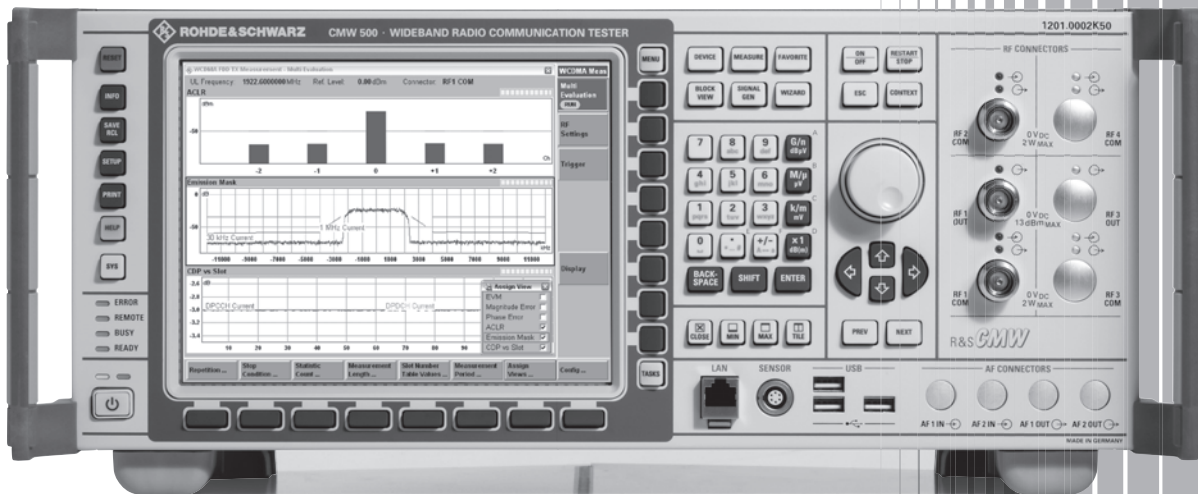


R&S® CMW500

Wideband Radio

Communication Tester

Specifications



75 Years of
Driving
Innovation



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Specifications apply under the following conditions:

Data valid for both R&S®CMW500 or 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). Mcps, kbps, and ksps 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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General technical specifications

RF generator

Frequency range		70 MHz to 3300 MHz up to 6000 MHz with 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 $f_{\text{nonharmonic}} = 3900 \text{ MHz} - f_{\text{carrier}}$, except $f_{\text{nonharmonic}} = 3900 \text{ MHz}$	>60 dB
	3300 MHz to 3600 MHz	>25 dB
	3600 MHz to 6000 MHz, except $f_{\text{nonharmonic}} = 2 \times f_{\text{carrier}} - 6400 \text{ MHz}$	>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

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	<-55 dB
	3300 MHz to 3700 MHz, except $f_{in} = 6400 \text{ MHz} - f_{selected}$, except $f_{in} = 6400 \text{ MHz} - 0.5 \times f_{selected}$	<-40 dB
	3700 MHz to 6000 MHz, except $f_{in} = 6400 \text{ MHz} - 0.5 \times f_{selected}$	<-40 dB

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

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

Phase noise	single sideband, 70 MHz to 3300 MHz	
Carrier offset	$\geq 1 \text{ MHz}$	<-120 dBc, 1 Hz

Phase noise	single sideband, 3300 MHz to 6000 MHz	
Carrier offset	$\geq 1 \text{ MHz}$	<-117 dBc, 1 Hz

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

Power meter

Frequency range		70 MHz to 3300 MHz up to 6000 MHz with 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, $\alpha = 0.1$, 3.84 MHz, RRC, $\alpha = 0.22$, 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, level range 0 dB to -40 dB	
RF1 COM, RF2 COM		<0.3 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, <i>RBW</i> \rightarrow 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, <i>RBW</i> \rightarrow 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* \rightarrow 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 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 <i>detector</i> → <i>peak</i>	see general technical specifications
Dynamic range		
	70 MHz to 3300 MHz, <i>for FFT length</i> → <i>16k</i> and <i>span</i> → <i>5 MHz</i> (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, <i>for FFT length</i> → <i>16k</i> and <i>span</i> → <i>5 MHz</i> (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	$\pm 1 \times 10^{-6}$
Max. aging	at +25 °C, after 14 days of continuous operation	$\pm 1 \times 10^{-6}$ /year

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

Max. frequency drift	in temperature range +5 °C to +45 °C	$\pm 5 \times 10^{-8}$
Retrace	at +25 °C, after 24 hours power ON / 2 hours power OFF / 1 hour power ON	$\pm 2 \times 10^{-8}$
Max. aging	at +25 °C, after 10 days of continuous operation	$\pm 1 \times 10^{-7}$ /year $\pm 1 \times 10^{-9}$ /day
Warm-up time	at +25 °C, the frequency is in the range that is 10 times the frequency drift ($\pm 5 \times 10^{-7}$)	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 with instrument orientation	$\pm 5 \times 10^{-9}$ $\pm 1 \times 10^{-9}$
Retrace	at +25 °C, after 24 hours power ON / 2 hours power OFF / 1 hour power ON	$\pm 5 \times 10^{-9}$
Max. aging	at +25 °C, after 10 days of continuous operation	$\pm 3 \times 10^{-8}$ /year $\pm 5 \times 10^{-10}$ /day
Warm-up time	at +25 °C, the frequency is in the range that is 10 times the frequency drift ($\pm 5 \times 10^{-8}$)	approx. 10 min

Reference frequency inputs/outputs

Synchronization input		BNC connector REF IN, rear panel
Frequency	sinewave squarewave (TTL level)	10 MHz to 80 MHz, step: 1 Hz 1 MHz to 80 MHz, step: 1 Hz
Max. frequency variation		$\pm 10 \times 10^{-6}$
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	GSM 450 band	460 MHz to 468 MHz
	GSM 480 band	488 MHz to 496 MHz
	GSM 750 band	747 MHz to 762 MHz
	GSM 850 band	869 MHz to 894 MHz
	GSM 900 band	921 MHz to 960 MHz
	GSM 1800 band	1805 MHz to 1880 MHz
	GSM 1900 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)

Arbitrary waveform files	GMSK, B × T = 0.3	GSM_GMSK.WV (PAR = 0 dB), GMSKDIGMOD.WV (PAR = 0 dB)
	8PSK	GSM_EDGE.WV (PAR = 3.23 dB), EDGEDIGMOD.WV (PAR = 3.22 dB)

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

Signal quality		
Phase error	GMSK waveform file used: GSM_GMSK.WV	<1°, RMS <4°, peak
Error vector magnitude (EVM)	8PSK waveform file used: GSM_EDGE.WV	<2 %, RMS

GSM RF analyzer (R&S®CMW-KM200 option)

Frequency range	GSM 450 band	450 MHz to 458 MHz
	GSM 480 band	478 MHz to 486 MHz
	GSM 750 band	777 MHz to 792 MHz
	GSM 850 band	824 MHz to 849 MHz
	GSM 900 band	876 MHz to 915 MHz
	GSM 1800 band	1710 MHz to 1785 MHz
	GSM 1900 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
Inherent phase error	GMSK	<0.6°, RMS <2°, peak
Inherent error vector magnitude (inherent EVM)	8PSK	<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, $\alpha = 0.16$
	8PSK	windowed raised-cosine filter in line with 3GPP TS 45.005

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

Power versus time measurement

Filter	selectable	Gaussian, 500 kHz or 1 MHz
---------------	------------	----------------------------

Dynamic range	<i>filter</i> → 500 kHz, Gaussian, with fixed expected nominal power setting	
	GMSK	>72 dB, RMS
	8PSK	>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	<i>filter</i> → 500 kHz or 1 MHz, Gaussian	see general technical specifications

Spectrum due to modulation measurement

Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	-8 dBm to +42 dBm ⁷
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	>70 dB

Spectrum due to switching measurement

Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	-8 dBm to +42 dBm ⁷
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	>68 dB

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

WCDMA specifications – mobile station (UE) test

Standard	3GPP FDD
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WCDMA RF generator (prerequisite: R&S®CMW-B110A option)

Frequency range	WCDMA band 1	2110 MHz to 2170 MHz
	WCDMA band 2	1930 MHz to 1990 MHz
	WCDMA band 3	1805 MHz to 1880 MHz
	WCDMA band 4	2110 MHz to 2155 MHz
	WCDMA band 5	869 MHz to 894 MHz
	WCDMA band 6	875 MHz to 885 MHz
	WCDMA band 7	2620 MHz to 2690 MHz
	WCDMA band 8	925 MHz to 960 MHz
	WCDMA band 9	1844.9 MHz to 1879.9 MHz
	WCDMA band 10	2110 MHz to 2170 MHz
	WCDMA band 11	1475.9 MHz to 1500.9 MHz
	WCDMA band 12	728 MHz to 746 MHz
	WCDMA band 13	746 MHz to 756 MHz
	WCDMA band 14	758 MHz to 768 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	<4 %, RMS

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

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

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

Signal quality		
Error vector magnitude (EVM)	composite EVM, with R&S®CMW-KW400 option waveform file used: 3GPPDEFAULT.WV	<4 %, RMS
	composite EVM, with R&S®CMW-KW401 option waveform file used: WCDMA_DL_HSDPA.WV,	<4 %, RMS
	composite EVM, with R&S®CMW-KW402 option waveform file used: WCDMA_DL_HSUPA.WV	<4 %, RMS

WCDMA RF analyzer (R&S® CMW-KM400 option and R&S® CMW-KM401 option)

Frequency range	WCDMA band 1	1920 MHz to 1980 MHz
	WCDMA band 2	1850 MHz to 1910 MHz
	WCDMA band 3	1710 MHz to 1785 MHz
	WCDMA band 4	1710 MHz to 1755 MHz
	WCDMA band 5	824 MHz to 849 MHz
	WCDMA band 6	830 MHz to 840 MHz
	WCDMA band 7	2500 MHz to 2570 MHz
	WCDMA band 8	880 MHz to 915 MHz
	WCDMA band 9	1749.9 MHz to 1784.9 MHz
	WCDMA band 10	1710 MHz to 1770 MHz
	WCDMA band 11	1427.9 MHz to 1452.9 MHz
	WCDMA band 12	698 MHz to 716 MHz
	WCDMA band 13	777 MHz to 787 MHz
	WCDMA band 14	788 MHz to 798 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, $\alpha = 0.22$, WCDMA filter
Level range		-28 dBm to +42 dBm ⁸
Analysis modes	with R&S® CMW-KM400 option	QPSK, WCDMA
	with R&S® CMW-KM400 option and R&S® CMW-KM401 option	WCDMA + HSDPA, WCDMA + HSUPA, 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

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

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		
Filter	RMS detector	3.84 MHz, RRC, $\alpha = 0.22$, 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 ⁹
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		
Filter	RMS detector	bandpass, 6.3 MHz, RRC, $\alpha = 0.22$
Level range		-55 dBm to +42 dBm ⁹
Level uncertainty		see general technical specifications
Measurement length		half-slot, 1 slot

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

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

LTE specifications – mobile station test

Standard	LTE FDD and TDD
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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 = 11.03 dB)

Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform file used: LTE_FDD_QPSK_10MHZ.WV	add 0.15 dB to RF generator level uncertainty (see general technical specifications)
	waveform file used: LTE_TDD_64QAM_20MHZ.WV	add 0.15 dB to RF generator level uncertainty (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	<4 %, 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	<4 %, 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 \leq input level $<$ +30 dBm, RMS	<1 %, RMS
	allocated resource blocks ≤ 50	
	-30 dBm \leq input level \leq +30 dBm, RMS	<1 %, RMS
	-38 dBm \leq input level $<$ -30 dBm, RMS	<1.5 %, RMS
	allocated resource blocks ≤ 100	
-30 dBm \leq input level \leq +30 dBm, RMS	<1 %, RMS	
-38 dBm \leq 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 ¹⁰

Spectrum flatness		
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 ¹⁰

SEM		
Frequency span		70 MHz
Noise floor	RBW → 1 MHz	<-35dBm
	RBW → 100 kHz	<-40 dBm
	RBW → 30 kHz	<-45 dBm

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

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

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

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 \leq input level $<$ +30 dBm, RMS	<1 %, RMS
	allocated resource blocks ≤ 50	
	-30 dBm \leq input level \leq +30 dBm, RMS	<1 %, RMS
	-38 dBm \leq input level $<$ -30 dBm, RMS	<1.5 %, RMS
	allocated resource blocks ≤ 100	
	-30 dBm \leq input level \leq +30 dBm, RMS	<1 %, RMS
	-38 dBm \leq 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 ¹¹

Spectrum flatness		
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, $\alpha = 0.22$, 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

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

SEM		
Frequency span		70 MHz
Noise floor	RBW → 1 MHz	<-35dBm
	RBW → 100 kHz	<-40dBm
	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
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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_PRBS9_3-DH5.WV	see general technical specifications
Output level resolution		see general technical specifications

Signal quality		
Modulation index uncertainty	basic rate, frequency deviation $\Delta f_{1\max} = 160$ kHz waveform file used: BLUETOOTH_11110000_DH5.WV	<1 %
Differential error vector magnitude (DEV M)	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
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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 ¹²
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	Δf_2 99.9 %, frequency accuracy, frequency drift, max drift rate, frequency deviation Δf_1 average, frequency deviation Δf_1 minimum, frequency deviation Δf_1 maximum, frequency deviation Δf_2 average, frequency deviation Δf_2 minimum, frequency deviation Δf_2 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
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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

¹² The maximum permissible continuous power is +34 dBm due to thermal limits.

GPS specifications

Standard		GPS
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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
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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

WLAN specifications

Standard		IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n
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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	add 0.15 dB to RF generator output level uncertainty (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 burst 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)
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Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform files used: WLAN_N_64QAM_5_6.WV	add 0.15 dB to RF generator output level uncertainty (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 ¹³
Payload Length		≥16 symbols or ≥403 bytes
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
	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

Error vector magnitude (EVM)	DSSS	
Inherent EVM	IEEE 802.11b/g	<5 %, peak <2 %, RMS
Measurement length		1000 samples

Error vector magnitude (EVM)	OFDM	
Inherent EVM	IEEE 802.11g IEEE 802.11a	<-40 dB, RMS <-37 dB, RMS
Measurement length		entire PPDU

Center frequency error	DSSS	
Frequency measurement uncertainty		<35 Hz + drift of timebase, see general technical specifications

Center frequency error	OFDM	
Frequency measurement uncertainty	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

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

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

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

Modulation analysis

Filter		20 MHz
Level range		-28 dBm to $+42$ dBm ¹⁴
Payload length		≥ 16 symbols or ≥ 403 bytes
Analysis modes		BPSK code rate 1/2, BPSK code rate 3/4, QPSK code rate 1/2, QPSK code rate 3/4, 16QAM code rate 1/2, 16QAM code rate 3/4, 64QAM code rate 1/2, 64QAM code rate 2/3, 64QAM code rate 3/4, 64QAM code rate 5/6
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

Error vector magnitude (EVM)		
Inherent EVM	IEEE 802.11n	< -40 dB, RMS
Measurement length		entire PPDU

Center frequency error		
Frequency measurement uncertainty	for ≥ 100 symbol (400 μ s)	< 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

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

TD-SCDMA specifications – mobile station (UE) test

Standard	TD-SCDMA CWTS
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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 R&S® CMW-KW750	TD-SCDMA_DEFAULT.WV (PAR = 3.14 dB), TD-SCDMA_PTWLOW.WV (PAR = 2.67 dB)
	with R&S® CMW-KW750 and R&S® CMW-KW751	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, $\alpha = 0.22$, TD-SCDMA filter
Level range		-28 dBm to +42 dBm ¹⁵
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

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

Code domain

Filter		1.28 MHz, RRC, $\alpha = 0.22$, TD-SCDMA filter
Level range		-28 dBm to +42 dBm ¹⁶
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, $\alpha = 0.22$, 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 ¹⁶
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

Power meter

Measured parameters	numeric current RMS values	UE power
UE power		
Filter	RMS detector	
Level range		bandpass, 2.1 MHz, RRC, $\alpha = 0.22$
Level uncertainty		-55 dBm to +42 dBm ¹⁶
Level uncertainty		see general technical specifications
Measurement length		1 slot

¹⁶ 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[®] 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, $\alpha = 0.22$, CDMA filter
Level range		-28 dBm to +42 dBm ¹⁷
Analysis modes		O-QPSK, 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

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

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

Code domain

Filter		1.23 MHz, RRC, $\alpha = 0.22$, CDMA filter
Level range		-28 dBm to +42 dBm ¹⁸
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 ¹⁸
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 ¹⁸
Level uncertainty		see general technical specifications
Measurement length		616 chip (0.5 ms)

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

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
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	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, $\alpha = 0.22$, CDMA filter
Level range		-28 dBm to +42 dBm ¹⁹
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 μ s)

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

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

¹⁹ The maximum permissible continuous power is +34 dBm due to thermal limits.

Code domain

Filter		1.23 MHz, RRC, $\alpha = 0.22$, CDMA filter
Level range		-28 dBm to +42 dBm ²⁰
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 μ s)

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

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 ²⁰
Uncertainty	for -43 dBc adjacent channel level	<0.5 dB
Measurement length	half-slot	1024 chip (833.33 μ s)

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 ²⁰
Level uncertainty		see general technical specifications
Measurement length	half-slot	1024 chip (833.33 μ s)

²⁰ The maximum permissible continuous power is +34 dBm due to thermal limits.

WiMAX™ specifications

Standard	IEEE 802.16e-2005, OFDMA
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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)
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Output level range	depending on PAR	see general technical specifications
Output level uncertainty	waveform file used: WIMAX_DL_3-BURST_46_5MS.WV	add 0.15 dB to RF generator level uncertainty (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 option)

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

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, WiMAX: IF power

Measured parameters	numeric results	RMS power (subframe, burst, preamble), RSSI, CINR, crest factor, error vector magnitude (all carriers, pilot carriers, data carriers), unmodulated EVM, frequency error, I/Q DC offset, I/Q imbalance gain,
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		I/Q imbalance quadrature, spectrum flatness, spectrum flatness neighbor, occupied bandwidth, spectrum emission mask, adjacent channel leakage ratio
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Power measurement

Subframe RMS power		
Level uncertainty	RF1 COM, RF2 COM, WiMAX™ band 1, band 2, and band 3	add 0.15 dB to RF analyzer level uncertainty (see general technical specifications) ²¹

Modulation analysis

Error vector magnitude		
Measurement range		from inherent EVM up to -12 dB
Inherent EVM	WiMAX™ band 1 UL	
	-15 dBm ≤ input level ≤ +27 dBm	<-40 dB, RMS ²¹
	-40 dBm ≤ input level < -15 dBm	<-36 dB, RMS ²¹
	WiMAX™ band 2 UL	
	-15 dBm ≤ input level ≤ +27 dBm	<-38 dB, RMS ²¹
	-35 dBm ≤ input level < -15 dBm	<-35 dB, RMS ²¹
	WiMAX™ band 3 UL	
	-15 dBm ≤ input level ≤ +27 dBm	<-38 dB, RMS ²¹
	-35 dBm ≤ input level < -15 dBm	<-35 dB, RMS ²¹
	WiMAX™ band 1 DL	
	-15 dBm ≤ input level ≤ +27 dBm	<-38 dB, RMS ²¹
	WiMAX™ band 2 DL	
	-15 dBm ≤ input level ≤ +27 dBm	<-36 dB, RMS ²¹
	WiMAX™ band 3 DL	
	-15 dBm ≤ input level ≤ +27 dBm	<-36 dB, RMS ²¹
Measurement length		1 frame, multiframe
Resolution		0.01 dB

Frequency error		
Measurement range	FFT size 512, BW = 3.5 MHz	-3.9063 kHz to +3.9063 kHz
	FFT size 512, BW = 5 MHz	-5.468 kHz to +5.468 kHz
	FFT size 1024, BW = 7 MHz	-3.9063 kHz to +3.9063 kHz
	FFT size 1024, BW = 8.75 MHz	-4.8828 kHz to +4.8828 kHz
	FFT size 1024, BW = 10 MHz	-5.468 kHz to +5.468 kHz
Frequency measurement uncertainty		<10 Hz + drift of timebase, see general technical specifications ²¹
Resolution		0.01 Hz

I/Q imbalance		
Inherent I/Q gain imbalance		<0.1 dB ²¹
I/Q gain imbalance resolution		0.01 dB
Inherent I/Q quadrature imbalance		<0.1° RMS ²¹
I/Q quadrature imbalance resolution		0.01°

²¹ Averaging across 100 bursts, UL signal definition: BW = 10 MHz, NFFT = 1024, all subchannels used, zone length: 34 DL, 18 UL.

Spectrum measurements

Spectrum flatness, relative		
Level uncertainty	inner carriers: spectral lines from $-N_{used}/4$ to -1 and spectral lines from 1 to $N_{used}/4$	<0.6 dB ²²
	outer carriers: spectral lines from $-N_{used}/2$ to $-N_{used}/4$ and spectral lines from $N_{used}/4$ to $N_{used}/2$	<1.1 dB ²²
	neighbor subcarrier deviation	<0.2 dB ²²
Resolution		0.01 dB

Adjacent channel leakage ratio		
	RMS detector	
Filter		rectangle 5 MHz, 10 MHz
Dynamic range	first adjacent channel	>45 dB
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	>-3 dBm

SEM		
	RMS detector	
Frequency span		40 MHz
Supported masks		IEEE
Dynamic range		>50 dB
Expected nominal power setting for full dynamic range	RF1 COM, RF2 COM	>-3 dBm

²² Averaging across 100 bursts, UL signal definition: BW = 10 MHz, NFFT = 1024, all subchannels used, zone length: 34 DL, 18 UL.

Digital I/Q 1 to 4 (R&S[®]CMW-B510A option)²³

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 MHz to 100 MHz
Predefined values ²⁴	standard-independent	100 MHz
	WCDMA, LTE	1.92 MHz, 3.84 MHz, 7.68 MHz, 15.36 MHz, 30.72 MHz

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
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²³ R&S[®]CMW500 only.

²⁴ Further values in the range from 400 Hz to 100 MHz 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) ²⁵		
LAN		Ethernet RJ-45 connector, 100 Mbit/s

Remote control interfaces (rear panel)		
IEEE 488	R&S [®] CMW-B612A IEEE bus (single) interface option or R&S [®] CMW-B612B IEEE bus (dual) interface option ²⁵	IEC 60625-2 (IEEE 488.2), 24-pin Amphenol connector 2 × IEC 60625-2 (IEEE 488.2), 24-pin Amphenol connector
LAN REMOTE		Ethernet RJ-45 connector, 1000 Mbit/s
USB REMOTE ²⁵		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 output trigger sources	2 × BNC connector GPRF: BB generator, WCDMA: DCCH TTI trigger, WCDMA: frame trigger, WCDMA: HS-DPCCH trigger, WCDMA: slot trigger, WCDMA: TPC trigger

Operating temperature range		+5 °C to +45 °C, in line with EN 60068-2-1 and -2
Storage temperature range		-25 °C to +60 °C, in line with EN 60068-2-1 and -2
Humidity	+40 °C, non-condensing	80 % relative humidity, in line with EN 60068-2-78
Electromagnetic compatibility	The instrument complies with the emission requirements stipulated by EN 55011 class A. This means that the instrument is suitable for use in industrial environments.	in line with EMC Directive 2004/108/EC, applied standard: EN 61326 (immunity: for industrial environment; emissions: class A)
Electrical safety		in line with IEC 61010-1: 2001 (ed. 2), EN 61010-1: 2001 (ed. 2), UL61010-1 (ed. 2), CAN C22.2 No. 61010-1-04

²⁵ R&S[®]CMW500 only.

Mechanical resistance	non-operating mode	
Vibration	sinusoidal	in line with EN 60068-2-6, MIL-PRF-28800F class 3 and 4, 5 Hz to 150 Hz, max. 2 g at 55 Hz, 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 $\pm 10\%$ (AC), max. 850 VA, 50 Hz to 60 Hz $\pm 5\%$
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)	21 cm TFT color display (8.4")
Resolution		800 × 600 pixels (SVGA resolution)
Pixel failure rate		$<1.1 \times 10^{-5}$

Dimensions 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 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 R&S[®]CMW500	single tester, non-signaling	approx. 14 kg approx. 31 lb
	with typical options	approx. 18 kg approx. 40 lb
Weight 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 ²⁶	1409.5505.02
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 ²⁶	1415.0201.02

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

²⁶ R&S[®]CMW500 only.

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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 75 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

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Certified Quality System
ISO 9001

Certified Environmental System
ISO 14001

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*0.14 €/min within German wireline network; rates may vary in other networks (wireline and mobile) and countries.