

Keysight ZA0060A Custom IoT Device Functional Test Solution

For Multi-up Configuration

Notices

Copyright Notice

© Keysight Technologies 2020

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Keysight Technologies as governed by United States and international copyright laws.

Trademarks

Bluetooth® and the *Bluetooth*® logos are trademarks owned by *Bluetooth*® SIG, Inc., U.S.A. and licensed to Keysight Technologies, Inc.

Manual Part Number

ZA0060-90001

Edition

Edition 2, October 2020

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 FOR 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.

	Standby supply. Unit is not completely connected from AC mains when switched off		Alternating current (AC)
	Protective earth (ground) terminal		Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Frame or chassis (ground) terminal		

Safety Considerations

Read the information below before using this instrument.

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards for design, manufacture, and intended use of the instrument. Keysight Technologies assumes no liability for the customer's failure to comply with these requirements.

General

Do not use this product in any manner not specified by the manufacturer. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

Before Applying Power

Verify that all safety precautions are taken. Make all connections to the unit before applying power and select the appropriate power line voltage on the fuse module.

Ground the Instrument

This product is provided with protective earth terminals. To minimize shock hazard, the instrument must be connected to the ac power mains through a grounded power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

Do Not Operate in an Explosive Atmosphere

Do not operate the instrument in the presence of flammable gases or fumes.

Do Not Remove the Instrument Cover

Only qualified, service-trained personal who are aware of the hazards involved should remove instrument covers. Always disconnect the power cable and any external circuits before removing the instrument cover.

Do Not Modify the Instrument

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to a Keysight Sales and Service Office for service and repair to ensure that safety features are maintained.

In Case of Damage

Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

Environmental Conditions

The ZA0060A is designed for indoor use and in an area with low condensation. The table below shows the general environmental requirements for this instrument.

Environmental condition	Requirement
Temperature	Operating condition 0 to 40 °C
	Storage condition –40 to 70 °C
Humidity	Operating condition – Up to 80% RH at 40°C (non-condensing)
	Storage condition – Up to 95% RH at 40°C (non-condensing)
Altitude	Up to 2000 m
Pollution degree	2

Safety and Regulatory Information

The ZA0060A complies with the following safety and Electromagnetic Compatibility (EMC) regulations:

Safety compliance

- IEC 61010-1/EN 61010-1; IEC 61010-2-030/EN61010-2-030
- Canada: CAN/CSA-C22.2 No.61010-1-12; CAN/CSA-C22.2 No. 61010-2-030-12
- USA: ANSI/UL Std. No. 61010-1; ANSI/UL Std No.61010-2-030

EMC regulation

- IEC 61326-1/EN 61326-1
- Canada: ICES/NMB-001
- Australia/New Zealand: AS/NZS CISPR 11

Regulatory Markings

	<p>The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives.</p>
	<p>The RCM mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australia EMC Framework regulations under the terms of the Radio Communication Act of 1992.</p>
<p>ICES/NMB-001</p>	<p>ICES/NMB-001 indicates that this ISM device complies with the Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada.</p>
	<p>This symbol indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.</p>
	<p>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.</p>
	<p>This symbol is a South Korean Class A EMC Declaration, with product identification code R-R-Kst-GM20714.</p> <p>This equipment is suitable for professional use and is for use in electromagnetic environment outside of the home.</p> <p>South Korean Class A EMC Declaration</p> <p>A 급 기기 (업무용 방송통신기자재)</p> <p>Information to the user: This equipment has been conformity assessed for use in business environments. In a residential environment this equipment may cause radio interference.</p> <div> <div>사 용 자 안 내 문</div> <div> <p>이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.</p> </div> </div>

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/X8711A
(product-specific information and support, software and documentation updates)
- www.keysight.com/find/assist
(worldwide contact information for repair and service)

Table of Contents

Safety Symbols	3
Safety Considerations	4
Environmental Conditions	6
Safety and Regulatory Information	7
Safety compliance	7
EMC regulation	7
Regulatory Markings	8
Waste Electrical and Electronic Equipment (WEEE) Directive	
2002/96/EC	9
Product category	9
Sales and Technical Support	10
Introduction	13
To Prepare Instrument for Use	14
Equipment requirements	14
Software requirements	14
Hardware Configuration	15
Software Installation	17
TAP and Measurement Suite License Redemption	19
TAP and Measurement Suite License Installation	22
Node-Locked License	22
USB Portable License	23
Getting Started: IoT Device Test Add-Ons Package	29
Procedure to use USB Coaxial Switch Step (Method 1)	29
Procedure to use USB Coaxial Switch Step (Method 2)	34
Procedure to use 34901 Measurement	36
Record and export data	38
Troubleshooting and Error Messages	39
Fail to switch RF path(s) with error code -4	39
Fail to switch RF path(s) with error code -2	39

No valid BLE/WLAN/Zigbee option license found. For license request
please contact Keysight Technologies Sales & Support. 40

Could not create '<Test step>': License required: KS8330xA or
KS8330xB 40

Keysight ZA0060A

Custom IoT Device Functional Test Solution Quick Start Guide

Introduction

The Keysight ZA0060A is a custom solution based on the X8711A IoT device functional test solution. It is an over-the-air signaling tester that enables you to test your IoT device's transmitter and receiver easily and effectively. It is as simple as placing your device into a shield box and running the software test plans to get the transmitter and receiver test results in seconds!

With ZA0060A, you can now extend your test coverage for *Bluetooth*® 5 and Zigbee® 3.0, on top of the existing *Bluetooth*® Low Energy 4.2 and WLAN 802.11b/g/n.

This Quick Start Guide is designed to guide you through the hardware and software setup for the ZA0060A solution before introducing the features and capabilities of the Zigbee 3.0 and *Bluetooth*® 5 measurement suites. You can create and customize your test plan according to your test requirement.

With the use of a USB Coaxial Switch, you are now able to test up to two devices under test (DUT) sequentially using one measurement system. The ZA0060A solution supports the use U1810B and U1816A models of USB Coaxial Switch.



To Prepare Instrument for Use

Equipment requirements

- Keysight 34972A LXI Data Acquisition / Switch Unit
- Keysight 34999B RF Module
- Keysight U1810B USB Coaxial Switch that comes with a N-type female to female adaptor (1250-3274), a USB cable (8121-0506) and three RF cables.
- Power cord
- 34999-60009 USB cables Type A/B
- 34999-60011 USB cables Type A/Micro B
- RF cable*
- Shield box*
- Device under test (DUT)*

NOTE

* These accessories are not included in the ZA0060A Custom IoT device functional test solution.

Software requirements

NOTE

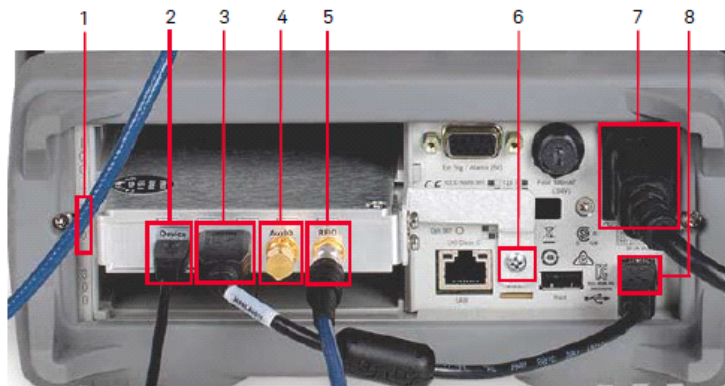
- Keysight License Manager version 5.2 or above
- For those who are using USB portable license, download and install Keysight License Manager 6 at www.keysight.com/find/KLM6.

NOTE

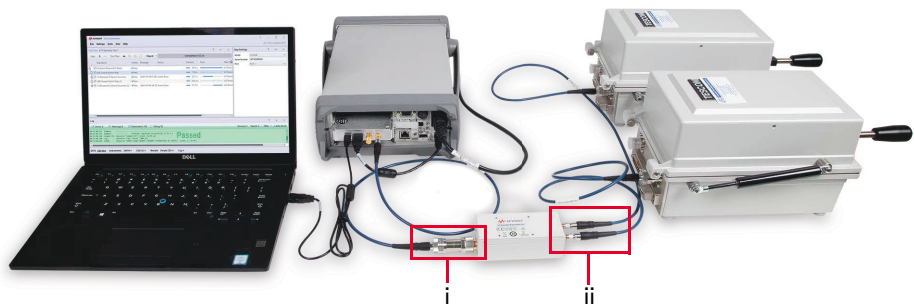
- Keysight IO Libraries Suite version 18.0 or above
 - Keysight Test Automation Platform (TAP) Software version 8.7
 - KS8400A TAP Developer's System or KS8000A TAP Deployment System
 - Keysight 34999 Utility software version 2.1 or above
- The KS8400A TAP Developer's System will install Keysight License Manager if not already installed.

Hardware Configuration

- 1 Attach the L locking bracket to the 34999B module and insert them into **1 (slot 200)**. Ensure that you have tightened the L locking bracket with a screw on **6 (Chassis Ground Screw)**.

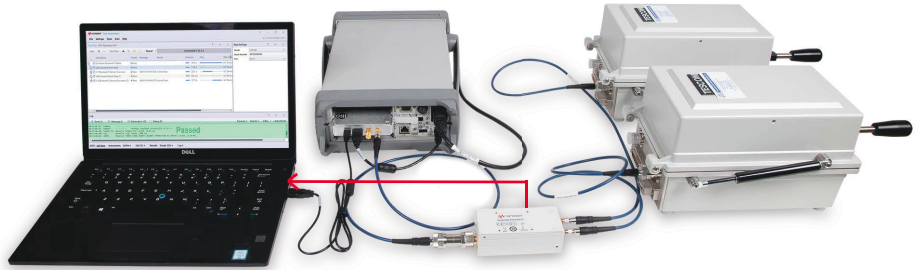


- 2 Set up the connections below.
 - i **34999-60009** USB cable from **2 (Micro-USB Port)** of 34999B RF module to PC.
 - ii **34999-60011** USB cable from **3 (USB Port)** to **8 (USB Interface Connector)** of the 34999B RF module.
- 3 For this step, refer to the connections of the U1810B switch as shown below.



- i Connect the N-type female to female adapter (P/N 1250-3274) to the common port of U1810B before connecting the RF cable from the adapter to **5 (RFIO Port)** of 34999B. Do not remove the terminator at **4 (AuxIO Port)**.

- ii Connect the respective RF cables from the back of the shield boxes to Port 1 and 2 of U1810B switch.
- 4 Connect the U1810B cable (P/N 8121-0506) to the USB port on your PC as indicated by the red arrow below. The LED indicator at Ports 1 or 2 will light up once it is connected.



- 5 Plug in the power cord to **7 (Power Line Fuse Holder Assembly)** and then to the source of electricity.
- 6 Download and install the software listed in the next section, then power on the 34972A. Allow 15 seconds after powering on the 34972A for your PC to detect the instrument and its VISA address.

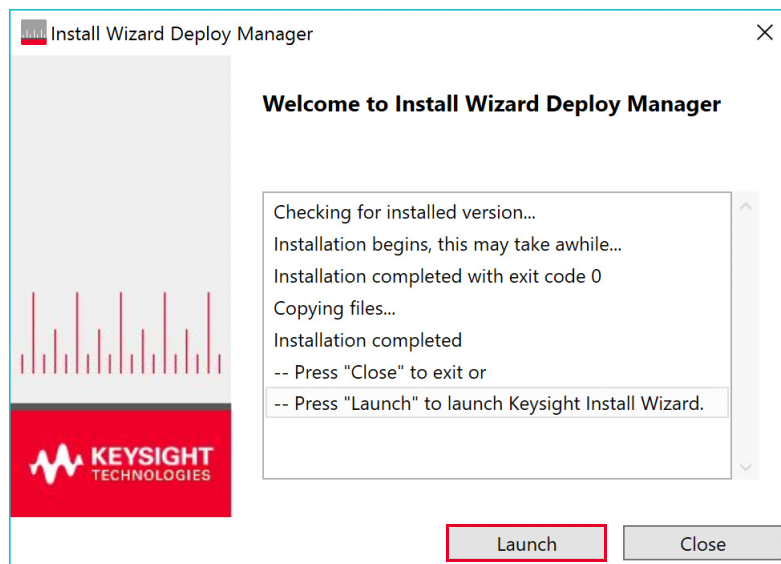
NOTE

Refer to the **U1810B Operating and Service Manual** for more information on troubleshooting and calibration.

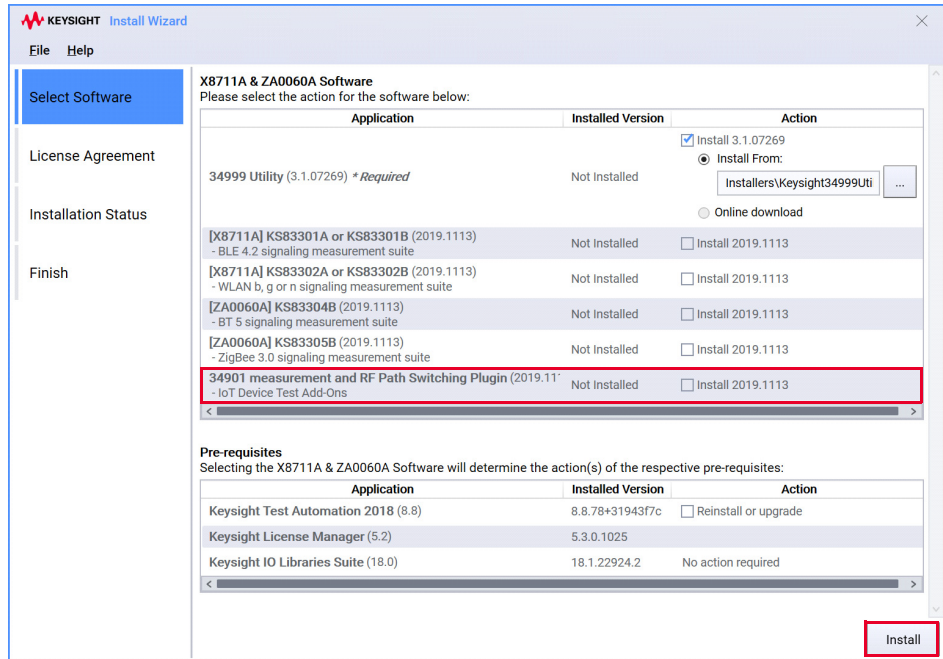
Software Installation

The Install wizard is a centralized application that contains necessary installers and software packages for the ZA0060A solution. Download the latest Install wizard to access the new releases of the software packages.

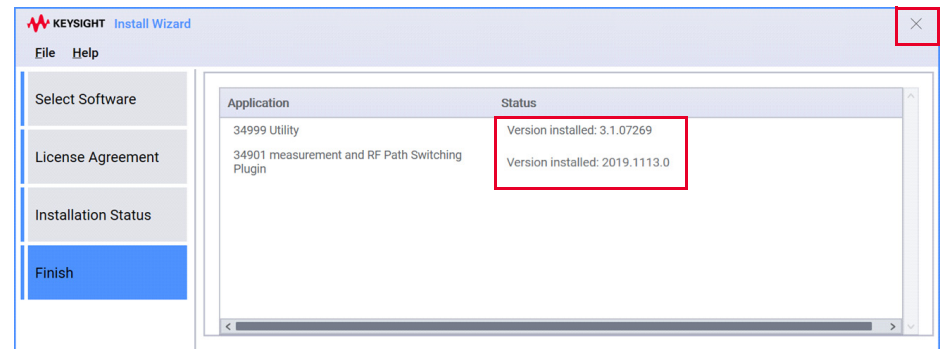
- 1 Download and install X8711A & ZA0060A Install wizard from www.keysight.com/find/ZA0060A-installwizard.
- 2 Follow the on-screen instructions and click **Finish** to complete installation.
- 3 Click **Launch** when you see the pop-up below.



- 4 Select the **Install 2019.1113** check box to install the IoT Device Add-Ons package and software prerequisites in the 'Action' column as shown below. The 34999 Utility application is a compulsory software that will be selected by default when it is not installed in your PC.



- 5 When the status reflects the latest version installed, you may close the Install wizard. Next, proceed to redeem your licenses.

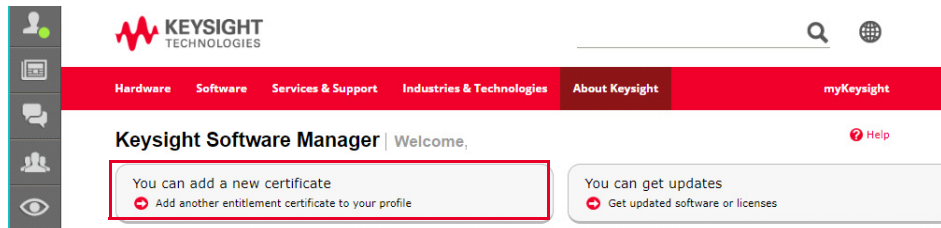


TAP and Measurement Suite License Redemption

NOTE

The **KS8400A** license is required to install the 34901 measurement and RF path switching plugin (IoT Device Test Add-Ons) package for the X8753A multi-up configuration.

- 1 Refer to the email or printed **Keysight License Entitlement Certificate** for instructions on how to redeem your license.
- 2 Log in to Keysight Software Manager (KSM) using your myKeysight account at www.keysight.com/find/softwaremanager. First time users need to create a new account and add the Keysight Software Manager capability.
- 3 Click **You can add a new certificate**.



- 4 Enter the **Order Number** and **Certificate Number** from your Keysight License Entitlement Certificate. Click **Continue**.

Enter your certificate information

Order Number	<input type="text"/>	?	Certificates already in your profile:		
Certificate Number	<input type="text"/>	?	<table><thead><tr><th>Order Number</th><th>Certificate Number</th></tr></thead><tbody></tbody></table>	Order Number	Certificate Number
Order Number	Certificate Number				

- 5 Review the summary of the licenses on your certificate and click **Add Certificate**. You should see a confirmation message indicating that you have successfully added the certificate.
- 6 When you see the selection below, click **Yes** followed by **OK** to redeem your licenses.

Do you want to get your licenses now?

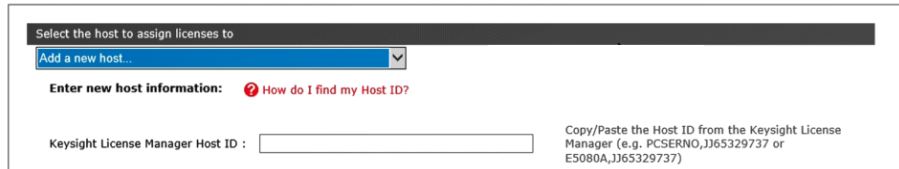
- ☒ **Yes**
☐ No, I will get them later.

OK

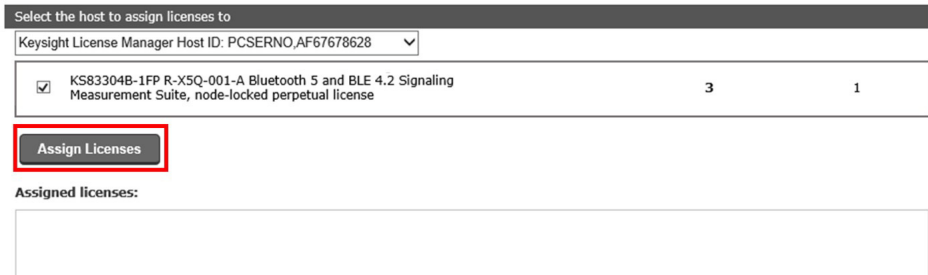
- 7 Select a host to assign your licenses. Depending on the type of license(s) selected, you are required to provide any one of the following information.

Assign licenses to hosts, then click **Continue** to proceed.

 Help



- a For node-locked licenses, click '**Add a new Keysight License Manager Host ID host**' and enter the Host ID.
 - b For floating licenses, click '**Add a new MAC Address host**' and enter the MAC address of your server.
 - c For USB portable licenses, click '**Add a new USB Portable FlexNet ID host**' and enter the Flexnet ID printed on the USB dongle.
- 8 Select the license to assign to the specific Host ID and click **Assign Licenses**. Verify the details before you click **Continue**.



Select the host to assign licenses to			
Keysight License Manager Host ID: PCSERNO_AF67678628			
<input checked="" type="checkbox"/>	KS83304B-1FP R-X5Q-001-A Bluetooth 5 and BLE 4.2 Signaling Measurement Suite, node-locked perpetual license	3	1

Assign Licenses

Assigned licenses:

- 9 You should see the page below. Click **Yes** to assign more license(s) to other hosts. Otherwise, click **No** and followed by **Continue**.

The screenshot shows a software window titled "Assigned Licenses:". Inside, there is a table with one row containing the text "Keysight License Manager Host ID: PCSERNO, AF67678628 KS83304B-1FP R-X5Q-001-A Bluetooth 5 and BLE 4.2 Signaling Mea..." and "(Quantity 1)". Below the table, it says "(You still have licenses available.)". Then, it asks "Do you want to assign more licenses to hosts now?" with two radio button options: "Yes" and "No, I will assign these later." (which is selected). At the bottom, there are three buttons: "< Back" on the left, "Cancel" in the middle, and "Continue >" on the right, which is highlighted with a red border.

- 10 Enter your email address and click **Submit**. You should receive an email shortly.

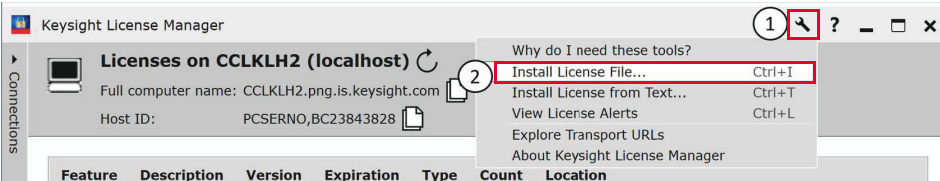
NOTE

For more information, view the [Keysight Software Manager Help File](#).

TAP and Measurement Suite License Installation

Node-Locked License

- 1 You will receive an email for the license file(s). Copy the attachment with the .lic extension to your PC.
- 2 Launch Keysight License Manager.
- 3 Perform the following steps with reference to the image below.
 - a Click the tools icon (1) followed by **Install License File (2)**.



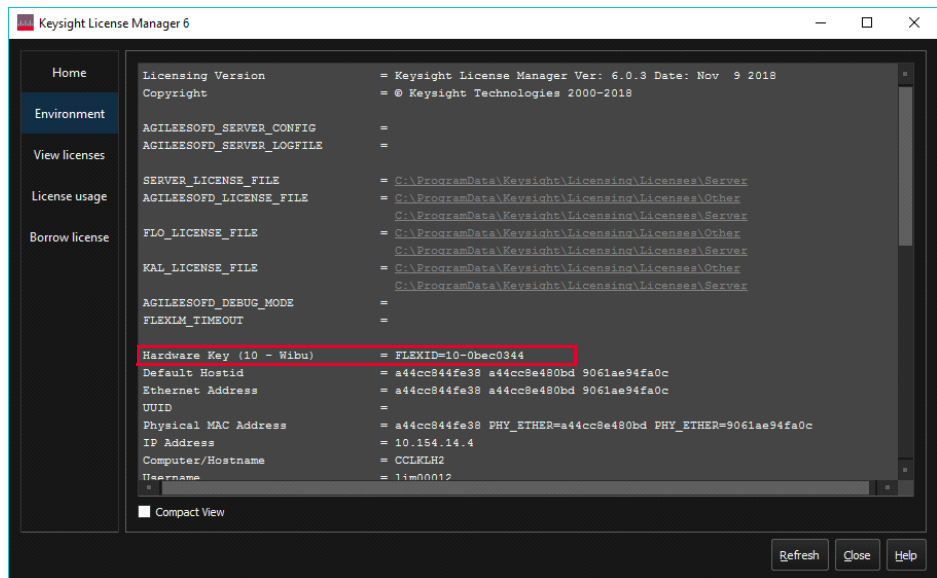
- b Locate the local copy of the License file (.lic) and click **Open**.
- c Successful license installation will be listed as below.

Feature	Description	Version	Expiration	Type	Count	Location
KS83301A	KS83301A	1.000	2018/02/06	Fixed	Unlimited	Local
KS83302A	KS83302A	1.000	2018/02/06	Fixed	Unlimited	Local
KS8400A	Test Automation Platform	2.200	2018/01/06	Fixed	Unlimited	Local

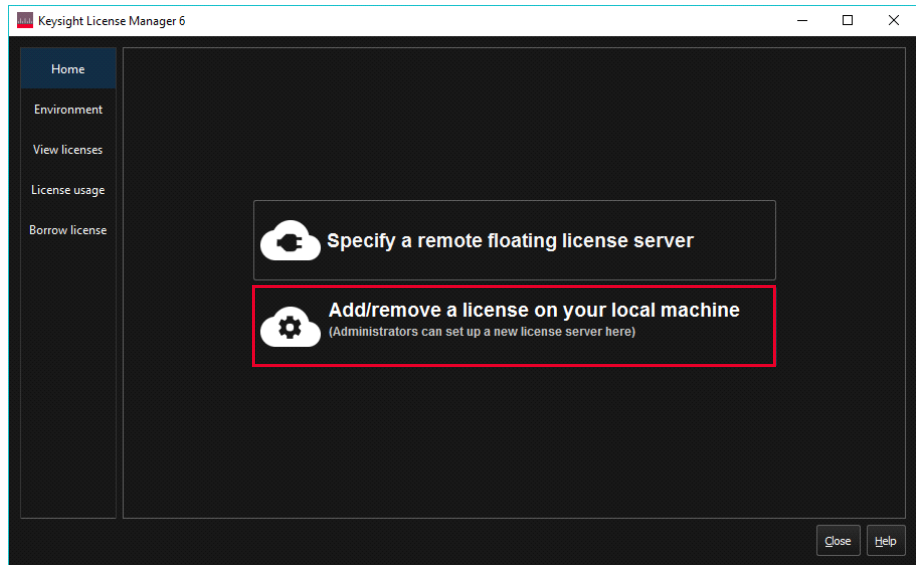
- 4 Repeat steps 1 through 3 to install more than one licenses.

USB Portable License

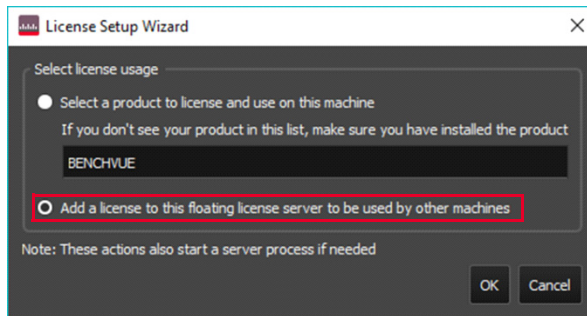
- 1 You will receive an email for the license file(s). Copy the attachment with the .lic extension to your PC.
- 2 Download and install Keysight License Manager 6 at www.keysight.com/find/KLM6. Double-click the installer and follow the instructions to complete installation.
- 3 Download and install the FLEXID10 USB Dongle Driver package at www.keysight.com/find/licensingusbdriver.
 - a Extract the files to a convenient location.
 - b Execute the Setup64.exe (on 64-bit Windows) or Setup32.exe (on 32-bit Windows). Follow the instructions, accepting the default values.
- 4 Connect the dongle to a USB port. The Flexnet ID is printed on the USB dongle. With the USB dongle connected to your PC, you can also retrieve the FlexNet ID in the Environment tab of KLM 6 as shown below.



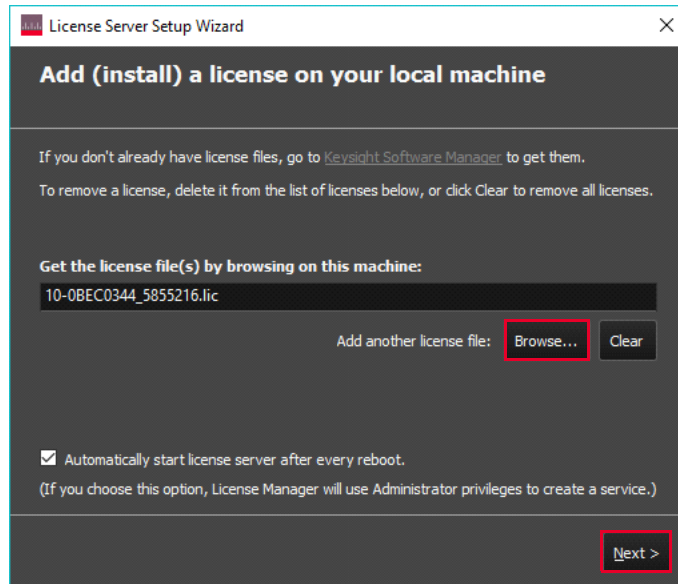
- 5 Launch Keysight License Manager 6 from your computer's Start menu. Click the **Add/remove a license to your local machine**.



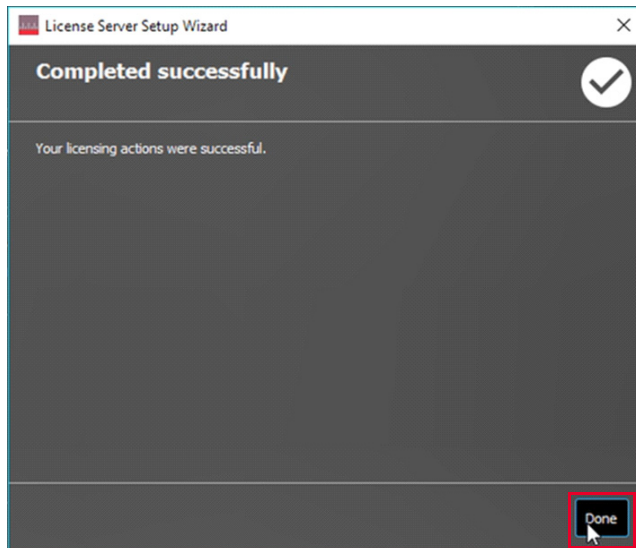
- 6 Click the **Add a license to this floating license server to be used by other machines** option.



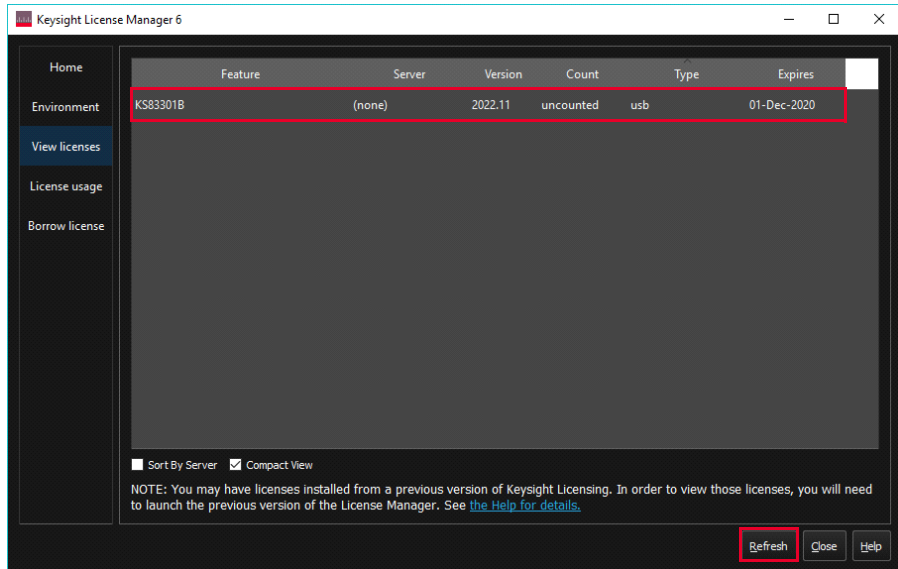
- 7 Click **Browse** and browse to the location of the license File. Click **Next**. When you are prompted to run a service in a pop-up window, click **Yes**.



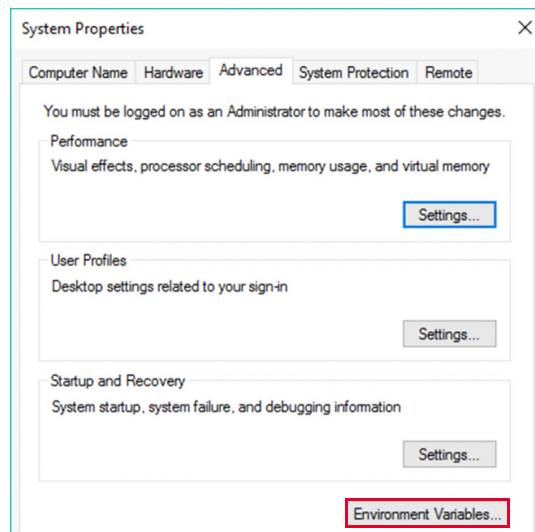
- 8 You should see the image below the licensing actions were completed successfully. Click **Done**.



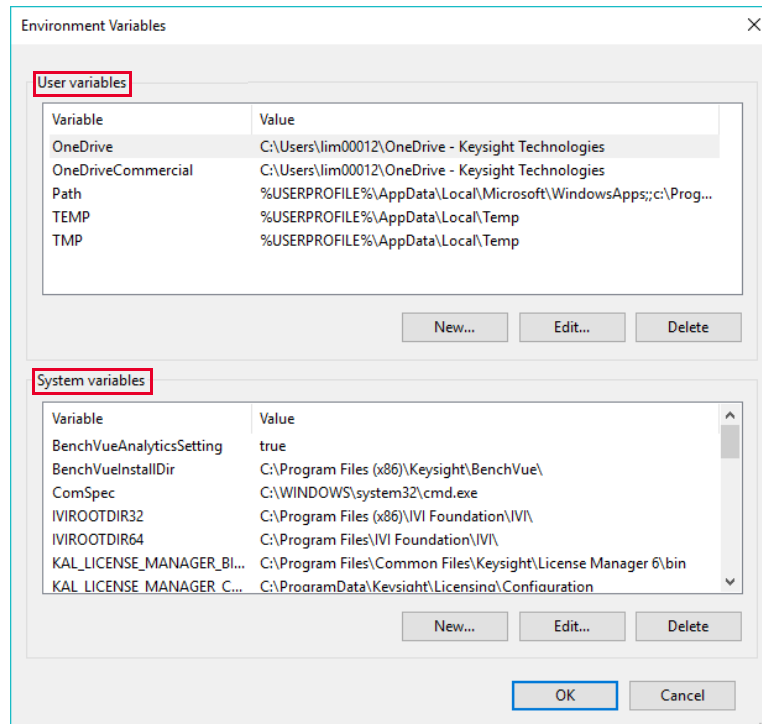
- 9 Select the View Licenses tab to view the license and the details of the license. You may need to click **Refresh** if it is not listed. In this example, KS83301B is successfully installed in the KLM 6.



- 10 Go to the Windows menu, search for 'Edit the system environment variables' and press **Enter** to view the window below. Click **Environment variables**.



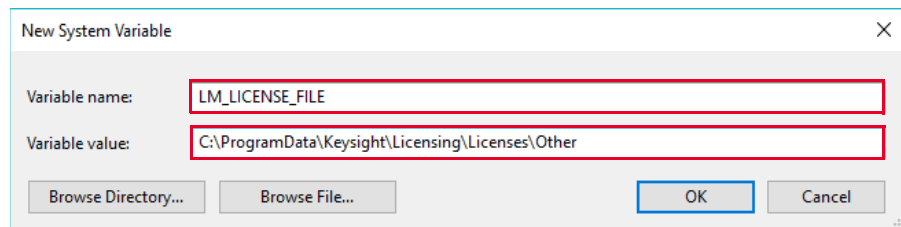
- 11 Search for the **LM_LICENSE_FILE** in the User and System variables. You will need to create one if it is not listed in either User or System variables.



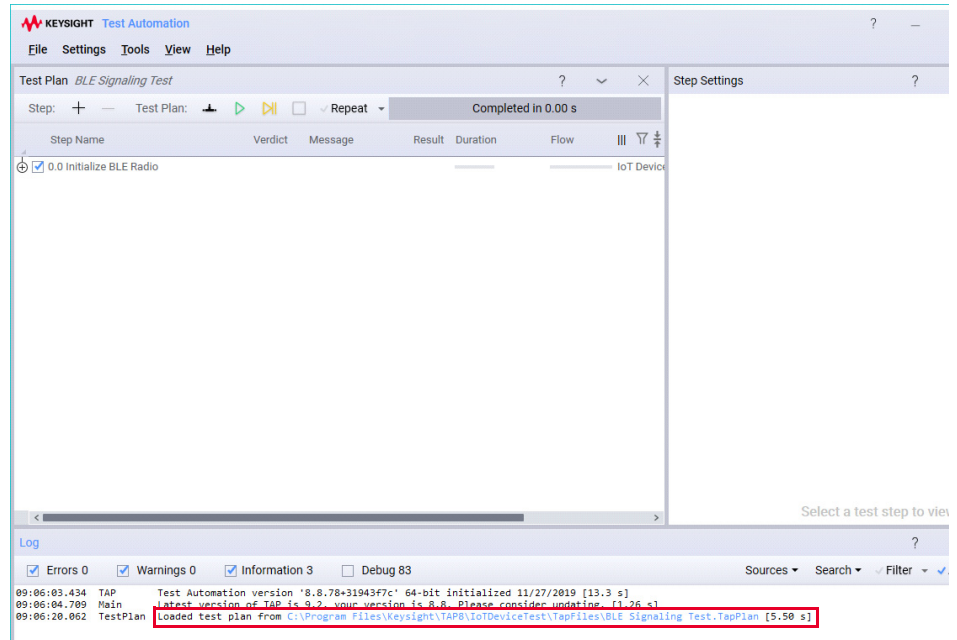
NOTE

Ensure that only one of **LM_LICENSE_FILE** variable is created in either User or System variables.

- 12 Click **New** to create the **LM_LICENSE_FILE** variable and enter the information as shown below. Click **OK** and you may close all the windows related to environmental variables.



- 13 Launch TAP and verify if you can load any of the test plans from the installed measurement suite. Based on the example below, you can now load the test plans from the BLE measurement suite in TAP with the KS83301B license installed.



- 14 Repeat these steps on each machine on which you plan to use the USB portable license.

NOTE

View the [Keysight Licensing Administrator's Guide](#) for more information.

Getting Started: IoT Device Test Add-Ons Package

This package consists of the two test steps shown below. The USB coaxial switch (U1810B and U1816A) and the 34901A module are also required.

- a USB Coaxial Switch
Placing this test step in your test plan will allow 34999B RF module to switch between the RF ports of the USB coaxial switch (supported models are U1810B and U1816C, subject to the ports available).
- b 34901A Measurement
This step requires the use of 34901A module in slot 100 or 300 of the 34972A chassis to measure temperature, DC voltage, and resistance

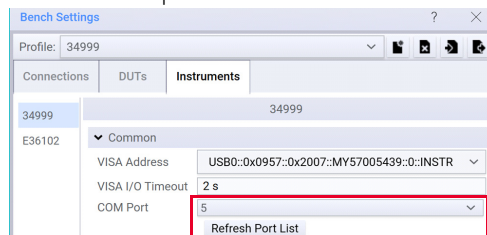
NOTE

In the following examples, additional license(s) are required to access the Zigbee and *Bluetooth*® 5 test plans. Contact your local Keysight representative to purchase your license.

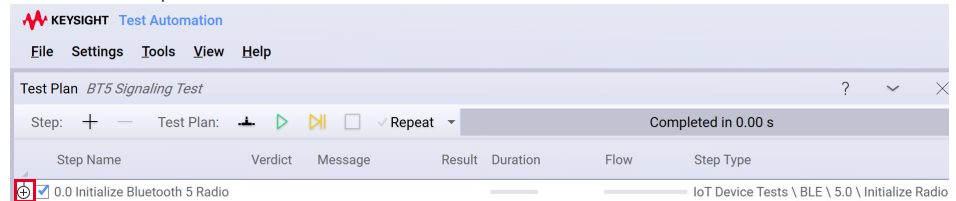
Procedure to use USB Coaxial Switch Step (Method 1)

In this example, you will create a test plan to run the *Bluetooth*® 5 Signaling test plans on two devices under test (DUT).

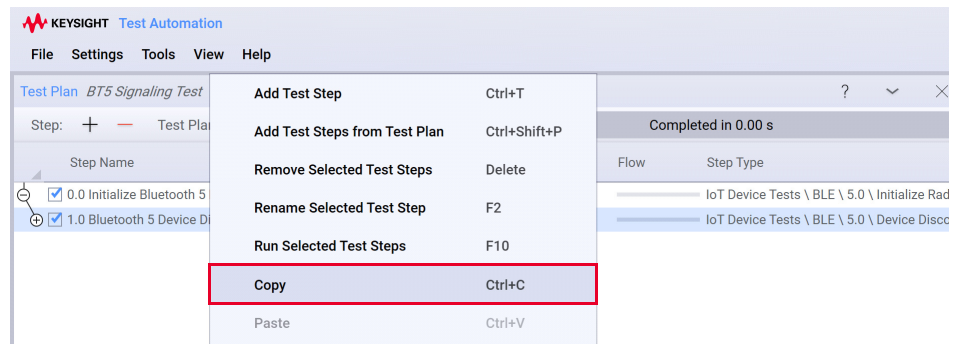
- 1 Launch Keysight TAP. You may turn on the 34972A and allow 15 seconds for your PC to detect the connection via Keysight Connection Expert.
- 2 Ensure that you have selected and installed the IoT Device Test Add-Ons package using the Install wizard shown in [Step 5](#). Otherwise, go to [C:\Program Files\Keysight\TAP8\IoTDeviceTest\TapFiles](#) and double-click IoT Device Test Add-Ons <version number> TapPackage to install the plug-in.
- 3 Go to **Settings > Bench > Instruments** to verify the COM Port number selected in the 34999 profile. Click **Refresh Port List** to update, if necessary.



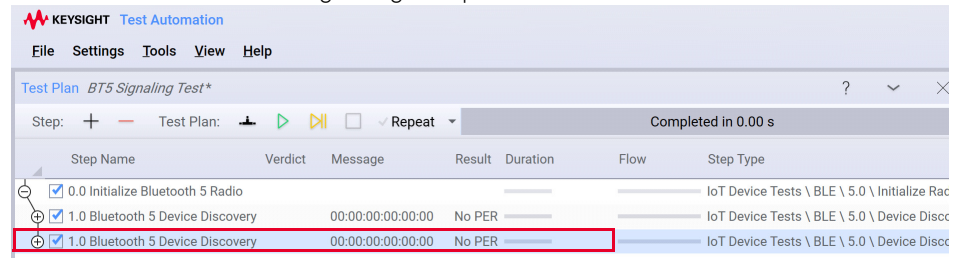
- 4 Click **File > Open** and load the *Bluetooth*® 5 Signaling test plan.
- 5 Click the icon highlighted below to expand the **0.0 Initialize Bluetooth 5 Radio** step.



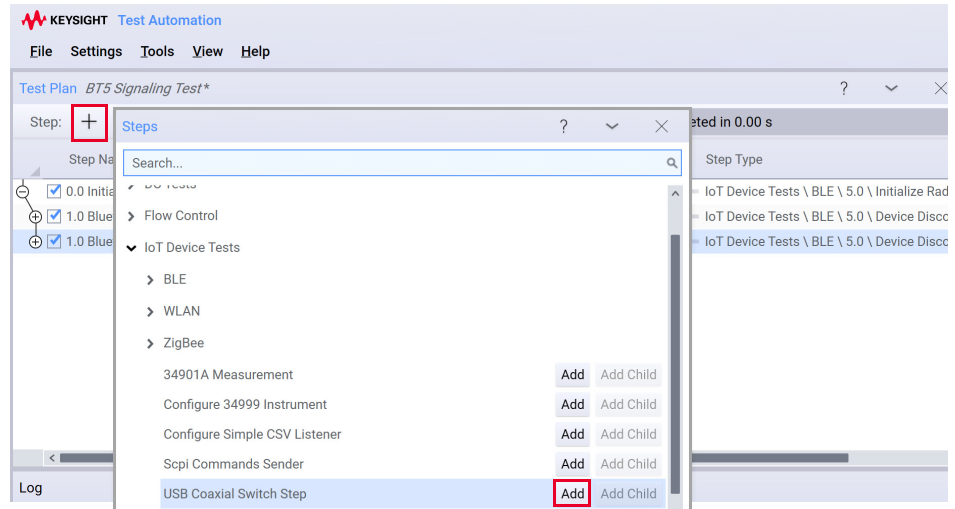
- 6 Right-click the **1.0 Bluetooth 5 Device Discovery** test step and click **Copy**.



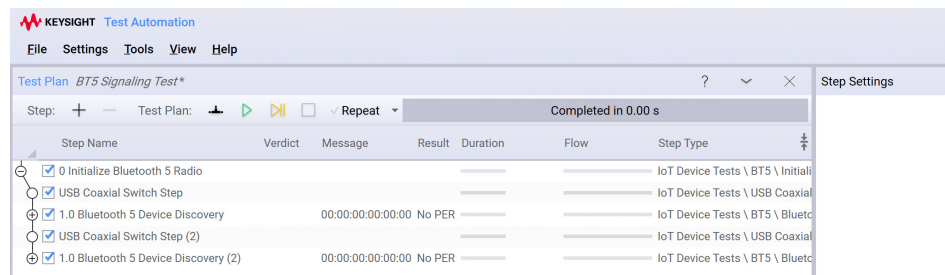
- 7 Right-click the **1.0 Bluetooth 5 Device Discovery** and click **Paste** to place the second *Bluetooth*® 5 Signaling test plan.



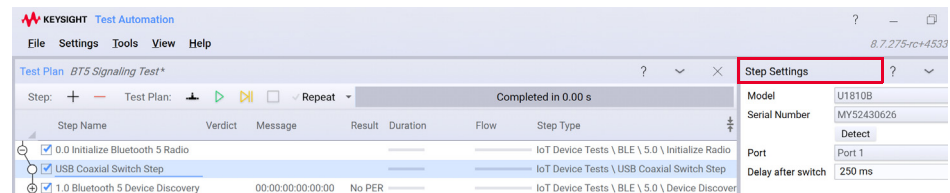
- 8 Next, add the **USB Coaxial Switch Step** in your test plan to enable the switch between Port 1 and 2 of U1810B switch. Click **+** and click **Add** for USB Coaxial Switch Step, twice.



- 9 Click and drag test steps to rearrange the steps as shown below.



- 10 Next, configure the Step Settings for the two USB Coaxial Switch Steps.



- a Select U1810B or U1816A model from the drop-down list.

- b Click **Detect** to update the serial number of the switch. You can find the matching serial number labeled on the hardware.
- c Select the port corresponds to the shield boxes.
 - i U1810B: Select either Port 1 or Port 2.
 - ii U1816A: Select Switch 1 or 2 Port to switch to the desired panels.

NOTE

Since there are two of this steps, ensure that one is set to Port 1 and the other as Port 2 to enable the switching between the DUTs in the shield boxes.

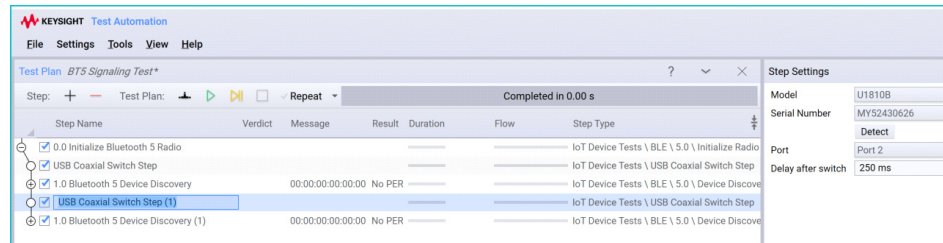
- c Delay after switch is set at 250 ms (default) after the RF path has switched to allow a connection.

This test plan structure will initialize the *Bluetooth*[®] radio and then turn on Port 1 of the switch and run the *Bluetooth*[®] 5 Signaling test plan on the first DUT. When that test plan finished, it will switch to Port 2 and test the second DUT.

For this example, you only initialize the *Bluetooth*[®] radio once to run the *Bluetooth*[®] Signaling test plans on two DUTs. If you intend to run two test plans that uses different radios, place the USB Coaxial Switch Step at the start of the first and second test plan as shown below.

Step Name	Verdict	Message	Result	Duration	Flow	Step Type
USB Coaxial Switch Step						IoT Device Tests \ USB Coaxial Switch Step
0.0 Initialize Bluetooth 5 Radio						IoT Device Tests \ BLE \ 5.0 \ Initialize Radio
1.0 Bluetooth 5 Device Discovery		00:00:00:00:00:00	No PER			IoT Device Tests \ BLE \ 5.0 \ Device Discovery
1.1 Parallel Measure Advertising Interval						Flow Control \ Parallel
1.1a Measure Advertising Interval						IoT Device Tests \ BLE \ Measure Advertising Interval
1.1b Advertising Channel Power Measure						IoT Device Tests \ BLE \ Advertising Channel Power Measure
1.2 Set Bluetooth 5 DL Power						IoT Device Tests \ BLE \ Set DL Power
1.2.1 Active Scan						IoT Device Tests \ BLE \ Active Scan
1.2.2 Connect Request						IoT Device Tests \ BLE \ 5.0 \ Connect Request
USB Coaxial Switch Step (1)						IoT Device Tests \ USB Coaxial Switch Step
1. Initialize WLAN Radio						IoT Device Tests \ WLAN \ Initialize WLAN Radio
1.1 Initialize WLAN Signaling						IoT Device Tests \ WLAN \ Initialize WLAN Signaling
1.1.1 Establish WLAN Link						IoT Device Tests \ WLAN \ Establish WLAN Link
1.1.1.1 Signaling PER						IoT Device Tests \ WLAN \ Signaling PER
Measure WLAN Tx Power						IoT Device Tests \ WLAN \ Measure WLAN Tx Power

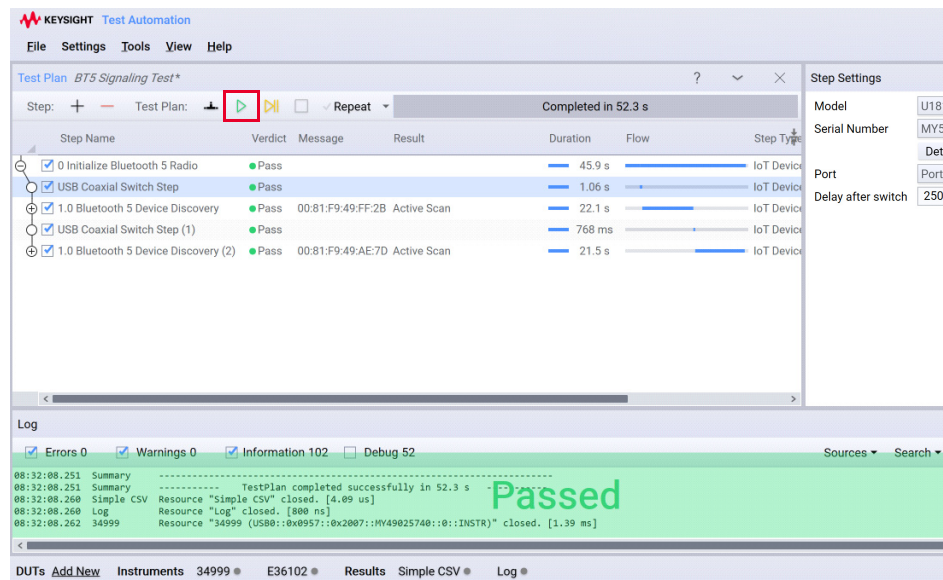
- 11 Double-click a test step to rename it according to the USB switch or ports selected.



NOTE

For those who wish to record and export their data, go to **Record and export data** to set up the Results Listener plug-ins before you run the test plan.

- 12 Your test plan is complete and ready to run. Turn on your DUTs and place them in the shield boxes. Click **Run** to start your test plan. An example of a successful run is shown below.

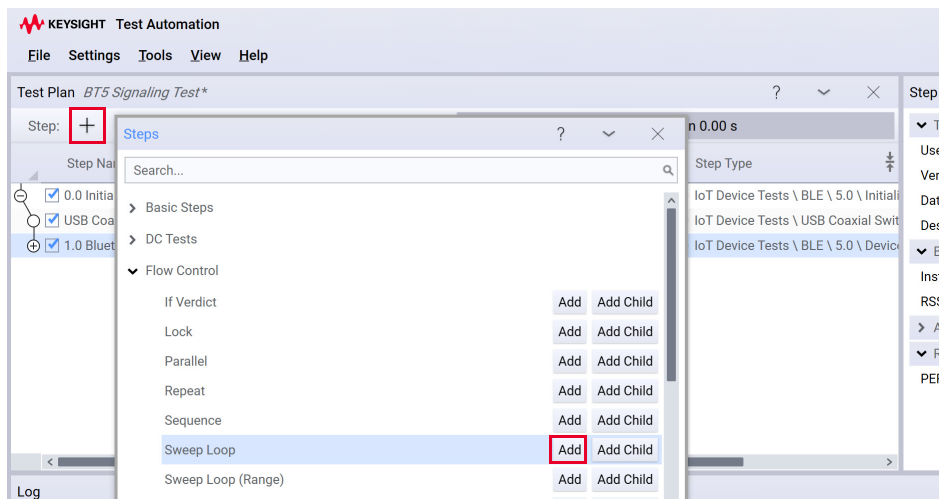


- 13 Once the test is complete, you can view the results at the 'Step Settings' tab for each test step. For those who have set up the Results Listener plug-ins, find your recorded results in the default directory **C:\Program Files\Keysight\Tap8\Results** to open each file in Microsoft Excel.

Procedure to use USB Coaxial Switch Step (Method 2)

This is an alternative method to loop the *Bluetooth*[®] 5 Signaling test plan.

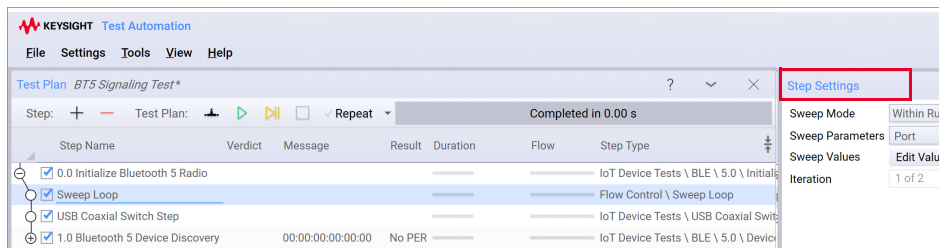
- 1 Follow step 1 to 5 of the above method.
- 2 Click **+** and **Add** for the Sweep Loop and USB Coaxial Switch Step. You can also add a **Delay** step of 500 milliseconds as recommended to allow the U1810B switch to make a connection.



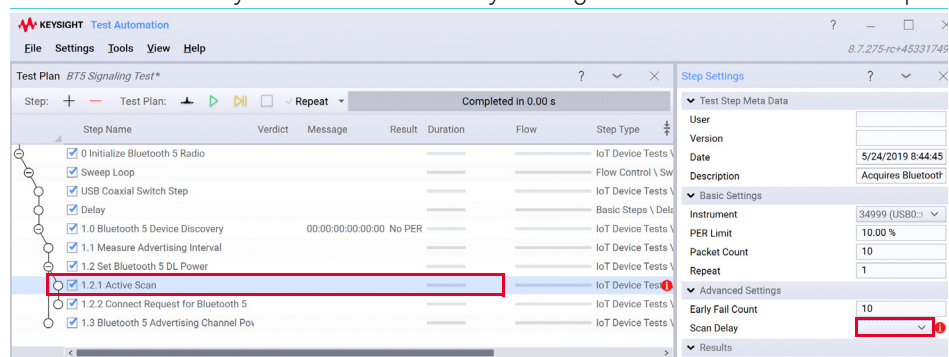
NOTE

The settings for USB Coaxial Switch Step are as described in [Step 10](#).

- 3 Drag the Sweep Loop test step and place it after **0 Initialize Bluetooth 5 Radio**. Ensure the USB Coaxial Switch and the remaining test steps are placed as the child steps of Sweep Loop.



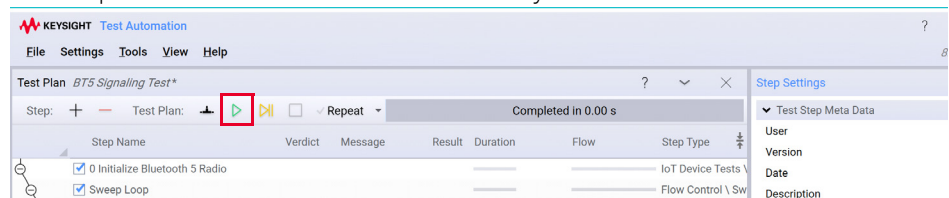
- 4 Modify the Step Settings to the following:
 - a Sweep Mode: Within Run
 - b Sweep Parameters: Port
 - c Sweep Values: Click Edit Values and select Port 1 and Port 2
 - d Iteration: 1 of 2
- 5 Before you run the test plan, expand the remaining test steps and take note of other dependencies as marked by the red icon. In the example below, you need to manually select the Scan Delay setting for the Active Scan test step.



NOTE

For those who wish to record and export their data, go to **Record and export data** to set up the Results Listener plug-ins before you run the test plan.

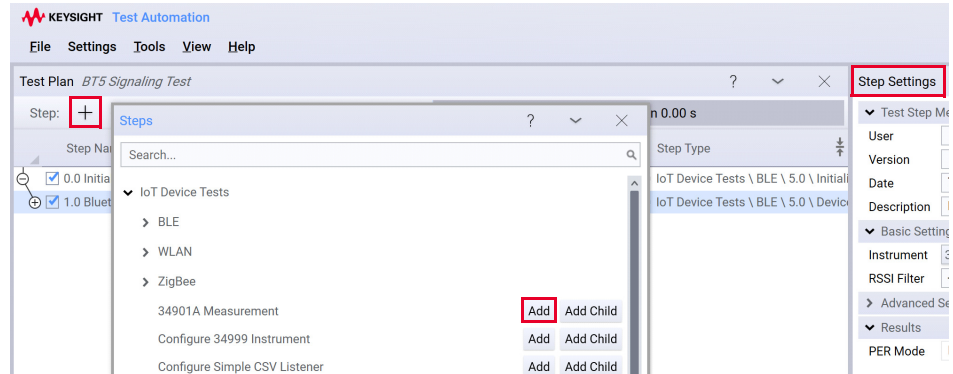
- 6 The structure of your test plan should be similar as above. Turn on your DUTs and place them in the shield boxes before you run the test. Click **Run**.



- 7 Once the test is complete, you can view the results at the 'Step Settings' tab for each test step. For those who have set up the Results Listener plug-ins, find your recorded results in the default directory **C:\Program Files\Keysight\Tap8\Results** to open each file in Microsoft Excel.

Procedure to use 34901 Measurement

- 1 Click **+** and click **Add** to place a **34901 Measurement** step in your test plan.



- 2 On the Steps Settings panel (towards the right), configure these settings:
 - a Basic Settings
 - Instrument: Select the VISA address of your 34972A
 - Slot: Select 1 or 3 to indicate the slot number of 34901A module in the 34972A (as 34999B is in slot 2)
 - Measurement: Supported measurements are Temperature, DC voltage, 2-wire resistance, and 4-wire resistance
 - Channels: Hover your cursor on the squares to select channel 1 to 20. For 4-wire resistance measurement, the channels range from 1 to 10.

Note: Default parameters are shown in **bold**.

- 3 Based on your choice of measurement, configure the respective settings:

- a Temperature Measurement Settings
 - Probe Type: Thermistor, **Thermocouple**, 2-wire RTD, and 4-wire RTD
 - Type:
 - Thermocouple: B, E, **J**, K, N, R, S, T
 - Thermistor: 2252, **5000**, 10000
 - 2-wire and 4-wire RTD: **85**, 91
 - Resolution: **Default**, Maximum, Minimum, and Custom. For custom resolution, enter the resolution value in °C in the entry box.

b DC Voltage Measurement Settings

- Range: **Auto**, 100 mV, 1 V, 10 V, 100 V, and 300 V.
- Resolution: **Default**, Maximum, Minimum, and Custom. For custom resolution, enter the resolution value in V in the entry box.

c Resistance Measurement Settings (2-wire Resistance and 4-wire Resistance)

- Range: **Auto**, 100 Ω , 1 k Ω , 10 k Ω , 100 k Ω , 1 M Ω , 10 M Ω , and 100 M Ω .
- Resolution: **Default**, Maximum, Minimum, and Custom. For custom resolution, enter the resolution value in Ω in the entry box.

NOTE

For those who wish to record and export their data, go to **Record and export data** to set up the Results Listener plug-ins before you run the test plan.

- 4 Turn on your DUT and place them in the shield box before you run the test plan. Click **Run** to start your test plan.
- 5 Once the test is complete, you can view the results at the 'Step Settings' tab for each test step. For those who have set up the Results Listener plug-ins, find your recorded results in the default directory **C:\Program Files\Keysight\Tap8\Results** to open each file in Microsoft Excel.

For your information, these are the commands used to perform measurements in the 34901A Measurement test step.

- a** MEASure:TEMPerature?
{TCouple|RTD|FRTD|THERmistor},{<type>},1,{<resolution>|MIN|MAX|DEF}, (@<scan_list>)
- b** MEASure:VOLT:DC?
{<range>|AUTO},{<resolution>|MIN|MAX|DEF}, (@<scan_list>)
- c** MEASure:RESitance?
{<range>|AUTO},{<resolution>|MIN|MAX|DEF}, (@<scan_list>)
- d** MEASure:FRESitance?
{<range>|AUTO},{<resolution>|MIN|MAX|DEF}, (@<scan_list>)

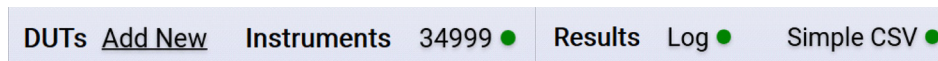
Refer to **34901A Quick Reference Guide** or **34970A User's Guide**.

Record and export data

Other than viewing the results in the 'Step Settings' tab or the Log panel, you may configure the TAP software using the Result Listener plug-ins. The TAP software includes Result Listener plug-ins for the purpose of storing results such as Text Log and CSV files.

- **Text Log File** allows you to save the text log separately after each run, and its file names support macros.
- **CSV file** will save collected data in data analysis software.

The default listener is **Simple CSV Listener**, which will appear next to the Results section at Resource bar shown below.



If not already configured, follow the instructions below to configure the plug-ins.

- 1 Click Simple CSV listed at the bottom of the Log panel.
- 2 Select the check boxes corresponding to the desired Result Listener plug-ins on the left tab. Click **+** to view more options other than Log and Simple CSV.

A simple CSV Result Listener will generate report into specific folders:

- Saving ResultSaveMode is set to Single Report, the report is saved as:
[<CustomPrefix>_]YYYYMMDD_HHmmss_<TestPlan>_<Verdict>.csv
- Saving ResultSaveMode is set to Individual Reports, the reports are saved as one CSV file per report name into a folder with the name
[<CustomPrefix>_]YYYYMMDD_HHmmss_<TestPlan>_<Verdict>.

- 3 For Log, configure the File Path settings and set the Filter Options according to your preference.
- 4 Click **OK** to return to your test plan.
- 5 When your test plan completes, find your recorded results in the default directory **C:\Program Files\Keysight\Tap8\Results** to open each file in Microsoft Excel.

Troubleshooting and Error Messages

Fail to switch RF path(s) with error code -4

The error message below could be caused by the following issues:

0.0 Initialize BLE Radio \ USB Coaxial Switch Step started.

Fail to switch RF path(s) with error code -4

TAP is currently configured to abort run on verdict Error. This can be changed in Engine Settings.

- Incorrect serial number of the USB coaxial switch
- Faulty USB cable
- USB coaxial switch not plugged in

Here are the few tips you can try (applicable for U1810B and U1816A).

- Ensure that the serial number of the USB coaxial switch matches that in Step Settings.
- Check the connection of the USB cable to your PC and the switch is secure.
- Verify the green LED beside the USB port on the USB coaxial switch. It will light up when the switch is connected to the PC.
- Replace the faulty cable with a new one.

Fail to switch RF path(s) with error code -2

You will see this error message when there is no power to the USB coaxial switch.

0 Initialize Bluetooth 5 Radio \ USB Coaxial Switch Step (1) started.

Fail to switch RF path(s) with error code -2

TAP is currently configured to abort run on verdict Error. This can be changed in Engine Settings.

Test plan abort requested...

0 Initialize Bluetooth 5 Radio \ USB Coaxial Switch Step (1) completed with verdict 'Error'. [1.49 s]

TAP is currently configured to abort run on verdict Error. This can be changed in Engine Settings.

Here are the few tips you can try.

- Check the connection of the USB cable to your PC and the switch is secure.
- When the USB coaxial switch is plugged in, you should see the green LED light up.
- Ensure that the power supply is functioning well.
- Replace the faulty cable with a new one.

No valid BLE/WLAN/Zigbee option license found. For license request please contact Keysight Technologies Sales & Support.

Depending on the options purchased, this error message indicates that the respective radio options are not enabled on your 34999B boards. You will need to purchase the license(s) to use by contacting your local Keysight representative.

```
Description: Initialize ZigBee Signaling and establish link; Date/Time: Monday, 01 April 2019 16:47:23
Description: Sets downlink power and acquires ZigBee Signaling PER readings; Date/Time: Monday, 01 April 2019 16:47:23
Description: Measures ZigBee Tx Power; Date/Time: Monday, 01 April 2019 16:47:23
ZigBee Network Configuration started.
ZigBee Network Configuration completed. [10.5 ms]
Initialize ZigBee Radio started.
Keysight.Tap.Plugins.Kt34999A.ZigBee Version: 2019.0311.0.0
Initialize ZigBee Radio failed, moving on. The error was 'No valid ZigBee option license found. For license request please contact Keysight
Initialize ZigBee Radio completed with verdict 'Error'. [17.3 ms]
TAP is currently configured to abort run on verdict Error. This can be changed in Engine Settings.
Test plan abort requested...
TestPlan aborted. (Verdict of 'Initialize ZigBee Radio' was 'Error'.)
----- Summary of run started 04/01/2019 16:47:27 -----
ZigBee Network Configuration 10.5 ms
```

Once you have purchased your license(s), refer to the instructions in the entitlement certificate to redeem your license(s).

Could not create '<Test step>': License required: KS8330xA or KS8330xB

An example of the error message shown above indicates that there is no KS83301A or KS83301B license installed. You will need to purchase the following licenses before being able to access and create the test steps.

```
Unable to create instance of Keysight.Tap.Plugins.Kt34999A.BLE.TestSteps.InitializeBleRadio.
Exception: Could not create an instance of 'Initialize BLE Radio': License required: KS83301B or KS83301A
Loaded test plan from C:\Program Files\Keysight\TAP8\IoTDeviceTest\TapFiles\BLE Signaling Test.TapPlan [77.8
```

Here are the few tips you can try.

- Purchase the following license(s) according to your test requirement by contacting your local Keysight representative.
 - KS83304B for *Bluetooth*® 5 related test plans
 - KS83305B for Zigbee 3.0 and Zigbee Pro related test plans
- Follow the instructions in the entitlement certificate on how to redeem the license.

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK.

This information is subject to change without notice. Always refer to the English version at the Keysight website for the latest revision.

© Keysight Technologies 2020
Edition 2, October 2020

Printed in Malaysia



ZA0060-90001

www.keysight.com