Keysight mmWave Reference Solutions

M1749B Performance mmWave Transceiver

22.7 - 49 GHz

22.7 - 54 GHz

KEYSIGHT

GETTING STARTED GUIDE

Notices

Trademark Acknowledgments

Manual Part Number

M1749-90003

Edition

Edition 2, June 2025
Supersedes: March 2024

Printed in USA/Malaysia

Published by:
Keysight Technologies
1400 Fountaingrove Parkway
Santa Rosa, CA 95403

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 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 WILL CONTROL.

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.

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.

Safety Notices

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.

Where to Find the Latest Information

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

For product specific information and support, software and documentation updates:

http://www.keysight.com/find/m1749b

Worldwide contact information for repair and service:

http://www.keysight.com/find/assist

To contact Keysight Technologies:

http://www.keysight.com/find/contactus

To receive the latest updates by email, subscribe to Keysight Email Updates at the following URL:

http://www.keysight.com/find/MyKeysight

Information on preventing instrument damage can be found at:

www.keysight.com/find/PreventingInstrumentRepair

Is your product software up-to-date?

Periodically, Keysight releases software updates to fix known defects and incorporate product enhancements. To search for software updates for your product, go to the Keysight Technical Support website at:

http://www.keysight.com/find/techsupport

Table of Contents

Keysight Wireless Test Set
M1749B Performance mmWave Transceiver

Getting Started Guide

1 Safety & Environmental Information

The following topics can be found in this section:

Warning Statements and Symbols

Caution and Warning notices are used in this document are described below.

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 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.

See also: “Labels and Symbols” on page 35.

Safety

This product has been designed and tested in accordance with accepted industry standards, and has been supplied in a safe condition.The documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

Safety Compliance

This product complies with the essential requirements of the European Low Voltage Directive as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity):

– IEC/EN 61010-1

Safe Installation

Safety of any system incorporating this equipment is the responsibility of the assembler of the system.

Acoustic statement (European Machinery Directive)

Acoustic noise emission
LpA <70 dB
Operator position
Normal operation mode per ISO 7779

General Safety Notices

WARNING If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.

WARNING No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.

Environmental Conditions (Operating)

This product is designed for use in the following conditions:

- For indoor use only
- Altitude up to 2000 m
- Temperature 15 to 35°C
- Maximum relative humidity 85% (non-condensing)

CAUTION This product is designed for use in INSTALLATION CATEGORY II and POLLUTION DEGREE 2, per IEC 61010-1 Third Edition and 664 respectively.

Environmental Information

Samples of this product have been type tested in accordance with the Keysight Environmental Test Manual and verified to be robust against the environmental stresses of Storage, Transportation and End-use; those stresses include but are not limited to temperature, humidity, shock, vibration, altitude and power line conditions.

Test Methods are aligned with IEC 60068-2 and levels are similar to MIL-PRF-28800F Class 3.

EMC (Electromagnetic Compatibility)

This product complies with the essential requirements of the European EMC Directive as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity):

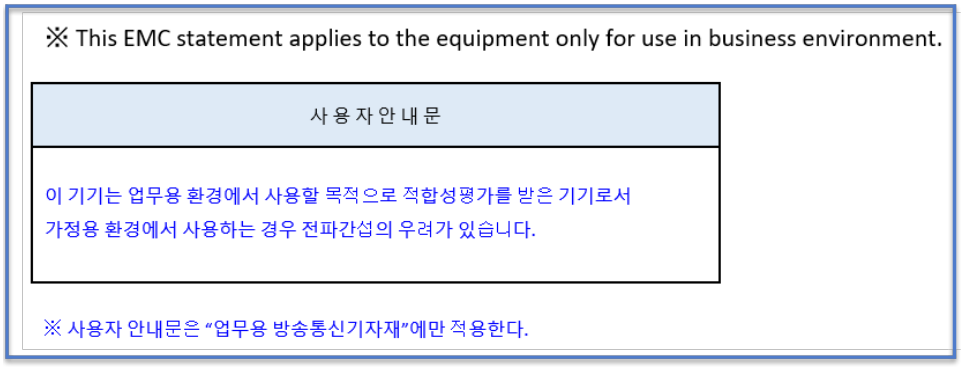
- IEC/EN 61326-1
- CISPR Pub 11 Group 1, class A
- AS/NZS CISPR 11
- ICES/NMB-001(A)
  This ISM device complies with Canadian ICES-001.
  Cet appareil ISM est conforme a la norme NMB-001 du Canada.

CAUTION This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

NOTE This is a sensitive measurement apparatus by design and may have some performance loss during receive measurements using a low input range setting. Ambient continuous electromagnetic phenomena between 2.3 and 4.1 GHz may appear at up to 55 dB above DANL using the M1749B Tx/Rx ports.

South Korean Class A EMC declaration

This equipment has been conformity assessed for use in business environments. In a residential environment this equipment may cause radio interference.



Declaration of Conformity

The Declaration of Conformity for any Keysight product can be found on the website:
http://www.keysight.com/go/conformity

Ventilation

CAUTION

VENTILATION REQUIREMENTS: When installing the instrument(s) into a cabinet, consideration shall be given to the convection flow into and out of the cabinet. Consideration shall also be given to the individual instruments to avoid having the heated discharge of one instrument, now becoming the cooling intake air for another instrument.

Do not place the transceiver against any surface in such a way as to block its ventilation openings. Interfering with ventilation airflow can cause the transceiver to overheat.

Another area of concern is verification that the maximum ambient operating temperature of the instrument(s) is not exceeded by cabinet installation.

Keysight recommends forced air convection whenever an instrument(s) are installed in a cabinet and further recommends that the maximum operating temperature of the cabinet be reduced 10°C from the lowest, of the maximum operating temperature of a single instrument.

If there are any concerns or special requirements an Keysight Field Engineer should be consulted to assure instrument(s) temperature compliance and performance.

Power requirements

The M1749B does not have an AC power connection. It is powered by a 19 Volt DC input from an AC/DC converter. (In some test applications, the DC input is furnished by a power supply, such as a Keysight N6702C, controlled remotely by solution software.) This input does not represent a risk of personal injury.

CAUTION Do not remove the DC input plug from the M1749B while it is in an active state. Make sure the **Status** LED on the DUT-facing side of the M1749B is dark before disconnecting the DC input.

Installation Location

Install the instrument so that the detachable power cord is readily identifiable and is easily reached by the operator. The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. Alternatively, an externally installed switch or circuit breaker (which is readily identifiable and is easily reached by the operator) may be used as a disconnecting device.

Power requirements of the AC adapter

- Input: 100-240VAC, 50-60 Hz, 2.5 - 1 A
- Input power stability: the AC-DC adapter is certified and can operate with mains supply voltage fluctuations up to ±10% of the nominal voltage.
- Output: 19 VDC, 6 A

The main power cord is the system disconnecting device. It disconnects the mains circuits from the mains supply.

WARNING The Mains wiring, and connectors shall be compatible with the connector used in the premise electrical system. Failure to ensure adequate earth grounding by not using the correct components may cause product damage, and serious injury.

WARNING This is a Safety Protection Class I Product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.

CAUTION This instrument has auto-ranging line voltage input. Be sure the supply voltage is within the specified range, and that voltage fluctuations do not to exceed 10 percent of the nominal supply voltage.

Using Accessories

Only Keysight-approved accessories shall be used.

Use the AC-DC power adapter and power cord which is supplied with the product.

See the accessories listed under “Initial Inspection” on page 26.

Weight and Dimensions

The weight and dimensions of the M1749B are as follows.

- Weight: 3.5 kg
- Height: 70 mm
- Width: 175 mm
- Length: 345 mm

Protecting against electrostatic discharge

Electrostatic discharge (ESD) can damage or destroy electronic components (the possibility of unseen damage caused by ESD is present whenever components are transported, stored, or used).

Test equipment and ESD

To help reduce ESD damage that can occur while using test equipment:

WARNING Do not use these first three techniques when working on circuitry with a voltage potential greater than 500 volts.

- Before connecting any coaxial cable to a test set connector for the first time each day, momentarily short the center and outer conductors of the cable together.
- Personnel should be grounded with a 1 MΩ resistor-isolated wrist-strap before touching the center pin of any connector and before removing any assembly from the test set.
- Be sure that all instruments are properly earth-grounded to prevent build-up of static charge.
- Perform work on all components or assemblies at a static-safe workstation.
- Keep static-generating materials at least one meter away from all components.
- Store or transport components in static-shielding containers.
- Always handle printed circuit board assemblies by the edges. This reduces the possibility of ESD damage to components and prevent contamination of exposed plating.

Additional information about ESD

For more information about ESD and how to prevent ESD damage, contact the Electrostatic Discharge Association (http://www.esda.org). The ESD standards developed by this agency are sanctioned by the American National Standards Institute (ANSI).

Instrument Maintenance

Cleaning the Instrument

CAUTION

Disconnect the M1749B from all cables before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.

Connector Care

Factory-installed semi-rigid jumper cables between connectors should be left permanently in place.

Because connectors can become defective due to wear during normal use, all connectors should be inspected and maintained to maximize their service life. Inspect the mating surface each time a connection is made.

Metal particles from connector threads often find their way onto the mating surface when a connection is made or disconnected. Clean dirt and contamination from the connector mating surface and threads.

Connector Cleaning

Cleaning connectors with isopropyl alcohol shall only be done with all cables disconnected, and in a well-ventilated area. Allow all residual alcohol moisture to evaporate, and the fumes to dissipate prior to energizing the instrument.

WARNING

Keep isopropyl alcohol away from heat, sparks, and flame. Store in a tightly closed container. The alcohol shall not be stored, or left open, in the area of the equipment. Use isopropyl alcohol with adequate ventilation to prevent the combustions of fumes or vapors.

Avoid contact with eyes, skin, and clothing, as isopropyl alcohol causes skin irritation, may cause eye damage, and is harmful if swallowed or inhaled. It may be harmful if absorbed through the skin. Wash thoroughly after handling. In case of spill, soak up with sand or earth. Flush spill area with water. Dispose of isopropyl alcohol in accordance with all applicable federal, state, and local environmental regulations.

In case of fire, use alcohol foam, dry chemical, or carbon dioxide; water may be ineffective.

Cable Connections

Precautions

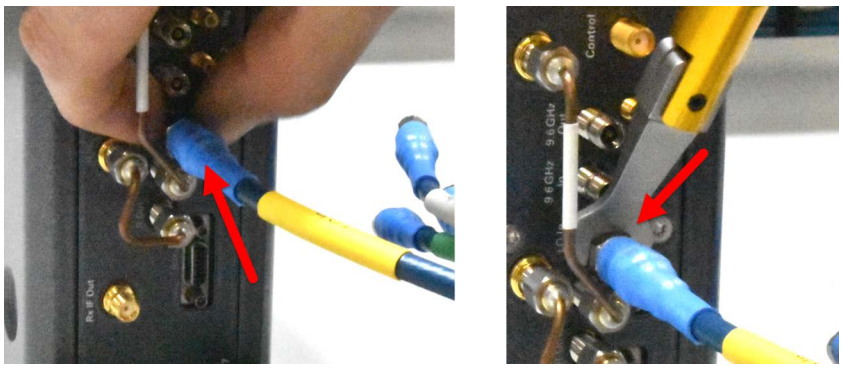
Threaded connectors can be damaged when cables are connected to them, particularly if they are over-tightened (this could break the signal path entirely, making the M1749B non-functional).

CAUTION When attaching cables to threaded connectors, use a torque wrench to apply the proper torque, as described in the table below.

Connector Type	Torque Wrench Part Number	Wrench Opening	Torque Setting
3.5 mm, 2.92 mm, 2.4 mm, 1.85 mm	8710-1765	5/16 in	90 N-cm (8 in-lb)
Type-N 50 Ω or 75 Ω	8710-1766	3/4 in	135 N-cm (12 in-lb)

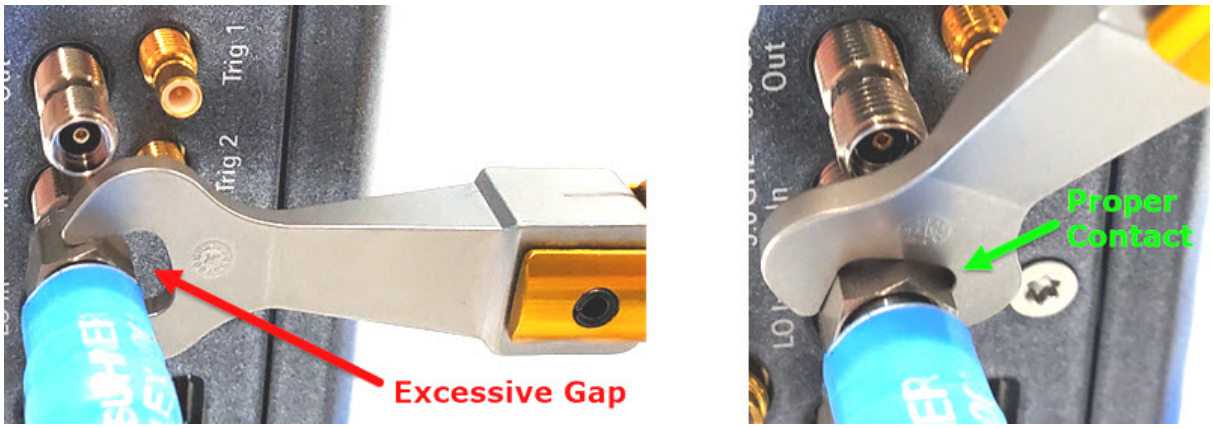
When connecting a cable to a port, thread the cable-end onto the connector using your fingers, then use the torque wrench to tighten the connection.

Figure 1-1 Attaching a cable to a connector



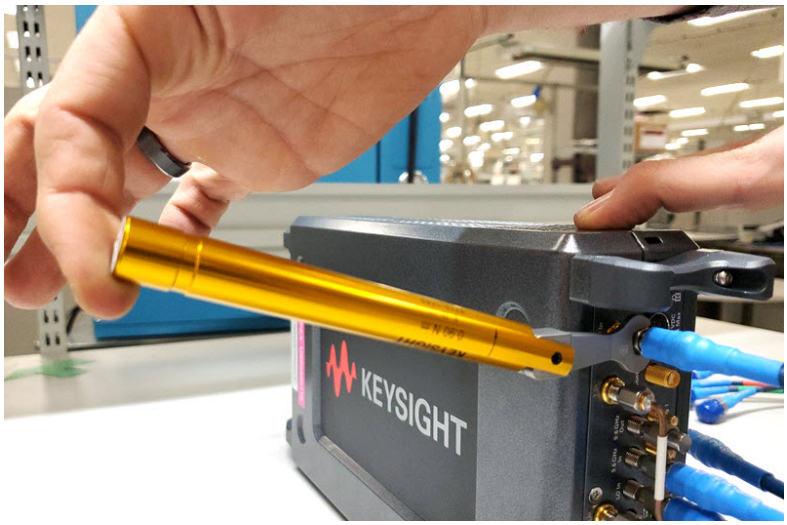
The torque wrench should contact the connector fully, with no visible gap.

Figure 1-2 Making proper contact between the wrench and the connector



When tightening the connection, turn the wrench gently from the far end, to avoid over-tightening.

Figure 1-3 Turning wrench from the far end



Be aware that the Power cable has a rectangular locking mechanism on the end of it; once it has been connected to **Power** on the M1749B, it cannot be removed until you pull back on the locking mechanism as shown below.

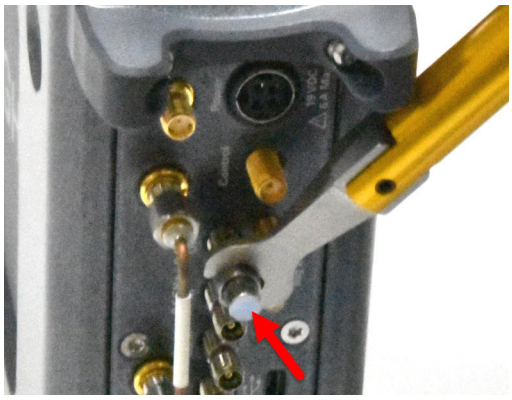
Figure 1-4 Locking mechanism of Power cable.

Connection procedure for cable bundle

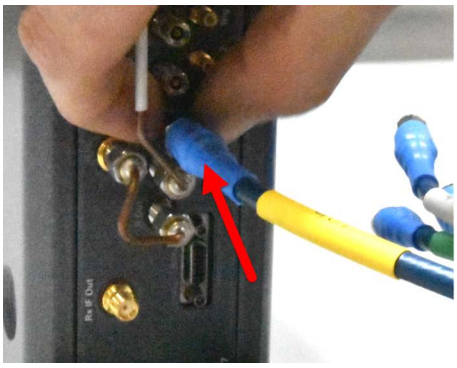
Use the following procedure to attach cables to the M1749B. The cables in the bundle are labeled for easy identification.

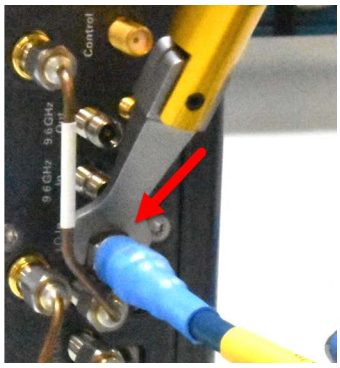
Step 1. Turn the M1749B on its side, with the **Power** connector at the top (this position makes the connectors much easier to reach with a torque wrench).

Step 2. Loosen and remove the 50 ohm terminator from **9.6 GHz Out**.

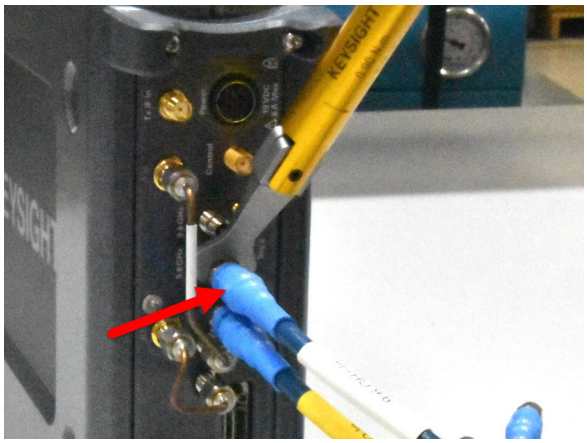


Step 3. Connect the LO input cable to **LO In**.

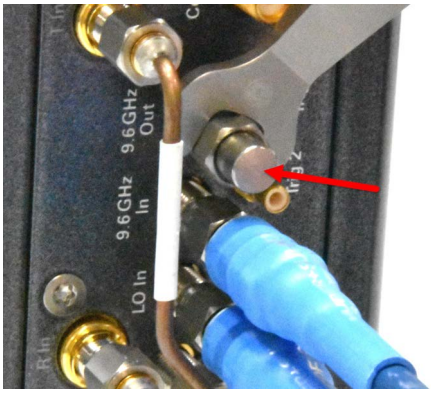




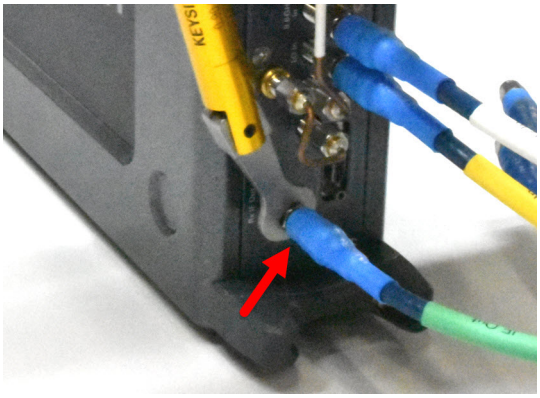
Step 4. Connect the 9.6 GHz input cable to **9.6 GHz In**.



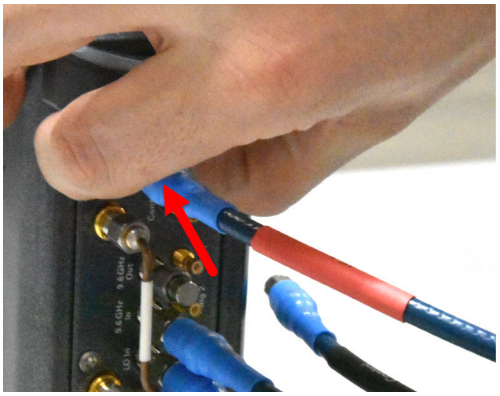
Step 5. Replace the 50 ohm terminator onto **9.6 GHz Out**.



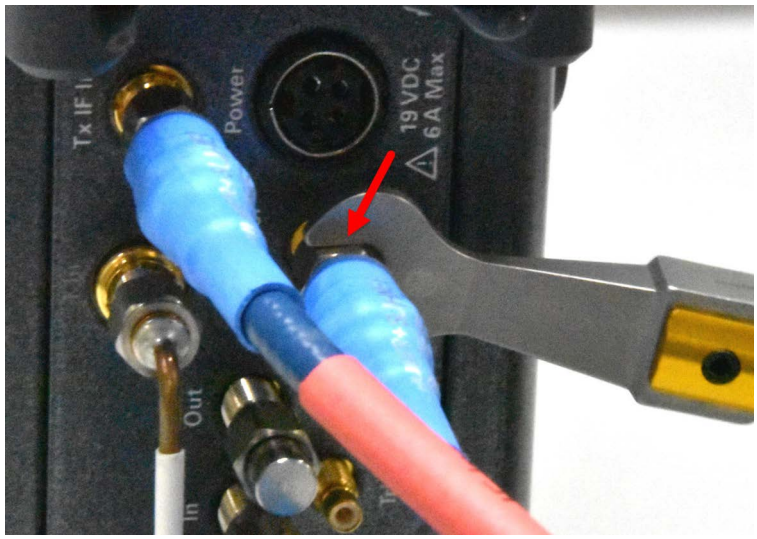
Step 6. Connect the Rx IF output cable to **Rx IF Out**.



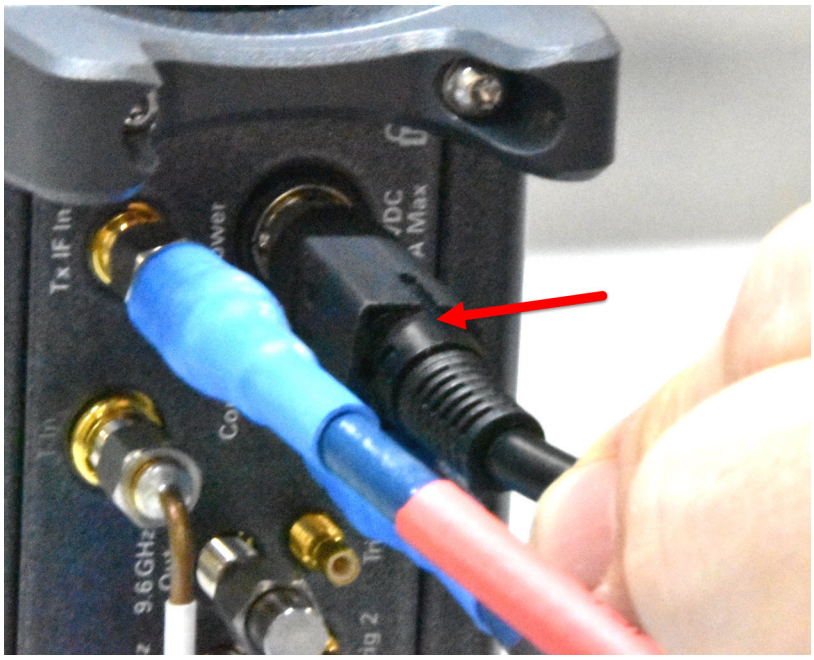
Step 7. Connect the TX IF input cable to **Tx IF In**.



Step 8. Connect the Control cable to **Control**.



Step 9. Connect the Power cable to **Power**.



Step 10. Return the M1749B back to its normal position (bottom-side down).

2 Quick Start

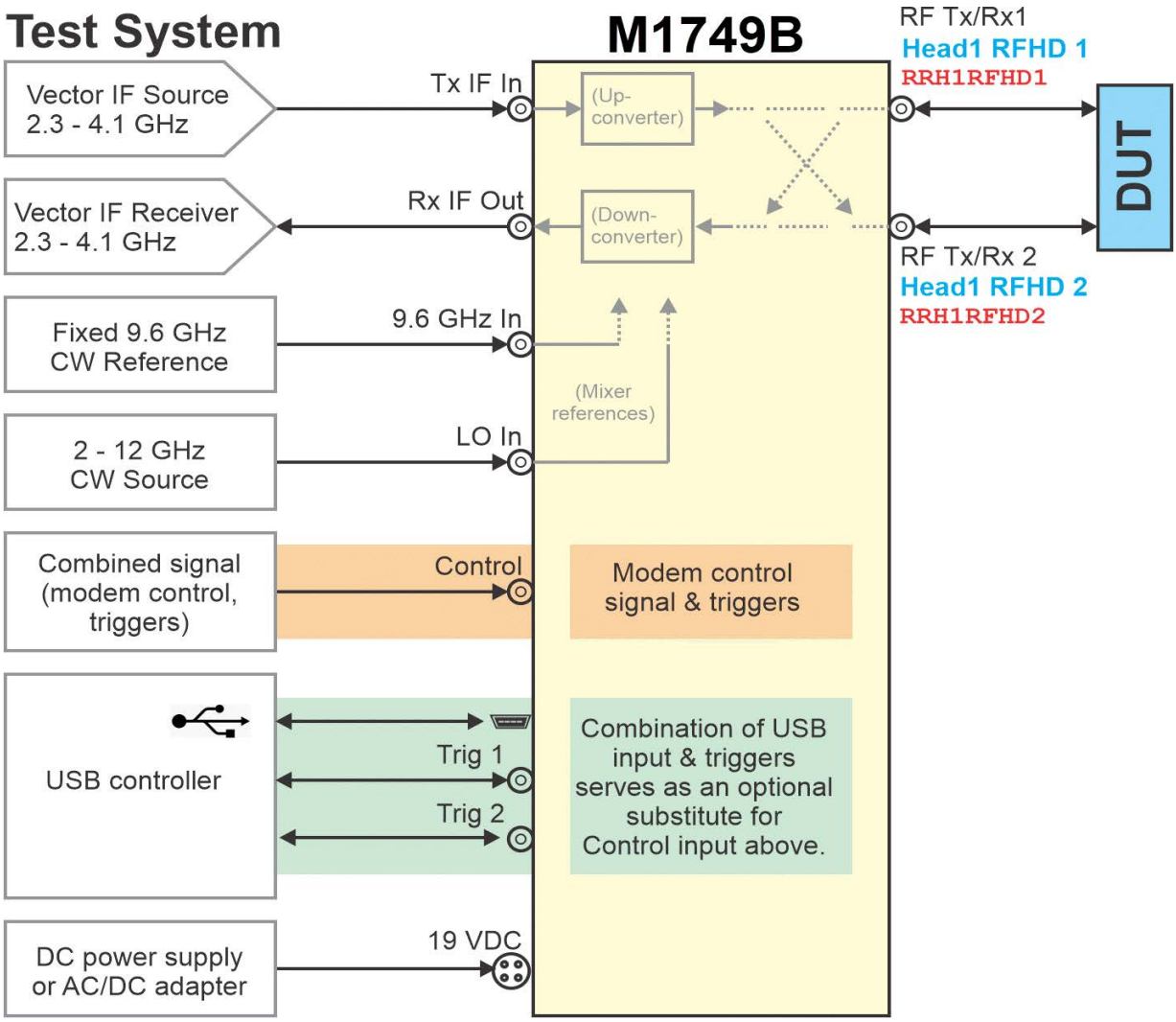
The following topics can be found in this section:

Purpose and Function

The M1749B Performance mmW Transceiver is designed to be used as the millimeter-wave interface between a wireless test system and a millimeter-wave Device Under Test. The M1749B upconverts the test system's Tx output to the higher range of the DUT, and downconverts the received signal from the DUT to the lower range of the test system's Rx input.

The DUT-facing ports of the M1749B (**RF Tx/Rx 1** and **RF Tx/Rx 2**) are half-duplex ports -- that is, either port can transmit or receive (although never both at once).

Figure 2-1 M1749B used as an RF/mmWave interface



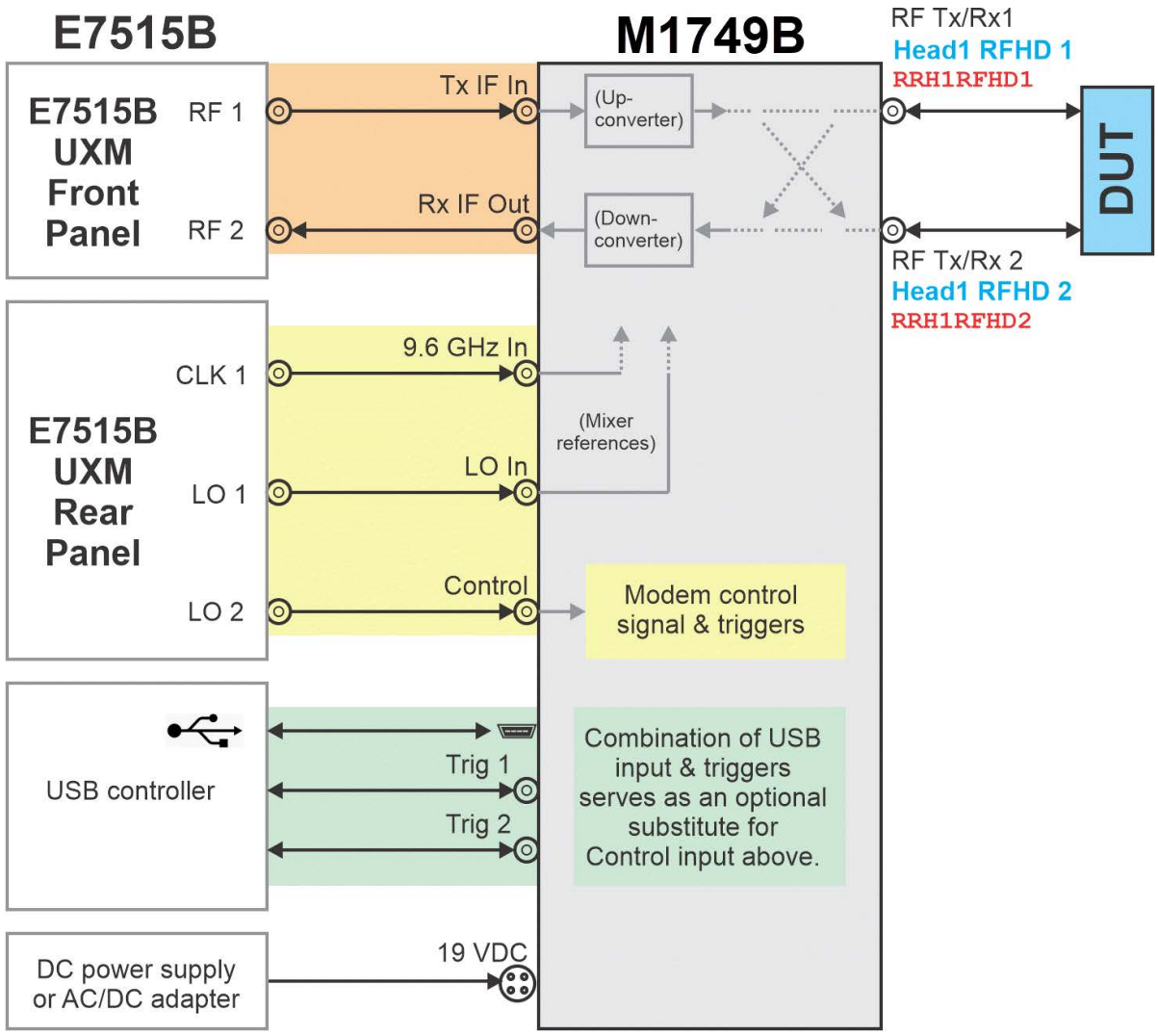
On the left side of the M1749B in the diagram, the **Tx IF In** port takes an input from the test system and upconverts it to the higher range of the DUT. Signals received from the DUT are downconverted and returned to the test system from the **Rx IF Out** port. In upconverting and downconverting, the M1749B

uses two reference inputs (from the test system): the fixed-frequency **9.6 GHz In** and the variable-frequency **LO In**. The LO input can include a modem control signal, with embedded triggers; this eliminates the need for the USB controller and trigger lines shown in the illustration.

The supplied AC/DC adapter provides a **19 VDC** power input to the M1749B (this can also be done by a DC power supply, if one is included in the system steup).

The diagram below shows an example of the M1749B interfacing with a specific test set (the E7515B UXM 5G Wireless Test Platform).

Figure 2-2 Example setup: M1749B used with E7515B UXM system



Initial Inspection

Inspect the shipping container and the cushioning material for signs of stress. Retain undamaged shipping materials for future use, as you may wish to ship the test set to another location or to Keysight Technologies for service. Verify the contents of the container against the table below.

Item	Deliverable	Description
Getting Started Guide (this document)		Provides first-time power on instructions, licensing information, operating system information, and general hardware information.
Keysight M1749B mmWave Transceiver		
AC/DC power converter Part# 0950-6166		Provides DC power input (19 V) to instrument-facing panel of M1749B. (In some test applications, the DC input is furnished by a power supply, such as a Keysight N6702C, controlled remotely by solution software.)
AC power cable		(Cord type varies by country.)

Shipping Problems?

If the shipping materials are damaged or the contents of the container are incomplete:

- Contact the nearest Keysight Technologies office.
- Keep the shipping materials for the carrier's inspection.
- If you must return a test set to Keysight Technologies, use the undamaged original or comparable shipping materials. See "Returning the M1749B for Service" on page 47.

Location and Mounting

It is recommended to suspend the transceiver above the Device Under Test (DUT), with the mmWave port pointed downwards at the DUT, so that heat given off by the transceiver will rise away from the DUT. Leave a minimum clearance of 2.5 inches (7 cm) around the transceiver. Also, ensure there is enough room to attach all necessary cables between the transceiver and other devices.

CAUTION Do not place the transceiver against any surface in such a way as to block its ventilation openings. Interfering with ventilation airflow can cause the transceiver to overheat.

3 Exterior Features

The following topics can be found in this section:

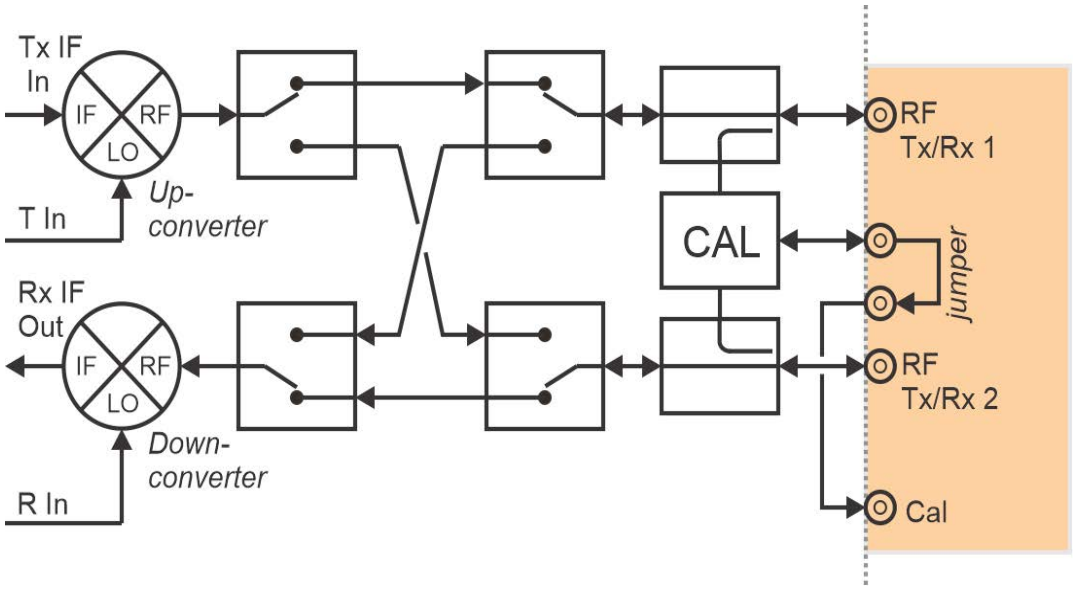
DUT-Facing Side

The photograph below shows the DUT-facing side of the M1749B.

Figure 3-1 M1749B, DUT-facing side

The DUT-facing ports are shown on the right in the block diagram below.

Figure 3-2 M1749B, DUT-facing ports (on right)



The features of this side of the M1749B are illustrated and described on the following page.

Figure 3-3 M1749B, DUT-facing features

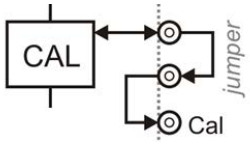
The features are described in the following table.

CAUTION

When attaching cables to threaded connectors on this panel, use a torque wrench as described in "Connector Care" on page 16.
The Cal jumper (see item 2 in the table) should be left permanently in place.

CAUTION

Do not remove the DC input plug from the M1749B while it is in an active state. Make sure the **Status** LED on the DUT-facing side of the M1749B is dark before disconnecting the DC input.

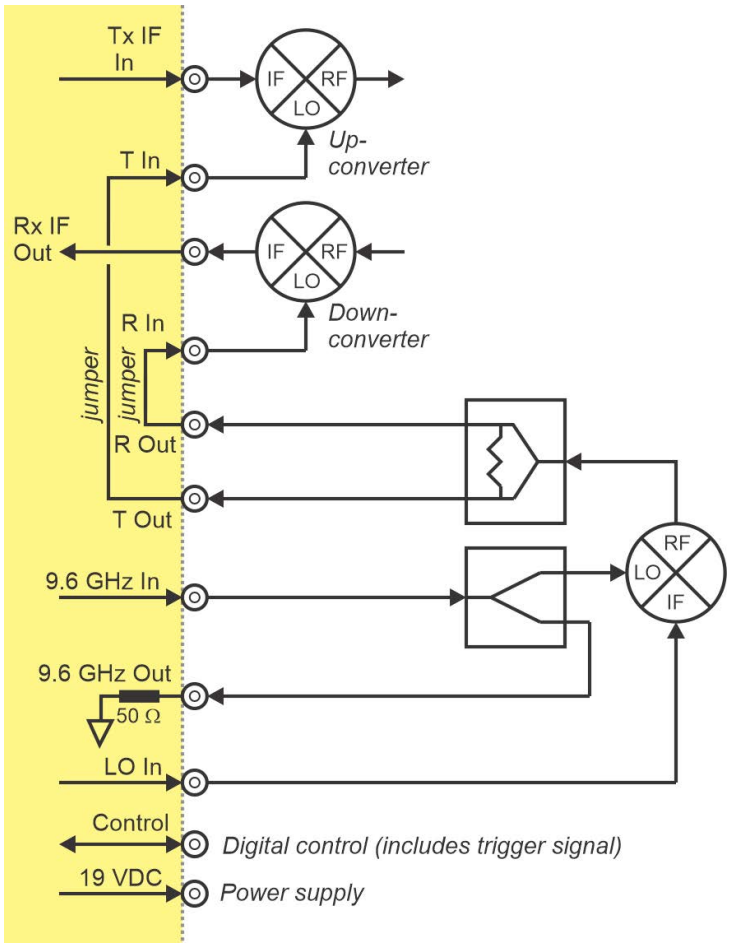
Port/LED	Description
(1) **RF Tx/Rx 1** (3) **RF Tx/Rx 2**	These 2.4 mm ports are functionally interchangeable, because the internal switching of the M1749B can be configured so that either port is the RF output from the Tx upconverter, or the RF input to the Rx downconverter. These ports communicate with the DUT through an over-the-air interface (OTA), typically within a test chamber. *Torque wrench required.*
(2) **Cal**	The labeled Cal connector at the upper right is a 2.4 mm port provides a switched output from RF level detectors within the M1749B; these outputs are used during the calibration process. *Torque wrench required.* The path to the Cal port is routed through an exterior jumper on the front panel; leave it in place. 
(4) **RF Tx/Rx1** (6) **RF Tx/Rx 2**	These LEDs are lit when the named port is in use.
(5) **Status**	This LED is lit to indicate that the M1749B is in an active state (this is determined by inputs received at the **Control** port on the instrument-facing side of the M1749B).

Instrument-Facing Side

The photograph below shows the instrument-facing side of the M1749B; the block diagram shows the instrument-facing RF ports (on the left).

Figure 3-4 M1749B, instrument-facing side

Figure 3-5 M1749B, instrument-facing ports (on left)



The features of this side of the M1749B are illustrated below.

Figure 3-6 M1749B, instrument-facing features

The features of this side of the M1749B are described in the following table.

CAUTION

When attaching cables to threaded connectors on this panel, follow the instructions provided in "Precautions" on page 17 and "Connection procedure for cable bundle" on page 20.
The installed jumpers (see items 8, 9, 11, and 12 in the table) should be left permanently in place.

CAUTION

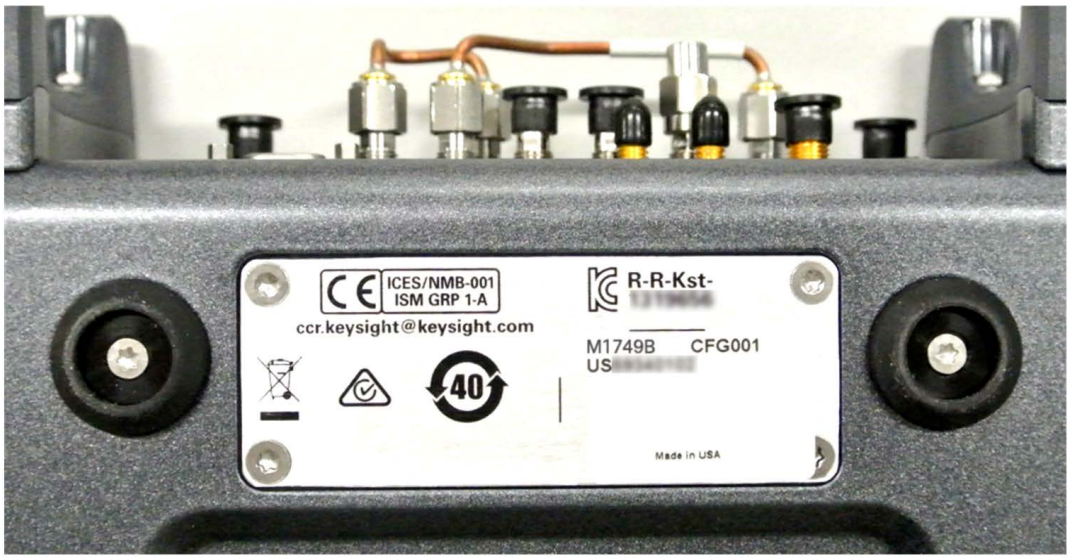
Do not remove the DC input plug from the M1749B while it is in an active state. Make sure the **Status** LED on the DUT-facing side of the M1749B is dark before disconnecting the DC input (Item 6 in the illustration).

Connector	Description
(1) **AUX**	This multi-pin auxiliary interface is used only by Keysight, for purposes of testing and repair.
(2) **USB**	This USB micro B connector provides USB connectivity with an external controller. This is one of two methods of controlling the M1749B (the other involves use of the Control port, which incorporates trigger signals). When the USB interface is used, triggering must be accomplished by means of the Trig1 and Trig 2 ports.
(3) **Trig 2** (4) **Trig 1**	These SMB connectors carry trigger inputs and output to the external controller. These ports are required if the M1749B is controlled by way of the USB port. They are not required if the M1749B is controlled by way of the Control port, which incorporates trigger signals (however, even if the Control port is used, these trigger ports remain available for use).

Connector	Description
(5) **Control**	This SMA port accepts a combined signal which includes both a modem control signal and trigger signals; it is an alternative to the USB control port described above. As the control interface incorporates trigger signals, the Trig 1 and Trig 2 ports are not needed when the Control interface is used (however, they can be used if that is preferred). *Torque wrench required.*
(6) **Power**	This 4-pin connector accepts a 19-volt DC power input from the AC/DC converter accessory, or from another DC power source.
(7) **Tx IF In**	This SMA connector accepts an IF input to the Transmitter upconverter. The input is received from the Tx/IF Out connector on the front panel.*Torque wrench required.*
(8) **T In**	This 2.4 mm connector accepts and LO input to the Transmitter upconverter. The input is received from the T Out port of the M1749B (a semi-rigid coaxial jumper connects the two, and should be left in place).
(9) **R In**	This 2.4 mm connector port accepts and LO input to the Receiver downconverter. The input is received from the R Out port of the M1749B (a semi-rigid coaxial jumper connects the two, and should be left in place).
(10) **Rx IF Out**	This SMA connector provides an IF output from the Receiver downconverter. The input is furnished to the Rx IF In connector on the front panel. *Torque wrench required.*
(11) **R Out**	This 2.4 mm connector provides a signal which will be used as the LO input to the Receiver downconverter. A semi-rigid coaxial jumper connects it to the M1749B R In port, and should be left in place.
(12) **T Out**	This 2.4 mm connector provides a signal which will be used as the LO input to the Transmitter downconverter. A semi-rigid coaxial jumper connects it to the M1749B T In port, and should be left in place.
(13) **LO In** (see *Caution* below)	This 3.5 mm connector accepts a variable-frequency input from the LO Out connector on the front panel. This input is mixed with another input to the M1749B (9.6 GHz In) to generate the LO input to the Transmitter Upconverter and the Receiver Downconverter. *Torque wrench required.*
(14) **9.6 GHz In** (see *Caution* below)	This 3.5 mm connector accepts a fixed-frequency input from the 9.6 GHz Out connector on the front panel. This input is mixed with another input to the M1749B (LO In) to generate the LO input to the Transmitter Upconverter and the Receiver Downconverter. *Torque wrench required.*
(15) **9.6 GHz Out** (see *Caution* below)	This 3.5 mm connector provides an output of the same signal which is received at the 9.6 GHz In port. It can be used in synchronizing other equipment. When it is not connected to anything else, this port should be given a 50 Ohm termination to ground. The M1749B is shipped with a terminating cap in place on the connector. *Torque wrench required.*

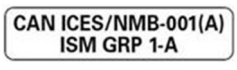
Labels and Symbols

Figure 3-7 M1749B regulatory labels



Labels and symbols which may be shown on the M1749B (mainly on the rear panel of the chassis) are described in the table below.

Symbol	Description
	This symbol marks the standby position of the power line switch.
	This symbol marks the ON position of the power line switch.
	This symbol marks the OFF position of the power line switch.
	This symbol indicates the input power required is AC.
	This symbol indicates DC voltage.
	This symbol indicates a three-phase alternating current.
	This symbol indicates frame or chassis terminal.

Symbol	Description
	The instruction documentation symbol. The product is marked with this symbol when it is necessary for the user to refer to the instruction in the documentation.
	This symbol indicates the presence of a laser device.
	This symbol indicates that the surface can be hot.
	This symbol identifies the Protective Conductor Terminal.
	This symbol indicates the equipment is protected throughout by double or reinforced insulation.
	The CE marking is a registered trademark of the European Community (if accompanied by a year, it is the year when the design was proven). It indicates that the product complies with all relevant directives.
	UK conformity mark is a UK government owned mark. Products showing this mark comply with all applicable UK regulations.
	The Keysight email address is required by EU directives applicable to our product.
	The CSA mark is a registered trademark of the CSA international.
	Canada EMC label. Interference-Causing Equipment Standard for industrial, scientific and medical (ISM) equipment. Matériel industriel, scientifique et médical (ISM).
	CE/ICES/ISM label. This is a space-saver label that combines three markings – CE with CAN ICES (see above) and ISM (see below).
	The RCM mark is a registered trademark of the Australian Communications and Media Authority.
	This is a combined marking to indicate product compliance with the Industry Canadian Interference-Causing Equipment Standard (ICES/NMB-001). This is also a symbol of an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 5).
	This is a symbol of an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 5).

Symbol	Description
	South Korean Certification (KC) mark. It includes the marking's identifier code.
	The crossed-out wheeled bin symbol indicates that separate collection for waste electric and electronic equipment (WEEE) is required, as obligated by the EU DIRECTIVE and other National legislation. Please refer to www.keysight.com/go/takeback for information about your trade-in options with Keysight, in addition to product takeback instructions.
	China Restricted Substance Product Label. The EPUP (environmental protection use period) number in the center indicates the time period during which no hazardous or toxic substances or elements are expected to leak or deteriorate during normal use and generally reflects the expected useful life of the product.
	Universal recycling symbol. This symbol indicates compliance with the China standard GB 18455-2001 as required by the China RoHS regulations for paper/fiberboard packaging.
IP x y	This mark indicates product has been designed to meet the requirements of "IP x y", where "x" is the solid particle protection and "y" is the liquid ingress protection.

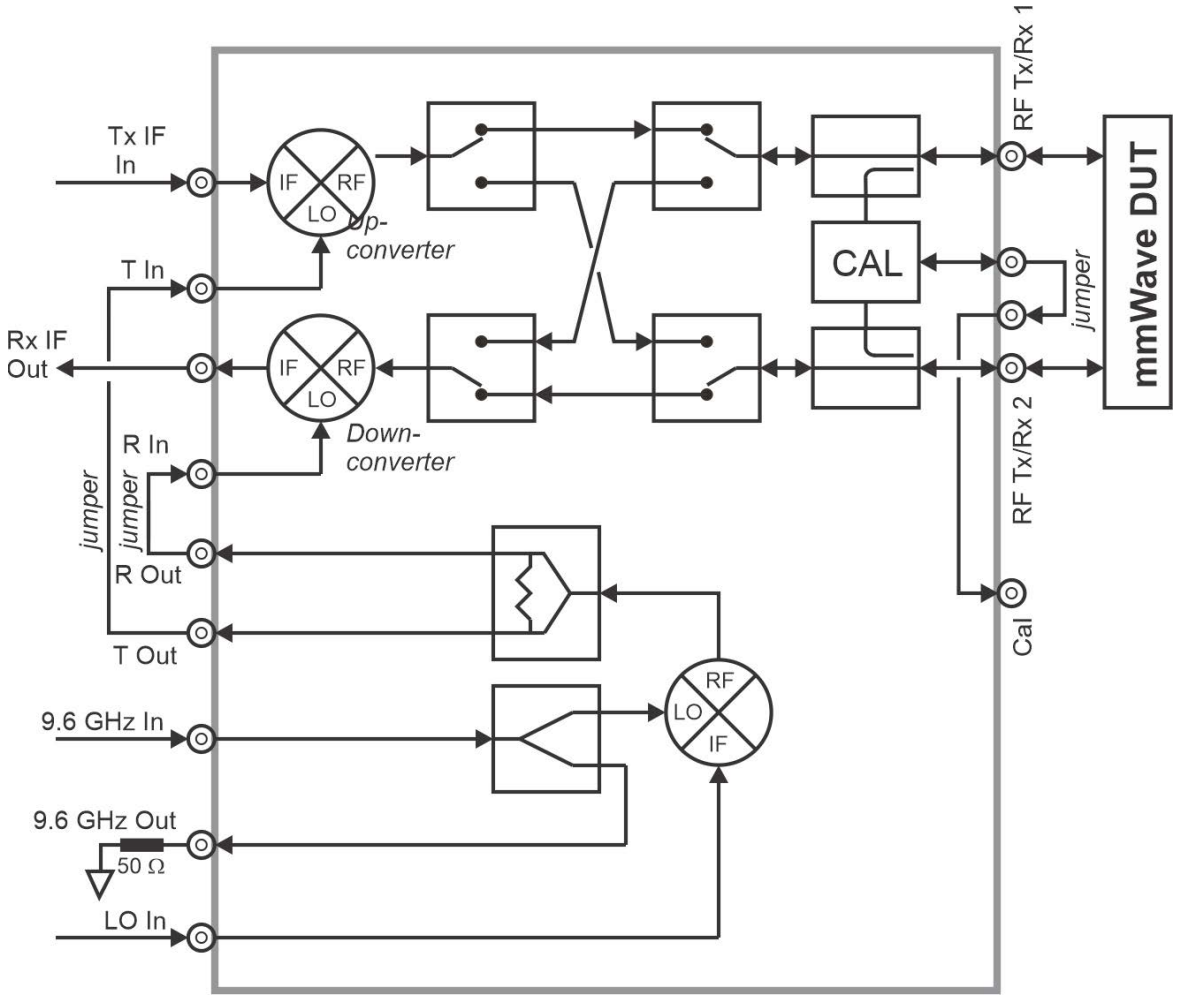
4 Functionality

The following topics can be found in this section:

Simplified Block Diagram

The simplified functional block diagram below shows how signals to and from the S9130A system front panel (the left side of the M1749B in the illustration below) interface with the Tx upconverter and Rx downconverter, and how the upconverted and downconverted signals interface with the DUT-facing ports of the test head (the right side of the illustration).

Figure 4-1 M1749B block diagram and system connections



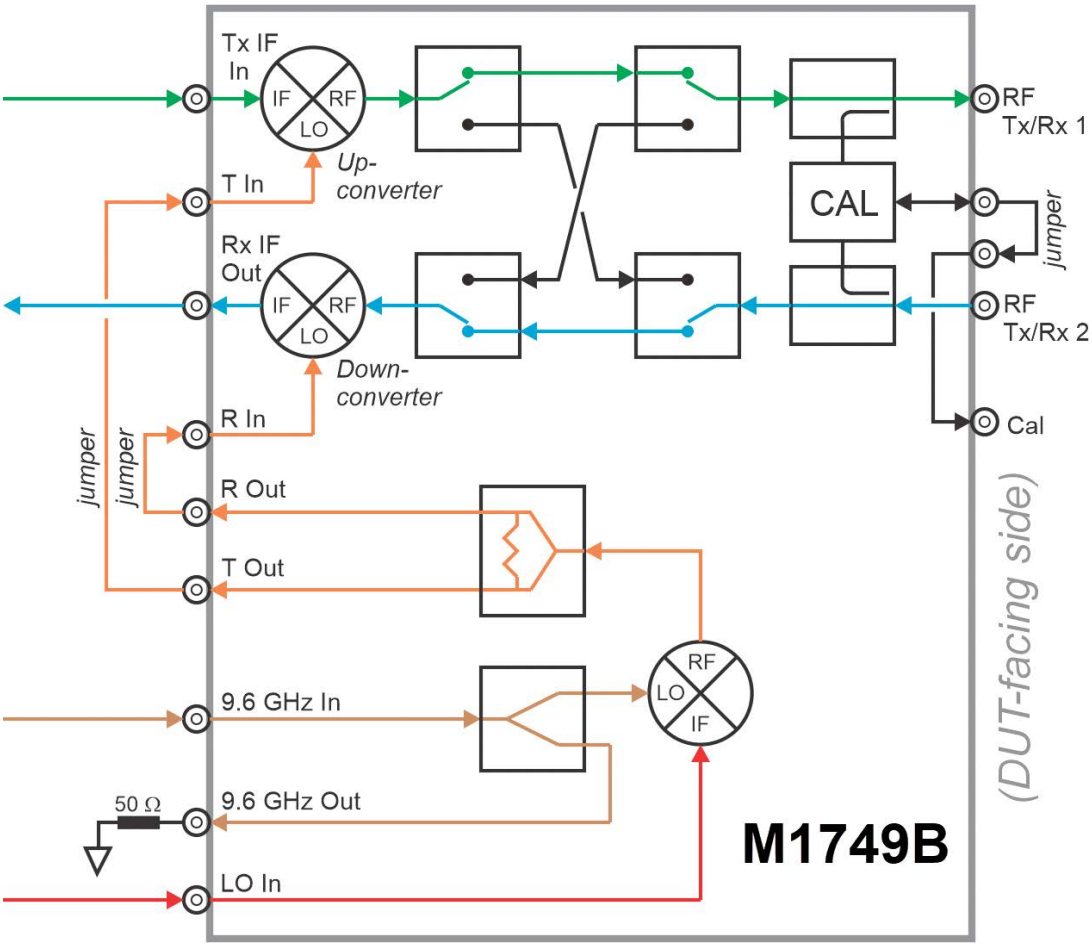
The DUT-facing ports at the right side of the diagram can serve either as Tx ports or as Rx ports, depending on how the switches are set.

The left side of the diagram shows the M1749B's system connections. Control and power inputs are omitted.

Signal Routing

The diagram below uses color-coding to distinguish between various paths for Tx and Rx signals through the M1749B.

Figure 4-2 RF signal paths through the M1749B

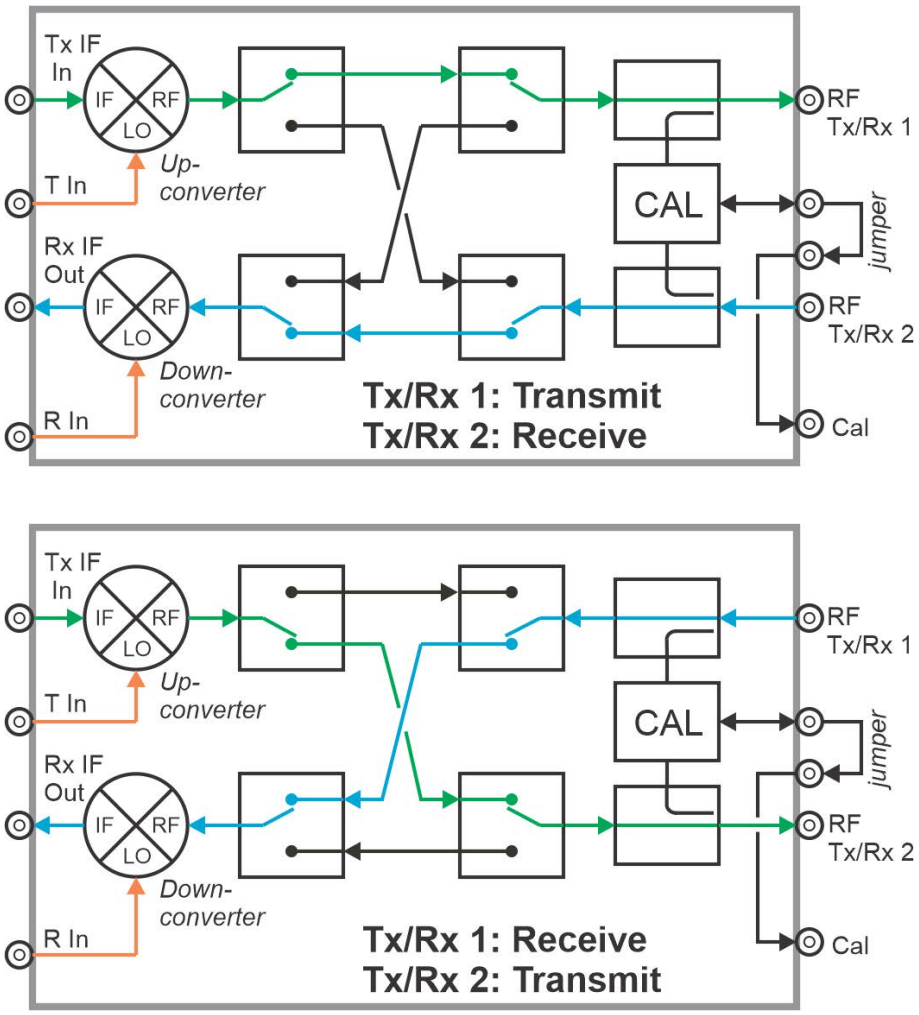


The colors are interpreted as follows:

- **Red**: variable-frequency LO input to the M1749B, used in generating an LO input to the upconverter and downconverter.
- **Brown**: fixed 9.6 GHz input to the M1749B, used in generating an LO input to the upconverter and downconverter.
- **Orange**: generated LO signal to the upconverter and downconverter. (Because both use the same LO, Tx and Rx frequencies need to match.)
- **Green**: Tx path, transmitting a stimulus signal to the DUT by way of either of the Tx/Rx ports.
- **Blue**: Rx path, receiving a response signal from the DUT by way of either of the Tx/Rx ports.

The Tx/Rx ports are half-duplex: each one can function as a transmit port or a receive port (although not simultaneously). In the illustration below, the green transmit path can be routed either to **RF Tx/Rx 1** (as in the upper picture) or to **RF Tx/Rx 2** (as in the lower picture). Whichever port is not transmitting becomes the receiver (the blue path). The choice between these alternatives is made by means of configuration menus in the test application which is running on the UXM.

Figure 4-3 Alternative signal routings

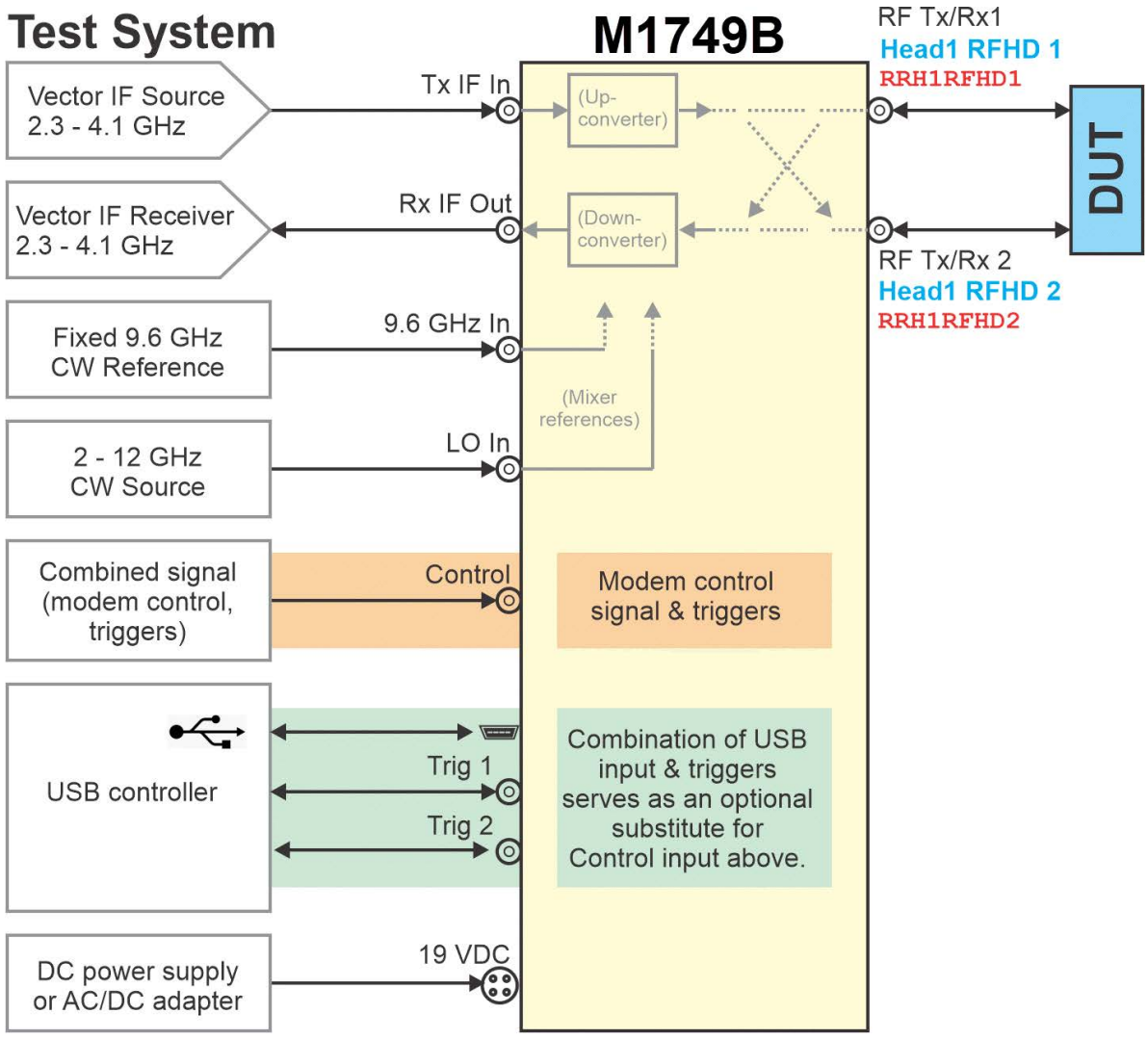


Control

The M1749B can be operated from an external controller connected to the UXB port of the M1749B (this approach requires separate trigger lines). Alternatively, the M1749B can receive a combined signal which includes both a modem control input and trigger signals (provided such a combined input can be generated by the wireless test system).

Configuration choices for the M1749B are made within the application interface of the test application which the test set is running. For example, if the output (source) port is designated in the application interface as **Head 1 RFHD 1**, this is equivalent to **RF Tx/Rx 1** on the M1749B. In the diagram below, the port names are designated in blue (as they appear in the application interface menus) and also in red (as they are identified in SCPI commands.)

Figure 4-4 Two types of control inputs (highlighted in orange and green)



Functionality
Control

5 Troubleshooting

The following topics can be found in this section:

Where to get technical help

For product-specific information and support, software and documentation updates: https://www.keysight.com/find/m1749b

For online assistance: http://www.keysight.com/find/assist

To contact Keysight Technologies: http://www.keysight.com/find/contactus

Also, see "Locations for Keysight Technologies" on page 48.

Identifying Problems

WARNING No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers.

If the status indicator on the M1749B is not lit, or if it appears that mmWave signals are not being exchanged with the Device Under Test check the following:

1. Are the RF cables connected appropriately between the M1749B and the measurement instrument? (See Figure 2-1 on page 24.)
2. Is the M1749B powered on?
3. Is the PXIe chassis (and its measurement instruments) powered on?
4. Is the measurement application properly configured (for example, are the input and output ports selected appropriately for your test setup?).

If no obvious problem in the test setup can be found, contact Keysight Technologies to ask for technical support.

Returning the M1749B for Service

Use original packaging, or comparable packaging, when returning the M1749B for service.

Calling Keysight Technologies

Keysight Technologies has offices around the world to provide you with complete support for the M1749B. To obtain servicing information, or to order replacement parts, contact the nearest Keysight Technologies office listed under “Locations for Keysight Technologies” on page 48. In any correspondence or telephone conversations, refer to your test set by its product number and full serial number.

Locations for Keysight Technologies

For online assistance: http://www.keysight.com/find/assist

To contact Keysight Technologies: http://www.keysight.com/find/contactus

Alternately, contact the nearest Keysight sales office:

Americas		
Canada (877) 894 4414	Brazil 55 11 3351 7010	Mexico 001 800 254 2440
United States (800) 829 4444		

Asia & Pacific		
Australia 1 800 629 485	China 800 810 0189	Hong Kong 800 938 693
India 1 800 112 929	Japan 0120 (421) 345	Korea 080 769 0800
Malaysia 1 800 888 848	Singapore 1 800 375 8100	Taiwan 0800 047 866
Other Asia-Pacific countries: (65) 6375 8100		

Europe & Middle East		
Austria 0800 001122	Belgium 0800 58580	Finland 0800 523252
France 0805 980333	Germany 0800 6270999	Ireland 1800 832700
Israel 1 809 343051	Italy 800 599100	Luxembourg +32 800 58580
Netherlands 0800 0233200	Russia 8800 5009286	Spain 0800 000154
Sweden 0200 882255	Switzerland 0800 805353 Opt. 1 (DE), Opt. 2 (FR), Opt. 3 (IT)	United Kingdom 0800 0260637

Edition 2, June 2025

M1794-90003

www.keysight.com