4205 Series
Model 4205B-95.5
RoHS

Programmable Attenuator – 0.3 to 8000 MHz, 95.75 dB

USB, PARALLEL, I2C, SPI & UART Control Modes

Features

- Cost Effective, Proven Design
- Excellent solid-state repeatability and performance
- Uninterrupted RF when changing attenuation values
- Extremely fast attenuation switching and very fine attenuation step resolution

Application

- Ideal for Automated Test Equipment (ATE)
- 2G/3G/4G LTE/5G fading simulators
- MIMO, WiMAX, WiFi
- Engineering/Production test lab environments

Description

Spectrum Control's Weinschel 4205B series Programmable Attenuators are 50 ohm bidirectional units that operate over the 0.3 to 8000 MHz frequency range. Model 4205B-95.5 offers an attenuation range of 0 to 95.75 dB in 0.25 dB step size. These units can be controlled using parallel (TTL compatible), I2C, SPI, UART, or USB interfaces.

Control Configuration

Units are supplied with both an AUX connector for operation in either a parallel (TTL compatible) mode or I2C, SPI, UART modes and a USB connector (Mini-B) for USB 2.0 operation. The main mode of operation is determined internally by the source of DC power to the unit.

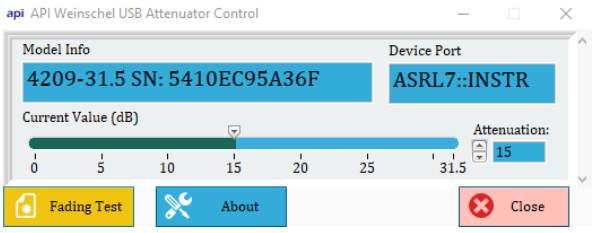
USING AUX CONTROL: Each unit is supplied with a mating 10 pin connector (Amp 746285-1). Refer to the table in page 5 for mating connector pin/wiring details. There are four user-selectable digital interface AUX modes: PIO, I2C, SPI, and UART. In addition there are three AUX application modes (PIOSW, PULSE, and FADE) that allow the generation of RF patterns when operating standalone. The AUX mode selection is done via USB command (see SET AUX) and is stored in non-volatile memory (NVM) so that changes to the mode will be automatically applied at startup. Additional information is presented in the Operating & Installation Manual, IM-672.

USING USB CONFIGURATION: In USB mode the attenuator is controlled and powered via a standard USB 2.0 connection to a USB host. The 4205B-95.5 operates as a USB CDC device (USB VID=25EA, PID=106D), so it may be controlled via any software that can communicate to a standard virtual COM port. Programming is done via simple ASCII text-based message strings to control the device.

Additional Features

Attenuation Range	95.75 dB in 0.25 dB steps
Switching Speed	0.2 µsec. (10% RF to 90% RF)
Control Logic	PARALLEL, I2C, SPI, UART or USB
Operating Voltage	+3.3 to +16 VDC @ 25 mA
Temperature Range	-20° C to +85° C
RF Connectors	SMA Female input/output
Weight	83 g (2.92 oz.)
Test Data	Test data available upon request

Control Software Included



Spectrum Control's Weinschel LabView based USB Control Center Software (AUCS) can also be used in the operation of this series of digital attenuators. The AUCS will allow the user to setup, control, and perform test and measurements over a standard USB 2.0 communication interface. Additional information is available in the Operating & Installation Manual, IM-611.

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RF Specifications

Parameter	Frequency Range	Condition	Minimum	Typical	Maximum	Units
Operating Frequency	-	-	0.3	-	8000	MHz
Nominal Impedance	0.3 – 8000 MHz	-	-	50		Ohm
Attenuation Range	0.3 – 8000 MHz	0.25 dB Steps	0	-	95.75	dB
Insertion Loss	0.3 – 1000 MHz	@ 0dB	-	4.1	5	dB
	1000 – 2200 MHz		-	5.2	6	
	2200 – 4000 MHz		-	6.0	7.2	
	4000 – 6000 MHz		-	8.0	9.0	
	6000 – 8000 MHz		-	10.0	11	dB
VSWR (All Ports)	0.3 – 6000 MHz	0 – 95.75 dB	-	1.40 : 1	1.85 : 1	-
	6000 – 8000 MHz		-	1.75 : 1	2 : 1	
Attenuation Accuracy[1]	0.3 – 600 MHz	0 – 7.75 dB	-	± 0.2	± 0.3	dB
		8 – 31.75 dB	-	-0.1 / +0.3	±0.75	
		32 – 63.75 dB	-	-0.5 / +0.0	-4% / + 0.5	
		64 – 95.75 dB	-	-1 / +0.0	-2/+1	
	600 – 3000 MHz	0 – 7.75 dB	-	± 0.1	± 0.3	
		8 – 31.75 dB	-	± 0.5	-0.9 / +0.4	
		32 – 63.75 dB	-	± 0.2	-4% / +0.4	
		64 – 95.75 dB	-	-1 / + 0.0	-2.5 / +0.5	
	3000 – 6000 MHz	0 – 7.75 dB	-	-0.1 / +0.2	± 0.3	
		8 – 31.75 dB	-	-0.1 / +0.3	-0.5 / +0.4+10%	
		32 – 63.75 dB	-	-0.0 / +1.1	-5% / +10%	
		64 – 95.75 dB	-	-0.0 / +2.0	-5% / +10%	
	6000 – 8000 MHz	0 – 7.75 dB	-	± 0.3	± 0.5	
		8 – 31.75 dB	-	+-0.9	±10%	
		32 – 63.75 dB	-	± 1	±10%	
		64 – 95.75 dB	-	-0 / +2.5	±10%	
Monotonicity	-	0.5 dB minimum step	0.3	-	8000	MHz
RF Input Power, CW	0.3 – 50 MHz	0 – 95.75 dB	-	-	12 – 28[3]	dBm
	50– 8000 MHz	0 – 95.75 dB			28	dBm
RF Input Power, Pulsed	0.3 – 50 MHz	0 – 95.75 dB			12 – 31[3]	dBm
	50 – 8000 MHz	0 – 95.75 dB			31	dBm
Input IP3[2]	0.3 – 8000 MHz	0 – 95.75 dB	-	61	-	dBm

1. X% is the percentage of the nominal attenuation setting
2. Measured with two tones at +18 dBm, 20 MHz spacing
3. Increases linearly with frequency from 12-28 dBm

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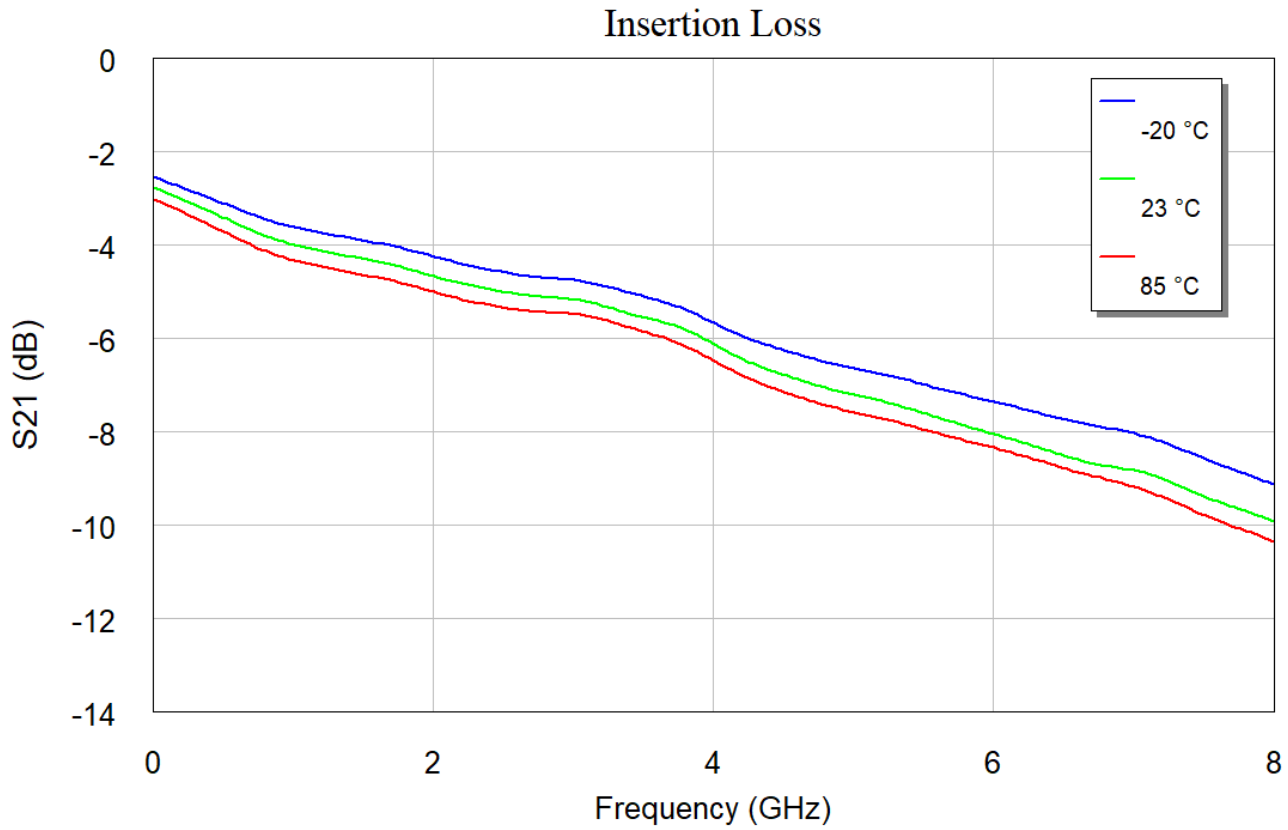
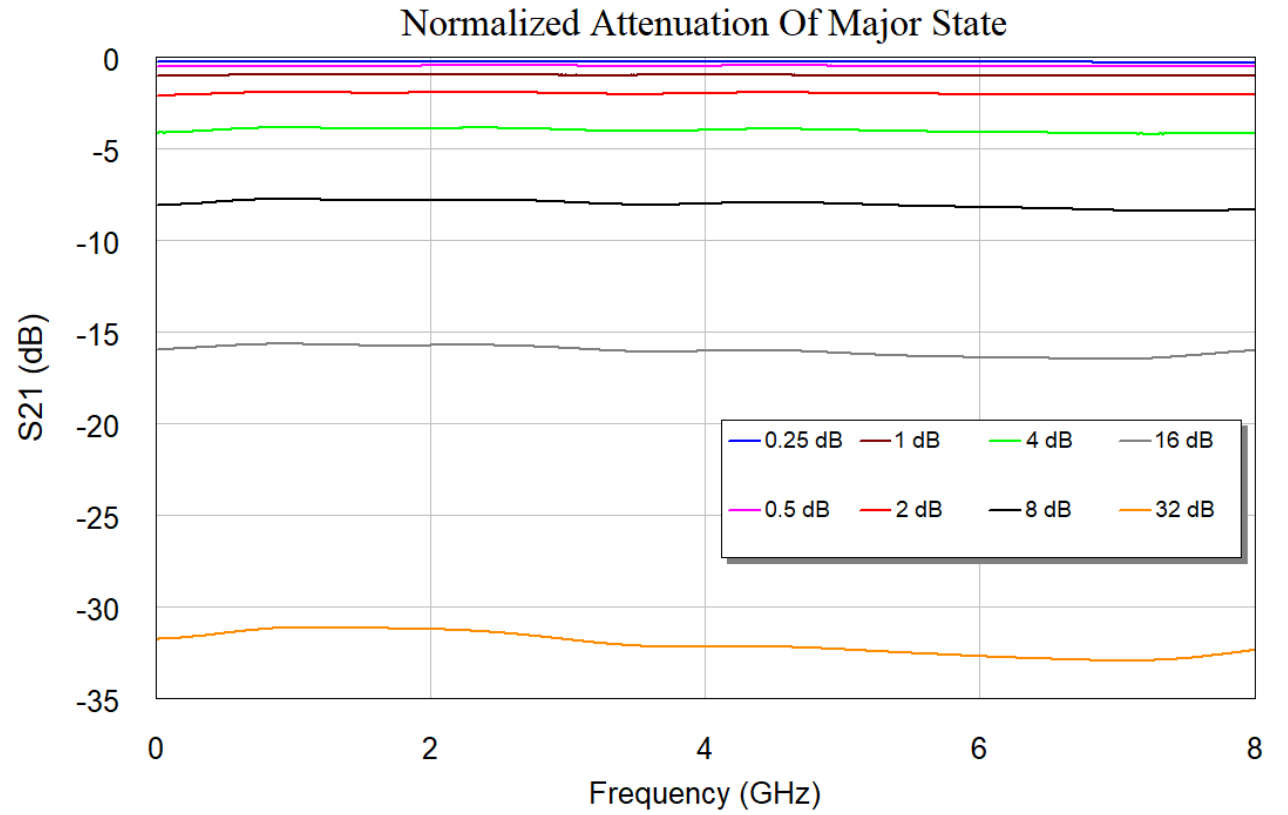
Typical RF Performance





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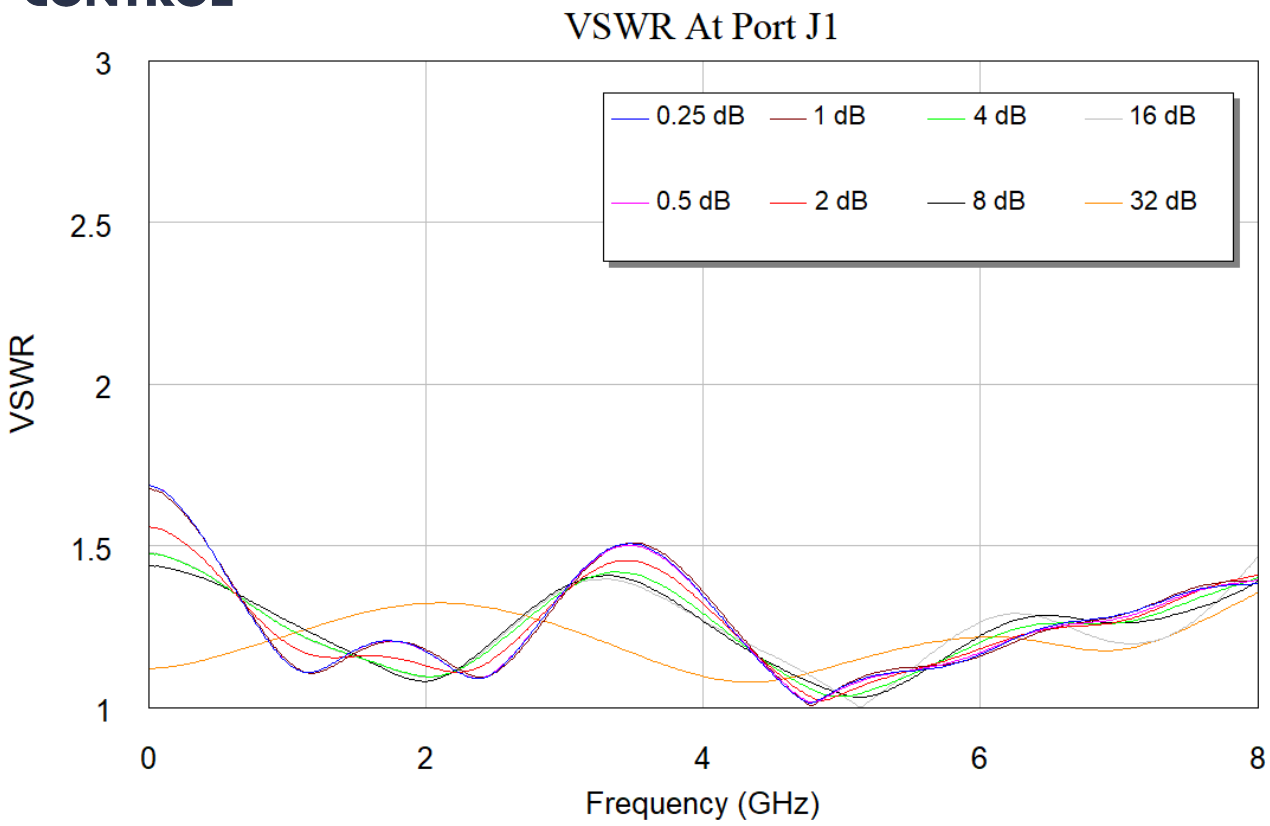

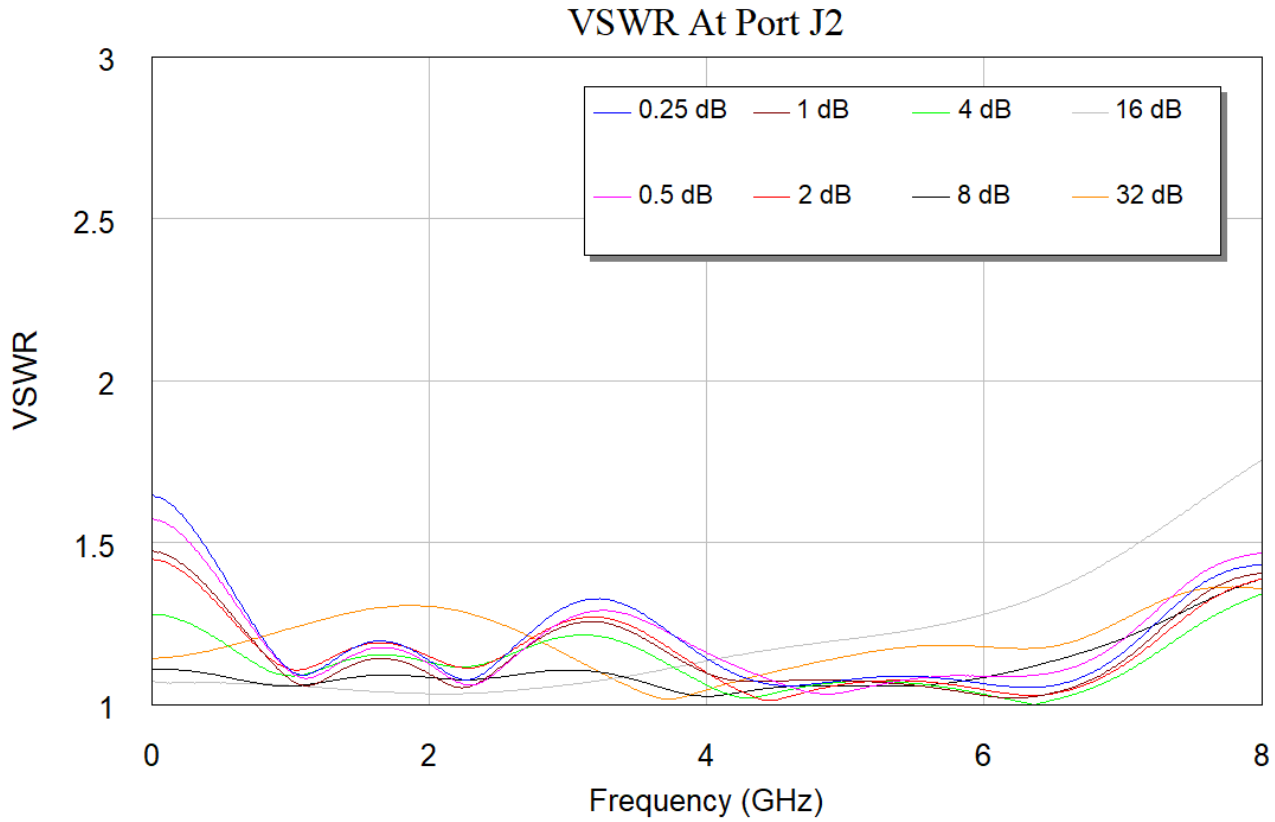

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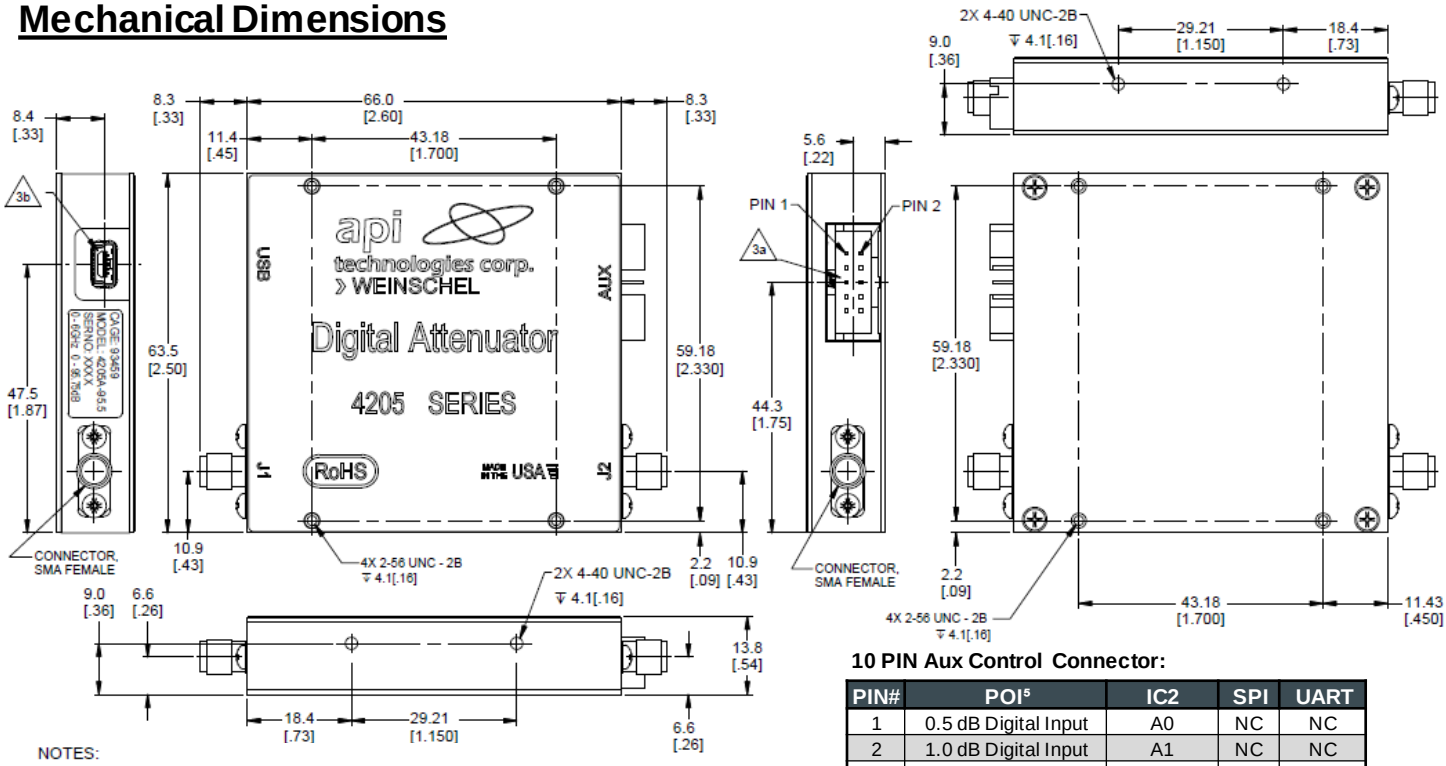
Electrical and Environmental Specifications

Parameter	Condition	Minimum	Typical	Maximum	Units
Switching Time	RF Trise/Tfall (10%/90%)	-	0.2	0.4	Micro Sec.
	50% PIO CTRL to 90% RF	-	3	5	
Supply Voltage (VDC)	10 Pin Aux	+3.3	3.3 to +5	+16	Volt
	USB	+4.4	+5	+5.25	
Digital input low voltage	VDC = 3.3V to 4.5V	-0.3	-	0.15VDC	Volt
	VDC = 4.5V to 16V	-0.3	-	0.8	
Digital input High voltage	VDC = 3.3V to 4.5V	2	-	VDC+0.3	Volt
	VDC = 4.5V to 16V	2	-	5	
Supply Current	-	-	15	25	mA
Operating Temperature	-	-20	-	85	°C
Storage Temperature	-	-55	-	125	°C

Mechanical Dimensions



NOTES:

1. ALL DIMENSIONS ARE GIVEN IN mm [in.]

2. ALL MATERIALS AND PROCESSES ARE TO BE IN COMPLIANCE WITH THE EUROPEAN DIRECTIVE RESTRICTION OF HAZARDOUS SUBSTANCES (RoHS) (REF: WEINSCHEL 080-638)

3. CONTROL CONNECTORS:

a. AMP latch 10 pin ribbon cable connector mates with AMP P/N 746285-1 (supplied with each unit)

b. USB - Mini-B

10 PIN Aux Control Connector:

PIN#	POI[5]	IC2	SPI	UART
1	0.5 dB Digital Input	A0	NC	NC
2	1.0 dB Digital Input	A1	NC	NC
3	2.0 dB Digital Input	A2	NC	RXD
4	4.0 dB Digital Input	A3	NC	TXD
5	8.0 dB Digital Input	TRIG	NC	NC
6	16 dB Digital Input	RESETN	SSN	NC
7	32 dB Digital Input #1	SCL	SCLK	NC
8	32 dB Digital Input #2	SDA	SDI	NC
9	Supply Voltage (VDC)			
10	Ground			

5. Parallel Input Mode:
Digital input Low turns OFF desired attenuator bit
Digital input High turns ON desired attenuator bit

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