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Application Note [AN-035]

display products group

Handling Precautions for Liquid Crystal Display (LCD) Modules

Introduction

To avoid damage to a Liquid Crystal Module (LCM) necessary handling precautions should be taken. The main considerations are outlined in this application note. For specific information about a particular Liquid Crystal Display (LCD) refer to the manufacturers' specification sheets for more details.

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1 Liquid Crystal Display

A LCD is composed of 2 fragile materials, glass and polarizer. Please pay attention to the following items when handling.

Please keep the temperature within the specified range for operation and storage. Polarizer degradation, bubble formation or polariser peel-off may occur at high temperature and high humidity.

Do not touch, push or rub the exposed polarisers with anything harder than HB hardness (glass, tweezers, etc.).

N-hexane is recommended for cleaning polarisers and reflectors. The polariser adhesives will be damaged by such chemicals as acetone, toluene, ethanol and isopropylalcohol.

When the display surface becomes dusty, wipe gently with absorbent cloth or other soft material like chamois soaked in petroleum benzin (*Figure 1*). Do not scrub hard to avoid damaging the polarizer surface.

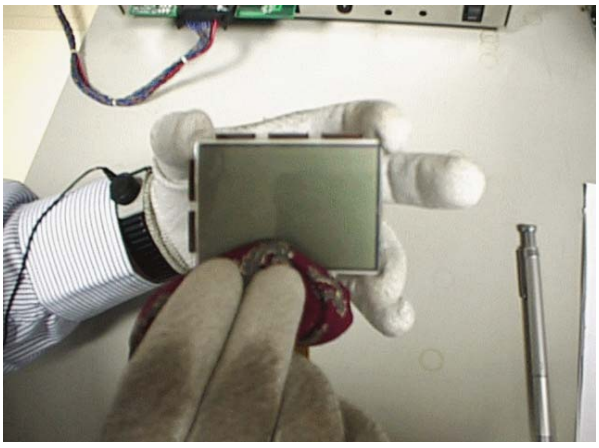

Figure 1: Cleaning Liquid Crystal Module

Wipe off saliva or water drops immediately. Contact with water over an extended period of time may cause deformation or color fading of the polariser.

Avoid contamination with oil and fats.

Condensation on the surface and contact terminals due to cold will damage or stain the polarisers. After products are tested at low temperatures they must be warmed up before coming in contact with room temperature air.

Do not put or attach anything on the display area to avoid leaving marks on the polarizer.

As glass is fragile, it tends to become cracked or chipped during handling especially on the edges. Please avoid dropping or jarring.

2 Liquid Crystal Display Module

2.1 Installing LCD Modules

Holes in the LCD module are used to mount some LCMs. Adhere to the following recommendations when installing the LCM.

Cover the surface with a protective plate or film to protect the polariser and LCD glass.

When assembling the LCM into other equipment, the spacer to be fit between the LCM and the fitting plate should have enough height to avoid causing any stress to the module surface. Refer to the individual specifications for measurements. The measurement tolerance should be +/- 0.1 mm.

Do not remove polariser protection film until necessary, when removing polariser protection film remove slowly, 2~3 seconds in total (*Figure 2*).

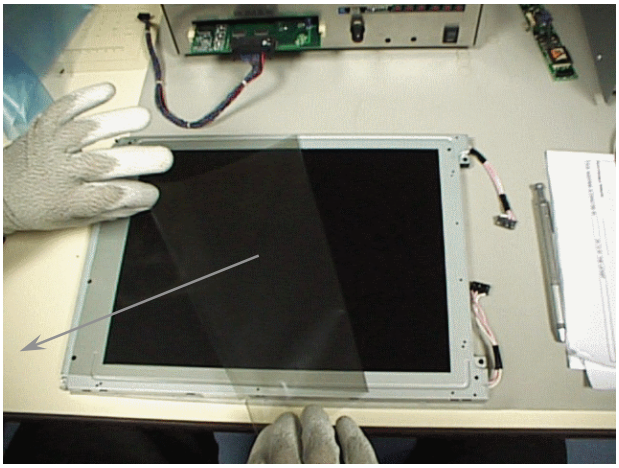

Figure 2: Removing Protective Film

2.2 Handling LCD Modules

Since an LCM is assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

LCMs should be handled by glass edges only and without exerting excess pressure when holding LCMs by display area (*Figure 3*).

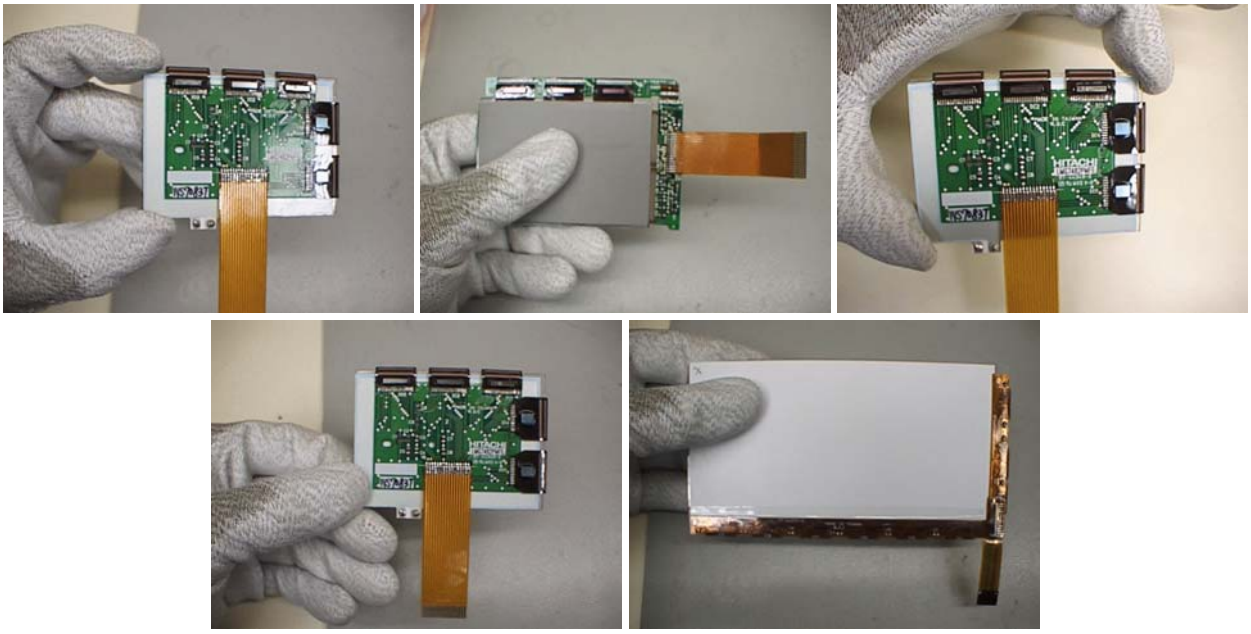

Figure 3: Correct Handling of the Liquid Crystal Module

Do not alter, modify or change the shape of the metal frame.

Do not make any extra holes on the printed circuit board, modify its shape or change the positions of the components attached.

Do not touch driver chips, touch PCB or hold the LCM by the flexible data cable (*Figure 4*).

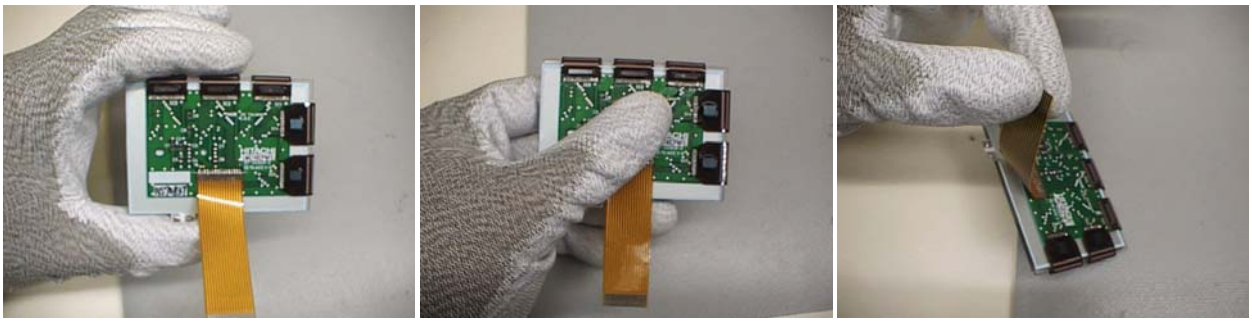

Figure 4: Incorrect Handling of the Liquid Crystal Module

Do not damage or modify the pattern wiring on the printed circuit board.

Except for soldering the interface, do not make any alterations or modifications with a soldering iron.

Do not drop, bend or twist LCM.

2.3 Avoiding Electrostatic Discharge

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

Make certain that you are grounded and have a soft grounded surface to work on when handling a LCM (*Figure 5*).

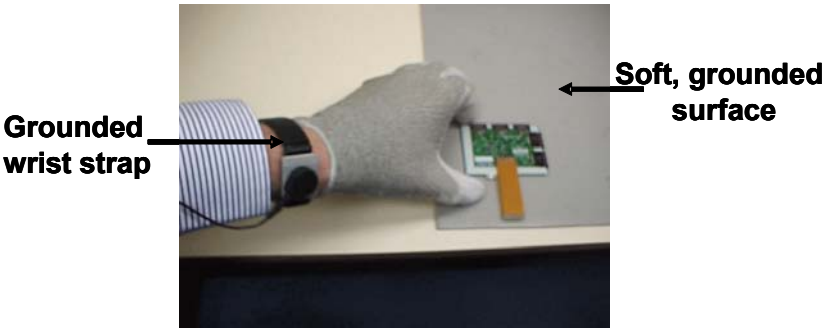

Figure 5: Electrostatic Discharge Precautions

Before removing a LCM from its packing case or installing it, be sure that the module and your body have the same potential.

When using an electric screwdriver to attach the LCM, the screwdriver should be of ground potential to minimize as much as possible any transmission of electro-magnetic waves produced by sparks coming from the comutator of the motor.

As far as possible make the potential of your work clothes and that of the work bench ground potential (*Figure 5*).

To reduce the generation of static electricity, be careful that the air in the work area is not too dry. (A relative humidity of 50-60 percent is recommended.)

2.4 Soldering Precautions

Observe the following when soldering lead wire, connector cables etc, to the LCM

Soldering iron temperature:	280°C +/- 10°C
Soldering time:	3 - 4 sec.
Solder:	eutectic-solder

If soldering flux is used, be sure to remove any remaining flux after finishing the soldering operation. (This does not apply in the case of a non-halogen type of flux). It is recommended that you protect the LCD surface with a protective plate or film during soldering to prevent any damage due to flux spatters.

3 Operation Precautions

Viewing angles and contrast vary with a change of liquid crystal driving voltage. Adjust the contrast voltage to set the optimum contrast and viewing angle.

Driving an LCD with a voltage above the maximum limit shortens its life.

Response time is greatly delayed at temperatures below the operating temperature range.

The display area becomes dark blue at temperatures above this range. However, it will recover when it returns within the specified temperature range.

If pressure is applied to the glass surface during operation, the display will become abnormal. However, it will return to normal operation after being turned off and on.

Do not apply any signals to the LCM before the driving voltage has become stable. Pleas refer to the correct power up/down sequence in the display specification.

4 Storage Precautions

When storing LCDs for some time, the following precautions are necessary:

Store them in a sealed polyethylene bag. If properly sealed, there is no need for dessicant.

Store them in a dark place; do not expose to sunlight or fluorescent light. Keep the temperature between 0°C and 35°C.

The polarizer surface should not come in contact with any other object. (We advise you to store them in the container in which they were shipped).

Environmental conditions:

(a) Humidity

Observe the following conditions both in storage and in operations.

Below 50°C humidity should stay at 85% relative humidity or less

Above 50°C humidity should not exceed maximum absolute humidity of 40°C 85% relative humidity.

(b) Exposure to high humidity and temperature

Do not leave them for more than 168 hours at 60°C.

Do not leave for more than 48 hours at -20°C.

5 Safety

If any LC fluid leaks out of a damaged glass cell, wash off exposed parts with soap and water.

Keep safety first in your circuit designs!

- Hitachi Europe Ltd. puts the maximum effort into making display products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with display products may lead to personal injury, fire or property damage.
  Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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