

Series 348 and 348H 8 Bit Digital/Analog Attenuators

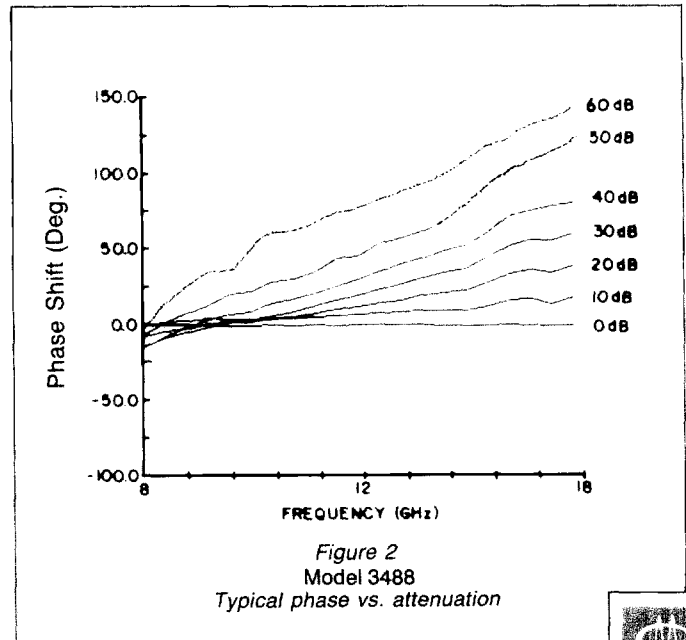
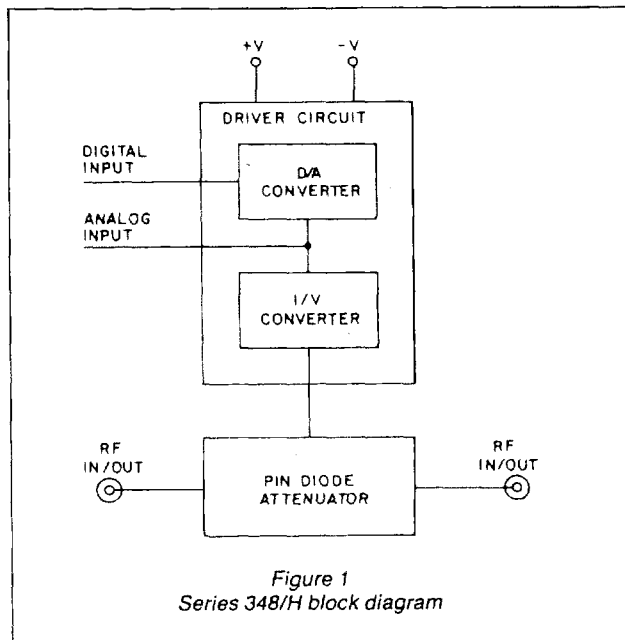
SERIES 348 AND 348H

The Series 348 and 348H Digitally Programmable Attenuators provide greater than octave band performance in small hermetic packages ideally suited for high reliability applications. The Series 348 offers moderate power handling capability (100 mW) at switching speeds less than 500 nsec while the 348H Series offers 200 nsec switching speed at lower power. Attenuation of all units is 60 dB with monotonic 0.25 dB step resolution.

The attenuator is an integrated assembly of a sealed RF Microwave Integrated Circuit assembly and a sealed hybrid driver. Attenuation is controlled via a miniature 14 pin connector. See Fig. 1.

Although these units are primarily intended for use as digital attenuators, they can also be used as analog (voltage driven) attenuators or as combination analog/digital attenuators. (See note 4 on page 49.)

- 2 to 18 GHz
- Digital/Analog
- 8 Bit TTL
- Hermetically sealed
- Miniature



Series 348 and 348H Specifications

PERFORMANCE CHARACTERISTICS

MODEL	FREQUENCY RANGE (GHz)	MAX. INSERTION LOSS (dB)	MAX VSWR	FLATNESS (\pm dB) AT MEAN ATTENUATION LEVELS UP TO			
				10 dB	20 dB	40 dB	60 dB
3482/H	2.0-4.0	1.8	1.5	0.5	1.0	1.5	1.6
	1.5-4.5 ⁽²⁾	1.9	2.0	0.7	1.6	3.0	3.5
3483/H	2.6-5.2	2.0	1.6	0.5	1.0	1.5	1.6
	1.95-5.85 ⁽²⁾	2.1	2.1	0.7	1.6	3.0	3.5
3484/H	4.0-8.0	2.4	1.7	0.5	1.0	1.5	1.6
	3.0-9.0 ⁽²⁾	2.5	2.2	0.7	1.6	3.0	3.5
3486/H	6.0-12.0	2.7	1.8	0.7	1.0	1.5	1.6
	4.5-13.5 ⁽²⁾	2.8	2.2	0.9	1.6	3.0	3.5
3488/H	8.0-18.0	3.0 ⁽¹⁾	1.8 ⁽¹⁾	0.7	1.0	1.5	1.6
	6.0-18.0 ⁽²⁾	3.0 ⁽¹⁾	1.8 ⁽¹⁾	0.9	1.6	3.0	3.5

(1) For 3488H only: Except from 12-16 GHz where insertion loss is 3.5 dB max, and from 16-18 GHz where insertion loss is 4.0 dB max and VSWR is 2.0 max.

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

Mean Attenuation Range . . . 60 dB

Accuracy of Attenuation . . . 0-30 dB \pm 0.5 dB
 > 30-50 dB \pm 1.0 dB
 > 50-60 dB \pm 1.5 dB

Monotonicity Guaranteed

Phase Shift See Fig. 2

Temperature Coefficient . . . \pm 0.02 dB/ $^{\circ}$ C

Power Handling Capability Without Performance Degradation 348 100 mW cw or peak
 348H 10 mW cw or peak

Survival Power (from -65 $^{\circ}$ C to +25 $^{\circ}$ C. See Figure 3 for Higher Temperatures) 1W average, 25W peak

Switching Time (348) 500 nsec max
 (348H) 200 nsec max

Programming: 8 Bit TTL . . . Positive true binary

Minimum Attenuation Step 0.25 dB

Logic Input Logic "0": -0.3 to +0.8V
 Logic "1": +2.0 to +5.0V
 Logic Input Current: 10 μ A max

Analog Input Characteristics

Range 0 to 6V
 Transfer Function 10 dB/V
 Input Resistance 6 kohms

Power Supply

Requirements +12 to +15V, 120 mA
 -12 to -15V, 50 mA

ENVIRONMENTAL RATINGS

Operating Temperature

Range -54 $^{\circ}$ C to +110 $^{\circ}$ C

Non-Operating Temperature

Range -65 $^{\circ}$ C to +125 $^{\circ}$ C

ACCESSORY FURNISHED

Mating power/logic connector

AVAILABLE OPTIONS

Option No.	Description
7	Two SMA male rf connectors
10	One SMA male (J1) and one SMA female (J2) rf connector
49	High Rel screening (see Table 1, page 32)

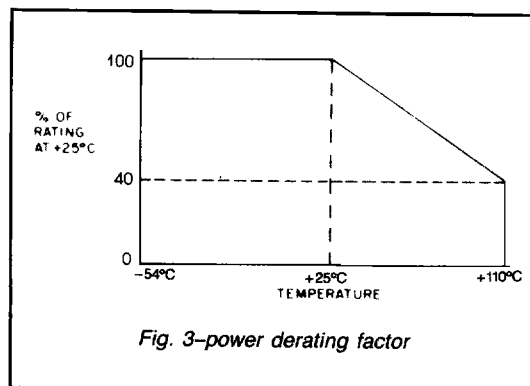
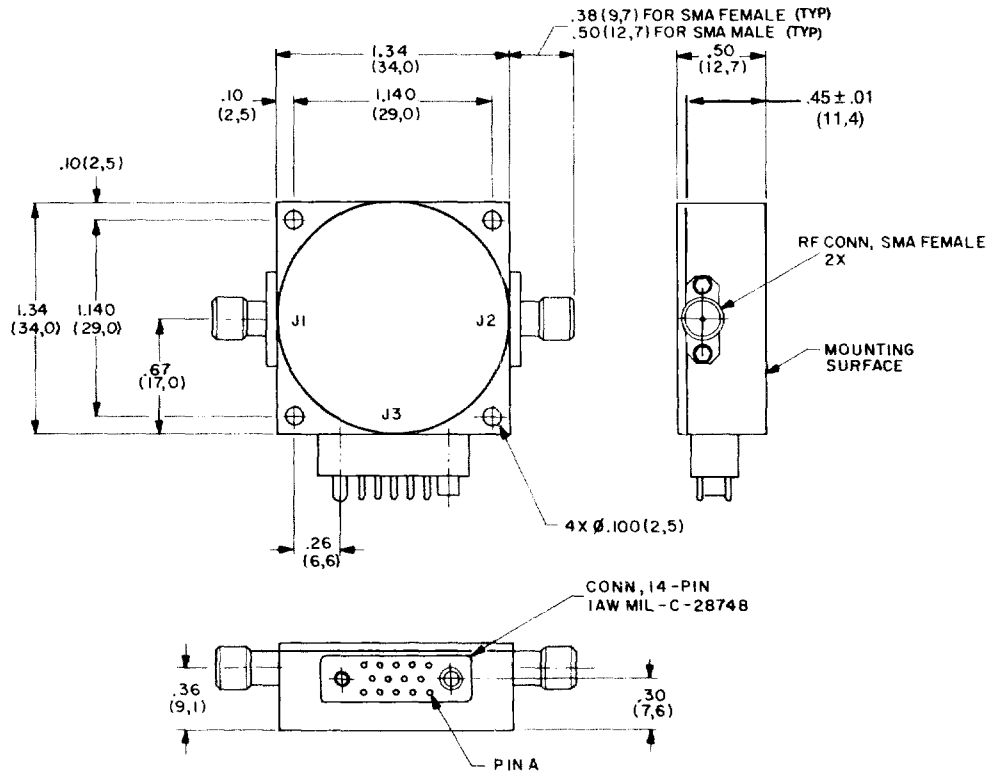


Fig. 3—power derating factor



Series 348 and 348H Specifications

DIMENSIONS AND WEIGHT



SERIES 348/H
Wt: 2.4 oz. (68 gm) approx.

Dimensional Tolerances, unless otherwise indicated: .xx ± .02; .xxx ± .005

J3 POWER/LOGIC CONNECTIONS

PIN	FUNCTIONS
A	Digital/Power GND
B	Logic Control (Note 2)
C	- 12 to - 15V
D	0.25 dB (LSB)
E	0.5 dB
F	1 dB
H	4 dB
J	2 dB
K	16 dB
L	32 dB (MSB)
M	+ 12 to + 15V
N	8 dB
P	GND
R	Analog Input (Notes 3&4)

NOTES:

1. All unused logic inputs must be grounded.
2. For normal TTL programming control, PIN B must be grounded or at Logic 0. Application of Logic 1 to PIN B overrides the digital input and sets the unit to insertion loss. To interface with other logic families (e.g., CMOS, MTL, NMOS, etc...) contact factory.
3. For digital operation only, connect PIN R to PIN P.
4. To use the unit as a voltage controlled attenuator, apply a control voltage of 0 to +6V at PIN R. The slope of attenuation will be nominally 10 dB/V. For a non-zero source resistance (R_0) of up to 500 ohms, the attenuation error is approximately $-.0017 \cdot R_0 \cdot V_{IN}$ dB and the slope will decrease by approximately 0.17 dB/V per 100 ohms of source resistance.

Using the 348/H Series attenuator as both a digital and analog control attenuator, the total attenuation $ATT = 10 \cdot V_{IN} +$ programmed digital attenuation. The maximum attainable mean attenuation is 60 dB.

