
Keysight X-Series EMI Receiver

This manual provides documentation for the following X-Series instrument running the Microsoft Windows 10 operating system:

PXE EMI Receiver N9048B

Notices

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

Where to Find the Latest Information

Documentation is updated periodically. For the latest information about these products, including instrument software upgrades, application information, and product information, browse to one of the following URLs, according to the name of your product:

<https://www.keysight.com/find/pxe>

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

<https://www.keysight.com/find/MyKeysight>

Information on preventing instrument damage can be found at:

<https://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:

<https://www.keysight.com/find/techsupport>

Product and Solution Cybersecurity

Keysight complies with multinational regulations for the cybersecurity of its own products and is committed to providing information to assist you in protecting your products and solutions from external cyber threats. For more information, see:

<https://www.keysight.com/us/en/about/quality-and-security/security/product-and-solution-cyber-security.html>

Keysight also recommends that you secure your IT environments using appropriate third-party tools. For instruments that run the Microsoft Windows operating system, Keysight concurs with Microsoft's recommendations for ensuring that the instrument is protected:

- Get the latest critical Windows updates
- For network-connected instruments, use an Internet firewall (in Keysight instruments, Windows Firewall is enabled by default)
- For network-connected instruments, use up-to-date antivirus and anti-spyware software

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<https://www.keysight.com/us/en/contact/responsible-disclosure-program.html>

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If you discover a cybersecurity issue that you suspect may involve Keysight's proprietary software, or third-party software supplied by Keysight as part of a product, or that may affect the operation of Keysight products, we encourage you to report it to us using this form:

<https://www.keysight.com/us/en/about/quality-and-security/security/product-and-solution-cyber-security/report-a-product-cybersecurity-issue>

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1 Quick Start

This section explains how to initialize the EMI receiver and view a signal.

The following topics can be found in this section:

“Initial Inspection” on page 10

“Instrument Location and Rack Mounting Requirements” on page 11

“Turning on the EMI Receiver the First Time” on page 12

“Anti-Virus Software and Firewalls” on page 17

“Instrument Information” on page 18

Initial Inspection

Inspect the shipping container and the cushioning material for signs of stress. Retain the shipping materials for future use, as you may wish to ship the instrument to another location or to Keysight Technologies for service.

Verify the Contents

Verify the shipping container contents using the box contents list.

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 the EMI Receiver to Keysight Technologies, use the original (or comparable) shipping materials. See **“Returning an EMI Receiver for Service” on page 89.**

Instrument Location and Rack Mounting Requirements

Locating the instrument

Make sure that the fan inlet and exhaust vent areas on the sides of the instrument are not obstructed. The minimal required clearance is 2 inches. Airflow restrictions cause additional airflow noise and cause the fans to speed up so they can draw in enough air for the required cooling. This results in excessive audible noise.

NOTE

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

Cooling and rack mounting

Do not rack mount the receiver side-by-side with any other instrument with side-by-side ventilation. Make sure the exhaust air from the first instrument is directed away from the inlet of the second unit. If the pre-heated air from the first instrument is directed into the second instrument, it can cause excessive operating temperatures in the second unit and can cause instrument failures. The instrument draws air in from the left side and exhausts air from the right side.

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.

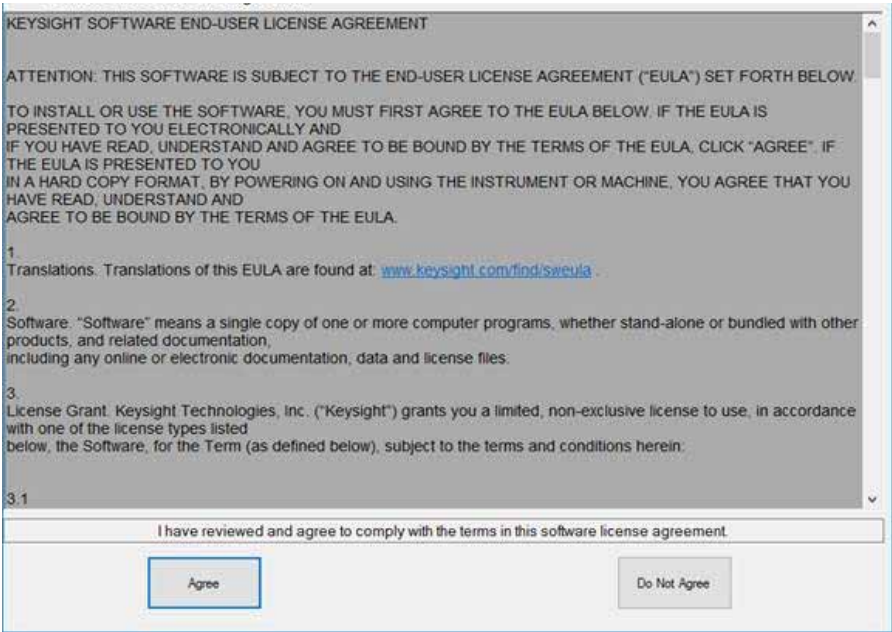
Turning on the EMI Receiver the First Time

Initial power-on of the instrument can be accomplished using the following methods:

Initializing the instrument

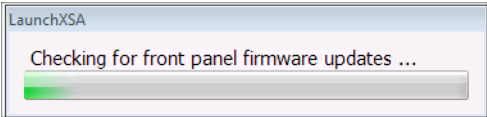
Steps	Actions	Notes
1. Power on the instrument	a. Position the instrument so you have easy access to the power cord and plug it in. b. Press the power switch (located in the lower left corner of the instrument's front panel) to turn the instrument on.	See "Instrument Location and Rack Mounting Requirements" and "Power requirements" on page 18 for more details. The instrument can require more than 5 minutes to power-on. The Keysight Technologies screen appears followed by a screen that allows you to select Windows10 or the Recovery option.

2. Viewing the End-User License Agreement
- After a brief startup, the following window appears giving you information about the End-User License Agreement.



At this time, it is safe to turn off the instrument before initializing the software.

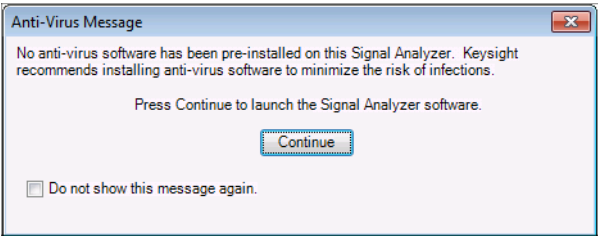
3. Reboot and log on
- Click **OK**
- When the instrument restarts, the following message window appears:



Quick Start

Turning on the EMI Receiver the First Time

Steps	Actions	Notes
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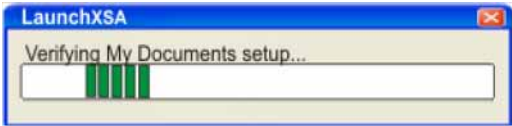


This window appears and covers the Launch window.

NOTE

If you do not check the “Do not show this message again” check box, this message will be displayed each time the instrument is turned on. No application will start while this message is displayed. Before continuing, make sure that you carefully read the Anti-Virus message and determine what action is appropriate.

4. Disable the Anti-Virus message
- Select the check box and click **Continue**.
- Messages similar to the following continue to appear:



Several required processes continue.

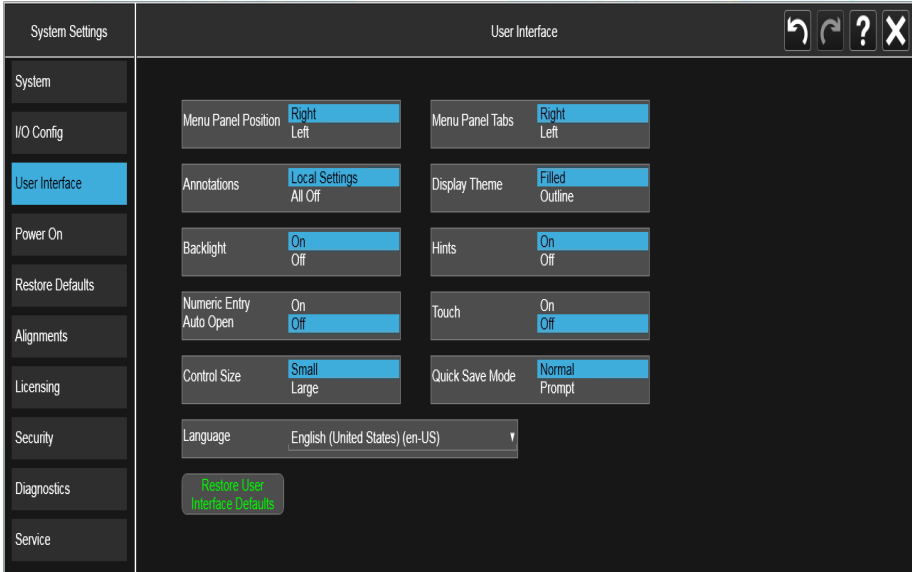
The application initializes.

5. When the installation is complete, you should see a display like this:



6. Set user interface language
- a. On the instrument, press **System, User Interface** tab.
- b. Choose the desired language from the **Language** drop-down menu.

Quick Start
Turning on the EMI Receiver the First Time

Steps	Actions	Notes
		

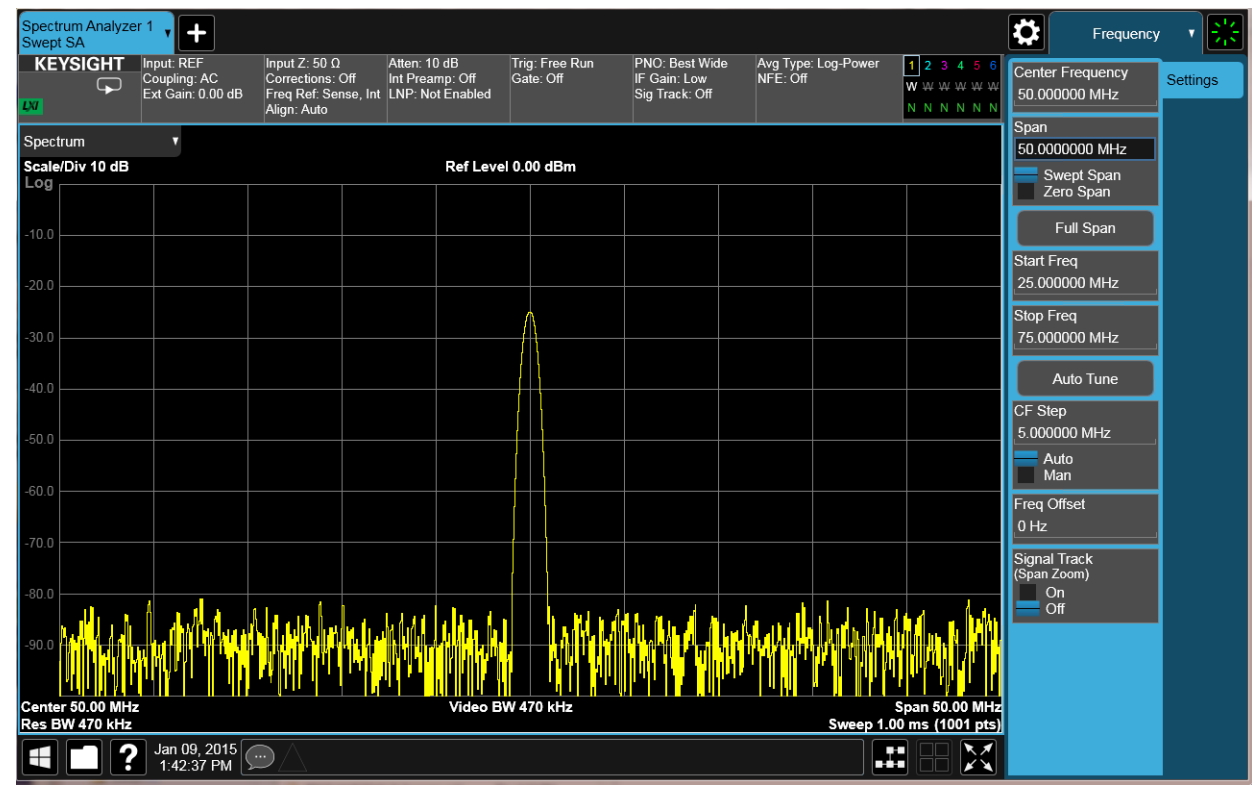
7. Verify the installation	a. On the instrument, press System, Show System .	If you require further assistance, contact the Keysight support team. Online assistance: http://www.keysight.com/find/assist
	b. Verify that the purchased application(s) appear in the list or have an entitlement certificate.	
8. View a signal	a. Press the plus tab.	
	b. Select Spectrum Analyzer, OK .	
	c. Press Input/Output, RF Calibrator, 50 MHz .	
	d. Press FREQ, Center Freq, 50, MHz .	
	e. Press SPAN, 50, MHz .	

Quick Start

Turning on the EMI Receiver the First Time

Steps	Actions	Notes
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The 50 MHz reference signal appears on the display as shown below..



Instrument Power Down Process

The following steps ensure that your data is saved before the instrument shuts down.

Recommended instrument shut down

Step	
1. Briefly press the front panel power button.	CAUTION Do not hold the button down (since this signals the processor to immediately shut down before saving data, which could potentially cause disk corruption).
2. The instrument will begin the power down sequence where the instrument performs clean-up activities such as closing applications and writing data to disk. The “Shutting Down” Message will appear on screen.	CAUTION Do not disconnect the AC power at this time. It is important that the instrument be able to complete all power down activities before power is interrupted.
3. When the display goes blank, the fans stop, and the front panel yellow standby light turns on, the instrument is completely shut down.	
4. You may safely remove the power cable at this time.	

Anti-Virus Software and Firewalls

No third-party anti-virus software is shipped with the instrument. It is recommended that you install anti-virus software if your instrument is connected to the LAN. Check with your IT department to see what they recommend.

Do not modify the default network settings as this may cause problems with the operating system of the instrument.

The instrument is shipped with the Windows 10 firewall enabled and Windows Defender.

To adjust Windows Defender settings you must be logged in as an "administrator" (default password:"Keysight4u!"). Minimize the X-Series Application, click the Start button and type: defender. Then click on Windows Defender from the Best match column.

NOTE

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

Instrument Information

Power requirements

The only physical installation of your Keysight receiver is a connection to a power source. Line voltage does **not** need to be selected.

This instrument does **not** contain user serviceable fuses.

NOTE

The instruments can operate with mains supply voltage fluctuations up to $\pm 10\%$ of the nominal voltage.

WARNING

This is a Safety Class 1 Product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.

Failure to ground the instrument properly can result in personal injury. Before turning on the instrument, you must connect its protective earth terminals to the protective conductor of the main power cable. Insert the main power cable plug into a socket outlet that has a protective earth contact only. DO NOT defeat the earth-grounding protection by using an extension cable, power cable, or autotransformer without a protective ground conductor.

CAUTION

This product is designed for use in Installation Category II and Pollution Degree 2 per IEC 61010 Second Edition and IEC 664 respectively. This instrument has autoranging line voltage input. Be sure the supply voltage is within the specified range.

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.

AC power cord

The receiver is equipped with a three-wire power cord, in accordance with international safety standards. This cable grounds the instrument cabinet when connected to an appropriate power line outlet. The cable appropriate to the original shipping location is included with the instrument.

CAUTION

Always use the three-prong AC power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord can cause product damage.

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.

Protecting Against Overpowering

The input circuitry of the instrument can be damaged by applying signals that exceed the maximum safe input level of +30 dBm average total power or +/- 0.2 Vdc (when DC coupled) or +/- 70 Vdc (when AC coupled). Refer to the instrument's specification guide for more details regarding the Maximum Safe Input Level. Repairing damage to the input circuitry can be expensive.

If the instrument will be used to measure signals which might be near the maximum safe input level, use external attenuators and/or limiters to help protect the instrument input. The External Gain, amplitude Corrections, and/or Ref Lvl Offset features may be used to compensate for the gains and losses of external devices. External Gain and Corrections are under the Input/Output menu and Ref Lvl Offset is under the AMPTD Y-Scale menu.

Instrument Maintenance

Cleaning the instrument

WARNING

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

Cleaning Connectors

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

WARNING

Keep isopropyl alcohol away from heat, sparks, and flame. Store in a tightly closed container. It is extremely flammable. In case of fire, use alcohol foam, dry chemical, or carbon dioxide; water may be ineffective.

Use isopropyl alcohol with adequate ventilation and avoid contact with eyes, skin, and clothing. It causes skin irritation, may cause eye damage, and is harmful if swallowed or inhaled. It may be harmful if absorbed through the skin. Wash thoroughly after handling.

In case of spill, soak up with sand or earth. Flush spill area with water.

Dispose of isopropyl alcohol in accordance with all applicable federal, state, and local environmental regulations.

Battery Information

The instrument uses a lithium battery located on the CPU board. This is not an operator replaceable part. See [“Returning an EMI Receiver for Service” on page 89](#). Replaceable parts must be approved or supplied by Keysight Technologies.

You can order the service documentation for the instrument through your Keysight Sales and Service office.

WARNING

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended. Discard used batteries according to the manufacturer’s instructions.

Do not throw batteries away but collect as small chemical waste.



**DO NOT THROW BATTERIES AWAY BUT
COLLECT AS SMALL CHEMICAL WASTE.**

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 an instrument 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 instrument.
- 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).

South Korean Class B EMC declaration:

This equipment is Class B suitable for home electromagnetic environments and is suitable for use in all areas.

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2 Front and Rear Panel Features

This section describes the following features:

“Front-Panel Features” on page 24

“Display Features” on page 26

“Rear-Panel Features” on page 33

“Instrument Markings” on page 35

Front-Panel Features



Item		Description
#	Name	
1	Measurement Keys	These keys (in the shaded area) enable you to set the parameters used for making measurements in the current Mode and Measurement.
2	Preset Keys	Mode Preset - local to the current mode, global to all measurements in the mode, affects most but not all parameters in the mode, does not affect Input/Output or System variables User Preset - local to the current mode, global to all measurements in the mode, affects all parameters in the mode as well as the Input/Output variables. Does not affect System variables.
3	Save/Recall Keys	Save - enables you to save states, traces, screen images and other items from the instrument to files on the instrument's internal storage, to removable devices, and to directories on the network. Recall - enables you to recall previously saved states, traces and other items to the instrument from files on the instrument's internal storage, from removable devices, and from directories on the network.
4	Sweep Keys	Single/Cont - toggles between single and continuous measurement sweeps. Restart - restarts the measurement.
5	Mode/Measurement Key	This key enables you to select the desired Mode (measurement application), Measurement, and/or View.

Front and Rear Panel Features
Front-Panel Features

Item		Description
#	Name	
6	Enter and Arrow Keys	The Enter key terminates data entry when either no unit of measure is needed, or you want to use the current unit. The arrow keys: – Increment and decrement the value of the current measurement selection. (up/down = big increment, left/right = small increment) – Navigate within tables.
7	Knob	Increments and decrements the value of the current active function.
8	Utility Keys	The following keys are available in the Utility section: Numeric key pad System Help Local/Cancel/(Esc) Back-space Delete Control Alt Undo/Redo Touch On/Off Onscreen Keyboard Tab
9	RF Input	Connector for inputting an external signal. Make sure that the total power of all signals at the instrument input does not exceed +30 dBm (1 watt).
10	USB Connectors	Standard USB 2.0 ports, Type A. Connect to external peripherals such as a mouse, keyboard, DVD drive, or hard drive. Proper Ergonomics should be considered when using accessories such as a keyboard or a mouse.
11	Headphones Output	Headphones can be used to hear any available audio output.
12	Probe Power	Supplies power for external high frequency probes and accessories.
13	Ext Mixer	Provides LO output signal to and receives IF input signals from an external mixer. See the Specifications Guide for details on signal levels.
14	Power Standby/ On	Turns the instrument on. A green light indicates power on. A yellow light indicates standby mode. NOTE The front-panel switch is a standby switch, not a LINE switch (disconnecting device). The instrument continues to draw power even when the front-panel switch is in standby. The main power cord can be used as the system disconnecting device. It disconnects the mains circuits from the mains supply.
15	RF Input 2	Connector for inputting an external signal.

Display Features

This section describes the regions of the display.



Invalid Data Indicator

 The invalid data indicator is displayed whenever the data on the display does not match the settings of the instrument. The most common example of this is when instrument settings have changed in the time since the data in the traces on the display was taken. This means that the screen annotation cannot be guaranteed to match the trace data. For example, if you change Center Frequency, the invalid data indicator will display until a new sweep has completed.

If any Trace is in View mode (displaying but not updating) and instrument settings are changed, the invalid data indicator will display as long as that trace remains in View. Traces that are blanked do not turn on the invalid data indicator.

Not all instrument settings require display of the invalid data indicator when they change, only changes that require a new acquisition will cause it to display. For example, changing the Y-Axis scale of the instrument does not cause the invalid data indicator to display, unless the attenuation changes.

Also, the invalid data indicator is turned on:

- When the counter is turned on, until the completion of the first count

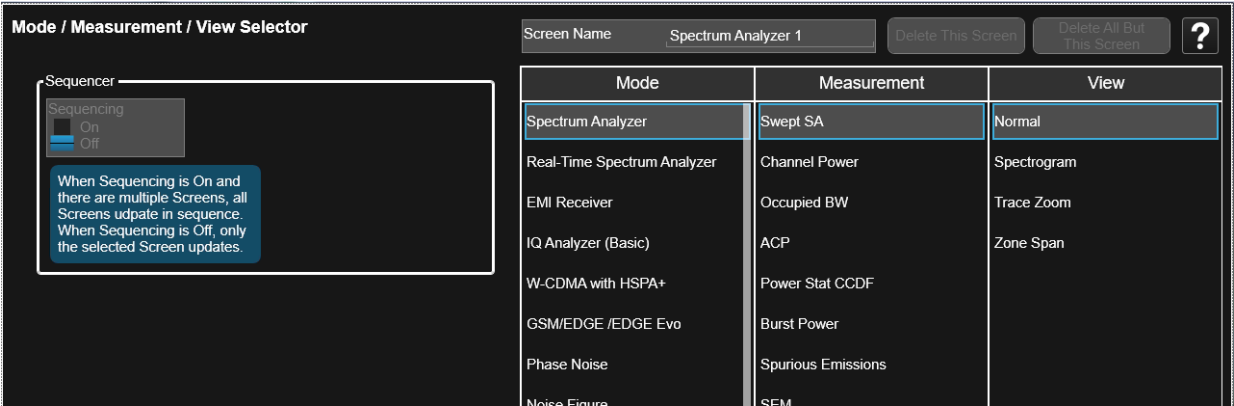
- When a trace is imported from mass storage and the trace’s parameters do not match the current instrument settings
- When a trace is sent to the instrument from a remote interface (since there is no way to know if its settings match)

NOTE

The Data Invalid Indicator has an associated status bit that can be checked at any time to see if it is on.

Screen Tabs

Along the top of the display are tabs, one for each measurement screen you have defined. Tap the + sign to "clone" the current measurement, which can be changed once it is created. Tap the current screen tab (or press the Mode/Meas hardkey) to display the following dialog:



This dialog allows you to choose a Mode, Measurement and View.

When you select a mode, the measurements that are available in the mode are displayed in the Measurement column.

When you select the desired measurement, the views available for the measurement are displayed under the View column.

You can have up to 16 measurement tabs, but only 6 can be viewed at one time. If the tabs overfill the top bar, then scroll left and right using the arrows to the left and right of the tabs.

You switch screens by touching the tabs. Then, to view multiple screens, press the  icon on the Bottom Bar.

Meas Bar

The Meas Bar shows general measurement settings and information. The annotations on this bar can be used to change settings. Tap anywhere in the annotation box to access the drop-down panel that contains relevant parameters. The following graphic shows some of the drop-down menus and the parameters they contain.



  Indicates single/continuous measurement.

Measurement Display

This area shows the measurement results in graphical and tabular form. You can interact with this area using pinch, drag, scroll and tap gestures.

On the signal:

Horizontal pinch - changes the span of the instrument

Horizontal drag - changes the center frequency

Vertical pinch - changes the vertical scaling

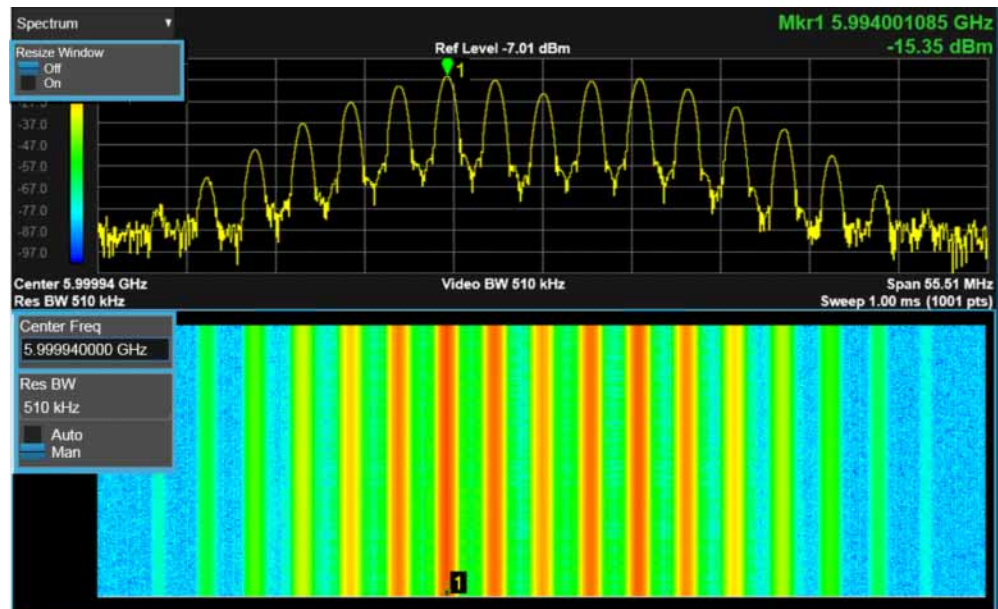
Vertical drag - changes the reference level

Markers may be moved by dragging them to the desired location

Touch and hold - simulates a right click

Swipe scroll - allows you to view information that extends beyond the window area. When you begin to scroll, the scroll bar appears and fades once you stop scrolling.

The annotation drop-downs in the window area allow you to change parameters. The window title drop-down allows you to resize the windows in the multi-window format. When you tap in those areas, the drop-down control menus appear as shown in the following graphic.



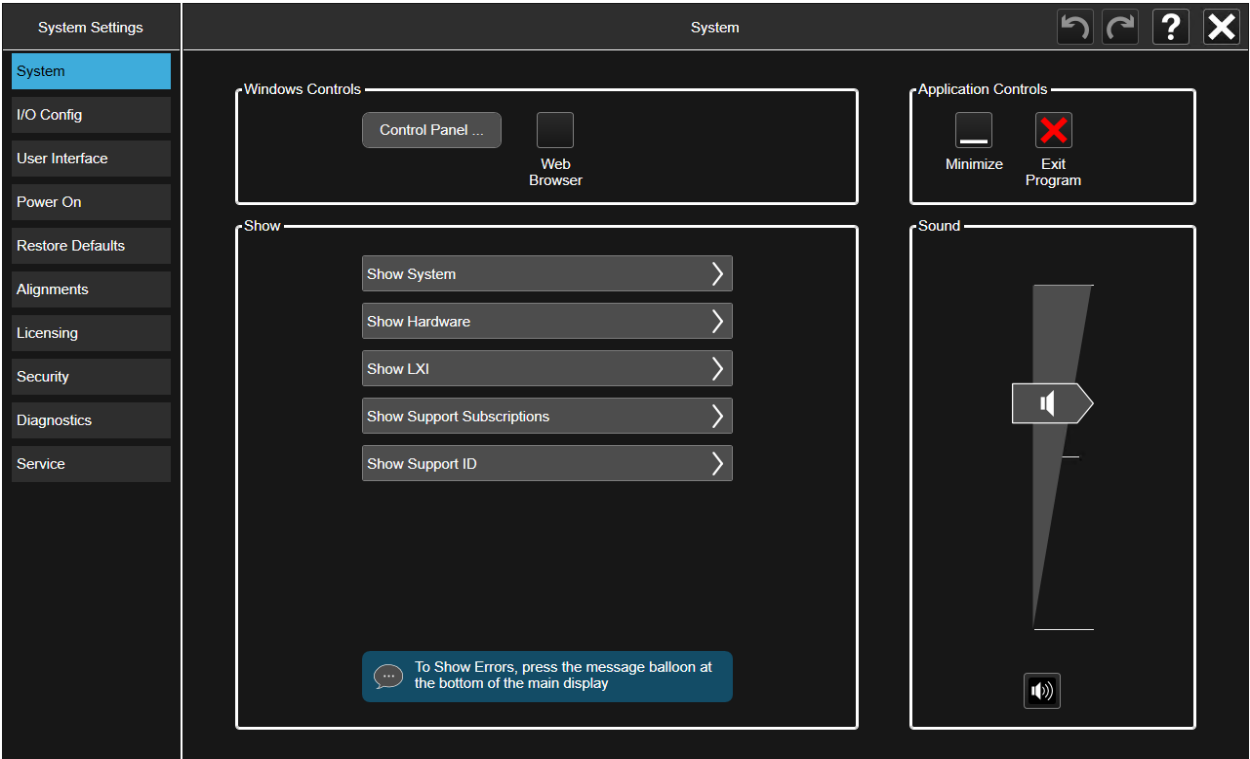
Menu Panel

At the top of the menu panels are two icons:

The Preset icon  accesses the following control menu:



The System icon  accesses the following dialog:

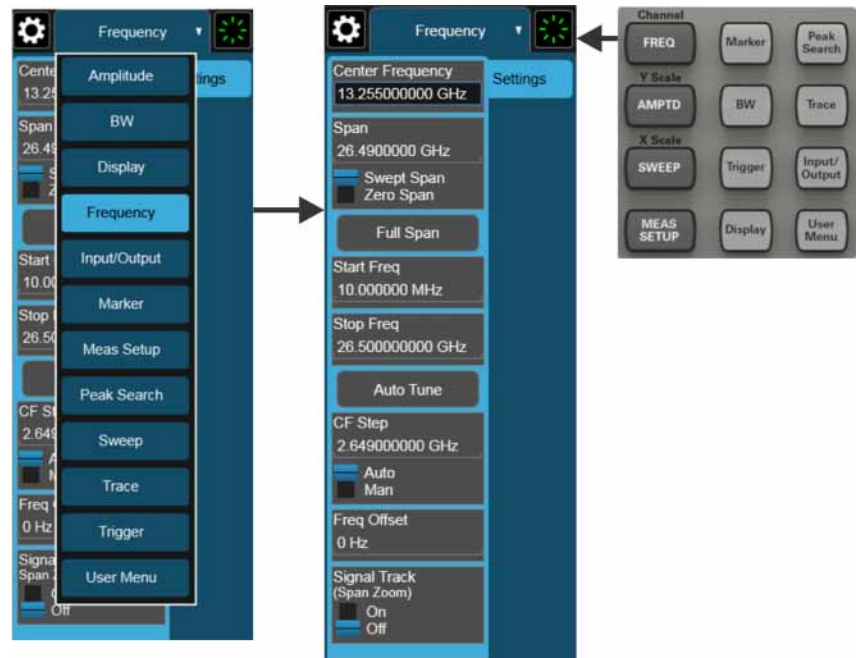


Front and Rear Panel Features
Display Features

The hardkey drop-down panel contains the measurement controls. These are the same as the hardkeys in the shaded area of the keypad:



You can select functions using either the keypad or the drop-down menu.



Notice that the Frequency panel has a Settings tab on the right side. Other panels may have multiple tabs. The tabs access controls for the particular parameter noted on the tab.

Front and Rear Panel Features
Display Features



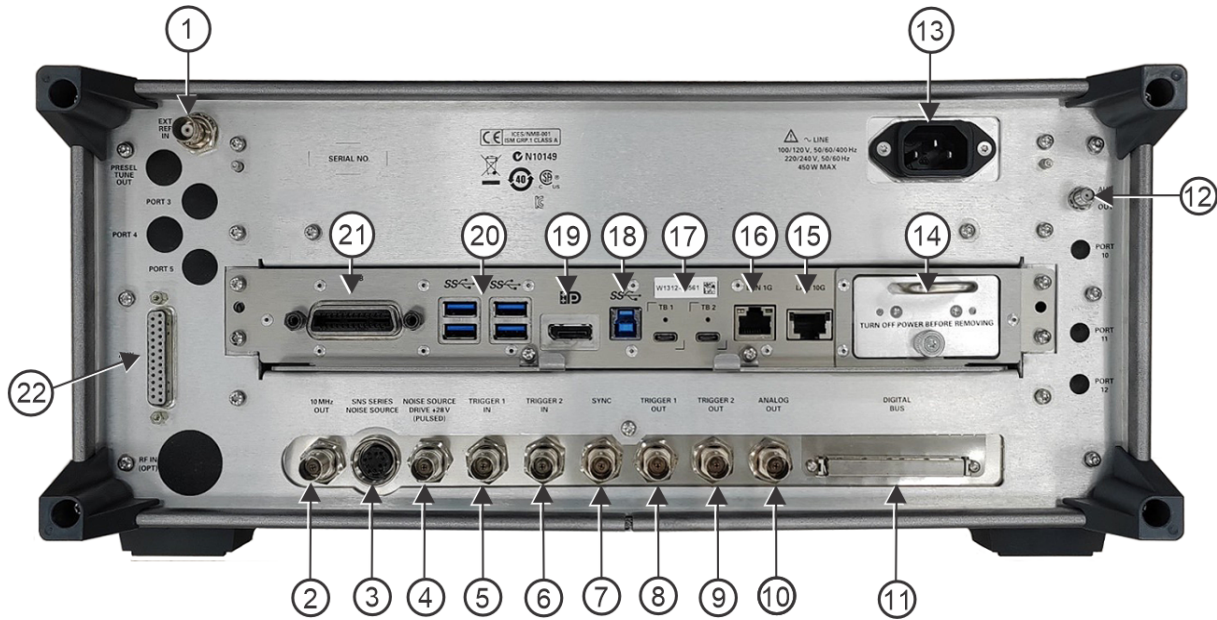
Bottom Bar

The bottom bar contains several icons that access various controls.



Rear-Panel Features

PXE



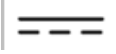
Item		Description
#	Name	
1	EXT REF IN	Input for an external frequency reference signal.
2	10 MHz OUT	An output of the analyzer internal 10 MHz frequency reference that the analyzer is currently using internally.
3	SNS Series Noise Source	For use with Keysight N4000A, N4001A, N4002A Smart Noise Sources (SNS).
4	Noise Source Drive +28 V (Pulsed)	For use with Keysight 346A, 346B, and 346C Noise Sources.
5	TRIGGER 1 IN	Allows external triggering of measurements.
6	TRIGGER 2 IN	Allows external triggering of measurements.
7	Sync	Reserved for future use.
8	TRIGGER 1 OUT	A trigger output used to synchronize other test equipment with the instrument. Configurable from the Input/Output keys.
9	TRIGGER 2 OUT	A trigger output used to synchronize other test equipment with the instrument. Configurable from the Input/Output keys.

Front and Rear Panel Features
Rear-Panel Features

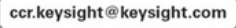
Item		Description
#	Name	
10	Analog Out	For Option YAS: Screen Video Log Video Linear Video For Option EMC or N9063C Analog Demod Measurement Application: Demod Audio
11	Digital Bus	Reserved for future use
12	AUX IF OUT	CR3 Second IF Out
13	Line power input	The AC power connection. See the product specifications for more details.
14	Removable Disk Drive	Standard
15	10G LAN	LAN (RJ45) 10 G Base-T Ethernet port
16	1G LAN	LAN (RJ45) 1 G Base-T Ethernet port
17	Thunderbolt 3	USB Type C, female (2 ports), 5V, 1.0A max. TB1 supports Display port.
18	USB 3.0 Type B	Super Speed USB 3.0 port, Type B. USB TMC (test and measurement class) connects to an external PC controller to control the instrument and for data transfers over a 480 Mbps link.
19	Display Port	Used for video output. Accepts a standard display port connector, or adapter for connection of an external monitor.
20	USB 3.0 Type A	Super Speed USB 3.0 Type A, Host ports. Connect to external peripherals such as a mouse, keyboard, printer, DVD drive, or hard drive.
21	GPB	A General Purpose Interface Bus (GPB, IEEE 488.1) connection that can be used for remote instrument operation.
22	AUX/IO	External LISN control.

Instrument Markings

The table below lists the definitions of markings that may be on or with the product. Familiarize yourself with each marking and its meaning before operating the instrument.

Marking	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 that 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 indicate the presence of a Laser device.
	This symbol indicates the surface can be hot.
	This symbol indicated the product is sensitive to electrostatic discharge.
	This symbol identifies the Protective Conductor terminal.
	This symbol indicates the equipment is protected throughout by double or reinforced insulation.

Front and Rear Panel Features
Instrument Markings

Marking	Description
	The CE mark 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 the relevant directives.
	The 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.
	Two person lift required.
CAN ICES/NMB-001(B)	Canada EMC label. Interference-Causing Equipment Standard for industrial, scientific and medical (ISM) equipment. Matériel industriel, scientifique et médical (ISM).
	CE/ICES/ISM label. (Old mark for reference only.) This is a space saver label that combines three markings - CE with CAN ICES and ISM (see above) and ISM (see below).
	This is a space saver label that combines three markings - CE with CAN ICES and ISM (see above) and ISM (see below).
	The RCM mark is a registered trademark of the Australian Communications and Media Authority.
	This is a space saver label that combines two markings - CAN ICES and ISM.
ISM 1-B	This is a symbol of an Industrial Scientific and Medical Group 1 Class B 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 to understand your trade-in options with Keysight, in addition to product takeback instructions.

Front and Rear Panel Features
Instrument Markings

Marking	Description
	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.

Front and Rear Panel Features
Instrument Markings

3 Using the EMC32 Software

The PXE is designed to be compatible with EMC32 software. The following section contains the details for configuring the instrument and software.

How to Set Up and Run the EMC32 Software

To be compatible with the EMC32 software, the PXE EMI Receiver must behave like the R&S ESU. The following procedure details the steps necessary to correctly configure the instrument to emulate the ESU.

Configuring the PXE

Step	Action	Notes
1. PXE connection	– Connect the GPIB cable between the PC and the PXE	
2. Set the PXE GPIB address	a. Press System > I/O Config > GPIB b. Press GPIB Address > 20 > Enter	This is what ESU defaults to
3. Set the EMI Receiver Mode	– Press Mode > EMI Receiver	The EMI Receiver Mode has the ability to identify as an ESU, which is required by the EMC32 software. Most other modes in the PXE do not have this ability.
NOTE The EMC32 software does an ID query when it starts up a test, so the PXE should always be set to the EMI Receiver Mode before setting up the EMC32 software.		
4. Set the EMI Receiver Mode to ID as an ESU	a. Press Meas Setup > Advanced tab > Mode IDN Response b. Press R&S ESU	
3. Set the PXE to preset to the EMC Standard	For a CISPR test: a. Press Meas Setup > Meas Standard tab > EMC Std, CISPR b. Press EMC Std > Preset To , and ensure that it is set to CISPR Or For a MIL test: a. Press Meas Setup > Meas Standard tab > EMC Std, MIL b. Press EMC Std > Preset To, MIL	The PXE uses the EMC Standard to choose which RBW's to make available, and how to couple them. Note that CISPR is the default at instrument startup, but if you have set MIL to be the preset and you press the Mode Preset key, the instrument will preset to MIL.

4 Instrument Operating System

This chapter describes the Microsoft Windows 10, configuration and the settings used with the Keysight instrument software. It includes information about changing some of the system settings. And it describes the Windows operating system configuration and the software installations that are present on the Disk Drive when the instrument leaves the factory.

It is possible to use the front panel and touchscreen for changing operating system configuration items, but it is easier to perform these tasks with a USB mouse and external keyboard.

The following topics can be found in this chapter:

“Microsoft Windows” on page 42

“Installed Software ” on page 42

“User installation of software” on page 43

“User Accounts” on page 44

“Keysight X-Series EMI Receiver Licensing Options” on page 46

“Licensing New Measurement Application Software - After Initial Purchase” on page 49

“Windows Configuration” on page 51

“Configuring Printers” on page 54

“Configuring LAN” on page 55

“Windows Security” on page 57

“System Maintenance” on page 58

“USB Connections” on page 59

“Disk Drive Partitioning and Use” on page 60

“Disk Drive Recovery Process” on page 62

Microsoft Windows

Your instrument has Microsoft Windows installed at the factory. Keysight has already configured many of the settings in Microsoft Windows for optimal behavior in your instrument. This chapter contains details about many of these settings.

Installed Software

Signal analyzer software

The N9060C Spectrum Analyzer Measurement Application software is installed in the instrument. Additional measurement applications are available. Each application requires a license to execute the software. All of these applications are installed by the factory at the time of manufacture, even if the licenses have not been purchased. You may purchase additional licenses at a later date.

User installation of software

3rd Party Software verified by Keysight

Keysight has verified that the following programs are compatible with the instrument's applications:

- MathWorks MATLAB

Installation of other 3rd Party Software

The EMI Receiver's platform is an Open Windows environment, so you can install software on the instrument. However, installation of non-approved software may affect instrument performance. Keysight does not warrant the performance of the instruments with non-approved software installed.

NOTE

Before installing any additional programs on the instrument, you should exit the EMI Receiver application.

Also, you must not remove any applications or programs that were installed on the instrument when it was shipped from the factory.

If you install programs other than those that Keysight has tested, it could cause problems with the instrument'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 Instrument Recovery system to reinstall the instrument's system software.

User Accounts

The instrument ships with a number of different accounts already set up. In addition you can create your own accounts if you desire. The privileges associated with each account determine what you can and cannot do from that account.

Administrator account

The default Administrator password that ships from the factory is "Keysight4u!".

Using the Administrator account you can perform the following operations:

- Install software
- Configure network and printer access
- Access all files on the instrument
- Add or change user accounts and passwords
- Change Firewall settings
- Change Windows settings (e.g., using Device Manager)
- Change the time and date
- Run any application

Instrument accounts

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 may perform the following operations:

- Configure network and printer access (although not local printer access)
- Access files on the instrument that are accessible to the Users group
- Run applications that are accessible to the Users group

Keysight-Only user account

The instrument contains a user account called "KeysightOnly" that can be used by Customer Support in the event that the user has changed the Administrator password and has forgotten the password. You must not remove or modify the KeysightOnly account.

Service user accounts

There are user accounts defined in the instrument for servicing the instrument.

User 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, standard user, backup operators. User names are not case sensitive but passwords are case sensitive.

Instrument Operating System

User Accounts

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 Instrument Recovery must be performed. Also, this facilitates convenient backup by copying the contents of the D: drive to external media. All user accounts created by the factory already have My Documents mapped to the D: drive. It is recommended to map all new users' My Documents folders to the D: drive.

Keysight X-Series EMI Receiver Licensing Options

The Keysight X-Series EMI Receiver has four licensing types that have one of two terms attached. The terms are P (Perpetual) and L (1 year). These licensing types and terms are available on all existing measurement applications except the Spectrum Analyzer Measurement Application, which requires a fixed perpetual license (shipped Standard). Fixed Perpetual licenses are also required to enable hardware options.

Fixed Licenses

Fixed licenses are the traditional license type with the same duration that have been available for all features since the introduction of the X-Series EMI Receiver. Fixed licenses are identified by the "F" in the second character and a "P" or an "L" in the third character of the option designator:

Example: N9068EM0E-1FP or N9068EM0E-1FL

A license key is instrument model and serial number dependent. You can only install the license key on the specific instrument for which it was created.

Transportable Licenses

Transportable licenses are a type of license offering deployment duration that is not fixed to a specific instrument model and serial number. Transportable licenses are identified in the product structure by a "T" in the second character and a "P" or an "L" in the third character of the option designator:

Example: N9068EM0E-1TP or N9068EM0E-1TL

Transportable licenses require a connection to the Keysight server only for managing the transfer of the license to and from the instrument. The connection to the Keysight server may be via the instrument itself or an external PC. The Keysight licensing server also provides for storage of unused licenses that have been transported off instruments but are awaiting assignment to new instruments. The server will limit the number of transports per 30 day period per application license to 10.

Transportable licenses require redemption and installation of the license before the first use. This allows the user to determine on which instrument to initially install the application license.

It is recommended that instruments be at the same instrument software release to ensure the latest code is available on each instrument so that the user experience is identical between instruments. This is particularly important when transporting the license for a newly-released application, which may only be available in the latest software release.

Network Licenses

Network licenses are available over the user's network from a server the user configures. Network licenses are identified in the product structure by an "N" in the second character and either a "P" or an "L" in the third character, indicating a term of either Perpetual or 1 year (12 months), respectively.

Example: N9068EM0E-1NP

The server has a count for each license and will only allow instruments to "check-out" a license up to that count. Once the count is reached for a specific license, further check-outs fail until one of the licenses is checked back in to the server. Therefore, it is possible for an instrument to have different features available to it based on what licenses are available on the server when it tries to get the licenses.

Setting up network licenses is done via the [Keysight Floating License Manager](#). Refer to the Installation Guide that can be downloaded from this web page.

Application license

Application licenses (like N9077EM0E-1NP) are automatically checked out when entering the mode that uses them, and they are automatically checked-in when leaving that mode. Because the server may have already checked out the last license for the application to another instrument, there is a possibility that a mode switch will fail because a required license could not be checked out from the server. If the server has a limited number of licenses compared to the number of users desiring to use that license, this may mean that switching from mode A to mode B then back to mode A may fail when returning to mode A because another instrument checked out the last available license while the user was in mode B. Also, for modes with multiple licenses for different features (like Multi-Standard Radio), the features available may also change when switching out of the mode and back into it.

USB Portable Licenses

The USB Portable license is implemented with a physical dongle that is a USB device like a USB thumb drive. It has a Host ID fixed in the dongle hardware. It does not contain any writable data and so is acceptable to high security A/D users. Transporting licenses from one instrument to another just requires moving the dongle and license files to the desired instrument. The license files can be installed on many instruments, but they will only be valid on the one instrument that has the dongle.

USB Portable licenses are identified in the product structure by an "U" in the second character and either a "P" or an "L" in the third character, indicating a term of either Perpetual or 1 year (12 months), respectively.

Example: N9068EM0E-1UP

With USB portable licenses, the pre-installed [Keysight Floating License Manager](#) is used to add licenses to the instrument's server.

USB Portable licenses with a limited count are checked out and in like Network licenses. Because the licenses are local, there will be no network latency involved in the check-out/check-in, but there can still be a slight performance degradation compared to Fixed and Transportable licenses.

USB Portable licenses that are "uncounted", will perform comparably to the Fixed and Transportable licenses.

Plugging/un-plugging the dongle is equivalent to transporting a license to/from the instrument, however, the XSA application must be restarted whenever the dongle is plugged in.

Configuring Network and USB Licenses

The Keysight Floating License Manager must be used to configure the Network or USB Portable licenses before the licenses can be used. An instrument can be configured for Network or USB Portable licenses or both. To set up USB Portable licenses, in the Keysight Floating License Manager select "Start a floating license server with a license file" and add files containing the USB Portable licenses desired. To set up Network licenses, in the Keysight Floating License Manager select "Connect to a floating license server" and enter the network server's name preceded by the "@" character (example: "@myserver"). To set up both Network and USB Portable license, first configure the USB Portable license, then configure the Network licenses, but append ";@localhost" to the server name (example: "@myserver;@localhost"). Whenever the configuration is changed, the X-Series software must be restarted.

Licensing New Measurement Application Software – After Initial Purchase

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

For all new measurement application installations, we recommend that the latest version of the instrument software be installed. This ensures that the measurement application being licensed and activated is installed and is the most current version.

The latest revision of the software may be downloaded from:

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

A license key is usually for one Host ID only. The Host ID for Fixed and Transportable is the instrument model and serial number, for Network it is the server's MAC address, and for USB Portable it is the USB Dongle's number (printed on the dongle).

NOTE

No calibration is required after a measurement application installation.

Installation procedure over USB for Fixed licenses

Step	Action	Notes
1. Redeem the Option Upgrade Entitlement Certificate	Follow the instructions on the Certificate	After redeeming your Option Upgrade Entitlement Certificate you will receive an e-mail with an attached License 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 instrument USB ports.	Windows will detect the new hardware and may display the configuration menu. The instrument will automatically load the license file. (This may take a few minutes) Upon completion, the Keysight License Manager will display 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 instrument.
C:\Program Files\Agilent\licensing

Step	Action	Notes
4. Verify installation	– Cycle the power on the instrument. – Press System, Show System. – Verify that the new application appears in the list.	The application will not be available for use until after the power has been cycled. This displays the list of installed applications. If you require further assistance, please contact the Keysight support team. Online assistance: http://www.keysight.com/find/assist If you do not have access to the Internet, contact your local Keysight Technologies Sales and Service Office, or if in the United States, call 1-800-829-4444.

NOTE

For other license types:

- Transportable licenses use the Keysight License Manager to perform a transport
- Network licenses are loaded on the server and set up with the Keysight Floating License Manager
- USB Portable licenses are loaded onto the instrument and configured with the Keysight Floating License Manager. License files should be loaded onto the D: drive to prevent losing them in the case of a System Recovery.

Windows Configuration

The Windows settings have been optimized for the best measurement performance. Any modifications to these settings may degrade instrument performance and measurement speed. In general, most Windows System settings (typically set through the Windows Control Panel) should not be modified. Those that can be safely modified are listed below.

CAUTION

To recover from problems caused by changing Windows Systems settings, you may have to reinstall the Windows system and instrument applications using the Instrument Recovery process.

Settings that can be changed

You may change the following Windows settings or administrative tasks (available from the Windows Control Panel) to suit your own personal preferences. It is recommended that you document any changes to the instrument's configuration in case an Instrument Recovery is performed and the configuration is reset.

NOTE

Some of these actions can only be performed with Administrator privileges.

You May Use This Feature:	To Do This...
 Windows Update	Configure Microsoft Windows Automatic Updates. Microsoft recommends that you always get the latest critical Windows updates to ensure that the instrument's Windows operating system is protected. If the instrument has Internet access, the instrument default is set to automatically check for critical Windows Updates and notify you.
 User Accounts	Setup new user accounts. CAUTION Do not delete or modify the "KeysightOnly" user account. Doing so may prevent Keysight from servicing the instrument.
 Network and Sharing Center	Add the instrument to a network
 Devices and Printers	Install and configure a printer
 Date and Time	Set the time and date

You May Use This Feature:	To Do This...
 System	If you click on “Advanced System Settings” a dialog will open called “System Properties.” On this dialog there is an “Advanced” tab, which opens up a dialog with a number of settings options. One of these is “Performance”, and if you click on the “Settings” button under “Performance”, you will see another dialog with a number of settings options. The default is “Let Windows choose what’s best for my computer.” You can also select “Adjust for best performance.” You should leave the remaining selections unchanged.

Settings that must not be changed

Avoid changing the settings described below (available from the Windows Control Panel). Changes to these settings may degrade instrument performance, screen displays, and measurement speed.

Do NOT Use This Feature:	To Do This...
 Power Options	Do not change Power Options.
 System	If you click on “Advanced System Settings” a dialog will open called “System Properties.” On this dialog there is a tab called “Hardware.” You should not modify any settings under the “Hardware” tab. On this dialog there is also a tab called “Advanced.” You should not modify any settings under the “Advanced” tab except as described above under “Settings that can be changed”.
 Fonts	Do not remove installed Fonts
 Display	Do not change the following Display Settings: – Screen Saver settings (under “Personalization”) – Screen resolution (under “Adjust Resolution”) – DPI setting (under “Set custom text size”)
 Region and Language	Do not change any settings under “Region and Language” or the instrument keyboard and display may not operate properly
 User Accounts	Do not delete or modify the “KeysightOnly” user account.

In addition, do not:

- Add, delete, or modify disk drive partitions.
- Delete or modify Keysight registry entries.
- Change the contents of any directories containing the name "Keysight".
- Stop the IIS server
- Tamper with any virtual directories (or their contents) that came configured with the instrument.
- Uninstall these libraries, interfaces, or programs:
 - The I/O Libraries
 - The .NET Framework or any Hotfixes or Service Packs for the .NET Framework
 - The “Microsoft Visual J# .NET Redistributable Package 1.1”
 - Programs that begin with "Keysight"
 - The Adobe Acrobat reader
- Modify:
 - The I/O Library “GPIB27”, “GPIB28” interfaces shown as configured Instrument I/O in the Connection Expert or I/O Config

Autoplay/Autorun

Since the introduction of Windows XP, the term Autoplay (sometimes also called Autorun) has come to be associated with the feature which assists users in selecting appropriate actions when new media and devices are detected. The Autoplay/Autorun feature is turned off in the instrument, by default, for heightened security, unless the Administrator account is running.

If you wish to re-enable Autoplay/Autorun, you may use the Auto Play function in the Control Panel. However, be aware that if you do this you may be more subject to virus attack from portable media such as USB flash drives.

Configuring Printers

Printers are configured using the Microsoft Windows Control Panel. It is easily accessed from the Windows Start menu or from under the front panel System key. This setup process can be done using the touch screen and front-panel keys.

When setting up a new printer, you may need to load the printer driver (unless you are using a network printer that your IT department has set up to include the driver). The manufacturer of the printer supplies the driver software and process. That may require that you attach an external USB disk drive. An alternative is to connect the instrument to the LAN and download the driver from the printer manufacturer's internet site.

Configuring LAN

Hostname

The Computer Name, or Hostname, is preconfigured from the factory. It must be a unique name such that it does not conflict with other equipment on your LAN. The preconfigured Computer Name is K-<model number>-xxxxx, where xxxxx is the last 5 digits of the instrument's serial number.

IP Address & Gateway

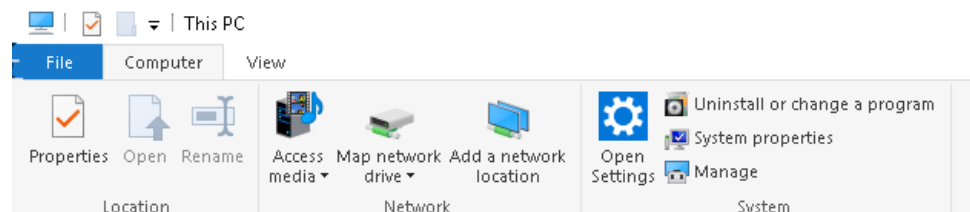
The instrument is preconfigured to obtain an IP Address via DHCP. You can change the IP Address and Gateway as you desire.

You must be logged in as an "administrator" (default password:"Keysight4u!") to make changes.

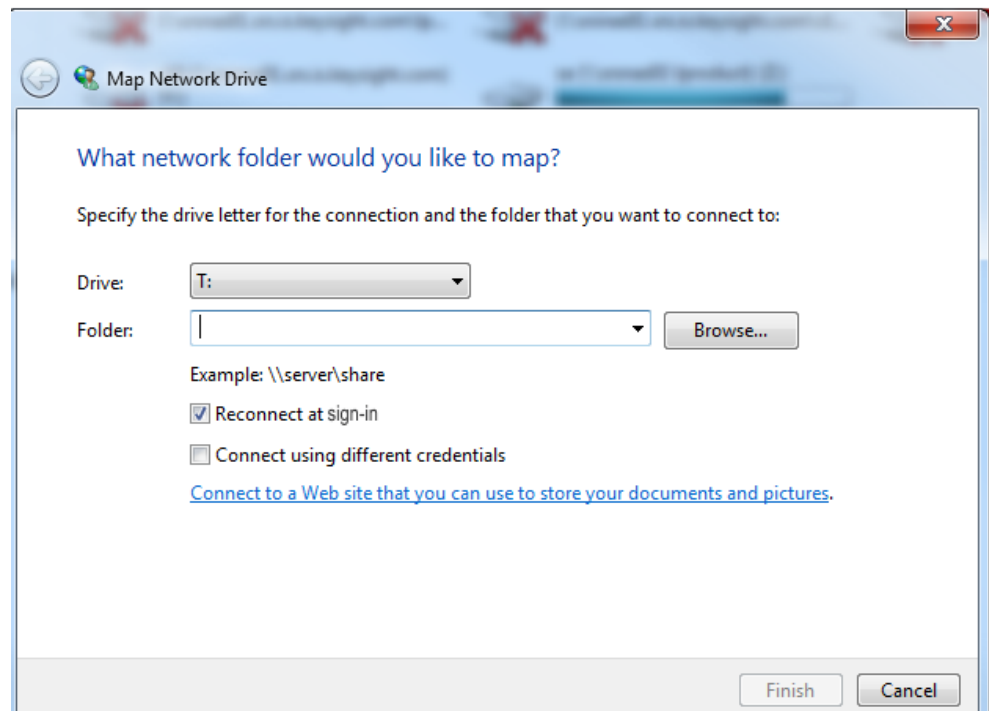
Connecting to a Network Shared Folder

The instrument contains standard Windows networking. The time required to authenticate is dependent on your LAN infrastructure. You may have improved performance by mapping a network drive to the shared folder that you need to access.

To map a network drive, click the Start icon , open File Explorer , and choose **This PC** from the left sidebar. Select the **Computer** Tab, and select **Map Network Drive** from the drop down menu:



When the Map Network Drive window appears, browse to the correct folder, and click **Finish**.



NOTE

In Windows 10 there is no visual indication that authentication is in progress.

Windows Security

Microsoft recommends the following to ensure the instrument's Windows operating system is protected:

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

Windows Firewall



The instrument is shipped with the Windows Firewall enabled. You can verify the status of Windows Firewall by going to the Control Panel and clicking on System and Security, Windows Firewall.

Windows Firewall Exceptions for programs and ports have been added to allow proper operation of the instrument over a network. Modifying these settings may cause the instrument to not operate properly.

Automatic Updates

Microsoft recommends that you always get the latest critical Windows updates to ensure that the instrument's Windows operating system is protected. If the instrument has internet access, the instrument default is set to automatically check for critical Windows Updates and notify you.

You can change the configuration of the Microsoft Automatic Updates. You can choose not to have automatic updates. However, if you do this then you should manually update Windows periodically.

NOTE

Be aware that downloading and installing Windows Updates can be network and CPU usage intensive (impacting the instrument performance), and some Windows Updates automatically reboot the instrument. It is recommended that Windows Updates be performed when the instrument is not in normal use.

Spyware Protection

There is no anti-spyware software installed on the instrument. This should not be a problem if you do not use the instrument for a lot of internet browsing. Having spyware in the instrument could have an impact on the instrument performance.

System Maintenance

Backup

It is recommended that you have a regular backup strategy. Your IT department may already have a backup strategy in place that is suitable for the instrument and its data. Using the Instrument Recovery system in conjunction with a regular backup strategy should allow full recovery of the instrument data.

Windows has a Backup utility that you can use to archive files and folders in case of a disk drive failure. You can also use third party backup utilities. However, you must ensure that this third party software is compatible with the instrument's system software. See **“User installation of software” on page 43** for more information.

When performing backups, we recommend that you backup the data to an external storage device connected to the network or one of the instrument's USB connectors. Also, you should perform backups at times when the instrument is not being used for normal operations, as it may impact the instrument's overall performance.

System Restore

Windows contains 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 always 100% successful. Therefore, it is not recommended that you rely on System Restore to protect your instrument. System Restore has not been tested to verify successful restoring.

Disk Defragmenting

The instrument has a solid state drive. Disk defragmenting is not recommended.

USB Connections

All of the USB ports are compatible with the USB 2.0/3.0 and 1.1 specification. The three USB ports on the front panel (see graphic below) and three of the USB ports on the rear panel are USB Series “A” ports. These are ports that you can use to connect USB mass storage devices and printers. The instrument USB Host support includes the standard Microsoft Windows USB drivers for human interface, mass storage, printing, scanning, and imaging devices. A complete up-to-date list of the Windows USB class driver support is available on the Microsoft website.



The square USB port (see graphic below) on the rear panel is a USB 3.0 Series “B” port and is used for controlling the instrument over USB. Information to help you program your instrument is documented in the X-Series Programmer’s Guide. The instrument USB device driver included in the instrument software supports the test and measurement industry standard USBTMC-USB488 device class.



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

Disk Drive Partitioning and Use

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

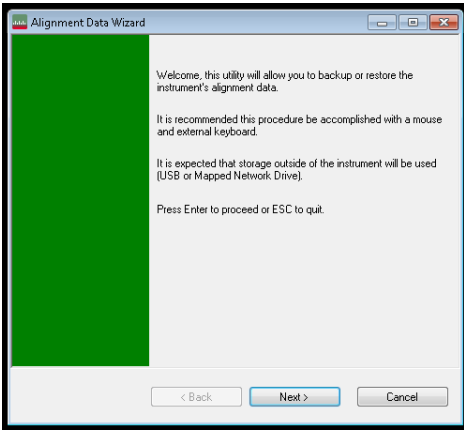
- The **C: partition** contains the Windows 10 operating system and software installed by Keysight. This is an Open System which means you can install additional software, and these should be installed on the C: drive. However, only a limited set of software applications are tested for use with the Keysight 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 Recovery process. 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 My Documents folder mapped to the D: drive. This is for the convenience of backing-up the measurement data. You should always back-up the data on the D: drive to an external device. This allows you to restore the data if you ever need to replace the disk drive.
- The **E: partition** is reserved for Keysight's use. The primary use of the E: drive is for housing 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. It is also recommended that you back up the contents of this drive by using the factory calibration data backup utility.

Backing-up the factory calibration data

To back up the factory calibration data to an external location, you will need a USB storage device.

Instruments running Window 10 should have an internal CAL_BACKUP F: drive, which is the default backup location.

Step	Notes
1. Press System, Alignments, Backup/Restore Align Data...	You may be prompted for the administrator password. Enter Keysight4u! An information window appears that informs you that the instrument must shut down to complete the backup: "Press OK to force shut down and proceed. Press Cancel to exit."

Step	Notes
2. Select OK.	The Alignment Data Wizard will appear: 
3. Follow the on screen instructions to backup the calibration data to the USB drive and save the file.	NOTE The default location is an internal flash SD card, if present, but you can choose another location.

Disk Drive Recovery Process

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

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

- Additional software that has been installed after the instrument was shipped from the factory. (Thus, following an Instrument Recovery any software installed after the instrument was shipped from the factory will need to be re-installed.)
- System configurations (for example user accounts, windows configurations) that have been made after the instrument was shipped from the factory. (Thus, following an Instrument Recovery configuration changes will have to be performed.)
- The Instrument Recovery overwrites the contents of the C: partition. It does not affect the D: or E: partitions.

It is recommended that the user use a regular back up strategy. Your IT department may already have a backup strategy in place that is suitable for the instrument and its data. Using the Instrument Recovery System in conjunction with a regular back up strategy should allow you to fully recover the instrument's software and data.

Table 4-1 Recovery Process

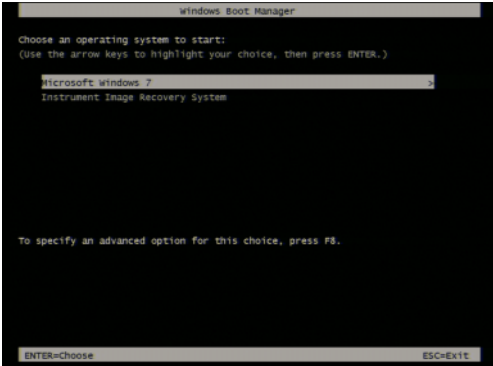
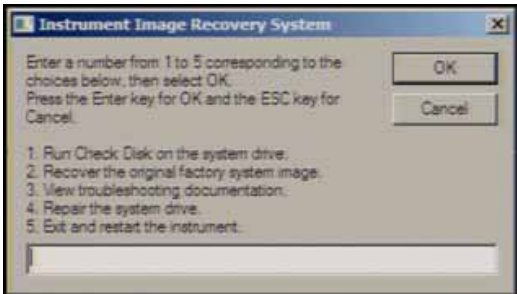
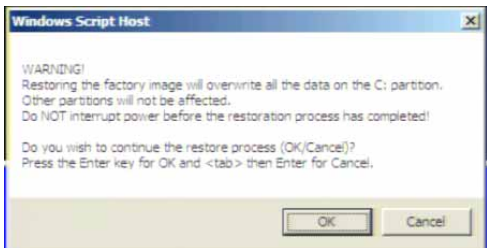
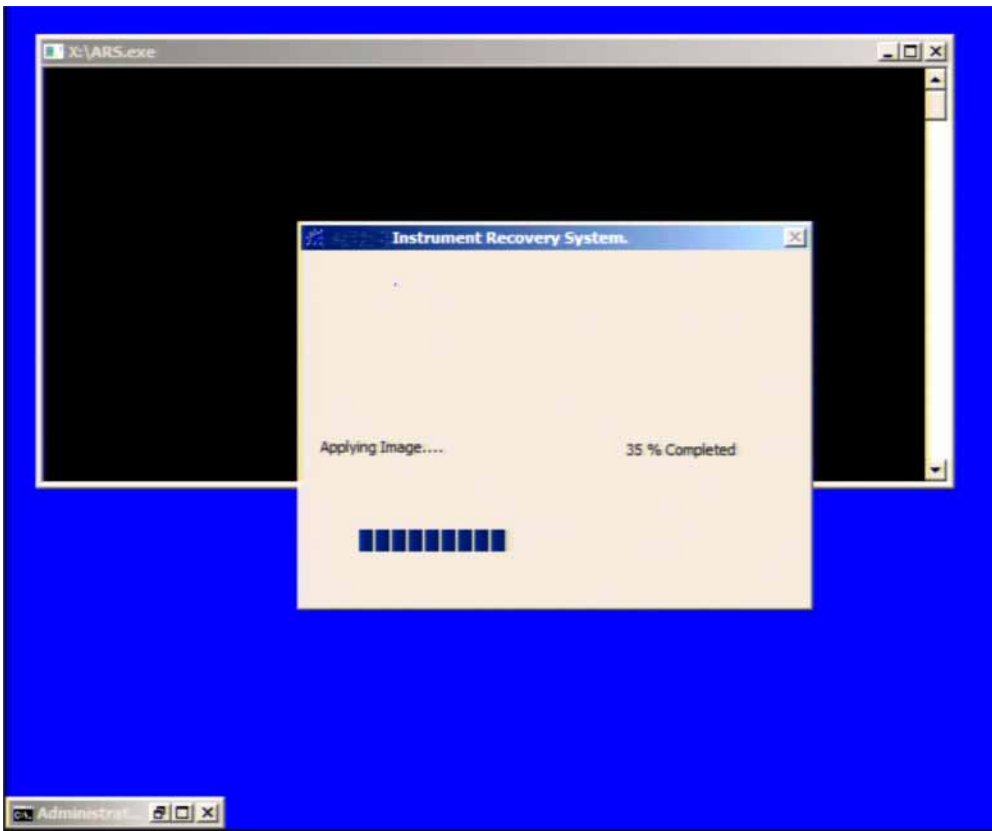
Step	Notes
1. Make sure the instrument is turned off.	
2. Turn on the instrument. – Press the down arrow key to move the highlight to Instrument Recovery System , then press Enter .	After the Keysight Technologies screen is displayed, This screen is displayed for five seconds. 

Table 4-1 Recovery Process

Step	Notes	
3.	When the Instrument Recovery System has booted, follow the on-screen instructions to recover the image of the C: drive. Press 2, then press Enter to select the recovery.	
4.	A warning message appears. Press Enter to start the recovery, which may take up to 25 minutes to complete.	
5.	Press Enter to exit and reboot the instrument once this portion of the recovery has completed.	

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 information or re-installing applications, data and performing system customizations.

Updating the software (required after a recovery)

To install the latest software version, the software and installation instructions are available at:

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

Table 4-2 Installing the Software

Step
1. Log out of the default user (instrument): — Select the Start icon , select the Change account settings icon , Sign out.
2. At the log in prompt enter: — User Name: administrator — Password: Keysight4u!
3. Follow the instructions on the software update web page. CAUTION When you see the message Programming FPGAs... Do NOT turn off power to the instrument, be sure to do as it says and DO NOT turn off the instrument power at this time for ANY reason. If this process is interrupted the instrument most likely will need to be sent back to an Keysight Service Center for servicing before it will be usable again.

Updating Digital IF (0014.01) FPGA from version 03.05.05.02 to 03.05.05.03

Do not turn off power or interrupt this process!

不要关闭电源或中断此过程!

電源を切ったり、更新プロセスを中断したりしないで下さい。

전원을 끄거나 진행되는 작업을 중단 시키지 마세요!

Ne pas interrompre ni couper l'alimentation électrique!

Nicht ausschalten oder abbrechen!

Не выключать и не прерывать процесс!

FPGA code updates may require a significant period of time. Interrupting the FPGA update process may result in corrupt FPGA code which would require returning this instrument to Agilent for service.

Table 4-2 Installing the Software

Step	
NOTE	The installation process can take up to 45 minutes. Do not turn the instrument power off or serious damage may occur. If any pop up windows appear, click OK or Ignore to proceed.
4.	When the installation has finished, select Yes, I want to restart my computer now, Finish.
5.	After the instrument restarts, the newly installed version of the X-Series instrument software will run.

Instrument Operating System
Disk Drive Recovery Process

5 Using Windows Tools

NOTE

The capabilities described in this section are Microsoft Windows 10 features. The discussion provided here gives some guidelines for using the capabilities with the instrument. You need to refer to the Windows 10 help documentation for more information. Your version of Windows may not match these instructions exactly.

You need an external keyboard and mouse to fully use these features.

[“Remote Desktop: Using the X-Series EMI Receiver Remotely” on page 68](#)

[“Embedded Web Server: Using the X-Series EMI Receiver Remotely” on page 77](#)

[“Windows Shortcuts and Miscellaneous Tasks” on page 83](#)

Remote Desktop: Using the X-Series EMI Receiver Remotely

Windows Remote Desktop is recommended for remote control of the instrument. It offers fully-interactive control that is almost identical to direct face-to-face control of the instrument. You can also remotely control the instrument using the Embedded Web Server interface. The Embedded Web Server functionality provides a communications method that does not require login to the instrument. However, due to its slower response time, it is only recommended for setup and data exchanges that do not involve instrument control.

NOTE

The Remote Desktop functionality is a Microsoft Windows 10 capability. The following discussion provides some guidelines for using this capability with the instrument. You need to refer to the Windows 10 help documentation for more information. As Windows evolves, these instructions may no longer be exact.

You need an external keyboard and mouse to fully use this functionality.

Overview of Remote Desktop operation

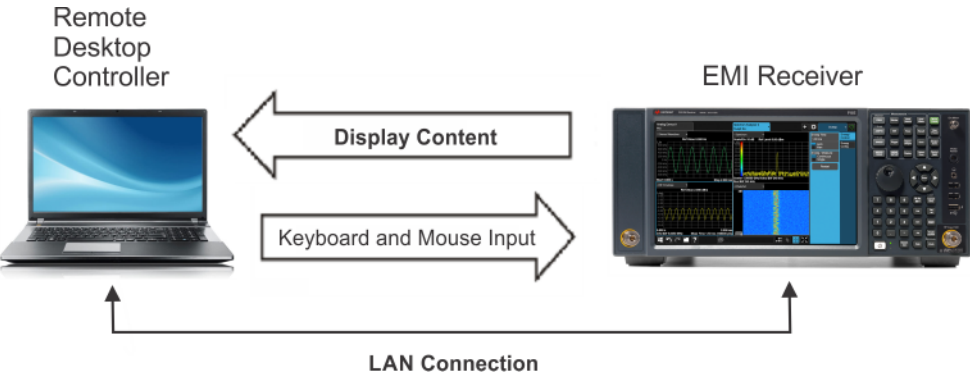
Using the Remote Desktop functionality of the instrument allows you to control and interact with the instrument from a remote computer as though you were sitting in front of the instrument.

When you have configured the instrument for remote connectivity, and configured a separate computer to act as a Remote Desktop Host, you can send commands to the instrument from the remote computer, and you can see the instrument display on the screen of the remote computer.

This section provides full details of how to set up the instrument for remote connectivity, and also how to set up a computer running any version of Microsoft Windows as a Remote Desktop Host.

Setting up Remote Desktop operation

Figure 5-1 Basic setup for remote desktop operation



NOTE

To perform this operation successfully, you must have Administrator level access to the instrument.

Table 5-1 Setting up a remote desktop connection

Step	Action
1. On the instrument, open the Windows Control Panel	– From the instrument application, press System, Control Panel ,
2. Select System functions	– From the Adjust your computers settings menu, click System .
3. Access Remote setting	– In the Control Panel Home window, select Remote settings
4. Select the Remote option	– On the Remote tab, in the Remote Desktop section, click the appropriate checkbox.
5. To add users	– Click Select Users, Add .
6. Follow the on screen instructions.	

Setting up the remote computer

The procedure depends on whether the Remote Computer to be set up is running Windows 10, or another version of Microsoft Windows.

Remote computer running Windows 10

Windows 10 includes the Remote Desktop Connectivity Client software, so no additional setup is required.

Remote computer running another version of Windows

You can use any version of Windows to install and run the Client software for Remote Desktop Connectivity. However, you need to have available a Windows installation CD-ROM, because that contains the Client software.

NOTE

The following instructions relate to software provided by Microsoft Corporation. Keysight offers no warranty regarding the operation of such software. The procedure described here may be changed by Microsoft at some future time.

Table 5-2 Installing the Client software

Step	Notes
1. When the Welcome Screen appears, click Perform additional tasks	
2. From the What do you want to do? screen, click Set up Remote Desktop Connection .	The Remote Desktop Connection InstallShield Wizard appears.
3. Click Next .	Follow the on screen instructions provided by the Wizard.
4. To access the installed software, click Start > All Programs > Accessories > Communications > Remote Desktop Connection .	

How to locate the computer name of the instrument

To connect a remote computer to the instrument, you need to know its Computer Name. The Computer Name can be displayed as follows:

Table 5-3 Locating the name from the Keysight application

Step	Notes
On the instrument front panel, press System , Show , System .	A page listing various parameters appears. The instrument's computer name is shown in the list next to the title Computer Name.

Table 5-4 Locating the name from the Windows desktop (with a mouse):

Step	Notes
1. Click Start, Control Panel .	
2. Double-click System	The Computer name is listed in the Computer name, domain, and workgroup settings section.

Running a Remote Desktop session

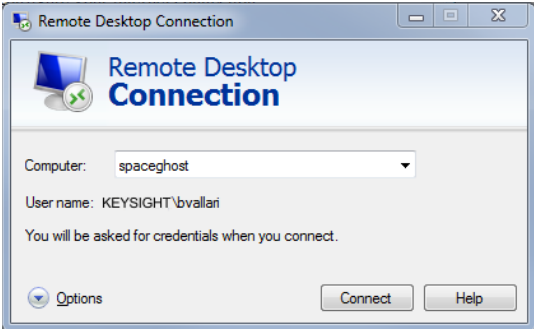
Initializing a Remote Desktop session

NOTE

To initialize a Remote Desktop Session, you need to know the Computer Name of the instrument.

After setting up the remote computer for Remote Desktop Connectivity, as described in **“Setting up Remote Desktop operation” on page 69**, you are ready to start a Remote Desktop session.

Table 5-5 Starting a session

Step	Notes
1. Click Windows > Start menu >Programs, Accessories > Remote Desktop Connection.	A Remote Desktop Connection dialog appears: 
2. Enter the computer name of the instrument.	
3. Click Connect.	A login dialog box appears.
4. Enter the login account name and password.	The default account name is Instrument and the default password is measure4u , but these parameters may be changed by instrument users.

NOTE

Only the current User or an Administrator can remotely log into the instrument. To see who the current user of the instrument is, press **Ctrl+Esc** on the instrument until you can view the current user name on the Start menu. If no one is currently logged into the instrument, any valid instrument user can remotely log in.

The instrument display appears on the screen of the remote computer. Because the instrument front-panel keys are not available when using the instrument remotely, three alternative methods are available to perform the functions of the front-panel keys.

Windows Remote Desktop Options

Table 5-6 Setting Remote Desktop options

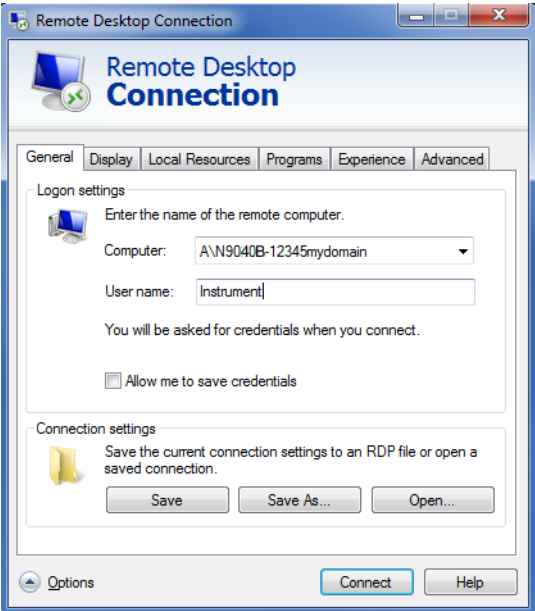
Step	Notes
1. On the Remote Desktop Connection menu, click Options .	 The Options dialog has several tabs. Generally, the default settings are correct.
2. Under the General tab, ensure that the Computer name, User name and Domain name are set correctly.	You may choose to enter the password and save it for future sessions, by checking the Save my password box.

Table 5-6 Setting Remote Desktop options

Step	Notes
3.	Click the Display tab. – Under Remote desktop size, you may select the size of the window in which the instrument display appears. Do not select any size smaller than the instrument’s front panel display. Selecting a remote desktop size smaller than the instrument’s front panel display results in some of the items on the instrument display not being fully visible. In such circumstances, scroll bars do not appear, so portions of the display are not accessible. – Under Colors, set this to 16 bits If you operate Remote Desktop with greater color depth (e.g., 32-bit) your windows may have a different appearance than they do on the instrument display because transparency becomes enabled. Remote Desktop Connection General Display Local Resources Programs Experience Advanced Display configuration Choose the size of your remote desktop. Drag the slider all the way to the right to use the full screen. Small Large 1920 by 1200 pixels ☐ Use all my monitors for the remote session Colors Choose the color depth of the remote session. High Color (16 bit) ☒ Display the connection bar when I use the full screen Options Connect Help

Table 5-6 Setting Remote Desktop options

Step	Notes
4. Click the Local Resources tab.	Remote Desktop Connection General Display Local Resources Programs Experience Advanced Logon settings Enter the name of the remote computer. Computer: A\N9040B-12345mydomain.com User name: Instrument You will be asked for credentials when you connect. ☐ Allow me to save credentials Connection settings Save the current connection settings to an RDP file or open a saved connection. Save Save As... Open... Options Connect Help Remote Desktop Connection General Display Local Resources Programs Experience Advanced Logon settings Enter the name of the remote computer. Computer: A\N9040B-12345mydomain.com User name: Instrument You will be asked for credentials when you connect. ☐ Allow me to save credentials Connection settings Save the current connection settings to an RDP file or open a saved connection. Save Save As... Open... Options Connect Help

Remote Desktop Connection

General

Display

Local Resources

Programs

Experience

Advanced

Logon settings

Enter the name of the remote computer.

Computer:

User name:

You will be asked for credentials when you connect.

☐ Allow me to save credentials

Connection settings

Save the current connection settings to an RDP file or open a saved connection.

Options

5. Click the **Experience** tab.

Remote Desktop Connection

General

Display

Local Resources

Programs

Experience

Advanced

Performance

Choose your connection speed to optimize performance.

Allow the following:

☐ Desktop background

☐ Font smoothing

☐ Desktop composition

☐ Show window contents while dragging

☐ Menu and window animation

☒ Visual styles

☒ Persistent bitmap caching

☒ Reconnect if the connection is dropped

Options

Ending a Remote Desktop session

There are two ways to disconnect the remote computer from the instrument:
ending the session:

Table 5-7 Ending a session

Step	Notes
1. Click the X , then click OK .	For full-screen, the X appears at the top center of the window. For non full-screen, the X appears in a red box at the right of the window's title bar.
<i>or</i>	
2. When the remote desktop is full screen, move the cursor to the bottom left of the window: – Click Start, Disconnect. – Click Disconnect.	You are asked to confirm that you want to disconnect.

Embedded Web Server: Using the X-Series EMI Receiver Remotely

The instrument can be controlled using either the Embedded Web Server or Windows Remote Desktop. The Embedded Web Server is a good solution when you do not want to log into the instrument's user account. This allows you to view the display or control the instrument, without logging the current user off. Multiple users can connect at the same time.

The web server in the X-Series EMI Receiver updates many times per second and it has the advantage over Remote Desktop that it does not lock out the front panel.

NOTE

Drag gestures do not work in web control, whereas they do in Remote Desktop.

Browsers that support the X-Series EMI Receiver Embedded Web Server (these versions or later)

IE	Chrome	Safari	Firefox	iOS Safari	Chrome for Android
11	35	8	34	8	39

Accessing the instrument through the Internet

It is possible to access and control the instrument through the Internet and World Wide Web, or a local internet, using the built-in Embedded Server functionality. This section provides details of how to use this functionality.

The instrument may also be accessed and controlled using the Windows Remote Desktop functionality (see the section **“Remote Desktop: Using the X-Series EMI Receiver Remotely” on page 68**, for details).

The instrument Embedded Server capabilities are fully compliant with the LXI (LAN eXtensions for Instrumentation) standard.

NOTE

To gain access to the instrument from the LAN, you need to know its hostname (or IP Address). For details of how to locate this information using the instrument Display, see “How to locate the computer name of the instrument” on page 70.

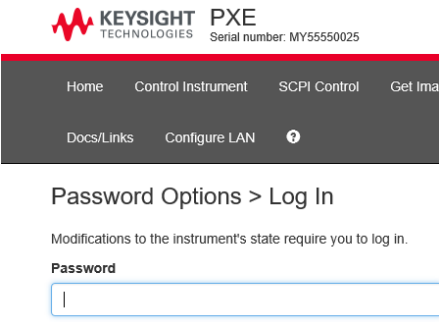
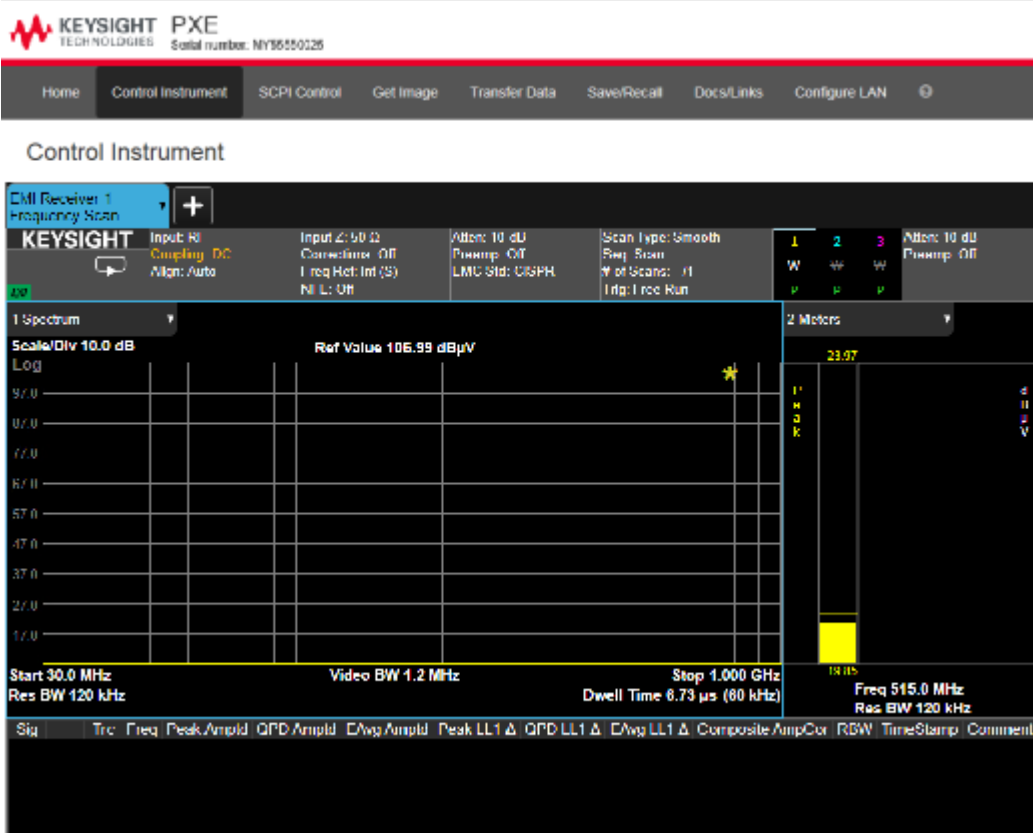
Table 5-8 Accessing the instrument

Step	Notes																		
1. Enter a URL corresponding to the instrument hostname or IP Address.	NOTE This functionality is only fully supported when using Internet Explorer. When the connection is made, the welcome page appears.																		
KEYSIGHT TECHNOLOGIES PXE Serial number: MY55550025 Log in ⚙ Home Control Instrument SCPI Control Get Image Transfer Data Save/Recall Docs/Links Configure LAN ?  Connected to N9048B - PXE at IP address 141.121.151.225  ☐ Flash LXI indicator on the front panel to identify Description <table><tr><td>Model number</td><td>N9048B</td></tr><tr><td>Serial number</td><td>MY55550025</td></tr><tr><td>Firmware revision</td><td>A.22.06</td></tr><tr><td>Description</td><td>Keysight N9048B EMI Receiver - MY55550025</td></tr></table> VISA instrument addresses <table><tr><td>HiSLIP LAN protocol</td><td>TCPIP::K-N9048B-50025.srs.is.keysight.com::hislip0::INSTR</td></tr><tr><td>VXI-11 LAN protocol</td><td>TCPIP::K-N9048B-50025.srs.is.keysight.com::inst0::INSTR</td></tr><tr><td>GPIB over LAN protocol</td><td>TCPIP::K-N9048B-50025.srs.is.keysight.com::gpib0,18::INSTR</td></tr><tr><td>TCP/IP SOCKET protocol</td><td>TCPIP::K-N9048B-50025.srs.is.keysight.com::5025::SOCKET</td></tr><tr><td>II SR // IISBTMC4881</td><td>II SR::40893::0::MY55550025-0::INST0</td></tr></table>		Model number	N9048B	Serial number	MY55550025	Firmware revision	A.22.06	Description	Keysight N9048B EMI Receiver - MY55550025	HiSLIP LAN protocol	TCPIP::K-N9048B-50025.srs.is.keysight.com::hislip0::INSTR	VXI-11 LAN protocol	TCPIP::K-N9048B-50025.srs.is.keysight.com::inst0::INSTR	GPIB over LAN protocol	TCPIP::K-N9048B-50025.srs.is.keysight.com::gpib0,18::INSTR	TCP/IP SOCKET protocol	TCPIP::K-N9048B-50025.srs.is.keysight.com::5025::SOCKET	II SR // IISBTMC4881	II SR::40893::0::MY55550025-0::INST0
Model number	N9048B																		
Serial number	MY55550025																		
Firmware revision	A.22.06																		
Description	Keysight N9048B EMI Receiver - MY55550025																		
HiSLIP LAN protocol	TCPIP::K-N9048B-50025.srs.is.keysight.com::hislip0::INSTR																		
VXI-11 LAN protocol	TCPIP::K-N9048B-50025.srs.is.keysight.com::inst0::INSTR																		
GPIB over LAN protocol	TCPIP::K-N9048B-50025.srs.is.keysight.com::gpib0,18::INSTR																		
TCP/IP SOCKET protocol	TCPIP::K-N9048B-50025.srs.is.keysight.com::5025::SOCKET																		
II SR // IISBTMC4881	II SR::40893::0::MY55550025-0::INST0																		
2. Click More Information	This displays further settings and configuration information.																		

Controlling the Instrument

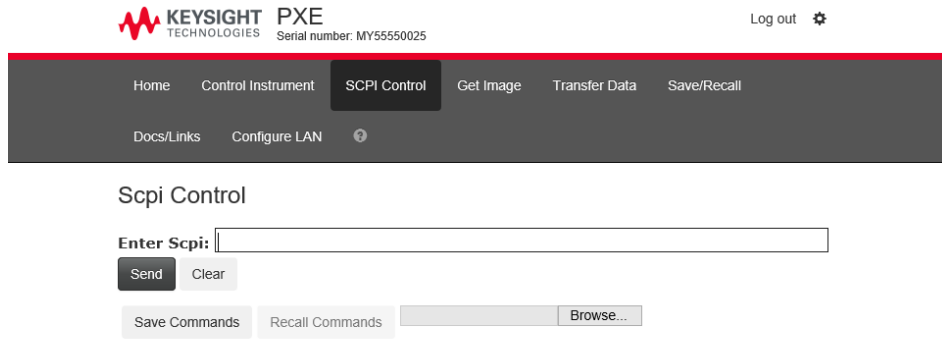
Selecting this tab enables you to view, control and interact with the instrument through the web server.

Table 5-9 Selecting the Control Instrument tab

Step	Notes
1. Select Control Instrument	A password entry dialog appears.
	By default, this password is set at the factory as “measure4u”. However, you may subsequently change the password. (Select System, I/O Config, Web Password Reset on the instrument front panel to change the password.)
	When the correct password has been entered, the Control Instrument web page appears.
2. You can now enter new settings as required.	

Enabling SCPI Control of the instrument

Selecting this tab enables you to control the instrument via SCPI.



Selecting the Get Image tab

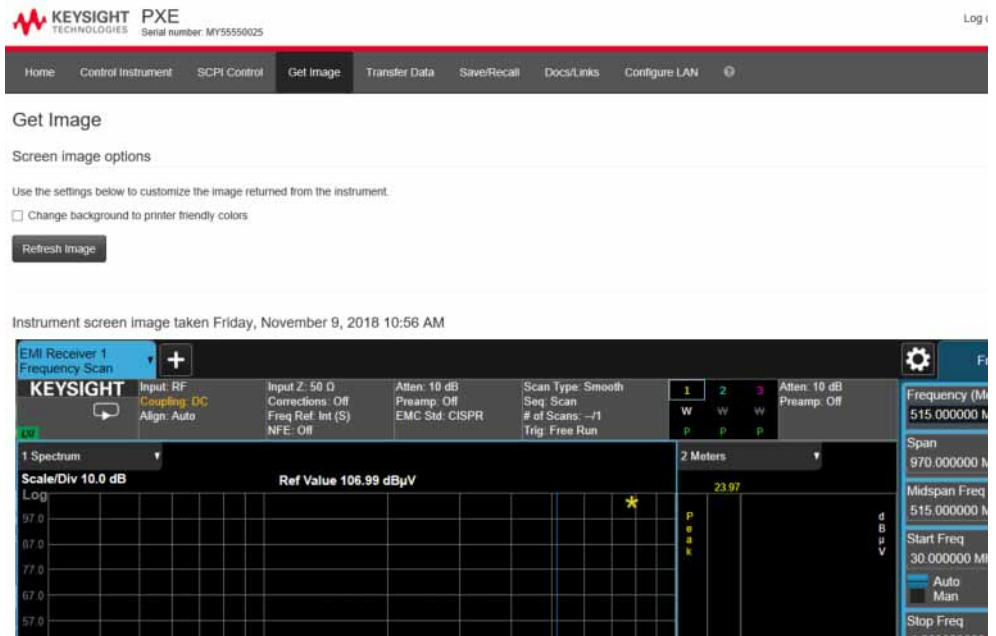
Selecting the Get Image tab captures a screen image from the Instrument display.

NOTE

To capture a screen image using the web server, the Instrument Application must be running.

The image is captured as a Portable Network Graphics (PNG) file, to the default file name **Screen.png**. The image file can be saved to the client computer disk drive, or copied to the Windows clipboard.

A typical screen capture image appears as follows:



Selecting the Transfer Data tab

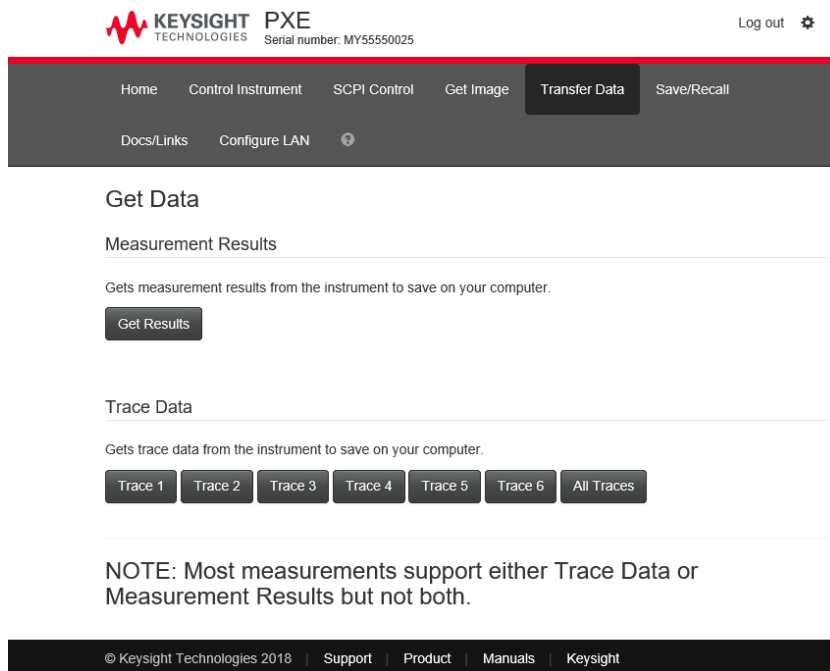
Selecting the Transfer Data tab enables you to capture results from the instrument's currently active measurement. Depending on the current measurement type, captured results consist of either Trace Data or Measurement Results.

NOTE

To capture data using the web server, the instrument application must be running.

The captured data is formatted as a Comma Separated Value (CSV) file, which may be saved on the client computer's disk drive, or opened with a spreadsheet application such as Microsoft Excel, or imported into a database application such as Microsoft Access.

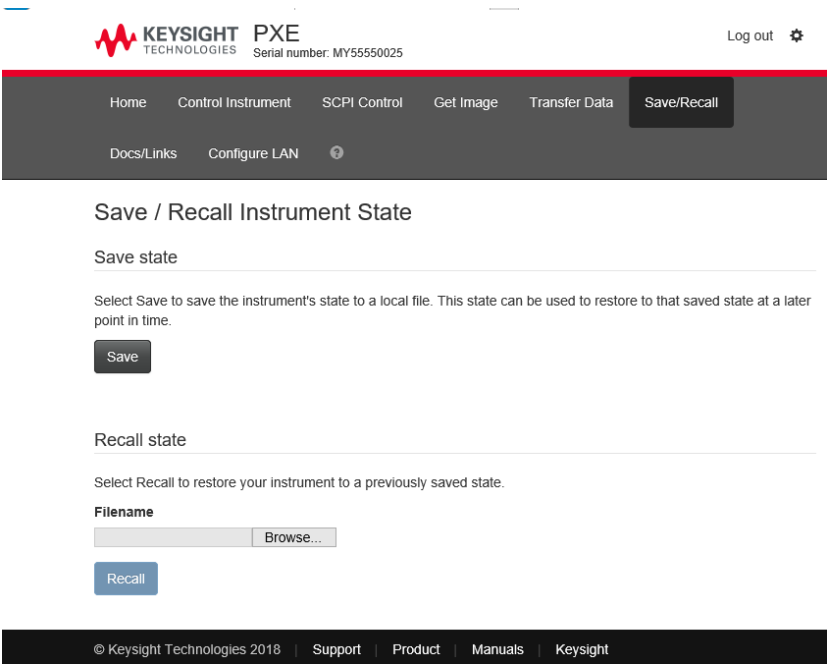
A typical Transfer Data web page display is shown below:



Selecting the Save/Recall tab

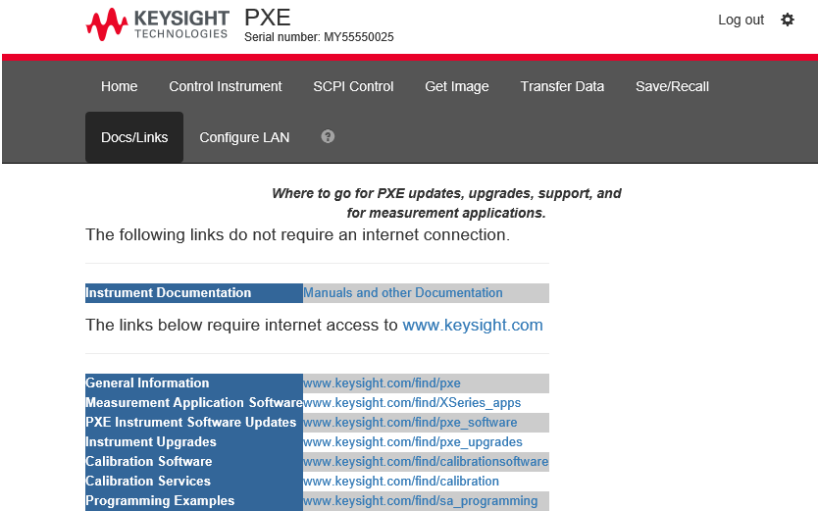
Selecting this tab enables you to save and recall data from the instrument.

Using Windows Tools
Embedded Web Server: Using the X-Series EMI Receiver Remotely



Selecting the Docs/Links tab

Selecting this tab enables access links to the instrument documentation and application software.



Windows Shortcuts and Miscellaneous Tasks

This section provides a list of windows shortcuts (key combinations) that are useful when you operate the instrument without an attached mouse and keyboard.

Although these shortcuts are available in any Windows 10 system, they are not commonly used when a mouse and keyboard are attached.

Windows shortcuts (key combinations)

You can use the following combinations of front panel keys to perform basic windows tasks when using the instrument without an attached mouse and keyboard.

Table 5-10 Windows shortcut key combinations

To do the following:	Press:
Display the Windows Start Menu	Ctrl+Esc
Cycle through all open applications	Alt+Tab
Select the first menu of a menu bar	Alt
Move through menu headings	Left Arrow, Right Arrow
Open (drop down) a menu	Down Arrow
Move through items in an expanded menu	Up Arrow, Down Arrow
Close the current menu selection	Esc
Cancel the current menu bar selection	Alt
Open an application's control menu (usually the left-most menu on the menu bar, starting with F ile)	Alt+Down Arrow
In a dialog: move between tabs	Ctrl+Tab
In a dialog: move forward through dialog box items	Tab
In a dialog: move backward through dialog box items	Shift+Tab
In a dialog: open a list box	Alt+Down Arrow
In a dialog list box or check box: select or deselect one item at a time	Shift+Up Arrow, Shift+Down Arrow
In My Computer , expand a selected folder	Enter
In My Computer , open a folder one level up from the current folder	Bk Sp

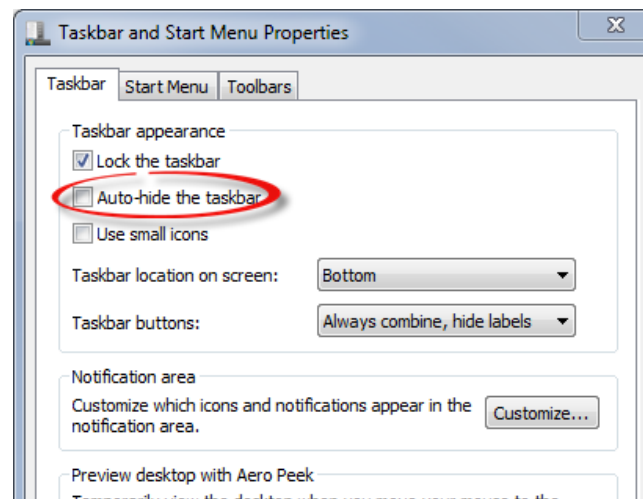
Windows taskbar auto-hide feature

The Windows taskbar should always be in the auto-hide mode when using the instrument application. If the taskbar is not set to auto-hide, the lower part of the instrument display is obscured by the taskbar.

If at any time the Windows taskbar is inadvertently set to the non-auto-hide mode, you can restore the auto-hide behavior by doing the following:

Table 5-11 Restoring taskbar auto-hide mode

Step	Notes
1. Click Start, Control Panel	If not using a mouse, press Ctrl+Esc .
2. Click Taskbar and Start Menu	If you are not using a mouse, use the shortcut key combinations specified in the Section “Windows shortcuts (key combinations)” on page 83 to make these selections.
3. Click the Taskbar tab	The Taskbar and Start Menu Properties dialog appears.
4. Select the Auto-hide the taskbar check box	If you are not using a mouse, press Tab repeatedly until the auto-hide option is selected, then press Select to toggle the check box state.



5. Click OK .	This applies the change and closes the dialog box.
----------------------	--

6 Troubleshooting

[“Check the Basics” on page 86](#)

[“Problems with Microsoft Windows 10” on page 88](#)

[“Returning an EMI Receiver for Service” on page 89](#)

WARNING

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

Check the Basics

- Is there power at the receptacle?
- Is the instrument turned on? Check to see if the green LED beside the power switch is on. Also, listen for internal fan noise to determine if the instrument's cooling fans are running.
- If other equipment, cables, and connectors are being used with your instrument, make sure they are connected properly and operating correctly.

If the instrument cannot completely load or run the operating system, or the instrument application is not successfully launched, the problem could be a corrupt disk drive. If the instrument gets far enough along in the boot process to run the "Instrument Recovery System", perform the **"Disk Drive Recovery Process"** as described on page 60.
- Is the Measurement Application running? If not, there is a software launch shortcut/icon on the desktop.
- Does the instrument application have the focus? If not, move focus to the application with Alt-Tab.
- Review the measurement procedures being performed when the problem first appeared. Are all of the settings correct?
- If the instrument is not functioning as expected, return the instrument to a known state by pressing **Mode Preset**.

NOTE

Some instrument settings are not affected by a Preset. If you wish to reset the instrument settings, press **System, Power On, Restore Power On Defaults**.

- Is the measurement being performed, and the results that are expected, within the specifications and capabilities of the instrument?

Refer to the specifications guide for the PXE EMI receiver:
N9048B PXE EMI Receiver Specifications Guide

For more information on your instrument, visit the product page at:
http://www.keysight.com/find/pxe_support
- If the instrument is not communicating via the LAN connection, check for the presence of blinking yellow LEDs on the rear panel LAN connector. If the ACT LED is not blinking, check the LAN cable and LAN integrity.
- To meet specifications, the instrument must be aligned. Either the Auto Align (On) feature must be selected (press **System, Alignments, Auto Align**, and select **Normal**), or the instrument must be manually aligned.
- Perform an Alignment. Press **System, Alignments, Align Now, Align All Now**.

- If the previously performed alignments did not resolve the problem, press **System, Alignments, Restore Align Defaults**. Then press **System, Alignments, Align Now, Align Now All**.
- If the instrument exhibits large amplitude errors (> 10 dB) especially at frequencies above 10 GHz, the RF preselector might not be properly centered. Press **AMPTD, Signal Path, Presel Center**. If the signal amplitude error is corrected, the preselector characterization should be performed. Press **System, Alignments, Advanced, Characterize Preselector**. The characterization will take several minutes and the instrument must not be interrupted during this time. If the instrument is interrupted during the characterization process, the characterization data will be destroyed and it will be necessary to perform the entire process again.
- Is the instrument displaying an error message? If so, refer to the Instrument Messages Guide.
- Check if the external frequency reference is selected but not available. Verify that it is selected by pressing **Input/Output, Freq Ref Input**. If **External** is selected, changing the setting to **Sense** allows the instrument to sense the presence of an external reference and use it only if it is available. The frequency of the reference should be set correctly.
- If you are using a Windows program other than the instrument application, you may notice it running slow. Place the instrument application in single sweep/measurement.

Problems with Microsoft Windows 10

The Microsoft Windows 10 operating system settings have been optimized for the best performance. Modification of these settings may degrade instrument performance and measurement speed. Those that can be safely modified are described in **“Settings that can be changed” on page 51**.

The X-Series EMI Receiver operates in an open Windows environment, so you can install software on the instrument. However, installation of non-approved software may affect instrument performance. Keysight does not warrant the performance with non-approved software installed.

Returning an EMI Receiver for Service

Calling Keysight Technologies

Keysight Technologies has offices around the world to provide you with complete support for your instrument. To obtain servicing information or to order replacement parts, contact the nearest Keysight Technologies office listed below. In any correspondence or telephone conversations, refer to your instrument by its product number, full serial number, and software revision.

Press **System**, **Show System**, and the product number, serial number, and software revision information will be displayed on your instrument screen. A serial number label is also attached to the rear panel of the instrument.

Locations for Keysight Technologies

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

Americas

Canada
1 877 894 4414

Latin America
(305) 269 7500

United States
1 800 829 4444

Asia Pacific

Australia
1 800 629 485

China
800 810 0189

Hong Kong
800 938 693

India
1 800 112 929

Japan
0 120 (421) 345

Korea
080 769 0800

Malaysia
1 800 888 848

Singapore
1 800 375 8100

Taiwan
0800 047 866

Thailand
1 800226 008

Europe & Middle East

Austria
43 (0) 1 360 277 1571

Belgium
32 (0) 2 404 93 40

Denmark
45 70 13 15 15

Finland
358 (0) 10 855 2100

France
0825 010 700*
*0.125 Euros/minute

Germany
49 (0) 7031 464 6333

Ireland
1890 924 204

Israel
972-3-9288-504/544

Italy
39 02 92 60 8484

Netherlands
31 (0) 20 547 2111

Spain
34 (91) 631 3300

Sweden
0200-88 22 55

Switzerland
0800 80 53 53

United Kingdom
44 (0) 118 9276201

Other European Countries: <http://www.keysight.com/find/contactus>

Read the Warranty

The warranty for your instrument is in the front of your Specifications Guide. Please read it and become familiar with its terms.

If your instrument is covered by a separate maintenance agreement, please be familiar with its terms.

Service Options

Keysight Technologies offers several optional maintenance plans to service your instrument after the warranty has expired. Call your Keysight Technologies office for full details.

If you want to service the instrument yourself after the warranty expires, you can download the service documentation that provides all necessary troubleshooting and maintenance information from the Keysight web page.

Performance Verification and Adjustment tests require the N7818A Keysight X-Series Signal Analyzer Calibration Application Software. Information regarding the N7818A Keysight X-Series Analyzer Calibration Application Software can be found at:

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

Packaging the Instrument

Use original packaging or comparable. It is best to pack the unit in the original factory packaging materials if they are available.

WARNING

Analyzer damage can result from using packaging materials other than those specified. Never use styrene pellets in any shape as packaging materials. They do not adequately cushion the equipment or prevent it from shifting in the carton. They cause equipment damage by generating static electricity and by lodging in the analyzer louvers, blocking airflow.

You can repackage the analyzer with commercially available materials, as follows:

Table 6-1

Step	Notes
1. Wrap the analyzer in anti-static plastic to reduce the possibility of damage caused by electrostatic discharge	
2. Use a strong shipping container.	The carton must be both large enough and strong enough to accommodate the analyzer. A double-walled, corrugated cardboard carton with 159 kg (350 lb) bursting strength is adequate. Allow at least 3 to 4 inches on all sides of the analyzer for packing material.
3. Surround the equipment with three to four inches of packing material and prevent the equipment from moving in the carton.	If packing foam is not available, the best alternative is plastic bubble-pak. This material looks like a plastic sheet filled with 1-1/4 inch air bubbles. Use the pink-colored bubble which reduces static electricity. Wrapping the equipment several times in this material should both protect the equipment and prevent it from moving in the carton.
4. Seal the shipping container securely with strong nylon adhesive tape.	
5. Mark the shipping container "FRAGILE, HANDLE WITH CARE" to assure careful handling.	
6. Retain copies of all shipping papers.	

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