

Cisco Prisma II Hybrid QAM Transmitters

Cisco's Prisma[®] II optical networks support DOCSIS 3.1 features in growing fiber deep and remote PHY architectures. The Cisco Prisma II Hybrid QAM Transmitter (HQT) offers superior MER complete with 4k QAM and Orthogonal Frequency Division Multiplexing (OFDM) capabilities.

Designed to support the move to higher order modulation for capacity increases, the HQT also enhances legacy systems with analog capability combining the superior performance of externally modulated systems with the cost-effective and ease-of-use of familiar directly modulated transmitters. Low sensitivity to link-length variations make the HQT ideal for redundant rings. Adjustable dither control for varying Brillouin Scattering suppression (SBS) and iWDM wavelength plans ensure excellent performance when fiber non-linearities are unavoidable.

The first truly universal transmitter in the broadband marketplace, the HQT provides unprecedented value in the highly competitive service provider space. Flexibility to support traditional legacy and best-in-class architectures, the HQT is a transmitter that delivers performance with increased reliability, scalability, and cost-effectiveness.

Figure 1. Cisco Prisma II Hybrid QAM Transmitter



Features

- Highest MER transmitter available in broadband markets
- Link performance no longer transmitter limited
- Selectable dither controls for few wavelength, high gain systems
- Increased Power over DFB-based transmitters
- Low link-length sensitivity for Ring topologies
- Fully DOCSIS 3.1 compatible
- OFDM, 1k, 2k, 4k QAM support (high order modulation)
- 1218 MHz RF bandwidth for increased channel capacity
- High immunity to impairments
 - 20-30 dB less Chirp and Dispersion induced distortion
 - 75% reduction in fiber noise generation
 - Low sensitivity to fiber length variations for redundant rings
 - 75% less fiber noise generation compared to DFB improves SNR
 - Lower distortion from EXISTING Mux-Demux slope variation
- Operates within the Prisma II or Prisma XD platform systems
- ITU-T wavelength compatible for DWDM systems
- Small CO2 footprint: lowest power consumption per transmitter in the industry
- Status LEDs indicate module condition and simplify troubleshooting
- Blind-mate (push-on) RF and DC connectors
- RF input test points
- Nonvolatile storage of pre-set operating parameters simplifies installation procedures
- User selectable Automatic Gain Control (AGC)
- Local control via Local Craft Interface (LCI) or Intelligent Communications Interface Module (ICIM)
- SNMP remote monitoring

Product Specifications

Unless otherwise noted, specifications are based on measurements made in accordance with NCTA Practices for Measurements made on Cable Television Systems using standard frequency assignments, and are referenced to the ambient air temperature at the inlet to the Prisma II or Prisma XD chassis.

Table 1. Cisco Prisma II Hybrid QAM Transmitter product specifications

Optical	
Wavelength	ITU channels 21, 22, 24, 26, 28, 33, 36, 39 44, 48, 52, 54, 57, 60, 61, 62
Output Power	11-12 dBm
Modulation Type	Hybrid Externally Modulated Laser
Dither setting	User settable: off (12 dBm SBS) or on (16 dBm SBS)
RF	
Operating Bandwidth	54 MHz to 1218 MHz
Nominal Channel Loading	30 Channels, NTSC CW Analog [54-258 MHz] 96 Channels, J.83 ITU Annex B, 256 QAM (6 MHz) [258-834 MHz] 2 Channels, 192 MHz OFDM [834-1218 MHz]
RF Input for Nominal Channel Loading	
<ul style="list-style-type: none"> • Broadcast port, Analog channels • Broadcast port, QAM channels • Broadcast port, OFDM signal • Narrowcast port, QAM channels • Narrowcast port OFDM signal 	18 dBmV/ch 12 dBmV/ch 27 dBmV total power (matches QAM level—see note below) 12 dBmV/ch 27 dBmV total power (matches QAM level—see note below)

Total Composite RF Input	36.5 dBmV (nominal channel loading)
RF Input Return Loss	16 dB
Digital Link Performance @ 60 km fiber <ul style="list-style-type: none"> • 194 QAM channels or • 130 QAM channels plus 384 MHz OFDM 	MER: ≥ 44 dB BER: $< 1.0 \times 10^{-9}$ Pre-FEC $< 1.0 \times 10^{-12}$ Post-FEC
Mixed Link Performance @ 40 km fiber <ul style="list-style-type: none"> • 30 analog channels and • 96 QAM channels and • 2 OFDM channels (384 MHz) 	CNR: 50.0 dB CSO, CTB: -62 dBc MER: ≥ 38 dB BER: $< 1.0 \times 10^{-9}$ Pre-FEC $< 1.0 \times 10^{-12}$ Post-FEC
Electrical/Mechanical/Environmental	
Power Consumption	7.5 W
Connector Type	SC/APC
Management & Control	Web Interface SNMP
Dimensions	Height: 3.48 in, 8.84 mm Width: 1.03 in, 2.62 mm Depth: 8.80 in, 22.35 mm
Weight	< 0.90 lbs., < 0.41 kg
Operational Temperature	0 to 50 degrees Celsius
Humidity	5 to 95% Non-Condensing

NOTES

1. Available ITU channels constitute the iWDM plan. See table 2 for the part numbers associated with the particular wavelengths.
2. With nominal channel loading at levels and total composite power indicated, the GUI or CLI parameter table will read 0 dB in.
3. Level shown for OFDM represents the total power of a 192 MHz wide OFDM signal. This is equivalent to the power per 6 MHz CEA (Consumer Electronics Association) channel + $10 \cdot \log_{10}$ (Number of occupied CEA channels); that is $[12\text{dBmV} + 10 \cdot \log_{10}(32)] = 27$ dBmV.
4. Specifications are based on a single transmitter.
5. The test link setup is shown in figure 2. The receiver has an efficiency of 0.95 A/W and a noise equivalent power of $3.9 \text{ pA}/\sqrt{\text{Hz}}$.
6. Test loading may substitute SC-QAM for OFDM signals.
7. Received power is -1.5 dBm for all digital load and -2 dBm for mixed analog plus digital load.
8. Dither setting will impact the SBS level, and should be on only if per wavelength power exceeds ~12 dBm. The MER can degrade up to 4 dB with high SBS levels.
9. Transmitter MER is based on system MER >57 dB with SBS level of 12 dBm.

Figure 2. Transmitter Module Test Link Configuration



Ordering Information

Part numbers for the Cisco Prisma II Hybrid QAM 1.2 transmitters are shown in Table 2. Please consult with your Cisco account representative, customer service representative, or system engineer to determine the best configuration for your particular application.

Table 2. Cisco Prisma II Hybrid QAM 1.2 transmitter part numbers

Description	Cisco Part Number
1.2 GHZ HYBRID QAM TRANSMITTER, ITU21 iWDM	P2HD1.2G15TXQP21i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU22 iWDM	P2HD1.2G15TXQP22i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU24 iWDM	P2HD1.2G15TXQP24i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU26 iWDM	P2HD1.2G15TXQP26i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU28 iWDM	P2HD1.2G15TXQP28i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU33 iWDM	P2HD1.2G15TXQP33i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU36 iWDM	P2HD1.2G15TXQP36i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU39 iWDM	P2HD1.2G15TXQP39i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU44 iWDM	P2HD1.2G15TXQP44i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU48 iWDM	P2HD1.2G15TXQP48i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU52 iWDM	P2HD1.2G15TXQP52i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU54 iWDM	P2HD1.2G15TXQP54i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU57 iWDM	P2HD1.2G15TXQP57i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU60 iWDM	P2HD1.2G15TXQP60i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU61 iWDM	P2HD1.2G15TXQP61i=
1.2 GHZ HYBRID QAM TRANSMITTER, ITU62 iWDM	P2HD1.2G15TXQP62i=

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