SPECIFICATION
FOR
APPROVAL

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

Title	15.4” WXGA+ TFT LCD

BUYER	Apple
MODEL	

SUPPLIER	LG.Philips LCD Co., Ltd.
*MODEL	LP154WP2
Suffix	TLA3

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

APPROVED BY	SIGNATURE
/	
/	
/	

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

APPROVED BY	SIGNATURE
REVIEWED BY	
PREPARED BY	

Product Engineering Dept.
LG. Philips LCD Co., Ltd

Contents

RECORD OF REVISIONS

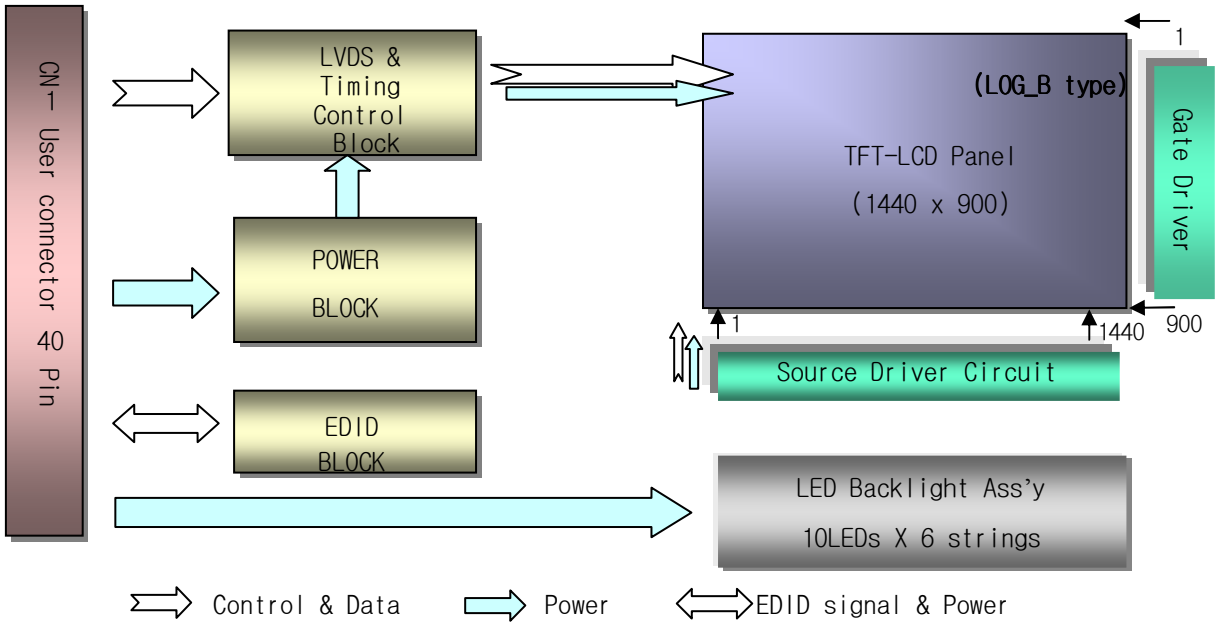
Revision No	Revision Date	Page	Description	EDID ver
0.0	05. Nov. 2007	-	First Draft	V0.0

1. General Description

The LP154WP2 is a Color Active Matrix Liquid Crystal Display with an integral 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(1440 horizontal by 900 vertical 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 LP154WP2 has been designed to apply the interface method that enables low power, high speed, low EMI.

The LP154WP2 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 LP154WP2 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) × 5.8(D, Typ.) mm
Pixel Pitch	0.2301 mm × 0.2301 mm
Pixel Format	1440 horiz. by 900 vert. Pixels RGB strip arrangement
Color Depth	6-bit, 262,144 colors
Luminance, White	330 cd/m^2(Typ., @I_{LED}=19mA) , 160 points Average
Power Consumption	Total 4. 57 Watt @ LCM circuit 1.15 Watt(Typ.full black), B/L 3.42 Watt(Max.)
Weight	440g (Typ.), 455(Max.)
Display Operating Mode	Transmissive mode, normally white
Surface Treatment	Hard coating(2H) Anti-glare treatment of the front Polarizer (Haze 44%)

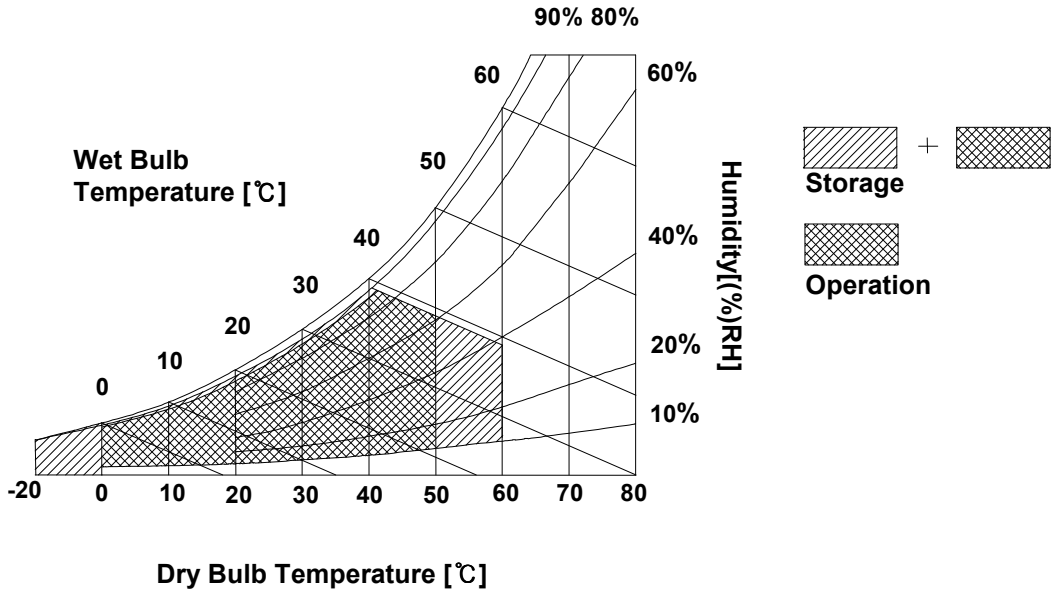
2. Absolute Maximum Ratings

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		
Power Input Voltage	VCC	-0.3	4.0	Vdc	at 25 ± 5°C
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 LP154WP2 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 LED BL.

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}	-	348	400	mA	1
Power Consumption	Pc	-	1.15	1.32	Watt	1
Differential Impedance	Zm	90	100	110	Ohm	2
LED Backlight :						
Operating Voltage	V_{LED}	-	30	33	V	3
Operating Current per string	I_{LED}	-	19	-	mA	4
Power Consumption	P_{BL}	-	3.42	3.77	Watt	5
Life Time		10,000	-	-	Hrs	6

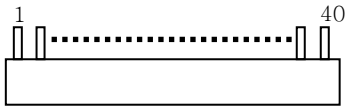
Note)

1. The specified current and power consumption are under the Vcc = 3.3V , 25℃, fv = 60Hz condition whereas **full 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. I_{LED} is the current of each LEDs' string, LED backlight has 6 strings on it.
5. The LED power consumption shown above does not include power of external LED driver circuit for typical current condition.
6. The life time is determined as the time at which brightness of LED is 50% compare to that of initial value at the typical LED current.

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.
The electronics interface connector is a model FI-JH-40S manufactured by JAE.

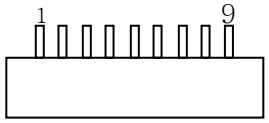
Table 3. MODULE CONNECTOR PIN CONFIGURATION (CN1)

Pin	Symbol	Description	Notes
1	GND	Ground	[LVDS Receiver] SW, (LVD4107x) X 2 [Connector] JAE FI-JT-40S-HF10 or equivalent (1.0 mm thickness, lock-in type, pin 1 starts from left on the front) [Mating Connector] JAE FI-JT-40C series or equivalent (micro-coax type) [Connector pin arrangement] LCD rear view 
2	VCC	Power Supply, 3.3V Typ.	
3	VCC	Power Supply, 3.3V Typ.	
4	V EDID	DDC 3.3V power	
5	VCC	Power Supply, 3.3V Typ.	
6	CLK EDID	DDC Clock	
7	DATA EDID	DDC Data	
8	RA1-	Negative LVDS differential data input	
9	RA1+	Positive LVDS differential data input	
10	GND	Ground	
11	RB1-	Negative LVDS differential data input	
12	RB1+	Positive LVDS differential data input	
13	GND	Ground	
14	RC1-	Negative LVDS differential data input	
15	RC1+	Positive LVDS differential data input	
16	GND	Ground	
17	RCLK1-	Negative LVDS differential clock input	
18	RCLK1+	Positive LVDS differential clock input	
19	GND	Ground	
20	RA2-	Negative LVDS differential data input	
21	RA2+	Positive LVDS differential data input	
22	GND	Ground	
23	RB2-	Negative LVDS differential data input	
24	RB2+	Positive LVDS differential data input	
25	GND	Ground	
26	RC2-	Negative LVDS differential data input	
27	RC2+	Positive LVDS differential data input	
28	GND	Ground	
29	RCLK2-	Negative LVDS differential clock input	

30	RCLK2+	Positive LVDS differential clock input	
31	Vdc1	LED Cathode (Negative)	
32	Vdc2	LED Cathode (Negative)	
33	Vdc3	LED Cathode (Negative)	
34	Vdc4	LED Cathode (Negative)	
35	Vdc5	LED Cathode (Negative)	
36	Vdc6	LED Cathode (Negative)	
37	NC	No Connection	
38	Vdc(1,2,3,4,5,6)	LED Anode(Positive)	
39	Vdc(1,2,3,4,5,6)	LED Anode(Positive)	
40	Vdc(1,2,3,4,5,6)	LED Anode(Positive)	

The LED backlight connector is a model TF12-9S-0.5H, manufactured by Hirose.

Table 4. BACKLIGHT CONNECTOR PIN CONFIGURATION (CN2)

Pin	Symbol	Description	Notes
1	Vdc(1,2,3,4,5,6)	LED Anode(Positive)	
2	Vdc(1,2,3,4,5,6)	LED Anode(Positive)	
3	NC	No Connection	
4	Vdc1	LED Cathode (Negative)	
5	Vdc2	LED Cathode (Negative)	
6	Vdc3	LED Cathode (Negative)	
7	Vdc4	LED Cathode (Negative)	
8	Vdc5	LED Cathode (Negative)	
9	Vdc6	LED Cathode (Negative)	

3-3. Signal Timing Specifications

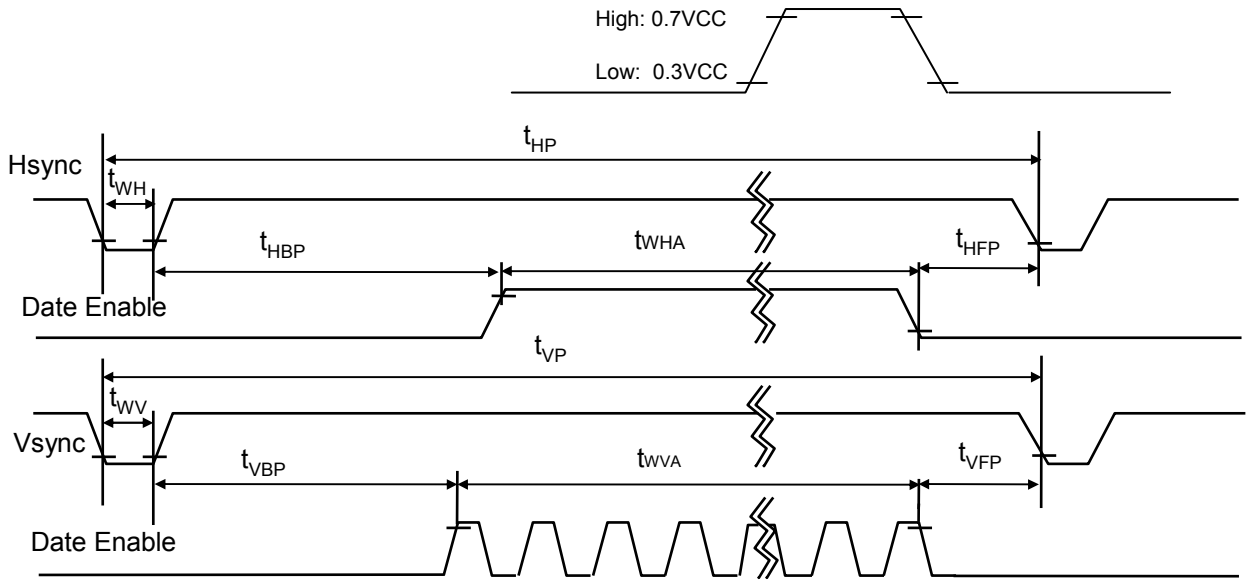
This is the signal timing required at the input of the User connector. All of the interface signal timing should be satisfied with the following specifications and specifications of LVDS Tx/Rx for its proper operation.

Table 5. TIMING TABLE

ITEM	Symbol		Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	f_{CLK}	89.48	96.82	103.2	MHz	
Hsync	Active	tw_{HA}	1440	1440	1440	tCLK	
	Period	t_{HP}	1648	1752	1872		
	Width-Active	t_{WH}	16	32	48		
Vsync	Active	tw_{VA}	900	900	900	tHP	
	Period	t_{VP}	905	923	923		
	Width-Active	t_{WV}	1	3	3		
Data Enable	Horizontal back porch	t_{HBP}	176	220	272	tCLK	
	Horizontal front porch	t_{HFP}	16	60	112		
	Vertical back porch	t_{VBP}	3	17	17	tHP	
	Vertical front porch	t_{VFP}	1	3	3		

3-4. Signal Timing Waveforms

Condition : V_{CC} =3.3V



3-5. 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	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	0	1
	…			…						…						…			
	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

3-6. Power Sequence

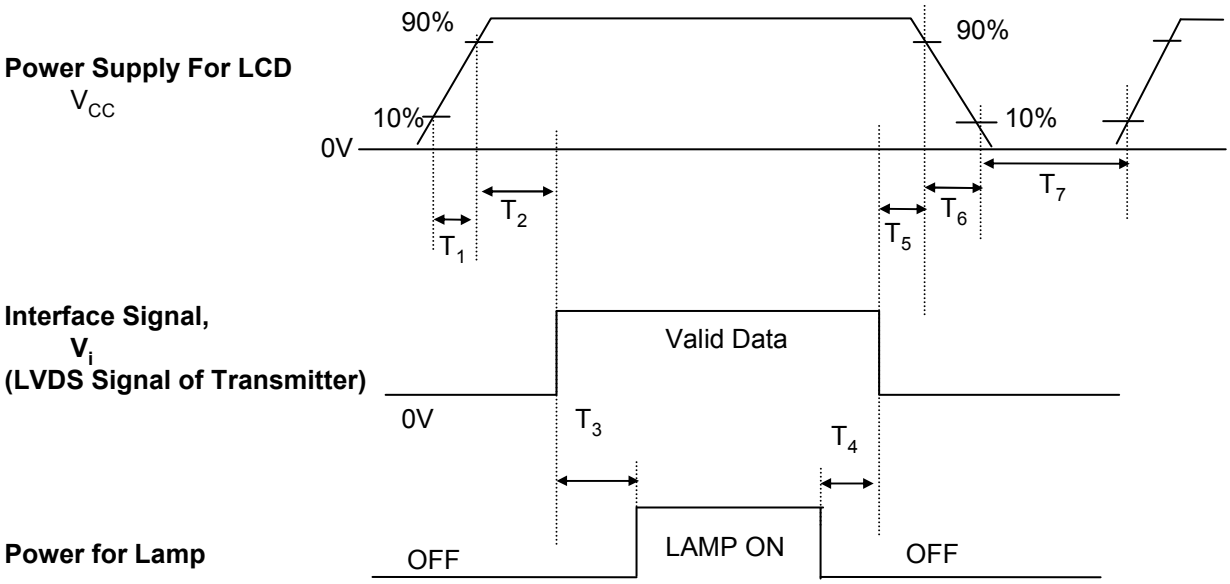


Table 7. POWER SEQUENCE TABLE

Parameter	Value			Units
	Min.	Typ.	Max.	
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	400	-	-	(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 VCC 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 20 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

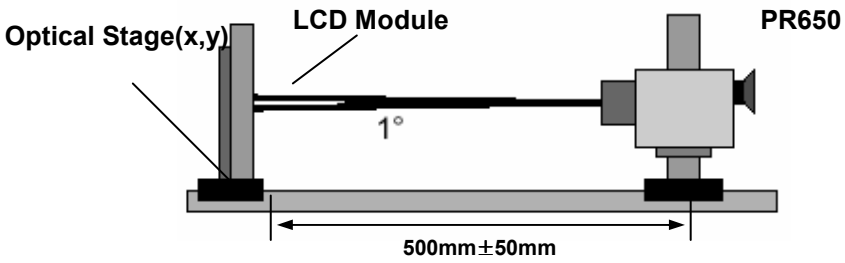


Table 8. OPTICAL CHARACTERISTICS

Ta=25°C, VCC=3.3V, fv=60Hz, f_{CLK}= 96.3MHz, ILED = 19mA

Parameter		Symbol	Condition	Min	Typ	Max	Units	Notes
Average Luminance		L_{AVE}	160 Points (I_{LED}= 19mA)	280	330	-	cd/m²	Fig 2
Luminance variation		%	160 points	46.2	-	-	-	Fig 2
C/R		-	Center 1 Point	400	500	-	-	
Response time		$Tr_R + Tr_D$	-	-	16	25	ms	Fig 3
Viewing angle	Horizontal	Θ	ϕx(Left,Right)	±55	±60	-	°	Fig 4
	Vertical	Θ	ϕyu(Up)	50	55	-		
		Θ	ϕyd(Down)	55	55	-		
Worst neighbor Brightness uniformity		%		70				
White chromaticity deviation (W.R.T center)			d u'v'	-	-	0.0112		
White chromaticity deviation (Over panel)			d u'v'	-	-	0.0165		
White chromaticity deviation (Worst neighbor)			d u'v'	-	-	0.00325		
Cross Talk		D_{SHA}	-	-	-	4.0	%	Fig 5
Gray Scale		-	-	Gamma 2.2				

Table 9. RGB Color Chromaticity

	White		Red		Green		Blue	
	Wx	Wy	Rx	Ry	Gx	Gy	Bx	By
Max.	0.345	0.369	0.627	0.375	0.361	0.604	0.185	0.167
Typ.	0.313	0.329	0.595	0.335	0.329	0.564	0.153	0.127
Min.	0.281	0.289	0.563	0.295	0.297	0.524	0.121	0.087

Notes)

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. 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.

3. 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.

4. Gray scale specification * f_V=60Hz

Gray Level	Luminance [%] (Typ)
L0	0.13
L7	2.00
L15	6.90
L23	13.5
L31	23.2
L39	38.6
L47	59.1
L55	80.8
L63	100

5. Average Luminance

Ave. = SUM(L1:L160) / 160

where L1 to L160 are the luminance values measured at point #1 to #160.

6. Luminance Uniformity

Luminance Uniformity:

U = 100% - (Lmax-Lmin)/Lmax

where, Lmax = max {Luminance values at 160 points},

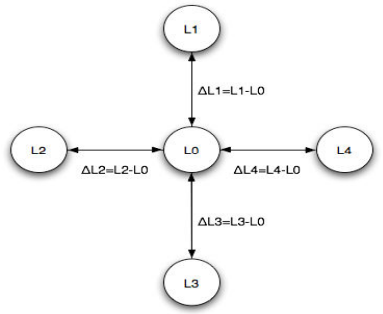
Lmin = min {Luminance values at 160 points}

7. Worst neighbor Luminance Uniformity

Worst Neighbor Luminance Uniformity (The 4 points that are closest to the test point)

WNU=100%-Max(ΔL1, ΔL2, ΔL3, ΔL4)/L0

Global WNU = min (WNU1, …WNU160)



8. White chromaticity deviation – with respect to center

Center color coordinate is defined as the Average of points: 72, 73, 88, 89.

9. White chromaticity deviation – over panel

Maximum delta u'v' between any two measured points over the 160 points

10. White chromaticity deviation – worst neighbor

Maximum delta u'v' between any two neighboring points on the panel

11. White Chromaticity

Average (72, 73, 88, 89 Points)

12. RGB Chromaticity

Center Point

FIG. 2 Luminance

<Measuring point for Average Luminance & measuring point for Luminance variation>

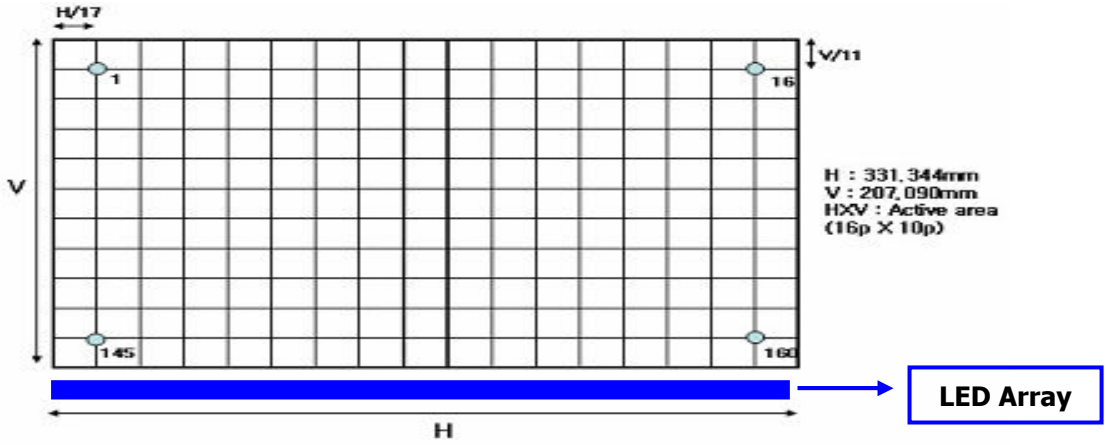


FIG. 3 Response Time

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

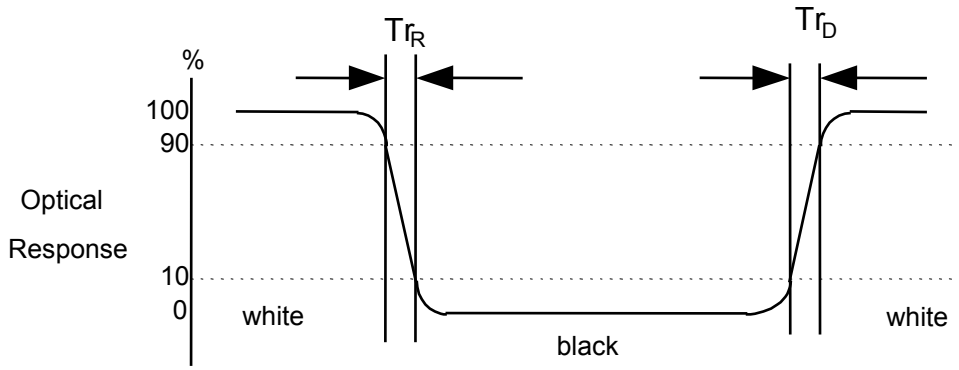


FIG. 4 Viewing angle

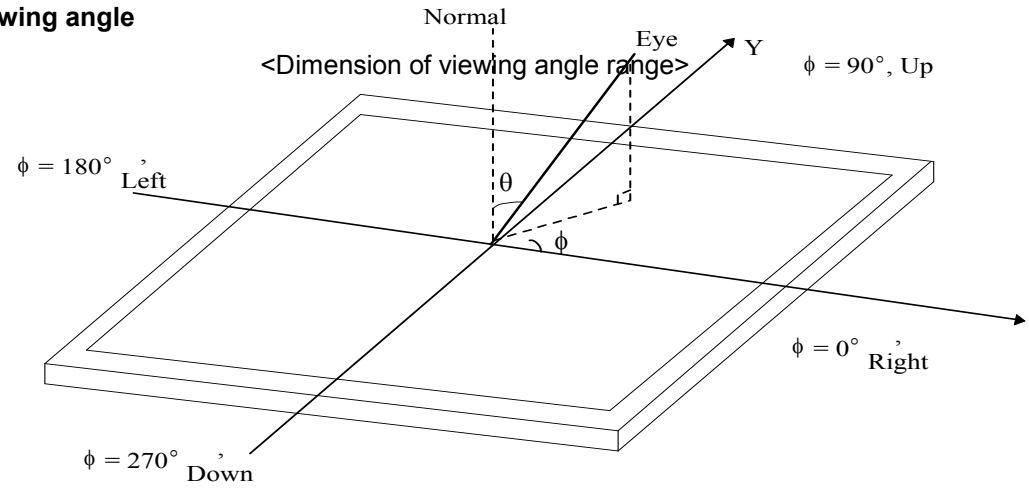


FIG. 5 Cross talk

No visual cross-talk will be allowed. Two luminance values are measured at center spot with 50 x 50 pixels. The cross-talk, D_{SHA}, is defined as,

$$D_{SHA} = (L_B - L_A)/L_B \bullet 100\%,$$

Where, L_A = Luminance in Pattern A

L_B = Luminance in Pattern B.

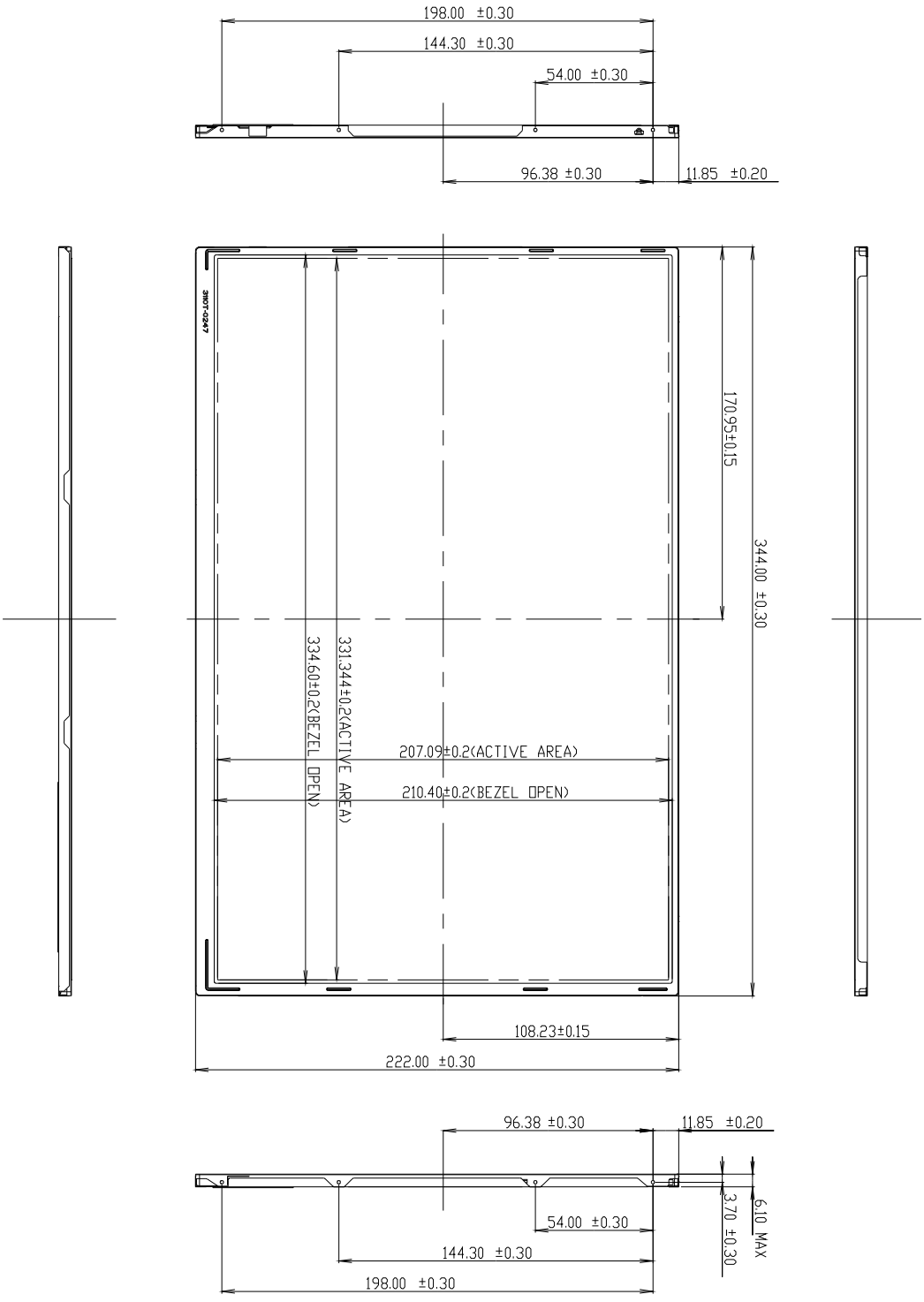
5. Mechanical Characteristics

The contents provide general mechanical characteristics for the model LP154WP2.
In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal	344.0 ± 0.30mm
	Vertical	222.0 ± 0.30mm
	Depth	6.1mm(Max)
Bezel Area	Horizontal	334.60 mm
	Vertical	210.40mm
Active Display Area	Horizontal	331.344mm
	Vertical	207.09 mm
Weight	450(Typ.), 455g (Max.)	
Surface Treatment	Hard coating(2H) Anti-glare treatment of the front Polarizer (Haze 44%)	

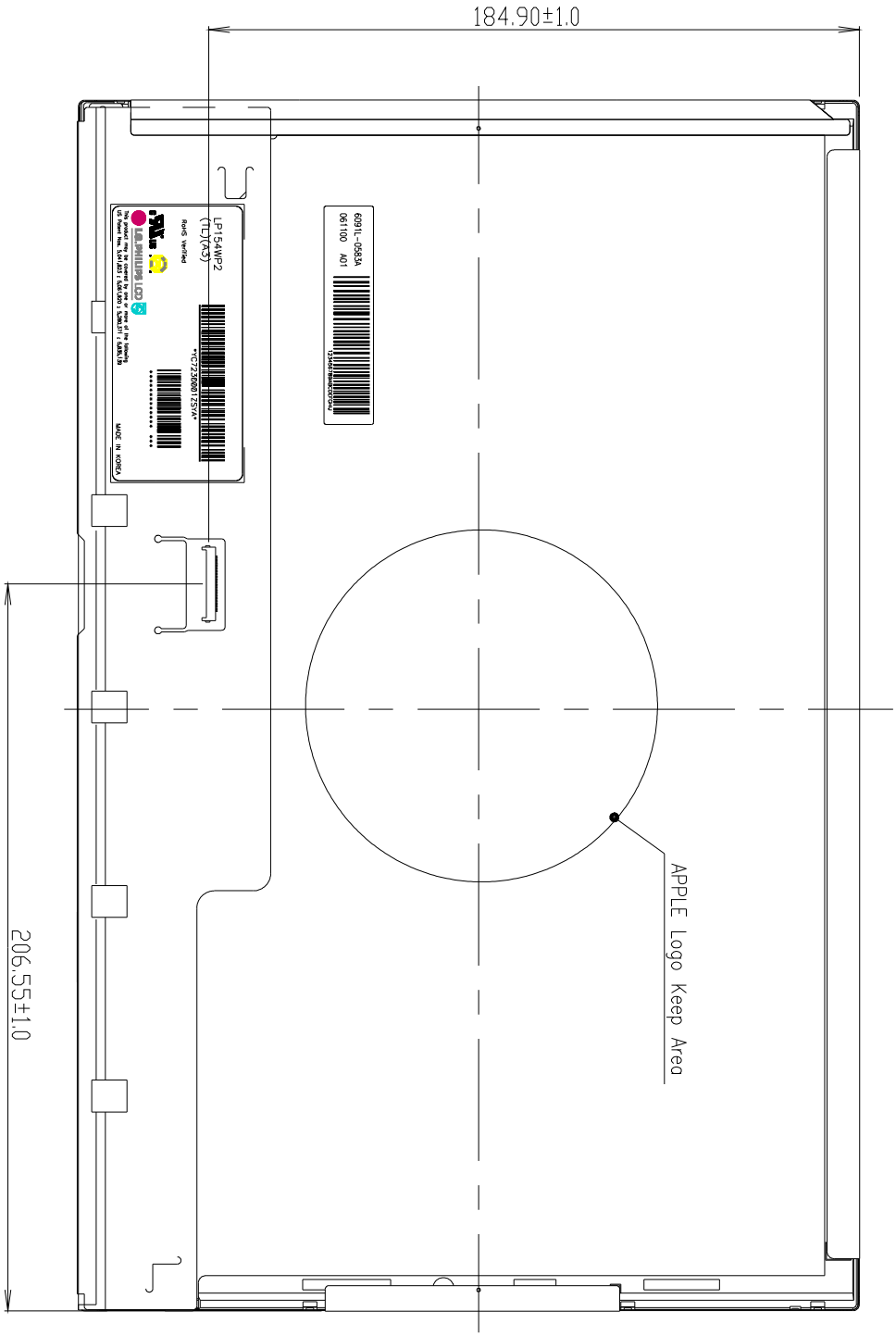
<FRONT VIEW>

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

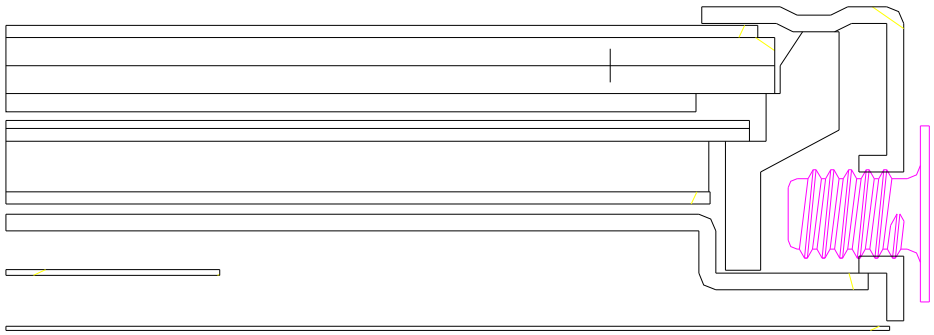


<REAR VIEW>

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



[DETAIL DESCRIPTION OF SIDE MOUNTING SCREW]



*** Screw(8EA) Torque : 2.5kgf.cm max**
*** Screw Hole Depth : 2.5mm min**
*** Screw Length : Max 2.5, min 2.0**

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 1950 Third Edition, Underwriters Laboratories, Inc. Jan. 28, 1995.
Standard for Safety of Information Technology Equipment Including Electrical Business Equipment.
b) CAN/CSA C22.2 No. 950-95 Third Edition, Canadian Standards Association, Jan. 28, 1995.
Standard for Safety of Information Technology Equipment Including Electrical Business Equipment.
c) EN 60950 : 1992+A1: 1993+A2: 1993+A3: 1995+A1: 1997+A11: 1997
IEC 950 : 1991+A1: 1992+A2: 1993+A3: 1995+A1: 1996
European Committee for Electrotechnical Standardization(CENELEC)
EUROPEAN STANDARD for Safety of Information Technology Equipment Including Electrical Business 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

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 : 30 pcs

b) Box Size : 515mm ×425mm × 325mm

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 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=± 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	Header	F	F	1111 1111	
2	02	Header	F	F	1111 1111	
3	03	Header	F	F	1111 1111	
4	04	Header	F	F	1111 1111	
5	05	Header	F	F	1111 1111	
6	06	Header	F	F	1111 1111	
7	07	Header	0	0	0000 0000	
8	08	EISA manufacturer code(3 Character ID) = APP	0	6	0000 0110	Vender/ Product ID
9	09	Compressed ASCII	1	0	0001 0000	
10	0A	Product code(Refer to Apple's request)	8	1	1000 0001	
11	0B	(Hex, LSB first)	9	C	1001 1100	
12	0C		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	1	0000 0001	
17	11	Year of Manufacture = 2007	1	1	0001 0001	
18	12	EDID Structure version # = 1	0	1	0000 0001	EDID Version/ Revision
19	13	EDID Revision # = 2	0	2	0000 0010	
20	14	Video Input Definition = Digital I/P,non TMDS CRGB	8	0	1000 0000	Display Parameter
21	15	Max H image size(㎝)=33.156cm(33)	2	1	0010 0001	
22	16	Max V image size(㎝)=20.722cm(21)	1	5	0001 0101	
23	17	Display gamma =2.2	7	8	0111 1000	
24	18	Feature support(DPMS) = Active off, RGB Color	0	A	0000 1010	
25	19	Red/Green low Bits	9	C	1001 1100	Color Characteristic
26	1A	Blue/White Low Bits	6	0	0110 0000	
27	1B	Red X = 0.600	9	9	1001 1001	
28	1C	Red Y = 0.345	5	8	0101 1000	
29	1D	Green X = 0.320	5	1	0101 0001	
30	1E	Green Y = 0.555	8	E	1000 1110	
31	1F	Blue X = 0.150	2	6	0010 0110	
32	20	Blue Y = 0.120	1	2	0001 0010	
33	21	White X = 0.313	5	0	0101 0000	
34	22	White Y = 0.329	5	4	0101 0100	
35	23	Established Timing I = 00h(If not used)	0	0	0000 0000	Established Timings
36	24	Established Timing II = 00h(If not used)	0	0	0000 0000	
37	25	Manufacturer's Timings = 00h(If not used)	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	Pixel Clock/10,000 (LSB) => main clock = 96.82 MHz	D	2	1101 0010	Timing Descriptor #1
55	37	Pixel Clock/10,000 (MSB)	2	5	0010 0101	
56	38	Horizontal Active = 1440 pixels	A	0	1010 0000	
57	39	Horizontal Blanking = 312 pixels	3	8	0011 1000	
58	3A	Horizontal Active : Horizontal Blanking = 1440:312	5	1	0101 0001	
59	3B	Vertical Avtive = 900 lines	8	4	1000 0100	
60	3C	Vertical Blanking = 23 lines	1	7	0001 0111	
61	3D	Vertical Active : Vertical Blanking = 900 : 23	3	0	0011 0000	
62	3E	Horizontal Sync. Offset =64 pixels	4	0	0100 0000	
63	3F	Horizontal Sync Pulse Width = 32 pixels	2	0	0010 0000	
64	40	Vertical Sync Offset = 3 lines : Sync Width = 3 lines	3	3	0011 0011	
65	41	Horizontal Vertical Sync Offset/Width upper 2bits = 0	0	0	0000 0000	
66	42	Horizontal Image Size = 33.156cm(331)	4	C	0100 1100	
67	43	Vertical Image Size = 20.722cm(210)	C	F	1100 1111	
68	44	Horizontal & Vertical Image Size	1	0	0001 0000	
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	8	0001 1000	
72	48	Detailed Timing Descriptor #2	0	0	0000 0000	Timing Description #2
73	49		0	0	0000 0000	
74	4A		0	0	0000 0000	
75	4B		0	1	0000 0001	
76	4C	Version	0	0	0000 0000	
77	4D	Apple edid signature	0	6	0000 0110	
78	4E	Apple edid signature	1	0	0001 0000	
79	4F	Link Type	3	0	0011 0000	
80	50	Pixel and link component format(6-bit panel interface)	0	0	0000 0000	
81	51	Panel features(Inverter NA, no inverter)	0	0	0000 0000	
82	52		0	0	0000 0000	
83	53		0	0	0000 0000	
84	54		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	A	0000 1010	
89	59		2	0	0010 0000	
90	5A	Detailed Timing Descriptor #3	0	0	0000 0000	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	P	5	0	0101 0000	
97	61	1	3	1	0011 0001	
98	62	5	3	5	0011 0101	
99	63	4	3	4	0011 0100	
100	64	W	5	7	0101 0111	
101	65	P	5	0	0101 0000	
102	66	2	3	2	0011 0010	
103	67	-	2	D	0010 1101	
104	68	T	5	4	0101 0100	
105	69	L	4	C	0100 1100	
106	6A	A	4	1	0100 0001	
107	6B	3	3	3	0011 0011	

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	
109	6D		0	0	0000 0000	
110	6E		0	0	0000 0000	
111	6F		F	E	1111 1110	
112	70		0	0	0000 0000	
113	71	C	4	3	0100 0011	
114	72	o	6	F	0110 1111	
115	73	l	6	C	0110 1100	**Timing**
116	74	o	6	F	0110 1111	**Description**
117	75	r	7	2	0111 0010	**#4**
118	76	SPACE	2	0	0010 0000	
119	77	L	4	C	0100 1100	
120	78	C	4	3	0100 0011	
121	79	D	4	4	0100 0100	
122	7A	LF	0	A	0000 1010	
123	7B	SPACE	2	0	0010 0000	
124	7C	SPACE	2	0	0010 0000	
125	7D	SPACE	2	0	0010 0000	
126	7E	Extension flag = 00	0	0	0000 0000	**Extension Flag**
127	7F	Checksum	F	4	1111 0100	**Checksum**