



DMD20

Universal Satellite Modem



HIGHLIGHTS

- ▶ DoubleTalk Carrier-in-Carrier bandwidth compression
- ▶ BPSK/QPSK/OQPSK/8-PSK/8-QAM/16-QAM Operation
- ▶ 2.4 Kbps to 20 Mbps, 1 bps Steps
- ▶ FEC - Viterbi, Reed-Solomon, Sequential, Trellis, Turbo Product Code, Low Density Parity Check Code
- ▶ Configuration, Monitor and Control Features Fully User-Programmable
- ▶ Excellent Spurious Performance
- ▶ Fully Compliant with IESS 308/309/310/314/315
- ▶ Optional DVB to EN301-210 and EN300-421
- ▶ Industry-standard Universal Interface Module
- ▶ Fast Acquisition
- ▶ 50 to 90 MHz and 100 to 180 MHz IF, and 950 to 2050 MHz L-Band in 1 Hz Steps
- ▶ Standard Features Include: Reed-Solomon, Asynchronous Overhead, Satellite Control Channel and Automatic Uplink Power Control

OVERVIEW

The DMD20 Satellite Modem breaks new ground in flexibility, operation and cost. With standards including IDR, IBS and DVB, and covering data rates up to 20 Mbps, this 1RU duplex modem covers virtually all your Satellite IP, Telecom, Video and Internet applications. Switch between spur-free 70/140 MHz operation and L-Band without any configuration changes. It's all in the same box!

DMD20 now offers DoubleTalk Carrier-in-Carrier bandwidth compression. DoubleTalk Carrier-in-Carrier, based on patented "Adaptive Cancellation" technology, allows transmit and receive carriers of a duplex link to share the same transponder space. DoubleTalk Carrier-in-Carrier is complementary to all advances in modem technology,

including advanced FEC and modulation techniques. As these technologies approach theoretical limits of power and bandwidth efficiency, DoubleTalk Carrier-in-Carrier utilizing advanced signal processing techniques provides a new dimension in bandwidth and power efficiency. The extensive list of software options allows for budgeting the modem for today's needs while covering tomorrow's plans. These options can be purchased and then activated in seconds via the front panel.

Additional hardware options like Turbo, LDPC, Interface Expansion, High Stability and DC operation complete the modem's dynamic feature coverage. Stock this modem at its minimum configuration (and cost) locally at your warehouse for immediate distribution. Then configure on-site, allowing huge savings in time and dollars with just-in-time feature installation.

The DMD20's impressive remote accessibility surpasses all others in the field. Remote control via the trusted RLLP (Radyne Link Level Protocol), Ethernet 10 Base-T (SNMP and Web Browser) includes control of all the modem's features plus software maintenance. Additionally, the two-line backlit LCD can be supplemented with terminal software running on a PC or laptop. The modem now presents its entire monitor and control functions on the big screen.

Supported by an extensive line of redundancy switches, converters, encoders and decoders, the DMD20 can be built into any satellite requirement. The DMD20 is compatible with DMD15, DMD50, CM701, MD2401 and CDM-600.

Hardware Options

- DoubleTalk Carrier-in-Carrier
- Turbo FEC
- LDPC FEC
- Sequential FEC
- DC Input Power 48 VDC
- High-Stability Reference

Software Options

- Data Rate Upgrades
- L-Band Operation
- IDR, IBS
- 8-PSK/8-QAM
- 16-QAM
- Drop and Insert
- DVB-S

Interface Options:

- Ethernet 10/100
- HSSI Interface
- HSSI/Ethernet
- HSSI/G703 Interface
- DVB ASI/SPI Interface
- G703/IDR/ESC

SPECIFICATIONS

DMD20 BER Performance Guaranteed (Typical) at BERs shown:

Modulation/FEC	Code Rate	1 x 10 ⁻⁵	1 x 10 ⁻⁶	1 x 10 ⁻⁷	1 x 10 ⁻⁸	Data Rate Range
BPSK VIT	1/2	5.5 (5.1)	6.1 (5.7)	6.7 (6.2)	7.4 (6.8)	2.4 Kbps - 5.0 Mbps
QPSK VIT	1/2	5.5 (5.1)	6.1 (5.7)	6.7 (6.2)	7.4 (6.8)	4.8 Kbps - 10.0 Mbps
QPSK VIT	3/4	6.8 (6.3)	7.6 (7.0)	8.3 (7.7)	8.9 (8.4)	7.2 Kbps - 15.0 Mbps
QPSK VIT	7/8	7.9 (7.2)	8.6 (7.9)	9.3 (8.6)	10.2 (9.4)	8.4 Kbps - 17.5 Mbps
QPSK VIT RS	1/2	3.8 (3.4)	4.1 (3.6)	4.2 (3.8)	4.4 (4.0)	4.8 Kbps - 8.88 Mbps
QPSK VIT RS	3/4	5.4 (4.7)	5.6 (4.9)	5.8 (5.1)	6.0 (5.3)	7.2 Kbps - 13.33 Mbps
QPSK VIT RS	7/8	6.5 (6.0)	6.7 (6.4)	6.9 (6.7)	7.2 (7.1)	7.8 Kbps - 15.55 Mbps
QPSK SEQ	1/2	5.6 (5.1)	5.9 (5.4)	6.3 (5.8)	6.7 (6.2)	4.8 Kbps - 2.048 Mbps
QPSK SEQ	3/4	6.1 (5.6)	6.5 (6.1)	7.0 (6.5)	7.4 (6.9)	7.2 Kbps - 2.048 Mbps
QPSK SEQ	7/8	6.9 (6.4)	7.4 (6.9)	7.9 (7.4)	8.4 (7.9)	8.4 Kbps - 2.048 Mbps
QPSK TPC	1/2	2.7 (2.4)	2.9 (2.6)	3.1 (2.8)	3.3 (3.0)	4.8 Kbps - 9.54 Mbps
QPSK TPC	3/4	3.6 (3.2)	3.8 (3.4)	4.1 (3.7)	4.4 (4.0)	7.2 Kbps - 15.0 Mbps
QPSK TPC	7/8	4.2 (3.9)	4.3 (4.0)	4.4 (4.1)	4.5 (4.2)	8.4 Kbps - 17.5 Mbps
8-PSK TRE	2/3	7.8 (6.4)	8.7 (7.2)	9.5 (8.1)	10.2 (8.9)	9.6 Kbps - 20.0 Mbps
8-PSK TRE RS	2/3	5.8 (5.4)	6.2 (5.6)	6.5 (5.8)	6.7 (6.1)	8.9 Kbps - 18.3 Mbps
8-PSK TPC	3/4	6.0 (5.6)	6.2 (5.8)	6.4 (6.0)	6.8 (6.3)	10.8 Kbps - 20.0 Mbps
8-PSK TPC	7/8	6.9 (6.5)	7.0 (6.6)	7.1 (6.7)	7.2 (6.8)	12.6 Kbps - 20.0 Mbps
16-QAM VIT	3/4	10.7 (9.9)	11.5 (10.7)	12.4 (11.6)	13.3 (12.5)	14.4 Kbps - 20.0 Mbps
16-QAM VIT	7/8	11.9 (11.1)	12.7 (11.9)	13.5 (12.7)	14.3 (13.5)	16.8 Kbps - 20.0 Mbps
16-QAM VIT RS	3/4	8.9 (8.3)	9.1 (8.6)	9.3 (8.8)	9.5 (9.1)	13.3 Kbps - 20.0 Mbps
16-QAM VIT RS	7/8	10.3 (9.9)	10.5 (10.2)	10.8 (10.4)	11.0 (10.7)	15.5 Kbps - 20.0 Mbps
16-QAM TPC	3/4	7.0 (6.7)	7.4 (7.1)	7.8 (7.5)	8.2 (7.9)	14.4 Kbps - 20.0 Mbps
16-QAM TPC	7/8	8.0 (7.6)	8.1 (7.7)	8.2 (7.8)	8.3 (7.9)	16.84 Kbps - 20.0 Mbps

Modulator

Modulation:	BPSK, QPSK, and OQPSK (8-PSK, 8-QAM & 16-QAM Optional)
IF Tuning Range:	50 to 90 and 100 to 180 MHz in 1 Hz Steps
L-Band Tuning Range:	950 to 2050 MHz in 1 Hz Steps
Impedance:	IF: 75 Ohm (50 Ohm Optional) L-Band: 50 Ohm
Connector:	BNC: 75 Ohm SMA: 50 Ohm, L-Band
Return Loss:	IF: 20 dB Minimum L-Band: 14 dB Minimum
Output Power:	0 to -25 dBm
Output Stability	IF: ±0.5 dB Over Frequency and Temperature L-Band: ±1.0 dB Over Frequency and Temperature
Output Spectrum:	Meets IESS 308/309/310/DVB-S Power Spectral Mask
Spurious:	-55 dBc In-Band (50 to 90 MHz, 100 to 180 MHz, 950 to 2050 MHz) -45 dBc Out-of-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 Sequential 1/2, 3/4 and 7/8 (Optional) Trellis 2/3 Turbo Product Code (Optional) BPSK: 21/44 QPSK/OQPSK: 1/2 (21/44), 3/4, 7/8 8-PSK/8-QAM, 16-QAM: 3/4, 7/8 Legacy Turbo Rates: 0.495, 0.793 (Optional) LDPC (Optional) BPSK: 1/2 QPSK/OQPSK: 1/2, 2/3, 3/4 8-PSK/8-QAM: 2/3, 3/4 16-QAM: 3/4
Outer Encoder Options:	Reed-Solomon INTELSAT (DVB-S Optional) Custom (N, K) Reed-Solomon (Optional)
Data Clock Source:	Internal, External, Rx Recovered
Internal Stability:	1 x 10 ⁻⁶ Typical (Optional to 5 x 10 ⁻⁸)
Plesiochronous Buffer	
Size:	0 msec to 64 msec
Centering:	Automatic on Overflow/Underflow
Centering Modes:	IBS: Integral Number of Frames IDR: Integral Number of Multi-Frames
Clock:	Transmit, External, Rx Recovered or SCT (Internal)

DMD20 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 and PCM30 (PCM 30C) or PCM31 (PCM 31C) for E1
Time Slot Selection:	n x 64 contiguous or arbitrary blocks for Drop or Insert
D&I Open Network Satellite Overhead	6.6%
Time Slots:	TS1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, 30, 31
EFFICIENT D&I Closed Network, Satellite Overhead	0.4%
Time Slots:	1-31 Any Combination

Demodulator

Demodulation:	BPSK, QPSK, and OQPSK (8-PSK, 8-QAM & 16-QAM Optional)
IF Tuning Range:	50 to 90 and 100 to 180 MHz in 1 Hz Steps
L-Band Tuning Range:	950 to 2050 MHz in 1 Hz Steps
Impedance:	IF: 75 Ohm (50 Ohm Optional) L-Band: 50 Ohm
Connector:	BNC: 75 Ohm SMA: 50 Ohm (L-Band)
Return Loss:	IF: 20 dB Minimum L-Band: 14 dB Minimum
Spectrum:	Intelsat IESS 308/309/310/DVB-S Compliant
Input Level:	10 x log (Symbol Rate) - 100, ±12 dB
Total Input Power:	-10 dBm or +40 dBc (The Lesser) @ 256 Kbps
FEC:	Viterbi, K=7 at 1/2, 3/4 and 7/8, Sequential 1/2, 3/4 and 7/8 (Optional) Trellis 2/3 Turbo Product Code (Optional) BPSK: 21/44 QPSK/OQPSK: 1/2 (21/44), 3/4, 7/8 8-PSK/8-QAM, 16-QAM: 3/4, 7/8 Legacy Turbo Rates: 0.495, 0.793 (Optional) LDPC (Optional) BPSK: 1/2 Q-PSK/OQPSK: 1/2, 2/3, 3/4 8-PSK/8-QAM: 2/3, 3/4 16-QAM: 3/4
Decoder Options:	Reed-Solomon Intelsat (DVB-S Optional) Custom (N, K) Reed-Solomon (Optional)
Descrambler:	CCITT V.35 or IBS (Others Optional)
Acquisition Range:	Programmable ±1 kHz to ± 255 kHz
Sweep Delay Value:	100 msec to 6000 seconds in 100 msec Steps

DoubleTalk Carrier-in-Carrier

Delay Range	0 to 300 ms
Power Spectral Density Ratio (Interferer to Desired)	BSPK/OQPSK/QPSK/8-PSK/8-QAM: -7 dB to +10 dB 16-QAM: -7 dB to +7 dB
Maximum Symbol Rate Ratio	3:1 (TX:RX or RX:TX)
Eb/No Degradation	<u>0 dB Power spectral density ratio</u> BPSK/QPSK/OQPSK: 0.6 dB 8-QAM: 0.7 dB 8-PSK: 0.8 dB 16-QAM: 0.9 dB
Satellite Restrictions	Satellite in "loop-back" mode (i.e., the transmit station can receive itself) "Non-processing" satellite (i.e., does not demodulate or remodulate the signal)

IDR/ESC Interface (Optional)

G.703 T1 (DSX1):	1.544 Mbps, 100 Ohm Balanced, AMI and B8ZS Line Codes
G.703 E1:	2.048 Mbps, 75 Ohm Unbalanced and 120 Ohm Balanced, HDB3
G.703 T2 (DSX2):	6.312 Mbps, 75 Ohm Unbalanced, B8ZS Line Code and 110 Ohm Balanced, B6ZS Line Code
G.703 E2:	8.448 Mbps, 75 Ohm BNC, Unbalanced, HDB3 Line Code

Monitor and Control

Ethernet 10 Base-T/Remote RS-485/Terminal RS-232, Web Browser

Terrestrial Interfaces

- DVB, ASI/SPI
- HSSI
- Ethernet 4 Port 10/100 Base-T
- HSSI/Ethernet 4 Port 10/100 Base-T
- HSSI/G703 T1/E1/T2/E2

IBS/Synchronous Interface (Standard)

RS-422/-530:	All Rates, Differential, Clock/Data, DCE
ITU V.35:	All Rates, Differential, Clock/Data, DCE
RS-232:	(DCE up to 200 Kbps)

Environmental

Prime Power:	100 to 240 VAC, 50 to 60 Hz, 40 Watts 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

Size:	19" x 1.75" x 16" Deep (48.26 cm x 40.64 cm x 4.45 cm)
Weight:	6.5 Pounds (3.0 Kg)



DMD20 Rear Panel



2114 West 7th Street, Tempe, Arizona 85281 USA Voice 1 480 333 2200 Fax 1 480 333 2540 Email sales@comtechefdata.com

Comtech EF Data reserves the right to change specifications of products described in this document at any time without notice and without obligation to notify any person of such changes. Information in this document may differ from that published in other Comtech EF Data documents. Refer to the website or contact Customer Service for the latest released product information.