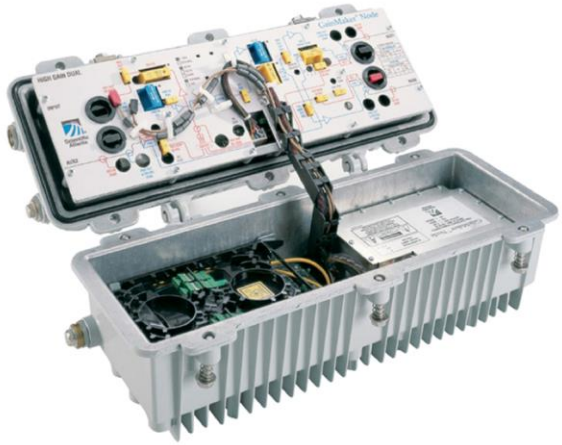
Cisco GainMaker High Output High Gain Balanced Triple 1 GHz Node 85/102 MHz

Looking for the ideal platform for delivering digital and analog video and high-speed data services over advanced hybrid fiber/coax (HFC) networks? Look no further. The GainMaker® High Output Node is designed to serve as an integral part of today's network architectures. It combines the proven technologies of both the GainMaker RF Amplifier and Prisma® optical components. The GainMaker High Output Node is capable of higher output levels than standard Cisco® GainMaker Nodes. With its modular design of fiber receiver, reverse fiber transmitter, and RF amplifier electronics, the GainMaker High Output Node station can provide a variety of functions required by advanced networks.

Figure 1. GainMaker High Output Node



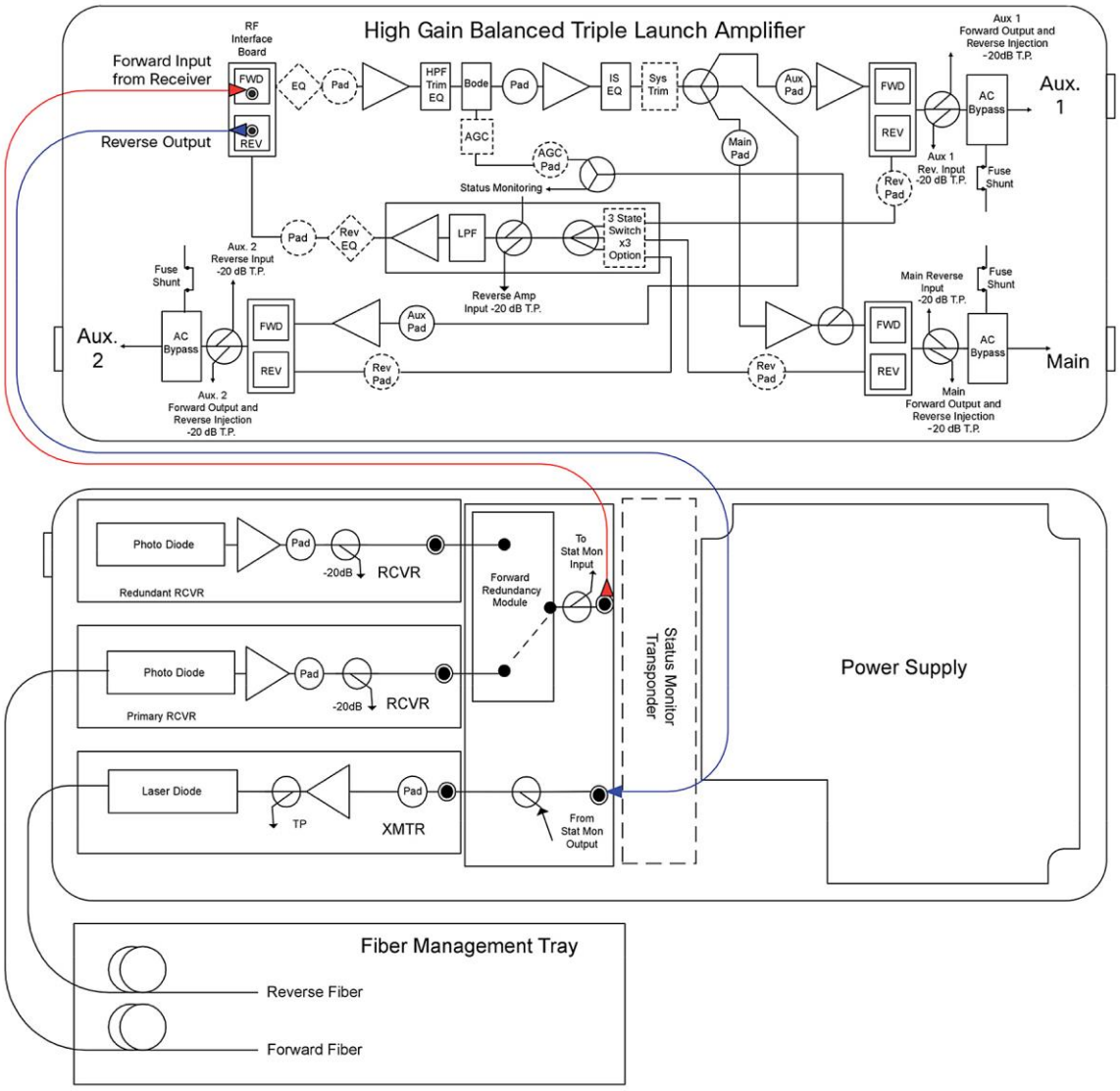
The GainMaker High Output Node accommodates a second forward receiver with an RF switch to provide forward path optical redundancy. Reverse traffic can be combined and routed to distributed feedback (DFB), coarse wavelength-division multiplexing (CWDM), dense wavelength-division multiplexing (DWDM), or Enhanced Digital Reverse (EDR) transmitters. The High Gain Balanced Triple (HGBT) launch amplifier module provides three high-level outputs. Additionally, the node is available with an optional DOCSIS status monitoring transponder. On-board temperature, automatic gain control (AGC) levels, RF switch position, power supply condition, as well as other features and parameters can be monitored through this transponder.

Features

- Capable of higher output levels than standard GainMaker nodes
- Forward redundancy available through a second 1310/1550 nm optical receiver (optional)
- Uses plug-in accessories common to all GainMaker products
- Cable to linear EQ in amplifiers I/S EQ spot provides 15.5 dB of internal Linear tilt
- Local test points and LED indicators on optical receivers, transmitters, and optical interface board simplify installation and maintenance
- AGC has thermal mode, eliminating disruptive RF output variation in the event of pilot loss
- Optional plug-in for status monitoring
- Optional 3-state reverse switch (on/off/-6 dB) allows each reverse input to be isolated for noise and ingress troubleshooting (status monitoring required)
- Fiber management tray provides easy access to fiber connections and folds back to provide access to optical transmitter and receivers
- Reverse input pad and RF test point for each reverse input port on launch amplifier allow optimum reverse path design and alignment

Block Diagrams

Figure 2. High Gain Balanced Triple (HGBT) Diagram

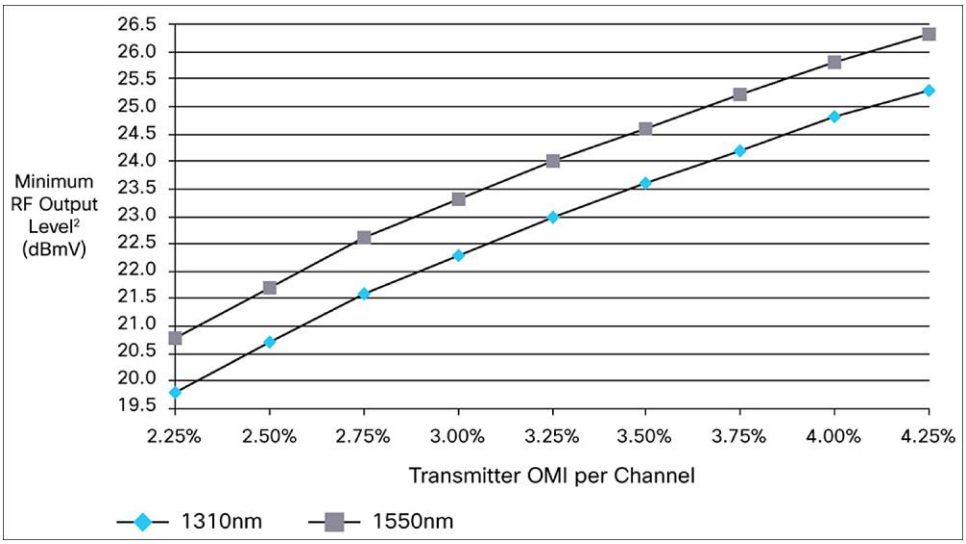


Optical specifications for the GainMaker High Output Node are shown in Table 1.

Table 1. Optical Section Specifications

Optical Section - Forward Receiver Module	Units	GainMaker Standard RX	Notes
Wavelength	nm	1310 and 1550	
Optical Input Range	mW dBm	0.5 to 1.6 -3 to + 2	
Pass Band	MHz	105-1002	
Frequency Response	dB	+/- 0.75	1
Tilt (+/- 1.0 dB)	dB	0	
Optical Input Test Point (+/- 10%)	V DC	1V/mW	
Redundant Optical Rx switching threshold (± 1.0 dB)	dBm	-6	
RF Output Level @ 0 dBm Optical Input	dBmV	Refer to chart (below)	2
RF Output Test Point (± 1.0 dB)	dB	- 20	

Figure 3. Receiver RF Output Level vs. Transmitter OMI



Notes for Optical Section Specifications:

[1] For forward receiver module only. Does not include 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. To determine RF output levels at other optical input power, add (or subtract) 2 dB in RF level for each 1 dB increase (or decrease) in receiver optical input power.

For reverse optical transmitter and link performance, see the “Analog Reverse Optical Transmitters with Thermal Compensation” data sheet.

Unless otherwise noted, specifications reflect typical performance and are referenced to 68°F (20°C). Specifications are based upon measurements made in accordance with SCTE/ANSI standards (where applicable), using standard frequency assignments.

Table 2. RF Section Specifications

General Station Performance	Units	Forward	Reverse	Notes
Pass Band	MHz	105-1002	5-85	14
Return Loss	dB	16	16	7
Hum Modulation @ 12 A	dB	70 (105-870 MHz) 60 (870-1002 MHz)	60 (5-10 MHz) 70 (11-85 MHz)	
Hum Modulation @ 15 A	dB	65 (105-870 MHz) 60 (870-1002 MHz)	60 (5-10 MHz) 65 (11-85 MHz)	
Test Points (±0.5 dB)	dB	-20	-20	

Table 3. Launch Amplifier Performance - Forward

Launch Amplifier Performance - Forward	Units	HGBT	Notes
Operational Gain (minimum)	dB	41	2, 14
Frequency Response	dB	+/- 0.5	
Internal Tilt (±1 dB)	dB	15.5	1, 3
Noise Figure @… 105 MHz **1002 MHz**	dB	8.5 8.0	2
Reference Output Levels @… 1002 MHz **870 MHz** **750 MHz** **650 MHz** **550 MHz** **105 MHz**	dBmV	56.0 54.0 52.2 50.5 49.0 42.3	
Reference Output Tilt (105-1002 MHz)	dB	13.7	1,4
73 NTSC channels (CW) with digital			9
Composite Triple Beat	dB	65	5
Cross Modulation	dB	59	5, 13
Composite Second Order (high side)	dB	64	5
Composite Intermodulation Distortion (CIN)	dB	57	5, 10

Table 4. Forward Insertion Loss

Forward Insertion Loss Optical Interface Board and Plug-Ins (Loss from Specified Optical Receiver RF Output to Launch Amplifier RF Input)	Units	With Redundancy Module Installed	Notes
Receiver position 1	dB	1.5	11
Receiver position 2	dB	1.5	11

Unless otherwise noted, specifications reflect typical performance and are referenced to 68°F (20°C). Specifications are based upon measurements made in accordance with SCTE/ANSI standards (where applicable), using standard frequency assignments.

Table 5. Launch Amplifier Performance - Reverse

Launch Amplifier Performance - Reverse	Units	Reverse	Notes
Amplifier Type	-	Push-Pull	
Operational Gain (minimum)	dBmV	19	7, 12
Frequency Response	dB	+/- 0.5	
Internal Tilt (+/- 1dB)	dB	-0.5	
Noise Figure	dB	14.5	7, 12
Reference Output Levels @ 5 and 85 MHz	dBmV	35	6
6 NTSC Channels (CW)			
Composite Triple Beat	dB	92	
Cross Modulation	dB	80	13
Composite Second Order	dB	82	
Station Performance - Reverse (Station port input to optical transmitter input)	**Units**		
Operational Gain (minimum)	dB	17	7, 8

Table 6. Station Delay Characteristics and Frequency

Station Delay Characteristics 85/105 Split			
Forward (Chrominance to Luminance Delay)		**Reverse** (Group Delay in 1.5 MHz BW)	
Frequency (MHz)	**Delay (nS)**	**Frequency (MHz)**	**Delay (nS)**
109.25 - 112.83	13	5.0 - 6.5	60
115.25 - 118.83	7	6.5 - 8.0	22
121.25 - 124.83	5	8.0 - 9.5	12
		80.5 - 82.0	10
		82.0 - 83.5	13
		83.5 - 85.0	18

Notes for RF Section Specifications:

[1] Reference output tilt and internal tilt are both “linear” tilt.
[2] Forward gain and noise figure measured with 0 dB input EQ and 1 dB input pad.
[3] Forward internal tilt specified is primarily due to an on-board equalizer and a factory configured 10.5 dB cable to linear interstage equalizer (ISEQ).
[4] The forward reference output tilt specified is achieved via field installation of appropriate input EQ, in conjunction with the internal tilt of the launch amplifier and the tilt associated with the optical link (transmitter/receiver combination).
[5] Station performance can be determined by combining optic performance and launch amplifier performance. Stated distortion performance is for launch amplifier section operated at reference output levels and tilt. Consult Cisco System Engineering for CIN calculations.
[6] Reverse output reference level at the RF output of the launch amplifier.
[7] Reverse operational gain, noise figure, and return loss are specified without reverse switch option. If switch is installed, reduce gain by 0.5 dB, increase noise by 0.5 dB, and decrease return loss by 1 dB.
[8] Station reverse gain from station input(s) to reverse transmitter input. With 0 dB reverse input pad, 1 dB reverse output pad, and 0 dB reverse EQ in launch amplifier. Includes optical interface board losses.
[9] “Digital” refers to 550 - 1002 MHz loading with QAM carriers at -6 dB relative to analog video carrier levels.
[10] Composite Intermodulation Noise is a broadband noise-like distortion product associated with QAM loading.
[11] Insertion loss from optical receiver RF output to launch amplifier RF input, with specified forward plug-in module installed in the optical interface board. Subtract this loss from the launch amplifier operational gain to determine forward station gain from optical receiver output to station output.
[12] Reverse Gain and Noise Figure for launch amp with 0 dB reverse input pad, 0 dB reverse output EQ, and 1 dB output pad.
[13] X-mod (@ 15.75 kHz) specified using 100% synchronous modulation and frequency selective measurement device.
[14] The gain at 102 MHz is < 1.5 dB below the gain at 105 MHz. 102 to 105 MHz is recommended for out of band communication only. No video carriers should be used between 102 and 105 MHz.

Unless otherwise noted, specifications reflect typical performance and are referenced to 68°F (20°C). Specifications are based upon measurements made in accordance with SCTE/ANSI standards (where applicable), using standard frequency assignments.

Table 7. Electrical and Component DC Power Consumption

Electrical	Units				Notes
Max. AC Through Current (continuous)	Amps	15			
Max. AC Through Current (surge)	Amps	25			
Component DC Power Consumption (Typical)		**@ +24 VDC**	**@ +15 VDC**	**@ -6 VDC**	**1**
Launch Amplifier High Gain Dual (thermal)	Amps	1.7	-	-	
Status Monitoring Transponder	Amps	0.15	-	-	
Standard Optical Receiver	Amps	0.25	0.01	0.035	
Reverse Transmitter - Standard FP	Amps	0.14	-	0.07	
Reverse Transmitter - Standard DFB	Amps	0.08	-	0.09	
Power Supply DC Current Rating	Amps	3.4	0.05	0.3	1

Table 8. Station Powering Data

Station Powering Data												
High Output GainMaker HGBT	I DC (Amps at 24V DC)		**AC Voltage**									
			90	85	80	75	70	65	60	55	50	45	40
1 or 2 RX, 1 TX, & Stat Mon	2.8	AC Current (A)	1.04	1.08	1.09	1.14	1.20	1.28	1.56	1.63	1.77	1.97	2.23
		AC Power (W)	78.50	78.10	77.60	77.90	78.00	77.30	77.60	77.70	77.90	78.40	78.80

Data is based on stations configured for 2-way operation with status monitoring transponder. AC currents specified are based on measurements made with typical CATV type ferro-resonant AC power supply (quasi-square wave), and GainMaker High Output Node DC power supply (3.4 amp, 24 V DC, pn 4022705).

DC supply has a user configurable 40 V or 50 V AC under-voltage lockout circuit.

Note: 1. The total DC Power consumption of installed components should not exceed the power supply DC current rating.

Table 9. Environmental and Mechanical Housing Dimensions

Environmental	Units	
Operating Temperature Range	degrees	-40°F to 140°F (-40°C to 60°C)
Relative Humidity Range	percent	5% to 95%
Mechanical		
Housing Dimensions	**Weight**	
17.5 in. L x 7.3 in. H x 7.5 in. D (445 mm L x 185 mm H x 191 mm D)	Station with 1 RX, 1 TX, & power supply: 22 lbs (9.9 kg)	

Unless otherwise noted, specifications reflect typical performance and are referenced to 68°F (20°C). Specifications are based upon measurements made in accordance with SCTE/ANSI standards (where applicable), using standard frequency assignments.

Ordering Information

The GainMaker High Gain Balanced Triple Node is available in a wide variety of configurations. The desired configuration is built by accessing the Cisco Commerce Workspace tool at https://cisco-apps.cisco.com/cisco/psn/commerce. The user specifies the new Assemble to Order (ATO) Product ID for the GainMaker High Gain Balanced Triple Node “GMN-HGBTand the tool steps through the available options. Services may also be selected during this process. Once all the desired options are selected, the configuration and price are displayed. When the “Done” radio button is clicked, the configuration can be exported and saved for future use or immediate ordering.

Table 10. Required Accessories for RF Module

Required Accessories for RF Module	Part Number
Plug-in Pads (attenuators) - Available in 0.5 dB steps from 0 to 20 dB • 1 required for forward input • 1 required for AGC, if applicable* • 4 required for reverse (3 input, 1 output) *To determine AGC pad value, subtract 34dB from the design value main port RF output level at the AGC pilot frequency.	589693 (0 dB) sequentially thru 589734 (20.5 dB)
Plug-in Forward Linear Equalizer - Available in 1.5 dB steps from 0 to 21 dB • 1 required for forward input	See table below
Plug-in Reverse Equalizer - Available in 1 dB steps from 0 to 12 dB at 40 MHz • 1 required for reverse output - unless design value is 0 dB (0 dB EQ is provided)	712719 (0 dB) and 589628 (1 dB) sequentially thru 589639 (12 dB)

Table 11. Required Accessories for Optical Components

Required Accessories for Optical Components	Part Number
Plug-in Pads (attenuators) - Available in 0.5 dB steps from 0 to 20.5 dB • 1 ea required for Transmitter and Receiver(s).	279500 (0 dB)sequentially thru 279513 (13 dB) in 1 dB steps
	504151 (14 dB) sequentially thru 504157 (20 dB) in 1 dB steps
	565231 (0.5 dB) sequentially thru 565251 (20.5 dB) in 1 dB steps

Table 12. Forward Linear Equalizers

Forward Linear Equalizers	Part Number
0 dB 1GHz Forward Linear EQ	4007228
1.5 dB 1GHz Forward Linear EQ	4008778
3.0 dB 1GHz Forward Linear EQ	4008779
4.5 dB 1GHz Forward Linear EQ	4008780
6.0 dB 1GHz Forward Linear EQ	4008781
7.5 dB 1GHz Forward Linear EQ	4008782
9.0 dB 1GHz Forward Linear EQ	4008783
10.5 dB 1GHz Forward Linear EQ	4008784
12.0 dB 1GHz Forward Linear EQ	4008785
13.5 dB 1GHz Forward Linear EQ	4008786
15.0 dB 1GHz Forward Linear EQ	4008787
16.5 dB 1GHz Forward Linear EQ	4019258

Forward Linear Equalizers	Part Number
18.0 dB 1GHz Forward Linear EQ	4019259
19.5 dB 1GHz Forward Linear EQ	4019260
21.0 dB 1GHz Forward Linear EQ	4019261

Table 13. Optical Receivers

Optical Receivers (Available As Part of Configuration or Separately)	Part Number on Module	Part Number for Ordering
GainMaker Node Optical Receiver with SC/APC Connector	4007501	4007671
GainMaker Node Optical Receiver with SC/UPC Connector	4007502	4007672
GainMaker Node Optical Receiver with FC/APC Connector	4007503	4007673
Optical Transmitters (Available As Part of Configuration or Separately)	**Part Number on Module***	**Part Number for Ordering***
All Listed Below Are Thermally Compensated Transmitters		
1310 nm DFB Optical Transmitter - Standard Gain, with SC/APC connector	4013903.1310	590934
1310 nm DFB Optical Transmitter - Standard Gain, with SC/UPC connector	4013904.1310	590935
1310 nm DFB Optical Transmitter - Standard Gain, with FC/APC connector	4013905.1310	590932
1470 nm CWDM DFB Optical Transmitter - Standard Gain with SC/APC connector	4013903.1470	4006971
1490 nm CWDM DFB Optical Transmitter - Standard Gain with SC/APC connector	4013903.1490	4006972
1510 nm CWDM DFB Optical Transmitter - Standard Gain with SC/APC connector	4013903.1510	4006973
1530 nm CWDM DFB Optical Transmitter - Standard Gain with SC/APC connector	4013903.1530	4006974
1550 nm CWDM DFB Optical Transmitter - Standard Gain with SC/APC connector	4013903.1550	4006975
1570 nm CWDM DFB Optical Transmitter - Standard Gain with SC/APC connector	4013903.1570	4006976
1590 nm CWDM DFB Optical Transmitter - Standard Gain with SC/APC connector	4013903.1590	4006977
1610 nm CWDM DFB Optical Transmitter - Standard Gain with SC/APC connector	4013903.1610	4006978
1470 nm CWDM DFB Optical Transmitter - Standard Gain with SC/UPC connector	4013904.1470	4006979
1490 nm CWDM DFB Optical Transmitter - Standard Gain with SC/UPC connector	4013904.1490	4006980
1510 nm CWDM DFB Optical Transmitter - Standard Gain with SC/UPC connector	4013904.1510	4006981
1530 nm CWDM DFB Optical Transmitter - Standard Gain with SC/UPC connector	4013904.1530	4006982
1550 nm CWDM DFB Optical Transmitter - Standard Gain with SC/UPC connector	4013904.1550	4006983
1570 nm CWDM DFB Optical Transmitter - Standard Gain with SC/UPC connector	4013904.1570	4006984
1590 nm CWDM DFB Optical Transmitter - Standard Gain with SC/UPC connector	4013904.1590	4006985
1610 nm CWDM DFB Optical Transmitter - Standard Gain with SC/UPC connector	4013904.1610	4006986
1470 nm CWDM DFB Optical Transmitter - Standard Gain with FC/APC connector	4013905.1470	4006987
1490 nm CWDM DFB Optical Transmitter - Standard Gain with FC/APC connector	4013905.1490	4006988
1510 nm CWDM DFB Optical Transmitter - Standard Gain with FC/APC connector	4013905.1510	4006989
1530 nm CWDM DFB Optical Transmitter - Standard Gain with FC/APC connector	4013905.1530	4006990
1550 nm CWDM DFB Optical Transmitter - Standard Gain with FC/APC connector	4013905.1550	4006991
1570 nm CWDM DFB Optical Transmitter - Standard Gain with FC/APC connector	4013905.1570	4006992
1590 nm CWDM DFB Optical Transmitter - Standard Gain with FC/APC connector	4013905.1590	4006993
1610 nm CWDM DFB Optical Transmitter - Standard Gain with FC/APC connector	4013905.1610	4006994

Table 14. Cisco GainMaker EDR CWDM Reverse Optical Transmitters

GainMaker EDR CWDM Reverse Optical Transmitter and Optical Pluggable Modules (OPMs)	Part Number Module	Part Number for Ordering
Digital 1:1 EDR CWDM Transmitters		
EDR GM1185 transmitter module	800-4042187-01	4042881
EDR 1:1 transmitter OPM CWDM-1270	10-1022072-01	4042868.1270
EDR 1:1 transmitter OPM CWDM-1290	10-1022073-01	4042868.1290
EDR 1:1 transmitter OPM CWDM-1310	10-1022074-01	4042868.1310
EDR 1:1 transmitter OPM CWDM-1330	10-1022075-01	4042868.1330
EDR 1:1 transmitter OPM CWDM-1350	10-1022076-01	4042868.1350
EDR 1:1 transmitter OPM CWDM-1370	10-1022077-01	4042868.1370
EDR 1:1 transmitter OPM CWDM-1390	10-1022078-01	4042868.1390
EDR 1:1 transmitter OPM CWDM-1410	10-1022079-01	4042868.1410
EDR 1:1 transmitter OPM CWDM-1430	10-1022080-01	4042868.1430
EDR 1:1 transmitter OPM CWDM-1450	10-1022081-01	4042868.1450
EDR 1:1 transmitter OPM CWDM-1470	10-1022082-01	4042868.1470
EDR 1:1 transmitter OPM CWDM-1490	10-1022083-01	4042868.1490
EDR 1:1 transmitter OPM CWDM-1510	10-1022084-01	4042868.1510
EDR 1:1 transmitter OPM CWDM-1530	10-1022085-01	4042868.1530
EDR 1:1 transmitter OPM CWDM-1550	10-1022086-01	4042868.1550
EDR 1:1 transmitter OPM CWDM-1570	10-1022087-01	4042868.1570
EDR 1:1 transmitter OPM CWDM-1590	10-1022088-01	4042868.1590
EDR 1:1 transmitter OPM CWDM-1610	10-1022089-01	4042868.1610

Table 15. Cisco GainMaker EDR DWDM Reverse Optical Transmitters

GainMaker EDR DWDM Reverse Optical Transmitter Optical Pluggable Modules (OPMs)	Part Number on Transmitter Module	Part Number for Ordering
Digital 1:1 EDR DWDM Transmitter OPMs		
EDR GM1185 transmitter module	800-4042187-01	4042881
EDR 1:1 transmitter OPM DWDM-17	10-1022090-01	4042869.17
EDR 1:1 transmitter OPM DWDM-18	10-1022091-01	4042869.18
EDR 1:1 transmitter OPM DWDM-19	10-1022092-01	4042869.19
EDR 1:1 transmitter OPM DWDM-20	10-1022093-01	4042869.20
EDR 1:1 transmitter OPM DWDM-21	10-1022094-01	4042869.21
EDR 1:1 transmitter OPM DWDM-22	10-1022095-01	4042869.22
EDR 1:1 transmitter OPM DWDM-23	10-1022096-01	4042869.23
EDR 1:1 transmitter OPM DWDM-24	10-1022097-01	4042869.24
EDR 1:1 transmitter OPM DWDM-25	10-1022098-01	4042869.25
EDR 1:1 transmitter OPM DWDM-26	10-1022099-01	4042869.26
EDR 1:1 transmitter OPM DWDM-27	10-1022100-01	4042869.27
EDR 1:1 transmitter OPM DWDM-28	10-1022101-01	4042869.28
EDR 1:1 transmitter OPM DWDM-29	10-1022102-01	4042869.29
EDR 1:1 transmitter OPM DWDM-30	10-1022103-01	4042869.30
EDR 1:1 transmitter OPM DWDM-31	10-1022104-01	4042869.31
EDR 1:1 transmitter OPM DWDM-32	10-1022105-01	4042869.32

GainMaker EDR DWDM Reverse Optical Transmitter Optical Pluggable Modules (OPMs)	Part Number on Transmitter Module	Part Number for Ordering
EDR 1:1 transmitter OPM DWDM-33	10-1022106-01	4042869.33
EDR 1:1 transmitter OPM DWDM-34	10-1022107-01	4042869.34
EDR 1:1 transmitter OPM DWDM-35	10-1022108-01	4042869.35
EDR 1:1 transmitter OPM DWDM-36	10-1022109-01	4042869.36
EDR 1:1 transmitter OPM DWDM-37	10-1022110-01	4042869.37
EDR 1:1 transmitter OPM DWDM-38	10-1022111-01	4042869.38
EDR 1:1 transmitter OPM DWDM-39	10-1022112-01	4042869.39
EDR 1:1 transmitter OPM DWDM-40	10-1022113-01	4042869.40
EDR 1:1 transmitter OPM DWDM-41	10-1022114-01	4042869.41
EDR 1:1 transmitter OPM DWDM-42	10-1022115-01	4042869.42
EDR 1:1 transmitter OPM DWDM-43	10-1022116-01	4042869.43
EDR 1:1 transmitter OPM DWDM-44	10-1022117-01	4042869.44
EDR 1:1 transmitter OPM DWDM-45	10-1022118-01	4042869.45
EDR 1:1 transmitter OPM DWDM-46	10-1022119-01	4042869.46
EDR 1:1 transmitter OPM DWDM-47	10-1022120-01	4042869.47
EDR 1:1 transmitter OPM DWDM-48	10-1022121-01	4042869.48
EDR 1:1 transmitter OPM DWDM-49	10-1022122-01	4042869.49
EDR 1:1 transmitter OPM DWDM-50	10-1022123-01	4042869.50
EDR 1:1 transmitter OPM DWDM-51	10-1022124-01	4042869.51
EDR 1:1 transmitter OPM DWDM-52	10-1022125-01	4042869.52
EDR 1:1 transmitter OPM DWDM-53	10-1022126-01	4042869.53
EDR 1:1 transmitter OPM DWDM-54	10-1022127-01	4042869.54
EDR 1:1 transmitter OPM DWDM-55	10-1022128-01	4042869.55
EDR 1:1 transmitter OPM DWDM-56	10-1022129-01	4042869.56
EDR 1:1 transmitter OPM DWDM-57	10-1022130-01	4042869.57
EDR 1:1 transmitter OPM DWDM-58	10-1022131-01	4042869.58
EDR 1:1 transmitter OPM DWDM-59	10-1022132-01	4042869.59
EDR 1:1 transmitter OPM DWDM-60	10-1022133-01	4042869.60
EDR 1:1 transmitter OPM DWDM-61	10-1022134-01	4042869.61

Table 16. Related Equipment

Related Equipment (Available As Part of Configuration or Separately)	Part Number on Module	Part Number for Ordering
GainMaker High Output Node - DC Power Supply 40 - 90 V AC	4022705	4026156
GainMaker - Crowbar Surge Protector	715973	4007682
GainMaker Reverse RF Switch	-	GM-3WSW=
GainMaker Node Status Monitoring Transponder (See Transponder Data Sheet)	Refer to the Cisco GainMaker Status Monitoring Transponder Data Sheet. http://www.cisco.com/c/en/us/products/video/transponders/index.html.	

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