



SL62-0460 Specification

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Product Information

Issue Date: August 8, 2006

Model: SL62-0460

Note: The product and specification are subject to change without prior notice. Please contact your sales representative for the most current specifications.

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*** Revision History**

| Date | Rev No | Page | Summary |
|-------------|---------------|-------------|----------------|
| | | | |

1. Overview

| Items | Specification | Unit |
|-------------------|-----------------------------------|-------------------|
| Module dimension | 173.0(W) x 70.0(H) x 7.0(D) | mm |
| Display area | 148.8(W) x 53.76(H) | mm |
| Display colors | 262K | colors |
| Number of pixels | 640 x RGB(H) x 240(V) | dot |
| Pixel arrangement | R.G.B. Strip | - |
| Pixel pitch | 0.0775 x 0.224 | mm |
| Display mode | Transmissive TFT (Normally White) | - |
| Viewing direction | 9 | O'clock |
| Brightness | 350 | cd/m ² |
| Weight | 100 | g |
| Interface | 40 pin(C-MOS) | |
| Backlight | CCFL | |

2. Absolute Maximum Rating

| Item | Symbol | Value | Unit | Note |
|-----------------------|--------|--------------|------|----------|
| Supply Voltage(Logic) | VDD | -0.3~4.0 | V | |
| Input Voltage | VI | -0.2~VDD+0.2 | V | |
| Input Current | Ii | 0~1 | A | (1), (2) |
| Storage Temperature | | -30~60°C | °C | |
| Operating Temperature | | -25~55°C | °C | |

Note (1) 200pF~250Ω 25°C - 70%RH

Note (2) Interface Pin Connector.

Note (3) The surface of metal bezel and LCD panel.

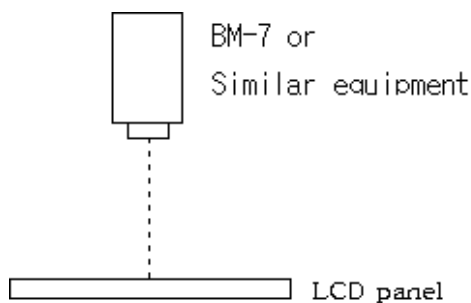
3. Optical Characteristics

1) Optical characteristics of LCD

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | Note | |
|----------------------------|------------|--------------------------------|--------------------------------|------|------|------|------|--|
| Viewing Area | θ_x | $\Phi 0^\circ, K \geq 5.0$ | - | 70 | - | deg | | |
| | θ_x | $\Phi 180^\circ, K \geq 5.0$ | - | 80 | - | deg | | |
| | θ_y | $\Phi 90^\circ, K \geq 5.0$ | - | 80 | - | deg | | |
| | θ_y | $\Phi 270^\circ, K \geq 5.0$ | - | 80 | - | deg | | |
| Contrast Ratio | K | $\Phi 0^\circ, \theta 0^\circ$ | (150) | 200 | - | - | | |
| Response Time(rise+fall) | Tr+Tf | $\Phi 0^\circ, \theta 0^\circ$ | (30) | 35 | - | ms | | |
| Color Tone (Primary Color) | Red | x | $\Phi 0^\circ, \theta 0^\circ$ | - | 0.59 | - | - | |
| | | y | | - | 0.34 | - | - | |
| | Green | x | | - | 0.31 | - | - | |
| | | y | | - | 0.55 | - | - | |
| | Blue | x | | - | 0.14 | - | - | |
| | | y | | - | 0.12 | - | - | |
| | White | x | | - | 0.31 | - | - | |
| | | y | | - | 0.33 | - | - | |

Note (1) Test Equipment Setup

After stabilizing and leaving the panel alone at a given temperature for 30 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room 30 minutes after lighting the back-light. This should be measured in the center of the screen. Environment condition: $T_a 25 \pm 2^\circ$

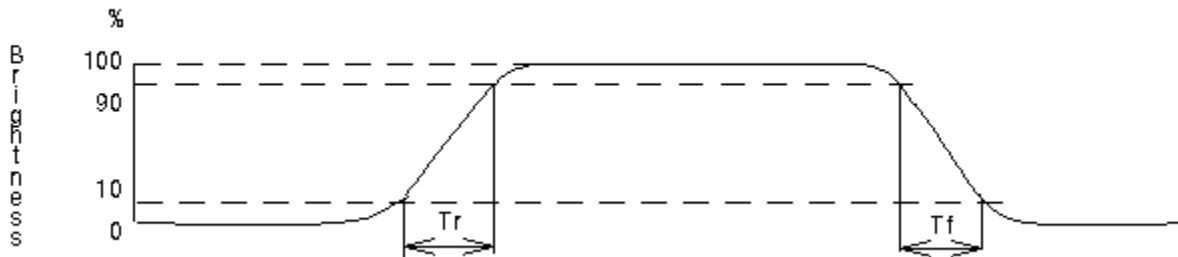
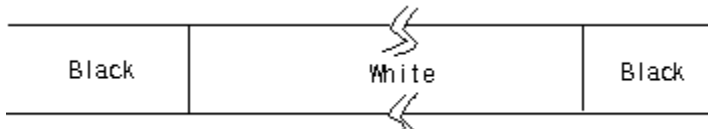


Note (2) Definition of contrast "K"

$$K = \frac{\text{White Brightness}}{\text{Black Brightness}}$$

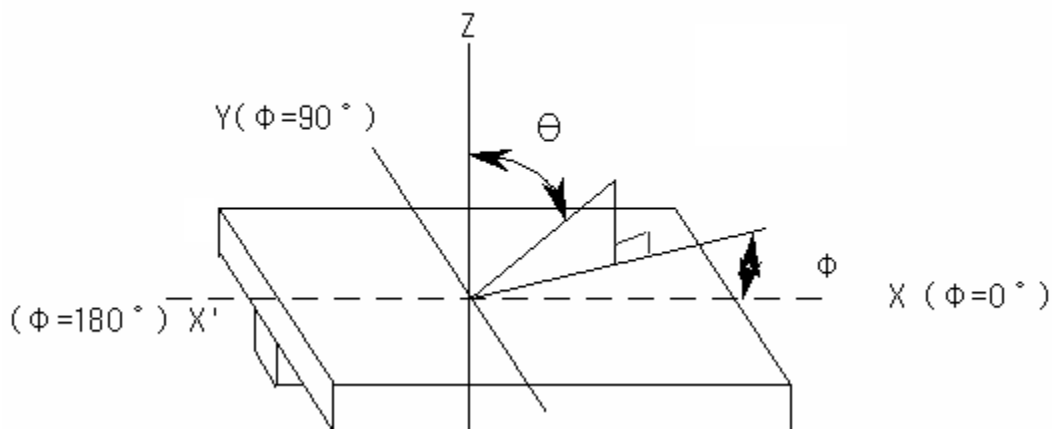
Note (3) Definition of Luminance of White: Luminance of white at the center point

Note (4) Definition of optical response time



Note (5) Definition of Color Chromaticity (CIE1931) Color co-ordinate of white & red, green, blue at center point.

Note (6) Definition of θ and Φ : Viewing direction



2) Optical characteristic of backlight

| Item | Min. | Type. | Max. | Unit | Note |
|-----------------------|------|-------|-------|-------------------|----------|
| Brightness | - | 350 | - | cd/m ² | IL (5)mA |
| Rise Time | - | (3) | - | | |
| Brightness Uniformity | - | - | (±30) | % | |

CCFL : 0h operation, Ta 25 °C, Display data should all be "ON"

Note (1) Measurement after 10 minutes from CCFL operating.

4. Electrical Characteristics

1) Electrical characteristics of LCD

Ta 25 °C, VSS OV

| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT |
|---------------------------------|----------------------------|--------------|--------|--------|--------|------|
| Power Supply Voltage | VDD | - | 3.0 | 3.3 | 3.6 | V |
| Input Voltage of Logic (Note 1) | VI | "H" level | 2.0 | - | VDD | V |
| | | "L" level | VSS | - | 0.8 | |
| Power Supply Current | IDD for HVGA Display Mode | VDD-VSS=3.3V | - | (94) | - | mA |
| | IDD for VGA Display Mode | | - | (110) | - | |
| Vsync Frequency | fV | - | (52) | (60) | (68) | Hz |
| Hsync Frequency | fH for HVGA Display Mode | - | (12.8) | (15.1) | (36.1) | kHz |
| | fH for VGA Display Mode | - | (25.3) | (29.5) | (36.1) | |
| DCLK Frequency | fCLK for HVGA Display Mode | - | (8.7) | (10.7) | (26.7) | MHz |
| | fCLK for VGA Display Mode | - | (17.2) | (20.9) | (26.6) | |

Note (1) fV 60Hz, Ta 25 °C, Pattern used as display pattern

Note (1) fV 60Hz, Ta 25°C, Pattern used as display pattern

Note (2) Need to make sure of flickering and rippling of display when setting the frame frequency in your set.

2) Electrical characteristics of backlight

| ITEM | SYMBOL | MIN. | TYP. | MAX. | UNIT | NOTE |
|-------------------------------|-------------|--------|-------|-------|------|---------|
| Lamp Voltage | VL | - | (450) | - | Vrms | Ta=25°C |
| Frequency | fL | - | (55) | - | kHz | |
| Lamp Current (1Lamp) | IL | (2.0) | (5.0) | (7.0) | mA | Ta=25°C |
| Starting Discharge Voltage | VS (Note 2) | (1300) | - | - | Vrms | Ta=25°C |

Note (1) Please design your lamp driving circuit (inverter) based on the above specifications.

5. Input Signal Assignment

CN1 JAE : FA5B040HP1 (Suitable FPC : t0.3±0.05mm, 0.5±0.05mm pitch)

| PIN No. | Signal | Function |
|---------|--------|-----------------------------------|
| 1 | VDD | Power Supply for Logic |
| 2 | VDD | Power Supply for Logic |
| 3 | VDD | Power Supply for Logic |
| 4 | VDD | Power Supply for Logic |
| 5 | NC | No Connection |
| 6 | DTMG | Timing Signal for Data |
| 7 | VSS | GND |
| 8 | DCLK | Dot Clock |
| 9 | VSS | GND |
| 10 | NC | No Connection |
| 11 | VSS | GND |
| 12 | B5 | Blue Data |
| 13 | B4 | |
| 14 | B3 | |
| 15 | VSS | GND |
| 16 | B2 | Blue Data |
| 17 | B1 | |
| 18 | B0 | |
| 19 | VSS | GND |
| 20 | G5 | Green Data |
| 21 | G4 | |
| 22 | G3 | |
| 23 | VSS | GND |
| 24 | G2 | Green Data |
| 25 | G1 | |
| 26 | G0 | |
| 27 | VSS | GND |
| 28 | R5 | Red Data |
| 29 | R4 | |
| 30 | R3 | |
| 31 | VSS | GND |
| 32 | R2 | Red Data |
| 33 | R1 | |
| 34 | R0 | |
| 35 | Vcom | Common Voltage (Generated by LCM) |
| 36 | VSS | GND |
| 37 | NC | No Connection |
| 38 | NC | No Connection |
| 39 | NC | No Connection |
| 40 | NC | No Connection |

6. Timing Characteristics of Input Signals

| Item | Min. | TYP. | Max. | Unit | Symbol | Remarks | |
|-------|------------------------|------|-------|-------|--------|-----------------------------------|-------------|
| DCLK | Cycle time | 37.5 | (94) | 114.9 | ns | tCLK | |
| | Low level width | 15 | - | - | | tWCL | |
| | High level width | 15 | - | - | | tWCH | |
| | Rise time | - | - | 25 | | trCLK | |
| | Fall time | - | - | 25 | | tfCLK | |
| | Duty | 0.45 | 0.5 | 0.55 | - | D | D=tCLKL/CLK |
| Hsync | Set up time | 5 | - | - | ns | tSH | |
| | Hold time | 10 | - | - | | tHH | |
| | Cycle | 679 | (709) | 739 | tCLK | tHP | |
| | Valid width | 4 | 5 | 5 | | tWH | |
| | Rise/Fall time | - | - | 30 | ns | tHr, tHf | |
| Vsync | Set up | 0 | - | - | tCLK | tSV | for Hsync |
| | Hold | 2 | - | - | | tHV | |
| | Cycle | 245 | (251) | 533 | tHP | tVP | |
| | Valid width | 2 | 2 | 2 | | tWV | |
| | Rise/Fall time | - | - | 50 | ns | tVr, tVf | |
| DTMG | Set up | 5 | - | - | ns | tSI | for DCLK |
| | Hold time | 10 | - | - | | tHI | |
| | Rise/Fall time | - | - | 30 | ns | tI _r , tI _f | |
| | Horizontal back porch | 24 | (37) | 50 | tCLK | tHBP | |
| | Horizontal front porch | 15 | (32) | 49 | | tHFP | |
| | Vertical back porch | 4 | (7) | 196 | tHP | tVBP | |
| | Vertical back porch | 1 | (4) | 97 | | tVFP | |
| DATA | Set up time | 5 | - | - | ns | tSD | for DCLK |
| | Hold time | 10 | - | - | | tHD | |
| | Rise/Fall time | - | - | 20 | ns | tDr, tDf | |

7. Interface Timing

1) Interface timing for **HVGA** display mode

| ITEM | | MIN. | TYP. | MAX. | UNIT | SYMBOL | REMARKS |
|-------|------------------------|------|-------|-------|------|-----------------------------------|-------------|
| DCLK | Cycle time | 37.5 | (94) | 114.9 | ns | tCLK | |
| | Low level width | 15 | - | - | | tWCL | |
| | High level width | 15 | - | - | | tWCH | |
| | Rise time | - | - | 25 | | trCLK | |
| | Fall time | - | - | 25 | | tfCLK | |
| | Duty | 0.45 | 0.5 | 0.55 | - | D | D=tCLKL/CLK |
| Hsync | Set up time | 5 | - | - | ns | tSH | |
| | Hold time | 10 | - | - | | tHH | |
| | Cycle | 679 | (709) | 739 | tCLK | tHP | |
| | Valid width | 4 | 5 | 5 | | tWH | |
| | Rise/Fall time | - | - | 30 | ns | tHr, tHf | |
| Vsync | Set up | 0 | - | - | tCLK | tSV | for Hsync |
| | Hold | 2 | - | - | | tHV | |
| | Cycle | 245 | (251) | 533 | tHP | tVP | |
| | Valid width | 2 | 2 | 2 | | tWV | |
| | Rise/Fall time | - | - | 50 | ns | tVr, tVf | |
| DTMG | Set up | 5 | - | - | ns | tSI | for DCLK |
| | Hold time | 10 | - | - | | tHI | |
| | Rise/Fall time | - | - | 30 | ns | tI _r , tI _f | |
| | Horizontal back porch | 24 | (37) | 50 | tCLK | tHBP | |
| | Horizontal front porch | 15 | (32) | 49 | | tHFP | |
| | Vertical back porch | 4 | (7) | 196 | tHP | tVBP | |
| | Vertical back porch | 1 | (4) | 97 | | tVFP | |
| DATA | Set up time | 5 | - | - | ns | tSD | for DCLK |
| | Hold time | 10 | - | - | | tHD | |
| | Rise/Fall time | - | - | 20 | ns | tD _r , tD _f | |

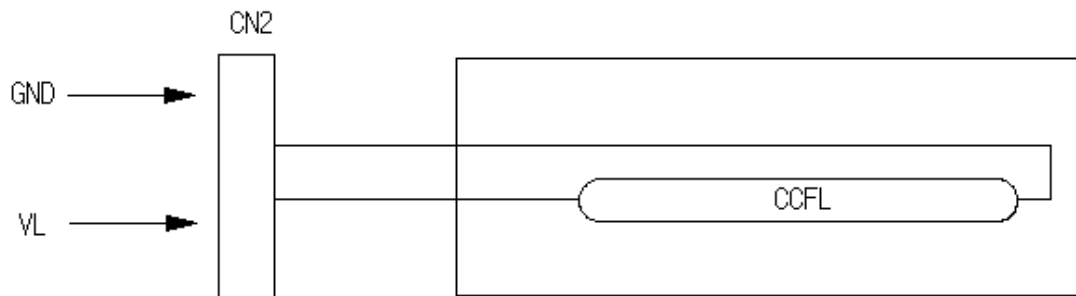
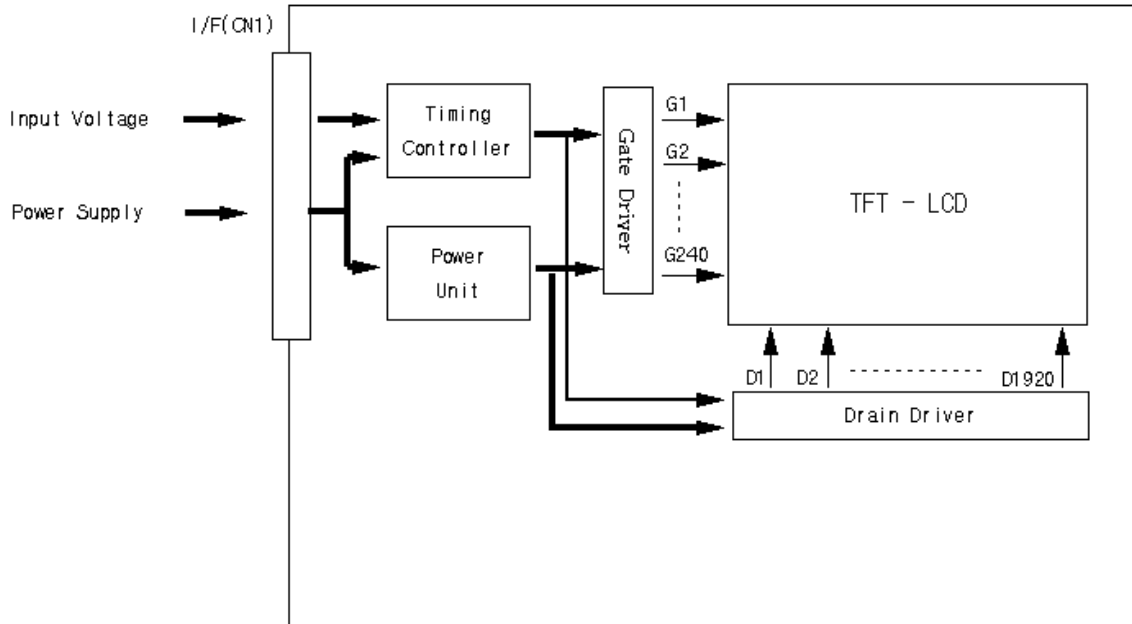
2) Interface timing for **VGA** display mode

| Item | MIN. | TYP. | MAX. | Unit | Symbol | Remarks | |
|-------|------------------------|------|--------|------|--------|-----------------------------------|-------------|
| DCLK | Cycle time | 37.4 | (47.8) | 58.1 | ns | tCLK | |
| | Low level width | 15 | - | - | | tWCL | |
| | High level width | 15 | - | - | | tWCH | |
| | Rise time | - | - | 25 | | trCLK | |
| | Fall time | - | - | 25 | | tfCLK | |
| | Duty | 0.45 | 0.5 | 0.55 | - | D | D=tCLKL/CLK |
| Hsync | Set up time | 5 | - | - | ns | tSH | |
| | Hold time | 10 | - | - | | tHH | |
| | Cycle | 679 | (709) | 739 | tCLK | tHP | |
| | Valid width | 4 | 5 | 5 | | tWH | |
| | Rise/Fall time | - | - | 30 | ns | tHr, tHf | |
| Vsync | Set up | 0 | - | - | tCLK | tSV | for Hsync |
| | Hold | 2 | - | - | | tHV | |
| | Cycle | 485 | (491) | 533 | tHP | tVP | |
| | Valid width | 2 | 2 | 2 | | tWV | |
| | Rise/Fall time | - | - | 50 | ns | tVr, tVf | |
| DTMG | Set up | 5 | - | - | ns | tSI | for DCLK |
| | Hold time | 10 | - | - | | tHI | |
| | Rise/Fall time | - | - | 30 | ns | tI _r , tI _f | |
| | Horizontal back porch | 24 | (37) | 50 | tCLK | tHBP | |
| | Horizontal front porch | 15 | (32) | 49 | | tHFP | |
| | Vertical back porch | 4 | (7) | 28 | tHP | tVBP | |
| | Vertical back porch | 1 | (4) | 25 | | tVFP | |
| DATA | Set up time | 5 | - | - | ns | tSD | for DCLK |
| | Hold time | 10 | - | - | | tHD | |
| | Rise/Fall time | - | - | 20 | ns | tDr, tDf | |

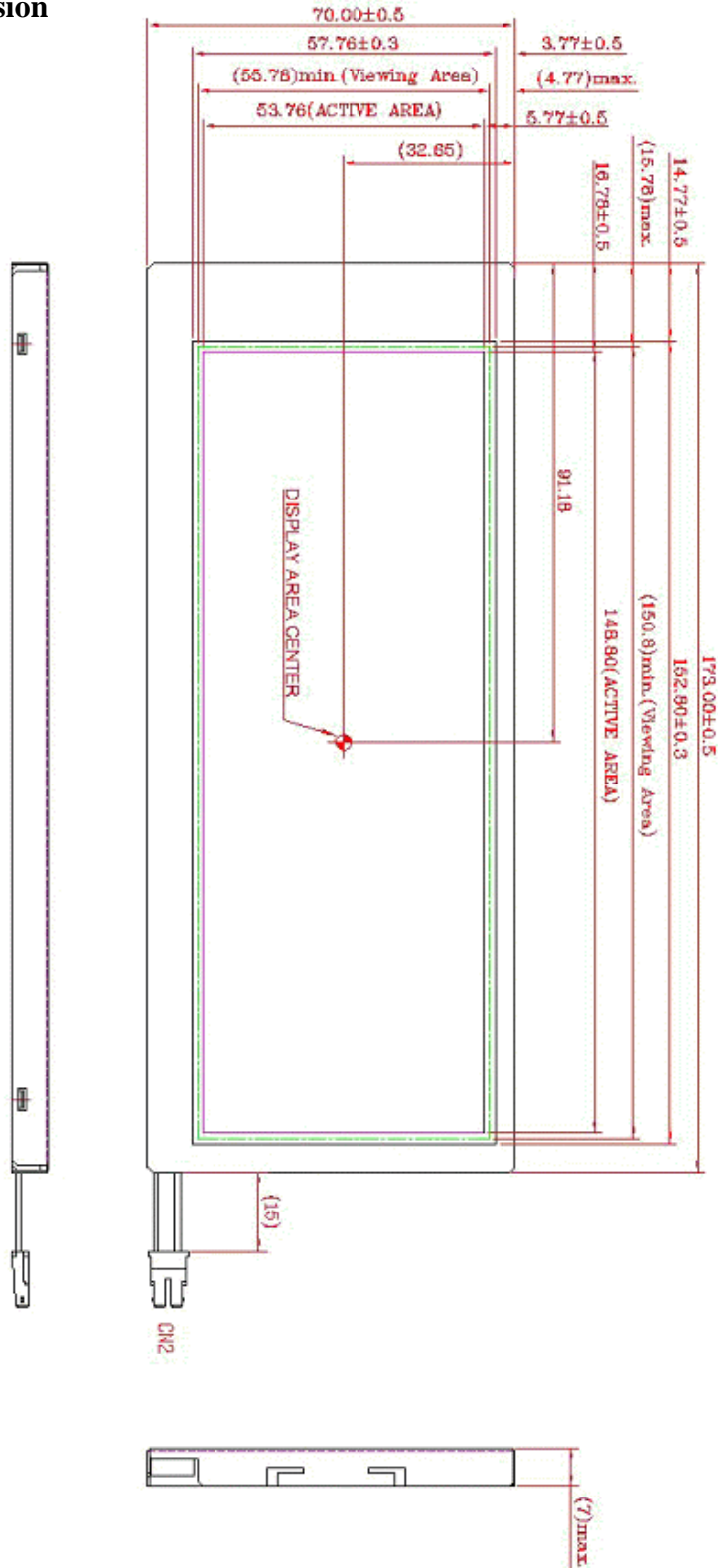
3) Relationship between displayed color and input data

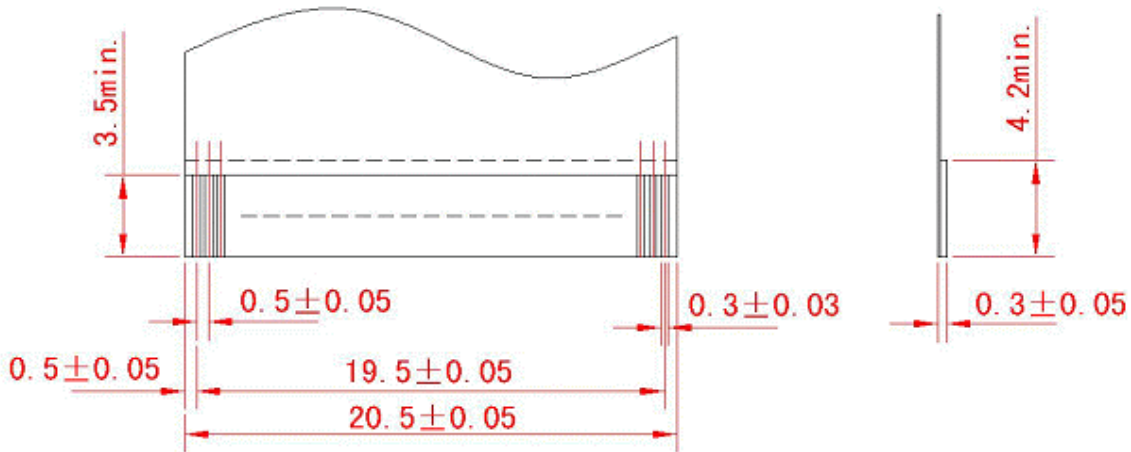
| | COLOR & GRAY SCALE | GRAY SCALE LEVELS | DATA SIGNAL | | | | | | | | | | | | | | | | | |
|-------------|-------------------------------------|-------------------|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| | | | R0 | R1 | R2 | R3 | R4 | R5 | G0 | G1 | G2 | G3 | G4 | G5 | B0 | B1 | B2 | B3 | B4 | B5 |
| Basic Color | Black | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Green | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Cyan | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Red | | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 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 | Black | GS0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ↑ Darker ↑ ↓ Brighter ↓ | GS1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | GS2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | ↓ | ↓ | | | ↓ | | | | | | ↓ | | | | | | | | |
| | | ↓ | ↓ | | | ↓ | | | | | | ↓ | | | | | | | | |
| | | GS61 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | GS62 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | RED | GS63 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Green | Black | GS0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ↑ Darker ↑ ↓ Brighter ↓ | GS1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | GS2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | ↓ | ↓ | | | ↓ | | | | | | ↓ | | | | | | | | |
| | | ↓ | ↓ | | | ↓ | | | | | | ↓ | | | | | | | | |
| | | GS61 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | GS62 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green | GS63 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Blue | Black | GS0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ↑ Darker ↑ ↓ Brighter ↓ | GS1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | | GS2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | | ↓ | ↓ | | | ↓ | | | | | | ↓ | | | | | | | | |
| | | ↓ | ↓ | | | ↓ | | | | | | ↓ | | | | | | | | |
| | | GS61 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 |
| | | GS62 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| | Blue | GS63 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |

8. Block Diagram

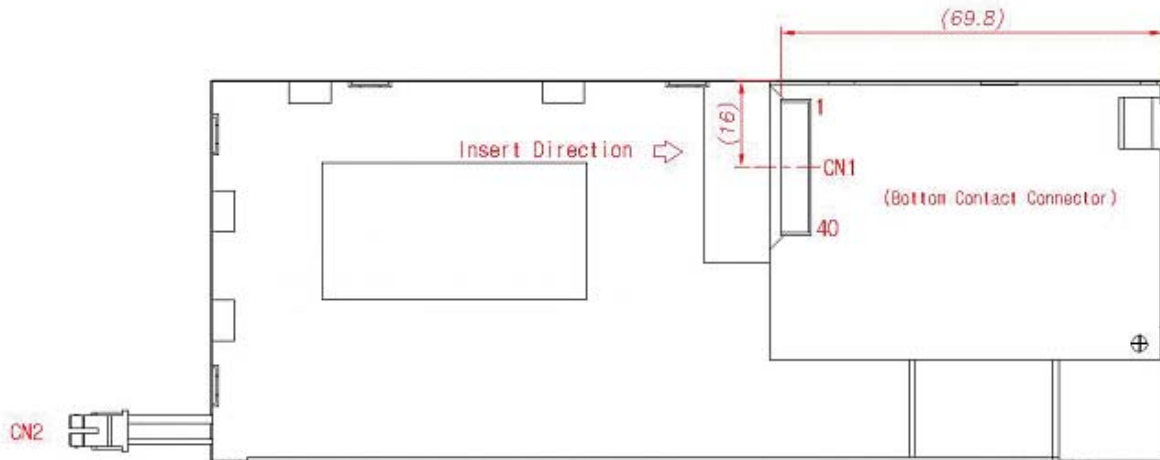


9. Outline Dimension



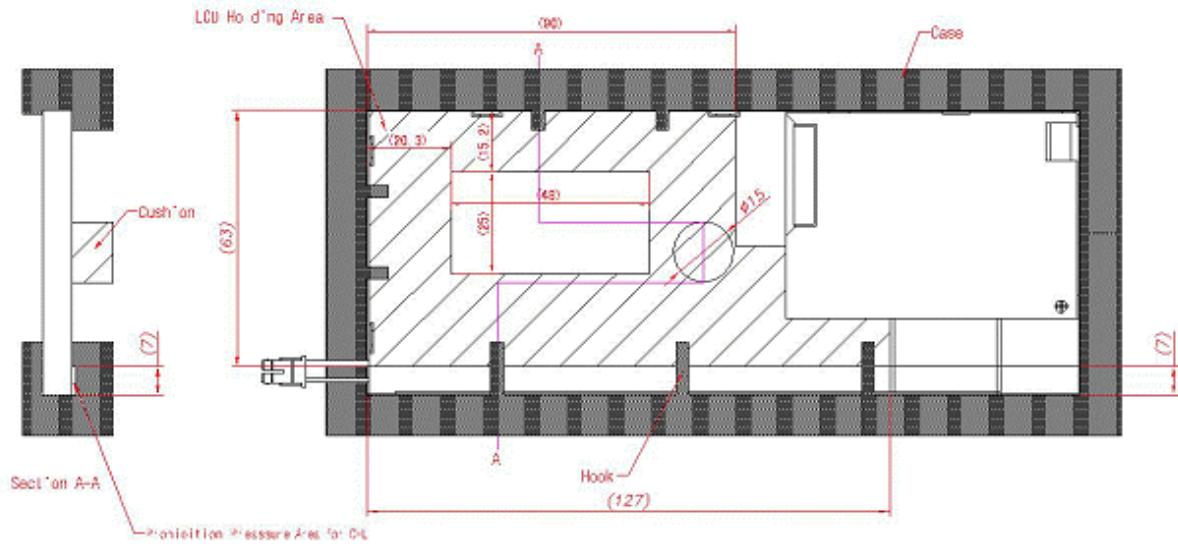


Recommended design rule for I/F FPC



10. Mounting precautions

- 1) When assembling the LCD module, please refer to the illustration below.
- 2) Using a cushion is recommended in order to protect the module from shock.



11. General Precautions

1) Handling

- (a) When the module is assembled, it should be attached to the system firmly. Be careful not to twist and bend the module.
- (b) Refrain from strong mechanical shock and/ or any force to the module. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
- (c) Note that polarizers are very fragile and could be easily damaged. Do not press or scratch the surface.
- (d) Wipe off water droplets and oil immediately. If you leave the droplets for a long time, Staining and discoloration may occur.
- (e) If the surface of the polarizer is dirty, clean it using an absorbent cotton or soft cloth.
- (f) Acceptable cleaners are water, IPA(Isopropyl Alcohol) or Hexane. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It may permanently damage the polarizer due to certain chemical reactions.
- (g) If the liquid crystal material leaks from the panel, it should be kept away from your eyes and mouth. In case of contact with skin or clothes, you should wash away thoroughly with soap.
- (h) Protect the module from static; it may cause damage to the Integrated Gate Circuit.
- (i) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (j) Do not disassemble the module.
- (k) Prior to use, the protective film on the module should be removed slowly in order to minimize the risk of an electrostatic charge.
- (l) Pins of I/F connector shall not be touched directly with bare hands

2) Storage

- (a) Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperatures from 0 to 35°C and relative humidity of less than 70%.
- (b) Do not store the TFT-LCD module in direct sunlight.
- (c) The module should be stored in a dark place. Keep away from direct sunlight or fluorescent light while in storage.

3) Operation

- (a) Do not connect; disconnect the module in the "Power On" condition.
- (b) Power supply should always be turned on/off by the "Power on/ off sequence"

4) Others

- (a) Prolonged exposure to direct sunlight or ultraviolet rays may damage the liquid crystals.
- (b) Avoid condensation of water. It may result in improper operation and disconnection of the electrodes.
- (c) Do not exceed the absolute maximum rating value (the supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on). Otherwise the panel may be damaged.
- (d) If the panel displays the same pattern continuously for extended periods of time, it may cause the image to "burn-in" to the screen.
- (e) This panel has its circuitry FPC on the bottom side and should be handled carefully.