

N.J. Seong / Manager

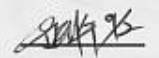


PREPARED BY

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

**Products Engineering Dept.
LG. Philips LCD Co., Ltd**

Product Specification

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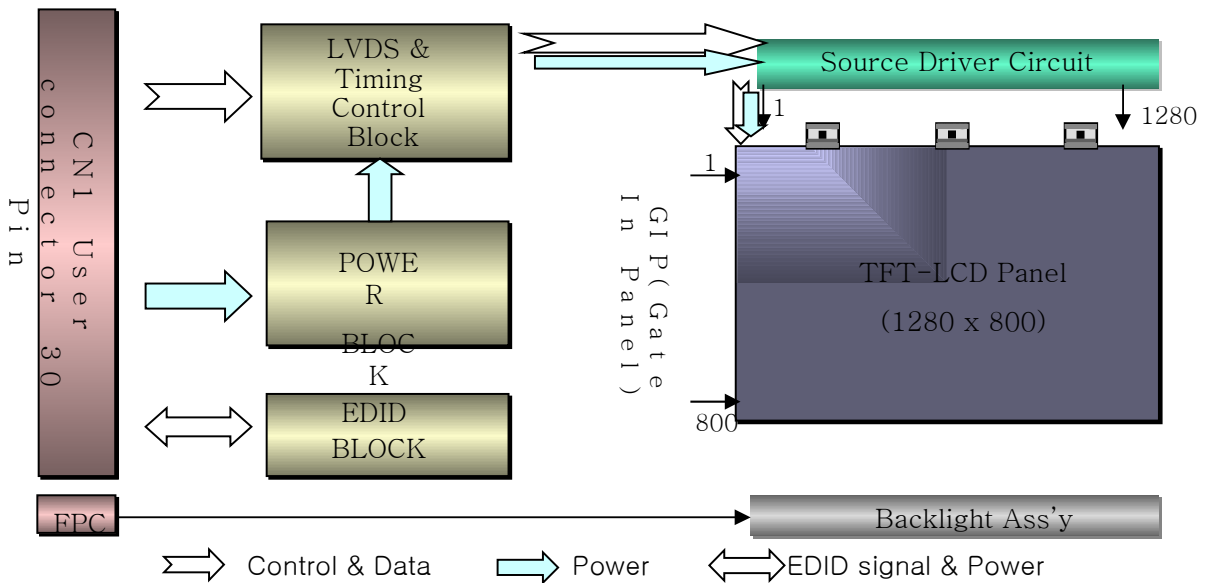
Product Specification

1. General Description

The LP154WX7 is a Color Active Matrix Liquid Crystal Display with an integral White LED 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. This TFT-LCD has 15.4 inches diagonally measured active display area with WXGA resolution(800 vertical by 1280 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 6-bit gray scale signal for each dot, thus, presenting a palette of more than 262,144 colors.

The LP154WX7 has been designed to apply the interface method that enables low power, high speed, low EMI.

The LP154WX7 is intended to support applications where thin thickness, low power are critical factors and graphic displays are important. In combination with the vertical arrangement of the sub-pixels, the LP154WX7 characteristics provide an excellent flat display for office automation products such as Notebook PC.



General Features

Active Screen Size	15.4 inches diagonal
Outline Dimension	344.0(H.) × 222.0(V) × 6.5(D,Max) [mm]
Pixel Pitch	0.2588mm × 0.2588 mm
Pixel Format	1280 horiz. By 800 vert. Pixels RGB strip arrangement
Color Depth	6-bit, 262,144 colors
Luminance, White	200 cd/m ² (Typ.5 point)
Power Consumption	Total 4.6 Watt(Typ.) @ LCM circuit 1.2Watt(Typ.), B/L input 3.4Watt(Typ.)
Weight	570g(Max.)
Display Operating Mode	Transmissive mode, normally white
Surface Treatment	Anti-glare treatment of the front polarizer
RoHS Comply	Yes

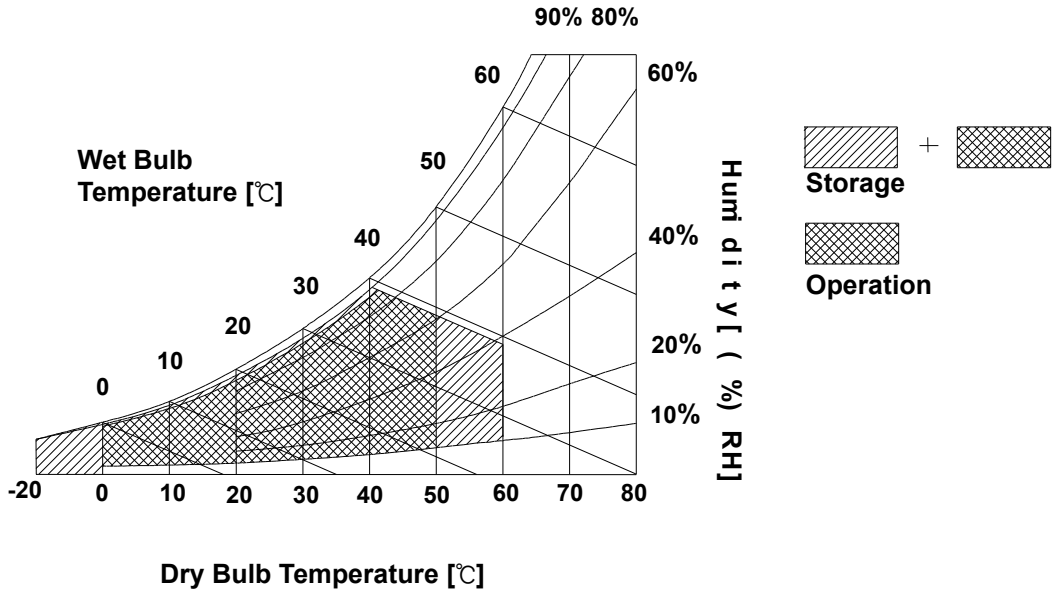
2. Absolute Maximum Ratings

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		
Operating Temperature	TOP	0	50	°C	1
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

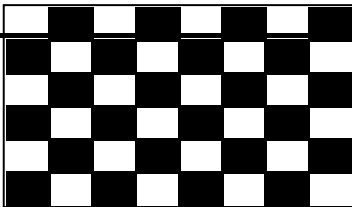
3-1. Electrical Characteristics

The LP154WX7 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 White LED, is typically generated by an LED Driver. The LED Driver is an external unit to the LCD.

Table 2. ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
MODULE :						
Power Supply Input Voltage	VCC	3.0	3.3	3.6	V _{DC}	
Power Supply Input Current	I _{CC}	305	360	415	mA	1
Power Consumption	P _c	-	1.2	1.4	Watt	1
Differential Impedance	Z _m	90	100	110	Ohm	2
LED :						
Operating Current per string	I _{LED}	5.0	20.0	21.0	mA	3
Operating Voltage per string	V _{LED}	-	28.5	30.5	V	4
Power Consumption (Note)	P _{BL}		3.4	3.7	W	4
Life time					Hrs	5

1. The specified current and power consumption are under the Vcc = 3.3V, 25°C, fv = 60Hz condition where Mosaic pattern is displayed and fv is the frame frequency.



- This impedance value is needed to proper display and measured form LVDS Tx to the mating connector.
- The typical operating current is for the typical surface luminance (L_{WH}) in optical characteristics.
I_{LED} is the current of each LEDs' string, LED backlight has 6 strings on it.
- The LED power consumption shown above does not include power of external LED driver circuit for typical current condition.
- The life time is determined as the time at which brightness of LED is 50% compare to that of minimum value specified in table 8.

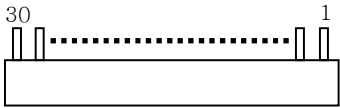
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3-2. Interface Connections

This LCD employs two interface connections, a 30 pin connector is used for the module electronics interface and the other connector is used for the integral backlight system.

The electronics interface connector is a model GT101-30S-HR11 manufactured by LSC.

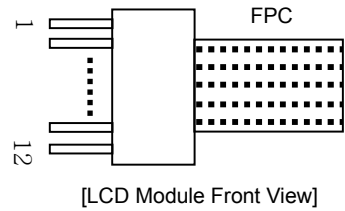
Table 3. MODULE CONNECTOR PIN CONFIGURATION (CN1)

Pin	Symbol	Description	Notes
1	GND	Ground	<p>1. Interface chips 1.1 LCD : SW, SW0612B (LCD Controller) including LVDS Receiver 1.2 System : THC63LVD823A or equivalent * Pin to Pin compatible with LVDS</p> <p>2. Connector 2.1 LCD : GT101-30S-HR11, LS Cable it's compatible. 2.2 Mating : FI-X30M or equivalent. 2.3 Connector pin arrangement</p>  <p>[LCD Module Rear View]</p>
2	VCC	Power Supply, 3.3V Typ.	
3	VCC	Power Supply, 3.3V Typ.	
4	V EEDID	DDC 3.3V power	
5	NC	Reserved for supplier test point	
6	Clk EEDID	DDC Clock	
7	DATA EEDID	DDC Data	
8	R _{IN} 0-	Negative LVDS differential data input	
9	R _{IN} 0+	Positive LVDS differential data input	
10	GND	Ground	
11	R _{IN} 1-	Negative LVDS differential data input	
12	R _{IN} 1+	Positive LVDS differential data input	
13	GND	Ground	
14	R _{IN} 2-	Negative LVDS differential data input	
15	R _{IN} 2+	Positive LVDS differential data input	
16	GND	Ground	
17	CLKIN-	Negative LVDS differential clock input	
18	CLKIN+	Positive LVDS differential clock input	
19	GND	Ground	
20	NC	No Connect	
21	NC	No Connect	
22	GND	Ground	
23	NC	No Connect	
24	NC	No Connect	
25	GND	Ground	
26	NC	No Connect	
27	NC	No Connect	
28	GND	Ground	
29	NC	No Connect	
30	NC	No Connect	

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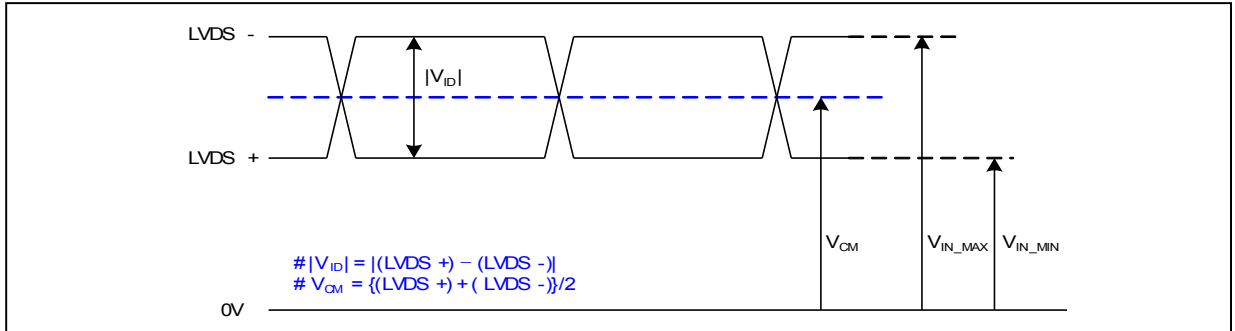
Table 4. LED FPC CONNECTOR PIN CONFIGURATION)

Pin	Symbol	Description	Notes
1	FB1	LED Channel 1 Cathode	Connector FH33-12S-0.5SH, Hirose it's compatible.
2	FB2	LED Channel 2 Cathode	
3	FB3	LED Channel 3 Cathode	
4	FB4	LED Channel 4 Cathode	
5	FB5	LED Channel 5 Cathode	
6	FB6	LED Channel 6 Cathode	
7	NC	No Connect	
8	NC	No Connect	
9	NC	No Connect	
10	Vin	LED Power (LED Anode)	
11	Vin	LED Power (LED Anode)	
12	Vin	LED Power (LED Anode)	



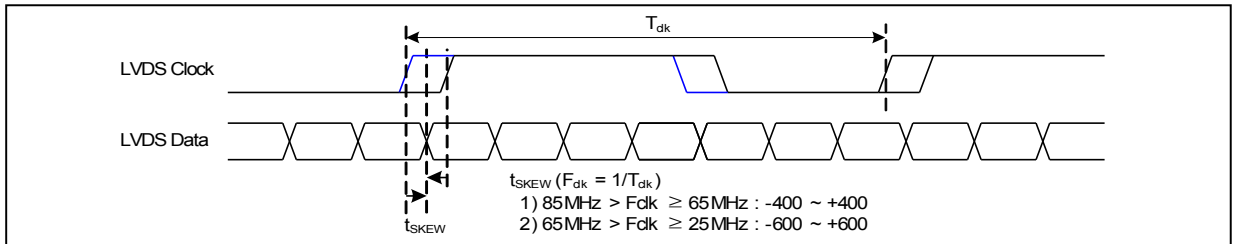
3-3. LVDS Signal Timing Specifications

3-3-1. DC Specification



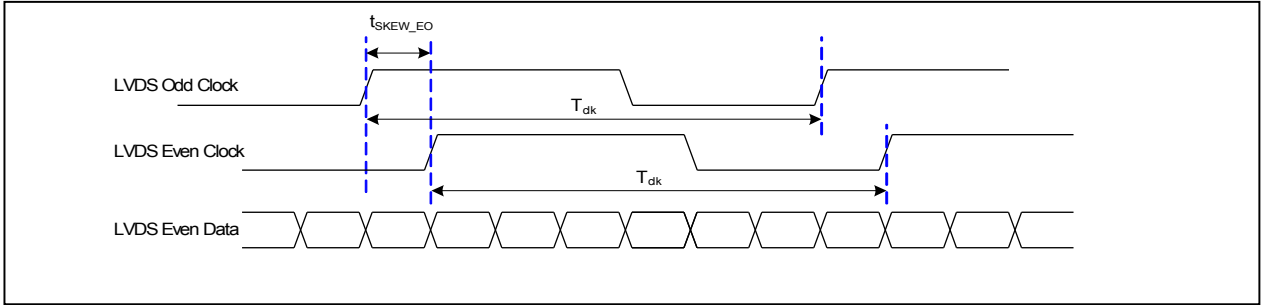
Description	Symbol	Min	Max	Unit	Notes
LVDS Differential Voltage	$ V_{ID} $	100	600	mV	-
LVDS Common mode Voltage	V_{CM}	0.6	1.8	V	-
LVDS Input Voltage Range	V_{IN}	0.3	2.1	V	-

3-3-2. AC Specification

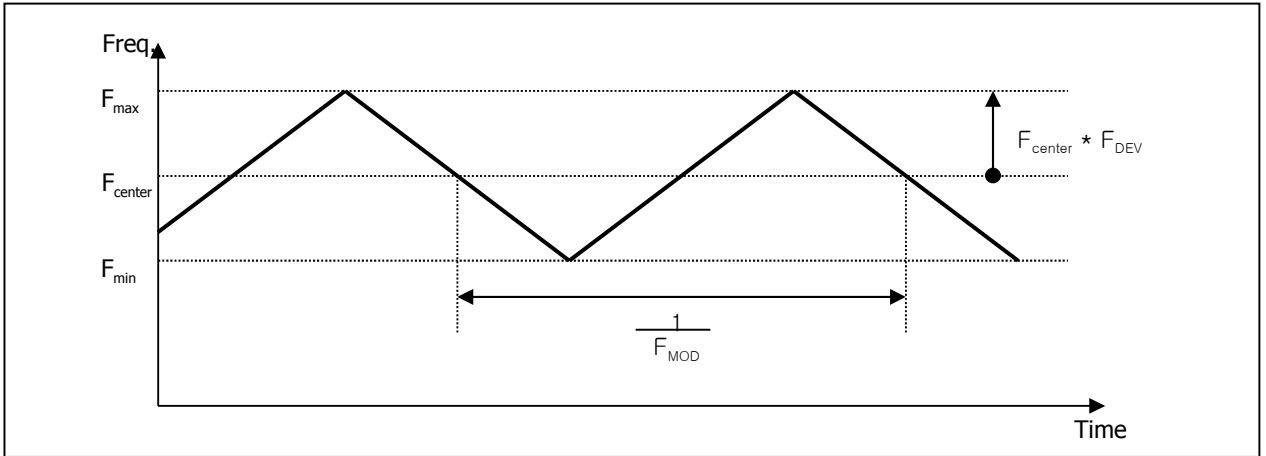


Description	Symbol	Min	Max	Unit	Notes
LVDS Clock to Data Skew Margin	t_{SKEW}	- 400	+ 400	ps	$85MHz > F_{clk} \geq 65MHz$
	t_{SKEW}	- 600	+ 600	ps	$65MHz > F_{clk} \geq 25MHz$
LVDS Clock to Clock Skew Margin (Even to Odd)	t_{SKEW_EO}	- 1/7	+ 1/7	T_{clk}	-
Maximum deviation of input clock frequency during SSC	F_{DEV}	-	± 3	%	-
Maximum modulation frequency of input clock during SSC	F_{MOD}	-	200	KHz	-

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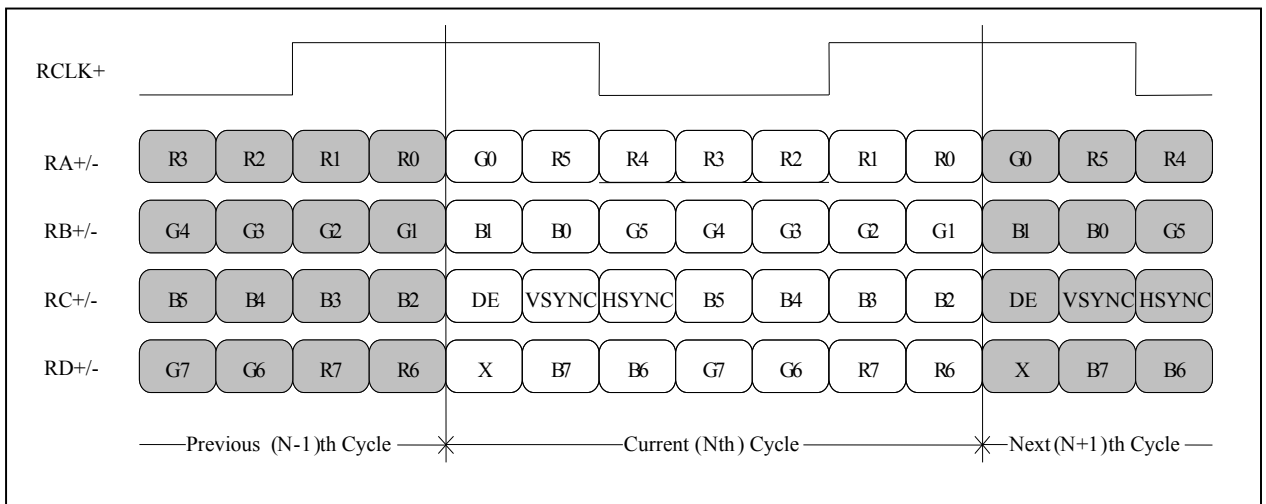
< Clock skew margin between channel >



< Spread Spectrum >

3-3-3. Data Format

1) LVDS 1 Port



< LVDS Data Format >

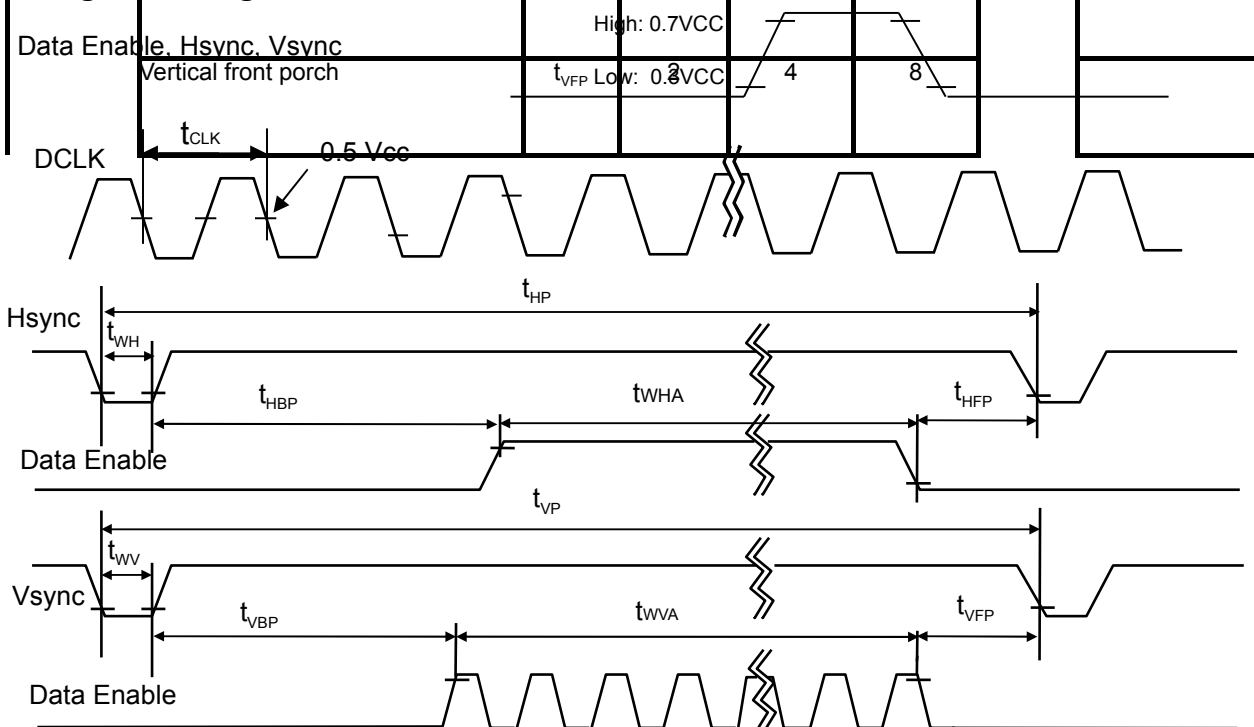
3-4. Signal Timing Specifications

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	Frequency	f_{CLK}	66.9	69.3	73.9	MHz
Hsync	Period	T_{hp}	1376	1408	1480	tCLK
	Width	t_{WH}	24	32	40	
	Width-Active	t_{WHA}	1280	1280	1280	
Vsync	Period	t_{VP}	810	820	832	tHP
	Width	t_{WV}	2	4	6	
	Width-Active	t_{WVA}	800	800	800	
Data Enable	Horizontal back porch	t_{HBP}	56	72	96	tCLK
	Horizontal front porch	t_{HFP}	16	24	64	
Data Enable	Vertical back porch	t_{VBP}	6	12	18	tHP
	Vertical front porch	t_{VFP}	4	8	8	

3-5. Signal Timing Waveforms



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3-6. Color Input Data Reference

The brightness of each primary color (red, green and blue) is based on the 6-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			GREEN			BLUE											
		MSB	LSB		MSB	LSB		MSB	LSB										
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	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
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	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
RED	RED (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (01)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

	RED (62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN (01)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
	
	GREEN (62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	GREEN (63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
BLUE	BLUE (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE (01)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	
	BLUE (62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	BLUE (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

3-7. Power Sequence

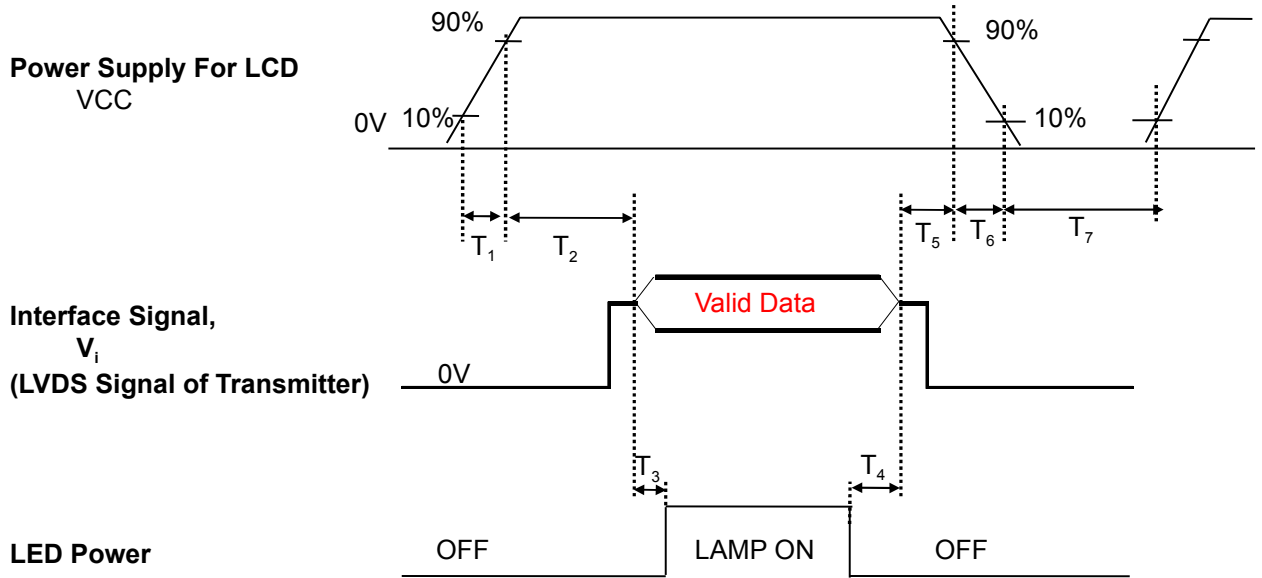


Table 7. POWER SEQUENCE TABLE

Parameter	Value			Units
	Min.	Typ.	Max.	
T ₁	0.5	-	10	(ms)
T ₂	0	-	50	(ms)
T ₃	200	-	-	(ms)
T ₄	200	-	-	(ms)
T ₅	0	-	50	(ms)
T ₆	3	-	10	(ms)
T ₇	400	-	-	(ms)

Note)

1. Valid Data is Data to meet “3-3. LVDS Signal Timing Specifications”
2. Please avoid floating state of interface signal at invalid period.
3. When the interface signal is invalid, be sure to pull down the power supply for LCD VCC to 0V.
4. LED 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 θ equal to 0° .

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

FIG. 1 Optical Characteristic Measurement Equipment and Method

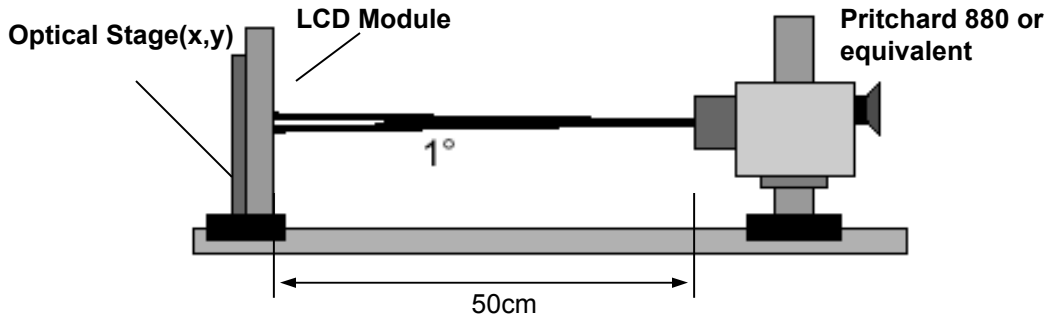


Table 8. OPTICAL CHARACTERISTICS

Ta=25° C, VCC=3.3V, fv=60Hz, f_{CLK}= 69.3MHz, I_{LED} = 20.0mA

Parameter	Symbol	Values			Units	Notes
		Min	Typ	Max		
Contrast Ratio	CR	-	500	-		1
Surface Luminance, white	L _{WH}	170	200	-	cd/m ²	2
Luminance Variation	δ _{WHITE}	-	1.4	1.6		3
Response Time	Tr _R + Tr _D		16		ms	4
Color Coordinates						
RED	RX	0.562	0.592	0.622		
	RY	0.321	0.351	0.381		
GREEN	GX	0.304	0.334	0.364		
	GY	0.519	0.549	0.579		
BLUE	BX	0.124	0.154	0.184		
	BY	0.100	0.130	0.160		
Ver. 1.0		Sep. 02, 2008				14 / 31
WHITE	WY	0.282	0.312	0.342		

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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 average of 5 point across the LCD surface 50cm from the surface with all pixels displaying white. For more information see FIG 1.

$$L_{WH} = \text{Average}(L_1, L_2, \dots L_5)$$

3. The variation in surface luminance , The panel total variation (δ_{WHITE}) is determined by measuring L_N at each test position 1 through 13 and then defined as followed numerical formula.

For more information see FIG 2.

$$\delta_{WHITE} = \frac{\text{Maximum}(L_1, L_2, \dots L_{13})}{\text{Minimum}(L_1, L_2, \dots L_{13})}$$

4. Response time is the time required for the display to transition from white to black (rise time, T_{R}) and from black to white(Decay Time, T_{D}). For additional information see FIG 3.

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

6. Gray scale specification

* f = 60Hz

Gray Level	Luminance [%] (Typ)
L0	0.20
L7	1.86
L15	6.17
L23	12.7
L31	21.3
L39	35.6
L47	55.3
L55	78.5
L63	100

FIG. 2 Luminance

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

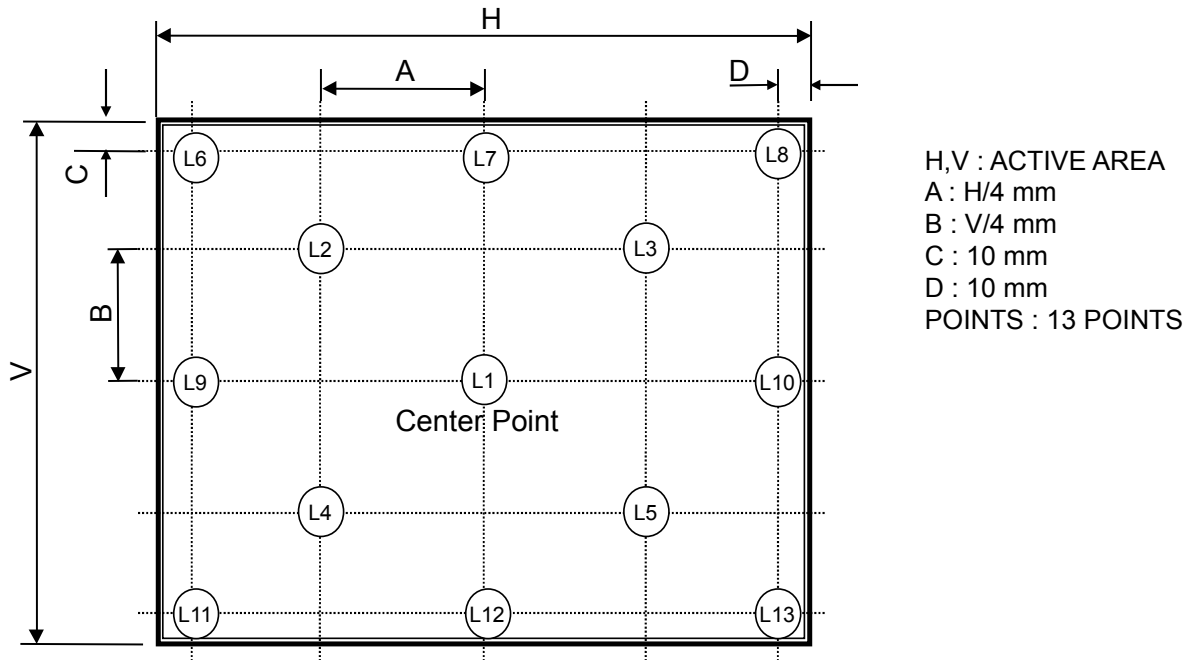
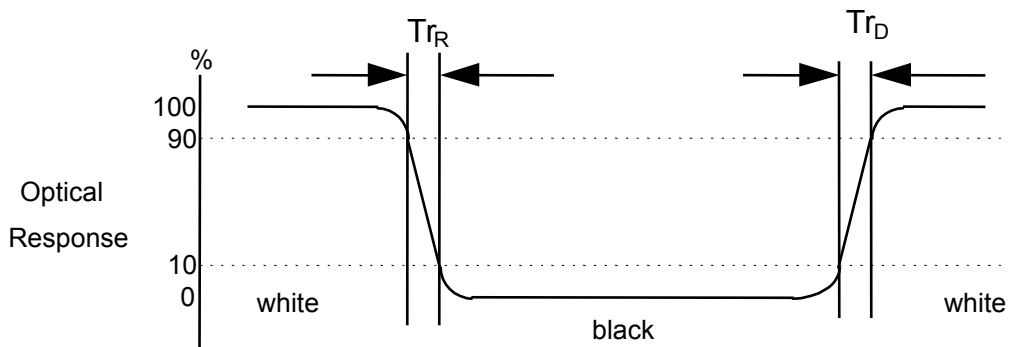


FIG. 3 Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".



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5. Mechanical Characteristics

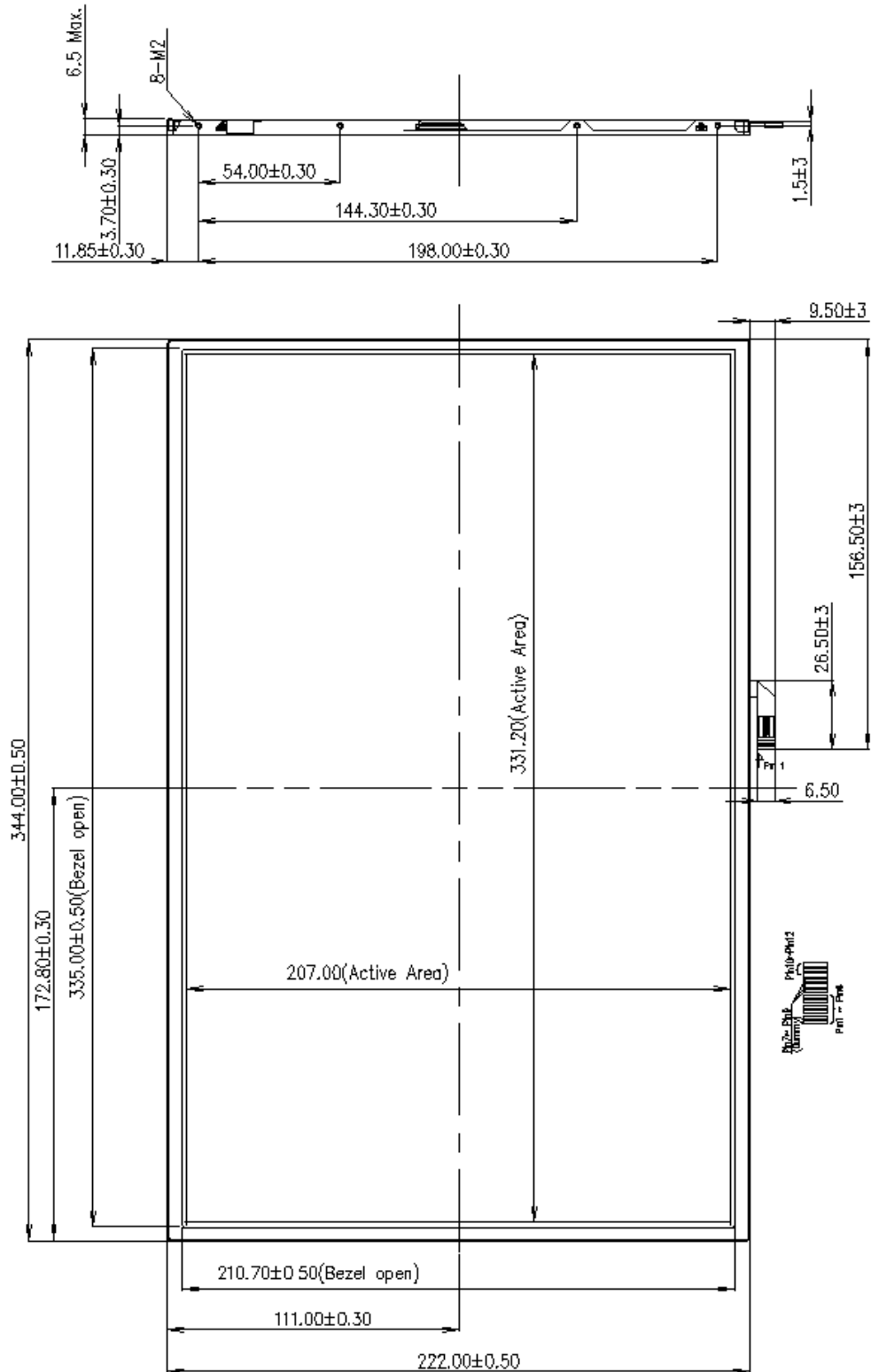
The contents provide general mechanical characteristics for the model LP154WX7. In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal	344.0 ± 0.5mm
	Vertical	222.0 ± 0.5mm
	Thickness	6.5mm (max)
Bezel Area	Horizontal	335.0 ± 0.5mm
	Vertical	210.7 ± 0.5mm
Active Display Area	Horizontal	331.2 mm
	Vertical	207.0 mm
Weight	570g(Max)	
Surface Treatment	Anti-glare treatment of the front polarizer	

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<FRONT VIEW>

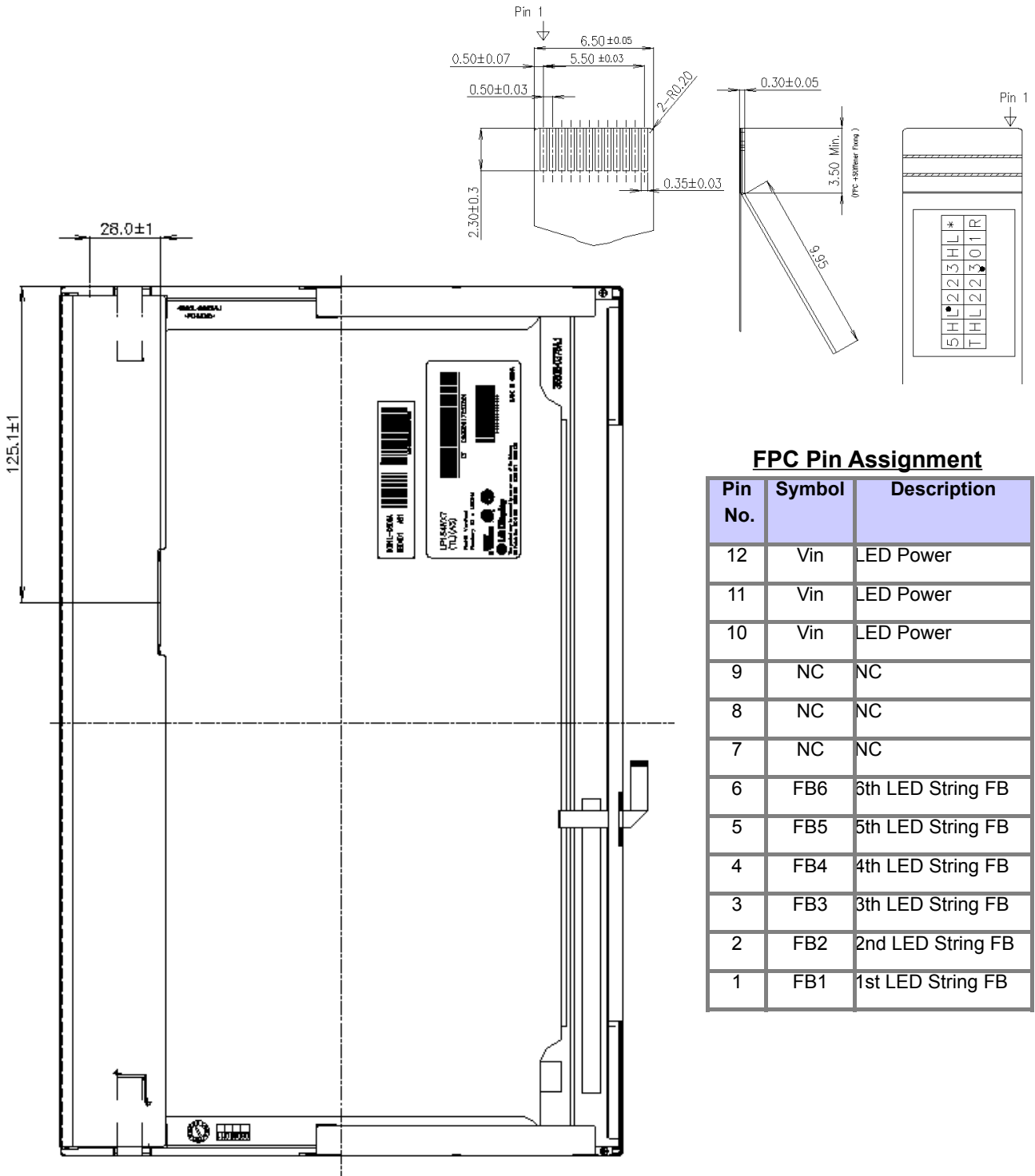
Note) Unit:[mm], General tolerance: $\pm 0.5\text{mm}$



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<REAR VIEW>

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

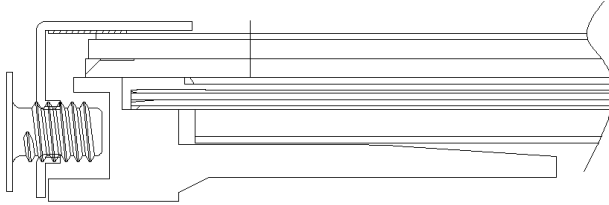


FPC Pin Assignment

Pin No.	Symbol	Description
12	Vin	LED Power
11	Vin	LED Power
10	Vin	LED Power
9	NC	NC
8	NC	NC
7	NC	NC
6	FB6	6th LED String FB
5	FB5	5th LED String FB
4	FB4	4th LED String FB
3	FB3	3th LED String FB
2	FB2	2nd LED String FB
1	FB1	1st LED String FB

Product Specification

[DETAIL DESCRIPTION OF SIDE MOUNTING SCREW]

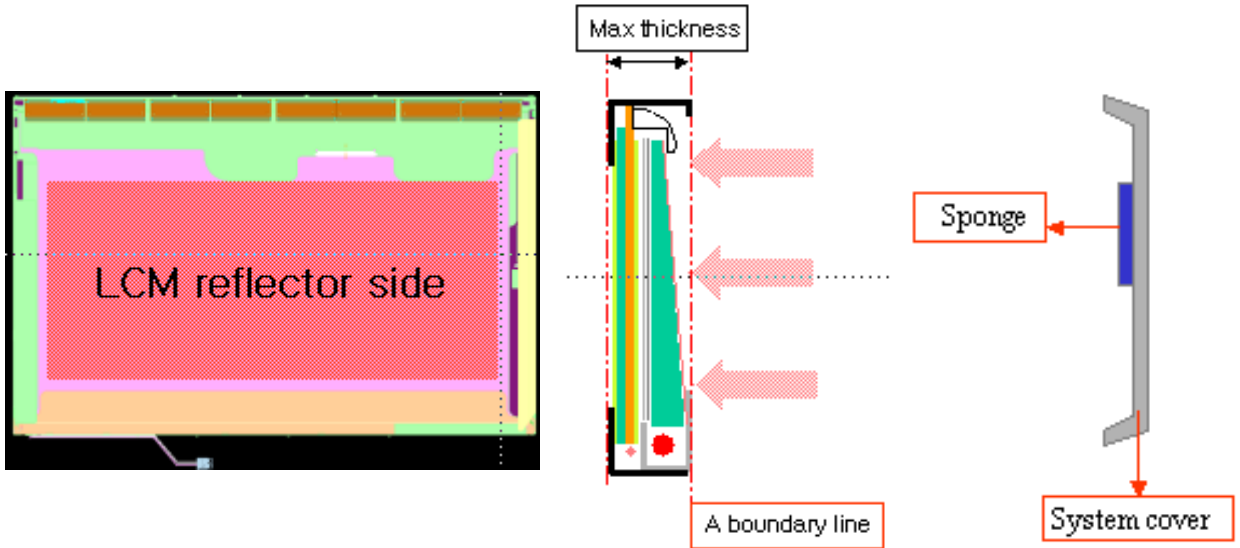


- * Screw Length(A) : Max : 2.5, Min : 2.0
- * Screw Depth(B) : Min 2.5
- * Screw Torque : Max 2.5kgf.cm (Measurement Gauge:Torque Meter)

Notes : 1. Screw plated through the method of non-electrolytic nickel plating is preferred to reduce possibility that results in vertical and/or horizontal line defect due to the conductive particles from screw surface.

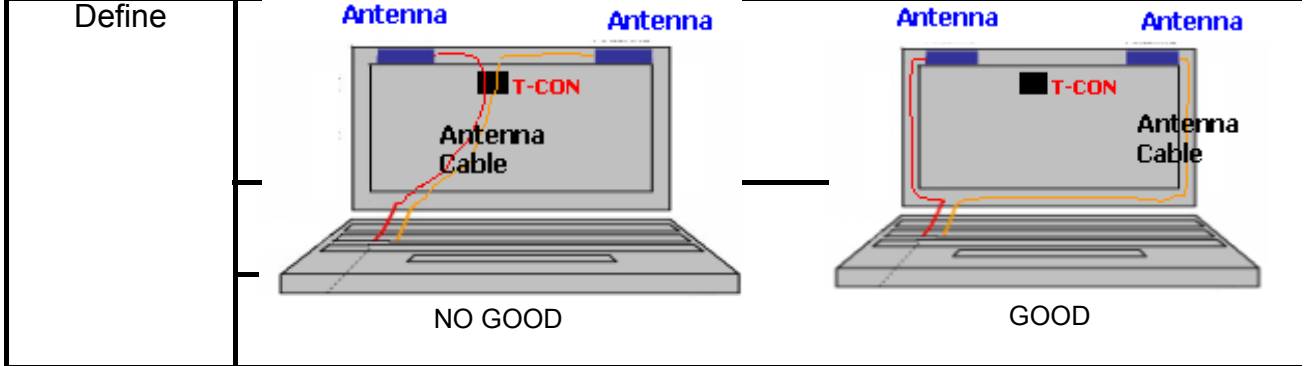
LGD Proposal for system cover design.(Appendix)

1	Gap check for securing the enough gap between LCM and System cover.	
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Define	<p>1.Rear side of LCM is sensitive against external stress,and previous check about interference is highly needed.</p> <p>2.In case there is something from system cover comes into the boundary above,mechanical interference may cause the FOS defects. (Eg:Ripple,White spot..)</p>	
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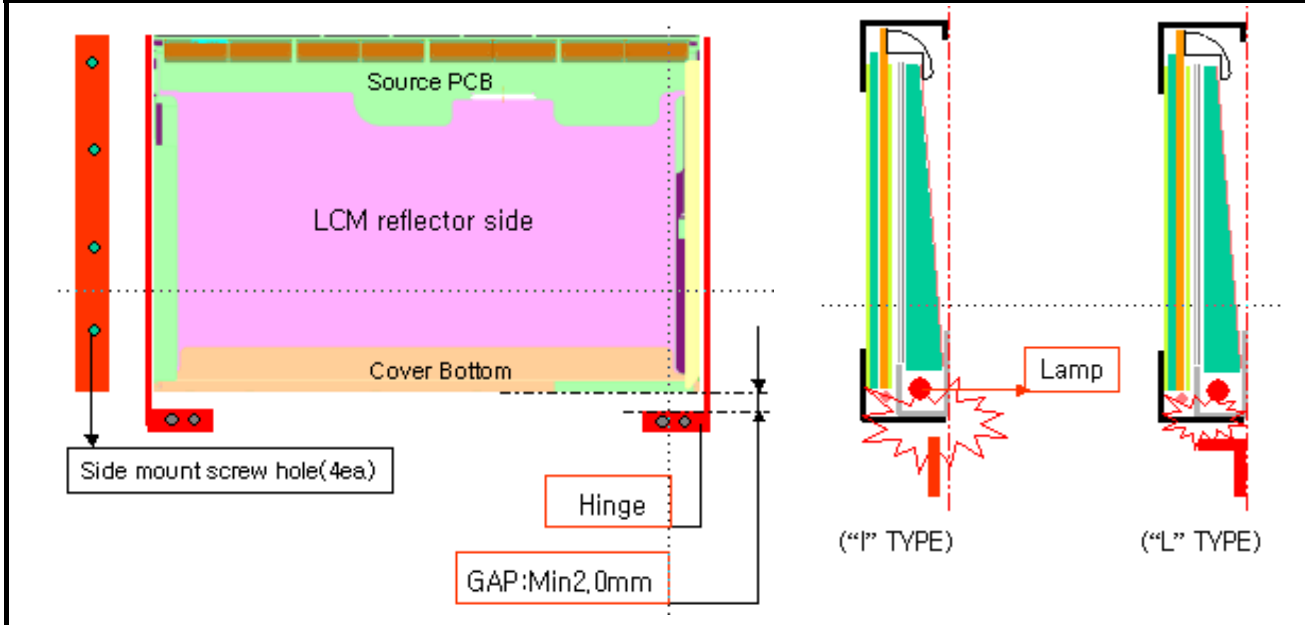
2	Check if antenna cable is sufficiently apart from T-CON of LCD Module.	
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	1.If system antenna is overlapped with T-CON,it might be cause the noise.	
--	---	--

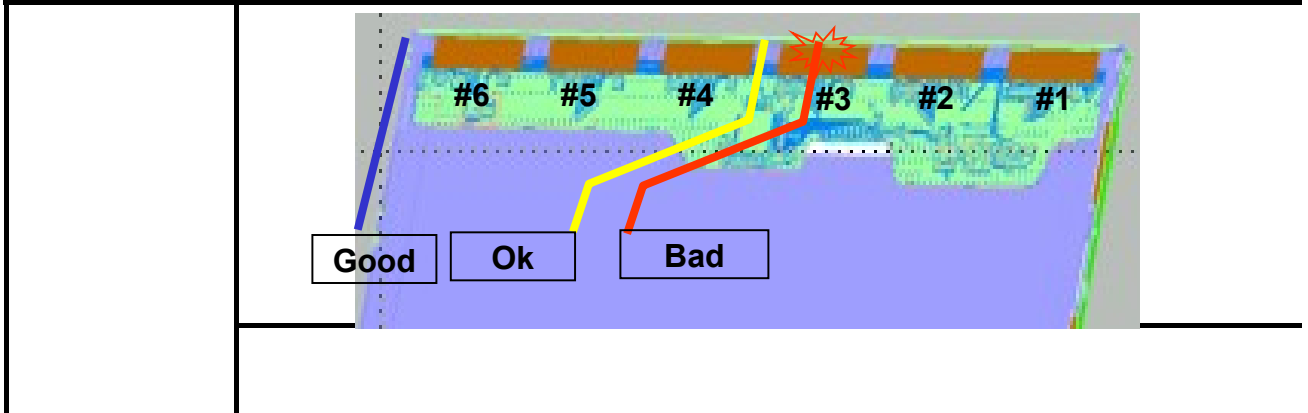
LGD Proposal for system cover design.

3	Gap check for securing the enough gap between LCM and System hinge.	
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Define	<ol style="list-style-type: none"> 1. At least 2.0mm of gap needs to be secured to prevent the shock related defects. 2. "L" type of hinge is recommended than "I" type under shock test.
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4	Checking the path of the System wire.	
---	---------------------------------------	--



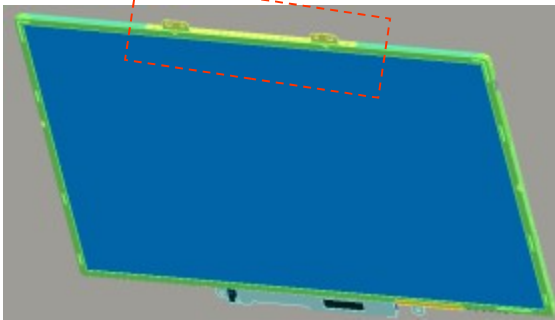
Define	<ol style="list-style-type: none"> 1. COF area needs to be handled with care. 2. GOOD → Wire path design to system side. OK → Wire path is located between COFs. BAD → Wire path overlapped with COF area.
--------	--

LGD Proposal for system cover design.

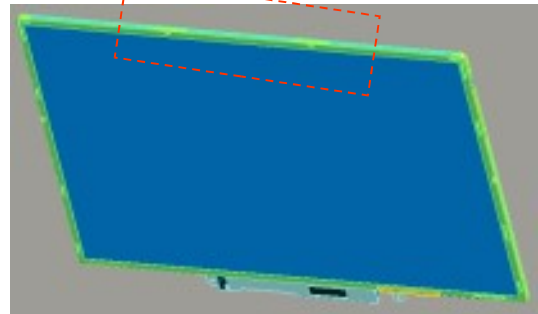
5	Using a bracket on the top of LCM is not recommended.	
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bracket



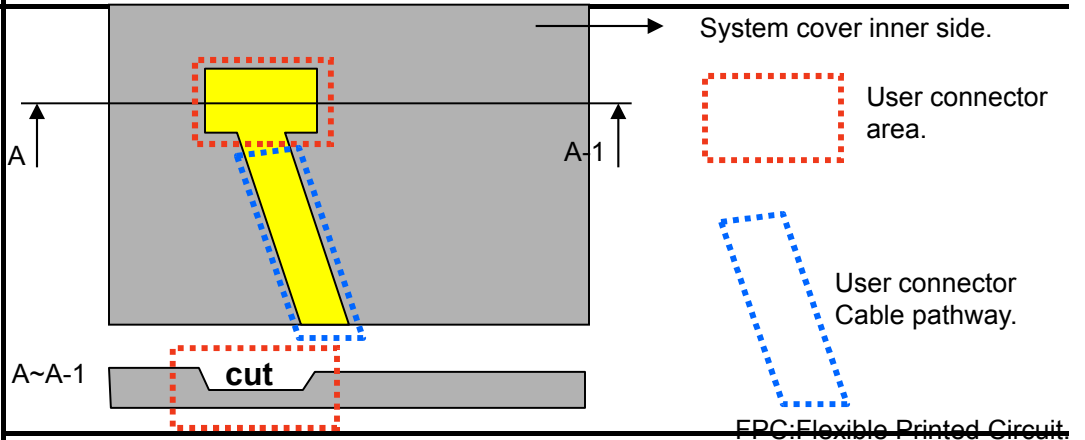
With bracket



Without bracket

Define	<p>1. Condition without bracket is good for mechanical noise, and can minimize the light leakage from deformation of bracket.</p> <p>2. The results show that there is no difference between the condition with or without bracket.</p>	
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6	Securing additional gap on CNT area..	
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Define	<p>1. CNT area is specially sensitive against external stress, and additional gap by cutting on system cover will be helpful on removing the Ripple.</p> <p>2. Using a thinner CNT will be better. (eg: FPC type)</p>	
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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, 10 ~ 500 ~ 10Hz, 1.5G, 0.37oct/min 3 axis, 1hour/axis
6	Shock test (non-operating)	Half sine wave, 180G, 2ms one shock of each six faces(I.e. run 180G, 2ms for all six faces)
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)

Product Specification

8. Packing

8-1. Designation of Lot Mark

a) Lot Mark

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

A,B,C : SIZE(INCH)
E : MONTH

D : YEAR
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 : 20 pcs

b) Box Size : 441mm × 373mm × 348mm

9. PRECAUTIONS

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

9-1. MOUNTING PRECAUTIONS

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

9-2. OPERATING PRECAUTIONS

- (1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage :
 $V = \pm 200\text{mV}$ (Over and under shoot voltage)
- (2) Response time depends on the temperature. (In lower temperature, it becomes longer.)
- (3) Brightness depends on the temperature. (In lower temperature, it becomes lower.)
And in lower temperature, response time (required time that brightness is stable after turned on) becomes longer.
- (4) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
- (5) When fixed patterns are displayed for a long time, remnant image is likely to occur.
- (6) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

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.

Product Specification

APPENDIX A. Enhanced Extended Display Identification Data (EEDID™) 1/3

	Byte (Dec)	Byte (Hex)	Field Name and Comments	Value (Hex)	Value (Bin)	
Header	0	00	Header	00	00000000	
	1	01	Header	FF	11111111	
	2	02	Header	FF	11111111	
	3	03	Header	FF	11111111	
	4	04	Header	FF	11111111	
	5	05	Header	FF	11111111	
	6	06	Header	FF	11111111	
	7	07	Header	00	00000000	
Vendor / Product EDID Version	8	08	EISA manufacture code (3 Character ID)	LGD	30	00110000
	9	09	EISA manufacture code (Compressed ASC II)		E4	11100100
	10	0A	Panel Supplier Reserved - Product Code	01ABh	AB	10101011
	11	0B	(Hex. LSB first)		01	00000001
	12	0C	LCD Module Serial No - Preferred but Optional ("0" If not used)		00	00000000
	13	0D	LCD Module Serial No - Preferred but Optional ("0" If not used)		00	00000000
	14	0E	LCD Module Serial No - Preferred but Optional ("0" If not used)		00	00000000
	15	0F	LCD Module Serial No - Preferred but Optional ("0" If not used)		00	00000000
	16	10	Week of Manufacture	00 weeks	00	00000000
	17	11	Year of Manufacture	2008 years	12	00010010
	18	12	EDID structure version # = 1		01	00000001
	19	13	EDID revision # = 3		03	00000011
Display Parameters	20	14	Video input Definition = Digital signal		80	10000000
	21	15	Max H image size (Rounded cm) = 33 cm		21	00100001
	22	16	Max V image size (Rounded cm) = 21 cm		15	00010101
	23	17	Display gamma = (gamma*100)-100 = Example:(2.2*100)-100=120 = 2.2 Gamma		78	01111000
	24	18	Feature Support (no_DPMS, no_Active Off/Very Low Power, RGB color display, Timing BLK l_no_GTF)		0A	00001010
Panel Color Coordinates	25	19	Red/Green Low Bits (RxRy/GxGy)		BA	10111010
	26	1A	Blue/White Low Bits (BxBY/WxWy)		95	10010101
	27	1B	Red X Rx = 0.592		97	10010111
	28	1C	Red Y Ry = 0.351		59	01011001
	29	1D	Green X Gx = 0.334		55	01010101
	30	1E	Green Y Gy = 0.549		8C	10001100
	31	1F	Blue X Bx = 0.154		27	00100111
	32	20	Blue Y By = 0.130		21	00100001
	33	21	White X Wx = 0.313		50	01010000
	34	22	White Y Wy = 0.329		54	01010100
Established Timings	35	23	Established timing 1 (00h if not used)		00	00000000
	36	24	Established timing 2 (00h if not used)		00	00000000
	37	25	Manufacturer's timings (00h if not used)		00	00000000
Standard Timing ID	38	26	Standard timing ID1 (01h if not used)		01	00000001
	39	27	Standard timing ID1 (01h if not used)		01	00000001
	40	28	Standard timing ID2 (01h if not used)		01	00000001
	41	29	Standard timing ID2 (01h if not used)		01	00000001
	42	2A	Standard timing ID3 (01h if not used)		01	00000001
	43	2B	Standard timing ID3 (01h if not used)		01	00000001
	44	2C	Standard timing ID4 (01h if not used)		01	00000001
	45	2D	Standard timing ID4 (01h if not used)		01	00000001
	46	2E	Standard timing ID5 (01h if not used)		01	00000001
	47	2F	Standard timing ID5 (01h if not used)		01	00000001
	48	30	Standard timing ID6 (01h if not used)		01	00000001
	49	31	Standard timing ID6 (01h if not used)		01	00000001
	50	32	Standard timing ID7 (01h if not used)		01	00000001
	51	33	Standard timing ID7 (01h if not used)		01	00000001
	52	34	Standard timing ID8 (01h if not used)		01	00000001
	53	35	Standard timing ID8 (01h if not used)		01	00000001

Product Specification

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

	Byte (Dec)	Byte (Hex)	Field Name and Comments	Value (Hex)	Value (Bin)	
Timing Descriptor #1	54	36	Pixel Clock/10,000 (LSB) 69.3 MHz @ 60Hz	12	00010010	
	55	37	Pixel Clock/10,000 (MSB)	1B	00011011	
	56	38	Horizontal Active (lower 8 bits) 1280 Pixels	00	00000000	
	57	39	Horizontal Blanking(Thp-HA) (lower 8 bits) 128 Pixels	80	10000000	
	58	3A	Horizontal Active / Horizontal Blanking(Thp-HA) (upper 4:4bits)	50	01010000	
	59	3B	Vertical Avtive 800 Lines	20	00100000	
	60	3C	Vertical Blanking (Tvp-HA) (DE Blanking typ.for DE only panels) 20 Lines	14	00010100	
	61	3D	Vertical Active : Vertical Blanking (Tvp-HA) (upper 4:4bits)	30	00110000	
	62	3E	Horizontal Sync. Offset (Thfp) 24 Pixels	18	00011000	
	63	3F	Horizontal Sync Pulse Width (HSPW) 32 Pixels	20	00100000	
	64	40	Vertical Sync Offset(Tvfp) : Sync Width (VSPW) 4 Lines : 4 Lines	44	01000100	
	65	41	Horizontal Vertical Sync Offset/Width (upper 2bits)	00	00000000	
	66	42	Horizontal Image Size (mm) 331 mm	4B	01001011	
	67	43	Vertical Image Size (mm) 207 mm	CF	11001111	
	68	44	Horizontal Image Size / Vertical Image Size	10	00010000	
	69	45	Horizontal Border = 0 (Zero for Notebook LCD)	00	00000000	
	70	46	Vertical Border = 0 (Zero for Notebook LCD)	00	00000000	
	71	47	Non-Interlace, Normal display, no stereo, Digital Separate (Vsync_NEG, Hsync_NEG)	18	00011000	
	Timing Descriptor #2	72	48	Flag	00	00000000
		73	49	Flag	00	00000000
		74	4A	Flag	00	00000000
75		4B	Data Type Tag (Descriptor Defined by manufacturer)	00	00000000	
76		4C	Flag	00	00000000	
77		4D	Descriptor Defined by manufacturer	00	00000000	
78		4E	Descriptor Defined by manufacturer	00	00000000	
79		4F	Descriptor Defined by manufacturer	00	00000000	
80		50	Descriptor Defined by manufacturer	00	00000000	
81		51	Descriptor Defined by manufacturer	00	00000000	
82		52	Descriptor Defined by manufacturer	00	00000000	
83		53	Descriptor Defined by manufacturer	00	00000000	
84		54	Descriptor Defined by manufacturer	00	00000000	
85		55	Descriptor Defined by manufacturer	00	00000000	
86		56	Descriptor Defined by manufacturer	00	00000000	
87		57	Descriptor Defined by manufacturer	00	00000000	
88		58	Descriptor Defined by manufacturer	00	00000000	
89		59	Descriptor Defined by manufacturer	00	00000000	
Timing Descriptor #3		90	5A	Flag	00	00000000
	91	5B	Flag	00	00000000	
	92	5C	Flag	00	00000000	
	93	5D	Data Type Tag (ASCII String)	FE	11111110	
	94	5E	Flag	00	00000000	
	95	5F	ASCII String L	4C	01001100	
	96	60	ASCII String G	47	01000111	
	97	61	ASCII String	20	00100000	
	98	62	ASCII String D	44	01000100	
	99	63	ASCII String i	69	01101001	
	100	64	ASCII String s	73	01110011	
	101	65	ASCII String p	70	01110000	
	102	66	ASCII String l	6C	01101100	
	103	67	ASCII String a	61	01100001	
	104	68	ASCII String y	79	01111001	
	105	69	Manufacturer P/N(If<13 char--> 0Ah, then terminate with ASCII code 0Ah,set remaining char = 20)	0A	00001010	
	106	6A	Manufacturer P/N(If<13 char--> 0Ah, then terminate with ASCII code 0Ah,set remaining char = 20)	20	00100000	
	107	6B	Manufacturer P/N(If<13 char--> 0Ah, then terminate with ASCII code 0Ah,set remaining char = 20)	20	00100000	

Product Specification

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

	Byte (Dec)	Byte (Hex)	Field Name and Comments	Value (Hex)	Value (Bin)
Timing Descriptor #4	108	6C	Flag	00	00000000
	109	6D	Flag	00	00000000
	110	6E	Flag	00	00000000
	111	6F	Data Type Tag (ASCII String)	FE	11111110
	112	70	Flag	00	00000000
	113	71	ASCII String L	4C	01001100
	114	72	ASCII String P	50	01010000
	115	73	ASCII String 1	31	00110001
	116	74	ASCII String 5	35	00110101
	117	75	ASCII String 4	34	00110100
	118	76	ASCII String W	57	01010111
	119	77	ASCII String X	58	01011000
	120	78	ASCII String 7	37	00110111
	121	79	ASCII String -	2D	00101101
	122	7A	ASCII String T	54	01010100
123	7B	ASCII String L	4C	01001100	
124	7C	ASCII String A	41	01000001	
125	7D	ASCII String 3	33	00110011	
Checksum	126	7E	Extension flag (# of optional 128 panel ID extension block to follow, Typ = 0)	00	00000000
	127	7F	Check Sum (The 1-byte sum of all 128 bytes in this panel ID block shall = 0)	91	10010001