SPECIFICATION
FOR
APPROVAL

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

Title	17.1” WUXGA TFT LCD

BUYER	Dell
MODEL	

SUPPLIER	LG.Philips LCD Co., Ltd.
*MODEL	LP171WU5
Suffix	TLA4

*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.

APPROVED BY	SIGNATURE
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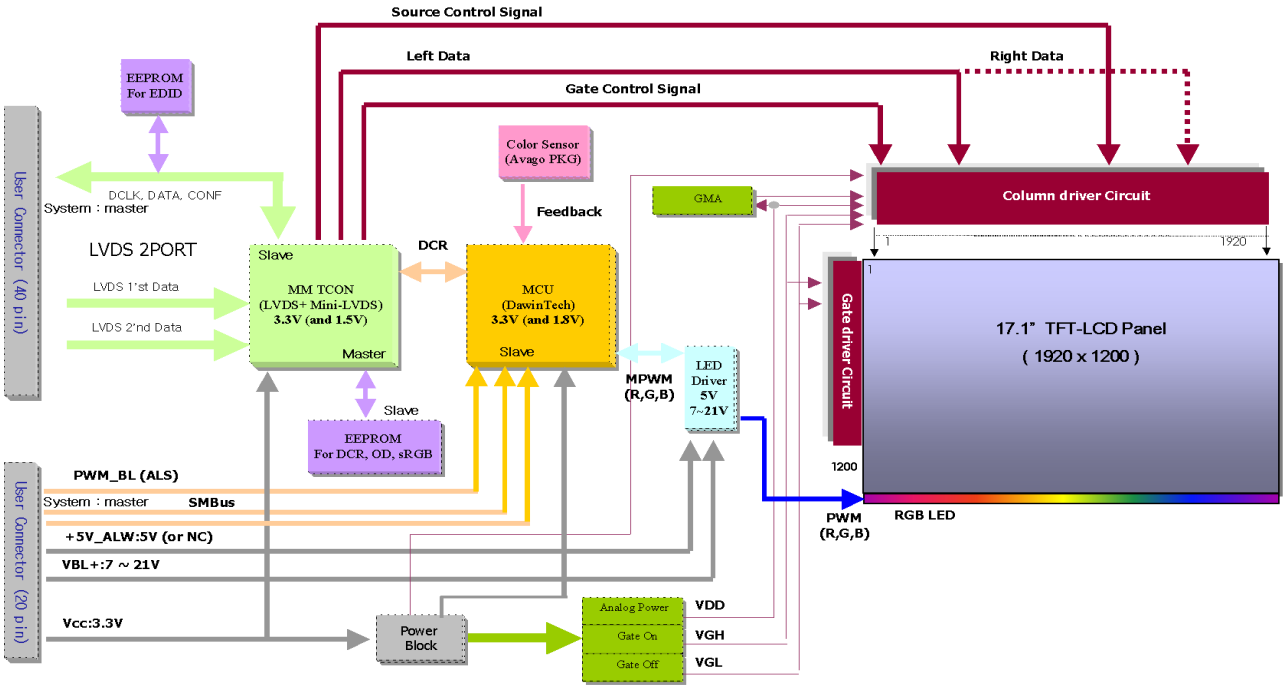
RECORD OF REVISIONS

Revision No	Revision Date	Page	Description	Note
0.1	28. May. 2009	-	First draft	-
0.2	12. Aug. 2009	19~21	Mechanical drawing	
		30~32	Update EDID	0.1
0.3	03.Nov. 2009	11	Update Signal Timing Specifications	
		30~32	Update EDID	1.0
1.0	03.Nov. 2009	-	Final CAS	1.0

1. General Description

The LP171WU5 is a Color Active Matrix Liquid Crystal Display with an integral RGB 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 17.1 inches diagonally measured active display area with WUXGA resolution(1920 horizontal by 1200 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 8-bit gray scale signal for each dot, thus, presenting a palette of more than 16.7M(True) colors.

The LP171WU5 has been designed to apply the interface method that enables low power, high speed, low EMI. The LP171WU5 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 LP171WU5(TLA4) characteristics provide an excellent flat display for office automation products such as Notebook PC.



General Features

Active Screen Size	17.1 inches diagonal
Outline Dimension(max)	382.7 (H) × 248.0 (V) × 7.0(D) mm
Pixel Pitch	0.191 mm × 0. 191 mm
Pixel Format	1920 horiz. by 1200 vert. Pixels RGB strip arrangement
Color Depth	8-bit, 16.7M colors
Luminance, White	300 cd/m^2(Typ.) , 5 point
Power Consumption	15W(Typ.) [3.3W(Logic, Typ.) + 11.7W(B/L, Typ.)]
Weight (Max.)	800 g
Display Operating Mode	Transmissive mode, normally white
Surface Treatment	Hard coating(4H), Anti-Glare treatment of the front polarizer

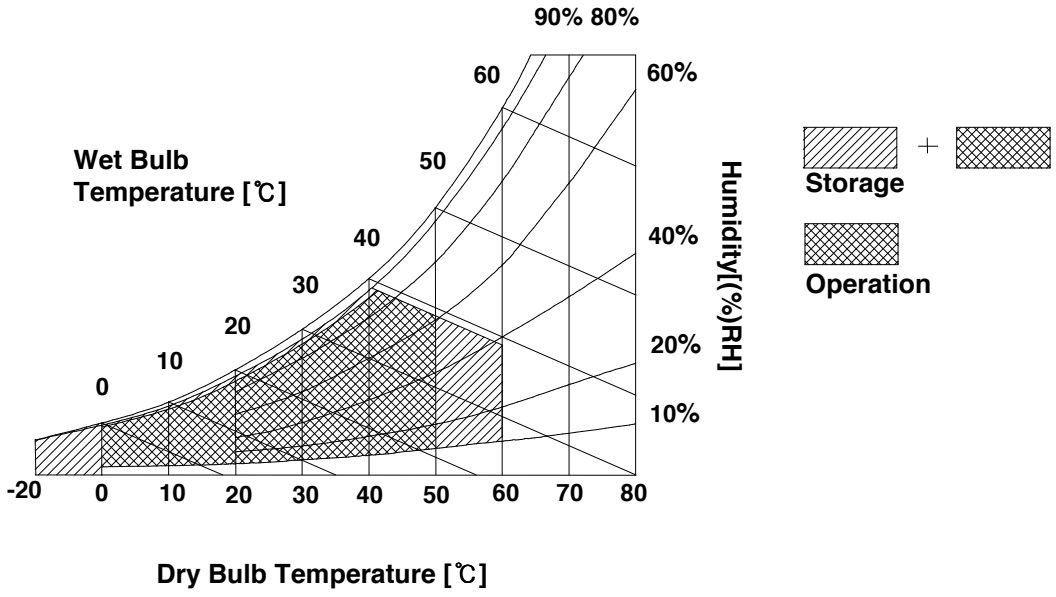
2. Absolute Maximum Ratings

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		
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 LP171WU5(TLA4)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, is typically generated by an LED Driver. The LED Driver is an internal 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}	850	1000	1150	mA	1
Power Consumption	Pc	2.8	3.3	3.8	Watt	1
Differential Impedance	Zm	90	100	110	Ohm	2
LED Backlight :						
Power Supply Input Voltage	V_{BL+}	7.5	14.4	21	V_{DC}	
Operating Voltage	$V_{LED\ (R,G,B)}$	-	-	42.4	V	3
Operating Current per string	$I_{LED\ (R,G,B)}$	-	-	50	mA	3
Power Consumption	P_{BL}		11.7	15.5	Watt	4
Life Time		15,000	-	-	Hrs	5

Note)

1. The specified current and power consumption are under the Vcc = 3.3V , 25℃, fv = 60Hz condition whereas Mosaic 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. RGB LED Operating Voltage and Operating Current per string should be within Max. SPEC.
4. The LED power consumption (Typ) shown above does include power of internal LED driver circuit for typical current condition. (Luminance = 300nit condition)
   The power consumption (Max) condition is R,G,B LED 100% Dimming.
5. 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.

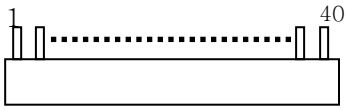
Table 3. MODULE CONNECTOR PIN CONFIGURATION (CN1)

Pin	Symbol	Description
1	CONNTST	TEST LOOP_Only to pin 40
2	VDD	Logic power 3.3v
3	VDD	Logic power 3.3v
4	VDD	Logic power 3.3v
5	TEST (BIST_EN)	Panel Self Test
6	AI (for DBC)	-
7	VEDID (3.3V)	EDID 3.3V Power
8	Clk EEDID	Two wire serial interface clock
9	DATA EEDID	Two wire serial interface data
10	VSS	Ground
11	RXinO0-	- LVDS differential data input, Chan 0-Odd
12	RXinO0+	+ LVDS differential data input, Chan 0-Odd
13	VSS	Ground
14	RXinO1-	- LVDS differential data input, Chan 1-Odd
15	RXinO1+	+ LVDS differential data input, Chan 1-Odd
16	VSS	Ground
17	RXinO2-	- LVDS differential data input, Chan 2-Odd
18	RXinO2+	+ LVDS differential data input, Chan 2-Odd
19	VSS	Ground
20	RXOC-	- LVDS Differential Clock input (Odd)
21	RXOC+	+ LVDS Differential Clock input (Odd)
22	VSS	Ground
23	RXinO3-	- LVDS differential data input, Chan 3-Odd
24	RXinO3+	+ LVDS differential data input, Chan 3-Odd
25	VSS	Ground
26	RXinE0-	- LVDS differential data input, Chan 0-Even
27	RXinE0+	+ LVDS differential data input, Chan 0-Even
28	VSS	Ground
29	RXinE1-	- LVDS differential data input, Chan 1-Even
30	RXinE1+	+ LVDS differential data input, Chan 1-Even
31	VSS	Ground
32	RXinE2-	- LVDS differential data input, Chan 2-Even
33	RXinE2+	+ LVDS differential data input, Chan 2-Even
34	VSS	Ground
35	RXEC-	- LVDS Differential Clock input (Even)
36	RXEC+	+ LVDS Differential Clock input (Even)
37	VSS	Ground
38	RXinE3-	- LVDS differential data input, Chan 3-Even
39	RXinE3+	+ LVDS differential data input, Chan 3-Even
40	CONNTST	TEST LOOP_Only to pin 1

Notes

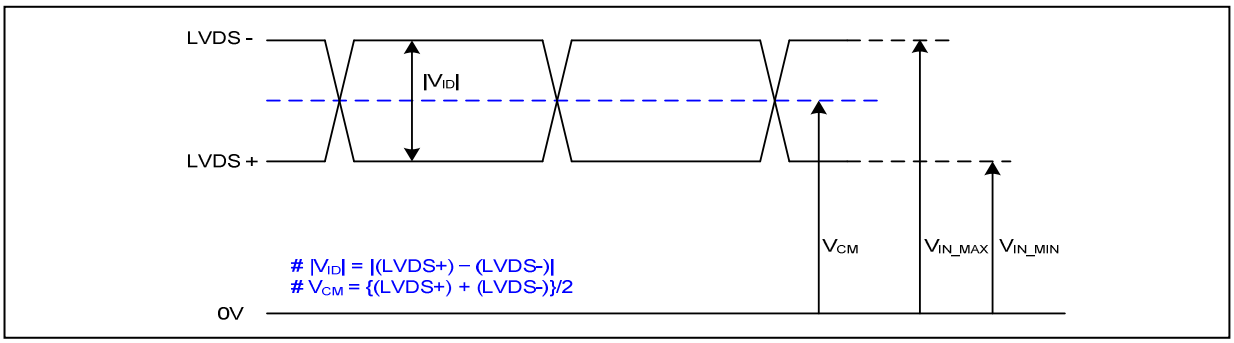
1, Interface chips
1.1 LCD : Renesas (MM-TCON) including LVDS Receiver
1.2 System :
* Pin to Pin compatible with LVDS

2.Connector
2.1 LCD :JAE FI-NXB40SL or equivalent (1.0 mm thickness, lock-in type, pin 1 starts from left on the front)
2.2 Mating: JAE or equivalent
2.3 Connector pin arrangement
LCD rear view



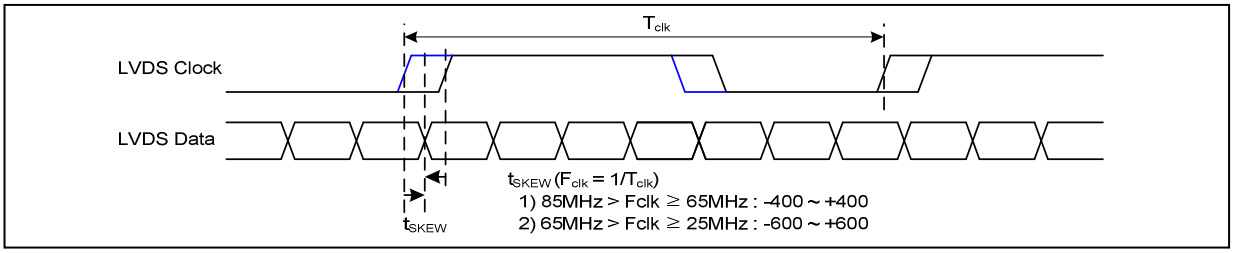
3-3. LVDS Signal Timing Specifications

3-3-1. DC Specification

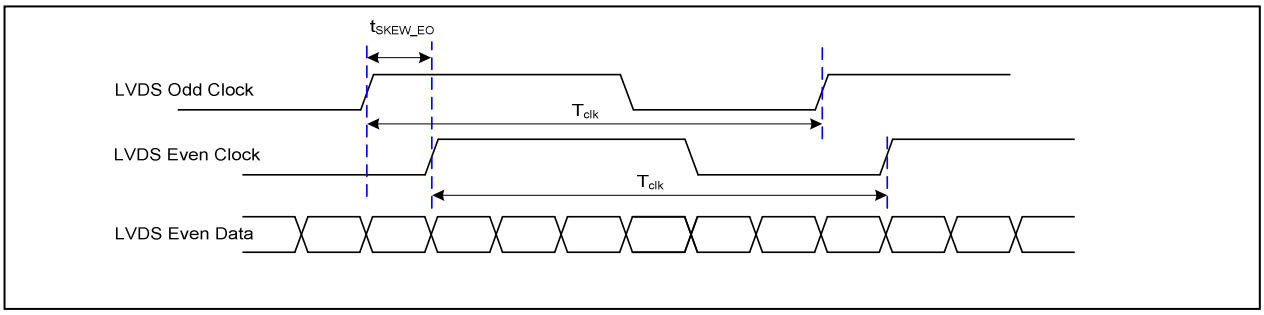


Description	Symbol	Min	Max	Unit	Notes
LVDS Differential Voltage	$\|V_{ID}\|$	100	600	mV	-
LVDS Common mode Voltage	V_{CM}	0.6	1.8	V	-
LVDS Input Voltage Range	V_{IN}	0.3	2.1	V	-

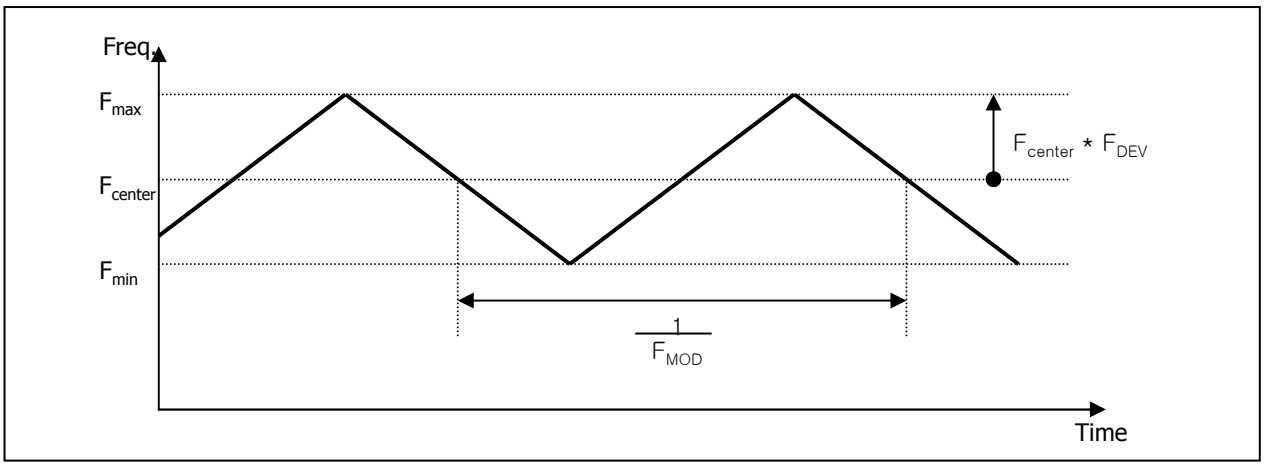
3-3-2. AC Specification



Description	Symbol	Min	Max	Unit	Notes
LVDS Clock to Data Skew Margin	t_{SKEW}	- 400	+ 400	ps	85MHz > Fclk ≥ 65MHz
	t_{SKEW}	- 600	+ 600	ps	65MHz > Fclk ≥ 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	-



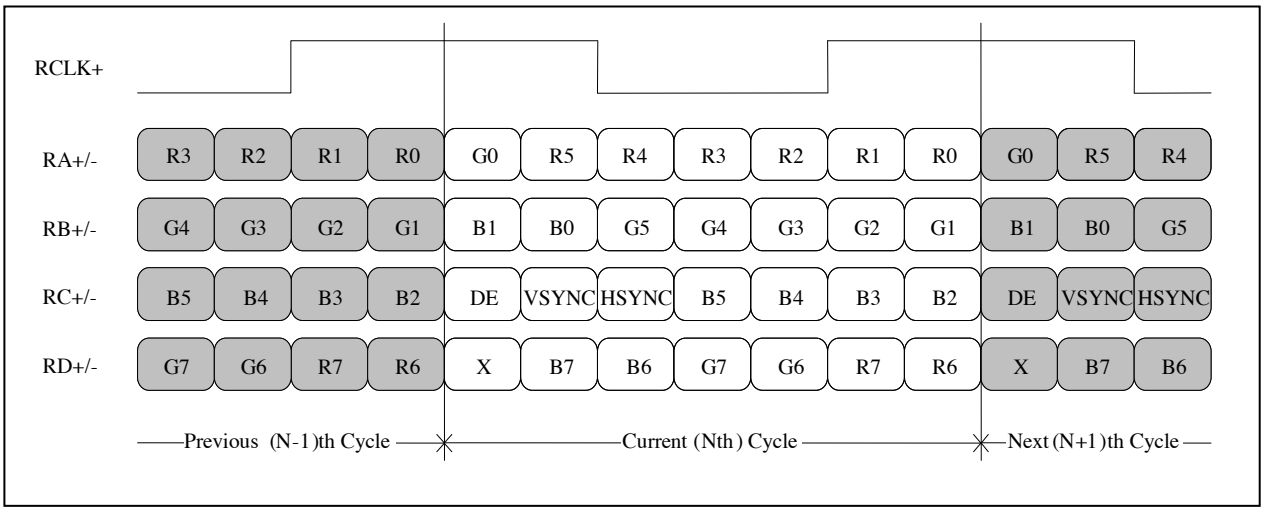
< Clock skew margin between channel >



< Spread Spectrum >

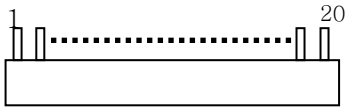
3-3-3. Data Format

1) LVDS Data Port



< LVDS Data Format: LG format >

Table 4. BACKLIGHT CONNECTOR PIN CONFIGURATION (CN2)

Pin	Symbol	Description	Notes
1	CONNTST	TEST LOOP_Only to pin 20	1. Connector 1.1 LCD : FI-XB20S-HF10(JAE) or equivalent 1.2 Mating : JAE equivalent. 1.3 Connector pin arrangement  [LCD Module Rear View]
2	+5V_ALW	5V_ALW (or NC)	
3	VSS	Ground	
4	VSS	Ground	
5	PWM_BL	Power Brightness Control	
6	VBL-	LED Power Return	
7	VBL-	LED Power Return	
8	VBL-	LED Power Return	
9	VBL-	LED Power Return	
10	NC	No Connection	
11	VBL+	7V ~ 20V LED Power	
12	VBL+	7V ~ 20V LED Power	
13	VBL+	7V ~ 20V LED Power	
14	VBL+	7V ~ 20V LED Power	
15	SMB_DATA	SMB_DATA	
16	SMB_CLK	SMB_CLK	
17	NC	No Connection	
18	NC	No Connection	
19	NC	No Connection	
20	CONNTST	TEST LOOP_Only to pin 1	

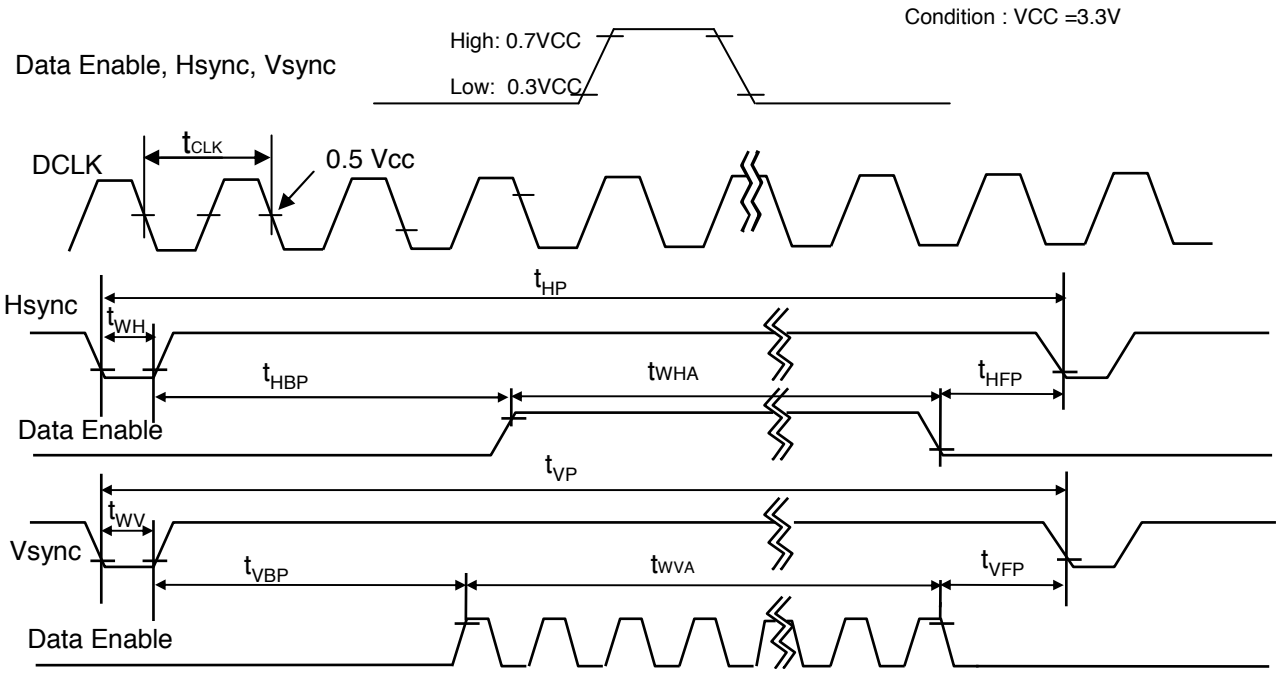
3-3. Signal Timing Specifications

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}	-	154.34	-	MHz	$t_{CLK} = 1 / f_{CLK}$
Hsync	Period	t_{HP}	1982	2060	2144	t_{CLK}	
	Width	t_{WH}	15	32	32		
	Active	t_{WHA}	1920	1920	1920		
Vsync	Period	t_{VP}	1213	1248	1278	t_{HP}	
	Width	t_{WV}	3	6	6		
	Active	t_{WVA}	1200	1200	1200		
Data Enable	Horizontal back porch	t_{HBP}	22	60	112	t_{CLK}	
	Horizontal front porch	t_{HFP}	25	48	80		
	Vertical back porch	t_{VBP}	15	39	48	t_{HP}	
	Vertical front porch	t_{VFP}	2	3	24		

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

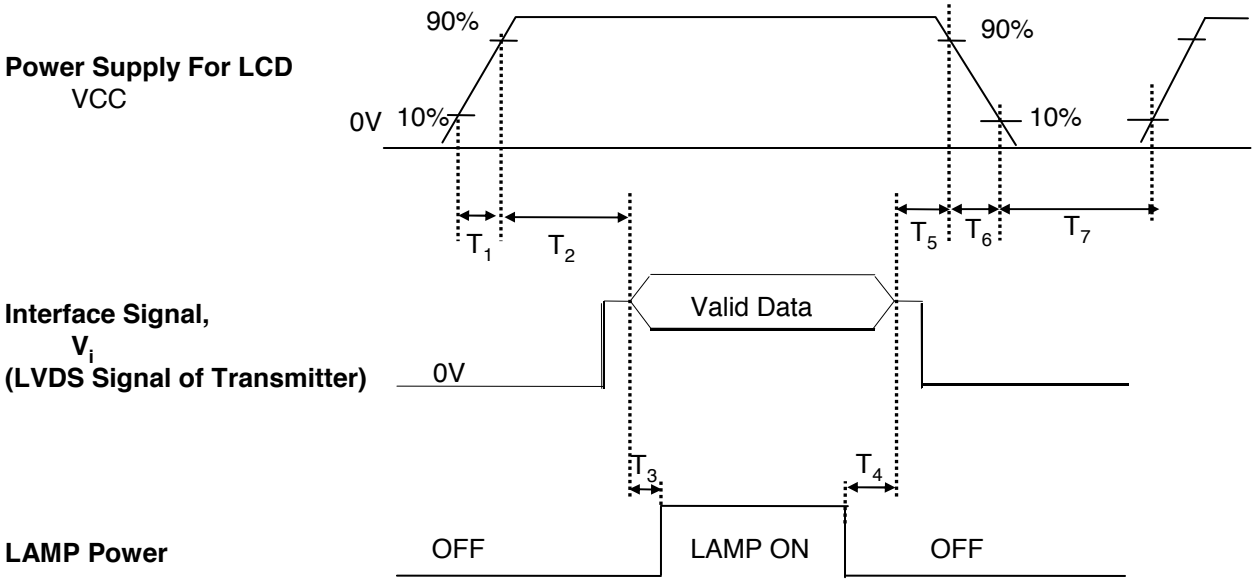


Table 7. POWER SEQUENCE TABLE

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. 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. 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 Θ equal to 0°.
FIG. 1 presents additional information concerning the measurement equipment and method.

FIG. 1 Optical Characteristic Measurement Equipment and Method

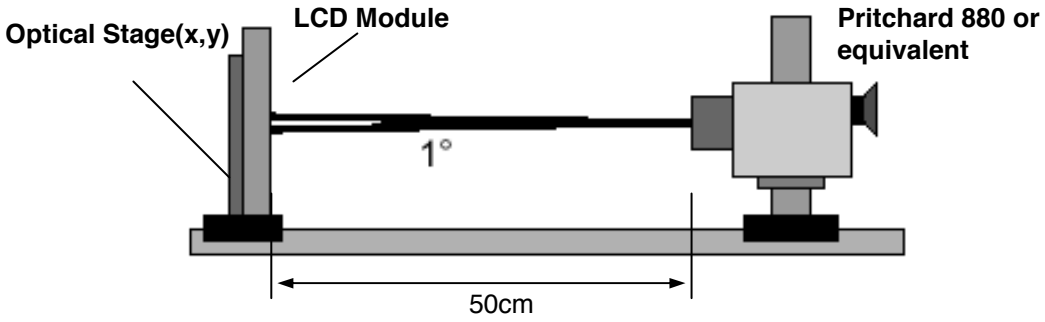


Table 8. OPTICAL CHARACTERISTICS

Ta=25°C, VCC=3.3V, fV=60Hz, fCLK= 155MHz, Finished Color Calibration

Parameter	Symbol	Values			Units	Notes
		Min	Typ	Max		
Contrast Ratio	CR	400	600	-		1
Surface Luminance, white	L_{WH}	255	300	-	cd/m^2	2
Luminance Variation	δ_{WHITE}	-	1.4	1.6		3
Response Time						4
Rise Time+Decay Time	$Tr_{R+}Tr_D$	-	16	20	ms	W to B
Rise Time+Decay Time	$Tr_{R+}Tr_D$	-	8	16	ms	G to G
Color Coordinates						
RED	RX	0.660	0.690	0.720		±0.03
	RY	0.271	0.301	0.331		
GREEN	GX	0.172	0.202	0.232		
	GY	0.687	0.717	0.747		
BLUE	BX	0.121	0.151	0.181		
	BY	0.021	0.051	0.081		
WHITE	WX	0.293	0.313	0.333		±0.02
	WY	0.309	0.329	0.349		
Viewing Angle						5
x axis, right(Φ=0°)	Θr	55	65	-	degree	
x axis, left (Φ=180°)	Θl	55	65	-	degree	
y axis, up (Φ=90°)	Θu	45	55	-	degree	
y axis, down (Φ=270°)	Θd	45	55	-	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 Luminance (300nit). 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)

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.

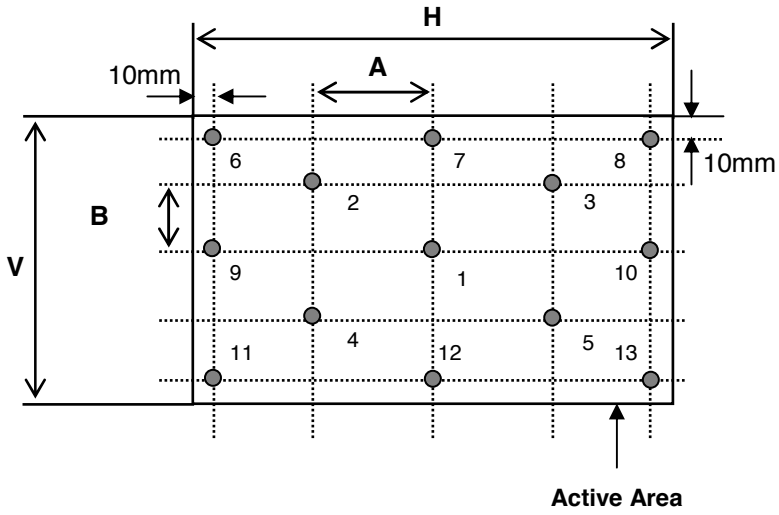
5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 4.

6. Gray scale specification * f_V=60Hz

Gray Level	Luminance [%] (Typ)
L0	0.13
L15	0.32
L31	1.53
L47	3.37
L63	5.85
L79	8.78
L95	12.25
L111	15.95
L127	20.35
L143	26.3
L159	34.15
L175	42.8
L191	53.25
L207	64.75
L223	77.3
L239	89.4
L255	100

FIG. 2 Luminance

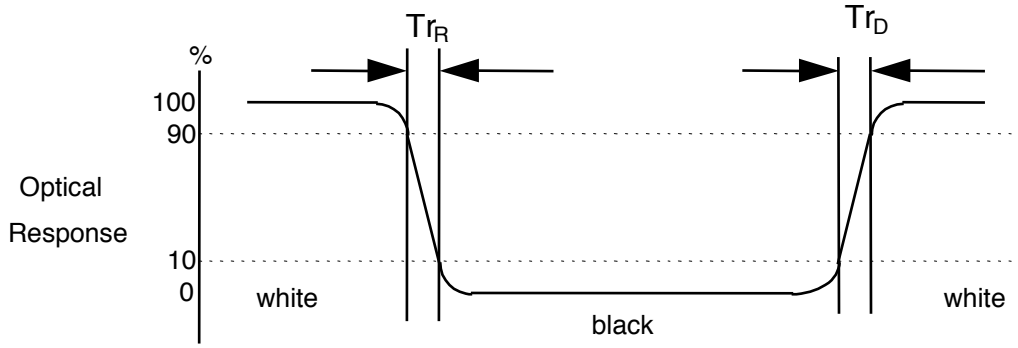
<measuring point for surface luminance & measuring point for luminance variation>



H,V : ACTIVE AREA
A : H/4 mm
B : V/4 mm
POINTS: 13 POINTS

FIG. 3 Response Time

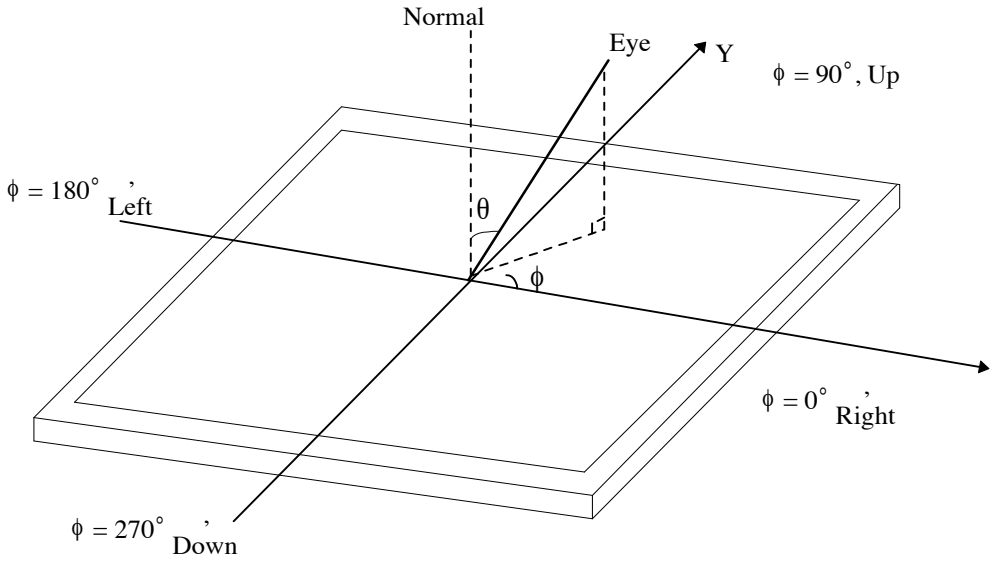
The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white” In condition of RGB LED Duty 100%



In other condition (For example, RGB LED Duty 80%), The response time defined as measurement data which is not lack

FIG. 4 Viewing angle

<Dimension of viewing angle range>



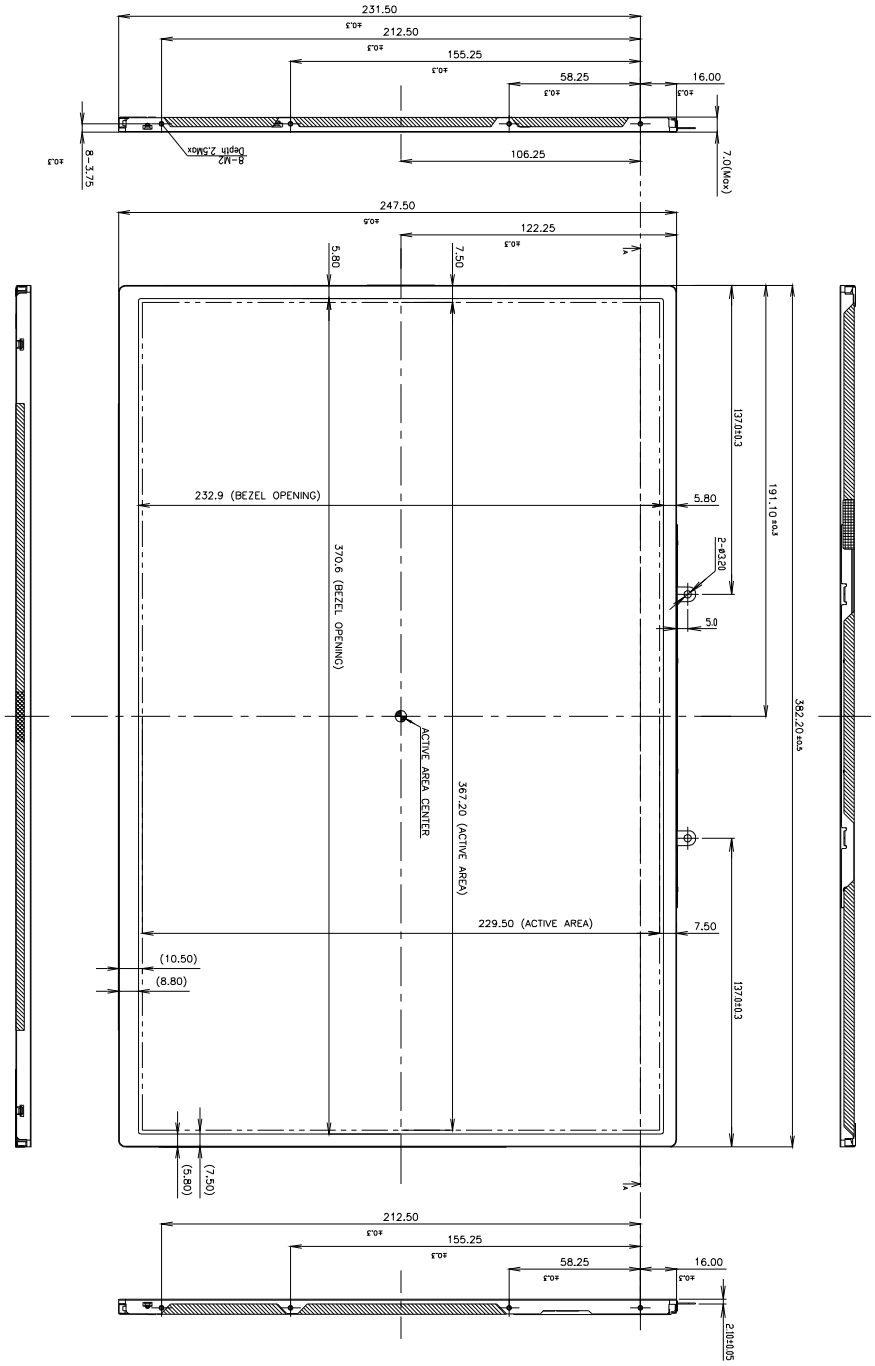
5. Mechanical Characteristics

The contents provide general mechanical characteristics for the model LP171WU5(TLA2). In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal	382.2 ± 0.5 mm
	Vertical	247.5 ± 0.5 mm
	Depth (Max)	7.0 mm
Bezel Area	Horizontal	370.6(H)
	Vertical	232.9(V)
Active Display Area	Horizontal	367.2 mm
	Vertical	229.5 mm
Weight	800 g (MAX)	
Surface Treatment	Hard coating(4H), Anti-Glare treatment of the front polarizer	

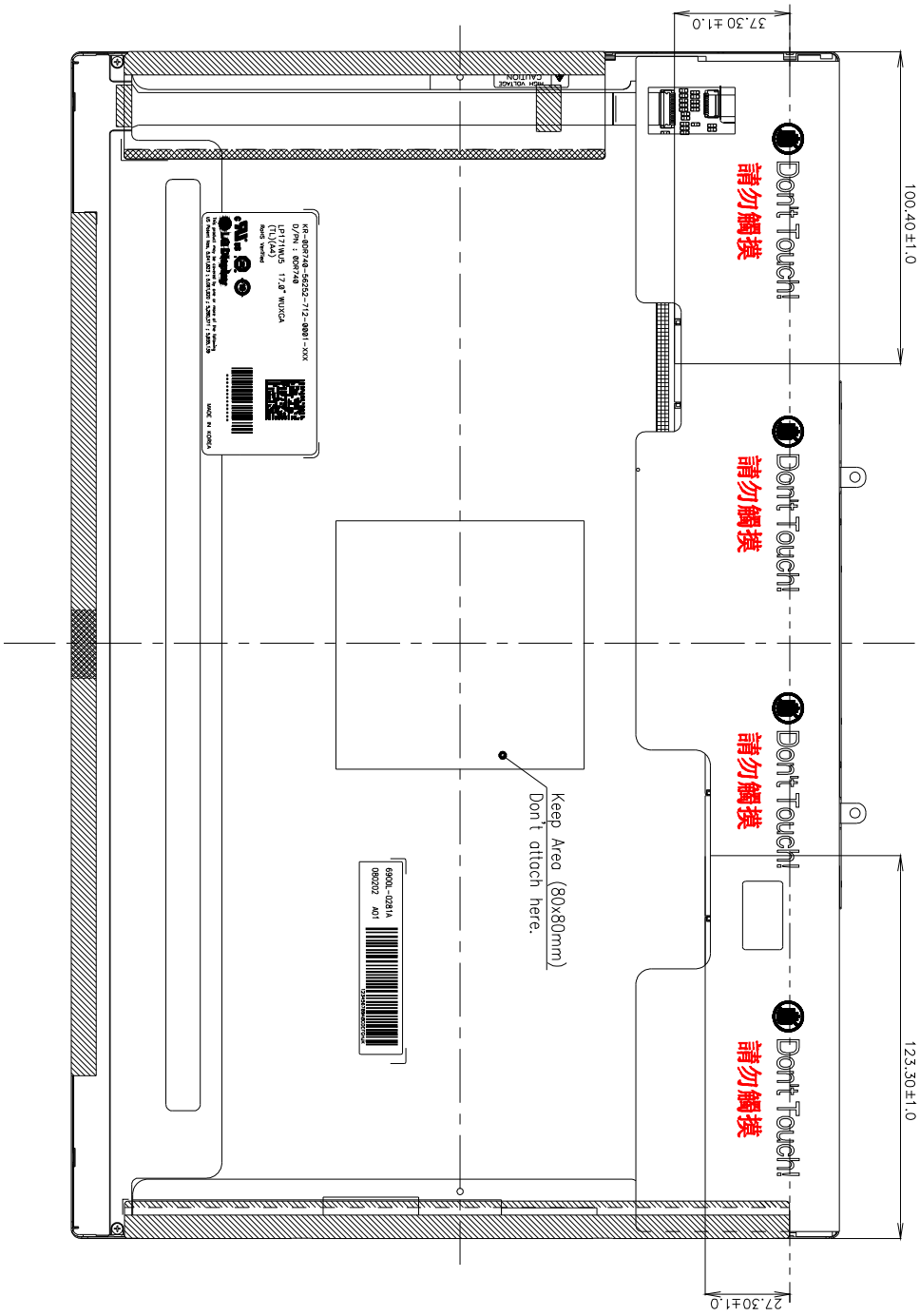
<FRONT VIEW>

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

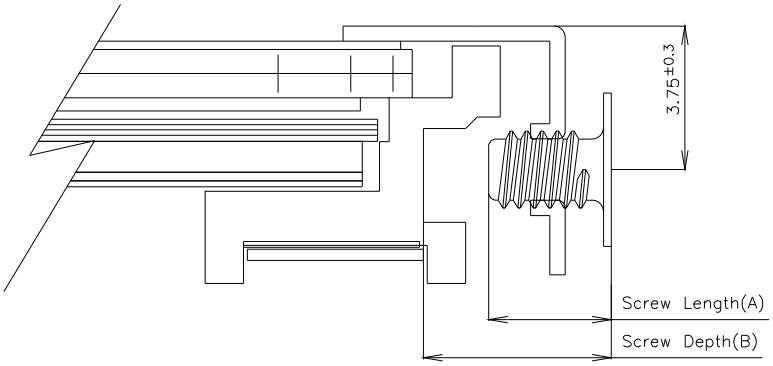


<REAR VIEW>

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



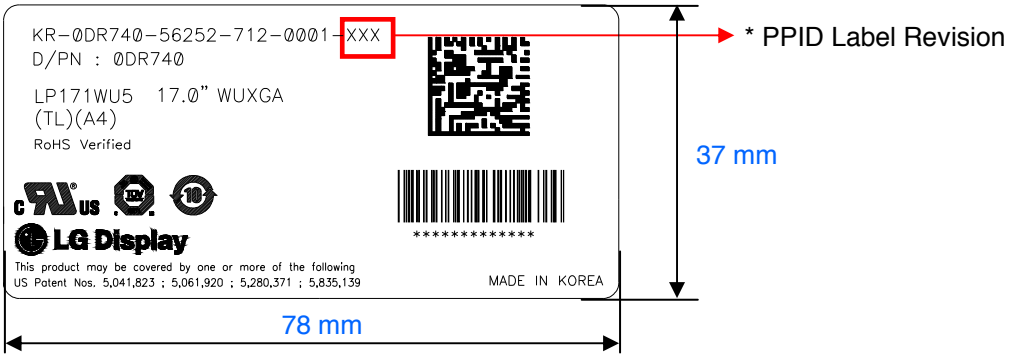
[DETAIL DESCRIPTION OF SIDE MOUNTING SCREW]



* Mounting Screw Length (A)
  = 2.0(Min) / 2.5(Max)
* Mounting Screw Hole Depth (B)
  = 2.5(Min)
* Mounting hole location : 3.75(typ.)
* Torque : 2.5 kgf.cm(Max)
  (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.

[DETAIL INFORMATION OF PPID LABEL AND REVISION CODE]

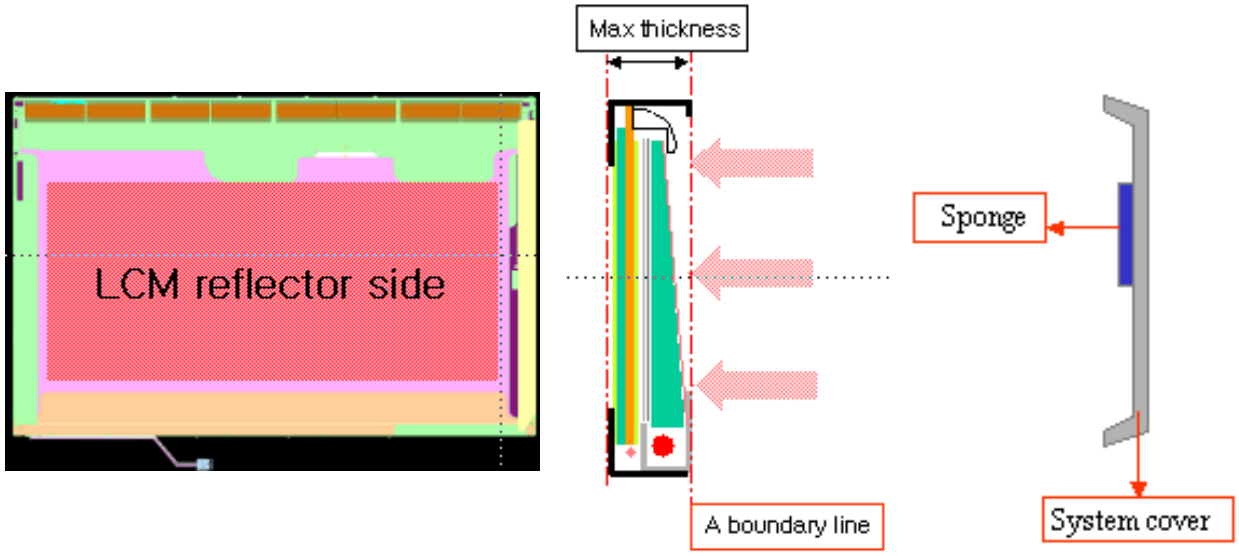


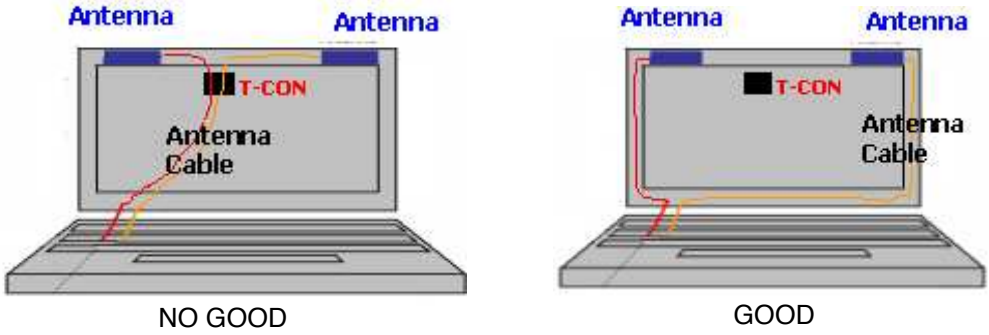
* PPID Label Revision :
  It is subject to change with Dell event. Please refer to the below table for detail.

Classification	No Change	1st Revision	2nd Revision	…	9th Revision	…
SST(WS)	X00	X01	X02	…	A09	…
PT(ES)	X10	X11	X12	…	A19	…
ST(CS)	X20	X21	X22	…	A29	…
XB(MP)	A00	A01	A02	…	A09	…

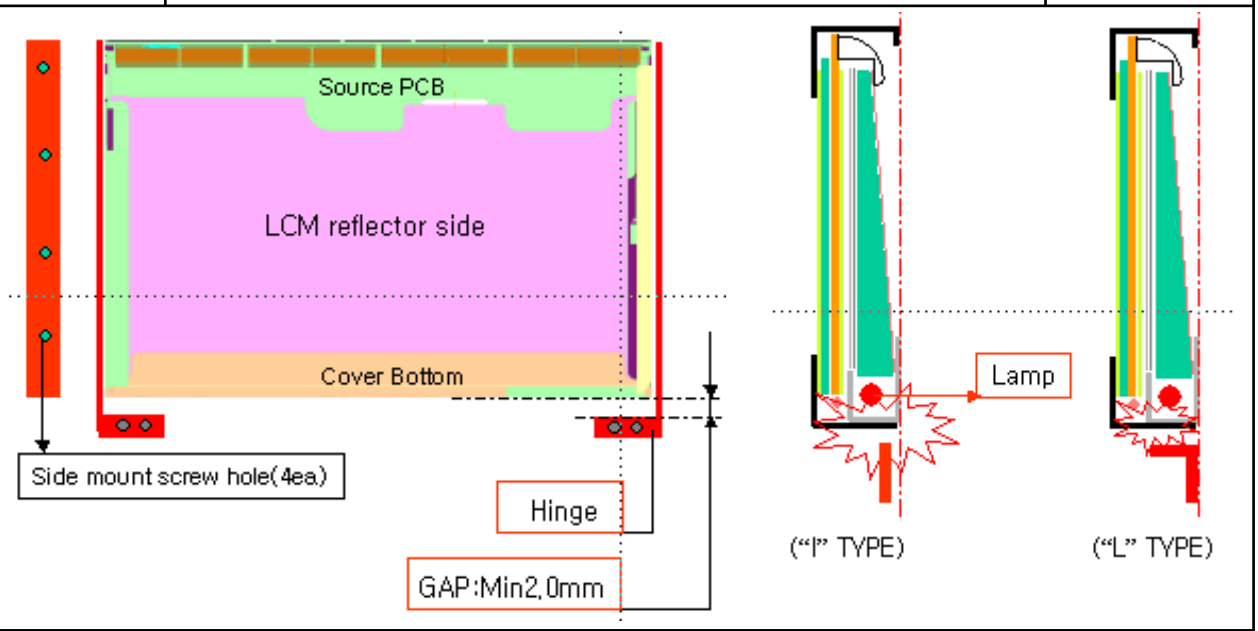
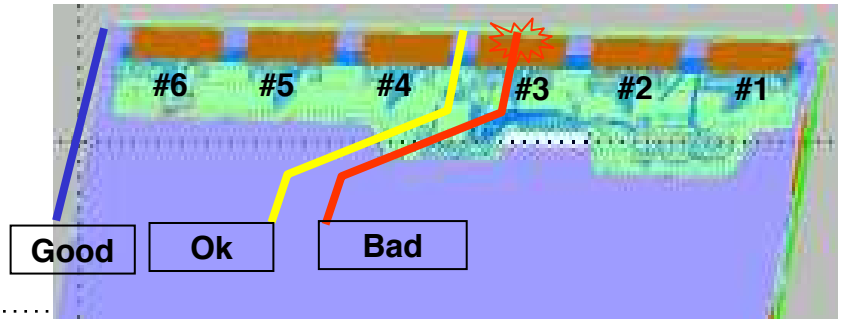
LGD Proposal for system cover design.(Appendix)

1	Gap check for securing the enough gap between LCM and System cover.	



Define	1.Rear side of LCM is sensitive against external stress,and previous check about interference is highly needed. 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..)
2	Check if antenna cable is sufficiently apart from T-CON of LCD Module.
Define	
	1.If system antenna is overlapped with T-CON,it might be cause the noise.

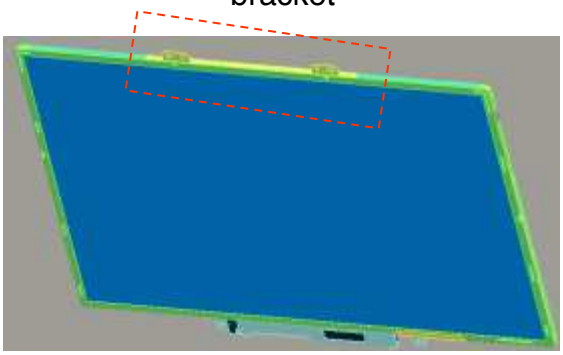
LGD Proposal for system cover design.

3	Gap check for securing the enough gap between LCM and System hinge.	
		
Define	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.	
4	Checking the path of the System wire.	
		
Define	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.	

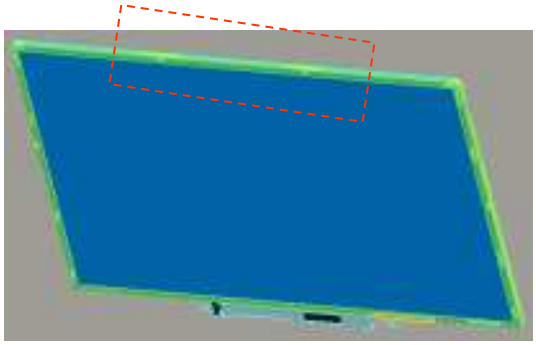
LGD Proposal for system cover design.

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

bracket

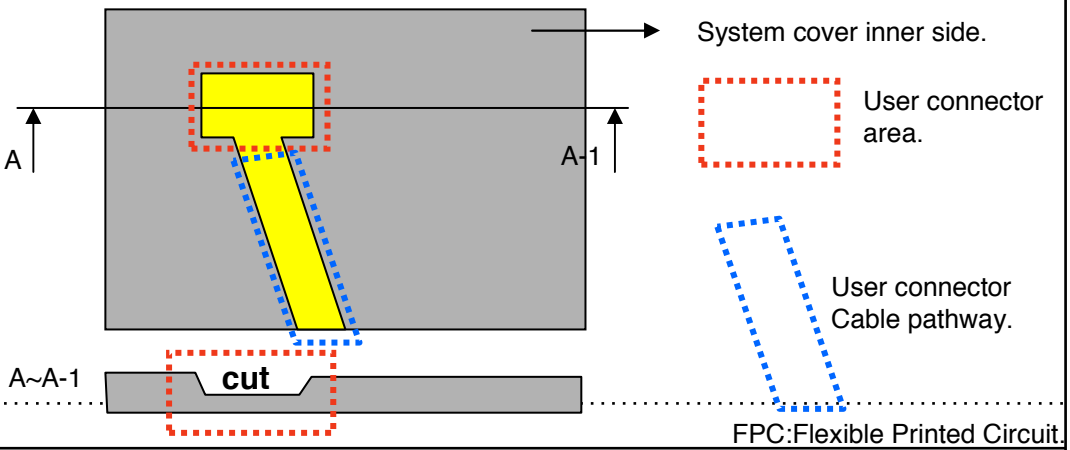


With bracket



Without bracket

Define	1.Condition without bracket is good for mechanical noise,and can minimize the light leakage from deformation of bracket. 2.The results shows that there is no difference between the condition with or without bracket.
6	Securing additional gap on CNT area..



Define	1.CNT area is specially sensitive against external stress,and additional gap by cutting on system cover will be helpful on removing the Ripple. 2.Using a thinner CNT will be better. (eg: FPC type)

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 200 G in a half sine pulse no longer than 2 ms to the display module - No functional defects following a shock delivering at least 260 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 : 20

b) Box Size : 490mmX393mmX327mm

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

EDID Data for Dell _ ver. 1.0

2009.11.03

	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	8	08	ID Manufacture Name LGD	30	00110000
	9	09	ID Manufacture Name	E4	11100100
	10	0A	ID Product Code 0241h	41	01000001
	11	0B	(Hex. LSB first)	02	00000010
	12	0C	ID Serial No. - Optional ("00h" If not used, Number Only and LSB First)	00	00000000
	13	0D	ID Serial No. - Optional ("00h" If not used, Number Only and LSB First)	00	00000000
	14	0E	ID Serial No. - Optional ("00h" If not used, Number Only and LSB First)	00	00000000
	15	0F	ID Serial No. - Optional ("00h" If not used, Number Only and LSB First)	00	00000000
	16	10	Week of Manufacture - Optinal 00 weeks	00	00000000
	17	11	Year of Manufacture 2009 years	13	00010011
	18	12	EDID structure version # = 1	01	00000001
	19	13	EDID revision # = 4	04	00000100
Display	20	14	Video Input Definition = Input is a Digital Video signal interface , Color Bit Depth : 8 Bits per Primary Color , Digital Video Interface Standard Supported: Digital Interface is not defined	A0	10100000
	21	15	Horizontal Screen Size (Rounded cm) = 37 cm	25	00100101
	22	16	Vertical Screen Size (Rounded cm) = 23 cm	17	00010111
	23	17	Display Transfer Characteristic (Gamma) = (gamma*100)-100 = Example:(2.2*100)-100=120 = 2.2 Gamma	78	01111000
	24	18	Feature Support (Display Power Management(DPM) : Standby Mode is not supported, Suspend Mode is not supported, Active Off = Very Low Power is not supported ,Supportted Color Encoding Formats : RGB 4:4:4 ,Other Feature Support Flags : No_sRGB, Preferred Timing Mode, No_Display is continuous frequency (Multi-mode Base EDID and Extension Block))	02	00000010
Vendor / Product	25	19	Red/Green Low Bits (RxRy/GxGy)	88	10001000
	26	1A	Blue/White Low Bits (BxBy/WxWy)	C5	11000101
	27	1B	Red X Rx = 0.693	B1	10110001
	28	1C	Red Y Ry = 0.301	4D	01001101
	29	1D	Green X Gx = 0.217	37	00110111
	30	1E	Green Y Gy = 0.711	B6	10110110
	31	1F	Blue X Bx = 0.151	26	00100110
	32	20	Blue Y By = 0.043	0B	00001011
	33	21	White X Wx = 0.313	50	01010000
	34	22	White Y Wy = 0.329	54	01010100
Established	35	23	Established timing 1 (Optional_00h if not used)	00	00000000
	36	24	Established timing 2 (Optional_00h if not used)	00	00000000
	37	25	Manufacturer's timings (Optional_00h if not used)	00	00000000
Standard Timing ID	38	26	Standard timing ID1 (Optional_01h if not used)	01	00000001
	39	27	Standard timing ID1 (Optional_01h if not used)	01	00000001
	40	28	Standard timing ID2 (Optional_01h if not used)	01	00000001
	41	29	Standard timing ID2 (Optional_01h if not used)	01	00000001
	42	2A	Standard timing ID3 (Optional_01h if not used)	01	00000001
	43	2B	Standard timing ID3 (Optional_01h if not used)	01	00000001
	44	2C	Standard timing ID4 (Optional_01h if not used)	01	00000001
	45	2D	Standard timing ID4 (Optional_01h if not used)	01	00000001
	46	2E	Standard timing ID5 (Optional_01h if not used)	01	00000001
	47	2F	Standard timing ID5 (Optional_01h if not used)	01	00000001
	48	30	Standard timing ID6 (Optional_01h if not used)	01	00000001
	49	31	Standard timing ID6 (Optional_01h if not used)	01	00000001
	50	32	Standard timing ID7 (Optional_01h if not used)	01	00000001

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) 154.54 MHz @ 60Hz	4A	01001010
	55	37	Pixel Clock/10,000 (MSB)	3C	00111100
	56	38	Horizontal Active (HA) (lower 8 bits) 1920 Pixels	80	10000000
	57	39	Horizontal Blanking (HB) (lower 8 bits) 140 Pixels	8C	10001100
	58	3A	Horizontal Active / Horizontal Blanking(HA HB) (upper 4:4bits)	70	01110000
	59	3B	Vertical Avtive (VA) 1200 Lines	B0	10110000
	60	3C	Vertical Blanking (VB) (DE Blanking typ.for DE only panels) 48 Lines	30	00110000
	61	3D	Vertical Active / Vertical Blanking (VA VB) (upper 4:4bits)	40	01000000
	62	3E	Horizontal Front Porch in pixels (HF) (lower 8 bits) 48 Pixels	30	00110000
	63	3F	Horizontal Sync Pulse Width in pixels (HS) (lower 8 bits) 32 Pixels	20	00100000
	64	40	Vertical Front Porch in lines (VF) (lower 4 bits) : Vertical Sync Pluse Width in lines (VS) (lower 4 bits) 3 Lines : 6 Lines	36	00110110
	65	41	Horizontal Front Porch/ Sync Pulse Width/ Vertical Front Porch/ Sync Pulse Width (upper 2bits)	00	00000000
	66	42	Horizontal Vedio Image Size (mm) (lower 8 bits) 370 mm	72	01110010
	67	43	Vertical Vedio Image Size (mm) (lower 8 bits) 230 mm	E6	11100110
	68	44	Horizontal Image Size / Vertical Image Size (upper 4 bits)	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 (outside of V-sync)]	19	00011001
Timing Descriptor #2	72	48	Pixel Clock/10,000 (LSB) 103 MHz @ 40.1Hz	3C	00111100
	73	49	Pixel Clock/10,000 (MSB)	28	00101000
	74	4A	Horizontal Active (HA) (lower 8 bits) 1920 Pixels	80	10000000
	75	4B	Horizontal Blanking (HB) (lower 8 bits) 160 Pixels	A0	10100000
	76	4C	Horizontal Active / Horizontal Blanking(HA HB) (upper 4:4bits)	70	01110000
	77	4D	Vertical Avtive (VA) 1200 Lines	B0	10110000
	78	4E	Vertical Blanking (VB) (DE Blanking typ.for DE only panels) 35 Lines	23	00100011
	79	4F	Vertical Active / Vertical Blanking (VA VB) (upper 4:4bits)	40	01000000
	80	50	Horizontal Front Porch in pixels (HF) (lower 8 bits) 48 Pixels	30	00110000
	81	51	Horizontal Sync Pulse Width in pixels (HS) (lower 8 bits) 32 Pixels	20	00100000
	82	52	Vertical Front Porch in lines (VF) (lower 4 bits) : Vertical Sync Pluse Width in lines (VS) (lower 4 bits) 3 Lines : 6 Lines	36	00110110
	83	53	Horizontal Front Porch/ Sync Pulse Width/ Vertical Front Porch/ Sync Pulse Width (upper 2bits)	00	00000000
	84	54	Horizontal Vedio Image Size (mm) (lower 8 bits) 370 mm	72	01110010
	85	55	Vertical Vedio Image Size (mm) (lower 8 bits) 230 mm	E6	11100110
	86	56	Horizontal Image Size / Vertical Image Size (upper 4 bits)	10	00010000
	87	57	Horizontal Border = 0 (Zero for Notebook LCD)	00	00000000
	88	58	Vertical Border = 0 (Zero for Notebook LCD)	00	00000000
	89	59	Non-Interlace, Normal display, no stereo, Digital Separate [Vsync_NEG, Hsync_NEG (outside of V-sync)]	19	00011001
Timing Descriptor #3	90	5A	Flag	00	00000000
	91	5B	Flag	00	00000000
	92	5C	Flag	00	00000000
	93	5D	Data Type Tag : Alphanumeric Data String (ASCII String)	FE	11111110
	94	5E	Flag	00	00000000
	95	5F	Dell P/N 1st Character = D	44	01000100
	96	60	Dell P/N 2nd Character = R	52	01010010
	97	61	Dell P/N 3rd Character = 7	37	00110111
	98	62	Dell P/N 4th Character = 4	34	00110100
	99	63	Dell P/N 5th Character = 0	30	00110000
	100	64	EDID Revision Build Name = MP(X-Build) , Revision # = A00	80	10000000
	101	65	Manufacturer P/N = 1	31	00110001
	102	66	Manufacturer P/N = 7	37	00110111
	103	67	Manufacturer P/N = 1	31	00110001
	104	68	Manufacturer P/N = W	57	01010111
	105	69	Manufacturer P/N = U	55	01010101
	106	6A	Manufacturer P/N = 5	35	00110101

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 : Descriptor Defined by manufacturer	00	00000000
	112	70	Flag	00	00000000
	113	71	Color Management [No +2 FRC Support, True Color Depth : 8 bit]	02	00000010
	114	72	Panel Type [RGB LED] , Configuration [Back light color Adjustment], Number Lamp or LED Light Bar [one]	4A	01001010
	115	73	Frame Rate Details [Minimum Frame Rate : 40Hz, Maximum Frame Rate : 65Hz , Tcon provides native Intel No DRRS / sDRRS support]	01	00000001
	116	74	Controller Interface and Maximum Luminance [SMBUS type, 300 nit]	1E	00011110
	117	75	Front Surface / Polarizer [Anti-Glare, No Transflective] , Pixel Structure [RGB v-stripe]	00	00000000
	118	76	Multi-Media Features [Color Management : NTSC , sRGB and Adobe , Dynamic Backlight Control : No]	02	00000010
	119	77	Multi-Media Features [Motion Blur : No support , Active Gamma Control : No support]	00	00000000
	120	78	Special Features [Wireless Enhancement Hardware : No support , In-Cell Scanner : No support]	00	00000000
	121	79	Special Features [Number of LVDS channels or eDP lanes : two , Overdrive : yes ,Interface : LVDS , In-Cell Touch Support : No]	06	00000110
	122	7A	Special Features [BIST Support : yes , Electronic Privacy : No electronic privacy hardware support , 3-D Support : No]	01	00000001
	123	7B	(If<13 char--> 0Ah, then terminate with ASCⅡ code 0Ah,set remaining char = 20h)	0A	00001010
	124	7C	(If<13 char--> 0Ah, then terminate with ASCⅡ code 0Ah,set remaining char = 20h)	20	00100000
	125	7D	(If<13 char--> 0Ah, then terminate with ASCⅡ code 0Ah,set remaining char = 20h)	20	00100000
	126	7E	Extension flag (# of optional 128 panel ID extension block to follow, Typ = 0)	00	00000000
Checksum	127	7F	Check Sum (The 1-byte sum of all 128 bytes in this panel ID block shall = 0)	FC	11111100