



DMD2401LS

Low-Speed Satellite Modem



HIGHLIGHTS

- ▶ 50 to 180 MHz in 1 Hz Steps
- ▶ Low Cost
- ▶ Light Weight, Low Profile
- ▶ BPSK, QPSK and OQPSK Operation (8PSK Optional)
- ▶ 4.8 to 1024 Kbps
- ▶ One Bit-Per-Second Steps
- ▶ 1/2, 3/4, and 7/8 Rate Viterbi
- ▶ 1/2, 3/4, and 7/8 Rate Sequential (Optional)
- ▶ 21/44, 1/2, 3/4, 7/8, 0.495 and 0.793 Rate Turbo Product Code (Optional)
- ▶ Accurate E_b/N_0 , Symbol Error Rate and Bit Error Rate Display
- ▶ IBS or IDR Framing (Optional)
- ▶ Drop and Insert (Optional)
- ▶ Automatic Uplink Power Control (AUPC) (Optional)
- ▶ 2/3 Trellis 8PSK (Optional)

OVERVIEW

The Radyne DMD2401LS Satellite Modem offers the best features of a sophisticated programmable modem, at an affordable price.

Digital microprocessor control eliminates virtually all on-board adjustments. Direct Digital Synthesis (DDS) of the IF and data rate synthesizers allow settings to one hertz and one bit-per-second, respectively. These features ensure that the modem will perform over years of service without degradation.

The DMD2401LS is designed to perform as both ends of a satellite Single Channel Per Carrier (SCPC) link or as the VSAT remote site modem in a TDMA hub system. The

DMD2401LS is perfect for mesh or star topology networks. The modulator and demodulator operate independently using BPSK, QPSK, OQPSK or 8PSK (optional) modulation in either SCPC or VSAT modes.

The DMD2401LS is also the ideal VSAT modem for use in a point-to-point frame relay hybrid network. Other applications include FDMA, telephony, video conferencing, long distance learning, paging and news gathering.

Selection of any data rate is provided over the following ranges:

- 4.8 Kbps to 1024 Kbps BPSK
- 9.6 Kbps to 1024 Kbps QPSK
- 9.6 Kbps to 1024 Kbps OQPSK
- 64 Kbps to 1024 Kbps 8PSK (Optional)

The DMD2401LS is programmable from the front panel. The program menu was specifically designed for ease of use to quickly put the modem online and to input network changes. The modem can also be monitored and controlled through the RS-485 or RS-232 serial control channel.

Available options for the DMD2401LS include a low data rate asynchronous serial overhead channel for remote monitor and control. Additionally, a Reed-Solomon or Turbo Product codec is available for applications requiring bit error rates of 10^{-10} .

All of the configuration, monitor and control functions are available at the front panel. Operating parameters, such as variable data rates, FEC code rate, modulation type, IF frequencies, IBS/IDR framing and interface type can be readily set and changed at the front panel by earth station operations personnel.



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SPECIFICATIONS

Transmit and Receive Data Rates

DMD2401:	BPSK - 4.8 to 1024 Kbps, Rate 1/2 QPSK - 9.6 to 1024 Kbps, Rate 1/2, 3/4, 7/8 OQPSK - 9.6 to 1024 Kbps, Rate 1/2, 3/4, 7/8 8PSK - 64 to 1024 Kbps, Rate 2/3 (Optional) Selectable in 1 bps Steps
Data Rate Setting:	Selectable in 1 bps Steps

Modulator Specifications

Frequency Range:	50 to 90 and 100 to 180 MHz Standard in 1 Hz Steps
Frequency Stability:	±1.0 ppm (88 Hz at 88 MHz)
Level Control:	-5 to -30.0 dBm, 0.1 dB Steps
Level Accuracy:	±0.5 dB Over Frequency and Temperature
Impedance:	75 Ohm or 50 Ohm Software Selectable
Return Loss:	20 dB Minimum
Output Off Isolation:	>60 dB
Spurious Output:	<-55 dBc from 2 to 200 MHz
FEC:	1/2, 3/4, and 7/8 Viterbi, K=7 1/2, 3/4, and 7/8 Sequential (Optional) 0.495 and 0.793 TPC (Optional)
Scrambler:	Intelsat V.35, Mode Selectable

Demodulator Specifications

Frequency Range:	50 to 90 and 100 to 180 MHz Standard in 1 Hz Steps
Input Carrier Range:	-65 to -40 dBm (Symbol Rate < 64 kHz) -50 to -30 dBm (Symbol Rate > 64 kHz)
Acquisition/Tracking:	±1 kHz to ±32 kHz, 1 kHz Steps
Reacquisition Range:	±1 kHz to ±32 kHz, 1 kHz Steps
IF Input Impedance:	75 Ohm or 50 Ohm Software Selectable
Return Loss:	20 dB Minimum
FEC:	1/2, 3/4, and 7/8 Viterbi, K=7 1/2, 3/4, and 7/8 Sequential (Optional)

Typical E_b/N_0 (Viterbi)	Rate 1/2	Rate 3/4	Rate 7/8		
@ BER=10 ⁻⁵	5.1	6.3	7.5		
@ BER=10 ⁻⁷	6.2	7.7	8.6		
Typical E_b/N_0 (Sequential)	Rate 1/2	Rate 3/4	Rate 7/8		
@ BER=10 ⁻⁵	5.1	5.6	6.4		
@ BER=10 ⁻⁷	6.5	6.5	7.4		
Typical E_b/N_0 (8PSK Trellis)	Rate 2/3				
@ BER=10 ⁻⁵	6.4				
@ BER=10 ⁻⁷	8.1				
Typical E_b/N_0 (Turbo)	Rate 1/2	Rate 3/4	Rate 7/8	Rate 0.495	Rate 0.793
	(21/44)				
B/OQPSK @ BER=10 ⁻⁵	2.4	3.2	3.9	2.5	3.4
@ BER=10 ⁻⁷	2.8	3.7	4.1	2.7	3.8
8PSK @ BER=10 ⁻⁵	---	5.6	6.7	---	5.9
@ BER=10 ⁻⁷	---	6.0	7.5	---	6.4

Note: E_b/N_0 typical values include effect of using differential encoding and V.35 scrambler.

Descrambler:	Intelsat V.35, Mode Selectable
Data Buffering:	8 Bits to 262,144 Bits, in 8-Bit Steps

Alarms

Summary Alarms:	Two separate form-C contacts available at the rear panel. Each provides a summary alarm of fault conditions.
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Front Panel LED Indicators

Unit:	Power Alarm Event Remote
Demodulator:	Signal Lock Major Alarm Minor Alarm Test Mode
Modulator:	Transmit On Major Alarm Minor Alarm Test Mode

Monitor and Control

All operating parameters can be monitored and controlled via the front panel display/keypad or the RS485 or RS232 serial control channel in either terminal or command modes. The following modem parameters may be controlled and/or monitored:

Transmit and Receive Frequencies	
Transmit and Receive Offsets	
Modulator Power Level	
Modulator On/Off	
Modulator/Demodulator Modulation (BPSK, QPSK, OQPSK or Optional 8PSK)	
Modulator/Demodulator Data Rates (1 bps Steps)	
Modulator/Demodulator Code Rates (1/2, 3/4, 7/8; Optional 2/3 8PSK, TPC 0.495, 0.793, 21/44, 1/2, 3/4, 7/8 Rates)	
Modulator/Demodulator Differential Decoders (On/Off)	
Modulator/Demodulator Scrambler (On/Off)	

Terrestrial Interfaces

T1 (DSX1):	1.544 Mbps, 100 Ohm and B8ZS
E1 (G.703):	2.048 Mbps, 75 and 120 Ohm, HDB3
ITU V.35:	All Rates, Differential, Clock/Data, DCE
RS-422/-449:	All Rates, Differential, Clock/Data, DCE

Options

Turbo Product Codec:	Per IESS 315
Concatenated Codec:	A Reed-Solomon Codec is Available
Asynchronous Channel:	Asynchronous overhead channel for remote control and order-wire applications.
IDR:	Per IESS 308
IBS:	Per IESS 309
8PSK:	Per IESS 310/314
Drop and Insert:	Optional
Terrestrial Data:	1.544 Mbps or 2.048 Mbps, G.732/733
Line Coding:	B8ZS and AMI for T1 and HDB3 for E1
Framing:	D4, ESF for T1 and PCM30 (Channel Associated Signaling) or PCM31 (Signaling Disabled) for E1
Time Slot Selection:	$n \times 64$ Contiguous or Arbitrary Blocks for Drop and Insert
Data Rates:	64, 128, 192, 256, 320, 384, 512, 640, 768, 960, 1024

Environmental

Prime Power:	100 to 240 VAC, 50 to 60 Hz, 1.0 A (IEC 3-Pin Power Connector with Switch)
Operating Temperature:	0 to 50° C, 95% Humidity, Noncondensing
Storage Temperature:	-20 to 70° C, 99% Humidity, Noncondensing

Physical

Chassis Size:	19" x 17" x 1.75" (48.26 x 43.2 x 4.45 cm)
Weight:	8 Pounds (3.6 Kg)
Shipping Weight:	10 Pounds (4.5 Kg)

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