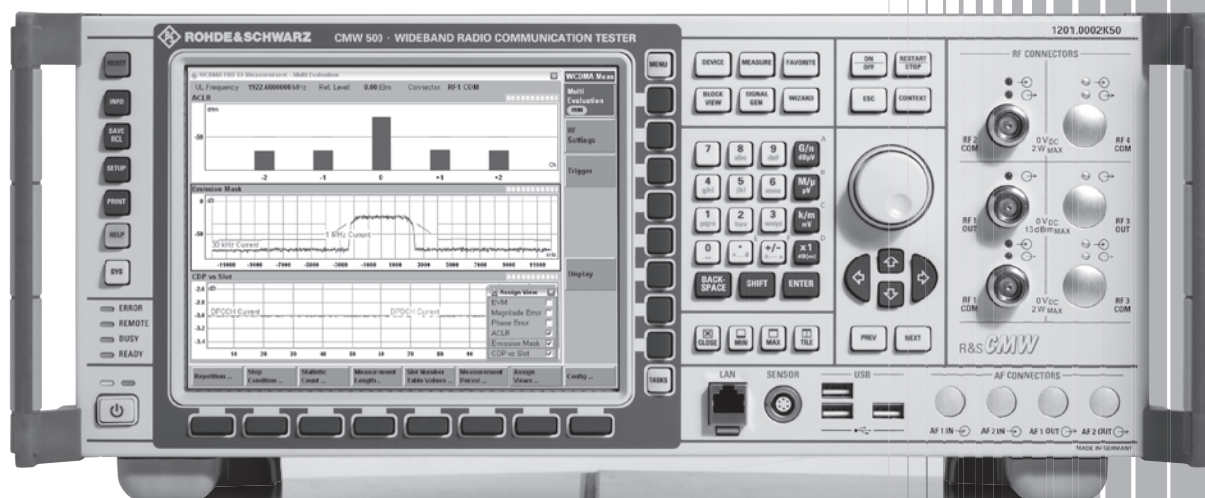


# R&S® CMW500

## Wideband Radio

## Communication Tester

## Specifications



**75** Years of  
Driving  
Innovation



# CONTENTS

|  |           |
|--|-----------|
| <b>General technical specifications .....</b>  | <b>4</b>  |
| RF generator .....   | 4         |
| <i>Modulation source: arbitrary waveform generator (ARB) (R&amp;S®CMW-B110A option).....</i>   | <i>5</i>  |
| RF analyzer.....   | 6         |
| <i>Power meter .....</i>   | <i>7</i>  |
| Timebase .....   | 8         |
| <i>Timebase TCXO.....</i>  | <i>8</i>  |
| <i>Timebase basic OCXO (R&amp;S®CMW-B690A option) .....</i>  | <i>8</i>  |
| <i>Timebase highly stable OCXO (R&amp;S®CMW-B690B option).....</i>   | <i>8</i>  |
| <i>Reference frequency inputs/outputs.....</i>   | <i>8</i>  |
| <b>GSM specifications – mobile station test .....</b>  | <b>9</b>  |
| GSM RF generator (prerequisite: R&S®CMW-B110A option) .....  | 9         |
| <i>GSM GEN (R&amp;S®CMW-KG200 option).....</i>   | <i>9</i>  |
| <i>GSM WINIQSIM2 (R&amp;S®CMW-KW200 option).....</i>   | <i>9</i>  |
| GSM RF analyzer (R&S®CMW-KM200 option).....  | 9         |
| <i>Modulation analysis.....</i>  | <i>10</i> |
| <i>Power versus time measurement.....</i>  | <i>10</i> |
| <i>Spectrum due to modulation measurement .....</i>  | <i>10</i> |
| <i>Spectrum due to switching measurement .....</i>   | <i>10</i> |
| <b>WCDMA specifications – mobile station (UE) test .....</b>   | <b>11</b> |
| WCDMA RF generator (prerequisite: R&S®CMW-B110A option).....   | 11        |
| <i>WCDMA GEN (R&amp;S®CMW-KG400 option), WCDMA HSPA GEN (R&amp;S®CMW-KG401 option).....</i>  | <i>11</i> |
| <i>WCDMA WINIQSIM2 (R&amp;S®CMW-KW400 option), WCDMA HSDPA WINIQSIM2 (R&amp;S®CMW-KW401 option), WCDMA HSUPA WINIQSIM2 (R&amp;S®CMW-KW402 option).....</i> | <i>11</i> |
| WCDMA RF analyzer (R&S®CMW-KM400 option and R&S®CMW-KM401 option) .....  | 12        |
| <i>Modulation analysis.....</i>  | <i>13</i> |
| <i>Spectrum measurements .....</i>   | <i>14</i> |
| <i>Power meter .....</i>   | <i>14</i> |
| <b>TD-SCDMA specifications – mobile station (UE) test .....</b>  | <b>15</b> |
| TD-SCDMA RF generator (prerequisite: R&S®CMW-B110A option).....  | 15        |
| <i>TD-SCDMA WINIQSIM2 (R&amp;S®CMW-KW750 option) .....</i>   | <i>15</i> |
| TD-SCDMA RF analyzer (R&S®CMW-KM750 option).....   | 15        |
| <i>Modulation analysis.....</i>  | <i>16</i> |
| <i>Code domain .....</i>   | <i>17</i> |
| <i>Spectrum measurements .....</i>   | <i>17</i> |
| <i>Power meter .....</i>   | <i>17</i> |

|   |           |
|---|-----------|
| <b>CDMA2000® 1xRTT specifications – mobile station test .....</b>         | <b>18</b> |
| CDMA2000® 1xRTT RF generator (prerequisite: R&S®CMW-B110A option).....    | 18        |
| <i>CDMA2000® WINIQSIM2 (R&amp;S®CMW-KW800 option).....</i>                | <i>18</i> |
| CDMA2000® RF analyzer (R&S®CMW-KM800 option) .....                        | 18        |
| <i>Modulation analysis.....</i>   | <i>19</i> |
| <i>Code domain.....</i>   | <i>20</i> |
| <i>Spectrum measurements.....</i>   | <i>20</i> |
| <i>Power meter.....</i>   | <i>20</i> |
| <b>CDMA2000® 1xEV-DO specifications – access terminal test .....</b>      | <b>21</b> |
| CDMA2000® 1xEV-DO RF generator (prerequisite: R&S®CMW-B110A option) ..... | 21        |
| <i>1xEV-DO WINIQSIM2 (R&amp;S®CMW-KW880 option).....</i>                  | <i>21</i> |
| CDMA2000® 1xEV-DO RF analyzer (R&S®CMW-KM880 option) .....                | 21        |
| <i>Modulation analysis.....</i>   | <i>22</i> |
| <i>Code domain.....</i>   | <i>23</i> |
| <i>Spectrum measurements.....</i>   | <i>23</i> |
| <i>Power meter.....</i>   | <i>23</i> |
| <b>WiMAX specifications – mobile station test .....</b>                   | <b>24</b> |
| WiMAX RF generator (prerequisite: R&S®CMW-B110A option).....              | 24        |
| <i>WiMAX WINIQSIM2 (R&amp;S®CMW-KW700 option).....</i>                    | <i>24</i> |
| WiMAX RF analyzer (R&S®CMW-KM700 option).....                             | 24        |
| <i>Power measurement.....</i>   | <i>25</i> |
| <i>Modulation analysis.....</i>   | <i>25</i> |
| <i>Spectrum measurements.....</i>   | <i>26</i> |
| <b>Digital IQ 1 TO 4 (R&amp;S® CMW-B510A option).....</b>                 | <b>27</b> |
| Digital I/Q interface .....   | 27        |
| AUX interface.....  | 27        |
| Included extras.....  | 27        |
| <b>General data .....</b>   | <b>28</b> |
| <b>Ordering information .....</b>   | <b>29</b> |
| Base unit.....  | 29        |
| Recommended extras for manual operation.....                              | 29        |
| Recommended extras.....   | 29        |

Specifications apply under the following conditions:

Data without tolerance limits is not binding. Based on a 24-month calibration interval unless otherwise stated.

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 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).

CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA - USA).

# General technical specifications

## RF generator

|                              |  |  |
|------------------------------|--|--|
| <b>Frequency range</b>       |  | 70 MHz to 3300 MHz<br>up to 6000 MHz with R&S®CMW-KB036 option |
| <b>Frequency resolution</b>  |  | 0.1 Hz   |
| <b>Frequency uncertainty</b> |  | same as timebase + frequency resolution                        |

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

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

|                                 |   |                      |
|---------------------------------|---|----------------------|
| <b>Output level uncertainty</b> | in temperature range +5 °C to +45 °C,<br>no overranging |                      |
| RF1 COM, RF2 COM                | output level >-120 dBm                                  |                      |
|                                 | 70 MHz to 100 MHz                                       | <2.0 dB <sup>1</sup> |
|                                 | 100 MHz to 3300 MHz                                     | <1.0 dB <sup>1</sup> |
| RF1 OUT                         | 3300 MHz to 6000 MHz                                    | <2.0 dB <sup>1</sup> |
|                                 | output level >-110 dBm                                  |                      |
|                                 | 70 MHz to 100 MHz                                       | <2.0 dB <sup>1</sup> |
|                                 | 100 MHz to 3300 MHz                                     | <1.0 dB <sup>1</sup> |
|                                 | 3300 MHz to 6000 MHz                                    | <2.0 dB <sup>1</sup> |

<sup>1</sup> Valid for a 12-month calibration interval.

|   |   |                       |
|---|---|-----------------------|
| <b>Output level linearity with fixed RF output attenuator setting</b> | 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 |

|                                   |   |          |
|-----------------------------------|---|----------|
| <b>Output level resolution</b>    |   | 0.01 dB  |
| <b>Output level repeatability</b> | typical values after 1 h warm-up time, always returning to same level and frequency, no temperature change, insignificant time change |          |
|                                   | output level $\geq -80$ dBm   | <0.01 dB |
|                                   | output level $< -80$ dBm  | <0.05 dB |

|                  |  |                      |
|------------------|--|----------------------|
| <b>VSWR</b>      |  |                      |
| RF1 COM, RF2 COM | 70 MHz to 3300 MHz<br>3300 MHz to 5000 MHz<br>5000 MHz to 6000 MHz | <1.2<br><1.5<br><1.6 |
| RF1 OUT          | 70 MHz to 3300 MHz<br>3300 MHz to 5000 MHz<br>5000 MHz to 6000 MHz | <1.5<br><1.5<br><1.6 |

|                                    |                                 |        |
|------------------------------------|---------------------------------|--------|
| <b>Attenuation of 2nd harmonic</b> |                                 |        |
| 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 |

|                                    |                                 |        |
|------------------------------------|---------------------------------|--------|
| <b>Attenuation of 3rd harmonic</b> |                                 |        |
| 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 |

|                                    |   |        |
|------------------------------------|---|--------|
| <b>Attenuation of nonharmonics</b> | >5 kHz offset from carrier, for output level $\geq -40$ 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 |

|                    |                                     |                 |
|--------------------|-------------------------------------|-----------------|
| <b>Phase noise</b> | single sideband, 70 MHz to 3300 MHz |                 |
| Carrier offset     | $\geq 1$ MHz                        | <-120 dBc, 1 Hz |

|                    |                                       |                 |
|--------------------|---------------------------------------|-----------------|
| <b>Phase noise</b> | single sideband, 3300 MHz to 6000 MHz |                 |
| Carrier offset     | $\geq 1$ MHz                          | <-117 dBc, 1 Hz |

|                              |  |  |
|------------------------------|--|--|
| <b>Signal-to-noise ratio</b> | 70 MHz to 3300 MHz   |  |
| RF1 COM, RF2 COM             | 5 MHz offset from carrier, for output level $\geq -30$ dBm | >95 dB, typ. >101 dB, 1 kHz<br>(>125 dB, typ. >131 dB, 1 Hz) |

|                              |  |               |
|------------------------------|--|---------------|
| <b>Signal-to-noise ratio</b> | 3300 MHz to 6000 MHz                                       |               |
| RF1 COM, RF2 COM             | 5 MHz offset from carrier, for output level $\geq -30$ dBm | >92 dB, 1 kHz |

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

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

## RF analyzer

|  |  |  |
|--|--|--|
| <b>VSWR</b><br>RF1 COM, RF2 COM              | 70 MHz to 3300 MHz<br>3300 MHz to 5000 MHz<br>5000 MHz to 6000 MHz   | <1.2<br><1.5<br><1.6   |
| <b>Inherent spurious response</b>            | without input signal<br>70 MHz to 6000 MHz,<br>except 4000 MHz, 4800 MHz, 5600 MHz,<br>6000 MHz  | <-100 dBm  |
| <b>Spurious response</b>                     | for full scale single tone input signal  |  |
|  | 70 MHz to 3300 MHz   | <-55 dB  |
|  | 3300 MHz to 3700 MHz,<br>except $f_{in} = 6400 \text{ MHz} - f_{selected}$ ,<br>except $f_{in} = 6400 \text{ MHz} - 0.5 \times f_{selected}$ | <-40 dB  |
|  | 3700 MHz to 6000 MHz,<br>except $f_{in} = 6400 \text{ MHz} - 0.5 \times f_{selected}$  | <-40 dB  |
| <b>Harmonic response</b><br>RF1 COM, RF2 COM | 2nd harmonic   |  |
|  | $f_{in} = 70 \text{ MHz to } 1650 \text{ MHz}$ ,<br>$f_{selected} = 140 \text{ MHz to } 3300 \text{ MHz}$                                    | <-30 dB  |
|  | $f_{in} = 1650 \text{ MHz to } 3000 \text{ MHz}$ ,<br>$f_{selected} = 3300 \text{ MHz to } 6000 \text{ MHz}$                                 | <-30 dB  |
| <b>Harmonic response</b><br>RF1 COM, RF2 COM | 3rd harmonic   |  |
|  | $f_{in} = 70 \text{ MHz to } 1100 \text{ MHz}$ ,<br>$f_{selected} = 210 \text{ MHz to } 3300 \text{ MHz}$                                    | <-50 dB  |
|  | $f_{in} = 1100 \text{ MHz to } 2000 \text{ MHz}$ ,<br>$f_{selected} = 3300 \text{ MHz to } 6000 \text{ MHz}$                                 | <-50 dB  |
| <b>Phase noise</b><br>Carrier offset         | single sideband, 70 MHz to 3300 MHz<br>$\geq 1 \text{ MHz}$  | <-120 dBc, 1 Hz  |
| <b>Phase noise</b><br>Carrier offset         | single sideband, 3300 MHz to 6000 MHz<br>$\geq 1 \text{ MHz}$  | <-117 dBc, 1 Hz  |
| <b>Trigger</b><br>Trigger sources            |  | BASE: external TRIG A,<br>BASE: external TRIG B,<br>GPRF: free run,<br>GPRF: IF power,<br>GPRF: BB generator,<br>WCDMA: DCCH TTI trigger,<br>WCDMA: frame trigger,<br>WCDMA: HS-DPCCH trigger,<br>WCDMA: slot trigger,<br>WCDMA: TPC trigger |

## Power meter

|   |  |  |
|---|--|--|
| <b>Frequency range</b>                      |  | 70 MHz to 3300 MHz<br>up to 6000 MHz with R&S®CMW-KB036 option   |
| <b>Frequency resolution</b>                 |  | 0.1 Hz   |
| <b>Resolution bandwidths</b>                |  | 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 |
| <b>Expected nominal power setting range</b> | for ADC full scale   |  |
| RF1 COM, RF2 COM                            | 70 MHz to 100 MHz<br>100 MHz to 3300 MHz<br>3300 MHz to 6000 MHz | -37 dBm to +42 dBm <sup>2</sup><br>-47 dBm to +42 dBm <sup>2</sup><br>-37 dBm to +42 dBm <sup>2</sup>  |

|                    |  |   |
|--------------------|--|---|
| <b>Level range</b> |  |   |
| RF1 COM, RF2 COM   | 70 MHz to 100 MHz<br>continuous power (CW)<br>peak envelope power (PEP)    | -74 dBm <sup>3</sup> to +34 dBm<br>up to +42 dBm <sup>2</sup> |
|                    | 100 MHz to 3300 MHz<br>continuous power (CW)<br>peak envelope power (PEP)  | -84 dBm <sup>3</sup> to +34 dBm<br>up to +42 dBm <sup>2</sup> |
|                    | 3300 MHz to 6000 MHz<br>continuous power (CW)<br>peak envelope power (PEP) | -74 dBm <sup>3</sup> to +34 dBm<br>up to +42 dBm <sup>2</sup> |
|                    | maximum input DC level   | 0 V DC  |

|                          |  |  |
|--------------------------|--|--|
| <b>Level uncertainty</b> | in temperature range +20 °C to +35 °C                            |  |
| RF1 COM, RF2 COM         | 70 MHz to 100 MHz<br>100 MHz to 3300 MHz<br>3300 MHz to 6000 MHz | <1.0 dB <sup>4</sup><br><0.5 dB <sup>4</sup><br><1.0 dB <sup>4</sup> |

|                          |  |  |
|--------------------------|--|--|
| <b>Level uncertainty</b> | in temperature range +5 °C to +45 °C                             |  |
| RF1 COM, RF2 COM         | 70 MHz to 100 MHz<br>100 MHz to 3300 MHz<br>3300 MHz to 6000 MHz | <1.2 dB <sup>4</sup><br><0.7 dB <sup>4</sup><br><1.2 dB <sup>4</sup> |

|  |  |         |
|--|--|---------|
| <b>Level linearity with fixed expected nominal power setting</b> | in temperature range +20 °C to +35 °C,<br>level range 0 dB to -40 dB |         |
| RF1 COM, RF2 COM   |  | <0.3 dB |

|                         |  |         |
|-------------------------|--|---------|
| <b>Level resolution</b> |  | 0.01 dB |
|-------------------------|--|---------|

|                            |  |          |
|----------------------------|--|----------|
| <b>Level repeatability</b> | typical values after 1 h warm-up time,<br>always returning to same level and<br>frequency, no temperature change,<br>insignificant time change |          |
|                            | input level $\geq -40$ dBm   | <0.01 dB |
|                            | input level $< -40$ dBm  | <0.03 dB |

|  |   |                                |
|--|---|--------------------------------|
| <b>Dynamic range</b>   | 70 MHz to 3300 MHz,<br><i>RBW</i> $\rightarrow$ 1 kHz,<br>with fixed expected nominal power setting | >100 dB                        |
| <b>Expected nominal power setting for full dynamic range</b> |   |                                |
| RF1 COM, RF2 COM   |   | -8 dBm to +42 dBm <sup>2</sup> |

|  |   |                                |
|--|---|--------------------------------|
| <b>Dynamic range</b>   | 3300 MHz to 6000 MHz,<br><i>RBW</i> $\rightarrow$ 1 kHz,<br>with fixed expected nominal power setting | >97 dB                         |
| <b>Expected nominal power setting for full dynamic range</b> |   |                                |
| RF1 COM, RF2 COM   |   | +2 dBm to +42 dBm <sup>2</sup> |

<sup>2</sup> The maximum permissible continuous power is +34 dBm due to thermal limits.

<sup>3</sup> *RBW*  $\rightarrow$  1 kHz.

<sup>4</sup> Valid for a 12-month calibration interval.

# Timebase

## Timebase TCXO

|                             |   |                              |
|-----------------------------|---|------------------------------|
| <b>Max. frequency drift</b> | in temperature range +5 °C to +45 °C                | $\pm 1 \times 10^{-6}$       |
| <b>Max. aging</b>           | at +25 °C,<br>after 14 days of continuous operation | $\pm 1 \times 10^{-6}$ /year |

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

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

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

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

## Reference frequency inputs/outputs

|                              |                        |                                  |
|------------------------------|------------------------|----------------------------------|
| <b>Synchronization input</b> |                        | BNC connector REF IN, rear panel |
| Frequency                    | sinewave               | 10 MHz to 80 MHz, step: 1 Hz     |
|                              | squarewave (TTL level) | 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                             |

|                                 |  |   |
|---------------------------------|--|---|
| <b>Synchronization output 1</b> |  | BNC connector REF OUT 1, rear panel                                     |
| Frequency                       |  | 10 MHz from internal reference or<br>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)

|                        |   |  |
|------------------------|---|--|
| <b>Frequency range</b> | GSM450 band<br>GSM480 band<br>GSM750 band<br>GSM850 band<br>GSM900 band<br>GSM1800 band<br>GSM1900 band | 460 MHz to 468 MHz<br>488 MHz to 496 MHz<br>747 MHz to 762 MHz<br>869 MHz to 894 MHz<br>921 MHz to 960 MHz<br>1805 MHz to 1880 MHz<br>1930 MHz to 1990 MHz |
|------------------------|---|--|

## GSM GEN (R&S®CMW-KG200 option)

|                                 |                  |                                      |
|---------------------------------|------------------|--------------------------------------|
| <b>Output level range</b>       | depending on PAR | see general technical specifications |
| <b>Output level uncertainty</b> |                  | see general technical specifications |
| <b>Output level resolution</b>  |                  | see general technical specifications |

|                              |      |                       |
|------------------------------|------|-----------------------|
| <b>Signal quality</b>        |      |                       |
| Phase error                  | GMSK | <1°, rms<br><4°, peak |
| Error vector magnitude (EVM) | 8PSK | <2 %, rms             |

## GSM WINIQSIM2 (R&S®CMW-KW200 option)

|                                 |                   |   |
|---------------------------------|-------------------|---|
| <b>Arbitrary waveform files</b> | GMSK, B x T = 0.3 | GSM_GMSK.WV (PAR = 0 dB),<br>GMSKDIGMOD.WV (PAR = 0 dB)       |
|                                 | 8PSK              | GSM_EDGE.WV (PAR = 3.23 dB),<br>EDGEDIGMOD.WV (PAR = 3.22 dB) |

|                                 |  |                                      |
|---------------------------------|--|--------------------------------------|
| <b>Output level range</b>       | depending on PAR   | see general technical specifications |
| <b>Output level uncertainty</b> | waveform file used:<br>GMSKDIGMOD.WV or<br>EDGEDIGMOD.WV | see general technical specifications |
| <b>Output level resolution</b>  |  | see general technical specifications |

|                              |   |                       |
|------------------------------|---|-----------------------|
| <b>Signal quality</b>        |   |                       |
| Phase error                  | GMSK<br>waveform file used: GSM_GMSK.WV | <1°, rms<br><4°, peak |
| Error vector magnitude (EVM) | 8PSK<br>waveform file used: GSM_EDGE.WV | <2 %, rms             |

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

|                        |   |  |
|------------------------|---|--|
| <b>Frequency range</b> | GSM450 band<br>GSM480 band<br>GSM750 band<br>GSM850 band<br>GSM900 band<br>GSM1800 band<br>GSM1900 band | 450 MHz to 458 MHz<br>478 MHz to 486 MHz<br>777 MHz to 792 MHz<br>824 MHz to 849 MHz<br>876 MHz to 915 MHz<br>1710 MHz to 1785 MHz<br>1850 MHz to 1910 MHz |
|------------------------|---|--|

|                 |  |   |
|-----------------|--|---|
| <b>Trigger</b>  |  |   |
| Trigger sources |  | BASE: external TRIG A,<br>BASE: external TRIG B,<br>GPRF: BB generator,<br>GSM: free run,<br>GSM: IF power,<br>GSM: acquisition |

## Modulation analysis

|  |      |   |
|--|------|---|
| <b>Level range</b>                       |      | -28 dBm to +42 dBm <sup>5</sup>                                     |
| <b>Inherent phase error</b>              | GMSK | <0.6°, rms<br><2°, peak   |
| <b>Inherent EVM</b>                      | 8PSK | <0.8 %, rms   |
| <b>Frequency measurement uncertainty</b> |      | <35 Hz + drift of timebase,<br>see general technical specifications |
| <b>Inherent I/Q offset</b>               |      | <-50 dB   |
| <b>Filter</b>                            | GMSK | bandpass, 900 kHz, RRC filter, $\alpha = 0.16$                      |
|  | 8PSK | windowed raised-cosine filter in line with 3GPP TS 45.005           |

|                                |  |                                      |
|--------------------------------|--|--------------------------------------|
| <b>Burst power measurement</b> |  |                                      |
| Level uncertainty              | bandpass, 900 kHz, RRC filter, $\alpha = 0.16$ | see general technical specifications |

## Power versus time measurement

|               |            |                            |
|---------------|------------|----------------------------|
| <b>Filter</b> | selectable | Gaussian, 500 kHz or 1 MHz |
|---------------|------------|----------------------------|

|   |   |                                |
|---|---|--------------------------------|
| <b>Dynamic range</b>                                  | <i>filter</i> → 500 kHz, Gaussian,<br>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 <sup>5</sup> |

|   |                          |              |
|---|--------------------------|--------------|
| <b>Relative measurement uncertainty</b> | result >-40 dB           | typ. <0.1 dB |
|   | -60 dB ≤ result ≤ -40 dB | typ. <0.5 dB |

|                                |  |                                      |
|--------------------------------|--|--------------------------------------|
| <b>Burst power measurement</b> |  |                                      |
| Level range                    |  | -50 dBm to +42 dBm <sup>5</sup>      |
| 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 <sup>5</sup>                             |
| Test method   |                       | relative measurement, averaging                            |
| Filter  |                       | Gaussian, 30 kHz, 5 pole                                   |
| Measurement   | at an offset of ± kHz | 100, 200, 250, 400, 600, 800, 1000, 1200, 1400, 1600, 1800 |

|               |                   |        |
|---------------|-------------------|--------|
| 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 <sup>5</sup> |
| Test method   |                       | absolute measurement, Max Hold |
| Filter  |                       | Gaussian, 30 kHz, 5 pole       |
| Measurement   | at an offset of ± kHz | 400, 600, 1200, 1800           |

|               |                   |        |
|---------------|-------------------|--------|
| Dynamic range | offset ≥ 1200 kHz |        |
|               | GMSK              | >72 dB |
|               | 8PSK              | >68 dB |

<sup>5</sup> 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  | 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 |

|                              |               |           |
|------------------------------|---------------|-----------|
| <b>Signal quality</b>        |               |           |
| 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),<br>3GPPDEFAULT.WV (PAR = 10.65 dB) |
|                          | with R&S®CMW-KW401 option | WCDMA_DL_HSDPA.WV<br>(PAR = 10.08 dB)                           |
|                          | with R&S®CMW-KW402 option | WCDMA_DL_HSUPA.WV<br>(PAR = 10.12 dB)                           |

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

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

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

|                        |   |  |
|------------------------|---|--|
| <b>Frequency range</b> | WCDMA band 1<br>WCDMA band 2<br>WCDMA band 3<br>WCDMA band 4<br>WCDMA band 5<br>WCDMA band 6<br>WCDMA band 7<br>WCDMA band 8<br>WCDMA band 9<br>WCDMA band 10<br>WCDMA band 11<br>WCDMA band 12<br>WCDMA band 13<br>WCDMA band 14 | 1920 MHz to 1980 MHz<br>1850 MHz to 1910 MHz<br>1710 MHz to 1785 MHz<br>1710 MHz to 1755 MHz<br>824 MHz to 849 MHz<br>830 MHz to 840 MHz<br>2500 MHz to 2570 MHz<br>880 MHz to 915 MHz<br>1749.9 MHz to 1784.9 MHz<br>1710 MHz to 1770 MHz<br>1427.9 MHz to 1452.9 MHz<br>698 MHz to 716 MHz<br>777 MHz to 787 MHz<br>788 MHz to 798 MHz |
|------------------------|---|--|

|                   |  |   |
|-------------------|--|---|
| <b>Statistics</b> |  |   |
| Statistical count |  | 1 to 1000   |
| Values            |  | current, average, minimum/maximum, standard deviation |

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

## Modulation analysis

|                            |  |  |
|----------------------------|--|--|
| <b>Filter</b>              |  | 3.84 MHz, RRC, $\alpha = 0.22$ , WCDMA filter  |
| <b>Level range</b>         |  | -28 dBm to +42 dBm <sup>6</sup>  |
| <b>Analysis modes</b>      | with R&S <sup>®</sup> CMW-KM400 option                                       | QPSK, WCDMA  |
|                            | with R&S <sup>®</sup> CMW-KM400 option and R&S <sup>®</sup> CMW-KM401 option | WCDMA + HSDPA, WCDMA + HSUPA, WCDMA + HSPA   |
| <b>Measured parameters</b> | 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 |

|                                     |  |   |
|-------------------------------------|--|---|
| <b>Error vector magnitude (EVM)</b> |  |   |
| Measurement range                   |  | up to 25 %, rms                         |
| Inherent EVM                        |  | <2.5 %, rms                             |
| Measurement length                  |  | half-slot, 1 slot, multislot (1 to 120) |

|                                   |  |  |
|-----------------------------------|--|--|
| <b>Frequency error</b>            |  |  |
| Measurement range                 |  | $\pm 3$ kHz  |
| Frequency measurement uncertainty |  | <35 Hz + drift of timebase, see general technical specifications |

|                          |                                    |         |
|--------------------------|------------------------------------|---------|
| <b>I/Q origin offset</b> |                                    |         |
| Inherent I/Q offset      | for average $\geq 10$ measurements | <-55 dB |

|                        |  |         |
|------------------------|--|---------|
| <b>I/Q imbalance</b>   |  |         |
| Inherent I/Q imbalance |  | <-50 dB |

<sup>6</sup> The maximum permissible continuous power is +34 dBm due to thermal limits.

## Spectrum measurements

|   |   |   |
|---|---|---|
| <b>Adjacent channel leakage ratio</b>                 | rms detector                              |   |
| Filter  |   | 3.84 MHz, RRC, $\alpha = 0.22$ , WCDMA filter |
| Dynamic range   | first adjacent channel at $\pm 5$ MHz     | >54 dB  |
|   | second adjacent channel at $\pm 10$ MHz   | >57 dB  |
| Expected nominal power setting for full dynamic range | RF1 COM, RF2 COM                          | -4 dBm to +42 dBm <sup>7</sup>                |
| 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 chips)                           |

## Power meter

|                             |              |   |
|-----------------------------|--------------|---|
| <b>UE power measurement</b> | rms detector |   |
| Filter                      |              | bandpass, 6.3 MHz, RRC, $\alpha = 0.22$ |
| Level range                 |              | -55 dBm to +42 dBm <sup>7</sup>         |
| Level uncertainty           |              | see general technical specifications    |
| Measurement length          |              | half-slot, 1 slot                       |

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

<sup>7</sup> The maximum permissible continuous power is +34 dBm due to thermal limits.

## 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<br>channels 9512 to 9588<br>channels 10062 to 10113 | 1900 MHz to 1920 MHz<br>2010 MHz to 2025 MHz |
|                 | TD-SCDMA band II<br>channels 9262 to 9538<br>channels 9662 to 9938  | 1850 MHz to 1910 MHz<br>1930 MHz to 1990 MHz |
|                 | TD-SCDMA band III<br>channels 9562 to 9638                          | 1910 MHz to 1930 MHz                         |

### TD-SCDMA WINIQSIM2 (R&S® CMW-KW750 option)

|                          |  |  |
|--------------------------|--|--|
| Arbitrary waveform files |  | TD-SCDMA_DEFAULT.WV<br>(PAR = 3.14 dB),<br>TD-SCDMA_PTWLOW.WV<br>(PAR = 2.67 dB) |
|--------------------------|--|--|

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

|                              |  |           |
|------------------------------|--|-----------|
| <b>Signal quality</b>        |  |           |
| Error vector magnitude (EVM) | composite EVM,<br>waveform file used:<br>TD-SCDMA_DEFAULT.WV | <4 %, rms |

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

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

|                   |  |  |
|-------------------|--|--|
| <b>Statistics</b> |  |  |
| Statistical count |  | 1 to 1000  |
| Values            |  | current, average, minimum/maximum,<br>standard deviation |

|                 |  |   |
|-----------------|--|---|
| <b>Trigger</b>  |  |   |
| Trigger sources |  | BASE: external TRIG A,<br>BASE: external TRIG B,<br>GPRF: BB generator,<br>TD-SCDMA: free run,<br>TD-CDMA: IF power |

## Modulation analysis

|                            |  |   |
|----------------------------|--|---|
| <b>Filter</b>              |  | 1.28 MHz, RRC, $\alpha = 0.22$ , TD-SCDMA filter  |
| <b>Level range</b>         |  | -28 dBm to +42 dBm <sup>8</sup>   |
| <b>Analysis modes</b>      |  | TD-SCDMA uplink:<br>DPCH<br>DPCH + HSDPA  |
| <b>Measured parameters</b> | numeric results and standard deviation | error vector magnitude (EVM),<br>magnitude error (ME),<br>phase error (PE),<br>frequency error,<br>I/Q origin offset,<br>I/Q imbalance,<br>UE power |
|                            | graphical                              | EVM versus time,<br>ME versus time,<br>PE versus time   |

|                                     |  |                              |
|-------------------------------------|--|------------------------------|
| <b>Error vector magnitude (EVM)</b> |  |                              |
| Measurement range                   |  | up to 25 %, rms              |
| Inherent EVM                        |  | <2.5 %, rms                  |
| Measurement length                  |  | 1 slot, multislot (1 to 112) |

|                                   |  |   |
|-----------------------------------|--|---|
| <b>Frequency error</b>            |  |   |
| Measurement range                 |  | $\pm 3$ kHz   |
| Frequency measurement uncertainty |  | <35 Hz + drift of timebase,<br>see general technical specifications |

|                          |                                    |         |
|--------------------------|------------------------------------|---------|
| <b>I/Q origin offset</b> |                                    |         |
| Inherent I/Q offset      | for average $\geq 10$ measurements | <-55 dB |

|                        |  |         |
|------------------------|--|---------|
| <b>I/Q imbalance</b>   |  |         |
| Inherent I/Q imbalance |  | <-50 dB |

<sup>8</sup> The maximum permissible continuous power is +34 dBm due to thermal limits.



## Code domain

|                            |  |  |
|----------------------------|--|--|
| <b>Filter</b>              |  | 1.28 MHz, RRC, $\alpha = 0.22$ , TD-SCDMA filter |
| <b>Level range</b>         |  | -28 dBm to +42 dBm <sup>9</sup>                  |
| <b>Analysis modes</b>      |  | TD-SCDMA uplink:<br>DPCH<br>DPCH + HSDPA         |
| <b>Measured parameters</b> | numeric results and standard deviation | code domain error (CDE)                          |
|                            | graphical                              | code domain power versus code                    |

|                                      |  |         |
|--------------------------------------|--|---------|
| <b>Code domain power versus code</b> |  |         |
| Uncertainty                          |  | <0.4 dB |
| Measurement length                   |  | 1 slot  |

|                                |  |         |
|--------------------------------|--|---------|
| <b>Code domain error (CDE)</b> |  |         |
| Uncertainty                    |  | <0.4 dB |
| Measurement length             |  | 1 slot  |

## Spectrum measurements

|   |   |  |
|---|---|--|
| <b>Adjacent channel leakage ratio</b>                 | rms detector                              |  |
| Filter  |   | 1.28 MHz, RRC, $\alpha = 0.22$ , TD-SCDMA filter |
| Dynamic range   | first adjacent channel at $\pm 1.6$ MHz   | >53 dB   |
|   | second adjacent channel at $\pm 3.2$ MHz  | >61 dB   |
| Expected nominal power setting for full dynamic range | RF1 COM, RF2 COM                          | -3 dBm to +42 dBm <sup>9</sup>                   |
| 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

|                            |                            |          |
|----------------------------|----------------------------|----------|
| <b>Measured parameters</b> | numeric current rms values | UE power |
|----------------------------|----------------------------|----------|

|                    |              |   |
|--------------------|--------------|---|
| <b>UE power</b>    | rms detector |   |
| Filter             |              | bandpass, 2.1 MHz, RRC, $\alpha = 0.22$ |
| Level range        |              | -55 dBm to +42 dBm <sup>9</sup>         |
| Level uncertainty  |              | see general technical specifications    |
| Measurement length |              | 1 slot                                  |

<sup>9</sup> The maximum permissible continuous power is +34 dBm due to thermal limits.

## CDMA2000<sup>®</sup> 1xRTT specifications – mobile station test

|                    |   |   |
|--------------------|---|---|
| <b>Standard</b>    | CDMA2000 <sup>®</sup> standards<br>CDMA2000 <sup>®</sup> test standards | TIA/EIA IS-2000 Rev. 0<br>TIA/EIA IS-98-F |
| <b>Symbol rate</b> |   | 1.2288 Mcps                               |

## CDMA2000<sup>®</sup> 1xRTT RF generator (prerequisite: R&S<sup>®</sup> CMW-B110A option)

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

## CDMA2000<sup>®</sup> WINIQSIM2 (R&S<sup>®</sup> CMW-KW800 option)

|                                 |  |  |
|---------------------------------|--|--|
| <b>Arbitrary waveform files</b> |  | CDMA_OQPSK.WV (PAR = 5.54 dB) or<br>CDMA_HPSK.WV (PAR = 6.97 dB) |
| <b>Output level range</b>       | depending on PAR                                     | see general technical specifications                             |
| <b>Output level uncertainty</b> | waveform file used:<br>CDMA_OQPSK.WV or CDMA_HPSK.WV | see general technical specifications                             |
| <b>Output level resolution</b>  |  | see general technical specifications                             |
| <b>Signal quality</b>           |  |  |
| Waveform quality (rho)          | waveform file used:<br>CDMA_OQPSK.WV or CDMA_HPSK.WV | >0.99  |

## CDMA2000<sup>®</sup> RF analyzer (R&S<sup>®</sup> CMW-KM800 option)

|                        |   |  |
|------------------------|---|--|
| <b>Frequency range</b> | band class 0<br>band class 1<br>band class 2<br>band class 3<br>band class 4<br>band class 5<br>band class 6<br>band class 7<br>band class 8<br>band class 9<br>band class 10<br>band class 11<br>band class 12<br>band class 13<br>band class 14<br>band class 15<br>band class 16 | 815.025 MHz to 848.985 MHz<br>1850.000 MHz to 1910.000 MHz<br>872.0125 MHz to 914.9875 MHz<br>887.0125 MHz to 924.9875 MHz<br>1750.000 MHz to 1780.000 MHz<br>411.675 MHz to 483.480 MHz<br>1920.000 MHz to 1979.950 MHz<br>776.000 MHz to 794.000 MHz<br>1710.000 MHz to 1784.950 MHz<br>880.000 MHz to 913.750 MHz<br>806.000 MHz to 900.975 MHz<br>411.675 MHz to 483.475 MHz<br>870.0125 MHz to 875.9875 MHz<br>2500.000 MHz to 2570.000 MHz<br>1850.000 MHz to 1915.000 MHz<br>1710.000 MHz to 1755.000 MHz<br>2502.000 MHz to 2568.000 MHz |
|------------------------|---|--|

|                   |  |  |
|-------------------|--|--|
| <b>Statistics</b> |  |  |
| Statistical count |  | 1 to 1000  |
| Values            |  | current, average, minimum/maximum, standard deviation                                    |
| <b>Trigger</b>    |  |  |
| Trigger sources   |  | BASE: external TRIG A,<br>BASE: external TRIG B,<br>GPRF: BB generator,<br>C2K: free run |

## Modulation analysis

|                            |  |   |
|----------------------------|--|---|
| <b>Filter</b>              |  | 1.23 MHz, RRC, $\alpha = 0.22$ , CDMA filter  |
| <b>Level range</b>         |  | -28 dBm to +42 dBm <sup>10</sup>  |
| <b>Analysis modes</b>      |  | O-QPSK, HPSK  |
| <b>Measured parameters</b> | numeric results and standard deviation | error vector magnitude (EVM),<br>magnitude error (ME),<br>phase error (PE),<br>frequency error,<br>rho,<br>carrier feedthrough,<br>I/Q imbalance,<br>power,<br>wideband power (8 MHz),<br>narrowband power (1.23 MHz) |
|                            | graphical                              | EVM versus time,<br>ME versus time,<br>PE versus time   |

|                               |                  |                    |
|-------------------------------|------------------|--------------------|
| <b>Waveform quality (rho)</b> |                  |                    |
| Uncertainty                   | for rho 0.9 to 1 | <0.003             |
| Measurement length            |                  | 616 chips (0.5 ms) |

|                                     |  |                 |
|-------------------------------------|--|-----------------|
| <b>Error vector magnitude (EVM)</b> |  |                 |
| Measurement range                   |  | up to 25 %, rms |
| Inherent EVM                        |  | <2.5 %, rms     |
| Measurement length                  |  | 0.5 ms          |

|                                   |  |   |
|-----------------------------------|--|---|
| <b>Frequency error</b>            |  |   |
| Measurement range                 |  | $\pm 3$ kHz   |
| Frequency measurement uncertainty |  | <35 Hz + drift of timebase,<br>see general technical specifications |

|                              |                                    |         |
|------------------------------|------------------------------------|---------|
| <b>Carrier feedthrough</b>   |                                    |         |
| Inherent carrier feedthrough | for average $\geq 10$ measurements | <-55 dB |

|                        |  |         |
|------------------------|--|---------|
| <b>I/Q imbalance</b>   |  |         |
| Inherent I/Q imbalance |  | <-50 dB |

<sup>10</sup> The maximum permissible continuous power is +34 dBm due to thermal limits.

## Code domain

|                            |  |  |
|----------------------------|--|--|
| <b>Filter</b>              |  | 1.23 MHz, RRC, $\alpha = 0.22$ , CDMA filter                 |
| <b>Level range</b>         |  | -28 dBm to +42 dBm <sup>11</sup>                             |
| <b>Measured parameters</b> | 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 |

|                                      |  |                    |
|--------------------------------------|--|--------------------|
| <b>Code domain power versus code</b> |  |                    |
| Uncertainty                          |  | <0.4 dB            |
| Measurement length                   |  | 616 chips (0.5 ms) |

|                                      |  |                    |
|--------------------------------------|--|--------------------|
| <b>Code domain error versus code</b> |  |                    |
| Measurement uncertainty              |  | <0.4 dB            |
| Measurement length                   |  | 616 chips (0.5 ms) |

## Spectrum measurements

|   |   |                                 |
|---|---|---------------------------------|
| <b>Adjacent channel power</b>                         | 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 <sup>11</sup> |
| Uncertainty   | for -43 dBc adjacent channel level              | <0.5 dB                         |
| Measurement length                                    | one power control group                         | 1536 chips (1.25 ms)            |

## Power meter

|                    |            |                                      |
|--------------------|------------|--------------------------------------|
| <b>MS power</b>    |            |                                      |
| Filter             | narrowband | bandpass, 1.25 MHz                   |
| Filter             | wideband   | bandpass, 8 MHz                      |
| Level range        |            | -55 dBm to +42 dBm <sup>11</sup>     |
| Level uncertainty  |            | see general technical specifications |
| Measurement length |            | 616 chips (0.5 ms)                   |

<sup>11</sup> The maximum permissible continuous power is +34 dBm due to thermal limits.

# CDMA2000<sup>®</sup> 1xEV-DO specifications – access terminal test

|                    |   |                                |
|--------------------|---|--------------------------------|
| <b>Standard</b>    | CDMA2000 <sup>®</sup> 1xEV-DO standards<br>CDMA2000 <sup>®</sup> 1xEV-DO test standards | TIA/EIA 856-2<br>TIA/EIA 866-A |
| <b>Symbol rate</b> |   | 1.2288 Mcps                    |

## CDMA2000<sup>®</sup> 1xEV-DO RF generator (prerequisite: R&S<sup>®</sup> CMW-B110A option)

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

## 1xEV-DO WINIQSIM2 (R&S<sup>®</sup> CMW-KW880 option)

|                                 |  |                                 |
|---------------------------------|--|---------------------------------|
| <b>Arbitrary waveform files</b> |  | EVDO_DEFAULT.WV (PAR = 4.86 dB) |
|---------------------------------|--|---------------------------------|

|                                 |                                     |                                      |
|---------------------------------|-------------------------------------|--------------------------------------|
| <b>Output level range</b>       | depending on PAR                    | see general technical specifications |
| <b>Output level uncertainty</b> | waveform file used: EVDO_DEFAULT.WV | see general technical specifications |
| <b>Output level resolution</b>  |                                     | see general technical specifications |

|                        |                                     |       |
|------------------------|-------------------------------------|-------|
| <b>Signal quality</b>  |                                     |       |
| Waveform quality (rho) | waveform file used: EVDO_DEFAULT.WV | >0.99 |

## CDMA2000<sup>®</sup> 1xEV-DO RF analyzer (R&S<sup>®</sup> CMW-KM880 option)

|                        |   |  |
|------------------------|---|--|
| <b>Frequency range</b> | band class 0<br>band class 1<br>band class 2<br>band class 3<br>band class 4<br>band class 5<br>band class 6<br>band class 7<br>band class 8<br>band class 9<br>band class 10<br>band class 11<br>band class 12<br>band class 13<br>band class 14<br>band class 15<br>band class 16 | 815.025 MHz to 848.985 MHz<br>1850.000 MHz to 1910.000 MHz<br>872.0125 MHz to 914.9875 MHz<br>887.0125 MHz to 924.9875 MHz<br>1750.000 MHz to 1780.000 MHz<br>411.675 MHz to 483.480 MHz<br>1920.000 MHz to 1979.950 MHz<br>776.000 MHz to 794.000 MHz<br>1710.000 MHz to 1784.950 MHz<br>880.000 MHz to 913.750 MHz<br>806.000 MHz to 900.975 MHz<br>411.675 MHz to 483.475 MHz<br>870.0125 MHz to 875.9875 MHz<br>2500.000 MHz to 2570.000 MHz<br>1850.000 MHz to 1915.000 MHz<br>1710.000 MHz to 1755.000 MHz<br>2502.000 MHz to 2568.000 MHz |
|------------------------|---|--|

|                   |  |   |
|-------------------|--|---|
| <b>Statistics</b> |  |   |
| Statistical count |  | 1 to 1000   |
| Values            |  | current, average, minimum/maximum, standard deviation |

|                 |  |  |
|-----------------|--|--|
| <b>Trigger</b>  |  |  |
| Trigger sources |  | BASE: external TRIG A,<br>BASE: external TRIG B,<br>GPRF: BB generator,<br>1xEV-DO: free run |

## Modulation analysis

|                            |  |   |
|----------------------------|--|---|
| <b>Filter</b>              |  | 1.23 MHz, RRC, $\alpha = 0.22$ , CDMA filter  |
| <b>Level range</b>         |  | -28 dBm to +42 dBm <sup>12</sup>  |
| <b>Analysis modes</b>      |  | dual BPSK   |
| <b>Measured parameters</b> | numeric results and standard deviation | error vector magnitude (EVM),<br>magnitude error (ME),<br>phase error (PE),<br>frequency error,<br>rho,<br>carrier feedthrough,<br>I/Q imbalance,<br>power,<br>wideband power (8 MHz),<br>narrowband power (1.23 MHz) |
|                            | graphical                              | EVM versus time,<br>ME versus time,<br>PE versus time   |

|                               |                  |                             |
|-------------------------------|------------------|-----------------------------|
| <b>Waveform quality (rho)</b> |                  |                             |
| Uncertainty                   | for rho 0.9 to 1 | <0.003                      |
| Measurement length            | half-slot        | 1024 chips (833.33 $\mu$ s) |

|                                     |           |                             |
|-------------------------------------|-----------|-----------------------------|
| <b>Error vector magnitude (EVM)</b> |           |                             |
| Measurement range                   |           | up to 25 %, rms             |
| Inherent EVM                        |           | <2.5 %, rms                 |
| Measurement length                  | half-slot | 1024 chips (833.33 $\mu$ s) |

|                                   |  |   |
|-----------------------------------|--|---|
| <b>Frequency error</b>            |  |   |
| Measurement range                 |  | $\pm 3$ kHz   |
| Frequency measurement uncertainty |  | <35 Hz + drift of timebase,<br>see general technical specifications |

|                              |                                    |         |
|------------------------------|------------------------------------|---------|
| <b>Carrier feedthrough</b>   |                                    |         |
| Inherent carrier feedthrough | for average $\geq 10$ measurements | <-55 dB |

|                        |  |         |
|------------------------|--|---------|
| <b>I/Q imbalance</b>   |  |         |
| Inherent I/Q imbalance |  | <-50 dB |

<sup>12</sup> The maximum permissible continuous power is +34 dBm due to thermal limits.

## Code domain

|                            |  |  |
|----------------------------|--|--|
| <b>Filter</b>              |  | 1.23 MHz, RRC, $\alpha = 0.22$ , CDMA filter                 |
| <b>Level range</b>         |  | -28 dBm to +42 dBm <sup>13</sup>                             |
| <b>Measured parameters</b> | 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 |

|                                      |           |                             |
|--------------------------------------|-----------|-----------------------------|
| <b>Code domain power versus code</b> |           |                             |
| Uncertainty                          |           | <0.4 dB                     |
| Measurement length                   | half-slot | 1024 chips (833.33 $\mu$ s) |

|                                      |           |                             |
|--------------------------------------|-----------|-----------------------------|
| <b>Code domain error versus code</b> |           |                             |
| Measurement uncertainty              |           | <0.4 dB                     |
| Measurement length                   | half-slot | 1024 chips (833.33 $\mu$ s) |

## Spectrum measurements

|   |   |                                 |
|---|---|---------------------------------|
| <b>Adjacent channel power</b>                         | 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 <sup>13</sup> |
| Uncertainty   | for -43 dBc adjacent channel level              | <0.5 dB                         |
| Measurement length                                    | half-slot                                       | 1024 chips (833.33 $\mu$ s)     |

## Power meter

|                    |            |                                      |
|--------------------|------------|--------------------------------------|
| <b>MS power</b>    |            |                                      |
| Filter             | narrowband | bandpass, 1.25 MHz                   |
| Filter             | wideband   | bandpass, 8 MHz                      |
| Level range        |            | -55 dBm to +42 dBm <sup>13</sup>     |
| Level uncertainty  |            | see general technical specifications |
| Measurement length | half-slot  | 1024 chips (833.33 $\mu$ s)          |

<sup>13</sup> The maximum permissible continuous power is +34 dBm due to thermal limits.

# WiMAX specifications – mobile station test

|          |                          |
|----------|--------------------------|
| Standard | IEEE 802.16e-2005, OFDMA |
|----------|--------------------------|

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

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

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

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

|                          |   |  |
|--------------------------|---|--|
| Output level range       | depending on PAR                                  | see general technical specifications   |
| Output level uncertainty | waveform file used:<br>WIMAX_DL_3-BURST_46_5MS.WV | add 0.15 dB to RF generator level<br>uncertainty (see general technical<br>specifications) |
| Output level resolution  |   | see general technical specifications   |

|                              |  |              |
|------------------------------|--|--------------|
| Signal quality               |  |              |
| Error vector magnitude (EVM) | ID_Cell = 0, permbase = 0, prbs_id = 0,<br>cp = 1/8, BW = 10 MHz,<br>bursts: FCH, DL-MAP, data PN15,<br>modulation type and coding rate<br>QPSK 1/2;<br>waveform file used:<br>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,<br>10 MHz |
| Link direction        |  | uplink, downlink                           |
| Subcarrier allocation |  | DL PUSC, UL PUSC                           |

|                 |  |  |
|-----------------|--|--|
| Frequency range | WiMAX band 1<br>WiMAX band 2,<br>prerequisite: R&S®CMW-KB036 option<br>WiMAX band 3,<br>prerequisite: R&S®CMW-KB036 option | 2300 MHz to 2800 MHz<br>3300 MHz to 3800 MHz<br><br>5100 MHz to 5580 MHz and 5620 MHz to<br>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 |  | WiMAX: IF power |

|                     |                 |   |
|---------------------|-----------------|---|
| Measured parameters | numeric results | subframe rms power,<br>crest factor,<br>error vector magnitude<br>(all carriers, pilot carriers, data carriers),<br>frequency error,<br>I/Q imbalance gain,<br>I/Q imbalance quadrature,<br>spectrum flatness, relative |
|---------------------|-----------------|---|



## Power measurement

|                           |   |   |
|---------------------------|---|---|
| <b>Subframe rms power</b> |   |   |
| Level uncertainty         | RF1 COM, RF2 COM,<br>WiMAX band 1, band 2, and band 3 | add 0.15 dB to RF analyzer level uncertainty (see general technical specifications) <sup>14</sup> |

## Modulation analysis

|                               |   |  |
|-------------------------------|---|--|
| <b>Error vector magnitude</b> |   |  |
| Measurement range             |   | from inherent EVM up to -12 dB   |
| Inherent EVM                  | WiMAX band 1 UL<br>-15 dBm ≤ input level ≤ +27 dBm<br>-40 dBm ≤ input level < -15 dBm<br>WiMAX band 2 UL<br>-15 dBm ≤ input level ≤ +27 dBm<br>-35 dBm ≤ input level < -15 dBm<br>WiMAX band 3 UL<br>-15 dBm ≤ input level ≤ +27 dBm<br>-35 dBm ≤ input level < -15 dBm<br>WiMAX band 1 DL<br>-15 dBm ≤ input level ≤ +27 dBm<br>WiMAX band 2 DL<br>-15 dBm ≤ input level ≤ +27 dBm<br>WiMAX band 3 DL<br>-15 dBm ≤ input level ≤ +27 dBm | <-40 dB, rms <sup>14</sup><br><-36 dB, rms <sup>14</sup><br><-38 dB, rms <sup>14</sup><br><-35 dB, rms <sup>14</sup><br><-38 dB, rms <sup>14</sup><br><-35 dB, rms <sup>14</sup><br><-38 dB, rms <sup>14</sup><br><-36 dB, rms <sup>14</sup><br><-36 dB, rms <sup>14</sup> |
| Measurement length            |   | 1 frame, multiframe  |
| Resolution                    |   | 0.01 dB  |

|                                   |   |  |
|-----------------------------------|---|--|
| <b>Frequency error</b>            |   |  |
| Measurement range                 | FFT size 512, BW = 3.5 MHz<br>FFT size 512, BW = 5 MHz<br>FFT size 1024, BW = 7 MHz<br>FFT size 1024, BW = 8.75 MHz<br>FFT size 1024, BW = 10 MHz | -3.9063 kHz to +3.9063 kHz<br>-5.468 kHz to +5.468 kHz<br>-3.9063 kHz to +3.9063 kHz<br>-4.8828 kHz to +4.8828 kHz<br>-5.468 kHz to +5.468 kHz |
| Frequency measurement uncertainty |   | <10 Hz + drift of timebase,<br>see general technical specifications <sup>14</sup>  |
| Resolution                        |   | 0.01 Hz  |

|                                     |  |                         |
|-------------------------------------|--|-------------------------|
| <b>I/Q imbalance</b>                |  |                         |
| Inherent I/Q gain imbalance         |  | <0.1 dB <sup>14</sup>   |
| I/Q gain imbalance resolution       |  | 0.001 dB                |
| Inherent I/Q quadrature imbalance   |  | <0.1° rms <sup>14</sup> |
| I/Q quadrature imbalance resolution |  | 0.001°                  |

<sup>14</sup> Averaging across 100 bursts, UL signal definition: BW = 10 MHz, NFFT = 1024, all subchannels used, zone length: 34 DL, 18 UL.

## Spectrum measurements

| <b>Spectrum flatness, relative</b> |   |                         |
|------------------------------------|---|-------------------------|
| Level uncertainty                  | inner carriers:<br>spectral lines from $-N_{used}/4$ to $-1$ and<br>spectral lines from $1$ to $N_{used}/4$                   | $<0.6$ dB <sup>15</sup> |
|                                    | outer carriers:<br>spectral lines from $-N_{used}/2$ to $-N_{used}/4$<br>and spectral lines from $N_{used}/4$ to $N_{used}/2$ | $<1.1$ dB <sup>15</sup> |
|                                    | neighbor subcarrier deviation   | $<0.2$ dB <sup>15</sup> |
| Resolution                         |   | 0.01 dB                 |

| <b>Adjacent channel leakage ratio</b>                 |                        |                         |
|---|------------------------|-------------------------|
|   | 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               |

| <b>SEM</b>  |                  |           |
|---|------------------|-----------|
|   | 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 |

<sup>15</sup> Averaging across 100 bursts, UL signal definition: BW = 10 MHz, NFFT = 1024, all subchannels used, zone length: 34 DL, 18 UL.

# Digital IQ 1 TO 4 (R&S<sup>®</sup> CMW-B510A option)

The R&S<sup>®</sup>CMW-B510A 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<sup>®</sup>CMW to the digital I/Q interface of other Rohde & Schwarz instruments (e.g. R&S<sup>®</sup>AMU200A, R&S<sup>®</sup>EX-IQ-BOX).

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

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

|                        |   |         |
|------------------------|---|---------|
| <b>Control signals</b> | general-purpose control, for future use |         |
|                        | 6 signals                               | 100 MHz |

|                 |                              |                               |
|-----------------|------------------------------|-------------------------------|
| <b>I/Q data</b> |                              |                               |
| Resolution      | for clock rate up to 100 MHz | 16 bit for I and 16 bit for Q |

|                                 |                                    |  |
|---------------------------------|------------------------------------|--|
| <b>I/Q sample rate</b>          |                                    |  |
| Source                          |                                    | internal, digital input, digital output, AUX interface           |
| Range                           |                                    | 1.92 MHz to 100 MHz  |
| Predefined values <sup>16</sup> | standard-independent<br>WCDMA, LTE | 100 MHz<br>1.92 MHz, 3.84 MHz, 7.68 MHz,<br>15.36 MHz, 30.72 MHz |

|                                |  |   |
|--------------------------------|--|---|
| <b>I/Q enable/request rate</b> |  |   |
| Digital input                  | I/Q mode 1<br>I/Q mode 2               | 75 MHz, 100 MHz<br>0 MHz to 100 MHz           |
| Digital output                 | I/Q mode 1<br>I/Q mode 2<br>I/Q mode 4 | 75 MHz, 100 MHz<br>0 MHz to 100 MHz<br>75 MHz |

## AUX interface

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

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

## Included extras

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

<sup>16</sup> Further values in range of 400 Hz to 100 MHz can be provided on demand.

# General data

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

|  |  |                                      |
|--|--|--------------------------------------|
| <b>Remote control interfaces (front panel)</b> |  |                                      |
| LAN  |  | Ethernet RJ-45 connector, 100 Mbit/s |

|   |   |   |
|---|---|---|
| <b>Remote control interfaces (rear panel)</b> |   |   |
| IEEE 488                                      | R&S®CMW-B612A IEEE bus interface option | IEC 60625-2 (IEEE 488.2), 24-pin Amphenol connector |
| LAN REMOTE                                    |   | Ethernet RJ-45 connector, 1000 Mbit/s               |
| USB REMOTE                                    |   | USB 2.0 type B connector                            |

|   |  |                               |
|---|--|-------------------------------|
| <b>Further interfaces (front panel)</b> |  |                               |
| 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 configuration (front panel without display or keypad) | DVI-D connector               |

|  |  |   |
|--|--|---|
| <b>Further interfaces (rear panel)</b> |  |   |
| 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<br>output trigger sources           | 2 × BNC connector<br>GPRF: BB generator,<br>WCDMA: DCCH TTI trigger,<br>WCDMA: frame trigger,<br>WCDMA: HS-DPCCH trigger,<br>WCDMA: slot trigger,<br>WCDMA: TPC trigger |

|                                      |   |   |
|--------------------------------------|---|---|
| <b>Operating temperature range</b>   |   | +5 °C to +45 °C,<br>in line with EN 60068-2-1 and -2  |
| <b>Storage temperature range</b>     |   | -25 °C to +60 °C,<br>in line with EN 60068-2-1 and -2   |
| <b>Humidity</b>                      | +40 °C, non-condensing  | 80 % relative humidity,<br>in line with EN 60068-2-3  |
| <b>Electromagnetic compatibility</b> | 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) |
| <b>Electrical safety</b>             |   | 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                 |

|                              |                    |   |
|------------------------------|--------------------|---|
| <b>Mechanical resistance</b> | 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   |

|                             |  |  |
|-----------------------------|--|--|
| <b>Power supply</b>         |  | 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           | base unit, non-signaling   | approx. 200 W  |
| <b>Display</b>              | selected with R&S <sup>®</sup> CMW-S600B configuration (front panel with display and keypad) | 21 cm TFT color display (8.4")   |
| Resolution                  |  | 800 x 600 pixels (SVGA resolution)   |
| Pixel failure rate          |  | $<1.1 \times 10^{-5}$  |
| <b>Dimensions</b>           | W x H x D, overall   | 465.1 mm x 197.3 mm x 517.0 mm<br>18.31 in x 7.77 in x 20.35 in                                |
|                             | for rackmounting   | 19" 1/1, 4 HU, 450   |
| <b>Weight</b>               | base unit  | approx. 14 kg<br>approx. 31 lb   |
|                             | with typical options   | approx. 18 kg<br>approx. 40 lb   |
| <b>Calibration interval</b> | 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

### Base unit

|                                  |   |              |
|----------------------------------|---|--------------|
| <b>R&amp;S<sup>®</sup>CMW500</b> | base unit with following accessories: power cord, operating manual (quick start guide), comprehensive documentation on CD-ROM | 1201.0002K50 |
|----------------------------------|---|--------------|

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<sup>®</sup>CMW-S600B configuration (front panel with display and keypad):

|                                   |                                   |              |
|-----------------------------------|-----------------------------------|--------------|
| <b>R&amp;S<sup>®</sup>PSL-Z10</b> | mouse with USB interface, optical | 1157.7060.04 |
|-----------------------------------|-----------------------------------|--------------|

For R&S<sup>®</sup>CMW-S600A configuration (front panel without display or keypad):

|                                   |   |              |
|-----------------------------------|---|--------------|
| <b>R&amp;S<sup>®</sup>PSL-Z10</b> | mouse with USB interface, optical           | 1157.7060.04 |
| <b>R&amp;S<sup>®</sup>PSL-Z2</b>  | keyboard with USB interface (US assignment) | 1157.6870.04 |
| <b>R&amp;S<sup>®</sup>PMC3</b>    | 17" TFT monitor                             | 1082.6004.12 |

#### Important information:

We recommend using only the above-mentioned original PC components from Rohde & Schwarz in connection with the R&S<sup>®</sup>CMW500. 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

|                                     |  |              |
|-------------------------------------|--|--------------|
| <b>R&amp;S<sup>®</sup>ZZA-411</b>   | 19" rack adapter   | 1096.3283.00 |
| <b>R&amp;S<sup>®</sup>EX-IQ-BOX</b> | digital signal interface module  | 1409.5505.02 |
| <b>R&amp;S<sup>®</sup>SMU-Z6</b>    | cable TVR 290, 26-pin MDR connector; additional cable for R&S <sup>®</sup> CMW-B510A used with e.g. R&S <sup>®</sup> AMU200A, R&S <sup>®</sup> EX-IQ-BOX | 1415.0201.02 |

## Service you can rely on

- | In 70 countries
- | Person-to-person
- | Customized and flexible
- | Quality with a warranty
- | No hidden terms

## 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.

## Regional contact

Europe, Africa, Middle East

+49 1805 12 42 42\* or +49 89 4129 137 74

customersupport@rohde-schwarz.com

North America

1-888-TEST-RSA (1-888-837-8772)

customer.support@rsa.rohde-schwarz.com

Latin America

+1-410-910-7988

customersupport.la@rohde-schwarz.com

Asia/Pacific

+65 65 13 04 88

customersupport.asia@rohde-schwarz.com

Certified Quality System  
**ISO 9001**  
DQS REG. NO 1954 QM

Certified Environmental System  
**ISO 14001**  
DQS REG. NO 1954 UM

For product brochure,  
see PD 5213.9211.12  
and [www.rohde-schwarz.com](http://www.rohde-schwarz.com)

## Rohde & Schwarz GmbH & Co. KG

Mühldorfstraße 15 | 81671 München

Phone +49 89 41 290 | Fax +49 89 41 29 121 64

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

R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG  
Trade names are trademarks of the owners | Printed in Germany (bb)  
PD 5213.9211.22 | Version 04.00 | July 2008 | R&S®CMW500  
Subject to change

\*0,14 €/min within German wireline network; rates may vary in other networks (wireline and mobile) and countries.