R&S®ZV-Z4xx
Mechanical Verification Kits
Specifications

ROHDE&SCHWARZ

Test & Measurement

Data Sheet | 01.00

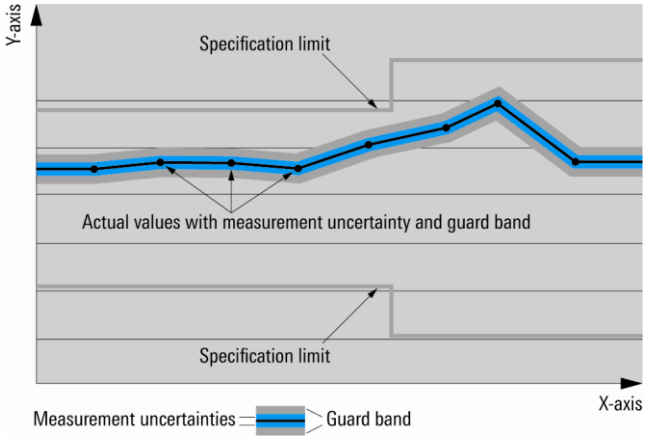
CONTENTS

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 mea5surand. 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 designated with the format “parameter: value”.

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

Specifications

Measurement range

Impedance		50 Ω
Frequency range	R&S®ZV-Z470	45 MHz to 18 GHz
	R&S®ZV-Z435	45 MHz to 26.5 GHz
	R&S®ZV-Z429	45 MHz to 40 GHz
	R&S®ZV-Z424	45 MHz to 50 GHz

Mechanical data

Connector type	R&S®ZV-Z470	type N, female and male
	R&S®ZV-Z435	3.5 mm, female and male
	R&S®ZV-Z429	2.92 mm, female and male
	R&S®ZV-Z424	2.4 mm, female and male
Pin depth	R&S®ZV-Z470	5.22 mm to 5.26 mm (female)
		- 5.28 mm to - 5.32 mm (male)
	R&S®ZV-Z435	0 mm to - 0.035 mm
	R&S®ZV-Z429	0 mm to - 0.035 mm
	R&S®ZV-Z424	0 mm to - 0.035 mm
Inner conductor material		Au-plated age-hardened CuBe alloy
Outer conductor material		stainless steel

Electrical data of R&S®ZV-Z470

Offset short (female and male)	offset length	30 mm (nom.)
	return loss, 45 MHz to 18 GHz	< 0.6 dB
Mismatch (female and male)	return loss, 45 MHz to 18 GHz	17 dB to 27 dB
Attenuator (female to male)	return loss, 45 MHz to 18 GHz	> 20 dB
	insertion loss, 45 MHz to 18 GHz	39 dB to 41 dB
Stepped thru (female to male)	return loss, 45 MHz to 18 GHz	> 7 dB
	insertion loss, 45 MHz to 18 GHz	< 1 dB

Calibration data of R&S®ZV-Z470

The characteristic data of the verification standards are measured by a DAkkS accredited calibration laboratory. The uncertainties are valid at the calibration frequencies.

Calibration frequencies	45/100/250 MHz; in steps of 250 MHz from 250 MHz to the upper frequency limit	
Offset short (female and male)	reflection magnitude uncertainty (linear)	
	45 MHz to 10 GHz	≤ 0.01
	10 GHz to 18 GHz	≤ 0.013
	reflection phase uncertainty	
	45 MHz to 10 GHz	≤ 0.8°
	10 GHz to 18 GHz	≤ 1.2°
Mismatch (female and male)	reflection magnitude uncertainty (linear), 45 MHz to 18 GHz	≤ 0.0060
Attenuator (female to male)	reflection magnitude uncertainty (linear), 45 MHz to 18 GHz	≤ 0.007
	attenuation uncertainty	
	45 MHz to 10 GHz	≤ 0.05 dB
	10 GHz to 18 GHz	≤ 0.06 dB
	transmission phase uncertainty	
	45 MHz to 5 GHz	≤ 0.75°
	5 GHz to 10 GHz	≤ 1°
	10 GHz to 18 GHz	≤ 1.5°
Stepped thru (female to male)	reflection magnitude uncertainty (linear), 45 MHz to 18 GHz	≤ 0.009
	attenuation uncertainty	
	45 MHz to 10 GHz	≤ 0.05 dB
	10 GHz to 18 GHz	≤ 0.06 dB
	transmission phase uncertainty	
	45 MHz to 5 GHz	≤ 0.75°
	5 GHz to 10 GHz	≤ 1°
	10 GHz to 18 GHz	≤ 1.5°

Electrical data of R&S®ZV-Z435

Offset short (female and male)	offset length	15 mm (nom.)
	return loss	
	45 MHz to 18 GHz	< 0.4 dB
	18 GHz to 26.5 GHz	< 0.6 dB
Mismatch (female and male)	return loss, 45 MHz to 26.5 GHz	17 dB to 27 dB
Attenuator (female to male)	return loss , 45 MHz to 26.5 GHz	> 20 dB
	insertion loss, 45 MHz to 26.5 GHz	39 dB to 41 dB
Stepped thru (female to male)	return loss, 45 MHz to 26.5 GHz	> 3 dB
	insertion loss, 45 MHz to 26.5 GHz	< 2.5 dB

Calibration data of R&S®ZV-Z435

The characteristic data of the verification standards are measured by a DAkkS accredited calibration laboratory. The uncertainties are valid at the calibration frequencies.

Calibration frequencies	45/100/250 MHz; in steps of 250 MHz from 250 MHz to the upper frequency limit	
Offset short (female and male)	reflection magnitude uncertainty (linear)	
	45 MHz to 18 GHz	≤ 0.013
	18 GHz to 26.5 GHz	≤ 0.016
	reflection phase uncertainty	
	45 MHz to 10 GHz	≤ 0.8°
	10 GHz to 18 GHz	≤ 1.2°
	18 GHz to 26.5 GHz	≤ 1.4°
Mismatch (female and male)	reflection magnitude uncertainty (linear)	
	45 MHz to 18 GHz	≤ 0.006
	18 GHz to 26.5 GHz	≤ 0.008
Attenuator (female to male)	reflection magnitude uncertainty (linear)	
	45 MHz to 18 GHz	≤ 0.007
	18 GHz to 26.5 GHz	≤ 0.009
	attenuation uncertainty	
	45 MHz to 18 GHz	≤ 0.06 dB
	18 GHz to 26.5 GHz	≤ 0.08 dB
	transmission phase uncertainty	
	45 MHz to 3 GHz	≤ 0.75°
	3 GHz to 8 GHz	≤ 1°
	8 GHz to 18 GHz	≤ 1.5°
	18 GHz to 26.5 GHz	≤ 2.25°
Stepped thru (female to male)	reflection magnitude uncertainty (linear)	
	45 MHz to 18 GHz	≤ 0.009
	18 GHz to 26.5 GHz	≤ 0.011
	attenuation uncertainty	
	45 MHz to 18 GHz	≤ 0.08 dB
	18 GHz to 26.5 GHz	≤ 0.1 dB
	transmission phase uncertainty	
	45 MHz to 3 GHz	≤ 0.95°
	3 GHz to 8 GHz	≤ 1.2°
	8 GHz to 18 GHz	≤ 1.7°
	18 GHz to 26.5 GHz	≤ 2.35°

Electrical data of R&S®ZV-Z429

Offset short (female and male)	offset length	15 mm (nom.)
	return loss	
	45 MHz to 18 GHz	< 0.4 dB
	18 GHz to 26.5 GHz	< 0.6 dB
	26.5 GHz to 40 GHz	< 0.8 dB
Mismatch (female and male)	return loss	
	45 MHz to 18 GHz	17 dB to 27 dB
	18 GHz to 26.5 GHz	16 dB to 28 dB
	26.5 GHz to 40 GHz	15 dB to 32 dB
Attenuator (female to male)	return loss	
	45 MHz to 26.5 GHz	> 20 dB
	26.5 GHz to 40 GHz	> 18 dB
	insertion loss	
	45 MHz to 26.5 GHz	39 dB to 41 dB
	26.5 GHz to 40 GHz	38.5 dB to 41.5 dB
Stepped thru (female to male)	return loss, 45 MHz to 40 GHz	> 6 dB
	insertion loss, 45 MHz to 40 GHz	< 1.5 dB

Calibration data of R&S®ZV-Z429

The characteristic data of the verification standards are measured by a DAkkS accredited calibration laboratory. The uncertainties are valid at the calibration frequencies.

Calibration frequencies	45/100/250 MHz; in steps of 250 MHz from 250 MHz to the upper frequency limit	
Offset short (female and male)	reflection magnitude uncertainty (linear)	
	45 MHz to 18 GHz	≤ 0.016
	18 GHz to 26.5 GHz	≤ 0.018
	26.5 GHz to 40 GHz	≤ 0.023
	reflection phase uncertainty	
	45 MHz to 10 GHz	≤ 1°
	10 GHz to 18 GHz	≤ 1.2°
	18 GHz to 26.5 GHz	≤ 1.4°
	26.5 GHz to 40 GHz	≤ 1.8°
Mismatch (female and male)	reflection magnitude uncertainty (linear)	
	45 MHz to 18 GHz	≤ 0.009
	18 GHz to 26.5 GHz	≤ 0.010
	26.5 GHz to 40 GHz	≤ 0.013
Attenuator (female to male)	reflection magnitude uncertainty (linear)	
	45 MHz to 18 GHz	≤ 0.01
	18 GHz to 26.5 GHz	≤ 0.011
	26.5 GHz to 40 GHz	≤ 0.014
	attenuation uncertainty	
	45 MHz to 18 GHz	≤ 0.06 dB
	18 GHz to 26.5 GHz	≤ 0.08 dB
	26.5 GHz to 40 GHz	≤ 0.12 dB
	transmission phase uncertainty	
	45 MHz to 3 GHz	≤ 0.75°
	3 GHz to 8 GHz	≤ 1°
	8 GHz to 18 GHz	≤ 1.5°
	18 GHz to 26.5 GHz	≤ 2.25°
	26.5 GHz to 32 GHz	≤ 2.8°
	32 GHz to 40 GHz	≤ 3.2°
Stepped thru (female to male)	reflection magnitude uncertainty (linear)	
	45 MHz to 18 GHz	≤ 0.014
	18 GHz to 26.5 GHz	≤ 0.016
	26.5 GHz to 40 GHz	≤ 0.019
	attenuation uncertainty	
	45 MHz to 18 GHz	≤ 0.06 dB
	18 GHz to 26.5 GHz	≤ 0.08 dB
	26.5 GHz to 40 GHz	≤ 0.12 dB
	transmission phase uncertainty	
	45 MHz to 3 GHz	≤ 0.75°
	3 GHz to 8 GHz	≤ 1°
	8 GHz to 18 GHz	≤ 1.5°
	18 GHz to 26.5 GHz	≤ 2.25°
	26.5 GHz to 32 GHz	≤ 2.8°
	32 GHz to 40 GHz	≤ 3.2°

Electrical data of R&S®ZV-Z424

Offset short (female and male)	offset length	15 mm (nom.)
	return loss	
	45 MHz to 18 GHz	< 0.4 dB
	18 GHz to 26.5 GHz	< 0.6 dB
	26.5 GHz to 50 GHz	< 0.8 dB
Mismatch (female and male)	return loss	
	45 MHz to 18 GHz	17 dB to 27 dB
	18 GHz to 26.5 GHz	16 dB to 28 dB
	26.5 GHz to 50 GHz	14 dB to 32 dB
Attenuator (female to male)	return loss	
	45 MHz to 26.5 GHz	> 20 dB
	26.5 GHz to 40 GHz	> 17 dB
	40 GHz to 50 GHz	> 14 dB
	insertion loss	
	45 MHz to 26.5 GHz	39 dB to 41 dB
	26.5 GHz to 40 GHz	38.5 dB to 41.5 dB
	40 GHz to 50 GHz	38 dB to 42 dB
Stepped thru (female to male)	return loss, 45 MHz to 40 GHz	> 3 dB
	insertion loss, 45 MHz to 40 GHz	< 3 dB

Calibration data of R&S®ZV-Z424

The characteristic data of the verification standards are measured by a DAkkS accredited calibration laboratory. The uncertainties are valid at the calibration frequencies.

Calibration frequencies	45/100/250 MHz; in steps of 250 MHz from 250 MHz to the upper frequency limit	
Offset short (female and male)	reflection magnitude uncertainty (linear)	
	45 MHz to 18 GHz	≤ 0.018
	18 GHz to 26.5 GHz	≤ 0.02
	26.5 GHz to 40 GHz	≤ 0.024
	40 GHz to 50 GHz	≤ 0.028
	reflection phase uncertainty	
	45 MHz to 10 GHz	≤ 1°
	10 GHz to 18 GHz	≤ 1.2°
	18 GHz to 26.5 GHz	≤ 1.4°
	26.5 GHz to 40 GHz	≤ 1.8°
	40 GHz to 50 GHz	≤ 2.4°
Mismatch (female and male)	reflection magnitude uncertainty (linear)	
	45 MHz to 18 GHz	≤ 0.01
	18 GHz to 26.5 GHz	≤ 0.012
	26.5 GHz to 40 GHz	≤ 0.016
	40 GHz to 50 GHz	≤ 0.018
Attenuator (female to male)	reflection magnitude uncertainty (linear)	
	45 MHz to 18 GHz	≤ 0.011
	18 GHz to 26.5 GHz	≤ 0.013
	26.5 GHz to 40 GHz	≤ 0.017
	40 GHz to 50 GHz	≤ 0.019
	attenuation uncertainty	
	45 MHz to 18 GHz	≤ 0.07 dB
	18 GHz to 26.5 GHz	≤ 0.09 dB
	26.5 GHz to 40 GHz	≤ 0.12 dB
	40 GHz to 50 GHz	≤ 0.2 dB
	transmission phase uncertainty	
	45 MHz to 3 GHz	≤ 0.85°
	3 GHz to 8 GHz	≤ 1.1°
	8 GHz to 18 GHz	≤ 1.6°
	18 GHz to 26.5 GHz	≤ 2.25°
	26.5 GHz to 32 GHz	≤ 2.8°
	32 GHz to 40 GHz	≤ 3.2°
	40 GHz to 50 GHz	≤ 4.5°
Stepped thru (female to male)	reflection magnitude uncertainty (linear)	
	45 MHz to 18 GHz	≤ 0.015
	18 GHz to 26.5 GHz	≤ 0.018
	26.5 GHz to 40 GHz	≤ 0.022
	40 GHz to 50 GHz	≤ 0.025
	attenuation uncertainty	
	45 MHz to 18 GHz	≤ 0.1 dB
	18 GHz to 26.5 GHz	≤ 0.12 dB
	26.5 GHz to 40 GHz	≤ 0.14 dB
	40 GHz to 50 GHz	≤ 0.16 dB
	transmission phase uncertainty	
	45 MHz to 3 GHz	≤ 1.1°
	3 GHz to 8 GHz	≤ 1.3°
	8 GHz to 18 GHz	≤ 1.8°
	18 GHz to 26.5 GHz	≤ 2.5°
	26.5 GHz to 32 GHz	≤ 3°
	32 GHz to 40 GHz	≤ 3.4°
	40 GHz to 50 GHz	≤ 4.2°

General data

Temperature loading	operating temperature range	+18 °C to +28 °C
	permissible temperature range	0 °C to +50 °C
	storage temperature range	–40 °C to +70 °C
		in line with IEC 60068-2-1 and IEC 60068-2-2
Calibration interval		1 year
Dimensions	(W × H × D)	400 mm × 70 mm × 260 mm (15.8 in × 2.8 in × 10.2 in)
Weight	R&S®ZV-Z470	2 kg (4.4 lb)
	R&S®ZV-Z435	1.7 kg (3.8 lb)
	R&S®ZV-Z429	1.7 kg (3.8 lb)
	R&S®ZV-Z424	1.7 kg (3.8 lb)
	shipping weight	3 kg (6.6 lb)

Ordering information

Designation	Type	Order No.
Mechanical Verification Kit, N type, 45 MHz to 18 GHz	R&S®ZV-Z470	1319.1053.02
Mechanical Verification Kit, 3.5 mm, 45 MHz to 26.5 GHz	R&S®ZV-Z435	1319.1060.02
Mechanical Verification Kit, 2.92 mm, 45 MHz to 40 GHz	R&S®ZV-Z429	1319.1076.02
Mechanical Verification Kit, 2.4 mm, 45 MHz to 50 GHz	R&S®ZV-Z424	1319.1082.02

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 [1]. 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 [1] and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

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