

1 GHz CWDM Forward Path Transmitters

CHP Max5000

Converged Headend Platform



- **ITU G.695 compliant for CWDM spacing**
- **1 GHz technology**
- **Improves existing fiber utilization**
- **Revolutionary variable optical output**
- **Dual high isolation input**
- **Low profile footprint allows 200 transmitters in a standard rack**
- **Universal local or remote management through Craft interface and SNMP with HMS**

The CHP Max5000 Advanced 1 GHz CWDM Transmitter is ideal for MSOs that need to support growing residential and business services on a fiber-scarce HFC plant. The ITU G.695 standards-based CWDM transmitter is available at a wavelength of 1311 ± 4 nm with variable output power levels of 4, 6, 8, 10, or 12 dBm and with fixed output levels of 13, 14, and 15 dBm. This transmitter is also available at a wavelength of 1291 ± 4 nm or 1331 ± 4 nm with a variable output with a maximum power of 8 dBm. By deploying 1311 nm CWDM transmitters, adjacent ITU channels at 1291 nm or 1331 nm can be used in CWDM applications to increase the existing capacity of the HFC networks.

CHP Max5000 1 GHz CWDM transmitters enable customers to support rapidly growing residential and business services while leveraging existing network infrastructure and provides the capability to multiplex two forward wavelengths on a single fiber. In many cases, multiple return wavelengths can also be carried on the same fiber.

CHP Max5000 1 GHz CWDM transmitter's variable optical output power range enables operators to reduce spare inventory up to 60 percent, reduce the need for optical attenuators, and adjusted for unexpected link loss during system implementation. These benefits translate into significant CapEx and OpEx savings, and provide maximum flexibility for deploying advanced interactive services. The 1 GHz Transmitter's dual-input capability provides isolation that is much superior to alternative offerings, enabling simultaneous advanced service deployment of video and telephony. In addition, integral high isolation eliminates having to add external devices to achieve similar performance, thereby lowering CapEx even further and reducing system complexity.

CHP Max5000 1 GHz transmitters are dual-input, hot-swappable transmitters with integrated management through the local Craft GUI and remote management via SNMP HMS-compliant interface for external connection to an element manager.

Features

- Leverages existing network infrastructure and provides the capability to multiplex two forward wavelengths on a single fiber
- ITU G.695 standards compliant
- Variable optical output power range for spare inventory reduction and flexibility to adjust for unexpected link loss during system implementation
- Superior performance to facilitate 256-QAM digital channel transmission capability
- Plug-in equalizer and attenuators for RF gain control and front panel RF testpoint for convenient monitoring
- Downloadable firmware upgrades

Applications

The following diagrams depict the typical applications for combining two and three CWDM wavelengths in the forward paths that are multiplexed onto a single fiber with a maximum launch power of 7 dBm per wavelength (two wavelengths) or 3.5 dBm per wavelength (three wavelengths). The first CWDM wavelength that should be deployed is 1311 nm. This facilitates immediate forward path segmentation and reduces the customers served by a node in half. Follow the implementation requirements listed in the table below to ensure a successful implementation. Contact C-COR for implementation details and solutions for other applications.

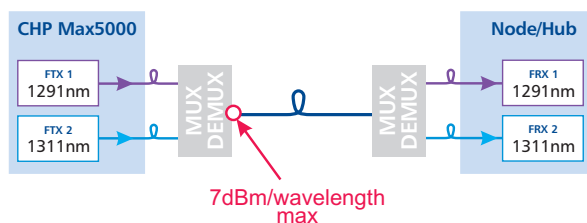


Diagram 1. 1291 and 1311 nm CWDM forward path implementation

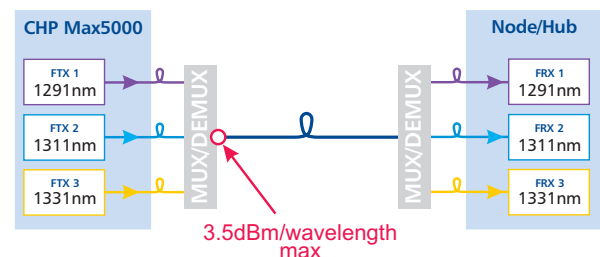


Diagram 2. 1291, 1311, and 1331 nm CWDM forward path implementation

Implementation Requirements for Two and Three Wavelength Applications

Implementation Requirements	Two Wavelength Application	Three Wavelength Application
Unique Requirements		
Recommended wavelengths (Note 1)	1291 and 1311 nm	1291, 1311, 1331 nm
Maximum launch power/wavelength	7 dBm	3.5 dBm (Note 2)
Common Requirements		
Analog broadcast content	Must use identical analog content	
Digital broadcast content	Can use different, digitally modulated narrowcast content	
Analog RF input level	13 to 15 dBmV/channel	
Digital RF input level	7 to 9 dBmV/channel	
Maximum RF input cable length difference to TXs	100 feet	

Notes

1. C-COR recommends to deploy 1311 nm as the first wavelength.
2. An optical attenuator may be required for the CHP-GFXV-1291-08-S and CHP-GFXV-1331-08-S transmitters.

Specifications

Optical

Optical Wavelength	1291, 1311, 1331 nm \pm 4nm
Optical Output Power	See CNR vs. Link Budget Tables

RF

Bandwidth	
Operational Range	54 to 1002MHz
Analog Channel Range	54 to 550MHz
Digital Channel Range	550 to 1002MHz
Response Flatness, P-V, typ./max.	1.0/2.0dB
Input Return Loss	16 dB
Port-to-Port Isolation	\geq 60dB, 54 to 870MHz \geq 50dB, 870 to 1002MHz
Port-to-Port Gain Variation, typ./max.	\pm 0.5dB/ \pm 1.0dB

Powering

Power Consumption, max.	17.4W
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Performance

Channel Plan	79 NTSC channels and up to 75 256-QAM channels
Input RF Power	
Analog Channels (Notes 1 and 2)	15 dBmV/ch
Digital QAM Channels	9 dBmV/ch
Composite Second Order, typ. (Notes 1 and 3)	-63 dBc
Composite Triple Beat, typ. (Note 1)	-70 dBc

Mechanical

Optical Connector	SC/APC
RF Connector	F-type
RF Input Testpoint (Note 4)	-20 \pm 1.0dB
Dimensions (W x H x D) (Note 5)	1.25 x 3.4 x 18.5in. (3.2 x 8.7 x 47.0 cm)
Weight	2.75 lbs (1.24kg)

Environmental

Operational Temperature (Note 6)	32 to 122°F (0 to 50°C)
Storage Temperature	-40 to 158°F (-40 to 70°C)
Humidity, noncondensing, max.	85%

Notes:

- Distortions are measured using only CW analog carriers per SCTE recommendation by standard RF test methods. Performance shown represents typical performance for \geq 85% of production units tested over typical Corning SMF-28 fiber (or equivalent). For minimum CSO and CTB, subtract 2dB from typical. CSO performance is for the transmitter only. CSO specifications for 1291 and 1331 nm transmitters are obtained with 15km fiber. Typical system CSO is -60dbc, assuming 7 dBm launch power per wavelength into fiber for either a 1291 and 1311 nm system or a 1311 and 1331 nm system and 3.5dBm launch power for a three wavelength system.
- OMI is 3.9% at 79 NTSC channel loading.
- CSO performance for NTSC channels is for the in-band (high-side) beats.
- Relative to main port with 0 dB pad and 0 dB EQ.
- Includes handles and connectors.
- Temperature measured at transmitter module's air inlet.

Specifications subject to change without notice

CNR vs. Link Budget: CHP-GFXx-1311 Series Dual-Input 1 GHz Transmitters

	CHP-GFXV-1291/1311/1331 (Note 1)					CHP-GFX-1311		
	-04	-06	-08	-10	-12	-13	-14	-15
Output Power Tunable Range (dBm)	2.0 to 4.0	4.0 to 6.0	6.0 to 8.0	8.0 to 10.0	10.0 to 12.0	—	—	—
Output Power (dBm)	4.0	6.0	8.0	10.0	12.0	13.0	14.0	15.0
Fiber Length (km)	7.0	13.0	15.0	15.0	15.0	20.0	20.0	20.0
Optical Loss Budget (dB)	CNR (dB) for part fiber/part passive link (typical)							
2	—	—	—	—	—	—	—	—
3	55.0	—	—	—	—	—	—	—
4	54.2	—	—	—	—	—	—	—
5	53.6	54.0	—	—	—	—	—	—
6	—	53.5	—	—	—	—	—	—
7	—	52.8	53.8	—	—	—	—	—
8	—	—	53.2	—	—	—	—	—
9	—	—	52.6	53.8	—	—	—	—
10	—	—	—	53.2	—	—	—	—
11	—	—	—	52.6	53.9	—	—	—
12	—	—	—	—	53.2	53.4	—	—
13	—	—	—	—	52.6	52.8	53.4	—
14	—	—	—	—	—	52.2	52.8	53.4
15	—	—	—	—	—	51.5	52.2	52.8
16	—	—	—	—	—	50.6	51.5	52.2
17	—	—	—	—	—	—	50.6	51.5
18	—	—	—	—	—	—	—	50.6

Notes:

1. CHP-GFXV-1291 and CHP-GFXV-1331 transmitters are only available with a variable output power of 8 dBm.
2. Optical output power specified before transmitter's bulkhead.
3. CNR variation is ±0.5 dB within the tunable range if the receiver optical input power is adjusted to the same power level.
4. The variable optical output power range can be extended 0.5 dB above and below the specified range, but distortions, as specified on the previous page, are not guaranteed in this extended range.
5. CNR is measured using CW analog carriers per SCTE test procedures. Performance shown is ambient. Subtract 0.5 dB for performance over full temp. range.
6. OMI is automatically maintained within the tunable range except when operating in the custom manual mode.
7. Specifications measured using typical receiver with 0.85 mA/mW, 7 pA/Hz^{0.5} performance.
8. All performance specified for 79 NTSC channels at 15 dBmV/channel and 450 MHz of digital loading at 6 dB below equivalent video channels.
9. Multiple forward wavelengths on a single fiber requires specific application considerations, please contact C-COR for system design guidance.

Specifications subject to change without notice

Ordering Information

1	2	3	4	5	6	7	8
C	H	P	-	G	F	X	x
x	-	1	x	x	1	-	x
x	x	-	S				

1	Forward Transmitter Type	
V	Variable output transmitter series	a
blank	Fixed output transmitter series	b
a) Select "04", "06", "08", "10", or "12" in #6-7 blocks, Optical Output Level		
b) Select "13", "14", or "15" in #6-7 blocks, Optical Output Level		
2-5	CWDM Optical Wavelength	
1291	1291 ± 4 nm	a
1311	1311 ± 4 nm	
1331	1331 ± 4 nm	a
a) Must select "08" in #6-7 blocks, Optical Output Level		

6-7	Optical Output Level
04	Variable optical output power of 2 to 4 dBm in 0.25 dB steps
06	Variable optical output power of 4 to 6 dBm in 0.25 dB steps
08	Variable optical output power of 6 to 8 dBm in 0.25 dB steps
10	Variable optical output power of 8 to 10 dBm in 0.25 dB steps
12	Variable optical output power of 10 to 12 dBm in 0.25 dB steps
13	Fixed optical output power of 13 dBm
14	Fixed optical output power of 14 dBm
15	Fixed optical output power of 15 dBm
8	Connector Type
S	SC/APC

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