SPECIFICATION
FOR
APPROVAL

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

Title	7.0” WVGA (800 x RGB x 480) TFT LCD

BUYER	
MODEL	

SUPPLIER	LG.Philips LCD Co., Ltd.
MODEL	LB070WV1
Suffix	TD08

SIGNATURE	DATE
/	
/	
/	

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

SIGNATURE	DATE
C.S. KYEONG / G.Manager **REVIEWED BY**	
S.D. JUNG / Manager **PREPARED BY**	
J.Y. KIM / Engineer Y.W. SUNG / Engineer	

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

Contents

RECORD OF REVISIONS

Revision No	Revision Date	Page	Description
1.0	July.12.2007	-	Final

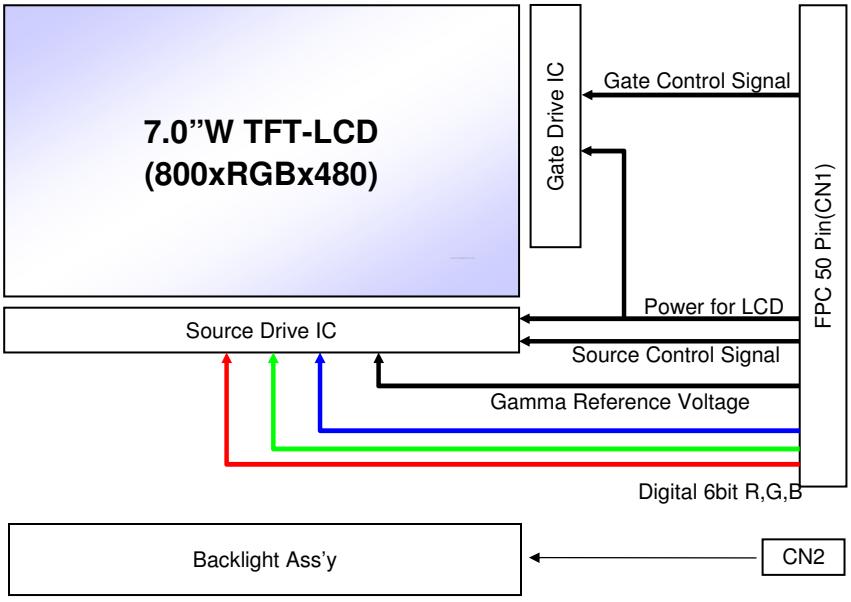
1. General Description

The LB070WV1 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 7.0 inches diagonally measured active display area with WVGA resolution(800 horizontal by 480 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 gray scale signal for each dot, thus, presenting a palette of more than 262,144 colors.

The LB070WV1 has been designed to apply the interface method that enables low power, high speed, low EMI.

The LB070WV1 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 LB070WV1 characteristics provide an excellent flat display.

Block Diagram



General Features

Active Screen Size	7.0 inches diagonal
Outline Dimension	167x104.6x5.5mm
Pixel Pitch	0.1905 mm × 0.1905 mm
Pixel Format	800 horiz. by 480 vert. Pixels RGB strip arrangement
Color Depth	6-bit, 262,144 colors
Luminance, White	220 cd/m^2 (Typ.)
Power Consumption	LCD(0.99W)
Weight	125g(Typ.)
Display Operating Mode	Transmitting type, normally white
Surface Treatment	Anti-glare treatment of the front polarizer

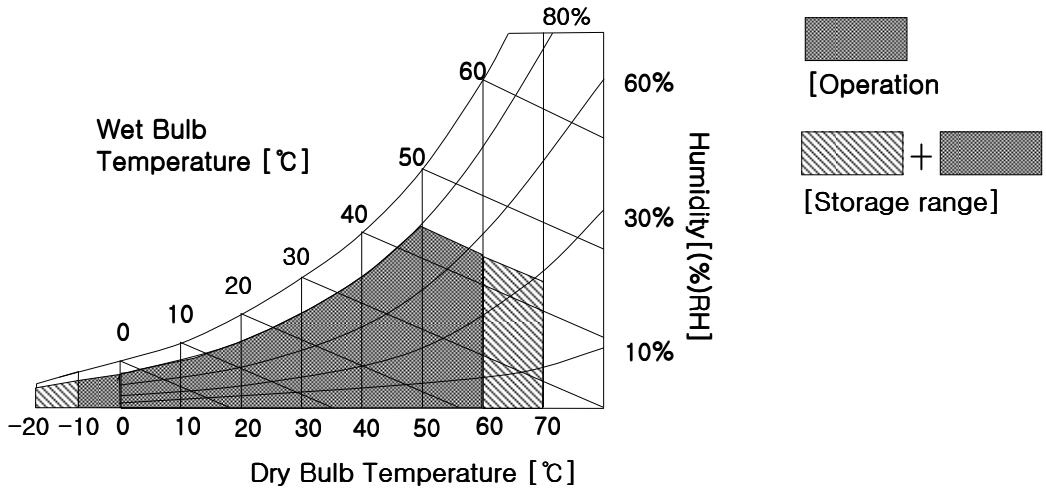
2. Absolute Maximum Ratings

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

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Condition	Min	Max	Unit	Remark
Logic Voltage	VCC	T_a=25℃	-0.5	4.0	V	
Source Driver Voltage	VDD	T_a=25℃	-0.3	14.5	V	
Digital Input Signals	V_{I1}	T_a=25℃	-0.5	VCC+0.5	V	[Note 2-1]
Analog Input Signals	V_{I2}	T_a=25℃	-0.5	VDD+0.5	V	[Note 2-2]
Gate Driver Voltage	VGH	T_a=25℃	-0.3	40	V	
	VGL	T_a=25℃	-20	0.3	V	
	VGH-VGL	T_a=25℃	-0.3	40	V	
	GVCC	T_a=25℃	-0.3	4	V	
Operating Temperature (Ambient Temperature)	T_{op}	-	-10	60	℃	[Note 2-3,4,5,6]
Storage Temperature	T_{st}	-	-20	70	℃	[Note 2-3,4]

[Note 2-1] U_D,GSP1/2,GSC,GOE, SSP1/2, SOE, SSC, POL, REV, L_R, R0-5/G0-5/B0-5
[Note 2-2] VCOM,VREF0/1/2/3/4/5
[Note 2-3] This rating applies to all parts of the module and should not be exceeded.
[Note 2-4] 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 2-5] The operating temperature only guarantees operation of the circuit and doesn't guarantee all the contents of Electro-optical specification.
[Note 2-6] Ambient temperature when the backlight is lit (reference value).



3. Electrical Specifications

3-1. Electrical Characteristics

The LB070WV1 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.

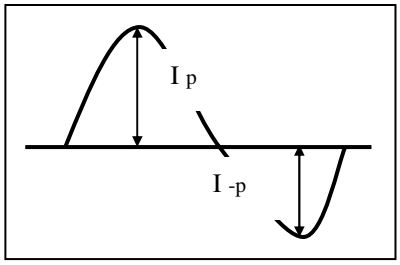
Table 2. ELECTRICAL CHARACTERISTICS(LAMP)

Parameter	Symbol	Values			Unit	Remark
		Min	Typ	Max		
LAMP :						
Operating Voltage	V_{BL}	- (-)	400 (5.5mA)	440 (6mA)	V_{RMS}	[Note 3-1]
Operating Current	I_{BL}	5.0	5.5	6.0	mA_{RMS}	[Note 3-2]
Power Consumption	P_{BL}	-	2.2	2.36		[Note 3-7]
Operating Frequency	f_{BL}	40	60	80	kHz	[Note 3-5]
Discharge Stabilization Time	Ts	-	-	3	Min	[Note 3-3]
Life Time		20,000	-	-	Hrs	[Note 3-4]
Established Starting Voltage at 25℃ at 0 ℃	Vs			 540 720	 V_{RMS} V_{RMS}	[Note 3-6]

[Note 3-1] The variance of the voltage is ± 10%.
[Note 3-2] The typical operating current is for the typical surface luminance (L_{WH}) in optical characteristics.
[Note 3-3] 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%.
[Note 3-4] 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.
[Note 3-5] 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.
[Note 3-6] The voltage above VS should be applied to the lamps for more than 1 second for start-up. Otherwise, the lamps may not be turned on. The used lamp current is the lamp typical current.
[Note 3-7] The lamp power consumption shown above does not include loss of external inverter. The applied lamp current is a typical one.

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}

※ 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.

Table 3. ELECTRICAL CHARACTERISTICS(TFT-LCD PANEL DRIVING SECTION) T_a=25℃

Parameter			Symbol	Min	Typ	Max	Unit	Remark
Logic Supply Voltage			VCC	3.0	3.3	3.6	V	
Digital Input Signal	High Level		V_{IH}	0.7VCC	-	VCC	V	
	Low Level		V_{IL}	0	-	0.3VCC	V	
Source Driver Supply Voltage			VDD	11.0	12.0	13.0	V	
Gate Driver	TFT	Hi	VGH	18.5	19.5	20.5	V	
		Lo	VGL	-10	(-4.5)	-4	V	
	Logic Supply Voltage		GVCC	3.0	3.3	3.6	V	
Gamma Correction Voltage	DC		VREF0~2	0.4VDD	-	VDD-0.2	V	
			VREF3~5	GND+0.2	-	0.6VDD		
Color Filter Substrate Voltage	DC		VCOM	4.8	5.0	5.2	V	
Source Driver Supply Current			IDD	-	36	50	mA	VDD = 12V
Logic Supply Current			ICC	-	11	30	mA	VCC = 3.3V
Gate Driver Logic Supply Current			GICC	-	0.02	0.1	mA	GVCC = 3.3V
Gate Driver High Supply Current			IGH	-	0.15	0.75	mA	VGH = 19.5V
Gate Driver Low Supply Current			IGL	-	0.45	2	mA	VGL = -4.5V

***** Cautionary Matter : When applying or disconnecting power, please be sure that such action is sequentially carried out for all power supplies. In addition, apply input signals only after power has been turned on.

[Power Sequence]
-Source Driver :
Power on sequence : Case.1) VCC > Logic input > VDD > VREF0 to VREF5.
Case.2) VCC > VDD > VREF0 to VREF5 > Logic input.
Power off sequence is reverse turn of this.
-Gate Driver :
Power on sequence : GVCC > VGL > Input signal > VGH.
Power off sequence is reverse turn of this.

3-2. Interface (Input Terminal)

This LCD employs two interface connections, a 50 pin connector is used for the module electronics interface and the other connector is used for the integral backlight system.

Table 4. TFT-LCD Panel Driving Part

Pin No.	Symbol	Description
1	VGH	Gate Driver Positive Voltage
2	VGL	Gate Driver Negative Voltage
3	GVCC	Power Line For Gate Driver IC Logic
4	GSP1	Gate Scanning Start Signal 1
5	GSP2	Gate Scanning Start Signal 2
6	GSC	Gate Driver Scanning Clock Pulse
7	U_D	Up/Down Scanning Change
8	GOE	Gate Driver Output Enable Control
9	VCOM	Voltage Applied To Color Filter Substrate
10	VCOM	
11	VDD	Source Driver Supply Voltage
12	VREF5	Voltage For Gamma Correction
13	VREF4	
14	VREF3	
15	VREF2	
16	VREF1	
17	VREF0	
18	GND	Ground
19	VCC	Power Line For Logic
20	VCC	Power Line For Logic
21	SSP2	Source Scanning Right Start Signal
22	SSP1	Source Scanning Left Start Signal
23	SOE	Source Driver Output Enable Control
24	SSC	Source Driver Clock Input
25	POL	Polarity Reversal Signal

Pin No.	Symbol	Description
26	GND	Ground
27	R0	Red Data 0 [LSB]
28	R1	Red Data 1
29	R2	Red Data 2
30	R3	Red Data 3
31	R4	Red Data 4
32	R5	Red Data 5 [MSB]
33	GND	Ground
34	G0	Green Data 0 [LSB]
35	G1	Green Data 1
36	G2	Green Data 2
37	G3	Green Data 3
38	G4	Green Data 4
39	G5	Green Data 5 [MSB]
40	GND	Ground
41	B0	Blue Data 0 [LSB]
42	B1	Blue Data 1
43	B2	Blue Data 2
44	B3	Blue Data 3
45	B4	Blue Data 4
46	B5	Blue Data 5 [MSB]
47	GND	Ground
48	REV	Reverse of Input R,G,B Data Code
49	L_R	Left/Right Scanning Change
50	VCOM	Voltage Applied To Color Filter Substrate

**The matching connector part number is FH19SC-50S-0.5SH(Bottom Contact Type, 0.5mm-Pitch) manufactured by Hirose or equivalent.

The backlight interface connector is a model BHSR-02VS-1, manufactured by JST or Compatible.
The mating connector part number is SM02(8.0)B-BHSS-1-TB or equivalent.

Table 5. BACKLIGHT CONNECTOR PIN CONFIGURATION (CN2)

Pin	Symbol	Description	Remark
1	HV	Power supply for lamp (High voltage side)	[Note 3-1]
2	LV	Power supply for lamp (Low voltage side)	

[Note 3-1] The high voltage side terminal is colored pink and the low voltage side terminal is white.

3-3. Signal Timing Specifications

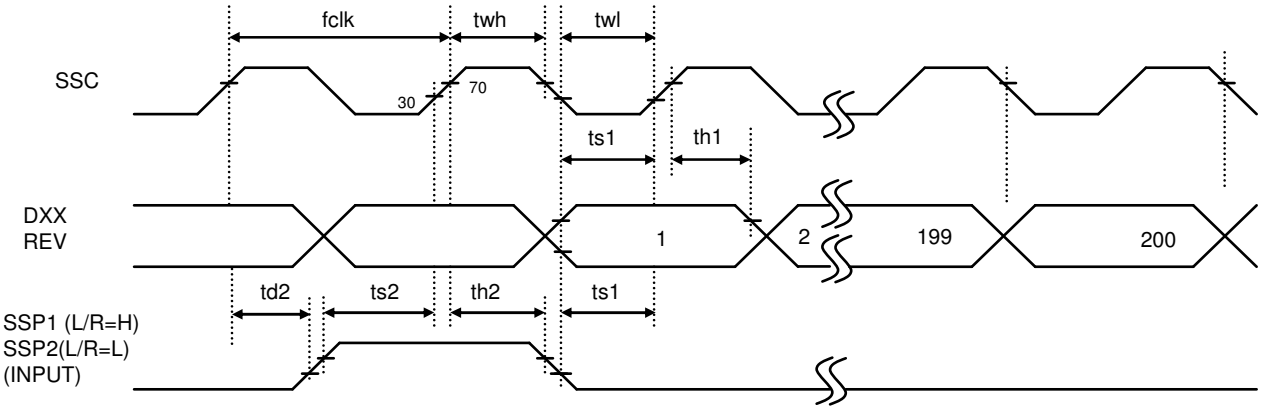
Table 6. Timing Characteristics of input signals

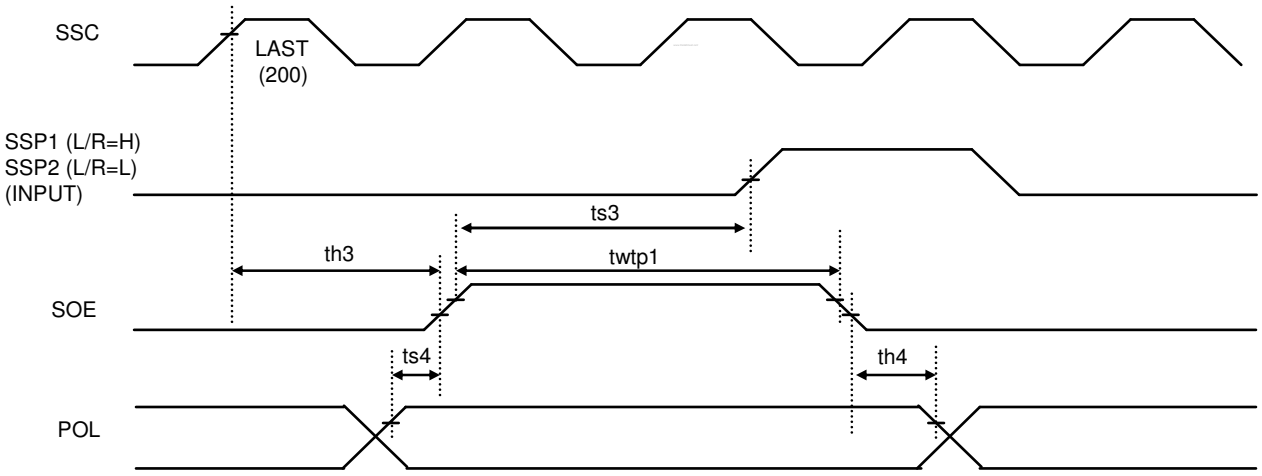
Parameter		Symbol	Min	Typ	Max	Unit	Remark
SOURCE	SSC Frequency	fclk	26	33.26	40	MHz	SSC
	High level SSC pulse width duration	twh	4	-	-	ns	
	Low level SSC pulse width duration	twl	4	-	-	ns	
	DATA/REV Setup Time	ts1	2	-	-	ns	DATA,REV
	DATA/REV Hold Time	th1	2	-	-	ns	
	Start Pulse Setup Time	ts2	3	-	-	ns	SSP1/2
	Start Pulse Hold Time	th2	3	-	-	ns	
	SOE Signal Setup Time	ts3	3	-	-	SSC cycle	SOE
	SOE Low Hold Time from final data SSC	th3	2	-	-	SSC cycle	
	High level SOE signal pulse width duration	twtp1	1	2.5	4	us	
	POL Signal SOE Setup Time	ts4	6	-	-	ns	SOE,POL
	POL Signal SOE Hold Time	th4	6	-	-	ns	
GATE	GSC Frequency	fclk	-	-	200	KHz	[Note 3-2]
	GSC Rise Time	trck	-	-	100	ns	
	GSC Falling Time	tfck	-	-	100	ns	
	GSC Pulse Width	pwclk	500	-	-	ns	
	GSP1/2 Setup Time	tsu	200	-	-	ns	
	GSP1/2 Hold Time	thd	300	-	-	ns	
	GOE Pulse Width	twcl	1	-	-	us	

[Note 3-2] At least input one cycle of GSC during “L” period of GSP1.

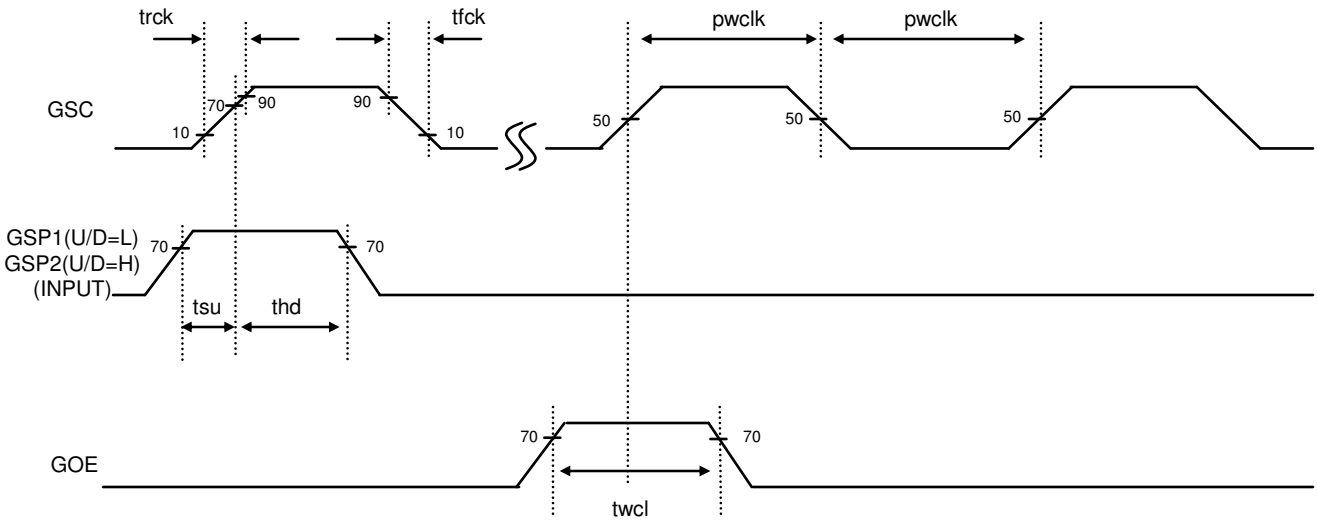
3-4. Timing Diagram

① Source D-IC Timing Diagram





② Gate D-IC Timing Diagram



3-5. Detail Description of Pin Functions

1. U_D is used as input pin for selecting the shifting direction of bi-directional shift register.

U_D	Output Shift	GSP Input Pin
H	Up to Down	GSP2
L	Down to Up	GSP1

2. L_R is is used as input pin for the horizontal scanning direction. If L_R is H, SSP1 is the Input Pin for the Source Start Pulse(SSP). Otherwise(If L_R is L), SSP2 is the Input Pin for the Source Start Pulse.

L_R	Scanning Direction	SSP Input Pin
H	Form Left to Right	SSP1
L	From Right to Left	SSP2

3-6. Recommended Gamma Correction Voltage [VREF0 to VREF5]

VDD=12V

Symbol	Values(Typ)	Unit	Remark
VREF0	(9.16)	V	[Note 3-3]
VREF1	(7.51)		
VREF2	(6.23)		
VREF3	(5.06)		
VREF4	(3.59)		
VREF5	(1.54)		

[Note 3-3] Be sure to maintain the voltage relationships of
VDD > VREF0 > VREF1 > VREF2 > VREF3 > VREF4 > VREF5 > GND

4. Optical Specifications

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25°C. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and Θ equal to 0°.
FIG. 1 presents additional information concerning the measurement equipment and method.

FIG. 1 Optical Characteristic Measurement Equipment and Method

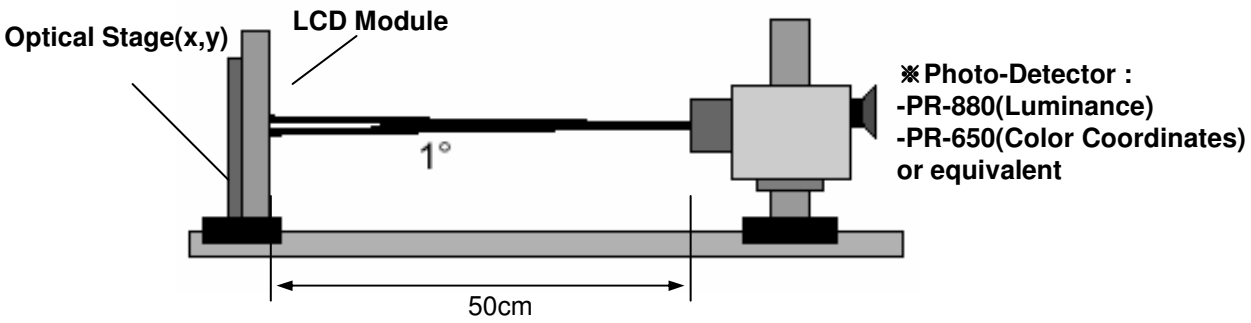


Table 9. OPTICAL CHARACTERISTICS

Ta=25°C, VCC=3.3V, fv=60Hz, f_{CLK}= 33.26MHz, I_{BL} = 5.5mA_{RMS}

Parameter	Symbol	Values			Units	Remark
		Min	Typ	Max		
Contrast Ratio	CR	280	400	-		[Note 4-1]
Surface Luminance, white	L_{WH}	180	220	-	cd/m^2	[Note 4-2]
Luminance Variation	δ_{WHITE}	-	1.25	1.4		[Note 4-3]
Response Time						[Note 4-4]
Rise Time	Tr_R	-	10	20	ms	
Decay Time	Tr_D	-	15	30	ms	
Color Coordinates						[Note 4-2]
WHITE	WX	0.283	0.313	0.343		
	WY	0.299	0.329	0.359		
Viewing Angle						[Note 4-5]
x axis, right(Φ=0°)	Θr	60	70	-	degree	
x axis, left (Φ=180°)	Θl	60	70	-	degree	
y axis, up (Φ=90°)	Θu	40	50	-	degree	
y axis, down (Φ=270°)	Θd	50	60	-	degree	

[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.

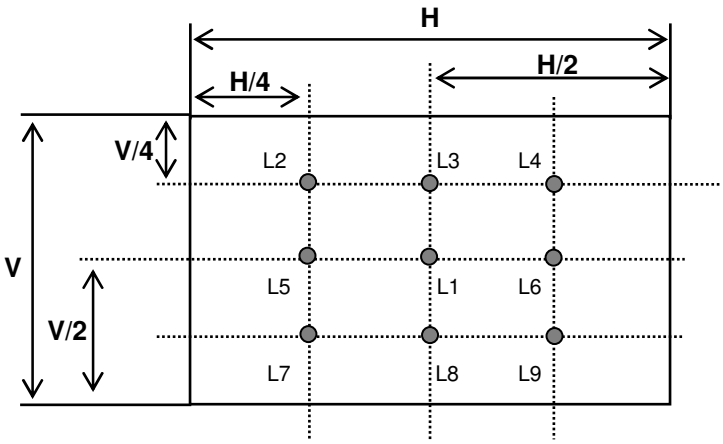
[Note 4-3] Luminance % uniformity is measured for 9 point For more information see FIG 2.
δ WHITE = Maximum(L1,L2, ….. L9) ÷ Minimum(L1,L2, ….. L9)

[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>



*H,V : ACTIVE AREA

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”.

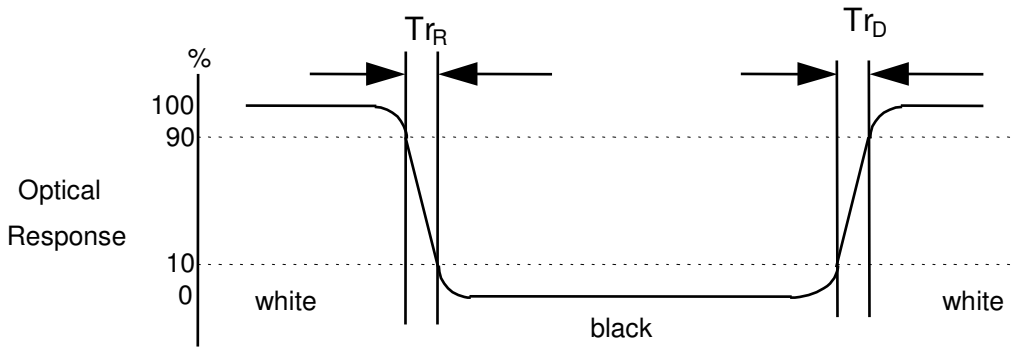
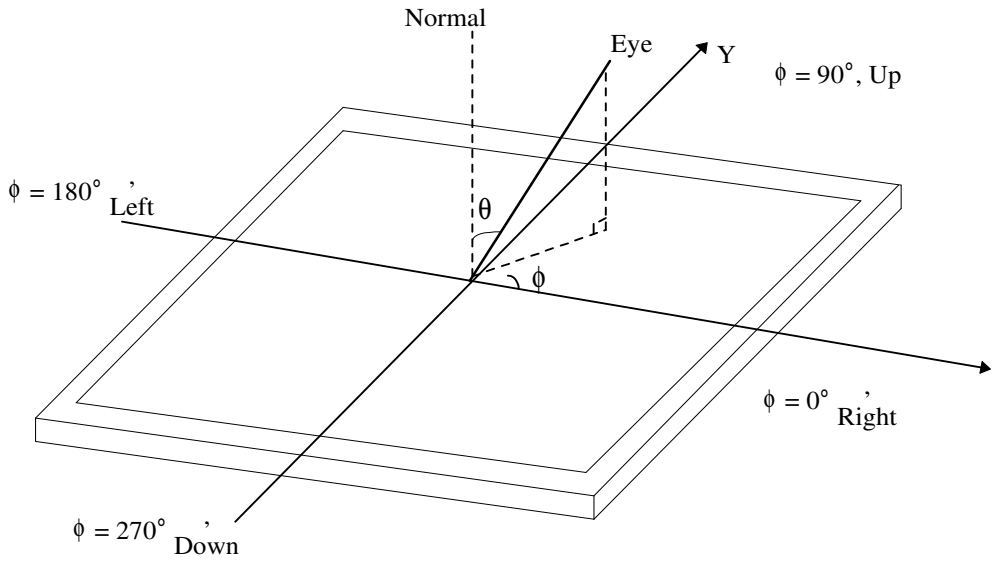


FIG. 4 Viewing angle

<Dimension of viewing angle range>



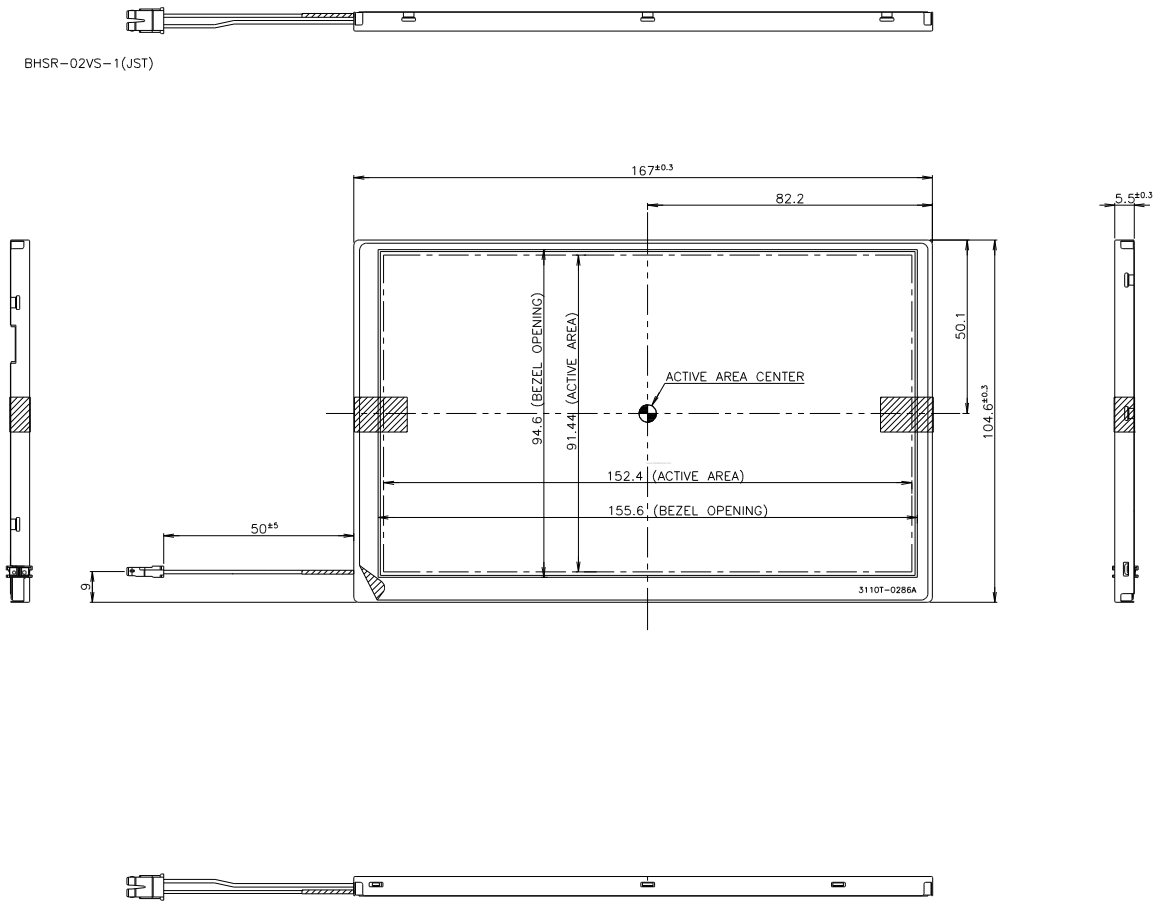
5. Mechanical Characteristics

The contents provide general mechanical characteristics for the model LB070WV1. In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal	167 mm(Typ)
	Vertical	104.6 mm(Typ)
	Depth	5.5 mm (Typ.)
Bezel Area	Horizontal	155.6 mm (Typ.)
	Vertical	94.6 mm (Typ.)
Active Display Area	Horizontal	152.40 mm (Typ.)
	Vertical	91.44 mm (Typ.)
Weight	125g(Typ.) / 135g (Max.)	
Surface Treatment	Anti-glare treatment of the front polarizer	

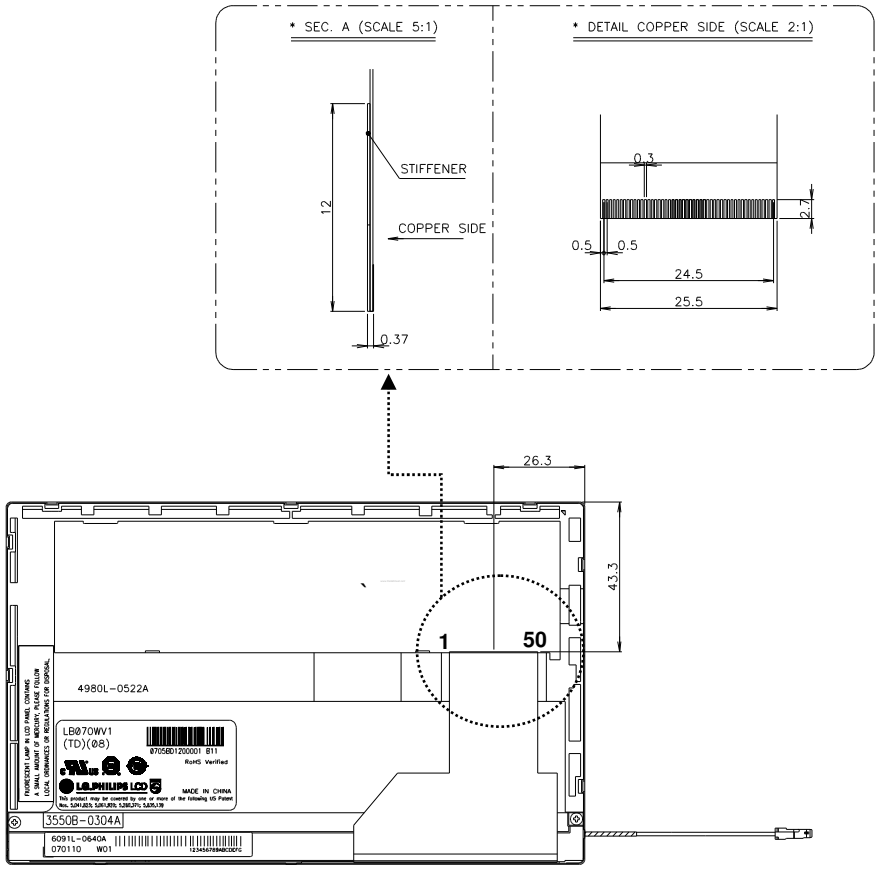
<FRONT VIEW>

Unit:[mm], General tolerance: ± 0.3mm



<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=-20℃ 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=50℃ 80%RH 240h	[Note 6-1,2,3]
6	Electro Static Discharge Test	-Panel Surface/Top_Case : 150pF, 150Ω (Air : ±15kV , Contact : ±8kV) -FPC input terminal : 100pF ±200V 0Ω	
7	Shock Test (non-operating)	Half sine wave, 80G, 11ms 3 times shock of each six faces	
8	Vibration Test (non-operating)	Sine wave, 10 ~ 500 ~ 10Hz, 1.5G, 0.37oct/min 3 axis, 1hour/axis	
9	Thermal Shock Test	-10℃(0.5h) ~ 60℃(0.5h) / 100 cycles	

[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.

※ 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, Third Edition, Underwriters Laboratories, Inc., Dated Dec. 11, 2000.
Standard for Safety of Information Technology Equipment, Including Electrical Business Equipment.
b) CAN/CSA C22.2, No. 60950, Third Edition, Canadian Standards Association, Dec. 1, 2000.
Standard for Safety of Information Technology Equipment, Including Electrical Business Equipment.
c) EN 60950 : 2000, Third Edition
IEC 60950 : 1999, Third Edition
European Committee for Electrotechnical Standardization(CENELEC)
EUROPEAN STANDARD for Safety of Information Technology Equipment Including Electrical Business 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 : 36 pcs

b) Box Size(mm) : 475(L)×348(W)×182(H)

9. PRECAUTIONS

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

9-1. MOUNTING PRECAUTIONS

(1) You must mount a module using holes arranged in four corners or four sides.
(2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
(3) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.
(4) You should adopt radiation structure to satisfy the temperature specification.
(5) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
(6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
Do not touch the surface of polarizer for bare hand or greasy cloth.(Some cosmetics are detrimental to the polarizer.)
(7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
(8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
(9) Do not open the case because inside circuits do not have sufficient strength.

9-2. OPERATING PRECAUTIONS

(1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage :
V=± 200mV(Over and under shoot voltage)

(2) Response time depends on the temperature.(In lower temperature, it becomes longer.)
(3) Brightness depends on the temperature. (In lower temperature, it becomes lower.)
And in lower temperature, response time(required time that brightness is stable after turned on) becomes longer.
(4) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
(5) When fixed patterns are displayed for a long time, remnant image is likely to occur.
(6) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.

9-3. ELECTROSTATIC DISCHARGE CONTROL

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

9-4. PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

9-5. STORAGE

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

(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
(2) The polarizer surface should not come in contact with any other object.
It is recommended that they be stored in the container in which they were shipped.

9-6. HANDLING PRECAUTIONS FOR PROTECTION FILM

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