

Precautions for Avoiding Static Electricity

About the handling of the device, attention for the static electricity in particular is necessary. The precautions described below are required to prevent damage from static electricity.

General

The basic requirements for countering static are to suppress its generation and to get rid of any charge that has built up as rapidly as possible. The environment must therefore be such as to allow correct handling of the devices, and the person handling them must know about how to avoid the problems of static.

(1) Environment

Static within the work environment must be suppressed to within 100V. Materials that generate static must therefore be avoided, and a humidifier used to prevent low levels of humidity. The effects of measures implemented to reduce static should also be reviewed periodically.

(2) Working

In the work-place, insulating materials (notably synthetic fibers and plastics), which are prone to the build up of a charge, should as far as possible be replaced by conductive materials. Examples are work clothes for controlling static and air ionizers.

When handling the semiconductor devices, they should be kept in materials designed to minimize static or conductive vessels (such as static shield bags or conductive mats), and care exercised when moving them.

Measures to Prevent Static During Work

(1) Equipment

To prevent the buildup of static, all equipment including instruments and testing devices, conveyors, workbenches, floor mats, tools, solder baths, and soldering irons must be securely earthed. The workbench must be covered with a conductive mat ($10^{11} \Omega$ maximum), and one placed on the floor. Both must be earthed.

(2) Human body

The worker must use a wrist or ankle strap to earth the body.

In addition, use gloves to prevent direct contact with the devices. Avoid nylon gloves or work clothes, which tend to build up a charge. Footwear should have a resistance in the range of $100k \Omega$ to $100M \Omega$. Note, however, that dirt and humidity will change the resistance.

(3) Methods of working

Use a soldering iron designed for use with semiconductors (with the low voltage of 12V to 24V). The tip must be earthed. When mounting the device, minimize the amount of handling.

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Post-Mounting Measures for Minimizing Static

Even after the device has been mounted on a printed circuit board (PCB), for example, care must be taken to prevent the buildup of static.

(1) Storage

When storing or shipping printed circuit boards (with devices mounted on them), store them in conductive bags, conductive plastic containers, or conductive racks. Avoid placing them in plastic boxes, vinyl bags, or polystyrene containers, which are prone to static buildup. When wrapping multiple printed circuit boards, use inserts to prevent the boards coming into contact with each other and from rattling around in their containers. Short the connectors of the printed circuit board with aluminum foil or shorting bars.

For dust-proofing with sheets only, use conductive sheets or cotton sheets.

(2) Human earthing

For testing, examining, and assembling printed circuit boards with mounted devices, the worker should use the same body earthing as when handling the devices themselves.

(3) Handling

Use gloves for handling printed circuit boards. In addition, the power must always be disconnected before connecting and disconnecting connectors (to prevent destruction of devices due to abnormal voltages being applied).