

# R&S® ZV-Z5x Calibration Units Specifications



Specifications apply under the following conditions:

Sufficient warm-up time (approx. 15 minutes) at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and all internal calibrations and characterizations performed. Data designated "overrange" and data without tolerance limits is not binding.

## Measurement range

Impedance		50 $\Omega$ or 75 $\Omega$
Calibration port connector type	R&S <sup>®</sup> ZV-Z51	type N (50 $\Omega$ ), female or 3.5 mm, female
	R&S <sup>®</sup> ZV-Z52	3.5 mm, female
	R&S <sup>®</sup> ZV-Z53	type N (50 $\Omega$ or 75 $\Omega$ ), female or 3.5 mm, female
	R&S <sup>®</sup> ZV-Z54	2.92 mm, female
	R&S <sup>®</sup> ZV-Z55	2.4 mm, female
	R&S <sup>®</sup> ZV-Z58	type N (50 $\Omega$ ), female or 3.5 mm, female
	R&S <sup>®</sup> ZV-Z59	3.5 mm, female
Number of calibration ports	R&S <sup>®</sup> ZV-Z51	4
	R&S <sup>®</sup> ZV-Z52	4
	R&S <sup>®</sup> ZV-Z53	2
	R&S <sup>®</sup> ZV-Z54	2
	R&S <sup>®</sup> ZV-Z55	2
	R&S <sup>®</sup> ZV-Z58	8
	R&S <sup>®</sup> ZV-Z59	6
Frequency range	R&S <sup>®</sup> ZV-Z51	300 kHz to 8 GHz
	R&S <sup>®</sup> ZV-Z52	10 MHz to 24 GHz
	R&S <sup>®</sup> ZV-Z53	300 kHz to 3 GHz, 18 GHz or 24 GHz
	R&S <sup>®</sup> ZV-Z54	10 MHz to 40 GHz
	R&S <sup>®</sup> ZV-Z55	10 MHz to 50 GHz
	R&S <sup>®</sup> ZV-Z58	300 kHz to 8 GHz
	R&S <sup>®</sup> ZV-Z59	10 MHz to 20 GHz

Calibration time	4 ports, 201 points, and 1 kHz bandwidth	27 s
	401 points, and 1 kHz bandwidth	34 s
	201 points, and 100 Hz bandwidth	67 s
	8 ports, 201 points, and 1 kHz bandwidth	84 s
	401 points, and 1 kHz bandwidth	115 s
	201 points, and 100 Hz bandwidth	210 s
Nominal input level range		-45 dBm to +20 dBm
Damage level	R&S® ZV-Z51	+23 dBm
	R&S® ZV-Z52	+23 dBm
	R&S® ZV-Z53	+23 dBm
	R&S® ZV-Z54	+20 dBm
	R&S® ZV-Z55	+20 dBm
	R&S® ZV-Z58	+23 dBm
	R&S® ZV-Z59	+23 dBm
Damage DC voltage	R&S® ZV-Z51	12 V
	R&S® ZV-Z52	12 V
	R&S® ZV-Z53	12 V
	R&S® ZV-Z54	0 V
	R&S® ZV-Z55	0 V
	R&S® ZV-Z58	12 V
	R&S® ZV-Z59	12 V

## Effective system data of the R&S® ZV-Z51

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	300 kHz to 10 MHz	> 40 dB
	10 MHz to 4 GHz	> 46 dB
	4 GHz to 8 GHz	> 40 dB
Source match	300 kHz to 10 MHz	> 23 dB
	10 MHz to 4 GHz	> 40 dB
	4 GHz to 8 GHz	> 36 dB
Reflection tracking	300 kHz to 10 MHz	< 0.1 dB
	10 MHz to 4 GHz	< 0.04 dB
	4 GHz to 8 GHz	< 0.1 dB
Load match	300 kHz to 10 MHz	> 40 dB
	10 MHz to 4 GHz	> 46 dB
	4 GHz to 8 GHz	> 40 dB
Transmission tracking	300 kHz to 10 MHz	< 0.2 dB
	10 MHz to 4 GHz	< 0.06 dB
	4 GHz to 8 GHz	< 0.1 dB

## Effective system data of the R&S® ZV-Z52

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	10 MHz to 700 MHz	> 36 dB
	700 MHz to 8 GHz	> 40 dB
	8 GHz to 20 GHz	> 36 dB
	20 GHz to 24 GHz	> 32 dB
Source match	10 MHz to 700 MHz	> 30 dB
	700 MHz to 8 GHz	> 36 dB
	8 GHz to 18 GHz	> 30 dB
	18 GHz to 24 GHz	> 26 dB
Reflection tracking	10 MHz to 700 MHz	< 0.2 dB
	700 MHz to 8 GHz	< 0.1 dB
	8 GHz to 24 GHz	< 0.15 dB
Load match	10 MHz to 700 MHz	> 36 dB
	700 MHz to 8 GHz	> 40 dB
	8 GHz to 20 GHz	> 36 dB
	20 GHz to 24 GHz	> 32 dB
Transmission tracking	10 MHz to 700 MHz	< 0.2 dB
	700 MHz to 24 GHz	< 0.15 dB

## Effective system data of the R&S® ZV-Z53 (50 Ω)

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	300 kHz to 10 MHz	> 40 dB
	10 MHz to 4 GHz	> 46 dB
	4 GHz to 8 GHz	> 40 dB
	8 GHz to 18 GHz	> 36 dB
	18 GHz to 20 GHz (3.5 mm only)	> 36 dB
	20 GHz to 24 GHz (3.5 mm only)	> 32 dB
Source match	300 kHz to 10 MHz	> 23 dB
	10 MHz to 4 GHz	> 40 dB
	4 GHz to 8 GHz	> 36 dB
	8 GHz to 18 GHz	> 30 dB
	18 GHz to 24 GHz (3.5 mm only)	> 26 dB
Reflection tracking	300 kHz to 10 MHz	< 0.1 dB
	10 MHz to 4 GHz	< 0.04 dB
	4 GHz to 8 GHz	< 0.1 dB
	8 GHz to 18 GHz	< 0.3 dB
	18 GHz to 24 GHz (3.5 mm only)	< 0.3 dB
Load match	300 kHz to 10 MHz	> 40 dB
	10 MHz to 4 GHz	> 46 dB
	4 GHz to 8 GHz	> 40 dB
	8 GHz to 18 GHz	> 36 dB
	18 GHz to 20 GHz (3.5 mm only)	> 36 dB
	20 GHz to 24 GHz (3.5 mm only)	> 32 dB

Transmission tracking	300 kHz to 10 MHz	< 0.2 dB
	10 MHz to 4 GHz	< 0.06 dB
	4 GHz to 8 GHz	< 0.1 dB
	8 GHz to 18 GHz	< 0.3 dB
	18 GHz to 24 GHz (3.5 mm only)	< 0.3 dB

### Effective system data of the R&S® ZV-Z53 (75 Ω)

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	300 kHz to 10 MHz	> 36 dB
	10 MHz to 3 GHz	> 40 dB
Source match	300 kHz to 10 MHz	> 23 dB
	10 MHz to 3 GHz	> 33 dB
Reflection tracking	300 kHz to 10 MHz	< 0.2 dB
	10 MHz to 3 GHz	< 0.1 dB
Load match	300 kHz to 10 MHz	> 33 dB
	10 MHz to 3 GHz	> 36 dB
Transmission tracking	300 kHz to 10 MHz	< 0.2 dB
	10 MHz to 3 GHz	< 0.1 dB

## Effective system data of the R&S® ZV-Z54

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	10 MHz to 20 GHz	> 36 dB
	20 GHz to 40 GHz	> 30 dB
Source match	10 MHz to 700 MHz	> 30 dB
	700 MHz to 20 GHz	> 34 dB
	20 GHz to 40 GHz	> 30 dB
Reflection tracking	10 MHz to 700 MHz	< 0.15 dB
	700 MHz to 8 GHz	< 0.1 dB
	8 GHz to 40 GHz	< 0.15 dB
Load match	10 MHz to 20 GHz	> 36 dB
	20 GHz to 40 GHz	> 30 dB
Transmission tracking	10 MHz to 700 MHz	< 0.15 dB
	700 MHz to 8 GHz	< 0.1 dB
	8 GHz to 40 GHz	< 0.15 dB



## Effective system data of the R&S® ZV-Z55

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	10 MHz to 20 GHz	> 36 dB
	20 GHz to 40 GHz	> 30 dB
	40 GHz to 50 GHz	> 26 dB
Source match	10 MHz to 700 MHz	> 30 dB
	700 MHz to 20 GHz	> 34 dB
	20 GHz to 40 GHz	> 30 dB
	40 GHz to 50 GHz	> 26 dB
Reflection tracking	10 MHz to 700 MHz	< 0.15 dB
	700 MHz to 8 GHz	< 0.1 dB
	8 GHz to 40 GHz	< 0.15 dB
	40 GHz to 50 GHz	< 0.2 dB
Load match	10 MHz to 20 GHz	> 36 dB
	20 GHz to 40 GHz	> 30 dB
	40 GHz to 50 GHz	> 26 dB
Transmission tracking	10 MHz to 700 MHz	< 0.15 dB
	700 MHz to 8 GHz	< 0.1 dB
	8 GHz to 40 GHz	< 0.15 dB
	40 GHz to 50 GHz	< 0.2 dB

## Effective system data of the R&S® ZV-Z58

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	300 kHz to 4 GHz	> 40 dB
	4 GHz to 8 GHz	> 36 dB
Source match	300 kHz to 10 MHz	> 23 dB
	10 MHz to 4 GHz	> 36 dB
	4 GHz to 8 GHz	> 32 dB
Reflection tracking	300 kHz to 4 GHz	< 0.1 dB
	4 GHz to 8 GHz	< 0.2 dB
Load match	300 kHz to 4 GHz	> 40 dB
	4 GHz to 8 GHz	> 36 dB
Transmission tracking	300 kHz to 10 MHz	< 0.2 dB
	10 MHz to 4 GHz	< 0.15 dB
	4 GHz to 8 GHz	< 0.3 dB

## Effective system data of the R&S® ZV-Z59

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	10 MHz to 700 MHz for the R&S® ZVT8	> 34 dB
	10 MHz to 700 MHz for the R&S® ZVT20	> 34 dB
	700 MHz to 8 GHz	> 38 dB
	8 GHz to 20 GHz	> 32 dB
Source match	10 MHz to 700 MHz for the R&S® ZVT8	> 28 dB
	10 MHz to 700 MHz for the R&S® ZVT20	> 28 dB
	700 MHz to 8 GHz	> 34 dB
	8 GHz to 20 GHz	> 28 dB
Reflection tracking	10 MHz to 700 MHz for the R&S® ZVT8	< 0.3 dB
	10 MHz to 700 MHz for the R&S® ZVT20	< 0.3 dB
	700 MHz to 8 GHz	< 0.2 dB
	8 GHz to 20 GHz	< 0.3 dB
Load match	10 MHz to 700 MHz	> 34 dB
	700 MHz to 8 GHz	> 38 dB
	8 GHz to 20 GHz	> 34 dB
Transmission tracking	10 MHz to 700 MHz	< 0.3 dB
	700 MHz to 8 GHz	< 0.2 dB
	8 GHz to 20 GHz	< 0.3 dB

## USB connector

USB	universal serial bus connector (type B) for connecting the calibration unit with a vector network analyzer of the R&S® ZVA/B family, e.g. the R&S® ZVB8
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## General data

Temperature loading	operating temperature range	+5 °C to +40 °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
Damp heat		+40 °C at 85 % rel. humidity
Mechanical resistance	vibration test, sinusoidal	5 Hz to 150 Hz, in line with IEC 60068-2-6
	vibration test, random	10 Hz to 300 Hz, in line with IEC 60068-2-64
	shock test	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 in residential, commercial, and business areas or in small-size companies is not covered. Thus, the instrument may 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 complied with.	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; immunity: industrial environment (excluding operating frequency)
Safety		in line with IEC 61010-1, EN 61010-1, and UL 61010B-1, CSA C22.2 No. 61010.1

Power supply	R&S® ZV-Z51, R&S® ZV-Z52, R&S® ZV-Z53, R&S® ZV-Z54, R&S® ZV-Z55	5 V, 500 mA via universal serial bus (USB)
	R&S® ZV-Z58 and R&S® ZV-Z59	100 V to 240 V (AC) with tolerance $\pm 10\%$ , 50 Hz to 60 Hz with tolerance $\pm 5\%$ , safety class I in line with VDE 411
Power consumption	R&S® ZV-Z51, R&S® ZV-Z52, R&S® ZV-Z53, R&S® ZV-Z54, R&S® ZV-Z55	2.5 W
	R&S® ZV-Z58 and R&S® ZV-Z59	125 W, typ. 20 W
Dimensions (W x H x D)	R&S® ZV-Z51, R&S® ZV-Z52, R&S® ZV-Z53, R&S® ZV-Z54, R&S® ZV-Z55	121.0 mm x 56.0 mm x 155.0 mm (4.8 in x 2.2 in x 6.1 in)
	R&S® ZV-Z58 and R&S® ZV-Z59	465.1 mm x 108.4 mm x 350.0 mm (18.3 in x 4.3 in x 13.8 in)
Weight	R&S® ZV-Z51, R&S® ZV-Z52, R&S® ZV-Z53, R&S® ZV-Z54, R&S® ZV-Z55	750 g (1.7 lb)
	R&S® ZV-Z58 and R&S® ZV-Z59	5 kg (11 lb)
Shipping weight	R&S® ZV-Z51, R&S® ZV-Z52, R&S® ZV-Z53, R&S® ZV-Z54, R&S® ZV-Z55	3 kg (6.6 lb)
	R&S® ZV-Z58 and R&S® ZV-Z59	13 kg (29 lb)

## Ordering information

Designation	Type	Order No.
Calibration Unit, 300 kHz to 8 GHz, 4 ports, type N (f)	R&S®ZV-Z51	1164.0515.70
Calibration Unit, 300 kHz to 8 GHz, 4 ports, 3.5 mm (f)	R&S®ZV-Z51	1164.0515.30
Calibration Unit, 10 MHz to 24 GHz, 4 ports, 3.5 mm (f)	R&S®ZV-Z52	1164.0521.30
Calibration Unit, 300 kHz to 3 GHz, 2 ports, type N (f), 75 Ω	R&S®ZV-Z53	1164.0473.75
Calibration Unit, 300 kHz to 18 GHz, 2 ports, type N (f)	R&S®ZV-Z53	1164.0473.72
Calibration Unit, 300 kHz to 24 GHz, 2 ports, 3.5 mm (f)	R&S®ZV-Z53	1164.0473.32
Calibration Unit, 10 MHz to 40 GHz, 2 ports, 2.92 mm (f)	R&S®ZV-Z54	1164.0467.92
Calibration Unit, 10 MHz to 50 GHz, 2 ports, 2.4 mm (f)	R&S®ZV-Z55	1164.0480.42
Calibration Unit, 300 kHz to 8 GHz, 8 ports, type N (f)	R&S®ZV-Z58	1164.0638.78
Calibration Unit, 300 kHz to 8 GHz, 8 ports, 3.5 mm (f)	R&S®ZV-Z58	1164.0638.38
Calibration Unit, 10 MHz to 20 GHz, 6 ports, 3.5 mm (f)	R&S®ZV-Z59	1164.0450.36



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