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RuggedSwitch® RS950G

Managed PRP Redundancy Box

Product Overview

The RuggedCom RS950G is a platform to demonstrate RuggedCom's on-going implementation of network redundancy as defined in the standard IEC 62439-3. The RS950G provides the ultimate in network reliability and zero failover time from network faults. This is achieved by simultaneously transmitting duplicate packets on independent routes through the network to provide complete path redundancy. In PRP networks the receiving nodes eliminate redundant packets resulting in a truly seamless failover mechanism that is not compromised by failures.

Features:

Reliability:

- IEC 62439-3 PRP
- Guaranteed behavior under failure conditions
- High availability network using simultaneous transmission over two Ethernet ports
- Efficient elimination of duplicated packets at hardware level
- Zero recovery time from network failures
- FPGA implementation maximizes PRP performance

RuggedRated™:

- Meets IEC 61850 and IEEE 1613 standard
- -40°C to +85°C operating temperature range
- Panel or DIN mounting
- Dual-input DC power supply
- Wide-range high-voltage AC/DC power supply
- 20 AWG steel enclosure
- 5 Year Warranty
- Global 24x7x365 Support
- SSH/SSL encryption
- Web-based, Telnet, CLI

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Key Benefits

- Connects legacy non-PRP devices to high availability IEC 62439 networks
- Delivers unprecedented reliability, resilience to faults and performance for the most critical applications
- Allows scalability by supporting multiple network topologies, eg: tree, ring, mesh, etc.

Applications

- Substation automation networks compliant to IEC 61850
- Reliable circuit breaker tripping via GOOSE
- Guaranteed delivery of sampled measured values (SMV) on IEC 61850-9-2 process bus
- High availability industrial control networks with zero failover time
- Time-critical and Safety-critical transport systems

Parallel Redundancy Protocol (PRP)

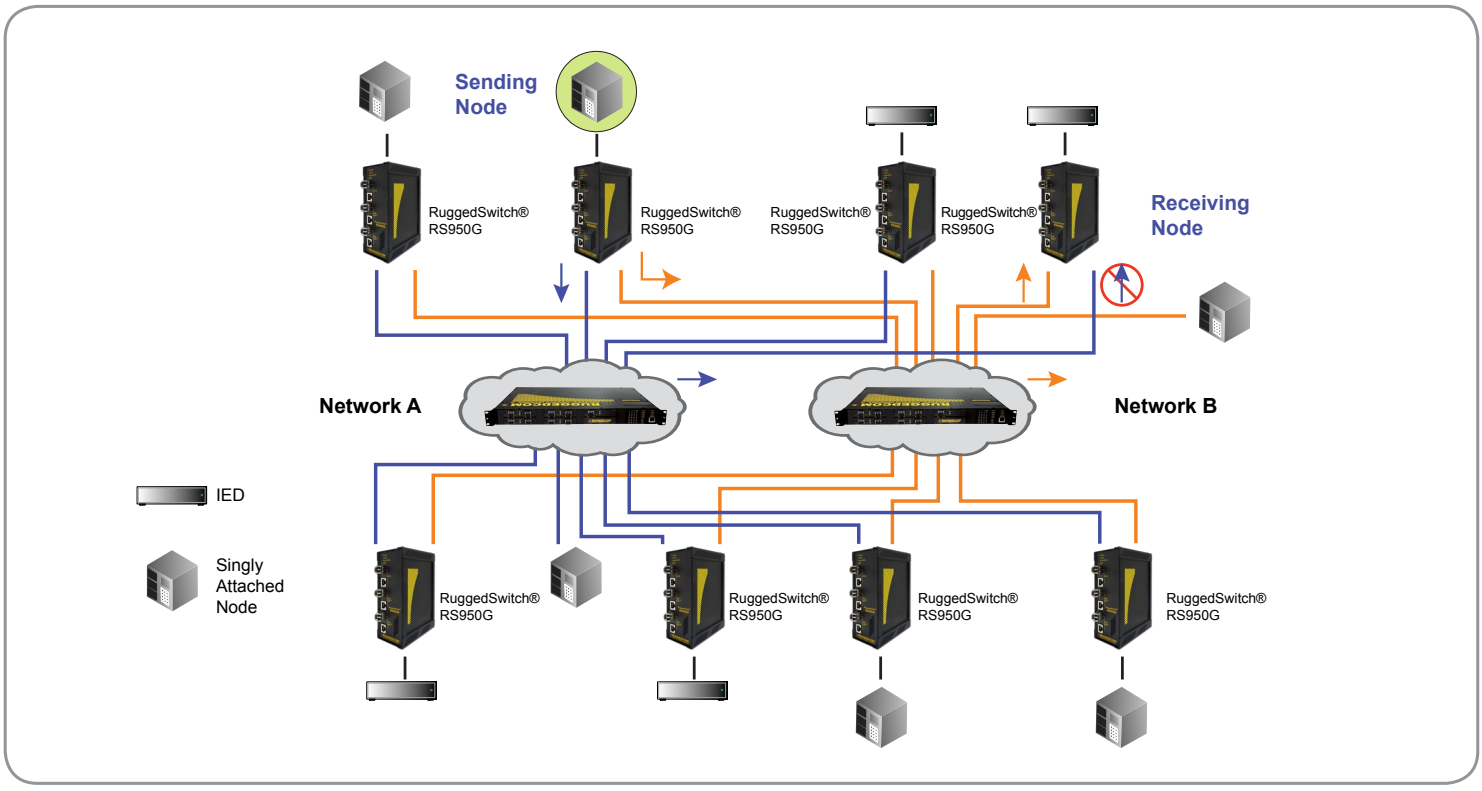

Figure 1. The RS950G can be used in PRP mode. Duplicate packets are generated by the sending node and removed at the receiving node as required. With PRP, singly attached nodes can be part of the network.

RuggedSwitch® RS950G

Dual Ports:
(Fiber or Copper)

Fiber:
- Pluggable Optics (SFP)
- LC connectors

Copper:
- 100/TX RJ45

Critical Alarm Relay:
- Form-C fail-safe contact relay: 1A@30VDC

Power Inputs:
- 24 VDC (10-36 VDC)
- 48 VDC (36-72 VDC)
- 85-264VAC or 88-300VDC

Mounting Options:
- Din Rail
- Panel Mount

Operating Temperature:
- -40°C to +85°C
- No Fans

Rugged Construction:
- 20 AWG. galvanized steel enclosure
- Conformal coating (optional)

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Technical Specifications

Interfaces
- Two IEC 62439 PRP Ethernet ports
- One access port for standard IEEE 802.3 Ethernet devices
- All Ethernet ports support copper or fiber media
  - SFP pluggable fiber transceiver with 100FX
  - 100TX (disabled when SFP present)
- RS232 Console Port
- LED Status Indicators

Power
- Dual DC inputs
- Power Consumption: 10W Max
- 24VDC: 10-36 VDC, 1.2A
- 48VDC: 36-72 VDC, 0.6A
- HI Voltage AC/DC: 88-300VDC or 85-264VAC

Critical Alarm Relay
- Form-C contact ratings:
  - Max Voltage 250VAC,125VDC
  - Max Current 2A@250VAC, 2A@30VDC

Environmental
- -40 to +85C (operating and storage) (no fans)
- 5 to 95% relative humidity (non-condensing)
- Ingress Protection: IP40 (1mm objects)

Physical
- Height: 18.8cm / 7.4”
- Width: 6.6cm / 2.6”
- Depth: 12.7cm / 5.0”
- Weight: 1.22kg / 2.7 lbs
- Enclosure: 20 AWG galvanized steel enclosure
- Mounting: DIN rail or panel

Switch Properties
- MAC addresses: 1024
- Frame buffer memory: 512k bits

Network Management
- HTTP graphical web-based
- Telnet, VT100
- Command Line Interface (CLI)
- SSH/SFTP (128-bit encryption)
  - SNMP v1, v2c, v3 (56-bit encryption)
  - Authentication and Accounting - TACACS+
  - RADIUS client

Approvals
- ISO: Designed and manufactured using a ISO9001: 2000 certified quality program
- CE Marking
- Emissions: FCC Part 15 (Class A), EN55022 (CISPR22 Class A)
- Safety: cCSAus (Compliant with CSA C22.2 No. 60950, UL60950, EN60950)
- Laser Eye Safety (FDA/CDRH): Complies with 21 CFR Chapter1, Subchapter J.

EMI Immunity and Environmental Compliance
- IEC 61000-6-2 Industrial (Generic)
- IEC 61800-3 Industrial (Variable Speed Drive Systems)
- IEC 61850-3 Electric Utility Substations
- IEEE 1613 Class 2 Electric Utility Substations

IEEE Compliance
- 802.3u-100BaseTX, 100BaseFX

IETF RFC Compliance
- RFC768-UDP
- RFC783-TFTP
- RFC791-IP
- RFC792-ICMP
- RFC793-TCP
- RFC826-ARP
- RFC854-Telnet
- RFC894-IP over Ethernet
- RFC2865-RADIUS
- RFC1519-CIDR
- RFC1541-DHCP (client)
- RFC2030-SNTP
- RFC2068-HTTP

IETF SNMP MIBs
- RFC1493-BRIDGE-MIB
- RFC1907-SNMPv2-MIB
- RFC2012-TCP-MIB
- RFC2013-UDP-MIB
- RFC2578-SNMPv2-SMI
- RFC2579-SNMPv2-TC
- RFC2863-IF-MIB
- IANAifType-MIB

Warranty
- 5 Years - Applicable to design and manufacturing related product defects.

ROS® Features

ROS

All RuggedCom managed switches come with embedded Rugged Operating System (ROS®) software to provide a rich set of features to connect intelligent substation devices on IEC 61850 networks. ROS based switches are built on the latest networking and security standards to integrate seamlessly with the enterprise LAN architectures and meet corporate policies.

Parallel Redundancy Protocol (PRP)

The RuggedCom RS950G is compliant with IEC 62439 and PRP. The RS950G generates duplicate packets and transmits them on independent paths on the PRP networks, providing complete redundancy for network or device faults that could interrupt the continued operation. If both paths remain intact and the receiving node receives duplicate packets, the RS950G ensures the duplicate packets are removed and taken out of circulation. The RS950G permits connection of singly attached nodes to the PRP networks.

Network Security

Network security is a key requirement in any industry where advanced automation and communications networks play a crucial role in mission critical applications. ROS® provides fundamental security features to address the various industry specific security standards such as NERC CIP, ISA S99, AGA 12, IEC 62443, ISO 17799:2005 and PCSRF SPP-ICS.

ROS® security features:

- Multi-level passwords provides user privileges and controls configuration access
- SSH / SSL encryption prevents clear text transmission of passwords
- RADIUS - Provides centralized password management

SNTP (Simple Network Time Protocol)

ROS® devices can contact an SNTP server on the network to automatically synchronize the internal clock and also act as SNTP servers to other devices. Time synchronization allows for correlation of time stamped events for sequence of event recording.

Loss of Link Management

Many intelligent electronic devices (IEDs) have dual fiber optic ports with automatic failover. ROS® ensures this mechanism works reliably under all failure modes by appropriately disabling link signals when failover occurs. ROS® also flushes learned MAC addresses to ensure rapid failover.

Port Statistics

ROS® provides real time in and out packet and byte counters as well as detailed error figures per port.

Event Logging and Alarms

Events and Alarms provide a means to alert the network manager about conditions and record them for later analysis. Non-critical or Alert level Alarms can be user configured to control their output behavior. ROS® can record configured events to a non-volatile system log for forensic troubleshooting. Events include link failure and recovery, unauthorized access, broadcast storm detection, and self-test diagnostics among others. Alarms provide a snapshot of recent events for the network administrator to acknowledge. Critical alarms can trip the Fail-Safe allowing an external controller to monitor the device.

HTML Web Browser and Telnet User Interfaces

ROS® provides a simple, intuitive user interface for configuration and monitoring via Telnet or a graphical user interface accessed via a standard web browser. All system parameters include detailed on-line help to ease setup. All ROS® devices have a common look and feel and standardized configuration process allowing easy migration to other RuggedCom managed products.

Configuration via ASCII Text File

All configuration parameters are stored in an ASCII formatted text file that can easily be transferred via TFTP or SFTP. The configuration file can be saved for backup purposes and easily manipulated by a text editor. The same text file can be downloaded to the switch at a later date in order to re-configure or restore a previous configuration.

Command Line Interface (CLI)

A command line interface can be used in conjunction with remote shell to automate data retrieval, configuration updates, and firmware upgrades. A powerful SQL-like capability allows expert users the ability to selectively retrieve or manipulate any parameters the device has to offer.

SNMP (Simple Network Management Protocol)

SNMP provides a standardized method for network management stations the ability to interrogate devices from different vendors. SNMP versions supported by ROS ® are v1, v2c, and v3. SNMPv3 in particular provides security features (such as authentication, privacy, and access control) not present in earlier SNMP versions. ROS ® also supports numerous standard MIBs (Management Information Base) allowing for easy integration with any network management system (NMS).

EMI and Environmental Type Tests

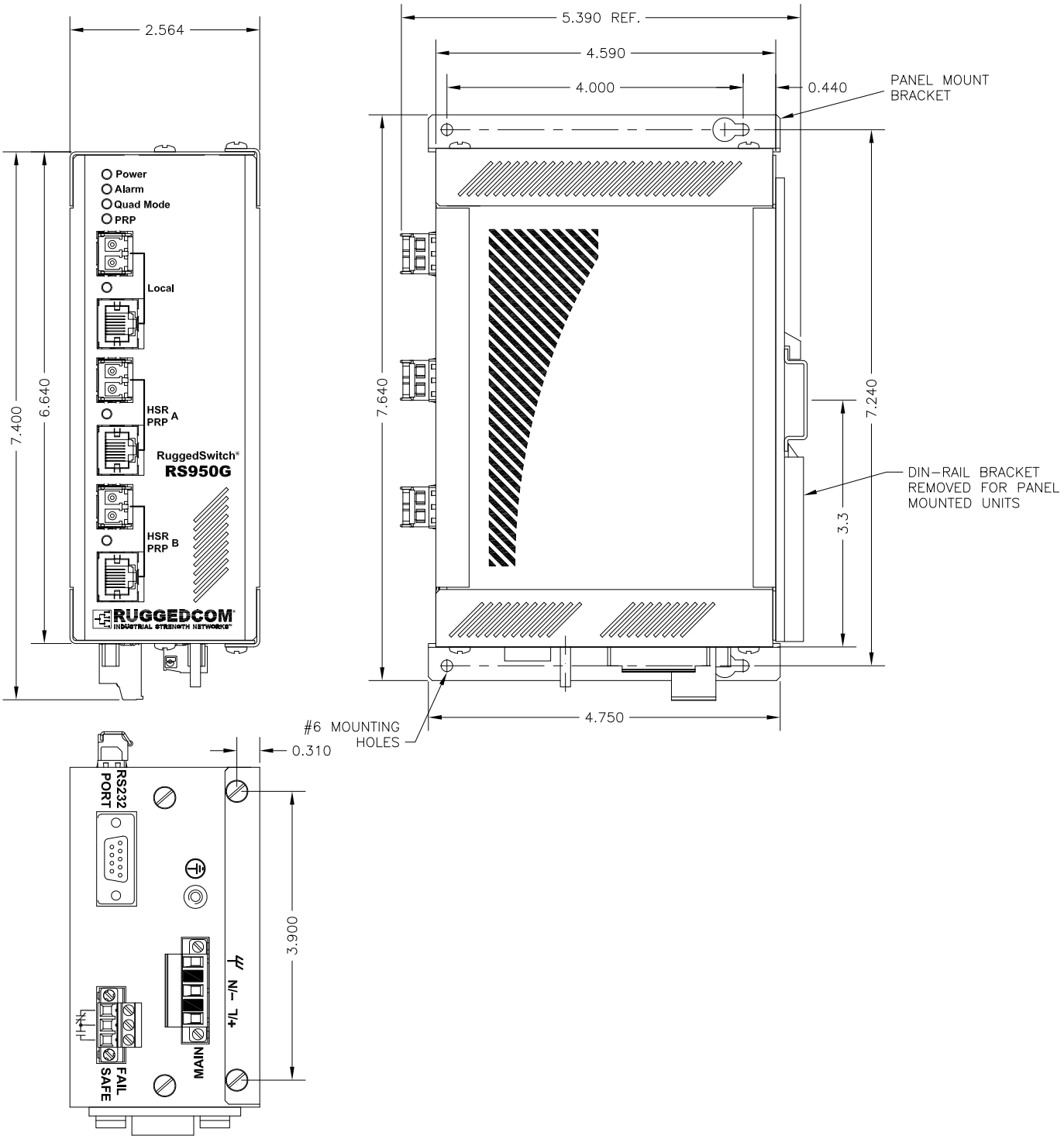
IEC 61850-3 EMI TYPE TESTS				
TEST	Description		Test Levels	Severity Levels
IEC 61000-4-2	ESD	Enclosure Contact	+/- 8kV	4
		Enclosure Air	+/- 15kV	4
IEC 61000-4-3	Radiated RFI	Enclosure ports	20 V/m	Note 1
IEC 61000-4-4	Burst (Fast Transient)	Signal ports	+/- 4kV @ 2.5kHz	Note 1
		D.C. Power ports	+/- 4kV	4
		A.C. Power ports	+/- 4kV	4
		Earth ground ports	+/- 4kV	4
IEC 61000-4-5	Surge	Signal ports	+/- 4kV line-to-earth, +/- 2kV line-to-line	4
		D.C. Power ports	+/- 2kV line-to-earth, +/- 1kV line-to-line	3
		A.C. Power ports	+/- 4kV line-to-earth, +/- 2kV line-to-line	4
IEC 61000-4-6	Induced (Conducted) RFI	Signal ports	10V	3
		D.C Power ports	10V	3
		A.C. Power ports	10V	3
		Earth ground ports	10V	3
IEC 61000-4-8	8 Magnetic Field	Enclosure ports	40 A/m continuous, 1000 A/m for 1 s	Note 1
			1000 A/m for 1 s	5
IEC 61000-4-29	Voltage Dips & Interrupts	D.C. Power ports	30% for 0.1s, 60% for 0.1s, 100% for 0.05s	N/A
		A.C. Power ports	30% for 1 period, 60% for 50 periods	N/A
IEC 61000-4-11			100% for 5 periods, 100% for 50 periods	N/A
IEC 61000-4-12	Damped Oscillatory	Signal ports	2.5kV common, 1kV diff. mode@1MHz	3
		D.C. Power ports	2.5kV common, 1kV diff. mode@1MHz	3
		A.C. Power ports	2.5kV common, 1kV diff. mode@1MHz	3
IEC 61000-4-16	Mains Frequency Voltage	Signal ports	30V Continuous, 300V for 1s	4
		D.C. Power ports	30V Continuous, 300V for 1s	4
IEC 61000-4-17	Ripple on D.C. Power Supply	D.C. Power ports	10%	3
IEC 60255-5	Dielectric Strength	Signal ports	2kVac (Fail-Safe Relay output)	N/A
		D.C. Power ports	2kVac	N/A
		A.C. Power ports	2kVac	N/A
IEC 60255-5	H.V. Impulse	Signal ports	5kV (Fail-Safe Relay output)	N/A
		D.C. Power ports	5kV	N/A
		A.C. Power ports	5kV	N/A

IEEE 1613 (C37.90.x) EMI IMMUNITY TYPE TESTS[2]			
Test	Description		Test Levels
IEEE C37.90.3	ESD	Enclosure Contact	+/-2kV, +/-4kV, +/- 8kV
		Enclosure Air	+/-4kV, +/-8kV, +/-15kV
IEEE C37.90.2	Radiated RFI	Enclosure ports	35 V/m
IEEE C37.90.1	Fast Transient	Signal ports	+/- 4kV @ 2.5kHz
		D.C. Power ports	+/- 4kV
		A.C. Power ports	+/- 4kV
		Earth ground ports3	+/- 4kV
IEEE C37.90.1	Oscillatory	Signal ports	2.5kV common mode @1MHz
		D.C. Power ports	2.5kV common, 1kV diff. mode@1MHz
		A.C. Power ports	2.5kV common, 1kV diff. mode@1MHz
IEEE C37.90	H.V. Impulse	Signal ports	5kV (Fail-Safe Relay output)
		D.C. Power ports	5kV
		A.C. Power ports	5kV
IEEE C37.90	Dielectric Strength	Signal ports	2kVac
		D.C. Power ports	2kVac
		A.C. Power ports	2kVac

Environmental Type Tests			
Test	Description		Test Levels
IEC 60068-2-1	Cold Temperature	Test Ad	-40°C, 16 Hours
IEC 60068-2-2	Dry Heat	Test Bd	+85°C, 16 Hours
IEC 60068-2-30	Humidity (Damp Heat, Cyclic)	Test Db	95% (non-condensing), 55°C , 6 cycles
IEC 60255-21-1	Vibration		2g @ (10 - 150) Hz
IEC 60255-21-2	Shock		30g @ 11mS

Notes: 1. Ruggedcom specified severity levels
2. Meets Class 2 requirements for an all fiber configuration. Class 1 for copper ports.

Mechanical Drawings



Order Codes

RS950G -__ - __ - __ - ___ - ___ - _____

PS M P1 P2 P3 MOD

PS: Power Supply
- 24 = 24 VDC (9-36 VDC)
- 48 = 48 VDC (36-72 VDC)
- HI = 85-264VAC or 88-300VDC

M: Mounting Option
- D = DIN Rail
- P = Panel Mount
- N = None

P1, P2, P3: Port 1-3 Options
- XX = No SFP Installed
- 1FX51 = 1 x 100FX SFP - Multimode, 1310nm, LC, 2Km
- 1FX52 = 1 x 100FX SFP - Singlemode, 1310nm, LC, 20Km
- *See Note**

Accessories:

Fast Ethernet SFPs
- 99-25-0003 = 100FX SFP Multimode LC 1310nm 2Km
- 99-25-0004 = 100FX SFP Singlemode LC 1310nm 20Km

MOD: Manufacturing Modifications
- XX = None
- C01 = Conformal Coating

Note: * RuggedCom does not guarantee compatibility of any SFPs not mentioned above, and not supplied by RuggededCom.

Example Order Codes

RS950G-24-D-XX-XX-XX

RS950G with 24VDC, DIN Mount, 3 10/100TX Ports

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