for dot defect are Pure Red, Green, Blue, Black, and White.
2) Adjacent two dots will be counted as two dots.
3) The distribution of dot defects should be below. Average value of dot defect s should be less than 1.



Required distribution of dot defect

4) The definition of 2 adjacent dots.

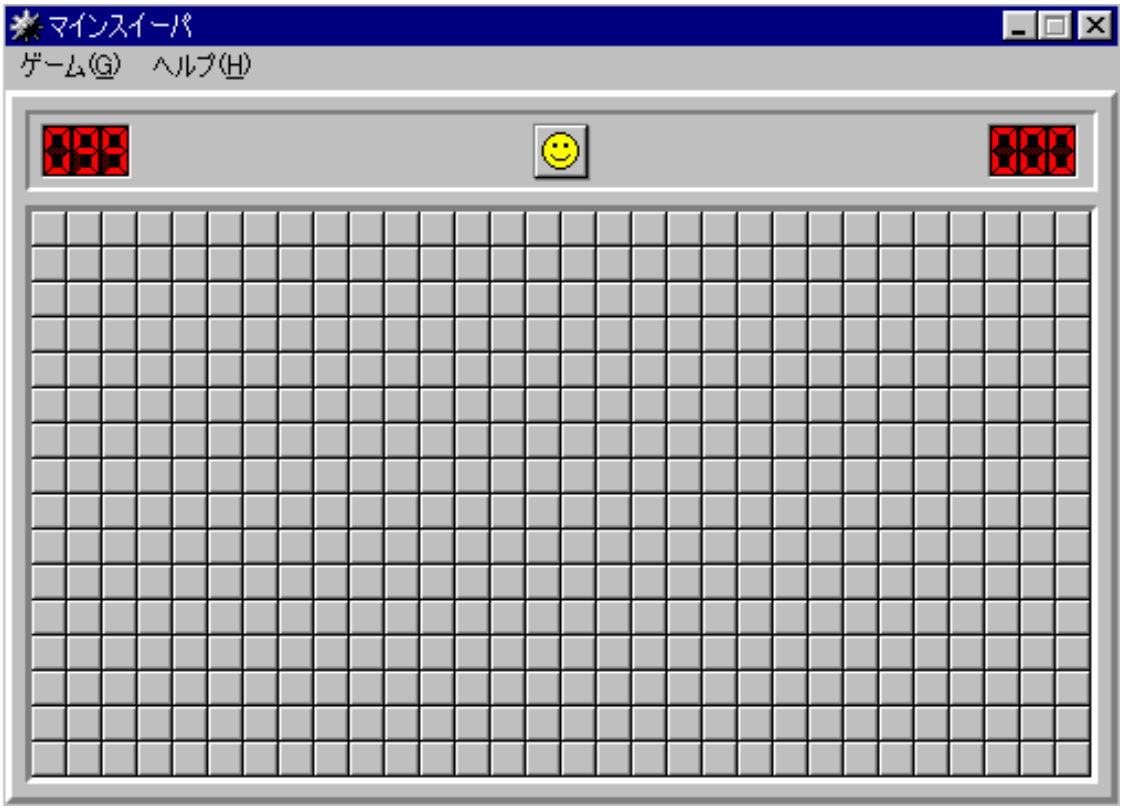


(2) Light leakage

Light leakage can not be seen between metal chassis (bezel) and glass when displaying black plane.

(3) Image sticking

Image sticking pattern shall not be to persist longer than 1second after displaying following pattern 8 hours in the room temperature condition.



(4) Glue/stain/dirt

Glue, non-removable stain and dirt which are visible in the inspection area are not acceptable.

10. Packing

10.1. Carton

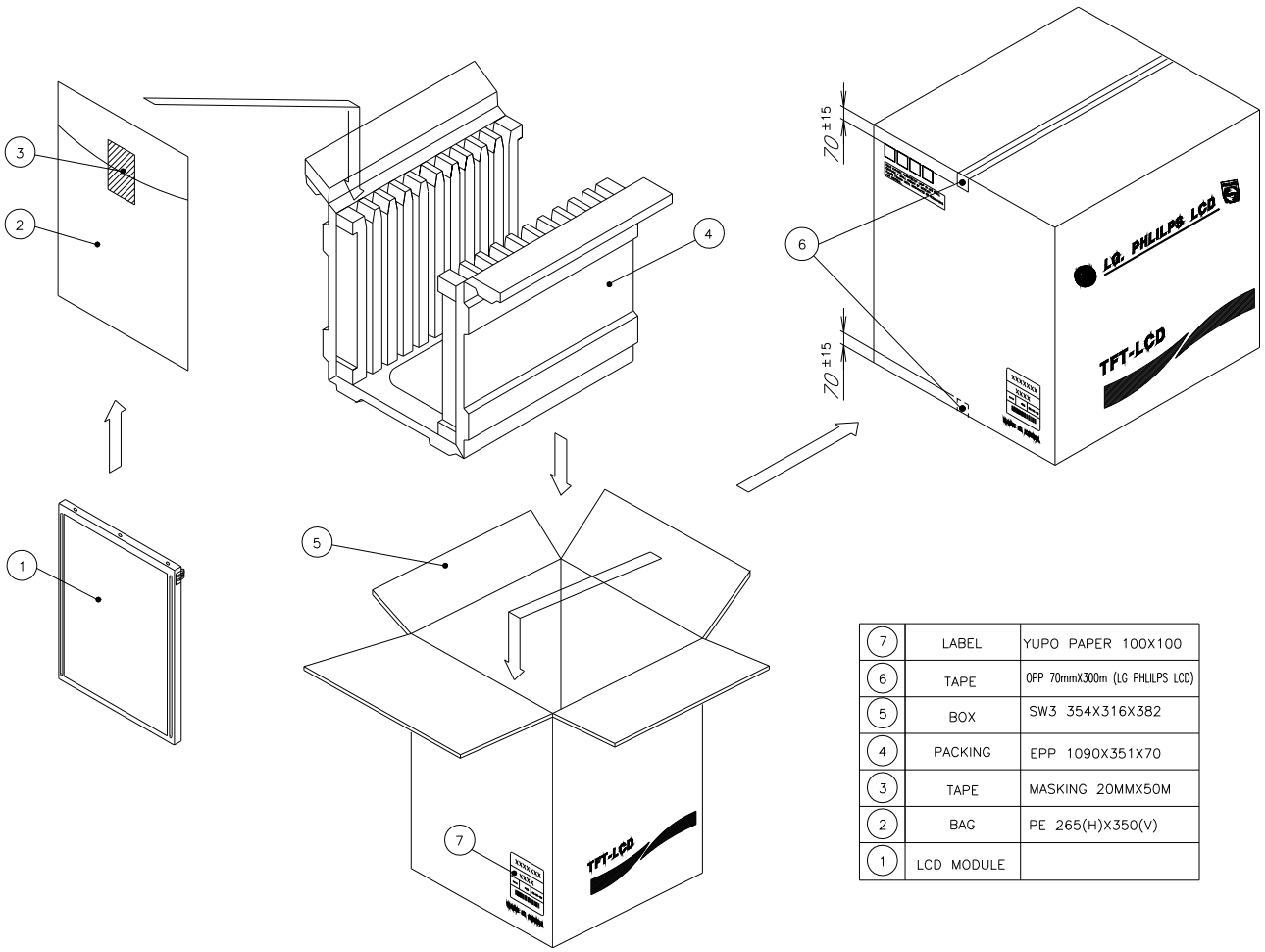
(1) Packing Form

Corrugated cardboard box and EPP

(2) Packing Method

Packing Material

Packing Weight: 265g
(1BOX/10Module)



7	LABEL	YUPO PAPER 100X100
6	TAPE	OPP 70mmX300m (LG PHILIPS LCD)
5	BOX	SW3 354X316X382
4	PACKING	EPP 1090X351X70
3	TAPE	MASKING 20MMX50M
2	BAG	PE 265(H)X350(V)
1	LCD MODULE	

(3) Packing Specification

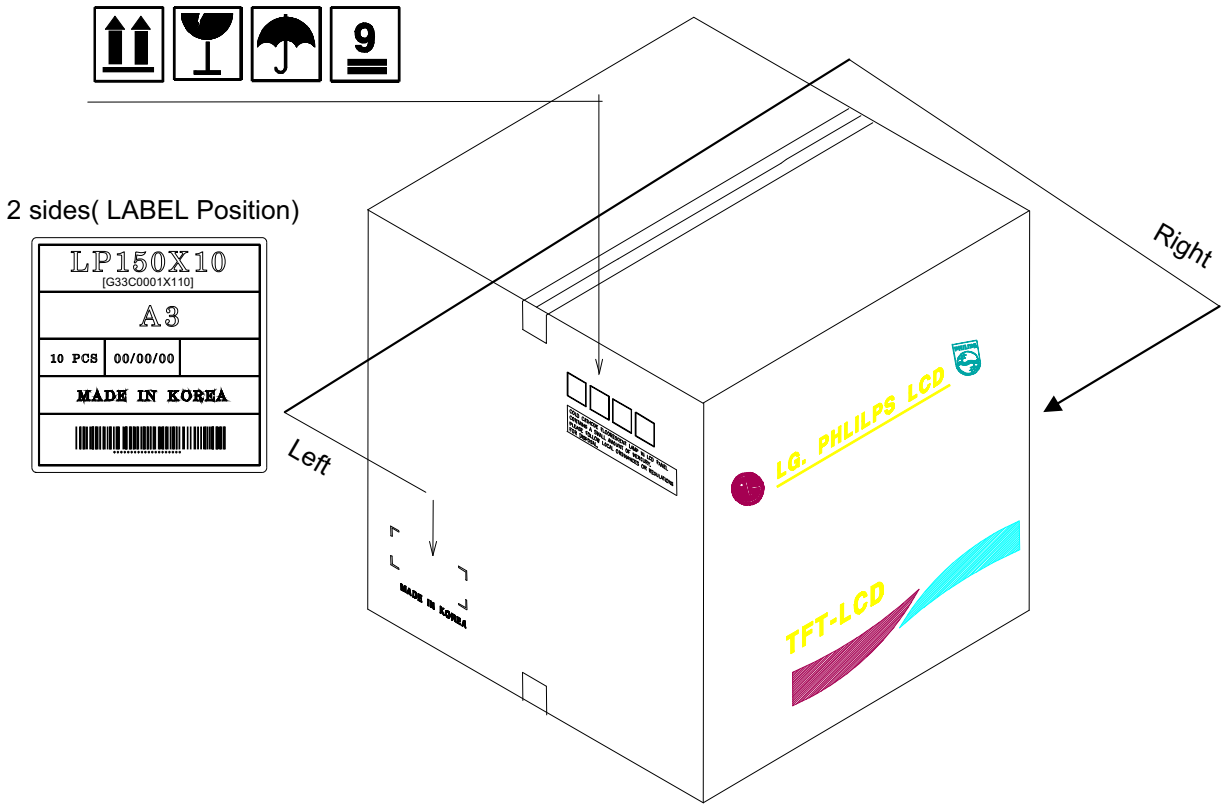
Item	Conditions
Packing Vibration	Frequency Range : 5 - 500 - 5 Hz, Degree of acceleration 1.0G(9.8m/s^2). Sweep rate 27 minutes Resonance Frequency : 1.0G(9.8m/s^2), 30minutes each Axis(X, Y, Z direction) : Non Operation Random 1.06Grms, 30minutes each Axis(X, Y, Z direction) : Non Operation
Packing Drop Test	1 Angle, 3 Edge, 6 Face, 70 cm

(4) Package Label

Package label should be at least shown the following information.

a) TOSHIBA code name(G33C0001K110) which will be numbered by Toshiba
b) Revision number which be numbered by LCD maker
c) Quantity
d) LCD maker
e) Model number which be numbered by LCD maker
f) Production Year / Month

(5) Location of Package label : 2 points (Side)



11. Labels and Lamp Ass'y Exchange

11.1. LCD code Label on LCD

LCD code label should be at least shown the following information.

(1) TOSHIBA code name (G33C0001W110) which will be numbered by Toshiba & Bar code
(Bar code : CODE-39 High-density)

(2) LGPL Serial number CODE (numbered by LCD maker , less than equal 13 digits)

A	B	C	D	E	F	G	H	I	J	K	L	M

A,B,C : Inch
D : Year
E : Month
F : Panel Code
G : Factory Code
H : Assembly Code
I,J,K,L,M : Serial No

Note:

1. Year

Year	97	98	99	2000	2001	2002	2003	2004	2005	2006	2007
Mark	7	8	9	0	1	2	3	4	5	6	7

2. Month

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mark	1	2	3	4	5	6	7	8	9	A	B	C

3. Panel Code

Panel Code	P1 Factory	P2 Factory	P3 Factory	P4 Factory	P5 Factory	Hydis Panel
Mark	1	2	3	4	5	H

4. Factory Code

Factory Code	LPL Gumi	LPL Nanjing	HEESUNG
Mark	K	C	D

5. Serial No

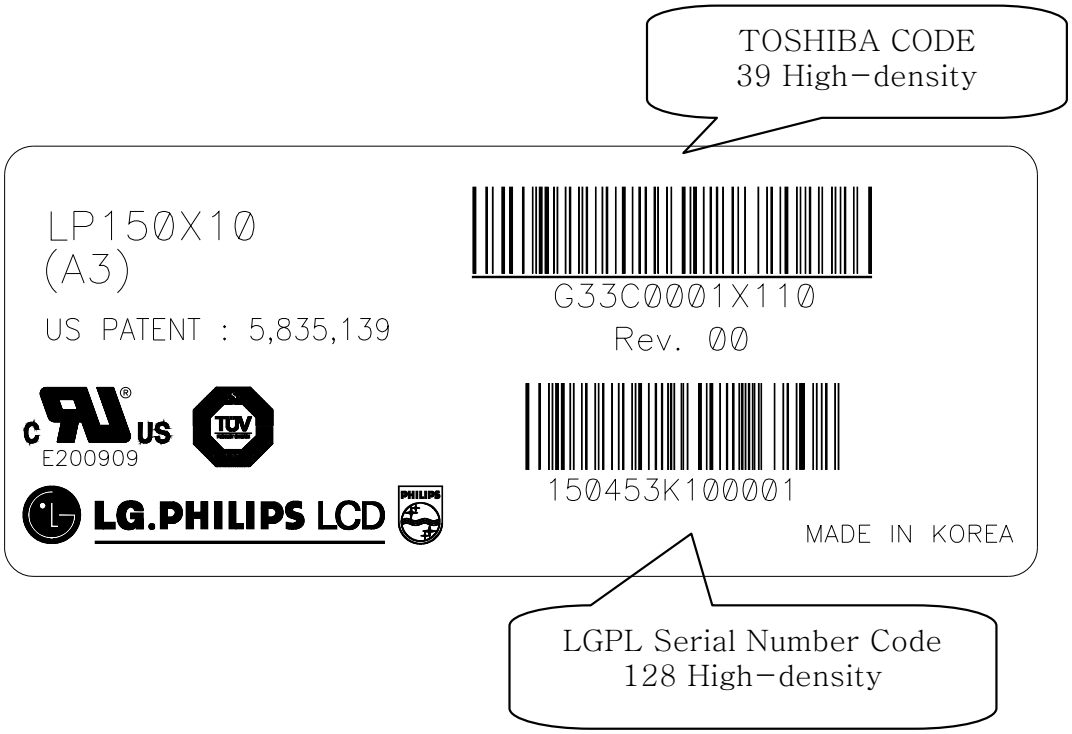
Serial No.	1 ~ 99,999	100,000 ~
Mark	00001 ~ 99999	A0001 ~ A9999, - - - - , Z9999

Serial NO. Is printed on the label. The label is attached to the backside of the LCD module.
This is subject to change without prior notice.

a) Bar code of Serial number
b) Revision number (numbered by LCD maker)
c) Bar code of Revision number
d) LCD maker
e) LCD Model number (numbered by LCD maker)
f) Production Year / Month

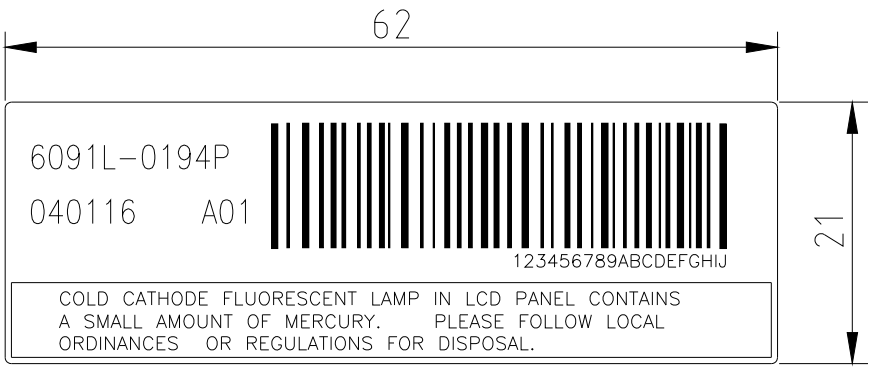
Example >

LABEL : 72mm X 30mm

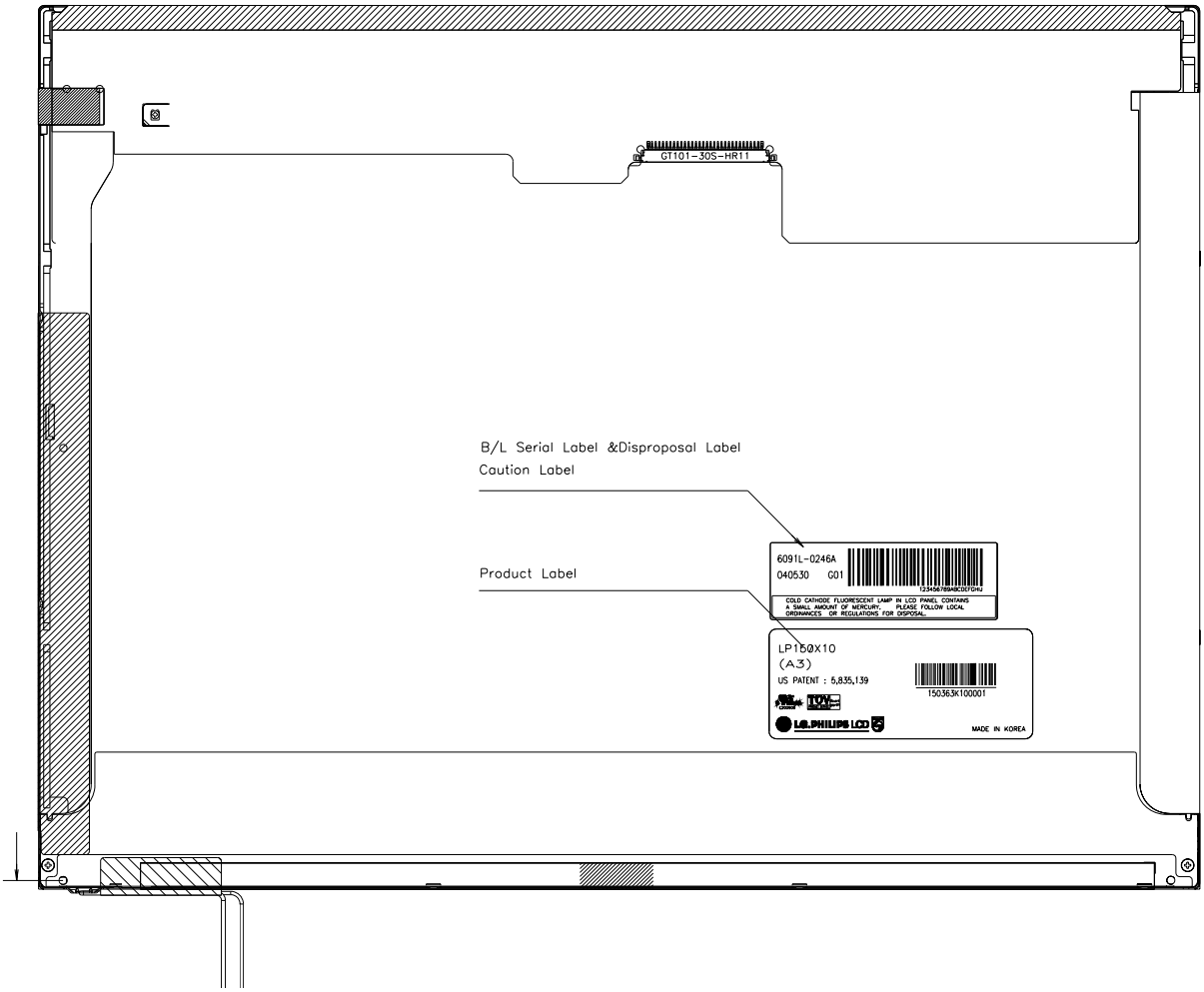


11.2. Caution Texture and Labels on LCD

[Disposal of CCFL]



11.3. Label Locations on LCD



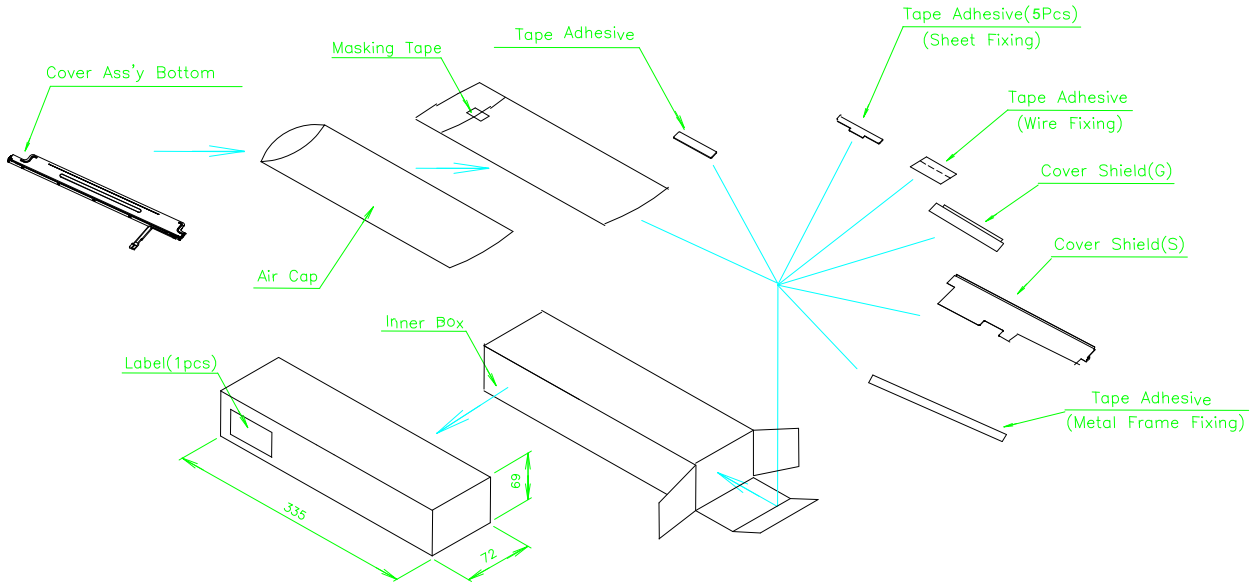
11.4. Others

(1) Backlight repair parts kit : 6913L-0192A(G33C0001W110001)

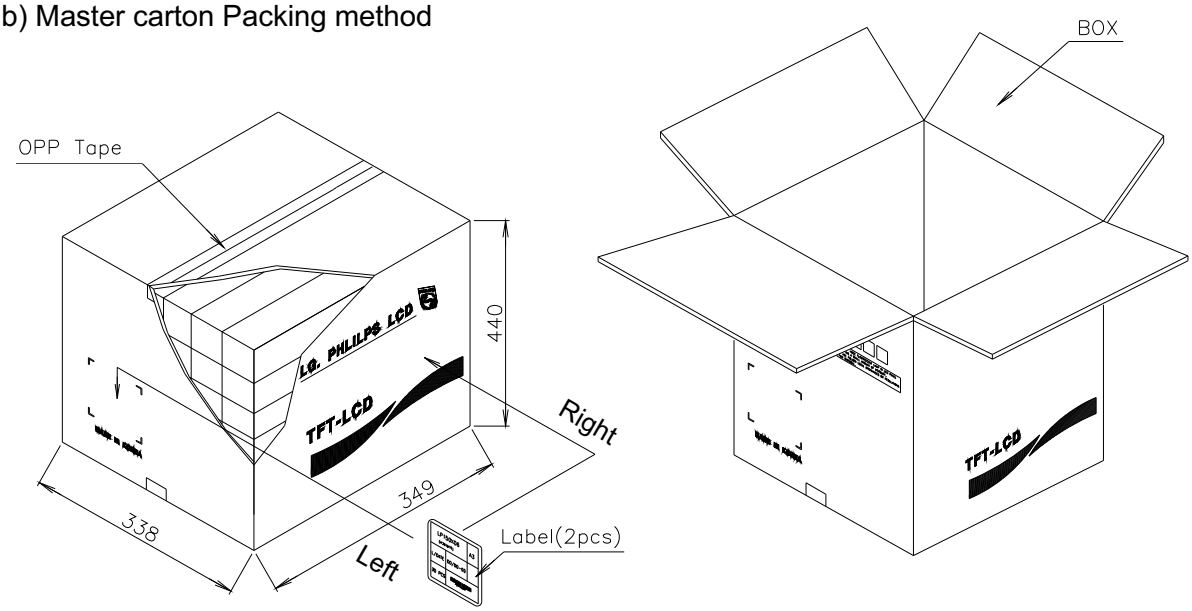
No.	Part	Product Code	Maker	Qt'y	Note
1	Cover Ass'y Bottom	3550B-0087A	L&F	1	
2	Cover Shield(S)	3550S-0160B	Jae Hyun	1	
3	Cover Shield(G)	3550S-0090A	Jae Hyun	1	
4	Tape Adhesive	7250L-0050K	Jae Hyun	1	
5	Tape Adhesive	7250L-0080A	Jae Hyun	1	
6	Tape Filament	7250L-0083A	Jae Hyun	1	
7	Tape Adhesive	7250L-0045Z	Tae Sung	2	
8	Tape Adhesive	7250L-0045L	Tae Sung	2	

(2) Package specification of Backlight repair parts kit

a) Individual packing



b) Master carton Packing method



c) Label

11.5. Instruction of changing the Lamp parts - Lamp Ass'y Exchange process

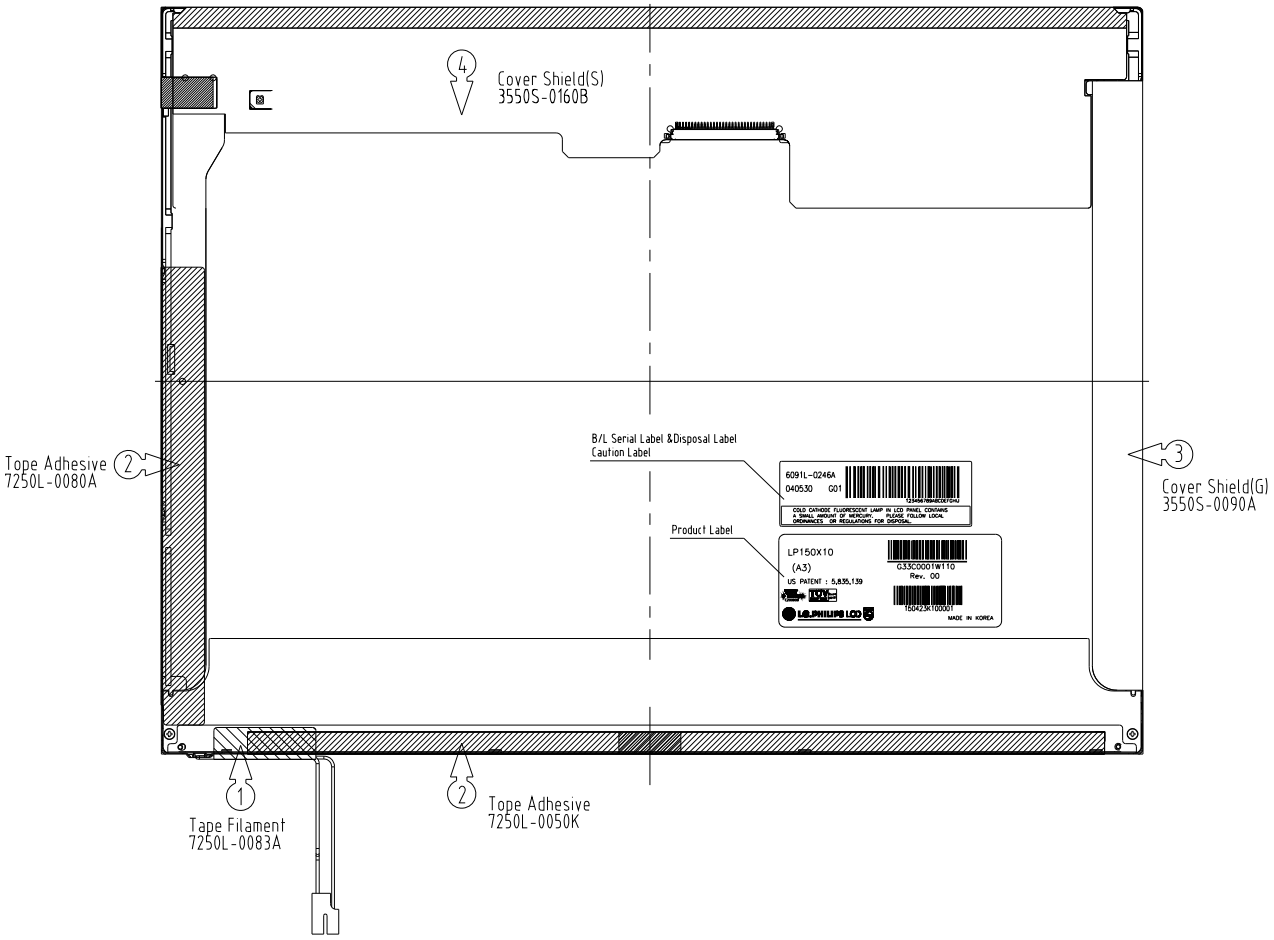
11.5.1. Disassembly of outside tape / Cover shield

(1) ① Disassembly of Tape Filament used for B/L Wire fixing
Caution: Pressure or stress should not be given on B/L Wire.

(2) ② Disassembly of Tape Adhesive used for Top case fixing
Caution: Pressure or stress should not be given on Top case during this process

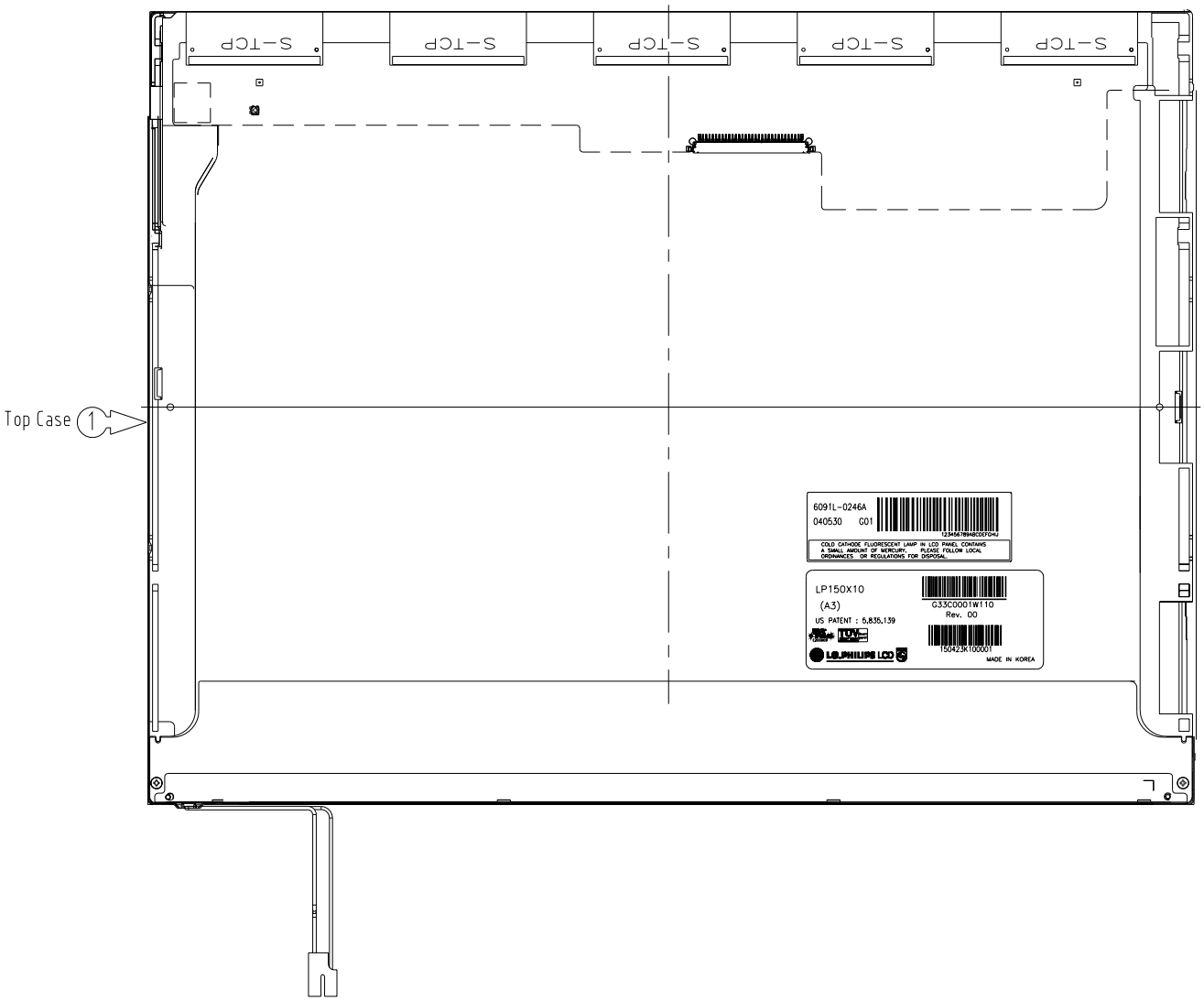
(3) ③ Disassembly of Cover shield(G)
Caution: Pressure or stress should not be given on Gate COF.

(4) ④Disassembly of Cover shield(S)
Caution: Pressure or stress should not be given on Source PCB.
Usage of gloves with anti-electric discharge coating is recommended.
To eliminate possible damage on circuits occurred by ESC.



11.5.2. Disassembly of Top Case

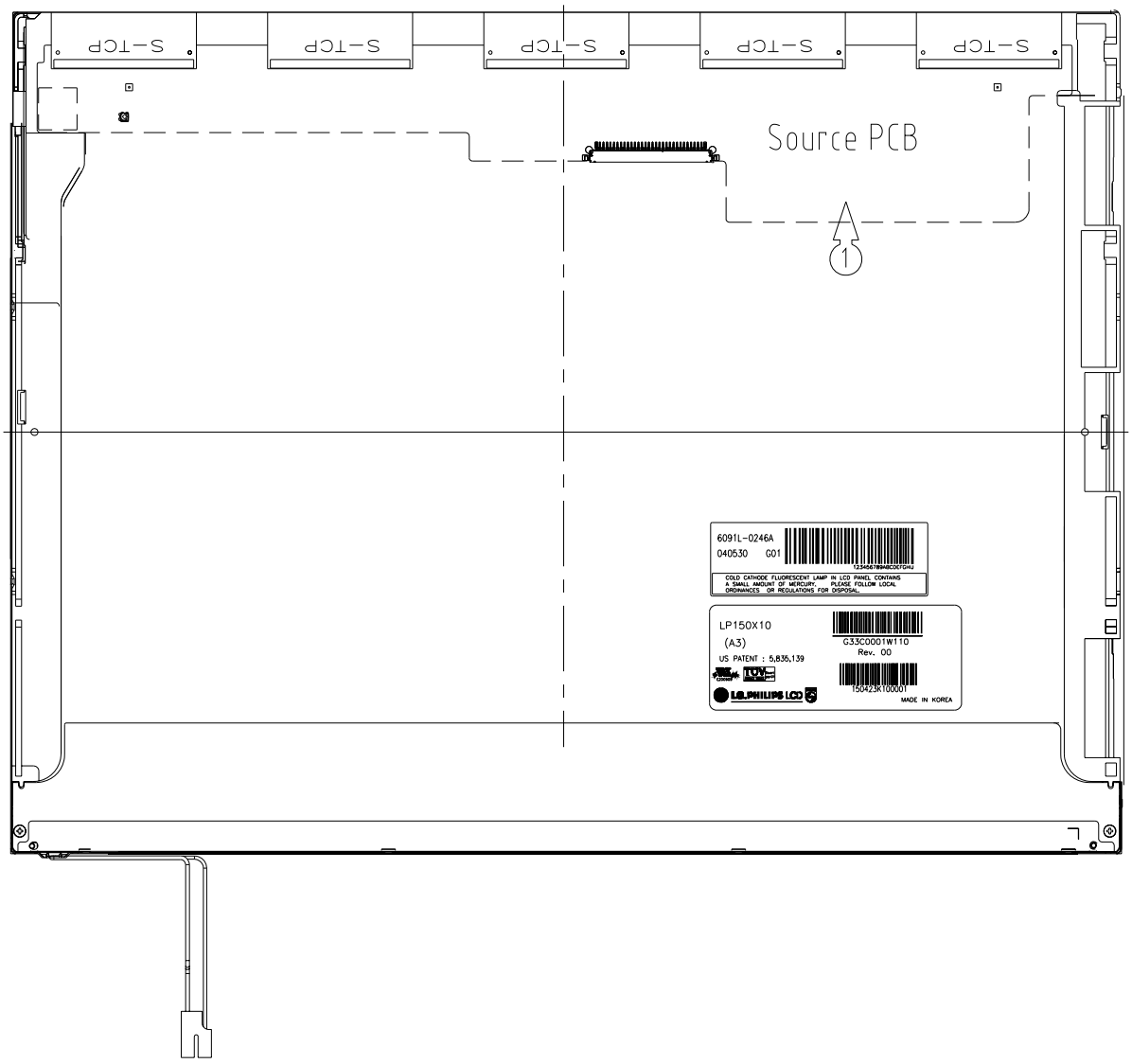
(1) ① Disassembly of Top Case
Caution: Pressure or stress should not be given on Source TCP and Gate COF.



11.5.3. Disassembly of Source PCB

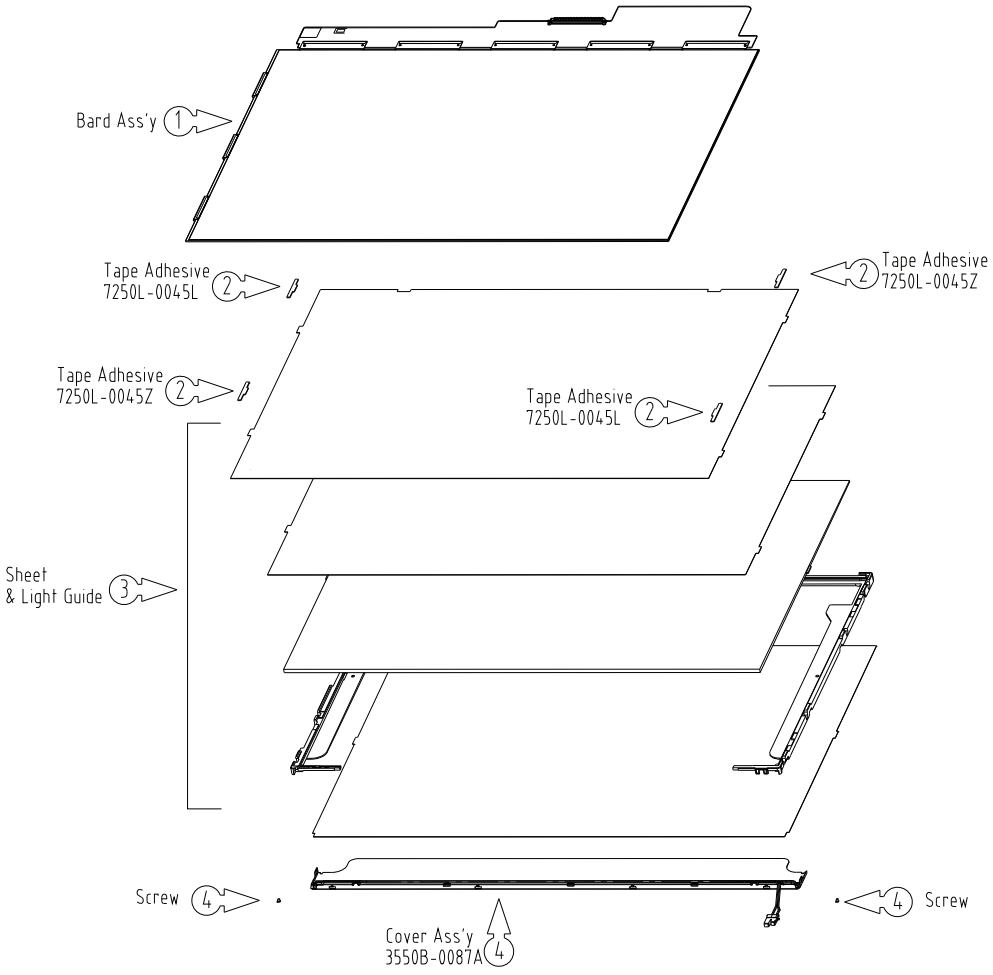
(1) ① Disassembly of Source PCB.

Caution: Pressure or stress should not be given on PCB and TCP



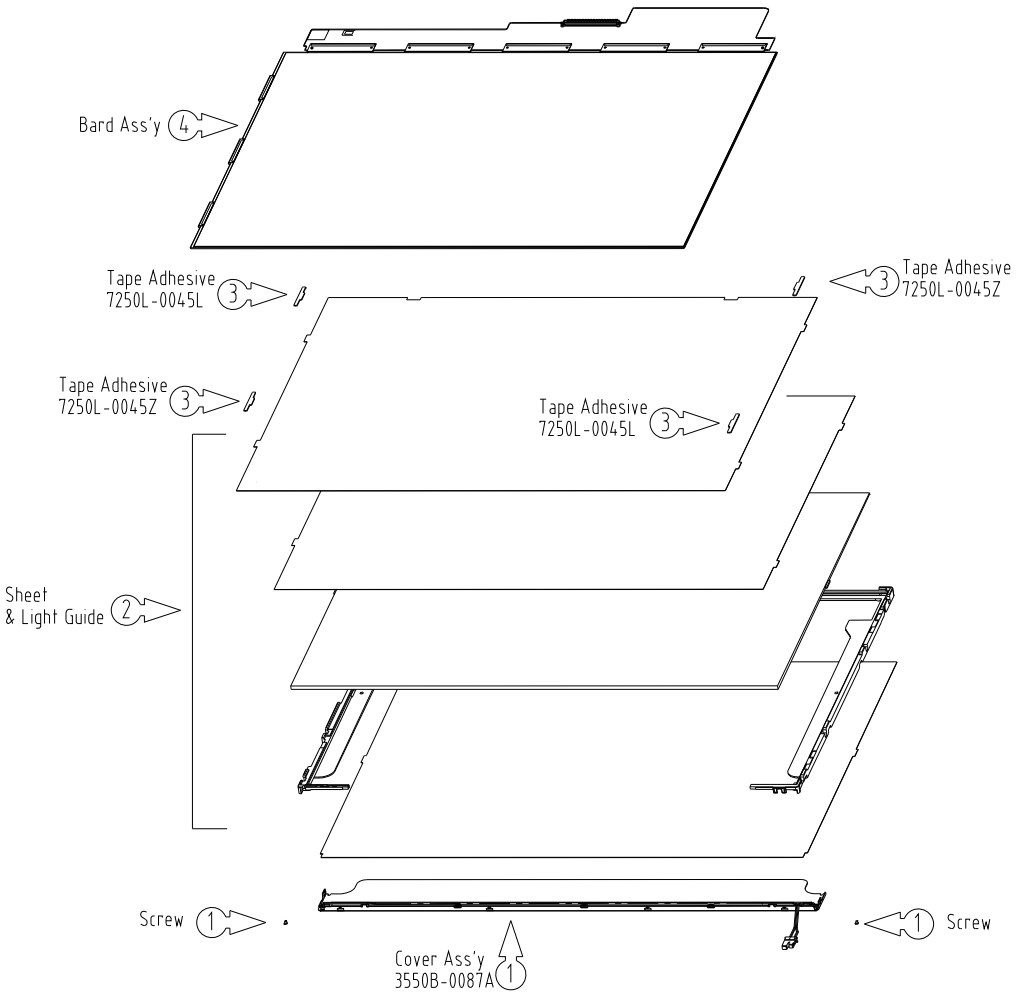
11.5.4. Disassembly of Board Ass'y, Tape Adhesive, Light guide,Cover Ass'y Bottom(L)

(1) ① Disassembly of Board Ass'y.
Caution: This process should be made in Clean room with no scratch nor particle on Polarizer and B/L Ass'y.
(2) ② Disassembly of Tape Adhesive used for Sheets fixing (4Point).
(3) ③ Disassembly of Sheets, Light guide.
Caution: No penetration of foreign body is indispensable with no scratch on the surface of each Sheets.
(4) ④ Disassembly of Screw(2Point) and Cover Ass'y Bottom
Caution: Maximum value of torque with Screw should be below 1.5kg.



11.5.5. Assembly of Cover Ass'y Bottom(L), Sheets, Light guide, Tape Adhesive and Board Ass'y.

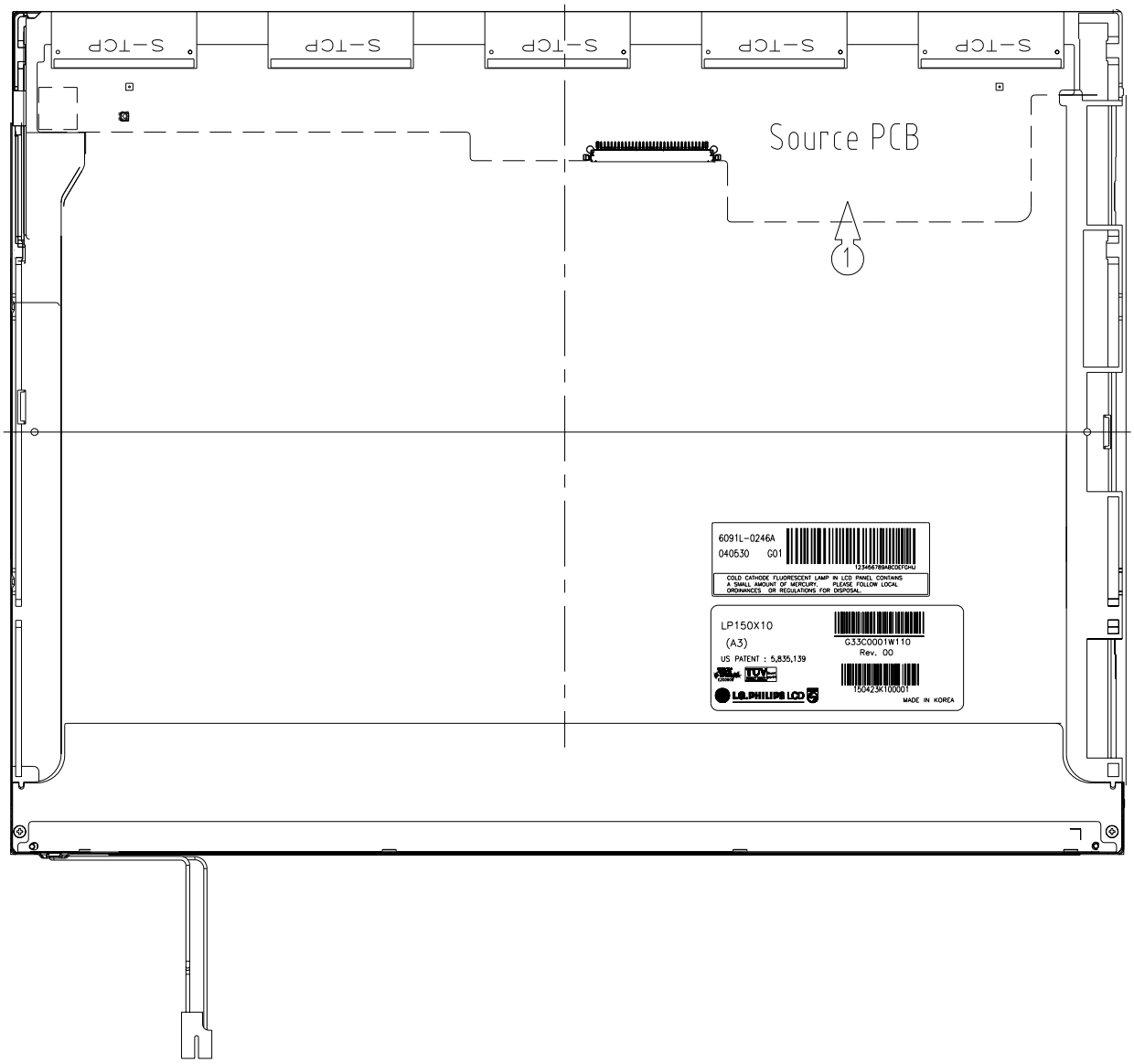
(1) ① Assembly of Cover Ass'y Bottom and Screw(2Point).
Caution: Maximum value of torque with Screw should be below 2.0kgf.cm
(2) ② Assembly of Light Guide and Sheets.(Reflector Sheet fixing with one Double Tape, Diffuser Sheet fixing with one Double Tape.)
Caution: No penetration of foreign body is indispensable with no scratch on the surface of each Sheet and Light guide.
(3) ③ Assembly of Tape adhesive used for Sheets fixing(4Point)
(4) ④ Assembly of Board Ass'y.
Caution: Pressure or stress should not be given on PCB and TCP.



11.5.6. Assembly of Source PCB

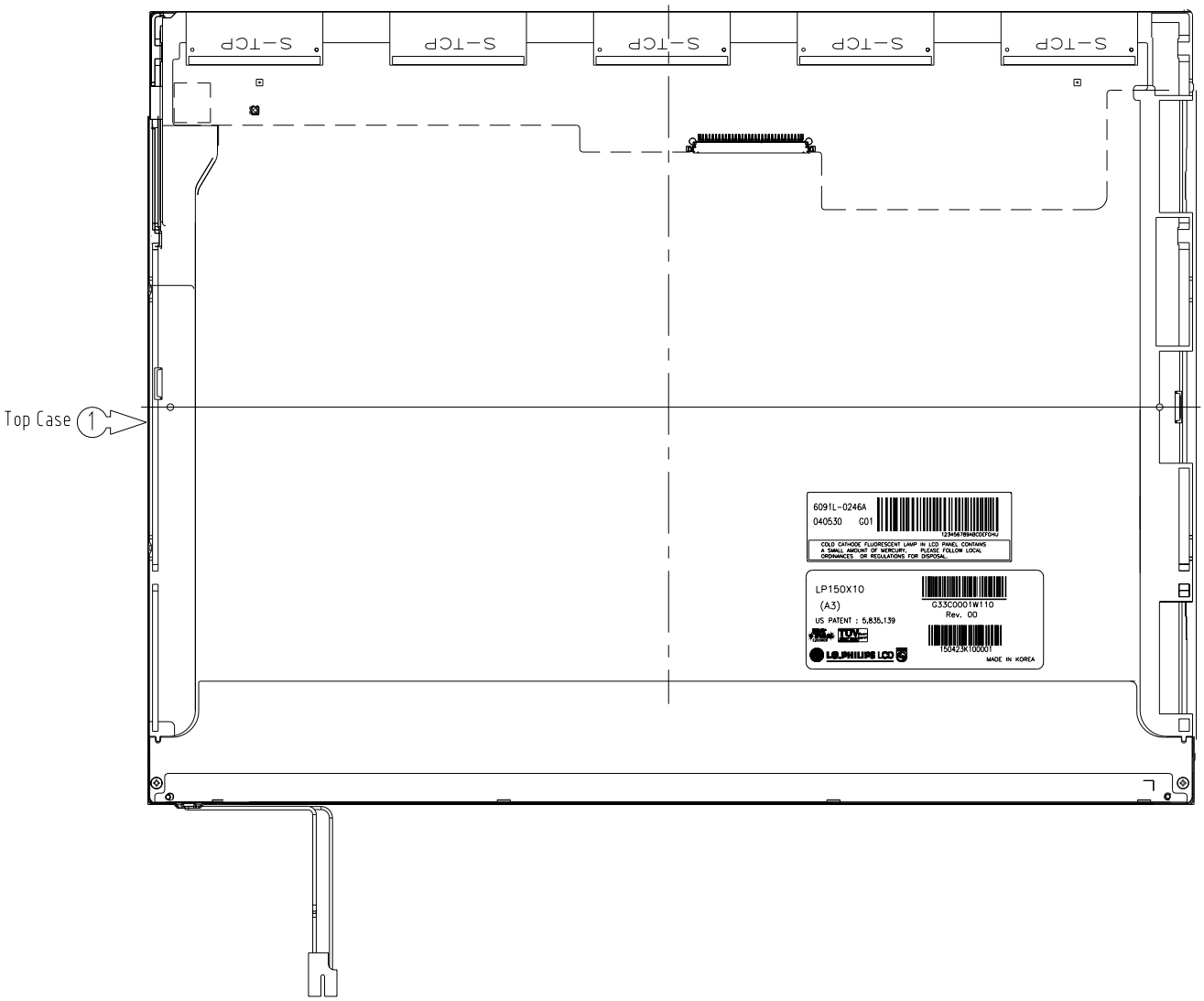
(1) ① Assembly of Source PCB.

Caution: Stress should not be given on TCP



11.5.7. Assembly of Top Case

(1) ① Assembly of Top Case.
Caution: Pressure should not be given on Source TCP and Gate COF.



11.5.8. Assembly of outside Tape and Cover shield

(1) ① Assembly of Cover shield(S)

Caution: Pressure or stress should not be given on Source PCB.
Usage of gloves with anti-electric discharge coating is recommended
To eliminate possible damage on circuits occurred by ESC.

(2) ② Assembly of Cover shield(G)

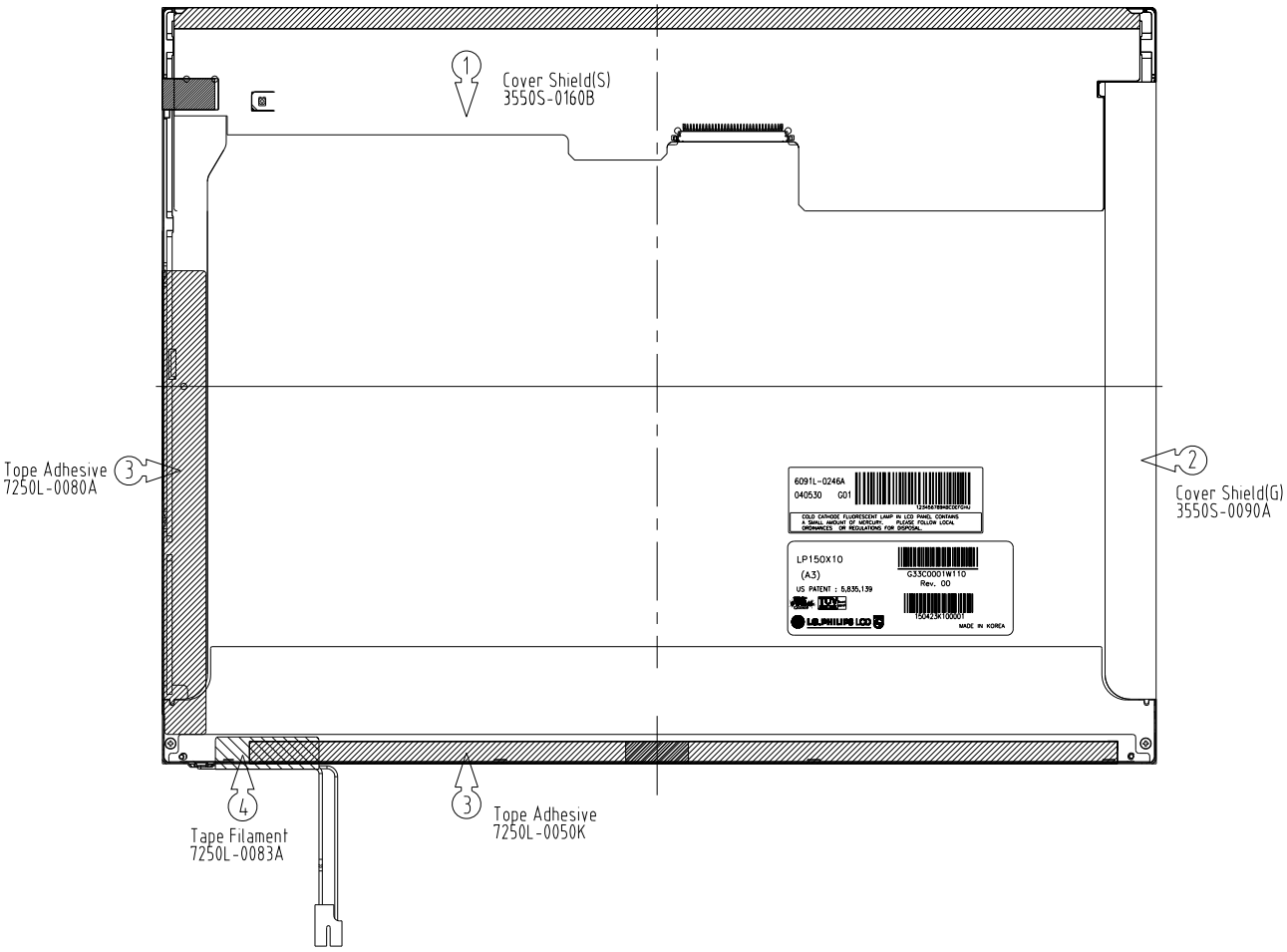
Caution: Pressure or stress should not be given on Gate TCP.

(3) ③ Assembly of Tape Adhesive used for Top case fixing

Caution: Pressure or stress should not be given on Top case during this process

(4) ④ Assembly of Tape adhesive used for B/L Wire fixing

Caution: Pressure or stress should not be given on B/L Wire.



12. General Precaution

Please pay attention to the followings when you use this TFT LCD module.

12.1. Mounting Precautions

(1) You must mount a module using holes arranged in four corners or four sides.
(2) You should consider the mounting structure so that uneven force (ex. twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
(3) Please attach a transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to resist external force.
(4) You should adopt radiation structure to satisfy the temperature specification.
(5) Acetic acid type and chlorine type materials for the cover case aren't desirable because the former generates corrosive gas of attacking the polalizer at high temperature and the latter causes circuit break by electro-chemical reaction.
(6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth. (Some cosmetics are detrimental to the polarizer.)
(7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaked with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
(8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
(9) Do not open the case because inside circuits do not have sufficient strength.

12.2. Operating Precautions

(1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage
: V = ± 200mV (Over and under shoot voltage).
(2) Response time depends on the temperature. (In lower temperature, it becomes longer.)
(3) Brightness depends on the temperature. (In lower temperature, it becomes lower.) And in lower temperature, response time (required time that brightness is stable after turned on) becomes longer.
(4) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
(5) When fixed patterns are displayed for a long time, remnant image is likely to occur.
(6) A module has high frequency circuit. If you need to shield the electromagnetic noise, please co-work. When a Back-light unit is operating, it sounds. If you need to shield the noise, please co-work.

12.3. Electrostatic Discharge Control

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc . And don't touch interface pin directly.

12.4. Precautions for Strong Light Exposure

Strong light exposure causes degradation of polarizer and color filter.

12.5. Storage

When storing modules as spares for a long time, the following precautions are necessary.

(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5℃ and 35℃ at normal humidity.

(2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

12.6. Handling Precautions for Protection Film

(1) When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion- blown equipment or in such a condition, etc.

(2) The protection film is attached to the polarizer with a small amount of glue. If some stress is applied to rub the protection film against the polarizer during the time you peel off the film, the glue is apt to remain on the polarizer. Please carefully peel off the protection film without rubbing it against the polarizer.

(3) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the polarizer after the protection film is peeled off.

(4) You can remove the glue easily. When the glue remains on the polarizer surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

< Appendix>

E-EDID DATA FOR LP150X10-A3 (Ver0.1)

Byte# (decimal)	Byte# (HEX)	Field Name and Comments	Value (HEX)		Value (binary)	
0	00	Header	0	0	0000 0000	Header
1	01		F	F	1111 1111	
2	02		F	F	1111 1111	
3	03		F	F	1111 1111	
4	04		F	F	1111 1111	
5	05		F	F	1111 1111	
6	06		F	F	1111 1111	
7	07		0	0	0000 0000	
8	08	EISA manufacturer code = LGP	3	0	0011 0000	Vender/ Product ID
9	09	Compressed ASCII	F	0	1111 0000	
10	0A	Product code=LP150X10-A3 (15" 10th Model) = 15A	4	6	0100 0110	
11	0B	(Hex, LSB first)	A	1	1010 0001	
12	0C	ID(32-bit) serial number = don't care	0	0	0000 0000	
13	0D		0	0	0000 0000	
14	0E		0	0	0000 0000	
15	0F		0	0	0000 0000	
16	10	Week of manufacture = don't care	0	0	0000 0000	
17	11	Year of manufacture = "2004"	0	E	0000 1110	
18	12	EDID Structure version # = "1"	0	1	0000 0001	EDID Version/ Revision
19	13	EDID Revision # = "3"	0	3	0000 0011	
20	14	Video input definition = Digital I/p,non TMDS CRGB	8	0	1000 0000	Display Parameter
21	15	Max H image size(cm)= 30.4128cm(30)	1	E	0001 1110	
22	16	Max V image size(cm)= 22.8096cm(23)	1	7	0001 0111	
23	17	Display gamma = 2.2	7	8	0111 1000	
24	18	Feature support(DPMS) = Active off, RGB Color	0	A	0000 1010	
25	19	Red/Green low Bits (RxRy/GxGy)	1	8	0001 1000	Color Characteristic
26	1A	Blue/White Low Bits (BxBy/WxWy)	A	0	1010 0000	
27	1B	Red X Rx = 0.590	9	7	1001 0111	
28	1C	Red Y Ry = 0.345	5	8	0101 1000	
29	1D	Green X Gx = 0.323	5	2	0101 0010	
30	1E	Green Y Gy = 0.540	8	A	1000 1010	
31	1F	Blue X Bx = 0.159	2	8	0010 1000	
32	20	Blue Y By = 0.139	2	3	0010 0011	
33	21	White X Wx = 0.313	5	0	0101 0000	
34	22	White Y Wy = 0.329	5	4	0101 0100	
35	23	Established Timing I	0	0	0000 0000	Established Timings
36	24	Established Timing II	0	0	0000 0000	
37	25	Manufacturer's Timings	0	0	0000 0000	
38	26	Standard Timing ID1 (01h if not used)	0	1	0000 0001	Standard Timing ID
39	27	Standard Timing ID1 (01h if not used)	0	1	0000 0001	
40	28	Standard Timing ID2 (01h if not used)	0	1	0000 0001	
41	29	Standard Timing ID2 (01h if not used)	0	1	0000 0001	
42	2A	Standard Timing ID3 (01h if not used)	0	1	0000 0001	
43	2B	Standard Timing ID3 (01h if not used)	0	1	0000 0001	
44	2C	Standard Timing ID4 (01h if not used)	0	1	0000 0001	
45	2D	Standard Timing ID4 (01h if not used)	0	1	0000 0001	
46	2E	Standard Timing ID5 (01h if not used)	0	1	0000 0001	
47	2F	Standard Timing ID5 (01h if not used)	0	1	0000 0001	
48	30	Standard Timing ID6 (01h if not used)	0	1	0000 0001	
49	31	Standard Timing ID6(01h if not used)	0	1	0000 0001	
50	32	Standard Timing ID7(01h if not used)	0	1	0000 0001	
51	33	Standard Timing ID7 (01h if not used)	0	1	0000 0001	
52	34	Standard Timing ID8 (01h if not used)	0	1	0000 0001	
53	35	Standard Timing ID8 (01h if not used)	0	1	0000 0001	

< Appendix>

Byte# (decimal)	Byte# (HEX)	Field Name and Comments	Value (HEX)		Value (binary)	
54	36	Detailed Timing Descriptor #1	6	4	0110 0100	Detailed Timing Description #1
55	37	1024X768 @60 Hz mode : pixe; clock = 65.00 MHz	1	9	0001 1001	
56	38	Horizontal Active = 1024 pixels	0	0	0000 0000	
57	39	Horizontal Blanking = 320 pixels	4	0	0100 0000	
58	3A	Horizontal Active : Horizontal Blanking	4	1	0100 0001	
59	3B	Vertical Avtive = 768 lines	0	0	0000 0000	
60	3C	Vertical Blanking = 38 lines	2	6	0010 0110	
61	3D	Vertical Active : Vertical Blanking	3	0	0011 0000	
62	3E	Horizontal Sync. Offset = 24 pixels	1	8	0001 1000	
63	3F	Horizontal Sync Pulse Width = 136 pixels	8	8	1000 1000	
64	40	Vertical Sync Offset = 3 lines : Sync Width = 6 lines	3	6	0011 0110	
65	41	Horizontal Vertical Sync Offset/Width upper 2bits	0	0	0000 0000	
66	42	Horizontal Image Size = 304.128 ㎜(304)	3	0	0011 0000	
67	43	Vertical Image Size = 228.096 ㎜(228)	E	4	1110 0100	
68	44	Horizontal & Vertical Image Size	1	0	0001 0000	
69	45	Horizontal Border = 0	0	0	0000 0000	
70	46	Vertical Border = 0	0	0	0000 0000	
71	47	Non-interlaced,Normal display,no stereo,Digital separate sync,H/V pol negatives	1	8	0001 1000	
72	48	Detailed Timing Descriptor #2 was not used	0	0	0000 0000	Detailed Timing Description #2
73	49		0	0	0000 0000	
74	4A		0	0	0000 0000	
75	4B		0	0	0000 0000	
76	4C		0	0	0000 0000	
77	4D		0	0	0000 0000	
78	4E		0	0	0000 0000	
79	4F		0	0	0000 0000	
80	50		0	0	0000 0000	
81	51		0	0	0000 0000	
82	52		0	0	0000 0000	
83	53		0	0	0000 0000	
84	55		0	0	0000 0000	
85	55		0	0	0000 0000	
86	56		0	0	0000 0000	
87	57		0	0	0000 0000	
88	58		0	0	0000 0000	
89	59		0	0	0000 0000	
90	5A	Detailed Timing Descriptor #3	0	0	0000 0000	Detailed Timing Description #3
91	5B	ASCII Data String Tag (Supplier Name)	0	0	0000 0000	
92	5C		0	0	0000 0000	
93	5D		F	E	1111 1110	
94	5E		0	0	0000 0000	
95	5F	[L]	4	C	0100 1100	
96	60	[G]	4	7	0100 0111	
97	61	[P]	5	0	0101 0000	
98	62	[h]	6	8	0110 1000	
99	63	[i]	6	9	0110 1001	
100	64	[l]	6	C	0110 1100	
101	65	[i]	6	9	0110 1001	
102	66	[p]	7	0	0111 0000	
103	67	[s]	7	3	0111 0011	
104	68	[-]	2	D	0010 1101	
105	69	[L]	4	C	0100 1100	
106	6A	[C]	4	3	0100 0011	
107	6B	[D]	4	4	0100 0100	

< Appendix>

Byte# (decimal)	Byte# (HEX)	Field Name and Comments	Value (HEX)		Value (binary)	
108	6C	Detailed Timing Descriptor #4	0	0	0000 0000	
109	6D	ASCII Data String Tag (Supplier P/N)	0	0	0000 0000	
110	6E		0	0	0000 0000	
111	6F		F	E	1111 1110	
112	70		0	0	0000 0000	
113	71	[L]	4	C	0100 1100	
114	72	[P]	5	0	0101 0000	
115	73	[1]	3	1	0011 0001	Detailed Timing Description #4
116	74	[5]	3	5	0011 0101	
117	75	[0]	3	0	0011 0000	
118	76	[X]	5	8	0101 1000	
119	77	[1]	3	1	0011 0001	
120	78	[0]	3	0	0011 0000	
121	79	[-]	2	D	0010 1101	
122	7A	[A]	4	1	0100 0001	
123	7B	[3]	3	3	0011 0011	
124	7C	[^] Line Feed	0	A	0000 1010	
125	7D	<space>	2	0	0010 0000	
126	7E	Extension flag = 00	0	0	0000 0000	Extension Flag
127	7F	Checksum	B	0	1011 0000	Checksum