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Installation and Operation Manual

EVTM Stand-alone Encoder/Decoder

Quasonix, Inc.
6025 Schumacher Park Dr.
West Chester, OH 45069
11 July, 2017

****** "Revision 1.0.1"******

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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.

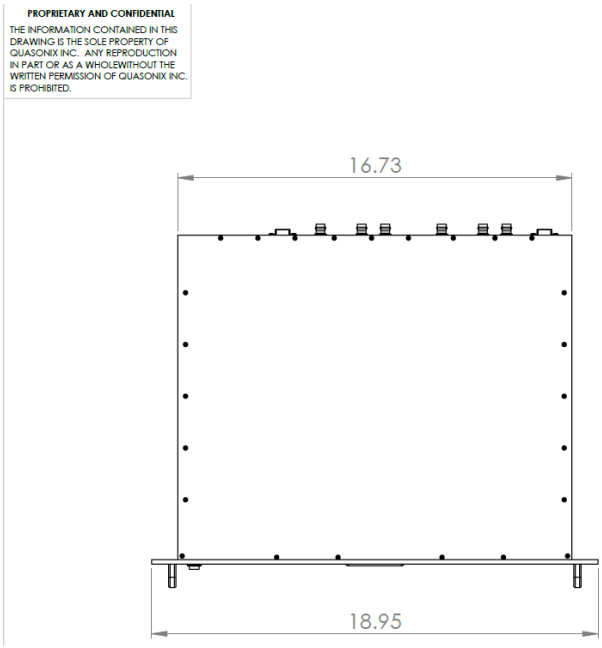

Figure 3: Mechanical Drawing – 1U Top View - EVTM 1U Rack Mount Encoder/Decoder

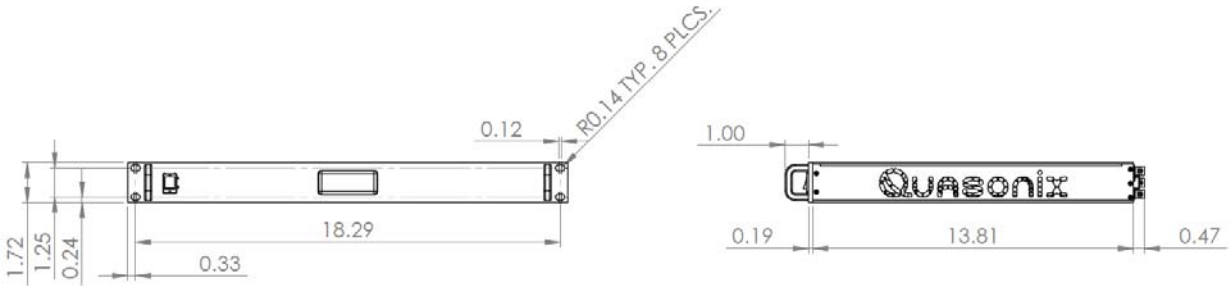

Figure 4: Mechanical Drawing – 1U Front and Side Views - EVTM 1U Rack Mount Encoder/Decoder

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 in^3 Airborne Encoder/Decoder

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

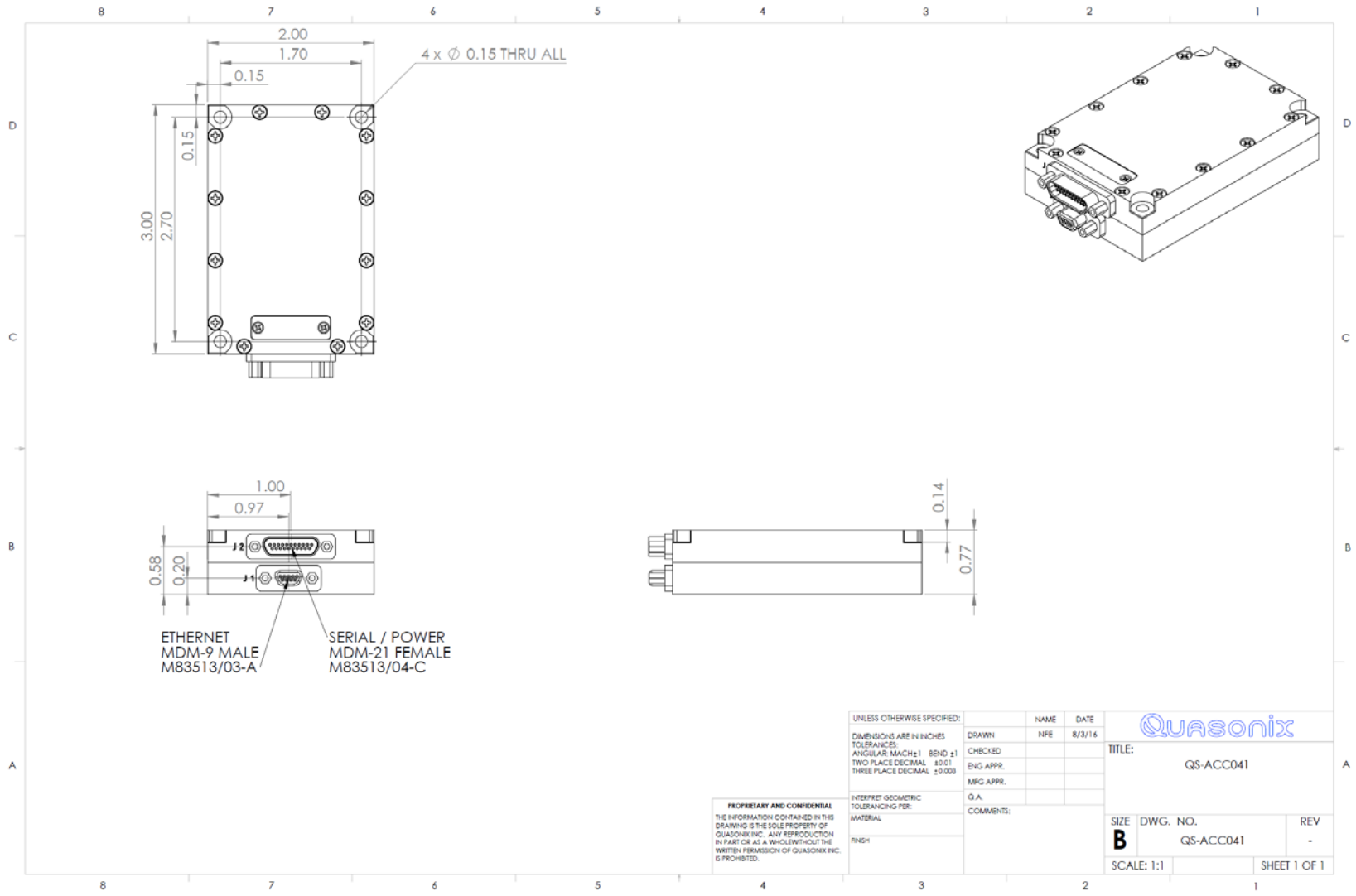

Figure 6: Airborne EVTM Stand-alone Encoder/Decoder

2.2 Thermal

The storage temperature of the Airborne unit is rated for -55°C to +100°C, while the operating temperature is rated for -40°C to +70°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°C to +70°C, while the operating temperature is rated for 0°C to +50°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

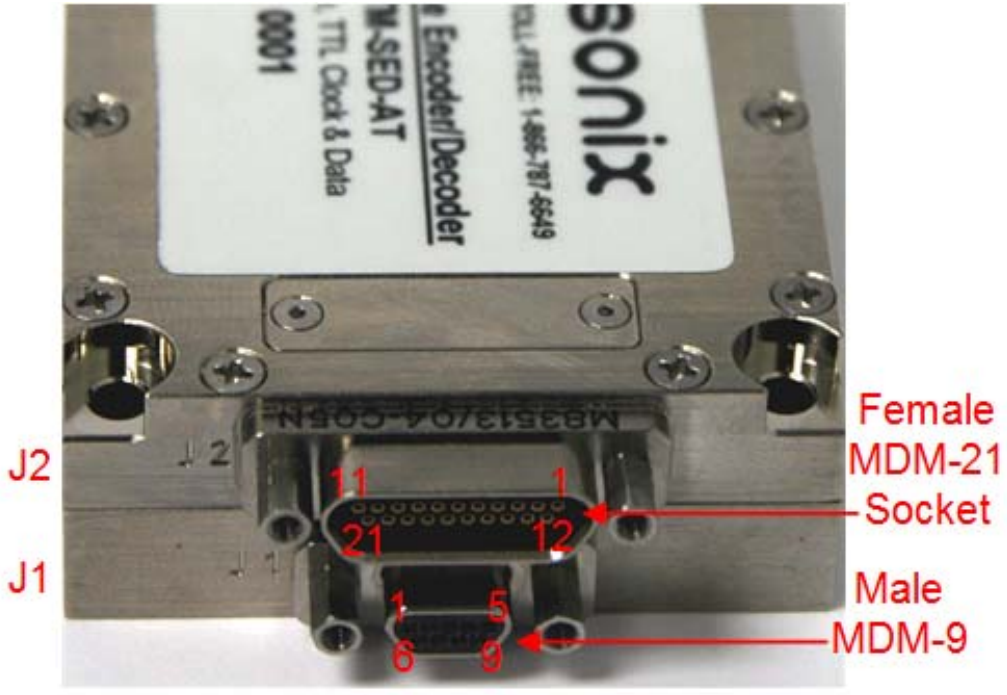

Figure 7: Airborne Encoder/Decoder Connectors Labeled

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 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

Position	Signal	Description
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 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)

Position	Signal	Description
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 Ethernet ports **are not** 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 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 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 Ethernet ports **are not** 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.

4 Appendix A – Acronym List

Acronym	Description
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

Acronym	Description
MHz	Megahertz
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