



ELECTRONICS

# Product Information

**SAMSUNG TFT-LCD**  
**MODEL NO. : LTN170X2-L02**

LCD Product Planning Group 1, Marketing Team

Samsung Electronics Co . , LTD.



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## GENERAL DESCRIPTION

### DESCRIPTION

LTN170X2-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 unit. The resolution of a 17.0" contains 1,440 x 900 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
- Wide XGA+(1440 x 900 pixels) resolution
- Low power consumption
- Fast Response
- DE(Data enable) only mode
- 3.3V LVDS Interface
- Onboard EEDID 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	367.20(H) x 229.50(V) (17.0" diagonal )	mm	
Driver element	a-Si TFT active matrix		
Display colors	262,144		
Number of pixel	1440 x 900 (Wide XGA+)	pixel	16 : 10
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.255(H) x 0.255(V) (TYP.)	mm	99.6ppi
Display Mode	Normally white		
Surface treatment	Haze 0(Glare) Haze 25(Anti-Glare), Hard-Coating 3H		

**MECHANICAL INFORMATION**

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal (H)	381.7	382.2	382.7	mm	
	Vertical (V)	224.0	244.5	245.0	mm	
	Depth (D)	-	6.7	7.0	mm	
Weight		-	715	735	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	$I_L$	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 and PR-650

\* Ta = 25 ± 2 °C, VDD=3.3V, fv= 60Hz, fdCLK = 48.15MHz, IL = 6.5 mA

Item		Symbol	Condition	Min.	Typ.	Max	Unit
Contrast Ratio (5 Points)		CR		300	500	-	-
Response Time at Ta ( Rising + Falling )		TRT		-	16	25	msec
Average Luminance of White (5 Points)		YL,AVE		175	200	-	cd/m <sup>2</sup>
Color Chromaticity ( CIE )	Red	R <sub>X</sub>	Normal Viewing Angle φ = 0 θ = 0	0.578	0.608	0.638	-
		R <sub>Y</sub>		0.317	0.347	0.377	
	Green	G <sub>X</sub>		0.279	0.309	0.339	
		G <sub>Y</sub>		0.517	0.547	0.577	
	Blue	B <sub>X</sub>		0.122	0.152	0.182	
		B <sub>Y</sub>		0.095	0.125	0.155	
	White	W <sub>X</sub>		0.283	0.313	0.343	
		W <sub>Y</sub>		0.299	0.329	0.359	
Viewing Angle	Hor.	θ <sub>L</sub>	CR ≥ 10	40	45		Degrees
		θ <sub>H</sub>		40	45		
	Ver.	φ <sub>H</sub>		15	20		
		φ <sub>L</sub>		20	25		
13 Points White Variation		δ <sub>L</sub>		-	-	1.7	-

### 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>	-	54.72	-	KHz		
Main Frequency	f <sub>DCLK</sub>	47.15	48.15	49.15	MHz		
Rush Current	I <sub>RUSH</sub>	-	-	1.5	A		
Current of Power Supply	White	I <sub>DD</sub>	-	710	-	mA	
	Mosaic		-	720	-	mA	
	V. stripe		-	830	900	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> = 48.15MHZ, 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.

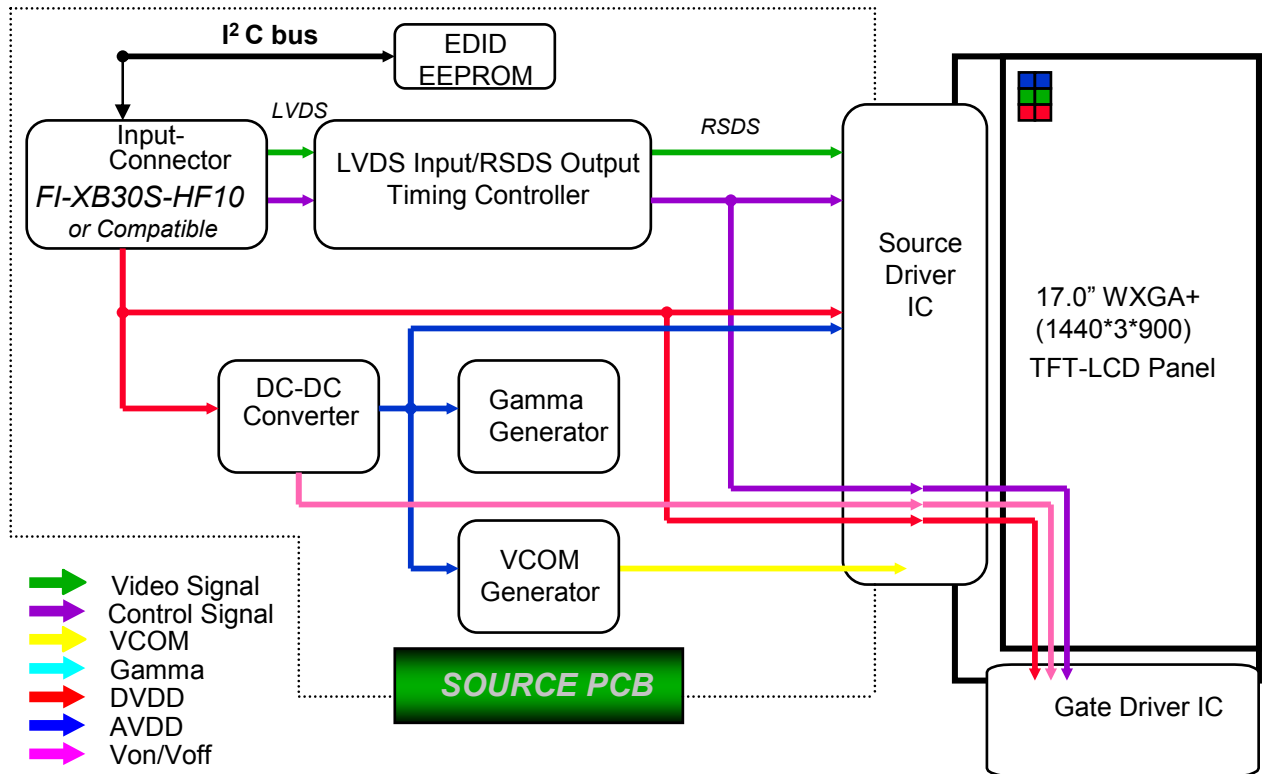
- INVERTER : SIT 130T

Ta= 25 ± 2 °C

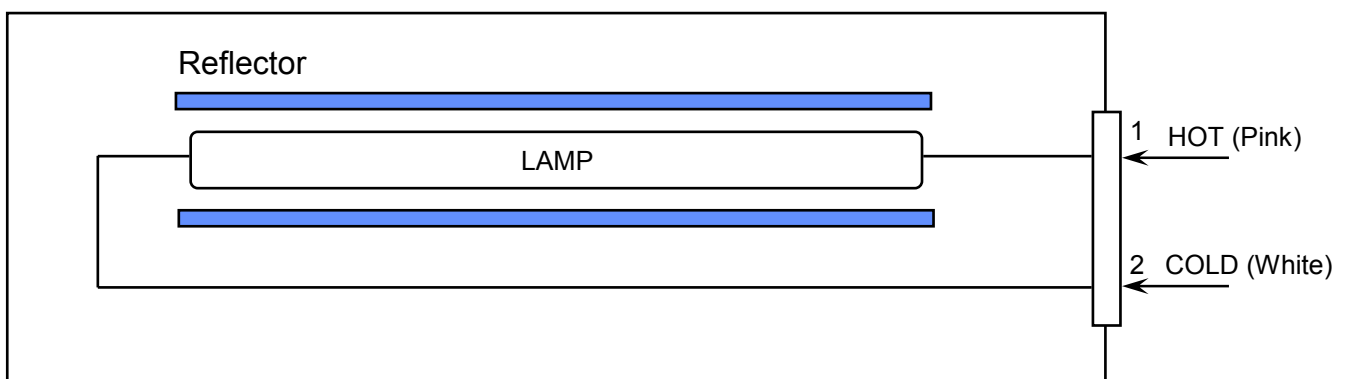
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Lamp Current	I <sub>L</sub>	3.0	6.0	6.5	mArms	
Lamp Voltage	V <sub>L</sub>	-	720	-	Vrms	I <sub>L</sub> = 6.0mA
Frequency	f <sub>L</sub>	40	60	65	KHz	
Power Consumption	P <sub>L</sub>		4.32		W	I <sub>L</sub> = 6.0mA
Operating Life Time	Hr	12,000	-	-	Hour	
Startup Voltage	V <sub>s</sub>			1,280	Vrms	25°C
				1,600	Vrms	0°C

## 4. BLOCK DIAGRAM

### 4.1 TFT LCD Module



### 4.2 BACKLIGHT UNIT



Note) 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-XB30SL-HF10 or compatible )  
Mating Connector : JAE FI-X30M or compatible)

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	NC	No connection		
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	



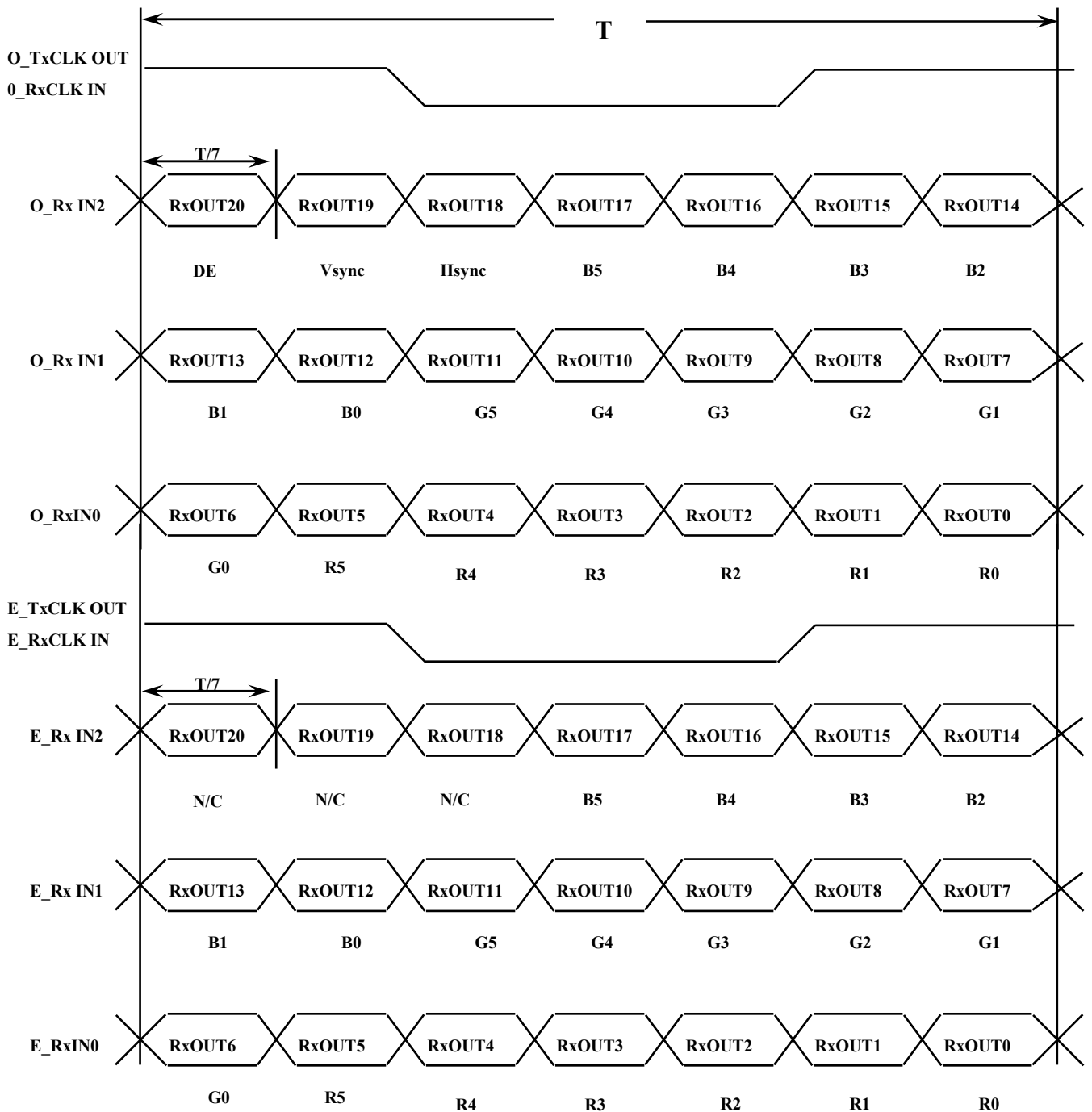
### 5.2 BACK LIGHT UNIT

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

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

### 5.3 Timing Diagrams of LVDS For Transmission

LVDS Receiver : Integrated T-CON

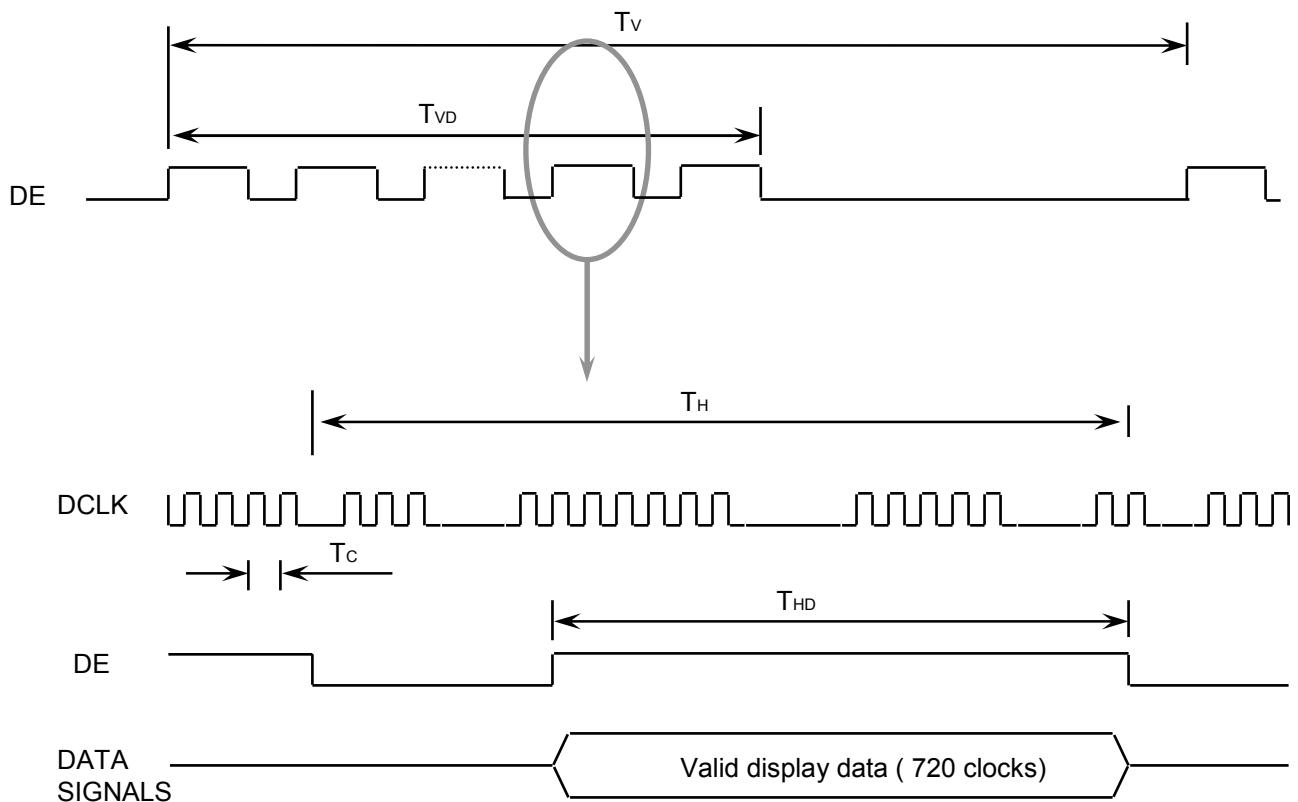


## 6. INTERFACE TIMING

### 6.1 Timing Parameters

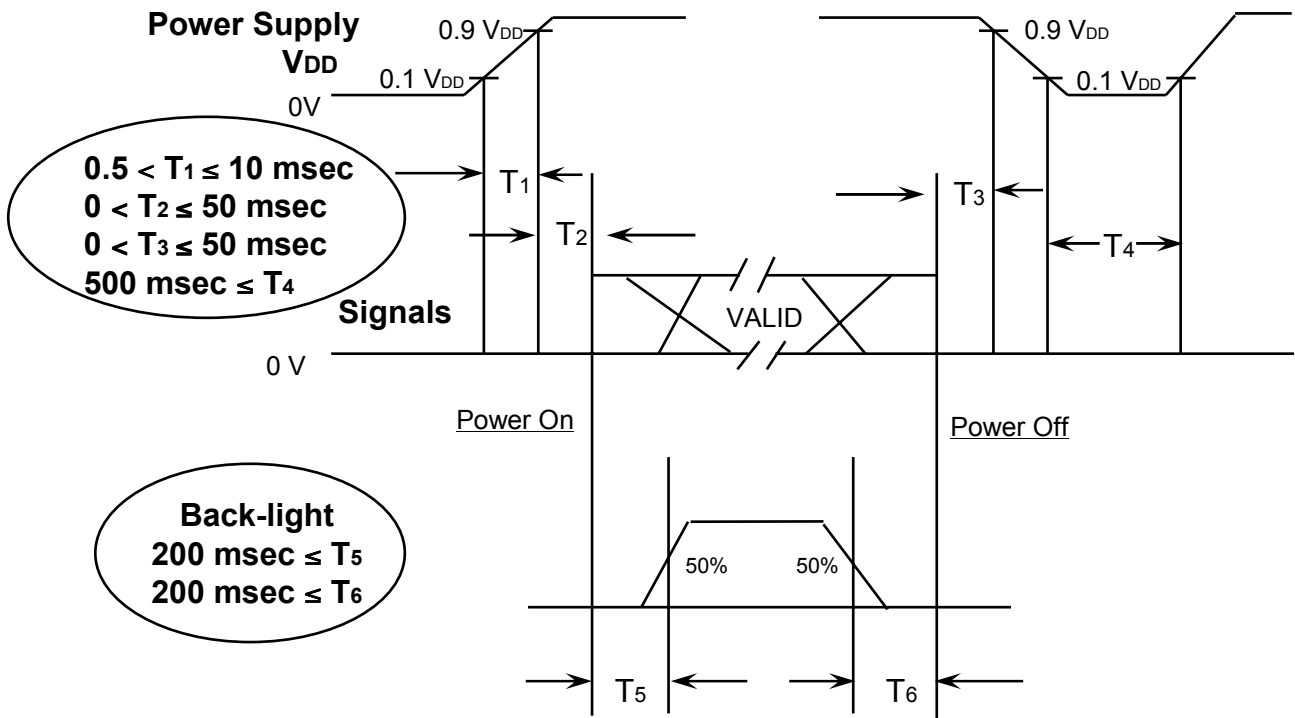
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Frame Frequency	Cycle	TV	905	912	970	Lines	
Vertical Active Display Term	Display Period	TVD	-	900	-	Lines	
One Line Scanning Time	Cycle	TH	876	880	950	Clocks	
Horizontal Active Display Term	Display Period	THD	-	720	-	Clocks	

### 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.

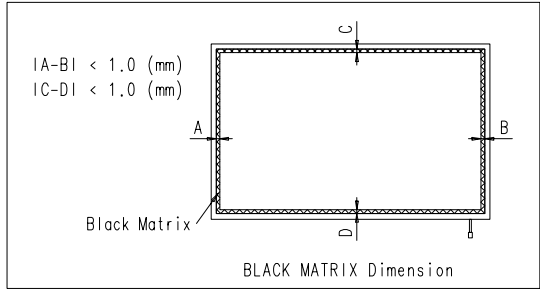
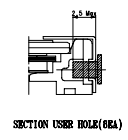
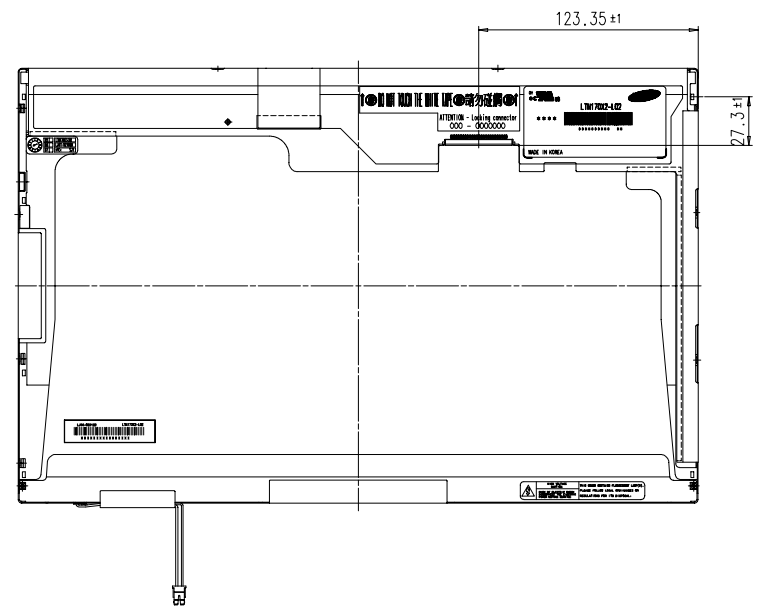
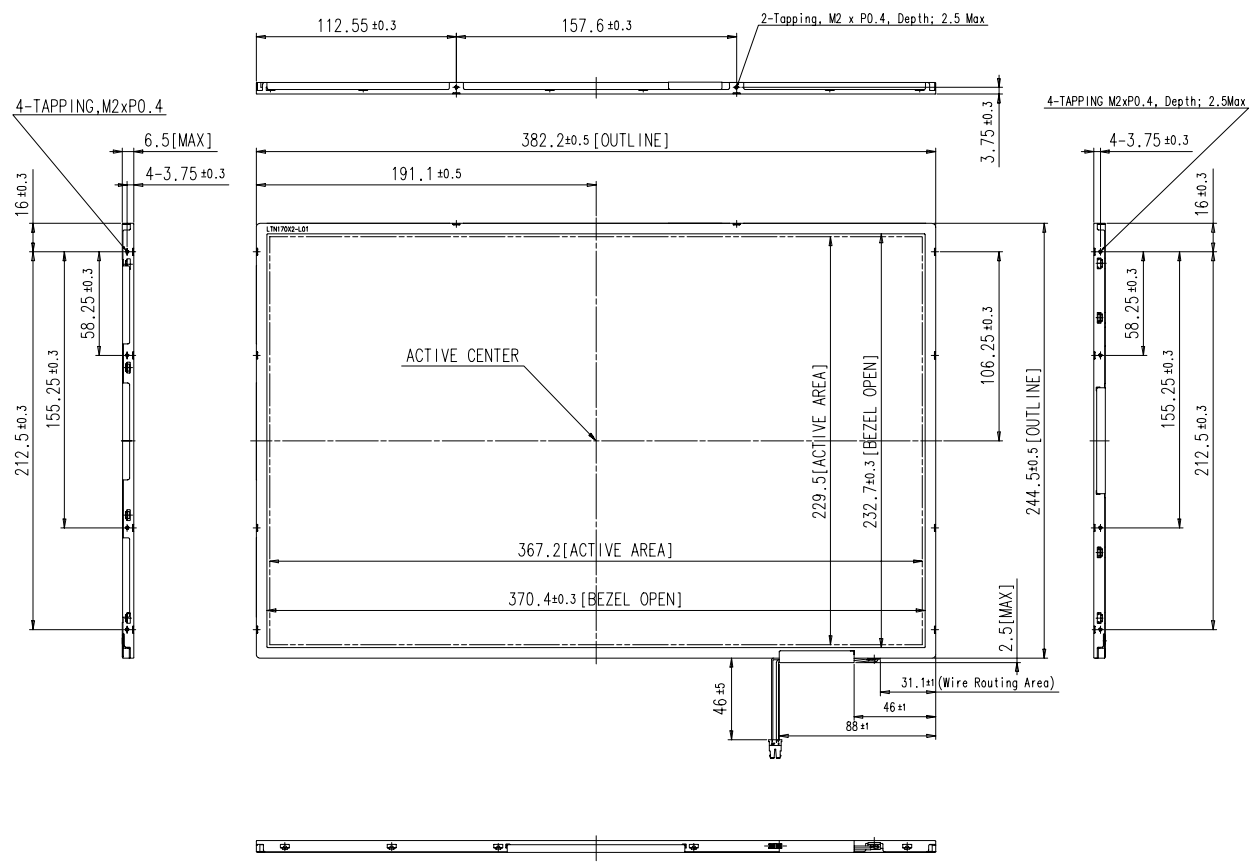
**NOTE.**

- (1) The supply voltage of the external system for the module input should be the same as the definition of 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) T<sub>4</sub> 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

[ Refer to the next page ]

NO	PART NAME	CODE NO	SPECIFICATION	Q'TY	SPEC. NO.	REMARK
1	OUTLINE	LTN1702-L02				



- \* NOTE
- SIGNAL INTERFACE CONNECTOR TO BE SPECIFIED AS BELOW.  
- MAKER : JAE  
- PART NO : F1-YB30SL-HF10
  - COFT CONNECTOR FOR BACKLIGHT TO BE SPECIFIED AS BELOW.  
- MAKER : JST  
- PART NO : BHSR-02VS-1  
- LAMP DIAMETER :  $\phi 2.0$
  - CALIFERS MEASURING FORCE :  $530 \pm 150$  gf
  - USER HOLE TORQUE SPEC :  $3.0$  kgfm Max (5TIMES)
  - WEIGHT SPEC :  $715$ g Max

REV. 00

GENERAL TOLERANCE				REV. DATE	DESCRIPTION OF REVISION	REASON	CHK'D BY
0 - X & 4	H0.05	H0.1	H0.2	1/1/1	1. S.A.LEE	S.A.LEE	D.C.YANG
4 - X & 16	H0.08	H0.15	H0.3	1/1/2	1. S.A.LEE	S.A.LEE	D.C.YANG
16 - X & 24	H0.12	H0.25	H0.5	1/1/3	1. S.A.LEE	S.A.LEE	D.C.YANG
24 - X & 254	H0.25	H0.4	H0.8				

STEP	LEVEL	LEVEL 2	LEVEL 3	REV. DATE	DESCRIPTION OF REVISION	REASON	CHK'D BY
0 - X & 4	H0.05	H0.1	H0.2	1/1/1	1. S.A.LEE	S.A.LEE	D.C.YANG
4 - X & 16	H0.08	H0.15	H0.3	1/1/2	1. S.A.LEE	S.A.LEE	D.C.YANG
16 - X & 24	H0.12	H0.25	H0.5	1/1/3	1. S.A.LEE	S.A.LEE	D.C.YANG
24 - X & 254	H0.25	H0.4	H0.8				

MODEL NAME	PART/SHIELD NAME	OUTLINE DIMENSION	SHEET	VER.
LTN1702-L02			1/1	000