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Find the *Comtech EF Data SLM-3650* at our website: ***Click HERE***

SLM-3650
Satellite Modem



INTRODUCTION

Comtech EF Data's modems have been designed to communicate with all the world's major satellite systems, including 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 (RS) FEC for superior performance.

The SLM-3650 includes Fully Accessible System Topology (FAST) enhancement features. With FAST technology, the customer is given the ability to purchase only what is needed at any time, and may add functionality via software upgrades as needed. FAST is a value-added feature exclusive to Comtech EF Data's next generation of satellite communications equipment.

FEATURES

- MIL-STD-188-165 compliant (Type B)
- BPSK, OQPSK, QPSK, 8-PSK
- 2.4 kbps to 5 Mbps
- Fully Accessible System Topology (FAST)
- IDR/IBS
- Drop and Insert (D&I)
- Closed network overhead capability for:
  - Automatic Uplink Power Control (AUPC)
  - Asynchronous Channel Unit Overhead
- Turbo Product Codec
- Reed-Solomon (R-S)
- Fast Acquisition
- Built-In Self Test

COMPATIBILITY

The SLM-3650 is compatible with the OM-73, MD-1002, SLM-6650, SLM-8650, SDM-650, LM-46/4046, and MD-945 within the data rate limitations specified for those modems. The INTELSAT/EUTELSAT option provides compatibility with PTT earth stations worldwide.

A fully operational SLM-3650 can be configured to operate with many existing commercial and proprietary modems by selecting specific parameters via the front panel keypad or remote control.

APPLICATIONS

The SLM-3650 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 SLM-3650 is the ideal equipment solution when implementing Tri-band terminals that require both commercial and government communication access.

DATA AND CLOCK

The modem is configured to derive timing from either the data clock or a 1, 5, 10 or 20 MHz station clock. The interface type is MIL-STD-188 and accepts balanced differential pairs for data and clock. The data and clock also meet the requirements for EIA-422.

OPEN NETWORK MODE (IDR, IBS, or D&I)

The SLM-3650 can be equipped with the necessary baseband processors to operate with Intermediate Data Rate (IDR), INTELSAT Business Service (IBS), or SMS earth stations worldwide. The open network mode also supports fractional T1 or E1 transmission.

UPLINK POWER CONTROL (SLM-3650-02)

The SLM-3650 can be equipped with an optional Asynchronous Overhead/Automatic Uplink Power Control (AUPC). Operation in the SLM-3650-02 mode adds overhead bits to the data stream for an over-the-satellite communications link. This link can be used to monitor and control the equipment at a remote site. For the AUPC mode, some of the overhead bits of the frame are used to establish a modem-to-modem control link. Thresholds and limits can then be set to automatically compensate for fades. The AUPC mode requires another similarly equipped Comtech EF Data modem operating on the opposite end.

HIGH ORDER MODULATOR

8-PSK operation can significantly increase the capacity of the satellite link. A 2 Mbps circuit may be increased to 2.6 Mbps when changing from QPSK 3/4 with R-S to 8-PSK 2/3 with R-S. Both configurations have equal bandwidth on the satellite transponder. More signal power is required for the satellite to achieve the desired bit error performance.

Modems

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SLM-3650 Satellite Modem

SYSTEM SPECIFICATIONS

Operating Frequency Range	50 to 90, 100 to 180 MHz, in 1 Hz steps
Modulation Types	BPSK, QPSK, Offset QPSK, 8-PSK
Digital Data Rate	2.4 kbps to 5 Mbps, in 1 bps steps
Symbol Rate	4.8 Ksps to 2.5 Msps
External Reference In	1, 5, 10, or 20 MHz at ≥ 0 dBm
External Reference Out	10 MHz (high stability mode) +10 dBm ± 5dB
Stability	± 2 x 10^{-7} internal reference
Energy Dispersal	CCITT, V.35, and others

MODULATION SPECIFICATIONS

Output Power	-5 to -30 dBm, adjustable in 0.1 dB steps (+5 to -20 dBm optional)
Output Return Loss	20 dB typical
Output Impedance	50Ω
Spurious	0 to 500 MHz (-5 to -30 dBm) -55 dBc 0 to 500 MHz (+5 to -20 dBm) -50 dBc >64 kbps 0 to 500 MHz (+5 to -20 dBm) -45 dBc <64 kbps
Output Connector	TNC (BNC optional)

DEMODULATION SPECIFICATIONS

Input Power:	
Desired Carrier	-15 to -55 dBm
Maximum Composite	0 dBm or +40 dBc
Input Impedance	50Ω
Input Connector	TNC (BNC optional)
Carrier Acquisition Range	±35 kHz, selectable
Input Return Loss	20 dB typical
Elastic Buffer	32 to 262,144 bits, selectable

OPEN NETWORK OPTIONS

IDR	INTELSAT IESS-308, IESS-310
Interface	G.703
Orderwires	1 EIA-422 8 kbps, or 1 EIA-422 64 kbps
IBS/SMS	INTELSAT IESS-309/EUTALSAT BS7-40
Interface	EIA-422, V.35, G.703
Orderwires	ASYNC, EIA-232, EIA-485, 1/2000 of data rate

DROP AND INSERT OPTION

Interface	G.703
Data Rate	T1 or E1
n x 64 kbps	n =1 - 6, 8, 10, 12, 15, 16, 20, 24, 30

CONCATENATED CODING OPTION

Inner Code	Viterbi or Sequential or none
Outer Code	Reed-Solomon
N, K, T	Refer to manual for ranges
Interleaver Depth	4, 8, and 16

ENVIRONMENTAL AND PHYSICAL SPECIFICATIONS

Prime Power	90 to 264 VAC, 47 to 63 Hz, 40 W
Mounting	1 RU
Size	19 W x 15.2 D x 1.71 H in. (48.2 W x 38.6 D x 4.3 H cm)
Weight	11 lbs. (5.0 kg)
Temperature	
Operating	0 to 50°C (32 to 122° F)
Storage	-40 to +70°C (-40 to 158° F)
Humidity	0 to 95%, non-condensing

AVAILABLE OPTIONS

How Enabled	Option
FAST	Variable Rate Data
FAST	Add Viterbi or Sequential decoder
FAST	8-PSK
FAST	Asymmetrical loop timing
FAST	IBS, IDR, D&I, (Future)
FAST + Card	R-S, Rx mode, Ant Handover
FAST + Card	R-S, Tx mode, Ant Handover
FAST + Card	R-S, Tx, IESS
FAST + Card	R-S, Rx, IESS
FAST + Card	Concatenated R-S Codec, IESS
FAST + Card	Asynchronous overhead (ASYNC/AUPC) w/50-pin connector
FAST + Card	AUPC only (requires Tx and Rx boards)
FAST + Card	Turbo Product Codec
Hardware	High output to +5 dBm
Hardware	2 x 10^{-7} internal stability for IF and data clock
Hardware	25 Pin (F) D Connector, EIA-530 (EIA-422), EIA-232 and V.35
Hardware	50 Pin (F) D Connector for use with overhead card
Hardware	50 Pin (F) D Connector for use without overhead card Includes, EIA-422, EIA-232 and V.35
Hardware	NRZ Interface

BER PERFORMANCE (E_b/N_0, dB)

Viterbi with Reed-Solomon

BER	IBS 1/2	IDR 3/4
10^{-6}	4.1	5.6
10^{-7}	4.2	5.8
10^{-8}	4.4	6.0
10^{-10}	5.0	6.3

Viterbi/Sequential with Reed-Solomon

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

56 kbps, Sequential, BPSK, QPSK, OQPSK

BER	1/2	3/4	7/8
10^{-3}		4.6	5.5
10^{-4}	4.1	5.1	6.1
10^{-5}	4.5	5.5	6.6
10^{-6}	5.0	5.9	7.3
10^{-7}	5.4	6.4	7.8
10^{-8}	5.8	6.8	8.4

1544 kbps Sequential, BPSK, QPSK, OQPSK

BER	1/2	3/4	7/8
10^{-3}	4.8	5.2	6.0
10^{-4}	5.2	5.7	6.4
10^{-5}	5.6	6.1	6.9
10^{-6}	5.9	6.5	7.4
10^{-7}	6.3	7.0	7.9
10^{-8}	6.7	7.4	8.4

8-PSK with/without R-S

BER	2/3 with/ RS	2/3 without/ RS
10^{-4}	6.1	7.3
10^{-5}	6.3	8.2
10^{-6}	6.5	9.0
10^{-7}	6.7	9.8
10^{-8}	6.9	10.4

Uncoded, BPSK, QPSK, OQPSK

BER	1/1
10^{-3}	8.0
10^{-4}	9.6
10^{-5}	10.8
10^{-6}	11.6
10^{-7}	12.4

Turbo Product Codec

	(OQPSK)		BPSK		8-PSK
BER	1/2	3/4	21/44	5/16	3/4
10^{-6}		4.1	2.8	-	6.5
10^{-7}	3.2	4.3	3.1	-	6.9
10^{-8}	3.5	4.6	3.3	-	7.2
10^{-9}	3.8	4.9	3.7	4.0	7.5

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