NAMREG

NM-COMM-5501

Universal Satellite Modem

KEY FEATURES AND BENEFITS

- Satellite access through FDMA and CDMA modes
- Supports DSSS, BPSK, QPSK, OQPSK modulation-demodulation
- Configurable data rate from 2.4kbps to 20Mbps
- Supported FEC: Viterbi and reed solomon
- Fully configurable from front panel interface
- Remote monitoring and control using RS232, RS485 and ethernet interfaces
- Various data interfaces like asynchronous (RS232/RS485), synchronous (EIA-530) and ethernet interfaces
- Supports mesh and star networks
- Drivers provided in linux
- Built In Test Equipment (BITE).
- Automatic configuration recovery

APPLICATIONS

- Voice, fax, data, video, VoIP and other TCP/IP services
- Rural network, thin-route and remote area networks
- Shipboard mobile and portable satcom services
- Small, medium and large size satcom networks
- Mesh, star, point-to-point and mixed networks
- Rapid deployment, law enforcement
- Software defined radio
- Military communication
- Communication intelligence

DESCRIPTION

The DSSS (Direct Sequence Spread Spectrum) satellite modem, NM-COMM-5501 offers extreme flexibility for building a satellite network. Its multiple operation modes fit the diverse communication environment and its high BER (Bit Error Rate) performance assures the reliability of data links. The NM-COMM-5501 provides two operation modes (CDMA mode and FDMA mode). The CDMA (Code Division Multiple Access) mode can largely reduce radio interference from adjacent channels to meet the requirement of high-speed and high performance data link suitable for high noise radio channel.

The DSSS satellite modem, NM-COMM-5501 is a high-performance, low-cost, satcom solution . Using the most advanced CDMA technology, the satellite modem NM-COMM-5501 is ideal for both low bandwidth and high bandwidth network services suitable for defense communication networks, remote/isolated areas, private network applications and for rapid-deployment SATCOM applications to support national defense, law enforcement, emergency relief and special events operation.

BLOCK LEVEL EXPLANATION

WIDEBAND CDMA TERMINAL MODEM FOR BROADBAND SATELLITE COMMUNICATION

The high flexibility of CDMA makes it attractive for future broadband secure satellite systems. Realistic satellite communication systems require a careful system design to exploit the potential of CDMA at its best. The CDMA technique has been implemented in an efficient modem architecture. Adequate focus has been given for the most critical part and the digital demodulator which ensures that the modem is capable of sustaining a chip rate of 20Mcps. The main challenge lies in fast synchronisation and operation at negative SNR.

The satellite modem offers the following advantages in the CDMA mode

- Jam resistant
- Anti-Interference (A/I)
- Low Probability of Intercept (LPI)
- Seamless support for multiple users
- Secure communication channel

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The satellite modem NM-COMM-5501 uses a modular design hardware and software for ease of upgradation and future network expansion. The communication system can be implemented to include one or more hub stations and up to thousands of remote terminals and network stations through any satellite operating in S-band, C-band, X-band, Ku-band or Ka-band with suitable external RF transducers. The system is flexible for operations in a mesh and star network configuration.

ADVANCED SIGNAL PROCESSING ALGORITHMS

All building blocks including the signal processing algorithms are completely designed and developed in Data Patterns. We can customize to support various encryption / decryption, compression / de-compression of payload data based on user needs. The modem can also be modified and customized to support GSM, 2G, 3G networks optionally.

FORWARD ERROR CORRECTION TO MINIMIZE BER

Data Patterns offer all traditional forward error correction plus optional advanced methods combined with higher order modulation that provide increased coding gain, lower decoding delay and significant bandwidth and power savings.

SATELLITE FRAMING

The satellite modem NM-COMM-5501 breaks new ground in flexibility, operation and cost. With standards including IBS satellite framing and covering data rates upto 20Mbps, this 1U full duplex satellite modem covers virtually all the satellite IP, telecom, video and internet applications. Advanced FEC is complementary to all advances in modem technology which ensures reliable data channel under low S/N conditions. As these technologies approach the theoretical limits of power and bandwidth efficiency. The advanced FPGA based high speed and concurrent signal processing techniques provide a new dimension in bandwidth and power efficiency. Advanced signal processing techniques are applied to enhance the BER performance in noisy channels.

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SPECIFICATIONS

TRANSMITTER

Frequency range	: IF-1 : 50MHz to 90MHz
	: IF-2 :100MHz to 180MHz
Output frequency step	: 1Hz
Spectrum side lobe	: -28dBc
Spurious outputs	: -55dBc in band
	: -45dBc out of band
Phase noise	: 90dBc/Hz at 100KHz
Output power	: -40dBm to 0dBm
Output power step	: 0.5dBm
Output power deviation	: ±1dB
Output interface	: 75Ω BNC connector

RECEIVER

Frequency range	: IF-1 : 50MHz to 90MHz
	: IF-2 :100MHz to 180MHz
Maximum error frequency for synchronization	: 15KHz (Max.)
Input power	: -65dBm to +5dbm for DSSS
Input interface	: 75Ω BNC connector

CDMA MODE

Code length	: 63, 127, 255, 511, 1023 chips/bit, selectable
Optional codes	: 2047 chips/bit
Chip rate	: Upto 20Mcps or higher option
Inner FEC coding	:1/2, 2/3, 3/4, 5/6, 7/8, K=7
Outer FEC coding	: Reed-Solomon with interleaving
Turbo coding	: Optional
Modulation	: DQPSK, DBPSK
Output power	: -40dBm to 0dBm
Output power step	: 0.5dBm
Output power step	: 0.5dBm
Output impedance	: 75Ω unbalanced
TX IF output frequency	: 50MHz to 90MHz or 100MHz to 180MHz
Tx IF frequency tuning	: 1Hz
Rx operating frequency	: 50MHz to 90MHz or 100MHz to 180MHz

MODULATOR

DSSS (64 to 1024), BPSK, QPSK, OQPSK, 8PSK and 16QAM
FEC algorithm selectable between,
Viterbi, K = 7 at 1/2, 3/4 and 7/8

Outer encoder options	: Reed-solomon
Data clock source	: Internal, external, Rx recovered
Internal clock stability	: 5 x 10^{-8}

DEMODULATOR

DSSS (64 to 1024), BPSK, QPSK, OQPSK, 8PSK and 16QAM
FEC algorithm selectable between,
Viterbi, K = 7 at 1/2, 3/4 and 7/8

Decoder options	: Reed-solomon
De-scrambler	: CCITT V.35 or IBS
Data clock source	: Transmit, external, Rx recovered or Serial clock transmit (SCT) (Internal)

CLOCK

External clock	: Sine wave input clock
Amplitude	: 0.5V to 5V P-P
Frequency	: 1MHz to 20MHz
Interface	: 75Ω BNC connector

AUTOMATIC CONFIGURATION RECOVERY

Configuration of modulation and demodulation shall be stored and recovered during initial power ON.

OPTIONAL

Hardware	: S, L, C, X, Ku and Ka-band
Software	: 8PSK,16QAM
	: Turbo FEC 1/2, 3/4, 7/8, LDPC
	: Sequential FEC
	: DVB S2 framing

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SPECIFICATIONS

INTERFACE

Synchrnous data interface	: EIA-530 (RS422 and RS232)
	: RS232 - 2400bps to 115200bps
	: RS422 - Up to 2Mbps
Ethernet (Data interface)	: TCP / IP : RJ-45, 10/100 base T
	1 No. - For data interface up to 20Mbps
Asynchronous data interface	: RS232 / RS485
	Baud rate - 2400bps to 115200bps
FXO and FXS interface	: FXO/FXS interface, DTMF dialing,
	RJ-11 connector with 2 wire interface.
Data rate	: 2.4Kbps to 20Mbps
	(modulation dependent)

MONITORING AND CONTROL

Remote terminal	: RS485, Baud rate: 2400bps to 115200bps
	RS232, Baud rate: 2400bps to 115200 bps
Ethernet	: 10/100/1000 base T
Local user monitoring	: Front panel LCD - 2X20 characters
	: Status indication LEDs – 12 Nos.
Local user control	: Keypad control (numeric and navigation control) – 16 Nos.
Terminal (For factory use)	: RS232 interface, Baud rate: 115200 bps

DATA CHANNEL RATE

Asynchronous	: 2400bps to 115200bps
Synchronous	: Upto 20Mbps or higher option

POWER REQUIREMENT

Input power supply	: 100V to 240V AC, 50Hz
	48V DC optional

MECHANICAL

Overall dimension	: 19" x 19.25" x 1.75" (W x D x H)

ENVIRONMENTAL

Operating temperature	: 0ºC to 55ºC (Non condensing)
Storage temperature	: -20ºC to 70ºC (Non condensing)
Humidity level	: 95% humidity (Non condensing)

SOFTWARE SUPPORT

The DSSS modem host interface mode application software compatible with windows XP / 7.

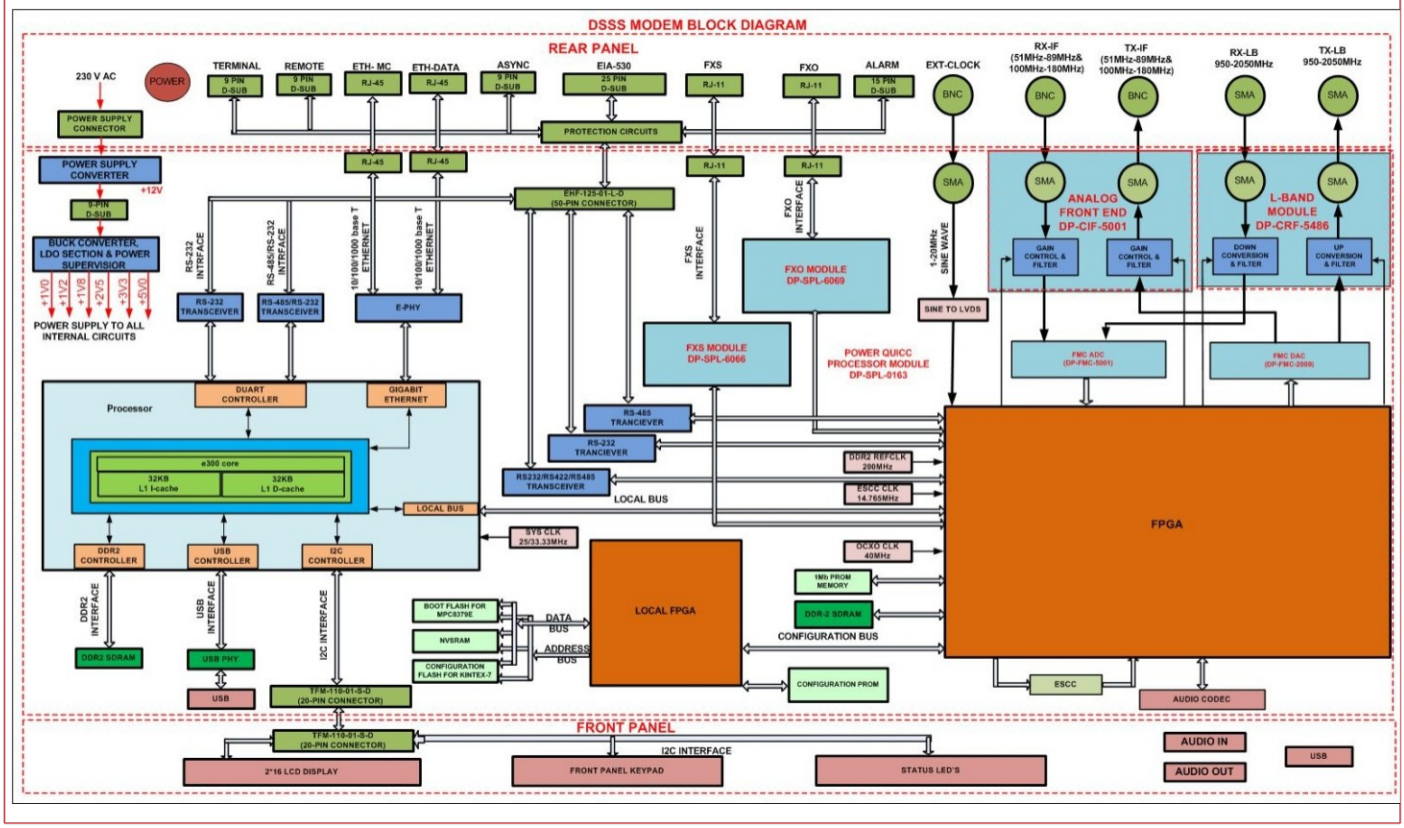
ORDERING INFORMATION

NM-COMM-5501-300

- Reserved
- Reserved
- Commercial

Note: Please contact factory for detailed information

BLOCK DIAGRAM OF DP-COMM-8001



BER PERFORMANCE

S.No	Modulation/FEC	FEC Code Rate	1.00E-005	1.00E-006	1.00E-007	1.00E-008	Data Rate Range
1	BPSK with Viterbi Decoding	1/2	5.64	6.35	7.06	7.71	2.4 kbps - 5.0 Mbps
2	QPSK with Viterbi Decoding	1/2	5.82	6.38	6.98	7.83	4.8 kbps - 10.0 Mbps
3	QPSK with Viterbi Decoding	3/4	7.21	8.02	8.39	9.29	7.2 kbps - 15.0 Mbps
4	QPSK with Viterbi Decoding	7/8	8.17	8.84	9.64	10.46	8.4 kbps - 17.5 Mbps
5	QPSK with Viterbi and RS Decoding	1/2	3.82	4.20	4.30	4.87	4.8 kbps - 8.88 Mbps
6	QPSK with Viterbi and RS Decoding	3/4	5.69	6.06	6.13	6.28	7.2 kbps - 13.33 Mbps
7	QPSK with Viterbi and RS Decoding	7/8	6.68	7.16	6.98	7.45	7.8 kbps - 15.55 Mbps
8	OQPSK with Viterbi and RS Decoding	1/2	3.72	4.10	4.20	4.67	4.8 kbps - 8.88 Mbps
9	OQPSK with Viterbi and RS Decoding	3/4	5.49	6.00	6.10	6.10	7.2 kbps - 13.33 Mbps
10	OQPSK with Viterbi and RS Decoding	7/8	6.48	7.00	6.90	7.40	7.8 kbps - 15.55 Mbps

Note: Please contact factory for Detailed Performance Report