Product Specifications

SPECIFICATION
FOR
APPROVAL

( ) Preliminary Specification
(●) Final Specification

Title	8.0”W (800 X RGB X 480) TFT - LCD

BUYER	
MODEL	

SUPPLIER	LG.Philips LCD Co., Ltd.
MODEL	LB080WV4
SUFFIX	TD01

SIGNATURE	DATE
/	
/	
/	

APPROVED BY	DATE
J.D. KIM /G.Manager	
REVIEWED BY	
S.G. KIM /S.Manager	
PREPARED BY	
S.M. JE /Engineer	

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

Product Specifications

CONTENTS

RECORD OF REVISIONS

Revision No.	Revision Date	Page	Summary
0.0	Mar.03, 2006	-	First Draft (Preliminary)
0.1	Jul.19, 2006	9	Change V_{BRIGHT} Min value : 0V → 0.5V Add $V_{CONSTRAST}$ Min / Max value. Add Inrush current. (VCC, VBL)
		14	Add Viewing angle Min value. Add Color Coordinates Value.
		20	Add a note1.
0.2	Sep. 1, 2006	10	Change DCLK frequency range. (Min:31MHz / Typ:33MHz / Max:36MHz)
0.3	Nov. 24, 2006	5	Add a detailed description of Outline dimension. (Transformer area thickness)
		6	Change the absolute maximum value as below. • VCC : 4.0Vdc → 3.8Vdc (by Timing controller IC specification) Add a absolute maximum value of RBF signal. Add a note1. (about Time duration of VBL over-voltage) Correct the Operating temperature. • Tp = -30~85℃ → Ta = -30~85℃ Correct the Dry Wet bulb temperature diagram.
		9	Add PWM_DIM & BL_SW High / Low voltage range. Add LR_UD High / Low voltage range & note. Correct the wrong description. (Digital RGB high / low voltage range)
		10	Change DCLK frequency range. (Min:30MHz / Typ:32.18MHz / Max:36MHz)
		13	Add a delay time between VCC and VBL, a note.
		14	Change R/G/B Color Coordinates Typ value. Add R/G/B Color Coordinates Min / Max value. Add Measurement condition. (V_{BRIGHT} / $V_{CONTRAST}$ value)
		17	Correct the wrong description. (Bezel area, Thickness dimension)
		20	Correct the High temperature operation test condition. • Tp = 85℃ → Ta = 85℃ Add Thermal Shock Test item.
0.4	Jan. 2, 2007	6	Change the absolute maximum value as below. • VBL Max : 22.0Vdc → 24.0Vdc (by Customer's request)
1.0	Jun. 29, 2007	6	Change the DIM absolute maximum rating specification. • PWM_DIM → DIM (Dimming method is changed by customer's request)
		7	Change the pin name. (CN1 pin 10) • PWM_DIM → DIM (Dimming method is changed by customer's request)
		9,10	Change the DIM electrical characteristics and note 4.
		14	Change the electro-optical characteristics measurement condition. • PWM_DIM = 100% → DIM = 2V (Dimming method is changed by customer's request)
		18,19	Change the front / rear view drawings. • Mechanical tapes are added. • Warning sentences about backlight mercury content are imprinted on cover shield.
		20	Fix the ESD and Vibration test temperature cycle test condition.
		22	Change the packing quantity and box size. (Packing method is changed by customer's request)

Product Specifications

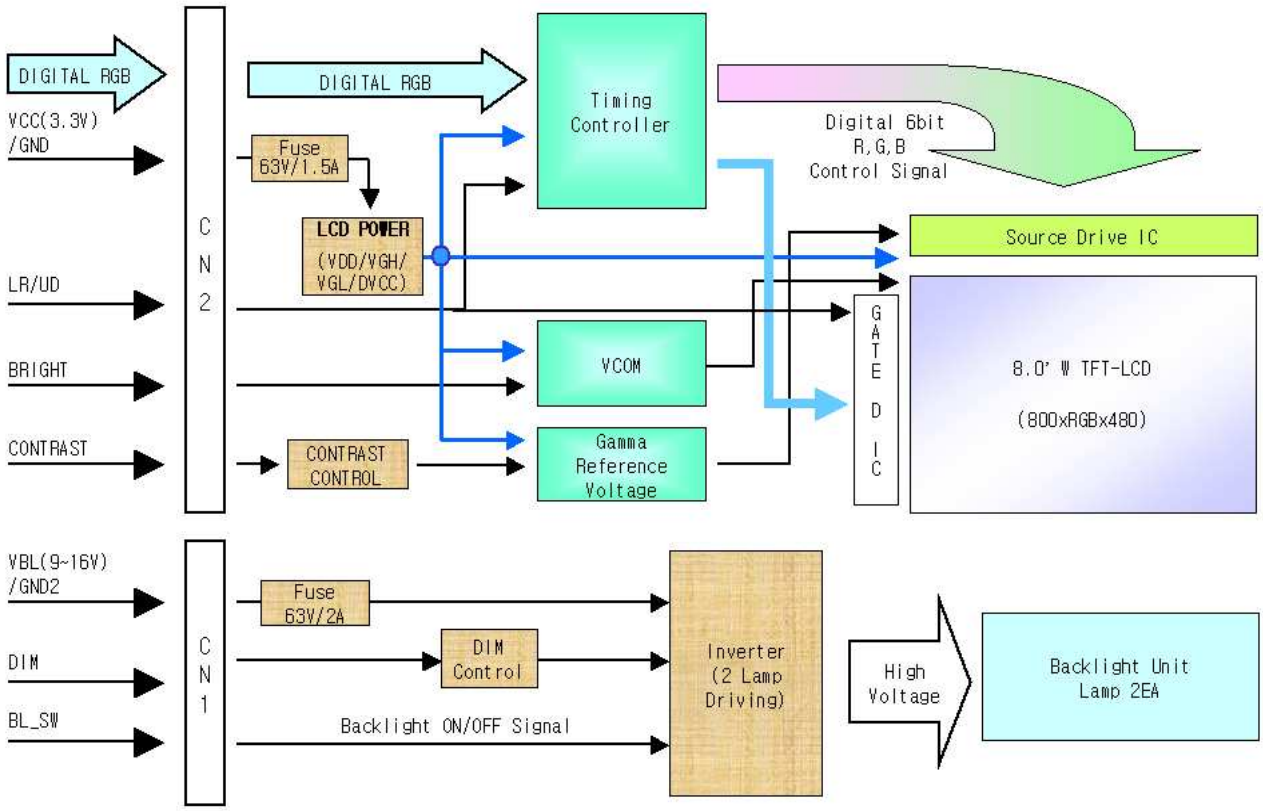
1. Summary

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 Digital RGB signal (18bit TTL level) input interface is available.

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.



3. General Specification

@T_a=25℃, Aging time: Over 30 minutes

CHARACTERISTIC ITEMS		SPECIFICATION
Input Signals	Power	DC +3.3V for logic power supply DC +9.0V ~ +16.0V for backlight
	Video	Digital RGB (18bits)
	Control	Brightness, Contrast
Active Screen Size (Diagonal)		8.0" (20.27㎝), 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		199mm (H) X 121mm (V) X 16.8mm (T) (Typ.) Transformer area : 18.5mm(T) (Typ.)
Main Viewing Direction		12 o'clock [Direction]
Pixel Pitch		0.2208 mm × 0.2070 mm
Display Modes		16:9
Luminance, white		500 cd/m^2 (Typ.)
Power Consumption		VCC : 1.8W (Typ.) @ VCC 3.3V & 25℃ VBL : 5.6W (Typ.) @ VBL 12V & 25℃
Weight		375g (Max)
Backlight		2 CCFL
Surface Treatment		Anti-Glare Treatment

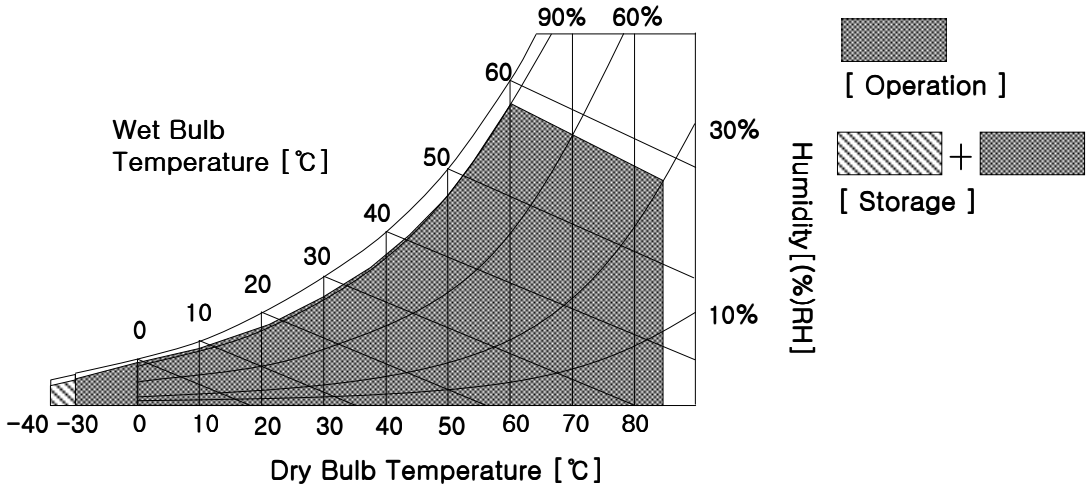
4. Absolute Maximum Rating

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		VCC	T_a=25℃	-0.3	3.8	Vdc	
		VBL	T_a=25℃	-0.3	24.0	Vdc	1
Input Signal	B/L Dimming	DIM	-	-0.3	5.0	Vdc	
	BRIGHT	BRIGHT		-0.3	4.0	Vdc	
	CONTRAST	CONTRAST		-0.3	4.0	Vdc	
	Display direction	LR_UD		-0.3	3.6	V	
	B/L Switch	BL_SW		-0.3	5.0	Vdc	
	LCD Test	RBF	-	-0.3	3.6	V	
	Digital RGB	R0-R5 G0-G5 B0-B5 DE,DCLK	-	-0.3	3.6	V	
Storage Temperature		T_{ST}	-	-40	85	℃	2
Operating Temperature		Ta	-	-30	85	℃	2,3,4

Notes :

1. 18V time duration is 60 minutes, 24V time duration is 1 minute.
2. When the temperature goes up rapidly, don't operate the LCM. 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)



5. Electrical Specifications

5-1. Interface (Input terminal:CN1)

This LCD uses an 10 pin connector , which is used for the Backlight operation, as an interface connection. The model name is **IP125-L10B-C26** manufactured by UJU Electronics. The matching connector is a **HP125-L10N-N26** model manufactured by UJU Electronics or a compatible model.

Pin No.	Pin Name	I/O	Description	Notes
1	VBL	I	Backlight Power Supply	
2	VBL	I	Backlight Power Supply	
3	VBL	I	Backlight Power Supply	
4	VBL	I	Backlight Power Supply	
5	GND2	I	Backlight Ground	
6	GND2	I	Backlight Ground	
7	GND2	I	Backlight Ground	
8	GND2	I	Backlight Ground	
9	BL_SW	I	Backlight Switch signal	
10	DIM	I	Backlight Dimming signal	

5-2 Interface (Input terminal:CN2)

This LCD uses an 30 pin connector , which is used for the module operation, as an interface connection. The model name is **IP125-L30B-C26** manufactured by UJU Electronics. The matching connector is a **HP125-L30N-N26** model manufactured by UJU Electronics or a compatible model.

Pin No.	Pin Name	I/O	Description	Notes
1	BRIGHT	I	Brightness control signal	
2	CONTRAST	I	Contrast control signal	
3	VCC	I	Video Power Supply	
4	VCC	I	Video Power Supply	
5	LR_UD	I	Display direction select signal	
6	DE	I	Digital RGB Data Enable	
7	GND	I	Ground	
8	B5	I	Digital BLUE Signal MSB	
9	B4	I	Digital BLUE Signal	
10	B3	I	Digital BLUE Signal	
11	B2	I	Digital BLUE Signal	
12	B1	I	Digital BLUE Signal	
13	B0	I	Digital BLUE Signal LSB	
14	GND	I	Ground	
15	G5	I	Digital GREEN Signal MSB	
16	G4	I	Digital GREEN Signal	
17	G3	I	Digital GREEN Signal	
18	G2	I	Digital GREEN Signal	
19	G1	I	Digital GREEN Signal	
20	G0	I	Digital GREEN Signal LSB	
21	GND	I	Ground	
22	R5	I	Digital RED Signal MSB	
23	R4	I	Digital RED Signal	
24	R3	I	Digital RED Signal	
25	R2	I	Digital RED Signal	
26	R1	I	Digital RED Signal	
27	R0	I	Digital RED Signal LSB	
28	GND	I	Ground	
29	CLK	I	Digital RGB Pixel Clock	
30	RBF	NC	Test pin for LCD manufacture	1

Note : 1. This pin should be connected to GND or open(No Connection) for a normal operation.

5-3. Electrical Characteristics

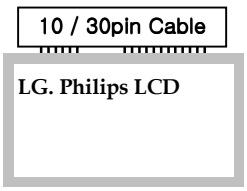
@T_a=25℃

Parameter		Symbol	Values			Unit	Notes
			Min.	Typ.	Max.		
Power Supply	Video Circuit	VCC	3.0	3.3	3.6	Vdc	
		ICC	460	550	640	mA	@VCC=3.3V
		IRUSH	-	-	1.7	Apeak	@VCC=3.3V
	B/L Inverter Circuit	VBL	9.0	12.0	16.0	Vdc	
		IBL	400	470	550	mA	@VBL=12V
			550	620	700	mA	@VBL=9V
		IRUSH	-	-	1.2	Apeak	@VBL=12V
Video Input Signal Voltage	Digital RGB	V_H	0.7*VCC	-	VCC	V	
		V_L	0	-	0.3*VCC	V	
Control Signal Input Voltage	Brightness	V_{BRIGHT}	0.5	2	3	Vdc	2 Section.6 note2
	Contrast	$V_{CONTRAST}$	1	1.75	2.3	Vdc	
	LR_UD	V_H	0.7*VCC	-	VCC	V	3
		V_L	0	-	0.3*VCC	V	
	BL_SW	V_H (ON)	2	-	5	V	
		V_L (OFF)	0	-	1	V	
B/L Dimming Adjust		DIM	2	-	3.3	Vdc	4

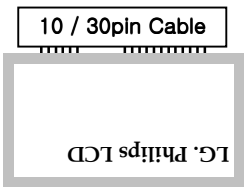
Notes :

1. The recommended operating conditions show the ranges in which the device can operate normally. Operation beyond the limit of the recommended operation conditions is not assured, even though operating conditions are within the limit of the maximum ratings.
2. The Brightness and Contrast control pin are preset on each Typical value by using pull-up and pull-down resisters inside the LCD. Therefore, when these pins are unconnected to the system connector(Hi-Z), these voltages are set on each Typical value (V_{BRIGHT} = 2V, $V_{CONTRAST}$ = 1.75V : Default Condition)
   If these pins are connected to the system connector, these input voltages should be kept the value which is intended for control within the specified range.
3. The LR_UD signal is selecting Display direction.

- LR_UD="Low"



- LR_UD="High or Hi-Z"



Notes :

4. Either DC or PWM signal can be used to control DIM.
   The luminance is in inverse proportion to DC value of DIM.
   If customer want to use PWM signal as DIM, PWM duty ratio should be adjusted to DC value which is corresponding with customer's use dimming ratio.
   (The below table is reference data)

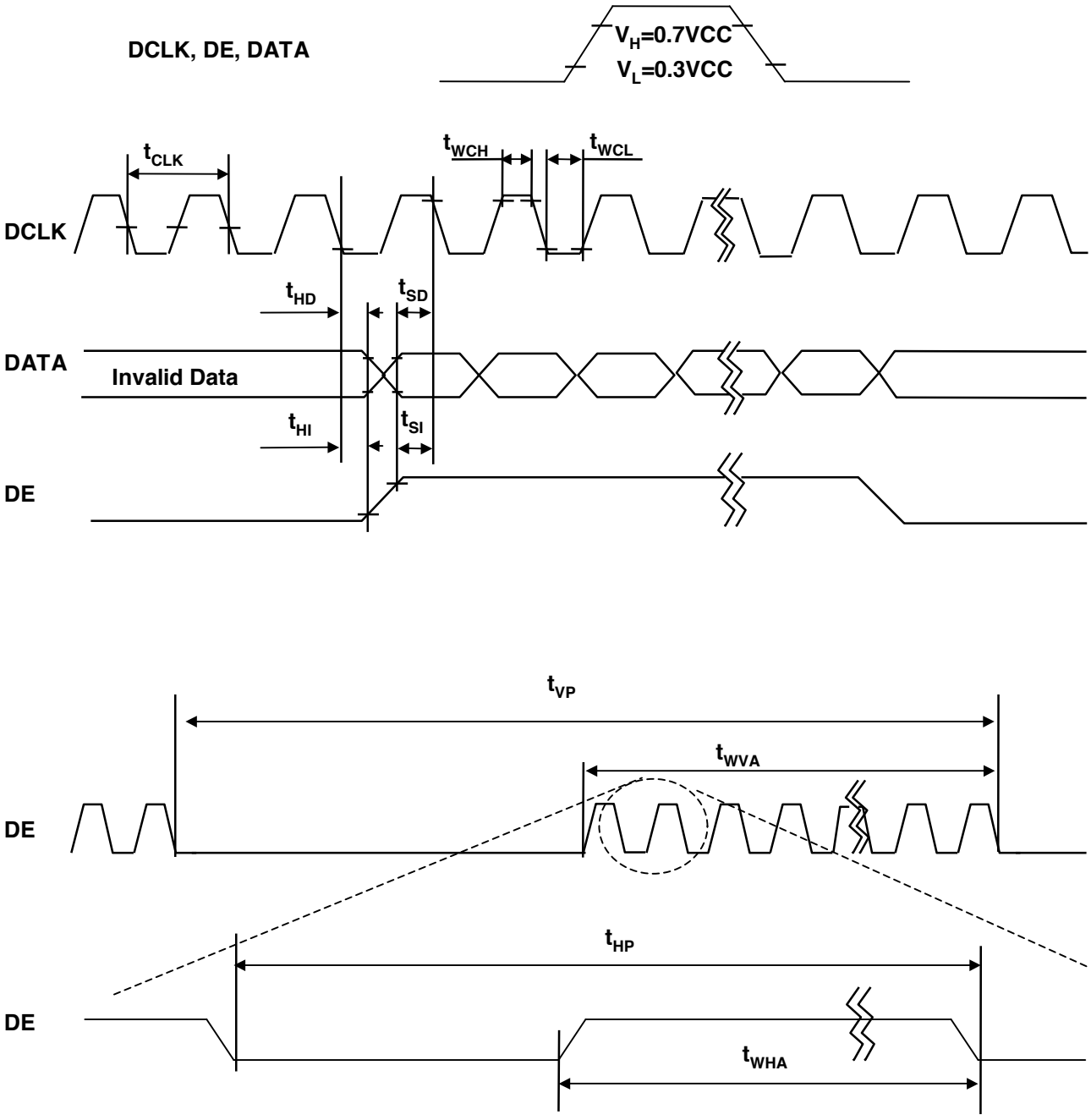
Backlight Dimming Ratio		67	100	%	Section 6 Condition ① White Luminance (Typ.) = 100%
DIM	DC	3.3	2	Vdc	
	PWM (Duty)	63	35	%	PWM signal - High 5V, Low 0V, Freq 150Hz

5-4. Interface Timing Specification (Digital RGB)

All of the interface signal timing should be satisfied with the following specifications for its proper operation.

ITEM		Symbol	MIN.	TYP.	MAX.	UNIT	NOTE
DCLK	Frequency	f_{CLK}	30	32.18	36	MHz	
	Width_Low	t_{WCL}	8	-	-	ns	
	Width_High	t_{WCH}	5	-	-		
Vertical	Frequency	f_{VP}	60	60	60	Hz	$f_{CLK} / (t_{HP} * t_{VP})$
DE	Setup Time	t_{SI}	6	-	-	ns	
	Hold Time	t_{HI}	6	-	-		
	Horizontal Valid	t_{WHA}	800	800	800	t_{CLK}	
	Horizontal Period	t_{HP}	1000	1056	1088		
	Vertical Valid	t_{WVA}	480	480	480	t_{Hp}	
	Vertical Period	t_{VP}	500	508	550		
DATA	Setup Time	t_{SD}	6	-	-	ns	
	Hold Time	t_{HD}	6	-	-		

5-4-1. Digital RGB Timing Diagram



Note : VCC means logic power voltage of LCD module internal. (typ. 3.3V)

5-4-2. Color Input Data Reference(Digital RGB)

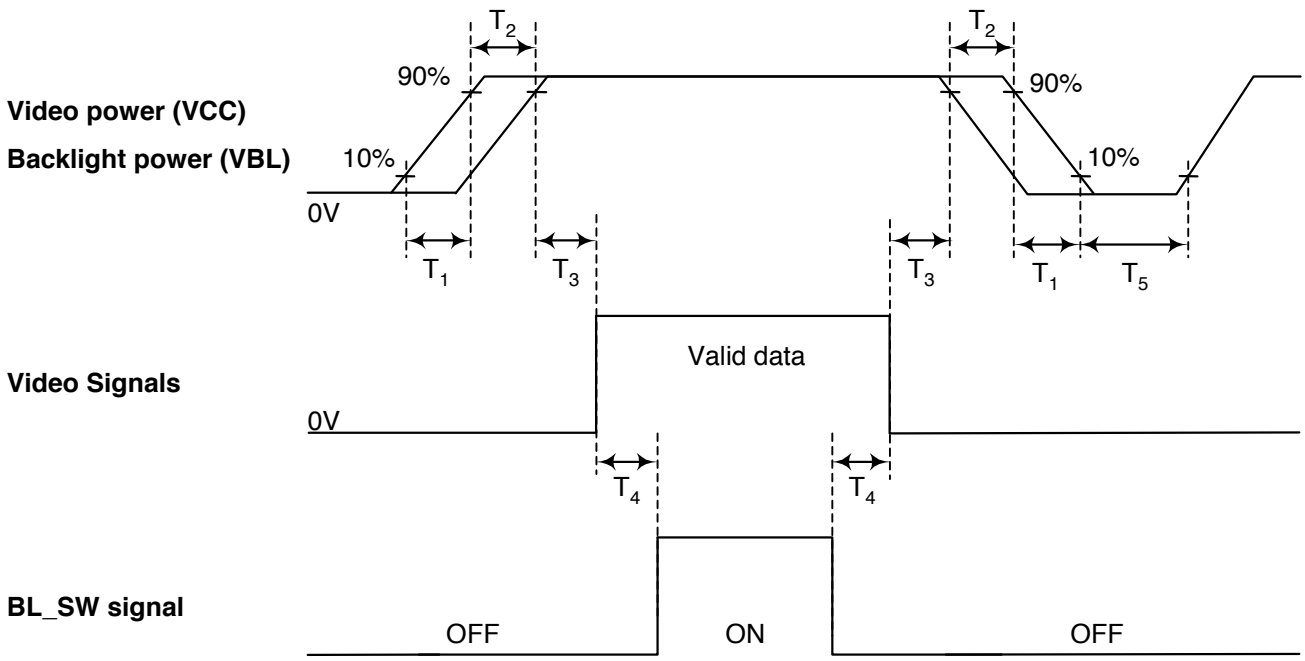
The brightness of each primary color(red,green and blue) is based on the 6-bit gray scale data input for the color ; the higher the binary input, the brighter the color.
The following table provides a reference for color versus data input.

COLOR DATA REFERENCE

Color		Input Color Data																	
		Red						Green						Blue					
		MSB					LSB	MSB					LSB	MSB					LSB
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	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	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	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
Red	Red(00) Dark	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	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(02)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63) Bright	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Green(00)Dark	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	1	0	0	0	0	0	0
	Green(02)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)Bright	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	Blue(00) Dark	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	1
	Blue(02)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63) Bright	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

5-5. Power Supply Input Sequence

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



Parameter	Value			Units	Note
	Min.	Typ.	Max.		
T_1	0	-	10	(ms)	
T_2	0	-	50	(ms)	1
T_3	0	-	50	(ms)	
T_4	600	-	-	(ms)	
T_5	1500	-	-	(ms)	

Notes :

1. We recommend that Video power and Backlight power are supplied simultaneously.
   If it is difficult to perform as our recommendation, the delay time(T_2) between these two power should be less than 50ms. In this case, any power of these can be the first within T_2 time.

6. Electro-optical Characteristics

@T_a=25, DIM = 2V, Aging time: Over 30 minutes

Parameter		Symbol	Values			Units	Condition	Notes
			Min	Typ	Max			
Contrast Ratio		CR	250	400	-	-	①	3
Surface Luminance, white		L_{WH}	370	460	-	cd/m2	①	4
			400	500	-	cd/m2	②	4
Luminance Variation		δ_{WHITE}	-	1.25	1.40	-	①	5
Response Time	Rise Time	Tr_R	-	10	15	ms	②	6
	Decay Time	Tf_D	-	20	25	ms		
Color Coordinates	Red	R_X	0.557	0.587	0.617	-	①	4 (Reference Value)
		R_Y	0.314	0.344	0.374			
	Green	G_X	0.295	0.325	0.355			
		G_Y	0.510	0.540	0.570			
	Blue	B_X	0.128	0.158	0.188			
		B_Y	0.111	0.141	0.171			
	White	W_X	0.270	0.300	0.330			4
		W_Y	0.290	0.320	0.350			
Viewing Angle	x axis, right(ϕ=0°)	Θr	65	70	-	degree	③	7
	x axis, left (ϕ=180°)	Θl	65	70	-			
	y axis, up (ϕ=90°)	Θu	55	60	-			
	y axis, down(ϕ=270°)	Θd	40	50	-			
Lamp Life Time		-	20,000	–	–	Hours		8

Notes :

1. Condition ① : V_{BRIGHT} = 2V, $V_{CONTRAST}$ = 1.75V (Default)
   These default values are preset by using pull-up and pull-down resisters inside the LCD.
   ② : V_{BRIGHT} = 0.5V, $V_{CONTRAST}$ = 1.75V (Full White)
   ③ : V_{BRIGHT} = 3V, $V_{CONTRAST}$ = 2.3V (Viewing Angle)
2. V_{BRIGHT} is in inverse proportion to luminance and $V_{CONTRAST}$ is in proportion to contrast ratio.
   These voltages can be controlled by user. But, in this case, the electro-optical quality can be deteriorated.
3. Contrast Ratio(CR) is defined mathematically as

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

4. 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.

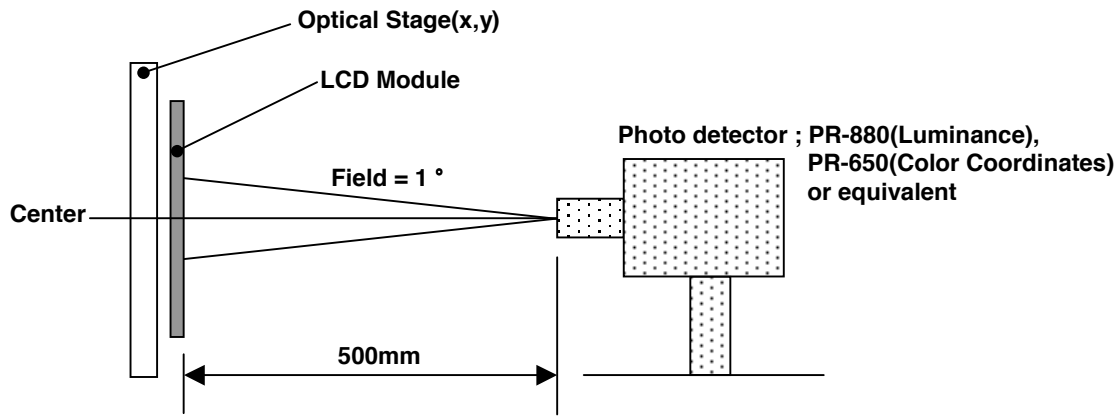
Notes :

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

$$\delta_{WHITE} = \text{Maximum}(L1,L2, \ldots L5) / \text{Minimum}(L1,L2, \ldots L5)$$

6. 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.
7. 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.
8. "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℃.

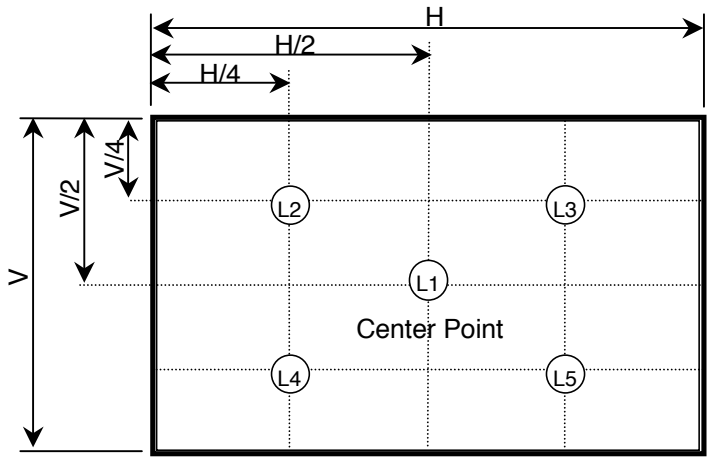
Fig. 1 Optical Characteristic Measurement Equipment and Method



Measuring Conditions ;
-Surroundings : Dark Room
-Temperature : Ta=25℃
-Input Video Signal : Digital RGB(TTL)
-Electrical parameters set typical values.
-Measured value at the center point of LCD panel after more than 30 minutes while backlight turning on.

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".

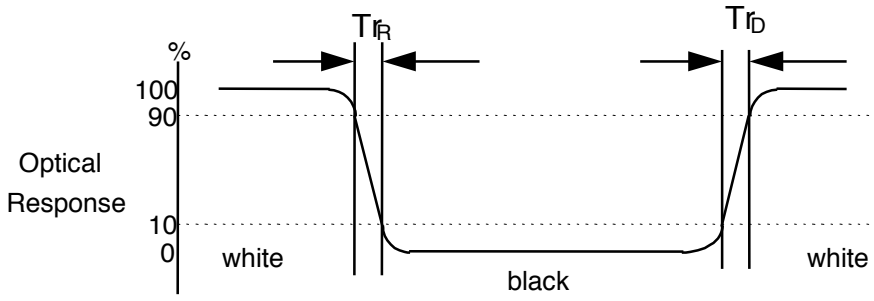
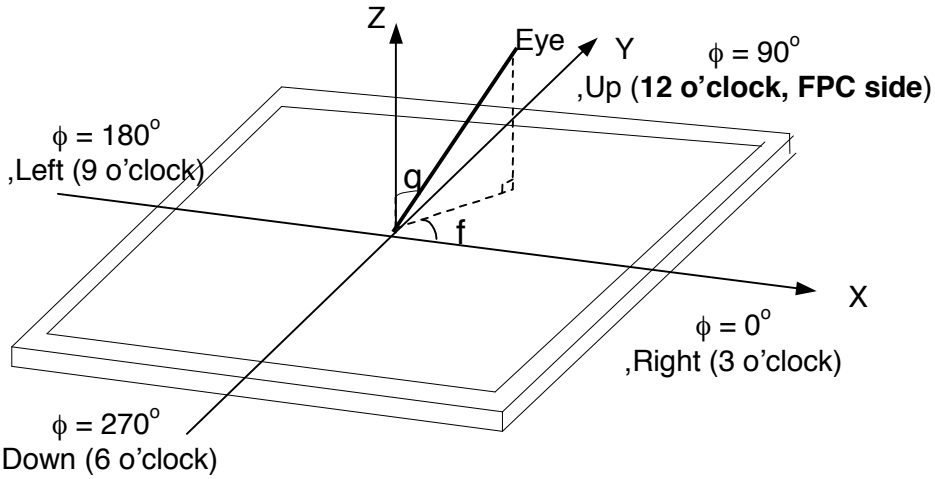


Fig. 4 Viewing angle

[Interface Connector Side]



7. Mechanical Characteristics

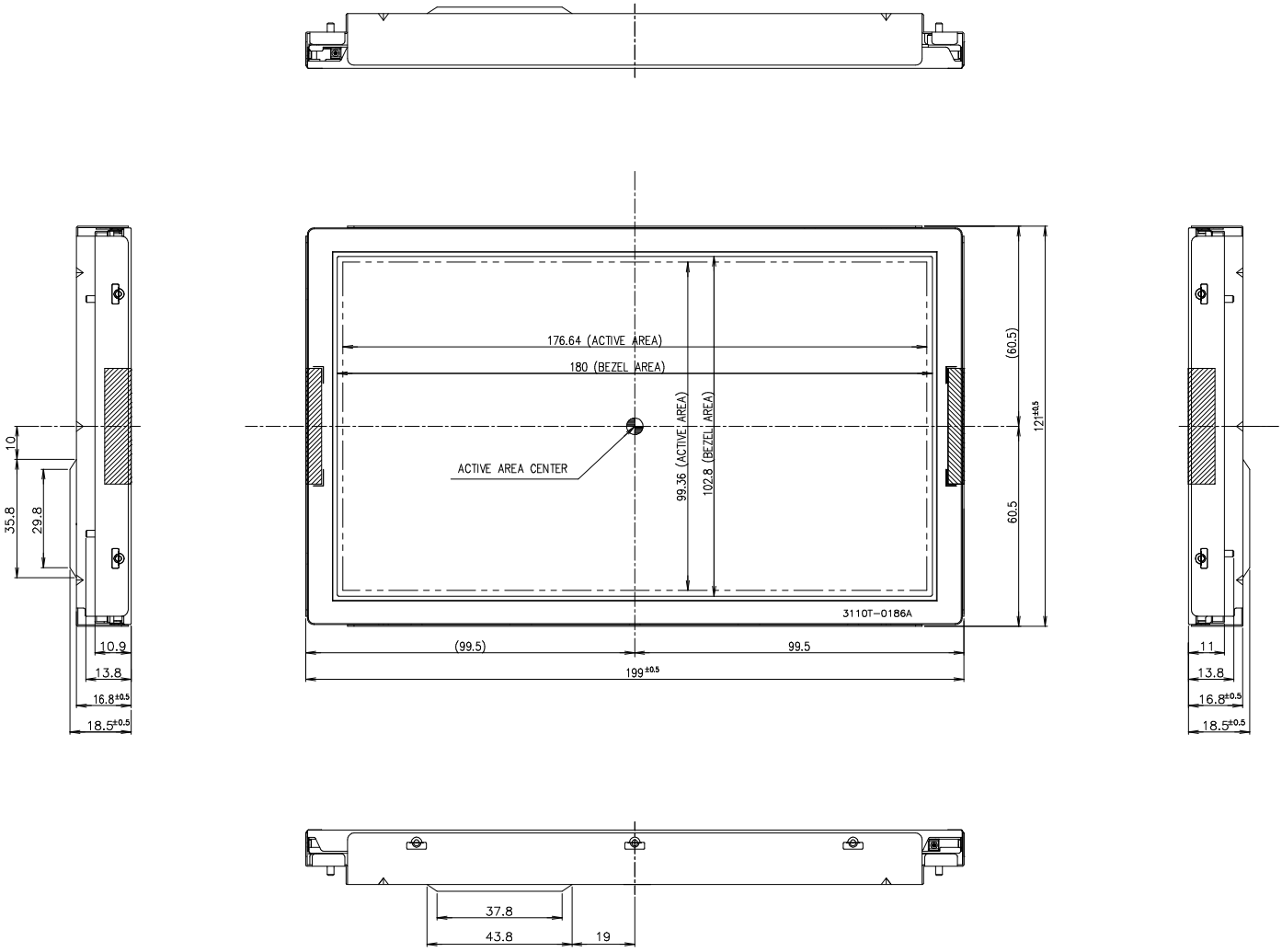
The contents provide general mechanical characteristics for this module. In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal	199.0 (± 1.0)mm
	Vertical	121.0 (± 0.5)mm
	Thickness	16.8 (± 0.5)mm 18.5 (± 0.5)mm:Trans area
Bezel Area	Horizontal	180.0 (± 0.5)mm
	Vertical	102.8 (± 0.5)mm
Active Display Area	Horizontal	176.64 mm
	Vertical	99.36 mm
Weight	375g (Max)	

<FRONT VIEW>

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

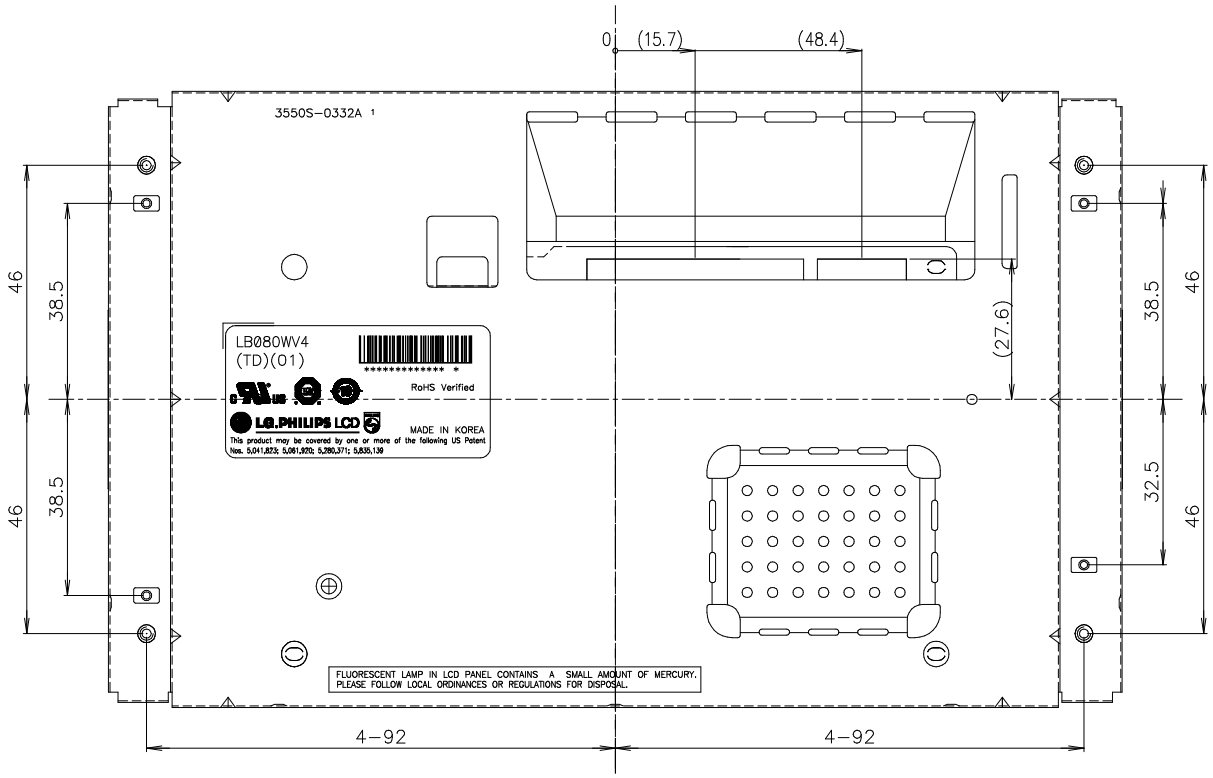
(12 o'clock direction)



<REAR VIEW>

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

(12 o'clock direction)



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	Ta=85℃ 240h	
4	Low Temperature Operation Test	Ta=-30℃ 240h	
5	High Humidity Operation Test	Ta=65℃/90%RH 240h	
6	Humid Heat Cyclic Test	Ta=-10℃~65℃/80~96%RH 240h	
7	Thermal Shock Test	- 1cycle : Ta=-40℃(0.5h) ~ 85℃(0.5h) - 240Cycles	
8	Electro Static Discharge Test	- Panel Surface : ±15kV, Air, Power On - Case Top, Cover Bottom : ±10kV, Direct, Power Off (Air : 330pF,2kΩ / Direct : 150pF,2kΩ / 10 times)	
9	Shock Test (non-operating)	Half sine wave, 50G, 11ms, three times One in each opposite direction of each perpendicular axis	
10	Vibration Test (non-operating)	- 5Hz to 200Hz logarithm sweep for 20min/cycle. - 5Hz to 12.2Hz:The amplitude is 10 mm p-p. - 12.2Hz to 100Hz:The acceleration is 3.0G 0-pk. - 101Hz to 200Hz:The acceleration is 1.5G 0-pk. - 3 axes, 18 sweeps per axis	
11	Vibration Test Temperature Cycle	-10Hz to 1000Hz, 20.9G, -40℃~70℃ - 8H×3Cycle	

• Ta ; Ambient Temperature

9. International Standards

9-1. Safety

a) UL 60950-1:2003, First Edition, Underwriters Laboratories, Inc.,
Standard for Safety of Information Technology Equipment.
b) CAN/CSA C22.2, No. 60950-1-03 1st Ed. April 1, 2003, Canadian Standards Association,
Standard for Safety of Information Technology Equipment.
c) EN 60950-1:2001, First Edition,
European Committee for Electrotechnical Standardization(CENELEC)
European Standard for Safety of Information Technology Equipment.

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
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.

10-2. Packing Form

a) Package quantity in one box : 12 pcs
b) Box Size : 475 x 262 x 182 (mm)

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 the 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) Response time depends on the temperature.(In lower temperature, it becomes longer.)
(2) 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.
(3) 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.
(4) When fixed patterns are displayed for a long time, remnant image is likely to occur.
(5) 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.

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.