



Series 195 Octave-Band PIN Diode Attenuator/Modulator

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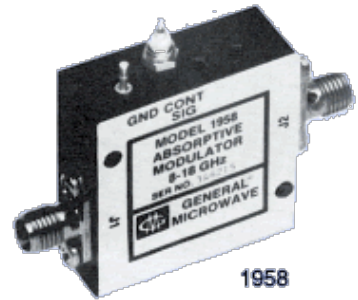
SERIES 195

Series 195 current-controlled attenuator/modulators provide small size with greater than octave-bandwidth performance at low cost. All models except the 1950A* provide a minimum of 60 dB of attenuation with fall times of 20 nsec max, and rise times ranging from 25 nsec for the 1951 and 1952 to 125 nsec max for the 1956 and 1958. The 1950A* provides a minimum of 80 dB of attenuation with a fall time of 50 nsec max and a rise time of 250 nsec max. These characteristics make this series suitable for a wide range of applications including level setting, complex amplitude modulation, pulse modulation and high-speed switching. The eight models in the Series 195 encompass a frequency range from 0.5 to 18 GHz. All models except the 1950A* are capable of extended bandwidth operation, typically 3:1, with only moderate degradation in performance at the band edges.

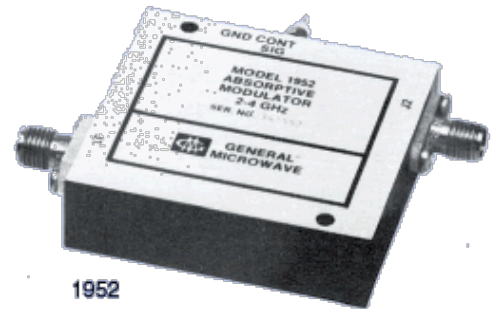
As shown in figures 1 and 2 below, the RF circuit employed in all models except the Model 1950A* uses two shunt arrays of PIN diodes and two quadrature hybrid couplers. The quadrature hybrids are of a unique GMC microstrip design which are integrated with the diode arrays to yield a minimal package size. The RF circuit employed in the Model 1950A* uses one shunt array of PIN diodes with input and output impedance matching circuits.

*Model 1950A is a special-order product. Consult factory before ordering.

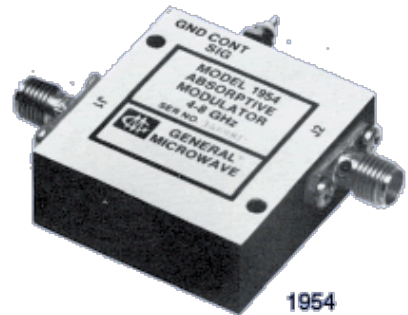
- Absorptive
- Current controlled
- 0.5 to 18 GHz frequency range
- High performance MIC quadrature hybrid design
- High speed



1958



1952



1954

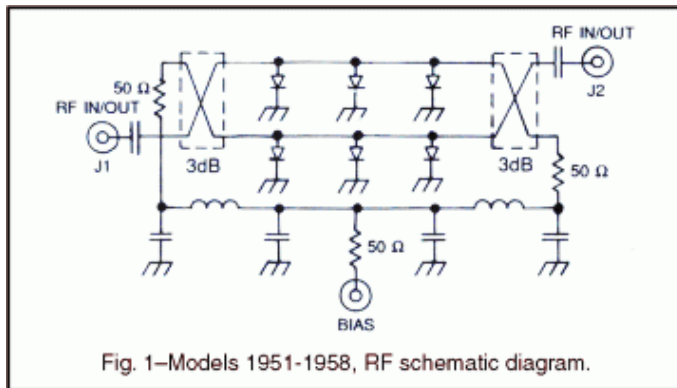


Fig. 1—Models 1951-1958, RF schematic diagram.

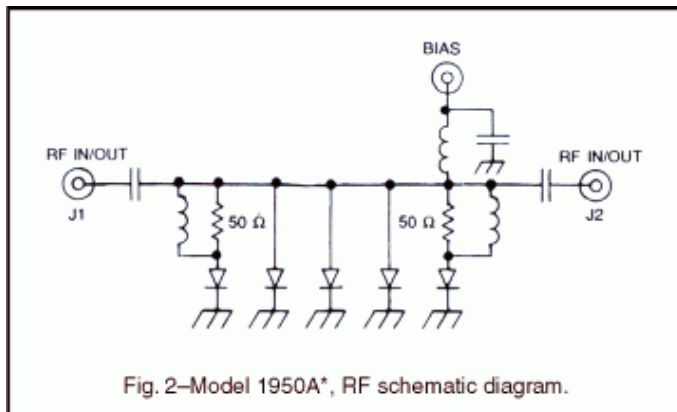


Fig. 2—Model 1950A*, RF schematic diagram.

MODEL	FREQUENCY RANGE (GHz)	MAX. INSERTION LOSS	MAX. VSWR	MAX. FLATNESS (± dB) AT MEAN ATTENUATION LEVELS UP TO				
				10 dB	20 dB	40 dB	60 dB	80 dB
1950A*	0.5 - 1.0	1.4	2.0	0.3	1.0	1.7	2.2	3.2
1951	1.0 - 2.0	1.3	1.5	0.3	1.0	1.5	1.6	

1951	0.75 - 2.25 ⁽¹⁾	1.4	2.0	0.5	1.4	3.0	3.5
1952	2.0 - 4.0	1.5	1.5	0.3	1.0	1.5	1.6
	1.5 - 4.5 ⁽¹⁾	1.6	2.0	0.5	1.4	3.0	3.5
1953	2.6 - 5.2	1.7	1.6	0.3	1.0	1.5	1.6
	1.95 - 5.85 ⁽¹⁾	1.8	2.1	0.5	1.4	3.0	3.5
1954	4.0 - 8.0	2.0	1.7	0.3	1.0	1.5	1.6
	3.0 - 9.0 ⁽¹⁾	2.1	2.2	0.5	1.4	3.0	3.5
1955	5.0 - 10.0	2.2	1.7	0.5	1.0	1.5	1.6
	3.75 - 11.25 ⁽¹⁾	2.3	2.2	0.7	1.4	3.0	3.5
1956	6.0 - 12.0	2.3	1.8	0.7	1.0	1.5	1.6
	4.5 - 13.5 ⁽¹⁾	2.4	2.2	0.9	1.5	3.0	3.5
1958	8.0 - 18.0	2.5 ⁽²⁾	1.8 ⁽²⁾	0.7	1.0	1.5	1.6
	6.0 - 18.0 ⁽¹⁾	2.5 ⁽²⁾	1.8 ⁽²⁾	0.9	1.5	3.0	3.5

(1) Specifications for the extended frequency ranges are typical.

(2) Except from 16-18 GHz where insertion loss is 3.5 dB max and VSWR is 2.0 max

*Model 1950A is a special-order product. Consult factory before ordering.

PERFORMANCE CHARACTERISTICS

Mean Attenuation Range

1950A* 80 dB
 All other units 60 dB

Monotonicity Guaranteed

Phase Shift [See Application Note](#)

Temperature Effects See Fig. 3

Power Handling Capability

Without Performance Degradation
 1950A*, 1951 10 mW cw or peak
 All other units 100 mW cw or peak
 Survival Power (from -65°C to +25°C;
 see Fig. 4 for higher temperatures)
 All units 1 W average 25W peak (1
 µsec max pulse width)

Switching Speed

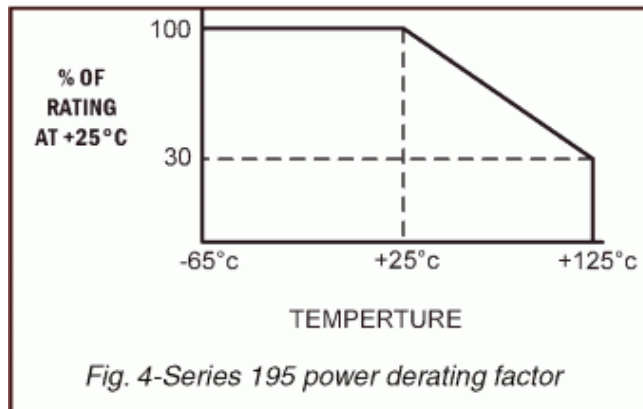
Fall Time
 1950A* 50 nsec max⁽³⁾
 All other units 20 nsec max⁽³⁾
 Rise Time
 1950A* 250 nsec max⁽³⁾
 All other units 125 nsec max⁽³⁾

Bias Current for Maximum Attenuation

1950A* 5 to 35 mA
 All other units 15 to 70 mA

(3) For attenuation steps of 10 dB or more.

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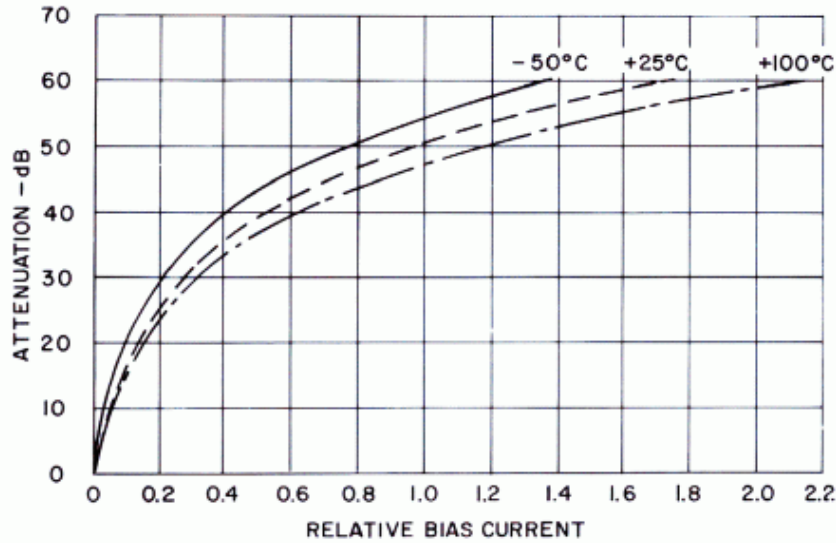


Fig 3—Series 195, typical effects of temperature on attenuation

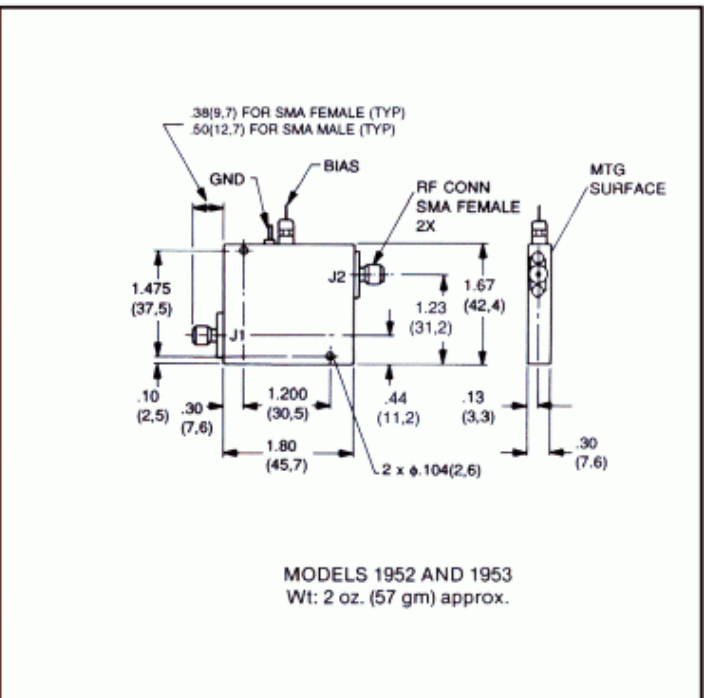
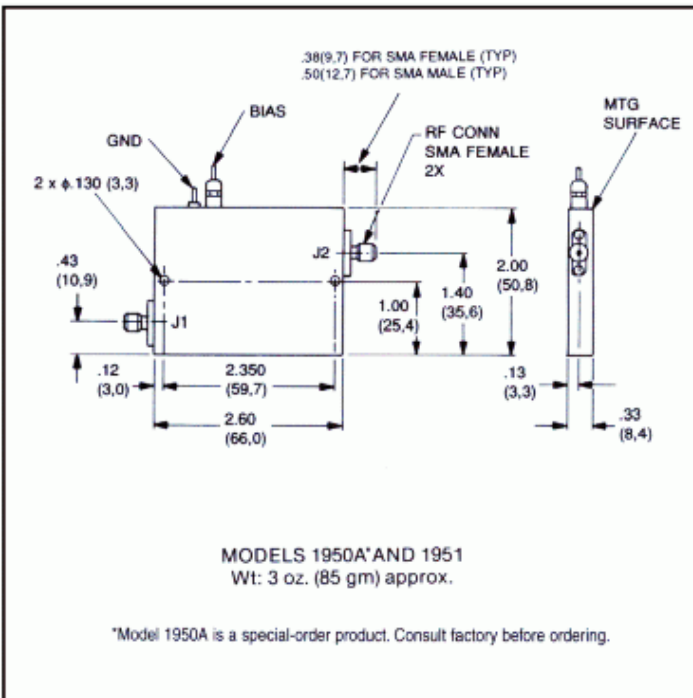
ENVIRONMENTAL RATINGS

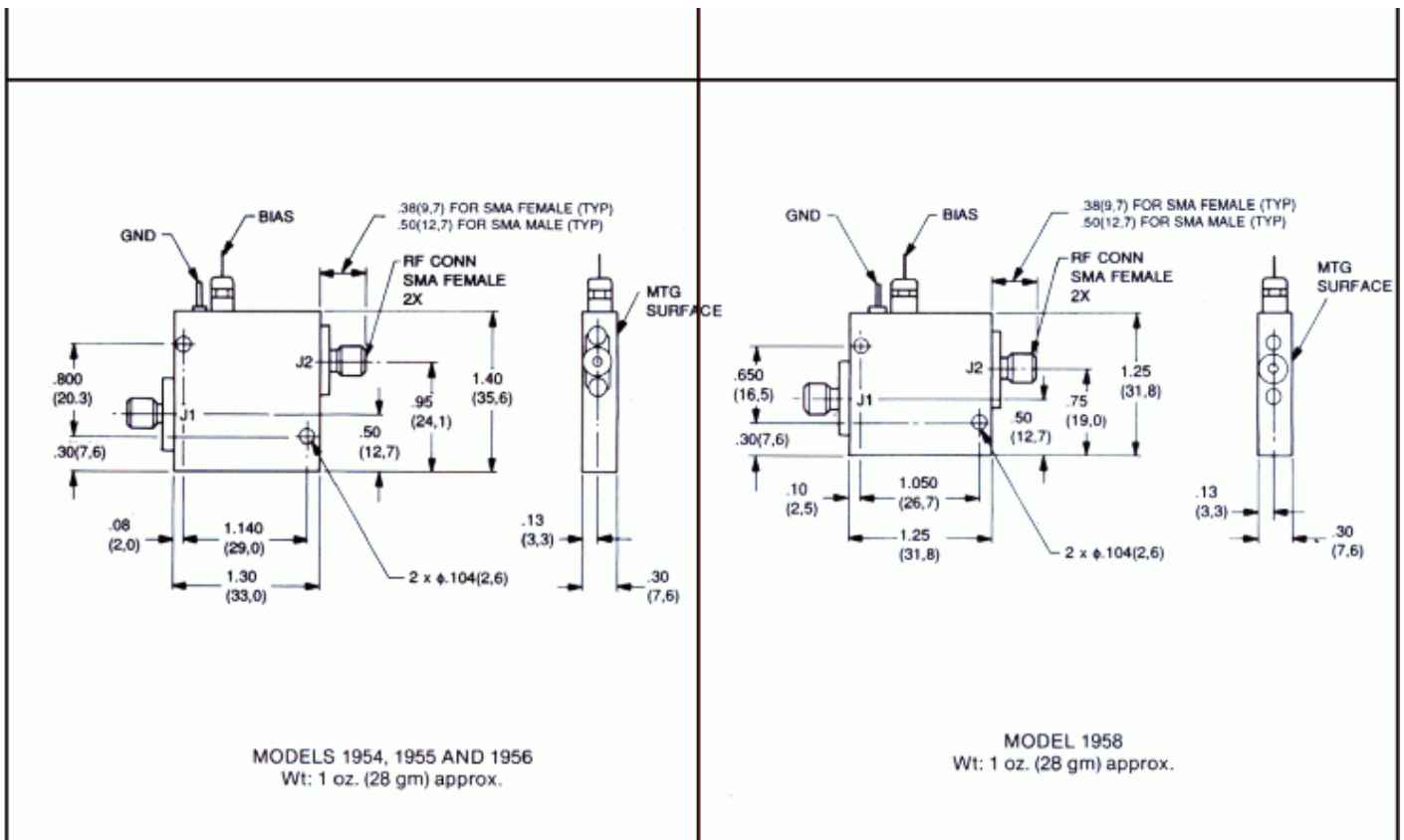
Operating Temperature	
Range.....	-54°C to + 125°C
Non-Operating	
Temperature Range	-65°C to + 125°C
Humidity	MIL-STD-202F, Method 103B, Cond. B (96 hrs. at 95%)
Shock	MIL-STD-202F, Method 213B, Cond. B (75G, 6 msec)
Vibration	MIL-STD-202F, Method 204D, Cond. B (.06" double amplitude or 15G, whichever is less)
Altitude	MIL-STD-202F, Method 105C, Cond. B (50,000 ft.)
Temp. Cycling	MIL-STD-202F, Method 107D, Cond. A, 5 cycles

AVAILABLE OPTIONS

Option No.	Description
3	SMA female bias connector
7	Two SMA male rf connectors
10	One SMA male (J1) and one SMA female (J2) rf connector
64	SMC male bias connector
64A	SMB male bias connector

DIMENSIONS AND WEIGHTS





Dimensional Tolerances, unless otherwise indicated: $.XX \pm .02$; $.XXX \pm .005$

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