

**SAMSUNG**

**ELECTRONICS**

Product Information



# Product Information

**SAMSUNG TFT-LCD**

**MODEL NO. : LTN154U2-L04-0**

LCD Product Planning Group 1, Marketing Team

Samsung Electronics Co . , LTD.



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## GENERAL DESCRIPTION

### DESCRIPTION

LTN154U2-L04 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 a backlight system. The resolution of a 15.4" contains 1,920 x 1200 pixels and can display up to 262,144 colors. 6 O'clock direction is the optimum viewing angle.

### FEATURES

- Thin and light weight
- High contrast ratio, high aperture structure
- Super wide Viewing Angle
- Fast Response Time
- Wide UXGA(1920 X 1200) resolution
- Low power consumption
- DE (Data enable) only mode.
- 3.3V LVDS Interface
- On board EDID chip
- Pb-free product

### 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	331.2(H) X 207.0(V) (15.4" diagonal)	mm	
Driver element	a-si TFT active matrix		
Display colors	262,144		
Number of pixel	1920 x 1200(16 : 10)	pixel	
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.1725(H) x 0.1725(V)	mm	
Display Mode	Normally white		
Surface treatment	Haze 25, 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)	-	6.2	6.5	mm	(1)
Weight		-	545	560	g	

Note (1) Measurement condition of outline dimension

- . Equipment : Vernier 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	$I_L$	3.0	7.0	mArms	(1)
Lamp frequency	$f_L$	50	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 condition

## 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, V<sub>DD</sub>=3.3V, fv= 60Hz, fdCLK=81MHz, ( IL= 6.5 mA)

Item		Symbol	Condition	Min.	Typ.	Max	Unit
Contrast Ratio (5 Points)		CR	$\phi = 0,$ $\theta = 0$	200	300	-	-
Response Time at Ta	Rising	T <sub>R</sub> + T <sub>F</sub>			25	35	msec
Average Luminance of White (5 Points)		Y <sub>L,AVE</sub>		145	170	-	cd/m <sup>2</sup>
Color Chromaticity ( CIE )	Red	R <sub>x</sub>		0.565	0.595	0.625	-
		R <sub>y</sub>		0.317	0.347	0.377	
	Green	G <sub>x</sub>		0.289	0.319	0.349	
		G <sub>y</sub>		0.516	0.546	0.576	
	Blue	B <sub>x</sub>		0.122	0.152	0.182	
		B <sub>y</sub>		0.106	0.136	0.166	
	White	W <sub>x</sub>		0.283	0.313	0.343	
		W <sub>y</sub>		0.299	0.329	0.359	
Viewing Angle	Hor.	$\theta_L$	CR ≥ 10	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	V <sub>CM</sub> =+1.2V
	Low	V <sub>IL</sub>	-100	-	-	mV	
Vsync Frequency	f <sub>v</sub>	-	60	-	Hz		
Hsync Frequency	f <sub>H</sub>	-	75	-	KHz		
Main Frequency	f <sub>DCLK</sub>	-	81	-	MHz		
Rush Current	I <sub>RUSH</sub>	-	-	1.5	A		
Current of Power Supply	White	I <sub>DD</sub>	-	500	-	mA	
	Mosaic		-	550	-	mA	
	V.stripe		-	720	820	mA	

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

(2) f<sub>v</sub>=60Hz, f<sub>DCLK</sub> =81MHZ, V<sub>dd</sub> = 3.3V , DC Current.

(3) Power dissipation pattern

#### 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.

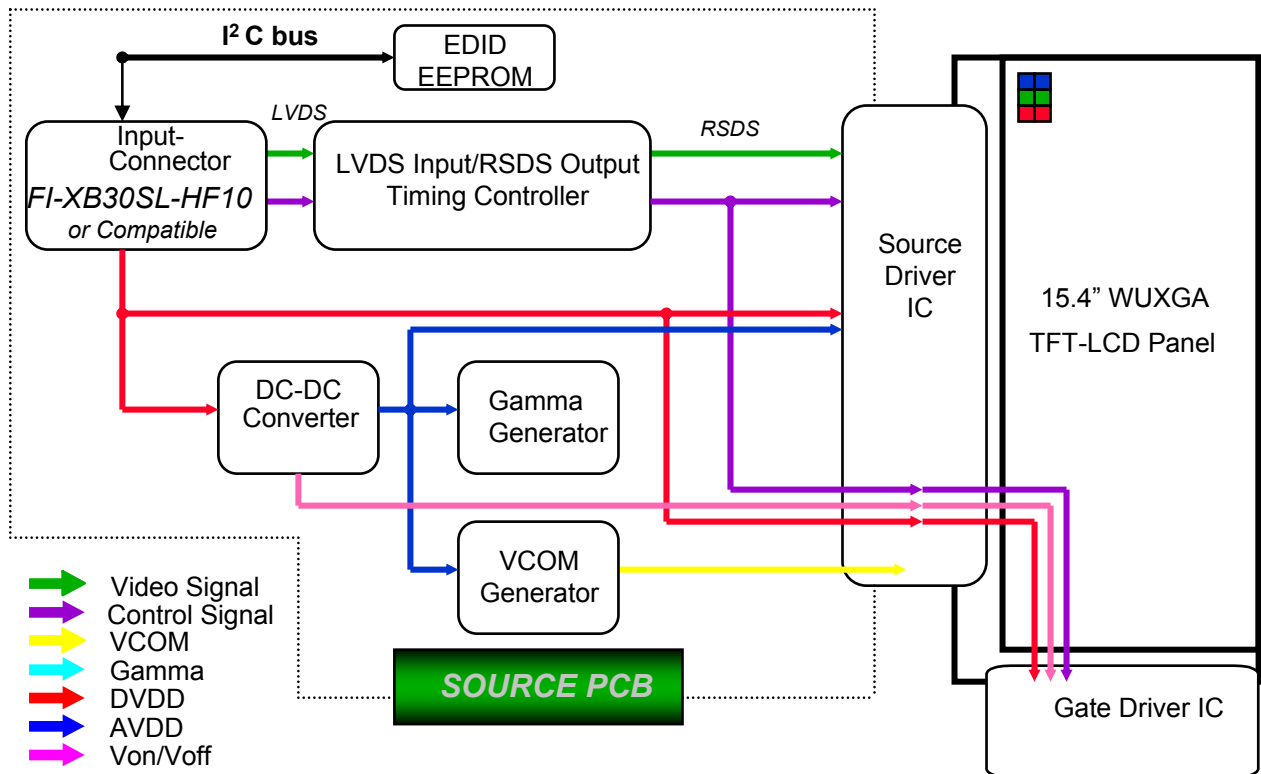
- INVERTER : SEM SIC 130T

Ta= 25 ± 2 °C

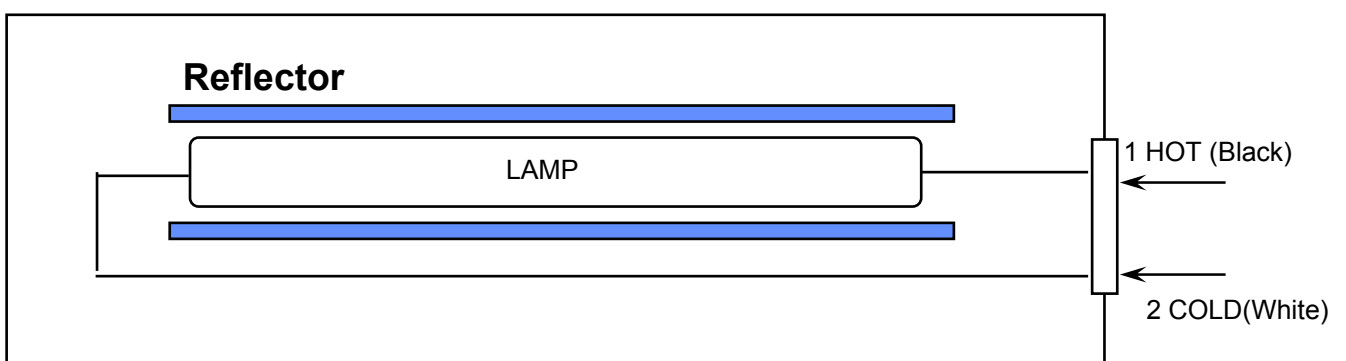
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Lamp Current	I <sub>L</sub>	2.0	6.0	6.5	mArms	
Lamp Voltage	V <sub>L</sub>	-	700	-	Vrms	I <sub>L</sub> =6.0mA
Frequency	f <sub>L</sub>	40	60	80	KHz	
Power Consumption	P <sub>L</sub>		4.2		W	I <sub>L</sub> =6.0mA
Operating Life Time	Hr	10,000			Hour	
Startup Voltage	V <sub>s</sub>	-	-	1230	Vrms	25°C
				1480	Vrms	0°C
Lamp startup time		-	-	1	sec	

## 4. BLOCK DIAGRAM

### 4.1 TFT LCD Module



### 4.2 BACK-LIGHT 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	



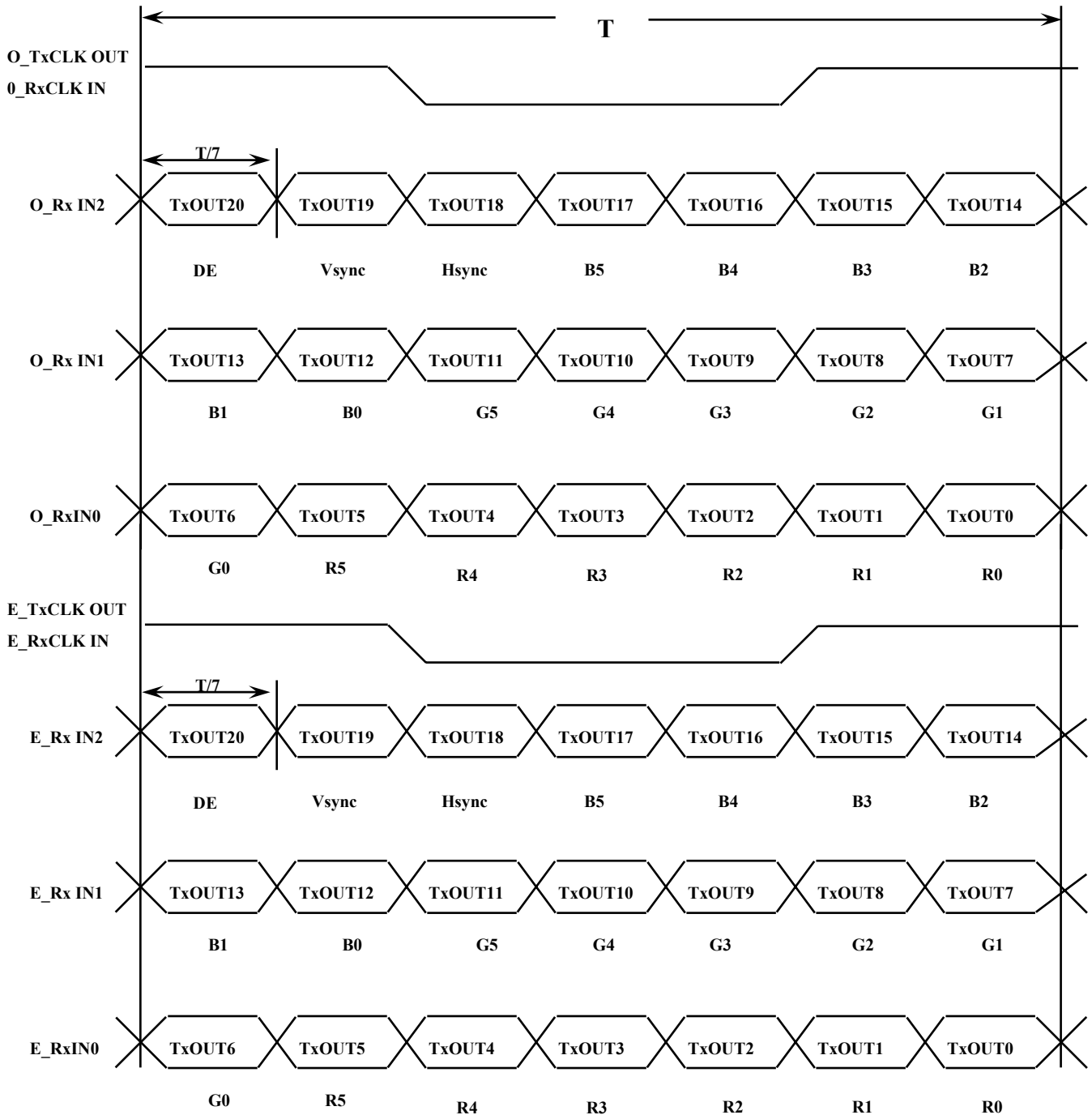
5.2 BACK LIGHT UNIT

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

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

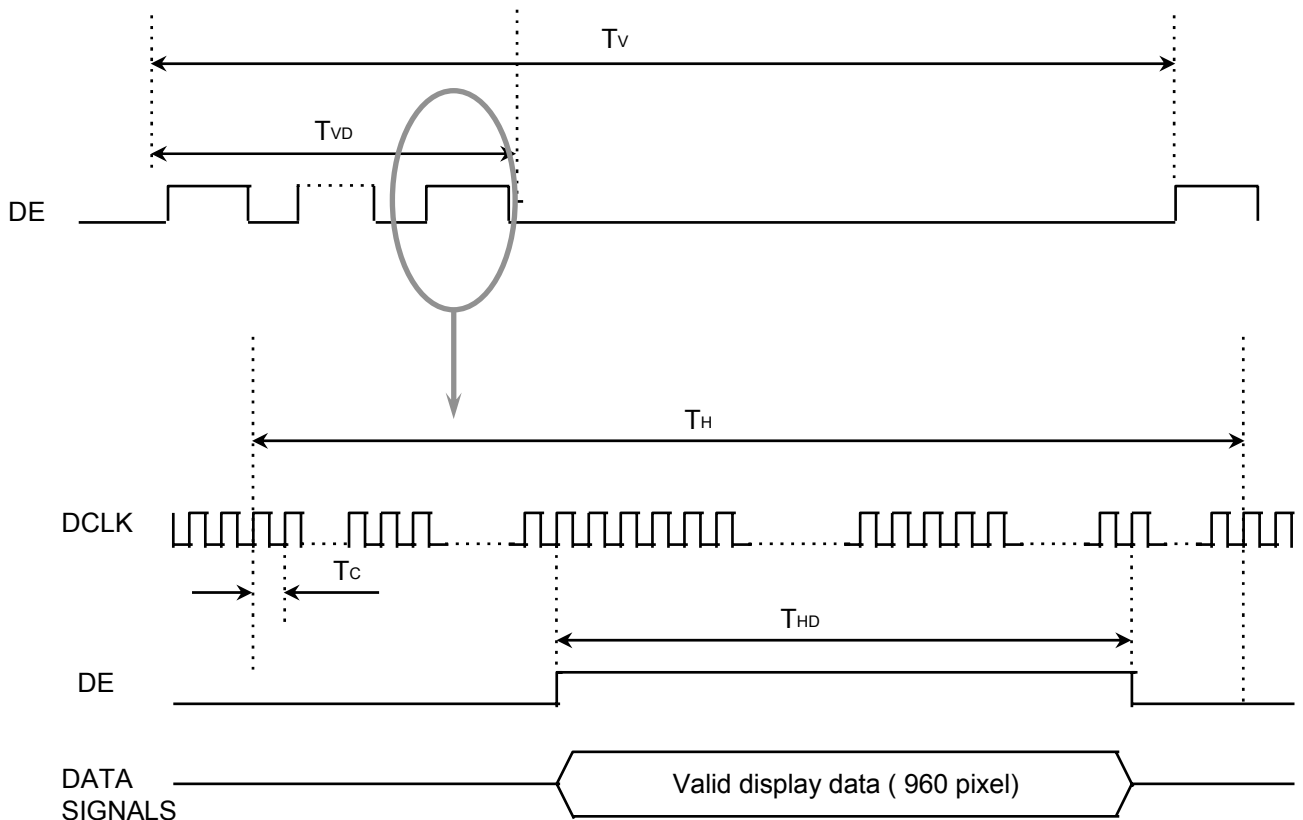


## 6. INTERFACE TIMING

### 6.1 Timing Parameters

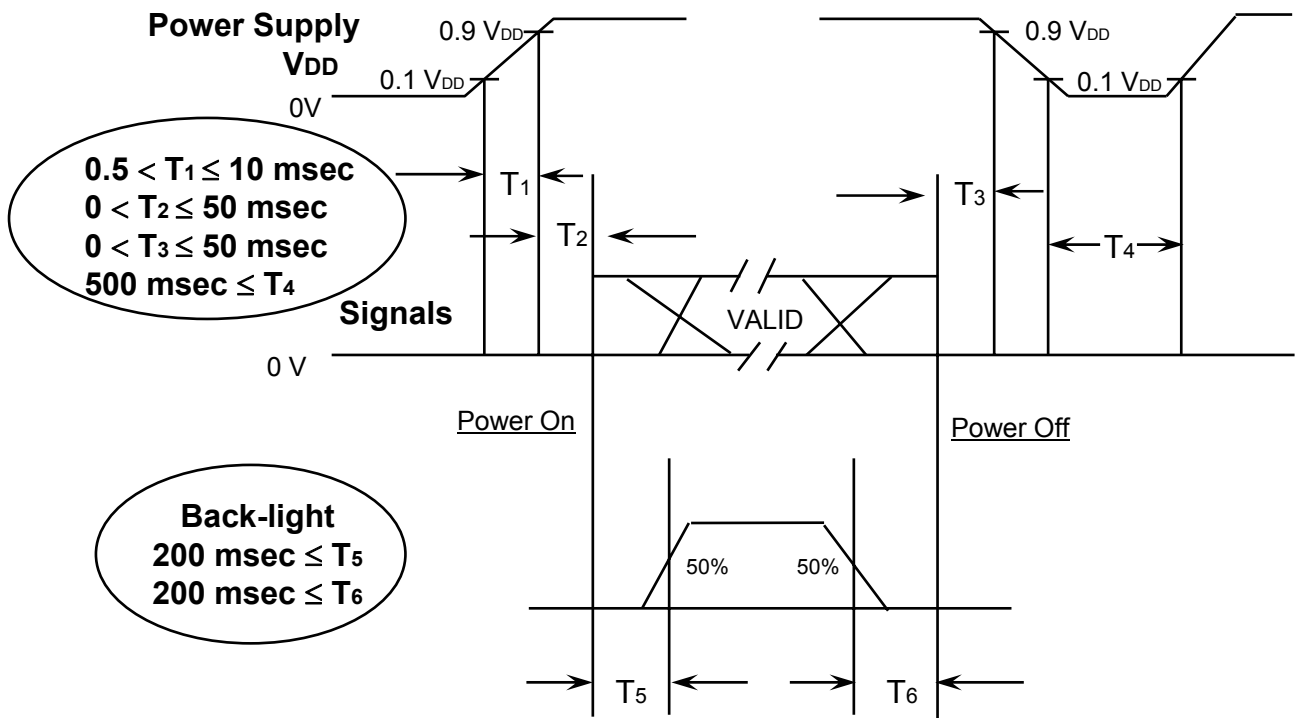
Signal	Item	Symbol	MIN	TYP	MAX	Unit	Note
Frame Frequency	Cycle	$T_v$	1204	1250	1400	lines	
Vertical Active Display Term	Display Period	$T_{VD}$	-	1200	-	lines	
One Line Scanning Time	Cycle	$T_H$	1030	1080	1170	clocks	
Horizontal Active Display Term	Display Period	$T_{HD}$	-	960	-	clocks	

### 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 : 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.**

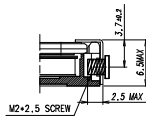
- (1) The supply voltage of the external system for the module input should be the same as the definition of VDD.
- (2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily 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

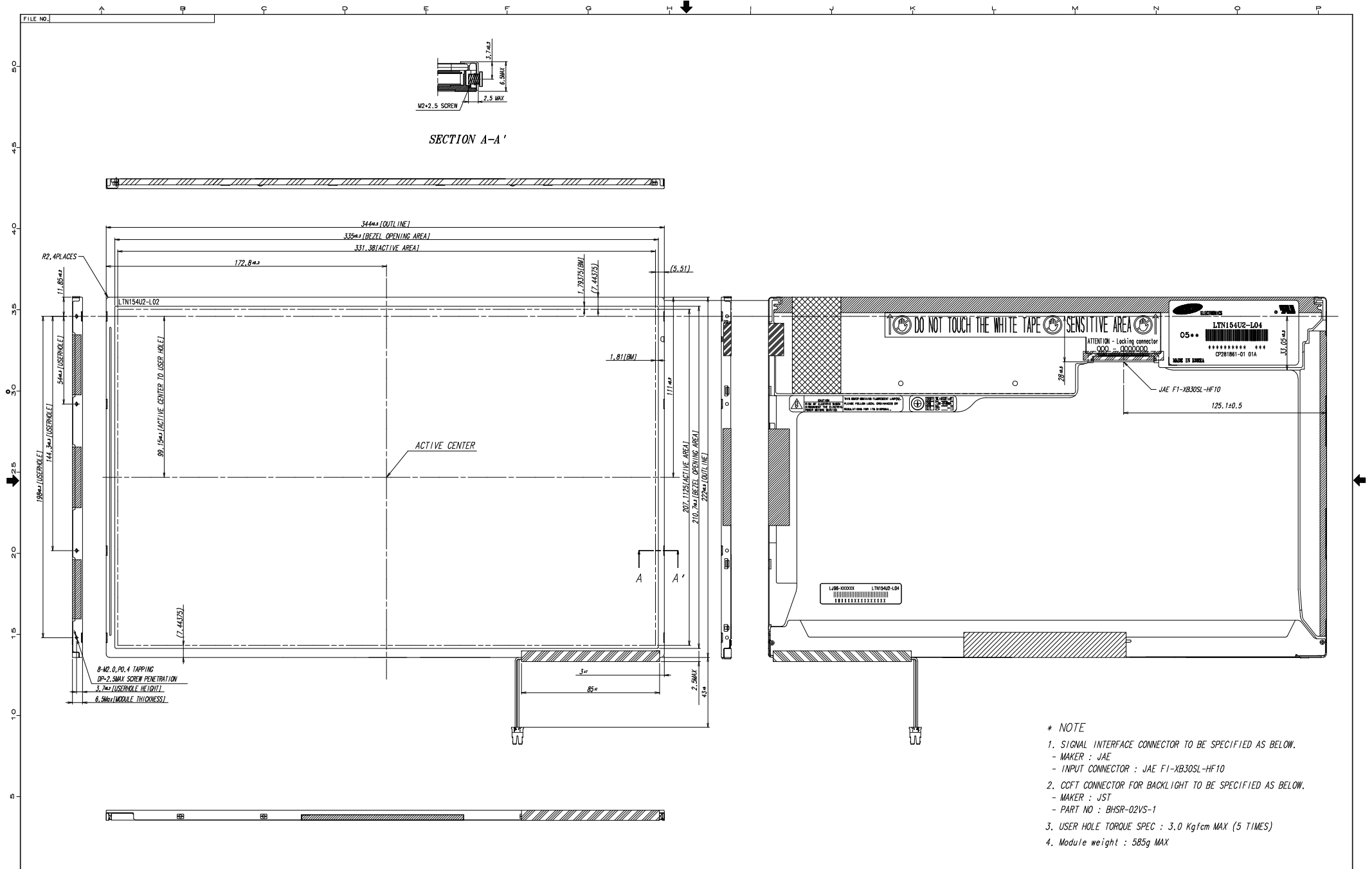
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SECTION A-A'



- \* NOTE
1. SIGNAL INTERFACE CONNECTOR TO BE SPECIFIED AS BELOW.  
- MAKER : JAE  
- INPUT CONNECTOR : JAE F1-XB30SL-HF10
  2. CCFT CONNECTOR FOR BACKLIGHT TO BE SPECIFIED AS BELOW.  
- MAKER : JST  
- PART NO : BHSR-02VS-1
  3. USER HOLE TORQUE SPEC : 3.0 Kg/cm MAX (5 TIMES)
  4. Module weight : 583g MAX

GENERAL TOLERANCE				REV.	DATE	DESCRIPTION OF REVISION			REASON	CHK'D BY
STEP	LEVEL 1	LEVEL 2	LEVEL 3	UNIT	REV.	DATE	CHK'D BY	DES'G BY	APP'D BY	MODEL NAME
0 < X ≤ 4	±0.05	±0.1	±0.2	SCALE	1:1		Y.K.KIM	N.S.KIM	D.C.YANG	LTN154U2-L04
4 < X ≤ 16	±0.08	±0.15	±0.3	TOLERANCE						PART/SHEET NAME
16 < X ≤ 64	±0.12	±0.25	±0.5	LEVEL3			05.10.12	05.10.12		OUTLINE DIMENSION
64 < X ≤ 256	±0.25	±0.4	±0.8							SHEET 1/1
SAMSUNG ELECTRONICS										VER. 000