



Handling, Storage, & Use Precautions

FOUNDATION DEVICES - LCD MODULES

Handling Precautions

1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping or impacting the display module.
2. If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any of it in your mouth. If the substance contacts your skin or clothes, wash it off immediately with soap and water.
3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle the polarizer carefully.
5. If the display surface becomes contaminated, breathe on the display surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten the cloth with one of the following solvents:
 - a. Isopropyl alcohol
 - b. Ethyl alcohol

*Solvents other than the two listed above may damage the polarizer.

Specifically, **do not** use the following to clean contamination off of the display surface:

- Water
 - Ketone
 - Aromatic solvents
6. Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, condensation due to moisture, or a current flow in a high humidity environment.
 7. Install the LCD module by using mounting holes where possible. When mounting the LCD module, make sure that it is free of twisting, warping, and distortion. Specifically, do not forcibly pull, bend, or twist the I/O cable or the backlight cable.
 8. Do not attempt to disassemble the LCD module.
 9. NC terminal should be open. Do not connect anything.
 10. If the logic circuit power is off, do not apply the input signals.

11. To prevent destruction of the components by static electricity, be careful to maintain an optimal work environment.
 - a. Be sure to ground yourself when handling LCD modules.
 - b. Tools required for assembling, such as soldering irons, must also be properly grounded.
 - c. The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated by this action.

Handling Precautions Cont.

Since the LCD modules are assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications.

- Do not alter, modify, or change the shape of the tab on the metal frame.
- Do not make extra holes on the printed circuit board, modify its shape, or change the positions of components that may be attached.
- Do not damage or modify the writing on the printed circuit board.
- Absolutely do not modify the conductive strip or heat sealed connector.
- Except for potentially soldering the interface, do not make any alterations or modifications with a soldering iron.
- Do not drop, bend, or twist the module or FPC connector.

Storage Precautions

When storing LCD modules, avoid exposure to direct sunlight or to the light of fluorescent bulbs/lamps. Keep the LCD modules in bags (avoid high temperatures, high humidity, and low temperatures below 0 degrees C). Whenever possible, the LCD modules should be stored in the same conditions in which they are shipped to you (ie. Foundation LCD &/or Digikey packaging).

When storing the LCD for longer periods of time, the following precautions are necessary:

1. Store the LCD modules in sealed polyethylene bags. If properly sealed, there is no need for desiccant.
2. Store them in a dark place. Do not expose the LCD modules to sunlight or fluorescent light, keep the temperature between 0 degrees celsius and 35 degrees celsius.
3. The polarizer surface should not come into contact with any other objects. (We advise you to store them in a container in which they are shipped)

4. Environmental conditions:
 - a. Do not leave the LCD modules for more than 160 hours at 70 degrees celsius.
 - b. Do not leave for more than 48 hours at negative 20 degrees celsius.

Additional Considerations

Liquid crystals solidify under low temperatures (below storage temperature range) leading to defects or the generation of air bubbles. If the LCD module has been operating for an extremely long amount of time showing the same display pattern, the display pattern may remain on the screen as a ghost image and a slight contrast irregularity may also occur. Note, this phenomenon does not adversely affect performance reliability.

To minimize any potential performance degradation of the LCD module caused by static electricity, exercise care to avoid holding the following areas of the LCD module:

- Exposed areas of the printed circuit board (PCB)
- Terminal electrodes

Using LCD Modules

The LCD Module is composed of glass and a polarizer. Pay attention to the following things when handling or operating the LCD module:

1. Keep the ambient temperature within the specified range for use and storage. Polarization degradation, bubble generation, or polarizer peel-off may occur with high temperatures and/or humidities.
2. Do not touch, push, or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc. should not be used)
3. N-hexane is recommended for cleaning the adhesives used to attach the front and rear polarizers and reflectors made of organic substances which will be damaged by chemicals such as acetone, toluene, ethanol, and isopropyl alcohol.
4. When the display surface becomes dusty, wipe gently with absorbent cotton. Do not scrub hard so that you can avoid scratching or damaging the display surface.
5. Wipe off any droplets or water from the display; contact with water over a long period of time may cause deformation or color fading.
6. Avoid contacting the display with any oils or fats
7. Condensation on the surface and contact with terminals due to cold will damage, stain, or dirty the polarizers. After products are tested at low

temperatures they must be warmed briefly in a container before coming in contact with room temperature air.

8. Do not put or attach anything on the display area to avoid leaving any marks on the display.
9. Do not touch the display with bare hands.
10. As the glass can be fragile (depending on if you design custom glass with us or not), it can tend to chip if the handling around the edges of the display is too aggressive. Avoid any dropping or jarring of the LCD module.

Electrostatic Discharge Control

Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC.

1. Make sure that you are grounded when handling the LCM.
2. Before removing the LCM from its packaging, case, or bag, be sure that the module and your body have the same electric potential.
3. When soldering the terminal of the LCM, make certain that the AC power source for the soldering iron does not leak.
4. When using an electric screwdriver to attach the LCM, the screwdriver should be of ground potentiality to minimize as much transmission of electromagnetic waves as possible.
5. As much as you possibly can, please ensure that your work clothes and your work bench are that of grounded potential.
6. To reduce the generation of static electricity, be careful that the air in the work area is not too dry, and has an approximate relative humidity of 50-60% (recommended).

Additional Considerations (Cont.)

1. Viewing angle varies with the change of liquid crystal driving voltage (VO). Adjust VO to show the best contrast.
2. Driving the LCD in the voltage above the limit shortens its life.
3. Response time is greatly delayed at temperatures below the specified operating temperature range. However, this does not necessarily mean that the LCD will be completely defective. It may (and most of the time should), recover and remain operational when it returns to normal operating range.
4. If the display area is pushed hard during operation, the display may become glitchy or seem defective. It will return to normal if it is turned off and turned back on after this happens.

5. Condensation on the terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, the LCD must be operated under the relative condition of 40 degrees celsius and 50% RH.
6. When turning the power on, input each signal after the positive/negative voltage becomes stable.

Limited Warranty

1. Unless agreed between Foundation LCD and the customer, Foundation LCD will replace or repair any of its LCD modules which are found to be functionally defective when inspected in accordance with Foundation LCD acceptance standards (copies available upon request) for a period of one year from the date of the product shipment to the customer. Cosmetic and visual defects must be reported and returned to Foundation LCD within 90 days of shipment. Confirmation of such date will be based upon freight documentation from the courier delivering the product for the respective order. The warranty liability of Foundation LCD is limited to the repair and/or replacement on the terms set forth above. Foundation LCD will not be responsible for any subsequent or consequential events.

Returning LCD Modules Under Warranty

No warranty can be granted if the precautions stated above are determined to have been disregarded by the customer. The typical examples of violations of this are:

- Broken LCD glass
- FPC/circuitry modified in any way, including all components comprising the LCD module.

Module repairs will be invoiced to the customer upon a mutual agreement made after the return is evaluated. Modules must be returned with sufficient description of the failures and/or defects. Any connectors or cables installed by the customer must be removed completely without damaging the PCB's eyelets, connectors, and/or terminals.