LG.PHILIPS LCD

Product Specification

SPECIFICATION
FOR
APPROVAL

(   ) **Preliminary Specification**

(◆) **Final Specification**

Title	13.3" WXGA TFT LCD

Customer	General
MODEL	

SUPPLIER	LG.Philips LCD Co., Ltd.
*MODEL	LP133WX1
Suffix	TLN2

*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**

S. C. Yun / G.Manager

REVIEWED BY

G. J. Han / Manager

PREPARED BY

Y. J. Kim / Engineer

J. M. Shin / Engineer

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

Contents

RECORD OF REVISIONS

| Revision No	Revision Date	Page	Description	EDID ver
0.0	Nov. 23. 2007	-	First Draft (Preliminary Specification)	-
0.1	Mar. 24.2008	4,6	Power consumption spec. confirmation	
		16	Gray scale spec. confirmation	
		19,20	Add 2D label	
		30~32	EDID confirmation	

Product Specification

1. General Description

The LP133WX1 is a Color Active Matrix Liquid Crystal Display with an integral Cold Cathode Fluorescent Lamp (CCFL) backlight system. The matrix employs a-Si Thin Film Transistor as the active element. It is a transmissive type display operating in the normally white mode. This TFT-LCD has 13.3 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 LP133WX1 has been designed to apply the interface method that enables low power, high speed, low EMI.

The LP133WX1 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 LP133WX1 characteristics provide an excellent flat display for office automation products such as Notebook PC.
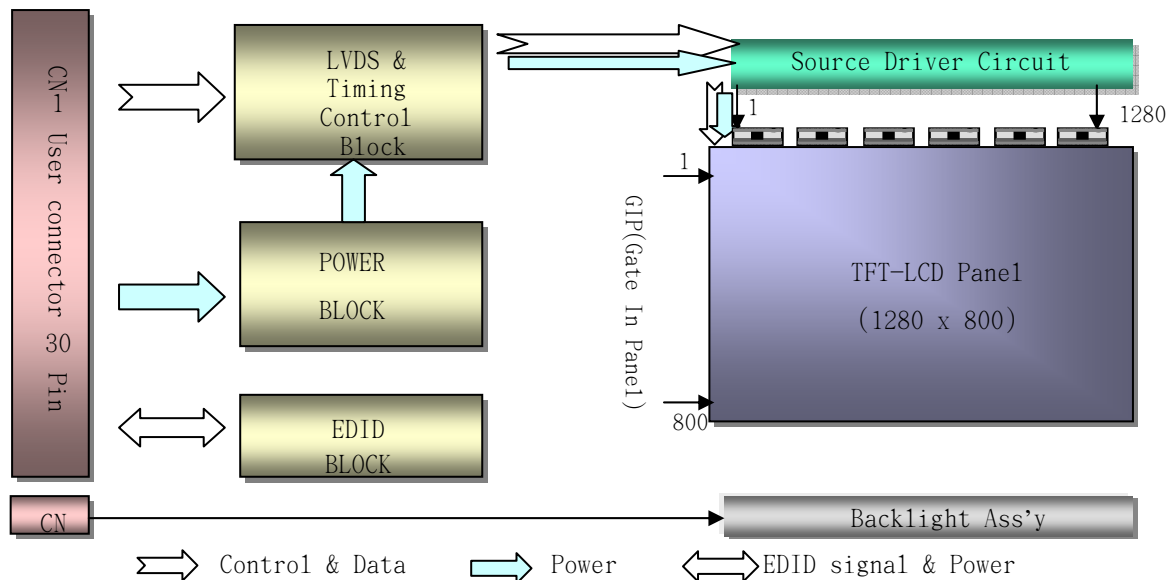
General Features

|	
Active Screen Size	13.3 inches diagonal
Outline Dimension	299.0(H)[typ.] $\times$ 195.0(V)[typ.] $\times$ 5.5(D) mm [Max.]
Pixel Pitch	0.2235 mm $\times$ 0.2235 mm
Pixel Format	1280 horiz. By 800 vert. Pixels RGB strip arrangement
Color Depth	6-bit, 262,144 colors
Luminance, White	220 cd/m^2(Typ.5 point)
Power Consumption	Total 4.28 Watt(Typ.) @ LCM circuit 0.48 Watt(Typ.), B/L input 3.8Watt(Typ.)
Weight	340g [Typ.] , 350g [Max.]
Display Operating Mode	Transmissive mode, normally white
Surface Treatment	Glare, hard coating 3H
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		
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.

Dry Bulb Temperature [°C]
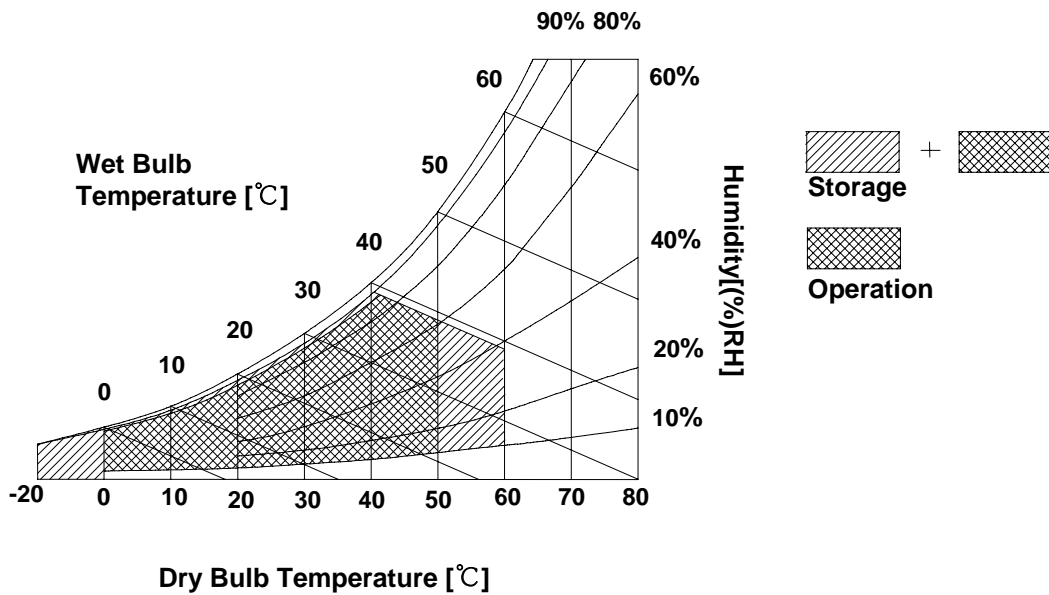
3. Electrical Specifications
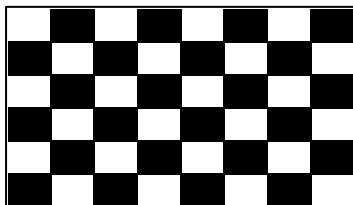
3-1. Electrical Characteristics

The LP133WX1 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second input which powers the CCFL, is typically generated by an inverter. The inverter is an external unit to the LCD.

Table 2. ELECTRICAL CHARACTERISTICS

Parameter	Symbol		Values			Unit	Notes
			Min	Typ	Max		
MODULE :							
Power Supply Input Voltage	VCC		3.0	3.3	3.6	V_{DC}	
Power Supply Input Current	I_{CC}	Mosaic		146	168	mA	1
Power Consumption	Pc		-	0.48	0.55	Watt	1
Differential Impedance	Zm		90	100	110	Ohm	2
LAMP :							
Operating Voltage	V_{BL}		605	640	855	V_{RMS}	
Operating Current	I_{BL}		2.0	6.0	7.0	mA_{RMS}	3
Power Consumption	P_{BL}		-	3.8	4.2		
Operating Frequency	f_{BL}		45	60	80	kHz	
Discharge Stabilization Time	Ts		-	-	3	Min	4
Life Time			15,000	-	-	Hrs	5
Established Starting Voltage at 25℃	Vs				1140	V_{RMS}	
at 0 ℃					1370	V_{RMS}	

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. The typical operating current is for the typical surface luminance (L_{WH}) in optical characteristics.
4. Define the brightness of the lamp after being lighted for 5 minutes as 100%, Ts is the time required for the brightness of the center of the lamp to be not less than 95%.
5. The life time is determined as the time at which brightness of lamp is 50% compare to that of initial value at the typical lamp current.

Product Specification

Note)
6. The output of the inverter must have symmetrical(negative and positive) voltage waveform and
   symmetrical current waveform.(Asymmetrical ratio is less than 10%) Please do not use the inverter
   which has asymmetrical voltage and asymmetrical current and spike wave.
   Lamp frequency may produce interface with horizontal synchronous frequency and as a result this may
   cause beat on the display. Therefore lamp frequency shall be as away possible from the
   horizontal synchronous frequency and from its harmonics in order to prevent interference.
7. It is defined the brightness of the lamp after being lighted for 5 minutes as 100%.
   T_S is the time required for the brightness of the center of the lamp to be not less than 95%.
8. The lamp power consumption shown above does not include loss of external inverter.
   The applied lamp current is a typical one.
9. Requirements for a system inverter design, which is intended to have a better display performance, a
   better power efficiency and a more reliable lamp, are following.
   It shall help increase the lamp lifetime and reduce leakage current.
     a. The asymmetry rate of the inverter waveform should be less than 10%.
     b. The distortion rate of the waveform should be within $\sqrt{2} \pm 10\%$.
        * Inverter output waveform had better be more similar to ideal sine wave.
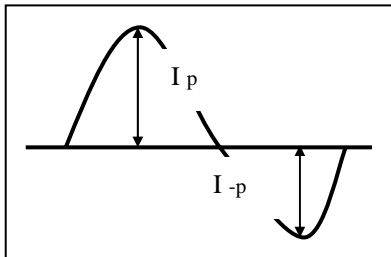

* Asymmetry rate:

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

* Distortion rate

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

10. Inverter open voltage must be more than lamp voltage for more than 1 second for start-up.
    Otherwise, the lamps may not be turned on.
    ※ Do not attach a conducting tape to lamp connecting wire.
      If the lamp wire attach to a conducting tape, TFT-LCD Module has a low luminance and the inverter
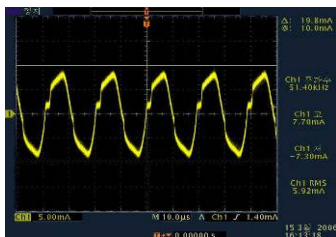   has abnormal action. Because leakage current is occurred between lamp wire and conducting tape.

Ex of current wave)
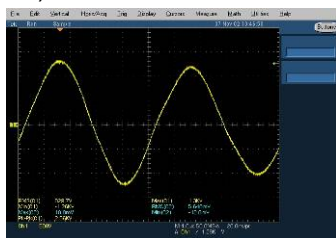
Normal current wave - Standard

Abnormal current wave - Bad

Abnormal current wave - Bad
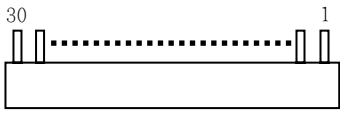

Abnormal current wave - Bad

Product Specification

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 FI-XB30SRL-HF11 manufactured by JAE.

. **Table 3. MODULE CONNECTOR PIN CONFIGURATION (CN1)**

Pin	Symbol	Description	Notes
1	GND	Ground	
2	VCC	Power Supply, 3.3V Typ.	1, Interface chips
3	VCC	Power Supply, 3.3V Typ.	1.1 LCD : SW, SW0615_M (LCD Controller)
4	V EEDID	DDC 3.3V power	including LVDS Receiver
5	NC	Reserved for supplier test point	1.2 System : it must include international
6	Clk EEDID	DDC Clock	standard LVDS Transmitter.
7	DATA EEDID	DDC Data	* Pin to Pin compatible with LVDS
8	$R_{IN}0-$	Negative LVDS differential data input	
9	$R_{IN}0+$	Positive LVDS differential data input	2. Connector
10	GND	Ground	2.1 LCD :FI-XB30SRL-HF11,JAE.
11	$R_{IN}1-$	Negative LVDS differential data input	its compatibles
12	$R_{IN}1+$	Positive LVDS differential data input	2.2 Mating : FI-X30C2L or equivalent.
13	GND	Ground	2.3 Connector pin arrangement
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	[LCD Module Rear View]
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	

The backlight interface connector is a model BHSR-02VS-1, manufactured by JST or Compatible.
The mating connector part number is AMP1674817-2 or equivalent.
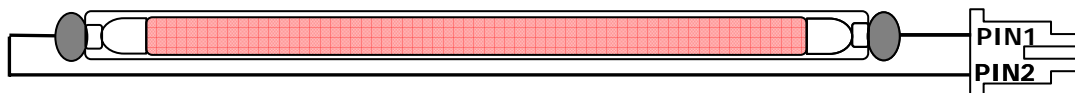
Table 4. BACKLIGHT CONNECTOR PIN CONFIGURATION (J3)

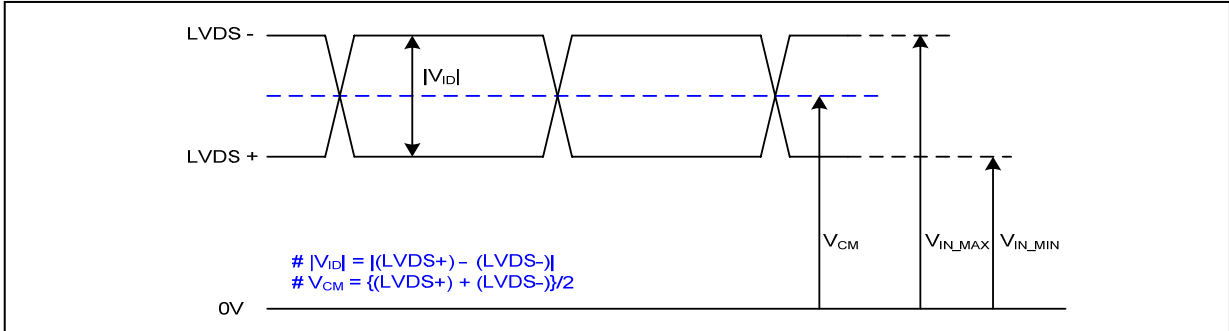| Pin	Symbol	Description	Notes
1	HV	Power supply for lamp (High voltage side)	1
2	LV	Power supply for lamp (Low voltage side)	1

Notes : 1. The high voltage side terminal is colored Pink and the low voltage side terminal is Yellow.

3-3. LVDS Signal Timing Specifications

3-3-1. DC Specification

$|V_{ID}| = |(LVDS+) - (LVDS-)|$
$V_{CM} = \{(LVDS+) + (LVDS-)\}/2$

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

$t_{SKEW} (F_{clk} = 1/T_{clk})$
1) 85MHz > Fclk $\geq$ 65MHz : –400 ~ +400
2) 65MHz > Fclk $\geq$ 25MHz : -600 ~ +600
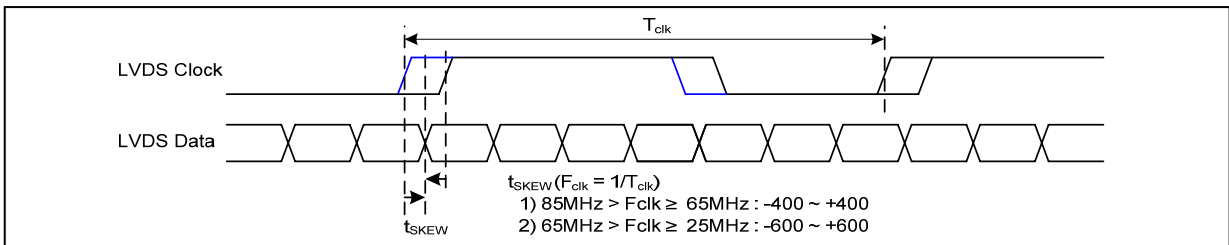
Description	Symbol	Min	Max	Unit	Notes
LVDS Clock to Data Skew Margin	t_{SKEW}	- 400	+ 400	ps	85MHz > Fclk $\geq$ 65MHz
	t_{SKEW}	- 600	+ 600	ps	65MHz > Fclk $\geq$ 25MHz
LVDS Clock to Clock Skew Margin (Even to Odd)	t_{SKEW_EO}	- 1/7	+ 1/7	T_{clk}	-
Maximum deviation of input clock frequency during SSC	F_{DEV}	-	$\pm$ 3	%	-
Maximum modulation frequency of input clock during SSC	F_{MOD}	-	200	KHz	-

Product Specification
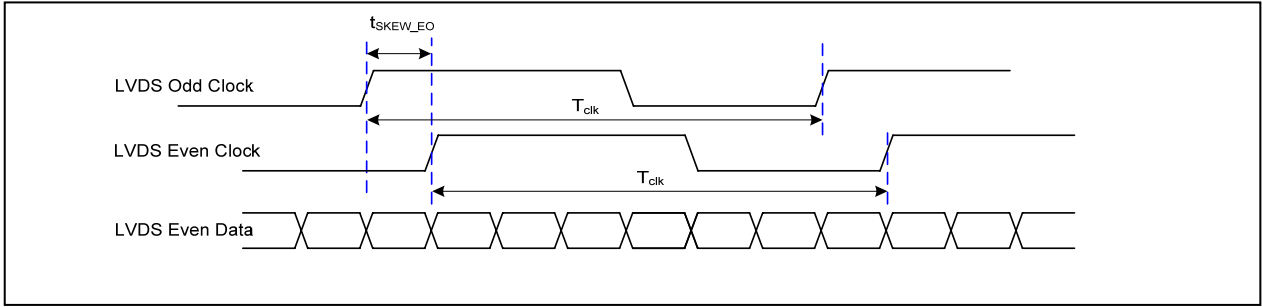
< Clock skew margin between channel >
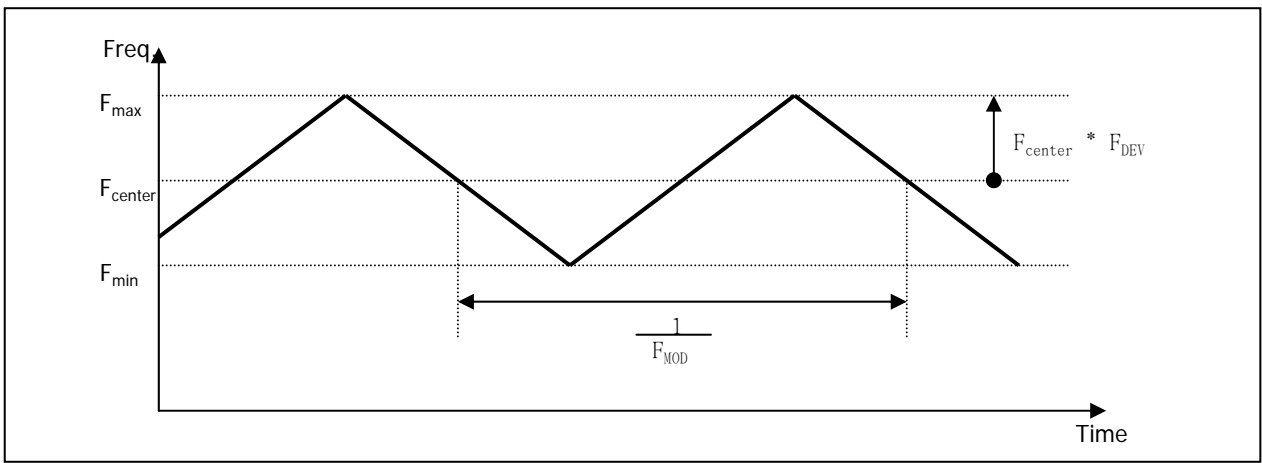
< Spread Spectrum >

3-3-3. Data Format
  1) LVDS 2 Port

< LVDS Data Format >

LG.PHILIPS LCD

2) LVDS 1 Port

RCLK+

RA+/-	R3	R2	R1	R0	G0	R5	R4	R3	R2	R1	R0	G0	R5	R4
RB+/-	G4	G3	G2	G1	B1	B0	G5	G4	G3	G2	G1	B1	B0	G5
RC+/-	B5	B4	B3	B2	DE	VSYNC	HSYNC	B5	B4	B3	B2	DE	VSYNC	HSYNC
RD+/-	G7	G6	R7	R6	X	B7	B6	G7	G6	R7	R6	X	B7	B6

—— Previous (N-1)th Cycle —— ✕ —— Current (Nth) Cycle —— ✕ — Next (N+1)th Cycle ——
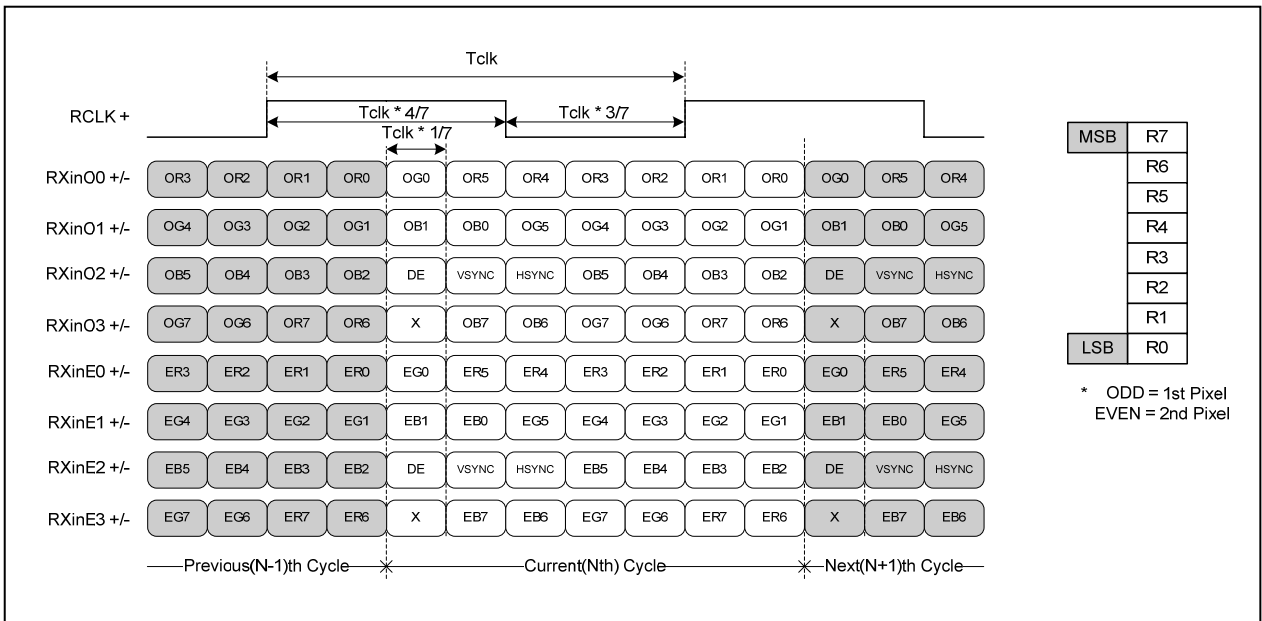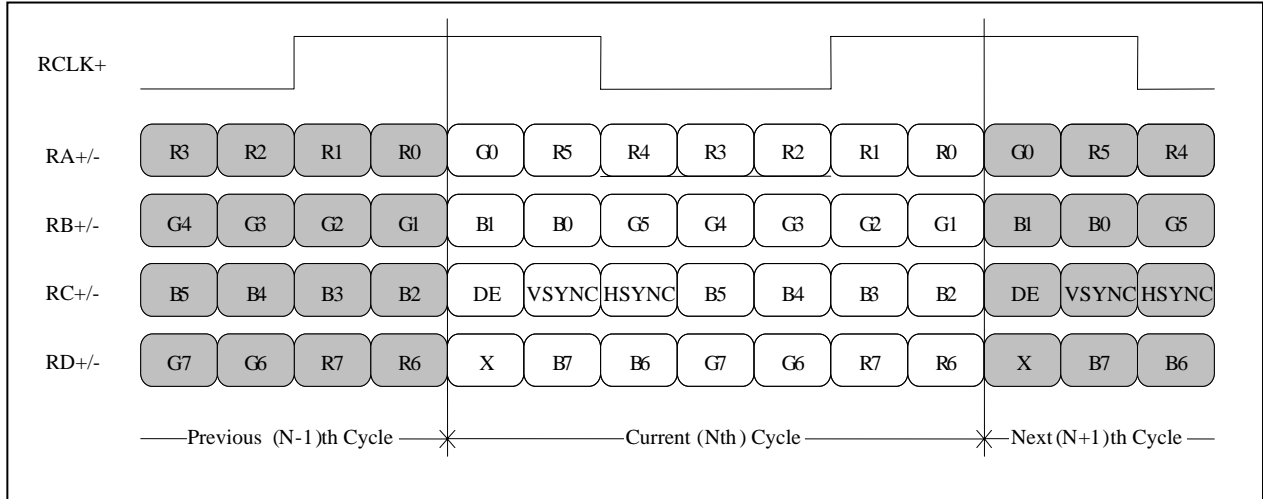
Product Specification

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 6. TIMING TABLE

ITEM	Symbol		Min	Typ	Max	Unit	Note
DCLK	Frequency	f_{CLK}	-	69.3	-	MHz	
Hsync	Period	Thp	1366	1416	1488	t_{CLK}	
	Width	t_{WH}	16	32	48		
	Active	t_{WHA}	1280	1280	1280		
Vsync	Period	t_{VP}	811	816	847	t_{HP}	
	Width	t_{WV}	3	6	9		
	Active	t_{WVA}	800	800	800		
Data Enable	Horizontal back porch	t_{HBP}	54	80	98	t_{CLK}	
	Horizontal front porch	t_{HFP}	16	24	62		
	Vertical back porch	t_{VBP}	5	6	35	t_{HP}	
	Vertical front porch	t_{VFP}	4	4	4		

3-5. Signal Timing Waveforms

Condition : VCC =3.3V

Data Enable, Hsync, Vsync

High: 0.7VCC

Low: 0.3VCC
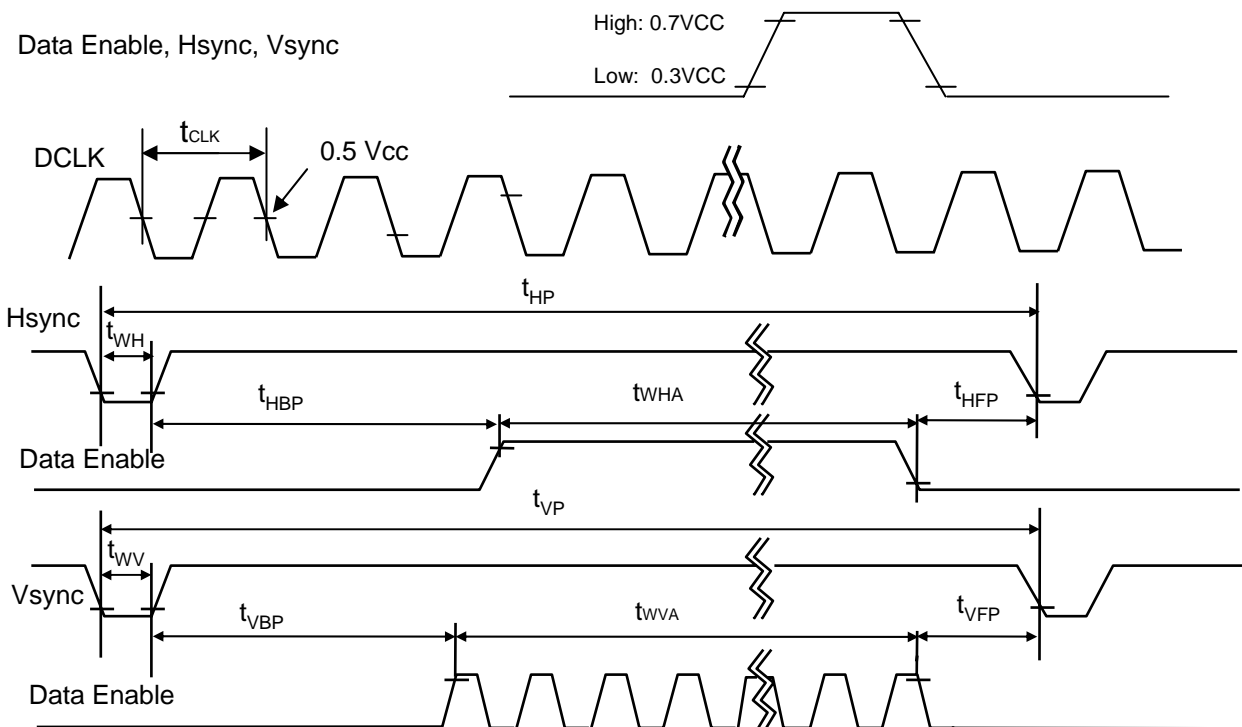
Product Specification

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 7. COLOR DATA REFERENCE

Color		Input Color Data																		
		RED						GREEN						BLUE					
		MSB					LSB	MSB					LSB	MSB					LSB
		R 5	R 4	R 3	R 2	R 1	R 0	G 5	G 4	G 3	G 2	G 1	G 0	B 5	B 4	B 3	B 2	B 1	B 0
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
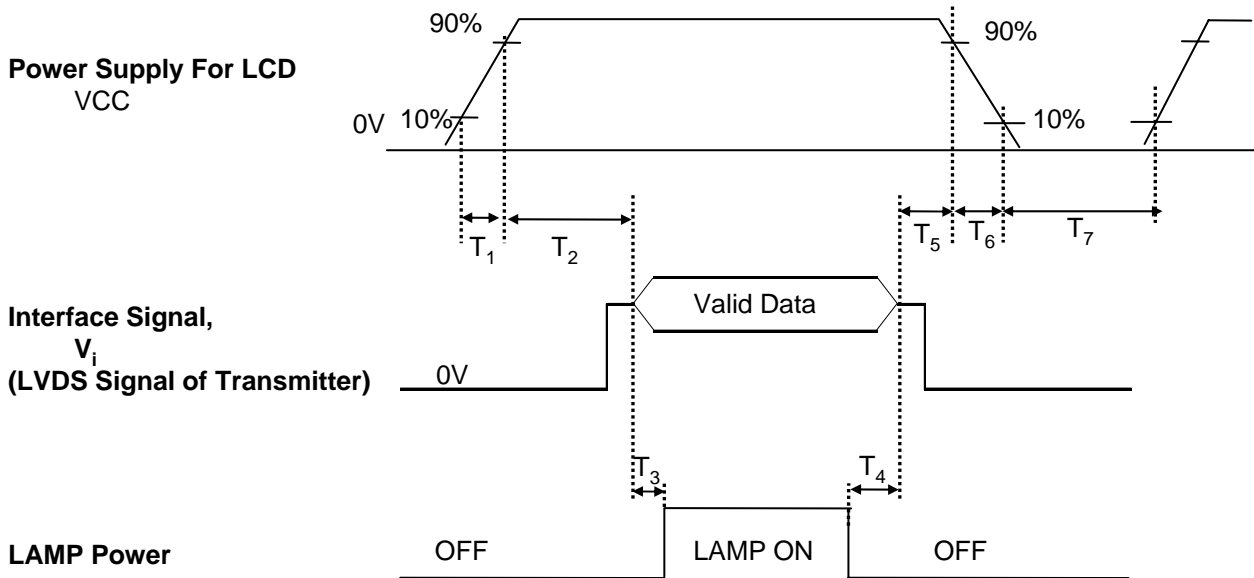
3-7. Power Sequence

Table 8. POWER SEQUENCE TABLE

Parameter	Value			Units
	Min.	Typ.	Max.	
T_1	0	-	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	200	-	-	(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.

Product Specification

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.

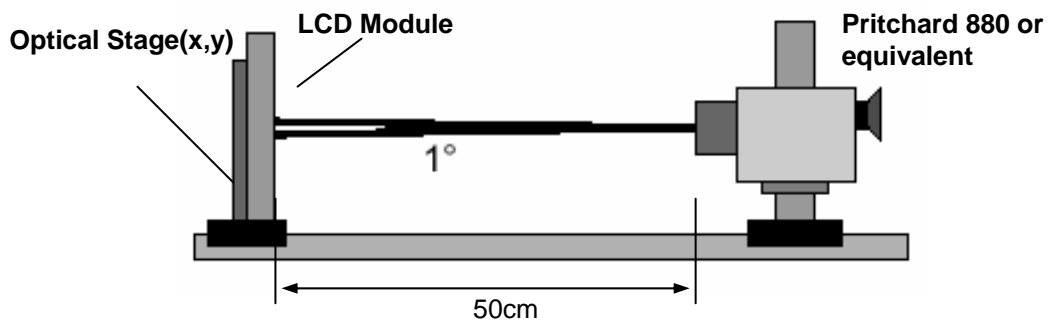### FIG. 1 Optical Characteristic Measurement Equipment and Method

Optical Stage(x,y) **LCD Module** **Pritchard 880 or equivalent**

1°

50cm

Table 9. OPTICAL CHARACTERISTICS

Ta=25°C, VCC=3.3V, f_V=60Hz, f_{CLK}= 69.3MHz, F_{BL}= 60KHz , I_{BL}= 6.0mA

Parameter		Symbol	Values			Units	Notes
			Min	Typ	MAx		
Contrast Ratio		CR	500	-	-		1
Surface Luminance, white		L_{WH}	200	220	-	cd/m^2	2
Luminance Variation		δ_{WHITE}		-	1.7		3
Response Time							4
	Rise Time+Decay Time	$Tr_R + Tr_D$	-	25	35	ms	
Color Coordinates							
	RED	RX	0.560	0.590	0.620		
		RY	0.313	0.343	0.373		
	GREEN	GX	0.298	0.328	0.358		
		GY	0.510	0.540	0.570		
	BLUE	BX	0.131	0.161	0.191		
		BY	0.118	0.148	0.178		
	WHITE	WX	0.283	0.313	0.343		
		WY	0.299	0.329	0.359		
Viewing Angle							5
	x axis, right(Φ=0°)	Θr	40	45	-	degree	
	x axis, left (Φ=180°)	Θl	40	45	-	degree	
	y axis, up (Φ=90°)	Θu	15	20	-	degree	
	y axis, down (Φ=270°)	Θd	30	35	-	degree	
Gray Scale				-			6

Product Specification

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.

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

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.

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

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	0.24
L7	1.54
L15	5.39
L23	12.07
L31	23.0
L39	37.8
L47	54.7
L55	74.9
L63	100

FIG. 2 Luminance

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

H,V : ACTIVE AREA
A : H/4 mm
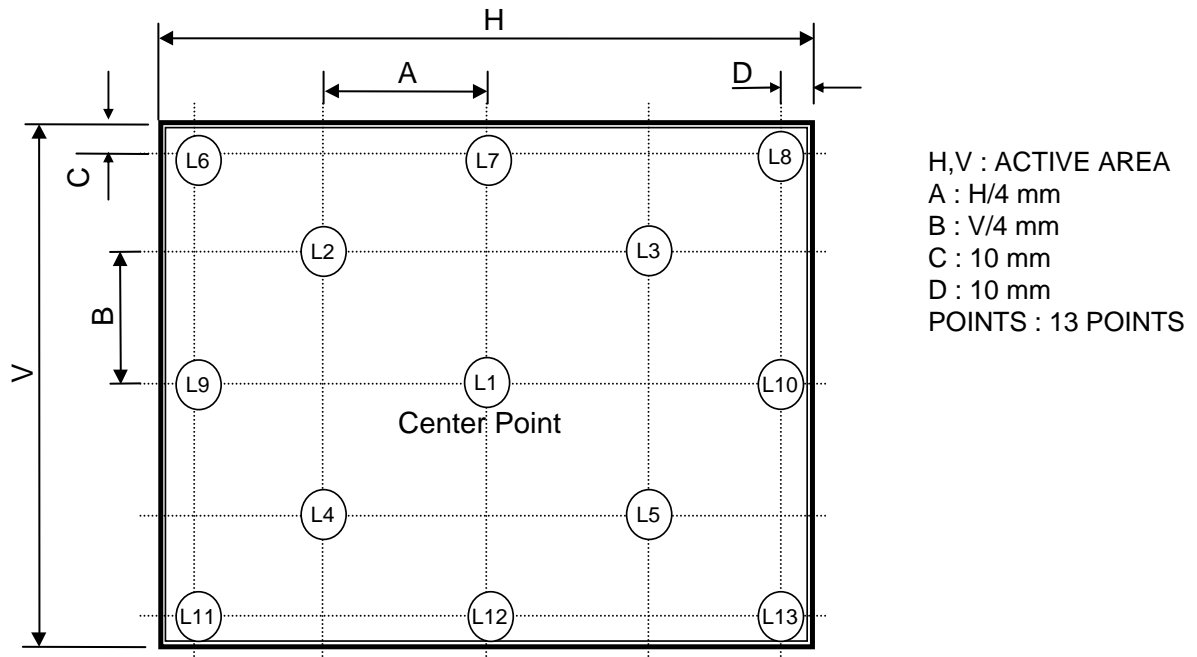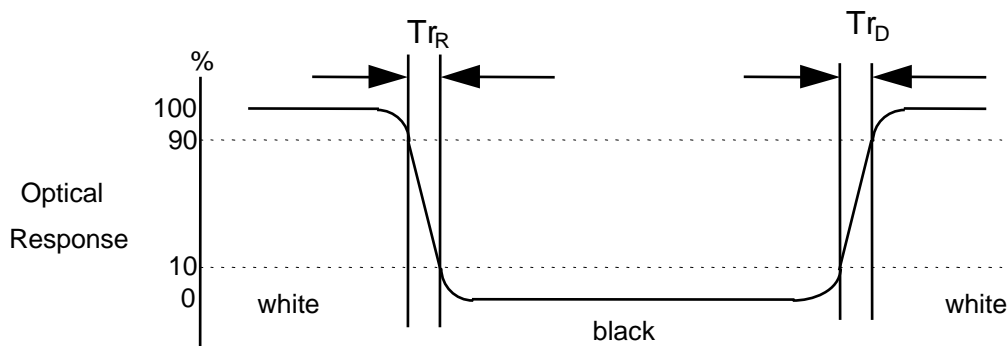B : V/4 mm
C : 10 mm
D : 10 mm
POINTS : 13 POINTS

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".

5. Mechanical Characteristics

The contents provide general mechanical characteristics for the model LP133WX1. In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal	299.0 ± 0.3mm
	Vertical	195.0 ± 0.3mm
	Depth	5.2mm(Typ.),5.5mm(Max.)
Bezel Area	Horizontal	289.5 ± 0.3mm
	Vertical	182.2 ± 0.3mm
Active Display Area	Horizontal	286.08 mm
	Vertical	178.8 mm
Weight	350g(Max.)	
Surface Treatment	Glare, hard coating 3H	

Product Specification

<FRONT VIEW>

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

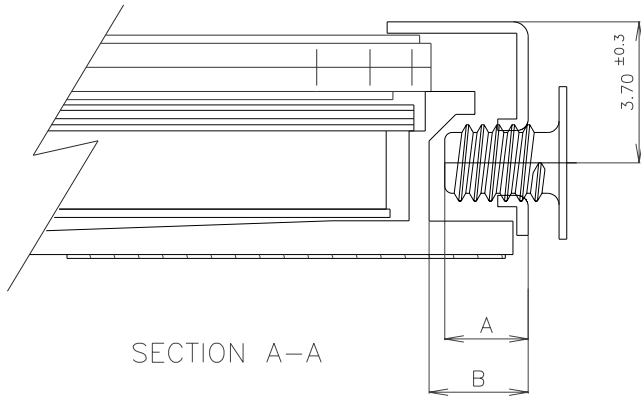<REAR VIEW>
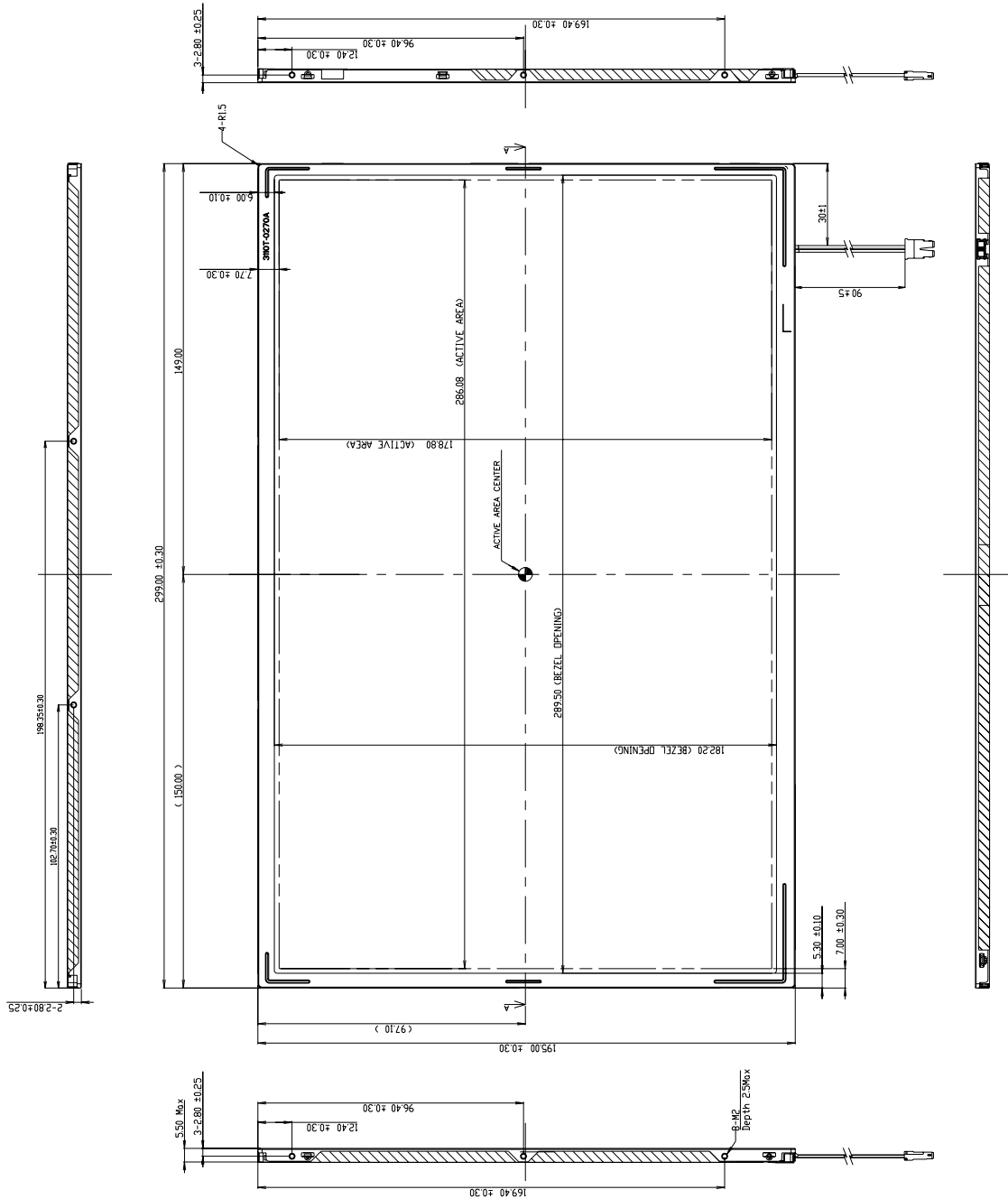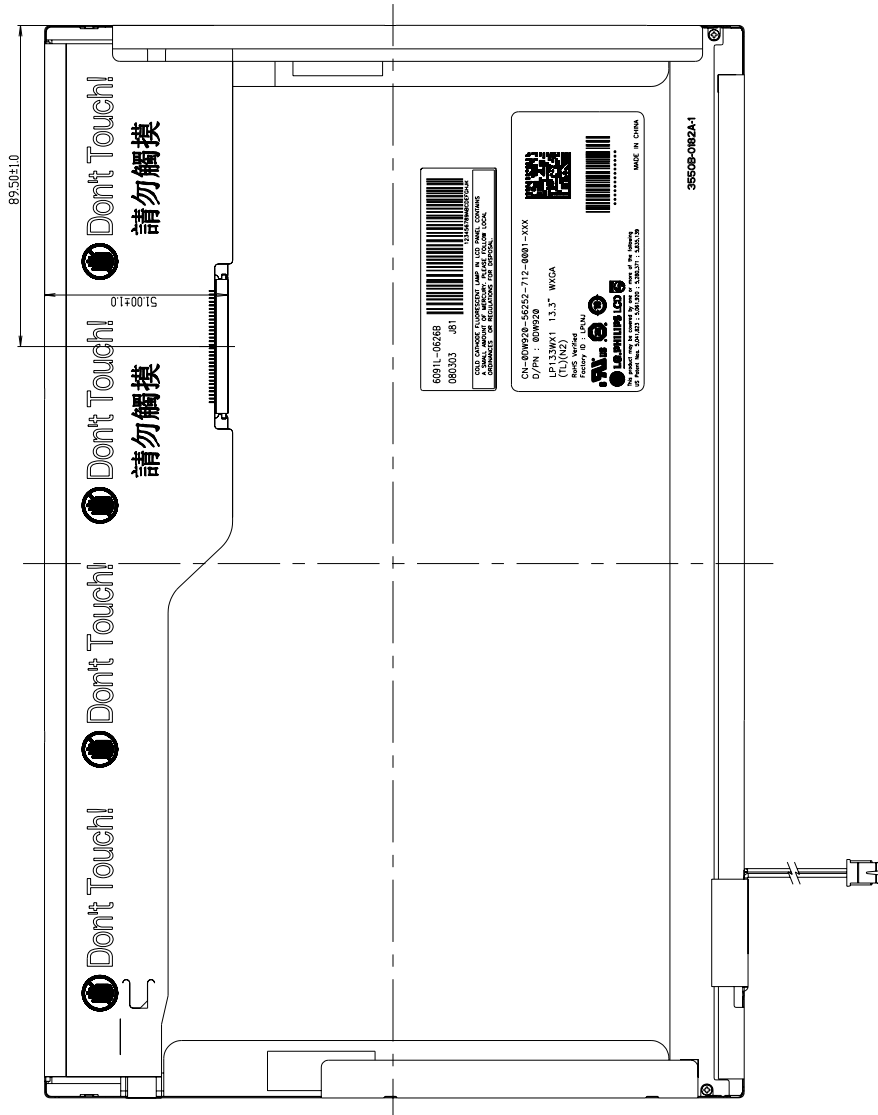
Product Specification

[DETAIL DESCRIPTION OF SIDE MOUNTING SCREW]

SECTION A-A

* Mounting Screw Length (A)
  = 2.0(Min) / 2.5(Max)
* Mounting Screw Hole Depth (B)
  = 2.5(Min)
* Mounting hole location : 3.7(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

37 mm

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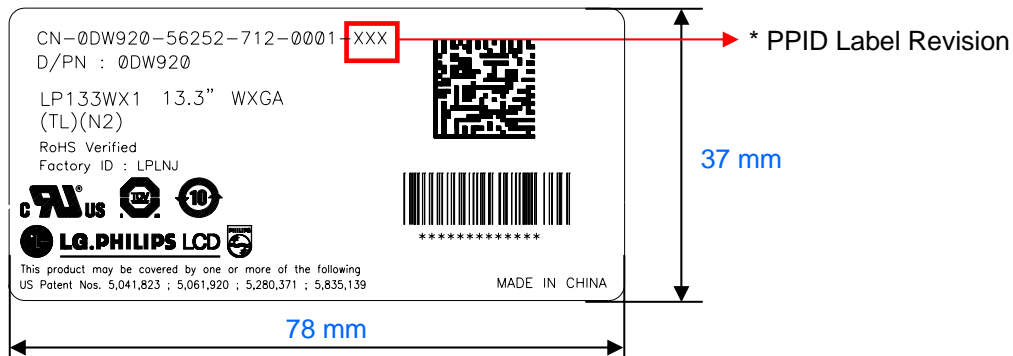
* PPID Label Revision :
  It is subject to change with Dell event. Please refer to the below table for detail.

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	…

LPL Proposal for system cover design.(Appendix)

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

	1.Rear side of LCM is sensitive against external stress,and previous check about interference is highly needed.
Define	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.
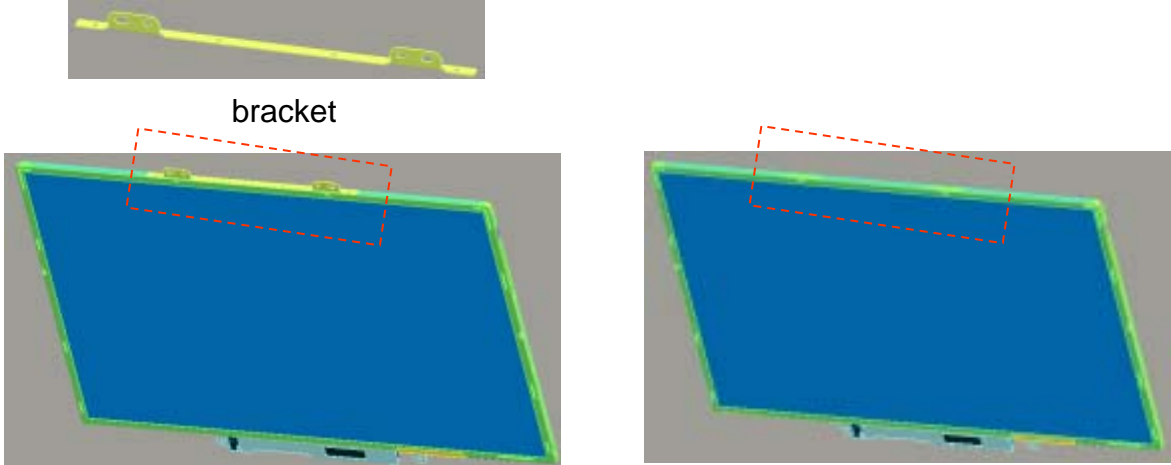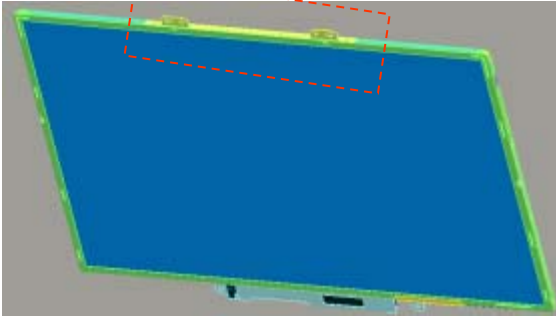
Product Specification

LPL 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.

LPL 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..

System cover inner side.

A | A-1

User connector area.

A~A-1   **cut**

User connector Cable pathway.

FPC:Flexible Printed Circuit.

| 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, 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 6ms 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)

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 :   30 pcs

b) Box Size :   475.0 mm × 348.0 mm × 274.0 mm

9. PRECAUTIONS

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

9-1. MOUNTING PRECAUTIONS

(1) You must mount a module using holes arranged in four corners or four sides.
(2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
(3) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.
(4) You should adopt radiation structure to satisfy the temperature specification.
(5) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
(6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
Do not touch the surface of polarizer for bare hand or greasy cloth.(Some cosmetics are detrimental to the polarizer.)
(7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum 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=$\pm$ 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) = LPL	3	2	0011	0010	Vender/ Product ID
9	09	EISA manufacture code (Compressed ASCII)	0	C	0000	1100	
10	0A	Panel Supplier Reserved – Product code	0	0	0000	0000	
11	0B	Panel Supplier Reserved – Product code	0	0	0000	0000	
12	0C	LCD Module Serial No. = 0 (If not used)	0	0	0000	0000	
13	0D	LCD Module Serial No. = 0 (If not used)	0	0	0000	0000	
14	0E	LCD Module Serial No. = 0 (If not used)	0	0	0000	0000	
15	0F	LCD Module Serial No. = 0 (If not used)	0	0	0000	0000	
16	10	Week of Manufacture = 00	0	0	0000	0000	
17	11	Year of Manufacture = 2008	1	2	0001	0010	
18	12	EDID Structure version # = 1	0	1	0000	0001	EDID Version/ Revision
19	13	EDID Revision # = 3	0	3	0000	0011	
20	14	Video Input Definition = Digital signal, 6 bit_Dell only	9	0	1001	0000	Display Parameter
21	15	Max H image size (cm) = 28.61cm (29)	1	D	0001	1101	
22	16	Max V image size (cm) = 17.88cm (18)	1	2	0001	0010	
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	3	1	0011	0001	Color Characteristic
26	1A	Blue/White Low Bits	4	5	0100	0101	
27	1B	Red X　=　0.590	9	7	1001	0111	
28	1C	Red Y　=　0.343	5	7	0101	0111	
29	1D	Green X　=　0.328	5	4	0101	0100	
30	1E	Green Y　=　0.540	8	A	1000	1010	
31	1F	Blue X　=　0.161	2	9	0010	1001	
32	20	Blue Y　=　0.148	2	6	0010	0110	
33	21	White X　=　0.313	5	0	0101	0000	
34	22	White Y　=　0.329	5	4	0101	0100	
35	23	Established timings 1 (00h if not used)	0	0	0000	0000	Established Timings
36	24	Established timings 2 (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	

Product Specification

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)	1	2	0001	0010
55	37	Pixel Clock/10,000 (MSB) / 1280 x 800 @ 60Hz pixel clock = 69.3MHz	1	B	0001	1011
56	38	Horizontal Active = 1280 pixels	0	0	0000	0000
57	39	Horizontal Blanking = 136 pixels	8	8	1000	1000
58	3A	Horizontal Active : Horizontal Blanking = 1280 : 136	5	0	0101	0000
59	3B	Vertical Avtive = 800 lines	2	0	0010	0000
60	3C	Vertical Blanking = 17 lines	1	1	0001	0001
61	3D	Vertical Active : Vertical Blanking = 800 : 16	3	0	0011	0000
62	3E	Horizontal Sync. Offset = 24 pixels	1	8	0001	1000
63	3F	Horizontal Sync Pulse Width = 32 pixels	2	0	0010	0000
64	40	Vertical Sync Offset = 4 lines : Sync Width = 6 lines	4	6	0100	0110
65	41	Horizontal Vertical Sync Offset/Width upper 2bits = 0	0	0	0000	0000
66	42	Horizontal Image Size = 286mm	1	E	0001	1110
67	43	Vertical Image Size = 179mm	B	3	1011	0011
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	B	0001	1011
72	48	Pixel Clock/10,000 (LSB)	1	2	0001	0010
73	49	Pixel Clock/10,000 (MSB) / 1280 x 800 @ 60Hz pixel clock = 69.3MHz	1	B	0001	1011
74	4A	Horizontal Active = 1280 pixels	0	0	0000	0000
75	4B	Horizontal Blanking = 136 pixels	8	8	1000	1000
76	4C	Horizontal Active : Horizontal Blanking = 1280 : 136	5	0	0101	0000
77	4D	Vertical Avtive = 800 lines	2	0	0010	0000
78	4E	Vertical Blanking = 17 lines	1	1	0001	0001
79	4F	Vertical Active : Vertical Blanking = 800 : 16	3	0	0011	0000
80	50	Horizontal Sync. Offset = 24 pixels	1	8	0001	1000
81	51	Horizontal Sync Pulse Width = 32 pixels	2	0	0010	0000
82	52	Vertical Sync Offset = 4 lines : Sync Width = 6 lines	4	6	0100	0110
83	53	Horizontal Vertical Sync Offset/Width upper 2bits = 0	0	0	0000	0000
84	54	Horizontal Image Size = 286mm	1	E	0001	1110
85	55	Vertical Image Size = 179mm	B	3	1011	0011
86	56	Horizontal & Vertical Image Size	1	0	0001	0000
87	57	Horizontal Border = 0	0	0	0000	0000
88	58	Vertical Border = 0	0	0	0000	0000
89	59	Non-interlaced, Normal display, no stereo, Digital separate sync, H/V pol negatives	1	B	0001	1011
90	5A	Flag	0	0	0000	0000
91	5B	Flag	0	0	0000	0000
92	5C	Flag	0	0	0000	0000
93	5D	Dummy Descriptor	F	E	1111	1110
94	5E	Flag	0	0	0000	0000
95	5F	Dell P/N 1st Character = D	4	4	0100	0100
96	60	Dell P/N 2nd Character = W	5	7	0101	0111
97	61	Dell P/N 3nd Character = 9	3	9	0011	1001
98	62	Dell P/N 4th Character = 2	3	2	0011	0010
99	63	Dell P/N 5th Character = 0	3	0	0011	0000
100	64	LCD Supplier EEDID Revision # = A00	8	0	1000	0000
101	65	Manufacturer P/N = 1	3	1	0011	0001
102	66	Manufacturer P/N = 3	3	3	0011	0011
103	67	Manufacturer P/N = 3	3	3	0011	0011
104	68	Manufacturer P/N = W	5	7	0101	0111
105	69	Manufacturer P/N = X	5	8	0101	1000
106	6A	Manufacturer P/N = 1	3	1	0011	0001
107	6B	cturer P/N (If<13 char, then terminate with ASCII code 0Ah, set remain in fch	0	A	0000	1010

Note: "Detailed Timing Description #1" spans bytes 54–71, "Detailed Timing Description #2" spans bytes 72–89, and "Detailed Timing Description #3" spans bytes 90–107.

Product Specification

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

Byte# (decimal)	Byte# (HEX)	Field Name and Comments	Value (HEX)		Value (binary)		
108	6C	Flag	0	0	0000	0000	Detailed Timing Description #4
109	6D	Flag	0	0	0000	0000	
110	6E	Flag	0	0	0000	0000	
111	6F	Data Type Tag : ASCII String	0	0	0000	0000	
112	70	Flag	0	0	0000	0000	
113	71	SMBUS Value = 10 nits	1	F	0001	1111	
114	72	SMBUS Value = 17 nits	3	6	0011	0110	
115	73	SMBUS Value = 24 nits	4	2	0100	0010	
116	74	SMBUS Value = 30 nits	4	C	0100	1100	
117	75	SMBUS Value = 60 nits	6	B	0110	1011	
118	76	SMBUS Value = 100 nits	8	A	1000	1010	
119	77	SMBUS Value = 160 nits	B	2	1011	0010	
120	78	SMBUS Value = Max (Typically = FFh, 220nits)	F	F	1111	1111	
121	79	Number of LVDS receiver chips = 1 or 2	0	1	0000	0001	
122	7A	BIST Enable: Yes = 01' No = 00'	0	1	0000	0001	
123	7B	(If<13 char, then terminate with ASCII code 0Ah, set remaining char=20h	0	A	0000	1010	
124	7C	(If<13 char, then terminate with ASCII code 0Ah)	2	0	0010	0000	
125	7D	(If<13 char, then terminate with ASCII code 0Ah)	2	0	0010	0000	
126	7E	Extension flag = 00	0	0	0000	0000	Extension Flag
127	7F	Checksum	6	2	0110	0010	Checksum