



## 100 W HOT SWITCHING PROGRAMMABLE ATTENUATORS

In order to test high power amplifiers used in today's cellular base station equipment it is sometimes necessary to perform automated switching of the high power amplifiers without shutting down the system to make the RF connection. The high power RF signal must be diverted from the main signal path during normal operation without the threat of damage to the amplifier. The missing element in this scenario has been a hot switching programmable attenuator that can adjust the high power input signal level and remove it from the main signal path without damage to the drive components or power amplifier.

The model 8312 is a 100 W "hot switchable" programmable attenuator that permits the signal attenuation level to be adjusted while the input switch terminates the input signal into a 50  $\Omega$  load. Thus the high power signal is removed from the main signal path without affecting the other components of the system. 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. The input switch then reconnects the input signal to the attenuator. In doing so the system can be operated with either a remote controller using IEEE-488 or RS-232 interface or through the

attenuator's front panel controls, providing a means of adjusting the high power amplifier output for test purposes without the need for system shutdown.

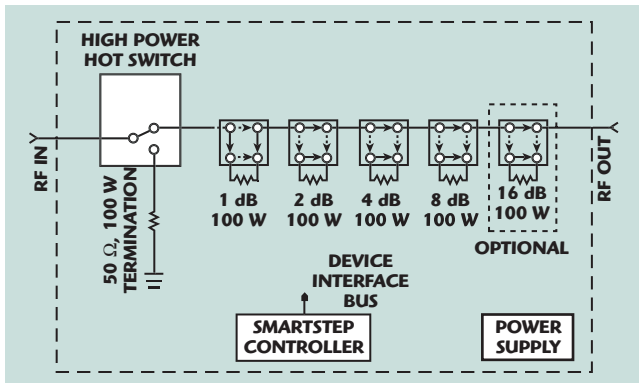
The new programmable attenuator operates from DC to 13 GHz and is designed to provide high power signal switching using a high performance/high power input switch. This switch is also available as a stand alone unit. The 8501 Series subsystem provides front panel and computer control for up to two channels of high power RF switching for use in EMI screen rooms during susceptibility testing and in life testing of high power amplifiers where automated switching to remote test equipment is required. The switches have also been used in test sets involved in radar equipment testing.

The 8312 attenuator is comprised of a highly adaptable platform that allows the configuration of the step attenuator to be matched to the user's requirements using either the front panel controls or a remote controller. The unit provides a flexible, easy to program, low cost solution for bench testing, calibration setups and subsystem use. The 8312 unit is available in 0

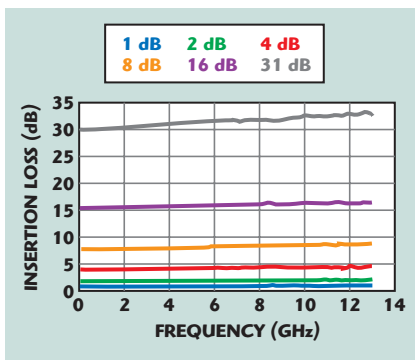
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# CAD, TEST AND MEASUREMENT SUPPLEMENT



▲ Fig. 1 The attenuator's simplified block diagram.



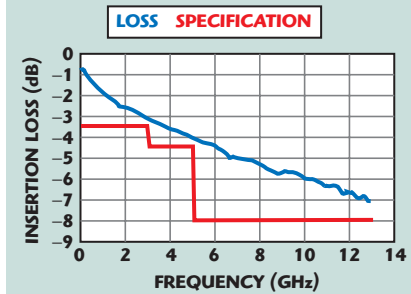
▲ Fig. 2 Incremental insertion loss.

to 15 and 0 to 31 dB configurations and offers 1 dB attenuation level adjustments. **Figure 1** shows a simplified block diagram of the attenuator's electrical configuration.

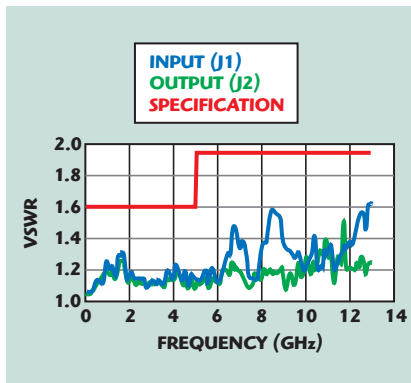
The unit is capable of 100,000 hot-switched attenuator selections with a typical attenuation update rate of one

second. Attenuation accuracy varies from  $\pm 0.5$  dB at 3 GHz in the 1 to 15 dB attenuation range to  $\pm 3$  dB at 13 GHz in the 16 to 31 dB attenuation range. **Figure 2** shows the unit's incremental insertion loss vs. frequency and **Figure 3** shows the insertion loss at 0 dB attenuation.

The model 8312 programmable attenuator is supplied in a 19"  $\times$  5.22"  $\times$  12" deep housing that is easily rack mounted. Its RF input and output connectors are type-N female at 50  $\Omega$  impedance. Input and output VSWR is 1.60 max. 50 MHz to 5 GHz and 1.95 max. 5 to 13 GHz. **Figure 4** shows a plot of the measured input and output VSWR vs. frequency. The RF power rating is 100 W from 50 MHz to 5 GHz and 50 W max. from 5 to 13 GHz. Input power requirements are 100 to 240 VAC, 50/60 Hz at 50 W. A 24-pin connector for IEEE-488 bus and a 9-pin D connector for RS232 bus connections are available in the rear of the housing. Environmental requirements include an operating temperature of 0° to 50°C, with a relative humidity of up to 95 percent non-condensing. Addi-



▲ Fig. 3 Insertion loss at 0 dB attenuation.



▲ Fig. 4 Input and output VSWR.

tional information may be obtained from the company's Web site at [www.weinschel.com](http://www.weinschel.com).

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