ECM31 and DRM31 DOCSIS® 3.1

Temperature Hardened Cable Modem

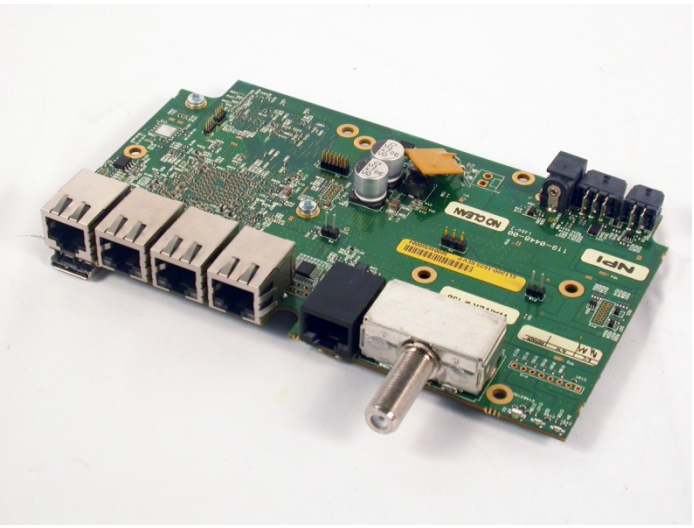
Highlights

The ECM31 and the DRM31 series Rugged Cable Modem is DOCSIS® 3.1 and EuroDOCSIS™ 3.1 compliant and is specially designed for installations where temperatures can be extreme, uncontrolled, and typical of the outside plant in an HFC cable network.

It features a Full-Band Capture (FBC) technology which benefits operators with total bandwidth deployment flexibility. Any frequency can be assigned to a given service removing the block tuner restrictions with wideband tuners. FBC also enables new advanced diagnostic capabilities to minimize truck rolls and reduce service cost, the diagnostic data can be collected, viewed and analyzed either on CPE or remotely for instant customer service analysis.

With the minimum size of DOCSIS® 3.1 cable modem module, ECM31 is ideal for system integrations and applications such as TV, Wi-Fi AP, Small Cells, hand-held devices, power meters, Security Cameras, Set-Top-Box, and etc.

This Cable Modem has a SCTE-HMS (HMS022) compliant port. It can be used to interface with Power Supplies and perform status monitoring.



Cable Modem Features

- Designed for DOCSIS® & EURODOCSIS™ specifications
- Network Monitoring - Embedded Spectrum Analyzer
- 32x8 QAM channels and 2x2 OFDM bonded channels
- Support for BSOD and L2VPN
- Watchdog mechanism that resets the Cable Modem when it does not respond. This reduces truck rolls.
- 4-port 10/100/1000 BASE-T auto sensing / auto-MDIX Ethernet port (with option to assemble 1 or 2 ports only)
- Small size (ECM31 dimensions): 96.5mm x 164mm
- Spectrum analyzer with a precision of 1 dB at any temperature; temperature sensor integrated in CM to compensate the values reported by different temperature readings
- Individually calibrated with specific calibration points for improved accuracy
- The DRM31 includes metal housing, while the ECM31 does not have any housing and is used for OEM projects
- ECM31 has assembly options with MCX or SMB connectors instead of a diplexer with an F-Connector.

DOCSIS® 3.1 cable-modem specifications

Upstream		
Frequency Range[1] (edge to edge) Full band: Switchable sub-band:	5-F_{US_MAX} 5-42 (for North America model) 5-65 (for EURO model)	MHz
Output Impedance	75	Ω
Maximum Transmit Level	(Total average power) +65	dBmV
Output Return Loss (across freq. range)	≥ 6	dB
SC-QAM channels		
Signal Type	TDMA, S-CDMA	
Number of Channels	8	max
Modulation Type	QPSK, 8 QAM, 16 QAM, 32 QAM, 64 QAM, and 128 QAM	
Modulation Rate (nominal)	TDMA: 1280, 2560, and 5120 S-CDMA: 1280, 2560, and 5120 Pre-DOCSIS3 operation: TDMA: 160, 320, and 640	KHz
Bandwidth	TDMA: 1600, 3200, and 6400 S-CDMA: 1600, 3200, and 6400 Pre-DOCSIS3 operation: TDMA: 200, 400, and 800	KHz
Minimum Transmit Level	P_{min} = +17 at ≤1280KHz modulation rate P_{min} = +20 at 2560KHz modulation rate P_{min} = +23 at 5120KHz modulation rate	dBmV
OFDMA channels		
Signal Type	OFDMA	
Maximum OFDMA Channel Bandwidth[2]	96	MHz
Minimum OFDMA Occupied Bandwidth	6.4 (for 25 KHz subcarrier spacing) 10 (for 50 KHz subcarrier spacing)	MHz
Number of Independently configurable OFDMA channels	2	
Subcarrier Channel Spacing	25, 50	KHz
FFT Size	50 KHz: 2048 (2K FFT); 1900 Maximum active subcarriers 25 KHz: 4096 (4K FFT); 3800 Maximum active subcarriers	
Sampling Rate	102.4 (96 MHz Block Size)	MHz
FFT Time Duration	40 (25 KHz subcarriers) 20 (50 KHz subcarriers)	µs
Modulation Type	BPSK, QPSK, 8-QAM, 16-QAM, 32-QAM, 64-QAM,128-QAM, 256-QAM, 512-QAM, 1024-QAM, 2048-QAM, 4096-QAM	
Bit Loading	Variable from minislot to minislot. Constant for subcarriers of the same type in the minislot. Support zero valued subcarriers per profile and minislot.	
Pilot Tones	14 data patterns and 2 subslot patterns, minislot subcarrier size and length dependent.	

Notes: (1) F_{US_MAX} determined by external diplexer. Maximum upstream frequency supported by SoC: 204 MHz.
(2) Not including external diplexer bandwidth limitation.

Downstream		
Frequency Range[1] (edge to edge)	F_{DS_MIN}-1218MHz	MHz
Input Impedance	75	Ω
Total Input Power	< 40	dBmV
Input Return Loss (across freq. range)	≥ 6	dB
SC-QAM channels		
Number of Channels	32	max
Level Range (one channel)	North Am (64 QAM and 256 QAM): -15 to +15 EURO (64 QAM): -17 to +13 EURO (256 QAM): -13 to +17	dBmV
Modulation Type	64 QAM and 256 QAM	
Symbol Rate (nominal)	North Am (64 QAM): 5.056941 North Am (256 QAM): 5.360537 EURO (64 QAM and 256 QAM): 6.952	Msym/s
Bandwidth	North Am (64 QAM/256QAM with α=0.18/0.12): 6 EURO (64 QAM/256QAM with α=0.15): 8	MHz
OFDM channels		
Signal Type	OFDM	
Maximum OFDM Channel Bandwidth	192	MHz
Minimum Contiguous-Modulated OFDM Bandwidth	24	MHz
Number of OFDM channels	2	
Frequency Boundary Assignment Granularity	25 KHz 8K FFT 50 KHz 4K FFT	
Subcarrier Spacing / FFT Duration	25 KHz / 40 µs 50 KHz / 20 µs	
Modulation Type	QPSK, 16-QAM, 64-QAM,128-QAM, 256-QAM, 512-QAM, 1024-QAM, 2048-QAM, 4096-QAM	
Variable Bit Loading	Support with subcarrier granularity Support zero bit loaded subcarriers	
Level Range (24 MHz min occupied BW) Equivalent Power Spectral Density to SC-QAM of -15 dBmV to +15 dBmV per 6MHz.	-9 dBmV/24 MHz to 21 dBmV/24 MHz	
Maximum average power per MHz input to the CM from 54 MHz to 1218 MHz	Let X = Average power of lowest power 24 MHz of modulated spectrum for demodulation Additional Demodulated Bandwidth, B_{DEMOD}: ≤ Min [X - 10*log(24) + 10; 21 - 10*log(24)] Additional Non-Demodulated Bandwidth, $B_{NO\text{-}DEMOD}$: ≤ Min [X - 10*log(24) + 10; 26 - 10*log(24)] For up to 12 MHz of occupied bandwidth (analog, OOB, QAM, OFDM) ≤ Min [X - 10*log(24) + 10; 21 - 10*log(24)] For all remaining bandwidth	dBmV/ MHz

Notes: (1) F_{DS_MIN} determined by external diplexer.

Specifications are subject to change without prior notification.

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