

## ACION 1002 Optical Node

### 1 or 2 Output Optical Node 1002 MHz

The ACION 1002 is a compact economically priced 1 or 2 output node that is ideal for use in HFC, fiber deep, MDU or commercial class services architectures. The node can be configured with either a FP, DFB or CWDM DFB reverse path transmitter.

#### Features

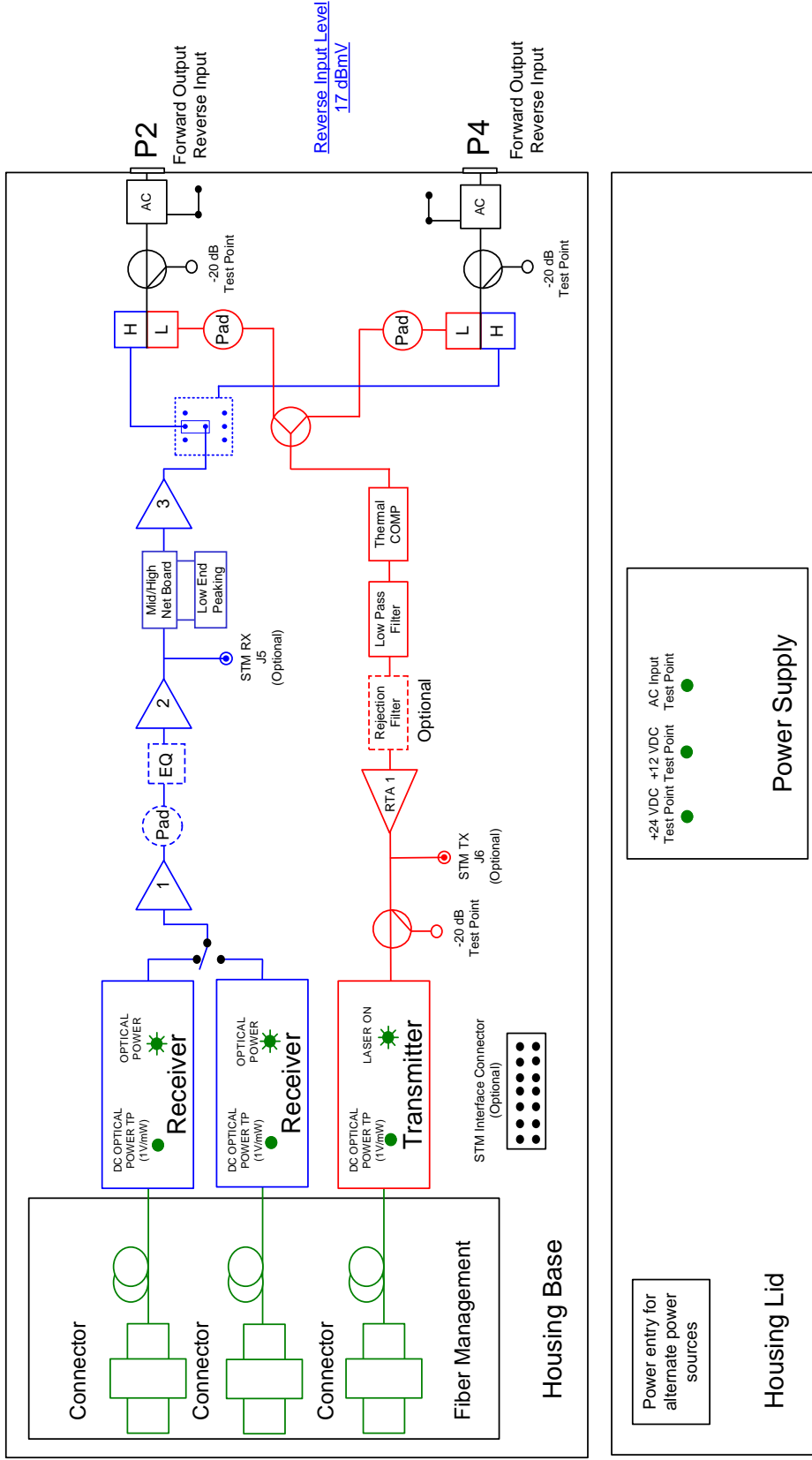
- ◆ One (1) driven output or two (2) split outputs
- ◆ Modular RF / optics section
- ◆ Plug-in pads and equalizers
- ◆ -20 dB directional coupler test points
- ◆ Optional redundant receiver
- ◆ FP, DFB and CWDM transmitters available
- ◆ 40 to 90 VAC (cable)
- ◆ 90 to 240 VAC (mains)
- ◆ 15 Amp power passing capacity (40 to 90 VAC only)

#### Benefits

- ◆ Compact size
- ◆ Up to 52.2 dBmV out at 1002 MHz on the single output version
- ◆ Ideal for HFC and passive architectures, or MDU and commercial class applications
- ◆ Common plug-ins with other ACI nodes and amplifier products
- ◆ Configurable to your specific needs
- ◆ 85/105 MHz frequency option that will double the reverse bandwidth
- ◆ Plug-in location for reverse path rejection filter (sold separately)

# ACION 1002

## 1002 MHz One [1] Driven Output or Two [2] Split Output Optical Nodes



ACION 1002 Optical Node 1002 MHz (One [1] Driven Output or Two [2] Split Outputs)					
STATION PARAMETERS:					
	CONDITIONS	UNITS	SPECIFICATION	NOTES	
Housing passband		MHz	5 to 1002		
Input current capacity	Any port, worst case	Amperes	15	Cable power only (40-90 VAC)	
Frequency range		MHz	50 - 1002		
Hum modulation	Time domain @ 0 AMPS	-dBc	70	Cable power only (40-90 VAC)	
Hum modulation	Time domain @ 12 AMPS	-dBc	70	Cable power only (40-90 VAC)	
Hum modulation	Time domain @ 15 AMPS	-dBc	65	Cable power only (40-90 VAC)	
Test Points					
Test point type	Directional coupler	N/A	DC		
Test point level(s)		-dBc	20		
Test point accuracy	Forward TP	±dB	0.5		
Test point accuracy	Reverse TP	±dB	0.5		
RF Station					
Station passband		MHz	54 to 1002		
Return loss	Worst case	-dB	17	18 Typical	
Station flatness - feeder out		±dB	0.75		
Gain: 1 output / 2 outputs	@ 1002 MHz Minimum	dB	45.0 / 42.0		
Output stability		dB	1.5		
Gain control type			Plug-in pads		
Gain control range		dB	15		
Gain control steps	Pad value steps	dB	0.5		
Slope control type	Linear equalizers	dB	Plug-in EQ's		
Slope control range		dB	-21.0 to +13.0		
Slope control steps	Equalizer value steps	dB	1.5		
Operational Specifications with a -2 dBm optical input					
Operational level	@ 1002 MHz	dBmV	52.2	48.7 dBmV for split version	
Operational slope	@ 54 / 550 / 750 / 870 / 1002 MHz	dB	35.0 / 44.0 / 47.6 / 49.8 / 52.2		
Optical input range	Typical	dBmV	-3 to +2		
Station Output Levels					
Distribution out	@ 54 / 550 / 750 / 870 / 1002 MHz	dBmV	35.0 / 44.0 / 47.6 / 49.8 / 52.2	Split 31.5 / 40.5 / 44.1 / 46.3 / 48.7	
Station Noise Figure - values for RF portion of node only. Complete values dependent upon link.					
Noise figure (NF)	@ 54 MHz	dB	4.1		
Noise figure (NF)	@ 550 MHz	dB	5.1		
Noise figure (NF)	@ 1002 MHz	dB	6.2		
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					
			Worst Case	Typical	
Composite Triple Beat (CTB)		-dBc	76	78	
Composite Second Order (CSO -)	(Vc +0.75 & -1.25 MHz)	-dBc	67	69	
Composite Second Order (CSO +)	(Vc +1.25 MHz only)	-dBc	75	77	
Cross Modulation (XMOD)		-dBc	74	76	
Carrier-to-Intermodulation Noise (CIN)		-dBc	74	76	
Station Group Delay					
Group delay	Channel 2 (Std)	nSec / 3.58 MHz	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		

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ACION 1002 Optical Node 1002 MHz  
(One [1] Driven Output or Two [2] Split Outputs)

REVERSE SPECTRUM:					
Reverse - General		CONDITIONS	UNITS	SPECIFICATION	NOTES
Station passband			MHz	5 to 42	
Station flatness	Peak-to-valley		dB	1.0	
Output stability			±dB	0.75	
Return loss	Worst case		-dB	17	18 Typical
Reverse - Station Gain					
Gain	+1, -0		dB	18	
Gain control type			N / A	Plug-in pads	
Gain control range			dB	12	
Gain control steps	Pad value steps		dB	0.5	
Reverse - Station Output Levels					
@ Input to transmitter	Typical		dBmV	40	With 17 dBmV at housing port
Reverse - Noise Figure					
Station noise figure			dB	10.5	
Reverse - Bit Error Rate					
Bit error rate	QPSK (1.5 Mbps)		BER	≤10 <sup>-6</sup>	
Reverse - NPR					
Noise-to-Power Ratio (NPR)	Noise loading		dB	Typical >35 / 18	@ 10.0 dB optical loss (6.0 dB fiber +4.0 dB flat loss) @ -52.2 dBmV/Hz
Reverse - Station Group Delay					
Group delay	5.5 MHz	nSec / 1.5 MHz		36	
Group delay	10.0 MHz	nSec / 1.5 MHz		16	
Group delay	33.5 MHz	nSec / 1.5 MHz		7	
Group delay	38.5 MHz	nSec / 1.5 MHz		10	
Power Requirements: For cable powered 40-90 VAC					
Station configuration	1RX + 1TX over temperature range of -40 to +140 °F (-40 to +60 °C)				
Power requirements	Worst case		W	30.1	
AC Voltage					
Input ranges			VAC	40 - 90	
Current Draw (Cable powered 40-90 VAC)					
@ 40 VAC	Maximum		A	0.87	
@ 50 VAC	Maximum		A	0.74	
@ 60 VAC	Maximum		A	0.66	
@ 70 VAC	Maximum		A	0.60	
@ 80 VAC	Maximum		A	0.55	
@ 90 VAC	Maximum		A	0.50	
Environmental					
Operating temperature			°F (°C)	-40 to +140 (-40 to +60)	
Physical					
Dimensions (H X W X D)			in. (cm)	5.8 X 9.25 X 5.94 (14.73 X 23.50 X 15.10)	
Weight			lbs (kg)	8.7 (3.95)	

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ACION 1002 Optical Node 1002 MHz  
DFB & FP Transmitter Specifications

GENERAL		CONDITIONS	UNITS	TRANSMITTER SPECIFICATIONS						NOTES
TRANSMITTER MODEL NUMBER				090607-01XXX 3.0 mW	090607-02XXX 2.0 mW	090607-03XXX 1.0 mW	090606-02XXX 2.0 mW W/Isolator	090606-04XXX 1.0 mW	090606-05XXX 1.0 mW W/Isolator	WHERE XXX= CONNECTOR TYPE
Laser type		N/A	Uncooled DFB	Uncooled DFB	Uncooled DFB	Fabry-Perot FP	Fabry-Perot FP	Fabry-Perot FP		
Optical connector		N/A	SC/APC, SC/UPC, FC/APC, FC/UPC							
Operating bandwidth		MHz	5-200							
Optical wave length		nm	1310 ±20	1550 ±20	1310 ±20	1310 ±20	1310 ±20	1310 ±20		
Optical power test point		V/mW	1.0 / 1.0							
Optical power range		mW	2.8-3.2	2.0 min	1.0 Min	2.0 min	1.0 Min	1.0 Min		At 25 °C
Laser ON/OFF status indicator		-dBmV	3							Relative to initial optical power at 25 °C
RF impedance		Ohms	75							
Peak-to-valley frequency response		dB	1.0							Over operating bandwidth
Operational temperature		°F (°C)	-40 to +140 (-40 to +60)							
<b>DISTORTIONS</b>										
Input level		dBmV	40							
Level repeatability		±dB	1.0							Maximum receiver RF level variation between transmitters
Return loss	Worst Case	-dB	10.0	10.0	10.0	9.0	9.0	9.0		
Single tone CNR		dB	60	55	55	50	45	45		CNR in 4 MHz bandwidth 19 dBmV @ input to station, using A8KQRR receiver
DTO (FP) CTB (DFB)	Worst Case	-dBc	53	55	55	51	65	65		Test uses 2T channels T12-T13 (FP) or 4T channels T9-T13 (DFB), using A8KQRR receiver
DSO (FP) CSO (DFB)	Worst Case	-dBc	54	51	51	53	65	65		Test uses 2T channels T12-T13 (FP) or 4T channels T9-T13 (DFB), using A8KQRR receiver

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ACION 1002 Optical Node 1002 MHz  
DFB CWDM Transmitter Specifications

ACION 1002 Optical Node 1002 MHz DFB CWDM Transmitter Specifications											
GENERAL	CONDITIONS	UNITS	TRANSMITTER SPECIFICATIONS								NOTES
TRANSMITTER MODEL NUMBER			090646-01XXX	090646-02XXX	090646-03XXX	090646-04XXX	090646-05XXX	090646-06XXX	090646-07XXX	090646-08XXX	WHERE XXX= CONNECTOR TYPE
Optical wave length		nm	1471	1491	1511	1531	1551	1571	1591	1611	±1.5 nm @ 25° C
Optical power range	Minimum	mW	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Laser type		N/A	Uncooled DFB (CWDM)								
Optical connector		N/A	SC/APC, SC/UPC, FC/APC, FC/UPC								
Operating bandwidth		MHz	5-200								
Optical power test point		V/mW	1.0 / 1.0								
Laser ON/OFF status indicator		-dBmV	3								Relative to initial optical power at 25° C
RF impedance		Ohms	75								
Peak-to-valley frequency response		dB	1.0								Over operating bandwidth
Operational temperature range		°F (°C)	-40 to +140 (-40 to +60)								
DISTORTIONS											
Input level		dBmV	40.0								
Level repeatability		±dB	1.0								Maximum receiver RF level variation between transmitters
Return loss	Worst Case	-dB	10.0								
Single tone CNR		dB	50.0								CNR in 4 MHz bandwidth 9 dBmV @ input to station, using A8KQRR receiver
CTB	Worst Case	-dBc	64.0								Test uses 4T channels (T9-T13), using A8KQRR receiver
CSO	Worst Case	-dBc	62.0								Test uses 4T channels (T9-T13), using A8KQRR receiver

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# Part Number Ordering Matrix:

## ACION 1002 Configuration Sheet

Customer: \_\_\_\_\_

Created By: \_\_\_\_\_ Order Date: \_\_\_\_\_

### ORDERING MATRIX

October 11, 2017

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>PART NUMBER</b>	<b>1</b>	<b>N</b>	<b>R</b>												

- |   |   |
|---|---|
| <p>3 <input checked="" type="checkbox"/> <b>BASIC CONFIGURATION</b><br/>R = Allows Dual Receivers (1 Tx)</p> <p>4 <input type="checkbox"/> <b>RECEIVERS &amp; LOCAL INJECTION PORT</b><br/>0 = No Receiver<br/>1 = Single Receiver</p> <p>5 <input type="checkbox"/> <b>TRANSMITTERS</b><br/>0 = No Transmitters<br/>1 = Single Transmitter</p> <p>6 <input type="checkbox"/> <b>DIPLEX FREQUENCY SPLIT</b><br/>4 = 42/53<br/>5 = 55/70<br/>6 = 65/85<br/>7 = 40/50<br/>8 = 85/105 (1002 MHz Only)</p> <p>7 <input type="checkbox"/> <b>OPTICAL CONNECTOR TYPE</b><br/>1 = SC/APC (Standard)<br/>2 = SC/UPC<br/>3 = FC/APC<br/>4 = FC/UPC</p> <p>8 <input type="checkbox"/> <b>TRANSMITTER TYPE FP &amp; DFB</b><br/>0 = None<br/>D = Uncooled 1310 nm 1.0 mW FP<br/>Y = Uncooled 1310 nm 1.0 mW FP W/ISOLATOR<br/>H = Uncooled 1310 nm 2.0 mW FP W/ISOLATOR<br/>J = Uncooled 1310 nm 1.0 mW DFB<br/>R = Uncooled 1310 nm 2.0 mW DFB<br/>B = Uncooled 1310 nm 3.0 mW DFB<br/>C = Uncooled 1550 nm 2.0 mW DFB<br/>E = Uncooled 1550 nm 2.0 mW DFB with WDM</p> <p><b>TRANSMITTER TYPE CWDM</b><br/>A = Uncooled 1471 nm DFB CWDM (2.0 mW)<br/>G = Uncooled 1491 nm DFB CWDM (2.0 mW)<br/>V = Uncooled 1511 nm DFB CWDM (2.0 mW)<br/>L = Uncooled 1531 nm DFB CWDM (2.0 mW)<br/>W = Uncooled 1551 nm DFB CWDM (2.0 mW)<br/>M = Uncooled 1571 nm DFB CWDM (2.0 mW)<br/>N = Uncooled 1591 nm DFB CWDM (2.0 mW)<br/>T = Uncooled 1611 nm DFB CWDM (2.0 mW)<br/>U = Uncooled 1551 nm DFB CWDM (2.0 mW) with WDM 1310/1550 nm<br/>F = Uncooled 1471 nm DFB CWDM (2.0 mW) with MUX 1X2 ADD/DROP 1291nm<br/>K = Uncooled 1491nm DFB CWDM (2.0 mW) with MUX 1X2 ADD/DROP 1293nm</p> | <p>9 <input type="checkbox"/> <b>STATION SLOPE</b><br/>0 = 0 dB @ 750 &amp; 870 MHz<br/>1 = 14.8 dB @ 870 &amp; 17.2 @ 1002 MHz<br/>2 = 12.9 dB @ 870 &amp; 15.0 @ 1002 MHz<br/>3 = 10.3 dB @ 870 &amp; 12.0 @ 1002 MHz<br/>9 = 5.2 dB @ 870 &amp; 6.0 @ 1002 MHz</p> <p>10 <input type="checkbox"/> <b>POWER SUPPLY INPUT TYPE (See Note 6)</b><br/>C = 40 TO 90 VAC (Cable powering)<br/>L = 90 to 240 VAC (Mains Power Non-UL)<br/>M = 90 to 240 VAC (Mains Power UL)</p> <p>11 <input type="checkbox"/> <b>POWER SUPPLY MAINS</b><br/>0 = NONE<br/>1 = North America<br/>2 = International/Europe<br/>3 = Japan<br/>4 = Australia<br/>5 = Argentina<br/>X = Custom (Contact Product Management)</p> <p>12 <input type="checkbox"/> <b>STATUS MONITORING (See Note 7)</b><br/>N = NONE (Standard)<br/>M = Status Monitoring Upgradeable</p> <p>13 <input type="checkbox"/> <b>HOUSING TYPE</b><br/>0 = No Housing or Power supply<br/>N = Normal (Standard)<br/>C = Chromate Finish</p> <p>14 <input type="checkbox"/> <b>SURGE PROTECTION (See Note 8)</b><br/>A = Recommended Plug-in Sidactor<br/>N = None</p> <p>15 <input type="checkbox"/> <b>CUSTOM</b><br/>Blank = Not custom<br/>A = Pad Adjustable ALEQ<br/>X = Determined by Product Management</p> |
|---|---|

### NOTES:

- All ACION 1002 units are 1002 MHz.
- All ACION 1002 units will be shipped as a 2 port device. A conversion kit is available for a single port version. (P/N KIT-A1P1)
- All ACION 1002 units will be set up for max. gain of 48.7 dBmV on both ports (52.2 dBmV with jumper installed on single output version). The levels can be adjusted by the use of optional plug-in attenuator pads.
- All ACION 1002 units will be set up to the chosen slope (17.2 dB 1002 MHz is standard). Optionally, further adjusting of this slope can be accomplished with plug-in
- To complete 180 degree rotation of inner module, a power cord extension is required. (P/N 240314)
- The "M" version of the AC powered unit has an external UL listed 90-240 VAC to 24 VDC external transformer. The "L" version has a internal 90-240 VAC switching power supply and is not UL listed.
- The standard ACION 1002 node will not have the connectors required for upgrading the node in the field to have status monitoring.
- The optional surge protecting sidactor is only offered on the 40-90 VAC cable powered node.

## Accessory & Spare Part Ordering Information:

The ACION 1002 ordering matrix provides the part number information to order the configured stations. This page contains the ordering information for the optional accessories and replacement or spare parts that can be ordered separately.

Part Number	Description
<b>ACION 1002 Transmitters &amp; Receivers (one Rx included with unit)</b>	
<b>XXX = Optical Connector Type (FC/UPC, SC/APC &amp; SC/UPC)</b>	
090667-01XXX	ACION 1002 Receiver 1002 MHz (One included with base unit)
090606-06XXX	ACION 1002 FP Transmitter 0.5 mW
090606-02XXX	ACION 1002 FP Transmitter 2.0 mW with Isolator
090607-03XXX	ACION 1002 DFB Uncooled, Isolated 1310 nm Transmitter 1.0 mW
090607-01XXX	ACION 1002 DFB Uncooled, Isolated 1310 nm Transmitter 3.0 mW
090607-02XXX	ACION 1002 DFB Uncooled, Isolated 1550 nm Transmitter 2.0 mW
090646-01XXX	ACION 1002 DFB CWDM Uncooled, Isolated 1471 nm Transmitter 2.0 mW
090646-02XXX	ACION 1002 DFB CWDM Uncooled, Isolated 1491 nm Transmitter 2.0 mW
090646-03XXX	ACION 1002 DFB CWDM Uncooled, Isolated 1511 nm Transmitter 2.0 mW
090646-04XXX	ACION 1002 DFB CWDM Uncooled, Isolated 1531 nm Transmitter 2.0 mW
090646-05XXX	ACION 1002 DFB CWDM Uncooled, Isolated 1551 nm Transmitter 2.0 mW
090646-06XXX	ACION 1002 DFB CWDM Uncooled, Isolated 1571 nm Transmitter 2.0 mW
090646-07XXX	ACION 1002 DFB CWDM Uncooled, Isolated 1591 nm Transmitter 2.0 mW
090646-08XXX	ACION 1002 DFB CWDM Uncooled, Isolated 1611 nm Transmitter 2.0 mW
<b>WDM &amp; 1x2 Muxes</b>	
WDM-01XXX	ACION 1000/02 WDM option
MUX2AD-1311XXX	MUX 1X2 ADD/DROP 1311nm
MUX2AD-1291XXX	MUX 1X2 ADD/DROP 1291nm
MUX2AD-1295XXX	MUX 1X2 ADD/DROP 1295nm
190088	CLIP,NYLON WDM/Mux HOLDER
<b>Linear Equalizers * = dB value</b>	
LEQ870/*	Linear Equalizers 870 MHz 1.5 to 21.0 dB in 1.5 dB steps
LEQH1G/*	Linear Equalizers 1002 MHz 1 to 13 dB in 1.0 dB steps
ALEQ1G	Linear Equalizers JXP Platform 0-18 dB
<b>Attenuators/Pads * = dB values</b>	
JXP100.*	JXP Style Attenuators/Pads 1.0" long 0 to 20 in 0.5 dB steps
JXP045.*	JXP Style Attenuators/Pads 0.45" long 0 to 20 in 0.5 dB steps (for using the ALEQ1G)
<b>Plug-in Jumper, Splitter &amp; Directional Couplers</b>	
100355-01	Jumper (for single output port)
SDASPLTR3.5	Splitter, 3.5 dB, 1 GHz
SDADC7	Directional Coupler, 7 dB, 1 GHz
SDADC12	Directional Coupler, 12 dB, 1 GHz
<b>AC Power Directors (For Cable 40-90 VAC version only)</b>	
100818-01	AC Power Director
<b>Reverse Path Rejection Filter</b>	
RPRFLTR-14	Filter Reverse Rejection 14 MHz
RPRFLTR-8	Filter Reverse Rejection 8 MHz
<b>Seizure Screw / RF Connector</b>	
100633-01	Seizure Screw / RF Connector 15A
<b>Power Supplies</b>	
A1K-40-90PS-2	ACION 1000/02 40-90 VAC power supply (Version 2)
A1-90-240PSV2-1	ACION 1000/02 90-240 VAC external power supply (Version 2) North American Plug
<b>Single Output Port Conversion Kit</b>	
KIT-A1P1	Single output port conversion kit (terminating pad, port plug and RF jumper)
<b>Power Supply Extension Cable For RF Module Rotation</b>	
240314	Power Supply extension cable (for rotated RF module)
<b>RF Test Probe</b>	
100685-01	RF Test Probe 5.5"
TP-7504	RF Test Probe 1.57" (4 cm) Long
<b>RF Test Adapter</b>	
100677	Test Adapter for Test Probe to Seizure Screw (RF Connector)



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