

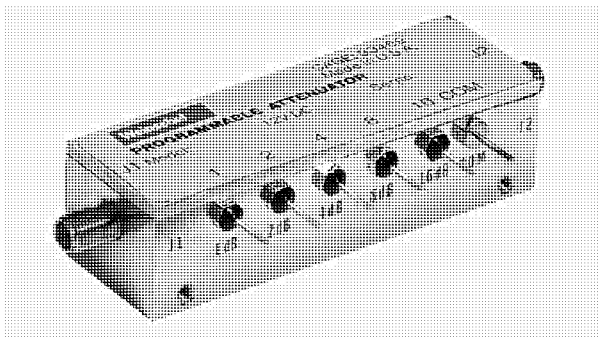
Models 3200, 3201, 3205, 3206 & 3209

PROGRAMMABLE ATTENUATORS

dc to 2.0 GHz

Wide Selection of Attenuation Ranges & Steps

1 WATT



FEATURES

- ❑ Available in 4, 5, 6, and 8 Cell Configurations -

127 dB/1 dB steps	63.75 dB/0.25 dB steps
63 dB/1 dB steps	64.5/0.1 steps (NEW)
55 dB/5 dB steps	120 dB/10 dB steps
70 dB/10 dB steps	31 dB/1 dB steps
1.2/0.1 dB steps	1.5/0.1 dB steps
- ❑ TTL and SmartStep Interface Options
- ❑ Switching Time - Cell switching is completed, after electrical command, within 6 msec.
- ❑ Long Switch Life - Each cell has a rated switch life of 10,000,000 switching operations.
- ❑ Special Configurations Available Upon Request.
 - Custom Cell/Step Size Configurations
 - 2.5 GHz and Higher Frequencies

DESCRIPTION

The 3200 Series Programmable Step Attenuators are designed for use in automatic test equipment and OEM systems operating in the dc to 2 GHz frequency range. This Series is available in six standard attenuation ranges and cell configurations. Custom designed configurations are available upon request. Each cell contains a standard TO-5 type double-pole, double-throw relay that provides a minimum loss or attenuated path for the RF signal.

Microstrip circuitry and special compensation techniques produce flat attenuation versus frequency characteristics. The microstrip construction, using thick-film circuit elements, ensures product uniformity and minimizes special hand work usually required to achieve the performance specified. To minimize RF leakage, the 3200 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 2.0 GHz

MAXIMUM SWR:

FREQUENCY Range (GHz)	3200-X	3201-X 3205-X 3206-X	3209-X
dc - 0.2	1.30	1.25	1.35
0.2 - 2	1.25	1.25	1.35

MAXIMUM INSERTION LOSS:

Frequency Range (GHz)	3200-X	3201-1 3201-2	3205-X 3201-4	3206-X	3209-X
dc - 0.5	2.80	1.80	1.80	2.00	3.50
0.5 - 1	3.50	2.40	2.30	2.70	4.50
1.0 - 1.5	4.25	3.00	2.80	3.30	5.60
1.5 - 2	4.75	3.75	3.30	4.00	6.70

* Insertion Loss Variation from -55 C to 71 °C is less than 0.14 dB per cell.

MONOTONICITY: dc to 2.0 GHz

CELL CONFIGURATIONS:

Model Number	NO. Cells	Attenuation Range/Steps (dB)	Cell Increments (dB)
3200-1	8	127/1	1, 2, 4, 8, 16, 32, 64*
3200-2	8	63.75/0.25	0.25, 0.5, 1, 2, 4, 8, 16, 32
3201-1	5	31/1	1, 2, 4, 8, 16
3201-2	5	120/10	10, 20, 30, 60**
3201-4	4	1.2/01	0.1, 0.2, 0.3, 0.6
3205-1	4	70/10	10, 20, 20, 20
3205-2	4	55/5	5, 10, 20, 20
3205-3	4	1.5/0.1	0.1, 0.2, 0.4, 0.8
3206-1	6	63/1	1, 2, 4, 8, 16, 32
3209-64.5	10	64.5/0.1	0.1, 0.2, 0.4, 0.8, 1, 2, 4, 8, 16, 32

* 64 dB cell comprised of two 32 dB cells

** 60 dB cell comprised of two 30 dB cells

SPECIFICATIONS (Con't):

INCREMENTAL ATTENUATION ACCURACY:

FREQUENCY RANGE (GHz)	ACCURACY
dc - 0.5	± 0.2 dB or 0.5 %
0.5 - 1	± 0.2 dB or 1 %
1 - 2	± 0.3 dB or 2 %

INCREMENTAL TEMPERATURE COEFFICIENT:

30 and 32 dB Cells:	0.00005 dB/dB/°C
All other cells:	0.00002 dB/dB/°C

POWER RATING: 1 watt **average** to 25 °C ambient temperature, derated linearly to 0.25 watt @ 71 °C. 50 watts **peak** (5 µsec pulse width; 1% duty cycle)

POWER COEFFICIENT: < 0.005 dB/dB/watt

RATED SWITCH LIFE: 10⁷ cycles operations per cell @ 0 dBm

SWITCHING TIME: 6 msec. maximum at nominal rated voltage

RELEASE TIME: 3 msec maximum

CYCLING RATE: 5 Hz maximum per relay

OPERATING VOLTAGE: + 12 V (+ 16 V maximum; + 9 V minimum)

OPERATING CURRENT: 14 mA typical per cell @ +12 V

TEMPERATURE RANGE (Operating):

-55 °C to +71 °C

CALIBRATION: Test data is available at additional cost.

CONNECTORS: SMA female connectors per MIL-STD-348 interface dimensions - mate nondestructively with MIL-C-39012 connectors.

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):

3200-1 & 3200-2	117 g (4.1 oz)
3201-1 & 3201-4	89 g (3.1 oz)
3201-2	96 g (3.4 oz)
3205-X	77 g (2.7 oz)
3206-1	99 g (3.5 oz)
3209-64.5	159 g (5.6 oz)

ACCESSORIES

Model 8200: Using this controller allows the user to control any Model 3200 via either front panel or IEEE-488 GPIB operation. Using a specially designed mounting Kit these attenuators can be easily installed into the controller ([refer to Model 8200 data sheet](#)).

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 options are supplied with a very low profile connectorized TTL interface board mounted directly to the control terminals. This TTL interface option is available with either a 10 pin ribbon cable connector or a 15 pin "D" connector (limited models, refer to list below). Each type 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 3200 Series Attenuators with this option add -1 to basic model number for ribbon cable connector and -2 for the "D" connector. **Example:** Model 3201-1 with a TTL interface board would be 3201-1-1. Mating connector is provided. To order a TTL Driver board separately for an existing 3200 Series Attenuator, use the following:

Basic Model No.	Model No. w/TTL	Model No. w/TTL "D" Conn
3200-1	3200-1-1	3200-1-2
3200-2	3200-2-1	3200-2-2
3201-1	3201-1-1	3201-1-2
3201-2	3201-2-1	3201-2-2
3201-4	3201-4-1	3201-4-2
3205-1	3205-1-1	N/A
3205-2	3205-2-1	N/A
3205-3	3205-3-1	N/A
3206-1	3206-1-1	N/A
3209-64.5	N/A	N/A

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. **Option -2:** 15 pin D Socket Connector. Mates with Cannon connector DA-15S or equivalent.

INPUT VOLTAGE: V_{IN} High= +2.0 V minimum
+5.0 V typical
+15.0 V maximum
 V_{IN} Low = 0 minimum
0.8 maximum

INPUT CURRENT: I_{IN} ($V_{IN}=2.4$ V) = 55 µA
 I_{IN} ($V_{IN}=3.85$ V) = 280 µA

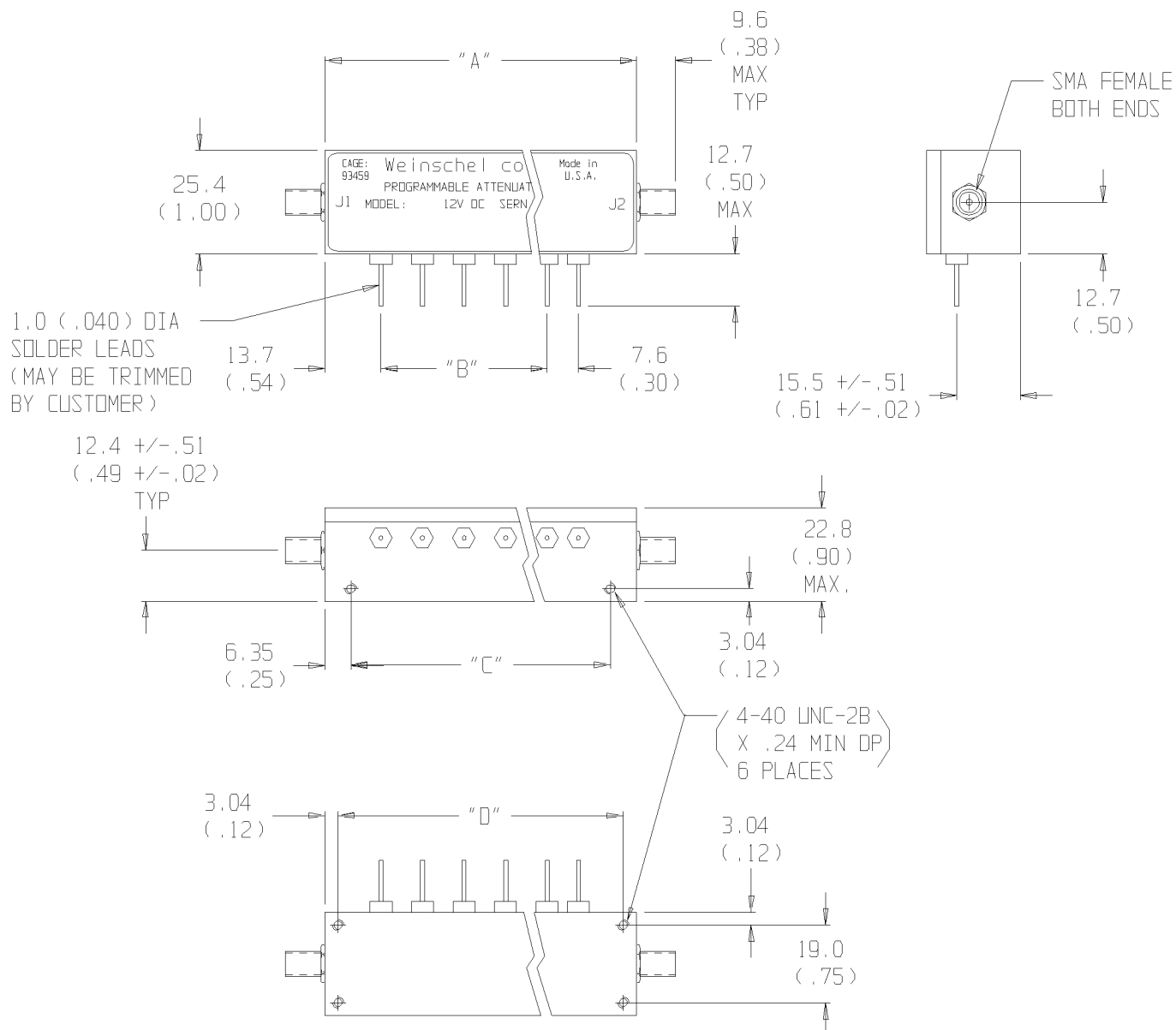
SUPPLY CURRENT: $I_{CC}=18.5$ mA maximum per cell

SUPPLY VOLTAGE: $V_{CC}=+12.0$ to +17 V

TEMPERATURE RANGE (Operating): -40 to +70 °C

NEW SMARTSTEP DRIVER MODELS: Most 3200s are available with a SmartStep interface/Driver cards. These are designed to interface with our 8210A Series SmartStep Controllers which greatly simplifies computer control applications. [Refer to Model 3200T and 3201T data sheet for more information.](#)

PHYSICAL DIMENSIONS:



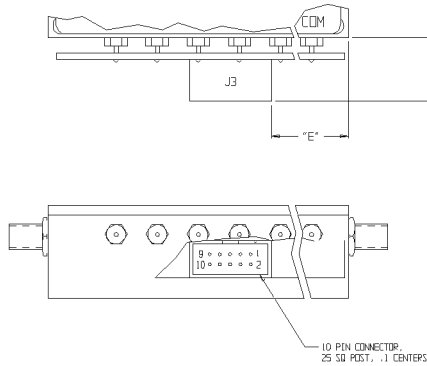
Model No.	No. Cells	A	B	C	D
3200-X	8	101.6 (4.0)	7 EQ SPCS @ 10.16 (.40) = 71.1 (2.80)	88.9 (3.50)	95.2 (3.75)
3201-X	5/4	76.2 (3.00)	4 EQ SPCS @ 10.16 (.40) = 40.64 (1.60)	63.5 (2.50)	69.8 (2.75)
3205-X	4	58.9 (2.32)	3 EQ SPCS @ 10.16 (.40) = 30.5 (1.20)	46.2 (1.82)	52.6 (2.07)
3206-X	6	81.3±0.5 (3.20±0.02)	5 EQ SPCS @ 10.16 (.40) = 50.8 (2.00)	75.18±0.12 (2.960±0.005)	69.8 (2.75)

NOTE: Dimensions are given in mm (inches) and are maximum unless otherwise specified.

PHYSICAL DIMENSIONS (Con't):

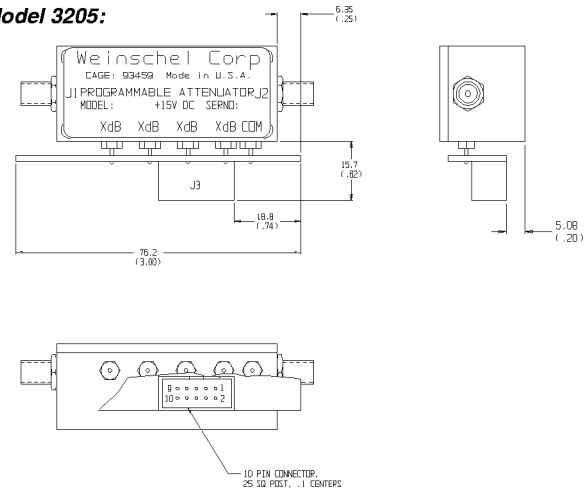
TTL Driver Option -1:

Models 3200, 3201, 3206:



Model No.	E
3200-X-1	37.8 (1.49)
3201-X-1	18.8 (0.74)
3206-X-1	18.8 (0.74)

Model 3205:

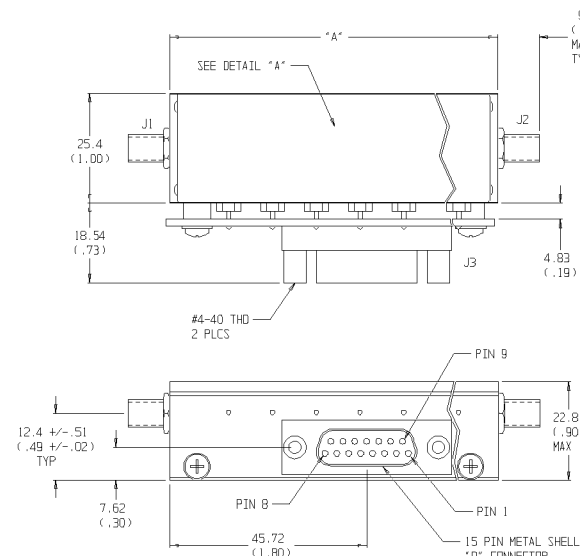


Control Connector (J3) Pin Location

TTL Conn PIN No. (J3)	3200-1-1 dB (Cell)	3200-2-1 dB (Cell)	3201-1-1 dB (Cell)	3201-2-1 dB (Cell)	3201-4-1 dB (Cell)	3205-1-1 dB (Cell)	3205-2-1 dB (Cell)	3205-3-1 dB (Cell)	3206-1-1 dB (Cell)
1	32	0.25	NC	NC	NC	NC	NC	NC	NC
2	1	0.5	NC	NC	NC	NC	NC	NC	NC
3	2	1	1	30	0.1	10	5	0.1	32
4	32*	2	2	10	0.2	20	10	0.2	1
5	4	4	4	30**	0.3	20	20	0.4	2
6	8	8	8	20	0.6	20	20	0.8	4
7	16	16	16	30**	NC	NC	NC	NC	8
8	32*	32	NC	NC	NC	NC	NC	NC	16
9	COM	COM	COM	COM	COM	COM	COM	COM	COM
10	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc

*64dB cell comprised of two 32dB cells
 **60dB cell comprised of two 30dB cells
 NC=Not Connected

TTL Driver Option -2:



Model No.	A
3200-X	101.6 (4.00)
3201-X	76.2 (3.00)

Control Connector (J3) Pin Location

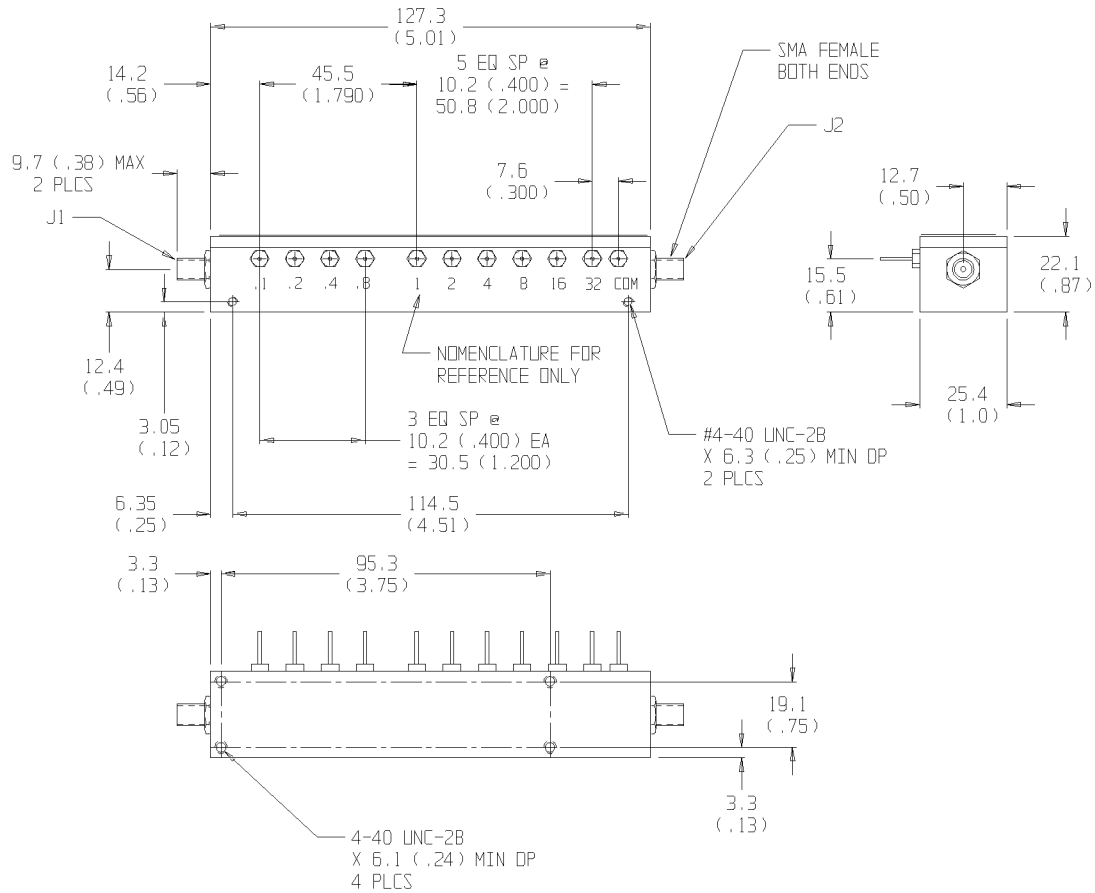
"D" Conn PIN No. (J3)	3200-1-2 dB (Cell)	3200-2-2 dB (Cell)	3201-1-2 dB (Cell)	3201-2-2 dB (Cell)	3201-4-2 dB (Cell)
1	32	0.25	NC	NC	NC
2	1	0.5	NC	NC	NC
3	2	1	1	30	0.1
4	32*	2	2	10	0.2
5	4	4	4	30**	0.3
6	8	8	8	20	0.6
7	16	16	16	30**	NC
8	32*	32	NC	NC	NC
9	NC	NC	NC	NC	NC
10	NC	NC	NC	NC	NC
11	NC	NC	NC	NC	NC
12	NC	NC	NC	NC	NC
13	NC	NC	NC	NC	NC
14	NC	NC	NC	NC	NC
15	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc

*64dB cell comprised of two 32dB cells
 **60dB cell comprised of two 30dB cells
 NC=Not Connected

NOTE: Dimensions are given in mm (inches) and are maximum unless otherwise specified.

PHYSICAL DIMENSIONS (Con't):

Model 3209-64.5 (10cell):



NOTE: Dimensions are given in mm (inches) and are maximum unless otherwise specified.