Keysight E2697A
1 MΩ Impedance Adapter

User's Guide

KEYSIGHT
TECHNOLOGIES

Notices

Manual Part Number

E2697-97002

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Safety Notices

CAUTION

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WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Contents

Introduction

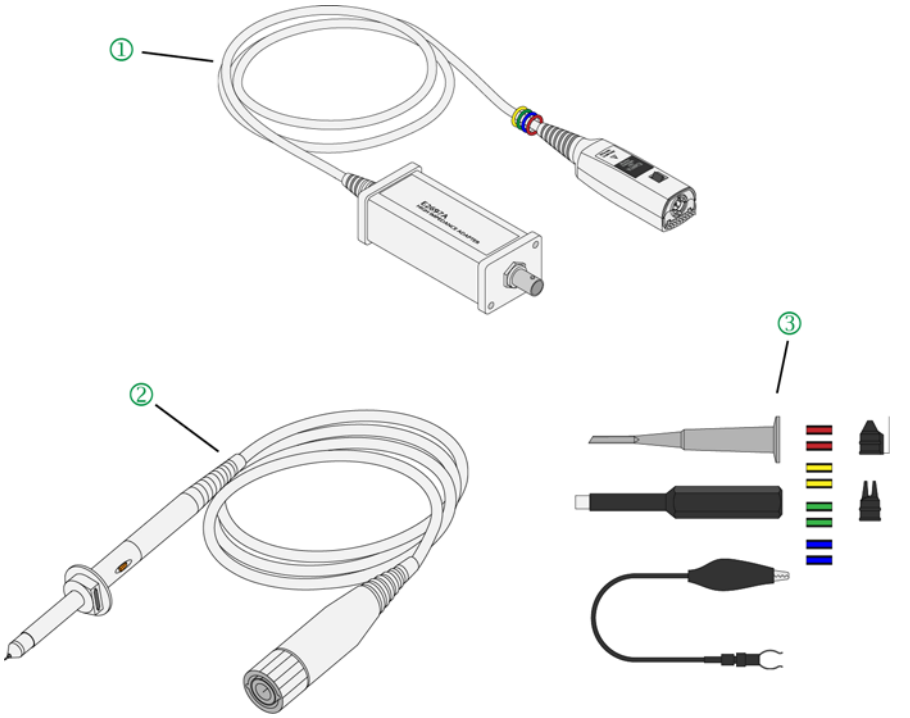
The E2697A high impedance adapter allows connection of probes that require a high impedance input (for example, passive and current probes) to the Infiniium 54850, 80000 and 90000 Series of high performance oscilloscopes. By extending the capability of Keysight Infiniium high-performance oscilloscopes, the E2697A enables a variety of general-purpose measurements such as power supplies, inverters, and semiconductor devices. The E2697A provides switchable ac/dc coupling, as well as 10:1 and 1:1 attenuation settings.

To Use The Adapter

The Infiniium family of oscilloscopes provides both power and offset control to the E2697A 1 MΩ impedance adapter through the front panel connector. Probe offset is changed by adjusting the vertical offset control on the Infiniium oscilloscope. Adjust the control to center your waveform within the dynamic range of the probe.

For best accuracy, you should calibrate the oscilloscope, adapter, and probe combination using the Infiniium probe calibration routine before using the 1 MΩ impedance adapter assembly. When the probe has been calibrated, the dc gain, zero offset, and offset gain will be calibrated. The controls for setting these parameters can be found by selecting Setup > Channel Number > Probes... from the Infiniium main menu.

WARNING **Maximum Input Voltage: 100V PEAK CAT I.**



Item	Description	Qty	Keysight Part Number
①	1 MΩ Impedance Adapter	1	–
②	500 MHz, 10:1 Passive Probe	1	10073D
③	10073D Probe Accessories	1	–

Figure 1 E2697A with Accessories

To Inspect The Adapter

- Inspect the shipping container for damage. Keep a damaged shipping container or cushioning material until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically.
- Check the accessories. Accessories supplied with the instrument are listed in Figure 1 on page 6. If the contents are incomplete or damaged notify your Keysight Technologies, Inc. Sales Office.
- Inspect the adapter. If there is mechanical damage or defect, or if the adapter does not operate properly or pass the performance test, notify your Keysight Technologies, Inc. Sales Office. If the shipping container is damaged, or the cushioning materials show signs of stress, notify the carrier as well as your Keysight Technologies, Inc. Sales Office.

Keep the shipping materials for the carrier's inspection. The Keysight Technologies, Inc. Office will arrange for repair or replacement at Keysight Technologies, Inc. option without waiting for claim settlement.

Cleaning

To clean the probe

If the probe requires cleaning, disconnect it from the oscilloscope and clean it with a soft cloth dampened with a mild soap and water solution. Make sure the probe is completely dry before reconnecting it to the oscilloscope.

To clean the scope

If the instrument requires cleaning:

1. Remove power from the instrument.
2. Clean the external surfaces of the instrument with a soft cloth dampened with a mixture of mild detergent and water.
3. Make sure that the instrument is completely dry before reconnecting it to a power source.

Safety Notices

This apparatus has been designed and tested in accordance with IEC Publication 1010, Safety Requirements for Measuring Apparatus, and has been supplied in a safe condition. This is a Safety Class I instrument (provided with terminal for protective earthing). Before applying power, verify that the correct safety precautions are taken (see the following warnings).

CAUTION

Risk of Danger symbol. Refer to the manual for more information.

CAUTION

Risk of Electric Shock symbol. Refer to the manual for more information.

NOTE

Earth terminal symbol: Used to indicate a circuit common connected to grounded chassis.

WARNING

Before turning on the instrument, you must connect the protective earth terminal of the instrument to the protective conductor of the (mains) power cord. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. You must not negate the protective action by using an extension cord (power cable) without a protective conductor (grounding). Grounding one conductor of a two-conductor outlet is not sufficient protection.

WARNING

If you energize this instrument by an auto transformer (for voltage reduction or mains isolation), the common terminal must be connected to the earth terminal of the power source.

WARNING

Whenever it is likely that the ground protection is impaired, you must make the instrument inoperative and secure it against any unintended operation.

WARNING Service instructions are for trained service personnel. To avoid dangerous electric shock, do not perform any service unless qualified to do so. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

WARNING Do not install substitute parts or perform any unauthorized modification to the instrument.

WARNING Capacitors inside the instrument may retain a charge even if the instrument is disconnected from its source of supply.

WARNING Do not operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

WARNING Do not use the instrument in a manner not specified by the manufacturer.

Characteristics and Specifications

The following characteristics are typical for the active probe. The specification is a warranted parameter.

Table 1 Characteristics and Specifications

Item	Characteristic
Bandwidth (–3 dB)	500 MHz (with 10073D probe)
Rise and Fall Time (10% to 90%)	700 ps calculated from $t_r = \frac{0.35}{\text{bandwidth}}$
Input Impedance[a]	1 MΩ ±1% (~12 pF)
Input Dynamic Range	±0.8V (internal attenuator at 1:1) ±8.0V (internal attenuator at 10:1)
Input Dynamic Range (with 10073D 10:1 probe)	±8.0V (internal attenuator at 1:1) ±80V (internal attenuator at 10:1)
Input Coupling	dc, ac (7 Hz)
DC Attenuation	1.16:1 (internal attenuator at 1:1)[b] 11.6:1 (internal attenuator at 10:1)[c]
Offset Range	±5.0V (internal attenuator at 1:1) ±50V (internal attenuator at 10:1)
⚠ Maximum Input Voltage	±100V (dc + ac)(ac < 100 kHz), CAT I

a. Denotes Warranted Specifications, all others are typical. Specifications are valid after a warmup period and within ±5°C of the calibration temperature.
b. At scale settings > 200 mV/div signal size limited by input dynamic range.
c. At scale settings > 2V/div signal size limited by input dynamic range.

General Characteristics

The following general characteristics apply to the active probe.

Table 2 General Characteristics

Item	Characteristic
Weight	approximately 0.69 kg
Pollution degree 2	Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.
Use	Indoor

Table 3 Environmental Characteristics

Item	Operating	Non-Operating
Temperature	0°C to +40°C	–40°C to +70°C
Humidity	up to 95% relative humidity (non-condensing) at +40°C	up to 90% relative humidity at +65°C
Power Requirements	+12 Vdc @ 1.9 mA typical +5 Vdc @ 51 mA typical –5 Vdc @ 26 mA typical –12 Vdc @ 1.9 mA typical 0.43W	(voltages supplied by AutoProbe Interface)

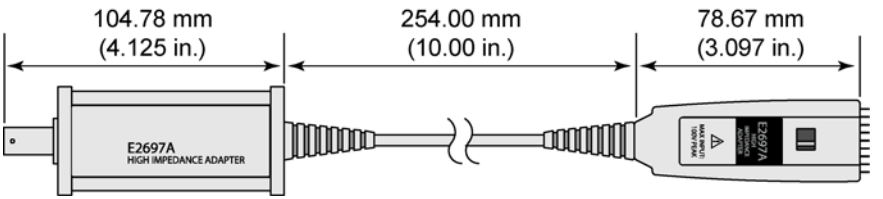


Figure 2 E2697A Dimensions

Regulatory Information

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC (including 93/68/EEC) and carries the CE-marking accordingly (European Union).

Sound Pressure Level: NA

EMC

Table 4 EMC Regulations

Regulation	Performance Criteria
IEC 61326-1:1997+A1:1998+A2:2000/EN 61326-1:1997+A1:1998+A2:2000	
CISPR 11:1997+A1:1999 / EN 55011:1998+A1:1999	B[a]
IEC 61000-4-2:1995+A1:1998/EN 61000-4-2:1995	A[b]
IEC 61000-4-3:1995/EN 61000-4-3:1996	B[b]
IEC 61000-4-4:1995/EN 61000-4-4:1995	B[b]
IEC 61000-4-5:1995/EN 61000-4-5:1995	B[b]
IEC 61000-4-11:1994/EN61000-4-11-1994	B[b]
Canada: ICES-001:1998	
Australia/New Zealand: AS/NZS 2064.1	

a. A Pass (Normal operation, no effect.)
b. B Pass (Temporary degradation, self recoverable.)

Regulatory Information for Canada

ICES/NMB-001:1998

This ISM device complies with Canadian ICES-001. Cet appareil ISM est confomre à la norme NMB-001 du Canada.

Regulatory Information for Australia/New Zealand

This ISM device complies with Australian/New Zealand AS/NZS 2064.1

Safety

IEC 61010-1:2001/EN 61010-1:2001
Canada: CSA-C22.2 No. 1010.1:1992

Service

If the E2697A is under warranty, normal warranty services apply. Contact your nearest Keysight Technologies, Inc. Service Center. If the E2697A is not under warranty, a failed adapter can be exchanged for a reconditioned one at a nominal cost.

To return the adapter to Keysight Technologies, Inc. for service

Before shipping the E2697A to Keysight Technologies, Inc., contact your nearest Keysight Technologies, Inc. Sales Office for additional details.

1 Write the following information on a tag and attach it to the E2697A.

- Name and address of owner
- E2697A model number
- E2697A serial number
- Description of the service required or failure indications

2 Remove all accessories from the E2697A. Accessories include all cables. Do not include accessories unless they are associated with the failure symptoms.

3 Protect the probe by wrapping it in plastic or heavy paper.

4 Pack the probe in foam or other shock absorbing material and place it in a strong shipping container. You can use the original shipping materials or order materials from an Keysight Technologies, Inc. Sales Office. If neither are available, place 3 to 4 inches of shock absorbing material around the probe and place it in a box that does not allow movement during shipping.

5 Seal the shipping container securely.

6 Mark the shipping container as FRAGILE. In any correspondence, refer to E2697A by model number and full serial number.

Failure Symptoms

The following symptoms may indicate a problem with the E2697A or the way it is used. Possible remedies and repair strategies are included. The most important troubleshooting technique is to try different combinations of equipment so you can isolate the problem to a specific E2697A.

Probe calibration failure with an oscilloscope is usually caused by improper setup. If the calibration will not pass, check the following:

- Check that the E2697A passes a waveform with the correct amplitude.
- If the E2697A is powered by the oscilloscope, check that the offset is approximately correct. The E2697A calibration cannot correct major failures.
- Be sure the oscilloscope passes calibration without the E2697A.

Verifying the E2697A's Input Impedance

Specification:. . . . . 1 MΩ ±1%

Table 5 Equipment Required

Equipment	Critical Specification	Recommended Model/Part
Oscilloscope	Software Version 3.10 or higher	Keysight 5483x-series or 5485xA-series oscilloscope
Digital Multimeter (DMM)	2-Wire Resistance Measurement, Accuracy ±0.1% or better	Keysight 34401A
Adapter	Dual Banana to BNC (f)	Pasternack Enterprises PE9008
Cable	Coaxial with BNC (m) at both ends	Keysight 10503A

Procedure

1 From the Control Menu of the oscilloscope, Select Factory Default.

2 Plug the E2697A into Channel 1.

3 From the Setup menu of the oscilloscope, select Channel 1.

4 Click the Probes button.

5 In the Probe Setup dialog box set the E2697A Atten control to 1:1 and set the Coupling control to DC.

6 Set the DMM to measure a 2-wire resistance.

7 Connect the DMM to the E2697A input using a BNC cable.

8 Record the reading on the DMM as R1. The input impedance should be 1 MΩ ±1%.

R1 Input Impedance: _____

9 In the Probe Setup dialog box set the Atten control to 10:1.

10 Record the reading on the DMM as R2. The input impedance should be 1 MΩ ±1%.

R2 Input Impedance: _____

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