

Attenuator/Switch

50Ω Bi-Phase 1 to 200 MHz

Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
Control Current	30mA

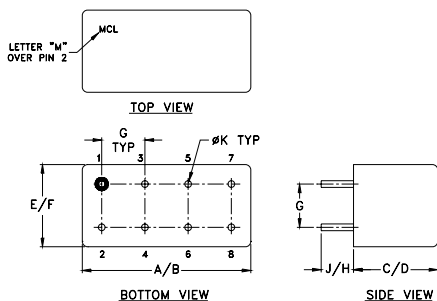
Permanent damage may occur if any of these limits are exceeded.

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, 1 to 200 MHz
- hermetic case
- low insertion loss, 1.6 typ.
- excellent amplitude and phase unbalance

Applications

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

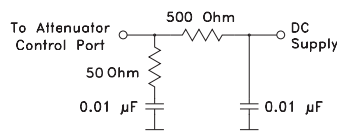
Attenuator/Switch Electrical Specifications

FREQUENCY (MHz)		INSERTION LOSS (dB) ±20 mA				MAX. INPUT PWR (dBm) ±20 mA		IN-OUT ISOLATION (dB) 0 mA								BI-PHASE $\bar{X}$ (±20 mA) Typ. Δ AMP (dB) Phase (deg.) deviation from 180°			
IN	CON	Mid-Band m		Total Range		1 dB	no	L		M		U		Total		Total			
f _L -f _U		Typ.	Max.	Typ.	Max.	compr.	damage	Typ.	Min.	Typ.	Min.	Typ.	Min.	m	Range	m	Range		
1-200	DC-0.05	1.4	2.0	1.6	2.5	15	29	65	50	50	40	50	35	0.1	0.1	0.5	1.0		

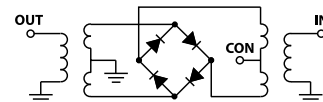
L = low range [f_i to $10 f_i$] M = mid range [$10 f_i$ to $f_i/2$] U = upper range [$f_i/2$ to f_i] m = [$2 f_i$ to $f_i/2$]

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

suggested control port biasing configuration

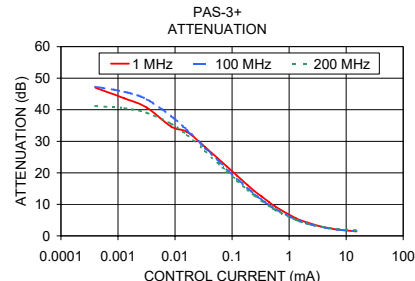
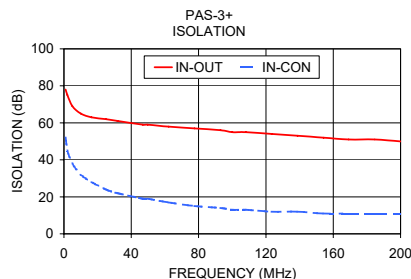
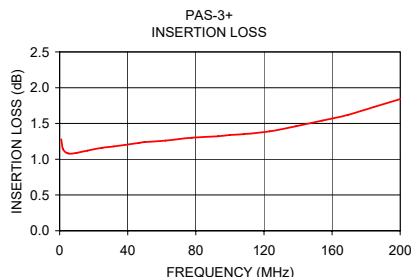


electrical schematic



Typical Performance Data

Freq. (MHz)	I. Loss (dB) at 20mA		±Control ΔΔAMP (dB)	20mA ΔΔPhase (deg.)	Isolation (dB)		Input R. Loss (dB)	Control Current (mA)	Attenuation (dB)			Phase Δ ref at 15mA Ctrl			Input VSWR		
					(in-out)	(in-con)			1 MHz	100 MHz	200 MHz	1 MHz	100 MHz	200 MHz	1 MHz	100 MHz	200 MHz
	$\bar{x}$	σ	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$		deg.	deg.	deg.						
1.0	1.28	0.002	0.01	180.0	78	52	23.5	0.0000	50.3	47.8	41.7	26.3	69.1	69.7	13.6	11.6	8.1
2.0	1.14	0.002	0.01	180.0	75	45	28.1	0.0004	47.0	47.3	41.2	19.0	65.6	65.4	13.5	11.6	8.1
5.0	1.08	0.002	0.01	180.0	69	38	35.4	0.0013	43.6	45.7	40.5	10.3	50.0	58.2	13.3	11.5	8.0
10.0	1.09	0.002	0.01	180.0	65	32	43.0	0.0032	40.7	43.3	39.0	5.7	36.8	46.4	12.9	11.3	7.9
16.4	1.12	0.002	0.01	179.9	63	28	42.7	0.0085	34.7	38.0	35.6	6.3	20.9	29.7	12.5	10.9	7.7
24.9	1.16	0.002	0.01	179.9	62	24	37.5	0.0162	33.0	33.5	32.0	6.6	12.3	19.1	11.7	10.3	7.4
31.8	1.18	0.002	0.01	179.9	61	22	35.2	0.0336	28.2	27.9	27.0	7.2	7.0	10.3	10.5	9.2	6.8
46.8	1.23	0.001	0.02	179.8	59	19	31.6	0.0567	24.5	23.9	23.1	7.5	4.7	6.0	9.3	8.1	6.1
49.8	1.24	0.001	0.02	179.8	59	19	31.0	0.0807	22.0	21.2	20.5	7.7	3.9	4.3	8.3	7.3	5.6
62.2	1.26	0.002	0.02	179.8	58	17	28.7	0.1215	19.1	18.2	17.5	7.5	3.0	2.9	7.1	6.2	4.9
77.6	1.30	0.001	0.02	179.7	57	15	26.4	0.1860	16.1	15.2	14.6	7.1	2.4	1.8	5.8	5.1	4.2
93.0	1.32	0.001	0.02	179.6	56	14	24.4	0.2459	14.2	13.3	12.8	6.5	2.1	1.4	5.0	4.5	3.7
100.0	1.34	0.001	0.02	179.6	55	13	23.5	0.3285	12.5	11.5	11.1	6.3	1.8	1.1	4.3	3.8	3.2
108.0	1.35	0.001	0.02	179.6	55	13	22.6	0.4365	10.8	9.9	9.6	5.7	1.6	0.9	3.6	3.3	2.8
123.4	1.39	0.001	0.02	179.5	54	12	21.0	0.5714	9.3	8.5	8.2	5.1	1.4	0.7	3.1	2.8	2.5
138.8	1.46	0.001	0.02	179.5	53	12	19.5	1.3114	5.6	5.2	5.1	3.3	0.8	0.3	2.0	1.9	1.7
154.2	1.54	0.001	0.02	179.4	52	11	18.2	2.0989	4.2	3.9	3.9	2.3	0.6	0.3	1.6	1.6	1.5
169.2	1.62	0.001	0.02	179.5	51	11	17.0	3.7220	2.9	2.8	2.9	1.3	0.3	0.1	1.3	1.3	1.3
184.6	1.73	0.001	0.02	179.5	51	11	15.9	7.0357	2.0	2.0	2.2	0.5	0.2	0.0	1.2	1.2	1.2
200.0	1.84	0.002	0.03	179.6	50	11	14.8	15.1415	1.4	1.5	1.8	0.0	0.0	0.0	1.1	1.1	1.1



Notes

NOTES:

A. 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.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"). Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit [Mini-Circuits' website at www.minicircuits.com/MCISore/terms.jsp](http://www.minicircuits.com/MCISore/terms.jsp)



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CASE STYLE: A01

+RoHS Compliant

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

REV. C
M151107
PAS-3
WP/TD/CP/AM
200401

Typical Performance Data

FREQ. (MHz)	INSERTION LOSS (dB) at 20mA Control Current	AMP. UNBAL. (dB) at ± 20 mA Control Current	PHASE UNBAL. (deg.) at ± 20 mA Control Current	ISOLATION at 0 mA Control Current (dB)		RETURN LOSS (dB) Input
				In-Out	In-Con	
1.0	1.28	0.01	180.0	78	52	23.5
2.0	1.14	0.01	180.0	75	45	28.1
5.0	1.08	0.01	180.0	69	38	35.4
10.0	1.09	0.01	180.0	65	32	43.0
16.4	1.12	0.01	179.9	63	28	42.7
24.9	1.16	0.01	179.9	62	24	37.5
31.8	1.18	0.01	179.9	61	22	35.2
46.8	1.23	0.02	179.8	59	19	31.6
49.8	1.24	0.02	179.8	59	19	31.0
62.2	1.26	0.02	179.8	58	17	28.7
77.6	1.30	0.02	179.7	57	15	26.4
93.0	1.32	0.02	179.6	56	14	24.4
100.0	1.34	0.02	179.6	55	13	23.5
108.0	1.35	0.02	179.6	55	13	22.6
123.4	1.39	0.02	179.5	54	12	21.0
138.8	1.46	0.02	179.5	53	12	19.5
154.2	1.54	0.02	179.4	52	11	18.2
169.2	1.62	0.02	179.5	51	11	17.0
184.6	1.73	0.02	179.5	51	11	15.9
200.0	1.84	0.03	179.6	50	11	14.8

CONTROL CURRENT (mA)	ATTENUATION (dB)			PHASE UNBALANCE REF AT 15 mA CONTROL (deg.)			INPUT VSWR (:1)		
	1 MHz	100 MHz	200 MHz	1 MHz	100 MHz	200 MHz	1 MHz	100 MHz	200 MHz
0.0000	50.3	47.8	41.7	26.3	69.1	69.7	13.6	11.6	8.1
0.0004	47.0	47.3	41.2	19.0	65.6	65.4	13.5	11.6	8.1
0.0013	43.6	45.7	40.5	10.3	50.0	58.2	13.3	11.5	8.0
0.0032	40.7	43.3	39.0	5.7	36.8	46.4	12.9	11.3	7.9
0.0085	34.7	38.0	35.6	6.3	20.9	29.7	12.5	10.9	7.7
0.0162	33.0	33.5	32.0	6.6	12.3	19.1	11.7	10.3	7.4
0.0336	28.2	27.9	27.0	7.2	7.0	10.3	10.5	9.2	6.8
0.0567	24.5	23.9	23.1	7.5	4.7	6.0	9.3	8.1	6.1
0.0807	22.0	21.2	20.5	7.7	3.9	4.3	8.3	7.3	5.6
0.1215	19.1	18.2	17.5	7.5	3.0	2.9	7.1	6.2	4.9
0.1860	16.1	15.2	14.6	7.1	2.4	1.8	5.8	5.1	4.2
0.2459	14.2	13.3	12.8	6.5	2.1	1.4	5.0	4.5	3.7
0.3285	12.5	11.5	11.1	6.3	1.8	1.1	4.3	3.8	3.2
0.4365	10.8	9.9	9.6	5.7	1.6	0.9	3.6	3.3	2.8
0.5714	9.3	8.5	8.2	5.1	1.4	0.7	3.1	2.8	2.5
1.3114	5.6	5.2	5.1	3.3	0.8	0.3	2.0	1.9	1.7
2.0989	4.2	3.9	3.9	2.3	0.6	0.3	1.6	1.6	1.5
3.7220	2.9	2.8	2.9	1.3	0.3	0.1	1.3	1.3	1.3
7.0357	2.0	2.0	2.2	0.5	0.2	0.0	1.2	1.2	1.2
15.1415	1.4	1.5	1.8	0.0	0.0	0.0	1.1	1.1	1.1

REV. X1

PAS-3+

061203

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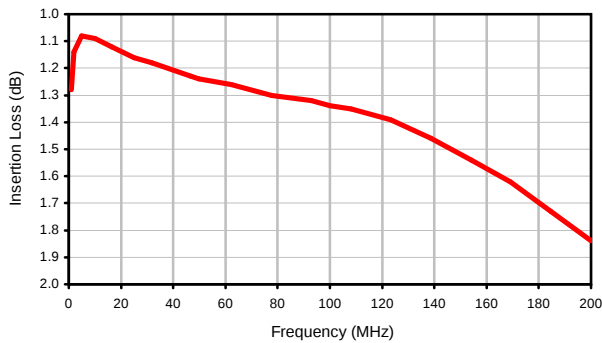


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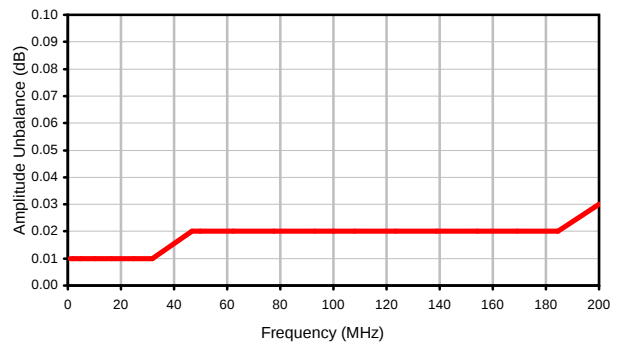


Typical Performance Curves

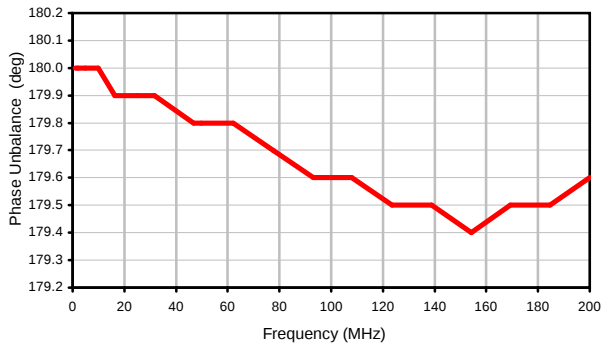
Insertion Loss @ 20 mA



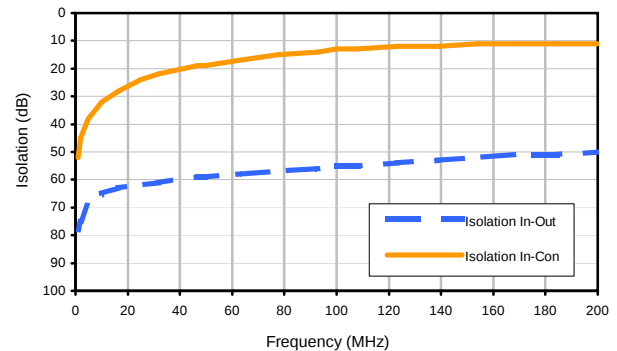
Amplitude Unbalance @ ± 20 mA



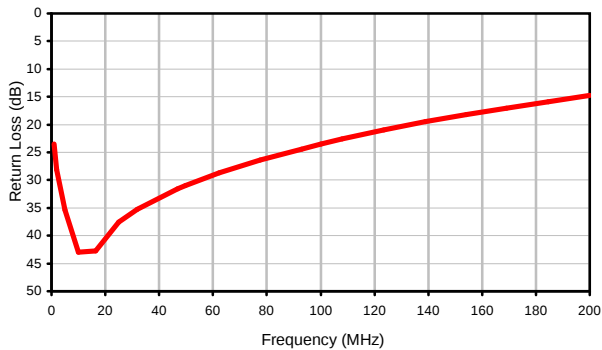
Phase Unbalance @ ± 20 mA



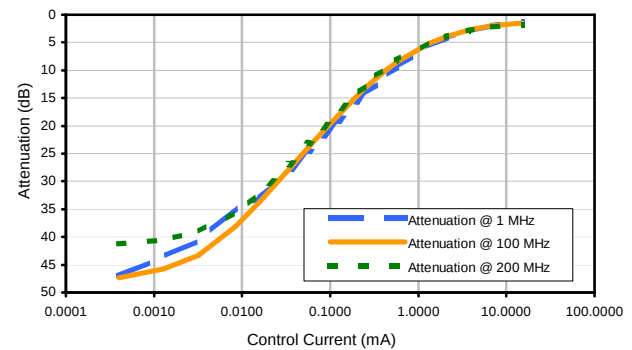
Isolation @ 0 mA



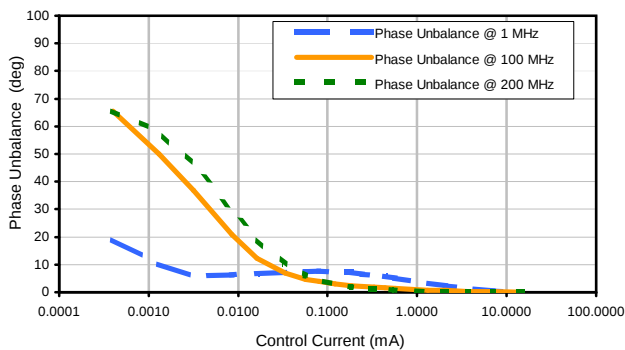
Return Loss Input



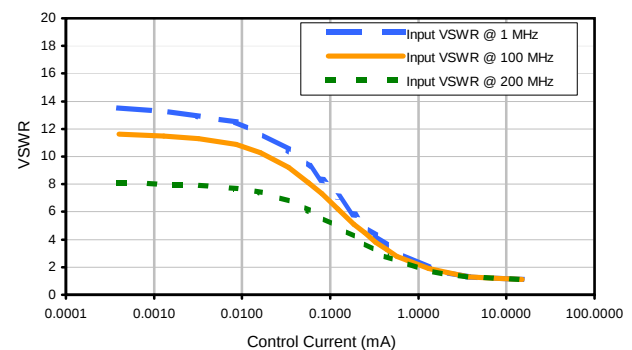
Attenuation



Phase Unbalance ref @ 15 mA



Input VSWR



REV. X1

PAS-3+

061203

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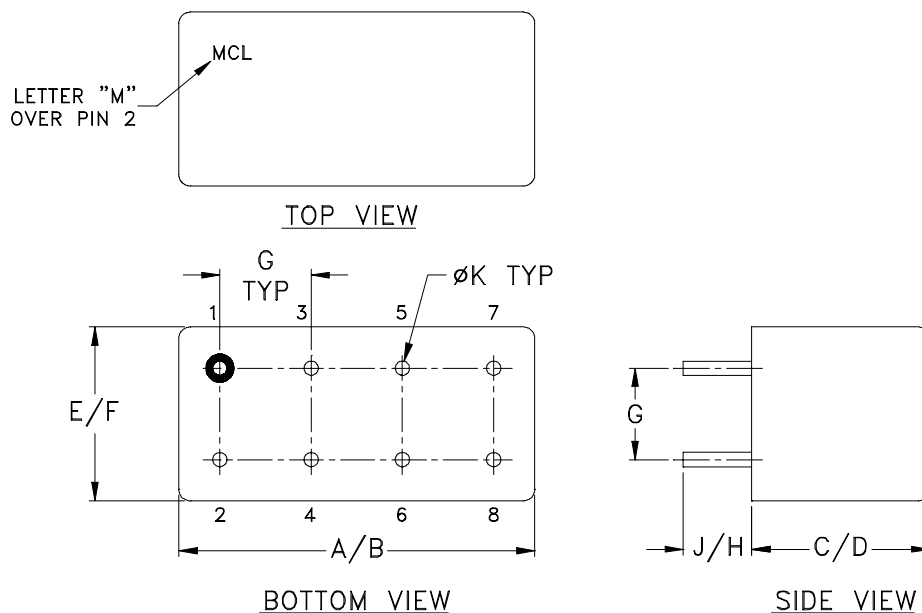


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A01
A04
A05
A06

Outline Dimensions



CASE#	A	B	C	D	E	F	G	H	J	K	WT, GRAM
A01	.770 (19.56)	.800 (20.32)	.385 (9.78)	.400 (10.16)	.370 (9.40)	.400 (10.16)	.200 (5.08)	.20 (5.08)	.14 (3.56)	.031 (.79)	5.2
A04			.200 (5.08)	.210 (5.33)							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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Mini-Circuits ISO 9001 & ISO 14001 Certified



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