

## ***TFT-Display Datenblatt***

Modell LC170WXL-SAA1

### **Kurzdaten**

Hersteller	LG Display
Diagonale	17,0" / 43,2cm
Format	16:9
Auflösung	1366x768
Backlight	LED/350cd/m <sup>2</sup>
Temperatur	0...+60°C (Betrieb)

**Product Specification**

# SPECIFICATION FOR APPROVAL

( ) Preliminary Specification

(●) Final Specification

Title	17" WXGA TFT LCD
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BUYER	
MODEL	

SUPPLIER	LG Display Co., Ltd.
*MODEL	LC170WXL
SUFFIX	SAA1(RoHS Verified)

\*When you obtain standard approval,  
please use the above model name without suffix

APPROVED BY	SIGNATURE	DATE
/		
/		
/		

Please return 1 copy for your confirmation with  
your signature and comments.

APPROVED BY	SIGNATURE	DATE
H. S. Song / Senior Manager		
<b>REVIEWED BY</b>		
J. K. Park / Manager		
<b>PREPARED BY</b>		
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**TV Product Development Dept.**  
**LG. Display Co., Ltd**

## Product Specification

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## Product Specification

## RECORD OF REVISIONS

[illegible]

## Product Specification

### 1. General Description

The LC170WXL is a Color Active Matrix Liquid Crystal Display with an LED backlight system.

The matrix employs a-Si Thin Film Transistor as the active element. It is a transmissive display type which is operating in the normally black mode. It has a 16.8 inch diagonally measured active display area with WXGA resolution (768 vertical by 1366 horizontal pixel array).

Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arrayed in vertical stripes.

Gray scale or the luminance of the sub-pixel color is determined with a 8-bit gray scale signal for each dot.

Therefore, it can present a palette of more than 16.7M(true) colors.

It has been designed to apply the 8-bit 1-port LVDS interface.

It is intended to support LCD TV, PCTV where high brightness, super wide viewing angle, high color gamut, high color depth and fast response time are important.

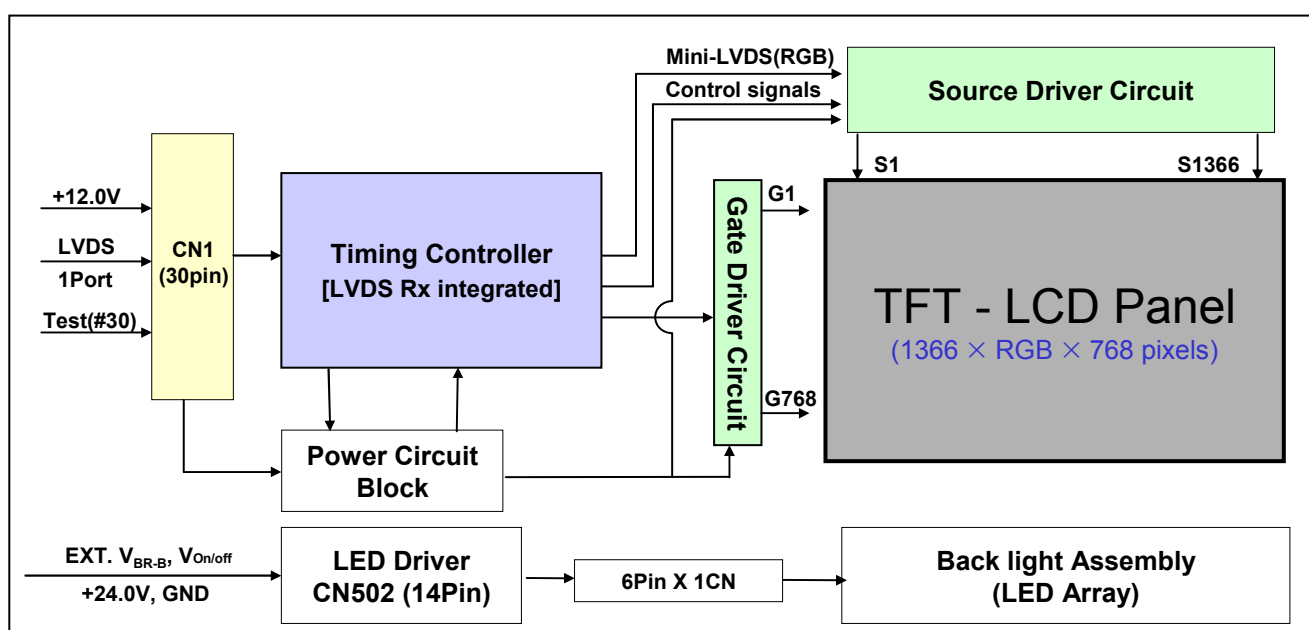


Figure 1. Block diagram

### General Features

Active Screen Size	16.84 inches(427.816mm) diagonal
Outline Dimension	397.9 (H) × 234.6 (V) × 13.5 (D) mm (Typ.)
Pixel Pitch	0.091(H) × 0.273(V) mm x RGB
Pixel Format	1366 horiz. by 768 vert. Pixels, RGB stripe arrangement
Color Depth	8-bit, 16.7 M colors
Luminance, White	350 cd/m <sup>2</sup> (Center 1point ,Typ.)
Viewing Angle (CR>10)	Viewing angle free ( R/L 178 (Min.), U/D 178 (Min.))
Power Consumption	Total 20.1W (Typ.) (Logic=2.5 W, LED Driver=18W)
Weight	1130g (Typ.)
Display Mode	Transmissive mode, Normally black
Surface Treatment	Hard coating(3H), Anti-glare treatment of the front polarizer (Haze 13%)

## Product Specification

### 2. Absolute Maximum Ratings

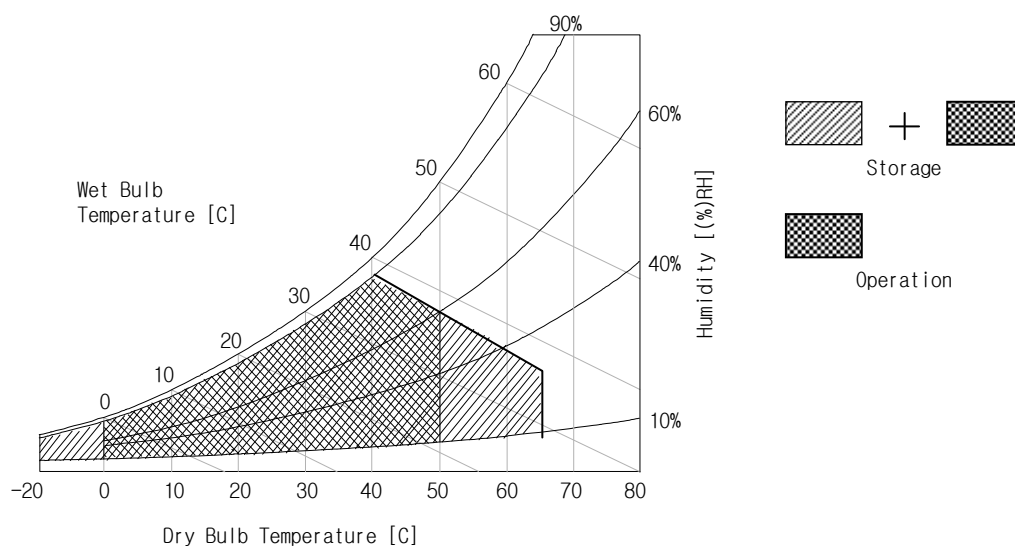
The following items are maximum values which, if exceeded, may cause faulty operation or damage to the LCD module.

**Table 1. ABSOLUTE MAXIMUM RATINGS**

Parameter		Symbol	Value		Unit	Remark
			Min	Max		
Power Input Voltage	LCM	VLCD	-0.3	+14.0	V <sub>DC</sub>	at 25 ± 2 °C
	LED Driver	VBL	-0.3	+27.0	V <sub>DC</sub>	
ON/OFF Control Voltage		VON/OFF	-0.3	+5.5	V <sub>DC</sub>	
Brightness Control Voltage		VBR	0	+5.0	V <sub>DC</sub>	
Operating Temperature		T <sub>OP</sub>	0	+50	°C	Note 1,2
Storage Temperature		T <sub>ST</sub>	-20	+65	°C	
Operating Ambient Humidity		H <sub>OP</sub>	10	90	%RH	
Storage Humidity		H <sub>ST</sub>	10	90	%RH	

**Notes :**

- Temperature and relative humidity range are shown in the figure below.  
Wet bulb temperature should be 39 °C Max, and no condensation.
- Gravity mura can be guaranteed under 40°C condition.
- Abnormal visual problems by panel front side surface temperature can be occurred in specific range (60 °C ~ 65 °C), But materials (exp : polarizer) are not damaged permanently in this range, TSUR.



## Product Specification

### 3. Electrical Specifications

#### 3-1. Electrical Characteristics

It requires two power inputs. One is employed to power for the LCD circuit. The other is used for the LED backlight and LED Driver circuit.

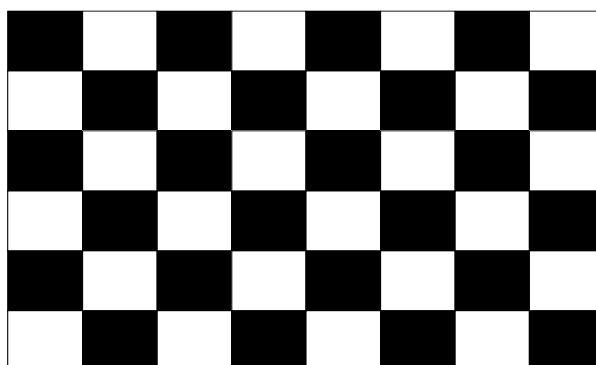
**Table 2. ELECTRICAL CHARACTERISTICS**

Parameter	Symbol	Value			Unit	Note
		Min	Typ	Max		
Circuit :						
Power Input Voltage	V <sub>LCD</sub>	11.4	12.0	12.6	V <sub>DC</sub>	
Power Input Current	I <sub>LCD</sub>	-	210	240	mA	1
		-	250	280	mA	2
Power Consumption	P <sub>LCD</sub>	-	2.5		Watt	1
Rush current	I <sub>RUSH</sub>	-	-	2.4	A	3

Notes:

1. The specified current and power consumption are under the  $V_{LCD}=12.0V$ ,  $25 \pm 2^{\circ}C$ ,  $f_v=60Hz$  condition whereas mosaic pattern(8 x 6) is displayed and  $f_v$  is the frame frequency.
2. The current is specified at maximum current pattern.
3. The duration of rush current is about 2ms and rising time of power input is 0.5ms (min.).

White : 255Gray  
Black : 0Gray



Mosaic Pattern(8 x 6)

<b>Product Specification</b>
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**Table 3. ELECTRICAL CHARACTERISTICS (Continue)**

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Input Voltage	Vin		<b>22.8</b>	24.0	<b>25.2</b>	V	
Input Current	Iin	Vin = 24V, EXTVbr-B = 100%		<b>0.75</b>	0.8	A	Aging 2hrs @ LCM,1
Input Power	Pin	Vin = 24V EXTVbr-B=100%		<b>18</b>	19.2	W	
Back light ON/OFF Control	Von/off	LED ON = High	2.5	-	5.25	V	
		LED OFF = Low	-0.3	-	0.8		
Boost up Voltage	Vout	Vin = 24V, Vbr-B = 100%	42	<b>45</b>	48	Vdc	Aging 2hrs @ LCM,1
PWM Duty	EXT Vbr-B	High Level	<b>2.4</b>	-	5.0	Vdc	
		Low Level	0.0	-	0.8	Vdc	
		Vin = 24V EXTVbr-B = 20%	20%		100%	Duty	Input signal, 5
LED Current	Iout	Vin = 24V EXTVbr-B = 100%	75	80	85	mA	@1ch
Boost Frequency	Freq.	Vin = 24V, EXTVbr-B = 3.3V	<b>390</b>	<b>410</b>	<b>430</b>	KHz	1,2
Burst Mode Frequency	Fb	Vin=24V	-	<b>120</b>	-	Hz	3
			-	<b>100</b>	-		3
Life Time			<b>30,000</b>	50.000		Hrs	4

**Notes :**

- Electrical characteristics are determined after the unit has been 'ON' and stable for approximately 120 minutes at  $25 \pm 2^\circ\text{C}$ . The specified current and power consumption are under the typical supply Input voltage 24V it is total power consumption.  
The ripple voltage of the power supply input voltage is under 0.5 Vp-p. LGD recommend Input Voltage is  $24.0\text{V} \pm 5\%$ .
- Electrical characteristics are determined within 30 minutes at  $25 \pm 2^\circ\text{C}$ .  
The specified currents are under the typical supply Input voltage 24V.
- LGD recommend that the PWM freq. is synchronized with two times (NTSC) or double (PAL) harmonic of Vsync signal of system.
- The life time is determined as the time at which brightness of LED is 50% compare to that of initial value at the typical LED current,  $25 \pm 2^\circ\text{C}$
- The low duty(3%~20%)can be used, but continuous driving is recommended to be used within 10minutes



## Product Specification

### 3-2. Interface Connections

This LCD module employs two kinds of interface connection, a 30-pin connector is used for the module electronics and 14-pin connector is used for the integral backlight system.

#### 3-2-1. LCD Module

- LCD Connector(CN1) : FI-X30SSL-HF (Manufactured by JAE)
- Mating Connector : FI-X30C2L (Manufactured by JAE) or Equivalent

**Table 4. MODULE CONNECTOR(CN1) PIN CONFIGURATION**

Pin No.	Symbol	Description	Note
1	VLCD	Power Supply +12.0V	
2	VLCD	Power Supply +12.0V	
3	VLCD	Power Supply +12.0V	
4	VLCD	Power Supply +12.0V	
5	GND	Ground	
6	GND	Ground	
7	GND	Ground	
8	GND	Ground	
9	LVDS Select	'H' = JEIDA , 'L' or NC = VESA	<b>Appendix VII Disable</b>
10	NC	No Connection	
11	GND	Ground	
12	RA-	LVDS Receiver Signal(-)	
13	RA+	LVDS Receiver Signal(+)	
14	GND	Ground	
15	RB-	LVDS Receiver Signal(-)	
16	RB+	LVDS Receiver Signal(+)	
17	GND	Ground	
18	RC-	LVDS Receiver Signal(-)	
19	RC+	LVDS Receiver Signal(+)	
20	GND	Ground	
21	RCLK-	LVDS Receiver Clock Signal(-)	
22	RCLK+	LVDS Receiver Clock Signal(+)	
23	GND	Ground	
24	RD-	LVDS Receiver Signal(-)	
25	RD+	LVDS Receiver Signal(+)	
26	GND	Ground	
27	Reserved	No Connection	
28	Reserved	No Connection	
29	GND	Ground	
30	GND	Ground	



**Rear view of LCM**

- Notes :
1. All GND(ground) pins should be connected together to the LCD module's metal frame.
  2. All VLCD (power input) pins should be connected together.
  3. All Input levels of LVDS signals are based on the **EIA 644** Standard.
  4. Specific pin No. **#30** is used for "No signal detection" of system signal interface.  
It should be GND for **NSB(No Signal Black)** during the system interface signal is not.  
If this pin is "H", LCD Module displays **AGP(Auto Generation Pattern)**.

## Product Specification

### 3-2-2. LED Driver For Backlight

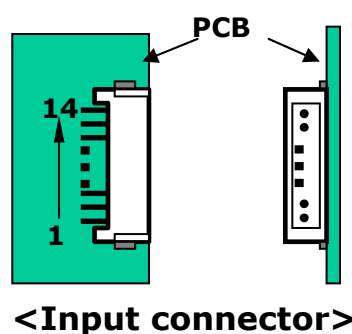
- LED Connector : SM14B-SRSS-TB(Manufactured by JST)
- Mating Connector : SHR-14V-S-B(With protrusions) or SHR-14V-S(Without protrusions) ; (Manufacture by JST)

**Table 5. LED Driver CONNECTOR PIN CONFIGURATION**

Pin No	Symbol	Description	Note
1	VBL	Power Supply +24.0V	
2	VBL	Power Supply +24.0V	
3	VBL	Power Supply +24.0V	
4	VBL	Power Supply +24.0V	
5	VBL	Power Supply +24.0V	
6	GND	Backlight Ground	1
7	GND	Backlight Ground	
8	GND	Backlight Ground	
9	GND	Backlight Ground	
10	GND	Backlight Ground	
11	VBR-A	N.C	
12	VON/OFF	Backlight ON/OFF control	2
13	EXTVBR-B	External PWM	3
14	Status	LED Status	4

**Notes :**

1. GND should be connected to the LCD module's metal frame.
- 2.ON : 2.4 ~ 5.0V / OFF : 0.0 ~ 0.8V . Open or 'H' for B/L On is default status
3. High : LED ON/ Low : LED OFF, Pin#13 can be opened. ( if Pin #13 is open , EXTVBR-B is 100% )
4. Normal : Under 0.7V, Abnormal : External Pull-up
5. Each impedance of 12 and 13 is 88 [KΩ] and 70 [KΩ].



## Product Specification

### 3-3. Signal Timing Specifications

Table 6 shows the signal timing required at the input of the LVDS transmitter. All of the interface signal timings should be satisfied with the following specification for normal operation.

**Table 6. TIMING TABLE for NTSC &PAL**

[ DE (Data Enable) Only ]

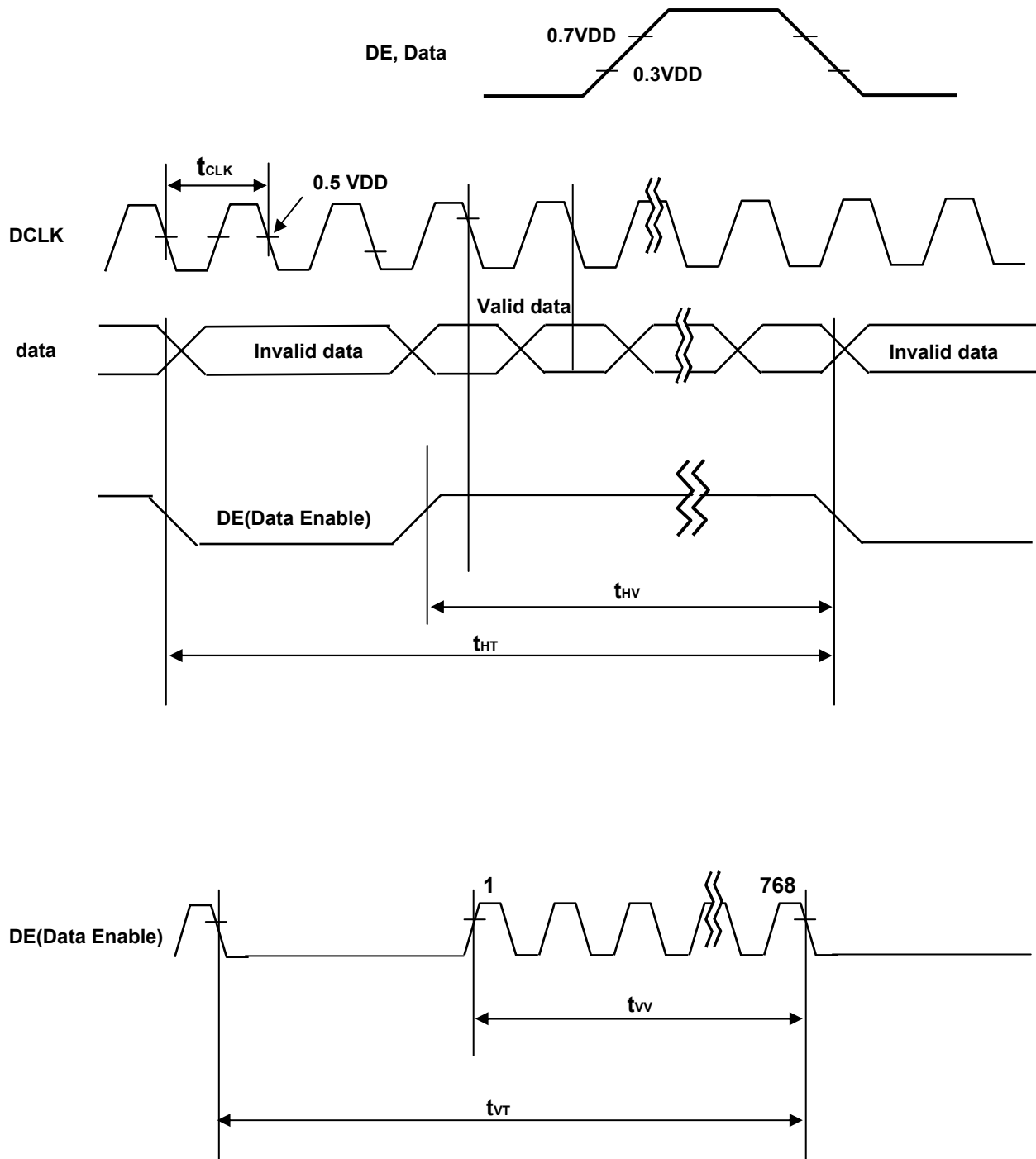
ITEM	Symbol		Min	Typ	Max	Unit	Note
DCLK	Period	tCLK	12.5	13.8	15.8	ns	
	Frequency	-	63	72.4	80	MHz	
Hsync	Period	tHT	1456	1528	1920	tCLK	
	Horizontal Valid	thV	1366	1366	1366	tCLK	
	Horizontal Blank	-	tHP- thV	162	tHP- thV		
	Frequency	fH	45	47.4	50	KHz	
	Width	tWH	-	32	-	tCLK	
	Horizontal Back Porch	tHBP	24	48	-		
	Horizontal Front Porch	tHFP	40	80	-		
Vsync	Period	tVT	776 (894)	790 (948)	1063 (1008)	tHP	Note 1) NTSC : 57~63Hz (PAL : 47~53Hz)
	Vertical Valid	tVV	768	768	768	tHP	
	Vertical Blank	-	tVP- tVV	22	tVP- tVV	tHP	
	Frequency	fV	57 (47)	60 (50)	63 (53)	Hz	
	Width	tWV	-	5 (12)	-	tHP	
	Vertical Back Porch	tVBP	5	15 (128)	-	Hz	
	Vertical Front Porch	tVFP	1	2 (40)	-	tHP	

Note :

1. The input of HSYNC & VSYNC signal does not have an effect on normal operation(DE Only Mode).  
If you use spread spectrum of EMI, add some additional clock to minimum value for clock margin.
2. The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rate and the horizontal frequency
3. Timing should be set based on clock frequency.

## Product Specification

## 3-4. Signal Timing Waveforms



## Product Specification

### 3-5. Color Data Reference

The brightness of each primary color(red,green,blue) is based on the 8-bit gray scale data input for the color. The higher binary input, the brighter the color. Table 7 provides a reference for color versus data input.

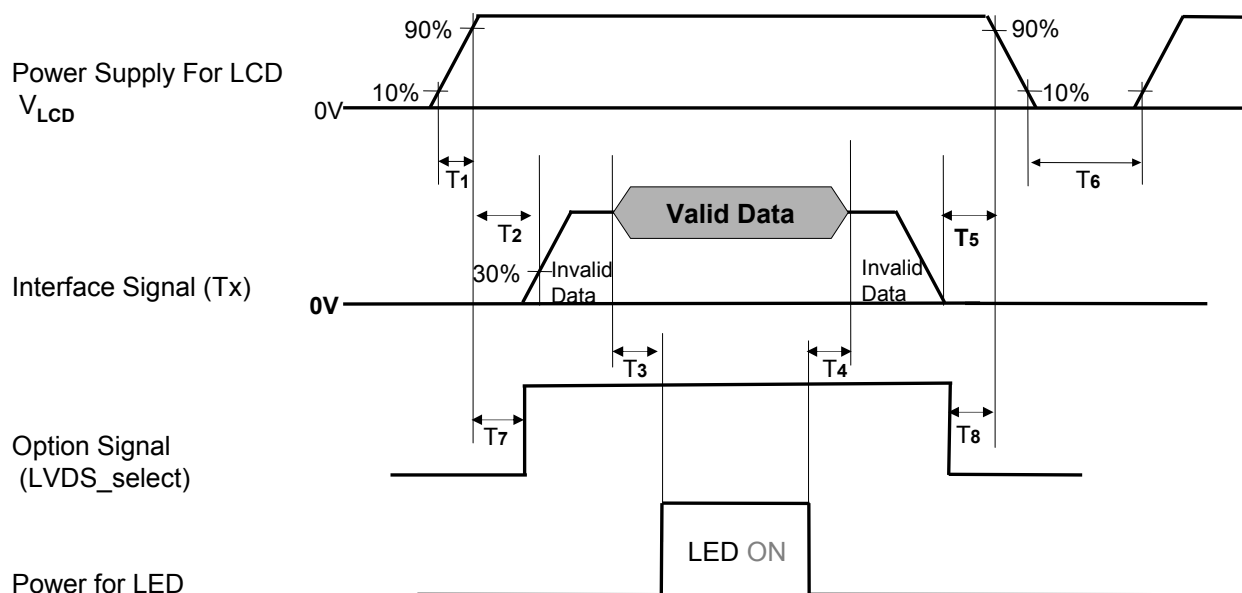
**Table 7. COLOR DATA REFERENCE**

Color		Input Color Data																							
		RED								GREEN								BLUE							
		MSB				LSB				MSB				LSB				MSB				LSB			
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	1	1	1	1	1	1
RED	RED (000)    Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (001)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	...	...								...								...							
	RED (254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN (000)    Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN (001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	...	...								...								...							
	GREEN (254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	GREEN (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
BLUE	BLUE (000)    Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE (001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	...	...								...								...							
	BLUE (254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	BLUE (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

## Product Specification

### 3-6. Power Sequence

#### 3-6-1. LCD Driving circuit



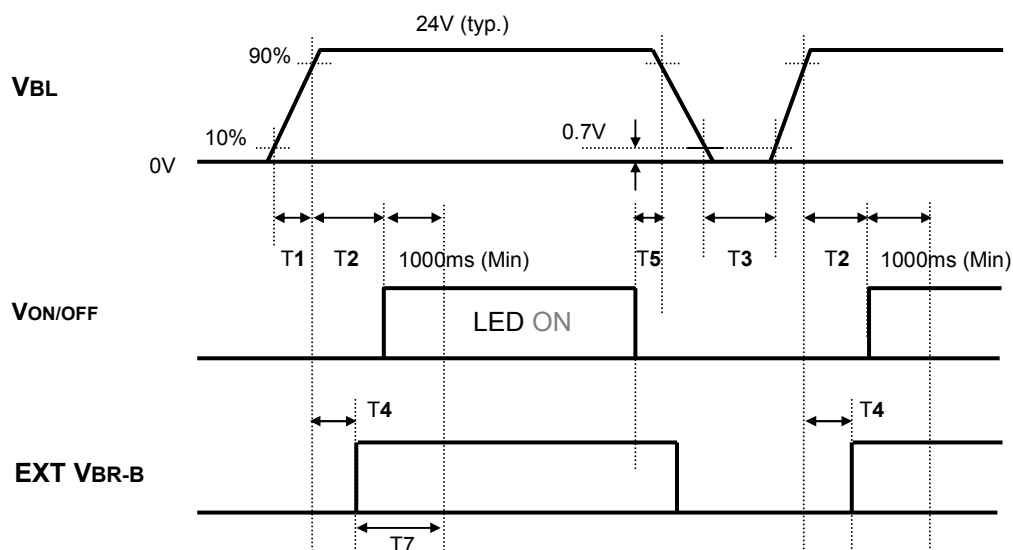
**Table 8. POWER SEQUENCE**

Parameter	Value			Unit	Notes
	Min	Typ	Max		
T1	0.5	-	20	ms	
T2	0.5	-	-	ms	4, 5
T3	200	-	-	ms	3
T4	200	-	-	ms	3
T5	0	-	-	ms	
T6	2.0	-	-	s	6
T7	0.5	-	T2	ms	4
T8	0	-	-	ms	4

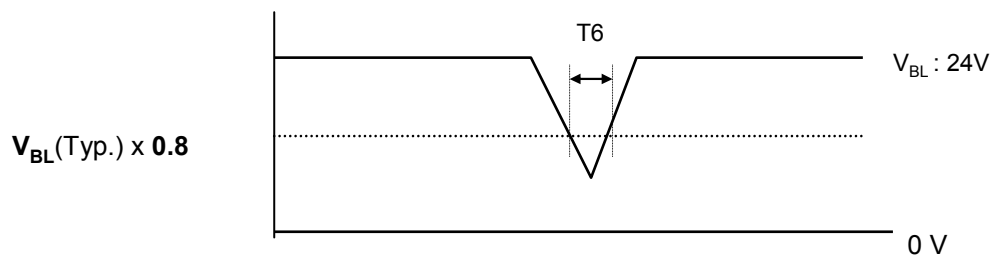
- Note :
1. Please avoid floating state of interface signal at invalid period.
  2. When the interface signal is invalid, be sure to pull down the power supply  $V_{LCD}$  to 0V.
  3. The T3/T4 is recommended value, the case when failed to meet a minimum specification, abnormal display would be shown. There is no reliability problem.
  4. If the on time of signals (Interface signal and Option signals) precedes the on time of Power ( $V_{LCD}$ ), it will be happened abnormal display.
  5. T6 should be measured after the Module has been fully discharged between power off and on period.

## Product Specification

### 3-6-2. Sequence for LED Driver



### 3-6-3. Deep condition for LED Driver



**Table 9. Power Sequence for LED Driver**

Parameter	Values			Units	Remarks
	Min	Typ	Max		
T1	20	-	-	ms	1
T2	500	-	-	ms	
T3	200	-	-	ms	
T4	0	-	-	ms	2
T5	10	-	-	ms	
T6	-	-	10	ms	$V_{BL}(Typ) \times 0.8$
T7	1000	-	-	ms	3

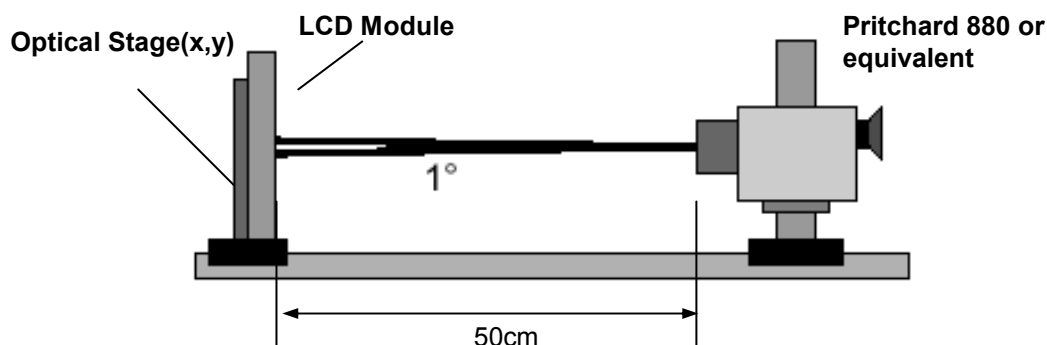
- Notes :
1. T1 describes rising time of 0V to 24V and this parameter does not applied at restarting time.
  2. T4(max) is less than T2.
  3. In T7 section,  $EXTV_{BR-B}$  is recommended 100%.

## Product Specification

### 4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable in a dark environment at  $25 \pm 2^\circ\text{C}$ . The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of  $\Phi$  and  $\theta$  equal to  $0^\circ$ .

FIG. 1 shows additional information concerning the measurement equipment and method.



**FIG. 1 Optical Characteristic Measurement Equipment and Method**

**Table 10. OPTICAL CHARACTERISTICS**

$T_a = 25 \pm 2^\circ\text{C}$ ,  $V_{\text{LCD}} = 12.0\text{V}$ ,  $f_v = 60\text{Hz}$ ,  $D_{\text{clk}} = 72.3\text{MHz}$  EXT.  $V_{\text{BR\_B}} = 100\%$

Parameter		Symbol		Value			Unit	Note
				Min	Typ	Max		
Contrast Ratio		CR		700	900	-		1
Surface Luminance, white		L <sub>WH</sub>		280	350	-	cd/m²	2
Luminance Variation		δ <sub>WHITE</sub>	5P	-	-	1.3		3
Response Time	Rise Time	Tr <sub>R</sub>		-	8	12	ms	4,5
	Decay Time	Tr <sub>D</sub>		-	10	15		
Color Coordinates [CIE1931]	RED	R <sub>x</sub>	Typ -0.03	0.640	Typ +0.03			
		R <sub>y</sub>		0.336				
	GREEN	G <sub>x</sub>		0.282				
		G <sub>y</sub>		0.638				
	BLUE	B <sub>x</sub>		0.148				
		B <sub>y</sub>		0.064				
	WHITE	W <sub>x</sub>		0.279				
		W <sub>y</sub>		0.292				
Viewing Angle (CR>10)								
	x axis, right(φ=0°)	θ <sub>r</sub>	89	-	-	degree	6	
	x axis, left (φ=180°)	θ <sub>l</sub>	89	-	-			
	y axis, up (φ=90°)	θ <sub>u</sub>	89	-	-			
	y axis, down (φ=270°)	θ <sub>d</sub>	89	-	-			
Gray Scale				-	-	-		7



## Product Specification

### Notes :

1. Contrast Ratio(CR) is defined mathematically as :

$$CRn = \frac{\text{Surface Luminance at all white pixels}}{\text{Surface Luminance at all black pixels}}$$

It is measured at center 1-point.

2. Surface luminance are determined after the unit has been 'ON' and 1 Hour after lighting the backlight in a dark environment at  $25 \pm 2^\circ\text{C}$ . Surface luminance is the luminance value at center 1-point across the LCD surface 50cm from the surface with all pixels displaying white.  
For more information see the FIG. 2.
3. The variation in surface luminance,  $\delta$  WHITE and  $\delta$  BLACK are defined as :  
-  $\delta$  WHITE(5P) = Maximum( $L_{on1}, L_{on2}, L_{on3}, L_{on4}, L_{on5}$ ) / Minimum( $L_{on1}, L_{on2}, L_{on3}, L_{on4}, L_{on5}$ )  
Where Lon1 to Lon5 are the luminance with all pixels displaying white at 5 locations .  
For more information, see the FIG. 2.
4. Response time is the time required for the display to transition from black to white (Rise Time,  $Tr_R$ ) and from white to black (Decay Time,  $Tr_D$ ).  
For additional information, see FIG 3.
5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD module surface. For more information, see the FIG. 4.
6. Gray scale specification  
Gamma Value is approximately 2.2. For more information, see the Table 11.
7. Image sticking  
When it changes into pattern-B after a 1-hour drive by pattern-A, it disappears within 10 minutes.  
For more information, see the FIG. 5.

**Table 11. GRAY SCALE SPECIFICATION**

Gray Level	Luminance [%]		
	Minimum	Typical	Maximum
L0		0.111	
L15		0.27	
L31		1.00	
L47		2.40	
L63		4.60	
L79		7.60	
L95		11.4	
L111		16.0	
L127		21.6	
L143		28.0	
L159		35.4	
L175		43.7	
L191		53.0	
L207		63.2	
L223		74.5	
L239		88.0	
L255		100	

## Product Specification

Measuring point for surface luminance & measuring point for luminance variation.

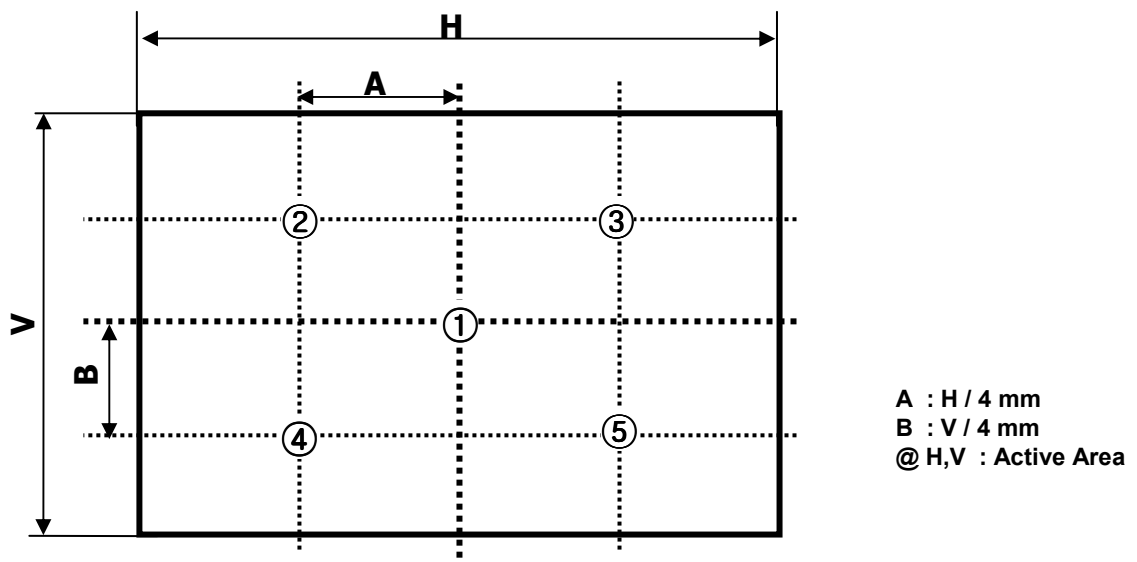


FIG. 2 5 Points for Luminance Measure

Response time is defined as the following figure and shall be measured by switching the input signal for "Gray(N)" and "Gray(M)".

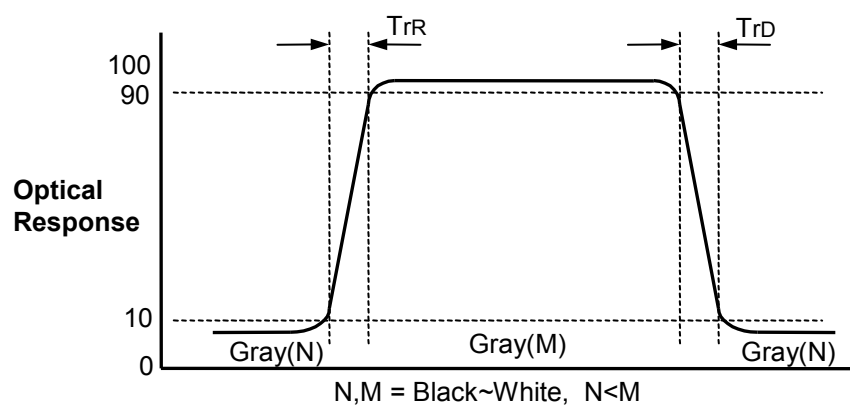
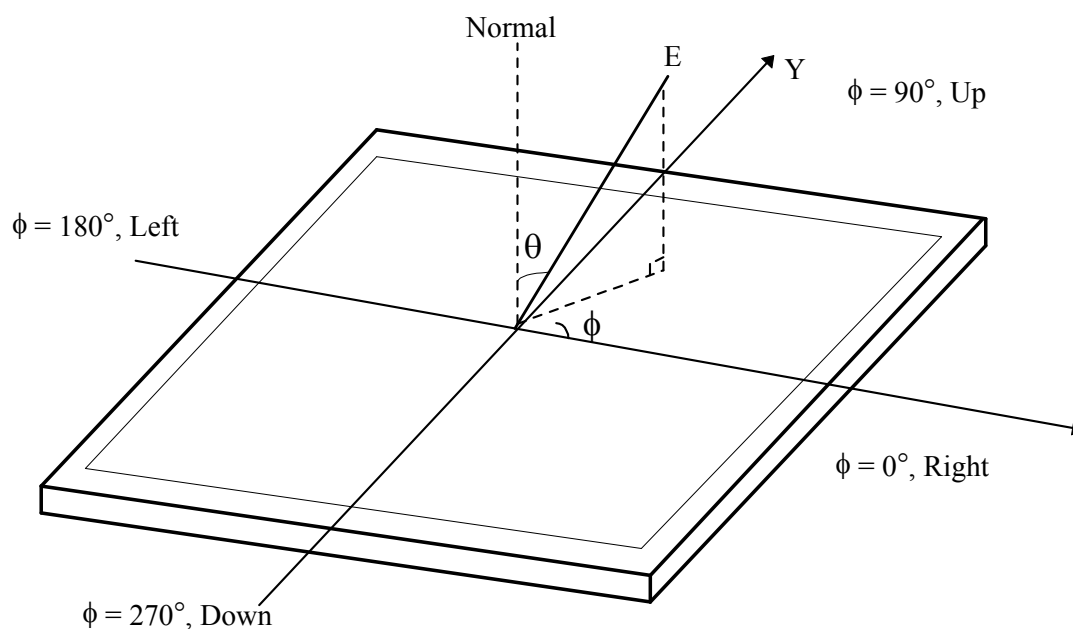


FIG. 3 Response Time

## Product Specification

Dimension of viewing angle range

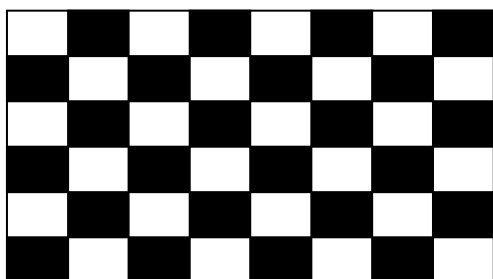


**FIG. 4 Viewing Angle**

Image sticking

When it changes into pattern-B after a 1-hour drive by pattern-A, it disappears within 10 minutes.

<Pattern-A, Chess board (8x6)>



<Pattern-B, Mid-gray(127 gray)>



**FIG. 5 Image sticking Test pattern**

## Product Specification

### 5. Mechanical Characteristics

Table 12 provides general mechanical characteristics.

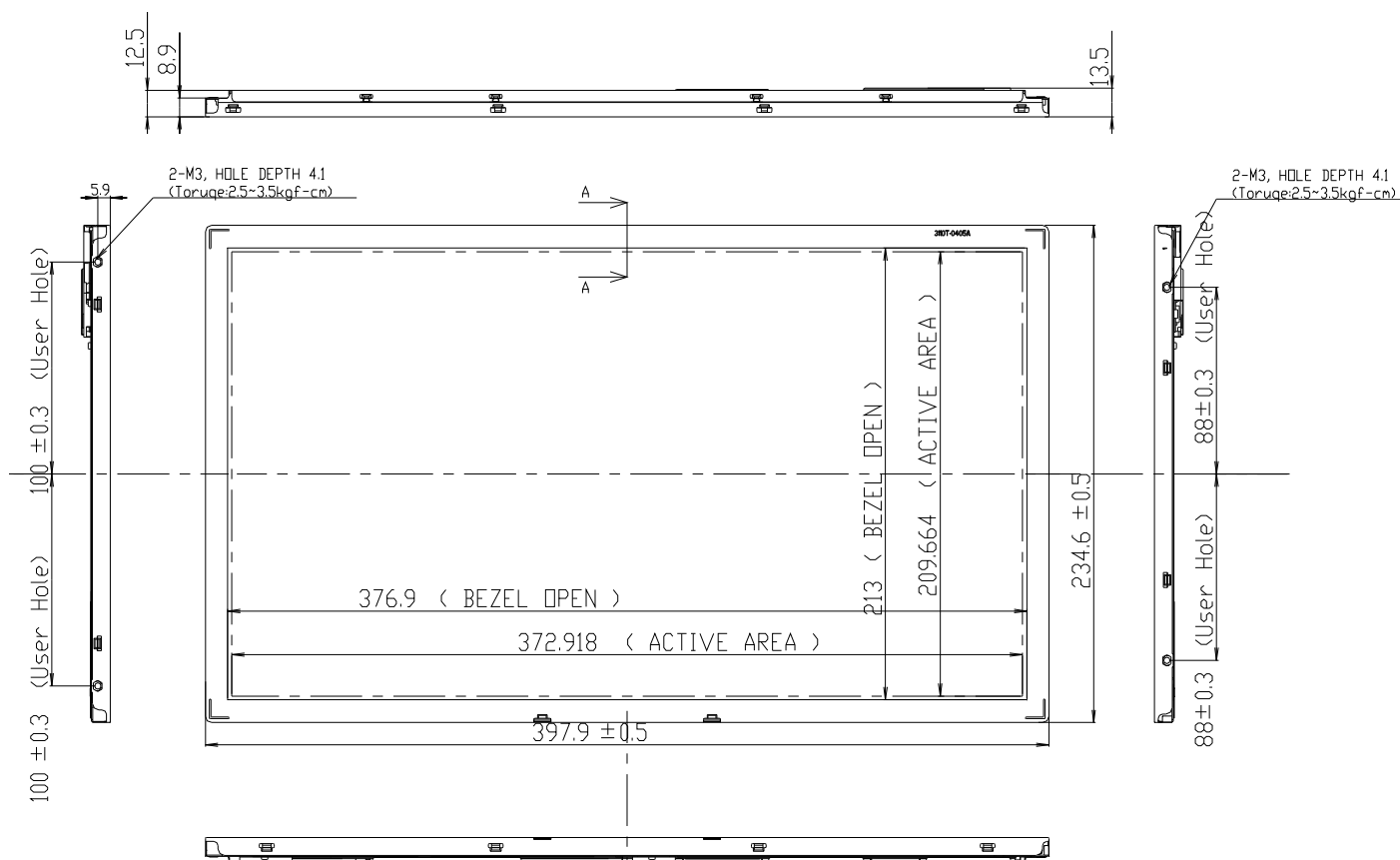
**Table 12. MECHANICAL CHARACTERISTICS**

Item	Value	
Outline Dimension	Horizontal	397.9 mm
	Vertical	234.6 mm
	Depth	13.5 mm
Bezel Area	Horizontal	376.9 mm
	Vertical	213.0 mm
Active Display Area	Horizontal	372.918 mm
	Vertical	209.664 mm
Weight	1130g (Typ.) , 1180g (Max.)	

Note : Please refer to a mechanic drawing in terms of tolerance at the next page.

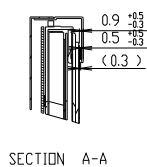
## Product Specification

## &lt;FRONT VIEW&gt;

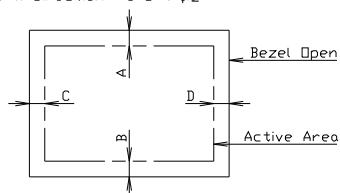


## NOTES

1. Unspecified tolerances to be  $\pm 0.5$
2. Backlight wires and contraction tubes are excluded from outline dimensions.
3. Tilt and partial disposition tolerance of display area as following.
  - (1) Y-Direction :  $A-B < 1.0$
  - (2) X-Direction :  $C-D < 1.0$



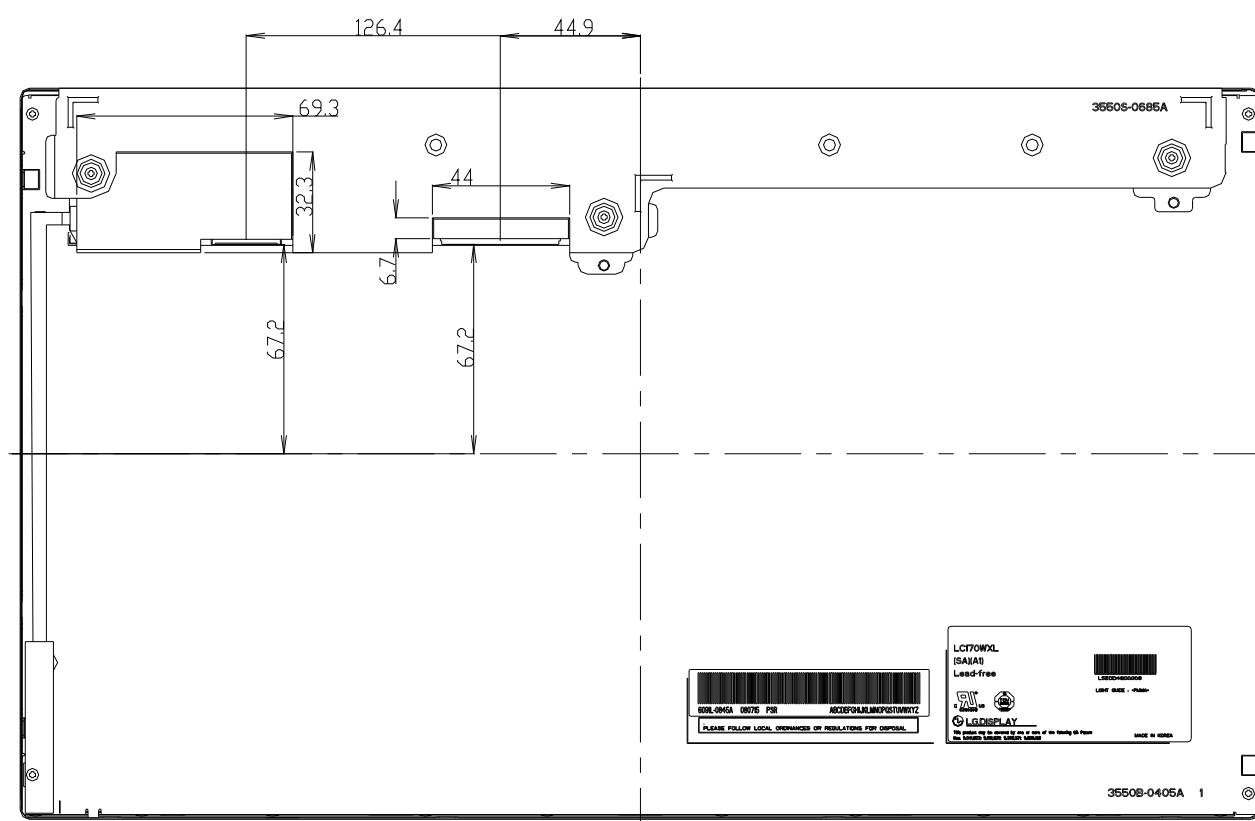
SECTION A-A



4. Do not wind conductive tape around the backlight wires.

## Product Specification

&lt;REAR VIEW&gt;



## Product Specification

### 6. Reliability

**Table 13. ENVIRONMENT TEST CONDITION**

No.	Test Item	Condition
1	High temperature storage test	Ta= 60°C, 500h
2	Low temperature storage test	Ta= -20°C, 500h
3	High temperature operation test	Ta= 50°C, 80%RH, 500h Ta= 60°C, 500h(2000h)
4	Low temperature operation test	Ta= 0°C, 500h(1000h)
5	Heat cycle test	Ta= -20 °C ~ 60 °C, 30min/5min/30min, 100cycles
6	Soldering heat cycle test	Ta= -40 °C ~ 80 °C, 30min/5min/30min, 200cycles
7	Vibration test (non-operating)	Wave form : random Vibration level : 1.0Grms Bandwidth : 10-300Hz Duration : X,Y,Z, 10 min One time each direction
8	Shock test (non-operating)	Shock level : 100Grms Waveform : half sine wave, 2ms Direction : ± X, ± Y, ± Z One time each direction
9	ESD test	Condition : 150pF, 330 ohm Case , air Evaluation : ± 15kV
10	Humidity storage test	Ta= 40 °C, 70%RH, 240h

Note : Before and after Reliability test, LCM should be operated with normal function.

**Product Specification****7. International Standards****7-1. Safety**

- a) UL 60065, 7<sup>th</sup> Edition, dated June 30, 2003, Underwriters Laboratories, Inc.,  
Standard for Audio, Video and Similar Electronic Apparatus.
- b) CAN/CSA C22.2, No. 60065:03, Canadian Standards Association,  
Standard for Audio, Video and Similar Electronic Apparatus.
- c) IEC60065:2001, 7<sup>th</sup> Edition CB-scheme and EN 60065:2002,  
Safety requirements for Audio, Video and Similar Electronic Apparatus..

**7-2. EMC**

- a) ANSI C63.4 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electrical Equipment in the Range of 9kHz to 40GHz. "American National Standards Institute(ANSI), 1992
- b) CISPR13 "Limits and Methods of Measurement of Radio interference characteristics of Sound and Television broadcast receivers and associated equipment"  
CISPR22 "Limits and Methods of Measurement of Radio interference characteristics of Information Technology Equipment" International Special Committee on Radio Interference.
- c) EN55013 "Limits and Methods of Measurement of Radio interference characteristics of Sound and Television broadcast receivers and associated equipment"  
EN55022 "Limits and Methods of Measurement of Radio interference characteristics of Information Technology Equipment" European Committee for Electro Technical Standardization.(CENELEC), 1988(Including A1:2000)



## Product Specification

### 8. Packing

#### 8-1. Designation of Lot Mark

a) Lot Mark

A	B	C	D	E	F	G	H	I	J	K	L	M
---	---	---	---	---	---	---	---	---	---	---	---	---

A,B,C : SIZE(INCH)

D : YEAR

F : PANEL CODE

H : ASSEMBLY CODE

E : MONTH

G : FACTORY CODE

I,J,K,L,M : SERIAL NO.

Note

##### 1. YEAR

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Mark	1	2	3	4	5	6	7	8	9	0

##### 2. MONTH

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mark	1	2	4	4	5	6	7	8	9	A	B	C

b) Location of Lot Mark

Serial NO. is printed on the label. The label is attached to the backside of the LCD module.  
This is subject to change without prior notice.

#### 8-2. Packing Form

a) Package quantity in one Box : 12 pcs

b) box Size : 375 mm X 320 mm X 484 mm.

## Product Specification

### 9. Precautions

Please pay attention to the followings when you use this TFT LCD module.

#### 9-1. Mounting Precautions

- (1) You must mount a module using holes arranged in four corners or four sides.
- (2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- (3) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to resist external force.
- (4) You should adopt radiation structure to satisfy the temperature specification.
- (5) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
- (6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth. (Some cosmetics are detrimental to the polarizer.)
- (7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaked with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
- (8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
- (9) Do not open the case because inside circuits do not have sufficient strength.

#### 9-2. Operating Precautions

- (1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage :  
 $V = \pm 200\text{mV}$  (Over and under shoot voltage)
- (2) Response time depends on the temperature. (In lower temperature, it becomes longer.)
- (3) Brightness depends on the temperature. (In lower temperature, it becomes lower.)  
 And in lower temperature, response time (required time that brightness is stable after turned on) becomes longer
- (4) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
- (5) When fixed patterns are displayed for a long time, remnant image is likely to occur.
- (6) 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.
- (7) Please do not give any mechanical and/or acoustical impact to LCM. Otherwise, LCM can't be operated its full characteristics perfectly.
- (8) A screw which is fastened up the steels should be a machine screw.  
 (if not, it can cause conductive particles and deal LCM a fatal blow)
- (9) Please do not set LCD on its edge.

**Product Specification****9-3. Electrostatic Discharge Control**

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

**9-4. Precautions for Strong Light Exposure**

Strong light exposure causes degradation of polarizer and color filter.

**9-5. Storage**

When storing modules as spares for a long time, the following precautions are necessary.

- (1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
- (2) The polarizer surface should not come in contact with any other object.  
It is recommended that they be stored in the container in which they were shipped.

**9-6. Handling Precautions for Protection Film**

- (1) The protection film is attached to the bezel with a small masking tape.  
When the protection film is peeled off, static electricity is generated between the film and polarizer.  
This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
- (2) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the bezel after the protection film is peeled off.
- (3) You can remove the glue easily. When the glue remains on the bezel surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

■ Required signal assignment for Flat Link (DS90C385) Transmitter(Pin9="L")

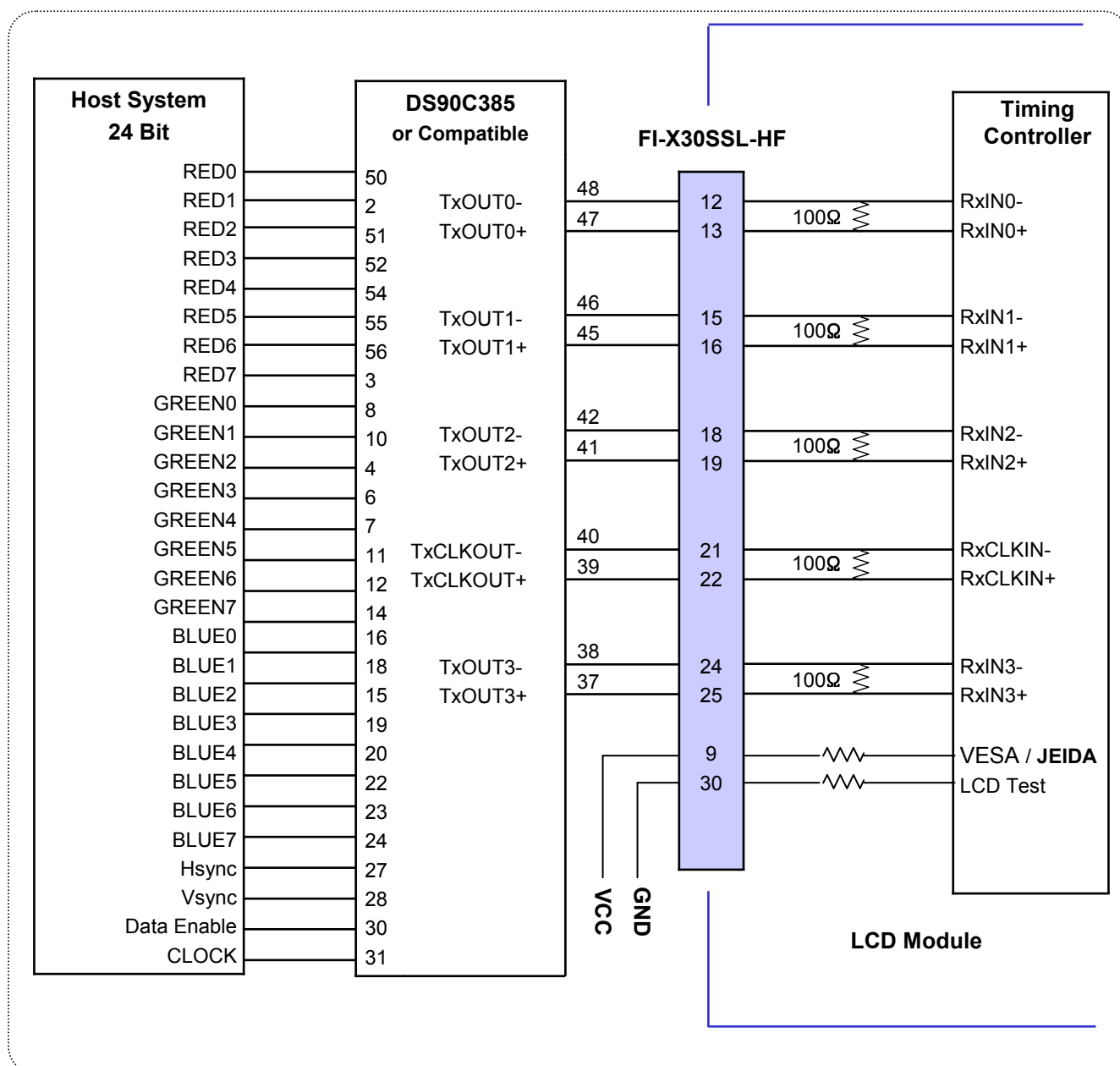


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## Product Specification

## # APPENDIX- I-2

## ■ Required signal assignment for Flat Link Transmitter (Pin9="H")



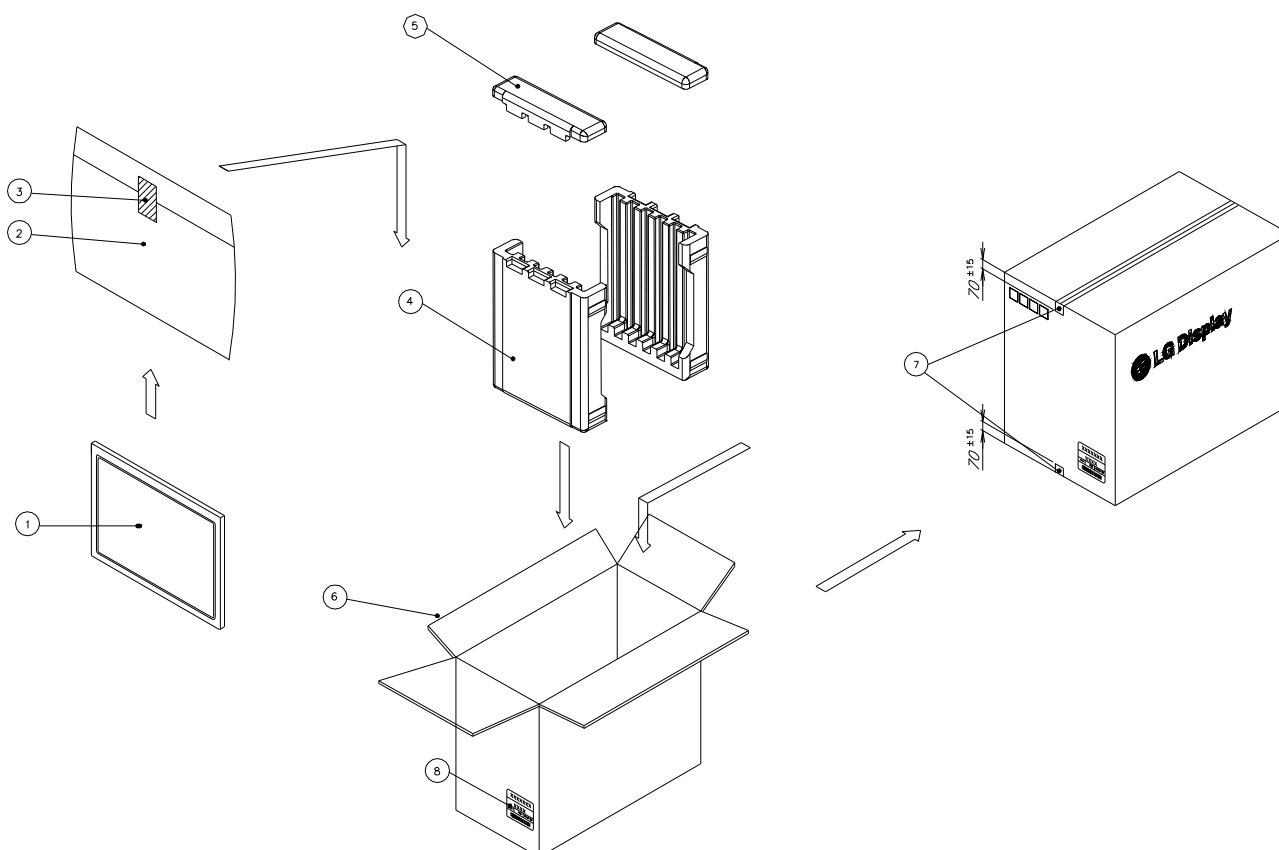
## Notes:

1. The LCD module uses a 100 Ohm( $\Omega$ ) resistor between positive and negative lines of each receiver input.
2. Refer to LVDS transmitter data sheet for detail descriptions. (DS90C385 or Compatible)
3. '7' means MSB and '0' means LSB at R,G,B pixel data.

## Product Specification

### # APPENDIX- II-1

#### ■ Packing Ass'y

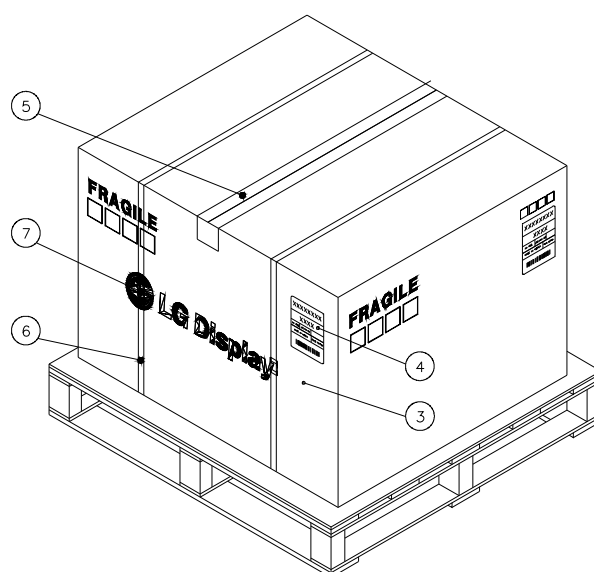
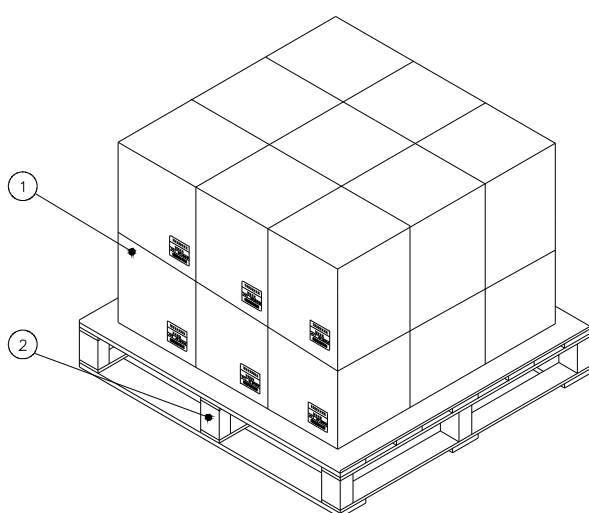


NO.	DESCRIPTION	MATERIAL
1	LCD MODULE	
2	BAG	PE
3	TAPE	MASKING 20MM X 50M
4	PACKING, BOTTOM	EPS
5	PACKING, TOP	EPS
6	BOX	PAPER_SW3
7	TAPE	OPP 70MMX300M
8	LABEL	YUPO PAPER 100X100

## Product Specification

## # APPENDIX- II-2

## ■ Pallet Ass'y

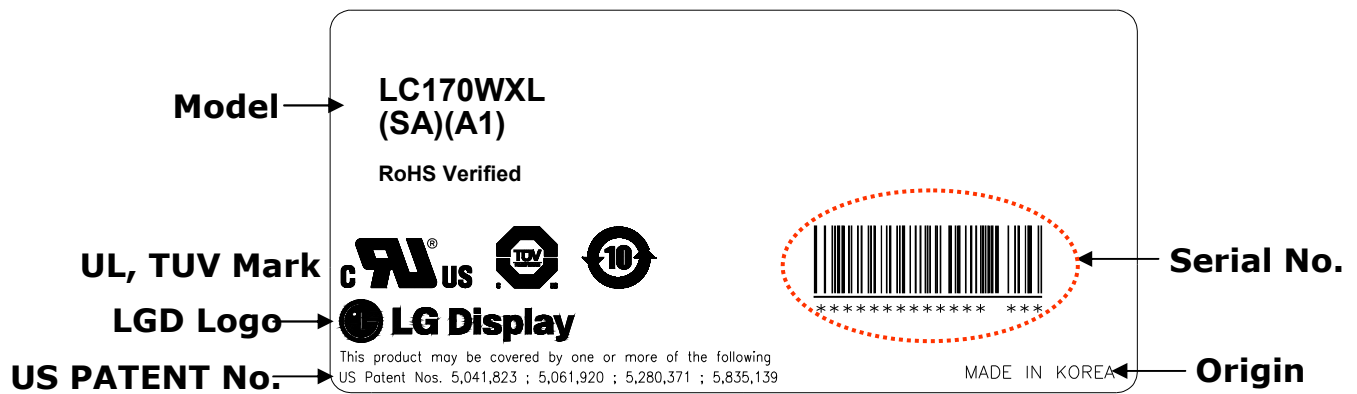


NO.	DESCRIPTION	MATERIAL
1	PACKING ASS'Y	
2	PALLET	Plywood_1140X990X117.5
3	ANGLE, PACKING	SWR4
4	LABEL	YUPO PAPER
5	TAPE	OPP
6	BAND	PP
7	BAND, CLIP	CLIP 18MM

## Product Specification

## # APPENDIX- III

## ■ LCM Label






Product Specification

# APPENDIX- IV

■ Box Label

LC170WXL		
SAA1		
12 PCS	001/01-01	
MADE IN KOREA		RoHS Verified
		

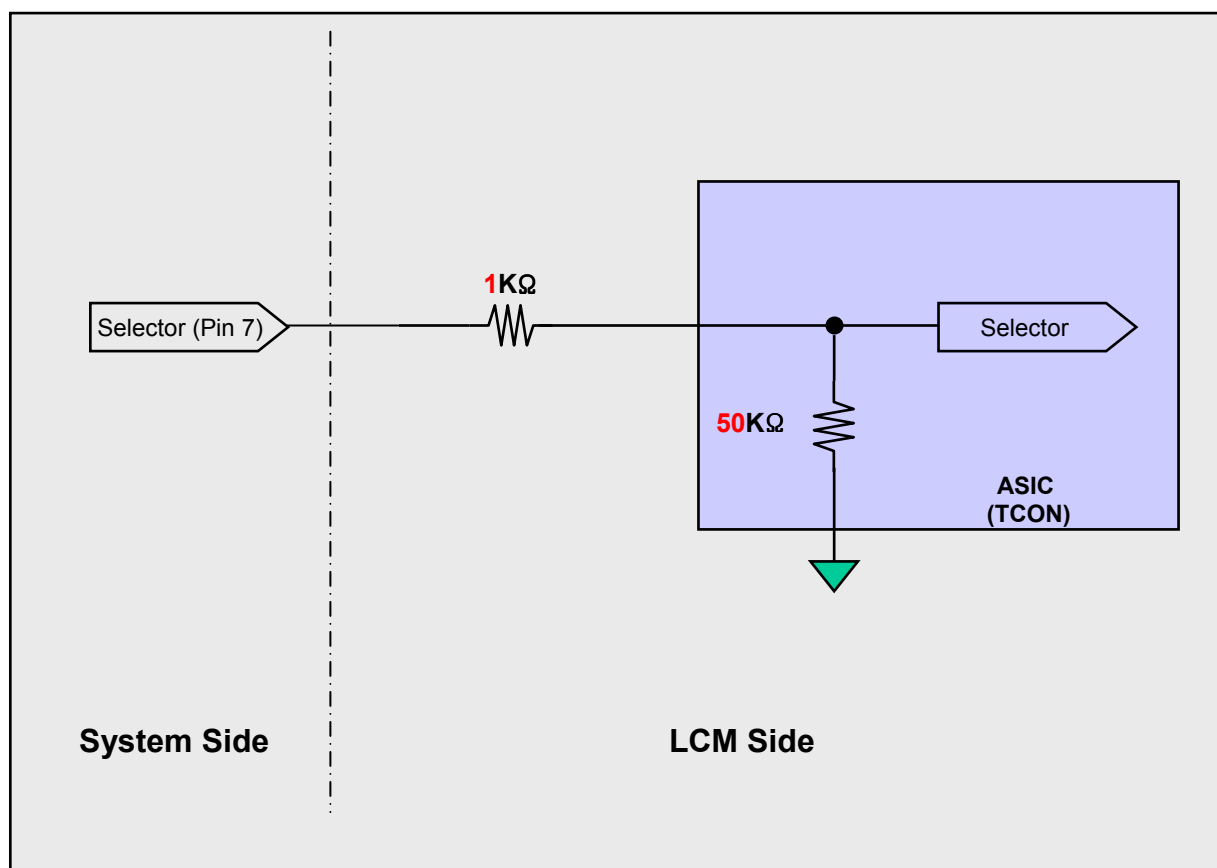
■ Pallet Label

LC170WXL		
SAA1		
216 PCS	LOT/MM-DD	
MADE IN KOREA		RoHS Verified
		
*****		

## # APPENDIX- V

## Option Pin Circuit Block Diagram

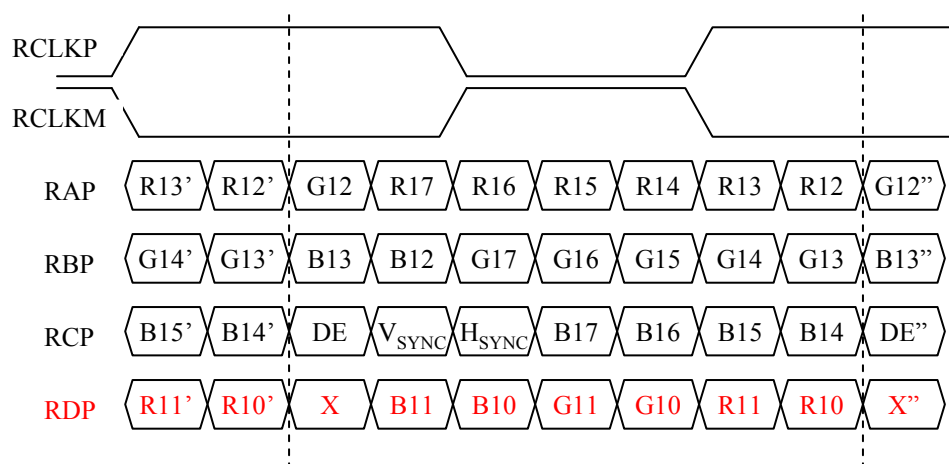
Circuit Block Diagram of LVDS Format Selection pin



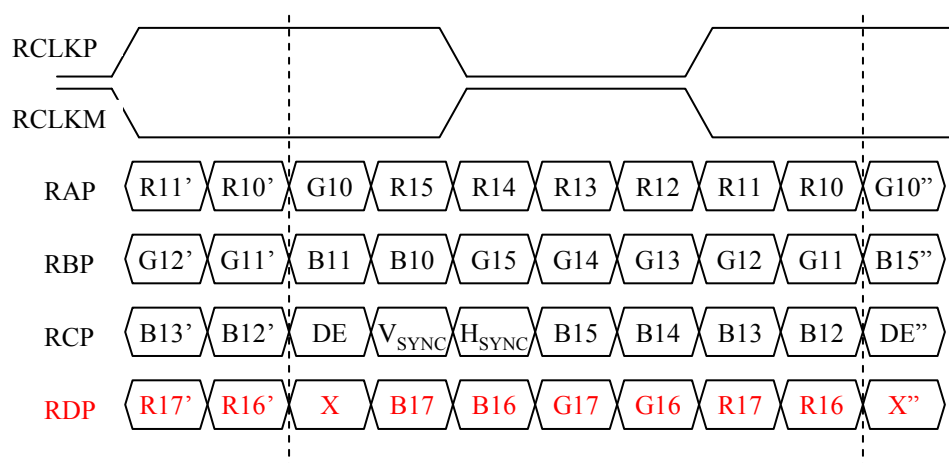
## # APPENDIX- VI

## LVDS Data-Mapping info. (8bit)

## ■ LVDS Select : “H” Data-Mapping (JEIDA format)



## ■ LVDS Select : “L” Data-Mapping (VESA format)

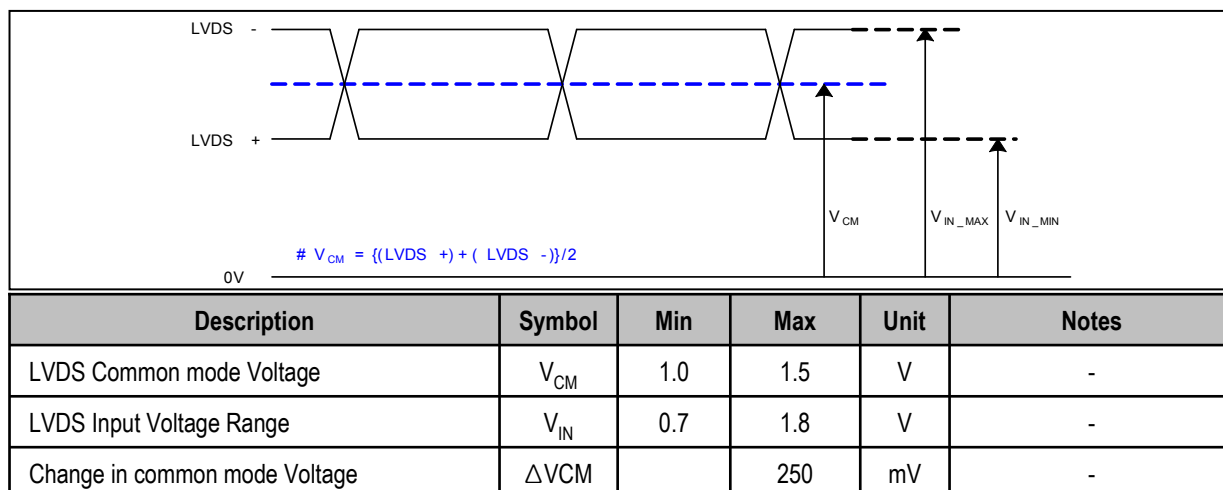


## Product Specification

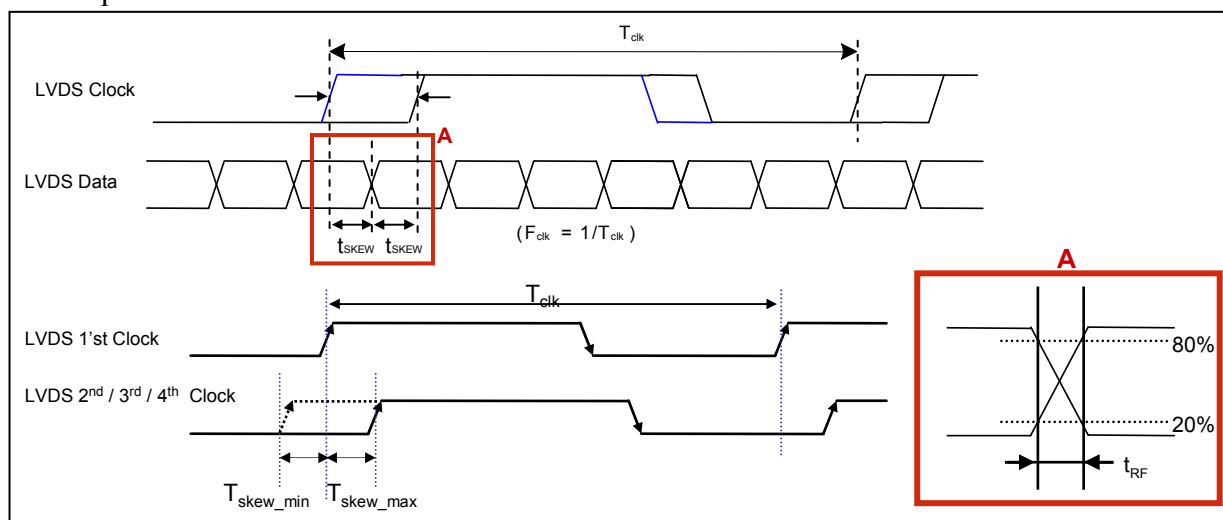
## # APPENDIX- VII-1

## LVDS Input characteristics

## 1. DC Specification



## 2. AC Specification



Description		Symbol	Min	Max	Unit	Notes
LVDS Differential Voltage	High Threshold	V <sub>TH</sub>	100	300	mV	3
	Low Threshold	V <sub>TL</sub>	100	300	mV	-
LVDS Clock to Data Skew Margin		t <sub>SKEW</sub>		(0.25*T <sub>clk</sub> ) / 7	ps	-
LVDS Clock/DATA Rising/Falling time		t <sub>RF</sub>	260	(0.3*T <sub>clk</sub> ) / 7	ps	2
Effective time of LVDS		t <sub>eff</sub>	±360		ps	-
LVDS Clock to Clock Skew Margin (Even to Odd)		t <sub>SKEW EO</sub>		1/7* T <sub>clk</sub>	T <sub>clk</sub>	-

Notes : 1. All Input levels of LVDS signals are based on the EIA 644 Standard.

2. If  $t_{RF}$  isn't enough,  $t_{eff}$  should meet the range.

## # APPENDIX- VII-2

## LVDS Input characteristics

