

# RF & Microwave Components & Subsystems

## Quick Reference Guide



**Digital & Programmable Attenuators**

**Programmable Attenuation, Phase Shifter & Switch Units**

**COTS Subsystems**


**High Reliability Attenuators**

**Low PIM Attenuators & Terminations**

**Medium & High Power Attenuators & Terminations**

**Conduction Cooled (Flat-Pack) Attenuators & Terminations**



**api**   
**technologies corp.**  
**> WEINSCHTEL**  
[www.weinschel.apitech.com](http://www.weinschel.apitech.com)

# MMIC Digitally Switched Attenuator, Model 4205

✓ RoHS



Weinschel, a part of API Technologies Corp., offers a series of MMIC digital attenuators that operate from 0.2 to 6 GHz in a variety of attenuation ranges up to 95.5 dB in steps as low as 0.25. These units can be controlled using either parallel TTL or USB interfaces.

- /// Ideal for Automated Test Equipment (ATE), WiMAX, 3G/4G, LTE, WiFi fading simulators, engineering/production test lab environments
- /// Excellent solid-state repeatability & performance
- /// Uninterrupted RF when changing attenuation levels
- /// Ruggedized construction



Model No.	Frequency Range (GHz)	Attenuation Range (dB)	Step Size (dB)	Insertion Loss, Max. (dB)	Maximum SWR <sup>1</sup>	Connector Type	Average Power
4205-31.5	0.2-6.0	0-31.5	0.5	3.0 - 4.0*	1.50-1.70*	SMA	+23 dBm
4205-63.5		0-63.5	0.25	4.5 - 6.0*	1.60-1.80*		
4205-95.5		0-95.5	0.5	6.5 - 8.0*	1.60-2.10*		



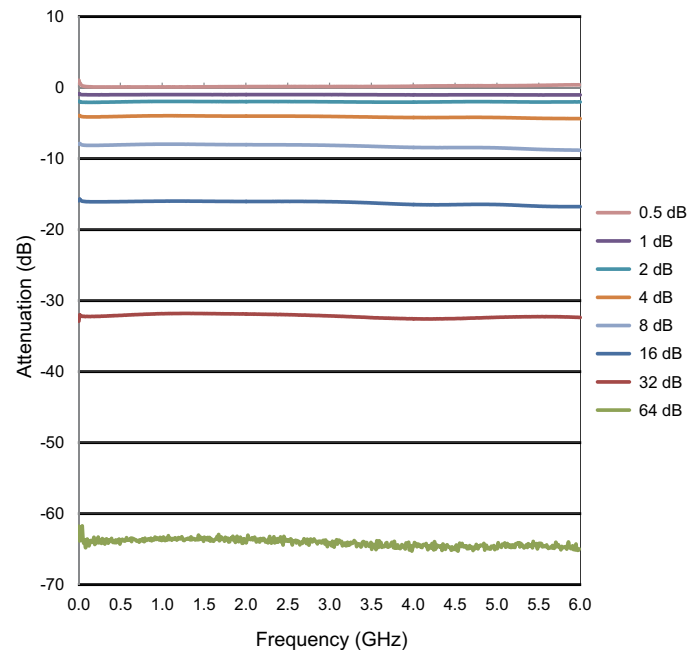
\* Varies with frequency.

## Control Configuration

Units are supplied with both parallel TTL and USB 2.0 interfaces. The mode of operation is determined by the source of DC power to the unit. *NOTE: Do not simultaneously connect DC power to the TTL connector while the USB is connected.*

**USING TTL CONTROL:** Each unit is supplied with a mating 10 pin connector (Amp 746285-1). Refer to Physical Dimensions for mating connector pin/wiring details. Two pins are specified for supply voltage and ground. The remaining pins 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.

**USING USB CONFIGURATION:** The USB interface is compatible with standard USB 2.0 interfaces. In USB mode, DC power to the attenuator is provided by the host USB connection. The attenuator operates as a USB CDC device and accepts simple ASCII text commands. This allows the unit to be controlled from any system capable of sending data via a standard COM port-style interface.



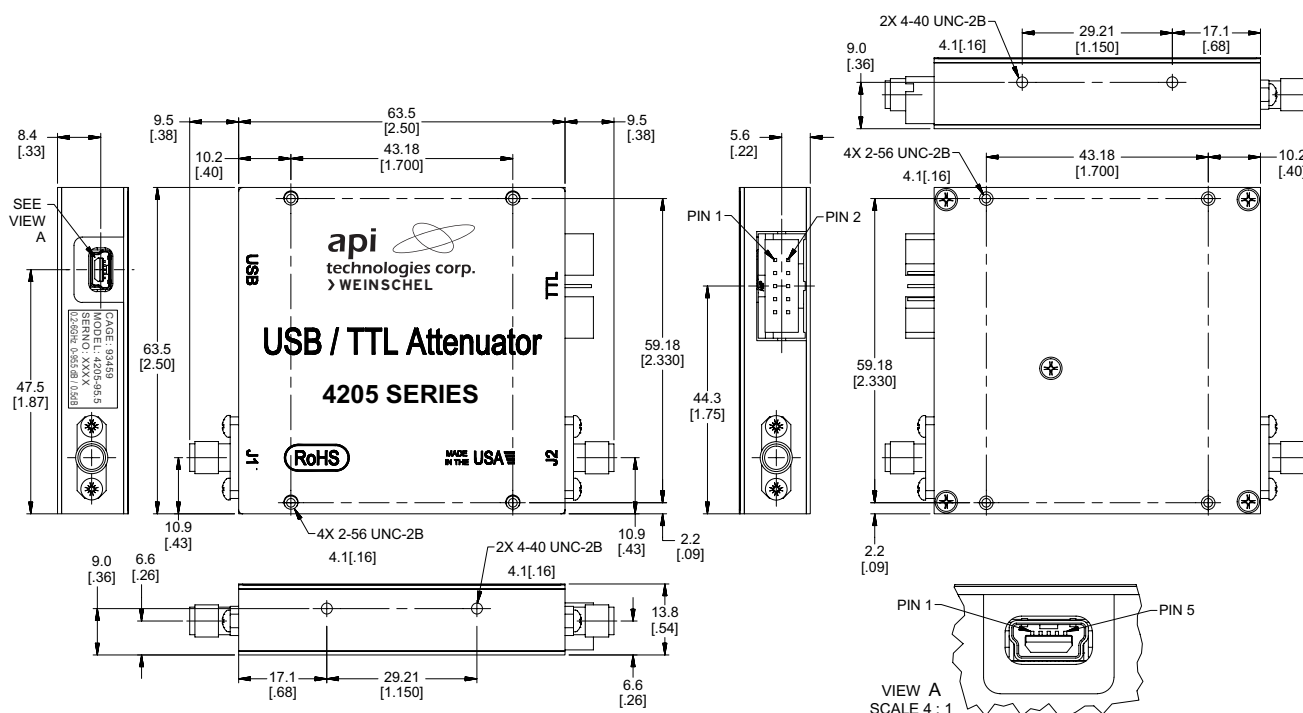
Attenuation Performance Plot

## Control Software Included

Weinschel LabVIEW™ based USB Control Center Software can be used in conjunction with the operation of this series of digital attenuators. The control center software will allow the user to setup, control and perform tests and measurements using these digital attenuators over a standard USB 2.0 communication interface.



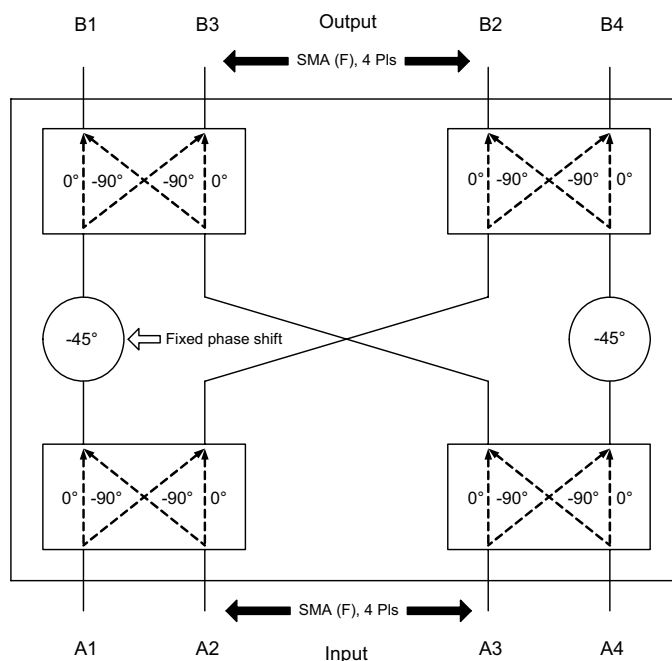
## Physical Dimensions



## Dual Band 4x4 Butler Matrix, Model 8401



- /// Ideal for lab testing/calibration setups and subsystem applications
- /// Operating frequencies: 2.4 to 6.0 GHz
- /// Compact module design with SMA female connectors
- /// Isolated inputs
- /// VSWR: 1.5:1 typical, 1.6:1 maximum
- /// Output phase accuracy:  $\pm 30^\circ$
- /// Insertion loss: 8 dB typical, 10 dB maximum
- /// Isolation: 18 dB typical, 15 dB minimum
- /// Operating temperature range:  $-20^\circ\text{C}$  to  $+70^\circ\text{C}$
- /// Custom and other configurations available.



## Digital Switch, Model 4284

Operating over the 0.1 to 6 GHz frequency range, the SP4T absorptive switch can be controlled using either parallel TTL or USB interfaces.

- /// Ideal for Automated Test Equipment (ATE), WiMAX, LTE, WiFi, 3G/4G fading simulators, engineering/production test lab environments
- /// Excellent solid-state repeatability & performance
- /// Uninterrupted RF when changing switch positions.
- /// Unselected ports are internally terminated with a 50 ohm load.
- /// Switching Speed: 1  $\mu$ sec maximum (TTL)  
5  $\mu$ sec typical (USB)
- /// Control software included
- /// Ruggedized construction



RoHS



Model No.	Switch Type	Frequency Range (GHz)	Isolation minimum (dB)		Insertion Loss, Min.	Maximum SWR	Connector Type	Ave. pwr (watts)
			Typ.	Max.				
4284	SP4T	0.1-6.0	0.1 - 3.0:	60	55	3.0-4.5	1.50:1	1
			3.0 - 5.0:	48	42			
			5.0 - 6.0:	38	30			



### Control Configuration

Units are supplied with both parallel-TTL and USB 2.0 interfaces. The mode of operation is determined by the source of DC power to the unit. *NOTE: Do not simultaneously connect DC power to the TTL connector while the USB is connected.*

**USING TTL CONTROL:** Each unit is supplied with a mating 10 pin connector (Amp 746285-1). Refer to Physical Dimensions for mating connector pin/wiring details. Two pins are specified for supply voltage and ground. The remaining pins will accept TTL control signals to activate or de-activate a particular switch position.

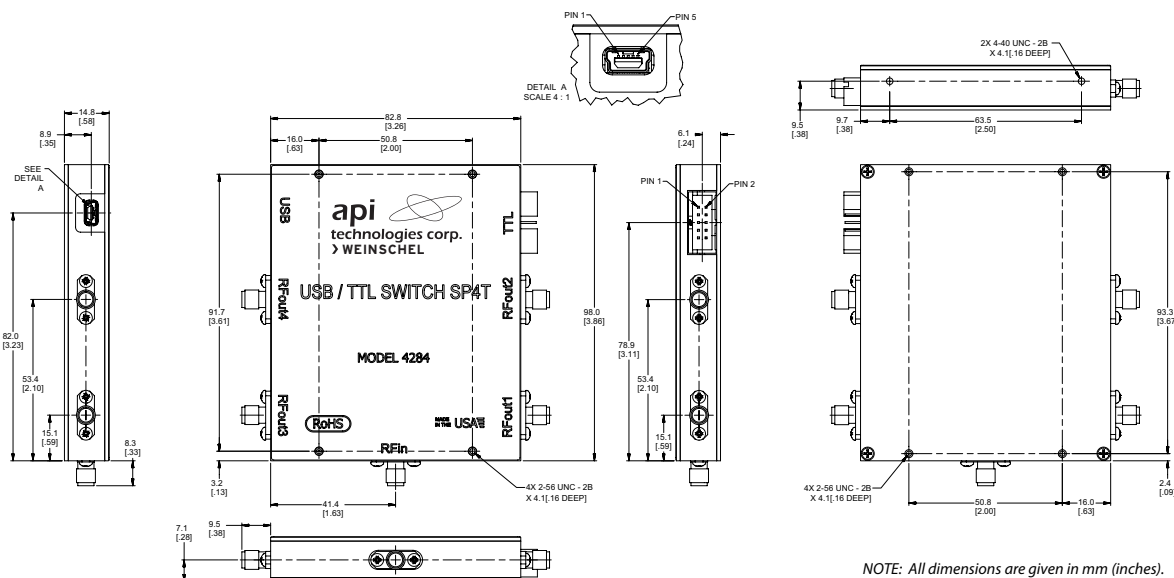
**USING USB CONFIGURATION:** The USB interface is compatible with standard USB 2.0 interfaces. In USB mode, DC power to the switch is provided by the host USB connection. The switch operates as a USB CDC device and accepts simple ASCII text commands. This allows the unit to be controlled from any system capable of sending data via a standard COM port-style interface.

### Control Software Included

Weinschel LabVIEW™ based USB Control Center Software (UCS) can also be used in the operation of this series of digital switches. The UCS will allow the user to setup, control and perform test and measurements using these digital switches over a standard USB 2.0 communication interface.



### Physical Dimensions





## 75 $\Omega$ Programmable Attenuators

Model 3456 series 75  $\Omega$  programmable step attenuators are designed for use in automatic test equipment and OEM systems operating in the DC to 3 GHz frequency range. Each cell contains a double-pole, double-throw relay that provides a zero path or attenuated path for the RF signal.

- /// Cost effective design for wireless/cable applications
- /// Custom configurations including bus controlled attenuator subsystems



Model No.	Frequency Range (GHz)	Attenuation Range (dB)	Step Size (dB)	Insertion Loss, Max. (dB)	Maximum SWR	Connector Type	Average Power (watts)	Peak Power (watts)
3456-63	DC-3.0	0-63	1	2.10-3.30*	1.45-1.50*	SMA	1	50

\* Varies with frequency.



## 6 GHz Programmable Attenuators & Phase Shifters

**Ideal for wireless/test applications**

- /// Higher frequency range to 6 GHz
- /// Selection of attenuation ranges & step sizes
- /// High quality construction & connectors
- /// Optional TTL interface for easy subsystem integration
- /// Special configurations available upon request



### Programmable Attenuators

Model No.	Frequency Range (GHz)	Attenuation Range (dB)	Step Size (dB)	Insertion Loss, Max (dB)	Maximum SWR	Connector Type	Average Power (watts)	Peak Power (watts)
3404-15	DC-6.0	0-15	1	2.60	1.30-1.45*	SMA	1	50
3404-55		0-55	5	2.60				
3404-70		0-70	10	2.60				
3404T-15	DC-6.0	0-15	1	2.60	1.30-1.45*	SMA	1	50
3404T-55		0-55	5	2.60				
3404T-70		0-70	10	2.60				
3409-127	DC-6.0	0-127	1	3.8-5.8*	1.40-1.55*	SMA	1	50



### Programmable Phase Shifters

Model No.	Frequency Range (GHz)	Phase Shift Range (°)	Insertion Loss dB Maximum (Any Phase State)	Insertion Loss Variation	Insertion Phase	Maximum SWR' (°)	Power Rating (Watts)	Connector Type
984-1	DC-6.0	From 0° @ DC to 630° in 10° steps @ 6 GHz (Normally linear with frequency)	2.5 @ 3 GHz 4.3 @ 6 GHz	± 0.5 dB Typical	2,700° Typical @ 6 GHz	1.50-1.60*	1	SMA

\* Varies with frequency.



## Programmable Attenuator Units, Models 8320, 8321 & 8331

 **RoHS**



Model  
8320



Model  
8331

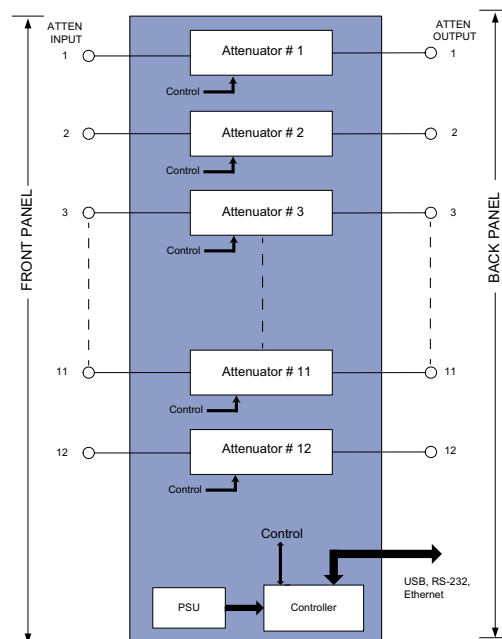


This series of programmable attenuator units represent a new streamlined approach in programmable attenuation for bench test and subsystem applications, providing a flexible, easy to program, low cost solution. Standard 8320 and 8321 series designs house and control various Weinschel programmable attenuator models (3200-XE, 3400, 150T, and 4200 series) via front panel controls, Ethernet, USB and Serial communications interfaces. A GPIB (IEEE-488) interface is also available as an option.

The 8320 series are single or up to 4 channel configurations housed in half rack enclosures. The 8321 series are multi-channel configurations housed in 19 inch enclosures and can be configured for up to 12 attenuation channels. Both series can be configured for front or rear and through options.

Most 8331 Series are multi-channel configurations where RF signal is routed through either the front or rear mounted ports. This series can be configured for up to 12 independent channels of attenuation and can be controlled via Ethernet, USB and Serial communications interfaces.

Weinschel also provides custom subsystems where a variety of test configurations can be incorporated within a single unit. Contact us with your specialized needs.



Simplified 12 Channel Block Diagram

### Model Number Configuration Matrix

**8320 - XX - XX - XX G**

Basic Model Number      Attenuator Designator (see page 7)      Number of Channels<sup>(1)</sup> (01 to 04)      Connector Type

GPIB (IEEE-488) Option  
Blank = Not Installed  
G = Installed

Connector Location<sup>(1)</sup>  
F = Front  
R = Rear  
T = Front - Rear

Example: 8320-M3-02-TS

**8331 - XX - XX - XX**

Basic Model Number      Attenuator Designator (see below)      Number of Channels<sup>(1)</sup> (01 to 12)      Connector Type

Connector Location<sup>(1)</sup>  
F = Front  
R = Rear  
T = Front - Rear

Example: 8331-M3-09-TS

1. 8320: Up to 4 channels total except for up to 2 channels for option F & R (Front or Rear), up to 2 channels for option C & D (150T & 152T Series), 1 channel only for option C7 & D5, up to 2 channels for option E3

8321 & 8331: Up to 12 channels total except for up to 6 channels for option F & R (Front or Rear), up to 10 channels for option C & D (150T & 152T Series), up to 5 channels for option C7 & D5, up to 6 channels for option E3

2. Not available for option D, E & F (152T, 156 & 3456 Series)

3. Not available for option E & F (156 & 3456 Series)

4. Only for option E (156 Series)

5. Only for option F (3456 Series)

### Control Software Included

Weinschel LabVIEW™ based Attenuator Control Center Software (ACCS) can be used in conjunction with the operation of the this series of programmable attenuator units and allows the user to setup, control and perform test and measurements over standard communication interfaces such as USB, Ethernet or RS-232.

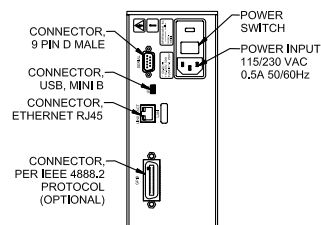
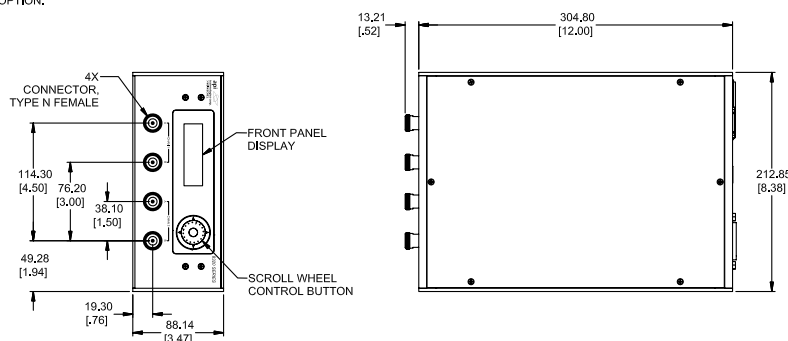
## Attenuator Designations & Specifications

Electro-mechanical								
Frequency Range	Attenuator Designation		Attenuator Model	Range (dB)	Step Size (dB)	Insertion Loss (maximum)	VSWR (maximum)	☑ RoHS
DC-3 GHz	A	1	3205-1E	70	10	3.75 dB	1.4	
		2	3205-2E	55	5	3.75 dB	1.4	
		3	3205-3E	1.5	0.1	3.75 dB	1.4	
		4	3201-1E	31	1	4.00 dB	1.4	
		5	3206-1E	63	1	4.25 dB	1.4	
		6	3200-1E	127	1	5.25 dB	1.4	
		7	3200-2E	63.75	0.25	5.25 dB	1.4	
		8	3209-1E	64.5	0.1	6.50 dB	1.5	
DC-6 GHz	B	1	3404-15	15	1	3.50 dB	1.55	
		2	3404-55	55	5	3.50 dB	1.55	
		3	3404-70	70	10	3.50 dB	1.55	
		4	3406-55	55	1	4.50 dB	1.55	
		5	3408-55.75	55.75	0.25	6.00 dB	1.55	
		6	3408-103	103	1	6.00 dB	1.55	☑
		7	3409-127	127	1	6.50 dB	1.55	
DC-18 GHz	C	1	150T-70	70	10	3.25 dB	1.75	☑
		2	150T-15	15	1	3.50 dB	1.95	☑
		3	150T-75	75	5	3.50 dB	1.95	☑
		4	150T-110	110	10	3.50 dB	1.95	☑
		5	150T-31	31	1	3.75 dB	1.95	☑
		6	150T-62	62	2	3.75 dB	1.95	☑
		7	150T-15 & 150T-110	125	1	5.50 dB	1.95	☑
DC-26.5 GHz	D	1	152AT-70	70	10	4.75 dB	1.95	☑
		2	152T-15	15		5.00 dB	1.95	☑
		3	152T-75	75	5	5.00 dB	1.95	☑
		4	152T-90	90	10	5.00 dB	1.95	☑
		5	152T-90 & 152T-15	105	1	8.00 dB	1.95	☑
DC-40 GHz <i>New</i>	E	1	156-11	11	1	5.00 dB	2.00	☑
		2	156-90	90	10	5.00 dB	2.00	☑
		3	156-11 & 156-90	101	1	7.00 dB	2.00	☑
DC-3 GHz (75 Ω) <i>New</i>	F	1	3456-63	63	1	4.50 dB	1.70	☑
Solid-state								
0.8 to 2.5/3 GHz	J	1	4226-63	63	1	4.75 dB	1.6	
		2	4228-63.75	63.75	0.25	6.00 dB	1.6	
		3	4228-103	103	1	6.00 dB	1.6	
0.01 to 2.5 GHz	K	1	4238-63.75	63.75	0.25	10.00 dB	1.75	
		2	4238-103	103	1	10.00 dB	1.75	
0.01 to 2.5 GHz	L	1	4246-63	63	1	11.00 dB	2.0	
		2	4248-63.75	63.75	0.25	14.00 dB	2.0	
		3	4248-103	103	1	14.00 dB	2.0	
0.2 to 6 GHz	M	1	4205-31.5	31.5	0.5	4.00 dB	1.8	☑
		2	4205-63.5	63.5	0.5	6.00 dB	1.8	☑
		3	4205-95.5	95.5	0.5	8.50 dB	2.0	☑

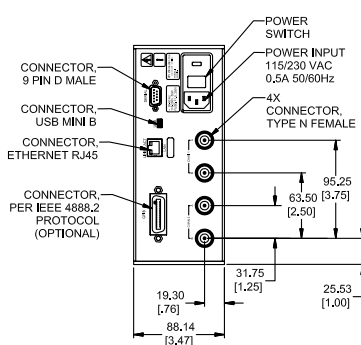
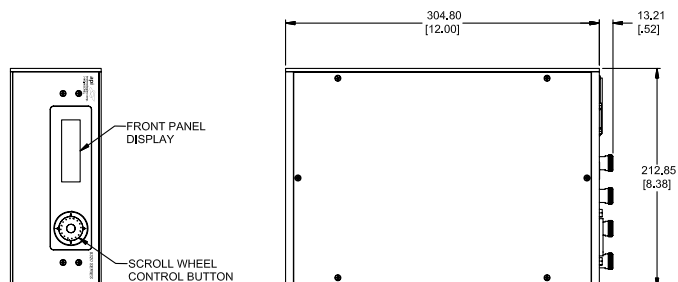
✓ RoHS compliance dependent on attenuator installed. Some attenuators are NOT compliant.

## Physical Dimensions

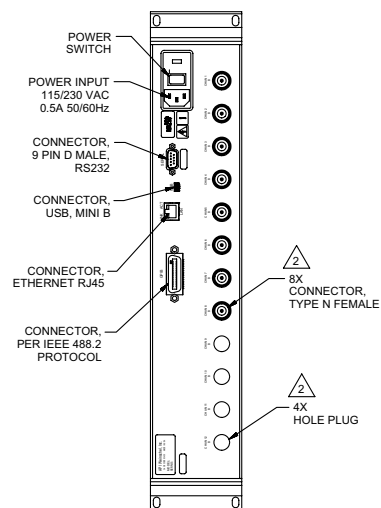
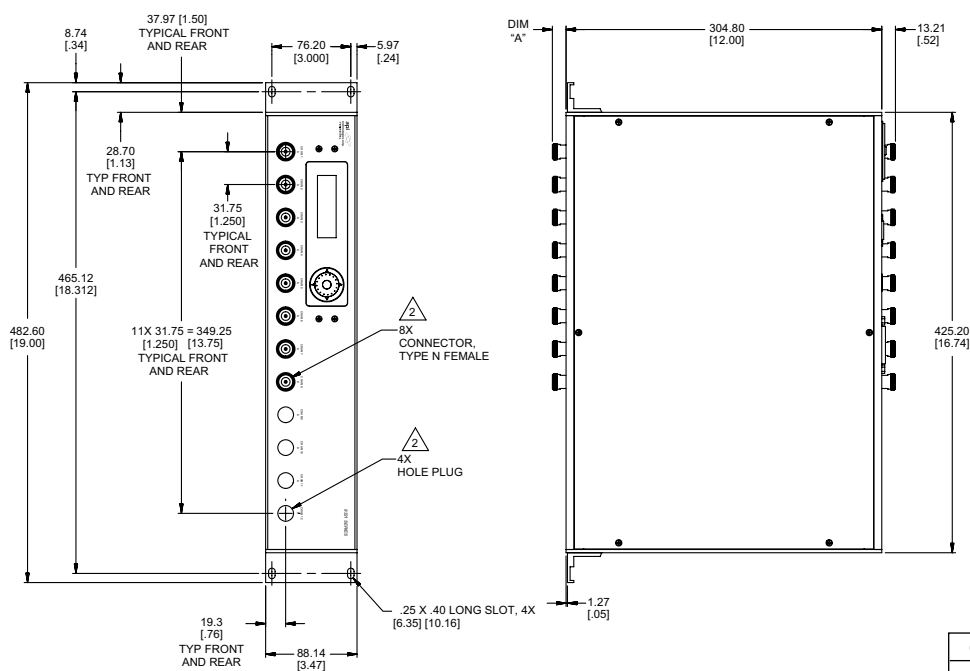
FRONT OPTION:



REAR OPTION:



Standard 19 in Rack Unit up to 12 channels:



Connector Type	DIM A
N	14.7 (0.60)
SMA, SMK (2.92mm)	5.21 (0.21)
F	15.5 (0.61)

NOTE:

1. All dimensions are given in mm (inches).
2. Connectors and hole plugs are installed as required and determined by number of channel in unit. 2 channel shown for Model 8320 and 8 channel unit shown for 8321.
3. Connector location (Front/Rear) may vary depending on model ordered.



## 8304-5, RF Switch Subsystem (Simplified Mobile Radio Testing)

 **RoHS**



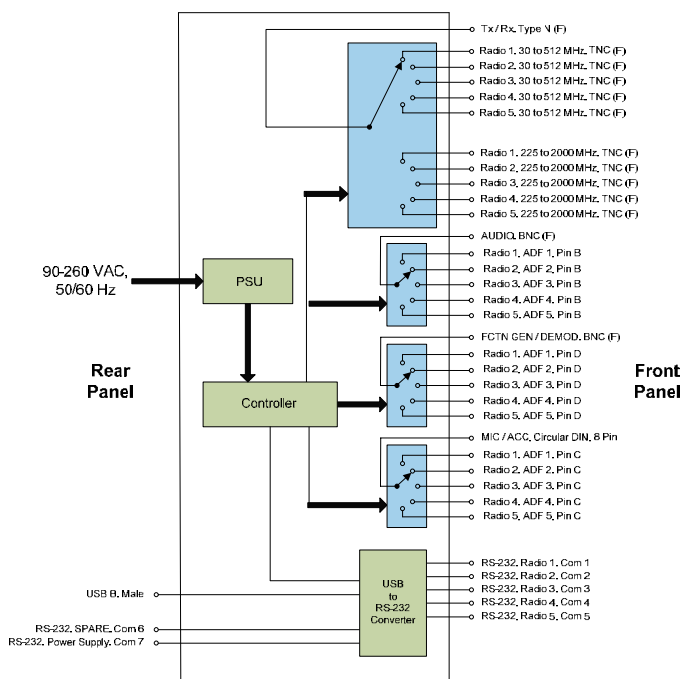
Model 8304-5 RF switching system is part of an automated test set-up for various types of commercial and military radios. The difference in the test set up and configuration between different types of radios will be the control interconnect cables used.

The block diagram below shows the RF switch subsystem which is designed to control and test up to 5 radios at a time. This subsystem acts as an interface and is connected to a Model 3901 digital radio test set (customer provided) to enable the total system to automatically connect signals to 5 radios. The RF signals are routed through an internal electro-mechanical switch. The digital radio test set is used as the controller, signal stimulus and measurement instrument.

All switching selection occurs via the USB control port located on the rear panel of the Model 8304-5. The RF switching system is an RF subsystem that utilizes an internal micro-computer to provide control of the switches and relays via the USB to serial interface.

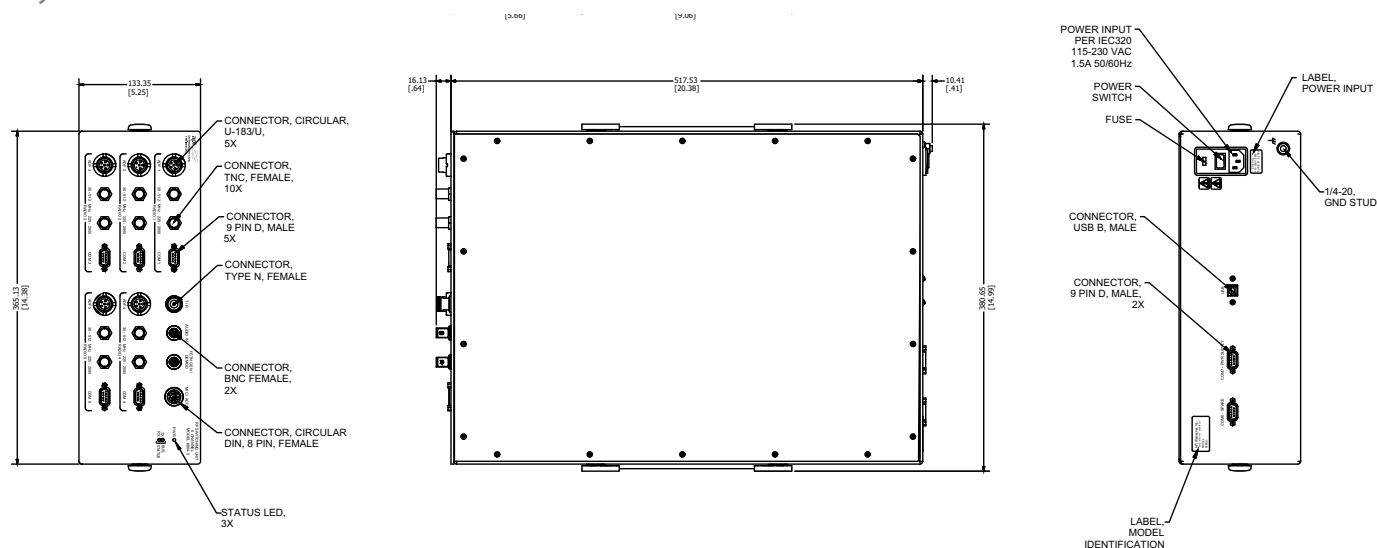
### Features

- /// DC - 2 GHz Frequency Range
- /// 50 Ohm Impedance
- /// 5 Radio Interfaces
- /// RS-232 Control



**Simplified Block Diagram**

### Physical Dimensions:



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

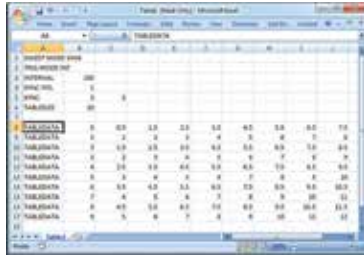
**EXPORT CONTROL:** This product is controlled for export under the International Traffic in Arms Regulations (ITAR). A license from the U.S. Department of State is required prior to the export of this product from the United States.

**EXPORT WARNING:** Military and space products are controlled for export under the International Traffic in Arms Regulations (ITAR) and may not be sold or proposed or offered for sale to certain countries. (See ITAR 126.1 for complete information.)

# Programmable Attenuation Profile Simulator Unit, Model 8334



**RoHS**



## Features

- /// Programmable attenuation update rates from 50  $\mu$ sec. per point to 1 second per point in 50  $\mu$ sec. intervals
- /// External TTL trigger (with programmable polarity) allows for synchronization with other external hardware
- /// Various TTL status outputs (running, programmable sync, and interval update) for monitoring a profile
- /// Supplied with industry standard communication interfaces:
  - RS-232 (Serial)
  - Ethernet Control (10/100 BaseT)
  - USB 2.0
- /// Rack configurable, rack ears are supplied

## Applications

Applications for the 8334 series include:

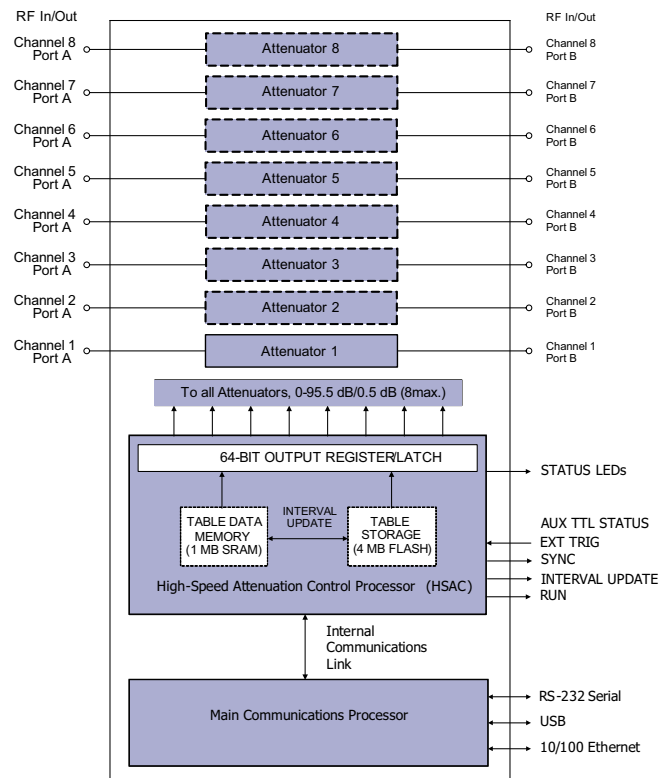
- /// Simulate path loss on each channel or mobility scenarios between a handset and multiple base stations
- /// Create arbitrary, synchronous attenuation profiles with timing skews of <10  $\mu$ sec. between channels to replicate precision fading and handover scenarios
- /// Generate coherent, multi-channel pulsed RF outputs for a given attenuation level

## Description

8334 Series of attenuation profile simulators provide multi-channel high-speed attenuation control with synchronous output update capability. The unit allows for programming of up to 128K (131072) attenuation data points per attenuator and sweeping through those data points at user-programmable intervals from 50  $\mu$ sec to 1 sec per point. The system provides for non-volatile storage of up to four data point tables which may be later recalled under user control. Status and control TTL signals are available for external monitoring and sweep control via a rear-panel DE9 connector.

The 8334 series are multi-channel configurations housed in 19 inch enclosures and can be configured for up to 8 attenuation simulator channels with front, rear or through (front to rear) RF signal routing.

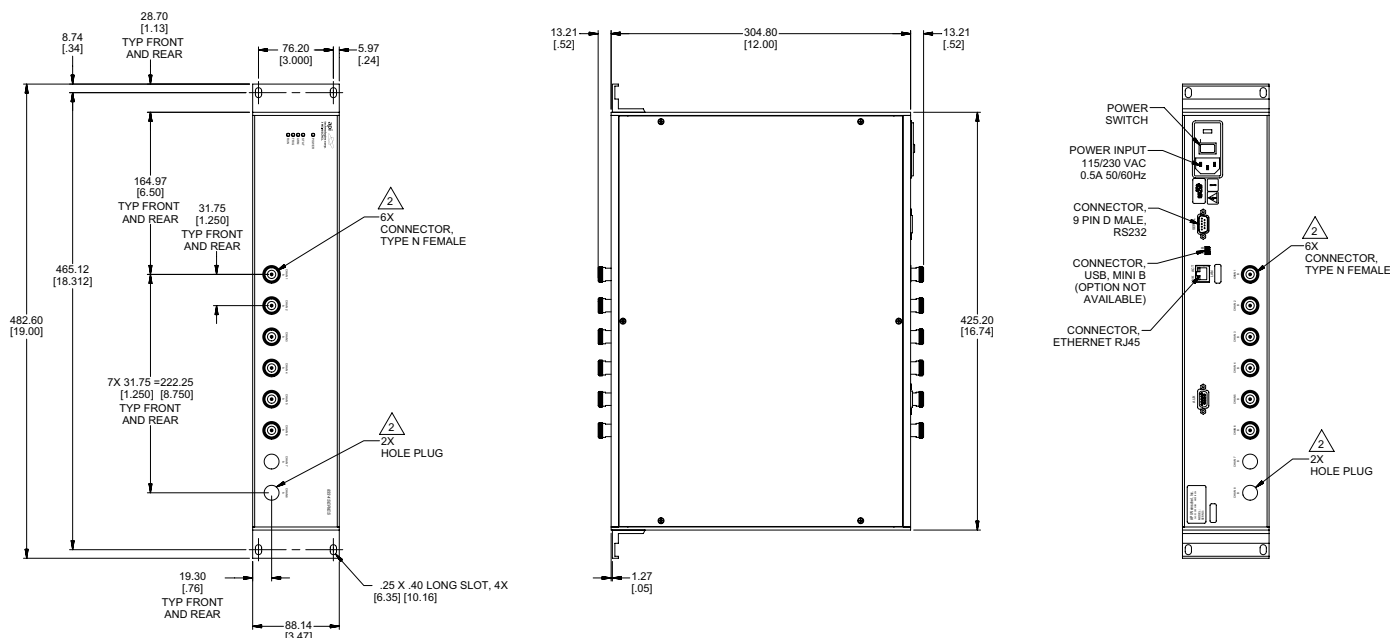
Weinschel also provides custom subsystems where a variety of test configurations can be incorporated within a single unit. Contact us with your specialized needs.



**Simplified 8 Channel Block Diagram**

## Physical Dimensions

Standard 19 in Rack Unit (Up to 8 channels):



**NOTE:**

1. All dimensions are given in mm (inches).
2. Connectors and hole plugs are installed as required and determined by number of channel in unit. Six channel unit shown.
3. Connector location (Front/Rear) may vary depending on Model ordered.

## 8334 - M3 - XX - XN

Basic  
Model  
Number

Attenuator  
Designator

Number of  
Channels  
(01 to 08)



Connector Type  
N = N Female

Example: 8334-M3-08-TN

Connector Location  
F = Front \*  
R = Rear \*  
T = Thru

\* up to 6 Channel units available for option F & R.

### Solid-state (Only)

Frequency Range		Attenuator Designation		Attenuator Model	Range (dB)	Step Size (dB)	Insertion Loss (maximum)	VSWR (maximum)	 RoHS
0.2 to 6 GHz		M	3	4205-95.5	95.5	0.5	8.50 dB	2.0	

✓ RoHS compliance dependent on attenuator installed. Some attenuators are NOT compliant.

# Model 8351, High Power Fixed Attenuator Unit

## Internal Temperature Monitoring/Reporting



### Features

- /// Sensors indicate the maximum allowed input power into each channel
- /// Thermal monitoring of each channel reported through USB 2.0 and Serial communication interface
- /// Multi-channel fixed attenuation paths (up to 6 channels)
- /// Extremely low VSWR
- /// Frequency range from DC to 6 GHz minimum
- /// Power handling up to 400 watts C.W. per channel
- /// Standard communication interfaces:
  - USB 2.0
  - RS-232 (Serial)
- /// 3 light LED front panel status indicator
- /// LabView based attenuator monitor software included
- /// Rack configurable (rack mount ears are supplied) for a standard 19" rack configuration

### Applications

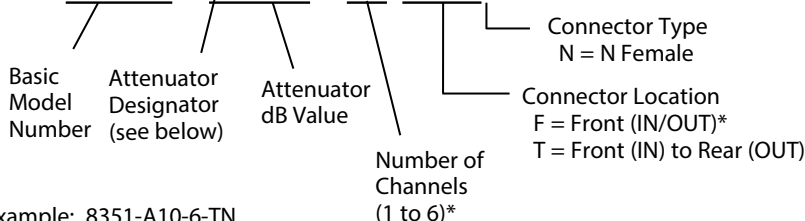
Applications for the 8334 series include:

- /// 4G LTE base station testing
- /// Distributed Antenna Systems (DAS)
- /// Military radio testing
- /// High power amplifier testing

Model 8351 series of high power fixed attenuator units offers a compact, rack mount solution to monitor up to 6 channels of Weinschel high power fixed attenuators for bench testing, sub-system, and system applications. The standard Model 8351 series designs operate over the DC to 6 GHz frequency range, with power handling up to 400 watts C.W.

### Model Number Configuration Matrix

**8351 - A XX - X - XN**



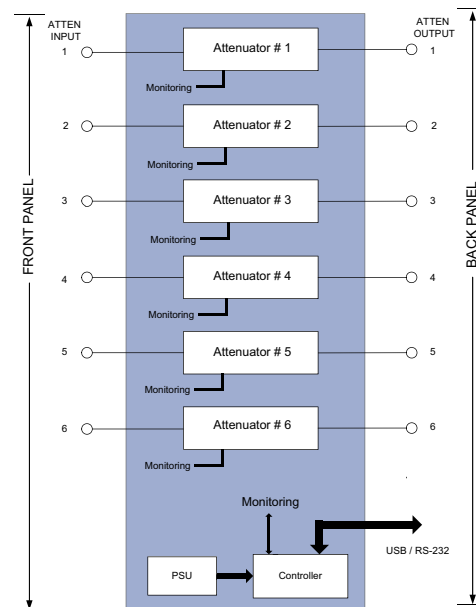
Example: 8351-A10-6-TN

\* up to 3 channels for Option F (Front)

Model 8351 series features Weinschel conduction cooled (flat pack) attenuators, mounted on an internal heat sink and are cooled with 2 automatic, variable speed fans based upon internal temperature monitoring. This series can be configured with front mounted Type N connectors (IN/OUT) for up to 3 channels, or front to rear Type N connectors for up to 6 channels.

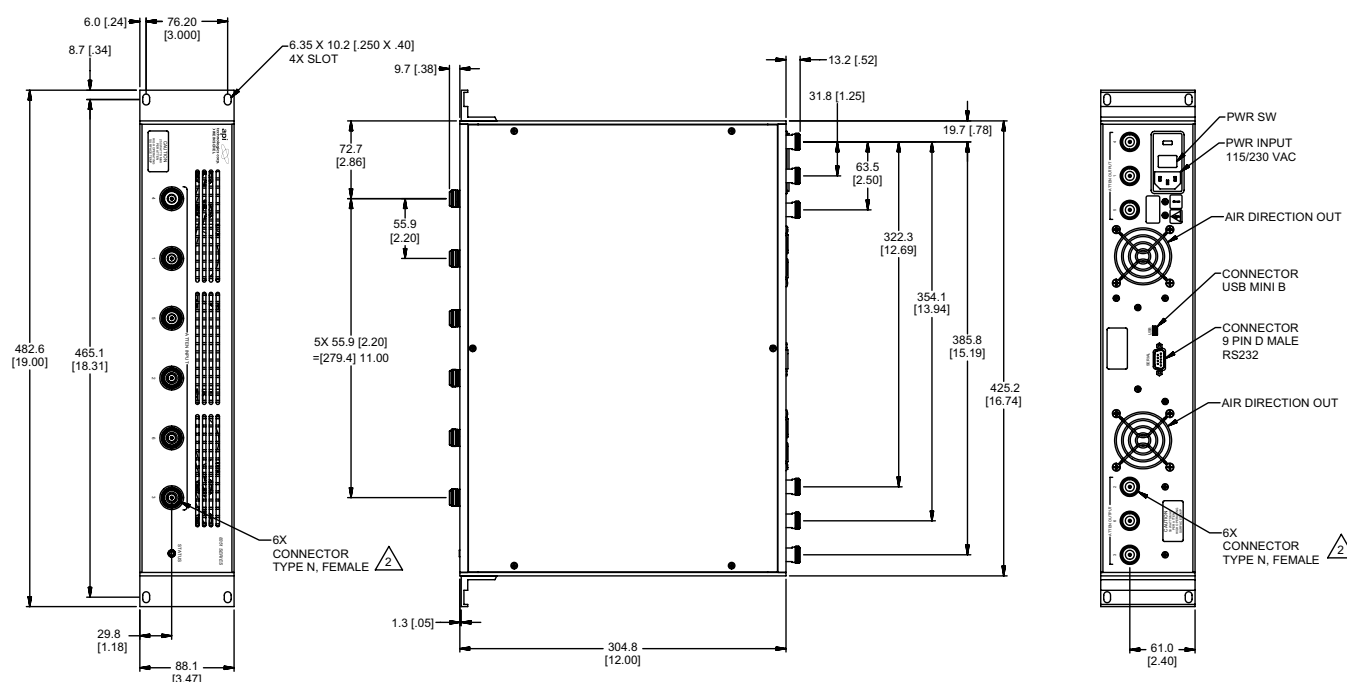
LabVIEW™ based attenuator monitor software is included for the monitoring of the internal power sensors via USB 2.0 or RS-232 communication interfaces.

Weinschel also provides custom configurations where multiple dB values / high power requirements can be incorporated within a single unit. Contact us with your specialized needs.



**Simplified 6 Channel Block Diagram**

## Physical Dimensions



### NOTE:

1. All dimensions are given in mm (inches).
2. Connectors and hole plugs are installed as required and are determined by the number of channels in the unit. 6 channel shown.
3. Connector location (Front/Rear) may vary depending upon the Model ordered.

## Attenuator Designations & Specifications

Channel Specifications										
Frequency Range	Attenuator Designation		Attenuator Model	Attenuation (dB)	Deviation (+dB)	VSWR IN (maximum)		VSWR OUT (maximum)	Maximum Power** (Watt)	RoHS
						2.5 GHz	2.5-6 GHz			
DC-6 GHz	A	10	268-10-33	10	1	1.1	1.15	1.35	100	✓
		20	268-20-33	20	1	1.1	1.15	1.35	100	✓
		30	268-30-33	30	1	1.1	1.15	1.35	100	✓
		40	268-40-33	40	1	1.1	1.15	1.35	100	✓
DC-6 GHz	B	10	257-10-33	10	1	1.1	1.15	1.35	250	✓
		20	257-20-33	20	1	1.1	1.15	1.35	250	✓
		30	257-30-33	30	1	1.1	1.15	1.35	250	✓
		40	257-40-33	40	1	1.1	1.15	1.35	250	✓
DC-6 GHz	C	10	258-10-33	10	1.50	1.1	1.15	1.35	400	✓
		20	258-20-33	20	1.50	1.1	1.15	1.35	400	✓
		30	258-30-33	30	1.75	1.1	1.15	1.35	400	✓
		40	258-40-33	40	1.75	1.1	1.15	1.35	400	✓

✓ RoHS compliance dependent upon attenuator installed.

\*\* Maximum input power is derated in certain cases, depending upon the ambient temperature and the number of active channels.



# Programmable Phase Shifter Units, Models 8420 & 8421



**RoHS**



Model  
8421



Model  
8420

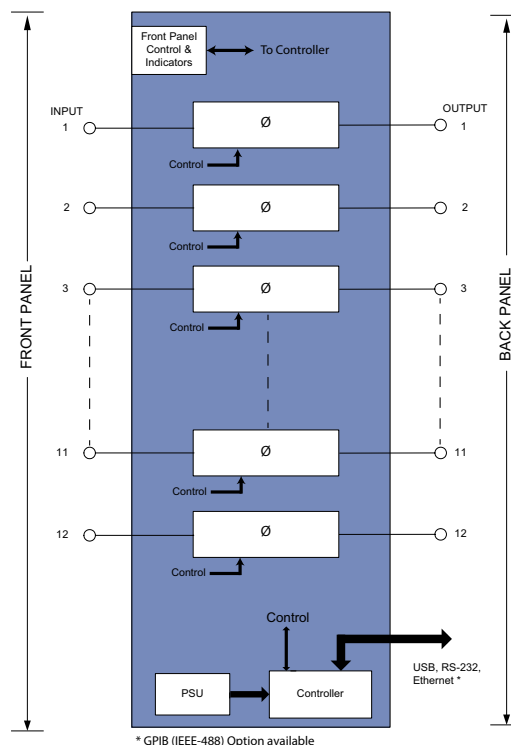
Model 8420 and 8421 series represent a new, streamlined approach in signal phase shift control for bench test and subsystem applications. This series is designed to house and control the new Weinschel programmable phase shifter series via front panel controls, Ethernet, USB and Serial communications interfaces. A GPIB (IEEE-488) interface is also available as an option.

The 8420 series are single or dual channel configurations housed in half rack enclosures. The 8421 series are multi-channel configurations housed in 19 inch enclosures and can be configured for up to 12 channels. Both series can be configured for front or rear and through (front to rear) is only available for 8421 Series.

Weinschel also provides custom subsystems where a variety of test configurations can be incorporated within a single unit. Contact us with your specialized needs.

## Control Software Included

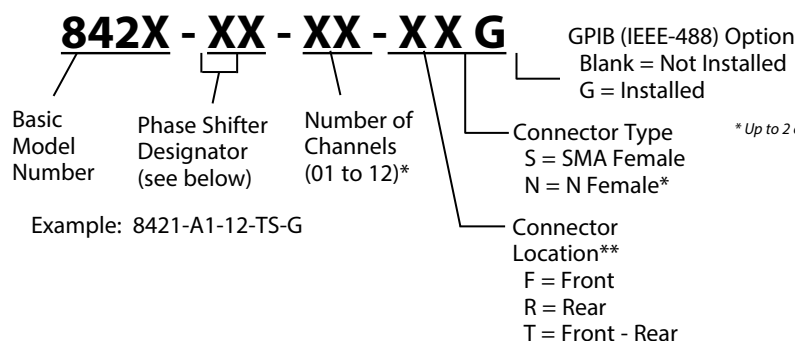
Weinschel's LabVIEW™ based Control Center Software can be used in conjunction with the operation of the this series of programmable phase shifter units and allows the user to setup, control and perform test and measurements over standard communication interfaces such as RS-232, USB, Ethernet or optional GPIB (IEEE-488).



\* GPIB (IEEE-488) Option available

**Simplified 12 Channel Block Diagram**

## Model Number Configuration Matrix



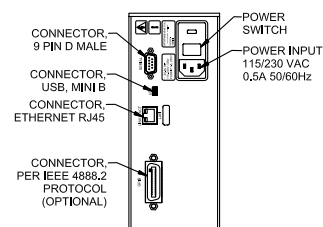
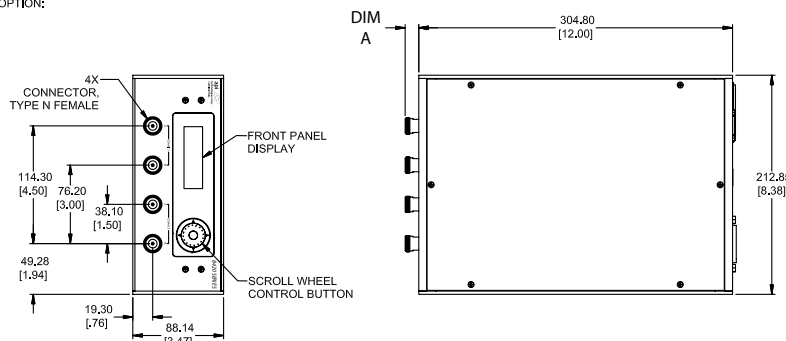
Electro-mechanical							
Frequency Range	Phase Shifter Designation		Phase Shifter Model	Range (°)	Step Size (dB)	Insertion Loss (maximum)	VSWR (maximum)
DC to 6 GHz	A	1	984-1	0 - 630	10°	6.0 dB	1.6

RoHS compliance dependent on phase shifter installed. Some designs are NOT compliant.

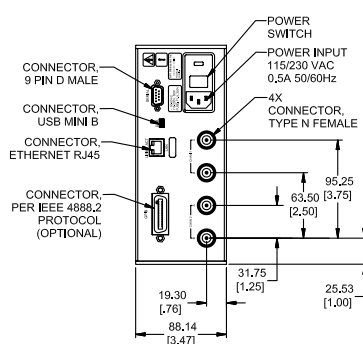
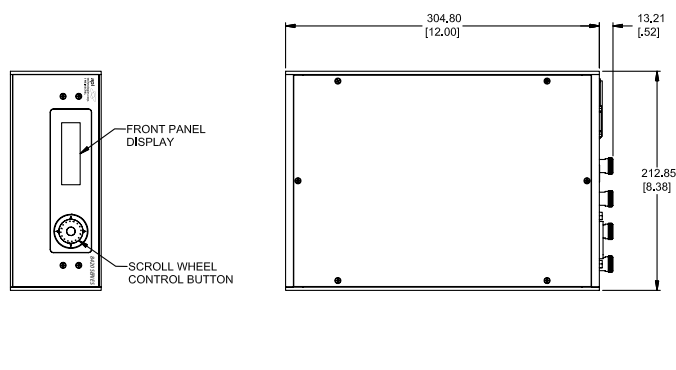
## Physical Dimensions

### Model 8420, Half Rack Unit, 1 or 2 Channels:

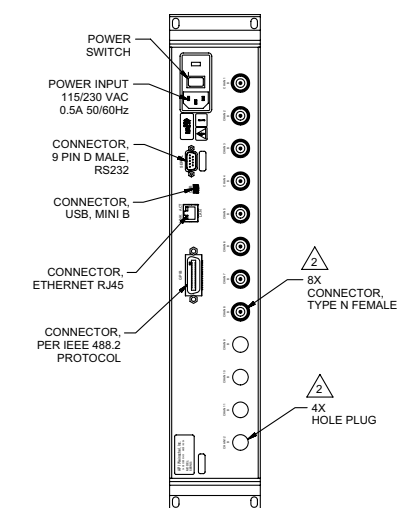
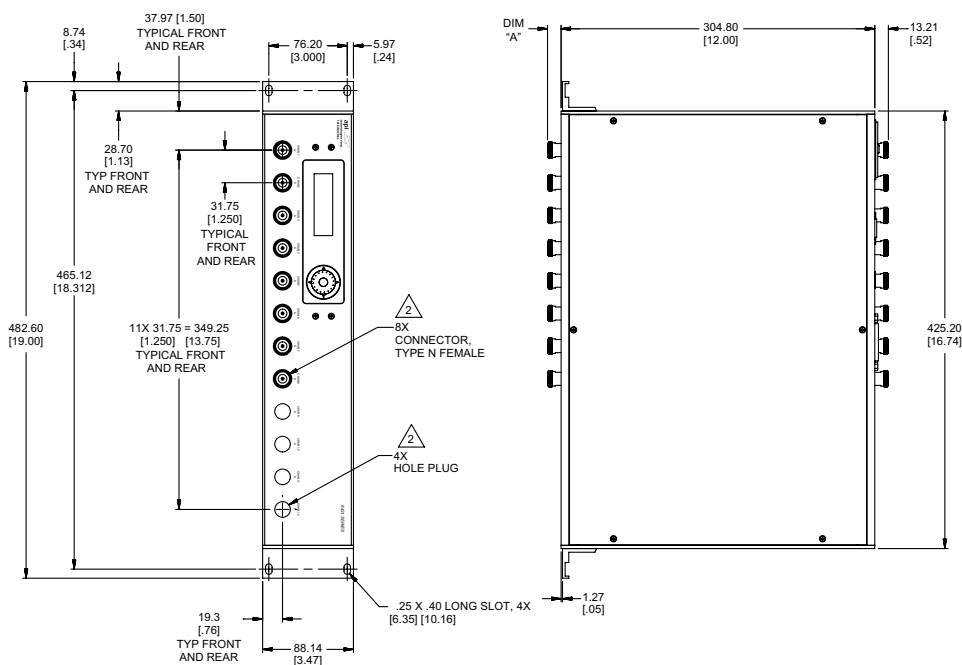
FRONT OPTION:



REAR OPTION:



### Model 8421, Standard 19 in Rack Unit up to 12 channels:



Connector Type	DIM A
N	14.7 (0.60)
SMA	5.21 (0.21)

NOTE:

- All dimensions are given in mm (inches).
- Connectors and hole plugs are installed as required and determined by number of channel in unit. 2 channel shown for Model 8420 and 8 channel unit shown for 8421.
- Connector location (Front/Rear) may vary depending on model ordered.

# Programmable Switch Unit, Model 8512

 **RoHS**



## Features

- /// Configurable with up to 14 each, SP3T, SP4T, SP5T or SP6T switches.
- /// Front panel local control and display make it ideal for lab and manual test environments.
- /// Up to 26.5 GHz operating frequency range.
- /// Integrated switch cycle counter.
- /// Failsafe (break-before-make) & latching (make-before-break) switching functionality available.
- /// Easily expandable - additional switches can be quickly installed by the customer.
- /// Low insertion loss and high isolation.
- /// Supplied with industry standard communication interfaces:
  - Ethernet (10/100 BaseT)
  - USB 2.0
  - RS-232 (Serial)
  - GPIB/IEEE-488 optional
- /// LabVIEW™ based Switch Control Software included.
- ☐ Compact 2 RU, 19" rack mount configuration. Other configurations available.

## Applications

- /// Wi-Fi, WiMAX, 4G LTE base station testing.
- /// Signal routing from multiple instruments to single or multiple DUTs.
- /// Production testing - Multiple tests can be performed using the same test setup.
- /// ATE and STE applications requiring configuration flexibility.

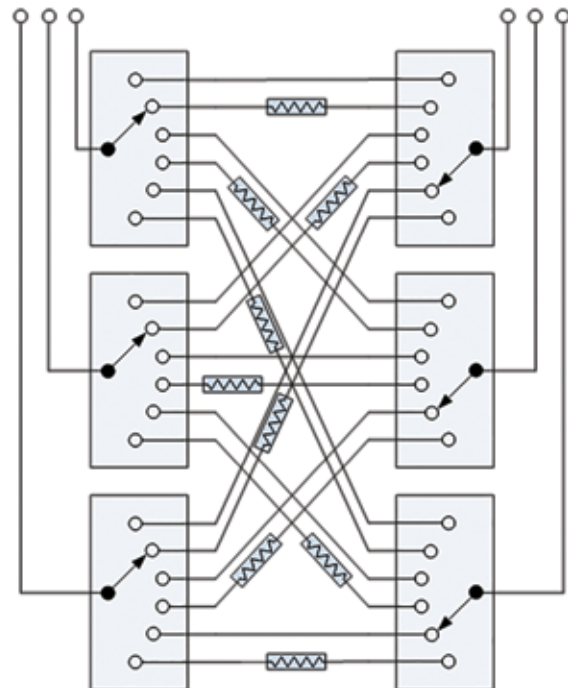
## Control Software Included

Weinschel LabVIEW™ based Switch Control Center Software (SCCS) is to be used in conjunction with the operation of the Weinschel 8512 series of programmable switch units. The SCCS will allow the user setup, control and perform tests and measurements using these programmable switch units over standard communication interfaces.

Model 8512 series of programmable switch units offer a compact, expandable, rack mount solution for a variety of test, subsystem, and system applications. The Model 8512 series operates over the DC to 18/26.5 GHz frequency range, with SP3T to SP6T configurations with up to 14/6 switches respectively. Ethernet, USB, and RS-232 control interfaces are standard, along with LabVIEW™ based control software. A GPIB/IEEE-488 interface is also available as an option.

Using the Switch Control Center Software supplied with each unit, the user can quickly set up and operate the unit's switches independently, or using the Configure Virtual Switch option, create custom "tree" or "matrix" configurations by assigning input, output, and path labels as required.

Weinschel also provides custom configurations where a variety of configurations can be incorporated within a single unit. Contact us with your specialized needs.



**Redundant 3 x 3 matrix with fixed attenuators in the redundant paths as an example of an 8512-06-XX application.**

## Model Number Configuration Matrix

# 8512 - XX - XX - XG

Basic  
Model  
Number

Switch  
Designation  
(See Table)

Number of  
Switches  
Installed  
(01 to 14)\*

GPIO (IEEE-488) Option  
Blank = Not Installed  
G = Installed

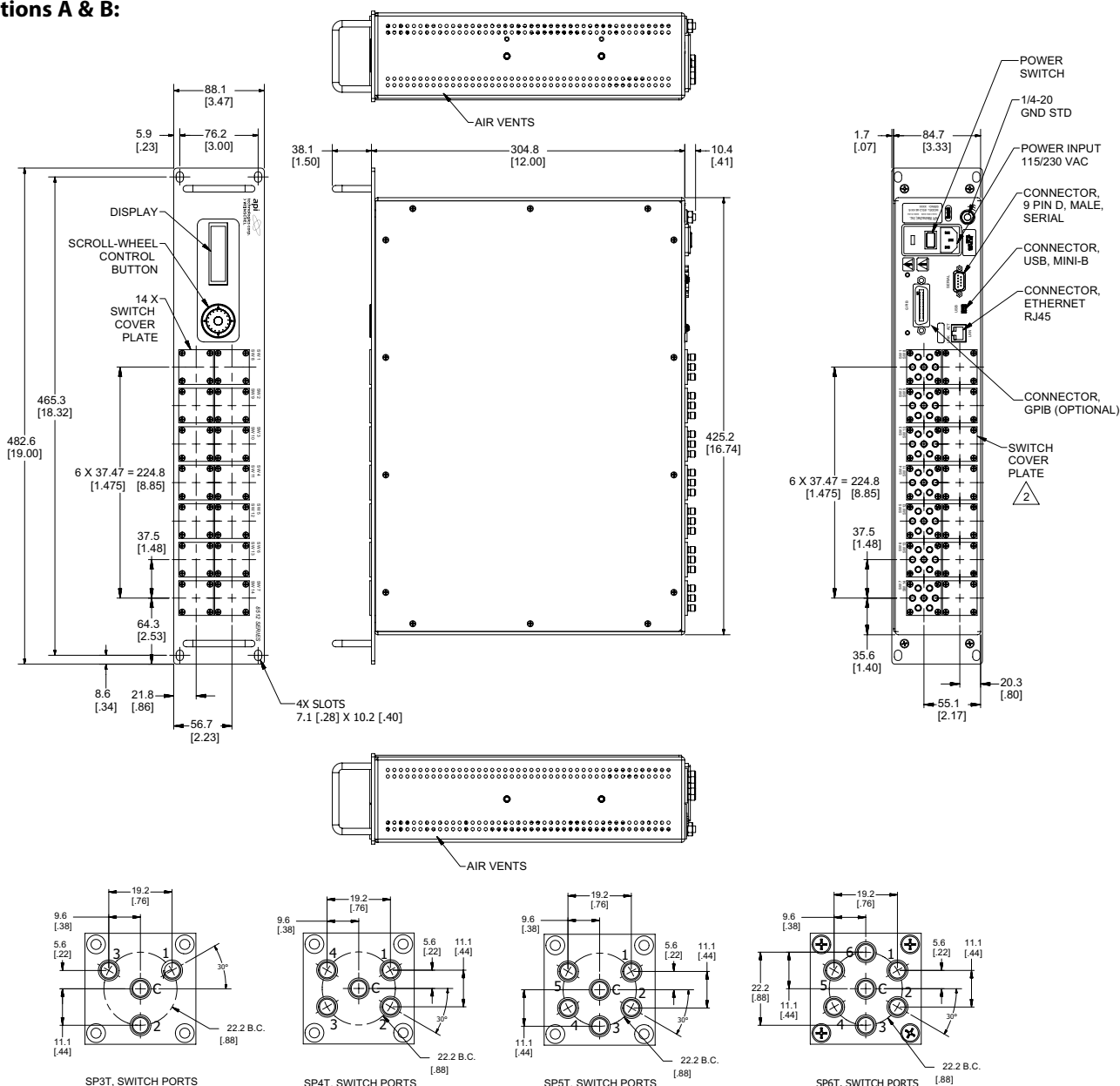
Connector Location  
F = Front  
R = Rear

\* Up to 6 channels for option C

Example: 8512-A6-07-F

## Physical Dimensions

### Options A & B:



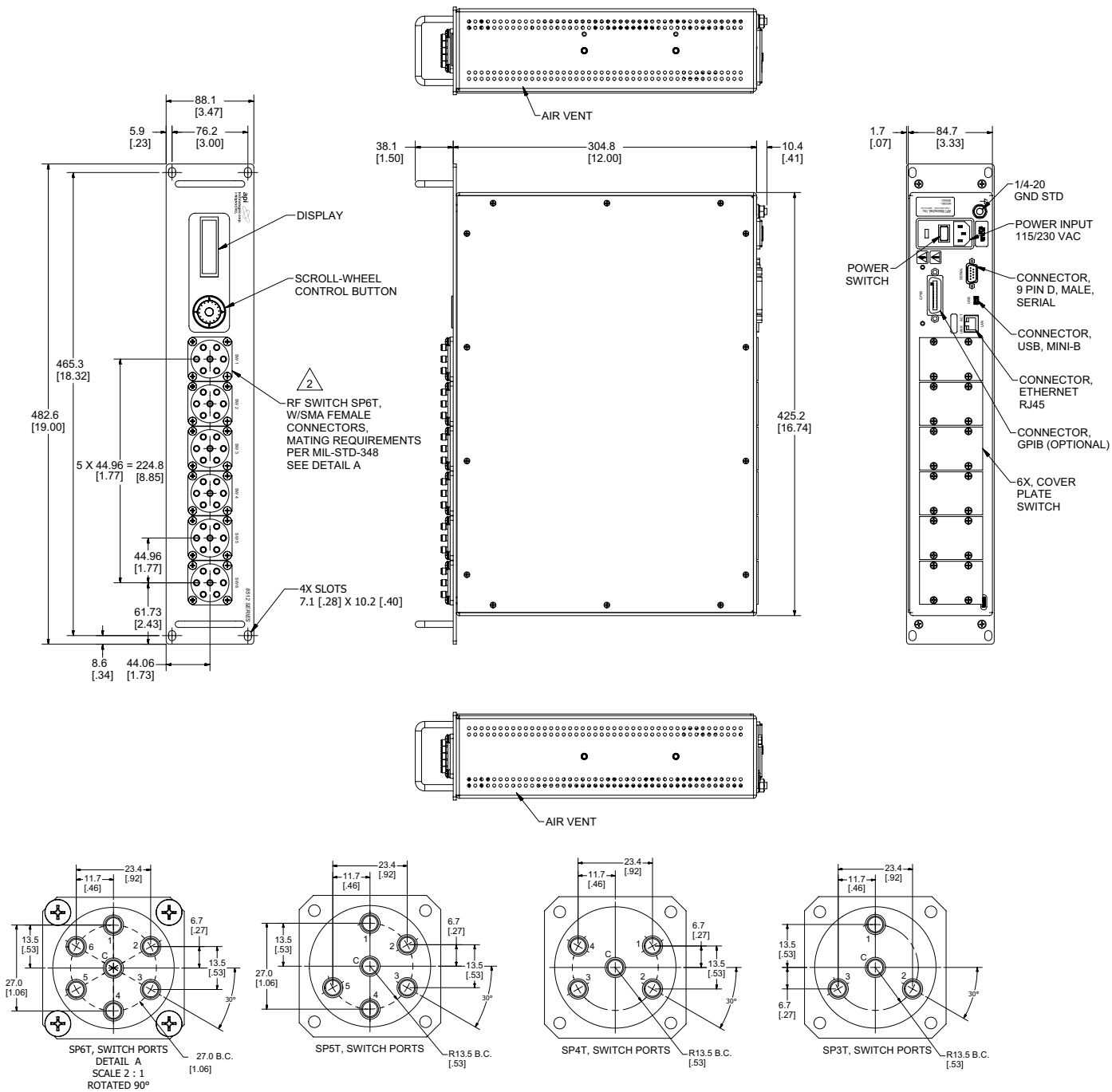
### NOTE:

- All dimensions are given in mm (inches).
- RF switches and switch plates as required and determined by configuration. Seven switch unit configuration shown.

Electro-mechanical		
Switch Description	Switch Designation	# of Positions
DC-18 GHz, Failsafe to open, Make Before Break, SMA Female	A	3 SP3T
		4 SP4T
		5 SP5T
		6 SP6T
DC-18 GHz, Latching, Make Before Break, SMA Female	B	3 SP3T
		4 SP4T
		5 SP5T
		6 SP6T
DC-26.5 GHz, Failsafe to open, Break Before Make, SMA Female	C	3 SP3T
		4 SP4T
		5 SP5T
		6 SP6T

## Physical Dimensions

### Options C:



#### NOTE:

1. All dimensions are given in mm (inches).
2. RF switches and switch plates as required and determined by configuration. Six switch unit configuration shown.

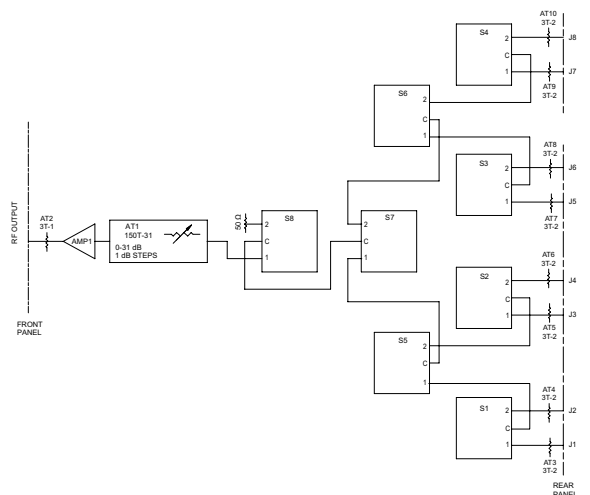


## Model 8390 & 8390-1 Amplifier / Switch Units



Models 8390 and 8390-1, amplifier / switch unit is comprised of an array of eight input switches (S1-S8), a relay-based step attenuator that provides 0-31 dB of attenuation in 1 dB steps and an output RF amplifier. Switch, S8 is terminated with a 50  $\Omega$  termination at port 2. Each input/output port contains a masking pad. The unit includes a front-panel interface for status and control, and supports programming via a serial RS232 port and/or 10/100 BaseT Ethernet port.

- /// Choice of frequency ranges:
  - Model 8390: 3.4 to 4.2 GHz
  - Model 8390-1: 0.95 to 13 GHz
- /// Can be rack mounted into any rack or cabinet designed per EIA RS-310 or MIL-STD-189.

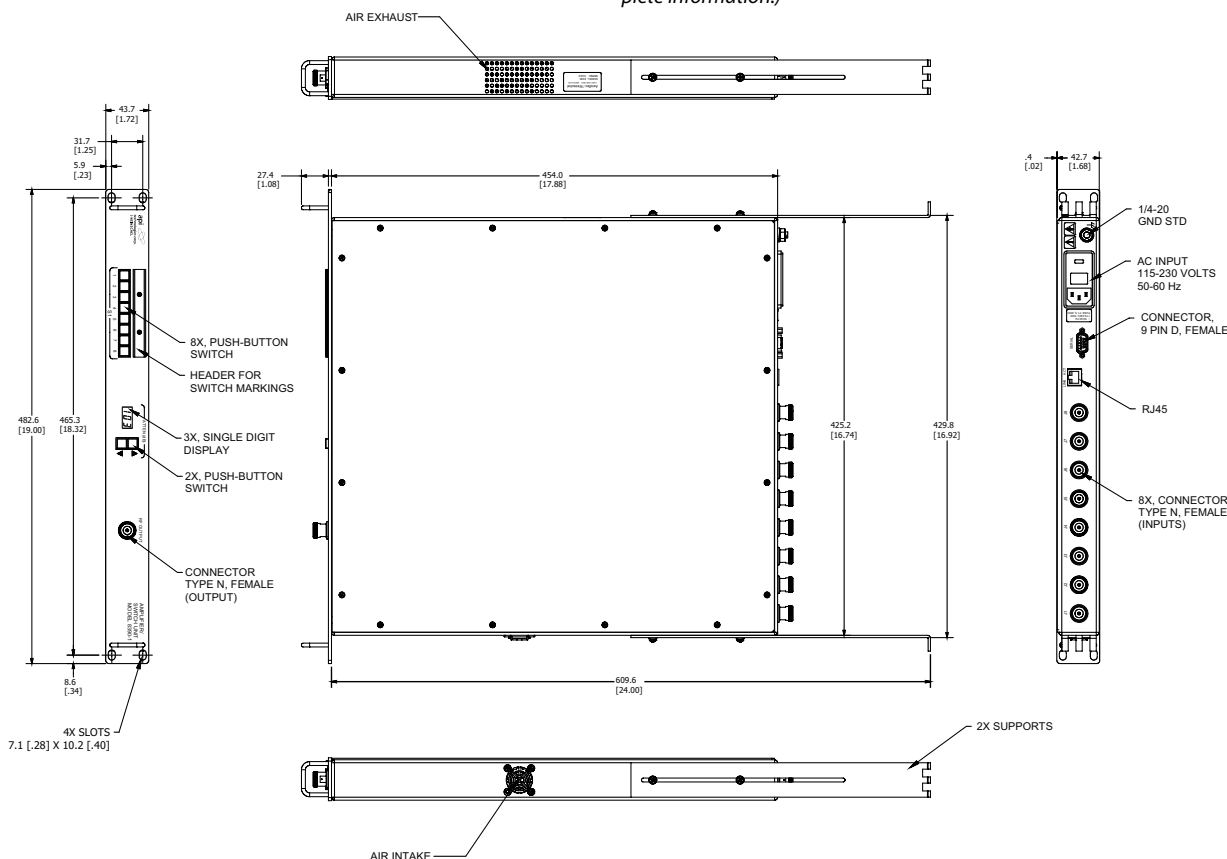


### Simplified Block Diagram

**EXPORT CONTROL:** This product is controlled for export under the International Traffic in Arms Regulations (ITAR). A license from the U.S. Department of State is required prior to the export of this product from the United States.

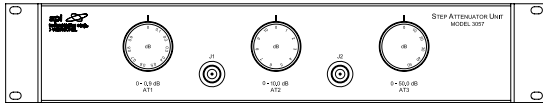
**EXPORT WARNING:** Military and space products are controlled for export under the International Traffic in Arms Regulations (ITAR) and may not be sold or proposed or offered for sale to certain countries. (See ITAR 126.1 for complete information.)

### Physical Dimensions



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

## Precision Step Attenuator Unit, Model 3057



Model 3057 series of precision step attenuators are designed for use in automatic test equipment and OEM systems operating in the DC to 1.5 GHz frequency range. This design contains three Weinschel manual step attenuators connected in series to provide 0 to 50 dB of attenuation with 0.1, 1.0 and 10.0 dB of resolution.

- /// Wide dynamic range - Up to 50 dB of attenuation with 0.1 dB resolution.
- /// Excellent repeatability.
- /// Highly accurate detent stepping
- /// Compact 2 RU, 19" rack mount configuration.

### Specifications

**NOMINAL IMPEDANCE:** 50  $\Omega$   
**FREQUENCY RANGE:** dc to 1.5 GHz  
**ATTENUATION RANGE:** 0 to 50 dB  
**RESOLUTION:** 0.1 dB, 1.0 dB, 10.0 dB  
**Attenuation Accuracy:** 0 - 0.9 dB:  $\pm 0.1$  dB  
 1.0 - 50 dB:  $\pm 0.2$  dB  
**INSERTION LOSS:** 1.5 dB maximum  
**VSWR:** 1.3:1 maximum  
**REPEATABILITY:** 0.02 dB  
**MAXIMUM POWER RATING:** 1 watt  
**TEMPERATURE RANGE:**  
 Operating: 0°C to +54°C  
 Nonoperating: -54°C to +54°C

## Low Passive Intermodulation Fixed Attenuators & Terminations

Weinschel announces a new line of Low Passive Intermodulation (PIM) coaxial fixed attenuators and terminations. These designs offer models with power handling up to 175 watts with PIM levels, 3rd order IM magnitude (IM3) down to -120 dBc to -150 dBc.

- /// Low PIM design
- /// Quality connectors with special high temperature support beads
- /// Rugged construction, free of solder joints.



Models  
298 / 1492



Models  
254 / 1479



Model  
264

### Fixed Attenuators

Model No.	Connector Type	Frequency Range (GHz)	Average Power (W)	Standard Attenuation Values (dB)	SWR (maximum)
264-XX-XX	SMK (2.92mm) / N	DC-8.5	50	10, 20, 30, 40	1.20-1.30*
298-XX-XX	SMK (2.92mm) / N	DC-6.0	100	10, 20, 30, 40	1.10-1.15*
254-XX-XX	SMK (2.92mm) / N	DC-6.5	175	10, 20, 30, 40	1.10-1.20*

### Terminations & Loads

Model No.	Connector Type	Frequency Range (GHz)	Average Power (W)	SWR (max.)
1491-X	SMK (2.92mm) / N	DC-8.5	50	1.20-1.30*
1492-X	SMK (2.92mm) / N	DC-6.5	100	1.20
1479-X	SMK (2.92mm) / N	DC-6.5	175	1.10-1.20*



Model  
1491

Notes: 1. \* = VARIES WITH FREQUENCY.  
 2. Connector Option:  
 1 (SMK female)  
 2 (SMK male)  
 3 (N female)  
 4 (N male)

### Model Number Configuration Matrix

**264 - XX - XX**

Basic  
Model  
Number

Attenuation  
Value (dB)

Connector Options  
1st digit is input side  
2nd digit is output side

## Conduction Cooled (Flat-Pack) Fixed Attenuators & Terminations

Weinschel line of conduction cooled flat-pack coaxial fixed attenuators and terminations is expanding to include new models covering the DC to 10 GHz frequency range. These products offer several models with power handling up to 550 watts.

- /// Precision connectors with high temperature support beads
- /// Designed to meet environmental requirements of MIL-DTL-3933
- /// 10 Kilowatts peak, conduction cooled
- /// Low Intermodulation (LIM) distortion option available on select models
- /// Wireless applications - Optimized for use in the communications bands



### Fixed Attenuators

Model No.	Connector Type	Frequency Range (GHz)	Average Power (W)	Peak Power (kW)	Standard Attenuation Values (dB)	SWR <sup>1</sup> (max.)
253-XX-XX**	SMK (2.92mm) / N	DC-6.0	550	10	10, 20, 30, 40	1.10-1.20*
257-XX-XX**	SMK (2.92mm) / N	DC-6.0	250	10	10, 20, 30, 40	1.10
258-XX-XX**	SMK (2.92mm) / N	DC-6.0	400	10	10, 20, 30, 40	1.10-1.25*
268-XX-XX**	SMK (2.92mm) / N	DC-6.0	100	10	6, 10, 20, 30, 40	1.10-1.15*
275-XX-XX	SMK (2.92mm)	DC-40.0	5	0.2	3, 6, 10, 20, 30	1.25-1.45*
284-XX-XX**	SMK (2.92mm) / N	DC-10.0	50	5	3, 6, 10, 20, 30, 40	1.15-1.30*
285-XX-XX**	SMK (2.92mm) / N	DC-10.0	100	10	10, 20, 30, 40	1.10-1.50*
286-XX-XX**	SMK (2.92mm) / N	DC-10.0	150	10	10, 20, 30, 40	1.10-1.50*
287-XX-XX**	SMK (2.92mm) / N	DC-10.0	200	10	10, 20, 30, 40	1.10-1.20*

Notes: 1. \* = VARIES WITH FREQUENCY.  
2. \*\* = Low Intermodulation available  
3. Connector Option: 1 (SMK female)  
2 (SMK male)  
3 (N female)  
4 (N male)

### Model Number Configuration Matrix

**253 - XX - XX - LIM**

Basic Model Number      Attenuation Value (dB)      Connector Options  
1st digit is input side  
2nd digit is output side

\* Add -LIM for Low Intermodulation option.

### Terminations & Loads

Model No.	Connector Type	Frequency Range (GHz)	Average Power (W)	Peak Power (kW)	SWR <sup>1</sup> (max.)
1470-X**	SMK (2.92mm) / N	DC-6.0	100	10	1.20
1471-X**	SMK (2.92mm) / N	DC-6.0	250	10	1.20
1472-X**	SMK (2.92mm) / N	DC-6.0	400	10	1.20
1473-X**	SMK (2.92mm) / N	DC-6.0	550	10	1.20
1474-X**	SMK (2.92mm)	DC-40.0	5	0.2	1.25-1.45*
1476-X	SMK (2.92mm) / N	DC-10.0	50	5	1.15-1.30*
1482-X**	SMK (2.92mm) / N	DC-10.0	100	10	1.20
1483-X**	SMK (2.92mm) / N	DC-10.0	150	10	1.20
1484-X**	SMK (2.92mm) / N	DC-10.0	200	10	1.20

Notes: 1. \* = VARIES WITH FREQUENCY.  
2. \*\* = Low Intermodulation available. Add -LIM to Model number  
3. -X = Connector Option: -1 (SMK female), -2 (SMK male), -3 (N female), -4 (N male)



# High Reliability Attenuators (DC to 18 / 40 GHz)

Since 1952, Weinschel has supplied high quality precision coaxial attenuators and terminations to test and calibration labs throughout the world. These products offer rugged construction, frequency ranges up to 40 GHz, many standard dB values and power handling to 1,500 Watts.

Weinschel has released the Model 32K, DC to 40 GHz, 2 watt high reliability fixed coaxial attenuator designed specifically for space applications. The Model 32K is available with SMK connectors in dB values of 3, 6, 10, 20 and 30. Other features include 1.25-1.45 maximum SWR,  $\pm 1.00$ -1.50 dB deviation, quality connectors, and an operating temperature range of -55 °C to +100 °C.

Also being introduced is a line of hi-reliability fixed attenuators (Models 272-274, 276) specifically designed as commercial alternative to MIL-DTL-3933 CLASS IIW/I/VE, N/S (N=Non-Screened, S=Screened) attenuators. These units are designed to meet the MIL-DTL-3933 requirements.



Model No.	Connector Type	Frequency Range (GHz)	Average Power (W)	Peak Power (kW)	Standard Attenuation Values (dB)	SWR <sup>1</sup> (max.)
32K	SMK (f-m)	DC-40.0	2	0.50	3, 6, 10, 20, 30	1.25-1.45
272-XX-N/S	N (f-m)	DC-18.0	2	0.5	1- 10, 20, 30, 40	1.12-1.20
273-XX-N/S	SMA (f-m)	DC-18.0	2	0.5	0-10 in 0.5 increments, 11- 20 in 1 increments, 25 - 40 in 5 increments	1.10-1.35
274-XX-N/S	SMA (f-m)	DC-18.0	2	0.5	0-20 in 0.5 increments, 30, 40	1.15-1.35
276-XX-N/S	N (f-m)	DC-18.0	25	1.0	3, 6, 10, 20, 30	1.15-1.40

Notes: 1. VARIES WITH FREQUENCY.  
2. Custom dB values available.  
XX = Standard dB Value, f = female, m = Male

## Features

- Screened and non-screened models available.
- Choice of attenuation values.
- Frequency ranges from DC to 18 GHz.
- Power capability from 2 to 25 watts.
- Test data supplied at additional cost as follows:

**Non-screened (N):** Swept data plots of attenuation and SWR across the frequency band.

**Screened (S):** Swept data plots of attenuation and SWR across the frequency band. Film, standard data package includes lot record performance showing pass/fail quantities for all tests and testreports as applicable.

## Screening

Units are screened as follows:

### "N" versions:

SWR  
Attenuation  
Peak Power

### "S" versions:

Thermal Shock  
Monitored Thermal Cycle (MTC)  
Attenuation w/Parts Assembly Verification (PAV)  
Conditioning  
Peak Power  
Attenuation  
SWR  
Radiographics

## Medium & High Power Attenuators, Terminations & Mismatches (DC to 6 / 18 GHz)



API Weinschel continues to expand its medium and high power fixed coaxial attenuator and termination offering with the additions of new models with:

- /// The Model 251 is a convection cooled, 200 W bi-directional design that operates over the DC to 6 GHz frequency range. Available in standard dB values of 10, 20, 30 and 40. Standard Type N or SMK (2.92mm) connectors.
- /// Designs DC to 40 GHz, 10 W (Model 279 / 1477) and 20 W (Model 89 / 1478) with choice of SMK (2.92mm) male / female connectors.
- /// New body style 50 W (Model 90) and 100 W (Model 260 / 1467) designs that operate over the DC to 18 GHz frequency range with Type N or 3.5mm connectors and are available in 50 W or 100 W configurations. Standard dB values: 3, 6, 10, 20, 30.
- /// API Weinschel introduces a new line of Medium and High Power Mismatches that operate over the DC to 6 GHz frequency range. This Model offers mismatch SWR values of 2 to 6.5 in 0.5 increments.

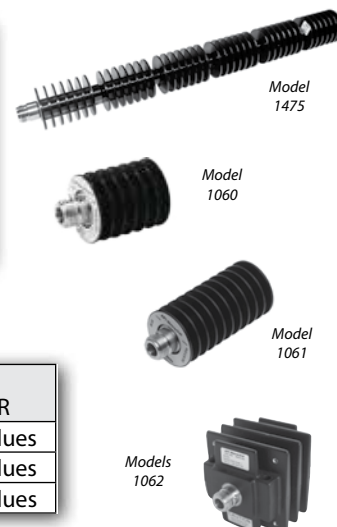


### Fixed Attenuators

Model No.	Connector Type	Frequency Range (GHz)	Average Power (W)	Peak Power (kW)	Standard Attenuation Values (dB)	SWR <sup>1</sup> (maximum)
89-XX-XX	SMK (2.92mm)	DC-40.0	20	0.2	10, 20, 30	1.25-1.40*
90-XX-XX	3.5mm / N	DC-18.0	50	1	3, 6, 10, 20, 30	1.15-1.30
251-XX-XX	SMK (2.92mm) / N	DC-6.0	200	10	10, 20, 30, 40	1.10-1.20
260-XX-XX	3.5mm / N	DC-18.0	100	1	3, 6, 10, 20, 30	1.15-1.30
279-XX-XX	SMK (2.92mm)	DC-40.0	10	0.2	10, 20, 30	1.20-1.35*
290-XX-XX	3.5mm / N	DC-18.0	300	10	10, 20, 30, 40	1.10-1.20

### Terminations & Loads

Model No.	Connector Type	Frequency Range (GHz)	Average Power (W)	Peak Power (kW)	SWR <sup>1</sup> (max.)
1467-X	3.5mm / N	DC-20.0	50	1	1.30-1.60*
1469-X	3.5mm / N	DC-18.0	100	1	1.15
1475-X	3.5mm / N	DC-18.0	150	1	1.90
1477-X	SMK (2.92mm)	DC-40.0	10	0.2	1.25-1.40*
1478-X	SMK (2.92mm)	DC-40.0	20	0.2	1.25-1.40*
1479-X	3.5mm / N	DC-18.0	300	10	1.90



### Mismatches

Model No.	Connector Type	Frequency Range (GHz)	Average Power (W)	Peak Power (kW)	Mismatch SWR
1060-M-X	N / 3.5mm)	DC-6.0	25	5	2 to 6.5 in 0.5 values
1061-M-X	N / SMK (2.92mm)	DC-6.0	50	10	2 to 6.5 in 0.5 values
1062-M-X	N / SMK (2.92mm)	DC-6.0	100	10	2 to 6.5 in 0.5 values

Notes:

1. \* = VARIES WITH FREQUENCY.



Get the latest products information from API Weinschel. . .



### RF & Microwave Components & Subsystems Catalog

The Weinschel full-line catalog outlines the wide range of RF, wireless, and microwave components and subsystems that operate over the DC to 50 GHz frequency range. Included are programmable step attenuators including MMIC, PIN, FET, relay and edge-line technologies, resistive power splitters, dividers, high power (up to 1500 watts) and low passive IM fixed attenuators, coaxial terminations, continuously variable and manual step attenuators, Planar Blind-mate and Planar Crown connector systems, custom and RF simulation subsystems.



Visit our website @ ...  
**weinschel.apitech.com**

Updated daily the API Weinschel website outlines a wide variety of Standard RF & Microwave Components & Subsystems that operate over the DC to 50 GHz frequency range. Weinschel also designs and manufactures custom RF & microwave components & subsystems for application specific customer requirements.



## About API Weinschel

For over sixty years the name Weinschel has become synonymous with leadership in RF and microwave technologies and superior quality components and subsystems for wireless, defense, test and measurement, and broadband markets throughout the world. Among its many technological achievements, Weinschel was the first to design and manufacture commercially available coaxial attenuators. Today, built upon a strong heritage, Weinschel (formerly Aeroflex / Weinschel) continues to provide a vast array of standard products together with custom-engineered solutions to satisfy demanding market needs for precision and high reliability coaxial components.

The Weinschel product offering includes fixed attenuators for test, metrology and space applications; continuously variable, manual step, solid-state digital step and programmable step attenuators; high power terminations; resistive splitters and dividers; manual phase shifters; Planar Blind-Mate®, Planar Crown® connectors. In addition to coaxial components covering DC-50 GHz, Weinschel offers a complete range of standard and custom-designed SmartStep® multi-path switching, combining, and attenuation subsystems for cable infrastructure and mobile wireless test applications, including RF simulation, multi-path and fading, high-power hot-switching attenuation, RF signal conditioning, RF and IF signal routing, and production testing.



**api**  
**technologies corp.**  
**> WEINSCHEL**

API Weinschel  
5305 Spectrum Drive  
Frederick, MD 21703-7362  
Phone: 800-638-2048 | Fax: 301-846-9116  
Email: weinschel-sales@apitech.com

**www.weinschel.apitech.com**