

GainMaker 1 GHz High Output 4-Port Node with 65/86 MHz Split

The Cisco GainMaker[®] High Output 4-Port Node with 65/86 MHz Split is designed to serve as an integral part of today's network architectures. The node combines the proven Cisco[®] technologies of both the Cisco GainMaker RF Amplifier and Cisco Prisma[®] optical components. Featuring four high-level RF output ports and a segmentable reverse path, it is an ideal platform for delivering video (digital and analog) as well as high-speed data services over advanced hybrid fiber-coaxial (HFC) networks.

Reverse traffic can be segmented and routed to Fabry-Perot (FP), distributed feedback (DFB), coarse wavelength-division multiplexing (CWDM), dense wavelength-division multiplexing (DWDM), or 2:1 baseband digital reverse (bdr) reverse transmitters. The Cisco GainMaker High Output 4-Port Node (Figure 1) is also available with an optional custom status-monitoring Hybrid Management System (HMS) transponder for use with all HMS-compliant monitoring and control element management systems. Onboard temperature, RF switch position (wink switch), power supply condition, as well as other features and parameters can be monitored through this module.

Figure 1. Cisco GainMaker High Output 4-Port Node with 65/86 MHz Split



Features

- Use of plug-in accessories common to all Cisco GainMaker products
- Two optical transmitters and one receiver positioned in the lid
- Optional plug-in status monitoring
- Optional transmitter redundancy (with nonsegmented option)
- Fiber entry and management tray that 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 port, which allow optimum reverse path design and alignment
- Optional dual redundant receiver that provides the ability to switch to redundant optical power in case of a fiber cut

Block Diagrams

Figures 2 through 5 provide block diagrams of configuration options for the Cisco GainMaker High Output 4-Port Node with 65/86 MHz Split.

Figure 2. Combined Reverse Path with Redundant Transmitter Block Diagram

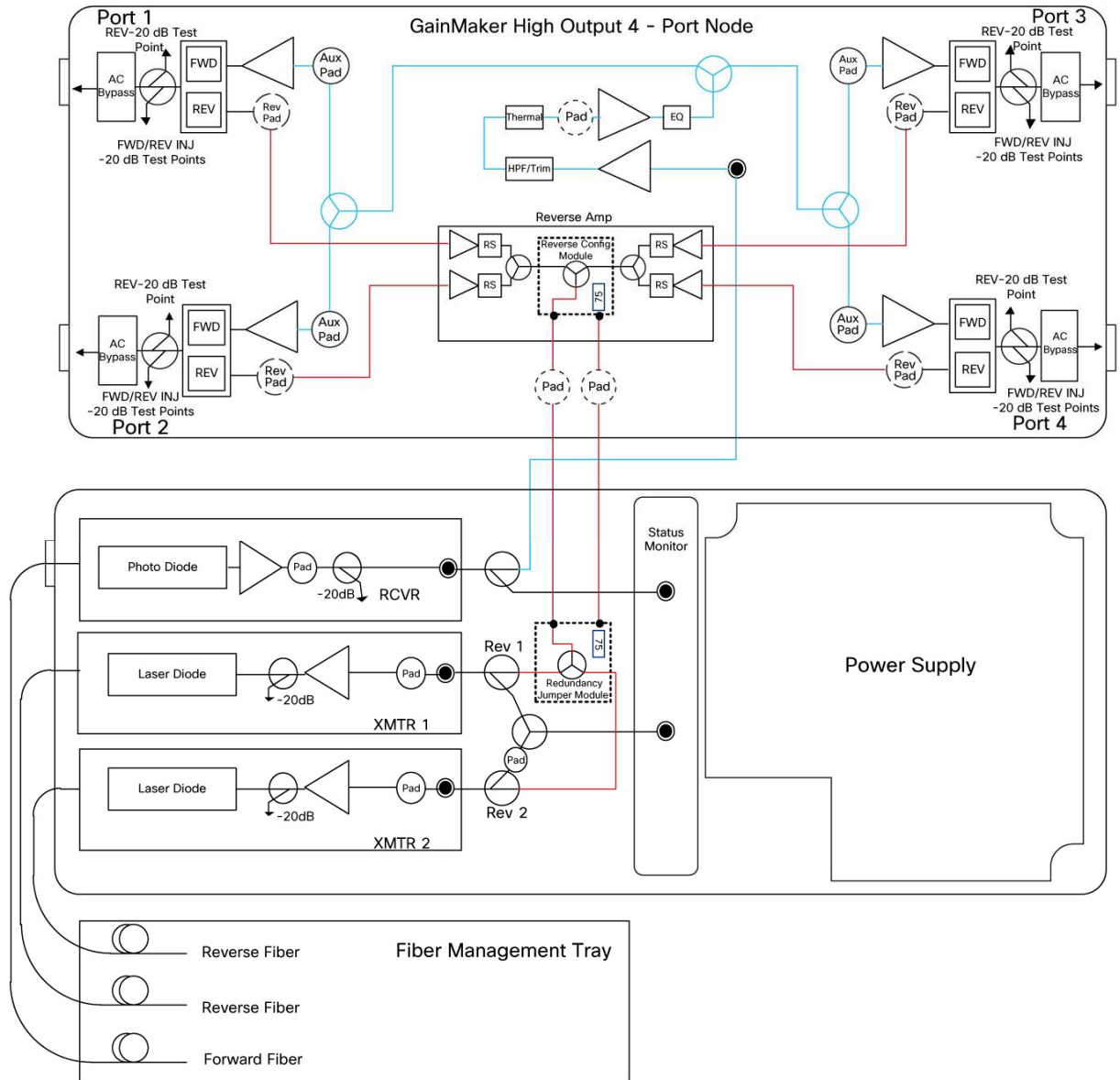


Figure 3. Segmented Reverse Path Block Diagram

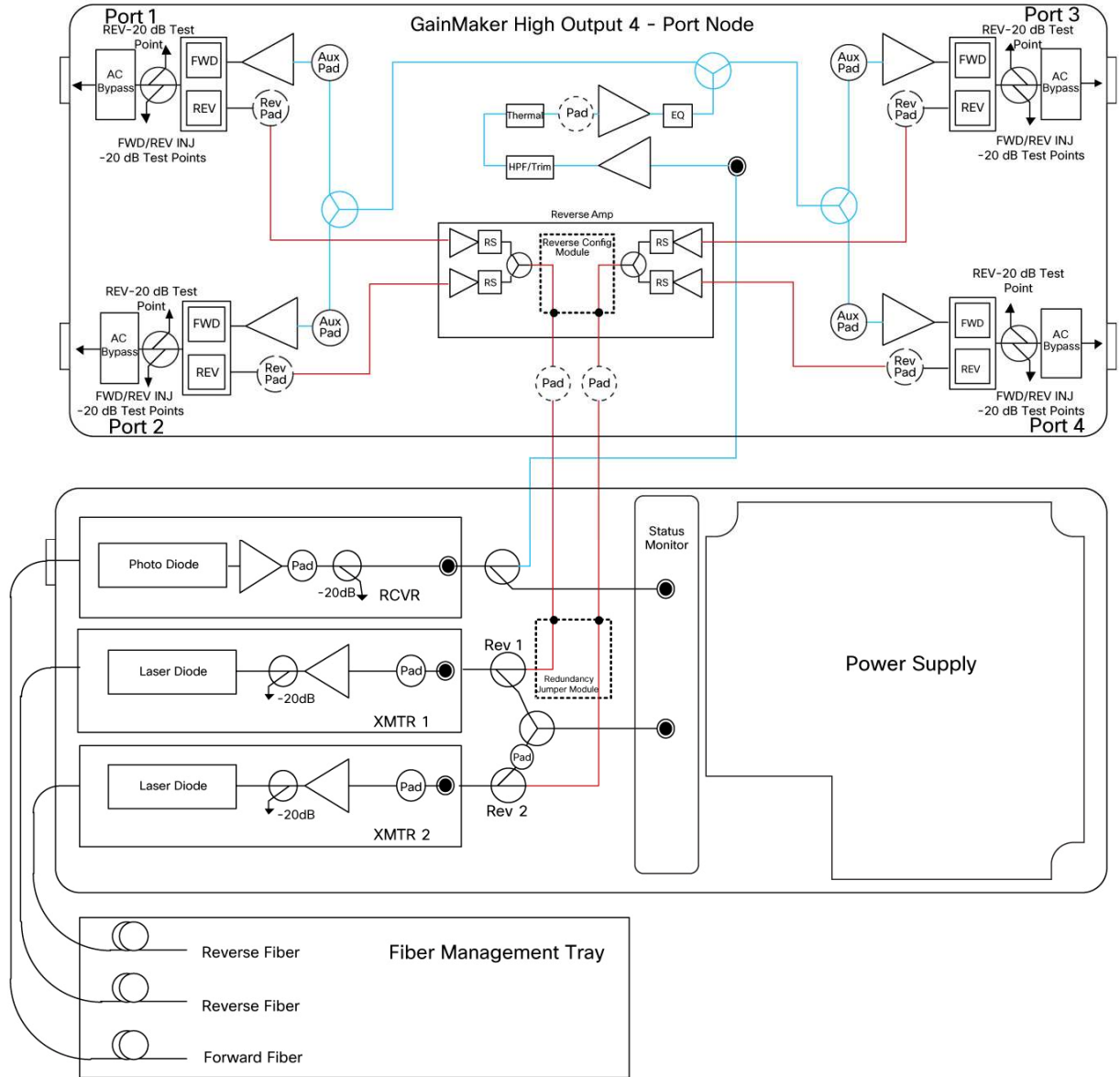


Figure 4. Dual Redundant Receiver Block Diagram

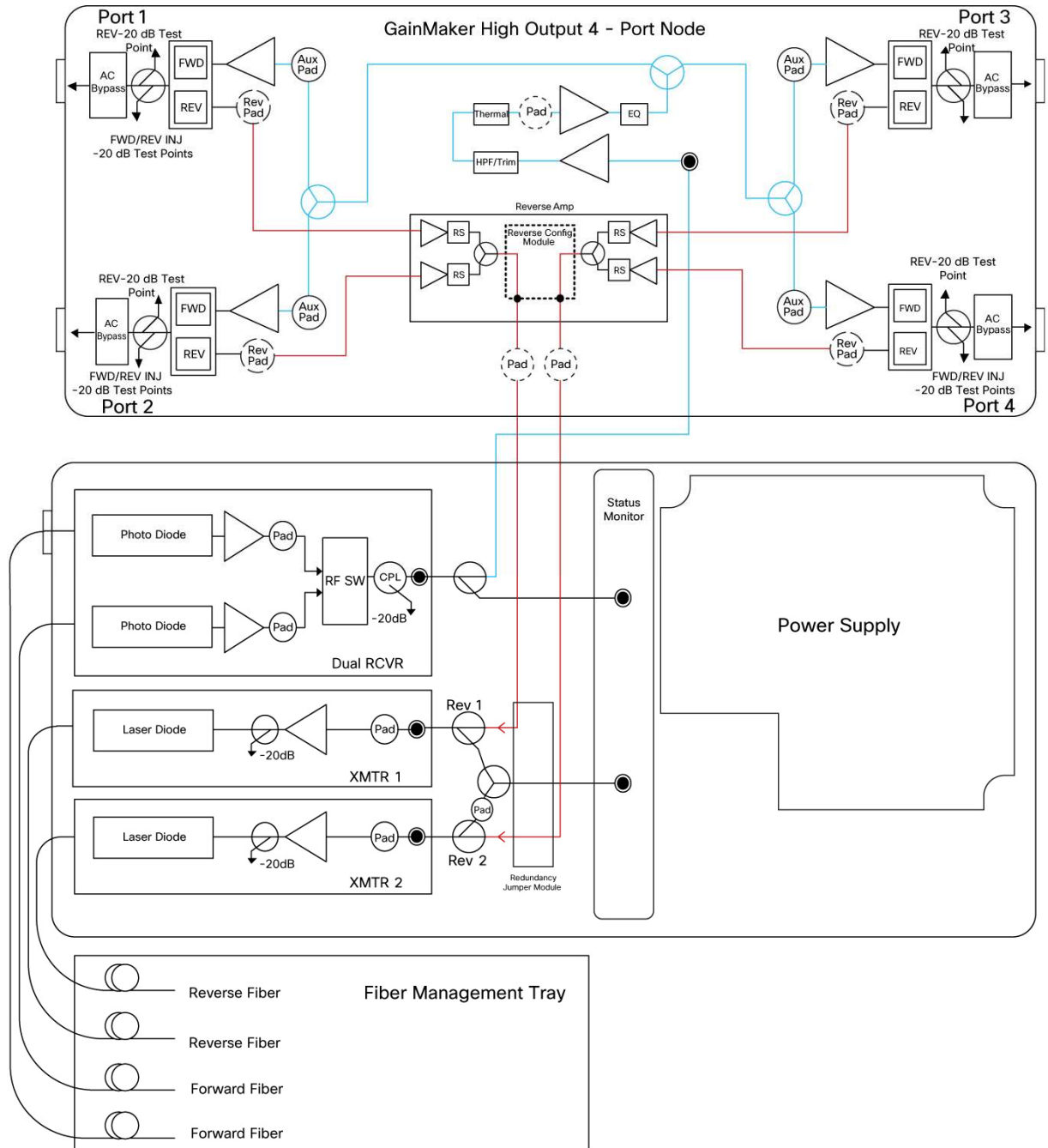
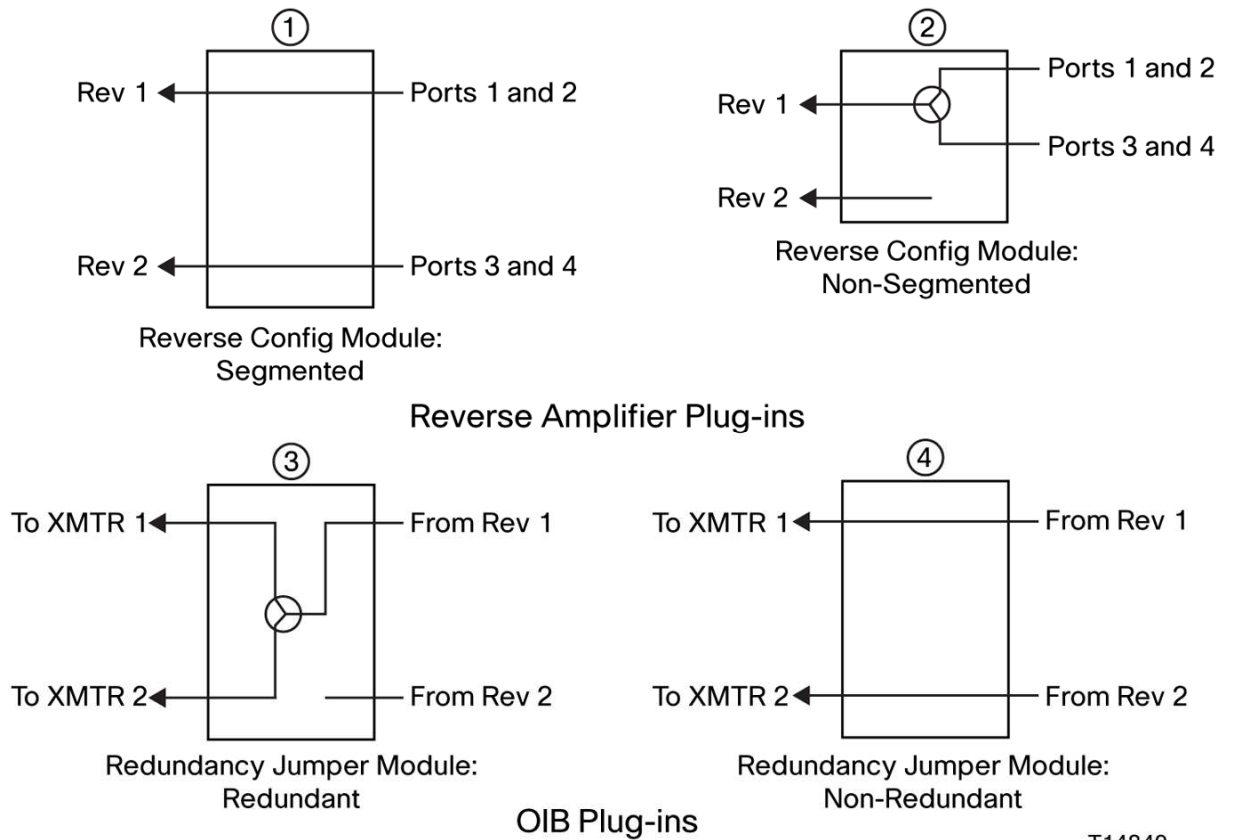


Figure 5. Configuration Module Block Diagram



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Table 1 lists all possible reverse amplifier plug-in and Optical Interface Board (OIB) plug-in combinations. Each circled number references the plug-ins shown in Figure 5.

Table 1. Reverse Amplifier and Optical Interface Board Plug-in Combinations

Transmitters	Reverse Amplifier Plug-in	OIB Plug-in
Segmented XMTRS (nonredundant)	①	④
Redundant XMTR (nonsegmented)	②	③
Nonsegmented and nonredundant	②	④

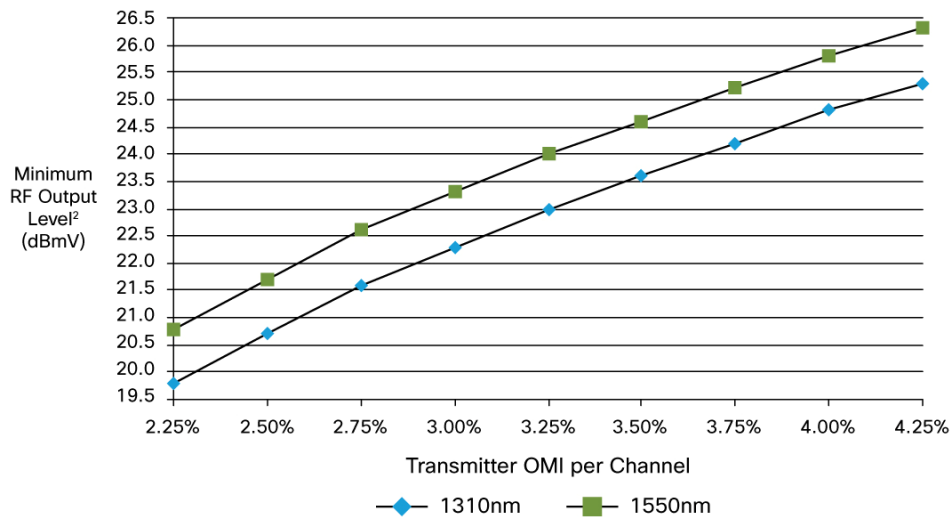
Optical Specifications

Table 2 lists optical section specifications for the forward receiver module, and Figure 6 compares receiver RF output levels with the transmitter Optical Modulation Index (OMI). The notes following Figure 6 also apply to Table 2.

Table 2. Optical Section

Optical Section: Forward Receiver Module	Units	GainMaker Standard RX	Notes
Wavelength	nm	1310 and 1550	
Optical input range	mW dBm	0.5-1.6 -3 -+2	
Pass band	MHz	52-1002	
Frequency response	dB	± 0.75	1
Tilt (±1.0 dB)	dB	0	
Optical input test point (±10%)	VDC	1V per mW	
RF output level at 0 dBm optical input	dBmV	Refer to Figure 6	2
RF output test point (±1.0 dB)	dB	-20	

Figure 6. Receiver RF Output Level and Transmitter OMI



Notes:

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 per channel, with receiver optical input power of 0 dBm. To determine RF output levels at other optical input power levels, 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 for Model 6940/6944 and GainMaker Optoelectronic Stations" data sheet, part number 750874.

Other Product Specifications

Tables 3 through 9 provide additional specifications for the Cisco GainMaker GainMaker High Output 4-Port Node with 65/86 MHz Split.

Table 3. RF Section Specifications

General Station Performance	Units	Forward	Reverse	Notes
Pass band	MHz	86-1002	5-65	
Return loss	dB	16	16	
Hum modulation at 12A	dB	70 (86-870 MHz) 60 (870-1002 MHz)	60 (5-10 MHz) 70 (11-65 MHz)	
Hum modulation at 15A	dB	65 (86-870 MHz) 60 (870-1002 MHz)	60 (5-10 MHz) 65 (11-65 MHz)	
Test points (± 0.5 dB)	dB	-20	-20	

Table 4. Launch Amplifier Performance: Forward

Launch Amplifier Performance: Forward	Units	GainMaker 4-Port	Notes
Operational gain (minimum)	dB	41	
Frequency response	dB	0.5	
Internal tilt (± 1 dB)	dB	14.0	1, 2
Noise figure at:			
86 MHz	dB	8.5	
1002 MHz		8.0	
Reference output levels at:			
1002 MHz	dBmV	56.0	
870 MHz		54.0	
750 MHz		52.2	
650 MHz		50.5	
550 MHz		49.0	
86 MHz		42.0	
Reference output tilt (86-1002 MHz)	dB	14.0	1, 3
64 PAL B/G Channels (CW) with Digital			8
Composite triple beat	dB	66	4
Cross modulation	dB	60	4, 11
Composite second order (high side)	dB	64	4
64 PAL I Channels (CW) with Digital			9
Composite triple beat	dB	59	4
Cross modulation	dB	59	4, 11
42 CENELEC Channels (CW)			10
Composite triple beat	dB	112.5	
Cross modulation	dB	113.0	
Composite second order (high side)	dB	115.5	
78 NTSC Channels (CW) with Digital			7
Composite triple beat	dB	65	4
Cross modulation	dB	59	4, 11
Composite second order (high side)	dB	64	4

Notes:

- Reference output tilt and internal tilt are both "Linear" tilt.
- Forward internal tilt specified is primarily due to an on-board equalizer and a factory configured linear interstage equalizer (ISEQ).
- 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).
- 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.
- Reverse Operational Gain is measured from the reverse RF input port to the RF input to the reverse transmitter and includes optical interface board losses.
- Reverse Gain and Noise Figure for launch amp with 0 dB reverse input pad and 0 dB output pad.
- Loaded with 78 NTSC CW carriers from 91 to 550 MHz. "Digital" refers to 550 to 1002 MHz loading with QAM carriers at -6 dB relative to analog video carrier levels.
- Loaded with 64 PAL B/G CW carriers from 112-600 MHz. "Digital" refers to 600 to 1002 MHz loading with QAM carriers at -6 dB relative to analog video carrier levels.
- Loaded with 64 PAL I CW carriers from 88-600 MHz. "Digital" refers to 600 to 1002 MHz loading with QAM carriers at -6 dB relative to analog video carrier levels.
- Tested per CENELEC Standard EN50083-3. RF output level is at 870 MHz (forward).
- X-mod (@ 15.75 kHz) specified using 100% synchronous modulation and frequency selective measurement device.

Table 5. Launch Amplifier Performance - Reverse

Reverse Station Performance	Units	Reverse	Notes
Amplifier type	-	GaAs FET	
Operational gain (minimum)	dB	-2	5, 6
Frequency response	dB	± 0.5	
Internal tilt (±1 dB)	dB	0	
Path to path isolation	dB	50	
Noise figure	dB	13.5	6

Notes:

1. Reverse operational gain is measured from the reverse RF input port to the RF input to the reverse transmitter and includes optical interface board losses.
2. Reverse gain and noise figure for launch amplifier with 0 dB reverse input pad and 0 dB output pad.

Table 6. RF Delay Specifications

Station Delay Characteristics			
Forward (Chrominance to Luminance Delay)		Reverse (Group Delay in 1.5 MHz BW)	
Frequency (MHz)	Delay (nS)	Frequency (MHz)	Delay (nS)
112.25 - 116.68	2	5.0-6.5	33
119.25 - 123.68	2	6.5-8.0	15
126.25 - 130.68	2	8.0-9.5	8
		60.5-62.0	5
		62.0-63.5	7
		63.5-65.0	10

Table 7. Electrical Specifications

Electrical	Units	Value			Notes
Maximum AC through current (continuous)	A	15			
Maximum AC through current (surge)	A	25			
Component DC Power Consumption (Typical)		at +24 VDC	at +15 VDC	at -6 VDC	1
Launch amplifier	A	2.60			
Status monitoring transponder	A	0.15			
Standard optical receiver	A	0.25	0.01	0.035	
Reverse transmitter: high gain FP	A	0.09	-	0.07	
Reverse transmitter: high gain DFB	A	0.11	-	0.09	
Power supply DC current rating	A	3.5	0.05	0.35	1

Note:

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

Table 8. Electrical Specifications

GainMaker 4-Port Node, 2 Transmitters, 1 Receiver, 1 Status Monitor, 1 Launch Amplifier						
DC current	24 VDC at 3.2A, 15 VDC at 0.01A, and -6 VDC at 0.215A					
AC voltage	90	80	70	60	50	40
AC current (A)	1.21	1.26	1.45	1.69	1.97	2.47
AC power (W)	92.31	91.67	90.91	90.49	90.22	90.5

Table 9. Environmental and Mechanical Specifications

Environmental	Units	Value
Operating temperature range	°F and °C	-40 to 140°F (-40 to 60°C)
Relative humidity range	%	5 to 95%
Mechanical		
Housing dimensions (L x H x D)	in. and mm	17.6 in. x 7.5 in. x 7.9 in. (447 mm x 191 mm x 201 mm)
Weight (station with 1 RX, 1 TX, and power supply)	lb and kg	22.5 lb (10.2 kg)

Ordering Information

The Cisco GainMaker High Output 4-Port Node with 65/86 MHz Split is available in a wide variety of configurations. The GainMaker Ordering Matrix provides ordering information for configured node stations and launch amplifiers. Tables 10 and 11 contain ordering information for required and optional accessories, and Tables 12 and 13 give information for transmitters and receivers and for related equipment. Please consult with your Account Representative, Customer Service Representative, or Applications Engineer to determine the best configuration for your particular application.

Table 10. Required Accessories

Required Accessories for RF Module	Part Number
Plug-in Pads (attenuators): available in 0.5-dB steps from 0 to 20 dB <ul style="list-style-type: none"> • 1 required for interstage (if 0 dB value installed in the node when shipped does not fit the system design) • 6 required for reverse (4 input, 2 output) 	589693 (0 dB) sequentially through 589734 (20.5 dB)
Plug-in Forward Linear Equalizer: available in 1.5-dB steps from 0 to 30 dB at 1002 MHz <ul style="list-style-type: none"> • 1 required for forward input 	See Table 10
Required Accessories for Optical Components	Part Number
Plug-in Pads (attenuators): available in 0.5-dB steps from 0 to 20.5 dB <ul style="list-style-type: none"> • 1 each required for transmitter and receiver(s) 	279500 (0 dB) sequentially through 279513 (13 dB) in 1-dB steps
	504151 (14 dB) sequentially through 504157 (20 dB) in 1-dB steps
	565231 (0.5 dB) sequentially through 565251 (20.5 dB) in 1-dB steps

Note: Configured nodes ship without reverse input pads and without forward input pads or equalizer. All other accessories are shipped from the factory. Forward launch amplifier attenuator pads, interstage equalizer and system trim are shipped with every configured node.

Table 11. Optional Accessories

Reverse Amplifier Segmentation Module		Part Number	
Reverse Configuration Module: Nonsegmented (box of 5)		4018565	
Reverse Configuration Module: Segmented (box of 5)		4018564	
OIB Redundancy Module		Part Number	
Redundancy Jumper Module Plug-in: Redundant (box of 5)		4018565	
Redundancy Jumper Module Plug-in: Nonredundant (combined) (box of 5)		4018564	
Launch Amplifier Module		Part Number on Module	Part Number for Ordering
GainMaker High Output 4-Port Launch Amplifier 65/86 MHz		4030929	4030924
Forward Linear Equalizers		Part Number on Module	Part Number for Ordering
0 dB 1GHz Forward Linear Equalizer		-	4007228
1.5 dB 1GHz Forward Linear Equalizer		-	4008778
3.0 dB 1GHz Forward Linear Equalizer		-	4008779
4.5 dB 1GHz Forward Linear Equalizer		-	4008780
6.0 dB 1GHz Forward Linear Equalizer		-	4008781
7.5 dB 1GHz Forward Linear Equalizer		-	4008782
9.0 dB 1GHz Forward Linear Equalizer		-	4008783
10.5 dB 1GHz Forward Linear Equalizer		-	4008784
12.0 dB 1GHz Forward Linear Equalizer		-	4008785
13.5 dB 1GHz Forward Linear Equalizer		-	4008786
Forward Linear Equalizers		Part Number on Module	Part Number for Ordering
16.5 dB 1GHz Forward Linear Equalizer		-	4019258
18.0 dB 1GHz Forward Linear Equalizer		-	4019259
19.5 dB 1GHz Forward Linear Equalizer		-	4019260
21.0 dB 1GHz Forward Linear Equalizer		-	4019261

Table 12. Transmitters and Receivers

Optical Transmitters and Receivers (available as part of configuration or separately)	Part Number on Module	Part Number for Ordering
Receivers		
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
GainMaker Node Dual Redundant Receiver with SC/APC connector	4030121	4030121
Analog FP Transmitters		
FP Optical Transmitter: High Gain 1310 nm with SC/APC connector	717908	590942
FP Optical Transmitter: High Gain 1310 nm with SC/UPC connector	717909	590943
FP Optical Transmitter: High Gain 1310 nm with FC/APC connector	717906	590940
Analog DFB Transmitters		
DFB Optical Transmitter: High Gain 1310 nm with SC/APC connector	4013906.1310	590938
DFB Optical Transmitter: High Gain 1310 nm with SC/UPC connector	4013907.1310	590939
DFB Optical Transmitter: High Gain 1310 nm with FC/APC connector	4013896.1310	590936

Optical Transmitters and Receivers (available as part of configuration or separately)	Part Number on Module	Part Number for Ordering
Analog CWDM Transmitters		
CWDM DFB Optical Transmitter: High Gain 1470 nm with SC/APC connector	4013906.1470	4007003
CWDM DFB Optical Transmitter: High Gain 1490 nm with SC/APC connector	4013906.1490	4007004
CWDM DFB Optical Transmitter: High Gain 1510 nm with SC/APC connector	4013906.1510	4007005
CWDM DFB Optical Transmitter: High Gain 1530 nm with SC/APC connector	4013906.1530	4007006
CWDM DFB Optical Transmitter: High Gain 1550 nm with SC/APC connector	4013906.1550	4007007
CWDM DFB Optical Transmitter: High Gain 1570 nm with SC/APC connector	4013906.1570	4007008
CWDM DFB Optical Transmitter: High Gain 1590 nm with SC/APC connector	4013906.1590	4007009
CWDM DFB Optical Transmitter: High Gain 1610 nm with SC/APC connector	4013906.1610	4007010
CWDM DFB Optical Transmitter: High Gain 1470 nm with SC/UPC connector	4013907.1470	4007011
CWDM DFB Optical Transmitter: High Gain 1490 nm with SC/UPC connector	4013907.1490	4007012
CWDM DFB Optical Transmitter: High Gain 1510 nm with SC/UPC connector	4013907.1510	4007013
CWDM DFB Optical Transmitter: High Gain 1530 nm with SC/UPC connector	4013907.1530	4007014
CWDM DFB Optical Transmitter: High Gain 1550 nm with SC/UPC connector	4013907.1550	4007015
CWDM DFB Optical Transmitter: High Gain 1570 nm with SC/UPC connector	4013907.1570	4007016
CWDM DFB Optical Transmitter: High Gain 1590 nm with SC/UPC connector	4013907.1590	4007017
CWDM DFB Optical Transmitter: High Gain 1610 nm with SC/UPC connector	4013907.1610	4007018
CWDM DFB Optical Transmitter: High Gain 1470 nm with FC/APC connector	4013908.1470	4007019
CWDM DFB Optical Transmitter: High Gain 1490 nm with FC/APC connector	4013908.1490	4007020
CWDM DFB Optical Transmitter: High Gain 1510 nm with FC/APC connector	4013908.1510	4007021
CWDM DFB Optical Transmitter: High Gain 1530 nm with FC/APC connector	4013908.1530	4007022
CWDM DFB Optical Transmitter: High Gain 1550 nm with FC/APC connector	4013908.1550	4007023
CWDM DFB Optical Transmitter: High Gain 1570 nm with FC/APC connector	4013908.1570	4007024
CWDM DFB Optical Transmitter: High Gain 1590 nm with FC/APC connector	4013908.1590	4007025
CWDM DFB Optical Transmitter: High Gain 1610 nm with FC/APC connector	4013908.1610	4007026
Analog DWDM TX		
DWDM Analog Optical Transmitter, Ch. 20, 1561.42 nm with SC/APC connector	4023375.20	4023375.20
DWDM Analog Optical Transmitter, Ch. 21, 1560.61 nm with SC/APC connector	4023375.21	4023375.21
DWDM Analog Optical Transmitter, Ch. 22, 1559.79 nm with SC/APC connector	4023375.22	4023375.22
DWDM Analog Optical Transmitter, Ch. 23, 1558.98 nm with SC/APC connector	4023375.23	4023375.23
DWDM Analog Optical Transmitter, Ch. 24, 1558.17 nm with SC/APC connector	4023375.24	4023375.24
DWDM Analog Optical Transmitter, Ch. 25, 1557.36 nm with SC/APC connector	4023375.25	4023375.25
DWDM Analog Optical Transmitter, Ch. 26, 1556.55 nm with SC/APC connector	4023375.26	4023375.26
DWDM Analog Optical Transmitter, Ch. 27, 1555.75 nm with SC/APC connector	4023375.27	4023375.27
DWDM Analog Optical Transmitter, Ch. 28, 1554.94 nm with SC/APC connector	4023375.28	4023375.28
DWDM Analog Optical Transmitter, Ch. 29, 1554.13 nm with SC/APC connector	4023375.29	4023375.29
DWDM Analog Optical Transmitter, Ch. 30, 1553.33 nm with SC/APC connector	4023375.30	4023375.30
DWDM Analog Optical Transmitter, Ch. 31, 1552.52 nm with SC/APC connector	4023375.31	4023375.31
DWDM Analog Optical Transmitter, Ch. 32, 1551.72 nm with SC/APC connector	4023375.32	4023375.32
DWDM Analog Optical Transmitter, Ch. 33, 1550.92 nm with SC/APC connector	4023375.33	4023375.33
DWDM Analog Optical Transmitter, Ch. 34, 1550.12 nm with SC/APC connector	4023375.34	4023375.34
DWDM Analog Optical Transmitter, Ch. 35, 1549.32 nm with SC/APC connector	4023375.35	4023375.35
DWDM Analog Optical Transmitter, Ch. 36, 1548.51 nm with SC/APC connector	4023375.36	4023375.36

Optical Transmitters and Receivers (available as part of configuration or separately)	Part Number on Module	Part Number for Ordering
DWDM Analog Optical Transmitter, Ch. 37, 1547.72 nm with SC/APC connector	4023375.37	4023375.37
DWDM Analog Optical Transmitter, Ch. 38, 1546.92 nm with SC/APC connector	4023375.38	4023375.38
DWDM Analog Optical Transmitter, Ch. 39, 1546.12 nm with SC/APC connector	4023375.39	4023375.39
DWDM Analog Optical Transmitter, Ch. 40, 1545.32 nm with SC/APC connector	4023375.40	4023375.40
DWDM Analog Optical Transmitter, Ch. 41, 1544.53 nm with SC/APC connector	4023375.41	4023375.41
DWDM Analog Optical Transmitter, Ch. 42, 1543.73 nm with SC/APC connector	4023375.42	4023375.42
DWDM Analog Optical Transmitter, Ch. 43, 1542.94 nm with SC/APC connector	4023375.43	4023375.43
DWDM Analog Optical Transmitter, Ch. 44, 1542.14 nm with SC/APC connector	4023375.44	4023375.44
DWDM Analog Optical Transmitter, Ch. 45, 1541.35 nm with SC/APC connector	4023375.45	4023375.45
DWDM Analog Optical Transmitter, Ch. 46, 1540.56 nm with SC/APC connector	4023375.46	4023375.46
DWDM Analog Optical Transmitter, Ch. 47, 1539.77 nm with SC/APC connector	4023375.47	4023375.47
DWDM Analog Optical Transmitter, Ch. 48, 1538.98 nm with SC/APC connector	4023375.48	4023375.48
DWDM Analog Optical Transmitter, Ch. 49, 1538.19 nm with SC/APC connector	4023375.49	4023375.49
DWDM Analog Optical Transmitter, Ch. 50, 1537.40 nm with SC/APC connector	4023375.50	4023375.50
DWDM Analog Optical Transmitter, Ch. 51, 1536.61 nm with SC/APC connector	4023375.51	4023375.51
DWDM Analog Optical Transmitter, Ch. 52, 1535.82 nm with SC/APC connector	4023375.52	4023375.52
DWDM Analog Optical Transmitter, Ch. 53, 1535.04 nm with SC/APC connector	4023375.53	4023375.53
DWDM Analog Optical Transmitter, Ch. 54, 1534.25 nm with SC/APC connector	4023375.54	4023375.54
DWDM Analog Optical Transmitter, Ch. 55, 1533.47 nm with SC/APC connector	4023375.55	4023375.55
DWDM Analog Optical Transmitter, Ch. 56, 1532.68 nm with SC/APC connector	4023375.56	4023375.56
DWDM Analog Optical Transmitter, Ch. 57, 1531.90 nm with SC/APC connector	4023375.57	4023375.57
DWDM Analog Optical Transmitter, Ch. 58, 1531.12 nm with SC/APC connector	4023375.58	4023375.58
DWDM Analog Optical Transmitter, Ch. 59, 1530.33 nm with SC/APC connector	4023375.59	4023375.59
Digital DFB 2:1 bdr-I Transmitters		
DFB 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1310 nm with SC/APC connector	4018916.1310	4018915.1310
Digital CWDM 2:1 bdr-I Transmitters		
CWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1470 nm with SC/APC connector	4018916.1470	4018915.1470
CWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1490 nm with SC/APC connector	4018916.1490	4018915.1490
CWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1510 nm with SC/APC connector	4018916.1510	4018915.1510
CWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1530 nm with SC/APC connector	4018916.1530	4018915.1530
CWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1550 nm with SC/APC connector	4018916.1550	4018915.1550
CWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1570 nm with SC/APC connector	4018916.1570	4018915.1570
CWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1590 nm with SC/APC connector	4018916.1590	4018915.1590
CWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1610 nm with SC/APC connector	4018916.1610	4018915.1610
Digital DWDM 2:1 bdr-I Transmitters		
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1563.86 nm with SC/APC	4018916.17	4018915.17
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1563.05 nm with SC/APC	4018916.18	4018915.18
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1562.23 nm with SC/APC	4018916.19	4018915.19
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1561.42 nm with SC/APC	4018916.20	4018915.20
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1560.61 nm with SC/APC	4018916.21	4018915.21
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1559.79 nm with SC/APC	4018916.22	4018915.22
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1558.98 nm with SC/APC	4018916.23	4018915.23
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1558.17 nm with SC/APC	4018916.24	4018915.24

Optical Transmitters and Receivers (available as part of configuration or separately)	Part Number on Module	Part Number for Ordering
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1557.36 nm with SC/APC	4018916.25	4018915.25
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1556.55 nm with SC/APC	4018916.26	4018915.26
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1555.75 nm with SC/APC	4018916.27	4018915.27
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1554.94 nm with SC/APC	4018916.28	4018915.28
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1554.13 nm with SC/APC	4018916.29	4018915.29
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1553.33 nm with SC/APC	4018916.30	4018915.30
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1552.52 nm with SC/APC	4018916.31	4018915.31
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1551.72 nm with SC/APC	4018916.32	4018915.32
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1550.92 nm with SC/APC	4018916.33	4018915.33
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1550.12 nm with SC/APC	4018916.34	4018915.34
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1549.32 nm with SC/APC	4018916.35	4018915.35
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1548.51 nm with SC/APC	4018916.36	4018915.36
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1547.72 nm with SC/APC	4018916.37	4018915.37
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1546.92 nm with SC/APC	4018916.38	4018915.38
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1546.12 nm with SC/APC	4018916.39	4018915.39
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1545.32 nm with SC/APC	4018916.40	4018915.40
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1544.53 nm with SC/APC	4018916.41	4018915.41
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1543.73 nm with SC/APC	4018916.42	4018915.42
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1542.94 nm with SC/APC	4018916.43	4018915.43
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1542.14 nm with SC/APC	4018916.44	4018915.44
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1541.35 nm with SC/APC	4018916.45	4018915.45
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1540.56 nm with SC/APC	4018916.46	4018915.46
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1539.77 nm with SC/APC	4018916.47	4018915.47
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1538.98 nm with SC/APC	4018916.48	4018915.48
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1538.19 nm with SC/APC	4018916.49	4018915.49
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1537.40 nm with SC/APC	4018916.50	4018915.50
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1536.61 nm with SC/APC	4018916.51	4018915.51
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1535.82 nm with SC/APC	4018916.52	4018915.52
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1535.04 nm with SC/APC	4018916.53	4018915.53
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1534.25 nm with SC/APC	4018916.54	4018915.54
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1533.47 nm with SC/APC	4018916.55	4018915.55
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1532.68 nm with SC/APC	4018916.56	4018915.56
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1531.90 nm with SC/APC	4018916.57	4018915.57
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1531.12 nm with SC/APC	4018916.58	4018915.58
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1530.33 nm with SC/APC	4018916.59	4018915.59
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1529.55 nm with SC/APC	4018916.60	4018915.60
DWDM 2.5, 2:1 bdr-I Transmitter, GainMaker Node, 1528.77 nm with SC/APC	4018916.61	4018915.61
Digital 2:1 bdr-I Receivers		
2.5, 2:1 bdr-I P2 Receiver, STD RNG	4018936	4018935
2.5, 2:1 bdr-I P2 Receiver, EXT RNG	4018939	4018938

Table 13. Related Equipment

Related Equipment (available as part of configuration or separately)	Part Number on Module	Part Number for Ordering
High Output 4-Port GainMaker Node: Standard DC Power Supply 40-90 VAC	4027978	4027962
High Output 4-Port GainMaker Node Status Monitoring Transponder: See Transponder for GainMaker Optoelectronic Node data sheet, part number 7000087	4027979	4027963

Table 14. Cisco GM EDR CWDM Reverse Optical Transmitters

GM EDR CWDM Reverse Optical Transmitters	Part Number on Tx Module	Part Number of OPM	Part Number for Ordering
Digital 1:1 EDR CWDM Transmitters			
EDR GM1185 Tx module	800-4042187-01	N/A	4042881
EDR GM1185 Tx w/ OPM CWDM-1270	800-4042187-01	10-1022072-01	4042883.1270
EDR GM1185 Tx w/ OPM CWDM-1290	800-4042187-01	10-1022073-01	4042883.1290
EDR GM1185 Tx w/ OPM CWDM-1310	800-4042187-01	10-1022074-01	4042883.1310
EDR GM1185 Tx w/ OPM CWDM-1330	800-4042187-01	10-1022075-01	4042883.1330
EDR GM1185 Tx w/ OPM CWDM-1350	800-4042187-01	10-1022076-01	4042883.1350
EDR GM1185 Tx w/ OPM CWDM-1370	800-4042187-01	10-1022077-01	4042883.1370
EDR GM1185 Tx w/ OPM CWDM-1390	800-4042187-01	10-1022078-01	4042883.1390
EDR GM1185 Tx w/ OPM CWDM-1410	800-4042187-01	10-1022079-01	4042883.1410
EDR GM1185 Tx w/ OPM CWDM-1430	800-4042187-01	10-1022080-01	4042883.1430
EDR GM1185 Tx w/ OPM CWDM-1450	800-4042187-01	10-1022081-01	4042883.1450
EDR GM1185 Tx w/ OPM CWDM-1470	800-4042187-01	10-1022082-01	4042883.1470
EDR GM1185 Tx w/ OPM CWDM-1490	800-4042187-01	10-1022083-01	4042883.1490
EDR GM1185 Tx w/ OPM CWDM-1510	800-4042187-01	10-1022084-01	4042883.1510
EDR GM1185 Tx w/ OPM CWDM-1530	800-4042187-01	10-1022085-01	4042883.1530
EDR GM1185 Tx w/ OPM CWDM-1550	800-4042187-01	10-1022086-01	4042883.1550
EDR GM1185 Tx w/ OPM CWDM-1570	800-4042187-01	10-1022087-01	4042883.1570
EDR GM1185 Tx w/ OPM CWDM-1590	800-4042187-01	10-1022088-01	4042883.1590
EDR GM1185 Tx w/ OPM CWDM-1610	800-4042187-01	10-1022089-01	4042883.1610
Digital 2:1 EDR CWDM Transmitters			
EDR GM2185 Tx module	4041274	N/A	4042885
EDR GM2185 Tx w/ OPM CWDM-1270	4041274	10-1022058-01	4042887.1270
EDR GM2185 Tx w/ OPM CWDM-1290	4041274	10-1022059-01	4042887.1290
EDR GM2185 Tx w/ OPM CWDM-1310	4041274	10-1022060-01	4042887.1310
EDR GM2185 Tx w/ OPM CWDM-1330	4041274	10-1022061-01	4042887.1330
EDR GM2185 Tx w/ OPM CWDM-1350	4041274	10-1022062-01	4042887.1350
EDR GM2185 Tx w/ OPM CWDM-1370	4041274	10-1022008-01	4042887.1370
EDR GM2185 Tx w/ OPM CWDM-1390	4041274	10-1022063-01	4042887.1390
EDR GM2185 Tx w/ OPM CWDM-1410	4041274	10-1022064-01	4042887.1410
EDR GM2185 Tx w/ OPM CWDM-1430	4041274	10-1022065-01	4042887.1430
EDR GM2185 Tx w/ OPM CWDM-1450	4041274	10-1022066-01	4042887.1450
EDR GM2185 Tx w/ OPM CWDM-1470	4041274	10-1022067-01	4042887.1470
EDR GM2185 Tx w/ OPM CWDM-1490	4041274	10-1022009-01	4042887.1490
EDR GM2185 Tx w/ OPM CWDM-1510	4041274	10-1022010-01	4042887.1510

GM EDR CWDM Reverse Optical Transmitters	Part Number on Tx Module	Part Number of OPM	Part Number for Ordering
EDR GM2185 Tx w/ OPM CWDM-1530	4041274	10-1022068-01	4042887.1530
EDR GM2185 Tx w/ OPM CWDM-1550	4041274	10-1022011-01	4042887.1550
EDR GM2185 Tx w/ OPM CWDM-1570	4041274	10-1022069-01	4042887.1570
EDR GM2185 Tx w/ OPM CWDM-1590	4041274	10-1022012-01	4042887.1590
EDR GM2185 Tx w/ OPM CWDM-1610	4041274	10-1022070-01	4042887.1610

Table 15. Cisco GM EDR DWDM Reverse Optical Transmitters

GM EDR DWDM Reverse Optical Transmitters	Part Number on Tx Module	Part Number of OPM	Part Number for Ordering
Digital 1:1 EDR DWDM Transmitters			
EDR GM1185 Tx w/ OPM DWDM-17	800-4042187-01	10-1022090-01	4042884.17
EDR GM1185 Tx w/ OPM DWDM-18	800-4042187-01	10-1022091-01	4042884.18
EDR GM1185 Tx w/ OPM DWDM-19	800-4042187-01	10-1022092-01	4042884.19
EDR GM1185 Tx w/ OPM DWDM-20	800-4042187-01	10-1022093-01	4042884.20
EDR GM1185 Tx w/ OPM DWDM-21	800-4042187-01	10-1022094-01	4042884.21
EDR GM1185 Tx w/ OPM DWDM-22	800-4042187-01	10-1022095-01	4042884.22
EDR GM1185 Tx w/ OPM DWDM-23	800-4042187-01	10-1022096-01	4042884.23
EDR GM1185 Tx w/ OPM DWDM-24	800-4042187-01	10-1022097-01	4042884.24
EDR GM1185 Tx w/ OPM DWDM-25	800-4042187-01	10-1022098-01	4042884.25
EDR GM1185 Tx w/ OPM DWDM-26	800-4042187-01	10-1022099-01	4042884.26
EDR GM1185 Tx w/ OPM DWDM-27	800-4042187-01	10-1022100-01	4042884.27
EDR GM1185 Tx w/ OPM DWDM-28	800-4042187-01	10-1022101-01	4042884.28
EDR GM1185 Tx w/ OPM DWDM-29	800-4042187-01	10-1022102-01	4042884.29
EDR GM1185 Tx w/ OPM DWDM-30	800-4042187-01	10-1022103-01	4042884.30
EDR GM1185 Tx w/ OPM DWDM-31	800-4042187-01	10-1022104-01	4042884.31
EDR GM1185 Tx w/ OPM DWDM-32	800-4042187-01	10-1022105-01	4042884.32
EDR GM1185 Tx w/ OPM DWDM-33	800-4042187-01	10-1022106-01	4042884.33
EDR GM1185 Tx w/ OPM DWDM-34	800-4042187-01	10-1022107-01	4042884.34
EDR GM1185 Tx w/ OPM DWDM-35	800-4042187-01	10-1022108-01	4042884.35
EDR GM1185 Tx w/ OPM DWDM-36	800-4042187-01	10-1022109-01	4042884.36
EDR GM1185 Tx w/ OPM DWDM-37	800-4042187-01	10-1022110-01	4042884.37
EDR GM1185 Tx w/ OPM DWDM-38	800-4042187-01	10-1022111-01	4042884.38
EDR GM1185 Tx w/ OPM DWDM-39	800-4042187-01	10-1022112-01	4042884.39
EDR GM1185 Tx w/ OPM DWDM-40	800-4042187-01	10-1022113-01	4042884.40
EDR GM1185 Tx w/ OPM DWDM-41	800-4042187-01	10-1022114-01	4042884.41
EDR GM1185 Tx w/ OPM DWDM-42	800-4042187-01	10-1022115-01	4042884.42
EDR GM1185 Tx w/ OPM DWDM-43	800-4042187-01	10-1022116-01	4042884.43
EDR GM1185 Tx w/ OPM DWDM-44	800-4042187-01	10-1022117-01	4042884.44
EDR GM1185 Tx w/ OPM DWDM-45	800-4042187-01	10-1022118-01	4042884.45
EDR GM1185 Tx w/ OPM DWDM-46	800-4042187-01	10-1022119-01	4042884.46
EDR GM1185 Tx w/ OPM DWDM-47	800-4042187-01	10-1022120-01	4042884.47
EDR GM1185 Tx w/ OPM DWDM-48	800-4042187-01	10-1022121-01	4042884.48
EDR GM1185 Tx w/ OPM DWDM-49	800-4042187-01	10-1022122-01	4042884.49
EDR GM1185 Tx w/ OPM DWDM-50	800-4042187-01	10-1022123-01	4042884.50

GM EDR DWDM Reverse Optical Transmitters	Part Number on Tx Module	Part Number of OPM	Part Number for Ordering
EDR GM1185 Tx w/ OPM DWDM-51	800-4042187-01	10-1022124-01	4042884.51
EDR GM1185 Tx w/ OPM DWDM-52	800-4042187-01	10-1022125-01	4042884.52
EDR GM1185 Tx w/ OPM DWDM-53	800-4042187-01	10-1022126-01	4042884.53
EDR GM1185 Tx w/ OPM DWDM-54	800-4042187-01	10-1022127-01	4042884.54
EDR GM1185 Tx w/ OPM DWDM-55	800-4042187-01	10-1022128-01	4042884.55
EDR GM1185 Tx w/ OPM DWDM-56	800-4042187-01	10-1022129-01	4042884.56
EDR GM1185 Tx w/ OPM DWDM-57	800-4042187-01	10-1022130-01	4042884.57
EDR GM1185 Tx w/ OPM DWDM-58	800-4042187-01	10-1022131-01	4042884.58
EDR GM1185 Tx w/ OPM DWDM-59	800-4042187-01	10-1022132-01	4042884.59
EDR GM1185 Tx w/ OPM DWDM-60	800-4042187-01	10-1022133-01	4042884.60
EDR GM1185 Tx w/ OPM DWDM-61	800-4042187-01	10-1022134-01	4042884.61
Digital 2:1 EDR DWDM Transmitters			
EDR GM2185 Tx w/ OPM DWDM-17	4041274	10-1022013-01	4042888.17
EDR GM2185 Tx w/ OPM DWDM-18	4041274	10-1022014-01	4042888.18
EDR GM2185 Tx w/ OPM DWDM-19	4041274	10-1022015-01	4042888.19
EDR GM2185 Tx w/ OPM DWDM-20	4041274	10-1022016-01	4042888.20
EDR GM2185 Tx w/ OPM DWDM-21	4041274	10-1022017-01	4042888.21
EDR GM2185 Tx w/ OPM DWDM-22	4041274	10-1022018-01	4042888.22
EDR GM2185 Tx w/ OPM DWDM-23	4041274	10-1022019-01	4042888.23
EDR GM2185 Tx w/ OPM DWDM-24	4041274	10-1022020-01	4042888.24
EDR GM2185 Tx w/ OPM DWDM-25	4041274	10-1022021-01	4042888.25
EDR GM2185 Tx w/ OPM DWDM-26	4041274	10-1022022-01	4042888.26
EDR GM2185 Tx w/ OPM DWDM-27	4041274	10-1022023-01	4042888.27
EDR GM2185 Tx w/ OPM DWDM-28	4041274	10-1022024-01	4042888.28
EDR GM2185 Tx w/ OPM DWDM-29	4041274	10-1022025-01	4042888.29
EDR GM2185 Tx w/ OPM DWDM-30	4041274	10-1022026-01	4042888.30
EDR GM2185 Tx w/ OPM DWDM-31	4041274	10-1022027-01	4042888.31
EDR GM2185 Tx w/ OPM DWDM-32	4041274	10-1022028-01	4042888.32
EDR GM2185 Tx w/ OPM DWDM-33	4041274	10-1022029-01	4042888.33
EDR GM2185 Tx w/ OPM DWDM-34	4041274	10-1022030-01	4042888.34
EDR GM2185 Tx w/ OPM DWDM-35	4041274	10-1022031-01	4042888.35
EDR GM2185 Tx w/ OPM DWDM-36	4041274	10-1022032-01	4042888.36
EDR GM2185 Tx w/ OPM DWDM-37	4041274	10-1022033-01	4042888.37
EDR GM2185 Tx w/ OPM DWDM-38	4041274	10-1022034-01	4042888.38
EDR GM2185 Tx w/ OPM DWDM-39	4041274	10-1022035-01	4042888.39
EDR GM2185 Tx w/ OPM DWDM-40	4041274	10-1022036-01	4042888.40
EDR GM2185 Tx w/ OPM DWDM-41	4041274	10-1022037-01	4042888.41
EDR GM2185 Tx w/ OPM DWDM-42	4041274	10-1022038-01	4042888.42
EDR GM2185 Tx w/ OPM DWDM-43	4041274	10-1022039-01	4042888.43
EDR GM2185 Tx w/ OPM DWDM-44	4041274	10-1022040-01	4042888.44
EDR GM2185 Tx w/ OPM DWDM-45	4041274	10-1022041-01	4042888.45
EDR GM2185 Tx w/ OPM DWDM-46	4041274	10-1022042-01	4042888.46
EDR GM2185 Tx w/ OPM DWDM-47	4041274	10-1022043-01	4042888.47

GM EDR DWDM Reverse Optical Transmitters	Part Number on Tx Module	Part Number of OPM	Part Number for Ordering
EDR GM2185 Tx w/ OPM DWDM-48	4041274	10-1022044-01	4042888.48
EDR GM2185 Tx w/ OPM DWDM-49	4041274	10-1022045-01	4042888.49
EDR GM2185 Tx w/ OPM DWDM-50	4041274	10-1022046-01	4042888.50
EDR GM2185 Tx w/ OPM DWDM-51	4041274	10-1022047-01	4042888.51
EDR GM2185 Tx w/ OPM DWDM-52	4041274	10-1022048-01	4042888.52
EDR GM2185 Tx w/ OPM DWDM-53	4041274	10-1022049-01	4042888.53
EDR GM2185 Tx w/ OPM DWDM-54	4041274	10-1022050-01	4042888.54
EDR GM2185 Tx w/ OPM DWDM-55	4041274	10-1022051-01	4042888.55
EDR GM2185 Tx w/ OPM DWDM-56	4041274	10-1022052-01	4042888.56
EDR GM2185 Tx w/ OPM DWDM-57	4041274	10-1022053-01	4042888.57
EDR GM2185 Tx w/ OPM DWDM-58	4041274	10-1022054-01	4042888.58
EDR GM2185 Tx w/ OPM DWDM-59	4041274	10-1022055-01	4042888.59
EDR GM2185 Tx w/ OPM DWDM-60	4041274	10-1022056-01	4042888.60
EDR GM2185 Tx w/ OPM DWDM-61	4041274	10-1022057-01	4042888.61

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