

Product Specification

SPECIFICATION FOR APPROVAL



- () Preliminary Specification
- () Final Specification

Title			12.85" IFI LC	D
		_		
BUYER	Google		SUPPLIER	LG Display Co., Ltd.
MODEL		1	*MODEL	LP129QE1
		J	Suffix	SPA1

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

	APPROVED BY	SIGNATURE
	1	
	1	
	1	
Plea	se return 1 copy for yo	our confirmation with

your signature and comments.

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Product Specification

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RECORD OF REVISIONS

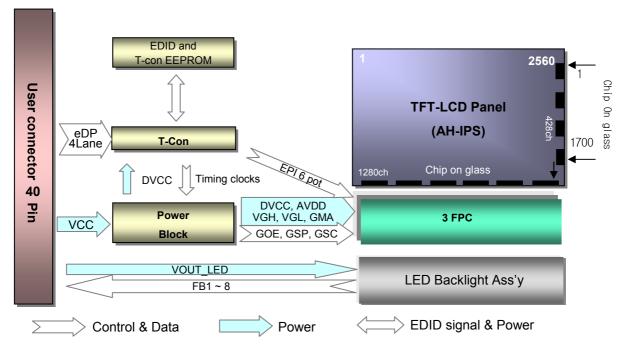
Revision No	Revision Date	Page	Description	EDID ver
0.0	May. 10, 2011	-	First Draft (Preliminary Specification)	0.0
0.2	May.22.2011	4	Update general feature	0.0
0.3		6	Update Electrical specification	0.0
		11	Update color input data reference (6bit →8bit)	0.0
		17-18	Update Mechanical Drawing	0.0
0.4	May.26.2011	13-14	Update Optical specification (CR)	0.0
0.5	May 27 2011	17-18	Al specification / Guide hole size and position	0.0
0.6	Oct.20.2011	4, 6	MAX Power Consumption	0.3
		8	Update CNT pin name	0.3
		10	Update signal timing specification	0.3
		12	Update power sequence (T8/T9)	0.3
		13	Update optical specification	0.3
		16	Update mechanical characteristics (thickness)	0.3
		17-18	Update Mechanical Drawing	0.3
		24-26	Update EDID	0.3
0.7	Apr.17.2012	6	Update Electrical specification	0.4
		13-14	Update optical specification	0.4
		17-18	Update Mechanical Drawing	0.4
		21	Update packing form	0.4
0.8	Jul.09.2012	14	Update grayscale specification (gamma 2.5 → 2.2)	0.4
		17-18	Update Mechanical Drawing	0.4
1.0	Jul.17.2012	-	Final Specification	1.0
1.1	Aug.13.2012	19	Add ESD Specification	1.0
]



Product Specification

1. General Description

The LP129QE1 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 12.85 inches diagonally measured active display area with special resolution (2560 horizontal by 1700 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 16.7M colors. The LP129QE1 has been designed to apply the interface method that enables low power, high speed, low EMI. The LP129QE1 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 LP129QE1 characteristics provide an excellent flat display for office automation products such as Notebook PC.



General Features

Active Screen Size	12.85 inches diagonal
Outline Dimension	283.3(H, Typ.) x 195.0(V, Typ.) x 2.95(D,Max) [mm]
Pixel Pitch	0.1062mm x 0.1062mm (239ppi)
Pixel Format	2560 horiz. By 1700 vert. Pixels RGB strip arrangement
Color Depth	8-bit, 16,777,216 colors
Luminance, White	400 cd/m ² (Typ.5point)
Power Consumption	Total 9.57W (Max.) @ super-pixel 1dot (Logic = 4.0W, B/L = 5.57W)
Weight	265g (Max.)
Display Operating Mode	Transmissive mode, normally black
Surface Treatment	(POL) ATW & HC
RoHS Comply	Yes

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2. Absolute Maximum Ratings

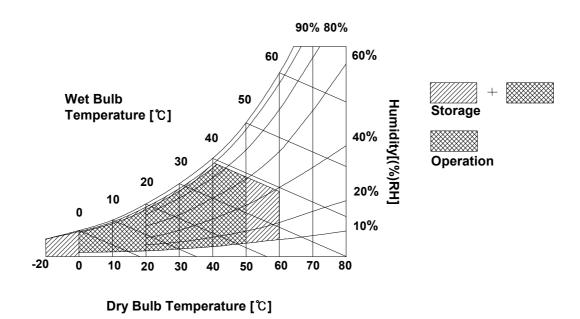
The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Val	ues	Units	Notes	
Farameter	Syllibol	Min	Max	Offics		
Power Input Voltage	VCC	-0.3	4.0	Vdc	at 25 ± 5°C	
Operating Temperature	Тор	0	50	°C	1	
Storage Temperature	Нѕт	-20	60	°C	1	
Operating Ambient Humidity	Нор	10	90	%RH	1	
Storage Humidity	Нѕт	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.





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3. Electrical Specifications

3-1. Electrical Characteristics

The LP129WQ 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

Table 2. ELECTRICAL CHARACTERISTICS

Parameter		Cymahal		Values	Values		Notes
		Symbol	Min	Тур	Max	Unit	Notes
LOGIC:							
LCD Input Voltage a	t CNT	Vcc	3.0	3.3	3.6	V	1
LCD Input Current Superpixel 1 dot		Icc			1200	mA	2
Power Consumption		Pcc			4.0	W	2
Inrush Current		Icc_p			2000	mA	4
eDP Impedance		ZLVDS	85.5	95	104.5	Ω	5
BACKLIGHT : (witho	ut LED Driver)						
LED Power Input Voltage		Vout			42	V	6
LED Power Input Current		ILED		18.5		mA	6
LED Power Consumption		PLED			5.57	W	6
Life Time				1,5000		Hrs	7

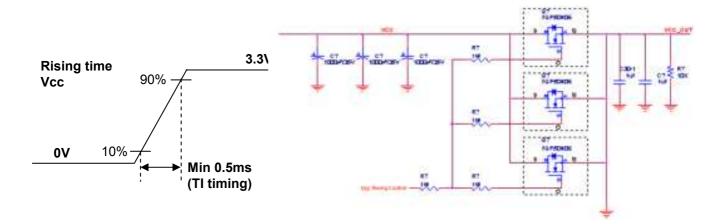
Test condition) 400nit @ Full dimming



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Note)

- 1. The measuring position is the connector of LCD and the test conditions are under 25° C, fv = 60Hz, Superpixel 1 dot pattern.
- 2. The specified lcc current and power consumption are under the Vcc = 3.3V , 25°C, fv = 60Hz condition and Super pixel 1 dot 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. Inrush current has relation with 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 LCD and the test conditions are under $25\,^{\circ}$ C. and 400nit(Full dimming)
- 7. 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.



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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	H_GND	High Speed Ground	
2	Lane3_N	Complement Signal Link Lane 3	1, Interface chips
3	Lane3_P	True Signal Link Lane 3	1.1 LCD: ANX, DIKE (LCD Controller)
4	H_GND	High Speed Ground	including eDP Receiver
5	Lane2_N	Complement Signal Link Lane 2	1.2 System : ANX eDP RX or equivalent
6	Lane2_P	True Signal Link Lane 2	* Pin to Pin compatible with eDP
7	H_GND	High Speed Ground	2. Connector
8	Lane1_N	Complement Signal Link Lane 1	2.1 LCD : 20474-040E-12, I-PEX
9	Lane1_P	True Signal Link Lane 1	or its compatibles 2.2 Mating : 20474-040E-12, I-PEX
10	H_GND	High Speed Ground	or its compatibles
11	Lane0_N	Complement Signal Link Lane 0	2.3 Connector pin arrangement
12	Lane0_P	True Signal Link Lane 0	
13	H_GND	High Speed Ground	40 1
14	AUX_CH_P	True Signal Auxiliary Ch.	¶
15	AUX_CH_N	Complement Signal Auxiliary Ch.	[##]
16	H_GND	High Speed Ground	
17	LCD_VCC	LCD Logic power	[Real View from top side of connector]
18	LCD_VCC	LCD Logic power	
19	LCD_VCC	LCD Logic power	
20	LCD_VCC	LCD Logic power	
21	NC	No Connection (Reserved)	
22	LCD_GND	LCD Logic ground	
23	LCD_GND	LCD Logic ground	
24	LCD_GND	LCD Logic ground	
25	HPD	HPD Signal pin	
26	PWM_IN	BL Ground	
27	PWM_OUT	BL Ground	
28	NC	No Connection (Reserved)	
29	BL_FB7	Backlight Cathode	
30	BL_FB6	Backlight Cathode	
31	BL_FB5	Backlight Cathode	
32	BL_FB4	Backlight Cathode	
33	BL_FB3	Backlight Cathode	
34	BL_FB2	Backlight Cathode	
35	BL_FB1	Backlight Cathode	
36	BL_FB0	Backlight Cathode	
37	NC	No Connection (Reserved)	
38	BL_VOUT	Backlight power	
39	BL_VOUT	Backlight power	
40	BL_VOUT	Backlight power	

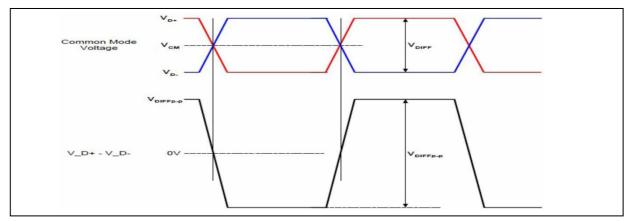


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3-3. eDP Signal Timing Specifications

3-3-1. DC Specification

The VESA Display Port related AC specification is compliant with the VESA Display Port Standard v1.1a.



Description	Symbol	Min	Max	Unit	Notes
Differential peak to peak laput voltage		120	-	mV	For high bit rate
Differential peak-to-peak Input voltage	VDIFF p-p	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 v1.1a.

Description	Symbol	Min	Тур	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
Unit Interval for high bit rate (1.62Gbps/lane)	UI_Low_Rate	-	617	-	ps	clock generation
Lane-to-Lane skew	V Rx-SKEW- INTER_PAIR	1	-	5200	ps	-
Lano intra nair akaw	V Rx-SKEW-	ı	-	100	ps	For high bit rate
Lane intra-pair skew	INTRA_PAIR	-	-	300	ps	For reduced bit rate



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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.	Тур.	Max.	Unit	Note
DCLK	Frequency	f _{CLK}	ı	285.25	ı	MHz	2 Port
	Period	t _{HP}	ı	2720	-		
Hsync	Width	t _{WH}	-	32	-	tCLK	2 Port
	Width-Active	t w _{HA}	-	2560	-		
	Period	t _{VP}	-	1749	-		
Vsync	Width	t _{WV}	-	10	-	tHP	
	Width-Active	tw _{VA}	-	1700	-		
	Horizontal back porch	t _{HBP}	-	80	-	+01.1/	O Dowt
Data	Horizontal front porch	t _{HFP}	-	48	-	tCLK	2 Port
Enable	Vertical back porch	t _{VBP}	-	36	-	+UD	
	Vertical front porch	t _{VFP}	_	3	_	tHP	

3-5. Signal Timing Waveforms

Condition : V_{CC} =3.3V High: 0.7VCC Low: 0.3VCC t_{HP} Hsync **t**wha t_{HBP} t_{HFP} Date Enable t_{VFP} $\mathbf{t}_{\mathsf{VBP}}$ twva Date Enable

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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

												Inpu	ıt Co	lor E	ata										
	Color				RE	ΕD							GRI	EEN							BL	UE			
		MS								MS								MS							_SB
	I		R6											G3											
	Black	0	. 0 	0			0	0		0	0	0	0		0	0		0 	0	0	0	0			
	Red	1	. 1 	1		. 1 				0	0		0				0	0				0			0
	Green	0	. 0 		0	. 0 	0	0	0	1 		1	1		. 1 			0	0			0			0
Basic	Blue	0	0	0	0		0	0	0	0	0	0	0		0	0	0	1	1		1			1	1
Color	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			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 (00)	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 (01)	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																									
	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 (00)	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 (01)	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																									
	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 (00)	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 (01)	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							• • • •							 			• • • • •	ļ							
	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	
	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



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3-7. Power Sequence

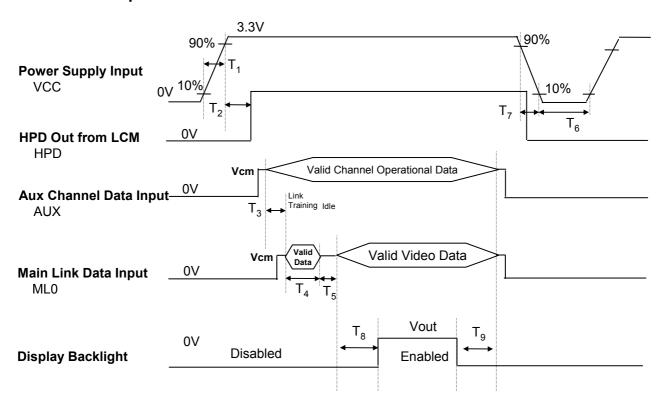


Table 6. POWER SEQUENCE TABLE

Logic		Value		Linita	LED		Value		Linita
Parameter	Min.	Тур.	Max.	Units	Parameter	Min.	Тур.	Max.	Units
T ₁	0.5	-	10	ms	T ₉	200	-	-	ms
T ₂	0	ı	200	ms					
T ₃	50	75	ı	ms					
T ₄	0	ı	ı	ms					
T ₅	0	-	ı	ms					
T ₆	500	-	ı	ms					
T ₇	3	-	10	ms					
T ₈	200	-	-	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. LGD recommend the rising sequence of Vout after the Vcc and valid status of eDP turn on.



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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

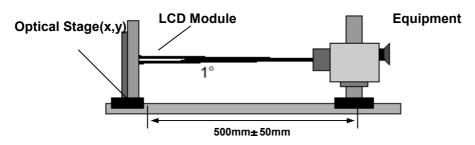


Table 7. OPTICAL CHARACTERISTICS

Ta=25°C, VCC=3.3V, f_V =60Hz, f_{CLK} = 295.5MHz

Darameter	Cumbal		Values		Lloito	Notoo
Parameter	Symbol	Min	Тур	Max	Units	Notes
Contrast Ratio	CR	600	800	-		1
Surface Luminance, white	L_WH	340	400		cd/m ²	2
Luminance Variation(15P)	δ _{WHITE}	- 	1.15	1.35		3
Response Time (G to G)	Tr _{R +} Tr _D	-	20	30	ms	
Color Coordinates						
RED	RX	0.614	0.634	0.654		
	RY	0.328	0.348	0.368		
GREEN	GX	0.303	0.323	0.343		
	GY	0.557	0.577	0.597		
BLUE	BX	0.131	0.151	0.171		
	BY	0.071	0.091	0.111		
WHITE	WX	0.290	0.310	0.330		Тур. 6500К
	WY	0.320	0.340	0.360	 	Тур. 6500К
Viewing Angle						5
x axis, right(Φ=0°)	Θr	80 (45)	-		degree	00 > 40
x axis, left (Ф=180°)	Θl	80 (45)	-		degree	CR ≥ 10
y axis, up (Φ=90°)	Θu	80 (45)			degree	(CR ≥ 100 with ATW)
y axis, down (⊕=270°)	Θd	80 (45)	-	-	degree	
Gray Scale					.	6
Flicker		-	-	-30	dB	Half grey(128step)
Color Gamut	C/G		65	-	%	1976 NTSC



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Note)

1. Contrast Ratio(CR) is defined mathematically as

Surface Luminance with all white pixels

Contrast Ratio =

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.

$$L_{WH} = Average(L_1, L_2, ... L_5)$$

3. The variation in surface luminance , The panel total variation (δ_{WHITE}) is determined by measuring L_N at each test position 1 through 15 and then defined as followed numerical formula. For more information see FIG 2.

$$\delta_{\text{WHITE}} = \frac{\text{Maximum}(\mathsf{L}_{1}, \mathsf{L}_{2}, \, \dots \, \mathsf{L}_{15})}{\text{Minimum}(\mathsf{L}_{1}, \mathsf{L}_{2}, \, \dots \, \mathsf{L}_{15})}$$

- 4. Response time is the time required for the display to transition from gray to gray (rise time, Tr_R) and from black to white(Decay Time, Tr_D).
- 5. Viewing angle is the angle at which the contrast ratio is greater than 10. (Viewing angle in parentheses is the angle at which the contrast ratio is greater than 100 with A-TW POL.) 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)
LO	0.10
L15	0.30
L31	1.14
L47	2.98
L63	5.93
L79	9.77
L95	14.47
L111	19.93
L127	25.99
L143	33.57
L159	41.98
L175	50.75
L191	60.1
L207	70.31
L223	81.27
L239	92.54
L255	100



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FIG. 2 Luminance

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

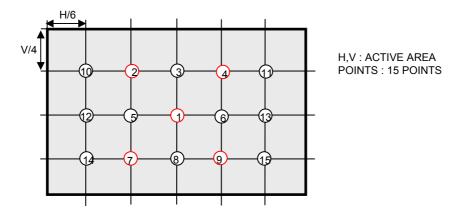
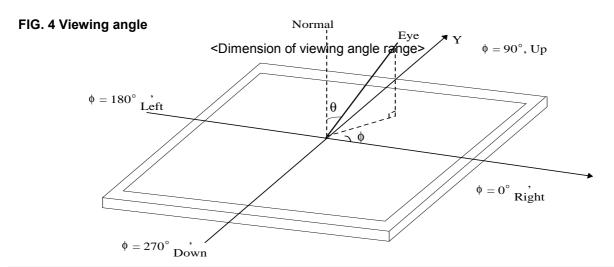


FIG. 3 Response Time

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





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5. Mechanical Characteristics

The contents provide general mechanical characteristics for the model LP129WQ1. In addition the figures in the next page are detailed mechanical drawing of the LCD.

	Horizontal	283.3 ± 0.3mm
Outline Dimension (Without PCB)	Vertical	195.0 ± 0.3mm
(1111 1)	Thickness	2.95mm (max.)
Bezel Area	Horizontal	275.10 ± 0.3mm
(Pol. Size)	Vertical	184.85 ± 0.3mm
Active Diepley Area	Horizontal	271.9mm
Active Display Area	Vertical	180.5mm
Weight	265g (Max.)	
Surface Treatment (POL)	HC and ATW	

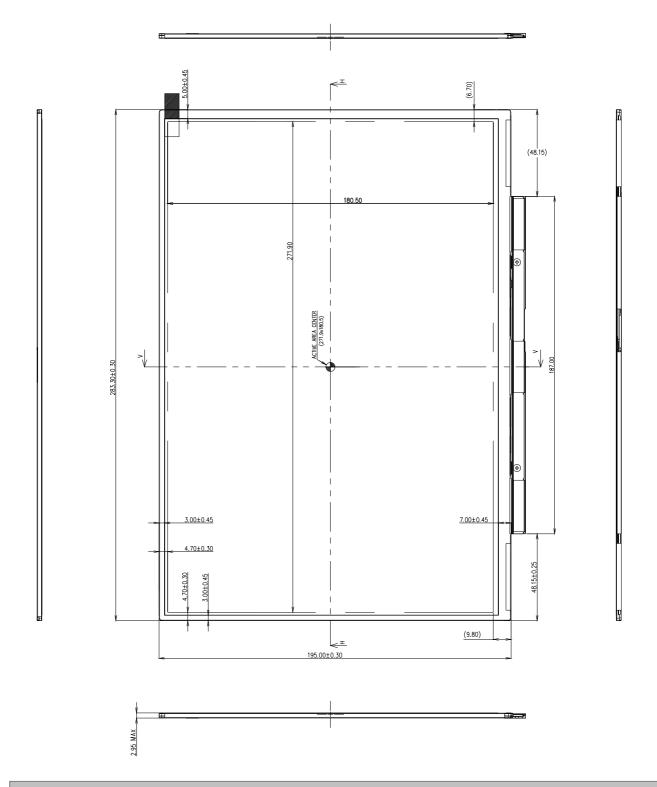
Ref) Nickel surface treatment added on surface of metal chassis.



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<FRONT VIEW>

Note) Unit:[mm], General tolerance: ± 0.3mm

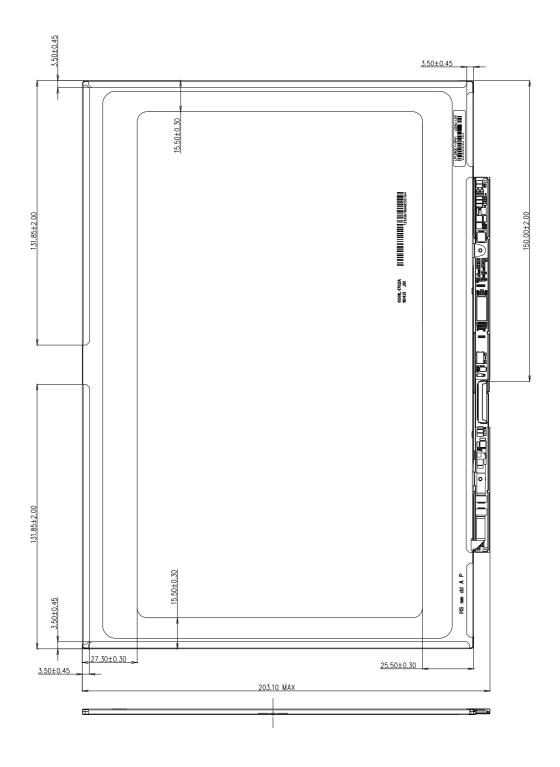




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<REAR VIEW>

Note) Unit:[mm], General tolerance: ± 0.3mm





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6. Reliability

Environment test condition

No.	Test Item	Conditions
1	High temperature storage test	Ta= 60°C, 240h
2	Low temperature storage test	Ta= -20°C, 240h
3	High temperature operation test	Ta= 50°C, 50%RH, 240h
4	Low temperature operation test	Ta= 0°C, 240h
5	Vibration test (non-operating)	Sine wave, 10 ~ 500 ~ 10Hz, 1.5G, 0.37oct/min 3 axis, 1hour/axis
6	Shock test (non-operating)	Half sine wave, 180G, 2ms one shock of each six faces(I.e. run 180G 2ms for all six faces)
7	Altitude operating storage / shipment	0 ~ 10,000 feet (3,048m) 24Hr 0 ~ 40,000 feet (12,192m) 24Hr
8	ESD (non-operating)	User Connector (Contact) : ± 2kV Plate Bottom (Contact) : ± 8kV Bezel Area (Air) : ± 15kV

{ 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.



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7. International Standards

7-1. Safety

- a) UL 60950-1, Second Edition, Underwriters Laboratories Inc.
 Information Technology Equipment Safety Part 1: General Requirements.
- b) CAN/CSA C22.2 No.60950-1-07, Second Edition, Canadian Standards Association. Information Technology Equipment Safety Part 1 : General Requirements.
- c) EN 60950-1:2006 + A11:2009, European Committee for Electrotechnical Standardization (CENELEC). Information Technology Equipment Safety Part 1 : General Requirements.
- d) IEC 60950-1:2005, Second Edition, The International Electrotechnical Commission (IEC). Information Technology Equipment Safety Part 1 : General Requirements.

7-2. EMC

- a) ANSI C63.4 "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz." American National Standards Institute (ANSI), 2003.
- b) CISPR 22 "Information technology equipment Radio disturbance characteristics Limit and methods of measurement." International Special Committee on Radio Interference (CISPR), 2005.
- c) CISPR 13 "Sound and television broadcast receivers and associated equipment Radio disturbance characteristics Limits and method of measurement." International Special Committee on Radio Interference (CISPR), 2006.

7-3. Environment

a) RoHS, Directive 2002/95/EC of the European Parliament and of the council of 27 January 2003



Product Specification

8. Packing

8-1. Designation of Lot Mark

a) Lot Mark

A B C D E F G H I J K L	М
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A,B,C : SIZE(INCH) D : YEAR

E: MONTH F ~ M: SERIAL NO.

Note

1. YEAR

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Mark	3	4	5	6	7	8	9	10	Α	В

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	Α	В	С

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 288 mm



Product Specification

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.



Product Specification

9-3. ELECTROSTATIC DISCHARGE CONTROL

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

9-4. PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

9-5. STORAGE

When storing modules as spares for a long time, the following precautions are necessary.

- (1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
- (2) The polarizer surface should not come in contact with any other object.

 It is recommended that they be stored in the container in which they were shipped.

9-6. HANDLING PRECAUTIONS FOR PROTECTION FILM

- (1) When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
- (2) The protection film is attached to the polarizer with a small amount of glue. If some stress is applied to rub the protection film against the polarizer during the time you peel off the film, the glue is apt to remain on the polarizer.
 - Please carefully peel off the protection film without rubbing it against the polarizer.
- (3) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the polarizer after the protection film is peeled off.
- (4) You can remove the glue easily. When the glue remains on the polarizer surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.



Product Specification

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

EDID Data for Google _ ver. 0.4

2012/2/3

	Byte (Dec)	Byte (Hex)	Field Name and Comments	Value (Hex)	Value (Bin)
	0	00	Header	00	00000000
	1	01	Header	FF	11111111
	2	02	Header	FF	11111111
Header	3	03	Header	FF	11111111
ea	4	04	Header	FF	11111111
H	5	05	Header	FF	11111111
	6	06	Header	FF	11111111
	7	07	Header	00	00000000
	8	08	ID Manufacture Name LGD	30	00110000
	9	09	ID Manufacture Name	E4	11100100
	10	0A	ID Product Code 0379h	79	01111001
n n	11	0В	(Hex. LSB first)	03	00000011
dt Sio	12	0C	ID Serial No Optional ("00h" If not used, Number Only and LSB First)	00	00000000
F F	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
op ∏	15	0F	ID Serial No Optional ("00h" If not used, Number Only and LSB First)	00	00000000
Vendor / Product EDID Version	16	10	Week of Manufacture - Optinal 00 weeks	00	00000000
,	17	11	Year of Manufacture 2011 years	15	00010101
	18	12	EDID structure version # = 1	01	00000001
	19	13	EDID revision # = 4	04	0000001
	20	14	Video input Definition = Input is a Digital Video signal Interface, Colo Bit Depth: 8 Bits per Primary Color, Digital Video Interface Standard Supported: DisplayPort is supported	A5	10100101
8	21	15	Horizontal Screen Size (Rounded cm) = 27 cm	1B	00011011
v ter	22	16	Vertical Screen Size (Rounded cm) = 18 cm	12	00011011
nd.	23	17	Display Transfer Characteristic (Gamma) = (gamma*100)-100 = Example:(2.2*100)-100=120 = 2.5 Gamma	96	10010110
Display Parameters	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 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
	25	19	Red/Green Low Bits (RxRy/GxGy)	4F	01001111
	26	1A	Blue/White Low Bits (BxBy/WxWy)	D5	11010101
	27	1B	Red X $Rx = 0.634$	A2	10100010
Panel Color Coordinates	28	1C	Red Y $Ry = 0.348$	59	01011001
ing Co	29	1D	Green X $Gx = 0.323$	52	01010010
nel ord	30	1E	Green Y $Gy = 0.577$	93	10010011
an So	31	1F	Blue X Bx = 0.151	26	00100110
7	32	20	Blue Y By = 0.091	17	00010111
	33	21	White X $Wx = 0.313$	50	01010000
	34	22	White Y $Wy = 0.329$	54	01010100
2 7 2	35	23	Established timing 1 (Optional_00h if not used)	00	00000000
Estator ished Timin es	36	24	Established timing 2 (Optional_00h if not used)	00	00000000
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	37	25	Manufacturer's timings (Optional_00h if not used)	00	00000000
	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
6	42	2A	Standard timing ID3 (Optional_01h if not used)	01	00000001
ing ID	43	2B	Standard timing ID3 (Optional_01h if not used)	01	00000001
ing	44		Standard timing ID4 (Optional_01h if not used)	01	00000001
ш	45	2D	Standard timing ID4 (Optional_01h if not used)	01	00000001
1 I	46	2E	Standard timing ID5 (Optional_01h if not used)	01	00000001
Standard Timi	47	2F	Standard timing ID5 (Optional_01h if not used)	01	00000001
nd	48	30	Standard timing ID6 (Optional_01h if not used)	01	00000001
Sta	49	31	Standard timing ID6 (Optional_01h if not used)	01	00000001
-1	50	32	Standard timing ID7 (Optional_01h if not used)	01	00000001
	51	33	Standard timing ID7 (Optional_01h if not used)	01	00000001
	52	34	Standard timing ID8 (Optional_01h in lot used)	01	00000001
	53	35	Standard timing ID8 (Optional_01h in lot used)	01	00000001
	23	33	Standard thining 12-5 (Optional_Offi if not used)	UI	0000001



Product Specification

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

	Byte (Dec)	Byte (Hex)	Field Name and Comments	Value (Hex)	Value (Bin)
	54	36	Pixel Clock/10,000 (LSB) 285.25 MHz @ 60Hz	6D	01101101
	55	37	Pixel Clock/10,000 (MSB)	6F	01101111
	56	38	Horizontal Active (lower 8 bits) 2560 Pixels	00	00000000
	57	39	Horizontal Blanking(Thp-HA) (lower 8 bits) 160 Pixels	A0	10100000
	58	3A	Horizontal Active / Horizontal Blanking(Thp-HA) (upper 4:4bits)	A0	10100000
<i>I#</i>	59	3B	Vertical Avtive 1700 Lines	A4	10100100
01.	60	3C	Vertical Blanking (Tvp-HA) (DE Blanking typ.for DE only panels) 49 Lines	31	00110001
ipt	61	3D	Vertical Active: Vertical Blanking (Tvp-HA) (upper 4:4bits)	60	01100000
scı	62	3E	Horizontal Sync. Offset (Thfp) 48 Pixels	30	00110000
Timing Descriptor #1	63	3F	Horizontal Sync Pulse Width (HSPW) 32 Pixels	20	00100000
s.	64	40	Vertical Sync Offset(Tvfp): Sync Width (VSPW) 3 Lines: 10 Lines	3A	00111010
mi	65	41	Horizontal Vertical Sync Offset/Width (upper 2bits)	00	00000000
Tii	66	42	Horizontal Image Size (mm) 272 mm	10	00010000
	67	43	Vertical Image Size (mm) 181 mm	B5	10110101
	68	44	Horizontal Image Size / Vertical Image Size	10	00010000
	69	45	Horizontal Border = 0 (Zero for Notebook LCD)	00	00000000
	70	46	Vertical Border = 0 (Zero for Notebook LCD)	00	00000000
	71	47	Non-Interlace, Normal display, no stereo, Digital Separate [Vsync_NEG, Hsync_NEG (outside of V-sync)]	19	00011001
	72	48	Flag	00	00000000
	73	49	Flag	00	00000000
	74	4A	Flag	00	00000000
	75	4B	Data Type Tag (Descriptor Defined by manufacturer)	00	00000000
	76	4C	Flag	00	00000000
#2	77	4D	Descriptor Defined by manufacturer	00	00000000
tor	78	4E	Descriptor Defined by manufacturer	00	00000000
rip	79	4F	Descriptor Defined by manufacturer	00	00000000
ssc	80	50	Descriptor Defined by manufacturer	00	00000000
$D\epsilon$	81	51	Descriptor Defined by manufacturer	00	00000000
Timing Descriptor #2	82	52	Descriptor Defined by manufacturer	00	00000000
imi	83	53	Descriptor Defined by manufacturer	00	00000000
T_i	84	54	Descriptor Defined by manufacturer	00	00000000
	85	55	Descriptor Defined by manufacturer	00	00000000
	86	56	Descriptor Defined by manufacturer	00	00000000
	87	57	Descriptor Defined by manufacturer	00	00000000
	88	58	Descriptor Defined by manufacturer	00	00000000
	89	59	Descriptor Defined by manufacturer	00	00000000
	90	5A	Flag	00	00000000
	91	5B	Flag	00	00000000
	92 93	5C	Flag Data Tuna Tag (Alphanumaria Data String (ASCII String))	00 EE	00000000
	93	5D 5E	Data Type Tag (Alphanumeric Data String (ASCII String))	FE 00	00000000
8	95		Flag Alphanumeric Data String (ASCII String) L	4C	01001100
r #3		5F	Alphanumeric Data String (ASCII String) L Alphanumeric Data String (ASCII String) G	47	01001100
ıto _i	96 97	60	Alphanumeric Data String (ASCII String) Alphanumeric Data String (ASCII String)	20	00100000
Timing Descriptor	98	62	Alphanumeric Data String (ASCII String) Alphanumeric Data String (ASCII String) D	44	0100000
sə	98	63	Alphanumeric Data String (ASCII String) Alphanumeric Data String (ASCII String) i	69	01000100
; p	100	64	Alphanumeric Data String (ASCII String) s s	73	0110001
ing	101	65	Alphanumeric Data String (ASCII String) p	70	01110011
ïm	102	66	Alphanumeric Data String (ASCII String) 1	6C	0110100
7	103	67	Alphanumeric Data String (ASCII String) a	61	01100001
	104	68	Alphanumeric Data String (ASCII String) y	79	01111001
	105	69	Manufacturer P/N(If<13 char> 0Ah, then terminate with ASC II code 0Ah,set remaining char = 20h)	0A	00001010
	106	6A	Manufacturer P/N(If<13 char-> 0Ah, then terminate with ASC II code 0Ah,set remaining char = 20h)	20	00100000
	107	6B	Manufacturer P/N(If<13 char> 0Ah, then terminate with ASC II code 0Ah,set remaining char = 20h)	20	00100000
	131	()D	The state of the s	20	0010000



Product Specification

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

	Byte (Dec)	Byte (Hex)	Field Name and Comments		Value (Hex)	Value (Bin)
	108	6C	Flag		00	00000000
	109	6D	Flag		00	00000000
	110	6E	Flag		00	00000000
	111	6F	Data Type Tag (Alphanumeric Data String (ASCII String))		FE	11111110
	112	70	Flag		00	00000000
#4	113	71	Alphanumeric Data String (ASCII String)	L	4C	01001100
or:	114	72	Alphanumeric Data String (ASCII String)	P	50	01010000
Timing Descriptor #4	115	73	Alphanumeric Data String (ASCII String)	1	31	00110001
scr	116	74	Alphanumeric Data String (ASCII String)	2	32	00110010
De	117	75	Alphanumeric Data String (ASCII String)	9	39	00111001
81	118	76	Alphanumeric Data String (ASCII String)	Q	51	01010001
nin	119	77	Alphanumeric Data String (ASCII String)	Е	45	01000101
Tür	120	78	Alphanumeric Data String (ASCII String)	1	31	00110001
	121	79	Alphanumeric Data String (ASCII String)	-	2D	00101101
	122	7A	Alphanumeric Data String (ASCII String)	S	53	01010011
	123	7B	Alphanumeric Data String (ASCII String)	P	50	01010000
	124	7C	Alphanumeric Data String (ASCII String)	A	41	01000001
	125	7D	Alphanumeric Data String (ASCII String)	1	31	00110001
Checksum	126	7E	Extension flag (# of optional 128 panel ID extension block to follow, Typ = 0)		00	00000000
Сћес	127	7 F	Check Sum (The 1-byte sum of all 128 bytes in this panel ID block shall = 0)		24	00100100