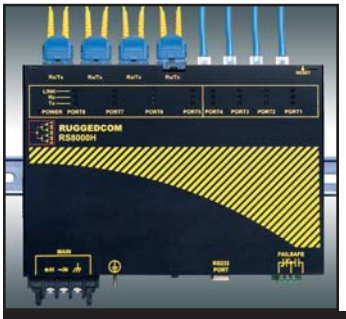
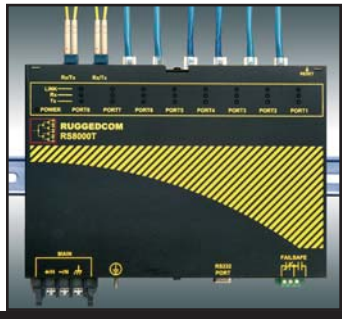
RS8000

RS8000A

RS8000H



RS8000T



RUGGEDIZED FOR HARSH ENVIRONMENTS

The RuggedSwitch™ RS8000 Family provides substation hardened, fully managed, Ethernet switches specifically designed to operate reliably in electrically and environmentally harsh environments.

The RS8000 Family's Zero-Packet-Loss technology provides a high level of immunity to electromagnetic interference (EMI) and heavy electrical surges typical of environments found in electric utility substations, industrial plant floors or in curb side traffic control cabinets. The RS8000 model provides IEEE 1613 Class 2 error-free communications performance under EMI stress. An operating temperature range of -40 to +85°C (-40 to +185°F) allows the RS8000 family to be placed in almost any location.

The RS8000 Family provides a wide range of power supply options suitable for multiple industries and for worldwide operability. Options include: 24Vdc, 48Vdc, and HI=(88Vdc - 300Vdc / 85Vac - 264Vac)

All RuggedSwitch™ RS8000 Family members offer advanced Layer 2 and 3 networking features and network management via the RuggedSwitch™ Operating System (ROS). A unique feature of ROS is the performance of its IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) used for implementing fault tolerant ring and mesh network architectures. The protocol has been optimized to support ring sizes of up to 80 switches and fault recovery times in the order of less than 5ms per switch.

The RS8000 Family's superior ruggedized design coupled with the RuggedSwitch™ Operating System (ROS) provides improved system reliability and advanced networking features making it ideally suited for creating Ethernet networks for mission-critical, real-time, control applications. All RuggedCom products are backed by a five year warranty and unsurpassed customer support.

KEY FEATURES AND BENEFITS

8-ETHERNET PORTS

- RS8000: 8-100BaseFX
- RS8000T: 6-10/100BaseTX + 2-100BaseFX (MTRJ/LC connectors)
- RS8000H: 4 -10/100BaseTX + 4 -100BaseFX (SC/ST Connectors)
- RS8000A: 2-10/100BaseTX + 2-10BaseFL + 4-100BaseFX
- Multimode and Singlemode optical transceivers
- Industry standard fiber optical connectors: LC, SC, ST, MTRJ

UNIVERSAL POWER SUPPLY OPTIONS

- Input voltages of 24VDC, 48VDC, HI = (88VDC-300VDC / 85VAC-264VAC) for worldwide operability
- Terminal blocks for reliable maintenance free connections
- CSA/UL 60950 safety approved to +85°C

DESIGNED FOR HARSH ENVIRONMENTS

- Exceeds IEC 61850-3 requirements for electric power substations
- Exceeds IEC 61000-6-2 for industrial environments
- Exceeds NEMA TS 2 requirements for traffic control equipment
- Meets IEEE 1613 requirements for electric power substations
- Meets IEEE 1613 Class 2 performance via Zero-Packet-Loss™ technology (RS8000 model)
- Failsafe Output Relay: For critical failure or error alarming
- Operates over a temperature range of -40°C to +85°C without the use of fans for improved reliability
- 18 AWG galvanized steel enclosure and DIN or panel mounting options provide secure mechanical reliability

HIGH PERFORMANCE ETHERNET SWITCHING

- Full compliance with IEEE 802.3 and IEEE 802.3u Ethernet standards for universal interoperability
- Non-blocking, store and forward switching for high network throughput
- Full duplex operation and flow control (IEEE 802.3x) results in no collisions and deterministic network response

SIMPLE PLUG AND PLAY OPERATION

- Automatic learning of up to 8192 MAC addresses
- Auto-negotiation on 10/100TX ports simplifies setup
- Auto-MDI/MDIX on all 10/100TX ports eliminates need for crossover cables
- LED indicators for link, activity and speed aid in field troubleshooting

ROS ADVANCED MANAGEMENT

- Enhanced Rapid Spanning Tree (802.1w) for fault tolerance with fast recovery times (<5ms)
- Quality of Service (802.1p) for real-time traffic
- VLAN (802.1q) for traffic segregation with double tagging
- IGMP Snooping for multicast filtering
- Port configuration, status, statistics, mirroring, security
- Loss of link management for link pulse control on fiber ports
- Web-based, Telnet, CLI management interfaces
- SNMP v2 and RMON
- Rich set of diagnostics with logging and alarms

IEEE 1613 CLASS 2 ERROR-FREE COMMUNICATIONS PERFORMANCE UNDER EMI STRESS

RAPID SPANNING TREE PROTOCOL (IEEE 802.1w)

RSTP allows the creation of fault-tolerant ring and mesh Ethernet networks that incorporate redundant links that are 'pruned' to prevent loops. The ROS optimized version of RSTP yields worst-case failovers of 5ms times the 'bridge diameter' and allows rings of up to 80 switches. For example, a ring of ten switches will have failover times under 50ms. ROS implements both STP and RSTP to ensure interoperability with commercial switches unlike other proprietary 'ring' based solutions.

QUALITY OF SERVICE (IEEE 802.1p)

Some networking applications such as real-time control or VoIP (voice over IP) require predictable arrival times for Ethernet frames. Switches can introduce latency in times of heavy network traffic due to the internal queues that buffer frames and than transmit on a first come first serve basis. ROS supports 'Class of Service' in accordance with IEEE 802.1p that allows time critical traffic to jump ahead to the front of the queue thus minimizing latency and reducing jitter to allow such demanding applications to operate correctly. ROS allows priority classification by port, tags, MAC address, and IP type of service (TOS). A configurable "weighted fair queuing" algorithm controls how frames are emptied from the queues.

VLAN (IEEE 802.1q)

Virtual local area networks (VLAN) allow the segregation of a physical network into separate logical networks with independent broadcast domains. A measure of security is provided since hosts can only access other hosts on the same VLAN and traffic storms are isolated. ROS supports 802.1q tagged Ethernet frames and VLAN trunks. Port based classification allows legacy devices to be assigned to the correct VLAN.

IGMP SNOOPING

ROS uses IGMP snooping (Internet Group Management Protocol v1&v2) to intelligently forward or filter multicast traffic streams (e.g. MPEG video) to or from hosts on the network. This reduces the load on network trunks and prevents packets from being received on hosts that are not involved. ROS has a very powerful implementation of IGMP snooping that:

- Can be enabled on a per VLAN basis.
- Detects and filters all multicast streams regardless of whether subscribers exist
- Supports "router-less" operation by supporting an "active" mode
- Restores traffic streams immediately after an RSTP topology change

PORT MIRRORING

ROS can be configured to duplicate all traffic on one port to a designated mirror port. When combined with a network analyzer, this can be a powerful troubleshooting tool.

PORT CONFIGURATION AND STATUS

ROS allows individual ports to be 'hard' configured for speed, duplex, auto-negotiation, flow control and more. This allows proper connection with devices that do not negotiate or have unusual settings. Detailed status of ports with alarm and SNMP trap on link problems aid greatly in system troubleshooting.

PORT STATISTICS AND RMON (REMOTE MONITORING)

ROS provides continuously updating statistics per port that provide both ingress and egress packet and byte counters as well as detailed error figures. Also provided is full support for the RMON statistics, history, alarms, and event groups. RMON allows for very sophisticated data collection, analysis and detection of traffic patterns.

LOSS OF LINK MANAGEMENT

Some intelligent electronic devices (IEDs) have dual fiber optic ports with automatic failover to a backup port should the primary fail. ROS ensures this mechanism works reliably under all failure modes by appropriately disabling link signals when required. ROS also flushes learned MAC addresses to ensure the failover occurs quickly.

PORT SECURITY

ROS provides the ability to filter or accept traffic from specific hosts to prevent unknown users or devices from gaining access to the network. Unauthorized access results in the port being shutdown for a period of time along with SNMP trap and alarm generation.

BROADCAST STORM FILTERING

Broadcast storms wreak havoc on a network and can cause attached devices to malfunction. This could be disastrous on a network with mission critical equipment. ROS limits this by filtering broadcast frames with a user-defined threshold.

SNMP (SIMPLE NETWORK MANAGEMENT PROTOCOL)

SNMP provides a standardized method for network management stations the ability to interrogate devices from different vendors. ROS supports numerous standard MIBs (Management Information Base) allowing for easy integration with any network management system (NMS). A feature of SNMP supported by ROS is the ability to generate "traps" upon system events. A NMS can record traps from multiple devices providing a powerful network troubleshooting tool. RuggedVue™ is RuggedCom's NMS that provides graphical visualization of the network and is fully integrated with all RuggedCom products.

HTML WEB BROWSER AND TELNET USER INTERFACES

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

EVENT LOGGING AND ALARMS

ROS records all significant events to a non-volatile system log allowing 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 that have yet to be acknowledged by the network administrator. An extreme hardware relay is de-energized during the presence of critical alarms allowing an external controller to react if desired.

SNTP (SIMPLE NETWORK TIME PROTOCOL)

SNTP automatically synchronizes the internal clock of all ROS devices on the network. This allows for correlation of time stamped events for troubleshooting.

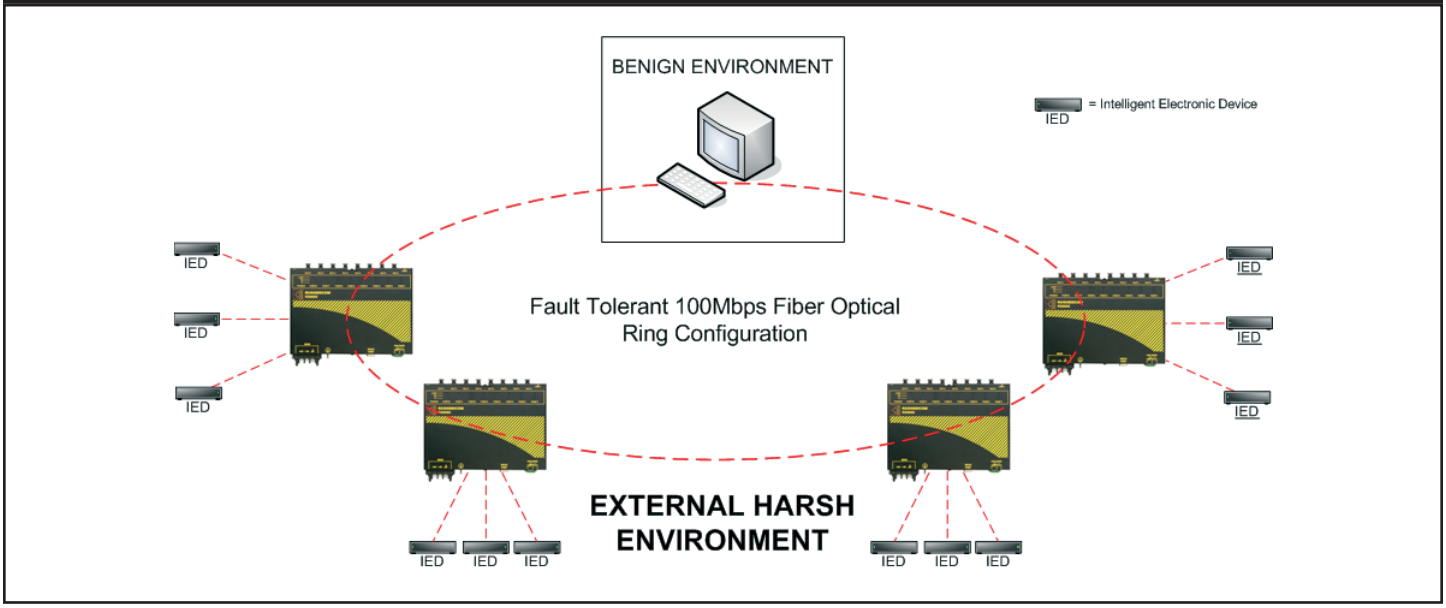
CONFIGURATION VIA ASCII TEXT FILE

All configuration parameters are stored in an ASCII formatted text file that can easily be transferred via TFTP or Xmodem. The configuration file can be saved for backup purposes and easily manipulated by a text editor. The text same 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.

Typical Application: Fault Tolerant Loop Architecture with Fast Recovery Times



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	x
IEC 61000-4-4	Burst (Fast Transient)	Signal ports	+/- 4kV @ 2.5kHz	x
		D.C. Power ports	+/- 4kV	4
		A.C. Power ports	+/- 4kV	4
		Earth ground ports [3]	+/- 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 [3]	10V	3
IEC 61000-4-8	Magnetic Field	Enclosure ports	40 A/m continuous, 1000 A/m for 1 s	N/A
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 [2]	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 Continous, 300V for 1s	4
		D.C. Power ports	30V Continous, 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				
Test	***Description***		***Test Levels***	***Severity Levels***
IEEE C37.90.3	ESD	Enclosure Contact	+/- 8kV	N/A
		Enclosure Air	+/- 15kV	N/A
IEEE C37.90.2	Radiated RFI	Enclosure ports	35 V/m	N/A
IEEE C37.90.1	Fast Transient	Signal ports	+/- 4kV @ 2.5kHz	N/A
		D.C. Power ports	+/- 4kV	N/A
		A.C. Power ports	+/- 4kV	N/A
		Earth ground ports3	+/- 4kV	N/A
IEEE C37.90.1	Oscillatory	Signal ports	2.5kV common mode @1MHz	N/A
		D.C. Power ports	2.5kV common, 1kV diff. mode@1MHz	N/A
		A.C. Power ports	2.5kV common, 1kV diff. mode@1MHz	N/A
IEEE C37.90	Dielectric Strength	Signal ports	2kVac	N/A
		D.C. Power ports	2kVac	N/A
		A.C. Power ports	2kVac	N/A

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

Notes:
1. Only applicable to functional earth connections separated from the safety earth connection.
2. Class 2 refers to "Measuring relays and protection equipment for which a very high security margin is required or where the vibration levels are very high,
5. (e.g. shipboard application and for severe transportation conditions")

POWER SUPPLY
- Power Consumption: 20W (max)
- 24VDC: 18-36VDC (max)
- 48VDC: 36-59VDC (max)
- HI Voltage AC/DC: 88-300VDC, 85-264VAC (max)

CRITICAL ALARM RELAY
- Form-C failsafe contact relay: 1A@30VDC

PHYSICAL DIMENSIONS
- Height: 2.43"
- Width: 7.81"
- Depth: 9.8"
- Weight: 5lbs (2.25 Kg)
- Enclosure: 18 AWG galvanized steel enclosure
- Mounting: DIN rail or panel mounted

SWITCH PROPERTIES
- Switching method: Store & Forward
- Switching latency: 7 us
- Switching bandwidth: 1.6Gbps
- MAC addresses: 8192
- Priority Queues: 2
- Frame buffer memory: 160 packet buffers, 1536 bytes each
- VLANs: 1000
- IGMP multicast groups: 256

APPROVALS
- ISO: Manufactured in an ISO9001 facility
- cCSAus: CSA C22.2 No. 60950, UL 60950
- CE: EN 60950
- Emissions: FCC Part 15, Class A
- Complies with 21 CFR Chapter 1, Subchapter J.
- NEMA TS-2

WARRANTY
- 5 Years-Applicable to design or manufacturing related product defects.

NETWORK MANAGEMENT
- Web-based graphical HTML
- SNMP v1, v2c
- Telnet, VT100
- Command Line Interface (CLI)

IEEE COMPLIANCE
- 802.3-10BaseT
- 802.3u-100BaseTX, 100BaseFX
- 802.3x-Flow Control
- 802.3d-MAC Bridges
- 802.1d-Spanning Tree Protocol
- 802.1p-Class of Service
- 802.1q-VLAN Tagging
- 802.1w-Rapid Spanning Tree Protocol

IETF RFC COMPLIANCE
- RFC791-IP
- RFC792-ICMP
- RFC793-TCP
- RFC783-TFTP
- RFC826-ARP
- RFC768-UDP
- RFC894-IP over Ethernet
- RFC854-Telnet
- RFC1519-CIDR
- RFC1541-DHCP (client)
- RFC1112-IGMP v1
- RFC2236-IGMP v2
- 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
- RFC2819-RMON-MIB
- RFC2863-IF-MIB
- draft-ietf-bridge-rstpmib-03-BRIDGE-MIB
- draft-ietf-bridge-bridgemib-smiv2-03-RSTP-MIB
- IANAifType-MIB

Fiber Optical Specifications

Parameter	Fiber Port Type				
Speed	10BaseFL	100BaseFX			
Mode	Multimode	Multimode	Singlemode		
Connectors	ST	MTRJ / ST / SC	LC / SC		
Typical Dist. (km)	2	2	20	50	90
Optical Wavelength (nm)	820	1310	1310		
Cable SizeCore/Cladding	62.5/125	62.5/125	9/125		
Tx Power (dBm)	-34.4	-15.7	-15.5	-2.5	2.5
Rx Sensitivity (dBm)	-8.2	-33.5	-32	-37	-39
Typical Budget	22	17	16.5	34.5	41.5
Longer segment lengths dependent on fiber specifications. Consult factory for further detials.					

ORDER CODES

RS8000 - __ - __ - __
PS - FO - MS

RS8000A - __ - __ - __
PS - FO - MS

RS8000H - __ - __ - __
PS - FO - MS

RS8000T - __ - __ - __
PS - FO - MS

PS (POWER SUPPLY)
- 24 = 24VDC
- 48 = 48VDC
- HI = 87-264VAC OR 88-300VDC

RS8000-FO (FIBER OPTIONS)
- MM = 1300nm, MM, 2km via SFF MTRJ connectors
- SM-X = 1310nm, SM, 15km via SFF LC connectors
- (X= 4 or 8 SM Fiber Ports)

RS8000A-FO (FIBER OPTIONS FOR 100BASEFX PORTS ONLY)
- MM = 1300nm, MM, 2km via SFF MTRJ connectors
- SM = 1310nm, SM, 15km via SFF LC connectors

RS8000H-FO (FIBER OPTIONS)
- MMSC = 1300nm, MM, 2km via SC connectors
- MMST = 1300nm, MM, 2km via ST connectors
- SMSC = 1310nm, SM, 15km via SC connectors
- SMST = 1310nm, SM, 15km via ST connectors

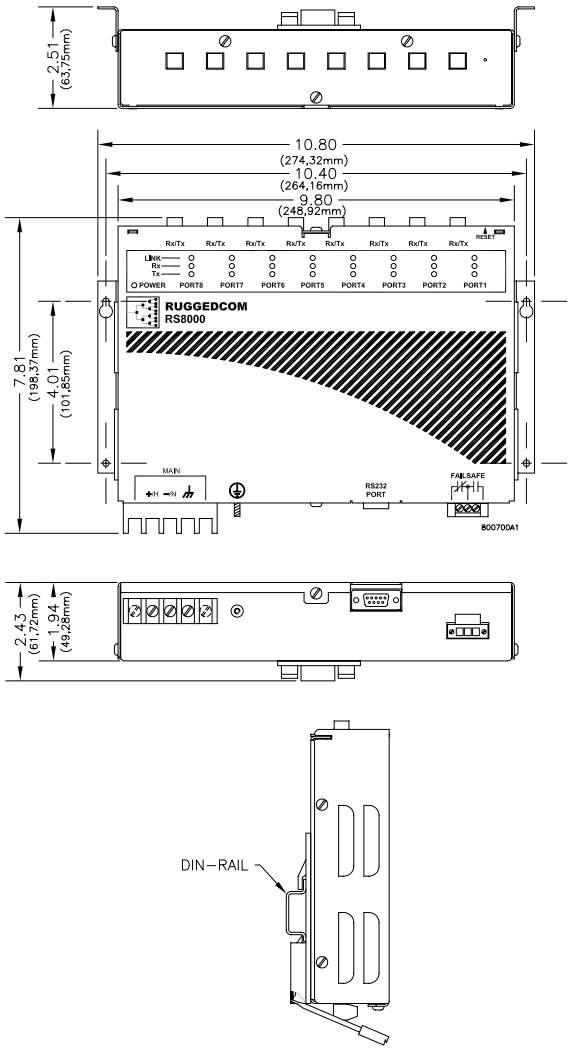
RS8000T-FO (FIBER OPTIONS)
- MM = 1300nm, MM, 2km via SFF MTRJ connectors
- SM = 1310nm, SM, 15km via SFF LC connectors
- 0 = No Fiber Ports

MS (MANAGED SWITCH FUNCTIONS)
- UM = Unmanaged
- MS = Managed Switch option

VALID ORDER CODE EXAMPLES
- RS8000-24-SM-8-MS
- RS8000-HI-MM-MS
- RS8000A-24-MM-UM
- RS8000A-HI-MM-MS
- RS8000A-HI-SM-MS
- RS8000H-24-SMSC-MS
- RS8000H-HI-MMST-MS
- RS8000T-24-SM-MS
- RS8000T-HI-MM-MS
- RS8000T-48-0-UM

*MM= MultiMode *SM= SingleMode

MOUNTING OPTIONS:
STANDARD UNIT FOR DIN RAIL MOUNTING USE
FOR 19" RACK MOUNTING, ORDER P/N 41-81-0007
FOR PANEL MOUNTING, ORDER P/N 14-50-0005



For additional information on our products and services, please visit our website at: www.ruggedcom.com

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