

# R&S® ZVAX24 EXTENSION UNIT

## Specifications



Data Sheet  
Version 06.00

**ROHDE & SCHWARZ**

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# Definitions

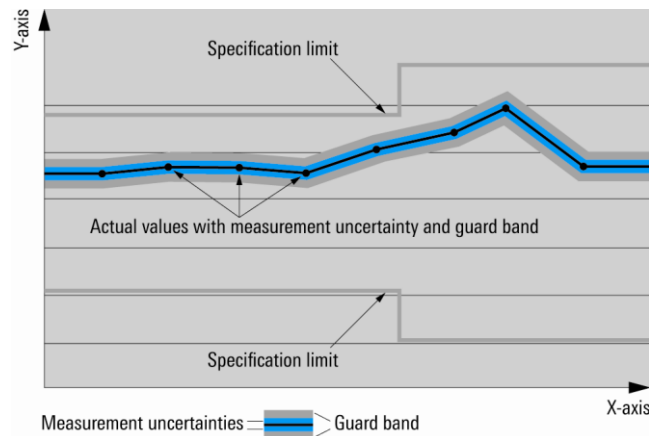
## General

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  $<$ ,  $\leq$ ,  $>$ ,  $\geq$ ,  $\pm$ , 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

## Measurement range

Frequency range		10 MHz to 24 GHz (unless other specification of an option)
Dynamic range from PORT 1 to PORT 2		typ. > 120 dB (with R&S®ZVAX-B291 and R&S®ZVAX-B292 options not installed)

## Through path transmission loss

Without switchable option looped into the signal path.

PORT 1 SOURCE IN to PORT 1 SOURCE OUT (with R&S®ZVAX-B291 option not installed)	10 MHz to 8 GHz	< 4 dB
	8 GHz to 24 GHz	< 7 dB
PORT 1 SOURCE IN to PORT 1 (with R&S®ZVAX-B291 option installed)	10 MHz to 8 GHz	< 6 dB
	8 GHz to 24 GHz	< 10 dB
PORT 3 SOURCE IN to PORT 3 SOURCE OUT	10 MHz to 8 GHz	< 5 dB
	8 GHz to 24 GHz	< 8 dB
PORT 2 MEAS IN to PORT 2 MEAS OUT (with R&S®ZVAX-B292 option not installed)	10 MHz to 8 GHz	< 5 dB
	8 GHz to 24 GHz	< 8 dB
PORT 2 to PORT 2 MEAS OUT (with R&S®ZVAX-B292 option installed)	500 MHz to 8 GHz	< 16 dB
	8 GHz to 24 GHz	< 19 dB

## Options

Data for an option is valid for an RF path switch setting that loops only the respective option into the signal path(s).

<b>R&amp;S®ZVAX-B203 low noise amplifier port 2</b>	reduces uncertainty of noise figure measurements	
Transmission gain		
With R&S®ZVAX-B292 option not installed	PORT 2 MEAS IN to PORT 2 MEAS OUT	
	10 MHz to 8 GHz	> 27 dB
	8 GHz to 24 GHz	> 22 dB
With R&S®ZVAX-B292 option installed	PORT 2 to PORT 2 MEAS OUT	
	500 MHz to 8 GHz	> 17 dB
	8 GHz to 24 GHz	> 12 dB
Noise figure		
With R&S®ZVAX-B292 option not installed	PORT 2 MEAS IN to PORT 2 MEAS OUT	
	10 MHz to 24 GHz	typ. < 5 dB
With R&S®ZVAX-B292 option installed	PORT 2 to PORT 2 MEAS OUT	
	1.2 GHz to 24 GHz	typ. < 16 dB

<b>R&amp;S®ZVAX-B210 port 2 receiver monitor output</b>	allows monitoring of the signal in the measurement receiver path of test port 2	
Transmission loss		
With R&S®ZVAX-B292 option not installed	PORT 2 MEAS IN to PORT 2 MONITOR	
	500 MHz to 8 GHz	11 dB ± 7 dB
	8 GHz to 23 GHz	15 dB ± 7 dB
	23 GHz to 24 GHz	17 dB ± 7 dB
With R&S®ZVAX-B292 option installed	PORT 2 to PORT 2 MONITOR	
	700 MHz to 8 GHz	21 dB ± 7 dB
	8 GHz to 23 GHz	24 dB ± 7 dB
	23 GHz to 24 GHz	26 dB ± 7 dB

<b>R&amp;S®ZVAX-B211 combiner</b>	generates a two tone-signal by combining the sources of test ports 1 and 3, e.g. for intermodulation measurements	
Transmission loss		
With R&S®ZVAX-B291 option not installed	PORT 1 or 3 SOURCE IN to PORT 1 SOURCE OUT	
	10 MHz to 8 GHz	< 9 dB
	8 GHz to 24 GHz	< 14 dB
With R&S®ZVAX-B291 option installed	PORT 1 or 3 SOURCE IN to PORT 1	
	10 MHz to 8 GHz	< 10 dB
	8 GHz to 24 GHz	< 16 dB
Isolation		
PORT 1 SOURCE IN to PORT 3 SOURCE IN		
500 MHz to 24 GHz		> 19 dB
Match		
PORT 3 SOURCE OUT		
10 MHz to 8 GHz		< 16 dB
8 GHz to 24 GHz		< 13 dB

<b>R&amp;S®ZVAX-B251 harmonic filter generator port 1</b>	reduces the harmonic distortion of the source signal of test port 1	
Transmission loss		
With R&S®ZVAX-B291 option not installed	PORT 1 SOURCE IN to PORT 1 SOURCE OUT	
	1 GHz to 8 GHz	< 11 dB
	8 GHz to 20 GHz	< 16 dB
	20 GHz to 24 GHz	< 19 dB
With R&S®ZVAX-B291 option installed	PORT 1 SOURCE IN to PORT 1	
	1 GHz to 8 GHz	< 12 dB
	8 GHz to 20 GHz	< 17 dB
	20 GHz to 24 GHz	< 20 dB
Harmonic suppression		
PORT 1 SOURCE IN to PORT 1 (SOURCE OUT)		
1 GHz to 12 GHz		> 45 dB
Harmonics of source signal <sup>1</sup>		
PORT 1 (of the R&S®ZVAX24 or the R&S®ZVA24)		typ. < -60 dBc at maximum power

<b>R&amp;S®ZVAX-B253 harmonic filter generator port 3</b>	reduces the harmonic distortion of the source signal of test port 3	
Transmission loss		
	PORT 3 SOURCE IN to PORT 3 SOURCE OUT	
	1 GHz to 8 GHz	< 11 dB
	8 GHz to 20 GHz	< 16 dB
	20 GHz to 24 GHz	< 19 dB
Harmonic suppression		
PORT 3 SOURCE IN to PORT 3 SOURCE OUT		
1 GHz to 12 GHz		> 45 dB
Harmonics of source signal <sup>1</sup>		
PORT 3 (of the R&S®ZVAX24 or the R&S®ZVA24)		typ. < -60 dBc at maximum power

<b>R&amp;S®ZVAX-B252 harmonic filter receiver port 2</b>	suppresses the fundamental entering the measurement receiver of port 2 and thus avoids receiver-generated harmonics that could distort harmonic measurements	
Transmission loss		
With R&S®ZVAX-B292 option not installed	PORT 2 MEAS IN to PORT 2 MEAS OUT	
	1 GHz to 8 GHz	< 12 dB
	8 GHz to 20 GHz	< 16 dB
	20 GHz to 24 GHz	< 19 dB
With R&S®ZVAX-B292 option installed	PORT 2 to PORT 2 MEAS OUT	
	1 GHz to 8 GHz	< 21 dB
	8 GHz to 20 GHz	< 25 dB
	20 GHz to 24 GHz	< 28 dB
Fundamental suppression		
PORT 2 (MEAS IN) to PORT 2 MEAS OUT		
1 GHz to 4 GHz		> 27 dB
4 GHz to 11 GHz		> 45 dB
11 GHz to 12 GHz		> 35 dB

<sup>1</sup> When the R&S®ZVAX24 operates with the R&S®ZVA24.

<b>R&amp;S®ZVAX-B271 pulse modulator generator port 1</b>	allows pulse modulation of the source signal of port 1	
Transmission loss with modulator on	PORT 1 SOURCE IN to PORT 1 SOURCE OUT	
With R&S®ZVAX-B291 option not installed	10 MHz to 8 GHz	< 9 dB
	8 GHz to 20 GHz	< 14 dB
	20 GHz to 24 GHz	< 17 dB
With R&S®ZVAX-B291 option installed	PORT 1 SOURCE IN to PORT 1	
	10 MHz to 8 GHz	< 11 dB
	8 GHz to 20 GHz	< 16 dB
Transmission loss with modulator off	PORT 1 SOURCE IN to PORT 1 (SOURCE OUT)	
	10 MHz to 24 GHz	typ. > 70 dB
Pulse rise and fall time (10 % ↔ 90 % RF power)	10 MHz to 24 GHz	typ. < 10 ns

<b>R&amp;S®ZVAX-B273 pulse modulator generator port 3</b>	allows pulse modulation of the source signal of port 3	
Transmission loss with modulator on	PORT 3 SOURCE IN to PORT 3 SOURCE OUT	
	10 MHz to 8 GHz	< 9 dB
	8 GHz to 20 GHz	< 14 dB
	20 GHz to 24 GHz	< 17 dB
Transmission loss with modulator off	PORT 3 SOURCE IN to PORT 3 SOURCE OUT	
	10 MHz to 24 GHz	typ. > 70 dB
	10 MHz to 24 GHz	typ. < 10 ns
Pulse rise and fall time (10 % ↔ 90 % RF power)	10 MHz to 24 GHz	typ. < 10 ns

<b>R&amp;S®ZVAX-B272 pulse modulator receiver port 2</b>	allows pulse modulation of the measurement receiver signal of port 2	
Transmission loss with modulator on	PORT 2 MEAS IN to PORT 2 MEAS OUT	
With R&S®ZVAX-B292 option not installed	10 MHz to 8 GHz	< 10 dB
	8 GHz to 24 GHz	< 17 dB
	PORT 2 to PORT 2 MEAS OUT	
With R&S®ZVAX-B292 option installed	500 MHz to 8 GHz	< 21 dB
	8 GHz to 24 GHz	< 27 dB
Transmission loss with modulator off	PORT 2 (MEAS IN) to PORT 2 MEAS OUT	
	10 MHz to 24 GHz	typ. > 70 dB
	10 MHz to 24 GHz	typ. < 10 ns
Pulse rise and fall time (10 % ↔ 90 % RF power)	10 MHz to 24 GHz	typ. < 10 ns

<b>R&amp;S®ZVAX-B291 high power coupler port 1</b>	allows testing of high-power devices	
Maximum power at PORT 1 <sup>2</sup>	10 MHz to 24 GHz	40 dBm
Reference channel coupling loss PORT 1 SOURCE IN to PORT 1 REF OUT	500 MHz to 8 GHz	22 dB ± 5 dB
	8 GHz to 24 GHz	25 dB ± 5 dB
Reference channel isolation PORT 1 to PORT 1 REF OUT	10 MHz to 24 GHz	> 28 dB
Measurement channel coupling loss PORT 1 to PORT 1 MEAS OUT	500 MHz to 24 GHz	10 dB ± 5 dB
Measurement channel isolation PORT 1 SOURCE IN to PORT 1 MEAS OUT	10 MHz to 20 GHz	> 25 dB
	20 GHz to 24 GHz	> 23 dB

<sup>2</sup> External attenuators and/or isolators may be necessary to prevent the R&S®ZVAX24 or the R&S®ZVA24 from being damaged.

<b>R&amp;S®ZVAX-B292 high power coupler port 2</b>	allows testing of high-power devices	
Maximum power at PORT 2 <sup>2</sup>	10 MHz to 24 GHz	40 dBm
Transmission loss PORT 2 SOURCE IN to PORT 2	10 MHz to 8 GHz	< 4 dB
	8 GHz to 20 GHz	< 5 dB
	20 GHz to 24 GHz	< 6 dB
Reference channel coupling loss PORT 2 SOURCE IN to PORT 2 REF OUT	500 MHz to 8 GHz	20 dB ± 5 dB
	8 GHz to 24 GHz	22 dB ± 5 dB
Reference channel isolation PORT 2 to PORT 2 REF OUT	10 MHz to 24 GHz	> 28 dB
Measurement channel isolation PORT 2 SOURCE IN to PORT 2 MEAS OUT	10 MHz to 20 GHz	> 25 dB
	20 GHz to 24 GHz	> 23 dB

## Connectors

General data for RF inputs and outputs (unless otherwise specified)

Connector type		2.92 mm female
Impedance		50 $\Omega$
Maximum nominal input power		20 dBm
Damage power		27 dBm
Damage DC voltage		$\pm 1$ V

### Front panel connectors

<b>PORT 3 SOURCE IN</b>	only with R&S®ZVAX-B211, -B253 or -B273 options	input for the source signal of port 3
<b>PORT 3 SOURCE OUT</b>	only with R&S®ZVAX-B211, -B253 or -B273 options	output for the source signal of port 3
<b>PORT 1 SOURCE IN</b>	only with R&S®ZVAX-B211, -B251, -B271 or -B291 options	input for the source signal of port 1
<b>PORT 1 SOURCE OUT</b>	only with R&S®ZVAX-B211, -B251 or -B271 options, but not if -B291 is installed	output for the source signal of port 1
<b>PORT 1 REF OUT</b>	only with R&S®ZVAX-B291 option	output for the reference receiver signal of port 1
<b>PORT 1 MEAS OUT</b>	only with R&S®ZVAX-B291 option	output for the measurement receiver signal of port 1
<b>PORT 1</b>	only with R&S®ZVAX-B291 option	test port 1
Connector type		3.5 mm male
Impedance		50 $\Omega$
Maximum nominal input power		40 dBm
Damage power		45 dBm
<b>PORT 2 SOURCE IN</b>	only with R&S®ZVAX-B292 option	input for the source signal of port 2
Maximum nominal input power		40 dBm
Damage power		45 dBm
<b>PORT 2 REF OUT</b>	only with R&S®ZVAX-B292 option	output for the reference receiver signal of port 2
<b>PORT 2 MEAS IN</b>	only with R&S®ZVAX-B252 or -B272 options, but not if -B292 is installed	input for the measurement receiver signal of port 2
<b>PORT 2 MEAS OUT</b>	only with R&S®ZVAX-B252, -B272 or -B292 options	output for the measurement receiver signal of port 2
<b>PORT 2</b>	only with R&S®ZVAX-B292 option	test port 2
Connector type		3.5 mm male
Impedance		50 $\Omega$
Maximum nominal input power		40 dBm
Damage power		45 dBm
<b>PORT 2 MONITOR</b>	only with R&S®ZVAX-B210 option	monitor output for the measurement receiver signal of port 2
<b>USB</b>		(two) universal serial bus connectors type A for USB devices (USB 2.0)



## Rear panel connectors

<b>PORT 1 SOURCE IN, OUT</b>	only with R&S®ZVAX-B211, -B251 or -B271 option	input and output that can be used to loop external components into port 1 source signal path
<b>PORT 2 SOURCE IN, OUT</b>	only with R&S®ZVAX-B292 option	input and output that can be used to loop external components into port 2 source signal path
<b>PORT 3 SOURCE IN, OUT</b>	only with R&S®ZVAX-B211, -B253 or -B273 option	input and output that can be used to loop external components into port 3 source signal path
Maximum nominal input power <sup>3</sup>	with R&S®ZVAX-B211 option not installed	40 dBm
	with R&S®ZVAX-B211 option installed	37 dBm
Damage power <sup>3</sup>	with R&S®ZVAX-B211 option not installed	45 dBm
	with R&S®ZVAX-B211 option installed	40 dBm
<b>USB FROM NWA</b>		universal serial bus connector type B for connection to the R&S®ZVA (USB 2.0)
<b>USB</b>		(two) universal serial bus connectors type A for USB devices (USB 2.0)
<b>FILTER CONTROL IN</b>		25-pin D-Sub connector, reserved for future use
<b>CASCADE IN</b>		input for pulse and sync LVDS signals from R&S®ZVA pulse generator, for connection to the R&S®ZVA CASCADE jack, connector type 8P8C western modular jack
Not connected	pins 1 to 3, 6	–
Pulse_B and pulse_A	pins 4 and 5 (input)	pulse signal from R&S®ZVA
Sync_B and sync_A	pins 7 and 8 (input)	sync signal from R&S®ZVA
GND	pins 9 and 10	signal ground
<b>EXT PULSE GENERATOR IN 1, 2</b>	inputs for pulse signals from external pulse generator	
Connector type		BNC, female
TTL signal		5 V
Polarity		positive
Input impedance		> 10 kΩ
<b>EXT PULSE GENERATOR IN 1, 2</b>	outputs for pulse signals	
Connector type		BNC, female
TTL signal		5 V
Polarity		positive

<sup>3</sup> At PORT 1 SOURCE IN and PORT 3 SOURCE IN.

## General data

Temperature loading	in line with IEC 60068-2-1 and IEC 60068-2-2	
	operating temperature range	+5 °C to +40 °C
	permissible temperature range	+5 °C to +40 °C
	storage temperature range	-40 °C to +70 °C
Damp heat		+40 °C at 95 % 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 IEC 60068-2-27, MIL-STD-810
Calibration interval		1 year
EMC, RF emission	In line with EN 61000-6-4, operation is not covered in residential, commercial and business areas or in small-size companies. Thus, the instrument must not be operated in residential, commercial and business areas or in small-size companies unless additional measures are taken to ensure that EN 61000-6-3 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 class A. This means that the instrument is suitable for use in industrial environments.
EMC, other emissions and immunity		in line with IEC/EN 61326, emission class B (residential environment), immunity industrial environment (excluding operating frequency)
Safety		IEC 61010-1, EN 61010-1, UL 61010-1 (3rd edition), CAN/CSA C22.2 No. 61010-1-12
Power supply		100 V to 240 V AC with tolerance $\pm 10\%$ , 50 Hz to 60 Hz with tolerance $\pm 5\%$
Power consumption		0.5 A to 0.2 A (typ. 20 W)
Test mark		VDE, CSA, CSA-NRTL/C, CE conformity mark
Dimensions ( W x H x D )		465 mm x 109 mm x 495 mm (18.31 in x 4.29 in x 19.49 in)
Weight		9 kg (20 lb)
Shipping weight		16 kg (35 lb)

## Ordering information

Designation	Type	Order No.
Extension unit	R&S®ZVAX24	1311.2509.02
<b>Options</b>		
Low noise amplifier port 2	R&S®ZVAX-B203	1311.2515.02
Port 2 receiver monitor output	R&S®ZVAX-B210	1311.2521.02
Combiner	R&S®ZVAX-B211	1311.2538.02
Harmonic filter source port 1	R&S®ZVAX-B251	1311.2544.02
Harmonic filter receiver port 2	R&S®ZVAX-B252	1311.2550.02
Harmonic filter source port 3	R&S®ZVAX-B253	1311.2567.02
Pulse modulator source port 1	R&S®ZVAX-B271	1311.2573.02
Pulse modulator receiver port 2	R&S®ZVAX-B272	1311.2580.02
Pulse modulator source port 3	R&S®ZVAX-B273	1311.2596.02
High power coupler port 1	R&S®ZVAX-B291	1311.2609.02
High power coupler port 2	R&S®ZVAX-B292	1311.2615.02

<b>Service options</b>		
Two-year calibration service	R&S®CO2ZVAX24	Please contact your local Rohde & Schwarz sales office.
Three-year calibration service	R&S®CO3ZVAX24	
Five-year calibration service	R&S®CO5ZVAX24	
One-year repair service following the warranty period	R&S®RO2ZVAX24	
Two-year repair service following the warranty period	R&S®RO3ZVAX24	
Four-year repair service following the warranty period	R&S®RO5ZVAX24	

## Service that adds value

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

## Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

[www.rohde-schwarz.com](http://www.rohde-schwarz.com)

## 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**

## Rohde & Schwarz training

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