

# Plug-In Attenuator/Switch

## PAS-1+

50Ω Bi-Phase 5 to 450 MHz



Generic photo used for illustration purposes only

CASE STYLE: A01

**+RoHS Compliant**  
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

### Maximum Ratings

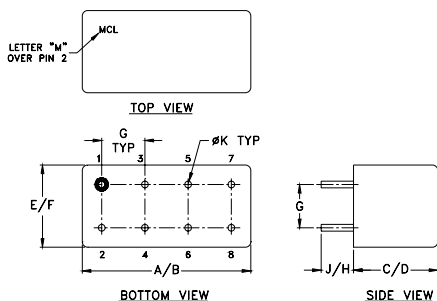
Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
Control Current	30mA
Permanent damage may occur if any of these limits are exceeded.	

### Pin Connections

INPUT	1
OUTPUT	8
CONTROL	3,4^
GROUND	2,5,6,7
CASE GROUND	2

^ pins must be connected together externally

### Outline Drawing



### Outline Dimensions (inch/mm)

A	B	C	D	E	F
.770	.800	.385	.400	.370	.400
19.56	20.32	9.78	10.16	9.40	10.16
G	H	J	K	wt	
.200	.20	.14	.031	grams	
5.08	5.08	3.56	0.79	5.2	

### Features

- wideband, 5 to 450 MHz
- hermetic case
- high in-out isolation
- low insertion loss, 3.5 dB typ.

### Applications

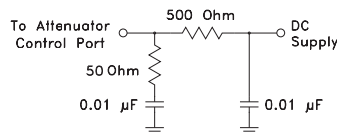
- military hi-rel applications
- bi-phase modulator
- electronic attenuator

### Attenuator/Switch Electrical Specifications

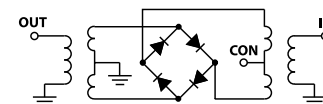
FREQUENCY (MHz)	INSERTION LOSS (dB) ±20 mA	MAX. INPUT PWR (dBm) ±20 mA	IN-OUT ISOLATION (dB) 0 mA			BI-PHASE X (±20 mA) Typ.						
			L	M	U	Δ AMP (dB)	Phase (deg.) deviation from 180°					
5-450	DC-0.05	20 29	65	50	45	35	35	25	0.1	0.1	0.5	1.2

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  $f_U/2$ ]  
Performance specifications apply for input power up to 10 dB below stated 1 dB compression.

### suggested control port biasing configuration

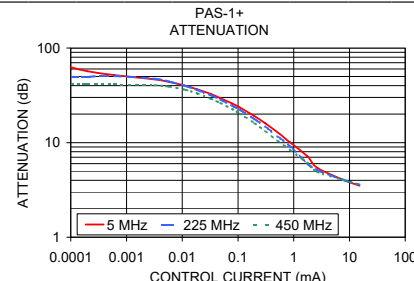
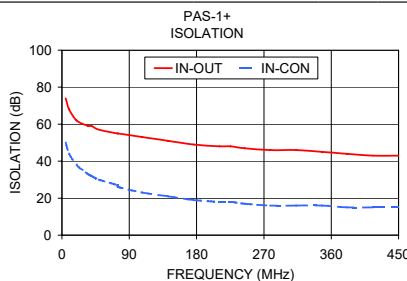
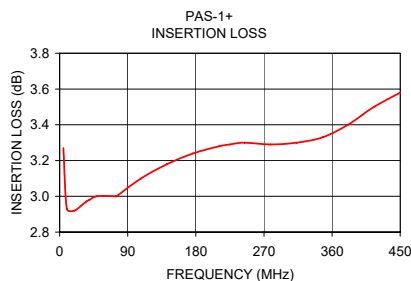


### electrical schematic



### Typical Performance Data

Freq. (MHz)	I. Loss (dB) at 20mA	±Control ΔAMP (dB)	20mA ΔPhase (deg.)	Isolation (dB)		Input R. Loss (dB)	Control Current (mA)	Attenuation (dB)			Phase Δ ref at 15mA Ctrl			Input VSWR			
				(in-out)	(in-con)			5 MHz	225 MHz	450 MHz	5 MHz	225 MHz	450 MHz	5 MHz	225 MHz	450 MHz	
5.0	3.27	0.025	0.02	179.9	74	50	11.8	0.0000	68.1	50.0	41.3	-52.4	124.7	108.2	2.9	2.9	2.6
9.5	2.93	0.019	0.02	179.9	68	44	13.4	0.0001	62.8	49.6	41.6	-9.9	119.7	103.2	2.9	2.9	2.6
19.5	2.92	0.017	0.02	179.9	62	38	14.3	0.0002	56.7	49.9	41.3	-18.0	114.6	102.4	2.9	2.9	2.6
35.0	2.97	0.017	0.02	179.9	59	33	14.5	0.0006	51.7	50.5	41.3	-20.7	101.4	95.5	2.9	2.9	2.6
39.5	2.98	0.017	0.03	179.9	59	32	14.5	0.0032	46.6	47.3	40.4	-10.7	58.4	76.3	2.9	2.9	2.6
49.5	3.00	0.017	0.03	179.9	57	30	14.4	0.0058	43.8	44.3	39.0	-6.4	45.6	60.3	2.9	2.9	2.6
74.0	3.00	0.019	0.04	179.8	55	27	14.1	0.0116	39.8	39.6	36.0	-0.4	29.9	43.3	2.8	2.9	2.6
75.1	3.00	0.018	0.03	179.8	55	26	14.1	0.0184	36.6	36.1	33.2	3.3	24.8	33.3	2.8	2.8	2.5
107.4	3.10	0.019	0.04	179.7	53	23	14.3	0.0327	32.6	31.6	29.1	5.9	18.3	23.7	2.8	2.7	2.4
141.8	3.18	0.019	0.04	179.7	51	21	14.6	0.0486	29.5	28.4	26.2	6.9	15.6	19.4	2.7	2.7	2.4
176.3	3.24	0.021	0.04	179.6	49	19	14.5	0.0787	25.9	24.6	22.6	7.6	13.3	14.8	2.6	2.5	2.2
210.8	3.28	0.021	0.04	179.5	48	18	14.6	0.1081	23.5	22.2	20.3	7.9	12.2	12.8	2.5	2.4	2.1
225.3	3.29	0.023	0.04	179.5	48	18	14.7	0.1975	19.1	17.8	16.1	7.8	10.0	9.7	2.2	2.2	1.9
244.2	3.30	0.024	0.04	179.4	47	17	14.8	0.3085	16.0	14.8	13.3	7.4	8.7	7.9	2.0	1.9	1.7
278.7	3.29	0.024	0.04	179.3	46	16	15.1	0.5100	12.9	11.7	10.6	6.5	7.3	6.0	1.7	1.7	1.4
313.2	3.30	0.026	0.05	179.2	46	16	15.1	0.8548	10.1	9.2	8.4	5.3	5.5	4.4	1.5	1.4	1.2
347.7	3.33	0.029	0.05	179.1	45	16	14.8	1.7555	7.2	6.0	6.1	3.3	3.4	2.5	1.3	1.2	1.1
381.0	3.40	0.034	0.05	179.1	44	15	15.0	2.6670	5.4	5.1	4.9	2.0	2.0	1.3	1.3	1.2	1.2
415.5	3.50	0.041	0.06	179.0	43	15	14.7	8.1232	4.0	4.0	4.0	0.5	0.5	0.4	1.5	1.4	1.4
450.0	3.58	0.044	0.06	178.9	43	15	13.7	15.1218	3.5	3.6	3.6	0.0	-0.1	0.0	1.6	1.5	1.4



### 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-Circuits' applicable established test performance criteria and measurement instructions.
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M151107  
PAS-1+  
WP/TD/CP/AM  
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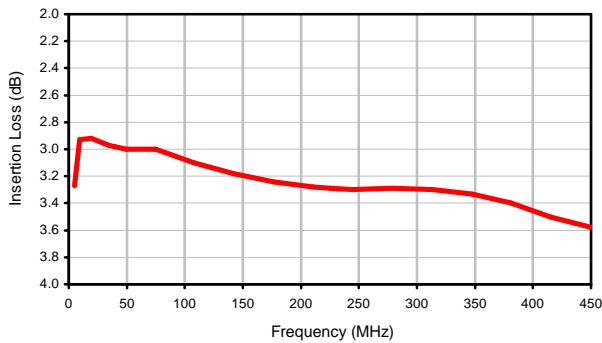
## Typical Performance Data

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	
5.0	3.27	0.02	179.9	74	50	11.8
9.5	2.93	0.02	179.9	68	44	13.4
19.5	2.92	0.02	179.9	62	38	14.3
35.0	2.97	0.02	179.9	59	33	14.5
39.5	2.98	0.03	179.9	59	32	14.5
49.5	3.00	0.03	179.9	57	30	14.4
74.0	3.00	0.04	179.8	55	27	14.1
75.1	3.00	0.03	179.8	55	26	14.1
107.4	3.10	0.04	179.7	53	23	14.3
141.8	3.18	0.04	179.7	51	21	14.6
176.3	3.24	0.04	179.6	49	19	14.5
210.8	3.28	0.04	179.5	48	18	14.6
225.3	3.29	0.04	179.5	48	18	14.7
244.2	3.30	0.04	179.4	47	17	14.8
278.7	3.29	0.04	179.3	46	16	15.1
313.2	3.30	0.05	179.2	46	16	15.1
347.7	3.33	0.05	179.1	45	16	14.8
381.0	3.40	0.05	179.1	44	15	15.0
415.5	3.50	0.06	179.0	43	15	14.7
450.0	3.58	0.06	178.9	43	15	13.7

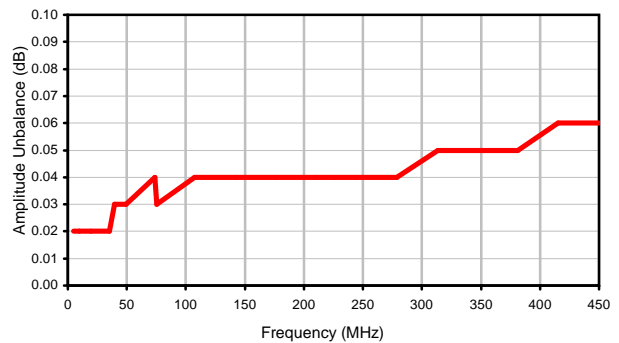
CONTROL CURRENT (mA)	ATTENUATION (dB)			PHASE UNBALANCE REF AT 15 mA CONTROL (deg.)			INPUT VSWR (:1)		
	5 MHz	225 MHz	450 MHz	5 MHz	225 MHz	450 MHz	5 MHz	225 MHz	450 MHz
0.0000	68.1	50.0	41.3	-52.4	124.7	108.2	2.9	2.9	2.6
0.0001	62.8	49.6	41.6	-9.9	119.7	103.2	2.9	2.9	2.6
0.0002	56.7	49.9	41.3	-18.0	114.6	102.4	2.9	2.9	2.6
0.0006	51.7	50.5	41.3	-20.7	101.4	95.5	2.9	2.9	2.6
0.0032	46.6	47.3	40.4	-10.7	58.4	76.3	2.9	2.9	2.6
0.0058	43.8	44.3	39.0	-6.4	45.6	60.3	2.9	2.9	2.6
0.0116	39.8	39.6	36.0	-0.4	29.9	43.3	2.8	2.9	2.6
0.0184	36.6	36.1	33.2	3.3	24.8	33.3	2.8	2.8	2.5
0.0327	32.6	31.6	29.1	5.9	18.3	23.7	2.8	2.7	2.4
0.0486	29.5	28.4	26.2	6.9	15.6	19.4	2.7	2.7	2.4
0.0787	25.9	24.6	22.6	7.6	13.3	14.8	2.6	2.5	2.2
0.1081	23.5	22.2	20.3	7.9	12.2	12.8	2.5	2.4	2.1
0.1975	19.1	17.8	16.1	7.8	10.0	9.7	2.2	2.2	1.9
0.3085	16.0	14.8	13.3	7.4	8.7	7.9	2.0	1.9	1.7
0.5100	12.9	11.7	10.6	6.5	7.3	6.0	1.7	1.7	1.4
0.8548	10.1	9.2	8.4	5.3	5.5	4.4	1.5	1.4	1.2
1.7555	7.2	6.0	6.1	3.3	3.4	2.5	1.3	1.2	1.1
2.6670	5.4	5.1	4.9	2.0	2.0	1.3	1.3	1.2	1.2
8.1232	4.0	4.0	4.0	0.5	0.5	0.4	1.5	1.4	1.4
15.1218	3.5	3.6	3.6	0.0	-0.1	0.0	1.6	1.5	1.4

## Typical Performance Curves

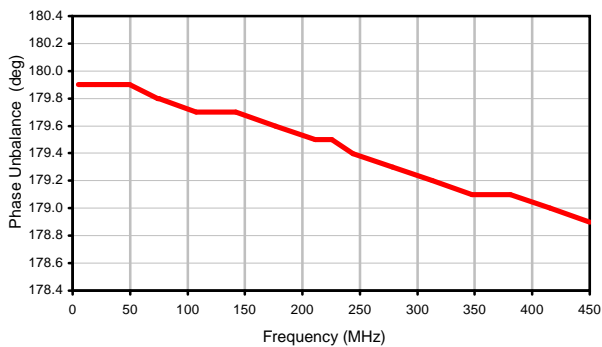
### Insertion Loss @ 20 mA



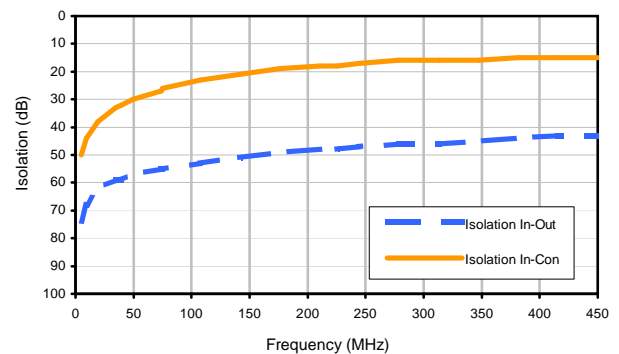
### Amplitude Unbalance @ ± 20mA



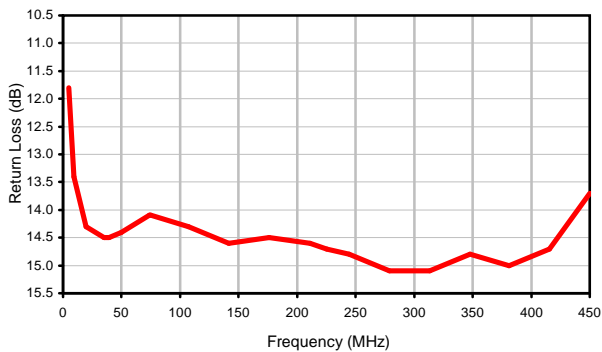
### Phase Unbalance @ ± 20mA



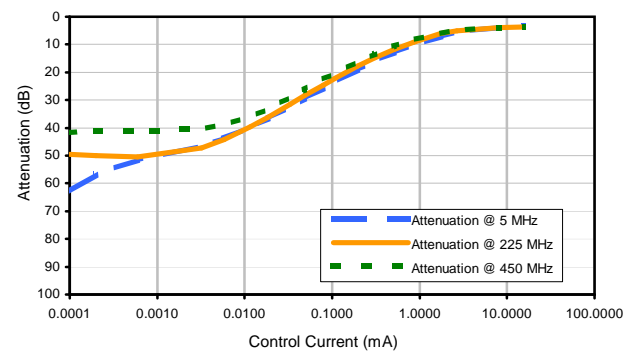
### Isolation @ 0 mA



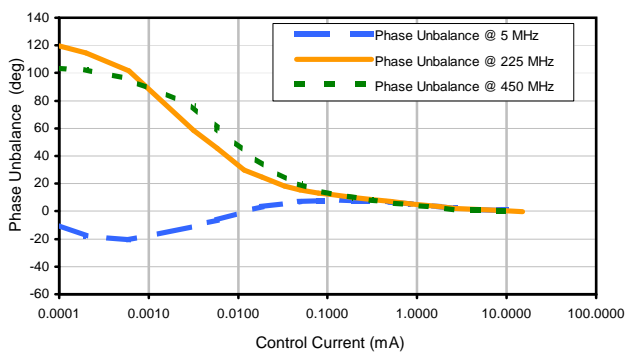
### Return Loss Input



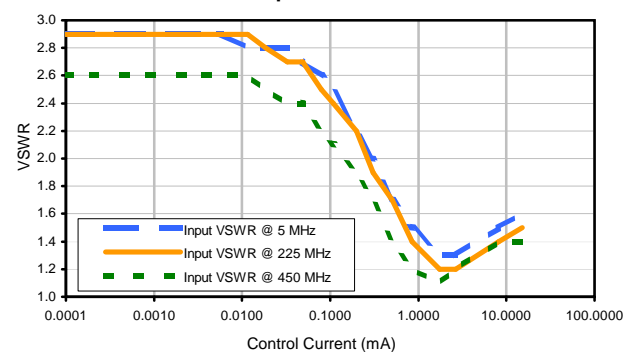
### Attenuation



### Phase Unbalance ref @ 15 mA



### Input VSWR

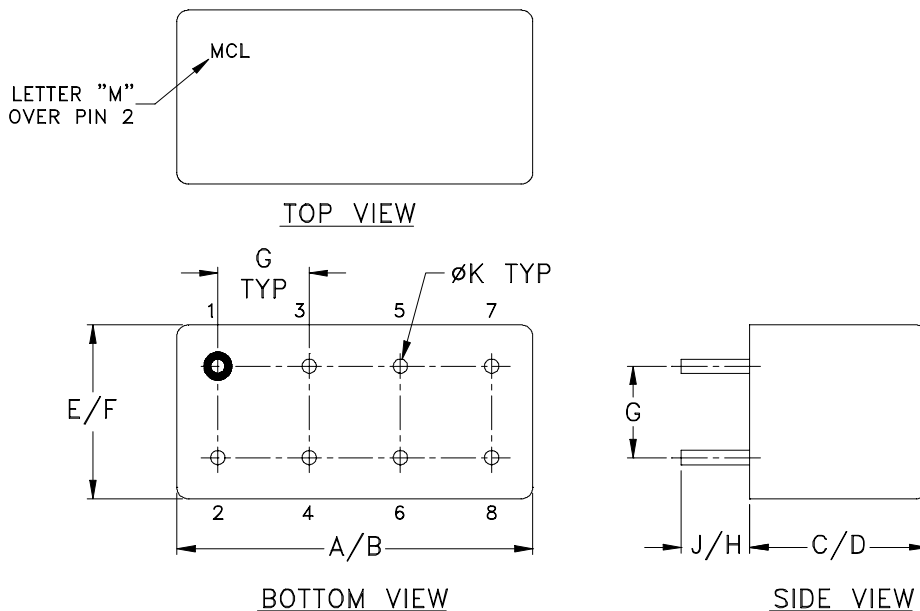


# Case Style

# 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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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