

## Technical Specifications

# 7

### 7.0 Data Rates

BPSK Uncoded	4.8 Kbps to 10.0 Mbps
1/2 Rate BPSK	2.4 Kbps to 10.0 Mbps
3/4 Rate BPSK	3.6 Kbps to 10.0 Mbps
7/8 Rate BPSK	4.2 Kbps to 10.0 Mbps
QPSK Uncoded	9.6 Kbps to 10.0 Mbps
1/2 Rate QPSK	4.8 Kbps to 20.0 Mbps
3/4 Rate QPSK	7.2 Kbps to 20.0 Mbps
7/8 Rate QPSK	8.4 Kbps to 20.0 Mbps
Rate 2/3 8PSK	9.6 Mbps to 52.0 Mbps
3/4 Rate 16QAM	14.4 Mbps to 52.0 Mbps
7/8 Rate 16QAM	16.84 Mbps to 52.0 Mbps

### 7.1 Modulator

Modulation	BPSK, QPSK, and OQPSK, 8PSK, 16QAM
IF Tuning Range	50 to 90, 100 to 180 MHz in 1 Hz Steps
L-Band Tuning Range	950 to 2050 MHz in 1 Hz Steps
Impedance	IF, 50 Ohm (75 Ohm Optional) L-Band, 50 Ohm
Connector	TNC, 50 Ohm SMA, 50 Ohm, L-Band
Return Loss	IF, 1.5:1 L-Band, 2.0:1
Output Power	0 to -25 dB
Output Stability	IF, $\pm 0.5$ dB Over Frequency and Temperature L-Band, $\pm 1.0$ dB Over Frequency and Temperature
Output Spectrum	Selectable and Meets MIL-188-165A or IESS 308/309/ 310 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	OM-73, CCITT V.35 or IBS
FEC	Viterbi, K = 7 at 1/2, 3/4 and 7/8 2/3 Rate Trellis Turbo Product Code (Optional) BPSK 21/44 QPSK/OQPSK 1/2, 3/4, 7/8 8PSK/16QAM 3/4, 7/8 Legacy Turbo Rates: 0.495, 0.793
Outer Encoder Options	Reed-Solomon INTELSAT (DVB Optional) Custom (N, K) Reed-Solomon
Data Clock Source	Internal, External, Rx Recovered
Internal Stability	$5 \times 10^{-8}$

## 7.2 Demodulator

Demodulation	BPSK, QPSK, and OQPSK, 8PSK, 16QAM
IF Tuning Range	50 to 90, 100 to 180 MHz in 1 Hz Steps
L-Band Tuning Range	950 to 2050 MHz in 1 Hz Steps
Impedance	IF, 50 Ohm (75 Ohm Optional) L-Band, 50 Ohm
Connector	TNC, 50 Ohm SMA, 50 Ohm, L-Band
Return Loss	IF, 1.5:1 L-Band, 2.0:1
Spectrum	Selectable and Meets MIL-188-165A or INTELSAT IESS 308/309/310 Compliant
Input Level	-55 to +10 dBm
Total Input Power	+20 dBm or +40 dBc (the Lesser)
FEC	Viterbi, K = 7 at 1/2, 3/4 and 7/8 Rate, Rate Sequential 1/2 Rate, 3/4, 7/8 (Optional) Trellis 2/3 Turbo Product Code (Optional) BPSK 21/44 QPSK/OQPSK 1/2, 3/4, 7/8 8PSK/16QAM 3/4, 7/8 Legacy Turbo Rates: 0.495, 0.793
Decoder Options	Reed-Solomon INTELSAT (DVB Optional) Custom (N, K) Reed-Solomon
Descrambler	OM-73, CCITT V.35 or IBS
Acquisition Range	Programmable $\pm 1$ kHz to $\pm 255$ kHz
Reacquisition Range	Programmable $\pm 1$ Hz to 25000 Hz
Sweep Delay Value	0 to 6000 seconds in 100 msec Steps

## 7.3 Plesiochronous Buffer

Size	0 msec to 64 msec
Centering	Automatic on Underflow/Overflow
Centering Modes	IBS: Integral Number of Frames IDR: Integral Number of Multi-Frames
Clock	Transmit, External, Rx Recovered or SCT (Internal)

## 7.4 Monitor and Control

Ethernet 10 Base-T, Remote RS-485/Terminal RS-232/DMD15 Protocol Compatible

## 7.5 DMD2050 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 PCM-30 (PCM-30C) or PCM-31 (PCM-31C) 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, 31
Data Rates	64, 128, 192, 256, 320, 384, 512, 640, 768, 960, 1024, 1280, 1536, 1920 Kbps

## 7.6 Terrestrial Interfaces

MIL-188-114A, DVB ASI/SPI, HSSI, Ethernet 4 Port 10/100 Base-T

## 7.7 IDR/ESC Interface (Optional)

G.703 T1 (100)	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 (100)	6.312 Mbps, 75 Ohm Unbalanced and 110 Ohm Balanced, B8ZS and B6ZS
G.703 E2	8.448 Mbps, 75 Ohm BNC, Unbalanced, HDB3

## 7.8 IBS/Synchronous Interface (Standard)

MIL-188-144A/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)

## 7.9 High-Speed Serial Interface (HSSI)

HSSI:	HSSI, Serial, 50-Pin SCSI-2 Type Connector (Female)
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## 7.10 ASI

ASI/RS-422 Parallel:	ASI, Serial, 75 Ohm BNC (Female) DVB/M2P, Parallel, RS-422, DB-25 (Female)
ASI/LVDS Parallel:	ASI, Serial, 75 Ohm BNC (Female) DVB/M2P, Parallel, LVDS, DB-25 (Female)

## 7.11 DVB/M2P

DVB/M2P:	DB-25 Female Connector. It complies with RS-422 Electrical Specifications.
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## 7.12 Ethernet Data Interface (Optional)

Ethernet Data Interface	Four RJ-45, Auto-Crossover, Auto-Sensing, 10/100 Ethernet Data Ports. Complies with IEEE 802.3 and IEEE 802.3u.
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## 7.13 Environmental

Prime Power	100 to 240 VAC, 50 to 60 Hz, 250 Watts Maximum 48 VDC (Optional)
Operating Temperature	-10 to +60°C, 95% Humidity, Non-Condensing
Storage Temperature	-20 to 70°C, 99% humidity, Non-Condensing

## 7.14 Physical

Size	19" W x 19.25" D x 1.75" H (48.26 x 48.89 x 4.45 cm)
Weight	6.5 Pounds (3.0 Kg)

## 7.15 DMD2050 Data Rate Limits

### 7.15.1 Non-DVB

Modulation	Code Rate	Min Data Rate	Max Data Rate
BPSK	NONE	4800	10000000
BPSK	VIT 1/2	2400	10000000
BPSK	VIT 3/4	3600	10000000
BPSK	VIT 7/8	4200	10000000
BPSK	SEQ 1/2	2400	2048000
BPSK	SEQ 3/4	3600	2048000
BPSK	SEQ 7/8	4200	2048000
BPSK	TPC 21/44	2400	4772727
BPSK	TPC .495	2376	4950000
BPSK	TPC .793	3806	7930000
QPSK	NONE	9600	20000000
QPSK	VIT 1/2	4800	20000000
QPSK	VIT 3/4	7200	20000000
QPSK	VIT 7/8	8400	20000000
QPSK	SEQ 1/2	4800	2048000
QPSK	SEQ 3/4	7200	2048000
QPSK	SEQ 7/8	8400	2048000
QPSK	TPC 1/2	4582	9545454
QPSK	TPC 3/4	7200	15000000
QPSK	TPC 7/8	8400	17500000
QPSK	TPC .495	4752	6312000
QPSK	TPC .793	7612	6312000
OQPSK	NONE	9600	20000000
OQPSK	VIT 1/2	4800	20000000
OQPSK	VIT 3/4	7200	20000000
OQPSK	VIT 7/8	8400	20000000
OQPSK	SEQ 1/2	4800	2048000
OQPSK	SEQ 3/4	7200	2048000
OQPSK	SEQ 7/8	8400	2048000
OQPSK	TPC 1/2	4582	9545454
OQPSK	TPC 3/4	7200	15000000
OQPSK	TPC 7/8	8400	17500000

OQPSK	TPC .495	4752	6312000
OQPSK	TPC .793	7612	6312000
8PSK	TRE 2/3	9600	52000000
8PSK	TPC 3/4	10800	52000000
8PSK	TPC 7/8	12600	52000000
8PSK	TPC .495	9504	6312000
8PSK	TPC .793	15225	6312000
16QAM	VIT 3/4	14400	20000000
16QAM	VIT 7/8	16800	20000000
16QAM	TPC 3/4	14400	20000000
16QAM	TPC 7/8	16800	20000000
16QAM	TPC .495	9504	6312000
16QAM	TPC .793	15225	6312000

### 7.15.2 DVB

187 Mode			
Modulation	Code Rate	Min Data Rate	Max Data Rate
BPSK	VIT 1/2	2400	4583333
BPSK	VIT 2/3	2934	6111111
BPSK	VIT 3/4	3300	6875000
BPSK	VIT 5/6	3667	7638888
BPSK	VIT 7/8	3850	8020833
QPSK	VIT 1/2	4400	9166666
QPSK	VIT 2/3	5867	12222222
QPSK	VIT 3/4	6600	13750000
QPSK	VIT 5/6	7334	15277777
QPSK	VIT 7/8	7700	16041666
8PSK	TRE 2/3	8800	18333333
8PSK	TRE 5/6	11000	20000000
8PSK	TRE 8/9	11550	20000000
16QAM	TRE 3/4	13200	20000000
16QAM	TRE 7/8	15400	20000000

188 Mode			
Modulation	Code Rate	Min Data Rate	Max Data Rate
BPSK	VIT 1/2	2400	4607843
BPSK	VIT 2/3	2950	6143790
BPSK	VIT 3/4	3318	6911764
BPSK	VIT 5/6	3687	7679738
BPSK	VIT 7/8	3871	8063725
QPSK	VIT 1/2	4424	9215686
QPSK	VIT 2/3	5899	12287581
QPSK	VIT 3/4	6636	13823529
QPSK	VIT 5/6	7373	15359476
QPSK	VIT 7/8	7742	16127450
8PSK	TRE 2/3	8848	18431372
8PSK	TRE 5/6	11059	20000000
8PSK	TRE 8/9	11797	20000000
16QAM	TRE 3/4	13271	20000000
16QAM	TRE 7/8	15483	20000000

204 Mode			
Modulation	Code Rate	Min Data Rate	Max Data Rate
BPSK	VIT 1/2	2400	5000000
BPSK	VIT 2/3	3200	6666666
BPSK	VIT 3/4	3600	7500000
BPSK	VIT 5/6	4000	8333333
BPSK	VIT 7/8	4200	8750000
QPSK	VIT 1/2	4800	10000000
QPSK	VIT 2/3	6400	13333333
QPSK	VIT 3/4	7200	15000000
QPSK	VIT 5/6	8000	16666666
QPSK	VIT 7/8	8400	17500000
8PSK	TRE 2/3	9600	20000000
8PSK	TRE 5/6	12000	20000000
8PSK	TRE 8/9	12800	20000000
16QAM	TRE 3/4	14400	20000000
16QAM	TRE 7/8	16800	20000000