In-Line, Coaxial

Broadband Slope Equalizer ZEQ-7-24K+

50Ω DC to 20 GHz

The Big Deal

- Internally matched to 50 Ohm
- Minimal slope deviation of ±0.4 dB typical
- Small form-factor 0.80 x 0.56 inches
- Power handling of 2W



CASE STYLE: RA2937

Product Overview

Mini-Circuits' ZEQ-7-24K+ is a broadband, connectorized negative slope equalizer, with a slope of 7.4 dB typ. over the range of DC to 20 GHz. The model is bi-directional and offers excellent electrical performance in applications where frequency dependent losses due to skin-depth (positive gain slope) hinders the overall system performance. The small form factor model comes with complementary connectors to avoid use of any additional adapters and operates over a wide temperature range of -55*C to +105*C.

Key Features

Feature	Advantages
Minimal slope deviation of +/- 0.4 dB typ.	Provides low signal distortion over the broadband range from DC – 20 GHz
Good 50 Ohm match over broadband	Model offers good return loss of 15 dB typ. over entire band, minimizing signal distortion.
Small form factor	Model is offered in a small case size of 0.80" x 0.56" providing advantages in densely clustered systems.
Wide operating temperature	The device operates over a wide temperature range of -55*C to +105*C with slope deviation of +/- 0.4 dB typ.

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

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ZEQ-7-24K+

50Ω DC to 20 GHz



Generic photo used for illustration purposes only

CASE STYLE: RA2937

Connectors	Model
2.92mm (K-type)	ZEQ-7-24K+

+RoHS Compliant

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

Maximum Ratings

Operating Temperature	-55°C to 105°C
Storage Temperature	-65°C to 150°C
Input power*	+33 dBm

Permanent damage may occur if any of these limits are exceeded.
*Max. RF power rating is the same in either directions.
Derate to 30 dBm at 105°C.

Coaxial Connections

Input	2.92 mm Female
Output	2.92 mm Male

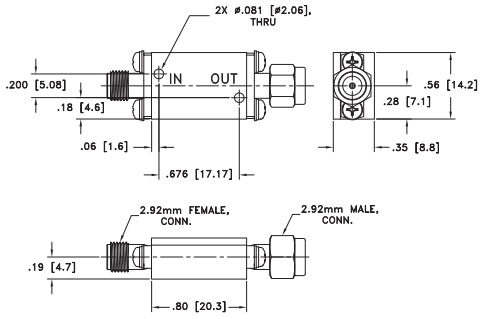
Features

- Negative slope of 7.4 dB typ. (other slope values available)
- Wideband operation, DC – 20 GHz
- Minimal slope variation, +/- 0.4 dB typ.
- Small form factor 0.80” x 0.56”

Applications

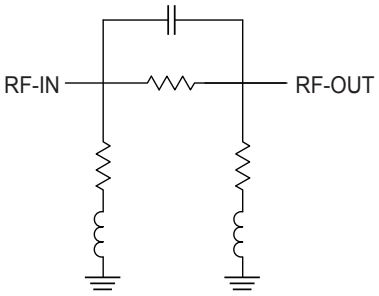
- Amplifier Gain slope compensation
- Cable loss compensation

Outline Drawing

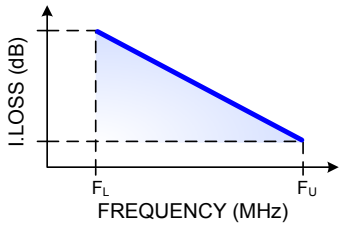


Weight: 25 grams

Simplified Functional Schematic



Typical Frequency Response



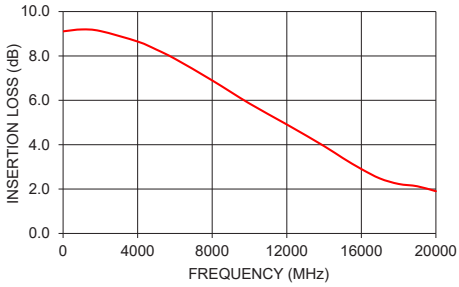
Electrical Specifications at 25°C

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range		DC		20	GHz
Insertion Loss	0.01		9.1		dB
	1.00		9.2		
	5.00		8.3		
	10.00		5.8		
	18.00		2.25		
	20.00		1.75		
VSWR	DC-18		1.3		:1
	18-20		1.65		

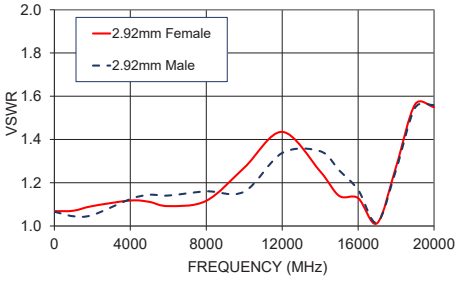
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR Female 2.92 mm	VSWR Male 2.92 mm
10	9.11	1.07	1.07
1000	9.19	1.07	1.05
2000	9.12	1.09	1.05
4000	8.65	1.12	1.12
5000	8.29	1.11	1.14
6000	7.87	1.09	1.14
8000	6.90	1.12	1.16
10000	5.85	1.27	1.16
12000	4.91	1.44	1.34
14000	3.94	1.25	1.35
15000	3.40	1.14	1.26
16000	2.90	1.13	1.17
17000	2.48	1.01	1.02
18000	2.23	1.27	1.26
19000	2.13	1.56	1.55
20000	1.90	1.55	1.56

ZEQ-7-24K+
INSERTION LOSS



ZEQ-7-24K+
VSWR



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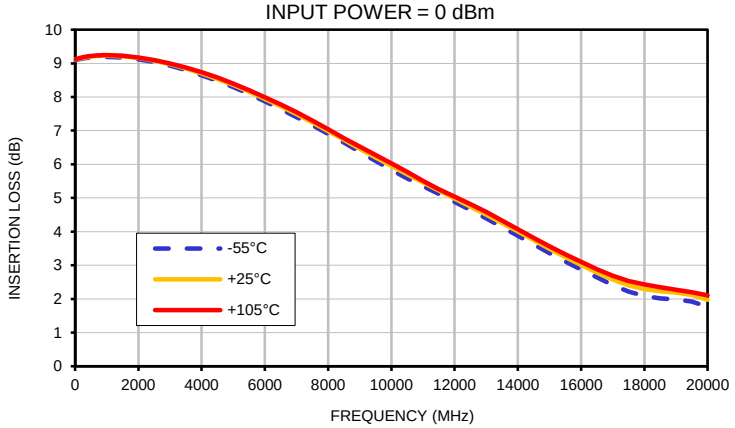
Coaxial Slope Equalizer ZEQ-7-24K+

Typical Performance Data

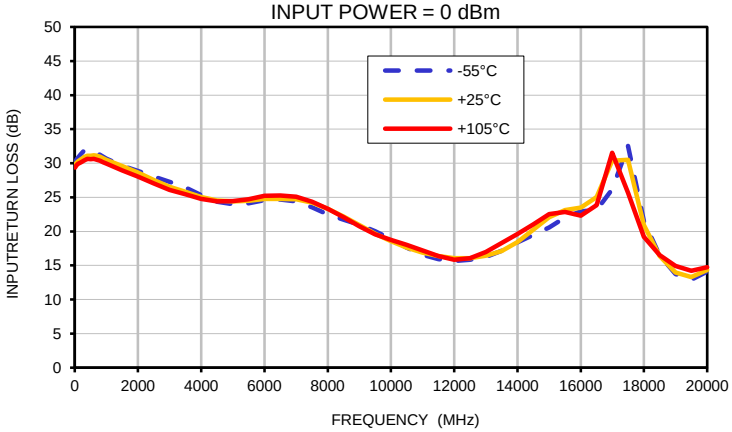
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-55˚C	@25°C	@+105°C	@-55˚C	@25°C	@+105°C	@-55˚C	@25°C	@+105°C
10	9.09	9.11	9.12	30.14	29.73	29.36	30.22	29.80	29.48
50	9.11	9.12	9.13	30.51	30.04	29.67	30.79	30.20	29.87
100	9.12	9.13	9.15	30.85	30.26	29.90	31.13	30.32	30.00
200	9.14	9.16	9.17	31.39	30.59	30.16	31.58	30.61	30.26
300	9.15	9.17	9.19	31.87	30.92	30.42	31.49	30.77	30.47
400	9.16	9.19	9.21	32.07	31.10	30.64	31.57	30.88	30.68
500	9.17	9.20	9.22	31.84	31.12	30.58	31.46	30.83	30.56
600	9.18	9.21	9.23	31.73	31.16	30.63	31.46	30.89	30.62
700	9.18	9.21	9.23	31.45	31.08	30.50	31.20	30.77	30.51
800	9.18	9.22	9.24	31.24	30.95	30.35	30.83	30.48	30.23
900	9.19	9.22	9.24	30.94	30.72	30.15	30.70	30.41	30.12
1000	9.19	9.22	9.24	30.70	30.53	29.95	30.52	30.27	29.91
1500	9.17	9.21	9.23	29.65	29.61	28.96	29.38	29.01	28.41
2000	9.12	9.16	9.17	28.87	28.64	28.04	28.49	28.25	27.63
2500	9.04	9.08	9.10	28.07	27.54	27.03	27.83	28.09	27.70
3000	8.93	8.98	9.00	27.26	26.53	26.07	27.64	28.17	27.92
3500	8.80	8.85	8.88	26.47	25.80	25.45	27.19	27.42	26.85
4000	8.65	8.70	8.74	25.32	25.04	24.77	27.29	26.95	25.99
4500	8.48	8.54	8.58	24.35	24.55	24.42	26.88	26.49	25.89
5000	8.29	8.36	8.40	24.01	24.41	24.46	26.04	25.82	26.60
5500	8.09	8.16	8.20	24.11	24.49	24.74	24.98	24.69	26.45
6000	7.87	7.95	7.99	24.60	24.76	25.22	24.18	23.69	24.97
6500	7.64	7.72	7.78	24.68	24.75	25.25	23.80	23.35	23.45
7000	7.40	7.49	7.54	24.41	24.70	25.09	22.49	22.88	22.20
7500	7.16	7.24	7.30	23.52	24.21	24.35	21.25	22.34	21.85
8000	6.91	6.99	7.04	22.49	23.31	23.33	20.65	22.20	22.77
8500	6.64	6.73	6.78	21.73	22.17	22.08	20.90	22.60	24.27
9000	6.37	6.46	6.52	20.99	20.93	20.75	21.99	22.68	23.16
9500	6.10	6.21	6.28	20.03	19.65	19.57	22.88	21.79	20.43
10000	5.83	5.95	6.03	18.88	18.57	18.74	22.47	20.71	19.12
10500	5.58	5.70	5.78	17.61	17.62	18.04	20.38	19.58	19.29
11000	5.35	5.47	5.51	16.55	16.87	17.21	17.84	18.23	19.82
11500	5.13	5.23	5.27	15.94	16.39	16.39	16.44	17.12	19.00
12000	4.89	4.99	5.04	15.68	16.05	15.86	15.96	16.60	17.41
12500	4.64	4.75	4.82	15.82	16.08	16.08	15.95	16.40	16.10
13000	4.39	4.51	4.59	16.26	16.41	16.98	15.85	16.39	15.68
13500	4.14	4.26	4.33	17.15	17.14	18.30	16.09	16.74	16.29
14000	3.88	4.01	4.07	18.37	18.43	19.62	16.98	17.59	17.83
14500	3.62	3.75	3.81	19.48	20.28	21.04	18.74	18.87	19.58
15000	3.36	3.49	3.57	20.57	22.08	22.56	20.38	20.11	20.62
15500	3.11	3.25	3.33	22.03	23.12	22.84	21.30	21.01	20.75
16000	2.87	3.01	3.10	22.93	23.50	22.31	21.81	22.07	21.03
16500	2.64	2.78	2.88	23.10	25.05	23.84	22.64	24.40	23.12
17000	2.41	2.57	2.68	26.19	30.38	31.54	26.74	30.22	26.93
17500	2.22	2.40	2.54	32.54	30.49	25.67	33.82	28.54	22.83
18000	2.09	2.29	2.43	21.51	20.95	19.21	21.93	20.33	18.62
18500	2.02	2.23	2.34	16.48	16.36	16.51	16.56	15.79	16.40
19000	1.99	2.19	2.27	13.77	13.98	14.95	13.70	13.60	15.13
19500	1.93	2.12	2.20	12.91	13.30	14.22	12.72	13.17	14.38
20000	1.77	1.97	2.11	14.09	14.31	14.75	13.53	14.11	14.38

Typical Performance Curves

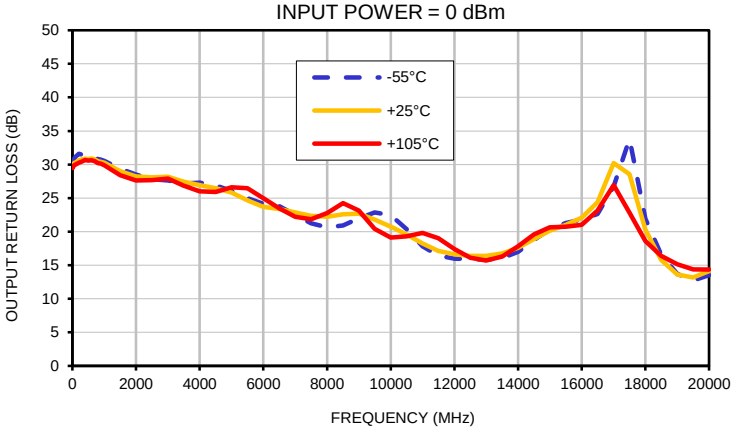
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



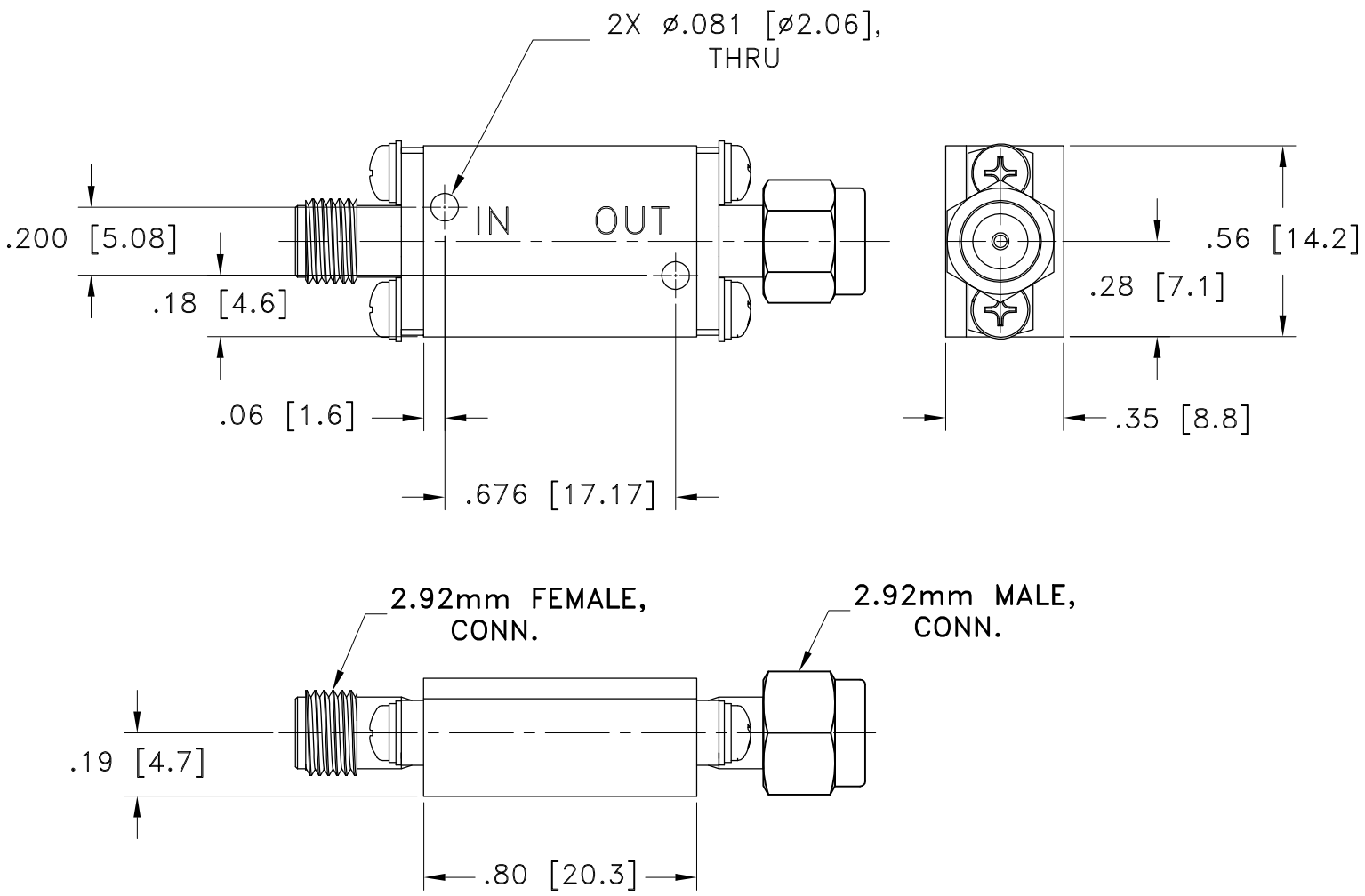
OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



Case Style RA

Outline Dimensions

RA2937



Weight: 25 grams

Dimensions are in inches (mm). Tolerances: 2 Pl.±.015; 3 Pl. ±.005

Notes:

1. Case material: Brass.
2. Case Finish: Gold plate.

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Environmental Specifications **ENV28T17**

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 105°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-65° to +150° C Ambient Environment	Individual Model Data Sheet
Humidity	90% RH, 65°C (non-condensing) 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

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