Cisco Prisma II 1310 nm, High-Density Transmitter and Host Module for 1.2 GHz Operation

Description

The Cisco® Prisma® II line of optical network transmission products is an advanced system designed to help optimize network architecture and increase reliability, scalability, and cost-effectiveness. The 1310 nm high-density transmitters (HDTx) are designed for use in the standard* Prisma II or the Prisma II XD chassis (Figure 1) containing standard power supplies and fan trays. The ability to mix high-density transmitter modules with other Prisma II modules in the same chassis greatly enhances the flexibility of the platform. Up to 26 transmitters can operate in a standard 6-rack-unit (6RU) Prisma II chassis, effectively doubling the density for 1310 nm transmitters in that chassis. Up to 16 HDTx modules fit in the Prisma II XD chassis for even higher density. The transmitters have a 1.2 GHz passband to permit the inclusion of high-order modulation types consistent with DOCSIS® 3.1 advances. Microprocessor control allows ease of installation and flexibility of application. The transmitters are offered in two performance levels and a range of output powers from 3 to 15 dBm.

Figure 1. Cisco Prisma II XD and Prisma II Chassis

Prisma II Chassis

Prisma II XD Chassis

The Prisma II high-density platform includes the following modules:

- **Premium 1310 nm high-density transmitters:** The premium 1310 nm HDTx offers superior performance for either high-power hybrid fiber-coax (HFC) applications or forward path segmentation. Transmitters are offered with output power from 4 to 15 dBm and deliver both analog and digital signals.
- **Standard 1310 nm high-density transmitters:** The standard HDTx offers a cost-effective solution for forward path segmentation. Transmitters are offered with output power from 3 to 12 dBm and deliver both analog and digital signals.
- **High-density host module:** The host module is designed to double the density of the standard Prisma II chassis. It provides two slots for the high-density modules for each current Prisma II slot (Figure 2). The simple design provides an efficient route of RF and electrical signal between the backplane and the high-density module.

* The Prisma II 56-connector chassis is standard and is required if both broadcast and narrowcast inputs are used. A 28-connector Prisma II chassis is also available, in which only the HDTx broadcast Input port is connected.

Figure 2. Two HDTx in Host Module

Common Features

High-density design allows up to 26 transmitters in a Prisma II Chassis.

- Energy-efficient design with lowest power consumption per transmitter
- 1.2 GHz RF passband to increase bandwidth capacity for new services
- Compatibility with current Prisma II Chassis, power supply, and fan tray
- Precise optical power levels that enable superior link optimization and lower spare requirements
- Advanced pre-distortion circuitry, which improves cost-to-performance ratio
- Nonvolatile storage of preset operating parameters, which simplifies installation procedures
- Simple plug-and-play operation, so no user configuration is required
- Dual RF inputs for broadcast video and new media (narrowcast) service tiers
- Blind-mate (push-on) RF and DC connectors
- RF input test point
- User-selectable Automatic Gain Control (AGC)
- Multiple setup and control options:
  - Local control through Cisco Local Craft Interface (LCI)
  - Local monitoring through Cisco Prisma II Intelligent Communications Interface Module (ICIM)
  - Remote monitoring through Cisco ROSA® element manager or TNCS status monitoring and control element manager
- Primary and secondary redundancy

Figure 3. HDTx

Premium 1310 nm HDTx Features

- Designed to achieve premium system performance
- Provides a full range of output powers from 4 to 15 dBm
- Applicable for loss budgets of 2 to 17 dB
- Offers wide operating temperature from -20 to +65°C

Standard 1310 nm HDTx Features

- Designed to achieve excellent cost-to-performance ratio
- Offers high carrier-to-noise ratio in a value-engineered product
- Provides a full range of output powers from 3 to 12 dBm
- Operating temperature ranges from 0 to 50°C

High-Density Host Module Features

- Host module (figure 4) provides an upper and a lower slot for HDTx modules
- Passive design provides for high reliability
- Provides an RF and DC route between backplane of the chassis and sub-module

Figure 4. Host Module

Specifications

Table 1. Specifications

Optical	Units	HDTx Premium	HDTx Standard	Notes
Nominal optical output wavelength	nm	1310 ±10		
Optical interface		SC/APC connector		
Optical output power	dBm	4 6 8 10 12 14 15	3 5 6 8 10 12	-0.2 to +0.5 dB
Electrical				
Bandwidth	MHz	52-1218		
Frequency response	dB	±0.6		
Input return loss	dB	>16.0		@22 dBmV input
Port-to-port isolation (Narrowcast to broadcast inputs)	dB	>45		
Broadcast (BC) RF Input Required RF input level per channel (NTSC) 79 NTSC analog channels with: 256-QAM to 834 MHz @ -6 dB and two 192 MHz OFDM @ equivalent amplitude 64 PAL B/G analog channels with: 270 MHz QAM (600 to 870 MHz) @ -6 dB 400 MHz QAM (600 to 1002 MHz) @ -6 dB 59 PAL D/K analog channels with: 270 MHz QAM (600 to 870 MHz) @ -6 dB 400 MHz QAM (600 to 1002 MHz) @ -6 dB	 dBmV dBmV dBmV dBmV dBmV dBmV	 15.0 9.0 24.0 16.3 16.0 16.6 16.3		PAL performance levels are for reference only and derived assuming the same composite Optical Modulation Index (OMI); the per-channel drive levels may vary
Narrowcast (NC) RF Input Required RF input level per channel (QAM) for QAM @ -6 dBc relative to analog channels Required RF input level per channel (analog) for equal amplitude analog channels (BC and NC)	 dB dB	 6 12 (above broadcast RF analog level)		See note (i.e., 15 dBmV/ch for QAM at NC port matches QAM level in BC port)
Power consumption (maximum)	W	7.5		
Front-panel test point relative to input	 dB dB	Broadcast Input -20 ±0.5 Narrowcast Input -32 ±0.5		
Environmental				
Operating temperature range				
Full specifications	°C	-20 to 65	0 to 50	
	°F	-4 to 149	32 to 122	
Storage	°C	-40 to 65	-40 to 65	
	°F	-40 to 149	-40 to 149	
Humidity Range (non-condensing)	%	0 to 95		

Optical	Units	HDTx Premium	HDTx Standard	Notes
Mechanical (Modules)				
Depth	in.	8.80		
	cm	22.35		
Width	in.	1.03		
	cm	2.62		
Height	in.	3.48		
	cm	8.84		
Weight	lb	0.90		
	kg	0.41		
Module width	slots	1		

Note: Digital channels only; level must be set such that digital channels are 6 dB below analog channels in the composite RF signal. Narrowcast input shall require an input signal to be 6 dB greater per channel than an identical such signal applied to the broadcast input in order to produce the identical OMI on the output.

Link Performance Specifications

Table 2. Premium and Standard HDTx

Parameter	Tx Power, dBm	Standard Spec Limit[1]	Premium Spec Limit[1]
CSO	All	65 dBc	65 dBc
CTB		70 dBc	70 dBc
XMOD		65 dBc	65 dBc
SPURIOUS		68 dBc	68 dBc
CNR	3	50.5 dB	-
	4	-	51.5 dB
	5	50.0 dB	-
	6	50.0 dB	51.5 dB
	8	50.0 dB	51.5 dB
	10	49.6 dB0	51.1 dB
	12	49.6 dB	51.1 dB
	14	-	51.1 dB
	15	-	50.1 dB

Digital channels: MER > 38 dB; Pre-FEC BER < $1x10^{-8}$ for 256 QAM

Note:

1. At specified RF input level and 0 dBm optical input to a compatible GS7000 or GainMaker receiver
2. RF levels shown are required when operated with transmitter AGC off.
3. Optical link budget includes 3.5 dB of non-dispersive loss.
4. Pre-FEC BER is for ITU-T J.83 Annex B 256-QAM modulation, 79 NTSC in CW mode, 10-minute test duration with averaged BER.
5. Temperature is specified at air inlet to Prisma II chassis.

Table 3. Ordering Information

Part Number	Description
P2HD1.2G13TXP04=	P2 HD 1310 nm Tx, Premium, 4 dBm, SC/APC
P2HD1.2G13TXP06=	P2 HD 1310 nm Tx, Premium, 6 dBm, SC/APC
P2HD1.2G13TXP08=	P2 HD 1310 nm Tx, Premium, 8 dBm, SC/APC
P2HD1.2G13TXP10=	P2 HD 1310 nm Tx, Premium, 10 dBm, SC/APC
P2HD1.2G13TXP12=	P2 HD 1310 nm Tx, Premium, 12 dBm, SC/APC
P2HD1.2G13TXP14=	P2 HD 1310 nm Tx, Premium, 14 dBm, SC/APC
P2HD1.2G13TXP15=	P2 HD 1310 nm Tx, Premium, 15 dBm, SC/APC
P2HD1.2G13TXS03=	P2 HD 1310 nm Tx, Standard, 3 dBm, SC/APC
P2HD1.2G13TXS05=	P2 HD 1310 nm Tx, Standard, 5 dBm, SC/APC
P2HD1.2G13TXS06=	P2 HD 1310 nm Tx, Standard, 6 dBm, SC/APC
P2HD1.2G13TXS08=	P2 HD 1310 nm Tx, Standard, 8 dBm, SC/APC
P2HD1.2G13TXS10=	P2 HD 1310 nm Tx, Standard, 10 dBm, SC/APC
P2HD1.2G13TXS12=	P2 HD 1310 nm Tx, Standard, 12 dBm, SC/APC

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