Data Acquisition Interface
8098763 (9508-10)

LabVolt Series

Datasheet

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General Description

The Data Acquisition Interface (DAI) provides the following instrumentation for the designed LVDAM-MW software: Power Meter, SWR Meter, and Oscilloscope, thereby eliminating the need for separate instruments.

The DAI is stackable and powered by the Gunn Oscillator Power Supply, Model 9501. It uses a USB connection for communication with the computer. The DAI has four multi-function analog inputs used to digitalize signals from the microwave components. The gain and the function of these inputs are userconfigurable in LVDAM-MW.

LVDAM-MW allows adjustment and monitoring of the bias voltage applied to the PIN Diode, Model 9538. It also allows modulation of the amplitude of this voltage by using an external modulating signal, or an internal 1 kHz rectangular signal. Furthermore, it allows adjustment of the frequency of the optional Voltage-Controlled RF Oscillator, Model 9511. It also allows modulation of the frequency of the RF oscillator's output signal around the carrier frequency. A frequency monitoring input allows measurement of the frequency of the RF oscillator's output signal with the LVDAM-MW Frequency Meter. Finally, the DAI provides automatic control of the turning on and turning off of the Gunn Oscillator when performing zero adjustment of the LVDAM-MW Power Meter.

The LVDAM-MW software includes the following instrumentation: SWR Meter, Power Meter, Dual-Trace Oscilloscope, and PIN Diode Bias Meter.

- It dispenses with the need for the SWR Meter, Model 9502, Power Meter, Model 9503, or any equivalent.
- The LVDAM-MW software displays the bias voltage and current used to drive the PIN Diode, and the operating frequency of the Voltage-Controlled RF Oscillator, thereby eliminating the need for separate ammeter, voltmeter, and frequency meter.
- The software allows the user to record, save, print, import, and export data, graphs, and the Smith Chart.
- The Smith Chart has a rotatable vector and a panel that displays all the line parameter values in real-time. The user can determine the impedance of an unmatched load, as well as the impedance and the location of the device used to perform impedance matching (that is, the Slide-Screw Tuner).

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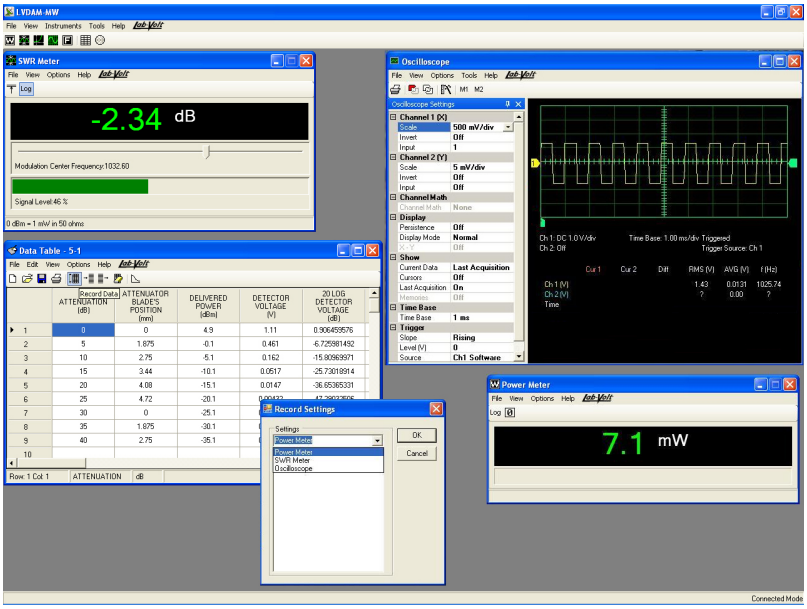


The LVDAM-MW main window shows the instrumentation and the measured values in real time. The values indicated by the Power Meter, the SWR Meter, and the Oscilloscope can be recorded in a Data Table at the click of one button. Other parameters can be entered manually in the table, such as calculated values like attenuation.

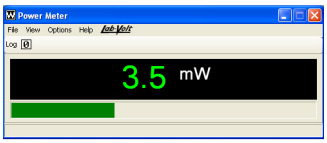
The software is built around the Data Acquisition Interface, Model 9508, that performs 12-bit A/D acquisition on four channels. The software uses the acquired data to calculate and display the values of the measured parameters. The software includes the following virtual instruments and tools:

A Power Meter displaying either the relative power or absolute power of microwave signals.
A SWR Meter displaying the standing-wave ratio along a waveguide or the power relative to a reference set by the user.
A Data Table used to record and save the values of parameters measured during a work session. A Graph function allows the user to plot the relationships between the parameters.

- A Smith Chart used to evaluate the transmission line parameters: the impedance, the admittance, the SWR, the reflection coefficient, and the transmission coefficient.
- An oscilloscope displaying analog or digital waveforms.

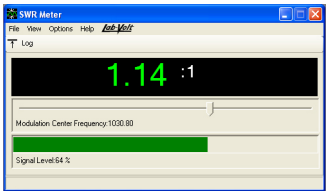
Upon launching the software, the main window appears, showing the icons of the virtual instruments (left-hand section of the toolbar) and a Settings panel in its right-hand section.

The Settings panel allows configuration of the function, the gain, and the filters of the four acquisition channels of the Data Acquisition Interface. The Settings panel aslo provide control of the PIN Diode, the power to the Gunn Oscillator Power Supply, and the optional Voltage-Controlled RF Oscillator.



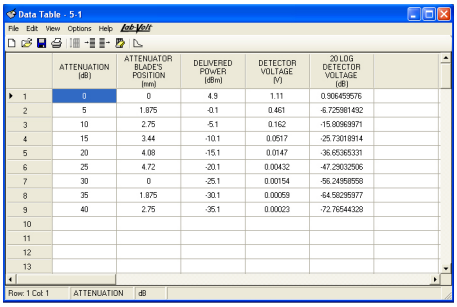
Power Meter

The Power Meter displays the relative power or absolute power of microwave signals. This meter operates with the included Thermistor Mount and a Wheatstone bridge contained in the Data Acquisition Interface.



SWR Meter

The SWR Meter displays the standing-wave ratio (SWR) in a waveguide, or the power level relative to a reference set by the user. The SWR Meter is used with the Slotted Line to measure SWRs, or with the Crystal Detector to measure relative power levels.

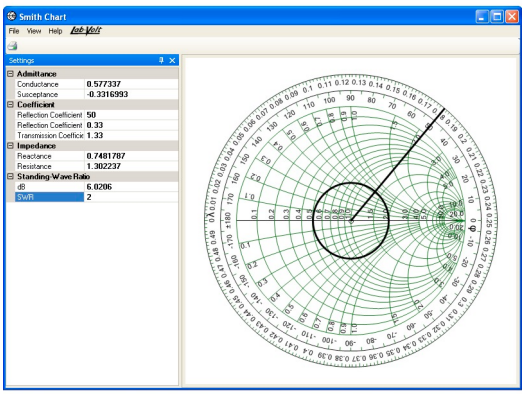


Data Table

The Data Table allows the user to record and save all the parameter values measured during a work session and then to graph these parameters using the Graph function. The power, SWR, and voltage measured with the Power Meter, the SWR Meter, and the Oscilloscope can be automatically recorded in the table at any time by clicking on a tool button. Other values, such as calculated values, can be entered manually. The table can be exported to a spread sheet application or copied to the Windows® clipboard.

Graph

The Graph is used to plot the relationships between the parameters recorded in the Data Table. Up to three traces can be simultaneously plotted. The Graph type is selectable (linear or logarithmic). The Graph colors, the X-interval and scale, and the minimum and maximum values of the X-axis are all selectable.



Interactive Smith Chart

The Smith Chart is used to evaluate the transmission line parameters. It features a rotatable vector and a circle of constant SWR. A Settings panel indicates the line parameter values. These values are automatically computed and refreshed as the user rotates the vector, or when the user changes a parameter value. By entering the SWR of an unmatched load and moving the vector along the reflection coefficient angle scale or the wavelength scale on the outer rim of the Smith Chart, the user determines the impedance and the location of the device required to match a load.

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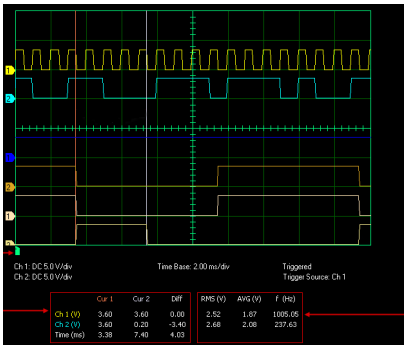
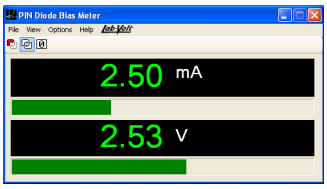


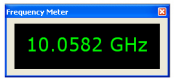
Oscilloscope

The Oscilloscope has two channels which can be associated with any of the four acquisition channels of the Data Acquisition Interface to observe the signals present on these channels. Numerical data corresponding to the displayed waveforms and to the active cursors is shown below the graticule. Two memories are used to store the traces. The display and the data can be displayed once only or continuously. A persistence function can be used to superimpose several signals on the same view. Horizontal and vertical cursors are also provided to facilitate the measurements.



PIN Diode Bias Meter

The Bias Meter of the PIN Diode allows the monitoring of the bias voltage applied to the diode and the bias current flowing through it.



Frequency Meter

The Frequency Meter displays the operating frequency of the Voltage-Controlled RF Oscillator.

Manual

Description	Manual number
Microwave Data Acquisition and Management (User Guide)	580506 (85756-E0)

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Microwave Data Acquisition and Management (User Guide) (580506 (85756-E0))

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- 3 Startup Procedures for Using the Power Meter and the SWR Meter of LVDAM-MW
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- 3.2 Startup Procedure for Using the SWR Meter to Measure Relative Power Levels
- 3.3 Startup Procedure for Using the SWR Meter to Measure Standing-Wave Ratios (SWRs)
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- 4.1 The Data Table
- 4.2 The Graph Function
- 4.3 The Smith Chart
- 4.4 The Oscilloscope

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