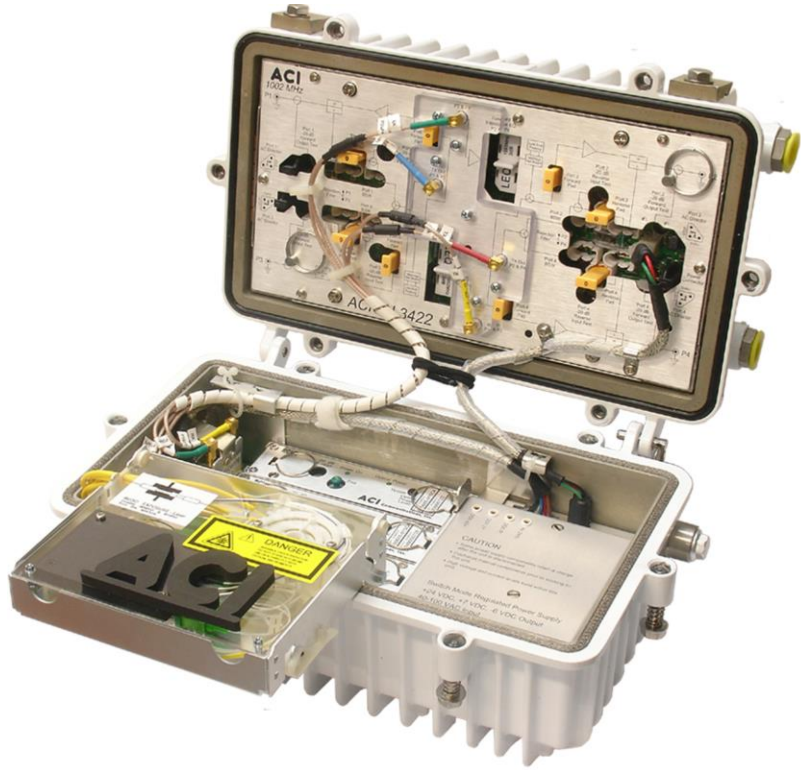
ACI®



ACION™ 3422 Optical Node

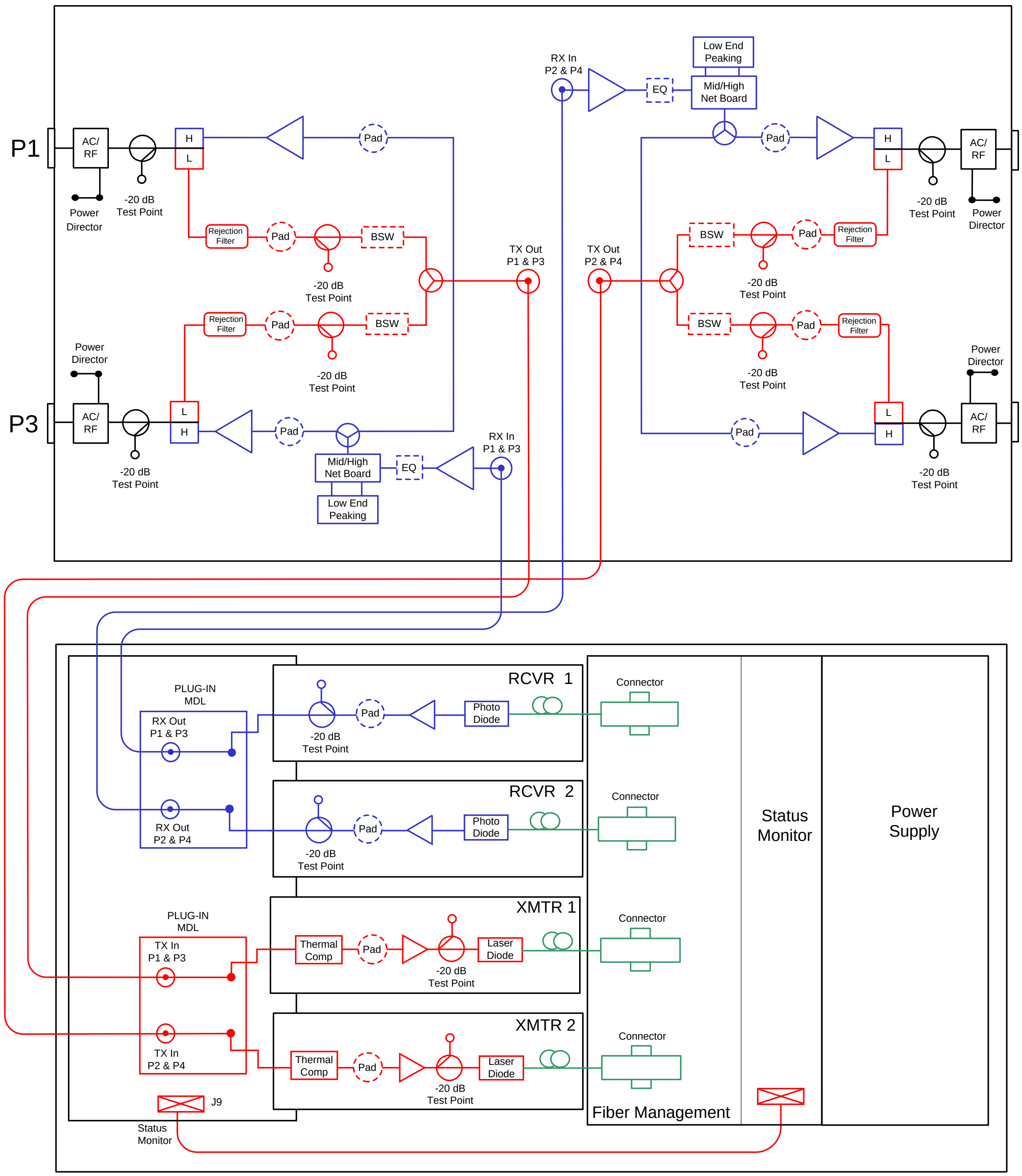
2x2 Fully Segmentable

The ACI Communications' ACION 3422 1GHz is a 4-output 2x2 fully segmentable optical node that is capable of providing up to 52.2 dBmV output at 1002 MHz and has an optical input level range from -3 dBm to +2 dBm. The node can have up to two optical receivers and two optical transmitters.

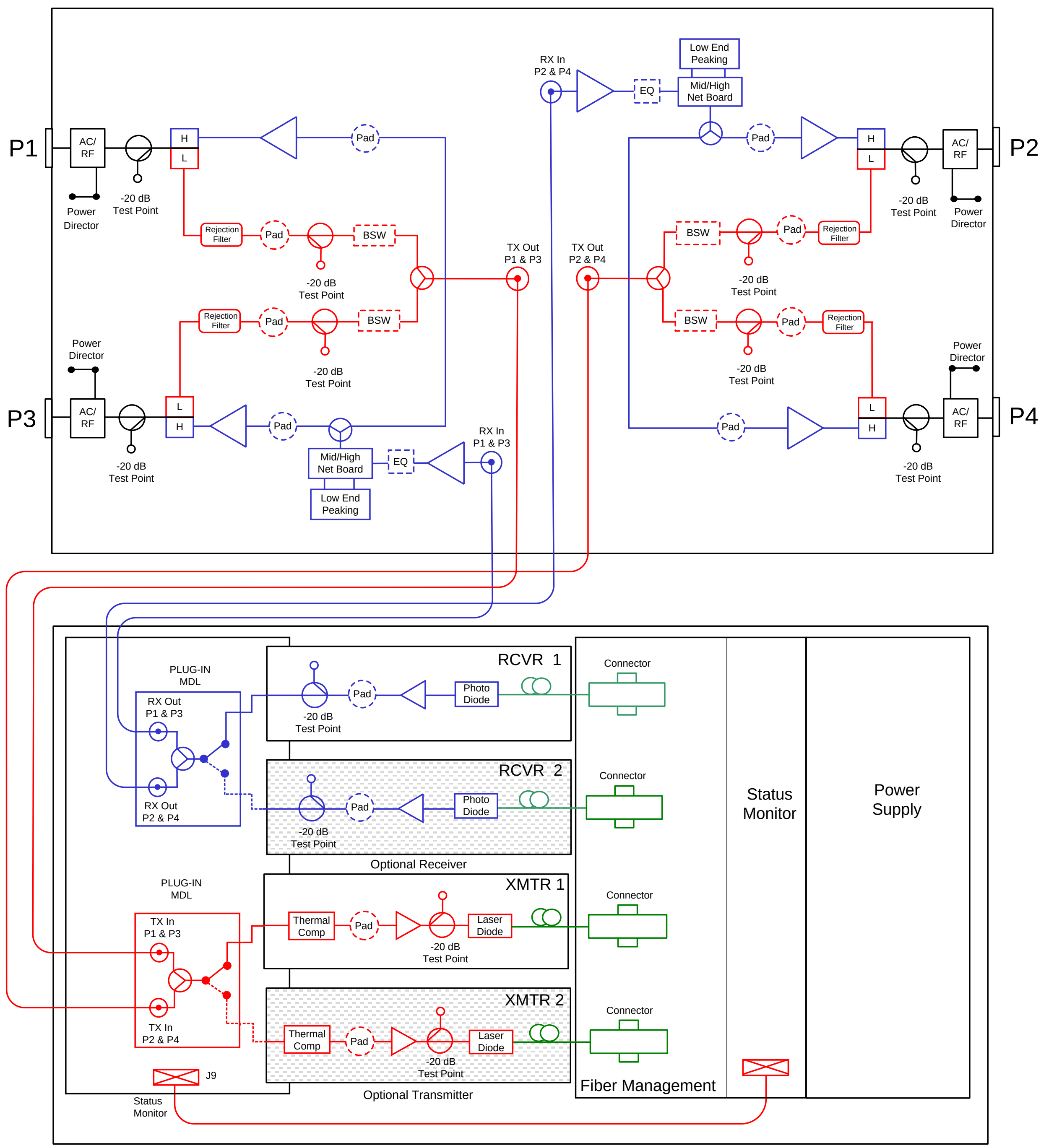
Features

- Four driven output ports
- Up to 52.2 dBmV output at 1002MHz
- -20.0 dB directional coupler test points
- 15 amp power passing
- Plug-in bridger switching for managing the reverse path @ 0, -3.0, -6.0, -12.0 dB and open with active status monitoring (optional)
- Standard push on "F" connectors can be used on all test points
- FP, DFB, CWDM, DWDM & Digital transmitters available
- Redundant receiver & Transmitter (optional 1:4 only)
- Compact size for a 2x2 segmentable node
- Plug-in forward and reverse configuration modules allows for easy field reconfiguration to add or remove segmentation as needed
- 85% efficient 40/90 VAC switch-mode power supply with built-in Triac surge protection
- Internal Mux / De-Mux (Optional)
- Pad adjustable linear equalizers (Optional)
- Powder coated housing for extra corrosion protection

Block Diagrams



ACION 3422 Block Diagram (Forward and Reverse Segmented Optical Node 1002 MHz)



ACION 3422 Block Diagram (Non-Segmented Optical Node 1002 MHz)

Specifications

ACION 34224-Output (Forward and Reverse Segmentable Optical Node 1002 MHz)						
STATION PARAMETERS						
	CONDITIONS	UNITS	SPECIFICATION			NOTES
Housing passband		MHz	5 to 1002			
Input current capacity	Any port, worst case	Amperes	15			
Frequency range		MHz	5 - 10	11-750	751 - 1002	
Hum modulation	Time domain @ rated current above	-dBc	55	70	65	
Station passband		MHz	54 to 1002			
Return loss- Ports 1 to 4	Worst case	-dB	16.5			Typical 18.0
Frequency range		MHz	54-870	871-1002		
Port to Port Isolation	Typical	-dB	70	60		
Test Points						
Test point type	Directional coupler	N / A	DC			
Test point level(s)		-dB	20.0			
Test point accuracy	Forward TP	±dB	0.5			
Frequency range	Reverse TP	MHz	5 to 40			
Test point accuracy	Reverse TP	±dB	0.5			
Frequency Range						
Station passband		MHz	54 to 1002			
Station flatness - feeder out		±dB	0.75			
Station Gain						
			Minimum	Minimum		
Configuration			1:4	1:2 (X2)		
Gain - feeder	@ 1002 MHz	dB	33	37		
Gain control type		N / A	Plug-in pads			
Gain control range		dB	15.0			
Gain control steps	Pad value steps	dB	0.5			
Station Slope						
Slope control type	Linear equalizers	dB	Plug-in Equalizers			
Slope control range		dB	-12.0 to +13.0			
Slope control steps	Equalizer value steps	dB	1.0 linear steps			
Operational Specifications						
Operational level - feeders	@ 1002 MHz	dBmV	52.2			
Operational slope	@ 54 / 550 / 750 / 870 / 1002 MHz	dB	0 / 9.0 / 12.6 / 14.8 / 17.2			
Operational optical input range		dBm	-3 to +2			Recommended optical input level 0 dBm
Station Output Levels with a -3 dBm optical input						
Distribution out	@ 54 / 550 / 750 / 870 / 1002 MHz	dBmV	35.0 / 44.0 / 47.6 / 49.8 / 52.2			
Station Noise Figure - values for RF portion of node only. Complete values dependent on optical link.						
			* No slope	17.2 dB slope		* LEQ1= 0 dB
Noise figure (NF)	@ 54 MHz	dB	9.5	16.0		
Noise figure (NF)	@ 550 MHz	dB	9.5	11.0		
Noise figure (NF)	@ 1002 MHz	dB	9.5	11.0		
Station Distortions - values for RF Portion of node only. Complete values dependent on optical link.						
550 MHz analog channel loading, 79 channels + 450 MHz digital channel loading, 256 QAM at -6 dBc relative to its associated visual carrier						
Reference levels	@ 54 / 550 / 650 / 870 / 1002 MHz	dBmV	35.0 / 44.0 / 47.6 / 49.8 / 52.2			
		N / A	Worst Case	Typical		
Composite Triple Beat (CTB)		-dBc	70	72		
Cross Modulation (XMOD)		-dBc	64	66		
Composite Second Order (CSO -)	(Vc +0.75 & -1.25 MHz only)	-dBc	69	71		
Composite Second Order (CSO +)	(Vc +1.25 MHz only)	-dBc	69	71		
CIN		-dBc	65	67		
Station Group Delay						
Group delay	Channel 2 (std)	nSec / 3.58 MHz	30			Typical 25
Group delay	Channel 3	nSec / 3.58 MHz	16			
Group delay	Channel 4	nSec / 3.58 MHz	10			
Group delay	Channel 5 >	nSec / 3.58 MHz	3			

REVERSE SPECTRUM:

	CONDITIONS	UNITS	SPECIFICATIONS		NOTES
Reverse - General					
Station passband		MHz	5 to 42		
Station flatness		±dB	1.0		
Bridger switch control (optional)		-dB	0, 3.0, 6.0, 12.0 & open		
Port to Port Isolation	Typical	-dB	65		
Reverse - Station Gain (RF section only)					
Configuration			4:1	2:1 (X2)	
Gain	Minimum	dB	6.0	5.0	
Gain control type		N / A	Plug-in pads		
Gain control steps	Pad value steps	dB	0.5		
Reverse - Station Input Levels					
RF station input to node for 40 dBmV @ Laser TP	Minimum	dBmV	17		
Reverse - Noise Figure					
Configuration			4:1	2:1 (X2)	
Station Noise Figure (w/EQ)		dB	16.5	12.0	
Reverse - Station Distortions @ 23 dBmV					
Composite Second Order (CSO)	6 NTSC channel loading	-dBc	75		
Composite Triple Beat (CTB)	6 NTSC channel loading	-dBc	80		
Cross Modulation (XMOD)	6 NTSC channel loading	-dBc	80		
Reverse - Noise-to-Power Ratio (NPR/Dynamic Range)					
Analog OTX	Noise loading	dB	Typical >40.0 / 13.0		@ 10.0 dB optical loss (6.0 dB fiber +4.0 dB flat loss) @ -51 dBmV/Hz
Digital Return TDR			Typical >40.0 / 18.0		
MER	6 NTSC Channel Loading	dB	≥ 38.0		QAM 64 or QAM 256
BER	6 NTSC Channel Loading	dB	$\leq 1x10^{-9}$		QAM 64 or QAM 256
Reverse - Station Group Delay					
Group delay	5 MHz	nSec / 1.5 MHz	36		
Group delay	7 MHz	nSec / 1.5 MHz	16		
Group delay	10 MHz	nSec / 1.5 MHz	4		
Group delay	35 MHz	nSec / 1.5 MHz	8		
Group delay	38.5 MHz	nSec / 1.5 MHz	25		
Power Requirements:					
Station configuration (Over temperature range of -40°F to +140°F (-40°C to +60°C) @ 90 VAC)			1X4 (1RX & 1TX)	2X2 (2RX & 2TX)	
Power requirements	Worst case	W	67.5	79.8	
AC Voltage					
Input ranges		VAC	40 - 90		
Current Draw					
@ 40 VAC	Maximum	A	1.97	2.28	
@ 50 VAC	Maximum	A	1.66	1.90	
@ 60 VAC	Maximum	A	1.43	1.64	
@ 70 VAC	Maximum	A	1.30	1.48	
@ 80 VAC	Maximum	A	1.18	1.33	
@ 90 VAC	Maximum	A	1.05	1.22	
Environmental					
Operating temperature		°F (°C)	-40 to +140 (-40 to +60)		
RF output stability over temperature		±dB	0.5		
Physical					
Dimensions (H X W X D)		In. (cm)	6.75 X 14.25 X 9 (17.15 X 36.20 X 22.86)		
Weight		lbs. (kg)	18.25 (8.28)		

Ordering Matrix

ACION 3422 Configuration Sheet

Customer: ______________________________

Created By: ______________________ Order Date: ____________

ORDERING MATRIX **August 13, 2021**

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
PART NUMBER	**3**	**N**																

3 ☐ **BASIC CONFIGURATION**
A = FWD 1:4 REV 4:1 nonsegmented
- 1 Transmitter installed
- 1 Receiver installed
- TX and RX redundancy capable

B = FWD 1:4 REV 2:1 (X2) Reverse segmented
- 2 Analog or 1 Digital Dual Transmitter installed
- 1 Receiver installed
- RX redundancy capable

C = FWD 1:2 (X2) REV 4:1 Forward segmented
- 1 Transmitter installed
- 2 Receivers installed
- TX redundancy capable

D = FWD 1:2 (2X) REV 2:1 (X2) Forward & Return segmented
- 2 Analog or 1 Digital Dual Transmitter installed
- 2 Receivers installed
- Not TX or RX redundancy capable

4 ☐ **DIPLEX FREQUENCY SPLIT**
4 = 42/53
5 = 55/70
6 = 65/85
8 = 85/105
2 = 204/258

5 ☐ **OPTICAL CONNECTOR TYPE**
1 = SC/APC (Standard)
2 = SC/UPC
3 = FC/APC
4 = FC/UPC

6 ☐ **TRANSMITTER 1 - Primary 4:1 or Ports 1 & 3 for 2:1 (X2)**
7 ☐ **TRANSMITTER 2 - Secondary 4:1 or Ports 2 & 4 for 2:1 (X2)**

TYPE FP & DFB
0 = None
D = Uncooled 1310 nm 1.0 mW FP
H = Uncooled 1310 nm 2.0 mW FP W/ISOLATOR
J = Uncooled 1310 nm 1.0 mW DFB
R= Uncooled 1310 nm 2.0 mW DFB
B = Uncooled 1310 nm 3.0 mW DFB
C = Uncooled 1550 nm 2.0 mW DFB
Z = Uncooled 1550 nm 4.0 mW DFB

TYPE DFB CWDM 2.0 mW
A = Uncooled 1471 nm DFB CWDM (2.0 mW)
G = Uncooled 1491 nm DFB CWDM (2.0 mW)
V = Uncooled 1511 nm DFB CWDM (2.0 mW)
L = Uncooled 1531 nm DFB CWDM (2.0 mW)
W = Uncooled 1551 nm DFB CWDM (2.0 mW)
M = Uncooled 1571 nm DFB CWDM (2.0 mW)
N = Uncooled 1591 nm DFB CWDM (2.0 mW)
T = Uncooled 1611 nm DFB CWDM (2.0 mW)
U = Uncooled 1431 nm DFB CWDM (2.0 mW) E-Band
Y = Uncooled 1451 nm DFB CWDM (2.0 mW) E-Band

TYPE DFB CWDM 3.0 mW
F = Uncooled 1471 nm DFB CWDM (3.0 mW)
I = Uncooled 1491 nm DFB CWDM (3.0 mW)
Q = Uncooled 1551 nm DFB CWDM (3.0 mW)
K = Uncooled 1591 nm DFB CWDM (3.0 mW)
P = Uncooled 1611 nm DFB CWDM (3.0 mW)

TYPE DFB CWDM 4.0, 5.0 & 6.0 mW
9 = Uncooled 1551 nm DFB CWDM (4.0 mW)
8 = Uncooled 1551 nm DFB CWDM (5.0 mW)
5 = Uncooled 1591 nm DFB CWDM (5.0 mW)
6 = Uncooled 1611 nm DFB CWDM (5.0 mW)
3 = Uncooled 1471 nm DFB CWDM (6.0 mW)
4 = Uncooled 1491 nm DFB CWDM (6.0 mW)

TYPE DIGITAL RETURN TRANSMITTER MODULE
7 = Enter "7" in position 6 and "0" in position 7
See position #18 on following page for options

TYPE ANALOG DWDM: ITU Grid: C-Band, 100 GHz Spacing
2 = Enter "2" in position 6 and "0" in position 7
See positions 16 & 17 on following page for wavelength options

8 ☐ **RECEIVER REDUNDANCY (Basic configuration A or B only)**
1 Not redundant
2 RX Redundant

CWDM/DWDM Mux/DeMux or WDM
(For a 1X2 Mux or WDM use positions 9 & 11)
9 ☐ **CWDM or DWDM DeMux Downstream Wavelength # 1**
10 ☐ **CWDM or DWDM DeMux Downstream Wavelength # 2**
11 ☐ **CWDM Mux Upstream Wavelength #1**
12 ☐ **CWDM Mux Upstream Wavelength #2**

0 = None
A = 1271 nm K = 1451 nm W = 1310 nm
B = 1291 nm L = 1471 nm Y = 1550 nm
C = 1311 nm M = 1491 nm
D = 1331 nm N = 1511 nm
E = 1351 nm P = 1531 nm
F = 1371 nm R = 1551 nm
G = 1391 nm T = 1571 nm
H = 1411 nm U = 1591 nm
J = 1431 nm V = 1611 nm

DWDM O-Band: 1270nm to 1370nm (Downstream Only)
3 = 1290 nm
4 = 1291 nm
5 = 1293 nm
6 = 1295 nm

DWDM C-Band: 1531nm to 1570nm (Downstream Only)
1 = Channel 21 - 1560.61 nm
H Channel 22 - 1559.79 nm
7 = Channel 24 - 1558.17 nm
8 = Channel 26 - 1556.56 nm
9 = Channel 28 - 1554.94 nm
I = Channel 33 - 1550.92 nm
Q = Channel 36 - 1548.52 nm
S = Channel 39 - 1546.12 nm

13 ☐ **HOUSING TYPE (See Note 1)**
P = Powder Coated (Complete Station)
K = Powder Coated (Upgrade kit without housing base)

14 ☐ **STATUS MONITORING**
0 = None
M = Status Monitoring upgradeable (With Bridger switching)
D = Docsis HMS Transponder

15 ☐ **CUSTOM**
0 = None
2 = Port 1 bypassed, Port 2 forward gain lowered by 10 dB
5 = 15 dB Slope at 1002 MHz (Fixed Value LEQ's)
A = 15.0 dB Slope at 1002 MHz (Pad Adjustable LEQ's)
B = 17.2 dB Slope at 1002 MHz (Pad Adjustable LEQ's)
X = Determined by Product Management

Ordering Matrix (Continued)

16 17	**DWDM TRANSMITTER 1 Primary 4:1 or Ports 1 & 3 for 2:1 (X2)** **DWDM TRANSMITTER 2: Secondary 4:1 or Ports 2 & 4 for 2:1 (X2)** **DWDM: ITU Grid: C-Band, 100 GHz Spacing** Blank = No DWDM or Digital Return Transmitters 0 = For a Digital Return Transmitter use "0" for #16 & #17 H = Channel 21 - 1560.61 nm (10.0 mW) R = Channel 22 - 1559.79 nm (10.0 mW) J = Channel 23 - 1558.98 nm (10.0 mW) P = Channel 24 - 1558.17 nm (10.0 mW) K = Channel 25 - 1557.36 nm (10.0 mW) C = Channel 26 - 1556.56 nm (10.0 mW) D = Channel 28 - 1554.94 nm (10.0 mW) L = Channel 29 - 1554.13 nm (10.0 mW) E = Channel 30 - 1553.33 nm (10.0 mW) M = Channel 31 - 1552.52 nm (10.0 mW) F = Channel 32 - 1551.72 nm (10.0 mW) N = Channel 33 - 1550.92 nm (10.0 mW) G = Channel 34 - 1550.12 nm (10.0 mW)	18 & 19	**DIGITAL RETURN TRANSMITTER MODULE** **18 & 19 Blank = None** **Use 18 for Single RF** C = 45 MHz, Single RF, Single 1310 nm DFB, 40 km D = 45 MHz, Single RF, Single 1471 nm CWDM, 80 km E = 45 MHz, Single RF, Single 1491 nm CWDM, 80 km F = 45 MHz, Single RF, Single 1511 nm CWDM, 80 km G = 45 MHz, Single RF, Single 1531 nm CWDM, 80 km H = 45 MHz, Single RF, Single 1551 nm CWDM, 80 km J = 45 MHz, Single RF, Single 1571 nm CWDM, 80 km K = 45 MHz, Single RF, Single 1591 nm CWDM, 80 km L = 45 MHz, Single RF, Single 1611 nm CWDM, 80 km B = 45 MHz, Dual RF, Single 1310 nm DFB, 40 km M = 45 MHz, Dual RF, Single 1591 nm CWDM, 80 km 1 = 85 MHz, Single RF, Single 1310 nm DFB, 40 km 2 = 85 MHz, Single RF, Single 1471 nm CWDM, 80 km 3 = 85 MHz, Single RF, Single 1491 nm CWDM, 80 km 4 = 85 MHz, Single RF, Single 1511 nm CWDM, 80 km 5 = 85 MHz, Single RF, Single 1531 nm CWDM, 80 km 6 = 85 MHz, Single RF, Single 1551 nm CWDM, 80 km 7 = 85 MHz, Single RF, Single 1571 nm CWDM, 80 km 8 = 85 MHz, Single RF, Single 1591 nm CWDM, 80 km 9 = 85 MHz, Single RF, Single 1611 nm CWDM, 80 km **Use 18 & 19 for Dual RF** 1D = 85 MHz, Dual RF, Single 1310 nm DFB, 40 km 2D = 85 MHz, Dual RF, Single 1471 nm CWDM, 80 km 3D = 85 MHz, Dual RF, Single 1491 nm CWDM, 80 km 4D = 85 MHz, Dual RF, Single 1511 nm CWDM, 80 km 5D = 85 MHz, Dual RF, Single 1531 nm CWDM, 80 km 6D = 85 MHz, Dual RF, Single 1551 nm CWDM, 80 km 7D = 85 MHz, Dual RF, Single 1571 nm CWDM, 80 km 8D = 85 MHz, Dual RF, Single 1591 nm CWDM, 80 km 9D = 85 MHz, Dual RF, Single 1611 nm CWDM, 80 km

NOTES:

1 The ACION 3422 upgrade kit (option # 13 selection K) will include a fully configured optical top housing assembly and the RF module tray. The upgrade Kit will allow field upgrades of legacy ACION 3000 & ACION 3410 nodes or it can be used as a conversion kit to convert an existing SDA RF amplifier into a fully 2X2 segmentable optical node.

ACI Communications, Inc.
23307 66th Avenue South
Kent, WA 98032

Rev AB 08-13-2021 Printed in U.S.A.