Cisco 1 GHz GainStar Mini Node with 85/105 MHz Split

The Cisco® 1 GHz GainStar Mini Node (GSMN) is a compact node specifically designed to serve in fiber-deep hybrid fiber-coaxial (HFC) networks. The Cisco GSMN (Figure 1 and Figure 2) provides excellent forward and reverse path performance combined with high reliability and a user-friendly layout. All new Cisco GainStar products share common plug-in accessories and perform to 1 GHz in the forward path.

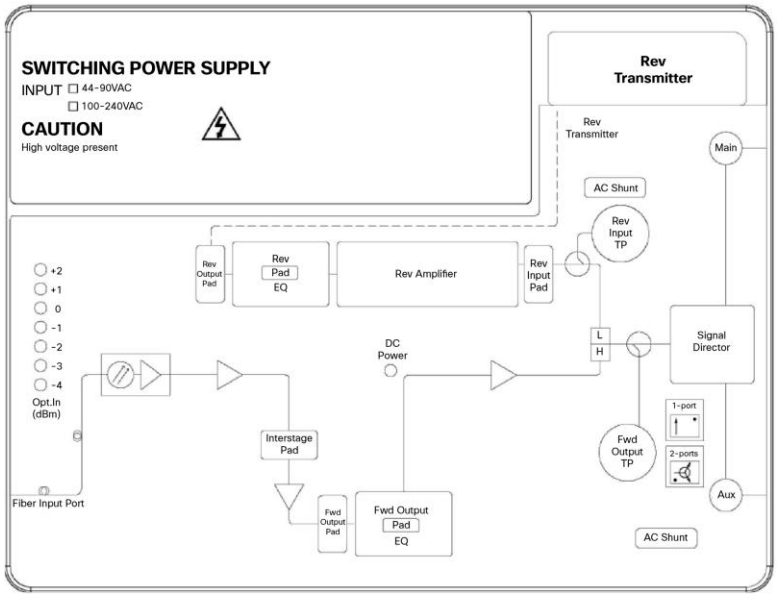
The Cisco 1 GHz GSMN uses GaAsFET technology optimized for superior distortion performance. It provides a single higher-level output or two lower-level RF output ports in a strand-mount configuration. In addition, it features onboard LEDs to indicate the optical input power. The integrated optical receiver module with a built-in AGC increases reliability and decreases nonlinear distortion. Reverse traffic can be combined and routed to an FP, DFB or CWDM reverse optical transmitter.

Features

- 1-GHz performance
- Selectable single or dual outputs with an onboard signal director
- LED display for optical input power
- AGC optical input range of -4 to 2 dBm
- Standard plug-in attenuators that are used to adjust the gain and equalization
- FP, DFB, or CWDM transmitter (available option)
- Surge-resistant circuitry that helps ensure resistance to high-voltage transients (6kV)
- Thermal RF control that reduces gain movement over temperature
- 10A current capacity (steady state) and 15A surge survivability
- Outdoor housing is IP68 dustproof and watertight
- PG11 or 5/8-inch ports with adapter included
- RoHS 6 of 6

Figure 1. Cisco 1 GHz GainStar Mini Node

Figure 2. Block Diagram

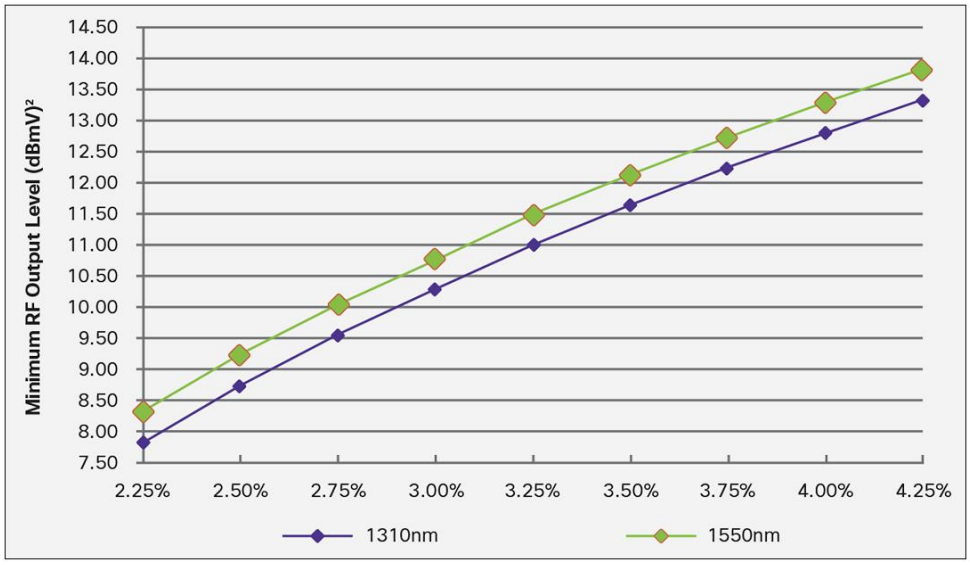


Specifications

Tables 1 through 9 provide product specifications for the Cisco 1 GHz GainStar Mini Node with 85/105 MHz Split.

Table 1. Optical Section Specifications

Feature	Description
Forward Receiver Module	
Wavelength	1310 and 1550 nm
Optical AGC range	-4 to 2 dBm
Optical AGC control stability	±1.0 dB
Pass band	50 to 1000 MHz
Frequency response[1]	±0.5 dB
Tilt (±1.0 dB)	0 dB
Equivalent input noise	≤ 8 pA/$\sqrt{\text{Hz}}$
RF output level @ 0 dBm optical input[2]	Refer to chart below.



Notes:

1. For forward receiver module only. Does not include the frequency response contributions from forward optical transmitter.
2. Minimum receiver RF output level for the stated transmitter percent optical modulation index per channel (OMI/ch), with receiver optical input power of 0 dBm.

Table 2. Forward RF Section Specifications

Feature	Description	
Forward RF		
Frequency range	105 to 1000 MHz	
	1 port	2 ports
RF reference output level @... 1000 MHz	50.0 dBmV	46.5 dBmV
862 MHz	47.8 dBmV	44.3 dBmV
750 MHz	46.1 dBmV	42.6 dBmV
650 MHz	44.5 dBmV	41.0 dBmV
550 MHz	42.9 dBmV	39.4 dBmV
105 MHz	36.0 dBmV	32.5 dBmV
Internal tilt[1]	14 ±1 dB	
Gain[2]	39 dB, 1 port 35.5 dB, 2 ports	
Frequency response	±0.75 dB	
Output return loss	≥ 16 dB	
RF output test point	–20 ±1 dB, 1 port –16.5 ±1 dB, 2 ports	
Hum	65 dB @10 A	
Noise figure[2]	< 7 dB	
Distortion @ 73 NTSC + digital[3, 4, 5]		
CTB	68 dB	
CSO	63 dB	
XMOD	60 dB	
Distortion @ 58 PAL B/G + digital[3, 4, 5]		
CTB	74 dB	
CSO	73 dB	

Feature	Description
Distortion @ 42 cenelec[3, 4]	
CTB ≥ 66 dB	112 dBµV
CSO ≥ 60 dB	111 dBµV

Notes: Unless otherwise noted, specifications reflect typical performance and are referenced to 20ºC.

1. Forward internal tilt specified is primarily due to an on-board equalizer 7 dB (1 GHz band) and a factory configured 7 dB (1GHz band) linear output equalizer.
2. Noise figure measured with 0 dB input EQ and 0 dB input pad.
3. With 3 dB interstage Pad installed for 1 GHz.
4. Tilt 14 dB
5. Distortion performance reference output level is 50 dBmV (1 port). Digital refers to 550 MHz to 1 GHz loading with QAM carriers at -6 dB relative to analog CW carrier levels.

Table 3. Reverse RF Section Specifications

Feature	Description
Reverse RF	
Frequency range	5 to 85 MHz
Frequency response	±0.75 dB
Gain[1]	20 dB, 1 port 16.5 dB, 2 ports
Hum	65 dB @ 10 A
Input return loss	≥ 16 dB
Test point	–20 ±1 dB, 1 port –23.5 ±1 dB, 2 ports
Noise figure[1]	< 9 dB

Notes: Unless otherwise noted, specifications reflect typical performance and are referenced to 20ºC.

1. Reverse Gain and Noise Figure measured with 0 dB EQ, 0 dB input pad, and 0 dB output pad.

Table 4. Reverse Transmitter Module Specifications

Feature	FP Laser	DFB Laser	CWDM Laser
Wavelength	1310 nm	1310 nm	1470 nm, 1490 nm, 1510 nm, 1530 nm, 1550 nm, 1570 nm, 1590 nm, 1610 nm
Pass band	5 to100 MHz	5 to100 MHz	5 to 200 MHz
Frequency response[1]	±0.5 dB	±0.5 dB	±0.5 dB
Input return loss	≥ 16 dB	≥ 16 dB	≥ 16 dB
Output optical power	2.0 dBm	3.0 dBm	3.0 dBm
NPR[2]	15 dB @ 30 dB	20 dB @ 30 dB	25 @ 30 dB
RF test point relative to transmitter RF input (±1 dB)	-20 dB	-20 dB	–20[3]

Notes:

1. Frequency response for transmitter module only: Does not include the frequency response contribution of an optical receiver.
2. NPR test condition: 7 dB optic link (15 km fiber, plus passive loss)
3. 10% OMI when 20 dBmV is detected

Table 5. Station Delay Characteristics

Station Delay Characteristics			
Forward (Chrominance to Luminance)		**Reverse (Group Delay in 1.5 MHz Bandwidth)**	
Frequency (MHz)	**Delay (ns)**	**Frequency (MHz)**	**Delay (ns)**
109.25 to 112.83	8	5.0 to 6.5	35
115.25 to 118.83	5	6.5 to 8.0	15
121.25 to 124.83	3	8.0 to 9.5	8
		80.5 to 82.0	9
		82.0 to 83.5	13
		83.5 to 85.0	15

Table 6. Electrical Specifications

Feature	Description
Electrical	
Maximum AC through current (continuous)	10A
Maximum AC through current (surge)	15A

Table 7. Station Powering Data (40-90 V)

Station Powering Data												
	I DC *		**AC Voltage**									
			90	**85**	**80**	**75**	**70**	**65**	**60**	**55**	**50**	**45**	**40**
1 RX and 1 TX	0.82	AC current (A)	0.30	0.31	0.33	0.34	0.36	0.38	0.42	0.43	0.47	0.52	0.58
		Power (W)	16.0	16.0	15.9	15.9	15.9	15.9	15.9	16.0	16.0	16.1	16.3

* Data is based on stations configured for two-way operation. AC currents specified are based on measurements made with typical CATV type ferroresonant AC power supply (quasi-square wave),

Table 8. Station Powering Data (100 to 240V)

Station Powering Data																
	I DC *		**AC Voltage**													
			240	**230**	**220**	**210**	**200**	**190**	**180**	**170**	**160**	**150**	**140**	**130**	**120**	**110**	**100**
1 RX and 1 TX	0.82	AC current (A)	0.14	0.15	0.15	0.16	0.16	0.17	0.17	0.18	0.19	0.12	0.21	0.22	0.23	0.25	0.26
		Power (W)	16.3	16.3	16.3	16.2	16.1	16.0	16.0	16.0	15.9	15.8	15.8	15.8	15.7	15.7	15.7

* Data is based on stations configured for 2-way operation. AC currents specified are based on measurements made with typical CATV type ferroresonant AC power supply (quasi-square wave).

Table 9. Mechanical and Environmental Specifications

Feature	Description
Mechanical	
Water and dust ingress rating	IP68
Dimensions (H x W x D)	90 x 234 x 212 mm 3.5 x 9.2 x 8.4 in.
Weight	3.0 kg 6.6 lb
Environmental	
Operating temperature	-40 to 60°C -40 to 140°F
Storage temperature	-40 to 85°C -40 to 185°F
Compliance	EU RoHS 6/6, IEC/EN 60728-11, IEC/EN 60065, EN60825-1:2007, EN 50083-2, FCC Part 76, Subpark K, CB Scheme Certification with all national deviations and CENELEC Common Mods

Ordering Information

To place an order, visit the Cisco Ordering Home Page and refer to the ordering information provided in Tables 10 through 12.

Table 10. Ordering Information

Product Description	Part Number
Cisco 1 GHz GainStar Mini Node, 85/105MHz Split, Strand, Rev DFB Tx, Rev/20, SC/APC, 60V	S311G83001012020
Cisco 1 GHz GainStar Mini Node, 85/105MHz Split, Strand, Rev DFB Tx, Rev/20, SC/APC, 220V, India Cord	S311G83002512020
Cisco 1 GHz GainStar Mini Node, 85/105MHz Split, Strand, Rev FP Tx, Rev/20, SC/APC, 60V	S311G83001012010

Table 11. Required Accessories

Required Accessories for RF Module	Part Number
Plug-in Pads (attenuators) - Available in 1 dB steps from 0 to 20 dB • 1 required for reverse input • 1 required for reverse output	4036021 (0 dB) sequentially through 4036041 (20 dB)

Table 12. Optional Accessories

Optional Accessories	Part Number
Optical Transmitter	
Cisco GainStar 1310 nm FP Optical Transmitter 2 dBm, with SC/APC	4034446
Cisco GainStar 1310 nm FP Optical Transmitter 2 dBm, with FC/APC	4034448
Cisco GainStar 1310 nm DFB Optical Transmitter 3 dBm, with SC/APC	4034447
Cisco GainStar 1310 nm DFB Optical Transmitter 3 dBm, with FC/APC	4034449
Cisco GainStar 1470 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039243
Cisco GainStar 1490 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039244
Cisco GainStar 1510 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039245
Cisco GainStar 1530 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039246
Cisco GainStar 1550 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039247
Cisco GainStar 1570 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039248
Cisco GainStar 1590 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039249

Optional Accessories	Part Number
Cisco GainStar 1610 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039250
Reverse Amplifier Module	
Cisco GainStar Reverse Amplifier Module, 20dB Gain (5-85 MHz)	GS-REV-AMP-20-85
Reverse Equalizer	
Plug-in Reverse Equalizer: Available from 0 to 10 dB 0 to 5 dB EQ (GS-REQ-85-00-05) and 0 dB Pad (4036021) are provided - Other values must be ordered. • 1 required for reverse input; 1 Pad also required and plugged into EQ 85 MHz platform: ◦ Cisco GainStar Reverse Cable Equalizer 0 to 5 dB ◦ Cisco GainStar Reverse Cable Equalizer 6 to 10 dB	 GS-REQ-85-00-05 GS-REQ-85-06-10
Forward Equalizer	
Plug-in Forward Equalizer: Available from 0 to 14 dB 5 to 9 dB EQ (4034460) and 7 dB Pad - Other values must be ordered. • 1000 MHz platform: ◦ GainStar Forward Linear Equalizer 0 to 4 dB ◦ GainStar Forward Linear Equalizer 5 to 9 dB ◦ GainStar Forward Linear Equalizer 10 to 14 dB	 4034459 4034460 4034461
Directional Coupler	
Cisco GainStar 1GHz 8dB Directional Coupler	GS-1G-DC-08
Cisco GainStar 1GHz 12dB Directional Coupler	GS-1G-DC-12
Related Equipment	
Cisco Plug-in 75 ohm Pad	4036140

For More Information

Cisco 1 GHz GainStar Line Extender products offer the industry's most complete range of high-performance components. For additional information, please go to:
http://www.cisco.com/c/en/us/products/video/gainstar-nodes/index.html

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