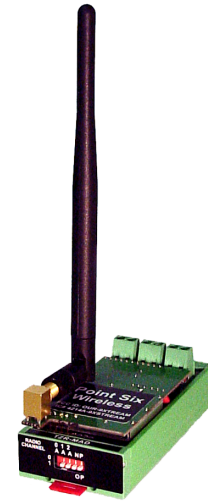




**FEATURES**

- **RS485 Master/Slave auto-sensing radio interface**
- **Built in 900 MHz. frequency hopping radio for long-range wireless interface**
- **Provides remote capability to RS485 Modbus networks**
- **Automatically senses Master or Slave data flow**
- **Multiple radios allow many remote RS485 network to coexist logically**
- **Provides means to convert legacy RS485 devices to wireless**
- **Range Indoor: 600' to 1300'**
- **Range Outdoor: 7mi. with dipole, >20 mi. w/ high gain antenna**
- **LED power and activity indicator**
- **Configuration parameters set by dipswitch**
- **Low power, 6-24 VDC at 200 milliamp transmitting, 70 milliamp receiving**
- **Astron AXH900RP SMA R Reverse Polarity SMA 6.5" Antenna**
- **High Impact ABS enclosure.**



**DESCRIPTION**

The TZR-MAD uses an embedded 100-milliwatt frequency hopping wireless modem that provides communication between a local RS485 network and a remote network of RS485 connected devices. The TZR-MAD will automatically sense the direction of data flow and switch the RS485 and Radio devices accordingly. The TZR-MAD can be placed in a network of RS485 devices and appear as a slave repeater of remote RS485 devices or it can be placed in a network of one or many RS485 slaves and act as the RS485 repeater of a remote master. The radio operates within the 900 MHz ISM Band under Part 15 of the FCC Rules and regulations.

The TZR-MAD operates at 19200 Baud at either odd parity or no parity. Dipswitches select parity and one of 7 radio networks. Radios operating together must have the same radio network address (1-7 set by switches labeled A0-A2) Select a different radio network address to prevent interference from nearby networks that are not sharing information. The default radio network for Rooftop applications is 5. The user may choose another network address (1-7) if desired. While all radios in a network must have the same network address they do not have to have the same parity, the parity is local to the RS485 serial port on the TZR-MAD only. Parity information is not transmitted or received.

Radio network selection 0 (A0, A1, A2 all set to 0) selects a special network setup. When network address setting 0 is selected the pre-programmed radio network parameters are used, these parameters are user and application specific and must be set at the factory for specific OEM applications.

The TZR-MAD can also be used as a general purpose RS485 half duplex radio interface operating at 19200 Baud at either odd or no parity (dip switch selectable).

PARAMETER	MIN	TYP	MAX	UNITS
Supply Voltage	6.0	12	24	Volts
Supply Current	70	-	200	mA
Baud Rate	-	19200	-	Baud

PIN	SIGNAL	DESCRIPTION
1	TR-	RS485 transmit/receive negative I/O
2	TR+	RS485 transmit/receive positive I/O
3	GND	Common

# 9XSTREAM-192/96 Radio

## Introduction

The 9XSTREAM-192/96 radio is a 100-milliwatt frequency hopping wireless modem that communicates with other equipment using a standard 19200 or 9600-baud asynchronous serial data stream. The radio is half-duplex and can sustain a continuous data stream at the specified data rate. The 9XSTREAM operates within the 900 MHz ISM Band under Part 15 of the FCC Rules and Regulations.

**IMPORTANT:** The 9XSTREAM radio has been certified as a module by the FCC for integration into OEM products without further certification being necessary (as per FCC section 2.1091.) The OEM must satisfy the following requirements in order to comply with FCC regulations:

The system integrator must ensure that the external label provided with this device is placed on the outside of the final product.

In order to comply with the FCC RF exposure requirements, the 9XSTREAM may be used only with approved antennas that have been tested with this radio and a minimum separation distance of 20 cm must be maintained from the antenna to any near by persons. The OEM must also include a statement in the final product manual, informing users of the requirement to maintain 20 cm separation from the antenna to any near by persons. If the OEM integrates the 9XStream into their final product, where the final product utilizes a non-approved antenna or is classified as a portable device per FCC Section 2.1093 (less than 20 cm separation distance between the antenna to any near by persons,) the OEM is responsible for obtaining a separate authorization on the final product.

The 9XSTREAM radio requires a regulated 5-volt, 200mA supply for operation. Any voltage higher than 5.5 volts will damage the radio.

## Approved Antennas

<b>Mfr Model</b>	<b>Freq</b>	<b>Gain Type</b>	<b>Connector Dimensions</b>
Astron AXQ900 PTL	902-928	2dBi Omni	MMCX 3"
Astron AXH900RP SMA R	902-928	2dBi Omni	Reverse Polarity SMA 6.5"
MaxStream 900CDAN	902-928	2dBi Omni	Integrated 3"

External Label:

This device contains transmitter module  
FCC ID:OUR9XTREAM. The enclosed  
device complies with Part 15 of the FCC Rules.  
Operation is subject to the following two  
conditions: (1) This device may not cause  
harmful interference, and (2) this device  
must accept any interference received,  
including interference that may cause  
undesired operation.

## 9XStream Frequency Hopping Data Radio

### **FCC Compliance Warning:**

Changes or modifications to the 9XStream Data Radio not expressly approved by MaxStream, Inc. could void the user's authority to operate this product.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

## Radio Modem Specifications

### General

Frequency Range 902 to 928 MHz, unlicensed ISM Band  
Type Frequency Hopping Spread Spectrum Transceiver  
Frequency Control Direct FM  
Transport Protocol Transparent networking  
Network Topology Multi-drop  
Channel Capacity Hops through 25 channels, Up to 65,000 NetIDs  
Serial Data Interface Asynchronous (RS-232) CMOS (TTL) signals, 5V, 3.3V tolerant  
I/O Data Rate 9600 or 19200 bps, set at factory (performance specifications vary with the data rate)

### Performance

Channel Data Rate 10k or 20k bps respectively (vary with data rate)  
Transmit Power Output 100mW  
Rx Sensitivity -110 or -107 respectively  
Range\* Indoor: 600' to 1300' Outdoor: 7mi. with dipole,  
>20 mi. w/ high gain antenna  
Interference Rejection 70 dB at pager and cellular phone frequencies  
\*Range calculations are for 9600-baud radio, line-of-sight. Actual range will vary based upon specific board integration, antenna selection, environment and the OEM's device.

### Power Requirements

Supply Voltage 5 VDC +/-0.3V  
Current Consumption Tx – 170 mA nominal, Rx – 50 mA nominal

### Physical Properties

Board Size 1.6" x 2.7" x .35" (4.06 x 6.86 x .89)cm  
Weight 0.8oz (24g)  
Connector 11 pin 0.1" spaced male berg type header  
Operating Temperature -40°C to 85°C  
Operating Humidity 10% to 90% (non-condensing)

### Antenna

Antenna Connector MMCX Female  
Antenna Impedance 50 Ohms unbalanced  
Approved Antennas Integral wire antenna (factory installed)  
Astron AXQ9PRLMMCX – 1/4 wave flexible whip  
Astron AXH900 RP SMAR – 1/2 wave flexible whip, SMA