



**SAMSUNG**

**ELECTRONICS**

Product Information



# Product Information

**SAMSUNG TFT-LCD**

**MODEL NO. : LTN121XJ-L07**

LCD Product Planning Group 1, Marketing Team

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## GENERAL DESCRIPTION

### DESCRIPTION

LTN121XJ-L07 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 12.1" contains 1024 x 768 pixels and can display up to 262,144 colors. 6 O'clock direction is the Optimum viewing angle.

### FEATURES

- Ultra Thin and light weight
- High contrast ratio
- XGA (1024x768 pixels) resolution
- Low power consumption
- DE (Data enable) only mode.
- 3.3V LVDS Interface
- On board EDID chip
- PB-Free Product (RoHS compliant)

### 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	245.76(H) X 184.32(V) (12.1"diagonal)	mm	
Driver element	a-si TFT active matrix		
Display colors	262,144		
Number of pixel	1024 x 768 (XGA )	pixel	
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.240(H) x 0.240(V)	mm	
Display Mode	Normally white		
Surface treatment	HAZE Typ 40, HARDNESS 2H, (ARC150T)		

## MECHANICAL INFORMATION

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal (H)	260.5	261.0	261.5	mm	
	Vertical (V)	197.5	198.0	198.5	mm	
	Depth (D)	-	4.7	5.0	mm	(1)
Weight		-	275		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	$V_{DD}$	$V_{SS} - 0.3$	$V_{DD} + 0.3$	V	(1)
Logic Input Voltage	$V_{IN}$	$V_{SS} - 0.3$	$V_{DD} + 0.3$	V	(1)

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

### (2) BACK-LIGHT UNIT

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

Item	Symbol	Min.	Max.	Unit	Note
Lamp Current	$I_L$	2.0	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 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 =  $25 \pm 2$  °C, V<sub>DD</sub>=3.3V, fv= 60Hz, f<sub>DCLK</sub> = 65MHz, IL = 6.0 mA

Item		Symbol	Condition	Min.	Typ.	Max	Unit	
Contrast Ratio (5 Points)		CR			300	-	-	
Response Time at Ta	Rising	T <sub>R</sub>			-	40	70	msec
	Falling	T <sub>T</sub>						
Average Luminance of White (5 Points)		Y <sub>L,AVE</sub>	Normal Viewing Angle ϕ = 0 θ = 0		120	150	-	cd/m <sup>2</sup>
Color Chromaticity ( CIE )	Red	R <sub>X</sub>		0.539	0.569	0.599	-	
		R <sub>Y</sub>		0.302	0.332	0.362		
	Green	G <sub>X</sub>		0.282	0.312	0.342		
		G <sub>Y</sub>		0.514	0.544	0.574		
	Blue	B <sub>X</sub>		0.119	0.149	0.179		
		B <sub>Y</sub>		0.102	0.132	0.162		
	White	W <sub>X</sub>		0.285	0.313	0.341		
		W <sub>Y</sub>		0.309	0.329	0.349		
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>	35		40	-		
13 Points White Variation		δ <sub>L</sub>		-	-	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>	-	48.2	-	KHz	
Main Frequency		f <sub>DCLK</sub>	-	65	-	MHz	
Rush Current		I <sub>RUSH</sub>	-	-	1.5	A	
Current of Power Supply	White	I <sub>DD</sub>	-	270	-	mA	
	Mosaic		-	300	-	mA	
	V. Stripe		-	-	360	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.

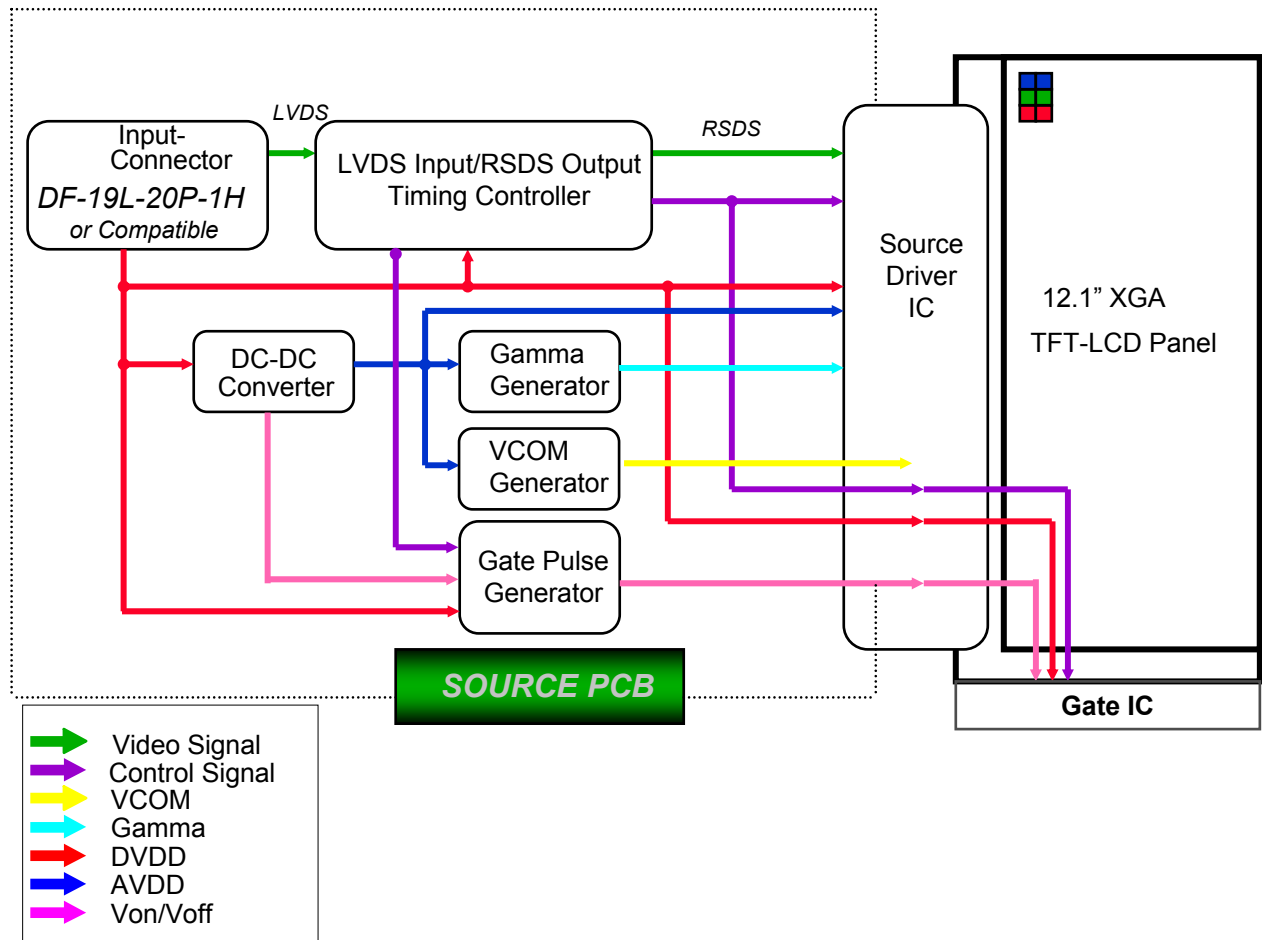
- INVERTER : SEM SIC 130T

Ta= 25 ± 2 °C

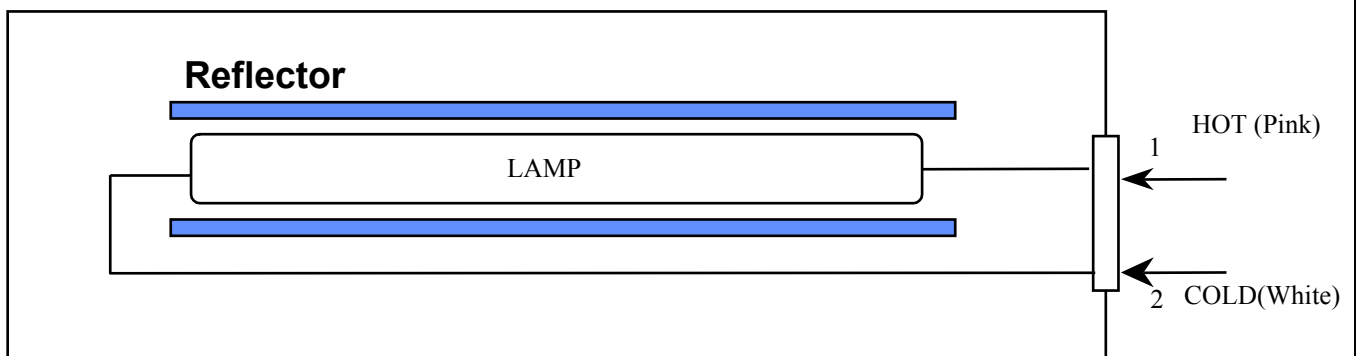
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Lamp Current	I <sub>L</sub>	3.0	6.0	6.5	mArms	
Lamp Voltage	V <sub>L</sub>		565	-	Vrms	I <sub>L</sub> =6.0mA
Frequency	f <sub>L</sub>	50	60	65	KHz	
Power Consumption	P <sub>L</sub>		3.4		W	I <sub>L</sub> =6.0mA
Operating Life Time	Hr	10,000			Hour	
Startup Voltage	V <sub>s</sub>	-	-	1080	Vrms	25°C
				1300	Vrms	0°C
Lamp startup time		-	-	1.0	sec	

## 4. BLOCK DIAGRAM

### 4.1 TFT LCD Module



### 4.2 BACK-LIGHT 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 : (Hirose, DF-19L-20P-1H or Compatible)

PIN NO	SYMBOL	FUNCTION	POLARITY	REMARK
1	VSS	Ground		
2	VDD	POWER SUPPLY +3.3V		
3	VDD	POWER SUPPLY +3.3V		
4	VEDID	DCC 3.3V Power		
5	NC	No connection		
6	CLOCKEDID	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	VSS	Ground		
11	RxIN1-	LVDS Differential Data INPUT(G1-G5, B0-B1)	Negative	
12	RxIN1+	LVDS Differential Data INPUT(G1-G5, B0-B1)	Positive	
13	VSS	Ground		
14	RxIN2-	LVDS Differential Data INPUT(B2-B5, Sync, DE)	Negative	
15	RxIN3+	LVDS Differential Data INPUT(B2-B5, Sync, DE)	Positive	
16	VSS	Ground		
17	RxCLK-	LVDS Differential Clock INPUT(Clock)	Negative	
18	RxCLK+	LVDS Differential Clock INPUT(Clock)	Positive	
19	VSS	Ground		
20	VSS	Ground		



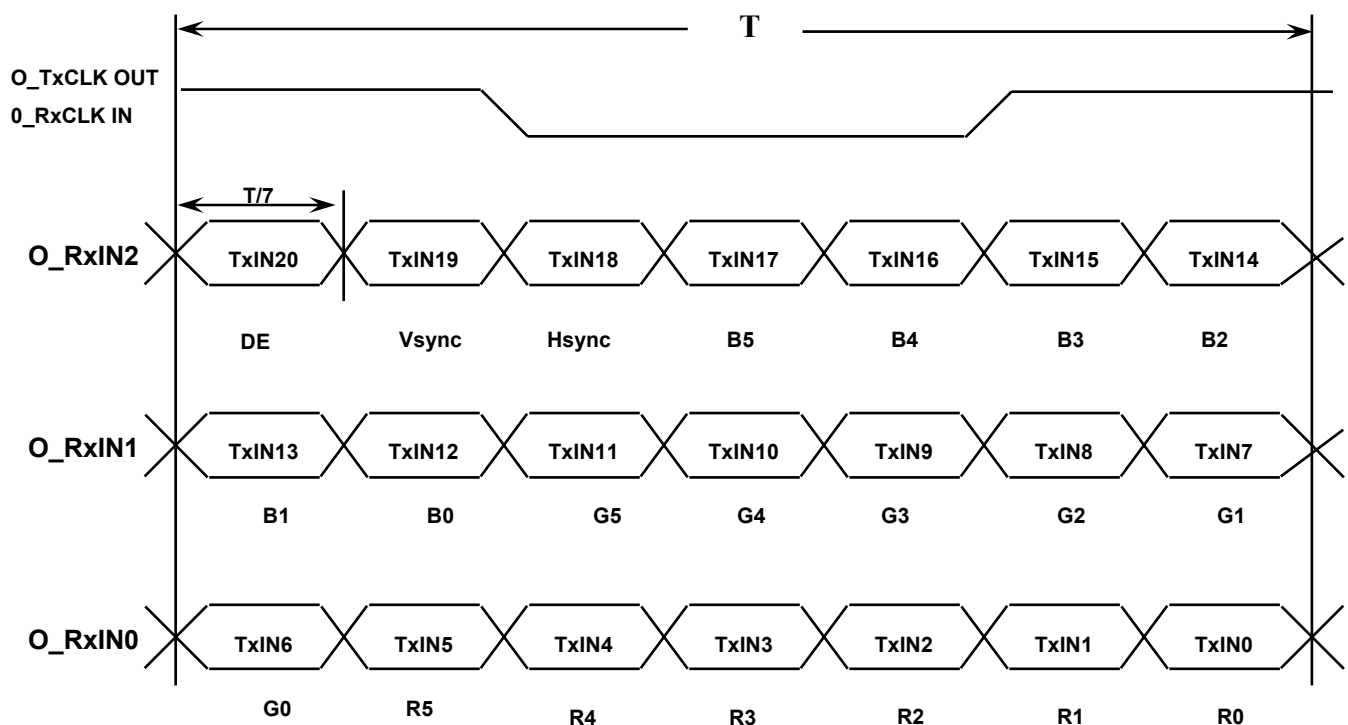
## 5.2 BACK LIGHT UNIT

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

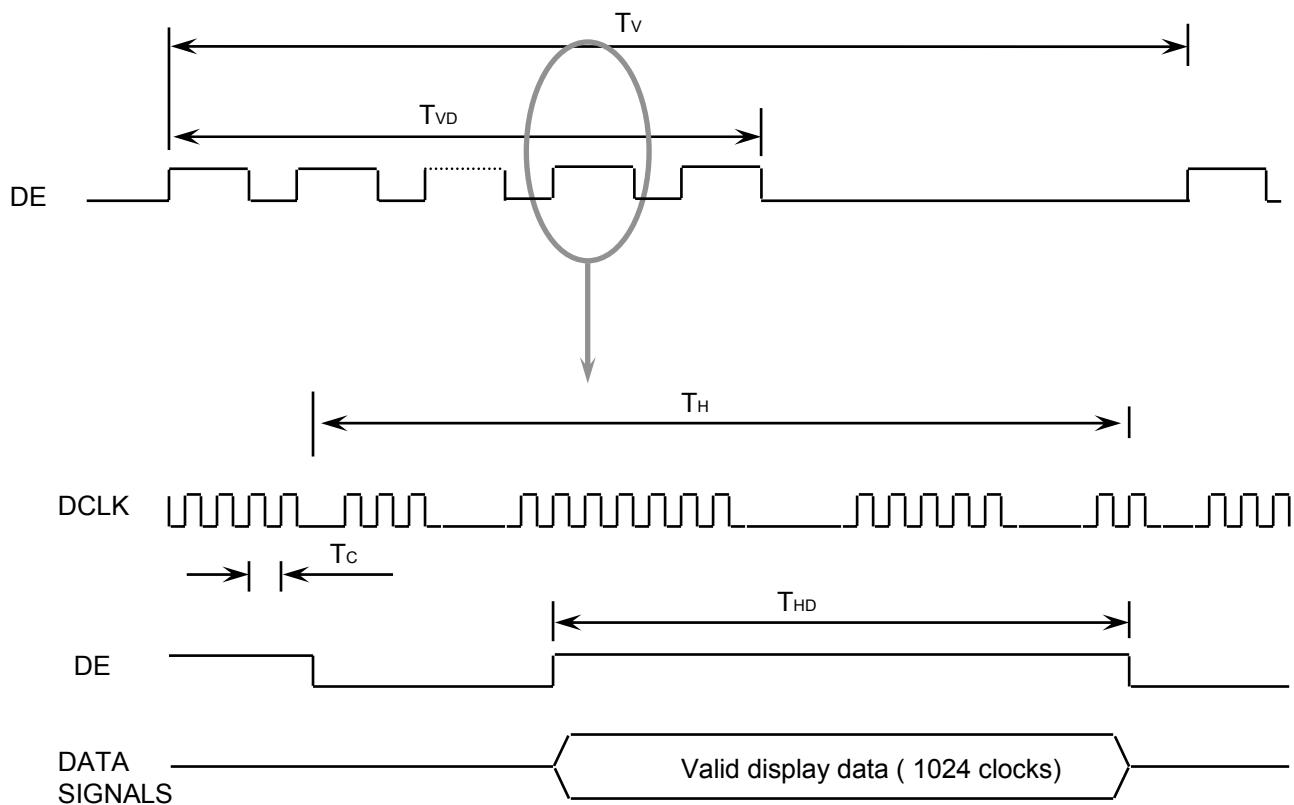


## 6. INTERFACE TIMING

### 6.1 Timing Parameters

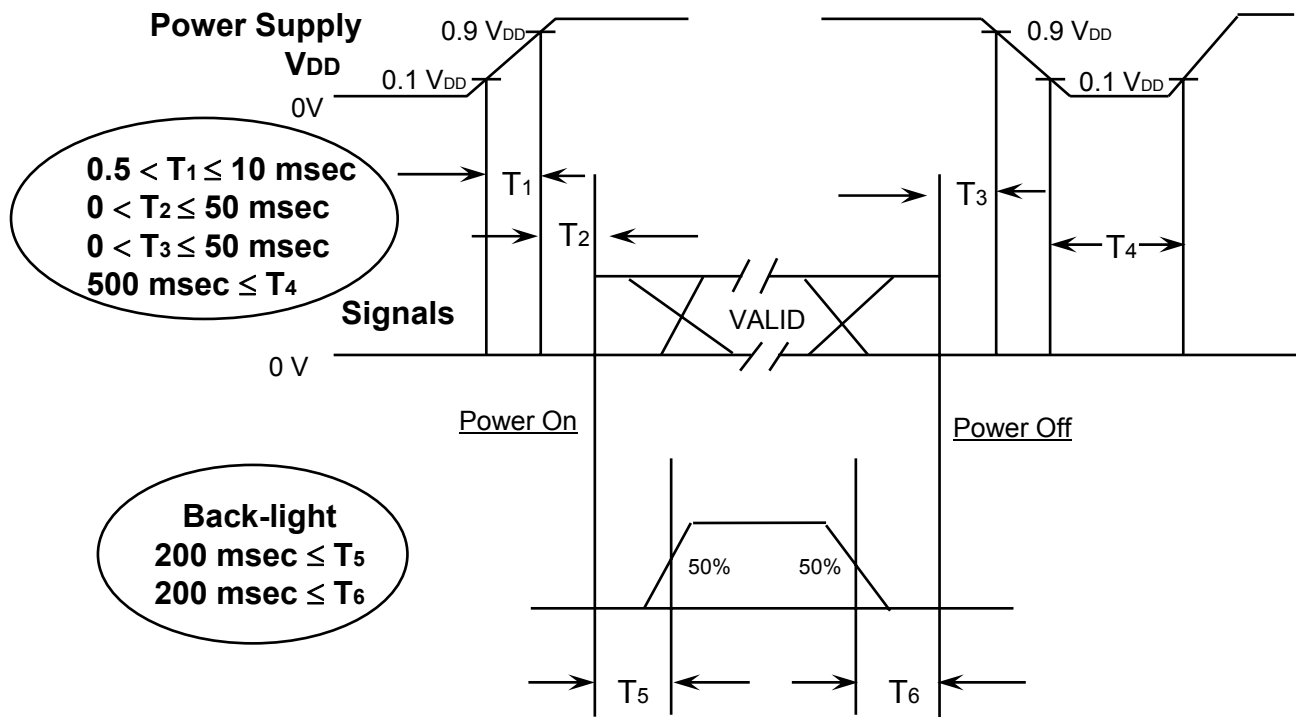
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Frame Frequency	Cycle	$T_V$	-	806	-	Lines	-
Vertical Active Display Term	Display Period	$T_{VD}$	-	768	-	Lines	-
One Line Scanning Time	Cycle	$T_H$	-	1344	-	Clocks	-
Horizontal Active Display Term	Display Period	$T_{HD}$	-	1024	-	Clocks	-

### 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) 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

[ Refer to the next page ]

