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SPECIFICATION
FOR
APPROVAL

( ) **Preliminary Specification**

(●) **Final Specification**

Title	42.0” WUXGA TFT LCD

BUYER	General
MODEL	

SUPPLIER	LG.Philips LCD Co., Ltd.
*MODEL	LC420WU5
SUFFIX	SLA1 (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
J.H. Yoon /Senior Manager	
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D.K. Yang / Engineer	

TV Product Development Dept.
LG. Philips LCD Co., Ltd

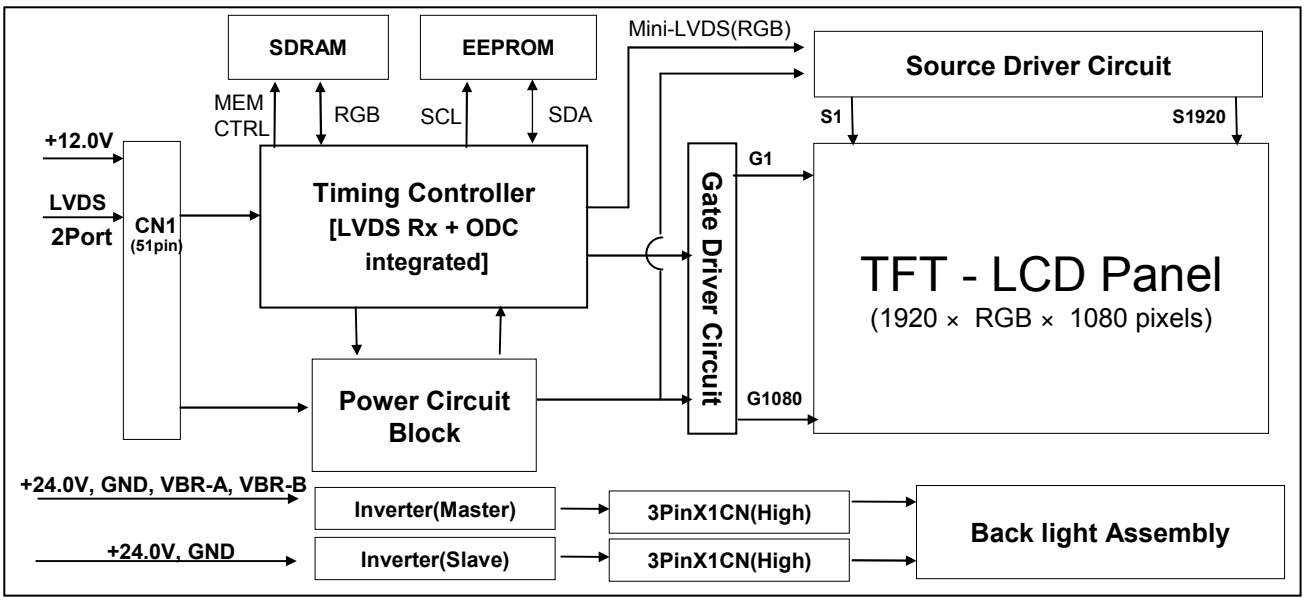
CONTENTS

RECORD OF REVISIONS

Revision No.	Revision Date	Page	Description
1.0	July, 23, 2007	-	Final Specification

1. General Description

The LC420WU5 is a Color Active Matrix Liquid Crystal Display with an integral External Electrode Fluorescent Lamp(EEFL) 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 42.02 inch diagonally measured active display area with WUXGA resolution (1080 vertical by 1920 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 2-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.



General Features

Active Screen Size	42.02 inches(1067.31mm) diagonal
Outline Dimension	983.0(H) x 576.0 (V) x 51.0 mm(D) (Typ.)
Pixel Pitch	0.4845 mm x 0.4845 mm
Pixel Format	1920 horiz. by 1080 vert. Pixels, RGB stripe arrangement
Color Depth	8-bit, 16.7 M colors
Luminance, White	500 cd/m^2 (Center 1point ,Typ.)
Viewing Angle (CR>10)	Viewing angle free (R/L 178 (Typ.), U/D 178 (Typ.))
Power Consumption	Total 169.6 W (Typ.) (Logic = 8.8 W, Inverter = 160.8 W [VBR-A=1.65V])
Weight	11.5 Kg (Typ.)
Display Mode	Transmissive mode, Normally black
Surface Treatment	Hard coating(3H), Anti-glare treatment of the front polarizer (Haze 13%)

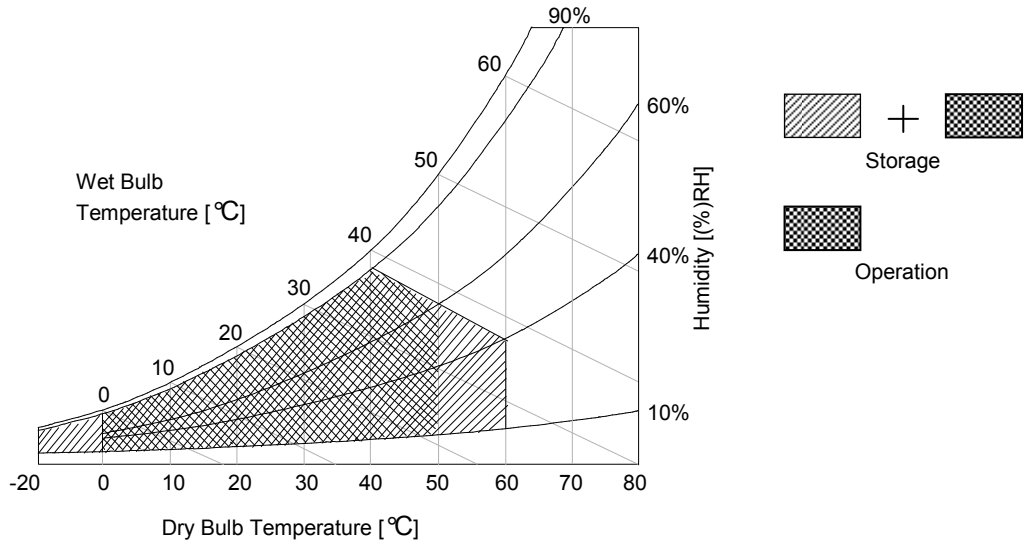
2. Absolute Maximum Ratings

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	V_{LCD}	+8.0	+14.0	V_{DC}	at 25 ± 2 ℃
	Backlight inverter	V_{BL}	+21.6	+28.0	V_{DC}	
ON/OFF Control Voltage		VON/OFF	-0.3	+5.5	V_{DC}	
Brightness Control Voltage		V_{BR}	0	+5.0	V_{DC}	
Operating Temperature		T_{OP}	0	+50	℃	Note 1,2
Storage Temperature		T_{ST}	-20	+60	℃	
Operating Ambient Humidity		H_{OP}	10	90	%RH	
Storage Humidity		H_{ST}	10	90	%RH	

Notes : 1. Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39 ℃ Max. and no condensation of water.
2. Gravity mura can be guaranteed under 40℃condition.



3. Electrical Specifications

3-1. Electrical Characteristics

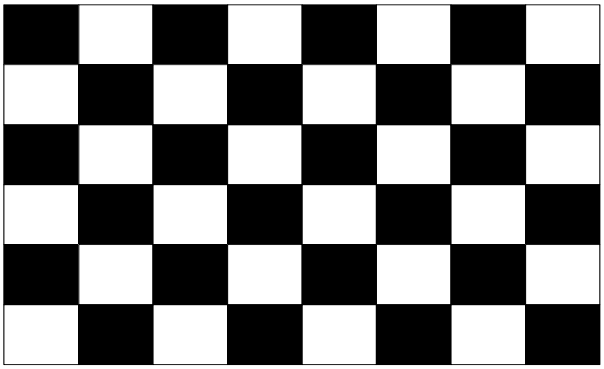
It requires two power inputs. One is employed to power for the LCD circuit. The other Is used for the EEFL backlight and inverter circuit.

Table 2. ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Value			Unit	Note
		Min	Typ	Max		
Circuit :						
Power Input Voltage	V_{LCD}	11.4	12.0	12.6	V_{DC}	
Power Input Current	I_{LCD}	-	734	954	mA	1
		-	866	1125	mA	2
Power Consumption	P_{LCD}	-	8.8	11.5	Watt	1
Rush current	I_{RUSH}	-	-	3	A	3

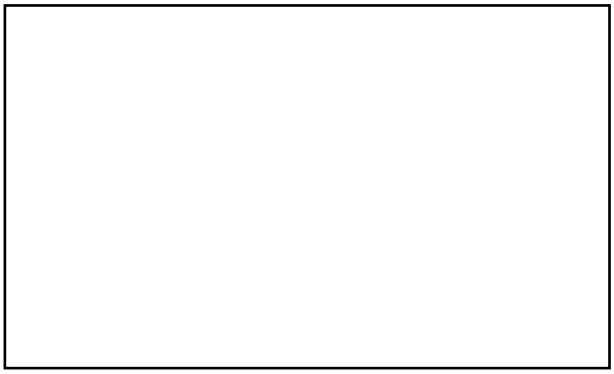
Notes: 1. The specified current and power consumption are under the V_{LCD}=12.0V, 25 ± 2℃, f_V=60Hz condition whereas mosaic pattern(8 x 6) is displayed and f_V is the frame frequency.
2. The current is specified at full white pattern.
3. The duration of rush current is about 2ms and rising time of power input is 1ms (min.).

White : 255Gray
Black : 0Gray



Mosaic Pattern(8 x 6)

White : 255 Gray



Full White pattern

Table 3. ELECTRICAL CHARACTERISTICS (Continue)

Parameter			Symbol	Values			Unit	Notes
				Min	Typ	Max		
Inverter :								
Power Supply Input Voltage			VBL	22.8	24.0	26.2	Vdc	1
Unloading Input Voltage						28	Vdc	
Power Supply Input Voltage Ripple				-	-	0.5	Vp-p	1
Power Supply Input Current	After Aging		IBL_A	-	6.7	7.3	A	Boost = 1.65V … 1
				-	7.3	7.8	A	Boost = 3.3V … 1
	Before Aging		IBL_B	-	7.0	7.5	A	Boost = 1.65V … 2
				-	7.5	8.0	A	Boost = 3.3V … 2
Power Supply Input Current(In-Rush)			Irush	-	-	12	A	VBL = 24V EXTVbr-B=100% Boost = 1.65V…6
Power Consumption			PBL	-	160.8	175.2	W	1
Input Signal for Inverter Control	Brightness Adjust		Boost	0.0	-	3.3	Vdc	3
	On/Off	On	V on	2.5	-	5.0	Vdc	
		Off	V off	-0.3	0.0	0.8	Vdc	
	Brightness Adjust		EXTVBR-B	40		100	%	Input duty
			Brightness	20		100	%	
PWM Frequency for NTSC & PAL			NTSC/PAL	135		190	Hz	4
Pulse Duty(PWM) (Burst mode)			High Level	2.5	-	5.0	V_{DC}	HIGH: Lamp on LOW:Lamp off
			Low Level	0.0	-	0.8	V_{DC}	
Audible Noise			Peak Level			24	dB(A)	Appendix VIII
			Overall Level			27		
Lamp :								
Lamp Voltage (EXTVBR-B = 100%)			Vout	650	900	1150	V(rms)	Boost = Typ
Lamp Current (EXTVBR-B = 100%)			I_{O-MAX}	130	140	150	mA(rms)	Boost = Max
			I_{O-TYP}	120	130	140	mA(rms)	Boost = TYP
			I_{O-MIN}	110	120	130	mA(rms)	Boost = Min
Life Time			Boost(0V~3.3V)	50,000			Hrs	5

Notes :

1. Electrical characteristics are determined after the unit has been 'ON' and stable for approximately 120 minutes at 25± 2℃. The specified current and power consumption are under the typical supply Input voltage 24V and Vbr 1.65V, it is total power consumption.
   The ripple voltage of the power supply input voltage is under 0.5 Vp-p. LPL recommend Input Voltage is 24.0V ± 5%.
2. Electrical characteristics are determined within 120 minutes at 25± 2℃.
   The specified currents are under the typical supply Input voltage 24V.
3. Brightness Control. This V_{br-A} Voltage control brightness.

Vbr-A	Function	Vbr-A	Function
0V	Minimum Brightness (95%)	3.3V	Maximum Brightness (105%)

4. LPL recommend that the PWM freq. is synchronized with three times harmonic of Vsync signal of system.
5. Specified Values are for a single lamp which is aligned horizontally.
   The life time is determined as the time which luminance of the lamp is 50% compared to that of initial value at the typical/ maximum lamp current on condition of continuous operating at 25 ± 2℃
6. The duration of rush current is about 10ms.

3-2. Interface Connections

This LCD module employs two kinds of interface connection, a 51-pin connector is used for the module electronics and Master 14-pin and Slave 12-pin connectors are used for the integral backlight system.

3-2-1. LCD Module

- LCD Connector(CN1): FI-R51S-HF(manufactured by JAE) or KN25-51P-0.5SH(manufactured by Hirose)
- Mating Connector : FI-R51HL(JAE) or compatible

Table 4. MODULE CONNECTOR(CN1) PIN CONFIGURATION

No	Symbol	Description	No	Symbol	Description
1	GND	Ground	27	Reserved	No connection or GND
2	NC	No Connection	28	RE0N	SECOND CHANNEL 0-
3	NC	No Connection	29	RE0P	SECOND CHANNEL 0+
4	NC	No Connection	30	RE1N	SECOND CHANNEL 1-
5	NC	No Connection	31	RE1P	SECOND CHANNEL 1+
6	NC	No Connection	32	RE2N	SECOND CHANNEL 2-
7	LVDS Select	'H' =JEIDA , 'L' or NC= VESA	33	RE2P	SECOND CHANNEL 2+
8	NC	No Connection	34	GND	Ground
9	NC	No Connection	35	RECLKN	SECOND CLOCK CHANNEL C-
10	NC	No Connection	36	RECLKP	SECOND CLOCK CHANNEL C+
11	GND	Ground	37	GND	Ground
12	RO0N	FIRST CHANNEL 0-	38	RE3N	SECOND CHANNEL 3-
13	RO0P	FIRST CHANNEL 0+	39	RE3P	SECOND CHANNEL 3+
14	RO1N	FIRST CHANNEL 1-	40	Reserved (NC)	No Connection
15	RO1P	FIRST CHANNEL 1+	41	Reserved (NC)	No Connection
16	RO2N	FIRST CHANNEL 2-	42	Reserved	No connection or GND
17	RO2P	FIRST CHANNEL 2+	43	Reserved	No connection or GND
18	GND	Ground	44	GND	Ground
19	ROCLKN	FIRST CLOCK CHANNEL C-	45	GND	Ground
20	ROCLKP	FIRST CLOCK CHANNEL C+	46	GND	Ground
21	GND	Ground	47	NC	No connection
22	RO3N	FIRST CHANNEL 3-	48	VLCD	Power Supply +12.0V
23	RO3P	FIRST CHANNEL 3+	49	VLCD	Power Supply +12.0V
24	Reserved (NC)	No Connection	50	VLCD	Power Supply +12.0V
25	Reserved (NC)	No Connection	51	VLCD	Power Supply +12.0V
26	Reserved	No connection or GND	-	-	-

Notes :

1. The pin no 44 is LCD Test option. "AGP" (Auto Generation LCM operates Pattern) or "NSB" (No Signal Black) is case that LVDS signals are out of frequency or abnormal condition in spite of 12 volt power supply. LPL recommends "NSB". (AGP : "VCC" or "OPEN" / NSB : "GND")
2. All GND(ground) pins should be connected together to the LCD module's metal frame.
3. All VLCD (power input) pins should be connected together.
4. All Input levels of LVDS signals are based on the IEA 664 Standard.
5. Specific pins(pin No. #1~#10) are used for internal data process of the LCD module. If not used, these pins are no connection.
6. If DCR function should be enable('H'), 10th pin must be connected to serial resistor which value is under 1k ohm.

3-2-2. Backlight Inverter

Master
-Inverter Connector : S14B-PH-SMC
(manufactured by JST) or Equivalent
- Mating Connector : PHR-14 or Equivalent

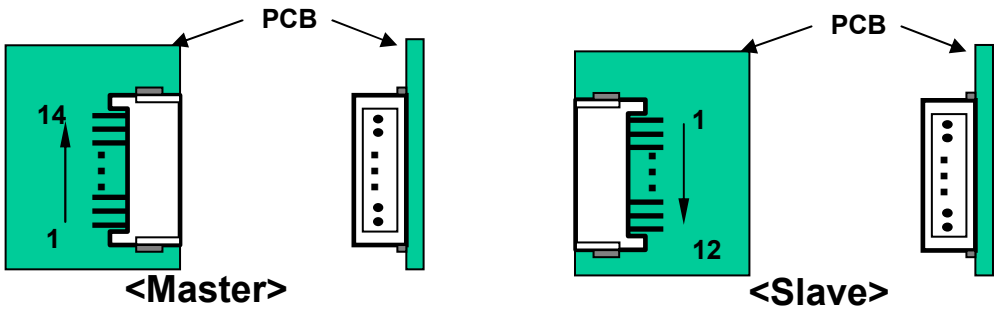
Slave
-Inverter Connector : S12B-PH-SMC
(manufactured by JST) or Equivalent
-Mating Connector : PHR-12 or Equivalent

Table 7. INVERTER CONNECTOR PIN CONFIGULATION

Pin No	Symbol	Description	Master	Slave	Note
1	V_{BL}	Power Supply +24.0V	V_{BL}	V_{BL}	
2	V_{BL}	Power Supply +24.0V	V_{BL}	V_{BL}	
3	V_{BL}	Power Supply +24.0V	V_{BL}	V_{BL}	
4	V_{BL}	Power Supply +24.0V	V_{BL}	V_{BL}	
5	V_{BL}	Power Supply +24.0V	V_{BL}	V_{BL}	
6	GND	Backlight Ground	GND	GND	1
7	GND	Backlight Ground	GND	GND	
8	GND	Backlight Ground	GND	GND	
9	GND	Backlight Ground	GND	GND	
10	GND	Backlight Ground	GND	GND	
11	Boost	0.0V ~ 3.3V	V_{BR}	Don't care	2
12	$V_{ON/OFF}$	0.0V ~ 5.0V	On/Off	Don't care	3, Open/High for B/L on as default
13	$EXTV_{BR-B}$	0.0V ~ 3.3V	External PWM	-	4
14	GND	POWER GND	GND	-	5

Note : 1. GND should be connected to the LCD module's metal frame.
2. Minimum Brightness : Boost = 0.0V Maximum Brightness : Boost = 3.3V
"OPEN" : Boost = 1.65V
3. Rising Edge : Lamp "ON" / Falling Edge : Lamp "OFF"
4. Pin#13 can be opened. (if Pin #13 is open , EXTVBR-B is 100%)
5. Pin#14 can be opened. (GND or NC)
6. Each impedance of pin #11, 12 and 13 is 156 [KΩ] , 23 [KΩ] and 56.5 [KΩ].

◆ Rear view of LCM



3-3. Signal Timing Specifications

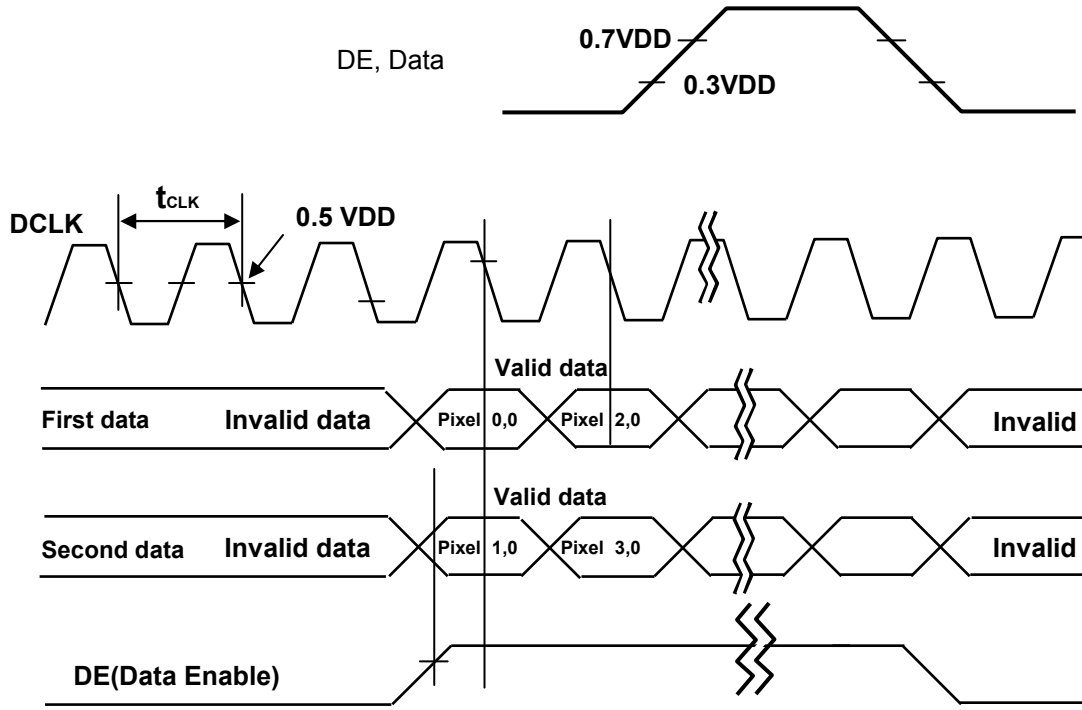
Table 6 shows the signal timing required at the input of the LVDS transmitter. All of the interface signal timing should be satisfied with the following specification for normal operation.

Table 6. TIMING TABLE for NTSC & PAL **[DE (Data Enable) Only]**

ITEM	Symbol		Min	Typ	Max	Unit	Note
DCLK	Period	t_{CLK}	12.98	13.47	17.15	ns	
	Frequency	-	58.3	74.25	77	MHz	=148.5/2
Hsync	Period	t_{HP}	1060	1100	1280	t_{CLK}	
	Horizontal Valid	t_{HV}	960	960	960	t_{CLK}	
	Horizontal Blank	-	100	140	320		
	Frequency	f_H	55.25	67.5	68.9	KHz	
	Width	t_{WH}	4	22	-	t_{CLK}	
	Horizontal Back Porch	t_{HBP}	72	88	-		
	Horizontal Front Porch	t_{HFP}	24	30	-		
Vsync	Period	t_{VP}	1092	1125	1149	t_{HP}	Note 1) PAL : 47~53Hz NTSC : 57~63Hz
	Vertical Valid	t_{VV}	1080	1080	1080	t_{HP}	
	Vertical Blank	-	12	45	69	t_{HP}	
	Frequency	f_V	47	60	63	Hz	
	Width	t_{WV}	2	12	-	t_{HP}	
	Vertical Back Porch	t_{VBP}	6	25	-	Hz	
	Vertical Front Porch	t_{VFP}	4	8	-	t_{HP}	

Note : The Input of HSYNC & VSYNC signal does not have an effect on normal operation(DE Only Mode).
The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rate.

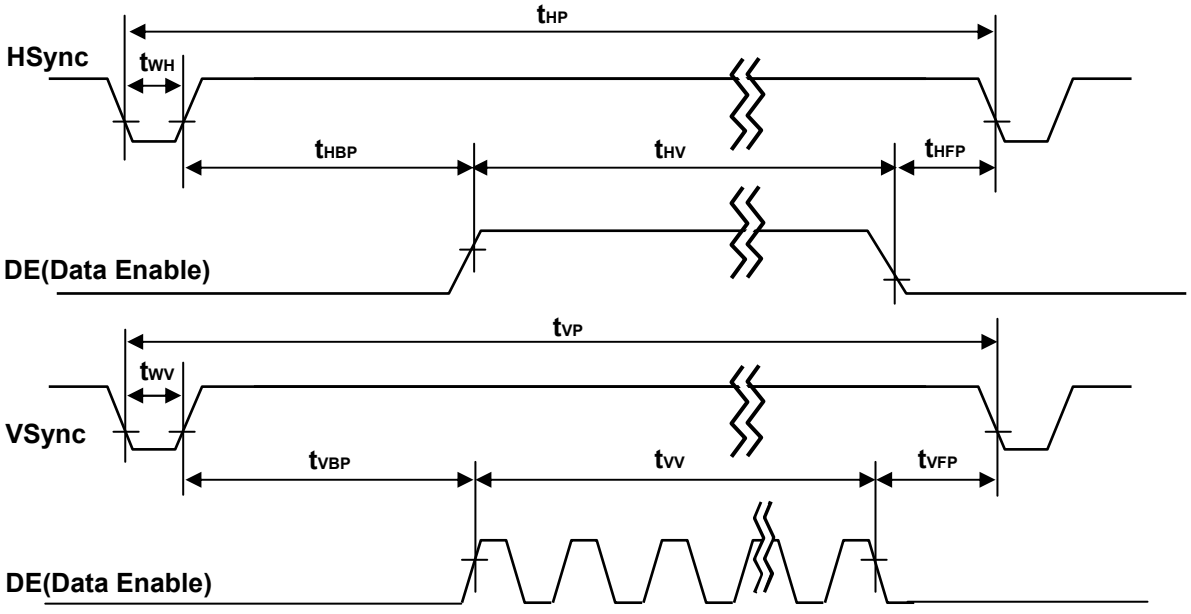
3-4. Signal Timing Waveforms



*** Reference : Sync. Relation**

* $t_{HB} = t_{HFP} + t_{WH} + t_{HBP}$

* $t_{VB} = t_{VFP} + t_{WV} + t_{VBP}$



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 10 provides a reference for color versus data input.

Table 10. 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	0	1
	...					...								...							...				
	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

3-6. Power Sequence

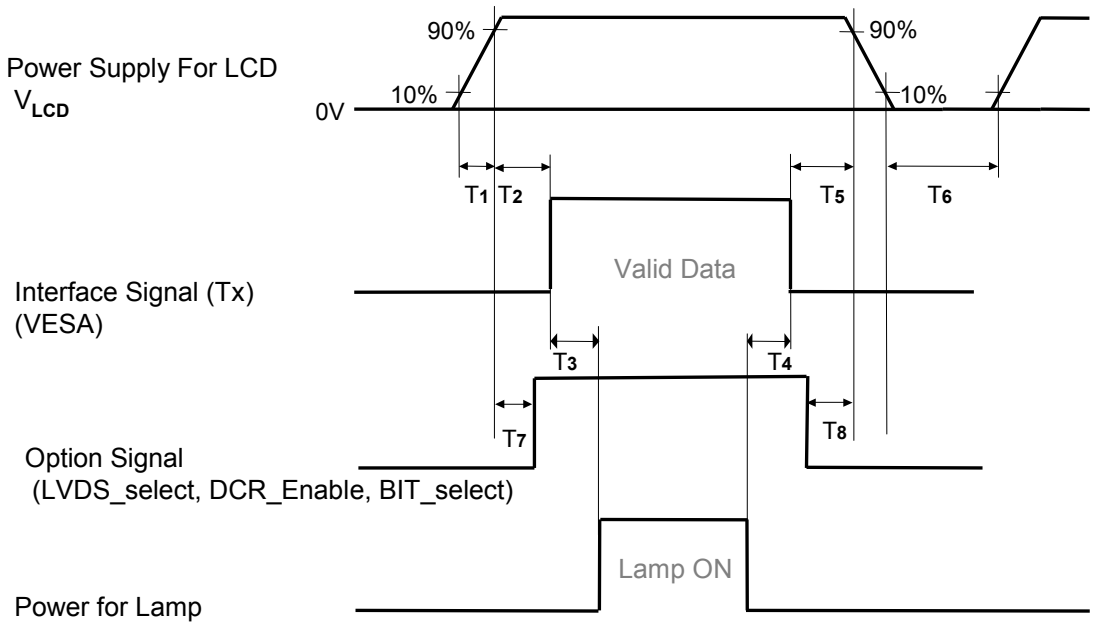


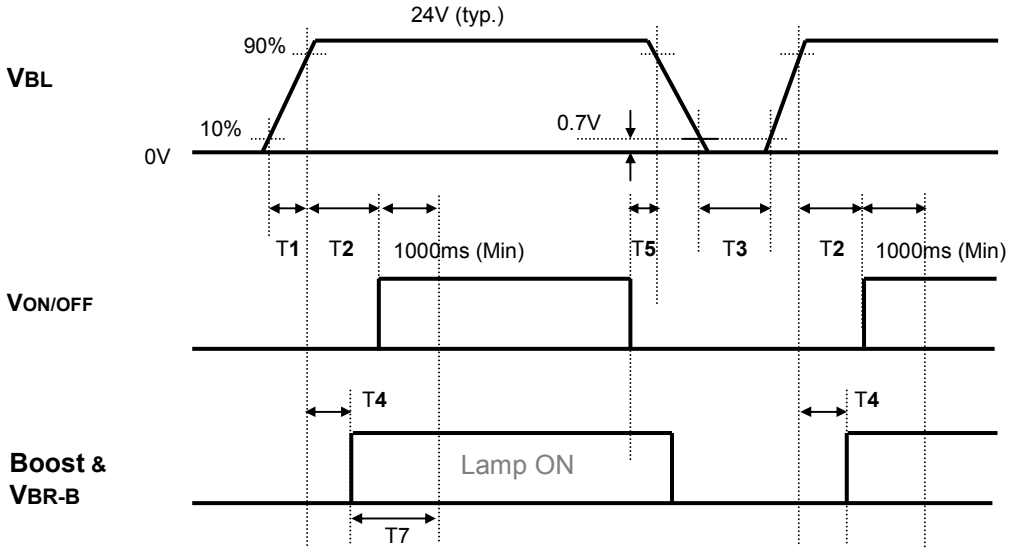
Table 9. POWER SEQUENCE

Parameter	Value			Unit	Notes
	Min	Typ	Max		
T1	0.5	-	20	ms	
T2	0.5	-	3 x ($1/f_V$)	ms	3,5
T3	200	-	-	ms	4
T4	200	-	-	ms	4
T5	0	-	-	ms	3,5
T6	2.0	-	-	s	2,6
T7	0	-	T2	ms	5
T8	0	-	T5	ms	5

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 case when the T2/T5 exceed 3x(1/fv), it operates protection pattern (Black pattern) till valid signal inputted. There is no reliability problem. (ex. 60Hz : 3x(1/60Hz) = 50ms)
4. 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.
5. If the on time of signals(Interface signal and Option signals) precedes the on time of Power(V_{LCD}), check the LCD logic Power(Vcc) is under 0.8V, otherwise it will be happened abnormal display.
6. T6 should be measured after the Module has been fully discharged between power off and on period.

3-6-2. Sequence for Inverter

Power Supply For Inverter



3-6-3. Deep condition for Inverter

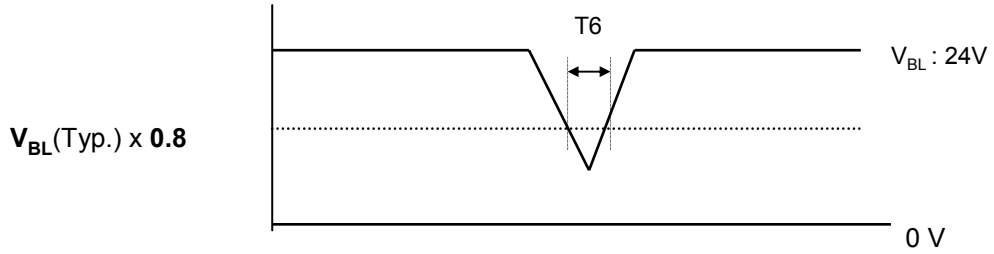


Table 10. Power Sequence for Inverter

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) x **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, VBR-B is recommended 3.3V. Boost should be typ(1.65V).

4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable in a dark environment at 25± 2℃. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and θ equal to 0 °.
FIG. 1 shows additional information concerning the measurement equipment and method.

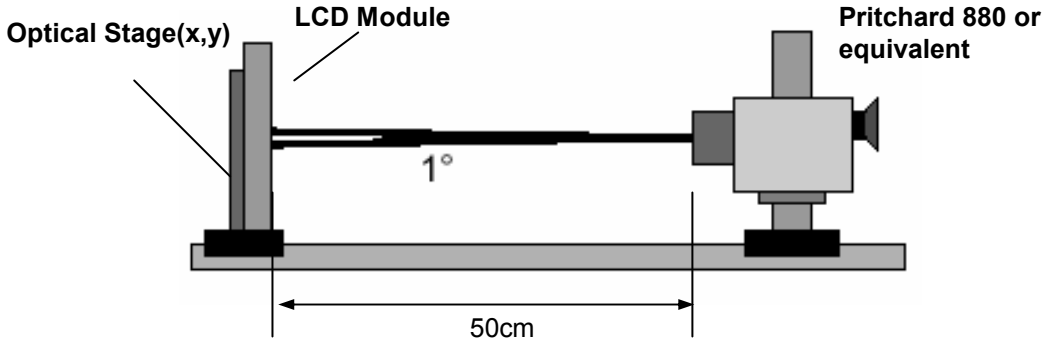


FIG. 1 Optical Characteristic Measurement Equipment and Method

Table 11. OPTICAL CHARACTERISTICS

Ta= 25± 2℃, V_{LCD}=12.0V, fv=60Hz, Dclk=148.5MHz VBR_A=1.65V, VBR_B=3.3V

Parameter		Symbol	Value			Unit	Note
			Min	Typ	Max		
Contrast Ratio		CR	700	1000	-		1
Surface Luminance, white		L_{WH}	400	500	-	cd/m^2	2
Luminance Variation		δ_{WHITE} 5P	-	-	1.3		3
		δ_{BLACK} 5P	-	-	1.7		
Response Time	Gray-to-Gray	G to G	-	5	8	ms	4
Color Coordinates [CIE1931]	RED	Rx	Typ -0.03	0.640	Typ +0.03		
		Ry		0.343			
	GREEN	Gx		0.287			
		Gy		0.613			
	BLUE	Bx		0.144			
		By		0.065			
	WHITE	Wx		0.279			
		Wy		0.292			
Viewing Angle (CR>10)							
	x axis, right(ϕ=0°)	θr	89	-	-	degree	5
	x axis, left (ϕ=180°)	θl	89	-	-		
	y axis, up (ϕ=90°)	θu	89	-	-		
	y axis, down (ϕ=270°)	θd	89	-	-		
Gray Scale			-	-	-		6
Cross Talk					1.8	%	7

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 120min after lighting the backlight in a dark environment at 25± 2℃. 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 , δ WHITE and δ BLACK are defined as :
   δ WHITE(5P) = Maximum(L_{on1},L_{on2}, L_{on3}, L_{on4}, L_{on5}) / Minimum(L_{on1},L_{on2}, L_{on3}, L_{on4}, L_{on5})
   δ BLACK(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. (Black uniformity spec is reference.)

4. Response time is the time required for the display to transition from G(N) to G(M) (Rise Time, Tr_R) and from G(M) to G(N) (Decay Time, Tr_D). For additional information see the FIG. 3. (N<M)

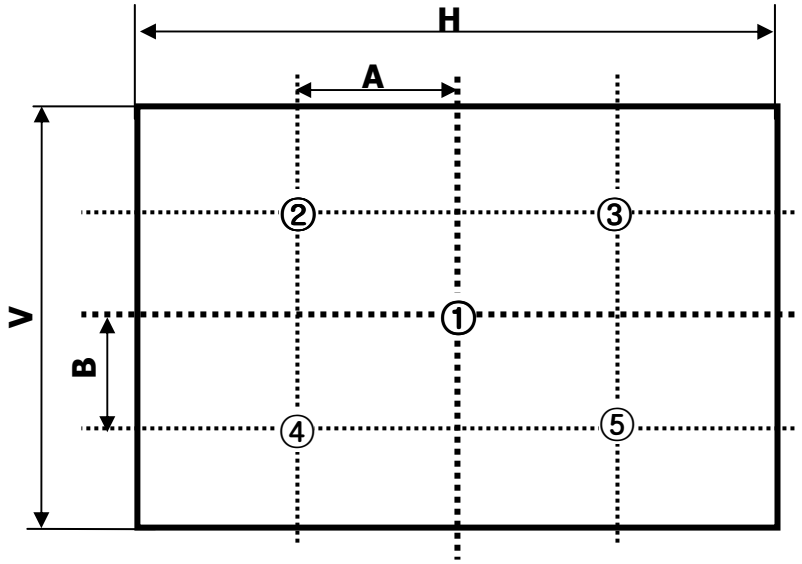
5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD module surface. For more information, see the FIG. 4.

6. Gray scale specification
   Gamma Value is approximately 2.2. For more information, see the Table 12.

Table 12. GRAY SCALE SPECIFICATION

Gray Level	Luminance [%] (Typ.)
L0	0.10
L15	0.26
L31	1.16
L47	2.61
L63	4.80
L79	7.77
L95	11.6
L111	16.2
L127	21.7
L143	28.2
L159	35.5
L175	43.8
L191	53.0
L207	63.3
L223	74.5
L239	86.7
L255	100

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



A : H / 4 mm
B : V / 4 mm
@ H,V : Active Area

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)".

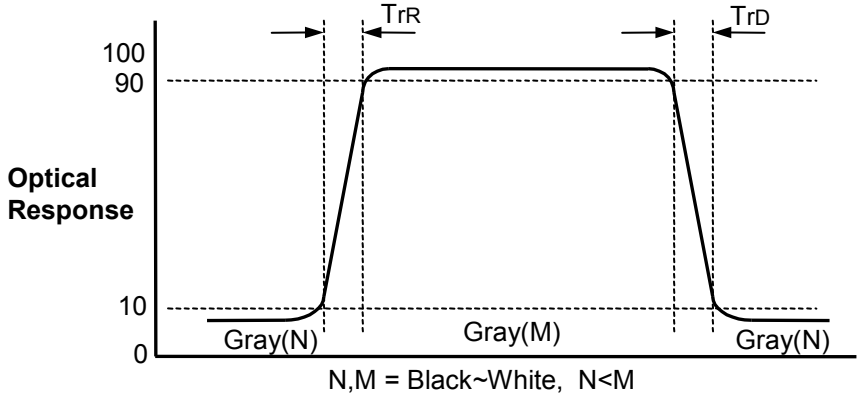


FIG. 3 Response Time

Dimension of viewing angle range

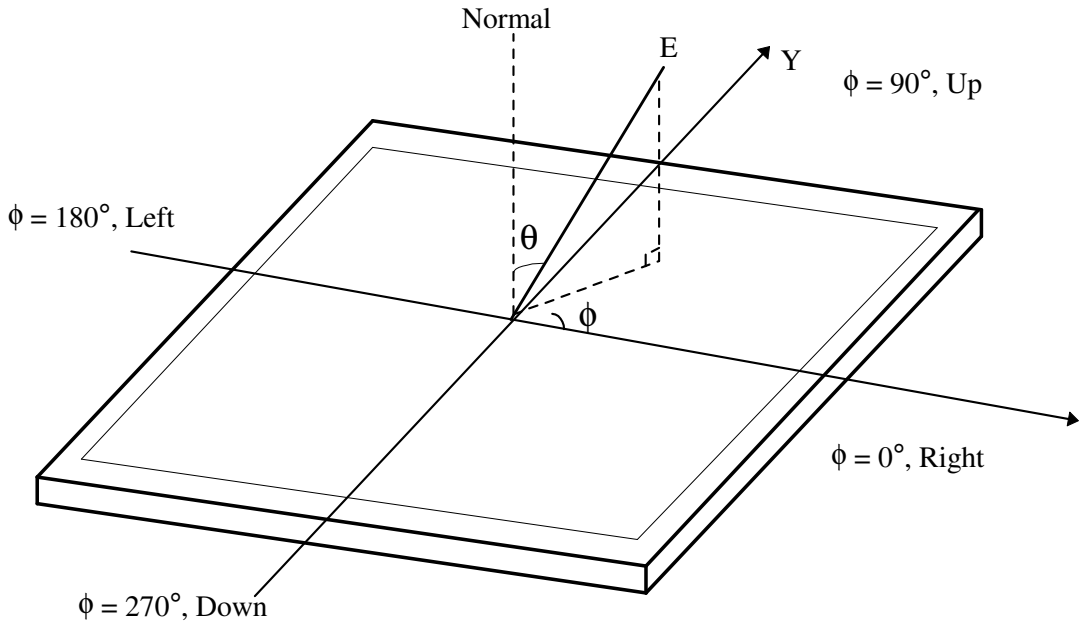


FIG. 4 Viewing Angle

5. Mechanical Characteristics

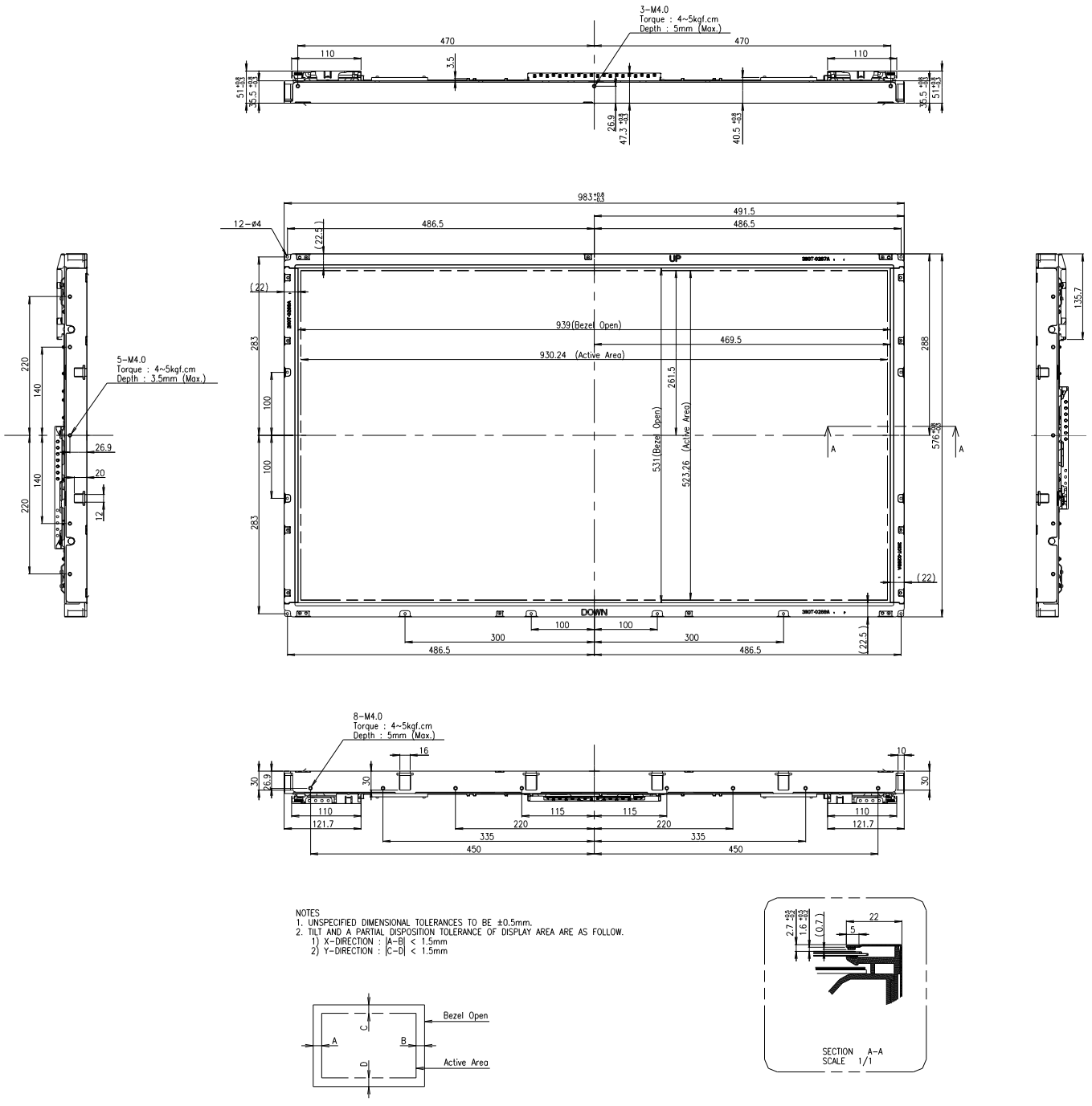
Table 15 provides general mechanical characteristics.

Table 15. MECHANICAL CHARACTERISTICS

Item	Value	
Outline Dimension	Horizontal	983.0 mm
	Vertical	576.0 mm
	Depth	51.0 mm
Bezel Area	Horizontal	939.0 mm
	Vertical	531.0 mm
Active Display Area	Horizontal	930.24 mm
	Vertical	523.26 mm
Weight	11.5 Kg (Typ.) , 12.5Kg (Max.)	

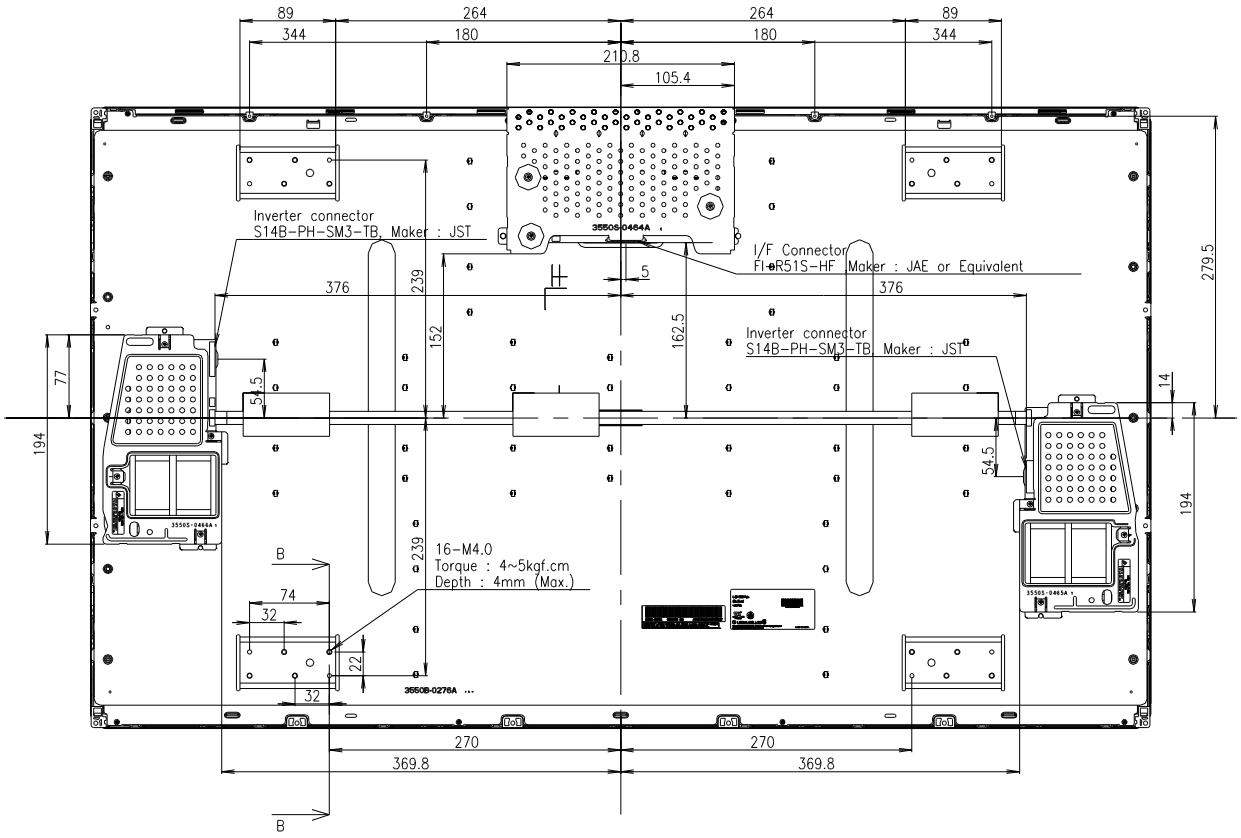
Note : Please refer to a mechanic drawing in terms of tolerance at the next page.

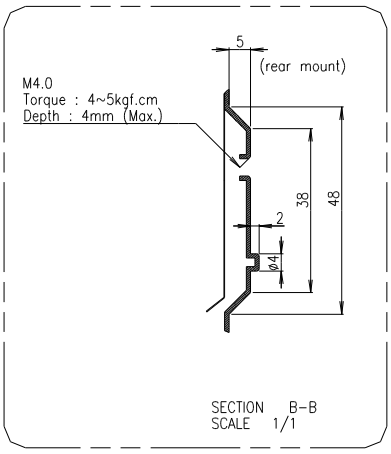
<FRONT VIEW>



NOTES
1. UNSPECIFIED DIMENSIONAL TOLERANCES TO BE ±0.5mm.
2. TILT AND A PARTIAL DISPOSITION TOLERANCE OF DISPLAY AREA ARE AS FOLLOW.
   1) X-DIRECTION : |A-B| < 1.5mm
   2) Y-DIRECTION : |C-D| < 1.5mm

<REAR VIEW>


89
264
264
89
344
180
180
344
210.8
105.4
Inverter connector
S14B-PH-SM3-TB, Maker : JST
I/F Connector
FI-eR51S-HF Maker : JAE or Equivalent
376
376
239
152
162.5
5
279.5
77
54.5
14
194
194
54.5
Inverter connector
S14B-PH-SM3-TB, Maker : JST
B
74
32
16-M4.0
Torque : 4~5kgf.cm
Depth : 4mm (Max.)
239
22
32
270
270
369.8
369.8
B


5
(rear mount)
M4.0
Torque : 4~5kgf.cm
Depth : 4mm (Max.)
38
48
2
Ø4
SECTION B-B
SCALE 1/1

6. Reliability

Table 16. ENVIRONMENT TEST CONDITION

No.	Test Item	Condition
1	High temperature storage test	Ta= 60℃ 75%RH 240h
2	Low temperature storage test	Ta= -20℃ 240h
3	High temperature operation test	Ta= 50℃ 60%RH 240h
4	Low temperature operation test	Ta= 0℃ 240h
5	Vibration test (non-operating)	Wave form : random Vibration level : 1.0Grms Bandwidth : 10-300Hz Duration : X,Y,Z, 30 min One time each direction
6	Shock test (non-operating)	Shock level : 50Grms Waveform : half sine wave, 11ms Direction : ±X, ±Y, ±Z One time each direction
7	ESD test	Condition : 150pF, 330 ohm Case , air Evaluation : ± 15kV
8	Humidity condition Operation	Ta= 40 ℃ ,90%RH
9	Altitude operating storage / shipment	0 - 15,000 ft 0 - 40,000 ft

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

7. International Standards

7-1. Safety

a) UL 60065, 7th 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, 7th 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)

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
E : MONTH
F : PANEL CODE
G : FACTORY CODE
H : ASSEMBLY 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 Pallet : 12 pcs

b) Pallet Size : 1150mm(W) X 1020mm(D) X 810mm(H)

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 specified mounting holes (Details refer to the drawings).
(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 the 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 soaks with petroleum benzine. 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=± 200mV(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 minimized 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 causes conductive particles and deal LCM a fatal blow)
(9) Please do not set LCD on its edge.
(10) It is recommended to avoid the signal cable and conductive material over the inverter transformer for it can cause the abnormal display and temperature rising.

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.

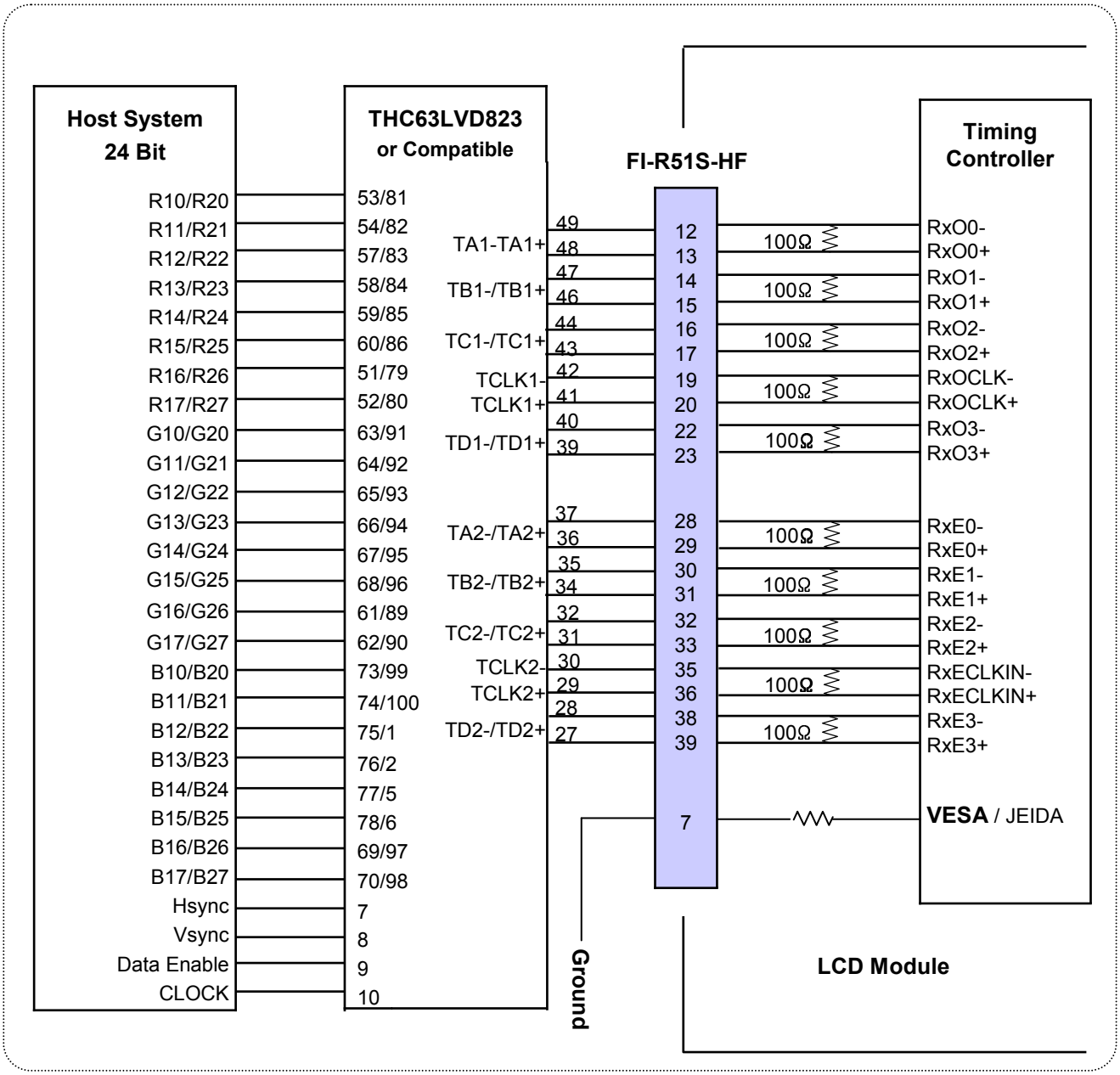
(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5℃ and 35℃ at normal humidity.
(2) The polarizer surface should not come in contact with any other object.
It is recommended that they be stored in the container in which they were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

APPENDIX-I-1

■ **Required signal assignment for Flat Link (Thine : THC63LVD823) Transmitter(Pin7="L")**

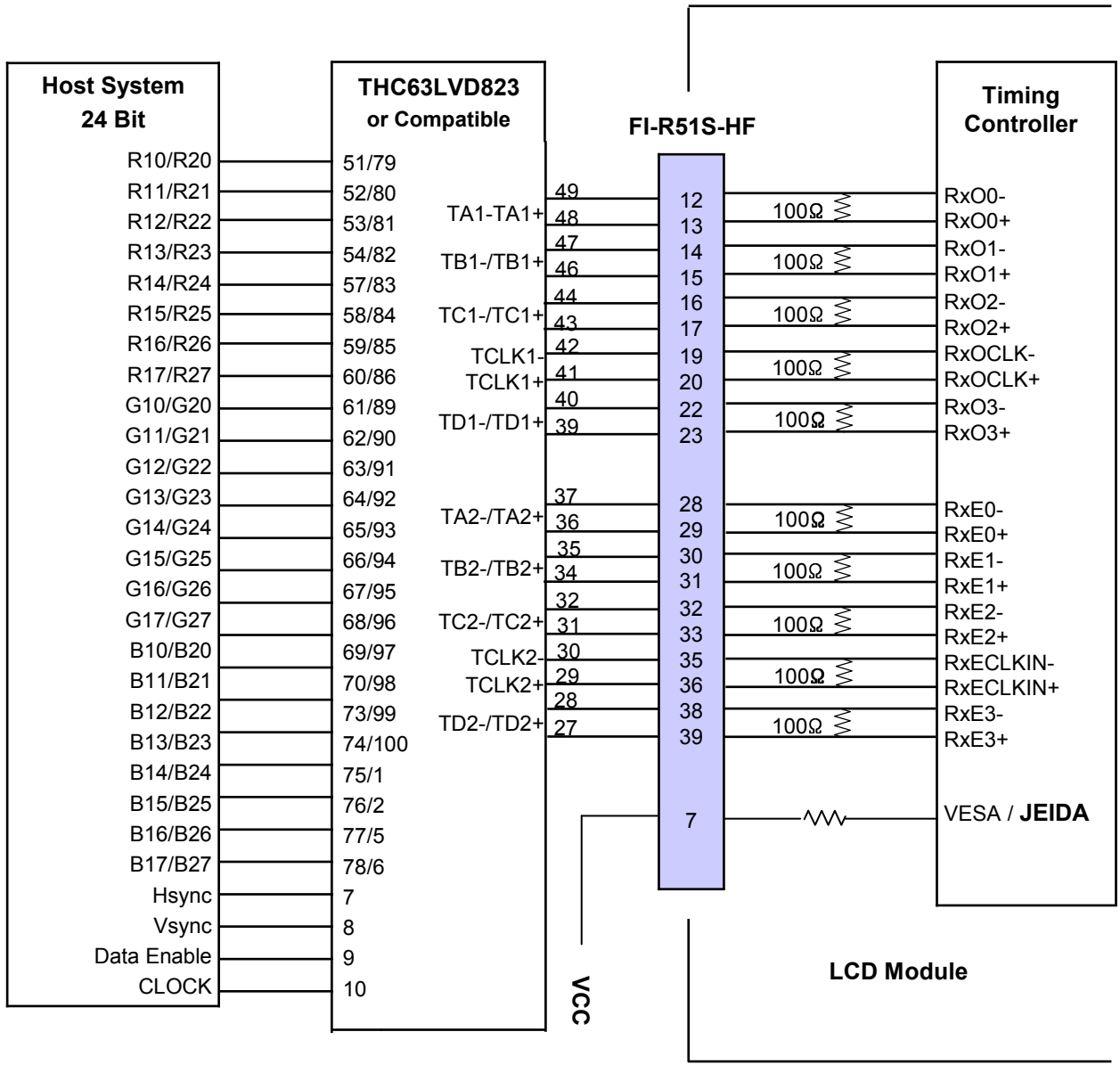


Notes:

1. The LCD module uses a 100 Ohm(Ω) resistor between positive and negative lines of each receiver input.
2. Refer to LVDS transmitter data sheet for detail descriptions. (THC63LVD823 or Compatible)
3. '7' means MSB and '0' means LSB at R,G,B pixel data.

APPENDIX-I-2

■ **Required signal assignment for Flat Link (Thine : THC63LVD823) Transmitter(Pin7="H")**

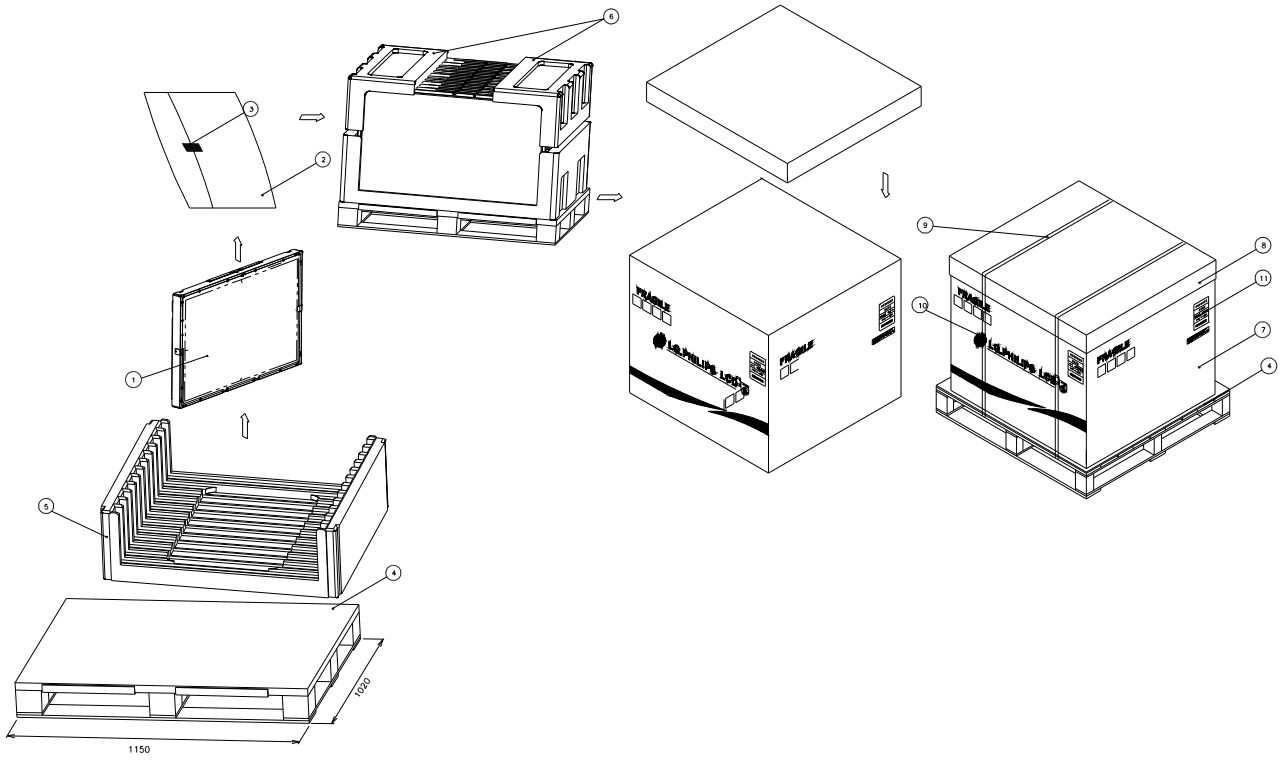


Notes:

1. The LCD module uses a 100 Ohm(Ω) resistor between positive and negative lines of each receiver input.
2. Refer to LVDS transmitter data sheet for detail descriptions. (THC63LVD823 or Compatible)
3. '7' means MSB and '0' means LSB at R,G,B pixel data.

 # APPENDIX-II

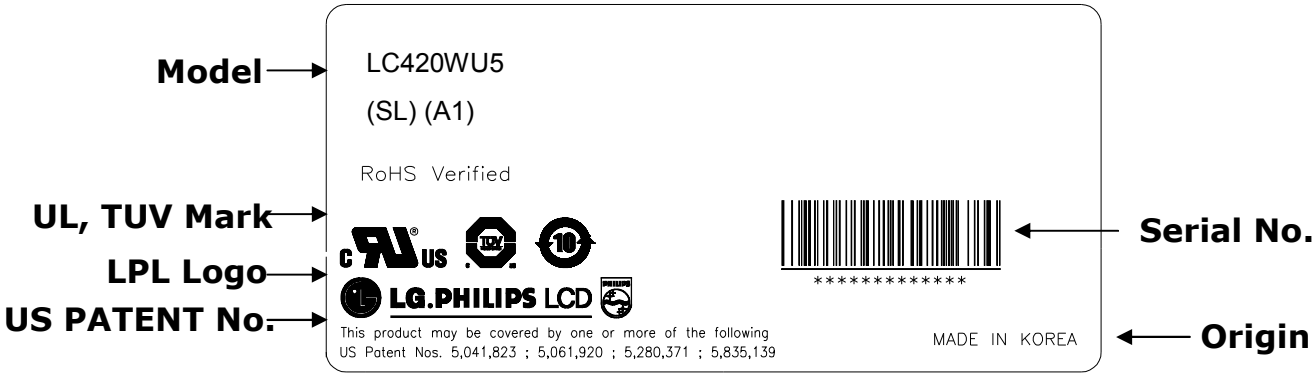
■ Pallet Ass'y



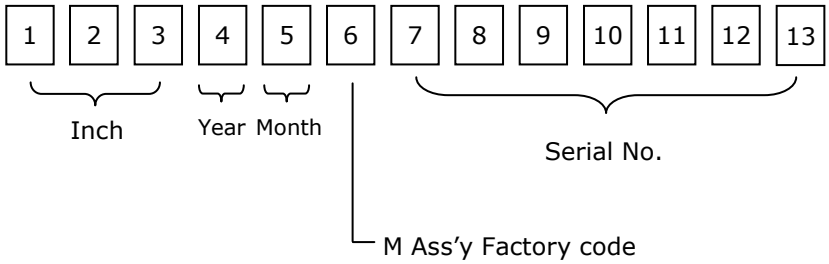
NO.	DESCRIPTION	MATERIAL
1	LCD Module	
2	BAG	42INCH
3	TAPE	MASKING 20MM X 50M
4	PALLET	PAPER 1150X1020X138MM
5	PACKING	EPS
6	PACKING	EPS
7	ANGLE PACKING	PAPER
8	PAPER ANGLE	PAPER
9	BAND	PP
10	LABEL	YUPO PAPER 80G 100x100

 # APPENDIX- III

■ LCM Label



■ Serial No. (See CAS 24page for more information)



 # APPENDIX- IV

■ Pallet Label