

## Installation and Operation Manual EVTM Stand-alone Encoder/Decoder



**Quasonix, Inc.  
6025 Schumacher Park Dr.  
West Chester, OH 45069  
19 July, 2018**

**\*\*\* Revision 1.1 \*\*\***

Specifications subject to change without notice.

All Quasonix products are under U.S. Department of Commerce jurisdiction; not covered by ITAR

---

No part of the document may be circulated, quoted, or reproduced for distribution without prior written approval from Quasonix, Inc.

**Copyright Quasonix, Inc., All Rights Reserved.**

**Table of Contents**

1 Introduction ..... 1

    1.1 Description ..... 1

    1.2 Part Numbers..... 2

2 Installation Instructions ..... 3

    2.1 Mechanical..... 3

        2.1.1 1U Rack Mount Encoder/Decoder..... 3

        2.1.2 Airborne Encoder/Decoder ..... 4

    2.2 Thermal..... 6

    2.3 Electrical ..... 6

        2.3.1 Airborne Encoder/Decoder ..... 6

        2.3.2 1U Rack Mount Rear Panel Connections ..... 9

3 Operating Instructions..... 11

    3.1 Airborne Encoder/Decoder ..... 11

    3.2 1U Rack Mount Encoder/Decoder ..... 11

5 Maintenance Instructions..... 12

6 Product Warranty ..... 13

7 Technical Support and RMA Requests..... 14

8 Appendix A – Acronym List..... 15

**List of Figures**

Figure 1: EVTM Stand-alone Encoder/Decoder for Airborne Applications ..... 1

Figure 2: EVTM Stand-alone Encoder/Decoder for Rack Mount Applications ..... 1

Figure 3: Mechanical Drawing – 1U Top View - EVTM 1U Rack Mount Encoder/Decoder ..... 3

Figure 4: Mechanical Drawing – 1U Front and Side Views - EVTM 1U Rack Mount Encoder/Decoder ..... 3

Figure 5: 4.2 in3 Airborne Encoder/Decoder ..... 4

Figure 6: Airborne EVTM Stand-alone Encoder/Decoder..... 5

Figure 7: Airborne Encoder/Decoder Connectors Labeled ..... 7

Figure 8: Rack Mount EVTm Encoder/Decoder with Channels Labeled..... 9

**List of Tables**

Table 1: EVTm Encoder/Decoder Part Numbers..... 2  
Table 2: MDM-21 Socket Pin Assignments (J2) ..... 7  
Table 3: MDM-9 Pin Assignments (J1) ..... 8  
Table 4: Rear Panel Connector Descriptions..... 9

## 1 Introduction

### 1.1 Description

This document describes the installation and operation of the Quasonix EVTM Stand-alone Encoder/Decoder. The EVTM (Ethernet Via Telemetry) hardware is designed to translate Ethernet packet data to serial streaming clock and data, for input to transmitters. It also translates recovered serial clock and data from a telemetry receiver back to original Ethernet packets.

EVTM encoding and decoding is required at both ends of a link for operation. The Encoder/Decoder can support bidirectional data from a single piece of hardware.

Quasonix EVTM Stand-alone Encoder/Decoders are compatible with any transmitter or receiver.



**Figure 1: EVTM Stand-alone Encoder/Decoder for Airborne Applications**



**Figure 2: EVTM Stand-alone Encoder/Decoder for Rack Mount Applications**

The EVTM Stand-alone Encoder/Decoder is manufactured by:

**Quasonix, Inc.  
6025 Schumacher Park Drive  
West Chester, OH 45069  
CAGE code: 3CJA9**

### 1.2 Part Numbers

The part numbers for Quasonix EVTM Encoder/Decoders are listed in Table 1.

**Table 1: EVTM Encoder/Decoder Part Numbers**

| Part Number     | Description   |
|-----------------|---|
| QSX-EVTM-SED-AT | EVTM Encoder/Decoder, Airborne chassis, TTL             |
| QSX-EVTM-SED-AR | EVTM Encoder/Decoder, Airborne chassis, RS-422          |
| QSX-EVTM-1URX   | EVTM Encoder/Decoder, 2 Channels, 1U rack mount chassis |

## 2 Installation Instructions

### 2.1 Mechanical

#### 2.1.1 1U Rack Mount Encoder/Decoder

The 1U Rack Mount Encoder/Decoder's enclosure fits in a standard 19" rack, occupying only 1U of rack space. Mechanical layouts are provided in Figure 3 and Figure 4.

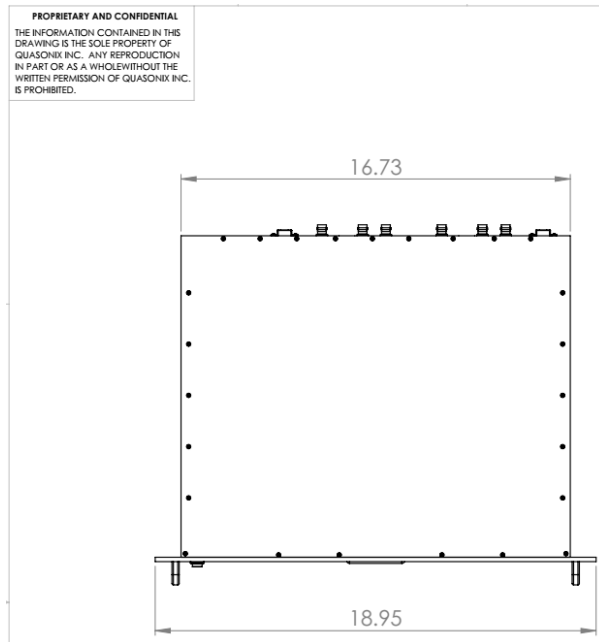


Figure 3: Mechanical Drawing – 1U Top View - EVTM 1U Rack Mount Encoder/Decoder

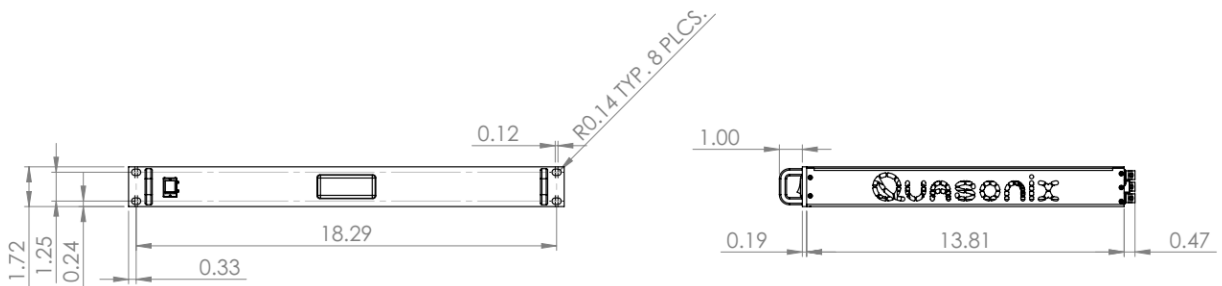


Figure 4: Mechanical Drawing – 1U Front and Side Views - EVTM 1U Rack Mount Encoder/Decoder

**2.1.2 Airborne Encoder/Decoder**

The 4.2 cubic inch Airborne Encoder/Decoder is designed to be mounted by four (4) 6-32 screws through the holes in the four corners, as shown in Figure 5.



**Figure 5: 4.2 in3 Airborne Encoder/Decoder**

Mechanical layouts for the Airborne Encoder/Decoder are provided in Figure 6.

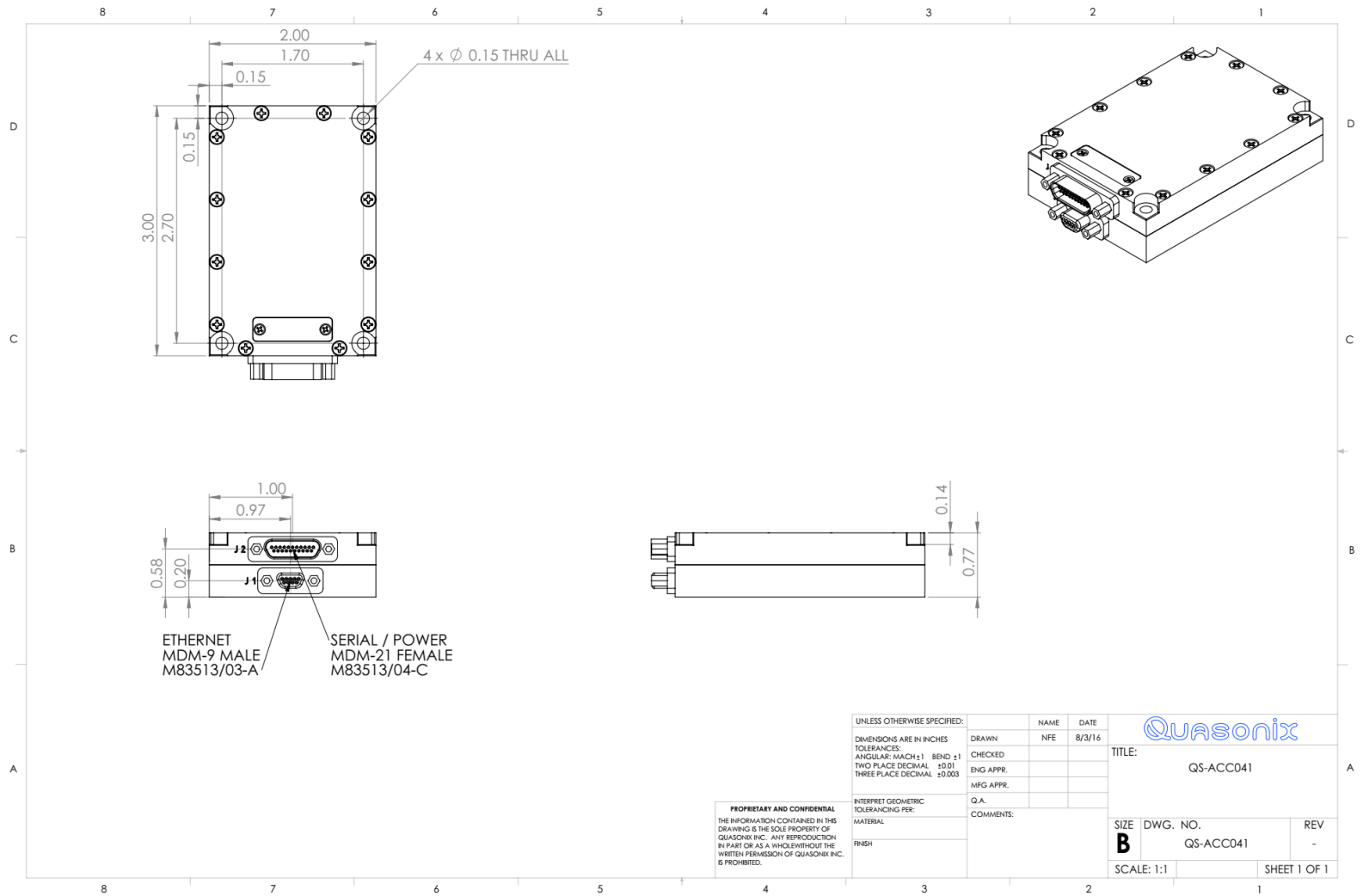


Figure 6: Airborne EVTM Stand-alone Encoder/Decoder



## 2.2 Thermal

The storage temperature of the Airborne unit is rated for  $-55^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$ , while the operating temperature is rated for  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ . It is recommended that the unit be kept in a temperature controlled environment to minimize the risk of operating (or storing) outside the ranges specified.

While the Airborne unit does not dissipate much power, it is recommended that it be mounted on top of associated transmitter or receiver hardware, or mounted adjacent to the hardware on the same heat sink surface.

The storage temperature of the Rack Mount unit is rated for  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ , while the operating temperature is rated for  $0^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ . It is recommended that the unit be kept in a temperature controlled environment to minimize the risk of operating (or storing) outside the ranges specified.

The Rack Mount unit features cooling vents on both sides of its aluminum chassis. These vents must be kept entirely unobstructed in order to allow for maximum airflow through the system. Whenever feasible, it is helpful to leave an open rack space above and below the Rack Mount unit for additional heat dissipation.

## 2.3 Electrical

### 2.3.1 Airborne Encoder/Decoder

The Airborne Encoder/Decoders uses a female MDM-21 Socket (M83513/04-C) and a male MDM-9 (M83513/03-A), as shown in Figure 7. Pin assignments for the MDM-21 connector are described in Table 2. Pin assignments for the MDM-9 connector are described in Table 3.

Pre-assembled MDM-9 Male to RJ-45 cables are available from Molex:

- 83421-9224 Micro-D 9 to RJ-45, 1.2m
- 83421-9225 Micro-D 9 to RJ-45, 10.0m
- 83421-9226 Micro-D 9 to RJ-45, 3.0m

Co-location of encoder/decoder and associated transmitter/receiver should be minimized for maximum signal integrity

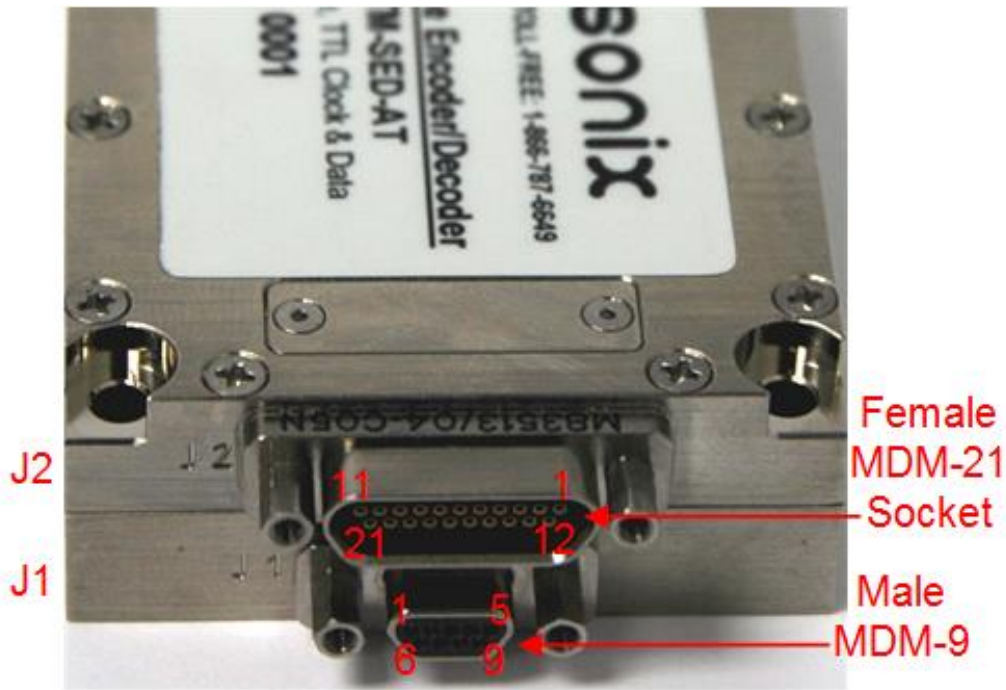


Figure 7: Airborne Encoder/Decoder Connectors Labeled

Table 2: MDM-21 Socket Pin Assignments (J2)

| Position | Signal           | Description   |
|----------|------------------|---|
| 1        | Transmit Clock + | Serial streaming synchronous clock from encoder to telemetry transmitter            |
| 2        | Transmit Data +  | Serial streaming data from encoder to telemetry transmitter                         |
| 3        | System Clock +   | Encoder data buffer drain rate clock<br>Signal sets telemetry transmitter data rate |
| 4        | TXD              | Factory Use Only  |
| 5        | No Connection    |   |
| 6        | Power            | DC power into device +10-32 VDC   |
| 7        | No Connection    |   |
| 8        | No Connection    |   |
| 9        | No Connection    |   |
| 10       | Receive Data +   | Serial streaming data from telemetry receiver to decoder                            |
| 11       | Receive Clock +  | Serial streaming synchronous clock from telemetry receiver to decoder               |

| <b>Position</b> | <b>Signal</b>    | <b>Description</b>  |
|-----------------|------------------|---|
| 12              | Transmit Clock - | Serial streaming synchronous clock from encoder to telemetry transmitter            |
| 13              | Transmit Data -  | Serial streaming data from encoder to telemetry transmitter                         |
| 14              | System Clock -   | Encoder data buffer drain rate clock<br>Signal sets telemetry transmitter data rate |
| 15              | RXD              | Factory Use Only  |
| 16              | Ground           | DC power ground   |
| 17              | Ground           | DC power ground   |
| 18              | No Connection    |   |
| 19              | No Connection    |   |
| 20              | Receive Data -   | Serial streaming data from telemetry receiver to decoder                            |
| 21              | Receive Clock -  | Serial streaming synchronous clock from telemetry receiver to decoder               |

**Table 3: MDM-9 Pin Assignments (J1)**

| <b>Position</b> | <b>Signal</b> | <b>Description</b>   |
|-----------------|---------------|--|
| 1               | Transmit +    | Positive leg of a differential pair, transmit data onto Ethernet network Pin 1 on a standard RJ-45 |
| 2               | No Connection |  |
| 3               | No Connection |  |
| 4               | No Connection |  |
| 5               | Receive +     | Positive leg of a differential pair, receive data from Ethernet network Pin 3 on a standard RJ-45  |
| 6               | Transmit -    | Negative leg of a differential pair, transmit data onto Ethernet network Pin 2 on a standard RJ-45 |
| 7               | No Connection |  |
| 8               | No Connection |  |
| 9               | Receive -     | Negative leg of a differential pair, receive data from Ethernet network Pin 6 on a standard RJ-45  |

2.3.2 1U Rack Mount Rear Panel Connections

The Rack Mount EVTM Encoder/Decoder has two identical channels, as shown in Figure 8. Ethernet ports are standard RJ-45 connectors. All other connectors are 75 ohm BNCs. Descriptions for rear panel connectors are listed in Table 4.



Figure 8: Rack Mount EVTM Encoder/Decoder with Channels Labeled

Table 4: Rear Panel Connector Descriptions

| Function                               | Description  |
|--|--|
| Channel 1, Ethernet                    | Ethernet format data from network to transmitter, and from receiver to network<br>Ethernet ports <b>are not</b> connected to each other internally |
| Channel 1, Clock to Transmitter        | Serial streaming synchronous clock from encoder to telemetry transmitter   |
| Channel 1, Data to Transmitter         | Serial streaming data from encoder to telemetry transmitter  |
| Channel 1, System Clock to Transmitter | Encoder data buffer drain rate clock<br>Signal sets the telemetry transmitter data rate  |
| Channel 1, Clock from Receiver         | Serial streaming synchronous clock from telemetry receiver to decoder  |
| Channel 1, Data from Receiver          | Serial streaming data from telemetry receiver to decoder   |
| Channel 2, Clock to Transmitter        | Serial streaming synchronous clock from encoder to telemetry transmitter   |
| Channel 2, Data to Transmitter         | Serial streaming data from encoder to telemetry transmitter  |
| Channel 2, System Clock to Transmitter | Encoder data buffer drain rate clock<br>Signal sets the telemetry transmitter data rate  |
| Channel 2, Clock from Receiver         | Serial streaming synchronous clock from telemetry receiver to decoder  |
| Channel 2, Data from Receiver          | Serial streaming data from telemetry receiver to decoder   |

| Function            | Description  |
|---------------------|--|
| Channel 2, Ethernet | Ethernet format data from network to transmitter, and from receiver to network<br>Ethernet ports <b>are not</b> connected to each other internally |
| Main Power          | 100-240 VDC, 50-60 Hz  |

## 3 Operating Instructions

### 3.1 Airborne Encoder/Decoder

The unit automatically begins operation upon application of DC power. IP addressing is not required.

The telemetry transmit data rate is set by the encoder data buffer drain rate clock connected to pins 3 and 14 of J2. The receiver data rate is automatically set by the incoming clock from the telemetry receiver.

### 3.2 1U Rack Mount Encoder/Decoder

The unit automatically begins operation upon application of DC power. IP addressing is not required.

The telemetry transmit data rate is set by the encoder data buffer drain rate clock connected to the System Clock inputs for each channel. The receiver data rate is automatically set by the incoming clock from the telemetry receiver.

The rack mount unit will support two separate channels at the same time, as the functionality of the airborne encoder/decoder is duplicated inside the chassis.

## **5 Maintenance Instructions**

The EVTM Stand-alone Encoder-Decoder requires no regular maintenance, and there are no user-serviceable parts inside.

## **6 Product Warranty**

The EVTM Stand-alone Encoder-Decoder carries a standard parts and labor warranty of one (1) year from the date of delivery.



## **7 Technical Support and RMA Requests**

In the event of a product issue, customers should contact Quasonix via phone (1-513-942-1287) or e-mail (support@quasonix.com) to seek technical support. If the Quasonix representative determines that the product issue must be addressed at Quasonix, a returned materials authorization (RMA) number will be provided for return shipment.

Authorized return shipments must be addressed in the following manner:

**Quasonix, Inc.  
ATTN: Repair, RMA #  
6025 Schumacher Park Drive  
West Chester, OH 45069**

**To ensure that your shipment is processed most efficiently, please include the following information with your product return:**

- Ship To – Company name, address, zip code, and internal mail-drop, if applicable
- Attention/Contact person – Name, Title, Department, Phone number, email address
- Purchase Order Number – If applicable
- RMA Number – provided by the Quasonix representative

Please note that Quasonix reserves the right to refuse shipments that arrive without RMA numbers.

## 8 Appendix A – Acronym List

| <b>Acronym</b> | <b>Description</b>  |
|----------------|---|
| AGC            | Automatic Gain Control  |
| AM             | Amplitude Modulation  |
| AQPSK          | Variant of Quadrature Phase Shift Keying                        |
| ARTM           | Advanced Range Telemetry  |
| AUQPSK         | Variant of Quadrature Phase Shift Keying                        |
| BER            | Bit Error Rate  |
| BNC            | Bayonet Neill-Concelman Connector (RF Connector)                |
| BPSK           | Binary Phase Shift Keying                                       |
| CCSDS          | Consultative Committee for Space Data Systems (coding standard) |
| CD             | Compact Disk  |
| CPM            | Continuous Phase Modulation                                     |
| DB-9           | D-subminiature 9 pin Serial Connector                           |
| DC             | Diversity Combiner  |
| DHCP           | Dynamic Host Configuration Protocol                             |
| DPM            | Digital Phase Modulation  |
| DQE            | Data Quality Encapsulation                                      |
| DQM            | Data Quality Metric   |
| FPGA           | Field Programmable Gate Array                                   |
| IF             | Intermediate Frequency  |
| IP             | Internet Protocol   |
| kbps           | Kilobits per second   |
| KHz            | Kilohertz   |
| LCD            | Liquid Crystal Display  |
| LDPC           | Low Density Parity Check  |
| Mbps           | Megabits per second   |
| MCX            | Snap on subminiature connector                                  |
| MHCPM          | multi-h Continuous Phase Modulation                             |
| MHz            | Megahertz   |

| <b>Acronym</b> | <b>Description</b>   |
|----------------|--|
| N              | (connector type) Threaded RF connector                       |
| OQPSK          | Offset Quadrature Phase Shift Keying                         |
| PCMFM          | Pulse Code Modulation/Frequency Modulation                   |
| PM             | Phase Modulation   |
| PSK            | Phase Shift Keying   |
| QPSK           | Offset Quadrature Phase Shift Keying                         |
| RDMS           | Receiver DeModulator Synchronizer                            |
| RF             | Radio Frequency  |
| RJ-45          | Ethernet Connection Jack                                     |
| RM             | Rack Mount   |
| RRC            | Remote RDMS Client   |
| RS-232         | Recommended Standard 232 (Serial Communications)             |
| SAW            | Surface Acoustic Wave  |
| SDI            | System Degradation Indication                                |
| SOQPSK         | Shaped Offset Quadrature Phase Shift Keying                  |
| SOQPSK-TG      | Shaped Offset Quadrature Phase Shift Keying –Telemetry Group |
| STC            | Space-Time Coding  |
| TRL            | Tracking Loop  |
| TTL            | Transistor Transistor Logic                                  |
| UDP            | User Datagram Protocol                                       |
| UQPSK          | Unbalanced Quadrature Phase Shift Keying                     |
| USB            | Universal Serial Bus   |
| VAC            | Voltage Alternating Current                                  |
| VDC            | Voltage, Direct Current                                      |
| WAN            | Wide Area Network  |