

# Plug-In Attenuator/Switch

## PAS-2000+

50Ω Bi-Phase 100 to 2000 MHz



Generic photo used for illustration purposes only

CASE STYLE: A05

**+RoHS Compliant**

The + suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

### Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
Control Current	30mA
Permanent damage may occur if any of these limits are exceeded.	

### Pin Connections

INPUT	1
OUTPUT	8
CONTROL	3
GROUND	2,5,6,7
CASE GROUND	2,5,6,7
NOT USED	4

### Features

- wideband, 100 to 2000 MHz
- excellent amplitude and phase unbalance
- low profile, rugged shielded case

### Applications

- bi-phase modulator

### Attenuator/Switch Electrical Specifications

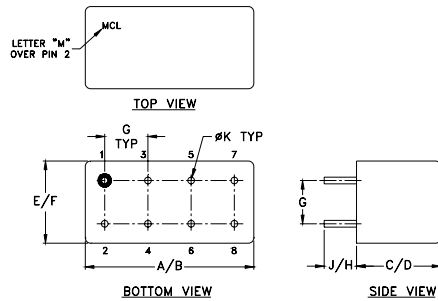
FREQUENCY (MHz)		INSERTION LOSS (dB) ±20 mA				MAX. INPUT PWR (dBm) ±20 mA		IN-OUT ISOLATION (dB) 0 mA				BI-PHASE $\bar{X}$ (±20 mA) Typ. $\Delta$ AMP (dB) Phase (deg.) deviation from 180°					
IN	CON	Mid-Band m		Total Range		1 dB compr.	no damage	L	M	U	Total		Total				
$f_L$ - $f_U$		Typ.	Max.	Typ.	Max.			Typ.	Min.	Typ.	Min.	m	Range	m	Range		
100-2000	DC-0.5	4.2	6.5	5.4	7.5	19*	25	30	22	—	—	26	20	0.3	0.4	5.0	8.0

L = low range [ $f_L$  to 10  $f_L$ ] M = mid range [10  $f_L$  to  $f_U/2$ ] U = upper range [ $f_U/2$  to  $f_U$ ] m = [ 2  $f_L$  to  $f_U/2$ ]

\* 15 dBm from 100-800 MHz.

Performance specifications apply for input power up to 10 dB below stated 1 dB compression.

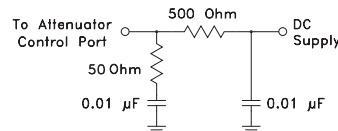
### Outline Drawing



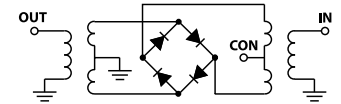
### Outline Dimensions (inch/mm)

A	B	C	D	E	F	
.770	.800	.240	.250	.370	.400	
19.56	20.32	6.10	6.35	9.40	10.16	
G	H	J	K			wt
.200	.20	.14	.031			grams
5.08	5.08	3.56	0.79			3.7

### suggested control port biasing configuration

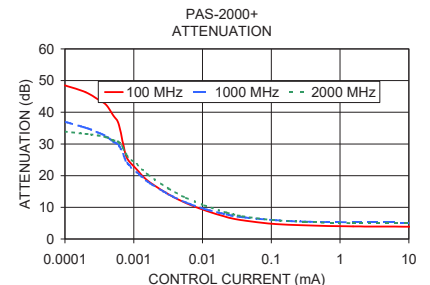
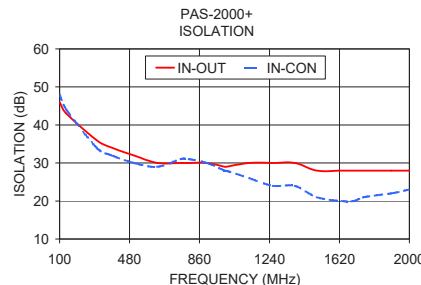
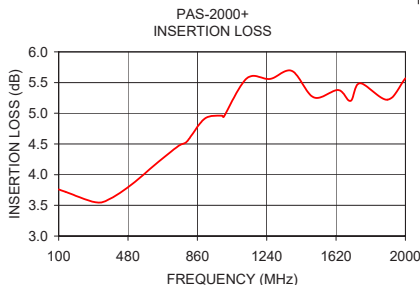


### electrical schematic



### Typical Performance Data

Freq. (MHz)	I. Loss (dB) at 20mA	±Control $\Delta$ AMP (dB)	20mA $\Delta$ Phase (deg.)	Isolation (dB)		Input R. Loss (dB)	Control Current (mA)	Attenuation (dB)			Phase $\Delta$ ref at 15mA Ctrl			Input VSWR			
				(in-out)	(in-con)			100 MHz	1000 MHz	2000 MHz	100 MHz	1000 MHz	2000 MHz	100 MHz	1000 MHz	2000 MHz	
$\bar{x}$	$\sigma$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$											
100.0	3.76	0.01	0.02	179.40	46.00	48.00	9.50	0.00	51.00	38.90	34.40	89.60	18.60	46.60	1.60	4.70	2.90
137.1	3.72	0.00	0.01	179.00	43.00	44.00	10.20	0.00	48.50	37.00	33.90	91.30	12.90	42.20	1.60	4.70	2.90
301.5	3.55	0.00	0.03	178.20	36.00	34.00	11.00	0.00	46.30	35.10	33.20	89.80	8.70	35.10	1.60	4.60	2.90
383.8	3.61	0.00	0.04	177.70	34.00	32.00	10.50	0.00	44.10	33.60	32.70	85.50	5.80	31.00	1.50	4.60	2.90
503.4	3.85	0.01	0.08	177.10	32.00	30.00	9.30	0.00	42.30	32.40	32.10	84.80	2.40	27.00	1.50	4.60	2.90
630.4	4.17	0.03	0.18	176.40	30.00	29.00	7.90	0.00	39.10	30.80	31.20	78.50	-1.40	21.20	1.50	4.60	2.90
757.5	4.47	0.06	0.21	176.30	30.00	31.00	6.90	0.00	36.50	29.70	30.60	71.50	-4.80	16.80	1.50	4.50	2.90
802.4	4.54	0.06	0.22	176.40	30.00	31.00	6.70	0.00	30.20	26.80	28.70	53.50	-12.00	6.90	1.50	4.40	2.80
899.5	4.91	0.11	0.27	176.10	30.00	30.00	6.30	0.00	25.50	24.00	26.30	43.00	-15.60	-0.90	1.40	4.20	2.70
996.7	4.96	0.11	0.28	175.90	29.00	28.00	6.20	0.00	22.00	21.20	23.60	36.60	-16.40	-5.90	1.40	4.00	2.60
1004.2	4.94	0.12	0.28	175.80	29.00	28.00	6.20	0.00	18.40	18.10	20.30	31.00	-16.00	-8.80	1.30	3.70	2.40
1131.3	5.57	0.16	0.36	175.70	30.00	26.00	6.40	0.00	14.10	14.10	15.90	24.30	-13.70	-9.80	1.20	3.30	2.00
1258.3	5.56	0.11	0.36	175.50	30.00	24.00	7.00	0.01	11.30	11.50	13.00	19.50	-11.10	-8.90	1.20	3.10	1.80
1377.9	5.69	0.05	0.37	175.50	30.00	24.00	7.70	0.01	9.10	9.50	10.60	14.80	-8.60	-7.50	1.30	3.00	1.60
1497.5	5.26	0.05	0.33	175.20	28.00	21.00	8.70	0.02	6.90	7.70	8.30	9.50	-5.50	-5.40	1.50	2.90	1.40
1632.1	5.38	0.05	0.27	174.70	28.00	20.00	10.00	0.04	5.90	6.90	7.20	6.70	-4.00	-4.00	1.60	2.90	1.40
1699.4	5.20	0.07	0.29	174.20	28.00	20.00	10.80	0.10	4.80	6.00	6.00	3.20	-2.00	-2.10	1.80	3.00	1.50
1751.7	5.49	0.07	0.27	174.20	28.00	21.00	11.30	0.31	4.30	5.50	5.40	1.30	-0.90	-1.00	1.90	3.00	1.60
1901.2	5.22	0.09	0.23	173.00	28.00	22.00	12.40	1.55	4.00	5.30	5.00	0.40	-0.40	-0.40	2.00	3.00	1.70
2000.0	5.57	0.16	0.25	172.70	28.00	23.00	12.50	15.11	3.90	5.20	4.90	0.10	-0.10	0.00	2.00	3.10	1.70



### Notes

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
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## Typical Performance Data

FREQ. (MHz)	INSERTION LOSS (dB) at 20mA Control Current	AMP. UNBAL. (dB) at ± 20mA Control Current	PHASE UNBAL. (deg.) at ± 20mA Control Current	ISOLATION at 0 mA Control Current (dB)		RETURN LOSS (dB) Input
				In-Out	In-Con	
100.0	3.76	0.02	179.4	46	48	9.5
137.1	3.72	0.01	179.0	43	44	10.2
301.5	3.55	0.03	178.2	36	34	11.0
383.8	3.61	0.04	177.7	34	32	10.5
503.4	3.85	0.08	177.1	32	30	9.3
630.4	4.17	0.18	176.4	30	29	7.9
757.5	4.47	0.21	176.3	30	31	6.9
802.4	4.54	0.22	176.4	30	31	6.7
899.5	4.91	0.27	176.1	30	30	6.3
996.7	4.96	0.28	175.9	29	28	6.2
1004.2	4.94	0.28	175.8	29	28	6.2
1131.3	5.57	0.36	175.7	30	26	6.4
1258.3	5.56	0.36	175.5	30	24	7.0
1377.9	5.69	0.37	175.5	30	24	7.7
1497.5	5.26	0.33	175.2	28	21	8.7
1632.1	5.38	0.27	174.7	28	20	10.0
1699.4	5.20	0.29	174.2	28	20	10.8
1751.7	5.49	0.27	174.2	28	21	11.3
1901.2	5.22	0.23	173.0	28	22	12.4
2000.0	5.57	0.25	172.7	28	23	12.5

CONTROL CURRENT (mA)	ATTENUATION (dB)			PHASE UNBALANCE REF AT 15 mA CONTROL (deg.)			INPUT VSWR (:1)		
	100 MHz	1000 MHz	2000 MHz	100 MHz	1000 MHz	2000 MHz	100 MHz	1000 MHz	2000 MHz
0.0000	51.0	38.9	34.4	89.6	18.6	46.6	1.6	4.7	2.9
0.0001	48.5	37.0	33.9	91.3	12.9	42.2	1.6	4.7	2.9
0.0002	46.3	35.1	33.2	89.8	8.7	35.1	1.6	4.6	2.9
0.0003	44.1	33.6	32.7	85.5	5.8	31.0	1.5	4.6	2.9
0.0004	42.3	32.4	32.1	84.8	2.4	27.0	1.5	4.6	2.9
0.0005	39.1	30.8	31.2	78.5	-1.4	21.2	1.5	4.6	2.9
0.0006	36.5	29.7	30.6	71.5	-4.8	16.8	1.5	4.5	2.9
0.0007	30.2	26.8	28.7	53.5	-12.0	6.9	1.5	4.4	2.8
0.0008	25.5	24.0	26.3	43.0	-15.6	-0.9	1.4	4.2	2.7
0.0011	22.0	21.2	23.6	36.6	-16.4	-5.9	1.4	4.0	2.6
0.0016	18.4	18.1	20.3	31.0	-16.0	-8.8	1.3	3.7	2.4
0.0032	14.1	14.1	15.9	24.3	-13.7	-9.8	1.2	3.3	2.0
0.0058	11.3	11.5	13.0	19.5	-11.1	-8.9	1.2	3.1	1.8
0.0106	9.1	9.5	10.6	14.8	-8.6	-7.5	1.3	3.0	1.6
0.0226	6.9	7.7	8.3	9.5	-5.5	-5.4	1.5	2.9	1.4
0.0381	5.9	6.9	7.2	6.7	-4.0	-4.0	1.6	2.9	1.4
0.1031	4.8	6.0	6.0	3.2	-2.0	-2.1	1.8	3.0	1.5
0.3098	4.3	5.5	5.4	1.3	-0.9	-1.0	1.9	3.0	1.6
1.5487	4.0	5.3	5.0	0.4	-0.4	-0.4	2.0	3.0	1.7
15.1120	3.9	5.2	4.9	0.1	-0.1	0.0	2.0	3.1	1.7



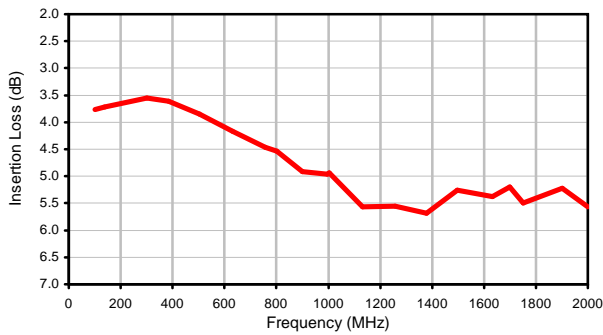
For detailed performance specs & shopping online see web site

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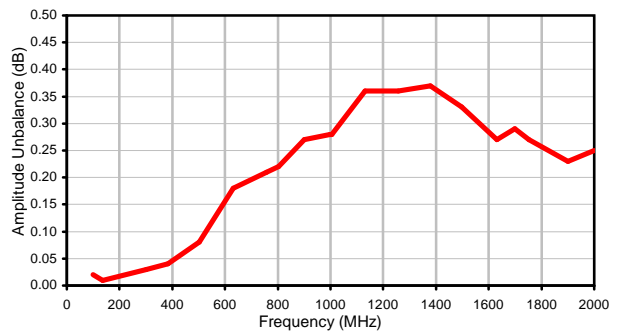
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## Typical Performance Curves

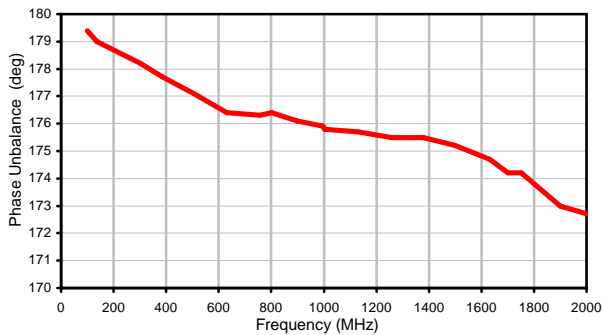
Insertion Loss @ 20 mA



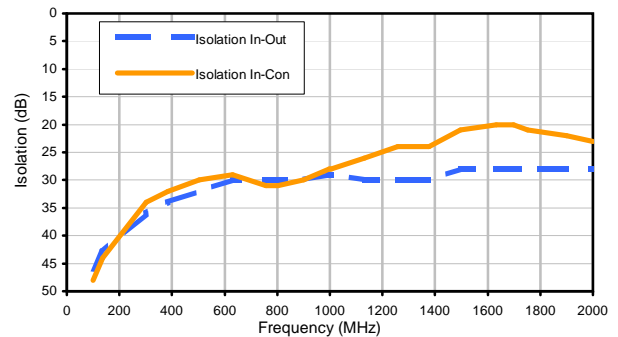
Amplitude Unbalance @ ± 20mA



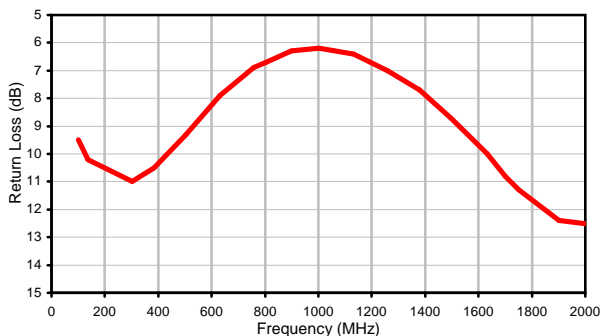
Phase Unbalance @ ± 20mA



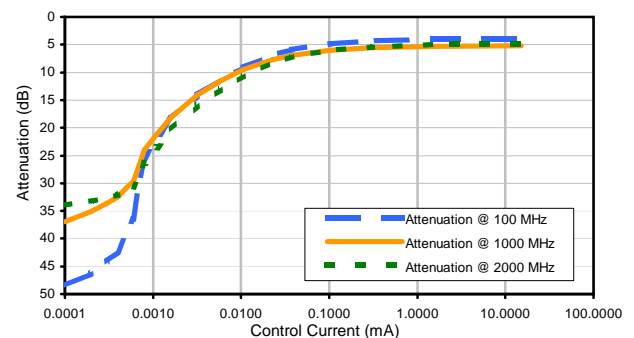
Isolation @ 0 mA



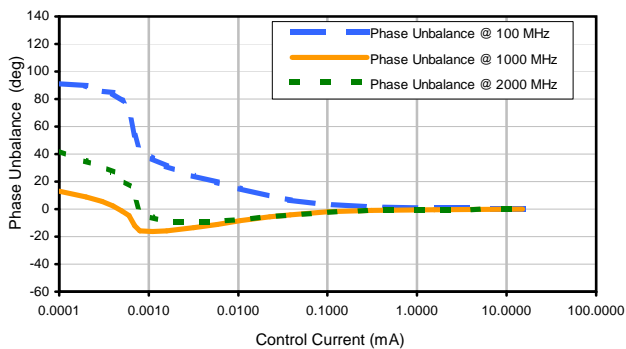
Return Loss Input



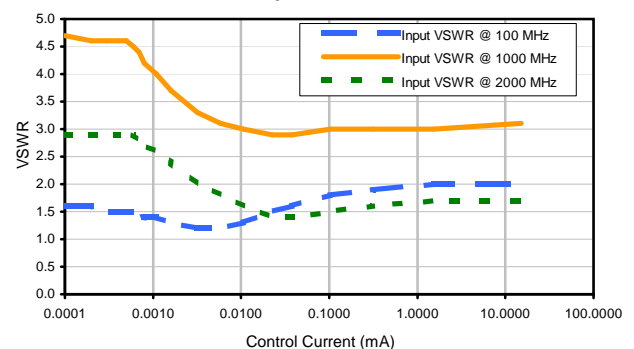
Attenuation



Phase Unbalance ref @ 15 mA



Input VSWR



ISO 9001 ISO 14001 AS 9100 CERTIFIED

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RF/MICROWAVE COMPONENTS

For detailed performance specs & shopping online see web site

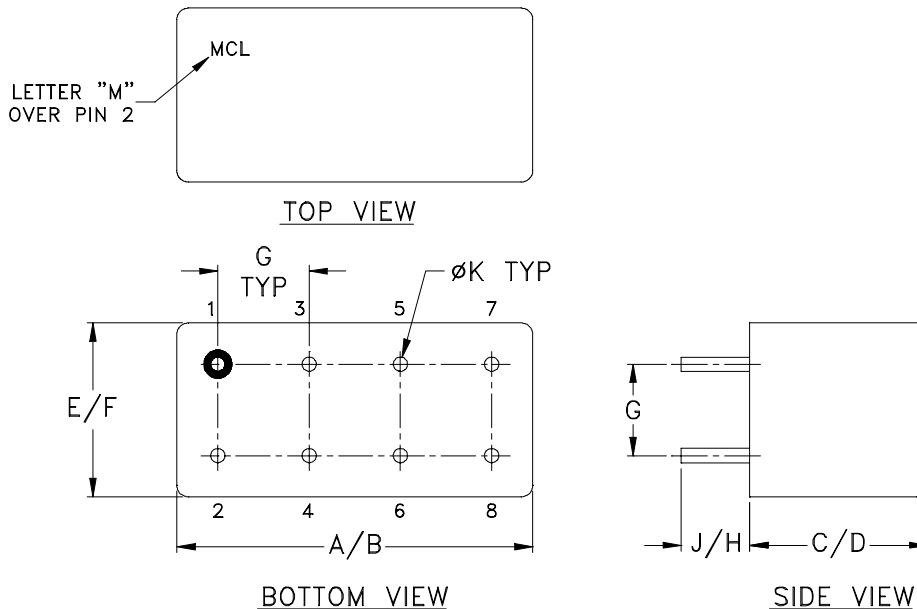
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# Case Style

# A

A01  
A04  
A05  
A06

## Outline Dimensions



CASE#	A	B	C	D	E	F	G	H	J	K	WT, GRAM
A01			.385 (9.78)	.400 (10.16)							5.2
A04	.770 (19.56)	.800 (20.32)	.200 (5.08)	.210 (5.33)	.370 (9.40)	.400 (10.16)	.200 (5.08)	.20 (5.08)	.14 (3.56)	.031 (.79)	3.7
A05			.240 (6.10)	.250 (6.35)							3.7
A06			.285 (7.24)	.310 (7.87)							5.2

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .03$ ; 3 Pl.  $\pm .015$

### Notes:

- Header material: C.R.S.  
Pin material: #52 alloy.  
Cover material: Cupro-Nickel.
- Pin finish: Electro Tin-Silver.
- Insulated spacer available. Request P/N B14-045-01.
- Tolerance on pin diameter  $\pm .005$  inch.
- Glass meniscus 0.015 inch max.
- Blue bead indicates Pin 1. Pin numbers do not appear on unit, for reference only.

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All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Moisture Resistance	10 cycles, 24 hours per cycle	MIL-STD-202, Method 106, Condition A, except 50°C and end point electrical test done within 12 hours
Solderability	10X Magnification	J-STD-002, 95% Coverage
Resistance to Solder Heat	260°C for 10 seconds	MIL-STD-202, Method 210, Condition B
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215
Terminal Strength	4 1/2 Pound Pull	MIL-STD-202, Method 211, Condition A



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Specification	Test/Inspection Condition	Reference/Spec
Gross Leak	125°C Bubble Test	MIL-STD-202, Method 112, Condition D
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D