

VLM-3650 VME Satellite Modulator and Demodulator



Modulator



Demodulator

INTRODUCTION

Comtech EFData's modulators and demodulators have been designed to communicate with all major satellite systems in the world. They have been designed to operate within the Defense Satellite Communications Systems (DSCS). The units have an extended range of microprocessor-controlled functions to implement advanced, high-level coding techniques such as Reed-Solomon FEC for superior performance.

FEATURES

- Fully Accessible System Topology (FAST)
- MIL-STD-188-165 compliant (Type B)
- BPSK, QPSK, QPSK
- 2.4 kbps to 5 Mbps
- IDR/IBS Framing
- Automatic Uplink Power Control (AUPC)
- Asynchronous Channel Unit (ACU) Overhead
- Reed-Solomon Codec
- Self Test Features

APPLICATIONS

The VLM-7650M/D can be used on DSCS, SKYNET, NATO, PANAMSAT, and all U.S. domestic satellites. Options extend the modem range to include EUTELSAT and INTELSAT satellite networks. The VLM-7650M/D are the ideal equipment solution when implementing Tri-band terminals that require both commercial and government communication access.

COMPATIBILITY

The VLM-3650M/D is compatible with the OM-73, MD-1002, SLM-3650, SLM-8650, SLM-8650, SDM-650, LM-46/4046, and MD-945 within the data rate limitations specified for those modems or for the VLM-3650. The INTELSAT/EUTELSAT option provides compatibility with PTT earth stations worldwide.

The VLM-3650M/D can be configured to operate with many existing commercial and proprietary modems by selecting specific parameters via the VME or EIA-485 controller.

OPERATING MODES

DSCS Mode

In DSCS mode, the VLM-7650M/D can derive timing from a 5 or 10 MHz station reference oscillator. In the demodulator, a built-in piezochronous elastic buffer can be used to check out the receive data.

MIL-STD-188 digital interface is the customary DSCS interface that is compatible with the SLM-8650-00.

Open Network Mode

The VLM-3650M/D is equipped with the necessary framing processors to operate with Intermediate Data Rate (IDR), INTELSAT Business Specifications (IBS), or Satellite Multiservice System (SMS) earth stations worldwide.

Closed Network Mode

The closed network mode provides total control of available modem resources. When the proper filter mask, modulation, FEC, and vector rotation are selected, the VLM-3650M/D can be programmed to emulate most other proprietary modems.

Asynchronous Overhead/Uplink Power Control (AUPC)

The VLM-3650M/D can be equipped with AUPC. Operation in the VLM-3650M/D mode adds overhead bits to the data stream for an over-the-satellite communications link compatible with SLM-8650-02. This link can be used to monitor and control the equipment at a remote site. For AUPC, bits of the frame are utilized to establish a link power control. Thresholds and limits can then be set to automatically compensate for rain fade.



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System Specifications

Frequency Range	50 to 80, in 1 Hz steps
Modulation Types	BPSK, QPSK, Offset QPSK, or optional 8-PSK
Digital Data Rate	2.4 kbps to 5.0 Mbps, in 1 tps steps
Symbol Rate	4.8 kbps to 2.5 Msps
External Reference In	5 or 10 MHz at ≥ 0 dBm external reference, selectable
Energy Dispersal	CCITT, V.35, and others

Modulation Specifications

Output Power	0 to -20 dBm, adjustable in 0.1 dB steps
Output Impedance	50 Ω
Spurious	0 to 500 MHz (0 to -20 dBm) -55 dBc
Output Connector	Blind Insert CDI connector

Demodulation Specifications

Input Power:	
Desired Carrier	-15 to -55 dBm
Maximum Composite	0 dBm or +40 dBc
Input Impedance	50 Ω
Input Connector	Blind Insert CDI connector
Carrier Acquisition Range	± 35 kHz, selectable
Elastic Buffer	32 to 262,144 bits, selectable

Uplink Power Control Option

Nominal BER	Programmable
Upper Limit	Programmable
Lower Limit	Programmable
Step Size	0.5 dB
Orderwire	Async EIA-485 up to 1.875% of data rate

Coding

Inner Code	Viterbi or Uncoded
Outer Code	Reed-Solomon - Intelsat Compliant
N=60 to 255	Refer to the manual for ranges
K=50 to 253	
T= 5 to 10	
Interleaver Depth	4, 8, and 16

Open Network Options

IDR	INTELSAT IESS-308 (Framing)
Interface	EIA-422, MIL-188-114
IBS/SMS	INTELSAT IESS-309/EUTALSAT BS7-40 (Framing)
Interface	EIA-422, MIL-188-114

BER Performance

E_b/N_0 Performance, Viterbi Decoder (Guaranteed)

BER	1/2 Rate	3/4 Rate	7/8 Rate
10^{-3}	4.2	5.2	6.4
10^{-4}	4.8	6.0	7.2
10^{-5}	5.5	6.7	7.9
10^{-6}	6.1	7.5	8.6
10^{-7}	6.7	8.2	9.2
10^{-8}	7.2	8.8	9.9

E_b/N_0 Performance, Viterbi Decoder (Typical)

BER	1/2 Rate	3/4 Rate	7/8 Rate
10^{-3}	3.8	4.9	6.1
10^{-4}	4.6	5.7	6.9
10^{-5}	5.3	6.4	7.6
10^{-6}	6.0	7.2	8.3
10^{-7}	6.6	7.9	8.9
10^{-8}	7.2	8.5	9.6

E_b/N_0 Performance (3650 Mode), Viterbi Decoder QPSK

BER	1/2 Rate	3/4 Rate	7/8 Rate
10^{-3}	4.1	5.2	6.4
10^{-4}	4.9	6.0	7.2
10^{-5}	5.6	6.7	7.9
10^{-6}	6.3	7.5	8.6
10^{-7}	6.9	8.2	9.2
10^{-8}	7.5	8.8	9.9

E_b/N_0 Performance, Viterbi Decoder, Reed-Solomon QPSK

BER	1/2 Rate	3/4 Rate	7/8 Rate
10^{-3}	4.1	5.6	6.7
10^{-4}	4.2	5.8	6.9
10^{-5}	4.4	6.0	7.1
10^{-6}	5.0	6.3	7.5

Environmental and Physical Specifications

Prime Power	Via user-supplied chassis
Mounting	9RU X 160 mm VME Chassis
Size	9RU X 160 mm circuit card Assy. 1 VME Slot each
Weight	< 2 lbs. (0.90 kg)
Temperature, Operating	32 to 122°F (0 to 50°C)
Humidity	0 to 95%, non-condensing
Temperature, Storage (Non-Operational)	-40 to 158°F (-40 to +70°C)



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Optimizing Satellite Communications

