

# 80A09 26 GHz ESD Protection Device Instructions



The Tektronix 80A09 is a DC-coupled voltage limiter that protects sensitive electrical sampling module inputs from damage due to electric overload stress (EOS) and electrostatic discharge (ESD). Voltages more than  $\pm 2$  V can damage the high-performance samplers (such as the 80E03 or 80E04) used in 8000 series sampling oscilloscopes. The 80A09 dramatically reduces the likelihood that such voltages will reach the sensitive high-bandwidth sampling diodes in the electrical sampling module, ensuring that its performance is not degraded.

## Best practices to prevent ESD



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**CAUTION.** *Electrostatic discharge (ESD) can damage the 80A09 and sampling module electrical inputs and outputs. Observe the following guidelines to prevent ESD when using the 80A09 or anytime that you are connecting signals or handling the 80A09 or the 80E04 Electrical Sampling Module:*

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- Always wear a grounded antistatic wrist strap when handling or connecting the 80A09 to the 80E04 module, when connecting cables to the 80A09, or when handling or installing sampling modules in the mainframe instrument.
- Wear anti-static clothing and work in a static-free area when using sampling modules.
- Safely discharge the center lead of all cables to ground before connecting them to the 80A09, sampling modules, or the oscilloscope mainframe.
- Do not create an ESD antenna by leaving cables attached to the 80A09 or a sampling module input with the other end of the cable open.
- Always store and transport the 80A09 and sampling modules in a static-free container, with all supplied terminations installed.



## Install the 80A09

You insert the 80A09 devices between the 80E04 TDR sampling module inputs and the cables to the device under test, with the 80A09 connected directly to the 80E04.



**CAUTION.** Follow ESD handling guidelines when connecting the 80A09 to the module and when connecting cables to the 80A09. (See page 1, Best practices to prevent ESD.)

1. Connect the 80A09 to the 80E04 module. Use a torque wrench to tighten the connector to 7.5 in-lb.
2. Connect the cable from the DUT to the 80A09. Make sure to discharge the cable center and shield to ground before connecting to the 80A09. Use a torque wrench to tighten the connector to 7.5 in-lb.



**CAUTION.** To prevent damaging the 80A09/80E04 module connectors, do not put excess pull or lateral movement on the cable attached to the 80A09/80E04 assembly.

## Verify that 80A09 is functional

Use the following procedure to verify that the 80A09 is fully functional to protect the sampling module from ESD (do these steps before major testing sessions, or as part of a scheduled maintenance routine):

- Required test equipment**
- Source Measure Unit (SMU).
  - Adapter, K to BNC.

- BNC T connector.
- Two BNC cables (example: Tektronix part number 012-0076-xx, 20 inch BNC cable).
- Two BNC to Banana plug adapters.

### Precautions while performing the test

This test checks the 80A09 leakage and clamping thresholds. Use caution when operating the Source Measure Unit (SMU) in this test setup. Even though the 80A09 protects the 80E04 from reasonable overvoltages, use care to avoid damaging the 80A09. Follow these precautions:

- Always disconnect the 80A09 from the sampling module input for this test.
- Always set SMU test limits as specified.
- Always disable the SMU output before connecting or disconnecting the SMU supply from the test setup.
- Set the SMU at zero volts before enabling the output.

### Procedure



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**CAUTION.** Follow ESD handling guidelines when connecting cables to the 80A09. (See page 1, Best practices to prevent ESD.)

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1. If connected, remove the cable from the 80A09.
2. Remove the 80A09 from the 80E04 module input.



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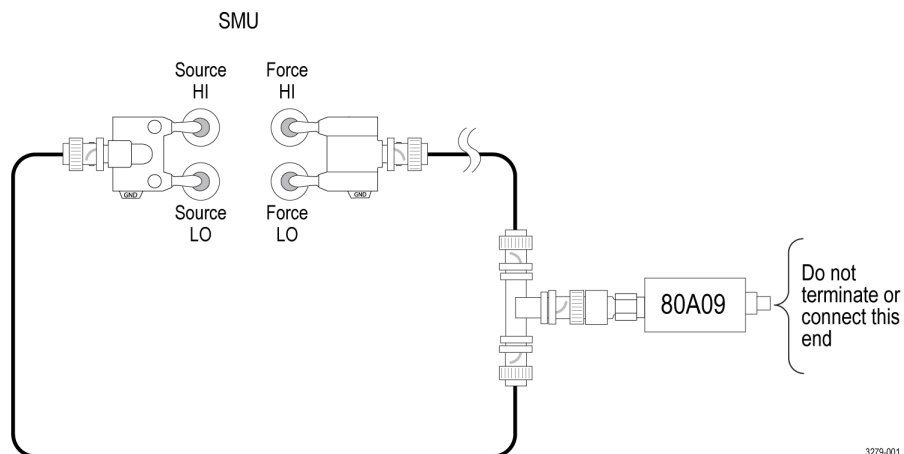
**CAUTION.** Do not perform this test with the 80A09 connected to the 80E04. Doing so can damage the 80E04 module input.

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*Do not connect a ground or 50  $\Omega$  terminator to the 80A09.*

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3. Configure the SMU before connecting to the 80A09:
  - Set the SMU at zero volts.
  - Disable the SMU supply output.
4. Connect the adapters and cables as shown in the following diagram.



**NOTE.** Make sure to connect the ground (GND) side of each BNC to Banana plug adapter to the LO connectors of the SMU.

5. Use the following guidelines while using the SMU with the 80A09:
  - Do not exceed the test voltage value.
  - Once tested, reduce the voltage to zero volts before changing SMU settings.
  - Do not disconnect or reconnect any test cables until you reduce the output to zero.
6. Set the SMU to output **+2.0 VDC**. Verify that the measured current is less than **+100  $\mu$ A**.
7. Set the SMU to output **-2.0 VDC**. Verify that the measured current is less than **-100  $\mu$ A**.
8. Set the SMU to source **+65 mA**, with the overvoltage limit set to **+3.5 V**. Verify that the measured voltage is  $\leq$  **3.42 VDC**.
9. Set the SMU to sink **-65 mA**, with the overvoltage limit set to **-3.5 V**. Verify that the measured voltage is  $\geq$  **-3.42 VDC**.
10. Set the SMU output to **zero** volts, disable the SMU output, and disconnect the SMA to BNC adapter from the 80A09.



**CAUTION.** If any of the checks are outside the stated limits, the 80A09 device can no longer provide ESD protection. Do not use a defective 80A09 with an 80E04. Contact Tektronix Customer Support to order a replacement 80A09 ESD Protection Device.

11. Repeat all of these steps to test other 80A09 devices.

## Environmental Compliance

### Product end-of-life handling

Observe the following guidelines when recycling an instrument or component:

**Equipment recycling.** Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. To avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



This symbol indicates that this product complies with the applicable European Union requirements according to Directives 2002/96/EC and 2006/66/EC on waste electrical and electronic equipment (WEEE) and batteries. For information about recycling options, check the Support/Service section of the Tektronix Web site ([www.tektronix.com](http://www.tektronix.com)).

### Restriction of hazardous substances

This product is classified as an industrial monitoring and control instrument accessory, and is not required to comply with the substance restrictions of the recast RoHS Directive 2011/65/EU until July 22, 2017.