SPECIFICATION
FOR
APPROVAL

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

Title	14.0” HD TFT LCD

Customer	Lenovo
MODEL	

SUPPLIER	LG Display Co., Ltd.
*MODEL	LP140QH1
Suffix	SPB1

*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.

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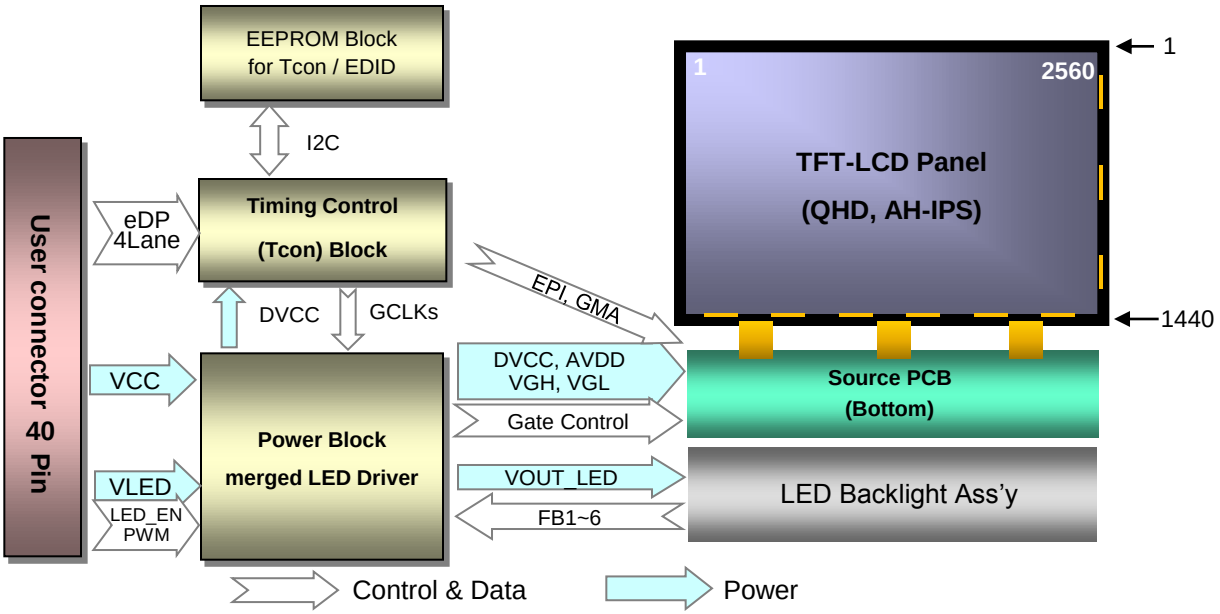
Contents

RECORD OF REVISIONS

Revision No	Revision Date	Page	Description	EDID ver
0.0	Mar. 15. 2013	-	First Draft (Preliminary Specification)	
0.1	Aug. 21. 2013	4	General Features	
		6	3-1. Electrical Characteristics	
		10	3-4. Signal Timing Specifications	
		13	4. Optical Specification	
		17~18	2D Drawing	
		21	8-2. Packing Form	
		22	8-3. Label Description	

1. General Description

The LP140QH1 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 black mode. This TFT-LCD has 14.0 inches diagonally measured active display area with QHD resolution (2560 horizontal by 1440 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 16,777,216 colors. The LP140QH1 has been designed to apply the interface method that enables low power, high speed, low EMI. The LP140QH1 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 LP140QH1 characteristics provide an excellent flat display for office automation products such as Notebook PC.



General Features

Active Screen Size	14.0 inches diagonal
Outline Dimension	320.4(H, typ) × 188.3(V, typ) × 2.6(D,max) [mm]
Pixel Pitch	0.1209mm × 0.1209 mm
Pixel Format	2560 horiz. by 1440 vert. Pixels RGB strip arrangement
Color Depth	8-bit, 16,777,216 colors
Luminance, White	300 cd/m^2
Power Consumption	Total 3.80 W(Typ.) Logic : 1.23 W (Typ.@ Mosaic), B/L : 2.57 W (Typ.@ VLED 12V)
Weight	250g (Max.)
Display Operating Mode	Transmissive mode, normally black
Surface Treatment	Anti-Glare treatment of the front Polarizer
RoHS Compliance	Yes
BFR / PVC / As Free	Yes for all

2. Absolute Maximum Ratings

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

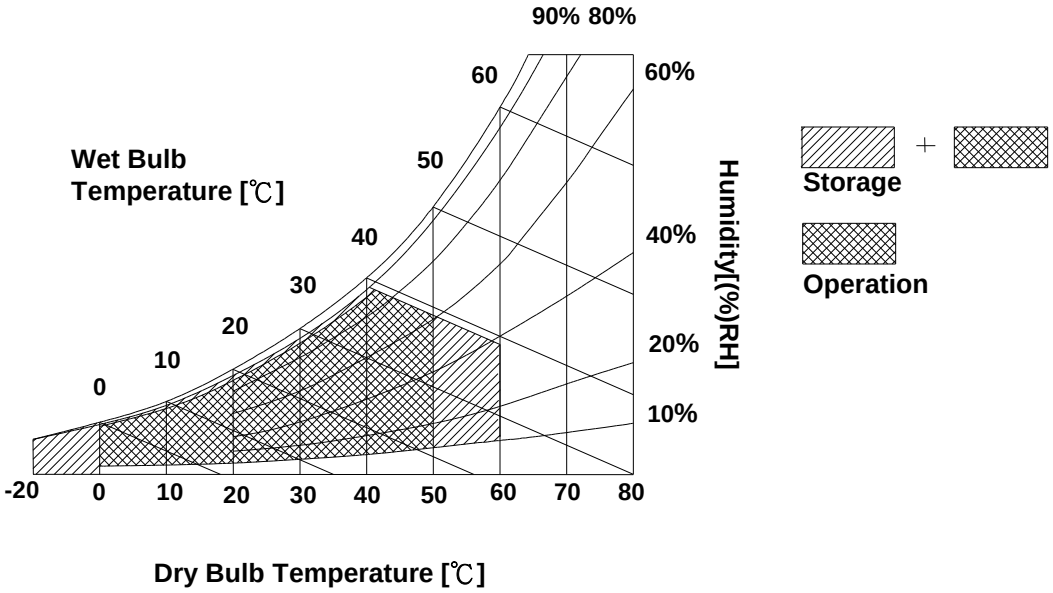
Table 1. ABSOLUTE MAXIMUM RATINGS

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, 2
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.

2. LCD Surface Temperature Spec :
Panel surface temperature should be under 60 degrees operating at 50 degrees / 2hrs

3. Storage Condition is guaranteed under packing condition.



3. Electrical Specifications

3-1. Electrical Characteristics

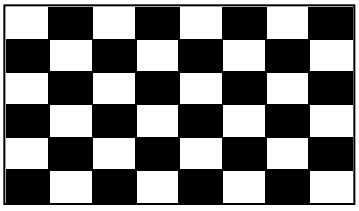
The LP140QH1 requires two power inputs. The first logic is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second backlight is the input about LED BL with LED Driver.

Table 2. ELECTRICAL CHARACTERISTICS

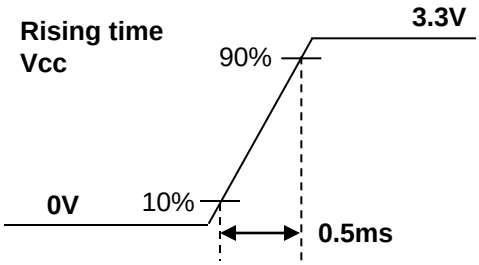
Parameter		Symbol	Values			Unit	Notes
			Min	Typ	Max		
LOGIC :							
Power Supply Input Voltage		V_{CC}	3.0	3.3	3.6	V	1
Power Supply Input Current	Mosaic	I_{CC}	-	373	428	mA	2
	Red	I_{CC}	-	470	540	mA	
Power Consumption		P_{CC}	-	1.23	1.41	W	2
Power Supply Inrush Current		I_{CC_P}	-	-	1500	mA	3
LVDS Impedance		Z_{LVDS}	90	100	110	Ω	4
BACKLIGHT : (with LED Driver)							
LED Power Input Voltage		V_{LED}	7.0	12.0	21.0	V	5
LED Power Input Current		I_{LED}	-	211	215	mA	6
LED Power Consumption		P_{LED}	-	2.53	2.57	W	6
LED Power Inrush Current		I_{LED_P}	-	-	1500	mA	7
PWM Duty Ratio			1	-	100	%	8
PWM Jitter		-	0	-	0.2	%	9
PWM Impedance		Z_{PWM}	20	40	60	kΩ	
PWM Frequency		F_{PWM}	200	-	1000	Hz	10
PWM High Level Voltage		V_{PWM_H}	2.2	-	5.3	V	
PWM Low Level Voltage		V_{PWM_L}	0	-	0.6	V	
LED_EN Impedance		Z_{PWM}	20	40	60	kΩ	
LED_EN High Voltage		$V_{LED\_EN\_H}$	2.2	-	5.3	V	
LED_EN Low Voltage		$V_{LED\_EN\_L}$	0	-	0.6	V	
Life Time			12,000	-	-	Hrs	11

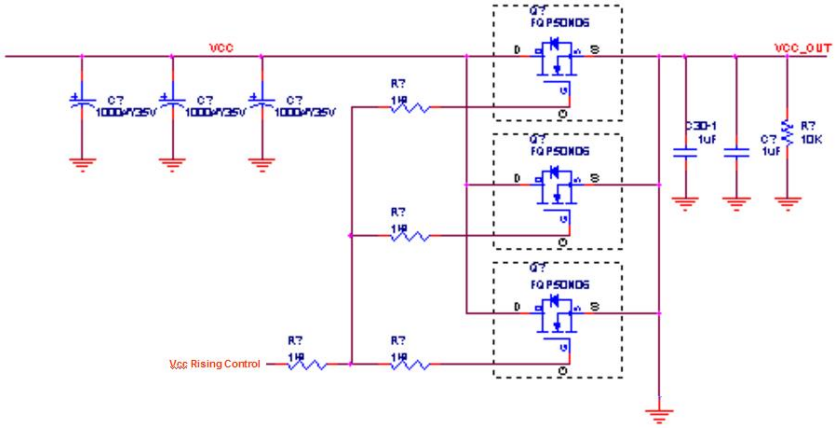
Note)

1. The measuring position is the connector of LCM and the test conditions are under 25℃, fv = 60Hz, Black pattern.
2. The specified Icc current and power consumption are under the Vcc = 3.3V , 25℃, fv = 60Hz condition and Mosaic pattern.

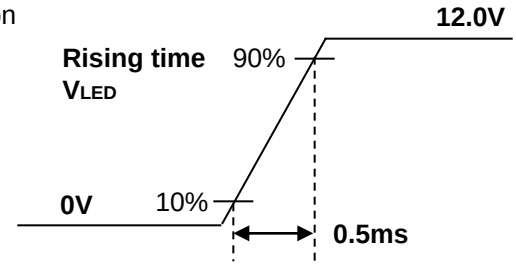


3. This Spec. is the max load condition for the cable impedance designing.
4. The below figures are the measuring Vcc condition and the Vcc control block LGD used. The Vcc condition is same as the minimum of T1 at Power on sequence.





5. This impedance value is needed for proper display and measured form eDP Tx to the mating connector.
6. The measuring position is the connector of LCM and the test conditions are under 25℃.
7. The current and power consumption with LED Driver are under the V_{LED} = 12.0V , 25℃, Dimming of Max luminance and White pattern with the normal frame frequency operated(60Hz).
8. The below figures are the measuring V_{LED} condition and the V_{LED} control block LGD used. V_{LED} control block is same with Vcc control block.

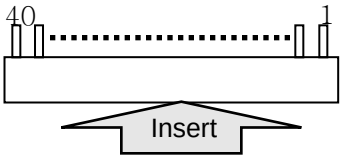


9. The operation of LED Driver below minimum dimming ratio may cause flickering or reliability issue.
10. If Jitter of PWM is bigger than maximum, it may induce flickering.
11. This Spec. is not effective at 100% dimming ratio as an exception because it has DC level equivalent to 0Hz. In spite of acceptable range as defined, the PWM Frequency should be fixed and stable for more consistent brightness control at any specific level desired.
12. The life time is determined as the time at which brightness of LCD is 50% compare to that of minimum value specified in table 7. under general user condition.

3-2. Interface Connections

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

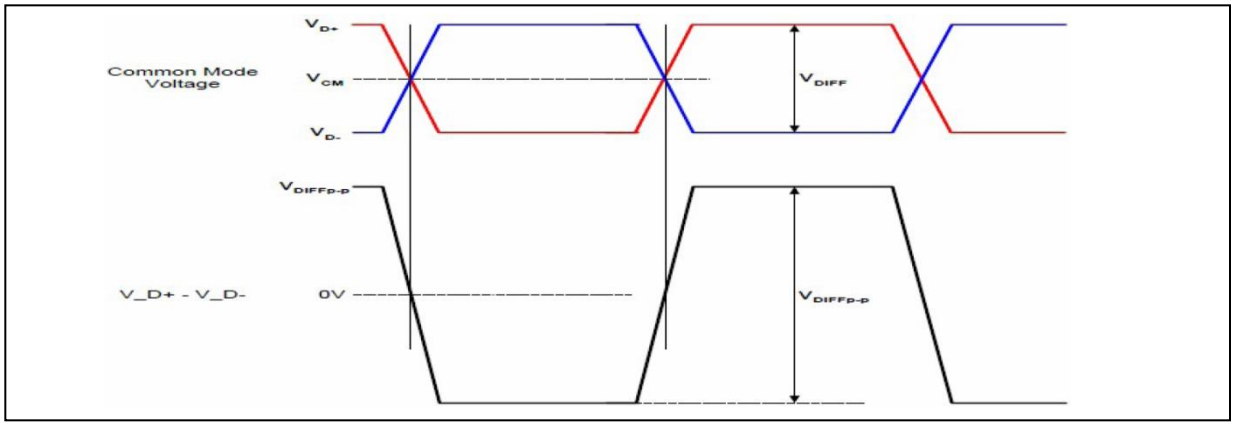
Table 3. MODULE CONNECTOR PIN CONFIGURATION (CN1)

Pin	Symbol	Description	Notes
1	NC	No Connection (LGD use internally)	**[Interface Chip]** 1. LCD : Analogix, ANX2804 (LCD Controller Including eDP Receiver. 2. System : TBD or equivalent * Pin to Pin compatible with eDP **[Connector]** KN38A-40S-0.5H, Hirose **[Mating Connector]** 20453-040T-0x, I-PEX or equivalent. **[Connector pin arrangement]**  [LCD Module Rear View] * Pin for PVcom : #34, #35 PVcom Address : 01010000
2	GND	High Speed Ground	
3	ML3-	Complement Signal-Lane 3	
4	ML3+	True Signal-Main Lane 3	
5	GND	High Speed Ground	
6	ML2-	Complement Signal-Lane 2	
7	ML2+	True Signal-Main Lane 2	
8	GND	High Speed Ground	
9	ML1-	Complement Signal-Lane 1	
10	ML1+	True Signal-Main Lane 1	
11	GND	High Speed Ground	
12	ML0-	Complement Signal-Lane 0	
13	ML0+	True Signal-Main Lane 0	
14	GND	High Speed Ground	
15	AUX+	True Signal-Auxiliary Channel	
16	AUX-	Complement Signal-Auxiliary Channel	
17	GND	High Speed Ground	
18	VCC	VCC for Module (3.3V)	
19	VCC	VCC for Module (3.3V)	
20	VCC	VCC for Module (3.3V)	
21	VCC	VCC for Module (3.3V)	
22	NC	No Connection (LGD use internally)	
23	GND	LCM Ground (Logic Ground)	
24	GND	LCM Ground (Logic Ground)	
25	GND	LCM Ground (Logic Ground)	
26	GND	LCM Ground (Logic Ground)	
27	HPD	HPD signal pin	
28	GND	LCM Ground (LED Backlight Ground)	
29	GND	LCM Ground (LED Backlight Ground)	
30	GND	LCM Ground (LED Backlight Ground)	
31	GND	LCM Ground (LED Backlight Ground)	
32	LED_EN	LED Backlight On/Off	
33	PWM	System PWM Signal input for dimming	
34	NC	No Connection (LGD use internally)	
35	NC	No Connection (LGD use internally)	
36	VLED	LED Backlight Power 7V-21V	
37	VLED	LED Backlight Power 7V-21V	
38	VLED	LED Backlight Power 7V-21V	
39	VLED	LED Backlight Power 7V-21V	
40	NC	No Connection (LGD use internally)	

3-3. eDP Signal Timing Specifications

3-3-1. DC Specification

The VESA Display Port related AC specification is compliant with the VESA Display Port Standard v1.3



Description	Symbol	Min	Max	Unit	Notes
Differential peak-to-peak Input voltage	VDIFF p-p	120	-	mV	For high bit rate
		40	-		For reduced bit rate
Rx DC common mode voltage	VCM	0	2.0	V	-

3-3-2. AC Specification

The VESA Display Port related AC specification is compliant with the VESA Display Port Standard v1.3

Description	Symbol	Min	Typ	Max	Unit	Notes
Unit Interval for high bit rate (2.7Gbps/lane)	UI_High_Rate	-	370	-	ps	Range is nominal ±350ppm. DisplayPort Link Rx does not require local crystal for link clock generation
Unit Interval for high bit rate (1.62Gbps/lane)	UI_Low_Rate	-	617	-	ps	
Lane-to-Lane skew	V Rx-SKEW-INTER_PAIR	-	-	5200	ps	-
Lane intra-pair skew	V Rx-SKEW-INTRA_PAIR	-	-	100	ps	For high bit rate
		-	-	300	ps	For reduced bit rate

3-4. Signal Timing Specifications

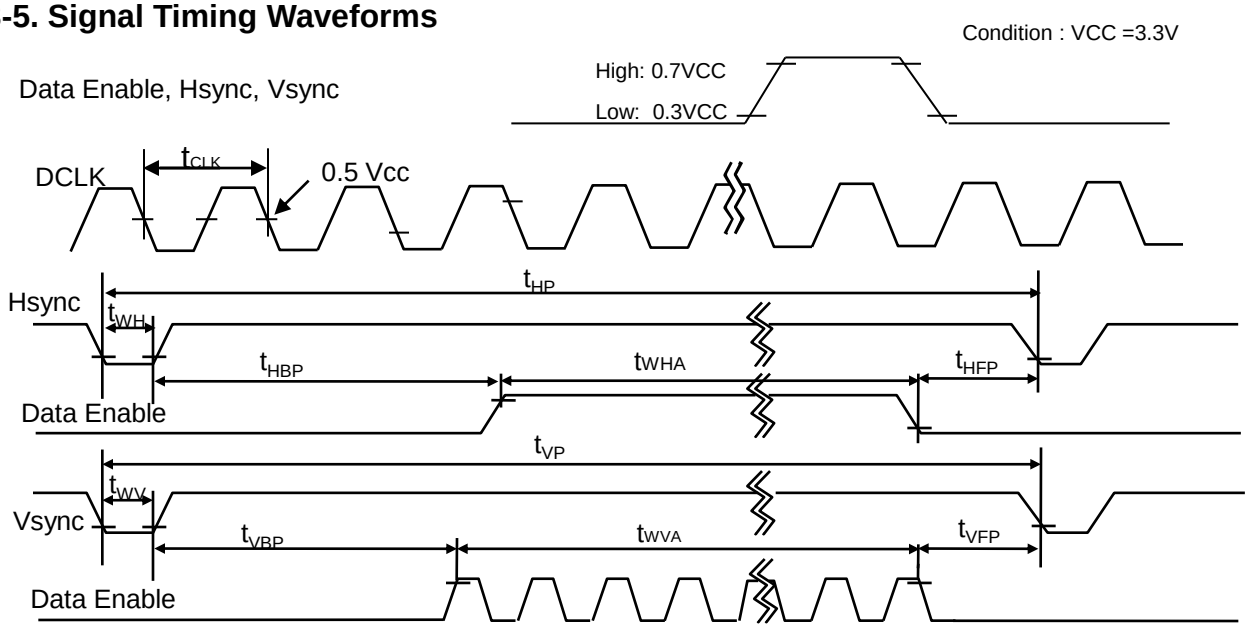
This is the signal timing required at the input of the User connector. All of the interface signal timing should be satisfied with the following specifications and specifications of eDP Tx/Rx for its proper operation.

Table 4. TIMING TABLE

ITEM	Symbol		Min	Typ	Max	Unit	Note
DCLK	Frequency	f_{CLK}	235.8	237.8	239.8	MHz	
Hsync	Period	t_{HP}	2708	2720	2732	tCLK	
	Width	t_{WH}	26	32	38		
	Width-Active	t_{WHA}	2560	2560	2560		
Vsync	Period	t_{VP}	1451	1457	1463	tHP	
	Width	t_{WV}	2	3	4		
	Width-Active	t_{WVA}	1440	1440	1440		
Data Enable	Horizontal back porch	t_{HBP}	76	80	84	tCLK	
	Horizontal front porch	t_{HFP}	46	48	50		
	Vertical back porch	t_{VBP}	8	12	16	tHP	
	Vertical front porch	t_{VFP}	1	2	3		

Appendix) all reliabilities are specified for timing specification based on refresh rate of 60Hz. However, LP140QH1 has a good actual performance even at lower refresh rate (e.g. 40Hz or 50Hz) for power saving mode, whereas LP140QH1 is secured only for function under lower refresh rate. 60Hz at Normal mode, 50Hz, 40Hz at Power save mode. Don't care Flicker level (power save mode).

3-5. Signal Timing Waveforms



3-6. 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 5. 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	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	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

3-7. Power Sequence

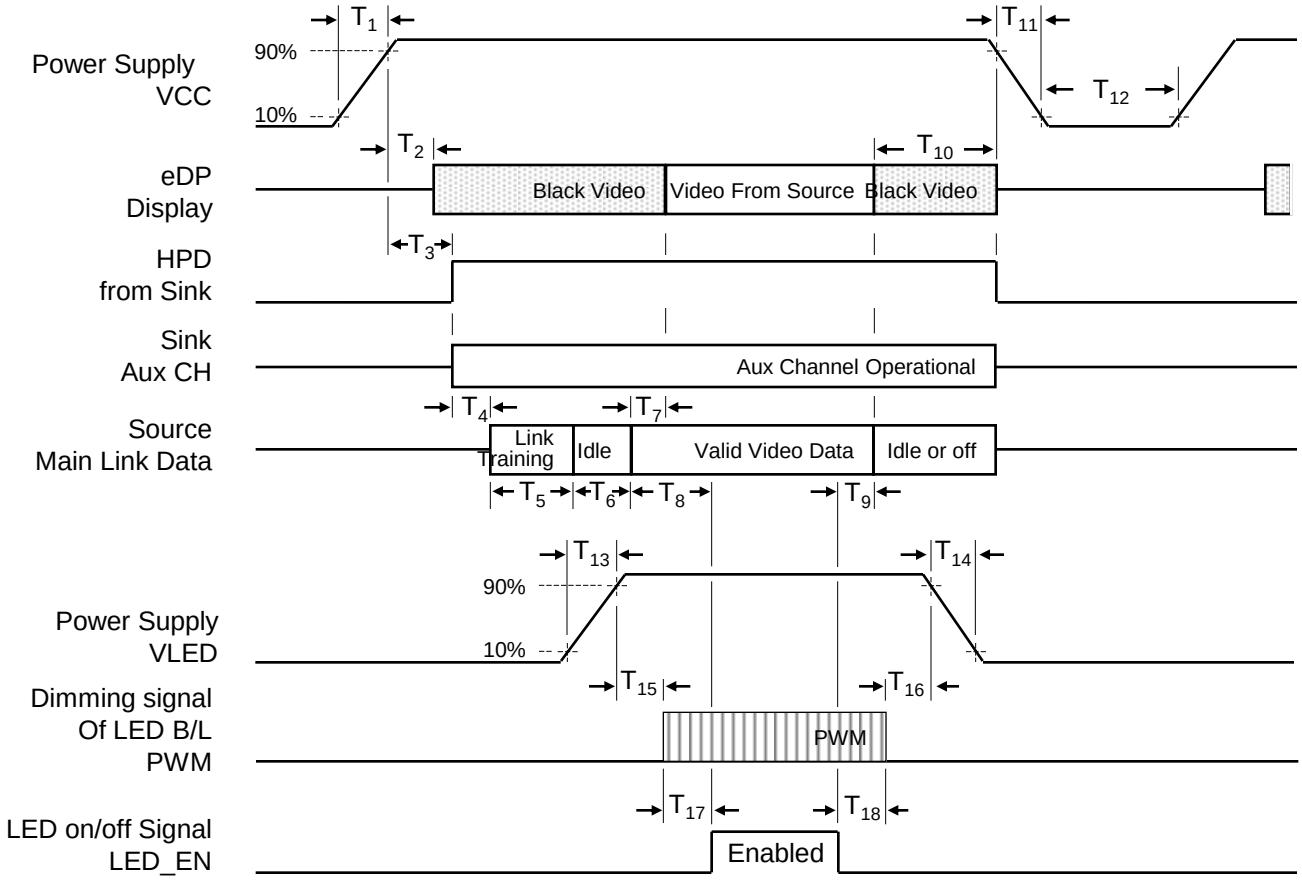


Table 6. POWER SEQUENCE TABLE

Timing	Required By	Limits		Units	Notes
		Min	Max		
T_1	Source	0.5	10	ms	-
T_2	Sink	0	200	ms	-
T_3	Sink	0	200	ms	-
T_4	Source	-	-	ms	-
T_5	Source	-	-	ms	-
T_6	Source	-	-	ms	-
T_7	Sink	0	50	ms	-
T_8	Source	-	-	ms	LGD recommend Min 200ms
T_9	Source	-	-	ms	-

Timing	Required By	Limits		Units	Notes
		Min	Max		
T_{10}	Source	0	500	ms	-
T_{11}	Source	-	10	ms	-
T_{12}	Source	150	-	ms	VESA recommend Min 500ms
T_{13}	Source	0.5	10	ms	-
T_{14}	Source	0	5000	ms	-
T_{15}	Source	0	-	ms	-
T_{16}	Source	0	-	ms	-
T_{17}	Source	0	-	ms	-
T_{18}	Source	0	-	ms	-

Note) 1. Do not insert the mating cable when system turn on.
2. Valid Data have to meet "3-3. eDP Signal Timing Specifications"
3. Video Signal, LED_EN and PWM need to be on pull-down condition on invalid status.
4. LGD recommend the rising sequence of VLED after the Vcc and valid status of Video Signal turn on.

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

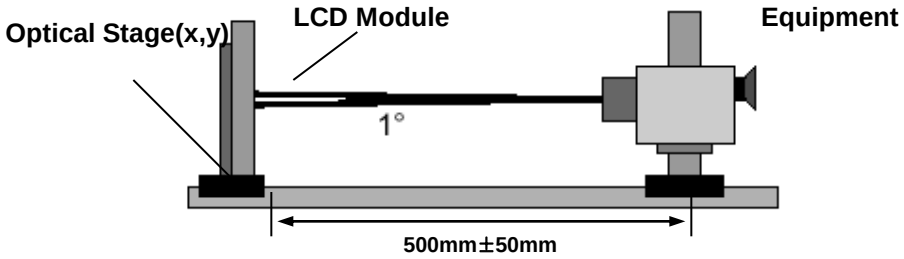


Table 7. OPTICAL CHARACTERISTICS

Ta=25°C, VCC=3.3V, fv=60Hz, f_{CLK}= 237.6MHz

Parameter	Symbol	Values			Units	Notes
		Min	Typ	Max		
Contrast Ratio	CR	500	700	-		1
Surface Luminance, white	L_{WH}	250	300	-	cd/m²	2
Luminance Variation	$\delta_{WHITE(5P)}$	-	-	1.25	-	3
	$\delta_{WHITE(13P)}$	-	1.4	1.6		
Response Time	$Tr_R + Tr_D$	-	25	40	ms	4
Color Coordinates						
RED	RX	0.594	0.624	0.654		
	RY	0.322	0.352	0.382		
GREEN	GX	0.303	0.333	0.363		
	GY	0.542	0.572	0.602		
BLUE	BX	0.125	0.155	0.185		
	BY	0.020	0.050	0.080		
WHITE	WX	0.283	0.313	0.343		
	WY	0.299	0.329	0.359		
Viewing Angle						5
x axis, right(Φ=0°)	Θr	80	85	-	degree	
x axis, left (Φ=180°)	Θl	80	85	-	degree	
y axis, up (Φ=90°)	Θu	80	85	-	degree	
y axis, down (Φ=270°)	Θd	80	85	-	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 average of 5 point across the LCD surface 50cm from the surface with all pixels displaying white. For more information see FIG 1.

LWH = Average(L1,L2, … L5)

3. The variation in surface luminance , The panel total variation (WHITE) is determined by measuring LN at each test position 1 through 13 and then defined as followed numerical formula. For more information see FIG 2.

$$\text{WHITE\_5P} = \frac{\text{Maximum(L1,L2, … L5)}}{\text{Minimum(L1,L2, … L5)}}$$

$$\text{WHITE\_13P} = \frac{\text{Maximum(L1,L2, … L13)}}{\text{Minimum(L1,L2, … L13)}}$$

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

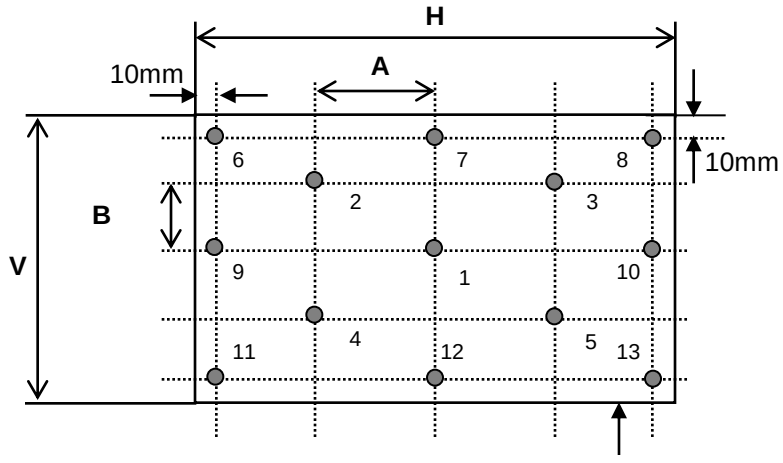
5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 4.

6. Gray scale specification * fV = 60Hz

Gray Level	Luminance [%] (Typ)
L0	0.12
L31	0.97
L63	4.26
L95	10.5
L127	19.8
L159	33.6
L191	52.1
L223	74.8
L255	100

FIG. 2 Luminance

<Measuring point for Average 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”.

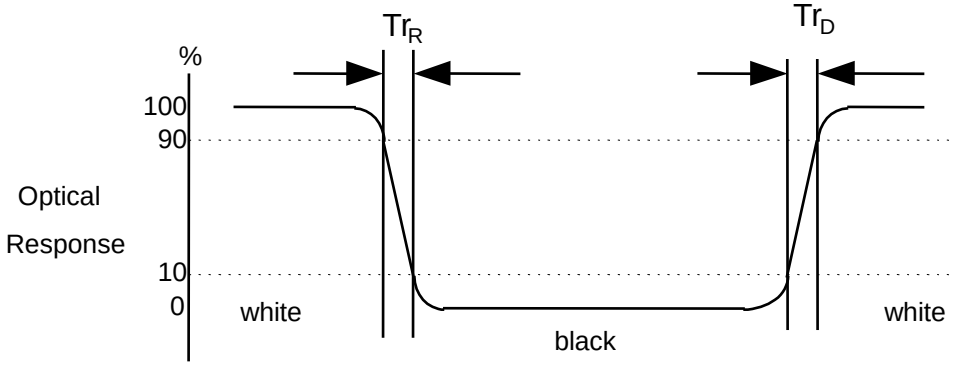
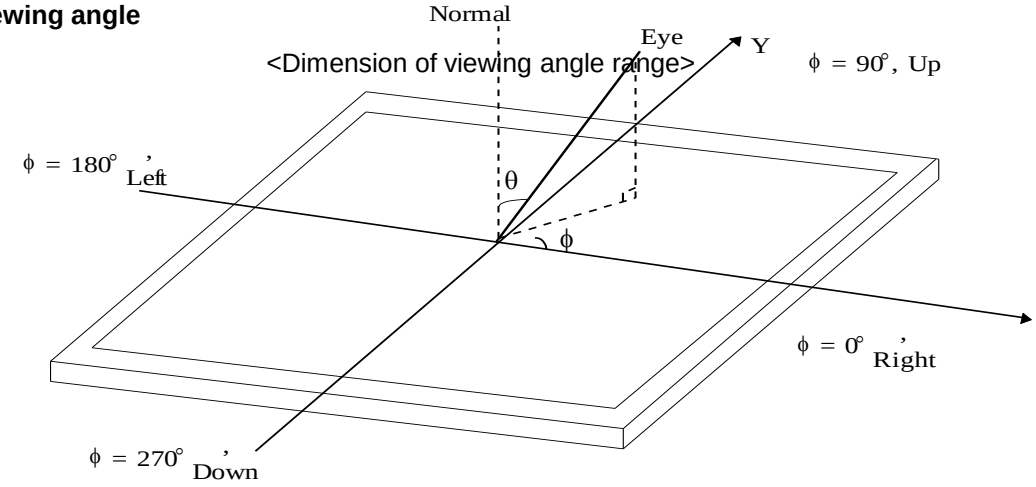


FIG. 4 Viewing angle

<Dimension of viewing angle range>



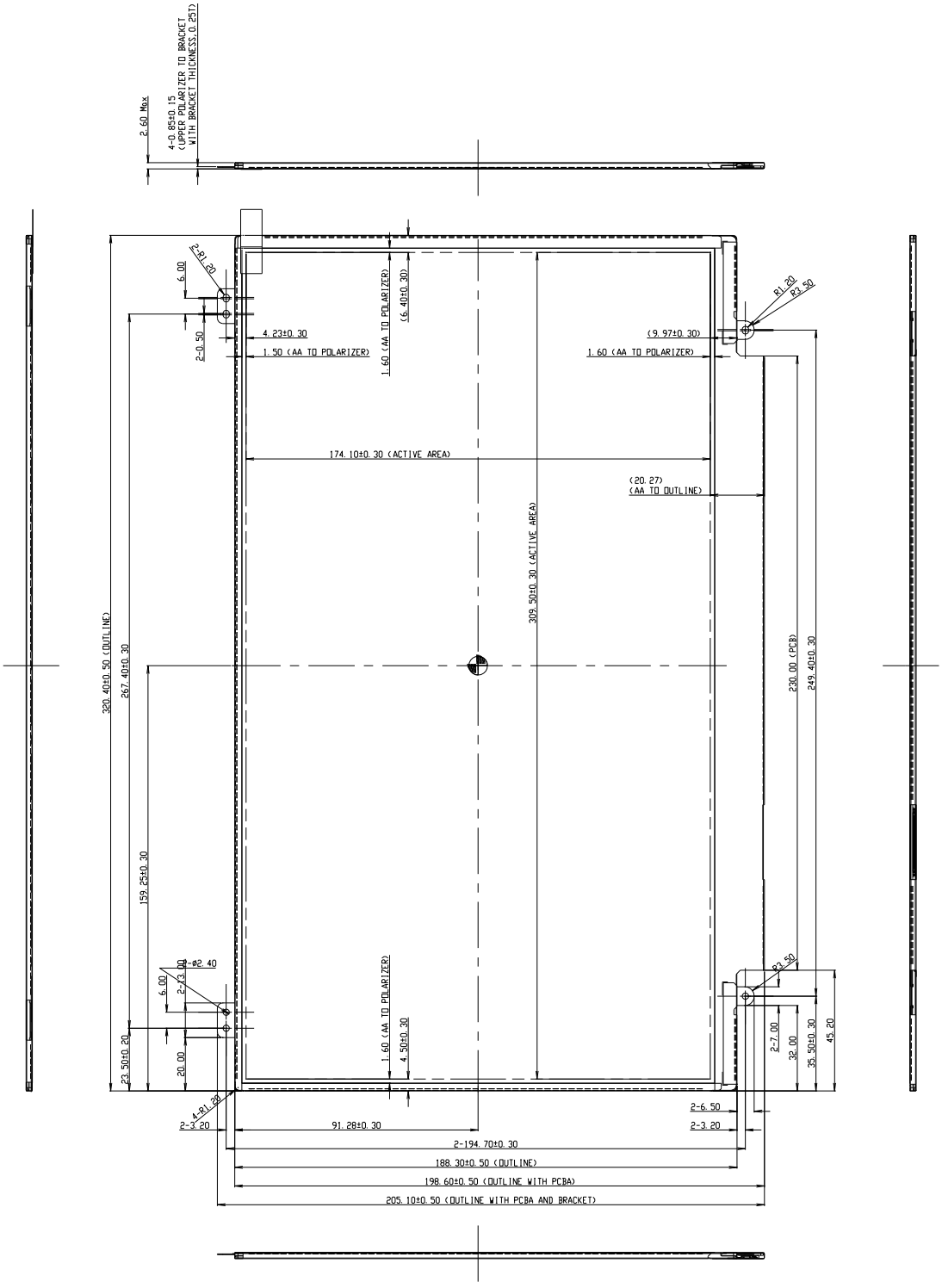
5. Mechanical Characteristics

The contents provide general mechanical characteristics for the model LP140QH1. In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal	320.4 ± 0.5mm
	Vertical	188.3± 0.5mm
	Thickness	2.6mm (max)
Bezel Area	Horizontal	312.70 mm
	Vertical	177.20 mm
Active Display Area	Horizontal	309.50 mm
	Vertical	174.10 mm
Weight	250g (Max.)	
Surface Treatment	Anti-Glare treatment of the front polarizer	

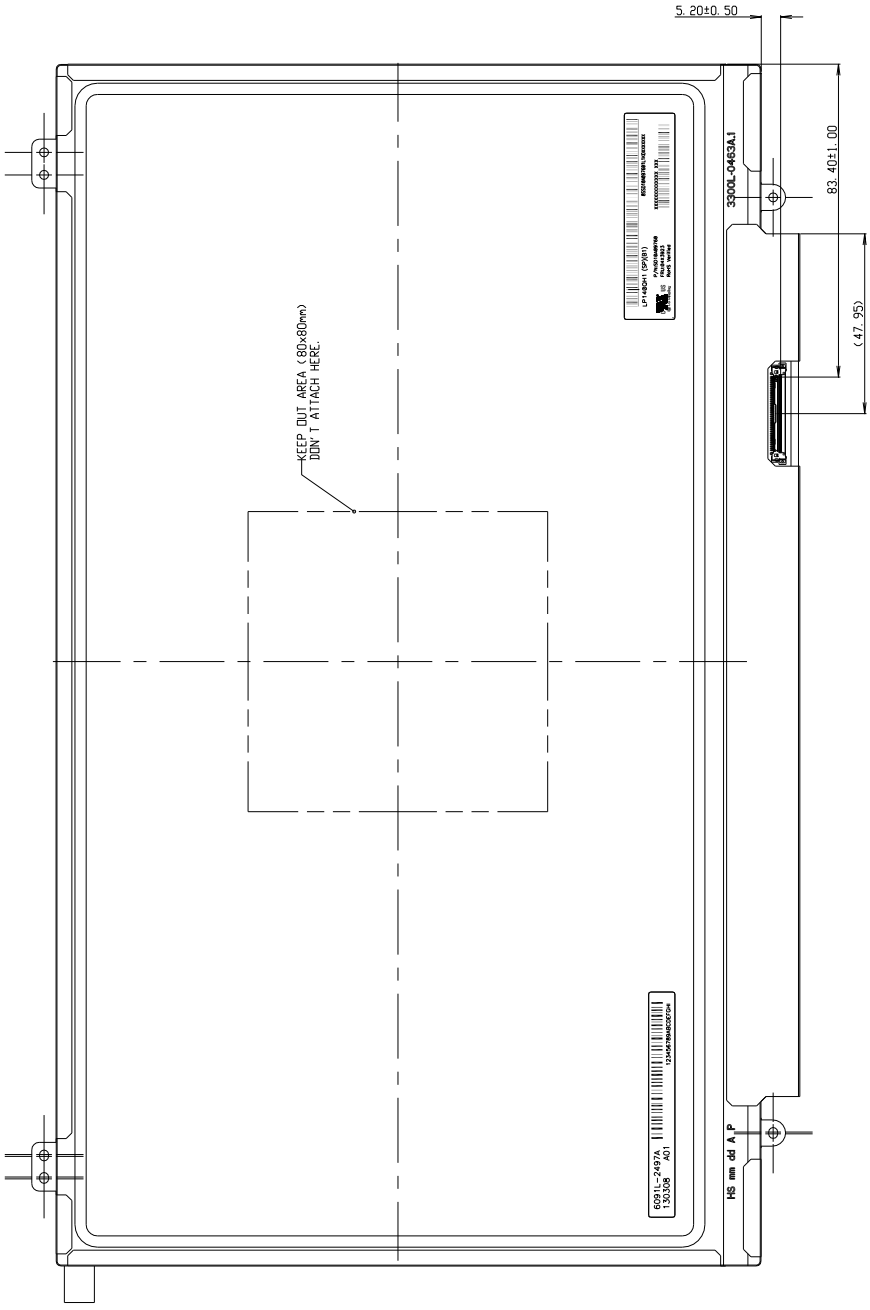
<FRONT VIEW>

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



<REAR VIEW>

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



6. Reliability

Environment test condition

No.	Test Item	Conditions
1	High temperature storage test	Ta= 60°C, 240h
2	Low temperature storage test	Ta= -20°C, 240h
3	High temperature operation test	Ta= 50°C, 50%RH, 240h
4	Low temperature operation test	Ta= 0°C, 240h
5	Vibration test (non-operating)	Sine wave, 5 ~ 150Hz, 1.5G, 0.37oct/min 3 axis, 30min/axis
6	Shock test (non-operating)	- No functional or cosmetic defects following a shock to all 6 sides delivering at least 180 G in a half sine pulse no longer than 2 ms to the display module - No functional defects following a shock delivering at least 200 g in a half sine pulse no longer than 2 ms to each of 6 sides. Each of the 6 sides will be shock tested with one each display, for a total of 6 displays
7	Altitude operating storage / shipment	0 ~ 10,000 feet (3,048m) 24Hr 0 ~ 40,000 feet (12,192m) 24Hr

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

7. International Standards

7-1. Safety

a) UL 60950-1, Underwriters Laboratories Inc.
Information Technology Equipment - Safety - Part 1 : General Requirements.

b) CAN/CSA C22.2 No.60950-1-07, Canadian Standards Association.
Information Technology Equipment - Safety - Part 1 : General Requirements.

c) EN 60950-1, European Committee for Electrotechnical Standardization (CENELEC).
Information Technology Equipment - Safety - Part 1 : General Requirements.

d) IEC 60950-1, The International Electrotechnical Commission (IEC).
Information Technology Equipment - Safety - Part 1 : General Requirements.

7-2. Environment

a) RoHS, Directive 2011/65/EU of the European Parliament and of the council of 8 June 2011

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	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Mark	A	B	C	D	E	F	G	H	J	K

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 : 478mm X 365mm X 288mm

8-3. Label Description

Model Name

LGD Code

(1) Model Name : **L P 1 4 0 Q H 1 - S P B 1**

- Revision Code
- Product Type
- Display Mode
- Basic Model Serial No.
- Resolution : HD
- Size (inch) : 14.0”
- Application : NBPC
- LGPL Brand Initial: L

(2) Lot Mark : **1 4 0 C 6 0 0 0 0 0 0 0 1**

- SERIAL NO.
- MONTH
- YEAR
- SIZE

Lenovo Code

1)P/N : SD10A09760
2)FRU : 04X3923

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.
(10) When handling the LCD module, it needs to handle with care not to give mechanical stress to the PCB and Mounting Hole area."

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

TBD

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

TBD

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

TBD