Model 8850

ATTENUATION MEASUREMENT SYSTEM　0.01 TO 18 GHz

(expandable to 40 GHz)

IEEE - 488

High Accuracy $\pm$ 0.005 dB/10 dB $\pm$ 0.010 dB

The Model 8850 Attenuation Measurement System combines the outstanding accuracy, performance, high sensitivity, and reliability of our Model **VM-7** Attenuator and Signal Calibrator with our Model **8852**, 0.01 to 18 GHz Frequency Converter.

When combined with a suitable generator, the Model 8850 provides the user with an attenuation calibration system of high accuracy, repeatability and speed.

Some other features of this system include:

• **ADVANCED TECHNIQUES** – Advanced digital detection and processing techniques of the VM-7 means that measurements are available instantaneously, no matter what the dynamic range or resolution.

• **SINGLE BAND OPERATION** – The system can be converted to a 0.01 to 18 GHz single port converter. This is accomplished by using the measurement accessory kit (P/N 187-4001) that is supplied as part of the system. The measurement accessory kit includes low SWR masking attenuators and a power divider to provide a measurement system as shown in Figure 1.

• **DUAL BAND OPERATION** – The RF input frequency range is divided into two bands, 0.01 to 2 GHz, and 2 GHz to 18 GHz. This allows the user direct access to the RF port of either the LOW band or HIGH band mixer to make full use of the VM-7 dynamic range.

• **IEEE-488 BUS PROGRAMMABLE** – Remote programmability over the IEEE-488 bus using an external controller or controlling the system using only the VM-7.

• **AUXILIARY OUTPUT** – An auxiliary output of 2 to 18 GHz synthesized continuous wave signal in 2 KHz steps at +7 dBm is available, which can be used as an RF signal source for other applications.

• **VERSATILE AND USER FRIENDLY** – This measurement system will test all types of attenuators such as fixed, manual, motorized, programmable and other coaxial components. Using CamLab Windows™ test software can provide an efficient and user friendly way to test all types of coaxial components quickly and accurately.

OPTIONS

Option 01 – The 01 option includes the Models VM-7, 8852, TEGAM Attenuation Measurement Accessory Kit and a suitable RF Signal Source. The result is a measurement system that leads the field in performance, at a price compatible with production test as well as calibration laboratory budgets.

Option 02 – The 02 option includes all items in the 01 option and the addition of a PC compatible system controller and the Calibration, Attenuation Measurement Lab (CamLab) Software for Windows™ (P/N 189-22)

SPECIFICATIONS

Model 8850 Measurement Receiver

SPECIFICATION	DESCRIPTION
INPUT POWER REQUIREMENTS	100,120, 220, 240 Vac ±10% @ 50 to 60 Hz (all Instruments)
ENVIRONMENTAL	Operating Temperature: 0 to 50°C (+32° to 122°F) Storage Temperature: -40 to +75°C (-40 to +167°F) Humidity: 95 %
INPUT FREQUENCY	Low Band: 0.01 to 2 GHz High Band: 2.0 to 18 GHz
FREQUENCY RESOLUTION	1 kHz from .01 to 2 GHz 2 kHz above 2 GHz
MAXIMUM INPUT LEVEL	To prevent damage +20 dBm
NOMINAL IMPEDANCE	50 W at RF input ports
SWR AT RF INPUT CONNECTOR	LOW BAND (0.01-2 GHz): 3.1 maximum HIGH BAND (2-18 GHz): <3.1 maximum
DYNAMIC RANGE	0 to -103 dBm 10 to 300 MHz 0 to -112 dBm 300 to 1000 MHz 0 to -117 dBm 1000 MHz to 18 GHz

SPECIFICATION	FREQUENCY	ACCURACY	RANGE (dBm)
LINEARITY ACCURACY*	10 to 300 MHz	±0.100/10 dB ±0.01 dB	-10 to -20
		±0.005/10 dB ±0.01 dB	-20 to - 86
		± 0.100/10 dB ±0.01 dB	-100 to -103
	300 MHz to 1 GHz	±0.100/10 dB ±0.01 dB	-10 to -20
		±0.005/10 dB ±0.01 dB	-20 to -95
		±0.100/10 dB ±0.01 dB	-100 to -112
	1 to 18 GHz	±0.100/10 dB ±0.01 dB	-10 to -20
		±0.005/10 dB ±0.01 dB	-20 to -100
		±0.100/10 dB ±0.01 dB	-100 to -117

* Exclusive of signal source, SWR effects and connector repeatability (1-18 GHz).

SPECIFICATION	DESCRIPTION	
INPUT SENSITIVITY**	Wideband:	≤ -100 dBm @ 0.01 to 18 GHz
	Narrow band:	≤ -103 dBm @ 10 to 300 MHz ≤ -112 dBm @ 300 to 1,000 MHz ≤ -1117 dBm @ 1.001 to 18 GHz

** Specification based on the ability of the VM-7 to phase lock to signal.

OPERATION	Remote using IEEE-488 bus control (Compatible with IEEE-488 STD-1987) or manual using VM-7 Local mode

Model 8850-01/02 Measurement System

SPECIFICATION	DESCRIPTION
INPUT POWER REQUIREMENTS	100, 120, 220, 240 Vac ± 10% @ 50 to 60 Hz (all Instruments)
ENVIRONMENTAL	Operating Temperature: 0 to 50°C (+32° to 122°F) Storage Temperature: -40 to +75°C (-40 to +167°F) Humidity: 95 %
INPUT FREQUENCY	Low Band: 0.01 to 2 GHz High Band: 2.0 to 18 GHz
FREQUENCY RESOLUTION	1 kHz from .01 to 2 GHz 2 kHz above 2 GHz
MAXIMUM INPUT LEVEL	To prevent damage +20 dBm
NOMINAL IMPEDANCE	50 W at RF Input ports
SWR AT DUT POINT	0.01 to 4.0 GHz 1.15 maximum 4.0 to 12.4 GHz 1.20 maximum 12.4 to 18.0 GHz 1.25 maximum
DYNAMIC RANGE	0 to -103 dBm 10 to 300 MHz 0 to -112 dBm 300 to 1000 MHz 0 to -117 dBm 1000 MHz to 18 GHz
ATTENUATION ACCURACY*	ACCURACY RANGE (dB) ±0.015 dB (System Repeatability) ±0.005/10 dB 0 to 80 ±0.100/10 dB 80 to 105 * Exclusive of SWR effects and connector repeatability (1-18 GHz).
OPERATION	Remote using IEEE-488 bus control (Compatible with IEEE-488 STD-1987) or manual using VM-7 Local mode
AUX OUTPUT	2 to 18 GHz, +7 dBm ±2.5 dB SMA connector, terminate into 50 Ω when not used.

Ordering Guide

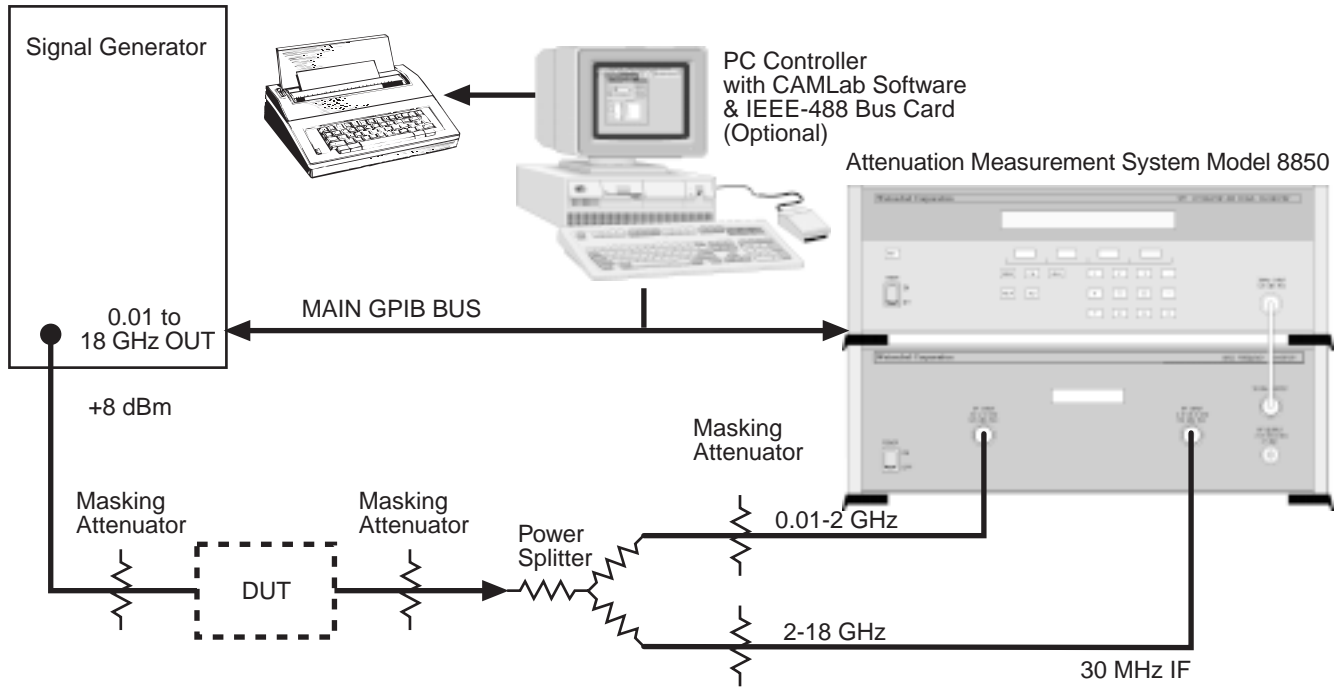| Model #	System Configurations
8850	VM-7, 8852, and TEGAM Attenuation Measurement Accessory Kit (P/N 187-4001)
8850-01	VM-7, 8852, Compatible Signal Source, and TEGAM Attenuation Measurement Accessory Kit (P/N 187-4001)
8850-02	VM-7, 8852, Compatible Signal Source, PC Controller (200 MHz Pentium with 32 Meg RAM or higher, color monitor, and GPIB Interface), TEGAM Attenuation Measurement Accessory Kit (P/N 187-4001, IEEE-488\System cables, and CamLab Windows Software™ (P/N 189-22).

Figure 1. Typical System Configuration

APPLICATIONS

Attenuation Measurements (0.01-18 GHz, extendible to 40 GHz): Figure 1 depicts a system setup for performing component measurements across the 0.01-18 GHz frequency band without changing any connections on the Model 8850 front panel. This setup gives the user the widest measuring frequency range possible. Removing the Power Splitter and connecting the input signal directly to the the desired frequency input allows the user to increase the measurement systems dynamic range with the lowest possible SWR effects. This configuration can perform measurements in either the 0.01-2 GHz band or 2-18 GHz band depending on the Model 8850 front panel connection.

Using the Model 8852 as a CW signal source and the addition of the TEGAM Model 8853 will allow the Model 8850 to process frequencies up to 40 GHz in coax. Refer to the Model 8853 data sheet for more information and actual configuration diagram.

Return Loss\SWR Measurements: The TEGAM SWR Measurement Kit (P/N 187-4001-1) can be used with the Model 8850 and the CamLab Windows™ Software to perform return loss measurements. The SWR Measurement Kit includes a return loss bridge with an "open" and "short." Because the Model 8850 operates as a single channel receiver, it can be used as a scalar system. The DUT's impedance to 50 ohms can be checked as a scalar quantity by measuring return loss.

The actual measured return loss can be readily converted into SWR by the system software. Refer to the SWR Measurement data sheet for more information and actual configuration diagram.

RF Substitution Measurements: The Model 8861 Switch Matrix can be used to perform RF substitution measurements using the internal attenuator as the substitution attenuator. The internal attenuator is set and reset automatically by the CamLab Windows™ software and does not require the operator to insert or remove the substitution attenuation during the measurement sequence.

Gain Measurements: Active devices having gain can also be measured by an attenuation measurement system such as the Model 8850. For this application extra attenuation is required, because the reference level is lower than the measurement level. Depending on the frequency range of the active device, the system can either be operated in single or dual band operation. Extra input attenuation will be required to decrease signal level by at least the value of the amplifiers gain so that the Model 8852 remains in its linear region. If the amplifier is to be tested at a particular level extra attenuation may be inserted at the output of the device to achieve the correct operating levels. Uncertainty values are similar to those for attenuation measurements. However, the distortion of the active device will make measurements level sensitive, adding to the uncertainty.

APPLICATIONS (Con't)

Compression Measurements: This process consists of first characterizing the steps of a well masked step attenuator at lower levels within the active device's linear region. A Level Set Attenuator such as the Weinschel Model 8300 can be used to increase the overall working level of the amplifier. Extra attenuation is inserted between the Model 8852 to keep it within its linear region. The steps of the attenuator are again measured and the difference from the characterization results shows the compression.

ACCESSORIES:

Weinschel Model 8300 Attenuator (Level Set) – The Model 8300 has the ability to store and hold calibration data. An enhanced user interface, and digital display allows the operator to dial in the frequency, nominal attenuation setting and then display the actual calibrated value of attenuation, not just individual attenuator cell values. The GPIB bus (IEEE-488) interface gives both read and write access to the calibration data array, allowing for computer automated calibration setups.

Weinschel PLANAR CROWN® Connector System – The use of Weinschel PLANAR CROWN® connectors at the INPUT connectors provides the 8850 user with easy exchange of connector types and eliminates the need for adapters and other devices that would create additional insertion loss. This "Torque Free" type of connector also provides quick replacement of defective connectors. All crowns will mate nondestructively with connectors per MIL-STD-39012 (Refer to the Weinschel PLANAR CROWN® data sheet for more details).

Model 8853 Frequency Converter – Adding the Model 8853 extends the frequency range of the Model 8850 to perform measurements over the 18 to 40 GHz in coax. Refer to the Model 8853 data sheet for more information and actual configuration diagram.

Model 8861 Switch Matrix – The Model 8861 can be used to perform RF substitution measurements using the internal attenuator as the substitution attenuator. The internal attenuator is set and reset automatically by the software and does not require the operator to insert or remove the substitution attenuation during the measurement sequence. Refer to the Model 8861 data sheet for more information

SWR Measurement Kit (P/N 187-4003-1) – The Weinschel SWR Measurement Kit includes a return loss bridge with an "open" and "short." Because the Model 8850 operates as a single channel receiver, it can be used as a scalar system. The DUT's impedance to 50 ohms can be checked as a scalar quantity by measuring return loss. The actual measured return loss can be readily converted into SWR by the system software. Refer to the SWR Measurement data sheet for more information.

Calibration, Attenuation Measurement Lab (CAMLab) Software Program – This system software operates with the Windows™ 3.1 operating environment. The major improvement over other DOS based and HTB programs is that this software provides all the features found in other windows programs such as point and click user operation, dialog boxes for easy instrumentation setup, enhanced measurement data collection, online help and the ability to generate and printout measurement data and graphs from almost any printer. Refer to the CAMLab data sheet for more information.

Rack Mounting Kits: The Model 8850 instruments can be rack mounted into any rack or cabinet that is designed according to EIA RS-310 or MIL-STD-189 using the following kits:

Part Number	Description
187- 1007	VM-7 Rack Adapter Ears and attaching hardware.
187-1007-1	8852 Rack Adapters and attaching hardware. (additional supporting hardware required)