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	TA01

SIGNATURE	DATE
/	
/	
/	

APPROVED BY	DATE
C.S. KYEONG /G.Manager	01.04.2007
REVIEWED BY	
J.D. KIM /S.Manager	Jan. 04. 2007
PREPARED BY	
D.H.JANG /Engineer	Jan. 04, 2007

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

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CONTENTS

RECORD OF REVISIONS

Revision No.	Revision Date	Page	Summary
0.0	Jul 14, 2006	-	First Draft (Preliminary)
0.1	Dec 20, 2006	8	Add PWM_DIM High / Low Voltage Range
		-	Final Specifications

Product Specifications

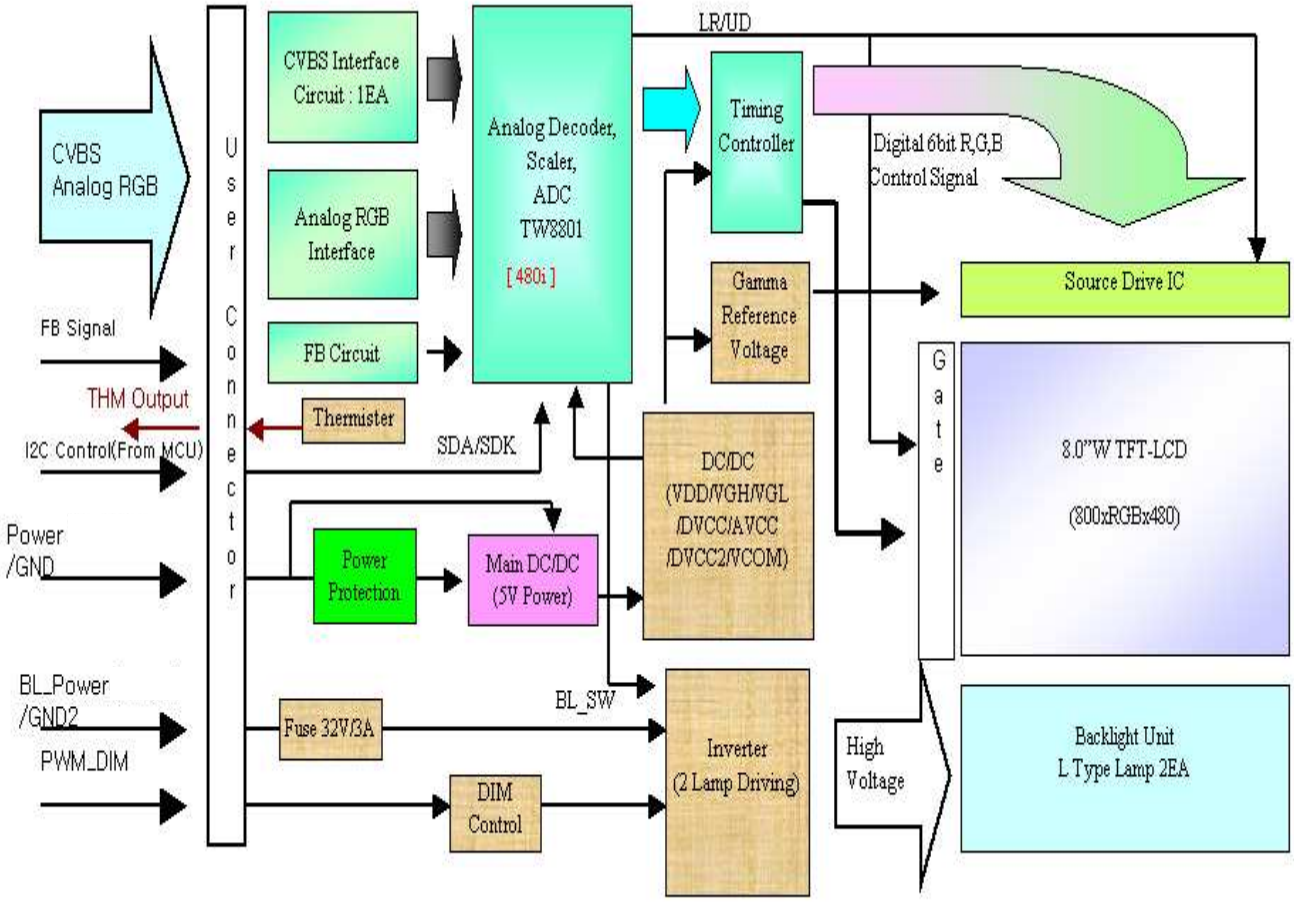
1. Summary

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 CVBS (Composite Video) , Analog RGB signal inputs.

The applications are not only FES(Family Entertainment System) 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.
- **It is needed an external microprocessor for display control.**



3. General Specification

@T_a=25℃, Aging time: Over 10 minutes

CHARACTERISTIC ITEMS		SPECIFICATION
Input Signals	Power	DC +8.5V ~ +18.0V for video power supply DC +8.5V ~ +18.0V for backlight
	Video	CVBS (NTSC/PAL) Analog RGB(Interlaced signal)
	Control	I²C serial control of video functions, Back light dimming
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		216.45mm (H) X 121mm (V) X 16.5mm (T) (Typ.) Transformer area:19.0mm(T) (Typ.)
Main Viewing Direction		12 o’clock [Direction]
Pixel Pitch		0.2208 mm × 0.2070 mm
Display Modes(User programmable)		Normal(4:3), Full(16:9)
Luminance, white		500 cd/m^2 (Typ.)
Power Consumption		VCC : 2.6W (Typ.) @ VCC 13.8V & 25℃ VBL : 10.8W (Typ.) @ VBL 13.8V & 25℃
Weight		515g (Typ.)
Backlight		2 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		VCC,VBL	T_a=25℃	-0.3	34.0	Vdc	1
Input Signal	CVBS	Video	VCC=13.8V 75Ω load	-	1.5	Vp-p	
	Analog RGB	RGB		-	1.5	Vp-p	
	RGB Composite Sync.	SYNC		-	1.5	Vp-p	
	I²C , FB	SCLK,SDAT FB	-	-0.2	3.7	V	
	PWM_DIM	PWM_DIM	-	-	500	Hz	
Storage Temperature		T_{ST}	-	-40	85	℃	2
Operating Temperature	Surface of Panel	T_P	-	-30	85	℃	2,3
	Ambient	Ta	-	-30	70	℃	2,3,4

Notes :

1. 24V time duration is two(2) minutes, 34V time duration is 50ms.
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 20 pin connector , which is used for the module operation, as an interface connection,
The model name is **55456-2069** manufactured by Molex.
The matching connector is a model **54596-2010** manufactured by Molex.

Pin No.	Pin Name	I/O	Description	Notes
1	VSYO	O	Vertical Sync Output	
2	HSYO	O	Horizontal Sync Output	
3	VBS1	I	Composite Video channel 1	
4	GND 1	I	Ground	
5	VR	I	Analog RED signal	
6	VG	I	Analog GREEN signal	
7	VB	I	Analog BLUE signal	
8	SYNC	I	Composite Sync for Analog RGB	
9	GND 1	I	Ground	
10	THM	O	Thermistor sensor output	
11	SCLK	I	I²C Clock	
12	SDAT	I/O	I²C Data	
13	GND 1	I	Ground	
14	VCC	I	Video Power Supply	
15	FB	I	Video Source selection signal	
16	PWM_DIM	I	Input signal for Backlight Dimming	
17	VBL	I	Backlight Power Supply	
18	VBL	I	Backlight Power Supply	
19	GND 2	I	Backlight Ground	
20	GND 2	I	Backlight Ground	

5-2. Electrical Characteristics

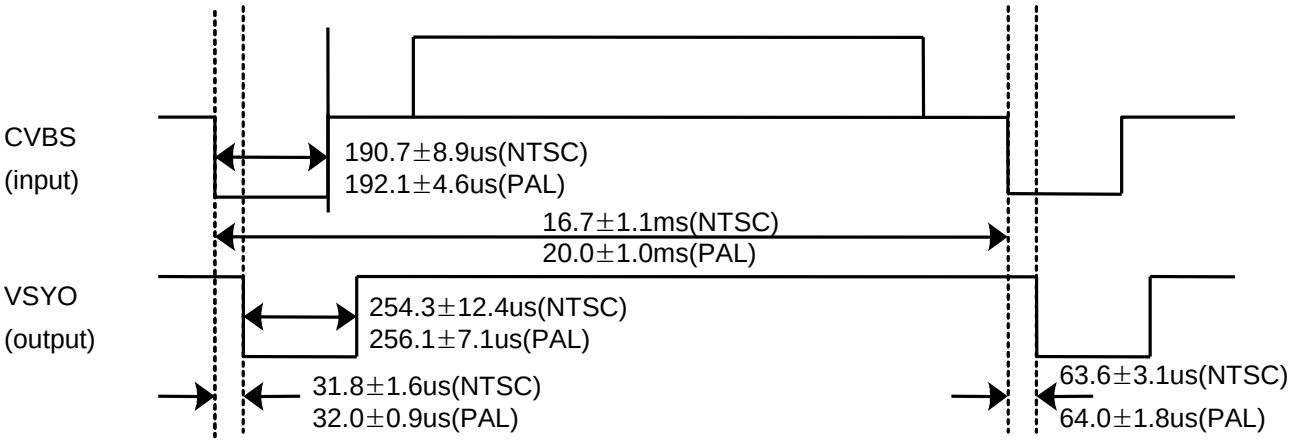
@T_a=25℃, Aging time: Over 10 minutes

Parameter			Symbol	Values			Unit	Notes	
				Min.	Typ.	Max.			
Power Supply		for Video Circuit	VCC	8.5	13.8	18.0	VDC		
			I_{CC}	-	0.2	0.4	Arms	@VCC=13.8V	
					0.3	0.5	Arms	@VCC=8.5V	
		for B/L Inverter	VBL	8.5	13.8	18.0	VDC		
			I_{BL}	-	0.8	1.0	Arms	@VBL=13.8V	
				-	1.3	1.5	Arms	@VBL=8.5V	
Video Input Signal Voltage		CVBS 1	V_{CVBS}	0.7	1.0	1.5	Vp-p	75Ω load	Refer to 5-3.
			V_{SYNC}	0.2	0.3	0.45			
			Chroma/Burst	0.2	0.3	0.45			
		Analog RGB	VR,VG,VB	0.5	0.7	1.0	Vp-p		Refer to 5-4.
			V_{CSYNC}	-	1.0	-			
Video Input Signal Timing	**NTSC** Vertical	Frequency	f_{VN}	57.14	59.93	62.86	Hz	5, Refer to 5-3, 5-4.	
		Sync width	t_{WVN}	2	3	4	t_{HN}		
	NTSC Horizontal	Frequency	f_{HN}	15.02	15.73	16.50	kHz		
		Sync width	t_{WHN}	4.0	4.7	5.4	us		
	PAL Vertical	Frequency	f_{VP}	48.64	50.00	52.60	Hz		
		Sync width	t_{WVP}	1.5	2.5	3.5	t_{HP}		
	PAL Horizontal	Frequency	f_{HP}	15.27	15.62	16.00	kHz		
		Sync width	t_{WHP}	4.5	4.7	4.9	us		
B/L Dimming Adjust		PWM_DIM	f_{PWM_DIM}	125	150	200	Hz	2	
			$V_{PWM\_DIM\_HIGH}$	3.3	-	5	V		
			$V_{PWM\_DIM\_LOW}$	0	-	0.8	V		
			Duty	2	-	100	%		
Video source select signal			FB	0	-	3.3	Vp-p	3,4	
I²C (SCLK,SDAT)		Voltage Level	High	2.5	-	3.6	V		
			Low	0	-	0.8			
		Clock Frequency	f_{SCLK}	0	-	400	kbit/s		
Sync output voltage(for OSD)			V_{VSYO},V_{HSYO}	0	-	3.7	Vp-p		

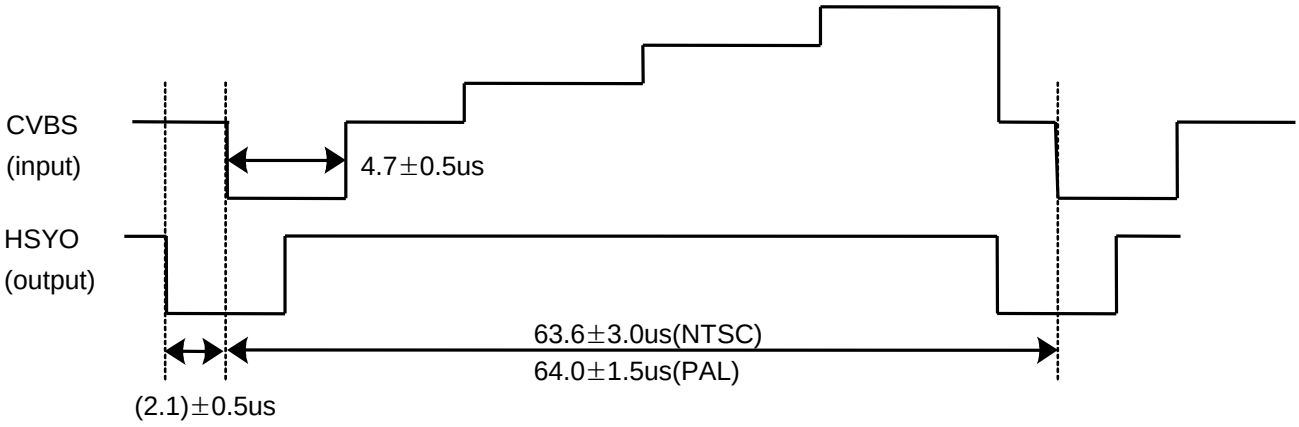
Notes)1. The recommended operating conditions show the ranges in which the device can operate normally. Operation beyond the limit of the recommended operation conditions is not assured, even though operating conditions are within the limit of the maximum ratings.
2. The PWM_DIM input is internally pulled up to +5V.
3. “FB” is a signal for video source selection.(CVBS,Analog RGB,Overlay) For more detail information, refer to the specification of video processor applied to LCD module.
4. Video processor has two available FB voltage input ranges, 0~1V and 1~2V. The using range could be selected by MCU setting. And, if you want to use this port as a switch for selecting one signal between CVBS and analog RGB, you can implement it as selecting the FB voltage between 0V or 3.3V.
5. We recommend to use Typ. value, but if customer will not use Typ. value, customer's MCU(Micro Control Unit) should adjust display setting to prevent from abnormal display(display shift, distortion, etc…).

5-3. CVBS Timing Diagram

[Vertical timing]

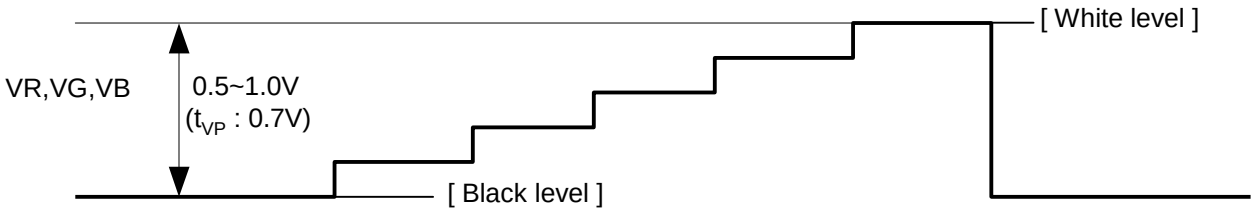


[Horizontal timing]

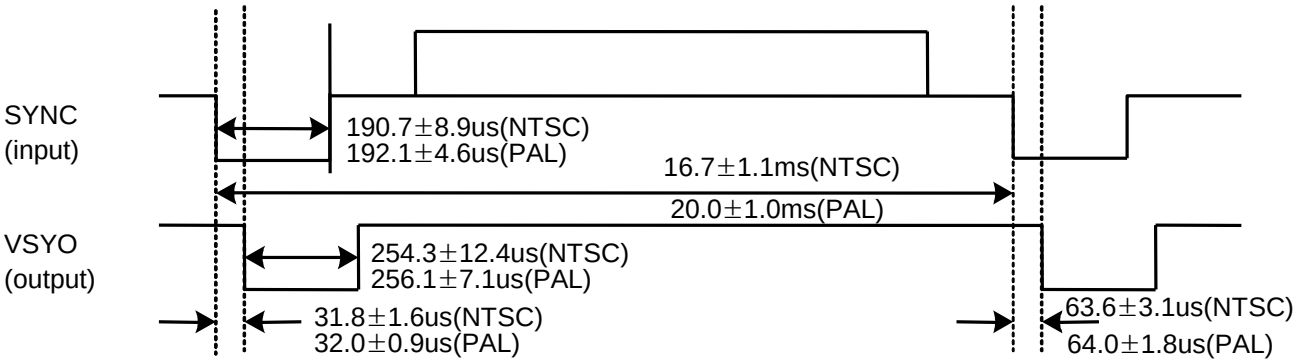


5-4. Analog RGB Amplitude & Timing Diagram

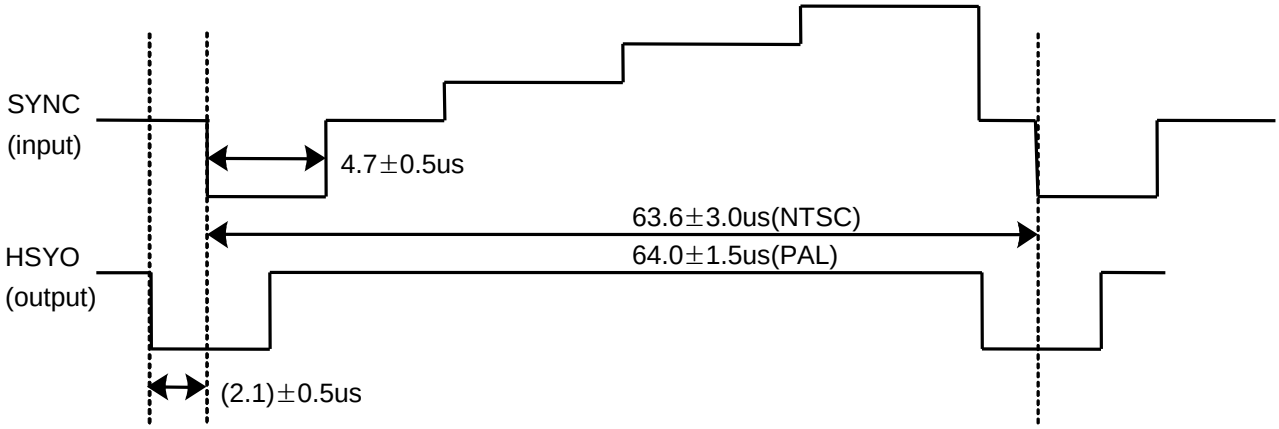
[Analog R,G,B amplitude]



[SYNC vertical timing]



[SYNC horizontal timing]



5-5. Display Control

All display control is conducted via commands sent on I²C interface to the display video controller. Through this command link the user can select input sources, adjust numerous video processing characteristics and control advanced features such as video overlay and OSD.

5-5-1. Features of the display controller

A partial list of display features controlled via I²C interface are:

FEATURE	DESCRIPTION
Video source selection	Selection from CVBS , Analog RGB
Video overlay	Overlay analog RGB over CVBS on pixel by pixel basis.
Video scaling	Scales incoming video to user selectable displayed resolution
De-interlacing	CVBS de-interlacing using 2 line average method
Digital comb filter	3 line digital adaptive filter for chroma and luminance separation
Format auto detection	Detects CVBS formats: NTSC , PAL , SECAM
Appearance adjustment	Color, Tint, Brightness, Contrast, Sharpness
OSD	8 color, 256 character font ROM, 32 character font SRAM
Video presence	Detects if video is present on any inputs
Auto power moding	Turn display on/off based on presence of video signals
Gamma correction	112 point gamma correction table

5-5-2. Display microprocessor requirements

The purpose of this microprocessor is to load default values into the display video controller registers.
The display video controller registers are accessed via 2-wire serial bus interface.
It operates as slave device. Serial clock and data lines transfer data from the bus master at a rate up 400kbit/s(Maximum).

5-6. Thermistor Characteristics

The display module shall incorporate a NTC thermistor surface mounted to the display circuit board.
The thermistor is to be connected to connector pins(THM) and GND1.
The user of LCD module can utilize this thermistor for some special purpose.
For example, the user can measure display temperature from the thermistor and then turn off backlight when LCD module temperature exceeds maximum rating.

Temperature (℃)	Resistance (kΩ, Typ.)
-40	1227.2628
-35	874.4491
-30	630.8514
-25	460.4568
-20	339.7972
-15	253.3626
-10	190.7661
-5	144.9635
0	111.0867
5	85.8417
10	66.8613
15	52.4701
20	41.4709
25	33.0000
30	26.4303
35	21.2983
40	17.2658
45	14.0761
50	11.5377
55	9.5058
60	7.8702
65	6.5494
70	5.4751
75	4.5950
80	3.8742
85	3.2815
90	2.7887

NCP 18WB333J03RB characteristics

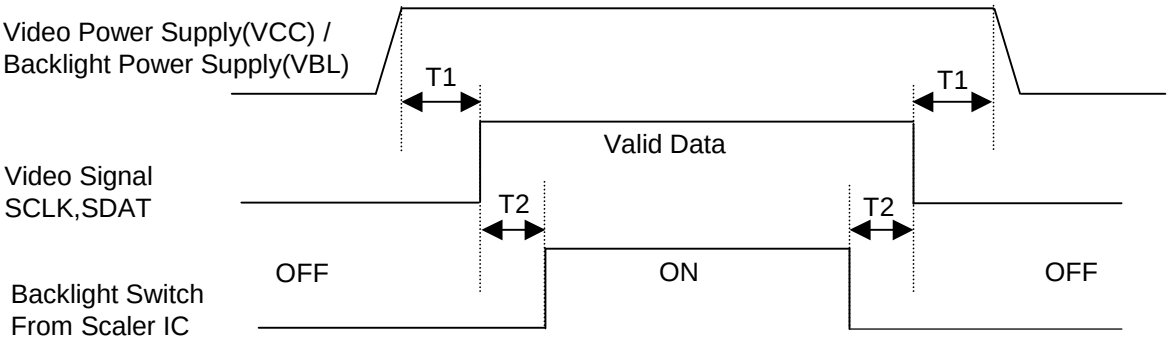
5-7. Power Supply Input Sequence

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

▶ Power On : VCC/VBL →I²C SCLK,SDAT, Video Signal → Backlight Switch ON

▶ Power Off : Backlight Switch OFF → I²C SCLK,SDAT ,Video Signal → VCC/VBL

(Video signal = CVBS, Analog RGB)



Parameter	Values			Units
	Min.	Typ.	Max.	
T1	0	-	50	ms
T2	200	-	-	ms

▣ I²C Control Reset Function

When the power supply(VCC) is turned off, all internal variants of display video processor is cleared.

Therefore, for the normal operation after power down, all of the variants should be rewritten through I²C.

6. Electro-optical Characteristics

@T_a=25, PWM_DIM duty = 100%

Parameter		Symbol	Values			Units	Notes
			Min	Typ	Max		
Contrast Ratio		CR	250	400	-	-	1
Surface Luminance, white		L_{WH}	425	500	-	cd/m^2	2
Luminance stabilize time @-30℃		$t_{LS(-30℃)}$	-	-	120	sec	3
Luminance Non-Uniformity		LNU_W	-	-	20	%	4
Response Time	Rise Time	Tr_R	-	10	15	ms	5
	Decay Time	Tr_D	-	20	25	ms	
Color Coordinates	Red	R_X	**(0.550)**	**(0.600)**	**(0.650)**	-	**2 Reference Value**
		R_Y	**(0.303)**	**(0.353)**	**(0.403)**		
	Green	G_X	**(0.288)**	**(0.338)**	**(0.388)**		
		G_Y	**(0.486)**	**(0.536)**	**(0.586)**		
	Blue	B_X	**(0.107)**	**(0.157)**	**(0.207)**		
		B_Y	**(0.095)**	**(0.145)**	**(0.195)**		
	White	W_X	0.263	0.313	0.363		2
		W_Y	0.279	0.329	0.379		
Viewing Angle	x axis, right(ϕ=0°)	Θr	65	70	-	degree	6
	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		-	10,000	–	–	Hours	7

Notes)

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(L5) of the LCD with all pixels displaying white at the distance of 50cm by PR-880. Color Coordinates are measured at the center point(L5) 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. Max time to reach 50% of typical surface luminance value.

4. The panel total luminance non-uniformity of white**(**LNU_W**)** is determined by measuring the luminance (L_N) at each test position 1 through 9. LNU_W is the value of dividing the difference of the maximum L_N of 9 points luminance and the minimum L_N of 9 points luminance by average L_N of 9 points luminance. For more information see Fig. 2.

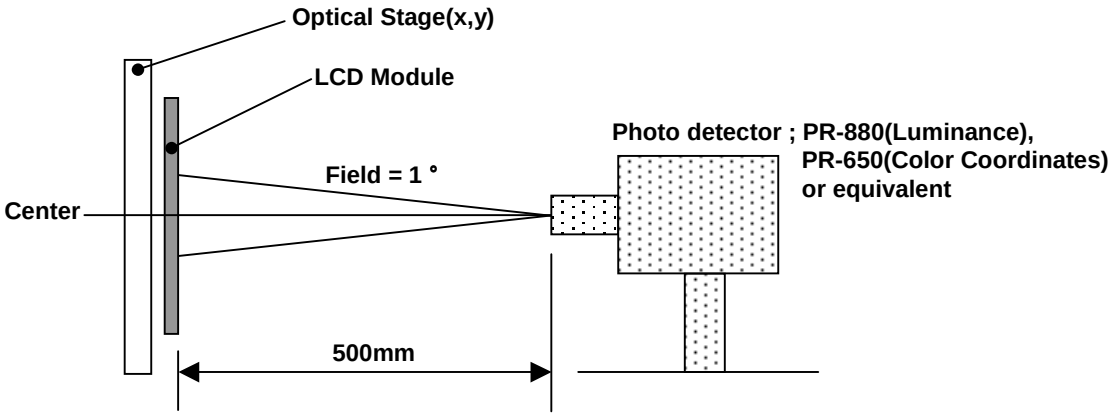
$$LNU_W = [\ (\text{Maximum}(L_1, L_2, \ldots L_9) - \text{Minimum}(L_1, L_2, \ldots L_9))\ /\ \text{Average}(L_1, L_2, \ldots L_9)\ ] \times 100\%$$

5. 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.

Notes)

6. 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.
7. "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℃.

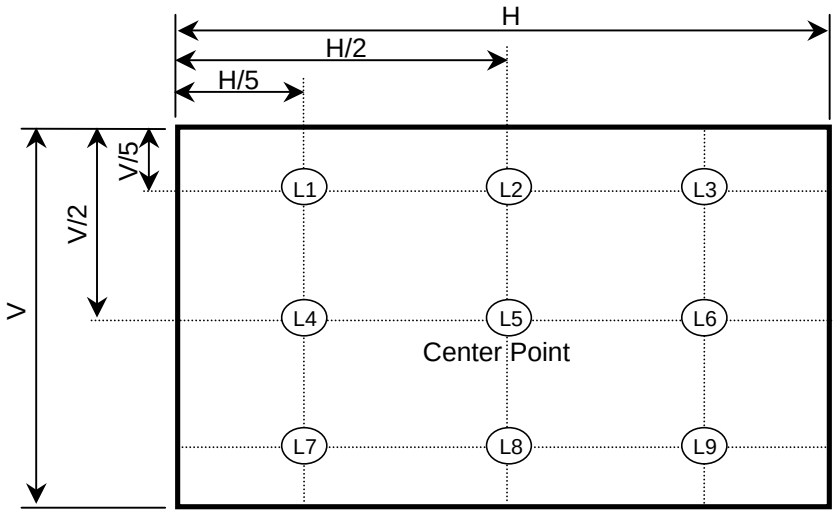
Fig. 1 Optical Characteristic Measurement Equipment and Method



Measuring Conditions ;
-Surroundings : Dark Room
-Temperature : Ta=25℃
-Input Video Signal : CVBS
-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 non-uniformity>



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”.

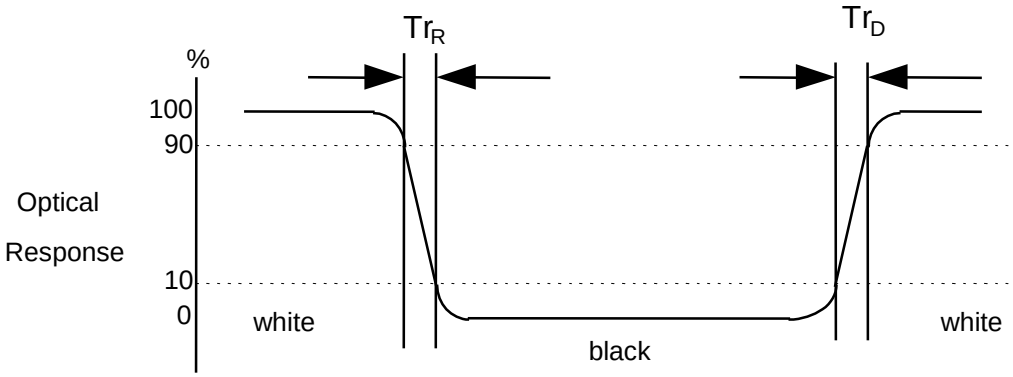
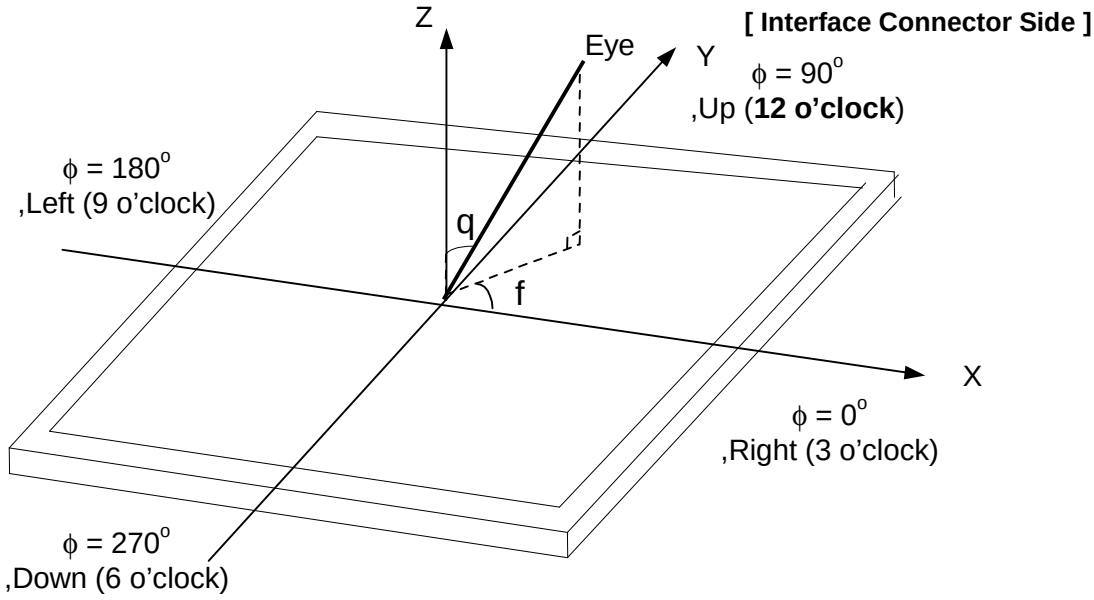


Fig. 4 Viewing angle



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.

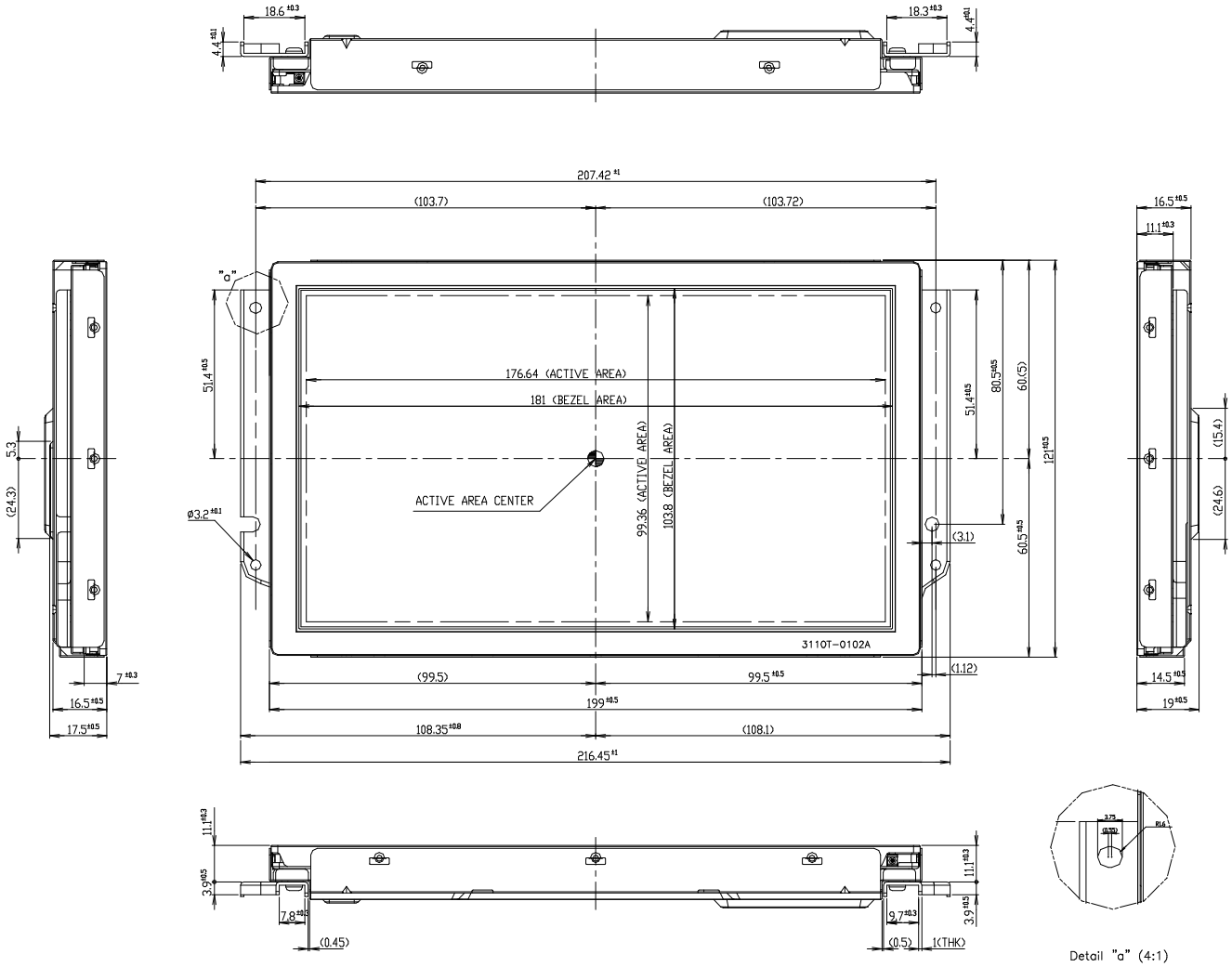
Outline Dimension	Horizontal	216.45 (± 1.0)mm
	Vertical	121.0 (± 0.5)mm
	Thickness	16.5 (± 0.5)mm 19.0 (± 0.5)mm:Trans area
Bezel Area	Horizontal	181.0 (± 0.5)mm
	Vertical	103.8 (± 0.5)mm
Active Display Area	Horizontal	176.64 mm
	Vertical	99.36 mm
Weight	515g Typ.	

Product Specifications

<FRONT VIEW>

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

(12 o'clock direction)

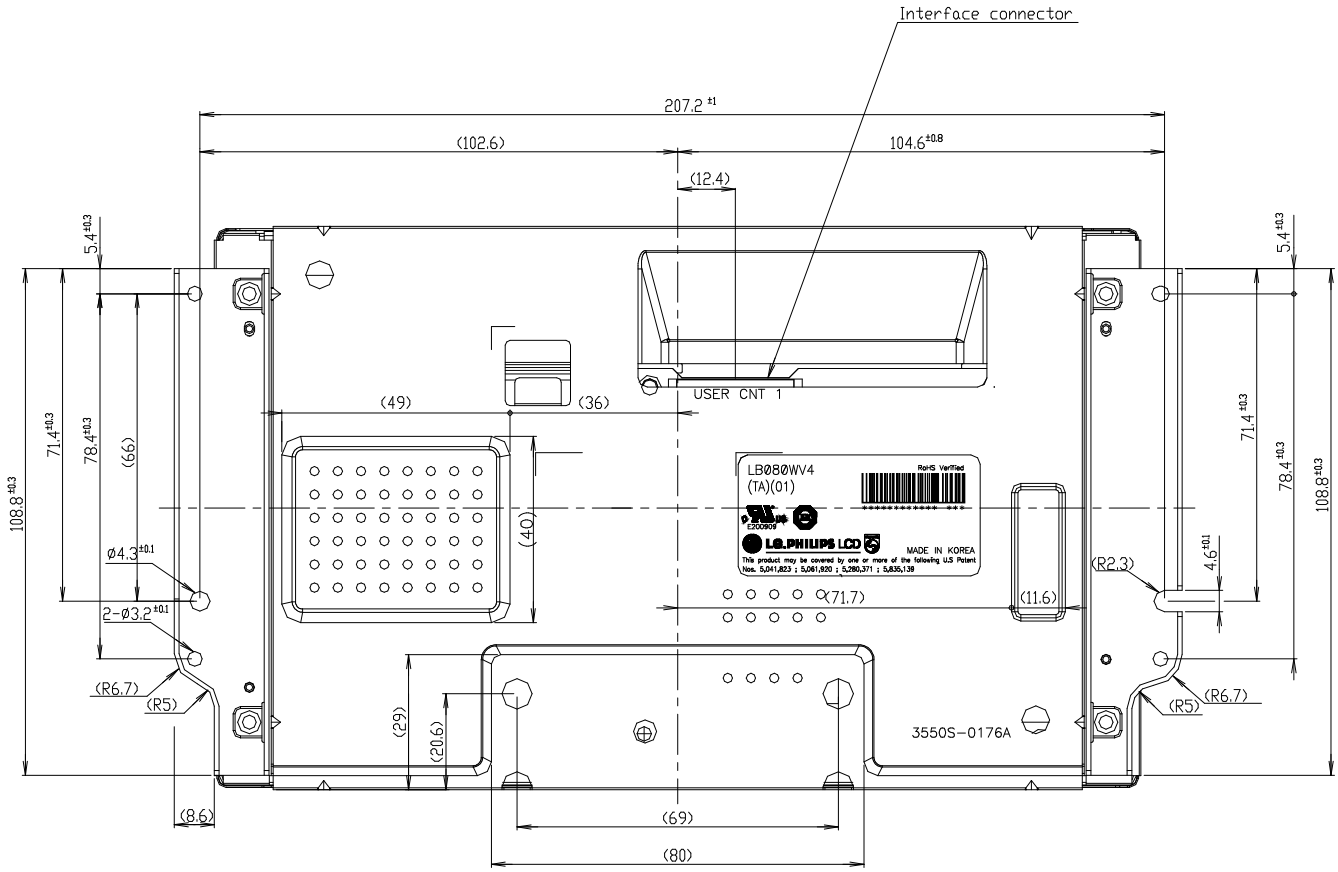


Notes : One of customers apply a LCM to the system upside down.

<REAR VIEW>

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

(12 o'clock direction)



Notes : One of customers apply a LCM to the system upside down.

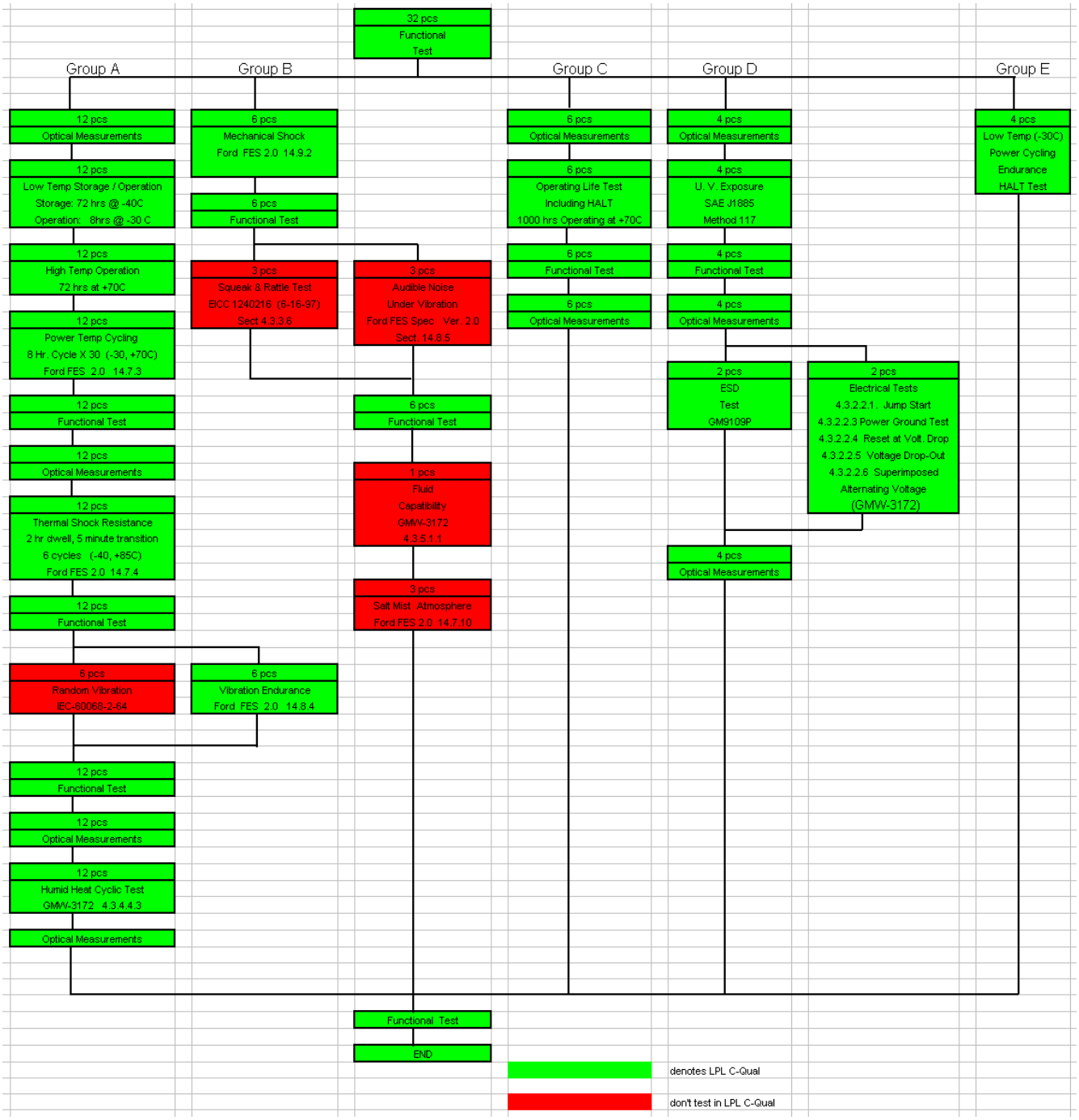
8. Qualification Testing

8-1. 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 : 2kΩ, 330pF, ±15kV (direct discharge, five times) -Input terminal : 2kΩ, 150pF, ±8kV	
7	Shock Test (non-operating)	Half sine wave, 50G, 10ms One in each opposite direction of each perpendicular axis	
8	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	
9	Thermal Shock Test	-40℃(0.5h) ~ 85℃(0.5h) / 100 cycles (no operation)	

• Ta ; Ambient Temperature, Tp ; Panel surface Temperature

8-2. Qualification Test Flow



Notes)

1. We test these items as a just reference. We don't guarantee the test results.

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

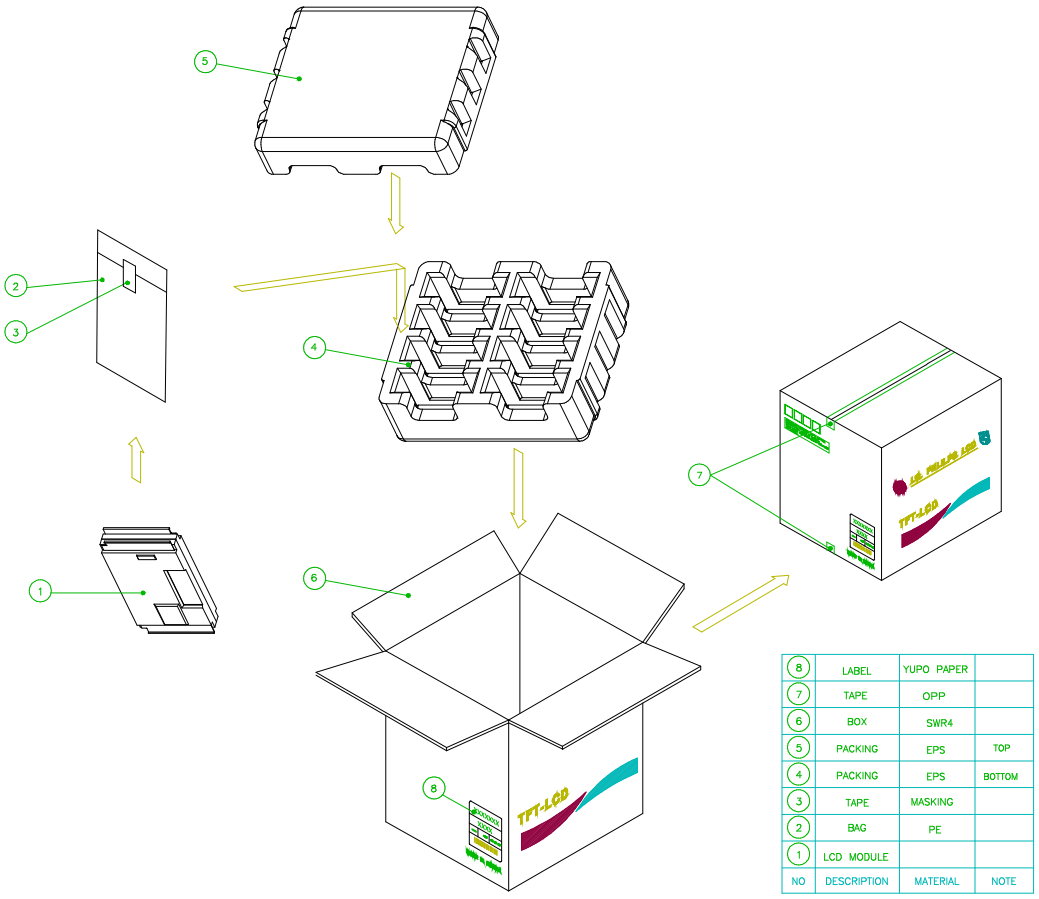
b) Location of Lot Mark

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.

Note) On the request of customer, we will be able to attach customer's own label.

10-2. Packing Form

a) Package quantity in one box : 16 pcs
b) Box Size : 333 x 282 x 280 (mm)



NO	DESCRIPTION	MATERIAL	NOTE
8	LABEL	YUPO PAPER	
7	TAPE	OPP	
6	BOX	SWR4	
5	PACKING	EPS	TOP
4	PACKING	EPS	BOTTOM
3	TAPE	MASKING	
2	BAG	PE	
1	LCD MODULE		

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.