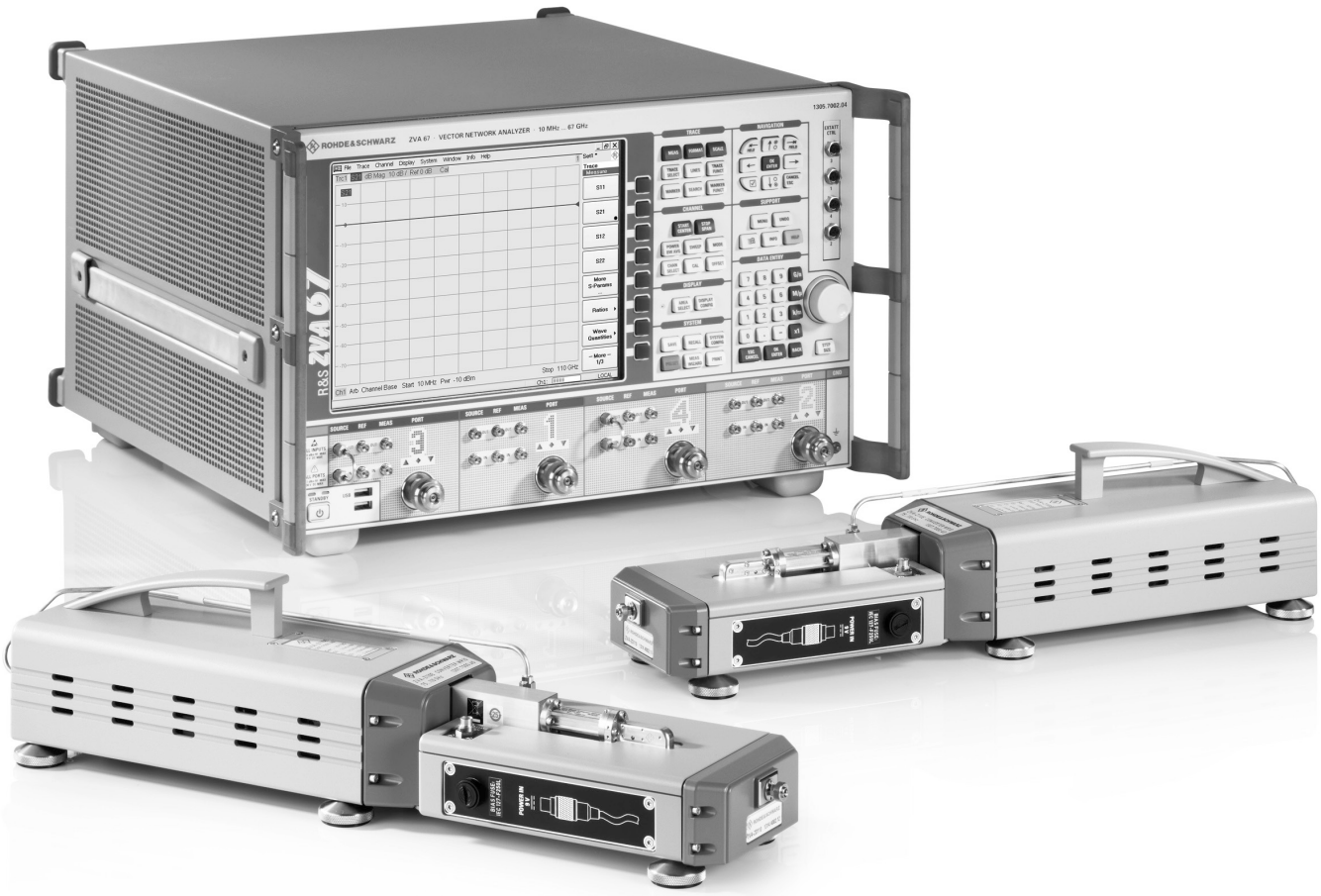
R&S®ZVA110
Vector Network Analyzer
Specifications



ROHDE&SCHWARZ

Data Sheet | Version 06.00

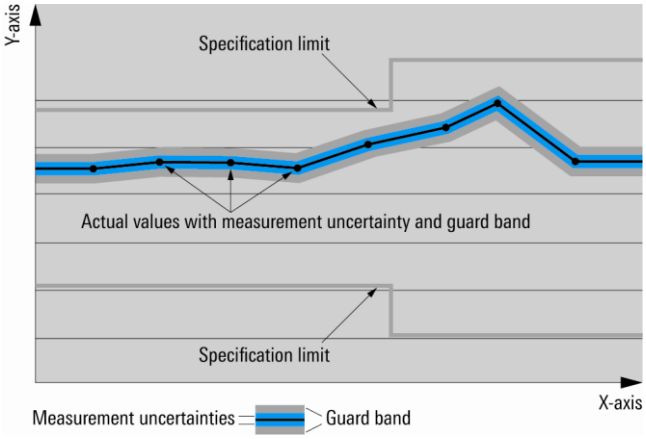
CONTENTS

Definitions

General
Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

Specifications with limits
Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as <, ≤, >, ≥, ±, or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



Specifications without limits
Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

Typical data (typ.)
Characterizes product performance by means of representative information for the given parameter. When marked with <, > or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

Nominal values (nom.)
Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

Measured values (meas.)
Characterize expected product performance by means of measurement results gained from individual samples.

Uncertainties
Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are indicated as follows: “parameter: value”.

Typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

Specifications

Overview

The R&S®ZVA110 is a 1.0 mm vector network analyzer system, covering the frequency range from 10 MHz to 110 GHz.

The R&S®ZVA110 vector network analyzer system consists of one R&S®ZVA67 four-port vector network analyzer (with -B16 and -K8 option) and two external test sets

Each of the external test sets is formed by a R&S®ZVA-Z110E frequency converter and a R&S®ZVA-ZD110 diplexer. The system can also be operated without the R&S®ZVA-ZD110 diplexers, yielding a two port waveguide measurement system with a WR10 test port. Specifications relevant to this operating mode can be found in the R&S®ZVA-Zxx data sheet PD 5214.2033.22

The following specifications apply for operation as a 1.0 mm vector network analyzer system. The specified data is only valid for a system configuration identical to the designation scheme at the rear panel of the R&S®ZVA67, with respect to the type and serial numbers as well as the correct position on the “right” or “left” side of the system. The position “left” is operated by ports 1 and 3 and position “right” by ports 2 and 4.

Measurement range

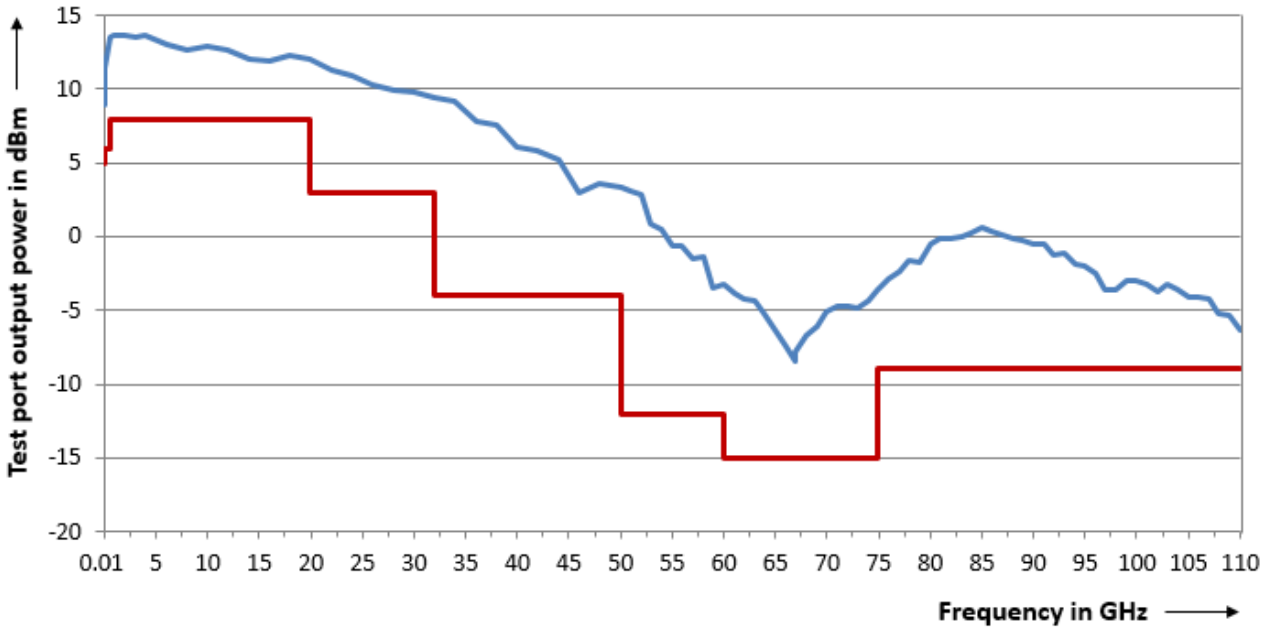
Impedance		50 Ω	
Test port connector		1.0 mm, male	
Number of test ports		2	
Frequency range	R&S®ZVA110	10 MHz to 110 GHz	
Static frequency accuracy	without optional oven quartz	8×10^{-6}	
	with optional oven quartz	1×10^{-7}	
Frequency resolution		1 Hz	
Number of measurement points	user-selectable	1 to 60001	
Measurement bandwidths	1/2/5 steps	1 Hz to 1 MHz	
Dynamic range	R&S®ZVA110	models .03 and .05	models .13 and .15
	10 MHz to 50 MHz	> 50 dB, typ. 60 dB	
	50 MHz to 500 MHz	> 90 dB, typ. 103 dB	
	500 MHz to 2 GHz	> 113 dB, typ. 123 dB	
	2 GHz to 20 GHz	> 120 dB, typ. 130 dB	
	20 GHz to 24 GHz	> 110 dB, typ. 120 dB	
	24 GHz to 32 GHz	> 106 dB, typ. 116 dB	
	32 GHz to 40 GHz	> 97 dB, typ. 110 dB	
	40 GHz to 50 GHz	> 87 dB, typ. 105 dB	
	50 GHz to 60 GHz	> 80 dB, typ. 94 dB	
	60 GHz to 75 GHz	> 70 dB, typ. 80 dB	> 75 dB, typ. 85 dB
	75 GHz to 110 GHz	> 75 dB, typ. 85 dB	> 80 dB, typ. 95 dB
The dynamic range is defined as the difference between the actually available maximum source power and the RMS value of the data trace of the transmission magnitude, which is produced by noise and crosstalk with the test ports short-circuited. The specification is valid without system error correction and at 10 Hz measurement bandwidth. The dynamic range can be increased by using a measurement bandwidth of 1 Hz.			

Test port output

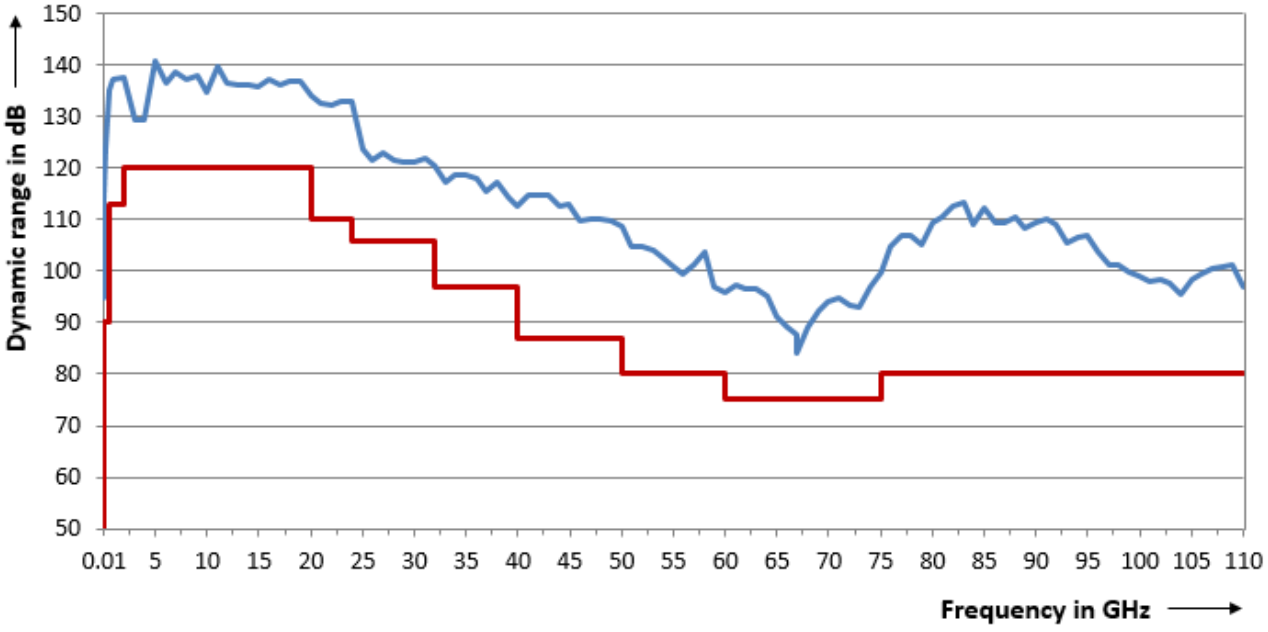
Output power	R&S®ZVA110	models .03 and .05	models .13 and .15
	10 MHz to 50 MHz	–30 dBm to +5 dBm [1]	
	50 MHz to 500 MHz	–30 dBm to +6 dBm [1]	
	500 MHz to 20 GHz	–30 dBm to +8 dBm [1]	
	20 GHz to 32 GHz	–30 dBm to +3 dBm [1]	
	32 GHz to 50 GHz	–30 dBm to –4 dBm [1]	
	50 GHz to 60 GHz	–35 dBm to –12 dBm [1]	
	60 GHz to 67 GHz	–37 dBm to –19 dBm [1]	–37 dBm to –15 dBm [1]
	67 GHz to 75 GHz	–30 dBm to –19 dBm [1]	–30 dBm to –15 dBm [1]
	75 GHz to 110 GHz	–30 dBm to –17 dBm [1,2]	–30 dBm to –9 dBm [1]
Output power accuracy (with power calibration)	500 MHz to 24 GHz	< 0.8 dB, typ. 0.3 dB	
	24 GHz to 67 GHz	< 2 dB, typ. 1 dB	
	67 GHz to 110 GHz	< 3 dB, typ. 2 dB	

[1] Electrically adjustable.

[2] The maximum output power is limited to below 0 dBm for f > 90 GHz.



Test port output power versus frequency of the R&S®ZVA110 (models .13 and .15).



Dynamic range in dB versus frequency of the R&S®ZVA110 (models .13 and .15).

Test port input

Damage level		+27 dBm

System characteristics

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. Frequency points, measurement bandwidth, and sweep time have to be identical for measurement and calibration (no interpolation allowed).

System characteristics of R&S®ZVA110		
Trace stability (transmission of the through standard)	10 MHz to 110 GHz	typ. < 0.4 dB and typ. < 4°
Effective source match (with system error correction)	10 MHz to 110 GHz	typ. > 32 dB
Effective directivity (with system error correction)	10 MHz to 110 GHz	typ. > 32 dB
Effective load match (with system error correction)	10 MHz to 110 GHz	typ. > 32 dB

Additional front panel connectors

USB	(two) universal serial bus connectors for connecting USB devices (USB 2.0); two additional USB connectors at the rear panel

Display

Screen	26 cm (10.4") diagonal color LCD
Resolution	800 × 600 × 262144 pixel (high color)

Rear panel connectors

IEC BUS	remote control in line with IEEE 488, IEC 60625; 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 connecting USB devices (USB 2.0); two additional USB connectors at the front panel

10 MHz REF	alternatively input or output for external frequency reference signal	
Connector type		BNC, female
Input frequency		10 MHz
Maximum permissible deviation		1 kHz
Input power		–3 dBm ± 8 dB
Input impedance		50 Ω
Output frequency		10 MHz
Output frequency accuracy		80 Hz
Output power		–3 dBm ± 8 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 accuracy		2.5 % of reading + 2.5 mV
Resolution		12 bit
Sample rate		3 MHz
Input impedance		> 10 kΩ
Damage voltage		30 V

DC MEAS 10 V	DC measurement input	
Connector type		4-pin mini DIN, female
Voltage range		–10 V to +10 V
Measurement accuracy		2.5 % of reading + 25 mV
Resolution		12 bit
Sample rate		3 MHz
Input impedance		> 10 kΩ
Damage voltage		30 V

Force (on R&S®ZVA-ZD110)	fused DC bias input for 1.0 mm PORT	
Connector type		subminiature triaxial connector, female, signal applied to inner connector
Maximum nominal input voltage		30 V
Maximum nominal input current		200 mA
Damage voltage		30 V
Damage current		500 mA

Sense (on R&S®ZVA-ZD110)	DC bias sense output for 1.0 mm PORT	
Connector type		subminiature triaxial connector, female, signal applied to inner connector

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

USER CONTROL	several control and trigger signals, 25-pin D-Sub, 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 and CHANNEL BIT 1	pin 8 and pin 9 (outputs)	not available
CHANNEL BIT 2 and CHANNEL BIT 3	pin 10 and 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 (user-selectable)		positive or negative
Minimum pulse width		1 µs
Input impedance		> 10 kΩ

General data

Temperature loading	in line with IEC 60068-2-1 and IEC 60068-2-2	
	operating temperature range	+18 °C to +28 °C
	permissible temperature range	+5 °C to +40 °C
	storage temperature range	–40 °C to +70 °C
Damp heat		+40 °C at 80 % rel. humidity, in line with IEC 60068-2-30
Mechanical resistance	vibration, sinusoidal	5 Hz to 150 Hz, in line with IEC 60068-2-6
	vibration, random	10 Hz to 300 Hz, in line with IEC 60068-2-64
	shock	40 g shock spectrum, in line with MIL-STD-810E Method No. 516.4 procedure I
Calibration interval		1 year
EMC, RF emission	in line with EN 55011 class A, operation is not covered in residential, commercial, and business areas nor in small-size companies. Thus, the instrument must not be operated in residential, commercial, and business areas nor in small-size companies unless additional measures are taken to ensure that EN 55011 class B is met.	in line with CISPR 11/EN 55011 group 1 class A (for a shielded test setup) The instrument complies with the emission requirements stipulated by EN 55011 and EN 61326-1 class A. This means that the instrument is suitable for use in industrial environments.
EMC, immunity		in line with IEC/EN 61326-1, immunity for industrial environments (excluding operating frequency)
Safety		in line with IEC 61010-1, EN 61010-1 and UL 3111-1
Power supply	R&S®ZVA67	100 V to 240 V (AC) with tolerance ±10 %, 50 Hz to 60 Hz with tolerance ±5 %, safety class I to VDE 411
	each external test set (consisting of R&S®ZVA-Z110 and R&S®ZVA-ZD110)	power adapter, 100 V to 240 V (AC) with tolerance ±10 %, 50 Hz to 60 Hz with tolerance ±5 %, safety class II output: 9 V, max. 1.1 A DC output connector: DIN 45323
Power consumption	R&S®ZVA67	450 W, typ. 310 W (standby: typ. 10 W)
	each external test set (consisting of R&S®ZVA-Z110 and R&S®ZVA-ZD110)	10 W, typ. 7 W
Dimensions (W × H × D)	R&S®ZVA67	465.1 mm × 286.2 mm × 495.0 mm (18.31 in × 11.27 in × 19.49 in)
	each external test set (consisting of R&S®ZVA-Z110 and R&S®ZVA-ZD110)	525 mm × 110 mm × 114 mm (20.7 in × 4.3 in × 4.5 in)
Weight	R&S®ZVA67	25 kg (55 lb)
	each external test set (consisting of R&S®ZVA-Z110 and R&S®ZVA-ZD110)	4.2 kg (9.3 lb)
Shipping weight	R&S®ZVA67	37 kg (82 lb)
	each external test set (consisting of R&S®ZVA-Z110 and R&S®ZVA-ZD110)	6.2 kg (13.6 lb)

Ordering information

Designation	Type	Order No.
Vector Network Analyzer, 110 GHz, two ports, complete system based on R&S®ZVA67	R&S®ZVA110	1312.7004.03
Vector Network Analyzer, 110 GHz, two ports, complete system based on R&S®ZVA67, without RF cables [3]	R&S®ZVA110	1312.7004.05
Vector Network Analyzer, 110 GHz, two ports, high power, complete system based on R&S®ZVA67	R&S®ZVA110	1312.7004.13
Vector Network Analyzer, 110 GHz, two ports, high power, complete system based on R&S®ZVA67, without RF cables [4]	R&S®ZVA110	1312.7004.15
Options		
Time Domain	R&S®ZVAB-K2	1164.1657.02
Pulsed Measurements	R&S®ZVA-K7	1164.1511.02
5 MHz Receiver Bandwidth	R&S®ZVA-K17	1164.1070.02
Internal Pulse Generators	R&S®ZVA-K27	1164.1892.02

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	

Extended warranty with a term of one to four years (WE1 to WE4)
Repairs carried out during the contract term are free of charge [5]. Necessary calibration and adjustments carried out during repairs are also covered. Simply contact the forwarding agent we name; your product will be picked up free of charge and returned to you in top condition a couple of days later.

Extended warranty with calibration (CW1 to CW4)
Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs [5] and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

For product brochure, see PD 5213.5680.12 and www.rohde-schwarz.com.

[3] Model 1312.7004.05 is identical to model 1312.7004.03 except the six RF cables R&S®ZV-Z196 (1306.4736.00) from the R&S®ZVA67 to the R&S®ZVA-ZD110 diplexers and the two LO feed cables R&S®ZV-Z193 (1306.4720.00) from the R&S®ZVA67 to the R&S®ZVA-Z110E frequency converters, which will not be supplied. **Data sheet specifications do apply if the R&S®ZVA110 system is set up with aforementioned cables, only.**

[4] Model 1312.7004.15 is identical to model 1312.7004.13 except the six RF cables R&S®ZV-Z196 (1306.4736.00) from the R&S®ZVA67 to the R&S®ZVA-ZD110 diplexers and the two LO feed cables R&S®ZV-Z193 (1306.4720.00) from the R&S®ZVA67 to the R&S®ZVA-Z110E frequency converters, which will not be supplied. **Data sheet specifications do apply if the R&S®ZVA110 system is set up with aforementioned cables, only.**

[5] Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

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- Longevity and optimized total cost of ownership

Certified Quality Management
ISO 9001

Certified Environmental Management
ISO 14001

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