

# Coaxial Attenuator/Switch

## ZAS-3+

50Ω Bi-Phase 1 to 200 MHz

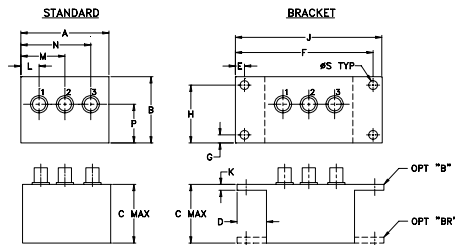
### Maximum Ratings

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/mm)

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

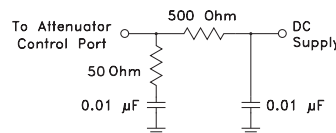
**+RoHS Compliant**  
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

### Attenuator/Switch Electrical Specifications

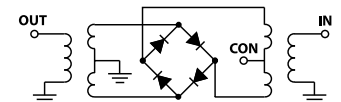
FREQUENCY (MHz)	INSERTION LOSS (dB) ±20 mA	MAX. INPUT PWR (dBm) ±20mA	IN-OUT ISOLATION (dB) 0 mA						BI-PHASE X̄ (±20 mA) Typ.								
			Mid-Band m		Total Range		L		M		U		Δ AMP (dB)		Phase (deg.) deviation from 180°		
IN f <sub>L</sub> -f <sub>U</sub>	CON	1 dB compr.	no damage	Typ.	Max.	Typ.	Max.	Typ.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

L = low range [f<sub>L</sub> to 10 f<sub>L</sub>] M = mid range [10 f<sub>L</sub> to f<sub>U</sub>/2] U = upper range [f<sub>U</sub>/2 to f<sub>U</sub>] m = [2 f<sub>L</sub> to f<sub>U</sub>/2]  
Performance specifications apply for input power up to 10 dB below stated 1 dB compression.

### suggested control port biasing configuration

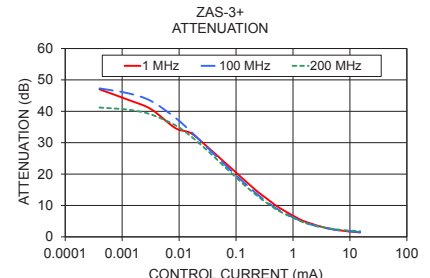
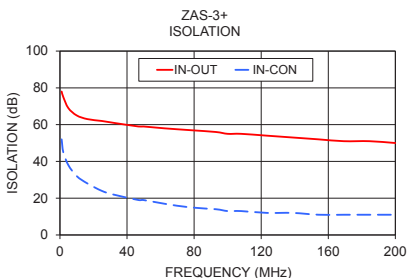
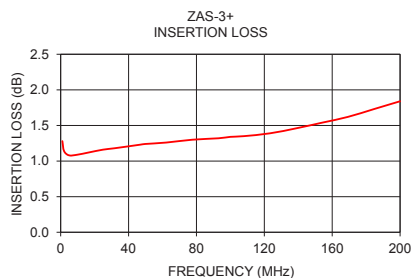


### electrical schematic



### Typical Performance Data

Freq. (MHz)	I. Loss (dB) at 20mA	±Control ΔΔAMP (dB)	20mA ΔΔPhase (deg.)	Isolation (dB) (in-out)	Input R. Loss (dB)	Control Current (mA)	Attenuation (dB)			Phase Δ ref at 15mA Ctrl deg.			Input VSWR				
							1 MHz	100 MHz	200 MHz	1 MHz	100 MHz	200 MHz	1 MHz	100 MHz	200 MHz		
x̄	σ	x̄	x̄	x̄	x̄												
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

- 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.
- 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](http://www.minicircuits.com/MCLStore/terms.jsp)



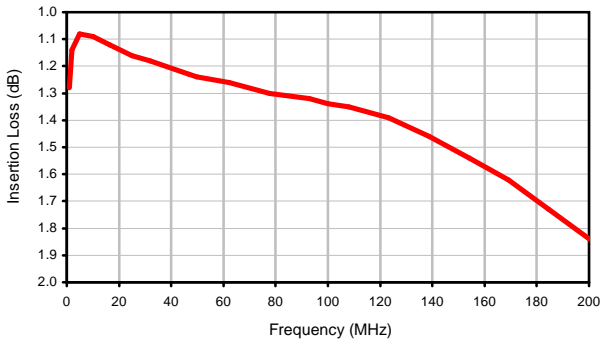
## Typical Performance Data

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	
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

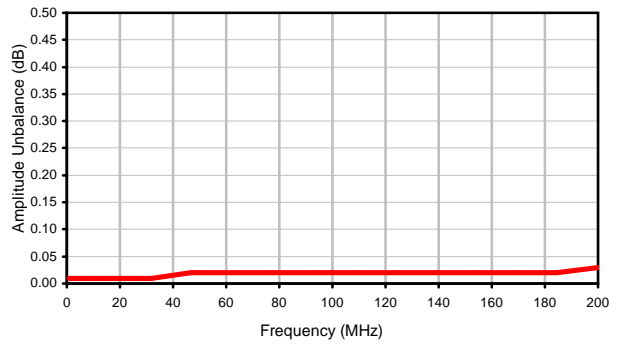
CONTROL CURRENT (mA)	ATTENUATION (dB)			PHASE UNBALANCE REF AT 15 mA CONTROL (deg.)			INPUT VSWR (:1)		
	1 MHz	100 MHz	200 MHz	1 MHz	100 MHz	200 MHz	1 MHz	100 MHz	200 MHz
0.0000	50.3	47.8	41.7	26.3	69.1	69.7	13.6	11.6	8.1
0.0004	47.0	47.3	41.2	19.0	65.6	65.4	13.5	11.6	8.1
0.0013	43.6	45.7	40.5	10.3	50.0	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

## Typical Performance Curves

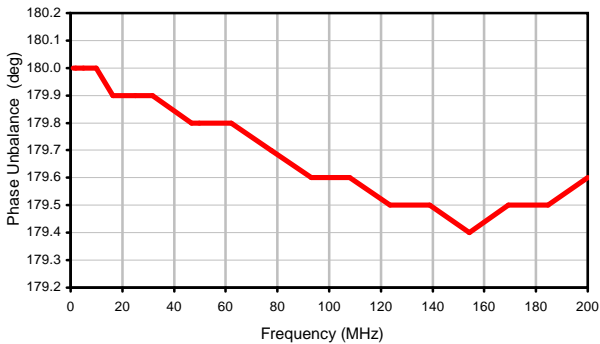
Insertion Loss @ 20 mA



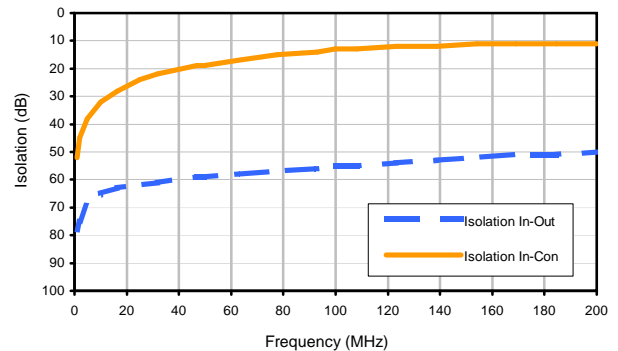
Amplitude Unbalance @ ± 20mA



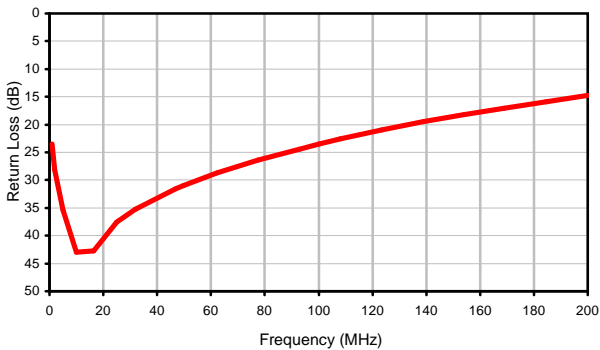
Phase Unbalance @ ± 20mA



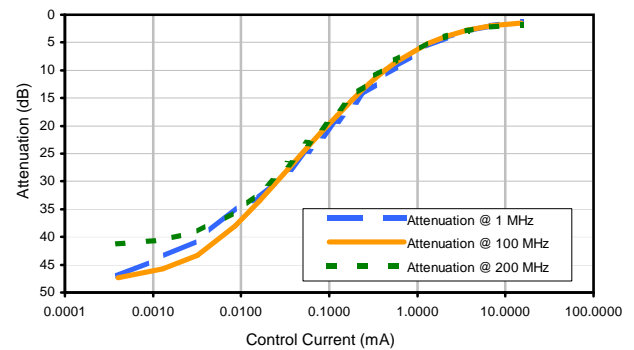
Isolation @ 0 mA



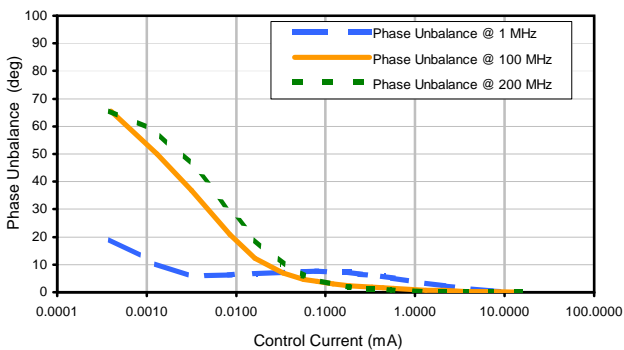
Return Loss Input



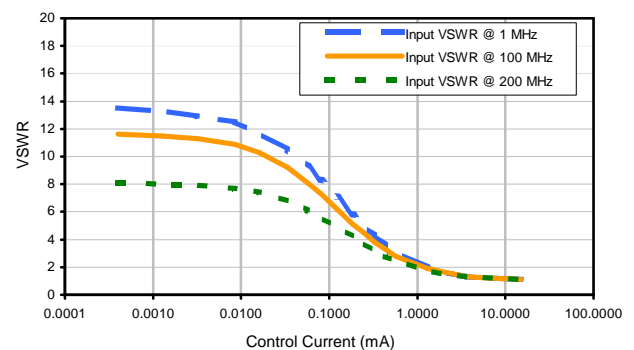
Attenuation



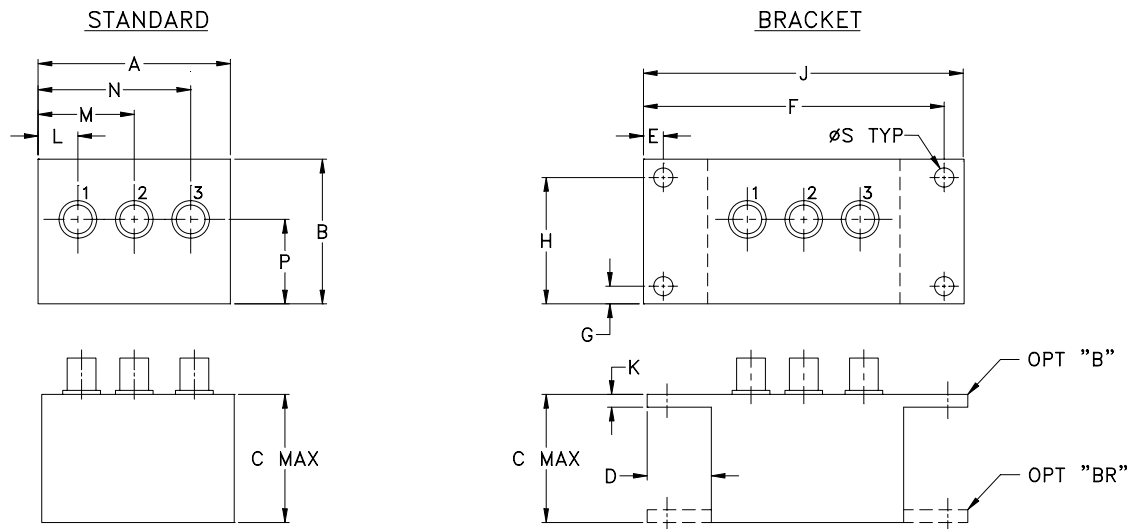
Phase Unbalance ref @ 15 mA



Input VSWR



## Outline Dimensions



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.

<b>Specification</b>	<b>Test/Inspection Condition</b>	<b>Reference/Spec</b>
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