MM200

MM200 Terrestrial Microwave Modem for High-Speed Applications

HIGHLIGHTS

- Internal One to Four Channel Multiplexer
- Up to Four User-Selectable Data/Overhead Interfaces
- Data Rates From 1 to 175 Mbps (200 Mbps optional)
- 4, 16, 32, 64, and 128 QAM (256 QAM Optional)
- Diversity Option
- Ideal for OEM, New Microwave Links, Upgrades or Retrofit
- High Resistance to Fading
- Wayside and/or Overhead Options

OVERVIEW

The MM200 Microwave Modem is an innovative and highly flexible platform configurable for data rates between 1 and 175 Mbps. The unit allows complete control over modulation density and channel bandwidth for efficiencies up to 5.3 Bps/Hz. The unique architecture of the MM200's IF allows large improvements to fading and multipath via multiple digital equalizers.

BENEFITS

The MM200 is an ideal solution for both new and retrofit microwave link installations. Maximum flexibility is achieved by an internal data multiplexer that combines up to four user-selectable data paths into a single data stream. Interface choices for each include OC-3 Optical, DS3, E3, STS-1, STM-1, SMPTE 310M, DVB ASI, DVB SPI, 10 BaseT, E2, Overhead and T1/E1(Wayside).

The IF can be configured with one to four channels providing total flexibility. Each channel can operate up to 7 Mbaud. The 2RU chassis can be configured for simplex or duplex. Two receivers can be connected with the internal Diversity option to further increase performance through Space or Frequency Diversity.

RELIABILITY

The MM200 series of microwave products are rich with features designed to maximize the integrity of your data service. Redundant switching is available through a series of redundancy switches. The Reed-Solomon decoder provides superior error correction while the adaptive equalizers provide superior protection from frequency selective fading and multipath.

Optional space diversity switching can provide higher than normal protection via the unit's ability to hitless switch to the redundant path before data errors occur.

Additional features include the choice of remotely interfacing through one of three onboard connections: Ethernet (SNMP), RS-485 or an externally-controlled RS-232 terminal. The front panel offers push-button control of all features and a backlit LCD display. Menus are specifically designed for ease of use and quick online operation as well as changes in configuration.

COMTECH EF DATA

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Specifications

Published specifications reflect the maximum MM200 performance. Each MM200 can be configured to customer requirements via hardware / software options applied at the factory or in the field.

Total Data Rate:	Variable From 1 to 175 Mbps Total in 1 bps Steps (1 to 200 Mbps Optional) Note: Interface selection may limit maximum data rate.
Total Baud Rate:	1 to 7, 1 to 14, 1 to 21, or 1 to 28 Mbaud Depending Upon Number of IF Channels Installed
IF Channels:	1 to 4
IF Channel Baud Rate:	1 to 7 Mbaud Per Channel
IF Channel Spacing:	1.15 to 1.4 Times Channel Baud Rate 1.25 Nominal
Mux/Demux:	One to Four* Data Channels DVB-Compliant
Modulation:	4, 16, 32, 64, 128 QAM 256 QAM - Consult Factory
FEC:	204/188 Reed-Solomon
FEC/Mux Overhead:	204/184 (204/188 for DVB Framed Interface)
Adaptive Equalize:	12 Tap DFE and 8 Tap FFE (One Per IF Channel)
IF Range:	50 to 90 MHz
IF Return Loss:	20 dB
Tx Output Power:	0 to -25 dBm in 0.1 dB Steps
Spurious Output:	-55 dBc In-Band
Rx Input Power:	0 to -25 dBm
Frequency Stability:	40 ppm
Carrier Acquisition:	Lesser of ± 400 kHz or ± 10% of Channel Baud Rate
Rx Data Buffer:	0 to ± 2 Mbits
Remote Control:	SNMP - 10 Base-T RS-485/-232 Modem Drives External Terminal
Chassis Size:	2RU (3.5")
Power:	85 to 264 VAC, 50/60 Hz
Environmental:	0 to 50°C
Compliance:	CE Mark

BER Specification

C/N Required For an Interface BER of 1 x 10^{-9} at 7 Msps, Single IF Channel

QAM4	12.5 dB
QAM16	20.2 dB
QAM32	23.3 dB
QAM64	27.3 dB
QAM128	31.0 dB

Options

48 VDC
24VDC
Simplex Configuration, Modulator Only
Simplex Configuration, Demodulator Only
Space Diversity, Demodulator Only
Additional Mod IF Channels, Up To 4 Per Chassis
Additional Demod IF Channels, Up To 4 Per Chassis

Optional Data Interfaces

G.703 T3, E3 or STS-1
G.703 E2
DVB ASI (Normal or Advanced)
DVB SPI, M2P
OC-3 Optical, STM1/ STS3 Electrical
10 Base-T
Other Interfaces Available Upon Request
Orderwire - Can Be Configured for Eight DS0s or Seven DS0s Plus one Audio

Note: Up to 4 interfaces per chassis. Any combination can be installed and operated by front panel control.

How to Calculate 3 dB Bandwidth of MM200 Modulated Carrier

1. Find combined interface data rate:
   DRC = Interface 1 Data Rate + Interface 2 Data Rate + Interface 3 Data Rate + Interface 4 Data Rate.
2. Find Total Data Rate plus R/S and mux overhead: DRT = DRC x (204/184).
3. Find Channel Baud Rate: BRC= DRT / (QAM X NC):
   Where NC = number of channels (one to four)
   and QAM = 2 for 4 QAM
   4 for 16 QAM
   5 for 32 QAM
   6 for 64 QAM
   7 for 128 QAM
   8 for 256 QAM
4. Select Channel Spacing: CS = from 1.15 to 1.4 times channel baud rate.
   This number is normally 1.25 but can be set to any number between 1.15 and 1.4.
5. Total 3 dB bandwidth = BRC x CS x (NC – 1) + BRC.

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