

Coaxial Attenuator/Switch

50Ω Bi-Phase 1 to 200 MHz

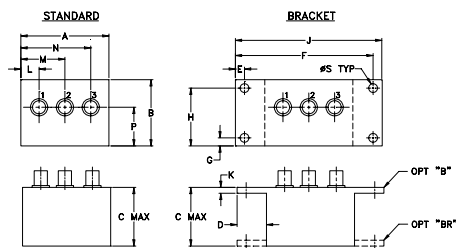
Maximum Ratings

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.	

Coaxial Connections

INPUT	3
OUTPUT	1
CONTROL	2

Outline Drawing



Outline Dimensions (inch)

A	B	C	D	E	F	G	H
2.25	1.38	1.24	.50	.150	3.100	.138	1.238
57.15	35.05	31.50	12.70	3.81	78.74	3.51	31.45
J	K	L	M	N	P	S	wt
3.25	.10	.40	1.15	1.86	.64	.150	grams
82.55	2.54	10.16	29.21	47.24	16.26	3.81	74.0

Features

- wideband, 1 to 200 MHz
- rugged shielded case
- excellent phase and amplitude unbalance
- low insertion loss, 1.6 dB typ.

Applications

- bi-phase modulator
- electronic attenuator



CASE STYLE: M22

Connectors Model
BNC ZAS-3+
BRACKET (OPTION "B")
BRACKET (OPTION "BR")

+RoHS Compliant

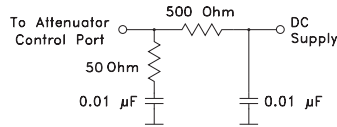
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Attenuator/Switch Electrical Specifications

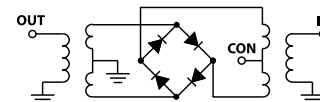
FREQUENCY (MHz)		INSERTION LOSS (dB) ±20 mA				MAX. INPUT PWR (dBm) ±20mA		IN-OUT ISOLATION (dB) 0 mA						BI-PHASE X (±20 mA) Typ.			
IN	CON	Mid-Band m		Total Range		1 dB compr.	no damage	L	M	U				Δ AMP (dB)	Phase (deg.) deviation from 180°	Total Range	Total Range
f _L -f _U		Typ.	Max.	Typ.	Max.			Typ.	Min.	Typ.	Min.	Typ.	Min.	m		m	
1-200	DC-0.05	1.4	2	1.6	2.5	15	30	65	50	50	40	50	35	0.10	0.1	0.5	1.0

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

suggested control port biasing configuration

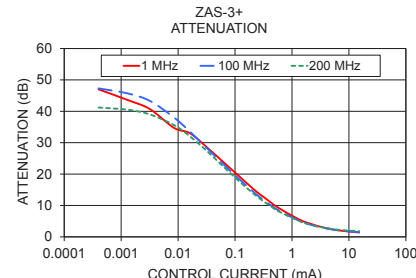
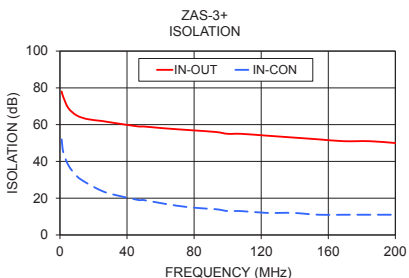
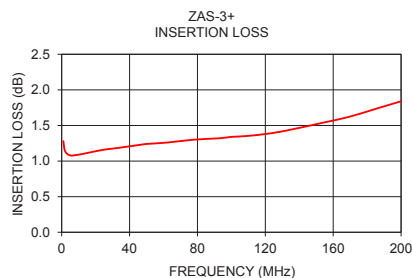


electrical schematic



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
	̄x	σ	̄x	̄x	̄x	̄x	̄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

- 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/MCLStore/terms.jsp



www.minicircuits.com P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

REV. C
M151107
ZAS-3+
WP/TD/CP
151005

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

ZAS-3+

061204

Page 1 of 1



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

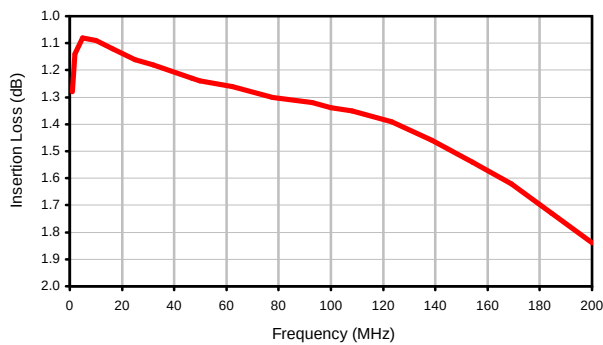


The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see

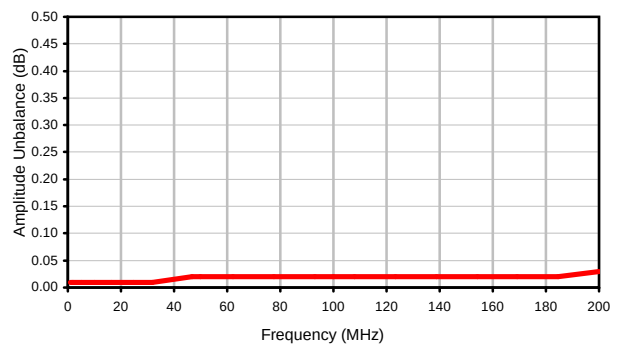


Typical Performance Curves

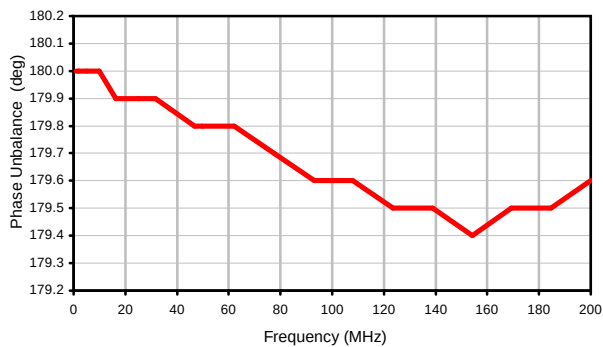
Insertion Loss @ 20 mA



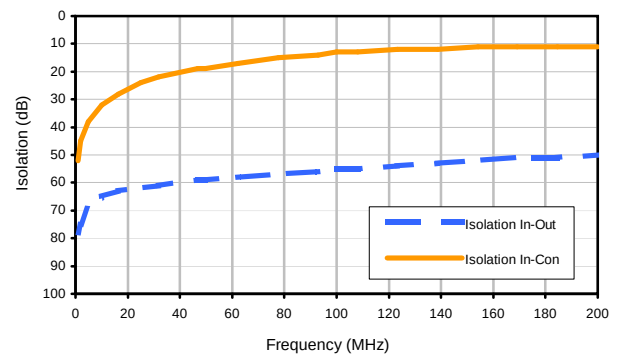
Amplitude Unbalance @ ± 20 mA



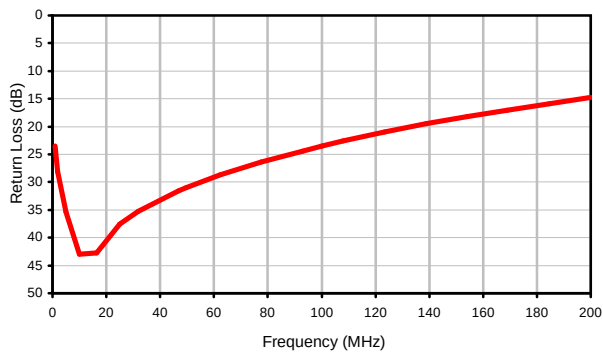
Phase Unbalance @ ± 20 mA



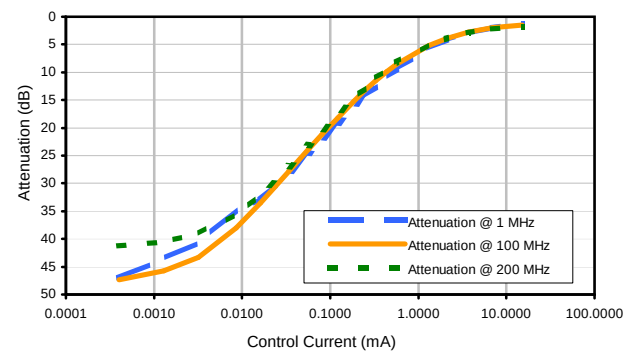
Isolation @ 0 mA



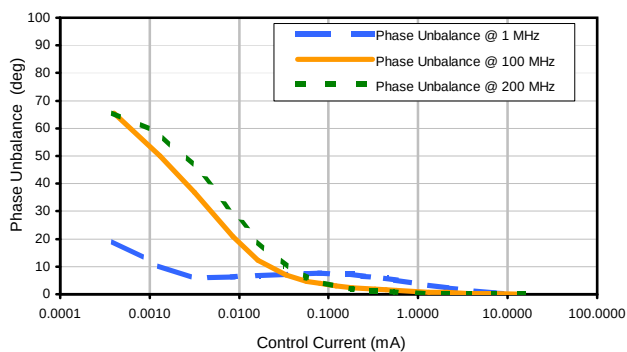
Return Loss Input



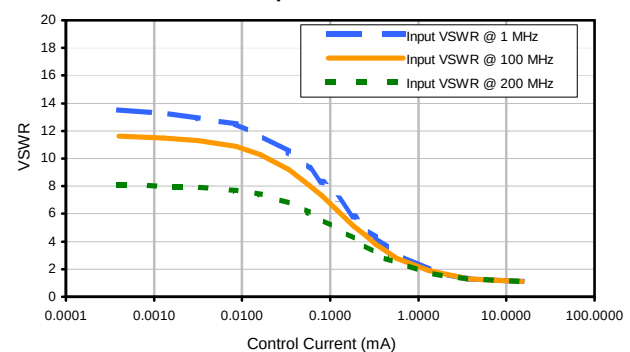
Attenuation



Phase Unbalance ref @ 15 mA



Input VSWR



REV. X1

ZAS-3+

061204

Page 1 of 1



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 CERTIFIED • RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see

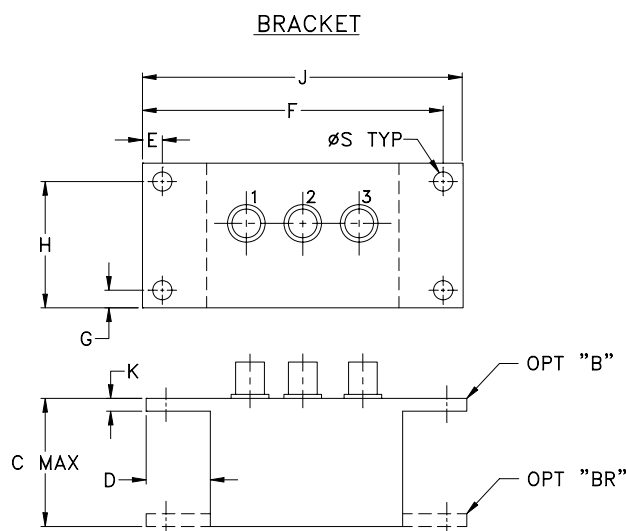
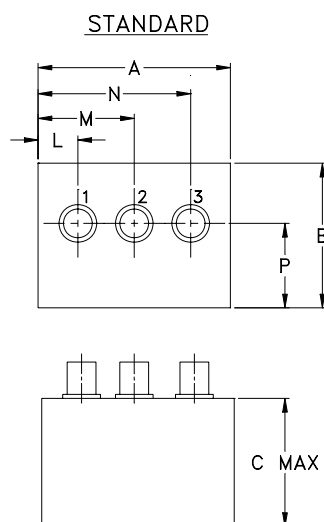


Outline Dimensions

M21

M22

M23



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
M21	1.50 (38.10)	1.13 (28.70)	1.00 (25.40)	.50 (12.70)	.155 (3.94)	2.345 (59.56)	.138 (3.51)	.987 (25.07)	2.50 (63.50)	.10 (2.54)	.31 (7.87)	.75 (19.05)	1.19 (30.23)
M22	2.25 (57.15)	1.38 (35.05)	1.24 (31.50)		.150 (3.81)	3.100 (78.74)		1.238 (31.45)	3.25 (82.55)		.40 (10.16)	1.15 (29.21)	1.86 (47.24)
M23	2.25 (57.15)	1.38 (35.05)	1.24 (31.50)		.150 (3.81)	3.100 (78.74)		1.238 (31.45)	3.25 (82.55)		.63 (16.00)	1.06 (26.92)	1.63 (41.40)

CASE#	P	Q	R	S	WT. GRAMS
M21	.66 (16.76)	--	--	.150 (3.81)	40.0
M22	.64 (16.26)	--	--		74.0
M23	.69 (17.53)	--	--		70.0

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

Notes:

- Case material: Aluminum alloy.
- Case finish:
 - For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.
 - For Non-RoHS Case Styles: Yellow hexavalent chrome based conversion coating.

Due to transition from non-RoHS to RoHS, models will be supplied with either case style finish until the non-RoHS case inventory is depleted.
- Mounting bracket available on request. For bracket mounted on connector end add suffix B to part number and add \$5.00 to unit cost. For bracket mounted on the rear, add suffix BR to part number and add \$1.50 to unit cost.



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
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D
Humidity	90% RH, 65°C Units may require bake-out after humidity to restore full performance.	MIL-STD-202, Method 103
Thermal Shock	-65° to 125°C, 5 cycles	MIL-STD-202, Method 107, Condition B
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	100g, 6ms sawtooth, 3 shocks each direction 3 axes (total 18)	MIL-STD-202, Method 213, Condition I