U2941A Parametric Test Fixture

KEYSIGHT

Operating Guide

NOTICE: This document contains references to Agilent Technologies. Agilent's former Test and Measurement business has become Keysight Technologies. For more information, go to **www.keysight.com.**

Notices

Copyright Notice

Manual Part Number

U2941-90001

Edition

Edition 7, August 2023

Printed in:

Printed in Malaysia

Published by:

Keysight Technologies
Bayan Lepas Free Industrial Zone,
11900 Penang, Malaysia

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

Declaration of Conformity

Declarations of Conformity for this product and for other Keysight products may be downloaded from the Web. Go to http://www.keysight.com/go/conformity. You can then search by product number to find the latest Declaration of Conformity.

U.S. Government Rights

The Software is “commercial computer software,” as defined by Federal Acquisition Regulation (“FAR”) 2.101. Pursuant to FAR 12.212 and 27.405-3 and Department of Defense FAR Supplement (“DFARS”) 227.7202, the U.S. government acquires commercial computer software under the same terms by which the software is customarily provided to the public. Accordingly, Keysight provides the Software to U.S. government customers under its standard commercial license, which is embodied in its End User License Agreement (EULA), a copy of which can be found at http://www.keysight.com/find/sweula. The license set forth in the EULA represents the exclusive authority by which the U.S. government may use, modify, distribute, or disclose the Software. The EULA and the license set forth therein, does not require or permit, among other things, that Keysight: (1) Furnish technical information related to commercial computer software or commercial computer software documentation that is not customarily provided to the public; or (2) Relinquish to, or otherwise provide, the government rights in excess of these rights customarily provided to the public to use, modify, reproduce, release, perform, display, or disclose commercial computer software or commercial computer software documentation. No additional government requirements beyond those set forth in the EULA shall apply, except to the extent that those terms, rights, or licenses are explicitly required from all providers of commercial computer software pursuant to the FAR and the DFARS and are set forth specifically in writing elsewhere in the EULA. Keysight shall be under no obligation to update, revise or otherwise modify the Software. With respect to any technical data as defined by FAR 2.101, pursuant to FAR 12.211 and 27.404.2 and DFARS 227.7102, the U.S. government acquires no greater than Limited Rights as defined in FAR 27.401 or DFAR 227.7103-5 (c), as applicable in any technical data.

Warranty

THE MATERIAL CONTAINED IN THIS DOCUMENT IS PROVIDED “AS IS,” AND IS SUBJECT TO BEING CHANGED, WITHOUT NOTICE, IN FUTURE EDITIONS. FURTHER, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, KEYSIGHT DISCLAIMS ALL WARRANTIES, EITHER EXPRESS OR IMPLIED, WITH REGARD TO THIS MANUAL AND ANY INFORMATION CONTAINED HEREIN, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. KEYSIGHT SHALL NOT BE LIABLE FOR ERRORS OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE FURNISHING, USE, OR PERFORMANCE OF THIS DOCUMENT OR OF ANY INFORMATION CONTAINED HEREIN. SHOULD KEYSIGHT AND THE USER HAVE A SEPARATE WRITTEN AGREEMENT WITH WARRANTY TERMS COVERING THE MATERIAL IN THIS DOCUMENT THAT CONFLICT WITH THESE TERMS, THE WARRANTY TERMS IN THE SEPARATE AGREEMENT SHALL CONTROL.

Safety Information

CAUTION

A CAUTION 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 damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

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.

Safety Symbols

The following symbols on the instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.

	Direct current (DC)		Equipment protected throughout by double insulation or reinforced insulation
	Alternating current (AC)		Off (supply)
	Both direct and alternating current		On (supply)
	Three-phase alternating current		Caution, risk of electric shock
	Earth (ground) terminal		Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Protective conductor terminal		Caution, hot surface
	Frame or chassis terminal		Out position of a bi-stable push control
	Equipotentiality		In position of a bi-stable push control

General Safety Information

WARNING

- Do not load the output terminals above the specified current limits.
- Do not use the device if it appears damaged or defective.
- Observe all markings on the device before establishing any connection.
- Do not operate the device in the presence of flammable gases or fumes.
- Do not install substitute parts or perform any unauthorized modification to the device.

CAUTION

- Applying excessive voltage or overloading the device will cause irreversible damage to the circuitry.
- Use the device with the cables provided.
- Repair or service that is not covered in this manual should only be performed by qualified personnel.

Environmental Conditions

This instrument is designed for indoor use and in an area with low condensation. The table below shows the general environmental requirements for this instrument.

Environmental conditions	Requirements
Operating temperature	0 °C to 50 °C
Operating humidity	20% to 85% RH noncondensing
Storage temperature	–20 °C to 70 °C
Storage humidity	5% to 90% RH noncondensing

Product Regulatory and Compliance

This U2941A complies with safety and EMC requirements.

Refer to Declaration of Conformity at http://www.keysight.com/go/conformity for the latest revision.

Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.

Product category:

With reference to the equipment types in the WEEE directive Annex 1, this instrument is classified as a “Monitoring and Control Instrument” product.

The affixed product label is as shown below.

Do not dispose in domestic household waste.

To return this unwanted instrument, contact your nearest Keysight Service Center, or visit http://about.keysight.com/en/companyinfo/environment/takeback.shtml for more information.

Sales and Technical Support

To contact Keysight for sales and technical support, refer to the support links on the following Keysight websites:

- www.keysight.com/find/u2941a
  (product-specific information and support, software and documentation updates)
- www.keysight.com/find/assist
  (worldwide contact information for repair and service)

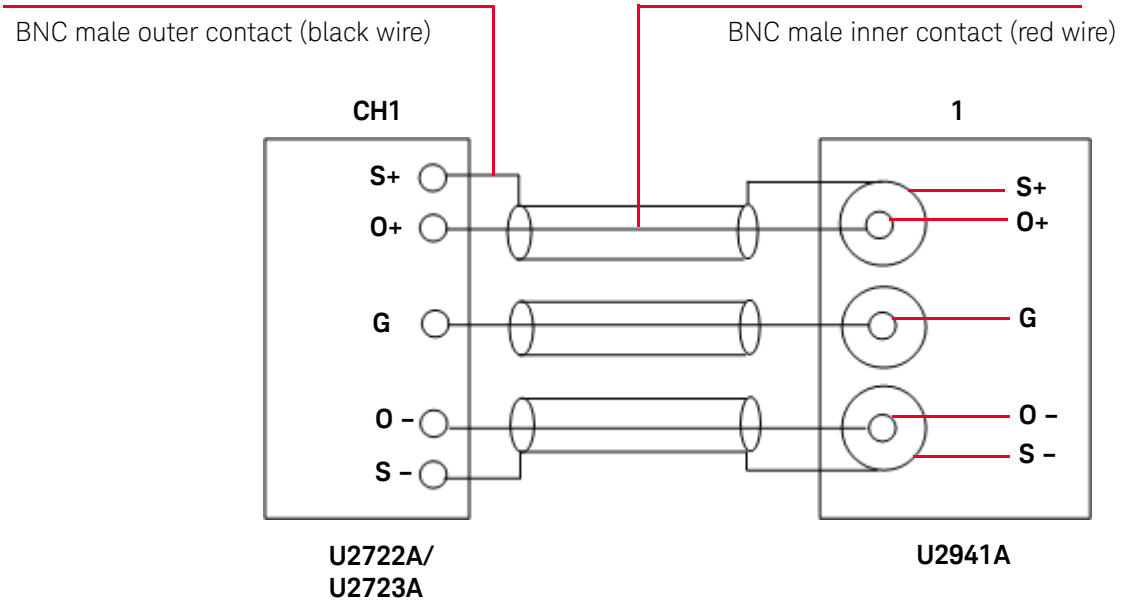
Table of Contents

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK.

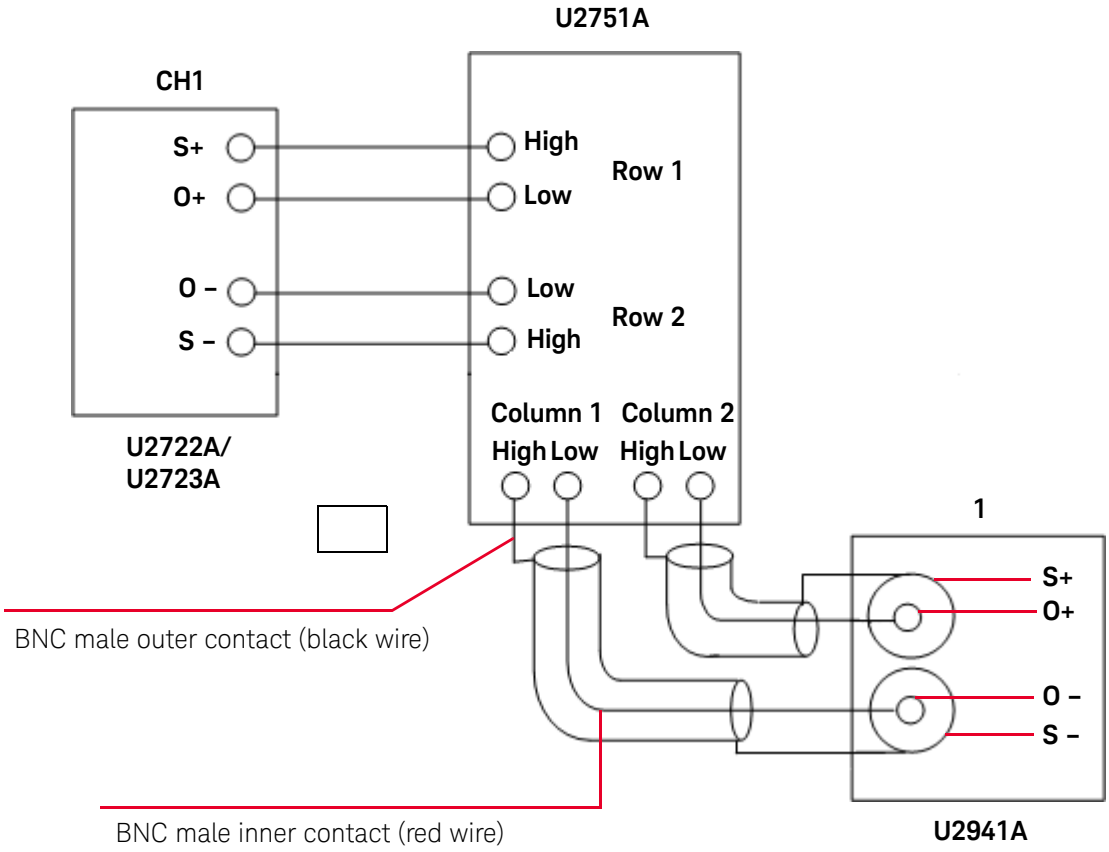
Introduction

The Keysight U2941A Parametric Test Fixture is designed for semiconductor device testing. The U2941A has three input channels and a common ground. You can select different types of socket modules for devices-under-test (DUTs) of various pin configurations. By mounting the suitable socket module on the U2941A, you are able to connect the DUTs to the U2722A/U2723A USB modular source measure unit and U2751A USB modular switch matrix.

You can connect the U2722A/U2723A directly to the U2941A as shown in the following figure.



You also have the option to connect the U2722A/U2723A via the U2751A to the U2941A as shown below.

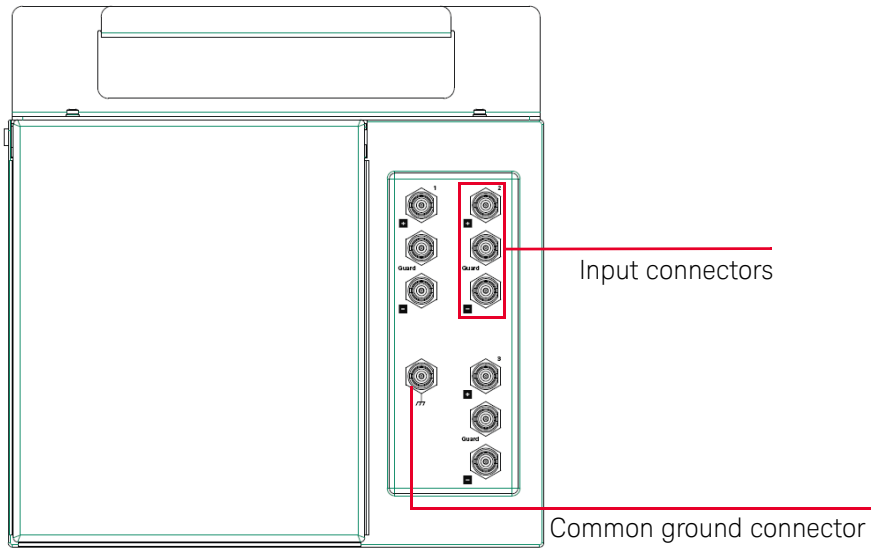


For the information on the socket modules, refer to "Socket Modules" on page 20. To obtain more information on the U2722A/U2723A and U2751A, refer to the *U2722A/U2723A USB Modular Source Measure Unit User's Guide* and *U2751A USB Modular Switch Matrix User's and Service Guide* respectively.

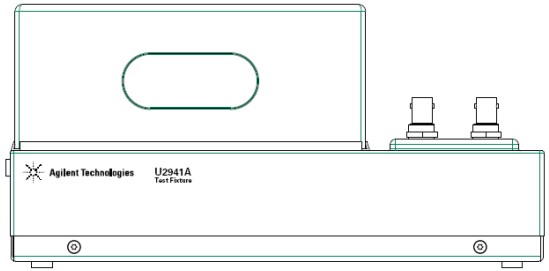
Product at a Glance

Product outlook (with closed cover)

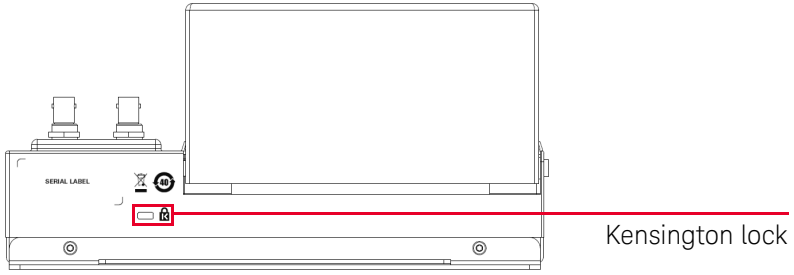
Top view



Front view

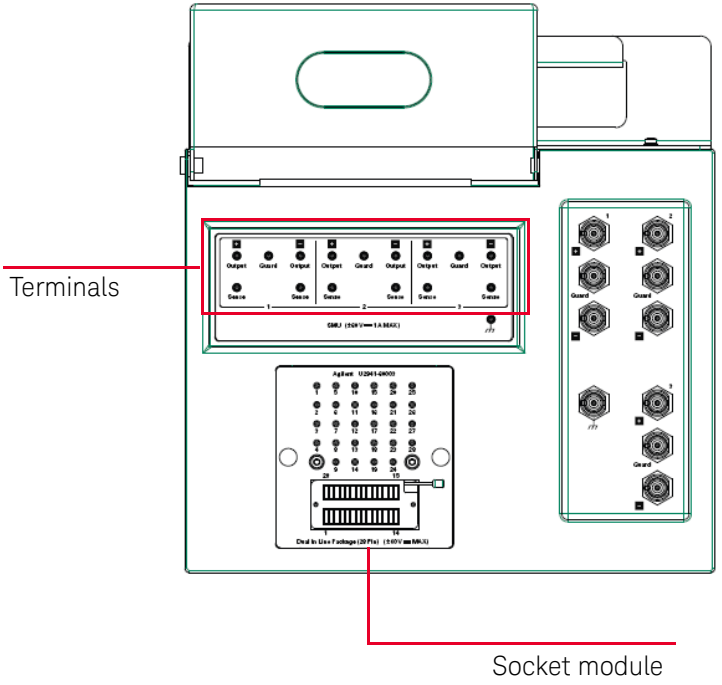


Rear view



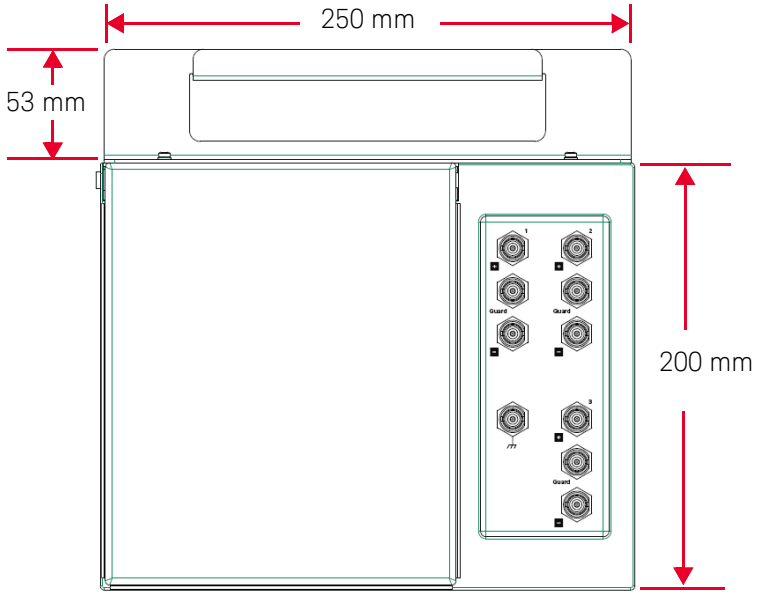
Product outlook (with opened cover)

Top view

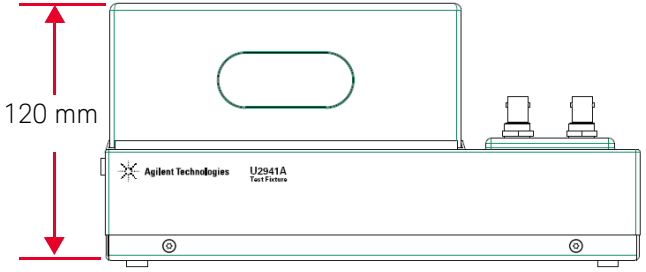


Product dimensions

Top view



Front view



Standard Shipped Items

Verify that you have received the following items with your U2941A. If anything is missing or damaged, please contact the nearest Keysight Sales Office.

- ✔ Assembly PTFE plate
- ✔ 28-pin dual-in-line package socket module
- ✔ 0.1 inch universal socket module
- ✔ 0.075 inch universal socket module
- ✔ 0.05 inch universal socket module
- ✔ Four pin plug to pin plug cables (black)
- ✔ Four pin plug to pin plug cables (red)
- ✔ Four pin plug to pin plug cables (blue)
- ✔ Four pin plug to miniature clip cables (black)
- ✔ Four pin plug to miniature clip cables (blue)
- ✔ Three BNC to two-wire cables, 1 m
- ✔ PCB jumper pins

Orderable Items

Module options

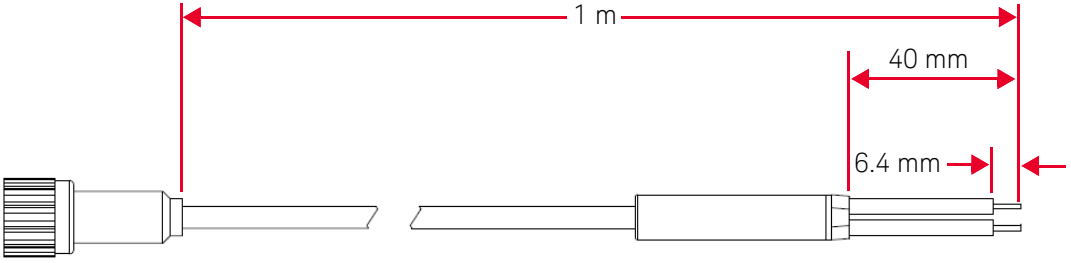
Orderable part number	Keysight part number	Description
U2941A-201	U2941-60002	Assembly PTFE plate
U2941A-202	U2941-60003	28-pin dual-in-line package socket module
U2941A-203	U2941-60004	0.1 inch universal socket module
U2941A-204	U2941-60005	0.075 inch universal socket module
U2941A-205	U2941-60006	0.05 inch universal socket module

Cable options

Orderable part number	Keysight part number	Description
U2941A-101	U2941-20001	Four pin plug to pin plug cables (black)
U2941A-102	U2941-20002	Four pin plug to pin plug cables (red)
U2941A-103	U2941-20003	Four pin plug to pin plug cables (blue)
U2941A-104	U2941-20004	Four pin plug to miniature clip cables (black)
U2941A-106	U2941-20006	Four pin plug to miniature clip cables (blue)
U2941A-107	U2941-61601	Three BNC to two-wire cables, 1 m

Connection Cables

– BNC to two-wire cable (U2941-61601)



Follow the procedure below to connect the BNC to two-wire cables from the U2722A/U2723A to the U2941A input connectors.

1 Push the cables through the cable casing. Refer to the *U2722A/U2723A USB Modular Source Measure Unit User's Guide* for the details.

2 Insert the black wire ends of the cables into the SENSE connectors of the U2722A/U2723A. Insert the red wire ends into the OUTPUT connectors.

3 Push the cable casing towards the connector until it firmly envelops the connector.

4 Connect the BNC ends of the cables to the U2941A input connectors.

To connect the U2722A/U2723A via the U2751A to the U2941A, use the U2922A terminal block. Refer to the *U2751A USB Modular Switch Matrix User's and Service Guide* for details on the U2922A terminal block.

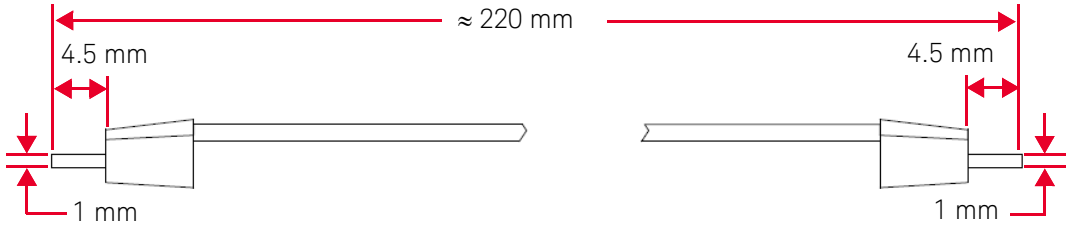
– Pin plug to pin plug cable

  Residual Resistance: 12 mΩ typical

  Black: U2941-20001

  Red: U2941-20002

  Blue: U2941-20003



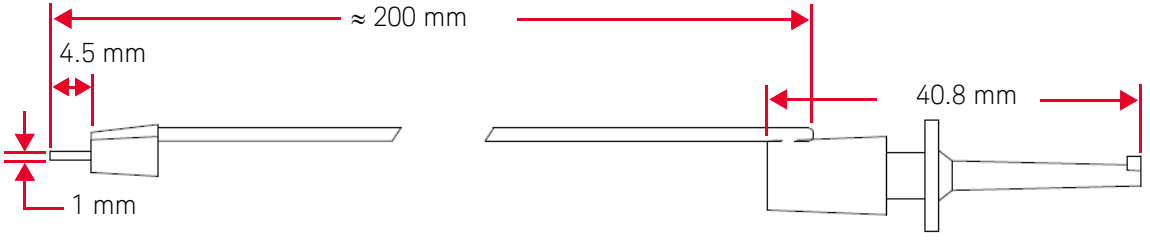
– Pin plug to miniature clip cable

  Residual Resistance: 12 mΩ typical

  Black: U2941-20004

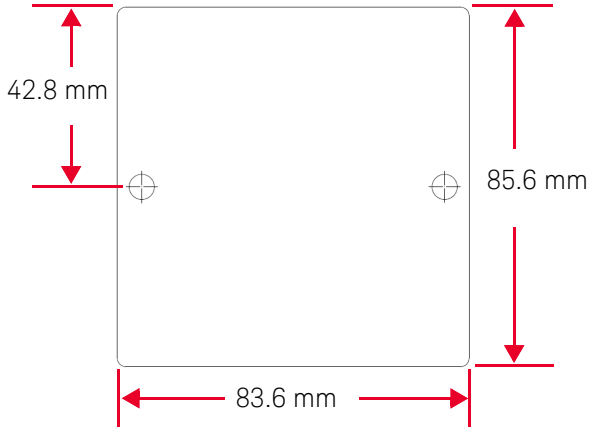
  Red: U2941-20005

  Blue: U2941-20006



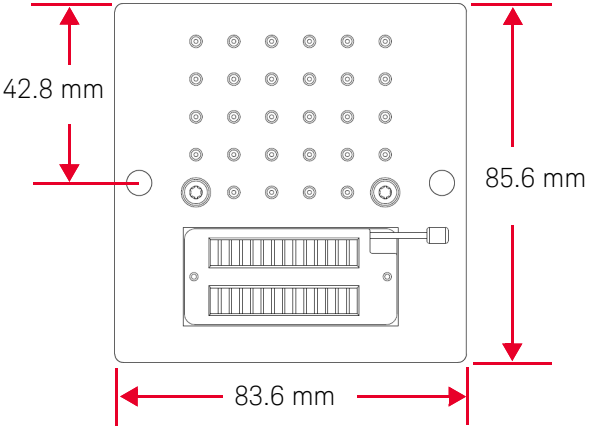
– Assembly PTFE plate (U2941-60002)

This insulation board has minimal leakage current which is suitable for extremely low current measurements, depending on the specifications of the cables and the U2722A/U2723A.



– 28-pin dual-in-line package (U2941-60003)

This socket module has a 28-pin dual-in-line lever actuated zero insertion force (ZIF) socket.



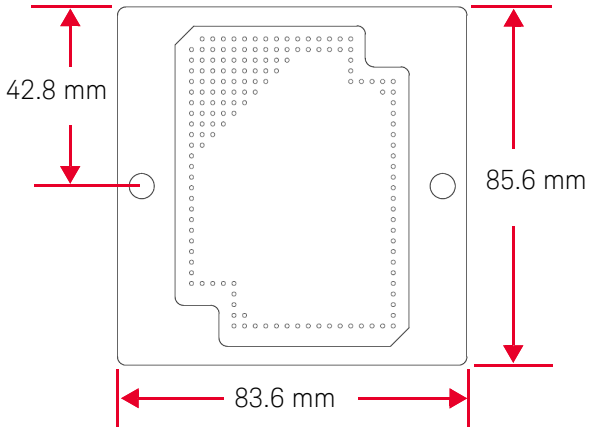
– Universal socket module

  0.1 inch pitch: U2941-60004

  0.075 inch pitch: U2941-60005

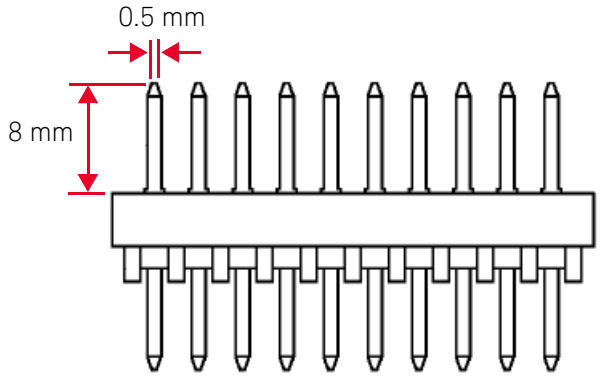
  0.05 inch pitch: U2941-60006

This socket module is used for measurement of virtually any device such as components, DIP IC, CPGA package, or any small-scale circuit.



Jumper pin (U2941-20008)

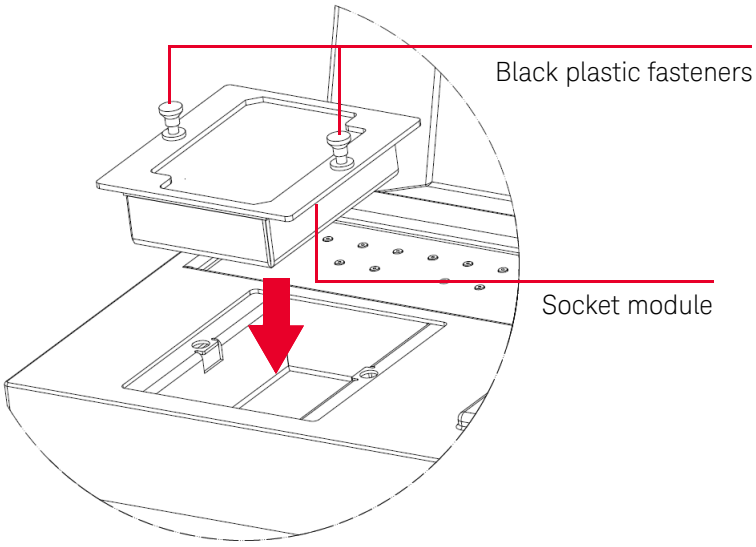
It is used with the universal socket module.



Hardware Installation

Attaching the socket module

After selecting the appropriate socket module for the DUT, install the socket module to the U2941A. The following figure shows the attachment of a socket module to the U2941A.



Use the following procedure to attach the socket module.

NOTE **Ensure that no voltage or current is applied to the U2941A when attaching the socket module.**

1. Open the lid of the U2941A.
2. Check that the black plastic fasteners of the socket module are unlocked (pulled up).
3. Insert the socket module onto the U2941A.
4. Press the black plastic fasteners down to lock the socket module into place.

Use the following procedure to remove the socket module from the U2941A.

NOTE Ensure that no voltage or current is applied to the U2941A when removing the socket module.

1. Open the lid of the U2941A.
2. Remove the connection cables.
3. Pull up the black plastic fasteners on both sides of the socket module.
4. Lift the socket module from the U2941A.

NOTE Always unlock the black plastic fasteners when the socket module is not in use.

Mounting and wiring the DUT on the socket module

You can mount and wire the DUTs as described in the following.

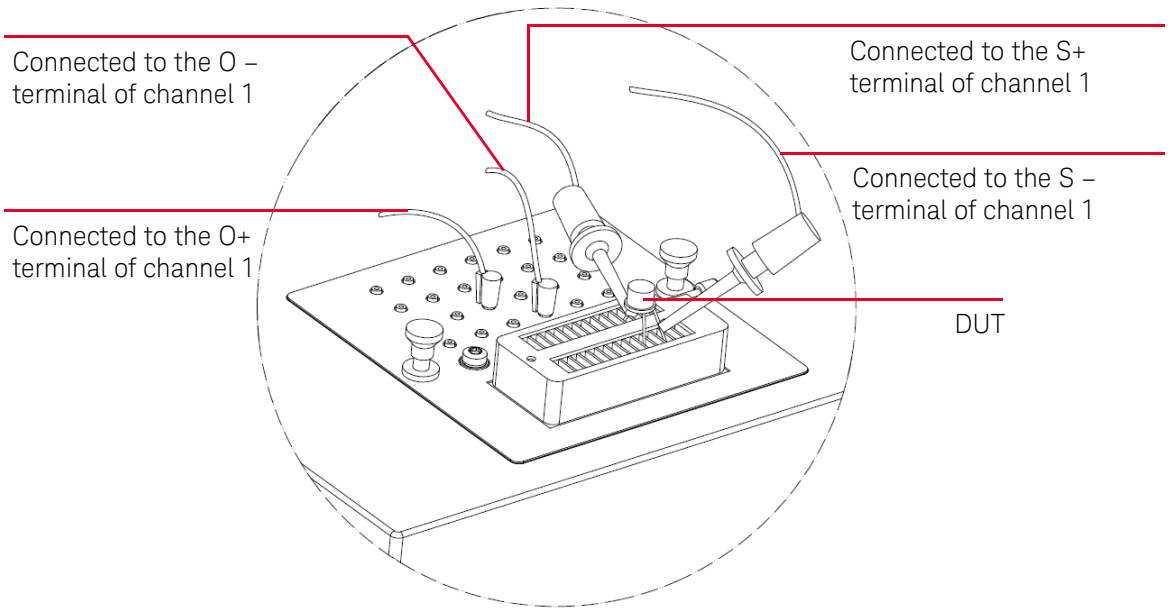
Non-Kelvin connections

Connect the pin plug to pin plug cables between the Output terminals on the U2941A and the desired terminals on the socket module.

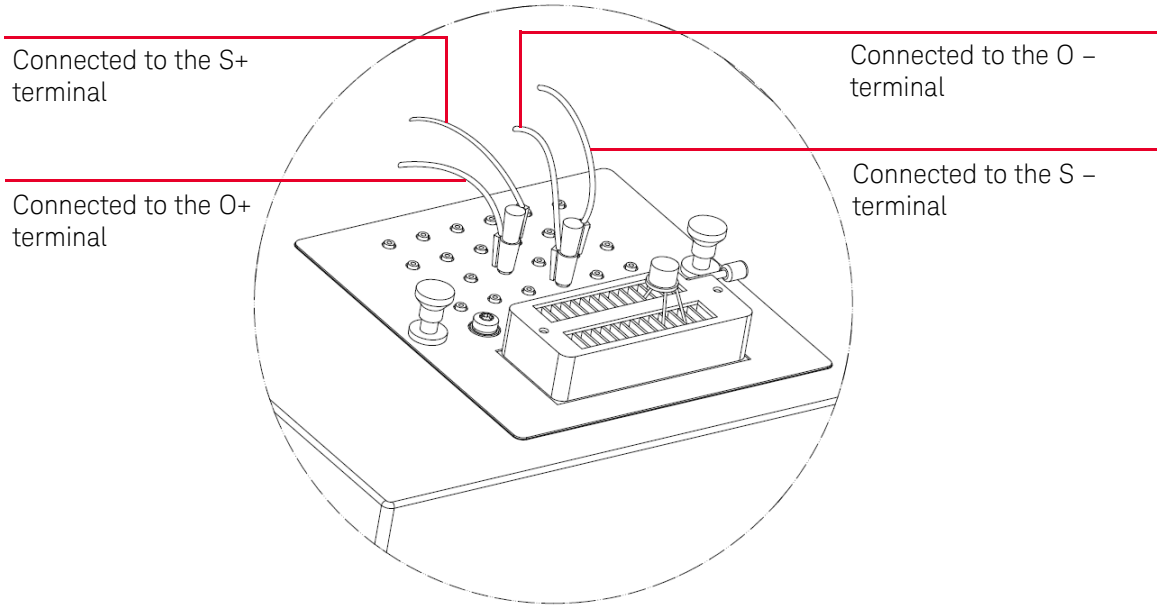
Kelvin connections

Connect a pin plug to pin plug cable between the Output terminal on the U2941A and the desired terminal on the socket module, and then connect a pin plug to miniature clip cable between the Sense terminal and DUT lead. The U2941A enables usage of the Kelvin connections for a maximum of three U2722A/U2723A channels.

The following figure shows an example of the Kelvin connection for channel 1.



You may also connect an additional pin plug to pin plug cable between the Sense terminal and the hole of the pin plug connected to the terminal as shown in the following figure.

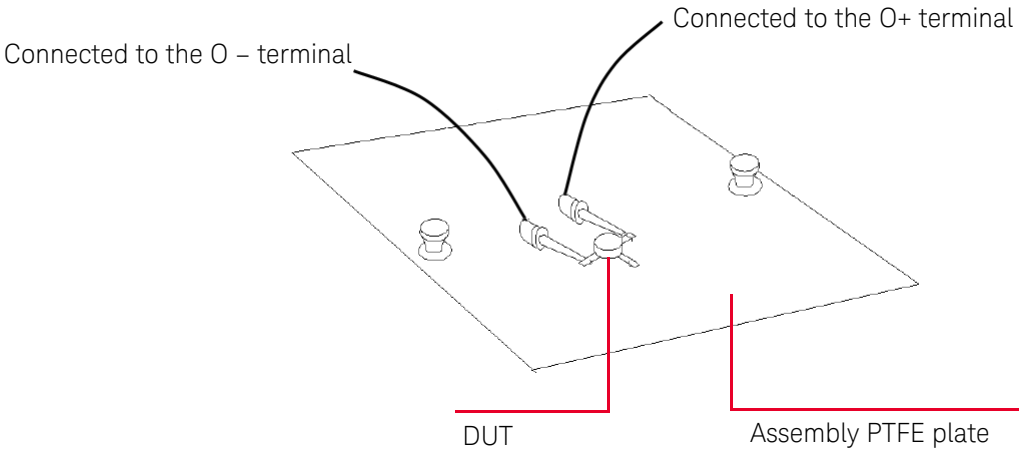


Connections for a uniquely shaped device

If there is no suitable socket module for a uniquely shaped DUT, you can connect the device by using the assembly PTFE plate or universal socket module as described in the following.

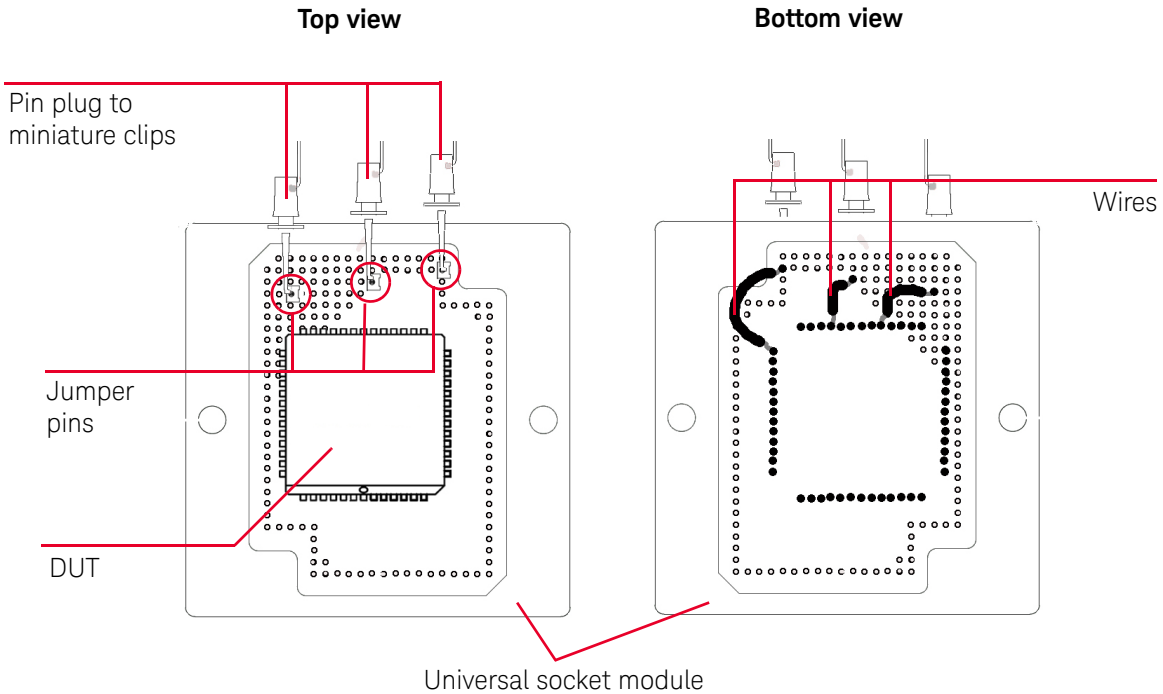
– Assembly PTFE plate

Connect the terminals directly to the DUT on the assembly PTFE plate using the pin plug to miniature clip connection cables, as shown in the following figure. Ensure that the DUT is placed on the assembly PTFE plate.



– **Universal socket module**

The provided pitch sizes (0.1 inch, 0.075 inch, and 0.05 inch) offer you the flexibility to mount your DUT on the U2941A. You may either solder the DUT directly or insert an IC holder on the universal socket module. Open the casing of the socket module by removing the screws and use a wire to connect the DUT lead or IC holder lead to the jumper pin which is inserted on the socket module. The jumper pins connection at the bottom layer of the printed circuit board (PCB) is shown in the **Bottom view** figure. The other end of the jumper pins at the top layer of the PCB allows you to connect the terminals to the jumper pins using the pin plug to miniature clip cables as shown in the Top view figure.



NOTE Do not use the universal socket module for low leakage current measurements (<1 nA).

Software Installation

The Parametric Measurement Manager extends the capabilities of the U2941A by allowing you to perform various types of measurements efficiently.

System requirements

Before installing the Parametric Measurement Manager, ensure that your PC meets the following minimum system requirements for installation and operation.

Hardware requirements

Required hardware	Specification
Processor	1.6 GHz Pentium® IV or higher
Operating system	One of the following Microsoft® Windows® versions: – Windows® XP Professional or Home Edition, Service Pack 1 or later – Windows® 2000 Professional, Service Pack 4 or later
Video	1024 × 768 recommended
Browser	Microsoft® Internet Explorer 5.01 or higher (6.0 or higher recommended)
Available RAM	512 MB (1.0 GB or higher recommended)
Hard disk space	1.0 GB free disk space at runtime

Software requirements

Required software	Version (Minimum)
Keysight IO Libraries Suite	Version 15.0[1] or higher
Keysight VEE	Runtime version 8.5[2], patch 8.5.1[2]
Keysight Measurement Manager	Version 1.6[3] or higher
Microsoft® .NET Framework	Version 1.1 and 2.0

[1] Download from www.keysight.com/find/iosuite.

[2] Bundled with the *Keysight Parametric Measurement Manager* installer.

[3] Bundled with the Keysight U2722A/U2723A USB Modular Source Measure Unit or the Keysight U2751A USB Modular Switch Matrix.

Installing the Parametric Measurement Manager

1. Disconnect any instrument that is connected to your PC and close all other applications on your PC.
2. Download and install the Keysight Parametric Measurement Manager from www.keysight.com/find/pmmpro.
3. Follow the instructions as prompted during the installation
4. Click **Finish** when the installation has completed.
5. A shortcut to the Parametric Measurement Manager will be created to your desktop.

NOTE Refer to the *Keysight U2941A Parametric Measurement Manager Application Software Help File* for more information on the software features and functions.

Product Specifications

The following specifications are valid for a temperature of 23 ±5 °C and 85% relative humidity.

ELECTRICAL SPECIFICATIONS	
Voltage rating	60 VDC
Current rating	1 A

ENVIRONMENTAL SPECIFICATIONS	
Operating temperature	0 °C to 50 °C
Storage temperature	–20 °C to 70 °C
Operating humidity	20% to 85% RH noncondensing
Storage humidity	5% to 90% RH noncondensing
Altitude	Up to 2000 m

PHYSICAL SPECIFICATIONS	
Dimensions (W × D × H)	250 mm × 200 mm × 120 mm
Weight	≈ 1.33 kg
Warranty	3 months

Maintenance

To maintain high performance, the U2941A must be kept clean. Oil, perspiration, hair, dust, and dirt will degrade board insulation, which increases leakage current and decreases measurement accuracy.

Keysight recommends the following cleaning procedures.

Chassis, lid, inner plate, and socket modules

1. Ensure that voltage or current is not applied to the U2941A.
2. Remove all connection cables from the U2941A.
3. Using lint-free paper, gently wipe the chassis, lid, inner plate, and socket module. For any area that will not come clean, dip the lint-free paper into alcohol and wipe the area gently.

Connection cables

1. Ensure that voltage or current is not applied to the U2941A.
2. Remove the connection cables from the U2941A.
3. Dip lint-free paper into alcohol and gently wipe the metal contacts of the connection cables.

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK.

Edition 7, August 2023

Printed in Malaysia

U2941-90001
www.keysight.com