

## Cisco GainStar 1 GHz Mini Node with 65/87 MHz Split

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

The GSMN utilizes GaAsFET technology optimized for superior distortion performance.

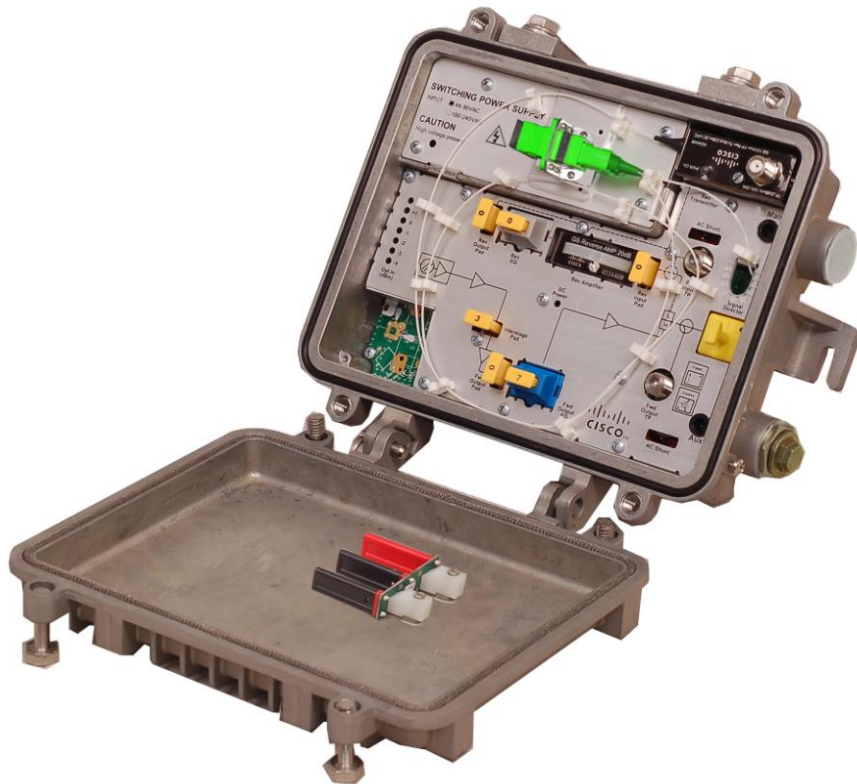
The GSMN provides a single high-level output or two lower-level RF output ports in a strand or pedestal mount configuration. The GSMN can be field-upgradable from a forward only configuration to a forward and reverse path configuration.

The GSMN 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

- Can be set up for 862 MHz or 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 can be used to adjust the gain and equalization
- FP, DFB or CWDM transmitter as an available option
- Surge-resistant circuitry ensures resistance to high voltage transients (6kV)
- Thermal RF control minimizes gain movement over temperature
- 10 A current capacity (steady state) and 15 A surge survivability
- Outdoor housing is IP68 dustproof and watertight
- Strand and pedestal mount housing configurations are available
- All ports are PG11 or 5/8" with included adapter
- RoHS 6 of 6

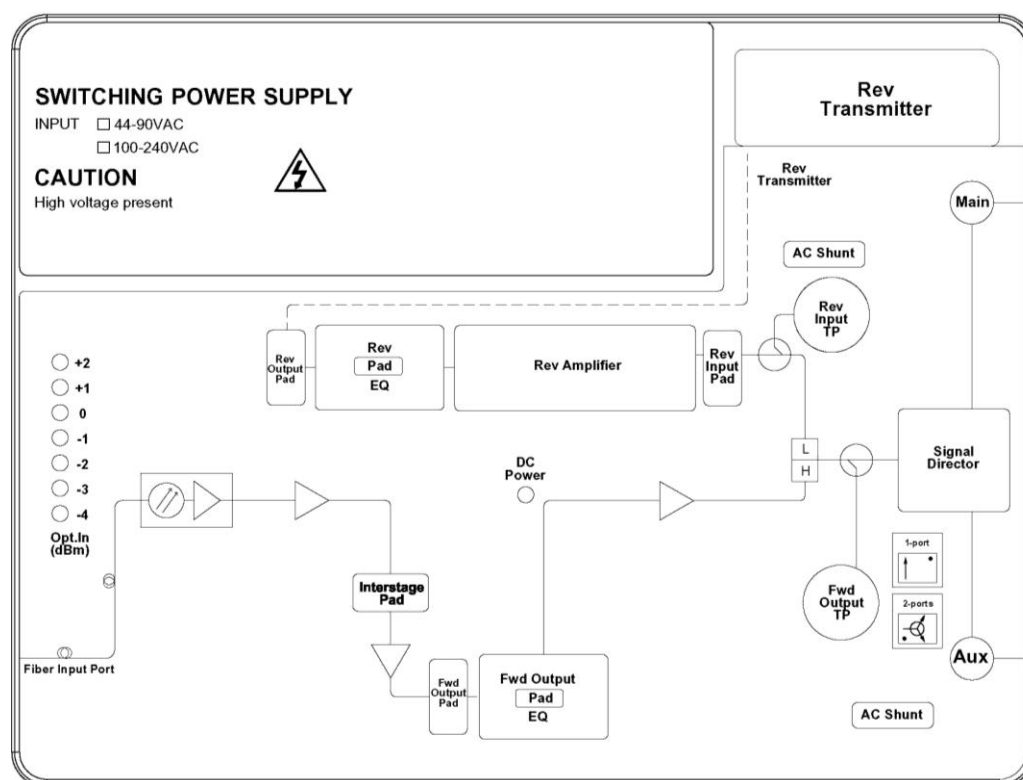
**Figure 1.** Cisco GainStar 1 GHz Mini Node Strand



**Figure 2.** Cisco GainStar 1 GHz Mini Node Pedestal



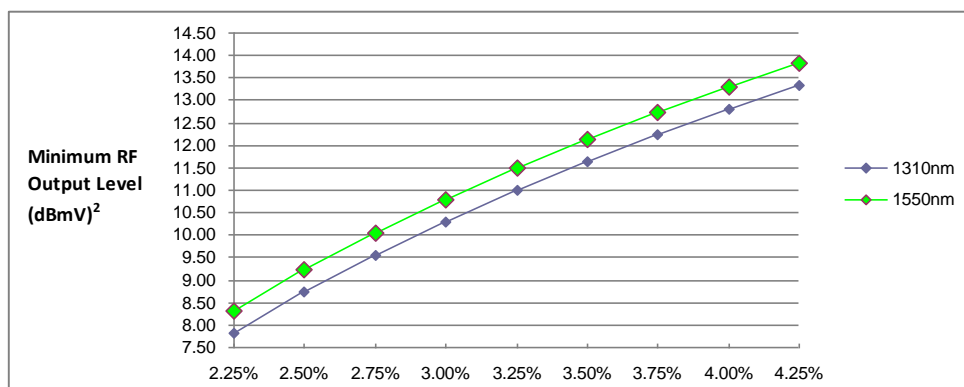
**Figure 3.** Block Diagram



## Specifications

**Table 1.** Optical Section Specifications

Item	Value
<b>Forward Receiver Module</b>	
Wavelength	1310 and 1550 nm
Optical AGC Range	-4 to +2 dBm
Optical AGC Control Stability	±1.0 dB
Pass Band	50–1000 MHz
Frequency Response <sup>1</sup>	±0.5 dB
Tilt (±1.0 dB)	0 dB
Equivalent Input Noise	≤ 8 pA/√Hz
RF Output Level @ 0 dBm Optical Input <sup>2</sup>	Refer to chart below (dBmV)



**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 OMI/ch (Optical modulation index per channel), with receiver optical input power of 0 dBm.

**Table 2.** Forward RF Section Specifications

Item	Value			
Forward RF				
Frequency Range	87–862 MHz		87–1000 MHz	
RF Reference Output Level @... 1000 MHz 862 MHz 750 MHz 650 MHz 550 MHz 87 MHz	1 port  50.0 dBmV 48.3 dBmV 46.7 dBmV 45.2 dBmV 38.0 dBmV	2 ports  46.5 dBmV 44.8 dBmV 43.2 dBmV 41.7 dBmV 34.5 dBmV	1 port 50.0 dBmV 47.9 dBmV 46.2 dBmV 44.6 dBmV 43.0 dBmV 36.0 dBmV	2 ports 46.5 dBmV 44.4 dBmV 42.7 dBmV 41.1 dBmV 39.5 dBmV 32.5 dBmV
Internal Tilt <sup>1</sup>	12 ±1 dB @ 862 MHz		14 ±1 dB @ 1 GHz	
Gain <sup>2</sup>	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 <sup>3</sup>	< 7 dB			
Distortion @ 79 NTSC + Digital <sup>2,3,4</sup>  CTB CSO XMOD	68 dB 63 dB 60 dB			
Distortion @ 59 PAL D/K + Digital <sup>2,3,4</sup>  CTB CSO	66 dB 63 dB			
Distortion @ 42 CENELEC <sup>3,4</sup>  CTB ≥ 66 dB CSO ≥ 60 dB	112 dBμV 111 dBμV			
Notes: Unless otherwise noted, specifications reflect typical performance and are referenced to 20°C.				
1. Forward internal tilt specified is primarily due to an on-board equalizer 6 dB (862 MHz band) or 7 dB (1 GHz band) and a factory configured 6 dB (862 MHz band) or 7 dB (1GHz band) linear output equalizer.				
2. With 3 dB interstage Pad installed for 1 GHz, 2 dB interstage Pad installed for 862 MHz.				
3. Tilt 12 dB @ 862 MHz and 14 dB @ 1 GHz.				
4. Distortion performance reference output level is 50 dBmV (1 port). Digital refers to 550 MHz to 862 MHz or 1 GHz loading with QAM carriers at -6 dB relative to analog CW carrier levels.				

**Table 3.** Reverse RF Section Specifications

Item	Value
<b>Reverse RF</b>	
Frequency Range	5–65 MHz
Frequency Response	±0.75 dB
Gain	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 <sup>1</sup>	< 9 dB
Notes: Unless otherwise noted, specifications reflect typical performance and are referenced to 20°C. 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

Transmitter Module	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	5–100 MHz	5–100 MHz	5–200 MHz
Frequency Response <sup>1</sup>	±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 <sup>2</sup>	15 dB @ 30 dB	20 dB @ 30 dB	25 dB @ 30 dB
RF Test Point relative to transmitter RF input (±1 dB)	–20 dB	–20 dB	–20 dB <sup>3</sup>
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 BW)	
Frequency (MHz)	Delay (ns)	Frequency (MHz)	Delay (ns)
112.25–116.68	3	5.0–6.5	35
119.25–123.68	2	6.5–8.0	15
126.25–130.68	2	8.0–9.5	7
		60.5–62.0	9
		62.0–63.5	12
		63.5–65.0	15

**Table 6.** Electrical Specifications

Item	Value
<b>Electrical</b>	
Max. AC Through Current (continuous)	10 A
Max. AC Through Current (surge)	15 A

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

Station Powering Data													
	I <sub>DC</sub> *		AC Voltage										
			90	85	80	75	70	65	60	55	50	45	40
1 RX & 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 2-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 (100-240 V)

Station Powering Data																	
	I DC *		AC Voltage														
			240	230	220	210	200	190	180	170	160	150	140	130	120	110	100
1 RX & 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

Item	Value
<b>Mechanical</b>	
Water/Dust Ingress Rating	IP68
Dimensions (H x W x D)	Strand
	90 x 234 x 212 mm 3.5 x 9.2 x 8.4 in.
	Pedestal
	90 x 250 x 197 mm 3.5 x 9.9 x 7.8 in.
Weight	3.0 kg 6.6 lb
<b>Environmental</b>	
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, Subpart K, CB Scheme Certification w/All National Deviation & CENELEC Common Mods

# Ordering Information

The GainStar Mini Node is available in a wide variety of configurations. This page contains ordering information for required and optional accessories. Please consult with your Customer Service Representative or Applications Engineer to determine the best configuration for your particular application.

**Table 10.** Required Accessories (Not required for forward only configuration)

Required Accessories for RF Module	Part Number
Plug-in Pads (attenuators) – Available in 1 dB steps from 0 to 20 dB <ul style="list-style-type: none"> <li>• 1 required for reverse input</li> <li>• 1 required for reverse output</li> </ul>	4036021 (0 dB) sequentially through 4036041 (20 dB)



**Table 11.** Optional Accessories

Optional Accessories	Part Number
<b>Optical Transmitter</b>	
GainStar 1310 nm FP Optical Transmitter 2 dBm, with SC/APC	4034446
GainStar 1310 nm FP Optical Transmitter 2 dBm, with FC/APC	4034448
GainStar 1310 nm DFB Optical Transmitter 3 dBm, with SC/APC	4034447
GainStar 1310 nm DFB Optical Transmitter 3 dBm, with FC/APC	4034449
GainStar 1470 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039243
GainStar 1490 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039244
GainStar 1510 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039245
GainStar 1530 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039246
GainStar 1550 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039247
GainStar 1570 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039248
GainStar 1590 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039249
GainStar 1610 nm CWDM Optical Transmitter 3 dBm, with SC/APC	4039250
<b>Reverse Amplifier Module</b>	
GainStar Reverse Amplifier Module, 20 dB Gain	4034469
<b>Reverse Equalizer</b>	
Plug-in Pad for Reverse Equalizer—Available from 0 to 10 dB 0 to 5 dB EQ (4034462) and 0 dB Pad (4036021) are provided—Other values must be ordered.	
<ul style="list-style-type: none"> <li>1 required for reverse input; 1 Pad also required and plugged into EQ</li> </ul>	
65 MHz platform:	
GainStar Reverse Cable Equalizer 0 to 5 dB	4034462
GainStar Reverse Cable Equalizer 6 to 10 dB	4034463
<b>Forward Equalizer</b>	
Plug-in Forward Equalizer—Available from 0 to 14 dB 5 to 9 dB EQ (4034457 or 4034460) and 6 dB Pad (4036027 for 862 MHz) or 7 dB Pad (4036028 for 1 GHz) are provided—Other values must be ordered.	
862 MHz platform:	
GainStar Forward Linear Equalizer 0 to 4 dB	4034456
GainStar Forward Linear Equalizer 5 to 9 dB	4034457
GainStar Forward Linear Equalizer 10 to 14 dB	4034458
1000 MHz platform:	
GainStar Forward Linear Equalizer 0 to 4 dB	4034459
GainStar Forward Linear Equalizer 5 to 9 dB	4034460
GainStar Forward Linear Equalizer 10 to 14 dB	4034461
<b>Related Equipment</b>	
Plug-in 75 ohm Pad	4036140

When upgrading from forward only to a forward and reverse, the Reverse Optical Transmitter, Reverse Amplifier Module, Reverse Equalizer with PAD, Reverse input PAD, and Reverse output PAD accessories are required.



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