RuggedVDSL™ RS910L
Serial and Ethernet Device Server with Ethernet over VDSL Uplink

Installation Guide
www.ruggedcom.com

RuggedCom Inc. l 30 Whitmore Road, Woodbridge, Ontario, Canada L4L 7Z4
Tel: (905) 856-5288 l **Fax:** (905) 856-1995 l **Toll Free:** (888) 264-0006

Federal Communications Commission
Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his expense.

Caution

This product contains a laser system and is classified as a "CLASS 1 LASER PRODUCT".

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. This product contains no user serviceable parts. Attempted service by unauthorized personnel shall render all warranties null and void.

Should this device require service see the "Warranty" section of this installation guide.

Important

This unit should be installed in a restricted access location where access can only be gained by service personnel or users who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken; and access is through the use of a tool or lock and key, or other means of security, and is controlled by the authority responsible for the location.

Trademarks:
Ethernet *is a trademark of Xerox Corporation*
RuggedSwitch, RuggedRated, ROS and eRSTP *are trademarks of RuggedCom® Inc.*

Table of Contents

Table of Figures

Table of Tables

4

1 Product Overview

1.1 Functional Overview

The RuggedVDSL™ RS910L is an industrial hardened serial server and managed Ethernet switch supporting Ethernet over VDSL (EoVDSL). The RS910L can be configured with 2 serial ports (RS485/RS422/RS232/fiber) and/or 2 Ethernet ports (copper or fiber). The RS910L can interconnect multiple types of intelligent electronic devices (IEDs) that have different methods of communications. The EoVDSL port allows for aggregation of these devices at a remote location back to the central control room using existing telephone grade cable (or other legacy serial cabling). The EoVDSL uplink allows up to 4km LAN segments at up to 50 Mbps.

1.2 Feature Highlights

- Interface Ports
  - o 1 Ethernet over VDSL (EoVDSL) interface
  - o 2 Serial and/or 2 Fast Ethernet Ports
  - o RS485/RS422/RS232 Serial Ports (DB9 and RJ45)
  - o Serial Fiber Interface (ST) available
  - o 10/100BaseTX or 100BasesFX Ethernet ports
- Ethernet Over VDSL Port Characteristics:
  - o Up to 4 km LAN segments
  - o Symmetric data rates up to 50 Mbps
  - o Automatically selects fastest data rate based on distance and quality of cable
  - o Software selectable to be master or slave
  - o Frequency Division Multiplexing (FDM)

5

1.3 RS910L Front Panel Description
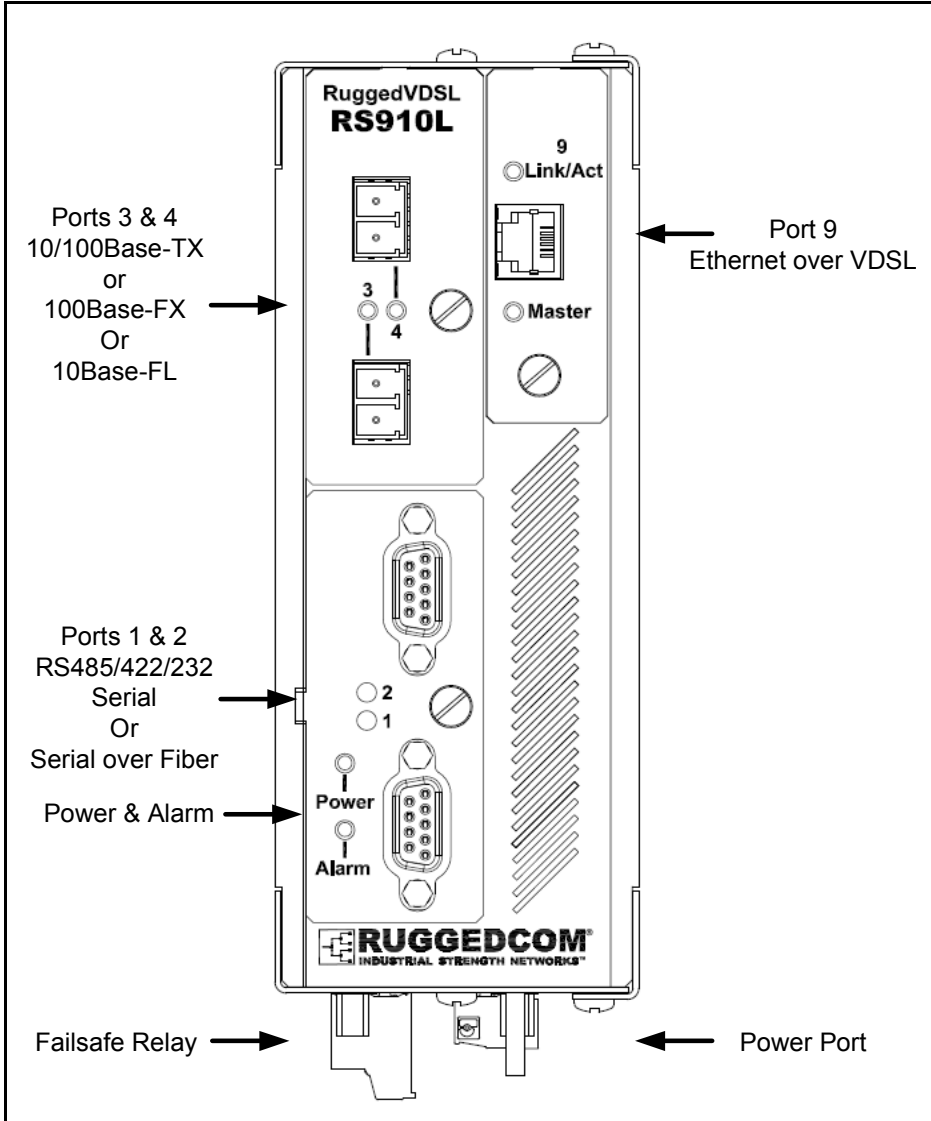
Figure 1 - RS910L Front Panel Description

Status LED	Colour	Activity	Comments
Power LED	Green	Solid	Power On
Alarm LED	Red	Solid	Alarm condition exists

Table 1 - Status LEDs

Rev100

1.4 RS910L Bottom Panel Description
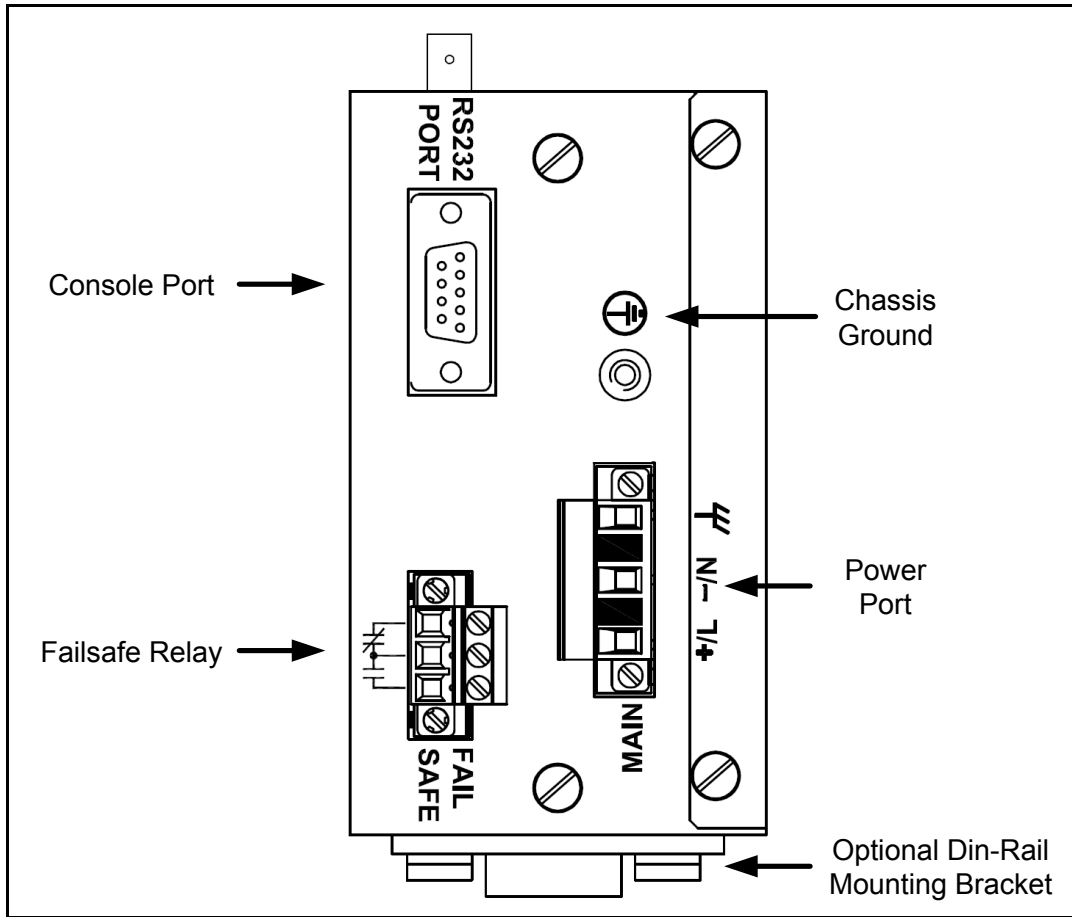
Figure 2 - RS910L Bottom Panel Description

7

2 Installation

2.1 Din Rail Mounting

An optional DIN rail mounting bracket is available for the RS910L. The figure below details mounting instructions for the standard 1" DIN Rail.
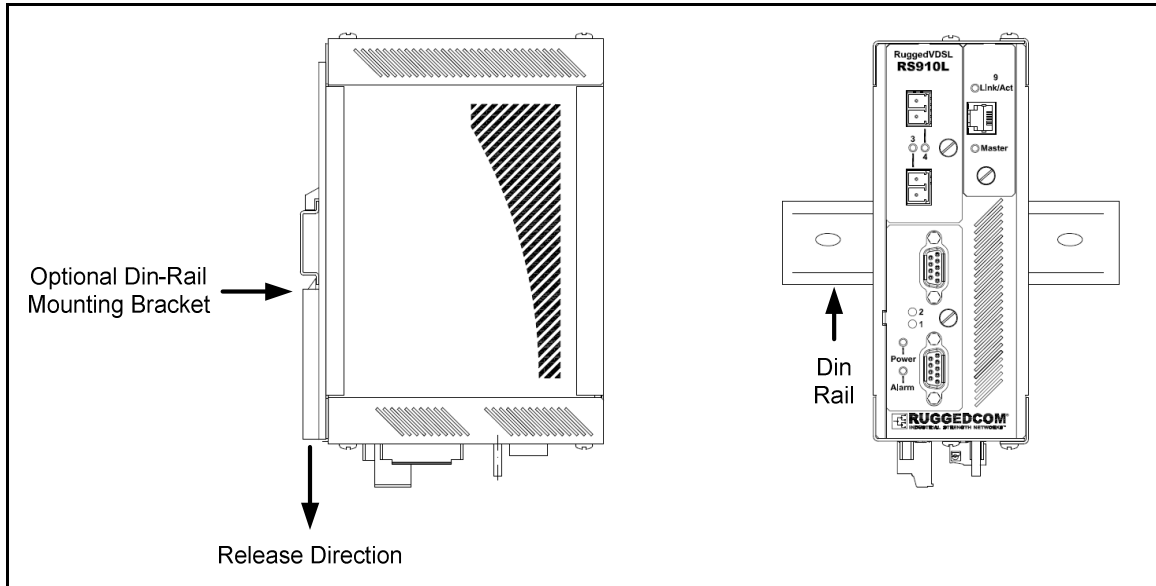
Figure 3 - RS910L DIN Rail Mounting

2.2 Power Supply Wiring and Grounding

2.2.1 AC Power Supply Wiring and Grounding
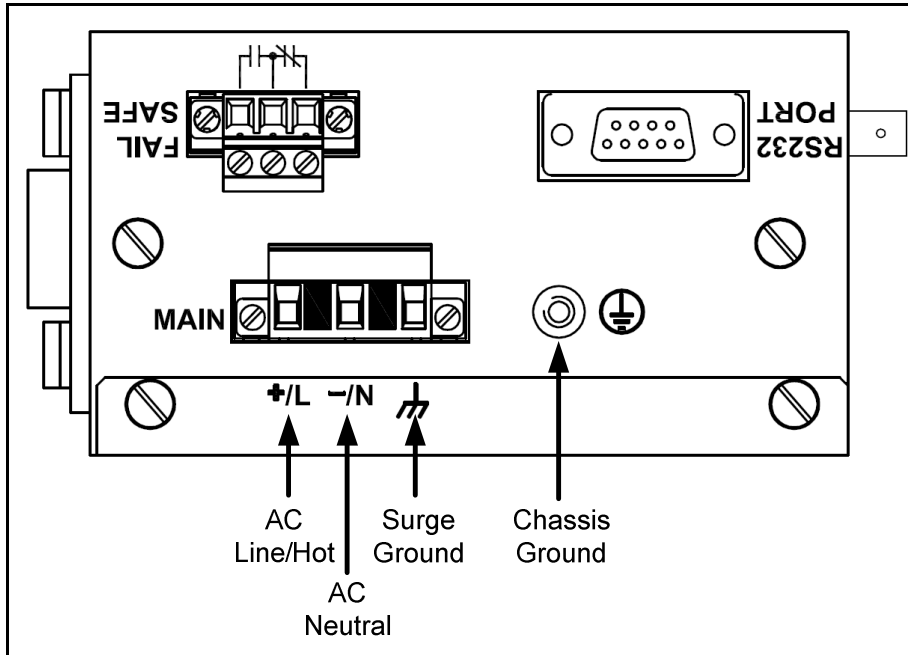
Figure 4 - RS910L Power Supply Inputs

The RS910L AC power supply inputs should be connected as follows:
1. +/L should be connected to AC Line/Hot.
2. -/N should be connected to AC Neutral.
3. Surge Ground should be connected to the Chassis Ground via a braided cable or other appropriate grounding wire. Surge Ground is used as the ground conductor for all surge and transient suppression circuitry internal to the unit.
4. Chassis Ground must be connected to the AC ground terminal.

NOTES:
1. Equipment must be installed according to the applicable country wiring codes.
2. All line-to-ground transient energy is shunted to the Surge Ground terminal. In cases where users require the inputs to be isolated from ground, remove the ground braid between Surge and Chassis Ground. Note that all line-to-ground transient protection circuitry will be disabled.

9

Rev100

2.2.2 DC Power Supply Wiring and Grounding
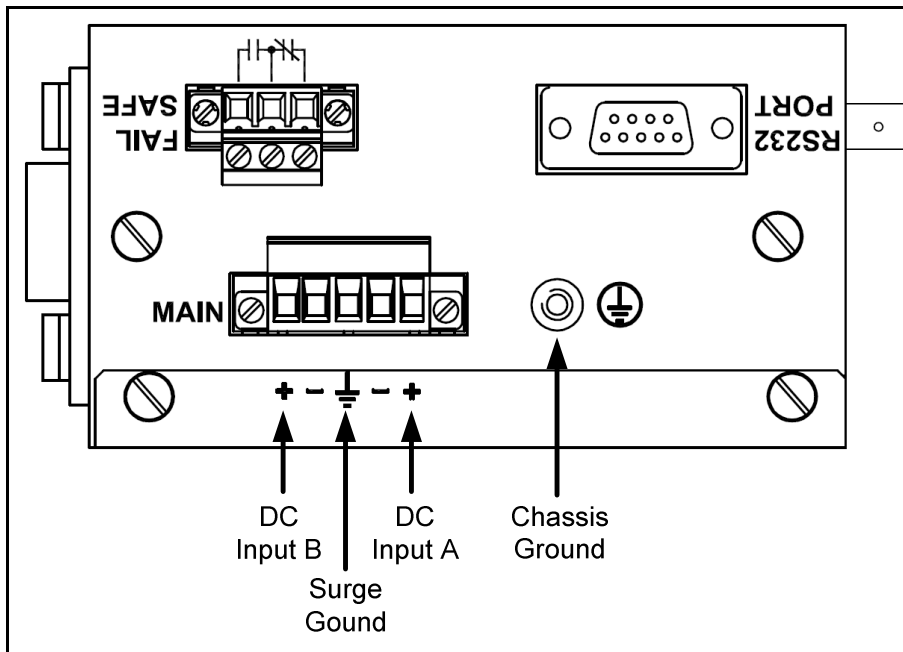
Figure 5 - DC Power supply wiring and grounding diagram

The RS910L low voltage DC power supply features reverse polarity protection and dual independent inputs. The latter feature allows the connection of two DC sources with the same nominal voltage to provide redundant power supply inputs.

The RS910L DC power supply inputs should be connected as follows:
1. Connect to the DC inputs according to the polarity markings on the unit.
2. Surge Ground should be connected to the Chassis Ground via a braided cable or other appropriate grounding wire. Surge Ground is used as the ground conductor for all surge and transient suppression circuitry internal to the unit.
3. Chassis Ground must be connected to the protective earth.

NOTES:
1. Equipment must be installed according to the applicable country wiring codes.
2. All line-to-ground transient energy is shunted to the Surge Ground terminal. In cases where users require the inputs to be isolated from ground, remove the ground braid between Surge and Chassis Ground. Note that all line-to-ground transient protection circuitry will be disabled.

10

Rev100

2.2.3 Dielectric Strength Testing

Units which are to have dielectric strength testing (HIPOT testing) done in the field must have the braided ground cable disconnected during the test. This is required in order to prevent the surge suppression circuitry, which is connected to surge ground, from being activated.
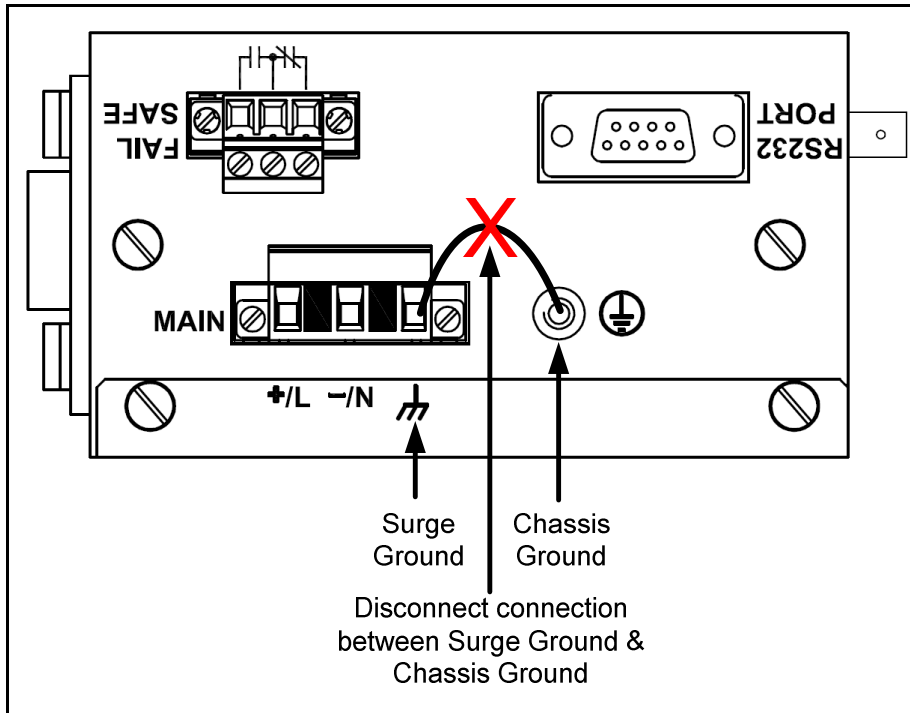
Figure 6 - Dielectric Strength Testing

Rev100

2.3 Failsafe Output Wiring

The Failsafe output relay is provided to signal critical error conditions that may occur on the RS910L. The contacts are energized upon power up of the unit and remain energized until an alarm condition or power loss occurs. The behavior of the failsafe relay is configurable via the RuggedSwitch Operating System. Consult the RuggedSwitch Users Guide for details.
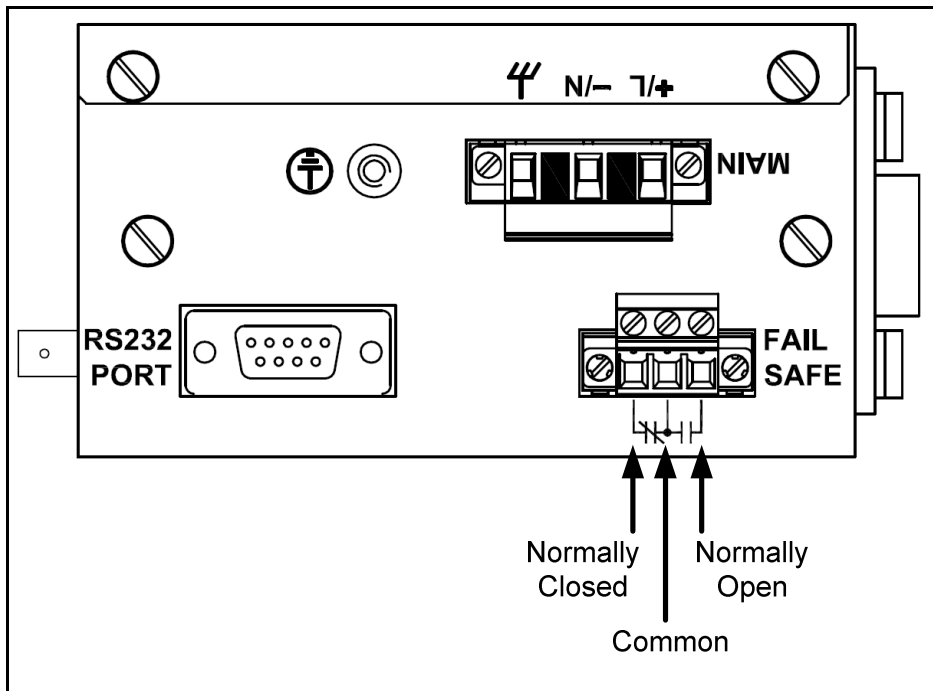
Figure 7 - RS910L Failsafe Output Relay

2.4 RS232 Console Port Wiring

The RS232 port is used for configuring the RS910L. A straight-through serial cable with a DB-9 connector is required. There is no need to crossover the TxD and RxD signals from the PC side since this has been done internally as is shown in the figure below.

Pin	Signal
1	Internal Connection
2	Transmit Data
3	Receive Data
4	Internal Connection
5	Ground
6	Internal Connection
7	Internal Connection
8	Internal Connection
9	No Connection
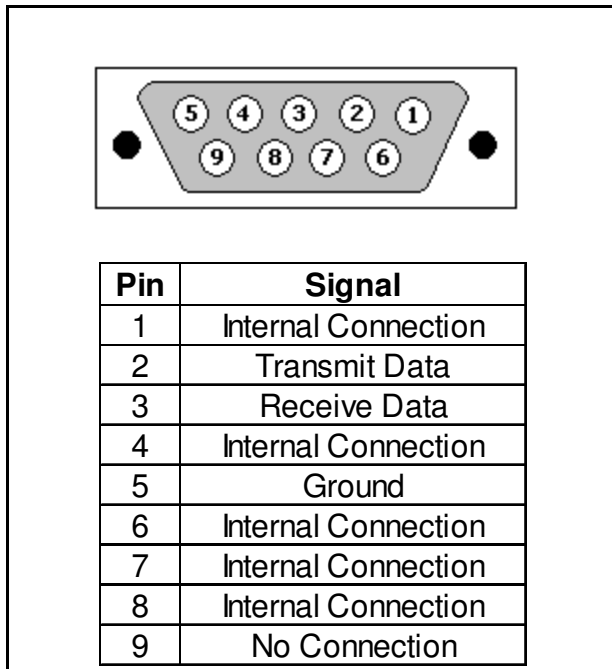
Figure 8 - RS232 Female DCE pin-out

NOTE: This port is not intended to be a permanent connection and the cable length should not exceed 2m (6.5 feet). Pins 1,4,6 are connected internally, and pins 7, 8 are connected internally.

13

Rev100

3 Serial Ports

The RS910L can be equipped with a Fiber Serial Interface, RS232/RS485/RS422 DB9 serial ports or RS232/RS485/RS422 RJ45 serial ports.

3.1.1 Fiber Serial Interface

The RS910L can be equipped with a Fiber Serial Interface (ST connector only) which allows RS485, RS422, or RS232 devices to communicate over secure, noise immune, optically isolated, fiber optic cabling at extended distances as well as protocol independent conversion to multimode fiber optics.
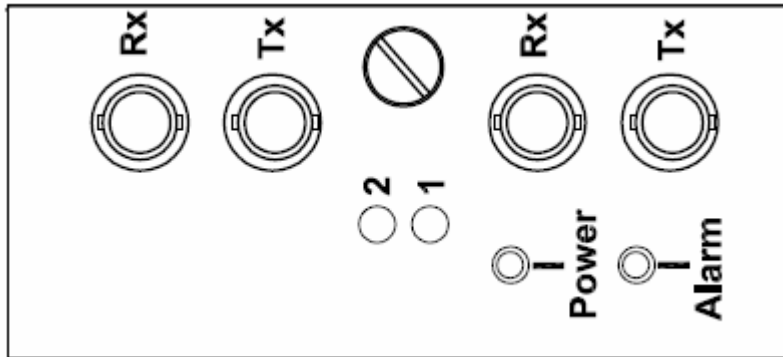
Figure 9: Fiber Serial Interface (ST Connector)

3.1.2 RS232/RS485/RS422 via DB9

Each port is individually selectable via software to be RS232, RS485 or RS422. The DB9 port and pin-out is shown in Figure 10.

14

Rev100

Pin	RS232 Mode	RS485 Mode	RS422 Mode
1	CD	-	-
2	TX	TX/RX+ (A)	TX+
3	RX	-	RX+
4	DTR	-	-
5	Common (Isolated Ground)		
6	DSR	-	RX-
7	CTS	TX/RX - (B)	TX-
8	RTS	-	
9	RI (NC)	-	-
Shield	Chassis Ground		
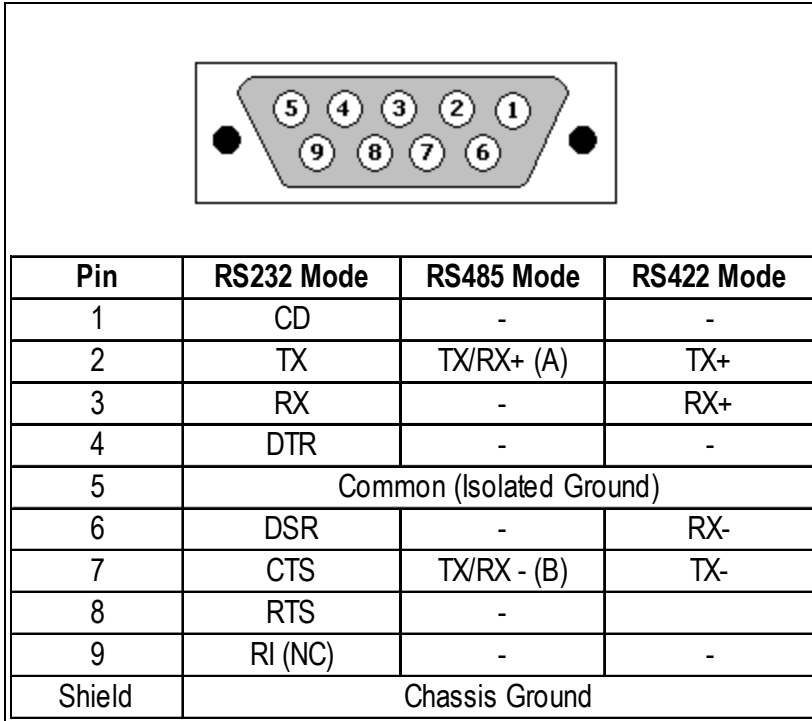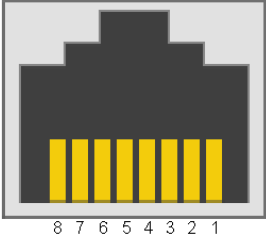
Figure 10: DB9 Port pin-out

NOTE: Pins 1, 4, and 6 are connected internally. Pins 7 and 8 are connected internally. No internal termination is provided.

3.1.3 RS232/RS485/RS422 via RJ45

Each port is individually selectable via software to be RS232, RS485 or RS422. The RJ45 port and pin-out is shown in Figure 11.

© 2007 RuggedCom Inc. All rights reserved   Rev100

Download from Www.Somanuals.com. All Manuals Search And Download.

Pin	RS232 Mode	RS485 Mode	RS422 Mode
1	DSR	-	RX-
2	DCD	-	-
3	DTR	-	-
4	Common (Isolated Ground)		
5	RX	-	RX+
6	TX	TX/RX + (A)	TX +
7	CTS	-	-
8	RTS	TX/RX - (B)	TX -
Shield	Chassis Ground		

Figure 11: RJ45 Port pin-out

NOTE: Pins 1, 2, and 3 are connected internally. Pins 7 and 8 are connected internally. No internal termination is provided.

3.1.4 RS485 Wiring

Each RS485 port can communicate to multiple RS485 devices by daisy chaining devices over a single twisted pair with transmit and receive signals on the same two wires (half duplex). The following guidelines should be followed to ensure reliable continuous communication:

1. To minimize the effects of ambient electrical noise, shielded cabling is recommended
2. The correct polarity must be observed throughout a single daisy chain
3. The number of devices wired should not exceed 32, and total distance should be less than 4000 feet (at 100Kbps)
4. The COM terminals should be connected to the common wire inside the shield.
5. The shield should be connected to earth ground at ONE single point to avoid loop currents.
6. The twisted pair should be terminated at each end of the chain.

Figure 12 shows the recommended RS485 wiring.

16
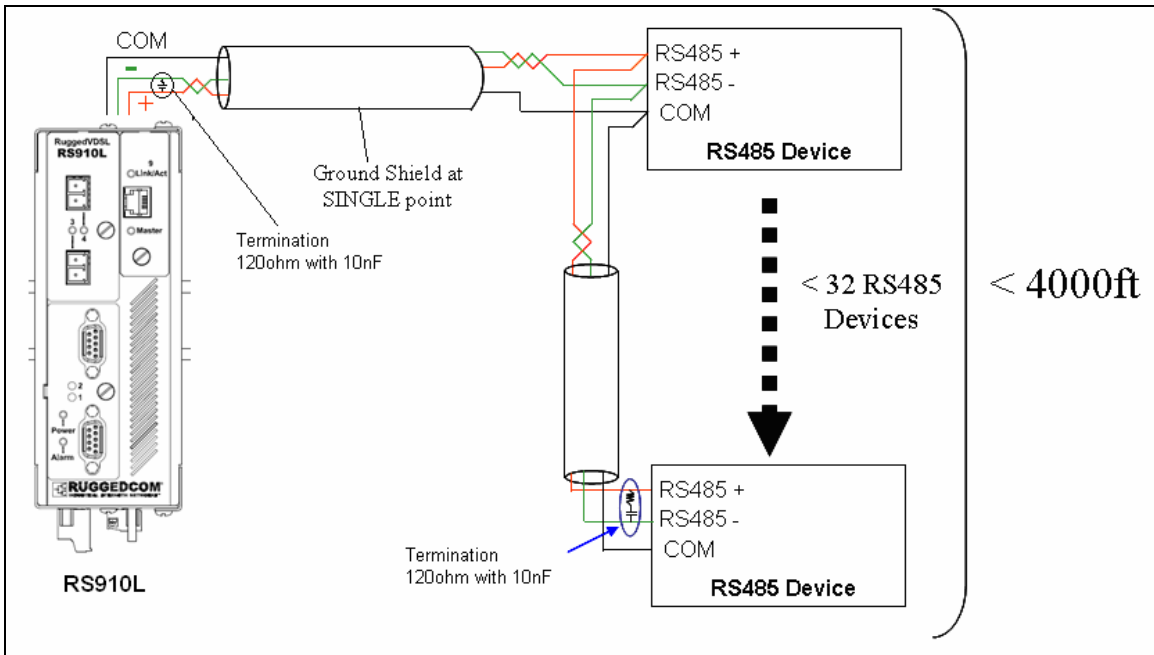
Figure 12: Conceptual recommended RS485 wiring diagram

3.1.5 Serial Port Transient Protection

RuggedCom does not recommend the use of copper cabling of any length for critical real-time substation automation applications. However, transient suppression circuitry is present on all copper ports to protect against damage from electrical transients and to ensure IEC 61850-3 and IEEE 1613 Class 1 conformance. This means that during the transient event communications errors or interruptions may occur but recovery is automatic. RuggedCom also does not recommend to use these ports to interface to field devices across distances which could produce high levels of ground potential rise, (i.e. greater than 2500V) during line to ground fault conditions.

17

4 Ethernet Ports

4.1 RJ11 Ethernet over VDSL Port

4.1.1 Overview

The Ethernet over VDSL (EoVDSL) port on RS910L operates in pairs with one configured as the Master and the other as the Slave. In VDSL literature the terms Central Office (CO) or Line Termination (LT) are used interchangeably for the Master and the terms Customer Premise Equipment (CPE) or Network Termination (NT) are used interchangeably for the Slave. Configuration of Master or Slave mode is done through the RuggedSwitch Operating System.

The unit contains one EoVDSL data port that allows connection to Category 3 (CAT-3) unshielded twisted-pair (UTP) cable with RJ11 male connectors. The figure below shows the RJ45 port pin-out and LEDs.
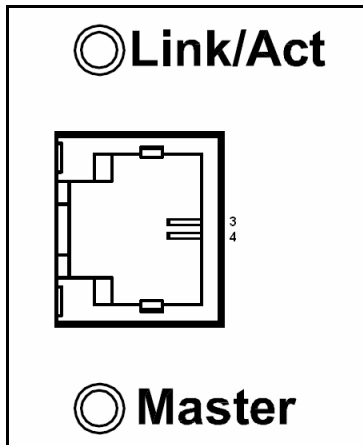
Figure 13 - RJ11 port pin-out and LEDs

Pin	Signal
3	Ring
4	Tip

Table 2 - RJ11 port pin-out

Status LED	Colour	Activity	Comments
Mode	Green	On	Master Mode
		Off	Slave Mode
Link / Act	Green	Solid	Link Established
		Blinking	Tx Activity

Table 3 - RJ11 port LED description

18

Rev100

4.1.2 Wiring

VDSL typically operates over 2-wire CAT-3 wiring; however, other categorized or uncategorized twisted-pair wiring will work although the performance will vary depending on the distance and cable characteristics. It is important that the wiring used does not have any open leads (also known as bridged taps or drop-lines) along its length because this will impact performance by degrading the signal.

4.1.3 Configuration & Setup

1. Log into the RuggedSwitch Operating System.
2. Highlight **Ethernet Ports** and press Enter.
3. Highlight **Configure/View EoVDSL Parameters** and press Enter. This will take you to the **EoVDSL Parameters** screen. Press Enter again.
4. Highlight Mode and press Enter.
5. Either press the Up or Down arrow to select either **Master** or **Slave**. Press Enter.
6. Press *Control* and *A* together to apply the changes.

Once configured as master and slave and connected together, the units will then attempt to achieve the maximum speed based on the line length and conditions. The unit's link LED may flash on and off several times before settling on a final link speed and declaring the port up. Please see the Rugged Operating System (ROS) Software User Guide for detailed software configuration options.

4.1.4 Performance

On 24 American Wire Gauge (AWG) Polyethylene Insulated Cable (PIC) twisted-pair the following performance is typical:

Distance [km]	Distance [feet]	Downstream/Upstream [Mbps]	Time to Achieve Port Up [Seconds]
0.5	1600	35.00	15
0.6	2000	30.00	30
0.7	2300	25.00	45
0.8	3000	20.00	60
1.0	3300	15.00	75
1.3	4300	10.00	90
1.7	5600	5.00	105
2.0	6600	2.50	120
2.5	8200	1.00	135

Table 4 - Typical Performance on 24 AWG PIC twisted-pair

The unit can automatically select the best bit-rate based on current line conditions. If the line conditions degrade (reducing the SNR) but the unit is able to maintain the link, an alarm will be triggered to notify the user of the reduced SNR. If the line conditions degrade such that the unit is unable to maintain the current link, the unit will restart the scan process.

NOTES:
1. This port is designed to be used on private communications lines and is not to be connected to the Public Switched Telephone Network (PSTN).

2. To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.

4.2 RJ45 Ethernet Ports

The RS910L has several 10/100Base-TX ports that allow connection to standard category 5 (CAT-5) unshielded twisted-pair (UTP) cable with RJ45 male connectors. The RJ45 receptacles are directly connected to the chassis ground on the unit and can accept CAT-5 shielded twisted-pair (STP) cables. If shielded cables are used, care must be taken to ensure the shielded cables do not form a ground loop via the shield wire and the RJ45 receptacles at either end. The figure below shows the RJ45 port pin-out.
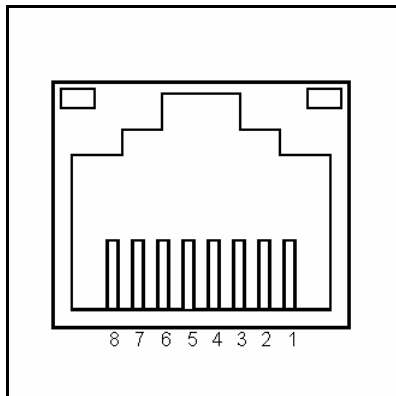
Figure 14 - RJ45 Ethernet port pin-out

Pin	Signal
1	+Rx
2	-Rx
3	+Tx
4	No Connection
5	No Connection
6	-Tx
7	No Connection
8	No Connection
Case	Shield (Chassis Ground)

20

Table 5 - RJ45 Ethernet port pin-out

NOTE: RuggedCom does not recommend the use of CAT-5 (10/100Base-TX communications) cabling of any length for critical real-time substation automation applications. However, transient suppression circuitry is present on all copper ports to protect against damage from electrical transients and to ensure IEC 61850-3 and IEEE 1613 Class 1 conformance. This means that during the transient event communications errors or interruptions may occur but recovery is automatic.

RuggedCom also does not recommended to use these ports to interface to field devices across distances which could produce high levels of ground potential rise, (i.e. greater than 2500V) during line to ground fault conditions.

4.3 Fiber Optic Ethernet Ports

Depending on the order code of the product, the RS910L can be equipped with several different fiber optic ports. The Transmit (Tx) and Receive (Rx) connections of each port must be properly connected and matched for proper link and operation. The drawings in the following figures show each fiber optical connector style with a side and top view to allow the user to identify the proper cable connection orientation.
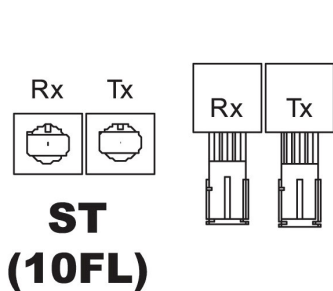
Figure 15: 10FL ST connector
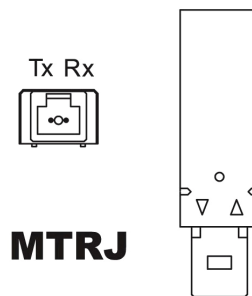
Figure 16: 100FX MTRJ connector
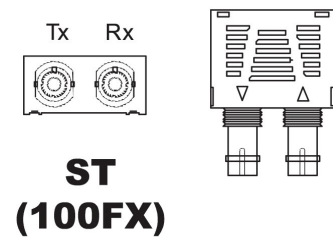
Figure 17: 100FX ST connector

21
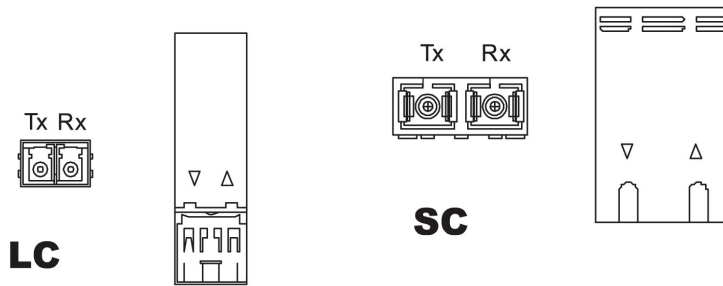
Figure 18: 100FX LC connector

Figure 19: 100FX SC connector

4.4 Ethernet Panel Description

Each Ethernet and Serial port is equipped with one LED that indicates link/activity status information. The LED will be solid for ports with link, and will blink for activity. The diagram in Figure 20 highlights the port and the associated link/activity LED.
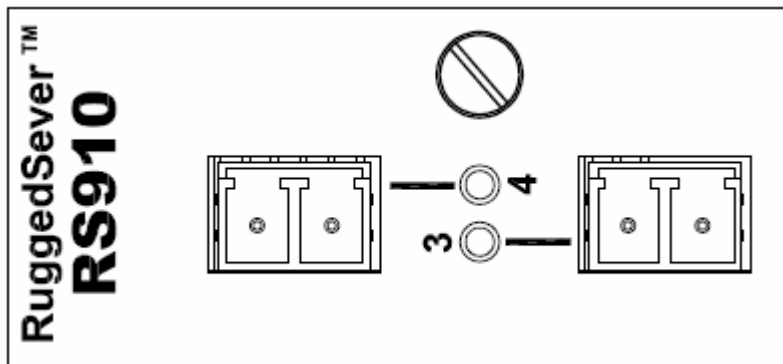
Figure 20: Ethernet panel LED description

Rev100

5 Technical Specifications

5.1 Operating Environment

Parameter	Range	Comments
Ambient Operating Temperature	-40 to 85°C	Ambient Temperature as measured from a 30 cm radius surrounding the center of the RS910 enclosure.
Ambient Storage Temperature	-40 to 85°C	
Ambient Relative Humidity	5% to 95%	Non-condensing

Table 6 - Operating Environment

5.2 Power Supply Specifications

Power Supply Type	Minimum Input	Maximum Input	Fuse Rating	Isolation	Maximum Power Consumption
12 – 24 VDC	10 VDC	36 VDC	3.15 (T)	1.5 kV DC	
24 VDC	18 VDC	36 VDC	3.15 (T)	1.5 kV DC	
48 VDC	36 VDC	72 VDC	3.15 (T)	1.5 kV DC	10W
HI (125/250 VDC) 1 HI (110/230 VAC) 1	88 VDC 85 VAC	300 VDC 265 VAC	3.15 (T)	4 kV AC 5.5 kV DC	

Table 7 - Power Supply Specifications

NOTES:
1. This is the same power supply for both AC and DC.
2. (F) Denotes fast-acting fuse, (T) denotes time-delay fuse.
3. For continued protection against risk of fire, replace only with same type and rating of fuse.

5.3 Failsafe Relay Specifications

Load Circuit	SELV		TNV-2
MAX operating Voltage	30VDC	30 VAC	80VDC
MAX operating Current	1A	0.5A	0.3A
Isolation (between coil and contacts)	1800 V$_{rms}$		

Table 8 - Failsafe Relay Specifications

5.4 RJ11 Ethernet over VDSL Port Specifications

Data Port	Media	Distance	Connector Type
VDSL	CAT-3 UTP or STP	2500m	RJ11

Table 9 – RJ1 Ethernet over VDSL Port Specifications

5.5 Serial Ports

5.5.1 Copper Ports

Parameter	Specifications	Notes
Baud Rate	300 bps – 230 kbps	
Connector	DB9 or RJ45	
Isolation	2.5 kV	RMS 1-minute

Table 10: Copper Port Specification

5.5.2 Fiber Optic Ports

Parameter	Specifications
Mode	Multimode
Connector	ST
Typical Dist. (km)	5
Optical Wavelength (nm)	820
Cable Size Core/Cladding (um)	50/125 62.5/125

Table 11: Fiber Optic Port Specification

NOTES:
1. Maximum segment length is greatly dependent on factors such as fiber quality, and number of patches and splices. Please consult RuggedCom sales associates when determining maximum segment distances.

24

5.6 Ethernet Ports

5.6.1 Copper Ports

Parameter	Specification	Notes
Speed	10/100 Mbps	Auto-negotiating
Duplex	FDX / HDX	Auto-negotiating
Cable-Type	> Category 5	Shielded/Unshielded
Wiring Standard	TIA/EIA T568A/B	Auto-Crossover, Auto-polarity
Max Distance	100 m	
Connector	RJ45	
Isolation	1.5 kV	RMS 1-minute

Table 12: Ethernet Ports - Copper Specifications

5.6.2 Fiber Optic Ports

Speed Standard	Mode / Connector	Tx λ (nm)	Cable Type[2] (μm)	Tx Pwr (dBm peak) [3] (Min / Max)	Rx Sensitivity (dBm Average) [3]	Rx Saturation (dBm Peak) [3]	Typical Distance (km) [1]	Power Budget (dB)
100Base-FX	MM / ST	1310	50/125	-15.7	-33.5	-11	2	17
100Base-FX	MM / SC	1310	50/125	-16/-11	-33	-11	2	17
100Base-FX	MM / LC	1310	50/125	-19 / -14	-32	-14	2	15
100Base-FX	MM / MTRJ	1310	50/125	-16/-11	-33.5	-11	2	17
100Base-FX	SM / ST	1310	9/125	-15/-8	-32	-7	20	16.5
100Base-FX	SM / SC	1310	9/125	-13/5	-31	-4	20	20
100Base-FX	SM / LC	1310	9/125	-15/-8	-31	-5	15	16.5

Table 13: Ethernet Ports – Fiber Optic Specifications

NOTES:
1. Maximum segment length is dependent on factors such as fiber quality, and number of patches and splices. Please consult RuggedCom sales associates when determining maximum segment distances.
2. To convert from average to peak add 3 dBm. To convert from peak to average, subtract 3 dBm.

5.7 Communication Standards

Protocol	Standards
Ethernet	IEEE 802.3

Table 14 - Communication Standard Compliance

25

Rev100

5.8 Mechanical Specifications

Parameter	Value
Dimensions	16.8 x 11.7 x 6.6 cm / 6.6 x 4.6 x 2.6 inches
Weight	1.2 kg / 2.7 lbs
Enclosure	20 AWG Galvanized Steel

Table 15 - Mechanical Specifications

Figure 21 - Mechanical Specifications

Rev100

6 Type Tests

6.1 IEC 61850-3 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	+/- 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	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 differential mode @ 1MHz	3
		D.C. Power ports	2.5kV common, 1kV differential mode @ 1MHz	3
		A.C. Power ports	2.5kV common, 1kV differential 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

Table 16 - IEC 61850-3 Type Tests

Rev100

6.2 IEEE 1613 Type Tests

Test	Description		Test Levels
IEEE C37.90.3	ESD	Enclosure Contact	+/- 8kV
		Enclosure Air	+/- 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 ports	+/- 4kV
IEEE C37.90.1	Oscillatory	Signal ports	2.5kV common mode @ 1MHz
		D.C. Power ports	2.5kV common & differential mode @ 1MHz
		A.C. Power ports	2.5kV common & differential mode @ 1MHz
IEEE C37.90	H.V. Impulse	Signal ports	5 kV (Failsafe Relay)
		D.C. Power ports	5 kV
		A.C. Power ports	5 kV
IEEE C37.90	Dielectric Strength	Signal ports	2kVac (Failsafe Relay)
		D.C. Power ports	2kVac
		A.C. Power ports	2kVac

Table 17 - IEEE 1613 Type Tests

NOTE:
- If the unit contains copper ports the IEEE 1613 conformance is Class 1 (During disturbance errors may occur but recovery is automatic).
- If the unit contains all fiber ports the IEEE 1613 conformance is Class 2 (During disturbance no errors will occur).

6.3 IEC Environmental Type Tests

Test	Description		Test Levels	Severity Levels
IEC 60068-2-1	Cold Temperature	Test Ad	-40 deg. C, 16 Hours	N/A
IEC 60068-2-2	Dry Heat	Test Bd	+85 deg. C, 16 Hours	N/A
IEC 60068-2-30	Humidity (Damp Heat, Cyclic)	Test Db	95% (non-condensing), 55 deg 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

Table 18 - Environmental Type Tests

7 Warranty

RuggedCom warrants this product for a period of five (5) years from date of purchase. For warranty details, visit http://www.ruggedcom.com or contact your customer service representative. Should this product require warranty or service contact the factory at:

RuggedCom Inc.
30 Whitmore Road,
Woodbridge, Ontario
Canada L4L 7Z4

Phone: (905) 856-5288
Fax: (905) 856-1995

Rev100

Free Manuals Download Website

http://myh66.com

http://usermanuals.us

http://www.somanuals.com

http://www.4manuals.cc

http://www.manual-lib.com

http://www.404manual.com

http://www.luxmanual.com

http://aubethermostatmanual.com

Golf course search by state

http://golfingnear.com

Email search by domain

http://emailbydomain.com

Auto manuals search

http://auto.somanuals.com

TV manuals search

http://tv.somanuals.com