GainStar 1 GHz Mini Node with 42/54 MHz Split

The 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 higher-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.

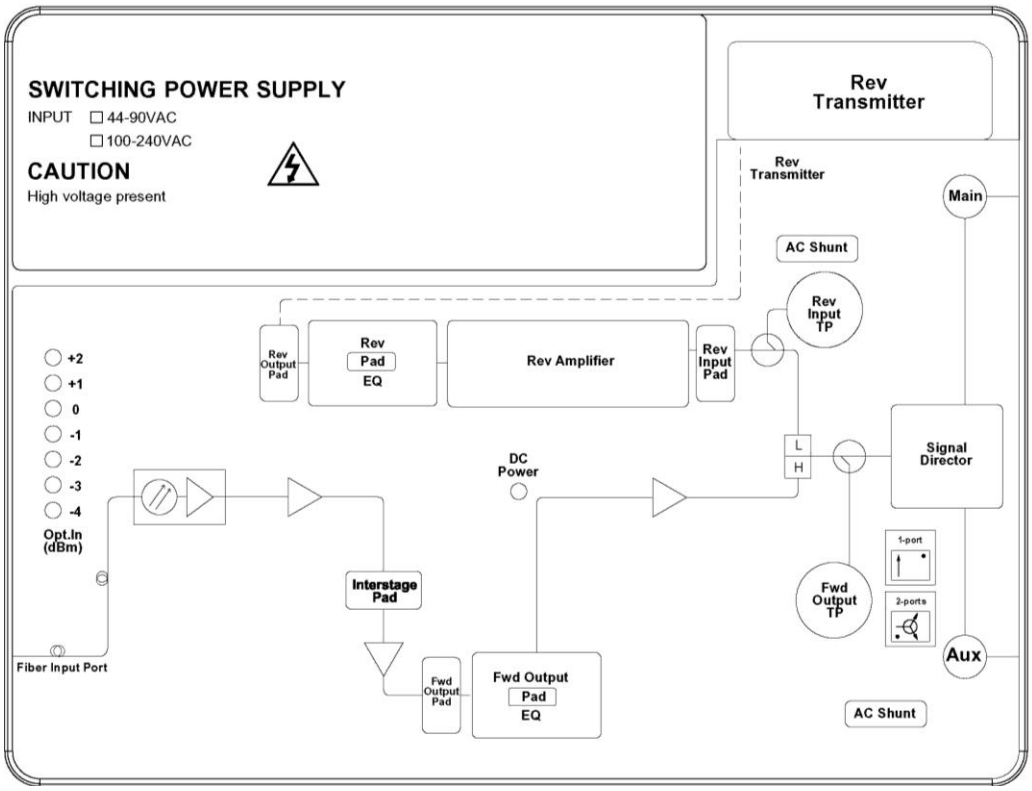
Features

- 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 RF ports are PG11 and configured with 5/8" adapters
- RoHS 6 of 6

Figure 1. GainStar 1 GHz Mini Node Strand

Figure 2. GainStar 1 GHz Mini Node Pedestal

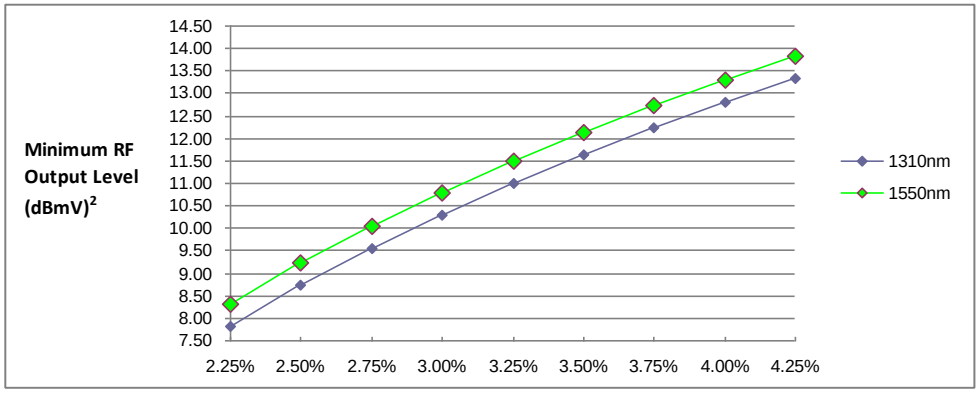
Figure 3. Block Diagram



Specifications

Table 1. Optical Section Specifications

Item	Units	Value
Forward Receiver Module		
Wavelength	nm	1310 and 1550
Optical AGC Range	dBm	–4 to +2
Optical AGC Control Stability	dB	±1.0
Pass Band	MHz	50–1000
Frequency Response[1]	dB	±0.5
Tilt (±1.0 dB)	dB	0
Equivalent Input Noise	$pA/\sqrt{Hz}$	≤ 8
RF Output Level @ 0 dBm Optical Input[2]	dBmV	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 OMI/ch (Optical modulation index per channel), with receiver optical input power of 0 dBm.

Table 2. Forward RF Section Specifications

Item	Units	Value			
Forward RF					
Frequency Range	MHz	54–862		54–1000	
RF Reference Output Level @...	dBmV	1 port	2 ports	1 port	2 ports
1000 MHz				50.0	46.5
862 MHz		50.0	46.5	48.0	44.5
750 MHz		48.3	44.8	46.3	42.8
650 MHz		46.9	43.4	44.8	41.3
550 MHz		45.4	41.9	43.3	39.8
54 MHz		38.0	34.5	36.0	32.5
Internal Tilt[1]	dB	12 ±1 @ 862 MHz		14 ±1 @ 1 GHz	
Gain[2]	dB	39, 1 port 35.5, 2 ports			
Frequency Response	dB	±0.75			
Output Return Loss	dB	≥ 16			
RF Output Test Point	dB	–20 ±1, 1 port –16.5 ±1, 2 ports			
Hum	dB	65 @10 A			
Noise Figure[2]	dB	< 7			
Distortion @ 79 NTSC + Digitial[2,3,4]	dB				
CTB		68			
CSO		63			
XMOD		60			
Distortion @ 64 PAL B/G + Digital[3,4,5]	dB				
CTB		76			
CSO		73			
Distortion @ 42 Cenelec[2,3]	dBµV				
CTB ≥ 66 dB		112			
CSO ≥ 60 dB		111			

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 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	Units	Value
Reverse RF		
Frequency Range	MHz	5–42
Frequency Response	dB	±0.75
Gain[1]	dB	20, 1 port 16.5, 2 ports
Hum	dB	65 @ 10 A
Input Return Loss	dB	≥ 16
Test Point	dB	–20 ±1, 1 port –23.5 ±1, 2 ports
Noise Figure[1]	dB	< 9
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

Item	Units	FP Laser	DFB Laser	CWDM Laser
Wavelength	nm	1310	1310	1470, 1490, 1510, 1530 1550, 1570, 1590, 1610
Pass Band	MHz	5–100	5–100	5–200
Frequency Response[1]	dB	±0.5	±0.5	±0.5
Input Return Loss	dB	≥ 16	≥ 16	≥ 16
Output Optical Power	dBm	2.0	3.0	3.0
NPR[2]	dB	15 @ 30 dB	20 @ 30 dB	25 @ 30 dB
RF Test Point relative to transmitter RF input (±1 dB)	dB	–20	–20	–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 BW)**	
Frequency (MHz)	Delay (ns)	Frequency (MHz)	Delay (ns)
55.25–58.83	20	5.0–6.5	35
61.25–64.83	8	6.5–8.0	15
67.25–70.83	5	8.0–9.5	7
		37.5–39.0	18
		39.0–40.5	20
		40.5–42.0	38

Table 6. Electrical Specifications

Item	Units	Value
Electrical		
Max. AC Through Current (continuous)	Amps	10
Max. AC Through Current (surge)	Amps	15

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 & 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	Units	Value	
Mechanical			
Water/Dust Ingress Rating	–	IP68	
Dimensions (H x W x D)	mm in.	Strand 90 x 234 x 212 3.5 x 9.2 x 8.4	Pedestal 90 x 250 x 197 3.5 x 9.9 x 7.8
Weight	kg lb	3.0 6.6	
Environmental			
Operating Temperature	°C °F	–40 to +60 –40 to +140	
Storage Temperature	°C °F	–40 to +85 –40 to +185	
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 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. Consult 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 • 1 required for reverse input • 1 required for reverse output	4036021 (0 dB) sequentially through 4036041 (20 dB)

Table 11. Optional Accessories

Optional Accessories	Part Number
Upgrade Kit	
Upgrade Kit, Plastic WDM Clips for GainStar Mini Node 42/54 split only	4040809
Optical Transmitter	
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
Reverse Amplifier Module	
GainStar Reverse Amplifier Module, 20dB Gain	4034469
Reverse Equalizer	
Plug-in Reverse Equalizer—Available from 0 to 10 dB 0 to 5 dB EQ (4034465) 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 42 MHz platform: GainStar Reverse Cable Equalizer 0 to 5 dB GainStar Reverse Cable Equalizer 6 to 10 dB	 4034465 4034466
Forward Equalizer	
Plug-in Forward Equalizer—Available from 0 to 14 dB 5 to 9 dB EQ (4034457 or 4034460) and 6 dB Pad (4036027 for 862MHz) or 7 dB Pad (4036028 for 1GHz) are provided—Other values must be ordered. 862 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 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	 4034456 4034457 4034458 4034459 4034460 4034461
Related Equipment	
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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