PSM-500L (L-Band) Satellite Modem

M500 SERIES

Our *latest generation* high performance L-Band Satellite Modem, the PSM-500L, is the industry's most reliable & sophisticated modem in its class. The PSM-500L is unmatched by any other modem for its BER performance, fast acquisition, low latency and total power/bandwidth optimization.

PSM-500L Highlights

- New Flexible LDPC with Multiple Block Sizes
- 1.2 kbps to 29.5 Mbps, 1 bps steps
- BPSK/QPSK/OQPSK/8PSK/8QAM/16QAM
- Standard High Stability 10 MHz Reference
- BUC and LNB Power Options
- Viterbi, TCM, Reed Solomon, Turbo Product Codes
- Most TPC Code Rates and Block Sizes Available
- Compatible with other Modem Manufacturers
- Ethernet IP Data Interface with Linux based SnIP provides Bridge or Router IP Modes
- Lowest Latency, <15 ms at 64 kbps ¾ QPSK
- Standard IBS Multiplexer, Async Overhead Channel, AUPC and Remote Modem Control
- Typical acquisition time of 315 ms at 9.6 kbps QPSK, 71 ms at 64 kbps QPSK.
- Tx Output Power Range of 40 dB, +5 to –35 dBm
- Optional Ethernet Remote Interface
- Legacy PSM-4900 Compatible
- Built-in 1:1 Redundancy

FEC Options

FEC types include Viterbi, Trellis, Reed Solomon, Turbo Product Codes (both 4K & 16K block sizes) and the most Flexible LDPC on the market today.
In addition, the PSM-500L has the largest selection of code rates and block sizes. Available LDPC block sizes include 256, 512, 1k, 2k, 4k, 8k & 16k.

Performance

Sophisticated digital signal processing eliminates all on board physical adjustments and provides performance within 0.3 dB of theoretical. Datum's unique DSP design also delivers the world's fastest SCPC carrier acquisition.

BUC/LNB Power & Reference

The PSM-500L is capable of providing a high stability 10 MHz reference, BUC and LNB power through the modem Transmit (N-Type) and Receive (F-Type) connections at the rear. Reference, BUC and LNB power can be disabled via the front panel. Front panel voltage and current measurements are available for BUC and LNB monitoring.

Key Enabled Upgrades

The PSM-500L can be upgraded via front panel key codes. Upgrades are simple to implement and are available in preconfigured software versions, which offer a variety of options for modulation, FEC and data rates up to 29.5Mbps.

Redundancy

M500 series modems come with a built-in 1:1 redundancy feature that can be enabled through the front panel and requires only a few external cables and power splitters.

Front Panel & Diagnostics

The modem front panel provides a backlit LCD display, full keypad and LED indicators for monitor and control of all modem parameters. The PSM-500L also has advanced monitor and BERT functions available to the user for quick field diagnostics.

DATUM SYSTEMS

PSM-500L (L-Band) Satellite Modem *back panel*

Specifications

PSM-500L Value Configurations:

- **M505 - BPSK/QPSK/OQPSK up to 5 Mbps (PSM-4900 Compatible)**
- **M511 - Adds 8PSK/8QAM to M505 Series & Data Rates up to 10 Mbps**
- **M523 - Adds 16QAM to M511 Series & Data Rates up to 29.52 Mbps**

System Specifications:

Operating Modes:	Rx and Tx Continuous (SCPC), Optional Tx Burst
Tx Tuning Range:	950 to 1750 MHz, in 1 Hz Steps
Rx Tuning Range:	950 to 1900 MHz, in 1 Hz Steps
Data Rate Selection:	1 bps increments
Data Rate Minimum:	1.2 kbps rate 1/2 BPSK
Data Rate Maximum:	29.52 Mbps rate 3/4 8PSK
Data Rate Accuracy:	Accurate to 2 x 10^{-12} of relative clock reference
Symbol Rate Range:	2.4 ksps to 14.76 Msps in 1 bps step sizes
Available Modulation:	BPSK, QPSK, OQPSK, 8PSK, 8QAM, 16QAM
Available TPC Modes:	M5 Full, Short & Legacy, Comtech and Advanced
Concatenated RS:	Selectable N & K, IESS 308/309/310 and CT Comp
Reed Solomon Depth:	4, 8 or 16

FEC and Code Rates:	**FEC**	**Code Rates**
	Viterbi	**1/2, 3/4, 5/6, 7/8 (k = 7)**
	Trellis	**2/3**
	TPC-4K	**1/2, 3/4, 7/8, 0.95, 21/44**
	TPC-16K	**1/2, 3/4, 7/8, 0.922, 0.453**
	LDPC	**1/2, 2/3, 3/4, 14/17, 7/8, 10/11, 16/17**

PSM500 Typical 1 x 10^{-8} BER Performance @ EB/N0

Selected Code Rates		**1/2**	**2/3**	**3/4**	**7/8**	**0.922**
Viterbi	QPSK	5.7		6.7	7.7	
Viterbi + RS	QPSK	2.9		4.1	5.3	
Trellis + RS	8PSK		5.7			
Turbo (TPC)	QPSK	2.3		2.8	4.0	4.9
	8PSK	5.2		6.8	7.9	
	8QAM	4.2		4.8	6.1	7.2
	16QAM	5.1		6.0	7.5	8.5
LDPC – 16k	QPSK	1.40	2.10	2.70	3.90	
	8PSK			5.08	6.65	
	8QAM	3.21	4.11	4.80	6.05	
	16QAM	3.73	5.00	5.85	7.40	
LDPC – 4k	QPSK	1.71	2.47	3.13	4.30	
	8PSK		4.51	5.55	7.20	
	8QAM	3.65	4.53	5.32	6.65	
	16QAM	4.18	5.48	6.37	7.84	

*** Guaranteed BER Performance is within 0.2 db of Typical**

Modulator:

Transmit Output Power:	+5 to –35 dBm in 0.1 dB steps (max +3 dBm @ 50Ω)
IF Tx Impedance:	50Ω (Type N)
Return Loss:	14 dB typical, 10 dB minimum
Output Phase Noise:	Better than IESS-308/309 by 6 dB typical, 4 dB min
Level Stability:	±0.5 dB, 0 ~ 50°C, MHz at 25°C
Level Accuracy:	Accurate ±0.5 dB, 950 ~ 1750
Output Spurious:	< -55 dBc/4 kHz, Typical < - 65 dBc/4 kHz
Carrier on/ off Isolation:	> 60 dB
Scrambler Types:	IBS, V.35, IESS, TPC, RS, LDPC, EFD
Data Clock Sources:	Internal, Terminal Timing, External, Rx Recovered
Internal Stability:	2 x 10^{-6} TCXO (Standard)
External Reference:	1, 5, 9, or 10 MHz input on rear panel
Transmit BUC Power:	Nominal 24 VDC, 96 Watts (Or 12/36/48 VDC)
(via rear DIN connector)	Max 60 VDC/6A up to 250 Watt
Transmit BUC Reference:	10 MHz at nominal – 3 dBm internal or external
Reference Stability/Aging:	1 x 10^{-8} OCXO, 2 x 10^{-7}/ year aging (L-Band)
Reference Phase Noise:	-110 dBc @ 10 Hz, -130 dBC @ 100 Hz, -140 dBc @ 1 kHz, -150 dBc @ 10 kHz, -155 dBc @ 100 kHz

Demodulator:

Rx Carrier Input Range:	-20 to -70 dBm, scales to -101 dBm at lower rates r (minimum = 10 log(symbol rate) – 135 dBm)
IF Tx Impedance:	75Ω Type F -Connector
Return Loss:	10 dB minimum
Max Composite Input:	- 5 dBm or +40 dBc, whichever is lower power
Input Phase Noise:	Better than Intelsat by 6 dB typical, 4 dB min
Rx Acquisition Range:	Programmable from ± 100 Hz to ± 1.25 MHz
Descrambler Types:	IBS, V.35, IESS, TPC, RS, LDPC, EFD

Fast Receive Lock Performance:

Example: FEC ½, EB/N0 = 6.0 dB, Acquisition Range of ± 30 kHz

- 315 ms at 9.6 kbps QPSK
- 175 ms at 9.6 kbps BPSK
- 71 ms at 64 kbps QPSK

Plesiochronous or Doppler Buffer Store:

Receive Buffer Range:	4 bits to 524,280 bits, in 1 bit steps or delay time
Receive Clock Options:	Internal, External, Mod Clock, Receive Clock

Terrestrial Interfaces:

Standard Synchronous:	Serial RS232, RS422, V.35, V.36, EIA-530(A)
Optional:	HSSI Ethernet IP 10/100 Base-T, available in Bridge or Router modes with SnIP (Linux Operating System)

Multiplexer and Overhead Features:

IBS Multiplexer:	Built-in IBS Overhead Channel with standard and enhanced variable rate RS232 and RS485. Supports Automatic Uplink Power Control (AUPC), Remote Modem Control Interface and 2 Form-C Backward Alarms

Monitor and Control:

Front Panel:	LCD and Keyboard for easy control and status
Terminal Mode:	Full screen interactive display of all parameters
Remote Packet Mode:	Packet driven RS232/RS485 control and status
Optional Web Browser:	Available through the Ethernet Interface SnIP

Diagnostics:

Loopback Modes:	IF, bi-directional terr and sat data loopbacks
BER Test Pattern:	2047 or 2^{23-1}
BERT:	Built-in bi-directional bit error rate test set
Carrier:	Pure carrier and sideband
Form C Relays:	Assignable faults to Form C rear alarm connector

Environmental and Physical:

Prime Power Input:	90 to 264 VAC, 50/60 Hz, < 30 watts, 50 Watts Max fully loaded including internal LNB power
LNB Power:	Selectable: Off, 13 or 18 VDC
External BUC Supply:	Input 115/230 VAC, 50 / 60 Hz Output: See modem input options below
Modem Input Options: (Uses DIN Connector)	(1) 24 VDC @ 96 Watts, 4A max (2) 24 VDC @ 150 Watts, 5.4A max (3) 48 VDC @ 150 Watts, 3.2A max (4) 48 VDC @ 240 Watts, 5A max
Power Factor Correction:	Optional
Operating Conditions:	0 to 50°C, to 95% humidity, non-condensing
Storage Temperature:	- 20 to +70° C, 99% humidity, non condensing
Size:	Rack mount - 1 RU (19"W x 12"D x 1.75"H)
Weight:	Approximately 7 lbs fully configured

Certifications and Compliance:

CE Certified for:	EN55022 Class B (Emissions) EN50082-1 Part 1 (Immunity) EN60950 (Safety)
RoHS Compliant:	Meets RoHS lead-free standards