SIEMENS

Catalog

SIMATIC NET

Networking Components

RUGGEDCOM Modules

For RX1500, RX1501, RX1510, RX1511, RX1512

Edition 12/2019

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C79000-G8976-1320-12

Legal Information

Warning Notice System

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.

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indicates that death or severe personal injury may result if proper precautions are not taken.

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indicates that minor personal injury can result if proper precautions are not taken.

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indicates that property damage can result if proper precautions are not taken.

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Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Siemens AG
Digital Industry
Process Automation
Postfach 48 48
90026 NÜRNBERG
GERMANY

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Table of Contents

Preface

This document details RUGGEDCOM power and line modules available for use with devices in the RUGGEDCOM RX1500/RX1501/RX1510/RX1511/RX1512 series of multi-service routers and switches.

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

Related Documents

Other documents that may be of interest include:

- **RUGGEDCOM RX1500 Installation Manual**
  https://support.industry.siemens.com/cs/ww/en/view/82166529
- **RUGGEDCOM RX1501 Installation Manual**
  https://support.industry.siemens.com/cs/ww/en/view/82164308
- **RUGGEDCOM RX1510 Installation Manual**
  https://support.industry.siemens.com/cs/ww/en/view/82164310
- **RUGGEDCOM RX1511 Installation Manual**
  https://support.industry.siemens.com/cs/ww/en/view/82166915
- **RUGGEDCOM RX1512 Installation Manual**
  https://support.industry.siemens.com/cs/ww/en/view/82167597

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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.

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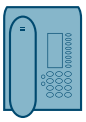
Customer support is available 24 hours, 7 days a week for all Siemens customers. For technical support or general information, contact Siemens Customer Support through any of the following methods:

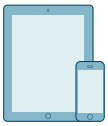
Online

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 https://w3.siemens.com/aspa_app/-?lang=en.



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

Contacting Siemens

Address	Siemens AG Industry Sector 300 Applewood Crescent Concord, Ontario Canada, L4K 5C7
Telephone	Toll-free: 1 888 264 0006 Tel: +1 905 856 5288 Fax: +1 905 856 1995
E-Mail	ruggedcom.info.i-ia@siemens.com
Web	https://www.siemens.com

Ordering RUGGEDCOM Products

Use the RUGGEDCOM-Selector to select and configure RUGGEDCOM products and accessories. Once selected, an item(s) can be transferred to the Siemens Industry Mall and ordered.

RUGGEDCOM-Selector

http://www.siemens.com/ruggedcom-selector.

For more information, refer to https://www.siemens.com.

1 Introduction

This catalog details the various power and line modules available for the RUGGEDCOM RX1500/RX1501/RX1510/RX1511/RX1512. Modules allow network designers to quickly and cost effectively adjust their communications infrastructure to the needs of the facilities and the network.

It is intended to be used as a supplement to the *Installation Manual* for the device. For a list of related Installation Manuals, refer to "Related Documents (Page v)".

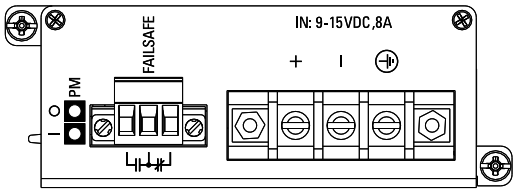
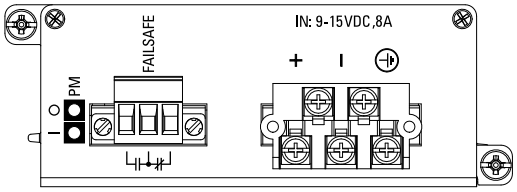
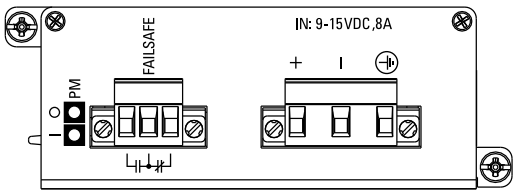
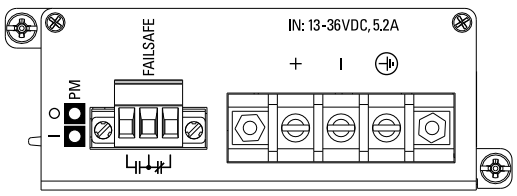
NOTICE
Only qualified personnel should be allowed to install and work on this equipment. Qualified persons in the sense of the safety-related notices in this manual are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

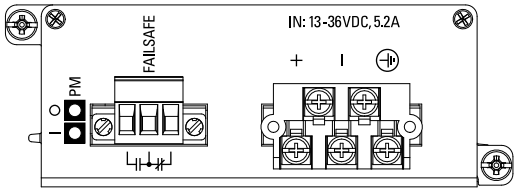
1.1 Available Modules

The following is a list of all power and line modules available for use in the RX1500/RX1501/RX1510/RX1511/RX1512.

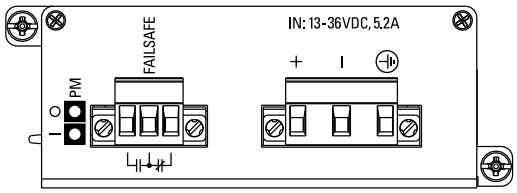
Power Supply Modules

Note
The RUGGEDCOM RX1512 features a built-in power supply.

RUGGEDCOM RX1500PN PS 12 (shipped until 2019) 	**Specifications** Input Range: 9 to 15 VDC Terminal Type: Non-removable Screw	**Article Numbers** 6GK6015-0AL17-0AA0 (Standard) 6GK6015-0AL17-0AA1 (Conformal Coated)
RUGGEDCOM RX1500PN PS 12 (shipped from 2019 on) 	**Specifications** Input Range: 9 to 15 VDC Terminal Type: Removable Screw	**Article Numbers** 6GK6015-0AL17-0AA0 (Standard) 6GK6015-0AL17-0AA1 (Conformal Coated)
RUGGEDCOM RX1500PN PS 12P 	**Specifications** Input Range: 9 to 15 VDC Terminal Type: European-style (Euroblock)	**Article Numbers** 6GK6015-0AL18-0AA0 (Standard) 6GK6015-0AL18-0AA1 (Conformal Coated)
RUGGEDCOM RX1500PN PS 24 (shipped until 2019) 	**Specifications** Input Range: 13 to 36 VDC Terminal Type: Non-removable Screw	**Article Numbers** 6GK6015-0AL11-0AA0 (Standard) 6GK6015-0AL11-0AA1 (Conformal Coated)
RUGGEDCOM RX1500PN PS 24 (shipped from 2019 on)	**Specifications** Input Range: 13 to 36 VDC Terminal Type: Removable Screw	**Article Numbers** 6GK6015-0AL11-0AA0 (Standard) 6GK6015-0AL11-0AA1 (Conformal Coated)

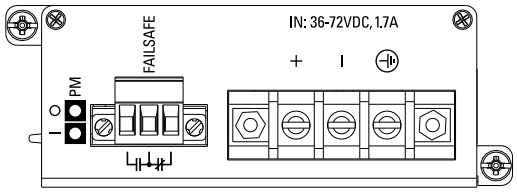


RUGGEDCOM RX1500PN PS 24P



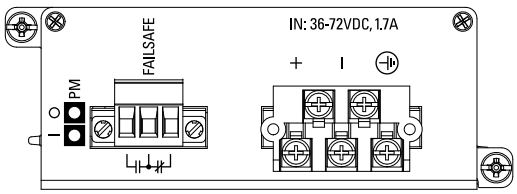
Specifications	Article Numbers
Input Range: 13 to 36 VDC	6GK6015-0AL14-0AA0 (Standard)
Terminal Type: European-style (Euroblock)	6GK6015-0AL14-0AA1 (Conformal Coated)

RUGGEDCOM RX1500PN PS 48 (shipped until 2019)



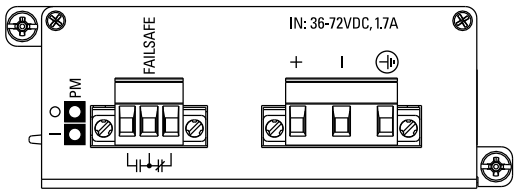
Specifications	Article Numbers
Input Range: 36 to 72 VDC	6GK6015-0AL12-0AA0 (Standard)
Terminal Type: Non-removable Screw	6GK6015-0AL12-0AA1 (Conformal Coated)

RUGGEDCOM RX1500PN PS 48 (shipped from 2019 on)



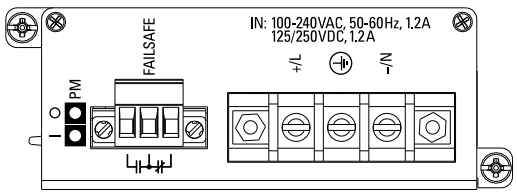
Specifications	Article Numbers
Input Range: 36 to 72 VDC	6GK6015-0AL12-0AA0 (Standard)
Terminal Type: Removable Screw	6GK6015-0AL12-0AA1 (Conformal Coated)

RUGGEDCOM RX1500PN PS 48P



Specifications	Article Numbers
Input Range: 36 to 72 VDC	6GK6015-0AL15-0AA0 (Standard)
Terminal Type: European-style (Euroblock)	6GK6015-0AL15-0AA1 (Conformal Coated)

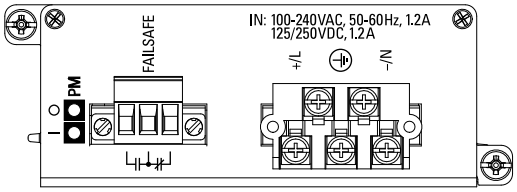
RUGGEDCOM RX1500PN PS HI (shipped until 2019)

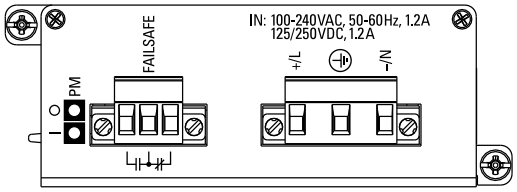


Specifications	Article Numbers
Input Range: 88 to 300 VDC or 85 to 264 VAC	6GK6015-0AL13-0AA0 (Standard)
Terminal Type: Non-removable Screw	6GK6015-0AL13-0AA1 (Conformal Coated)

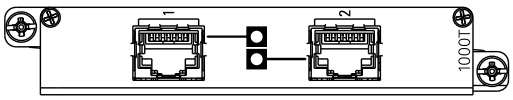
RUGGEDCOM RX1500PN PS HI (shipped from 2019 on)

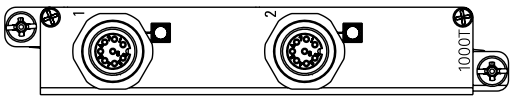
Specifications	Article Numbers

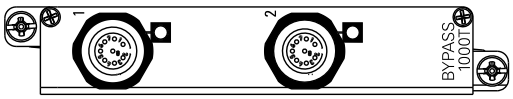
	Input Range: 88 to 300 VDC or 85 to 264 VAC Terminal Type: Removable Screw	6GK6015-0AL13-0AA0 (Standard) 6GK6015-0AL13-0AA1 (Conformal Coated)

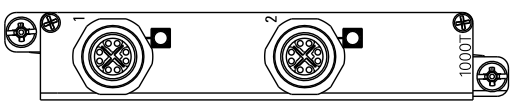
RUGGEDCOM RX1500PN PS HIP	Specifications	Article Numbers
	Input Range: 88 to 300 VDC or 85 to 264 VAC Terminal Type: European-style (Euroblock)	6GK6015-0AL16-0AA0 (Standard) 6GK6015-0AL16-0AA1 (Conformal Coated)

Copper Ethernet Modules

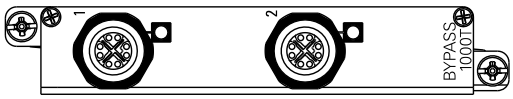
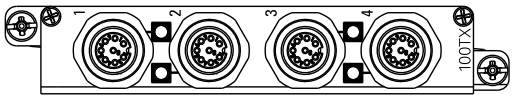
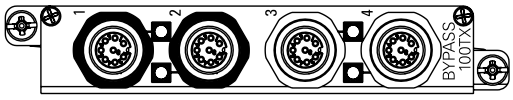
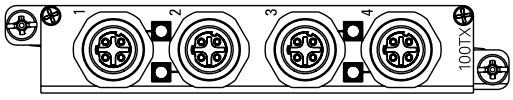
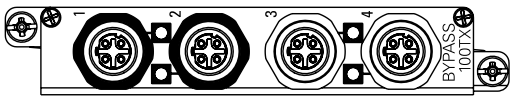
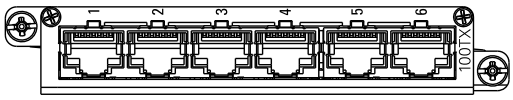
RUGGEDCOM RX1500PN LM CG01	Specifications	Article Numbers
	Ports: 2 Speed: 1000 Mbps Interface: TX Port Type: RJ45 Distance: 100 m (328 ft)	6GK6015-0AL20-0FC0 (Standard) 6GK6015-0AL20-0FC1 (Conformal Coated)

RUGGEDCOM RX1500PN LM CG03	Specifications	Article Numbers
	Ports: 2 Speed: 1000 Mbps Interface: TX Port Type: M12 (8-Pin, A-Coded) Distance: 100 m (328 ft)	6GK6015-0AL20-0PB0 (Standard) 6GK6015-0AL20-0PB1 (Conformal Coated)

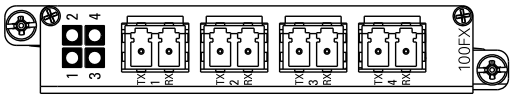
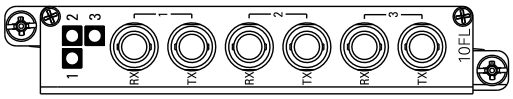
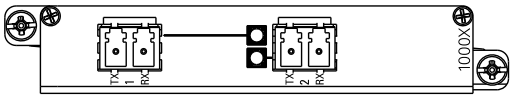
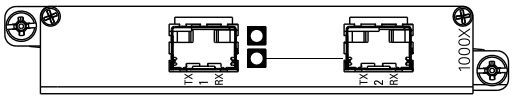
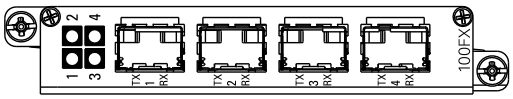
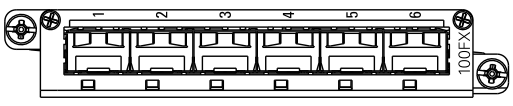
RUGGEDCOM RX1500PN LM CG03B	Specifications	Article Numbers
	Ports: 2 Speed: 1000 Mbps Interface: TX Port Type: M12 (8-Pin, A-Coded, Controlled Bypass) Distance: 100 m (328 ft)	6GK6015-0AL20-0PE0 (Standard) 6GK6015-0AL20-0PE1 (Conformal Coated)

RUGGEDCOM RX1500PN LM X CG04	Specifications	Article Numbers
	Ports: 2 Speed: 1000 Mbps Interface: TX Port Type: M12 (8-pin, X-Coded) Distance: 100 m (328 ft)	6GK6015-0AL20-0PH0 (Standard) 6GK6015-0AL20-0PH1 (Conformal Coated)

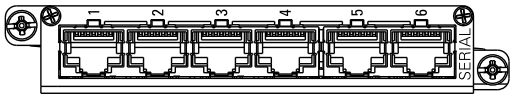
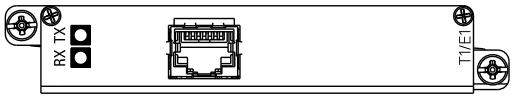
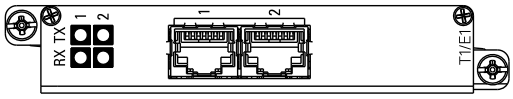
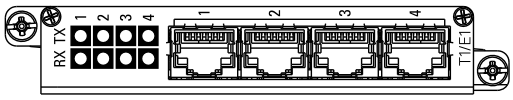
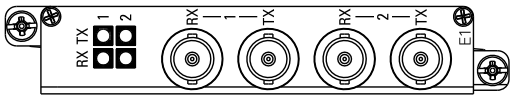
RUGGEDCOM RX1500PN LM X CG04B	Specifications	Article Numbers

	Ports: 2 Speed: 1000 Mbps Interface: TX Port Type: M12 (8-pin, X-Coded, Controlled By-pass) Distance: 100 m (328 ft)	6GK6015-0AL20-0PJ0 (Standard) 6GK6015-0AL20-0PJ1 (Conformal Coated)
RUGGEDCOM RX1500PN LM 4TX03	**Specifications**	**Article Numbers**
	Ports: 4 Speed: 100 Mbps Interface: TX Port Type: M12 (4-Pin, A-Coded) Distance: 100 m (328 ft)	6GK6015-0AL20-0PC0 (Standard) 6GK6015-0AL20-0PC1 (Conformal Coated)
RUGGEDCOM RX1500PN LM 4TX03B	**Specifications**	**Article Numbers**
	Ports: 4 Speed: 100 Mbps Interface: TX Port Type: M12 (8-Pin, A-Coded, Controlled By-pass) Distance: 100 m (328 ft)	6GK6015-0AL20-0PF0 (Standard) 6GK6015-0AL20-0PF1 (Conformal Coated)
RUGGEDCOM RX1500PN LM 4TX04	**Specifications**	**Article Numbers**
	Ports: 4 Speed: 100 Mbps Interface: TX Port Type: M12 (4-Pin, D-Coded) Distance: 100 m (328 ft)	6GK6015-0AL20-0PD0 (Standard) 6GK6015-0AL20-0PD1 (Conformal Coated)
RUGGEDCOM RX1500PN LM 4TX04B	**Specifications**	**Article Numbers**
	Ports: 4 Speed: 100 Mbps Interface: TX Port Type: M12 (4-Pin, A-Coded, Controlled By-pass) Distance: 100 m (328 ft)	6GK6015-0AL20-0PG0 (Standard) 6GK6015-0AL20-0PG1 (Conformal Coated)
RUGGEDCOM RX1500PN LM 6TX01	**Specifications**	**Article Numbers**
	Ports: 6 Speed: 100 Mbps Interface: TX Port Type: RJ45 Distance: 100 m (328 ft)	6GK6015-0AL20-0NB0 (Standard) 6GK6015-0AL20-0NB1 (Conformal Coated)

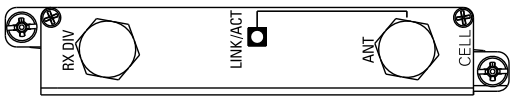
Fiber Optic Ethernet Modules

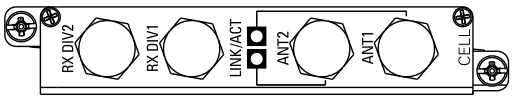
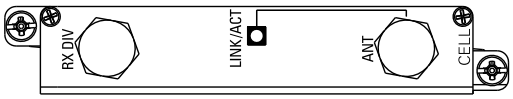
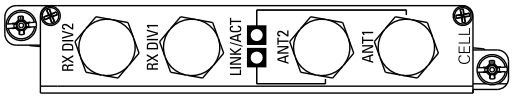
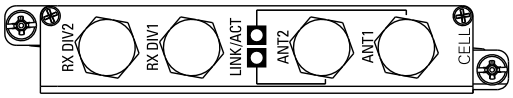
RUGGEDCOM RX1500PN LM 4FX11 	**Specifications** Mode: MM Speed: 100 Mbps Interface: FX Wavelength: 1300 nm Ports: 4 Port Type: LC Distance: 2 km (1.2 mi)	**Article Numbers** 6GK6015-0AL20-0BC0 (Standard) 6GK6015-0AL20-0BC1 (Conformal Coated)
RUGGEDCOM RX1500PN LM FL01 	**Specifications** Mode: MM Speed: 10/100 Mbps Interface: FL/SX Wavelength: 820 nm Ports: 3 Port Type: ST Distance: 2 km (1.2 mi)	**Article Numbers** 6GK6015-0AL20-0BD0 (Standard) 6GK6015-0AL20-0BD1 (Conformal Coated)
RUGGEDCOM RX1500PN LM FG03 	**Specifications** Mode: SM Speed: 1000 Mbps Interface: LX Wavelength: 820 nm Ports: 4 Port Type: LC Distance: 10 km (6.2 mi)	**Article Numbers** 6GK6015-0AL20-0EC0 (Standard) 6GK6015-0AL20-0EC1 (Conformal Coated)
RUGGEDCOM RX1500PN LM FG50 	**Specifications** SFP Sockets:s: 2 Speed: 1000 Mbps	**Article Numbers** 6GK6015-0AL20-0JB0 (Standard) 6GK6015-0AL20-0JB1 (Conformal Coated)
RUGGEDCOM RX1500PN LM FX50 	**Specifications** SFP Sockets:s: 4 Speed: 100 Mbps	**Article Numbers** 6GK6015-0AL20-0JC0 (Standard) 6GK6015-0AL20-0JC1 (Conformal Coated)
RUGGEDCOM RX1500PN LM 6FX50 	**Specifications** SFP Sockets:s: 6 Speed: 100 Mbps	**Article Numbers** 6GK6015-0AL20-0JD0 (Standard) 6GK6015-0AL20-0JD1 (Conformal Coated)

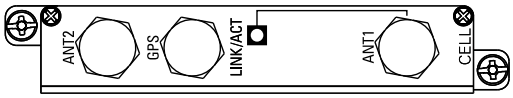
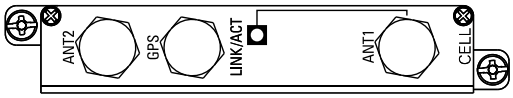
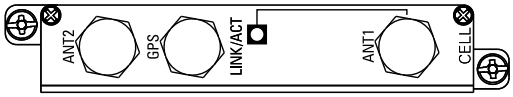
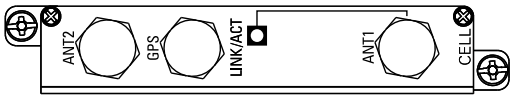
WAN Modules

RUGGEDCOM RX1500PN LM S01 	**Specifications** Standard: RS232/RS422/RS485 Ports: 6 Port Type: RJ45	**Article Numbers (Standard)** 6GK6015-0AL20-0KB0 (Standard) 6GK6015-0AL20-0KB1 (Conformal Coated)
RUGGEDCOM RX1500PN LM TC1 	**Specifications** Interface: T1/E1 Ports: 1 Port Type: RJ48C	**Article Numbers (Standard)** 6GK6015-0AL20-0MB0 (Standard) 6GK6015-0AL20-0MB1 (Conformal Coated)
RUGGEDCOM RX1500PN LM TC2 	**Specifications** Interface: T1/E1 Ports: 2 Port Type: RJ48C	**Article Numbers (Standard)** 6GK6015-0AL20-0MC0 (Standard) 6GK6015-0AL20-0MC1 (Conformal Coated)
RUGGEDCOM RX1500PN LM TC4 	**Specifications** Interface: T1/E1 Ports: 4 Port Type: RJ48C	**Article Numbers (Standard)** 6GK6015-0AL20-0MD0 (Standard) 6GK6015-0AL20-0MD1 (Conformal Coated)
RUGGEDCOM RX1500PN LM E02 	**Specifications** Interface: E1 Ports: 2 Port Type: BNC (75 Ω)	**Article Numbers (Standard)** 6GK6015-0AL20-0HC0 (Standard) 6GK6015-0AL20-0HC1 (Conformal Coated)
RUGGEDCOM RX1500PN LM D02 	**Specifications** Speed: 56 kbps (Master/Slave) or 64 kbps (Slave) Ports: 1 Port Type: RJ48S	**Article Numbers (Standard)** 6GK6015-0AL20-0LB0 (Standard) 6GK6015-0AL20-0LB1 (Conformal Coated)

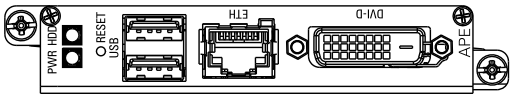
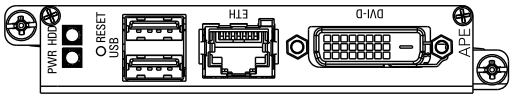
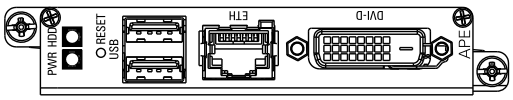
Cellular Modem Modules

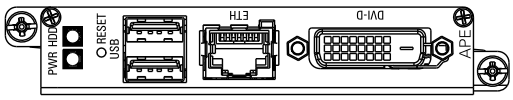
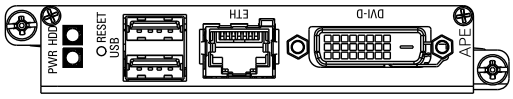
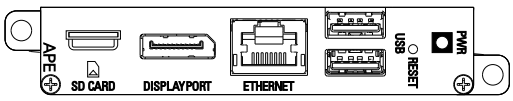
RUGGEDCOM RX1500PN LM W11 	**Specifications** Services: GSM/EDGE/HSPA+ Region: North America (AT&T) Port Type: 50 Ω SMA Antennas: 1 x GSM/EDGE/HSPA+, 1 x Re-	**Article Numbers (Standard)** 6GK6015-0AL20-0WB0 (Standard) 6GK6015-0AL20-0WB1 (Conformal Coated)

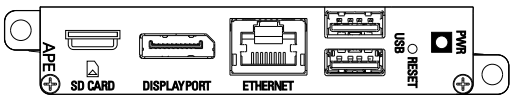
	ceive Diversity (Secondary) SIM: Dual Mini-SIM (2FF)	
RUGGEDCOM RX1500PN LM W12 	**Specifications** Services: GSM/EDGE/HSPA+ Region: North America (AT&T), European Union, Australia Port Type: 50 Ω SMA Antennas: 2 x GSM/EDGE/HSPA+, 2 x Receive Diversity (Secondary) SIM: Dual Mini-SIM (2FF)	**Article Numbers (Standard)** 6GK6015-0AL20-0WC0 (Standard) 6GK6015-0AL20-0WC1 (Conformal Coated)
RUGGEDCOM RX1500PN LM W21 	**Specifications** Services: EVDO Rev A Region: North America (Verizon) Port Type: 50 Ω SMA Antennas: 1 x EVDO Rev A, 1 x Receive Diversity (Secondary) SIM: Dual Mini-SIM (2FF)	**Article Numbers (Standard)** 6GK6015-0AL20-0WD0 (Standard) 6GK6015-0AL20-0WD1 (Conformal Coated)
RUGGEDCOM RX1500PN LM W22 	**Specifications** Services: EVDO Rev A Region: North America (Verizon) Port Type: 50 Ω SMA Antennas: 2 x EVDO Rev A, 2 x Receive Diversity (Secondary) SIM: Dual Mini-SIM (2FF)	**Article Numbers (Standard)** 6GK6015-0AL20-0WE0 (Standard) 6GK6015-0AL20-0WE1 (Conformal Coated)
RUGGEDCOM RX1500PN LM W32 	**Specifications** Services: EVDO Rev A Region: North America (Verizon) Port Type: 50 Ω SMA Antennas: 1 x GSM/EDGE/HSPA+, 1 x EVDO Rev A, 2 x Receive Diversity (Secondary) SIM: Dual Mini-SIM (2FF)	**Article Numbers (Standard)** 6GK6015-0AL20-0WF0 (Standard) 6GK6015-0AL20-0WF1 (Conformal Coated)

RUGGEDCOM RX1500PN LM W41 	**Specifications** Services: 4G LTE/HSPA+/HSDPA/HSUPA/DC-HSPA+/UMTS/WCDAM/EDGE/GPRS/GSM/GNSS Region: European Union Port Type: 50 Ω SMA Antennas: 1 x LTE Main, 1 x LTE MIMO, 1 x GPS SIM: Dual Mini-SIM (2FF)	**Article Numbers (Standard)** 6GK6015-0AL20-0WG0 (Standard) 6GK6015-0AL20-0WG1 (Conformal Coated)
RUGGEDCOM RX1500PN LM W51 	**Specifications** Services: 4G LTE/HSPA+/HSDPA/HSUPA/DC-HSAP+/UMTS/WDCAM/EDGE/GPRS/GSM/CDMA/EVDO/GNSS Region: North America (AT&T, Rogers, Bell, Telus) Port Type: 50 Ω SMA Antennas: 1 x LTE Main, 1 x LTE MIMO, 1 x GPS SIM: Dual Mini-SIM (2FF)	**Article Numbers (Standard)** 6GK6015-0AL20-0WH0 (Standard) 6GK6015-0AL20-0WH1 (Conformal Coated)
RUGGEDCOM RX1500PN LM W61 	**Specifications** Services: 4G LTE/HSPA+/CDMA/EVDO/GPS/GNSS Region: North America (Verizon, Sprint) Port Type: 50 Ω SMA Antennas: 1 x LTE Main, 1 x LTE MIMO, 1 x GPS SIM: Dual Mini-SIM (2FF)	**Article Numbers (Standard)** 6GK6015-0AL20-0WJ0 (Standard) 6GK6015-0AL20-0WJ1 (Conformal Coated)
RUGGEDCOM RX1500PN LM W81 	**Specifications** Services: 4G LTE/HSPA+/EDGE/GPRS/GSM/UMTS/GNSS Region: Asia-Pacific Port Type: 50 Ω SMA Antennas: 1 x LTE Main, 1 x LTE MIMO, 1 x GPS SIM: Dual Mini-SIM (2FF)	**Article Numbers (Standard)** 6GK60150AL200WK0 (Standard) 6GK60150AL200WK1 (Conformal Coated)

RUGGEDCOM APE Modules

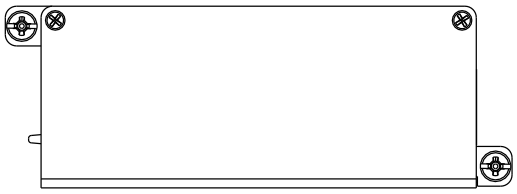
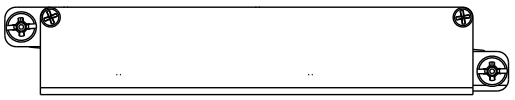
RUGGEDCOM RX1500PN LM APE1402 	**Specifications** Operating System: Debian Linux® Processor: Intel Atom E660 1.3 GHz, 512 KB L2 Cache RAM: 2 GB DDR2, 800 MHz, 32-bit Disk: 8 GB SATA, Solid State Networking: Realtek RTL8111, RJ45 Gigabit Ethernet Interface USB: 2 x USB 2.0[a] Video: Intel 4108 Graphics Processor, DVI-D	**Article Numbers** 6GK6015-0AL20-0GB0 (Standard) 6GK6015-0AL20-0GB1 (Conformal Coated)
RUGGEDCOM RX1500PN LM APE1402W7 	**Specifications** Operating System: Windows® Embedded Standard 7 Processor: Intel Atom E660 1.3 GHz, 512 KB L2 Cache RAM: 2 GB DDR2, 800 MHz, 32-bit Disk: 8 GB SATA, Solid State Networking: Realtek RTL8111, RJ45 Gigabit Ethernet Interface USB: 2 x USB 2.0[a] Video: Intel 4108 Graphics Processor, DVI-D	**Article Numbers** 6GK6015-0AL20-0GC0 (Standard) 6GK6015-0AL20-0GC1 (Conformal Coated)
RUGGEDCOM RX1500PN LM APE1404 	**Specifications** Operating System: Debian Linux® Processor: Intel Atom E660T 1.3 GHz, 512 KB L2 Cache RAM: 2 GB DDR2, 800 MHz, 32-bit Disk: 16 GB SATA, Solid State Networking: Realtek RTL8111, RJ45 Gigabit Ethernet Interface USB: 2 x USB 2.0[a]	**Article Numbers** 6GK6015-0AL20-0GD0 (Standard) 6GK6015-0AL20-0GD1 (Conformal Coated)

	Video: Intel 4108 Graphics Processor, DVI-D	
RUGGEDCOM RX1500PN LM APE1404W7 	**Specifications** Operating System: Windows® Embedded Standard 7 Processor: Intel Atom E660T 1.3 GHz, 512 KB L2 Cache RAM: 2 GB DDR2, 800 MHz, 32-bit Disk: 16 GB SATA, Solid State Networking: Realtek RTL8111, RJ45 Gigabit Ethernet Interface USB: 2 x USB 2.0[a] Video: Intel 4108 Graphics Processor, DVI-D	**Article Numbers** 6GK6015-0AL20-0GE0 (Standard) 6GK6015-0AL20-0GE1 (Conformal Coated)
RUGGEDCOM RX1500PN LM APE1404CKP 	**Specifications** Operating System: Check Point GAiA™ OS Processor: Intel Atom E660T 1.3 GHz, 512 KB L2 Cache RAM: 2 GB DDR2, 800 MHz, 32-bit Disk: 16 GB SATA, Solid State Networking: Realtek RTL8111, RJ45 Gigabit Ethernet Interface USB: 2 x USB 2.0[a] Video: Intel 4108 Graphics Processor, DVI-D	**Article Numbers (Standard)** 6GK6015-0AL20-0GF0 6GK6015-0AL20-0GF1
RUGGEDCOM RX1500PN LM APE1808 	**Specifications** Operating System: Debian Linux™ Processor: Intel x5-E3940 1.8 GHz, 2 MB L2 Cache RAM: 8 GB DDR3 ECC, 1600 MHz, 32-bit Disk: 64 GB, Solid State Networking: Intel I210, RJ45 Gigabit Ethernet Interface USB: 2 x USB 3.0	**Article Numbers** 6GK6015-0AL20-0GH0 (Standard) 6GK6015-0AL20-0GH1 (Conformal Coated)

	Video: Intel HD Graphics Processor, Display Port	
RUGGEDCOM RX1500PN LM APE1808W10 	**Specifications** Operating System: Windows® 10 Enterprise 2019 LTSC Processor: Intel x5-E3940 1.8 GHz, 2 MB L2 Cache RAM: 8 GB DDR3 ECC, 1600 MHz, 32-bit Disk: 64 GB, Solid State Networking: Intel I210, RJ45 Gigabit Ethernet Interface USB: 2 x USB 3.0 Video: Intel HD Graphics Processor, Display Port	**Article Numbers** 6GK6015-0AL20-0GJ0 (Standard) 6GK6015-0AL20-0GJ1 (Conformal Coated)

[a] Maximum combined USB device power consumption is 500 mA at 5 V.

Blank Modules

RUGGEDCOM RX1500PN PS XXP 	**Specifications** —	**Article Numbers** 6GK6015-0AL10-0AA0 (Standard) 6GK6015-0AL10-0AA1 (Conformal Coated)
RUGGEDCOM RX1500PN LM Blank 	**Specifications** —	**Article Numbers** 6GK6015-0AL20-0AA0 (Standard) 6GK6015-0AL20-0AA1 (Conformal Coated)

1.2 Installing/Removing Modules

Always refer to the *Installation Guide* for the host device RUGGEDCOM RX1500 for instructions on how to install or remove a power or line module. The *Installation Guide* cites important, chassis-specific safety warnings that should be followed to avoid damage to the module and/or device.

Additional installation/removal instructions may also be provided in this Catalog for select modules. Make sure to review all information provided for a module before installing or removing it.

1.3 Dimensions

Power and line modules conform to the following dimensions:

Note
All dimensions are in millimeters (mm).

Power Supply Module Dimensions

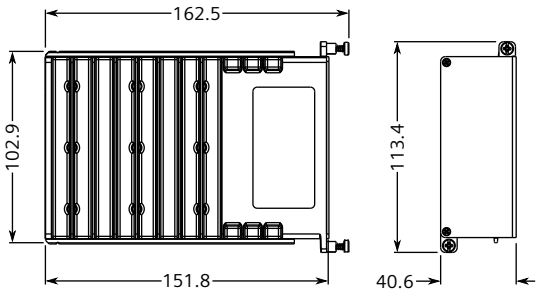


Figure 1.1 Power Supply Module Dimensions

Line Module Dimensions

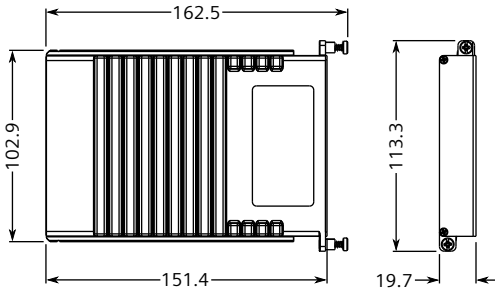


Figure 1.2 Line Module Dimensions

2 Power Supply Modules

The following power supply modules are available for the RUGGEDCOM RX1500 series devices, excluding the RUGGEDCOM RX1512.

Note
The RUGGEDCOM RX1512 features a built-in power supply.

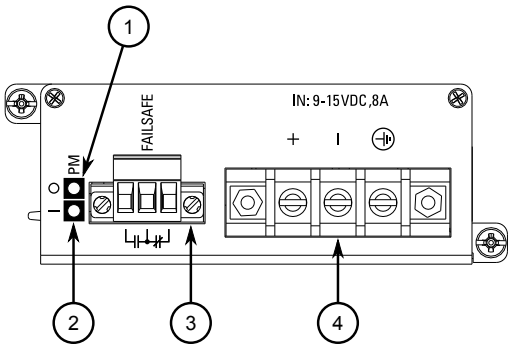
2.1 RUGGEDCOM RX1500PN PS 12

The RUGGEDCOM RX1500PN PS 12 power supply module provides 12 VDC power to the host device and features a failsafe relay to protect against critical error conditions. It is equipped with a removable screw terminal block and a failsafe relay terminal block. The module accepts DC power inputs from an external power supply.

NOTICE
The RUGGEDCOM RX1500PN PS 12 comes with a safety cover that must be removed to connect power to the module, and then reinstalled once the wiring is complete.

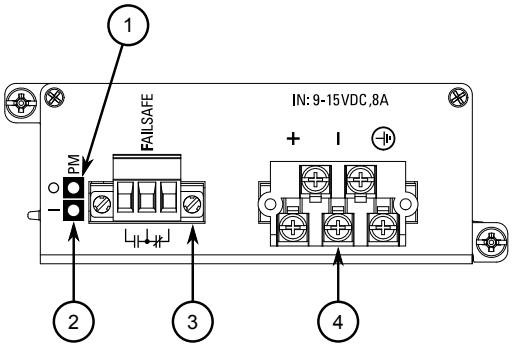
LEDs indicate when the module is receiving and supplying power.

LED	State	Description
O	Green	The module is supplying power
I	Green	The module is receiving power



① O LED
② I LED
③ Failsafe Alarm Relay
④ Non-removable Screw Terminal Block

Figure 2.1 RUGGEDCOM RX1500PN PS 12 (shipped until 2019)



① O LED
② I LED
③ Failsafe Alarm Relay
④ Removable Screw Terminal Block

Figure 2.2 RUGGEDCOM RX1500PN PS 12 (shipped from 2019 on)

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Technical Specifications

Input Range	9 to 15 VDC
Internal Fuse Rating	10 A(T)[a]
Maximum Power Consumption[b]	67 W
Maximum Cable Length[c]	5.5 m (18 ft)
Insulation	1500 VAC or 2121 VDC for 1 minute
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

[a] (T) denotes time-delay fuse.
[b] Power consumption varies based on the device configuration.
[c] Based on #16 AWG wiring.

Ordering Information

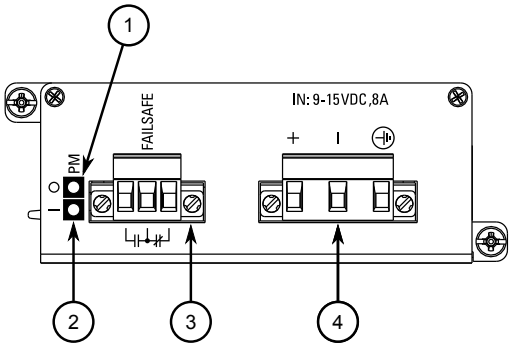
Description	12VDC (9-15VDC), screw terminal block
Article Numbers	6GK6015-0AL17-0AA0 (Standard) 6GK6015-0AL17-0AA1 (Conformal Coated)

2.2 RUGGEDCOM RX1500PN PS 12P

The RUGGEDCOM RX1500PN PS 12P power supply module provides 12 VDC power to the host device and features a failsafe relay to protect against critical error conditions. It is equipped with a 3-position European-style (Euroblock) terminal block and a failsafe relay terminal block. The module accepts DC power inputs from an external power supply.

LEDs indicate when the module is receiving and supplying power.

LED	State	Description
O	Green	The module is supplying power
I	Green	The module is receiving power



① O LED
② I LED
③ Failsafe Alarm Relay
④ European-style (Euroblock) Terminal Block

Figure 2.3 RUGGEDCOM RX1500PN PS 12P

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Technical Specifications

Input Range	9 to 15 VDC
Internal Fuse Rating	10 A(T)[a]
Maximum Power Consumption[b]	67 W
Maximum Cable Length[c]	5.5 m (18 ft)
Insulation	1500 VAC or 2121 VDC for 1 minute
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

[a] (T) denotes time-delay fuse.
[b] Power consumption varies based on the device configuration.
[c] Based on #16 AWG wiring.

Ordering Information

Description	12VDC (9-15VDC), European-style (Euroblock) terminal block
Article Numbers	6GK6015-0AL18-0AA0 (Standard) 6GK6015-0AL18-0AA1 (Conformal Coated)

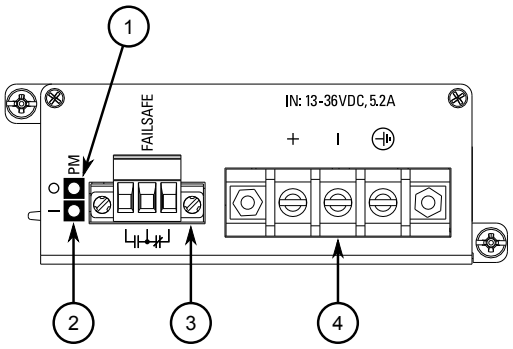
2.3 RUGGEDCOM RX1500PN PS 24

The RUGGEDCOM RX1500PN PS 24 power supply module provides 24 VDC power to the host device and features a failsafe relay to protect against critical error conditions. It is equipped with a removable screw terminal block and a failsafe relay terminal block. The module accepts DC power inputs from an external power supply.

NOTICE
The RUGGEDCOM RX1500PN PS 24 comes with a safety cover that must be removed to connect power to the module, and then reinstalled once the wiring is complete.

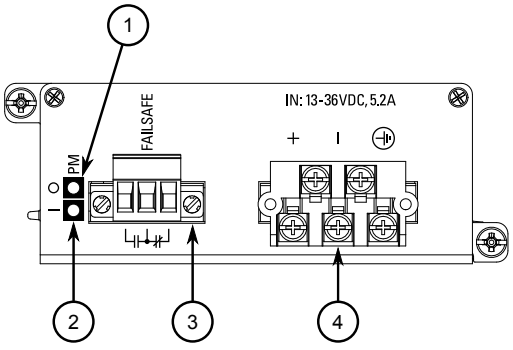
LEDs indicate when the module is receiving and supplying power.

LED	State	Description
O	Green	The module is supplying power
I	Green	The module is receiving power



① O LED
② I LED
③ Failsafe Alarm Relay
④ Non-removable Screw Terminal Block

Figure 2.4 RUGGEDCOM RX1500PN PS 24 with (shipped until 2019)



① O LED
② I LED
③ Failsafe Alarm Relay
④ Removable Screw Terminal Block

Figure 2.5 RUGGEDCOM RX1500PN PS 24 (shipped from 2019 on)

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Technical Specifications

Input Range	13 to 36 VDC
Internal Fuse Rating	10 A(T)[a]
Maximum Power Consumption[b]	63.5 W
Maximum Cable Length[c]	9.4 m (30.8 ft)
Insulation	1500 VDC for 1 minute
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

[a] (T) denotes time-delay fuse.
[b] Power consumption varies based on the device configuration.
[c] Based on #16 AWG wiring.

Ordering Information

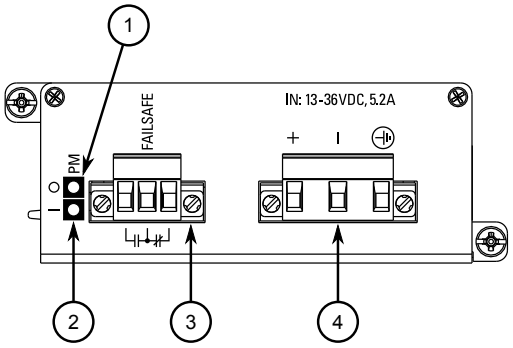
Description	24VDC (15-36VDC), screw terminal block
Article Numbers	6GK6015-0AL11-0AA0 (Standard) 6GK6015-0AL11-0AA1 (Conformal Coated)

2.4 RUGGEDCOM RX1500PN PS 24P

The RUGGEDCOM RX1500PN PS 24P power supply module provides 24 VDC power to the host device and features a failsafe relay to protect against critical error conditions. It is equipped with a 3-position European-style (Euroblock) terminal block and a failsafe relay terminal block. The module accepts DC power inputs from an external power supply.

LEDs indicate when the module is receiving and supplying power.

LED	State	Description
O	Green	The module is supplying power
I	Green	The module is receiving power



① O LED
② I LED
③ Failsafe Alarm Relay
④ European-style (Euroblock) Terminal Block

Figure 2.6 RUGGEDCOM RX1500PN PS 24P

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Technical Specifications

Input Range	13 to 36 VDC
Internal Fuse Rating	10 A(T)[a]
Maximum Power Consumption[b]	63.5 W
Maximum Cable Length[c]	9.4 m (30.8 ft)
Insulation	1500 VDC for 1 minute
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

[a] (T) denotes time-delay fuse.
[b] Power consumption varies based on the device configuration.
[c] Based on #16 AWG wiring.

Ordering Information

Description	24VDC (15-36VDC), European-style (Euroblock) terminal block
Article Numbers	6GK6015-0AL14-0AA0 (Standard) 6GK6015-0AL14-0AA1 (Conformal Coated)

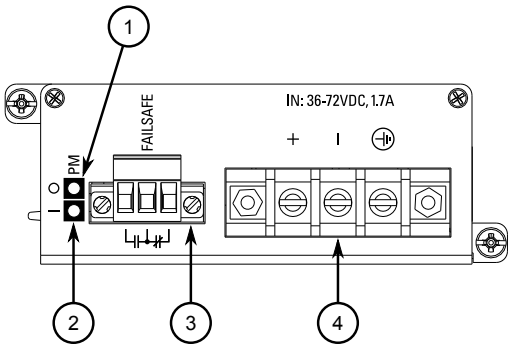
2.5 RUGGEDCOM RX1500PN PS 48

The RUGGEDCOM RX1500PN PS 48 power supply module provides 48 VDC power to the host device and features a failsafe relay to protect against critical error conditions. It is equipped with a removable screw terminal block and a failsafe relay terminal block. The module accepts DC power inputs from an external power supply.

NOTICE
The RUGGEDCOM RX1500PN PS 48 comes with a safety cover that must be removed to connect power to the module, and then reinstalled once the wiring is complete.

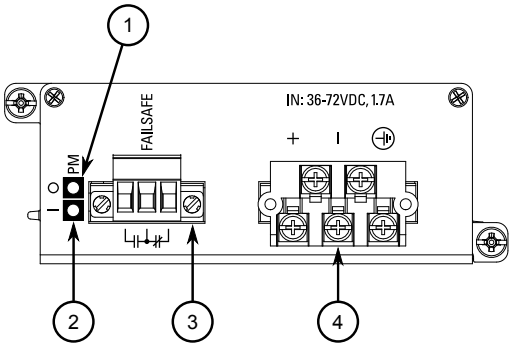
LEDs indicate when the module is receiving and supplying power.

LED	State	Description
O	Green	The module is supplying power
I	Green	The module is receiving power



① O LED
② I LED
③ Failsafe Alarm Relay
④ Non-removable Screw Terminal Block

Figure 2.7 RUGGEDCOM RX1500PN PS 48 (shipped until 2019)



① O LED
② I LED
③ Failsafe Alarm Relay
④ Removable Screw Terminal Block

Figure 2.8 RUGGEDCOM RX1500PN PS 48 (shipped from 2019 on)

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Technical Specifications

Input Range	36 to 72 VDC
Internal Fuse Rating	3.15 A(T)[a]
Maximum Power Consumption[b]	60 W
Maximum Cable Length[c]	45.5 m (149 ft)
Insulation	1500 VDC for 1 minute
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

[a] (T) denotes time-delay fuse.
[b] Power consumption varies based on the device configuration.
[c] Based on #16 AWG wiring.

Ordering Information

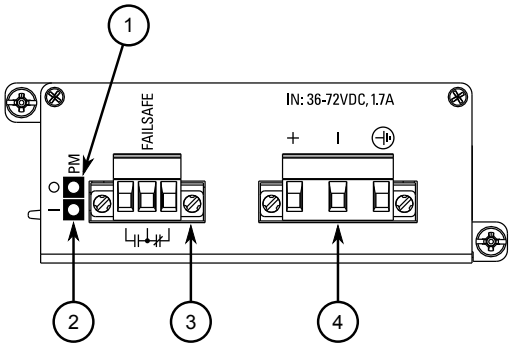
Description	48VDC (36-72VDC), screw terminal block
Article Numbers	6GK6015-0AL12-0AA0 (Standard) 6GK6015-0AL12-0AA1 (Conformal Coated)

2.6 RUGGEDCOM RX1500PN PS 48P

The RUGGEDCOM RX1500PN PS 48P power supply module provides 48 VDC power to the host device and features a failsafe relay to protect against critical error conditions. It is equipped with a 3-position European-style (Euroblock) terminal block and a failsafe relay terminal block. The module accepts DC power inputs from an external power supply.

LEDs indicate when the module is receiving and supplying power.

LED	State	Description
O	Green	The module is supplying power
I	Green	The module is receiving power



① O LED
② I LED
③ Failsafe Alarm Relay
④ European-style (Euroblock) Terminal Block

Figure 2.9 RUGGEDCOM RX1500PN PS 48P

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Technical Specifications

Input Range	36 to 72 VDC
Internal Fuse Rating	3.15 A(T)[a]
Maximum Power Consumption[b]	60 W
Maximum Cable Length[c]	45.5 m (149 ft)
Insulation	1500 VDC for 1 minute
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

[a] (T) denotes time-delay fuse.
[b] Power consumption varies based on the device configuration.
[c] Based on #16 AWG wiring.

Ordering Information

Description	48VDC (36-72VDC), European-style (Euroblock) terminal block
Article Numbers	6GK6015-0AL15-0AA0 (Standard) 6GK6015-0AL15-0AA1 (Conformal Coated)

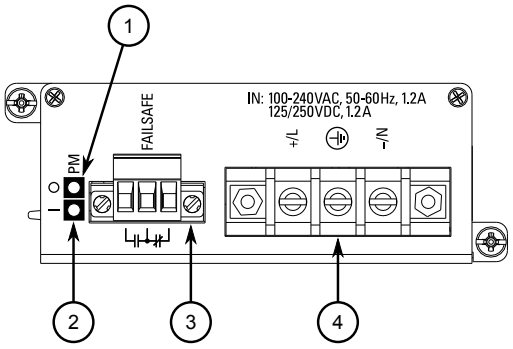
2.7 RUGGEDCOM RX1500PN PS HI

The RUGGEDCOM RX1500PN PS HI power supply module provides high VDC or VAC power to the host device and features a failsafe relay to protect against critical error conditions. It is equipped with a removable screw terminal block and a failsafe relay terminal block. The module accepts either AC or DC power inputs from an external power supply.

NOTICE
The RUGGEDCOM RX1500PN PS HI comes with a safety cover that must be removed to connect power to the module, and then reinstalled once the wiring is complete.

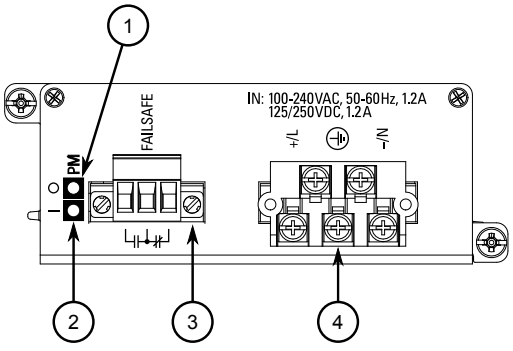
LEDs indicate when the module is receiving and supplying power.

LED	State	Description
O	Green	The module is supplying power
I	Green	The module is receiving power



① O LED
② I LED
③ Failsafe Alarm Relay
④ Non-removable Screw Terminal Block

Figure 2.10 RUGGEDCOM RX1500PN PS HI (shipped until 2019)



① O LED
② I LED
③ Failsafe Alarm Relay
④ Removable Screw Terminal Block

Figure 2.11 RUGGEDCOM RX1500PN PS HI (shipped from 2019 on)

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Technical Specifications

Input Range	88 to 300 VDC or 85 to 264 VAC
Internal Fuse Rating	3.15 A(T)[a]
Maximum Power Consumption[b]	65 W
Insulation	2800 VDC for 1 minute
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

[a] (T) denotes time-delay fuse.
[b] Power consumption varies based on the device configuration.

Ordering Information

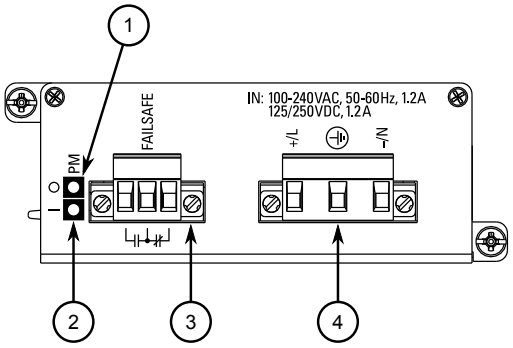
Description	88-300VDC or 85-264VAC, screw terminal block
Article Numbers	6GK6015-0AL13-0AA0 (Standard) 6GK6015-0AL13-0AA1 (Conformal Coated)

2.8 RUGGEDCOM RX1500PN PS HIP

The RUGGEDCOM RX1500PN PS HIP power supply module provides high VDC or VAC power to the host device and features a failsafe relay to protect against critical error conditions. It is equipped with a 3-position European-style (Euroblock) terminal block and a failsafe relay terminal block. The module accepts either AC or DC power inputs from an external power supply.

LEDs indicate when the module is receiving and supplying power.

LED	State	Description
O	Green	The module is supplying power
I	Green	The module is receiving power



① O LED
② I LED
③ Failsafe Alarm Relay
④ "European-style (Euroblock) Terminal Block

Figure 2.12 RUGGEDCOM RX1500PN PS HIP

Technical Specifications

Input Range	88 to 300 VDC or 85 to 264 VAC
Internal Fuse Rating	3.15 A(T)[a]
Maximum Power Consumption[b]	65 W
Insulation	2800 VDC for 1 minute
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

[a] (T) denotes time-delay fuse.
[b] Power consumption varies based on the device configuration.

Ordering Information

Description	88-300VDC or 85-264VAC, European-style (Euroblock) terminal block
Article Numbers	6GK6015-0AL16-0AA0 (Standard) 6GK6015-0AL16-0AA1 (Conformal Coated)

3

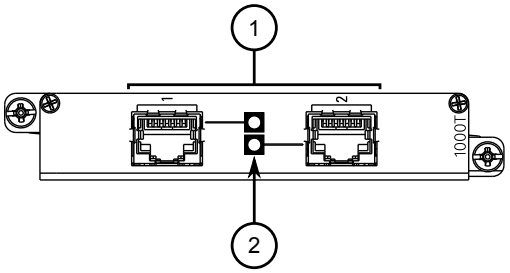
Copper Ethernet Modules

The following copper Ethernet modules are available for the RUGGEDCOM RX1500 series devices.

3.1 RUGGEDCOM RX1500PN LM CG01

The RUGGEDCOM RX1500PN LM CG01 module features two 10/100/1000Base-TX copper RJ45 Ethernet ports.

Each port features a dedicated LED that indicates its link/activity state.



① Ethernet Ports
② Port LEDs

Figure 3.1 RUGGEDCOM RX1500PN LM CG01

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

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

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

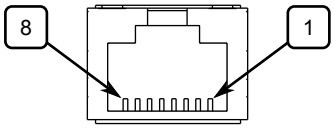


Figure 3.2 RJ45 Ethernet Port Pin Configuration

Pin	Name		Description
	10/100Base-TX	1000Base-TX	
1	RX+	BI_DA+	Receive Data+ or Bi-Directional Pair A+
2	RX-	BI_DA-	Receive Data- or Bi-Directional Pair A-
3	TX+	BI_DB+	Transmit Data+ or Bi-Directional Pair B+
4	Reserved (Do Not Connect)	BI_DC+	Transmit Data+ or Bi-Directional Pair C+

Pin	Name		Description
	10/100Base-TX	1000Base-TX	
5	Reserved (Do Not Connect)	BI_DC-	Receive Data- or Bi-Directional Pair C-
6	TX-	BI_DB-	Transmit Data- or Bi-Directional Pair B-
7	Reserved (Do Not Connect)	BI_DD+	Receive Data- or Bi-Directional Pair D+
8	Reserved (Do Not Connect)	BI_DD-	Receive Data- or Bi-Directional Pair D-

Technical Specifications

Connector	RJ45
Speed	1000 Mbps
Interface	TX
Duplex	FDX/HDX
Cable Type	> CAT-5
Wiring Standard	TIA/EIA T568A/B
Maximum Distance	100 m (328 ft)
Isolation	1.5 kV
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Ordering Information

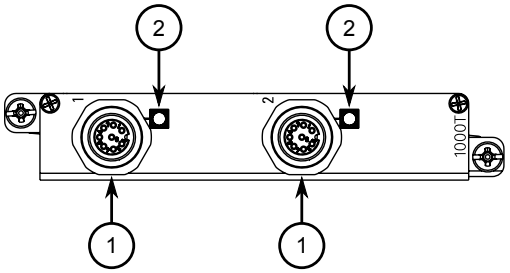
Description	2 x 10/100/1000TX RJ45
Article Numbers	6GK6015-0AL20-0FC0 (Standard) 6GK6015-0AL20-0FC1 (Conformal Coated)

3.2 RUGGEDCOM RX1500PN M12 CG03

The RUGGEDCOM RX1500PN M12 CG03 module features two 10/100/1000Base-TX copper M12 (8-pin, A-coded) Ethernet ports.

Each port features a dedicated LED that indicates its link/activity state.

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



① M12 Port
② Port LED

Figure 3.3 RUGGEDCOM RX1500PN M12 CG03

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

The following are the pin-out descriptions for the M12 ports:

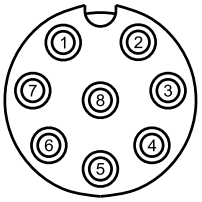


Figure 3.4 8-Pin M12 A-Coded Ethernet Port Pin Configuration

Pin	10/100Base-Tx Signal	10/100/1000Base-Tx Signal
1	Reserved (Do Not Connect)[a]	C+
2	Reserved (Do Not Connect)[a]	D+
3	Reserved (Do Not Connect)[a]	D-
4	TX-	A-
5	RX+	B+
6	TX+	A+
7	Reserved (Do Not Connect)[a]	C-
8	RX-	B-

[a] Terminated at GND (Ground)

Technical Specifications

Connector	M12 (8-Pin, A-Coded)
Speed	1000 Mbps
Interface	TX
Duplex	FDX/HDX
Cable Type	> CAT-5
Wiring Standard	TIA/EIA T568A/B
Maximum Distance	100 m (328 ft)
Isolation	1.5 kV
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Ordering Information

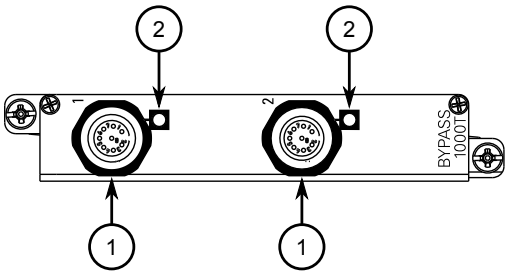
Description	2 x 10/100/1000TX 8-pin M12
Article Numbers	6GK6015-0AL20-0PB0 (Standard) 6GK6015-0AL20-0PB1 (Conformal Coated)

3.3 RUGGEDCOM RX1500PN M12 CG03B

The RUGGEDCOM RX1500PN M12 CG03B module features two 10/100/1000Base-TX copper M12 (8-pin, A-coded) Ethernet ports. Both ports can be utilized as bypass ports to protect the network from power disruptions.

Each port features a dedicated LED that indicates its link/activity state.

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



① M12 Port
② Port LED

Figure 3.5 RUGGEDCOM RX1500PN M12 CG03B

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

The following are the pin-out descriptions for the M12 ports:

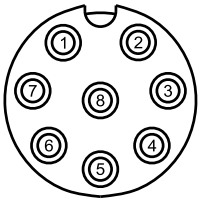


Figure 3.6 8-Pin M12 A-Coded Ethernet Port Pin Configuration

Pin	10/100Base-Tx Signal	10/100/1000Base-Tx Signal
1	Reserved (Do Not Connect)[a]	C+
2	Reserved (Do Not Connect)[a]	D+
3	Reserved (Do Not Connect)[a]	D-
4	TX-	A-
5	RX+	B+
6	TX+	A+
7	Reserved (Do Not Connect)[a]	C-
8	RX-	B-

[a] Terminated at GND (Ground)

Technical Specifications

Connector	M12 (8-Pin, A-Coded, Controlled Bypass)
Speed	1000 Mbps
Interface	TX
Duplex	FDX/HDX
Cable Type	> CAT-5
Wiring Standard	TIA/EIA T568A/B
Maximum Distance	100 m (328 ft)
Isolation	1.5 kV
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Ordering Information

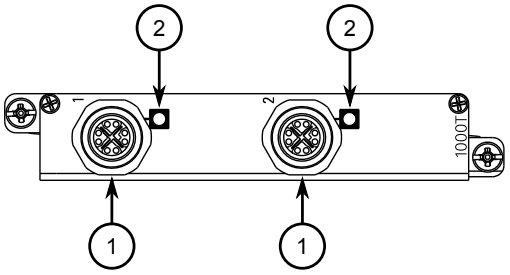
Description	2 x 10/100/1000TX 8-pin M12 with Controlled Bypass
Article Numbers	6GK6015-0AL20-0PE0 (Standard) 6GK6015-0AL20-0PE1 (Conformal Coated)

3.4 RUGGEDCOM RX1500PN M12 X CG04

The RUGGEDCOM RX1500PN M12 X CG04 module features two 10/100/1000Base-TX copper M12 (8-pin, X-coded) Ethernet ports.

Each port features a dedicated LED that indicates its link/activity state.

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



① M12 Port
② Port LED

Figure 3.7 RUGGEDCOM RX1500PN M12 X CG04

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

The following are the pin-out descriptions for the M12 ports:

Figure 3.8 8-Pin M12 X-Coded Ethernet Port Pin Configuration

Pin	10/100/1000Base-Tx Signal
1	A+
2	A-
3	B+
4	B-
5	D+
6	D-
7	C+
8	C-

Technical Specifications

Connector	M12 (8-Pin, X-Coded)
Speed	1000 Mbps
Interface	TX
Duplex	FDX/HDX

Cable Type	> CAT-5
Wiring Standard	TIA/EIA T568A/B
Maximum Distance	100 m (328 ft)
Isolation	1.5 kV
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Ordering Information

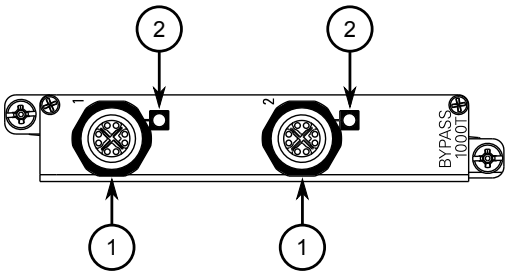
Description	2 x 10/100/1000TX 8-pin M12 X-Coded
Article Numbers	6GK6015-0AL20-0PH0 (Standard) 6GK6015-0AL20-0PH1 (Conformal Coated)

3.5 RUGGEDCOM RX1500PN M12 X CG04B

The RUGGEDCOM RX1500PN M12 X CG04B module features two 10/100/1000Base-TX copper M12 (8-pin, X-coded) Ethernet ports. Both ports can be utilized as bypass ports to protect the network from power disruptions.

Each port features a dedicated LED that indicates its link/activity state.

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



① M12 Port
② Port LED

Figure 3.9 RUGGEDCOM RX1500PN M12 X CG04B

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

The following are the pin-out descriptions for the M12 ports:

Figure 3.10 8-Pin M12 X-Coded Ethernet Port Pin Configuration

Pin	10/100/1000Base-Tx Signal
1	A+
2	A-
3	B+
4	B-
5	D+
6	D-
7	C+
8	C-

Technical Specifications

Connector	M12 (8-Pin, X-Coded, Controlled Bypass)
Speed	1000 Mbps
Interface	TX

Duplex	FDX/HDX
Cable Type	> CAT-5
Wiring Standard	TIA/EIA T568A/B
Maximum Distance	100 m (328 ft)
Isolation	1.5 kV
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Ordering Information

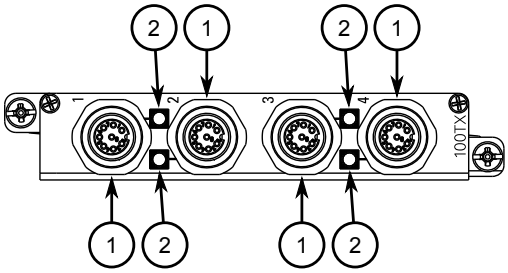
Description	2 x 10/100/1000TX 8-pin M12 X-Coded with Controlled Bypass
Article Numbers	6GK6015-0AL20-0PJ0 (Standard) 6GK6015-0AL20-0PJ1 (Conformal Coated)

3.6 RUGGEDCOM RX1500PN M12 4TX03

The RUGGEDCOM RX1500PN M12 4TX03 module features four 10/100Base-TX copper M12 (8-pin, A-Coded) Ethernet ports.

Each port features a dedicated LED that indicates its link/activity state.

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



① M12 Port
② Port LED

Figure 3.11 RUGGEDCOM RX1500PN M12 4TX03

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

The following are the pin-out descriptions for the M12 ports:

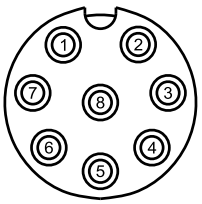


Figure 3.12 8-Pin M12 A-Coded Ethernet Port Pin Configuration

Pin	Signal
1	Reserved (Do Not Connect)[a]
2	Reserved (Do Not Connect)[a]
3	Reserved (Do Not Connect)[a]
4	TX-
5	RX+
6	TX+
7	Reserved (Do Not Connect)[a]
8	RX-

[a] Terminated at GND (Ground)

Technical Specifications

Speed	100 Mbps
Interface	TX
Connector	M12 (8-Pin, A-Coded)

Duplex	FDX/HDX
Cable Type	> CAT-5
Wiring Standard	TIA/EIA T568A/B
Maximum Distance	100 m (328 ft)
Isolation	1.5 kV
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Ordering Information

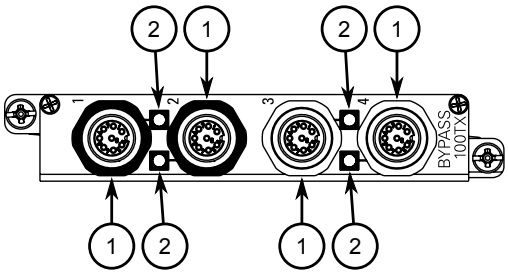
Description	4 x 10/100TX 8-pin M12
Article Numbers	6GK6015-0AL20-0PC0 (Standard) 6GK6015-0AL20-0PC1 (Conformal Coated)

3.7 RUGGEDCOM RX1500PN M12 4TX03B

The RUGGEDCOM RX1500PN M12 4TX03B module features four 10/100Base-TX copper M12 (8-pin, A-coded) Ethernet ports. Two of the available ports can be utilized as bypass ports to protect the network from power disruptions.

Each port features a dedicated LED that indicates its link/activity state.

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



① M12 Port
② M12 Port with Controlled Bypass
③ Port LED

Figure 3.13 RUGGEDCOM RX1500PN M12 4TX03B

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

The following are the pin-out descriptions for the M12 ports:

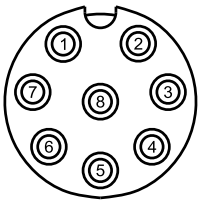


Figure 3.14 8-Pin M12 A-Coded Ethernet Port Pin Configuration

Pin	Signal
1	Reserved (Do Not Connect)[a]
2	Reserved (Do Not Connect)[a]
3	Reserved (Do Not Connect)[a]
4	TX-
5	RX+
6	TX+
7	Reserved (Do Not Connect)[a]
8	RX-

[a] Terminated at GND (Ground)

Technical Specifications

Speed	100 Mbps

Interface	TX
Connector	M12 (8-Pin, A-Coded, Controlled Bypass)
Duplex	FDX/HDX
Cable Type	> CAT-5
Wiring Standard	TIA/EIA T568A/B
Maximum Distance	100 m (328 ft)
Isolation	1.5 kV
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Ordering Information

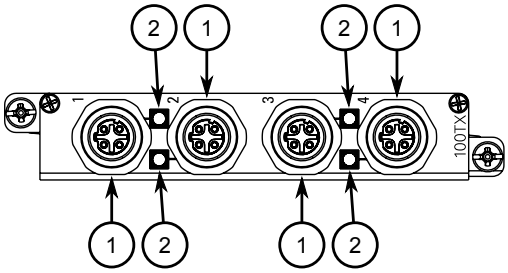
Description	4 x 10/100TX 8-pin M12 with Controlled Bypass
Article Numbers	6GK6015-0AL20-0PF0 (Standard) 6GK6015-0AL20-0PF1 (Conformal Coated)

3.8 RUGGEDCOM RX1500PN M12 4TX04

The RUGGEDCOM RX1500PN M12 4TX04 module features four 10/100Base-TX copper M12 (4-pin, D-coded) Ethernet ports.

Each port features a dedicated LED that indicates its link/activity state.

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



① M12 Port
② Port LED

Figure 3.15 RUGGEDCOM RX1500PN M12 4TX04

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

The following are the pin-out descriptions for the M12 ports:

Pin	Signal
1	TX+
2	RX+
3	TX-
4	RX-

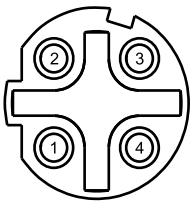


Figure 3.16 4-Pin M12 D-Coded Ethernet Port Pin Configuration

Technical Specifications

Speed	100 Mbps
Interface	TX
Connector	M12 (4-Pin, D-Coded)
Duplex	FDX/HDX
Cable Type	> CAT-5

Wiring Standard	TIA/EIA T568A/B
Maximum Distance	100 m (328 ft)
Isolation	1.5 kV
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Ordering Information

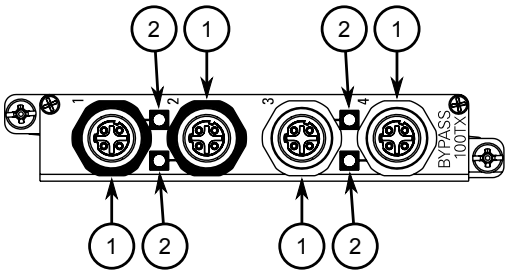
Description	4 x 10/100TX 4-pin M12
Article Numbers	6GK6015-0AL20-0PD0 (Standard) 6GK6015-0AL20-0PD1 (Conformal Coated)

3.9 RUGGEDCOM RX1500PN M12 4TX04B

The RUGGEDCOM RX1500PN M12 4TX04B module features four 10/100Base-TX copper M12 (4-pin, D-coded) Ethernet ports. Two of the available ports can be utilized as bypass ports to protect the network from power disruptions.

Each port features a dedicated LED that indicates its link/activity state.

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



① M12 Port
② M12 Port with Controlled Bypass
③ Port LED

Figure 3.17 RUGGEDCOM RX1500PN M12 4TX04B

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

The following are the pin-out descriptions for the M12 ports:

Pin	Signal
1	TX+
2	RX+
3	TX-
4	RX-

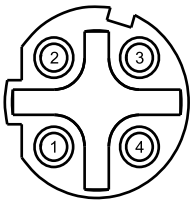


Figure 3.18 4-Pin M12 D-Coded Ethernet Port Pin Configuration

Technical Specifications

Speed	100 Mbps
Interface	TX
Connector	M12 (4-Pin, D-Coded, Conrolled Bypass)

Duplex	FDX/HDX
Cable Type	> CAT-5
Wiring Standard	TIA/EIA T568A/B
Maximum Distance	100 m (328 ft)
Isolation	1.5 kV
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Ordering Information

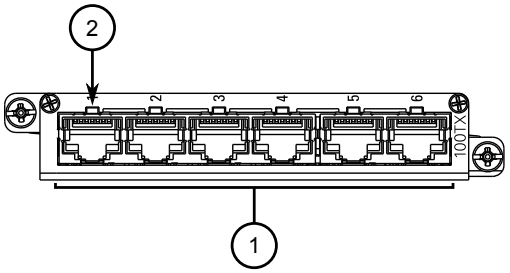
Description	4 x 10/100TX 4-pin M12 with Controlled Bypass
Article Numbers	6GK6015-0AL20-0PG0 (Standard) 6GK6015-0AL20-0PG1 (Conformal Coated)

3.10 RUGGEDCOM RX1500PN LM 6TX01

The RUGGEDCOM RX1500PN LM 6TX01 module features six 10/100Base-TX copper RJ45 Ethernet ports.

Each port features a dedicated LED that indicates its link/activity state.

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



① Ethernet Ports
② Port LEDs

Figure 3.19 RUGGEDCOM RX1500PN LM 6TX01

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

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

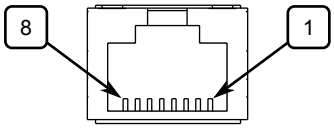


Figure 3.20 RJ45 Ethernet Port Pin Configuration

Pin	Name		Description
	10/100Base-TX	1000Base-TX	
1	RX+	BI_DA+	Receive Data+ or Bi-Directional Pair A+
2	RX-	BI_DA-	Receive Data- or Bi-Directional Pair A-
3	TX+	BI_DB+	Transmit Data+ or Bi-Directional Pair B+
4	Reserved (Do Not Connect)	BI_DC+	Transmit Data+ or Bi-Directional Pair C+

Pin	Name		Description
	10/100Base-TX	1000Base-TX	
5	Reserved (Do Not Connect)	BI_DC-	Receive Data- or Bi-Directional Pair C-
6	TX-	BI_DB-	Transmit Data- or Bi-Directional Pair B-
7	Reserved (Do Not Connect)	BI_DD+	Receive Data- or Bi-Directional Pair D+
8	Reserved (Do Not Connect)	BI_DD-	Receive Data- or Bi-Directional Pair D-

Technical Specifications

Speed	100 Mbps
Interface	TX
Connector	RJ45
Duplex	FDX/HDX
Cable Type	> CAT-5
Wiring Standard	TIA/EIA T568A/B
Maximum Distance	100 m (328 ft)
Isolation	1.5 kV
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Ordering Information

Description	6 x 10/100TX RJ45
Article Numbers	6GK6015-0AL20-0NB0 (Standard) 6GK6015-0AL20-0NB1 (Conformal Coated)

4

Fiber Optic Ethernet Modules

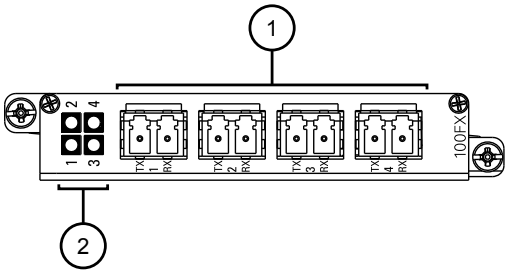
The following fiber optic Ethernet modules are available for the RUGGEDCOM RX1500 series devices.

4.1 RUGGEDCOM RX1500PN LM 4FX11

The RUGGEDCOM RX1500PN LM 4FX11 module features four 10/100Base-FX fiber optic Ethernet ports.

Note
When connecting cables, make sure the Transmit (Tx) and Receive (Rx) connections of each port are properly connected and matched to establish a proper link.

Each port set (transmit/receive) features a dedicated LED that indicates its link/activity state.



① Ethernet Ports
② Port LEDs

Figure 4.1 RUGGEDCOM RX1500PN LM 4FX11

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

Technical Specifications

Optical Characteristics

Transmit Power	-22.5 to -14 dBm
Receiver Sensitivity	-31 dBm
Receiver Saturation	-14 dBm
Power Budget	8.5 dB

Environment

Operating Temperature	-40 to 85 °C (-40 to 185 °F)
Operating Relative Humidity	5 to 95% (non-condensing)
Storage Temperature	-40 to 85 °C (-40 to 185 °F)

Cabling

Speed	100 Mbps
Interface	FX
Mode	MM (Multi-Mode)
Connector	LC
Cable Type	50/125 µm
Wavelength[a]	1300 nm
Nominal Distance[a]	2 km (1.2 mi)

[a] Typical.

Ordering Information

Description	4 x 100FX - Multimode 1300nm LC connectors 2km
Article Numbers	6GK6015-0AL20-0BC0 (Standard)

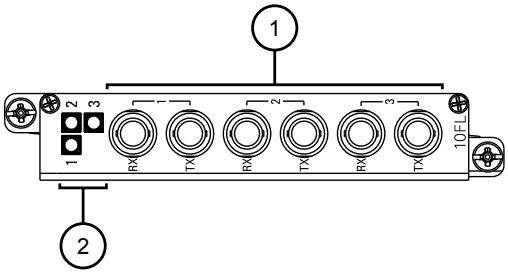
	6GK6015-0AL20-0BC1 (Conformal Coated)

4.2 RUGGEDCOM RX1500PN LM FL01

The RUGGEDCOM RX1500PN LM FL01 module features three 10Base-FL/100Base-SX fiber optic Ethernet ports.

Note
When connecting cables, make sure the Transmit (Tx) and Receive (Rx) connections of each port are properly connected and matched to establish a proper link.

Each port set (transmit/receive) features a dedicated LED that indicates its link/activity state.



① Ethernet Ports
② Port LEDs

Figure 4.2 RUGGEDCOM RX1500PN LM FL01

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

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Technical Specifications

Optical Characteristics (62.5/125 µm)

Transmit Power	-16 to -9 dBm
Receiver Sensitivity	-34 dBm
Receiver Saturation	-11.2 dBm
Power Budget	18 dB

Cabling (62.5/125 µm)

Speed	10 Mbps (FL) 100 Mbps (SX)
Interface	FL/SX
Mode	MM (Multi-Mode)
Connector	ST
Cable Type	62.5/125 µm

Optical Characteristics (50/125 µm)

Transmit Power	-19.8 to -12.8 dBm
Receiver Sensitivity	-34 dBm
Receiver Saturation	-11.2 dBm
Power Budget	14.2 dB

Cabling (50/125 µm)

Speed	10 Mbps (FL) 100 Mbps (SX)
Mode	MM (Multi-Mode)
Interface	FL/SX
Cable Type	50/125 µm
Wavelength[a]	820

Wavelength[a]	820
Nominal Distance[a]	2 km (1.2 mi)

Nominal Distance[a]	2 km (1.2 mi)

Environment

Operating Temperature	-40 to 85 °C (-40 to 185 °F)
Operating Relative Humidity	5 to 95% (non-condensing)
Storage Temperature	-40 to 85 °C (-40 to 185 °F)

[a] Typical.

Ordering Information

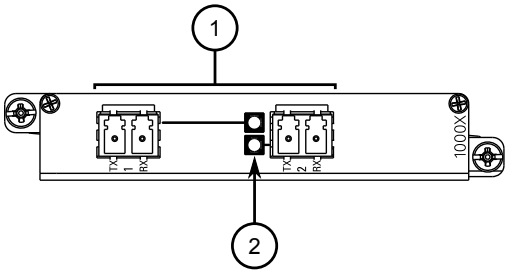
Description	3 x 10FL/100SX, Multimode, 850nm, ST, 2km
Article Numbers	6GK6015-0AL20-0BD0 (Standard) 6GK6015-0AL20-0BD1 (Conformal Coated)

4.3 RUGGEDCOM RX1500PN LM FG03

The RUGGEDCOM RX1500PN LM FG03 module features two 1000Base-LX fiber optic Ethernet ports.

Note
When connecting cables, make sure the Transmit (Tx) and Receive (Rx) connections of each port are properly connected and matched to establish a proper link.

Each port set (transmit/receive) features a dedicated LED that indicates its link/activity state.



① Ethernet Ports
② Port LEDs

Figure 4.3 RUGGEDCOM RX1500PN LM FG03

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

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Technical Specifications

Optical Characteristics

Transmit Power	-9.5 to -3.0 dBm
Receiver Sensitivity	-21 dBm
Receiver Saturation	-3 dBm
Power Budget	11.5 dB

Environment

Operating Temperature	-40 to 85 °C (-40 to 185 °F)
Operating Relative Humidity	5 to 95% (non-condensing)
Storage Temperature	-40 to 85 °C (-40 to 185 °F)

Cabling

Speed	1000 Mbps
Interface	LX
Mode	SM (Single-Mode)
Connector	LC
Cable Type	9/125 µm
Wavelength[a]	1300 nm
Nominal Distance[a]	10 km (6.2 mi)

[a] Typical.

Ordering Information

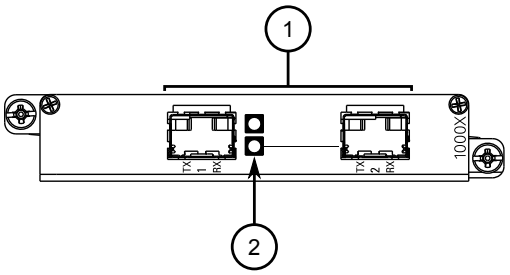
Description	2 x 1000LX Singlemode 1300 nm LC, 10km
Article Numbers	6GK6015-0AL20-0EC0 (Standard) 6GK6015-0AL20-0EC1 (Conformal Coated)

4.4 RUGGEDCOM RX1500PN LM FG50

The RUGGEDCOM RX1500PN LM FG50 module features sockets for up to two Small Form-factor Pluggable (SFP) transceivers.

Each transceiver socket features a dedicated LED that indicates the link/activity state of the associated SFP transceiver.

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



① SFP Transceiver Sockets
② Port LED

Figure 4.4 RUGGEDCOM RX1500PN LM FG50

Compatible SFP Transceivers

For information about which SFP transceivers are compatible with this module, as well as instructions for ordering and installation/removal, refer to the *RUGGEDCOM SFP Transceiver Catalog* [https://support.industry.siemens.com/cs/ca/en/view/109482309] .

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Technical Specifications

Operating Temperature	*Dependent on the installed SFP transceiver.*

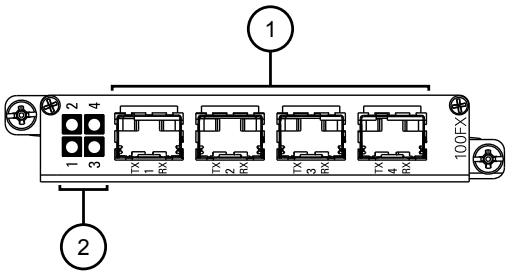
Ordering Information

Description	2 x 1000LX SFP Blank (no optical transceiver)
Article Numbers	6GK6015-0AL20-0JB0 (Standard) 6GK6015-0AL20-0JB1 (Conformal Coated)

4.5 RUGGEDCOM RX1500PN LM FX50

The RUGGEDCOM RX1500PN LM FX50 module features sockets for up to four Small Form-factor Pluggable (SFP) transceivers.

Each transceiver socket features a dedicated LED that indicates the link/activity state of the associated SFP transceiver.



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

① SFP Transceiver Sockets
② Port LED

Figure 4.5 RUGGEDCOM RX1500PN LM 6FX50

Compatible SFP Transceivers

For information about which SFP transceivers are compatible with this module, as well as instructions for ordering and installation/removal, refer to the *RUGGEDCOM SFP Transceiver Catalog* [https://support.industry.siemens.com/cs/ca/en/view/109482309] .

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Technical Specifications

Operating Temperature	** Dependent on the installed SFP transceiver*

Ordering Information

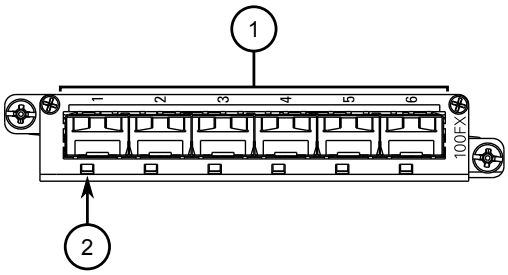
Description	4 x 100FX SFP Blank (no optical transceiver)
Article Numbers	6GK6015-0AL20-0JC0 (Standard) 6GK6015-0AL20-0JC1 (Conformal Coated)

4.6 RUGGEDCOM RX1500PN LM 6FX50

The RUGGEDCOM RX1500PN LM 6FX50 module features sockets for up to six Small Form-factor Pluggable (SFP) transceivers.

Each transceiver socket features a dedicated LED that indicates the link/activity state of the associated SFP transceiver.

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



① SFP Transceiver Sockets
② Port LED

Figure 4.6 RUGGEDCOM RX1500PN LM 6FX50

Compatible SFP Transceivers

For information about which SFP transceivers are compatible with this module, as well as instructions for ordering and installation/removal, refer to the *RUGGEDCOM SFP Transceiver Catalog* [https://support.industry.siemens.com/cs/ca/en/view/109482309] .

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Technical Specifications

Operating Temperature	* *Dependent on the installed SFP transceiver*

Ordering Information

Description	6 x 100FX SFP Blank (no optical transceiver)
Article Numbers	6GK6015-0AL20-0JD0 (Standard) 6GK6015-0AL20-0JD1 (Conformal Coated)

5

WAN Modules

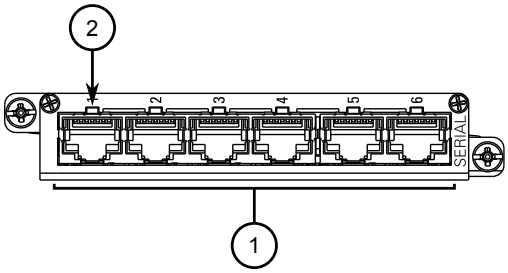
The following Wireless Area Network (WAN) modules are available for the RUGGEDCOM RX1500 series devices.

5.1 RUGGEDCOM RX1500PN LM S01

The RUGGEDCOM RX1500PN LM S01 module features six serial RJ45 ports that may be used with a null modem (crossover) serial cable.

Each port features a dedicated LED that indicates its activity state.

State	Description
Green	Activity detected
Off	No activity



① Serial Ethernet Ports
② Port LED

Figure 5.1 RUGGEDCOM RX1500PN LM S01

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Operating Modes

Each serial port can be run in **RS232**, **RS485** or **RS422** mode.

On initial power-up, all serial ports default to RS485 mode. However, each port can be individually set to RS232, RS485 or RS422 mode via RUGGEDCOM RX1500. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Pin-Out Description

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

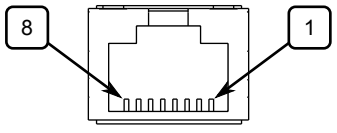


Figure 5.2 Serial RJ45 Port

Pin	RS232 Mode	RS485 Mode	RS422 Mode
1			RX- (Receive Negative)
2	Reserved (Do Not Connect)		
3[a]	Common (Isolated) Ground		
4[a]			
5	RX (Receive)		RX+ (Receive Negative)

Pin	RS232 Mode	RS485 Mode	RS422 Mode
6	TX (Transmit)	TX/RX + (Transmit/Receive Positive)[b]	TX+ (Transmit Positive)
7	Note[c]	TX/RX- (Transmit/Receive Negative)[d]	TX- (Transmit Negative)
8	Note[c]	TX/RX- (Transmit/Receive Negative)[d]	TX- (Transmit Negative)
Shield	Chassis Ground		

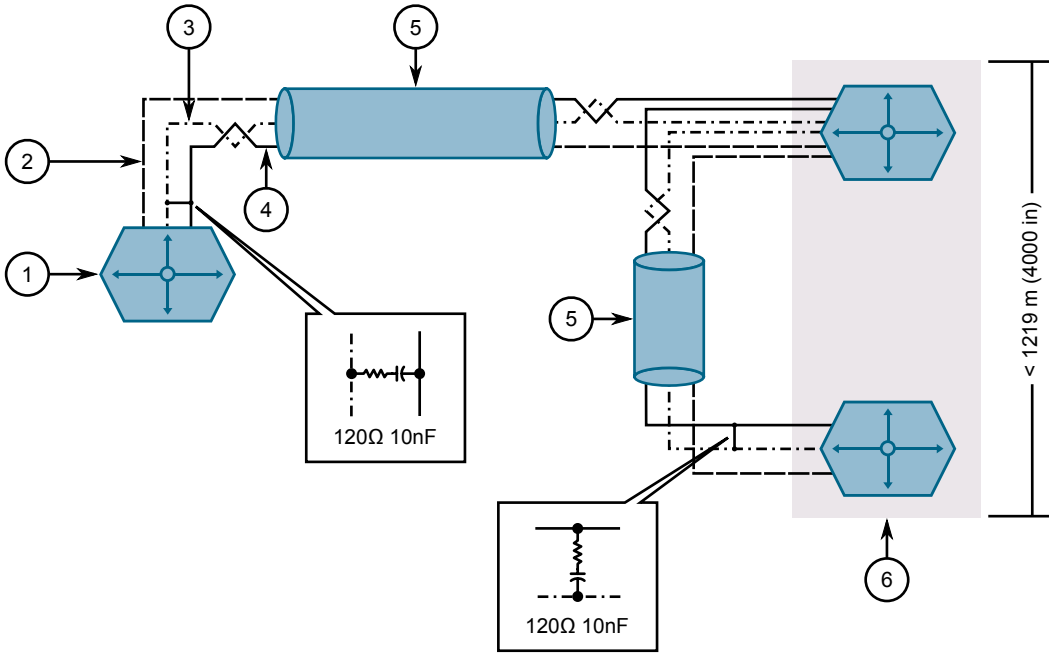
[a] Pins 3 and 4 are connected together internally.
[b] 15 kΩ pull-up resistor present on board.
[c] Pins 7 and 8 are connected together internally to simulate RTS-CTS hardware flow control for the user.
[d] In noisier environments, external pull-down resistors may be required for the negative terminal.

Connecting to RS485 Devices

When in RS485 mode, each port in the module can communicate with multiple RS485 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 illustration demonstrates the recommended RS485 wiring scheme:



① RUGGEDCOM RX1500PN LM S01 Module and Host Device
② Common (Isolated Ground)
③ Negative
④ Positive
⑤ Shield to Earth (Connected At a Single Point)
⑥ RS485 Devices (32 Total)

Figure 5.3 Recommended RS485 Wiring

Note

A 15 kΩ pull-up resistor is present on-board for the positive terminal.

In noisy environments, additional pull-down resistors may be required for the negative terminal.

Characteristics

Baud Rate	1200 to 230400 kbps
Connector	RJ45
Isolation	2500 VDC for 1 minute

Environment

Ingress Protection	IP40
Operating Temperature	-40 to 85 °C (-40 to 185 °F)
Operating Relative Humidity	5 to 95% (non-condensing)
Storage Temperature	-40 to 85 °C (-40 to 185 °F)

Ordering Information

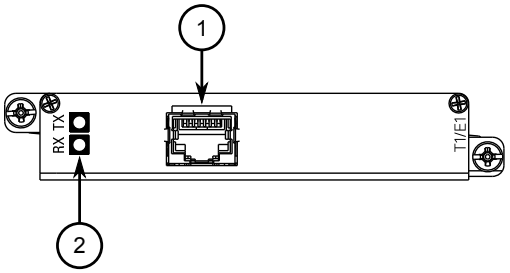
Description	6 x RS232/RS422/RS485 RJ45 Serial Line Module

Article Numbers	6GK6015-0AL20-0KB0 (Standard) 6GK6015-0AL20-0KB1 (Conformal Coated)

5.2 RUGGEDCOM RX1500PN LM TC1

The RUGGEDCOM RX1500PN LM TC1 module features a single T1/E1 RJ48C port for connection to a Wide Area Network (WAN).

An LED indicates the link/activity state of the port.



① T1/E1 RJ48C Port
② TX LED
③ RX LED

Figure 5.4 RUGGEDCOM RX1500PN LM TC1

LED	State	Description
Rx	Green	Connection established
Rx	Yellow	The interface is receiving an OOF (Out of Frame) alarm.
Rx	Red	The interface is receiving an ALOS (Alarm Loss of Signal) or Red alarm (e.g. corruption or loss of signal, connectivity loss, or no knowledge of connectivity).
Rx	Off	The interface is disabled.
Tx	Green	Connection established
Tx	Yellow	The interface is in loopback mode.
Tx	Red	The interface is receiving or transmitting an RAI (Remote Alarm Indication) or AIS (Alarm Indication Signal) alarm.
Tx	Off	The interface is disabled.

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

The following is the pin-out for the RJ48C port:

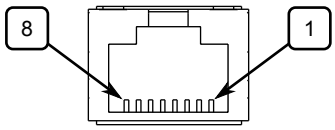


Figure 5.5 RJ48C Pin Configuration

Pin	Name	Description
1	RRING	Receive Negative
2	RTIP	Receive Positive
3	Reserved (Do Not Connect)	
4	TRING	Transmit Negative
5	TTIP	Transmit Positive
6	Reserved (Do Not Connect)	
7	Reserved (Do Not Connect)	
8	Reserved (Do Not Connect)	

Technical Specifications

Interface	T1/E1 (Channelized/Unchannelized)
Connector	RJ48C
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Certification

This module has been certified to comply with the requirements of the relevant standards.

Certification	Details
Industry Canada	This module is certified under IC CS-03 Part II, Issue 9. The product ID is listed on the label affixed to the module.
ACTA	This module is certified under Part 68 (subpart B) of the FCC Rules. The product ID is listed on the label affixed to the module. If requested, this information must be provided to the telephone company.

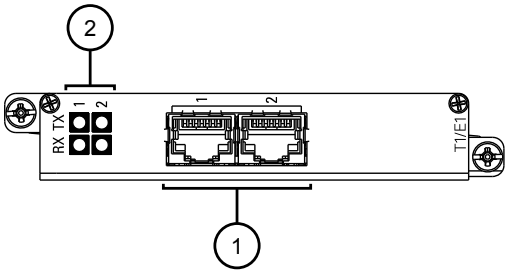
Ordering Information

Description	1 x T1/E1 RJ48 (Channelized/Unchannelized)
Article Numbers	6GK6015-0AL20-0MB0 (Standard) 6GK6015-0AL20-0MB1 (Conformal Coated)

5.3 RUGGEDCOM RX1500PN LM TC2

The RUGGEDCOM RX1500PN LM TC2 module features dual T1/E1 RJ48C ports for connection to a Wide Area Network (WAN).

Each port features a dedicated LED that indicates the link/activity state.



① T1/E1 RJ48C Ports
② TX LED
③ RX LED

Figure 5.6 RUGGEDCOM RX1500PN LM TC2

LED	State	Description
Rx	Green	Connection established
Rx	Yellow	The interface is receiving an OOF (Out of Frame) alarm.
Rx	Red	The interface is receiving an ALOS (Alarm Loss of Signal) or Red alarm (e.g. corruption or loss of signal, connectivity loss, or no knowledge of connectivity).
Rx	Off	The interface is disabled.
Tx	Green	Connection established
Tx	Yellow	The interface is in loopback mode.
Tx	Red	The interface is receiving or transmitting an RAI (Remote Alarm Indication) or AIS (Alarm Indication Signal) alarm.
Tx	Off	The interface is disabled.

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

The following is the pin-out for the RJ48C ports:

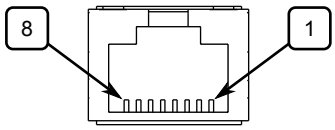


Figure 5.7 RJ48C Pin Configuration

Pin	Name	Description
1	RRING	Receive Negative
2	RTIP	Receive Positive
3	Reserved (Do Not Connect)	
4	TRING	Transmit Negative
5	TTIP	Transmit Positive
6	Reserved (Do Not Connect)	
7	Reserved (Do Not Connect)	
8	Reserved (Do Not Connect)	

Technical Specifications

Interface	T1/E1 (Channelized/Unchannelized)
Connector	RJ48C
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Certification

This module has been certified to comply with the requirements of the relevant standards.

Certification	Details
Industry Canada	This module is certified under IC CS-03 Part II, Issue 9. The product ID is listed on the label affixed to the module.
ACTA	This module is certified under Part 68 (subpart B) of the FCC Rules. The product ID is listed on the label affixed to the module. If requested, this information must be provided to the telephone company.

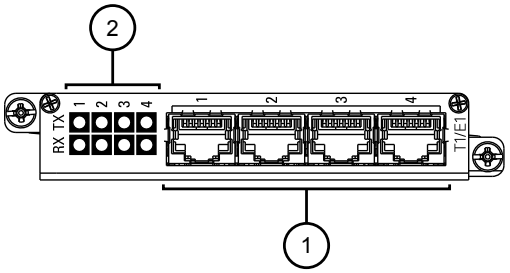
Ordering Information

Description	2 x T1/E1 RJ48 (Channelized/Unchannelized)
Article Numbers	6GK6015-0AL20-0MC0 (Standard) 6GK6015-0AL20-0MC1 (Conformal Coated)

5.4 RUGGEDCOM RX1500PN LM TC4

The RUGGEDCOM RX1500PN LM TC4 module features four T1/E1 RJ48C ports for connection to a Wide Area Network (WAN).

Each port features a dedicated LED that indicates the link/activity state.



① T1/E1 RJ48C Ports
② TX LED
③ RX LED

Figure 5.8 RUGGEDCOM RX1500PN LM TC4

LED	State	Description
Rx	Green	Connection established
Rx	Yellow	The interface is receiving an OOF (Out of Frame) alarm.
Rx	Red	The interface is receiving an ALOS (Alarm Loss of Signal) or Red alarm (e.g. corruption or loss of signal, connectivity loss, or no knowledge of connectivity).
Rx	Off	The interface is disabled.
Tx	Green	Connection established
Tx	Yellow	The interface is in loopback mode.
Tx	Red	The interface is receiving or transmitting an RAI (Remote Alarm Indication) or AIS (Alarm Indication Signal) alarm.
Tx	Off	The interface is disabled.

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

The following is the pin-out for the RJ48C ports:

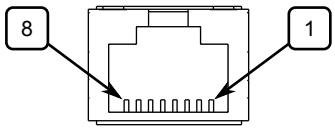


Figure 5.9 RJ48C Pin Configuration

Pin	Name	Description
1	RRING	Receive Negative
2	RTIP	Receive Positive
3	Reserved (Do Not Connect)	
4	TRING	Transmit Negative
5	TTIP	Transmit Positive
6	Reserved (Do Not Connect)	
7	Reserved (Do Not Connect)	
8	Reserved (Do Not Connect)	

Technical Specifications

Interface	T1/E1 (Channelized/Unchannelized)
Connector	RJ48C
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Certification

This module has been certified to comply with the requirements of the relevant standards.

Certification	Details
Industry Canada	This module is certified under IC CS-03 Part II, Issue 9. The product ID is listed on the label affixed to the module.
ACTA	This module is certified under Part 68 (subpart B) of the FCC Rules. The product ID is listed on the label affixed to the module. If requested, this information must be provided to the telephone company.

Ordering Information

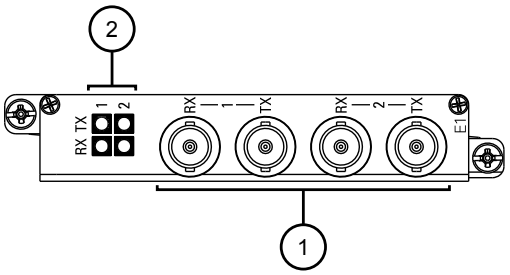
Description	4 x T1/E1 RJ48 (Channelized/Unchannelized)
Article Numbers	6GK6015-0AL20-0MD0 (Standard) 6GK6015-0AL20-0MD1 (Conformal Coated)

5.5 RUGGEDCOM RX1500PN LM E02

The RUGGEDCOM RX1500PN LM E02 module features two sets of E1 BNC ports for connection to a Wide Area Network (WAN).

Each receive (RX) and transmit (TX) port features a dedicated LED that indicates the link/activity state.

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



① E1 BNC Ports
② Port LEDs

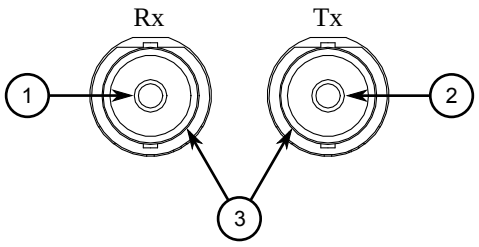
Figure 5.10 RUGGEDCOM RX1500PN LM E02

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

The following is the pin-out for the BNC ports:



① RTIP
② TTIP
③ Chassis

Figure 5.11 BNC Pin Configuration

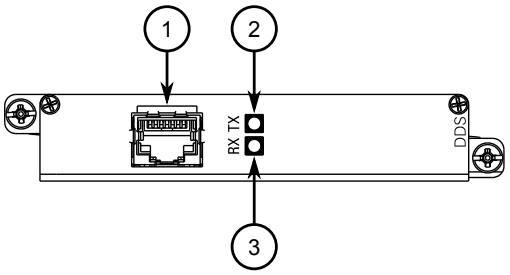
Interface	E1 (Channelized/Unchannelized)
Connector	BNC (75 Ω)
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Ordering Information

Description	2 x E1 75 Ohms BNC (Channelized/Unchanellized)
Article Numbers	6GK6015-0AL20-0HC0 (Standard) 6GK6015-0AL20-0HC1 (Conformal Coated)

5.6 RUGGEDCOM RX1500PN LM D02

The RUGGEDCOM RX1500PN LM D02 module features a single Digital Data Services (DDS) port that supports line rates of 56 kbps (Master/Slave) and 64 kbps (Slave).



① DDS Port
② TX LED
③ RX LED

Figure 5.12 RUGGEDCOM RX1500PN LM D02

LED	State	Description
Rx	Green	Connection established
Rx	Yellow	The interface is receiving an OOF (Out of Frame) alarm.
Rx	Red	The interface is receiving an ALOS (Alarm Loss of Signal) or Red alarm (e.g. corruption or loss of signal, connectivity loss, or no knowledge of connectivity).
Rx	Off	The interface is disabled.
Tx	Green	Connection established
Tx	Yellow	The interface is in loopback mode.
Tx	Red	The interface is receiving or transmitting an RAI (Remote Alarm Indication) or AIS (Alarm Indication Signal) alarm.
Tx	Off	The interface is disabled.

Standards and Operating Modes

The module is compatible with the following standards:

- AT&T PUB 62310 (Standard DDS)
- BELLCORE TA-TSY-000077
- BELLCORE TR-TSY-000458
- ANSI T1.410

It also supports the following operating modes, which are configurable via the operating system for the host device:

Operating Mode	Line Rate
DDS-PRI	56 kbps
CC-64K	72 kbps

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Pin-Out Description

The following is the pin-out for the RJ48S ports:

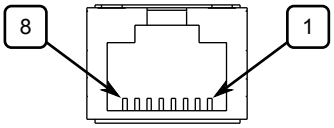


Figure 5.13 DDS RJ48S Pin

Pin	Name	Description
1	R1	Transmit data to network (Ring 1)
2	T1	Transmit data to network (Tip 1)
3	Reserved (Do Not Connect)	
4	Reserved (Do Not Connect)	
5	Reserved (Do Not Connect)	
6	Reserved (Do Not Connect)	
7	T	Receive data from network (Ring)
8	R	Receive data from network (Tip)

Technical Specifications

Speed	56 kbps (Master/Slave) or 64 kbps (Slave)
Connector	RJ48
Operating Temperature	-40 to 85 °C (-40 to 185 °F)

Ordering Information

Description	1k DDS RJ48 (56k Master/Slave, 64 Slave)
Article Numbers	6GK6015-0AL20-0LB0 (Standard) 6GK6015-0AL20-0LB1 (Conformal Coated)

6

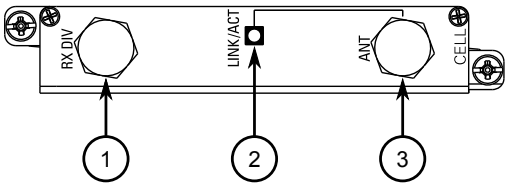
Cellular Modem Modules

The following cellular modem modules are available for the RUGGEDCOM RX1500 series devices.

6.1 RUGGEDCOM RX1500PN LM W11

The RUGGEDCOM RX1500PN LM W11 module offers GSM/EDGE/HSPA+ capabilities for wireless remote access to the 3G (third generation) networks in North America (AT&T). It supports a single primary antenna and an optional diversity antenna to improve radio signal strength.

The primary antenna port features a dedicated LED that indicates its link/activity state.



① Rx. Div. Port
② LED
③ Ant Port

Figure 6.1 RUGGEDCOM RX1500PN LM W11

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

General Safety Notices

⚠ WARNING

Radio interference hazard – risk of death, serious personal injury or equipment damage.

Do not operate the cellular modem in the following areas:

- Areas where explosives are actively used
- In explosive atmospheres, such as refueling stations, fuel depots, chemical plants, underground mining operations, etc.
- Near medical or life support equipment or devices
- In any aircraft, whether in flight or on the ground (unless permitted by the aircraft operator)

In such areas, the cellular modem must be disabled via host device's operating system. Otherwise the cellular modem can transmit signals that may interfere with nearby equipment that is susceptible to radio interference.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where

a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

NOTICE

If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

⚠ WARNING

Radiation hazard – risk of Radio Frequency (RF) exposure

The device must be placed at a distance of at least 20 cm (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.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

Installation Requirements

The cellular modem module is approved for modular use in mobile applications. The module, as part of the RUGGEDCOM RX1500, can be integrated into a final product without additional certification from the Federal Communications Commission (FCC) or Industry Canada (IC) if the application meets the following requirements:

Note
If this module is integrated into a portable device, separate approval related to the Specific Absorption Rate (SAR) requirements of FCC Part 2.1093 and IC RSS-102 is required.

- Persons in the area must be kept at least 20 cm (8 in) from the antenna at all times.
- The antenna gain, including cable loss, must not exceed the maximum allowable gain specified for the module.
- The cellular modem and antenna must not be next to or operate in conjunction with another transmitter or antenna within a host device.
- A label must be affixed to the end product that indicates the FCC and Industry Canada IDs for the cellular modem.

- The user documentation for the end product must clearly indicate the operating requirements and conditions that comply with current FCC and IC radio frequency exposure guidelines.
- The end product must comply with the unintentional emission testing requirements of FCC Part 15.

If the application does not meet these requirements, further certification is required.

Installing the Module

To install the module, do the following:

1. Open the module and install a mini-SIM card.
2. Insert the module into the host device. For more information, refer to the *Installation Guide* for the device.
3. Connect an antenna.

Installing SIM Cards

The line module requires at least one active mini-SIM card (2FF size format) for the primary antenna to connect with the associated network carrier. A second SIM card can be installed for redundancy if needed.

To install one or more SIM cards, do the following:

⚠ CAUTION

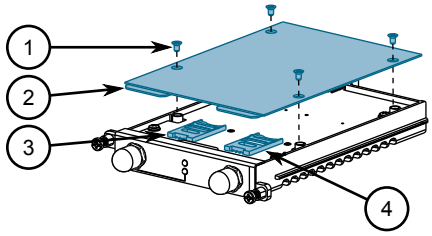
Static electricity hazard – risk of damage to equipment

Make sure to take appropriate anti-static precautions before opening the cellular modem module.

Note
The module only supports mini-SIM cards (2FF size format).

1. Remove the line module from the chassis. For more information, refer to the *Installation Guide* for the host device.

2. On the smooth side of the module, remove the four screws and separate the cover from the module housing.



① Screw
② Cover
③ SIM Card Cage 2
④ SIM Card Cage 1

Figure 6.2 SIM Card Assembly

3. Open Cage 1 by sliding the silver catch towards the front face of the module and then flip the cage up.
4. If necessary, remove the existing SIM card.
5. Insert a new mini-SIM card into the cage.
6. Flip the cage down and slide the silver catch back to its original position.
7. [Optional] Repeat the steps above to install a second SIM card in Cage 2.
8. Place the cover on the module housing and install the four screws removed previously.
9. Install the module back into the chassis. For more information, refer to the *Installation Guide* for the host device.
10. Configure the SIM cards. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Connecting Antennas

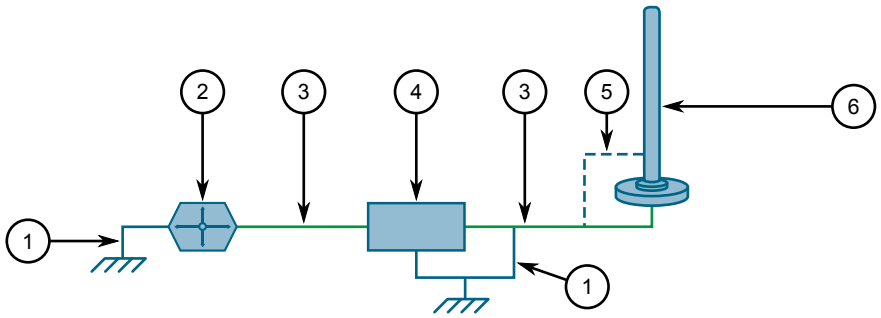
To connect a 3G multi-band antenna, do the following:

Note
Primary and diversity (secondary) antennas must be separated by a minimum distance of 20 cm (7.9 in).

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.

2. Using shielded coaxial cables, connect the antenna to the lightning protector. Make sure the cables are routed away from any noise sources, such as Switch-Mode Power Supplies (SMPS).



① Drain Wire
② RUGGEDCOM RX1500
③ Shielded Coaxial Cable
④ Lightning Protector
⑤ Ground Wire
⑥ Antenna

Figure 6.3 Antenna and Lightning Protector Assembly

3. Connect the lightning protector to the appropriate antenna port on the module.
   - If the antenna is a primary antenna,connect the cable to the **ANT** port
   - If the antenna is a diversity (secondary) antenna, connect the cable to the **RX. Div.** port

Technical Specifications

General

Services	GSM/EDGE/HSPA+
Region	North America (AT&T)
Connector	50 Ω SMA
Antennas	1 x GSM/EDGE/HSPA+, 1 x Receive Diversity (Secondary)
SIM	Dual Mini-SIM (2FF)

Conducted Transmit (Tx) Power Tolerances

System/Operating Band	Frequency Band (MHz)	Conducted Tx Power (dBm)	Comment
GSM-850 and GSM-900	850/900	+32 ± 1	GMSK mode, connectorized (class 4)
		+27 ± 1	8PSK mode, connectorized (class E2)
DCS-1800 and PCS-19001	1800/1900	+29 ± 1	GMSK mode, connectorized (class 1)

System/Operating Band	Frequency Band (MHz)	Conducted Tx Power (dBm)	Comment
		+26 ± 1	8PSK mode, connectorized (class E2)
Band I	2100	+23 ± 1	AMR 12.2 kbps, connectorized (class 3)
Band II, V, VI and VIII	800, 850, 900 and 1900		

Supported WCDMA Frequency Bands

Band	Frequency Range			
	Tx (MHz)	VSWR	Rx (MHz)	VSWR
Band I WCDMA 2100	1920 to 1980	< 2.5:1	2110 to 2170	< 3.5:1
Band II WCDMA 1900	1850 to 1910	< 2.5:1	1930 to 1990	< 2.5:1
Band VIII WCDMA 900	880 to 915	< 2.5:1	925 to 960	< 3.5:1
Band V WCDMA 850	824 to 849	< 2.5:1	869 to 894	< 3.5:1
Band VI WCDMA 800	830 to 840	< 2.5:1	875 to 885	< 3.5:1
GSM 850	824 to 849	< 2.5:1	869 to 894	< 3.5:1
EGSM 900	880 to 915	< 2.5:1	925 to 960	< 3.5:1
GSM 1800	1710 to 1785	< 2.5:1	1805 to 1880	< 3.5:1
GSM 1900	1850 to 1910	< 2.5:1	1930 to 1990	< 2.5:1

RX Diversity Support and Maximum Allowable Gain per WCDMA Frequency Band

Band	RX Diversity Support	Maximum Allowable Gain (dBi)
Band I WCDMA 2100	✓	4
Band II WCDMA 1900	✓	4
Band VIII WCDMA 900	✓	5
Band V WCDMA 850	✓	5
Band VI WCDMA 800	✓	5
GSM 850	×	5
EGSM 900	×	5
GSM 1800	×	4
GSM 1900	×	4

Operating Temperature

Operating Temperature	Compliance
-25 to 60 °C (-13 to 140 °F)	Full Radio Frequency (RF) compliance
60 to 75 °C (140 to 167 °F)	Reduced Radio Frequency (RF) performance

Certification

This module has been certified to comply with the requirements of the relevant standards.

NOTICE
If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

Certification	Details
FCC	This module is certified under Part 15 (subpart B) of the FCC Rules and has been assigned the product ID N7NMC8705.
Industry Canada	This module is certified under IC CS-03 Part II, Issue 9 and has been assigned the product ID 2417C-MC8705.
AT&T	This module has been assigned the FCC product ID N7NMC8705. This module has been assigned the Industry Canada product ID 2417C-MC8705.

Ordering Information

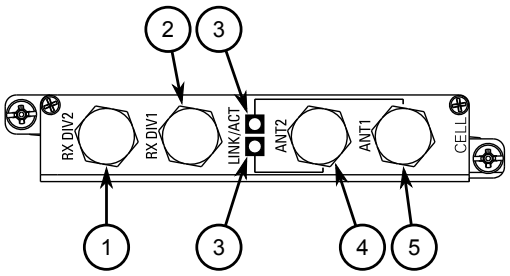
Description	1 x GSM/EDGE/HSPA
Article Numbers	6GK6015-0AL20-0WB0 (Standard) 6GK6015-0AL20-0WB1 (Conformal Coated)

6.2 RUGGEDCOM RX1500PN LM W12

The RUGGEDCOM RX1500PN LM W12 module offers GSM/EDGE/HSPA+ capabilities for wireless remote access to 3G (third generation) networks in North America (AT&T), Europe and Australia. It supports dual primary antennas and optional diversity antennas to improve radio signal strength.

Each primary antenna port features a dedicated LED that indicates its link/activity state.

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



① Rx. Div. 1 Port
② Rx. Div. 2 Port
③ LED
④ Ant. 1 Port
⑤ Ant. 2 Port

Figure 6.4 RUGGEDCOM RX1500PN LM W12

General Safety Notices

⚠ WARNING

Radio interference hazard – risk of death, serious personal injury or equipment damage.

Do not operate the cellular modem in the following areas:

- Areas where explosives are actively used
- In explosive atmospheres, such as refueling stations, fuel depots, chemical plants, underground mining operations, etc.
- Near medical or life support equipment or devices
- In any aircraft, whether in flight or on the ground (unless permitted by the aircraft operator)

In such areas, the cellular modem must be disabled via host device's operating system. Otherwise the cellular modem can transmit signals that may interfere with nearby equipment that is susceptible to radio interference.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

NOTICE

If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

⚠ WARNING

Radiation hazard – risk of Radio Frequency (RF) exposure

The device must be placed at a distance of at least 20 cm (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.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

Installation Requirements

The cellular modem module is approved for modular use in mobile applications. The module, as part of the RUGGEDCOM RX1500, can be integrated into a final product without additional certification from the Federal Communications Commission (FCC) or Industry Canada (IC) if the application meets the following requirements:

Note
If this module is integrated into a portable device, separate approval related to the Specific Absorption Rate (SAR) requirements of FCC Part 2.1093 and IC RSS-102 is required.

- Persons in the area must be kept at least 20 cm (8 in) from the antenna at all times.

- The antenna gain, including cable loss, must not exceed the maximum allowable gain specified for the module.
- The cellular modem and antenna must not be next to or operate in conjunction with another transmitter or antenna within a host device.
- A label must be affixed to the end product that indicates the FCC and Industry Canada IDs for the cellular modem.
- The user documentation for the end product must clearly indicate the operating requirements and conditions that comply with current FCC and IC radio frequency exposure guidelines.
- The end product must comply with the unintentional emission testing requirements of FCC Part 15.

If the application does not meet these requirements, further certification is required.

Installing the Module

To install the module, do the following:

1. Open the module and install a mini-SIM card for each network carrier.
2. Insert the module into the host device. For more information, refer to the *Installation Guide* for the device.
3. Connect antennas.

Installing SIM Cards

The line module requires at least one active mini-SIM card (2FF size format) for the primary antenna to connect with the associated network carrier. A second SIM card can be installed for redundancy if needed.

To install one or more SIM cards, do the following:

⚠ CAUTION

Static electricity hazard – risk of damage to equipment

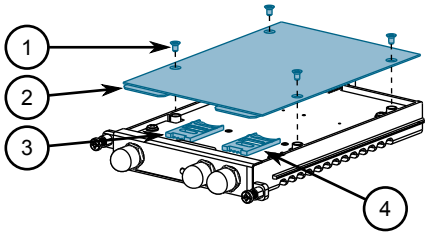
Make sure to take appropriate anti-static precautions before opening the cellular modem module.

Note

The module only supports mini-SIM cards (2FF size format).

1. Remove the line module from the chassis. For more information, refer to the *Installation Guide* for the host device.

2. On the smooth side of the module, remove the four screws and separate the cover from the module housing.



① Screw
② Cover
③ SIM Card Cage 2
④ SIM Card Cage 1

Figure 6.5 SIM Card Assembly

3. Open Cage 1 by sliding the silver catch towards the front face of the module and then flip the cage up.
4. If necessary, remove the existing SIM card.
5. Insert a new mini-SIM card into the cage.
6. Flip the cage down and slide the silver catch back to its original position.
7. [Optional] Repeat the steps above to install a second SIM card in Cage 2.
8. Place the cover on the module housing and install the four screws removed previously.
9. Install the module back into the chassis. For more information, refer to the *Installation Guide* for the host device.
10. Configure the SIM cards. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Connecting Antennas

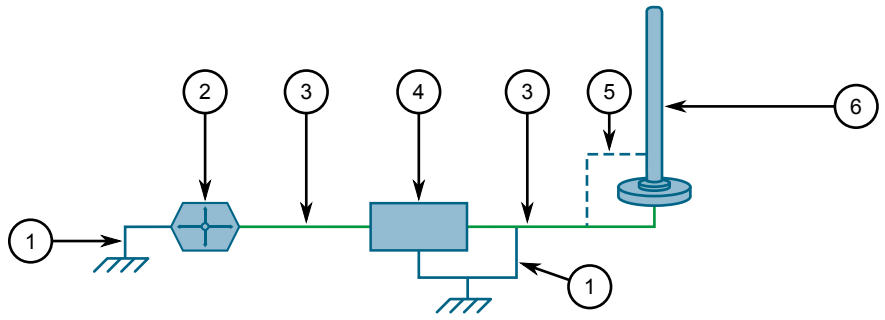
To connect a 3G multi-band antenna, do the following:

NOTICE
If two antennas are to be installed, the antennas must be separated by a minimum distance of 20 cm (7.9 in).

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.

2. Using shielded coaxial cables, connect the antenna to the lightning protector. Make sure the cables are routed away from any noise sources, such as Switch-Mode Power Supplies (SMPS).



① Drain Wire
② RUGGEDCOM RX1500
③ Shielded Coaxial Cable
④ Lightning Protector
⑤ Ground Wire
⑥ Antenna

Figure 6.6 Antenna and Lightning Protector Assembly

3. Connect the lightning protector to the appropriate antenna port on the module.
   - If the antenna is a primary antenna, connect the cable to the **ANT. 1** or **ANT. 2** port
   - If the antenna is a diversity (secondary) antenna, connect the cable to the **RX. Div. 1** or **RX. Div. 2** port

Technical Specifications

General

Services	GSM/EDGE/HSPA+
Region	North America (AT&T), European Union, Australia
Connector	50 Ω SMA
Antennas	2 x GSM/EDGE/HSPA+, 2 x Receive Diversity (Secondary)
SIM	Dual Mini-SIM (2FF)

Conducted Transmit (Tx) Power Tolerances

System/Operating Band	Frequency Band (MHz)	Conducted Tx Power (dBm)	Comment
GSM-850 and GSM-900	850/900	+32 ± 1	GMSK mode, connectorized (class 4)
		+27 ± 1	8PSK mode, connectorized (class E2)
DCS-1800 and PCS-19001	1800/1900	+29 ± 1	GMSK mode, connectorized (class 1)

System/Operating Band	Frequency Band (MHz)	Conducted Tx Power (dBm)	Comment
		+26 ± 1	8PSK mode, connectorized (class E2)
Band I	2100	+23 ± 1	AMR 12.2 kbps, connectorized (class 3)
Band II, V, VI and VIII	800, 850, 900 and 1900		

Supported WCDMA Frequency Bands

Band	Frequency Range			
	Tx (MHz)	VSWR	Rx (MHz)	VSWR
Band I WCDMA 2100	1920 to 1980	< 2.5:1	2110 to 2170	< 3.5:1
Band II WCDMA 1900	1850 to 1910	< 2.5:1	1930 to 1990	< 2.5:1
Band VIII WCDMA 900	880 to 915	< 2.5:1	925 to 960	< 3.5:1
Band V WCDMA 850	824 to 849	< 2.5:1	869 to 894	< 3.5:1
Band VI WCDMA 800	830 to 840	< 2.5:1	875 to 885	< 3.5:1
GSM 850	824 to 849	< 2.5:1	869 to 894	< 3.5:1
EGSM 900	880 to 915	< 2.5:1	925 to 960	< 3.5:1
GSM 1800	1710 to 1785	< 2.5:1	1805 to 1880	< 3.5:1
GSM 1900	1850 to 1910	< 2.5:1	1930 to 1990	< 2.5:1

RX Diversity Support and Maximum Allowable Gain per WCDMA Frequency Band

Band	RX Diversity Support	Maximum Allowable Gain (dBi)
Band I WCDMA 2100	✓	4
Band II WCDMA 1900	✓	4
Band VIII WCDMA 900	✓	5
Band V WCDMA 850	✓	5
Band VI WCDMA 800	✓	5
GSM 850	×	5
EGSM 900	×	5
GSM 1800	×	4
GSM 1900	×	4

Operating Temperature

Operating Temperature	Compliance
-25 to 60 °C (-13 to 140 °F)	Full Radio Frequency (RF) compliance
60 to 75 °C (140 to 167 °F)	Reduced Radio Frequency (RF) performance

Certification

This module has been certified to comply with the requirements of the relevant standards.

NOTICE
If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

Certification	Details
FCC	This module is certified under Part 15 (subpart B) of the FCC Rules and has been assigned the product ID N7NMC8705.
Industry Canada	This module is certified under IC CS-03 Part II, Issue 9 and has been assigned the product ID 2417C-MC8705.
AT&T	This module has been assigned the FCC product ID N7NMC8705. This module has been assigned the Industry Canada product ID 2417C-MC8705.
ACMA	This module complies with the Level 1, 2 and 3 requirements defind by the Australian Communications and Media Authority (ACMA) under the Radiocommunications Act 1992 and the Telecommunications Act 1997.

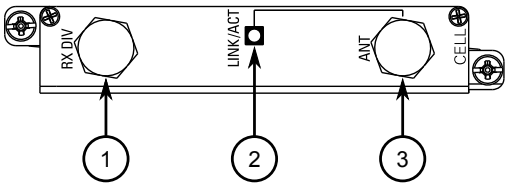
Ordering Information

Description	2 x GSM/EDGE/HSPA
Article Numbers	6GK6015-0AL20-0WC0 (Standard) 6GK6015-0AL20-0WC1 (Conformal Coated)

6.3 RUGGEDCOM RX1500PN LM W21

The RUGGEDCOM RX1500PN LM W22 module offers EVDO Rev A capabilities for wireless remote access to 3G (third generation) networks in North America (AT&T), Europe and Australia. It supports a single primary antenna and an optional diversity antenna to improve radio signal strength.

The primary antenna port features a dedicated LED that indicates its link/activity state.



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

① Rx. Div. Port
② LED
③ Ant Port

Figure 6.7 RUGGEDCOM RX1500PN LM W21

General Safety Notices

⚠ WARNING

Radio interference hazard – risk of death, serious personal injury or equipment damage.

Do not operate the cellular modem in the following areas:

- Areas where explosives are actively used
- In explosive atmospheres, such as refueling stations, fuel depots, chemical plants, underground mining operations, etc.
- Near medical or life support equipment or devices
- In any aircraft, whether in flight or on the ground (unless permitted by the aircraft operator)

In such areas, the cellular modem must be disabled via host device's operating system. Otherwise the cellular modem can transmit signals that may interfere with nearby equipment that is susceptible to radio interference.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where

a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

NOTICE

If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

⚠ WARNING

Radiation hazard – risk of Radio Frequency (RF) exposure

The device must be placed at a distance of at least 20 cm (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.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

Installation Requirements

The cellular modem module is approved for modular use in mobile applications. The module, as part of the RUGGEDCOM RX1500, can be integrated into a final product without additional certification from the Federal Communications Commission (FCC) or Industry Canada (IC) if the application meets the following requirements:

Note
If this module is integrated into a portable device, separate approval related to the Specific Absorption Rate (SAR) requirements of FCC Part 2.1093 and IC RSS-102 is required.

- Persons in the area must be kept at least 20 cm (8 in) from the antenna at all times.
- The antenna gain, including cable loss, must not exceed the maximum allowable gain specified for the module.
- The cellular modem and antenna must not be next to or operate in conjunction with another transmitter or antenna within a host device.
- A label must be affixed to the end product that indicates the FCC and Industry Canada IDs for the cellular modem.

- The user documentation for the end product must clearly indicate the operating requirements and conditions that comply with current FCC and IC radio frequency exposure guidelines.
- The end product must comply with the unintentional emission testing requirements of FCC Part 15.

If the application does not meet these requirements, further certification is required.

Installing the Module

To install the module, do the following:

1. Open the module and install a mini-SIM card.
2. Insert the module into the host device. For more information, refer to the *Installation Guide* for the device.
3. Connect an antenna.

Installing SIM Cards

The line module requires at least one active mini-SIM card (2FF size format) for the primary antenna to connect with the associated network carrier. A second SIM card can be installed for redundancy if needed.

To install one or more SIM cards, do the following:

⚠ CAUTION

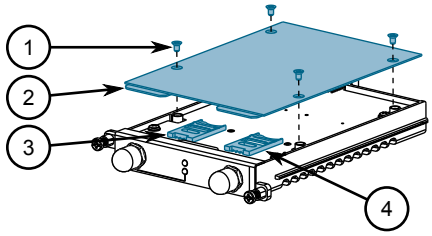
Static electricity hazard – risk of damage to equipment

Make sure to take appropriate anti-static precautions before opening the cellular modem module.

Note
The module only supports mini-SIM cards (2FF size format).

1. Remove the line module from the chassis. For more information, refer to the *Installation Guide* for the host device.

2. On the smooth side of the module, remove the four screws and separate the cover from the module housing.



① Screw
② Cover
③ SIM Card Cage 2
④ SIM Card Cage 1

Figure 6.8 SIM Card Assembly

3. Open Cage 1 by sliding the silver catch towards the front face of the module and then flip the cage up.
4. If necessary, remove the existing SIM card.
5. Insert a new mini-SIM card into the cage.
6. Flip the cage down and slide the silver catch back to its original position.
7. [Optional] Repeat the steps above to install a second SIM card in Cage 2.
8. Place the cover on the module housing and install the four screws removed previously.
9. Install the module back into the chassis. For more information, refer to the *Installation Guide* for the host device.
10. Configure the SIM cards. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Connecting Antennas

To connect a 3G multi-band antenna, do the following:

⚠ 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.

NOTICE

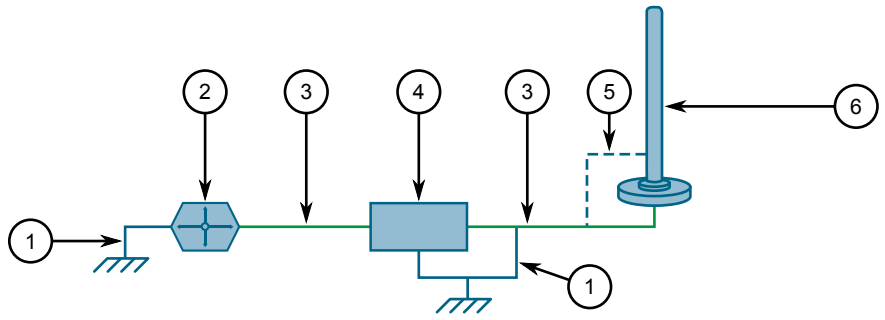
- Antenna installation must be as per Article 810 of the National Electric Code (NEC). Specifically, the grounding conductor must not be less than 10 AWG (Cu). The scheme should be either:
  - In accordance with UL 96 and 96A Lightning Protection Components and Installation Requirements for Lightning Protection Systems (LPS)
  - Tested in accordance with UL 50 and UL 497
- A Radio Frequency (RF) site survey is recommended prior to any installation to help determine the best location for the LTE and GPS antennas. For assistance, contact a Siemens Sales representative.
- The cellular modem supports SISO (Single Input Single Output) and MIMO (Multiple Input Multiple Output) modes. At minimum, a single antenna connected to the ANT1 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.
- For mobile and fixed operating configurations, in accordance with R&TTE Directive 1999/5/EC, the maximum antennae gain is 3 dBi for 900 MHz, 1800 MHz, 2100 MHz and 2600 MHz.
- 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.
- If the device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.
- If two or more antennas are to be installed, the antennas must be separated by a minimum distance of 20 cm (7.9 in).

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.

2. Using shielded coaxial cables, connect the antenna to the lightning protector. Make sure the cables are routed away from any noise sources, such as Switch-Mode Power Supplies (SMPS).



① Drain Wire
② RUGGEDCOM RX1500
③ Shielded Coaxial Cable
④ Lightning Protector
⑤ Ground Wire
⑥ Antenna

Figure 6.9 Antenna and Lightning Protector Assembly

3. Connect the lightning protector to the appropriate antenna port on the module.
   - If the antenna is a primary antenna,connect the cable to the **ANT** port
   - If the antenna is a diversity (secondary) antenna, connect the cable to the **RX. Div.** port

Technical Specifications

General

Services	EVDO Rev. A
Region	North America (Verizon)
Connector	50 Ω SMA
Antennas	1 x EVDO Rev A, 1 x Receive Diversity (Secondary)
SIM	Dual Mini-SIM (2FF)

Typical Radio Frequency (RF)

System/Operating Band	Frequency Band (MHz)		Conducted Tx Power (dBm)
	Transmit (Tx)	Receive (Rx)	
PCS	1851 to 1910	1930 to 1990	23 to 25
Cellular	824 to 849	869 to 894	

Supported WCDMA Frequency Bands

Band	Frequency Range			
	Tx (MHz)	VSWR	Rx (MHz)	VSWR
Band I WCDMA 2100	1920 to 1980	< 2.5:1	2110 to 2170	< 3.5:1
Band II WCDMA 1900	1850 to 1910	< 2.5:1	1930 to 1990	< 2.5:1
Band VIII WCDMA 900	880 to 915	< 2.5:1	925 to 960	< 3.5:1
Band V WCDMA 850	824 to 849	< 2.5:1	869 to 894	< 3.5:1
Band VI WCDMA 800	830 to 840	< 2.5:1	875 to 885	< 3.5:1
GSM 850	824 to 849	< 2.5:1	869 to 894	< 3.5:1
EGSM 900	880 to 915	< 2.5:1	925 to 960	< 3.5:1
GSM 1800	1710 to 1785	< 2.5:1	1805 to 1880	< 3.5:1
GSM 1900	1850 to 1910	< 2.5:1	1930 to 1990	< 2.5:1

RX Diversity Support and Maximum Allowable Gain per WCDMA Frequency Band

Band	RX Diversity Support	Maximum Allowable Gain (dBi)
Band I WCDMA 2100	✓	4
Band II WCDMA 1900	✓	4
Band VIII WCDMA 900	✓	5
Band V WCDMA 850	✓	5
Band VI WCDMA 800	✓	5
GSM 850	×	5
EGSM 900	×	5
GSM 1800	×	4
GSM 1900	×	4

Operating Temperature

Operating Temperature	Compliance
-30 to 60 °C (-22 to 140 °F)	Full Radio Frequency (RF) compliance
60 to 75 °C (140 to 167 °F)	Reduced Radio Frequency (RF) performance

Certification

This module has been certified to comply with the requirements of the relevant standards.

NOTICE
If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

Certification	Details
Verizon Wireless	This module is certified by Verizon Wireless in North America under Open Development Certification Agreement MA-004198-2012.

Ordering Information

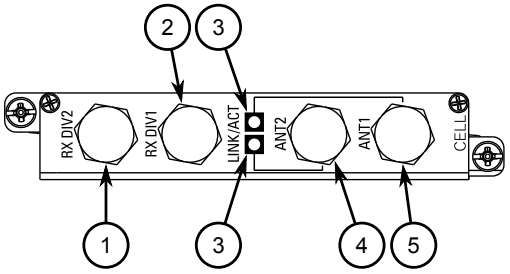
Description	1 x EVDO rev A Verizon US
Article Numbers	6GK6015-0AL20-0WD0 (Standard) 6GK6015-0AL20-0WD1 (Conformal Coated)

6.4 RUGGEDCOM RX1500PN LM W22

The RUGGEDCOM RX1500PN LM W22 module offers EVDO Rev A capabilities for wireless remote access to 3G (third generation) networks in North America (AT&T), Europe and Australia. It supports dual primary antennas and optional diversity antennas to improve radio signal strength.

The primary antenna ports features a dedicated LED that indicates its link/activity state.

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



① Rx. Div. 1 Port
② Rx. Div. 2 Port
③ LED
④ Ant. 1 Port
⑤ Ant. 2 Port

Figure 6.10 RUGGEDCOM RX1500PN LM W22

General Safety Notices

⚠ WARNING

Radio interference hazard – risk of death, serious personal injury or equipment damage.

Do not operate the cellular modem in the following areas:

- Areas where explosives are actively used
- In explosive atmospheres, such as refueling stations, fuel depots, chemical plants, underground mining operations, etc.
- Near medical or life support equipment or devices
- In any aircraft, whether in flight or on the ground (unless permitted by the aircraft operator)

In such areas, the cellular modem must be disabled via host device's operating system. Otherwise the cellular modem can transmit signals that may interfere with nearby equipment that is susceptible to radio interference.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

NOTICE

If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

⚠ WARNING

Radiation hazard – risk of Radio Frequency (RF) exposure

The device must be placed at a distance of at least 20 cm (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.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

Installation Requirements

The cellular modem module is approved for modular use in mobile applications. The module, as part of the RUGGEDCOM RX1500, can be integrated into a final product without additional certification from the Federal Communications Commission (FCC) or Industry Canada (IC) if the application meets the following requirements:

Note
If this module is integrated into a portable device, separate approval related to the Specific Absorption Rate (SAR) requirements of FCC Part 2.1093 and IC RSS-102 is required.

- Persons in the area must be kept at least 20 cm (8 in) from the antenna at all times.

- The antenna gain, including cable loss, must not exceed the maximum allowable gain specified for the module.
- The cellular modem and antenna must not be next to or operate in conjunction with another transmitter or antenna within a host device.
- A label must be affixed to the end product that indicates the FCC and Industry Canada IDs for the cellular modem.
- The user documentation for the end product must clearly indicate the operating requirements and conditions that comply with current FCC and IC radio frequency exposure guidelines.
- The end product must comply with the unintentional emission testing requirements of FCC Part 15.

If the application does not meet these requirements, further certification is required.

Installing the Module

To install the module, do the following:

1. Open the module and install a mini-SIM card for each network carrier.
2. Insert the module into the host device. For more information, refer to the *Installation Guide* for the device.
3. Connect antennas.

Installing SIM Cards

The line module requires at least one active mini-SIM card (2FF size format) for the primary antenna to connect with the associated network carrier. A second SIM card can be installed for redundancy if needed.

To install one or more SIM cards, do the following:

⚠ CAUTION

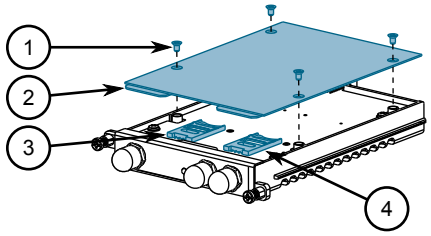
Static electricity hazard – risk of damage to equipment

Make sure to take appropriate anti-static precautions before opening the cellular modem module.

Note
The module only supports mini-SIM cards (2FF size format).

1. Remove the line module from the chassis. For more information, refer to the *Installation Guide* for the host device.

2. On the smooth side of the module, remove the four screws and separate the cover from the module housing.



① Screw
② Cover
③ SIM Card Cage 2
④ SIM Card Cage 1

Figure 6.11 SIM Card Assembly

3. Open Cage 1 by sliding the silver catch towards the front face of the module and then flip the cage up.
4. If necessary, remove the existing SIM card.
5. Insert a new mini-SIM card into the cage.
6. Flip the cage down and slide the silver catch back to its original position.
7. [Optional] Repeat the steps above to install a second SIM card in Cage 2.
8. Place the cover on the module housing and install the four screws removed previously.
9. Install the module back into the chassis. For more information, refer to the *Installation Guide* for the host device.
10. Configure the SIM cards. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Connecting Antennas

To connect a 3G multi-band antenna, do the following:

⚠ 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.

NOTICE

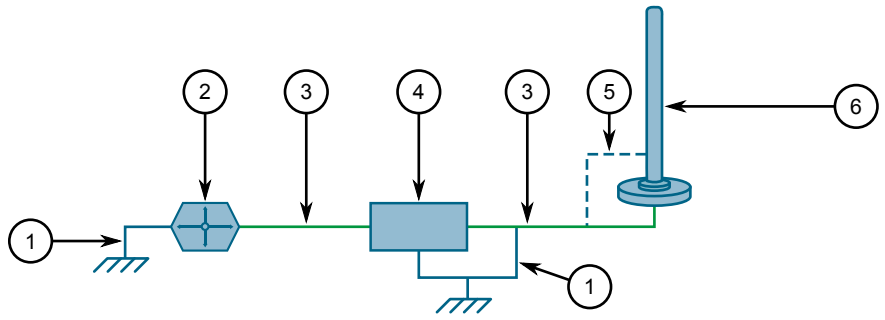
- Antenna installation must be as per Article 810 of the National Electric Code (NEC). Specifically, the grounding conductor must not be less than 10 AWG (Cu). The scheme should be either:
  - In accordance with UL 96 and 96A Lightning Protection Components and Installation Requirements for Lightning Protection Systems (LPS)
  - Tested in accordance with UL 50 and UL 497
- A Radio Frequency (RF) site survey is recommended prior to any installation to help determine the best location for the LTE and GPS antennas. For assistance, contact a Siemens Sales representative.
- The cellular modem supports SISO (Single Input Single Output) and MIMO (Multiple Input Multiple Output) modes. At minimum, a single antenna connected to the ANT1 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.
- For mobile and fixed operating configurations, in accordance with R&TTE Directive 1999/5/EC, the maximum antennae gain is 3 dBi for 900 MHz, 1800 MHz, 2100 MHz and 2600 MHz.
- 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.
- If the device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.
- If two or more antennas are to be installed, the antennas must be separated by a minimum distance of 20 cm (7.9 in).

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.

2. Using shielded coaxial cables, connect the antenna to the lightning protector. Make sure the cables are routed away from any noise sources, such as Switch-Mode Power Supplies (SMPS).



① Drain Wire
② RUGGEDCOM RX1500
③ Shielded Coaxial Cable
④ Lightning Protector
⑤ Ground Wire
⑥ Antenna

Figure 6.12 Antenna and Lightning Protector Assembly

3. Connect the lightning protector to the appropriate antenna port on the module.
   - If the antenna is a primary antenna, connect the cable to the **ANT. 1** or **ANT. 2** port
   - If the antenna is a diversity (secondary) antenna, connect the cable to the **RX. Div. 1** or **RX. Div. 2** port

Technical Specifications

General

Services	EVDO Rev. A
Region	North America (Verizon)
Connector	50 Ω SMA
Antennas	2 x EVDO Rev A, 2 x Receive Diversity (Secondary)
SIM	Dual Mini-SIM (2FF)

Typical Radio Frequency (RF)

System/Operating Band	Frequency Band (MHz)		Conducted Tx Power (dBm)
	Transmit (Tx)	Receive (Rx)	
PCS	1851 to 1910	1930 to 1990	23 to 25
Cellular	824 to 849	869 to 894	

Supported WCDMA Frequency Bands

Band	Frequency Range			
	Tx (MHz)	VSWR	Rx (MHz)	VSWR
Band I WCDMA 2100	1920 to 1980	< 2.5:1	2110 to 2170	< 3.5:1
Band II WCDMA 1900	1850 to 1910	< 2.5:1	1930 to 1990	< 2.5:1
Band VIII WCDMA 900	880 to 915	< 2.5:1	925 to 960	< 3.5:1
Band V WCDMA 850	824 to 849	< 2.5:1	869 to 894	< 3.5:1
Band VI WCDMA 800	830 to 840	< 2.5:1	875 to 885	< 3.5:1
GSM 850	824 to 849	< 2.5:1	869 to 894	< 3.5:1
EGSM 900	880 to 915	< 2.5:1	925 to 960	< 3.5:1
GSM 1800	1710 to 1785	< 2.5:1	1805 to 1880	< 3.5:1
GSM 1900	1850 to 1910	< 2.5:1	1930 to 1990	< 2.5:1

RX Diversity Support and Maximum Allowable Gain per WCDMA Frequency Band

Band	RX Diversity Support	Maximum Allowable Gain (dBi)
Band I WCDMA 2100	✓	4
Band II WCDMA 1900	✓	4
Band VIII WCDMA 900	✓	5
Band V WCDMA 850	✓	5
Band VI WCDMA 800	✓	5
GSM 850	×	5
EGSM 900	×	5
GSM 1800	×	4
GSM 1900	×	4

Operating Temperature

Operating Temperature	Compliance
-30 to 60 °C (-22 to 140 °F)	Full Radio Frequency (RF) compliance
60 to 75 °C (140 to 167 °F)	Reduced Radio Frequency (RF) performance

Certification

This module has been certified to comply with the requirements of the relevant standards.

NOTICE
If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

Certification	Details
Verizon Wireless	This module is certified by Verizon Wireless in North America under Open Development Certification Agreement MA-004198-2012.

Ordering Information

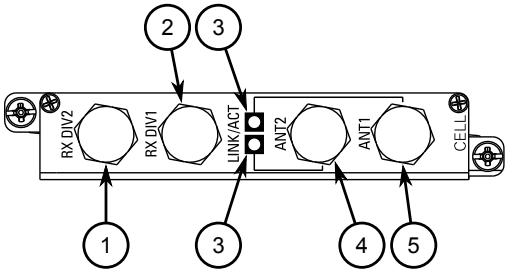
Description	2 x EVDO rev A Verizon US
Article Numbers	6GK6015-0AL20-0WE0 (Standard) 6GK6015-0AL20-0WE1 (Conformal Coated)

6.5 RUGGEDCOM RX1500PN LM W32

The RUGGEDCOM RX1500PN LM W32 module offers GSM/EDGE/HSPA+ and EVDO Rev A capabilities for wireless remote access to the 3G (third generation) networks in North America(AT&T and Verizon). It supports dual primary antennas and optional diversity antennas to improve radio signal strength.

The primary antenna ports features a dedicated LED that indicates its link/activity state.

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



① Rx. Div. 1 Port (GSM/EDGE/HSPA+)
② Rx. Div. 2 Port (EVDO Rev A)
③ LED
④ Ant. 1 Port (GSM/EDGE/HSPA+)
⑤ Ant. 2 Port (EVDO Rev A)

Figure 6.13 RUGGEDCOM RX1500PN LM W32

General Safety Notices

⚠ WARNING

Radio interference hazard – risk of death, serious personal injury or equipment damage.

Do not operate the cellular modem in the following areas:

- Areas where explosives are actively used
- In explosive atmospheres, such as refueling stations, fuel depots, chemical plants, underground mining operations, etc.
- Near medical or life support equipment or devices
- In any aircraft, whether in flight or on the ground (unless permitted by the aircraft operator)

In such areas, the cellular modem must be disabled via host device's operating system. Otherwise the cellular modem can transmit signals that may interfere with nearby equipment that is susceptible to radio interference.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

NOTICE

If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

⚠ WARNING

Radiation hazard – risk of Radio Frequency (RF) exposure

The device must be placed at a distance of at least 20 cm (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.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

Installation Requirements

The cellular modem module is approved for modular use in mobile applications. The module, as part of the RUGGEDCOM RX1500, can be integrated into a final product without additional certification from the Federal Communications Commission (FCC) or Industry Canada (IC) if the application meets the following requirements:

Note
If this module is integrated into a portable device, separate approval related to the Specific Absorption Rate (SAR) requirements of FCC Part 2.1093 and IC RSS-102 is required.

- Persons in the area must be kept at least 20 cm (8 in) from the antenna at all times.

- The antenna gain, including cable loss, must not exceed the maximum allowable gain specified for the module.
- The cellular modem and antenna must not be next to or operate in conjunction with another transmitter or antenna within a host device.
- A label must be affixed to the end product that indicates the FCC and Industry Canada IDs for the cellular modem.
- The user documentation for the end product must clearly indicate the operating requirements and conditions that comply with current FCC and IC radio frequency exposure guidelines.
- The end product must comply with the unintentional emission testing requirements of FCC Part 15.

If the application does not meet these requirements, further certification is required.

Installing the Module

To install the module, do the following:

1. Open the module and install a mini-SIM card for each network carrier.
2. Insert the module into the host device. For more information, refer to the *Installation Guide* for the device.
3. Connect antennas.

Installing SIM Cards

The line module requires at least one active mini-SIM card (2FF size format) for the primary antenna to connect with the associated network carrier. A second SIM card can be installed for redundancy if needed.

To install one or more SIM cards, do the following:

⚠ CAUTION

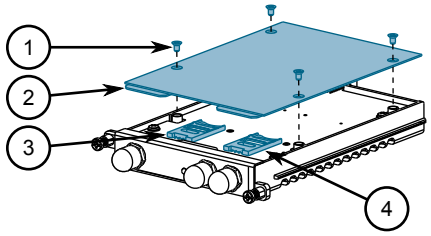
Static electricity hazard – risk of damage to equipment

Make sure to take appropriate anti-static precautions before opening the cellular modem module.

Note
The module only supports mini-SIM cards (2FF size format).

1. Remove the line module from the chassis. For more information, refer to the *Installation Guide* for the host device.

2. On the smooth side of the module, remove the four screws and separate the cover from the module housing.



① Screw
② Cover
③ SIM Card Cage 2
④ SIM Card Cage 1

Figure 6.14 SIM Card Assembly

3. Open Cage 1 by sliding the silver catch towards the front face of the module and then flip the cage up.
4. If necessary, remove the existing SIM card.
5. Insert a new mini-SIM card into the cage.
6. Flip the cage down and slide the silver catch back to its original position.
7. [Optional] Repeat the steps above to install a second SIM card in Cage 2.
8. Place the cover on the module housing and install the four screws removed previously.
9. Install the module back into the chassis. For more information, refer to the *Installation Guide* for the host device.
10. Configure the SIM cards. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Connecting Antennas

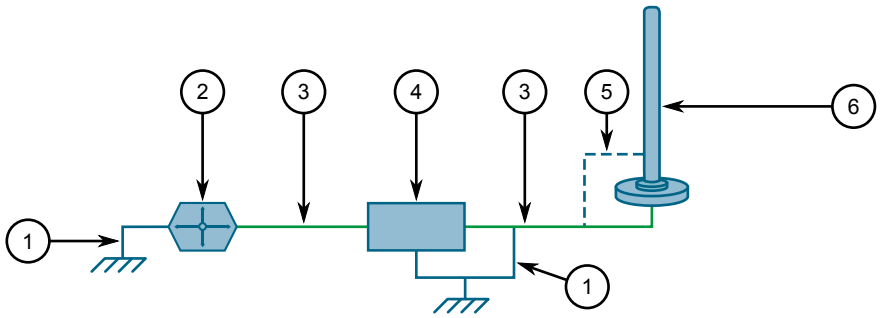
To connect a 3G multi-band antenna, do the following:

NOTICE
If two antennas are to be installed, the antennas must be separated by a minimum distance of 20 cm (7.9 in).

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.

2. Using shielded coaxial cables, connect the antenna to the lightning protector. Make sure the cables are routed away from any noise sources, such as Switch-Mode Power Supplies (SMPS).



① Drain Wire
② RUGGEDCOM RX1500
③ Shielded Coaxial Cable
④ Lightning Protector
⑤ Ground Wire
⑥ Antenna

Figure 6.15 Antenna and Lightning Protector Assembly

3. Connect the lightning protector to the appropriate antenna port on the module.
   - For a primary GSM/EDGE/HSPA+ antenna, connect the cable to the **Ant. 1** port
   - For a primary EVDO Rev A antenna, connect the cable to the **Ant. 3** port
   - For a GSM/EDGE/HSPA+ diversity (secondary) antenna, connect the cable to the **RX. Div. 1** port
   - For a EVDO Rev A diversity (secondary) antenna, connect the cable to the **RX. Div. 2** port

Technical Specifications

General

Services	GSM/EDGE/HSPA+ and EVDO Rev. A
Region	North America (AT&T and Verizon)
Connector	50 Ω SMA
Antennas	1 x GSM/EDGE/HSPA+, 1 x EVDO Rev A, 2 x Receive Diversity (Secondary)
SIM	Dual Mini-SIM (2FF)

Conducted Transmit (Tx) Power Tolerances

System/Operating Band	Frequency Band (MHz)	Conducted Tx Power (dBm)	Comment
GSM-850 and GSM-900	850/900	+32 ± 1	GMSK mode, connectorized (class 4)
		+27 ± 1	8PSK mode, connectorized (class E2)
DCS-1800 and PCS-19001	1800/1900	+29 ± 1	GMSK mode, connectorized (class 1)
		+26 ± 1	8PSK mode, connectorized (class E2)
Band I	2100	+23 ± 1	AMR 12.2 kbps, connectorized (class 3)
Band II, V, VI and VIII	800, 850, 900 and 1900		

Typical Radio Frequency (RF)

System/Operating Band	Frequency Band (MHz)		Conducted Tx Power (dBm)
	Transmit (Tx)	Receive (Rx)	
PCS	1851 to 1910	1930 to 1990	23 to 25
Cellular	824 to 849	869 to 894	

Supported WCDMA Frequency Bands

Band	Frequency Range			
	Tx (MHz)	VSWR	Rx (MHz)	VSWR
Band I WCDMA 2100	1920 to 1980	< 2.5:1	2110 to 2170	< 3.5:1
Band II WCDMA 1900	1850 to 1910	< 2.5:1	1930 to 1990	< 2.5:1
Band VIII WCDMA 900	880 to 915	< 2.5:1	925 to 960	< 3.5:1
Band V WCDMA 850	824 to 849	< 2.5:1	869 to 894	< 3.5:1
Band VI WCDMA 800	830 to 840	< 2.5:1	875 to 885	< 3.5:1
GSM 850	824 to 849	< 2.5:1	869 to 894	< 3.5:1
EGSM 900	880 to 915	< 2.5:1	925 to 960	< 3.5:1
GSM 1800	1710 to 1785	< 2.5:1	1805 to 1880	< 3.5:1
GSM 1900	1850 to 1910	< 2.5:1	1930 to 1990	< 2.5:1

RX Diversity Support and Maximum Allowable Gain per WCDMA Frequency Band

Band	RX Diversity Support	Maximum Allowable Gain (dBi)
Band I WCDMA 2100	✓	4
Band II WCDMA 1900	✓	4
Band VIII WCDMA 900	✓	5

Band	RX Diversity Support	Maximum Allowable Gain (dBi)
Band V WCDMA 850	✓	5
Band VI WCDMA 800	✓	5
GSM 850	×	5
EGSM 900	×	5
GSM 1800	×	4
GSM 1900	×	4

Operating Temperature

Radio	Operating Temperature	Compliance
First	-25 to 60 °C (-13 to 140 °F)	Full Radio Frequency (RF) compliance
	60 to 75 °C (140 to 167 °F)	Reduced Radio Frequency (RF) performance
Second	-30 to 60 °C (-22 to 140 °F)	Full Radio Frequency (RF) compliance
	60 to 75 °C (140 to 167 °F)	Reduced Radio Frequency (RF) performance

Certification

This module has been certified to comply with the requirements of the relevant standards.

NOTICE
If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

Certification	Details
FCC	This module is certified under Part 15 (subpart B) of the FCC Rules and has been assigned the product IDs N7NMC8705 and N7N-MC5728.
Industry Canada	This module is certified under IC CS-03 Part II, Issue 9 and has been assigned the product IDs 2417C-MC8705 and 2417C-MC5728.
AT&T	This module has been assigned the FCC product ID N7N-MC8705 and N7N-MC5728. This module has been assigned the Industry Canada product IDs 2417C-MC8705 and 2417C-MC5728.
Verizon Wireless	This module is certified by Verizon Wireless in North America under Open Development Certification Agreement MA-004198-2012.

Ordering Information

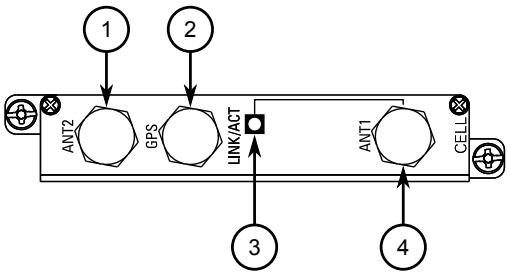
Description	2 x GSM/EDGE/HSPA and EVDO rev A Verizon US
Article Numbers	6GK6015-0AL20-0WF0 (Standard) 6GK6015-0AL20-0WF1 (Conformal Coated)

6.6 RUGGEDCOM RX1500PN LM W41

The RUGGEDCOM RX1500PN LM W41 module offers 4G LTE, HSPA+, HSDPA, HSUPA, DC-HSPA+, UMTS/WCDAM, EDGE, GPRS, GSM and GNSS capabilities for wireless remote access to 4G (fourth generation) LTE (Long Term Evolution) networks in European Union countries. It supports dual 4G LTE antennas and a single GPS antenna.

The primary 4G LTE antenna port features a dedicated LED that indicates its link/activity state.

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



① ANT2 Port
② GPS Port
③ LINK/ACT LED
④ ANT1 Port

Figure 6.16 RUGGEDCOM RX1500PN LM W41

General Safety Notices

⚠ WARNING

Radio interference hazard – risk of death, serious personal injury or equipment damage.

Do not operate the cellular modem in the following areas:

- Areas where explosives are actively used
- In explosive atmospheres, such as refueling stations, fuel depots, chemical plants, underground mining operations, etc.
- Near medical or life support equipment or devices
- In any aircraft, whether in flight or on the ground (unless permitted by the aircraft operator)

In such areas, the cellular modem must be disabled via host device's operating system. Otherwise the cellular modem can transmit signals that may interfere with nearby equipment that is susceptible to radio interference.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

NOTICE

If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

⚠ WARNING

Radiation hazard – risk of Radio Frequency (RF) exposure

The device must be placed at a distance of at least 20 cm (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.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

Installing the Module

To install the module, do the following:

1. Open the module and install a mini-SIM card for each network carrier.
2. Insert the module into the host device. For more information, refer to the *Installation Guide* for the device.
3. Connect antennas.
4. Configure the LTE modem and GPS settings. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Installing/Removing the SIM Card

The line module requires at least one active mini-SIM card (2FF size format) for each antenna to connect with the associated network carrier. A second SIM card can be installed for redundancy if needed.

To install or remove a SIM card, do the following:

⚠ CAUTION

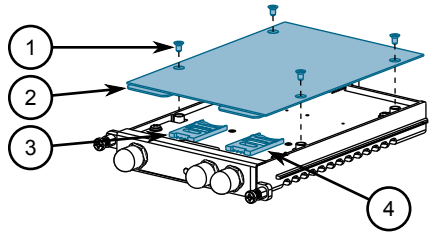
Static electricity hazard – risk of damage to equipment

Make sure to take appropriate anti-static precautions before opening the cellular modem module.

Note

The module only supports mini-SIM cards (2FF size format).

1. If necessary, remove the line module from the chassis. For more information, refer to the *Installation Guide* for the host device.
2. On the smooth side of the module, remove the four screws and separate the cover from the module housing.



① Screw
② Cover
③ SIM Card Cage 2
④ SIM Card Cage 1

Figure 6.17 SIM Card Assembly

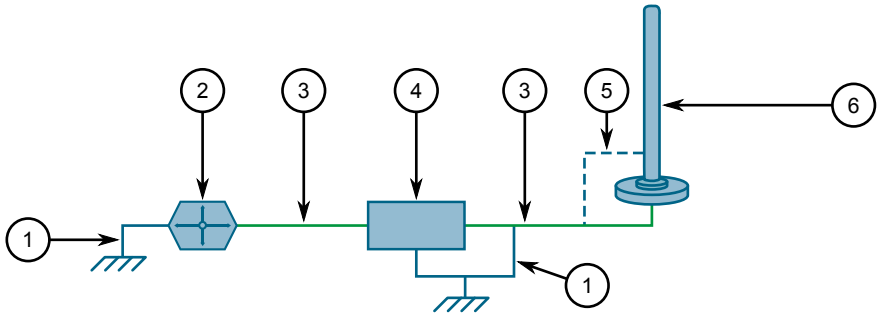
3. Open Cage 1 by sliding the silver catch towards the front face of the module and then flip the cage up.
4. If necessary, remove the existing SIM card.
5. Insert a new mini-SIM card into the cage.
6. Flip the cage down and slide the silver catch back to its original position.
7. [Optional] Repeat the steps above to install a second SIM card in Cage 2.
8. Place the cover on the module housing and install the four screws removed previously.
9. Install the module back into the chassis. For more information, refer to the *Installation Guide* for the host device.

10. Configure the SIM cards. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Connecting Antennas

To connect a 4G LTE multi-band or GPS antenna to the cellular modem line module, 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.
2. Using shielded coaxial cables, connect the antenna to the lightning protector. Make sure the cables are routed away from any noise sources, such as Switch-Mode Power Supplies (SMPS).



① Drain Wire
② RUGGEDCOM RX1500
③ Shielded Coaxial Cable
④ Lightning Protector
⑤ Ground Wire
⑥ Antenna

Figure 6.18 Antenna and Lightning Protector Assembly

3. Connect the lightning protector to the appropriate antenna port on the device:
   - For a primary antenna, connect the cable to the **ANT1** port
   - For a diversity (secondary) antenna, connect the cable to the **ANT2** port
   - For the GPS antenna, connect the cable to the **GPS** port

Technical Specifications

General

Services	4G LTE/HSPA+/HSDPA/HSUPA/DC-HSPA+/UMTS/WCDAM/EDGE/GPRS/GSM/GNSS
Region	European Union
Connector	50 Ω SMA
Antennas	1 x LTE Main, 1 x LTE MIMO, 1 x GPS

SIM	Dual Mini-SIM (2FF)

Supported LTE Channel Bandwidths

Band	Channel Bandwidths (MHz)					
	1.4	3	5	10	15	20
Band 1	×	×	✓	✓	✓	✓
Band 3	✓	✓	✓	✓	✓	✓
Band 7	×	×	✓	✓	✓	✓
Band 8	✓	✓	✓	✓	×	×
Band 20	×	×	✓	✓	✓	✓

Supported LTE Frequency Bands

Band	Frequencies (MHz)	
	Transmit (Tx)	Receive (Rx)
Band 1	1920 to 1980	2110 to 2170
Band 3	1710 to 1785	1805 to 1880
Band 7	2500 to 2570	2620 to 2690
Band 8	880 to 915	925 to 960
Band 20	832 to 862	791 to 821

Supported WCDMA Frequency Bands

Band	Frequencies (MHz)	
	Transmit (Tx)	Receive (Rx)
Band 1 (WCDMA 2100)	1920 to 1980	2110 to 2170
Band 2 (WCDMA 1900)	1850 to 1910	1930 to 1990
Band 5 (WCDMA 850)	824 to 849	869 to 894
Band 6 (WCDMA 800)	830 to 840	875 to 885
Band 8 (WCDMA 900)	880 to 915	925 to 960

Supported GSM Frequency Bands

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

GNSS Specifications

Satellite Channels	12 channel, continuous tracking
Protocols	NMEA 0183 v3.0
Acquisition Time	• Hot start: 1 s • Warm start: 29 s

	• Cold start: 32 s
Accuracy	• Horizontal: < 2 m 6.6 ft (50 %), < 5 m or 16.4 ft (90 %) • Altitude: < 4 m or 13.1 (50 %), < 8 m or 26.2 (90 %) • Velocity: < 0.2 m/s or 0.7 ft/s
Sensitivity	• Tracking: -161 dBm[a] • Acquisition (Assisted, Non-LTE): -158 dBm[b] • Acquisition (Assisted, LTE): -153 dBm • Acquisition (Standalone): -145 dBm
Operational Limits	Altitude < 6000 m (3.7 mi) or velocity < 100 m/s (328 ft/s)[c]

[a] The lowest GNSS signal level at which the device can detect an in-view satellite 50% of the time when in sequential tracking mode.
[b] The lowest GNSS signal level at which the device can detect an in-view satellite 50% of the time.
[c] Either limit may be exceeded, but not both

GNSS Standalone Antenna Requirements

Frequency Range	• Narrow-Band GPS: 1572.42 MHz ± 2 MHz minimum • Wide-Band GPS and GLONASS: 1565 to 1606 MHz recommended
Field of View (FoV)	• Omni-directional in azimuth • -45° to 90° in elevation
Polarization (average Gv/Gh)	> 0 dB[a]
Free space average gain (Gv +Gh) over FoV	> -3 (preferred) or -6 dBi[b]
Gain	• Maximum gain and uniform coverage in the high elevation angle and zenith • Gain in azimuth plane is not desired
Average 3D gain	> -5 dBi
Isolation between GNSS and LTE Main (Primary)	> 10 dB in all uplink bands
Typical VSWR	< 2:5:1
Polarization	Any other than LHCP (Left-Hand Circular Polarized) is acceptable.

[a] Vertical linear polarization is sufficient.
[b] Gv and Gh are measured and averaged over -45 to 90° in elevation, and ± 180° in azimuth.

Conducted Rx (Receive) Sensitivity for LTE Bands

Band	Conducted Rx Sensitivity (dBm)			
	Primary (Typical)	Secondary (Typical)	SIMO (Typical)	SIMO (Worst Case)
Band 1	-98.7	-97.8	-101.1	-96.3
Band 3	-99.5	-97.3	-101.6	-93.3
Band 7	-98.0	-97.5	-100.5	-94.3
Band 8	-99.3	-98.5	-102.0	-93.3
Band 20	-99.6	-98.4	-99.8	-93.3

Conducted Rx (Receive) Sensitivity for UMTS Bands

Band	Error Rate[a]	Conducted Rx Sensitivity (dBm)		
		Primary (Typical)	Secondary (Typical)	Primary/Secondary (Worst Case)
Band 1 (UMTS 2100)	0.1% BER	-111.4	-109.8	-106.7
Band 2 (UMTS 1900)		-110.8	-108.9	-104.7
Band 5 (UMTS 850)		-111.4	-111.2	-104.7
Band 8 (UMTS 900)		-111.8	-111.0	-103.7

[a] Measured at 12.2 kbps

Conducted Rx (Receive) Sensitivity for GSM/EDGE Bands

Band	Error Rate	Modulation	Conducted Rx Sensitivity (dBm)	
			Typical	Worst Case
GSM 850	2 % BER	CS[a]	-109	-102
	10 % BLER	GMSK (CS1)	-112	-104
		EDGE (MCS5)	-104	-98
EGSM 900	2 % BER	CS[a]	-109	-102
	10 % BLER	GMSK (CS1)	-112	-104
		EDGE (MCS5)	-104	-98
DCS 1800	2 % BER	CS[a]	-110	-102
	10 % BLER	GMSK (CS1)	-112	-104
		EDGE (MCS5)	-105	-98
PCS 1900	2 % BER	CS[a]	-109	-102
	10 % BLER	GMSK (CS1)	-112	-104
		EDGE (MCS5)	-104	-98

[a] Circuit Switched

Conducted Tx (Transmit) Power Tolerances

Standard	Band	Conducted Tx Power
LTE	Band 1	+23 dBm ± 1 dB
	Band 3	
	Band 7	+22 dBm ± 1 dB
	Band 8	+23 dBm ± 1 dB
	Band 20	
UMTS	Band 1 (IMT 2100 12.2 kbps)	+23 dBm ± 1 dB[a]
	Band 2 (UMTS 1900 12.2 kbps)	
	Band 5 (UMTS 850 12.2 kbps)	
	Band 8 (UMTS 900 12.2 kbps)	
GSM/EDGE	GSM 850 CS	+ 32 dBm ± 1 dB[b]
	EGSM 900 CS	+ 27 dBm ± 1 dB[c]
	DCS 1800 CS	+ 29 dBm ± 1 dB[d]

Standard	Band	Conducted Tx Power
	PCS 1900 CS	+ 26 dBm ± 1 dB[e]

[a] Connectorized (Class 3)
[b] GMSK mode, connectorized (Class 4, 2 W, 33 dBm)
[c] 8PSK mode, connectorized (Class E2, 0.5 W, 27 dBm)
[d] GMSK mode, connectorized (Class 1, 1 W, 30 dBm)
[e] 8PSK mode, connectorized (Class E2, 0.4 W, 26 dBm)

Operating Temperature

Operating Temperature	Compliance
-30 to 70 °C (-22 to 158 °F)	Class A (3GPP Compliant)
-40 to 85 °C (-40 to 185 °F)	Class B (Operational, Non-3GPP Compliant)

Certification

This module has been certified to comply with the requirements of the relevant standards.

Certification	Details
European Union (EU)	This module is marked with a CE marking and notified body number, and can be used throughout the European community. CE 0680 A copy of the CE Declaration of Conformity is available from Siemens AG. For contact information, refer to "Contacting Siemens (Page vii)".

Ordering Information

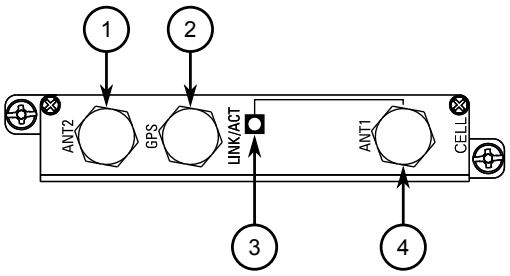
Description	1 x 4G/LTE European Union (EU)
Article Numbers	6GK6015-0AL20-0WG0 (Standard) 6GK6015-0AL20-0WG1 (Conformal Coated)

6.7 RUGGEDCOM RX1500PN LM W51

The RUGGEDCOM RX1500PN LM W51 module offers 4G LTE, HSPA+, HSDPA, HSUPA, DC-HSAP+, UMTS/WDCAM, EDGE, GPRS, GSM, CDMA, EVDO and GNSS capabilities for wireless remote access to 4G (fourth generation) LTE (Long Term Evolution) networks in North America. It supports dual 4G LTE antennas and a single GPS antenna.

The primary 4G LTE antenna port features a dedicated LED that indicates its link/activity state.

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



① ANT2 Port
② GPS Port
③ LINK/ACT LED
④ ANT1 Port

Figure 6.19 RUGGEDCOM RX1500PN LM W51

General Safety Notices

⚠ WARNING

Radio interference hazard – risk of death, serious personal injury or equipment damage.

Do not operate the cellular modem in the following areas:

- Areas where explosives are actively used
- In explosive atmospheres, such as refueling stations, fuel depots, chemical plants, underground mining operations, etc.
- Near medical or life support equipment or devices
- In any aircraft, whether in flight or on the ground (unless permitted by the aircraft operator)

In such areas, the cellular modem must be disabled via host device's operating system. Otherwise the cellular modem can transmit signals that may interfere with nearby equipment that is susceptible to radio interference.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

NOTICE

If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

⚠ WARNING

Radiation hazard – risk of Radio Frequency (RF) exposure

The device must be placed at a distance of at least 20 cm (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.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

Installation Requirements

The cellular modem module is approved for modular use in mobile applications. The module, as part of the RUGGEDCOM RX1500, can be integrated into a final product without additional certification from the Federal Communications Commission (FCC) or Industry Canada (IC) if the application meets the following requirements:

Note
If this module is integrated into a portable device, separate approval related to the Specific Absorption Rate (SAR) requirements of FCC Part 2.1093 and IC RSS-102 is required.

- Persons in the area must be kept at least 20 cm (8 in) from the antenna at all times.

- The antenna gain, including cable loss, must not exceed the maximum allowable gain specified for the module.
- The cellular modem and antenna must not be next to or operate in conjunction with another transmitter or antenna within a host device.
- A label must be affixed to the end product that indicates the FCC and Industry Canada IDs for the cellular modem.
- The user documentation for the end product must clearly indicate the operating requirements and conditions that comply with current FCC and IC radio frequency exposure guidelines.
- The end product must comply with the unintentional emission testing requirements of FCC Part 15.

If the application does not meet these requirements, further certification is required.

Installing the Module

To install the module, do the following:

1. Open the module and install a mini-SIM card for each network carrier.
2. Insert the module into the host device. For more information, refer to the *Installation Guide* for the device.
3. Connect antennas.
4. Configure the LTE modem and GPS settings. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Installing/Removing the SIM Card

The line module requires at least one active mini-SIM card (2FF size format) for each antenna to connect with the associated network carrier. A second SIM card can be installed for redundancy if needed.

To install or remove a SIM card, do the following:

⚠ CAUTION

Static electricity hazard – risk of damage to equipment

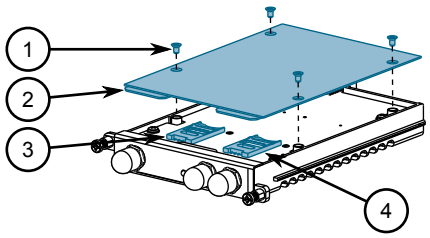
Make sure to take appropriate anti-static precautions before opening the cellular modem module.

Note

The module only supports mini-SIM cards (2FF size format).

1. If necessary, remove the line module from the chassis. For more information, refer to the *Installation Guide* for the host device.

2. On the smooth side of the module, remove the four screws and separate the cover from the module housing.



① Screw
② Cover
③ SIM Card Cage 2
④ SIM Card Cage 1

Figure 6.20 SIM Card Assembly

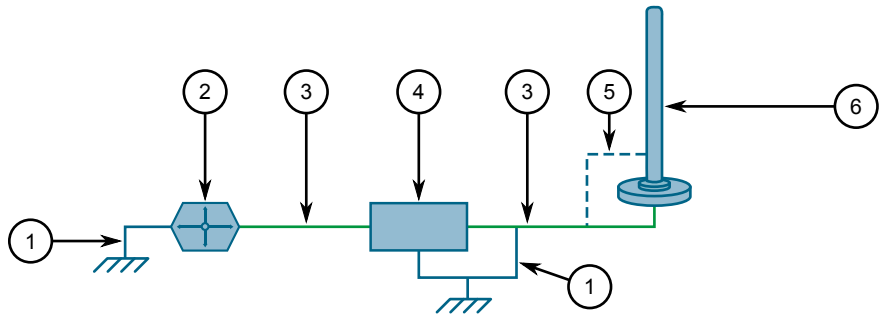
3. Open Cage 1 by sliding the silver catch towards the front face of the module and then flip the cage up.
4. If necessary, remove the existing SIM card.
5. Insert a new mini-SIM card into the cage.
6. Flip the cage down and slide the silver catch back to its original position.
7. [Optional] Repeat the steps above to install a second SIM card in Cage 2.
8. Place the cover on the module housing and install the four screws removed previously.
9. Install the module back into the chassis. For more information, refer to the *Installation Guide* for the host device.
10. Configure the SIM cards. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Connecting Antennas

To connect a 4G LTE multi-band or GPS antenna to the cellular modem line module, 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.

2. Using shielded coaxial cables, connect the antenna to the lightning protector. Make sure the cables are routed away from any noise sources, such as Switch-Mode Power Supplies (SMPS).



① Drain Wire
② RUGGEDCOM RX1500
③ Shielded Coaxial Cable
④ Lightning Protector
⑤ Ground Wire
⑥ Antenna

Figure 6.21 Antenna and Lightning Protector Assembly

3. Connect the lightning protector to the appropriate antenna port on the device:
   - For a primary antenna, connect the cable to the **ANT1** port
   - For a diversity (secondary) antenna, connect the cable to the **ANT2** port
   - For the GPS antenna, connect the cable to the **GPS** port

Technical Specifications

General

Services	4G LTE/HSPA+/HSDPA/HSUPA/DC-HSAP+/UMTS/WDCAM/EDGE/GPRS/GSM/CDMA/EVDO/GNSS
Region	North America (Bell, Rogers, AT&T, Telus)
Connector	50 Ω SMA
Antennas	1 x LTE Main, 1 x LTE MIMO, 1 x GPS
SIM	Dual Mini-SIM (2FF)

Supported RF Bandwidths

Standard	Bands	Notes	Data Rates
LTE	• Band 2 (1900 MHz) • Band 4 (AWS 1700/2100 MHz) • Band 5 (850 MHz) • Band 13 (700 MHz) • Band 17 (700 MHz)	MIMO support	Category 3 **Downlink** • 100 Mbps (20 MHz bandwidth) • 50 Mbps (10 MHz bandwidth)

Standard	Bands	Notes	Data Rates
	• Band 25 (1900 MHz G Block)		**Uplink** • 50 Mbps (20 MHz bandwidth) • 25 Mbps (10 MHz bandwidth)
CDMA EVDO Release 0 or EVDO Release A	• Band Class 0 (Cellular 800 MHz) • Band Class 1 (PCS 1900 MHz) • Band Class 10 (Secondary 800 MHz)	Diversity support	**CDMA IS-856 (1xEVDO Release A)** • Up to 3.1 Mbps forward channel • Up to 1.8 Mbps reverse channel **CDMA IS-2000** • Up to 153 kbps, simultaneous forward and reverse channel **Circuit-Switched Data Bearers** • Up to 14.4 kbps
UMTS (WCDMA) HSDPA HSUPA HSPA+ DC-HSPA+	• Band 1 (2100 MHz) • Band 2 (1900 MHz) • Band 4 (AWS 1700/2100 MHz) • Band 5 (850 MHz) • Band 8 (900 MHz)	Diversity support	**Downlink** • Up to 42 Mbps (category 24) **Uplink** • Up to 5.76 Mbps (category 6)
GSM GPRS EDGE	• GSM 850 (850 MHz) • EGSM 900 (900 MHz) • DCS 1800 (1800 MHz) • PCS 1900 (1900 MHz)		**EDGE Throughput** • Up to 236 kbps
GNSS	• GPS (1575.42 MHz) • GLONASS (1602 MHz)		

Supported LTE Channel Bandwidths

Band	Channel Bandwidths (MHz)					
	1.4	3	5	10	15	20
Band 2	✓	✓	✓	✓	✓	✓
Band 4 (AWS)	✓	✓	✓	✓	✓	✓
Band 5	✓	✓	✓	✓	×	×
Band 13	×	×	✓	✓	×	×
Band 17	×	×	✓	✓	×	×
Band 25	✓	✓	✓	✓	✓	✓

Supported LTE Frequency Bands

Band	Frequencies (MHz)	
	Transmit (Tx)	Receive (Rx)
Band 2	1850 to 1910	1930 to 1990

Band	Frequencies (MHz)	
	Transmit (Tx)	Receive (Rx)
Band 4 (AWS)	1710 to 1755	2110 to 2155
Band 5	824 to 849	869 to 894
Band 13	777 to 787	746 to 756
Band 17	704 to 716	734 to 746
Band 25	1850 to 1915	1930 to 1995

Supported WCDMA Frequency Bands

Band	Frequencies (MHz)	
	Transmit (Tx)	Receive (Rx)
Band 1 (WCDMA 2100)	1920 to 1980	2110 to 2170
Band 2 (WCDMA 1900)	1850 to 1910	1930 to 1990
Band 4 (AWS 1700/2100)	1710 to 1755	2110 to 2155
Band 5 (WCDMA 850)	824 to 849	869 to 894
Band 8 (WCDMA 900)	880 to 915	925 to 960

Supported GSM Frequency Bands

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

Supported CDMA Frequency Bands

Band	Frequencies (MHz)	
	Transmit (Tx)	Receive (Rx)
Band Class 0 (Cellular 800 MHz)	824 to 849	869 to 894
Band Class 1 (PCS 1900 MHz)	1850 to 1910	1930 to 1990
Band Class 10 (Secondary 800 MHz)[a]	817 to 824	861 to 869

[a] Subclass 2 and 3 are supported

GNSS Specifications

Satellite Channels	12 channel, continuous tracking
Protocols	NMEA 0183 v3.0
Acquisition Time	• Hot start: 1 s • Warm start: 29 s • Cold start: 32 s
Accuracy	• Horizontal: < 2 m 6.6 ft (50 %), < 5 m or 16.4 ft (90 %) • Altitude: < 4 m or 13.1 (50 %), < 8 m or 26.2 (90 %) • Velocity: < 0.2 m/s or 0.7 ft/s

Sensitivity	• Tracking: -161 dBm[a] • Acquisition (Assisted, Non-LTE): -158 dBm[b] • Acquisition (Assisted, LTE): -153 dBm • Acquisition (Standalone): -145 dBm
Operational Limits	Altitude < 6000 m (3.7 mi) or velocity < 100 m/s (328 ft/s)[c]

[a] The lowest GNSS signal level at which the device can detect an in-view satellite 50% of the time when in sequential tracking mode.
[b] The lowest GNSS signal level at which the device can detect an in-view satellite 50% of the time.
[c] Either limit may be exceeded, but not both

GNSS Standalone Antenna Requirements

Frequency Range	• Narrow-Band GPS: 1572.42 MHz ± 2 MHz minimum • Wide-Band GPS and GLONASS: 1565 to 1606 MHz recommended
Field of View (FoV)	• Omni-directional in azimuth • -45° to 90° in elevation
Polarization (average Gv/Gh)	> 0 dB[a]
Free space average gain (Gv +Gh) over FoV	> -3 (preferred) or -6 dBi[b]
Gain	• Maximum gain and uniform coverage in the high elevation angle and zenith • Gain in azimuth plane is not desired
Average 3D gain	> -5 dBi
Isolation between GNSS and LTE Main (Primary)	> 10 dB in all uplink bands
Typical VSWR	< 2:5:1
Polarization	Any other than LHCP (Left-Hand Circular Polarized) is acceptable.

[a] Vertical linear polarization is sufficient.
[b] Gv and Gh are measured and averaged over -45 to 90° in elevation, and ± 180° in azimuth.

Conducted Rx (Receive) Sensitivity for LTE Bands

LTE Band	Conducted Rx Sensitivity (dBm)			
	Primary (Typical)	Secondary (Typical)	SIMO (Typical)	SIMO (Worst Case)
LTE Band 2	-99.1	-98.2	-101.6	-94.3
LTE Band 4	-99.7	-98.9	-102.4	-96.3
LTE Band 5	-98.0	-99.1	-101.5	-94.3
LTE Band 13	-98.7	-99.1	-101.9	-96.3
LTE Band 17	-99.7	-99.0	-101.1	-93.3
LTE Band 25	-99.8	-98.1	-101.4	-92.8

Conducted Rx (Receive) Sensitivity for UMTS Bands

Band	Error Rate[a]	Conducted Rx Sensitivity (dBm)		
		Primary (Typical)	Secondary (Typical)	Primary/Secondary (Worst Case)
Band 1 (UMTS 2100)	0.1% BER	-111.0	-110.4	-106.7
Band 2 (UMTS 1900)		-111.4	-110.5	-104.7
Band 4 (AWS 1700/2100)		-112.1	-110.6	-106.7
Band 5 (UMTS 850)		-110.8	-111.7	-104.7
Band 8 (UMTS 900)		-111.8	-111.5	-103.7

[a] Measured at 12.2 kbps

Conducted Rx (Receive) Sensitivity for GSM/EDGE Bands

Band	Error Rate	Modulation	Conducted Rx Sensitivity (dBm)	
			Typical	Worst Case
GSM 850	2 % BER	CS[a]	-109	-102
	10 % BLER	GMSK (CS1)	-111	-104
		EDGE (MCS5)	-102	-98
EGSM 900	2 % BER	CS[a]	-109	-102
	10 % BLER	GMSK (CS1)	-111	-104
		EDGE (MCS5)	-102	-98
DCS 1800	2 % BER	CS[a]	-108	-102
	10 % BLER	GMSK (CS1)	-111	-104
		EDGE (MCS5)	-101	-98
PCS 1900	2 % BER	CS[a]	-108	-102
	10 % BLER	GMSK (CS1)	-111	-104
		EDGE (MCS5)	-101	-98

[a] Circuit Switched

Conducted Rx (Receive) Sensitivity for CDMA Bands

Band	Standard	Error Rate	Conducted Rx Sensitivity (dBm)	
			Typical	Worst Case
Band Class 0 (Cellular 800 MHz)	CDMA 1x	0.5% FER	-109.6	-104.0
	EVDO Rev A	0.5% PER	-109.8	-105.5
Band Class 1 (PCS 1900 MHz)	CDMA 1x	0.5% FER	-110.8	-104.0
	EVDO Rev A	0.5% PER	-110.6	-105.5
Band Class 10 (Secondary 800 MHz)	CDMA 1x	0.5% FER	-110.3	-104.0
	EVDO Rev A	0.5% PER	-110.7	-105.5

Conducted Tx (Transmit) Power Tolerances

Standard	Band	Conducted Tx Power
LTE	Band 2	+23 dBm ± 1 dB
	Band 4	

Standard	Band	Conducted Tx Power
	Band 5	
	Band 13	
	Band 17	
	Band 25	
UMTS	Band 1 (IMT 2100 12.2 kbps)	+23 dBm ± 1 dB[a]
	Band 2 (UMTS 1900 12.2 kbps)	
	Band 4 (AWS 1700/2100 12.2 kbps)	
	Band 5 (UMTS 850 12.2 kbps)	
	Band 8 (UMTS 900 12.2 kbps)	
GSM/EDGE	GSM 850 CS	+ 32 dBm ± 1 dB[b]
	EGSM 900 CS	+ 27 dBm ± 1 dB[c]
	DCS 1800 CS	+ 29 dBm ± 1 dB[d]
	PCS 1900 CS	+ 26 dBm ± 1 dB[e]
CDMA	Band Class 0 (Cellular)	+24 dBm +0.5/-1 dB
	Band Class 1 (PCS)	
	Band Class 10 (Cellular)	

[a] Connectorized (Class 3)
[b] GMSK mode, connectorized (Class 4, 2 W, 33 dBm)
[c] 8PSK mode, connectorized (Class E2, 0.5 W, 27 dBm)
[d] GMSK mode, connectorized (Class 1, 1 W, 30 dBm)
[e] 8PSK mode, connectorized (Class E2, 0.4 W, 26 dBm)

Operating Temperature

Operating Temperature	Compliance
-30 to 70 °C (-22 to 158 °F)	Class A (3GPP Compliant)
-40 to 85 °C (-40 to 185 °F)	Class B (Operational, Non-3GPP Compliant)

Certification

This module has been certified to comply with the requirements of the relevant standards.

Certification	Details
FCC	This module is certified under Part 15 (subpart B) of the FCC Rules and has been assigned the product ID N7NMC7355.
Industry Canada	This module is certified under IC CS-03 Part II, Issue 9 and has been assigned the product ID 2417C-MC7355.

Ordering Information

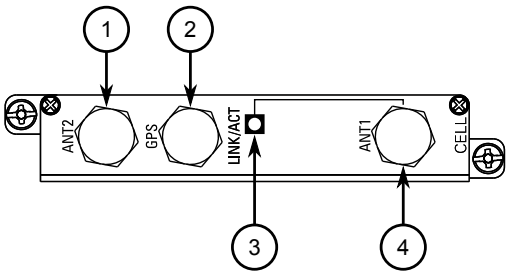
Description	1 x 4G/LTE ATT/Rogers/Telus/Bell
Article Numbers	6GK6015-0AL20-0WH0 (Standard) 6GK6015-0AL20-0WH1 (Conformal Coated)

6.8 RUGGEDCOM RX1500PN LM W61

The RUGGEDCOM RX1500PN LM W61 module offers 4G LTE, HSPA+, CDMA, EVDO, GPS and GNSS capabilities for wireless remote access to 4G (fourth generation) LTE (Long Term Evolution) networks in North America. It supports dual 4G LTE antennas and a single GPS antenna.

The primary 4G LTE antenna port features a dedicated LED that indicates its link/activity state.

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



① ANT2 Port
② GPS Port
③ LINK/ACT LED
④ ANT1 Port

Figure 6.22 RUGGEDCOM RX1500PN LM W61

General Safety Notices

⚠ WARNING

Radio interference hazard – risk of death, serious personal injury or equipment damage.

Do not operate the cellular modem in the following areas:

- Areas where explosives are actively used
- In explosive atmospheres, such as refueling stations, fuel depots, chemical plants, underground mining operations, etc.
- Near medical or life support equipment or devices
- In any aircraft, whether in flight or on the ground (unless permitted by the aircraft operator)

In such areas, the cellular modem must be disabled via host device's operating system. Otherwise the cellular modem can transmit signals that may interfere with nearby equipment that is susceptible to radio interference.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

NOTICE

If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

⚠ WARNING

Radiation hazard – risk of Radio Frequency (RF) exposure

The device must be placed at a distance of at least 20 cm (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.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

Installation Requirements

The cellular modem module is approved for modular use in mobile applications. The module, as part of the RUGGEDCOM RX1500, can be integrated into a final product without additional certification from the Federal Communications Commission (FCC) or Industry Canada (IC) if the application meets the following requirements:

Note
If this module is integrated into a portable device, separate approval related to the Specific Absorption Rate (SAR) requirements of FCC Part 2.1093 and IC RSS-102 is required.

- Persons in the area must be kept at least 20 cm (8 in) from the antenna at all times.

- The antenna gain, including cable loss, must not exceed the maximum allowable gain specified for the module.
- The cellular modem and antenna must not be next to or operate in conjunction with another transmitter or antenna within a host device.
- A label must be affixed to the end product that indicates the FCC and Industry Canada IDs for the cellular modem.
- The user documentation for the end product must clearly indicate the operating requirements and conditions that comply with current FCC and IC radio frequency exposure guidelines.
- The end product must comply with the unintentional emission testing requirements of FCC Part 15.

If the application does not meet these requirements, further certification is required.

Installing the Module

To install the module, do the following:

1. Open the module and install a mini-SIM card for each network carrier.
2. Insert the module into the host device. For more information, refer to the *Installation Guide* for the device.
3. Connect antennas.
4. Configure the LTE modem and GPS settings. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Installing/Removing the SIM Card

The line module requires at least one active mini-SIM card (2FF size format) for each antenna to connect with the associated network carrier. A second SIM card can be installed for redundancy if needed.

To install or remove a SIM card, do the following:

⚠ CAUTION

Static electricity hazard – risk of damage to equipment

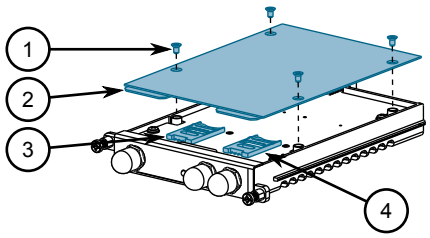
Make sure to take appropriate anti-static precautions before opening the cellular modem module.

Note

The module only supports mini-SIM cards (2FF size format).

1. If necessary, remove the line module from the chassis. For more information, refer to the *Installation Guide* for the host device.

2. On the smooth side of the module, remove the four screws and separate the cover from the module housing.



① Screw
② Cover
③ SIM Card Cage 2
④ SIM Card Cage 1

Figure 6.23 SIM Card Assembly

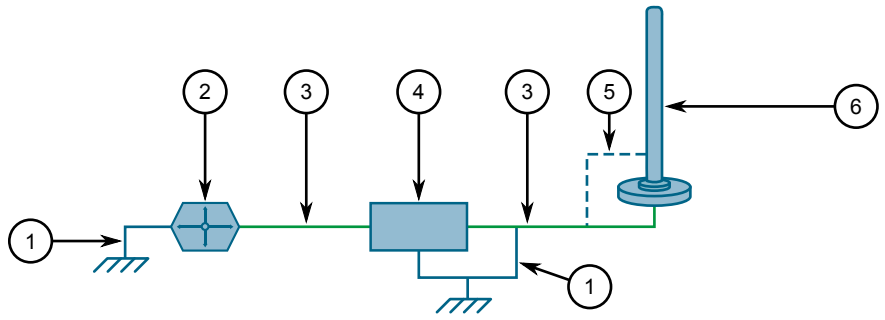
3. Open Cage 1 by sliding the silver catch towards the front face of the module and then flip the cage up.
4. If necessary, remove the existing SIM card.
5. Insert a new mini-SIM card into the cage.
6. Flip the cage down and slide the silver catch back to its original position.
7. [Optional] Repeat the steps above to install a second SIM card in Cage 2.
8. Place the cover on the module housing and install the four screws removed previously.
9. Install the module back into the chassis. For more information, refer to the *Installation Guide* for the host device.
10. Configure the SIM cards. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Connecting Antennas

To connect a 4G LTE multi-band or GPS antenna to the cellular modem line module, 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.

2. Using shielded coaxial cables, connect the antenna to the lightning protector. Make sure the cables are routed away from any noise sources, such as Switch-Mode Power Supplies (SMPS).



① Drain Wire
② RUGGEDCOM RX1500
③ Shielded Coaxial Cable
④ Lightning Protector
⑤ Ground Wire
⑥ Antenna

Figure 6.24 Antenna and Lightning Protector Assembly

3. Connect the lightning protector to the appropriate antenna port on the device:
   - For a primary antenna, connect the cable to the **ANT1** port
   - For a diversity (secondary) antenna, connect the cable to the **ANT2** port
   - For the GPS antenna, connect the cable to the **GPS** port

Technical Specifications

General

Services	4G LTE/HSPA+/CDMA/EVDO/GPS/GNSS
Region	North America (Verizon, Sprint)
Connector	50 Ω SMA
Antennas	1 x LTE Main, 1 x LTE MIMO, 1 x GPS
SIM	Dual Mini-SIM (2FF)

Supported LTE Channel Bandwidths

Band	Channel Bandwidths (MHz)					
	1.4	**3**	**5**	**10**	**15**	**20**
Band 4 (AWS)	✓	✓	✓	✓	✓	✓
Band 13	×	×	✓	✓	×	×
Band 25	✓	✓	✓	✓	✓	✓

Supported LTE Frequency Bands

Band	Frequencies (MHz)	
	Transmit (Tx)	**Receive (Rx)**
Band 4 (AWS)	1710 to 1755	2110 to 2155
Band 13	777 to 787	746 to 756
Band 25	1850 to 1915	1930 to 1995

Supported CDMA Frequency Bands

Band	Frequencies (MHz)	
	Transmit (Tx)	**Receive (Rx)**
Band Class 0 (Cellular 800 MHz)	824 to 849	869 to 894
Band Class 1 (PCS 1900 MHz)	1850 to 1910	1930 to 1990
Band Class 10 (Secondary 800 MHz)[a]	816 to 824	861 to 869

[a] Subclass 2 and 3 are supported

GNSS Specifications

Satellite Channels	12 channel, continuous tracking
Protocols	NMEA 0183 v3.0
Acquisition Time	• Hot start: 1 s • Warm start: 29 s • Cold start: 32 s
Accuracy	• Horizontal: < 2 m or 6.6 ft (50 %), < 5 m or 16.4 ft (90 %) • Altitude: < 4 m or 13.1 (50 %), < 8 m or 26.2 (90 %) • Velocity: < 0.2 m/s or 0.7 ft/s
Sensitivity	• Tracking: -161 dBm[a] • Acquisition (Assisted, Non-LTE): -158 dBm[b] • Acquisition (Assisted, LTE): -153 dBm • Acquisition (Standalone): -145 dBm
Operational Limits	Altitude < 6000 m (3.7 mi) or velocity < 100 m/s (328 ft/s)[c]

[a] The lowest GNSS signal level at which the device can detect an in-view satellite 50% of the time when in sequential tracking mode.
[b] The lowest GNSS signal level at which the device can detect an in-view satellite 50% of the time.
[c] Either limit may be exceeded, but not both

GPS and GNSS Standalone Antenna Requirements

Frequency Range	• Narrow-Band GPS: 1572.42 MHz ± 2 MHz minimum • Wide-Band GPS and GLONASS: 1565 to 1606 MHz recommended
Field of View (FoV)	• Omni-directional in azimuth • -45° to 90° in elevation
Polarization (average Gv/Gh)	> 0 dB[a]
Free space average gain (Gv +Gh) over FoV	> -3 (preferred) or -6 dBi[b]
Gain	• Maximum gain and uniform coverage in the high elevation angle and zenith

	• Gain in azimuth plane is not desired
Average 3D gain	> -5 dBi
Isolation between GNSS and LTE Main (Primary)	> 10 dB in all uplink bands
Typical VSWR	< 2:5:1
Polarization	Any other than LHCP (Left-Hand Circular Polarized) is acceptable.

[a] Vertical linear polarization is sufficient.
[b] Gv and Gh are measured and averaged over -45 to 90° in elevation, and ± 180° in azimuth.

Conducted Rx (Receive) Sensitivity 3GPP for LTE Frequency Bands

Band	LImit (dBm)	Room Typical (dBm)	Class A (dBm)	
			Extreme	Limit
Band 4	-96.3	-101	-100	-97.5
Band 13	-93.3	-100	-100	-97.5
Band 25	-93.3	-100	-100	-94.5

Conducted Rx (Receive) Sensitivity SISO for LTE Frequency Bands

Band	Room Typical (dBm)		Class A Extreme (dBm)	
	Primary	Secondary	Primary	Secondary
Band 4	-98	-98	-97	-96.5
Band 13	-97	-97	-96	-95.5
Band 25	-97	-97	-96	-95.5

VzW Conducted Rx Sensititivy SIMO for LTE Frequency Bands

Band	LImit (dBm)	Room Typical (dBm)	Class A (dBm)	
			Extreme	Limit
Band 4	-96.3	-99	-99	-97.5
Band 13	-96.3	-98	-98	-97.5

VzW Conducted Rx Sensititivy SISO for LTE Frequency Bands

Band	LImit (dBm)	Room Typical (dBm)	Class A (dBm)	
			Extreme	Limit
Band 4 (Primary)	-93.3	-97	-96.5	-96
Band 4 (Secondary)	-93.3	-97	-96.5	-96
Band 13 (Primary)	-93.3	-96	-95	-94.5
Band 13 (Secondary)	-93.3	-96.5	-96	-95.5

Conducted Rx (Receive) Sensitivity for CDMA Frequency Bands

Band	Standard	LImit (dBm)	Room Typical (dBm)	Class A (dBm)		Notes
				Extreme	Limit	
Band Class 0	CDMA 1X	-104	-108	-107	-106.5	CDMA 1 x 0.5% FER, SO2
	EVDO	-105.5	-109.5	-108.5	-108	EVDO rev A 0.5% PER, DRC4
Band Class 1	CDMA 1X	-104	-109	-108	-107.5	CDMA 1 x 0.5% FER, SO2
	EVDO	-105.5	-109.5	-109	-108	EVDO rev A 0.5% PER, DRC4
Band Class 10	CDMA 1X	-104	-108.5	-108	-107.5	CDMA 1 x 0.5% FER, SO2
	EVDO	-105.5	-109.5	-109	-108	EVDO rev A 0.5% PER, DRC4

Conducted Tx (Transmit) Maximum Output Power Tolerances for LTE Frequency Bands

Band	LImit (dBm)	Room Typical (dBm)	Class A Extreme (dBm)
Band 4	23 + 2.7/1.7 dB	23 ± 1 dB	23 ± 1 dB
Band 13	23 + 2.7/1.7 dB	23 ± 1 dB	23 ± 1 dB
Band 25	23 +2.7 dB	23 ± 1 dB	23 ± 1 dB

Conducted Tx (Transmit) Maximum Output Power Tolerances for CDMA Frequency Bands

Band	Room (dBm)	Class A Extreme (dBm)
Band Class 0	24 ± 1 dB	24 ± 1 dB
Band Class 1	24 ± 1 dB	24 ± 1 dB
Band Class 10	24 ± 1 dB	24 ± 1 dB

Operating Temperature

Operating Temperature	Compliance
-30 to 70 °C (-22 to 158 °F)	Class A (3GPP Compliant)
-40 to 85 °C (-40 to 185 °F)	Class B (Operational, Non-3GPP Compliant)

Certification

This module has been certified to comply with the requirements of the relevant standards.

Certification	Details
FCC	This module is certified under Part 15 (subpart B) of the FCC Rules and has been assigned the product ID N7NMC7350.
Industry Canada	This module is certified under IC CS-03 Part II, Issue 9 and has been assigned the product ID 2417C-MC7350.
Verizon Wireless	This module is certified by Verizon Wireless in North America under Open Development Certification Agreement MA-004198-2012.

Ordering Information

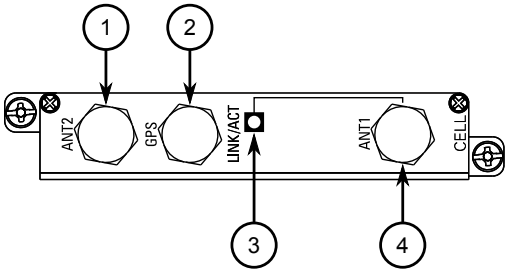
Description	1 x 4G/LTE Verizon
Article Numbers	6GK6015-0AL20-0WJ0 (Standard) 6GK6015-0AL20-0WJ1 (Conformal Coated)

6.9 RUGGEDCOM RX1500PN LM W81

The RUGGEDCOM RX1500PN LM W81 module offers GSM, EDGE, GPRS, UMTS, HS-PA+, 4G LTE and GNSS capabilities for wireless remote access to 4G (fourth generation) LTE (Long Term Evolution) networks in the Asia-Pacific region. It supports dual 4G LTE antennas and a single GPS antenna.

The primary 4G LTE antenna port features a dedicated LED that indicates its link/activity state.

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



① ANT2 Port
② GPS Port
③ LINK/ACT LED
④ ANT1 Port

Figure 6.25 RUGGEDCOM RX1500PN LM W81

General Safety Notices

⚠ WARNING

Radio interference hazard – risk of death, serious personal injury or equipment damage.

Do not operate the cellular modem in the following areas:

- Areas where explosives are actively used
- In explosive atmospheres, such as refueling stations, fuel depots, chemical plants, underground mining operations, etc.
- Near medical or life support equipment or devices
- In any aircraft, whether in flight or on the ground (unless permitted by the aircraft operator)

In such areas, the cellular modem must be disabled via host device's operating system. Otherwise the cellular modem can transmit signals that may interfere with nearby equipment that is susceptible to radio interference.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

NOTICE

If the host device is intended for use in a portable device, separate approval is required to satisfy the SAR requirements of FCC Part 2.1093 and IC RSS-102.

⚠ WARNING

Radiation hazard – risk of Radio Frequency (RF) exposure

The device must be placed at a distance of at least 20 cm (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.

⚠ WARNING

Communication disruption hazard – risk of serious personal injury, equipment damage, or data loss

Wireless communications are susceptible to disruptions that may result in the delay, corruption or loss of data. While cellular disruptions are uncommon when using a Siemens cellular modem, avoid using the cellular modem in applications where a communication failure could result in damage to equipment or personal injury to persons in the area. Siemens accepts no responsibility for any damages that may result due to wireless disruptions.

Installation Requirements

The cellular modem module is approved for modular use in mobile applications. The module, as part of the RUGGEDCOM RX1500, can be integrated into a final product without additional certification from the Federal Communications Commission (FCC) or Industry Canada (IC) if the application meets the following requirements:

Note
If this module is integrated into a portable device, separate approval related to the Specific Absorption Rate (SAR) requirements of FCC Part 2.1093 and IC RSS-102 is required.

- Persons in the area must be kept at least 20 cm (8 in) from the antenna at all times.

- The antenna gain, including cable loss, must not exceed the maximum allowable gain specified for the module.
- The cellular modem and antenna must not be next to or operate in conjunction with another transmitter or antenna within a host device.
- A label must be affixed to the end product that indicates the FCC and Industry Canada IDs for the cellular modem.
- The user documentation for the end product must clearly indicate the operating requirements and conditions that comply with current FCC and IC radio frequency exposure guidelines.
- The end product must comply with the unintentional emission testing requirements of FCC Part 15.

If the application does not meet these requirements, further certification is required.

Installing the Module

To install the module, do the following:

1. Open the module and install a mini-SIM card for each network carrier.
2. Insert the module into the host device. For more information, refer to the *Installation Guide* for the device.
3. Connect antennas.
4. Configure the LTE modem and GPS settings. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Installing/Removing the SIM Card

The line module requires at least one active mini-SIM card (2FF size format) for each antenna to connect with the associated network carrier. A second SIM card can be installed for redundancy if needed.

To install or remove a SIM card, do the following:

⚠ CAUTION

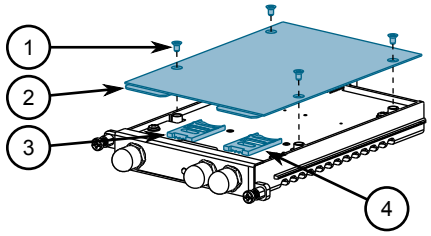
Static electricity hazard – risk of damage to equipment

Make sure to take appropriate anti-static precautions before opening the cellular modem module.

Note
The module only supports mini-SIM cards (2FF size format).

1. If necessary, remove the line module from the chassis. For more information, refer to the *Installation Guide* for the host device.

2. On the smooth side of the module, remove the four screws and separate the cover from the module housing.



① Screw
② Cover
③ SIM Card Cage 2
④ SIM Card Cage 1

Figure 6.26 SIM Card Assembly

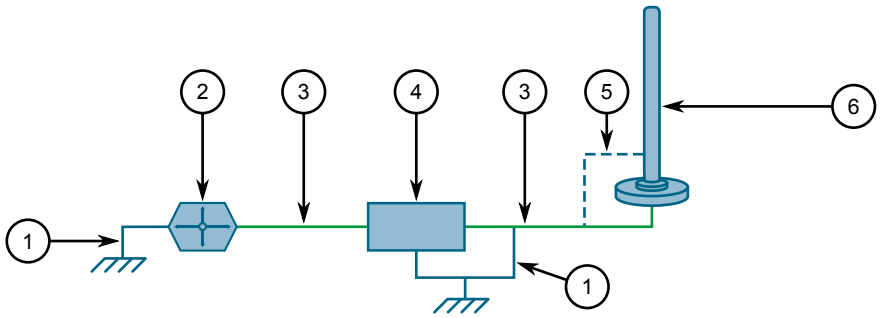
3. Open Cage 1 by sliding the silver catch towards the front face of the module and then flip the cage up.
4. If necessary, remove the existing SIM card.
5. Insert a new mini-SIM card into the cage.
6. Flip the cage down and slide the silver catch back to its original position.
7. [Optional] Repeat the steps above to install a second SIM card in Cage 2.
8. Place the cover on the module housing and install the four screws removed previously.
9. Install the module back into the chassis. For more information, refer to the *Installation Guide* for the host device.
10. Configure the SIM cards. For more information, refer to the *RUGGEDCOM RX1500 User Guide* for the host device.

Connecting Antennas

To connect a 4G LTE multi-band or GPS antenna to the cellular modem line module, 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.

2. Using shielded coaxial cables, connect the antenna to the lightning protector. Make sure the cables are routed away from any noise sources, such as Switch-Mode Power Supplies (SMPS).



① Drain Wire
② RUGGEDCOM RX1500
③ Shielded Coaxial Cable
④ Lightning Protector
⑤ Ground Wire
⑥ Antenna

Figure 6.27 Antenna and Lightning Protector Assembly

3. Connect the lightning protector to the appropriate antenna port on the device:
   - For a primary antenna, connect the cable to the **ANT1** port
   - For a diversity (secondary) antenna, connect the cable to the **ANT2** port
   - For the GPS antenna, connect the cable to the **GPS** port

Technical Specifications

General

Services	GSM/EDGE/GPRS/UMTS/HSPA+/LTE/GNSS
Region	Asia-Pacific
Connector	50 Ω SMA
Antennas	1 x LTE Main, 1 x LTE MIMO, 1 x GPS
SIM	Dual Mini-SIM (2FF)

Supported LTE Frequency Bands

Band	Frequencies (MHz)	
	Transmit (Tx)	**Receive (Rx)**
Band 1	1920 to 1980	2110 to 2170
Band 3	1710 to 1785	1805 to 1880
Band 7	2500 to 2570	2620 to 2690
Band 8	880 to 915	925 to 960

Band	Frequencies (MHz)	
	Transmit (Tx)	Receive (Rx)
Band 20	832 to 862	791 to 821

Supported LTE Bandwidths

Band	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Band 1	×	×	✓	✓	✓	✓
Band 3	✓	✓	✓	✓	✓	✓
Band 7	×	×	✓	✓	✓	✓
Band 8	✓	✓	✓	✓	×	×
Band 20	×	×	✓	✓	✓	✓

Supported WCDMA Frequency Bands

Band	Frequencies (MHz)	
	Transmit (Tx)	Receive (Rx)
Band 1 WCDMA 2100	1920 to 1980	2110 to 2170
Band 2 WCDMA 1900	1850 to 1910	1930 to 1990
Band 5 WCDMA 850	824 to 849	869 to 894
Band 6 WCDMA 800	830 to 840	875 to 885
Band 8 WCDMA 900	880 to 915	925 to 960

Supported GSM Frequency Bands

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

GNSS Specifications

Satellite Channels	12 channel, continuous tracking
Protocols	NMEA 0183 v3.0
Acquisition Time	• Hot start: 1 s • Warm start: 29 s • Cold start: 32 s
Accuracy	• Horizontal: < 2 m 6.6 ft (50 %), < 5 m or 16.4 ft (90 %) • Altitude: < 4 m or 13.1 (50 %), < 8 m or 26.2 (90 %)

	• Velocity: < 0.2 m/s or 0.7 ft/s
Sensitivity	• Tracking: -161 dBm • Acquisition (Assisted, Non-LTE): -158 dBm • Acquisition (Assisted, LTE): -153 dBm • Acquisition (Standalone): -145 dBm
Operational Limits	Altitude < 6000 m (3.7 mi) or velocity < 100 m/s (328 ft/s)[a]

[a] Either limit may be exceeded, but not both

GNSS Standalone Antenna Requirements

Frequency Range	• Narrow-Band GPS: 1572.42 MHz ± 2 MHz minimum • Wide-Band GPS and GLONASS: 1565 to 1606 MHz recommended
Field of View (FoV)	• Omni-directional in azimuth • -45° to 90° in elevation
Polarization (average Gv/Gh)	> 0 dB[a]
Free space average gain (Gv +Gh) over FoV	> -3 (preferred) or -6 dBi[b]
Gain	• Maximum gain and uniform coverage in the high elevation angle and zenith • Gain in azimuth plane is not desired
Average 3D gain	> -5 dBi
Isolation between GNSS and LTE Main (Primary)	> 10 dB in all uplink bands
Typical VSWR	< 2:5:1
Polarization	Any other than LHCP (Left-Hand Circular Polarized) is acceptable.

[a] Vertical linear polarization is sufficient.
[b] Gv and Gh are measured and averaged over -45 to 90° in elevation, and ± 180° in azimuth.

Conducted Rx (Receive) Sensitivity for LTE Frequency Bands

Band	Conducted Rx Sensitivity (dBm)			
	Primary	Secondary	SIMO (Typical)	SIMO (Worst Case)
Band 1	-98.7	-97.8	-101.1	-96.3
Band 3	-99.5	-97.3	-101.6	-93.3
Band 7	-98.0	-97.5	-100.5	-94.3
Band 8	-99.3	-98.5	-102.0	-93.3
Band 20	-99.6	-98.4	-99.8	-93.3

Conducted Rx (Receive) Sensitivity for UMTS Bands

Band	Error Rate[a]	Conducted Rx Sensitivity (dBm)		
		Primary (Typical)	Secondary (Typical)	Primary/Secondary (Worst Case)
Band 1 (UMTS 2100)	0.1% BER	-111.4	-109.8	-106.7
Band 2 (UMTS 1900)		-110.8	-108.9	-104.7

Band	Error Rate[a]	Conducted Rx Sensitivity (dBm)		
		Primary (Typical)	Secondary (Typical)	Primary/Secondary (Worst Case)
Band 5 (UMTS 850)		-111.4	-111.2	-104.7
Band 8 (UMTS 900)		-111.8	-111.0	-103.7

[a] Measured at 12.2 kbps

Conducted Rx (Receive) Sensitivity for GSM/EDGE Bands

Band	Error Rate	Modulation	Conducted Rx Sensitivity (dBm)	
			Typical	Worst Case
GSM 850	2 % BER	CS[a]	-109	-102
	10 % BLER	GMSK (CS1)	-112	-104
		EDGE (MCS5)	-104	-98
EGSM 900	2 % BER	CS[a]	-109	-102
	10 % BLER	GMSK (CS1)	-112	-104
		EDGE (MCS5)	-104	-98
DCS 1800	2 % BER	CS[a]	-110	-102
	10 % BLER	GMSK (CS1)	-112	-104
		EDGE (MCS5)	-105	-98
PCS 1900	2 % BER	CS[a]	-109	-102
	10 % BLER	GMSK (CS1)	-112	-104
		EDGE (MCS5)	-104	-98

[a] Circuit Switched

Conducted Tx (Transmit) Power Tolerances

Standard	Band	Conducted Tx Power
LTE	Band 1	+23 dBm ± 1 dB
	Band 3	
	Band 7	+22 dBm ± 1 dB
	Band 8	+23 dBm ± 1 dB
	Band 20	
UMTS	Band 1 (IMT 2100 12.2 kbps)	+23 dBm ± 1 dB[a]
	Band 2 (UMTS 1900 12.2 kbps)	
	Band 5 (UMTS 850 12.2 kbps)	
	Band 8 (UMTS 900 12.2 kbps)	
GSM/EDGE	GSM 850 CS	+ 32 dBm ± 1 dB[b]
	EGSM 900 CS	+ 27 dBm ± 1 dB[c]
	DCS 1800 CS	+ 29 dBm ± 1 dB[d]
	PCS 1900 CS	+ 26 dBm ± 1 dB[e]

[a] Connectorized (Class 3)
[b] GMSK mode, connectorized (Class 4, 2 W, 33 dBm)
[c] 8PSK mode, connectorized (Class E2, 0.5 W, 27 dBm)
[d] GMSK mode, connectorized (Class 1, 1 W, 30 dBm)

[e] 8PSK mode, connectorized (Class E2, 0.4 W, 26 dBm)

Operating Temperature

Operating Temperature	Compliance
-30 to 70 °C (-22 to 158 °F)	Class A (3GPP Compliant)
-40 to 85 °C (-40 to 185 °F)	Class B (Operational, Non-3GPP Compliant)

Certification

This module has been certified to comply with the requirements of the relevant standards.

Certification	Details
ACMA	This module complies with the regulations set forth by the Australian Communications and Media Authority (ACMA). As such, the module is marked with the Regulatory Compliance Mark (RCM) and is authorized for use in Australia.  A copy of the Declaration of Conformity is available via Siemens Industry Online Support at https://support.industry.siemens.com/cs/ww/en/view/109748643

Ordering Information

Description	1 x 4G/LTE Asia Pacific
Article Numbers	6GK6015-0AL20-0WK0 (Standard) 6GK6015-0AL20-0WK1 (Conformal Coated)

7

RUGGEDCOM APE Modules

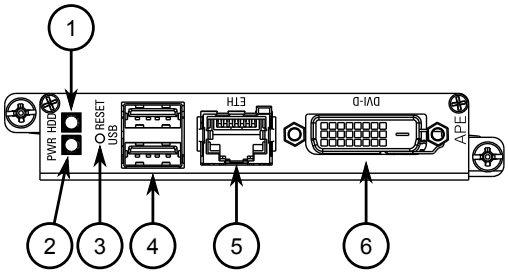
The following RUGGEDCOM Application Processing Engine (APE) modules are available for the RUGGEDCOM RX1500 series devices.

7.1 RUGGEDCOM RX1500PN LM APE1402

The RUGGEDCOM RX1500PN LM APE1402 module is a 32-bit computer with Debian Linux™ pre-installed and an 8 GB solid-state drive.

The module features the following LEDs:

LED	Description
HDD	Indicates when the module is active.
PWR	Indicates when the module is powered on.



① HDD LED
② PWR LED
③ RESET Button
④ USB Port
⑤ ETH Port
⑥ DVI-D Video Port

Figure 7.1 RUGGEDCOM RX1500PN LM APE1402

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Rebooting/Powering Down the Module

Each RUGGEDCOM APE module is powered on automatically when power is supplied to the chassis, but can be powered down independently using the **Power** button. This button also allows users to reboot the module.

NOTICE

Whenever possible, power down or reboot the RUGGEDCOM APE through the RUGGEDCOM RX1500 operating system instead of forcing a shutdown or reboot with the **Power** button. This helps protect against improper shutdowns and protect data integrity.

Note

The **Power** button is recessed and can only be reached using either a pin, unfolded paper clip, or a thin screwdriver.

- *Powering Down the Module*

  To fully power down the module, press the **Power** button and hold for 4 to 5 seconds.

- *Rebooting the Module*

  To reboot the module, quickly press and release the **Power** button.

Technical Specifications

Operating System	Debian Linux™
Processor	Intel Atom E660 1.3 GHz, 512 KB L2 Cache
RAM	2 GB DDR2, 800 MHz, 32-bit
Disk	8 GB SATA, Solid State
Networking	Realtek RTL8111, RJ45 Gigabit Ethernet Interface
USB	2 x USB 2.0[a]
Video	Intel 4108 Graphics Processor, DVI-D
Power Requirements	12 W with no USB load, 14.5 W with full USB load
Operating Temperature	-40 to 70 °C (-40 to 158 °F)

[a] Maximum combined USB device power consumption is 500 mA at 5 V.

Ordering Information

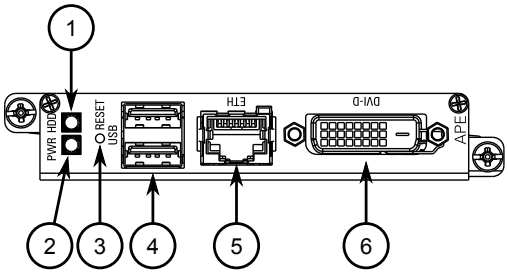
Description	APE, 1.3GHz, 2GB RAM, 8GB SATA, Video, USB, Linux
Article Numbers	6GK6015-0AL20-0GB0 (Standard) 6GK6015-0AL20-0GB1 (Conformal Coated)

7.2 RUGGEDCOM RX1500PN LM APE1402W7

The RUGGEDCOM RX1500PN LM APE1402W7 module is a 32-bit computer with Windows™ Embedded Standard 7 pre-installed and an 8 GB solid-state drive.

The module features the following LEDs:

LED	Description
HDD	Indicates when the module is active.
PWR	Indicates when the module is powered on.



① HDD LED
② PWR LED
③ RESET Button
④ USB Port
⑤ ETH Port
⑥ DVI-D Video Port

Figure 7.2 RUGGEDCOM RX1500PN LM APE1402W7

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Rebooting/Powering Down the Module

Each RUGGEDCOM APE module is powered on automatically when power is supplied to the chassis, but can be powered down independently using the **Power** button. This button also allows users to reboot the module.

NOTICE

Whenever possible, power down or reboot the RUGGEDCOM APE through the RUGGEDCOM RX1500 operating system instead of forcing a shutdown or reboot with the **Power** button. This helps protect against improper shutdowns and protect data integrity.

Note

The **Power** button is recessed and can only be reached using either a pin, unfolded paper clip, or a thin screwdriver.

- *Powering Down the Module*

  To fully power down the module, press the **Power** button and hold for 4 to 5 seconds.

- *Rebooting the Module*

  To reboot the module, quickly press and release the **Power** button.

Technical Specifications

Operating System	Windows® Embedded Standard 7
Processor	Intel Atom E660 1.3 GHz, 512 KB L2 Cache
RAM	2 GB DDR2, 800 MHz, 32-bit
Disk	8 GB SATA, Solid State
Networking	Realtek RTL8111, RJ45 Gigabit Ethernet Interface
USB	2 x USB 2.0[a]
Video	Intel 4108 Graphics Processor, DVI-D
Power Requirements	12 W with no USB load, 14.5 W with full USB load
Operating Temperature	-40 to 70 °C (-40 to 158 °F)

[a] Maximum combined USB device power consumption is 500 mA at 5 V.

Ordering Information

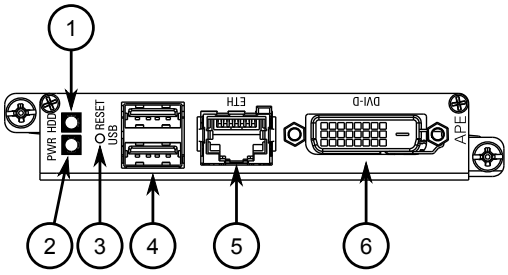
Description	APE, 1.3GHz, 2GB RAM, 8GB SATA, Video, USB, Windows 7 Embedded
Article Numbers	6GK6015-0AL20-0GC0 (Standard) 6GK6015-0AL20-0GC1 (Conformal Coated)

7.3 RUGGEDCOM RX1500PN LM APE1404

The RUGGEDCOM RX1500PN LM APE1404 module is a 32-bit computer with Debian Linux™ pre-installed and a 16 GB solid-state drive.

The module features the following LEDs:

LED	Description
HDD	Indicates when the module is active.
PWR	Indicates when the module is powered on.



① HDD LED
② PWR LED
③ RESET Button
④ USB Port
⑤ ETH Port
⑥ DVI-D Video Port

Figure 7.3 RUGGEDCOM RX1500PN LM APE1404

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Rebooting/Powering Down the Module

Each RUGGEDCOM APE module is powered on automatically when power is supplied to the chassis, but can be powered down independently using the **Power** button. This button also allows users to reboot the module.

NOTICE

Whenever possible, power down or reboot the RUGGEDCOM APE through the RUGGEDCOM RX1500 operating system instead of forcing a shutdown or reboot with the **Power** button. This helps protect against improper shutdowns and protect data integrity.

Note

The **Power** button is recessed and can only be reached using either a pin, unfolded paper clip, or a thin screwdriver.

- *Powering Down the Module*

  To fully power down the module, press the **Power** button and hold for 4 to 5 seconds.

- *Rebooting the Module*

  To reboot the module, quickly press and release the **Power** button.

Technical Specifications

Operating System	Debian Linux™
Processor	Intel Atom E660 1.3 GHz, 512 KB L2 Cache
RAM	2 GB DDR2, 800 MHz, 32-bit
Disk	16 GB SATA, Solid State
Networking	Realtek RTL8111, RJ45 Gigabit Ethernet Interface
USB	2 x USB 2.0[a]
Video	Intel 4108 Graphics Processor, DVI-D
Power Requirements	12 W with no USB load, 14.5 W with full USB load
Operating Temperature	-40 to 70 °C (-40 to 158 °F)

[a] Maximum combined USB device power consumption is 500 mA at 5 V.

Ordering Information

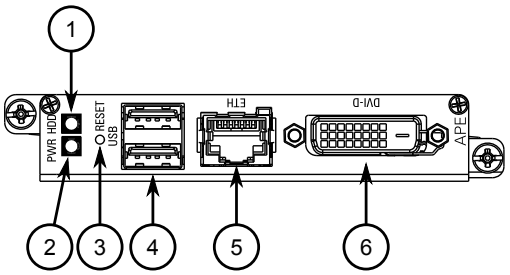
Description	APE, 1.3GHz, 2GB RAM, 16GB SATA, Video, USB, Linux
Article Numbers	6GK6015-0AL20-0GD0 (Standard) 6GK6015-0AL20-0GD1 (Conformal Coated)

7.4 RUGGEDCOM RX1500PN LM APE1404 ADM

The RUGGEDCOM RX1500PN LM APE1404 ADM module is a 32-bit computer with Debian Linux™ and CROSSBOW ADM pre-installed. It also features a 16 GB solid-state drive.

The module features the following LEDs:

LED	Description
HDD	Indicates when the module is active.
PWR	Indicates when the module is powered on.



① HDD LED
② PWR LED
③ RESET Button
④ USB Port
⑤ ETH Port
⑥ DVI-D Video Port

Figure 7.4 RUGGEDCOM RX1500PN LM APE1404

CROSSBOW ADM

The CROSSBOW Asset Discovery and Management Agent (ADM) is a security feature used to discover and monitor the activity of network connected devices. This information is collected and reported to the Secure Access Manager (SAM). Operators using CROSSBOW are then made aware of any devices added to the operational environment within minutes of activation, with the exact time of activation and a running account of the most recent activity.

Purposefully deployed devices can be identified and vetted for inclusion, whereas rogue devices can be quickly identified and isolated.

The ADM is designed to be deployed on the network where devices are to be discovered and monitored. The ADM must be reachable from the CROSSBOW External Database Integration Service (EDIS).

For more information about CROSSBOW ADM, refer to the RUGGEDCOM CROSSBOW user documentation available through Siemens Customer Support.

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Rebooting/Powering Down the Module

Each RUGGEDCOM APE module is powered on automatically when power is supplied to the chassis, but can be powered down independently using the **Power** button. This button also allows users to reboot the module.

NOTICE
Whenever possible, power down or reboot the RUGGEDCOM APE through the RUGGEDCOM RX1500 operating system instead of forcing a shutdown or reboot with the **Power** button. This helps protect against improper shutdowns and protect data integrity.

Note
The **Power** button is recessed and can only be reached using either a pin, unfolded paper clip, or a thin screwdriver.

- *Powering Down the Module*

  To fully power down the module, press the **Power** button and hold for 4 to 5 seconds.

- *Rebooting the Module*

  To reboot the module, quickly press and release the **Power** button.

Technical Specifications

Operating System	Debian Linux™
Processor	Intel Atom E660 1.3 GHz, 512 KB L2 Cache
RAM	2 GB DDR2, 800 MHz, 32-bit
Disk	16 GB SATA, Solid State
Networking	Realtek RTL8111, RJ45 Gigabit Ethernet Interface
USB	2 x USB 2.0[a]
Video	Intel 4108 Graphics Processor, DVI-D
Power Requirements	12 W with no USB load, 14.5 W with full USB load
Operating Temperature	-40 to 70 °C (-40 to 158 °F)

[a] Maximum combined USB device power consumption is 500 mA at 5 V.

Ordering Information

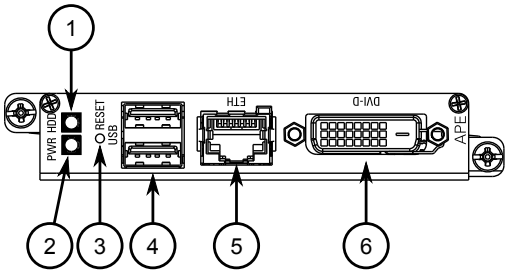
Description	APE, 1.3 GHz, 2 GB RAM, 16 GB SATA, Video, USB, Linux + CROSSBOW ADM
Article Numbers	6GK6015-0AL20-0GG0 (Standard) 6GK6015-0AL20-0GG1 (Conformal Coated)

7.5 RUGGEDCOM RX1500PN LM APE1404W7

The RUGGEDCOM RX1500PN LM APE1404W7 module is a 32-bit computer with Windows™ Embedded Standard 7 pre-installed and a 16 GB solid-state drive.

The module features the following LEDs:

LED	Description
HDD	Indicates when the module is active.
PWR	Indicates when the module is powered on.



① HDD LED
② PWR LED
③ RESET Button
④ USB Port
⑤ ETH Port
⑥ DVI-D Video Port

Figure 7.5 RUGGEDCOM RX1500PN LM APE1404W7

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Rebooting/Powering Down the Module

Each RUGGEDCOM APE module is powered on automatically when power is supplied to the chassis, but can be powered down independently using the **Power** button. This button also allows users to reboot the module.

NOTICE

Whenever possible, power down or reboot the RUGGEDCOM APE through the RUGGEDCOM RX1500 operating system instead of forcing a shutdown or reboot with the **Power** button. This helps protect against improper shutdowns and protect data integrity.

Note

The **Power** button is recessed and can only be reached using either a pin, unfolded paper clip, or a thin screwdriver.

- *Powering Down the Module*

  To fully power down the module, press the **Power** button and hold for 4 to 5 seconds.

- *Rebooting the Module*

  To reboot the module, quickly press and release the **Power** button.

Technical Specifications

Operating System	Windows® Embedded Standard 7
Processor	Intel Atom E660 1.3 GHz, 512 KB L2 Cache
RAM	2 GB DDR2, 800 MHz, 32-bit
Disk	16 GB SATA, Solid State
Networking	Realtek RTL8111, RJ45 Gigabit Ethernet Interface
USB	2 x USB 2.0[a]
Video	Intel 4108 Graphics Processor, DVI-D
Power Requirements	12 W with no USB load, 14.5 W with full USB load
Operating Temperature	-40 to 70 °C (-40 to 158 °F)

[a] Maximum combined USB device power consumption is 500 mA at 5 V.

Ordering Information

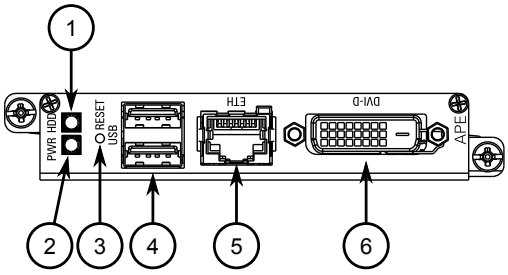
Description	APE, 1.3GHz, 2GB RAM, 16GB SATA, Video, USB, Windows 7 Embedded
Article Numbers	6GK6015-0AL20-0GE0 (Standard) 6GK6015-0AL20-0GE1 (Conformal Coated)

7.6 RUGGEDCOM RX1500PN LM APE1404CKP

The RUGGEDCOM RX1500PN LM APE1404CKP module is a 32-bit computer with Check Point GAiA™ OS pre-installed and a 16 GB solid-state drive.

The module features the following LEDs:

LED	Description
HDD	Indicates when the module is active.
PWR	Indicates when the module is powered on.



① HDD LED
② PWR LED
③ RESET Button
④ USB Port
⑤ ETH Port
⑥ DVI-D Video Port

Figure 7.6 RUGGEDCOM RX1500PN LM APE1404CKP

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Rebooting/Powering Down the Module

Each RUGGEDCOM APE module is powered on automatically when power is supplied to the chassis, but can be powered down independently using the **Power** button. This button also allows users to reboot the module.

NOTICE

Whenever possible, power down or reboot the RUGGEDCOM APE through the RUGGEDCOM RX1500 operating system instead of forcing a shutdown or reboot with the **Power** button. This helps protect against improper shutdowns and protect data integrity.

Note

The **Power** button is recessed and can only be reached using either a pin, unfolded paper clip, or a thin screwdriver.

- *Powering Down the Module*

  To fully power down the module, press the **Power** button and hold for 4 to 5 seconds.

- *Rebooting the Module*

  To reboot the module, quickly press and release the **Power** button.

Technical Specifications

Operating System	Check Point GAiA™ OS
Processor	Intel Atom E660 1.3 GHz, 512 KB L2 Cache
RAM	2 GB DDR2, 800 MHz, 32-bit
Disk	16 GB SATA, Solid State
Networking	Realtek RTL8111, RJ45 Gigabit Ethernet Interface
USB	2 x USB 2.0[a]
Video	Intel 4108 Graphics Processor, DVI-D
Power Requirements	12 W with no USB load, 14.5 W with full USB load
Operating Temperature	-40 to 70 °C (-40 to 158 °F)

[a] Maximum combined USB device power consumption is 500 mA at 5 V.

Ordering Information

Description	APE, 1.3GHz, 2GB RAM, 16GB SATA, Video, 2xUSB, Checkpoint FW
Article Numbers	6GK6015-0AL20-0GF0 (Standard) 6GK6015-0AL20-0GF1 (Conformal Coated)

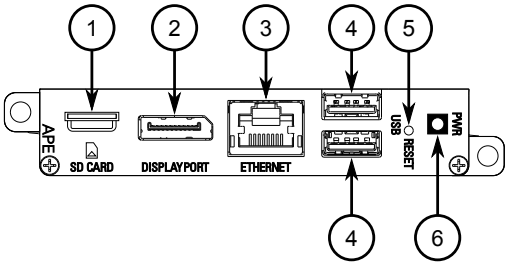
7.7 RUGGEDCOM RX1500PN LM APE1808

The RUGGEDCOM RX1500PN LM APE1808 module is a 64-bit computer with 8 GB RAM, and a 64 GB solid-state drive. It ships with Debian Linux™ pre-installed.

Note
Due to power supply limitations, this module is not compatible with the RUGGEDCOM RX1512.

The module features the following LEDs:

LED	Description
PWR	Indicates when the module is powered on.



① SD Card Slot
② Display Port
③ Gigabit Ethernet (GbE) Port
④ USB Ports
⑤ Reset Button
⑥ Power LED

Figure 7.7 RUGGEDCOM RX1500PN LM APE1808

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Rebooting/Powering Down the Module

⚠ CAUTION

Electrical hazard - risk of damage to the device

When hot swapping the RUGGEDCOM RX1500 module, wait 3 seconds before re-inserting the module into the RUGGEDCOM router.

- **Powering Down the Module**

  To fully power down the module, shut down the operating system.

- **Rebooting the Module**

  To reset the module, restart the operating system.

Technical Specifications

Operating System Options:	• Debian Linux™ • Windows® 10 Enterprise 2019 LTSC
Processor	Intel x5-E3940 1.8 GHz, 2 MB L2 Cache
RAM	8 GB DDR3 ECC, 1600 MHz, 64-bit
Disk	64 GB, Solid State
Networking	Intel I210, RJ45 Gigabit Ethernet Interface
USB	2 x USB 3.0
Video	Intel HD Graphics Processor, Display Port
Operating Temperature	-40 to 75 °C (-40 to 167 °F)

Ordering Information

Description	APE, 1.8 GHz, 8GB RAM, 64GB SSD, Video, USB, Linux
Article Numbers	**Debian Linux™** 6GK6015-0AL20-0GJ0 (Standard) 6GK6015-0AL20-0GJ1 (Conformal Coated) **Windows® 10 Enterprise** 6GK6015-0AL20-0GJ0 (Standard) 6GK6015-0AL20-0GJ1 (Conformal Coated)

8

Blank Modules

The following blank modules are available for the RUGGEDCOM RX1500 series devices.

NOTICE
Blank modules should be installed in empty slots to prevent the ingress of dirt or debris in the chassis.

8.1 RUGGEDCOM RX1500PN PS XXP

The RUGGEDCOM RX1500PN PS XXP is a blank module designed to occupy empty power supply module slots in the RUGGEDCOM RX1500 chassis.

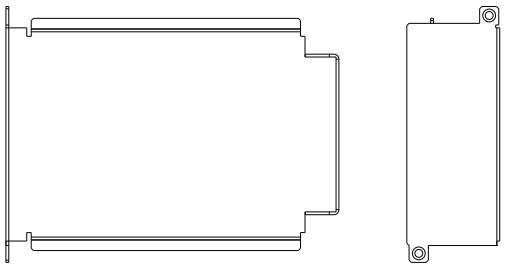


Figure 8.1 RUGGEDCOM RX1500PN PS XXP

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Ordering Information

Description	Blank Power Supply
Article Numbers	6GK6015-0AL10-0AA0 (Standard) 6GK6015-0AL10-0AA1 (Conformal Coated)

8.2 RUGGEDCOM RX1500PN LM Blank

The RUGGEDCOM RX1500PN LM Blank is a blank module designed to occupy empty line module slots in the RUGGEDCOM RX1500 chassis.

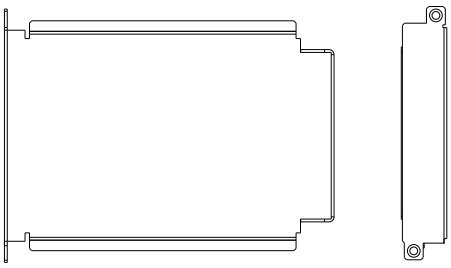


Figure 8.2 RUGGEDCOM RX1500PN LM Blank

Installing the Module

For information about installing this module, refer to the *Installation Guide* for the host device.

Ordering Information

Description	Blank Module
Article Numbers	6GK6015-0AL20-0AA0 (Standard) 6GK6015-0AL20-0AA1 (Conformal Coated)

Further Information

Siemens
https://www.siemens.com

Industry Online Support (service and support)
https://support.industry.siemens.com

Industry Mall
https://mall.industry.siemens.com

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Process Automation
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90026 NÜRNBERG
GERMANY