
Keysight Wireless Test Solutions

E6680A Wireless Test Set

Notices

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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.

NOTE

A **NOTE** calls the user's attention to an important point or special information in the text.

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/e6680a>

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>

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1 Safety & Environmental Information

The following topics can be found in this section:

“Warning Statements and Symbols” on page 10

“Safety” on page 11

“Environmental Conditions (Operating)” on page 12

“EMC (Electromagnetic Compatibility)” on page 13

“Ventilation” on page 14

“Power Requirements” on page 14

“Using Accessories” on page 15

“Location and Mounting” on page 15

“Weight and Dimensions” on page 15

“Electrical Safety” on page 16

“Protecting against electrostatic discharge” on page 17

“Instrument Maintenance” on page 18

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 36.](#)

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
- Canada: CSA C22.2 No. 61010-1
- USA: UL std no. 61010-1

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)

CAUTION

This product is designed for use in INSTALLATION CATEGORY II and POLLUTION DEGREE 2.

This product is designed for use in the following conditions:

- For indoor use only
- Altitude up to 3000 m (9842 feet)
- Temperature 5 to 45° C
- Maximum Relative Humidity (non-condensing): 95% RH up to 40°C, decreases linearly to 45% RH at 45°C

NOTE

From 40° C to 45° C, the maximum % Relative Humidity follows the line of constant dew point.

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 and the UK Electromagnetic Compatibility Regulations 2016, 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

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.

South Korean Class A EMC declaration

This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

A 급 기기 (업무용 방송통신기자재) 이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다 .

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 test set against any surface in such a way as to block its ventilation openings. Interfering with ventilation airflow can cause the test set 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 used.

Power Requirements

Voltage, Frequency, and Power Consumption:
100/120V, 50/60Hz, 1200W Max;
220/240V, 50/60Hz, 1300W Max

NOTE

Mains supply voltage fluctuates up to +/- 10% of the nominal voltage. Transient over-voltages are typically present on the mains supply.

WARNING

The power cord is connected to internal capacitors that may remain live for 5 seconds after disconnecting the plug from its power supply.

Using Accessories

Only Keysight approved accessories shall be used.

NOTE

Proper ergonomics should be considered when using accessories such as a keyboard or a mouse.

Location and Mounting

CAUTION

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. The front panel switch is only a standby switch and is not a LINE switch. 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.

Weight and Dimensions

The weight and dimensions of the E6680A are as follows:

- Weight: maximum 29.4 kg (4 TRXs installed), minimum 22.7 kg (1 TRX)
- Height: 190.4 mm
- Width: 449.9 mm
- Length: 581 mm

Lifting

As indicated by the "TWO PERSON LIFT" label, safety precautions must be taken in lifting or carrying the instrument.

WARNING

More than one person is required to safely lift or carry this instrument. Alternately a mechanical lift can be used to eliminate the risk of personal injury.

Figure 1-1 Lift warning label



Electrical Safety

NOTE

Measurement Category: None (not intended for Measurement Category II, III or IV).

The test set's input ports are not designed to measure hazardous voltages, or to be connected to equipment that is not protected from hazardous transient voltages.

WARNING

This is a Safety Class 1 Product (provided with a protective earth 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 instrument is likely to make the instrument dangerous. Intentional interruption is prohibited.

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. Install the instrument so that the detachable power cord is readily identifiable and 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. The front panel switch is only a standby switch and is not a LINE switch. 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.

CAUTION

This instrument has an auto-ranging line voltage input. Ensure the supply voltage is within the specified range and voltage fluctuations do not exceed 10 percent of the nominal supply voltage.

CAUTION

When installing the product in a cabinet the convection into and out of the product must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the product by 4° C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used. It is your responsibility to ensure the ambient temperature does not exceed the rated ambient temperature stated in the specification.

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.

CAUTION

Use the Keysight supplied power cord or one with the same or better electrical rating.

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 M Ω 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

WARNING

To prevent electrical shock, disconnect the instrument from mains before cleaning. Use a dry cloth slightly dampened with water to clean the external case parts. Do not attempt to clean internally.

Cleaning the connectors

NOTE

Cleaning connectors with alcohol shall only be done with the instrument's power cord removed, and in a well-ventilated area. Allow all residual liquid alcohol to evaporate and the fumes to dissipate prior to energizing the instrument.

2 Quick Start

The following topics can be found in this section:

“Initial Inspection” on page 20

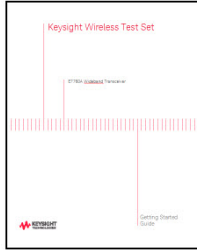

“Purpose and Function” on page 21

“Options and Licenses” on page 22

“First-time Use” on page 26

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 E6680A Wireless Test Set		
Y1168A	USB keyboard and optical mouse	
Y1217A	Rack mount and rack rail kit	

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 Your Test Set for Service” on page 142.**

Purpose and Function

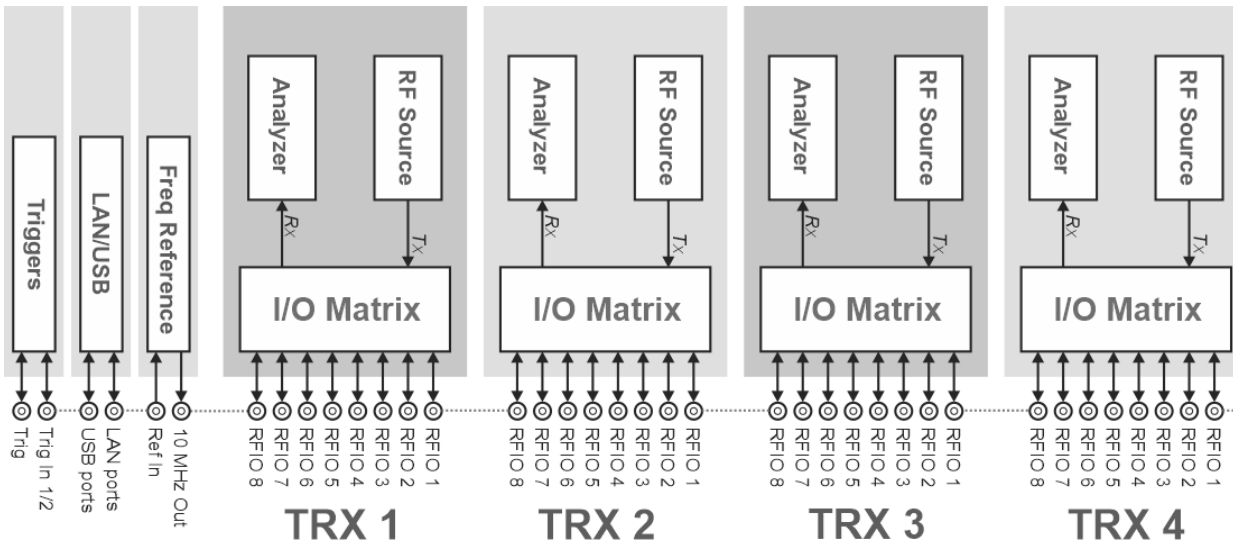
The E6680A test set supports wireless device testing, with up to four transmit/receive modules.

Figure 2-1 E6680A Front Panel



Each TRX unit in the E6680A system chassis supports eight RFIO ports. For more information on the ports and their rules of usage, see [“Port Configuration” on page 64](#).

Figure 2-2 E6680A RF Interface



Options and Licenses

Hardware Options

Designation	Description
E6680A	Wireless Test Set
E6680A-001	One TRX Module (M9414A), designated TRX1
E6680A-002, E6680A-003, E6680A-004	Up to three additional TRX Modules (M9414A), designated TRX2, TRX3, and TRX4
E6680A-B2X	200 MHz Bandwidth (for a specified TRX module)
E6680A-B4X	400 MHz Bandwidth (for a specified TRX module)
E6680A-B8X	800 MHz Bandwidth (for a specified TRX module)
E6680A-M44	True MIMO, up to 4x4, in one chassis
E6680A-MTS	Synchronization (with another chassis) to support 6x6 or 8x8 MIMO.
E6680A-250 E6680A-251 E6680A-252	Waveform License (50 pack) 1 to 3 (always included in E6680A)
E6680A-BTS	Downlink Measurement Capability
E6680A-MSS	Uplink Measurement Capability (always included in E6680A)

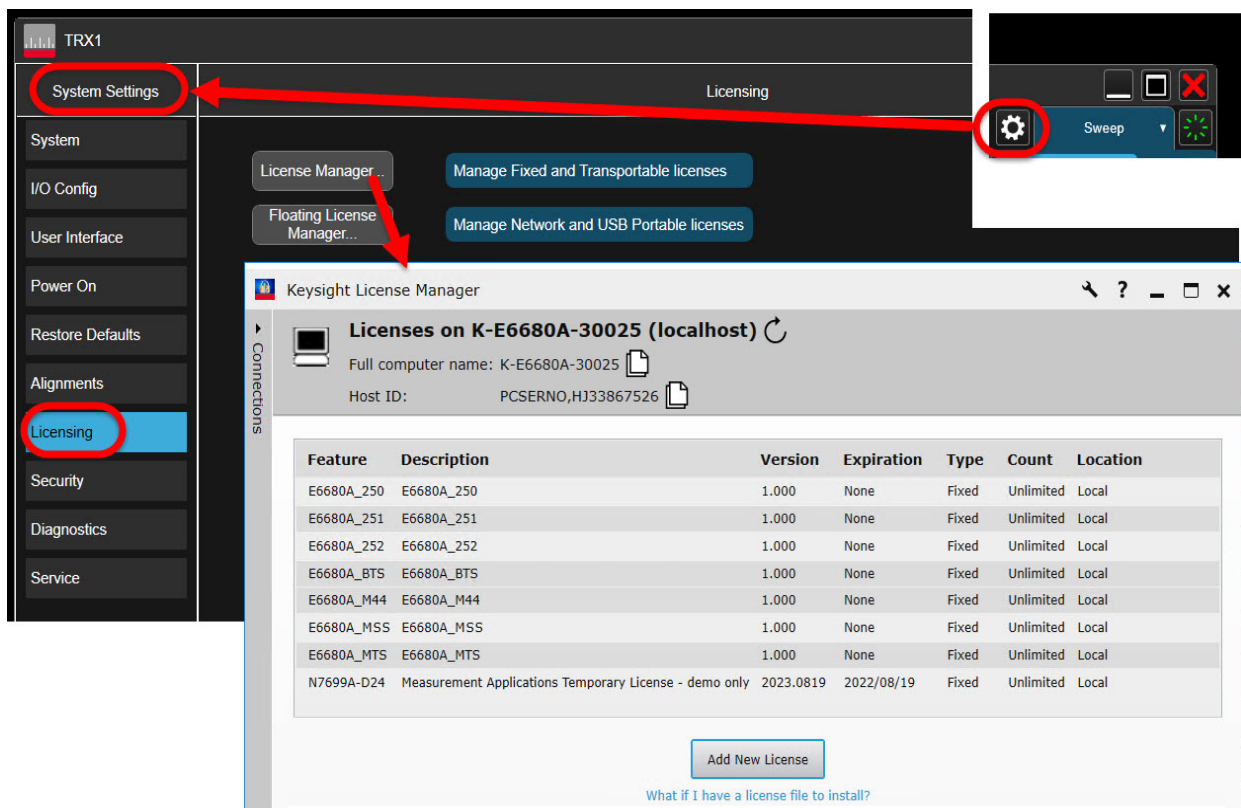
Hardware Upgrades

Designation	Description
E6680AU-TRX	Add a TRX module (M9414A) to the chassis.
E6680AU-B2X	200 MHz bandwidth on TRX added by E6680AU-TRX above.
E6680AU-B4X	400 MHz bandwidth on TRX added by E6680AU-TRX above.
E6680AU-B8X	800 MHz bandwidth on TRX added by E6680AU-TRX above.
E6680AU-BTS	Add Downlink Measurement Capability
E6680AU-BU1	Bandwidth upgrade from 200 MHz to 400 MHz on a specified TRX module.
E6680AU-BU2	Bandwidth upgrade from 200 MHz to 800 MHz on a specified TRX module.
E6680AU-BU3	Bandwidth upgrade from 400 MHz to 800 MHz on a specified TRX module.
E6680AU-M44	Add true MIMO, up to 4x4, in one chassis.
E6680AU-MTS	Add synchronization (with another chassis) to support 6x6 or 8x8 MIMO.

Application Licenses

The licenses for various applications that are installed on the E6680A controller are listed in the Keysight License Manager, which can be launched by opening the **System Settings** window (click on the gear-shaped icon near the upper right of the display) and selecting **Licensing > License Manager**, as illustrated below:

Figure 2-3 Keysight License Manager



The licenses available are described in the table below.

NOTE

Licenses in this table which begin with a "Y" support both measurement and waveform generation; licenses beginning with a "V" support measurement only.

Designation	Description
V9060EM0E	Test set measurement (always included in E6680A)
V9065EM1E	Sequence analyzer uplink applications (always included in E6680A)
V9065EM0E	Sequence analyzer downlink applications
V9080EM0E	LTE/LTE-A FDD measurement
V9082EM0E	LTE/LTE-A TDD measurement

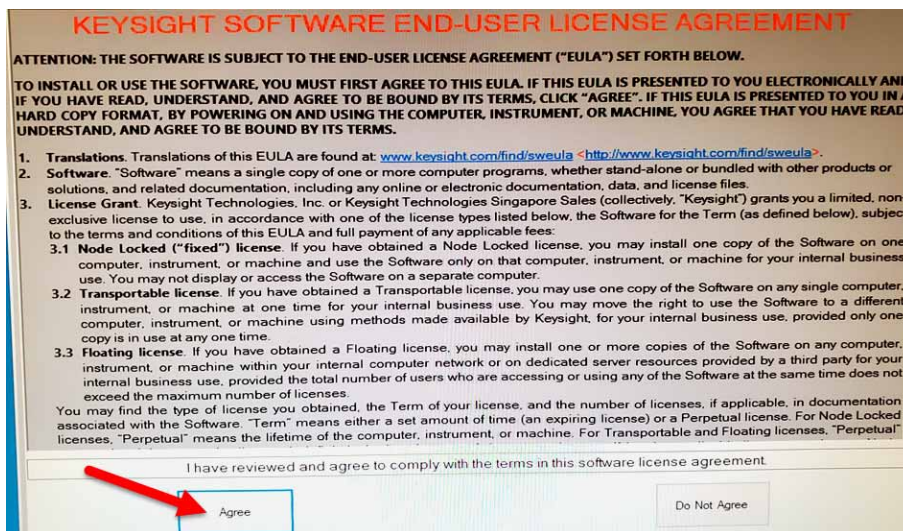
Quick Start
Options and Licenses

Designation	Description
V9085EM0E	5G NR measurement
V9085EM1E	PAvT (requires additional 5G NR license, V9085EM0E or Y9085EM0E)
Y9077EM0E	802.11a/b/g/j/n/p/af/ah waveform and measurement
Y9077EM1E	802.11ac/ax waveform and measurement
V9077EM2E	802.11be measurement
Y9077EM2E	802.11be waveform and measurement
Y9080EM0E	LTE/LTE-A FDD waveform and measurement
Y9081EM0E	Bluetooth™ waveform and measurement
Y9082EM0E	LTE/LTE-A TDD waveform and measurement
Y9085EM0E	5G NR non-signaling waveform and measurement
Planned Future Applications:	
V9071EM0E	GSM/EDGE/Evo measurement
V9073EM0E	W-CDMA/HSPA+ measurement
V9080EM3E	NB-IoT/eMTC measurement
Y9080EM4E	V2X waveform and measurement
Y9084EM0E	Short range communications waveform and measurement (for Zigbee)

First-time Use

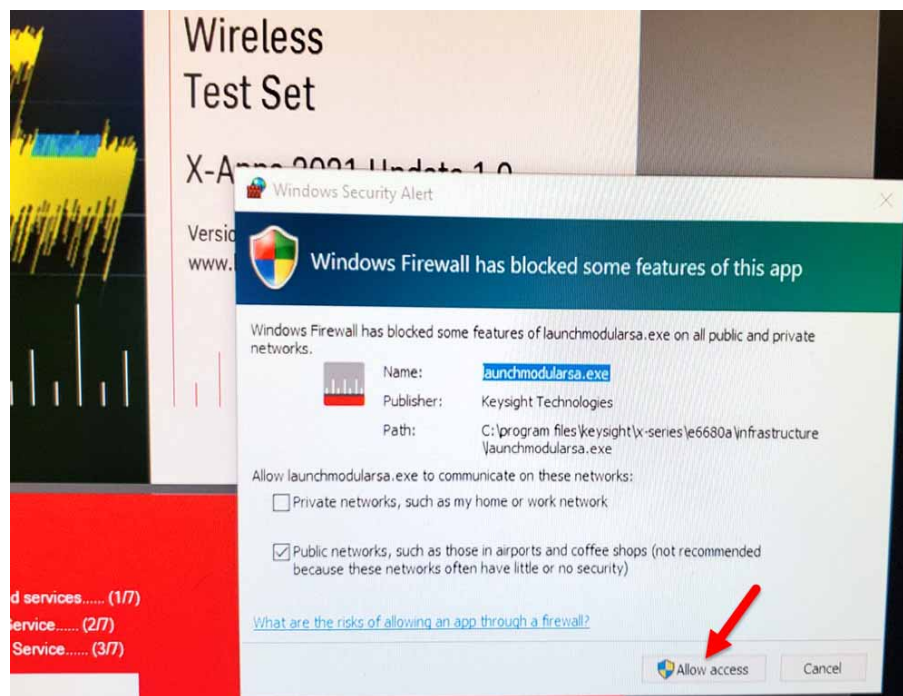
The first time you boot up the E6680A test set, you will be asked to approve the End User License Agreement by selecting **Agree**.

Figure 2-4 EULA window



You will also need to dismiss a Windows Security Alert by selecting **Allow Access** to permit the `launchmodularsa.exe` file to run within the Windows firewall.

Figure 2-5 Windows security alert



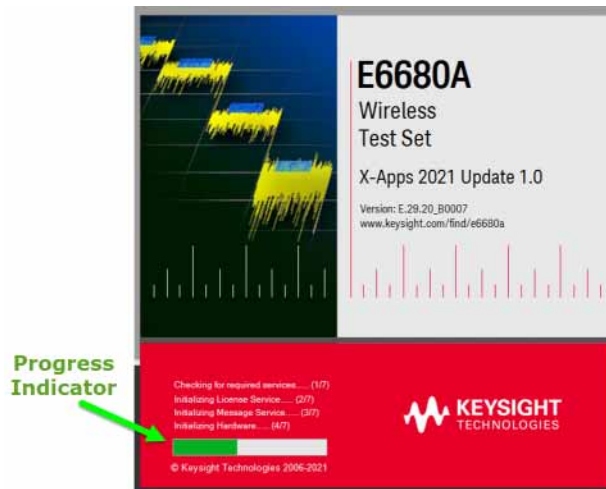
Load Time (initial usage only)

The first time the E6680A is run, the process of loading and running the measurement application involves a lengthy delay (typically between 60 and 80 minutes), while instrument data is loaded into working memory. During this delay the progress indicator on the screen will not appear to advance. (On subsequent occasions, the measurement application takes about one minute to load.)

NOTE

Do not interrupt the loading process during the delay.

Figure 2-6 Display screen shown while application is loading



Quick Start
First-time Use

3 Exterior Features

The following topics can be found in this section:

“Front Panel Features” on page 30

“Rear Panel Features” on page 35

“Labels and Symbols” on page 36

Front Panel Features

The photo below shows the front panel of the E6680A.

Figure 3-1 E6680A front panel



These sections of the front panel are described separately, as follows:

1. See “Controller interface” on page 31.
2. See “TRX connectors” on page 32.
3. See “Reference” on page 33.
4. See “System status” on page 34.

Controller interface

Figure 3-2 Controller interface



Connector/Indicator	Description
(1) Monitor Port	This connector supports a connection to a monitor with a DisplayPort input.
(2) Drive/Power/User	<ul style="list-style-type: none"> –DRIVE: When the Solid State Drive is active, the LED will flash. –POWER: If the LED is on, the power supply to the controller is good and the system should boot. –USER: Not used.
(3) Trig	This BNC trigger connector is not used by the E6680A.
(4) LAN1 & LAN2	Two TCP/IP Interface connectors that are used for remote test set operation. Choose the LAN 1 port to have an IP address assigned to the test set dynamically, using DHCP. If your local network does not support DHCP, choose the LAN 2 port to use a private static IP address. (“Port Configuration” on page 64)
(5) USB 3.0 (SS)	Two USB 3.0 interface ports are provided.
(6) USB 2.0	Four USB 2.0 interface ports are provided.

TRX connectors

Figure 3-3 TRX connectors



Connector	Description
(1) thru (8) RFIO 1 thru RFIO 8	Each of these Type N connectors can be configured as a half-duplex RF port (input or output), or as full-duplex port (input and output).
(9) Trig 1 & Trig 2	These BNC connectors are for triggers (configurable as input or output triggers). They can be set up as source triggers or receiver triggers.
(10) TRXn Status	This LED indicates the status of the TRX module. The LED lights green when the measurement application software is loaded for the TRX. The light turns red if the TRX develops an error condition which it is unable to correct.

CAUTION

For RFIO 1 through RFIO 8, the maximum input power is +30 dBm, 0 VDC. Excessive input RF power could cause damage.

Reference

Figure 3-4 System interfaces



Connector/Indicator	Description
(1) Ref Status	This LED indicates the status of the frequency reference. –Green: frequency reference is operating normally. –Red: frequency reference is unlocked. –Off: frequency reference has lost power or lost connection to the controller.
(2) 10 MHz Out	This BNC connector provides a 10 MHz output reference signal.
(3) Ref In	This BNC connector accepts a 10 MHz input reference signal.

NOTE

The reference is used in common by all TRX modules installed in the test set. See **“Frequency Reference Setup” on page 63** for additional information.

System status

Figure 3-5 System status



Indicator/Control	Description
(1) Temp	This amber LED is off when chassis temperature is in the normal operating range. The LED flashes to indicate the chassis is overheated. (It is never on continuously.)
(2) Fan	This green LED is off when the chassis is turned off. It is on continuously when the fans are running normally. The LED flashes whenever a fan is stopped or running too slowly.
(3) Power	This blue LED is off when the chassis is turned off. It is on continuously when all supply voltages are normal. The LED flashes whenever a supply voltage is outside its normal range.
(5) On/Standby Pushbutton	This pushbutton is used to turn chassis power on and off.

Rear Panel Features














Figure 3-6 E6680A rear panel













Number	Item Name	Description
1	Line power input	The AC power connection. See the product specifications for more details.
2	POWER SYNCH IN/OUT	These multi-pin connectors are reserved for future use.
3	FAN	Fan speed control (settings are HIGH and AUTO).
4	INHIBIT	Inhibit switch. The settings are DEF (default) and MAN (manual). –When the switch is in the default position, the chassis is powered up by the front panel ON/Standby pushbutton. This is the recommended setting. –When the switch is in the manual position, the chassis is powered up by the Inhibit input signal on the rear panel INHIBIT/VOLTAGE MON DB-9 connector.
5	INHIBIT/VOLTAGE MON	This DB-9 connector provides access for testing of internal power supply voltages. The voltages (by Pin #) are: (1) Logic Gnd, (2) +5 VDC, (3) Rsvrd, (4) +3.3 VDC, (5) Inhibit [Low], (6) +12 VDC, (7) Rsvrd, (8) -12 VDC, (9) Logic Gnd.
6	10 MHz REF OUT	This BNC connector is not used by the E6680A. The front panel 10 MHz OUT connector should be used instead.
7	10 MHz REF IN	This BNC connector is not used by the E6680A. The front panel REF IN connector should be used instead.

Labels and Symbols

Labels and symbols which may be shown on the E6680E (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.
	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.

Exterior Features
Labels and Symbols

Symbol	Description
	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.
CAN ICES/NMB-001(A)	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).
ISM 1-A	This is a symbol of an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 5).
	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.

Exterior Features
Labels and Symbols

4 User Interface

This is a basic introduction to the E6680A's user interface.

The following topics can be found in this section:

[Activating TRXs and Launching Applications on page 40](#)

[Screen Interface on page 44](#)

[Command Interface on page 57](#)

Activating TRXs and Launching Applications

(See “**First-time Use**” on page 26.)

Two desktop icons provide access to utilities which support the E6680A’s measurement applications. The Launch Modular TRX icon is used to determine which TRXs are activated. The Configure Applications icon is used to determine which measurement applications run by default when a TRX is activated.

Figure 4-1

Desktop icons



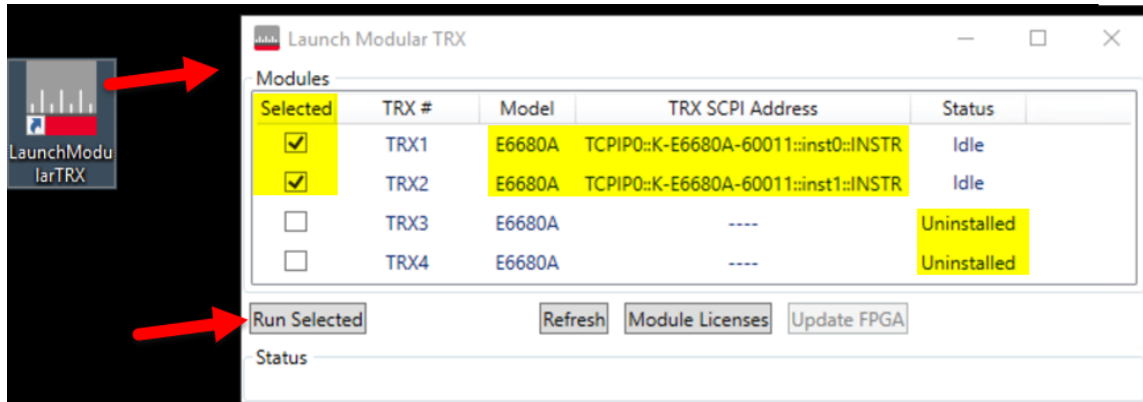
Launch Modular TRX

This tool shows which of the four possible TRXs are installed in the PXIe rack, and identifies them by SCPI address. At a minimum, TRX1 must be installed, and cannot be disabled using this tool. However, the other TRXs, if installed, can be selected or deselected using the checkboxes in the left column. When the desired TRXs are selected in the checkboxes, click **Run Selected** to activate them. Normally you will select all TRXs which are installed.

NOTE

It is usually not necessary to select the **Launch Modular TRX** icon, because the E6680A activates the TRXs at startup, and launches the measurement application for each TRX that is present. The icon is typically used to make a change to the existing setup of TRX modules (for example, to deactivate or reactivate one of the TRXs).

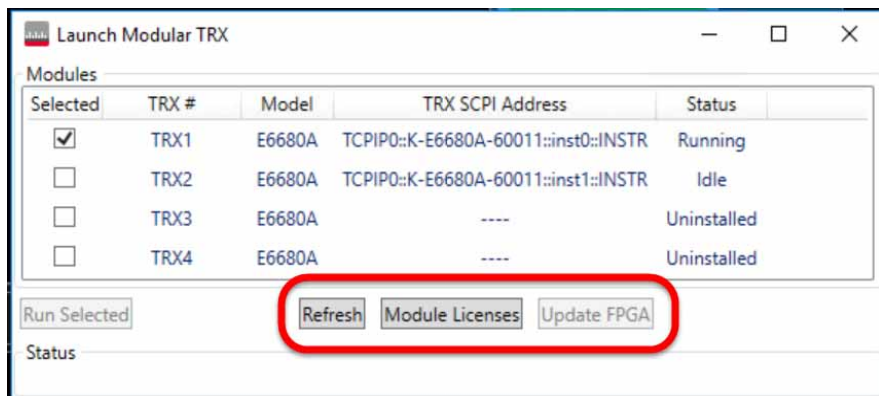
Figure 4-2 Modular TRX tool: select TRXs



If the table in the window above does not list all of the TRX modules installed in the system, click **Refresh** to force a new hardware scan. To check the status of licensed features for each TRX, click **Module Licenses**.

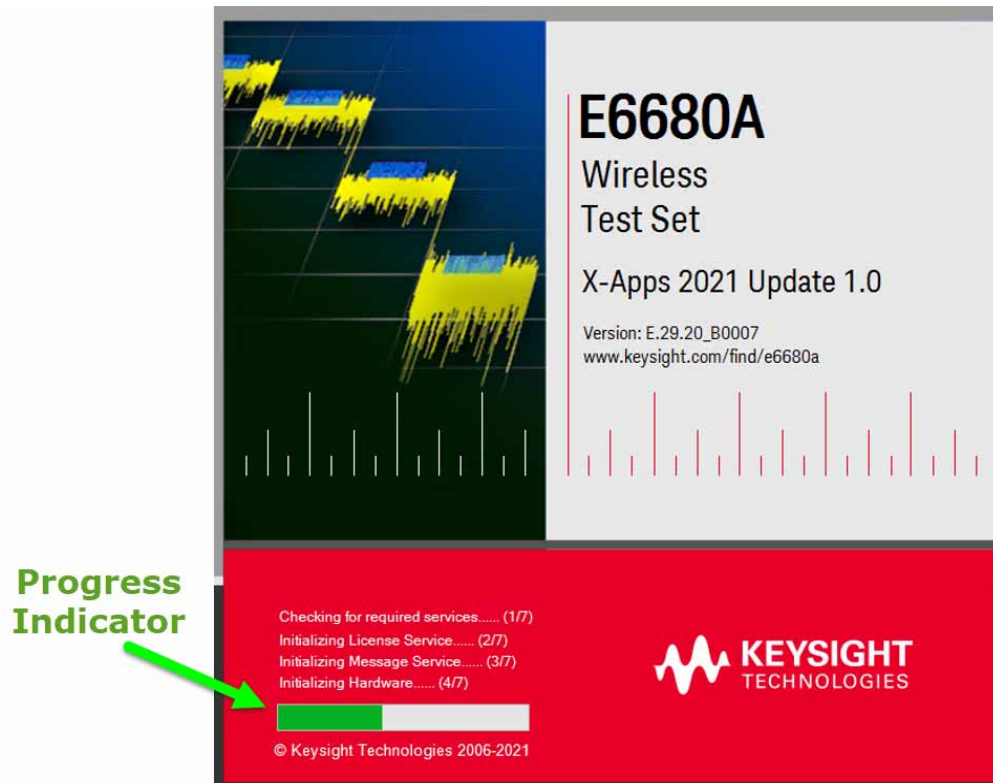
The **Update FPGA** button is used when installing a new TRX into an E6680A which was purchased without it, to ensure software compatibility.

Figure 4-3 Modular TRX tool: other features



This screen is displayed while the software is loading:

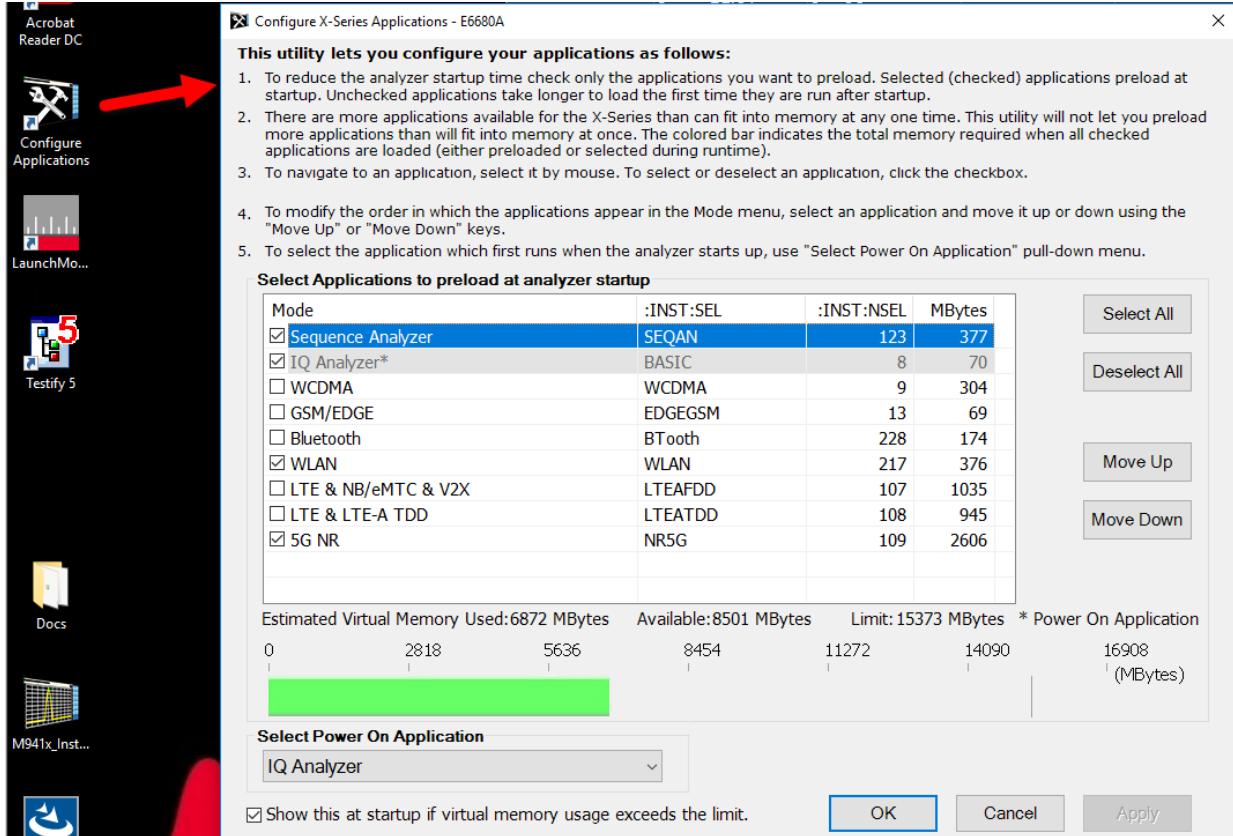
Figure 4-4 Application greeting screen



Configure X-Series Applications

Click the Configure X-Series Applications icon to launch this utility, which allows you to specify which of the E6680A's measurement applications will be preloaded into memory at startup. Preloading the most frequently-used applications is a convenience (however, selecting fewer of them for preload shortens the startup time and uses less memory).

Figure 4-5 Configure X-Series applications



A selector at the lower left of the window allows you specify which application will be running when the E6680A starts up.

Screen Interface

The overall appearance of the display interface is illustrated below. Different parts of it are discussed in more detail in the following sections.

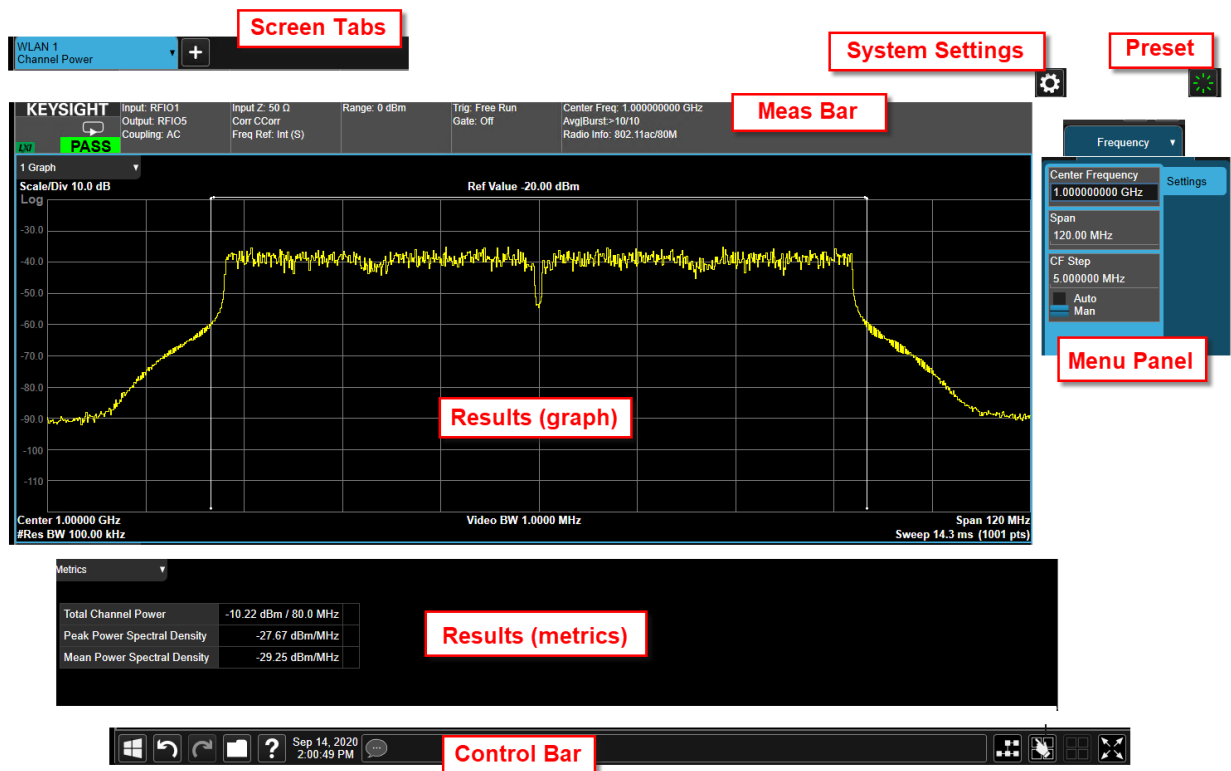
Figure 4-6 Application display interface (with results window for Channel Power)



User Interface
Screen Interface

Elements of the interface are discussed in more detail in the following sections.

Figure 4-7 Elements of the display interface



Screen Tabs

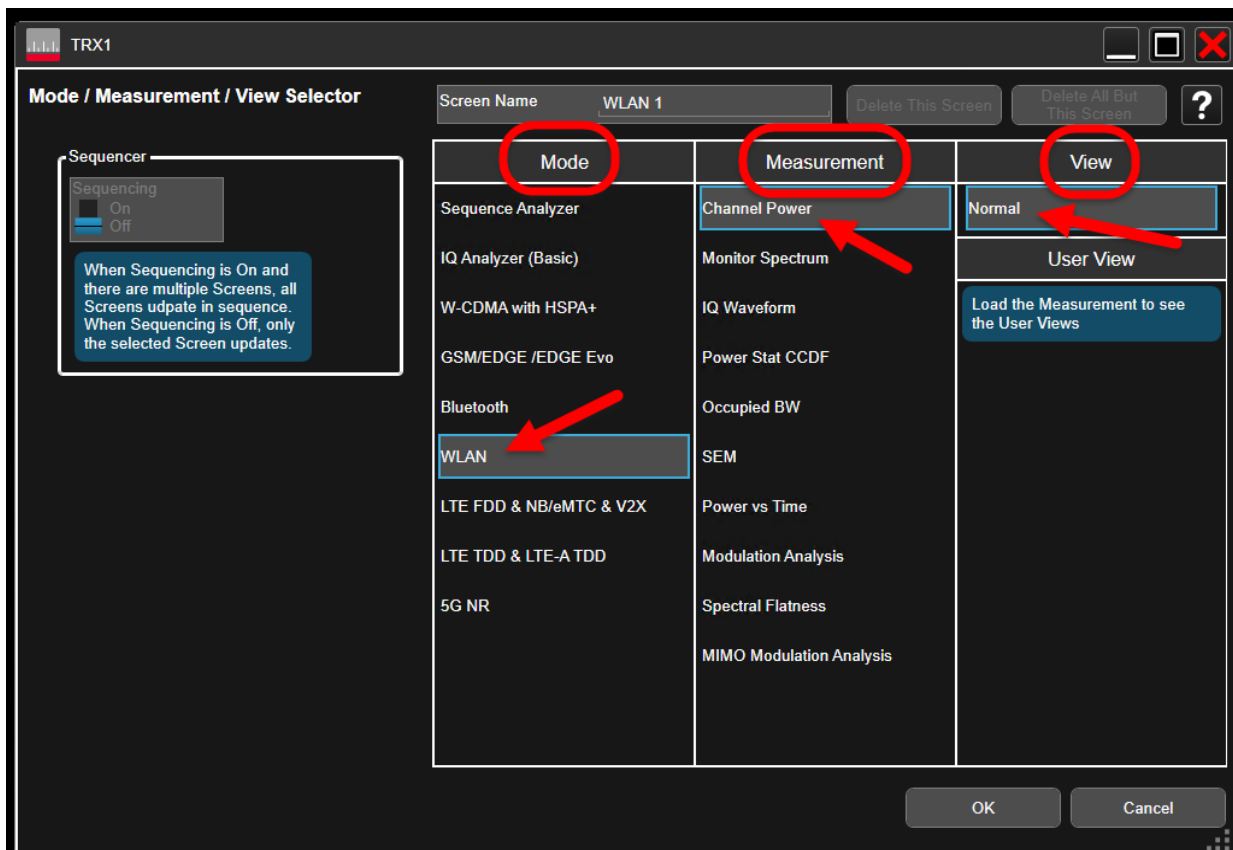
These are used to select a measurement screen for viewing and configuration (to add another screen, click the + button at the right of the existing tabs).

Figure 4-8 Screen tabs



Clicking on the currently selected tab brings up the **Mode/Meas/View** dialog, to change settings for that screen.

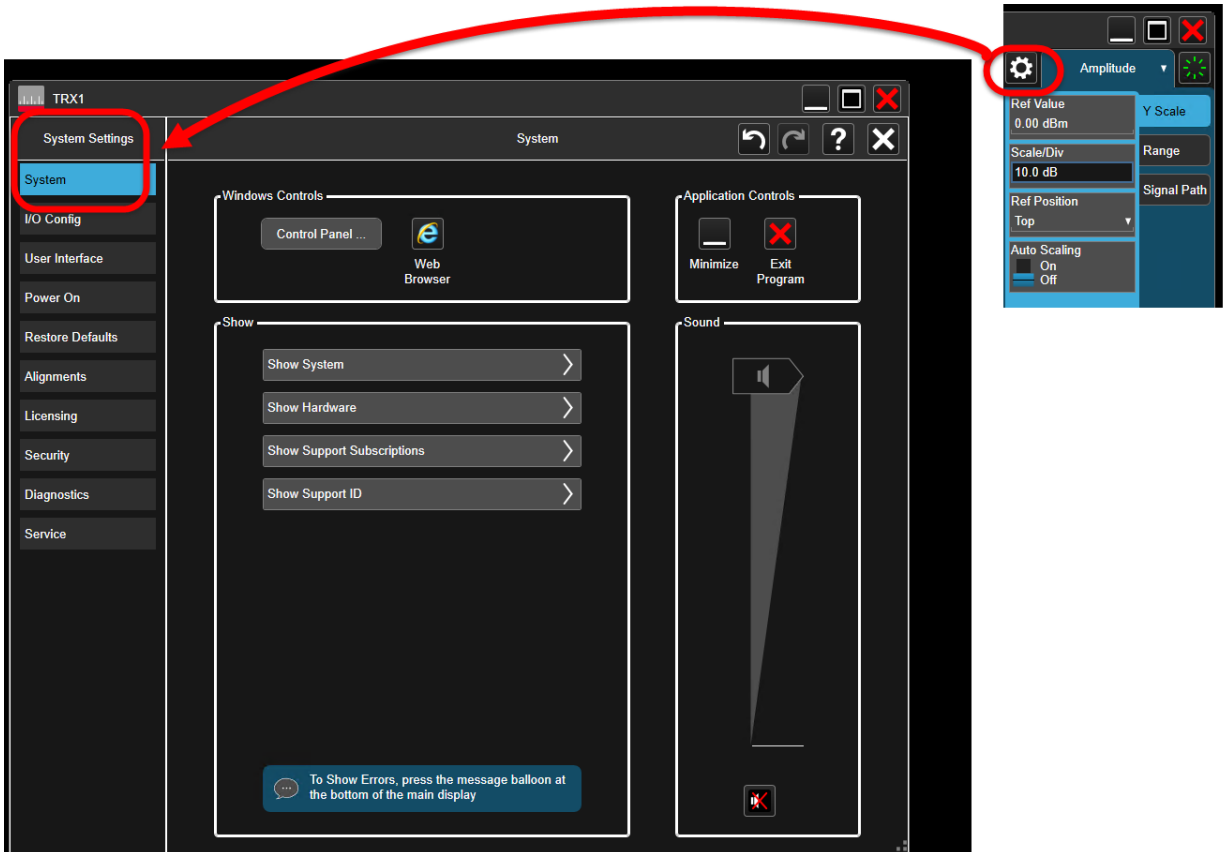
Figure 4-9 Mode/Meas/View dialog



System Settings

Clicking the "gear" icon opens the System Settings dialog, which allows you to access various information screens and settings interfaces. The tabs on the left side let you access various configuration screens.

Figure 4-10 System Settings



The System Settings screens include:

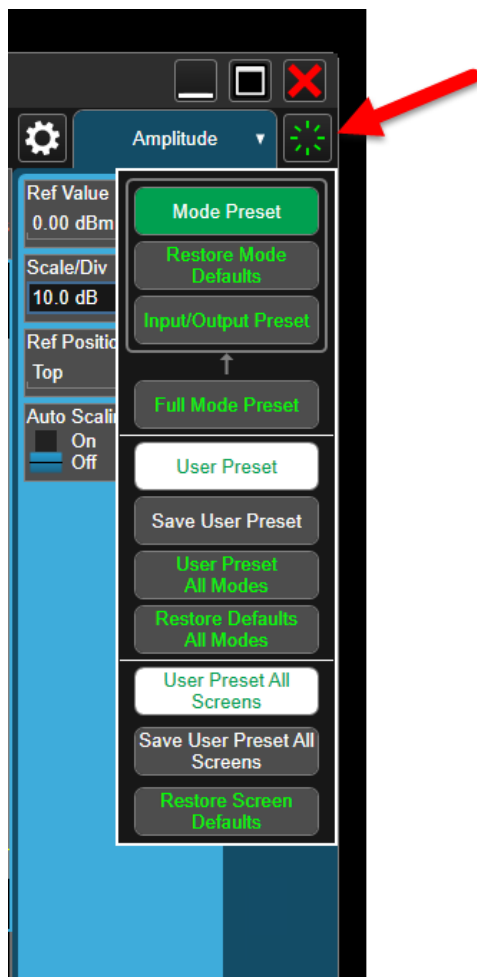
- System
- I/O Config
- User Interface
- Power On
- Restore Defaults
- Alignments
- Licensing
- Security
- Diagnostics
- Service

Preset

Clicking this icon opens a menu which provides access to the various ways in which settings can be restored to a default condition or a condition you defined earlier.

Figure 4-11

Preset

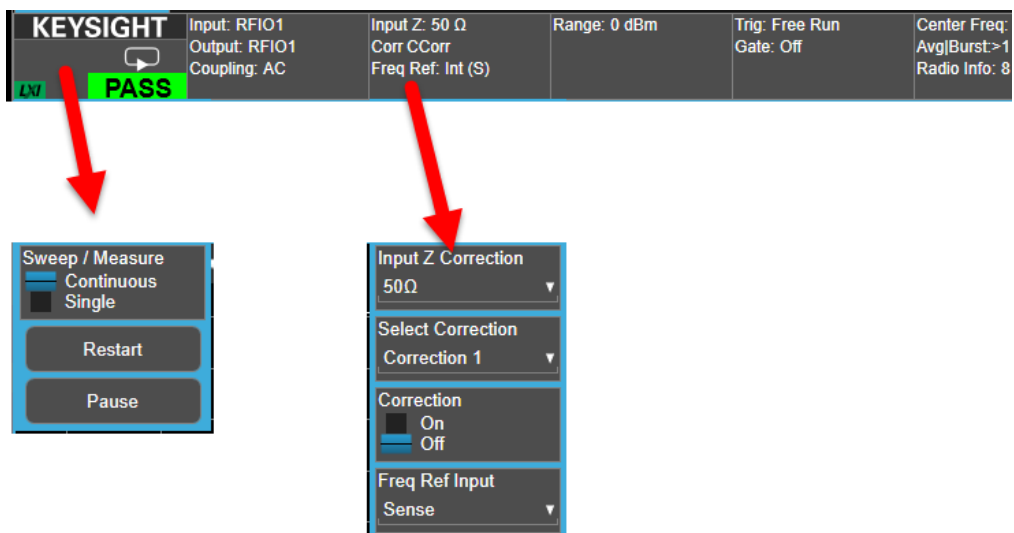


Meas Bar

This bar displays important settings for the measurement, in a series of annotation panels which can be clicked on to reveal menu choices for them. The panel at the far left, for example, allows you to toggle between continuous and single measurement modes, and also to restart or pause a measurement.

Figure 4-12

Meas Bar



Menu Panel

Clicking on the name at the top of the menu offers the available menus (**Amplitude**, **BW**, and so on) for selection. The selected menu is usually divided into separate sub-menus, any of which can be selected by clicking on the tabs to the right (for example, the tabs on the right of the **Amplitude** menu represent the **Y Scale** and **Range** sub-menus). Which items are included on a menu depend on which measurement is currently active, and sometimes on how other settings have been configured.

Figure 4-13

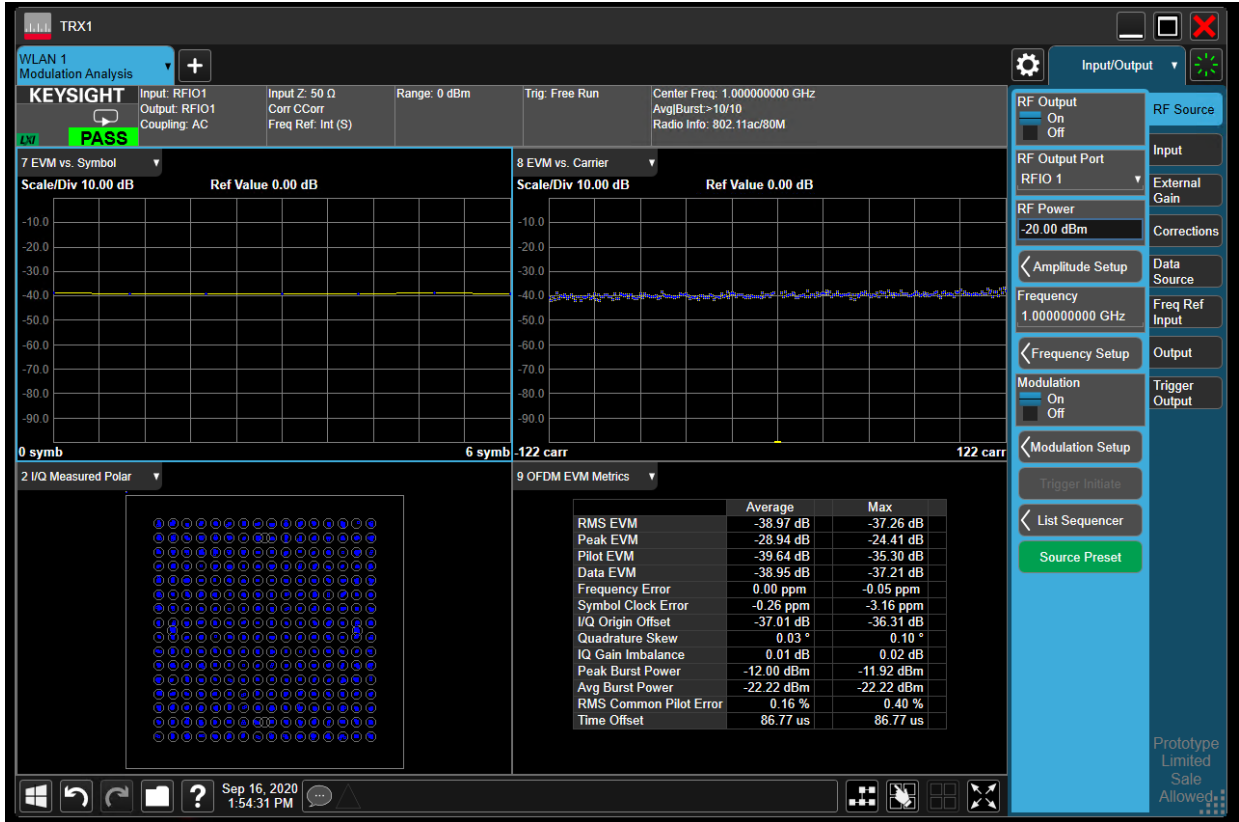
Menus (and sub-menus)



Measurement Display

The interface is centered around the display windows, which show the results of a measurement. The number of windows and the type of information displayed in them varies from measurement to measurement. For example, the Modulation Analysis measurement example below shows a constellation diagram, two graphical displays, and a table of numerical data.

Figure 4-14 Measurement Display for Modulation Analysis



User Interface
Screen Interface

The Power vs. Time measurement below is simpler, showing only one graph (for RF Envelope) and one table of numerical data.

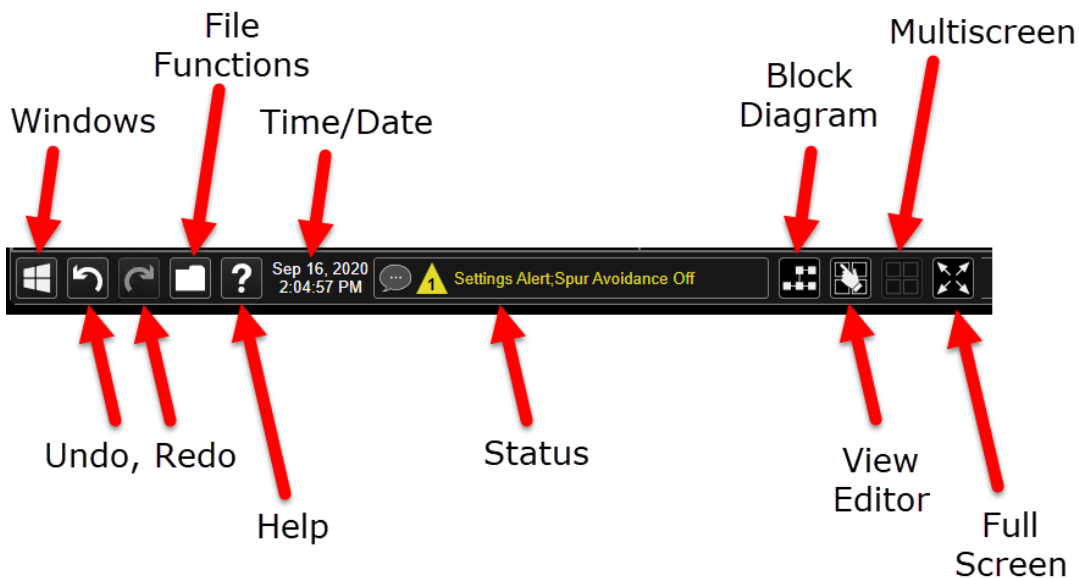
Figure 4-15 Measurement Display for Power vs. Time



Control Bar

This provides controls and information displays related to various instrument functions that are independent of the current measurement.

Figure 4-16 Control Bar

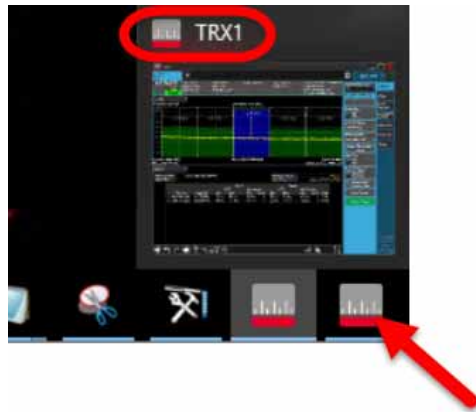


Minimized windows

Minimized windows can be brought back up by finding the icon representing them in the Windows taskbar. Although the graphics for any two TRXs will look alike (as in the illustration below), hovering the mouse over one of them will display its TRX number and a small graphic representation of its measurement screen.

Figure 4-17

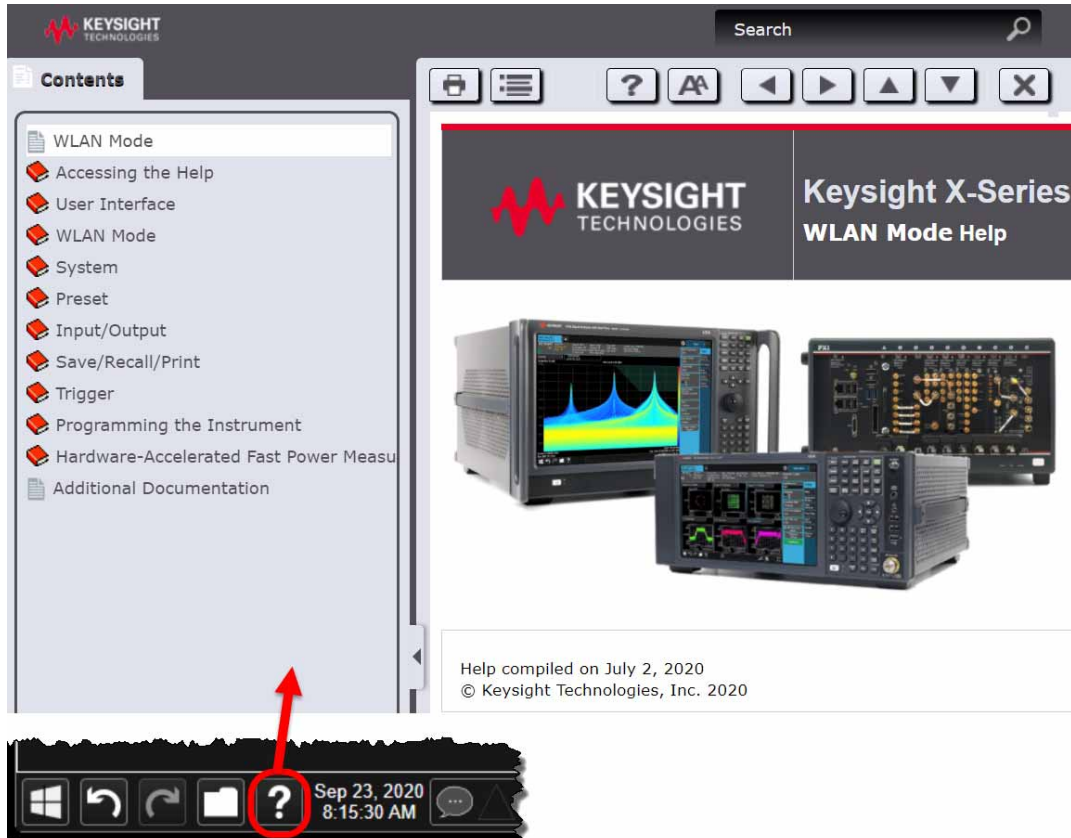
Reopening minimized windows



Help System

Detailed information about all features of the test software is available from the help system. To open the help content for the mode currently running, click the question-mark icon at the bottom of the screen. Because menus and features differ between (for example) the WLAN mode and the 5G NR mode, separate help systems for these modes are installed on the system.

Figure 4-18 Opening the help content



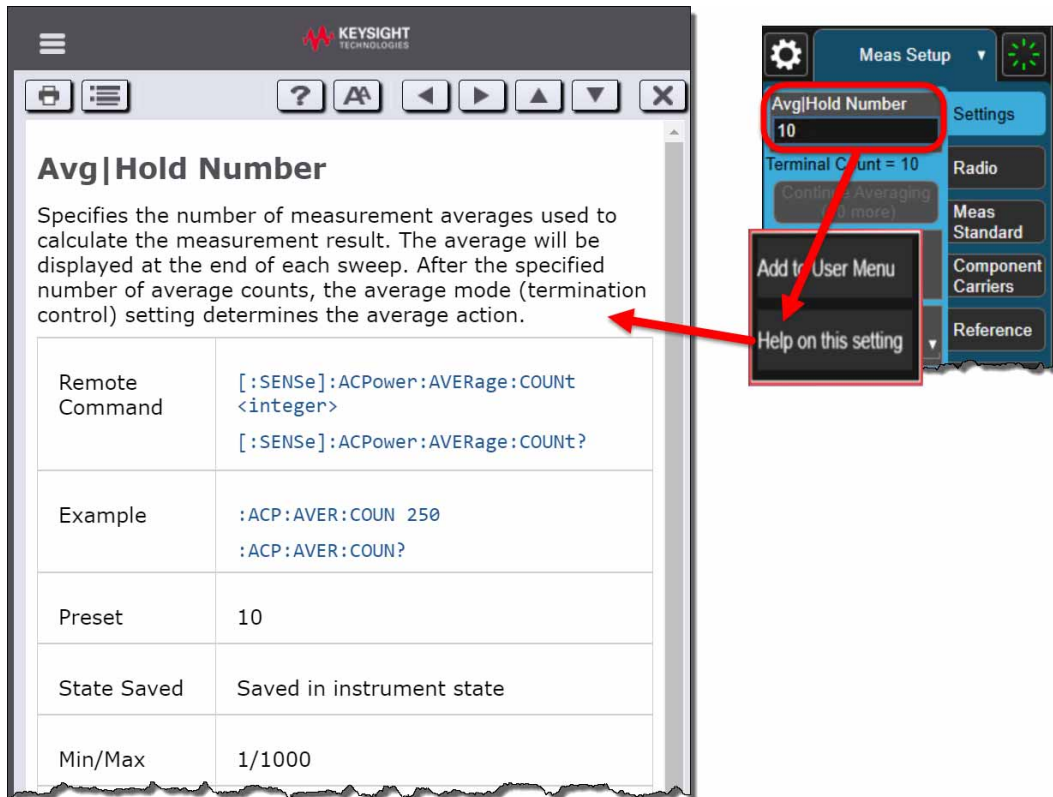
Within the help system, information can be found either by using the **Search** window at the upper right or by navigating the **Contents** tab at the left.

However, when you are looking for information specific to a menu selection or other feature of the user interface, it is easier to find it by using the context-sensitive help system described on the following page.

Context-sensitive help

To access information about a particular feature of the user interface, right-click on that feature; a popup menu appears which shows **Help on this setting** as a selection. This selection opens the help content to a page which is specific to that feature. For example, the help page for **Avg|Hold Number** in the **Meas Setup > Settings** menu explains the feature, provides the syntax for the equivalent SCPI commands (in complete and abbreviated forms), and specifies the default value (**Preset**) and range (**Min/Max**) of the possible settings.

Figure 4-19 Accessing help for a particular feature



Command Interface

In addition to being controlled and monitored by way of the screen interface, the instrument can be controlled and monitored by means of SCPI commands. For example, averaging can be disabled for the ACP measurement screen by changing the **Averaging** setting to **On** in the **Meas Setup > Settings** menu. The same thing can be done by sending the command `[[:SENSe]:ACPower:AVERage:[STATe] OFF`

Figure 4-20 Screen interface setting vs. SCPI command



In the SCPI command syntax, variables are indicated by angled brackets; for example, a parameter specifying an amplitude in dBm might be represented in the command syntax by the variable `<amp1>`, but in an actual command this variable be replaced by an actual value, such as `-10`.

Where a command parameter must be one of a limited set of choices, the alternatives are listed, with vertical lines separating the choices: `OFF|ON|0|1`.

The SCPI syntax allows for certain elements of a command to be omitted for brevity. Where a command name is given in a mixture of upper-case and lower-case letters, the lower-case letters are optional (for example, **AVERage** can be shortened to **AVER**). Also, any element that is enclosed in brackets is optional (however, if you do include the optional element, omit the brackets).

This command:

```
[[:SENSe]:ACPower:AVERage:[STATe] OFF
```

can be sent in its long format:

```
:SENSe:ACPower:AVERage:STATe OFF
```

Or it can be shortened by omitting lower-case characters:

```
:SENS:ACP:AVER:STAT OFF
```

Or it can be shortened further by omitting the bracketed elements:

```
ACP:AVER OFF
```

User Interface
Command Interface

To take another example, the command which sets the measurement center frequency has the following syntax:

```
[ :SENSe ]:FREQuency:CENTer <freq>
```

This command can be sent in its long form:

```
:SENSe:FREQuency:CENTer 16 GHz
```

However, it can also be shortened to:

```
:FREQ:CENT 16 GHz
```

NOTE

There is not always a command equivalent for a function of the screen interface (some functions which relate only to the display do not need a command). Also, there is not always a screen interface equivalent for a command (some commands perform functions which aren't available from the screen interface).

Detailed information about the SCPI commands and how they are used is provided in the help file for the measurement application you are running.

5 OperatingTasks: System-Level Tasks

The following topics can be found in this section:

[“TRX Selection” on page 60](#)

[“Frequency Reference Setup” on page 63](#)

[“Port Configuration” on page 64](#)

[“MIMO Setup” on page 75](#)

[“Alignments” on page 88](#)

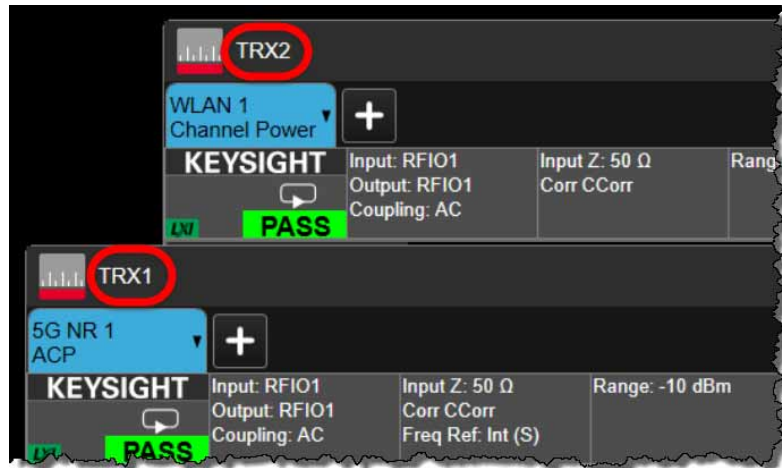
[“LAN Address Configuration” on page 92](#)

[“Managing Licenses” on page 94](#)

TRX Selection

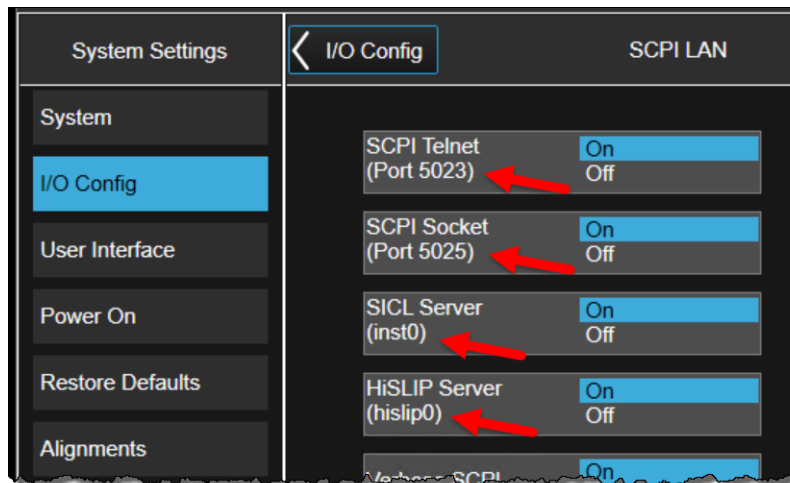
On the monitor or remote desktop view of the test set, each TRX is represented by a separate XSA window. You can identify which TRX a window controls by looking for the identifier (TRX1 through TRX4 for a fully loaded system) at the top left corner of the window. (The TRXs are placed in numerical order in the PXIe chassis, beginning with TRX1 on the left.)

Figure 5-1 Identifying application windows for different TRXs



Although the test set as a whole is assigned only one IP address for the entire PXIe chassis, the individual TRXs within the chassis can be differentiated in network communication with the test set. The means of identifying a TRX depends upon the connection method, as outlined below. (You can also verify the connections for any TRX from the **System Settings > I/O Config** menu.)

Figure 5-2 SCPI LAN on I/O Config Menu



Using HiSLIP

NOTE

HiSLIP (High-Speed LAN Instrument Protocol) is the recommended interface for connection to the E6680A, because of its superior performance characteristics.

Use hislip0 through hislip3:

- **TRX1:**
TCPIP0::::hislip0::INSTR
- **TRX2:**
TCPIP0::::hislip1::INSTR
- **TRX3:**
TCPIP0::::hislip2::INSTR
- **TRX4:**
TCPIP0::::hislip3::INSTR

Using Socket Ports

Use sockets 5025, 5125, 5225, and 5325:

- **TRX1:**
5025
- **TRX2:**
5125
- **TRX3:**
5225
- **TRX4:**
5325

Using VXI-11/SICL

Use inst0 through inst3:

- **TRX1:**
TCPIP0::::inst0::INSTR
- **TRX2:**
TCPIP0::::inst1::INSTR
- **TRX3:**
TCPIP0::::inst2::INSTR
- **TRX4:**
TCPIP0::::inst3::INSTR

Using Telnet Connection

Use telnet ports 5023, 5123, 5223, 5323:

- **TRX1 :**
5023
- **TRX2 :**
5123
- **TRX3 :**
5223
- **TRX4 :**
5323

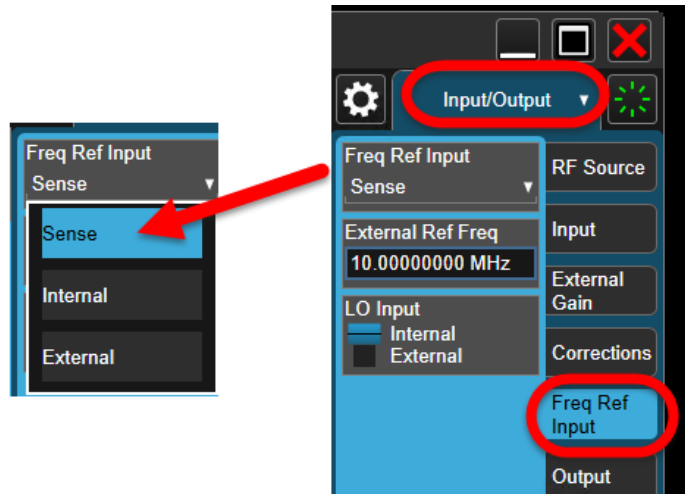
Frequency Reference Setup

The frequency reference for the test set as a whole (see “Reference” on page 33) is used by all TRX modules, but settings affecting it are made only to TRX1.

In the TRX1 application window, select **Input/Output** > **Freq Ref Input** to select the **Freq Ref Input** mode (**Sense**, **Internal**, or **External**).

Figure 5-3

Freq Ref Input menu (TRX 1)



By default, the selected mode is **Sense**. In this mode, the test set will detect the presence of a suitable external reference input, and use it; otherwise it will use the test set’s internal reference. **Sense** is usually the preferred setting, because it allows the test set to function normally even if the reference input signal is lost.

If **Internal** is selected, the test set will use its own internal oscillator as a reference, even if an external reference input is present.

If **External** is selected, the test set will use the 10 MHz external reference input signal provided at the front panel **Ref In** connector.

NOTE To avoid creating an error condition, be sure that a 10 MHz reference signal is actually being delivered to the **Ref In** connector whenever **External** mode is selected (or else use **Sense** mode instead).

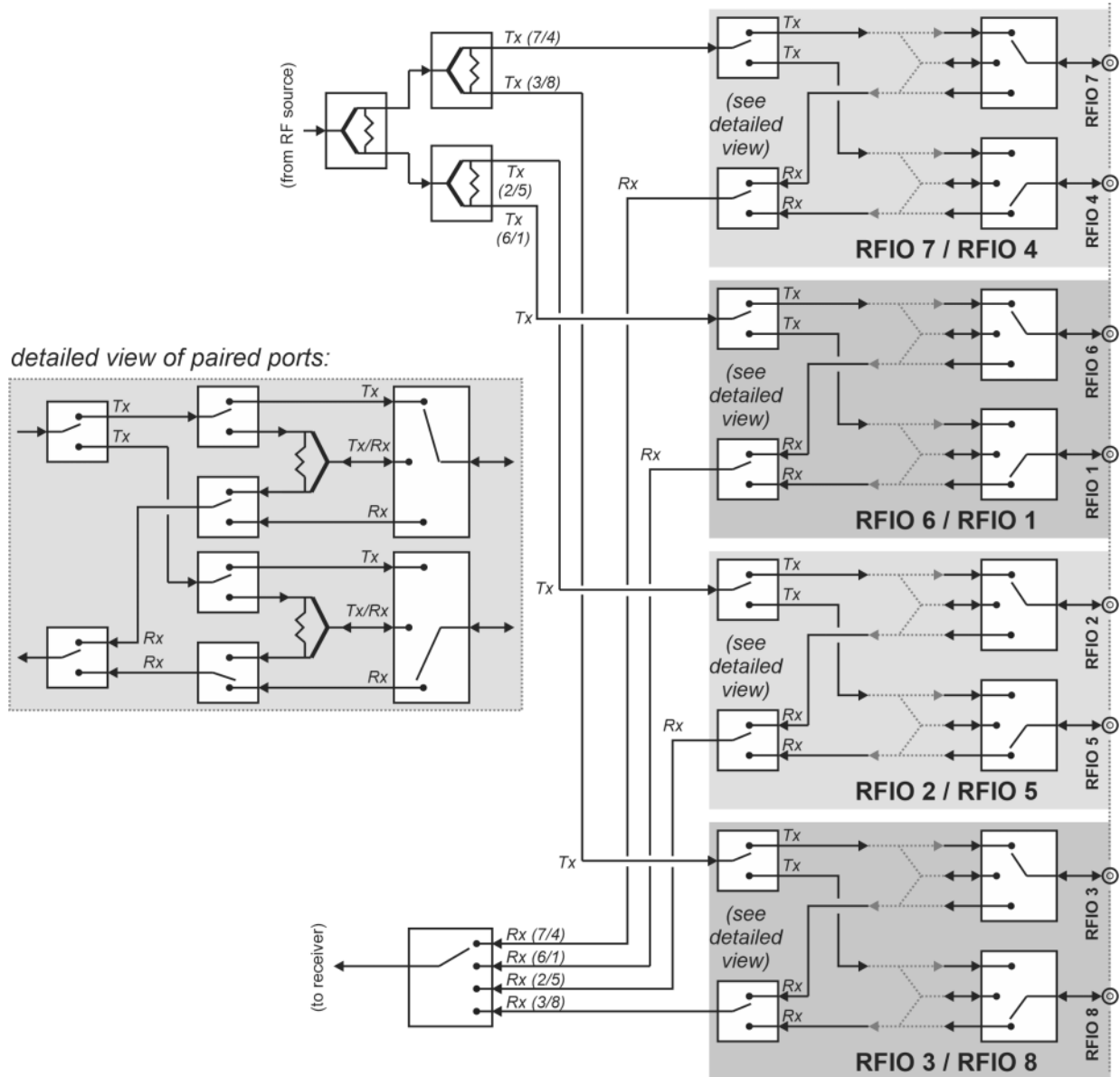
Although the user interface has an **External Ref Freq** setting, for this model the frequency of the reference input is fixed at 10 MHz, and cannot be set to a different frequency.

Port Configuration

Each TRX unit has its own analyzer and RF source; these communicate with a set of eight RFIO ports through the RF interface matrix illustrated below. Each RFIO port can be an input port (accepting a signal to be analyzed), as an output port (providing an RF stimulus), or as a full-duplex port (doing both).

For MIMO port configurations, see

Figure 5-4 TRX RF interface matrix



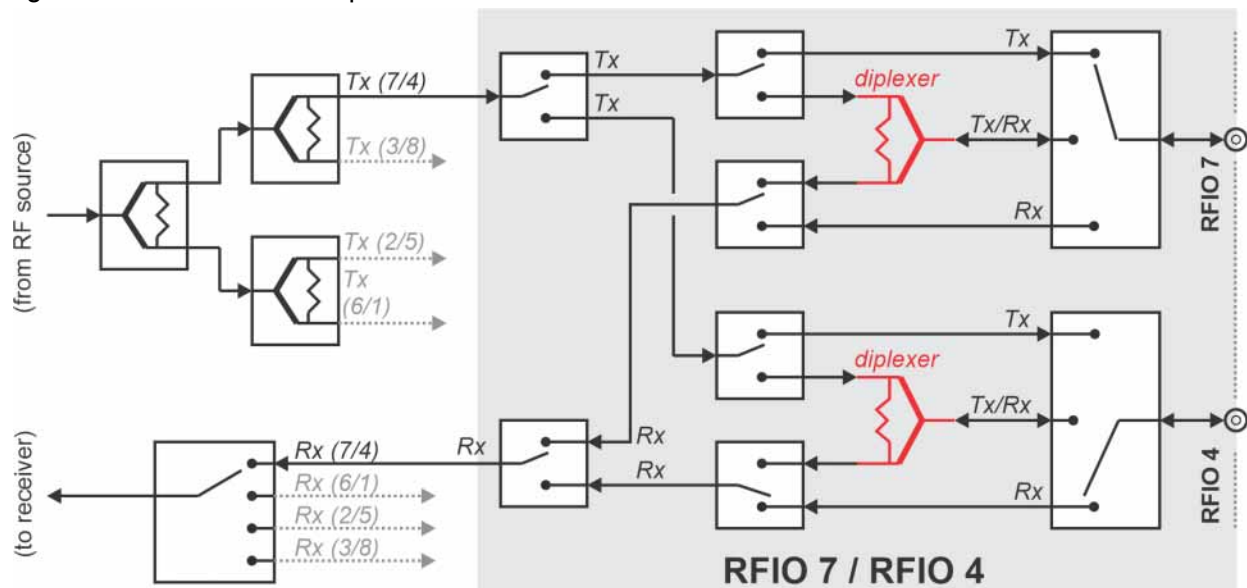
Port usage

Because the RF source sends signals to the ports through splitters, while the analyzer receives signals from the ports through a switch, the same signal can be sent simultaneously to as many as four ports, while only one port at a time can send back a signal to the analyzer.

The RFIO ports of each TRX consist of four pairs of ports which are functionally related because of the receiver-path switches they share. In the example below, the RF matrix for RFIO 4 and RFIO 7 is shown. An identical RF matrix is provided for the other three pairs: 6 and 1, 2 and 5, 3 and 8. Examples in the following pages show only 4 and 7, but the same could be done for the other three pairs in each case.

Figure 5-5

Paired ports (RFIO 4 and RFIO 7)



The pairing of ports in this way places some restrictions on how they are used; see [“Port combinations for paired ports” on page 66](#).

RF power in full duplex mode

Any port can be used in full duplex mode (Tx/Rx in the diagram above), by setting the same port as an input and an output. Because of the diplexer path used in full duplex mode (highlighted in red in the diagram), there is a power loss of about 5 dB, compared to half-duplex mode. For this reason, full duplex mode is only recommended in situations where it is acceptable to compromise on maximum RF output power (in transmit mode) and low-end sensitivity (in receive mode).

Port combinations for paired ports

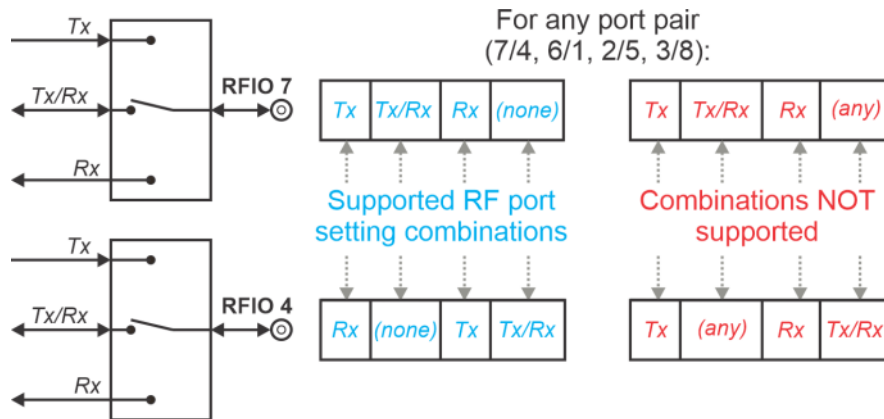
For any port pair (7/4, 6/1, 2/5, or 3/8), the following rules apply:

- If one port is used to transmit, the other can be used only to receive.
- If one port is used in full duplex mode (simultaneous transmit/receive), the other port is unavailable for use, because all the resources of the pair are assigned to the full duplex port.

The possible combinations of settings for a port pair are illustrated below.

Figure 5-6

Supported settings for paired ports



It is also possible to use one of these ports for Tx and a port from a different pair as Rx. For example, port RFIO 7 can be the output, and RF10 1 can be the input.

Setting input and output ports

To set the Tx (RF Output Port), go to the menu **Input/Output > RF Source** menu, and select the port from the **RF Output Port** dropdown list.

To set the Rx (RF Input Port), go to the menu **Input/Output > Input** menu, and select the port from the **RF Input Port** dropdown list.

These menus are illustrated below.

NOTE

When an unused port is set to NONE, this applies a ground termination to the port, to optimize port isolation.

Figure 5-7 Setting the output and input ports



SCPI commands for port setup

Input port command

The SCPI command for setting an input port is:

```
:FEED:RF:PORT:INP RFIO{n}
```

The value of *n* can be 1 through 8. For full duplex mode, set the same port as both input and output.

An unused port can be set to **NONE** instead of **RFIO{n}**.

Example: to set up RFIO 4 as the input port, send the command:

```
:FEED:RF:PORT:INP RFIO4
```

Output port command

The SCPI command for setting an output port is:

```
:FEED:RF:PORT:OUTP RFIO{n}
```

The value of *n* can be 1 through 8. For full duplex mode, set the same port as both input and output.

An unused port can be set to **NONE** instead of **RFIO{n}**.

Example: to set up RFIO 7 as the output port, send the command:

```
:FEED:RF:PORT:OUTP RFIO7
```

Broadcast command

The SCPI command for broadcast mode (see [“Configuration Examples \(Broadcast Mode\)” on page 73](#)) is:

```
:FEED:RF:PORT:OUTP:BR0adcast P12|P34|P1234|P56|P78|P5678|OFF
```

The "P" parameter specifies the port numbers included; for example, to set up ports 5, 6, 7, and 8 in broadcast mode, send the command:

```
:FEED:RF:PORT:OUTP:BR0 P5678
```

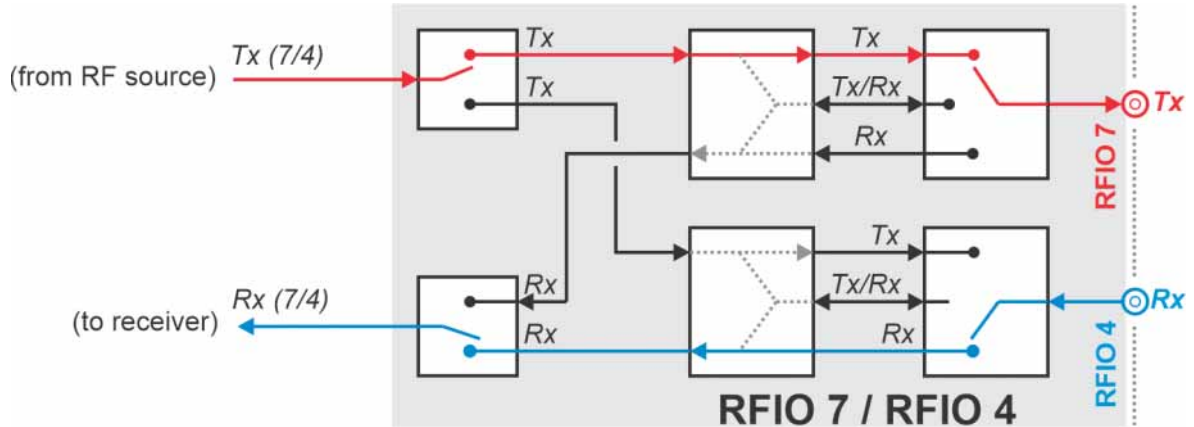
NOTE

Broadcast mode does not allow port combinations other than those listed above. Because **P3456** is not listed, it would not be possible to use ports 3, 4, 5, and 6 in broadcast mode.

Configuration Example (Tx 7, Rx 4)

Setting up RFIO 7 for transmit, RFIO 4 for receive.

Figure 5-8 Example: Tx 7, Rx 4



Set up the RF Input using this menu setting or its equivalent command:

Input/Output > Input > RF Input Port > RFIO 4

Command:

```
:FEED:RF:PORT:INP RFIO4
```

Then set up the RF Output using this menu setting or its equivalent command:

Input/Output > RF Source > RF Output > RFIO 7

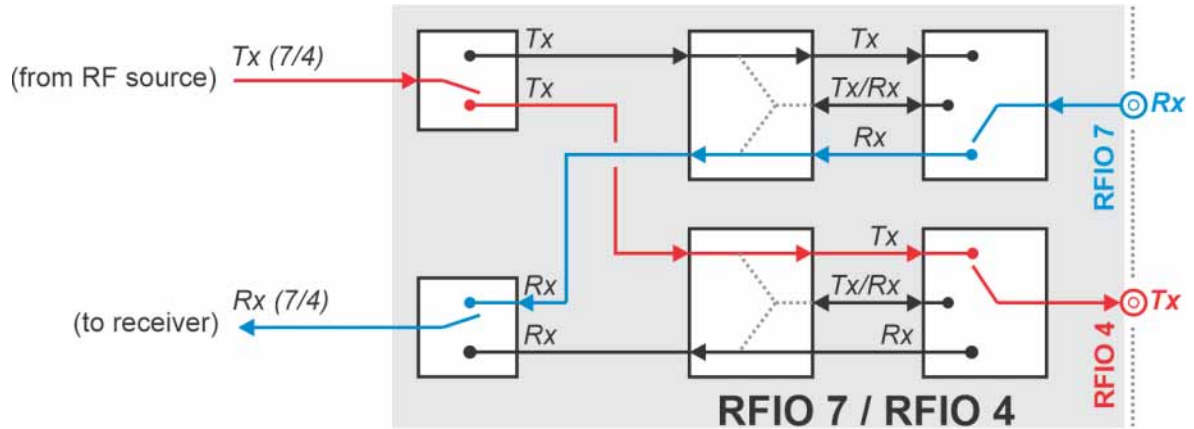
Command:

```
:FEED:RF:PORT:OUTP RFIO7
```

Configuration Example (Tx 4, Rx 7)

Setting up RFIO 4 for transmit, RFIO 7 for receive.

Figure 5-9 Example: Tx 4, Rx 7



Set up the RF Input using this menu setting or its equivalent command:

Input/Output > Input > RF Input Port > RFIO 7

Command:

```
:FEED:RF:PORT:INP RFIO7
```

Then set up the RF Output using this menu setting or its equivalent command:

Input/Output > RF Source > RF Output > RFIO 4

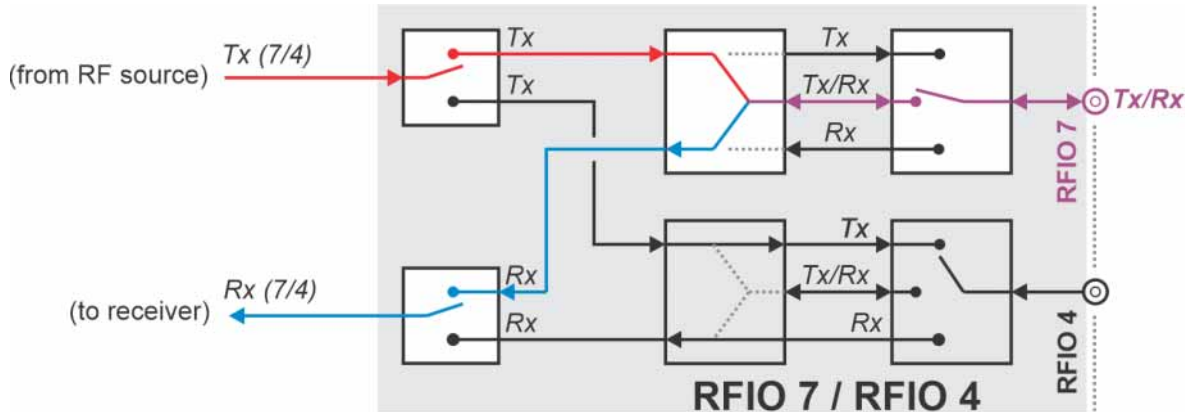
Command:

```
:FEED:RF:PORT:OUTP RFIO4
```

Configuration Example (TxRx 7)

Setting up RFIO 7 for full duplex. (See “RF power in full duplex mode” on page 65.)

Figure 5-10 Example: TxRx 7



Set up the RF Input using this menu setting or its equivalent command:

Input/Output > Input > RF Input Port > RFIO 7

Command:

```
:FEED:RF:PORT:INP RFIO7
```

Then set up the RF Output using this menu setting or its equivalent command:

Input/Output > RF Source > RF Output > RFIO 7

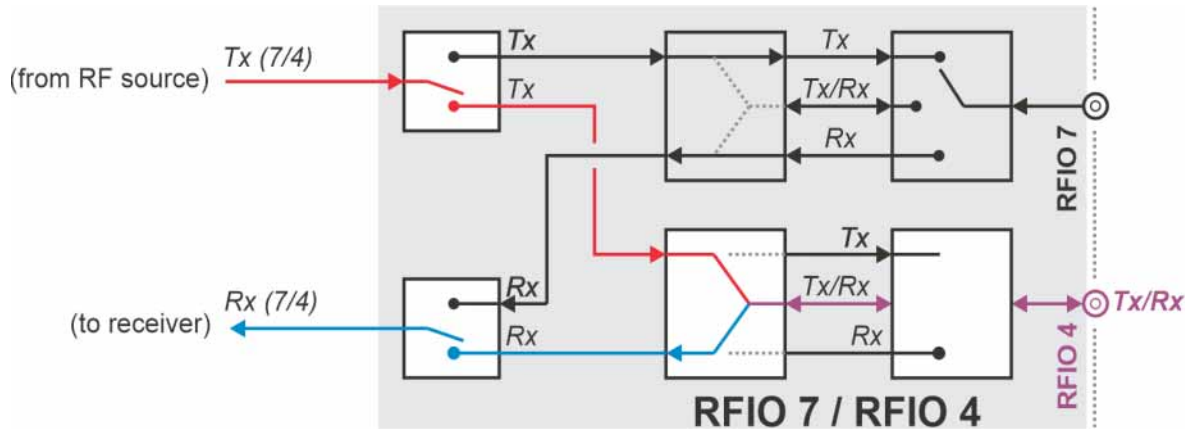
Command:

```
:FEED:RF:PORT:OUTP RFIO7
```

Configuration Example (TxRx 4)

Setting up RFIO 4 for full duplex. (See “RF power in full duplex mode” on page 65.)

Figure 5-11 Example: TxRx 4



Set up the RF Input using this menu setting or its equivalent command:

Input/Output > Input > RF Input Port > RFIO 4

Command:

`:FEED:RF:PORT:INP RFIO4`

Then set up the RF Output using this menu setting or its equivalent command:

Input/Output > RF Source > RF Output > RFIO 4

Command:

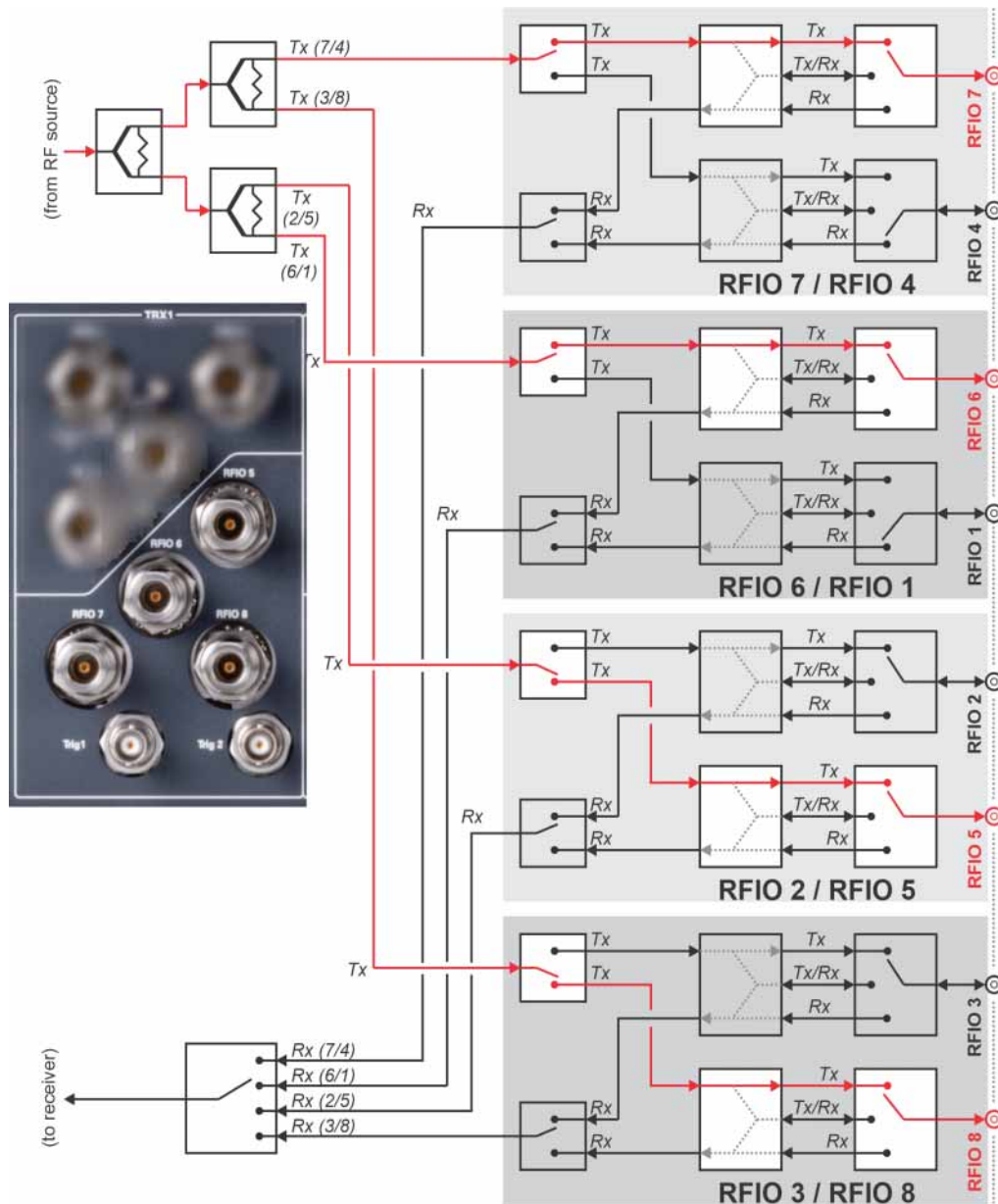
`:FEED:RF:PORT:OUTP RFIO4`

Configuration Examples (Broadcast Mode)

Setting up two or four outputs of the same signal (broadcast mode). In this example the output ports are RFIO 5, 6, 7, and 8. It would be also be possible to use ports RFIO 5 and 6, or ports RFIO 7 and 8.

Figure 5-12

Example: broadcast mode (ports 5 - 8)



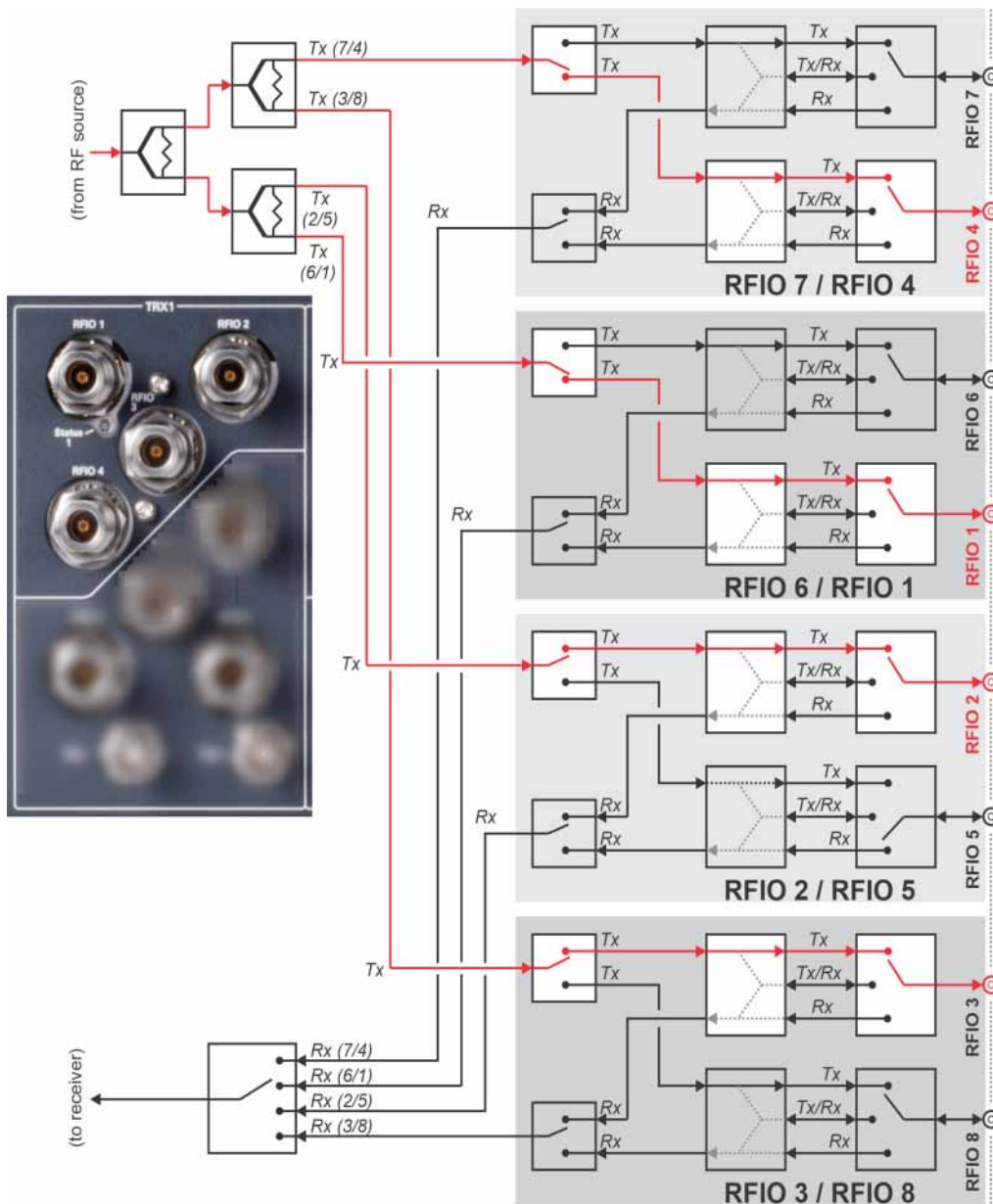
Set up the RF Output using this command:
:FEED:RF:PORT:OUTP:BRoadcast P5678

NOTE

Broadcast mode is set up only by means of SCPI commands, not by making menu selections.

In the example below, broadcast mode is set up for ports RFIO 1, 2, 3, and 4. (These ports are grouped above the diagonal line on the TRX front panel.) It would also be possible to use ports RFIO 1 and 2, or ports RFIO 3 and 4.

Figure 5-13 Example: broadcast mode (ports 1 - 4)



Set up the RF Output using this command:
:FEED:RF:PORT:OUTP:BR0adcast P1234

NOTE

Broadcast mode is set up only by means of SCPI commands, not by making menu selections.

MIMO Setup

In WLAN mode, True MIMO (simultaneous rather than switched MIMO) is supported for the MIMO Modulation Analysis measurement. (This functionality is not available in Sequence Analyzer mode.) Setting up this type of measurement requires configuration of two or more separate TRXs. (See the WLAN Mode help files for more information about this measurement.)

For MIMO Modulation Analysis, two or more measurement data streams are captured simultaneously, by two or more separate TRXs in the E6680A. In the E6680A, the TRXs share a common frequency source (if a second source frequency is used, a second E6680A is needed). The TRXs also share a common IP address, but have separate socket numbers. In MIMO testing, a single TRX (TRX 1) is designated the primary, and it controls the other TRX or TRXs used.

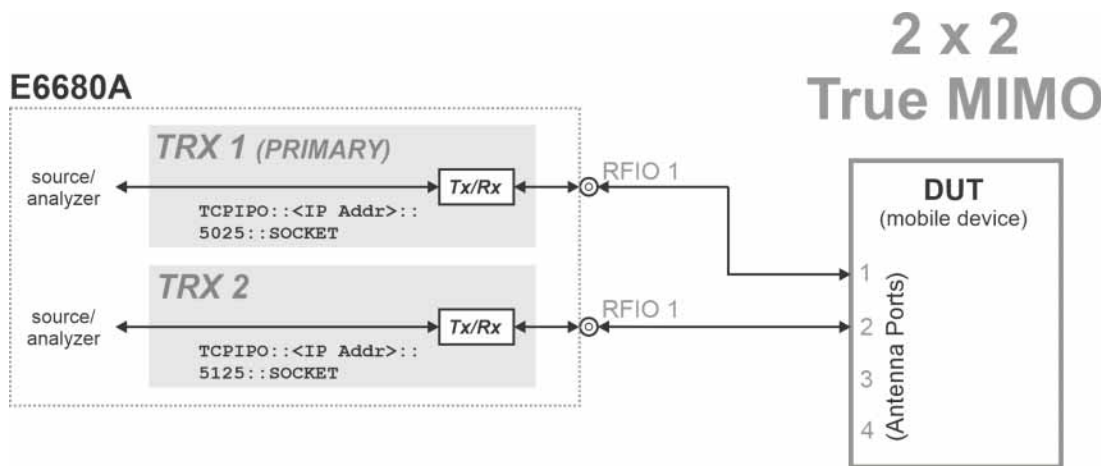
The following sections provide examples of the various possible MIMO configurations.

MIMO configuration examples (at a common source frequency)

MIMO testing is usually done at a common source frequency. Tests involving non-contiguous bandwidth segments require two source frequencies (indicated by a "+" sign in the **Sync Config** setting), see ["MIMO configuration examples \(with two frequency segments\)" on page 79](#).

Here is an example of 2x2 MIMO:

Figure 5-14 2X2 MIMO connections



In the example setup shown here, TRX 1 runs the MIMO Modulation Analysis measurement, and is also configured to control TRX 2, which collects the second data stream. The primary TRX controls the measurement settings for the secondary TRX, and also processes the measurement data collected by the secondary. (The display window for the secondary will display a mostly-blank screen, with a message indicating that it is in use by the primary.)

In the examples of 3x3 and 4x4 MIMO below, TRX 1 runs the MIMO Modulation Analysis measurement, and is also configured to control the other TRX units, which collect the additional data streams.

Figure 5-15 3X3 MIMO connections

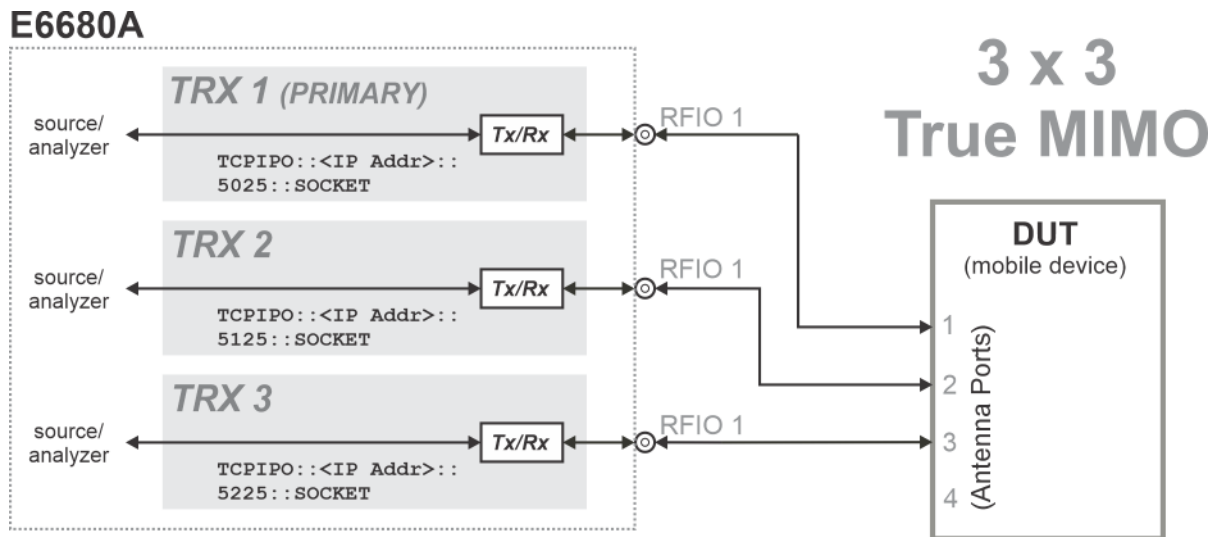
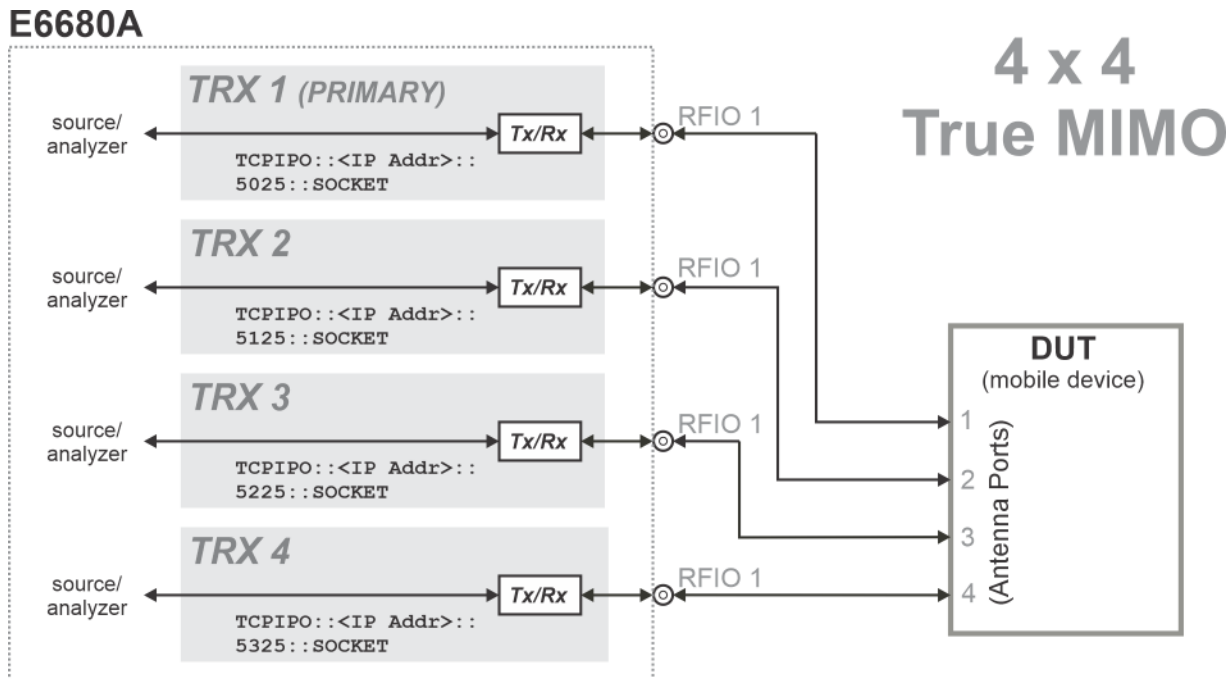
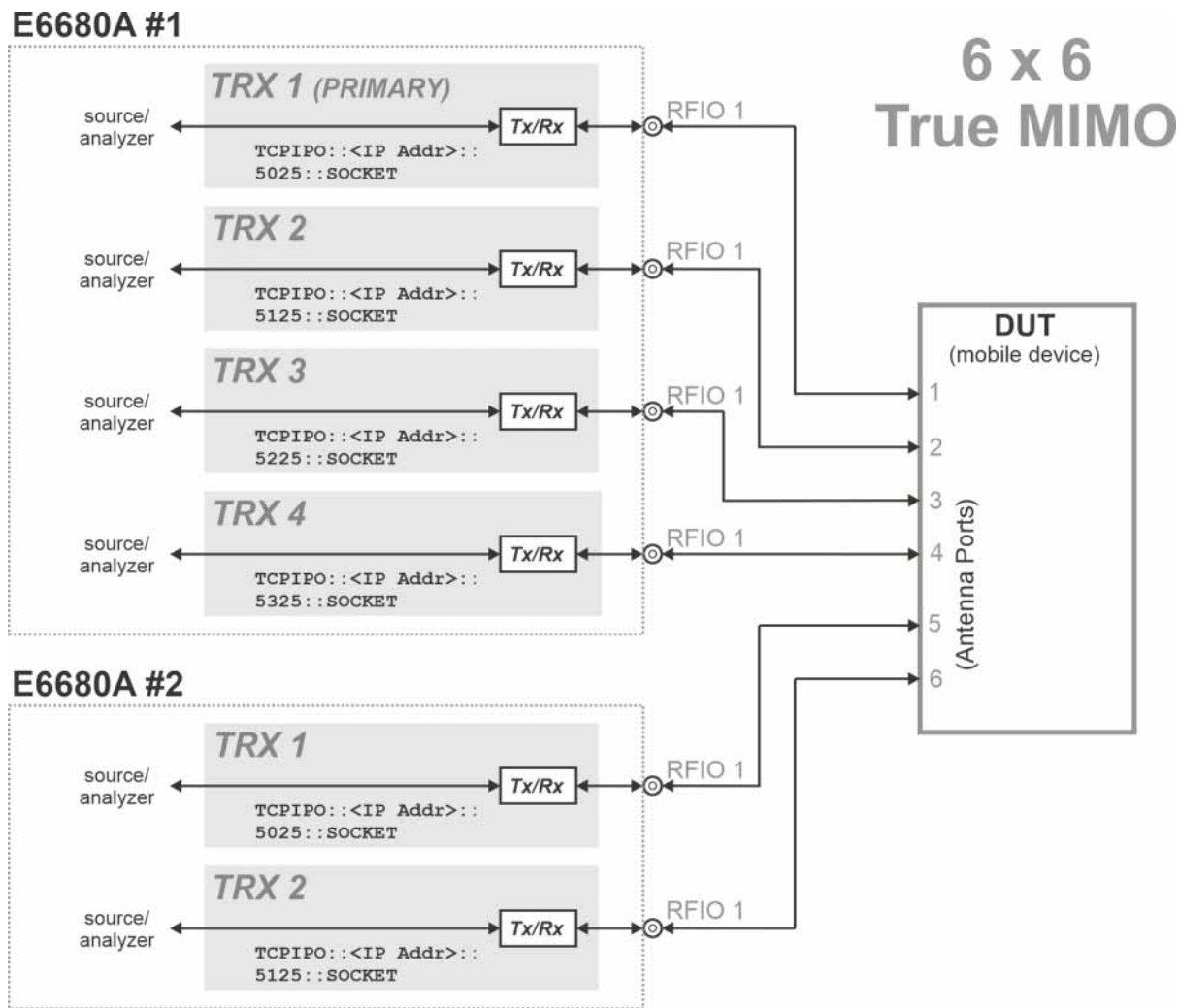


Figure 5-16 4X4 MIMO connections



Here is an example of 6x6 MIMO:

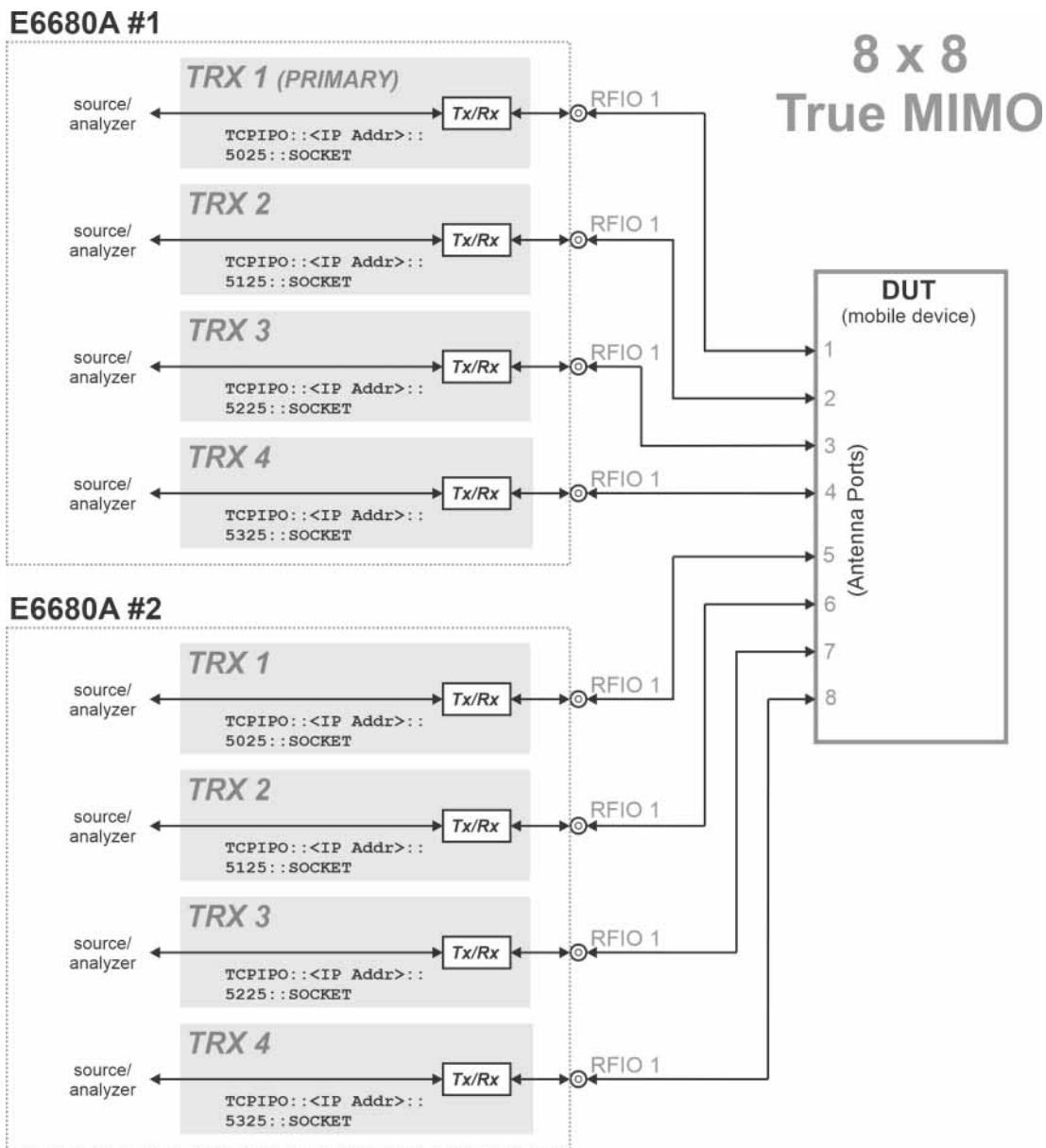
Figure 5-17 6X6 MIMO connections



In the example setup shown here, TRX 1 runs the MIMO Modulation Analysis measurement. It is also configured to control TRX 2 to 4, which collect the second, third, and fourth data streams. In addition, it is configured to run a second E6680A, and use two of its TRXs to collect the fifth and sixth data streams.

Here is an example of 8x8 MIMO:

Figure 5-18 8x8 MIMO connections



In the example setup shown here, TRX 1 runs the MIMO Modulation Analysis measurement. It is also configured to control TRX 2 to 4, which collect the second, third, and fourth data streams. In addition, it is configured to run a second E6680A, and use all four of its TRXs to collect the fifth, sixth, seventh, and eighth data streams.

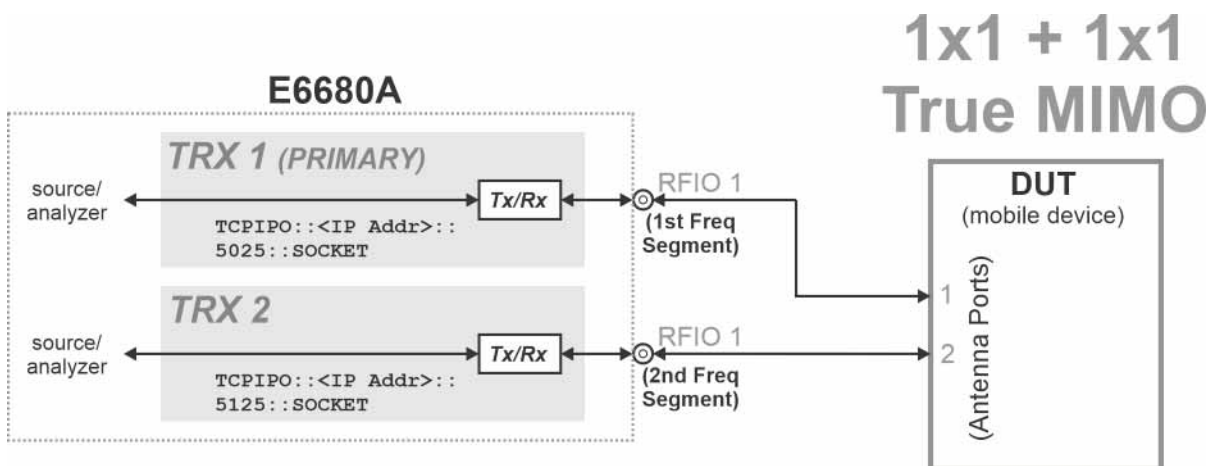
MIMO configuration examples (with two frequency segments)

The previous MIMO configuration examples were for MIMO testing at a common source frequency. It is also possible to use separate source frequencies (to cover non-contiguous bandwidth segments).

Tests involving two source frequency segments are indicated by a "+" sign in the **Sync Config** setting. Depending on the number of ports used, a second E6680A may be required.

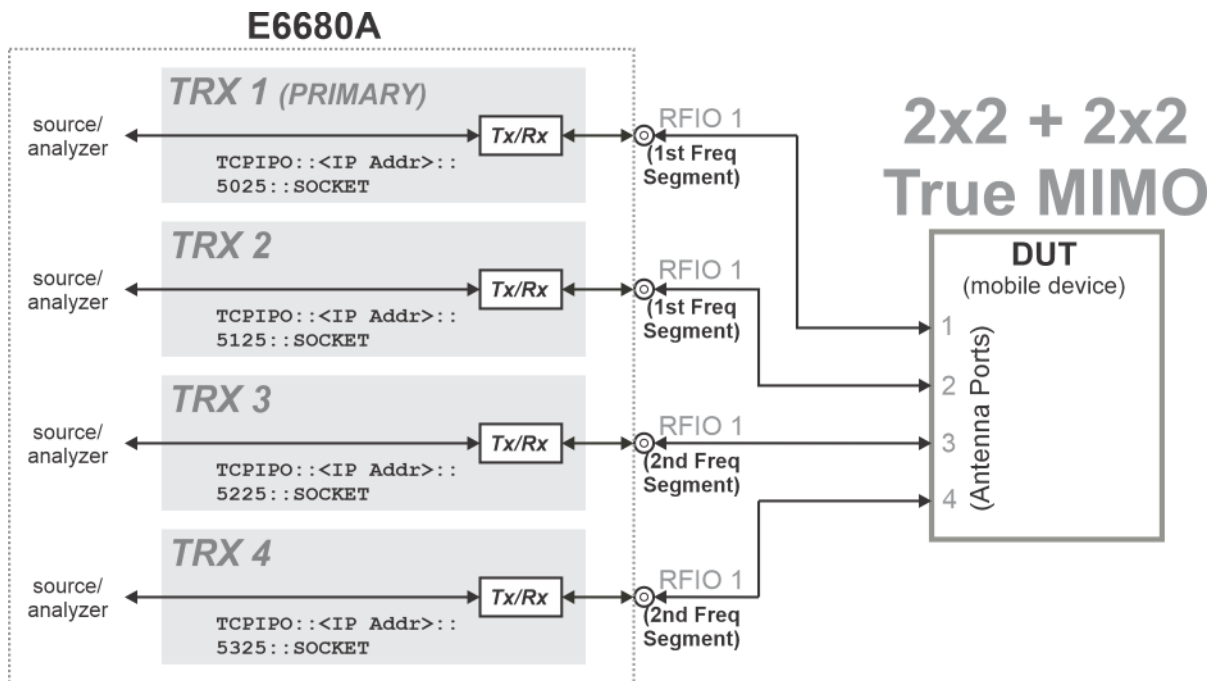
Here is an example of 1x1 + 1x1 MIMO:

Figure 5-19 1x1 + 1x1 MIMO connections



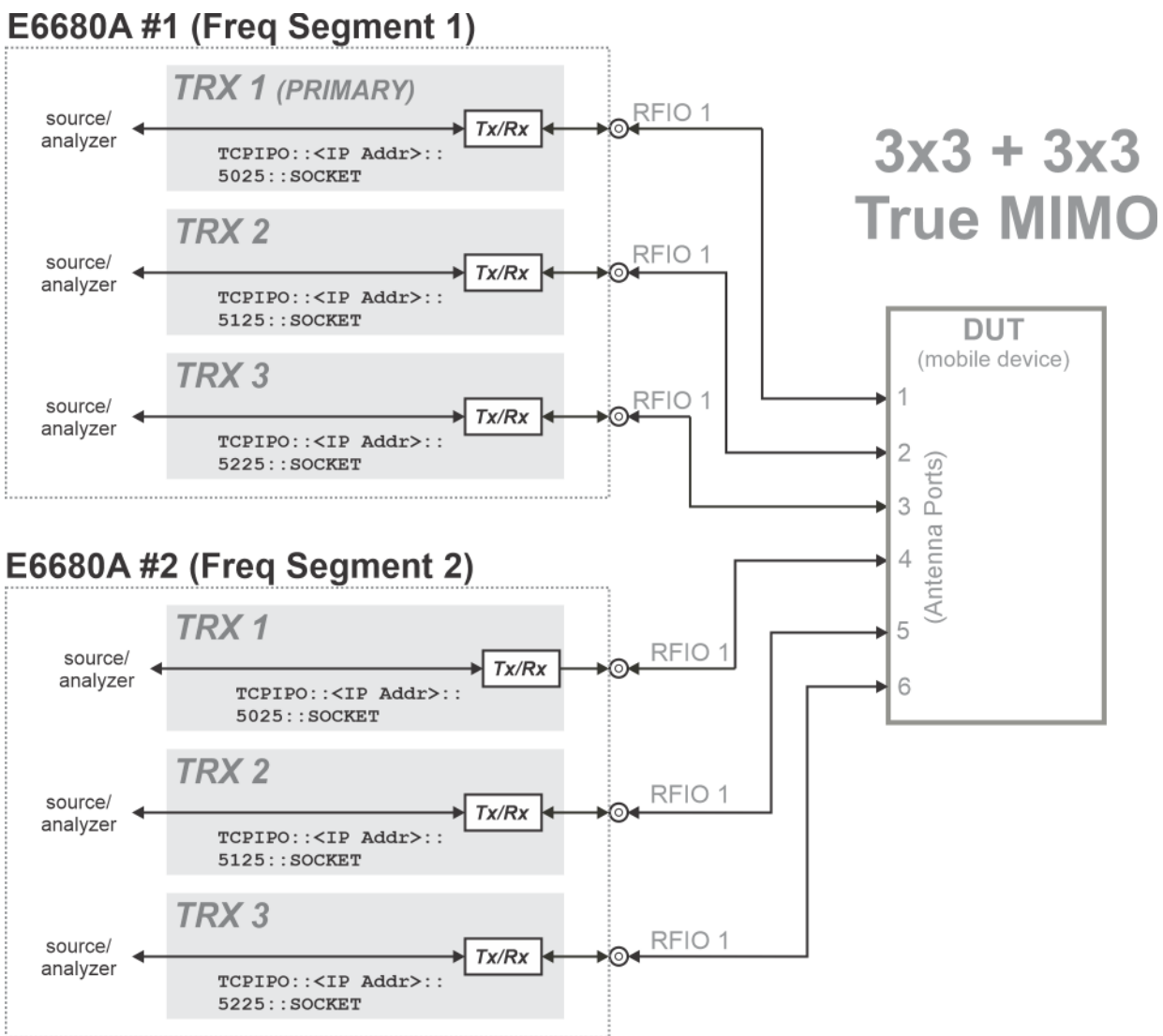
Here is an example of 2x2 + 2x2 MIMO:

Figure 5-20 2x2 + 2x2 MIMO connections



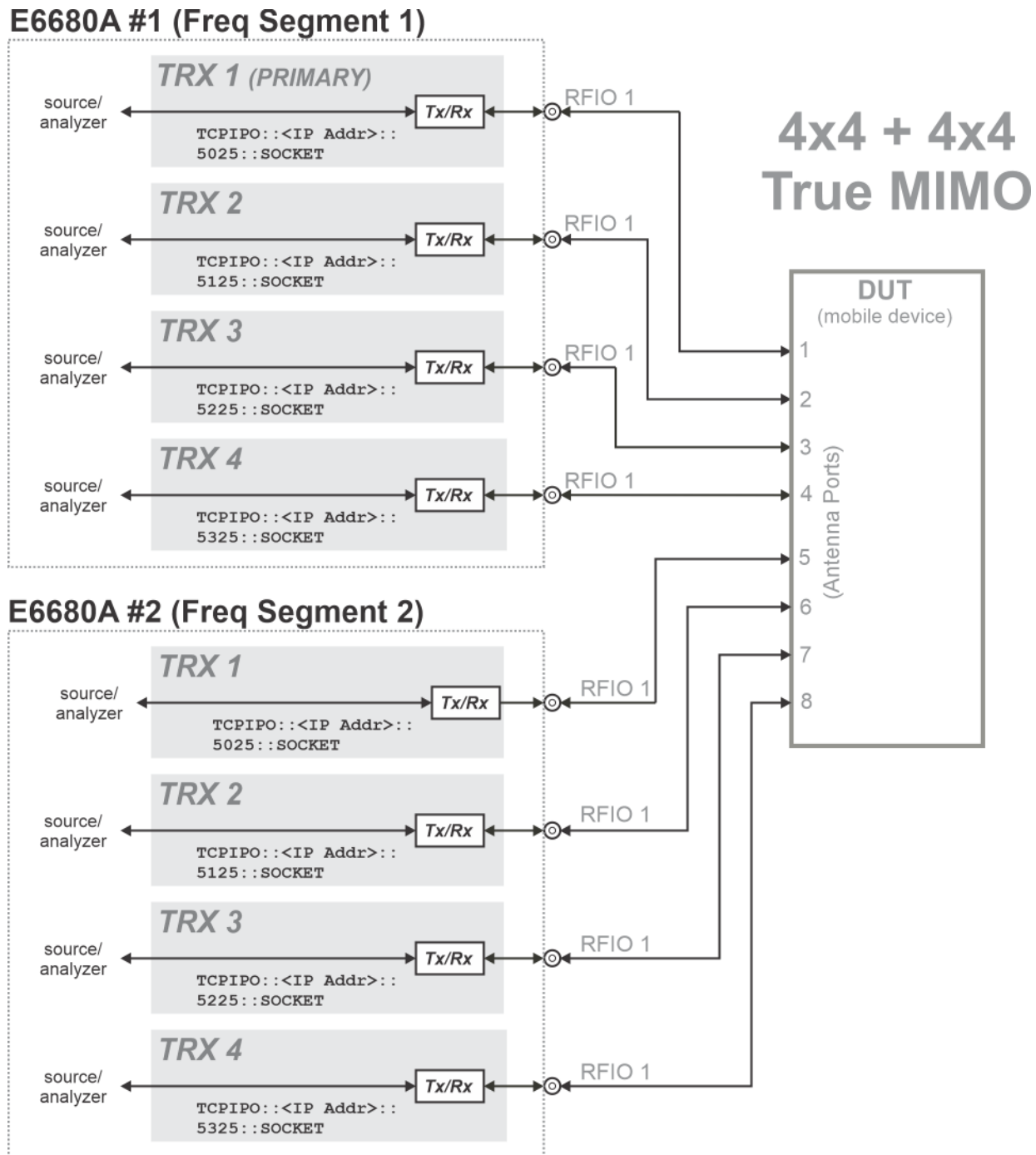
Here is an example of 3x3 + 3x3 MIMO (a second E6680A chassis is required in this case):

Figure 5-21 3x3 + 3x3 MIMO connections



Here is an example of 4x4 + 4x4 MIMO:

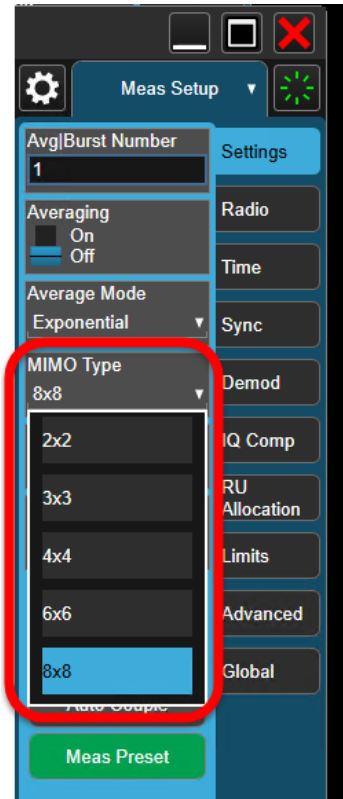
Figure 5-22 4x4 + 4x4 MIMO connections



MIMO Type Setup

For the MIMO Modulation Analysis measurement, go to the **Meas Setup > MIMO Type** menu and select **2x2**, **3x3**, **4x4**, **6x6**, or **8x8**. (This setting determines how many constellation diagrams are displayed for the measurement.) The equivalent SCPI command is:
`[:SENSe]:EVMMimo:TYPE M2M2|M3M3|M4M4|M6M6|M8M8`

Figure 5-23 MIMO Type menu



MIMO Analyzer Configuration

NOTE

The MIMO configuration that is set up here needs to match the **MIMO Type** selection, as described above. Error messages will be displayed until the two are in agreement.

For MIMO testing, it is necessary to coordinate and control the TRXs within the E6680A (and with any other E6680A which might be used for 6x6 or 8x8 MIMO). TRX1 in the main E6680A is primary; all other TRXs are secondary.

From the primary TRX window (TRX 1), in **WLAN** mode, **MIMO Modulation Analysis** measurement, select **Meas Setup > Global > Remote Analyzer Config**. Use **Add Analyzer** to add a row to the table for each TRX (including TRXs in a second E6680A). TRXs 1-4 are represented by socket ports 5025, 5125, 5225, and 5325. If there is a second E6680A, it will have a different IP address. Use **Verify Highlighted Analyzer** to make sure each TRX is present and recognized by the system. Use **Select Highlighted Analyzer** to take control of a TRX, or **Release Highlighted Analyzer** to release it.

For more information, see the WLAN mode help files under: **WLAN Mode / WLAN MIMO Modulation Analysis Measurement / Meas Setup / Global / Remote Analyzer Config**.

Figure 5-24

MIMO Analyzer Config (bottom four rows of table are for a second E6680A)

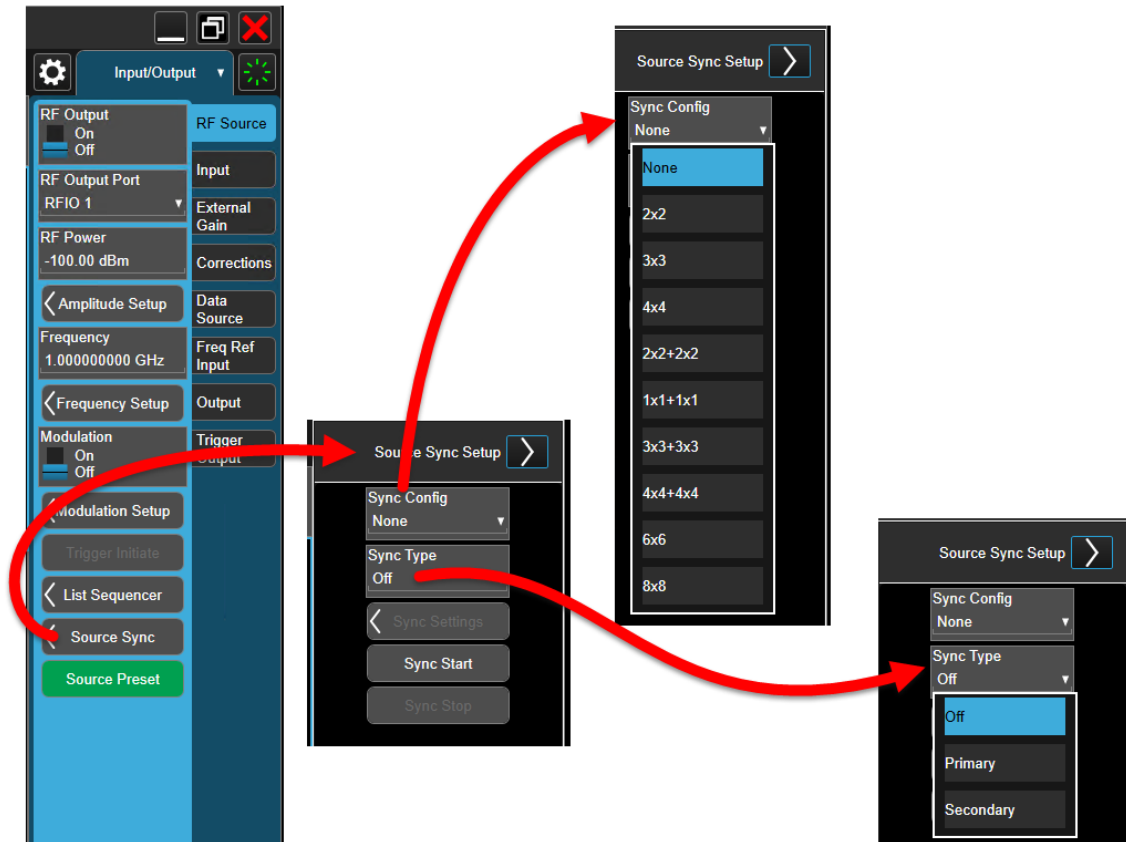
The screenshot shows the 'Remote Analyzer Config' interface. At the top, there are input fields for IP (0.0.0.0) and SCPI Socket Port (5025), along with an 'Add Analyzer' button. To the right are buttons for 'Verify Highlighted Analyzer', 'Select Highlighted Analyzer', 'Release Highlighted Analyzer', 'Delete Highlighted Analyzer', and 'Delete All'. Below this is the 'Available Analyzer List' table.

Channel	Selected	Verified	IP	Port	*IDN?
-1	Off	On	10.82.105.33	5125	Keysight Technologies,M9410A,MY61280825,M.32.50_D0004
-1	Off	On	10.82.105.33	5225	Keysight Technologies,M9410A,MY61280826,M.32.50_D0004
-1	Off	On	10.82.105.33	5325	Keysight Technologies,M9410A,MY61280827,M.32.50_D0004
-1	Off	On	10.82.105.130	5025	Keysight Technologies,M9410A,CN59090003,M.32.50_B0005
-1	Off	On	10.82.105.130	5125	Keysight Technologies,M9410A,MY58460781,M.32.50_B0005
-1	Off	On	10.82.105.130	5225	Keysight Technologies,M9410A,MY58460783,M.32.50_B0005
-1	Off	On	10.82.105.130	5325	Keysight Technologies,M9410A,MY58460788,M.32.50_B0005

MIMO Source Configuration

Because different MIMO test setups use various combinations of TRXs, the **Input/Output > RF Source > Source Sync Setup** menu is used to specify the **Sync Config** and **Sync Type** settings:

Figure 5-25 Source Sync menus



In the **Input/Output > RF Source > Source Sync** menu, click **Sync Config** and select the source synchronization type from the dropdown list (2x2, 3x3, 4x4, 2x2 + 2x2, 1x1 + 1x1, 3x3 + 3x3, 4x4 + 4x4, 6x6, or 8x8).

In the window for the primary TRX, go to the **Input/Output > RF Source > Source Sync > Sync Settings** window and set **Sync Settings Switch** to the **On** state. Use the **Add Secondary** button to add secondary devices to the table.

The **Segment 2 Setup** selections are not settable for MIMO measurements at a single frequency, and are grayed out; for MIMO measurements at two separate frequencies, **Sync Segment 2** can be enabled and the **Segment 2 Frequency** can be specified. These settings apply to the second bandwidth segment (that is, "2x2 + 2x2" means "2x2 + **2x2**", with the highlighted segment being the second segment).

If there is a second E6680A used, it will have a different IP address, but it will use the same Socket Port numberings scheme for its four TRXs. Adding that address adds all the TRXs into the source table together.

For more information, see the WLAN mode help files under: **WLAN Mode / Input/Output /RF Source / Source Sync / Sync Settings**.

Figure 5-26 Source Sync Setup menu (bottom four rows of table are for a second E6680A)

The screenshot displays the 'Source Sync Setup' interface. On the left, a table titled 'Secondary Devices List' contains the following data:

Available Secondary Devices	Secondary Device IP Address	Slot Number	Socket Port	Secondary Device Order	Selected
Secondary Device1	localhost	Slot 5	5125	1	<input checked="" type="checkbox"/>
Secondary Device2	localhost	Slot 8	5225	Unselected	<input type="checkbox"/>
Secondary Device3	localhost	Slot 10	5325	Unselected	<input type="checkbox"/>
Secondary Device4	10.82.105.130	Slot 3	5025	Unselected	<input type="checkbox"/>
Secondary Device5	10.82.105.130	Slot 5	5125	Unselected	<input type="checkbox"/>
Secondary Device6	10.82.105.130	Slot 8	5225	Unselected	<input type="checkbox"/>
Secondary Device7	10.82.105.130	Slot 10	5325	Unselected	<input type="checkbox"/>

On the right side of the interface, there are several configuration sections:

- Sync Settings Switch:** Sync Settings Switch is set to **Off**.
- Segment 2 Setup:** Sync Segment 2 is set to **On**, and Segment 2 Frequency is set to **2.412000000 GHz**.
- Remote Secondary Setting:** IP Address is **localhost** and SCPI Socket Port is **5325**.

At the bottom right, there are buttons for **Add Secondary** and **Delete Secondary**, along with a note: 'Use IP Address above to add or delete secondary devices in the secondary list left.'

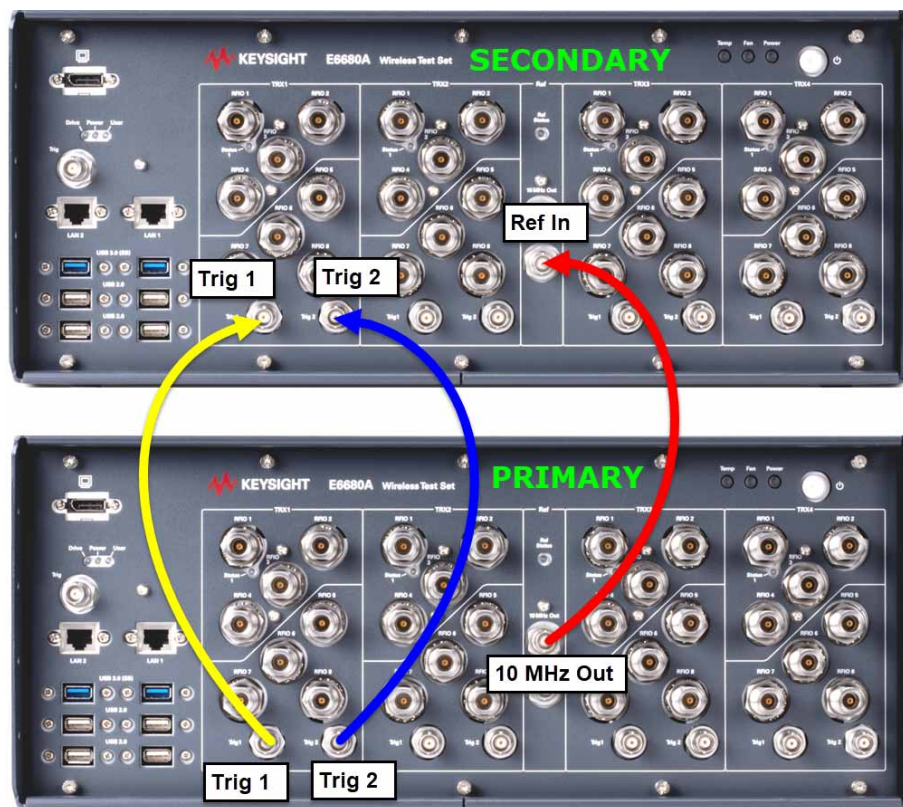
Connecting to a Secondary E6680A

For configurations requiring a second E6680A, the following cable interconnections are needed:

Type of Signal	On Primary E6680A	On Secondary E6680A
Frequency Reference	10 MHz Out	Ref In
Trigger	Trig 1	Trig 1
Trigger	Trig 2	Trig 2

Figure 5-27

Connecting two E6680As



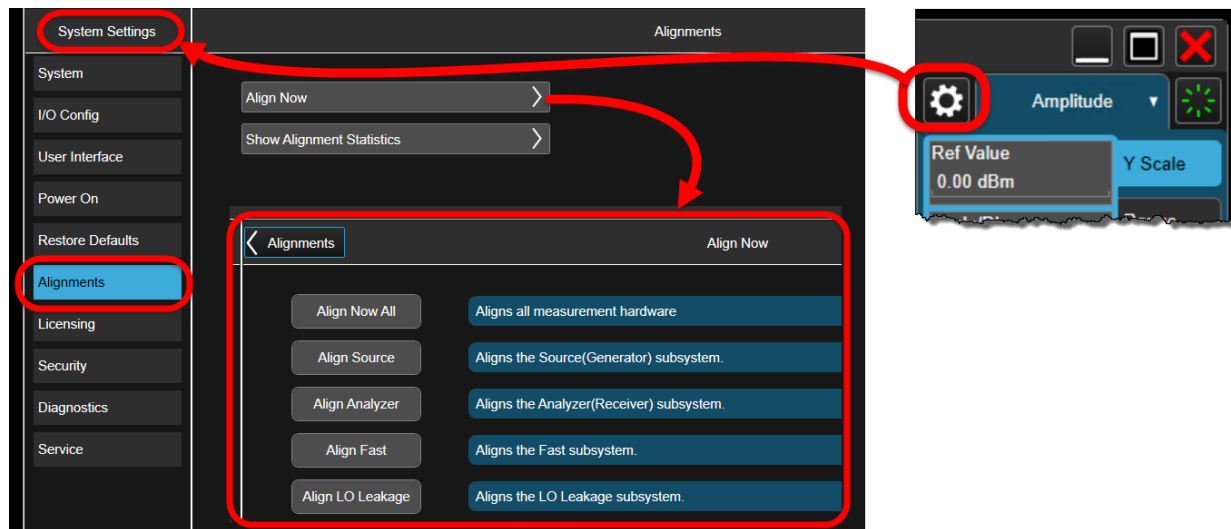
Alignments

Alignments are internal calibration adjustments which each TRX module must make to ensure that internal signal levels are properly maintained.

To avoid interruptions, the alignments are not run automatically, either at startup or afterward; you must run them explicitly.

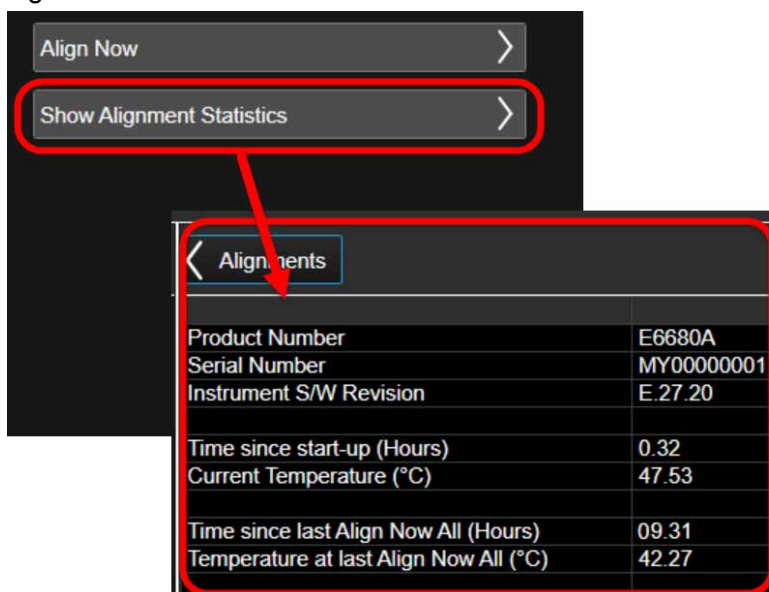
The **System Settings > Alignments > Align Now** menu is illustrated below.

Figure 5-28 Alignments > Align Now menu



The TRX's internal temperature and the time since the most recent alignment can be checked by selecting **System Settings > Alignments > Show Alignment Statistics**, as illustrated below.

Figure 5-29 Show Alignment Statistics



The available alignments are described in the table below.

Table 5-1

The five alignment types

Alignment	Description
Align All	Perform all possible alignments, to get the best RF and IF performance for both the source and the receiver.
Align Source	Perform all alignments needed to get the best RF and IF performance for the source.
Align Analyzer	Perform all alignments needed to get the best RF and IF performance for the analyzer.
Align Fast	To save time, perform most of the source and analyzer alignments.
Align LO Leakage	Perform only the LO Leakage relative alignments, for both the source and the analyzer.

“All” alignment (weekly use)

This alignment of all RF subsystems in the TRX should be performed when any of the following statements are true:

1. The TRX’s internal temperature has drifted more than 5° C since the previous "All" alignment (see **Show Alignment Statistics** on page 88).
2. More than 7 days have elapsed since the previous “All” alignment
3. More than 8 hours have elapsed since the previous "Fast" alignment (or "All" alignment).

The “All” alignment typically takes less than 15 minutes to run.

NOTE

The alignment process requires a 45-minute preliminary warm-up period, after applying power or after restarting the XSA application (when the application is not running, power is not applied to the TRXs; therefore an application shutdown has the same effect on alignment as a power shutdown).

NOTE

Make sure there is not an interfering signal being applied to the RFIO ports while the alignment is running. This can cause at least a portion of the alignment process to be skipped; you will see an error message (such as "Align Analyzer skipped"), and will have to re-run that portion of the process.

To run the alignment, select **System Settings > Alignments > Align Now > Align Now All**, or send the SCPI command:
:CAL

“Fast” alignment (daily use)

This partial alignment saves time by omitting some of the finer adjustments (such as IF Response Alignments) of the "All" alignment process. This alignment should be performed when any of the following statements are true:

1. The TRX's internal temperature has drifted more than 5° C since the previous "All" alignment (see **“Show Alignment Statistics” on page 88**).
2. More than 7 days have elapsed since the previous “All” alignment
3. More than 8 hours have elapsed since the previous "Fast" alignment (or "All" alignment).

The “Fast” alignment typically takes less than 9 minutes to run.

NOTE

The alignment process requires a 45-minute preliminary warm-up period, after applying power or after restarting the XSA application (when the application is not running, power is not applied to the TRXs; therefore an application shutdown has the same effect on alignment as a power shutdown).

NOTE

Make sure there is not an interfering signal being applied to the RFIO ports while the alignment is running. This can cause at least a portion of the alignment process to be skipped; you will see an error message (such as "Align RF skipped"), and will have to re-run that portion of the process.

To run the alignment, select **System Settings > Alignments > Align Now > Align Fast**, or send the SCPI command:
:CAL:INT:FAST

Other partial alignments (rarely used)

The only partial alignment which is run routinely is the "Fast" alignment. However, it is sometimes appropriate to run some other subset of the processes included in **Align Now All**.

This need typically arises when a previous alignment was partly successful, but an error message such as "Align Analyzer skipped" was displayed. You can correct the problem which caused the alignment failure (typically an interfering RF signal applied to an RFIO port) and then run only the part of the "All" alignment that was skipped.

1. Select **System Settings > Alignments > Align Now > Align Source**, or send the SCPI commands:

```
:CAL:INT:SOUR  
*WAI
```

2. Select **System Settings > Alignments > Align Now > Align Analyzer**, or send the SCPI commands:

```
:CAL:INT:REC  
*WAI
```

3. Select **System Settings > Alignments > Align Now > Align LO Leakage**, or send the SCPI commands:

```
:CAL:INT:LOL  
*WAI
```

NOTE

Any alignment process requires a 45-minute preliminary warm-up period, after applying power or after restarting the XSA application (when the application is not running, power is not applied to the TRXs; therefore an application shutdown has the same effect on alignment as a power shutdown).

NOTE

Make sure there is not an interfering signal being applied to the RFIO ports while the alignment is running. This can cause at least a portion of the alignment process to be skipped; you will see an error message (such as "Align Analyzer skipped"), and will have to re-run that portion of the process.

LAN Address Configuration

The E6680A supports both dynamic and static assignment of its IP address, using ports LAN 1 and LAN 2 respectively.

The LAN 1 port is designed for dynamic IP addressing, using the Dynamic Host Configuration Protocol. If your site network supports DHCP, the E6680A will be assigned an IP address automatically when it is connected to the LAN. Once the address is assigned, it is listed, along with the computer name, under **System > Show > System**. The address or computer name can be used to find the test set on the LAN. However, to see the **System > Show > System** screen and find this information, it is necessary either to connect a monitor to the front panel monitor port, or else to use the LAN 2 port to connect test set to a PC directly.

Figure 5-30 Checking the LAN address

System Settings	System Information		
System	Keysight Technologies		
	Keysight E6680A	Keysight E6680A Wireless Test Set	
I/O Config	Product Number	E6680A	
	Serial Number	MY	
User Interface	S/W Release Name	2020 Update 2	
	Instrument S/W Revision	E.27.20	
Power On	Revision Date	9/11/2020 4:42:00 PM	
	Computer System	Windows 10	
Restore Defaults	Computer Name	K-E6680A-	
	LAN Port1		
	IP Address	141.	
	IPv6 Address		
Alignments	Link-Local IPv6 Address	fe80::180:	
	LAN Port2	—Down—	
	Host ID	PCSERNO,H.	
Licensing	mDNS Enabled	Yes	
	mDNS Host Name	K-N9020A-3000-5	
Security	mDNS Service Name	Keysight E6680A Wireless Test Set - MY	
	Option	Name / Description	Option
Diagnostics	E6680A-PCX	Intel(R) Core(TM) i7-4700EQ CPU @ 2.40GHz, 16 GB	
	E6680A-SSD	INTEL SSDSC2BB240G7	
	E6680A-W10	Microsoft Windows 10 Enterprise 2016 LTSC, 64 bit OS	

Using the LAN 1 port to connect the test set directly to the public LAN is potentially insecure, because the test set does not provide anti-virus protection. Connecting the test set to the public LAN by way of a PC with antivirus protection is the preferred solution.

The LAN 2 port is designed to use a private static IP address, 192.168.1.2 (changing this address is possible but not recommended). This port can be used for direct connection to a PC.

To find the test set on the LAN, you will need to know its IP address or computer name. If you cannot easily obtain a monitor view of **System > Show > System**, you can determine the computer name using the instrument serial number. The computer name is in the format **K-E6680A-nnnnn**, ending in the last five digits of the serial number.

Configuring the LAN

Hostname

The Computer Name, or hostname, is pre-configured from the factory. It must be a unique name so that it does not conflict with other equipment on your LAN. The pre-configured Computer Name is K-E6680A-xxxxx, where xxxxx represents the last 5 digits of the test set serial number.

To change the Computer Name consult the Microsoft Windows Help and Support Center.

IP Address & Gateway

The test set is pre-configured to obtain an IP Address using DHCP. The IP Address and Gateway can be changed. Consult the Microsoft Windows Help and Support Center to configure the LAN.

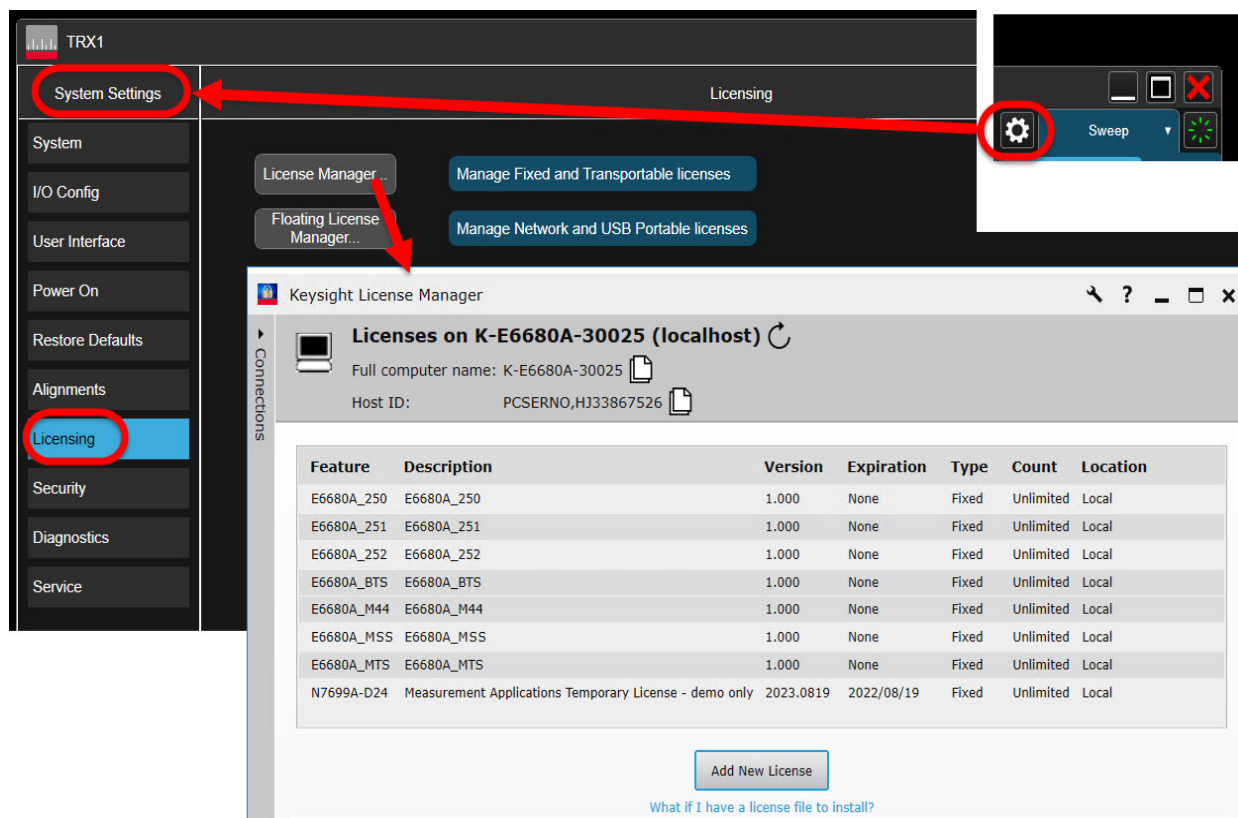
Managing Licenses

Licenses can be tied to a particular instrument, or transferable from one instrument to another by various means.

Licenses can be either time-based or perpetual (the latter have no expiration date).

To verify which licenses are installed, open the Keysight License Manager from the Windows **Start** menu. (It can also be opened by clicking the "gear" icon at the upper left to open the **System Settings** screen, and clicking **Licensing > License Manager**.) The licenses installed on the test set are listed, with information provided about license types and expiration dates (in the illustrated example, "Fixed" indicates a node-locked license).

Figure 5-31 Installed licenses (as displayed in Keysight License Manager)



Flexible Software Licensing

Keysight offers a variety of flexible licensing options. Each of the four license types is available under "Perpetual" or "Subscription" terms, as shown in the table below:

	Term: Perpetual	Term: Subscription
Node-locked (Fixed)	License is locked to a specific host instrument or PC. License may be used indefinitely.	License is locked to a specific host instrument or PC. License may be used over a limited time which is specified in the license terms.
Transportable	License is locked to one host instrument or PC at a time, but may be unlocked from one and locked to another. License may be used indefinitely.	License is locked to one host instrument or PC at a time, but may be unlocked from one and locked to another. License may be used over a limited time which is specified in the license terms.
USB Portable	License is locked to a USB device, and can be transported from one host instrument or PC to another by physically moving the USB device. License may be used indefinitely.	License is locked to a USB device, and can be transported from one host instrument or PC to another by physically moving the USB device. License may be used over a limited time which is specified in the license terms.
Floating (Network)	License is locked to a license server (a host PC that manages pools of licenses). The licenses can be used by multiple users on multiple host instruments or PCs; the license server ensures that each purchased license count is used by only one user at a time. License may be used indefinitely.	License is locked to a license server (a host PC that manages pools of licenses). The licenses can be used by multiple users on multiple host instruments or PCs; the license server ensures that each purchased license count is used by only one user at a time. License may be used over a limited time which is specified in the license terms.

KeysightCare Software Support Subscriptions

- Perpetual licenses are sold with a 12 (default), 24, 36, or 60-month software support subscription. Support subscriptions can be renewed for a fee after that.
- Subscription licenses include a software support subscription through the term of the license.

Licensing New Application Software

See [“Licensing New Application Software - After Initial Purchase”](#) on page 121.

Transporting Licenses

See [“Transporting a License Between Test Sets”](#) on page 123.

Links to more information

About license types:

<http://www.keysight.com/find/licensetypes>

About licensing in general:

www.keysight.com/find/licensing

About upgrading software:

www.keysight.com/find/upgrade_to_software_support

6 Operating Tasks: Receiver Setup

The following topics can be found in this section:

“Measurement Setup” on page 98

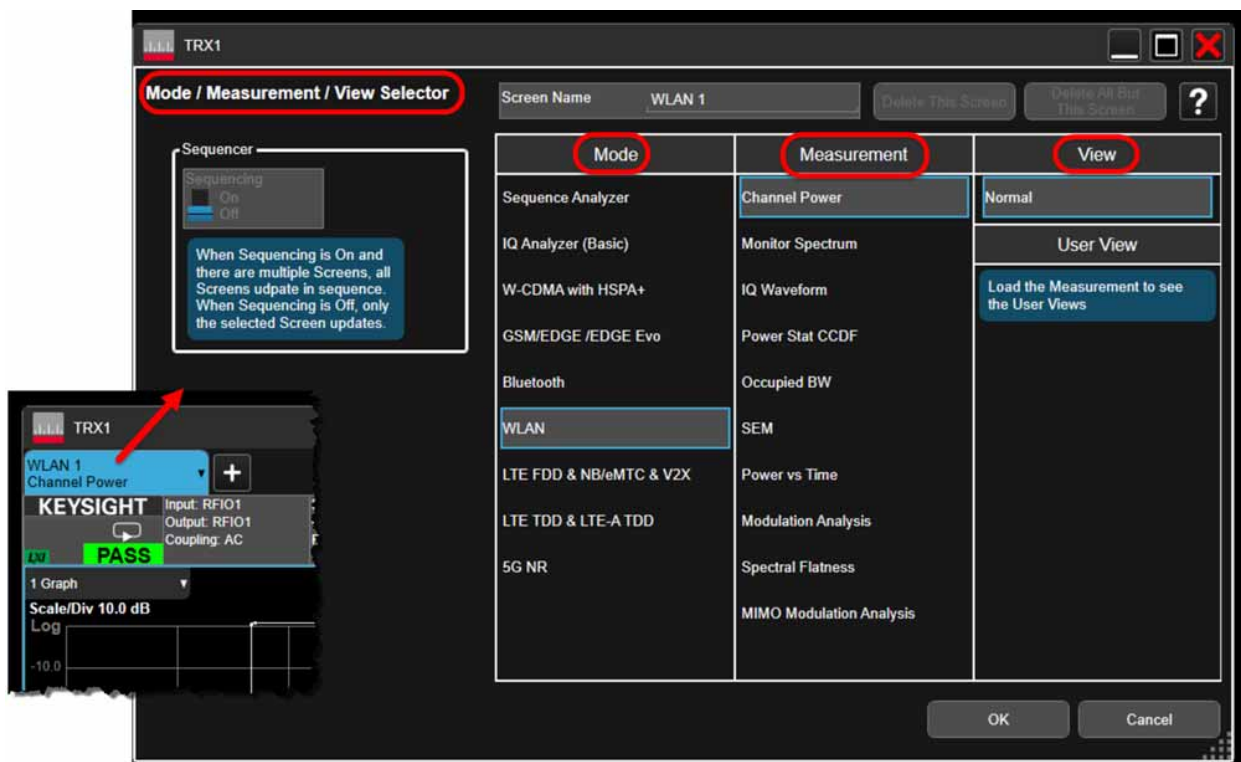
“Marker Setup” on page 102

Measurement Setup

The analyzer/receiver function of the E6680A relates to measurement of signals received from the DUT.

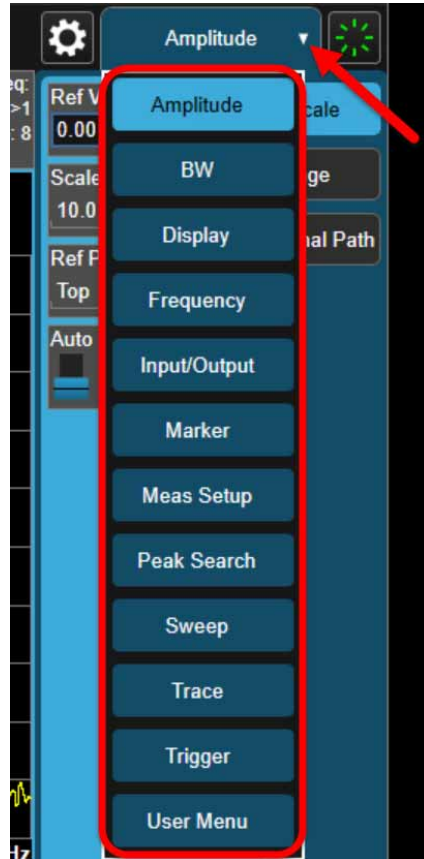
Clicking on the measurement tab at the upper left corner of the display opens the **Mode/Measurement/View Selector**, which you can use to select a particular kind of measurement. In this example, **WLAN** has been selected under **Mode**, and the selections under **Measurement** are the measurements available in that mode. (For some measurements, there are also selections to be made under **View**.) In the example illustrated below, the **Channel Power** measurement is selected. Click **OK** to run this mode/measurement selection.

Figure 6-1 Selecting Mode/Measurement



Most measurement settings are made from the menus, which can be accessed by selecting the dropdown button near the upper right of the display.

Figure 6-2 Accessing Menus



Selecting a menu from the dropdown list displays the menu selections (usually the selections are indented under multiple tabs shown at the right).

For example, the **Amplitude** menu has three tabs; the selections under the **Y Scale** and **Range** tabs are shown below.

Figure 6-3

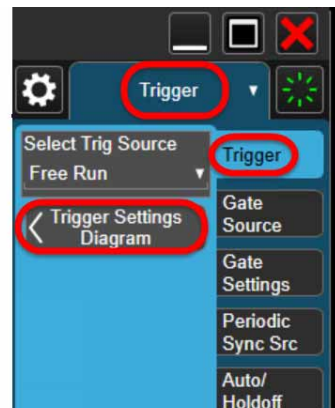
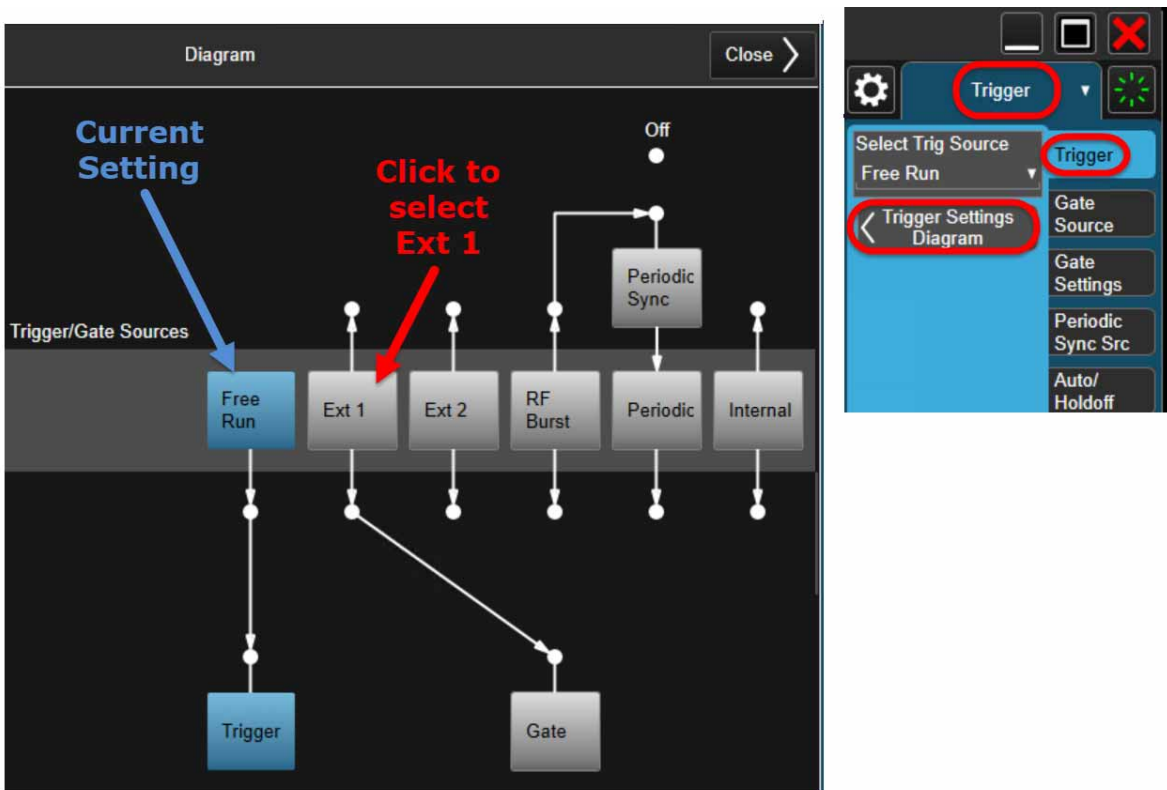
Measurement Menus



Although some menu choices involve only a simple selection (**On | Off**) or a value to be entered (**17 GHz**), some choices cause a more elaborate selection screen to appear in the display. In the example illustrated below, **Trigger > Trigger Settings Diagram** opens an interactive display (the trigger source can be changed from **Free Run** to **Ext 1** by clicking on the graphic).

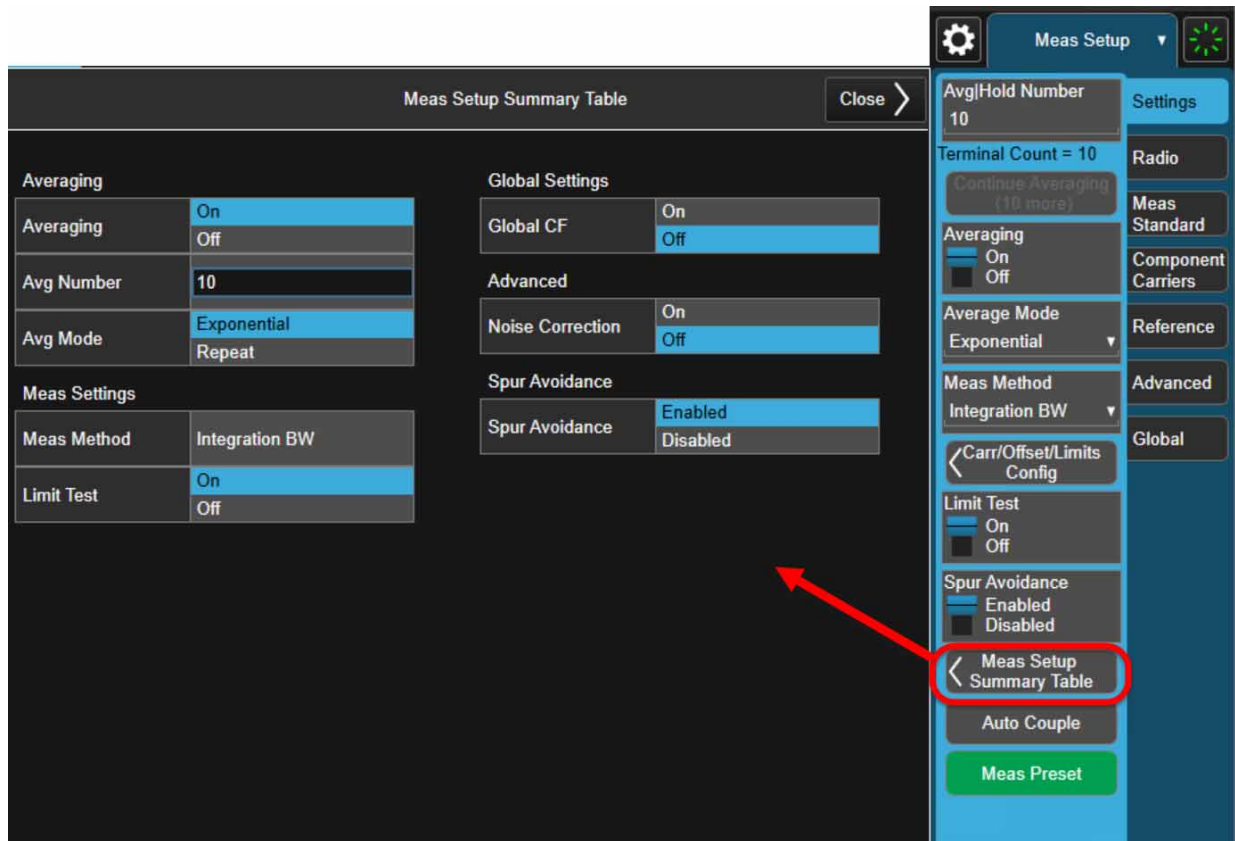
Figure 6-4

Trigger Settings Diagram



Another type of complex screen which some menu selections open is a configuration window such as the **Meas Setup Summary Table**, which gathers together multiple settings on one screen to make it easier to review them.

Figure 6-5 Meas Setup Summary Table



The menu choices are different for each measurement. For more detailed information, see the help file for the 5G application.

Marker Setup

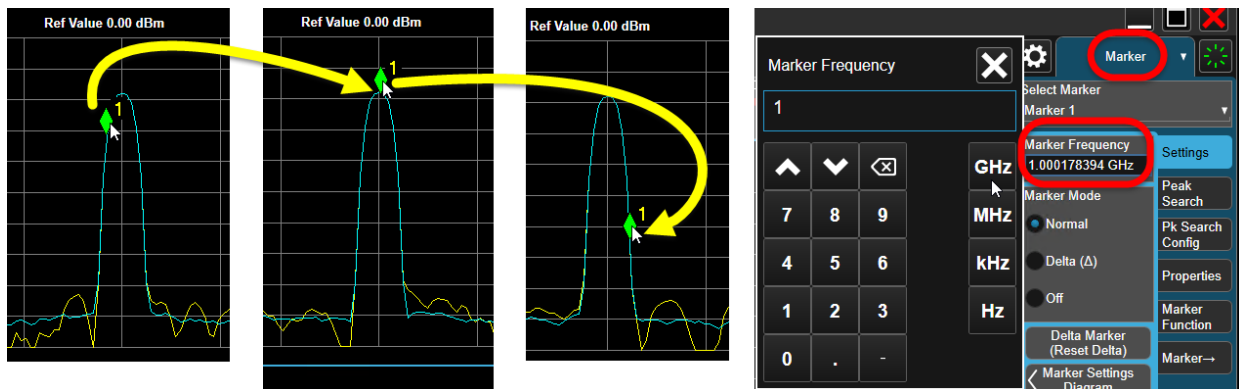
Multiple markers can be set up on the measurement display. Under **Marker > Select Marker**, choose the marker of interest and select **Settings** for it such as **Marker Frequency** and **Marker Mode**.

Figure 6-6 The Marker/Settings menu



The currently selected marker can be moved simply by dragging it, but it can also be positioned more precisely by entering a specific **Marker Frequency** for it.

Figure 6-7 Changing marker frequency with cursor (left) or keypad (right)

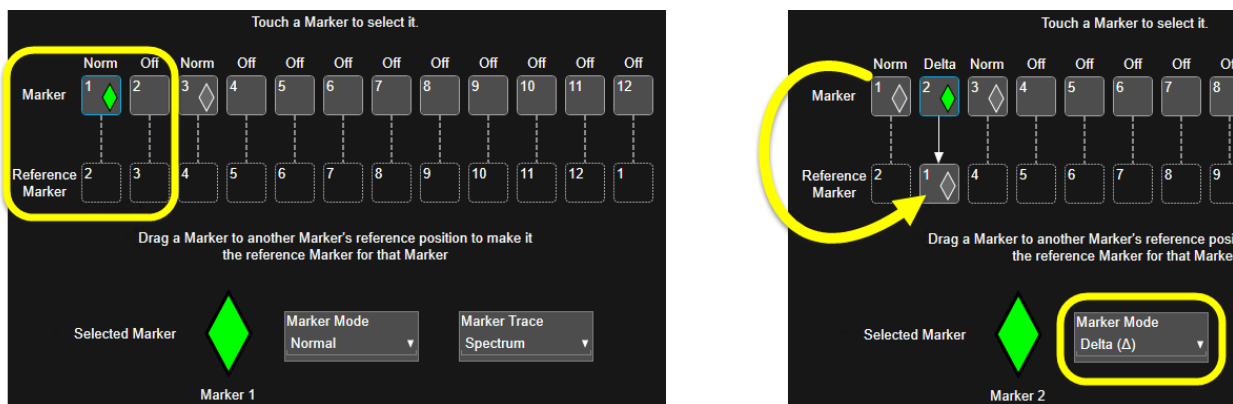


Click **Marker Settings Diagram** on the **Settings** menu to display an interactive graphic showing the settings and dependencies of all markers at once. Click on a numbered **Marker** to select it and change its mode to **Normal**, **Off**, or **Delta**.

(If **Delta** is selected, the marker is used with reference to another marker at a different frequency, to show the difference between trace amplitudes at those two points on the spectrum.)

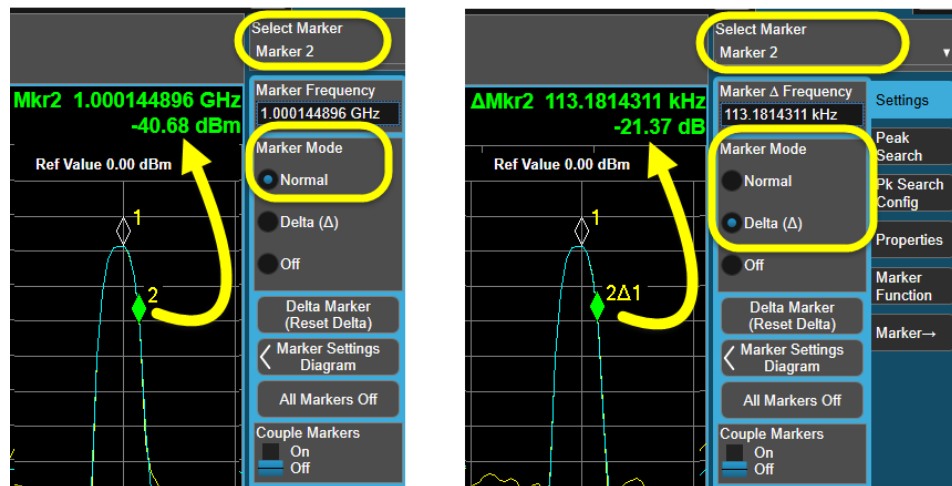
To define **Marker 2** as a delta marker referenced to **Marker 1**, first click on the **Marker 1** icon and drag it to the space occupied by the **Reference Marker** icon directly under the **Marker 2** icon; this makes **Marker 1** the reference marker for **Marker 2**. Click on the **Marker 2** icon to select it, and set the **Marker Mode** to **Delta**.

Figure 6-8 The Marker Settings Diagram



The illustration below shows the difference between **Normal** mode and **Delta** mode. When **Marker 2** is set to **Normal**, it displays the actual amplitude at that marker frequency. When **Marker 2** is set to **Delta**, it displays the difference between amplitude at **Marker 2** and amplitude at **Marker 1**.

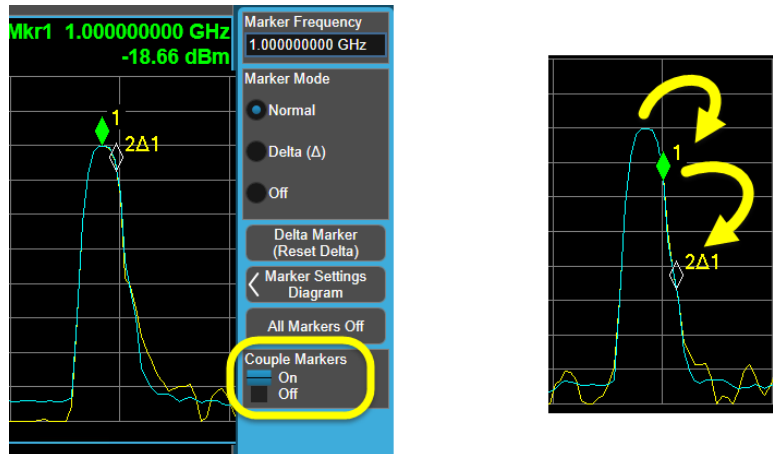
Figure 6-9 The Marker/Settings menu



Setting Couple Markers to on preserves the existing frequency separation between active markers (that is, moving one of a pair of coupled markers moves the other one by the same amount).

Figure 6-10

Coupled markers



In this example Marker 2 is set to a frequency 50 kHz higher than Marker 1; moving Marker 1 up in frequency moves Marker 2 up by the same amount, so that the 50 kHz separation is maintained.

7 Operating Tasks: Source Setup

The following topics can be found in this section:

[“General RF Source Setup” on page 106](#)

[“Loading and Running Waveform Files” on page 107](#)

[“Creating Waveform Sequences” on page 109](#)

[“Using Waveform Markers” on page 111](#)

[“Locking Waveform Files” on page 114](#)

[“Header Utilities” on page 116](#)

General RF Source Setup

The source function of the E6680A relates to generation of test signals to be transmitted to the DUT. (Not all measurement scenarios require these signals, but many do.)

Most source settings are made from the **Input/Output > RF Source** menu, illustrated below.

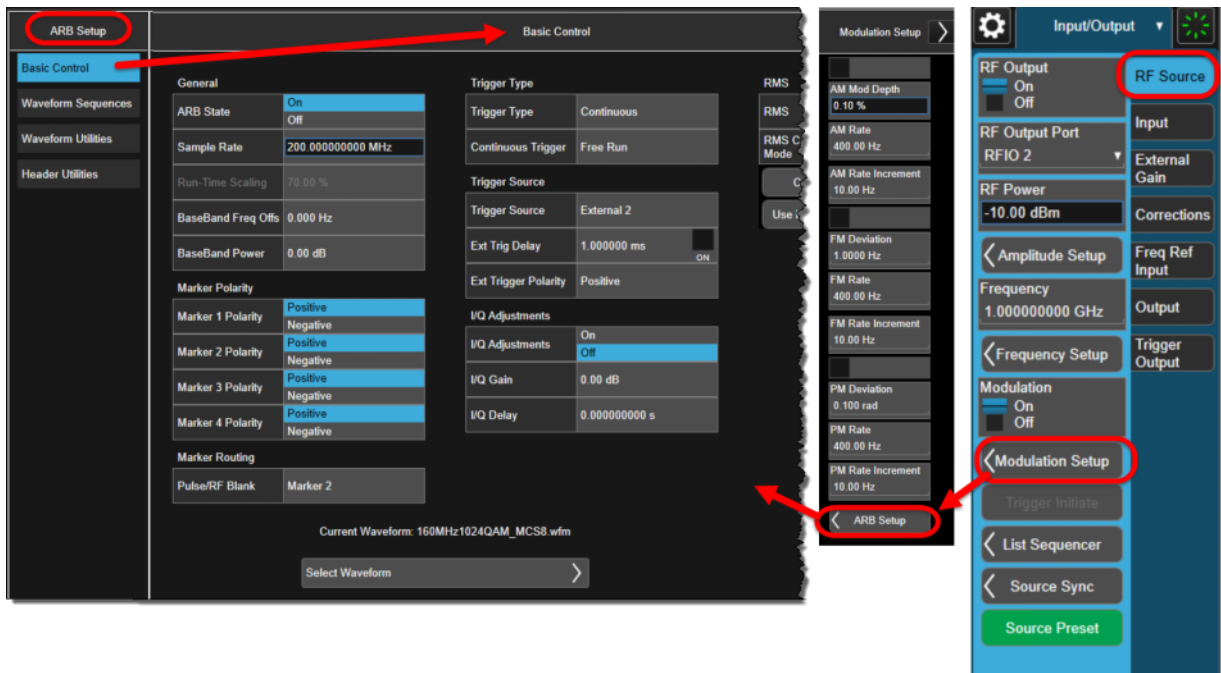
Figure 7-1 RF Source Menu



Loading and Running Waveform Files

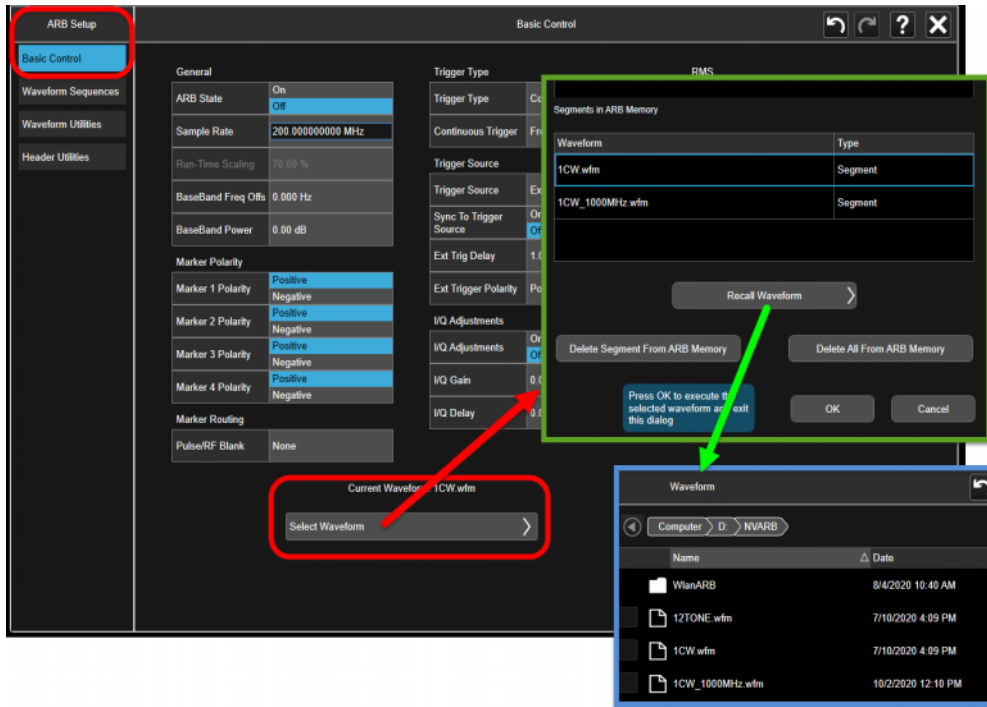
The **Modulation Setup > ARB Setup** window can be used to configure various functions of the arbitrary waveform generator, and to select which waveform files it plays.

Figure 7-2 ARB Setup Window



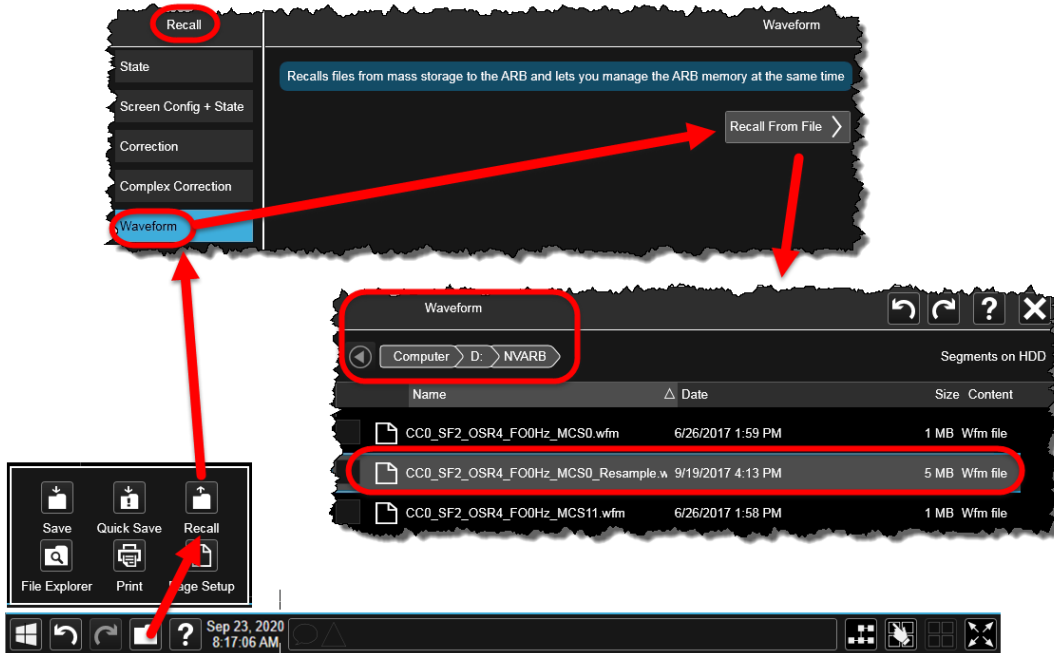
Basic Control is used to set markers and triggers, and to select waveform files as illustrated below. Click **Select Waveform** to choose a waveform file that is currently in ARB memory. If a desired waveform file is not currently shown in the **Segments in ARB Memory** list, use **Recall Waveform** to load it.

Figure 7-3 Basic Control (ARB Setup)



A waveform file can also be recalled directly from the **File > Recall** window:

Figure 7-4 Recalling an ARB file (Recall function)

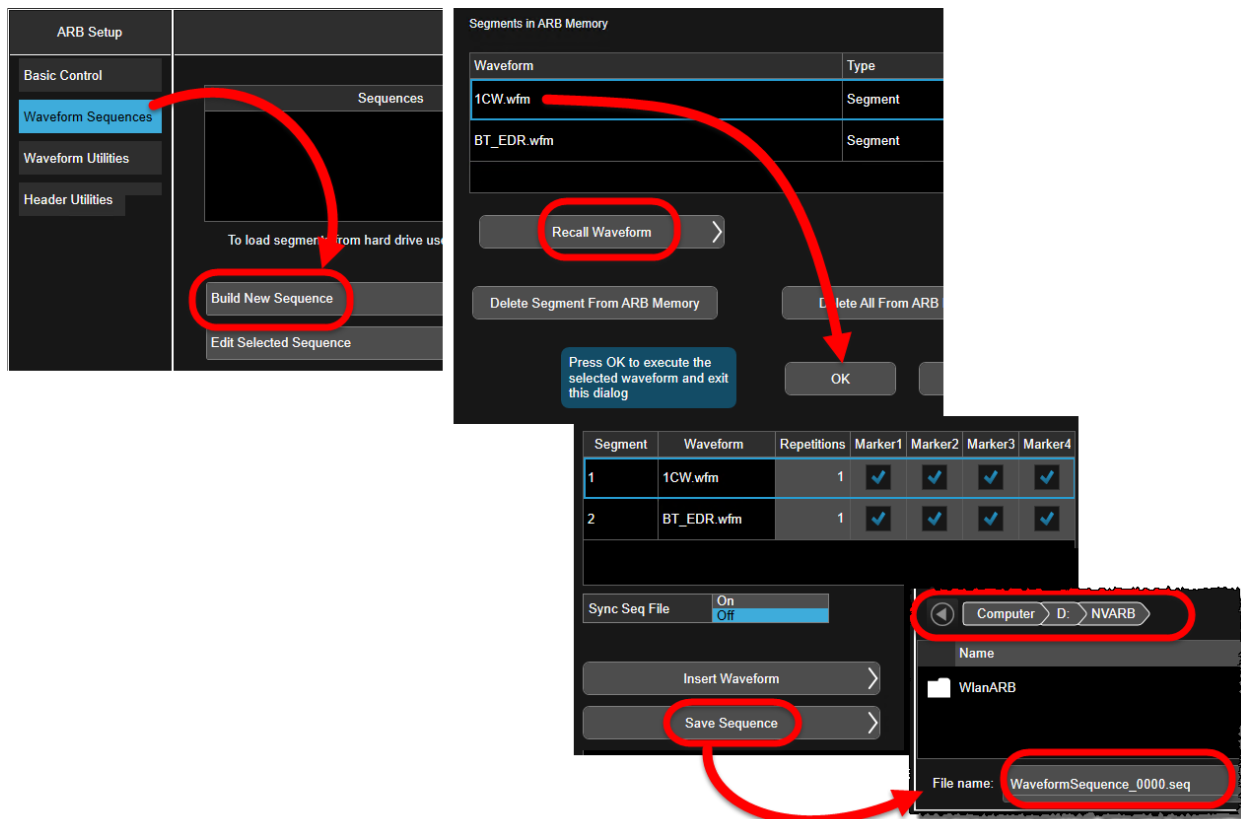


Creating Waveform Sequences

Waveform Sequences is used to create a sequence of waveform files to be played in order:

1. Click **Build New Sequence**.
2. In the window which opens, click **Insert Waveform** (this opens a window showing the waveforms that are in ARB memory. To add a waveform to the sequence, select it and click **OK**. Repeat this process to add more).
3. To add waveforms that are not shown in the table, use the **Recall Waveform** function to load them into ARB memory.
4. When you have all the waveforms added, and you've made the desired settings for their repetitions and markers, click **Save Sequence**.

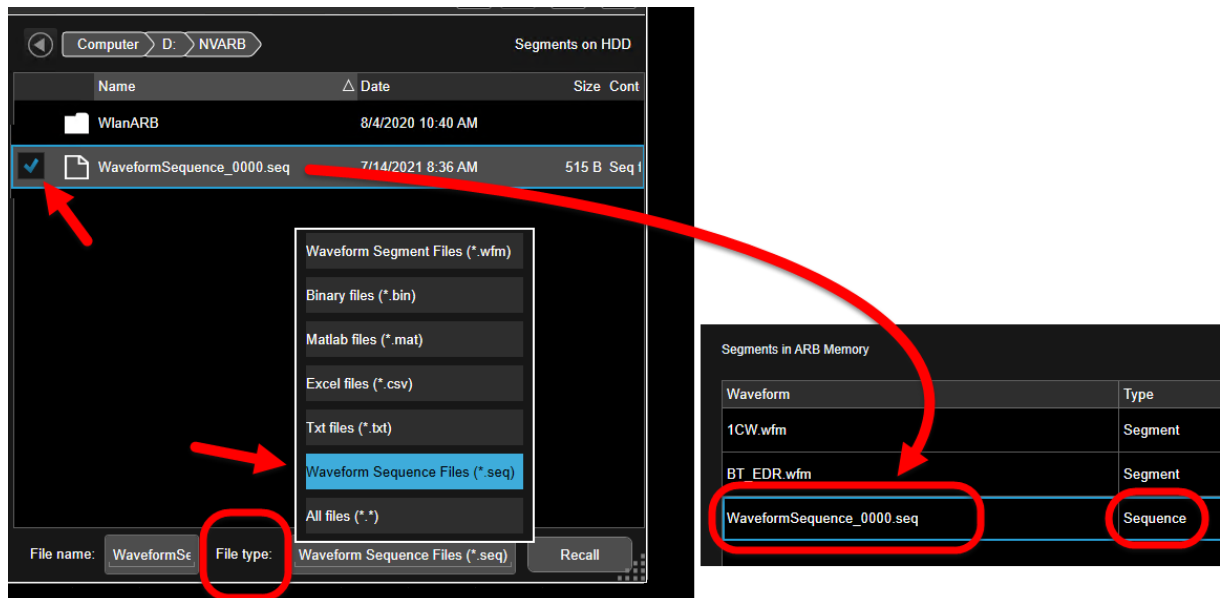
Figure 7-5 Waveform sequences (ARB Setup)



Using the waveform sequence

Once a waveform sequence file (.seq) has been saved, it can be used as if it were a regular waveform file (.wfm). In the **Recall Waveform** window, change the displayed **File Type** to **Waveform Sequence Files** and select the desired file, which is then loaded into ARB memory, and can be used in place of a waveform file.

Figure 7-6 Loading a waveform sequence (ARB Setup)



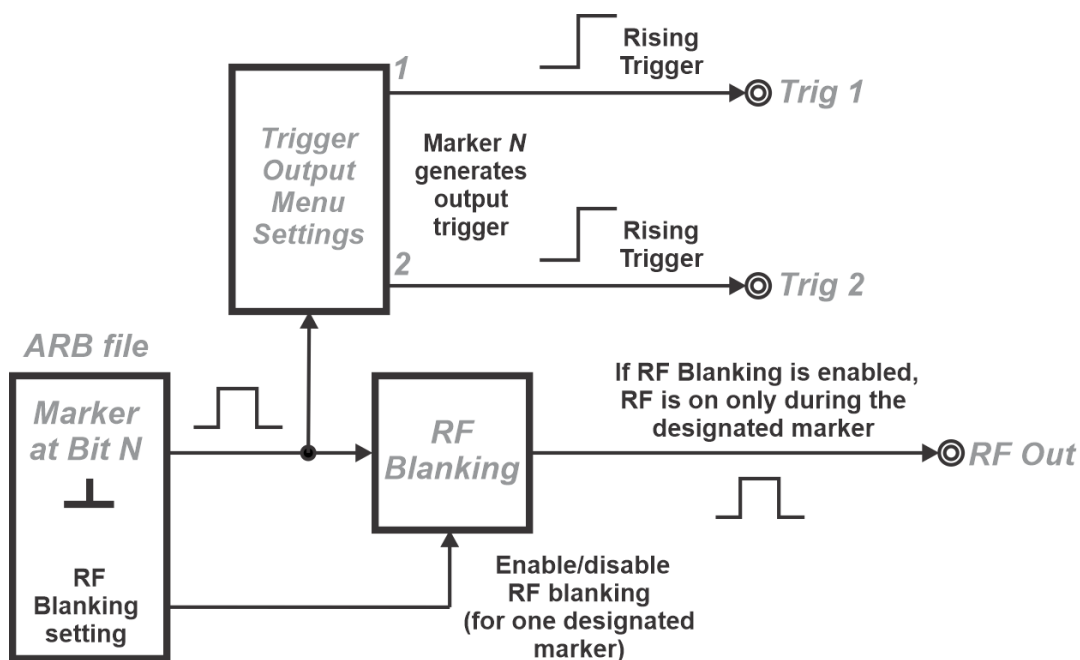
Using Waveform Markers

ARB waveform files played by the source in the E6680A include markers within the waveform data, together with settings for these markers included in the header of the waveform file. One of these markers can be designated for RF blanking of the source output (that is, RF power is on only during the marker event).

The markers can also be used to generate trigger outputs at the **Trig 1** and **Trig 2** connectors on the front panel.

The overall operation of waveform markers is illustrated in the diagram below.

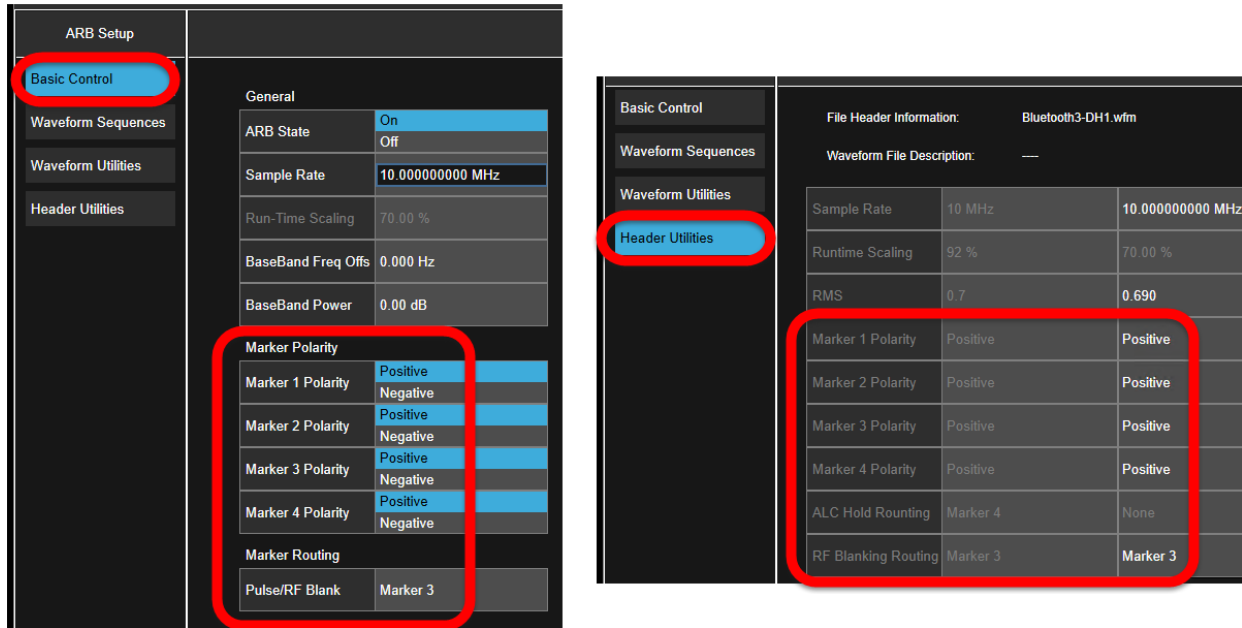
Figure 7-7 Waveform markers



Waveform Marker Settings

The marker settings included in the ARB file header can be viewed from the **Input/Ouput > RF Source > Modulation Setup > ARB Setup** screen, under **Basic Control** or under **Header Utilities**. Although settings can be changed in either of these places, the changes to the header can only be saved by using the **Save Header** button under **Header Utilities**.

Figure 7-8 Marker settings in ARB file header



Marker Polarity settings and **ALC Hold** settings have no effect in model E6680A.

RF blanking is set up by **Marker Routing** (under **Basic Control**) or by **RF Blanking Routing** under **Header Utilities**. The possible settings include:

- **None** (no RF blanking)
- **Marker 1, 2, 3, or 4** (RF is off during the numbered marker selected here)
- **Per Arb** (this selection, although sometimes visible in the user interface, is not applicable to Model E6680A)

The exact result of these settings depends upon how markers were created in the ARB waveform file.

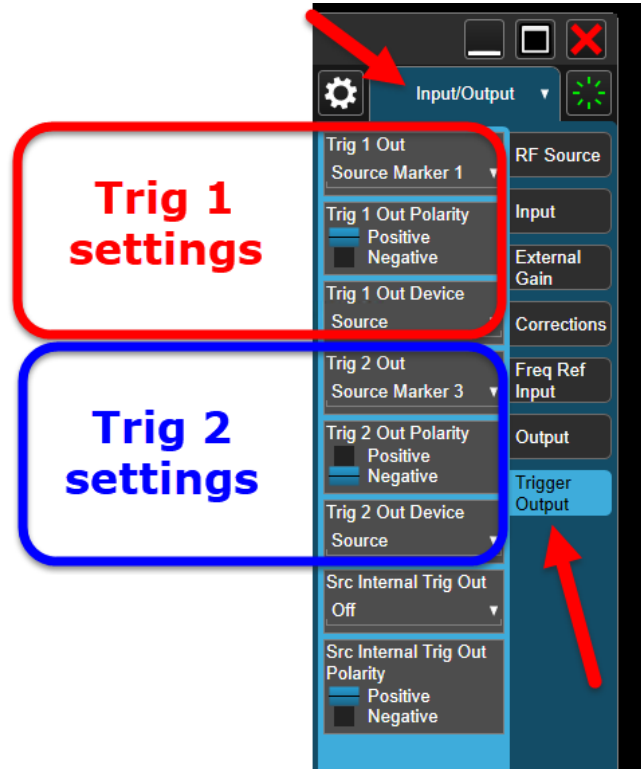
Generating Trigger Outputs

The waveform markers can be used to generate triggers at the **Trig 1** and **Trig 2** outputs on the front panel. In the **Input/Output > Trigger Output** menu, separate settings are available for **Trig 1 Out** and **Trig 2 Out**. (However, the **Polarity** settings have no effect in model E6680A.)

Select **Source Marker N** and choose **Source** as the output device.

Figure 7-9

Using waveform markers to generate trigger outputs



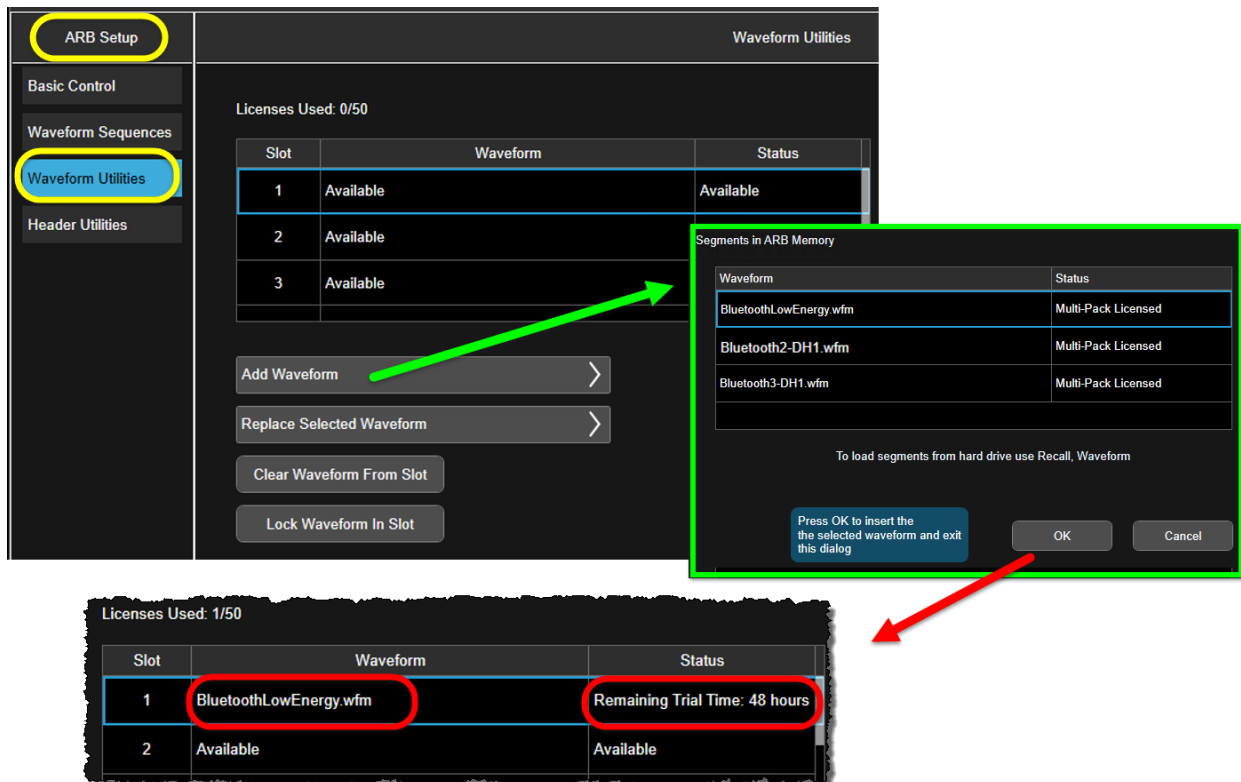
In selecting a marker under **Trig 1 Out** or **Trig 2 Out**, the options include **Off** (no output trigger), **Marker N** (choose a numbered marker), or **Source Per Arb**. If the latter option is selected, the markers are ignored, and the start of the ARB waveform generates the trigger output.

Locking Waveform Files

The measurement applications which run on the E6680A can have a "Y" license (which supports unrestricted use of waveform files by the internal source) or a "V" license (a measurement-oriented license which limits the source to a fixed number of slots into which waveforms can be locked). For example, the license **Y9085EMOE** supports unrestricted use of waveform files in the 5GNR mode; the license **V9085EMOE** is also for the 5GNR mode but limits the source to waveforms already locked in slots.

If you are using a "V" license, you will have to lock a waveform into a slot in order to use it. Open the **Waveform Utilities** window under **Arb Setup**. Select the waveform from the list of files in ARB memory and click **OK**. (If a waveform you want is not shown in the table, use the **Recall Waveform** function to load it into ARB memory.)

Figure 7-10 Waveform Utilities: adding a waveform

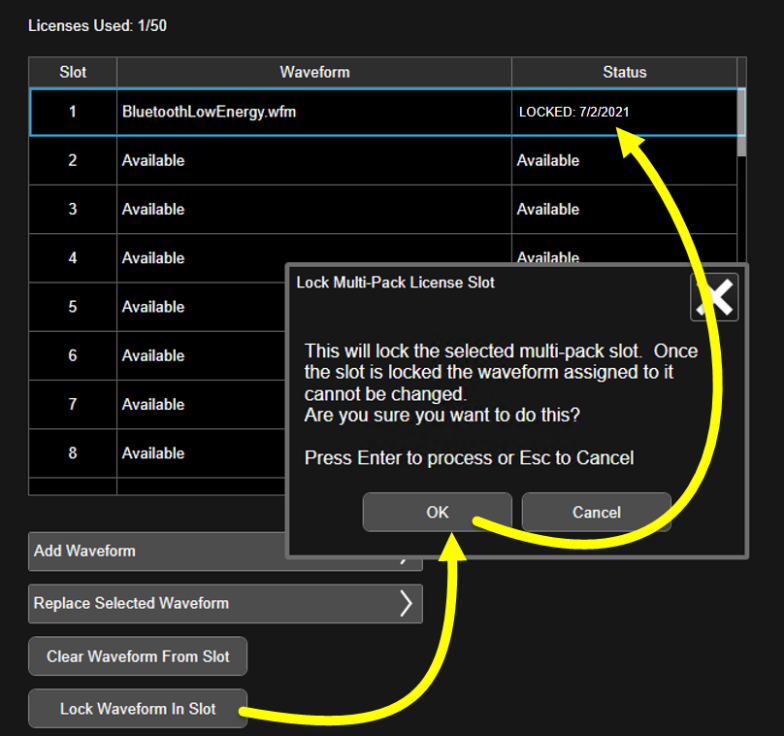


NOTE

If you have previously added a waveform file, but you removed it rather than locking it, that file name becomes unusable here; the interface will not allow you to add a new waveform file with the same name as a file added previously, even if that file is no longer shown in a slot.

To lock a waveform into a slot, highlight the name of the waveform in the list and click **Lock Waveform In Slot**. A confirmation window appears, giving you an opportunity to cancel if you don't want the slot permanently assigned.

Figure 7-11 Waveform Utilities: adding a waveform



Header Utilities

The **Header Utilities** window displays information from the header of the current waveform file or waveform sequence file. Settings which are shown in white rather than gray (such as **Sample Rate** and **Marker Polarity**) are editable; to save your changes to these settings, click **Save Header**.

Marker Polarity settings and **ALC Hold** settings have no effect in model E6680A. However, the setting for **RF Blanking** is functional and can be selected here.

Figure 7-12 Header Utilities (ARB Setup)

The screenshot shows the 'Header Utilities' window within the 'ARB Setup' application. The left sidebar contains a menu with 'Header Utilities' highlighted in blue and circled in red. The main window displays 'File Header Information: 1CW.wfm' and 'Waveform File Description: ---'. Below this is a table of settings:

Sample Rate	200 MHz	200.000000000 MHz	BB Frequency Offset	0 Hz	0.000 Hz
Runtime Scaling	70 %	70.00 %	AWGN State	0	---
RMS	1.0	1.000	AWGN C/N Ratio	0	---
Marker 1 Polarity	Positive	Positive	AWGN Carrier BW	1	---
Marker 2 Polarity	Positive	Positive	AWGN Noise BW	1000000	---
Marker 3 Polarity	Positive	Positive	AWGN Carrier RMS	Unspecified	---
Marker 4 Polarity	Positive	Positive	Over Range Protection	Unspecified	---
ALC Hold Rounding	None	None	Unique Waveform ID	670278039	---
RF Blanking Routing	None	None	License Required	No license required	---

At the bottom right, there are two buttons: 'Clear Header' and 'Save Header'.

8 Test Set Operating System

The following topics can be found in this section:

[“Keysight Software Installed” on page 118](#)

[“User Accounts” on page 119](#)

[“Licensing New Application Software - After Initial Purchase” on page 121](#)

[“Transporting a License Between Test Sets” on page 123](#)

[“Windows Security” on page 126](#)

[“System Maintenance” on page 129](#)

Keysight Software Installed

The E6680A has the 5G application (Y9085EM0E) already installed. Use of the application requires appropriate licenses. Whichever licenses were purchased with the instrument are installed at the factory (see **“Application Licenses” on page 24**). Other licenses can be purchased and installed later (including transportable licenses). For more information, see: <http://www.keysight.com/find/E6680A>

Customer Installation of Software

3rd Party software verified by Keysight

Keysight has verified that the following program is compatible with the test set applications: Symantec AntiVirus™ Corporate Edition version 10

Installation of other 3rd party software

The E6680A platform is an open Windows environment, so you can install non-approved software on the test set. However, installation of non-approved software may affect test set performance. Keysight does not warrant the performance of the test set with non-approved software installed.

NOTE

Before installing any additional programs on the test set, you should exit the E6680A Application.

Also, you must not remove any applications or programs that are installed on the test set when it is shipped from the factory.

If you install programs other than those that Keysight has tested, it could cause problems with the test set's applications. If this happens, you should try uninstalling the program that has caused the problem, or try changing the program's configuration. If this does not correct the problem, you may have to use the Keysight Recovery system to reinstall the test set's system software.

Installation of additional or updated Keysight software

See **“Instrument software installation” on page 135**.

User Accounts

Administrator login

The Administrator account ships from the factory with the password “Keysight4u!”. Using the Administrator account you can perform the following operations:

- Install software
- Configure network and printer access
- Access all files on the test set
- Add or change user accounts and passwords
- Change Firewall settings
- Change Windows settings
- Change the time and date
- Run any application

User login

The default user account that ships from the factory is “Instrument” with the password “measure4u”. This user is a member of the Standard Users group. Using the Instrument account you can perform the following operations:

- Access files on the test set that are accessible to the Standard Users group
- Run applications that are accessible to the Standard Users group

Customer creation of accounts

You can create additional user accounts and decide on the level of security granted to any new user accounts created. For example, the level of security can be assigned as administrator, power user, user, backup operators. User names are not case sensitive but passwords are case sensitive.

NOTE

For the test set software to operate, the user account executing the software must be assigned Administrator or Power User privileges. Otherwise, the test set software will not operate correctly.

It is Keysight's expectation that each user's My Documents folder is mapped to the D: drive. This is to avoid overwriting the user's data in the event the Keysight Recovery must be performed. Also, this facilitates convenient backup by copying the contents of the D: drive to external media. All users accounts created by the factory already have My Documents mapped to the D: drive. Please map all new users My Documents folders to the D: drive.

Licensing New Application Software - After Initial Purchase

Additional measurement application software can be ordered after your initial purchase of the E6680A test set. Software upgrades are provided in a kit that includes an option based Entitlement Certificate. The licenses are downloaded from the license Web site onto a storage device so they can be loaded into the instrument.

If you do not want to wait for your upgrade kit to arrive, licenses can be installed using any available USB storage device. If you choose to do this, we recommend that the latest version of the instrument software be installed. This ensures that the measurement application being licensed and installed matches the most current version of the instrument software.

The latest revision of the software may be downloaded from:
<http://www.keysight.com/find/E6680A>

A license key is usually for one instrument model and serial number combination. The license key will only install itself on that instrument.

NOTE

No calibration is required after a test set application installation.

The installation procedure is as follows:

Step	Action	Notes
1. Redeem the Option Upgrade Entitlement Certificate	Follow the instructions on the certificate.	Log into MyKeysight at http://www.keysight.com/my and go to the Keysight Software Manager to redeem your entitlement certificate. After redeeming your Option Upgrade Entitlement Certificate you will receive an e-mail with a License Certificate (.lic file).
2. Save the license file	Save the .lic file to the root directory of a USB storage device.	
3. Load the license file	Connect the USB storage device to one of the test set USB ports.	Windows will detect the new hardware and may display the configuration menu. The test set automatically loads the license file. (This may take a few minutes) Upon completion, the Keysight License Manager displays a "Successful License Installation" message.
NOTE	Alternatively the license file can be manually installed over USB or LAN by placing the license file in the following folder on the test set. C:\Program Files\Agilent\licensing	

Test Set Operating System
Licensing New Application Software - After Initial Purchase

Step	Action	Notes
4. Verify installation	The test set automatically loads the license file. (This may take a few minutes). Upon completion, the Keysight License Manager displays a "Successful License Installation" message.	On the License tab of the System > System Information window, verify that the new license is listed.
5. Restart the E6680A Application	Close the E6680A Application and re-launch it, to activate the new license.	

Transporting a License Between Test Sets

Transportable licenses are identified as such in the **Type** column of Keysight License Manager.

To transport a license from one test set to another, Keysight recommends that both test sets be at the same instrument software release. This ensures that the user experience is identical between instruments.

As a minimum, the instrument software release in the test set that will receive the transportable license (the "target instrument") must at least be able to support the desired application.

The E6680A supports several ways of transporting licenses. The procedure below will focus on the most common procedure, where neither of the test sets has access to an internet connection. For this procedure to work, a PC with an internet connection is required.

You will need the following:

- USB flash drive
- USB keyboard
- USB mouse

We will refer to the test set from which the transportable license will be removed as the "source instrument". We will refer to the test set which will receive the transportable license as the "target instrument".

The installation procedure is as follows:

Step	Action	Notes
1. Connect the USB devices to the source instrument	Connect the USB flash drive, USB keyboard, and USB mouse to the USB ports on the source instrument.	It will be necessary to use one or more of the rear panel ports to connect the USB devices.
2. Verify software version in each test set	For each test set, select System > System Information > System and make note of the Instrument S/W Revision on each.	Ideally, the revisions will be the same. But at least, both versions should be able to support the application whose license is being transported.
3. Obtain the Host ID from the Target Instrument	On the target instrument, select System > System Information > System and make note of the Host ID.	This information will be needed to issue the license for the target instrument. The Host ID is the model number, followed by a comma, followed by the serial number.

Step	Action	Notes																														
4. Start the License Manager on the Source Instrument	Using the Windows Start menu on the source instrument, open Keysight License Manager. It may take a minute for the Keysight License Manager screen to be fully populated with all the installed licenses:																															
	<table border="1"> <thead> <tr> <th>Feature</th> <th>Description</th> <th>Version</th> <th>Expiration</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>E6680A_BTS</td> <td>E6680A_BTS</td> <td>1.000</td> <td>None</td> <td>Fixed</td> </tr> <tr> <td>E6680A_M44</td> <td>E6680A_M44</td> <td>1.000</td> <td>None</td> <td>Fixed</td> </tr> <tr> <td>E6680A_MSS</td> <td>E6680A_MSS</td> <td>1.000</td> <td>None</td> <td>Fixed</td> </tr> <tr> <td>E6680A_MTS</td> <td>E6680A_MTS</td> <td>1.000</td> <td>None</td> <td>Fixed</td> </tr> <tr> <td>N7699A-D24</td> <td>Measurement Applications Temporary License - demo only</td> <td>2023.0819</td> <td>2022/08/19</td> <td>Fixed</td> </tr> </tbody> </table>	Feature	Description	Version	Expiration	Type	E6680A_BTS	E6680A_BTS	1.000	None	Fixed	E6680A_M44	E6680A_M44	1.000	None	Fixed	E6680A_MSS	E6680A_MSS	1.000	None	Fixed	E6680A_MTS	E6680A_MTS	1.000	None	Fixed	N7699A-D24	Measurement Applications Temporary License - demo only	2023.0819	2022/08/19	Fixed	
Feature	Description	Version	Expiration	Type																												
E6680A_BTS	E6680A_BTS	1.000	None	Fixed																												
E6680A_M44	E6680A_M44	1.000	None	Fixed																												
E6680A_MSS	E6680A_MSS	1.000	None	Fixed																												
E6680A_MTS	E6680A_MTS	1.000	None	Fixed																												
N7699A-D24	Measurement Applications Temporary License - demo only	2023.0819	2022/08/19	Fixed																												
5. Transport the Transportable License from Source Instrument	<p>Follow these steps:</p> <ol style="list-style-type: none"> 1. On the source instrument, locate the desired license to be transported in the KLM window and click on it to highlight it. Its option designator should include the letters "TP" or "TY". 2. Right-click on the mouse and select Delete. 3. Click Yes in the License Deletion Confirmation dialog box. 4. After a few seconds, a Transport License dialog box will appear. Click OK and save the *.url file on the USB flash drive, with a name such as "5G_license.url" 	<p>Be sure you are selecting a transportable license and not a node-locked (perpetual) license.</p> <p>Although you are "deleting" the transportable license, the ultimate action will be to transport it.</p> <p>The information in this dialog box will be used to issue a new license for the target instrument.</p>																														
6. Get New License from KSM Transportation Web page	<p>Follow these steps:</p> <ol style="list-style-type: none"> 1. Insert USB flash drive into PC that is connected to the internet. 2. On the PC, locate the *.url file on the USB flash drive that was saved in the previous step and click on it. 3. After a few seconds, the KSM Transportation Web page will appear. One field, the New Host ID, will be empty. 4. Enter the Host ID of the target instrument (step 3 above) into the field marked New Host ID. 5. Click Submit. 	<p>The PC must have an internet connection and an available USB port.</p> <p>Most of the fields have been populated from the information in the *.url file.</p> <p>Be very careful when entering the New Host ID. A mistake made in entering the New Host ID will result in an invalid license being issued. Be sure there is a comma between the model number and serial number. There should be no spaces in the Host ID.</p>																														

Step	Action	Notes
7. Save License File to USB Flash Drive	<p>Follow these steps:</p> <ol style="list-style-type: none">1.The KSM Transportation Web page will indicate that a license file is available and display two links to the license file. Right-click on the license file and select Save Target As...2.Save the license file to the root level of the USB flash drive, keeping the ".lic" file extension.3.Close the Save dialog and exit the KSM Transportation Web page.	<p>Either link can be used to either display or save the license file.</p> <p>The license file must be saved to the root level of the USB flash drive for it to be recognized by the target instrument.</p>
8. Install License File in Target Instrument	<p>Follow these steps:</p> <ol style="list-style-type: none">1.With the target instrument running, insert the USB flash drive into one of the front panel USB ports. After a few minutes, you should see a message saying "Successful License Installation".2.Cycle power on the target instrument.3.Once the test set has re-booted, the application should be ready to use on the target instrument.	<p>The Keysight License Services running on the target instrument looks for *.lic files whenever it detects a USB device has been inserted. If the contents of the *.lic file are appropriate for the instrument, the license will be installed automatically.</p> <p>Newly-installed licenses are only recognized by the instrument software on power-up.</p>

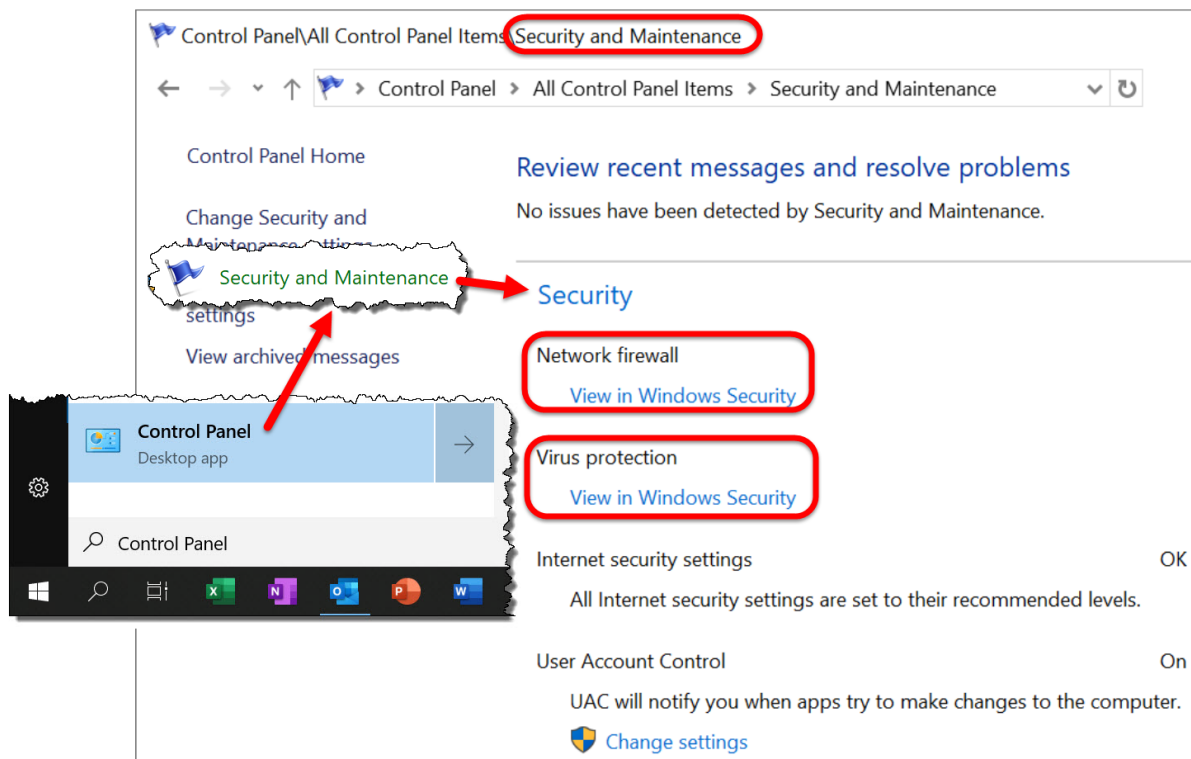
Windows Security

Microsoft recommends the following to ensure the test set Windows operating system is protected:

- Use an internet firewall.
- Get the latest critical Windows updates.
- Use up-to-date antivirus software.

To check the status or make changes in the security settings for your test set, click **Start, Control Panel**, and then **Security and Maintenance**. The following window appears:

Figure 8-1 Security and Maintenance



Windows Firewall

Click **Windows Firewall** in the System and Security window to check the firewall status of your test set. The test set is shipped with the Windows Firewall enabled.

Firewall & network protection

Who and what can access your networks.

Domain network

Status unavailable, open Symantec Endpoint Protection for information.

[Open Symantec Endpoint Protection](#)

Private network

Status unavailable, open Symantec Endpoint Protection for information.

[Open Symantec Endpoint Protection](#)

Public network

Status unavailable, open Symantec Endpoint Protection for information.

[Open Symantec Endpoint Protection](#)

Windows Firewall exceptions for programs and ports have been added to allow proper operation of the test set over a network. Modifying these settings may prevent the test set from operating properly.

Virus protection

Under **Action Center** in the **System and Security** window, click **Review your computer's status and resolve issues** to check the status of virus protection on your test set. There is no antivirus software included with your test set. Antivirus application software has been tested to be compatible with the test set. See the section on **“3rd Party software verified by Keysight” on page 118** for anti-virus software that has been tested by Keysight.

NOTE

Having antivirus software installed may have a slight impact on the test set performance.

Virus & threat protection

Protection for your device against threats.

Symantec Endpoint Protection

Symantec Endpoint Protection is turned on.

Current threats

Status unavailable, open Symantec Endpoint Protection for information.

Protection settings

Status unavailable, open Symantec Endpoint Protection for information.

Protection updates

Status unavailable, open Symantec Endpoint Protection for information.

[Open app](#)

[Windows Defender Antivirus options](#)



Spyware protection

The **Review your computer's status and resolve issues** window described above also shows the status of spyware protection. There is no anti-spyware software installed on the test set. This should not be a problem if you do not use the test set for a lot of internet browsing. Having spyware in the test set could have an impact on the test set performance.

System Maintenance

Back-up

It is recommended that you have a regular back-up strategy for all files which you create (these will be on the **D:** drive). Your IT department may already have a back-up strategy in place which is suitable for the test set and its data.

The Windows operating system has a Backup utility that you can use to archive files and folders in case of a hard disk drive failure. See the Microsoft Windows Help and Support Center for more information on this utility.

When performing back-ups, we recommend that you back-up the data to an external storage device connected to your company's internal network or one of the test set's USB connectors. Also, you should perform back-ups at times when the Server PC is not being used for normal operations as it may impact the test set's overall performance.

System Restore

The Windows operating system has the capability to restore the system to a previous point in time. System Restore is enabled with default settings as provided by Microsoft. However, System Restore is not 100% successful. Therefore, it is not the recommended method to back-up the instrument. System Restore has not been tested to verify successful restoration on this instrument.

Disk defragmenting

Over time the hard disk on the test set becomes fragmented. Windows has a Disk Defragmenter utility that you can use to defragment the hard disk. See the Microsoft Windows Help and Support Center for more information on this utility.

NOTE

Running Disk Defragmenter should be done when the measurement application is not running. Measurement throughput is significantly impacted while disk defragmentation is in process.

USB Connections

The instrument provides USB 2.0 ports on the front panel and rear panel (see **“Front Panel Features” on page 30** and **“Rear Panel Features” on page 35**). These can be connected to USB mass storage devices and to accessories such as printers and keyboards. The test set USB Host support includes the standard Microsoft Windows USB class drivers for human interface, mass storage, printing, scanning, and imaging devices.

In addition, the Keysight IO Libraries software that was included with your test set contains USB Host drivers that allow control of other test sets connected to the USB bus.

Keysight Technologies does not support or warrant correct test set operation if additional USB drivers from third parties are installed in the test set. It is possible that additional drivers could break the normal USB operation. If USB operation is broken, recovery might require reinstalling the test set application using the hard drive recovery process.

Hard Drive Partitioning and Use

The drive is partitioned into 3 sections: **C:**, **D:**, and **E:**

- The **C:** partition contains the Windows operating system and software installed by Keysight. This is an Open System which means you can install additional software. However, only a limited set of software applications are tested for use with the Keysight measurement software. The installation and/or use of other software is not warranted and could interfere with the operation of the measurement software. If instrument repair is ever needed, the Keysight version of the **C:** drive is the only part of the instrument software that is restored by the Instrument Image Recovery System. You must reload any other software that you have added in the instrument.
- The **D:** partition is reserved for data storage. The User Accounts that are configured by Keysight have their Users folder mapped to the **D:** drive. This is for the convenience of backing-up the test set measurement data. You should always back-up the data on the **D:** drive to an external device. This enables you to restore the data should the hard drive need to be replaced.
- The **E:** partition is reserved for Keysight’s use. The primary use of the **E:** drive is for storing the Calibration and Alignment data. Do not change or overwrite the files on this drive. This could cause your instrument to not meet specifications, or even to stop functioning correctly. Do not use this drive for data storage.

Hard Drive Recovery Process

The Keysight Recovery System can be used to repair errors on the test set's **C:** drive partition, or to restore the original factory configuration of the system software. The Keysight Recovery System is stored in a separate hidden hard disk drive partition.

Repairing errors on the hard disk drive may result in loss of data or files. If you need more information about the Windows “chkdsk” error repair process, see the chkdsk documentation in the Microsoft Windows Help and Support Center.

Restoring the original factory system software does not restore any of the following items:


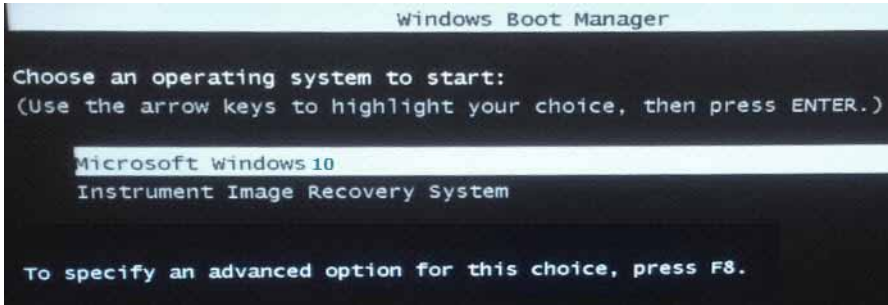
- Windows system configurations that were made after the test set was shipped from the factory. For example, Windows and Service Pack updates, user accounts, and Windows configuration settings. After an Keysight Recovery, these configurations need to be redone.
- Additional software that was installed after the test set was shipped from the factory. After an Keysight Recovery, that software needs to be re-installed.
- Any data or programs saved on the **D:** or **E:** drives.
- Any upgrades that were made to the Keysight measurement application software.

Restoring the original factory system software will not synchronize the code in the Field Programmable Gate Arrays (FPGAs) on the various hardware assemblies. As a result, you may see an error dialog box appear during the final boot-up at the end of the recovery process. This typically occurs when there are significant differences between the software version installed prior to performing the recovery and the version restored by the recovery. In these situations, upgrade the software to the latest version.

NOTE

It is recommended that you use a regular back up strategy. Your IT department may already have a back up strategy in place which is suitable for the test set and its data. See **“Hard Drive Partitioning and Use” on page 130**. Using the Keysight Recovery System in conjunction with a regular back up strategy should allow you to fully recover the test set software and data.

It is recommended that routine backups of the test set information be performed to keep current archives of the test set information. This allows a full recovery of the test set information after the test set recovery system operations are performed. See **“Hard Drive Partitioning and Use” on page 130** for more details.

Step	Notes
1. Make sure the test set is turned off.	
2. Turn test set power on.	After the Keysight Technologies screen is displayed,  the Windows Boot Manager screen is displayed for five seconds.
3. When the Keysight Recovery System has booted, follow the on-screen instructions to recover the image of the C: drive.	 Follow these steps: 1.Press 2, then press Enter to select the recovery. 2.Press 1, then press Enter to continue. 3.Press 1, then Enter to confirm.
4. Wait for the reboot	After exiting the Keysight Recovery System, the test set reboots.

NOTE

Additional recovery steps may be required to fully recover the system to a more current working state. This could involve restoring your own backups of the test set configuration, including re-installing applications, data, and performing system customizations.

Updating the software

The purpose of this update is to ensure that the E6680A's software, its measurement mode applications, and the FPGA content of its PC boards are all current and up to date.

NOTE

An update to the instrument software revision does not require a new license key for the measurement applications, so long as the applications were licensed prior to the update.

NOTE

This procedure will only update the instrument software that currently resides on the C: drive of the instrument. It will not update the version that exists on the recovery partition. Because of this, if the recovery process is performed, the instrument will revert back to the instrument software revision that was originally shipped from the factory.

Determining the current software revision

To determine what revision of instrument software is currently installed, select **System > System Information**. On the window which opens, look for the "Instrument S/W Revision" entry on the "System" tab. If the installed revision is the same as the latest revision on the web, there is no need to update the instrument software.

Requirements

The following requirements must be met to use this procedure:

- The E6680A must be functioning properly before the update is attempted.
- You must have a USB keyboard and mouse.
- You must be able to log in to the instrument as the administrator.
- You must be able to transfer a large file (~.6 MByte) to the E6680A being updated.

File Download

1. Go to <http://www.keysight.com/find/E6680A> and go to the Technical Support section; select the Driver, Firmware & Software tab.
2. Download the executable file by clicking on the file link. Save the file to a location of your choice. If you do not have the ability to download files directly to the C: drive of the E6680A being updated, store the file on a large capacity USB storage device for transfer to the instrument. (The file size is ~.6 MByte.)

User account and log-in

The default user account is Instrument, which does not have the required permissions to install the instrument software updates. For the process outlined below, the user must be logged in as Administrator.

The automated instrument software upgrade process has an install wizard which removes the old software version and installs new software version without manual steps. The removal of the old software version and the installation of the new software version completes in approximately 15 minutes.

1. Connect a USB keyboard and mouse to the E6680A.
2. If the E6680A is not already running, power it up and allow it to boot up completely.
3. Close the E6680A measurement application if it is running. Right-click in the application window, and select **Utility > File** from the right-click menu; select the **Exit** softkey and click **OK** in the confirmation window.
4. Log out as the default user (Instrument). Click the Start icon at the lower left corner of the screen, and select **Log Off**.
5. Select the Administrator icon on the Windows desktop, to log in as follows:
User Name: administrator
Password: Keysight4u!
6. If a “Found New Hardware” wizard window pops up, select “No, not at this time” to bypass the activity.

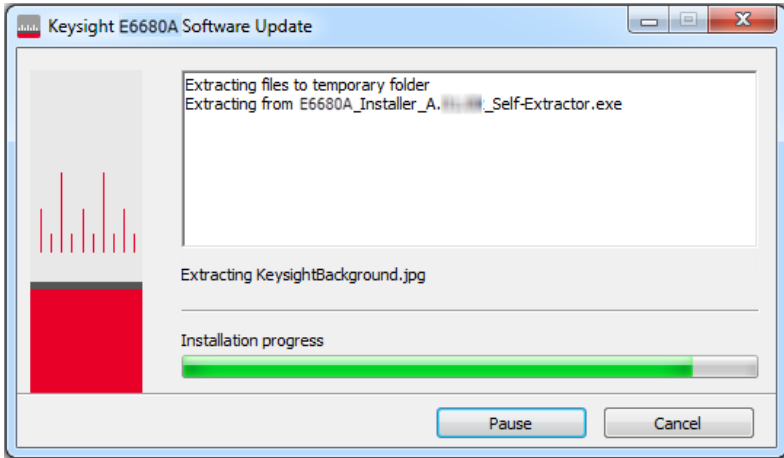
Instrument software installation

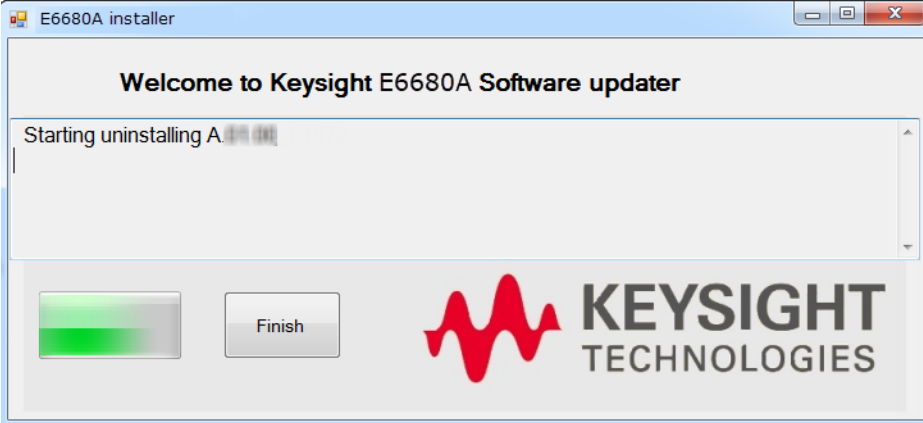
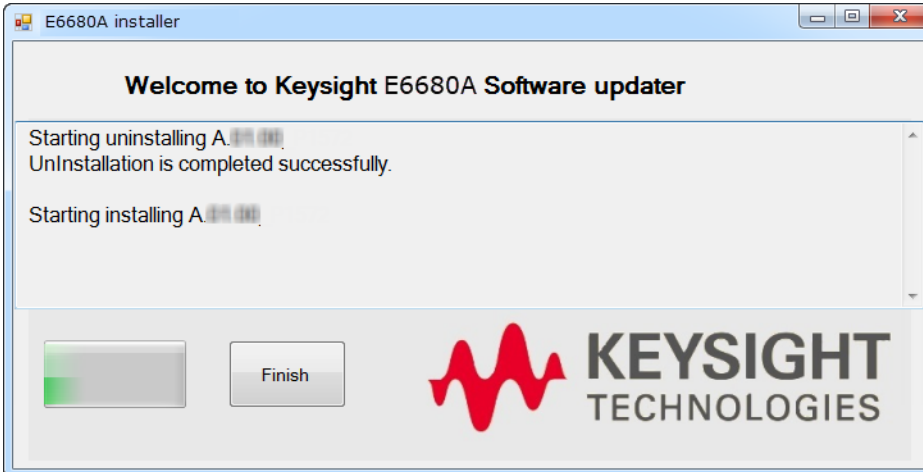
If you downloaded the instrument software update file to the instrument via LAN, access that file from the location that it was stored and proceed to step 1.


If you downloaded the instrument software update file to a USB storage device, plug that into one of the USB ports on the front of the instrument. Access the file for the removable drive, then proceed to step 1.

CAUTION

This installation may involve updating of FPGA devices within the E6680A. During the installation, DO NOT power off the E6680A for ANY reason! Interrupting the FPGA update process can place the instrument in an unusable state, requiring it to be returned to Keysight for repair.

Step	Notes
1. Double-click on the installer file, and click "Yes" in the confirmation window that appears.	The installer is an executable file with a name in the format: E6680A_Installer_A.xx.xx_Self-Extractor.exe
2. A window appears showing the extraction of the software installer.	A confirmation window will ask for your permission to continue the installation process after the installer has been extracted. 

Step	Notes
3. Wait while the previous version of the software is uninstalled.	 <p>The screenshot shows a window titled "E6680A installer" with the heading "Welcome to Keysight E6680A Software updater". A progress bar is partially filled with green, and the text "Starting uninstalling A." is visible. A "Finish" button is present on the right side of the window, along with the Keysight Technologies logo.</p>
4. Wait while the new version of the software is installed.	<p>During installation, you might see additional windows showing that FPGA changes are being made. (However, not all software updates involve such changes.)</p>  <p>The screenshot shows the same "E6680A installer" window. The progress bar is now fully filled with green. The text in the window reads "Starting uninstalling A.", "UnInstallation is completed successfully.", and "Starting installing A.". The "Finish" button remains visible, along with the Keysight Technologies logo.</p>

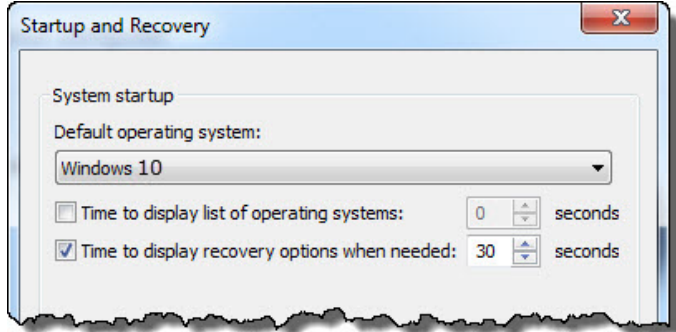
Step	Notes
5. After installation is completed, a power shutdown is required. Click the Finish button when you are ready to reboot.	
6. Reboot manually if necessary.	If the instrument shuts down but does not reboot automatically, remove the USB storage device and cycle power. The boot order for the instrument may have been changed in the instrument BIOS previously, and the instrument may be instructed to boot from USB first, and the internal drive second. If this is the case, failure to remove the USB device will result in an error, as the instrument attempts to boot from it.
7. Verify that the new software is installed.	Select System > System Information . On the window which opens, look for the "Instrument S/W Revision" entry on the "System" tab, and verify it matches the revision of the installer.
8. Perform Alignments	It is recommended to perform an alignment after a firmware upgrade or downgrade. After the alignment process is complete, please verify that the alignment was successful.

NOTE

Additional recovery steps may be required to fully recover the system to a more current working state. This could involve restoring your own backups of the instrument configuration, including re-installing applications, data, and performing system customizations.

Configuring recovery prompt timing

You can configure the time at which the test set power-up process waits for the selection of the recovery process by performing the following steps:

Step	Notes
1. From the Windows Start menu, right-click Computer and click Properties.	This opens the System window.
2. Click Advanced System Settings in the left pane.	This opens the System Properties window.
3. In the Startup and Recovery section, click Settings.	This opens the Startup and Recovery window.
4. Under the System Startup section, uncheck the "Time to display a list of operating systems" checkbox, or select the "Time to display recovery option when needed" checkbox and change the number of seconds to delay for it.	

NOTE

You must be logged in as an administrator to change these settings. See [“User Accounts” on page 119](#) for more information.

9 Troubleshooting

The following topics can be found in this section:

[“Identifying Problems” on page 141](#)

[“Returning Your Test Set for Service” on page 142](#)

Where to get technical help

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

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

<http://www.keysight.com/find/e6680a>

For worldwide contact information regarding repair and service:

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

To contact Keysight Technologies:

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

Also, see **“Locations for Keysight Technologies” on page 143.**

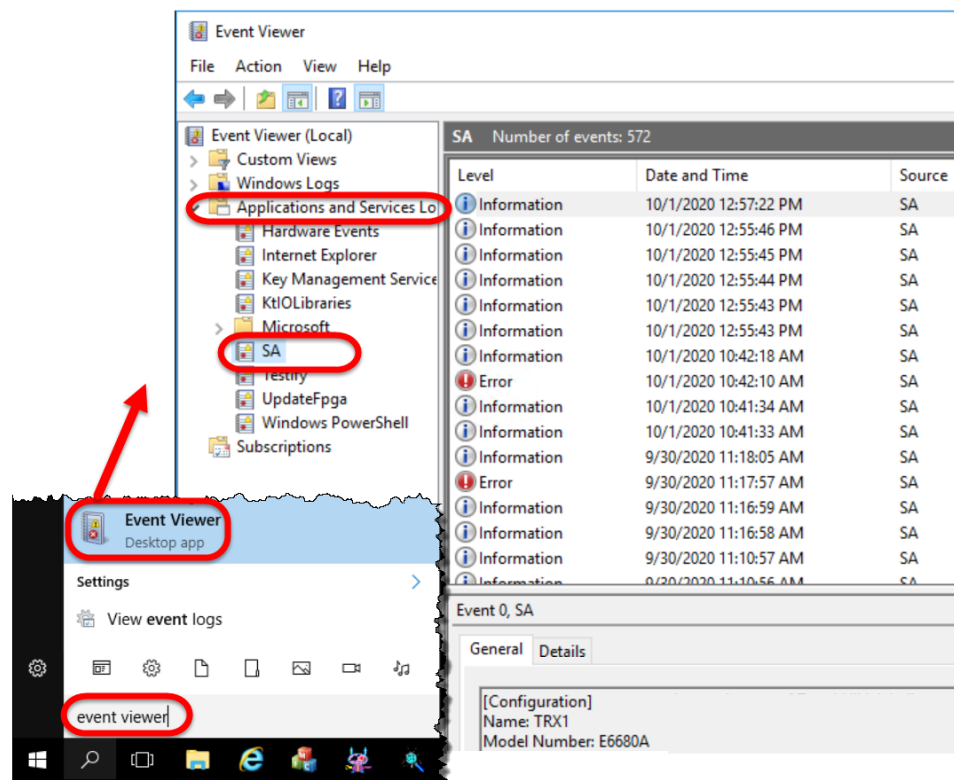
Identifying Problems

WARNING

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

1. Find out if an expected frequency reference input is not being provided to the test set (see **“Frequency Reference Setup”** on page 63).
2. If the E6680A appears to be in a faulty state, reboot the instrument (restart the Windows operating system).
3. Check for error messages in the status bar at the bottom of the interface window.
4. A source of valuable information is the **Event Viewer**, which can be opened from the **Windows Start** menu (enter the name Event Viewer in the search field to locate this utility).

Figure 9-1 Event Viewer



The **Event Viewer** window makes it possible to find information on recent administrative events such as errors and warnings. Look under **Applications and Service Logs > SA**, as illustrated above.

Returning Your Test Set for Service

Calling Keysight Technologies

Keysight Technologies has offices around the world to provide you with complete support for your wireless test set. To obtain servicing information, or to order replacement parts, contact the nearest Keysight Technologies office listed under **“Locations for Keysight Technologies” on page 143**. In any correspondence or telephone conversations, refer to your test set by its product number, full serial number, and software revision.

To access your product information, select **System Information** on the **System** menu (this relates mainly to installed software and licenses) and **Hardware Information** on the **System** menu (this relates mainly to installed circuit boards).

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



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