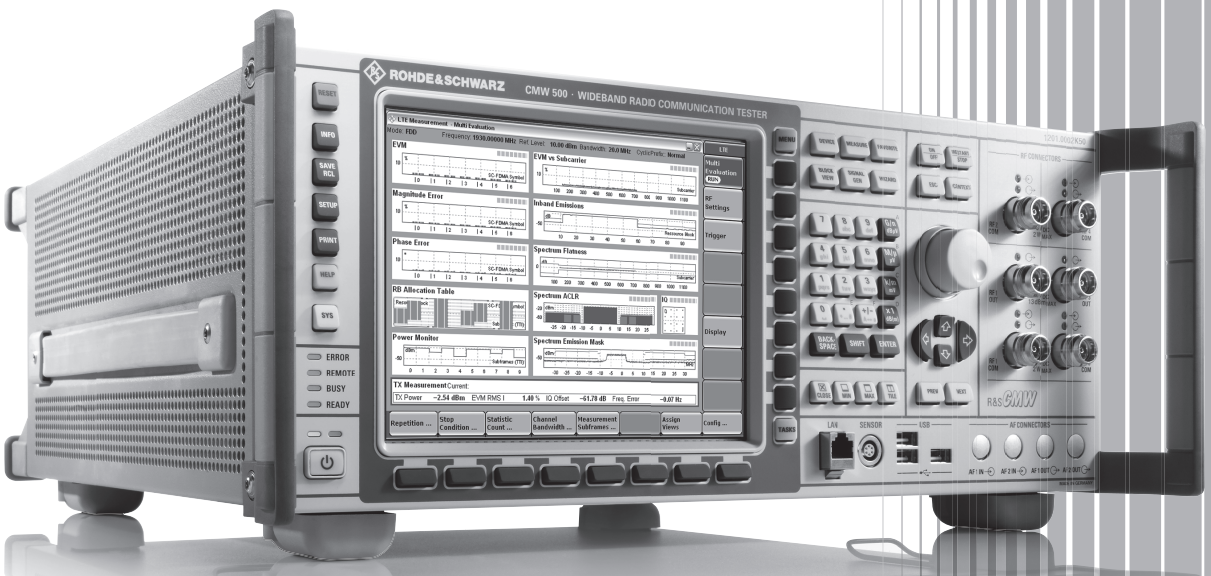
R&S®CMW500
Wideband Radio Communication Tester
Specifications



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Specifications apply under the following conditions:

Data valid for both the R&S®CMW500 and the R&S®CMW280 unless otherwise stated.

Data without tolerance limits is not binding. Based on a 24-month calibration interval unless otherwise stated. At least 15 minutes warm-up time at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and all internal automatic adjustments performed. "Typical values" are designated with the abbreviation "typ.". These values are verified during the final test but are not assured by Rohde & Schwarz. "Nominal values" are design parameters that are not assured by Rohde & Schwarz. These values are verified during product development but are not specifically tested during production.

In line with the 3GPP/3GPP2 standard, chip rates are specified in Mcps (million chips per second), whereas bit rates and symbol rates are specified in Mbps (million bits per second), kbps (thousand bits per second) or ksps (thousand symbols per second), and sample rates are specified in Msample/s (million samples per second). Mcps, kbps, ksps and Msample/s are not SI units

During the production process, each instrument is calibrated in line with defined procedures. All measurement results, including measurement uncertainties of the calibration system, have to be within the published specification limits to release the individual instrument. The expanded measurement uncertainties of the calibration system used in the production process are determined with a coverage factor of $k = 2$ (normally approx. 95 % probability).

Parameters written in italics can be set directly on the tester.

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Data without tolerance limits is not binding.

General technical specifications

RF generator

Frequency range		70 MHz to 3300 MHz up to 6000 MHz with the R&S®CMW-KB036 option
Frequency resolution		0.1 Hz
Frequency uncertainty		same as timebase + frequency resolution

Output level range		
RF1 COM, RF2 COM	70 MHz to 100 MHz	
	continuous wave (CW)	–130 dBm to –15 dBm
	peak envelope power (PEP)	up to –15 dBm
	overranging (PEP)	up to –10 dBm
	100 MHz to 3300 MHz	
	continuous wave (CW)	–130 dBm to –5 dBm
	peak envelope power (PEP)	up to –5 dBm
	overranging (PEP)	up to 0 dBm
	3300 MHz to 6000 MHz	
	continuous wave (CW)	–120 dBm to –15 dBm
	peak envelope power (PEP)	up to –15 dBm
	overranging (PEP)	up to –10 dBm
	maximum input DC level	0 V DC
RF1 OUT	70 MHz to 100 MHz	
	continuous wave (CW)	–120 dBm to –2 dBm
	peak envelope power (PEP)	up to –2 dBm
	overranging (PEP)	up to +3 dBm
	100 MHz to 3300 MHz	
	continuous wave (CW)	–120 dBm to +8 dBm
	peak envelope power (PEP)	up to +8 dBm
	overranging (PEP)	up to +13 dBm
	3300 MHz to 6000 MHz	
	continuous wave (CW)	–110 dBm to –2 dBm
	peak envelope power (PEP)	up to –2 dBm
	overranging (PEP)	up to +3 dBm
	maximum input DC level	0 V DC

Output level uncertainty	in temperature range +20 °C to +35 °C, no overranging	
RF1 COM, RF2 COM	output level > –120 dBm	
	70 MHz to 100 MHz	< 1.2 dB [1]
	100 MHz to 3300 MHz	< 0.6 dB [1]
	3300 MHz to 6000 MHz	< 1.2 dB [1]
RF1 OUT	output level > –110 dBm	
	70 MHz to 100 MHz	< 1.6 dB [1]
	100 MHz to 3300 MHz	< 0.8 dB [1]
	3300 MHz to 6000 MHz	< 1.6 dB [1]

Output level uncertainty	in temperature range +5 °C to +45 °C, no overranging	
RF1 COM, RF2 COM	output level > –120 dBm	
	70 MHz to 100 MHz	< 2.0 dB [1]
	100 MHz to 3300 MHz	< 1.0 dB [1]
	3300 MHz to 6000 MHz	< 2.0 dB [1]
RF1 OUT	output level > –110 dBm	
	70 MHz to 100 MHz	< 2.0 dB [1]
	100 MHz to 3300 MHz	< 1.0 dB [1]
	3300 MHz to 6000 MHz	< 2.0 dB [1]

[1] Valid for a 12-month calibration interval.

Output level linearity with fixed RF output attenuator setting	in temperature range +20 °C to +35 °C, GPRF generator list mode, level range 0 dB to –30 dB	
RF1 COM, RF2 COM	no overranging	< 0.2 dB, typ. < 0.1 dB

Output level resolution		0.01 dB
Output level repeatability	typical values after 1 h warm-up time, always returning to same level and frequency, no temperature change, insignificant time change	
	output level ≥ –80 dBm	< 0.01 dB
	output level < –80 dBm	< 0.05 dB

VSWR		
RF1 COM, RF2 COM	70 MHz to 3300 MHz	< 1.2
	3300 MHz to 5000 MHz	< 1.5
	5000 MHz to 6000 MHz	< 1.6
RF1 OUT	70 MHz to 3300 MHz	< 1.5
	3300 MHz to 5000 MHz	< 1.5
	5000 MHz to 6000 MHz	< 1.6

Attenuation of 2nd harmonic		
RF1 COM, RF2 COM	70 MHz to 6000 MHz, P < –10 dBm	> 30 dB
RF1 OUT	70 MHz to 6000 MHz, P < 0 dBm	> 30 dB

Attenuation of 3rd harmonic		
RF1 COM, RF2 COM	70 MHz to 6000 MHz, P < –10 dBm	> 40 dB
RF1 OUT	70 MHz to 6000 MHz, P < 0 dBm	> 40 dB

Attenuation of nonharmonics	> 5 kHz offset from carrier, for output level > –40 dBm, for full scale CW signal	
	400 MHz to 3300 MHz, except $f_{nonharmonic}$ = 3900 MHz – $f_{carrier}$, except $f_{nonharmonic}$ = 3900 MHz except $f_{carrier}$ = (899 to 901) MHz + n × 800 MHz with n = 1, 2, 3	> 60 dB
	3300 MHz to 3600 MHz	> 25 dB
	3600 MHz to 6000 MHz, except $f_{nonharmonic}$ = 2 × $f_{carrier}$ – 6400 MHz	> 40 dB

Phase noise	single sideband, 70 MHz to 3300 MHz	
Carrier offset	≥ 1 MHz	< –120 dBc, 1 Hz

Phase noise	single sideband, 3300 MHz to 6000 MHz	
Carrier offset	≥ 1 MHz	< –117 dBc, 1 Hz

Signal-to-noise ratio	70 MHz to 3300 MHz	
RF1 COM, RF2 COM	5 MHz offset from carrier, for output level > –30 dBm	> 95 dB, typ. > 101 dB, 1 kHz (> 125 dB, typ. > 131 dB, 1 Hz)

Signal-to-noise ratio	3300 MHz to 6000 MHz	
RF1 COM, RF2 COM	5 MHz offset from carrier, for output level > –30 dBm	> 92 dB, 1 kHz

Modulation source: arbitrary waveform generator (ARB) (R&S®CMW-B110A option)

Memory size		1.024 Gbyte
Word length	I	16 bit
	Q	16 bit
	marker	4 bit to 16 bit
Sample length	with 4-bit marker	up to 227.55 Msample
Sample rate	minimum	400 Hz
	maximum	100 MHz

Trigger		
Trigger sources		BASE: external TRIG A, BASE: external TRIG B

RF analyzer

VSWR		
RF1 COM, RF2 COM	70 MHz to 3300 MHz	< 1.2
	3300 MHz to 5000 MHz	< 1.5
	5000 MHz to 6000 MHz	< 1.6

Inherent spurious response	without input signal	
	70 MHz to 6000 MHz, except 4000 MHz, 4800 MHz, 5600 MHz, 6000 MHz	< –100 dBm

Spurious response	for full scale single tone input signal	
	70 MHz to 3300 MHz except f_{in} = 1962.5 MHz and 3925 MHz	< –55 dB
	3300 MHz to 3700 MHz, except f_{in} = 6400 MHz – $f_{selected}$, except f_{in} = 6400 MHz – 0.5 × $f_{selected}$	< –40 dB
	3700 MHz to 6000 MHz, except f_{in} = 6400 MHz – 0.5 × $f_{selected}$	< –40 dB

Harmonic response	2nd harmonic	
RF1 COM, RF2 COM	f_{in} = 70 MHz to 1650 MHz, $f_{selected}$ = 140 MHz to 3300 MHz	< –30 dB
	f_{in} = 1650 MHz to 3000 MHz, $f_{selected}$ = 3300 MHz to 6000 MHz	< –30 dB

Harmonic response	3rd harmonic	
RF1 COM, RF2 COM	f_{in} = 70 MHz to 1100 MHz, $f_{selected}$ = 210 MHz to 3300 MHz	< –50 dB
	f_{in} = 1100 MHz to 2000 MHz, $f_{selected}$ = 3300 MHz to 6000 MHz	< –50 dB

Phase noise	single sideband, 70 MHz to 3300 MHz	
Carrier offset	≥ 1 MHz	< –120 dBc, 1 Hz

Phase noise	single sideband, 3300 MHz to 6000 MHz	
Carrier offset	≥ 1 MHz	< –117 dBc, 1 Hz

Trigger		
Trigger sources		BASE: external TRIG A, BASE: external TRIG B, GPRF: free run, GPRF: IF power, BB generators, BB signaling

Power meter

Frequency range		70 MHz to 3300 MHz up to 6000 MHz with the R&S®CMW-KB036 option
Frequency resolution		0.1 Hz
Resolution bandwidths		Gaussian, 1 kHz to 10 MHz, in 1/3/5 steps, bandpass, 1 kHz to 30 MHz, in 1/3/5 steps, RRC, α = 0.1, 3.84 MHz, RRC, α = 0.22, WCDMA filter, 1.2288 MHz, CDMA filter
Expected nominal power setting range	for ADC full scale	
RF1 COM, RF2 COM	70 MHz to 100 MHz	–37 dBm to +42 dBm [2]
	100 MHz to 3300 MHz	–47 dBm to +42 dBm [2]
	3300 MHz to 6000 MHz	–37 dBm to +42 dBm [2]

Level range		
RF1 COM, RF2 COM	70 MHz to 100 MHz	
	continuous power (CW)	–74 dBm [3] to +34 dBm
	peak envelope power (PEP)	up to +42 dBm [2]
	100 MHz to 3300 MHz	
	continuous power (CW)	–84 dBm [3] to +34 dBm
	peak envelope power (PEP)	up to +42 dBm [2]
	3300 MHz to 6000 MHz	
	continuous power (CW)	–74 dBm [3] to +34 dBm
	peak envelope power (PEP)	up to +42 dBm [2]
	maximum input DC level	0 V DC

Level uncertainty	in temperature range +20 °C to +35 °C	
RF1 COM, RF2 COM	70 MHz to 100 MHz	< 1.0 dB [4]
	100 MHz to 3300 MHz	< 0.5 dB [4]
	3300 MHz to 6000 MHz	< 1.0 dB [4]

Level uncertainty	in temperature range +5 °C to +45 °C	
RF1 COM, RF2 COM	70 MHz to 100 MHz	< 1.2 dB [4]
	100 MHz to 3300 MHz	< 0.7 dB [4]
	3300 MHz to 6000 MHz	< 1.2 dB [4]

Level linearity with fixed expected nominal power setting	in temperature range +20 °C to +35 °C	
RF1 COM, RF2 COM	level range 0 dB to –40 dB	< 0.15 dB, typ. < 0.1 dB

Level resolution		0.01 dB

Level repeatability	typical values after 1 h warm-up time, always returning to same level and frequency, no temperature change, insignificant time change	
	input level ≥ –40 dBm	< 0.01 dB
	input level < –40 dBm	< 0.03 dB

Dynamic range	70 MHz to 3300 MHz, *RBW → 1 kHz*, with fixed expected nominal power setting	> 100 dB
Expected nominal power setting for full dynamic range		
RF1 COM, RF2 COM		–8 dBm to +42 dBm [2]

Dynamic range	3300 MHz to 6000 MHz, *RBW → 1 kHz*, with fixed expected nominal power setting	> 97 dB
Expected nominal power setting for full dynamic range		
RF1 COM, RF2 COM		+2 dBm to +42 dBm [2]

[2] The maximum permissible continuous power is +34 dBm due to thermal limits.

[3] *RBW → 1 kHz.*

[4] Valid for a 12-month calibration interval.

Spectrum measurements

FFT spectrum analyzer (R&S®CMW-KM010 option)		
Frequency range		70 MHz to 3300 MHz
		up to 6000 MHz with the R&S®CMW-KB036 option
Frequency span		1.25 MHz, 2.5 MHz, 5 MHz, 10 MHz, 20 MHz, 40 MHz
FFT length		1k, 2k, 4k, 8k, 16k
Detector		peak, RMS
Level range		see general technical specifications
Level uncertainty	for center frequency and *detector → peak*	see general technical specifications

Dynamic range	70 MHz to 3300 MHz, *for FFT length → 16k and span → 5 MHz* (equivalent to RBW → 781 Hz)	> 100 dB
Expected nominal power setting for full dynamic range		
RF1 COM, RF2 COM		–8 dBm to +42 dBm [5]

Dynamic range	3300 MHz to 6000 MHz, *for FFT length → 16k and span → 5 MHz* (equivalent to RBW → 781 Hz)	> 97 dB
Expected nominal power setting for full dynamic range		
RF1 COM, RF2 COM		+2 dBm to +42 dBm [5]

Inherent spurious response	without input signal	see general technical specifications

RF path 2 with RF TRX (R&S®CMW-B570 option) and RF frontend (BASIC) (R&S®CMW-B590A option) [6]

The R&S®CMW-B570 and R&S®CMW-B590A options make the second RF path (RF path 2) available on the front of the instrument with three additional RF connectors, i.e. RF3 COM, RF4 COM and RF3 OUT.

RF3 COM	equivalent to RF1 COM	see general technical specifications
RF4 COM	equivalent to RF2 COM	see general technical specifications
RF3 OUT	equivalent to RF1 OUT	see general technical specifications

[5] The maximum permissible continuous power is +34 dBm due to thermal limits.

[6] R&S®CMW500 only.

Timebase

Timebase TCXO

Max. frequency drift	in temperature range +5 °C to +45 °C	±1 × 10^{-6}
Max. aging	at +25 °C, after 14 days of continuous operation	±1 × 10^{-6}/year

Timebase basic OCXO (R&S®CMW-B690A option)

Max. frequency drift	in temperature range +5 °C to +45 °C	±5 × 10^{-8}
Retrace	at +25 °C, after 24 hours power ON / 2 hours power OFF / 1 hour power ON	±2 × 10^{-8}
Max. aging	at +25 °C, after 10 days of continuous operation	±1 × 10^{-7}/year ±1 × 10^{-9}/day
Warm-up time	at +25 °C, the frequency is in the range that is 10 times the frequency drift (±5 × 10^{-7})	approx. 10 min

Timebase highly stable OCXO (R&S®CMW-B690B option)

Max. frequency drift	in temperature range +5 °C to +45 °C, referenced to +25 °C	±5 × 10^{-9}
	with instrument orientation	±1 × 10^{-9}
Retrace	at +25 °C, after 24 hours power ON / 2 hours power OFF / 1 hour power ON	±5 × 10^{-9}
Max. aging	at +25 °C, after 10 days of continuous operation	±3 × 10^{-8}/year ±5 × 10^{-10}/day
Warm-up time	at +25 °C, the frequency is in the range that is 10 times the frequency drift (±5 × 10^{-8})	approx. 10 min

Reference frequency inputs/outputs

Synchronization input		BNC connector REF IN, rear panel
Frequency	sine wave	10 MHz to 80 MHz, step: 1 Hz
	square wave (TTL level)	1 MHz to 80 MHz, step: 1 Hz
Max. frequency variation		±10 × 10^{-6}
Input voltage range		0.5 V to 2 V, RMS
Impedance		50 Ω

Synchronization output 1		BNC connector REF OUT 1, rear panel
Frequency		10 MHz from internal reference or frequency at synchronization input
Output voltage		> 1.4 V, peak-to-peak
Impedance		50 Ω

GSM specifications – mobile station test

GSM RF generator (prerequisite: R&S®CMW-B110A option)

Frequency range	GSM450 band	460 MHz to 468 MHz
	GSM480 band	488 MHz to 496 MHz
	GSM750 band	747 MHz to 762 MHz
	GSM850 band	869 MHz to 894 MHz
	GSM900 band	921 MHz to 960 MHz
	GSM1800 band	1805 MHz to 1880 MHz
	GSM1900 band	1930 MHz to 1990 MHz

GSM GEN (R&S®CMW-KG200 option)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty		see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Phase error	GMSK	< 1°, RMS
		< 4°, peak
Error vector magnitude (EVM)	8PSK	< 2 %, RMS

GSM WINIQSIM2™ (R&S®CMW-KW200 option), GSM EDGE EVO WINIQSIM2™ (R&S®CMW-KW201 option)

Arbitrary waveform files	GMSK, B × T = 0.3, with the R&S®CMW-KW200 option	GSM_GMSK.WV (PAR = 0 dB), GMSKDIGMOD.WV (PAR = 0 dB)
	8PSK, with the R&S®CMW-KW200 option	GSM_EDGE.WV (PAR = 3.23 dB), EDGEDIGMOD.WV (PAR = 3.22 dB)
	16QAM, with the R&S®CMW-KW200 and R&S®CMW-KW201 options	EDGE_EVO_16QAM_A.WV (PAR = 4.70 dB)
	32QAM, with the R&S®CMW-KW200 and R&S®CMW-KW201 options	EDGE_EVO_32QAM_B.WV (PAR = 5.37 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	with the R&S®CMW-KW200 option, waveform files used: GMSKDIGMOD.WV or EDGEDIGMOD.WV	see general technical specifications
	with the R&S®CMW-KW200 and R&S®CMW-KW201 options, waveform files used: EDGE_EVO_16QAM_A.WV EDGE_EVO_32QAM_B.WV	see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Phase error	GMSK with the R&S®CMW-KW200 option, waveform file used: GSM_GMSK.WV	< 1°, RMS
		< 4°, peak
Error vector magnitude (EVM)	8PSK with the R&S®CMW-KW200 option, waveform file used: GSM_EDGE.WV	< 2 %, RMS
	16QAM / 32QAM level A with the R&S®CMW-KW200 and R&S®CMW-KW201 options, waveform file used: EDGE_EVO_16QAM_A.WV	< 2 %, RMS
	QPSK / 16QAM / 32QAM level B with the R&S®CMW-KW200 and R&S®CMW-KW201 options, waveform file used: EDGE_EVO_32QAM_B.WV	< 2 %, RMS

GSM RF analyzer (R&S®CMW-KM200 option) and GSM EDGE EVO A analyzer (R&S®CMW-KM201 option)

Frequency range	GSM450 band	450 MHz to 458 MHz
	GSM480 band	478 MHz to 486 MHz
	GSM750 band	777 MHz to 792 MHz
	GSM850 band	824 MHz to 849 MHz
	GSM900 band	876 MHz to 915 MHz
	GSM1800 band	1710 MHz to 1785 MHz
	GSM1900 band	1850 MHz to 1910 MHz

Trigger		
Trigger sources		BASE: external TRIG A, BASE: external TRIG B, GPRF: BB generator, GSM: free run, GSM: IF power, GSM: acquisition

Modulation analysis

Level range		–28 dBm to +42 dBm [7]
Analysis mode	with the R&S®CMW-KW200 option	GMSK, 8PSK
	with the R&S®CMW-KW200 and R&S®CMW-KW201 options	GMSK, 8PSK, 16QAM (level A)
Inherent phase error	GMSK	< 0.6°, RMS
		< 2°, peak
Inherent error vector magnitude (inherent EVM)	8PSK, 16QAM (level A)	< 0.8 %, RMS
Frequency measurement uncertainty		< 35 Hz + drift of timebase, see general technical specifications
Inherent I/Q offset		< –50 dB
Filter	GMSK	bandpass, 900 kHz, RRC filter, α = 0.16
	8PSK, 16QAM (level A)	windowed raised-cosine filter in line with 3GPP TS 45.005

Burst power measurement		
Level uncertainty	bandpass, 900 kHz, RRC filter, α = 0.16	see general technical specifications

Power versus time measurement

Filter	selectable	Gaussian, 500 kHz or 1 MHz

Dynamic range	*filter → 500 kHz, Gaussian,* with fixed expected nominal power setting	
	GMSK	> 72 dB, RMS
	8PSK, 16QAM (level A)	> 69 dB, RMS
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	–8 dBm to +42 dBm [7]

Relative measurement uncertainty	result > –40 dB	typ. < 0.1 dB
	–60 dB ≤ result ≤ –40 dB	typ. < 0.5 dB

Burst power measurement		
Level range		–50 dBm to +42 dBm [7]
Level uncertainty	*filter → 500 kHz or 1 MHz, Gaussian*	see general technical specifications

[7] The maximum permissible continuous power is +34 dBm due to thermal limits.

Spectrum due to modulation measurement

Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	–8 dBm to +42 dBm [8]
Test method		relative measurement, averaging
Filter		Gaussian, 30 kHz, 5 pole
Measurement	at an offset of ±	100/200/250/400/600/800/1000/1200/ 1400/1600/1800 kHz

Dynamic range	offset ≥ 1200 kHz	
	GMSK	> 74 dB
	8PSK, 16QAM (level A)	> 70 dB

Spectrum due to switching measurement

Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	–8 dBm to +42 dBm [8]
Test method		absolute measurement, max. hold
Filter		Gaussian, 30 kHz, 5 pole
Measurement	at an offset of ±	400/600/1200/1800 kHz

Dynamic range	offset ≥ 1200 kHz	
	GMSK	> 72 dB
	8PSK, 16QAM (level A)	> 68 dB

GSM signaling (prerequisite: R&S®CMW-KS200, R&S®CMW-B200A, R&S®CMW-B210A options; additionally R&S®CMW-KS210 option)

Frequency range		
GSM850 band, GSM900 band, GSM1800 band, GSM1900 band	DL	see GSM RF generator specifications
	UL	see GSM RF analyzer specifications

Frequency setting		channel number

Output level range	depending on PAR and additional 6 dB level margin	see general technical specifications
Output level resolution		see general technical specifications

Modulation		
Inherent phase error	GMSK	< 1°, RMS
		< 4°, peak

[8] The maximum permissible continuous power is +34 dBm due to thermal limits.

WCDMA specifications – mobile station (UE) test

Standard		3GPP FDD

WCDMA RF generator (prerequisite: R&S®CMW-B110A option)

Frequency range	WCDMA band 1	2112.4 MHz to 2167.6 MHz
	WCDMA band 2	1932.4 MHz to 1987.6 MHz
	WCDMA band 3	1807.4 MHz to 1877.6 MHz
	WCDMA band 4	2112.4 MHz to 2152.6 MHz
	WCDMA band 5	871.4 MHz to 891.6 MHz
	WCDMA band 6	877.4 MHz to 882.6 MHz
	WCDMA band 7	2622.4 MHz to 2687.6 MHz
	WCDMA band 8	927.4 MHz to 957.6 MHz
	WCDMA band 9	1847.4 MHz to 1877.4 MHz
	WCDMA band 10	2112.4 MHz to 2167.6 MHz
	WCDMA band 11	1478.4 MHz to 1498.4 MHz
	WCDMA band 12	730.4 MHz to 743.6 MHz
	WCDMA band 13	748.4 MHz to 753.6 MHz
	WCDMA band 14	760.4 MHz to 765.6 MHz
	WCDMA band S	2182.4 MHz to 2197.6 MHz
	WCDMA band S170	2180 MHz to 2190 MHz
	WCDMA band S190	2190 MHz to 2200 MHz

WCDMA GEN (R&S®CMW-KG400 option), WCDMA HSPA GEN (R&S®CMW-KG401 option)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty		see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Error vector magnitude (EVM)	composite EVM	< 2 %, RMS

WCDMA WINIQSIM2™ (R&S®CMW-KW400 option), WCDMA HSDPA WINIQSIM2™ (R&S®CMW-KW401 option), WCDMA HSUPA WINIQSIM2™ (R&S®CMW-KW402 option), WCDMA HSPA+ WINIQSIM2™ (R&S®CMW-KW403 option)

Arbitrary waveform files	with the R&S®CMW-KW400 option	TM4CPICH.WV (PAR = 8.34 dB), 3GPPDEFAULT.WV (PAR = 10.65 dB)
	with the R&S®CMW-KW400 and R&S®CMW-KW401 options	WCDMA_DL_HSDPA.WV (PAR = 10.08 dB)
	with the R&S®CMW-KW400 and R&S®CMW-KW401 and R&S®CMW-KW402 options	WCDMA_DL_HSUPA.WV (PAR = 10.12 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	with the R&S®CMW-KW400 option, waveform file used: 3GPPDEFAULT.WV	see general technical specifications
	with the R&S®CMW-KW401 option, waveform file used: WCDMA_DL_HSDPA.WV	see general technical specifications
	with the R&S®CMW-KW402 option, waveform file used: WCDMA_DL_HSUPA.WV	see general technical specifications
	with the R&S®CMW-KW400 and R&S®CMW-KW401 and R&S®CMW-KW402 and R&S®CMW-KW403 options	see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Error vector magnitude (EVM)	composite EVM, with the R&S®CMW-KW400 option, waveform file used: 3GPPDEFAULT.WV	< 2 %, RMS
	composite EVM, with the R&S®CMW-KW401 option, waveform file used: WCDMA_DL_HSDPA.WV,	< 2 %, RMS
	composite EVM, with the R&S®CMW-KW402 option, waveform file used: WCDMA_DL_HSUPA.WV	< 2 %, RMS
	with the R&S®CMW-KW400 and R&S®CMW-KW401 and R&S®CMW-KW402 and R&S®CMW-KW403 options	< 2 %, RMS

WCDMA RF analyzer (R&S®CMW-KM400, R&S®CMW-KM401, R&S®CMW-KM403 options)

Frequency range	WCDMA band 1	1922.4 MHz to 1977.6 MHz
	WCDMA band 2	1852.4 MHz to 1907.6 MHz
	WCDMA band 3	1712.4 MHz to 1782.6 MHz
	WCDMA band 4	1712.4 MHz to 1752.6 MHz
	WCDMA band 5	826.4 MHz to 846.6 MHz
	WCDMA band 6	832.4 MHz to 837.6 MHz
	WCDMA band 7	2502.4 MHz to 2567.6 MHz
	WCDMA band 8	882.4 MHz to 912.6 MHz
	WCDMA band 9	1752.4 MHz to 1782.4 MHz
	WCDMA band 10	1712.4 MHz to 1767.6 MHz
	WCDMA band 11	1430.4 MHz to 1450.4 MHz
	WCDMA band 12	700.4 MHz to 713.6 MHz
	WCDMA band 13	779.4 MHz to 784.6 MHz
	WCDMA band 14	790.4 MHz to 795.6 MHz
	WCDMA band S	2002.4 MHz to 2017.6 MHz
	WCDMA band S170	2010 MHz to 2020 MHz
	WCDMA band S190	2000 MHz to 2010 MHz

Statistics		
Statistical count		1 to 1000
Values		current, average, minimum/maximum, standard deviation

Trigger		
Trigger sources		BASE: external TRIG A, BASE: external TRIG B, GPRF: BB generator, WCDMA: free run, WCDMA: free run (fast sync), WCDMA: IF power, WCDMA: DCCH TTI trigger, WCDMA: frame trigger, WCDMA: HS-DPCCH trigger, WCDMA: slot trigger

Modulation analysis

Filter		3.84 MHz, RRC, α = 0.22, WCDMA filter
Level range		–28 dBm to +42 dBm [9]

[9] The maximum permissible continuous power is +34 dBm due to thermal limits.

Analysis modes	with the R&S®CMW-KM400 option	QPSK, WCDMA
	with the R&S®CMW-KM400 and R&S®CMW-KM401 options	WCDMA + HSDPA, WCDMA + HSUPA, WCDMA + HSPA
	with the R&S®CMW-KM400 and R&S®CMW-KM401 and R&S®CMW-KM403 options	WCDMA + HSPA+
Measured parameters	numeric results and standard deviation	error vector magnitude (EVM), magnitude error (ME), phase error (PE), frequency error, I/Q origin offset, I/Q imbalance, UE power, power steps, phase discontinuity, CDP, CDE
	graphical	EVM versus time, EVM versus chip, ME versus time, ME versus chip, PE versus time, PE versus chip, FE versus time, UE versus time, PS versus slot, PD versus slot, CDP versus slot, CDE versus slot, CD monitor

Error vector magnitude (EVM)		
Measurement range		up to 25 %, RMS
Inherent EVM		< 2.5 %, RMS
Measurement length		half-slot, 1 slot, multislot (1 to 120)

Frequency error		
Measurement range		±3 kHz
Frequency measurement uncertainty		< 35 Hz + drift of timebase, see general technical specifications

I/Q origin offset		
Inherent I/Q offset	for average ≥ 10 measurements	< –55 dB

I/Q imbalance		
Inherent I/Q imbalance		< –50 dB

Spectrum measurements

Adjacent channel leakage ratio	RMS detector	
Filter		3.84 MHz, RRC, α = 0.22, WCDMA filter
Dynamic range	first adjacent channel at ±5 MHz	> 54 dB
	second adjacent channel at ±10 MHz	> 57 dB
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	–4 dBm to +42 dBm [10]
Uncertainty	for –33 dBc first adjacent channel level	< 0.5 dB
	for –43 dBc second adjacent channel level	< 0.5 dB
Measurement length		1 slot (2560 chip)

Power meter

UE power measurement	RMS detector	
Filter		bandpass, 6.3 MHz, RRC, α = 0.22
Level range		–55 dBm to +42 dBm [10]
Level uncertainty		see general technical specifications
Measurement length		half-slot, 1 slot

[10] The maximum permissible continuous power is +34 dBm due to thermal limits.

Off power measurement	RMS detector	
Filter		3.84 MHz, RRC, α = 0.22, WCDMA filter
Noise floor		–72 dBm
Level uncertainty		see general technical specifications + uncertainty due to noise floor

3G WCDMA signaling (prerequisite: R&S®CMW-KS400, R&S®CMW-B300A options; additionally R&S®CMW-KS410 option)

Standard		3GPP FDD
Symbol rate		3.84 MHz

Channels		
Physical channels	DL	P-CPICH, P-SCH, S-SCH, P-CCPCH, S-CCPCH, AICH, PICH
	DL OCNS R99	16-channel orthogonal channel noise
	UL	DPCCH, DPDCH, PRACH
Radio bearer	DPCH signaling radio bearer (SRB)	
	DL	1.7 kbps, 2.5 kbps, 3.4 kbps, 13.6 kbps
	UL	1.7 kbps, 2.5 kbps, 3.4 kbps, 13.6 kbps
	DPCH reference measurement channels (RMC) in line with 3GPP TS 34.121	
	DL	12.2 kbps, 64 kbps, 144 kbps, 384 kbps
	UL	12.2 kbps, 64 kbps, 144 kbps, 384 kbps
	DPCH voice echo NB-AMR	
	with the R&S®CMW-KS400 option	12.2 kbps
	with the R&S®CMW-KS400 and R&S®CMW-KS410 options	4.75 kbps, 5.15 kbps, 5.9 kbps, 6.7 kbps, 7.4 kbps, 7.95 kbps 10.2 kbps, 12.2 kbps
	DPCH voice echo WB-AMR	
	with the R&S®CMW-KS400 and R&S®CMW-KS410 options	6.6 kbps, 8.85 kbps, 12.65 kbps, 14.25 kbps, 15.85 kbps, 18.25 kbps, 19.85 kbps, 23.05 kbps, 23.85 kbps
	DPCH video echo	64 kbps

Frequency range		
Bands 1 to 14	with the R&S®CMW-KS400 option	
	DL	see WCDMA RF generator specifications
	UL	see WCDMA RF analyzer specifications
Band S, band S170, band S190	with the R&S®CMW-KS400 and R&S®CMW-KS410 options	
	DL	see WCDMA RF generator specifications
	UL	see WCDMA RF analyzer specifications

Frequency setting		channel number

Output level range	depending on PAR	see general technical specifications
Output level uncertainty		see general technical specifications
Output level resolution		see general technical specifications
Output level setting		total output power

Channel levels	P-CPICH, P-SCH, S-SCH, P-CCPCH, PICH, DPCH, OCNS	–30 dB to +0 dB relative to total power

Signal quality		
Error vector magnitude (EVM)	global EVM for DL RMC in line with 3GPP TS 34.121 C3.1 to C3.4 with DPCH/CPICH = 0 dB	< 2 %, RMS

LTE specifications – mobile station test

Standard		LTE FDD and TDD

LTE RF generator (prerequisite: R&S®CMW-B110A option)

Frequency range	E-UTRA band 1, FDD	2110 MHz to 2170 MHz
	E-UTRA band 2, FDD	1930 MHz to 1990 MHz
	E-UTRA band 3, FDD	1805 MHz to 1880 MHz
	E-UTRA band 4, FDD	2110 MHz to 2155 MHz
	E-UTRA band 5, FDD	869 MHz to 894 MHz
	E-UTRA band 6, FDD	875 MHz to 885 MHz
	E-UTRA band 7, FDD	2620 MHz to 2690 MHz
	E-UTRA band 8, FDD	925 MHz to 960 MHz
	E-UTRA band 9, FDD	1844.0 MHz to 1879.9 MHz
	E-UTRA band 10, FDD	2110 MHz to 2170 MHz
	E-UTRA band 11, FDD	1475.9 MHz to 1500.0 MHz
	E-UTRA band 12, FDD	728 MHz to 746 MHz
	E-UTRA band 13, FDD	746 MHz to 756 MHz
	E-UTRA band 14, FDD	758 MHz to 768 MHz
	E-UTRA band 17, FDD	734 MHz to 746 MHz
	E-UTRA band 33, TDD	1900 MHz to 1920 MHz
	E-UTRA band 34, TDD	2010 MHz to 2025 MHz
	E-UTRA band 35, TDD	1850 MHz to 1910 MHz
	E-UTRA band 36, TDD	1930 MHz to 1990 MHz
	E-UTRA band 37, TDD	1910 MHz to 1930 MHz
	E-UTRA band 38, TDD	2570 MHz to 2620 MHz
	E-UTRA band 39, TDD	1880 MHz to 1920 MHz
	E-UTRA band 40, TDD	2300 MHz to 2400 MHz

LTE WINIQSIM2™ (R&S®CMW-KW500 option)

Arbitrary waveform file	LTE FDD	LTE_FDD_QPSK_10MHZ.WV (PAR = 11.15 dB)
	LTE TDD	LTE_TDD_64QAM_20MHZ.WV (PAR = 11.10 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform file used: LTE_FDD_QPSK_10MHZ.WV	see general technical specifications
	waveform file used: LTE_TDD_64QAM_20MHZ.WV	see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Error vector magnitude (EVM)	EVM PDSCH QPSK, bandwidth = 10 MHz, 50 resource blocks, PRB symbol offset = 3, 10 subframes, PCFICH present, waveform file used: LTE_FDD_QPSK_10MHZ.WV	< 2 %, RMS
	EVM PDSCH 64QAM, bandwidth = 20 MHz, 100 resource blocks, PRB symbol offset = 2, uplink/downlink configuration 1, special subframe configuration 7, waveform file used: LTE_TDD_64QAM_20MHZ.WV	< 2 %, RMS

LTE FDD RF analyzer (R&S®CMW-KM500 option)

Bandwidth		1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz

Frequency range	E-UTRA band 1, FDD	1920 MHz to 1980 MHz
	E-UTRA band 2, FDD	1850 MHz to 1910 MHz
	E-UTRA band 3, FDD	1710 MHz to 1785 MHz
	E-UTRA band 4, FDD	1710 MHz to 1755 MHz
	E-UTRA band 5, FDD	824 MHz to 849 MHz
	E-UTRA band 6, FDD	830 MHz to 840 MHz
	E-UTRA band 7, FDD	2500 MHz to 2570 MHz
	E-UTRA band 8, FDD	880 MHz to 915 MHz
	E-UTRA band 9, FDD	1749.9 MHz 1784.9 MHz
	E-UTRA band 10, FDD	1710 MHz to 1770 MHz
	E-UTRA band 11, FDD	1427.9 MHz to 1452.9 MHz
	E-UTRA band 12, FDD	698 MHz to 716 MHz
	E-UTRA band 13, FDD	777 MHz to 787 MHz
	E-UTRA band 14, FDD	788 MHz to 798 MHz
	E-UTRA band 17, FDD	704 MHz to 716 MHz
Level setting		manual mode

Statistics		
Statistical count		1 to 1000
Values		current, average, minimum/maximum, standard deviation

Trigger		
Trigger source		BASE: external TRIG A, BASE: external TRIG B, GPRF: BB generator, LTE: free run (fast sync), LTE: IF power

Power measurement

Slot power	RMS detector	
Level range		–50 dBm to +30 dBm, RMS
Level uncertainty		see general technical specifications

Modulation analysis

Measured parameters	numeric results	error vector magnitude (EVM), magnitude error (ME), phase error (PE), frequency error, I/Q origin offset, TX power, peak power, resource block power (RB power)
	graphical	EVM versus SC-FDMA symbol, ME versus SC-FDMA symbol, PE versus SC-FDMA symbol, EVM versus subcarrier, inband emissions, spectrum flatness, I/Q constellation

Error vector magnitude (EVM)		
Inherent EVM	allocated resource blocks ≤ 15	
	–38 dBm ≤ input level < +30 dBm, RMS	< 1 %, RMS
	allocated resource blocks ≤ 50	
	–30 dBm ≤ input level ≤ +30 dBm, RMS	< 1 %, RMS
	–38 dBm ≤ input level < –30 dBm, RMS	< 1.5 %, RMS
	allocated resource blocks ≤ 100	
	–30 dBm ≤ input level ≤ +30 dBm, RMS	< 1 %, RMS
	–38 dBm ≤ input level < –30 dBm, RMS	< 2 %, RMS

Frequency error		
Measurement range		±80 kHz
Frequency measurement uncertainty		< 35 Hz + drift of timebase, see general technical specifications

I/Q origin offset		
Inherent I/Q offset	for average ≥ 10 measurements	< –50 dB

Inband emissions		
Dynamic range	allocated resource blocks ≤ 50	> 50 dB
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	+2 dBm to +42 dBm [11]

Spectrum flatness	allocated resource blocks ≤ 50	
Level uncertainty		< 0.5 dB

Spectrum measurements

Adjacent channel leakage ratio		
Filter	E-UTRA	rectangle 1.08 MHz, 2.7 MHz, 4.5 MHz, 9 MHz, 13.5 MHz, 18 MHz
	UTRA	3.84 MHz, RRC, α = 0.22, WCDMA filter
Dynamic range	E-UTRA	> 45 dB
	UTRA	> 54 dB
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	+2 dBm to +42 dBm [11]

Spectrum emission mask (SEM)		
Frequency span		70 MHz
Noise floor	*RBW → 1 MHz*	< –35 dBm
	RBW → 100 kHz	< –40 dBm
	RBW → 30 kHz	< –45 dBm

LTE FDD signaling (prerequisite: R&S®CMW-KS500, R&S®CMW-B300A options) [12]

Standard		3GPP E-UTRA FDD

Channels		
Physical channels and signals	DL	RS (cell-specific RS), PSS, SSS, PBCH, PCFICH, PHICH, PDCCH, PDSCH
	UL	RS (demodulation RS), PRACH, PUCCH, PUSCH
Bandwidth		1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
Modulation schemes	DL PDSCH	QPSK, 16QAM, 64QAM
	UL PUSCH	QPSK, 16QAM
Reference measurement channels	RMCs in line with 3GPP TS 36.521 Annex A.2 (UL) and Annex A.3 (DL)	RMCs for FDD, full and partial RB allocation, modulation: QPSK, 16QAM, 64QAM (DL only)

Frequency range		
Bands 1 to 14 and band 17	with the R&S®CMW-KS500 option	
	DL	see LTE FDD RF generator specifications
	UL	see LTE FDD RF analyzer specifications

Frequency setting		channel number

[11] The maximum permissible continuous power is +34 dBm due to thermal limits.

[12] R&S®CMW500 only.

DL signal

Output level range	due to PAR	15 dB below max. output level of RF generator, see general technical specifications
Output level uncertainty		see general technical specifications
Output level resolution		0.1 dB
Output level setting	in line with 3GPP TS 36.521 Annex C.0	RS energy per resource element (EPRE) [dBm/15 kHz]

Channel levels	PSS, SSS, PBCH, PCFICH, PHICH, PDCCH, PDSCH	–30 dB to +0 dB relative to RS EPRE
	PHICH	–30 dB to –12 dB relative to RS EPRE

Signal quality		
Error vector magnitude (EVM)	global EVM for cell with bandwidth = 20 MHz	< 2 %, RMS

LTE TDD RF analyzer (R&S®CMW-KM550 option)

Bandwidth		1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz

Frequency range	E-UTRA band 33, TDD	1900 MHz to 1920 MHz
	E-UTRA band 34, TDD	2010 MHz to 2025 MHz
	E-UTRA band 35, TDD	1850 MHz to 1910 MHz
	E-UTRA band 36, TDD	1930 MHz to 1990 MHz
	E-UTRA band 37, TDD	1910 MHz to 1930 MHz
	E-UTRA band 38, TDD	2570 MHz to 2620 MHz
	E-UTRA band 39, TDD	1880 MHz to 1920 MHz
	E-UTRA band 40, TDD	2300 MHz to 2400 MHz
Level setting		manual mode

Statistics		
Statistical count		1 to 1000
Values		current, average, minimum/maximum, standard deviation

Trigger		
Trigger source		BASE: external TRIG A, BASE: external TRIG B, GPRF: BB generator, LTE: free run (fast sync), LTE: IF power

Power measurement

Slot power	RMS detector	
Level range		–50 dBm to +30 dBm, RMS
Level uncertainty		see general technical specifications

Modulation analysis

Measured parameters	numeric results	error vector magnitude (EVM), magnitude error (ME), phase error (PE), frequency error, I/Q origin offset, TX power, peak power, resource block power (RB power)
	graphical	EVM versus SC-FDMA symbol, ME versus SC-FDMA symbol, PE versus SC-FDMA symbol, EVM versus subcarrier, inband emissions, spectrum flatness, I/Q constellation

Error vector magnitude (EVM)		
Inherent EVM	allocated resource blocks ≤ 15	
	–38 dBm ≤ input level < +30 dBm, RMS	< 1 %, RMS
	allocated resource blocks ≤ 50	
	–30 dBm ≤ input level ≤ +30 dBm, RMS	< 1 %, RMS
	–38 dBm ≤ input level < –30 dBm, RMS	< 1.5 %, RMS
	allocated resource blocks ≤ 100	
	–30 dBm ≤ input level ≤ +30 dBm, RMS	< 1 %, RMS
	–38 dBm ≤ input level < –30 dBm, RMS	< 2 %, RMS

Frequency error		
Measurement range		±80 kHz
Frequency measurement uncertainty		< 35 Hz + drift of timebase, see general technical specifications

I/Q origin offset		
Inherent I/Q offset		< –50 dB

Inband emissions		
Dynamic range	allocated resource blocks ≤ 50	> 50 dB
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	+2 dBm to +42 dBm [13]

Spectrum flatness	allocated resource blocks ≤ 50	
Level uncertainty		< 0.5 dB

Spectrum measurements

Adjacent channel leakage ratio		
Filter	E-UTRA	rectangle 1.08 MHz, 2.7 MHz, 4.5 MHz, 9 MHz, 13.5 MHz, 18 MHz
	UTRA	1.28 MHz, RRC, α = 0.22, WCDMA filter
Dynamic range	E-UTRA	> 45 dB
	UTRA	> 54 dB
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	+2 dBm to +42 dBm [13]

[13] The maximum permissible continuous power is +34 dBm due to thermal limits.

Spectrum emission mask (SEM)		
Frequency span		70 MHz
Noise floor	*RBW → 1 MHz*	< –35 dBm
	RBW → 100 kHz	< –40 dBm
	RBW → 30 kHz	< –45 dBm

Bluetooth® specifications

Standard	standard	Bluetooth® Core Specification Version 2.1 + EDR
	test standard	Radio Frequency Test Specification V1.2/V2.0/V2.0+EDR/V2.1/V2.1+EDR

Bluetooth® RF generator (prerequisite: R&S®CMW-B110A option)

Frequency range	Bluetooth®	2402 MHz to 2481 MHz

Bluetooth® WINIQSIM2™ (R&S®CMW-KW610 option)

Arbitrary waveform file	basic rate	BLUETOOTH_11110000_DH5.WV LAP: 123456, (PAR = 0.00 dB)
	enhanced data rate (EDR)	BLUETOOTH_PRBS9_3-DH5.WV LAP: 123456, (PAR = 3.17 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform files used: BLUETOOTH_11110000_DH5.WV BLUETOOTH_PRBS_3-DH5.WV	see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Modulation index uncertainty	basic rate, frequency deviation Δf1 max. = 160 kHz, waveform file used: BLUETOOTH_11110000_DH5.WV	< 1 %
Differential error vector magnitude (DEVM)	enhanced data rate, waveform file used: BLUETOOTH_PRBS9_3-DH5.WV	< 1.5 %, RMS

Bluetooth® RF analyzer (R&S®CMW-KM610 option)

Frequency range	Bluetooth®	2402 MHz to 2481 MHz

Statistics		
Statistical count		1 to 1000
Values		current, average, maximum, minimum, standard deviation

Trigger		
Trigger sources		BT: IF power

Modulation analysis

Filter	filter bandwidth → wide	bandpass 2.0 MHz
	filter bandwidth → narrow	bandpass 1.3 MHz
Level range		–35 dBm to +42 dBm [14]
Supported packet types	basic rate	DH1, DH3, DH5
	enhanced data rate (EDR)	2-DH1, 2-DH3, 2-DH5, 3-DH1, 3-DH3, 3-DH5
Measured parameters	basic rate, numeric results and standard deviation	Δf2 99.9 %, frequency accuracy, frequency drift, maximum drift rate, frequency deviation Δf1 average, frequency deviation Δf1 minimum, frequency deviation Δf1 maximum, frequency deviation Δf2 average, frequency deviation Δf2 minimum, frequency deviation Δf2 maximum, nominal power
Measured parameters	enhanced data rate (EDR), numeric results and standard deviation	99 % DEVM, frequency stability ω_i, frequency stability $(\omega_o + \omega_i)_{max}$, frequency stability $\omega_{o\,max}$, RMS DEVM, peak RMS, nominal power

Total measurement range for frequency accuracy, frequency deviation and frequency drift	basic rate	±250 kHz

Frequency accuracy	basic rate	
Measurement range	for nominal deviation of 160 kHz	±100 kHz
Uncertainty	for deviation ≤ 160 kHz	< 2 kHz

Frequency deviation average	basic rate	
Measurement range	without frequency offset	≤ 210 kHz
Uncertainty	for modulation index 0.22 to 0.42	< 1 %

Frequency drift	basic rate	
Measurement range		±50 kHz
Uncertainty	measured in burst related to frequency offset in preamble with 10101010 pattern	< 2 kHz

Frequency stability ω_i	enhanced data rate	
Measurement range		±100 kHz
Uncertainty	for ω_i ≤ 75 kHz, for deviation ≤ 160 kHz	< 2 kHz

Frequency stability $\omega_{o\,max}$	enhanced data rate	
Measurement range		±15 kHz
Uncertainty	for ω_o ≤ 10 kHz	< 1 kHz

Differential error vector magnitude (DEVM)	enhanced data rate	
Inherent DEVM	for PRBS pattern	< 1.5 %, RMS < 3.0 %, peak

[14] The maximum permissible continuous power is +34 dBm due to thermal limits.

GPS specifications

Standard		GPS

GPS RF generator (prerequisite: R&S®CMW-B110A option)

Frequency range	GPS band	
	L1	1575.42 MHz
	L2	1227.6 MHz

GPS WINIQSIM2™ (R&S®CMW-KW620 option)

Arbitrary waveform file		GPS_DEFAULT.WV (PAR = 3.66 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform file used: GPS_DEFAULT.WV	see general technical specifications
Output level resolution		see general technical specifications

DVB specifications

Standard		DVB-T

DVB RF generator (prerequisite: R&S®CMW-B110A option)

Frequency range	VHF band III	
	channels 5 to 12	174 MHz to 230 MHz
	UHF band IV	
	channels 21 to 34	470 MHz to 582 MHz
	UHF band V	
	channels 35 to 69	582 MHz to 862 MHz

DVB WINIQSIM2™ (R&S®CMW-KW630 option)

Arbitrary waveform file		DVB-T_SCRAMBLED_16QAM_3SEC_ TESTFILE.WV (PAR = 13.23 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform file used: DVB-T_SCRAMBLED_16QAM_3SEC_ TESTFILE.WV	see general technical specifications
Output level resolution		see general technical specifications

FM STEREO RADIO specifications

Standard		FM STEREO RADIO

FM STEREO RADIO generator (prerequisite: R&S®CMW-B110A option)

Frequency range	FM	70 MHz to 110 MHz

FM STEREO RADIO waveforms (R&S®CMW-KV645 option)

Arbitrary waveform file		FM_M_M1K0_D75K0.WV (PAR = 0.00 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform file used: FM_M_M1K0_D75K0.WV	see general technical specifications
Output level resolution		see general technical specifications

Signal quality	RMS detector *SQRT(2)	
Deviation error	waveform file used: FM_M_M1K0_D75K0.WV	< 1 %

FM STEREO RADIO analyzer (R&S®CMW-KM645 option)

Frequency range	FM	70 MHz to 110 MHz

Statistics		
Statistical count		1 to 1000
Values		current, average, maximum, minimum, standard deviation

Audio filter, weighting

Lowpass		OFF, 3 kHz, 4 kHz, 15 kHz
Highpass		OFF, 6 Hz, 50 Hz, 300 Hz
Deemphasis		OFF, 50 µs, 75 µs, 750 µs
Weighting filter		OFF, A-weighting

RF carrier analysis

Carrier frequency error		
Measurement range	for nominal deviation of 75 kHz	±10 kHz
Uncertainty	for deviation ≤ 75 kHz	< 35 Hz + drift of timebase, see general technical specifications

Multiplex deviation		
Measurement range	without frequency offset	≤ 96 kHz
Uncertainty		< 1 %, peak

Modulation analysis

Filter	filter bandwidth	bandpass 500 kHz
Level range		–28 dBm to +42 dBm [15]
Measured parameters	numeric results	carrier power, carrier frequency error, multiplex deviation, pilot deviation, audio left/right deviation, pilot frequency error, THD left/right, THD+N/SINAD left/right, SNR left/right

Pilot frequency error		
Measurement range	for nominal deviation of 6.75 kHz	±10 Hz
Uncertainty	for deviation ≤ 67.5 kHz, drift of timebase according to pilot 19.0 kHz	< 0.1 Hz + drift of timebase, see general technical specifications

THD		
Measurement range		< 10 %
Inherent distortion		< 0.05 %
Uncertainty	for modulation frequency of 1 kHz and deviation of 67.5 kHz	< 1 % + inherent distortion

THD+N / (SINAD)		
Measurement range		< 10 %
Inherent distortion	with deemphasis filter (50 µs) and A-weighted filter	< 0.20 %
Uncertainty	for modulation frequency of 1 kHz, deviation of 67.5 kHz and with deemphasis filter (50 µs) and A-weighted filter	< 1 % + inherent distortion

SNR		
Inherent distortion	with deemphasis filter (50 µs) and A-weighted filter	> 54 dB

[15] The maximum permissible continuous power is +34 dBm due to thermal limits.

WLAN specifications

Standard		IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n

WLAN RF generator (prerequisite: R&S®CMW-B110A option)

Frequency range	WLAN IEEE 802.11b/g/n (2.4 GHz band)	2412 MHz to 2484 MHz
	WLAN IEEE 802.11a/n (5 GHz band) prerequisite: R&S®CMW-KB036 option	5000 MHz to 6000 MHz

WLAN ABG WINIQSIM2™ (R&S®CMW-KW650 option)

Arbitrary waveform files	in line with IEEE 802.11a/g OFDM 64QAM	WLAN_A_G_OFDM_64QAM.WV (PAR = 10.01 dB)
	in line with IEEE 802.11b CCK DQPSK	WLAN_B_CCK_DQPSK.WV (PAR = 1.48 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform files used: WLAN_A_G_OFDM_64QAM.WV WLAN_B_CCK_DQPSK.WV	see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Error vector magnitude (EVM)	IEEE 802.11a/g EVM all carriers waveform file used: WLAN_A_G_OFDM_64QAM.WV	< –40 dB, RMS
	IEEE 802.11b EVM waveform file used: WLAN_B_CCK_DQPSK.WV	< 4 %, peak

WLAN N WINIQSIM2™ (R&S®CMW-KW651 option)

Arbitrary waveform files	in line with IEEE 802.11n 64QAM code rate 5/6	WLAN_N_64QAM_5_6.WV (PAR = 10.01 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform files used: WLAN_N_64QAM_5_6.WV	see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Error vector magnitude (EVM)	IEEE 802.11n EVM all carriers waveform file used: WLAN_N_64QAM_5_6.WV	< –40 dB, RMS

WLAN ABG RF analyzer (R&S®CMW-KM650 option)

Frequency range	WLAN IEEE 802.11b/g	2412 MHz to 2484 MHz
	WLAN IEEE 802.11a prerequisite: R&S®CMW-KB036 option	5000 MHz to 6000 MHz

Statistics		
Statistical count		1 to 1000
Values		current, average, maximum, standard deviation

Trigger		
Trigger sources		WLAN: free run WLAN: IF power

Modulation analysis

Filter		20 MHz
Level range		–28 dBm to +42 dBm [16]
Payload length		≥ 16 symbol or ≥ 403 byte
Analysis modes	DSSS	1 Mbps DBPSK, 2 Mbps DQPSK, 5.5 Mbps CCK, 11 Mbps CCK
	OFDM	6 Mbps BPSK, 9 Mbps BPSK, 12 Mbps QPSK, 18 Mbps QPSK, 24 Mbps 16QAM, 36 Mbps 16QAM, 48 Mbps 64QAM, 54 Mbps 64QAM
Measured parameters	DSSS, numeric results and standard deviation	burst power, error vector magnitude (EVM) peak, error vector magnitude (EVM) RMS, center frequency error, chip clock error, I/Q offset, gain imbalance, quadrature error
	DSSS, graphical	EVM versus chip, I/Q constellation
	OFDM, numeric results and standard deviation	burst power, EVM all carriers, EVM data carriers, EVM pilot carriers, center frequency error, symbol clock error, I/Q offset, gain imbalance, quadrature error
	OFDM, graphical	EVM versus symbol, EVM versus carrier, I/Q constellation, spectrum flatness

Error vector magnitude (EVM)		
Inherent EVM	DSSS, IEEE 802.11b/g	< 5 %, peak
		< 2 %, RMS
	OFDM, IEEE 802.11g	< –40 dB, RMS
	OFDM, IEEE 802.11a	
	–18 dBm ≤ input level ≤ +42 dBm [16], RMS	< –37 dB, RMS
Measurement length	DSSS	1000 samples
	OFDM	entire PPDU

Center frequency error		
Frequency measurement uncertainty	DSSS	< 35 Hz + drift of timebase, see general technical specifications
	OFDM, for ≥ 100 symbol (400 µs)	< 35 Hz + drift of timebase, see general technical specifications

Chip clock error	DSSS	
Uncertainty		< 1 ppm

Symbol clock error	OFDM	
Uncertainty		< 1 ppm

[16] The maximum permissible continuous power is +34 dBm due to thermal limits.

I/Q offset		
Inherent I/Q offset	DSSS, for average ≥ 10 measurements	< –50 dB
	OFDM, for average ≥ 10 measurements	< –45 dB

Spectrum flatness		
Level uncertainty	OFDM, IEEE 802.11g (2.4 GHz band)	< 0.5 dB
	OFDM, IEEE 802.11a (5 GHz band)	< 0.8 dB

Spectrum measurements

Transmit spectrum mask		
Frequency span		80 MHz
Dynamic range	DSSS	in line with IEEE 802.11b
	OFDM	in line with IEEE 802.11a/g
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	
	IEEE 802.11g (2.4 GHz band)	+2 dBm to +42 dBm [17]
	IEEE 802.11a (5 GHz band)	+12 dBm to +42 dB m [17]

WLAN N RF analyzer (R&S®CMW-KM651 option)

Frequency range	WLAN IEEE 802.11n (2.4 GHz band)	2412 MHz to 2484 MHz
	WLAN IEEE 802.11n (5 GHz band) prerequisite: R&S®CMW-KB036 option	5000 MHz to 6000 MHz

Statistics		
Statistical count		1 to 1000
Values		current, average, maximum, standard deviation

Trigger		
Trigger sources		WLAN: free run WLAN: IF power

High throughput (HT)		
PPDU format		legacy mode, mixed mode, greenfield mode

Modulation analysis

Bandwidth		20 MHz, 40 MHz
Level range		–28 dBm to +42 dBm [17]
Payload length		≥ 16 symbol or ≥ 403 byte
Analysis modes		BPSK code rate 1/2 (MCS0), BPSK code rate 3/4, QPSK code rate 1/2 (MCS1), QPSK code rate 3/4 (MCS2), 16QAM code rate 1/2 (MCS3), 16QAM code rate 3/4 (MCS4), 64QAM code rate 1/2, 64QAM code rate 2/3 (MCS5), 64QAM code rate 3/4 (MCS6), 64QAM code rate 5/6 (MCS7)
	for optional 40 MHz MCS format	BPSK code rate 1/2 (MCS32)
Measured parameters	numeric results and standard deviation	burst power, EVM all carriers, EVM data carriers, EVM pilot carriers, center frequency error, symbol clock error, I/Q offset, gain imbalance, quadrature error

[17] The maximum permissible continuous power is +34 dBm due to thermal limits.

	graphical	EVM versus symbol, EVM versus carrier, spectrum flatness

Error vector magnitude (EVM)		
Inherent EVM	IEEE 802.11n (2.4 GHz band)	
	–28 dBm ≤ input level ≤ +42 dBm [18], RMS	< –37 dB, RMS
	IEEE 802.11n (5 GHz band)	
	–18 dBm ≤ input level ≤ +42 dBm [18], RMS	< –35 dB, RMS
Measurement length		entire PPDU

Center frequency error		
Frequency measurement uncertainty	for ≥ 100 symbol (400 µs)	< 35 Hz + drift of timebase, see general technical specifications

Symbol clock error		
Uncertainty		< 1 ppm

I/Q offset		
Inherent I/Q offset	for average ≥ 10 measurements	< –45 dB

Spectrum flatness		
Level uncertainty	IEEE 802.11n (2.4 GHz band)	
	bandwidth 20 MHz	< 0.5 dB
	bandwidth 40 MHz	< 0.8 dB
	IEEE 802.11n (5 GHz band)	
	bandwidth 20 MHz	< 0.8 dB
	bandwidth 40 MHz	< 1.0 dB

Spectrum measurements

Transmit spectrum mask		
Frequency span		80 MHz
Dynamic range		in line with IEEE 802.11n
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	
	IEEE 802.11n (2.4 GHz band)	+2 dBm to +42 dBm [18]
	IEEE 802.11n (5 GHz band)	+12 dBm to +42 dBm [18]

[18] The maximum permissible continuous power is +34 dBm due to thermal limits.

WiMAX™ specifications – mobile station and base station test

Standard		IEEE 802.16e-2005, OFDMA

WiMAX™ RF generator (prerequisite: R&S®CMW-B110A option)

Frequency range	WiMAX™ band 1	2300 MHz to 2800 MHz
	WiMAX™ band 2, prerequisite: R&S®CMW-KB036 option	3300 MHz to 3800 MHz
	WiMAX™ band 3, prerequisite: R&S®CMW-KB036 option	5100 MHz to 5850 MHz

WiMAX™ WINIQSIM2™ (R&S®CMW-KW700 option)

Arbitrary waveform file	in line with IEEE 802.16e-2005, OFDMA average power	WIMAX_DL_3-BURST_46_5MS.WV (PAR = 11.11 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform file used: WIMAX_DL_3-BURST_46_5MS.WV	see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Error vector magnitude (EVM)	ID_Cell = 0, permbase = 0, prbs_id = 0, cp = 1/8, BW = 10 MHz, bursts: FCH, DL-MAP, data PN15, modulation type and coding rate QPSK 1/2; waveform file used: WIMAX_DL_3BURST_46_5MS.WV	< –40 dB, RMS

WiMAX™ RF analyzer (R&S®CMW-KM700, R&S®CMW-KM701 options)

FFT size		512, 1024
Bandwidth		3.5 MHz, 5 MHz, 7 MHz, 8.75 MHz, 10 MHz
Link direction		uplink, downlink
Subcarrier allocation		DL PUSC, UL PUSC uplink collaborative MIMO

Frequency range	WiMAX™ band 1	2300 MHz to 2800 MHz
	WiMAX™ band 2, prerequisite: R&S®CMW-KB036 option	3300 MHz to 3800 MHz
	WiMAX™ band 3, prerequisite: R&S®CMW-KB036 option	5100 MHz to 5580 MHz and 5620 MHz to 5850 MHz
Level setting		manual mode
Level range	RF1 COM, RF2 COM	–40 dBm to +27 dBm, RMS

Statistics		
Statistical count		1 to 1000
Values		current, average, minimum, maximum

Trigger		
Trigger source		BASE: external TRIG A, BASE: external TRIG B, GPRF: BB generator, WiMAX™: IF power, WiMAX™ signaling: frame trigger

Measured parameters	numeric results	RMS power (subframe, burst, preamble), subcarrier power, crest factor, error vector magnitude (all carriers, pilot carriers, data carriers), unmodulated EVM, frequency error, sample clock error, I/Q DC offset, I/Q imbalance gain, I/Q imbalance quadrature, RSSI, CINR, spectrum flatness, spectrum flatness, neighbor, occupied bandwidth, spectrum emission mask, adjacent channel power
	graphical with the R&S®CMW-KM700 option	power versus time, constellation diagram
	graphical with the R&S®CMW-KM700 and R&S®CMW-KM701 options	FFT, spectral flatness, spectral flatness, neighbor, spectrum emission mask, adjacent channel power, CCDF, EVM versus carrier, EVM versus symbol

Power measurement

Power	RMS detector	
Level uncertainty		see general technical specifications [19]

Modulation analysis

Error vector magnitude		
Measurement range		from inherent EVM up to –12 dB
Inherent EVM [19]	WiMAX™ band 1 UL	
	–15 dBm ≤ input level ≤ +27 dBm	< –40 dB, RMS
	–40 dBm ≤ input level < –15 dBm	< –36 dB, RMS
	WiMAX™ band 2 UL	
	–15 dBm ≤ input level ≤ +27 dBm	< –38 dB, RMS
	–35 dBm ≤ input level < –15 dBm	< –35 dB, RMS
	WiMAX™ band 3 UL	
	–15 dBm ≤ input level ≤ +27 dBm	< –38 dB, RMS
	–35 dBm ≤ input level < –15 dBm	< –35 dB, RMS
	WiMAX™ band 1 DL	
	–15 dBm ≤ input level ≤ +27 dBm	< –38 dB, RMS
	WiMAX™ band 2 DL	
	–15 dBm ≤ input level ≤ +27 dBm	< –36 dB, RMS
	WiMAX™ band 3 DL	
	–15 dBm ≤ input level ≤ +27 dBm	< –36 dB, RMS

Frequency error		
Measurement range	FFT size 512, BW = 3.5 MHz	–27.34 kHz to +27.34 kHz
	FFT size 512, BW = 5 MHz	–38.28 kHz to +38.28 kHz
	FFT size 1024, BW = 7 MHz	–27.34 kHz to +27.34 kHz
	FFT size 1024, BW = 8.75 MHz	–34.18 kHz to +34.18 kHz
	FFT size 1024, BW = 10 MHz	–38.28 kHz to +38.28 kHz
Frequency measurement uncertainty		< 10 Hz + drift of timebase, see general technical specifications [19]

[19] Averaging across 100 bursts, UL: BW = 10 MHz, zone length = 18 symbols / 210 slots; DL: BW = 10 MHz, zone length = 34 symbols / 30 subchannels.

Sample clock error [20]		
Measurement range		–5 ppm to +5 ppm
Sample clock measurement uncertainty		< 0.1 ppm

I/Q imbalance [20]		
Inherent I/Q gain imbalance		< 0.1 dB
Inherent I/Q quadrature imbalance		< 0.1°

Spectrum flatness, neighbor [20]		
Level uncertainty	inner carriers / outer carriers	< 0.5 dB
	neighbor subcarriers	< 0.1 dB

Spectrum measurements

Adjacent channel power	RMS detector	
Filter		rectangle 5 MHz, 10 MHz 3.84 MHz or 7.68 MHz, RRC, α = 0.22, WCDMA
Dynamic range	adjacent channels	> 45 dB
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	> –3 dBm

Spectrum emission mask (SEM)	RMS detector	
Frequency span		60 MHz
Supported masks		IEEE, WiMAX Forum®, TTA, user-defined
Dynamic range	relative limit of IEEE mask	> 50 dB
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	> –3 dBm

WiMAX™ signaling base station emulator (prerequisite: R&S®CMW-KS700, R&S®CMW-KS701, R&S®CMW-KS702, R&S®CMW-B200A, R&S®CMW-B270A options) [21]

Standard		IEEE 802.16e
Physical layer mode		OFDMA

Frequency range		
WiMAX™ band 1, WiMAX™ band 2, WiMAX™ band 3	DL	see WiMAX™ RF generator specifications
	UL	see WiMAX™ RF analyzer specifications

Output level range		
RF1 COM, RF2 COM, RF1 OUT	peak envelope power (PEP)	see general technical specifications
	preamble power	up to –17.7 dBm [22] offset to peak envelope power
	single data subcarrier power	up to –51.2 dBm [22] offset to peak envelope power
Output level uncertainty		see general technical specifications
Output level resolution		see general technical specifications
Output level setting		manual mode
Output level reference	DL	single data subcarrier power

Physical layer

FFT size		512, 1024
Bandwidth		3.5 MHz, 5 MHz, 7 MHz, 8.75 MHz, 10 MHz
Duplexing		TDD mode
Frame duration		5 ms

[20] Averaging across 100 bursts, UL: BW = 10 MHz, zone length = 18 symbols / 210 slots; DL: BW = 10 MHz, zone length = 34 symbols / 30 subchannels.

[21] R&S®CMW500 only.

[22] BW = 10 MHz, all subchannels used.

Cyclic prefix		1/8
Number of OFDMA symbols		26 to 35
Link mode		SISO MIMO – Matrix A MIMO – Matrix B MIMO – collaborative pattern A MIMO – collaborative pattern B
Zone	DL	first zone, second zone
	UL	first zone, second zone
Segmentation	DL	first zone
Subcarrier allocation		first zone: PUSC second DL zone: PUSC, FUSC, AMC 2x3 second UL zone: PUSC, AMC 2x3
Modulation	FEC code type: DL	QPSK 1/2, QPSK 3/4, 16QAM 1/2, 16QAM 3/4, 64QAM 1/2, 64QAM 2/3, 64QAM 3/4, 64QAM 5/6
	FEC code type: UL	QPSK 1/2, QPSK 3/4, 16QAM 1/2, 16QAM 3/4, 64QAM 5/6
Channel coding		convolutional (CC), turbo (CTC)

Measurements

PER		
Measurement range	graphically displayed, stop on limit fail	0 % to 100 %
Payload mode	auto mode and user-defined mode	region, data interval, payload size
Acknowledge type		ARQ, HARQ, ping
Data	DL	All 0, All 1, bit pattern: 0101, bit pattern: 1010, pseudo random, PN9 to PN23
Estimated BER		ARQ, HARQ, ping
Physical parameters	graphically displayed	power, frequency offset, timing offset
Mobile capabilities		MAC address, DL service flows, UL service flows, time adjustment, carrier frequency error
Measurement reports	reported from DUT	RSSI, CINR (mean and SD), TX power
CQICH		physical and effective CINR

Features

Connection status	status indication	signal ON, network entry completed, waiting for CDMA RNG-RSP, waiting for initial RNG-RSP, waiting for SBC-RSP, waiting for REG-RSP, deregistered, MS disconnected
Ranging control		initial ranging, periodic ranging
Power control		open loop, closed loop
Power boosting		preamble, pilots, FCH, DL map, UL map, data and management bursts
Burst allocation mode	data burst region	optimized, normal
Dummy burst generator	unused symbols filled with	pilots, dummy burst
Sample frequency offset		−1000 Hz to +1000 Hz
AWGN	CN ratio	−6 dB to +40 dB, two channels
Trigger output	WiMAX™ signaling: frame trigger	adjustable offset, adjustable pulse width, slope

WiMAX™ IP application enabler (prerequisite: R&S®CMW-KA700, R&S®CMW-B660, R&S®CMW-B661 options)

Key features		throughput measurement and end-to-end application testing
Interface	rear panel	1 GBaseT
Convergence sublayer	IP version	V4
IP settings		DHCP, static IP
Interface to IP-based server/client applications		e.g. IPERF (throughput test), e.g. web browsing, e.g. FTP file transfer, e.g. video streaming, e.g. VoIP
Data throughput	end-to-end IP connection	
	DL: UDP, SISO	up to 17.2 Mbps
	DL: UDP, MIMO	up to 36.5 Mbps
	UL: UDP, SISO	up to 9.7 Mbps

TD-SCDMA specifications – mobile station (UE) test

Standard		TD-SCDMA CWTS

TD-SCDMA RF generator (prerequisite: R&S®CMW-B110A option)

Frequency range	TD-SCDMA band I	
	channels 9512 to 9588	1900 MHz to 1920 MHz
	channels 10062 to 10113	2010 MHz to 2025 MHz
	TD-SCDMA band II	
	channels 9262 to 9538	1850 MHz to 1910 MHz
	channels 9662 to 9938	1930 MHz to 1990 MHz
	TD-SCDMA band III	
	channels 9562 to 9638	1910 MHz to 1930 MHz

TD-SCDMA WINIQSIM2™ (R&S®CMW-KW750 option) and TD-SCDMA ENH. WINIQSIM2™ (R&S®CMW-KW751 option)

Arbitrary waveform files	with the R&S®CMW-KW750 option	TD-SCDMA_DEFAULT.WV (PAR = 3.14 dB), TD-SCDMA_PTWLOW.WV (PAR = 2.67 dB)
	with the R&S®CMW-KW750 and R&S®CMW-KW751 options	TD-SCDMA-DL_12K2.WV (PAR = 5.41 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform file used: TD-SCDMA_PTWLOW.WV	see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Error vector magnitude (EVM)	composite EVM, waveform file used: TD-SCDMA_DEFAULT.WV	< 4 %, RMS

TD-SCDMA RF analyzer (R&S®CMW-KM750 option)

Frequency range	TD-SCDMA band I	
	channels 9512 to 9588	1900 MHz to 1920 MHz
	channels 10062 to 10113	2010 MHz to 2025 MHz
	TD-SCDMA band II	
	channels 9262 to 9538	1850 MHz to 1910 MHz
	channels 9662 to 9938	1930 MHz to 1990 MHz
	TD-SCDMA band III	
	channels 9562 to 9638	1910 MHz to 1930 MHz

Statistics		
Statistical count		1 to 1000
Values		current, average, minimum/maximum, standard deviation

Trigger		
Trigger sources		BASE: external TRIG A, BASE: external TRIG B, GPRF: BB generator, TD-SCDMA: free run, TD-SCDMA: IF power

Modulation analysis

Filter		1.28 MHz, RRC, α = 0.22, TD-SCDMA filter
Level range		–28 dBm to +42 dBm [23]
Analysis modes	TD-SCDMA uplink	DPCH, DPCH + HSDPA
Measured parameters	numeric results and standard deviation	error vector magnitude (EVM), magnitude error (ME), phase error (PE), frequency error, I/Q origin offset, I/Q imbalance, UE power
	graphical	EVM versus time, ME versus time, PE versus time

Error vector magnitude (EVM)		
Measurement range		up to 25 %, RMS
Inherent EVM		< 2.5 %, RMS
Measurement length		1 slot, multislot (1 to 112)

Frequency error		
Measurement range		±3 kHz
Frequency measurement uncertainty		< 35 Hz + drift of timebase, see general technical specifications

I/Q origin offset		
Inherent I/Q offset	for average ≥ 10 measurements	< –55 dB

I/Q imbalance		
Inherent I/Q imbalance		< –50 dB

Code domain

Filter		1.28 MHz, RRC, α = 0.22, TD-SCDMA filter
Level range		–28 dBm to +42 dBm [23]
Analysis modes	TD-SCDMA uplink	DPCH, DPCH + HSDPA
Measured parameters	numeric results and standard deviation	code domain error (CDE)
	graphical	code domain power versus code

Code domain power versus code		
Uncertainty		< 0.4 dB
Measurement length		1 slot

Code domain error (CDE)		
Uncertainty		< 0.4 dB
Measurement length		1 slot

Spectrum measurements

Adjacent channel leakage ratio	RMS detector	
Filter		1.28 MHz, RRC, α = 0.22, TD-SCDMA filter
Dynamic range	first adjacent channel at ±1.6 MHz	> 53 dB
	second adjacent channel at ±3.2 MHz	> 61 dB
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	–3 dBm to +42 dBm [23]
Uncertainty	for –33 dBc first adjacent channel level	< 0.5 dB
	for –43 dBc second adjacent channel level	< 0.5 dB
Measurement length		1 slot

[23] The maximum permissible continuous power is +34 dBm due to thermal limits.

Power meter

Measured parameters	numeric current RMS values	UE power

UE power	RMS detector	
Filter		bandpass, 2.1 MHz, RRC, α = 0.22
Level range		–55 dBm to +42 dBm [24]
Level uncertainty		see general technical specifications
Measurement length		1 slot

[24] The maximum permissible continuous power is +34 dBm due to thermal limits.

CDMA2000® 1xRTT specifications – mobile station test

Standard	CDMA2000® standards	TIA/EIA IS-2000 Rev. 0
	CDMA2000® test standards	TIA/EIA IS-98-F
Symbol rate		1.2288 Mcps

CDMA2000® 1xRTT RF generator (prerequisite: R&S®CMW-B110A option)

Frequency range	band class 0	860.025 MHz to 893.985 MHz
	band class 1	1930.000 MHz to 1990.000 MHz
	band class 2	917.0125 MHz to 959.9875 MHz
	band class 3	832.0125 MHz to 869.9875 MHz
	band class 4	1840.000 MHz to 1870.000 MHz
	band class 5	421.675 MHz to 493.480 MHz
	band class 6	2110.000 MHz to 2169.950 MHz
	band class 7	746.000 MHz to 764.000 MHz
	band class 8	1805.000 MHz to 1879.950 MHz
	band class 9	925.000 MHz to 958.750 MHz
	band class 10	851.000 MHz to 939.975 MHz
	band class 11	421.675 MHz to 493.475 MHz
	band class 12	915.0125 MHz to 920.9875 MHz
	band class 13	2620.000 MHz to 2690 MHz
	band class 14	1930.000 MHz to 1995.000 MHz
	band class 15	2110.000 MHz to 2155.000 MHz
	band class 16	2624.000 MHz to 2690.000 MHz
	band class 17	2624.000 MHz to 2690.000 MHz
	band class 18	757.000 MHz to 769.000 MHz
	band class 19	728.000 MHz to 746.000 MHz

CDMA2000® GEN (R&S®CMW-KG800 option)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty		see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Waveform quality (rho)		> 0.99

CDMA2000® WINIQSIM2™ (R&S®CMW-KW800 option)

Arbitrary waveform files		CDMA_OQPSK.WV (PAR = 5.54 dB) or CDMA_HPSK.WV (PAR = 6.97 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform file used: CDMA_OQPSK.WV or CDMA_HPSK.WV	see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Waveform quality (rho)	waveform file used: CDMA_OQPSK.WV or CDMA_HPSK.WV	> 0.99

CDMA2000® RF analyzer (R&S®CMW-KM800 option)

Frequency range	band class 0	815.025 MHz to 848.985 MHz
	band class 1	1850.000 MHz to 1910.000 MHz
	band class 2	872.0125 MHz to 914.9875 MHz
	band class 3	887.0125 MHz to 924.9875 MHz
	band class 4	1750.000 MHz to 1780.000 MHz
	band class 5	411.675 MHz to 483.480 MHz
	band class 6	1920.000 MHz to 1979.950 MHz
	band class 7	776.000 MHz to 794.000 MHz
	band class 8	1710.000 MHz to 1784.950 MHz
	band class 9	880.000 MHz to 913.750 MHz
	band class 10	806.000 MHz to 900.975 MHz
	band class 11	411.675 MHz to 483.475 MHz
	band class 12	870.0125 MHz to 875.9875 MHz
	band class 13	2500.000 MHz to 2570.000 MHz
	band class 14	1850.000 MHz to 1915.000 MHz
	band class 15	1710.000 MHz to 1755.000 MHz
	band class 16	2502.000 MHz to 2568.000 MHz
	band class 17	2502.000 MHz to 2567.950 MHz
	band class 18	787.000 MHz to 700.000 MHz
	band class 19	698.000 MHz to 716.000 MHz

Statistics		
Statistical count		1 to 1000
Values		current, average, minimum/maximum, standard deviation

Trigger		
Trigger sources		BASE: external TRIG A, BASE: external TRIG B, GPRF: BB generator, C2K: free run

Modulation analysis

Filter		1.23 MHz, RRC, α = 0.22, CDMA filter
Level range		–28 dBm to +42 dBm [25]
Analysis modes		OQPSK, HPSK
Measured parameters	numeric results and standard deviation	error vector magnitude (EVM), magnitude error (ME), phase error (PE), frequency error, rho, carrier feedthrough, I/Q imbalance, power, wideband power (8 MHz), narrowband power (1.23 MHz)
	graphical	EVM versus time, ME versus time, PE versus time

Waveform quality (rho)		
Uncertainty	for rho 0.9 to 1	< 0.003
Measurement length		616 chip (0.5 ms)

Error vector magnitude (EVM)		
Measurement range		up to 25 %, RMS
Inherent EVM		< 2.5 %, RMS
Measurement length		0.5 ms

[25] The maximum permissible continuous power is +34 dBm due to thermal limits.

Frequency error		
Measurement range		±3 kHz
Frequency measurement uncertainty		< 35 Hz + drift of timebase, see general technical specifications

Carrier feedthrough		
Inherent carrier feedthrough	for average ≥ 10 measurements	< –55 dB

I/Q imbalance		
Inherent I/Q imbalance		< –50 dB

Code domain

Filter		1.23 MHz, RRC, α = 0.22, CDMA filter
Level range		–28 dBm to +42 dBm [26]
Measured parameters	numeric values of current, average, max. and min. values	code domain power (CDP), code domain error (CDE)
	graphical	code domain power versus code, code domain error versus code

Code domain power versus code		
Uncertainty		< 0.4 dB
Measurement length		616 chip (0.5 ms)

Code domain error versus code		
Measurement uncertainty		< 0.4 dB
Measurement length		616 chip (0.5 ms)

Spectrum measurements

Adjacent channel power	RMS detector, at the selected frequency offsets	
Filter		30 kHz Gaussian
Frequency offset interval	up to 10 adjacent channels on each side	–4 MHz to +4 MHz
Dynamic range		> 70 dB
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	+1 dBm to +42 dBm [26]
Uncertainty	for –43 dBc adjacent channel level	< 0.5 dB
Measurement length	one power control group	1536 chip (1.25 ms)

Power meter

MS power		
Filter	narrowband	bandpass, 1.25 MHz
Filter	wideband	bandpass, 8 MHz
Level range		–55 dBm to +42 dBm [26]
Level uncertainty		see general technical specifications
Measurement length		616 chip (0.5 ms)

[26] The maximum permissible continuous power is +34 dBm due to thermal limits.

CDMA2000® 1xRTT signaling (prerequisite: R&S®CMW-KS800, R&S®CMW-B200A, R&S®CMW-B220A options) [27]

Frequency range		
Band class 0 to band class 19	DL	see CDMA2000® 1xRTT RF generator specifications
	UL	see CDMA2000® 1xRTT RF analyzer specifications

Output level range	depending on PAR	see general technical specifications
Output level uncertainty		see general technical specifications
Output level resolution		see general technical specifications

Modulation		
Dual BPSK, multiple QPSK		1.2288 Mcps
Waveform quality (rho)		> 0.99
Code channel level uncertainty	relative to the total CDMA output power	
	PICH, PCH, FCH, SCH0	approx. 0.1 dB
	all other channels	approx. 0.25 dB
Code channel resolution		0.1 dB
Code channel level range	relative to the total CDMA output power	
	PICH, PCH, FCH, SCH0, SYNC	–20 dB to –1 dB

Supported service options		
Loopback service options		SO 2, 9, 55
Speech service options		SO 1, 3, 17, 68, 0x8000

[27] R&S®CMW500 only.

CDMA2000® 1xEV-DO specifications – access terminal test

Standard	CDMA2000® 1xEV-DO standards	TIA/EIA 856-2
	CDMA2000® 1xEV-DO test standards	TIA/EIA 866-A, TIA/EIA 866-B
Symbol rate		1.2288 Mcps

CDMA2000® 1xEV-DO RF generator (prerequisite: R&S®CMW-B110A option)

Frequency range	band class 0	860.025 MHz to 893.985 MHz
	band class 1	1930.000 MHz to 1990.000 MHz
	band class 2	917.0125 MHz to 959.9875 MHz
	band class 3	832.0125 MHz to 869.9875 MHz
	band class 4	1840.000 MHz to 1870.000 MHz
	band class 5	421.675 MHz to 493.480 MHz
	band class 6	2110.000 MHz to 2169.950 MHz
	band class 7	746.000 MHz to 764.000 MHz
	band class 8	1805.000 MHz to 1879.950 MHz
	band class 9	925.000 MHz to 958.750 MHz
	band class 10	851.000 MHz to 939.975 MHz
	band class 11	421.675 MHz to 493.475 MHz
	band class 12	915.0125 MHz to 920.9875 MHz
	band class 13	2620.000 MHz to 2690 MHz
	band class 14	1930.000 MHz to 1995.000 MHz
	band class 15	2110.000 MHz to 2155.000 MHz
	band class 16	2624.000 MHz to 2690.000 MHz
	band class 17	2624.000 MHz to 2690.000 MHz
	band class 18	757.000 MHz to 769.000 MHz
	band class 19	728.000 MHz to 746.000 MHz

1xEV-DO WINIQSIM2™ (R&S®CMW-KW880 option)

Arbitrary waveform file		EVDO_DEFAULT.WV (PAR = 4.86 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform file used: EVDO_DEFAULT.WV	see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Waveform quality (rho)	waveform file used: EVDO_DEFAULT.WV	> 0.99

CDMA2000® 1xEV-DO RF analyzer (R&S®CMW-KM880 option)

Frequency range	band class 0	815.025 MHz to 848.985 MHz
	band class 1	1850.000 MHz to 1910.000 MHz
	band class 2	872.0125 MHz to 914.9875 MHz
	band class 3	887.0125 MHz to 924.9875 MHz
	band class 4	1750.000 MHz to 1780.000 MHz
	band class 5	411.675 MHz to 483.480 MHz
	band class 6	1920.000 MHz to 1979.950 MHz
	band class 7	776.000 MHz to 794.000 MHz
	band class 8	1710.000 MHz to 1784.950 MHz
	band class 9	880.000 MHz to 913.750 MHz
	band class 10	806.000 MHz to 900.975 MHz
	band class 11	411.675 MHz to 483.475 MHz
	band class 12	870.0125 MHz to 875.9875 MHz
	band class 13	2500.000 MHz to 2570.000 MHz
	band class 14	1850.000 MHz to 1915.000 MHz
	band class 15	1710.000 MHz to 1755.000 MHz
	band class 16	2502.000 MHz to 2568.000 MHz
	band class 17	2502.000 MHz to 2567.950 MHz
	band class 18	787.000 MHz to 700.000 MHz
	band class 19	698.000 MHz to 716.000 MHz

Statistics		
Statistical count		1 to 1000
Values		current, average, minimum/maximum, standard deviation

Trigger		
Trigger sources		BASE: external TRIG A, BASE: external TRIG B, GPRF: BB generator, 1xEV-DO: free run

Modulation analysis

Filter		1.23 MHz, RRC, α = 0.22, CDMA filter
Level range		–28 dBm to +42 dBm [28]
Analysis modes		dual BPSK
Multicarrier		single carrier or 3 carriers within –8 MHz to +8 MHz
Measured parameters	numeric results and standard deviation	error vector magnitude (EVM), magnitude error (ME), phase error (PE), frequency error, rho, carrier feedthrough, I/Q imbalance, power, wideband power (8 MHz for single carrier or 16 MHz for multicarrier), narrowband power (1.23 MHz)
	graphical	EVM versus time, ME versus time, PE versus time

Waveform quality (rho)		
Uncertainty	for rho 0.9 to 1	< 0.003
Measurement length	half-slot	1024 chip (833.33 µs)

Error vector magnitude (EVM)		
Measurement range		up to 25 %, RMS
Inherent EVM		< 2.5 %, RMS
Measurement length	half-slot	1024 chip (833.33 µs)

Frequency error		
Measurement range		±3 kHz
Frequency measurement uncertainty		< 35 Hz + drift of timebase, see general technical specifications

Carrier feedthrough		
Inherent carrier feedthrough	for average ≥ 10 measurements	< –55 dB

I/Q imbalance		
Inherent I/Q imbalance		< –50 dB

[28] The maximum permissible continuous power is +34 dBm due to thermal limits.

Code domain

Filter		1.23 MHz, RRC, α = 0.22, CDMA filter
Level range		–28 dBm to +42 dBm [29]
Measured parameters	numeric values of current, average, max. and min. values	code domain power (CDP), code domain error (CDE)
	graphical	code domain power versus code, code domain error versus code

Code domain power versus code		
Uncertainty		< 0.4 dB
Measurement length	half-slot	1024 chip (833.33 µs)

Code domain error versus code		
Measurement uncertainty		< 0.4 dB
Measurement length	half-slot	1024 chip (833.33 µs)

Spectrum measurements

Adjacent channel power	RMS detector, at the selected frequency offsets	
Filter		30 kHz Gaussian
Frequency offset interval	up to 10 adjacent channels on each side	–4 MHz to +4 MHz to each carrier
Dynamic range		> 70 dB
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	+1 dBm to +42 dBm [29]
Uncertainty	for –43 dBc adjacent channel level	< 0.5 dB
Measurement length	half-slot	1024 chip (833.33 µs)

Power meter

MS power		
Filter	narrowband	bandpass, 1.25 MHz
Filter	wideband	bandpass, 8 MHz for single carrier or 16 MHz for multicarrier
Level range		–55 dBm to +42 dBm [29]
Level uncertainty		see general technical specifications
Measurement length	half-slot	1024 chip (833.33 µs)

[29] The maximum permissible continuous power is +34 dBm due to thermal limits.

CDMA2000® 1xEV-DO signaling (prerequisite: R&S®CMW-KS880, R&S®CMW-B200A, R&S®CMW-B230A options) [30]

Frequency range		
Band class 0, band class 19	DL	see CDMA2000® 1xEV-DO RF generator specifications
	UL	see CDMA2000® 1xEV-DO RF analyzer specifications

Output level range	depending on PAR	see general technical specifications
Output level uncertainty		see general technical specifications
Output level resolution		see general technical specifications

Modulation		
Dual BPSK		1.2288 Mcps
Waveform quality (rho)		> 0.99

Supported applications		
Test applications		FTAP/RTAP, FETAP/RETAP

[30] R&S®CMW500 only.

Data application unit (R&S®CMW-B450A option) [31]

The R&S®CMW-B450A option provides data test capabilities and makes a Gigabit Ethernet connector available on the rear of the instrument.

Data application

IP configuration		IPv4 address configuration
		IPv6 address configuration
File transfer protocol (FTP)		FTP server
		FTP traffic generator
Hypertext transfer protocol (HTTP)		HTTP server

Data application measurements (R&S®CMW-KM050 option)

Measured parameters		ping, IPerf

LAN DAU interface

LAN DAU		Ethernet RJ-45 connector, 1000 Mbps

[31] R&S®CMW500 only.

Digital I/Q 1 to 4 (R&S®CMW-B510A option) [32]

The R&S®CMW-B510A option makes the digital I/Q interface and AUX interface available on the rear of the instrument.

Digital I/Q interface

The digital I/Q interface can be used for connecting the R&S®CMW to the digital I/Q interface of other Rohde & Schwarz instruments (e.g. R&S®AMU200A, R&S®EX-IQ-BOX).

DIG I/Q IN/OUT 1/3	input and output, bidirectional, half-duplex	26-pin MDR connector
Level		LVDS
Clock rate in		100 MHz
Clock rate out		100 MHz

DIG I/Q OUT 2/4	output	26-pin MDR connector
Level		LVDS
Clock rate		100 MHz

Control signals	general-purpose control, for future use	
	6 signals	100 MHz

I/Q data		
Resolution	for clock rate up to 100 MHz	16 bit for I and 16 bit for Q

I/Q sample rate		
Source		internal, digital input, digital output, AUX interface
Range		1.92 Msample/s to 100 Msample/s
Predefined values [33]	standard-independent	100 Msample/s
	WCDMA, LTE	1.92 Msample/s, 3.84 Msample/s, 7.68 Msample/s, 15.36 Msample/s, 30.72 Msample/s

I/Q enable/request rate		
Digital input	I/Q mode 1	75 MHz, 100 MHz
	I/Q mode 2	0 MHz to 100 MHz
Digital output	I/Q mode 1	75 MHz, 100 MHz
	I/Q mode 2	0 MHz to 100 MHz
	I/Q mode 4	75 MHz

AUX interface

The AUX interface can be used for connecting the R&S®CMW to other instruments, e.g. to trigger, clock and enable signals.

AUX A/B	bidirectional, half-duplex	two BNC connectors
Level		3.3 V TTL
Clock rate		0 MHz to 100 MHz

Included extras

Digital I/Q cable (two sets)	same cable as included in R&S®SMU-Z6	26-pin MDR connector

[32] R&S®CMW500 only.

[33] Further values in the range from 400 sample/s to 100 Msample/s can be provided on demand.

General data

RF connectors (front panel)		Snap-N female, 50 Ω, compatible with N female connectors
RF1 COM, RF2 COM		combined RF input and RF output
RF1 OUT		RF output

Remote control interfaces (front panel) [34]		
LAN		Ethernet RJ-45 connector, 100 Mbps

Remote control interfaces (rear panel)		
IEEE 488	R&S®CMW-B612A IEEE bus (single) interface option or	IEC 60625-2 (IEEE 488.2), 24-pin Amphenol connector
	R&S®CMW-B612B IEEE bus (dual) interface option [34]	2 × IEC 60625-2 (IEEE 488.2), 24-pin Amphenol connector
LAN REMOTE		Ethernet RJ-45 connector, 1000 Mbps
USB REMOTE [34]		USB 2.0 type B connector

Further interfaces (front panel)		
USB	for keyboard, mouse, USB stick	3 × USB 2.0 type A connector
SENSOR		for R&S®NRP-Zxx power sensors
DIGITAL MONITOR	for external monitor, only included in R&S®CMW-S600A or R&S®CMW-S600E configuration (front panel without display or keypad)	DVI-D connector

Further interfaces (rear panel)		
USB	for keyboard, mouse, USB stick	1 × USB 2.0 type A connector
		1 × USB 1.1 type A connector
DVI	for external monitor, R&S®CMW-B620A DVI interface option	DVI-D connector
TRIG A, TRIG B	trigger input/output	2 × BNC connector
	output trigger sources	standard-specific internal trigger sources

Environmental conditions		
Temperature	operating temperature range	+5 °C to +45 °C
	storage temperature range	–25 °C to +60 °C
Relative humidity	+40 °C, non-condensing	80 %

Product conformity		
Electromagnetic compatibility	EU: EMC Directive 2004/108/EC	in line with EN 61326-1 (industrial environment) EN 61326-2-1 EN 55011 (class A) EN 61000-3-2 EN 61000-3-3
Electrical safety	EU: Low Voltage Directive 2006/95/EC	in line with EN 61010-1
	USA/Canada	in line with UL 61010-1 (second edition) CAN C22.2 No. 61010.1-04

[34] R&S®CMW500 only.

Mechanical resistance	non-operating mode	
Vibration	sinusoidal	in line with EN 60068-2-6, 5 Hz to 150 Hz, 0.15 mm amplitude const., 55 Hz to 150 Hz, 0.5 g const.
Vibration	random	in line with EN 60068-2-64, 10 Hz to 300 Hz, acceleration 1.2 g RMS
Shock		in line with MIL-STD-810F 40 g shock spectrum

Power supply		power factor correction, in line with EN 61000-3-2
Input		100 V to 240 V ± 10 % (AC), max. 850 VA, 50 Hz to 60 Hz ± 5 %
Power consumption	R&S®CMW500 single tester, non-signaling	approx. 200 W
	R&S®CMW280 single tester, non-signaling	approx. 180 W

Display		selected with R&S®CMW-S600B or R&S®CMW-S600F configuration (front panel with display and keypad)
Size		21 cm TFT color display (8.4")
Resolution		800 × 600 pixels (SVGA resolution)
Pixel failure rate		< 1.1 × 10^{-5}

Dimensions of the R&S®CMW500	W × H × D, overall	465.1 mm × 197.3 mm × 517.0 mm (18.31 in × 7.77 in × 20.35 in)
	for rackmounting	19" 1/1, 4 HU, 450
Dimensions of the R&S®CMW280	W × H × D, overall	465.1 mm × 197.3 mm × 417.0 mm (18.31 in × 7.77 in × 16.41 in)
	for rackmounting	19" 1/1, 4 HU, 350
Weight of the R&S®CMW500	single tester, non-signaling	approx. 14 kg (approx. 31 lb)
	with typical options	approx. 18 kg (approx. 40 lb)
Weight of the R&S®CMW280	single tester, non-signaling	approx. 12 kg (approx. 27 lb)
	with typical options	approx. 14 kg (approx. 31 lb)

Calibration interval	12 months	recommended for highest accuracy, see specified RF generator and RF analyzer level uncertainty
	24 months	add 0.2 dB to specified RF generator and RF analyzer level uncertainty

Ordering information

Designation	Type	Order No.
Wideband Radio Communication Tester Base unit with following accessories: power cord, operating manual (quick start guide), comprehensive documentation on CD-ROM	R&S®CMW500	1201.0002K50
Wideband Radio Communication Tester Base unit with following accessories: power cord, operating manual (quick start guide), comprehensive documentation on CD-ROM	R&S®CMW280	1201.0002K25

For more ordering information about available options, please see our product brochure (PD 5213.9211.12) or ask your local Rohde & Schwarz expert to find the solution that is optimally suited to your needs.

Recommended extras for manual operation

For R&S®CMW-S600B or R&S®CMW-S600F configuration (front panel with display and keypad):

Designation	Type	Order No.
Mouse with USB Interface, optical	R&S®PSL-Z10	1157.7060.04

For R&S®CMW-S600A or R&S®CMW-S600E configuration (front panel without display or keypad):

Designation	Type	Order No.
Mouse with USB Interface, optical	R&S®PSL-Z10	1157.7060.04
Keyboard with USB Interface (US assignment)	R&S®PSL-Z2	1157.6870.04
17" TFT Monitor	R&S®PMC3	1082.6004.12

Important information:
We recommend using only the above-mentioned original PC components from Rohde & Schwarz in connection with the R&S®CMW500 and R&S®CMW280. The interaction of all components is continuously tested.
Insufficiently shielded PC components may lead to EMC problems which may disturb RF measurements results.

Recommended extras

Designation	Type	Order No.
19" Rack Adapter	R&S®ZZA-411	1096.3283.00
Digital Signal Interface Module	R&S®EX-IQ-BOX [35]	1409.5505K04
Cable TVR 290, 26-pin MDR connector; additional cable for R&S®CMW-B510A used with e.g. R&S®AMU200A, R&S®EX-IQ-BOX	R&S®SMU-Z6 [35]	1415.0201.02

For product brochure, see PD 5213.9211.12 and www.rohde-schwarz.com

[35] R&S®CMW500 only.

Service you can rely on

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

About Rohde&Schwarz

Rohde&Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 75 years ago, Rohde&Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

Environmental commitment

- Energy-efficient products
- Continuous improvement in environmental sustainability
- ISO 14001-certified environmental management system

Certified Quality System
ISO 9001

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