

**SAMSUNG**

**ELECTRONICS**

Product Information



# Product Information

*SAMSUNG TFT-LCD*

**MODEL NO. : LTN154P1-L03**

LCD Product Planning Group 1, Marketing Team

Samsung Electronics Co . , LTD.



SAMSUNG TFT-LCD

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## GENERAL DESCRIPTION

### DESCRIPTION

LTN154P3-L02 is a color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as switching devices. This model is composed of a TFT LCD panel, a driver circuit and a backlight system. The resolution of a 15.4" contains 1,680 x 1050 pixels and can display up to 262,144 colors. 6 O'clock direction is the optimum viewing angle.

### FEATURES

- High contrast ratio, high aperture structure
- Fast Response Time
- Wide SXGA+(1680 X 1050) resolution
- Low power consumption
- DE (Data enable) only mode.
- 3.3V LVDS Interface
- On board EDID chip
- Green product (Complied with RoHS requirement)

### APPLICATIONS

- Notebook PC
- 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	331.38(H) X 207.1125(V) (15.4"diagonal)	mm	
Driver element	a-si TFT active matrix		
Display colors	262,144		
Number of pixel	1680 x 1050(16 : 10)	pixel	
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.19725(H) x 0.19725(V)	mm	
Display Mode	Normally white		
Surface treatment	Haze 0, Hard-Coating 3H		

**MECHANICAL INFORMATION**

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal (H)	343.5	344.0	344.5	mm	
	Vertical (V)	221.5	222.0	222.5	mm	
	Depth (D)	-	6.1	6.5	mm	(1)
Weight		-	565	580	g	

Note (1) Measurement condition of outline dimension

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

**1. ELECTRICAL ABSOLUTE RATINGS****(1) TFT LCD MODULE**

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

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

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

**(2) BACK-LIGHT UNIT**

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

Item	Symbol	Min.	Max.	Unit	Note
Lamp Current	$I_L$	2.0	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.

Measuring equipment : TOPCON BM-5A

\* Ta = 25 ± 2 °C, VDD=3.3V, fv= 60Hz, fDCLK=60.7MHz, IL= 6.0 mA

Item		Symbol	Condition	Min.	Typ.	Max	Unit
Contrast Ratio (5 Points)		CR	$\phi = 0,$ $\theta = 0$	200	300	-	-
Response Time at Ta	Rising	TR + TF			25	35	msec
Average Luminance of White (center)		YL,AVE		160	185	-	cd/m <sup>2</sup>
Color Chromatic ity ( CIE )	Red	Rx	CR ≥ 10	0.565	0.595	0.625	-
		Ry		0.317	0.347	0.377	
	Green	Gx		0.289	0.319	0.349	
		Gy		0.516	0.546	0.576	
	Blue	Bx		0.122	0.152	0.182	
		By		0.106	0.136	0.166	
	White	Wx		0.283	0.313	0.343	
		Wy		0.299	0.329	0.359	
Viewing Angle	Hor.	$\theta_L$	60	65		Degrees	
		$\theta_H$	60	65			
	Ver.	$\phi_H$	45	50			
		$\phi_L$	45	50			
13 Points White Variation		$\delta_L$		-	-	2.2	-

### 3. ELECTRICAL CHARACTERISTICS

#### 3.1 TFT LCD MODULE

Ta = 25 ± 2°C

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Voltage of Power Supply		V <sub>DD</sub>	3.0	3.3	3.6	V	
Differential Input Voltage for LVDS Receiver Threshold	High	V <sub>IH</sub>	-	-	+100	mV	
	Low	V <sub>IL</sub>	-100	-	-	mV	
Vsync Frequency		f <sub>v</sub>	-	60	-	Hz	
Hsync Frequency		f <sub>H</sub>	-	64.8	-	KHz	
Main Frequency		f <sub>DCLK</sub>	-	59.6	-	MHz	
Rush Current		I <sub>RUSH</sub>	-	-	1.5	A	
Power Consumption of Electric Circuit	White Pattern	I <sub>DD</sub>	-	430	-	mA	
	Mosaic Pattern		-	460	-	mA	
	V.stripe		-	580	650	mA	

#### 3.2 BACK-LIGHT UNIT

The backlight system is an edge-lighting type with a single CCFT ( Cold Cathode Fluorescent Tube ).  
The characteristics of a single lamp are shown in the following table.

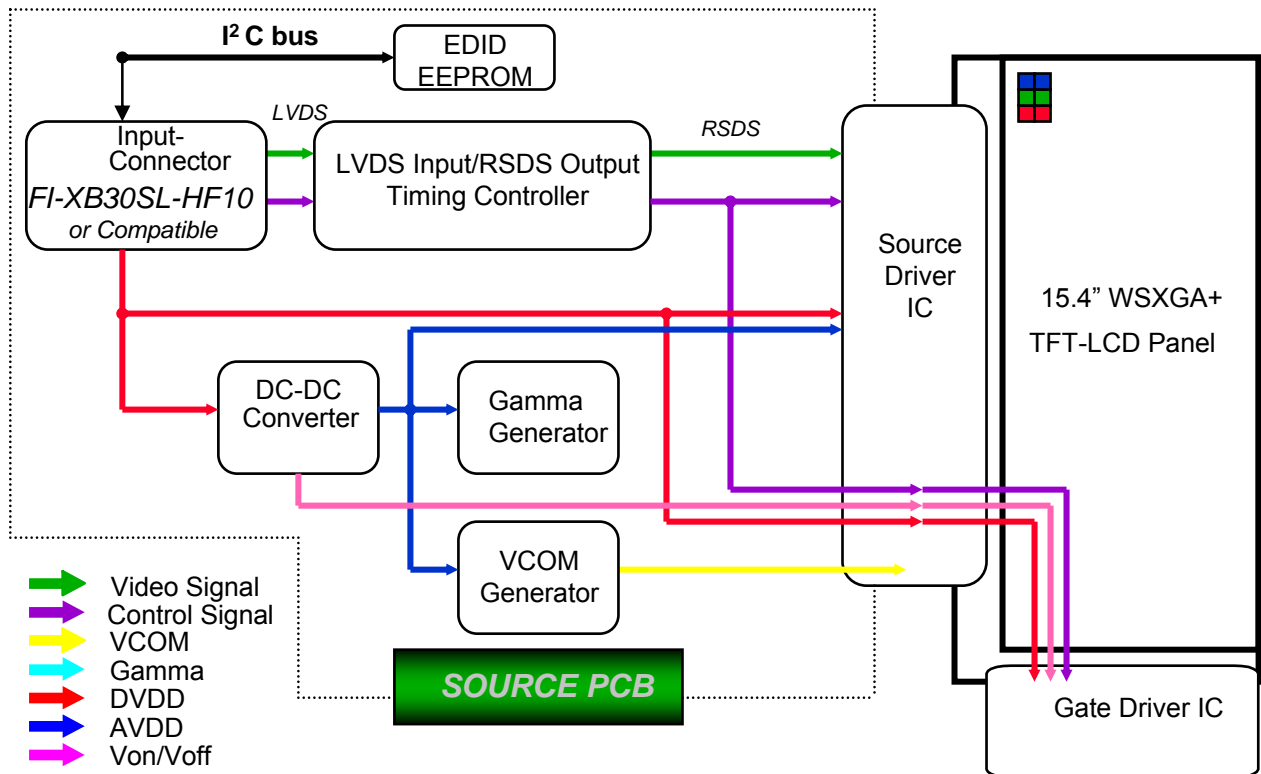
- INVERTER : SEM SIC 130T

Ta = 25 ± 2 °C

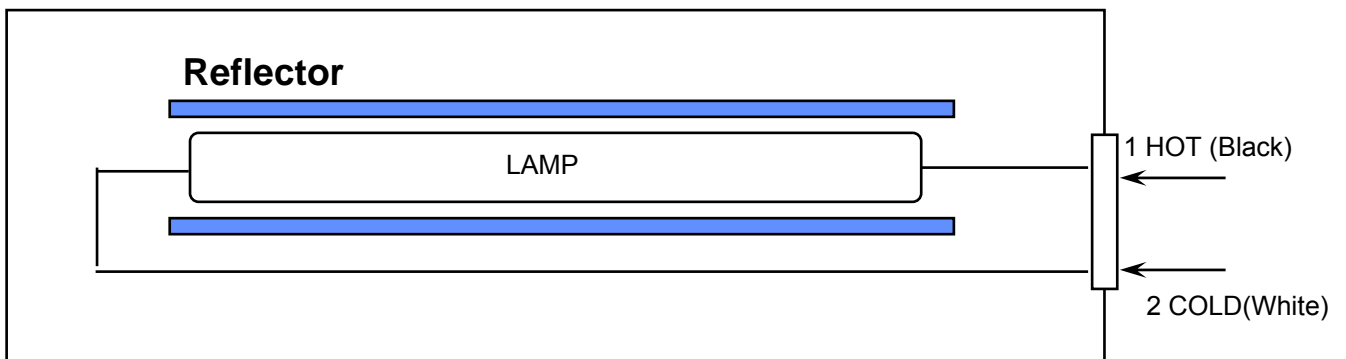
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Lamp Current	I <sub>L</sub>	4.0	6.0	6.5	mArms	
Lamp Voltage	V <sub>L</sub>	-	675	-	Vrms	I <sub>L</sub> =6.0mA
Frequency	f <sub>L</sub>	45	55	65	KHz	
Power Consumption	P <sub>L</sub>		4.4		W	I <sub>L</sub> =6.0mA
Operating Life Time	Hr	10,000			Hour	
Startup Voltage	V <sub>s</sub>	-	-	1200	Vrms	25°C
				1450	Vrms	0°C
Lamp startup time		-	-	1.0	sec	

## 4. BLOCK DIAGRAM

### 4.1 TFT LCD Module



### 4.2 BACKLIGHT UNIT



## 5. INPUT TERMINAL PIN ASSIGNMENT

5.1. Input Signal & Power (LVDS, Connector : JAE FI-XB30SL-HF10 or compatible )  
Mating Connector : JAE FI-X30M or compatible)

No.	Symbol	Function	Polarity	Remarks
1	GND	Ground		
2	VDD	POWER SUPPLY +3.3V		
3	VDD	POWER SUPPLY +3.3V		
4	VEEDID	DDC 3.3V Power		
5	GND	Ground		
6	CLKEDID	DDC Clock		
7	DATAEDID	DDC data		
8	O_RxIN0-	LVDS Differential Data INPUT (Odd R0-R5,G0)	Negative	
9	O_RxIN0+	LVDS Differential Data INPUT (Odd R0-R5,G0)	Positive	
10	GND	Ground		
11	O_RxIN1-	LVDS Differential Data INPUT (Odd G1-G5,B0-B1)	Negative	
12	O_RxIN1+	LVDS Differential Data INPUT (Odd G1-G5,B0-B1)	Positive	
13	GND	Ground		
14	O_RxIN2-	LVDS Differential Data INPUT (Odd B2-B5,Sync,DE)	Negative	
15	O_RxIN2+	LVDS Differential Data INPUT (Odd B2-B5,Sync,DE)	Positive	
16	GND	Ground		
17	O_RxCLK-	LVDS Differential Data INPUT (Odd Clock)	Negative	
18	O_RxCLK+	LVDS Differential Data INPUT (Odd Clock)	Positive	
19	GND	Ground		
20	E_RxIN0-	LVDS Differential Data INPUT (Even R0-R5,G0)	Negative	
21	E_RxIN0+	LVDS Differential Data INPUT (Even R0-R5,G0)	Positive	
22	GND	Ground		
23	E_RxIN1-	LVDS Differential Data INPUT (Even G1-G5,B0-B1)	Negative	
24	E_RxIN1+	LVDS Differential Data INPUT (Even G1-G5,B0-B1)	Positive	
25	GND	Ground		
26	E_RxIN2-	LVDS Differential Data INPUT (Even B2-B5,Sync,DE)	Negative	
27	E_RxIN2+	LVDS Differential Data INPUT (Even B2-B5,Sync,DE)	Positive	
28	GND	Ground		
29	E_RxCLK-	LVDS Differential Data INPUT (Even Clock)	Negative	
30	E_RxCLK+	LVDS Differential Data INPUT (Even Clock)	Positive	



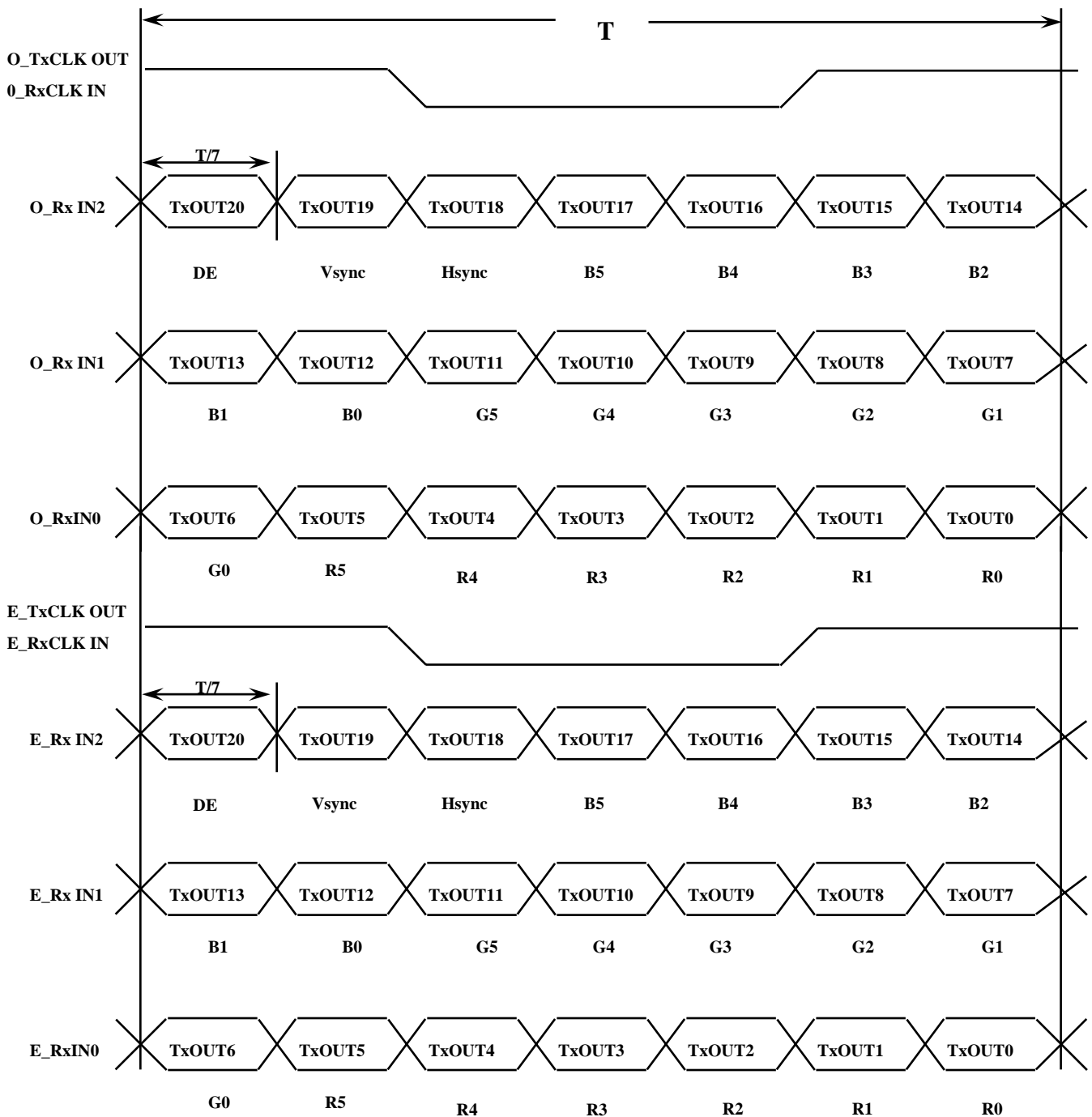
### 5.3 BACK LIGHT UNIT

Connector : JST BHSR - 02VS -1  
 Mating Connector : SM02B-BHSS-1(JST)

Pin NO.	Symbol	Color	Function
1	HOT	Black	High Voltage
2	COLD	White	Low Voltage

### 5.3 Timing Diagrams of LVDS For Transmission

LVDS Receiver : Integrated T-CON

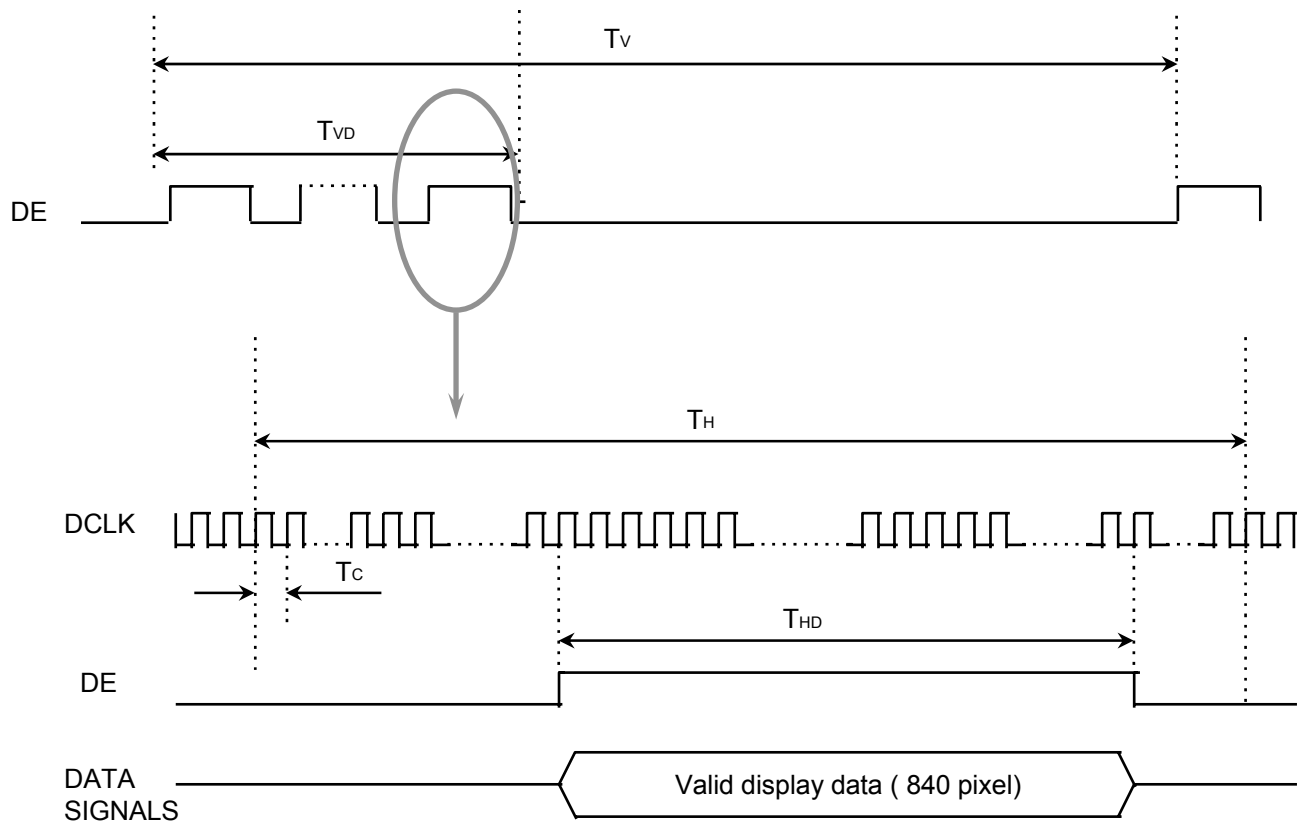


## 6. INTERFACE TIMING

### 6.1 Timing Parameters

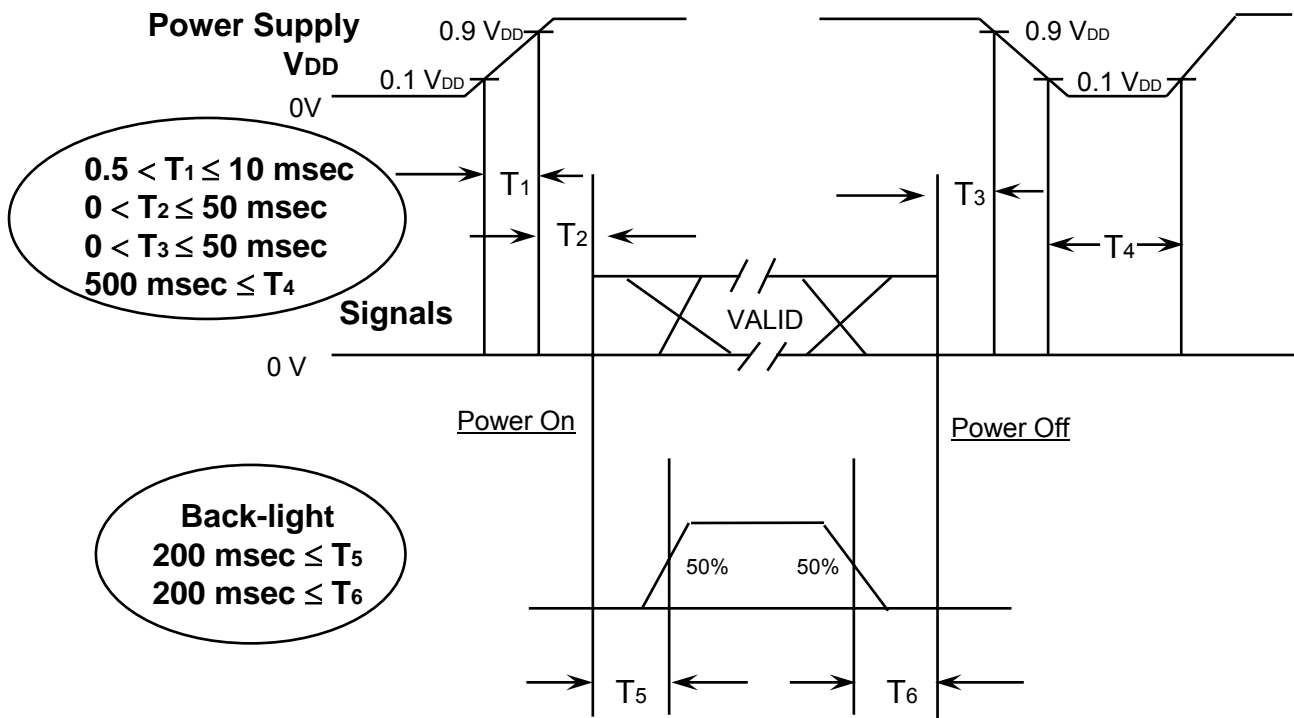
Signal	Item	Symbol	MIN	TYP	MAX	Unit	Note
Frame Frequency	Cycle	$T_v$	1054	1080	1250	lines	
Vertical Active Display Term	Display Period	$T_{vD}$	-	1050	-	lines	
One Line Scanning Time	Cycle	$T_H$	900	920	1050	clocks	
Horizontal Active Display Term	Display Period	$T_{HD}$	-	840	-	clocks	

### 6.2 Timing diagrams of interface signal



### 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.



Power ON/OFF Sequence

- T1 : V<sub>DD</sub> rising time from 10% to 90%
- T2 : The time from V<sub>DD</sub> to valid data at power ON.
- T3 : The time from valid data off to V<sub>DD</sub> off at power Off.
- T4 : V<sub>DD</sub> 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.**

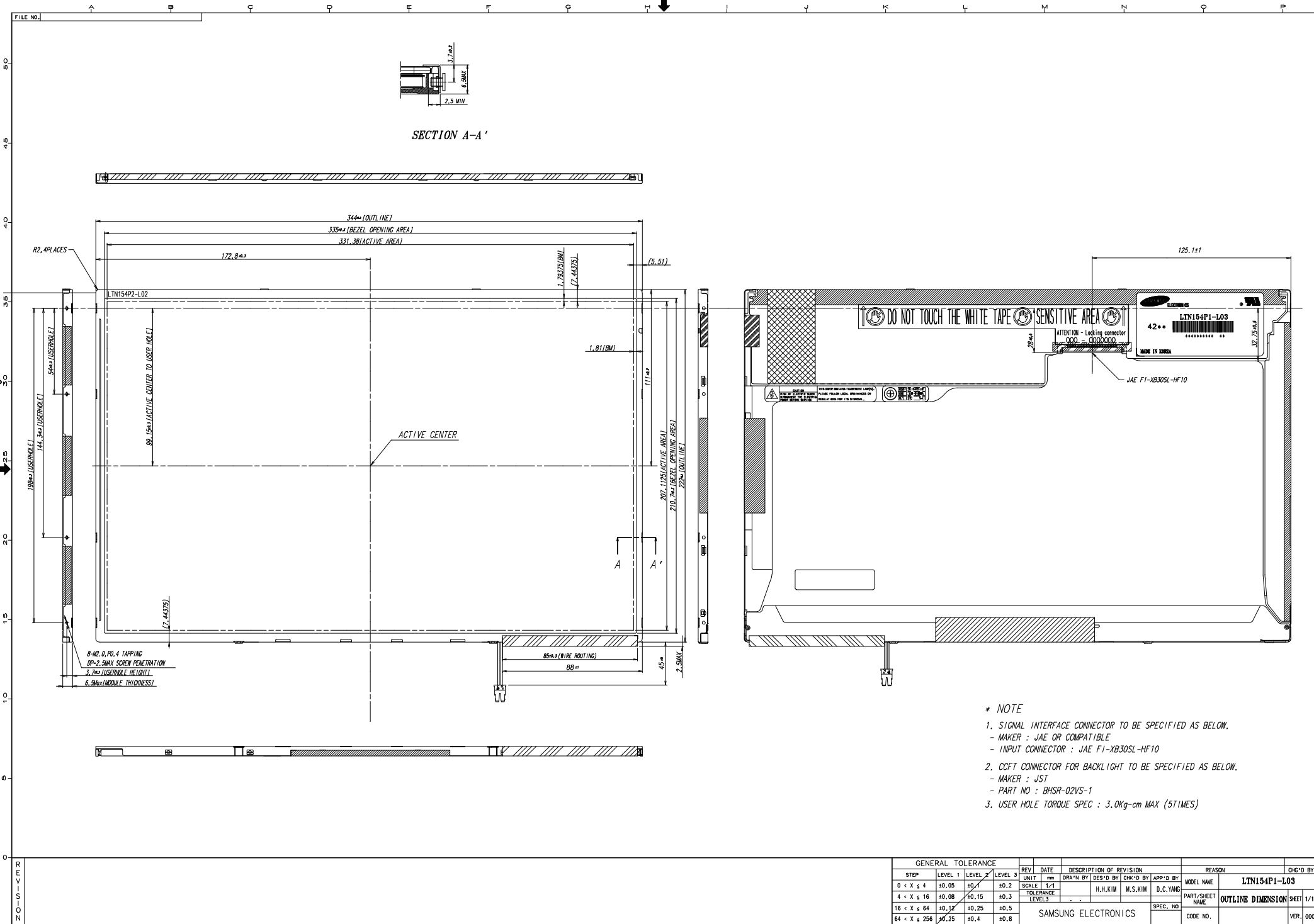
- (1) The supply voltage of the external system for the module input should be the same as the definition of V<sub>DD</sub>.
- (2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become white.
- (3) In case of V<sub>DD</sub> = 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

Product Information

[ Refer to the next page ]

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- \* NOTE
- SIGNAL INTERFACE CONNECTOR TO BE SPECIFIED AS BELOW.  
- MAKER : JAE OR COMPATIBLE  
- INPUT CONNECTOR : JAE F1-XB30SL-HF10
  - COF CONNECTOR FOR BACKLIGHT TO BE SPECIFIED AS BELOW.  
- MAKER : JST  
- PART NO : BHSR-02VS-1
  - USER HOLE TORQUE SPEC : 3.0kg-cm MAX (5TIMES)

GENERAL TOLERANCE				REV.	DATE	DESCRIPTION OF REVISION			REASON	CHK'D BY
STEP	LEVEL 1	LEVEL 2	LEVEL 3	UNIT	REV.	DRG.'N BY	DES'G BY	CHK'D BY	APP'D BY	MODEL NAME
0 < X ≤ 4	±0.05	±0.1	±0.2	SCALE	1/1	H.H.KIM	N.S.KIM	D.C.YANG		LTN154P1-L03
4 < X ≤ 16	±0.08	±0.15	±0.3	TOLERANCE						PART/SHEET NAME
16 < X ≤ 64	±0.12	±0.25	±0.5	LEVEL 3						OUTLINE DIMENSION SHEET 1/1
64 < X ≤ 256	±0.25	±0.4	±0.8							CODE NO.

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