SPECIFICATION
FOR
APPROVAL

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

Title	7.0” WSVGA (1024 x RGB x 600) TFT LCD

BUYER	
MODEL	

SUPPLIER	LG Display Co., Ltd.
MODEL	LD070WS2
Suffix	SL01

SIGNATURE	DATE
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/	

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

SIGNATURE	DATE
REVIEWED BY	
PREPARED BY	

Products Engineering Dept.
LG Display Co., Ltd

Contents

RECORD OF REVISIONS

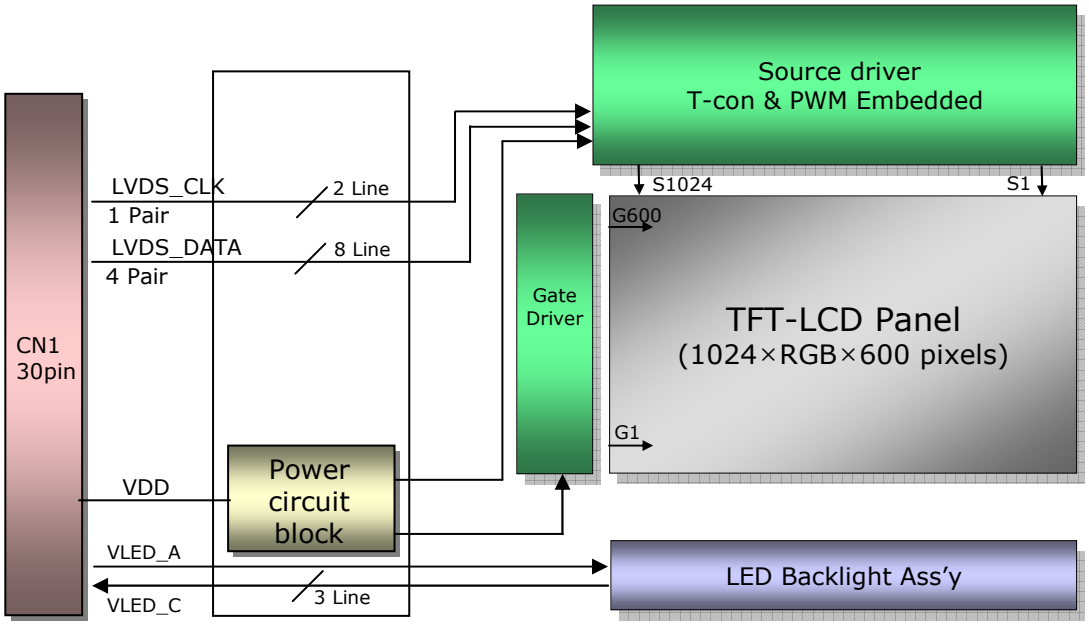
Revision No	Revision Date	Page	Description
0.0	Nov. 22. 2010	-	Preliminary specification
0.1	Feb. 07. 2011	4	Update General Features (Weight)
		7	Update table 4. Module connection Pin configuration(cn1)

1. General Description

The LD070WS1 is a Color Active Matrix Liquid Crystal Display with an integral Light Emitting Diode(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 7.0 inches diagonally measured active display area with WSVGA resolution(1024 horizontal by 600 vertical pixel array). Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 6-bit + 2-bit FRC gray scale signal for each dot, thus, presenting a palette of more than 16,772,216 colors.

The LD070WS1 has been designed to apply the interface method that enables low power, high speed, low EMI.

The LD070WS1 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 LD070WS1 characteristics provide an excellent flat display.



General Features

Active Screen Size	7.0 inches diagonal
Outline Dimension	162.8 (H) x 102.9 (V) x 2.7 (D) (Typ.)
Dot Pitch	0.050mm × 0.150mm
Pixel Format	1024 horiz. By 600 vert. Pixels RGB strip arrangement
Color Depth	6-bit + 2-bit FRC, 16,7M colors
Power consumption	Logic: 0.7W(Typ.), B/L: 1.26W(Typ.)
Luminance, White	400 cd/m^2
Weight	100g (Max.)
Display Operating Mode	Transmitting type, normally Black
Surface Treatment	Hard coat on the polarizer

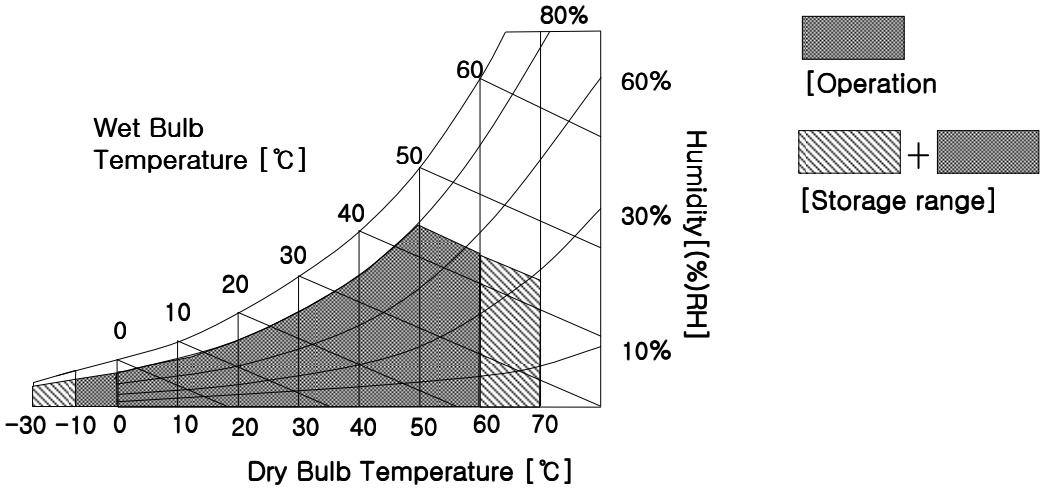
2. Absolute Maximum Ratings

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

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Values		Units	Notes
		Min	Max		
Power Input Voltage	VCC	-0.5	5.0	Vdc	at 25 ± 5°C
Operating Temperature	TOP	-20	60	°C	[Note 2-1,2,3,4]
Storage Temperature	HST	-30	70	°C	[Note 2-1,2]

[Note 2-1] This rating applies to all parts of the module and should not be exceeded.
[Note 2-2] Maximum wet-bulb temperature is 46℃. Condensation of dew must be avoided as electrical current leaks will occur, causing a degradation of performance specifications.
[Note 2-3] The operating temperature only guarantees operation of the circuit and doesn't guarantee all the contents of Electro-optical specification.
[Note 2-4] Ambient temperature when the backlight is lit (reference value).



3. Electrical Specifications

3-1. Electrical Characteristics

The LD070WS1 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second input which powers the LED, is typically generated by an LED Driver. The LCD don't include LED Driver.

Table 2. ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
LCD :						
Power Supply Input Voltage	VCC	3.0	3.3	3.6	V_{DC}	
Input High-Level Voltage	V_{IH}	0.7VCC	-	VCC	V_{DC}	
Input Low-Level Voltage	V_{IL}	0	-	0.3VCC	V_{DC}	
Power Supply Input Current	I_{CC}	-	212	250	mA	[Note 1]
Power Consumption	Pc	-	0.7	0.9	Watt	[Note 1]

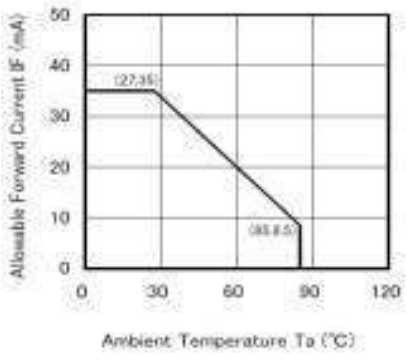
[Note 1] The specified current and power consumption are under the Vcc = 3.3V , 25℃, fv = 60Hz condition whereas "Mosaic Pattern" is displayed and fv is the frame frequency.

Table 3. Backlight Unit

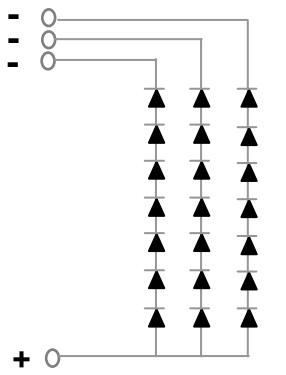
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
LED forward Current	I_f	-	20	21	mA	Ta=25℃ (per chain)
LED forward Voltage	V_f	-	21	23.1	V	Ta=25℃ (@ 20mA)
Power Consumption	P_{BL}	-	1,260	1,386	mW	Ta=25℃ (@ 20mA)

[Note 1] The permissible forward current of LED vary with environmental temperature.

[Nichia LED]



[LED Array Structure]



3-2. Interface (Input Terminal)

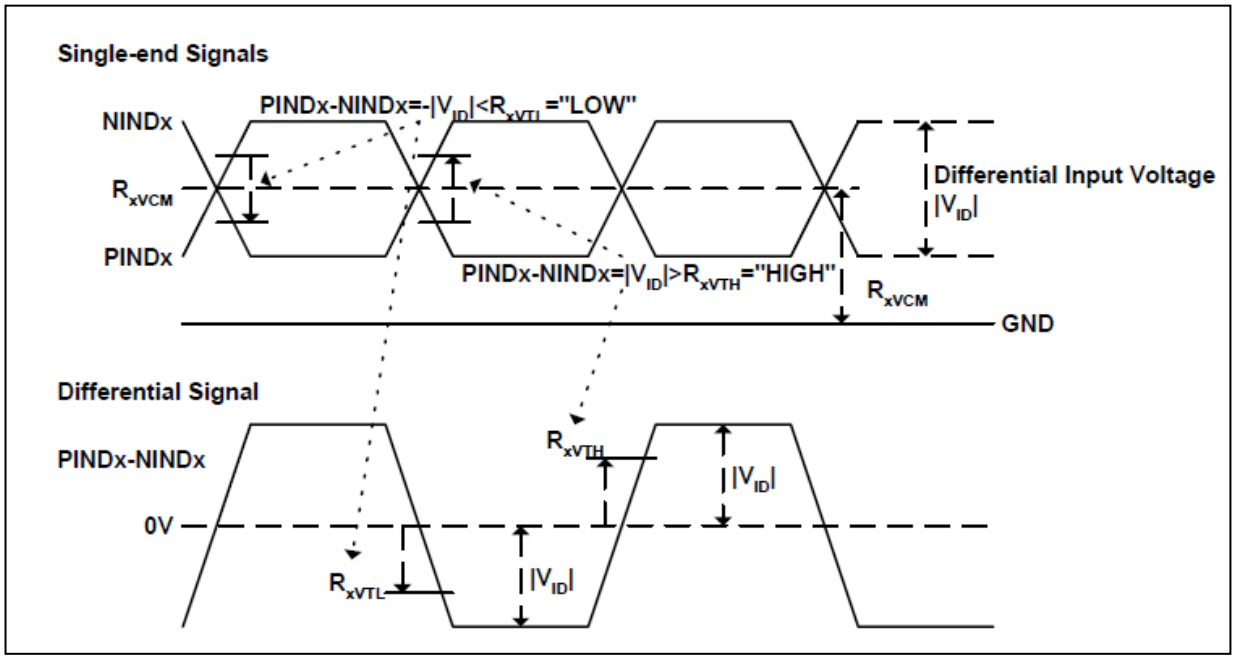
This LCD employs one interface connections, a 30 pin connector is used for the module electronics interface.
(Connector Type : 30Pin 0.5mm pitch, Matching Connector : HIROSE FH12-30S-0.5SH)

Table 4. Module Connection Pin Configuration (cn1)

No.	Symbol	Description	remark
1	ID Pin 1	Ground	-
2	ID Pin 2	No Connect: Normal, Ground: Improved yellowish	-
3	VDD	Power Supply +3.3V	-
4	VDD	Power Supply +3.3V	-
5	VDD	Power Supply +3.3V	-
6	VDD	Power Supply +3.3V	-
7	GND	Ground	-
8	RxIN0N	LVDS Differential DATA Input	R0~R5, G0
9	RxIN0P	LVDS Differential DATA Input	
10	GND	Ground	-
11	RxIN1N	LVDS Differential DATA Input	G1~G5, B0~B1
12	RxIN1P	LVDS Differential DATA Input	
13	GND	Ground	-
14	RxIN2N	LVDS Differential DATA Input	B2~B5, Vs, Hs, DE
15	RxIN2P	LVDS Differential DATA Input	
16	GND	Ground	-
17	RxCLKN	LVDS Differential DATA Input	Clock
18	RxCLKP	LVDS Differential DATA Input	
19	GND	Ground	-
20	RxIN3N	LVDS Differential DATA Input	R6~R7, G6~B7, B6~B7
21	RxIN3P	LVDS Differential DATA Input	
22	GND	Ground	-
23	NC	No Connect	-
24	BKA	BLU LED Anode	-
25	BKA	BLU LED Anode	-
26	BKA	BLU LED Anode	-
27	NC	No Connect	-
28	BKK1	BLU LED Cathode1	-
29	BKK2	BLU LED Cathode2	-
30	BKK3	BLU LED Cathode3	-

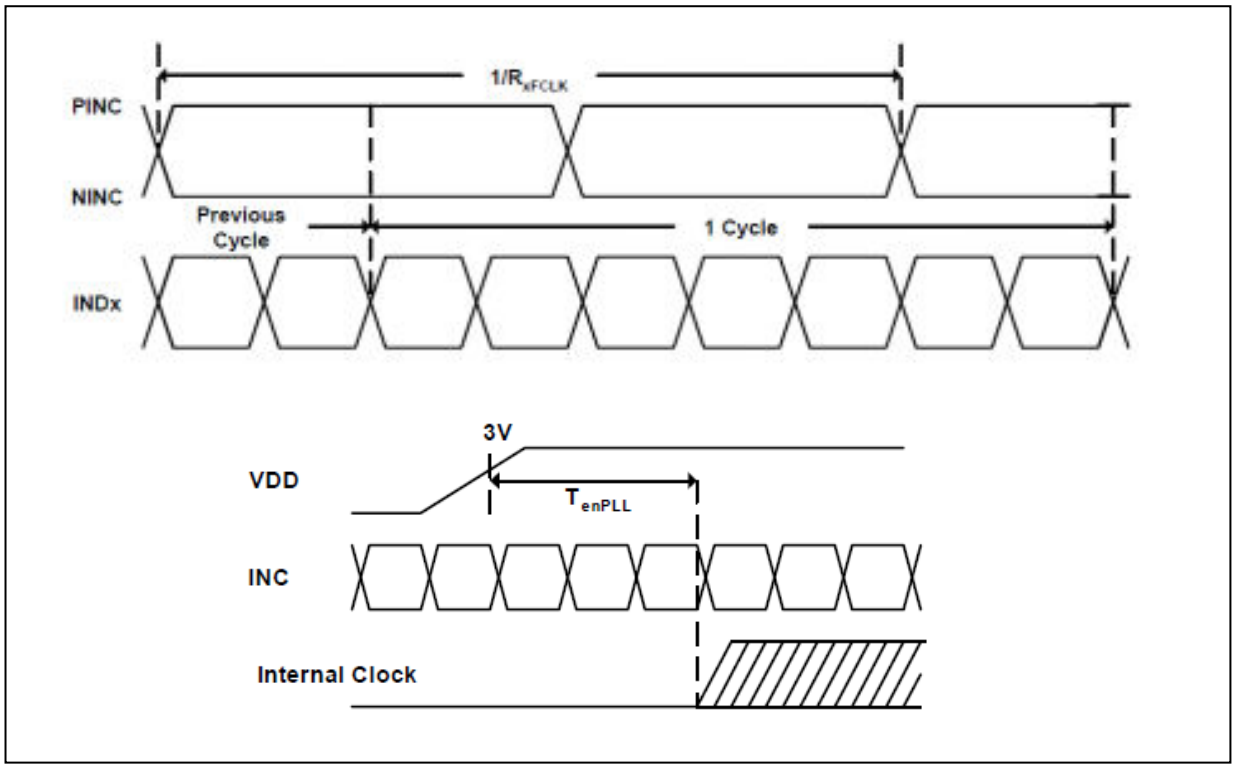
3-3. LVDS Signal Timing Specification

3-3-1. DC Specification

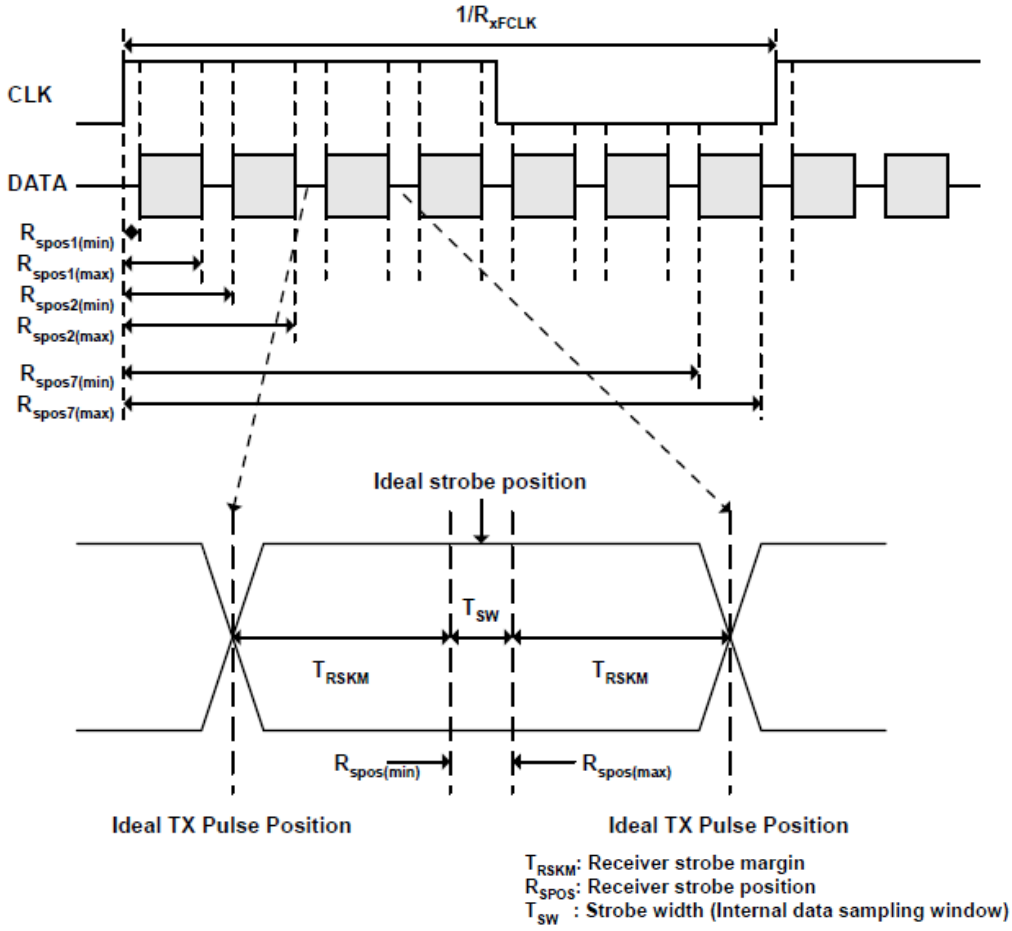


Description	Symbol	Min	Max	Unit	Notes
Differential input high threshold voltage	R_{xVTH}		0.1	V	R_{xVCM} =1.2V
Differential input low threshold voltage	R_{xVTL}	-0.1		V	
Input voltage range (singled-end)	R_{XVIN}	0	2.4	V	
Differential input common mode voltage	R_{xVCM}	|VID|/2	2.4-|VID|/2	V	
Differential input voltage	| VID|	0.2	0.6	V	
Differential input leakage current	RV_{xliz}	-10	10	uA	

3-3-2. AC Specification

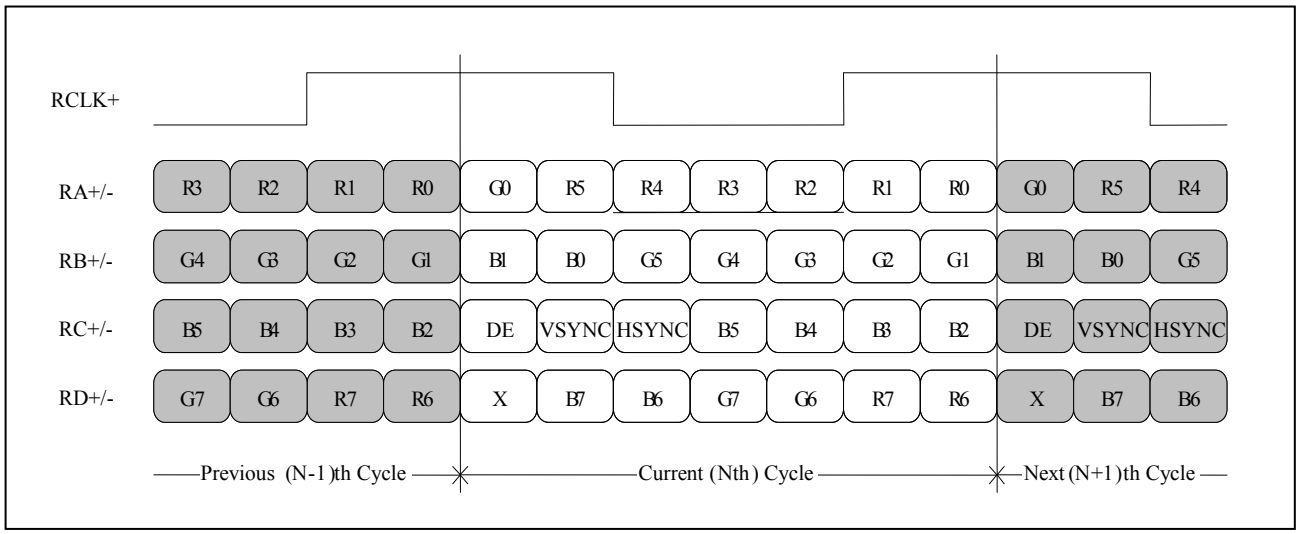


Description	Symbol	Min	Typ	Max	Unit	Notes
Clock Frequency	R_{XFCLK}	45.9	-	59.1	MHz	
Input Data Skew Margin	T_{RSKM}	500			ps	| VID| = 400mV RxVCM = 1.2V RxFCLK = 71 MHz
Clock high time	T_{LVCH}	-	4/(7* R_{xFCLK})		ns	-
Clock low time	T_{LVCL}	-	3/(7* R_{xFCLK})		ns	-
PLL wake-up time	T_{enPLL}	-		150	us	-



3-3-3. Data Format

-. LVDS 1 Port



< LVDS Data Format >

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.

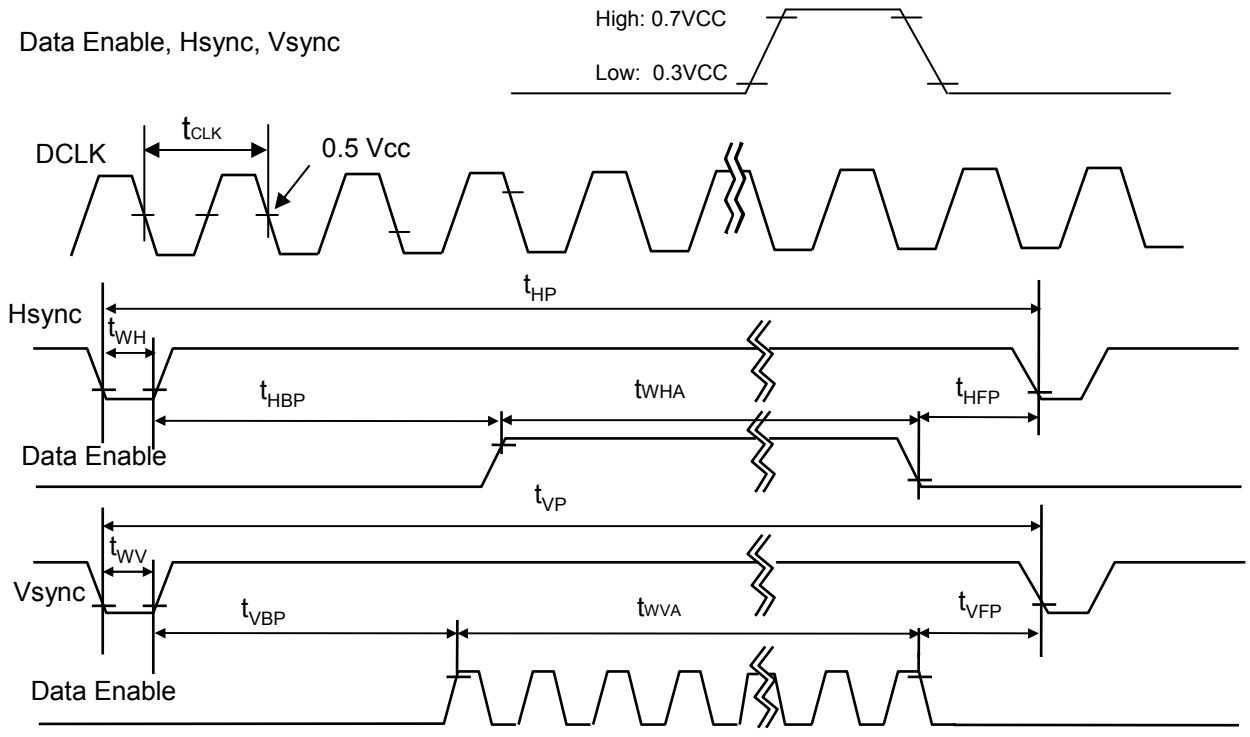
*** HV Mode**

Table 5. TIMING TABLE

ITEM	Symbol		Min	Typ	Max	Unit	Note
DCLK	Frequency	f_{CLK}	45.9	51.2	59.1	MHz	
Hsync	Period	Thp	1229	1344	1372	tCLK	
	Width	t_{WH}	1	-	140		
	Width-Active	t_{WHA}	1024	1024	1024		
Vsync	Period	t_{VP}	623	635	718	tHP	
	Width	t_{WV}	1	-	10		
	Width-Active	t_{WVA}	600	600	600		
Data Enable	Horizontal back porch	t_{HBP}	160	160	160	tCLK	
	Horizontal front porch	t_{HFP}	16	160	216		
	Vertical back porch	t_{VBP}	23	23	23	tHP	
	Vertical front porch	t_{VFP}	1	12	127		

3-5. Signal Timing Waveform

Condition : VCC =3.3V



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 6. COLOR DATA REFERENCE

Colors & Gray Scale	Gray Scale Levels	Data Signal																							
		RED								GREEN								BLUE							
		R0	R1	R2	R3	R4	R5	R6	R7	G0	G1	G2	G3	G4	G5	G6	G7	B0	B1	B2	B3	B4	B5	B6	B7
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
Blue	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Green	---	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
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
Red	---	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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
Black	R0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Darker	R1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Brighter	R253	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R254	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red	R255	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black	G0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Darker	G1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	G2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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Brighter	G253	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	G254	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Green	G255	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Black	B0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Darker	B1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	B2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Brighter	B253	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1
	B254	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
Blue	B255	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

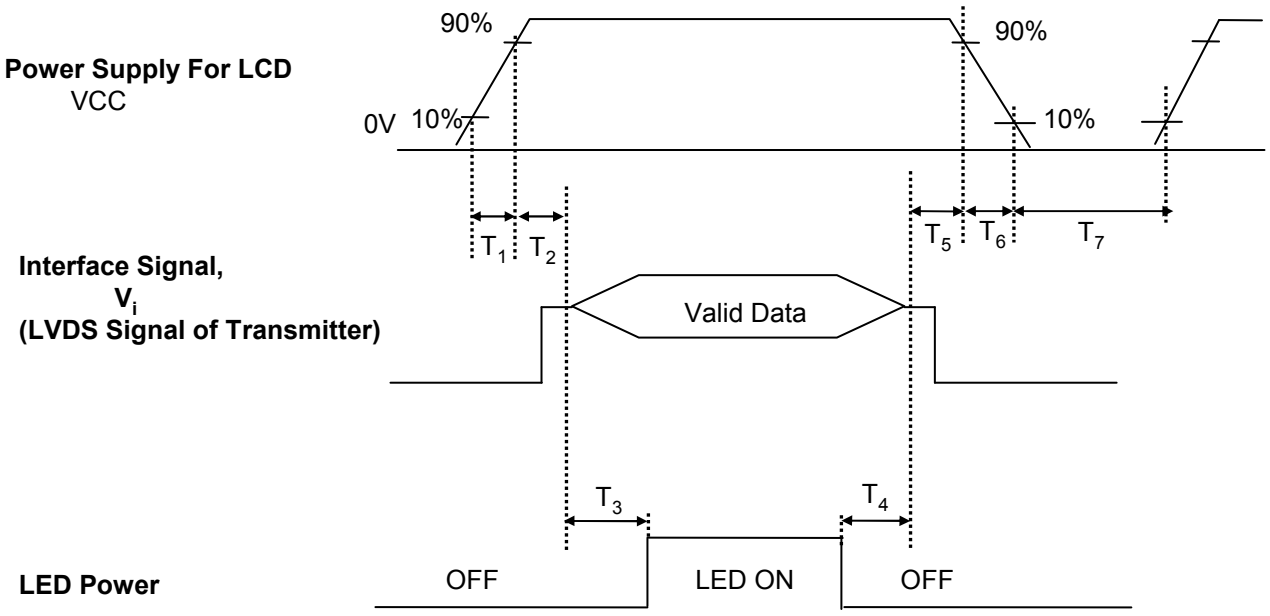


Table 7. POWER SEQUENCE TABLE

Parameter	Value			Units	Remark
	Min.	Typ.	Max.		
T_1	0.5	-	10	(ms)	-
T_2	0	-	50	(ms)	-
T_3	200	-	-	(ms)	-
T_4	200	-	-	(ms)	-
T_5	0	-	50	(ms)	-
T_6	3	-	10	(ms)	-
T_7	400	-	-	(ms)	-

[Note 1] Valid Data is Data to meet “3-3. LVDS Signal Timing Specifications”
[Note 2] Please avoid floating state of interface signal at invalid period.
[Note 3] When the interface signal is invalid, be sure to pull down the power supply for LCD VCC to 0V.
[Note 4] LED power must be turn on after power supply for LCD and interface signal are valid.

4. Optical Specifications

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 5 minutes in a dark environment at 25°C. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and Θ equal to 0°.
FIG. 1 presents additional information concerning the measurement equipment and method.

FIG. 1 Optical Characteristic Measurement Equipment and Method

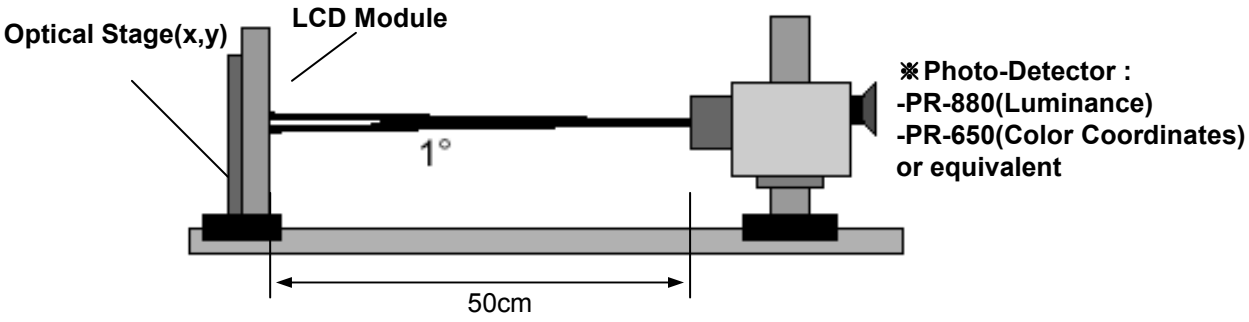


Table 8. OPTICAL CHARACTERISTICS

Ta=25°C, VCC=3.3V, fv=60Hz, f_{CLK}= 51.2MHz

Parameter		Symbol	Values			Units	Notes
			Min	Typ	Max		
Contrast Ratio		CR	640	800	-		1
Surface Luminance, white		L_{WH}	320	400	-	cd/m^2	@20mA, 2
Luminance Variation		δ_{WHITE}		1.18	1.34		3
Response Time(Rise Time + Decay Time)		$Tr_R + Tr_D$	-	-	40	ms	4
Color Coordinates							2
	Red	RX	0.572	0.607	0.642		
		RY	0.317	0.352	0.387		
	Green	GX	0.294	0.329	0.364		
		GY	0.539	0.574	0.609		
	Blue	BX	0.121	0.156	0.191		
		BY	0.102	0.137	0.172		
	White	WX	0.270	0.310	0.350		
		WY	0.300	0.340	0.380		
Viewing Angle							5
	x axis, right(Φ=0°)	Θr	75	85	-	degree	3 o'clock
	x axis, left (Φ=180°)	Θl	75	85	-	degree	9 o'clock
	y axis, up (Φ=90°)	Θu	75	85	-	degree	12 o'clock
	y axis, down (Φ=270°)	Θd	75	85	-	degree	6 o'clock

[Note 4-1] Contrast Ratio(CR) is defined mathematically as

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

[Note 4-2] Surface luminance is measured at the center point(L_1) of the LCD with all pixels displaying white at the distance of 50cm by PR-880. Color Coordinates are measured at the center point(L_1) of the LCD with all pixels displaying red, green, blue and white at the distance of 50cm by PR-650. For more information, refer to the FIG 1 and FIG 2.

[Note 4-3] Luminance uniformity is measured for 9 point For more information see FIG 2.
δ_{WHITE} = Maximum(L1,L2, ….. L9) ÷ Minimum(L1,L2, ….. L9)

[Note 4-4] 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.

[Note 4-5] 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.

FIG. 2 Luminance

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

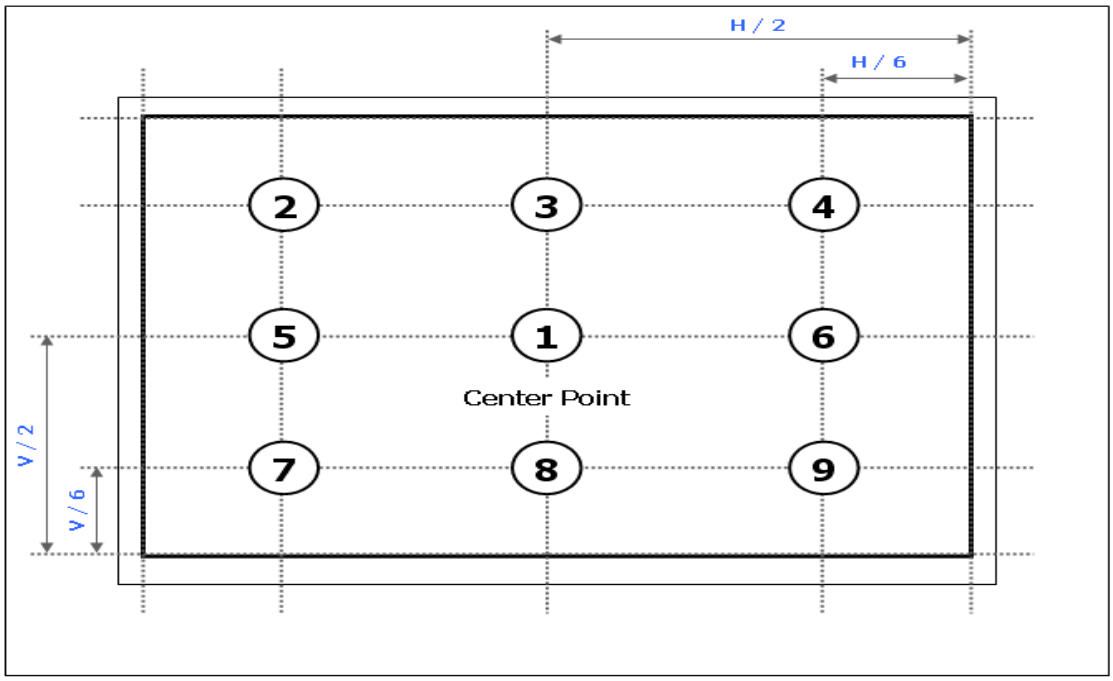


FIG. 3 Response Time

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

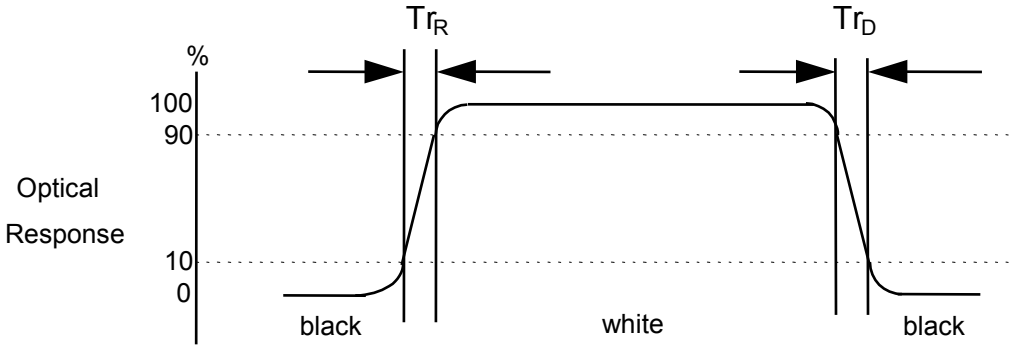
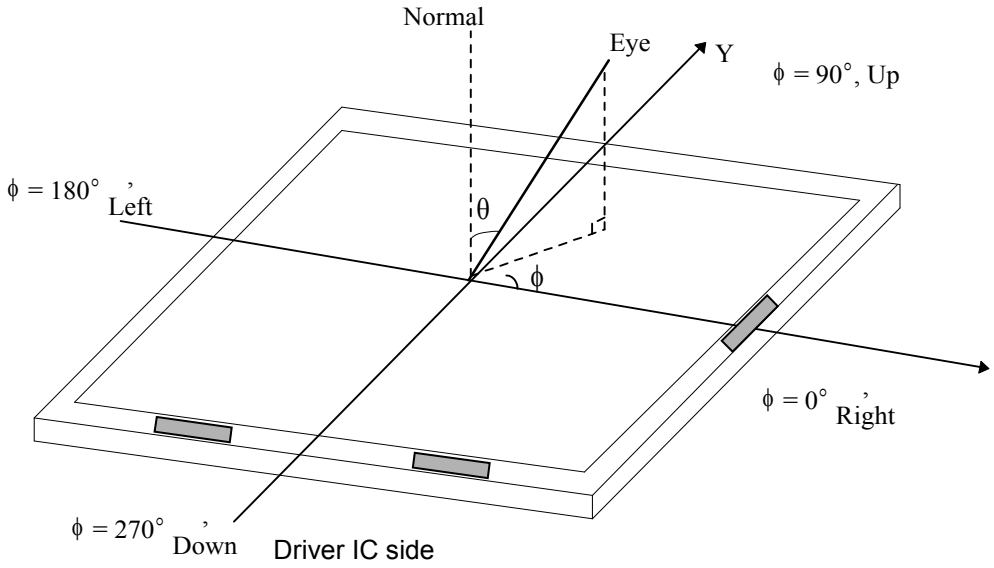


FIG. 4 Viewing angle

<Dimension of viewing angle range>



5. Mechanical Characteristics

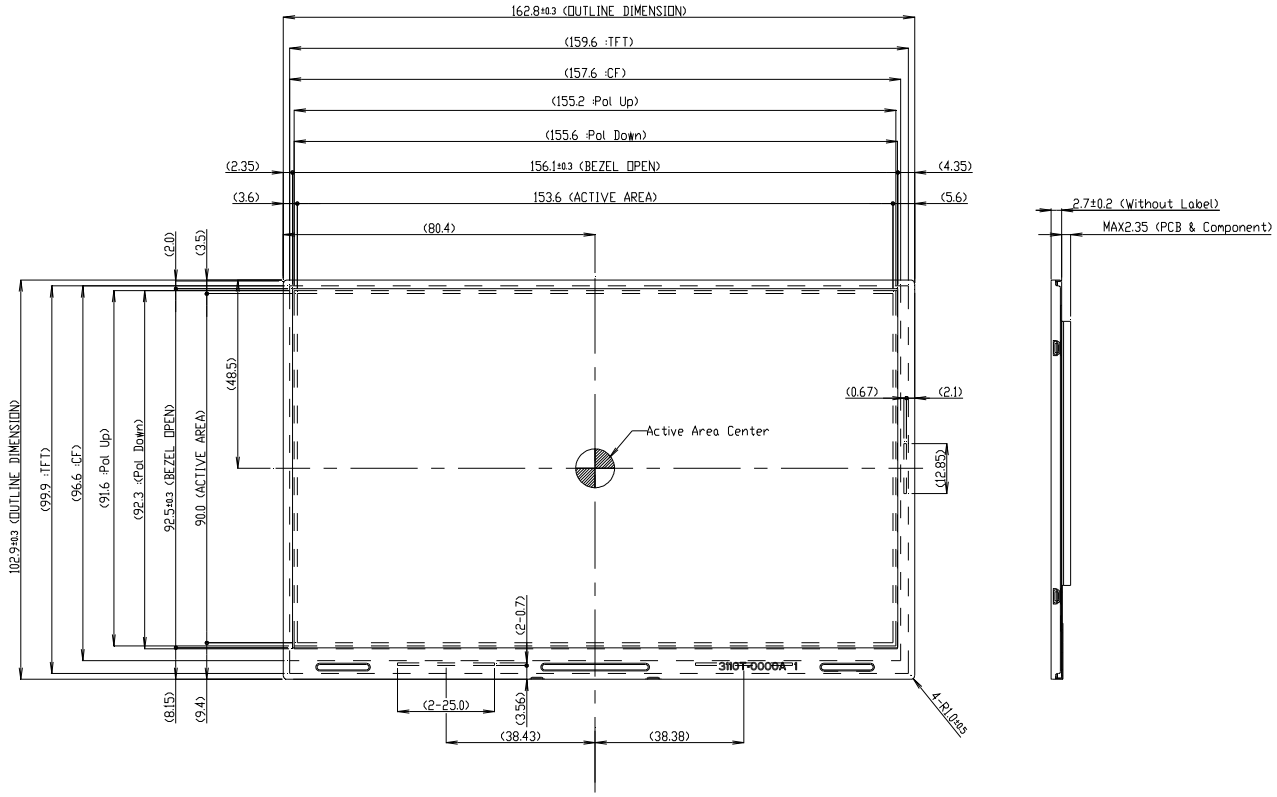
The contents provide general mechanical characteristics for the model LD070WS1. In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal	162.8 ± 0.3 mm
	Vertical	102.9 ± 0.3 mm
	Depth	2.70 ± 0.2 mm
Bezel Area	Horizontal	156.1 ± 0.3 mm
	Vertical	92.5 ± 0.3 mm
Active Display Area	Horizontal	153.6 ± 0.3 mm
	Vertical	90.0 ± 0.3 mm
Weight	100g (Max.)	
Surface Treatment	Hard coat on the polarizer	

Product Specification

<FRONT VIEW>

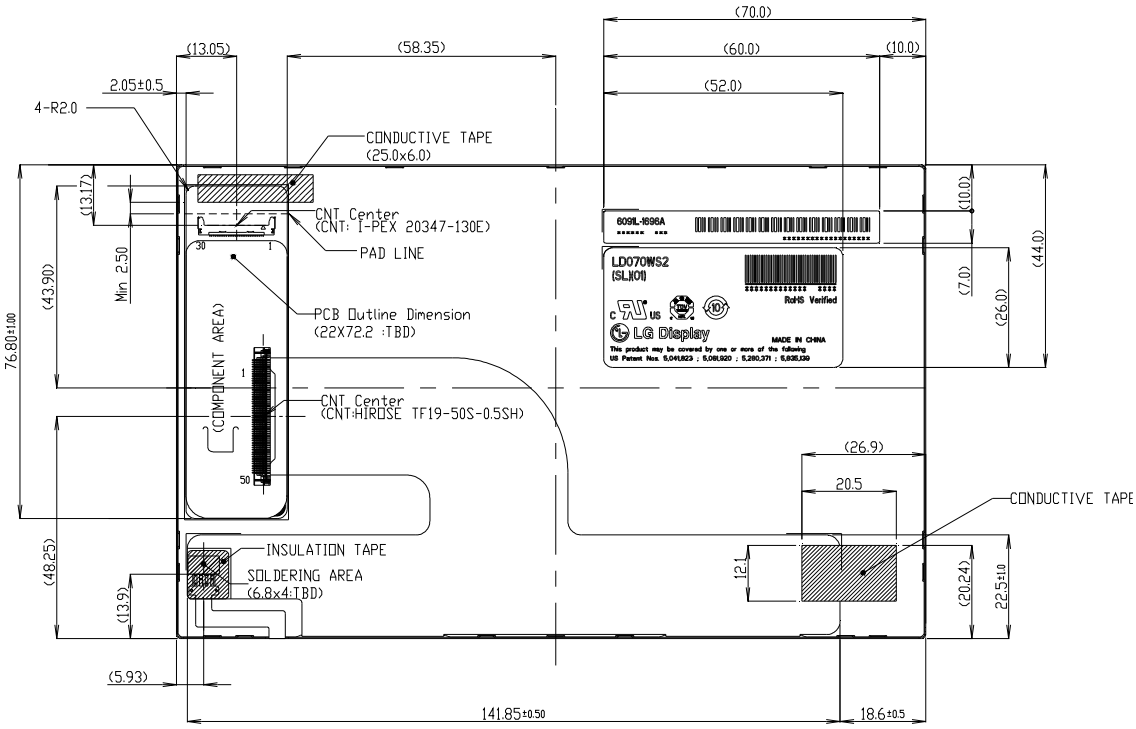
Unit:[mm], General tolerance: ± 0.3mm

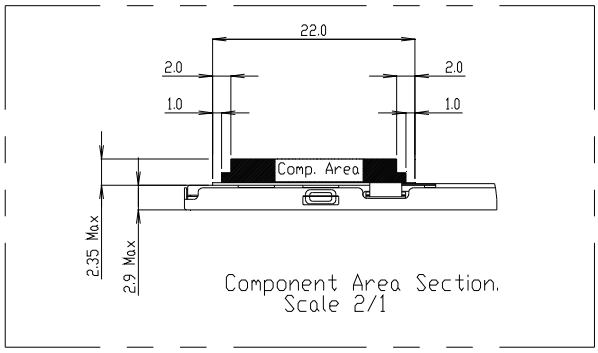


Product Specification

<REAR VIEW>

Unit:[mm], General tolerance: ± 0.3mm





6. Reliability

No.	Test Items	Test Condition	Remark
1	High Temperature Storage Test	Ta=70℃ 240h	[Note 6-1,2,3]
2	Low Temperature Storage Test	Ta=-30℃ 240h	[Note 6-1,2,3]
3	High Temperature Operation Test	Ta=60℃ 240h	[Note 6-1,2,3]
4	Low Temperature Operation Test	Ta =-10℃ 240h	[Note 6-1,2,3]
5	High Temperature and High Humidity Operation Test	Ta=40℃ 95%RH 240h	[Note 6-1,2,3]
6	Thermal Shock Test (non-operating)	-30℃(0.5h) ~ 70℃(0.5h) / 50 cycles	
7	Electro Static Discharge Test	-Panel Surface/Top_Case : 150pF, 150Ω (Air : ±15kV , Contact : ±8kV) -FPC input terminal : 100pF ±200V 0Ω	
8	Mechanical Shock Test (non-operating)	Half sine wave, 180G, 2ms 1 time shock of each six faces (OK) (±X / ±Y / ±Z)	
9	Mechanical Vibration Test (non-operating)	Sine wave, 10 ~ 500 ~ 10Hz, 1.5G, 0.37oct/min 3 axis, 1hour/axis	
10	Packing Drop	60cm, 1 corner, 3 edge, 6 surfaces, 1Box	
11	Packing vibration	1) Random Truck & Air 1.5Grms ,1hr, 1box (3~300Hz, 1.5Grms, Z axis)	

[Note 6-1] T_a = Ambient Temperature
[Note 6-2] In the Reliability Test, Confirm performance after leaving in room temp.
[Note 6-3] In the standard condition, there shall be no practical problems that may affect the display function 24 hours later after reliability test. After the reliability test, we can guarantee the product only when the corrosion is causing its malfunction. The corrosion causing no functional defect can not be guaranteed.
※ Ta= Ambient Temperature

{ 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, 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.

7-2. Environment

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

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.

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.
(7) This module is not designed to attach TSP(touch screen panels). If TSP is applied, LPL can't guarantee the 'Ripple' related problems.

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.