SPECIFICATION
FOR
APPROVAL

( ) Preliminary Specification
(●) Final Specification

Title	42.0" WXGA TFT LCD

BUYER	
MODEL	

SUPPLIER	LG.Philips LCD Co., Ltd.
*MODEL	LC420WX3
SUFFIX	SLA1 (RoHS Verified)

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

APPROVED BY		SIGNATURE DATE
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Please return 1 copy for your confirmation with your signature and comments.

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

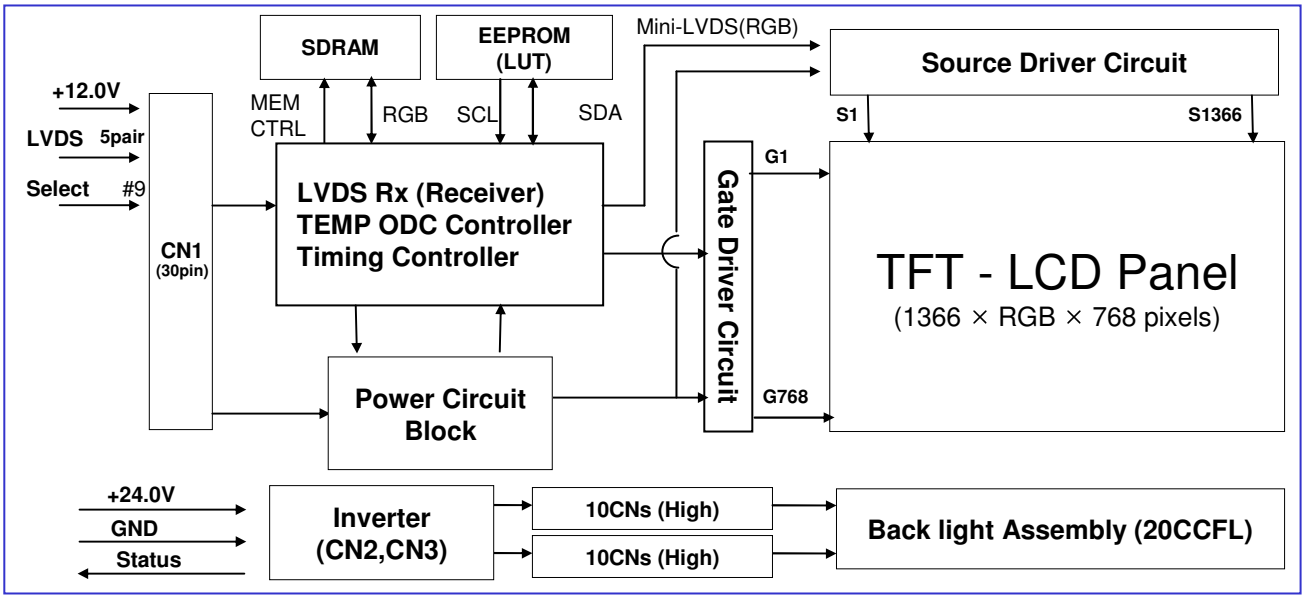
CONTENTS

RECORD OF REVISIONS

Revision No.	Revision Date	Page	Description
0.0	Apr,25, 2006	-	Preliminary Specification(First Draft)
0.1	Jun,13, 2006	-	First Revision for Philips Request
0.2	Jun,30, 2006	-	Second Revision for Philips Request
0.3	Jul, 18 ,2006	4,24	Change LCM Weight (14.0 Kg → 13.0 Kg)
		4	Change LCM Block diagram
		7	Update for Electrical Characteristics (CAS unification)
		8,9,10	Update for LVDS Pin 9 Description (CAS unification)
		11	Update for Inverter Pin Configuration (CAS unification)
		12,13	Update for Signal Timing Specifications (CAS unification)
		15	Update for Power Sequence (CAS unification)
		17	Update for Response Time & Gray Scale for Optical Characteristics
		25	Update International Standards for Safety
		30	Add Appendix B for the Impedance level of pin no.9
0.4	Jul.24,2006	17	Change Optical Characteristics Conditioin (Vbr =3.3V → Boost 1.65V)
0.5	Aug.2,2006	4	DCR concept removed
		7	Note 3 updated
		8	Note 3 removed, DCR concept removed at pin description
		15	Note 5 updated
		17	Update for Optical Characteristics for R/G/B Coordinates
1.0	Oct.2	-	Final specification
1.1	Oct.27,2006	22	Change Case Top Pad from 0.3t to 0.5t. ... Note 2)
1.2	Dec.11,2006	22	Change Gap Spec Between Top Case and Glass.
			Final Specification

1. General Description

The LC420WX3 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 42.0 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 arranged 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, thus presenting 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.



General Features

Active Screen Size	42.02 inches(1067.308mm) diagonal
Outline Dimension	983 mm(H) x 576 mm(V) x 51 mm(D) (Typ.)
Pixel Pitch	0.227mm x 0.681mm x RGB
Pixel Format	1366 horiz. by 768 vert. Pixels RGB stripe arrangement
Color Depth	8-bit, 16.7 M colors
Luminance, White	500 cd/m^2 (Center 1-point) (Typ.)
Viewing Angle (CR>10)	Viewing Angle Free (R/L 178 (Typ.), U/D 178 (Typ))
Power Consumption	Total 170.4 W (Typ.) (Logic=6.36 W, Inverter=164W [I_{BL}=6.2 mA])
Weight	13.0Kg (Typ.)
Display Operating Mode	Transmissive mode, Normally black
Surface Treatment	Hard coating(3H), Anti-glare treatment of the front polarizer (Haze 13%)

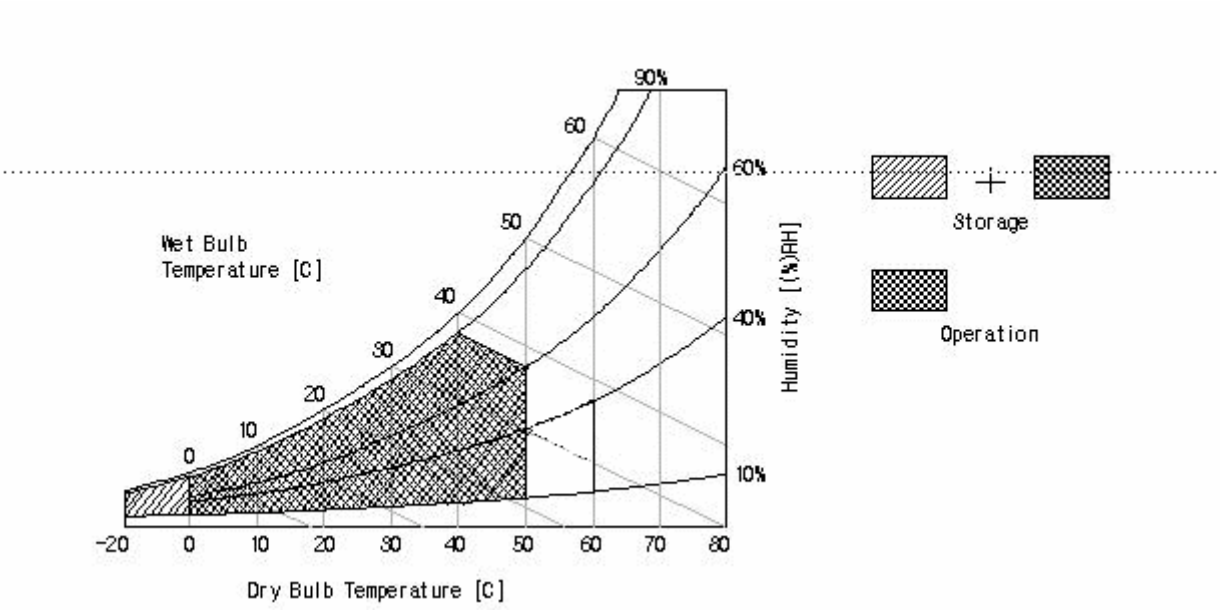
2. Absolute Maximum Ratings

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	LCD circuit	V_{LCD}	-0.3	+14.0	V_{DC}	at 25 ± 2 °C
	Inverter	V_{BL}	21.6	28.0	V_{DC}	
Inverter Control Voltage	ON/OFF	V_{OFF}/V_{ON}	-0.3	+5.25	V_{DC}	
	Brightness	V_{BR}	0.0	+5.0	V_{DC}	
Operating Temperature		T_{OP}	0	+50	°C	Note 1
Storage Temperature		T_{ST}	-20	+50	°C	
Operating Ambient Humidity		H_{OP}	10	90	%RH	
Storage Humidity		H_{ST}	10	90	%RH	

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



3. Electrical Specifications

3-1. Electrical Characteristics

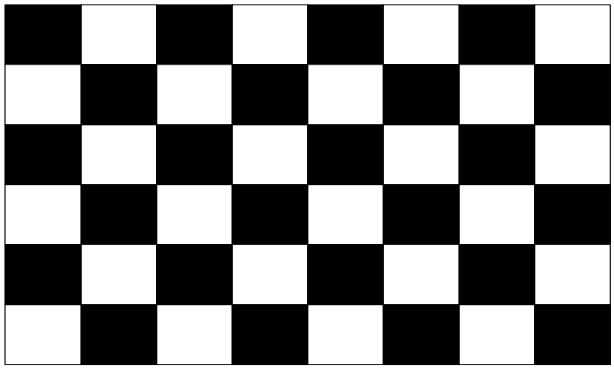
It requires two power inputs. One is employed to power for the LCD circuit. The other input power for the CCFL/Backlight is to power inverter.

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}	-	530	689	mA	1
		-	740	962	mA	2
Power Consumption	P_{LCD}		6.36	8.27	Watt	1
Rush current	I_{RUSH}	-	-	3.0	A	3

Note : 1. The specified current and power consumption are under the V_{LCD}=12.0V, 25 ± 2°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 the maximum current 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)

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				-0.2		0.2	Vp-p	1
Power Supply Input Current			IBL	-	6.8	7.25	A	ExtVbr-B = 100% Boost = 1.65V
				-	7.7	8.1	A	ExtVbr-B = 100% Boost = 3.3V
Power Supply Input Current(In-Rush)			Irush	-	-	13	A	VBL = 22.8V EXTVbr-B=100% Boost = 1.65V
Power Consumption			PBL	-	164	174	W	1
Input Voltage for Control System Signals	Brightness Adjust		VBR	0.0	-	3.3	Vdc	2
	On/Off	On	V on	2.5	-	5.0	Vdc	
		Off	V off	-0.3	0.0	0.5	Vdc	
Brightness Adj(Burst mode)			EXTVbr-B	20		100	%	
PWM Frequency for NTSC & PAL			NTSC/PAL	145		245	Hz	3
Pulse Duty(PWM) (Burst mode)			High Level	2.5	-	5.0	V_{DC}	
			Low Level	0.0	-	0.6	V_{DC}	
Lamp Voltage (ExtVbr-B = 100%)			Vout	500	650	800	V(rms)	Boost = Typ
Lamp Current (ExtVbr-B = 100%)			I_{O-MAX}	6.3	6.8	7.3	mA(rms)	Boost = Max
			I_{O-TYP}	5.7	6.2	6.7	mA(rms)	Boost = TYP
			I_{O-MIN}	5.1	5.6	6.1	mA(rms)	Boost = Min
Life Time			Boost =1.65V	50,000			Hrs	4
			Boost = 3.3V	40,000				

Notes :

1. Electrical characteristics are determined after the unit has been 'ON' and stable for approximately 120 minutes at 25±2°C. 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 0.4 Vp-p. LPL recommend Input Voltage is 24.0V ± 5%.
2. Brightness Control.
   This VBR Voltage control brightness.

VBR Voltage	Function
3.3V	Maximum Brightness (108%)
0V	Minimum Brightness (90%)

3. PWM freq. should be synchronized with the treble harmonic of Vsync signal of system.
4. Specified Values are forr 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 (Boost = 1.65V / 3.3V) on condition of continuous operating at 25 ± 2°C.

3-2. Interface Connections

This LCD module employs two kinds of interface connection, a 30-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-X30SSL-HF (Manufactured by JAE) or Equivalent
- Mating Connector : FI-30C2L (Manufactured by JAE) or Equivalent

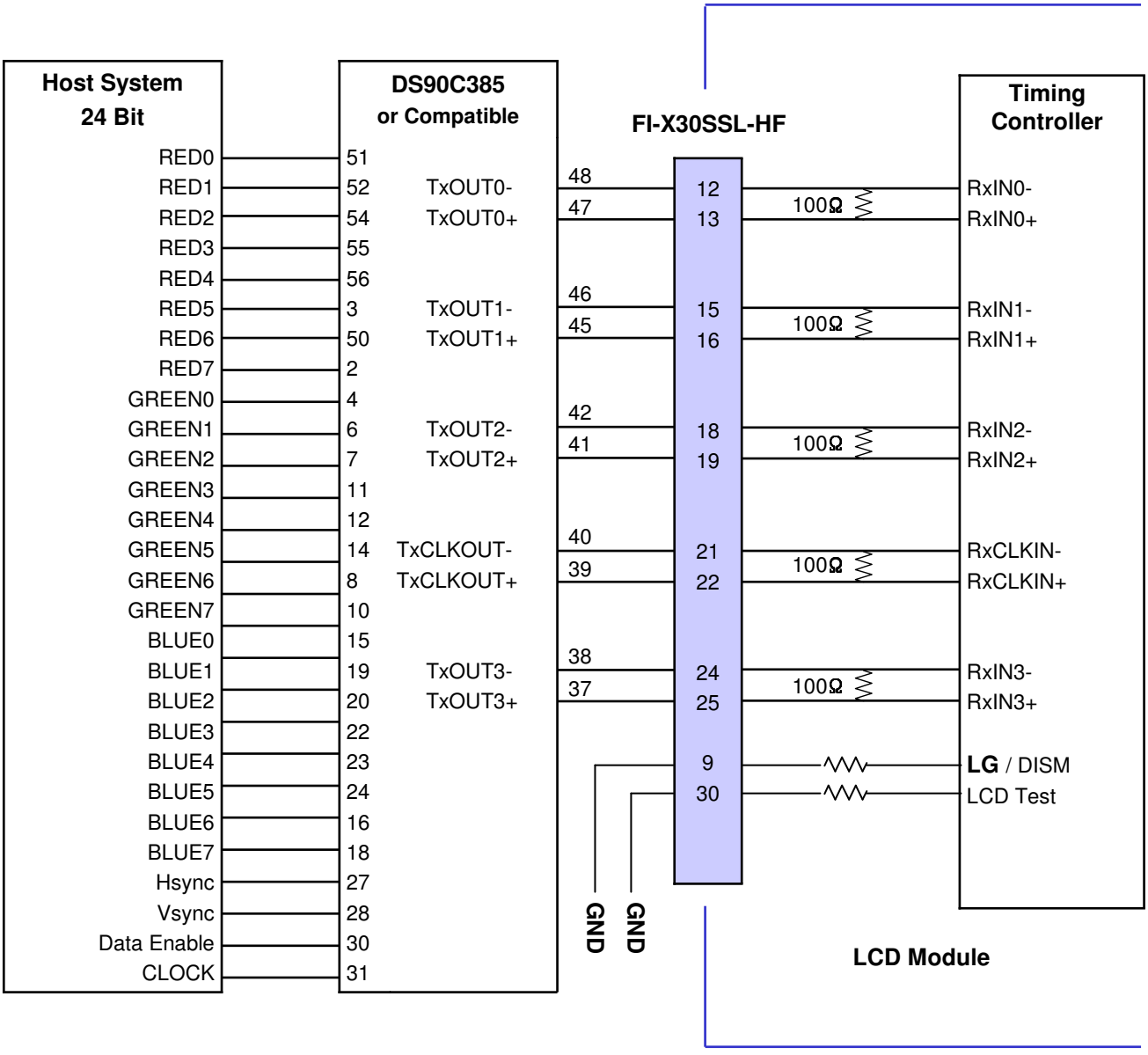
Table 4. MODULE CONNECTOR(CN1) PIN CONFIGURATION

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	Select	Select LVDS Data format	1
10	Reserved(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(NC)	No Connection	
28	Reserved(NC)	No Connection	
29	GND	Ground	
30	GND	Ground	3

Note:

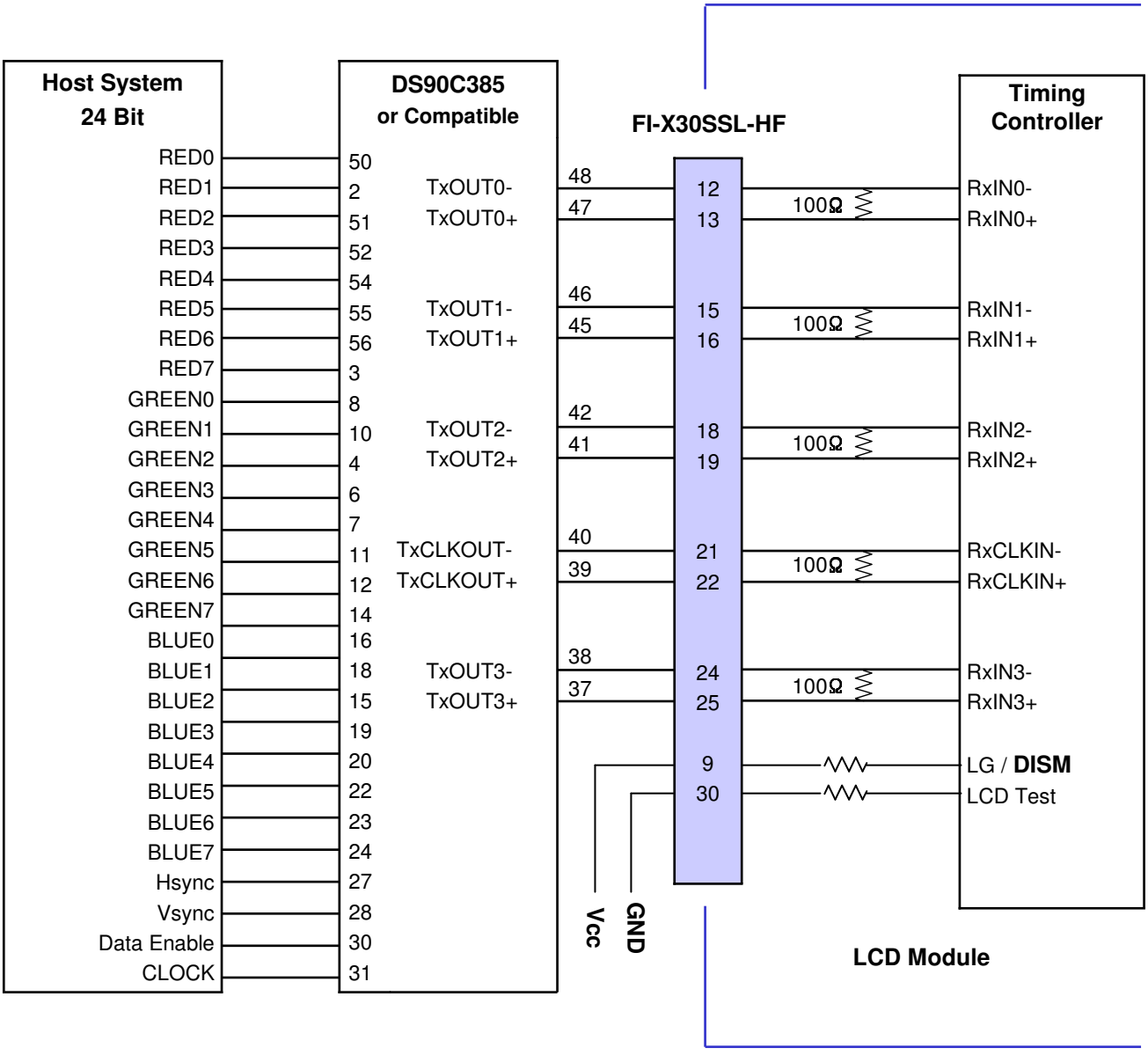
1. The pin no 9 is an option pin for DISM or LG format.(LG Format = “GND”or“OPEN”/ DISM Format =“VCC”) Please refer to page 9 ,10 and 30 for further details.
2. The pin no 30 is LCD Test option.
   “AGP” (Auto Generation LCM operates Pattern) or “NSB” (No Signal Black) is case that LVDS signals are out of frequency or abnormal condition in spite of 12 volt power supply.
   LPL recommends “NSB”. (AGP : “VCC” or “OPEN” / NSB : “GND”)
3. All GND (ground) pins should be connected together, which should be also connected to the LCD module’s metal frame.
4. All V_{LCD} (power input) pins should be connected together.
5. Input Levels of LVDS signals are based on the IEA 664 Standard.

Table 5. REQUIRED SIGNAL ASSIGNMENT FOR LVDS TRANSMITTER (Pin9="Low"or "OPEN")



Note: 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. (DS90C385 or Compatible)
3. '7' means MSB and '0' means LSB at R,G,B pixel data.

Table 6. REQUIRED SIGNAL ASSIGNMENT FOR LVDS TRANSMITTER (Pin9="High")



Note: 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. (DS90C385 or Compatible)
3. '7' means MSB and '0' means LSB at R,G,B pixel data.

3-2-2. Backlight Inverter

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

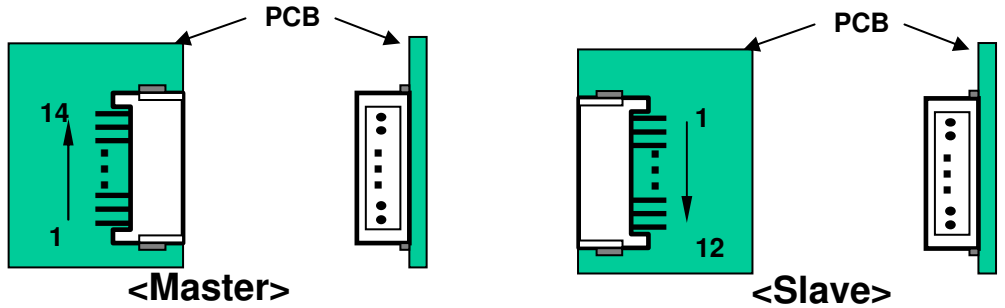
Slave
-Inverter Connector : S12B-PH-SMC
(manufactured by JST) or Equivalent
-Mating Connector : PHR-12 or Equivalent

Table 7. INVERTER CONNECTOR PIN CONFIGULATION

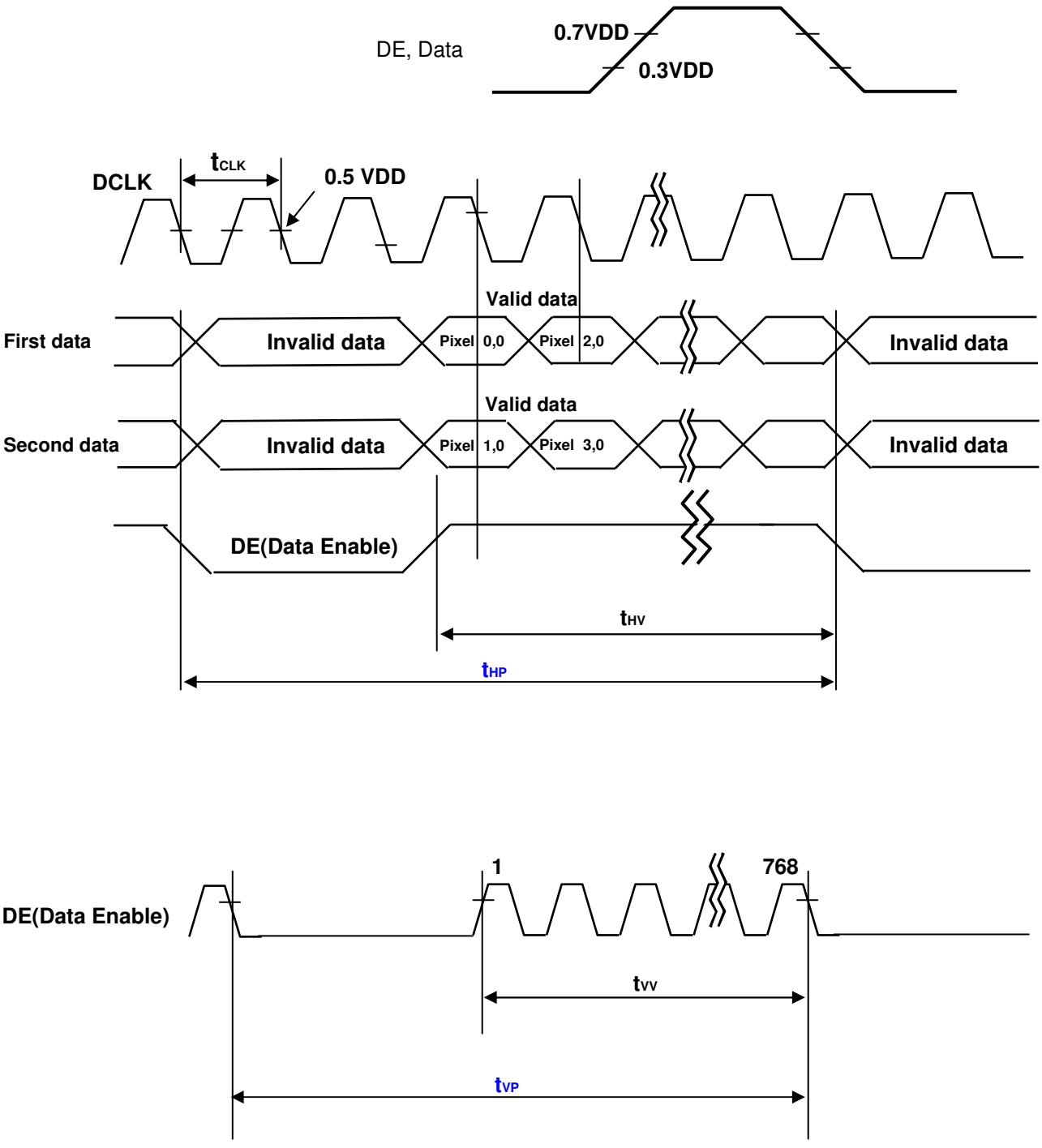
Pin No	Symbol	Description	Master	Slave	Note
1	V_{BL}	Power Supply +24.0V	V_{BL}	V_{BL}	
2	V_{BL}	Power Supply +24.0V	V_{BL}	V_{BL}	
3	V_{BL}	Power Supply +24.0V	V_{BL}	V_{BL}	
4	V_{BL}	Power Supply +24.0V	V_{BL}	V_{BL}	
5	V_{BL}	Power Supply +24.0V	V_{BL}	V_{BL}	
6	GND	POWER GND	GND	GND	1
7	GND	POWER GND	GND	GND	
8	GND	POWER GND	GND	GND	
9	GND	POWER GND	GND	GND	
10	GND	POWER GND	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. (Even though Pin #14 is GND or no connection, there is no effect on inverter operating)
6. Each impedance of pin #11, 12 and 13 is 4.9 [MΩ] , 290 [KΩ] and 145 [KΩ].

◆ Rear view of LCM



3-4. Signal Timing Waveforms



3-3. Signal Timing Specifications

Table 8 and Table9 show 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 8. TIMING TABLE for NTSC &PAL

[DE (Data Enable) Only]

ITEM	Symbol		Min	Typ	Max	Unit	Note
DCLK	Period	t_{CLK}	12.5	13.8	15.8	ns	
	Frequency	-	63	72.4	80	MHz	
Hsync	Period	t_{HP}	1456	1528	1920	t_{CLK}	
	Horizontal Valid	t_{HV}	1366	1366	1366	t_{CLK}	
	Horizontal Blank	-	t_{HP}- t_{HV}	162	t_{HP}- t_{HV}		
	Frequency	f_H	45	47.4	50	KHz	
	Width	t_{WH}	-	32	-	t_{CLK}	
	Horizontal Back Porch	t_{HBP}	24	48	-		
	Horizontal Front Porch	t_{HFP}	40	80	-		
Vsync	Period	t_{VP}	776	790	1063	t_{HP}	Note 1) PAL : 47~53Hz NTSC : 57~63Hz
	Vertical Valid	t_{VV}	768	768	768	t_{HP}	
	Vertical Blank	-	t_{VP}- t_{VV}	22	t_{VP}- t_{VV}	t_{HP}	
	Frequency	f_V	47	60	63	Hz	
	Width	t_{WV}	-	5	-	t_{HP}	
	Vertical Back Porch	t_{VBP}	5	15	-	Hz	
	Vertical Front Porch	t_{VFP}	1	2	-	t_{HP}	

Note :

1. The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rate.
2. Above Timing Tables are only valid for DE Mode.

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 9 provides a reference for color versus data input.

Table 9. 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

3-6-1. LCD Driving circuit

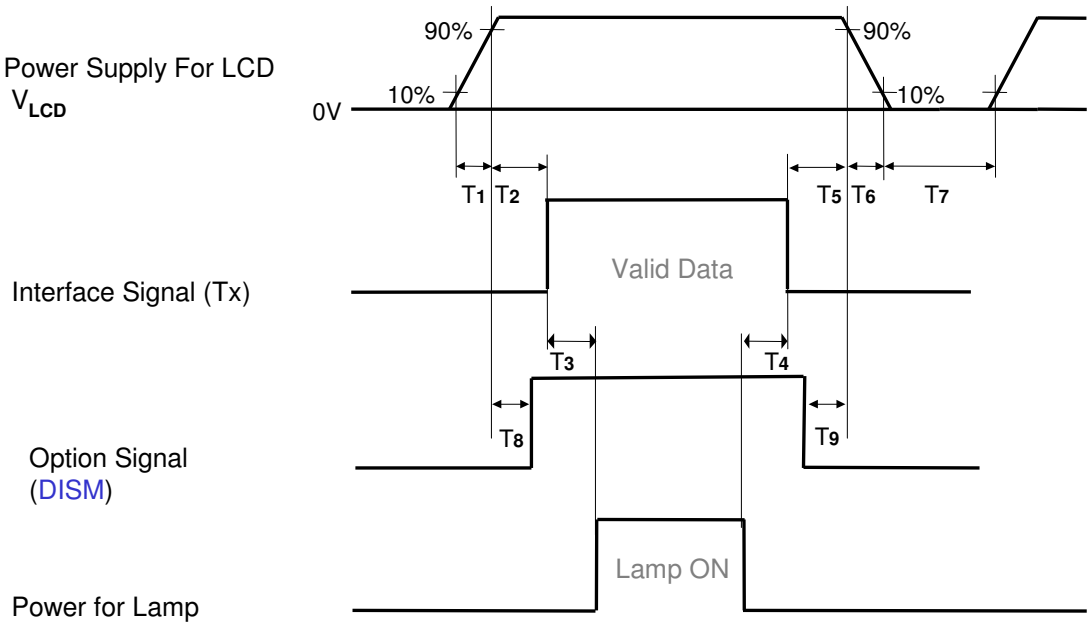


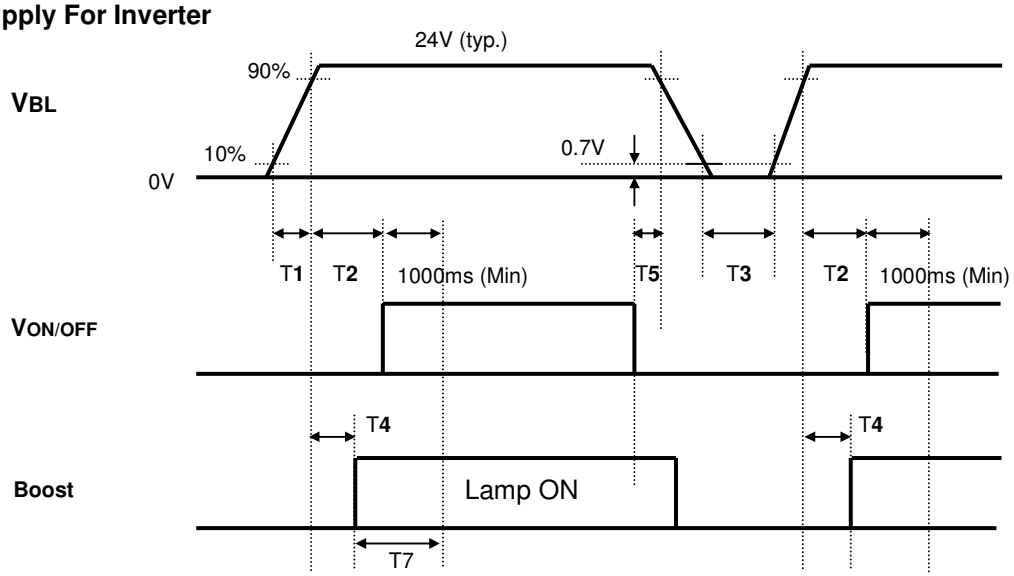
Table 10. POWER SEQUENCE

Parameter	Value			Unit
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0.5	-	50	ms
T3	200	-	-	ms
T4	200	-	-	ms
T5	0.5	-	50	ms
T6	0.01	-	300	ms
T7	1.0	-	-	s
T8	0 < T8 < T2			ms
T9	0 < T9 < T5			ms

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 maximum specification, it operates protection pattern(Black pattern) till valid signal inputted. There is no reliability problem.
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 option signal(DISM) precedes the on time of Power(VLCD),check the LCD logic Power(Vcc) is under 0.8V, otherwise it will be happened abnormal display.
6. Flicker would come out when power on-off(T7=under 1s) is continuously tested over several ten-times

3-6-2. Sequence for Inverter

Power Supply For Inverter



EXTVBR-B : 1. Lamp ON at PWM Rising Edge and Lamp OFF at PWM Falling Edge.
2. EXTVBR-B has Same sequence with Boost

3-6-3. Deep condition for Inverter

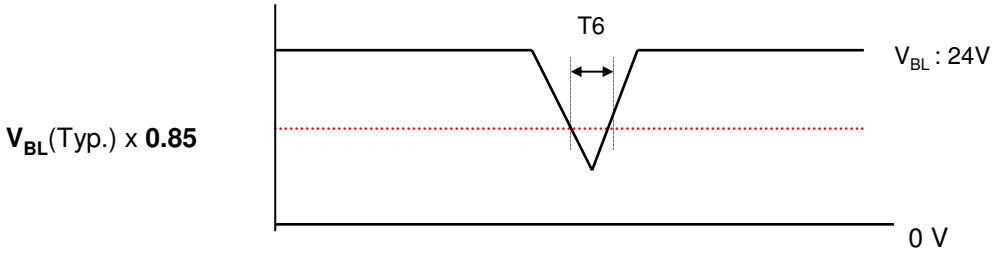


Table 11. Power Sequence for Inverter

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 **0.85**
T7	1000	-	-	ms	3

Notes : 1. T1 describes rising time of 0V to 24V and is not applied at restarting time.
2. T4(max) is less than T2.
3. In T7 section, EXTVBR-B should be duty 100%.
4. When V_{BL}[24V] is supplied always, there is no reliability problem.

4. Optical Specification

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

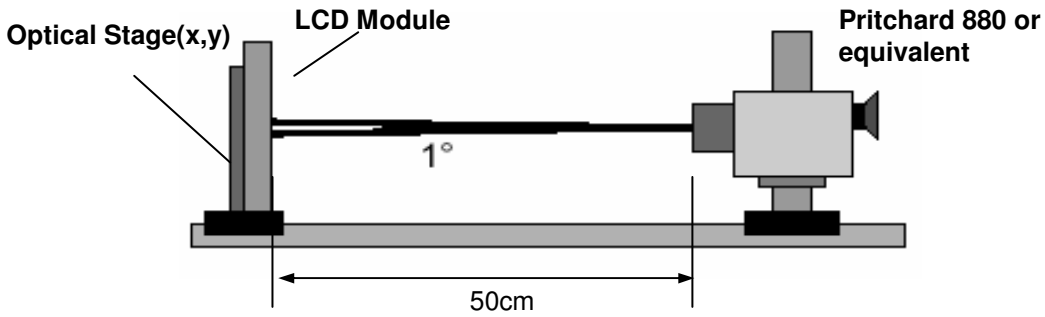


FIG. 1 Optical Characteristic Measurement Equipment and Method

Table 12. OPTICAL CHARACTERISTICS Ta= 25±2°C, V_{LCD}=12.0V, fv=60Hz, Dclk=72.4MHz, Boost=1.65V

Parameter		Symbol	Value			Unit	Note
			Min	Typ	Max		
Contrast Ratio		CR	800	1000			1
Surface Luminance, white		L_{WH}	400	500		cd/m²	2
Luminance Variation		δ_{WHITE} 5P			1.3		3
Response Time	Gray-to-Gray	G to G	-	5	8	ms	4
	Rise + decay	$Tr_R + Tr_D$	-	10	14		
Color Coordinates [CIE1931]	RED	Rx	Typ -0.03	**0.635**	Typ +0.03		
		Ry		**0.343**			
	GREEN	Gx		**0.283**			
		Gy		**0.608**			
	BLUE	Bx		**0.145**			
		By		**0.060**			
	WHITE	Wx		0.272			
		Wy		0.278			
Viewing Angle (CR>10)							
	x axis, right(ϕ=0°)	θr	85	89	-	degree	5
	x axis, left (ϕ=180°)	θl	85	89	-		
	y axis, up (ϕ=90°)	θu	85	89	-		
	y axis, down (ϕ=270°)	θd	85	89	-		
Gray Scale			-	2.2	-		6

Note :

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

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

It is measured at center 1-point.

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 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)

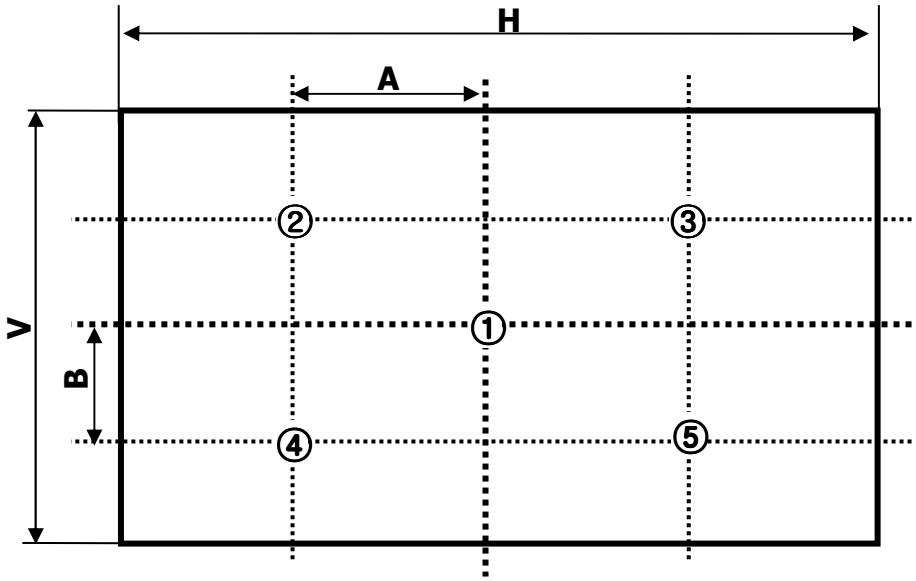
5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD module surface. For more information, see the FIG. 4.

6. Gray scale specification
Gamma Value is approximately 2.2. For more information, see the Table 13.

Table 13. GRAY SCALE SPECIFICATION

Gray Level	Luminance [%] (Typ)
L0	0.11
L15	0.19
L31	1.08
L47	2.07
L63	4.51
L79	7.75
L95	12.05
L111	17.06
L127	22.36
L143	28.21
L159	35.56
L175	43.96
L191	53.00
L207	63.37
L223	74.66
L239	88.17
L255	100

Measuring point for surface luminance & measuring point for luminance variation



A : H / 4 mm
B : V / 4 mm
H : 930.25 mm
V : 523.01 mm
@ H,V : Active Area

FIG.2 Measure Point for Luminance

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

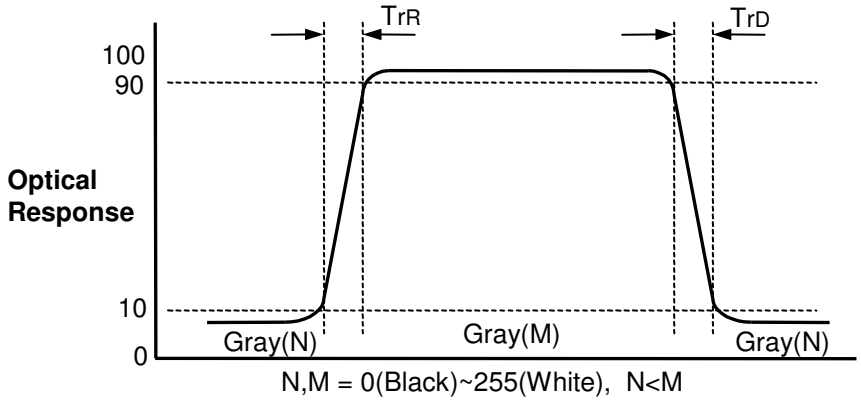


FIG.3 Response Time

Dimension of viewing angle range

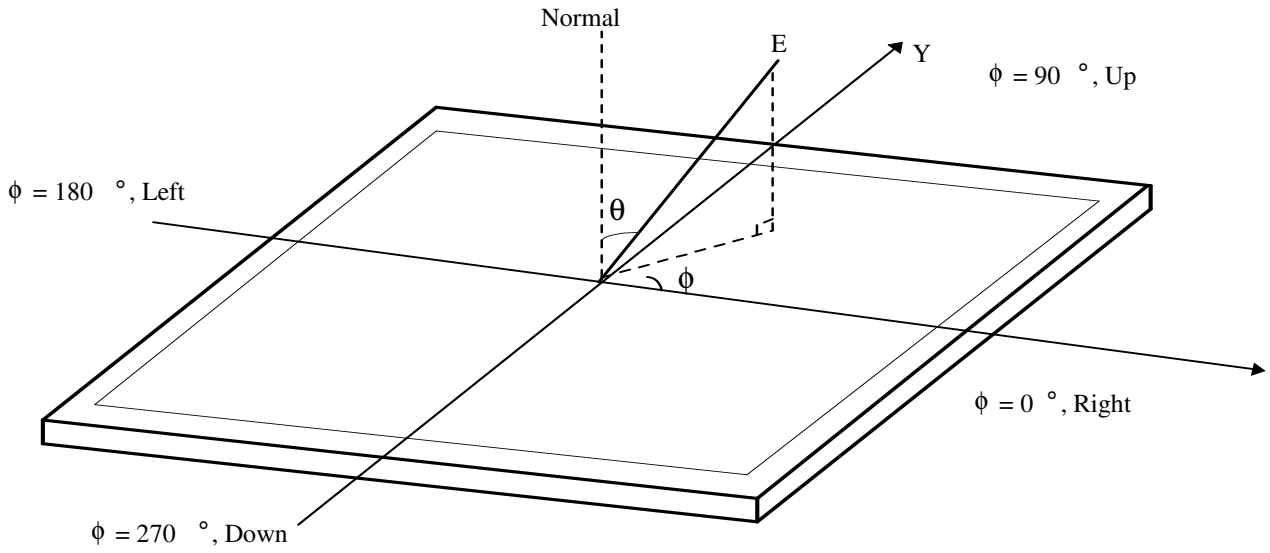


FIG.4 Viewing Angle

5. Mechanical Characteristics

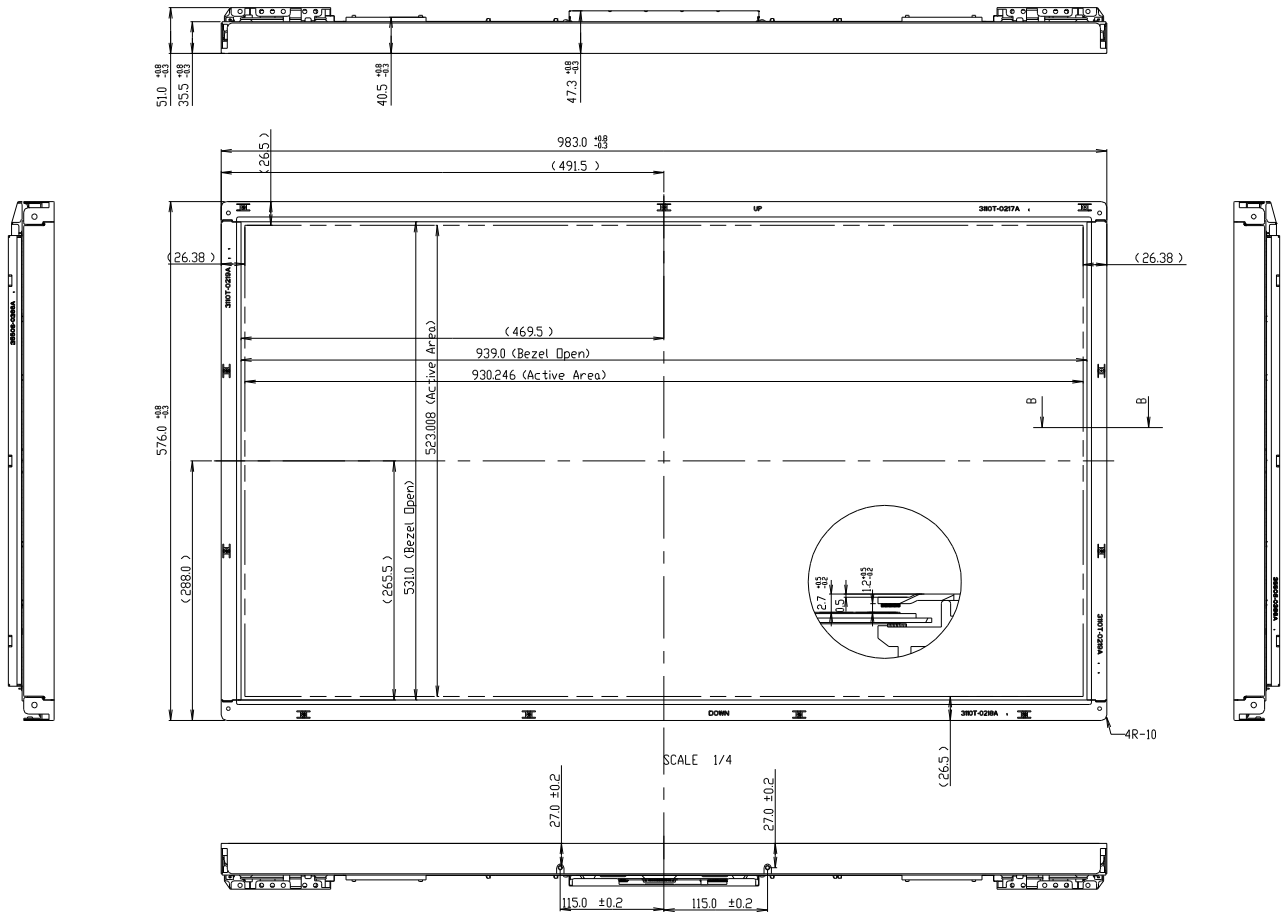
The contents provide general mechanical characteristics. In addition the figures in the next page are detailed mechanical drawing of the LCD module.

Table 14. MECHANICAL CHARACTERISTICS

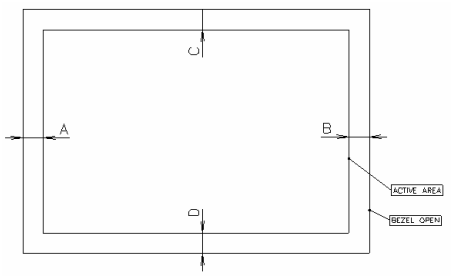
Item	Value	
Outline Dimension	Horizontal	983.0 mm
	Vertical	576.0 mm
	Depth	51.0 mm
Bezel Area	Horizontal	939.0 mm
	Vertical	531.0 mm
Active Display Area	Horizontal	930.25 mm
	Vertical	523.01 mm
Weight	13.0Kg (Typ.) , 14.0Kg (Max.)	
Surface Treatment	Hard coating(3H) Anti-glare treatment of the front polarizer (Haze 13%)	

Note : 1.Please refer to a mechanic drawing in terms of tolerance at the next page.

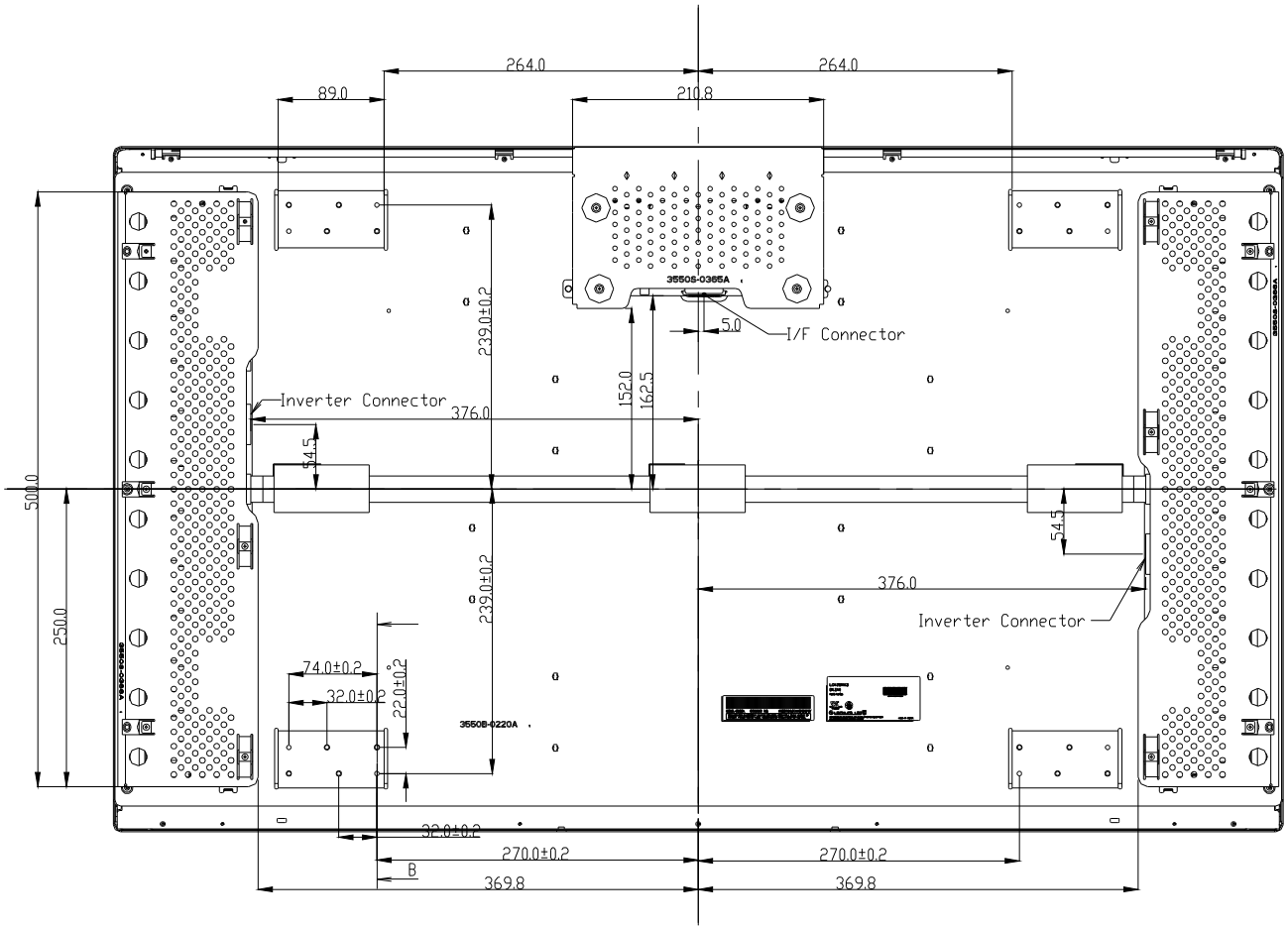
<FRONT VIEW>

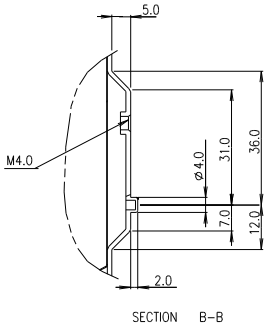


NOTE
1. Unspecified tolerance is ±1.0mm
2. Tilt and partial disposition tlerance of display area as follow
   1) Y-direction : ABS(A-B)<=1.5
   2) X-direction : ABS(C-D)<=1.5



<REAR VIEW>


264.0
264.0
89.0
210.8
3550B-0365A
5.0
I/F Connector
239.0±0.2
152.0
162.5
Inverter Connector
376.0
54.5
500.0
250.0
376.0
Inverter Connector
74.0±0.2
32.0±0.2
22.0±0.2
3550B-0220A
32.0±0.2
270.0±0.2
270.0±0.2
B
369.8
369.8


5.0
M4.0
Ø4.0
31.0
36.0
7.0
12.0
2.0
SECTION B-B

6. Reliability

Table 16. ENVIRONMENT TEST CONDITION

No.	Test Item	Condition
1	High temperature storage test	Ta= 50˚C 240h
2	Low temperature storage test	Ta= -20˚C 240h
3	High temperature operation test	Ta= 50˚C 50%RH 240h
4	Low temperature operation test	Ta= 0˚C 240h
5	Vibration test (operating)	Wave form : random Vibration level : 1.0Grms Bandwidth : 10-300Hz Duration : X,Y,Z, 30 min One time each direction
6	Shock test (operating)	Shock level : 50Grms Waveform : half sine wave, 11ms Direction : ±X, ±Y, ±Z One time each direction
7	Humidity condition Operation	Ta= 40 ˚C ,90%RH
8	Altitude operating storage / shipment	0 - 14,000 feet(4267.2m) 0 - 40,000 feet(12192m)

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) C.I.S.P.R “Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment.“ International Special Committee on Radio Interference.
c) EN 55022 “Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment.“ European Committee for Electrotechnical Standardization.(CENELEC), 1998 (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 ~ 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	3	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 :1150 mm X 1000 mm X 820 mm.

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 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 causes metallic foreign material and deal LCM a fatal blow)
(9) Please do not set LCD module on its edge.

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.