Product Specification

# SPECIFICATION
# FOR
# APPROVAL

( ) Preliminary Specification
( ● ) Final Specification

| Title | 7.0”W (400 X RGB X 234) TFT- LCD |
|---|---|

| | |
|---|---|
| BUYER | |
| MODEL | |

| | |
|---|---|
| SUPPLIER | LG Display CO., Ltd. |
| MODEL | LB070WQ3 |
| SUFFIX | TM05 |

| SIGNATURE | DATE |
|---|---|
| / | |
| / | |
| / | |

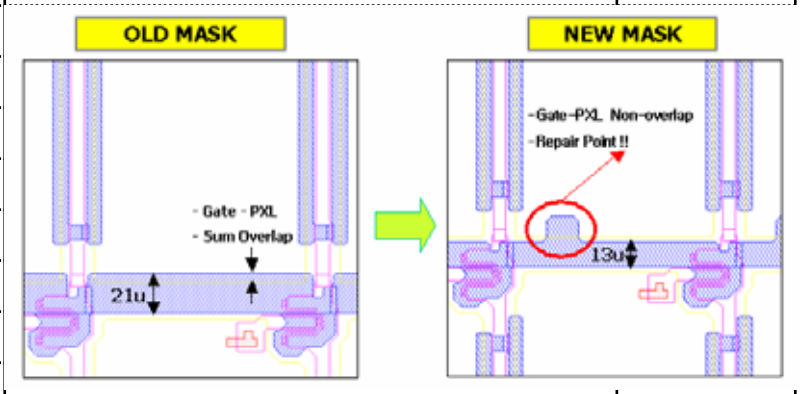
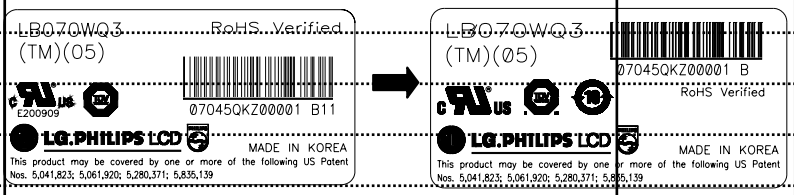
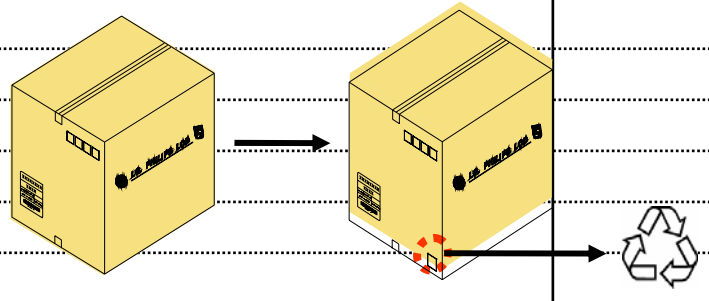
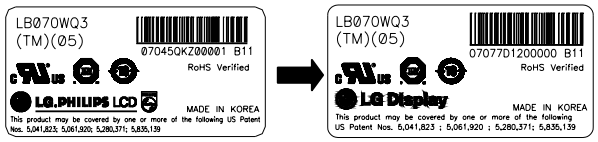
| APPROVED BY | DATE |
|---|---|
| J. D. Kim / Chief Engineer | |
| **REVIEWED BY** | |
| S. G. Kim / Senior Engineer | |
| **PREPARED BY** | |
| Y. B. Park / Engineer | |

**Product Engineering Dept.**
**LG Display Co., Ltd**

# Contents

# Product Specification

## Record of Revisions

| Revision No. | Revision Date | Page | Description | Note |
|---|---|---|---|---|
| 1.0 | Aug.31.2006 | - | First Draft(Final) | |
| | | 1, 18 | Model Suffix : TM04 → TM05 | [Changed] |
| 1.1 | Nov. 7.2006 | - | TFT pixel structure change to remove flickering. | [Changed] |
| | | |  | |
| 1.2 | Dec.21.2006 | 21 | 11-2 Packing Form | [Changed] |
| 1.3 | Jan. 24.2007 | 17 | LCM Label :China RoHS Mark[addition] | |
| | | |  | |
| | | - | Pallet label Size Change : 102×165 → 100×100 [mm]<br>The Number of box label change : 2ea → 1ea<br>Add to Recycle Marking in Box<br>  | |
| 1.4 | Apr. 23. 2008 | 18 | - LCM label : Changing the company logo (LG PHILIPS LCD → LG Display) | [Changed] |
| | | |  | |

## Product Specification

### Record of Revisions

| Revision No. | Revision Date | Page | Description | Note |
|---|---|---|---|---|
| | | 21 | Changing the Packing LOT Mark | [Changed] |
| | | 22 | LCM label Company logo Parallel use :<br>LG PHILIPS LCD and LG Display | [Changed] |
| | | - | - LCM label : Changing manufacture country by transferring manufacture site of cell and backlight unit.<br>- LCM label Manufacturing site Parallel use:<br>MADE IN KOREA and MADE IN CHINA | [Changed]<br>[Changed] |
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## 1. Summary

This module utilizes amorphous silicon thin film transistors and a 16:9 aspect ratio. A 7” active matrix liquid crystal display allows full color to be displayed.

The applications are Portable DVD, Multimedia applications and others AV system.

## 2. Features

•Utilizes a panel with a 16:9 aspect ratio, which makes the module suitable for use in wide-screen systems.
•The 7” screen produces a high resolution image that is composed of 93,600 pixel elements in a stripe arrangement.
•Wide viewing angle technology is employed.
[The most suitable viewing direction is in the 6 o’clock direction.]
•By adopting an active matrix drive, a picture with high contrast is realized.
•A thin, light and compact module is accomplished through the use of COG mounting technology.
•By adopting a high aperture panel, high transmittance color filter and high transmission polarizing plates, transmittance ratio is realized.

## 3. General Specification

| Characteristic Item | Specification |
|---|---|
| Display Technology | a-Si TFT active matrix |
| Display Mode | TN Type Full Color / Transmitting Type / Normally White |
| Screen Size (Diagonal) | 6.95” (17.657cm) |
| Aspect Ratio | 16:9 |
| Outline Dimension (W x H x D) | 167.5[mm] X 93.2[mm] X 6.9 [mm] Typ. |
| Active Area | 156(H) [mm] X 82.719(V) [mm] Typ. |
| Number Of dots | 400(H) X 3(RGB) X 234(V) |
| Dot Pitch | 0.130(W) [mm] X 0.3535(H) [mm] |
| Color Filter Array | RGB vertical stripes |
| Weight | 170g (Typ.) |
| Backlight | CCFL with 3 wave-length spectrum (L Type) |
| Surface Treatment | Anti-Glare Treatment |

## 4. Interface (Input terminal)

1> TFT-LCD panel driving part

| Pin No. | Symbol | I/O | Function | Remark |
|---|---|---|---|---|
| 1 | VGH | i | Power supply for gate driver(High level) | |
| 2 | OPEN | - | Open | |
| 3 | CS | i | CST electrode driving signal | |
| 4 | MODE2 | i | Control signal for gate driver | |
| 5 | MODE1 | i | Control signal for gate driver | |
| 6 | Up/Down | i | Control signal for gate driver | |
| 7 | GSP | i | Start signal for gate driver | |
| 8 | GSC | i | Clock signal for gate driver | |
| 9 | VCC | i | Power supply for gate driver Logic(Low level) | |
| 10 | OPEN | - | | |
| 11 | OPEN | - | | |
| 12 | VSS | i | Power supply for gate driver(Low level) | |
| 13 | OPEN | - | | |
| 14 | OPEN | - | | |
| 15 | VGL | i | Gate off voltage | |
| 16 | VCOM | i | Common electrode driving signal | |
| 17 | GND | i | GND | |
| 18 | SSC | i | Clock signal for source driver | |
| 19 | SSP_L | i/o | Start signal for source driver | |
| 20 | SOE | i | Control signal for source driver | |
| 21 | TST | i | Hi=VSH | |
| 22 | Left/Right | i | Control signal for source driver | |
| 23 | SSP_R | i/o | Start signal for source driver | |
| 24 | SAM | i | Control signal for source driver | |
| 25 | VA(B) | i | Color video signal Blue | |
| 26 | VB(G) | i | Color video signal Green | |
| 27 | VC(R) | i | Color video signal Red | |
| 28 | GND | i | GND | |
| 29 | VSHA1 | i | Power supply for source driver(High level) | |
| 30 | VSHA2 | i | Power supply for source driver(High level) | |
| 31 | VSHL2 | i | Power supply for source driver(High level) | |
| 32 | VSHL1 | i | Power supply for source driver(High level) | |

* Input connector for the operation of LCD module : SFV32R-1ST(FCI) or GF053-32S-LSS(LGC) or equivalent

2> Backlight fluorescent tube driving part

| Terminal | No. | Symbol | Function | Remark |
|---|---|---|---|---|
| CN1 | 1 | LV | Power Supply For Lamp [Low Voltage Side] | [Note 4-1] |
| | 2 | HV | Power Supply For Lamp [High Voltage Side] | [Note 4-2] |

The backlight interface connector is a model **BHSR-02VS-1** manufactured by JST or a model **1674817-1** manufactured by AMP. The matching connector part number is **SM02B-BHSS-1-TB** manufactured by JST or equivalent.

[Note 4-1] The wire color of low voltage side is white. Connect the low voltage side of the DC/AC inverter used to drive the fluorescent tube to GND of the inverter circuit.

[Note 4-2] The wire color of high voltage side is pink.

## 5. Absolute Maximum Ratings

| Parameter | | | Symbol | Condition | Min. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| Source Driver Voltage | | | VSH | $T_a$=25℃ | -0.3 | 6.0 | V | |
| Digital Input Signals | | | VID | $T_a$=25℃ | -0.3 | VSH+0.3 | V | [Note 5-1] |
| Analog Input Signals | | | VIA | $T_a$=25℃ | -0.3 | VSH+0.3 | V | [Note 5-2] |
| Gate Driver Voltage | TFT | Hi | VGH | $T_a$=25℃ | -0.3 | 33.0 | V | |
| | | Lo | VGL | $T_a$=25℃ | VGH-33.0 | VGH+0.3 | V | |
| | LOGIC | Hi | VCC | $T_a$=25℃ | VSS-0.3 | VSS+7.0 | V | |
| | | Lo | VSS | $T_a$=25℃ | VGH-33.0 | VGH+0.3 | V | |
| Storage Temperature | | | $T_{ST}$ | - | -40 | 85 | ℃ | [Note 5-3,4] |
| Operating Temperature (Panel Surface) | | | $T_P$ | - | -30 | 85 | ℃ | [Note 5-3,4,5,6] |
| Operating Temperature (Ambient Temperature) | | | $T_a$ | - | -30 | 65 | ℃ | |

[Note 5-1] MODE2,MODE1,Up/Down,GSP,GSC,SSC,SSP_L,SSP_R,SOE,Left/Right,SAM
[Note 5-2] VA(B), VB(G), VC(R)
[Note 5-3] This rating applies to all parts of the module and should not be exceeded.
[Note 5-4] Maximum wet-bulb temperature is 58℃. Condensation of dew must be avoided as electrical current leaks will occur, causing a degradation of performance specifications.
[Note 5-5] The operating temperature only guarantees operation of the circuit and doesn't guarantee all the contents of Electro-optical specification.
[Note 5-6] Ambient Temperature when the backlight is lit(reference value).

## 6. Electrical Characteristics

1> Recommended Operating Conditions

TFT-LCD Panel Driving Section

$T_a$=25℃

| Parameter | | | | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| Source driver voltage | | | | VSH | 4.5 | 5 | 5.5 | V | [Note 6-1] |
| Gate driver voltage | TFT | Hi | | VGH | 14.5 | 15 | 15.5 | V | [Note 6-1,2, 5] |
| | | Lo | AC | VGLAC | ±0.5 | ±3.9 | ±5.0 | Vp-p | |
| | | | DC | VGLDC | -9.5 | -10 | -10.5 | V | |
| | Logic | Hi | | VCC | -10.4 | -10.9 | -11.4 | V | |
| | | Lo | | VSS | -16.5 | -17 | -17.5 | V | |
| Analog input voltage | | AC | | VIAC | 2.0 | - | ±2.0 | V | [Note 6-3] VSM=VSH/2 |
| | | DC | | VIDC | VSM-0.1 | VSM | VSM+0.1 | V | |
| Digital input voltage | | Hi | | VIDSH | VSH-1.0 | - | VSH | V | VIDSH=VSH VIDSL=0V |
| | | Lo | | VIDSL | 0 | - | 1.0 | V | |
| Digital input current | | Hi | | IIDSH | - | - | 60.0 | uA | |
| | | Lo | | IIDSL | - | - | 60.0 | uA | |
| COM control signal | | AC | | VCAC | ±0.5 | ±3.9 | ±5.0 | Vp-p | [Note 6-1,4,5] |
| | | DC | | VCDC | 0.5 | 2 | 3.5 | V | |
| CS control signal | | AC | | VCsAC | ±0.5 | ±3.9 | ±5.0 | Vp-p | [Note 6-1,2, 3,4,5] |
| | | DC | | VCsDC | -5.3 | -5.5 | -5.7 | V | |

***** 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.

- ON : VSH → VSS → VCC → VGL→ VGH
- OFF : VGH → VGL → VCC → VSS → VSH

[Note 6-1] Any change in voltage adjusting VCDC ,VIDC,VCs DC should be less than 0.1V.
[Note 6-2] The AC element must make it into the same amplitude in the commonness electrode drive signal and the same phase.
[Note 6-3] Positive and negative amplitudes should be equal.
The MIN. value produces a white display and the MAX. value produces a black display.
[Note 6-4] To obtain the maximum value of contrast, each module must be adjusted to an optimum voltage.
[Note 6-5] In case of using Sharp Decoder IC(IR3Y29BM) and inputting standard NTSC signal (Normal mode)

Backlight Driving Section

$T_a$=25°C

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| Lamp Current | $I_{BL}$ | 3.0 | 6.0 | 6.5 | mArms | |
| Lamp Voltage | $V_{BL}$ | 565 (6.5mArms) | 580 (6.0mArms) | 640 (3.0mArms) | Vrms | ±10[%] |
| Lamp Power Consumption | $P_{BL}$ | - | 3.48 | 3.67 | Wrms | $I_{BL}$= 6.0mA |
| Lamp Frequency | $f_{BL}$ | 40 | - | 60 | kHz | *1 |
| | | 40 | - | 80 | | *2 |
| Kick-Off Voltage (*3) | $V_S$ | - | - | 1480 | Vrms | $T_a$=25°C |
| | | - | - | 1780 | Vrms | $T_a$=-30°C |
| Discharge Stabilization Time | $T_S$ | - | - | 3 | Minutes | *4 |
| Life Time | - | 12,000 | 15,000 | - | Hour | *5 |

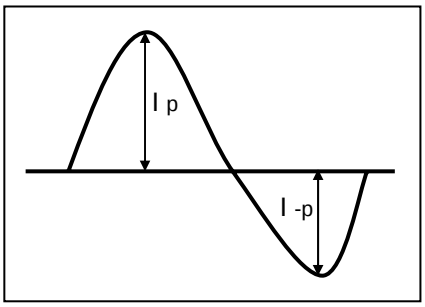
* 1 : This frequency range means the range to keep within ± 10% change of electrical and optical characteristics.
* 2 : This frequency range means not affecting to lamp life and reliability characteristics.
(The lamp frequency should be selected as different as possible from display horizontal synchronous signal (Including harmonic frequency of this scanning frequency) to avoid “Beat” interference which may be observed on the screen as horizontal stripes like moving wave. This phenomenon is caused by interference between lamp (CCFL) lighting frequency and LCD horizontal synchronous signal.)
* 3 : The “MAX” of “Kick-Off Voltage” means the minimum voltage for inverter to turn on the CCFL normally in the LCD module. However this isn’t the values that we can assure stability of starting lamp on condition that the module is installed in your set.
It should be careful that “Kick-Off Voltage” is changed by an increase of stray capacitance in your set, inverter method, value of ballast capacitor in your inverter and so on.
Especially, the value of “Kick-Off Voltage” is higher in low temperature condition than in normal temperature condition, because impedance of CCFL is increased.
"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"
* 4 : The time needed to achieve not less than 95%brightness of the center part of lamp.
The brightness of the lamp after lighted for 5 minutes is defined as 100%.
* 5 : “Life time” is defined as the lamp brightness decrease to 50% original brightness at $I_{BL}$=TYP; continuous lighting, $T_a$=25°C.

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. Inverter should be designed to be subject to the conditions below

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:

$$I_p \text{ (or } I_{-p}) / I_{rms}$$

C. There should not be any spikes in the waveform.

D. Lamp current should not exceed the “MAX” value under the “Operating Temperature” (it is prohibited to exceed the “MAX.” value even if it is operated in the guaranteed temperature). When lamp current exceed the maximum value for a long time, it may cause a smoking and ignition.

Therefore, it is recommended that the inverter have the current limited circuit that is used as a protection circuit and/or the lamp current-controlled inverter.

∗ Do not attach a conducting tape to lamp connecting wire.

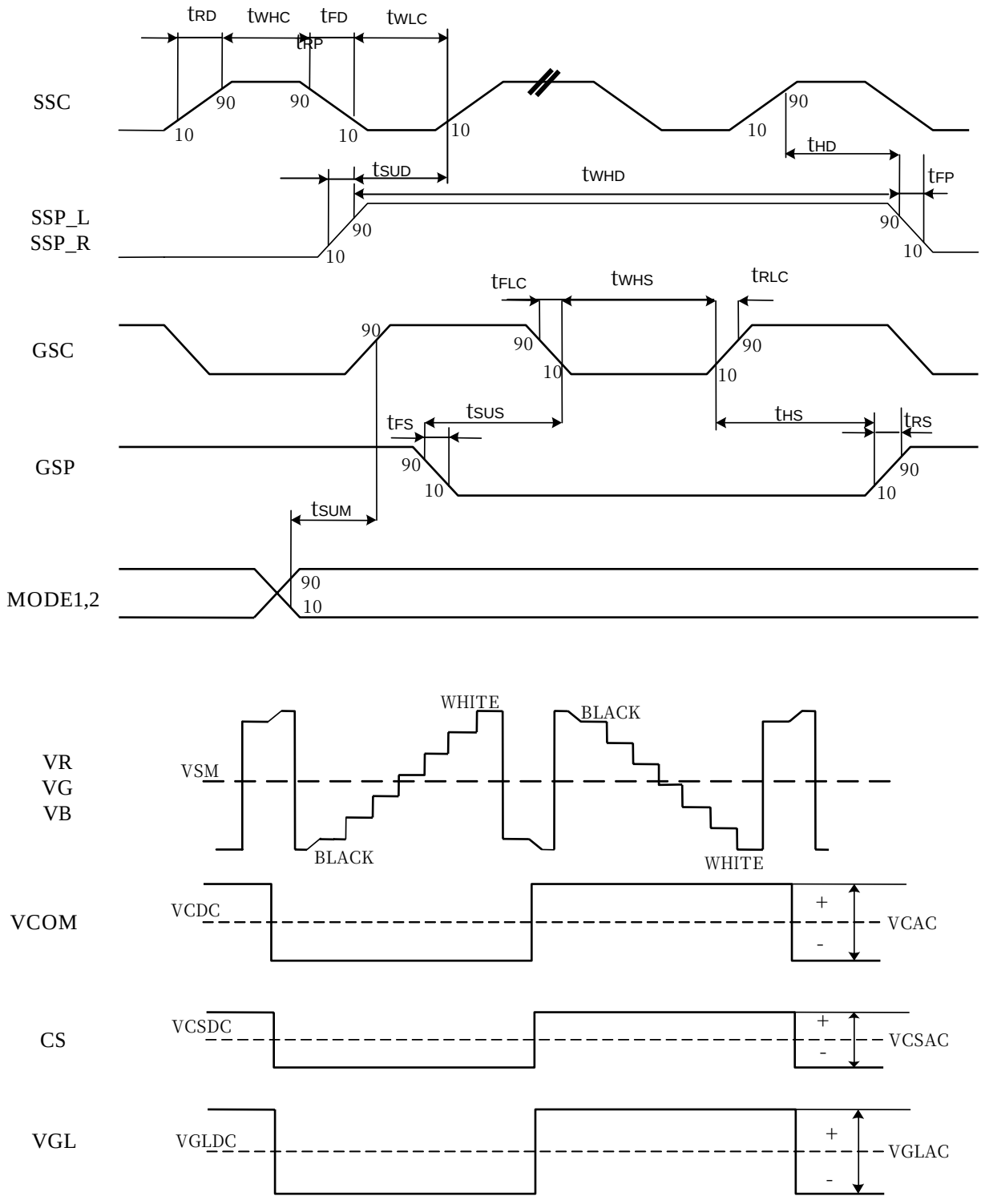
If the lamp wire attach to a conducting tape, TFT-LCD Module has a low luminance and the inverter has abnormal action. Because leakage current is occurred between lamp wire and conducting tape.

2> Timing Characteristics of input signals

$T_a$=25℃

| Parameter | | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| SOURCE | Clock frequency | $f_{CLD}$ | SAM=L | - | - | 5.0 | MHz | SSC |
| | | | SAM=H | - | - | 12.5 | | |
| | High level clock width | $t_{WHC}$ | SAM=L | 80.0 | - | | ns | |
| | | | SAM=H | 30.0 | | | | |
| | Low level clock width | $t_{WLC}$ | SAM=L | 80.0 | - | - | ns | |
| | | | SAM=H | 30.0 | - | - | | |
| | Clock rise time | $t_{RD}$ | SAM=L | - | - | 20.0 | ns | |
| | | | SAM=H | | | 10.0 | | |
| | Clock fall time | $t_{FD}$ | SAM=L | - | - | 20.0 | ns | |
| | | | SAM=H | - | | 10.0 | | |
| | Data setup time | $t_{SUD}$ | | 30.0 | - | - | ns | SSP_L SSP_R |
| | Data hold time | $t_{HD}$ | | 30.0 | - | - | ns | |
| | High level width | $t_{WHD}$ | | 0.4 | - | - | µs | |
| | Rise time | $t_{RP}$ | | | | 20.0 | ns | |
| | Fall time | $t_{FP}$ | | | | 20.0 | ns | |
| GATE | Clock frequency | $f_{CLS}$ | | - | - | 16.5 | kHz | GSC |
| | Minimum clock width | $t_{WHS}$ | | 0.5 | - | - | µs | |
| | Clock rise time | $t_{RLC}$ | | - | - | 100.0 | ns | |
| | Clock fall time | $t_{FLC}$ | | - | - | 100.0 | ns | |
| | Data setup time | $t_{SUS}$ | | 100.0 | - | - | ns | GSC,GSP |
| | Data hold time | $t_{HS}$ | | 300.0 | - | - | ns | |
| | Mode set up time | $t_{SUM}$ | | 300.0 | - | - | ns | GSC,MODE1/2 |
| | Rise time | $t_{RS}$ | | - | - | 100.0 | ns | GSP |
| | Fall time | $t_{FS}$ | | - | - | 100.0 | ns | |

***** Input Signal Timing Chart : Refer [FIG.4].




[FIG.4] Input Signal Timing Chart

3> Left/Right,Up/Down terminal (Signal For Reverse Scanning)

| Mode | Left/Right | Up/Down | Remark |
|---|---|---|---|
| Normal Mode | H | L | Refer to the p. 15 [Note 7-3]. |
| Left/Right Reverse Mode | L | L | |
| Up/Down Reverse Mode | H | H | |
| Right/Left & Up/Down Reverse Mode | L | H | |

H(High Level) =VSH , L(Low Level)=GND

4> SOE Terminal (Control signal for source driver)

This is control signal of switching sample holder circuit. Please set the high or low level synchronizing with SSP signal during the period each horizontal line.

High level = VSH Low level = GND

5> MODE1,2 terminal (Control signal for gate driver)

They are the terminal switching output mode of gate driver.
(Setting to VGL level by force)

| MODE1 | MODE2 | Outputting Mode |
|---|---|---|
| H | H | Normal Mode(1 Line Writing) |
| L | H | 2 Line Same Time Writing Mode |
| H | L | Out of Use |
| L | L | No Outputting |

High level = VSH Low level = GND

6>SAM terminal (Control signal for source driver)

Used as input pin for setting the selecting of normal sampling operation or 3-point simultaneous sampling operation.
For normal sampling operation (SAM=Hi), video signals are sampled in order 1 LCD source driver output.
For 3-point simultaneous sampling operation(SAM=Lo), video signals are sampled in order simultaneously 3 LCD drive outputs.

7>Current dissipations

$T_a$=25℃

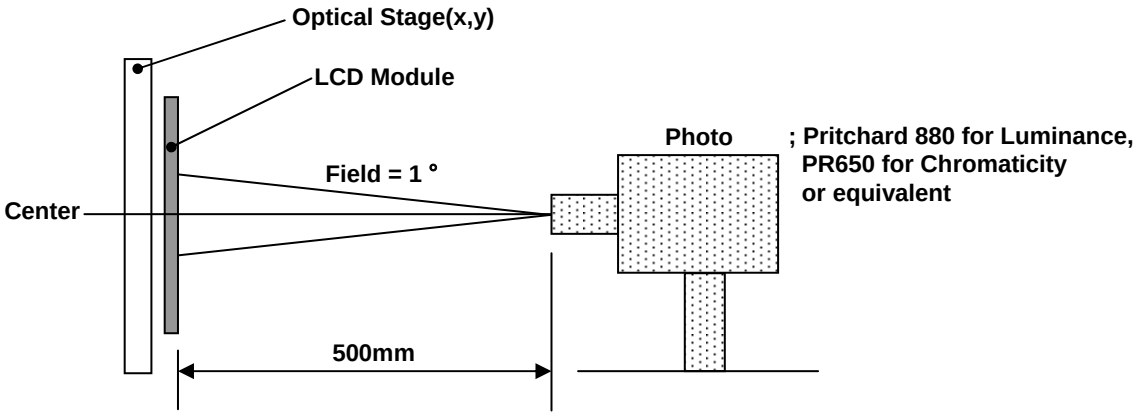
| Parameter | | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Current for source driver | H | $I_{SH}$ | $V_{SH}$ =5.0V | - | 45 | 60 | mA |
| Current for gate driver | H | $I_{GH}$ | $V_{GH}$ =13.0V | - | 0.1 | 1.0 | mA |
| | L | $I_{GL}$ | $V_{GLDC}$ =-10.0V | - | -0.1 | -1.0 | mA |
| | Logic | $I_{CC}$ | $V_{CC}$ =-10.9V | - | 0.1 | 1.0 | mA |
| | | $I_{SS}$ | $V_{SS}$ =-16.0V | - | -0.2 | -1.0 | mA |

In case of using exclusive timing control IC(LPL standard) and inputting standard NTSC signal (Normal mode)

## 7. Electro-optical Characteristics

$T_a$=25℃

| Parameter | | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| Luminance | | Y | $I_{BL}$=6mArms | 320 | 400 | - | cd/m$^2$ | [Note 7-1] |
| Contrast Ratio | | CR | Optimal | 150 | - | - | - | [Note 7-2] |
| White Color Chromaticity | | $W_x$ | $I_{BL}$=6mArms | 0.270 | 0.300 | 0.330 | - | [Note 7-1] |
| | | $W_y$ | | 0.290 | 0.320 | 0.350 | - | |
| Viewing Angle | ϕ=180° | Θl | CR≥10 | 60 | 70 | - | ° | [Note 7-2] [Note 7-3] |
| | ϕ=0° | Θr | | 60 | 70 | - | ° | |
| | ϕ=90° | Θu | | 45 | 50 | - | ° | |
| | ϕ=270° | Θd | | 55 | 60 | - | ° | |
| Response Time | Rise | $\tau_r$ | Θ=0° | - | 10 | - | ms | [Note 7-4] |
| | Fall | $\tau_d$ | | - | 20 | - | ms | |




Measuring Condition ;
-Measuring surroundings : Dark Room
-Measuring temperature : $T_a$=25℃
-Adjust operating voltage to get optimum contrast at the center of the display.
-Measured value at the center point of LCD panel after more than 30 minutes while backlight turning on.

[Note 7-1]

Measured on the center area of the panel by PHOTO RESEARCH photometer PR-880.

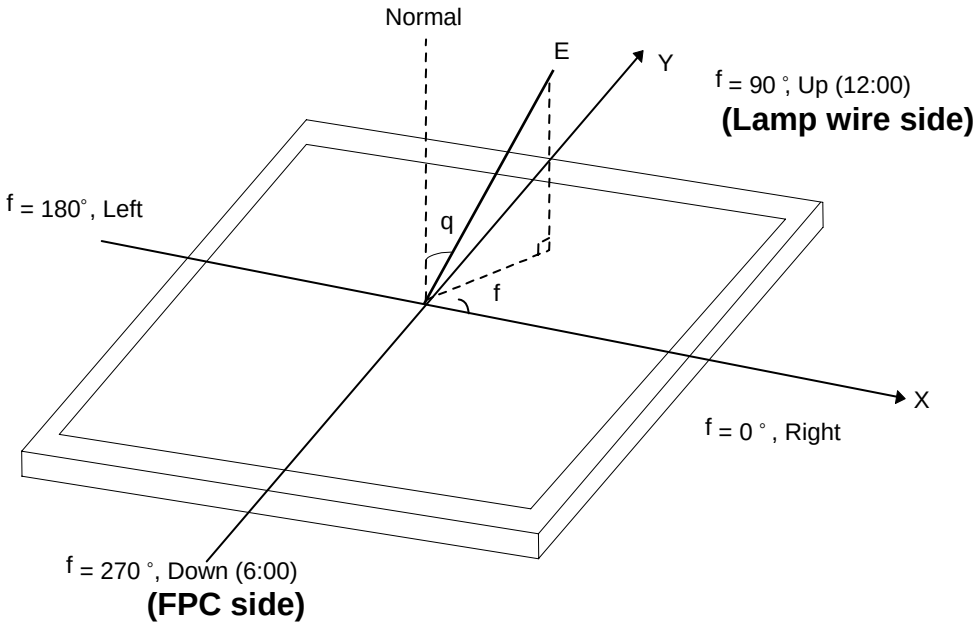
[Note 7-2]

Contrast ratio is defined as follows ;

$$\text{Contrast Ratio(CR)} = \frac{\text{Photo detector output with LCD being “white”}}{\text{Photo detector output with LCD being “black”}}$$

[Note 7-3]

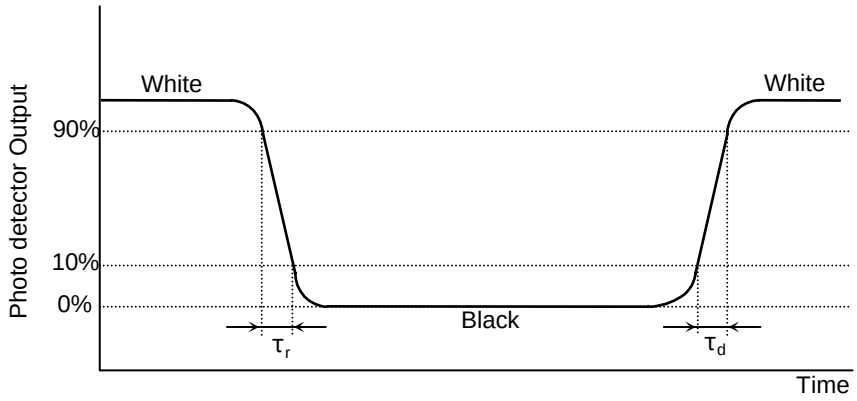
Viewing angle range is defined as follows;




**[ Normal scanning Mode view ]**

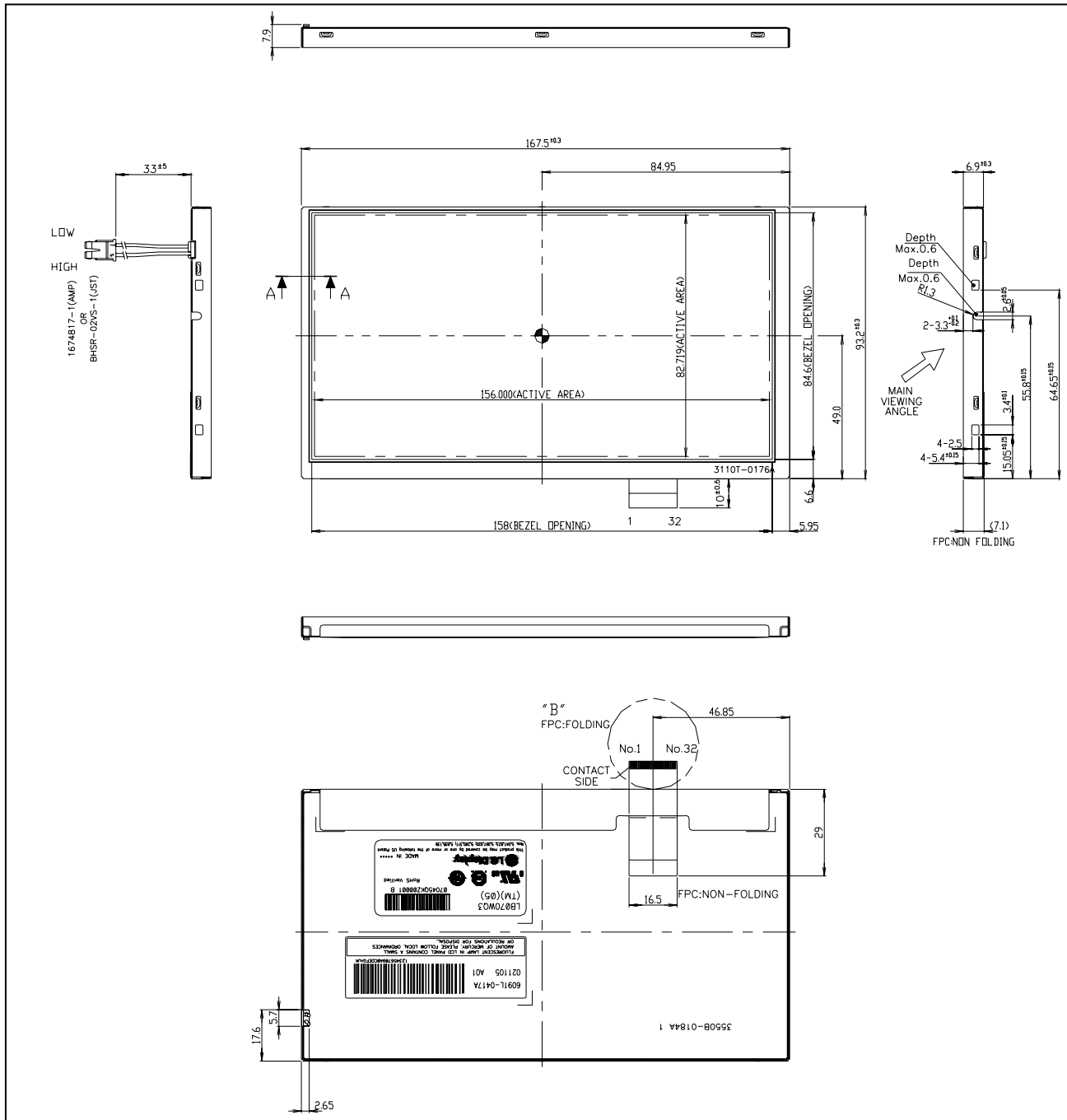
[Note 7-4]

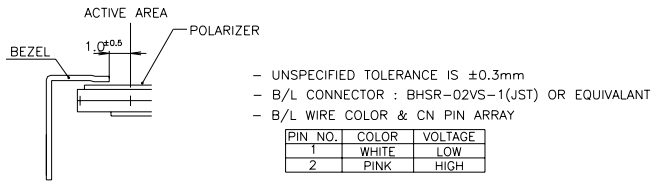
Response time is obtained by measuring the transition time of photo detector output, when input signals are applied so as to make the area “black” to and from “white”.



## 8. Mechanical Characteristics

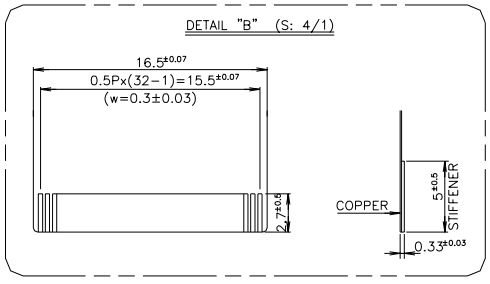
| Parameter | Specification | | Unit |
|---|---|---|---|
| Outline Dimension | Width | 167.5 | mm |
| | Height | 93.2 | mm |
| | Depth | 6.9 (TYP) | mm |
| Bezel Area | Width | 158.0 | mm |
| | Height | 84.6 | mm |
| Active Display Area | Width | 156.0 | mm |
| | Height | 82.719 | mm |
| Weight | 170 ( Typ. ) | | g |




- UNSPECIFIED TOLERANCE IS ±0.3mm
- B/L CONNECTOR : BHSR-02VS-1(JST) OR EQUIVALANT
- B/L WIRE COLOR & CN PIN ARRAY

| PIN NO. | COLOR | VOLTAGE |
|---|---|---|
| 1 | WHITE | LOW |
| 2 | PINK | HIGH |




SECTION A-A
(SCALE=5/1)

## 9. Reliability Test

| No. | Test Items | Test Condition | Remark |
|---|---|---|---|
| 1 | High Temperature Storage Test | Ta=85℃ 240hr | |
| 2 | Low Temperature Storage Test | Ta= -40℃ 240hr | |
| 3 | High Temperature Operation Test | Tp=85℃ 240hr | |
| 4 | Low Temperature Operation Test | Ta= -30℃ 240hr | |
| 5 | High Temperature and High Humidity Operation Test | Ta=65℃ 90%RH 240hr | |
| 6 | Electro Static Discharge Test | -Panel Surface/Top_case<br>: 150pF ±15kV 150Ω<br>(Direct Discharge, Five Times)<br>-FPC Input Terminal : 200pF ±200V 0Ω | |
| 7 | Shock Test<br>(Non-operating) | Half Sine Wave, 100G, 6ms<br>2 Times Shock of Each Six Faces | |
| 8 | Vibration Test<br>(Non-operating) | X, Y, Z : 96hrs for Each Axis<br>5 10 Hz Disp. 25 mm<br>10 30 Hz Accel. 3.7×9.8 m/s$^2$<br>30 50 Hz Accel. 1.6×9.8 m/s$^2$<br>50 80 Hz Accel. 0.7×9.8 m/s$^2$<br>80 100 Hz Accel. 0.3×9.8 m/s$^2$ | |
| 9 | Thermal Shock Test | -30℃(0.5hr) ~ 85℃(0.5hr) / 300 Cycles | |

* $T_a$= Ambient Temperature, Tp=Panel Surface Temperature

** In the standard condition, there shall be no practical problems that may affect the display function.

# 10. International Standards

## 10-1. 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.

## 10-2. 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 Electro technical Standardization.(CENELEC), 1998
( Including A1: 2000 )

## 11. Packing

### 11-1. 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

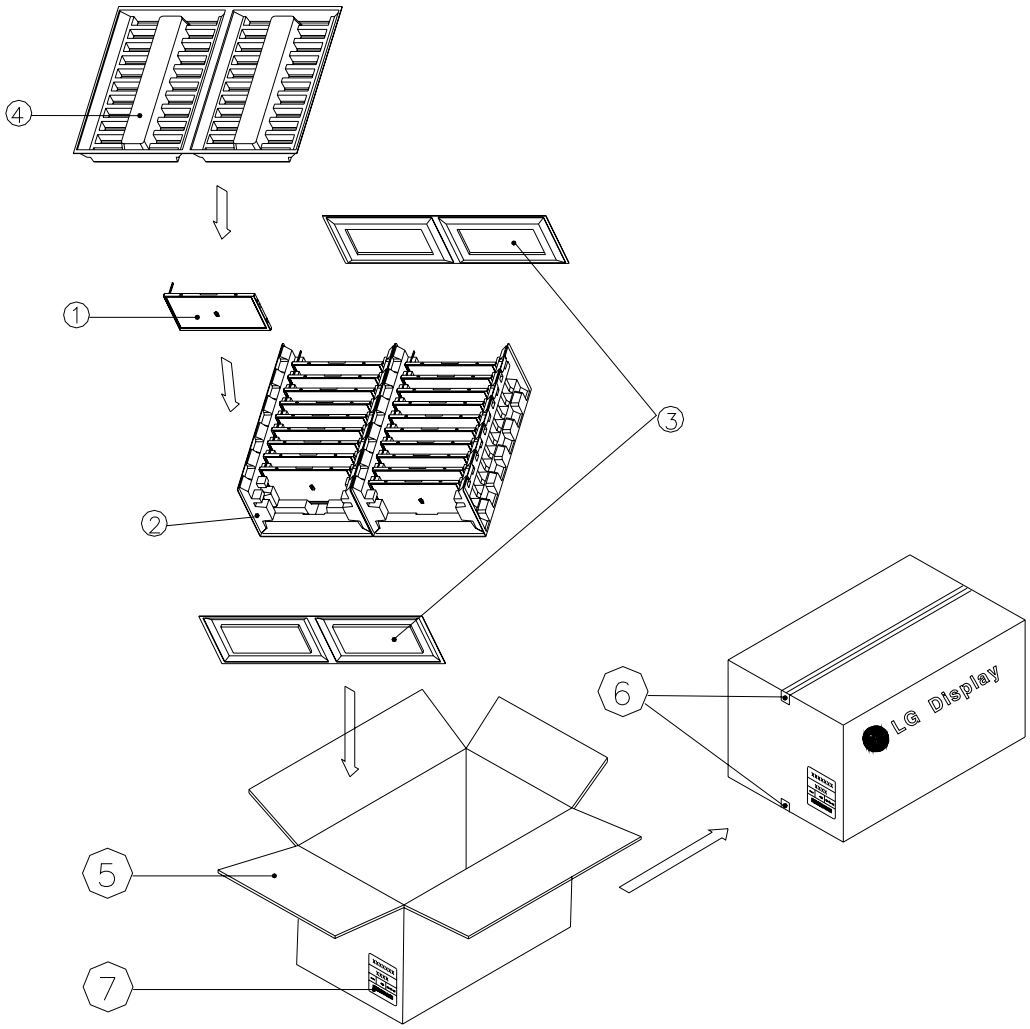
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mark | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |

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.

## 11-2. Packing Form

a) Package quantity in one box :20 pcs
b) Box Size : 427×330×151 (mm)




| NO. | Description | Material |
|---|---|---|
| 1 | Module | 20 pcs/1 Box |
| 2 | Packing, Bottom | PET |
| 3 | Packing, Side | PET |
| 4 | Packing, Top | PET |
| 5 | Carton Box | SWR4, 475X348X182 |
| 6 | Tape | OPP 70MMx300m |
| 7 | Label | YUPO Paper 100x70 |

## 12. PRECAUTIONS

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

### 12-1. 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 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 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 deteriorate the polarizer.)
(7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. 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.
(10) The metal case of a module should be contacted to electrical ground of your system.

### 12-2. 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.

## 12-3. 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.

## 12-4. PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

## 12-5. 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.

## 12-6. 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.