

# R&S® FE44S

## EXTERNAL FRONTEND

### 24 GHz to 44 GHz

Specifications



Data Sheet  
Version 06.00

**ROHDE & SCHWARZ**

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# Definitions

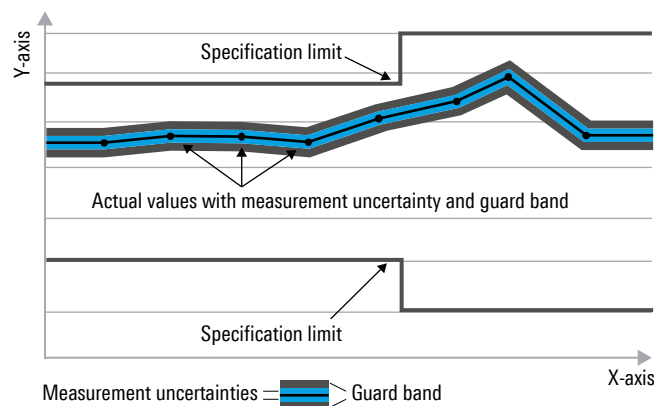
## General

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.



## Non-traceable specifications with limits (n. trc.)

Represent product performance that is specified and tested as described under “Specifications with limits” above. However, product performance in this case cannot be warranted due to the lack of measuring equipment traceable to national metrology standards. In this case, measurements are referenced to standards used in the Rohde & Schwarz laboratories.

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

Non-traceable specifications with limits, typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

In line with the 3GPP standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bit per second (Gbps), million bit per second (Mbps), thousand bit per second (kbps), million symbols per second (Msps) or thousand symbols per second (ksps), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, Msps, kbps, ksps and Msample/s are not SI units.

# Specifications for RX and TX mode

## Frequency

RF frequency range	R&S®FE44S	24 GHz to 44 GHz
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<b>Reference frequency</b>		
This item is specified in the data sheet of the instrument which is used as input for the R&S®FE44S reference frequency.		

<b>LO source</b>		
Mode	internal	internal synthesizer
	external	external signal generator or LO output of a further R&S®FE44S

<b>Setting times</b>		
Frequency change	≤ 10 MHz	< 10 ms (nom.)
	> 10 MHz	< 30 ms (nom.)

## Specifications for RX mode

Unless otherwise noted, all specifications in this section are valid for:

- R&S®FE44S, in combination with R&S®FSW, R&S®FSVA3000 or R&S®FSV3000 base instrument
- 640 MHz reference signal from R&S®FSW, R&S®FSVA3000 or R&S®FSV3000 base instrument, LO mode internal
- +12 V power supply (see Accessories supplied)
- IF cable, SMA, length: 1 m (see Accessories supplied)
- Temperature range: +20 °C to +30 °C

## Analysis bandwidth

<b>Maximum signal analysis bandwidth (equalized)</b>		
With R&S®FSW	base unit	28 MHz
	with R&S®FSW-B320 option	320 MHz
	with R&S®FSW-B512 option	512 MHz
	with R&S®FSW-B1200/-B2001/-B800R/-B4001/-B6001/-B8001 options	1 GHz
With R&S®FSVA3000 and R&S®FSV3000	base unit	28 MHz
	with R&S®FSV3-B200 option	200 MHz
With R&S®FSVA3000	with R&S®FSV3-B400 option	400 MHz
	with R&S®FSV3-B1000 option	1 GHz
	With R&S®RTP	with R&S®RTP-K11 and R&S®RTP-K121 options

## Level

Setting range of RF attenuator		0 dB to 31 dB, in 1 dB steps
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<b>Maximum safe input level</b>		
RF power	f > 100 MHz	
	RF attenuation = 0 dB	+12 dBm
	RF attenuation ≥ 13 dB	+25 dBm
	10 kHz ≤ f ≤ 100 MHz	0 dBm
DC voltage	f < 10 kHz	does not apply
		0 V

<b>Intermodulation</b>		
1 dB compression of input amplifier	RF attenuation = 0 dB	
	24 GHz ≤ f <sub>in</sub> ≤ 44 GHz	> -7 dBm (nom.)
Third order intercept point (TOI)	RF attenuation = 0 dB, every tone 5 dB under reference level, Δf = 500 kHz, analysis bandwidth = 10 MHz, IF mode = auto	
	24 GHz ≤ f <sub>in</sub> ≤ 33 GHz	> +1 dBm
	33 GHz < f <sub>in</sub> ≤ 44 GHz	> +5 dBm

## Sensitivity

All noise level data in this section not marked as typical (typ.) or nominal (nom.) are specified values whose compliance is ensured by testing.

Displayed average noise level	
	RF attenuation = 0 dB, termination = 50 $\Omega$ , log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, trace average 50, IF cable loss < 1 dB at I/Q analyzer center frequency, analysis bandwidth 10 MHz
	24 GHz $\leq f \leq$ 30 GHz      -157 dBm, -160 dBm (typ.)
	30 GHz < f $\leq$ 40 GHz      -154 dBm, -157 dBm (typ.)
	40 GHz < f $\leq$ 44 GHz      -150 dBm, -153 dBm (typ.)

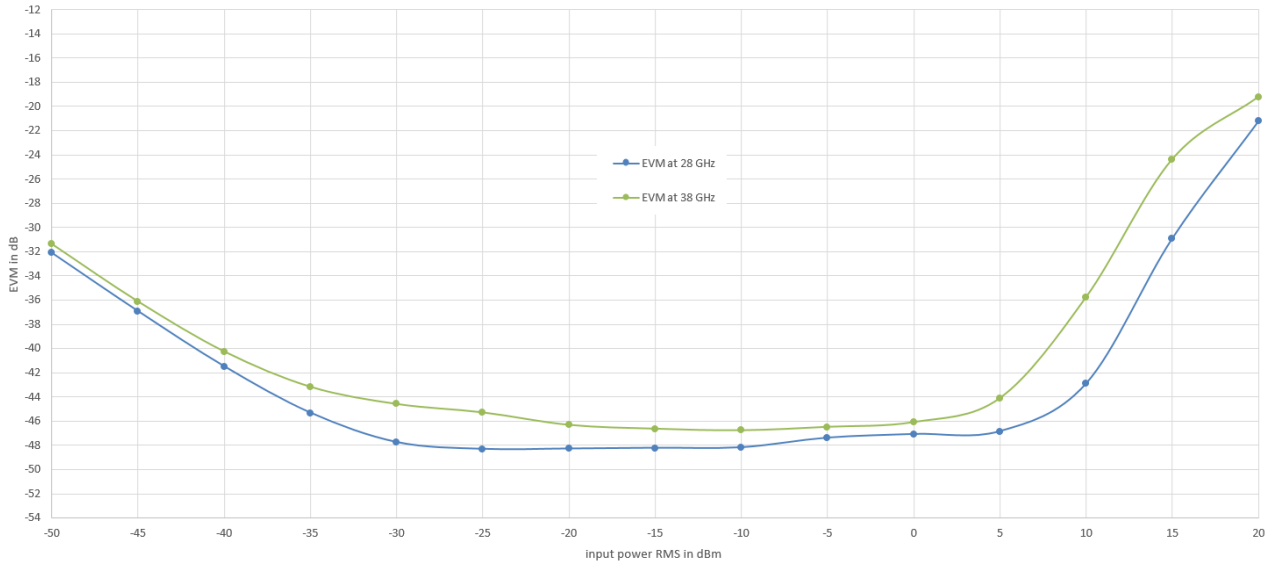
## Level measurement uncertainty

Level measurement uncertainty at center frequency	any RF attenuation, amplitude settings auto	
	24 GHz $\leq f \leq$ 30 GHz	< 1.5 dB ( $\sigma = 0.67$ dB)
	30 GHz < f $\leq$ 40 GHz	< 1.7 dB ( $\sigma = 0.83$ dB)
	40 GHz < f $\leq$ 44 GHz	< 2.0 dB ( $\sigma = 1.0$ dB)
RF attenuator switching uncertainty	referenced to 10 dB attenuation, $f_{\text{center}} = 28$ GHz	
	0 dB to 24 dB	< 0.3 dB ( $\sigma = 0.07$ dB)
	25 dB to 31 dB	< 0.5 dB ( $\sigma = 0.07$ dB)
	referenced to 10 dB attenuation, $f_{\text{center}} = 38$ GHz	
	0 dB to 24 dB	< 0.4 dB ( $\sigma = 0.07$ dB)
	25 dB to 31 dB	< 0.8 dB ( $\sigma = 0.07$ dB)
Amplitude flatness	RF attenuation = 10 dB, amplitude settings auto	
	analysis bandwidth $\leq 200$ MHz	
	24 GHz $\leq f_{\text{center}} \leq$ 36 GHz	$\pm 1.4$ dB (nom.)
	36 GHz < $f_{\text{center}} \leq$ 44 GHz	$\pm 1.8$ dB (nom.)
	analysis bandwidth $\leq 400$ MHz	
	24 GHz $\leq f_{\text{center}} \leq$ 36 GHz	$\pm 1.5$ dB (nom.)
	36 GHz < $f_{\text{center}} \leq$ 44 GHz	$\pm 2.0$ dB (nom.)
	analysis bandwidth $\leq 1$ GHz	
	24.3 GHz $\leq f_{\text{center}} \leq$ 36 GHz	$\pm 1.8$ dB (nom.)
	36 GHz < $f_{\text{center}} \leq$ 44 GHz	$\pm 2.3$ dB (nom.)
Deviation from linear phase	RF attenuation = 10 dB, amplitude settings auto	
	analysis bandwidth $\leq 400$ MHz	
	24 GHz $\leq f_{\text{center}} \leq$ 44 GHz	$\pm 10^\circ$ (nom.)
	analysis bandwidth $\leq 1$ GHz	
	24.3 GHz $\leq f_{\text{center}} \leq$ 44 GHz	$\pm 13^\circ$ (nom.)

## Signal performance for digital standards

Residual EVM	5G NR signal, channel bandwidth: 100 MHz, full allocation, SCS: 60 kHz, modulation: 4QPSK, IF mode = low	
	27.5 GHz $\leq f_{\text{in}} \leq$ 29.5 GHz	
	$-37$ dBm $\leq P_{\text{in}}$ (RMS) $\leq$ +7 dBm	< -44 dB (meas.)
	$-41$ dBm $\leq P_{\text{in}}$ (RMS) $\leq$ +11 dBm	< -40 dB (meas.)
	37.0 GHz $\leq f_{\text{in}} \leq$ 39.0 GHz	
	$-32$ dBm $\leq P_{\text{in}}$ (RMS) $\leq$ +4 dBm	< -44 dB (meas.)
	$-37$ dBm $\leq P_{\text{in}}$ (RMS) $\leq$ +6 dBm	< -40 dB (meas.)

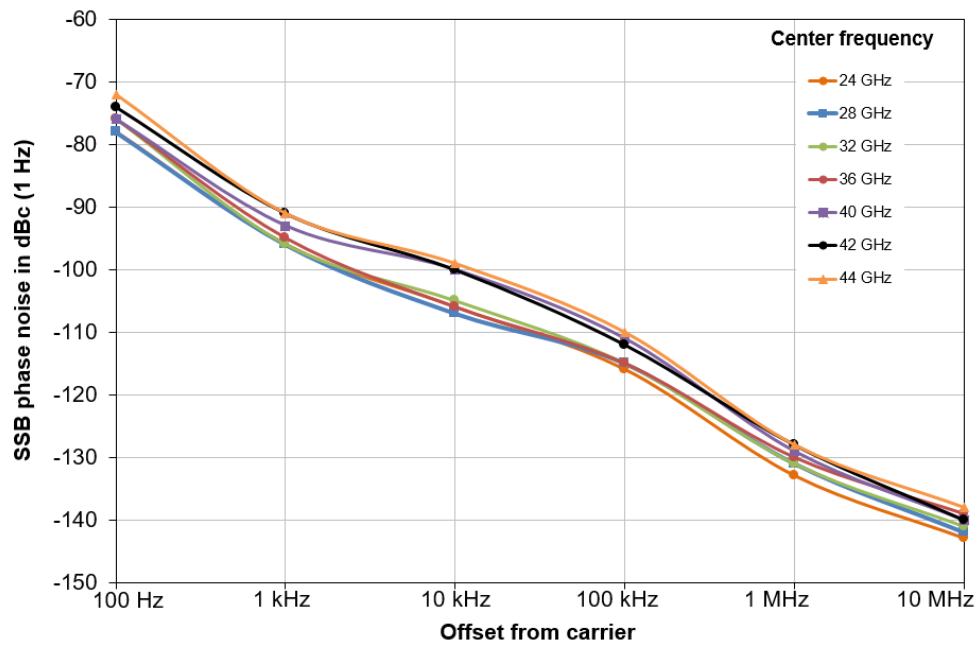
EVM versus input power (5G NR 100 MHz)



EVM values versus input power at different center frequencies in combination with an R&S®FSVA3000 (IF mode = low)

## Spectral purity

Image response	$f_{in} = f - 2 \times (1st\ IF)$ , input level $\leq -10\ dBm$	
	IF mode = low, $4.1\ GHz < (first\ IF) < 5.5\ GHz$	
	$24\ GHz \leq f \leq 31\ GHz$	$< -70\ dBc$
	$31\ GHz < f \leq 34\ GHz$	$< -50\ dBc$
	$34\ GHz < f \leq 44\ GHz$	$< -45\ dBc$
	IF mode = high, $7.5\ GHz < (first\ IF) < 9.2\ GHz$	
	$24\ GHz \leq f \leq 34\ GHz$	$< -70\ dBc$
	$34\ GHz < f \leq 44\ GHz$	$< -50\ dBc$
	f = receive frequency	
Intermediate frequency response	input level $\leq -10\ dBm$	
	$24\ GHz \leq f \leq 44\ GHz$	$< -70\ dBc$
	f = receive frequency	
Residual spurious response	RF attenuation = 0 dB, RF input termination = 50 $\Omega$ , analysis bandwidth $\leq 100\ MHz$	
	$24\ GHz \leq f \leq 44\ GHz$	$< -100\ dBm\ (nom.)$
	f = receive frequency	
SSB phase noise	RF center frequency = 28 GHz, IF mode = low, measured with an R&S®FSVA3000 and R&S®FSV3-K40 phase noise measurement option on the used IF carrier offset	
	100 Hz	$< -68\ dBc\ (1\ Hz)$
	1 kHz	$< -90\ dBc\ (1\ Hz)$
	10 kHz	$< -102\ dBc\ (1\ Hz)$
	100 kHz	$< -110\ dBc\ (1\ Hz)$
	1 MHz	$< -126\ dBc\ (1\ Hz)$
	10 MHz	$-137\ dBc\ (1\ Hz)\ (nom.)$



Typical single side band phase noise at different center frequencies in combination with an R&S®FSVA3000

## Specifications for TX mode

Unless otherwise noted, all specifications in this section are valid for:

- R&S®FE44S in combination with R&S®SMW200A or R&S®SMM100A base instrument
- 1 GHz reference signal from R&S®SMW200A or R&S®SMM100A base instrument
- +12 V power supply (see Accessories supplied)
- IF cable, SMA, length: 1 m (see Accessories supplied)
- Temperature range: +20 °C to +30 °C

### Modulation bandwidth

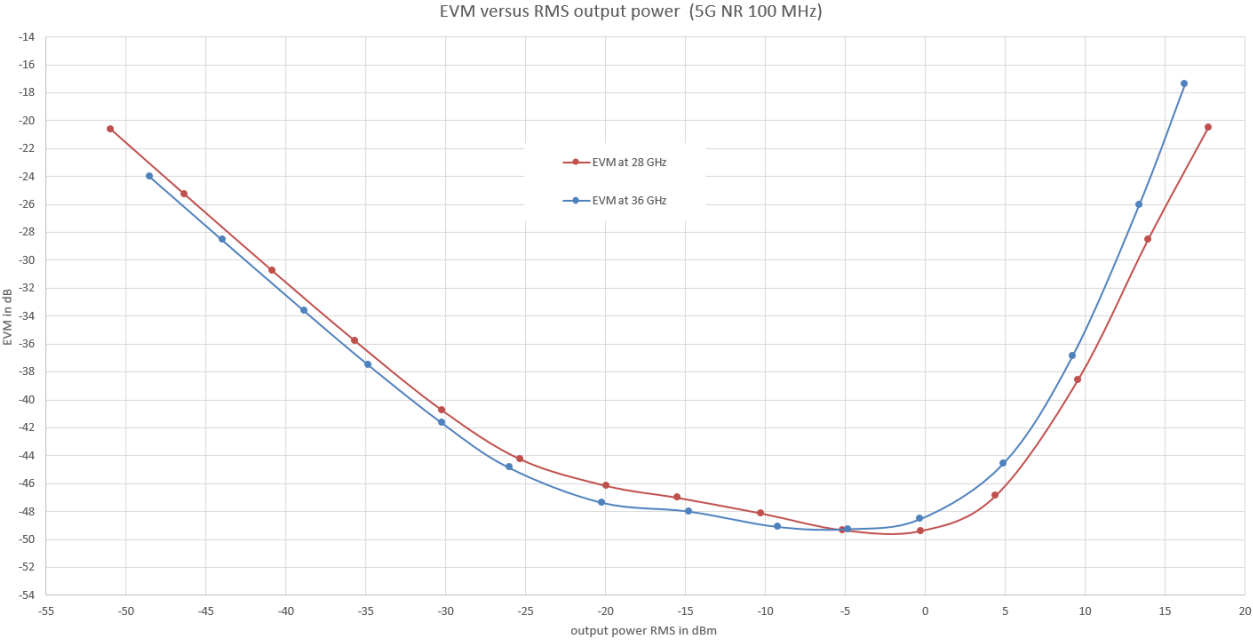
Maximum signal modulation bandwidth (equalized)	with R&S®SMW200A or R&S®SMM100A, depends on the installed bandwidth extensions of the used base instrument	max. 1 GHz
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### Level

Setting range		-145 dBm to +30 dBm
Specified level range	CW or I/Q modulated signals, coupled settings	
	$24 \text{ GHz} \leq f_{\text{out}} \leq 36 \text{ GHz}$	-50 dBm to +14 dBm (PEP)
	$36 \text{ GHz} < f_{\text{out}} \leq 44 \text{ GHz}$	-50 dBm to +6 dBm (PEP)
Resolution of setting		0.1 dB (nom.)
Setting range of RF attenuator		0 dB to 31 dB, in 1 dB steps
Level error	CW signal, coupled settings, level range -30 dBm to 0 dBm	
	$24 \text{ GHz} \leq f_{\text{out}} \leq 28.5 \text{ GHz}$	< 1.5 dB
	$28.5 \text{ GHz} < f_{\text{out}} \leq 40 \text{ GHz}$	< 1.7 dB
	$40 \text{ GHz} < f_{\text{out}} \leq 44 \text{ GHz}$	< 2.0 dB
	I/Q modulated signal, level range -30 dBm to 0 dBm	
	$24 \text{ GHz} \leq f_{\text{out}} \leq 44 \text{ GHz}$	add 0.4 dB
	for any other level setting	
$24 \text{ GHz} \leq f_{\text{out}} \leq 44 \text{ GHz}$	add 0.2 dB (nom.)	
Amplitude flatness	with internal baseband I/Q (R&S®SMW-B13XT wideband baseband main module option), optimization mode: high quality	
	modulation bandwidth $\leq 200 \text{ MHz}$	
	$24 \text{ GHz} \leq f_{\text{out}} \leq 28.5 \text{ GHz}$	$\pm 1.2 \text{ dB (nom.)}$
	$28.5 \text{ GHz} < f_{\text{out}} \leq 44 \text{ GHz}$	$\pm 1.7 \text{ dB (nom.)}$
	modulation bandwidth $\leq 400 \text{ MHz}$	
	$24.2 \text{ GHz} \leq f_{\text{out}} \leq 28.5 \text{ GHz}$	$\pm 1.5 \text{ dB (nom.)}$
	$28.5 \text{ GHz} < f_{\text{out}} \leq 44 \text{ GHz}$	$\pm 2.0 \text{ dB (nom.)}$
	modulation bandwidth $\leq 1 \text{ GHz}$	
	$24.5 \text{ GHz} \leq f_{\text{out}} \leq 28.5 \text{ GHz}$	$\pm 1.8 \text{ dB (nom.)}$
$28.5 \text{ GHz} < f_{\text{out}} \leq 44 \text{ GHz}$	$\pm 2.3 \text{ dB (nom.)}$	
Maximum rated reverse power	$f > 100 \text{ MHz}$	+25 dBm
	$10 \text{ kHz} \leq f \leq 100 \text{ MHz}$	0 dBm
	$f < 10 \text{ kHz}$	does not apply
Maximum permissible DC voltage		0 V

# Signal performance for digital standards

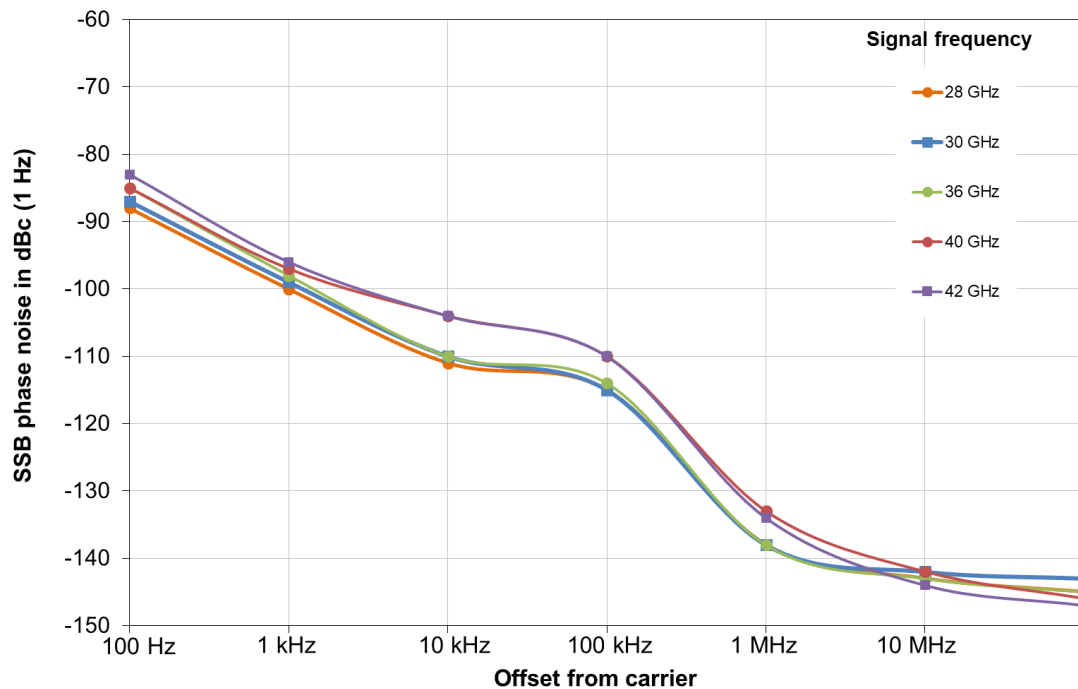
Residual EVM	5G NR signal, channel bandwidth: 100 MHz, full allocation, SCS: 60 kHz, modulation: 4QPSK, IF mode = low	
	27.5 GHz ≤ f <sub>out</sub> ≤ 29.5 GHz	
	-25 dBm ≤ P <sub>out</sub> (RMS) ≤ +5 dBm	< -44 dB (meas.)
	-30 dBm ≤ P <sub>out</sub> (RMS) ≤ +7 dBm	< -40 dB (meas.)
	36.0 GHz ≤ f <sub>out</sub> ≤ 38.0 GHz	
	-23 dBm ≤ P <sub>out</sub> (RMS) ≤ +3 dBm	< -44 dB (meas.)
-30 dBm ≤ P <sub>out</sub> (RMS) ≤ +6 dBm	< -40 dB (meas.)	



EVM values versus output power at different center frequencies in combination with an R&S®SMW200A (IF mode = low)

## Spectral purity

Image suppression	-10 dBm CW output signal	
	IF mode = low	
	$24 \text{ GHz} \leq f_{\text{out}} \leq 40 \text{ GHz}$	< -55 dBc (nom.)
	$40 \text{ GHz} < f_{\text{out}} \leq 44 \text{ GHz}$	< -50 dBc (nom.)
	IF mode = high	
	$24 \text{ GHz} \leq f_{\text{out}} \leq 30 \text{ GHz}$	< -45 dBc (nom.)
Wideband noise	-10 dBm CW output signal, IF mode = low, carrier offset 1 GHz, measurement bandwidth = 1 Hz	
	$24 \text{ GHz} \leq f_{\text{out}} \leq 40 \text{ GHz}$	< -144 dBc (meas.)
	$40 \text{ GHz} < f_{\text{out}} \leq 44 \text{ GHz}$	< -140 dBc (meas.)
LO suppression	-10 dBm CW output signal	
	$24 \text{ GHz} \leq f_{\text{out}} \leq 44 \text{ GHz}$	< -30 dBc (nom.)
Harmonics, subharmonics and other mixing products of the RF and LO signals	-10 dBm CW output signal, within modulation bandwidth	
	$24 \text{ GHz} \leq f_{\text{out}} \leq 44 \text{ GHz}$	< -70 dBc (meas.)
	-10 dBm CW output signal, observed frequency range from 0 Hz to 44 GHz	
	IF mode = low	
	$24 \text{ GHz} \leq f_{\text{out}} \leq 27.5 \text{ GHz}$	< -45 dBc (meas.)
	$27.5 \text{ GHz} < f_{\text{out}} \leq 44 \text{ GHz}$	< -60 dBc (meas.)
	IF mode = high	
$24 \text{ GHz} \leq f_{\text{out}} \leq 44 \text{ GHz}$	< -60 dBc (meas.)	



Typical single side band phase noise at different center frequencies in combination with an R&S®SMW200A

## Inputs and outputs

<b>RF input/output</b>		
Connector		1.85 mm female (compatible with 2.4 mm)
Impedance		50 $\Omega$
VSWR RX, mode: active	RF attenuation = 5 dB	
	24 GHz $\leq$ f $\leq$ 44 GHz	< 2.5, typ. 1.8 <sup>1</sup>
	RF attenuation = 10 dB, 20 dB and 30 dB	
VSWR TX, mode: active	24 GHz $\leq$ f $\leq$ 44 GHz	< 2.4, typ. 1.8 <sup>1</sup>
	RF attenuation auto, 0 dBm CW output power, RF off	
	24 GHz $\leq$ f $\leq$ 44 GHz	typ. 2.5

<b>IF output</b>		
Connector		SMA female
Impedance		50 $\Omega$ (nom.)
Output frequency range	IF mode = low	
	depends on RF frequency	4.1 GHz to 5.5 GHz
	IF mode = high	
	depends on RF frequency	7.5 GHz to 9.2 GHz
Level		-40 dBm to 0 dBm

<b>IF input</b>		
Connector		SMA female
Impedance		50 $\Omega$ (nom.)
Input frequency range	IF mode = low	
	depends on RF frequency	4.1 GHz to 5.5 GHz
	IF mode = high	
	depends on RF frequency	7.5 GHz to 9.2 GHz
Level		-40 dBm to +10 dBm

<b>Reference input 10 MHz, 640 MHz, 1 GHz</b>		
Connector		SMA female
Impedance		50 $\Omega$ (nom.)
Input frequency range		10 MHz, 640 MHz, 1 GHz
Required level		0 dBm to +20 dBm

<b>LO input</b>		
Connector		SMA female
Impedance		50 $\Omega$ (nom.)
Input frequency		8 GHz to 16.4 GHz
Level		+5 dBm to +20 dBm

<b>LO output</b>		
Connector		SMA female
Impedance		50 $\Omega$ (nom.)
Output frequency		8 GHz to 16.4 GHz
Level		+5 dBm to +20 dBm

<b>Power supply</b>		
Connector		2-pin LEMOSA
Supply voltage		+12 V DC, max. 2.5 A (nom.)

<b>LAN interface</b>		
Connector		10BASE-T/100BASE-T
PoE support		RJ-45 jack PoE++ (max. 52 W)

<b>USB interface</b>		
	for service use only	1 port, type B plug, version 2.0

<sup>1</sup> Typical VSWR performance: Performance expected to be met in 95 % of the cases with a confidence level of 95 %, temperature range from +20 °C to +30 °C. These values are not warranted and are subject to modification if a significant change in the statistical behavior of production instruments is observed.

## General data

Temperature		
Temperature range	operating	+5 °C to +40 °C
	storage	−40 °C to +70 °C
Climatic loading		+40 °C at 95 % relative humidity, in line with EN 60068-2-30, without condensation

Altitude		
Maximum operating altitude	above sea level	4600 m (approx. 15100 ft)

Mechanical resistance		
Vibration	sinusoidal	5 Hz to 55 Hz, displacement: 0.3 mm, constant amplitude (1.8 g at 55 Hz), in line with EN 60068-2-6
		55 Hz to 150 Hz, acceleration: 0.5 g constant, in line with EN 60068-2-6
	random	8 Hz to 500 Hz, acceleration 1.2 g (RMS), in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810G, method 516.6, procedure I

EMC		<ul style="list-style-type: none"> <li>• IEC/EN 61326-1 <sup>2, 3</sup></li> <li>• IEC/EN 61326-2-1</li> <li>• CISPR 11/EN 55011 <sup>2</sup></li> <li>• IEC/EN 61000-3-2</li> <li>• IEC/EN 61000-3-3</li> </ul>
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Recommended calibration interval		1 year
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External power supply		
DC output voltage range		+12 V
Maximum output current		5 A
Power consumption		max. 60 W
Safety		in line with IEC/UL/EN 60950-1/62368-1, CE, CB
Test marks		UL, GS, CE, FCC

Dimensions and weight		
Dimensions (nom.)	W × H × D (overall)	150 mm × 57 mm × 175 mm (5.90 in × 2.24 in × 6.88 in)
Net weight (nom.)		1.22 kg (2.69 lb)

<sup>2</sup> Emission limits for class A equipment apply.

<sup>3</sup> Immunity test requirement for industrial environment (EN 61326 table 2).

## Ordering information

Designation	Type	Order No.
External frontend from 24 GHz to 44 GHz	R&S®FE44S	1338.7001.02
<b>Accessories supplied</b>		
+12 V power supply, two IF cables, SMA, length: 1 m, reference cable, SMA, length: 2 m		

## Recommended extras

Designation	Type	Order No.
IF cable	R&S®ZV-Z193	1306.4520.36
Torque wrench for 3.5/2.92/2.4/1.85 mm connectors, 0.9 Nm coupling torque	R&S®ZN-ZTW	1328.8534.35
Height adjustment for external frontends	R&S®ZZA-FE02	1348.6550.02
LANCOM PoE++ injector (compatible with IEEE standard 802.3af/at/bt; up to 100 m distance)		4044144617799 (LANCOM order number)

## Supported base instruments

Designation	Type	Order No.
<b>Signal and spectrum analyzers</b>		
R&S®FSW		
Signal and spectrum analyzer, 2 Hz to 8 GHz	R&S®FSW8	1331.5003.08
Signal and spectrum analyzer, 2 Hz to 13.6 GHz	R&S®FSW13	1331.5003.13
Signal and spectrum analyzer, 2 Hz to 26.5 GHz	R&S®FSW26	1331.5003.26
Signal and spectrum analyzer, 2 Hz to 43.5 GHz	R&S®FSW43	1331.5003.43
Signal and spectrum analyzer, 2 Hz to 50 GHz	R&S®FSW50	1331.5003.50
Signal and spectrum analyzer, 2 Hz to 67 GHz	R&S®FSW67	1331.5003.67
Signal and spectrum analyzer, 2 Hz to 85 GHz	R&S®FSW85	1331.5003.85
R&S®FSVA3000, R&S®FSV3000		
Signal and spectrum analyzer, 10 Hz to 7.5 GHz	R&S®FSVA3007	1331.5003.08
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSVA3013	1331.5003.14
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSVA3030	1331.5003.31
Signal and spectrum analyzer, 10 Hz to 44 GHz	R&S®FSVA3044	1331.5003.44
Signal and spectrum analyzer, 10 Hz to 7.5 GHz	R&S®FSV3007	1330.5000.07
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSV3013	1330.5000.13
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSV3030	1330.5000.30
Signal and spectrum analyzer, 10 Hz to 44 GHz	R&S®FSV3044	1330.5000.43
<b>Vector signal generators</b>		
Vector signal generator	R&S®SMW200A	1412.0000.02
Vector signal generator	R&S®SMM100A	1440.8002.02
<b>Oscilloscopes</b>		
R&S®RTP		
High-performance oscilloscope, 8 GHz, 100 Mpoints memory	R&S®RTP084B	1803.7000.08
High-performance oscilloscope, 13 GHz, 100 Mpoints memory	R&S®RTP134B	1803.7000.13
High-performance oscilloscope, 16 GHz, 100 Mpoints memory	R&S®RTP164B	1803.7000.16

## Options needed for the base instrument

Designation	Type	Order No.
<b>Signal and spectrum analyzers</b>		
External frontend control, for R&S®FSW	R&S®FSW-K553	1350.6118.02
External frontend control, for R&S®FSVA3000/R&S®FSV3000	R&S®FSV3-K553	1346.4889.02
<b>Vector signal generators</b>		
Minimum needed frequency extension, for R&S®SMW200A	R&S®SMW-B1006	1428.4800.02
External frontend control, for R&S®SMW200A	R&S®SMW-K553	1414.6758.02
Minimum needed frequency extension, for R&S®SMM100A	R&S®SMM-B1006	1440.9009.02
External frontend control, for R&S®SMM100A	R&S®SMM-K553	1441.1147.02
<b>Oscilloscopes</b>		
External frontend control	R&S®RTP-K553	1803.6890.02
I/Q software interface	R&S®RTP-K11	1800.6683.02
Deembedding base option	R&S®RTP-K121	1326.3064.02

## Service options

Warranty		
Base unit		3 years
All other items <sup>4</sup>		1 year
Service options		
Extended warranty, one year	R&S®WE1	Contact your local Rohde & Schwarz sales office.
Extended warranty, two years	R&S®WE2	
Extended warranty with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	

### Extended warranty with a term of one and two years (WE1 and WE2)

Repairs carried out during the contract term are free of charge <sup>5</sup>. Necessary calibration and adjustments carried out during repairs are also covered.

### Extended warranty with calibration coverage (CW1 and CW2)

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 <sup>5</sup> and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

<sup>4</sup> For options installed, the remaining base unit warranty applies if longer than 1 year. Exception: all batteries have a 1 year warranty.

<sup>5</sup> Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.



**Service at Rohde & Schwarz**  
**You're in great hands**

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

**Rohde & Schwarz**

The Rohde&Schwarz technology group is among the trail-blazers when it comes to paving the way for a safer and connected world with its leading solutions in test & measurement, technology systems and networks&cybersecurity. Founded more than 85 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and 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**

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

**Rohde & Schwarz customer support**

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