



SAMSUNG

ELECTRONICS

Approval



TO : SONY

DATE : July 9, 2007

SAMSUNG TFT-LCD

MODEL NO. : LTN154XB-L01

NOTE : Extension code [-P]

→ LTN154XB-L01- P

Surface type [**Glare**]

Green product (Complied with RoHS requirement)

Any Modification of Spec is not allowed without SEC' permission

APPROVED BY : W B, Youn

PREPARED BY : Development Team 3

SAMSUNG ELECTRONICS CO., LTD.



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REVISION HISTORY

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Date	Rev. No.	Page	Summary												
Aug. 18, 2006	P00	All	The specification of LTN154XB-L01 model was first issued.												
Aug. 31, 2006	P01	6 10 12 31	Changed the electrical absolute ratings of TFT module. Added the Min/Max value of Sync frequency. Changed the lamp voltage to 670Vrms at 6.0mA Added the startup voltage. Added the reliability test spec.												
Oct. 25, 2006	P02	10	The specification of Vsync/ Hsync/ Main frequency was updated.												
Jan. 31, 2007	P03	10	The specification of Hsync frequency was modified by Sony's request. [Unit : kHz] <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <tr> <td></td><td>Min.</td><td>Typ.</td><td>Max.</td></tr> <tr> <td>AS-IS</td><td>48.3</td><td>48.9</td><td>49.9</td></tr> <tr> <td>TO-BE</td><td>45.9</td><td>48.9</td><td>52.4</td></tr> </table>		Min.	Typ.	Max.	AS-IS	48.3	48.9	49.9	TO-BE	45.9	48.9	52.4
	Min.	Typ.	Max.												
AS-IS	48.3	48.9	49.9												
TO-BE	45.9	48.9	52.4												
Apr. 13, 2007	A00	All 7	The approval specification of LTN154XB-L01 model was first issued. Based on the actual measurement data, SEC would like to change the 13 Points White Variation Specification from Min. 50% to Min. 45%.												
Apr. 18, 2007	A01	12	Lamp frequency specification was modified by Sony's request. [AS-IS] Min. 47kHz → [TO-BE] Min. 42kHz												
May. 11, 2007	P00	All	The preliminary specification of LTN154XB-L01-P(T3 panel + SESL module line) was first issued.												
May. 30, 2007	P01	7	The specification of 13 Points White Variation was changed as below. [AS-IS] Min. (45%) → [TO-BE] Min. (50%)												
July 9, 2007	A00	All 10	The approval specification of LTN154XB-L01-P model was first issued. The current of power supply specification was modified as below. [AS-IS] Max 630mA → [TO-BE] Max 550mA												

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GENERAL DESCRIPTION

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DESCRIPTION

LTN154XB is a color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching devices. This model is composed of a TFT LCD panel, a driver circuit, and back-light system. The resolution of a 15.4 " contains 1280 x 800 pixels and can display up to 262,144colors. 6 o'clock direction is the optimum viewing angle.

FEATURES

- Ultra High Luminance with 2-CCFL
- High Color Gamut (Typical 90%)
- Wide viewing angle (H140/ V 130)
- High contrast ratio (Ultra fine & shine view)
- WXGA (1280x800 pixels) resolution
- Low power consumption
- DE (Data enable) only mode.
- 3.3V LVDS (FPD Link) Interface with 1 pixel / clock
- On board EDID chip
- RoHS Compliance
- MS-Vista Compliance

APPLICATIONS

- Mega-Notebook PC
- Display terminals for AV application products
- If the usage of this product is not for PC application, but for others, please contact SEC.

GENERAL INFORMATION

Item	Specification	Unit	Note
Display area	331.2(H) X 207.0(V) (15.4"diagonal)	mm	
Driver element	a-si TFT active matrix		
Display colors	262,144		
Number of pixel	1280 x RGB x 800	pixel	16 : 10
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.25875(H) x 0.25875(V)	mm	
Display Mode	Normally white		
Surface treatment	Haze 0(Glare), Hardness 3H		

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Mechanical Information

ITEM		MIN	TYP	MAX	NOTE
Module size (mm)	Horizontal (H)	343.5	344.0	344.5	
	Vertical (V)	224.5	225.0	225.5	
	Depth (D)	-	6.7	7.0	(1)
Weight (g)		-	610	630	

Note (1) Measurement condition of outline dimension

- . Equipment : Vernier Calipers
- . Push Force : 500g · f (minimum)

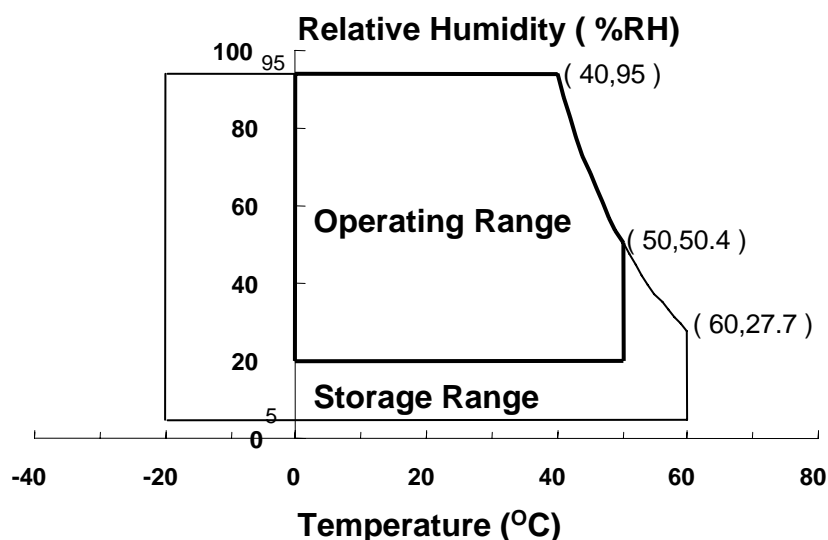
1. ABSOLUTE MAXIMUM RATINGS**1.1 ENVIRONMENTAL ABSOLUTE RATINGS**

Item	Symbol	Min.	Max.	Unit	Note
Storage temperate	TSTG	-20	60	°C	(1)
Operating temperate (Temperature of glass surface)	TOPR	0	50	°C	(1)
Shock (non-operating)	Snop	-	210	G	(2),(4)
Vibration (non-operating)	Vnop	-	2.41	G	(3),(4)

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

95 % RH Max. ($40^{\circ}\text{C} \geq T_a$)

Maximum wet - bulb temperature at 39°C or less. ($T_a > 40^{\circ}\text{C}$) No condensation



(2) 3ms, half sine wave, one time for $\pm X, \pm Y, \pm Z$.

(3) 5 - 500 Hz, random vibration, 30min for X, Y, Z.

(4) At testing Vibration and Shock, the fixture in holding the Module to be tested have to be hard and rigid enough so that the Module would not be twisted or bent by the fixture.

(5) If this product is used for extended time excessively or exposed to high temperatures for extended time, there is a possibility of wide viewing angle film damage which could affect visual characteristics.

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1.2 ELECTRICAL ABSOLUTE RATINGS

(1) TFT LCD MODULE

 $V_{DD} = 3.3V, V_{SS} = GND = 0V$

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{DD}	- 0.3	+ 3.8	V	(1)
Logic Input Voltage	V_{DD}	- 0.3	$V_{DD} + 0.3$	V	(1)

Note (1) Within T_a ($25 \pm 2^\circ C$)

(2) BACK-LIGHT UNIT

 $T_a = 25 \pm 2^\circ C$

Item	Symbol	Min.	Max.	Unit	Note
Lamp Current	I_L	3.0	7.0	mArms	(1)
Lamp frequency	F_L	40	80	kHz	(1)

Note 1) Permanent damage to the device may occur if maximum values are exceeded

Functional operation should be restricted to the conditions described under normal operating conditions.

2. OPTICAL CHARACTERISTICS

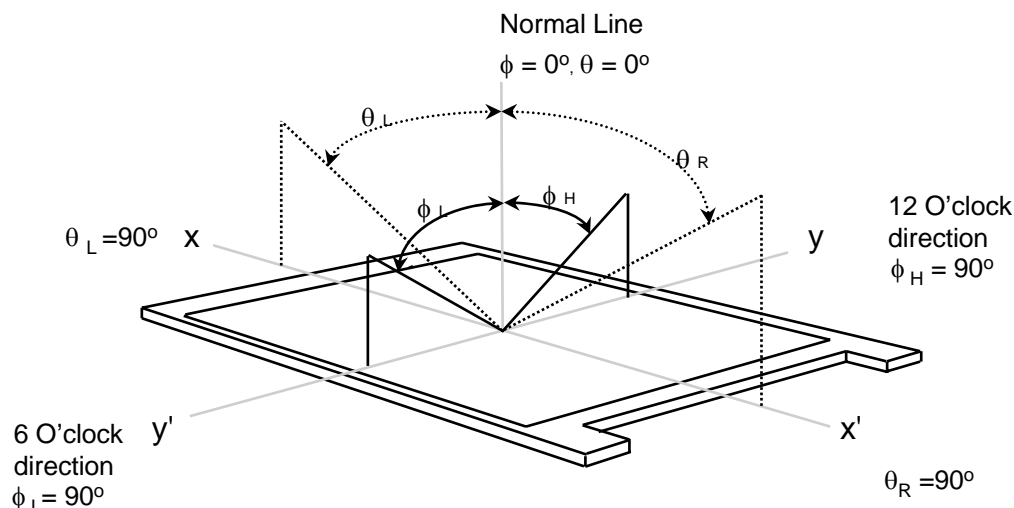
The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note (5).
Measuring equipment : TOPCON SR-3

* Ta = 25 ± 2 °C, V_{DD}=3.3V, f_v= 60Hz, f_{DCLK}=68.94MHz, (I_L= 6.0 mA)

Item		Symbol	Condition	Min.	Typ.	Max	Unit	Note
Contrast Ratio (5 points)		CR	Wide Viewing Angle $\phi = 0$ $\theta = 0$	-	600	-	-	(1), (2), (5)
Response Time at Ta (Rising + Falling)		T _{RT}		-	16	-	msec	(1), (3)
Luminance of White (5 points)		Y _{L,AVE}		430	500	-	cd/m²	I _L =6.0mA (1), (4)
Color Chromaticity (CIE)	Red	R _X		0.627	0.657	0.687	-	(1), (5) SR-3
		R _Y		0.297	0.327	0.357		
	Green	G _X		0.190	0.220	0.250		
		G _Y		0.634	0.664	0.694		
	Blue	B _X		0.116	0.146	0.176		
		B _Y		0.044	0.074	0.104		
	White	W _X		0.283	0.313	0.343		
		W _Y		0.299	0.329	0.359		
Viewing Angle	Hor.	θ _L	CR ≥ 10	-	70	-	Degrees	
		θ _H		-	70	-		
	Ver.	φ _H		-	65	-		
		φ _L		-	70	-		
13 Points White Variation		%		50%	-	-	-	(6)

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Note 1) Definition of Viewing Angle : Viewing angle range($10 \leq C/R$)

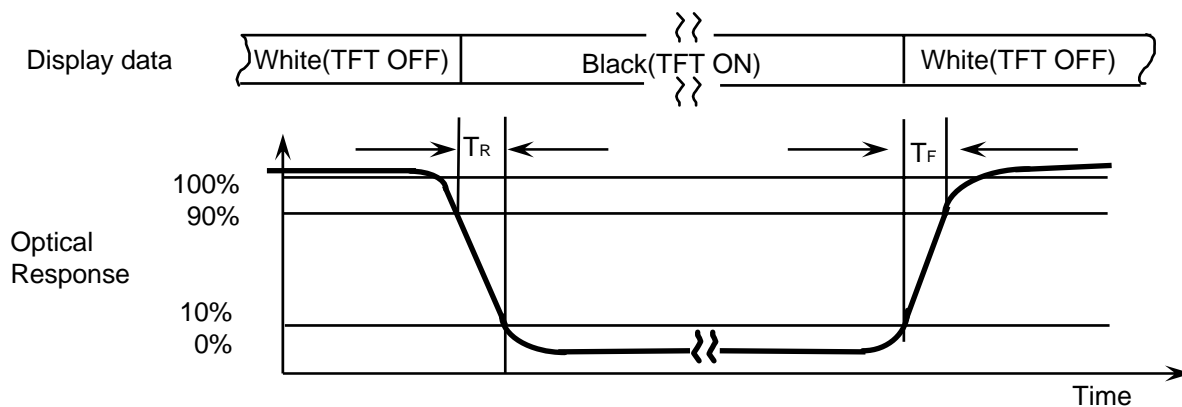


Note 2) Definition of Contrast Ratio (CR) : Ratio of gray max (Gmax) ,gray min (Gmin) at 5 points(4, 5, 7, 9, 10)

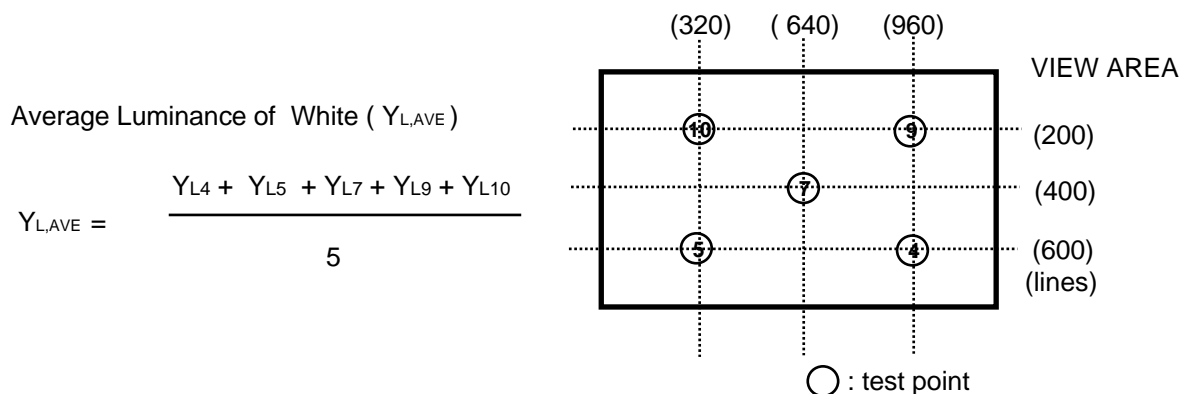
$$CR = \frac{CR(4) + CR(5) + CR(7) + CR(9) + CR(10)}{5}$$

Points : (4) , (5) , (7) , (9) , (10) at the figure of Note (6).

Note 3) Definition of Response time :

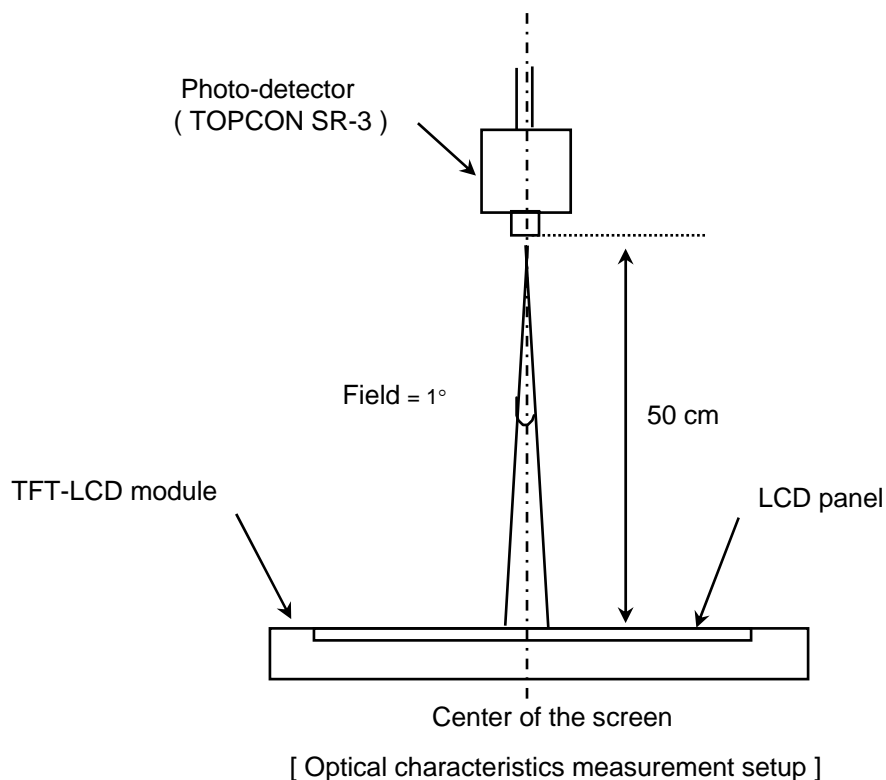


Note 4) Definition of Luminance of White : measure the luminance of white at center point.



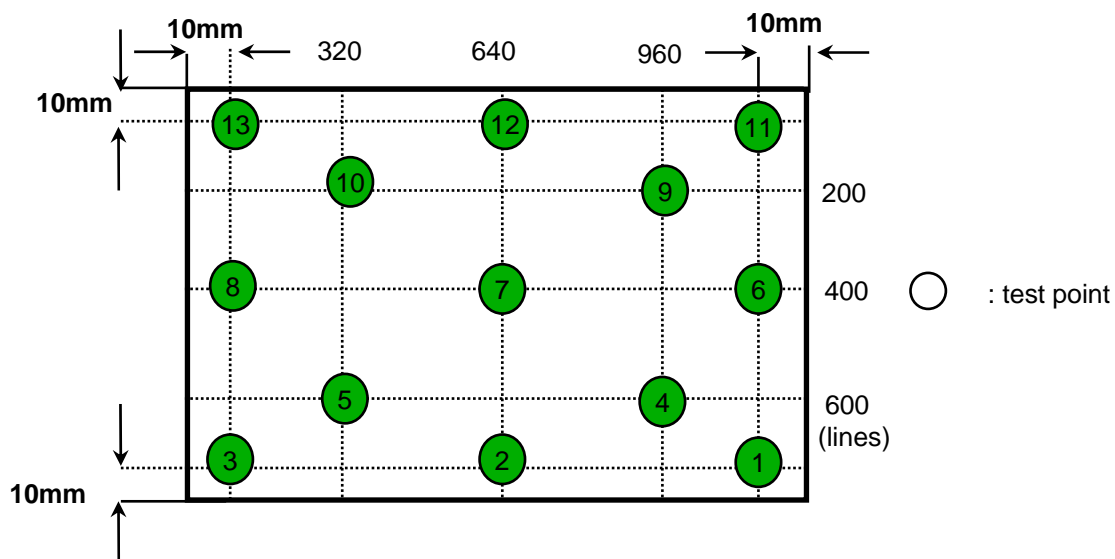
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Note 5) After stabilizing and leaving the panel alone at a given temperature for 30 min , the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. 30 min after lighting the backlight. This should be measured in the center of screen.
Lamp current : 6.0mA (Inverter : SIC-1801)
Environment condition : $T_a = 25 \pm 2 \text{ }^{\circ}\text{C}$



Note 6) Definition of 13 points white variation (%), [① ~ ⑬]

$$\% = \frac{\text{Minimum luminance of 13 points}}{\text{Maximum luminance of 13 points}}$$



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3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

Ta= 25 ± 2 °C

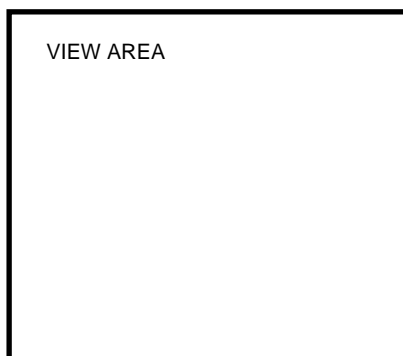
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply		V _{DD}	3.0	3.3	3.6	V	
Differential Input Voltage for LVDS Receiver Threshold	High	V _{IH}	-	-	+100	mV	V _{CM} = +1.2V
	Low	V _{IL}	-100	-	-	mV	
Vsync Frequency		f _v	50	60	70	Hz	
Hsync Frequency		f _H	45.9	48.9	52.4	KHz	
Main Frequency		f _{DCLK}	63.5	68.9	74.9	MHz	
Rush Current		I _{RUSH}	-	-	1.5	A	(4)
Current of Power Supply	White	I _{DD}	-	370	-	mA	(2),(3)*a
	Mosaic		-	460	-	mA	(2),(3)*b
	Max. pt.		-	480	550	mA	(2),(3)*c

Note (1) Display data pins and timing signal pins should be connected.(GND=0V)

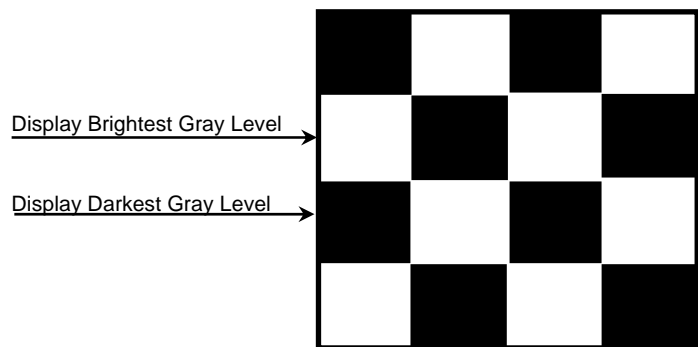
(2) f_v=60Hz, f_{DCLK} =68.94MHZ, V_{dd} = 3.3V , DC Current.

(3) Power dissipation pattern

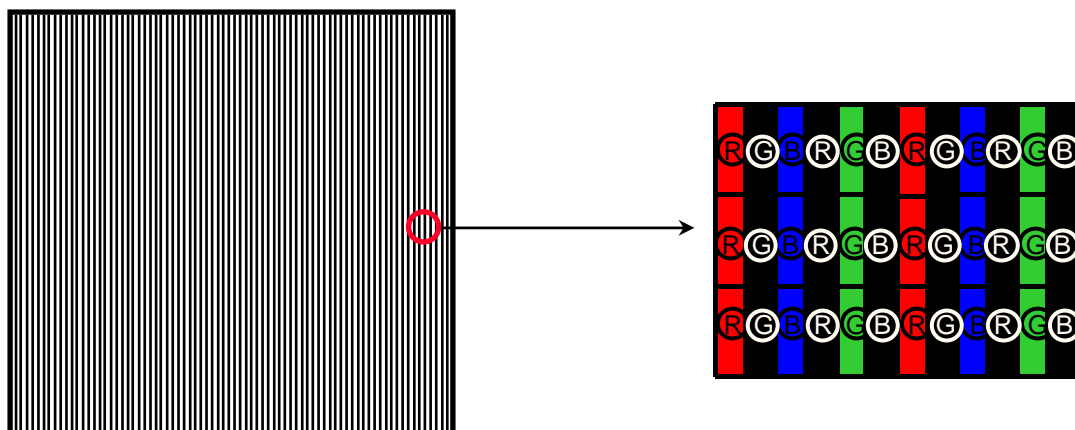
*a) White Pattern



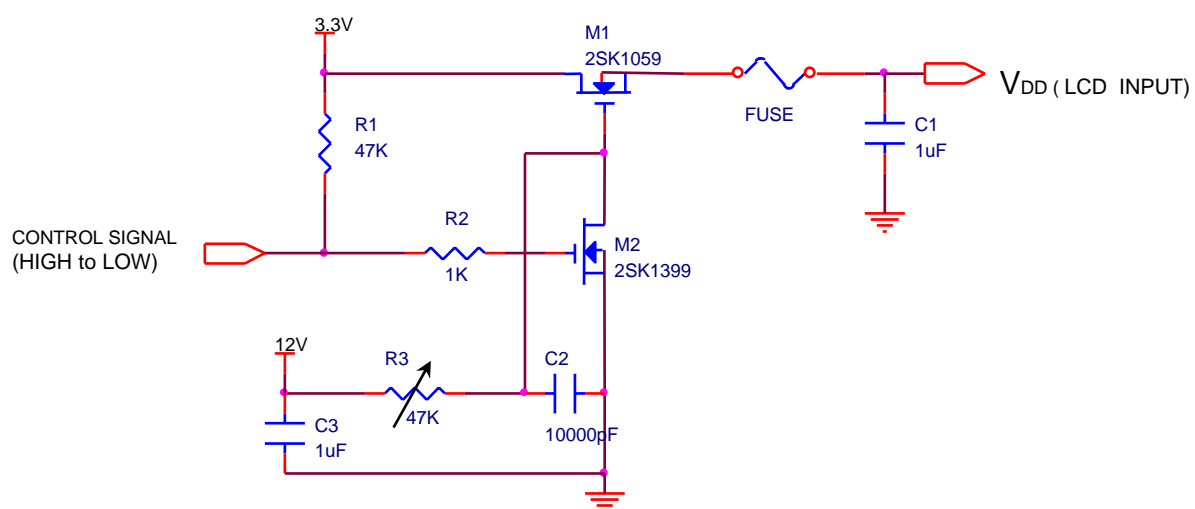
*b) Mosaic Pattern



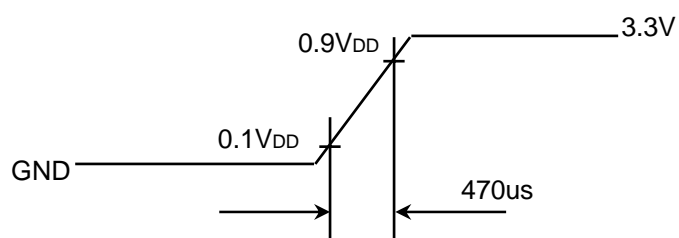
*c) 1dot Vertical stripe pattern



4) Rush current measurement condition



V_{DD} rising time is 470us



3.2 BACK-LIGHT UNIT

The backlight system is an edge - lighting type with dual CCFL (Cold Cathode Fluorescent Lamp).
The characteristics of a single lamp are shown in the following tables.

INVERTER : SIC-1801

$T_a = 25 \pm 2 \text{ }^{\circ}\text{C}$

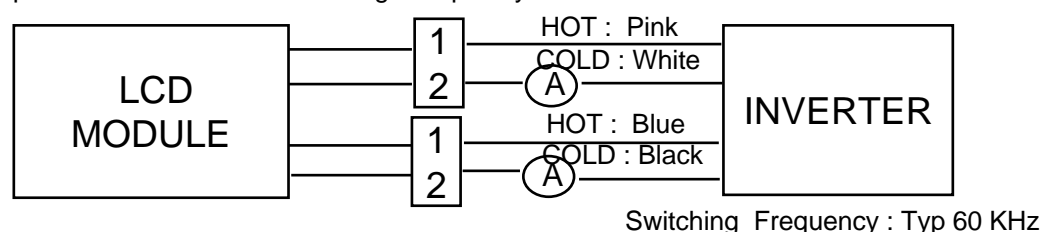
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Lamp Current	I _L	3.0	6.0	6.5	mArms	(1)
Lamp Voltage	V _L	-	670	-	Vrms	I _L =6.0mA
Frequency	f _L	42	60	65	KHz	(2)
Power Consumption	P _L		4.02		W	(3), I _L =6.0mA
Operating Life Time	Hr	12,000			Hour	(4), I _L =6.0mA
Startup Voltage	V _s	-	-	1150	Vrms	25°C, (5)
				1380	Vrms	0°C, (5)
Lamp startup time		-	-	1.0	sec	(5)

Note) The waveform of the inverter output voltage must be area symmetric and the design of the inverter must have specifications for the modularized lamp.

The performance of the back-light, for example life time or brightness, is much influenced by the characteristics of the DC-AC inverter for the lamp. So all the parameters of an inverter should be carefully designed so as not to produce too much leakage current from high-voltage output of the inverter.

When you design or order the inverter, please make sure that a poor lighting caused by the mismatch of the back-light and the inverter(miss lighting, flicker, etc.) never occurs. When you confirm it, the module should be operated in the same condition as it is installed in your instrument.

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



(2) Lamp frequency may produce interference with horizontal synchronous frequency and this may cause line flow on the display. Therefore lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible in order to avoid interference.

(3) refer to $I_L \times V_L$ to calculate.

(4) Life time (Hr) of a lamp can be defined as the time in which it continues to operate under the condition $T_a = 25 \pm 2 \text{ }^{\circ}\text{C}$ and $I_L = 6.0 \text{ mArms}$ until one of the following event occurs.

1. When the brightness becomes 50% or lower than the original.

2. When the Effective ignition length becomes 80% or lower than the original value.

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

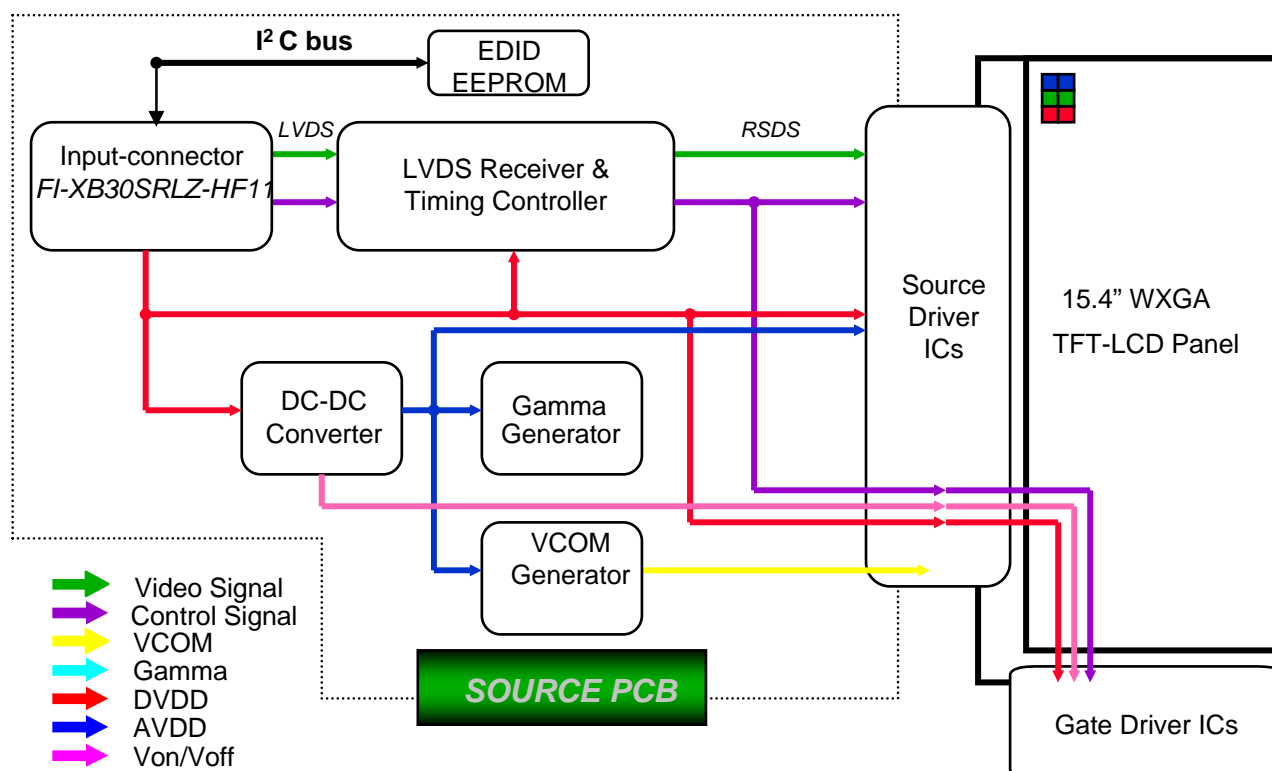
(5) The inverter open voltage - this voltage should be measured behind ballast capacitor- has to be larger than the lamp startup voltage. Otherwise, backlight may have blinking for a moment after being turned on, or not be turned on. If an inverter has shutdown function, it should keep its open voltage for longer than 1 second even if lamp connector is open. Also, to prevent over current of one side lamp, shut down function should be designed in the customer's inverter.

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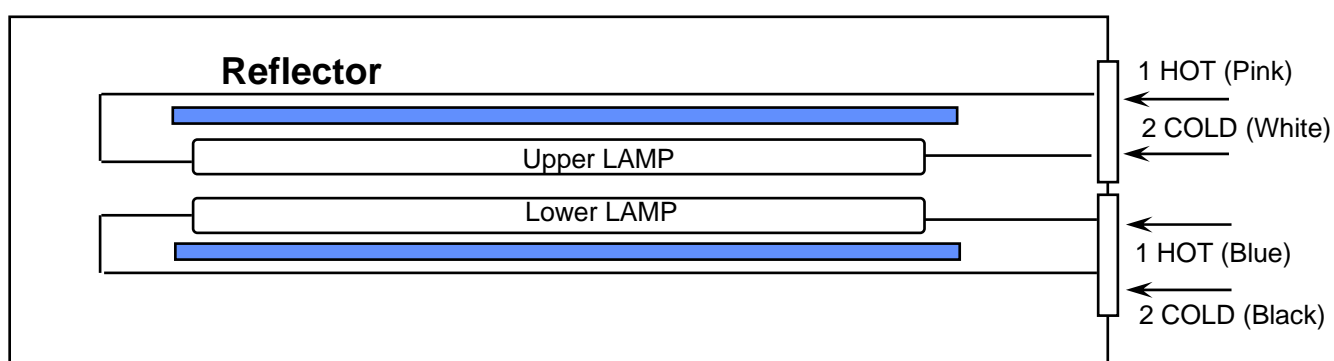
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4. BLOCK DIAGRAM

4.1 TFT LCD Module



4.2 BACK-LIGHT UNIT (2lamp, Y-stack structure)



Note1) The output of the inverter may change according to the material of the reflector.

5. INPUT TERMINAL PIN ASSIGNMENT

5.1. Input Signal & Power LVDS, Connector : JAE, FI-XB30SRLZ-HF11
Mating Connector: JAE, FI-X30M

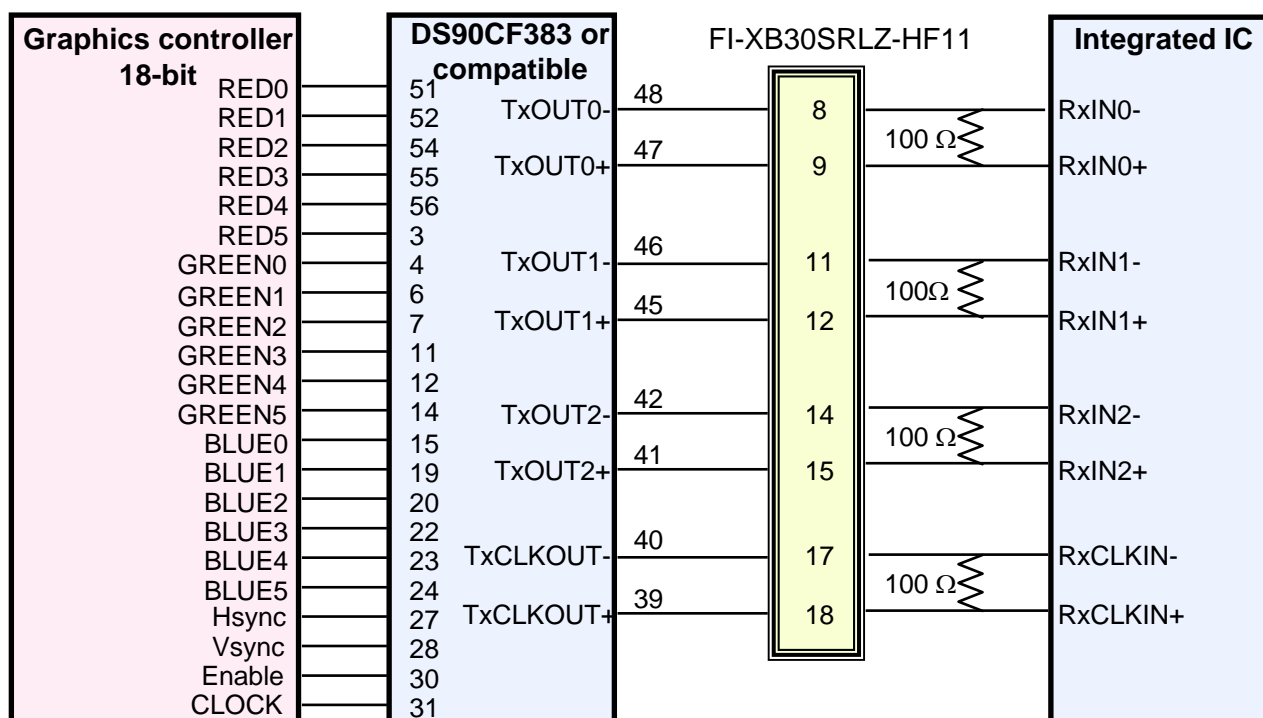
No.	Symbol	Function	Polarity	Remarks
1	VSS	Ground		
2	VDD	POWER SUPPLY +3.3V		
3	VDD	POWER SUPPLY +3.3V		
4	VEEDID	DDC 3.3V Power		
5	BIST	Panel BIST enable		
6	CLKEDID	DDC Clock		
7	DATAEDID	DDC data		
8	RxIN0-	LVDS Differential Data INPUT (R0-R5,G0)	Negative	
9	RxIN0+	LVDS Differential Data INPUT (R0-R5,G0)	Positive	
10	GND	Ground		
11	RxIN1-	LVDS Differential Data INPUT (G1-G5,B0-B1)	Negative	
12	RxIN1+	LVDS Differential Data INPUT (G1-G5,B0-B1)	Positive	
13	GND	Ground		
14	RxIN2-	LVDS Differential Data INPUT (B2-B5,Sync,DE)	Negative	
15	RxIN2+	LVDS Differential Data INPUT (B2-B5,Sync,DE)	Positive	
16	Vss	Ground		
17	ClkIN-	LVDS Differential Clock INPUT	Negative	
18	ClkIN+	LVDS Differential Clock INPUT	Positive	
19	Vss	Ground		
20	NC	No connect		
21	NC	No connect		
22	NC	No connect		
23	NC	No connect		
24	NC	No connect		
25	NC	No connect		
26	NC	No connect		
27	NC	No connect		
28	NC	No connect		
29	NC	No connect		
30	NC	No connect		

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5.2 LVDS Interface : Transmitter DS90CF383 or Compatible

Pin No.	Name	RGB Signal	Pin No.	Name	RGB Signal
51	TxIN0	R0	14	TxIN14	G5
52	TxIN1	R1	15	TxIN15	B0
54	TxIN2	R2	19	TxIN18	B1
55	TxIN3	R3	20	TxIN19	B2
56	TxIN4	R4	22	TxIN20	B3
3	TxIN6	R5	23	TxIN21	B4
4	TxIN7	G0	24	TxIN22	B5
6	TxIN8	G1	27	TxIN24	Hsync
7	TxIN9	G2	28	TxIN25	Vsync
11	TxIN12	G3	30	TxIN26	DE
12	TxIN13	G4	31	TxCLKIN	Clock

LVDS INTERFACE



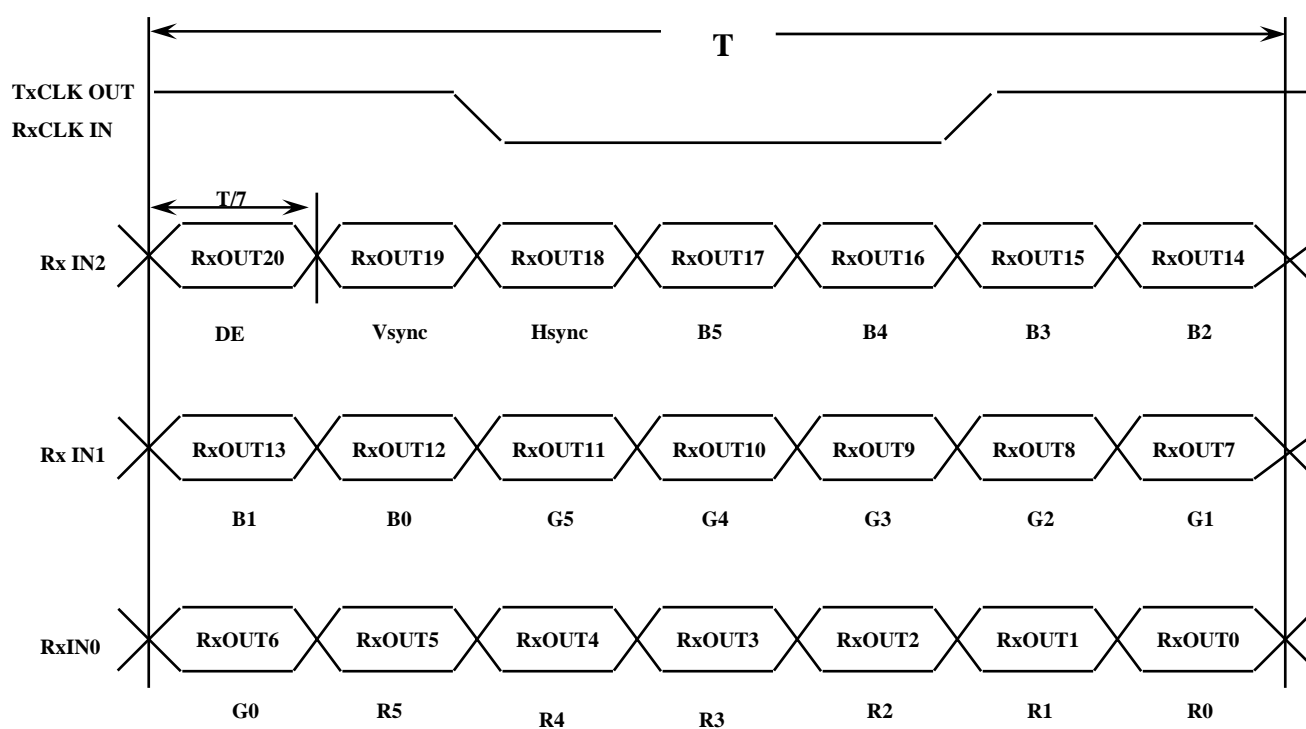
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5.3 BACK LIGHT UNIT

Connector : JST BHSR - 02VS -1 * 2pcs

Pin No.	Symbol	Color	Function
1	HOT	Pink / Blue	High Voltage
2	COLD	White / Black	Low Voltage

5.4 Timing Diagrams of LVDS For Transmission



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5.5 Input Signal, Basic Display Colors and Gray Scale of Each Colors

COLOR	DISPLAY	DATA SIGNAL																	GRAY SCALE LEVEL	
		RED						GREEN						BLUE						
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4		B5
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	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	-
	GREEN	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	-
	CYAN	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	-
	RED	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	-
	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	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R0
	DARK ↑	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R1
		0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	R3~R60
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	↓ LIGHT	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R61
		0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R62
	RED	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R63
GRAY SCALE OF GREEN	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G0
	DARK ↑	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	G1
		0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	G2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	G3~G60
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	↓ LIGHT	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	G61
		0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	G62
	GREEN	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	G63
GRAY SCALE OF BLUE	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B0
	DARK ↑	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	B1
		0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	B3~B60
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	↓ LIGHT	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	B61
		0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	B62
	BLUE	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	B63

Note

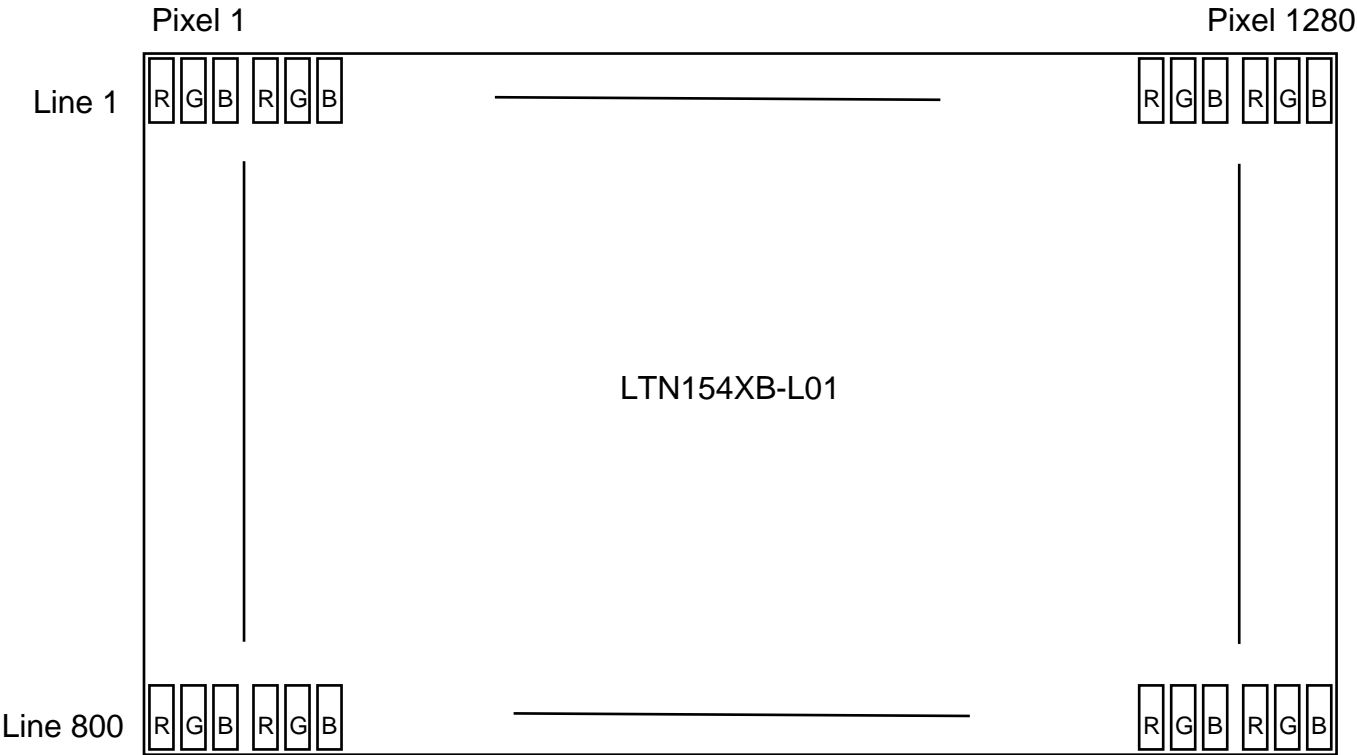
(1) Definition of Gray : Rn : Red Gray, Gn : Green Gray, Bn : Blue Gray (n = Gray level)

(2) Input Signal : 0 = Low level voltage, 1 = High level voltage

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5.6 PIXEL FORMAT

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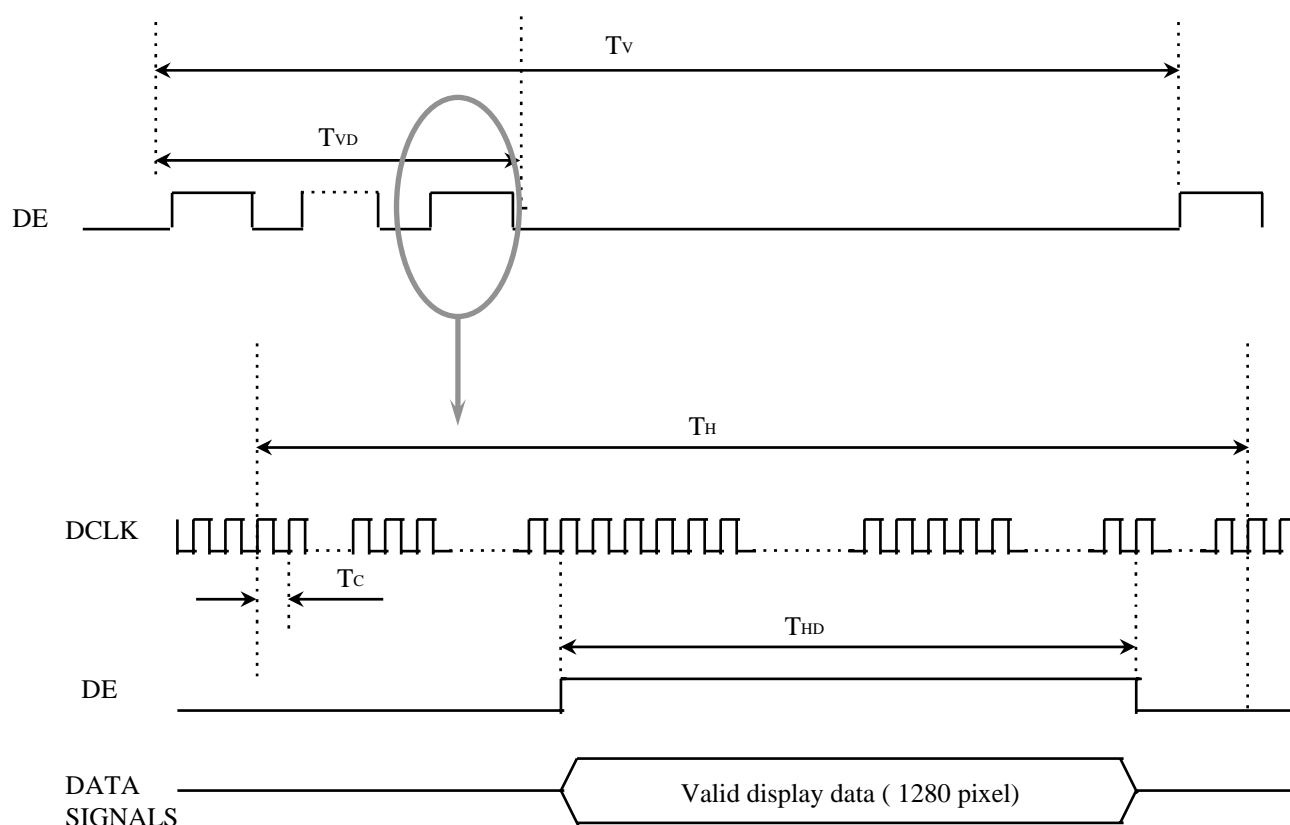
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6. INTERFACE TIMING

6.1 Timing Parameters

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Frame Frequency	Cycle	TV	806	816	833	Lines	-
Vertical Active Display Term	Display Period	TVD	800	800	800	Lines	-
One Line Scanning Time	Cycle	TH	1315	1408	1500	Clocks	-
Horizontal Active Display Term	Display Period	THD	1280	1280	1280	Clocks	-

6.2 Timing diagrams of interface signal



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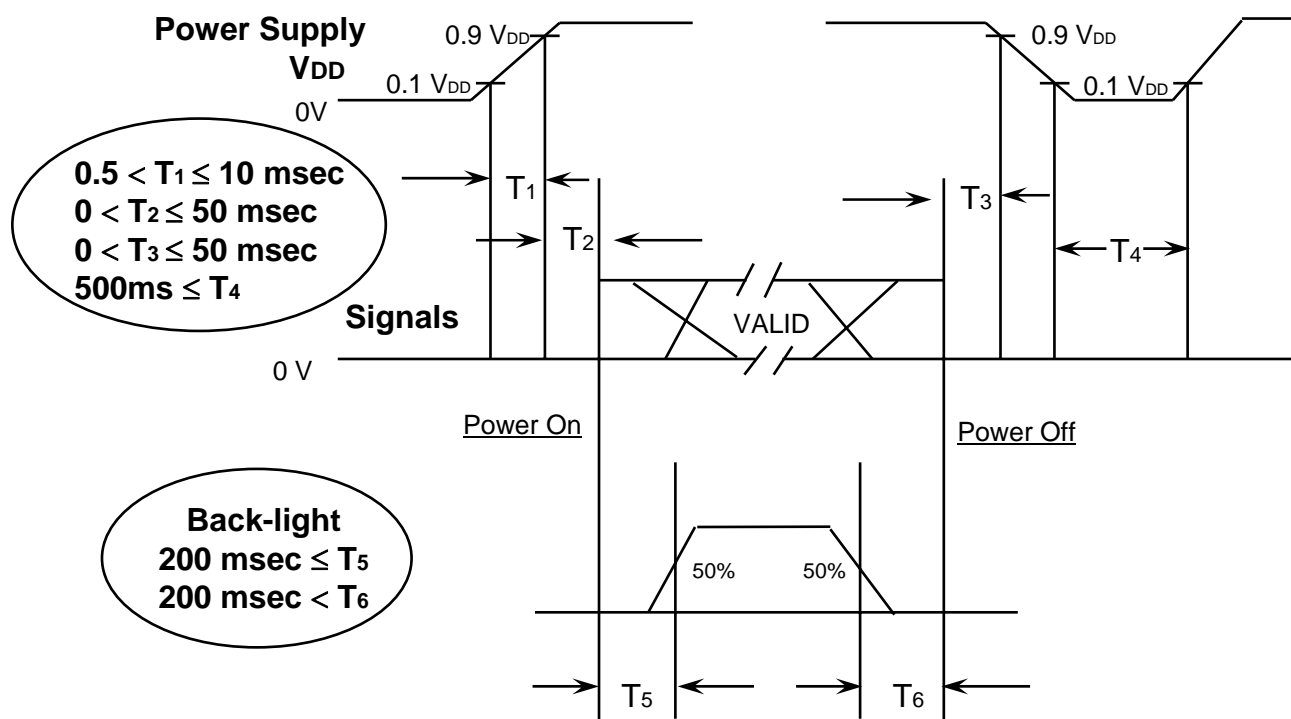
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6.3 Power ON/OFF Sequence

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



Power ON/OFF Sequence

T1 : Vdd rising time from 10% to 90%

T2 : The time from Vdd to valid data at power ON.

T3 : The time from valid data off to Vdd off at power Off.

T4 : Vdd off time for Windows restart

T5 : The time from valid data to B/L enable at power ON.

T6 : The time from valid data off to B/L disable at power Off.

NOTE.

- (1) The supply voltage of the external system for the module input should be the same as the definition of VDD.
- (2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become white.
- (3) In case of VDD = off level, please keep the level of input signals on the low or keep a high impedance.
- (4) T4 should be measured after the module has been fully discharged between power off and on period.
- (5) Interface signal shall not be kept at high impedance when the power is on.

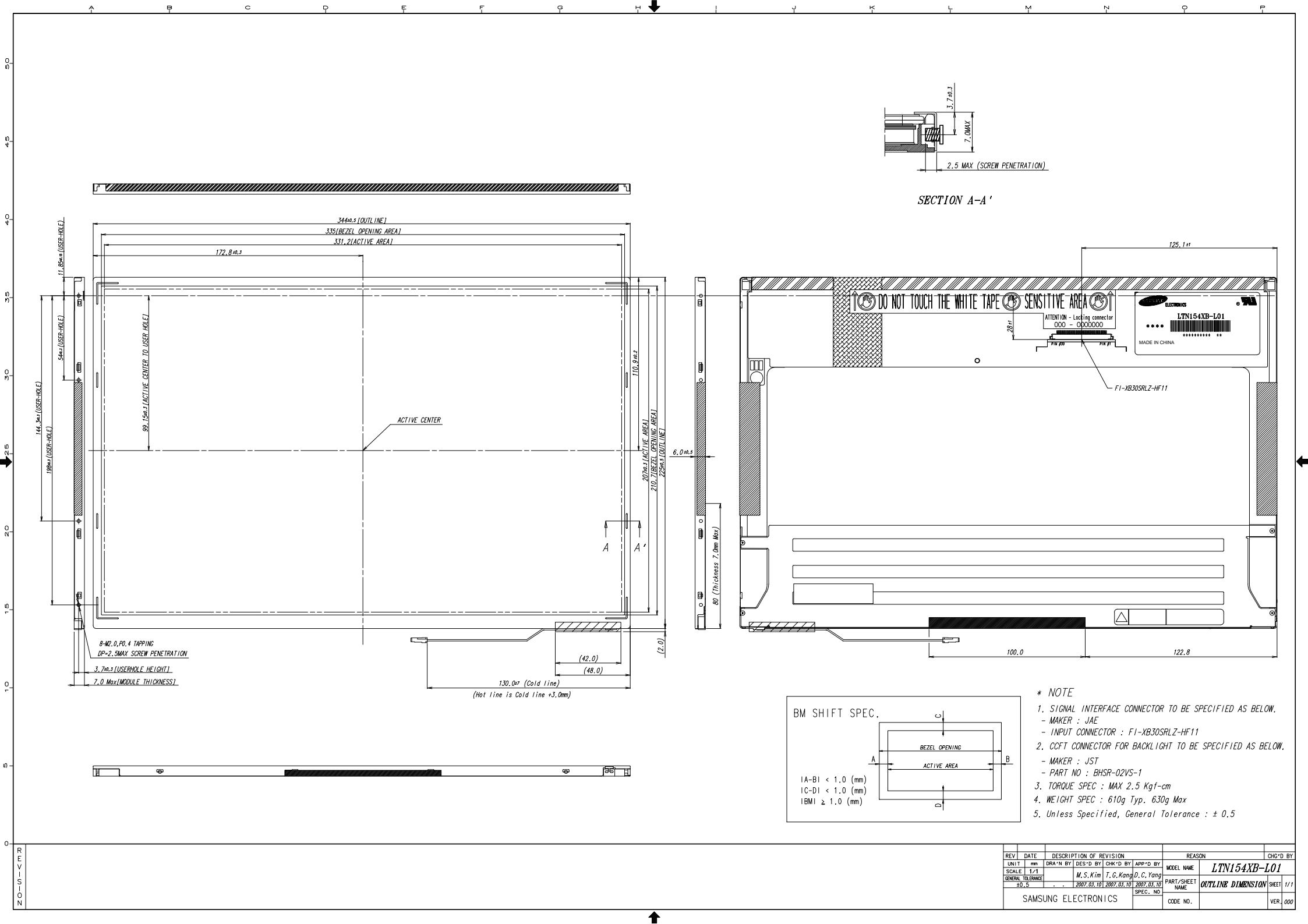
7. Mechanical Outline Dimension

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[Refer to the next page]

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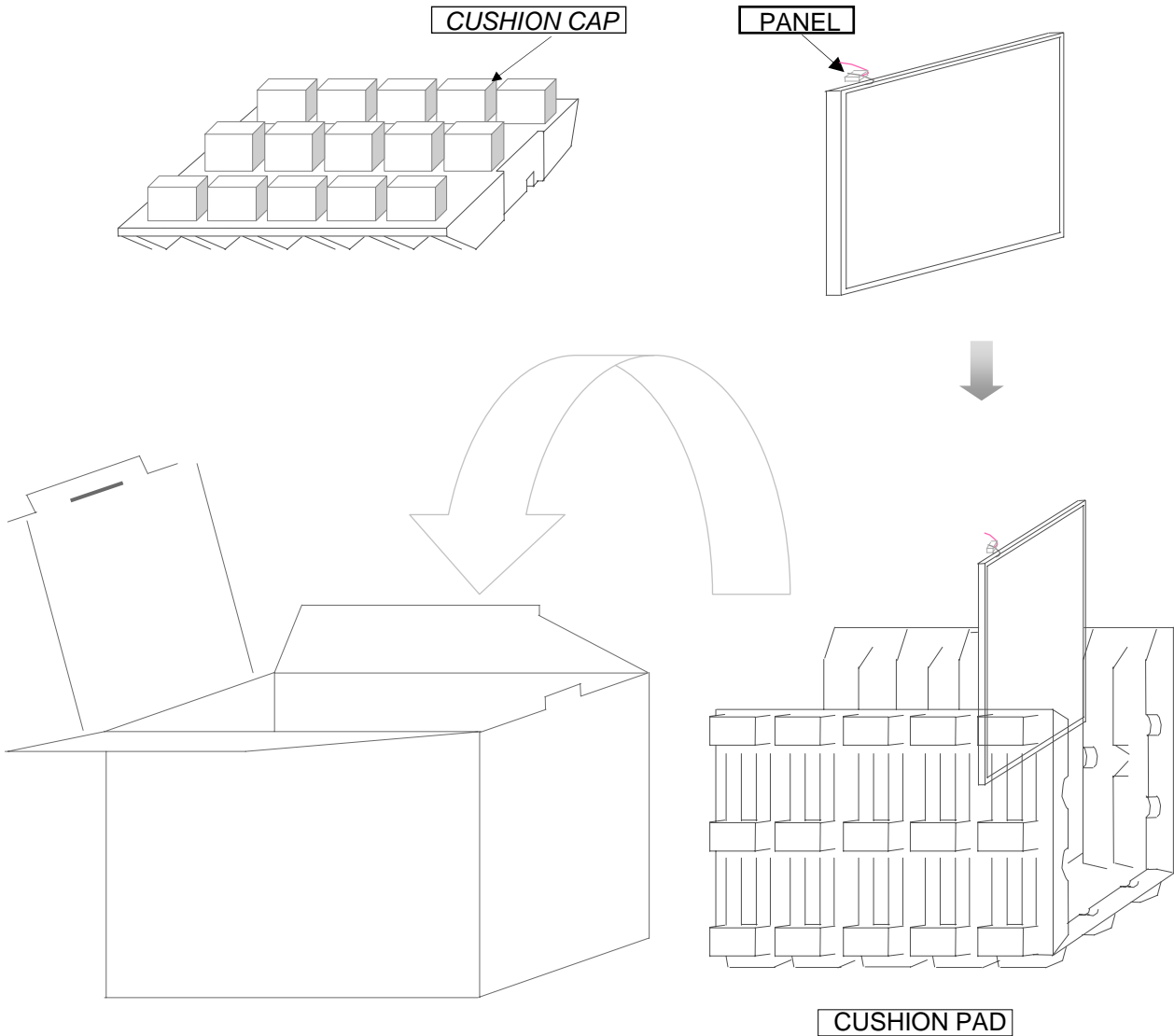
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8. PACKING

1. CARTON (Internal Package)

- (1) Packing Form
- Corrugated Cardboard box and Corrupad form as shock absorber
- (2) Packing Method



- Note 1)Total Weight : Approximately 10 kg
- 2) Acceptance number of piling : 10 sets
- 3) Carton size : 408(W) X 325(D) X 295(H)

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(3)Packing Material

No	Part name	Quantity
1	Static electric protective sack	10 pcs
2	Packing case (Inner box) included shock absorber	1 set
3	Pictorial marking	2 pcs
4	Carton	1 set

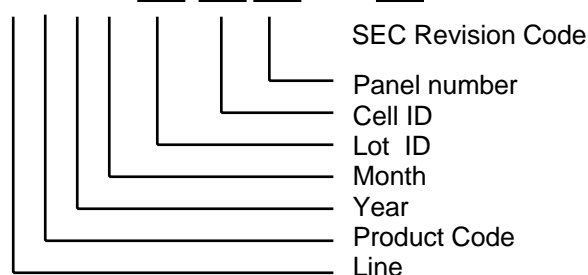
9. MARKINGS & OTHERS

A nameplate bearing followed by is affixed to a shipped product at the specified location on each product.

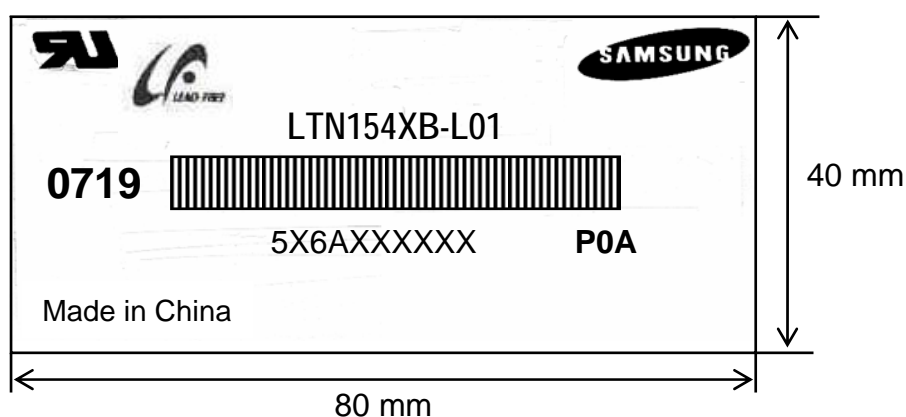
(1)Parts number : LTN154XB-L01

(2)Revision code : 3 letters

(3)Lot number : 5 X 6 A XX XX XX P0A

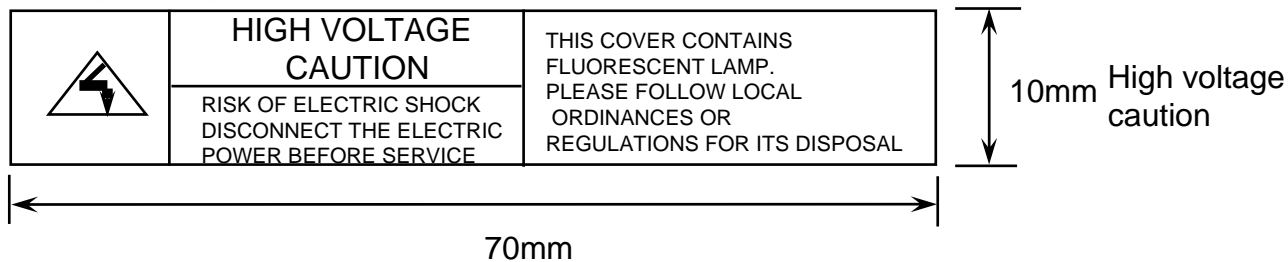


(4) Nameplate Indication

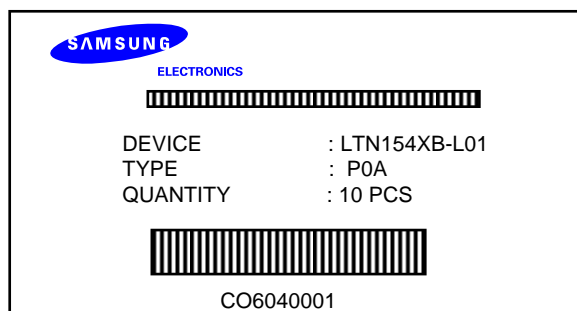


Parts name : LTN154XB-L01
 Lot number : 5X6AXXXXXX
 Inspected work week : 0719 (2007 year 19th week)
 Product Revision Code : P0A

High voltage caution label



(6) Packing small box attach



(7) Packing box Marking : Samsung TFT-LCD Brand Name



10. GENERAL PRECAUTIONS

1. Handling

- (a) When the module is assembled, It should be attached to the system firmly using every mounting holes. Be careful not to twist and bend the modules.
- (b) Refrain from strong mechanical shock and / or any force to the module. In addition to damage, this may cause improper operation or damage to the module and CCFT backlight.
- (c) Note that polarizers are very fragile and could be easily damaged. Do not press or scratch the surface harder than a HB pencil lead.
- (d) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, Staining and discoloration may occur.
- (e) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
- (f) The desirable cleaners are water, IPA(Isoprophyl Alcohol) or Hexane.
Do not use Ketone type materials(ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
- (g) 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, legs or clothes, it must be washed away thoroughly with soap.
- (h) Protect the module from static , it may cause damage to the C-MOS Gate Array IC.
- (i) Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (j) Do not disassemble the module.
- (k) Do not pull or fold the lamp wire.
- (l) Do not adjust the variable resistor which is located on the back side.
- (m) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (n) Pins of I/F connector shall not be touched directly with bare hands.

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2. STORAGE

- (a) Do not leave the module in high temperature, and high humidity for a long time.
It is highly recommended to store the module with temperature from 0 to 35 °C and relative humidity of less than 70%.
- (b) Do not store the TFT-LCD module in direct sunlight.
- (c) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.

3. OPERATION

- (a) Do not connect, disconnect the module in the “ Power On” condition.
- (b) Power supply should always be turned on/off by following item 6.3
“ Power on/off sequence “.
- (c) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.
- (d) The cable between the backlight connector and its inverter power supply shall be a minimized length and be connected directly . The longer cable between the backlight and the inverter may cause lower luminance of lamp(CCFT) and may require higher startup voltage(Vs).
- (e) The standard limited warranty is only applicable when the module is used for general notebook applications. If used for purposes other than as specified, SEC is not to be held reliable for the defective operations. It is strongly recommended to contact SEC to find out fitness for a particular purpose.

4. OTHERS

- (a) Ultra-violet ray filter is necessary for outdoor operation.
- (b) Avoid condensation of water. It may result in improper operation or disconnection of electrode.
- (c) Do not exceed the absolute maximum rating value. (the supply voltage variation, input voltage variation, variation in part contents and environmental temperature, so on)
Otherwise the module may be damaged.
- (d) If the module displays the same pattern continuously for a long period of time, it can be the situation when the image “sticks” to the screen.
- (e) This module has its circuitry PCB's on the rear side and should be handled carefully in order not to be stressed.

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11. EEDID

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LTN154XB-L01-G(1280 *800) EDID Sheet for SONY						
Address (HEX)	FUNCTION	Value HEX	BIN	DEC	ASCII or Data	Notes
00	Header	00	00000000	0		EDID Header
01		FF	11111111	255		
02		FF	11111111	255		
03		FF	11111111	255		
04		FF	11111111	255		
05		FF	11111111	255		
06		FF	11111111	255		
07		00	00000000	0		
08	ID Manufacturer Name	4C	01001100	76	S	3 character ID
					E	
09		A3	10100011	163	C	"SEC"
0A	ID Product Code	42	01000010	66	[B]	
0B		47	01000111	71	[G]	
0C	32-bit serial no.	00	00000000	0		
0D		00	00000000	0		
0E		00	00000000	0		
0F		00	00000000	0		
10	Week of manufacture	00	00000000	0		
11	Year of manufacture	10	00010000	16	2006	2006
12	EDID Structure Ver.	01	00000001	1	1	EDID Ver. 1.0
13	EDID revision #	03	00000011	3	3	EDID Rev. 3
14	Video input definition	80	10000000	128		
15	Max H image size	21	00100001	33	33	33 cm(approx)
16	Max V image size	15	00010101	21	21	21 cm(approx)
17	Display Gamma	78	01111000	120	2.2	Gamma 2.2
18	Feature support	0A	00001010	10		
19	Red/green low bits	04	00000100	4		10000111
1A	Blue/white low bits	25	00100101	37		11111110
1B	Red x/ high bits	AB	10101011	171	0.668	Red x0.668= 1001010010
1C	Red y	51	01010001	81	0.316	Red y0.316= 0101011100
1D	Green x	31	00110001	49	0.192	Green x0.192= 0100111101
1E	Green y	A6	10100110	166	0.648	Green y0.648= 1000110011
1F	Blue x	24	00100100	36	0.141	Blue x0.141= 0010011111
20	Blue y	14	00010100	20	0.080	Blue y0.080= 0010011111
21	White x	50	01010000	80	0.313	White x0.313= 0101000001
22	White y	54	01010100	84	0.329	White y0.329= 0101010001
23	Established timing 1	00	00000000	0		
24	Established timing 2	00	00000000	0		
25	Established timing 3	00	00000000	0		

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26	Standard timing #1	01	00000001	1		not used
27		01	00000001	1		
28	Standard timing #2	01	00000001	1		not used
29		01	00000001	1		
2A	Standard timing #3	01	00000001	1		not used
2B		01	00000001	1		
2C	Standard timing #4	01	00000001	1		not used
2D		01	00000001	1		
2E	Standard timing #5	01	00000001	1		not used
2F		01	00000001	1		
30	Standard timing #6	01	00000001	1		not used
31		01	00000001	1		
32	Standard timing #7	01	00000001	1		not used
33		01	00000001	1		
34	Standard timing #8	01	00000001	1		not used
35		01	00000001	1		
36	Detailed timing/monitor descriptor #1	EE	11101110	238	68.94	Main clock= 68.94 MHz
37		1A	00011010	26		
38		00	00000000	0	1280	Hor active=640*2 pixels
39		80	10000000	128	128	Hor blanking=128 pixels
3A		50	01010000	80		4bit : 4bit
3B		20	00100000	32	800	Vertical active=800 lines
3C		10	00010000	16	16	Vertical blanking=16 lines
3D		30	00110000	48		4bit : 4bit
3E		10	00010000	16	16	Hor sync. Offset=16 pixels
3F		30	00110000	48	48	H sync. Width=48 pixels
40		13	00010011	19	1 3	V sync. Offset=1 lines V sync. Width=3 lines
41		00	00000000	0		2bit : 2bit :2bit :2bit
42		4B	01001011	75	331	H image size= 331 mm(approx)
43		CF	11001111	207	207	V image size = 207 mm(approx)
44		10	00010000	16		
45		00	00000000	0		No Horizontal Border
46		00	00000000	0		No Vertical Border
47		19	00011001	25		
48	Detailed timing/monitor descriptor #2	00	00000000	0		Manufacturer Specified (Timing)
49		00	00000000	0		
4A		00	00000000	0		
4B		0F	00001111	15		
4C		00	00000000	0		Value=HSPWmin / 2
4D		00	00000000	0		Value=HSPWmax / 2
4E		00	00000000	0		Value=Thbpmin / 2
4F		00	00000000	0		Value=Thbpmax / 2
50		00	00000000	0		Value=VSPWmin / 2
51		00	00000000	0		Value=VSPWmax / 2
52		00	00000000	0		Value=Tvpmin / 2
53		00	00000000	0		Value=Tvpmax / 2
54		23	00100011	35		Thpmin=value*2 + HA pixelclks
55		87	10000111	135		Thpmax=value*2 + HA pixelclks
56		02	00000010	2		Tvpmin=value*2 + VA lines
57		64	01100100	100		Tvpmax=value*2 + VA lines
58		00	00000000	0		Module revision
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5A	Detailed timing/monitor descriptor #3	00	00000000	0		ASCII Data String Tag
5B		00	00000000	0		
5C		00	00000000	0		
5D		FE	11111110	254		
5E		00	00000000	0		
5F		53	01010011	83	[S]	
60		41	01000001	65	[A]	
61		4D	01001101	77	[M]	
62		53	01010011	83	[S]	
63		55	01010101	85	[U]	
64		4E	01001110	78	[N]	
65		47	01000111	71	[G]	
66		0A	00001010	10	[N]	
67		20	00100000	32	[]	
68		20	00100000	32	[]	
69		20	00100000	32	[]	
6A		20	00100000	32	[]	
6B		20	00100000	32	[]	
6C	Detailed timing/monitor descriptor #4	00	00000000	0		Monitor Name Tag (ASCII)
6D		00	00000000	0		
6E		00	00000000	0		
6F		FE	11111110	254		
70		00	00000000	0		
71		4C	01001100	76	[L]	
72		54	01010100	84	[T]	
73		4E	01001110	78	[N]	
74		31	00110001	49	[1]	
75		35	00110101	53	[5]	
76		34	00110100	52	[4]	
77		58	01011000	88	[X]	
78		42	01000010	66	[B]	
79		2D	00101101	45	[.]	
7A		4C	01001100	76	[L]	
7B		30	00110000	48	[0]	
7C		31	00110001	49	[1]	
7D		0A	00001010	10	[N]	
7E	Extension Flag	00	00000000	0		
7F	Checksum	A3	10100011	163		

12. Reliability test

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Items	Condition	Qty
Life time	Dynamic, > 5,000Hr(30Sec On/Off), 25℃	3
HTOL	50℃, Dynamic, 500Hr	5
LTOL	0℃, Dynamic, 500Hr	5
HTS	70℃, Storage, 500Hr	5
LTS	-25℃, Storage, 500Hr	5
THB	40℃, 95%RH, Dynamic, 500Hr	5
WHTS	60℃, 75%RH, Storage, 500Hr	5
T/C	-20℃/30min ~ 65℃/30min, 200 cycle	5
Altitude (OP)	570mb, 50℃, Dynamic, 72Hr	3
Altitude (Non-OP)	115mb, 70℃, Storage, 72Hr	3
CDM ESD	Non OP, ± 10 kV, 150pF/330Ω, 9Point, 3times/Point	3
Contact ESD	OP, ± 8 kV, 150pF/330Ω, 100Point, 1time/Point	3
Non-contact ESD	OP, ± 15kV, 150pF/330Ω, 100Point, 1time/Point	3
Input Con. ESD	OP, ± 6 kV, 150pF/330Ω, Input Con. Pin, 3times/Pin	3
POWER ON/OFF	25℃, 30,000times, 30 sec On ~ 30 sec Off	5
Vibration	5~500Hz, 2.41G, Random, 30min/±XYZ (6-axis)	3
Shock	210G, 3msec, Half Sine, 1time/±XYZ (6-axis)	3
Hinge	10° ~ 170° open close each 2sec/ Pause 1sec Dynamic, 30,000times	3
Image sticking	SEC pattern, 16Hr	10

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