



D196 Series Multi-Octave PIN Diode Attenuators

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Application Notes for [Microwave Attenuator](#)

The D196 Series is a family of non-reflective voltage variable 60 dB PIN Diode Attenuators covering the frequency range from 0.5 GHz to 18 GHz in four overlapping multi-octave bands.

Each model in the Series is equipped with an integrated driver which controls the attenuation level at the rate of 10 dB/volt.

The RF circuit consists of two wide-band, T-pad attenuator sections connected in tandem. The driver circuit, which consists of a voltage-to-current converter and linearizing network, furnishes the proper series and shunt currents to control the attenuation value at the specified rate while simultaneously maintaining a bilateral match. (See figs. 1 and 2.)

- Frequency range: 0.5 GHz-18 GHz in four overlapping bands
- Attenuation range: 60 dB
- Linear control: 10 dB/volt
- Low insertion loss
- Non-reflective

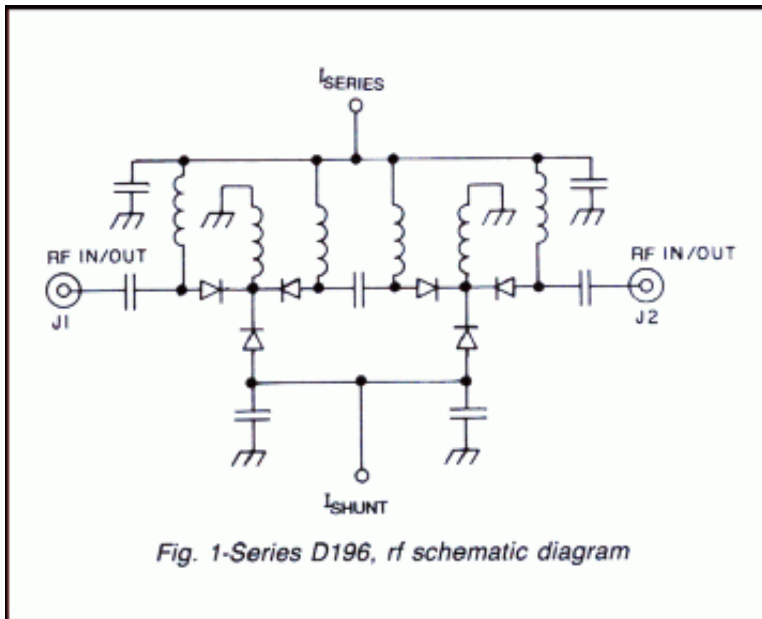


Fig. 1-Series D196, rf schematic diagram

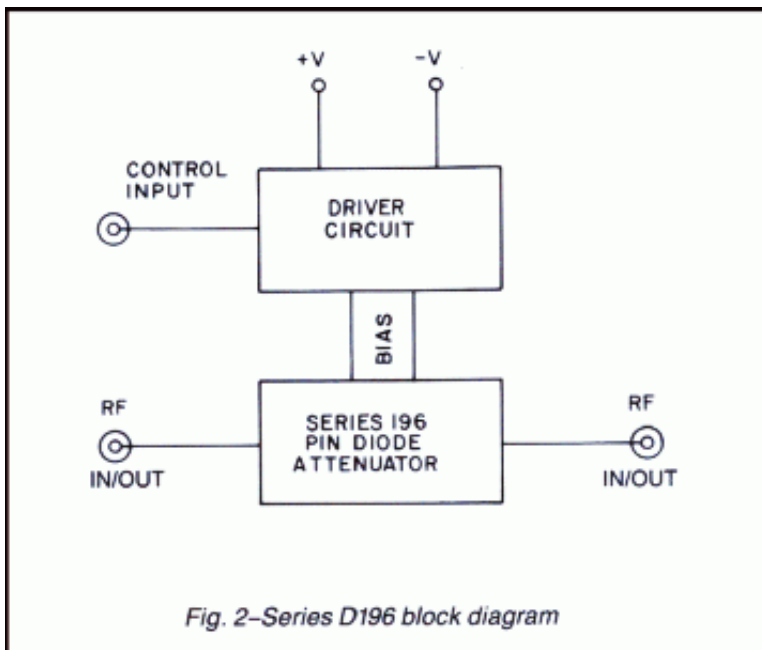
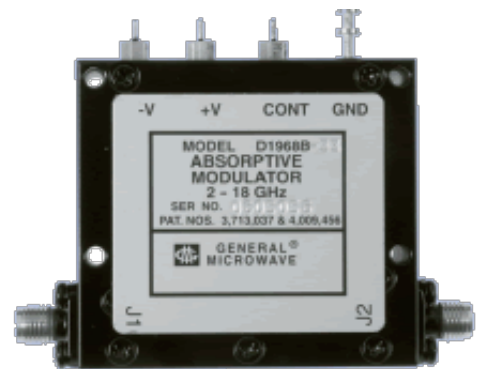


Fig. 2-Series D196 block diagram



D1968B

All units in this series are equipped with integrated drivers

PERFORMANCE CHARACTERISTICS

CHARACTERISTIC	MODEL D1960B*	MODEL D1961B	MODEL D1962B*	MODEL D1968B
Frequency Range (GHz)	0.5-4	0.5-8	2-8	2-18
Mean Attenuation Range (dB)	60	60	60	60
Insertion Loss (dB) (max)	2.7	2.5 (0.5-4 GHz) 3.2 (4-8 GHz)	3.2	4.5
VSWR (max)	1.8	1.8	1.8	2.0
Flatness up to				
20 dB	±0.5 dB	±0.75 dB	±0.75 dB	±1.0 dB
40 dB	±0.75 dB	±1.0 dB	±1.0 dB	±1.25 dB
60 dB	±1.0 dB	±1.5 dB	±1.5 dB	±3.0 dB

*Special-order product. Consult factory before ordering.

Mean Attenuation

Range 60dB

Accuracy of Attenuation

0-20 dB ±1.0 dB

20-40 dB ±1.5 dB

40-60 dB ±2.0 dB

Monotonicity Guaranteed

Phase Shift [See Application Note](#)

Temperature

Coefficient ±0.02 dB/ °C

Power Handling Capability

Without Performance Degradation:

All Units..... Up to 50 mW cw or peak (see Fig 3).

Survival Power

All Units..... 2 W average or peak, from -65(°)C to +25(°)C (see Fig. 4 for higher temperatures).

Switching Characteristics

ON Time..... 1.0 µsec max.

OFF Time..... 0.5 µsec max.

Nominal Control Voltage Characteristics

Range

Operating 0 to +6V

Maximum..... ±15V

Transfer Function 10 dB/volt

Input Impedance 10 kΩ

Modulation Bandwidth

Small Signal 20 kHz

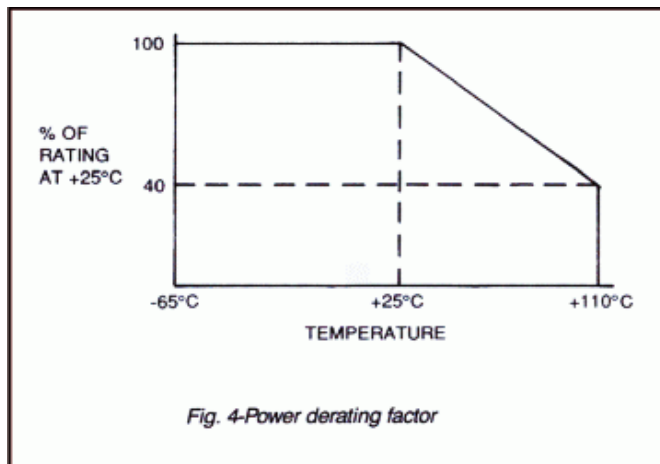
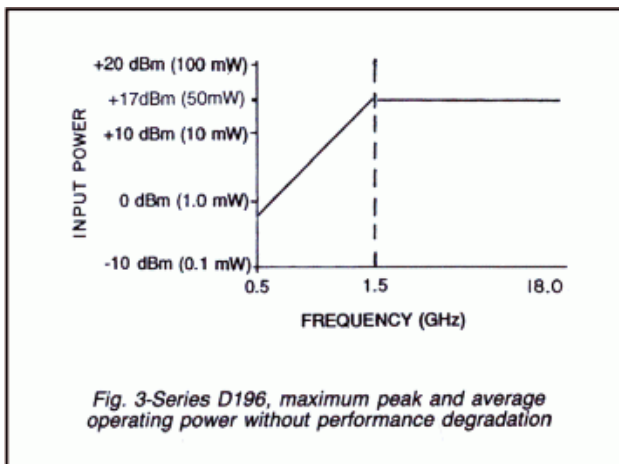
Large Signal 5 kHz

Power Supply

Requirements +12V to +15V, 80 mA
-12V to -15V, 50 mA

Power Supply

Rejection Less than 0.1 dB/volt change in either supply



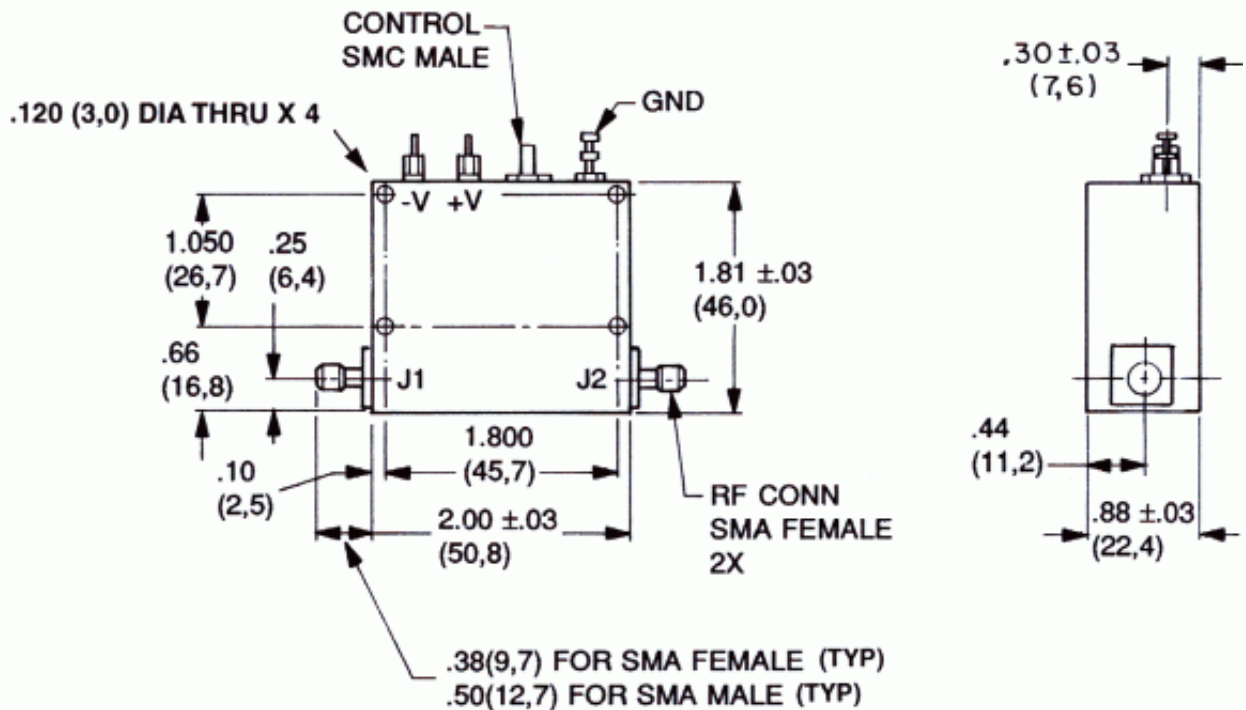
ENVIRONMENTAL RATINGS

Operating Temperature Range	- 54°C to + 110°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 control connectors
7	Two SMA male rf connectors
10	One SMA male (J1) and one SMA female (J2) rf connector
33	EMI filter solder-type control terminal
61	20 dB/volt transfer function with 0 to +3V control signal input
64A	SMB male control connector

DIMENSIONS AND WEIGHT



SERIES D196
Wt: 3 oz. (85 gm) approx.

Dimensional Tolerances, unless otherwise indicated: .XX ±.02; .XXX ±.005



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