



# DMD15

## Universal IBS/IDR Satellite Modem



### HIGHLIGHTS

- ▶ BPSK/QPSK/8PSK/16QAM Operation
- ▶ 9.6 Kbps to 5 Mbps, 1 bps Steps (DMD15A)
- ▶ 9.6 Kbps to 10 Mbps, 1 bps Steps (DMD15B)
- ▶ FEC - Viterbi, Reed-Solomon, Sequential, Trellis, Turbo Product Code
- ▶ Configuration, Monitor and Control Features Fully User-Programmable
- ▶ Excellent Spurious Performance
- ▶ Fully Compliant with IESS 308/309/310
- ▶ Industry-standard Universal Interface Module
- ▶ 50 to 180 MHz IF in 1 Hz Steps
- ▶ Optional L-Band IF

### OVERVIEW

The Radyne DMD15 satellite modem offers the best features of a sophisticated programmable IBS/IDR and closed network modem, at an affordable price.

This versatile equipment package combines unsurpassed performance with numerous user-friendly front panel programmable functions. The DMD15 provides selectable functions for different services: Intelsat IDR and IBS, as well as closed networks. 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.

Additionally, all functions can be accessed with a terminal or personal computer via a serial link for complete remote monitoring and control capability.

The DMD15 operates at all standard IBS and IDR data rates up to 8.448 Mbps. Selection of any data rate is provided over the range of 9.6 Kbps to 10 Mbps in 1 bps steps.

For applications requiring system redundancy, the DMD15 modem may be used with the Radyne RCS11 1:1 Redundancy Switch or the RCS20 M:N ( $N \leq 9$ ) Redundancy Switch. An optional Internal Engineering Service Channel Unit is available to provide voice, data, and alarms for Intelsat IDR applications.

A full range of industry standard interfaces are available for the DMD15. Interface types are selectable from V.35, RS-232, RS-422/449 and ITU G.703.

#### Available Options Include:

- OQPSK
- OM-73 Compatible
- 8PSK
- 16QAM
- Drop and Insert
- Internal Engineering Service Channel
- Async Overhead Channel
- Sequential Decoding
- Reed-Solomon FEC
- Turbo Product Code FEC
- Trellis FEC
- L-Band IF
- Analog AGC Voltage
- Internal Stability  $1 \times 10^{-7}$
- DC Input Power 48 VDC



# DMD15 Universal IBS/IDR Satellite Modem

## SPECIFICATIONS

### DMD15 System Data Rates

BPSK - 9.6 Kbps to 3.25 Mbps, Rate 1/2  
 QPSK/OQPSK - 19.2 Kbps to 6.5 Mbps, Rate 1/2  
 QPSK/OQPSK - 28.8 Kbps to 9.75 Mbps, Rate 3/4  
 QPSK/OQPSK - 33.6 Kbps to 10 Mbps, Rate 7/8  
 8PSK - 256 Kbps to 10 Mbps, Rate 2/3  
 16QAM - 38.4 Kbps to 10 Mbps, Rate 3/4  
 16QAM - 44.8 Kbps to 10 Mbps, Rate 7/8  
 BPSK - 19.2 Kbps to 6.5 Mbps, Uncoded  
 QPSK - 38.4 Kbps to 10 Mbps, Uncoded

### 0.495 Turbo Codec:

BPSK - 9.6 Kbps to 2 Mbps  
 QPSK/OQPSK - 19.2 Kbps to 4 Mbps  
 8PSK - 256 Kbps to 4 Mbps  
 16QAM - 256 Kbps to 4 Mbps

### 0.793 Turbo Codec:

BPSK - 15.2 Kbps to 3.2 Mbps  
 QPSK/OQPSK - 30.4 Kbps to 6.312 Mbps  
 8PSK - 256 Kbps to 6.312 Mbps  
 16 QAM - 512 Kbps to 4 Mbps

## Modulator

Modulation: BPSK and QPSK (OQPSK, 8PSK, 16QAM Optional)  
 IF Tuning Range: 50 to 180 MHz in 1 Hz Steps  
 Optional L-Band IF: 950 to 1750 MHz  
 IF Impedance: 75 Ohms, 50 Ohms Optional  
     L-Band, 50 Ohms  
 IF Connector: BNC, L-Band, SMA  
 IF Return Loss: 20 dB Minimum  
 Output Power: -20 to +5.0 dB in 0.1 dB Steps (L-Band -5 to -30 dB)  
 Output Accuracy: ±0.5 dB Over Frequency and Temperature (50 to 180 MHz)  
     ±1.0 dB Over Frequency and Temperature (L-Band)  
 Output Spectrum: Meets IESS 308/309/310 Power Spectral Mask  
 Spurious: <-55 dBc in Any 4 kHz Band  
 On/Off Power Ratio: >60 dB  
 Scrambler: CCITT V.35 or IBS (Others Optional)  
 FEC: Viterbi, K=7 at 1/2, 3/4 and 7/8  
     Rate Sequential 1/2, 3/4, 7/8 (Optional)  
     Trellis 2/3, 5/6 (Optional)  
     Turbo Product Code (Optional)  
         0.495 - (32,26) x (32,26) x (4,3)  
         0.793 - (64,57) x (64,57)  
     (Turbo Supported at all Modulation Types)  
 Outer Encoder Options: Reed-Solomon INTELSAT Rates  
 Data Clock Source: Internal, External, Rx Recovered  
 Internal Stability: 1 x 10<sup>-6</sup> Typical (Optional to 1 x 10<sup>-7</sup>)

## Demodulator

Demodulation: BPSK and QPSK (OQPSK, 8PSK, 16QAM Optional)  
 IF Tuning Range: 50 to 180 MHz in 1 Hz steps  
 Optional L-Band IF: 950 to 1750 MHz  
 IF Impedance: 75 Ohms, 50 Ohms (Optional)  
     L-Band, 50 Ohms  
 IF Connector: BNC, SMA (L-Band)  
 IF Return Loss: 20 dB Minimum  
 Spectrum: INTELSAT IESS 308/309/310 Compliant  
 Input Level: -55 to -25 dBm  
 Adjacent Channel Rejection Ratio: >+14 dBc  
 Total Input Power: +10 dBm or +40 dBc (The Lesser)  
     L-Band, -10 dBm or +35 dBc (The Lesser)

FEC: Viterbi, K=7 at 1/2, 3/4 and 7/8 Rate,  
     Rate Sequential 1/2, 3/4, 7/8 (Optional)  
     Trellis 2/3, 5/6 (Optional)  
     Turbo Product Code (Optional)  
         0.495 - (32,26) x (32,26) x (4,3)  
         0.793 - (64,57) x (64,57)  
     (Turbo Supported at all Modulation Types)  
 Decoder Options: Reed-Solomon  
 Descrambler: CCITT V.35 or IBS (Others Optional)  
 Acquisition Range: Programmable ±1 kHz to ± 32 kHz  
 Sweep Delay Value: 100 msec to 299.9 seconds in 100 msec Steps

## Plesiochronous Buffer

Size: 2 msec to 32 msec  
 Centering: Automatic on Overflow/Underflow  
 Centering Modes: IBS: Integral Number of Frames  
     IDR: Integral Number of Multiple Frames  
 Clock: Transmit, External, Rx Recovered or SCT (Internal)

## DMD15 Modem BER Performance

Typical E <sub>b</sub> /N <sub>0</sub>	VIT 3/4	VIT 1/2	VIT w/R-S 3/4	Turbo 0.793	Turbo 0.495
3 dB	--	--	--	3 x 10 <sup>-3</sup>	1 x 10 <sup>-7</sup>
4 dB	--	6 x 10 <sup>-5</sup>	2 x 10 <sup>-4</sup>	1 x 10 <sup>-8</sup>	<1 x 10 <sup>-10</sup>
5 dB	1 x 10 <sup>-4</sup>	2 x 10 <sup>-6</sup>	1 x 10 <sup>-8</sup>	<1 x 10 <sup>-10</sup>	<1 x 10 <sup>-10</sup>
6 dB	2 x 10 <sup>-6</sup>	5 x 10 <sup>-8</sup>	<1 x 10 <sup>-10</sup>	<1 x 10 <sup>-10</sup>	<1 x 10 <sup>-10</sup>

## Monitor and Control

Remote RS-485 / Terminal RS-232

## DMD15 Drop and Insert (Optional)

Terrestrial Data: 1.544 Mbps or 2.048 Mbps, G.732/733  
 Line Coding: AMI or B8ZS for T1 and HDB3 for E1  
 Framing: D4, ESF, or SLC-96 for T1 and PCM30 (30 Channels) or  
     PCM31 (31 Channels) for E1  
 Time Slot Selection: n x 64 Contiguous or Arbitrary Blocks for Drop or Insert  
 Time Slots: TS1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, 30  
 Data Rates: 64, 128, 192, 256, 320, 384, 512, 640, 768, 960,  
     1024, 1280, 1536, 1920 Kbps

## Terrestrial Interfaces

A variety of standard interfaces are available for the DMD15 modem in stand-alone applications.

## Universal Interface

Module (UIM): User Selectable RS-422/-449, V.35, T1(DSX1),  
     T2 (DSX2), E1 (G.703), and E2 (G.703)  
 G.703 T1 (DSX1): 1.544 Mbps, 100 Ohm Balanced, AMI and B8ZS  
 G.703 E1: 2.048 Mbps, 75 Ohm Unbalanced and  
     120 Ohm Balanced, HDB3  
 G.703 T2 (DSX2): 6.312 Mbps, 75 Ohm Unbalanced and  
     110 Ohm Balanced, B8ZS and B6ZS  
 G.703 E2: 8.448 Mbps, 75 Ohm BNC, Unbalanced, HDB3  
 ITU V.35: Differential, Clock and Data Only  
 RS-422/-449: All Rates, Differential, Clock/Data, DCE  
     (Available 50 Ohm Options)  
 RS-232: (DCE up to 200 Kbps)

## Environmental

Prime Power: 100 to 240 VAC, 50 to 60 Hz, 1.0 A Maximum  
     48 VDC Optional  
 Operating Temperature: 0 to 50° C, 95% Humidity, Non-Condensing  
 Storage Temperature: -20 to 70° C, 99% Humidity, Non-Condensing

## Physical

Chassis Size: 19" x 22" x 1.75" (48.26 x 43.18 x 4.45 cm)  
 Weight: 9.6 Pounds (4.3 Kg)  
 Shipping Weight: 13.6 Pounds (6.2 Kg)

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