Model 3499 Octave-Band 11 Bit Digital PIN Diode Attenuator

- **Frequency range: 18-40 GHz**
- **50 dB attenuation range**
- **500 nsec switching speed**
- **11 Bit binary programming**
- **Guaranteed monotonicity**
- **Absorptive**

Attenuator Model 3499
(WITH INTEGRATED
DRIVER)

The Model 3499 Millimeter Wave Digitally Controlled Attenuator provides greater than octave-band performance and wide programming flexibility in a compact rugged package.

The Model 3499 is an integrated assembly of a balanced PIN diode attenuator and a driver circuit consisting of a PROM, a D/A converter and a current-to-voltage converter, as shown in Figure 1. This arrangement provides a high degree of accuracy and repeatability and also preserves the inherent monotonicity of the attenuator.

The Model 3499 offers a 50 dB attenuation range, 0.03 dB resolution and switching speed of no more than 500 nanoseconds. It is available with either a strobe/latch or a non-linear current or voltage controlled attenuation capability.

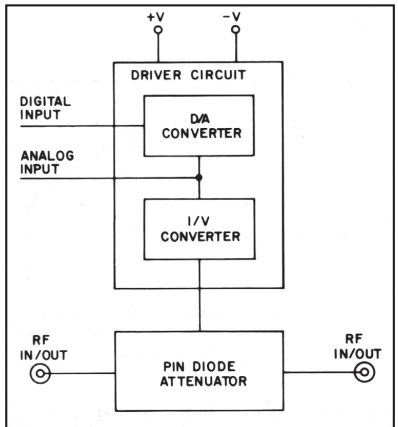


Fig. 1 – Model 3499 block diagram

Model 3499 Specifications

PERFORMANCE CHARACTERISTIC

MODEL	FREQUENCY RANGE (GHz)	MAX. INSERTION LOSS (dB)	MAX. VSWR	FLATNESS (± dB) AT MEAN ATTENUATION LEVELS UP TO			
				10 dB	20 dB	40 dB	50 dB
3499	18-26.5	4.1	2.2	1.3	2.2	3.4	4.0
	>26.5-36	4.6					
	>36-40	5.2					

Mean Attenuation Range .... 50 dB

Accuracy of Attenuation
0 to 30 dB..... ±0.5 dB
30 to 50..... ±1.0 dB

Monotonicity ..... Guaranteed

Temperature Coefficient ..... ±0.035 dB/°C

Phase Shift ..... See page 44

Power Handling Capability
Without Performance Degradation..... 10 mW cw or peak
Survival Power (from –40°C to +25°C; +25°C; see Figure 2 for higher temperatures) ..... 0.2W average, 5W peak (1 μsec max. pulse width)

Switching Time..... 0.5 μsec max.

Programming ..... Positive true binary. For complementary code, specify Option 2, To interface with other logic families, please contact factory.

Minimum Attenuation Step ..... 0.03 dB(1)

Logic Input
Logic "0" (Bit OFF) ..... –0.3 to +0.8V
Logic "1" (Bit ON) ..... +2.0 to +5.0V
Logic Input Current ..... 1 μA max.

Analog Input..... 0 to 6.4V

Power Supply Requirements..... +12V to +15V, 120 mA
–12V to –15V, 50 mA

Power Supply Rejection..... Less than 0.1 dB/volt change in either supply

ENVIRONMENTAL RATINGS

Operating Temperature Range..... –40°C to +85°C

Non-Operating Temperature Range..... –54°C to +100°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

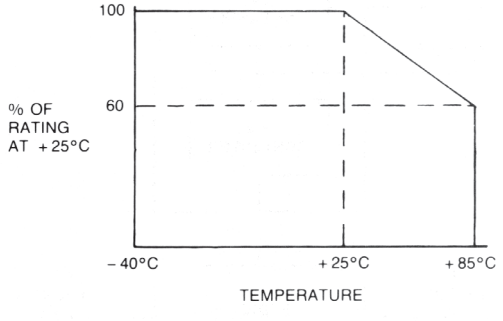
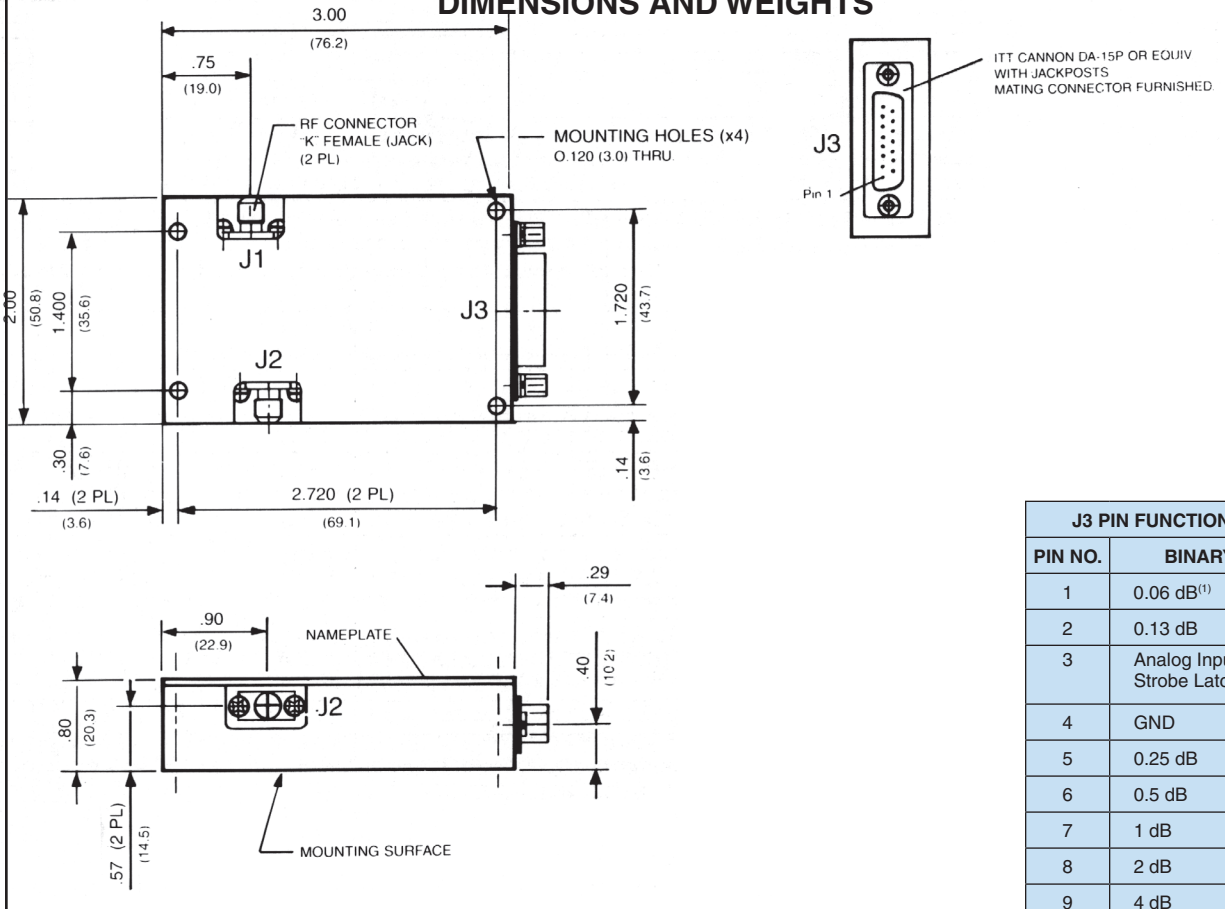


Fig. 2 – Model 3499 power derating factor

Model 3499 Specifications

DIMENSIONS AND WEIGHTS



MODEL 3499
Wt: 5 oz. (142 gr.) approx.

J3 PIN FUNCTIONS	
PIN NO.	**BINARY**
1	0.06 dB[1]
2	0.13 dB
3	Analog Input/ Strobe Latch[2][3]
4	GND
5	0.25 dB
6	0.5 dB
7	1 dB
8	2 dB
9	4 dB
10	8 dB
11	16 dB
12	32 dB
13	+12 to +15V
14	–12 to –15V
15	0.03 dB

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

ACCESSORY FURNISHED

Mating power/logic connector

AVAILABLE OPTIONS

Option No.	Description
2	Complementary programming (logic "0" is Bit ON)
4	Strobe latch for data input. Attenuator responds to data input when logic "0" is applied, Attenuator latched to data input when logic "1" is applied.
7	Two type K male RF connectors
10	One type K male (J1) and one type K female (J2) RF connector

NOTES:

1. The Model 3499 attenuator is an 11-bit digital attenuator. In order to use this device with a lesser number of bits (lower resolution), the user may simply ground the logic pins for the lowest order unused bits. For example, when operated as an 8-bit unit, the Model 3499 would have Pin 15, Pin 1 and Pin 2 connected to ground. All other parameters remain unchanged.
2. Normally supplied as an Analog input. Optionally available as a strobe latch function for input data.
3. Pin 3 is available to apply a current or voltage to control the attenuator in a non-linear fashion. leave pin as open circuit if not used.