

# SIEMENS

## RUGGEDCOM RX1400

### Installation Guide

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# Preface

This guide describes the RUGGEDCOM RX1400. It describes the major features of the device, installation, commissioning and important technical specifications.

It is intended for use by network technical support personnel who are responsible for the installation, commissioning and maintenance of the device. It is also recommended for use by network and system planners, system programmers, and line technicians.

## CONTENTS

- [“ Alerts ”](#)
- [“Related Documents”](#)
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## Alerts

The following types of alerts are used when necessary to highlight important information.



### **DANGER!**

*DANGER alerts describe imminently hazardous situations that, if not avoided, will result in death or serious injury.*



### **WARNING!**

*WARNING alerts describe hazardous situations that, if not avoided, may result in serious injury and/or equipment damage.*



### **CAUTION!**

*CAUTION alerts describe hazardous situations that, if not avoided, may result in equipment damage.*



### **IMPORTANT!**

*IMPORTANT alerts provide important information that should be known before performing a procedure or step, or using a feature.*



### **NOTE**

*NOTE alerts provide additional information, such as facts, tips and details.*

## Related Documents

Other documents that may be of interest include:

- *RUGGEDCOM ROX II User Guide for the RUGGEDCOM RX1400*

## Accessing Documentation

The latest user documentation for RUGGEDCOM RX1400 is available online at [www.siemens.com/ruggedcom](http://www.siemens.com/ruggedcom). To request or inquire about a user document, contact Siemens Customer Support.

## Training

Siemens offers a wide range of educational services ranging from in-house training of standard courses on networking, Ethernet switches and routers, to on-site customized courses tailored to the customer's needs, experience and application.

Siemens' Educational Services team thrives on providing our customers with the essential practical skills to make sure users have the right knowledge and expertise to understand the various technologies associated with critical communications network infrastructure technologies.

Siemens' unique mix of IT/Telecommunications expertise combined with domain knowledge in the utility, transportation and industrial markets, allows Siemens to provide training specific to the customer's application.

For more information about training services and course availability, visit [www.siemens.com/ruggedcom](http://www.siemens.com/ruggedcom) or contact a Siemens Sales representative.

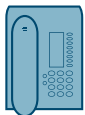
## Customer Support

Customer support is available 24 hours, 7 days a week for all Siemens customers. For technical support or general information, contact Siemens Customer Support through any of the following methods:



### Online

Visit <http://www.siemens.com/automation/support-request> to submit a Support Request (SR) or check on the status of an existing SR.



### Telephone

Call a local hotline center to submit a Support Request (SR). To locate a local hotline center, visit <http://www.automation.siemens.com/mcms/aspa-db/en/automation-technology/Pages/default.aspx>.



### Mobile App

Install the Industry Online Support app by Siemens AG on any Android, Apple iOS or Windows mobile device and be able to:

- Access Siemens' extensive library of support documentation, including FAQs and manuals
- Submit SRs or check on the status of an existing SR
- Contact a local Siemens representative from Sales, Technical Support, Training, etc.
- Ask questions or share knowledge with fellow Siemens customers and the support community



# 1 Introduction

The RUGGEDCOM RX1400 is a multi-protocol intelligent node that combines Ethernet switch, routing and firewall functionality with various wide area connectivity options.

The RUGGEDCOM RX1400 switch, with its rugged metal housing, is designed for DIN rail, panel or rack mounting.

The RUGGEDCOM RX1400 provides a high level of immunity to electromagnetic interference, heavy electrical surges, extreme temperature and humidity for reliable operation in harsh environments.

The device has IP40 degree protection, does not use internal fans for cooling and supports a -40 to 85 °C (-40 to 185 °F) extended temperature range. It is also certified for use in Class I, Division 2, Zone 2 hazardous locations.

Primary benefits include:

- Cost effective solution for large scale deployments
- Space-saving installation
- Reduced maintenance costs
- Customer data protection
- Support for additional applications

The RUGGEDCOM RX1400 is designed to support primary communications over public mobile networks and leverage enhanced capabilities of mobile networks, while making reliable and secure connections for mission critical applications in electric utility substations, traffic control cabinets, railway applications, oil and gas and other harsh environment applications.



## IMPORTANT!

*To comply with FCC regulations, this device must only be used for mobile and fixed applications.*

## CONTENTS

- [Section 1.1, "Feature Highlights"](#)
- [Section 1.2, "Description"](#)

### Section 1.1

## Feature Highlights

### Cellular Interface

- LTE: 700- B13, B17, 800/900/1800/2100/2600 MHz
- UMTS/HSPA+: 850/900/1900/2100 MHz
- Quad-Band EDGE/GPRS/GSM
- GNSS

### WLAN Interface

- WLAN Access Point and Client: WLAN Direct® (multi-channel, multi-role) dual band transceiver support of IEEE 802.11 a/b/g/n for 2.4 GHz and 5 GHz

### Ethernet Interfaces

- 4 x 10/100Base-T RJ45 ports

**Power Supply**

- 12 to 24 VDC
- ±12 to 24 VDC
- ±48 VDC
- HI VAC/VDC

**Optical SFP Pluggable Transceivers**

- 2 x 1000 Mbps ports

**Serial Interfaces with Isolation**

- 2 x RS232/422/485 ports

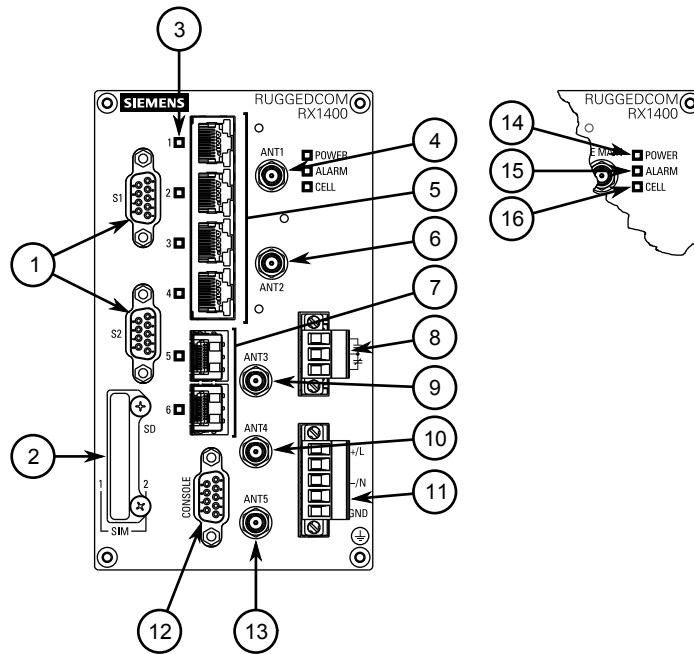
**Other Interfaces**

- Isolated built-in power input
- RS-232 console port for local management/ diagnostics on the device
- SMA connectors for cellular, GPS and RF interfaces
- R-SMA connectors for WLAN RF interface

Section 1.2

# Description

The RUGGEDCOM RX1400 features various ports, controls and indicator LEDs on the front panel for connecting, configuring and troubleshooting the device.



**Figure 1: RUGGEDCOM RX1400**

1. Serial Ports   2. Access Plate   3. Port Status LEDs   4. ANT1 Port   5. Fast Ethernet Ports   6. ANT2 Port   7. SFP Transceiver Ports  
 8. Failsafe Alarm Relay   9. ANT3 Port   10. ANT4 Port   11. Power Supply Terminal Block   12. RS232 Serial Console Port (DB9)  
 13. ANT5 Port   14. POWER LED   15. ALARM LED   16. CELL LED

<b>POWER LED</b>	Illuminates when power is being supplied to the device.
<b>ALARM LED</b>	Illuminates when an alarm condition exists.

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<b>CELL LED</b>	Indicates when the cellular modem is connected to the network. <ul style="list-style-type: none"><li>• Solid = Activity</li><li>• Off = No activity</li></ul>
<b>Port Status LEDs</b>	Indicate the status of each port: <ul style="list-style-type: none"><li>• Solid = Link</li><li>• Blinking = Activity</li><li>• Off = No link/activity</li></ul>
<b>Access Plate</b>	The removable access plate provides access to the Micro SD card and SIM card slots. <ul style="list-style-type: none"><li>• Use a Micro SD card to store the firmware and configuration for the device</li><li>• Use a single or dual (recommended) SIM cards to connect to an LTE network</li></ul>
<b>RS232 Serial Console Port</b>	The serial console port is for interfacing directly with the device and accessing initial management functions. For information about connecting to the device via the serial console port, refer to <a href="#">Section 2.11, "Connecting to the Device"</a> .
<b>ANT Ports</b>	SMA ports for connecting to an LTE network or Global Navigation Satellite System (GNSS). For more information, refer to: <ul style="list-style-type: none"><li>• <a href="#">Section 2.6, "Connecting the Antennas"</a></li><li>• <a href="#">Section 4.5, "Cellular Modem Specifications"</a></li></ul>
<b>Failsafe Alarm Relay</b>	Latches to default state when a power disruption or other alarm condition occurs. For more information, refer to: <ul style="list-style-type: none"><li>• <a href="#">Section 2.9, "Connecting the Failsafe Alarm Relay"</a></li><li>• <a href="#">Section 4.2, "Failsafe Alarm Relay Specifications"</a></li></ul>
<b>Power Supply Terminal Block</b>	A pluggable terminal block. For more information, refer to: <ul style="list-style-type: none"><li>• <a href="#">Section 2.10, "Connecting Power"</a></li><li>• <a href="#">Section 4.1, "Power Supply Specifications"</a></li></ul>

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# 2 Installing the Device

This chapter describes how to install the device, including mounting the device, connecting power, and connecting the device to the network.



## DANGER!

*Electrocution hazard – risk of serious personal injury and/or damage to equipment. Before performing any maintenance tasks, make sure all power to the device has been disconnected and wait approximately two minutes for any remaining energy to dissipate.*



## WARNING!

*Radiation hazard – risk of serious personal injury. This product contains a laser system and is classified as a **CLASS 1 LASER PRODUCT**. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.*



## WARNING!

*Radiation hazard – risk of Radio Frequency (RF) exposure. This device is compliant with the requirements set forth in FCC 47 CFR, section 1.1307, addressing Radio Frequency (RF) exposure from radio frequency base stations, as defined in [FCC OET Bulletin 65](http://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65.pdf) [[http://transition.fcc.gov/Bureaus/Engineering\\_Technology/Documents/bulletins/oet65/oet65.pdf](http://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65.pdf)]. The emitted radiation should be as little as possible. To achieve minimum RF exposure, install the device when it is configured not to transmit and set it to operational mode remotely, rather than having a technician enable transmission on-site. For maintenance of the device, or other operations which require RF exposure, the exposure should be minimized in time and according to the regulations set forth by the country of installation or the Federal Communications Commission (FCC).*



## IMPORTANT!

*This product contains no user-serviceable parts. Attempted service by unauthorized personnel shall render all warranties null and void.*

*Changes or modifications not expressly approved by Siemens Canada Ltd could invalidate specifications, test results, and agency approvals, and void the user's authority to operate the equipment.*



## IMPORTANT!

*This product should be installed in a **restricted access location** where access can only be gained by authorized personnel who have been informed of the restrictions and any precautions that must be taken. Access must only be possible through the use of a tool, lock and key, or other means of security, and controlled by the authority responsible for the location.*

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- [Section 2.1, "General Procedure"](#)
- [Section 2.2, "Required Tools and Materials"](#)
- [Section 2.3, "Cabling Recommendations"](#)

- [Section 2.4, "Installing the Device in Hazardous Locations"](#)
- [Section 2.5, "Mounting the Device"](#)
- [Section 2.6, "Connecting the Antennas"](#)
- [Section 2.7, "Installing the SIM Cards"](#)
- [Section 2.8, "Inserting/Removing the MicroSD Card"](#)
- [Section 2.9, "Connecting the Failsafe Alarm Relay"](#)
- [Section 2.10, "Connecting Power"](#)
- [Section 2.11, "Connecting to the Device"](#)
- [Section 2.12, "Configuring the Device"](#)

Section 2.1

## General Procedure

The general procedure for installing the device is as follows:

1. Review the relevant certification information for any regulatory requirements. For more information, refer to [Section 6.1, "Approvals"](#).
2. Mount the device.
3. Connect an antenna or antennas.
4. For LTE antennas only, install SIM cards.
5. Connect the failsafe alarm relay.
6. Connect power to the device and ground the device to safety Earth.
7. Connect the device to the network.
8. Configure the device.

Section 2.2

## Required Tools and Materials

The following tools and materials are required to install the RUGGEDCOM RX1400:

Tool/Material	Available For Purchase From Siemens <sup>a</sup>
WLAN, LTE and/or GPS antennas	✓
Antenna N-connect and/or SMA cables	✓
AC/DC power cord (16 AWG)	✗
Lightning protector	✗
Shielded coaxial cables	✗
SIM card(s) provided by the network carrier	✗
Flathead screwdriver for mounting the device to a DIN rail	✗
Phillips screwdriver for mounting the device to a rack or panel	✗

Tool/Material	Available For Purchase From Siemens <sup>a</sup>
Braided or equivalent ground wire for grounding the device	x

<sup>a</sup> For more information, contact a Siemens Sales representative.

Section 2.3

## Cabling Recommendations

Siemens recommends using SIMATIC NET industrial Ethernet shielded cables for all Ethernet ports.

### CONTENTS

- [Section 2.3.1, "Protection On Twisted-Pair Data Ports"](#)
- [Section 2.3.2, "Gigabit Ethernet 1000Base-TX Cabling Recommendations"](#)

Section 2.3.1

### Protection On Twisted-Pair Data Ports

All copper Ethernet ports on RUGGEDCOM products include transient suppression circuitry to protect against damage from electrical transients and conform with IEC 61850-3 and IEEE 1613 Class 1 standards. This means that during a transient electrical event, communications errors or interruptions may occur, but recovery is automatic.

Siemens also does not recommend using copper Ethernet ports to interface with devices in the field across distances that could produce high levels of ground potential rise (i.e. greater than 2500 V), during line-to-ground fault conditions.

Section 2.3.2

### Gigabit Ethernet 1000Base-TX Cabling Recommendations

The IEEE 802.3ab Gigabit Ethernet standard defines 1000 Mbit/s Ethernet communications over distances of up to 100 m (328 ft) using all 4 pairs in category 5 (or higher) balanced, unshielded twisted-pair cabling. For wiring guidelines, system designers and integrators should refer to the Telecommunications Industry Association (TIA) TIA/EIA-568-A wiring standard that characterizes minimum cabling performance specifications required for proper Gigabit Ethernet operation. For reliable, error-free data communication, new and pre-existing communication paths should be verified for TIA/EIA-568-A compliance.

The following table summarizes the relevant cabling standards:

Cabling Category	1000Base-TX Compliant	Required Action
< 5	No	New wiring infrastructure required.
5	Yes	Verify TIA/EIA-568-A compliance.
5e	Yes	No action required. New installations should be designed with Category 5e or higher.
6	Yes	No action required.
> 6	Yes	Connector and wiring standards to be determined.

Follow these recommendations for copper data cabling in high electrical noise environments:

- Data cable lengths should be as short as possible, preferably 3 m (10 ft) in length. Copper data cables should not be used for inter-building communications.
- Power and data cables should not be run in parallel for long distances, and should be installed in separate conduits. Power and data cables should intersect at 90° angles when necessary to reduce inductive coupling.

#### Section 2.4

## Installing the Device in Hazardous Locations

The RUGGEDCOM RX1400 is designed to comply with the safety standards for Class I, Division 2, Zone 2 hazardous locations where concentrations of flammable gases, vapors or liquids may be present, as opposed to normal operating environments.

### » Special Conditions for Safe Use

Installation and use of the device in a hazardous location must meet the following special conditions for safe use:

- The equipment shall be installed in an enclosure that provides an ingress protection rating of not less than IP54 according to CSA/UL/IEC/EN 60079-0 and CSA/UL/IEC/EN 60079-7 or CSA/UL/IEC/EN 60079-15. The enclosure shall have a minimum ambient temperature range of -40 to 95 °C (-40 to 203 °F).
- The equipment shall be used in an area of not more than pollution degree 2, as defined in IEC/EN 60664-1.
- Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value at the supply terminals to the equipment.
- The microSD card slot and serial console port shall only be used in the safe area.
- The equipment must be appropriately connected to safety Earth upon installation.



#### NOTE

*For further details of the device's compliance with Class I, Division 2, Zone 2 standards, refer to [Section 6.1, "Approvals"](#).*

### » Sample Hazardous Location Label

The following is an example of the RUGGEDCOM RX1400 hazardous location label:



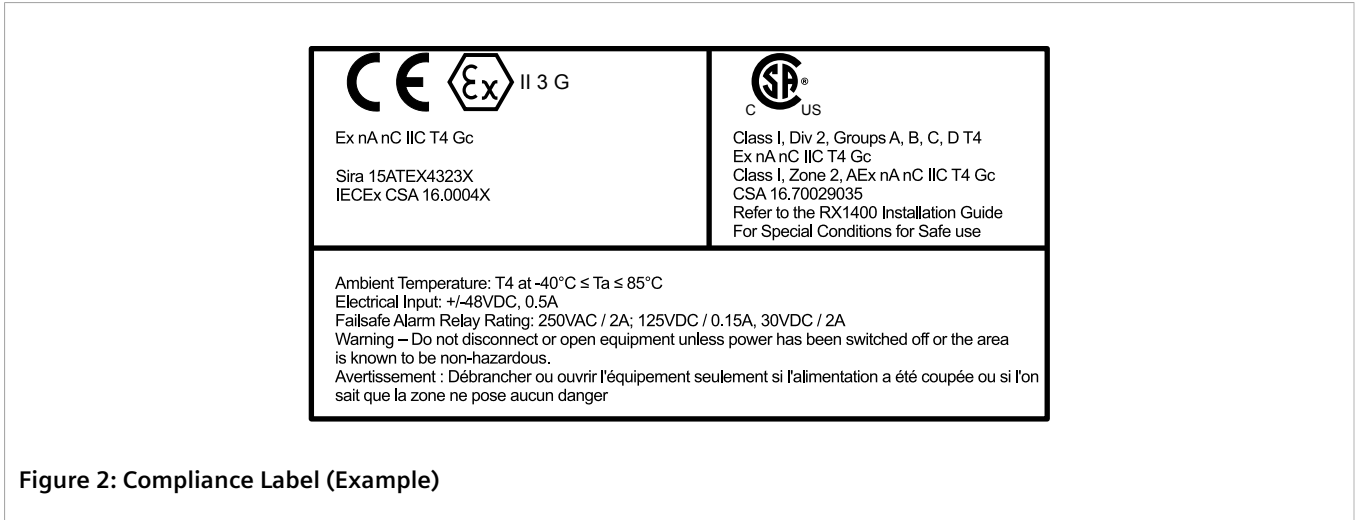


Figure 2: Compliance Label (Example)

Section 2.5

## Mounting the Device

The RUGGEDCOM RX1400 is designed for maximum mounting and display flexibility. It can be equipped with brackets that allow it to be installed in a 48 cm (19 in) rack, 35 mm (1.4 in) DIN rail, or directly on a panel.



**IMPORTANT!**

*Heat generated by the device is channeled outwards to the enclosure. As such, it is recommended that 2.5 cm (1 in) of space be maintained on all open sides of the device to allow for some convectational airflow.*

*Forced airflow is not required. However, any increase in airflow will result in a reduction of ambient temperature and improve the long-term reliability of all equipment mounted in the rack space.*



**NOTE**

*For detailed dimensions of the device with either rack, DIN rail or panel hardware installed, refer to [Chapter 5, Dimension Drawings](#) .*

**CONTENTS**

- [Section 2.5.1, "Mounting the Device to a Rack"](#)
- [Section 2.5.2, "Mounting the Device on a DIN Rail"](#)
- [Section 2.5.3, "Mounting the Device to a Panel"](#)

Section 2.5.1

### Mounting the Device to a Rack

For rack mount installations, the RUGGEDCOM RX1400 can be equipped with rack mount adapters pre-installed on the chassis.



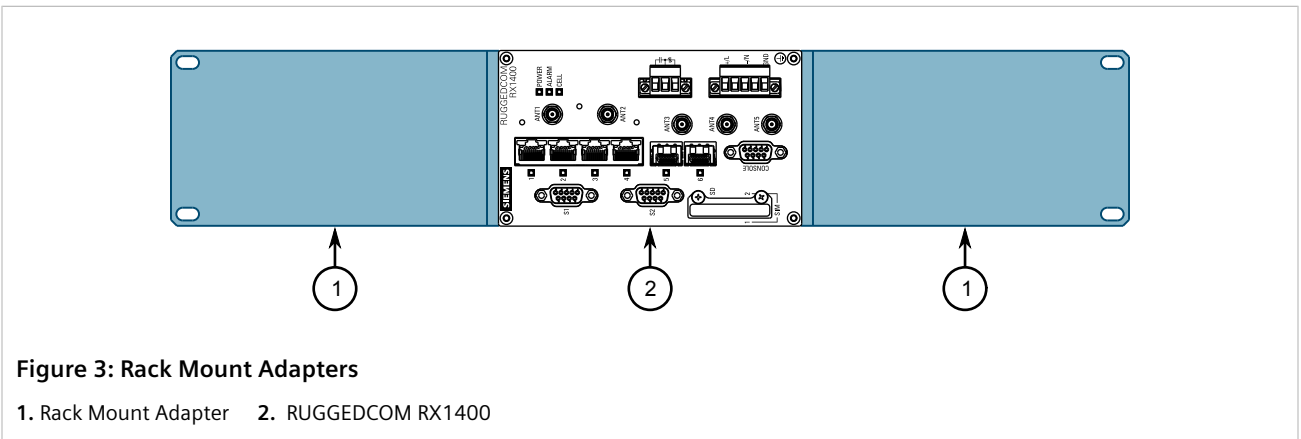
**CAUTION!**

*Electrical/mechanical hazard – risk of damage to the device. Before installing the device in a rack, make sure of the following:*

- *When installing the device in a closed or multi-device rack, be aware the operating ambient temperature of the rack may be higher than the ambient temperature of the room. Make sure the rack is installed in a suitable environment that can withstand the maximum ambient temperature generated by the rack.*
- *Make sure each device in the rack is separated by at least one rack-unit of space, or 44 mm (1.75 in), to promote convectional airflow. Forced airflow is not required. However, any increase in airflow will result in a reduction of ambient temperature and improve the long-term reliability of all equipment mounted in the rack space.*
- *Do not exceed the maximum number of devices or weight restrictions specified by the rack manufacturer.*
- *Do not overload the supply circuit. Refer to the over-current protection and power supply ratings specified by the rack manufacturer.*
- *Make sure the rack and all devices have a proper ground-to-Earth connection. Pay particular attention to power supply connections other than direct connections to the branch circuit (e.g. power strips).*

To secure the device to a standard 48 cm (19 in) rack, do the following:

1. Make sure the rack mount adapters are installed.



2. Insert the assembly into the rack.
3. Secure the adapters to the rack using the supplied hardware.

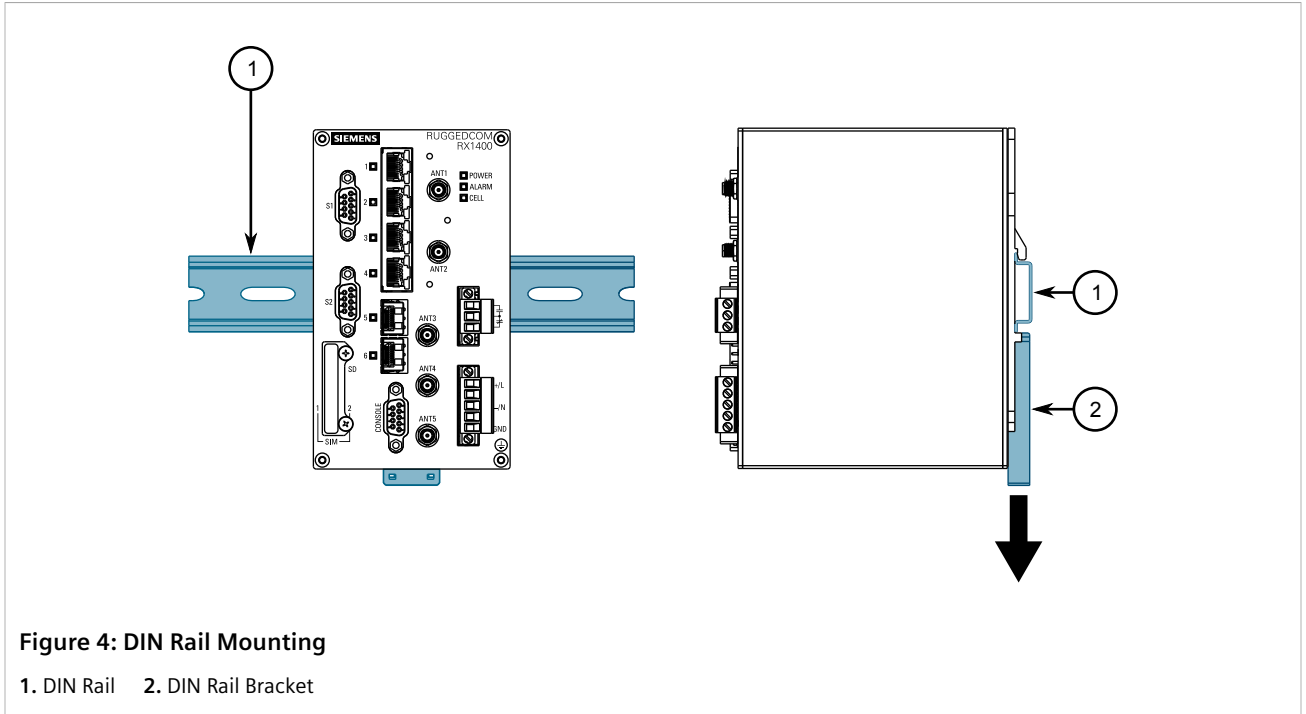
Section 2.5.2

## Mounting the Device on a DIN Rail

For DIN rail installations, the RX1400 can be equipped with a DIN rail bracket pre-installed on the back of the chassis. The bracket allows the device to be slid onto a standard 35 mm (1.4 in) DIN rail.

To mount the device to a DIN rail, do the following:

1. Align the slot in the bracket with the DIN rail.



2. Pull the release on the bracket down and slide the device onto the DIN rail. Let go of the release to lock the device in position. If access to the release is limited, use a slotted screwdriver or a similar tool to reach the release.

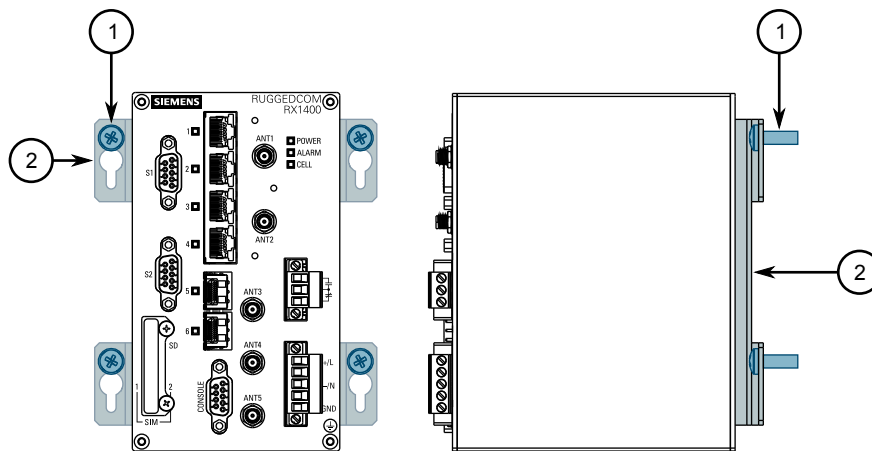
### Section 2.5.3

## Mounting the Device to a Panel

For panel installations, the RUGGEDCOM RX1400 can be equipped with panel adapters pre-installed on each side of the chassis. The adapters allow the device to be attached to a panel using screws.

To mount the device to a panel, do the following:

1. Place the device against the panel and align the adapters with the mounting holes.



**Figure 5: Panel Mounting**

1. Screw 2. Panel Adapter

2. Install the supplied screws to secure the adapters to the panel.

## Section 2.6

# Connecting the Antennas

The RUGGEDCOM RX1400 can be connected to external antennas for access to wireless networks. For increased signal coverage and improved performance, antennas are intended to be installed in a remote location separate from the RUGGEDCOM RX1400.



### IMPORTANT!

*The antenna installation must be as per Article 810 of the National Electric Code (NEC). Specifically, the grounding conductor must not be less than 10 AWG (Cu). The scheme should be either:*

- *In accordance with UL 96 and 96A Lightning Protection Components and Installation Requirements for Lightning Protection Systems (LPS)*
- *Tested in accordance with UL 50 and UL 497*



### NOTE

*For technical specifications, refer to [Section 4.5, "Cellular Modem Specifications"](#).*

## CONTENTS

- [Section 2.6.1, "Available Antennas"](#)
- [Section 2.6.2, "Connecting LTE Antennas"](#)
- [Section 2.6.3, "Connecting a GPS Antenna"](#)

- [Section 2.6.4, “Connecting WLAN Antennas”](#)

## Section 2.6.1

## Available Antennas

The RUGGEDCOM RX1400 supports the following antennas.

### » LTE and GPS Antennas

Antenna	Type	Operating Frequency (GHz)	Gain (dBi)	Article Number	Reference
ANT1096-4ME	Omni-Directional	0.7	3.0	6GK6000-8NT01-1AA0	<a href="https://support.industry.siemens.com/cs/jp/en/view/109477766">https://support.industry.siemens.com/cs/jp/en/view/109477766</a>
		2.7			
ANT1096-4MA	Omni-Directional	0.7	3.0	6GK6000-8NT01-0AA0	<a href="https://support.industry.siemens.com/cs/me/en/view/109477585">https://support.industry.siemens.com/cs/me/en/view/109477585</a>
		2.7			
ANT1390-4ML	Omni-Directional	1.5	3.0	6GK6000-8NT01-0AA0	<a href="https://support.industry.siemens.com/cs/ua/en/view/109477767">https://support.industry.siemens.com/cs/ua/en/view/109477767</a>

### » WLAN Antennas

Antenna	Type	Operating Frequency (GHz)	Gain (dBi)	Article Number	Reference
ANT792-4DN	Omni-Directional	2.4	4.0	6GK5792-4DN00-0AA6	—
ANT792-6MN	Omni-Directional	2.4	6.0	6GK5792-6MN00-0AA6	<a href="https://support.industry.siemens.com/cs/mw/en/view/26210199">https://support.industry.siemens.com/cs/mw/en/view/26210199</a>
ANT792-8DN	Directional	2.4	14.0	6GK5792-8DN00-0AA6	<a href="https://support.industry.siemens.com/cs/mw/en/view/26229510">https://support.industry.siemens.com/cs/mw/en/view/26229510</a>
ANT793-4MN	Omni-Directional	5.0	6.0	6GK5792-8DN00-0AA6	—
ANT793-6DG <sup>b</sup>	Directional	5.0	9.0	6GK5793-6DG00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/60509676">https://support.industry.siemens.com/cs/mw/en/view/60509676</a>
ANT793-6DT <sup>b</sup>	Omni-Directional	5.0	8.0	6GK5793-6DT00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/60510334">https://support.industry.siemens.com/cs/mw/en/view/60510334</a>
ANT793-6MN	Omni-Directional	5.0	5.0	6GK5793-6MN00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/26228205">https://support.industry.siemens.com/cs/mw/en/view/26228205</a>
ANT793-8DJ <sup>b</sup>	Directional	5.0	18.0 <sup>c</sup>	6GK5793-8DJ00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/60509959">https://support.industry.siemens.com/cs/mw/en/view/60509959</a>
ANT793-8DP <sup>b</sup>	Directional	5.0	13.5 <sup>d</sup>	6GK5793-8DP00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/89534905">https://support.industry.siemens.com/cs/mw/en/view/89534905</a>
ANT795-4MA	Omni-Directional	2.4	3.0	6GK5795-4MA00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/61199227">https://support.industry.siemens.com/cs/mw/en/view/61199227</a>
		5.0	5.0		

Antenna	Type	Operating Frequency (GHz)	Gain (dBi)	Article Number	Reference
ANT795-4MC	Omni-Directional	2.4	3.0	6GK5795-4MC00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/61199227">https://support.industry.siemens.com/cs/mw/en/view/61199227</a>
		5.0	5.0		
ANT795-4MD	Omni-Directional	2.4	3.0	6GK5795-4MD00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/61199227">https://support.industry.siemens.com/cs/mw/en/view/61199227</a>
		5.0	5.0		
ANT795-4MX	Omni-Directional	2.4	2.0	6GK5795-4MX00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/102325861">https://support.industry.siemens.com/cs/mw/en/view/102325861</a>
		5.0	2.5		
ANT795-6DC	Directional	2.4	9.0	6GK5795-6DC00-0AA6	<a href="https://support.industry.siemens.com/cs/mw/en/view/60510336">https://support.industry.siemens.com/cs/mw/en/view/60510336</a>
		5.0 <sup>b</sup>			
ANT795-6MN	Directional	2.4	6.0	6GK5795-6MN10-0AA6	<a href="https://support.industry.siemens.com/cs/mw/en/view/26536615">https://support.industry.siemens.com/cs/mw/en/view/26536615</a>
	Omni-Directional	5.0 <sup>b</sup>	8.0		
ANT795-6MT	Directional	2.4	5.0	6GK5795-6MT00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/60510908">https://support.industry.siemens.com/cs/mw/en/view/60510908</a>
	Omni-Directional	5.0 <sup>b</sup>	7.0		

<sup>b</sup> Not for use in Canada.

<sup>c</sup> Total gain is 9.2 dBi when connected via a 10 m (33 ft) cable (6X1875-5CN10) with an 8.8 dB loss.

<sup>d</sup> Total gain is 9.1 dBi when connected via a 5 m (16 ft) cable (6X1875-5CH50) with an 4.4 dB loss.

## Section 2.6.2

# Connecting LTE Antennas

Install a single 4G LTE (Long Term Evolution) antenna for Single-Input Single-Output (SISO) or dual antennas for Multiple-Input Multiple-Output (MIMO).

To install an LTE antenna, do the following:



### WARNING!

*Radiation hazard – risk of Radio Frequency (RF) exposure. Antennas must be placed at a distance of at least 25 cm (9.8 in) from all persons during normal operation. The antennas used for this product must not be located or operating in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter evaluation procedures.*



### CAUTION!

*Configuration hazard – risk of reduced performance. Each antenna and connecting cable must have a nominal impedance of 50 Ω with a return loss of better than 10 dB across each frequency band. If the nominal impedance is different, Radio Frequency (RF) performance will be reduced.*



### IMPORTANT!

*The antenna installation must be as per Article 810 of the National Electric Code (NEC). Specifically, the grounding conductor must not be less than 10 AWG (Cu). The scheme should be either:*

- In accordance with UL 96 and 96A Lightning Protection Components and Installation Requirements for Lightning Protection Systems (LPS)
- Tested in accordance with UL 50 and UL 497



**IMPORTANT!**

A Radio Frequency (RF) site survey is recommended prior to any installation to help determine the best location for the LTE antennas. For assistance, contact a Siemens Sales representative.



**IMPORTANT!**

The cellular modem supports SISO (Single Input Single Output) and MIMO (Multiple Input Multiple Output) modes. At minimum, a single antenna connected to the **LTE MAIN** port is required for SISO mode and to support lower generation wireless standards, such as GSM or EDGE. A separate diversity (secondary) antenna is required for MIMO performance.



**IMPORTANT!**

For mobile and fixed operating configurations, in accordance with R&TTE Directive 1999/5/EC, the maximum antenna gain is 3 dBi for 900 MHz, 1800 MHz, 2100 MHz and 2600 MHz.



**IMPORTANT!**

For mobile and fixed operating configurations, in accordance with FCC 47 CFR, section 2.1091, the antenna gain, including cable loss must not exceed:

- 9.0 dBi at 700 MHz
- 6.5 dBi at 800/850 MHz
- 6.0 dBi at 1700 MHz
- 3.0 dBi at 1900 MHz

Under no conditions may an antenna gain be used that would exceed the ERP and/or EIRP power limits specified in FCC 47 CFR Parts 22, 24, 27 and 90.



**NOTE**

For technical specifications, refer to [Section 4.5, "Cellular Modem Specifications"](#).



**NOTE**

A specific brand of antenna is not specified.

1. Mount the antenna to a pole or wall in an area that provides good signal coverage and is away from any signal noise emanating from other communications equipment.

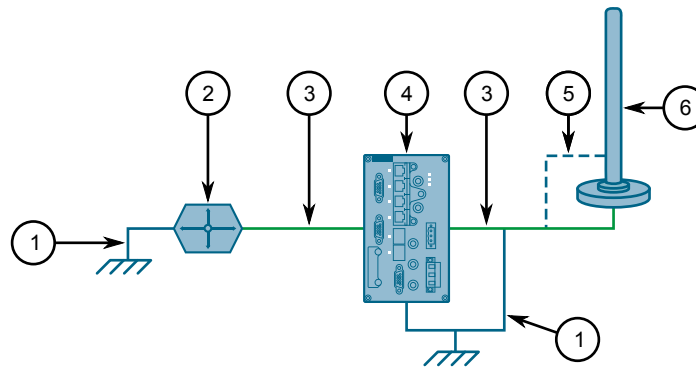


**IMPORTANT!**

MIMO is not certified for use in the Republic of Korea (South Korea).

2. Using shielded coaxial cables, connect the antenna to either the **ANT1** (SISO) or **ANT5** (MIMO) port on the device. Make sure the cable is routed away from any noise sources, such as Switch-Mode Power Supplies (SMPS).

If needed, install a lightning protect between the antenna and the device.



**Figure 6: Antenna and Lightning Protector Assembly (Optional)**

1. Drain Wire   2. RUGGEDCOM RX1400   3. Shielded Coaxial Cable   4. Lightning Protector   5. Ground Wire   6. LTE Antenna

Section 2.6.3

## Connecting a GPS Antenna

For increased signal coverage and improved performance, the GPS antenna is intended to be installed in a remote location separate from the RX1400. The signals received from the GPS satellite network are at a frequency of 1575.42 MHz. The GPS antenna must therefore have a clear view of the sky to receive the low power signals and track the maximum number of satellites. Structures, such as rooftops, that are clear of obstructions and have a clear view of the horizon are ideal.



**IMPORTANT!**

*A site survey is recommended prior to any installation to help determine the best location for the GPS antenna. For assistance, contact a Siemens Sales representative.*



**IMPORTANT!**

*Although it is impossible to protect the antenna from a direct lightning strike, the antenna and connected components can be protected from secondary effects through site selection and by installing protection devices.*

*Install the antenna at least 15 m (49 ft) away from and lower than any structures that attract lightning. GPS antenna damage is usually not the result of a direct lightning strike, but due to high currents induced by the effects of a lightning strike on a nearby structure. Lightning arrestors should also be installed in the antenna line to protect the receiver and connected devices. If a lightning arrestor is installed, it is important to make sure it has a low impedance path to ground.*

To promote signal reception and avoid signal saturation at the receiver input, the overall GPS system requires a relative gain between 5 and 18 dBi.

Use only low loss, 50 Ω coaxial cabling when connecting the GPS and any other optional components to the RX1400.



**NOTE**

*Using any length of coaxial cable will add some time delay to the GPS signal, which degrades the accuracy of the calculated time and position. The time delay is dependent on the type of dielectric*

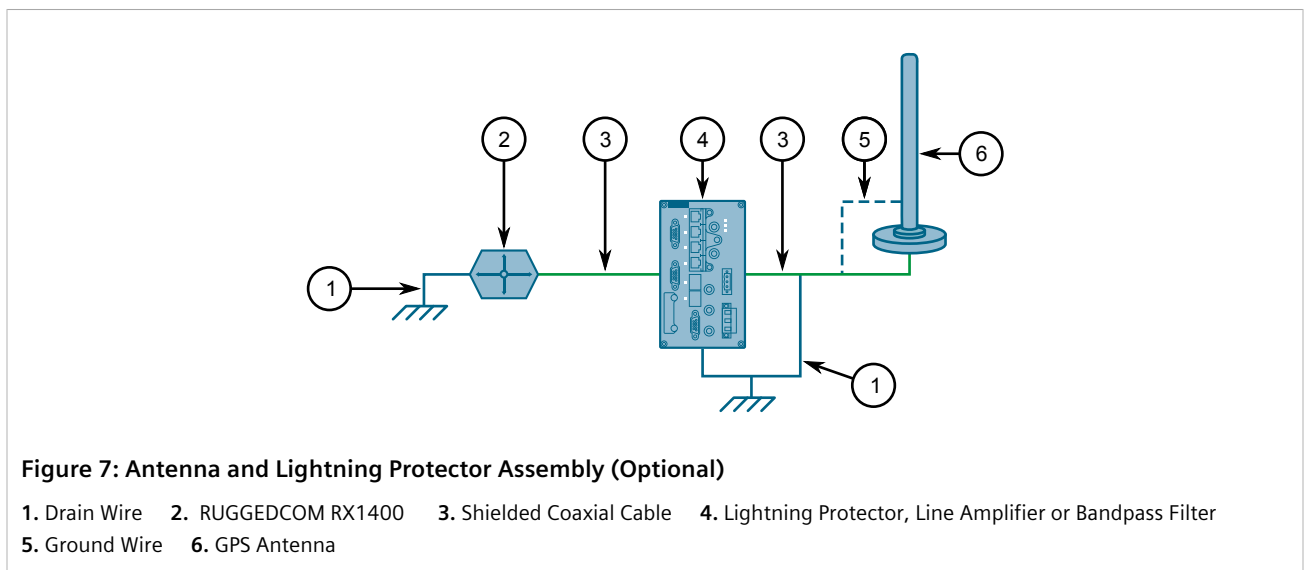


material in the cable and ranges from 1 to 2 ns/ft. The table below gives some examples of the delay that can be expected based on the dielectric type.

Dielectric Type	Time Delay (ns/ft)	Propagation Velocity (% of c)
Solid Polyethylene (PE)	1.54	65.9
Foam Polyethylene (FE)	1.27	80.0
Foam Polystyrene (FS)	1.12	91.0
Air Space Polyethylene (ASP)	1.15 to 1.21	84 to 88
Solid Teflon (ST)	1.46	69.4
Air Space Teflon (AST)	1.13 to 1.20	85 to 90

To connect a GPS antenna, do the following:

1. Mount the antenna to a pole or wall in an area that provides good signal coverage and is away from any signal noise emanating from other communications equipment. Make sure 90° of the sky is visible to the antenna.
2. If required, connect the optional lightning arrester, line amplifier or bandpass filter to the antenna.



3. Using shielded coaxial cables, connect the antenna assembly to the **ANT2** port on the device.

#### Section 2.6.4

## Connecting WLAN Antennas

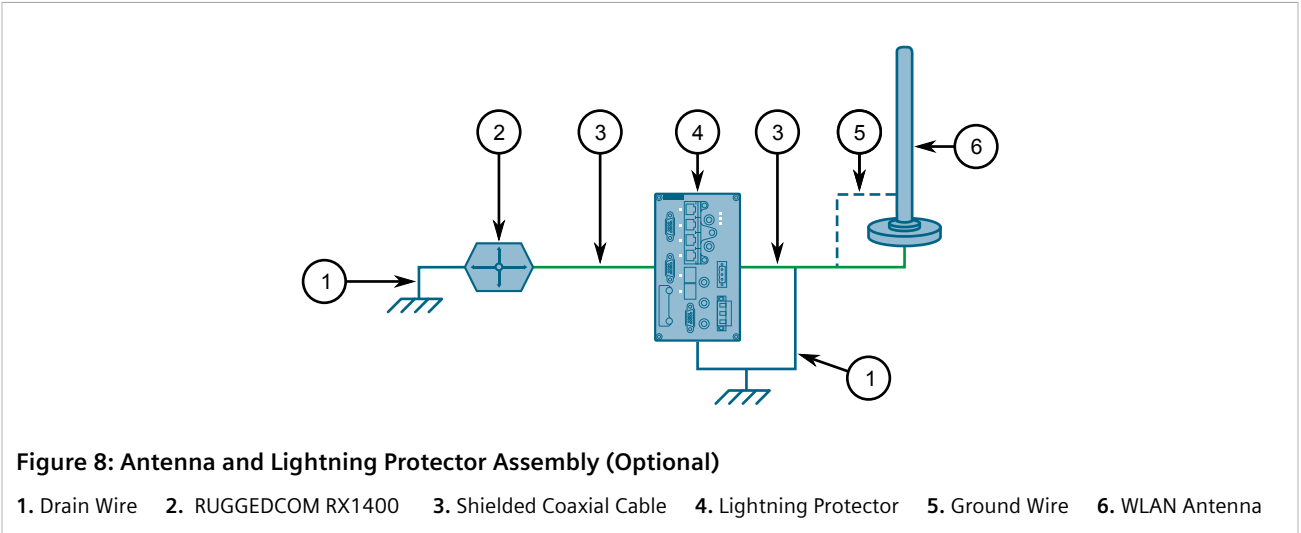
Install a single WLAN antenna for Single-Input Single-Output (SISO) or dual antennas for Multiple-Input Multiple-Output (MIMO).

To install a WLAN antenna, do the following:

1. Select an appropriate antenna. For a list of available WLAN antennas, refer to [Section 2.6.1, "Available Antennas"](#).
2. Mount the antenna to a pole or wall in an area that provides good signal coverage and is away from any signal noise emanating from other communications equipment.

- Using shielded coaxial cables, connect the antenna to either the **ANT3** (SISO) or **ANT4** (MIMO) port on the device. Make sure the cable is routed away from any noise sources, such as Switch-Mode Power Supplies (SMPS).

If needed, install a lightning protect between the antenna and the device.



### Section 2.7

## Installing the SIM Cards

The RUGGEDCOM RX1400 supports dual micro-SIM cards for the LTE modem to provide a fail-over mechanism should one of the SIM cards lose connectivity with the network.

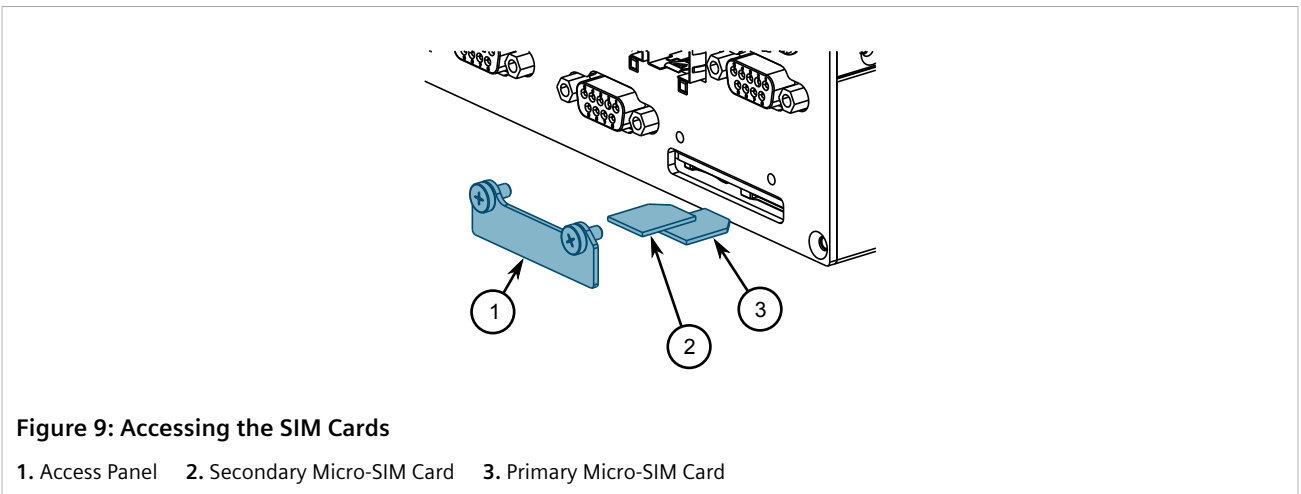
To install micro-SIM cards from a regional cellular carrier, do the following:



#### CAUTION!

*Static electricity hazard – risk of damage to equipment. Take appropriate anti-static precautions before accessing the SIM cards.*

- Remove the SIM card access panel.



2. Insert the SIM cards into the slots. Slot 1 is for the primary SIM card and slot 2 is for the secondary (backup) SIM card.
3. Close the access panel and secure it with the two screws.
4. Once the device is fully installed, activate the micro-SIM cards for the LTE modem. For more information, refer to the *RUGGEDCOM ROX II User Guide* for the RUGGEDCOM RX1400.

## Section 2.8

## Inserting/Removing the microSD Card

The RUGGEDCOM RX1400 accepts a microSD card for storing configuration files and/or software updates.

**CAUTION!**

*Configuration hazard – risk of data loss. The microSD card must not be removed or replaced during normal operation of the device. Make sure the device is powered down before removing or inserting the card.*

**CAUTION!**

*Mechanical/electrical hazard – risk of damage to the microSD card.*

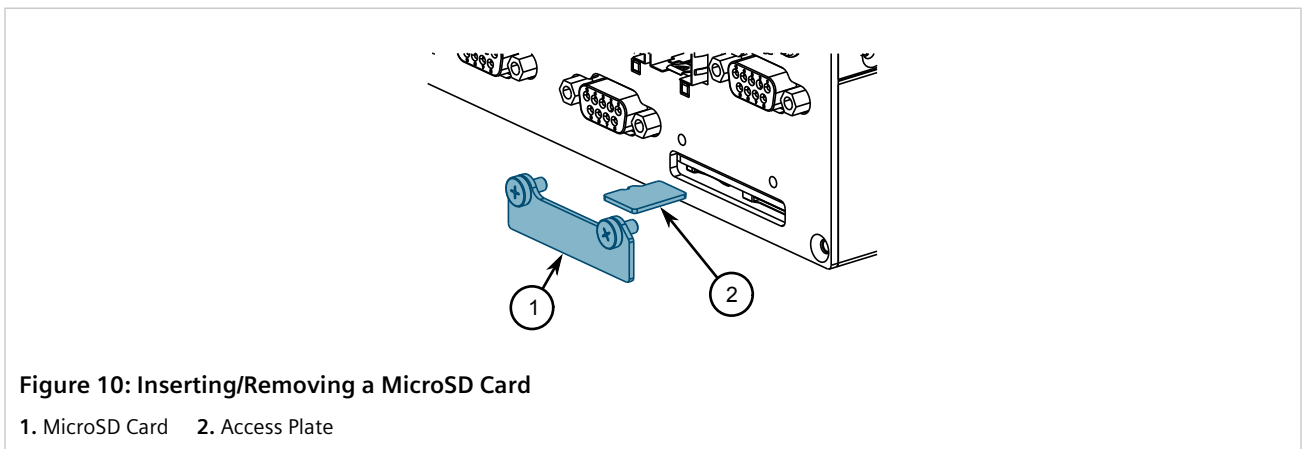
- Do not expose the microSD card to extreme temperatures or humidity.
- Do not expose the microSD card to large magnetic or static electric fields.
- Do not bend or drop the microSD card.

**CAUTION!**

*Security hazard – risk of unauthorized access and/or exploitation. Make sure to remove the microSD card before decommissioning the device or sending the device to a third-party.*

To insert or remove a microSD card, do the following:

1. Power down the device.
2. Disconnect all network, alarm and console cables.
3. Unscrew the retention screw and remove the access plate.



**Figure 10: Inserting/Removing a microSD Card**

1. MicroSD Card 2. Access Plate

4. Without touching the contacts on the card, insert or remove the microSD card.
5. Install the access plate and finger-tighten the retention screw.

6. Power up the device.

## Section 2.9

# Connecting the Failsafe Alarm Relay

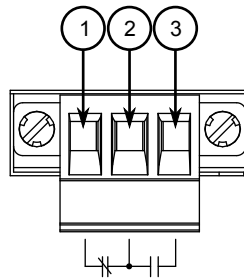
The failsafe relay can be configured to latch based on alarm conditions. The NO (Normally Open) contact is closed when the unit is powered and there are no active alarms. If the device is not powered or if an active alarm is configured, the relay opens the NO contact and closes the NC (Normally Closed) contact.



### NOTE

Control of the failsafe relay output is configurable through ROX II. One common application for this relay is to signal an alarm if a power failure occurs. For more information, refer to the ROX II User Guide for the RUGGEDCOM RX1400.

The following shows the proper relay connections.



**Figure 11: Failsafe Alarm Relay Wiring**

1. Normally Closed    2. Common    3. Normally Open

## Section 2.10

# Connecting Power

The RUGGEDCOM RX1400 supports a single integrated high AC/DC or low DC power supply.



### IMPORTANT!

Before installing the device, note the following:

- An appropriately rated AC or DC circuit breaker must be installed.
- Use only #16 gage copper wiring when connecting terminal blocks.
- Equipment must be installed according to applicable local wiring codes and standards.

### CONTENTS

- [Section 2.10.1, "Connecting High AC/DC Power"](#)

- Section 2.10.2, "Connecting Low DC Power"

Section 2.10.1

## Connecting High AC/DC Power

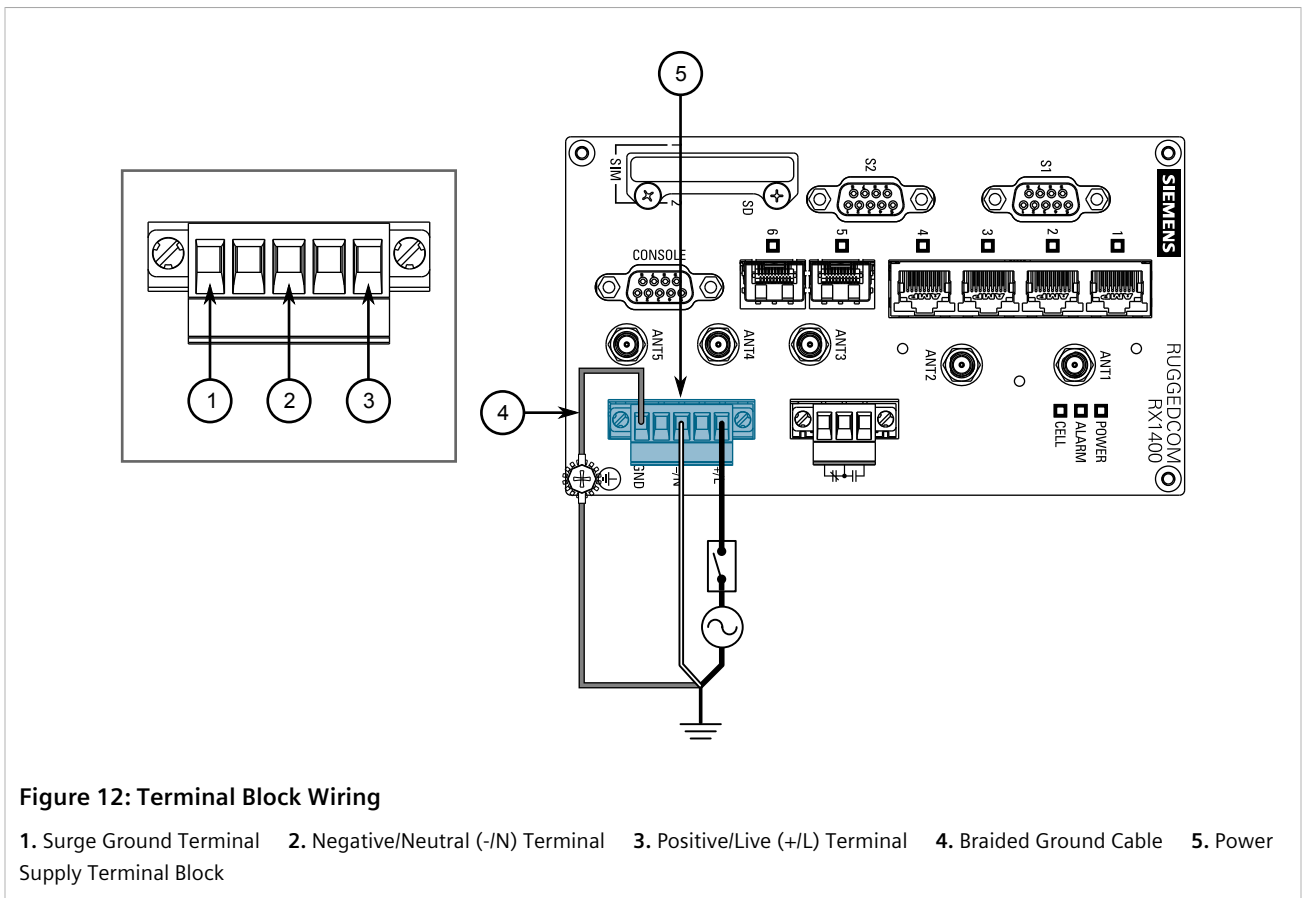
To connect a high AC/DC power supply to the device, do the following:



**CAUTION!**

*Electrical hazard – risk of damage to equipment. Do not connect AC power cables to terminals for DC power. Damage to the power supply may occur.*

1. Connect the power supply terminal block to the device.



**Figure 12: Terminal Block Wiring**

1. Surge Ground Terminal    2. Negative/Neutral (-/N) Terminal    3. Positive/Live (+/L) Terminal    4. Braided Ground Cable    5. Power Supply Terminal Block

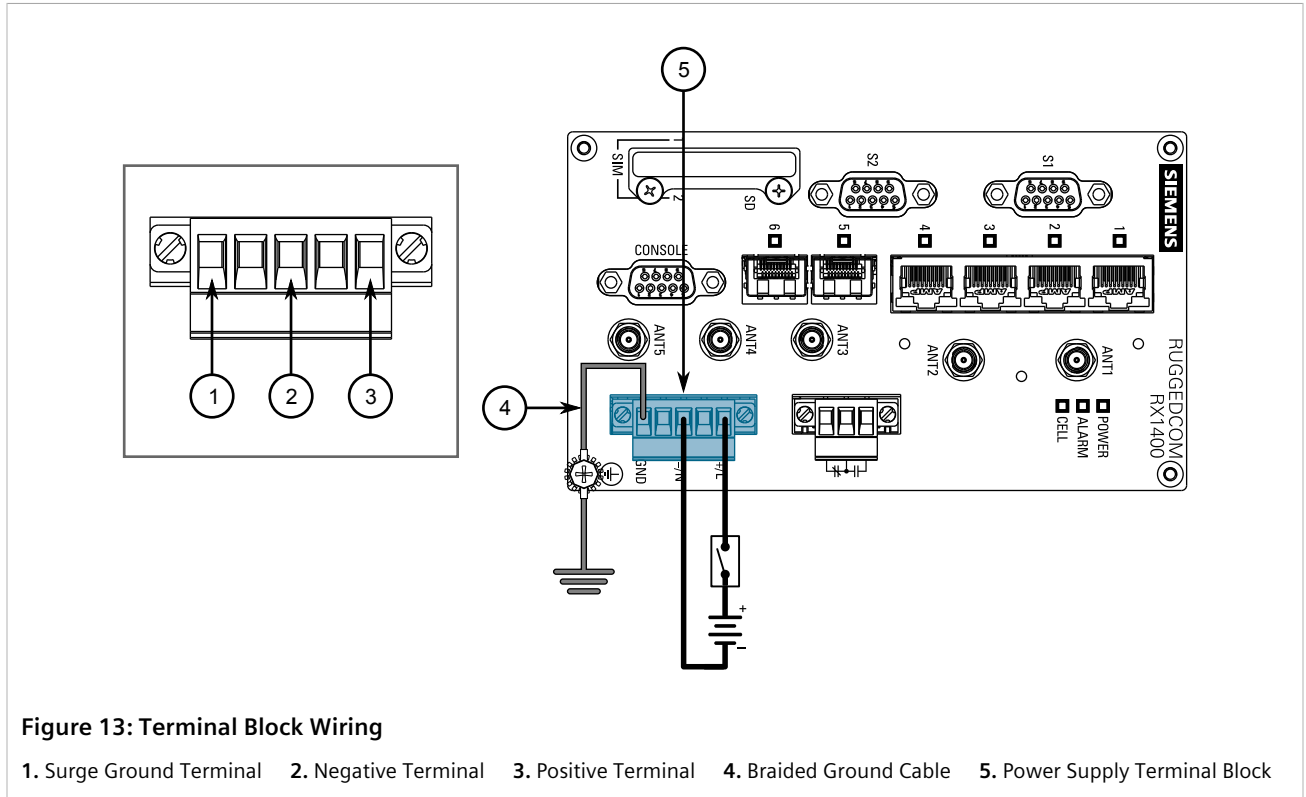
2. Connect the positive wire from the power source to the positive/live (+/L) terminal on the terminal block.
3. Connect the negative wire from the power source to the negative/neutral (-/N) terminal on the terminal block.
4. Using a braided wire or other appropriate grounding wire, connect the surge ground terminal to the chassis ground connection. The surge ground terminal is used as the ground conductor for all surge and transient suppression circuitry internal to the unit.
5. Connect the ground terminal on the power source to the chassis ground terminal on the device.

Section 2.10.2

## Connecting Low DC Power

To connect a low DC power supply to the device, do the following:

1. Connect the power supply terminal block to the device.



2. Connect the positive wire from the power source to the positive terminal on the terminal block.
3. Connect the negative wire from the power source to the negative terminal on the terminal block.
4. Using a braided wire or other appropriate grounding wire, connect the surge ground terminal to the chassis ground connection. The surge ground terminal is used as the ground conductor for all surge and transient suppression circuitry internal to the unit.
5. Connect the ground terminal on the power source to the chassis ground terminal on the device.

Section 2.11

## Connecting to the Device

The following describes the various methods for accessing the RUGGEDCOM ROX II console and Web interfaces on the device. For more detailed instructions, refer to the *RUGGEDCOM ROX II User Guide* for the RUGGEDCOM RX1400.

## » Serial Console Port

Connect a PC or terminal directly to the serial console port to access the boot-time control and RUGGEDCOM ROX II console interface.



### IMPORTANT!

*The serial console port is intended to be used only as temporary connections during initial configuration or troubleshooting.*

The serial console port implements RS-232 on a female DB9 connector. The following is the pin-out for the port:

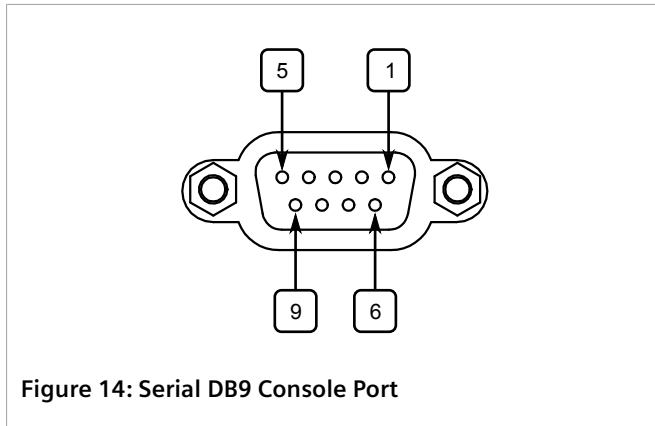


Figure 14: Serial DB9 Console Port

Pin	Name
1	Reserved (Do Not Connect)
2	Output Signal
3	Input Signal
4	Reserved (Do Not Connect)
5	Ground
6	Reserved (Do Not Connect)
7	Reserved (Do Not Connect)
8	Reserved (Do Not Connect)
9	Reserved (Do Not Connect)

For information about how to connect to the device via the serial console port, refer to the *RUGGEDCOM ROX II CLI User Guide* for the RUGGEDCOM RX1400.

## » Communication Ports

Connect any of the available Ethernet ports on the device to a management switch and access the RUGGEDCOM ROX II console and Web interfaces via the device's IP address. The factory default IP address for the RUGGEDCOM RX1400 is <https://192.168.0.2>.

For more information about available ports, refer to [Chapter 3, Communication Ports](#).

Section 2.12

# Configuring the Device

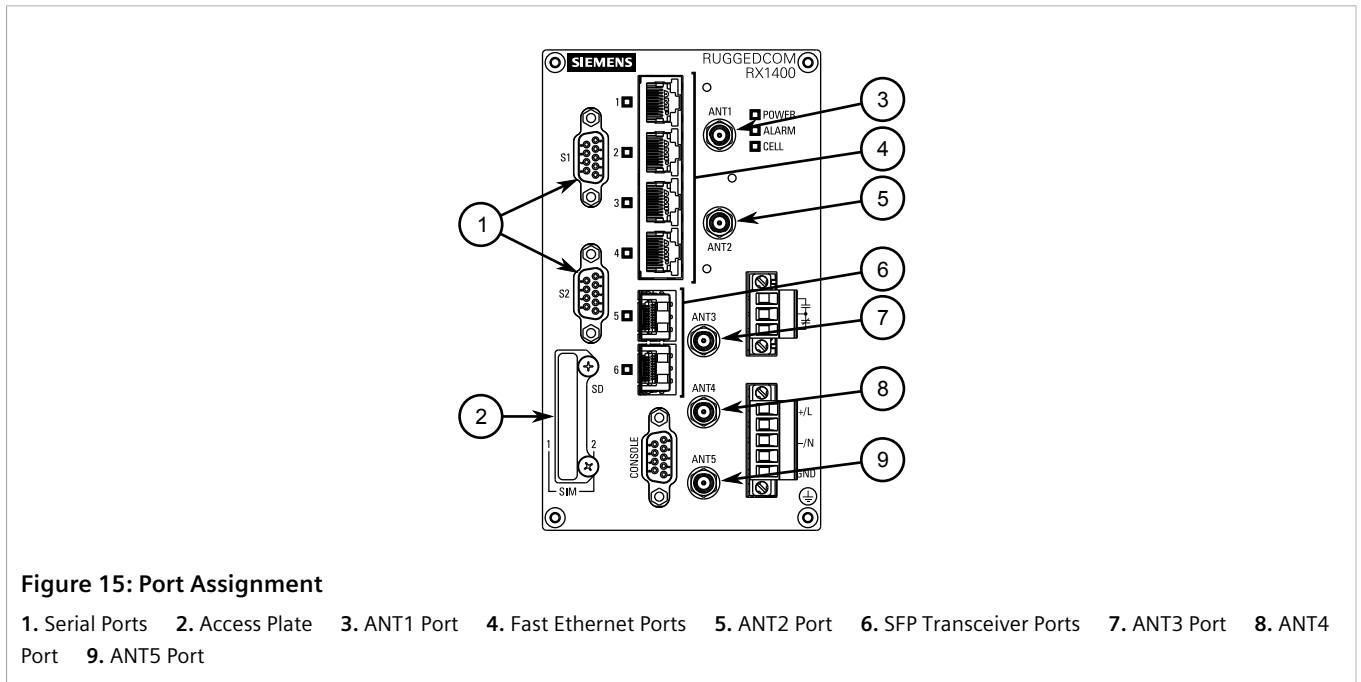
Once the device is installed and connected to the network, it must be configured. All configuration management is done via the RUGGEDCOM ROX II interface. For more information about configuring the device, refer to the *RUGGEDCOM ROX II User Guide* associated with the installed software release.





# 3 Communication Ports

The RUGGEDCOM RX1400 can be equipped with various types of communication ports to enhance its abilities and performance.



**NOTE**  
For information about the **LTE MAIN**, **LTE MIMO** or **GPS** ports and the cellular modem, refer to [Section 4.5, "Cellular Modem Specifications"](#).

- CONTENTS**
- [Section 3.1, "Fast Ethernet Ports"](#)
  - [Section 3.2, "SFP Transceivers"](#)
  - [Section 3.3, "Serial Ports"](#)

## Section 3.1

# Fast Ethernet Ports

The RUGGEDCOM RX1400 features four 10/100Base-TX fast Ethernet (FE) ports with RJ45 connectors. The RJ45 connectors are directly connected to the chassis ground on the device and can accept CAT-5 shielded twisted-pair (STP) cables.

For technical specifications, refer to [Section 4.3, “Fast Ethernet Port Specifications”](#).

Each port features an LED that indicates its link state.

State	Description
Green (Solid)	Link established
Green (Blinking)	Activity
Off	No link detected

The following are the pin-out descriptions for the RJ45 connectors:

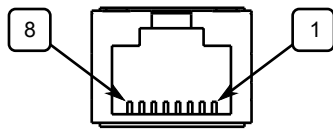


Figure 16: RJ45 Ethernet Port Pin Configuration

Pin	10/100Base-TX	Description
1	RX+	Receive Data+
2	RX-	Receive Data-
3	TX+	Transmit Data+
4	Reserved (Do Not Connect)	
5	Reserved (Do Not Connect)	
6	TX-	Transmit Data-
7	Reserved (Do Not Connect)	
8	Reserved (Do Not Connect)	

### Section 3.2

## SFP Transceivers

The RUGGEDCOM RX1400 features two Small Form-Factor Pluggable (SFP) transceiver sockets, which are compatible with a wide array of SFP transceivers available from Siemens.

### » LEDs

Each socket features an LED that indicates its link state.

State	Description
Green (Solid)	Link established
Green (Blinking)	Activity
Off	No link detected

### » Compatible SFP Transceivers

The following SFP transceivers are compatible with the RUGGEDCOM RX1400. For more information, including installation/removal instructions and ordering information, refer to the [RUGGEDCOM SFP Transceiver Catalog](#) [<https://support.industry.siemens.com/cs/ca/en/view/109482309>].



**IMPORTANT!**

Only use SFP transceivers approved by Siemens for RUGGEDCOM products. Siemens accepts no liability as a result of performance issues related in whole or in part to third-party components.

SFP Transceiver	Order Code	Speed (Mbit/s)	Mode <sup>a</sup>	Nominal Distance (km)
RUGGEDCOM SFP1121-1FX2A	6GK6000-8FE50-0AA0	100	MM	2
RUGGEDCOM SFP1132-1BX10R	6GK6000-8FB51-0AA0	1000	SM	10
RUGGEDCOM SFP1132-1BX10T	6GK6000-8FB52-0AA0	1000	SM	10
RUGGEDCOM SFP1132-1BX40R	6GK6000-8FB53-0AA0	1000	SM	40
RUGGEDCOM SFP1132-1BX40T	6GK6000-8FB54-0AA0	1000	SM	40
RUGGEDCOM SFP1122-1SX	6GK6000-8FG51-0AA0	1000	MM	0.5
RUGGEDCOM SFP1132-1LX10	6GK6000-8FG52-0AA0	1000	SM	10
RUGGEDCOM SFP1132-1LX25	6GK6000-8FG53-0AA0	1000	SM	25
RUGGEDCOM SFP1132-1LX40	6GK6000-8FG57-0AA0	1000	SM	40
RUGGEDCOM SFP1132-1LX70	6GK6000-8FG54-0AA0	1000	SM	70
RUGGEDCOM SFP1132-1LX100	6GK6000-8FG55-0AA0	1000	SM	100

<sup>a</sup> MM = Multi-Mode, SM = Single-Mode

Section 3.3

## Serial Ports

The RUGGEDCOM RX1400 supports two serial ports with female DB9 connectors, which can be run in RS-232, RS-485 or RS-422 mode. For technical specifications, refer to [Section 4.4, "Serial Port Specifications"](#).

The following is the pin-out description for DB9 serial ports:

### » Serial DB9 Port

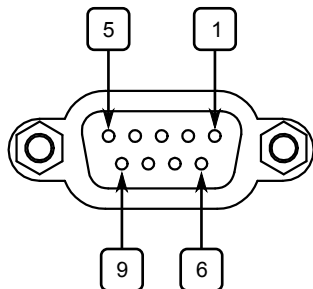


Figure 17: Serial DB9 Port Pin Configuration

Pin	Mode		
	RS-232	RS-422	RS-485
1	Reserved (Do Not Connect)		
2	RX <sup>b</sup>	RX-	
3	TX <sup>b</sup>	TX-	RX-/TX-
4	Reserved (Do Not Connect)		
5	Common (Isolated) Ground		
6	Reserved (Do Not Connect)		
7	RTS	TX+	RX+/TX+
8	CTS	RX+	

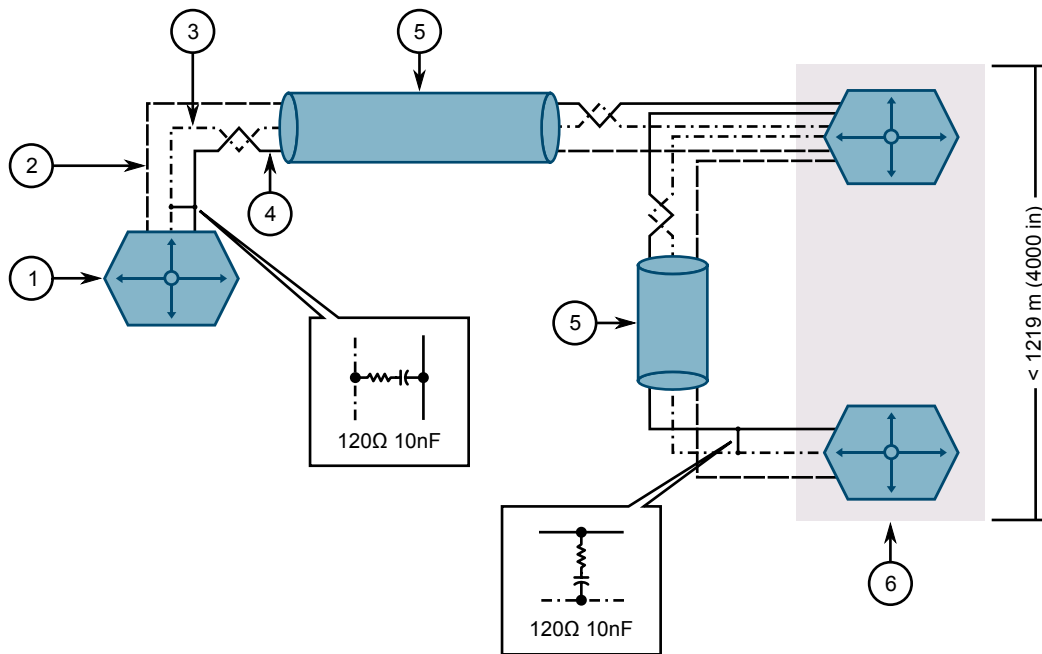
Pin	Mode		
	RS-232	RS-422	RS-485
9	Reserved (Do Not Connect)		
Shield	Chassis Ground		

<sup>b</sup> In RS-232 mode, ports transmit to DTE (Data Terminal Equipment) devices on pin 2 and receive from DTE devices on pin 3.

Each RS-485 port can communicate with multiple RS-485 devices by wiring devices together in sequence over a single twisted-pair with transmit and receive signals on the same two wires (half duplex). For reliable, continuous communication, adhere to the following guidelines:

- To minimize the effects of ambient electrical noise, use shielded cabling.
- The correct polarity must be observed throughout a single sequence or ring.
- The number of devices wired should not exceed 32, and total distance should be less than 1219 m (4000 ft) at 100 kbps.
- The Common terminals should be connected to the common wire inside the shield.
- The shield should be connected to earth ground at a single point to avoid loop currents.
- The twisted pair should be terminated at each end of the chain.

The following shows the recommended RS485 wiring.



**Figure 18: Recommended RS-485 Wiring**

1. RUGGEDCOM RX1400 Device 2. Common (Isolated Ground) 3. Negative 4. Positive 5. Shield to Earth (Connected At a Single Point) 6. RS-485 Devices (32 Total)

# 4 Technical Specifications

This chapter provides important technical specifications related to the device.

## CONTENTS

- [Section 4.1, "Power Supply Specifications"](#)
- [Section 4.2, "Failsafe Alarm Relay Specifications"](#)
- [Section 4.3, "Fast Ethernet Port Specifications"](#)
- [Section 4.4, "Serial Port Specifications"](#)
- [Section 4.5, "Cellular Modem Specifications"](#)
- [Section 4.6, "WLAN Specifications"](#)
- [Section 4.7, "Operating Environment"](#)
- [Section 4.8, "Mechanical Specifications"](#)

## Section 4.1

# Power Supply Specifications

The RUGGEDCOM RX1400 includes one of the following internal power supplies:

Power Supply Type	Input Range	Internal Fuse Rating <sup>a</sup>	Maximum Power Consumption <sup>b</sup>
HI	88-264 VAC	3.15 A(T)	< 15 W
	98-300 VDC		
±48V VDC	±36-72 VDC	6.3 A(T)	
12-24 VDC	9-36 VDC		
±12-24 VDC	±36 VDC		

<sup>a</sup> (T) denotes time-delay fuse.

<sup>b</sup> Power consumption varies based on the device configuration.

## Section 4.2

# Failsafe Alarm Relay Specifications

Parameter	Value (Resistive Load)
Max Switching Voltage	240 VAC

Parameter	Value (Resistive Load)
	125 VDC
Rated Switching Current	2 A @ 240 VAC 0.15 A @ 125 VDC 2 A @ 30 VDC
Maximum Switching Capacity	150 W 500 VA

## Section 4.3

## Fast Ethernet Port Specifications

The RUGGEDCOM RX1400 features four 10/100Base-TX fast Ethernet (FE) ports with RJ45 connectors. For more information about the serial ports, refer to [Section 3.1, “Fast Ethernet Ports”](#).

Speed <sup>c</sup>	100 Mbps
Connector	RJ45
Duplex <sup>c</sup>	FDX/HDX
Cable Type <sup>d</sup>	> CAT-5
Wiring Standard <sup>e</sup>	TIA/EIA T568A/B
Maximum Distance	100 m (328 ft)
Isolation <sup>f</sup>	1.5 kV

<sup>c</sup> Auto-negotiating.

<sup>d</sup> Shielded or unshielded.

<sup>e</sup> Auto-crossover and auto-polarity.

<sup>f</sup> RMS 1 minute.

## Section 4.4

## Serial Port Specifications

The RUGGEDCOM RX1400 supports two serial ports with female DB9 connectors. For more information about the serial ports, refer to [Section 3.3, “Serial Ports”](#).

Baud Rate	1200 to 230400 kbps
Connector	DB9
Isolation	2.5 kV

Section 4.5

# Cellular Modem Specifications

The following specifications detail the LTE, GNSS and WLAN capabilities of the cellular modem.

## CONTENTS

- [Section 4.5.1, "LTE Specifications"](#)
- [Section 4.5.2, "GNSS Specifications"](#)

Section 4.5.1

## LTE Specifications

### » Supported LTE Frequency Bands

Band	Network	Frequencies (MHz)	
		Transmit (Tx)	Receive (Rx)
Band 1	Europe	1920-1980	2110-2170
Band 2	AT&T	1850-1910	1930-1990
Band 3	Europe	1710-1785	1805-1880
Band 4 (AWS)	AT&T	1710-1755	2110-2155
Band 5	AT&T	824-849	869-894
Band 7	Europe	2500-2570	2620-2690
Band 8	Europe	880-915	925-960
Band 13	AT&T	777-787	746-756
Band 17	AT&T	704-716	734-746
Band 20	Europe	832-862	791-821
Band 25	AT&T	1850-1915	1930-1995

### » Supported LTE Bandwidths

Band	Network	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Band 1	Europe	✗	✗	✓	✓	✓	✓
Band 2	AT&T	✓	✓	✓	✓	✓	✓
Band 3	Europe	✓	✓	✓	✓	✓	✓
Band 4 (AWS)	AT&T	✓	✓	✓	✓	✓	✓
Band 5	AT&T	✓	✓	✓	✓	✗	✗
Band 7	Europe	✗	✗	✓	✓	✓	✓
Band 8	Europe	✓	✓	✓	✓	✗	✗

Band	Network	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Band 13	AT&T	✗	✗	✓	✓	✗	✗
Band 17	AT&T	✗	✗	✓	✓	✗	✗
Band 20	Europe	✗	✗	✓	✓	✓	✓
Band 25	AT&T	✓	✓	✓	✓	✓	✓

## » Supported WCDMA Frequency Bands

Band	Network	Frequencies (MHz)	
		Transmit (Tx)	Receive (Rx)
Band 1 WCDMA 2100	AT&T Europe	1920-1980	2110-2170
Band 2 WCDMA 1900	AT&T Europe	1850-1910	1930-1990
Band 4 AWS 1700/2100		1710-1755	2110-2155
Band 5 WCDMA 850	AT&T Europe	824-849	869-894
Band 6 WCDMA 800	Europe	830-840	875-885
Band 8 WCDMA 900	AT&T Europe	880-915	925-960

## » Supported GSM Frequency Bands

Band	Frequencies (MHz)	
	Transmit (Tx)	Receive (Rx)
GSM 850	824-849	869-894
EGSM 900	880-915	925-960
DCS 1800	1710-1785	1805-1880
PCS 1900	1850-1910	1930-1990

### Section 4.5.2

## GNSS Specifications

### » GNSS Specifications

Satellite Channels	12 channel, continuous tracking
Protocols	NMEA 0183 v3.0



<b>Acquisition Time</b>	<ul style="list-style-type: none"> <li>Hot start: 1 s</li> <li>Warm start: 29 s</li> <li>Cold start: 32 s</li> </ul>
<b>Accuracy</b>	<ul style="list-style-type: none"> <li>Horizontal: &lt; 2 m 6.6 ft (50 %), &lt; 5 m or 16.4 ft (90 %)</li> <li>Altitude: &lt; 4 m or 13.1 (50 %), &lt; 8 m or 26.2 (90 %)</li> <li>Velocity: &lt; 0.2 m/s or 0.7 ft/s</li> </ul>
<b>Sensitivity</b>	<ul style="list-style-type: none"> <li>Tracking: -161 dBm</li> <li>Acquisition (Assisted, Non-LTE): -158 dBm</li> <li>Acquisition (Assisted, LTE): -153 dBm</li> <li>Acquisition (Standalone): -145 dBm</li> </ul>
<b>Operational Limits</b>	Altitude < 6000 m (3.7 mi) or velocity < 100 m/s (328 ft/s) <sup>9</sup>

<sup>9</sup> Either limit may be exceeded, but not both

## » GNSS Standalone Antenna Requirements

<b>Frequency Range</b>	<ul style="list-style-type: none"> <li>Narrow-band GPS: 1572.42 MHz ± 2 MHz minimum</li> <li>Wide-band GPS and GLONASS: 1565 to 1606 MHz recommended</li> </ul>
<b>Field of View (FoV)</b>	<ul style="list-style-type: none"> <li>Omni-directional in azimuth</li> <li>-45° to 90° in elevation</li> </ul>
<b>Polarization (average Gv/Gh)</b>	> 0 dB <sup>h</sup>
<b>Free space average gain (Gv+Gh) over FoV</b>	> -3 (preferred) or -6 dBi <sup>i</sup>
<b>Gain</b>	<ul style="list-style-type: none"> <li>Maximum gain and uniform coverage in the high elevation angle and zenith</li> <li>Gain in azimuth plane is not desired</li> </ul>
<b>Average 3D gain</b>	> -5 dBi
<b>Isolation between GNSS and LTE Main (Primary)</b>	> 10 dB in all uplink bands
<b>Typical VSWR</b>	< 2.5:1
<b>Polarization</b>	Any other than LHCP (Left-Hand Circular Polarized) is acceptable.

<sup>h</sup> Vertical linear polarization is sufficient.

<sup>i</sup> Gv and Gh are measured and averaged over -45 to 90° in elevation, and ± 180° in azimuth.

### Section 4.6

## WLAN Specifications

<b>Supported Standards</b>	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n
<b>Maximum Throughput</b>	TCP: 80 Mbps at 2.4 GHz UDP: 100 Mbps at 2.4 GHz
<b>Diversity</b>	2.4 GHz MRC support for extended range 5.0 GHz diversity capable

<b>Host Interface</b>	4-Bit SDIO
<b>Maximum EIRP</b>	< 200 mW at 5250 to 5350 MHz

Section 4.7

## Operating Environment

The RUGGEDCOM RX1400 can operate under the following environmental conditions:

Parameter	Range	Comments
Ambient Operating Temperature	-40 to 85 °C (-40 to 185 °F) <sup>j</sup>	Measured from a 30 cm (12 in) radius surrounding the center of the enclosure.
Ambient Relative Humidity	5% to 95%	Non-condensing
Ambient Storage Temperature	-40 to 85 °C (-40 to 185 °F)	

<sup>j</sup> Maximum ambient operating temperature is 70 °C (158 °F) when the device is installed along with Underwriter Laboratories (UL) listed devices.

Section 4.8

## Mechanical Specifications

<b>Dimensions</b>	Refer to <a href="#">Chapter 5, Dimension Drawings</a>
<b>Weight</b>	2.5 kg (5.5 lb)
<b>Ingress Protection</b>	IP40
<b>Enclosure</b>	Aluminum

# 5 Dimension Drawings



**NOTE**

All dimensions are in millimeters, unless otherwise stated.

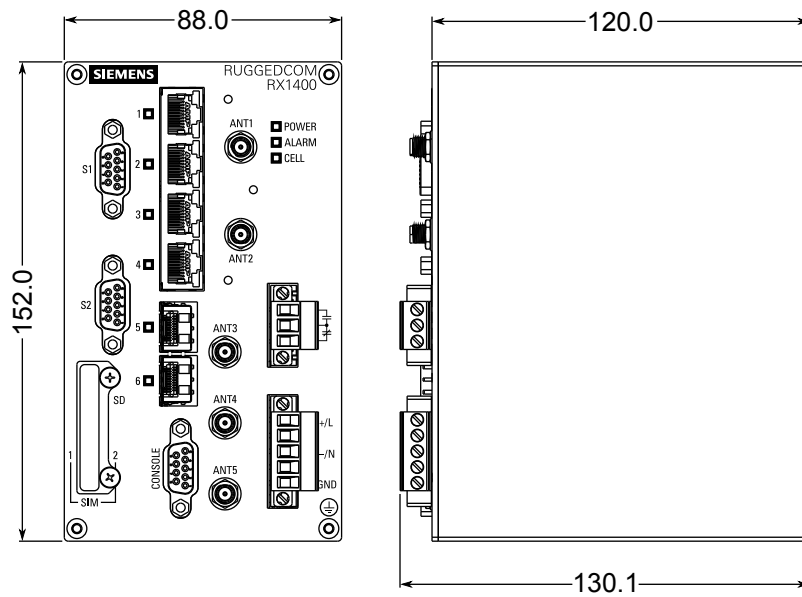
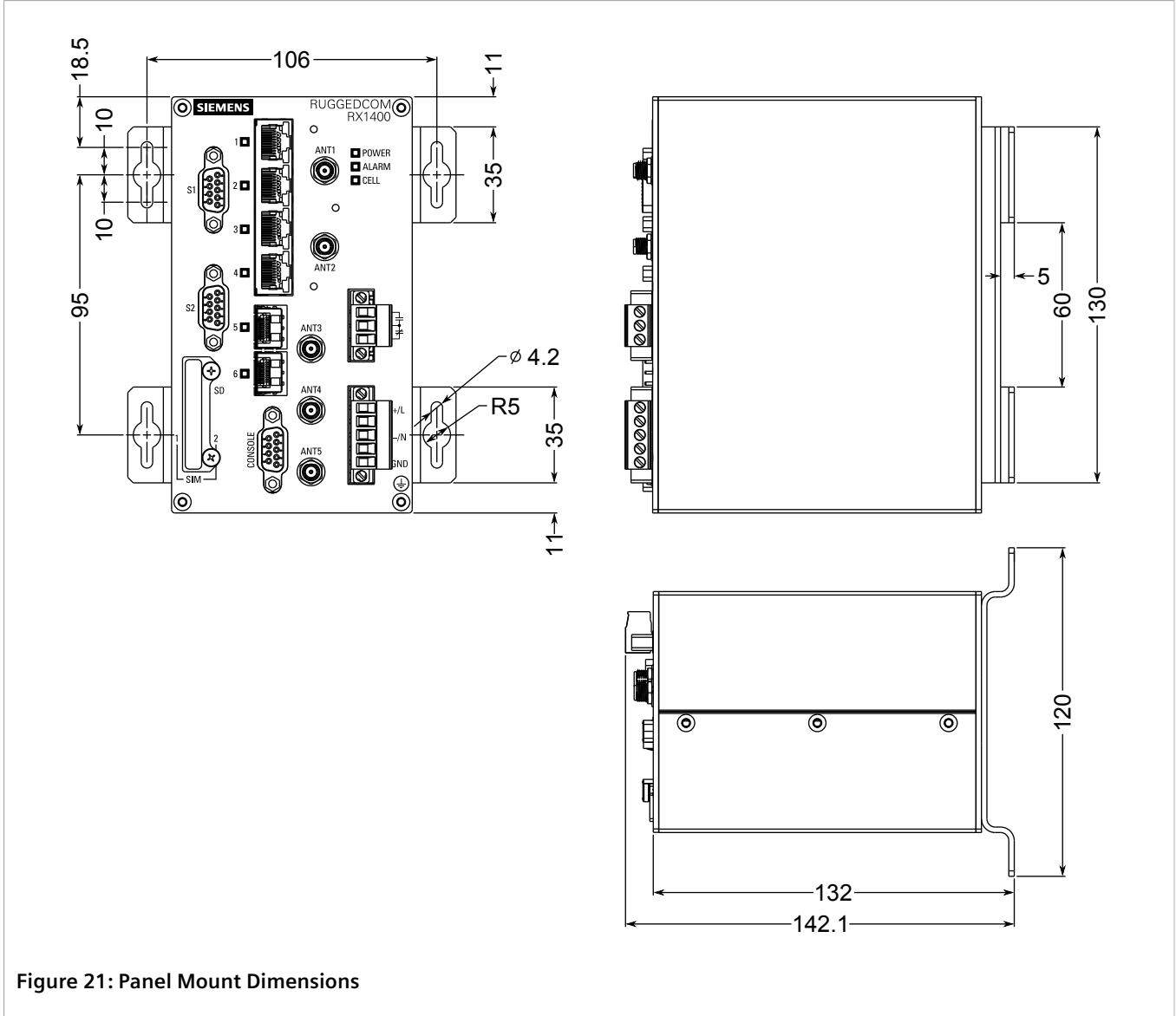


Figure 19: Overall Dimensions





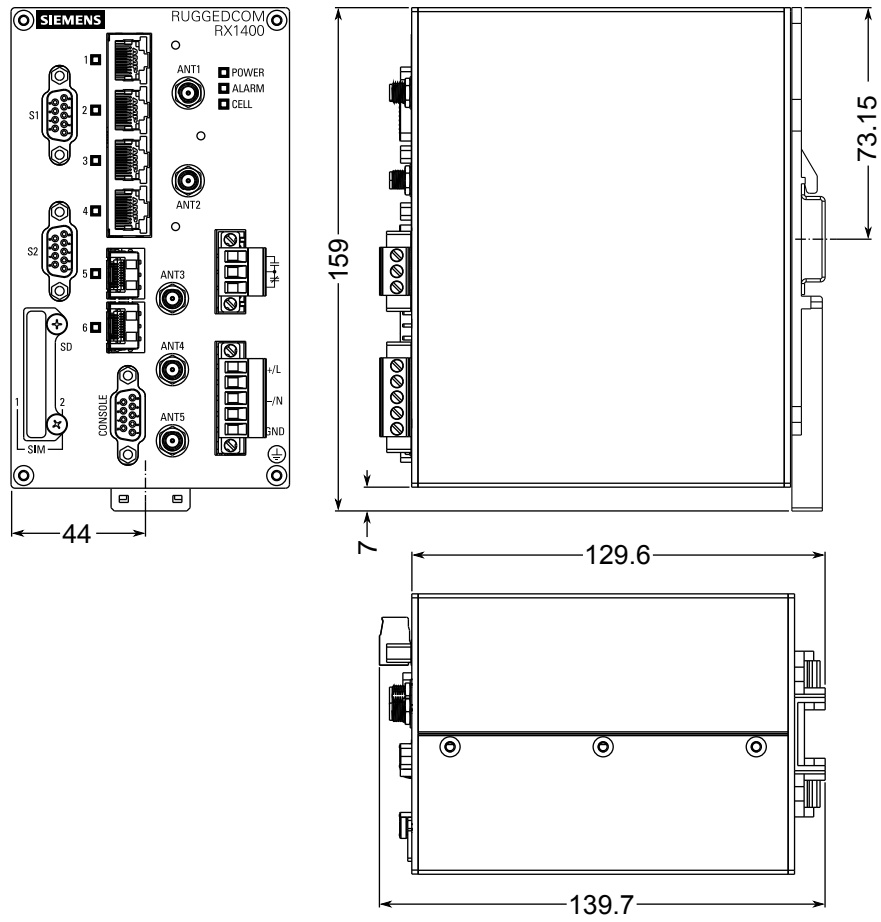


Figure 22: Din Rail Mount Dimensions

# 6 Certification

The RUGGEDCOM RX1400 device has been thoroughly tested to guarantee its conformance with recognized standards and has received approval from recognized regulatory agencies.

## CONTENTS

- [Section 6.1, "Approvals"](#)
- [Section 6.2, "EMC and Environmental Type Tests"](#)

### Section 6.1

## Approvals

This section details the standards to which the RUGGEDCOM RX1400 complies.

## CONTENTS

- [Section 6.1.1, "CSA"](#)
- [Section 6.1.2, "CSA/Sira"](#)
- [Section 6.1.3, "TÜV SÜD"](#)
- [Section 6.1.4, "European Union \(EU\)"](#)
- [Section 6.1.5, "FCC"](#)
- [Section 6.1.6, "FDA/CDRH"](#)
- [Section 6.1.7, "ISO"](#)
- [Section 6.1.8, "ISED"](#)
- [Section 6.1.9, "RRA"](#)
- [Section 6.1.10, "ICASA"](#)
- [Section 6.1.11, "Other Approvals"](#)

### Section 6.1.1

## CSA

This device meets the requirements of the following Canadian Standards Association (CSA) standards under certificate 16.70029035:

- **CAN/CSA-C22.2 No. 142-M1987**  
Process Control Equipment

- **CAN/CSA-C22.2 No. 213-M1987**  
Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations
- **CAN/CSA-C22.2 No. 60079-0:11**  
Explosive Atmospheres – Part 0: Equipment – General Requirements
- **CAN/CSA-C22.2 No. 60079-15:12**  
Electrical Apparatus for Explosive Gas Atmospheres – Part 15: Construction, Test and Marking of Type of Protection *N* Electrical Apparatus
- **UL 916, Edition 4.0 (2007)**  
Standard for Energy Management Equipment
- **UL 60079-0, Edition 6.0 (2013)**  
Explosive Atmospheres – Part 0: Equipment – General Requirements
- **UL 60079-15, Edition 4.0 (2013)**  
Explosive Atmospheres – Part 15: Equipment Protection by Type of Protection *N*
- **ANSI/ISA-12.12.01-2013**  
Non-Incendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Division 1 and 2 Hazardous (Classified) Locations

The device is marked with a CSA symbol that indicates compliance with both Canadian and U.S. requirements.



It is specifically approved for use in hazardous locations defined as:

- Class I, Division 2, Groups A, B, C, D
- Ex nA nC IIC T4 Gc
- Class I, Zone 2, AEx nA nC IIC T4 Gc

#### Section 6.1.2

### CSA/Sira

This device meets the requirements of the following CSA/Sira standards and is approved for use in hazardous locations under certificates Sira 15ATEX4323X and IECEx CSA 16.0004X:

- **Directive 94/9/EC (ATEX)**  
ATEX – Directive of the European Parliament and the Council of 23 March 1994 on the Approximation of the Laws of the Member States Concerning Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres
- **IEC 60079-0, Edition 6.0 (2011)/EN 60079-0:2012**  
Explosive Atmospheres – Part 0: Equipment – General Requirements
- **IEC 60079-15, Edition 4.0 (2010)/EN 60079-15:2010**  
Explosive Atmospheres – Part 15: Equipment Protection by Type of Protection *N*

The device is marked with an ATEX marking.







**NOTE**

*For the maximum ambient temperature, refer to the hazardous location label affixed to the device.*

Section 6.1.3

## TÜV SÜD

This device is certified by TÜV SÜD to meet the requirements of the following standards:

- **CAN/CSA-C22.2 NO. 60950-1-07 (R2012)**  
Information Technology Equipment – Safety – Part 1: General Requirements (Bi-National standard, with UL 60950-1)
- **UL 60950-1**  
Information Technology Equipment – Safety – Part 1: General Requirements)

Section 6.1.4

## European Union (EU)

This device is declared by Siemens Canada Ltd to comply with essential requirements and other relevant provisions of the following EU directives:

- **Directive 1999/5/EC**  
Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on Radio Equipment and Telecommunications Terminal Equipment and the Mutual Recognition of their Conformity
- **EN 60950-1**  
Information Technology Equipment – Safety – Part 1: General Requirements
- **EN 61000-6-2**  
Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments
- **EN 60825-1**  
Safety of Laser Products – Equipment Classification and Requirements
- **EN 55022**  
Information Technology Equipment – Radio disturbance characteristics – Limits and methods of measurement
- **EN 50581**  
Technical Documentation for the Assessment of Electrical and Electronic Products with Respect to the Restriction of Hazardous Substances
- **EN 60950-1:2006 + A11:2009 + A11:2010 + A12:2001 + A2:2013**  
Information Technology Equipment – Safety – Part 1: General Requirements
- **EN 62311:2008**  
Assessment of Electronic and Electrical Equipment Related to Human Exposure Restrictions for Electromagnetic Fields (0 Hz – 300 GHz)
- **EN 301 489-1 (v1.9.2)**  
Electromagnetic compatibility and radio spectrum matters (ERM) – Electromagnetic Compatibility for Radio Equipment and Services – Part 1: Common Technical Requirements

- **EN 301 489-3 (v1.6.1)**  
Electromagnetic compatibility and radio spectrum matters (ERM) – Electromagnetic Compatibility for Radio Equipment and Services – Part 3: Specific Conditions for Short-Range Devices (SRD) Operating on Frequencies Between 9 kHz and 246 GHz
- **EN 301 489-7 (v1.3.1)**  
Electromagnetic compatibility and radio spectrum matters (ERM) – Electromagnetic Compatibility for Radio Equipment and Services – Part 7 : Specific Conditions for Mobile and Portable Radio and Ancillary Equipment of Digital Cellular Radio Telecommunications Systems (GSM and DCS)
- **EN 301 489-24 (v1.5.1)**  
Electromagnetic Compatibility and Radio Spectrum Matters (ERM) – Electromagnetic Compatibility for Radio Equipment and Services – Part 24: Specific Conditions for Mobile and Portable IMT-2000 CDMA Direct Spread (UTRA) Radio and Ancillary Equipment
- **EN 301 511 (v9.0.2)**  
Global System for Mobile communications (GSM) – Harmonized EN for Mobile Stations in the GSM 900 and GSM 1800 Bands Covering Essential Requirements of Article 3.2 of the R&TTE Directive (1999/5/EC)
- **EN 301 908-1 (v6.2.1)**  
IMT Cellular Networks – Harmonized EN Covering the Essential Requirements of Article 3.2 of the R&TTE Directive – Part 1: Introduction and common requirements
- **EN 301 908-2 (v6.2.1)**  
IMT Cellular Networks – Harmonized EN Covering the Essential Requirements of Article 3.2 of the R&TTE Directive – Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (UE)

The device is marked with a CE marking and notified body number, and can be used throughout the European community.

**CE 0682**

A copy of the CE Declaration of Conformity is available from Siemens Canada Ltd. For contact information, refer to [“Contacting Siemens”](#).

Notices specific to the European Union:



**IMPORTANT!**

*For mobile and fixed operating configurations, in accordance with R&TTE Directive 1999/5/EC, the maximum antenna gain is 3 dBi for 900 MHz, 1800 MHz, 2100 MHz and 2600 MHz.*

Section 6.1.5

## FCC

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the device is operated in a commercial environment.

This device generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this device does cause harmful interference to radio or television reception, which can be determined by turning the device off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna

- Increase the separation between the device and receiver.
- Connect the device into an outlet on a circuit different from that to which the receiver is connected
- Contact Siemens Customer Support for assistance



**IMPORTANT!**

*Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this device.*

Section 6.1.6

## FDA/CDRH

This device meets the requirements of the following U.S. Food and Drug Administration (FDA) standard:

- Title 21 Code of Federal Regulations (CFR) – Chapter I – Sub-chapter J – Radiological Health

Section 6.1.7

## ISO

This device was designed and manufactured using a certified ISO (International Organization for Standardization) quality program that adheres to the following standard:

- **ISO 9001:2008**  
Quality management systems – Requirements

Section 6.1.8

## ISED

This device is declared by Siemens Canada Ltd to meet the requirements of the following ISED (Innovation Science and Economic Development Standard Canada) standard:

- CAN ICES-3 (B)/NMB-3 (B)

Notices specific to ISED:



**IMPORTANT!**

*This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:*

- *This device may not cause interference*
- *This device must accept any interference, including interference that may cause undesired operation of the device*

**IMPORTANT !**

*Cet appareil est conforme avec Industrie Canada exempts de licence standard RSS (s). Son fonctionnement est soumis aux deux conditions suivantes:*

- *Cet appareil ne doit pas provoquer d'interférences*
- *Cet appareil doit accepter toute interférence, y compris celles pouvant causer un mauvais fonctionnement de l'appareil*



**IMPORTANT!**

*Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the Equivalent Isotropically Radiated Power (EIRP) is not more than that necessary for successful communication.*

**IMPORTANT !**

*Conformément à la réglementation d'Industrie Canada, cet émetteur radio ne peut fonctionner à l'aide d'une antenne d'un type et maximum (ou moins) Gain approuvé pour l'émetteur par Industrie Canada. Pour réduire le risque d'interférence avec d'autres utilisateurs, le type d'antenne et son gain doivent être choisis afin que la Puissance Isotrope Rayonnée Équivalente (PIRE) ne dépasse pas ce qui est nécessaire pour une communication réussie.*



**IMPORTANT!**

*This device complies with Health Canada's Safety Code. The installer of this device should ensure that RF radiation is not emitted in excess of the Health Canada's requirement. Information can be obtained at [http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio\\_guide-lignes\\_direct/index-eng.php](http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio_guide-lignes_direct/index-eng.php).*

**IMPORTANT !**

*Cet appareil est conforme avec Santé Canada Code de sécurité 6. Le programme d'installation de cet appareil doit s'assurer que les rayonnements RF n'est pas émis au-delà de l'exigence de Santé Canada. Les informations peuvent être obtenues: [http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio\\_guide-lignes\\_direct/index-eng.php](http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio_guide-lignes_direct/index-eng.php)*



**IMPORTANT!**

*Operation in the band 5150-5250 MHz is only allowed for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.*

**IMPORTANT !**

*Operation dans la bande 5150-5250 MHz est autorisée uniquement pour un usage intérieur afin de réduire les risques d'interférence nuisible aux systèmes mobiles par satellite co-canal.*



**IMPORTANT!**

*When the device is operating in bands 5250-5350 MHz or 5470-5725 MHz, the maximum antenna gain permitted must comply with the EIRP limit.*

**IMPORTANT !**

*Le dispositif fonctionnant dans la bande 5150-5250 MHz est réservé uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.*



**IMPORTANT!**

*The maximum antenna gain permitted for devices in the band 5725-5825 MHz shall comply with the EIRP limits specified for point-to-point and non point-to-point operation as appropriate.*

*Users are advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.*

**IMPORTANT !**

*Le gain maximal d'antenne permis (pour les dispositifs utilisant la bande 5725-5825 MHz) doit se conformer à la limite de PIRE spécifiée pour l'exploitation point à point et non point à point, selon le cas.*

*Les utilisateurs êtes avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5250-5 350 MHz et 5650-5850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.*

**!** **IMPORTANT!**  
The maximum EIRP of the device is less than 200 mW when operating in the 5250 to 5350 MHz band. As such, the device is exempt from the elevation mask requirements outlined in RSS-247 Issue 2, Section 6.2.2.3.

**!** **IMPORTANT!**  
This radio transmitter IC: 4997A-VG5RX1400 has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

**IMPORTANT !**  
Cet émetteur radio IC : 4997A-VG5RX1400 a été approuvé par Industrie Canada pour fonctionner avec les types d'antennes énumérés ci-dessous avec le gain maximal admissible et l'impédance d'antenne requise pour chaque type d'antenne indiqué. Types d'antennes ne figurent pas dans cette liste, ayant un gain supérieur au gain maximum indiqué pour ce type, sont strictement interdites pour une utilisation avec cet appareil.

Antenna	Type	Operating Frequency (GHz)	Gain (dBi)	Article Number	Reference
ANT792-4DN	Omni-Directional	2.4	4.0	6GK5792-4DN00-0AA6	—
ANT792-6MN	Omni-Directional	2.4	6.0	6GK5792-6MN00-0AA6	<a href="https://support.industry.siemens.com/cs/mw/en/view/26210199">https://support.industry.siemens.com/cs/mw/en/view/26210199</a>
ANT792-8DN	Directional	2.4	14.0	6GK5792-8DN00-0AA6	<a href="https://support.industry.siemens.com/cs/mw/en/view/26229510">https://support.industry.siemens.com/cs/mw/en/view/26229510</a>
ANT793-4MN	Omni-Directional	5.0	6.0	6GK5792-8DN00-0AA6	—
ANT793-6DG <sup>a</sup>	Directional	5.0	9.0	6GK5793-6DG00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/60509676">https://support.industry.siemens.com/cs/mw/en/view/60509676</a>
ANT793-6DT <sup>a</sup>	Omni-Directional	5.0	8.0	6GK5793-6DT00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/60510334">https://support.industry.siemens.com/cs/mw/en/view/60510334</a>
ANT793-6MN	Omni-Directional	5.0	5.0	6GK5793-6MN00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/26228205">https://support.industry.siemens.com/cs/mw/en/view/26228205</a>
ANT793-8DJ <sup>a</sup>	Directional	5.0	18.0 <sup>b</sup>	6GK5793-8DJ00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/60509959">https://support.industry.siemens.com/cs/mw/en/view/60509959</a>
ANT793-8DP <sup>a</sup>	Directional	5.0	13.5 <sup>c</sup>	6GK5793-8DP00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/89534905">https://support.industry.siemens.com/cs/mw/en/view/89534905</a>
ANT795-4MA	Omni-Directional	2.4	3.0	6GK5795-4MA00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/61199227">https://support.industry.siemens.com/cs/mw/en/view/61199227</a>
		5.0	5.0		
ANT795-4MC	Omni-Directional	2.4	3.0	6GK5795-4MC00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/61199227">https://support.industry.siemens.com/cs/mw/en/view/61199227</a>
		5.0	5.0		
ANT795-4MD	Omni-Directional	2.4	3.0	6GK5795-4MD00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/61199227">https://support.industry.siemens.com/cs/mw/en/view/61199227</a>

Antenna	Type	Operating Frequency (GHz)	Gain (dBi)	Article Number	Reference
		5.0	5.0		
ANT795-4MX	Omni-Directional	2.4	2.0	6GK5795-4MX00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/102325861">https://support.industry.siemens.com/cs/mw/en/view/102325861</a>
		5.0	2.5		
ANT795-6DC	Directional	2.4	9.0	6GK5795-6DC00-0AA6	<a href="https://support.industry.siemens.com/cs/mw/en/view/60510336">https://support.industry.siemens.com/cs/mw/en/view/60510336</a>
		5.0 <sup>a</sup>			
ANT795-6MN	Directional	2.4	6.0	6GK5795-6MN10-0AA6	<a href="https://support.industry.siemens.com/cs/mw/en/view/26536615">https://support.industry.siemens.com/cs/mw/en/view/26536615</a>
	Omni-Directional	5.0 <sup>a</sup>	8.0		
ANT795-6MT	Directional	2.4	5.0	6GK5795-6MT00-0AA0	<a href="https://support.industry.siemens.com/cs/mw/en/view/60510908">https://support.industry.siemens.com/cs/mw/en/view/60510908</a>
	Omni-Directional	5.0 <sup>a</sup>	7.0		

<sup>a</sup> Not for use in Canada.

<sup>b</sup> Total gain is 9.2 dBi when connected via a 10 m (33 ft) cable (6X1875-5CN10) with an 8.8 dB loss.

<sup>c</sup> Total gain is 9.1 dBi when connected via a 5 m (16 ft) cable (6X1875-5CH50) with a 4.4 dB loss.

Section 6.1.9


## RRA

This device has been registered by the Korean Radio Research Agency (RRA) under Clause 3, Article 58-2 of the Radio Waves Act. As such, the device is marked with a KC symbol and can be used in the Republic of Korea (South Korea) as a Class B product in a commercial, industrial or business environment.



A copy of the KC Declaration of Conformity is available from Siemens Canada Ltd. For contact information, refer to [“Contacting Siemens”](#).

Notices specific to the RRA:



**WARNING!**  
Class B Equipment (Industrial Broadcasting and Communication Equipment)

*This device complies with the limits of a Class B electromagnetic wave device and is intended for use outside of a residential environment. The seller or user must be aware.*

**주의!**  
B급 기기 (업무용 방송통신기자재)

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

Section 6.1.10

## ICASA

This device meets the requirements of the following standards established by the Independent Communications Authority of South Africa and is certified for use in South Africa:

- Electronic Communications Act 2005

Section 6.1.11

## Other Approvals

This device meets the requirements of the following additional standards:

- **IEEE 1613**  
IEEE Standard Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations
- **IEC 61850-3**  
General Requirements
- **IEC 61000-6-2**  
Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments
- **NEMA TS-2**  
Traffic Controller Assemblies with NTCIP Requirements

Section 6.2

## EMC and Environmental Type Tests

The RUGGEDCOM RX1400 has passed the following Electromagnetic Compatibility (EMC) and environmental tests.

### » EMC Type Tests per IEC 61850-3

Test	Description		Test Levels	Severity Levels
IEC 61000-4-2	ESD	Enclosure Contact	± 8 kV	4
		Enclosure Air	± 15 kV	
IEC 61000-4-3	Radiated RFI	Enclosure Ports	20 V/m	Note <sup>d</sup>
IEC 61000-4-4	Burst (Fast Transient)	Signal Ports	± 4 kV @ 2.5 kHz, 5 kHz	4
		DC Power Ports	± 4 kV @ 2.5 kHz, 5 kHz	
		AC Power Ports	± 4 kV	
		Earth Ground Ports	± 4 kV @ 2.5 kHz, 5 kHz	
IEC 61000-4-5	Surge Immunity	Signal Ports	± 4 kV Line-to-Earth ± 2 kV Line-to-Line	3
		DC Power Ports	± 2 kV Line-to-Earth ± 1 kV Line-to-Line	

Test	Description		Test Levels	Severity Levels
		AC Power Ports	± 4 kV Line-to-Earth ± 2 kV Line-to-Line	4
IEC 61000-4-6	Induced (Conducted) RFI	Signal Ports	10 V	3
		DC Power Ports		
		AC Power Ports		
		Earth Ground Ports		
IEC 61000-4-8	Magnetic Field	Enclosure Ports	100 A/m Continuous 1000 A/m for 1 s	5
IEC 61000-4-9	Pulse Magnetic Field	Enclosure Ports	300 A/m	4
IEC 61000-4-11	Voltage Dips & Interrupts	AC Power Ports	30% for 0.5 Cycles 60% for 5 Cycles 100% for 250 Cycles	
IEC 61000-4-16	Mains Frequency Voltage	Signal Ports	30 V Continuous 300 V for 1s	4
		DC Power Ports		
IEC 61000-4-17	Ripple on DC Power Supply	DC Power Ports	10%	3
IEC 61000-4-18	Damped Oscillatory Wave	Slow Damped	2.5 kV Common 100 kHz or 1 MHz	3
IEC 61000-4-29	Voltage Dips and Interrupts	DC Power Ports	30% for 0.1 s 60% for 0.1 s 100% for 0.05 s	
IEC 60255-5	Dielectric Strength	Signal Ports	2 kV	
		DC Power Ports		
		AC Power Ports		
	HV Impulse	Signal Ports	5 kV	
		DC Power Ports		

<sup>d</sup> Siemens-specified severity levels

## » EMC Immunity Type Tests per IEEE 1613



### NOTE

The RUGGEDCOM RX1400 meets Class 1 requirements for copper ports, which allows for temporary communication loss.

Test	Description		Test Levels
IEEE 1613	HV Impulse	Signal Ports	5 kV
		DC Power Ports	
	Dielectric Strength	Signal Ports	2828 VDC or 2 kV
		DC Power Ports	



Test	Description		Test Levels
	Fast Transient (SWC)	Signal Ports	± 4 kV @ 2.5 kHz, 5 kHz
		DC Power Ports	
		Earth Ground Ports	
	Oscillatory (SWC)	Signal Ports	2.5 kV Common mode @1 MHz
		DC Power Ports	2.5 kV Common Mode 1 kV Differential Mode @ 1 MHz
	Radiated RFI	Enclosure ports	35 V/m
	ESD	Enclosure Contact	± 8 kV
Enclosure Air		± 15 kV	
IEEE 1613.1/ IEC 61000-4-10	Damped Oscillating Magnetic Field	Enclosure Ports	100 A/m for 1 s (100 kHz and 1 MHz)

## » Environmental Type Tests

Test	Description		Test Levels
IEC 60068-2-1	Cold Temperature	Test Ad	-40 °C (-40 °F), 16 Hours
	Cold Storage	Test Ab	-40 °C (-40 °F), 16 hours
IEC 60068-2-2	Dry Heat	Test Bd	85 °C (185 °F), 16 Hours
	Dry Heat Storage	Test Bb	85 °C (185 °F), 16 hours
IEC 60068-2-30	Humidity (Damp Heat, Cyclic)	Test Db	95% (Non-Condensing), 55 °C (131 °F), 6 cycles
IEC 60068-78	Humidity (Damp Heat, Steady State)		10 days @ 55 °C (131 °F) and 93% Relative Humidity
IEC 60255-21-1	Vibration		2 g @ 10-150 Hz
IEC 60255-21-2	Shock		30 g @ 11 ms
IEC 60255-21-3	Seismic		Method A, Class 2
IEC 60068-1-14	Change of Temperature		5 Cycles (-40 to 85 °C or -40 to 185 °F)

