



## Modem M7 IF or L-Band Compact Satellite Modem

### Modular Satellite Modems



#### SYSTEM ARCHITECTURES SUPPORTED

- Point-to-Point
- Point-to-Multipoint
- Mesh
- Multicast

#### KEY HIGHLIGHTS

- Compact and Modular Modem Design
- Smart Carrier Cancelling (Patented)
- FlexLDPC Multi Block Sizes & Code Rates
- 1.2 kbps to 59.4 Mbps, 1 bps steps
- BPSK/QPSK/OQPSK/8PSK/8QAM/16QAM
- Widest Range of Carrier Roll-Off Factors
- G.703/E1 (D&I), Full & Fractional (N x 64)
- Advanced IP Interface
  - 70,000 Packets Per Second Throughput
  - Bridge and Router Modes
  - 3rd Party Platform for IP Optimization
- Express Ethernet Interface
  - Layer 2 Bridge, Switch Based
  - 4-Port with additional SFP Port
  - QoS and VLAN Support
- Lowest Latency, <15 ms at 64 kbps 3/4 QPSK
- Fast Carrier acquisition time
- Perfect for Managed BW Systems
- Multi-Flo Async Channel, AUPC
- State-of-the-Art Web Browser GUI
- Local and Remote SNMP and Web Browser

#### APPLICATIONS

- Cellular Backhaul
- Enterprise
- IP Networks
- E1 Trunking
- On-the-Move
- Bandwidth on Demand

Datum Systems innovation is transforming the SCPC and MCPC modem industry with a new generation modular modem product, the M7 Series, that is versatile, compact, highly efficient and costs less to own and operate. Flexible M7 configurations include a full modem, mod-only, demod-only or multi-demod capability, all using common integrated assembly modules.

**Compact Modular Design** - The completely new M7 modem hardware platform fits within a single half-rack 1 RU space, or two modems mounted side-by-side, saving expensive rackspace at the hub.

#### Two Modems in 1 Rack Space "Side x Side"



**Advanced FlexLDPC Onboard** – Provides strong economic advantages to satellite service providers and their customers. Granular code rates and block sizes get you the most out of your available satellite bandwidth and spectral power, while keeping processing latency at the desired level.

**Sharp Carrier Filter Roll-Off** – This standard Roll-off capability allows an immediate spectral efficiency increase and significant bandwidth savings, at no additional hardware or software cost. Filter Roll-Off options in the new M7 modems Series include 5%, 8%, 10%, 15%, 20%, 25%, 30%, 35% and 40%.

**Smart Carrier Canceller** – Smart Carrier is a patented advanced second generation carrier canceller which allows 2 similar carriers to occupy the same transponder spectrum. Smart Carrier is easy to set-up and provides a Shannon Capacity improvement of up to ~ 2 dB, which is ~50 % increase in the fundamental channel capacity. Smart Carrier cancelling is supported by Datum AUPC.

**Flexible Interface Options** – Serial interface (S7), Managed IP interface (I7), Multi-port Ethernet Bridge interface (E7), Dual G.703 (G7), and High Speed Serial interface (H7). Consult the factory for new interface options.

**ACM** – Adaptive Coding Modulation provides a significant increase in throughput by utilizing margin provided in link budgets for worst case scenarios. ACM also increases link availability as the link will adjust for poor link conditions by seamlessly adjusting it's available Modcods.

**IP and 3G/LTE Optimization** – The managed IP interface provides Advanced QoS and supports optional TCP/IP Acceleration, Payload & Header Compression, Packet Coalescing and Byte Caching using the industry's best IP Optimization embedded software from award winning Xiplink.

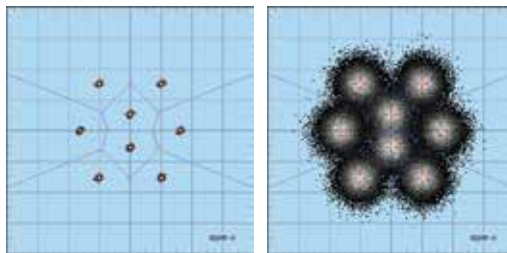
**1:1 Redundancy** – Built in 1:1 redundancy control allows for low cost implementation of redundancy when required.

SPECIFICATIONS	
Operating Mode	TX and RX Continuous (SCPC) FlexLDPC, Flexible Block and Code Rates, Low Latency Advanced TPC & Industry Comp Std and Custom Async Low Overhead Channels AUPC Remote Modem Control Channel
Interface Options	IP, Ethernet, Dual G.703/E1 (D&I), Serial, HSSI Opt Plug-in I/O Selections (Up to 2 per M7 Unit)
Data Rate Range	1.2 kbps to 59.04 Mbps, (1 bps steps)
Symbol Rate Range	2400 sps to 14.76 Msps (1 sps steps)
Freq Tuning Range	IF: 50-180 MHz (1 Hz Steps) L-Band: 950-2150 MHz (1 Hz Steps)
Demodulation Types	BPSK,QPSK,OQPSK,8PSK, 8QAM,16QAM
FEC Options	None Advanced FlexLDPC Blk Sizes 256,512,1k,2k,4k,8k,16k Rate 1/2,2/3,3/4,14/17,7/8,10/11,16/17 Viterbi (k=7) Rate 1/2,3/4,7/8 Trellis-Coded Modulation Rate 2/3 Reed Solomon Select N & K, IESS 308/309/310 Turbo Product Code TPC-4k 21/44, 1/2, 3/4, 7/8, 0.950 TPC 16k 1/2, 3/4, 7/8, 0.453, 0.922 (Opt HW)
Scram/Descrambler	IBS,V.35,IESS,TPC,RS,LDPC,EFD

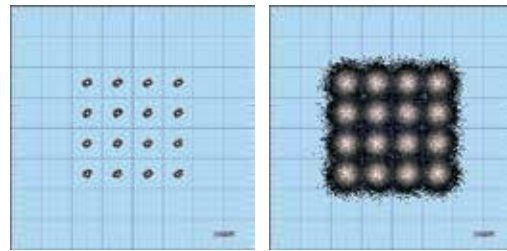
TYPICAL EB/NO 1E-8 BER					
FlexLDPC™	BPSK/QPSK (dB)	8QAM (dB)	16QAM (dB)	Delay @ 64kbps (mSec)	
LDPC-1/2-2k	2.04	3.80	4.48	49.6	
LDPC-1/2-16k	1.38	3.04	3.76	388.6	
LDPC-2/3-2k	2.77	4.68	5.85	44.4	
LDPC-2/3-16k	2.09	3.91	5.01	346.1	
LDPC-3/4-2k	3.52	5.51	6.78	41.9	
LDPC-3/4-16k	2.72	4.63	5.87	325.0	
LDPC-14/17-2k	4.23	6.27	7.66	39.6	
LDPC-14/17-16k	3.27	5.24	6.68	306.3	
LDPC-7/8-2k	4.96	6.98	8.48	38.1	
LDPC-7/8-16k	3.90	5.87	7.32	293.6	
LDPC-10/11-2k	5.63	7.68	9.37	37.0	
LDPC-10/11-16k	4.40	6.35	7.95	284.5	
LDPC-16/17-2k	6.35	8.39	10.14	35.8	
LDPC-16/17-16k	7.99	6.99	8.63	276.1	

\* Guaranteed Eb/No is 0.2 dB > Typical

### 8QAM

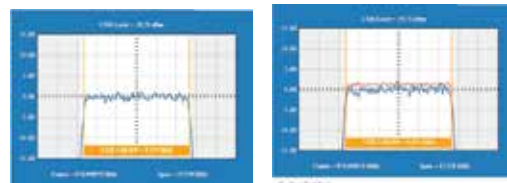


### M7 Constellation Monitors with and without noise

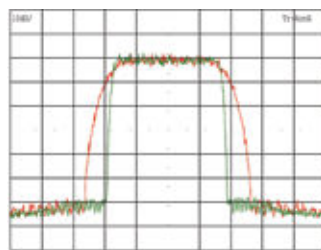


### 16QAM

### Spectrum Analyzer



Spectrum with and without Max Hold



Sharp Carrier Roll-Off  
8% vs. 35%

SERIAL DATA INTERFACE (S7)	
Main Interface Modes	Sync RS-232, 449, V.35, EIA-530 (DB-25)
Int Clk (ST) Accuracy	±1E-12, (±1 part per Trillion)
Doppler Buffer Depth	4 Bits to 524,284 Bits, 1 Bit Steps
ESC OH I/O Modes	Async RS-232, RS-485 (DB-25)
Adv Mux ESC OH DR	Disabled, 300 bps to 3.5 Mbps, 1 bps Steps
Adv Mux MCC OH DR	Disabled, 300 bps to 29.52 Mbps, 1 bps Steps
ESC Rem Signaling I/O	Form C (Qty 2)

ADVANCED IP INTERFACE (I7)	
Adv Ethernet Port	10/100/1000 BaseT Ethernet (RJ-45)
Operating System	Debian Linux Operating System
Operating Modes	Bridge and Vyatta Router
Packets Per Second	70,000 PPS
Network Protocols	See Specification

EXPRESS ETHERNET INTERFACE (E7)	
Express Ethernet Ports	4Ports (RJ-45), 1 Port SFP
4 Port Interface	10/100/1000 BaseT, Ethernet (RJ-45)
SFP Port	Optional Gigabit or Optic Fiber
Ethernet Protocol	Layer 2 Switched Bridge Only
Features	QoS and VLAN Selectable

DUAL G.703/E1 INTERFACE (G7)	
G.703 E1 Phys Inputs	Dual Bal Inputs on (RJ-48), UnBal Opt
Formats Supported	Full E1, D&I / PCM-30 (CAS), PCM-31 (CCS)
D&I Time Slots Supported	N x 64, N = 1 to 31 Time Slots

MONITOR AND CONTROL	
Remote Control Interfaces	RS-232, RS-485, SNMP, Web Browser
Alarm Outputs	Qty 2 Form C

ENVIRONMENTAL AND PHYSICAL	
AC to DC Adapter (Std)	Input 100-240 VAC, Output 24 V 65 W max
DC Input (Rear of Unit)	8 to 36 VDC, -48 VDC Optional
Operating Temp	0°C to 50°C, 99% humidity, non-cond
Storage Temperature	-20°C to +70°C, 99% humidity, non-cond
Size	8.5" (W) x 11" (D) x 1.75" (H), (2 Units in 1 RU)
Weight	< 5 lbs, fully configured

CERTIFICATION AND COMPLIANCE	
CE Certified for:	ETSI EN 301 489-1 V1.9.2 EN50022 Emissions EN50024 Immunity EN60950 (Safety)
RoHS	Meets RoHS lead-free standards

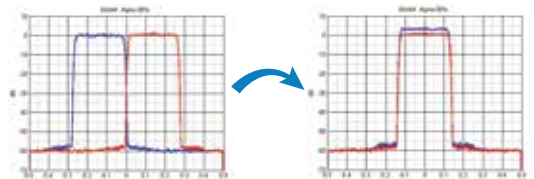
\* Specifications subject to change without notice

MODULATOR	
Output Level	IF: 0 dBm to -40 dBm L-Band: +5 dBm to -35.00 dBm
Output Lvl Accuracy	±0.5 dB Over Freq, Level and Temp
Output Impedance	IF: BNC; 50 or 75 Ohms (Selectable) L-Band: SMA; 50 Ohms
Output Return Loss	IF > 20 dB; L-Band > 16dB
Output Off Isolation	> 60 dB
Output Spurious	< -60 dBc / 4 kHz BW
Phase Noise:	
Offset = 10 Hz	< -78 dBc/Hz
Offset = 100 Hz	< -95 dBc/Hz
Offset = 1.0 kHz	< -110 dBc/Hz
Offset = 10 kHz	< -110 dBc/Hz
Offset = 100 kHz	< -115 dBc/Hz
Offset = 1.0 MHz	< -130 dBc/Hz
Mod Roll-Off Factor	5, 8, 10, 15, 20, 25, 30, 35, 40 (%)
Ext Ref Frequency	1, 1.544, 2.048, 5, 10, 20 (in MHz)
External Ref Level	-10 dBm to +10 dBm

DEMODULATOR	
Input Acq Range	±100 Hz to ±3 MHz, 1 Hz Steps
Minimum Input Lvl	10 × Log(SR) - 125 = Lvl (dBm)
Maximum Input Lvl	10 × Log(SR) - 80 = Lvl (dBm)
Max IF Input Pwr Density	+20 dBc/Hz
Max Total Power	+10 dBm
Receive Acq Time	Typical 71 ms at 64 kbps, QPSK
Input Impedance	IF: BNC; 50 or 75 Ohms (Selectable) L-Band: SMA; 50 Ohms
Input Return Loss	IF > 20 dB, L-Band > 16dB
Input Phase Noise	> Intelsat by 6 dB typical, 4 dB min
Demod Roll-Off Factor	5, 8, 10, 15, 20, 25, 30, 35, 40 (%)



M7 Rear Panel



Example Smart Carrier  
Bandwidth Savings of 50%

