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SPECIFICATION
FOR
APPROVAL

(   )   **Preliminary Specification**

(●)   **Final Specification**

Title	42.0" WUXGA TFT LCD

BUYER	
MODEL	

SUPPLIER	LG DISPLAY Co., Ltd.
*MODEL	LD420WUB
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
Y.S. Park /Senior Manager	
REVIEWED BY B.Y. Park / Manager	
PREPARED BY J.H.Kim / Engineer	

**PD Product Development Dept.
LG Display Co., Ltd**

	Product Specification	

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RECORD OF REVISIONS

Revision No.	Revision Date	Page	Description
1.0	Aug, 11, 2008	-	Final Specification

Product Specification

1. General Description

LD420WUB is a Color Active Matrix Liquid Crystal Display with an integral Cold Cathode Fluorescent Lamp(CCFL) backlight system. The matrix employs a-Si Thin Film Transistor as the active element.

It is a transmissive type display operating in the normally black mode. It has a 42 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 arranged in vertical stripes. Gray scale or the luminance of the sub-pixel color is determined with a 8bit or 10-bit gray scale signal for each dot, thus presenting a palette of more than 1.06Billion of colors.

It has been designed to apply the 10-bit 2 port LVDS interface.

It is intended to support Public Display where high brightness, super wide viewing angle, high color gamut, high color depth and fast moving picture response time are important.
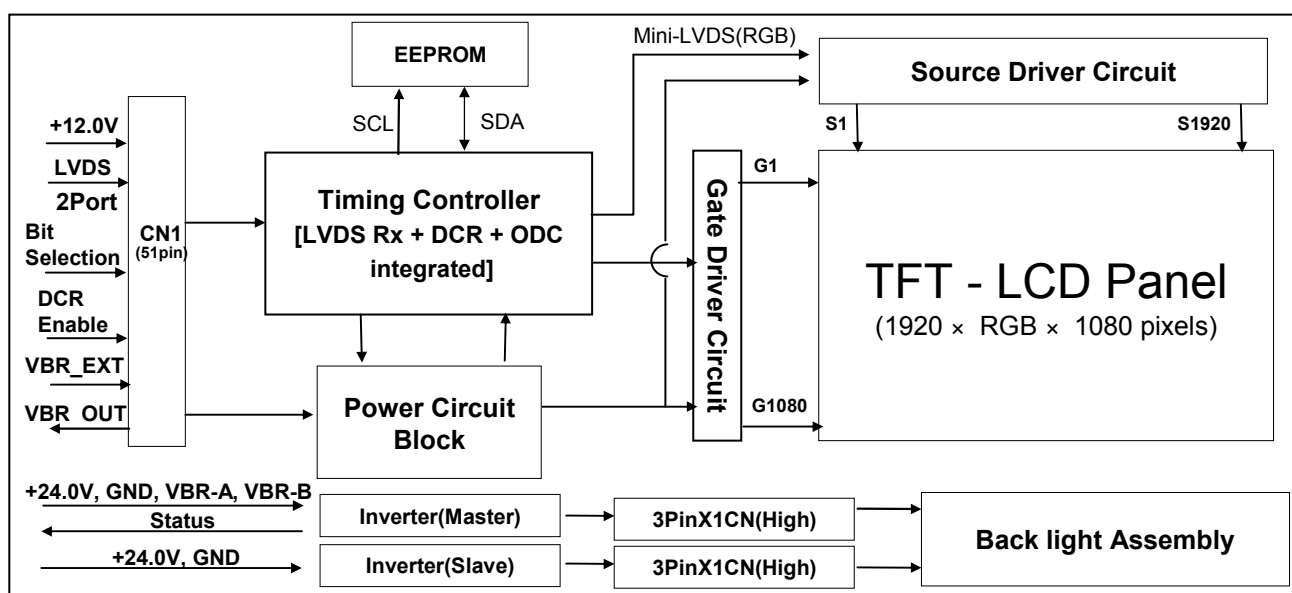
General Features

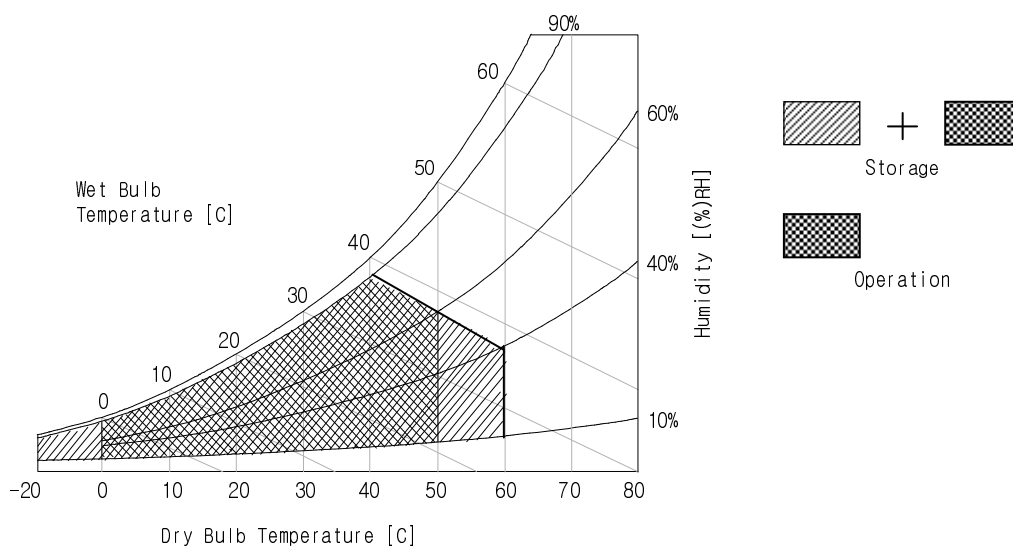| Active Screen Size	42.02 inches(1067.31mm) diagonal
Outline Dimension	956.4(H) x 549.4 (V) x 53.5 mm(D) (Typ.)
Pixel Pitch	0.4845 mm x 0.4845 mm
Pixel Format	1920 horiz. by 1080 vert. Pixels, RGB stripe arrangement
Color Depth	10bit (D) , 1.06Billon colors
Luminance, White	700 cd/m^2 (Center 1point ,Typ.)
Viewing Angle (CR>10)	Viewing angle free (R/L 178 (Typ.), U/D 178 (Typ.))
Power Consumption	Total 174.2 W (Typ.) (Logic = 6.2W, Inverter = 168W [VBR-A=1.65V])
Weight	10.5Kg (Typ.)
Display Mode	Transmissive mode, Normally black
Surface Treatment	Hard coating(3H), Anti-glare treatment of the front polarizer (Haze 13%)
Possible Display Type	Landscape and Portrait Enabled

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}	-0.3	+14.0	V_{DC}	at 25 ± 2 ℃
	Backlight inverter	V_{BL}	-0.3	+27.0	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.

3. Electrical Specifications
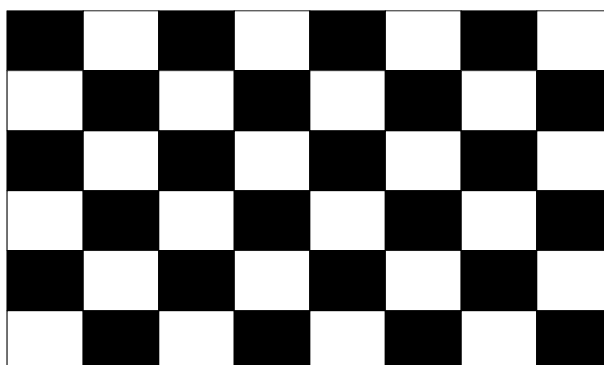
3-1. Electrical Characteristics

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$_{LCD}$	420	520	600	mA	1
		600	710	820	mA	2
Power Consumption	P$_{LCD}$	-	6.24	7.56	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 the maximum current pattern.
3. The duration of rush current is about 2ms and rising time of power input is 1ms (min)

White : 1023Gray
Black : 0Gray

Mosaic Pattern(8 x 6)

Product Specification

Table 3. ELECTRICAL CHARACTERISTICS (Continue)

Parameter		Symbol	Values			Unit	Notes
			Min	Typ	Max		
Inverter :							
Power Supply Input Voltage		VBL	22.8	24.0	25.2	Vdc	1
Power Supply Input Voltage Ripple			-	-	0.5	Vp-p	1
Power Supply Input Current	After Aging	IBL_A	-	7	8	A	V_{BR-A} = 1.65V … 1
			-	7.4	8.4	A	V_{BR-A} = 3.3V … 1
	Before Aging	IBL_B	-	8.5	9.5	A	V_{BR-A} = 1.65V … 2
			-	9.5	10.5	A	V_{BR-A} = 3.3V … 2
Power Supply Input Current (In-Rush)		Irush	-	-	12.0	A	V_{BL} = 22.8V V_{BR-B} = 3.3V V_{BR-A} = 1.65V
Power Consumption		PBL	-	168	192	W	V_{BR-A} = 1.65V … 1
Input Voltage for Control System Signals	Brightness Adjust	V_{BR-A}	0.0	1.65	3.3	Vdc	
	On/Off — On	V on	2.5	-	5.0	Vdc	
	On/Off — Off	V off	-0.3	0.0	0.8	Vdc	
	Brightness Adjust	V_{BR-B}	0	-	3.3	V	
Lamp:							
Discharge Stabilization Time		TS			3	min	3
Life Time			50,000			Hrs	4

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 24Vand VBR (VBR-A : 1.65V & VBR-B : 3.3V), 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 24.0V ± 5%.
2. Electrical characteristics are determined within 30 minutes at 25± 2℃.
   The specified currents are under the typical supply Input voltage 24V.
3. The brightness of the lamp after lighted for 5minutes is defined as 100%.
   TS is the time required for the brightness of the center of the lamp to be not less than 95% at typical current.
    The screen of LCD module may be partially dark by the time the brightness of lamp is stable after turn on.
4. 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 lamp current (VBR-A : 1.65V & VBR-B : 3.3V), on condition of continuous operating at 25± 2℃
5. The duration of rush current is about 20ms.

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	Bit Selection	'L'=8bit,'H'=10bit (D)
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' = VESA	33	RE2P	SECOND CHANNEL 2+
8	VBR_EXT	External VBR	34	GND	Ground
9	VBR_OUT	VBR output	35	RECLKN	SECOND CLOCK CHANNEL C-
10	DCR_Enable	'H' = Enable , 'L' = Disable	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	RE4N	SECOND CHANNEL 4- (For 10bit D)
15	RO1P	FIRST CHANNEL 1+	41	RE4P	SECOND CHANNEL 4+ (For 10bit D)
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	RO4N	FIRST CHANNEL 4- (For 10bit D)	50	VLCD	Power Supply +12.0V
25	RO4P	FIRST CHANNEL 4+ (For 10bit D)	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.

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3-2-2. Backlight Inverter

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

Table 5. INVERTER CONNECTOR PIN CONFIGULATION

Pin No	Symbol	Description	Inv.	Note
1	VBL	Power Supply +24.0V	VBL	
2	VBL	Power Supply +24.0V	VBL	
3	VBL	Power Supply +24.0V	VBL	
4	VBL	Power Supply +24.0V	VBL	
5	VBL	Power Supply +24.0V	VBL	
6	GND	Backlight Ground	GND	
7	GND	Backlight Ground	GND	
8	GND	Backlight Ground	GND	1
9	GND	Backlight Ground	GND	
10	GND	Backlight Ground	GND	
11	VBR-A	Analog dimming voltage DC 0.0V ~ 3.3V (Typ : 1.65V)	VBR-A	2, 3
12	VON/OFF	0.0V ~ 5.0V	On/Off	
13	VBR-B	Burst dimming voltage DC 0.0V ~ 3.3V	VBR-B	3
14	Status	Normal : Upper 3.0V Abnormal : Under 0.7V	Status	4

Notes : 1. GND should be connected to the LCD module's metal frame.
2. If Pin #11 is open, VBR-A = 1.65V. When apply over 1.65V(~ 3.3V) continuously,
its luminance is increasing however lamp's life time is decreasing.
It could be usable for boost up luminance when using DCR (=Dynamic contrast ratio) function only.
3. Minimum Brightness : VBR-B =0V   Maximum Brightness : VBR-B = 3.3V
4. Even though Pin #14 is open, there is no effect on inverter operating, The output terminal of inverter..
5. Each impedance of pin #11,12 and 13 is 186[$k\Omega$], 27.6[$k\Omega$], 116[$k\Omega$]

◆ **Rear view of LCM**
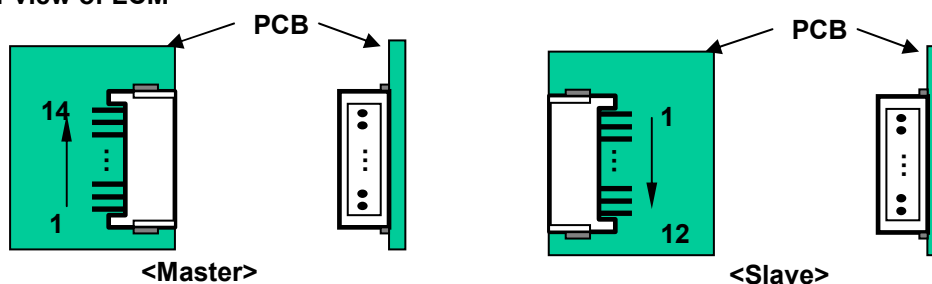
Product Specification

3-3. Signal Timing Specifications

Table 6 shows the signal timing required at the input of the LVDS transmitter. All of the interface signal timing should be satisfied with the following specification for normal operation.
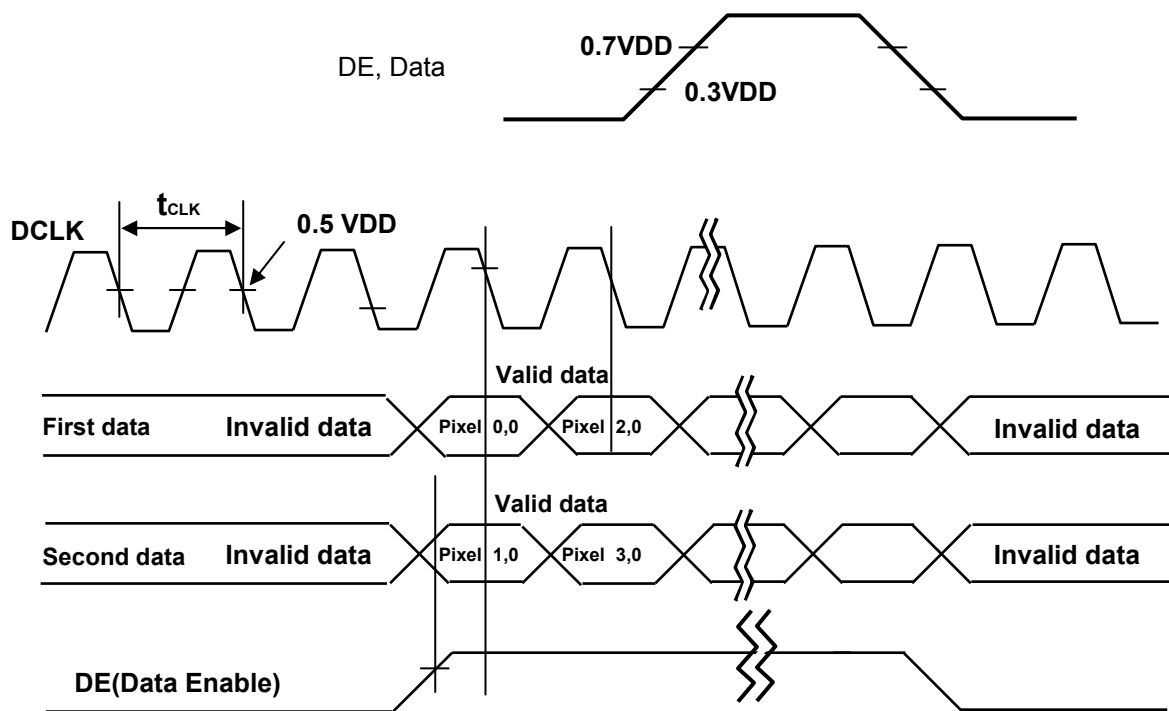
Table 6. TIMING TABLE (DE Only Mode)

ITEM		Symbol	Min	Typ	Max	Unit	Note
Horizontal	Display Period	tHV	-	960	-	tclk	
	Blank	tHB	100	140	240	tclk	
	Total	tHP	1060	1100	1200	tclk	2200/2
Vertical	Display Period	tVV	-	1080	-	Lines	
	Blank	tVB	11	45	69	Lines	
	Total	tVP	1091	1125	1149	Lines	

ITEM		Symbol	Min	Typ	Max	Unit	Note
Frequency	DCLK	fCLK	70	74.25	77	MHz	148.5/2
	Horizontal	fH	65.5	67.5	68.9	KHz	
	Vertical	fV	57	60	63	Hz	

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
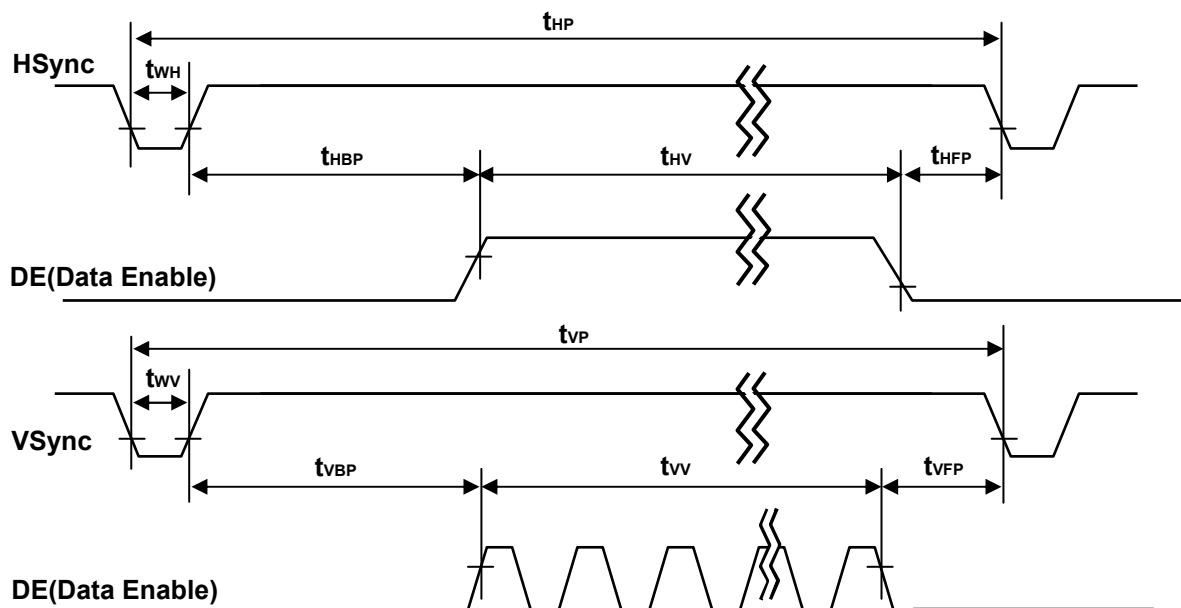
DE, Data   0.7VDD
0.3VDD

DCLK t_{CLK} 0.5 VDD

Valid data

First data   Invalid data   Pixel 0,0   Pixel 2,0   Invalid data

Valid data

Second data   Invalid data   Pixel 1,0   Pixel 3,0   Invalid data

DE(Data Enable)

* Reference : Sync. Relation

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

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

HSync t_{WH} t_{HP}

t_{HBP} t_{HV} t_{HFP}

DE(Data Enable)

VSync t_{WV} t_{VP}

t_{VBP} t_{VV} t_{VFP}

DE(Data Enable)

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 8 provides a reference for color versus data input.

Table 8. COLOR DATA REFERENCE

| Color		Input Color Data		
		RED MSB LSB R9 R8 R7 R6 R5 R4 R3 R2 R1 R0	GREEN MSB LSB G9 G8 G7 G6 G5 G4 G3 G2 G1 G0	BLUE MSB LSB B9 B8 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 0 0 0 0 0 0
	Red (1023)	1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
	Green (1023)	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0
	Blue (1023)	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1
	Cyan	0 0 0 0 0 0 0 0 0 0	1 1 1 1 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 1 1	0 0 0 0 0 0 0 0 0 0	1 1 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 1 1 1 1	0 0 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 1 1 1 1 1 1
RED	RED (000)	0 0 0 0 0 0 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 0 0 1	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
	. . .	. . .	. . .	. . .
	RED (1022)	1 1 1 1 1 1 1 1 1 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
	RED (1023)	1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
GREEN	GREEN (000)	0 0 0 0 0 0 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 0 0 0 0 1	0 0 0 0 0 0 0 0 0 0
	. . .	. . .	. . .	. . .
	GREEN (1022)	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 0	0 0 0 0 0 0 0 0 0 0
	GREEN (1023)	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0
BLUE	BLUE (000)	0 0 0 0 0 0 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 0 0 0 0 0 0 1
	. . .	. . .	. . .	. . .
	BLUE (1022)	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 0
	BLUE (1023)	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1

3-6. Power Sequence

### 3-6-1. LCD Driving circuit
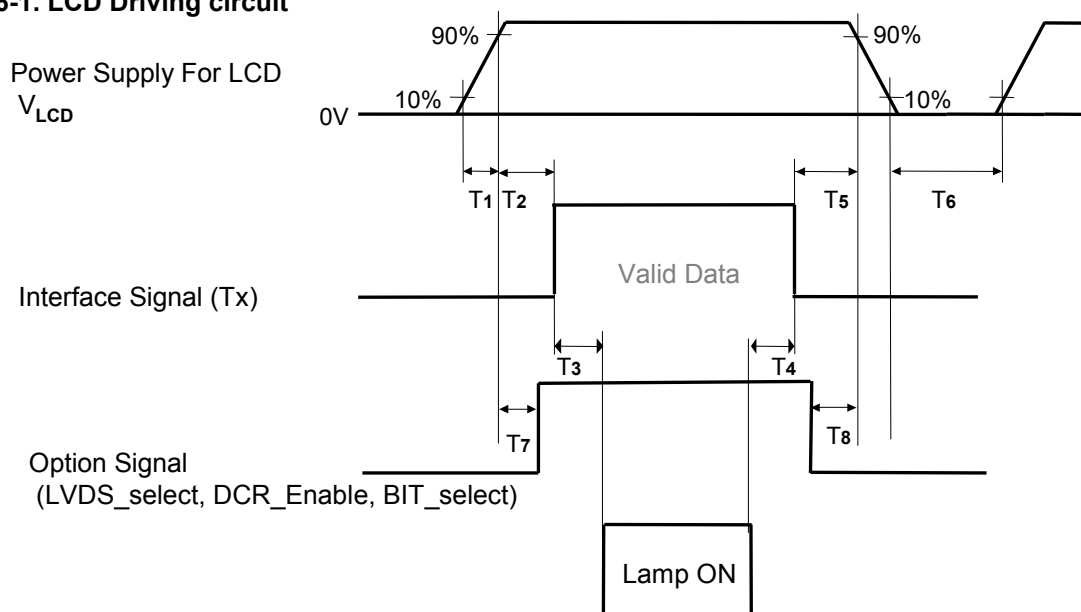
Table 9. POWER SEQUENCE

Parameter	Value			Unit	Notes
	Min	Typ	Max		
T1	0.5	-	20	ms	
T2	0	-	-	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	-	-	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
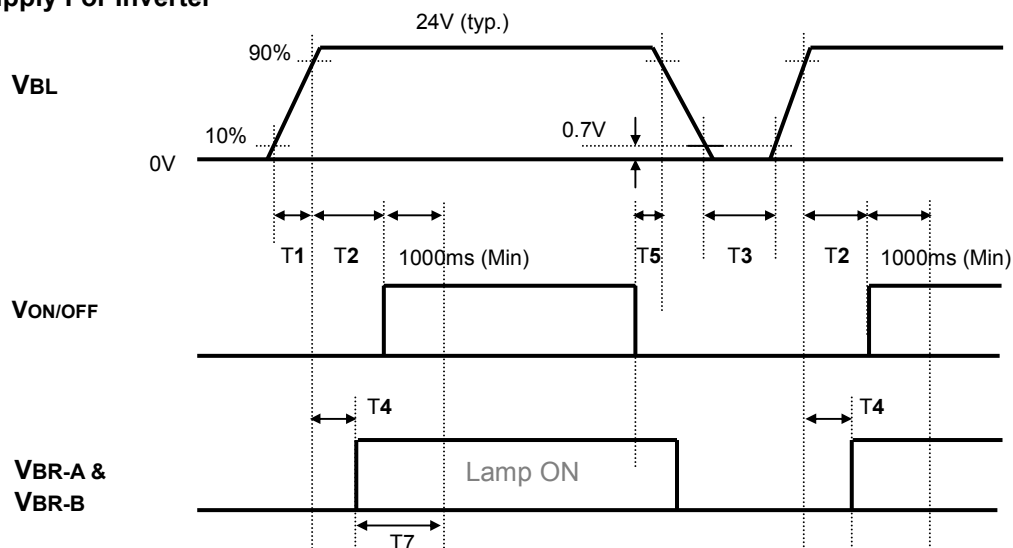
3-6-3. Deep condition for Inverter

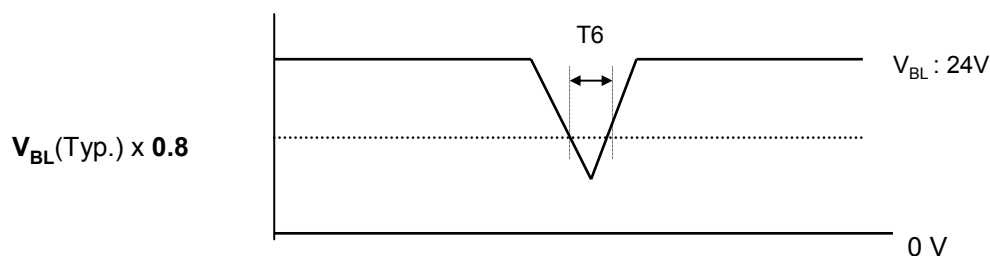**Table 12. Power Sequence for Inverter**

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.

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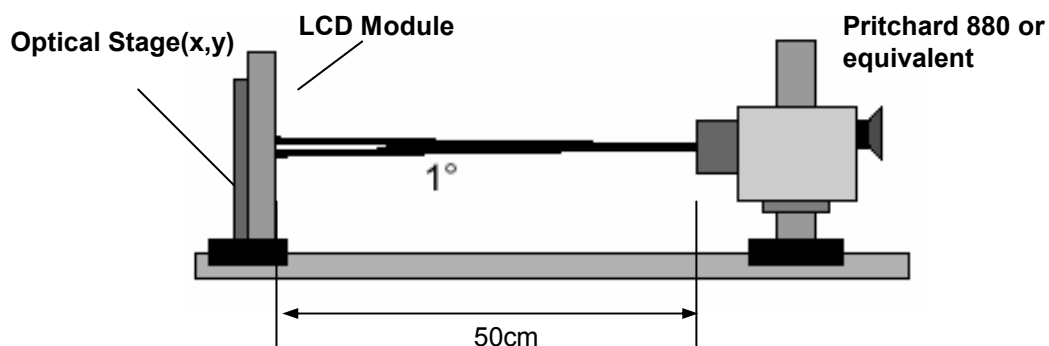FIG. 1 shows additional information concerning the measurement equipment and method.

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}		550	700	-	cd/m^2	2
Luminance Variation		δ_{WHITE}	5P	-	-	1.3		3
Response Time	Gray-to-Gray	G to G		-	9	14	ms	4,5
Color Coordinates [CIE1931]	RED	Rx			0.639			
		Ry			0.333			
	GREEN	Gx			0.285			
		Gy		Typ -0.03	0.605	Typ +0.03		
	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	6
	x axis, left (φ=180 °)	θl		89	-	-		
	y axis, up (φ=90 °)	θu		89	-	-		
	y axis, down (φ=270 °)	θd		89	-	-		
Gray Scale				-	-	-		7

Product Specification

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

CR(Contrast Ratio) = Maximum CRn (n=1, 2, 3, 4, 5)

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

n = the Position number(1, 2, 3, 4, 5). For more information, see FIG 2.

2. Surface luminance are determined after the unit has been 'ON' and 60min after lighting the backlight in a dark environment at 25± 2°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 , δ WHITE is defined as :

$$\delta \text{ WHITE(5P)} = \text{Maximum}(L_{on1}, L_{on2}, L_{on3}, L_{on4}, L_{on5}) / \text{Minimum}(L_{on1}, L_{on2}, L_{on3}, L_{on4}, L_{on5})$$

Where L_{on1} to L_{on5} 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 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	0.12
L63	0.31
L127	0.91
L191	2.41
L255	4.78
L319	7.88
L383	11.60
L447	16.34
L511	21.83
L575	28.30
L639	36.20
L703	44.30
L767	54.01
L831	64.02
L895	75.03
L959	86.21
L1023	100

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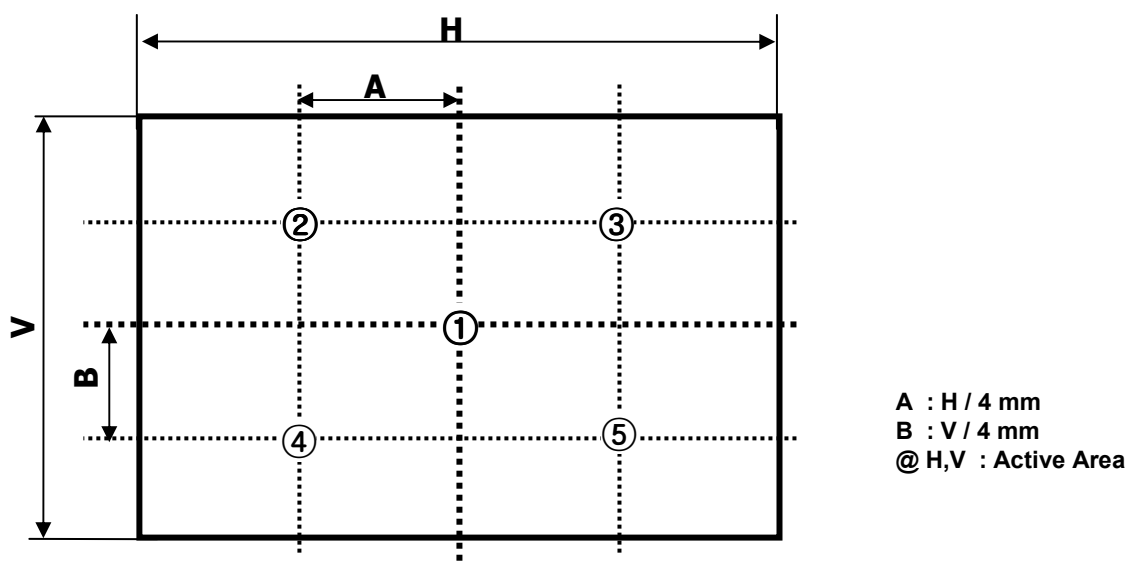

A : H / 4 mm
B : V / 4 mm
@ H,V : Active Area

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)".
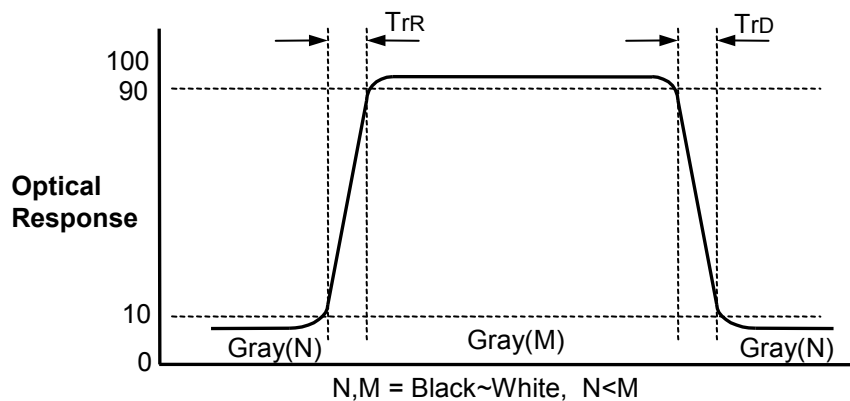

FIG. 3 Response Time

Dimension of viewing angle range

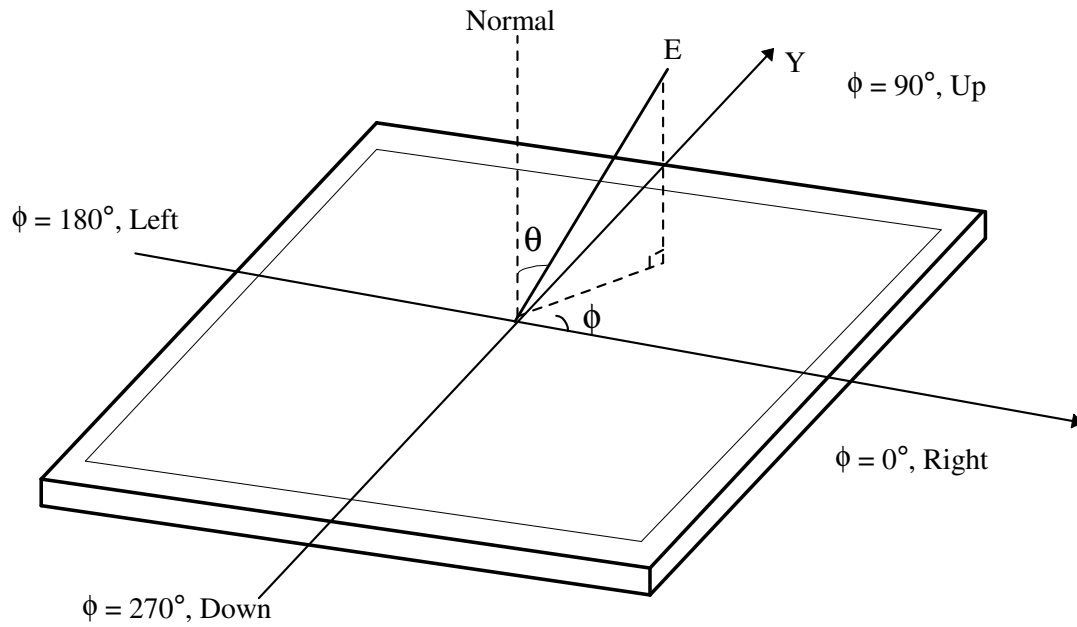**FIG. 4 Viewing Angle**

5. Mechanical Characteristics

Table 13 provides general mechanical characteristics.

Table 13. MECHANICAL CHARACTERISTICS

Item	Value	
Outline Dimension	Horizontal	956.4 mm
	Vertical	549.4 mm
	Depth	53.5 mm
Bezel Area	Horizontal	936.2 mm
	Vertical	529.2 mm
Active Display Area	Horizontal	930.25 mm
	Vertical	523.25 mm
Weight	10.5 Kg (Typ.) , 11.5Kg (Max.)	

Note : Please refer to a mechanic drawing in terms of tolerance at the next page.
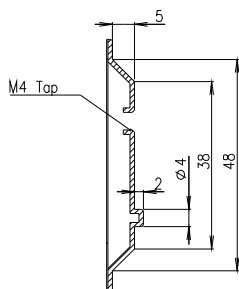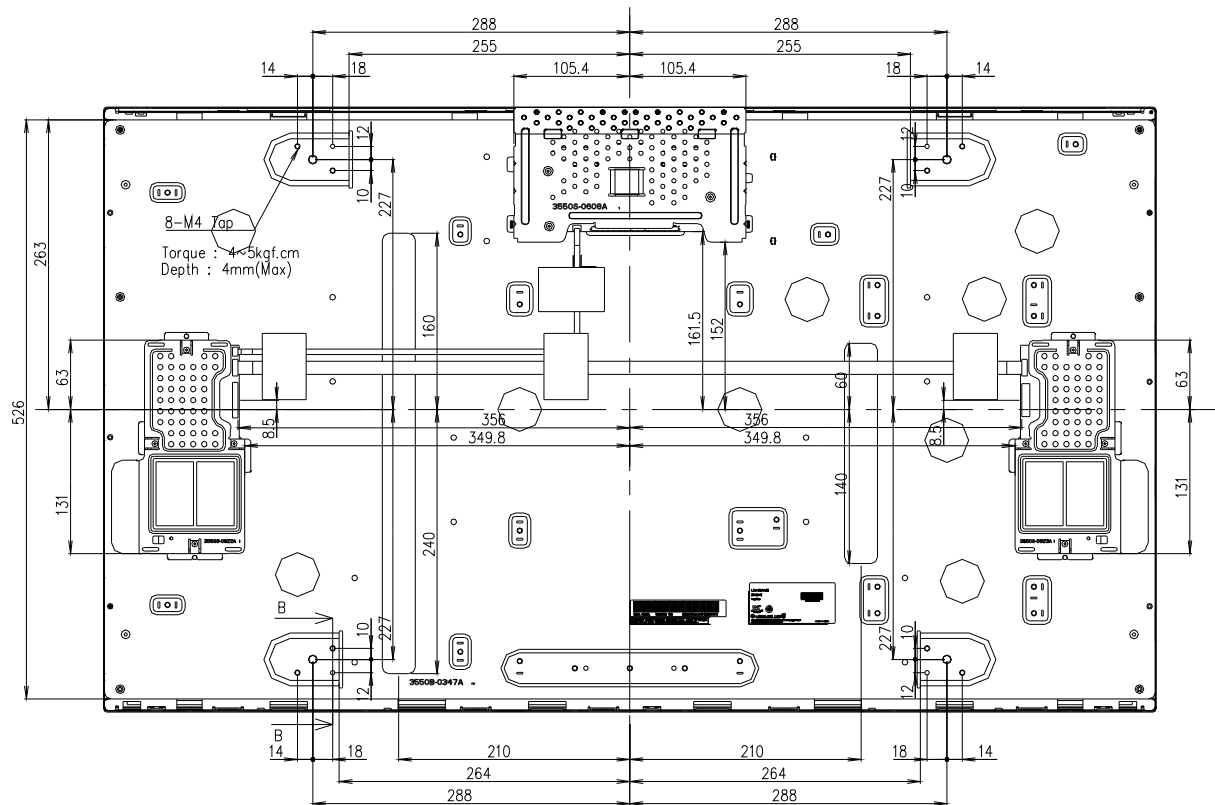
<FRONT VIEW>
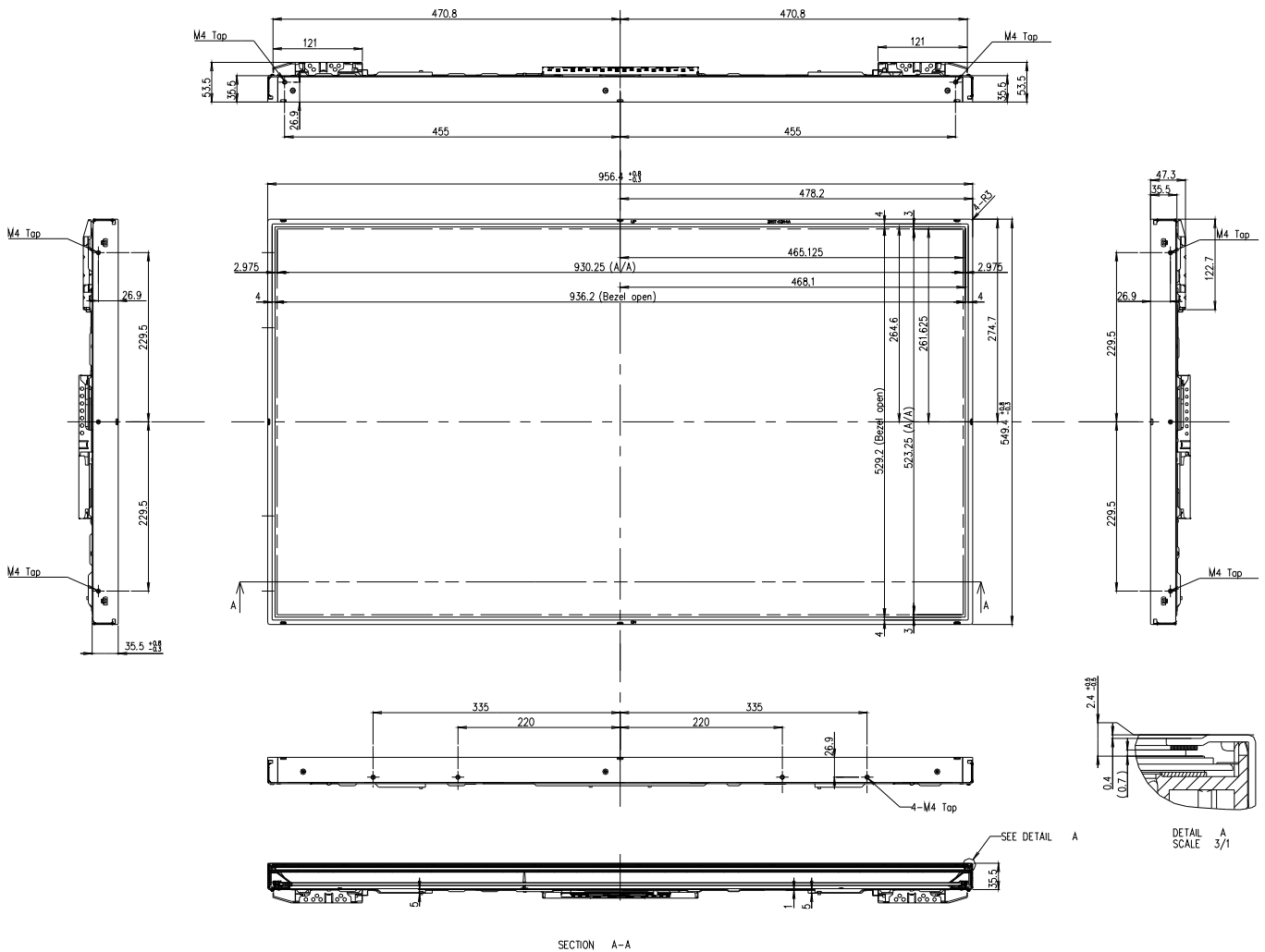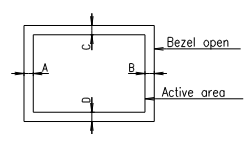
NOTES
1. Unspecified tolerances are to be ±1.0mm.

2. Tilt and partial disposition tolerance of display area
   are as following.
   (1) X-Direction : IA-BI ≤ 1.5mm
   (2) Y-Direction : IC-DI ≤ 1.5mm

DETAIL A
SCALE 3/1

SECTION A-A

SEE DETAIL A

Bezel open

Active area

Product Specification

<REAR VIEW>

SECTION B-B

6. Reliability

Table 14. ENVIRONMENT TEST CONDITION

No.	Test Item	Condition
1	High temperature storage test	Ta= 60℃ 240h
2	Low temperature storage test	Ta= -20℃ 240h
3	High temperature operation test	Ta= 50℃ 50%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 : 50G Waveform : half sine wave, 11ms Direction : ±X, ±Y, ±Z 　　　　　One time each direction
7	Humidity condition Operation	Ta= 40 ℃ ,90%RH
8	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 60950-1:2003, First Edition, Underwriters Laboratories, Inc.,
   Standard for Safety of Information Technology Equipment.
b) CAN/CSA C22.2, No. 60950-1-03 1st Ed. April 1, 2003, Canadian Standards Association,
   Standard for Safety of Information Technology Equipment.
c) EN 60950-1:2001, First Edition,
   European Committee for Electrotechnical Standardization(CENELEC)
   European Standard for Safety of Information Technology Equipment.
d) IEC 60950-1:2001, First Edition, The International Electrotechnical Commission (IEC)
   Standard for Safety of Information Technology Equipment.

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
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 Pallet : 12 pcs

b) Pallet Size : 1140 mm X 990 mm X 810 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 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. * There is no problem of Panel crack under 5kgf / φ10mm

(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.

(11) Partial darkness may happen during 3~5 minutes when LCM is operated initially in condition that luminance is under 40% at low temperature (under 5℃). This phenomenon which disappears naturally after 3~5 minutes is not a problem about reliability but LCD characteristic

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.

9-7. Appropriate Condition for Public Display

- Generally large-sized LCD modules are designed for consumer applications (TV).
  Accordingly, a long-term display like in Public Display (PD) application, can cause uneven display including image sticking. To optimize module's lifetime and function, several operating usages are required.

1. Normal operating condition
   - Temperature: 0 ~ 40℃
   - Operating Ambient Humidity : 10 ~ 90 %
   - Display pattern: dynamic pattern (Real display)
   Note) Long-term static display can cause image sticking.

2. Operating usages under abnormal condition1
   a. Ambient condition
     - Well-ventilated place is recommended to set up PD system.
   b. Power and screen save
     - Periodical power-off or screen save is needed after long-term display.

Product Specification

3. Operating usages to protect against image sticking due to long-term static display
  a. Suitable operating time: under 18 hours a day.
  b. Static information display recommended to use with moving image.
    - Cycling display between 5 minutes' information(static) display and 10 seconds' moving image.
  c. Background and character (image) color change
    - Use different colors for background and character, respectively.
    - Change colors themselves periodically.
  d. Avoid combination of background and character with large different luminance.
 1) Abnormal condition just means conditions except normal condition.
 2) Black image or moving image is strongly recommended as a screen save.

4. Lifetime in this spec. is guaranteed only when PD is used according to operating usages.

APPENDIX-I-1

■ **Required signal assignment for Flat Link (Thine : THC63LVD823) Transmitter(Pin7="L")**
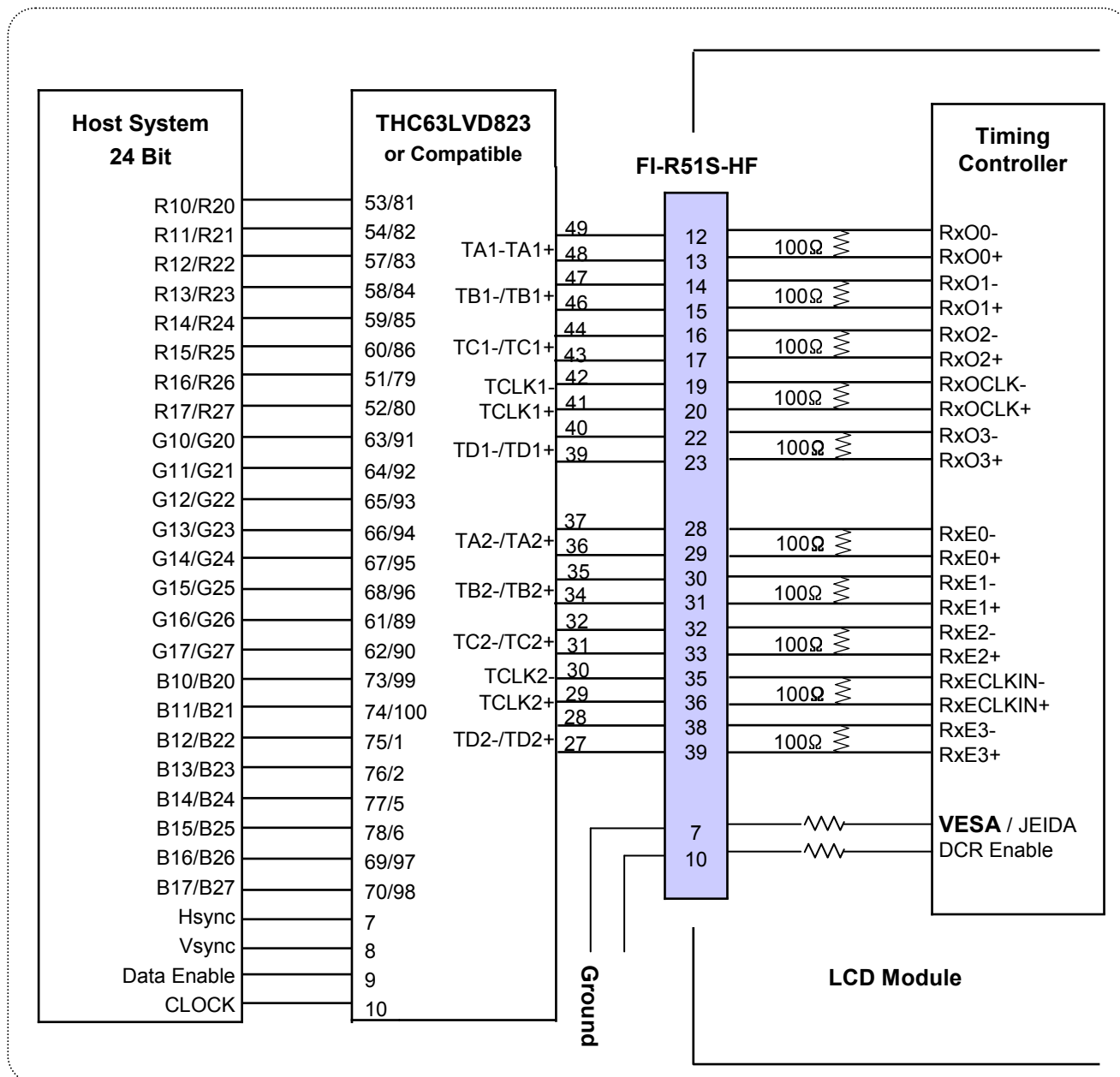
Notes:
1. The LCD module uses a 100 Ohm(Ω) resistor between positive and negative lines
   of each receiver input.
2. Refer to LVDS transmitter data sheet for detail descriptions. (THC63LVD823 or Compatible)
3. '7' means MSB and '0' means LSB at R,G,B pixel data.

Product Specification

APPENDIX-I-2

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

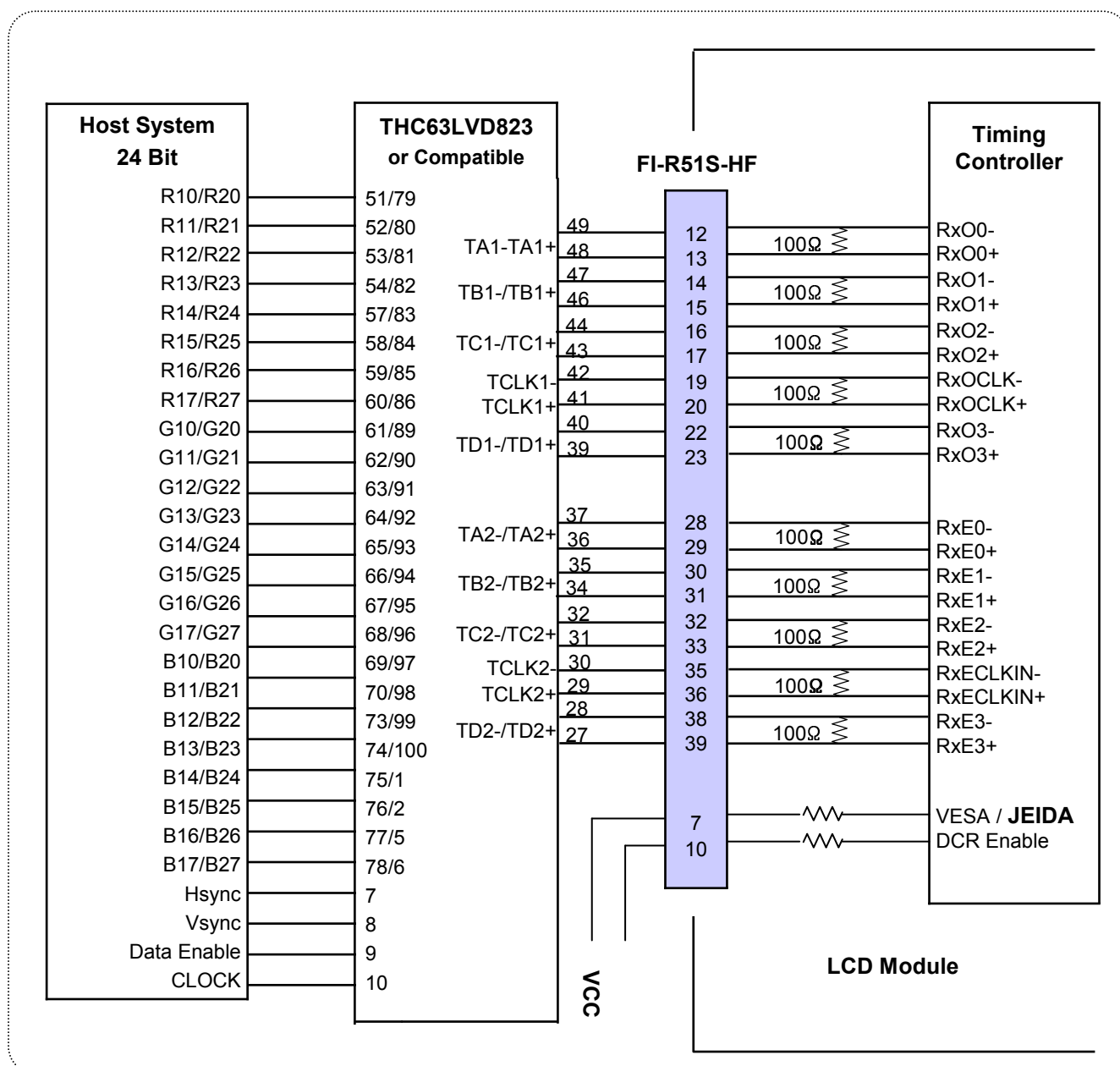| Host System 24 Bit	THC63LVD823 or Compatible		FI-R51S-HF			Timing Controller
R10/R20	51/79					
R11/R21	52/80	49	12			RxO0-
R12/R22	53/81	TA1-TA1+ 48	13	100Ω		RxO0+
R13/R23	54/82	47	14			RxO1-
R14/R24	57/83	TB1-/TB1+ 46	15	100Ω		RxO1+
R15/R25	58/84	44	16			RxO2-
R16/R26	59/85	TC1-/TC1+ 43	17	100Ω		RxO2+
R17/R27	60/86	42	19			RxOCLK-
G10/G20	61/89	TCLK1- 41	20	100Ω		RxOCLK+
G11/G21	62/90	TCLK1+ 40	22			RxO3-
G12/G22	63/91	TD1-/TD1+ 39	23	100Ω		RxO3+
G13/G23	64/92					
G14/G24	65/93	37	28			RxE0-
G15/G25	66/94	TA2-/TA2+ 36	29	100Ω		RxE0+
G16/G26	67/95	35	30			RxE1-
G17/G27	68/96	TB2-/TB2+ 34	31	100Ω		RxE1+
B10/B20	69/97	32	32			RxE2-
B11/B21	70/98	TC2-/TC2+ 31	33	100Ω		RxE2+
B12/B22	73/99	30	35			RxECLKIN-
B13/B23	74/100	TCLK2- 29	36	100Ω		RxECLKIN+
B14/B24	75/1	TCLK2+ 28	38			RxE3-
B15/B25	76/2	TD2-/TD2+ 27	39	100Ω		RxE3+
B16/B26	77/5		7			VESA / **JEIDA**
B17/B27	78/6		10			DCR Enable
Hsync	7					
Vsync	8					
Data Enable	9					
CLOCK	10					

VCC

LCD Module

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)
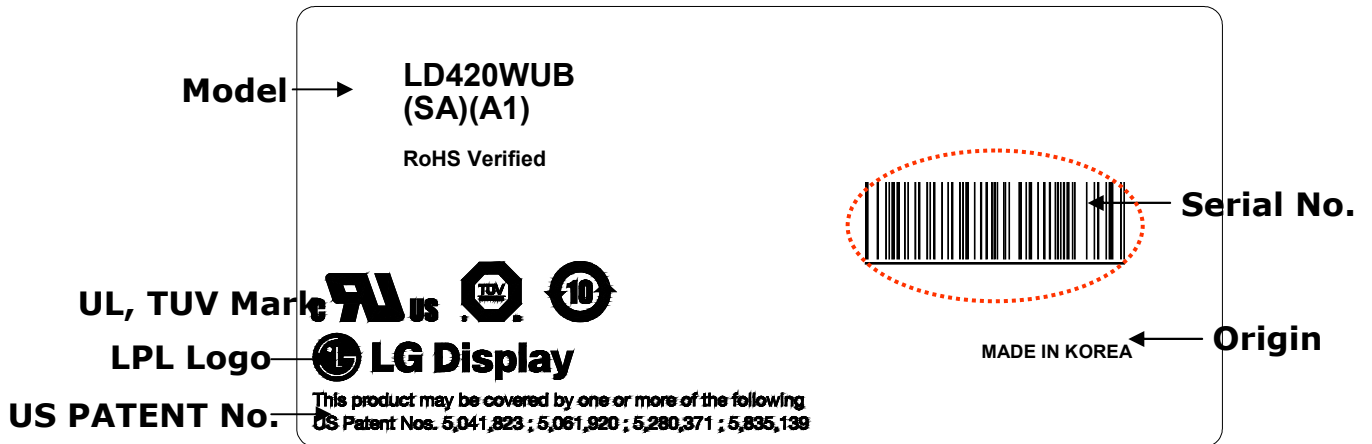3. '7' means MSB and '0' means LSB at R,G,B pixel data.

Product Specification

APPENDIX-II
■ Pallet Ass'y
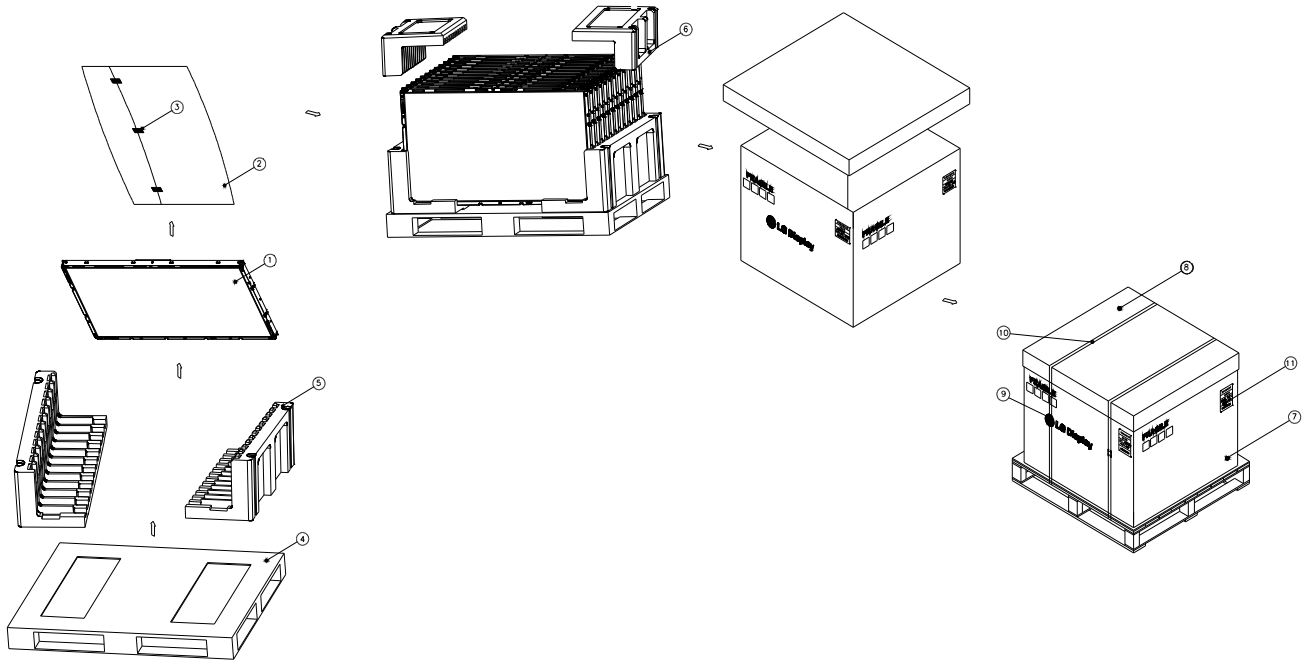
NO.	DESCRIPTION	MATERIAL
1	LCD Module	
2	BAG	42INCH
3	TAPE	MASKING 20MMX50M
4	PALLET	PAPER 1140X990X130MM
5	PACKING,BOTTOM	EPS
6	PACKING,TOP	EPS
7	ANGLE,POST	PAPER
8	ANGLE,PACKING	PAPER
9	BAND,CLIP	STEEL
10	BAND	PP
11	LABEL	YUPO 80G 100X100

APPENDIX- III
■ LCM Label

Model →	**LD420WUB** **(SA)(A1)** **RoHS Verified**

Serial No.

UL, TUV Mark

LPL Logo — **LG Display**

US PATENT No. — This product may be covered by one or more of the following US Patent Nos. 5,041,823 ; 5,061,920 ; 5,280,371 ; 5,835,139

MADE IN KOREA ← **Origin**

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

1	2	3	4	5	6	7	8	9	10	11	12	13

Inch   Year   Month

Serial No.

M Ass'y Factory code
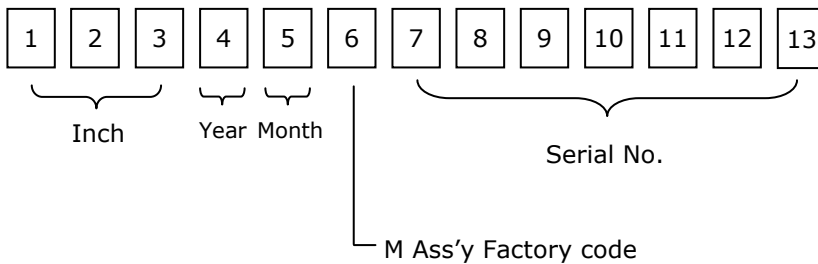
APPENDIX- IV
■ Pallet Label

LD420WUB		
SAA1		
12 PCS	001/01-01	
MADE IN KOREA		RoHS Verified

XXXXX XXXXXXXX XXX XXX XXXX

100.0

100.0