

Precision

Digital Step Attenuator

50Ω TTL Control, Pin Diode 10 to 1000 MHz

ZFAT-124

Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 125°C
Input Power	15 dBm
DC Voltage	5.5 V
TTL	5.5V

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

Features

- wideband, 10 to 1000 MHz
- excellent step accuracy, 0.2 dB typ.
- small, shielded metal case

Applications

- base stations
- cellular
- test sets



Generic photo used for illustration purposes only

CASE STYLE: SSS173

Connectors Model

SMA ZFAT-124

BRACKET (OPTION "B")

Digital Step Attenuator Electrical Specifications

MODEL NO.	FREQUENCY (MHz)		PRIMARY ATTENUATION STEPS (dB)			ATTENUATION (dB)		VSWR (:1)		
	f_L	f_U	#1	#2	#3	(1,1,1)** Nom.	(0,0,0) Max.	L	M	U
ZFAT-124	10	1000	1±0.25	2±0.25	4±0.3	7.0	4.0	1.6	1.4	1.5

L=10 to 100 MHz

M=100 to 500 MHz

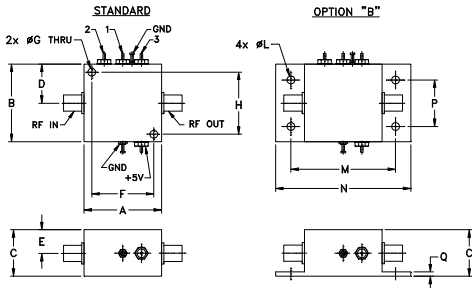
U=500 to 1000 MHz

** Total attenuation above thru-loss.

1. Step accuracy is specified for basic steps. For combination of steps accuracy is additive.

2. Thru-loss is minimum insertion loss with all attenuation elements bypassed (All TTL controls state are Low)

Outline Drawing



Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H
1.25	1.25	0.75	.63	.38	1.000	.125	1.000
31.75	31.75	19.05	16.00	9.65	25.40	3.18	25.40
J	K	L	M	N	P	Q	wt
--	--	.125	1.688	2.18	.75	.07	grams
--	--	3.18	42.88	55.37	19.05	1.78	75

Additional Specifications

DC Voltage	+5V
DC Current	12mA max.
Switching Time (50% TTL to within specified accuracy of the next-selected attenuation step, and to within 0.1 dB of steady-state Thru-Loss)	10μs typ., 15μs max.,
TTL Input High Threshold	2V min
TTL Input Low Threshold	0.8V max.
TTL Toggle Rate	50 kHz typ.
1dB Compression	0 dBm (10-100 MHz) +10 dBm (100-1000MHz)

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.

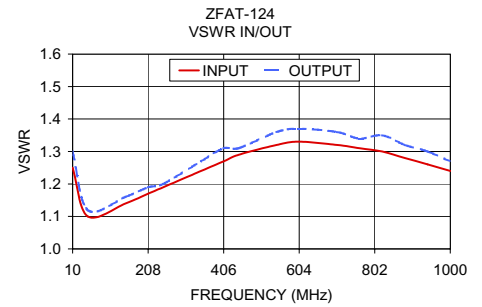
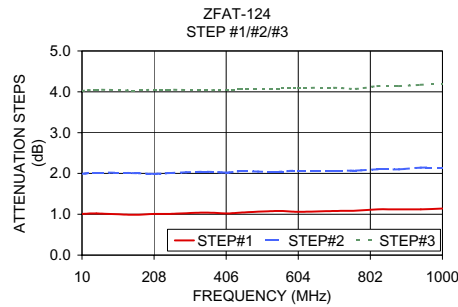
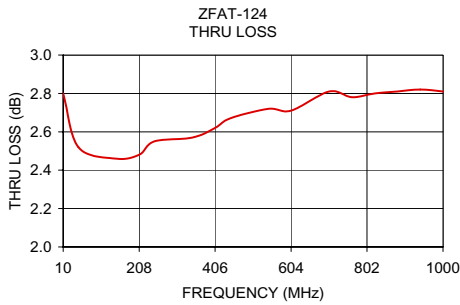
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ZFAT-124
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Step Attenuation* at TTL Control State

FREQ.	000	001	010	011	100	101	110	111
(MHz)	THRU LOSS (dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
10.00	2.80	1.01	1.99	3.01	4.02	5.03	6.03	7.03
49.60	2.52	1.02	2.02	3.05	4.05	5.06	6.05	7.09
148.60	2.46	0.99	2.01	3.02	4.03	5.03	6.02	7.07
208.00	2.48	1.01	1.99	3.00	4.05	5.07	6.02	7.05
247.60	2.55	1.01	2.01	3.03	4.05	5.06	6.02	7.02
346.60	2.57	1.04	2.04	3.03	4.04	5.07	6.08	7.06
406.00	2.62	1.02	2.02	3.03	4.05	5.06	6.04	7.05
445.60	2.67	1.04	2.05	3.09	4.06	5.11	6.06	7.09
544.60	2.72	1.08	2.04	3.11	4.08	5.14	6.06	7.13
604.00	2.71	1.06	2.07	3.11	4.09	5.14	6.11	7.15
703.00	2.81	1.08	2.07	3.11	4.10	5.17	6.09	7.16
762.40	2.78	1.09	2.07	3.17	4.07	5.20	6.10	7.21
821.80	2.80	1.12	2.10	3.20	4.14	5.25	6.17	7.27
881.20	2.81	1.12	2.10	3.19	4.14	5.23	6.22	7.30
940.60	2.82	1.12	2.14	3.20	4.17	5.31	6.22	7.35
1000.00	2.81	1.14	2.14	3.28	4.19	5.37	6.28	7.42

INPUT VSWR

FREQ.	001	010	011	100	101	110	111
(MHz)							
10.00	1.25	1.26	1.22	1.27	1.23	1.24	1.20
49.60	1.10	1.10	1.09	1.10	1.09	1.09	1.08
148.60	1.14	1.12	1.12	1.13	1.12	1.11	1.11
208.00	1.17	1.15	1.15	1.16	1.16	1.14	1.14
247.60	1.19	1.17	1.17	1.17	1.18	1.16	1.16
346.60	1.24	1.21	1.22	1.22	1.23	1.20	1.22
406.00	1.27	1.24	1.25	1.24	1.26	1.22	1.24
445.60	1.29	1.25	1.27	1.26	1.27	1.24	1.26
544.60	1.32	1.28	1.30	1.29	1.31	1.27	1.30
604.00	1.33	1.29	1.31	1.31	1.33	1.29	1.32
703.00	1.32	1.28	1.32	1.31	1.33	1.29	1.34
762.40	1.31	1.28	1.32	1.31	1.34	1.29	1.34
821.80	1.30	1.26	1.31	1.30	1.33	1.29	1.35
881.20	1.28	1.25	1.31	1.29	1.33	1.29	1.35
940.60	1.26	1.23	1.30	1.27	1.32	1.27	1.34
1000.00	1.24	1.21	1.29	1.25	1.31	1.26	1.34

OUTPUT VSWR

FREQ.	001	010	011	100	101	110	111
(MHz)							
10.00	1.30	1.27	1.25	1.16	1.16	1.15	1.15
49.60	1.12	1.10	1.10	1.07	1.07	1.07	1.06
148.60	1.16	1.13	1.14	1.09	1.10	1.09	1.09
208.00	1.19	1.16	1.16	1.11	1.11	1.09	1.10
247.60	1.20	1.18	1.18	1.13	1.13	1.11	1.12
346.60	1.27	1.23	1.23	1.16	1.17	1.16	1.15
406.00	1.31	1.25	1.26	1.18	1.19	1.17	1.19
445.60	1.31	1.27	1.28	1.19	1.20	1.18	1.18
544.60	1.36	1.30	1.30	1.21	1.22	1.21	1.21
604.00	1.37	1.31	1.31	1.21	1.22	1.21	1.23
703.00	1.36	1.32	1.33	1.22	1.23	1.24	1.23
762.40	1.34	1.30	1.32	1.23	1.24	1.25	1.25
821.80	1.35	1.30	1.31	1.22	1.24	1.25	1.24
881.20	1.32	1.29	1.28	1.22	1.22	1.23	1.25
940.60	1.30	1.27	1.29	1.23	1.23	1.25	1.25
1000.00	1.27	1.26	1.27	1.23	1.23	1.27	1.24

* Step attenuation above thru-loss (TTL logic 000)

Notes

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Digital Step Attenuator

ZFAT-124

Typical Performance Data

FREQUENCY (MHz)	STEP ATTENUATION* AT TTL CONTROL STATE (dB)							
	000 THRU LOSS	001 1 dB	010 2 dB	011 3 dB	100 4 dB	101 5 dB	110 6 dB	111 7 dB
10.0	2.80	1.01	1.99	3.01	4.02	5.03	6.03	7.03
49.6	2.52	1.02	2.02	3.05	4.05	5.06	6.05	7.09
148.6	2.46	0.99	2.01	3.02	4.03	5.03	6.02	7.07
208.0	2.48	1.01	1.99	3.00	4.05	5.07	6.02	7.05
247.6	2.55	1.01	2.01	3.03	4.05	5.06	6.02	7.02
346.6	2.57	1.04	2.04	3.03	4.04	5.07	6.08	7.06
406.0	2.62	1.02	2.02	3.03	4.05	5.06	6.04	7.05
445.6	2.67	1.04	2.05	3.09	4.06	5.11	6.06	7.09
544.6	2.72	1.08	2.04	3.11	4.08	5.14	6.06	7.13
604.0	2.71	1.06	2.07	3.11	4.09	5.14	6.11	7.15
703.0	2.81	1.08	2.07	3.11	4.10	5.17	6.09	7.16
762.4	2.78	1.09	2.07	3.17	4.07	5.20	6.10	7.21
821.8	2.80	1.12	2.10	3.20	4.14	5.25	6.17	7.27
881.2	2.81	1.12	2.10	3.19	4.14	5.23	6.22	7.30
940.6	2.82	1.12	2.14	3.20	4.17	5.31	6.22	7.35
1000.0	2.81	1.14	2.14	3.28	4.19	5.37	6.28	7.42

* Step Attenuation above Thru Loss (TTL Logic 000).

FREQUENCY (MHz)	INPUT VSWR AT TTL CONTROL STATE (:1)						
	001 1 dB	010 2 dB	011 3 dB	100 4 dB	101 5 dB	110 6 dB	111 7 dB
10.0	1.25	1.26	1.22	1.27	1.23	1.24	1.20
49.6	1.10	1.10	1.09	1.10	1.09	1.09	1.08
148.6	1.14	1.12	1.12	1.13	1.12	1.11	1.11
208.0	1.17	1.15	1.15	1.16	1.16	1.14	1.14
247.6	1.19	1.17	1.17	1.17	1.18	1.16	1.16
346.6	1.24	1.21	1.22	1.22	1.23	1.20	1.22
406.0	1.27	1.24	1.25	1.24	1.26	1.22	1.24
445.6	1.29	1.25	1.27	1.26	1.27	1.24	1.26
544.6	1.32	1.28	1.30	1.29	1.31	1.27	1.30
604.0	1.33	1.29	1.31	1.31	1.33	1.29	1.32
703.0	1.32	1.28	1.32	1.31	1.33	1.29	1.34
762.4	1.31	1.28	1.32	1.31	1.34	1.29	1.34
821.8	1.30	1.26	1.31	1.30	1.33	1.29	1.35
881.2	1.28	1.25	1.31	1.29	1.33	1.29	1.35
940.6	1.26	1.23	1.30	1.27	1.32	1.27	1.34
1000.0	1.24	1.21	1.29	1.25	1.31	1.26	1.34

FREQUENCY (MHz)	OUTPUT VSWR AT TTL CONTROL STATE (:1)						
	001 1 dB	010 2 dB	011 3 dB	100 4 dB	101 5 dB	110 6 dB	111 7 dB
10.0	1.30	1.27	1.25	1.16	1.16	1.15	1.15
49.6	1.12	1.10	1.10	1.07	1.07	1.07	1.06
148.6	1.16	1.13	1.14	1.09	1.10	1.09	1.09
208.0	1.19	1.16	1.16	1.11	1.11	1.09	1.10
247.6	1.20	1.18	1.18	1.13	1.13	1.11	1.12
346.6	1.27	1.23	1.23	1.16	1.17	1.16	1.15
406.0	1.31	1.25	1.26	1.18	1.19	1.17	1.19
445.6	1.31	1.27	1.28	1.19	1.20	1.18	1.18
544.6	1.36	1.30	1.30	1.21	1.22	1.21	1.21
604.0	1.37	1.31	1.31	1.21	1.22	1.21	1.23
703.0	1.36	1.32	1.33	1.22	1.23	1.24	1.23
762.4	1.34	1.30	1.32	1.23	1.24	1.25	1.25
821.8	1.35	1.30	1.31	1.22	1.24	1.25	1.24
881.2	1.32	1.29	1.28	1.22	1.22	1.23	1.25
940.6	1.30	1.27	1.29	1.23	1.23	1.25	1.25
1000.0	1.27	1.26	1.27	1.23	1.23	1.27	1.24

REV. X1

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061207

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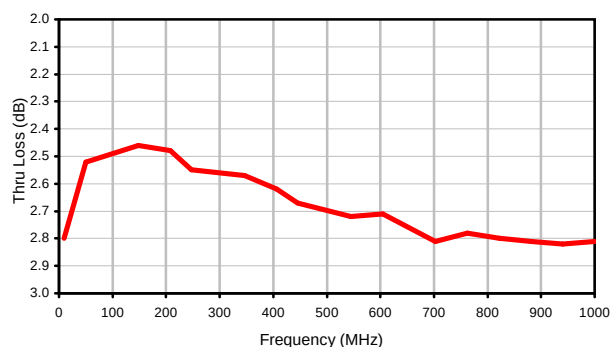


Digital Step Attenuator

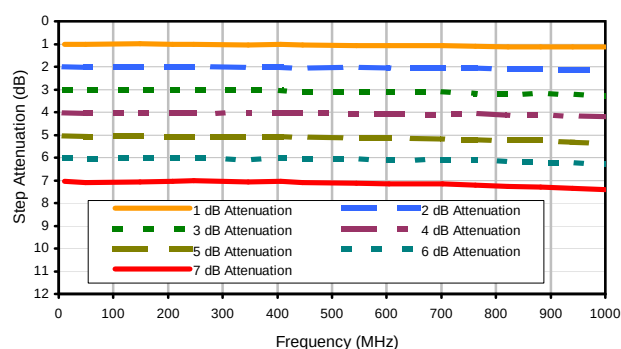
Typical Performance Curves

ZFAT-124

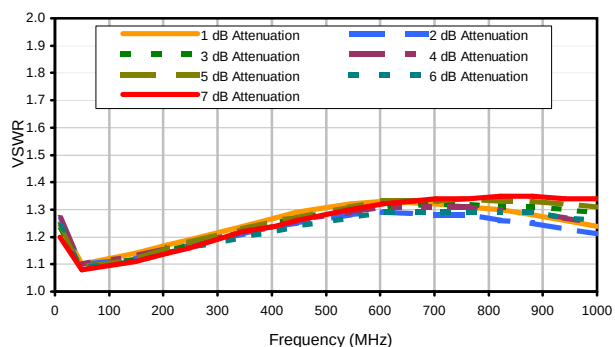
Thru Loss



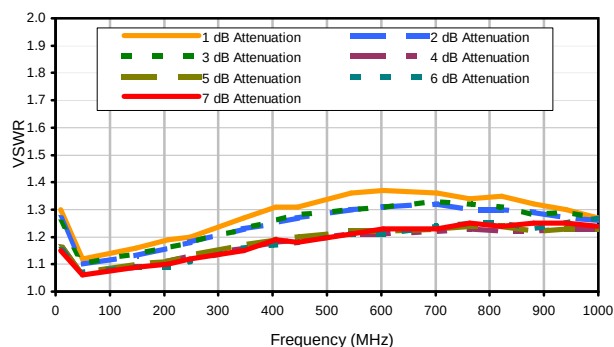
Step Attenuation



Input VSWR



Output VSWR



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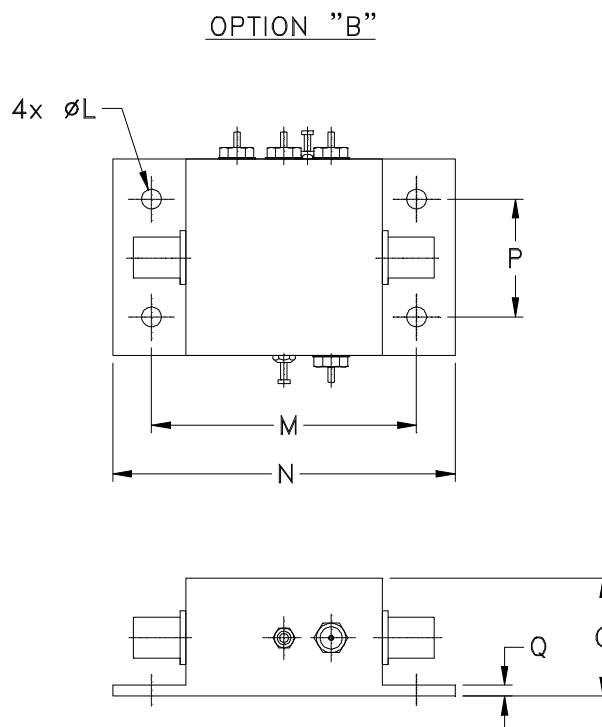
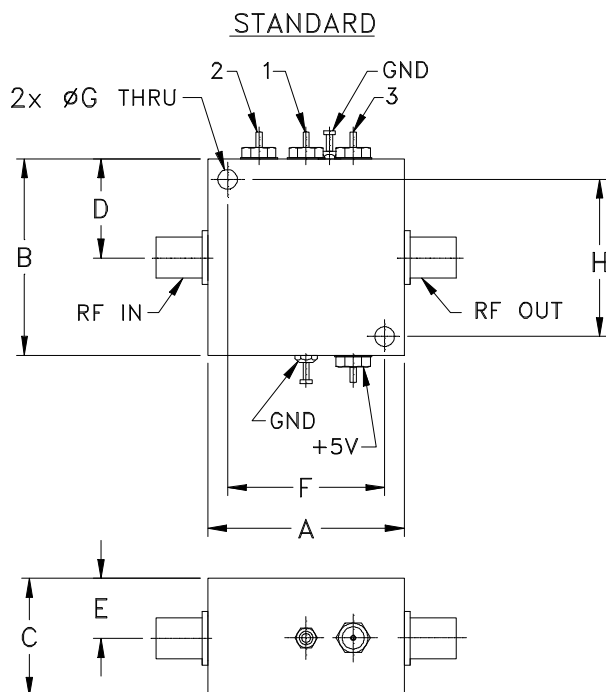
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Outline Dimensions



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
SSS173	1.25 (31.75)	1.25 (31.75)	.75 (19.05)	.63 (16.00)	.38 (9.65)	1.000 (25.40)	.125 (3.18)	1.000 (25.40)	--	--	.125 (3.18)	1.688 (42.88)	2.18 (55.38)

CASE#	P	Q	WT. GRAMS
SSS173	.750 (19.05)	.07 (1.78)	75

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.



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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