

# Tips for Preventing Damage to Oscilloscopes

## Ensure proper grounding

- Always use the power cord provided with the oscilloscope.
- Proper grounding of the oscilloscope will prevent a buildup of electrostatic charge, which could be harmful to the oscilloscope and the operator.
- Do not damage or circumvent the ground pin on the power cord provided.

## Read the warning labels and specifications

- Do not exceed the values provided in the data sheet or as indicated by the warning labels on the oscilloscope.
- Refer to the user's guide for conditions required to meet the listed specifications. Note information regarding general safety, power connection, and air flow requirements.
- For example, the warning label on the front panel of the oscilloscope indicates the maximum input level. Do not exceed the stated voltage.

## Avoid overdriving the oscilloscope inputs

- Always set the scale to its maximum setting before changing any inputs, to prevent overdriving the oscilloscope.



- Avoid damage by being prepared with some idea of the signal level to be connected with the oscilloscope. Overdriving the inputs can damage the front-end components.

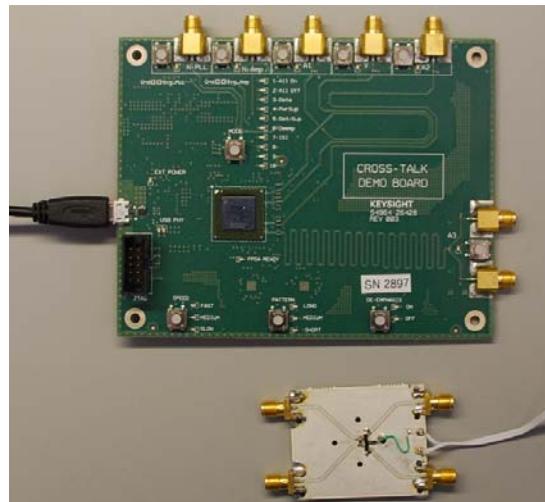
## Ensure proper instrument cooling (air flow)

- Make sure there is adequate clearance around the oscilloscope as specified in the user's guide to ensure adequate air flow.
- When using multiple oscilloscopes, avoid having the heated discharge of one oscilloscope become the cooling intake for another oscilloscope, especially when installed in a rack or cabinet.

- If the air flow is restricted, the internal operating temperature will be higher, reducing the oscilloscope's reliability.
- Do not cover the ventilation holes.
- Periodically check and clean the oscilloscope's cooling vents. Inadequate air flow can cause excessive operating temperatures, which can lead to oscilloscope failure.

## Follow electrostatic discharge (ESD) precautions

- ESD can damage or destroy the electronics behind the inputs of an oscilloscope. In general, higher bandwidth inputs are more susceptible to ESD damage than lower bandwidth inputs.
- ESD can be directly injected into the oscilloscope input by making contact with the center pin of the connector, or it can be indirectly injected through an external test fixture that has exposed traces.
- Test fixtures with exposed traces can transmit an electrostatic discharge from the test fixture to the input of the oscilloscope. Take care when using fixtures that expose center connectors, as it is easy to discharge onto an exposed trace. Here are two examples of fixtures with exposed traces:



- Make sure cables are discharged before connecting them to the oscilloscope. A momentary connection to a load or short will discharge the cable prior to connecting the cable to the oscilloscope inputs.
- When testing an active (powered) DUT, be aware that the capacitors can hold charges even after power is removed from the DUT. Voltage on the board can exceed the maximum input level of the oscilloscope. The transient voltage may occur from the DUT.
- Use the oscilloscope at a static-safe workstation if possible.
- Ensure grounded environment and personnel.
- Keep workstation free of static-generating materials such as plastic boxes, tape, and styrofoam.

## Use proper lifting techniques

- Use two people or a mechanical lift to transport the oscilloscope.
- Lift the oscilloscope by the handles when transporting.
- Avoid picking up the oscilloscope with your hand over the front panel. If the oscilloscope slips, damage may occur to the knobs or input connectors. Preferably, use the snap-on front cover to protect the front.

## Use proper packing for transport

- Oscilloscope damage can result from using packaging materials other than those specified. Never use styrene pellets in any shape as packaging materials. They do not adequately cushion the equipment and can cause equipment damage by generating static electricity.
- If possible, retain the original packaging for re-use when shipping the oscilloscope, or contact Keysight to order packaging materials.

## Protect the input and output connectors

- Avoid repeated bending of cables; a single sharp bend can damage a cable instantly.
- Use the provided connector savers to prevent excessive wear on the connectors. Replace the connector savers when needed.
- Inspect the connectors prior to use: look for dirt, nicks, and other signs of damage or wear. A bad connector can ruin the good connector instantly.
- Clean dirty connectors, including the threads, to prevent poor electrical connections and damage to the connector.
- To clean the mating surfaces of connectors, first use compressed air (from a can), and then use isopropyl alcohol. To clean the connectors, use isopropyl alcohol; do not use any abrasives.
- Use plastic end caps during storage.
- Do not set connectors contact-end down.
- Do not allow fluids into the connectors.

Follow these techniques when making connections:

Do	Don't
▪ Align connectors carefully	▪ Apply bending force to connection
▪ Make preliminary connection lightly	▪ Over-tighten preliminary connection
▪ Turn only the connector nut	▪ Twist or screw any connection
▪ Use a torque wrench for final tightening	▪ Tighten past torque wrench "break" point
▪ Support attached cables on bench or other surface	▪ Allow cables to hang unsupported (cable weight places strain on connectors)

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