

Product Specifications

SPECIFICATION FOR APPROVAL

- () Preliminary Specification
 () Final Specification

Title	8.0"W (800 X RGB X 480) TFT - LCD
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BUYER	
MODEL	

SUPPLIER	LG.Philips LCD Co., Ltd.
MODEL	LB080WV3
SUFFIX	A1

SIGNATURE	DATE
_____/	_____
_____/	_____
_____/	_____

APPROVED BY	DATE
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Product Specifications

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Product Specifications

RECORD OF REVISIONS

Revision No.	Revision Date	Page	Summary
0.0	Apr. 27, 2004	-	First Draft (Preliminary)
0.1	May.04.2004	-	Misprinted characters ----- [Correction]
0.2	July.18.2004	2	Contents page change
		4	Block diagram change
		5	Power consumption change : 9.2W(Typ) → 8.84W(Typ)
		6	Psychrometric chart add
		8	Electrical Characteristics parameter add & change
		9	CVBS timing diagram add
		11	MICOM reset point change in the Power Supply Input Sequence diagram
		12	Photo detector change PR-705 → PR-650
0.3	Aug.24.2004	8	Electrical Characteristics timing parameter change
		9	CVBS timing diagram change
		16,17	Mechanical drawing update
0.4	Mar.16.2005	6	Add note "Meets GMW3097(rev4) Load dump spec"
		8	CVBS amplitude & sync level values change for NTSC & PAL standard format
		9	Note2 condition change : "Vidoe- = 0 " → "This is CVBS Standard Format when system output Impedance is 75 "
		9	CVBS timing diagram change because CVBS level value change (refer page 8)
		9,11	Unify the name : Power_ON/OFF → Display Enable
		10	Display mode description change : Reserved → Display version
		12	Gy (Green Color Coordinates) values change : Typ 0.575 → 0.565
		12	Measuring conditions update : Pattern generator & CVBS format add
		12	Misprinted character correction : y axis, down ($\phi=270^\circ$) minimum value (40→30) because minimum value was misprinted equally to typical value.
		17	Conducting tape shape change on FPC (details compare with Ver 0.3)
0.5	Apr.19.2005	17	Conducting tape width increase ("L" bending type), cover bottom screw one point add(4points → 5points) & small holes on cover bottom position change because EMI characteristic improve.

Product Specifications

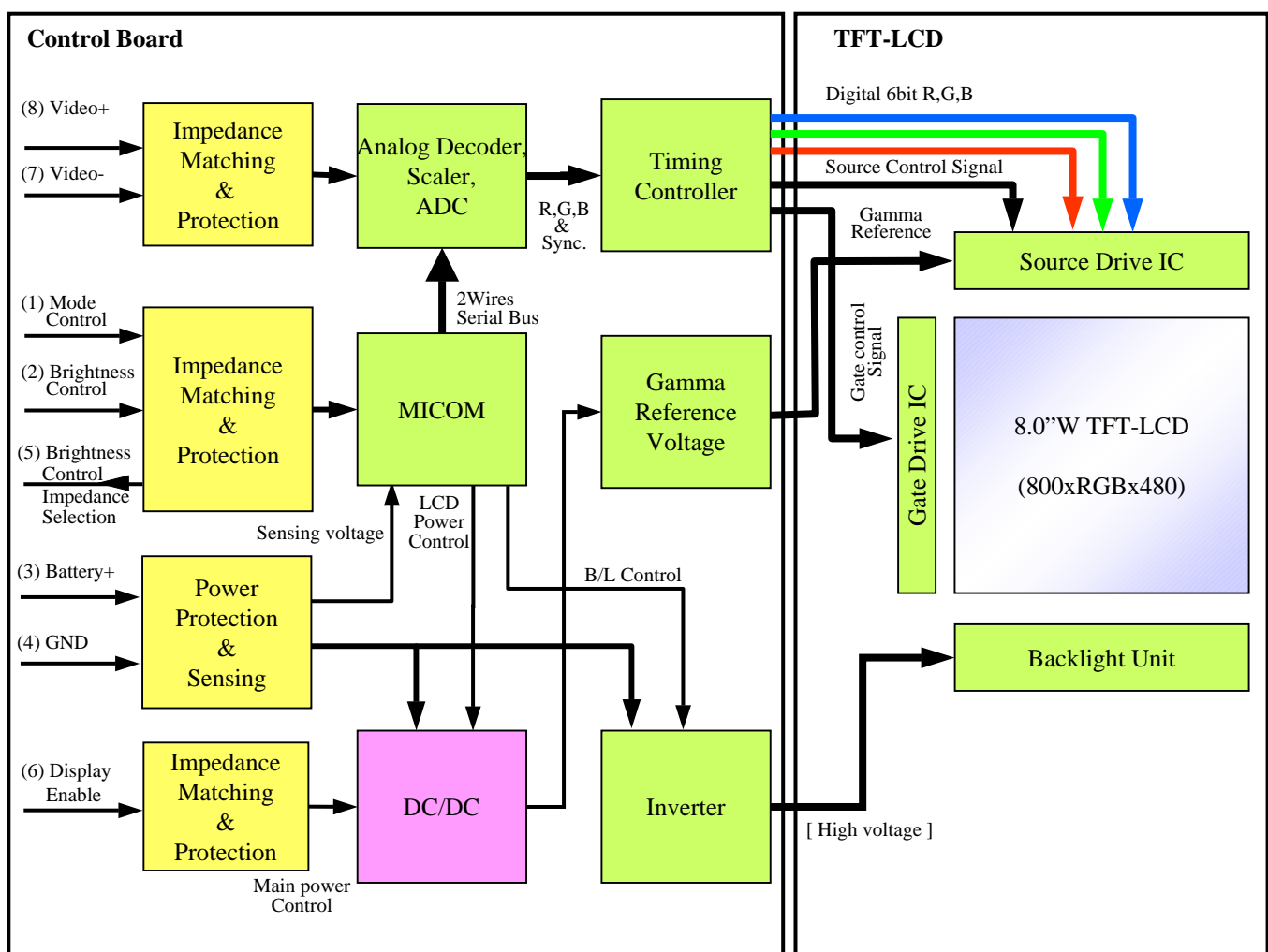
1. Summary

This module utilizes amorphous silicon thin film transistors and a aspect ratio of 16:9. The 8.0" active matrix liquid crystal display allows 262,144 colors to be displayed by Analog-to-Digital conversion of Composite Video signal input.

The applications are not only RSE(Rear Seat Entertainment) for a vehicle, but also display for Car Navigation system, multimedia applications and other AV systems.

2. Features

- Applying a panel with aspect ratio of 16:9, which makes the module suitable for use in wide-screen systems such as DVD player.
- The 8.0" screen produces a high resolution image that is composed of 384,000 RGB pixel elements in a stripe arrangement.
- Technology of wide viewing angle is employed.
- By adopting an active matrix drive, high contrast picture or image is realized.
- By using of COG mounting technology, the module became thin, light and compact.



Product Specifications

3. General Specification

CHARACTERISTIC ITEMS	SPECIFICATION
Input Signal(Video)	Composite Video (Except SECAM)
Active Screen Size (Diagonal)	8.0" (20.27cm), 176.64mm (H) X 99.36mm (V)
Pixel Format	800(H) X 3(R,G,B) X 480(V), BGR vertical stripes
Display Technology	a-Si TFT active matrix
	Normally White, Transmitting mode
Outline Dimension	198mm (H) X 117mm (V) X 16.0mm (T) (Typ.)
Main Viewing Direction	12 o'clock [Direction]
Pixel Pitch	0.2208 mm x 0.2070 mm
Display Modes	Normal(4:3), Full(16:9), Zoom(Vertical)
Luminance, white	400 cd/m ² (Typ.)
Power Consumption (with CCFL)	8.84 Watts (Typ.)
Weight	420g (Max.)
Backlight	1 CCFL (L Type)
Surface Treatment	Anti-Glare Treatment

Product Specifications

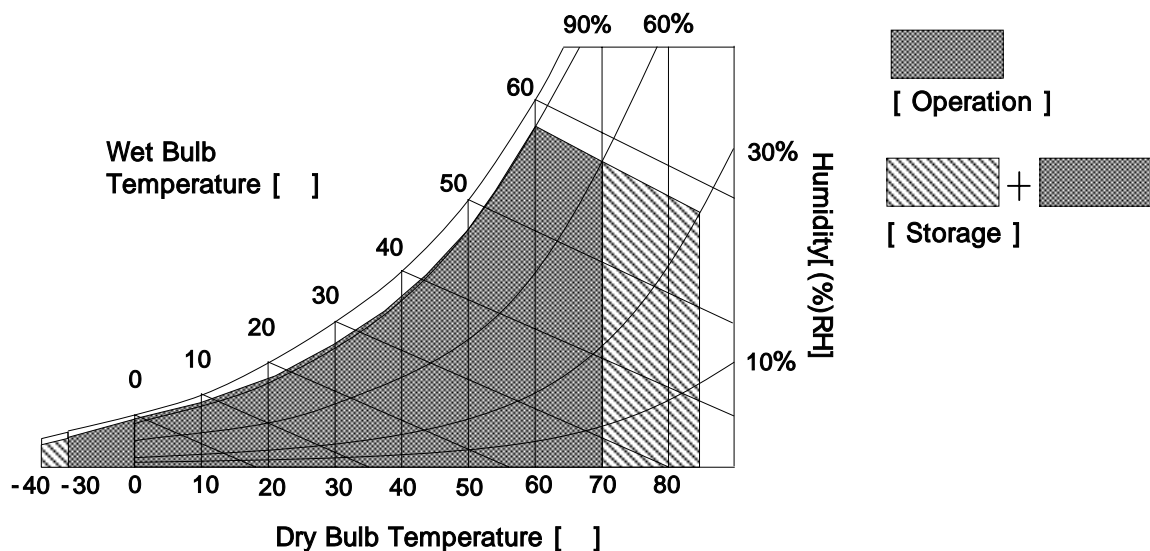
4. Absolute Maximum Rating

The followings are maximum values which, if exceeded, may cause malfunction or damage to the Module.

Parameter	Symbol	Condition	Min.	Max.	Unit	Notes
Power Supply Voltage	V _{BAT}	T _a =25	-0.3	22.0	Vdc	1
CVBS	Video+	Input impedance 75	-	1.5	Vp-p	
Storage Temperature	T _{ST}	-	-40	85		2
Operating Temperature	Surface of Panel	T _P	-	85		2,3
	Ambient	T _a	-	70		2,3,4

Notes :

1. Meets GMW3097(rev4) Load dump spec.
2. Maximum wet-bulb temperature is 58 . Condensation of dew must be avoided, because it may cause electrical current leakage, and deterioration of performance and quality.
3. The operating temperature means that LCD Module guarantees operation of the circuit.
All the contents of Electro-optical specifications are guaranteed under the room temperature condition.
4. This temperature is ambient temperature with regard to the heat which is generated under operation of circuit and backlight on.(reference value)



Product Specifications

5. Electrical Specifications

5-1. Interface (Input terminal)

This LCD uses an 8 pin connector , which is used for the module operation, as an interface connection. The model name is **IP254-L08B-C51** manufactured by Uju Electronics. The matching connector is a model **CD-104257** manufactured by AMP.

Pin No.	Pin Name	I/O	Description	Notes
1	Mode Control	I	Display Mode Control	Sec. 5-3
2	Brightness Control	I	Brightness Control	Sec. 5-4
3	Battery+	I	Power Supply	
4	GND	I	Power ground	
5	Brightness Control Impedance Selection	I	Impedance selection of Brightness Control input signal line for Single or Dual Display - Hi-Z(Floating) : For Single Display - Ground : For Dual Display	
6	Display Enable	I	Display Enable Signal - Display Enable : $V_{DE} = V_{BAT}$ - Display Disable : $V_{DE} = \text{Hi-Z(Float)}$ (LCD Module Internally pull-down)	
7	Video-	I	Composite video signal ground	
8	Video+	I	Composite video signal(CVBS)	

Product Specifications
5-2. Electrical Characteristics
Recommended operating conditions
@T_a=25

Parameter		Symbol	Values			Unit	Notes	
			Min.	Typ.	Max.			
Power Supply Input Voltage (Battery+)		V _{BAT}	9.0	13.2	16.0	V _{DC}	1	
Display Enable Input Voltage		V _{DE}	9.0	13.2	16.0	V _{DC}		
Composite Video signal	NTSC	Amplitude	V _{NTSC}	0.7	1.0	1.5	V _{p-p}	2
		Sync	V _{NSYNC}	0.19	0.285	0.43	V _{p-p}	2
	PAL	Amplitude	V _{PAL}	0.7	1.0	1.5	V _{p-p}	2
		Sync	V _{PSYNC}	0.21	0.3	0.45	V _{p-p}	2
Power Supply Input Current	Stand-by	IBAT	0.05	0.11	0.25	mA	3	
	B/L off	IBAT	25	40	70	mA	4	
	Normal	IBAT	570	670	770	mA	5	
Power Consumption	Stand-by	P _C	0.66	1.45	3.3	mW	3	
	B/L off	P _C	0.330	0.528	0.924	Watts	4	
	Normal	P _C	7.52	8.84	10.16	Watts	5	
PWM Control signal	High Level	V _{PWMH}	4.5	5.0	5.5	V _{DC}	6,7	
	Low Level	V _{PWML}	-	-	1.2	V _{DC}		
	Frequency	f _{PWM}	180	200	220	Hz	6	
	Duty Cycle	-	/			-	6,7	
NTSC Vertical Timing	Frequency	f _{VN}	58.93	59.93	60.93	Hz	8	
	Sync width	t _{WVN}	2H	3H	4H	us	8	
NTSC Horizontal Timing	Frequency	f _{HN}	15.732	15.734	15.736	kHz	8	
	Sync width	t _{WHN}	4.0	4.7	5.4	us	8	
PAL Vertical Timing	Frequency	f _{VP}	49.0	50.0	51.0	Hz	9	
	Sync width	t _{WVP}	1.5H	2.5H	3.5H	us	9	
PAL Horizontal Timing	Frequency	f _{HP}	15.623	15.625	15.627	kHz	9	
	Sync width	t _{WHP}	4.5	4.7	4.9	us	9	
Lamp Life Time		-	10,000	-	-	Hours	10	

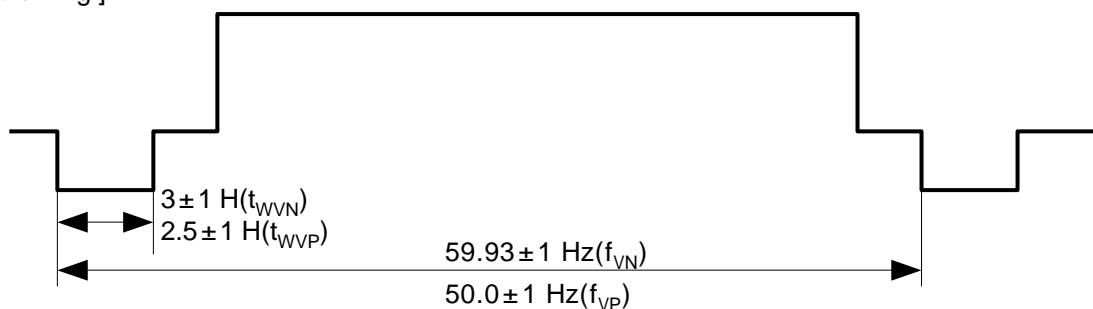
Product Specifications

Notes :

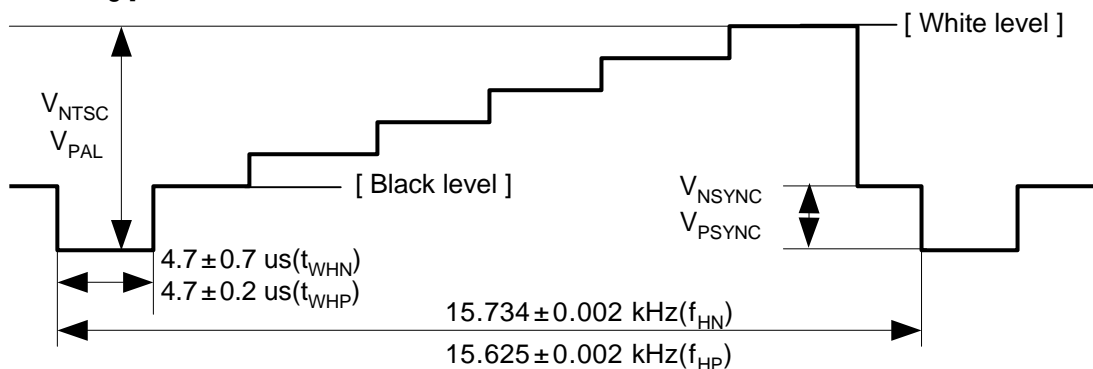
1. If the power supply voltage exceeds this range, a LCD Module is turned off to avoid serious damage of its circuit components by force.
2. Condition : This is CVBS Standard Format when system output Impedance is 75 Ω .
3. Condition : VBAT = 13.2V, Display Enable(V_{DE}) = Hi-Z(Float)
4. Condition : VBAT = 13.2V, Display Enable(V_{DE}) = VBAT, Mode Control signal High Duty > 87%
5. Condition : VBAT = 13.2V, Display Enable(V_{DE}) = VBAT,
display image : full black @Default brightness,
measure time : at least after 10 minutes from the Display enable
6. Display Mode Control signal, Brightness Control signal
7. Refer to the section 5-3 and 5-4.
8. NTSC-M, NTSC-J, NTSC-4.43, PAL-M, PAL-60
9. PAL-B,D,G,H,I, PAL-N
10. "Lamp Life Time" is defined as the time the lamp brightness decreases to 50% from initial brightness under continuous lighting condition, at ambient temperature 25 $^{\circ}\text{C}$.

5-2-1. CVBS standard Timing Diagram

[Vertical timing]



[Horizontal timing]



Product Specifications

5-3. Display Modes Control

The required range of PWM frequency is **200Hz ± 10%**. To prevent abnormal display, this PWM frequency should be kept.

Duty Cycle(%)	Display Mode	Notes
0 Duty 10	Full	1,5
12 Duty 22	Normal	
25 Duty 35	Zoom	
37 Duty 47	PAL 60 Full	2,5
50 Duty 60	PAL 60 Normal	
62 Duty 72	PAL 60 Zoom	
75 Duty 85	Display version	3,5
87 Duty 100	Backlight OFF	4,5

Protection Function

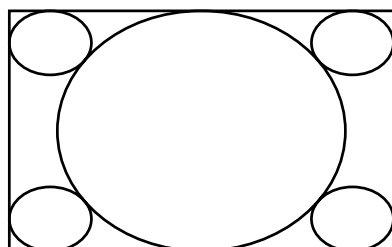
When the display mode control terminal is open circuit, short to VBAT or short to Ground, the default mode becomes Full mode.

Notes :

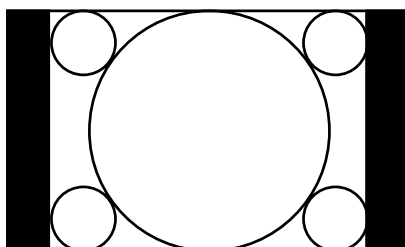
1. In these modes, the inputted video signal format is automatically detected.(Except SECAM)
2. These modes are only for PAL60 video format. For PAL60 format, it is recommended to use these modes.
3. In this mode, MICOM Firmware Version of a TFT-LCD is displayed on screen.
4. In this mode, backlight and LCD is turned off, but the MICOM operated.
5. In all of the duty cycle percentage except above each range(for example, 11%, 23%, etc.), the Display Mode does not change and preserve the previous display mode.

Display Modes

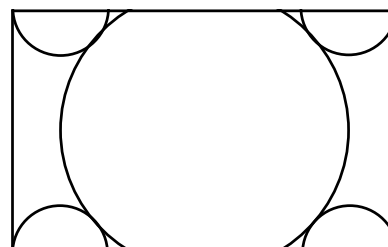
Ex.) @ Video source format : 4:3



[Full Mode]



[Normal Mode]



[Zoom Mode]

Product Specifications

5-4. Brightness Mode Control

The brightness is controlled by R,G,B gain in the video decoder, not by backlight brightness control. The required range of PWM frequency is **200Hz ± 10%**. To prevent abnormal display, this PWM frequency should be kept.

Duty Cycle(%)	Brightness Mode	Notes
0 Duty < 10	Default brightness	1
10 Duty 90	40 Steps, 2% per step - 10% : Max. brightness - 90% : Min. brightness	2
90 < Duty 100	Screen Mute	3

Protection Function

When the brightness control terminal is open circuit, short to VBAT or short to Ground, the brightness becomes default brightness.

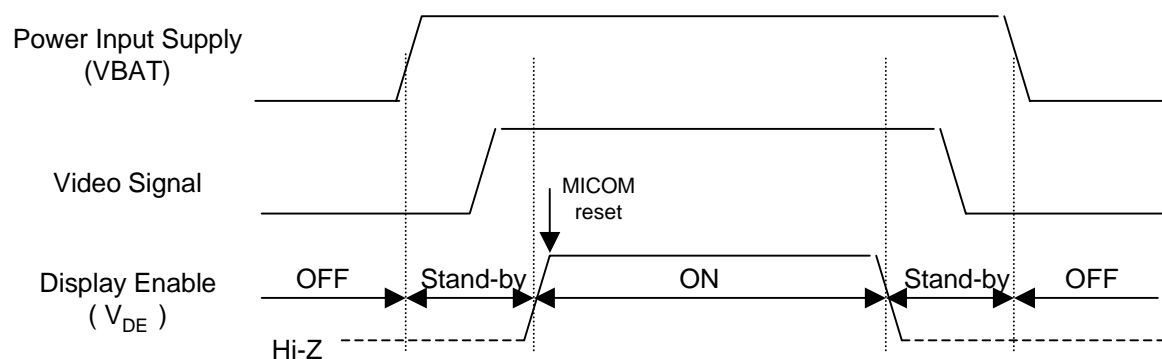
Notes :

- The default brightness means visually optimal brightness. All Electro-optical Characteristics are defined under the default brightness mode.
(If the total brightness steps are 20 levels, default brightness is 10th step.)
- Because these steps have hysteresis characteristics, the duty percentage should be changed at least ± 2% to decrease/increase one brightness step. If the duty ± 1% changed, the Brightness Mode preserve the previous brightness mode.
- The screen mute means that backlight is turned on and black image is displayed on panel screen.

5-5. Power Supply Input Sequence

This power input sequence should be kept to avoid abnormal image and to be an optimum operation.

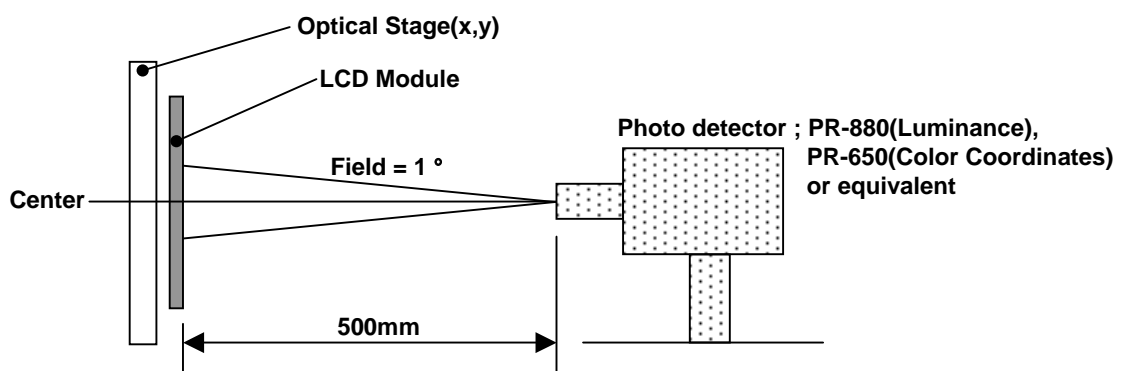
Display On : VBAT → Video Signal → $V_{DE} = VBAT$
 Display Off : $V_{DE} = Hi-Z(Float)$ → Video Signal → VBAT
 Display Stand-by : $V_{DE} = Hi-Z(Float)$, under the VBAT is applied.



Product Specifications
6. Electro-optical Characteristics

 @T_a=25, Default brightness Mode

Parameter	Symbol	Values			Units	Notes
		Min	Typ	MAx		
Contrast Ratio	CR	250	400	-		1
Surface Luminance, white	L _{WH}	320	400	-	cd/m ²	2
Luminance Variation	δ _{WHITE}	-	1.25	1.40		3
Response Time						4
Rise Time	T _R	-	10	20	ms	
Decay Time	T _D	-	40	50	ms	
Color Coordinates						2
Red	R _X	(0.611)	(0.641)	(0.671)		TBD
	R _Y	(0.319)	(0.349)	(0.379)		TBD
Green	G _X	(0.273)	(0.303)	(0.333)		TBD
	G _Y	(0.535)	(0.565)	(0.595)		TBD
Blue	B _X	(0.115)	(0.145)	(0.175)		TBD
	B _Y	(0.076)	(0.106)	(0.136)		TBD
White	W _X	0.283	0.313	0.343		
	W _Y	0.299	0.329	0.359		
Viewing Angle						5
x axis, right(φ=0°)	r	55	60	-	degree	
x axis, left (φ=180°)	l	55	60	-	degree	
y axis, up (φ=90°)	u	45	50	-	degree	
y axis, down (φ=270°)	d	30	40	-	degree	

FIG. 1 Optical Characteristic Measurement Equipment and Method


Measuring Conditions :

- Surroundings : Dark Room
- Temperature : T_a=25
- Pattern Generator : Use only standard analog(CVBS) pattern generator
- CVBS Format : NTSC-M
- Electrical parameters set typical values.
- Measured value at the center point of LCD panel after more than 30 minutes while backlight turning on.

Product Specifications

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 measured at the center point(L₁) of the LCD with all pixels displaying white at the distance of 50cm by PR-880. Color Coordinates are measured at the center point(L₁) 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.

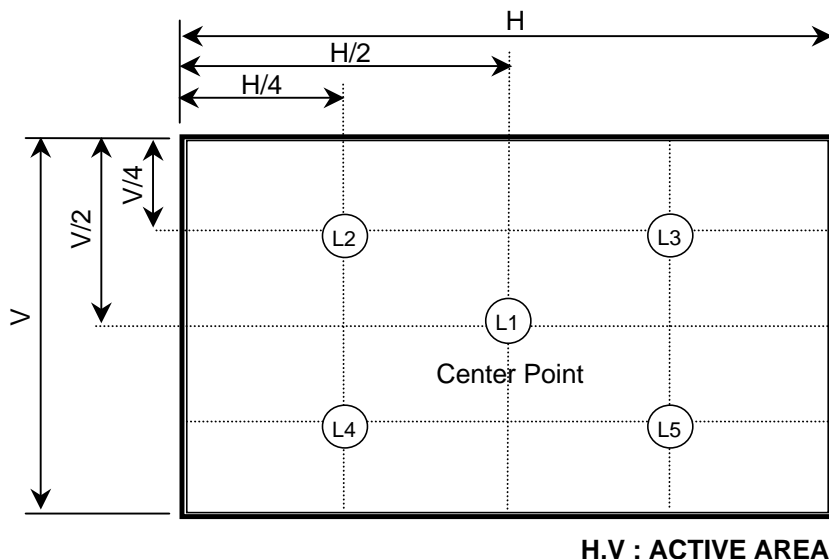
3. The variation in surface luminance. The Panel total variation (δ_{WHITE}) is determined by measuring L_N at each test position 1 through 5, and then dividing the maximum L_N of 5 points luminance by minimum L_N of 5 points luminance. For more information see FIG 2.

$$\delta_{\text{WHITE}} = \text{Maximum}(L_1, L_2, \dots, L_5) / \text{Minimum}(L_1, L_2, \dots, L_5)$$

4. Response time is the time required for the display to transition from white to black (rise time, Tr_R) and from black to white(Decay Time, Tr_D). For additional information see FIG 3.
5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 4.

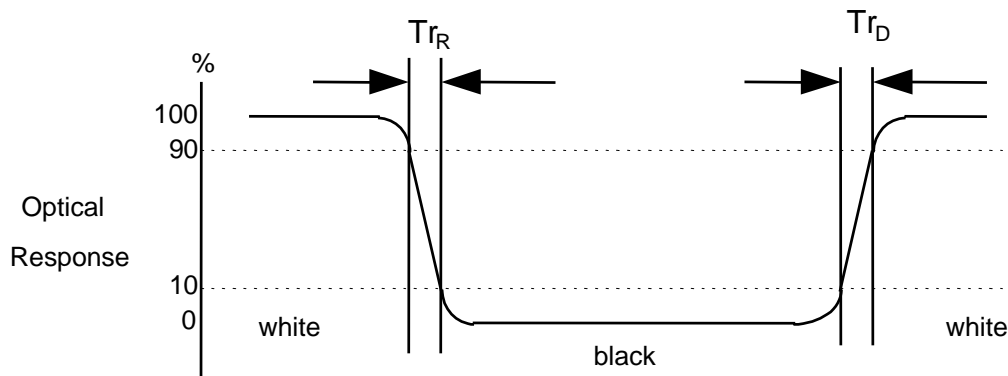
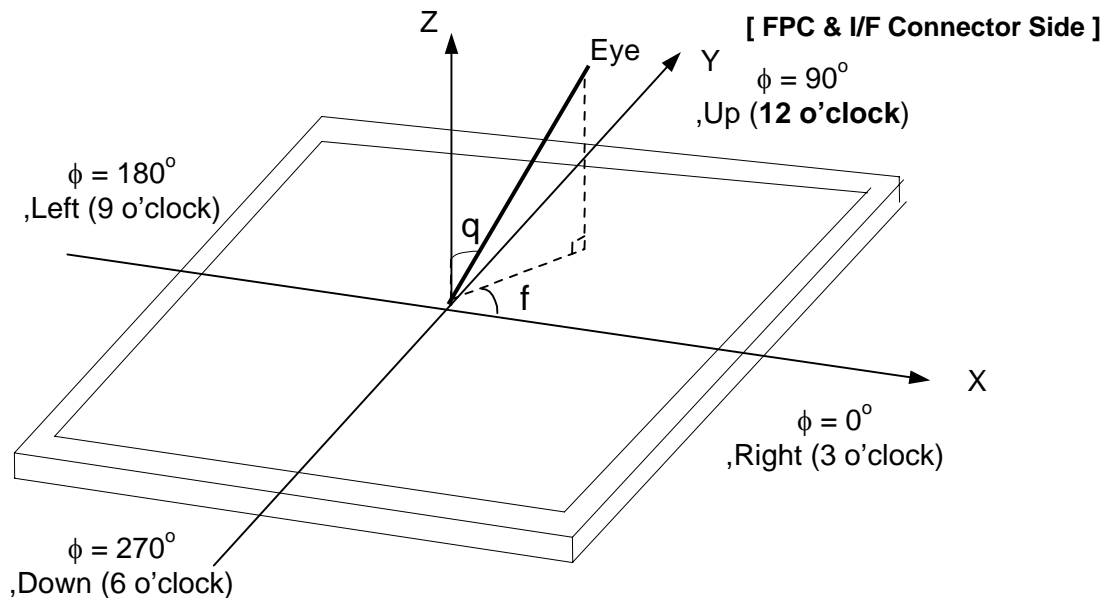
FIG. 2 Luminance

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



Product Specifications
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


Product Specifications

7. Mechanical Characteristics

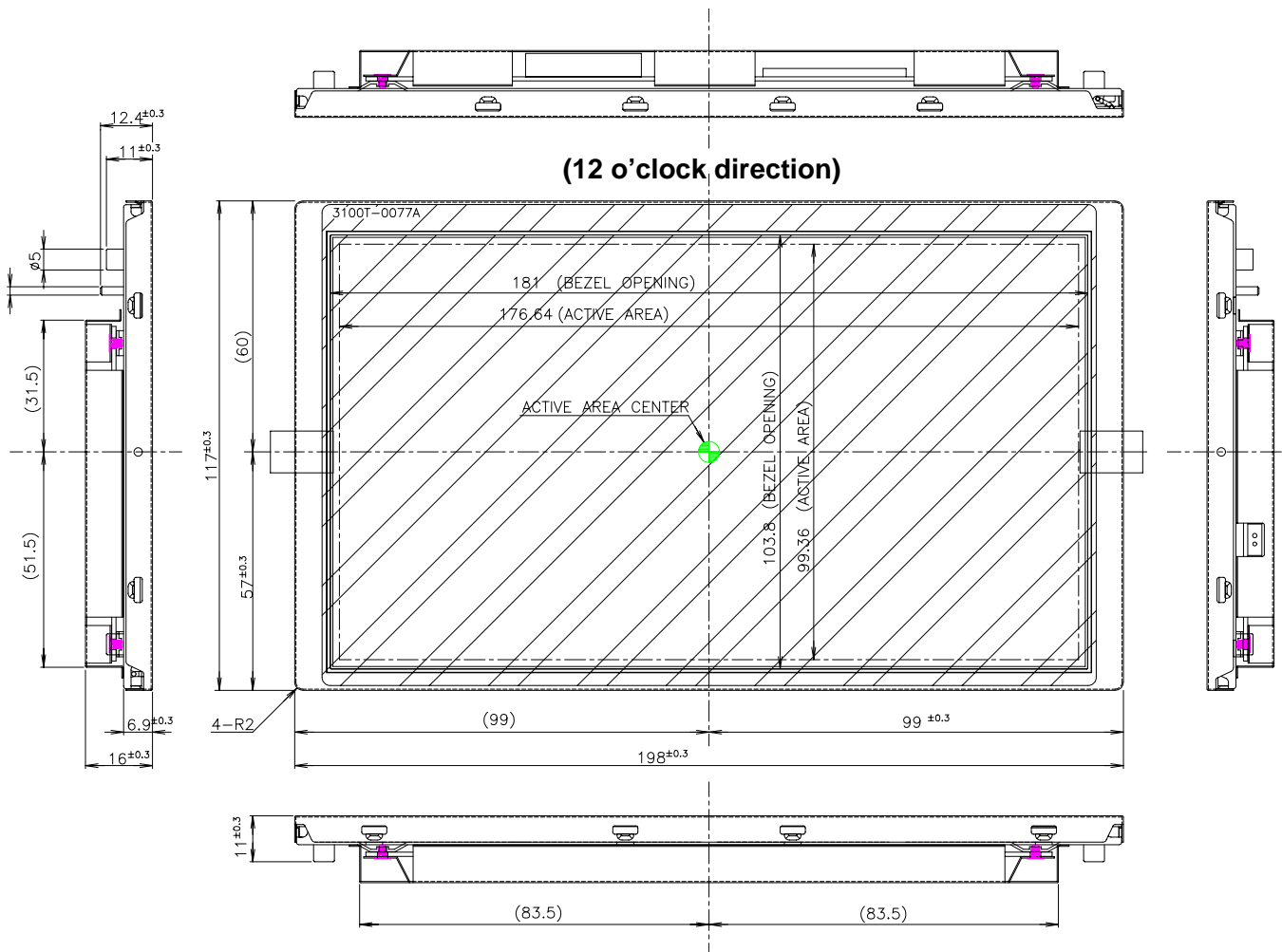
The contents provide general mechanical characteristics for this module. In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal	198.0 (± 0.3)mm
	Vertical	117.0 (± 0.3)mm
	Thickness	16.0 (± 0.3)mm
Bezel Area	Horizontal	181.0 (± 0.5)mm
	Vertical	103.8 (± 0.5)mm
Active Display Area	Horizontal	176.64 mm
	Vertical	99.36 mm
Weight	420g Max.	

Product Specifications

<FRONT VIEW>

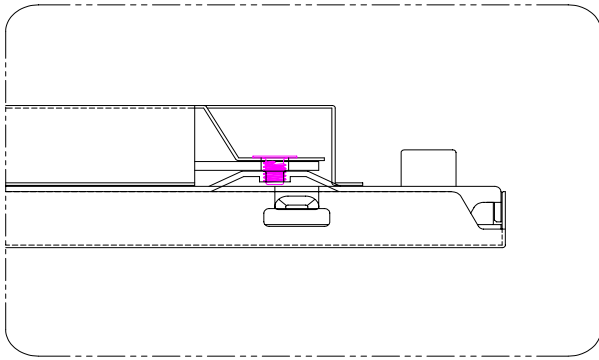
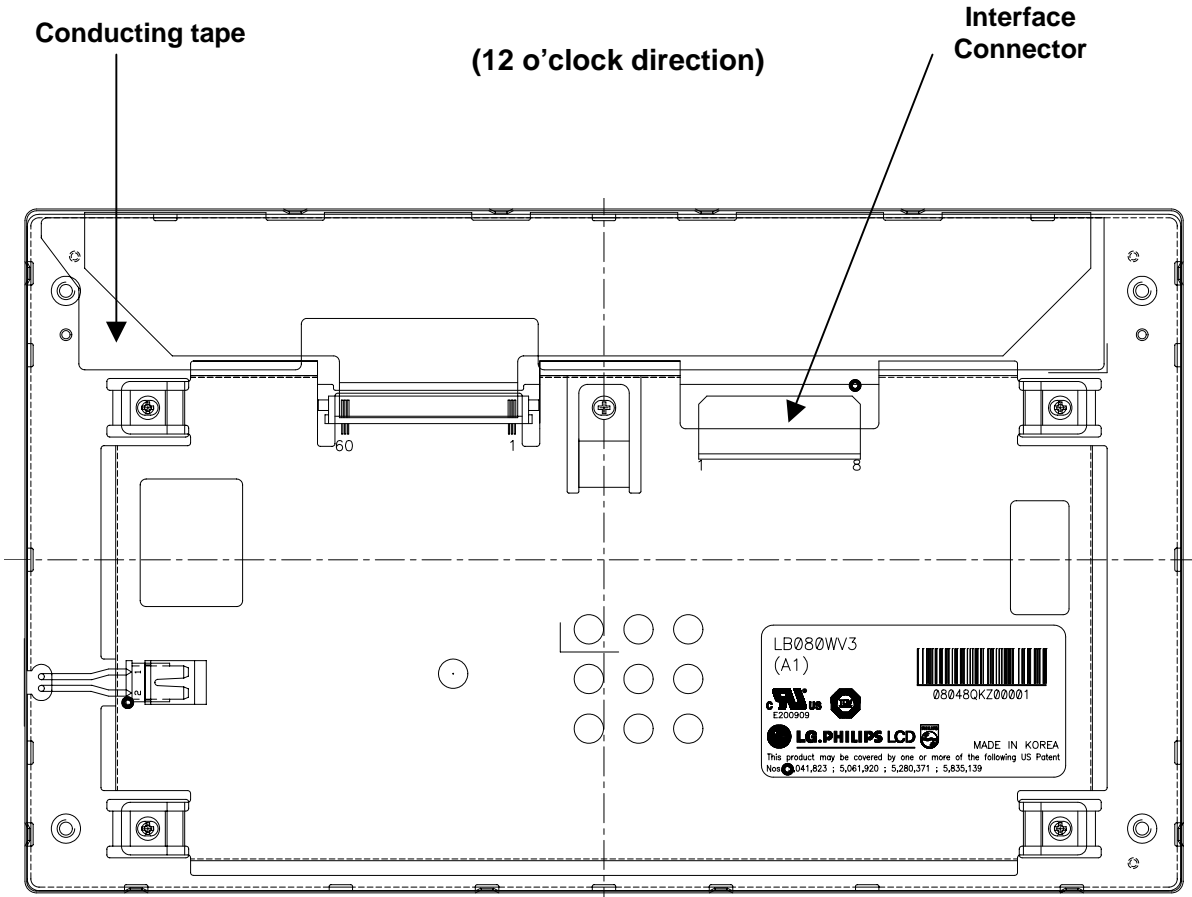
Note) Unit:[mm], General tolerance: ± 0.5mm



Product Specifications

<REAR VIEW>

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



Screw Torque Max 2.5Kgf.cm

Product Specifications

8. Reliability Test

No.	Test Items	Test Condition	Notes
1	High Temperature Storage Test	Ta=85 240h	
2	Low Temperature Storage Test	Ta=-40 240h	
3	High Temperature Operation Test	Tp=85 240h	
4	Low Temperature Operation Test	Ta=-30 240h	
5	High Temperature and High Humidity Operation Test	Tp=60 90%RH 240h	
6	Electro Static Discharge Test	-Panel Surface/Top_Case : 150 , 150pF, ±15kV (direct discharge, five times) -Input terminal : 0 , 100pF, ±200V	
7	Shock Test (non-operating)	Half sine wave, 80G, 11ms 3 times shock of each six faces	
8	Vibration Test (non-operating)	- 10Hz to 200Hz logarithm sweep for 15min/cycle. - 10Hz to 25Hz:The amplitude is 2 mm. - 25Hz to 200Hz:The acceleration is 2G. - X,Z : 8 cycle, Y : 16 cycle	
9	Thermal Shock Test	-40 (0.5h) ~ 85 (0.5h) / 100 cycles (no operation)	

• Ta ; Ambient Temperature, Tp ; Panel surface Temperature

Product Specifications

9. International Standards

9-1. 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 Electro-technical Standardization(CENELEC)
EUROPEAN STANDARD for Safety of Information Technology Equipment Including Electrical Business Equipment.

Product Specifications

10. Packing

10-1. 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

F : PANEL CODE

H : ASSEMBLY CODE

E : MONTH

G : FACTORY CODE

I,J,K,L,M : SERIAL NO.

Note

1. YEAR

Year	97	98	99	2000	2001	2002	2003	2004	2005	2006	2007
Mark	7	8	9	0	1	2	3	4	5	6	7

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

3. PANEL CODE

Panel Code	P1 Factory	P2 Factory	P3 Factory	P4 Factory	P5 Factory	Hydis Panel
Mark	1	2	3	4	5	H

4. FACTORY CODE

Factory Code	LPL Gumi	LPL Nanjing	HEESUNG
Mark	K	C	D

5. SERIAL NO.

Year	1 ~ 99999	100000 ~
Mark	00001 ~ 99999	A0001 ~ A9999, , Z9999

b) Location of Lot Mark

The 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.

10-2. Packing Form

a) Package quantity in one box : 14 pcs

b) Box Size : 329 x 278 x 271 (mm)

Product Specifications

11. PRECAUTIONS

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

11-1. 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 forces are not transmitted directly to the module.
- (3) Please attach a transparent protective plate to the surface in order to protect the polarizer.
Transparent protective plate should have sufficient strength in order to resist external forces.
- (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 deteriorate the polarizer.)
- (7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with a small amount of Ethanol.
- (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) The metal case of a module should be contacted to electrical ground of your system.

11-2. OPERATING PRECAUTIONS

- (1) The spike noise causes the malfunction of circuits. It should be lower than following voltage :
 $V = \pm 200\text{mV}$ (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 electrically 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 minimize the interference.

Product Specifications

11-3. ELECTROSTATIC DISCHARGE CONTROL

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

11-4. PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

11-5. 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.

11-6. 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 (more than 3 seconds) 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 a small amount of Ethanol.