

Installation
Guide

Keysight N6841A RF Sensor

Notices

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A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met

WARNING

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

Edition History

Edition	Summary of Change	Written by	Date
1.3	Regulatory Updates	D. Tripp	2018-11-06
1.2	Regulatory, Beep sequence, Temperature limits	D. Carpenter	2018-04-24
1.1	European Radio Equipment Directive (RED)	D. Carpenter	2017-12-9
1.03	Class B to A & Troubleshooting	D. Tripp	2017-09-05
1.02	Made shielded Ethernet cable required	R. Shen	2017-06-16
1.01	Added shielded Ethernet cable	R. Shen	2015-09-1
1.0	Initial version	R. Shen	2014-09-1

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Overview

The Keysight N6841A RF Sensor provides a cost-effective way to improve spectral awareness. The RF Sensor is enclosed in a weatherproof case allowing wide-area, close-proximity signal monitoring, detection and emitter location in any environment. Its open programming interface allows users to dynamically link to a wide range of software applications. An Ethernet TCP/IP network connection allows for remote deployment of a network of multiple sensors within a single room, throughout a city, or across the world. This document discusses the physical installation of the RF Sensor.

The table below lists other manuals pertinent to the RF Sensor.

Part Number	Title	Publication Date
N6841-90000	N6841A Quick Install Guide	Sep 2017
N6851-90001	RF Sensor Software User Guide	Sep 2017
N6854-90000	Geolocation Server User Guide	Sep 2017
	Application Programming Overview	Sep 2017
N6851-90004	System Planning Tool User Guide	Sep 2017

Important Safety Information

Servicing Information

Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when an antenna cable or Ethernet cable or connector is damaged, the unit has dropped from height, the sensor's casing has been opened, or the device does not operate normally.

Regulatory Information

All Keysight Technologies Inc. devices are designed to be compliant with rules and regulations in locations they are sold and will be labeled as required. Any changes or modifications to Keysight equipment, not expressly approved by Keysight, could void the user's authority to operate the equipment.

When Keysight devices are professionally installed, the Radio Frequency Output Power will not exceed the maximum allowable limit for the country of operation.

Unauthorized modifications or attachments could cause equipment damage and may violate regulations.

Radio Compliance (GPS)	Complies with the essential requirements of the European Radio Equipment Directive as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity): - EN 303 413 - EN 300 440
EMC compliance	Complies with current editions of the following standards (dates and editions are cited in the Declaration of Conformity): - IEC/EN 61326, CISPR Pub 11 Group 1, Class B - AS/NZS CISPR 11 - ICES/NMB-001 This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada. Note 1: Compliance with Radiated Emissions limits requires the use of a double-shielded, Cat 7 Ethernet cable with the weatherproof boot. (See page 19 in the Installation Guide for instructions.) Note 2: This is a sensitive measurement apparatus by design and may have some additional residual responses when exposed to ambient continuous electromagnetic phenomenon in the range of 150 kHz-2.7 GHz when tested per IEC 61000-4-3 or IEC 61000-4-6. Based on a small sample size, performance loss was observed, up to -40dBm compared to a measured baseline of -120dBm.
Safety compliance	IEC 61010-1:2010 / EN 61010-1:2010 (3 rd Edition)
ITU-R Compliance	ITU-R SM.377 between 20-6000MHz (frequency and frequency offset measurements) - ITU-R SM.378 (field strength measurements) - ITU-R SM.328 (bandwidth measurements)
Acoustic statement: (European Machinery Directive)	Acoustic noise emission LpA <70 dB Operator position Normal operation mode per ISO 7779

To find a current Declaration of Conformity for a specific Keysight product, go to: <http://regulations.about.keysight.com/DoC/search.htm>

Product Markings

Products may display the following symbols:



Warning, risk of electric shock



Refer to manual for additional safety information.



Earth Ground.  Chassis Ground.



Alternating Current (AC).



Standby Power. Unit is not completely disconnected from AC mains when switch is in standby.



Antistatic precautions should be taken.



The CSA mark is a registered trademark of the CSA International.



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). This product complies with all relevant directives



The RCM mark is a registered trademark of the Australian Communications and Media Authority.



South Korean Certification (KC) mark; includes the marking's identifier code which follows this format:
MSIP-REM-YYY-ZZZZZZZZZZZZ..

ICES/NMB-001

ICES/NMB-001 indicates that this ISM device complies with the Canadian ICES-001.



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.



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

This symbol indicates separate collection for electrical and electronic equipment, mandated under EU law as of August 13, 2005. All electric and electronic equipment are required to be separated from normal waste for disposal (Reference WEEE Directive, 2002/96/EC).



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.

CAT I, CAT II, CAT III, CAT IV

IEC Measurement Category I, II, III, or IV

N6841A RF Sensor at a Glance

N6841A RF Sensor's physical and electrical characteristics:

Physical	
Dimensions	Width: 291.80mm Height: 245.73 mm (casing only) 268.93 mm (casing and connectors) Depth: 53.70 mm
Housing	Aluminium Case
Weight	3.5 kg (7.7 lbs)
Rack Mounting	½ width 19-inch rack 2U height (requires additional air flow for cooling)
Environmental	
Temperature	-15°C to 55°C (Operating not in direct sunlight),
Humidity	15% to 95% Non-condensing
Altitude	21000 feet/6096 m @50°C (Operating)
Wind Loading	Max 158 N (35.6 lbs) @ 160 kph (100 mph)
Electrostatic Discharge	15kV (air) @ 50% rh, 8kV (contact) @ 50% r
Enclosure Rating	IP67 (for ingress of dust & water)
Electrical	
Operating Voltage	15–24Vdc (Nominal)
Power Consumption	25 Watts (Nominal), 30 Watts (Maximum)
Optional Power Supply (N6841A-SP1)	
Input Voltage	90 to 264 Vrms at 50/60 Hz
Rated Output Voltage	15 VDC (Nominal) @ 4 amps
Antenna Specifications	
RF Inputs	2 Type N (50 Ω) electronically switched inputs (for diversity or multi-band antennas)

CAUTION

Never exceed +20 dBm input on RF Inputs.
Never exceed 24VDC+20% on DC Power Input Connector.

Prepare for Installation

The N6841A RF Sensor must be installed by a trained professional or systems integrator familiar with outdoor electronic equipment installations, and regulatory limits, guidelines and code defined by the governing body of the country in which the unit will be installed. This section lists the required equipment and model numbers and explains how to select and survey the installation site.

WARNING

To ensure safe and durable wiring, installation of the Keysight N6841ARF Sensor must follow appropriate electrical and building codes. Follow the National Electrical Code (NEC) requirements, and additional local codes that may take precedence.

What's in the Package

These items are included in the N6841A RF Sensor package:

- N6841A RF Sensor
- Mounting bracket kit
- Weatherproof boot for Ethernet connector
- Ethernet connector
- Certificate of compliance
- Quick Install Procedure
- Software CD
- GPS antenna (optional)
- GPS antenna Cable (optional)
- Power cable weatherproof connector
- +15VDC power supply with integrated cable, connector, and localized power cord (optional)



Power Supply

The N6841A RF Sensor can be purchased with an optional AC power supply that may only be used for indoor sensor installations. The power supply is Keysight PN 0950-6131. This power supply has a 1.8 meter (6 foot), country-specific AC cord. Additionally, the power supply has a 1.8 meter (6 foot) DC power cord. Therefore, the RF Sensor site must have a mains connection within 3.8 meters (12 feet).



WARNING: The N6841A-SP1 optional power supply (PN 0950-6131) is for indoor use only, and may only be used when the RF Sensor is indoors.

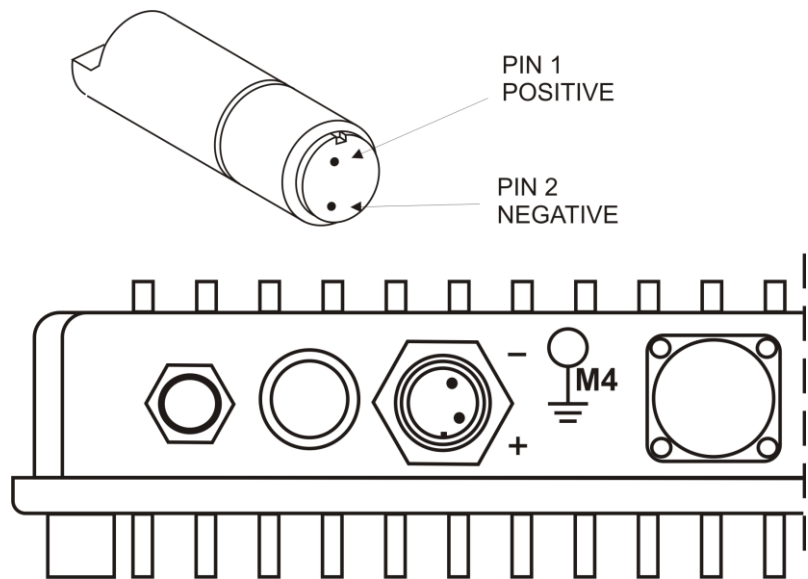
If the installation does not use the optional indoor power supply:

- Use a power supply with appropriate voltage, current and environmental ratings.
- Use a power cable with appropriate environmental ratings, and with conductors properly sized for the length of run, to ensure the voltage at the sensor is not below the minimum 15V.
- Use a power supply with the safety agency approvals for the location.

The provided additional power connector has solder cups, and will work for wire sizes up to 16 AWG, and an outside cable diameter of .22-.25 inch (5.6-6.3 mm).

The following illustration shows the polarity of the power connector plug and the connection on the RF Sensor casing. The connector is a [Switchcraft SF6382-2SG-520](#).

POWER CONNECTOR



Mounting Kit

The RF Sensor comes with a mounting kit that allows it to be installed in both indoor and outdoor locations. Included in the kit are:

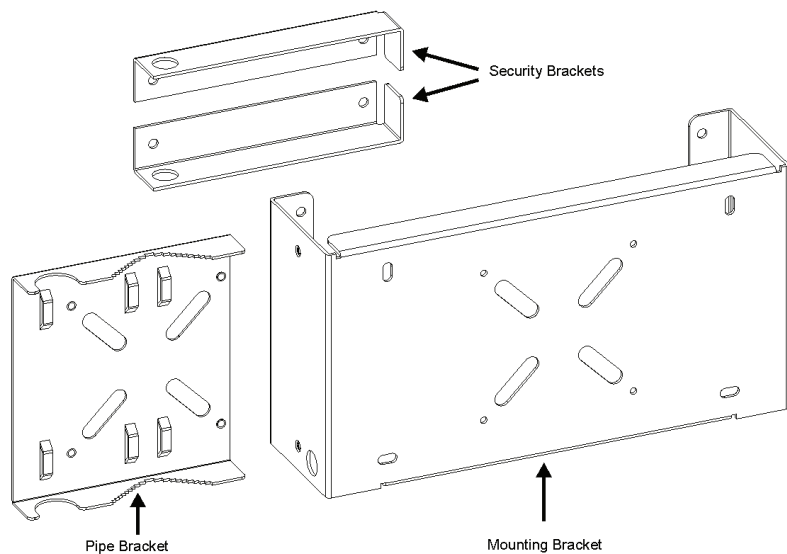
Mounting Bracket - Used by itself, this bracket allows the Sensor to be wall mounted.

WARNING

The installer is responsible to ensure the wall attachment can support 15 kg or more.

Pipe Bracket – Connected to the Mounting Bracket, the Pipe Bracket allows the Sensor to be mounted on either a horizontal or vertical pipe. To mount the Sensor to a pipe with a diameter equal to or less than 60mm (2 3/8 inches), use a U-bolt of the appropriate size. To mount the Sensor to a pipe with a diameter greater than 60mm (2 3/8 inches), use hose clamps of the appropriate size.

Security Brackets – Connected to the Sensor, they allow it to be secured to the Mounting Bracket with padlocks. These brackets also bear the weight of the Sensor while the final screws are installed.



Site Survey

Selection of monitoring sites is an important aspect of deploying a successful distributed monitoring system useful for both RF parametric measurements and emitter location. Here are some of the factors to consider in site selection (as stated in Annex 1 of Report ITU-R SM.2211 “Comparison of time-difference-of-arrival and angle-of-arrival methods of signal geolocation”:

Access to power, ground and network

Proximity to signal energy (both desired and undesired). Placement of monitoring sites in close proximity to wireless services or industrial grade electrical equipment has become necessary in many large metropolitan areas.

Terrain and line of sight to the area being monitored

Emitter density and nature of the spectral traffic

Importance of the user base in the area being monitored (i.e. critical infrastructure or government installations, etc.)

Duration of the monitoring activity. The Keysight N6841A RF Sensor is well-suited for temporary monitoring of events due to the small size, battery operation and ease of setup and tear down. The RF Sensor and accessories can easily be mounted to a small tripod for fast deployment.

The Keysight Sensor Planning and Optimization Tool (SPOT) should be used to model the sensor installations. The tool can also be used to simulate the RF detection range and geolocation coverage area for specific transmitter types. The use of SPOT and a GIS can save time in selection of the monitoring site locations and help determine the best candidates for the deployment.

Each RF Sensor installation is unique because of the physical and RF differences of each location. Before installing the RF Sensor, perform a site survey to determine the optimum placement of units for maximum RF detection range, geolocation coverage area, and network performance (especially if the network connection is wireless). In urban settings, sometimes moving the RF sensor and antenna by a few meters makes a big difference in the ability to detect and monitor an emitter. Signal blockages and reflections play a big role in these settings.

Consider carefully the connections to antennas, power and network service when performing a site survey:

- Antenna type and placement - Proper antenna configuration is a critical factor in maximizing RF detection range. As a rule, range increases in proportion to gain and antenna height measured from the ground.
- Availability of power- Ensure that there is a mains connection close enough for the power supply. For more discussion on power options, refer to Keysight N6841A Quick Note 2 (pub #5991-3083EN)
- Ethernet connection - The N6841A is supplied with a waterproof Ethernet cable connector housing and Ethernet connector. The customer must supply a shielded Ethernet (Cat5) cable.

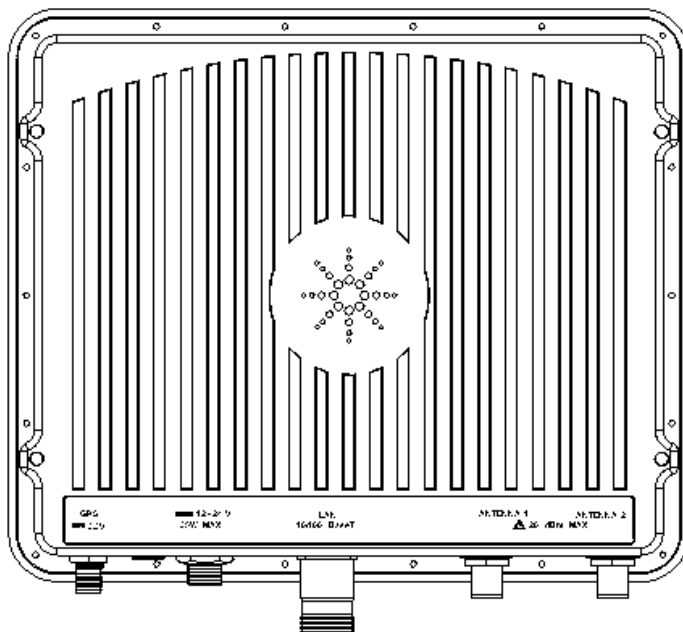
Tool List

To install the Keysight N6841A, the following tools will be needed:

- 10 mm box wrench.
- #2 Pozidrive or Phillips screwdriver (for the ground screw.)
- Wall mounting only: the appropriate connectors for the specific wall type.
- Wood pole mounting only: two 5/8-inch diameter, 3-inch long lag bolts
- Tower mounting only: supply stainless or galvanized steel channel stock and 1/2-inch or 5/8-inch nuts, bolts, and washers to connect to the tower arm.

Mounting Strategies

The RF Sensor is designed to be mounted either indoors or outdoors, on a wall or a vertical or horizontal pipe or strut and is installed in the position shown in Figure 1. Note the unit is installed with the antenna and LAN connectors facing down.



When choosing mounting locations, consider the available mounting structures and unit clearance. The RF Sensor should always be mounted with the top of the unit horizontal and level, and with the antenna and internet connectors facing downward.

The user should supply shielding in hot climates if the unit is to be mounted where receives direct sunlight.



You must provide clearance room for transient arrestors, grounding connections, and airflow.

WARNING

Do not impede convection airflow around the product.
Do not stack units flat on top of each other without space for airflow.

Do not enclose the unit in a container, such as a box or backpack, without providing active cooling.

Enclosing or covering the unit without adequate ventilation will lead to high temperatures and create the possibility of burn hazards.

Mounting Instructions

This section describes the steps needed to physically install the RF Sensor in various locations.

Note: Before installing an RF Sensor, make a note of the Sensor's serial number (located on the lower front of the housing, near the LAN connector). This is especially helpful if you are installing the RF Sensor so that the serial number plate is hidden or obscured in the final installation.

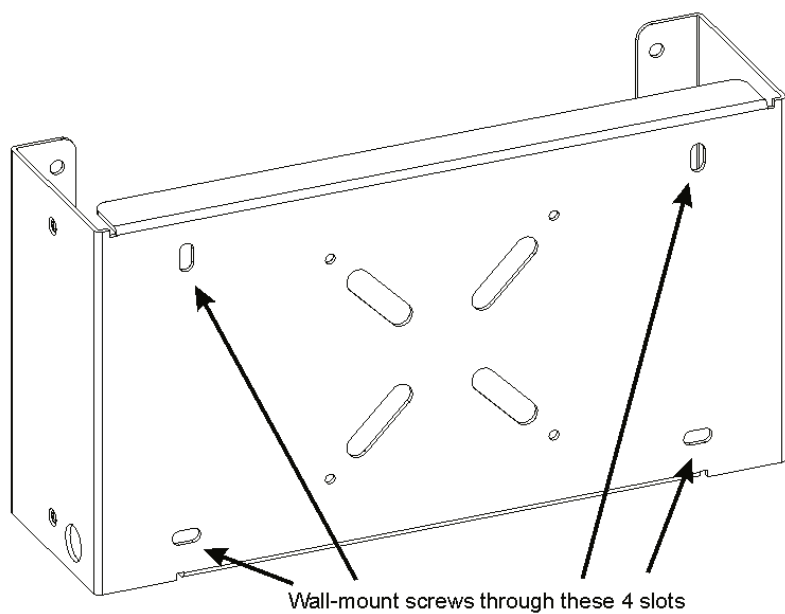
Wall Mounting Instructions

To install the RF Sensor to a wall, use the following steps:

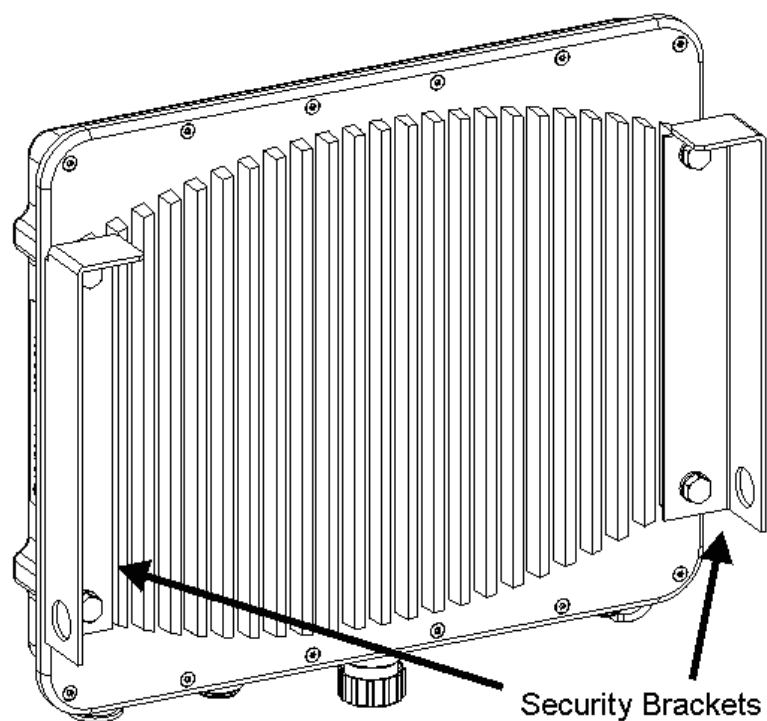
1. Place the base bracket of the Mounting Kit against the wall at the desired location.
2. Mount the base bracket to the wall with the appropriate customer-supplied screws and washers. Use the four mounting screw holes on the base bracket. These slotted holes accept screws up to 6.3mm (1/4 inch).

WARNING

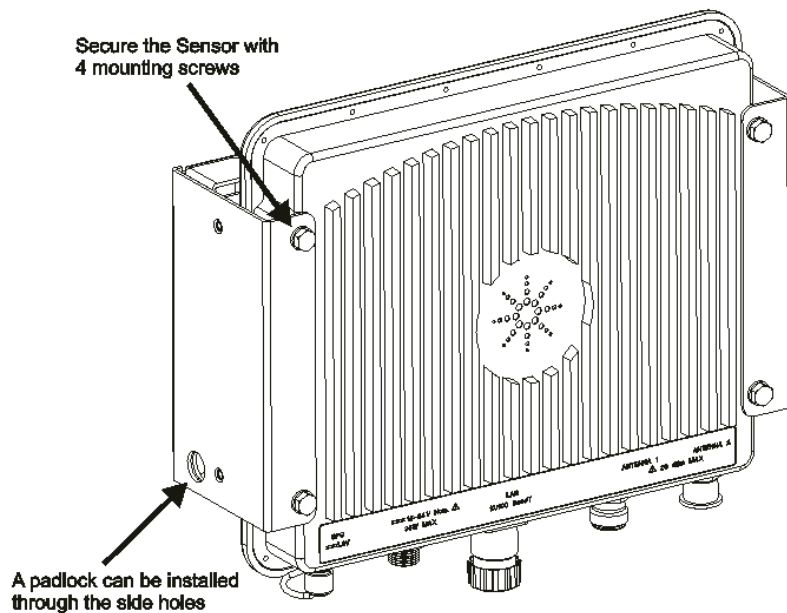
Use appropriate mounting hardware for the type of wall in use. Hardware and mounting method must support 15 kg (33 lbs) plus the weight of cables and accessories.



3. Secure left and right security brackets to the Sensor housing with four each of the M6 screws, flat washers, and lock washers included in the Mounting Kit. Install the brackets as shown so that the open side faces towards the unit's bottom (towards the power and antenna connectors.)



4. Gently slide the Sensor into the mounting bracket until the left and right security brackets rest on the main brackets.



5. Secure the Sensor with four each of the M6 screws, flat washers, and lock washers included in the Mounting Kit.
6. If desired, insert a padlock through the Mounting Bracket's side holes to secure the Sensor.

Pole and Tower Mounting Instructions

To mount the RF Sensor to a pipe, use the following steps:

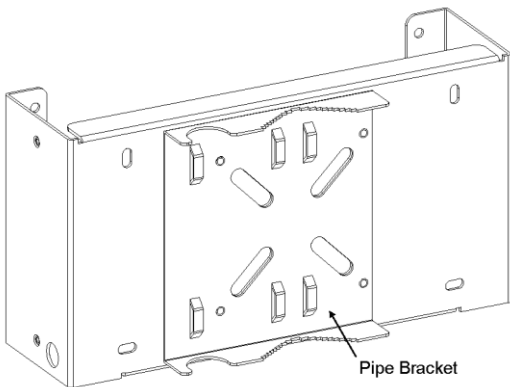
1. Place the pipe bracket to the Mounting Bracket, placing the four pipe bracket studs through the proper holes in the Mounting Bracket.

Note that the illustration shows the pipe bracket installed for a vertical pipe mount, but the pipe bracket can be rotated 90 degrees and installed so that the sensor can be mounted on a horizontal pipe.

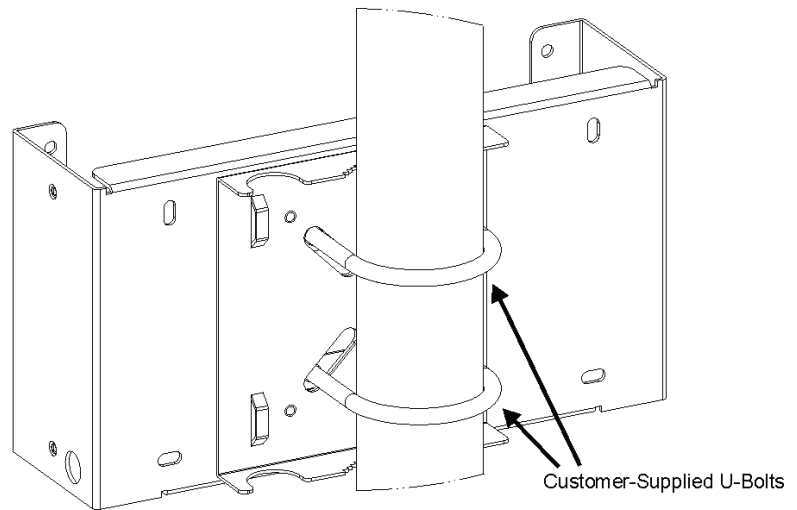
2. Secure the pipe bracket to the Sensor Mounting Bracket using 4 M4 lock nuts.

WARNING

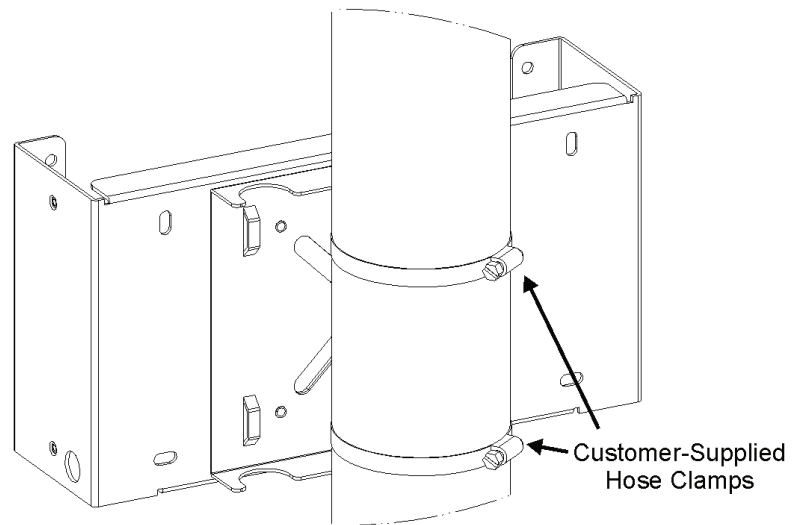
The pole, tower, or pipe must be anchored and capable of supporting 15 kg (33 lbs.) plus the weight of cables and accessories.



3. To mount to a pipe smaller than 60mm (2 3/8 inches), mount bracket to pipe using customer-supplied U-bolts and backing plates.

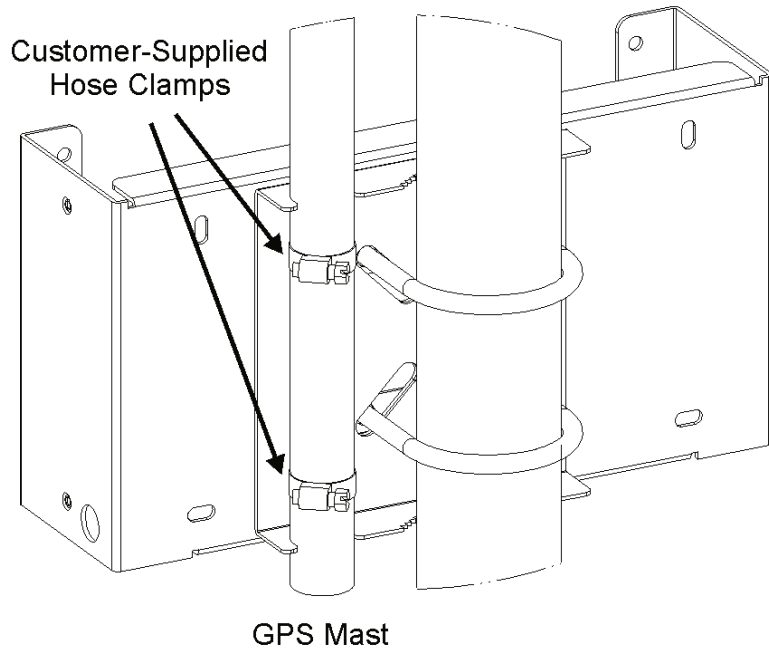


To mount to a pipe larger than 60mm (2 3/8 inches), mount bracket to pipe using customer-supplied hose clamps. Pass the clamps through the raised slots on the pipe mounting bracket and around the pipe.

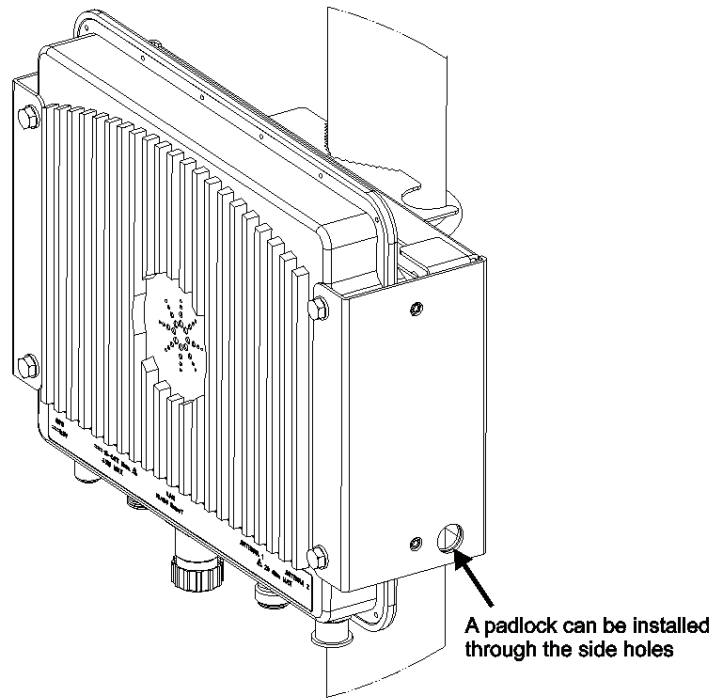


4. To add an optional GPS mast, secure the mast to the notch on the pipe bracket using customer-supplied hose clamps. The notch fits a 26 mm (1.05 inch) diameter pipe (3/4 inch nominal.) A standard 26mm threaded fitting will accommodate the threads on the base of the GPS antenna supplied (optionally) as N6841A-GPS.

Note: The GPS mast can be attached with the pipe bracket only if the mounting pipe is vertical. If you are mounting the Sensor to a horizontal pipe; some other method must be used to mount the GPS mast.



5. Gently lower the Sensor into the mounting bracket until the left and right security brackets rest on the Mounting Bracket.



6. Secure the sensor with four M6 screws, flat washers, and lock washers.
7. If desired, insert a padlock through the Mounting Bracket's side holes to secure the Sensor.

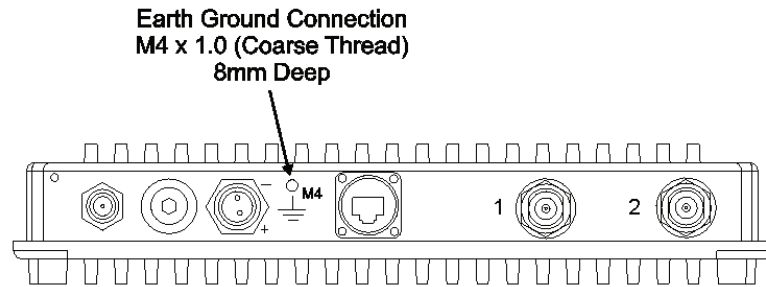
Install the Antenna and RF Cables

The Keysight N6841A has two Type-N (f) antenna input connections. They are switched with a solid state switch designed for long life. The switch has, at most, 30 dB of isolation. Many customers use only one broadband antenna connected to input #1. However, other combinations of antennas are possible. For example, one input may have an omni-directional and the other a directional, banded antenna. Some use a low-band antenna on one input and a high-band on the other. In this case, a high-pass filter on the high-band antenna and an FM-trap filter on the low-band may prove beneficial (depending on how active the RF environment is).

Protection of the RF inputs is also very important if the antennas are mounted outside. An RF Limiter such as the Keysight N9355B has low insertion loss, fast turn on time and will protect the N6841A from power surges that may be common in active RF environments. It is highly recommended for any outdoor installation. Upon request, Keysight will provide additional information and examples of sensor installations.

Refer to the instructions provided with the antenna. In all cases, install in a manner consistent with good practices and local electrical codes. The Keysight N6850A Broadband Omni-directional antenna is an excellent choice for use with the RF Sensor. It allows a very quick and easy installation and provides good support for both monitoring and emitter location measurements.

Ground all antenna connections to the Sensor's ground connection point, shown in the following illustration.



4kV of ESD protection is provided for bare antenna connections. Protecting bare antennas from human touch and other ESD sources will improve reliability.



Transient arrestors are required when the antennas are mounted outdoors, or when the system is potentially subject to lightning surges. (Hyperlink Technologies AL6-NMNFB-9 or equivalent.)



Bump (Incompatible)

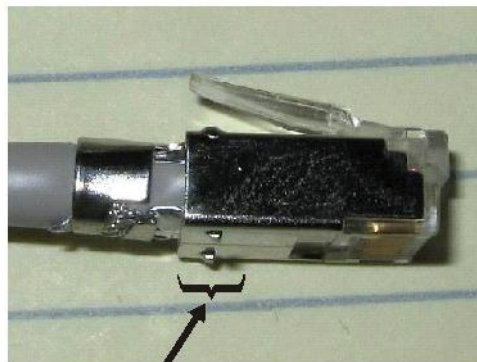
Preparing the Ethernet Cable

The RF Sensor uses Ethernet to communicate to the host PC.

The Ethernet connector will accept any standard 8P8C (RJ45) plug. It is required to use a shielded LAN cable to prevent excessive emissions from the cable.

To use the weatherproof boot in outdoor installations, the RF Sensor end of the Ethernet cable must use a connector that does not have a bump, flange, or tabs in the crimp section.

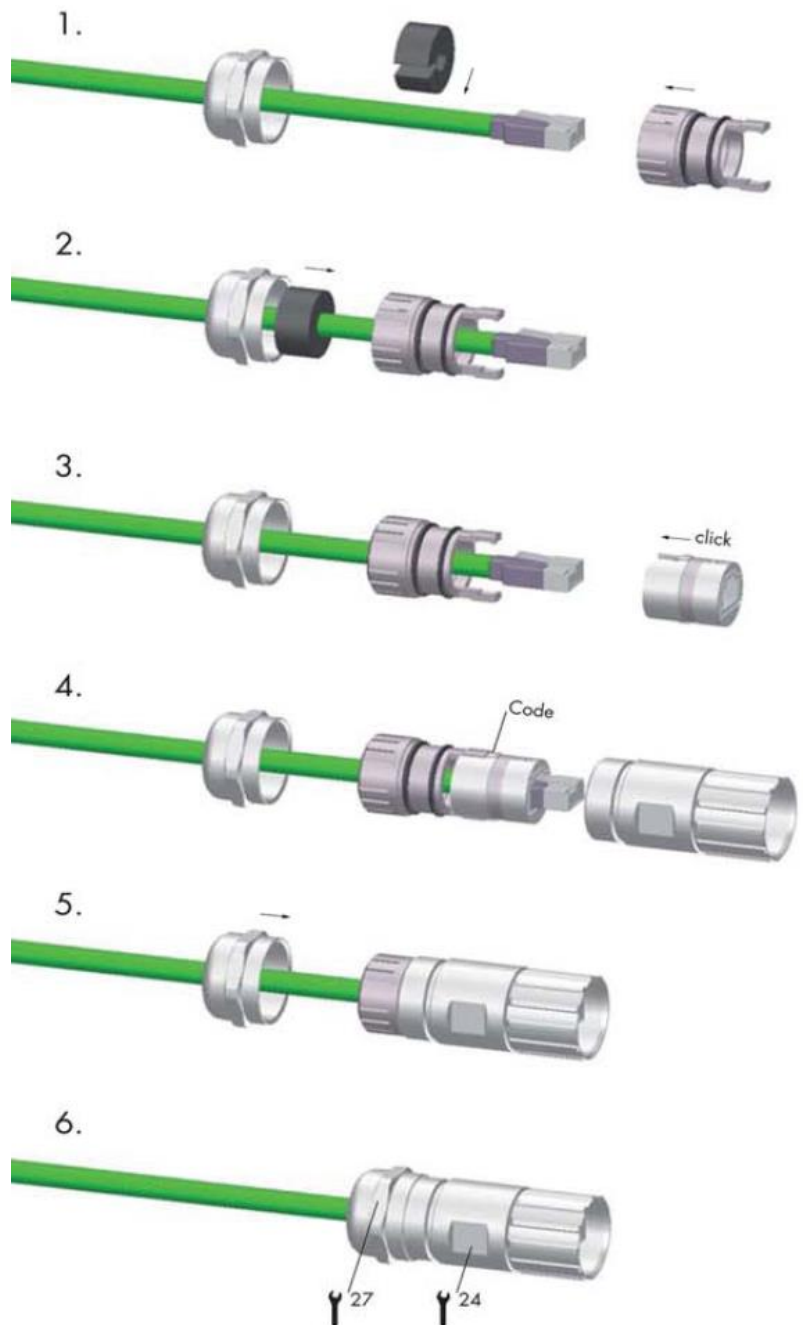
The illustrations show an incompatible RJ45 plug and a compatible RJ45 plug.



Tangs (Flatten with Pliers)

The following illustrations show how to install the Ethernet connector's waterproof boot.

Assemble the weatherproof boot as shown in the following illustration:



Install the RF Sensor Software

The software to operate the Keysight RF Sensor is provided on the software DVD included in the RF Sensor package. The software consists of:

SMT—the Sensor Management Tool is used to verify a sensor's status, configure a sensor, reboot a sensor, and launch sensor programs. The SMT communicates with a server using the Sensor Management Server (SMS).

SMS—the Sensor Management Server handles requests from the SMT and maintains a database entry for every sensor it manages.

SAL—the Sensor Access Library, an API is used to include sensor access calls in user-written programs.

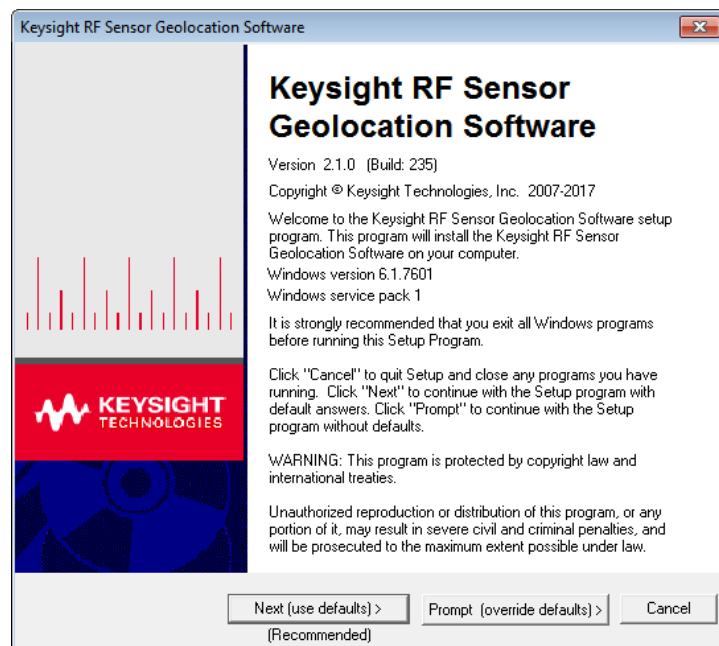
N6841A to KML— This tool enables porting geolocation results to a KML viewer such as Google Earth™.

System Planning and Optimization Tool – This tool aids in planning where to place sensors and to predict coverage range depending on signal power, format, antenna type, cables and preamplifier characteristics, as well as sensor sensitivity.

The software is designed to operate on Microsoft Windows 7 and Windows 10 (both 32 and 64 bit) operating systems.

To install the RF Sensor Software, use the following steps:

1. Place the DVD in the DVD drive of the laptop or workstation that will control the sensor.
2. If the PC has the autorun option enabled, the software installation program starts automatically. If the autorun option is disabled, from the DVD drive, run the program \winnt\setup.exe.



3. Click the “Next (use defaults)” button to continue the installation.
4. Review the license agreements and select “AGREE” to proceed. There are separate agreements for the Keysight and Mathworks software.
5. In addition to SMS/SMT, this installer installs seven third party tools. The automatic process assumes these installers install without a problem, and in many cases, if there is a problem the process indicates which installer had the problem. These installers are found in the installer under the folders “Java”, “MATLAB”, and “Microsoft”, and can be re-run individually if there are problems. The third-party tools installed are:
 - a. Oracle Java 1.6, service pack 33: “jre-6u33-windows-i568.exe”
 - b. Microsoft Visual Studio C++ 2005 Redistributable: “vcredist_x86_vs2005.exe”
 - c. Microsoft Visual Studio C++ 2010 32 bit Redistributable: “vcredist_x86_vs2010.exe”
 - d. Microsoft Visual Studio C++ 2010 64 bit Redistributable: “vcredist_x64_vs2010.exe”
 - e. Microsoft .NET2.0: “dotnetfx20.exe”
 - f. Microsoft .NET4.0: “dotnetfx40.exe”
 - g. The Mathworks MATLAB Runtime redistributable: “MCRInstaller.exe”

Depending on the operating system being used and what runtime libraries are currently installed, a different number of re-boots will be required.

When the installation process is complete, verify that the program appears in the Windows Start menu.

Verify the operation of the RF Sensor

Because the Keysight RF Sensor has no external switches, lights, or other indicators, there are two methods to ensure that the sensor is correctly completing the power-up sequence. These two methods, the Power-on self-test and the Sensor Management Tool are described below.

Power-On Self-Test

When power is applied to the Keysight RF Sensor, it performs a quick test of some of the major functions. When powering on the RF Sensor the following beep sequence will be heard when the sensor is in single channel mode:

- 1 short beep after approximately 1 minute
- 3 short beeps after another 20 seconds (1 minute, 20 seconds)
- 4 short beeps after another 5 seconds (1 minute, 25 seconds)

The test of major functions includes:

- PCI test—If the sensor fails this test, it emits one long beep.
- Capture SDRAM test—This test performs a quick write/read test of the sensor's capture SDRAM. If the sensor fails this test, it emits two long beeps.
- LO Unlock test—This test verifies that all the LO oscillators can sweep through their tuning ranges without unlock. If the sensor fails this test, the sensor emits four long beeps.

Verify Operation Using the SMT

The SMT was designed to manage and control a network of distributed Keysight RF Sensors, and so it provides the best verification that a sensor is operating. For more complete information on using the RF Sensor Software, refer to the manual *RF Sensor Software User Guide*.

This method of connecting to the RF sensor requires either an Ethernet crossover cable, hub or switch.

1. Using an Ethernet cable, connect the sensor directly to the workstation or laptop on which the RF Sensor software is installed.

Or, connect to the sensor to the workstation or laptop using an Ethernet hub or switch.

2. Start the copy of SMT.
3. If necessary, set the SMS preferences to "localhost."

Note: While connected to an RF Sensor directly, it is not possible to launch Surveyor or block tools.

4. Click on the "Configuration" icon.
5. Select the "Discover Sensors" tab on the right-hand side of the window.
6. At the bottom of the window, click the "Find Available Sensors" button.
7. The sensor information, including its IP address, is displayed in the Discovered Sensor list.

Troubleshooting

Detecting a SMS Port Conflict. The default Port for SMS is 8080. However, there can be other programs that use this port.

To check for a port conflict run the following program:

```
C:\Program Files (x86)\Keysight\RFSensor\bin>detectPortConflict.exe  
localhost 8080
```

Looking for port conflict on host: localhost port: 8080

Success! Unable to connect to socket on 'localhost', port 8080: No error

Detecting SMS Service: To verify that the SMS service is installed and running, run the following program:

```
C:\Program Files (x86)\Keysight\RFSensor\bin>detectSmsService
```

Found KeysightSMS service

State: Running

Fixing the Registry: It may be necessary to fix the registry if you are having problems run the Sensor Management Tool (SMT) or Sensor Management Server (SMS). Sometimes environmental variables don't get set or change. To fix these problems run the following program:

```
C:\Program Files (x86)\Keysight\RFSensor\bin>manipulateRegistry.exe
```

read key <== read an env var

delete key <== delete an env var

create key value <== create an env var

replace key value <== replace an env var (create if it doesn't exist)

createExpand key value <== create an env var with the REG_EXPAND_SZ

replaceExpand key value <== replace an env var with the REG_EXPAND_SZ

compare key expectedValue <== compare an env var to the expected value

readPath <== read the PATH

addPath element <== add an element to the front of the PATH

addPathEnd element <== add an element to the end of the PATH

removeFromPath element <== remove an element from the PATH

removePathDuplicates <== remove an element from the PATH

verifyPath element <== verify that the element is on the PATH

Verifying MATLAB: MATLAB is required for geo-location computations. To verify that the MATLAB Compiler Runtime is properly configured for Keysight's Sensor Management Server Software, run the following programs:

C:\Program Files (x86)\Keysight\RFSensor\bin>detectMatlabRuntime.exe

Successfully loaded the MATLAB Compiler Runtime DLL:...mclmcr711.dll

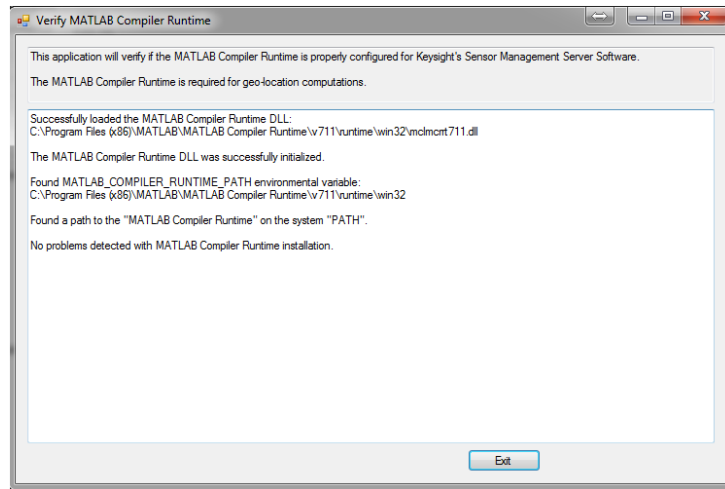
The MATLAB Compiler Runtime DLL was successfully initialized.

Found MATLAB_COMPILER_RUNTIME_PATH environmental variable:

Found a path to the "MATLAB Compiler Runtime" on the system "PATH".

No problems detected with MATLAB Compiler Runtime installation.

C:\Program Files (x86)\Keysight\RFSensor\bin\detectMatlabRuntimeGui.exe



Antivirus software conflicts: If you are having trouble finding RF Sensors using the Sensor Management Tool (SMT) some antivirus software can block this communication. For example, to allow McAfee antivirus to communicate with the RF Sensor using SMT, add the following rule to McAfee for SMS and SMT:

1. Open McAfee software and select Add Rule.
2. Name the new Rule "Keysight SMS_SMT".
3. Select Any Protocol.
4. Under Executables, add the following two executables:

C:\Program Files (x86)\Keysight\RFSensor\SMT\smt.exe

C:\Program Files
(x86)\Keysight\RFSensor\SMS\bin\KeysightSMS.exe

Temperature Limits

The N6841A RF Sensor is specified to work from -15 °C to +55 °C ambient temperature. In this temperature range the product will operate and meet specification. There is approximately a 15 - 20 °C difference from external to internal temperatures.

Internal RF Sensor temperature is considered questionable when it exceeds 70°C (quesHighTemp) or below -30°C (quesLowTemp)

If internal RF Sensor temperature is 80°C (powerDownTemp) the power is reduced and measurement services are suspended. Power to the RF boards is shut down and only the processor board remains powered on.

If internal RF Sensor temperature is 85°C (powerOffTemp), the power to all boards is shutoff completely, with no communications with the RF Sensor or ability to perform a software reboot. A power cycle, in addition to reduced temperature, is required to resume operation.

The RF Sensor internal temperature is checked every 180 seconds. If the temperature has been reduced to 65°C (powerBackUpTemp), the RF board power supply will be re-established and the RF Sensor can resume measurements.

Recommendations to correct or prevent exceeding temperature limits:

If the inside temperature of the RF Sensor is exceeding the limits mentioned above and shutting down, try installing a sun shield or move the sensor so it is not in direct sunlight.

If the inside temperature RF sensor is below the limits mentioned above and will not start, try placing it in an insulated enclosure with a small heat source, such as a light bulb.

Summary of RF Sensor internal temperature limits, indicators and actions:

- +70 °C – generates a questionable High Temperature Alarm
- -30 °C – generates a questionable Low Temperature Alarm
- +80 °C – Is the Power Off Temperature limit. Power is reduced and measurement services are suspended. Communication to the sensor remains active and the processor board keeps power.
- +65 °C - Power Back Up Temperature - Power is restored and measurement services are resumed. Power is restored to the RF boards.
- +85 °C - Power Off Temperature - All power supplies are shut down completely at this temperature, Sensors temperature must be lowered to less than 65 °C and an RF sensor power cycle is required to restore operation.

Maintenance of the RF Sensor

The RF Sensor is designed to be very low maintenance. The Sensor has no user-serviceable components; nor does it have any physically accessible adjustments. Do not open the sensor case.

To maintain the RF sensor, it should be checked occasionally to verify that it has not accumulated excessive dust, dirt, or sand. It should be cleaned of any bird droppings with a damp cloth. Ensure that the cooling fins are not blocked by twigs or wind-borne debris.



Do not clean the RF Sensor with pressurized water.

If an AC power supply cord requires replacement, only use a cord rated for the proper voltage and current, and one that has a safety agency approval mark appropriate for the country of installation. Contact Keysight Technologies for a suitable replacement cord set.

Java Update Problems

Symptoms

If the SMS and SMT have been working fine, then, after updating Java, while SMS and/or SMT are running, it is possible Java will not finish its update, causing it to work incorrectly. In this state, SMS and SMT will not work.

Recommend Procedure to fix broken Java

SMS must be stopped before running a Java update. To fix Java and keep it up to date, manually re-run the Java 6 update 33 installer, while SMS is stopped.

<http://www.oracle.com/technetwork/java/javase/downloads/jre6-downloads-1637595.html>

1. Get the Windows x86 Offline jre-6u33-windows-i586.exe (XP or another 32-bit windows OS)
2. Save to local disk
3. Close browsers
4. Stop SMT and SMS (these are most likely not running)
5. Run jre-6u33 installer
 - a. Select 'Yes', when prompted by: "This software has already been installed on your computer. Would you like to reinstall it?",

Recommend Java Update Procedure

Stop the SMS service and SMT prior to accepting any Java updates.

To stop the SMS service, follow these steps:

- Right click on “my computer”
- Select Manage
- Expand Services and Applications
- Select Services
- Select Keysight SMS
- Select “Stop” the service
- When done updating Java
- Select “Start” the service for Keysight SMS.

(This can also be done from the command line) Run CMD as Administrator

- CMD:
- C: sc start KeysightSMS
- A message will be displayed with State: 1 Stopped

```
C:\Windows\System32>sc stop KeysightSMS
SERVICE_NAME: KeysightSMS
        TYPE               : 10  WIN32_OWN_PROCESS
        STATE                : 1  STOPPED
        WIN32_EXIT_CODE       : 0   (0x0)
        SERVICE_EXIT_CODE   : 0   (0x0)
        CHECKPOINT           : 0x0
        WAIT_HINT            : 0x0

C:\Windows\System32>sc start KeysightSMS
SERVICE_NAME: KeysightSMS
        TYPE               : 10  WIN32_OWN_PROCESS
        STATE                : 2  START_PENDING
                        (NOT_STOPPABLE, NOT_PAUSABLE, IGNORES_SHUTDOWN)
        WIN32_EXIT_CODE       : 0   (0x0)
        SERVICE_EXIT_CODE   : 0   (0x0)
        CHECKPOINT           : 0x1
        WAIT_HINT            : 0xbb8
        PID                 : 7396
        FLAGS                 :
C:\Windows\System32>
```

- After installing the Java update, go back and start the service
- C: sc start KeysightSMS

Note this command is case sensitive.

