R&S®ZVL Vector Network Analyzer

Network analyzer and spectrum analyzer – two in one

The R&S®ZVL is the lightest and smallest vector network analyzer in its class. On top of this, it can be used as a full-featured spectrum analyzer if desired. This unique multi-purpose instrument relies on the tried-and-tested operating concept of the R&S®ZVB and R&S®ZVA analyzer families. It offers the performance of a medium-class instrument at a price that is hard to beat.

Full-fledged analyzer in a highly compact box

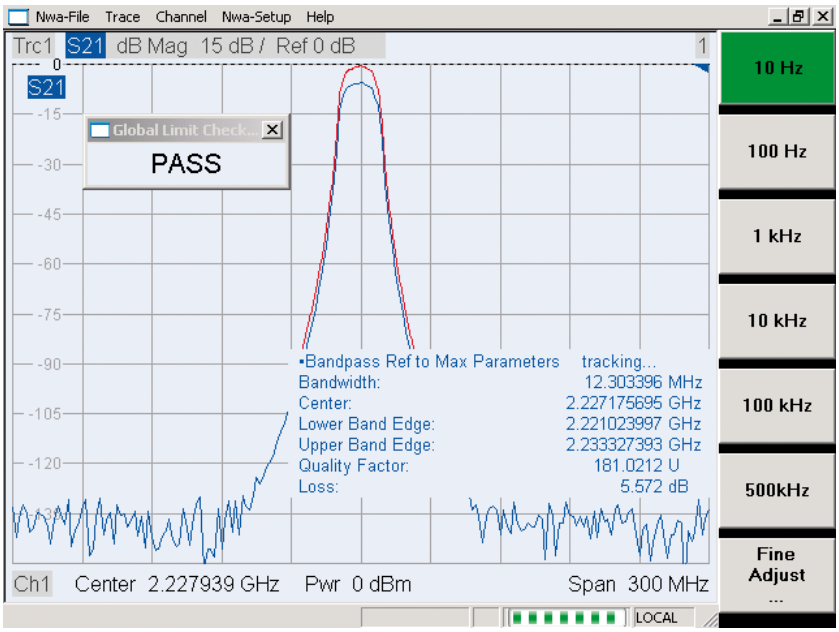
With a weight of only 7 kg and a depth of 37 cm, the R&S®ZVL (FIG 1, on right) is the lightest and most compact of the Rohde&Schwarz network analyzers – and unique in its class. It is easy to transport, and can be battery-operated for mobile applications. Yet it offers all the functionality you expect from a network analyzer, featuring a bidirectional test set that enables analysis of all four S-parameters. Plus, it features full spectrum analyzer capability (see page 38). The R&S®ZVL comes in two models, i.e. from 9 kHz to 3 GHz (R&S®ZVL3) and from 9 kHz to 6 GHz (R&S®ZVL6).

Multifaceted …

The R&S®ZVL can be used for a variety of applications. It is ideal for characterizing passive components such as filters, as well as for applications in production, installation, and service. Due to the instrument's high flexibility, the tuning of high-rejection base station filters poses no problem either. With a frequency range starting at 9 kHz, the analyzer is also ideal for cable measurements. This high versatility makes the R&S®ZVL an indispensable multipurpose tool.

The R&S®ZVL also features various calibration techniques to flexibly meet user's requirements in terms of accuracy and speed. The instrument offers transmission and reflection normalization, full one-port (OSM) and full two-port calibration (TOSM), as well as one-path two-port calibration for optimized speed.

FIG 2 Filter measurement with pass/fail evaluation.



… for filter measurements

Despite its extremely attractive price, the R&S®ZVL offers specifications almost as good as those of a medium-class instrument. With typically 123 dB dynamic range and measurement bandwidths from 10 Hz to 500 kHz, it easily satisfies the requirements commonly placed on filter measurements. The automatic band filter analysis function determines all relevant filter parameters such as filter bandwidth, center frequency, attenuation, and quality at the press of a button (FIG 2). Results can be evaluated by means of limit lines combined with pass/fail information. Limit lines can either be created by the user or from previously generated traces of known devices under test (DUTs).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Additional functions such as segmented sweep help to optimize filter measurements by combining two features that are normally incompatible: high measurement speed and wide dynamic range. With a segmented sweep, a sweep range is divided into frequency segments, and the sweep parameters such as the generator level, bandwidth, and number of measurement points per segment are separately defined for each segment. In this way, the measurement is optimally adapted to the DUT.

… at home in production

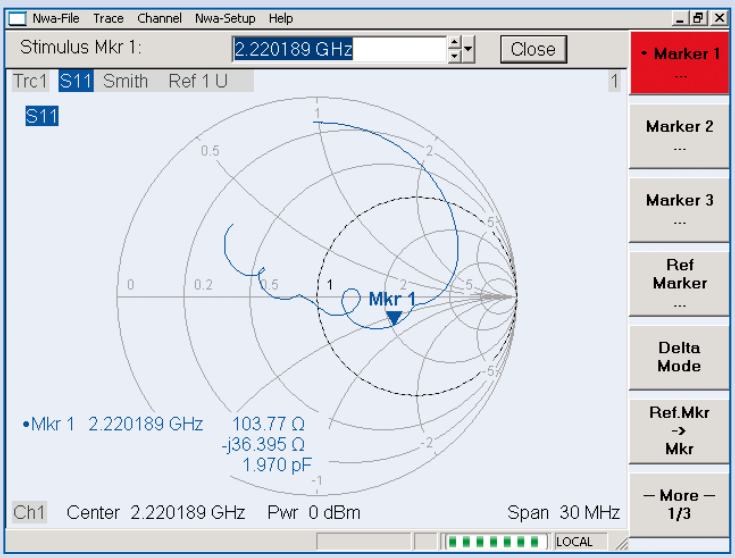
One of the main reasons in favor of using the R&S®ZVL in production is certainly its extremely favorable price. But there are many other features that make the R&S®ZVL attractive for use in production. For instance, the analyzer's wide dynamic range enables fast measurements even at larger measurement bandwidths without compromising on accuracy. Various sweep modes are available, e. g. linear, logarithmic, and segmented sweep. They can be chosen as required for the DUT to achieve the optimal measurement time. Several traces can be combined in a single diagram, which eliminates the need for calling several instrument setups – another time-saving feature.

Network analyzer ⟷ Spectrum analyzer

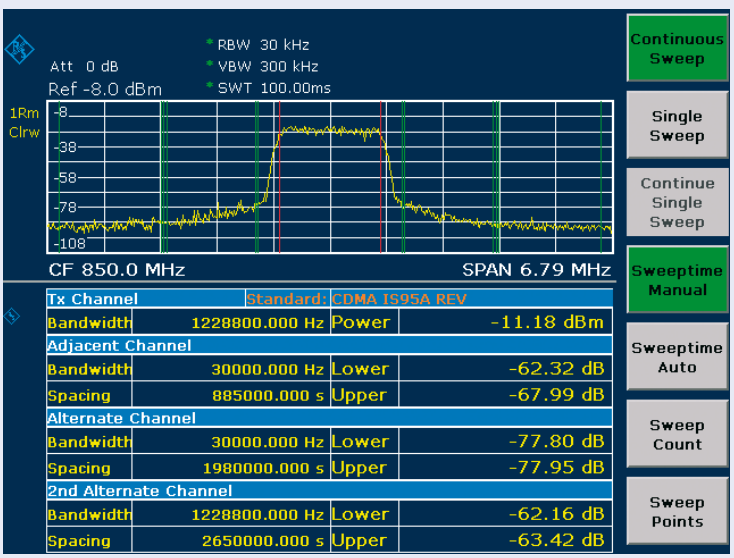
The R&S®ZVL is a network and a spectrum analyzer in one (FIG 3). This unique combination of full spectrum and network analyzer functionality in a single box "kills two birds with one stone". You can switch between the network and the spectrum analyzer mode in no time. It is thus possible to analyze the S-parameters of a DUT, e. g. an amplifier, as well as its spectral characteristics without having to reconnect the DUT. Moreover, an R&S®NRP power sensor can be connected to the USB interface to measure power with high accuracy, e. g. the output power of the amplifier. In production, the instrument can be switched from one mode to the other by remote control.

The spectrum analyzer functionality corresponds to that of the R&S®FSL spectrum analyzer. A variety of functions is available to characterize the DUT. Automatic channel power measurements determine the power within a defined bandwidth. Adjacent-channel power (ACP) measurements are performed for preset channel widths and spacings. For mobile radio measurements, all you have to do is select a radio standard. The instrument then automatically sets the relevant parameters, e. g. channel width and channel spacing. Results are thus obtained extremely fast and easily. On top of this, the gated sweep function makes it possible to analyze the modulation spectrum of burst signals that occur, for example, in GSM systems or WLANs.

FIG 3 In a single box: network analyzer …



… and spectrum analyzer.



… ideal for installation and service

What should the ideal instrument for installation and service be like? It must be small, lightweight, easy to operate, and capable of battery operation. The R&S®ZVL perfectly meets these requirements. Its optional battery pack allows operation independent of the AC supply. The battery pack can easily be removed and exchanged in order to extend the operating time. The instrument can also be powered from a vehicle's 12 V supply system. A carrying bag protects the analyzer against the effects of weather, and offers space for measurement accessories and an additional battery (FIG 4).

Preconfigured measurement routines can be conveniently loaded on site from the instrument's hard disk or a USB stick and then performed. Traces can be stored as screenshots in various formats. Likewise, measured values can be stored to the analyzer's hard disk or a USB stick in ASCII format or as an S-parameter file (s2p). All measurements can thus be prepared in advance and stored, and results can be documented quickly and comprehensively on completion of measurements, which minimizes the measurement time required on site.

Cross-platform operating concept

The R&S®ZVL operating concept combines highly versatile setting capabilities with easy and intuitive control. Various dialogs assist the user in setting the measurement parameters. The online help function provides information about the currently selected menu at the press of a button, including the corresponding remote control commands. Measured quantities can be shown in a single diagram or in several diagrams as required, i. e. all relevant test parameters can be displayed in any desired format (FIG 5).

Traces can be assigned user-specific names, allowing their easy correlation to the various test parameters.

All instrument functions can be performed by means of hardkeys and softkeys or the mouse. Pressing the incorrect key inadvertently will have no serious consequences – due to the Undo / Redo function. With Undo, you can cancel several operating steps, a feature appreciated by trained as well as untrained users. Redo, in turn, can be used to cancel an Undo.

FIG 4 The R&S®ZVL in a handy carrying bag.

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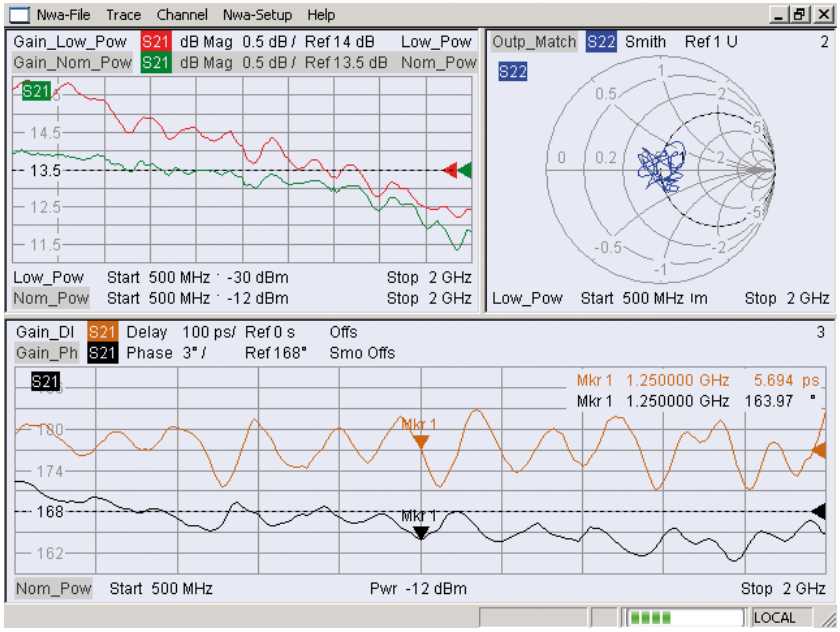
FIG 5 Display of different test parameters in a single window. The example below shows results of an amplifier measurement.



A uniform operating concept and identical remote control commands for all network analyzers from Rohde&Schwarz make the R&S®ZVL a worthwhile investment. For example, if you use an analyzer of the R&S®ZVA, R&S®ZVB, or R&S®ZVT family in development, the specific measurement tasks can easily be transferred to the R&S®ZVL, and existing remote programs can be used to control the R&S®ZVL. This saves time and money, reduces training time, and eliminates potential error sources.

A long-term investment

Investments should be profitable over a maximum period of time. It is therefore vital that test equipment can be adapted and upgraded to handle future measurement tasks. The plug-and-play concept of the R&S®ZVL allows hardware options to be installed subsequently on site without having to recalibrate the instrument (FIG 6). This saves time and cost, and adds to the analyzer's range of functions. In cases where the R&S®ZVL is not able to handle a task, another member of the Rohde&Schwarz line of network analyzers can take over. This is no problem due to the uniform operating concept.

Summary

High-quality measuring equipment need not be expensive. The R&S®ZVL is proof of this. Combining network analyzer functionality with optional spectrum analyzer functionality, it offers an excellent price/performance ratio. Its good technical characteristics make the analyzer an ideal choice for applications in development, production, installation, and service. Plus, it sets standards in the lower price segment.

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FIG 6 R&S®ZVL hardware options are simply plugged in; recalibration of the analyzer is not required.

Condensed data of the R&S®ZVL

Network analysis	
Frequency range	9 kHz to 3 GHz (R&S®ZVL3) 9 kHz to 6 GHz (R&S®ZVL6)
Dynamic range	>115 dB, typ. 123 dB
Output level range	–50 dBm to 0 dBm, typ. +10 dBm
Measurement bandwidths	10 Hz to 500 kHz
Measurement time	<75 ms (201 measurement points, 100 kHz bandwidth, full two-port calibration)
Measurement points per trace	2 to 4001
Weight (without battery)	<7 kg
Spectrum analysis (option)	
Frequency range	9 kHz to 3 GHz (R&S®ZVL3) 9 kHz to 6 GHz (R&S®ZVL6)
Resolution bandwidths	300 Hz to 10 MHz, optionally from 10 Hz
Displayed average noise level (DANL)	–152 dBm (1 Hz)
I/Q demodulation bandwidth	20 MHz
Total measurement uncertainty	<0.5 dB

More information, product brochure, and data sheet at www.rohde-schwarz.com (search term: ZVL)