AEROFLEX
WEINSCHEL

Switch Matrices

RF Distribution Networks
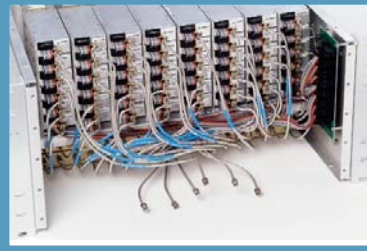
Attenuation Matrices &
Multi-Channel Subsystems

RF Translators

Mobile Unit (Radio & WLAN)
Fading Simulators

Cellular & PCS Subsystems
with Low IM Performance

Cable Modem Redundant
Switches & Test Systems

Test, Simulation, RF Distribution Modules & Subsystems

AEROFLEX
WEINSCHEL

Attenuation Matrices & Multi-Channel Subsystems

RF Distribution Networks

Switch Matrices

RF/Microwave Frequency Translators

Cellular & Wireless Subsystems with Low IM Performance

Mobile Unit (Radio & WLAN) Fading Simulators

Cable Modem Redundant Switches & Test Systems

Test, Simulation, RF Distribution Subsystems…
Smart Solutions at Work!

Aeroflex / Weinschel offers smart solutions to challenging test, simulation and RF distribution requirements by offering subsystem products that are either off-the-shelf or designed to customer specifications. Our subsystems feature:

- Standard communication interfaces (IEEE-488, RS-232, Ethernet) with proprietary SmartStep® Technology;
- Flexible, high-density mechanical layout & packaging;
- 50 & 75 configurations.

Our subsystems are employed in telecommunications, radar and CNI, satellite and ground communication systems, base station and mobile unit software conformance verification, signal analysis, cable modem and VoIP testing, production test systems and precision microwave related test instruments. Aeroflex / Weinschel's subsystems products and capabilities include:

- Switch Matrices
- Complex RF Distribution Networks
- Attenuation Matrices & Multi-Channel Subsystems
- RF Translators
- Mobile Unit (Radio & WLAN) Fading Simulators
- Cellular & PCS Subsystems with Low IM Performance
- Cable Modem Redundant Switches and Test Systems
- Programmable Attenuators with Built-In Digital Interface
- Custom Module and Mechanical Applications

AEROFLEX
WEINSCHEL

Attenuation Matrices
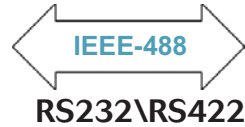
Custom Configurations & Design
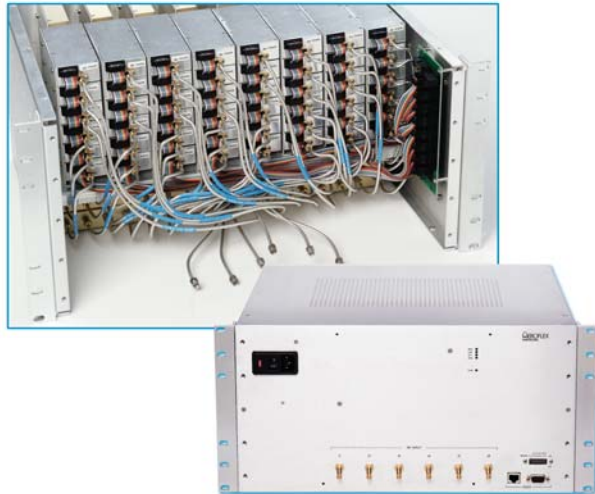
Description

Aeroflex / Weinschel has designed and manufacturered numerous versions of Attenuation Matrices for various applications. These units have typically been built in configurations that include 2x6,3x6, 4x6, 6x6, 4x4, 4x8 and 8x8 configurations., For the typical UMTS, CDMA 2000, and GSM bands the units can operate over 800 -3 GHz frequency range. However multiple units have been built for other applications and span the frequency range of DC to 18 GHz in multiple sub-band configurations.

The attenuation units available include all available Aeroflex / Weinschel programmable attenuators (relay based, PIN and GasFet types) and can be controlled using industry standard interfaces such as IEEE-488, RS-232 and Ethernet (10 BaseT).

Typical Specifications

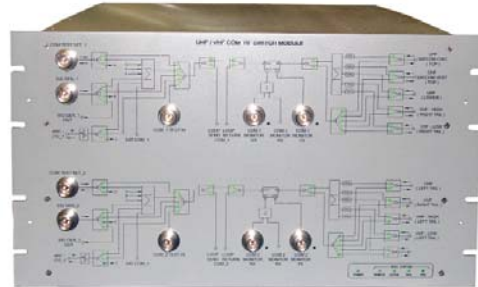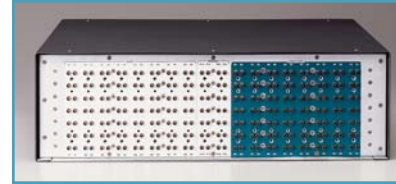Typical specifications for an 8 x 8 UMTS configuration are:

- ⁒ Frequency Range: 800 MHz to 3 GHz
- ⁒ Attenuation Range: 127 dB / 1 dB steps
- ⁒ Impedance: 50 Ω nominal
- ⁒ Insertion Loss: 25 dB @ 800 MHz (Target)
- ⁒ 30 dB @ 3 GHz (Target)
- ⁒ SWR: 1.50 maximum
- ⁒ RF Power Input: 0 dBm average
- ⁒ +30 dBm without damage
- ⁒ Isolation Input to Input: 40 dB minimum
- ⁒ Isolation Output to Output: 35 dB minimum
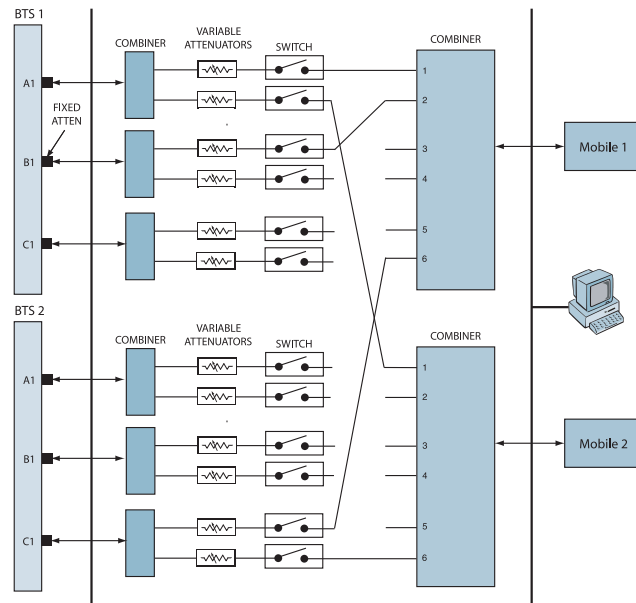
Optional Specifications:

- ⁒ High Isolation configurations
- ⁒ Phase Compensated Paths
- ⁒ High Power Inputs
- ⁒ Fast Switching Configurations
- ⁒ Front Panel Control
- ⁒ Ethernet Control (10BaseT)

4

5305 Spectrum Drive, Frederick, MD 21703-7362 ⬧ TEL: 301-846-9222, 800-638-2048 ⬧ Fax: 301-846-9116
web: www.aeroflex.com/weinschel ⬧ email: weinschel-sales@aeroflex.com

Revision Date: 2/20/09

SmartStep® Subsystems

Switch Matrices & RF Distribution Subsystems

Description

Aeroflex-Weinschel designs and manufactures custom switch matrices. The matrices consist of 50Ω and 75Ω designs with high isolation and gain flatness being critical performance parameters within our designs.

Designs are constructed using coaxial components for high frequency microwave applications, GaAs MMIC Switching design for fast switching applications and surface mount board designs for lower frequency, high density applications.

Typical Features

GaAs MMIC Switching Design:

- Frequency Range: 3.4-4.2 GHz
- Gain, any path: -14+1.5 dB @ 3.8 GHz @ 20°C
- Gain Bal between Channels: +1.0 dB max @ 3.8 GHz
- Gain Stability   +0.2 dB over +/- 5°C
- Gain Variation vs. Frequency:

  +0.20 dB over any 40 MHz segment
  +0.50 dB over any 80 MHz segment
  +1.5 dB over any 3.4-4.2 GHz

- Isolation (minimum):   Input/Input   60 dB
                          Input/Output   60 dB
                          Output/Output   60 dB
                          (different input)
- Noise Figure: 15 dB maximum
- VSWR (50 Ω):   Input: 1.3:1 maximum
                          Output: 1.5:1 maximum

75 Ω System - Board Design:

- Front Panel Serviceability: No down time for RF paths.
- All active modules are front panel replaceable using simple tools.
- 10 Base T Ethernet control (SNMP)
- Module Hot Swap capability.
- Modularity/Serviceability
- Input and Output Impedances: 75 Ω
- Maximum RF Input Power: +15 dBm
- Switch Type: Electro-mechanical, absorptive
- Frequency Range: 54 to 860 MHz
- Insertion Loss: -5.5 dB
- Flatness: +1.1 dB
- Return Loss: > 15.5 dB
- Isolation: > 60 dB

Coaxial Designs:

- Full Access Blocking Design
- 0.03 dB switch repeatability
- 5 Million switch cycles minimum
- 50 Ohm system
- Latching relays
- IEEE-488 and RS-232 control
- Frequency: DC-20 GHz
- Impedance: 50 ohm
- VSWR (maximum):   DC - 4 GHz   1.43:1
                    4 - 12 GHz   1.65:1
                    12 - 18 GHz   1.8:1
                    18 - 20 GHz   2.2:1
- Insertion Loss: 3 dB typical
                     4 dB maximum @ 20 GHz
- Insertion Loss Repeatability: 0.05 dB typical

L-Band RF 4x32 Switch Matrix

Features

- ⬜ 4x32 Matrix
- ⬜ 500 - 1500 MHz Operation
- ⬜ Ethernet 10 Base T (SNMP) and RS-232
- ⬜ 0 dB Gain & Low Noise Figure
- ⬜ High Intercept Point
- ⬜ Flat Gain Across Band
- ⬜ MTBF Prediction > 40,000 Hours
- ⬜ Front Panel Status and Error Indicators
- ⬜ Modularity/Serviceability
- ⬜ All software downloads/updates via TCP/IP Interface

Description

The Aeroflex-Weinschel RF Transmit and Receive Matrices are intended for use in a satellite communications terminal within a fixed Ground Station. It operates within both the UHF and L-Bands.

The Receive Switch Matrix allows each of four possible inputs to be connected to any number of the 32 possible outputs. The required connectivity constrains that each output will be connected to only one input. Amplification overcomes the inherent combiner divider loss and other insertion losses.

The Transmit Matrix allows 32 inputs from individual sources to be connected to one (and only one) of four outputs.

Switch Drawers & Ethernet Modules Hot Swappable

General Specifications

SPECIFICATION	DESCRIPTION	
Matrix Configuration	4 X 32	
Connectors	SMA, Female	
Frequency Range	500 - 1500 MHz	
Impedance	50 Ω	
Input Power Requirements	Voltage: Frequency: Power Consumption: Connector:	90-264 VAC +/- 10%, single phase. 50/60 +/- 5 Hz < 60 Watts Standard IEC 3-prong, single phase, male connector
Environmental	Operating Temperature Storage Temperature:	15 to +40 °C -20° to +70 °C
Local Control & Monitoring	Front Panel LED Matrix indicates Connectivity of all switched paths and BIT / Alarm Status.	
RS-232 Bus(1)	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD, RXD, RTS, CTS, DTR, GND 2400, 9600, 19200, and 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive)
Ethernet 10 Base T (SNMP)	10 Base T Connector: Console Connector:	Standard RJ45 9-pin male D

1. RS-232 can be used with standard PC serial port for short and medium distances (up to approximately 50 ft).

SmartStep® Subsystems

RF Characteristics:

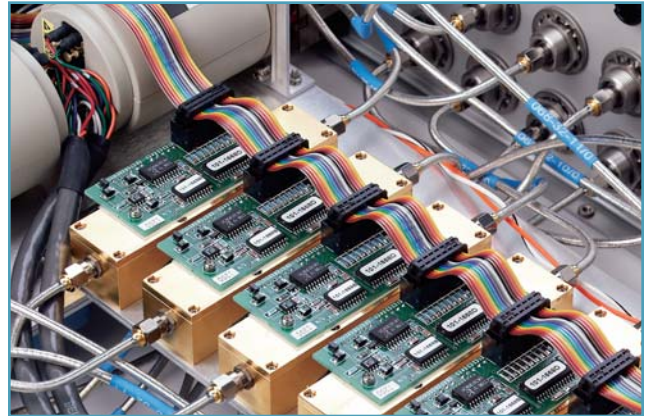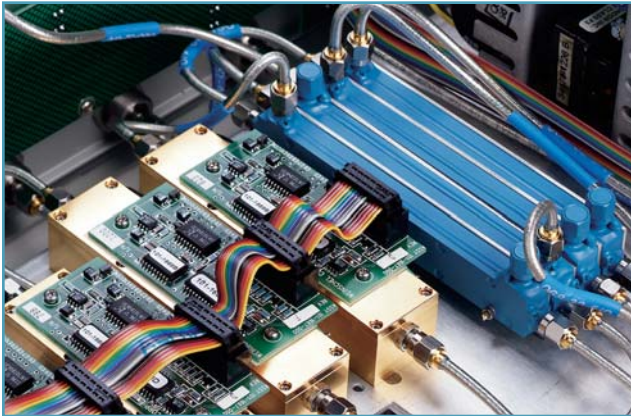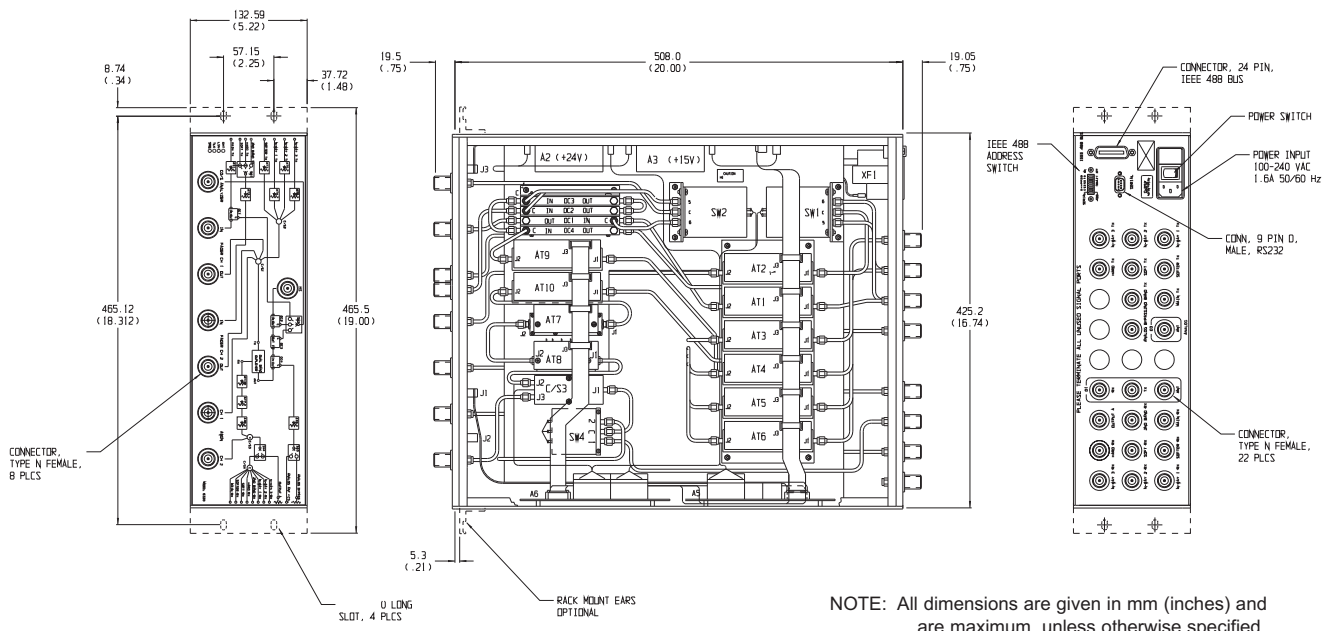| SPECIFICATION	DESCRIPTION
Input / Output VSWR	1.35:1 (maximum)
Input Power Rating	+20 dBm CW (Maximum)
Input Levels	0 dBm to meet performance
Output Power	Operational: 0 dBm (maximum) Fault Condition: not to exceed +15 dBm including Fault
Gain	Nominal Gain: 0 dB for all paths Gain Variation Across Bandwidth: The gain variation with frequency is within the following requirements: 1. Over any 1MHz frequency band within full bandwidth of 1000 MHz <0.08 dB pk-pk 2. Over any 80 MHz frequency band within the full bandwidth of 1000 MHz <0.5 dB pk-pk 3. Over the any 500 MHz bandwidth < 1.3 dB Gain Stability: Gain Tolerance: The initial wideband gain at ambient temperature of each path is 0 dB +/- 0.65 dB . The mean gain variation over the operating temperature range during any 24 hour period is less than +/- 0.65 dB. The differential port-to-port gain is less than 1.0 dB over time and temperature.
Noise Figure	Receive Switch Matrix: < +19 dB Transmit Switch Matrix: < +20 dB

Spectral Purity	Spurious Signals: Any carrier related spurious output is > -70 dBc (Signal Related)
	Intermodulation: 40 dB below the wanted signals at a total output power level of 0 dBm.
	Group Delay Variation: The group delay variation through the converter switch matrix does not exceed the following values:
	
	    Linear component < 0.02 ns/MHz
	    Ripple component over any 4 MHz bandwidth < 0.2 ns pk-pk
	
	Mutual Isolation: 70 dB (minimum)

Physical Dimensions
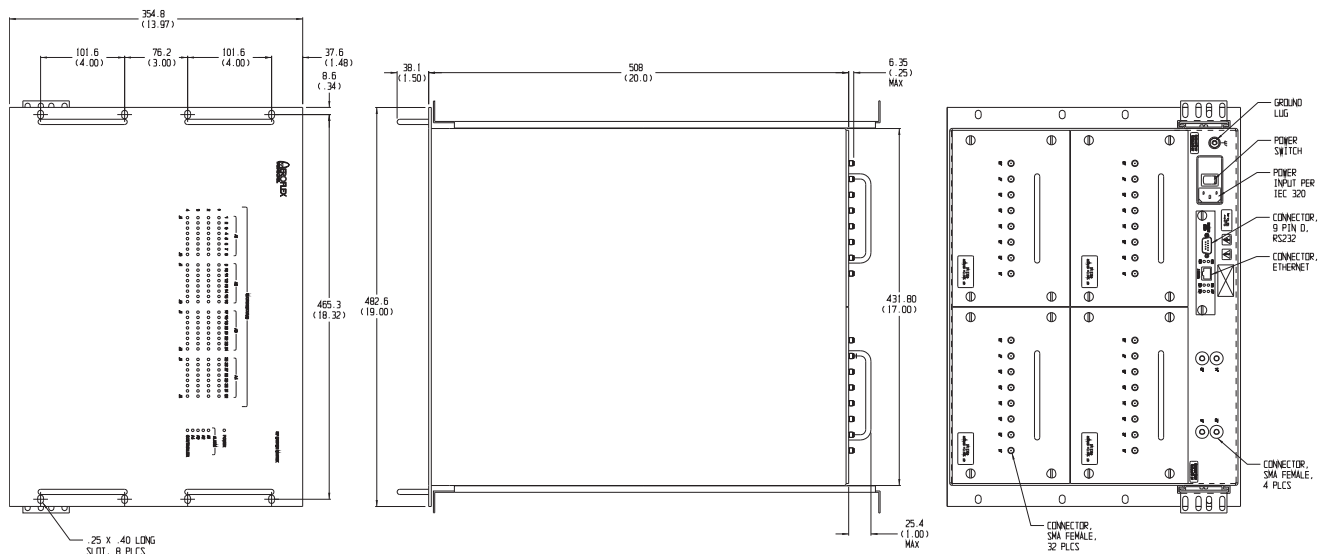
Cellular & Wireless Test Solutions

This Subsystem contains a wide variety of high perform-ance mechanical switches, combiners, directional couplers, and other standard microwave components creating a complex multi-function RF matrix that is controlled over var-ious industry standard bus interfaces. Other features include:

- 450 MHz - 3 GHz Frequency Range
- Customized front panel layout and graphics.
- IEEE-488 & RS-232 Serial interfaces.
- Optional rack mounting hardware.
- Standard Stainless Steel Type N Connectors on front & rear panel.
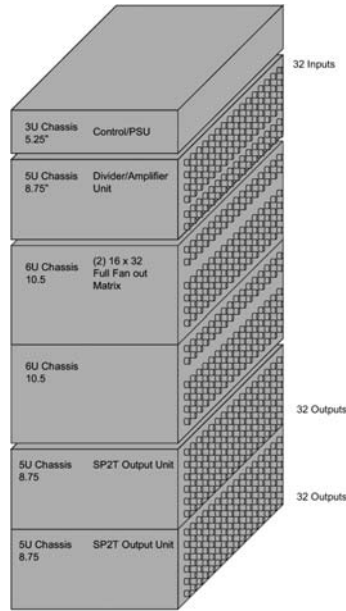- Aeroflex / Weinschel 3200T Programmable Attenuators with built-in driver circuitry and 8210A Controller.

Physical Dimensions:

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

SmartStep® Subsystems

32 x 64 Matrix


Features

- 32 input fan-out to 64 outputs
- Frequency Band: 3.4-4.2 GHz
- 50 Ohm impedance
- SMA Connectors
- GaAs MMIC Switching design.
- RS422 control

Description

The Aeroflex / Weinschel 32 x 64 matrix has 32 C-Band inputs and provides 64 outputs. Each output can individually select any of the 32 inputs independently of any other output. The Switch Matrix is a modular design designed using a GaAs MMIC Switching design.
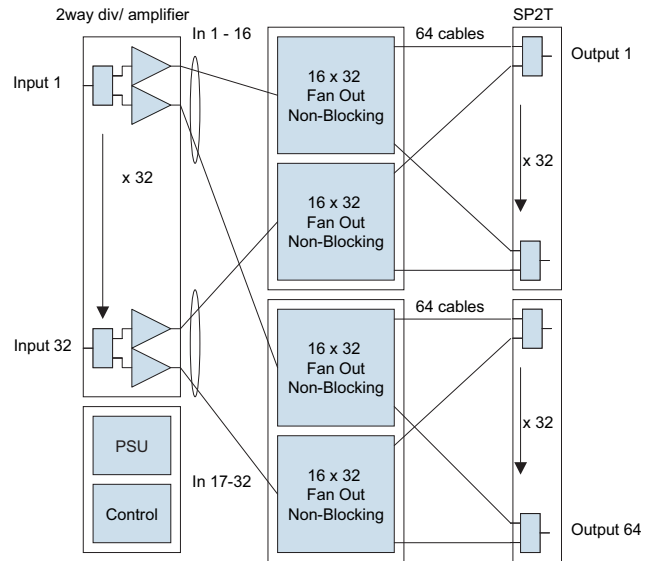
Specifications

SPECIFICATION	DESCRIPTION
Frequency Range:	3.4-4.2 GHz
Gain, any path:	-14 ± 1.5 dB @ 3.8 GHz @ 20°C
Gain bal between channels:	+/-1.0 dB max @ 3.8 GHz
Gain stability:	+/-0.2 dB over +/- 5 °C
Gain variation vs. frequency:	+/-0.20 dB over any 40 MHz segment +/-0.50 dB over any 80 MHz segment +/-1.5 dB over any 3.4-4.2 GHz
Isolation:	Input/Input: 60 dB minimum Input/Output 60 dB minimum Output/Output (different input) 60 dB minimum Output/Output (same input) 17 dB minimum
Noise figure	15 dB maximum Output 1 dB compression pt. -5 dBm minimum Output 3rd order intercept pt. +5 dBm minimum
Spurious Outputs:	Signal Independent: -100 dBm typical Signal Related: -70 dBc typical Group delay variation: +/-0.2 ns p-p max over any 80 MHz segment

SmartStep® Subsystems

Model 8314-1
Model 8314-2
WLAN System Simulator

2.0 to 4.0 GHz
2.0 to 6.0 GHz

NEW

Simulate Connectivity over Distance & Speed

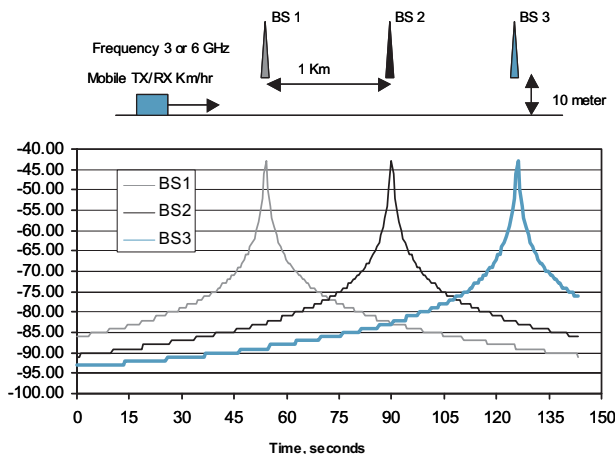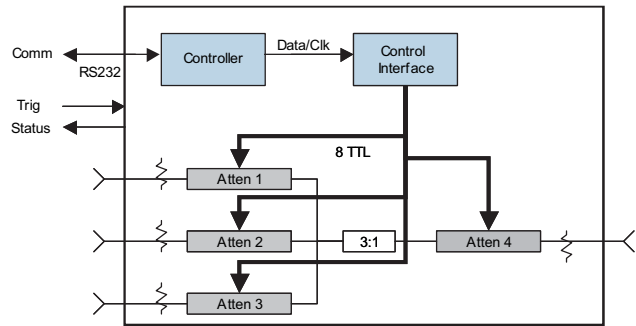*Figure 1. RF Simulator Block Diagram*

Description

This specialized subsystem is used to simulate the connectivity between a mobile unit running along a line of 3 base stations spaced from 250 to 1000 meters apart. The test subsystem is able to simulate the variation of the RF signal from the base stations reaching the mobile (as well as the signal from the mobile reaching the base stations) when the mobile is moving at speeds of up to 250 km/h. Serveral variations of this have been developed and produced.

The simulator attenuates the simulated Base Station signal through three independent attenuators, then combines the signals. Each attenuator has a dynamic range of 60 dB in 1 dB steps. The operation of the unit is via a RS232 interface, ASCII commands can input parameters into the controller. Upon receiving a trigger the controller executes the program to simulate the link loss to all three Base stations as seen from the mobile transceiver.

TRIGGER: The signal to begin a run can be either a hardware based trigger generated external from the controller, or via RS232 command. If it is desirable to synchronize the beginning of a train run with other external hardware/ software, a hardware based trigger is recommended. The controller will also output a status signal to indicate that the train is running. Once triggered, this signal is active for the duration of the run.

OPERATOR CONTROLLED PARAMETERS: Using the RS-232 control interface the operator has the ability to control the following parameters to set up any mobile unit simulation:

- Base Station Positions (X meters, A station, B station, C station, + offset from the track), 0-3000 meters for station positions and 10-100 meters for offset from the track.

- Mobile Transceiver Start/Stop Position (x , y meters):   0-10, 000 meters.

- Mobile Velocity (Y km/hr): 0-250 km/hr

- Time Resolution (1,10,100,1000 mS or auto to fill memory)

- Frequency: 2 to 6 GHz

- Ant Gain for Mobile and Base Station

- Transmitter Antenna Gain: -10 to +10 dB
  Receiver Antenna Gain: -10 to +10 dB

- Loop Command: Used to simulate the train running in a continuos loop.

Calculated signal level from each Base Station.

(mobile unit moving at 100 km/hr)

SmartStep® Subsystems

Specifications

SPECIFICATION	DESCRIPTION	
Input Power Requirements	ac	100 to 240 Vac, 50/60 Hz, 50 Watts
Environmental	Operating Temperature Storage Temperature: Humidity: Altitude:	0 to +50°C 67° to +167 °F (-55° to +75°C) 96% 40,000' (12,192M)
RS-232 Bus	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD, RXD, RTS, CTS, DTR, GND 2400, 9600, 19200, and 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive)
RF Characteristics	Attenuator (Qty 4): Attenuation Range/Step Size: Incremental Attenuation Accuracy: Frequency: Configuration: Impedance: Insertion Loss: RF Input Power (P1dB): RF Connector: VSWR: Port to Point Isolation:	Pin diode design 0-63.75 dB/ 0.25 dB step +5% of selected value Model 8314-1: 2.0 - 4.0 GHz Model 8314-2: 2.0 - 6.0 GHz 3 inputs, 1 output 50 ohm 27 dB +25 dBm N Female 1.75:1 Target >40 dB

1. RS-232 can be used with standard PC serial port for short and medium distances (up to approximately 50 ft).

Physical Dimensions
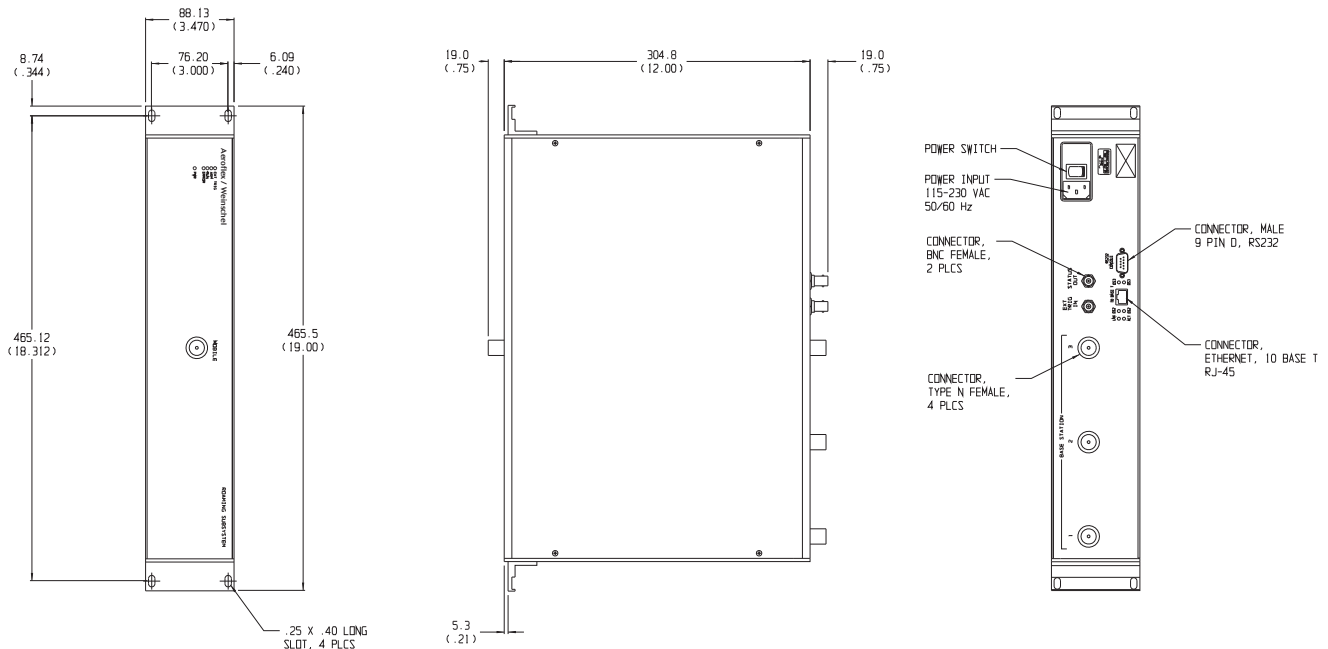
Gain Adjustable Amplifier
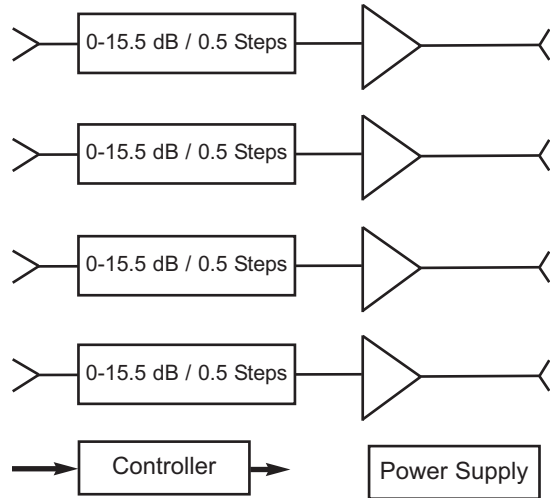
IEEE-488

RS232\RS422

Up to 4 independent channels

Features

- 3.4 to 4.2 GHz operation
- Up to 4 independent channels
- 50 Ohm operation
- 0-15 dB, 0.5 dB step programmable attenuation
- Output compression +15 dBm minimum
- Designed to interface with industry standard communication interfaces:
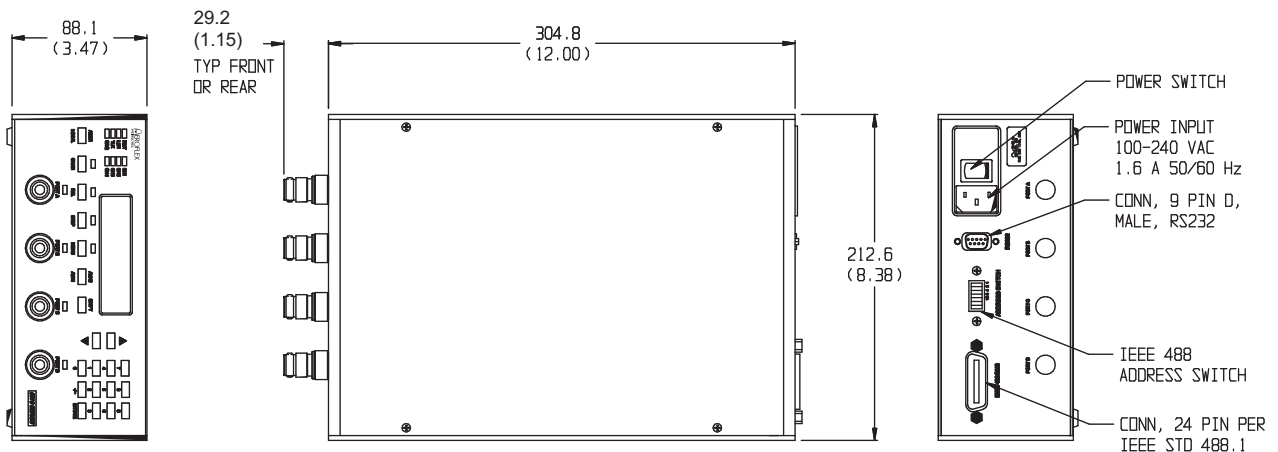 - GPIB/IEEE-488 (HS-488 ready)
  - RS-232, RS-422

Description

This versatile subsystem contains up to 4 parallel gain controllable channels. The attenuators being used are relay based, 0-15 dB, 0.5 dB step programmable attenuators. All of the attenuators are independently controllable through the RS-422/232 or IEEE-488 control bus.

Using a Rack Mounting Kit allows the unit to be easily mounted into any rack or cabinet that is designed per EIA RS-310 or MIL-STD-189.

| 0-15.5 dB / 0.5 Steps |
| 0-15.5 dB / 0.5 Steps |
| 0-15.5 dB / 0.5 Steps |
| 0-15.5 dB / 0.5 Steps |

Controller

Power Supply

Physical Dimensions

88.1
(3.47)

29.2
(1.15)
TYP FRONT
OR REAR

304.8
(12.00)

212.6
(8.38)

POWER SWITCH

POWER INPUT
100-240 VAC
1.6 A 50/60 Hz

CONN, 9 PIN D,
MALE, RS232

IEEE 488
ADDRESS SWITCH

CONN, 24 PIN PER
IEEE STD 488.1

SmartStep® Subsystems

Specifications

SPECIFICATION	DESCRIPTION	
Input Power Requirements	AC	100 to 240 Vac, 50/60 Hz, 50 Watts
Environmental	Operating Temperature	0 to +50°C
	Storage Temperature:	67° to +167 °F (-55° to +75°C)
	Humidity:	96%
	Altitude:	40,000' (12,192M)
IEEE-488 Bus	Connector:	24-pin per IEEE-488.1
	Protocols:	per IEEE-488.2
	Indicators:	Remote (RMT), Listen (LSN), Talk (TLK), SRQ (SRQ)
RS-232 Bus	Connector:	9-pin male D
	Signals:	TXD, RXD, RTS, CTS, DTR, GND
	Baud Rates:	2400, 9600, 19200, and 38400
	Data Bits:	8
	Handshaking:	None, RTS/CTS, XON/XOFF
	Parity:	None, Odd, Even
	Indicators:	Tx (Transmit) and Rx (Receive)
RS-422 BUS[3]	Connector:	9-pin male D
	Signals:	TXD+, TDX-, RXD+, RTX-, RTS+, RTS-, CTS+, CTS-, and signal GND
	Baud Rates:	2400, 9600, 19200, and 38400
	Data Bits:	8
	Handshaking:	None, RTS/CTS, XON/XOFF
	Parity:	None, Odd, Even
	Indicators:	Tx (Transmit) and Rx (Receive)
RF Characteristics	Frequency Range:	3.4 to 4.2 GHz
	Impedance:	50 Ohms
	Attenuation Range:	0 - 15 dB, 0.5 dB steps (other ranges available)
	Gain, any path:	13 +/- 0.5 dB @ 3.8 GHz
	Gain Stability:	+/- 0.2dB over +/- 5 ºC
	Gain Stability Vs Time:	Constant Temp & Input level = +/- 0.05 dB/Hr
	Gain Variation vs Frequency:	+/- 0.20 dB over any 40 MHz segment
		+/- 0.40 over any 80 MHz segment
		+/- 1.0 dB over 3.4 - 4.2 GHz
	Group Delay Variation:	+/- 0.2 nS p-p max over any 80 MHz segment
	Noise Figure:	18 dB max @ 0 dB gain (13 dB attn) typical
		8 dB max @ 10 dB gain (3 dB attn) typical
	Output 1 dB comp point:	+ 15 dBm minimum (optional improved spec available)
	Output 3rd order intercept point.	+25 dBm minimum (optional improved spec available)
	Spurious Outputs:	Signal Independent -100 dBm maximum
		Signal Related -70 dBc maximum
	VSWR (50 Ohm):	Input: 1.4:1 typical
		Output: 1.4:1 typical
	Maximum Input Power:	+3.5 dBm (with atten set to zero) to remain at or below 1 dB compression point
	Connectors:	N - Female

1. GPIB/IEEE-488 model allows user-selectable addresses
2. RS-232 can be used with standard PC serial port for short and medium distances (up to approximately 50 ft).
3. RS-422, designed for very long distance communications (4000 ft) and & optimized as a single node protocol, typically with one device connected to a single port.

![AEROFLEX WEINSCHEL logo]

Model 8501
High Power Programmable Switch

IEEE-488
RS232\RS422

100 Watt Hot Switching Capability

Features

- Provides a flexible, easy to program, low cost solution for your bench test/calibration setups and subsystem applications.
- Single or Dual Switch Configurations
- DC to 13.0 GHz Operation.
- Power Hot switching up to 100 Watts average
- Designed to interface with industry standard communication interfaces:

  - GPIB/IEEE-488 (HS-488 ready)
  - RS-232, RS-422

- Rack Configurable: Using a Rack Mounting Kit allows the Model 8501 to be easily mounted into any rack or cabinet that is designed per EIA RS-310 or MIL-STD-189.

Description

Aeroflex / Weinschel's 8501 Series provides front-panel and computer control for up to two channels of high power RF switching (Figure 1), where RF signals are routed through either the front or rear mounted switch port connectors labeled 1, C, 2.

Special configurations designed to specific customer requirements may contain other coaxial devices such as power combiners, directional couplers, and filters to create single or multi-channel subsystems. The 8501 can also contain and control a separate programmable attenuator channel.

MODEL NUMBER DESCRIPTION:

 Example:

8501 - X - F

Basic Model Number

Number of Switches

Connector Location
F = Front, R = Rear
(Type N, Female Only!)

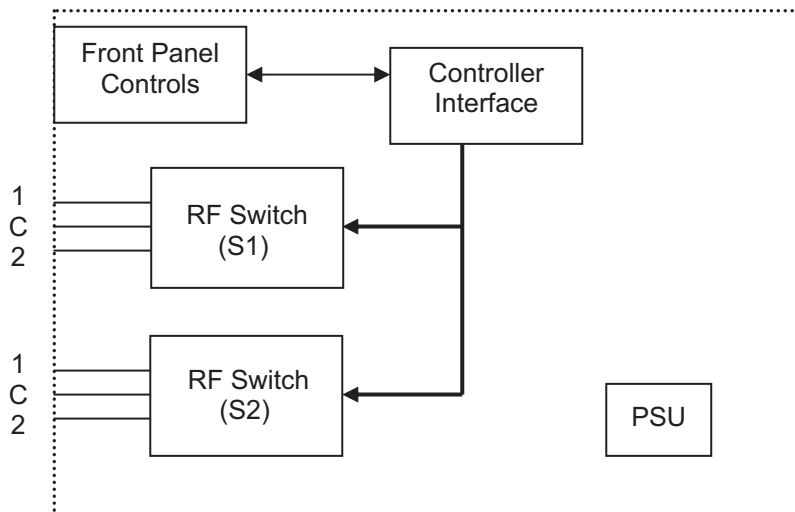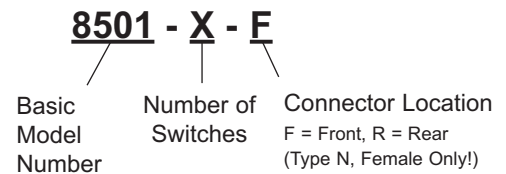*Figure 1. Model 8501 Block Diagram*

For additional information on the Model 8501, visit our website @ www.aeroflex.com/AW/8501.htm

SmartStep® Subsystems

ÆROFLEX
WEINSCHEL

Specifications

SPECIFICATION	DESCRIPTION				
Input Power Requirements	AC	100 to 240 Vac, 50/60 Hz, 50 Watts			
Environmental	Operating Temperature Storage Temperature: Humidity: Altitude:	0 to +50°C 67° to +167 °F (-55° to +75°C) 96% 40,000' (12,192M)			
IEEE-488 Bus	Connector: Protocols: Indicators:	24-pin per IEEE-488.1 per IEEE-488.2 Remote (RMT), Listen (LSN), Talk (TLK), SRQ (SRQ)			
RS-232 Bus	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD, RXD, RTS, CTS, DTR, GND 2400, 9600, 19200, and 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive)			
RS-422 BUS[3]	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD+, TDX-, RXD+, RTX-, RTS+, RTS-, CTS+, CTS-, and signal GND 2400, 9600, 19200, and 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive)			
RF Characteristics	Port Connectors: Frequency Range: Impedance:	Type N, Female dc - 13 GHz 50 Ω			

		DC to 3	3 to 5	5 to 11	11 to 13
	SWR (maximum):	1.25	1.45	1.70	1.70
	Insertion Loss (dB maximum):	0.25	0.30	0.50	0.65
	Isolation (dB maximum):	70	60	50	50
	RF Average Power Handling (CW):	100 W to 3 GHz 50 W to 13 GHz			
	Hot Switch Cycling:	100K @ 100 Watts CW @ 2 GHz			

1. GPIB/IEEE-488 model allows user-selectable addresses
2. RS-232 can be used with standard PC serial port for short and medium distances (up to approximately 50 ft).
3. RS-422, designed for very long distance communications (4000 ft) and & optimized as a single node protocol, typically with one device connected to a single port.

Physical Dimensions

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

8501-2-F SHOWN

![Aeroflex Weinschel logo]

Programmable SPDT Switch Unit

IEEE-488

RS232\RS422

NEW

Ideal for Bench Test / Calibration Applications

Features

- Provides a flexible, easy to program, low cost solution for your bench test/calibration setups and subsystem applications.
- Single or Dual Switch Configurations
- DC to 18.0 GHz Operation.
- Designed to interface with industry standard communication interfaces:

  - GPIB/IEEE-488 (HS-488 ready)
  - RS-232, RS-422
  - Ethernet, 10/100 BaseT (Optional)

- Rack Configurable: Using a Rack Mounting Kit allows the Switch Unit to be easily mounted into any rack or cabinet that is designed per EIA RS-310 or MIL-STD-189.

Description

Aeroflex / Weinschel's New Series of programmable switche units provide front-panel and computer control for up to two channels of RF switching (Figure 1), where RF signals are routed through either the front or rear mounted switch port connectors labeled 1, C, 2.

Special configurations designed to specific customer requirements may contain other coaxial devices such as power combiners, directional couplers, and filters to create single or multi-channel subsystems. The switch units can also contain and control a separate programmable attenuator channel.

Figure 1. Block Diagram

SmartStep® Subsystems

Specifications

SPECIFICATION	DESCRIPTION	
Input Power Requirements	AC	115 to 230 Vac, 50/60 Hz, 50 Watts
Environmental	Operating Temperature Storage Temperature: Humidity: Altitude:	0 to +50°C 67° to +167 °F (-55° to +75°C) 96% 40,000' (12,192M)
IEEE-488 Bus	Connector: Protocols: Indicators:	24-pin per IEEE-488.1 per IEEE-488.2 Remote (RMT), Listen (LSN), Talk (TLK), SRQ (SRQ)
RS-232 Bus	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD, RXD, RTS, CTS, DTR, GND 2400, 9600, 19200, and 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive)
RS-422 BUS[3]	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD+, TDX-, RXD+, RTX-, RTS+, RTS-, CTS+, CTS-, and signal GND 2400, 9600, 19200, and 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive)
RF Characteristics	Port Connectors: Frequency Range: Impedance: SWR (maximum): Insertion Loss (maximum): Isolation (maximum): RF Average Power Handling (CW): Switch Life:	SMA Female dc - 18.0 GHz 50 Ω 1.50:1 0.50 dB 60 dB 1 W Hot Switching, 200 W CW @ 1GHz 1 million cycles

1. GPIB/IEEE-488 model allows user-selectable addresses
2. RS-232 can be used with standard PC serial port for short and medium distances (up to approximately 50 ft).
3. RS-422, designed for very long distance communications (4000 ft) and & optimized as a single node protocol, typically with one device connected to a single port.

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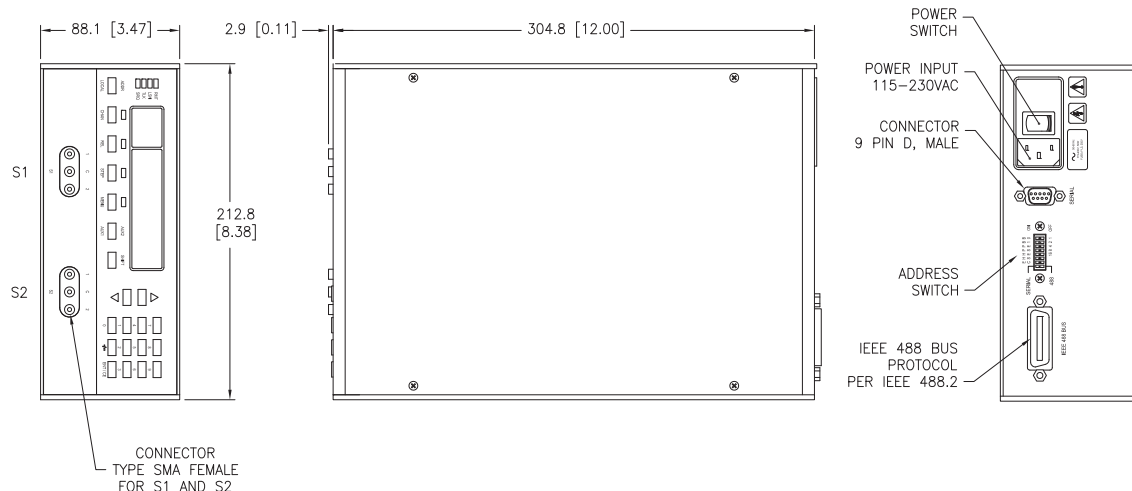
NOTE: All dimensions are given in mm (inches) and are maximum, unless otherwise specified.

100 Watt, Low IM, Signal Distribution Unit

The unit is designed to handle RF-signals, used for testing radio receivers and transmitters. The unit is designed to handle RF-power up to 100W (50 dBm) maximum.

This particular subsystem is used as an antenna TX leakage simulator unit e.g. it simulates the leakage between the antennas in a base station where the leakage ratio will be controllable with in a specified range, the unit has the following major features:

- Antenna to antenna TX leakage simulation
- External interference signal source connector
- High frequency support, 100KHz to 13GHz
- Diversity support, two branches (RF-A and RF-B)

The Distribution Unit is a antenna simulation unit, the unit supports two RF-branches and is bi-directional.

Mechanical Layout:
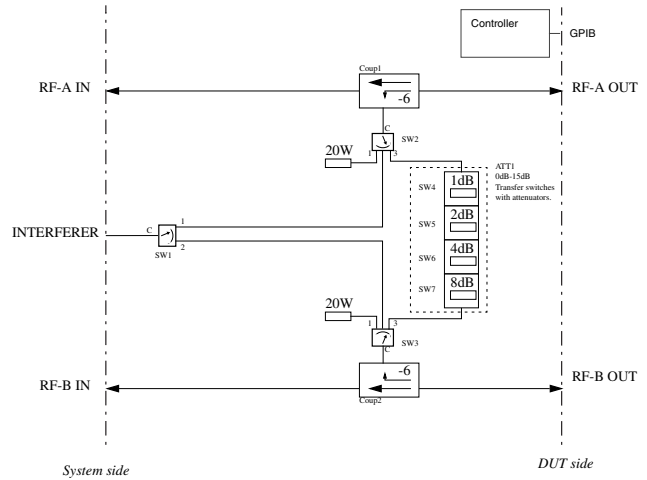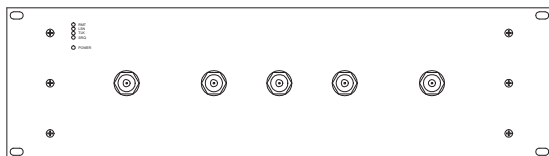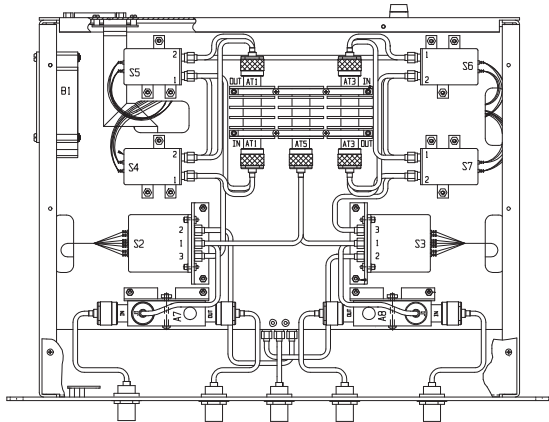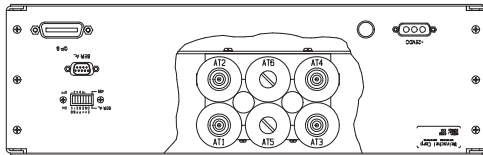
All RF-parts used in the construction are able to handle up to 100W average delivered to RF-A/B OUT inputs and 5 W average to INTERFERER input. The inputs are designed for the following powers. The input signal is a WCDMA signal with maximum peak to average and crest factor as below.

Peak to average @10%: 5 dB
Peak to average @1%: 8 dB
Peak to average @ 0.1%: 11dB
Peak to average @ 0.01%: 13dB
Peak to average @ 0.001%: 15dB
Crest factor: 17 dB

Operation

The switch functions are controlled via a GPIB interface, where the address is selectable between 0 to 30. Switching of relays supports switching of single relays as well as multiple relays at the same time. The commands are adapted from the IEEE 488.2 standard.

FREQUENCY RANGE: All RF-signal paths are compliant between 1.9GHz to 2.2GHz, except RF-A IN to RF-A OUT and RF-B IN to RF-B OUT which is compliant between 100 KHz to 13 GHz useable to 18 GHz.

Other features include:

- 100 Watt Aeroflex / Weinschel Model 47 Low IMD Fixed Attenuators. 25 and 50 Watt designs also available.
- Designed to customer specified packaging requirements.
- Built-in mounting brackets that are located on front panel for mounting into racks or cabinets designed per EIA RS-310 or MIL-STD-189.

SmartStep® Subsystems

Mobile Unit Fading Simulators

Aeroflex / Weinschel designs and manufactures multi-path attenuation subsystems for fading / simulation of a broad range of applications and subsystems. This subsystem illustrated features:

- 400 - 3500 MHz frequency range.
- 16 Input Channels to 8 Output Channels. (other configurations available)
- RS-232 Serial Interface.
- Wide Dynamic Range: 127/1 dB steps.
- Aeroflex / Weinschel 3200T Programmable Attenuators with 8210A Controller.
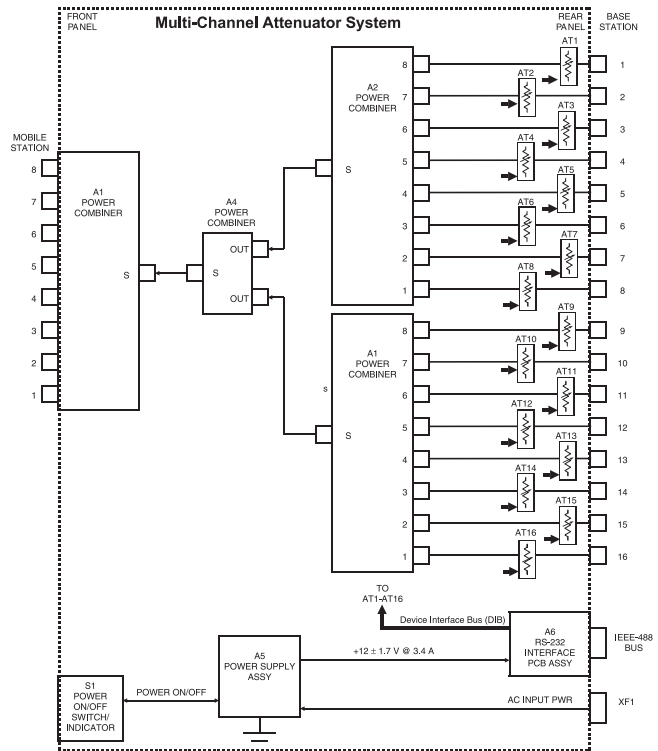
Mechanical Layout:
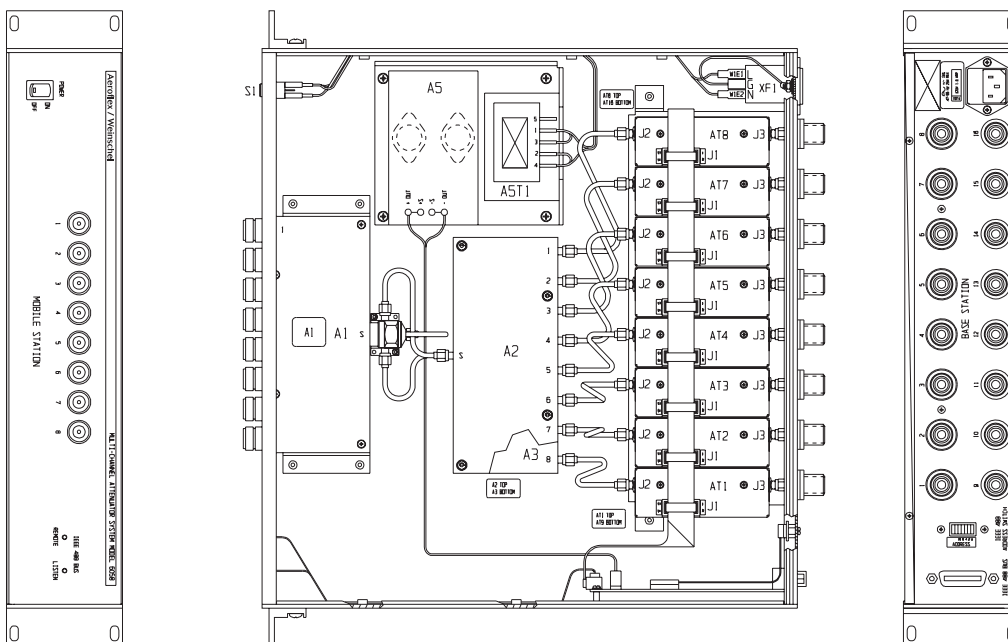
Cable Modem Testing (75Ω) & VoIP Testing Subsystems
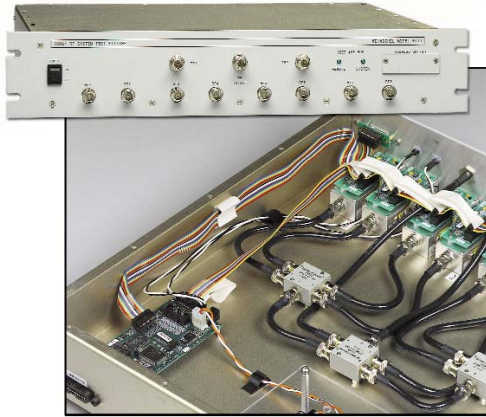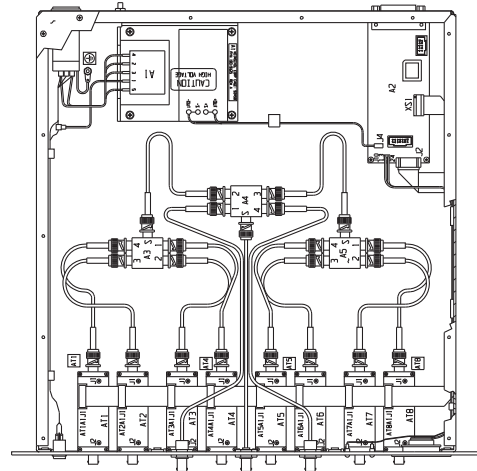
- ⌗ 800-1900 MHz frequency range
- ⌗ 8 Input Channels to 1 Output Channel
- ⌗ IEEE-488 Interface
- ⌗ Wide Dynamic Range: 63/1 dB steps, 75Ω
- ⌗ Aeroflex / Weinschel 3250T Programmable Attenuators with built-in driver circuitry.

Mechanical Layout:
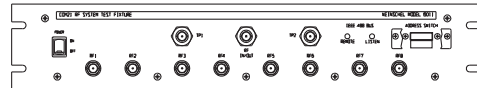
Simplified Block Diagram:

SmartStep® Subsystems
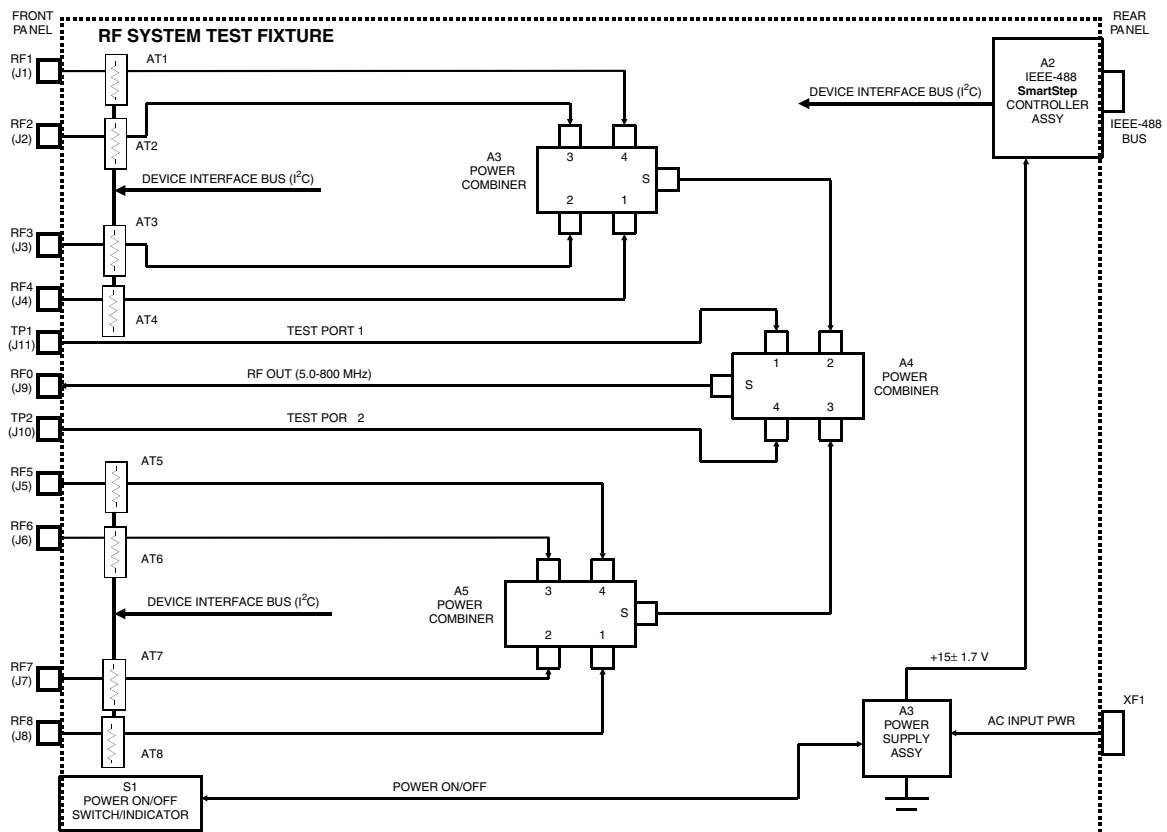
Complex Multi-Channel Attenuator
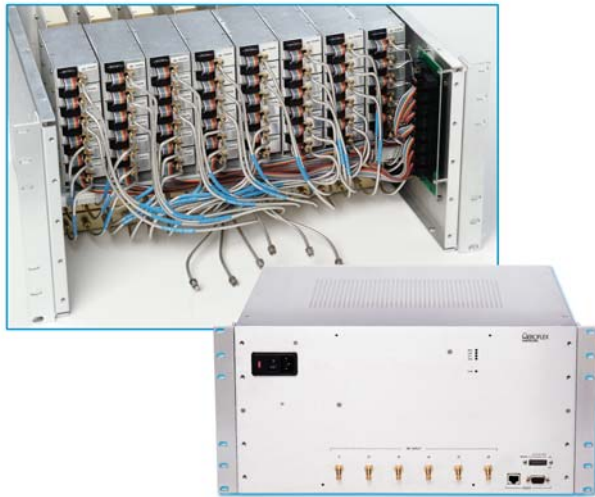
This application illustrates Aeroflex / Weinschel's ability to house and control a large number of solid-state program-mable attenuators and power combiners creating a complex multichannel attenuator subsystems. Other features include:

- ⌀ 800 MHz - 6 GHz frequency range.
- ⌀ 6 front panel Input channels to 8 rear panel Output Channels (other configurations available)
- ⌀ Wide Dynamic Range: 95 dB in 1 dB steps.
- ⌀ RS-232 Serial Interface.
- ⌀ Combiner Isolation 20 dB maximum.
- ⌀ Designed to customer specified packaging requirements.
- ⌀ 64 Aeroflex / Weinschel Solid-State Programmable Attenuators.
- ⌀ Removable mounting brackets that can be located on either end of unit, can be mounted into racks or cabi-nets designed per EIA RS-310 or MIL-STD-189.

Mechanical Layout:
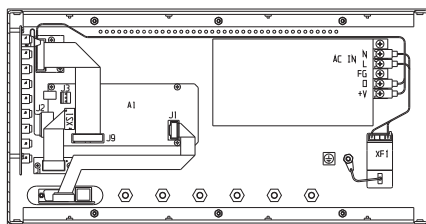
SECTION B-B
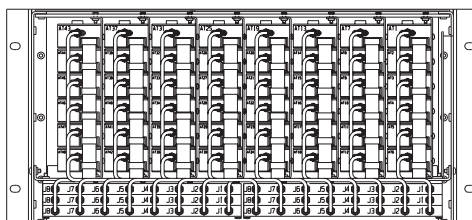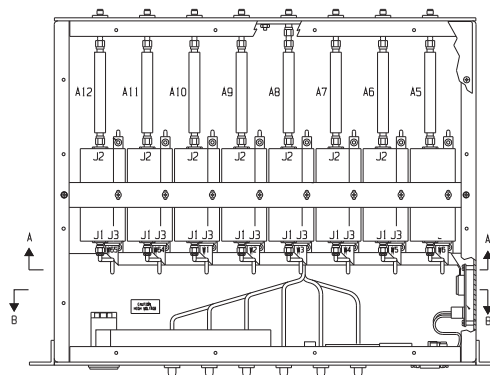
SECTION A-A
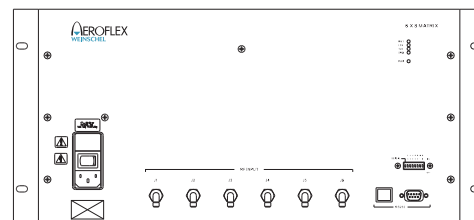
Application Specific Subsystems....

Switch Matrices & RF Distribution Networks:

Switch matrices are modularly designed which allows the end customer to order a variety of 8 x 8, 8 x 16 or 16 x 16 configurations. Switch matrices are designed using latching relays so that the signal path integrity can be maintained even during power outages or loss of IEEE-488, RS-232 and/or Ethernet control. These subsystems can be delivered either as a 50 or 75 Ω system.

Aeroflex / Weinschel's standard design approach, our designers use a highly adaptable platform that allows a dense integration of switches.

⟋ Customer defined configurations, layout and packaging.

⟋ Coaxial or surface mount designs available.

⟋ Modular Design allows easily exchange of front and rear panel switches, controllers or power modules.

⟋ IEEE-488, Serial or Ethernet (SNMP option) Interface for computer control.

⟋ Switch Matrix System firmware can be controlled through a 10 Base T TCP/IP software link as well as field level software upgrades or maintenance will be available through a TCP/IP link.
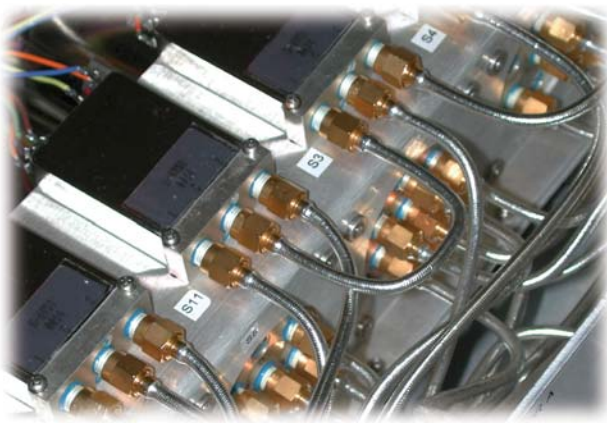
Microwave switch matrix products and subsystems are designed for Satellite Earth Stations applications such as, Uplink/ Downlink Routing, Cellular Base Stations, Metrology, Downlink and IF Signal Routing.

Cellular & Wireless Solutions:

Aeroflex / Weinschel has many years of product development experience in satellite and communications systems, test, measurement and simulation of wireless systems. This includes:

⟋ 3G, WCDMA, CDMA 2000, UMTS, PCS, & GSM.

⟋ Cable Modem Test Sets.

⟋ Precision RF & Microwave Instrumentation.

Combining Aeroflex / Weinschel's years of experience with our subsystem design approach enables our designers to provide the wireless infrastructure market with an almost endless amount of subsystem solutions.

Cable Modem & VoIP Testing Subsystems:

The need to calibrate and test 75 Ω operational performance is critical. Aeroflex / Weinschel's testing solution starts with the design and manufacturing of 75 Ω subsystems that offer:

⟋ Multi-channel inputs and outputs with front or rear panel connector mounting options.

⟋ Operation over the dc to 1.2 GHz frequency range.

⟋ High Isolation / Low SWR.

⟋ IEEE-488, Serial or Ethernet (SNMP option) Interface for computer control.

⟋ Wide dynamic range by employing Aeroflex / Weinschel Programmable Step Attenuators.

⟋ Custom Mechanical Design & Layout.

For convenience, Aeroflex / Weinschel also offers standard 75 Ω attenuator units (8310-1-X) that operates over the dc-1 GHz frequency range and provides an adjustable attenuation range of 0-63 dB in 1 dB steps.

SmartStep® Subsystems

Attenuation Matrices & Multi-Channel Subsystems:

Whether the application is an individual attenuation module for satellites or complex matrix/channel configurations for cellular base station testing and operation, Aeroflex / Weinschel's design approach offers a versatile but simple method of creating and packaging fixed, solid-state and/or mechanical (relay) attenuators into customer specified modules and subsystems.
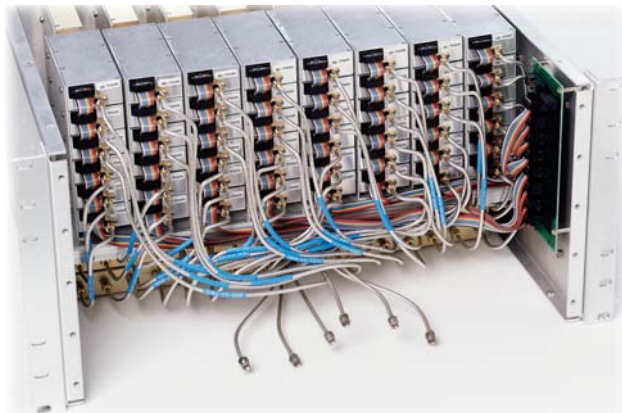
Advanced attenuation/switching schemes using other components such as switches, combiners/ dividers/splitters and directional couplers have already been designed.   Our designers use the advanced intelligent Interface firmware to create virtual devices with attenuation ranges up to 127 dB with resolutions of 0.25 dB that can operate over the dc-26.5 GHz frequency band. Other designs can include:

- ⫻ Complex Matrix/Channel Configurations. Typical configuration include 8x8, 4x8, 2x6, 3x6, 6x6

- ⫻ Custom Mechanical Design & Layout.

- ⫻ IEEE-488, Serial or Ethernet (SNMP option) Interface for computer control.

- ⫻ Wide dynamic range & frequency range options available.

- ⫻ Phase compensated attenuation designs.

- ⫻ Solid-State (GaAs FET & PIN) designs available.

- ⫻ Customer specialized testing and calibration can also be supplied.

Customized Mechanical Packaging & Modular Design:
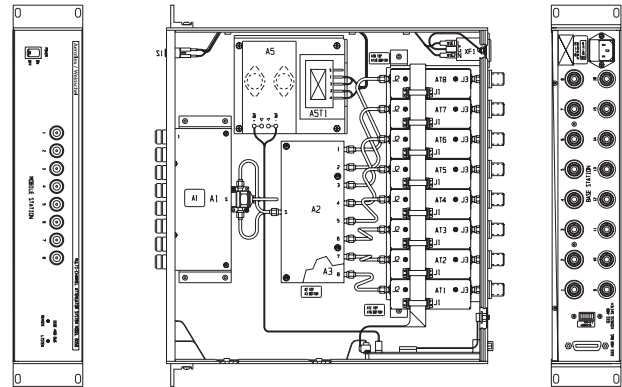
The strength of Aeroflex / Weinschel's subsystem design approach starts with an experienced engineering design staff. Using today's modern design tools and the latest software allows Aeroflex / Weinschel's engineering staff to offer its customers a wide range of customized mechanical packaging & modular design solutions.

Specific PCB and driver configurations can be designed for operating various types of devices or retrofitting an existing device to operate within a subsystem application!

Subsystems are easily configured for mounting into any rack or cabinet designed per EIA RS-310 or MIL-STD-189.

Although Aeroflex / Weinschel specializes in the design of customized module and cabinet configurations, most subsystems are designed using off-the-shelf components, devices and cabinet configurations which allows Aeroflex / Weinschel to design and manufacture subsystems with reduced lead times as well as lower overall design cost.

23

Low Intermodulation Subsystems & Signal Conditioning Networks...

Some custom subsystem designs warrant the use of Low Intermodulation passive components such as programmable attenuators, terminations, fixed attenuators, couplers, cables, connectors and switches. Aeroflex / Weinschel is a leading manufacturer of the first three items. The following paragraphs briefly describe the importance of low intermodulation and some design features and comparative test data for the same.

Programmable Attenuators

Historically the most demanding specifications for programmable components and subsystems have been low insertion loss and SWR, combined with a reasonable life expectancy of several million switching cycles. This was usually adequate for RF instruments like spectrum analyzers and signal generators, where the attenuator bandwidth rather than the switching speed was of prime concern. To achieve wide bandwidths, the programmable attenuators were mostly of electromechanical design and the linearity of these passive components was only taken for granted. Intermodulation distortion discussions and problems were usually limited to components such as amplifiers, mixers and filters.

In recent years, however, wireless communication systems employing complex digital modulation schemes, increased channel capacity, high transmit power and extremely low receiver sensitivity have put into question the linearity of passive components. Even very low level multi-tone intermodulation products generated by attenuators can seriously degrade the efficiency of a system/instrument if these products fall within the user passband. For two closely spaced tones at frequencies f1 and f2, the third order IM products at 2f1 - f2 and 2f2 - f1 , are the most harmful distortion products. They are harmful because they are close to f1 and f2 and virtually impossible to filter out.

In today's base stations the multi-carrier power amplifier (MCPA) is replacing banks of single-channel amplifiers and their corresponding power combining network. MCPAs have the capability of carrying a number of modulation schemes simultaneously and can also employ schemes such as dynamic channel allocation (DCA) to use the allocated frequency spectrum more efficiently. The in-band intermodulation distortion (IMD) performance of these amplifiers is extremely critical and needs to be measured using low distortion programmable multi-tone generators with superior IMD performance.
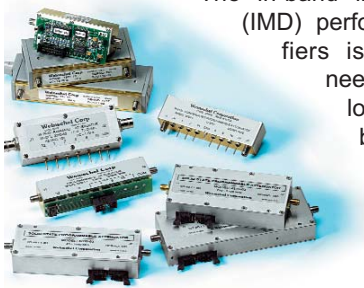
IM3 Performance of Electromechanical & Solid State Programmable Attenuators
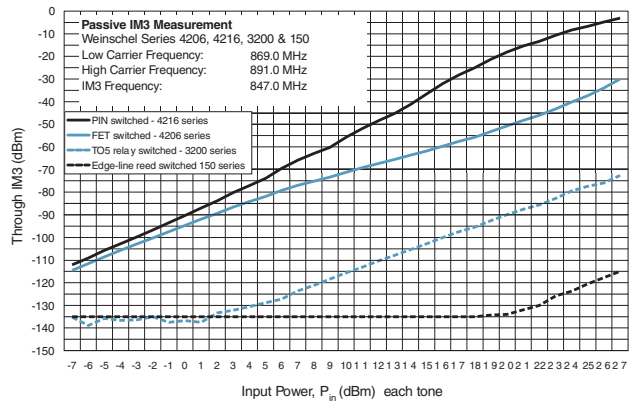
Electromechanical programmable attenuators obviously provide a far superior IMD performance than their corresponding solid state counterparts employing semiconductor switching elements. However, their slow switch speed, in the order of milli-seconds, and short switch life in the order of 5-10 million cycles make them unattractive in some applications like cell phone testing and other ATE systems. Solid State programmable attenuators do overcome these two problems and are, therefore, included here for IMD performance comparison. The goal is to provide some good basic IMD test data for a variety of commercial programmable attenuators and permit the end user to select the most appropriate type for his system application.

Fixed Attenuators & Terminations

These seemingly linear components generate low levels of IMD which must be considered, especially when incident power levels are high. Some of Aeroflex / Weinschel custom subsystem designs include low IM versions of medium and high power fixed attenuators and terminations. These components are supplied with specified 3rd order through and reflected intermodulation levels (IM3) measured with a passive IM analyzer. Typically, the IM3 levels for these components are -110 dBC . Standard Models with this LIM (low IM) option are models 33, 24, 49, 53, 57, 58 and the corresponding terminations, ranging in incident power ratings of 25 to 500 Watts. Features of these components include specifically designed connectors and carefully processed and trimmed thin film resistors for low IM performance.

Couplers, Cables, Switches, Connectors, etc.

For these other passive components Aeroflex / Weinschel works very closely with our suppliers, providing them pertinent design input to achieve the lowest possible IMD performance on such products.

24

SmartStep® Subsystems

AEROFLEX
WEINSCHEL

Models 8310 & 8311
Programmable Attenuator Units

<IEEE-488>

RS232\RS422/RS485

CE

Now Available with Ethernet Control!

Description

Aeroflex / Weinschel's 8310 and 8311Series Programmable Attenuator Units represent a new concept in programmable attenuation for bench test and subsystem applications. Standard 8310 Series designs house and control various Aeroflex / Weinschel Programmable Attenuator Models (3200T, 150T, and 4200 Series) via front panel controls or standard communications interfaces including GPIB (IEEE-488) and RS-232/RS-422 /RS485. This series combines the features of the Aeroflex / Weinschel 8210A Device Controller with a front panel user interface to form a flexible, easy to use solution.

Most 8310 Series are single channel configurations where RF signal is routed through either the front or rear mounted Ports A & B but can be configured for up to four channels of attenuation, RF switching, amplification or other functions. Multiple programmable attenuators can be used inconjuction with other coaxial devices such as switches, power combiners, directional couplers, and filters creating single or multichannel subsystems.

6 Channel 19" Rack Size Versions

Features

⌇ Provides a flexible, easy to program, low cost solution for your bench test/calibration setups and subsystem applications.

⌇ Multi-Channel attenuation paths (up to 4 input/outputs for 8310 & up to 6 input/outputs for 8311)

⌇ Relative vs. Nominal attenuation step function.

⌇ Wide choice of Frequency & Attenuation Ranges.
  - dc to 1, 2, 3, 6 & 18 GHz
  - NEW dc to 6 GHz Models
  - up to 127 dB
  - Solid-State (GaAs FET *& PIN)
  - Relay Switched

⌇ New Models with Ethernet Option

⌇ 75 Ω Configurations

⌇ Accuracy & Repeatability.

⌇ Designed to interface with Aeroflex / Weinschel's line of digitally controlled programmable attenuators and other electromechanical devices.

⌇ Designed to interface with industry standard communication interfaces:
  - GPIB/IEEE-488 (HS-488 ready)
  - RS-232, RS-422, RS-485
  - New Models with Ethernet Control (10 BaseT)

⌇ **Rack Configurable:** The Model 8310 or 8311 can be rack mounted either as a single unit using Rack Mounting Kit (P/N 193-8033) or two Model 8310's can be mounted together using Rack Mounting Kit (P/N 193-8033-1). These kits fit into any rack or cabinet that is designed per EIA RS-310 or MIL-STD-189.

Applications

Applications for the 8310 and 8311 Series range from providing control of a single Programmable Attenuator in a bench test/lab environment using a PC and a terminal emulator, to complex system applications where the 8310/8311 Series are employed to control many devices to create custom/ semi-custom subsystems to reduce overall design cost. Aeroflex / Weinschel can provide a variety of custom designed driver interfaces for various devices, such as RF switches, relays, pin attenuators, motorized step attenuators, displays, and other devices, as well as complete subsystem design and integration services. Contact us with your specialized needs.

For additional information on the Model 8310, visit our website @ www.aeroflex.com/AW/8310.htm

Specifications

SPECIFICATION	DESCRIPTION	
Input Power Requirements	ac	100 to 240 Vac, 50/60 Hz, 50 Watts
Environmental	Operating Temperature Storage Temperature: Humidity: Altitude:	0 to +50°C 67° to +167 °F (-55° to +75°C) 96% 40,000' (12,192M)
IEEE-488 Bus [1]	Connector: Protocols: Indicators:	24-pin per IEEE-488.1 per IEEE-488.2 Remote (RMT), Listen (LSN), Talk (TLK), SRQ (SRQ)
RS-232 Bus [2] **Serial I/O**	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD, RXD, RTS, CTS, DTR, GND 2400, 9600, 19200, and 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive)
RS-422 BUS [3] **RS-485 Bus** [4]	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD+, TDX-, RXD+, RTX-, RTS+, RTS-, CTS+, CTS-, and signal GND 2400, 9600, 19200, and 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive)
Ethernet TC/IP	10 Base T Connector: Console Connector:	Standard RJ45 9-pin male D
RF Characteristics[5]	See ordering guides (pg 26 through 28)	

1. GPIB/IEEE-488 model allows user-selectable addresses, Not included with Models with ethernet option.
2. RS-232 can be used with standard PC serial port for short and medium distances (up to approximately 50 ft).
3. RS-422, designed for very long distance communications (4000 ft) and & optimized as a single node protocol, typically with one device connected to a single port.
4. RS-485, designed for very long distance communications (4000 ft) & optimized for multi-drop connections that can used to create a low cost network.
5. Refer to Individual data sheet for detailed specifications on internal programmables.

Ordering Guide...8310 Series with 4200 Programmables

Model No	Attenuation Value (dB)	Frequency Range (GHz)	Insertion Loss (maximum)	SWR (Maximum)	No of Channels	Attenuator Model No.*	Connector Type	Conn Location
8310-136-F	63.75/0.25	0.8-2.5	6.0	1.6	1	4228-63.75	N/F	Front
8310-136-R	63.75/0.25	0.8-2.5	6.0	1.6	1	4228-63.75	N/F	Rear
8310-136-2-F	63.75/0.25	0.8-2.5	6.0	1.6	2	4228-63.75	N/F	Front
8310-136-2-R	63.75/0.25	0.8-2.5	6.0	1.6	2	4228-63.75	N/F	Rear
8310-137-F	63/1	0.8-3.0	4.7	1.6	1	4226-63	N/F	Front
8310-137-R	63/1	0.8-3.0	4.7	1.6	1	4226-63	N/F	Rear
8310-137-2-F	63/1	0.8-3.0	4.7	1.6	2	4226-63	N/F	Front
8310-137-2-R	63/1	0.8-3.0	4.7	1.6	2	4226-63	N/F	Rear
8310-138-F	103/1	0.8-3.0	6.0	1.6	1	4228-103	N/F	Front
8310-138-R	103/1	0.8-3.0	6.0	1.6	1	4228-103	N/F	Rear
8310-138-2-F	103/1	0.8-3.0	6.0	1.6	2	4228-103	N/F	Front
8310-138-2-R	103/1	0.8-3.0	6.0	1.6	2	4228-103	N/F	Rear
8310-138-3-T	103/1	0.8-3.0	6.0	1.6	3	4228-103	N/F	Front/Rear
8310-138-4-T	103/1	0.8-3.0	6.0	1.6	4	4228-103	N/F	Front/Rear

*Refer to Individual data sheet for detailed specifications on internal programmables.
Add N to the end of the Model number for ethernet option, IEEE-488 bus not included with option.

SmartStep® Subsystems

AEROFLEX WEINSCHEL

Ordering Guide...8310 Series with 3200 Programmables

| Model No	Attenuation Value (dB)	Frequency Range (GHz)	Insertion Loss (maximum)	SWR (Maximum)	No of Channels	Attenuator Model No.*	Connector Type	Conn Location
8310-1-F	63/1	dc-1.0 (75Ω)	6.0 dB	1.6	1	3250T-63	BNC/F	Front
8310-1-R	63/1	dc-1.0 (75Ω)	6.0 dB	1.6	1	3250T-63	BNC/F	Rear
8310-1-2-F	63/1	dc-1.0 (75Ω)	6.0 dB	1.6	2	3250T-63	BNC/F	Front
8310-1-2-R	63/1	dc-1.0 (75Ω)	6.0 dB	1.6	2	3250T-63	BNC/F	Rear
8310-1-3-T	63/1	dc-1.0 (75Ω)	6.0 dB	1.6	1	3250T-63	BNC/F	Front to Rear
8310-2-F	63/1	dc-1.0 (75Ω)	6.75 dB	2.0	1	3250T-63	F/F	Front
8310-2-R	63/1	dc-1.0 (75Ω)	6.75 dB	2.0	1	3250T-63	F/F	Rear
8310-2-2-F	63/1	dc-1.0 (75Ω)	6.75 dB	2.0	2	3250T-63	F/F	Front
8310-2-2-R	63/1	dc-1.0 (75Ω)	6.75 dB	2.0	2	3250T-63	F/F	Rear
8310-35-F	127/1	dc-2.0	6.0 dB	1.4	1	3200T-1	N/F	Front
8310-35-F-E	127/1	dc-3.0	6.0 dB	1.4	1	3200T-1E	N/F	Front
8310-35-R	127/1	dc-2.0	6.0 dB	1.4	1	3200T-1	N/F	Rear
8310-35-R-E	127/1	dc-3.0	6.0 dB	1.4	1	3200T-1E	N/F	Rear
8310-35-2-F	127/1	dc-2.0	6.0 dB	1.4	2	3200T-1	N/F	Front
8310-35-2-R	127/1	dc-2.0	6.0 dB	1.4	2	3200T-1	N/F	Rear
8310-35-3-T	127/1	dc-2.0	6.0 dB	1.4	3	3200T-1	N/F	Front to Rear
8310-35-4-T	127/1	dc-2.0	6.0 dB	1.4	4	3200T-1	N/F	Front to Rear
8310-35-4-T-E	127/1	dc-3.0	6.0 dB	1.4	4	3200T-1E	N/F	Front to Rear
8310-36-F	64.5/0.1	dc-2.0	8.0 dB	1.4	1	3209T-1	N/F	Front
8310-36-R	64.5/0.1	dc-2.0	8.0 dB	1.4	1	3209T-1	N/F	Rear
8310-36-2-F	64.5/0.1	dc-2.0	8.0 dB	1.4	2	3209T-1	N/F	Front
8310-36-2-R	64.5/0.1	dc-2.0	8.0 dB	1.4	2	3209T-1	N/F	Rear
8310-36-3-T	64.5/0.1	dc-2.0	8.0 dB	1.4	3	3209T-1	N/F	Front to Rear
8310-37-F	63.75/0.25	dc-2.0	6.0 dB	1.4	1	3200T-2	N/F	Front
8310-37-R	63.75/0.25	dc-2.0	6.0 dB	1.4	1	3200T-2	N/F	Rear
8310-37-2-F	63.75/0.25	dc-2.0	6.0 dB	1.4	2	3200T-2	N/F	Front
8310-37-2-R	63.75/0.25	dc-2.0	6.0 dB	1.4	2	3200T-2	N/F	Rear
8310-37-3-T	63.75/0.25	dc-2.0	6.0 dB	1.4	3	3200T-2	N/F	Front to Rear
8310-37-4-T	63.75/0.25	dc-2.0	6.0 dB	1.4	4	3200T-2	N/F	Front to Rear
8310-38-F	63/1	dc-2.0	5.25 dB	1.4	1	3206T-1	N/F	Front
8310-38-F-E	63/1	dc-3.0	5.25 dB	1.4	1	3206T-1E	N/F	Front
8310-38-R	63/1	dc-2.0	5.25 dB	1.4	1	3206T-1	N/F	Rear
8310-38-2-F	63/1	dc-2.0	5.25 dB	1.4	2	3206T-1	N/F	Front
8310-38-2-R	63/1	dc-2.0	5.25 dB	1.4	2	3206T-1	N/F	Rear
8310-38-3-T	63/1	dc-2.0	5.25 dB	1.4	3	3206T-1	N/F	Front to Rear
8310-38-4-T	63/1	dc-2.0	5.25 dB	1.4	4	3206T-1	N/F	Front to Rear
8310-352-F	103/1	dc-6.0	6.00 dB	1.55	1	3408T-103	N/F	Front
8310-352-R	103/1	dc-6.0	6.00 dB	1.55	1	3408T-103	N/F	Rear
8310-352-2-F	103/1	dc-6.0	6.00 dB	1.55	2	3408T-103	N/F	Front
8310-352-2-R	103/1	dc-6.0	6.00 dB	1.55	2	3408T-103	N/F	Rear
8310-352-3-T	103/1	dc-6.0	6.00 dB	1.55	3	3408T-103	N/F	Front to Rear
8310-352-4-T	103/1	dc-6.0	6.00 dB	1.55	4	3408T-103	N/F	Front to Rear

Ordering Guide...8310 Series with 150 Programmables

| Model No	Attenuation Value (dB)	Frequency Range (GHz)	Insertion Loss (maximum)	SWR (Maximum)	No of Channels	Attenuator Model No.*	Connector Type	Conn Location
8310-201-F	70/10	dc-18.0	3.25 dB	1.75	1	150T-70	SMA/F	Front
8310-201-R	70/10	dc-18.0	3.25 dB	1.75	1	150T-70	SMA/F	Rear
8310-201-2-F	70/10	dc-18.0	3.25 dB	1.75	2	150T-70	SMA/F	Front
8310-201-2-R	70/10	dc-18.0	3.25 dB	1.75	2	150T-70	SMA/F	Rear
8310-202-F	121/1	dc-18.0	5.25 dB	1.95	1	150T-11+150T-110	SMA/F	Front
8310-202-R	121/1	dc-18.0	5.25 dB	1.95	1	150T-11+150T-110	SMA/F	Rear
8310-204-F	62/2	dc-18.0	3.70 dB	1.95	1	150T-62	SMA/F	Front
8310-204-R	62/2	dc-18.0	3.70 dB	1.95	1	150T-62	SMA/F	Rear
8310-204-2-F	62/2	dc-18.0	3.70 dB	1.95	2	150T-62	SMA/F	Front
8310-204-2-R	62/2	dc-18.0	3.70 dB	1.95	2	150T-62	SMA/F	Rear

SmartStep® Subsystems

Ordering Guide...8311 Series!

Model No	Attenuation Value (dB)	Frequency Range (GHz)	Insertion Loss (maximum)	SWR (Maximum)	No of Channels	Attenuator Model No.*	Connector Type	Conn Location
8311-1-6-F	63/1	dc-1.0 (75Ω)	6.00 dB	1.60	6	3250T-63	BNC/F	Front
8311-38-6-F	63/1	dc-2.0	5.25 dB	1.40	6	3206T-1	N/F	Front
8311-38-12-T	63/1	dc-2.0	5.25 dB	1.40	12	3206T-1	N/F	Front-Rear
8311-137-6-F	63/1	0.8-3.0	4.70 dB	1.60	6	4226-63	N/F	Front
8311-202-2-F	121/1	dc-18.0	5.25 dB	1.95	2	150T-11+150T-110	SMA/F	Front
8311-202-3-F	121/1	dc-18.0	5.25 dB	1.95	3	150T-11+150T-110	SMA/F	Front
8311-204-6-F	62/2	dc-18.0	3.70 dB	1.95	6	150T-62	SMA/F	Front
8311-352-6-F	103/1	dc-6.0	6.00 dB	1.55	6	3408T-103	SMA/F	Front
8311-352-9-T	103/1	dc-6.0	6.00 dB	1.55	9	3408T-103	SMA/F	Front-Rear

8310 Series:

8311 Series:

Connector Type	DIM A
N	29.2 (1.15)
SMA	8.6 (0.34)
BNC	18.8 (0.74)
F	9.65 (0.38)
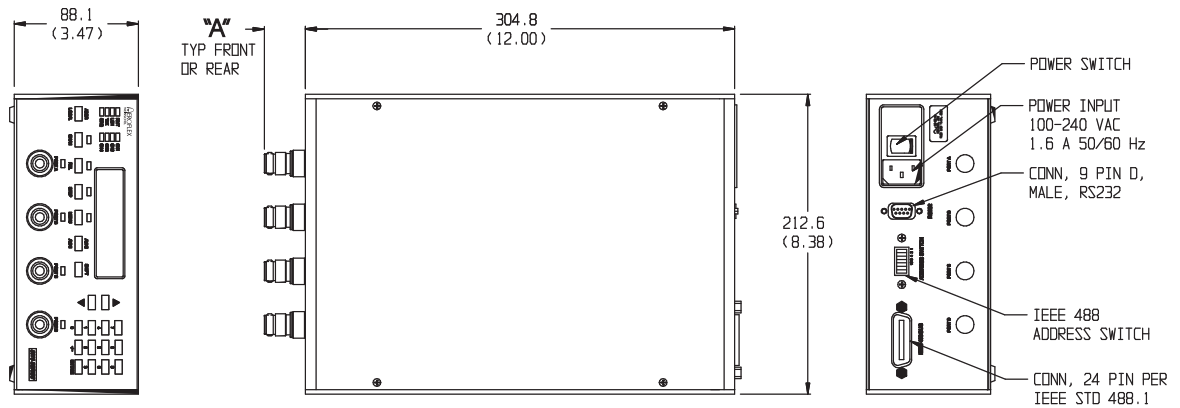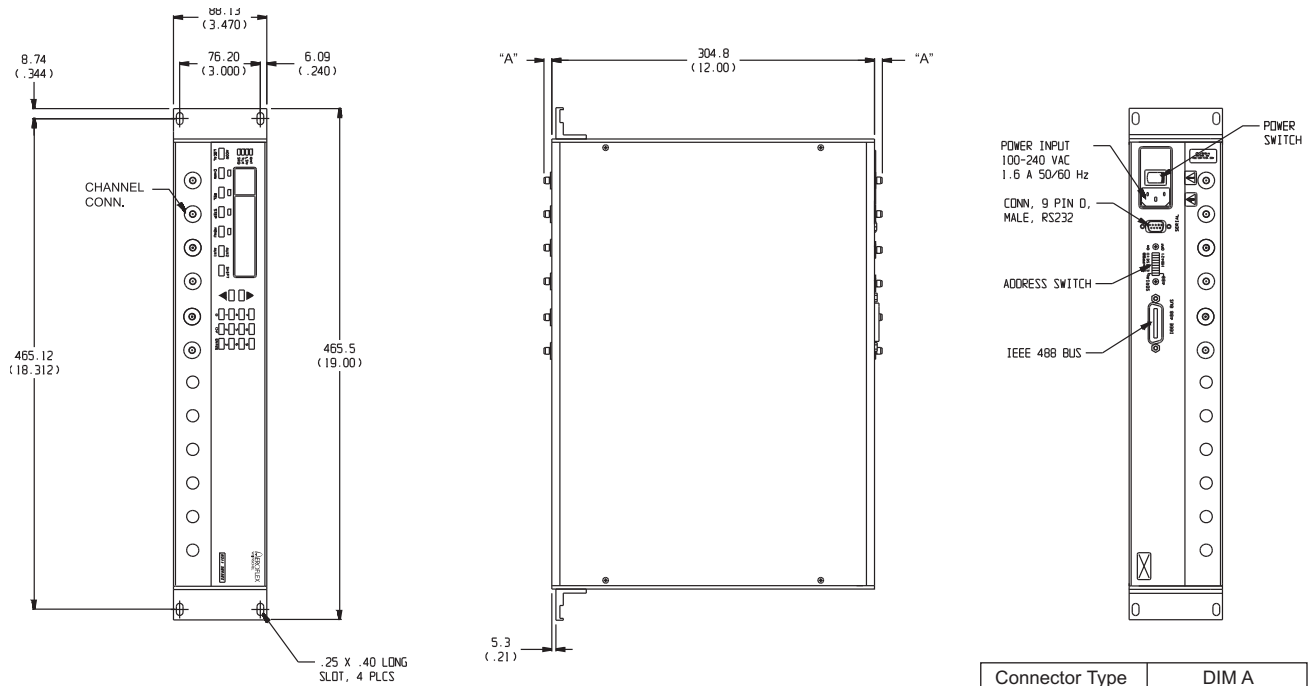
NOTE:

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

2. Connector location (Front/Rear) may vary depending on Model ordered.

SmartStep® Subsystems

AEROFLEX
WEINSCHEL

Model 8312
High Power Programmable Attenuator

100 Watt Hot Switching Capability

Description

Aeroflex / Weinschel's design approach uses a highly adaptable platform that allows configuration of the step attenuator to the customers requirements. When the controller requests a new attenuation level the input switch terminates the input signal into a 50 Ohm load. (See Figure 1) This input switch is **hot switchable at 100 Watts** of input power. This will remove the high power signal from the main signal path. With no signal connected to the attenuator path the controller then commands the series of relays to configure the attenuator for the requested attenuation value. Then the input switch re-connects the input signal to the attenuator path. The system can be operated with either a remote controller (IEEE-488 or RS-232) or through front panel control.

Features

⫽ Available in 0-15 dB or 0-31 dB Configurations.

⫽ Provides a flexible, easy to program, low cost solution for your bench test/calibration setups and subsystem applications.

⫽ Relative vs. Nominal attenuation step function.

⫽ DC to 13.0 GHz Operation.

⫽ High Accuracy & Repeatability.

⫽ Power Handling up to 100 Watts average

⫽ Designed to interface with industry standard communication interfaces:

  - GPIB/IEEE-488 (HS-488 ready)
  - RS-232, RS-422

⫽ Built-in monitoring for switching input power into the load in case of fan failure.

⫽ **Rack Configurable:** A Rack Mounting Kit is included for easily mounting the Model 8312 into any rack or cabinet that is designed per EIA RS-310 or MIL-STD-189.
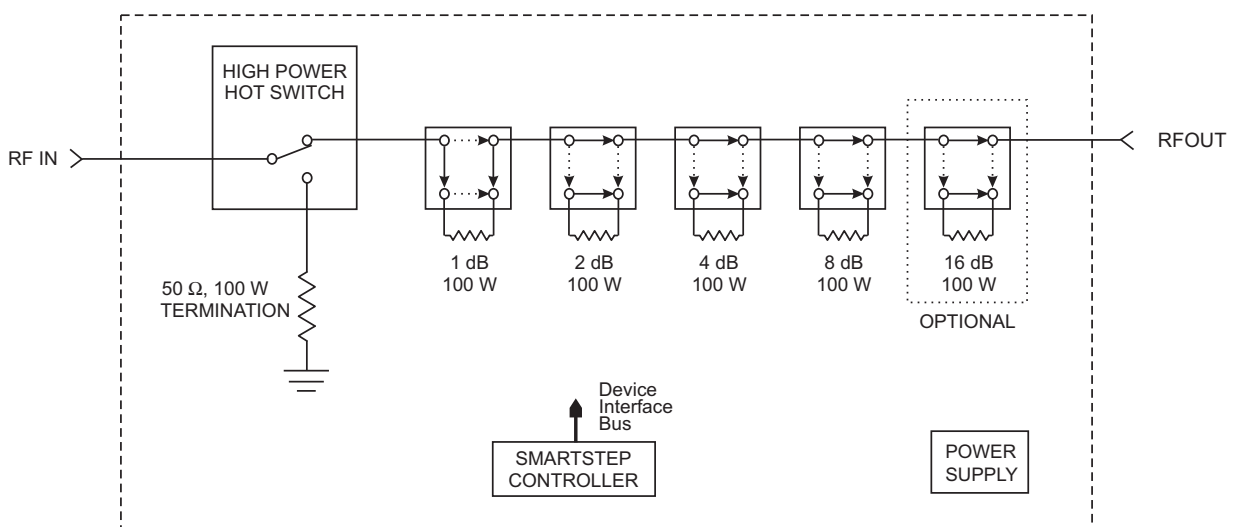
Note: If power failure should occur, the unit will remain in the last selected attenuation state.

Figure 1. Model 8312 Block Diagram

For additional information on the Model 8312, visit our website @ www.aeroflex.com/AW/8312.htm

Specifications

SPECIFICATION	DESCRIPTION	
Input Power Requirements	AC	100 to 240 Vac, 50/60 Hz, 50 Watts
Environmental	Operating Temperature Storage Temperature: Humidity: Altitude:	0 to +50°C 67° to +167 °F (-55° to +75°C) 96% 40,000' (12,192M)
IEEE-488 Bus	Connector: Protocols: Indicators:	24-pin per IEEE-488.1 per IEEE-488.2 Remote (RMT), Listen (LSN), Talk (TLK), SRQ (SRQ)
RS-232 Bus	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD, RXD, RTS, CTS, DTR, GND 2400, 9600, 19200, and 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive)
RS-422 BUS[3]	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD+, TDX-, RXD+, RTX-, RTS+, RTS-, CTS+, CTS-, and signal GND 2400, 9600, 19200, and 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive)

RF Characteristics[4]

Connectors:	Type N, Female		
Frequency Range:	dc - 13 GHz		
Impedance:	50 Ω		
SWR:	50 MHz - 5 GHz: 5 GHz - 13 GHz:	1.60 (Maximum) 2.30 (Maximun)	
Attenuation Range:	15 dB/1 dB steps (8312-15-F) 31 dB/1 dB steps (8312031-F)		
RF Power Rating:	50 MHz - 5 GHz: 5 GHz - 13 GHz:	100 Watts (Maximum) 50 Watts (Maximum)	
Attenuation Settings:	100, 000 selections (minimum)		
Attenuation Update Rate:	1 second (Typical)		

Incremental Accuracy:	Frequency	1-15 dB	16-31 dB
	50 MHz - 3 GHz:	+0.6 dB	+0.8 dB
	3 GHz - 5 GHz:	+0.6 dB	+0.8 dB
	5 GHz - 13 GHz:	+2.5 dB	+3.0 dB

| Insertion Loss (dB):	Frequency Range	8312-15-X	8312-31-X
	50 MHz - 3 GHz:	3.0	3.5
	3 GHz - 5 GHz:	4.0	4.5
	5 GHz - 13 GHz:	7.0	8.0

1. GPIB/IEEE-488 model allows user-selectable addresses.
2. RS-232 can be used with standard PC serial port for short and medium distances (up to approximately 50 ft).
3. RS-422, designed for very long distance communications (4000 ft) and & optimized as a single node protocol, typically with one device connected to a single port.
4. Refer to Individual data sheet for detailed specifications on internal programmables.

SmartStep® Subsystems

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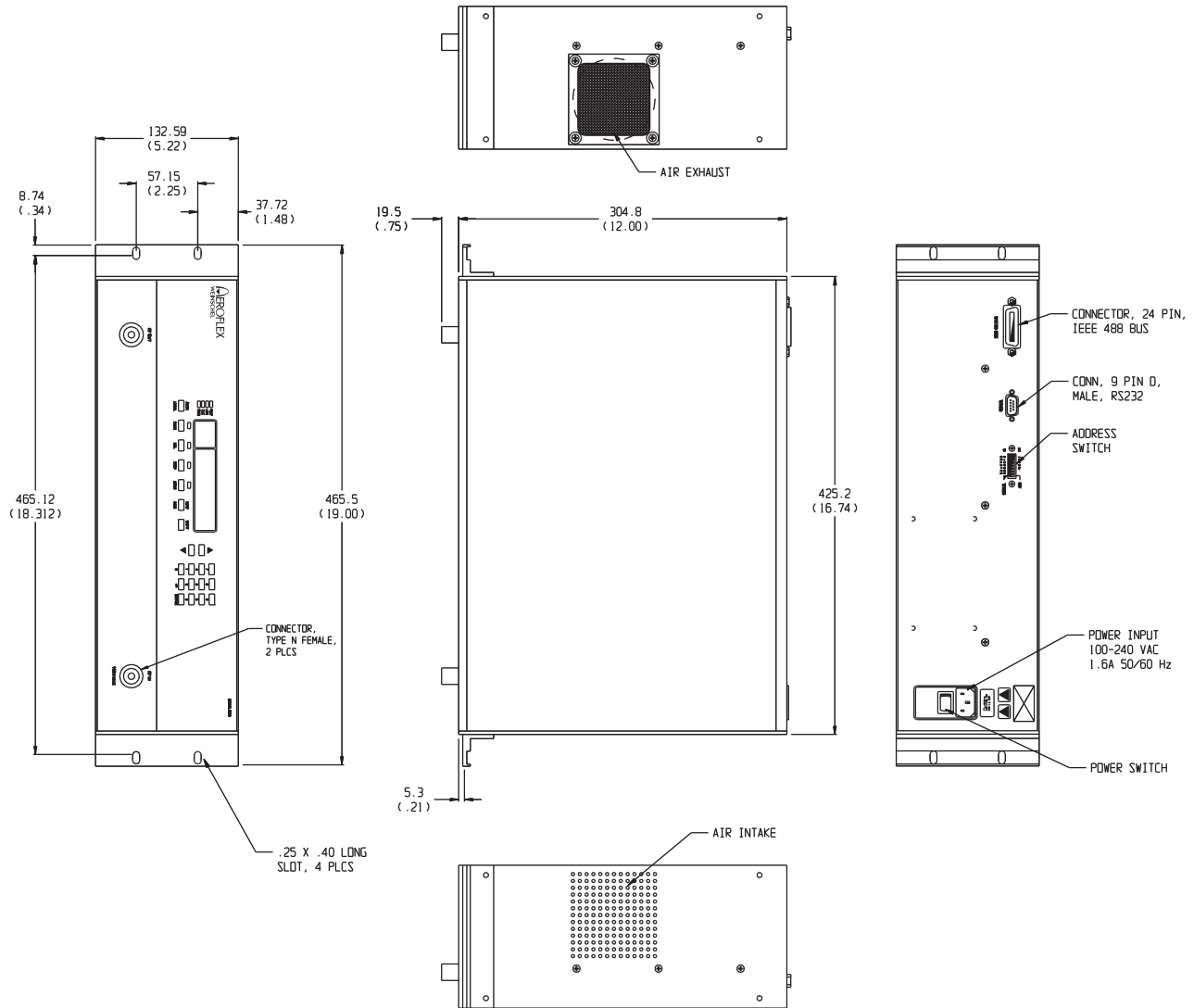
NOTE: All dimensions are given in mm (inches) and are maximum, unless otherwise specified.

MODEL NUMBER DESCRIPTION:

Example:

8312 - XX - F

Basic
Model
Number

Attenuation
Value (dB)*

Connector Location
F = Front (Only)

* Available in 0-15 dB and 0-31 dB configurations only!

Model 8210A
Programmable Attenuator/Switch Controller

IEEE-488

RS232\RS422/RS485

A Logical Interface for Switchable Devices!

Applications

Applications for the 8210A range from providing control of a single Programmable Attenuator in a bench test/lab environment using a PC and a terminal emulator, to complex system applications where the 8210A is employed to control many devices to create custom/semi-custom subsystems to reduce overall design cost. Aeroflex / Weinschel can provide a variety of custom designed driver interfaces for various devices, such as RF switches, relays, PIN attenuators, displays and other devices, as well as complete subsystem design and integration services. Contact us with your specialized needs.

Features

- Provides a flexible, powerful, low cost solution for bus control of programmable step attenuators and other switchable devices under computer control.
- Designed to interface with Aeroflex / Weinschel's line of intelligent programmable attenuators and other electromechanical devices.
- Simplifies your bench test setups and subsystem design.
- Available in two standard communication interfaces:
  - Model 8210A-1: GPIB/IEEE-488 (HS-488 ready)
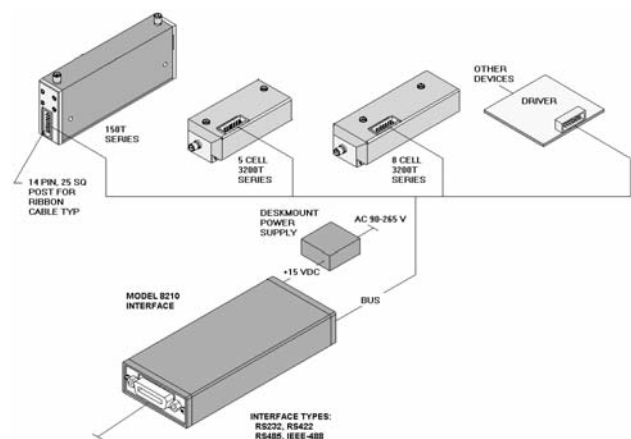 - Model 8210A-2: RS-232, RS-422, RS-485

Description

Model 8210A represents a new concept in device control applications and provides a high level interface from various industry standard communications interfaces to the serial Driver Interface Bus.

The Device Interface Bus (DIB) is a system for connecting a number of relatively low-speed I/O devices to a host, providing a simple, uniform and inexpensive way to control a variety of devices via a single port. The DIB is based on the two-wire serial bus and several software protocol layers that allow the Model 8210A to address up to 125 peripheral devices with serial data rates of up to 100 KHz. The DIB may also be used to supply DC power to the devices, resulting in a simple, low-cost interconnection system.

This Programmable attenuator/switch controller is available in two models, each providing a different type of communications interface to suit user configuration requirements. Each model contains similar capabilities, and provides switch-selectable parameters to the interfaces' operation.

Typical Capacity: Control a subsystem consisting of 32 individual 8-cell programmable attenuators plus 16 DPDT switches.

For additional information on the Model 8210A, visit our website @ www.aeroflex.com/AW/8210A.htm

SmartStep® Subsystems

Specifications

| SPECIFICATION	DESCRIPTION	
DC Input	Connector: Requirements:	2.5mm barrel style +12 to +15 Vdc @ 250 mA
Driver Interface	Connector:	14-pin 0.025" square post header @ 0.1" centers. Mates with AMP 746285-2 or equivalent.
	Signals :	SDA serial data SDC serial clock VDC DC supply voltage GND ground
	VDC Output Current: Maximum Cable Length: Data Transfer Rate:	2 A maximum 10 Meters (1000 pF maximum capacitance) 100 KHz
Environmental	Operating Temperature: Storage Temperature: Humidity: Altitude:	0 to +50°C -55° to +75°C (67° to +167°F) 95% 40,000' (12,192M)
IEEE-488 Bus[1]	Connector: Protocols: Indicators:	24-pin per IEEE-488.1 per IEEE-488.2 Remote, Listen
RS-232 Bus[2]	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD, RXD, RTS, CTS, DTR, GND 2400, 9600, and 19200, 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive Active)
RS-422 Bus[3] **&** **RS-485 Bus**[4]	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D(Model 8210-2) TXD+, TDX-, RXD+, RTX-, RTS+, RTS-, CTS+, CTS-, & signal GND 2400, 9600, and 19200, 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive Active)

Notes:

1. GPIB/IEEE-488 model allows user-selectable addresses.
2. RS-232 can be used with standard PC serial port for short and medium distances (up to approximately 50 ft).
3. RS-422, designed for very long distance communications (4000 ft) & optimized as a single node protocol, typically with one device connected to a single port.
4. RS-485, designed for very long distance communications (4000 ft) & optimized for multi-drop connections that can used to create a low cost network.
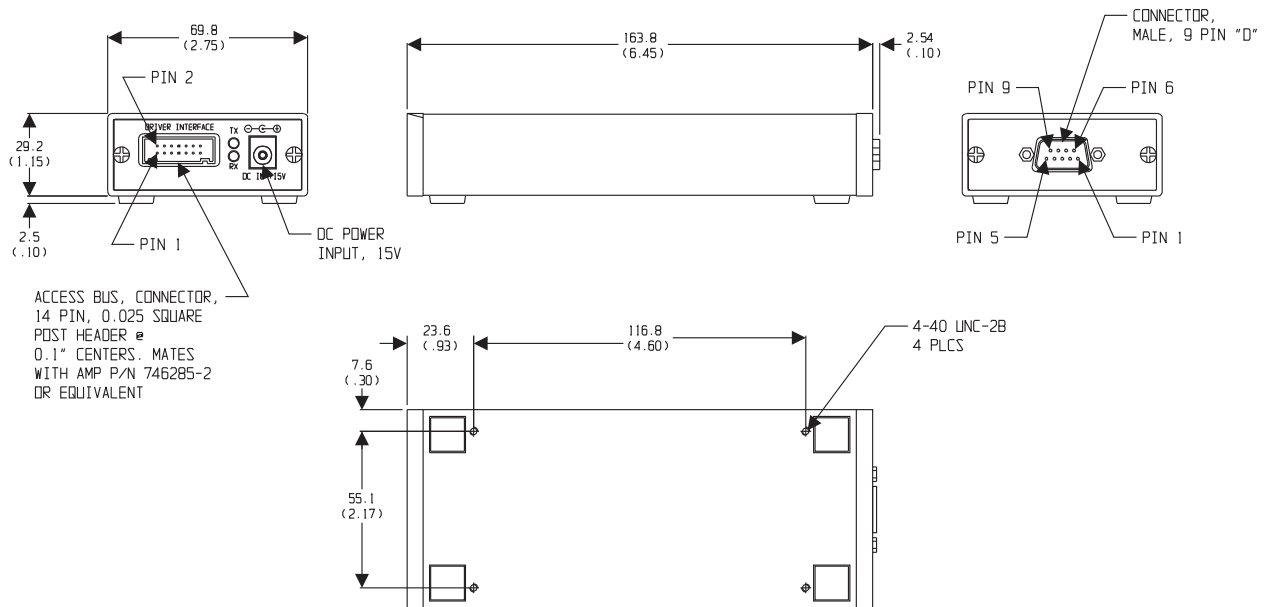
Accessories:

PART NUMBER	DESCRIPTION
001-378	Deskmount Power Supply, +15 V 95-250 Vac, 47-63 Hz ac input
193-8013	Interconnect Cable
193-8012	Attenuator Mounting Kit: This kit includes all hardware to allow the user to mount one attenuator onto the Model 8210A

Physical Dimensions

Model 8210A-1 (IEEE-488):
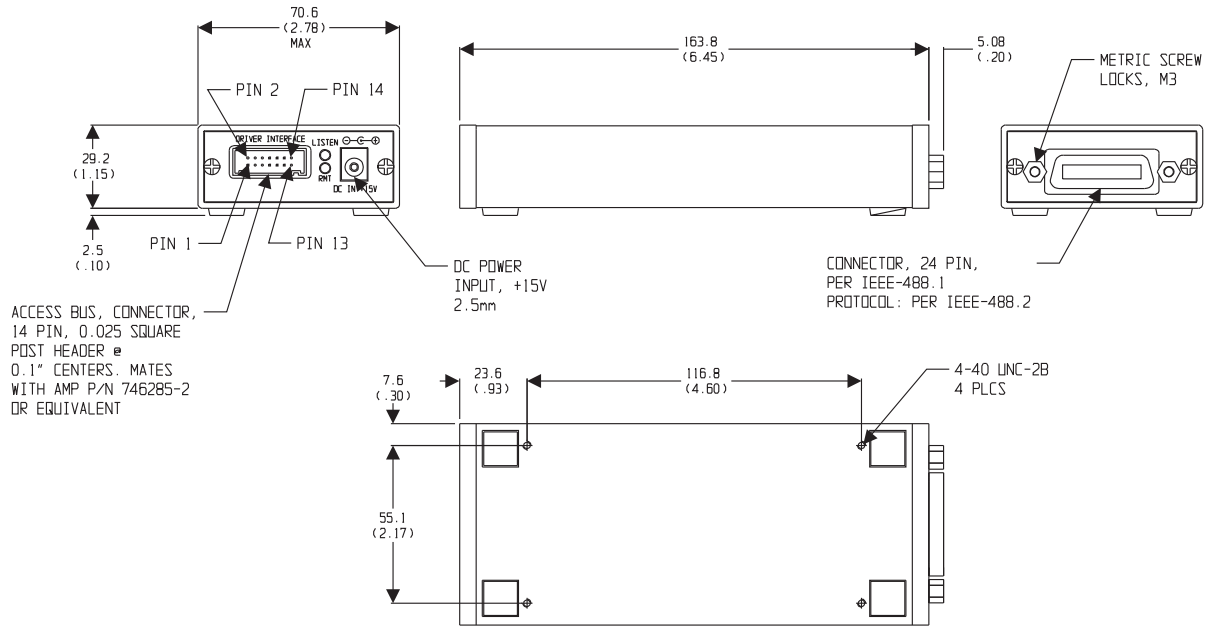
Model 8210A-2 (RS-232/RS-422/RS-485):

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

![AEROFLEX WEINSCHEL logo]

Frequency Translators

Broadband Frequency Coverage

Aeroflex / Weinschel has numerous Frequency Translator designs that cover frequency ranges of IF frequencies through X- Band frequencies. These custom designed sub-systems provide several parallel, extremely low phase noise conversion paths. Specifically designed low phase noise amplifiers, SRD's and divider circuits result in a superior frequency translation capability. Filters are designed to the customers needs to reduce spurious and harmonic content to extremely low levels.

These subsystems use frequency multipliers and mixers to generate a set of phase coherent low phase noise carriers. Through the use of ultra low phase noise oscillators driving distribution amplifiers supply the signals that are multiplied by various N values and combined with mixers to achieve the customer required frequencies with excellent phase noise. A bank of filters block the undesired mixer/multiplier products.

During the development, qualification and test of the Frequency Translators the main piece of test equipment used is the Aeroflex PN9000 Phase and Amplitude Noise Test Set.

A typical Translation block diagram is shown below. Also shown is typical phase noise performance of a X band translation circuit with a carefully designed times 18 multiplier circuit.
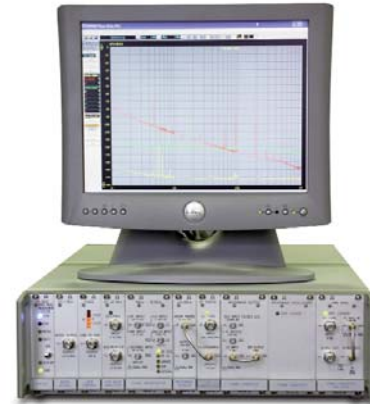
Aeroflex PN9000 Phase and Amplitude Noise Test Set (shown above) is used to test Aeroflex / Weinschel Translator designs.

X-Band 18x Multiplier
SSB Phase Noise
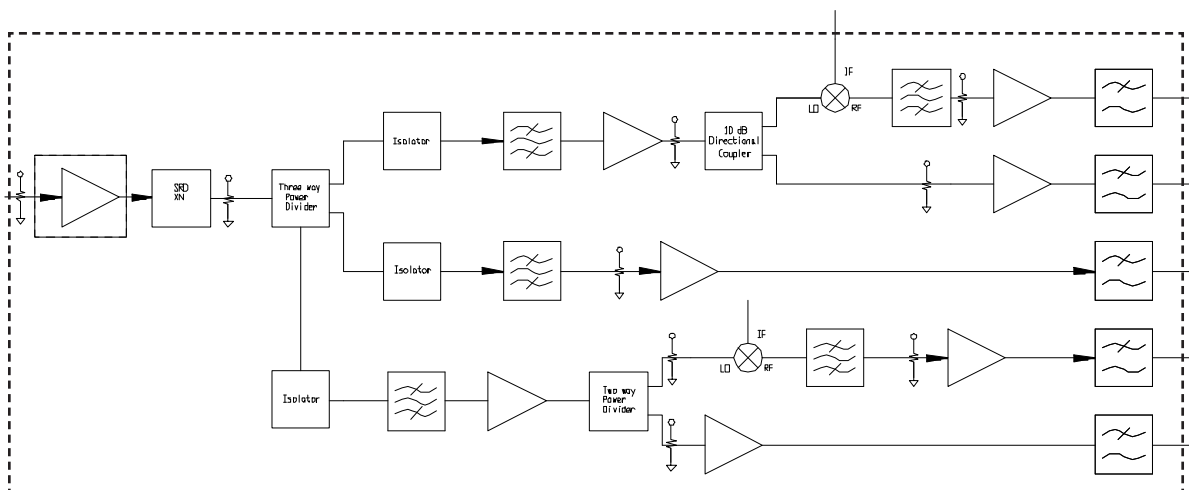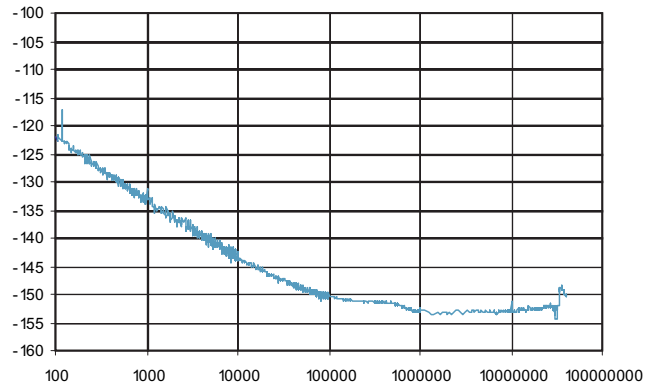
Certificate No. 289I

AEROFLEX / WEINSCHEL
5305 Spectrum Drive
Frederick, MD 21703-7362
Tel: 800-638-2048, 301-846-9222
Fax: 301-846-9116
www.aeroflex.com/weinschel
weinschel-sales@aeroflex.com

AEROFLEX
A passion for performance.

Our passion for performance is defined by three
attributes represented by these three icons:
solution-minded, performance-driven and customer-focused.