

CHP Max Headend Optics Platform

**CHP CORWave® D1-DUAL DENSITY
CHP CORWave® S1-SINGLE DENSITY
1.2 GHz O-BAND MULTIWAVELENGTH
FORWARD PATH TRANSMITTERS**



FEATURES

- 1.2 GHz O-Band transmitter supporting DOCSIS® 3.1 bandwidth upgrades
- Maximize fiber assets with up to 4 O-Band wavelengths (starting at 1291 nm) and 30 km reach, designed for both analog and digital channel loading
- Optimize headend and hub efficiencies with industry leading density and low power consumption
- Fixed or variable output powers and extended linearization, supporting multiple optical architecture needs
- Front or rear fiber connections enable flexible installations
- Configure, monitor, and manage with CORView™ Element Management System
- Internal Electronic Slope Adjustment to compensate for headend combining and cable loss at high frequencies



PRODUCT OVERVIEW

For cable operators looking to reduce CAPEX by decreasing footprint in their headends, collapse OTNs/hubs, or save on powering, the CHP CORWave® Dual Density (CHP CORWave D1) 1.2 GHz multiwavelength forward transmitter provides an immediate 50% decrease in the number of physical devices needed for forward path transmission and some of the lowest power consumption among comparable forward transmitters in the industry. The CHP CORWave D1, with 2 lasers in a single-wide application module, increases revenue by allowing other application modules to be added for new capacity and new services without increasing the current footprint. It is available in a power conserving, single density option (CHP CORWave S1) consisting of a single laser in a single-wide application module, for use where physical footprint is not considered an issue.

The CORWave multiwavelength plan allows fiber reclamation and leverages the existing fiber infrastructure for up to 4 multiplexed O-Band wavelengths and up to 30 km reach over one fiber.

Reduce Complexity and Headend Space Needs

The CHP CORWave® D1 is optimized for both analog and digital channel loading and is available in fixed and variable outputs with front and rear fiber connections. Extended linearization models are designed for better distortion performance in Celene loading applications. It is backwards compatible with all current and legacy CHP chassis. Two wavelengths in one single-wide application module simplify operations, provide less headend ‘plumbing,’ and provide easier module management.

Add Value To Existing Assets

A large installed base of the CHP Max Headend Optics Platform allows cable operators to add value to their headends with the addition of the CHP CORWave D1 for new, revenue generating services and reduced complexity. The CHP CORWave D1 can be monitored by the CORView™ Element Management System which provides an intuitive and user-friendly interface for security, discovery, configuration, and inventory functions. Internal Electronic Slope Adjustment has been added to these models to compensate for headend combining and cable loss at high frequency, especially when loading moves to 1.2 GHz.

TRANSMITTER SPECIFICATIONS

Optical

Fixed Optical Output Power	Fixed (0x): 4, 6, 8, 10, 13 dBm Variable (Vx): 2-4, 4-6, 6-8, 8-10, 10-12 dBm Extended Linearization (Xx): 4, 6, 8, 10, 12, 13 dBm
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RF

Bandwidth Operational Range	54 to 1218 MHz
RF Input Impedance	75 ohms
Response Flatness, P-V, min./max., typical	-0.5/0.5 dB (52 to 1006 MHz) -1.0/1.0 dB (52 to 1218 MHz)
Input Return Loss	16 dB
RF Input Test Point	-20 ± 1.0 dB
Port-to-Port Isolation	50 dB channel-to-channel
Port-to-Port Gain Variation, min./max.	-0.5 dB/0.5 dB (relative to 25°C)
Equalizer Slope Range	0 to 2 dB in 1 dB steps
Gain Adjustment Range, min./max.	-3.0/3.0 dB for 10 dBm and lower output power -3.0/0.0 dB for 12 and 13 dBm output power
ADC Range, min./max	-3.0/3.0 dB for 10 dBm and lower output power -3.0/0.0 dB for 12 and 13 dBm output power

Powering

Power Consumption	D1: 15 W maximum, 12.5 W typical S1: 8 W maximum, 6.5 W typical
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Mechanical

Optical Connector	LC/APC (8 degrees) or SC/APC (8 degrees)
RF Connector	F-type
Dimensions (W x H x D) in (cm) ¹	1.25 x 3.4 x 18.5 in (3.2 x 8.7 x 47.0 cm)
Weight	3.0 lbs (1.4 kg)

Environmental

Operational Temperature ²	32° to 122°F (0° to 50°C)
Storage Temperature	-40° to 158°F (-40° to 70°C)
Humidity, Non-condensing, max.	95%

NOTES:

1. Includes handles and connectors.
2. Temperature measured at transmitter module's air inlet.

CNR VS. LINK BUDGET

RF

Channel Loading	<ul style="list-style-type: none"> • 79 NTSC analog channels, 75 QAM channels (6 dB below analog) • 30 NTSC analog channels 160 QAM channels (6 dB below analog) • 190 QAM channels, 6-MHz QAM channels
Nominal Input RF Power	<ul style="list-style-type: none"> • 11 dBmV for 79 NTSC Analog channels from 55.25 MHz to 547.2625 MHz, 75 ITU-T J.83 Annex B QAM 256 channels (6 dB below analog) to 1002 MHz • 13 dBmV for 30 NTSC Analog channels from 55.25 MHz to 247.2625 MHz, 160 ITU-T J.83 Annex B QAM 256 channels (6 dB below analog) to 1218 MHz • 8 dBmV for 190 ITU-T J.83 Annex B QAM 256 channels, 54-1218 MHz

Typical Link Performance for 79 NTSC analog channels, 75 QAM channels (6 dB below analog)

CCNR	51.5 dB ^{1,2}
MER	> 42 dB ^{2,3}
BER	1E-6 (Annex B Test)
CSO	-62 dBc ^{1,2}
CTB	-65 dBc ^{1,2}

Typical Link Performance for 30 NTSC analog channels 160 QAM channels (6 dB below analog)

CCNR	53.5 dB ^{1,2}
MER	> 42 dB ^{2,3}
BER	1E-6 (Annex B Test)
CSO	- 63 dBc ^{1,2}
CTB	- 65 dBc ^{1,2}

NOTES:

1. The above specifications are at 25°C. The CNR, CSO and CTB may degrade up to 0.5, 2.0 and 2.0 dB, respectively, over the full operating temperature range and over all polarization states.
2. Link performance based on 4 wavelengths over 15 km including optical passives, 0 dBm into the receiver.
3. MER corrected for source contribution. Measured with a signal source with MER greater than 44 dB and a signal analyzer with MER measurement capability greater than 46 dB MER.

IMPLEMENTATION REQUIREMENTS FOR MULTIWAVELENGTH APPLICATIONS

Implementation Requirements	Multiwavelength Application
Unique Requirements	
Wavelengths	1291, 1293, 1295, 1290 nm
Maximum launch power/wavelength	11 dBm (4 wavelengths)
Common Requirements	
Analog content	Must use common analog content ¹
Digital content	Can use different, digitally modulated narrowcast content

NOTE:

1. Maximum RF input cable length difference to transmitters is 100 feet.

ORDERING INFORMATION

1.2 GHz Redundant Forward Path Receiver

				1	2	3	4		5	6	7	8		9	10		11
C	H	P	-	x	x	x	x	-	y	y	y	y	-	z	z	-	c

1-2	Module Type
D1	Dual CORWave 1.2 GHz
S1	Single CORWave 1.2 GHz
3	Fiber Orientation
F	Front
W	Rear
4	Output
0	Fixed
V	Variable
X	Extended Linearization

5-6	7-8	Wavelength	
Laser Wavelength pairings are as listed below. The wavelength for each channel shall comply with the O-Band multiwavelength plan (1291, 1293, 1295, 1290).			
For Single transmitters digits 5 and 6 will be 12. Digits 7 and 8 will reflect the center wavelength.			
		Laser 1	Laser 2
12	91	None	1291
12	93	None	1293
12	95	None	1295
12	90	None	1290
91	91	1291	1291
93	93	1293	1293
95	95	1295	1295
90	90	1290	1290
91	93	1291	1293
95	90	1295	1290

9-10	Laser Output Power
04	4 dBm (Variable or Fixed)
06	6 dBm (Variable or Fixed)
08	8 dBm (Variable or Fixed)
10	10 dBm (Variable or Fixed)
12	12 dBm (Variable only)
13	13 dBm (Fixed only)
11	Connector Type
S	SC/APC (D1F, S1F, S1W only)
L	LC/APC (D1F, D1W only)

RELATED PRODUCTS

CHP Chassis	Optical Patch Cords
Power Supplies	Optical Passives
Management Module	Installation Services

Note: Specifications are subject to change without notice.

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