Vector Network Analyzers R&S®ZVB

Frequency ranges up to 4 GHz and 8 GHz, with two or four test ports

- ◆ Multiport measurements
- ◆ Balanced measurements,
  mixed-mode S parameters
- ◆ Separate generator for each test port
- ◆ Parallel measurements
- ◆ Calibration techniques:
  – TOSM, TRL/LRL, TOM, TRM, TNA
  – Multiport calibration techniques
  – Model-adaptable standards

- ◆ Extremely fast measurement times
  with simultaneous data transfer
- ◆ Dynamic range >123 dB
- ◆ IF bandwidths 1 Hz to 500 kHz
- ◆ Level sweep range 50 dB
- ◆ Up to 20 001 points per trace
- ◆ Unlimited number of independent
  channels and traces

- ◆ Parallel loading of setups
  (preloading, setup swap)
- ◆ Operation via front-panel keys or
  mouse and keyboard
- ◆ Online help
- ◆ Measurement wizard
- ◆ Optimization of production sequences

ROHDE&SCHWARZ

Highlights

The network analyzers of the R&S®ZVB family feature an innovative reflectometer concept that sets new standards. Each test port is provided with a separate generator, measurement receiver and reference receiver. This concept of independent reflectometers allows parallel measurements to be performed, a precondition for higher levels of performance even as the complexity of measurement tasks steadily increases. Based on this concept, the R&S®ZVB is especially able to carry out multiport measurements extremely quickly, e.g. on balanced SAW filters, duplex filters or antenna switching modules.

R&S®ZVB 4: 300 kHz to 4 GHz

R&S®ZVB 8: 300 kHz to 8 GHz

The R&S®ZVB combines excellent performance with low weight and compact design. Intelligent and user-friendly functions offer maximum ease of operation. They allow, for example, the large number of measured quantities involved in multiport and balanced measurements to be handled easily, and also offer a variety of ways to optimize production sequences – a smart solution that satisfies even the most exacting demands.

Condensed data

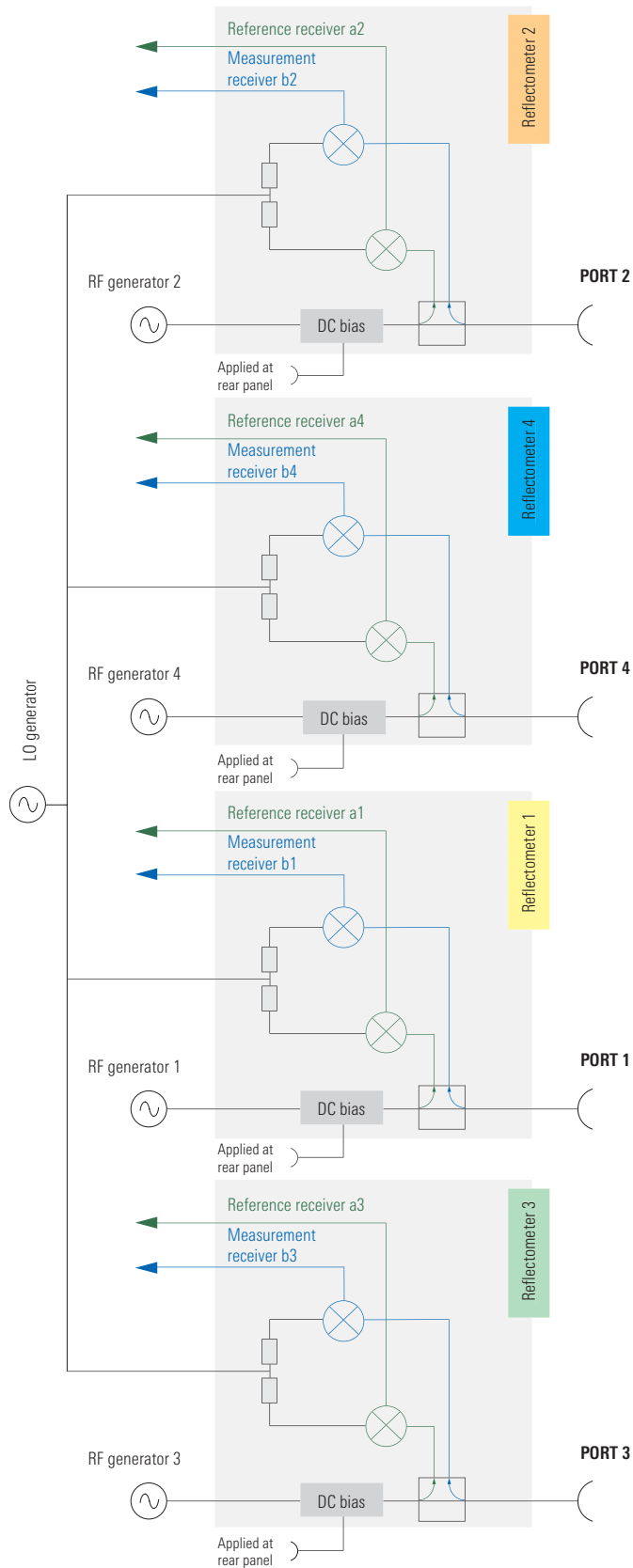|	
Measurement time including data transfer time[1]	<8 ms
Data transfer time	data transfer simultaneous with measurement
Dynamic range	>123 dB
Inherent noise	<−110 dBm
Level sweep range[2]	−40 dBm to +13 dBm
Measurement uncertainty (transmission)	0.1 dB or 1°
IF bandwidths	1 Hz to 500 kHz
Number of measurement points per trace	up to 20 001
Platform	
Number of test ports	2 or 4
Number of measurement and reference receivers	one measurement and one reference receiver per test port
Number of integrated generators	one generator per test port
Calibration techniques	TOSM, TRL/LRL, TOM, TRM, TNA, multiport calibration techniques
Operating system and internal PC	Windows XP
Operation	hardkeys/softkeys, keyboard and mouse, online help system, measurement wizard
Number of traces, measurement diagrams, independent channels, setups that can be simultaneously loaded into RAM	unlimited[3], traces can be freely assigned to measurement diagrams

[1] Specification valid for 201 measurement points, start frequency 1 GHz, stop frequency 1.2 GHz, measurement bandwidth 500 kHz, display off.

[2] Level range that can be continuously traversed in a level sweep.

[3] Number of traces and measurement diagrams limited only by available memory capacity.

Innovative concept ...

R&S®ZVB test set: four-port model

Reference receiver a2
Measurement receiver b2
Reflectometer 2
RF generator 2
DC bias
Applied at rear panel
PORT 2

Reference receiver a4
Measurement receiver b4
Reflectometer 4
RF generator 4
DC bias
Applied at rear panel
PORT 4

LO generator

Reference receiver a1
Measurement receiver b1
Reflectometer 1
RF generator 1
DC bias
Applied at rear panel
PORT 1

Reference receiver a3
Measurement receiver b3
Reflectometer 3
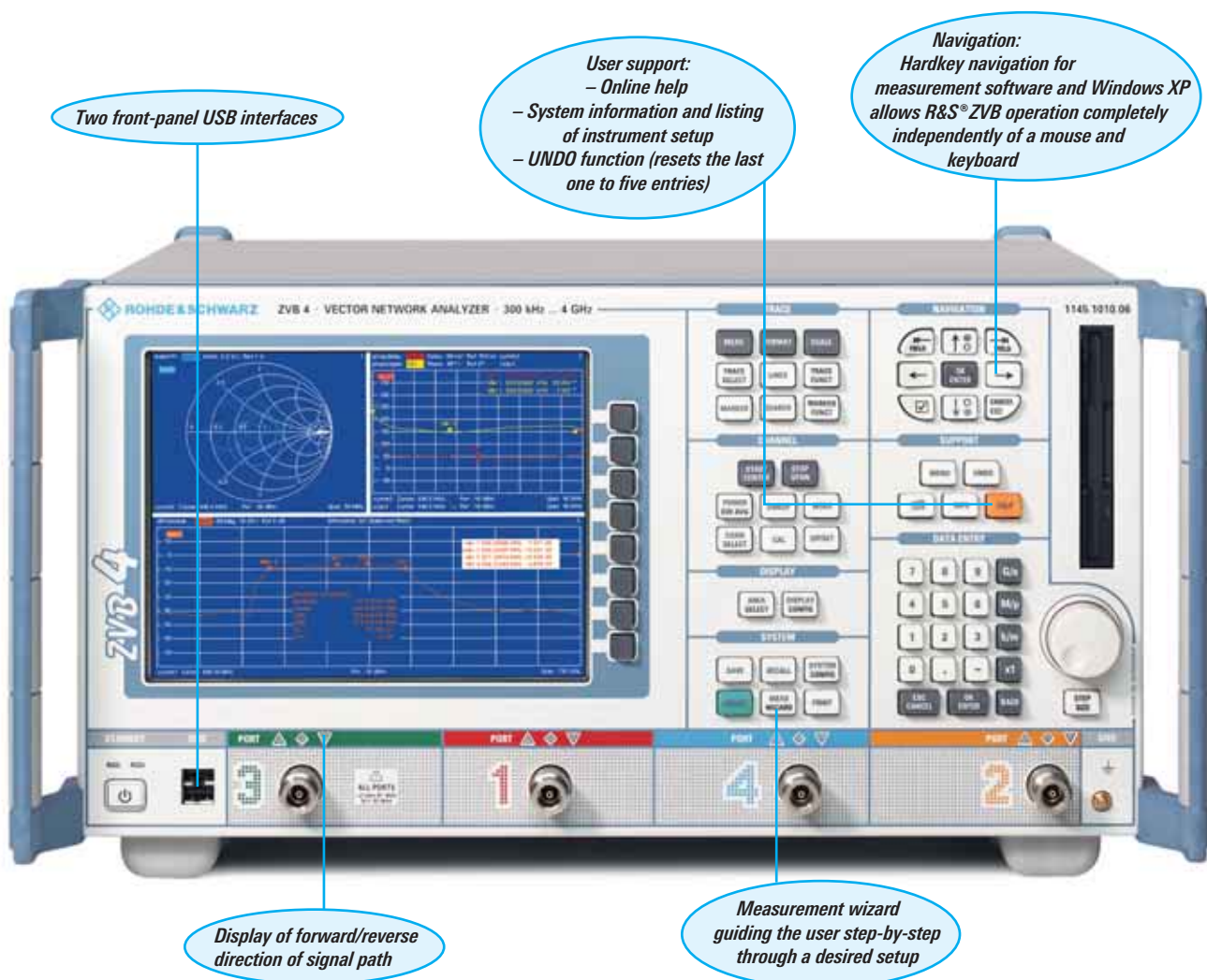RF generator 3
DC bias
Applied at rear panel
PORT 3

... for future-oriented performance

The innovative concept implemented in the R&S®ZVB significantly enhances the analyzer's performance in terms of measurement speed, available configuration options and system characteristics. The test set is made up of independent reflectometer units, each with a separate generator, measurement receiver and reference receiver for the individual test ports. The use of a common frequency reference ensures high measurement accuracy and frequency selectivity. Electronic switches for forward/reverse switchover of measurement paths are not required

in the test set. For this reason, no asymmetries occur between the analyzer test ports as may otherwise be the case as a result of the cascading of switches.

This means, for example, that the maximum output power of up to +13 dBm is available at each of the four test ports irrespective of the direction of measurement. With a specified dynamic range of >123 dB, the R&S®ZVB features very fast measurement times – even for applications requiring an extremely wide dynamic range.

The instrument concept of independent reflectometers also allows parallel measurements to be performed at maximum speed. With its two or four internal generators, the analyzer carries out measurements on different port groups of a DUT simultaneously and independently. For example, the four parameters S11 to S44 representing the reflection coefficients of a four-port DUT can be simultaneously measured and displayed, provided that there is adequate isolation between the ports. This reduces measurement time by a factor of approx. 4 compared with instruments featuring just one generator and an internal RF switch.

Two front-panel USB interfaces

User support:
– Online help
– System information and listing of instrument setup
– UNDO function (resets the last one to five entries)

Navigation:
Hardkey navigation for measurement software and Windows XP allows R&S®ZVB operation completely independently of a mouse and keyboard

Display of forward/reverse direction of signal path

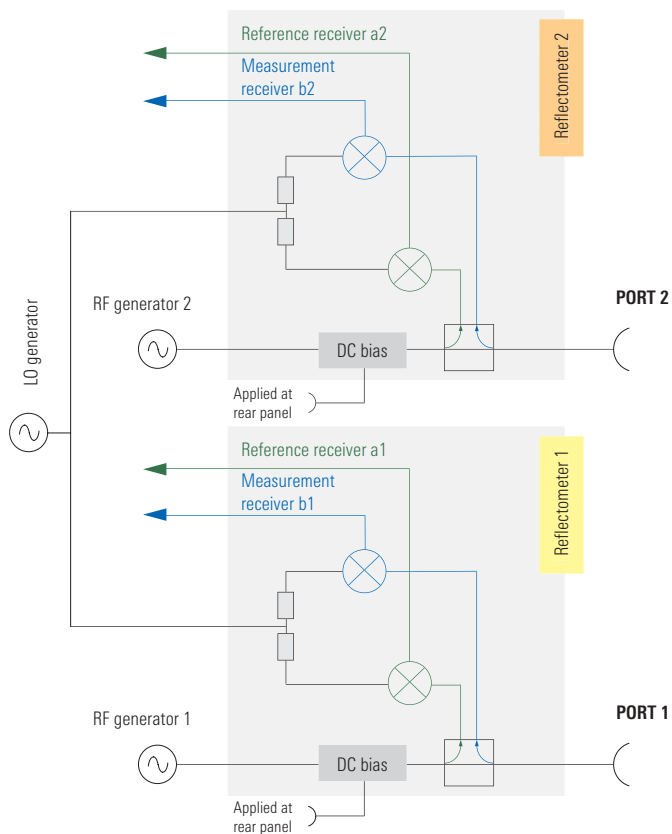*Measurement wizard guiding the user step-by-step through a desired setup*

Data processing in the instrument is also carried out in parallel, ranging from RF and IF through to digitization and display. Moreover, data transfer can be performed simultaneously with measurement. This means extremely fast measurement times even with complex tasks such as multiport measurements.
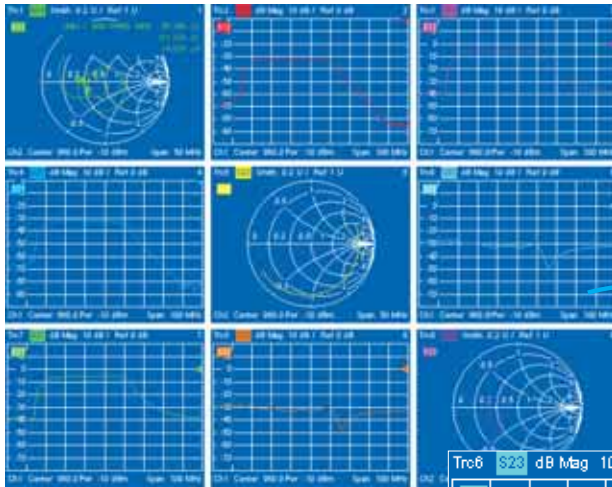
For measurements on active DUTs, power is supplied by a DC bias applied via the inner conductor of each test port. The required voltages are fed via connectors on the R&S®ZVB rear panel.

R&S®ZVB test set: two-port model

Reference receiver a2
Measurement receiver b2
Reflectometer 2
LO generator
RF generator 2
DC bias
Applied at rear panel
PORT 2

Reference receiver a1
Measurement receiver b1
Reflectometer 1
RF generator 1
DC bias
Applied at rear panel
PORT 1

A new dimension ...

User-configurable display of results

◆ Unlimited number of traces and measurement diagrams (areas)
◆ Flexible assignment of traces to measurement diagrams; hiding and deleting of traces
◆ Any combination of channels and traces
◆ Adjustment of diagram size by mouse or menu control
◆ Enlarging of individual measurement diagrams to full screen size for optimum readability
◆ User-definable labelling of measurement diagrams, setups, markers, traces and channels for straightforward documentation
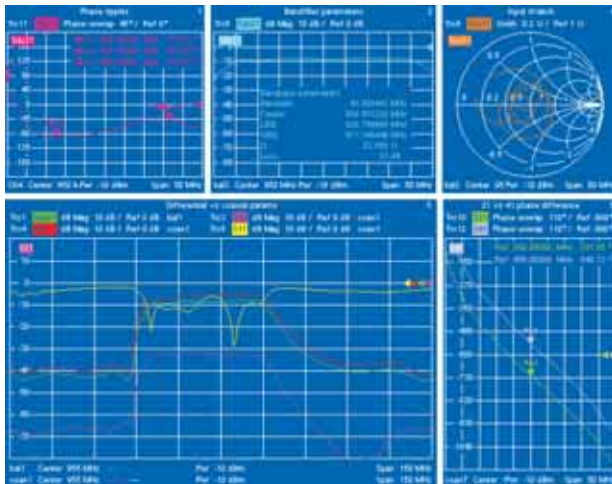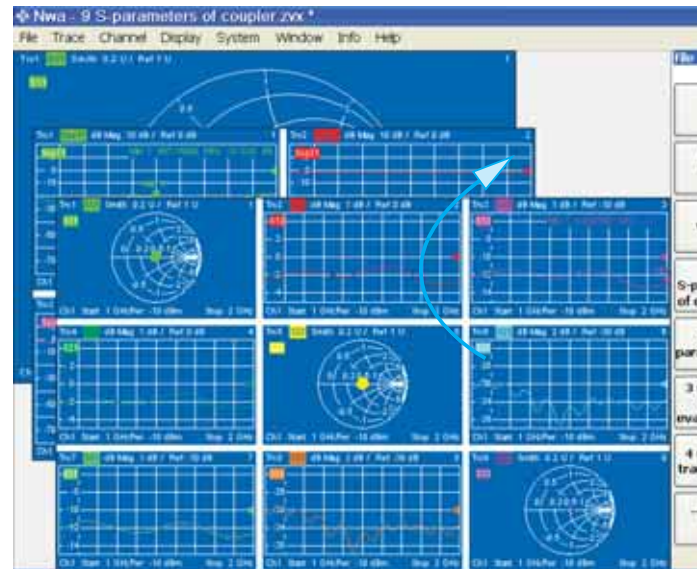

Independent channels

◆ Simultaneous management of unlimited number of independent channels[4] in memory
◆ User-definable coupling of traces and channels
◆ Combined capabilities of several network analyzers

◆ Description of DUT by a variety of measured quantities without any need for reconfigurations

Fast switching between instrument setups

◆ Simultaneous loading of several complete instrument setups into RAM (preloading)
◆ Each instrument setup represented by a separate measurement window
◆ Switching between instrument setups (setup swap) simply by switching between measurement windows
◆ Extremely fast setup swap by IEC/IEEE bus command in <10 ms
◆ Easy management and clear-cut representation – even with a large number of different measurements and measured quantities


[4] A channel is understood to designate an independent set of test parameters including, for example, the measurement mode, frequency range, number of measurement points, level, calibration technique and trigger mode. The number of channels is limited only by the instrument's memory capacity and other parameters such as the number of traces or points.

... in functionality

Convenient marker and analysis functions

◆ Up to 10 markers per trace
◆ Wide variety of marker data formats
◆ Detailed definition of marker properties
◆ Marker information can be moved on screen as required
◆ Marker values can optionally be displayed and printed in the form of a list for clear-cut documentation
◆ Marker analysis functions (max./min. search function, analysis functions for filters, etc)

Statistical analysis of trace
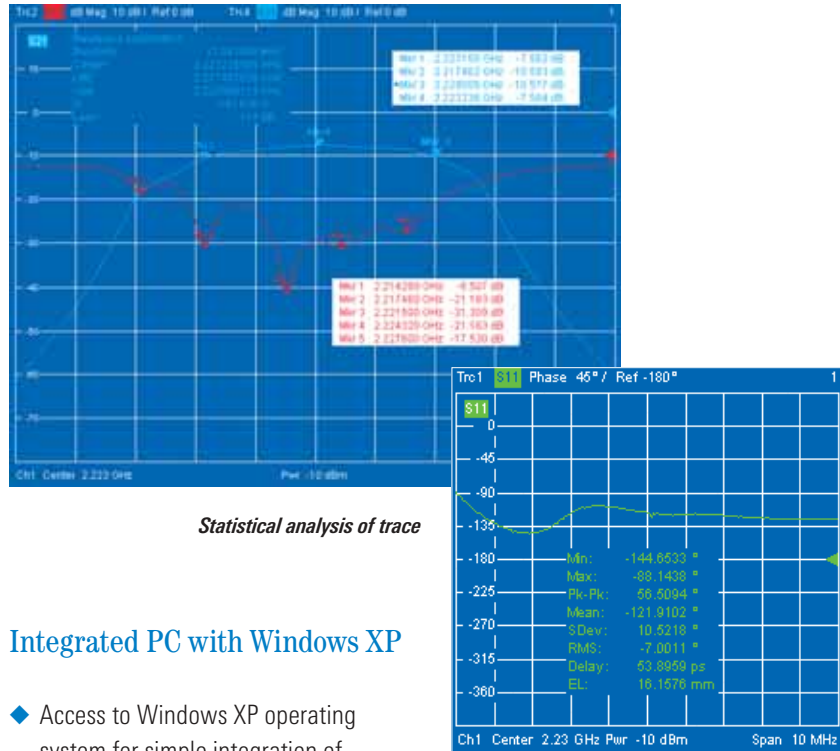
Equation editor and trace mathematics

◆ Equation editor with numerous mathematical functions
◆ Generation of any type of equation of unlimited length
◆ Online linking of active traces and stored traces
◆ Realtime derivation and display of virtually any quantity

Integrated PC with Windows XP

◆ Access to Windows XP operating system for simple integration of peripherals (e.g. CD-ROM drives, USB storage media, printers)
◆ Control and analysis software can be run directly on the R&S®ZVB
◆ Communication via LAN, IEC/IEEE bus, USB, digital I/O, parallel interface
◆ Fast data transfer via COM/DCOM

Manual operation support

◆ Operation via hardkeys and softkeys or keyboard and mouse
◆ Online help providing information about current menu item including associated IEC/IEEE bus commands
◆ Measurement wizard guiding the user step-by-step through desired setup
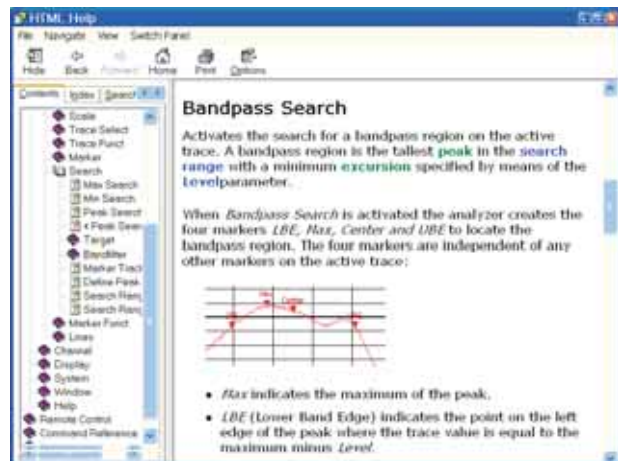
Applications ...

Multiport measurements

◆ Minimum number of sweeps through parallel data collection
◆ Extremely fast measurement times even with multiport measurements
◆ Excellent accuracy due to multiport calibration

Balanced measurements

◆ Analyzer model with four integrated test ports
◆ Calculation of mixed-mode S parameters
◆ Complete characterization of DUTs with balanced test ports only or with mixed single-ended and balanced test ports
◆ S parameters, impedances, admittances, Z and Y parameters as well as stability factors can also be measured on differential DUTs
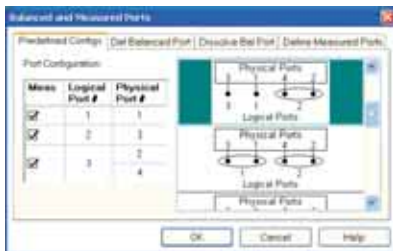
Filter measurements and adjustments

◆ User-configurable measurement diagrams and high sweep speed for convenient manual adjustments
◆ Marker functions and equation editor for determination of filter characteristics and realtime derivation of desired quantities
◆ Limit lines for adjustment procedures, including pass/fail indication
◆ Generation of limit lines from imported data sets or by online modification of current results
◆ Segmented sweep for minimized sweep time and data volume

Measurements on active components

◆ Wide level sweep range of 50 dB and excellent level linearity for compression measurements
◆ High compression point and TOI of receiver to withstand high input levels
◆ Two DC measurement inputs with voltage ranges ±1 V and ±10 V
◆ Display of DC values and derived quantities obtained with equation editor
◆ Efficiency measurements on amplifiers
◆ K and μ stability factors of amplifiers
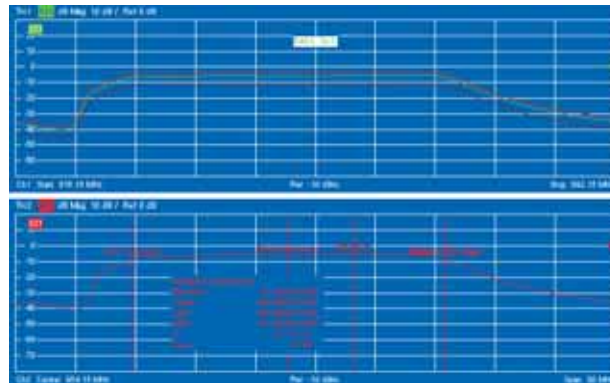
... and measurements

Highlights of R&S®ZVB in production

Integrated PC with Windows XP for automated procedures and data management

◆ Analysis and control programs for test and production sequences can be run directly on the R&S®ZVB

◆ The R&S®ZVB can be networked with system components such as measuring instruments or handlers via its LAN, IEC/IEEE bus and USB interfaces, universal TTL interface and parallel port
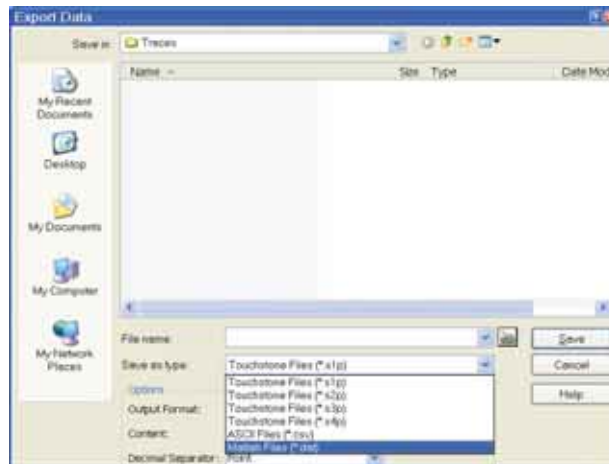
Optimization of test and production sequences

◆ Switchover between several channels instead of loading setups

◆ Simultaneous loading of several instrument setups into RAM (preloading) for extremely fast and simple configuration changes (setup swaps) via the IEC/IEEE bus in less than 10 ms or at a keystroke or mouse click

◆ Segmented sweep for minimized number of points and optimized sweep parameters

◆ Flexible trigger options for starting a sweep, sweep segment, frequency point or partial measurement

◆ Digital I/O port with signals synchronized to test sequence for fast and direct control of external system components and output of pass/fail information

◆ Reflectometer concept for independent measurements on different ports (e.g. measurement of two two-port DUTs with the R&S®ZVB four-port model)

Data import and export

◆ Export and import of traces in *.snp (Touchstone), ASCII or Matlab format

◆ Display of imported traces as stored traces or limit lines

◆ Access to correction values obtained by system error correction

◆ Access to measured values of calibration standards

◆ Description of calibration standards by models or an S parameter file

◆ Detailed description of calibration standards by flexible models

Measurement times and data transfer times

◆ Data transfer via LAN or IEC/IEEE bus simultaneous with data collection

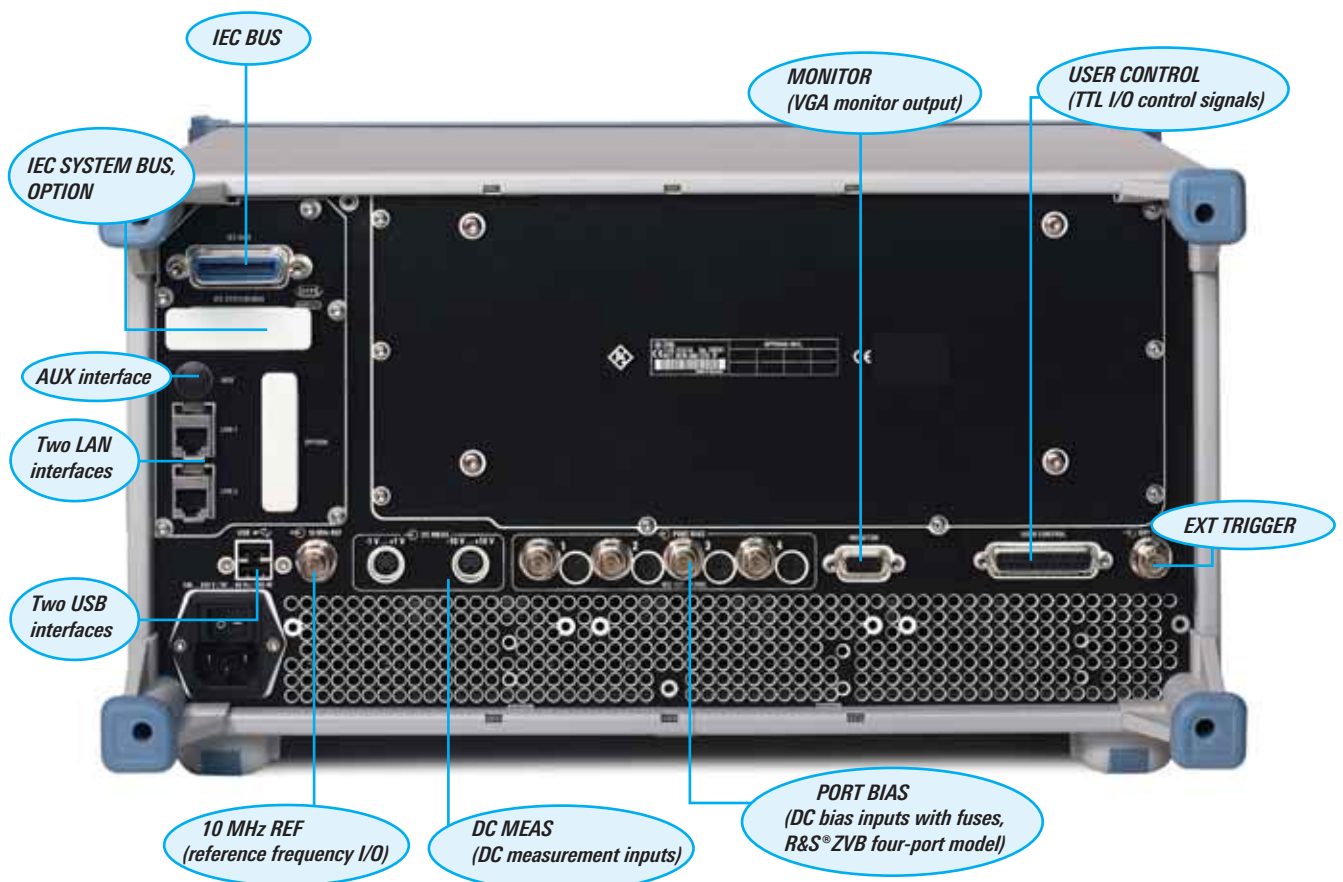◆ Minimum offset of data transfer time relative to total measurement time

Functions and options

Function	Description	Standard/option
Two test ports	Integrated bidirectional RF test ports	Standard
Four test ports	Integrated bidirectional RF test ports	Standard
Active test set (PORT BIAS)	Input of DC power for supply of amplifiers via inner conductor of test port; requires external DC power supply	Standard
Multiport measurements	Complete S parameter matrix, wave quantities, wave quantity ratios, impedances, admittances, Z and Y parameters of multiport DUTs	Standard
Balanced measurements	Mixed-mode S parameters, mixed-mode Z and Y parameters, impedances and admittances of balanced DUTs	Standard
Calibration techniques	TOSM, TRL/LRL, TOM, TRM, TNA, normalization	Standard
Unlimited number of measurement diagrams, traces, decoupled measurements	Any number of traces can be created and freely assigned to measurement diagrams; simultaneous display of decoupled measurements	Standard
Setup swap; preloading	Simultaneous loading of several instrument setups into RAM; fast switchover between instrument setups	Standard
Segmented sweep, lin/log sweep	Optimization of sweeps by focusing on frequency ranges of interest	Standard
Level sweep; time-domain sweep	Measurement of DUT compression; determination of measured quantities as a function of time	Standard
20 001 points per trace	High frequency resolution for swept measurements	Standard
IF bandwidths 1 Hz to 500 kHz (in 1/2/5 steps)	Optimization of measurement speed and dynamic range	Standard
Level sweep	Wide level sweep range of 50 dB for compression measurements (no attenuators required)	Standard
Online support functions	Online help for current function, UNDO function for resetting the last one to five entries, Windows XP key for accessing the operating system, complete listing of current instrument setup	Standard
Measurement wizard	Step-by-step guidance through desired instrument setup, including calibration if required	Standard
Trace mathematics, equation editor, marker functions, trace statistics	Functions for online processing of measured data, linking of traces by means of any type of equations, for adjustments and statistical analyses	Standard
Limit lines	Online generation of envelopes from traces; import (and export) of data for limit lines	Standard
Trigger functions	Trigger options for starting a sweep, sweep segment, frequency point or partial measurement	Standard
Power viewer	Functions as a power meter: values derived from a USB sensor are displayed as a trace, requires Rohde & Schwarz power sensor with USB interface	Software
Oven-controlled crystal oscillator	Enhanced frequency accuracy	Option R&S®ZVAB-B4
COM/DCOM control	Control of R&S®ZVB firmware by external programs	Standard
Interfaces (2 × LAN, 4 × USB, IEC BUS, 10 MHz REF, MONITOR, USER CONTROL, EXT TRIGGER)	Control of R&S®ZVB, control of external devices or handlers by R&S®ZVB, fast TTL handler and sequence control, connection of peripherals, e.g. printer or storage media (see also interface description)	Standard
DC MEAS inputs	Measurement inputs for DC voltage, allowing PAE (power added efficiency) measurements	Standard

Interface description

Interface	Function
LAN 1	Control of R&S®ZVB or subnetwork with R&S®ZVB as master, 8-pin RJ-45 connector
LAN 2	Control of R&S®ZVB or subnetwork with R&S®ZVB as master, 8-pin RJ-45 connector
IEC BUS	Remote control of R&S®ZVB
IEC SYSTEM BUS, OPTION	For future applications
AUX	Auxiliary interface for future applications, BNC connector
PORT BIAS	Input of DC power for supply of amplifiers via inner conductor of test port, one input and fuse per RF port, BNC connectors
USB	Standard 1.1 USB double port (for mouse, keyboard, printer, storage media, etc)
10 MHz REF	Reference frequency I/O: 10 MHz reference can be input from, or output to, external devices, BNC connector
DC MEAS	Measurement inputs for DC voltage and PAE measurements, input voltage ranges ±1 V and ±10 V, Mini DIN connectors, cable: R&S®ZV-Z71 (option)
MONITOR	For external VGA monitor; output of measurement screen or Windows XP user interface, standard VGA connector
USER CONTROL	TTL I/O signals: sweep status indication, pass/fail indication, indication of active test port, indication of active channel by channel bits, trigger signals for fast control of external devices, e.g. generators, handshake with handlers, sequence control without programming effort, 25-pin Sub-D connector
EXT TRIGGER	Input of external TTL trigger signal for starting a measurement or partial measurement, BNC connector

For specifications see PD 0758.1529.22
and www.rohde-schwarz.com
(search term: ZVB)

Certified Quality System
ISO 9001
DQS REG. NO 1954 QM

Certified Environmental System
ISO 14001
DQS REG. NO 1954 UM

IEC BUS

IEC SYSTEM BUS, OPTION

MONITOR (VGA monitor output)

USER CONTROL (TTL I/O control signals)

AUX interface

Two LAN interfaces

Two USB interfaces

EXT TRIGGER

10 MHz REF (reference frequency I/O)

DC MEAS (DC measurement inputs)

PORT BIAS (DC bias inputs with fuses, R&S®ZVB four-port model)

Ordering information

Designation	Type	Frequency range	Order No.
Vector Network Analyzers			
Vector Network Analyzer, 2 ports	R&S®ZVB 4	300 kHz to 4 GHz	1145.1010.04
Vector Network Analyzer, 2 ports	R&S®ZVB 8	300 kHz to 8 GHz	1145.1010.08
Vector Network Analyzer, 4 ports	R&S®ZVB 4	300 kHz to 4 GHz	1145.1010.06
Vector Network Analyzer, 4 ports	R&S®ZVB 8	300 kHz to 8 GHz	1145.1010.10
Option			
Oven-Controlled Crystal Oscillator (OCXO)	R&S®ZVAB-B4		1164.1757.02
Extras			
Test Cables			
N (m)/N (m), 50 Ω	R&S®ZV-Z11	0 Hz to 18 GHz	1085.6505.03
N (m)/PC 3.5 mm, 50 Ω	R&S®ZV-Z13	0 Hz to 18 GHz	1134.3997.02
Calibration Kits			
N, 50 Ω	R&S®ZV-Z21	0 Hz to 18 GHz	1085.7099.02
N, 50 Ω	R&S®ZCAN	0 Hz to 3 GHz	0800.8515.52
PC 3.5 mm	R&S®ZV-Z32	0 Hz to 26.5 GHz	1128.3501.02
PC 3.5 mm (incl. sliding matches)	R&S®ZV-Z33	0 Hz to 26.5 GHz	1128.3518.02
TRL Suppl. Kit, N, 50 Ω	R&S®ZV-Z26	0.4 Hz to 18 GHz	1085.7318.02
TRL Suppl. Kit, PC 3.5 mm	R&S®ZV-Z27	0.4 Hz to 26.5 GHz	1085.7401.02
Sliding Matches			
N (m), 50 Ω	R&S®ZV-Z41	1.7 GHz to 18 GHz	1085.8095.02
N (f), 50 Ω	R&S®ZV-Z41	1.7 GHz to 18 GHz	1085.8095.03
N, PC 3.5 mm, 50 Ω (m/f pair)	R&S®ZV-Z42	0 Hz to 26.5 GHz	1128.3524.02
Hardware and Measurement Add-Ons			
USB Compact Keyboard	R&S®ZV-Z75		1157.6870.03
USB Mouse[5]	R&S®ZV-Z76		1157.7060.02
Cable for DC Input[6]	R&S®ZV-Z71		1164.1005.02
Bias Network	R&S®ZV-Z61	2 MHz to 4 GHz	1106.8130.02
DC Block	R&S®FSE-Z3	5 MHz to 7 GHz	4010.3895.00
Power Splitter 2 × 50 Ω	R&S®RVZ	0 Hz to 2.7 GHz	0800.6612.52
Attenuators			
1 W	R&S®DNF	0 Hz to 12.4 GHz	0272.4x10.50[7]
50 W	R&S®RBU50	0 Hz to 2 GHz	1073.8695.xx[8]
100 W	R&S®RBU100	0 Hz to 2 GHz	1073.8495.xx[8]
Matching Pads 50 Ω → 75 Ω			
Series resistor	R&S®RAZ	0 Hz to 2.7 GHz	0358.5714.02
L-section	R&S®RAM	0 Hz to 2.7 GHz	0358.6514.02
Miscellaneous			
19" Rack Adapter with front handles	R&S®ZZA-511		1096.3290.00
Manual	R&S®ZVB-M		1145.1084.11

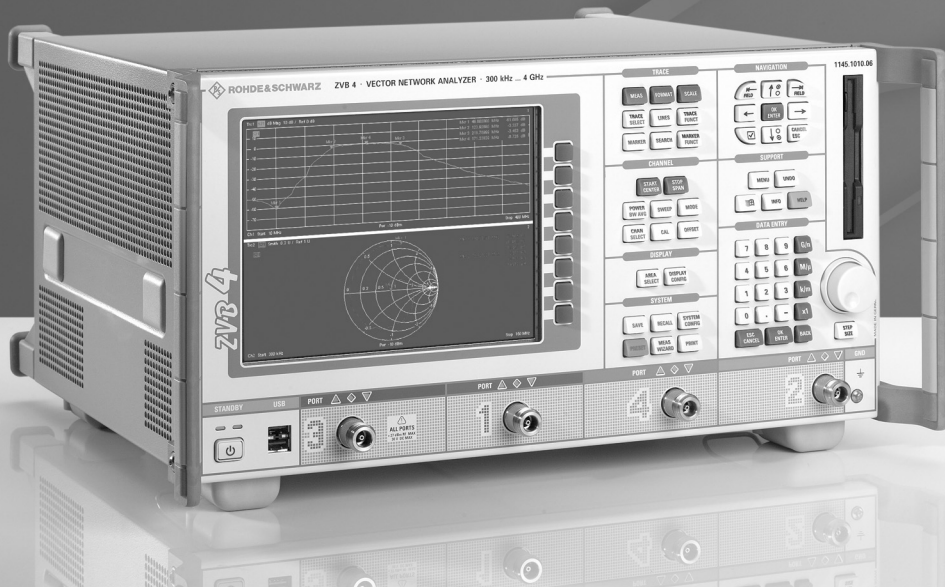[5] Supplied as standard.

[6] Mini DIN female to four banana plugs.

[7] x = 0:3 dB, x = 1:6 dB, x = 2:10 dB, x = 3:20 dB, x = 4: 30 dB.

[8] xx = 03:3 dB, xx = 06:6 dB, xx = 10:10 dB, xx = 20:20 dB, xx = 30:30 dB.

Vector Network Analyzers R&S®ZVB

Specifications

ROHDE&SCHWARZ

Specifications are valid under the following conditions:

90 minutes warm-up time at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and all internal adjustments performed. Data designated "overrange" and data without tolerance limits is not binding. Unless stated otherwise, specifications apply to test ports, a nominal source power of –10 dBm, and fast mode switched off.

Measurement range

Impedance		50 Ω
Test port connector		type N, female
Number of test ports		4
Frequency range	R&S ZVB4 R&S ZVB8	300 kHz to 4 GHz 300 kHz to 8 GHz
Static frequency uncertainty	without optional oven quartz with optional oven quartz	8×10^{-6} 1×10^{-7}
Frequency resolution		100 µHz
Number of measurement points	user-selectable	1 to 20001
Measurement time	for 201 measurement points, with start frequency 1 GHz, stop frequency 1.2 GHz, display switched off, 500 kHz measurement bandwidth	<8 ms

Data transfer time	for 201 measurement points
	  via IEC/IEEE bus
	  via VX11 over 100 Mbit/s LAN
	  via RSIB over 100 Mbit/s LAN
		
		<2.9 ms
		<1.3 ms
		<0.7 ms

Time for measurement and data transfer	for 201 measurement points (No additional time for data transfer is needed, as it is performed simultaneously during the measurement.)	<8 ms
Switching time between display channels	with not more than 2001 points	<1 ms
Switching time between two preloaded instrument settings	with not more than 2001 points	<10 ms
Measurement bandwidths	1/2/5 steps	1 Hz to 500 kHz

Dynamic range	between PORT 1 and PORT 2 and between PORT 3 and PORT 4
	without system error correction
	at 10 Hz measurement bandwidth
	  300 kHz to 50 MHz
	  50 MHz to 500 MHz
	  500 MHz to 4 GHz
	  4 GHz to 7 GHz (R&S ZVB8 only)
	  7 GHz to 7.5 GHz (R&S ZVB8 only)
	  above 7.5 GHz (R&S ZVB8 only)
		
		>80 dB
		>120 dB
		>123 dB
		>120 dB
		>115 dB
		>108 dB

The dynamic range is defined as the difference between the maximum source power and the rms value of the data trace of the transmission magnitude produced by noise and crosstalk with test ports short-circuited. The dynamic range may be reduced by 30 dB due to spurious signals. The dynamic range may be reduced to 80 dB at 1.28 GHz and 2.56 GHz.		

Measurement accuracy

This data is valid between 18 °C and 28 °C, provided the temperature has not varied by more than 1 K after calibration. Validity of the data is conditional on the use of a suitable calibration kit by which the effective system data specified below is achieved. Frequency points have to be identical for measurement and calibration (no interpolation allowed).

Uncertainty of transmission measurements		
Up to 50 MHz	for +15 dB to −30 dB	0.2 dB or 2°
	for −30 dB to −45 dB	1 dB or 6°
Above 50 MHz	for +15 dB to +5 dB	0.2 dB or 2°
	for +5 dB to −60 dB	0.1 dB or 1°
	for −60 dB to −75 dB	0.2 dB or 2°
	for −75 dB to −90 dB	1 dB or 6°
Specifications are based on a matched DUT, a measurement bandwidth of 10 Hz, and a nominal source power of −10 dBm.		

Uncertainty of reflection measurements		
Above 300 kHz	for +10 dB to +3 dB	0.6 dB or 4°
	for +3 dB to −15 dB	0.4 dB or 3°
	for −15 dB to −25 dB	1 dB or 6°
	for −25 dB to −35 dB	3 dB or 20°
Specifications are based on an isolating DUT, a measurement bandwidth of 10 Hz, and a nominal source power of −10 dBm.		

Trace noise of S11 (rms)	at 0 dB and 10 kHz measurement bandwidth	<0.01 dB
Variation of data trace	at 0 dB per K of temperature variation	<0.05 dB or <0.4°

Effective system data

This data is valid between 18 °C and 28 °C, provided the temperature has not varied by more than 1 K after calibration. The data is based on a measurement bandwidth of 10 Hz and system error calibration by means of a suitable calibration kit.

Directivity	up to 4 GHz	>46 dB
	above 4 GHz (R&S ZVB8 only)	>40 dB
Source match	up to 4 GHz	>40 dB
	above 4 GHz (R&S ZVB8 only)	>36 dB
Reflection tracking	up to 4 GHz	>0.04 dB
	above 4 GHz (R&S ZVB8 only)	>0.1 dB
Load match	up to 4 GHz	>46 dB
	above 4 GHz (R&S ZVB8 only)	>40 dB
Transmission tracking	up to 4 GHz	>0.06 dB
	above 4 GHz (R&S ZVB8 only)	>0.2 dB

Test port output

Power range	up to 50 MHz	−40 dBm to +10 dBm
	50 MHz to 4 GHz	−40 dBm to +13 dBm
	4 GHz to 7 GHz (R&S ZVB8 only)	−40 dBm to +10 dBm
	above 7 GHz (R&S ZVB8 only)	−40 dBm to +8 dBm
Power uncertainty	at −10 dBm without power calibration above 50 MHz	3 dB
	in temperature range 18 °C to 28 °C	2 dB
Power linearity	referenced to −10 dBm	<2 dB
Power resolution		0.01 dB
Harmonics	R&S ZVB4 and R&S ZVB8 50 MHz to 4 GHz at +10 dBm	<−20 dBc
	R&S ZVB8 4 GHz to 7 GHz at +10 dBm	<−20 dBc
	above 7 GHz at +8 dBm	<−20 dBc

Test port input

Match	without system error correction	
	up to 4 GHz	>16 dB
	up to 7 GHz (R&S ZVB8 only)	>16 dB
	above 7 GHz (R&S ZVB8 only)	>14 dB
Maximum nominal input level		+13 dBm
Power measurement uncertainty	at –10 dBm without power calibration in temperature range 18 °C to 28 °C	
	above 10 MHz	1 dB
Receiver linearity	referenced to –10 dBm in temperature range 18 °C to 28 °C for +20 dB to –60 dB	
	50 MHz to 4 GHz	0.1 dB
	4 GHz to 6 GHz (R&S ZVB8 only)	0.1 dB
	above 6 GHz (R&S ZVB8 only)	0.2 dB
Damage level		+27 dBm
Damage DC voltage		30 V
Noise level	at 10 Hz measurement bandwidth	
	up to 100 MHz	<–70 dBm
	100 MHz to 4 GHz	<–110 dBm
	above 4 GHz (R&S ZVB8 only)	<–105 dBm
The noise level is defined as the rms value of the indicated noise floor. The noise level may be enhanced by 30 dB due to spurious signals.		

Additional front panel connectors

USB	(two) Universal Serial Bus connectors for USB devices (USB 1.1); two additional USB connectors on the rear panel

Display

Screen	21 cm (8.4") diagonal colour LCD
Resolution	800 × 600 × 262144 (high colour)

Rear panel connectors

IEC BUS	remote control according to IEEE488, IEC60625; 24 pins

LAN 1	first Local Area Network connector, 8 pins, RJ-45

LAN 2	second Local Area Network connector, 8 pins, RJ-45

USB	(two) Universal Serial Bus connectors for USB devices (USB 1.1); two additional USB connectors on the front panel

10 MHz REF	alternatively input or output for external frequency reference signal	
Connector type		BNC, female
Input frequency		10 MHz
Maximum allowed deviation		1 kHz
Input power		0 dBm ± 3 dB
Input impedance		50 Ω
Output frequency		10 MHz
Frequency uncertainty		80 Hz
Output power (sinusoidal signal)		0 dBm ± 1 dB at 50 Ω

DC MEAS 1 V	DC measurement input	
Connector type		4-pin Mini DIN, female
Voltage range		–1 V to +1 V
Measurement uncertainty		2.5 % of reading + 2.5 mV
Input impedance		>10 kΩ

DC MEAS 10 V	DC measurement input	
Connector type		4-pin Mini DIN, female
Voltage range		−10 V to +10 V
Measurement uncertainty		2.5 % of reading + 25 mV
Input impedance		>10 kΩ

PORT BIAS 1	DC bias input for PORT 1	
Connector type		BNC, female
Maximum nominal input voltage		30 V
Maximum nominal input current		200 mA
Damage voltage		30 V
Damage current		500 mA

PORT BIAS 2	DC bias input for PORT 2	
Connector type		BNC, female
Maximum nominal input voltage		30 V
Maximum nominal input current		200 mA
Damage voltage		30 V
Damage current		500 mA

PORT BIAS 3	DC bias input for PORT 3	
Connector type		BNC, female
Maximum nominal input voltage		30 V
Maximum nominal input current		200 mA
Damage voltage		30 V
Damage current		500 mA

PORT BIAS 4	DC bias input for PORT 4	
Connector type		BNC, female
Maximum nominal input voltage		30 V
Maximum nominal input current		200 mA
Damage voltage		30 V
Damage current		500 mA

MONITOR	IBM-PC-compatible VGA monitor connector, 15-pin Sub-D (for external monitor)

USER CONTROL	several control and trigger signals, 25-pin Sub-D, 3.3 V TTL for controlling external generators, for limit checks, sweep signals, etc	
FOOT SWITCH 1 and FOOT SWITCH 2	pin 24 and pin 25 (inputs)	control inputs
DRIVE PORT 1 to DRIVE PORT 4	pin 16 to pin 19 (outputs)	indicate driving port
CHANNEL BIT 0 to CHANNEL BIT 3	pin 8 to pin 11 (outputs)	channel-specific user-configurable bits
PASS 1 and PASS 2	pin 13 and pin 14 (outputs)	pass/fail results of limit checks
BUSY	pin 4 (output)	measurements running
READY FOR TRIGGER	pin 6 (output)	ready for trigger
EXT GEN TRIGGER	pin 21 (output)	control signal for external generator
EXT GEN BLANK	pin 22 (input)	handshake signal from external generator
EXTERNAL TRIGGER	pin 2 (input)	trigger input for analyzer

EXT TRIGGER	trigger input for analyzer	
Connector type		BNC, female
TTL signal (edge triggered)		3 V
Polarity (selectable)		positive or negative
Minimum pulse width		1 µs
Input impedance		>10 kΩ

General specifications

Temperature loading	specs complied with operating temperature range storage temperature range	5 °C to 40 °C 5 °C to 40 °C –40 °C to 70 °C meets IEC 60068-2-1 and IEC 60068-2-2
Damp heat		40 °C at 95 % rel. humidity, meets IEC 60068-2-30
Mechanical resistance	vibration, sinusoidal	5 Hz to 150 Hz meets IEC 60068-2-6
	vibration, random	10 Hz to 300 Hz, meets IEC 60068-2-64
	shock	40 g shock spectrum, meets IEC 60068-2-27, MIL-STD-810
Calibration interval		1 year
EMC, RF emission		meets CISPR 11/EN 55011 Group 1 Class B (for a shielded test set-up)
EMC, other emissions and immunity		meets IEC/EN 61326, regarding immunity: industrial environment (immunity to EMI according to EN 61000-4-3 and -6 applies outside operating frequency range)
Safety		meets IEC 61010-1, EN61010-1, and UL 3111-1
Power supply		100 V to 240 V (AC) ± 10 %, 50 Hz to 60 Hz ± 5 %, safety class I to VDE 411
Power consumption		450 W, typ. 350 W (standby: typ. 10 W)
Test mark		VDE, GS, CSA, CSA-NRTL/C, CE conformity mark
Dimensions (W × H × D)		435 mm × 234 mm × 350 mm
Weight		20 kg

Ordering information

Designation	Type	Order No.
Vector Network Analyzer, 4 GHz, 4 ports	R&S ZVB4	1145.1010.06
Vector Network Analyzer, 8 GHz, 4 ports	R&S ZVB8	1145.1010.10
Option		
Oven Quartz (OCXO) Increased frequency accuracy and stability	R&S ZVAB-B4	1164.1757.02

For product brochure, see PD 0758.1529.12
and www.rohde-schwarz.com
(search term: ZVB)

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