

## Models 3404, 3406 & 3408 Programmable Attenuators with optional TTL Interface

dc to 6.0 GHz  
1 Watt



### Features

- /// Higher Frequency range to 6 GHz.
- /// Wide Selection of Attenuation Ranges & Step Sizes
  - 0 to 15 dB in 1 dB steps
  - 0 to 55 dB in 1 dB steps
  - 0 to 55.75 in 0.25 dB steps
  - 0 to 103 dB in 1 dB steps
  - 0 to 70 dB in 10 dB steps
- /// High Quality Construction & Connectors
- /// Special Configurations Available Upon Request

### Description

The 3400 Series Programmable Step Attenuators are designed for use in automatic test equipment and OEM systems operating in the dc to 6 GHz frequency range. This series is available in many standard attenuation ranges and cell configurations. Custom designed configurations are available upon request. Each cell contains a double-pole, double-throw relay that provides a zero path or attenuated path for the RF signal.

Microstrip circuitry and special compensation techniques produce flat attenuation versus frequency characteristics. The microstrip construction, using thin-film circuit elements, ensures product uniformity. To minimize RF leakage, the 3400 Series Attenuators are provided with gold-plated contact areas and feedthrough filters at each control terminal.

### Specifications

**NOMINAL IMPEDANCE:** 50 Ω  
**FREQUENCY RANGE:** dc to 6.0 GHz

#### MAXIMUM SWR:

Frequency Range (GHz)	SWR
dc - 3	1.30
3 - 6	1.45

#### CELL CONFIGURATIONS:

Model Number	NO. Cells	Attenuation Range/Steps (dB)	Cell Increments (dB)
3404-15	4	15/1	1, 2, 4, 8
3404-55	4	55/5	5, 10, 20, 20
3404-70	4	70/10	10, 20, 20, 20
3406-55	6	55/1	1, 2, 4, 8, 16, 24
3408-55.75	8	55.75/0.25	0.25, 0.5, 1, 2, 4, 8, 16, 24
3408-103	8	103/1	1, 2, 4, 8, 16, 24, 48*

\*48 dB cell comprised of two 24 dB cells

#### INCREMENTAL ATTENUATION ACCURACY:

Frequency Range (GHz)	Accuracy
dc - 3	±0.3 dB or 2% whichever is greater
3 - 6	±0.4 dB or 3% whichever is greater

#### MAXIMUM INSERTION LOSS (dB):

Frequency Range (GHz)	3404-15 3404-55 3404-70	3406-55	3408-55.75 3408-103
dc - 3	1.80	2.60	3.40
3 - 6	2.60	3.80	5.00

**MONOTONICITY:** dc to 6.0 GHz (minimum 1 dB change)

**POWER RATING:** 1 watt average to 25°C ambient temperature, derated linearly to 0.25 watt @ 70°C. 50 watts peak (5 μsec pulse width; 1% duty cycle)

**POWER COEFFICIENT:** <0.005 dB/dB/watt

**RATED SWITCH LIFE:** 5 million cycles operations per cell @ 0 dBm

**SWITCHING TIME:** 6 msec. maximum at nominal rated voltage

**RELEASE TIME:** 5 msec maximum

**CYCLING RATE:** 5 Hz maximum per relay

**OPERATING VOLTAGE:** +12 Vdc (+13 V maximum; +9 V minimum)

**OPERATING CURRENT:** 17 mA typical per cell @ +12 V

**TEMPERATURE RANGE (Operating):** -30°C to +70°C

**TEST DATA:** Test data is available at additional cost.

# Programmable Attenuators



## SPECIFICATIONS - Con't

**CONNECTORS:** SMA female connectors per MIL-STD-348 interface dimensions - mate nondestructively with MIL-C-39012 connectors. Leads may be used with PC board sockets/ receptacles.

**CONTROL TERMINALS:** 0.040 inch. (1 mm) diameter solderable leads. May be used with PC board sockets/ receptacles.

### CONSTRUCTION:

Housing: Aluminum  
Connectors: Stainless steel body and beryllium copper contacts.

Control terminals: Brass/Copper, Silver plated

**WEIGHT (Typical):** 3404-X: 99 g (3.5 oz)  
3406-X: 99 g (3.5 oz)  
3408-X: 135 g (4.8 oz)

## CONTROL CONFIGURATION:

**Standard Unit:** One terminal is connected to case ground and the remaining terminals are provided for activation of individual cells. Attenuation is fail-safe to "0" setting in the absence of a control voltage. Application of a voltage (+) to a particular cell causes it to switch to the attenuate position.

**Units with TTL Option:** Units with this option are supplied with a very low profile connectorized TTL interface board mounted directly to the control terminals. This TTL interface option is available with a 10 pin ribbon cable connector and is supplied with a mating connector. Refer to Physical Dimensions for mating connector pin/wiring details. Two wires are specified for supply voltage and ground. The remaining wires will accept TTL control signals to activate or de-activate a particular attenuation cell. A TTL high will energize a cell to the high attenuation state, whereas a TTL low will maintain a cell in its zero attenuation state.

To order 3400 Series Attenuators with this option add -1 to basic model number for ribbon cable connector. Example: Model 3406-63 with a TTL interface would be 3406-63-1.

Note: Control is non-latching and requires a continuous control signal for the period of time in which attenuation is required.

## TTL DRIVER SPECIFICATIONS:

**INTERFACE CONNECTOR:** Option -1: 10 pin .025 square post header on .1 center, mates with Amp connector 746285-1 or equivalent

**INPUT VOLTAGE:**  $V_{IN}$  High = +2.0V minimum  
+5.0V typical  
Vcc maximum  
 $V_{IN}$  Low = 0 minimum  
0.8 maximum

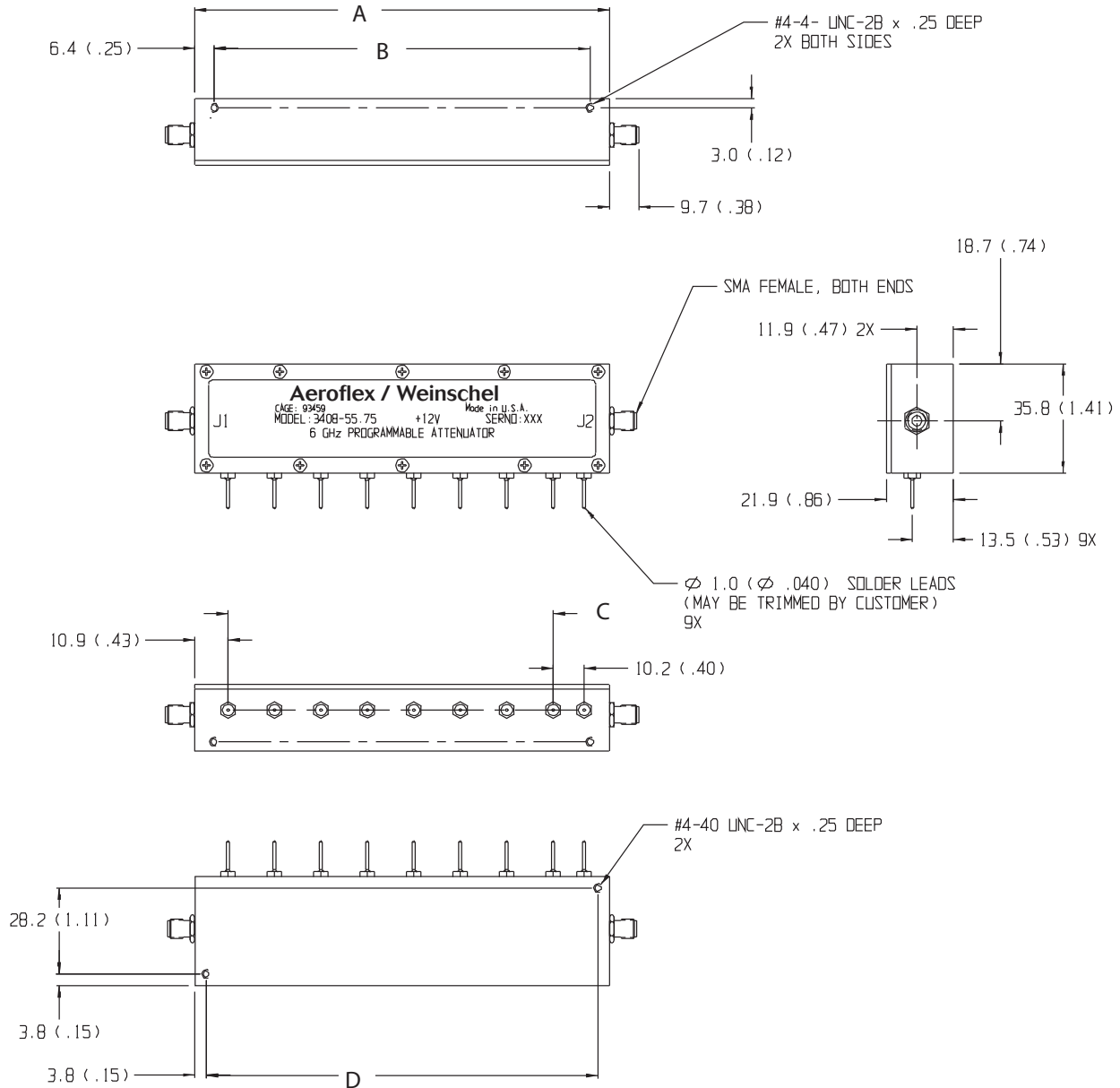
**INPUT CURRENT:**  $I_{IN}$  ( $V_{IN}=2.4$  V) = 55  $\mu$ A  
 $I_{IN}$  ( $V_{IN}=3.85$  V) = 280  $\mu$ A

**SUPPLY CURRENT:**  $I_{CC}=25$  mA maximum per cell

**SUPPLY VOLTAGE:**  $V_{CC}=+12.0$  to +15 V

**MODELS WITH BUILT-IN DRIVERS:** Most 3400s are available with an intelligent interface/driver cards. These are designed to interface with our 8210A Series Controllers which greatly simplifies computer control applications. Refer to Model 3406T and 3408T data sheet for more information.

## PHYSICAL DIMENSIONS:



Model No.	No. Cells	A	B	C	D
3408-X	8	136.1 (5.36)	123.4 (4.86)	7 EQ SPCS @ 15.20 (.60) = 106.7 (4.20)	128.5 (5.06)
3406-X	6	105.7 (3.66)	93.0 (3.66)	5 EQ SPCS @ 15.20 (.60) = 76.0 (3.00)	98.0 (3.86)
3404-X	4	75.18 (2.96)	62.48 (2.46)	3 EQ SPCS @ 15.20 (.60) = 45.72 (1.80)	67.56 (2.66)

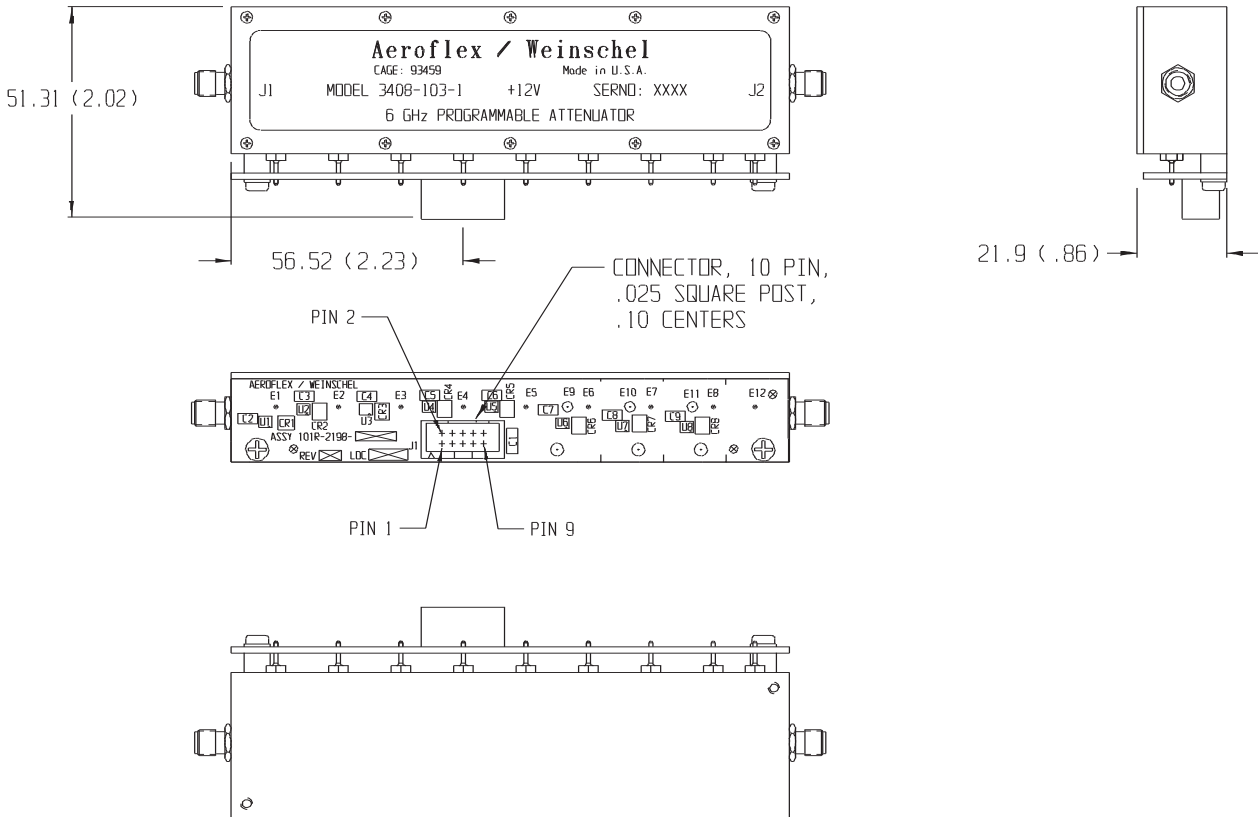
NOTE: All dimensions are given in mm (inches) and are nominal, unless otherwise specified.

# Programmable Attenuators



## PHYSICAL DIMENSIONS:

TTL OPTION -1 (3406 & 3408)



### Control Connector J3 Pin Locations:

TTL Conn PIN No. (J3)	3408-103-1 dB (Cell)	3408-55.75-1 dB (Cell)	3406-55-1 dB (Cell)	3404-15-1 dB (Cell)	3404-55-1 dB (Cell)	3404-70-1 dB (Cell)
1	24*	0.25	1	1	5	10
2	24	0.5	2	2	10	20
3	1	1	4	4	20	20
4	2	2	8	8	20	20
5	4	4	16	NC	NC	NC
6	8	8	24	NC	NC	NC
7	16	16	NC	NC	NC	NC
8	24*	24	NC	NC	NC	NC
9	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc
10	COM	COM	COM	COM	COM	COM

\* 48 dB cell comprised of two 24 dB cells  
NC = Not Connected

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