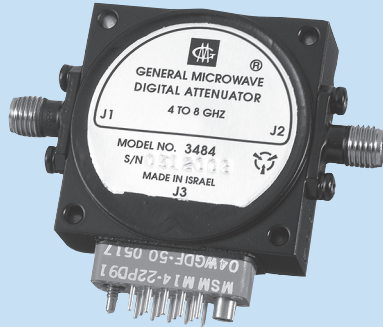


Series 348 and 348H 8 Bit Digital/Analog Attenuators

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



Attenuator Model 3484

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 44.)

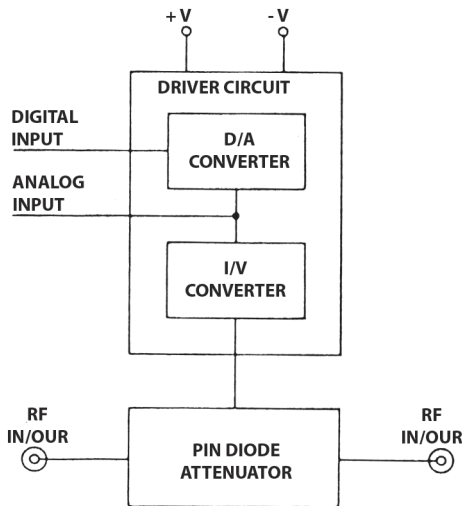


Figure 1
Series 348/H block diagram

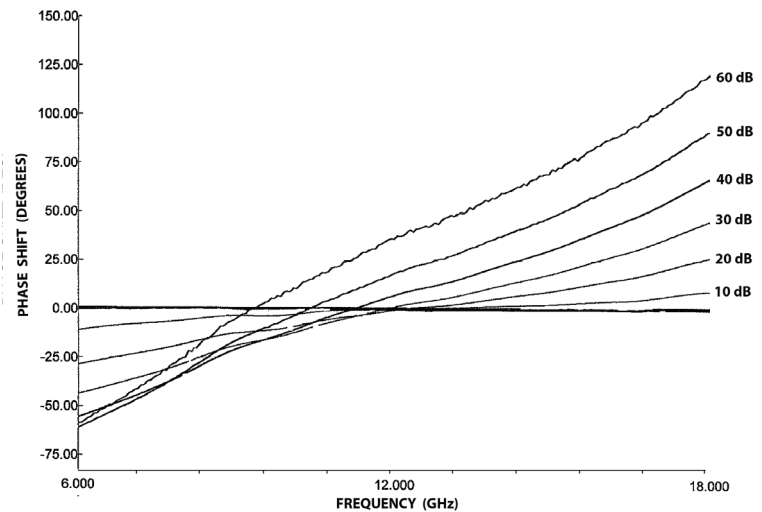


Figure 2 - Model 3488
Typical phase vs. attenuation & frequency

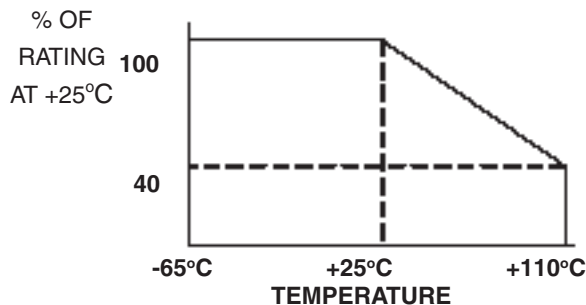


Fig. 4-Model 3250A, survival
power derating factor



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 ⁽¹⁾	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 ⁽¹⁾	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 ⁽¹⁾	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 ⁽¹⁾	2.8	2.2	0.9	1.6	3.0	3.5
3488/H	8.0-18.0	3.0 ⁽²⁾	1.8 ⁽³⁾	0.7	1.0	1.5	1.6
	6.0-18.0 ⁽¹⁾	3.0 ⁽²⁾	1.8 ⁽³⁾	0.9	1.6	3.0	3.5

*Special-order product. Consult factory before ordering.

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

(2) For 3488, 4.0 dB from 16-18 GHz. For 3488H, 3.5 dB from 12-16 GHz and 4.0 dB from 16-18 GHz.

(3) VSWR is 2.0 from 16-18 GHz.

Mean Attenuation Range 60 dB

Accuracy of Attenuation

0-30 dB ± 0.5 dB

>30-50 dB ± 1.0 dB

>50-60 dB ± 1.5 dB

Monotonicity Guaranteed

Phase Shift See Fig. 2

Temperature Coefficient ± 0.035 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° C to $+25^{\circ}$ C.

See Figure 3 for

Higher Temperatures)..... 1Waverage,25Wpeak

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 $+0.8$ V

Logic "1" $+2.0$ to $+5.0$ V

Logic Input Current 10 μ A max

Analog Input Characteristics⁽⁴⁾

Range 0 to 6V

Transfer Function 10 dB/V

Input Resistance 6 k Ω

Power Supply

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

(4) See note 4 on page 76

ENVIRONMENTAL RATINGS

Operating Temperature

Range -54° C to $+110^{\circ}$ C

Non-Operating Temperature

Range -65° 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, below)

Table 1. Option 49 High Rel Screening

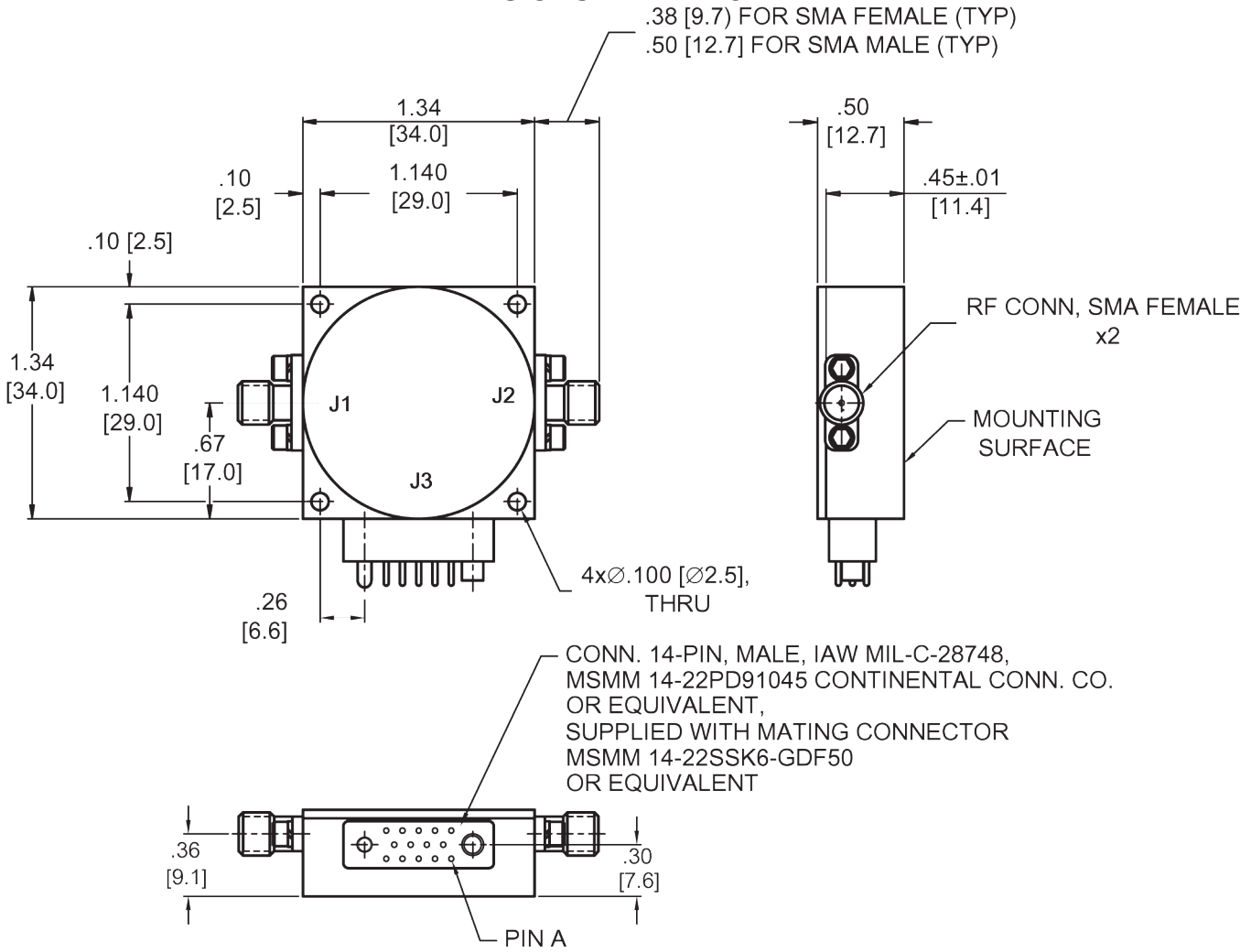
General Microwave's hermetically-sealed products utilize rugged construction techniques and hermetic sealing to meet stringent military requirements for shock, vibration, temperature, altitude, humidity, and salt atmosphere. All hermetically-sealed parts may be ordered, if desired, with 100% screening in accord with the following MIL-STD 883:

TEST	METHOD	CONDITION
Internal Visual	2017	-
Temperature Cycle	1010	B
Mechanical Shock	2002	B
Burn-In (at $+110^{\circ}$ C)	1015	-
Leak	1014	A1 & A2



Series 348 and 348H Specifications

DIMENSIONS AND WEIGHT



SERIES 348/H

wt: 2.4 oz. (68 gr) 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:

- All unused logic inputs must be grounded.
 - 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.
 - If Analog input is not to be used, then connect PIN R to PIN P.
 - 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_o) of up to 500 ohms, the attenuation error is approximately $-.0017 \cdot R_o \cdot V_{IN}$ 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.

