R&S®ZND
Vector Network Analyzer
Basic, solid-performance network analysis

ROHDE&SCHWARZ

Test & Measurement

Product Brochure | 01.01

R&S®ZND Vector Network Analyzer

At a glance

The R&S®ZND is a basic network analyzer that provides unidirectional measurements up to 4.5 GHz. Options are available to perform bidirectional measurements and to extend the frequency range to 8.5 GHz.

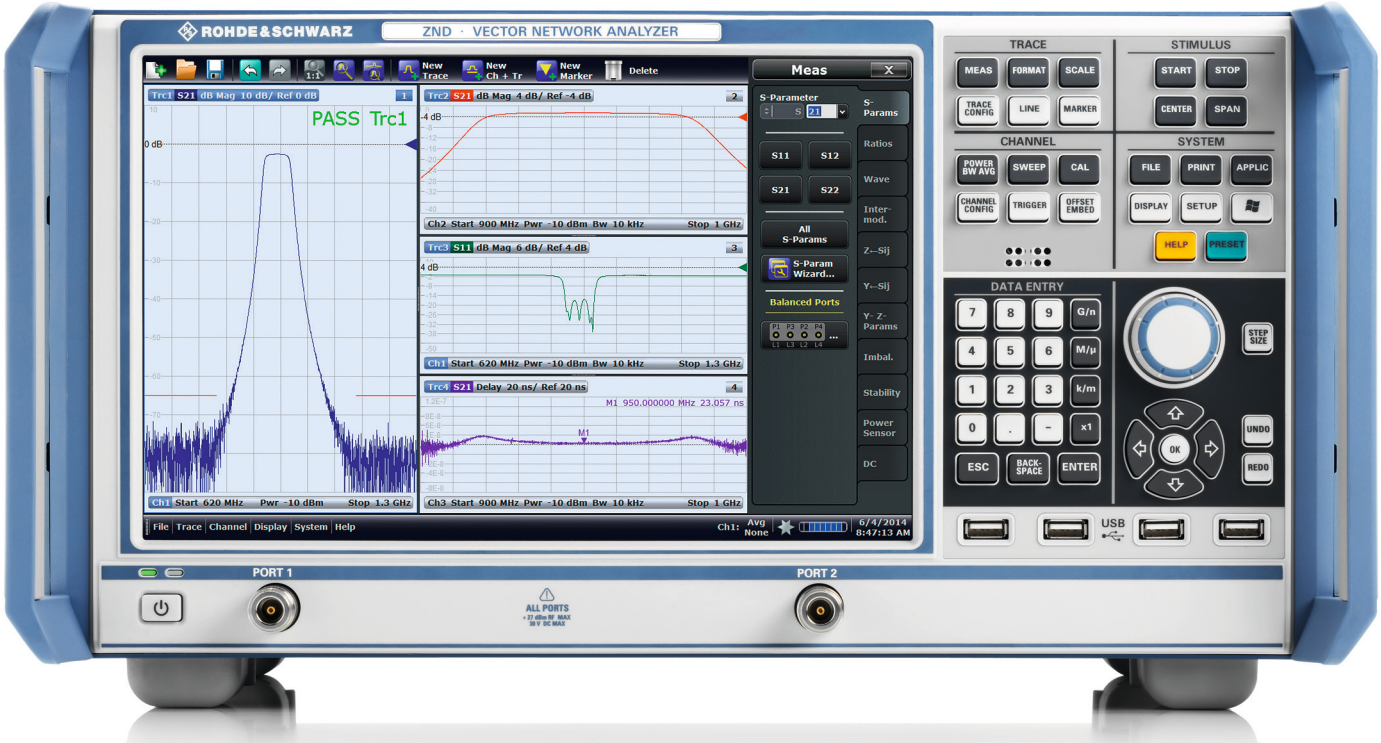
The R&S®ZND supplements the R&S®ZNB family of network analyzers. The unidirectional R&S®ZND base model can be used to measure the S-parameters S_{11} and S_{21}. The R&S®ZND can easily be upgraded to provide bidirectional measurements and to extend the frequency range up to 8.5 GHz. Users can tailor the instrument to their specific needs in RF component production and development.

The easy-to-operate R&S®ZND is also ideal for training purposes. The analyzer's large touchscreen makes it possible to display multiple results simultaneously.

The R&S®ZND has the same remote control command set as the analyzers from the R&S®ZNB family. Users can switch between instruments without having to modify control programs.

Key facts

- Two-port network analyzer for unidirectional measurements from 100 kHz to 4.5 GHz
- Frequency range can be extended to 8.5 GHz
- Test set can be enhanced for bidirectional measurements
- Touchscreen operation
- Dynamic range up to 120 dB
- Power sweep range up to 48 dB
- Bandwidths from 1 Hz to 300 kHz
- More than 100 traces and channels
- Compatible with all Rohde&Schwarz network analyzers



R&S®ZND Vector Network Analyzer

Benefits and key features

The analyzer that grows with your requirements

- Vector network analysis
- Unidirectional test set
- Bidirectional test set
- Easy to upgrade
- Time domain analysis for cable and filter measurements
- Easy transition to analyzers from the R&S®ZNB family
- Interfaces for test sequence control in production environments

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Easy to operate

- Flat menu structures for efficient operation
- Optimal display configuration for each measurement task

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Convenient calibration

- The right calibration method for every application
- Flexibility and accuracy with Rohde&Schwarz calibration kits
- Automatic calibration within 30 seconds

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The analyzer that grows with your requirements

Vector network analysis

Vector network analyzers such as the R&S®ZND can measure various parameters of an electronic network, e.g. the magnitude and phase of S-parameters. For applications in a production environment, customers are often looking for an instrument with a reduced range of functions in order to keep investment costs low. The R&S®ZND is the perfect answer to this requirement. In its basic configuration, the analyzer contains a unidirectional test set with a frequency range up to 4.5 GHz. The frequency range can be extended to 8.5 GHz, and the analyzer can be upgraded for bidirectional measurements to accommodate future or changing test requirements.

Unidirectional test set

The unidirectional test set incorporated in the analyzer base unit is made up of a bridge and three receivers for unidirectional S_{11} and S_{21} measurements up to 4.5 GHz. This test set can be used, for example, to test passive components such as filters, connectors and antennas.

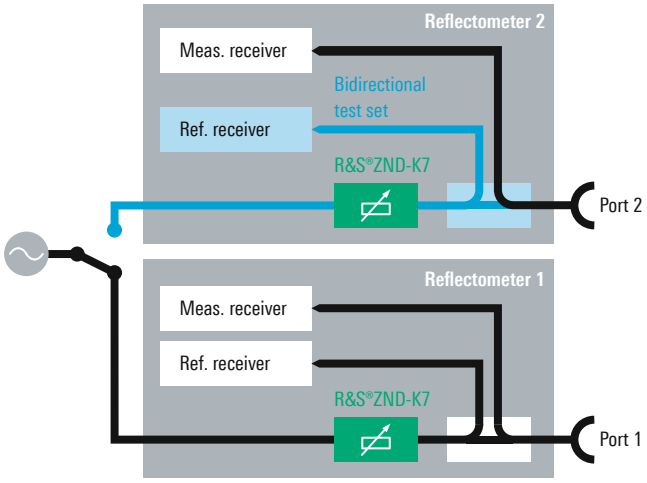
Bidirectional test set

The R&S®ZND base unit can be expanded to provide bidirectional measurements on RF components. The bidirectional test set contains four receivers and two bridges and can also stimulate the DUT via port 2. In this configuration, the analyzer can measure all four S-parameters (S_{11}, S_{12}, S_{21}, S_{22}) as well as other network parameters of a two-port DUT.

Easy to upgrade

Diverse options are available to expand the functionality of the base unit. The R&S®ZND can be upgraded from a unidirectional test set up to 4.5 GHz to a bidirectional test set up to 8.5 GHz. The power sweep range can be extended and time domain analysis functionality added. Further options include a GPIB interface and a parts handler interface (handler I/O).

Unidirectional/bidirectional test set



Unidirectional test set (black) of the R&S®ZND, expansion for bidirectional test set (blue) and extended power range options (green).

Time domain analysis for cable and filter measurements

The R&S®ZND offers a powerful option for analyzing components such as cables and filters in the frequency and time domain. The gating function is used to remove the effects of unwanted discontinuities and multiple reflections. The data is then converted back to the frequency domain. Using prediction, the frequency range of the R&S®ZND can be virtually extended, yielding a resolution higher than would be expected from the upper frequency limit of 8.5 GHz.

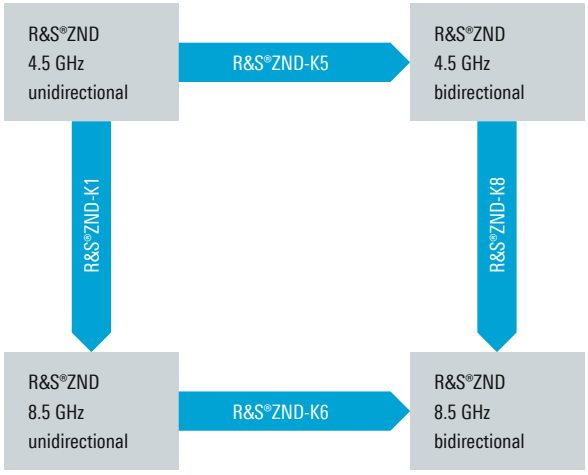
Easy transition to analyzers from the R&S®ZNB family

The R&S®ZND can be remotely controlled via LAN or GPIB in order to configure measurements and read results. The R&S®ZND is based on the same firmware and uses the same remote control command set as the analyzers from the R&S®ZNB family. When replacing R&S®ZND analyzers with analyzers from the R&S®ZNB family – e.g. to provide additional measurement functionality – existing test sequences can continue to be used, making it easy to upgrade existing systems.

Interfaces for test sequence control in production environments

The R&S®ZND offers various digital interfaces that can be used to speed up automatic test cycles. For example, the integrated user control port has special outputs that can be assigned (via the firmware) different bit combinations referred to as channel bits. These are used to synchronize external components in a test setup or the settings of a DUT to the analyzer's internal test sequences in realtime. In systems with fully automated test equipment (ATE), the optional handler I/O enables program-controlled communications with a parts handler and other components in the ATE. Equipped with the optional GPIB interface, the R&S®ZND can control further instruments such as signal generators, thus delivering expanded measurement capabilities.

Upgrade options for R&S®ZND base unit



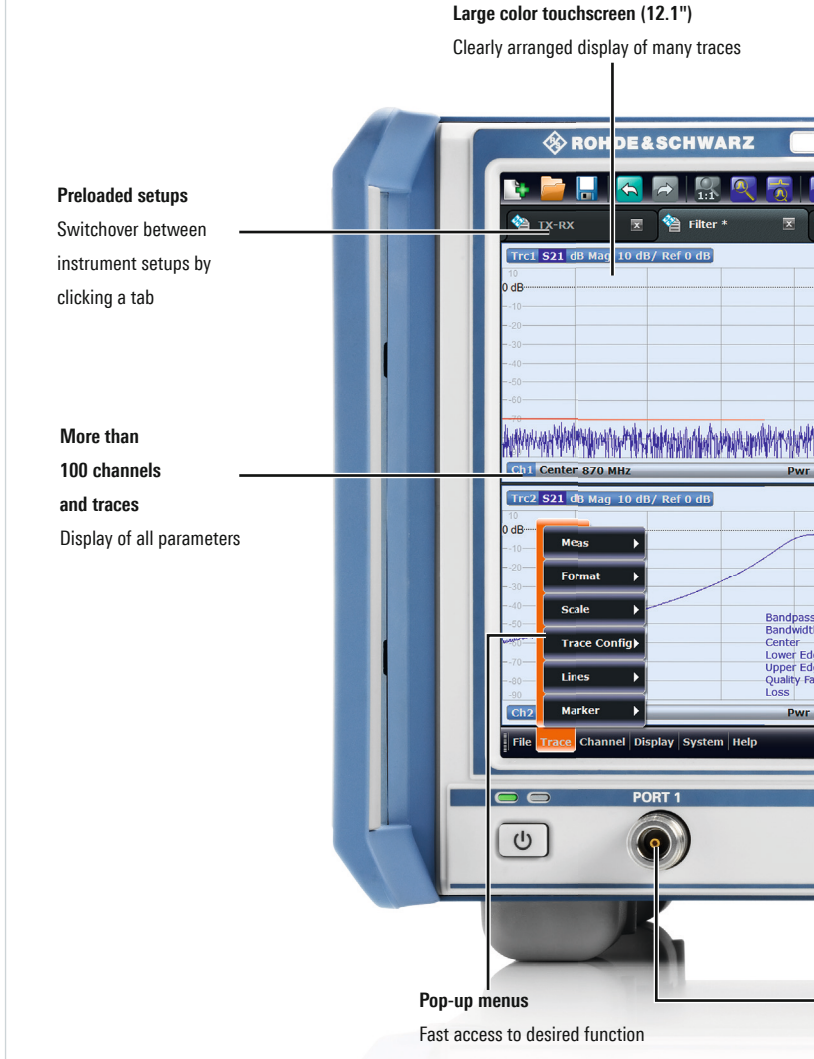
Easy to operate

Flat menu structures for efficient operation

The R&S®ZND groups together logically related analyzer control functions at a single operational level. Users can see all relevant setting options at a glance. Configuration, measurement and analysis are truly intuitive.

- The R&S®ZND features a soft panel that immediately shows all control elements that may be needed for a measurement and effectively helps users perform measurement tasks
- Via the soft panel, users can access all instrument functions in a maximum of three operating steps
- Pop-up menus allow many test parameters to be edited right where they are displayed
- Wizards guide the user through the steps of an operating sequence, for example when calibrating the network analyzer, thereby reducing operator errors to a minimum

Clearly structured user interface



Optimal display configuration for each measurement task

The R&S®ZND comes with a 30 cm (12.1") touchscreen that allows users to set up the display as required by arranging diagrams, traces and channels in any desired combination. Traces can simply be dragged and dropped between diagrams, either with a finger or the mouse. The names of traces, channels and markers can be edited and replaced by user-specific names to make them easier to identify.

Several instrument setups are available simultaneously on the R&S®ZND. The user simply touches or clicks a tab to put the desired setup and diagrams in the foreground and start the associated measurements. This convenient approach makes it possible to handle different measurement tasks simultaneously without overloading the display with diagrams that are not currently needed. The user can add further measurements without modifying the original measurement and very quickly switch between setups, an essential prerequisite for high throughput in production.

Toolbar
Fast access to frequently used functions

Soft panel
Optionally on the right or left, for direct instrument control without submenus

Logically arranged hardkeys
Just a few keystrokes to desired configuration

Online help
Context-sensitive, including remote control commands

Undo/Redo
Cancels or restores the last one to six entries

Widely spaced test ports
Easy connection of DUT
Plenty of space for connecting test cables

Transparent dialog windows
Traces remain visible

USB connectors for auxiliary equipment
Connection of power sensor, automatic calibration unit, mouse/keyboard, memory stick

Convenient calibration

The right calibration method for every application

All R&S®ZND configurations feature normalization for reflection and transmission measurements as well as one-path two-port calibration, fixture compensation and full one-port calibration. The R&S®ZND configurations with a bidirectional test set additionally provide the following full two-port calibration methods: TOSM, UOSM, TOM, TRM, TSM, TRL, TNA and adapter removal. The characters in these acronyms designate the standards used in the various calibration methods.

Calibration method	Standard	Parameter	Test set
Normalization, reflection	Open or Short	S_{11} S_{22}	unidirectional bidirectional
Normalization, transmission	Through	S_{21} S_{12}	unidirectional bidirectional
OSM	Open, Short, Match	S_{11} S_{22}	unidirectional bidirectional
One-path two-port	Open, Short, Match, Through	S_{11}, S_{21} or S_{22}, S_{12}	unidirectional bidirectional
TOSM or UOSM (n-port)	Through or Unknown Through, Open, Short, Match	S_{11}, S_{21} S_{22}, S_{12}	bidirectional
Adapter removal (2-port)	Open, Short, Match, Through	S_{11}, S_{21} S_{22}, S_{12}	bidirectional
TOM	Through, Open, Match	S_{11}, S_{21} S_{22}, S_{12}	bidirectional
TSM	Through, Short, Match	S_{11}, S_{21} S_{22}, S_{12}	bidirectional
TRM	Through, Reflect, Match	S_{11}, S_{21} S_{22}, S_{12}	bidirectional
TRL	Through, Reflect, Line 1, further lines (optional), can be combined with TRM (optional)	S_{11}, S_{21} S_{22}, S_{12}	bidirectional
TNA	Through, Network, Attenuation	S_{11}, S_{21} S_{22}, S_{12}	bidirectional

Flexibility and accuracy with Rohde&Schwarz calibration kits

Rohde&Schwarz offers manual calibration kits for use with standard connectors. These kits contain open, short, match and through standards (combined male and female). The standards are measured prior to delivery. For each standard, an average value depending on the type of calibration kit is stored in the R&S®ZND.

Calibration kits with separate male and female versions for each standard are also available, enhancing flexibility even further. These kits come with an individual set of data for each standard that can be read into the R&S®ZND for enhanced measurement accuracy.

Automatic calibration within 30 seconds

Rohde&Schwarz offers automatic calibration units that make calibration even more convenient. These calibration units are connected via USB and are immediately ready for operation. They calibrate an R&S®ZND in less than 30 seconds, covering 201 points. Users can connect adapters to a calibration unit to match different connector types used on the DUT. They can re-characterize the calibration unit, together with the adapters, and store the resulting data to the unit's internal memory.

Manual calibration standards.

R&S®ZN-Z151 calibration unit.

Calibration methods

- **TOSM** (**T**hrough, **O**pen, **S**hort, **M**atch): classic calibration method for coaxial test environments
- **TSM** (**T**hrough, **S**hort, **M**atch): full two-port calibration method requiring less calibration effort
- **TRL/LRL** (**T**hrough, **R**eflect, **L**ine/**L**ine, **R**eflect, **L**ine): calibration method for printed board based test structures and on-wafer applications
- **TRM/TNA** (**T**hrough, **R**eflect, **M**atch/**T**hrough, **N**etwork, **A**ttenuation): calibration method for applications using test fixtures
- **UOSM** (**U**nknown Through, **O**pen, **S**hort, **M**atch): calibration method for DUTs using a mix of connectors

Ordering information

Designation	Type	Frequency range	Order No.
Base unit			
Vector Network Analyzer, Two Ports, 4.5 GHz, N	R&S®ZND	100 kHz to 4.5 GHz	1328.5170.92
Options			
GPIB Interface [1]	R&S®ZND-B10		1328.5358.02
Handler I/O	R&S®ZN-B14		1316.2459.02
Extended Frequency Range, unidirectional, 8.5 GHz [2,3]	R&S®ZND-K1	100 kHz to 8.5 GHz	1328.5306.02
Time Domain Analysis (TDR)	R&S®ZND-K2		1328.5393.02
Full Test Set, Base Unit, bidirectional, 4.5 GHz [3,4]	R&S®ZND-K5	100 kHz to 4.5 GHz	1328.5312.02
Full Test Set, bidirectional, 8.5 GHz [3,5]	R&S®ZND-K6	100 kHz to 8.5 GHz	1328.5329.02
Extended Power Range for R&S®ZND	R&S®ZND-K7		1328.5335.02
Extended Frequency Range, Full Test Set, bidirectional, 8.5 GHz [3,6]	R&S®ZND-K8	100 kHz to 8.5 GHz	1328.5412.02
USB-to-IEC/IEEE Adapter	R&S®ZVAB-B44		1302.5544.02
Accessories			
Calibration kits (manual calibration)			
Calibration Kit, N, 50 Ω	R&S®ZCAN	0 Hz to 3 GHz	0800.8515.52
Calibration Kit, N (m), 50 Ω	R&S®ZV-Z170	0 Hz to 9 GHz	1317.7683.02
Calibration Kit, N (f), 50 Ω	R&S®ZV-Z170	0 Hz to 9 GHz	1317.7683.03
Calibration Kit, N, 50 Ω	R&S®ZV-Z270	0 Hz to 18 GHz	5011.6536.02
Calibration Kit, 3.5 mm (m), 50 Ω	R&S®ZV-Z135	0 Hz to 15 GHz	1317.7677.02
Calibration Kit, 3.5 mm (f), 50 Ω	R&S®ZV-Z135	0 Hz to 15 GHz	1317.7677.03
Calibration Kit, 3.5 mm, 50 Ω	R&S®ZV-Z235	0 Hz to 26.5 GHz	5011.6542.02
Calibration units (automatic calibration)			
Calibration Unit, Two ports, N (f)	R&S®ZN-Z151	100 kHz to 8.5 GHz	1317.9134.72
Calibration Unit, Two Ports, N (f) [7]	R&S®ZN-Z51	100 kHz to 8.5 GHz	1319.5507.72
Calibration Unit, Two Ports, 3.5 mm (f)	R&S®ZN-Z51	100 kHz to 8.5 GHz	1319.5507.32
Test cables			
N (m)/N (m), 50 Ω, length: 0.6 m/1 m	R&S®ZV-Z91	0 Hz to 18 GHz	1301.7572.25/38
N (m)/N (m), 50 Ω, length: 0.6 m/0.9 m	R&S®ZV-Z191	0 Hz to 18 GHz	1306.4507.24/36
N (m)/3.5 mm (m), 50 Ω, length: 0.6 m/1 m	R&S®ZV-Z92	0 Hz to 18 GHz	1301.7589.25/38
N (m)/3.5 mm (m), 50 Ω, length: 0.6 m/0.9 m	R&S®ZV-Z192	0 Hz to 18 GHz	1306.4513.24/36
3.5 mm (f)/3.5 mm (m), length: 0.6 m/1 m	R&S®ZV-Z93	0 Hz to 26.5 GHz	1301.7595.25/38
3.5 mm (f)/3.5 mm (m), length: 0.6 m/0.9 m	R&S®ZV-Z193	0 Hz to 26.5 GHz	1306.4520.24/36
Hardware add-on			
19" Rackmount Kit	R&S®ZZA-KN5		1175.3040.00

[1] Requires R&S®ZVAB-B44 to control external generators via the IEC/IEEE bus.
[2] R&S®ZND-K1: cannot be combined with R&S®ZND-K5 and R&S®ZND-K8.
[3] Recalibration required.
[4] R&S®ZND-K5: cannot be combined with R&S®ZND-K1 and R&S®ZND-K6.
[5] R&S®ZND-K6: requires R&S®ZND-K1, cannot be combined with R&S®ZND-K5 and R&S®ZND-K8.
[6] R&S®ZND-K8: requires R&S®ZND-K5, cannot be combined with R&S®ZND-K1 and R&S®ZND-K6.
[7] Can also be configured with other connector systems.

Service options		
Extended Warranty, one year	R&S®WE1	Please contact your local Rohde&Schwarz sales office.
Extended Warranty, two years	R&S®WE2	
Extended Warranty, three years	R&S®WE3	
Extended Warranty, four years	R&S®WE4	
Extended Warranty with Calibration Coverage, one year	R&S®CW1	
Extended Warranty with Calibration Coverage, two years	R&S®CW2	
Extended Warranty with Calibration Coverage, three years	R&S®CW3	
Extended Warranty with Calibration Coverage, four years	R&S®CW4	

For data sheet, see PD 3607.0381.22 and www.rohde-schwarz.com

Your local Rohde&Schwarz expert will help you determine the optimum solution for your requirements.
To find your nearest Rohde&Schwarz representative, visit
www.sales.rohde-schwarz.com

Rear view of the R&S®ZND.

Service that adds value

- Worldwide
- Local and personalized
- Customized and flexible
- Uncompromising quality
- Long-term dependability

About Rohde&Schwarz

The Rohde&Schwarz electronics group is a leading supplier of solutions in the fields of test and measurement, broadcasting, secure communications, and radiomonitoring and radiolocation. Founded more than 80 years ago, this independent global company has an extensive sales network and is present in more than 70 countries.
The company is headquartered in Munich, Germany.

Sustainable product design

- Environmental compatibility and eco-footprint
- Energy efficiency and low emissions
- Longevity and optimized total cost of ownership

Certified Quality Management
ISO 9001

Certified Environmental Management
ISO 14001

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