

## PSM-500 Series Programmable SCPC/VSAT Modem Feature Matrix



### DESCRIPTION

Datum Systems' latest satellite modem implementation represents state of the art enhancements to the popular PSM-4900 series of modems at the industry's lowest price. The new PSM-500 series incorporates all of the features of the PSM-4900, and adds 8PSK and 16QAM modulation modes, a standard Reed-Solomon and IBS multiplexer and higher data rates. The multiplexer's overhead channels provides the capability for orderwire, AUPC and Remote Modem Control to every modem. The PSM-500 series is available in IF versions for 70 MHz, I40 MHz and L-Band applications.

To provide capabilities consistent with customer needs, the PSM-500 may be purchased in 3 upgradeable versions or "Feature Sets", the M505, M511 and M523. Each offers a combination of modulation modes and data rates as shown below designed to match the needs of various users without paying for features not needed. In addition a user can upgrade a modem from one version to another at a very nominal cost when requirements change.

- The **M505** is designed as a direct replacement for the PSM-4900 modems. It's data rate and modulation modes are almost the same, plus it has a built-in IBS Multiplexer and Reed-Solomon capability. If the requirement is to add to existing systems using QPSK modulation and either Viterbi, Reed-Solomon or TPC then this is the right modem.
- The **M511** fits the requirements of users who need higher data rates up to 10 Mbps, and/or 8PSK with Trellis Code modulation. The built in Reed-Solomon allows it to operate in the normal 8PSK, TCM, Reed-Solomon with Viterbi at Rate 2/3 without anything additional needed. This is a good general purpose modem able to meet the needs of Teleports, users whose carriers require 8PSK to minimize bandwidth, and those transmitting video signals.
- The **M523** adds data rates up to 20 Mbps and 16QAM modulation. This modem can provide wideband outbound signals for large Star Networks, or a large channel point to point.

Upgrades from one version to another are accomplished by software/firmware loaded into the modem via a new USB connection on the modem rear panel.

There are currently two hardware options available for the PSM-500 series: TPC FEC cards and Ethernet Interface Cards. The TPC is a plug in card to the main modem board and can be either a 4k block Turbo Product Codes FEC (as in the PSM-4900) or a newer 16k block Turbo Product Codes FEC with higher performance (backward compatible with the PSM-4900). The Ethernet interface can be either the current "SDMS" type card or a new Satellite Network Interface Processor, or "Snip", which is in development now.

### PSM-500 Series IF Interface Versions.

Interface Versions	PSM-500S	PSM-500N	PSM-500L	PSM-500H**
IF Transmit	50 ~ 90 MHz	100 ~ 180 MHz	950 ~ 1750 MHz	50 ~ 90 MHz
IF Receive	50 ~ 90 MHz	100 ~ 180 MHz	950 ~ 1900 MHz	950 ~ 1900 MHz

\*\* Note: The Hybrid version production is dependent on demand.

**PSM-500 Series Feature Matrix.**

Feature	Original M5	New PSM-500S/N/L Series		
	PSM-4900	M505	M511	M523
<b>Modulation</b>				
BPSK	✓ □	✓ □	✓ □	✓ □
QPSK	✓ □	✓ □	✓ □	✓ □
OQPSK	N/A	✓ □	✓ □	✓ □
8PSK/TCM	N/A	Upgrade	✓ □	✓ □
16QAM/APSK	N/A	Upgrade	Upgrade	✓ □

**Max Data Rate**

M523 rates slightly higher at higher FEC rates

BPSK	2.46 Mbps	2.5 Mbps	5 Mbps	7.38 Mbps
QPSK/OQPSK	4.92 Mbps	5 Mbps	10 Mbps	14.76 Mbps
8PSK/TCM (1)	N/A	N/A	10 Mbps	20 Mbps
16QAM/APSK	N/A	N/A	N/A	20 Mbps

**FEC Modes**

Disabled	N/A	✓ □	✓ □	✓ □
Viterbi	✓ □	✓ □	✓ □	✓ □
Reed-Solomon	Option	✓ □	✓ □	✓ □
TPC – 4K (2)	Option	Option?	Option?	Option?
TPC – 16K (2)	N/A	Option	Option	Option
S-Tec (3)	Option	Option	Option	Option

**IBS Mux/AUPC**

Option	✓ □	✓ □	✓ □
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**SnIP Ethernet Int.**

Option	Option	Option	Option
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**Features Common to All Modems in Series**

- ◆ Programmable modulation modes.
- ◆ Programmable receive acquisition/tracking range.
- ◆ Typical DSP acquisition time of 315 mseconds at 9.6 kbps QPSK, 71 mseconds at 64 kbps QPSK.
- ◆ Viterbi and Reed-Solomon FEC standard, TPC optional. BER vs. Eb/No performance within 0.3 dB of theoretical. 10<sup>-7</sup> BER at 6.0 dB Eb/No (2.8 dB with TPC, 3.5 dB with Reed-Solomon codec).
- ◆ DDS transmit and receive frequency setting in 1 Hz increments.
- ◆ Programmable Interface type.
- ◆ Low power, light weight 1 U case.
- ◆ Built-in IBS Multiplexer with overhead channel, AUPC and Remote Modem Control.
- ◆ Built-in BER Test Set.
- ◆ DDS setting of transmit and receive data rates from 1.2 kbps to 20 Mbps in 1 bps increments.
- ◆ Viterbi FEC codec programmable to rate 1/2, 2/3, 3/4, 5/6, 7/8 and disabled.
- ◆ Wide AGC range.
- ◆ Full front panel control with keypad, LCD display and LED status.
- ◆ Fully programmable from either front panel or remote command without jumpers.
- ◆ Built-in 1:1 Redundancy.
- ◆ Designed to use internal or external G.703 and Ethernet interfaces.
- ◆ 8 User stored and recallable configurations. Automatic Recovery of stored configurations.

**BASE SERIES SPECIFICATIONS (Preliminary)**

Parameter	PSM-500
Operating Modes, all programmable:	Receive and Transmit Continuous (SCPC), Optional TX Burst.
Transmit IF Frequency Range:	50 to 90 (standard) in 1 Hz Steps. 950 to 1750 MHz, "L" version.
Receive IF Frequency Range:	50 to 90 (standard) in 1 Hz Steps. 950 to 1900 MHz, "L" version.
Transmit Output Power: (BNC Programmable 75/50 Ω) 50Ω only L-Band	+5 to -35 dBm, programmable in 0.1 dB steps (max. +3 dBm @ 50Ω)
Return Loss	20 dB minimum.
Transmit Output Phase Noise:	Better than IESS-308/309 by 6 dB typical, 4 dB minimum.
Transmit Output Level Stability/Accuracy:	±0.5 dB, 0 ~ 50°C, accurate ±0.5 dB, 50 ~ 90 MHz at 25°C
Transmit Output Spurious/Harmonics:	<-50 dBc / <-50 dBc up to -10 dBm, <-40 dBc @ +5 dBm out
Receive Carrier Level In: (BNC Programmable 75/50 Ω)	-20 to -60 dBm, scales to -84 at lower data rates. Formula is: minimum = 10log(symbol rate)-120dBm
Return Loss	10 dB minimum.
Maximum Composite Receive Input Power	+15 dBm or +40 dBc whichever is lower power
Receive Demodulator Phase Noise:	Better than IESS-308/309 by 4 dB minimum, 6 dB typical.
Receive Acquisition Range:	Programmable from ± 100 Hz to ± 1.25 MHz
Frequency Reference (Internal) Stability	2 x 10 <sup>-6</sup> TCXO (Standard), 1 x 10 <sup>-8</sup> OCXO in PSM-500L
External:	External reference input on rear panel for 1, 5, 9, or 10 MHz. Internal TCXO/OCXO phase locks to external input.
Modulation and Demodulation: M505: M511: M523:	Programmable for BPSK, QPSK, OQPSK, independently Adds 8PSK and 8APSK with Trellis Code Modulation Adds 16QAM and 16APSK to the M511 modes.
Forward Error Correction:	Viterbi standard. k=7. 4 or 16k block Turbo Product Codes optional.
Standard Concatenated Reed-Solomon:	n=126, k=112, t=7 or n=219, k=201, t=9 or programmable, depth of 4 or 8
FEC (Viterbi or TPC) Rates Selectable:	1/2, 3/4, 7/8 or disabled. Rate 5/6 in Viterbi only, Rate 2/3 in 8PSK mode.
Data Rates Minimum, all modems at FEC rate: (without IBS mux or R-S option)	1.2 kbps rate 1/2 BPSK, 2.4 kbps, rate 3/4 or 7/8 BPSK 2.4 kbps rate 1/2, 4.8 kbps rate 3/4 or 7/8 QPSK or OQPSK 9.6 kbps all rates 8PSK, 19.2 kbps all rates 16QAM
Data Rates Maximum - M505: M511: M523: (without IBS mux or R-S option) Note – Max rate may be limited by interface	5 Mbps, all modulation modes and FEC rates. 10 Mbps all modulation modes and FEC rates – see Note below 20 Mbps all modulation modes and FEC rates. – see Note below Note: Maximum rate limit of 7.38 Mbps, BPSK, rate 1/2; M523 Maximum rate limit of 14.76 Mbps, QPSK, rate 1/2, 19.68 Mbps 8PSK rate 2/3
IBS Multiplex (Standard Built-In)	IBS framing supporting enhanced buffered RS-232/485 overhead channel, AUPC, remote modem control and variable overhead.
Data Rate Selection: Transmit & Receive:	Programmable in 1bps increments. Accurate to 2 x 10E-12 (relative to reference).
Receive Data FIFO Buffer: Plesiochronous or Doppler Elastic Store	4 bits to 524,280 bits, programmable in 1 bit increments, or in delay time.
Data Interface (All synchronous).	RS-449/422 or V.35 or EIA-530 or RS-232 electronically selectable at DB-37 connector. DB25 and V.35 (M34) adaptors available.
BER Performance: with Viterbi FEC 1/2 rate: 1/2 rate Viterbi +R-S Concatenated FEC: 3/4 rate Viterbi +R-S Concatenated FEC: 1/2 rate Turbo Product Codes FEC: 3/4 rate Turbo Product Codes FEC:	10-7 at 6.0 dB Eb/No, 10-5 at 4.8 dB 10-7 at 3.7 dB, 3.5 dB typical (n=126, k=112) 10-7 at 4.7 dB, 4.5 dB typical 10-7 at 3.0 dB, 2.8 dB typical 10-7 at 3.7 dB, 3.5 dB typical
Fast Receive Lock Performance at FEC rate 1/2, 6.0 dB Eb/No, +/-30kHz acquisition range: (Average)	315 msecond at 9.6 kbps QPSK or 175 msecond at 9.6 kbps BPSK. 71 msecond at 64 kbps QPSK
Front Panel Control:	LCD display and keypad provide full status and programmability.
Remote Control: Terminal Mode:	Full screen live display and interactive control of all operating parameters and status.
Packet Mode:	Command packet driven RS-232/485 control and reporting of all parameters and status.
Case Dimensions:	Rack mount @ 1 RU (19"W X 14"D X 1.75"H.)
Input Power Requirements (without BUC):	90 to 264 VAC, 50/60 HZ, Approx. 40 Watts, 60 Watts maximum, fully loaded including LNB power in L-Band IF version.
Operating Conditions:	0 to 50° C, to 95% humidity, non-condensing.