LG.PHILIPS LCD
LP201WE1
Liquid Crystal Display
Product Specification

SPECIFICATION
FOR
APPROVAL

( ) **Preliminary Specification**
(●) **Final Specification**

Title	20.1" WSXGA+ TFT LCD

BUYER	HP
MODEL	

SUPPLIER	LG.Philips LCD Co., Ltd.
*MODEL	LP201WE1
Suffix	TLA1

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

SIGNATURE	DATE
/	
/	
/	

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

SIGNATURE	DATE
S.C .Yun / G.Manager	
REVIEWED BY	
Y.S. Ha / Manager	
PREPARED BY	
S.H.Kim / Engineer	김수환 07.06.15

Products Engineering Dept.
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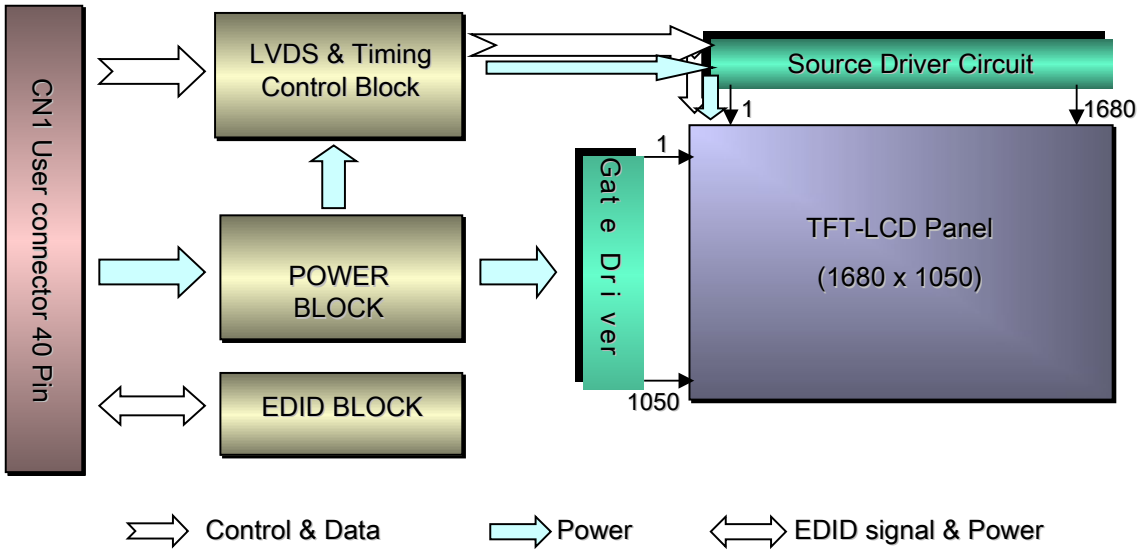
RECORD OF REVISIONS

Revision No	Revision Date	Page	Description	Note
0.0	10.AUG.2006	-	First Draft (Preliminary Specification)	
0.1	29.AUG.2006	28~30	Add E-EDID Data (preliminary), Checksum=0x9C	
0.2	21.SEP.2006	10 11 20~22	Update the Backlight connector pin configuration Add LVDS input diagram (Fig.1 Signal Timing Diagram) Update the Mechanical Characteristics (Drawings)	
0.3	26.SEP.2006	5, 7, 15 19 20 23	Change Lamp Current (Typ. 8mA → 7.5mA) & Lamp Power Change the Bezel Area (Vertical : 247.7± 0.5mm → 274.8 ± 0.5mm) Add Lamp Wire Outlet Dimension Change the shock test condition of Reliability (No. 6)	
0.4	16.OCT.2006	7	Change Lamp Voltage(Min. 730) & Current(Max. 9.0mA → 8.0mA) Change Lamp Starting Voltage(at 25℃ 1650V_{RMS} → 1250V_{RMS} at 0 ℃ 1950V_{RMS} → 1550V_{RMS})	
0.5	05.DEC.2006	9	Change 40pin Pin_map (VESA format)	
0.6	26.DEC.2006	10	Change Backlight Pin_map	
0.7	30.JAN.2007	5, 7 14 15 18 20~22 25 30	Add the Current spec. of V_{EDID} & update the Electrical Characteristic Add the Power sequence timing of V_{EDID} Add the Color Coordinates of Red, Green, Blue Update the Gray Scale Update Mechanical Drawing (Wire length, Top case gap) Update the Packing Form (Package quantity & box size) Update the EDID (Checksum : B7)	
0.8	05.MAR.2007	5,9 5 7 10 14 20 21 28~30	Change Power Consumption : 15.6 Watt → 15.0 Watt (Change Lamp Current (Typ. 7.5mA → 7.0mA),(Max. 8.0mA → 7.5mA) (Change LCD Interface Chip(0ITLL-0018B → 0ISWL-0011B) Update Polarizer Hardness : 2H → 3H Change Lamp Current and Power Consumption Change Lamp Wire Color Add T_0, T_8 Power Sequence Change Mechanical Drawing (Top case beading) Change Mechanical Drawing (Cover bottom shape) Update EEDID Data (Checksum=1C)	
0.9	30.MAR.2007	20, 21	Change Mechanical Drawing (bottom tape shape and location)	
1.0	12.JUN.2007	5 7 22	Change Power Consumption : 15.0 Watt → 14.6 Watt (Change Lamp Voltage (Typ. 770V → 750V),Circuit: 4.1Watt@Black) Change LCM and Lamp Power Consumption Change Topcase gap Spec.:0.5±0.2 →0.7±0.2	
1.1	14.JUN.2007	10	Change Lamp Wire Color (Wire High Color:Blue/Gray→Blue/Pink) Final Specificaton	

1. General Description

LP201WE1 is a Color Active Matrix Liquid Crystal Display with an integral Cold Cathode Fluorescent 2 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 white mode. It has a 20.1 inch diagonally measured active display area with WSXGA+ resolution (1050 vertical by 1680 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 brightness 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 8Bit 2 port LVDS interface. It is intended to support displays where high brightness, wide viewing angle, and high color are important.



General Features

Active Screen Size	20.1 inches(511.133mm) diagonal (Aspect ratio 16:10)
Outline Dimension	453.5(H) x 296.5 (V) x 8.3(D) mm (Typ.)
Pixel Pitch	0.258mm x 0.258mm
Pixel Format	1680 horiz. by 1050 Pixels RGB strip arrangement
Color Depth	8bit, 16.7M colors
Luminance, White	320 cd/m^2 (Typ.) 5 point Avg.
Viewing Angle (CR>10)	Viewing Angle R/L 160˚(Typ.), U/D 140˚(Typ)
Power Consumption	14.6Watt(Typ.) (Circuit: 4.1Watt@Black, B/L: 10.5Watt @each Lamp=7.0mA)
Weight	1220g Max
Display Operating Mode	Transmissive mode, normally White
Surface Treatment	Hard coating & Glare (3H) treatment of the front polarizer

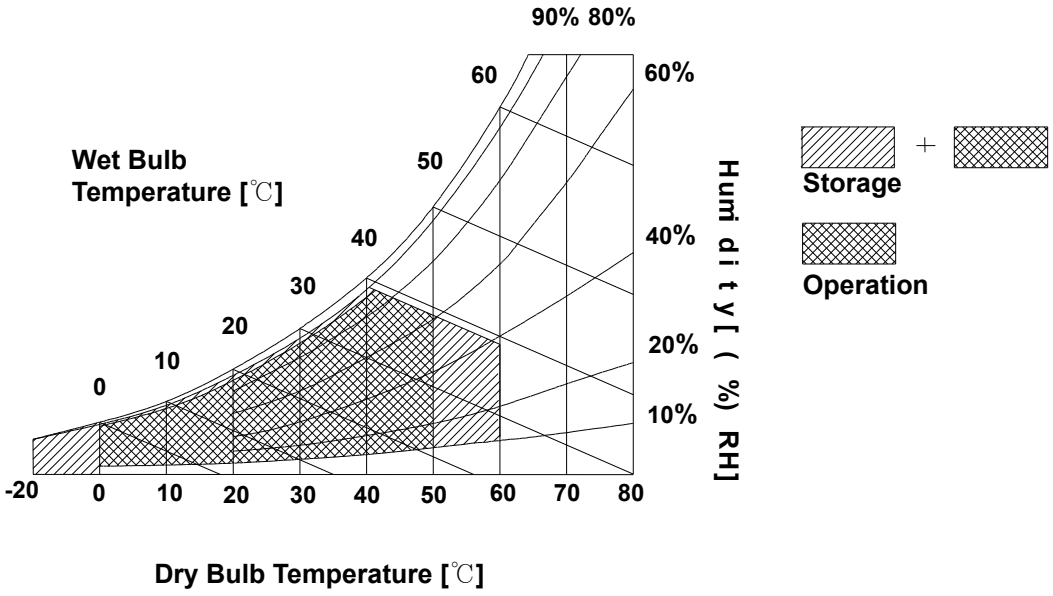
2. Absolute Maximum Ratings

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

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Values		Units	Notes
		Min	Max		
		0	50		
Storage Temperature	HST	-20	60	° C	1
Operating Ambient Humidity	HOP	10	90	%RH	1
Storage Humidity	HST	10	90	%RH	1

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.



3. Electrical Specifications

3-1. Electrical Characteristics

The LP201WE1(TLA1) requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second input which powers the CCFL, is typically generated by an inverter. The inverter is an external unit to the LCD.

Table 2. ELECTRICAL CHARACTERISTICS

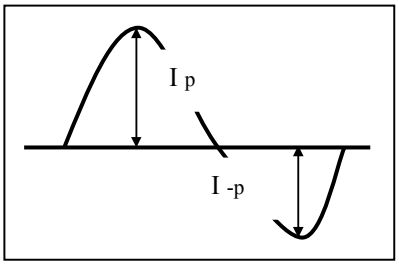
Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
MODULE :						
Power Supply Input Voltage	V_{EDID}	3.0	3.3	3.6	V_{DC}	
	V_{CC}	4.5	5.0	5.5	V_{DC}	
Power Supply Input Current	I_{EDID}	100	120	140	mA	1
	I_{VCC}	630	740	860	mA	1
Power Consumption	$P_{VCC+EDID}$	-	4.1	4.8	Watt	1
Differential Impedance	Zm	90	100	110	Ohm	2
LAMP (By 1Lamp)						
Operating Voltage	V_{BL}	730	750	880	V_{RMS}	3
Operating Current	I_{BL}	3.0	7.0	7.5	mA_{RMS}	4
Power Consumption	P_{BL}	-	5.25	5.63	W	9
Operating Frequency	f_{BL}	40	60	80	kHz	7
Discharge Stabilization Time	Ts	-	-	3	Minute	5
Life Time		15,000	-	-	Hrs	6
Established Starting Voltage at 25℃ at 0 ℃	V_S			 1250 1550	 V_{RMS} V_{RMS}	8

Note)

1. The specified current and power consumption are under the V_{CC} = 5.0V , 25℃, fv = 60Hz condition whereas Black pattern is displayed and fv is the frame frequency.
2. This impedance value is needed to proper display and measured form LVDS Tx to the mating connector.
3. The variance of the voltage is ± 10%.
4. The typical operating current is for the typical surface luminance (L_{WH}) in optical characteristics.
5. Define the brightness of the lamp after being lighted for 5 minutes as 100%, Ts is the time required for the brightness of the center of the lamp to be not less than 95%.
6. The life time is determined as the time at which brightness of lamp is 50% compare to that of initial value at the typical lamp current.
7. The output of the inverter must have symmetrical(negative and positive) voltage waveform and symmetrical current waveform.(Asymmetrical ratio is less than 10%) Please do not use the inverter which has asymmetrical voltage and asymmetrical current and spike wave.
   Lamp frequency may produce interface with horizontal synchronous frequency and as a result this may cause beat on the display. Therefore lamp frequency shall be as away possible from the horizontal synchronous frequency and from its harmonics in order to prevent interference.
8. The voltage above V_S should be applied to the lamps for more than 1 second for start-up. Otherwise, the lamps may not be turned on. The used lamp current is the lamp typical current.
9. The lamp power consumption shown above does not include loss of external inverter. The applied lamp current is a typical one.

Note)

10. Requirements for a system inverter design, which is intended to have a better display performance, a better power efficiency and a more reliable lamp, are following.
    It shall help increase the lamp lifetime and reduce leakage current.
    a. The asymmetry rate of the inverter waveform should be less than 10%.
    b. The distortion rate of the waveform should be within $\sqrt{2}$ ±10%.
    * Inverter output waveform had better be more similar to ideal sine wave.



* Asymmetry rate:

$| I_p - I_{-p} | / I_{rms} * 100\%$

* Distortion rate

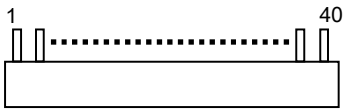
I_p (or I_{-p}) / I_{rms}

※ Do not attach a conducting tape to lamp connecting wire.
If the lamp wire attach to a conducting tape, TFT-LCD Module has a low luminance and the inverter has abnormal action. Because leakage current is occurred between lamp wire and conducting tape.

3-2. Interface Connections

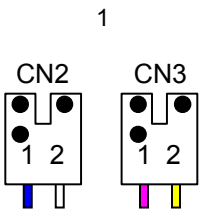
This LCD employs two interface connections, a 40 pin connector is used for the module electronics interface and the other connector is used for the integral backlight system.

Table 3. MODULE CONNECTOR PIN CONFIGURATION (CN1)

Pin	Symbol	Description	Notes
1	VSS	Ground	1. Interface chips 1.1 LCD : 0ISWL-0011B (LCD Controller) including LVDS Receiver (SILICON WORKS, Dual LVDS Receiver) 1.2 System : THC63LVDF823A or equivalent 2. Connector 2.1 LCD : JAE or its compatibles 2.2 Mating : JAE or equivalent. 2.3 Connector pin arrangement  [LCD Module Rear View]
2	VSS	Ground	
3	V_{CC}	Power Supply, 5.0V Typ.	
4	V_{CC}	Power Supply, 5.0V Typ.	
5	V_{CC}	Power Supply, 5.0V Typ.	
6	V_{EEDID}	Digital Power supply (3.3 Typ)	
7	V_{EEDID}	Digital Power supply (3.3 Typ)	
8	Clk EEDID	Two wire serial interface clock	
9	DATA EEDID	Two wire serial interface data	
10	RXinO0-	- LVDS differential data input, Chan 0-Odd	
11	RXinO0+	+ LVDS differential data input, Chan 0-Odd	
12	VSS	Ground	
13	RXinO1	- LVDS differential data input, Chan 1-Odd	
14	RXinO1+	+ LVDS differential data input, Chan 1-Odd	
15	VSS	Ground	
16	RXinO2-	- LVDS differential data input, Chan 2-Odd	
17	RXinO2+	+ LVDS differential data input, Chan 2-Odd	
18	VSS	Ground	
19	RXOC-	- LVDS Differential Clock input (Odd)	
20	RXOC+	+ LVDS Differential Clock input (Odd)	
21	VSS	Ground	
22	RXinO3-	- LVDS differential data input, Chan 3-Odd	
23	RXinO3+	+ LVDS differential data input, Chan 3-Odd	
24	VSS	Ground	
25	RXinE0-	- LVDS differential data input, Chan 0-Even	
26	RXinE0+	+ LVDS differential data input, Chan 0-Even	
27	VSS	Ground	
28	RXinE1-	- LVDS differential data input, Chan 1-Even	
29	RXinE1+	+ LVDS differential data input, Chan 1-Even	
30	VSS	Ground	
31	RXinE2-	- LVDS differential data input, Chan 2-Even	
32	RXinE2+	+ LVDS differential data input, Chan 2-Even	
33	VSS	Ground	
34	RXEC-	- LVDS Differential Clock input (Even)	
35	RXEC+	+ LVDS Differential Clock input (Even)	
36	VSS	Ground	
37	RXinE3-	- LVDS differential data input, Chan 3-Even	
38	RXinE3+	+ LVDS differential data input, Chan 3-Even	
39	VSS	Ground	
40	NC	Reserved	

The backlight interface connector is a model BHSR-02VS-1, manufactured by JST or Compatible

Table 4. BACKLIGHT CONNECTOR PIN CONFIGURATION (J3)

Pin	Symbol	Description	Notes
1	HV	Power Supply for the Lamp (High Voltage Side)	
2	LV	Power Supply for the Lamp (Low Voltage Side)	

[LCD Module Front View]

Note 1. The High Voltage side terminal is colored Blue / Pink, The Low Voltage side terminal is colored White / Yellow.

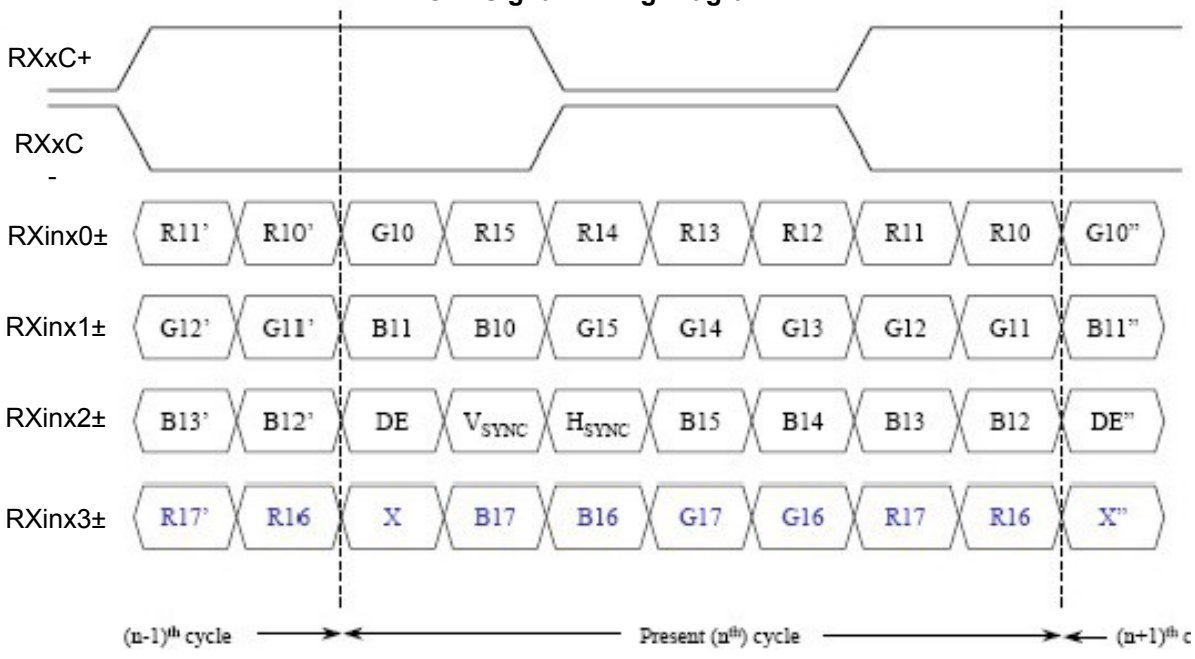
3-3. Signal Timing Specifications

This is the signal timing required at the input of the User connector. All of the interface signal timing should be satisfied with the following specifications and specifications of LVDS Tx/Rx for its proper operation.

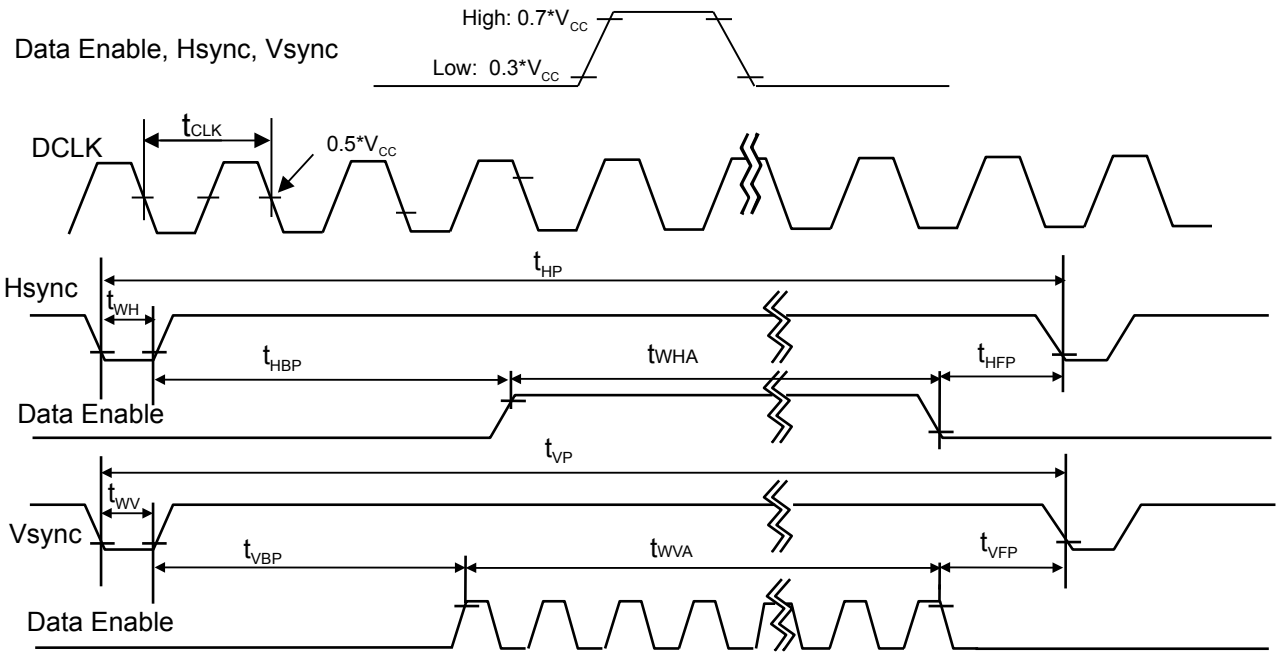
Table 5. TIMING TABLE

ITEM	Symbol		Min	Typ	Max	Unit	Note
DCLK	Period	t_{CLK}	8.33	8.40	8.47	ns	
	Frequency	f_{CLK}	118.0	119.0	120.0	MHz	
Hsync	Period	t_{HP}	1826	1840	1852	t_{CLK}	
	Width	t_{WH}	30	32	34		
	Active	t_{WHA}	1680	1680	1680		
Vsync	Period	t_{VP}	1073	1078	1084	t_{HP}	
	Width	t_{WV}	4	6	7		
	Active	t_{WVA}	1050	1050	1050		
Data Enable	Horizontal back porch	t_{HBP}	76	80	84	t_{CLK}	
	Horizontal front porch	t_{HFP}	40	48	54		
	Vertical back porch	t_{VBP}	17	19	23	t_{HP}	
	Vertical front porch	t_{VFP}	2	3	4		

FIG. 1 Signal Timing Diagram



3-4. Signal Timing Waveforms (Normal status)



3-5. Color Input Data Reference

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

Table 6. COLOR DATA REFERENCE

Color		Input Color Data		
		RED MSB LSB	GREEN MSB LSB	BLUE MSB LSB
		R7 R6 R5 R4 R3 R2 R1 R0	G7 G6 G5 G4 G3 G2 G1 G0	B7 B6 F11 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

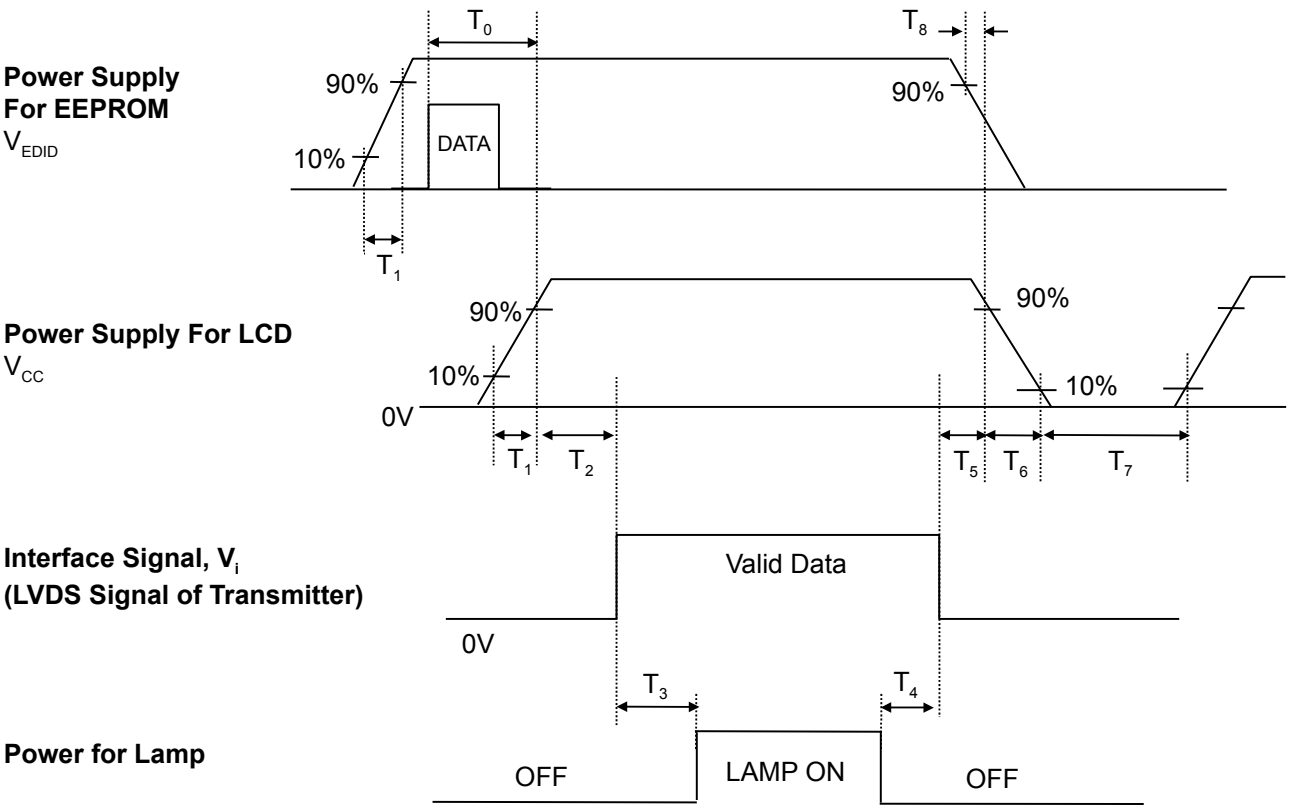


Table7. POWER SEQUENCE TABLE

Parameter3	Value			Units
	Min.	Typ.	Max.	
T_0	0	-	500	ms
T_1	-	-	10	ms
T_2	0	-	50	ms
T_3	200	-	-	ms
T_4	200	-	-	ms
T_5	0	-	50	ms
T_6	0	-	10	ms
T_7	1000	-	-	ms
T_8	0	-	5	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 for LCD V_{CC} to 0V.
3. Lamp power must be turn on after power supply for LCD and interface signal are valid.

4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25° C. The values specified are at an approximate distance 50cm from the LCD surface
at a viewing angle of Φ and Θequal to 0° .
FIG. 1 presents additional information concerning the measurement equipment and method.

FIG. 2 Optical Characteristic Measurement Equipment and Method

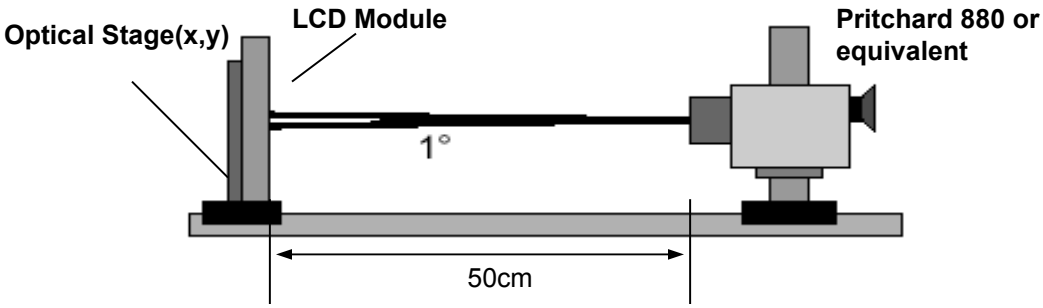


Table 8. OPTICAL CHARACTERISTICS

Ta=25° C, V_{CC}=5.0V, fv=60Hz, f_{CLK}= 119MHz, Iout = 7.0 mA

Parameter		Symbol	Values			Units	Notes
			Min	Typ	Max		
Contrast Ratio		CR	800	1000	-		1
Surface Luminance, white		L_{WH}	270	320	-	cd/m²	2
Luminance Variation		δ_{WHITE}	-	-	2.0		3
Response Time							
Rise Time+Decay Time		Tr_R+Tr_D	-	5	10	ms	
Color Coordinates							±0.03
	RED	RX	0.606	0.636	0.666		
		RY	0.315	0.345	0.375		
	GREEN	GX	0.272	0.302	0.332		
		GY	0.582	0.612	0.642		
	BLUE	BX	0.117	0.147	0.177		
		BY	0.042	0.072	0.102		
	WHITE	WX	0.283	0.313	0.343		
		WY	0.299	0.329	0.359		
Viewing Angle							5
	x axis, right(Φ=0°)	Θr	-	80	-	degree	
	x axis, left (Φ=180°)	Θl	-	80	-	degree	
	y axis, up (Φ=90°)	Θu	-	70	-	degree	
	y axis, down (Φ=270°)	Θd	-	70	-	degree	
Gray Scale							6

Note)

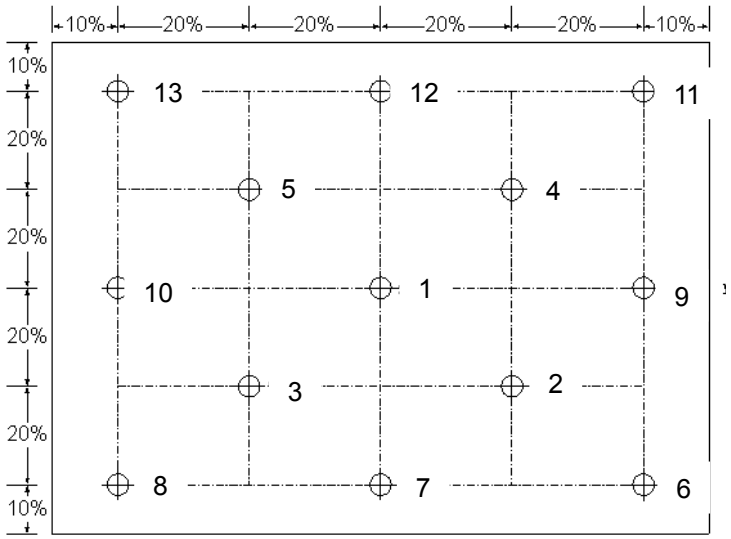
1. Contrast Ratio(CR) is defined mathematically as

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

2. Surface luminance is the 5point (1~5)average across the LCD surface 50cm from the surface with all pixels displaying white. For more information see FIG 2.

3. Luminance % uniformity is measured for 13 point For more information see FIG 2.
   δ WHITE = Maximum(LN1,LN2, ….. LN13) ÷ Minimum(LN1,LN2, ….. LN13)

<measuring point for surface luminance & measuring point for luminance variation>



Measuring Point
@ H,V: Active Area
H : 433.44 mm
V : 270.90 mm

FIG. 3 Measure Point for Luminance

4. Response time is the time required for the display to transition from white to black (rise time, Tr_R) and from black to white(Decay Time, Tr_D). For additional information see FIG 3.

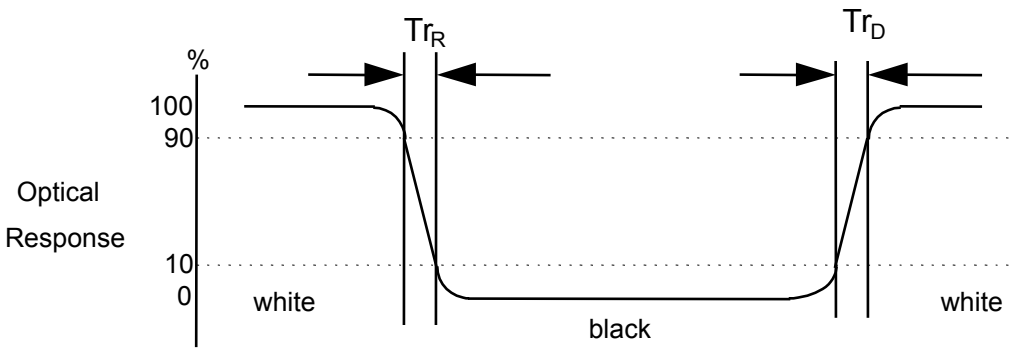


FIG. 4 Response Time

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 surface. For more information see FIG 4.

<Dimension of viewing angle range>

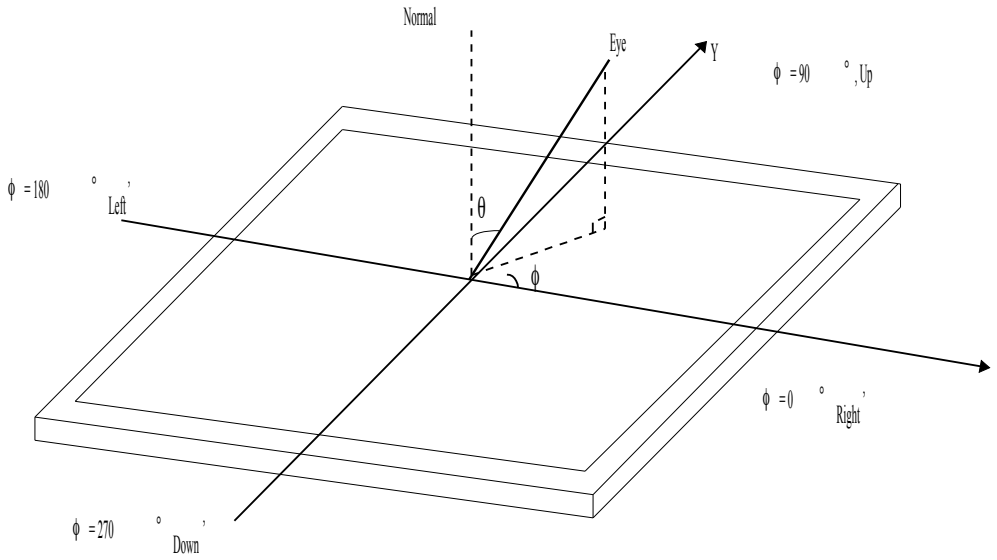


FIG. 5 Viewing angle

6. Gray scale specification

Gamma Value is approximately 2.2. For more information see Table 9.

Table 9. Gray Scale Specification

Gray Level	Luminance [%] (Typ)
L0	0.07
L15	0.18
L31	1.00
L47	2.30
L63	4.40
L79	7.40
L95	11.0
L111	15.5
L127	20.5
L143	26.5
L159	33.0
L175	42.5
L191	54.0
L207	65.0
L223	78.0
L239	93.8
L255	100.0

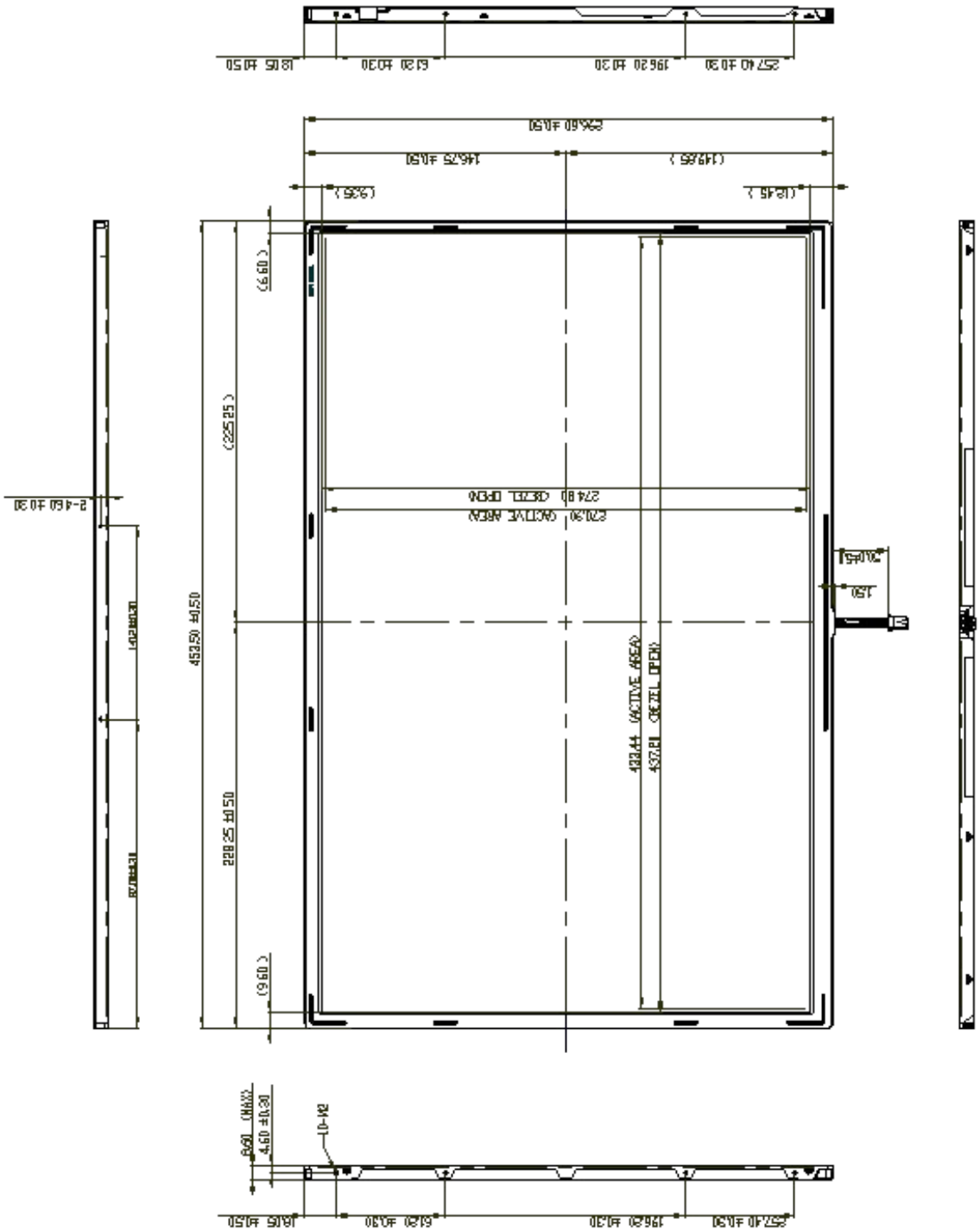
5. Mechanical Characteristics

The contents provide general mechanical characteristics for the model LP201WE1(TLA1). In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal	453.5 ± 0.5mm
	Vertical	296.5 ± 0.5mm
	Depth (Max)	8.6mm
Bezel Area	Horizontal	437.2 ± 0.5mm
	Vertical	274.8 ± 0.5mm
Active Display Area	Horizontal	433.44 mm
	Vertical	270.9 mm
Weight	1220 g (max)	
Surface Treatment	Hard coating(3H) Glare treatment of the front polarizer	

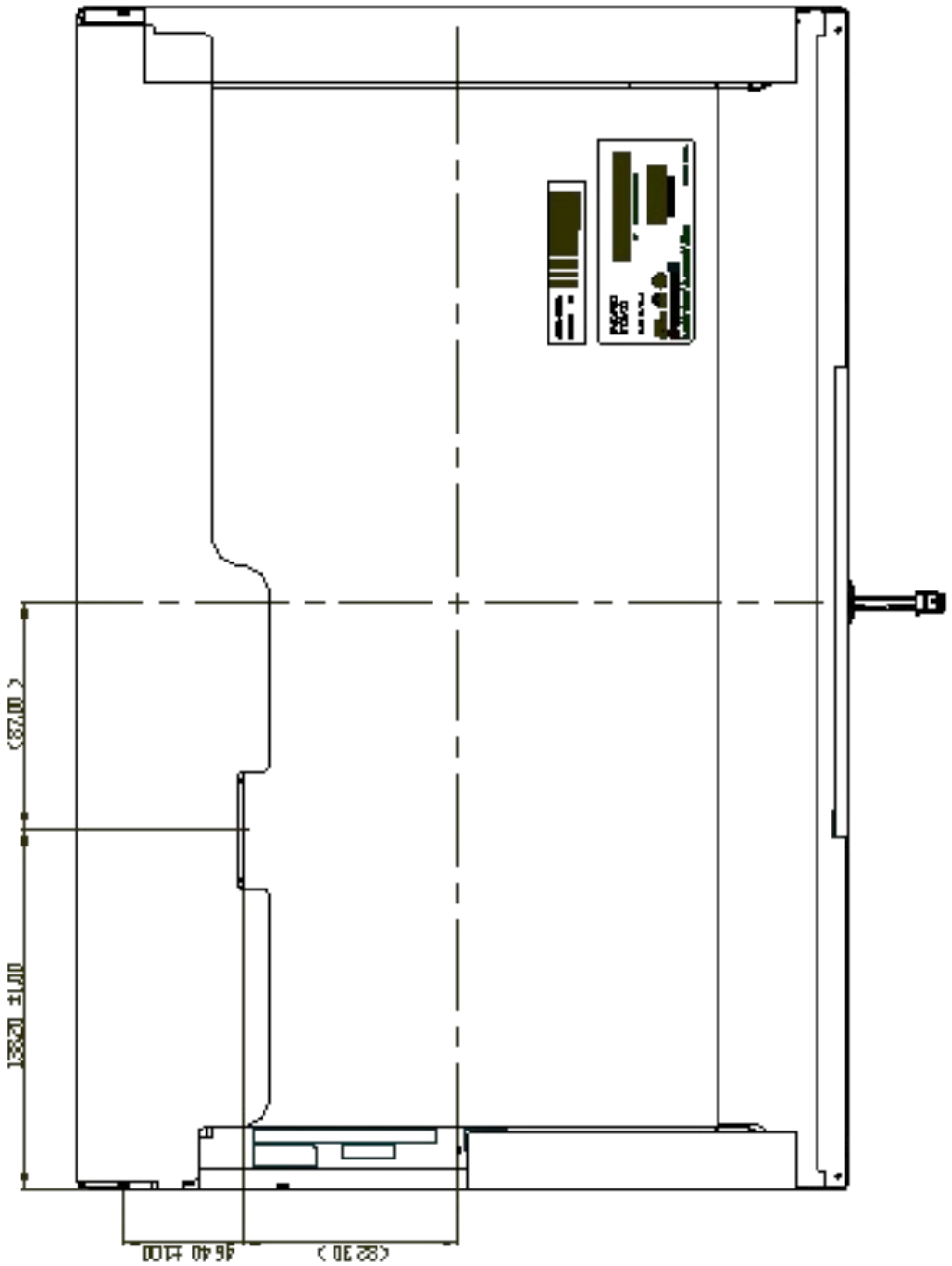
<FRONT VIEW>

Note) Unit:[mm], General tolerance: ± 0.5mm
Wire Length : 50.0

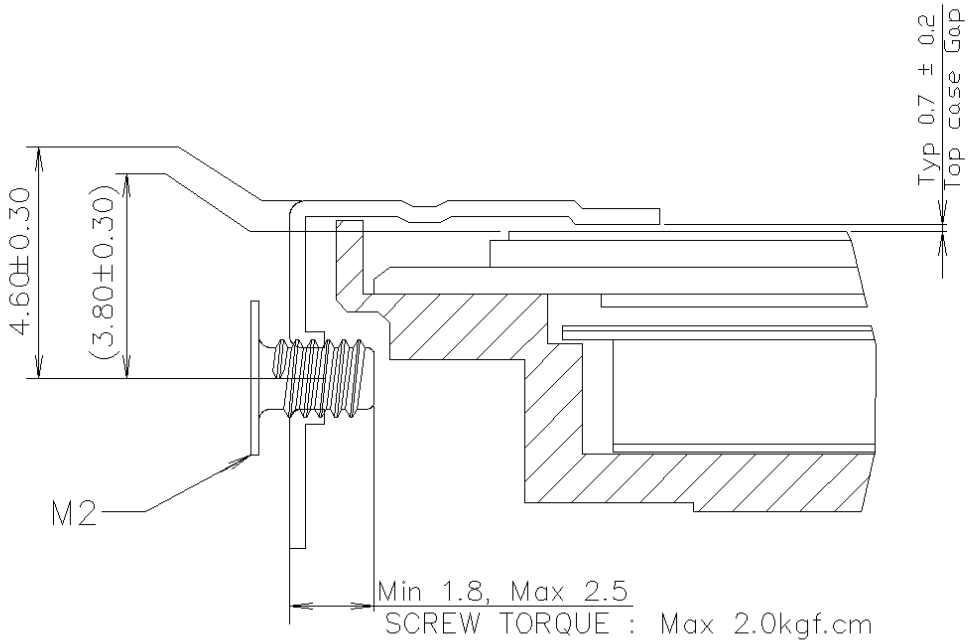


<REAR VIEW>

Note) Unit:[mm], General tolerance: ± 0.5mm



***Screw Torque (10 point):**
***Top Case Gap**



Note) Unit:[mm], General tolerance: ± 0.5mm

6. Reliability

Environment test condition

No.	Test Item	Conditions
1	High temperature storage test	Ta= 60° 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 (non-operating)	Sine wave, 5 ~ 150Hz, 1.5G, 0.37oct/min 3 axis, 30min/axis
6	Shock test (non-operating)	- No functional or cosmetic defects following a shock to all 6 sides delivering at least 180 G in a half sine pulse no longer than 2 ms to the display module - No functional defects following a shock delivering at least 200 g in a half sine pulse no longer than 2 ms to each of 6 sides. Each of the 6 sides will be shock tested with one each display, for a total of 6 displays
7	Altitude operating storage / shipment	0 ~ 10,000 feet (3,048m) 24Hr 0 ~ 40,000 feet (12,192m) 24Hr

{ Result Evaluation Criteria }
There should be no change which might affect the practical display function when the display quality test is conducted under normal operating condition.

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.

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 : 14 pcs

b) Box Size : 545mm X 320mm X 383mm

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 polarizer 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 benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizer. 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 abnormal 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.

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) 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) The protection film is attached to the polarizer with a small amount of glue. If some stress is applied to rub the protection film against the polarizer during the time you peel off the film, the glue is apt to remain on the polarizer.
Please carefully peel off the protection film without rubbing it against the polarizer.
(3) 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 polarizer after the protection film is peeled off.
(4) You can remove the glue easily. When the glue remains on the polarizer 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 A. Enhanced Extended Display Identification Data (EEDID™) 1/3

Byte# (decimal)	Byte# (HEX)	Field Name and Comments	Value (HEX)		Value (binary)	
0	00	Header	0	0	0000 0000	Header
1	01		F	F	1111 1111	
2	02		F	F	1111 1111	
3	03		F	F	1111 1111	
4	04		F	F	1111 1111	
5	05		F	F	1111 1111	
6	06		F	F	1111 1111	
7	07		0	0	0000 0000	
8	08	EISA manufacturer code(3 Character ID) = LPL	3	2	0011 0010	Vender/ Product ID
9	09		0	C	0000 1100	
10	0A	Product code = 5000	5	0	0101 0000	
11	0B	(Hex, LSB first)	0	0	0000 0000	
12	0C	32-bit serial number	0	0	0000 0000	
13	0D		0	0	0000 0000	
14	0E		0	0	0000 0000	
15	0F		0	0	0000 0000	
16	10	Week of manufacture	0	0	0000 0000	
17	11	Year of manufacture = 2006	1	0	0001 0000	
18	12	EDID Structure version # = 1	0	1	0000 0001	EDID Version/ Revision
19	13	EDID Revision # = 3	0	3	0000 0011	
20	14	Video input definition = Digital I/p, non TMDS CRGB	8	0	1000 0000	Display Parameter
21	15	Max H image size(cm) = 48.96cm	3	0	0011 0000	
22	16	Max V image size(cm) = 27.09cm	1	B	0001 1011	
23	17	Display gamma = 2.20	7	8	0111 1000	
24	18	Feature support(DPMS) = Active off, RGB Color	0	A	0000 1010	
25	19	Red/Green low Bits	D	6	1101 0110	Color Characteristic
26	1A	Blue/White Low Bits	9	0	1001 0000	
27	1B	Red X Rx = 0.636	A	2	1010 0010	
28	1C	Red Y Ry = 0.345	5	8	0101 1000	
29	1D	Green X Gx = 0.302	4	D	0100 1101	
30	1E	Green Y Gy = 0.612	9	C	1001 1100	
31	1F	Blue X Bx = 0.147	2	5	0010 0101	
32	20	Blue Y By = 0.072	1	2	0001 0010	
33	21	White X Wx = 0.313	5	0	0101 0000	
34	22	White Y Wy = 0.329	5	4	0101 0100	
35	23	Established Timing I	0	0	0000 0000	Established Timings
36	24	Established Timing II	0	0	0000 0000	
37	25	Manufacturer's Timings	0	0	0000 0000	
38	26	Standard Timing Identification 1 was not used	0	1	0000 0001	Standard Timing ID
39	27	Standard Timing Identification 1 was not used	0	1	0000 0001	
40	28	Standard Timing Identification 2 was not used	0	1	0000 0001	
41	29	Standard Timing Identification 2 was not used	0	1	0000 0001	
42	2A	Standard Timing Identification 3 was not used	0	1	0000 0001	
43	2B	Standard Timing Identification 3 was not used	0	1	0000 0001	
44	2C	Standard Timing Identification 4 was not used	0	1	0000 0001	
45	2D	Standard Timing Identification 4 was not used	0	1	0000 0001	
46	2E	Standard Timing Identification 5 was not used	0	1	0000 0001	
47	2F	Standard Timing Identification 5 was not used	0	1	0000 0001	
48	30	Standard Timing Identification 6 was not used	0	1	0000 0001	
49	31	Standard Timing Identification 6 was not used	0	1	0000 0001	
50	32	Standard Timing Identification 7 was not used	0	1	0000 0001	
51	33	Standard Timing Identification 7 was not used	0	1	0000 0001	
52	34	Standard Timing Identification 8 was not used	0	1	0000 0001	
53	35	Standard Timing Identification 8 was not used	0	1	0000 0001	

APPENDIX A. Enhanced Extended Display Identification Data (EEDID™) 2/3

Byte# (decimal)	Byte# (HEX)	Field Name and Comments	Value (HEX)		Value (binary)	
54	36	1680×1050 @ 60Hz mode : pixel clock = 119 MHz	7	C	0111 1100	Detailed Timing Description #1
55	37	(Stored LSB first)	2	E	0010 1110	
56	38	Horizontal Active = 1680 pixels	9	0	1001 0000	
57	39	Horizontal Blanking = 160 pixels	A	0	1010 0000	
58	3A	Horizontal Active : Horizontal Blanking = 1680 : 160	6	0	0110 0000	
59	3B	Vertical Avtive = 1050 lines	1	A	0001 1010	
60	3C	Vertical Blanking = 28 lines	1	C	0001 1100	
61	3D	Vertical Active : Vertical Blanking = 1050 : 28	4	0	0100 0000	
62	3E	Horizontal Sync. Offset = 48 pixels	3	0	0011 0000	
63	3F	Horizontal Sync Pulse Width = 32 pixels	2	0	0010 0000	
64	40	Vertical Sync Offset = 3 lines, Sync Width = 6 lines	3	6	0011 0110	
65	41	Horizontal Vertical Sync Offset/Width upper 2bits = 0	0	0	0000 0000	
66	42	Horizontal Image Size = 499.44mm	B	1	1011 0001	
67	43	Vertical Image Size = 270.9mm	0	F	0000 1111	
68	44	Horizontal & Vertical Image Size	1	1	0001 0001	
69	45	Horizontal Border = 0	0	0	0000 0000	
70	46	Vertical Border = 0	0	0	0000 0000	
71	47	Non-interlaced, Normal display, no stereo, Digital separate sync, H/V pol negatives	1	9	0001 1001	
72	48	Detailed Timing Descriptor #2	0	0	0000 0000	Detailed Timing Description #2
73	49		0	0	0000 0000	
74	4A		0	0	0000 0000	
75	4B		0	0	0000 0000	
76	4C		0	0	0000 0000	
77	4D		0	0	0000 0000	
78	4E		0	0	0000 0000	
79	4F		0	0	0000 0000	
80	50		0	0	0000 0000	
81	51		0	0	0000 0000	
82	52		0	0	0000 0000	
83	53		0	0	0000 0000	
84	55		0	0	0000 0000	
85	55		0	0	0000 0000	
86	56		0	0	0000 0000	
87	57		0	0	0000 0000	
88	58		0	0	0000 0000	
89	59		0	0	0000 0000	
90	5A	Detailed Timing Descriptor #3	0	0	0000 0000	Detailed Timing Description #3
91	5B		0	0	0000 0000	
92	5C		0	0	0000 0000	
93	5D		F	E	1111 1110	
94	5E		0	0	0000 0000	
95	5F	L	4	C	0100 1100	
96	60	G	4	7	0100 0111	
97	61	P	5	0	0101 0000	
98	62	h	6	8	0110 1000	
99	63	i	6	9	0110 1001	
100	64	l	6	C	0110 1100	
101	65	i	6	9	0110 1001	
102	66	p	7	0	0111 0000	
103	67	s	7	3	0111 0011	
104	68	L	4	C	0100 1100	
105	69	C	4	3	0100 0011	
106	6A	D	4	4	0100 0100	
107	6B	LF	0	A	0000 1010	

APPENDIX A. Enhanced Extended Display Identification Data (EEDID™) 3/3

Byte# (decimal)	Byte# (HEX)	Field Name and Comments	Value (HEX)	Value (binary)	
108	6C	Detailed Timing Descriptor #4	0 0	0000 0000	Detailed Timing Description #4
109	6D		0 0	0000 0000	
110	6E		0 0	0000 0000	
111	6F	L	4 C	0100 1100	
112	70	P	5 0	0101 0000	
113	71	2	3 2	0011 0010	
114	72	0	3 0	0011 0000	
115	73	1	3 1	0011 0001	
116	74	W	5 7	0101 0111	
117	75	E	4 5	0100 0101	
118	76	1	3 1	0011 0001	
119	77	-	2 D	0010 1101	
120	78	T	5 4	0101 0100	
121	79	L	4 C	0100 1100	
122	7A	A	4 1	0100 0001	
123	7B	L	3 1	0011 0001	
124	7C	1	0 A	0000 1010	
125	7D		2 0	0010 0000	
126	7E	Extension flag = 00	0 0	0000 0000	Extension Flag
127	7F	Checksum	1 C	0001 1100	Checksum