DATA SHEET

4-Channel Programmable Attenuator – 0.3 to 8000 MHz, 31.5 dB

USB & Ethernet Control Modes

Model 4401-8-31.5

RoHS

Features

- Excellent solid-state repeatability and performance
- Uninterrupted RF when changing attenuation values
- AUX connector provides a logic-level SYNC output signal
- Extremely fast attenuation switching (0.2µs) and fine attenuation step resolution (0.5dB)
- Cost-effective, proven design
- Small form-factor portable unit, powered via USB
- Four independently programmable channels

Applications

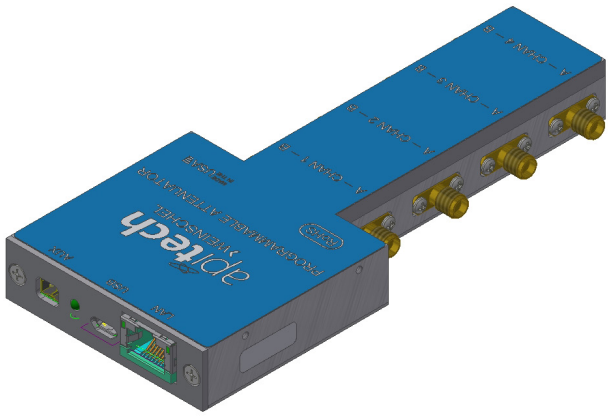
- Ideal for Automated Test Equipment (ATE)
- 3G/4G LTE/5G / DVB Fading Test simulation
- MU-MIMO, WiMax, Wi-Fi Testing
- Mobile Handover and Traffic Simulation Test Environments

Description

Spectrum Control Weinschel's 4-Channel Programmable Attenuators are 50 ohm bidirectional units that operate over the 0.3 to 8000 MHz frequency range. Model 4401-8-31.5 offers an attenuation range of 0 to 31.5 dB in 0.5 dB step size. These units can be controlled using USB & Ethernet interfaces. A Programmable TTL trigger is available through the AUX port.

Control Configuration

The attenuator provides four channels of attenuation controllable via either USB 2.0 or 10/100Base-T ethernet interfaces. The attenuation channels can be operated independently or in a synchronized fashion where all attenuators change simultaneously.



10/100BaseT Ethernet: The Ethernet port supports 10/100BaseT operation, with auto-negotiation of the interface speed and duplex mode. LED indicators are provided to indicate network LINK status (green) and TX/RX activity (YELLOW). Supported network protocols include: IP, UDP, TCP, ICMP (ARP and PING), DHCP, AUTOIP, TELNET, and HTTP. The TCP and UDP servers allow connections to be established for general programming purposes. A TELNET server is provided for a command-line interface that implements many of the functions of the serial console CLI, and an HTTP server that allows control via a browser.

USB Control: In USB mode, the attenuator is controlled and powered via a standard USB 2.0 connection to a USB host. The 10442-8-31.5 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.

4-Channel Programmable Attenuator – 0.3 to 8000 MHz, 31.5 dB

USB & Ethernet Control Modes

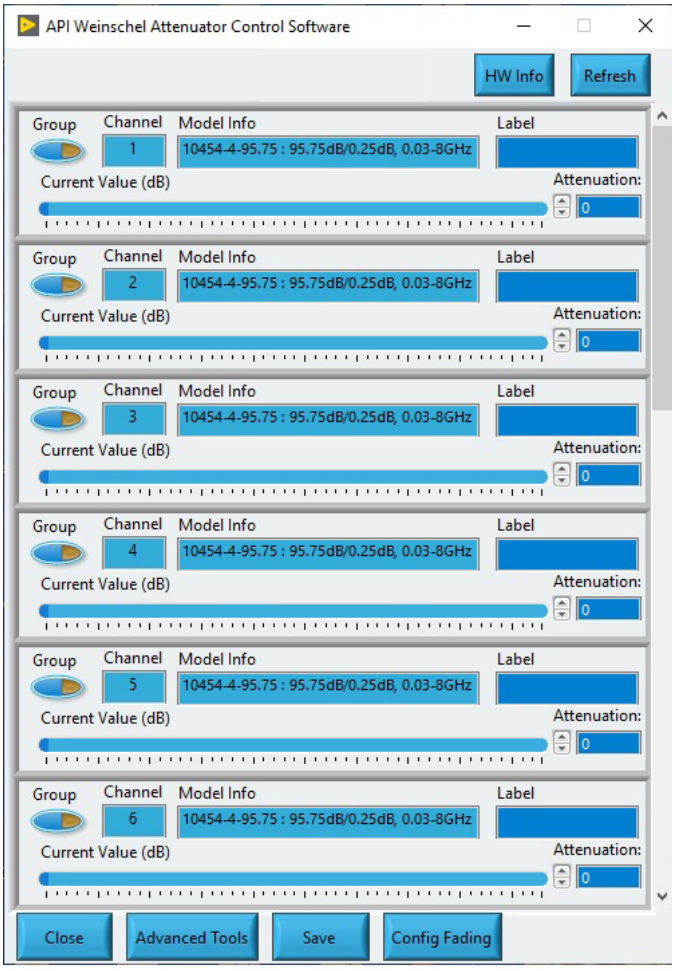
Model 4401-8-31.5

Additional Features

Attenuation Range	95.75 dB in 0.5 dB steps
Switching Speed	0.2 µsec. (10% RF to 90% RF)
Control Logic	Ethernet or USB
Operating Voltage	Through USB +5V
Temperature Range	-20°C to +85°C
RF Connectors	SMA Female input/output
Weight	XX g (oz.)
Test Data	Test data available upon request

Control Software Included

Spectrum Control Weinschel's Control Software can also be used in the operation of this series of digital attenuators. The Control Software 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.



4-Channel Programmable Attenuator – 0.3 to 8000 MHz, 31.5 dB

USB & Ethernet Control Modes

Model 4401-8-31.5

RF Specifications

Parameter	Frequency Range	Condition	Minimum	Typical	Maximum	Units
Operating Frequency	-	-	0.3	-	8	GHz
Nominal Impedance	0.003 – 8 GHz	-	-	50		Ohm
Attenuation Range	0.003 – 8 GHz	0.5 dB Steps	0	-	95.75	dB
Insertion Loss	0.003 – 1 GHz	@0 dB	-	4.1	5	dB
	1 – 2.2 GHz		-	5.2	6	
	2.2 – 4 GHz		-	6.0	7.2	
	4 – 6 GHz		-	8.0	9.0	
	6 – 8 GHz		-	10.0	11	dB
VSWR (All Ports)	0.003 – 6 GHz	0 – 95.75 dB	-	1.40 : 1	1.85 : 1	-
	6 – 8 GHz		-	1.75 : 1	2 : 1	
Attenuation Accuracy [1]	0.003 – 0.6 GHz	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	
	0.6 – 3 GHz	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	
	3 – 6 GHz	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%	
	6 – 8 GHz	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	-	8	GHz
RF Input Power, CW	0.003 – 0.05 GHz	0 – 95.75 dB	-	-	12 – 28[3]	dBm
	0.05– 8 GHz	0 – 95.75 dB			28	dBm
RF Input Power, Pulsed	0.003 – 0.05 GHz	0 – 95.75 dB			12 – 31[3]	dBm
	0.05 – 8 GHz	0 – 95.75 dB			31	dBm
Input IP3[2]	0.003 – 8 GHz	0 – 95.75 dB	-	61	-	dBm

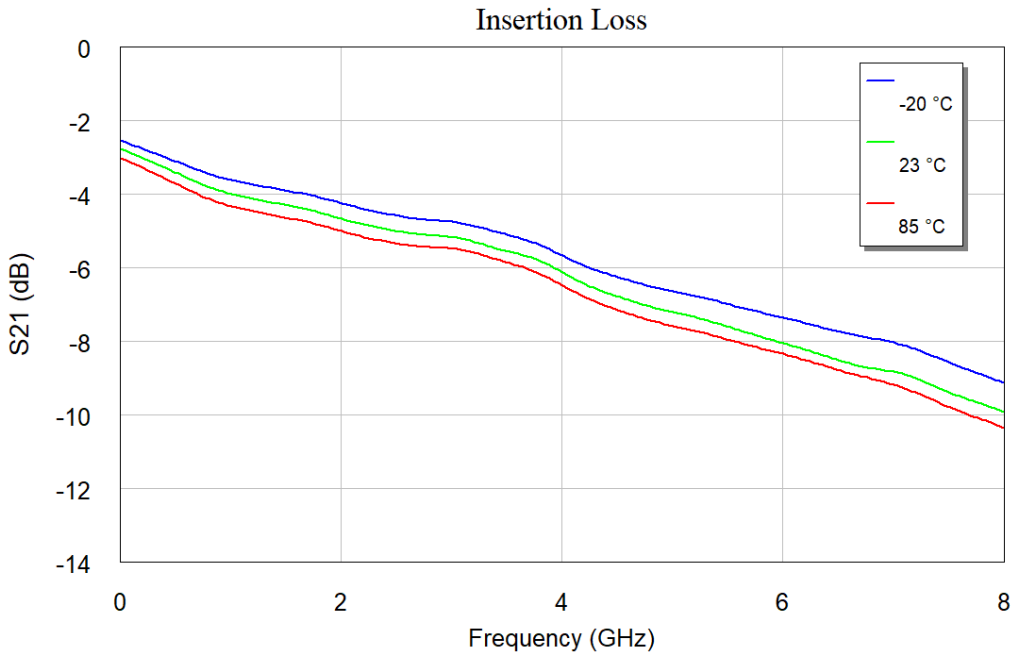
1. *X% is the percentage of the nominal attenuation setting*
2. *Measured with two tones at +18 dBm, 20 MHz spacing*
3. *Increases linearly with frequency from 12 to 28 dBm*

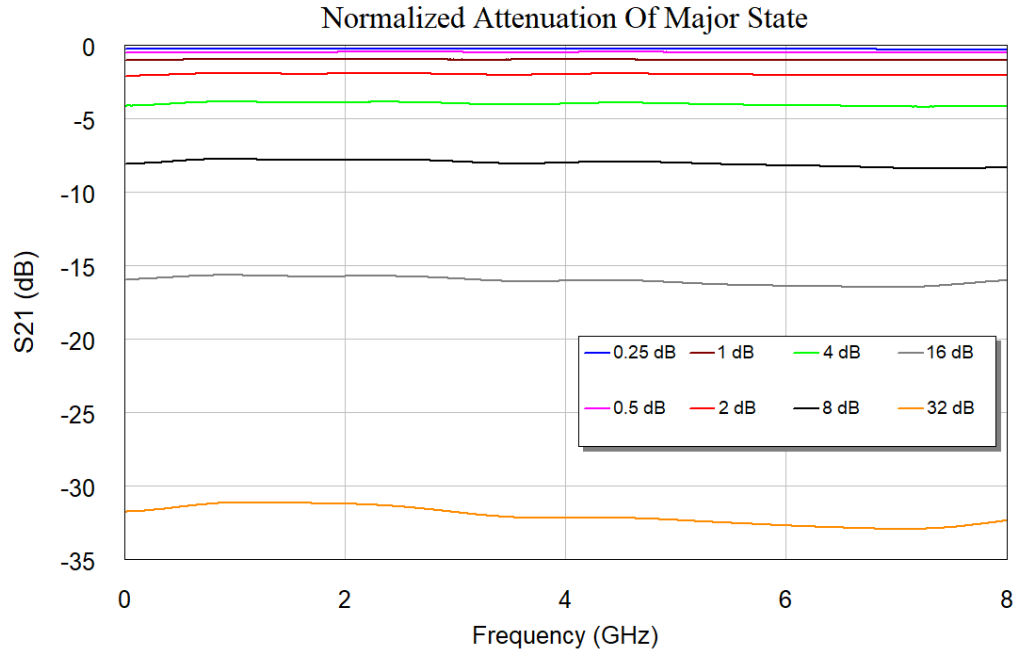
4-Channel Programmable Attenuator – 0.3 to 8000 MHz, 31.5 dB

USB & Ethernet Control Modes

Model 4401-8-31.5

Typical RF Performance

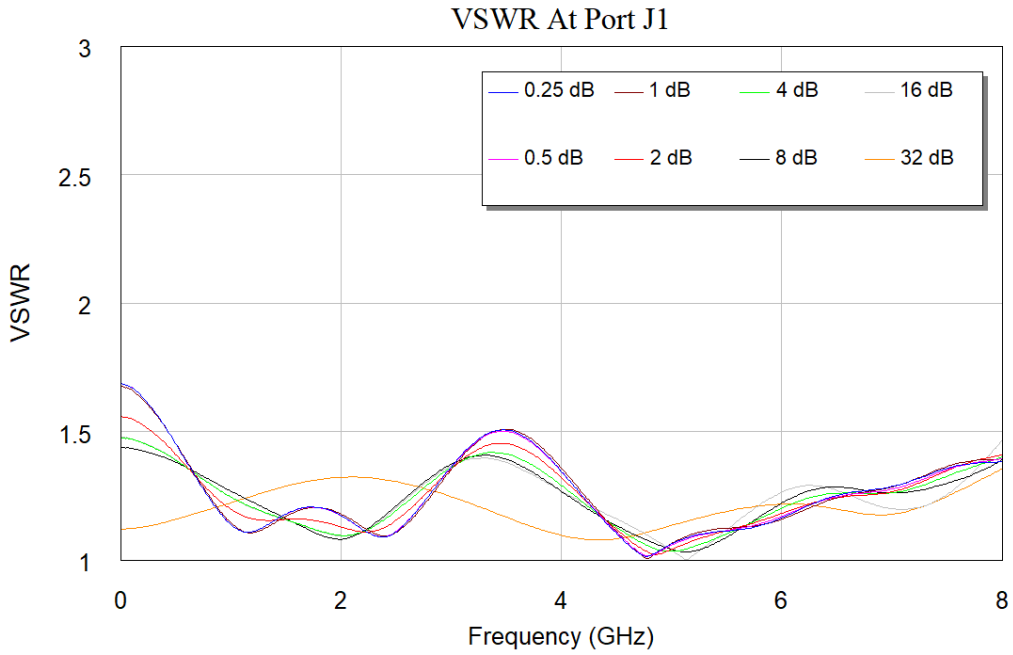


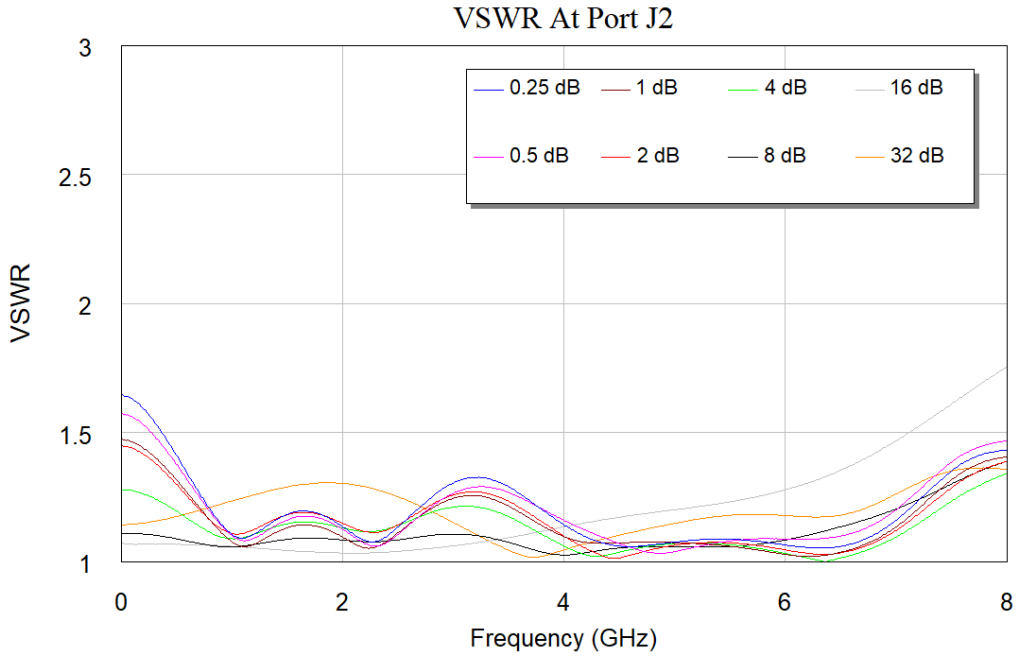


4-Channel Programmable Attenuator – 0.3 to 8000 MHz, 31.5 dB

USB & Ethernet Control Modes

Model 4401-8-31.5





4-Channel Programmable Attenuator – 0.3 to 8000 MHz, 31.5 dB

USB & Ethernet Control Modes

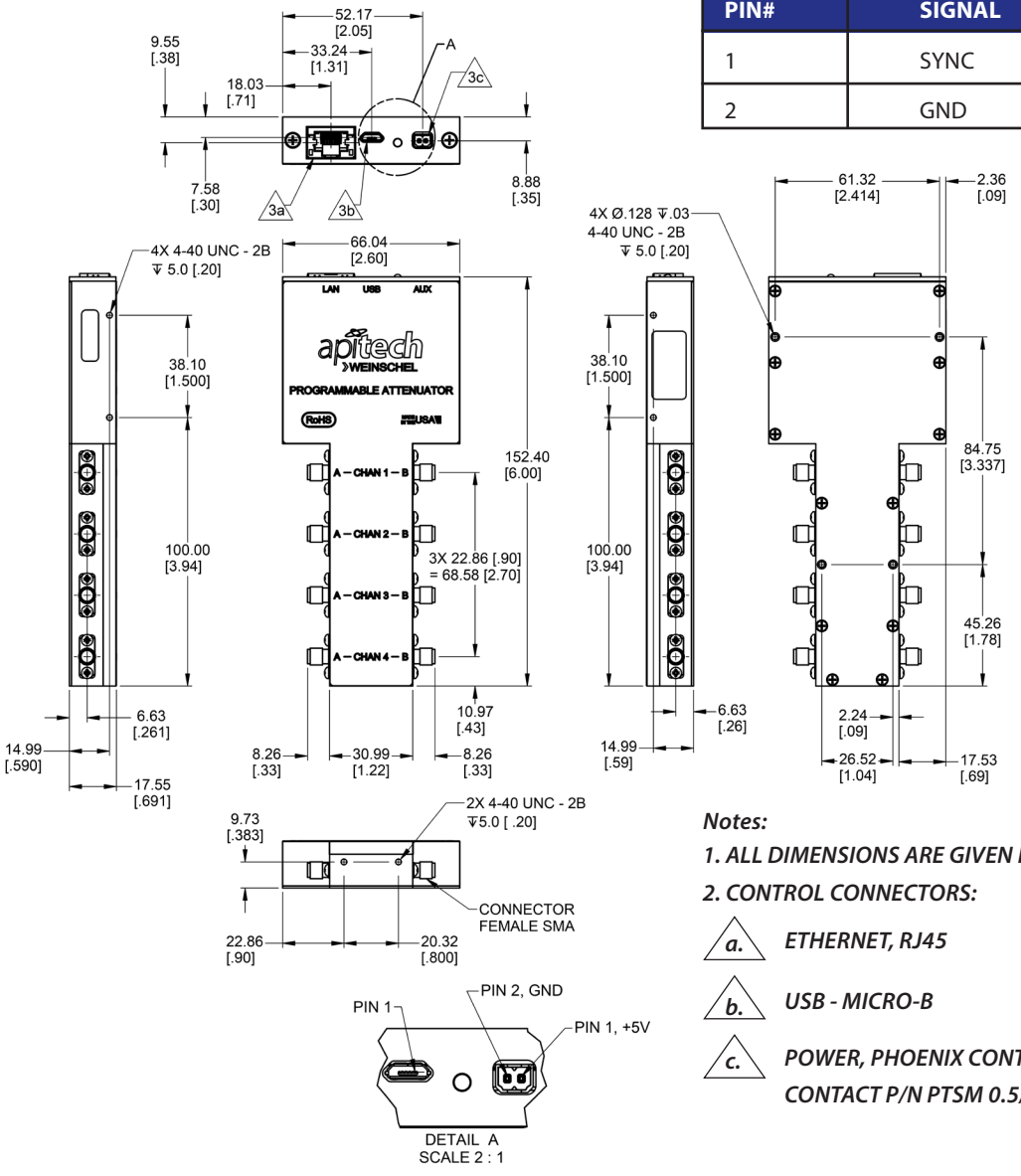
Model 4401-8-31.5

Electrical and Environmental Specifications

Parameter	Condition	Minimum	Typical	Maximum	Units
Switching Time	RF_{Trise}/Tfall (10%/90%)	-	0.2	0.4	Micro Sec.
Supply Voltage (VDC)	USB	+4.4	+5	+5.25	Volt
Supply Current	-	-	60	100	mA
Operating Temperature	-	-20	-	85	°C
Storage Temperature	-	-55	-	125	°C

Mechanical Dimensions

AUX Port (3c)		
PIN#	**SIGNAL**	**DESCRIPTION**
1	SYNC	Out, 5V CMOS
2	GND	Signal Ground



Notes:

1. ALL DIMENSIONS ARE GIVEN IN MM (INCHES)

2. CONTROL CONNECTORS:

a. ETHERNET, RJ45

b. USB - MICRO-B

c. POWER, PHOENIX CONTACT, 2.5MM, MATES WITH PHOENIX CONTACT P/N PTSM 0.5/2-P-2, 5-1778832