SDM-300
Satellite Modem

CALIFORNIA MICROWAVE | EF DATA

EFData's SDM-300 is the future generation of satellite modems designed to serve into the 21st century.

The SDM-300 utilizes the advanced technology of proprietary digital signal processing techniques. This design eliminates analog circuitry to perform modem signal processing, which results in higher reliability and reduced packaging size.

FEATURES

- 2.4 kbit/s to 4.375 Mbit/s
- Fully Accessible System Topology (FAST)
- Intermediate Data Rate (IDR)
- INTELSAT Business Services (IBS)
- Drop and Insert (D&I)
- Automatic Uplink Power Control (AUPC)
- Asynchronous Channel Unit Overhead
- Reed-Solomon
- Fast Acquisition
- Built-In Self Test

APPLICATIONS

Fully configured, the SDM-300 will meet or exceed all of the applicable requirements in IESS-308 and -309, and is available with a full range of industry standard digital interfaces.

COMPATIBILITY

Maintaining EFData's excellent history of modem compatibility, the SDM-300 is a direct replacement for many EFData modems. When configured properly, the SDM-300 can be installed to communicate with or replace the following EFData modems:

- SDM-308B
- SDM-309B
- SDM-650B
- SDM-100
- SDM-6000
- SDM-8000

All EFData redundancy switches (1:1 or M:N) can be used with the SDM-300, making field replacement or upgrades of existing systems easy and cost effective.

COST EFFECTIVE

EFData's SDM-300 introduces a new concept (FAST) for procuring satellite modems that provide a cost-effective approach to configuration. A base SDM-300 modem includes:

- BPSK and QPSK
- Viterbi or Sequential decoding
- Single data rate
- IF range from 50 to 180 MHz (1 Hz steps)
- 75Ω I/O impedance

From the base modem platform, additional features can be implemented on site (via the front panel or remote M&C port) for the required application when it occurs. This exclusive (and industry-first) feature enhancement eliminates the need to purchase options now that may be required in the future, making modem selection easy and eliminating guesswork.

FEATURE ENHANCEMENTS

Enhancing the SDM-300's performance is accomplished easily: simply purchase a unique access code from EFData and enter the code into the unit.

Base unit enhancements include:

- Changing from single rate to variable rate
- Extending the data rate from 512 kbit/s to 4.375 Mbit/s
- Reed-Solomon concatenated codec
- Viterbi or sequential decoding
- IDR/IBS/D&I/AUPC/ASYNC

BUILT-IN SELF TEST

EFData's unique built-in self test feature allows the SDM-300 to complete a bit error rate (BER) measurement without the use of expensive noise generators and BER test equipment.

The built-in self test:

- Provides fully functional modem testing with noise
- Displays pass or fail results
- Establishes modem confidence
- Eliminates BER test equipment

When commanded to the self test mode through the front panel or remote port, the SDM-300 disables the Tx and Rx IF ports and internally tests modulator, demodulator, and interface functions by means of a BER measurement. The BER measurement is achieved by an internal IF noise generator and BER test equipment built into the SDM-300.

The built-in self test mode operates the SDM-300 for less than 30 seconds, and displays a "Pass" or "Fail" test result on the front panel. This feature can be enabled automatically upon power-up, if desired.

SDM-300 SPECIFICATIONS

System Specifications (Fully Enhanced)

Operating Frequency Range	50 to 180 MHz, in 1 Hz steps
Digital Interface (Standard)	EIA-232, EIA-422, and V.35 (25-pin D)
Digital Data Rate	2.4 kbit/s to 4.375 Mbit/s, in 1 bit/s steps
Symbol Rate	4.8 kbit/s to 2.5 Mbit/s
Modulation/Demodulation	BPSK 1/2 rate QPSK 1/2, 3/4, and 7/8 rates
Plesiochronous Buffer	2 to 99 ms, in 2 ms steps
Forward Error Correction	Viterbi, K=7, 1/2, 3/4, and 7/8 rates Sequential 1/2, 3/4, and 7/8 rates Reed-Solomon 225/205, 126/112, 194/178, 219/201
Data Scrambling	IESS-308 (V.35), IESS-309, or None
External Reference Input	1, 5, 10, 20 MHz
Agency Approvals	CE Mark

Modulation Specifications

Output Power	-5 to -30 dBm, adjustable in 0.1 dB steps
Output Spurious	< -55 dBc, 0 to 500 MHz (4 kHz band)
Output Spectrum	Meets IESS-308/309 power spectral mask
Output Return Loss	> 20 dB
Output Impedance	75Ω
Data Clock Source	Internal or External
Internal Stability	$\pm 1 \times 10^{-5}$
Internal High Stability	$\pm 2 \times 10^{-7}$ optional

Demodulation Specifications

Input Power:	
Desired Carrier	-30 to -55 dBm
Maximum Composite	-5 dBm or +40 dBc
Input Impedance	75Ω
Input Return Loss	> 20 dB
Carrier Acquisition Range	± 35 kHz from 100 Hz to 35 kHz
Acquisition Time	64k, < 1 second
Sweep Reacquisition	0 to 999 seconds, in 1 second steps
Data Clock	Internal, External, Transmit, Recovered Rx
Plesiochronous Buffer	16 to 256 bits

Environmental and Physical Specifications

Prime Power	90 to 264 VAC, 47 to 63 Hz, 30W 24 or 48V DC, 30W
Size	19" W x 15.2" D x 1.71" H (1 RU)
Weight	< 9 lbs.
Operating Temperature	0 to 50°C
Humidity	Up to 95%, non-condensing

ESC Specifications

IDR	
Voice Orderwire	2 ADPCM (Input: 4-wire VF), or 64 kbit/s data
Data Orderwire	8 kbit/s (RS-422 interface)
Backward Alarms	Form C contacts (4)
Total Overhead	96 kbit/s
IBS	
ASYNC Data Orderwire	1/2000 x data rate
Backward Alarm	Form C contact
Total Overhead	1/15 x data rate
D&I	
Interface	G.703
Data Rate	T1 or E1
n x 64 kbit/s	n = 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, 30 2.048 Mbit/s (E1_IBS) 1.544 Mbit/s (T1_IBS)

Remote Control Specifications

Serial Interface	RS-232-C or RS-485
Signals Controlled/Monitored	Transmit Frequency Receive Frequency Transmit Power Transmitter ON/OFF Data Rate Select RF Loopback IF Loopback Data Loopback Scrambler ON/OFF Raw Error Rate Receive Carrier Detect Receive Signal Level Power Supply Voltages Fault Status Error Threshold Alarm Four Backward Alarms Field Upgradeability Modem Self Test Modes
Configuration Retention	Will maintain current configuration for at least one year without power

Available Options

G.703 Interface
IBS/IDR/D&I
Asynchronous Overhead (Async/AUPC)
Concatenated Reed-Solomon Codec
2×10^{-7} Internal Stability for IF and Data Clock
50Ω IF
High Output Power to +5 dBm

Guaranteed BER for E_b/N_0 (with Sequential Decoder)

		E_b/N_0 at rate:		
Data Rate	BER	1/2	3/4	7/8
100 kbit/s	10^{-5}	4.8	5.8	6.7
	10^{-7}	5.8	6.6	8.0
1.544 Mbit/s	10^{-5}	5.8	6.3	6.9
	10^{-7}	6.6	7.1	8.0

Guaranteed BER for E_b/N_0 (with Viterbi Decoder)

	Specification E_b/N_0 at rate:			Typical E_b/N_0 at rate:		
BER	1/2	3/4	7/8	1/2	3/4	7/8
10^{-3}	4.2	5.3	6.3	3.9	4.6	5.8
10^{-4}	4.7	6.1	7.2	4.1	5.4	6.5
10^{-5}	5.4	6.8	8.0	4.6	6.0	7.2
10^{-6}	6.1	7.6	8.7	5.3	6.8	7.9
10^{-7}	6.7	8.3	9.4	5.9	7.5	8.6
10^{-8}	7.2	8.8	10.2	6.4	8.0	9.4

Guaranteed BER with Concatenated Reed-Solomon Codes

	Specification			Typical	
BER	IBS 1/2 Rate	IDR 3/4 Rate	BER	IBS 1/2 Rate	IDR 3/4 Rate
10^{-6}	4.1 dB	5.6 dB	10^{-5}	3.2 dB	4.0 dB
10^{-7}	4.2 dB	5.8 dB	10^{-6}	3.5 dB	4.2 dB
10^{-8}	4.4 dB	6.0 dB	10^{-7}	3.6 dB	4.4 dB
10^{-10}	5.0 dB	6.3 dB	10^{-8}	3.8 dB	4.6 dB

"Your Error Free Choice"

EFData products are designed and manufactured under a quality system certified to ISO 9001

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