



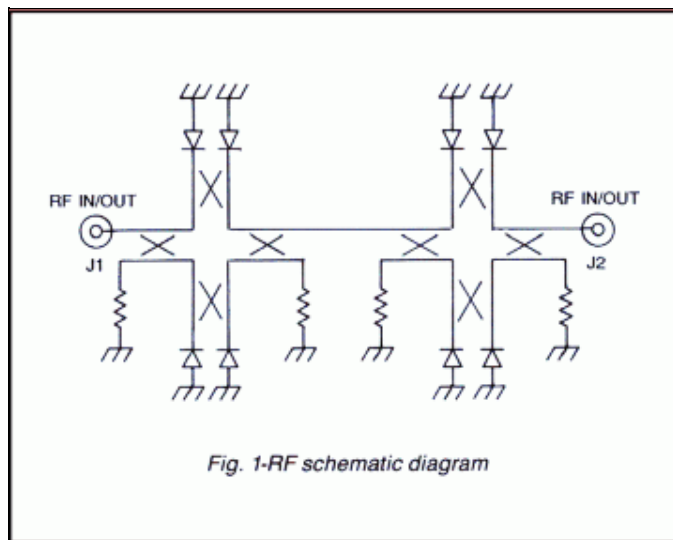
Series D197 Voltage Controlled Phase Invariant Attenuators

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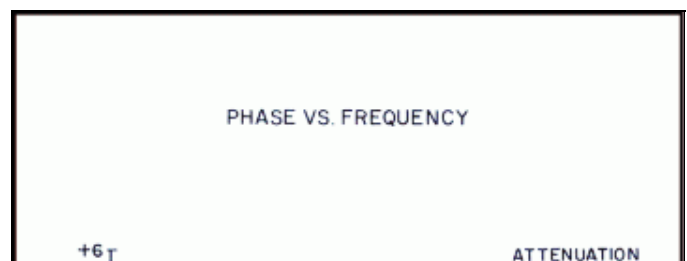
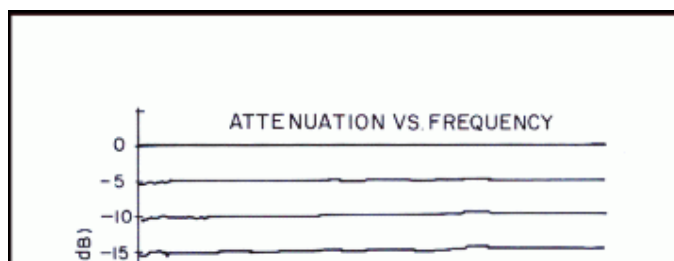
Application Notes for [Microwave Attenuators](#)

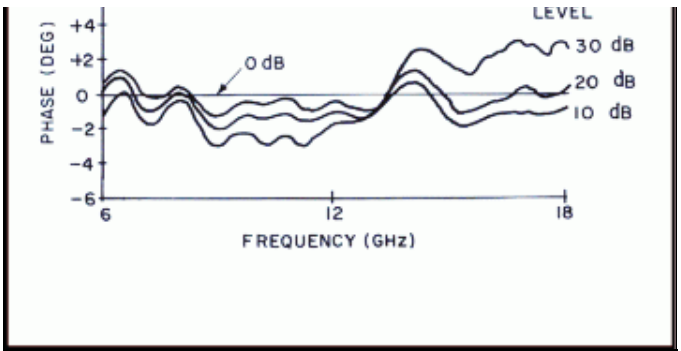
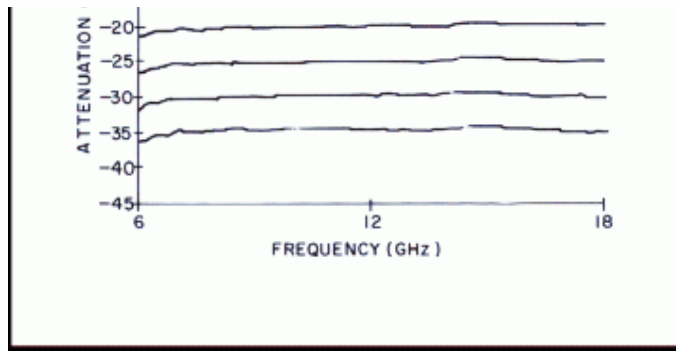
The Series D197 voltage controlled PIN diode attenuators offer essentially phase free operation over a wide dynamic range in multi-octave frequency bands between 2 and 18 GHz. The attenuators utilize a unique double balanced arrangement of diodes and quadrature couplers to achieve the phase independent attenuation characteristic. Excellent temperature stability is maintained by employing a self-compensating biasing scheme. (See Fig. 1.)

- Low phase shift
- Frequency range: 2-18 GHz
- Non-reflective
- Attenuator range: to 45 dB
- Linearized control: 10 dB/V
- High speed



TYPICAL PERFORMANCE





PERFORMANCE CHARACTERISTICS

MODEL		D1972	D1974	D1978
Frequency Range (GHz)		2 - 6	4-11	6-18
Mean Attenuation Range		32 dB		
Insertion Loss (Max)		4 dB	5 dB	5.5 dB
VSWR (Max)		2.0		
Accuracy of Attenuation	0 to 20 dB	± 1.0 dB		
	>20 to 32 dB	± 2.0 dB		
Amplitude Flatness	0 to 20 dB	± 0.4 dB	± 0.4 dB	± 0.8 dB ⁽¹⁾
	>20 to 32 dB	± 0.6 dB	± 0.8 dB	± 1.3 dB ⁽¹⁾
Monotonicity		Guaranteed		
Phase Shift	0 to 20 dB	$\pm 4^\circ$	$\pm 4^\circ$	$\pm 5^\circ$
	>20 to 32 dB	$\pm 8^\circ$	$\pm 8^\circ$	$\pm 10^\circ$
Control Voltage		0-3.2 V		
Control Input Impedance		10 kohms		
Transfer Function		10 dB/V		
On Time, Off Time		250 nsec		
Temperature Coefficient	0 to 20 dB	0.01 dB/°C		
	>20 TO 32 dB	0.03 dB/°C		
Max. RF Power Input (Operating)		100 mW		
Max. RF Power Input (Survival)		0.5 W		
Harmonic Distortion @ Pin = +10 dBm		-40 dBc	-50 dBc	-50 dBc
Power Supply Requirements		+15V $\pm 5\%$ @ 200 mA		
		-15V $\pm 5\%$ @ 120 mA		

SPECIFICATIONS WITH EXTENDED RANGE OPTION (OPTION 45)

Mean Attenuation Range		45 dB		
Accuracy of Attenuation	0 to 20 dB	± 1.0 dB		
	>20 TO 32 dB	± 2.0 dB		
	>32 dB	± 3.5 dB		
Amplitude Flatness	0 to 20 dB	± 0.4 dB	± 0.4 dB	± 0.8 dB ⁽¹⁾
	>20 TO 32 dB	± 0.6 dB	± 0.8 dB	± 1.3 dB ⁽¹⁾
	>32 dB	± 1.5 dB	± 1.5 dB	± 2.0 dB
Phase Variation	0 to 20 dB	$\pm 4^\circ$	$\pm 4^\circ$	$\pm 5^\circ$
	>20 TO 32 dB	$\pm 8^\circ$	$\pm 8^\circ$	$\pm 10^\circ$
	>32 dB	$\pm 15^\circ$	$\pm 20^\circ$	$\pm 30^\circ$

1) Except from 8-18 GHz, flatness is ± 0.5 dB up to 20 dB, ± 1.0 dB up to 32 dB.

ENVIRONMENTAL RATINGS

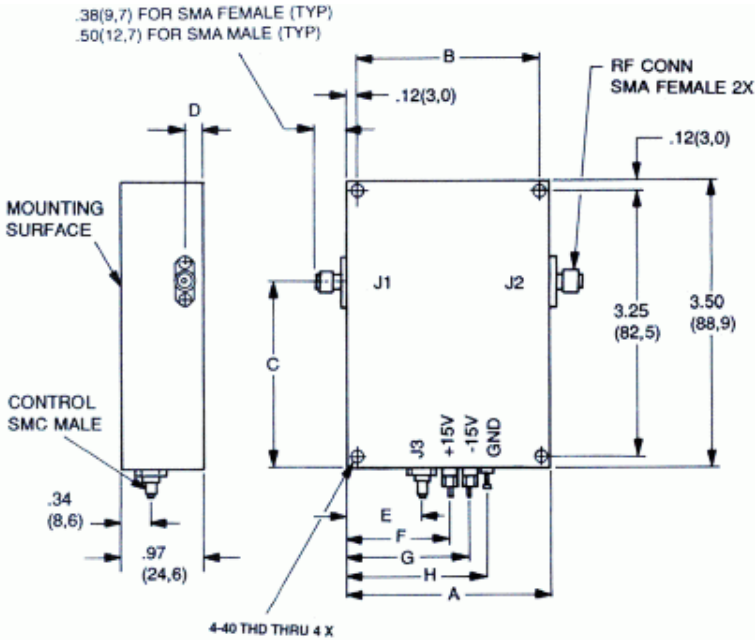
Operating Temperature	
Range	-54°C to +110°C
Non-Operating	

AVAILABLE OPTIONS

Option No.	Description
7	Two SMA male rf connectors
10	One SMA male(J1) and one SMA female (J2)

Temperature Range	-65°C to +125°C		rf connector
Humidity	MIL-STD-202F, Method 103B, Cond. B (96 hrs. at 95%)	45	Extended attenuation range to 45 dB
Shock	MIL-STD-202F, Method 213B, Cond. B (75G, 6 msec)	65	± 12V operation
Vibration	MIL-STD-202F, Method 204D, Cond. B (0.06" double amplitude or 15G, whichever is less)		
Altitude	MIL-STD-202F, Method 105C, Cond. B (50,000 ft.)		
Temp. Cycling	MIL-STD-202F, Method 107D, Cond. A, 5 cycles		

DIMENSIONS AND WEIGHT



MODEL	A	B	C	D	E	F	G	H
D1972	2.5 (63,5)	2.26 (57,4)	2.28 (57,9)	0.22 (5,6)	0.91 (23,1)	1.25 (31,7)	1.5 (38,1)	1.7 (43,2)
D1974	2.0 (50,8)	1.76 (44,7)	2.43 (61,7)	0.18 (4,6)	0.66 (16,8)	1.0 (25,4)	1.25 (31,7)	1.45 (36,8)
D1978	2.0 (50,8)	1.76 (44,7)	2.58 (65,5)	0.18 (4,6)	0.66 (16,8)	1.0 (25,4)	1.25 (31,7)	1.50 (38,1)

Dimentional Tolerances, unless otherwise included: .xx ± .02; .xx ± .005



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