

# PARTIAL Test Report

## 20-1-0060701T67a-C1



Deutsche  
Akreditierungsstelle  
D-PL-12047-01-01  
D-PL-12047-01-03  
D-PL-12047-01-04

**Number of pages:** 27 **Date of Report:** 2021-Jul-27

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**Applicant:** VALEO Telematik und Akustik GmbH

**Product:** Telematic Device  
**Model:** ATM-02-MEX-R1

**FCC ID:** QWY-ATM2-R-11 **IC:** --

**Testing has been carried out in accordance with:** Title 47 CFR, Chapter I  
FCC Regulations, Subchapter B  
Part 22 Subpart H, Part 24 Subpart E  
Part 15, Subpart C, §15.209

Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".

**Tested Technology:** UTRA FDD (W-CDMA)

**Test Results:**  **The EUT complies with the requirements in respect of selected parameters subject to the test.**  
The test results relate only to devices specified in this document

**Signatures:**

|  |   |
|--|---|
| Dipl.-Ing. Ninovic Perez<br>Test Lab Manager<br>Authorization of test report | B.Sc. Al-Amin Hossain<br>Test Manager<br>Responsible of test report |
|--|---|

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# 1 General information

## 1.1 Disclaimer and Notes

The test results of this test report relate exclusively to the test item specified in this test report as specified in chapter 2.7. CETECOM does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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Also we refer on special conditions which the applicant should fulfill according §2.927 to §2.948, special focus regarding modification of the equipment and availability of sample equipment for market surveillance tests.

## 1.2 Attestation

I declare that all measurements were performed by me or under my supervision and that all measurements have been performed and are correct to my best knowledge and belief to Industry Canada standards. All of the above requirements are met in accordance with enumerated standards.

### 1.3 Summary of Test Results

| Test case in W-CDMA2   | Reference Clause FCC <input checked="" type="checkbox"/> | Reference Clause ISED <input type="checkbox"/> | Page | Remark     | Result             |
|--|--|--|------|------------|--------------------|
| AC-Power Lines Conducted Emissions                             | §15.207(a)   | RSS-Gen, Issue 5:§8.8                          | --   | N/A        | --                 |
| <a href="#">Conducted RF output power</a>                      | §2.1046(a)   | RSS-133:4.1/6.4 + SRSP-510:5.1.2               | 14   | --         | PASSED             |
| Radiated RF output power                                       | §24.232(c), §2.1046(a)                                   | RSS-133:6.4 + SRSP-510:5.1.2                   | --   | Calculated | PASSED             |
| Occupied Channel Bandwidth 99%                                 | §24.238(b), §2.1049(h)                                   | RSS-Gen, Issue 5:§6.6                          | --   | NP         | See modules report |
| 26dB Emission bandwidth  | §24.238(b), §2.1049(h)                                   | RSS-Gen, Issue 5:§6.6                          | --   | NP         | See modules report |
| <a href="#">Radiated Band Edge</a>                             | §24.238(a)(b), §2.1053(a), §2.1057(a)                    | RSS-133, Issue 6: §6.5.1(i)(ii)                | 23   | --         | PASSED             |
| Conducted RF Band Edge   | §24.238(a)(b), §2.1051                                   | RSS-133, Issue 6: §6.5.1(i)(ii)                | --   | NP         | See modules report |
| <a href="#">Peak to Average ratio (PAPR)</a>                   | §2.1046(a)   | RSS-133:4.1/6.4 + SRSP-510:5.1.2               | 15   | Calculated | PASSED             |
| <a href="#">Radiated field strength emissions below 30 MHz</a> | §15.205, §15.209   | RSS-Gen: Issue 5: §8.9 Table 6                 | 19   | --         | PASSED             |
| Spurious emissions at antenna terminals                        | §24.238(a)(b), §2.1051                                   | RSS-133, Issue 6: §6.5.1(i)(ii)                | --   | NP         | See modules report |
| <a href="#">Radiated spurious emissions</a>                    | §24.238(a)(b), §2.1053(a)                                | RSS-133, Issue 6: §6.5.1(i)(ii)                | 21   | --         | PASSED             |
| Frequency stability, temperature variation                     | §24.235, §2.1055(a)(1)                                   | RSS-133: 6.3                                   | --   | NP         | See modules report |
| Frequency stability, voltage variation                         | §15.207(a)   | RSS-Gen, Issue 5:§8.8                          | --   | NP         | See modules report |

| Test case in W-CDMA4                         | Reference Clause FCC             | Reference Clause ISED            | Page | Remark     | Result             |
|--|----------------------------------|----------------------------------|------|------------|--------------------|
| AC-Power Lines Conducted Emissions           | §15.207(a)                       | RSS-Gen, Issue 5:§8.8            | --   | N/A        | --                 |
| <a href="#">Conducted RF output power</a>    | §27.50(d)(4), §2.1046            | RSS-139, Issue 3:§6.5            | 14   | --         | PASSED             |
| Radiated RF output power                     | §27.50(d)(4), §2.1046(a)         | RSS-139, Issue 3: 6.5 + SRSP-513 | --   | Calculated | PASSED             |
| Occupied Channel Bandwidth 99%               | §27.53(h)(3), §2.202(a)          | RSS-Gen, Issue 5:§6.6            | --   | NP         | See modules report |
| 26dB Emission bandwidth                      | §27.53(h)(3), §2.202(a)          | RSS-Gen, Issue 5:§6.6            | --   | NP         | See modules report |
| <a href="#">Radiated Band Edge</a>           | §27.53(h), §2.1053(a) §2.1057(a) | RSS-139, Issue 3: 6.6 (i)(ii)    | 23   | --         | PASSED             |
| Conducted RF Band Edge                       | §27.53(h), §2.1051               | RSS-139, Issue 3: §6.6 (i)(ii)   | --   | NP         | See modules report |
| <a href="#">Peak to Average ratio (PAPR)</a> | §27.50(d)(4), §2.1046            | RSS-139, Issue 3:§6.5            | 15   | Calculated | PASSED             |

|  |                       |                                |    |    |                    |
|--|-----------------------|--------------------------------|----|----|--------------------|
| <a href="#">Radiated field strength emissions below 30 MHz</a> | §15.205, §15.209      | RSS-Gen: Issue 5: §8.9 Table 6 | 19 | -- | PASSED             |
| Spurious emissions at antenna terminals                        | §27.53(h), §2.1051    | RSS-139, Issue 3: §6.6 (i)(ii) | -- | NP | See modules report |
| <a href="#">Radiated spurious emissions</a>                    | §27.53(h), §2.1053(a) | RSS-139, Issue 3: §6.6 (i)(ii) | 21 | -- | PASSED             |
| Frequency stability, temperature variation                     | §27.54, §2.1055(a)(1) | RSS-139, Issue 3: §6.4         | -- | NP | See modules report |
| Frequency stability, voltage variation                         | §15.207(a)            | RSS-Gen, Issue 5: §8.8         | -- | NP | See modules report |

| Test case in W-CDMA5   | Reference Clause FCC                  | Reference Clause ISED          | Page | Remark     | Result             |
|--|---------------------------------------|--------------------------------|------|------------|--------------------|
| AC-Power Lines Conducted Emissions                             | §15.207(a)                            | RSS-Gen, Issue 5: §8.8         | --   | N/A        | --                 |
| <a href="#">Conducted RF output power</a>                      | §22.913(a)(5), §2.1046                | RSS-132:5.4 + SRSP 503:5.1.3   | 14   | --         | PASSED             |
| Radiated RF output power                                       | §22.913, §2.1046(a)                   | RSS-132: 5.4 + SRSP 503:5.1.3  | --   | Calculated | PASSED             |
| <a href="#">Occupied Channel Bandwidth 99%</a>                 | §22.917(b), §2.1049(h)                | RSS-Gen, Issue 5: §6.6         | --   | NP         | See modules report |
| 26dB Emission bandwidth  | §22.917(b), §2.1049(h)                | RSS-Gen, Issue 5: §6.6         | --   | NP         | See modules report |
| <a href="#">Radiated Band Edge</a>                             | §22.917(a)(b), §2.1053(a), §2.1057(a) | RSS-132, Issue 3: §5.5(i)(ii)  | 23   | --         | PASSED             |
| Conducted RF Band Edge   | §22.917(a)(b), §2.1051                | RSS-132, Issue 3: §5.5(i)(ii)  | --   | NP         | See modules report |
| <a href="#">Peak to Average ratio (PAPR)</a>                   | §22.913(a)(5), §2.1046                | RSS-132:5.4 + SRSP 503:5.1.3   | 15   | Calculated | PASSED             |
| <a href="#">Radiated field strength emissions below 30 MHz</a> | §15.205, §15.209                      | RSS-Gen: Issue 5: §8.9 Table 6 | 19   | --         | PASSED             |
| Spurious emissions at antenna terminals                        | §22.917(a)(b), §2.1051                | RSS-132, Issue 3: §5.5(i)(ii)  | --   | NP         | See modules report |
| <a href="#">Radiated spurious emissions</a>                    | §22.917(a)(b), §2.1053(a)             | RSS-132, Issue 3: §5.5(i)(ii)  | 21   | --         | PASSED             |
| Frequency stability, temperature variation                     | §22.355, §2.1055(a)(1)                | RSS-132: 5.3                   | --   | NP         | See modules report |
| Frequency stability, voltage variation                         | §22.355, §2.1055(a)(1)                | RSS-132: 5.3                   | --   | NP         | See modules report |

Remarks:

\*1) For conducted tests see original reports from FCC/ISED ID no.

FCC ID: **QWY-V1231-0**

PASSED                                   The EUT complies with the essential requirements in the standard.  
 FAILED                                   The EUT does not comply with the essential requirements in the standard.  
 NP   The test was not performed by the CETECOM Laboratory.

\*The calculation of the measurement uncertainty shows compliance with the "maximum measurement uncertainties" of the tested standard and therefore for result evaluation the stated uncertainties will not be additionally added to the measured results.

### 1.4 Summary of Test Methods

| Test case                                      | Test method  |
|--|--|
| AC-Power Lines Conducted Emissions             | ANSI C63.4-2014 §7, ANSI C63.10-2013 § 6.2   |
| Conducted RF output power                      | ANSI C63.26:2015, §5.2, KDB 971168 D01 v03r01  |
| Radiated RF output power                       | ANSI C63.26:2015, §5.2.7, KDB 971168 D01 v03r01  |
| Occupied Channel Bandwidth 99%                 | ANSI C63.26:2015, §5.4.4, KDB 971168 D01 v03r01  |
| 26dB Emission bandwidth                        | ANSI C63.26:2015, §5.4.3, KDB 971168 D01 v03r01  |
| Modulation characteristics                     | ANSI C63.26:2015, §5.3   |
| Radiated Band Edge                             | ANSI C63.26:2015, §5.5, KDB 971168 D01 v03r01  |
| Conducted RF Band Edge                         | ANSI C63.26:2015, §5.7, KDB 971168 D01 v03r01  |
| Peak to Average ratio (PAPR)                   | ANSI C63.26:2015, §5.2.6<br>Result calculated with measured conducted RF-power value and stated/measured antenna gain for band of interest |
| Radiated field strength emissions below 30 MHz | ANSI C63.4-2014 §5.3, §8.2.1, §8.3.1.1+§8.3.2.1  |
| Spurious emissions at antenna terminals        | ANSI C63.26:2015, §5.7, KDB 971168 D01 v03r01  |
| Radiated spurious emissions                    | ANSI C63.26:2015, §5.5, KDB 971168 D01 v03r01, ANSI C63.26.1:2018  |
| Frequency stability, temperature variation     | ANSI C63.26:2015, §5.6, KDB 971168 D01 v03r01  |
| Frequency stability, voltage variation         | ANSI C63.26:2015, §5.6, KDB 971168 D01 v03r01  |

## 2 Administrative Data

### 2.1 Identification of the Testing Laboratory

|                                     |   |
|-------------------------------------|---|
| Company name:                       | CETECOM GmbH  |
| Address:                            | Im Teelbruch 116<br>45219 Essen - Kettwig<br>Germany  |
| Responsible for testing laboratory: | Dipl.-Ing. Ninovic Perez                              |
| Accreditation scope:                | <b>DAkkS Webpage:</b> <a href="#">FCC ISED</a>        |
| Test location:                      | CETECOM GmbH; Im Teelbruch 116; 45219 Essen - Kettwig |

### 2.2 General limits for environmental conditions

|                     |           |
|---------------------|-----------|
| Temperature:        | 22±2 °C   |
| Relative. humidity: | 45±15% rH |

### 2.3 Test Laboratories sub-contracted

|               |    |
|---------------|----|
| Company name: | -- |
|---------------|----|

### 2.4 Organizational Items

|                              |                           |
|------------------------------|---------------------------|
| Responsible test manager:    | B.Sc. Al-Amin Hossain     |
| Responsible for test report: | M.Sc. Patrick Marzotko    |
| Receipt of EUT:              | 2020-Nov-05               |
| Date(s) of test:             | 2021-Jan-08 – 2021-Jul-09 |
| Version of template:         | 14.7                      |

### 2.5 Applicant's details

|                         |  |
|-------------------------|--|
| Applicant's name:       | VALEO Telematik und Akustik GmbH   |
| Address:                | Max-Planck-Str. 28-32<br>61381 Friedrichsdorf<br>Hessen<br>Germany               |
| Contact Person:         | Martin Fleckenstein  |
| Contact Person's Email: | <a href="mailto:martin.fleckenstein@valeo.com">martin.fleckenstein@valeo.com</a> |

### 2.6 Manufacturer's details

|                      |  |
|----------------------|--|
| Manufacturer's name: | VALEO Telematik und Akustik GmbH                         |
| Address:             | Max-Planck-Str. 28-32<br>61381 Friedrichsdorf<br>Germany |



## 2.7 EUT: Type, S/N etc. and short descriptions used in this test report

| Short description*) | PMT Sample No.     | Product          | Model         | Type | S/N        | HW status   | SW status   |
|---------------------|--------------------|------------------|---------------|------|------------|-------------|-------------|
| EUT 01              | 20-1-00607S216_C01 | Telematic Device | ATM-02-MEX-R1 | --   | 0000964697 | 103.006.006 | 010.003.001 |
| EUT 02              | 20-1-00607S218_C01 | Telematic Device | ATM-02-MEX-R1 | --   | 0000964696 | 103.006.006 | 010.003.001 |

\*) EUT short description is used to simplify the identification of the EUT in this test report.

## 2.8 Auxiliary Equipment (AE): Type, S/N etc. and short descriptions

| Short description*) | PMT Sample No.     | Auxiliary Equipment         | Type                       | S/N           | HW status | SW status |
|---------------------|--------------------|-----------------------------|----------------------------|---------------|-----------|-----------|
| AE 01               | 20-1-00607S28_C01  | Automotive Antenna Roof-Pod | 64177 / DA WAVE LOW 5G-ROW | 29-07-20 0855 | AI04      | --        |
| AE 02               | 20-1-00607S53_C01  | Metal Plate                 | --                         | --            | --        | --        |
| AE 03               | 21-1-00251S12_C01  | EMV Testbox ATM-01 / ATM-02 | --                         | S12           | --        | --        |
| AE 04               | 20-1-00607S224_C01 | EMC Switchbox               | --                         | 97            | --        | --        |
| AE 05               | 20-1-00607S40_C01  | Antenna                     | --                         | --            | --        | --        |
| AE 06               | 20-1-00607S246_C01 | Automotive Antenna Roof-Pod | 64177 / DA WAVE LOW 5G-ROW | 18-05-21 0068 | AI04      | --        |
| AE 07               | 20-1-00607S253_C01 | Antenna Plastic Cover       | Black Big                  | --            | --        | --        |
| AE 08               | 20-1-00607S254_C01 | Ground Plane                | Partial car roof           | --            | --        | --        |

\*) AE short description is used to simplify the identification of the auxiliary equipment in this test report.

## 2.9 Connected cables

| Short description*) | PMT Sample No.     | Cable type    | Connectors | Length |
|---------------------|--------------------|---------------|------------|--------|
| CAB 01              | 20-1-00607S125_C01 | Cable Harness | --         | <3 m   |
| CAB 02              | 20-1-00607S169_C01 | Power Cable   | --         | --     |

\*) CAB short description is used to simplify the identification of the connected cables in this test report.

## 2.10 Software

| Short description*) | PMT Sample No. | Software | Type | S/N | HW status | SW status |
|---------------------|----------------|----------|------|-----|-----------|-----------|
| --                  | --             | --       | --   | --  | --        | --        |

\*) SW short description is used to simplify the identification of the used software in this test report.

## 2.11 EUT set-ups

| set-up no. *) | Combination of EUT and AE                                       | Description   |
|---------------|---|---|
| 1             | EUT 01 + AE 01 + AE 02 + AE 03+ AE 04 + CAB 01 + CAB 02         | Used for Radiated measurements  |
| 2             | EUT 02 + AE 03+ AE 04 + AE 06 + AE 07 + AE 08 + CAB 01 + CAB 02 | Used for Radiated measurements (used for radiated spurious emissions) |
| 3             | EUT 01 + AE 03 + AE 04 + AE 05 + CAB 01 + CAB 02                | Used for Conducted measurements                                       |

\*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

## 2.12 EUT operation modes

| EUT operating mode no.*) | Operating modes  | Additional information  |
|--------------------------|--|---|
| Operating mode 1         | <p>W-CDMA FDD-Band II<br/>Traffic, 12.2 kbps RMC<br/>UE allocated channel 9262 (fc = 1852.4 MHz) or<br/>channel 9538 (fc = 1907.6 MHz)</p> | <p>A communication link is established between the mobile station (UE) and the test simulator. The transmitter is operated on its maximum rated output power class: 21 dBm or 24 dBm nominal.<br/>The input signal to the receiver is modulated with normal test modulation.<br/>The wanted RF input signal level to the receiver of the mobile station is set to a level to provide a stable communication link according Table E5.1/Table E5.1A as described in 3GPP TS34.121, Annex E.</p> |
| Operating mode 2         | <p>W-CDMA FDD-Band IV<br/>Traffic, 12.2 kbps RMC<br/>UE allocated channel 1312 (fc = 1712.4 MHz) or<br/>channel 1513 (fc = 1752.6 MHz)</p> | <p>A communication link is established between the mobile station (UE) and the test simulator. The transmitter is operated on its maximum rated output power class: 21 dBm or 24 dBm nominal.<br/>The input signal to the receiver is modulated with normal test modulation.<br/>The wanted RF input signal level to the receiver of the mobile station is set to a level to provide a stable communication link according Table E5.1/Table E5.1A as described in 3GPP TS34.121, Annex E.</p> |
| Operating mode 3         | <p>W-CDMA FDD-Band V<br/>Traffic, 12.2 kbps RMC<br/>UE allocated channel 4132 (fc = 826.4 MHz) or<br/>channel 4233 (fc = 846.6 MHz)</p>    | <p>A communication link is established between the mobile station (UE) and the test simulator. The transmitter is operated on its maximum rated output power class: 21 dBm or 24 dBm nominal.<br/>The input signal to the receiver is modulated with normal test modulation.<br/>The wanted RF input signal level to the receiver of the mobile station is set to a level to provide a stable communication link according Table E5.1/Table E5.1A as described in 3GPP TS34.121, Annex E.</p> |

\*) EUT operating mode no. is used to simplify the test report.

### 3 Equipment under test (EUT)

#### 3.1 General Data of Main EUT as Declared by Applicant

|  |  |  |                         |
|--|--|--|-------------------------|
| <b>Product name</b>  | Telematic Device                             |  |                         |
| <b>Kind of product</b>   | ATM-02-MEX-R1                                |  |                         |
| <b>Firmware</b>  | <input type="checkbox"/> for normal use      | <input checked="" type="checkbox"/> Special version for test execution |                         |
|  | <input type="checkbox"/> AC Mains            | -  |                         |
|  | <input checked="" type="checkbox"/> DC Mains | 12 V   |                         |
|  | <input type="checkbox"/> Battery             | -  |                         |
| <b>Operational conditions</b>  | T <sub>nom</sub> =21 °C                      | T <sub>min</sub> =-40 °C   | T <sub>max</sub> =90 °C |
| <b>EUT sample type</b>   | <b>Production</b>                            |  |                         |
| <b>Weight</b>  | 0.3 kg                                       |  |                         |
| <b>Size [LxWxH]</b>  | 16x10x2 cm                                   |  |                         |
| <b>Interfaces/Ports</b>  | --   |  |                         |
| <b>For further details refer Applicants Declaration &amp; following technical documents</b><br><i>[Annex 1 Specification + add tech docs] 11_ATM-02_Test_setup_instruction</i><br><i>[Annex 1 Specification + add tech docs] 01_ATM-02_Product specification sheet</i> |  |  |                         |

### 3.2 Detailed Technical data of Main EUT as Declared by Applicant

|   |  |  |
|---|--|--|
| <b>TX Frequency range</b>   | <input checked="" type="checkbox"/> UMTS-FDD band 2 1850 - 1910 MHz (Uplink), 1930 - 1990 MHz (Downlink)<br><input checked="" type="checkbox"/> UMTS-FDD band 4 1710 - 1755 MHz (Uplink), 2110 - 2155 MHz (Downlink)<br><input checked="" type="checkbox"/> UMTS-FDD band 5 824 - 849 MHz (Uplink), 869 - 894 MHz (Downlink) |  |
| <b>Number of channels</b>   | <input checked="" type="checkbox"/> UMTS-FDD band 2 UARFCN range 9262 - 9538<br><input checked="" type="checkbox"/> UMTS-FDD band 4 UARFCN range 1312 - 1513<br><input checked="" type="checkbox"/> UMTS-FDD band 5 UARFCN range 4132 - 4233   |  |
| <b>Type of modulation</b>   |  |  |
| <b>Data rates</b>   | Downlink Max XX kbps   | Uplink Max XXIkbps                       |
| <b>Emission designator</b>  | Nominal CBW  | See initial certification of the module: |
| <b>Antenna Type</b>   | <input type="checkbox"/> Integrated<br><input type="checkbox"/> External, no RF- connector<br><input checked="" type="checkbox"/> External, separate RF-connector  |  |
| <b>Antenna gain(s)</b>  | UMTS-FDD band 2 <b>max. 2.8</b> dBi<br>UMTS-FDD band 4: <b>max. 1.6</b> dBi<br>UMTS-FDD band 5: <b>max. -0.6</b> dBi   |  |
| <b>FCC label attached</b>   | No   |  |
| <b>Test firmware / software and storage location</b>  | EUT  |  |
| <b>For further details refer Applicants Declaration &amp; following technical documents</b> |  |  |
| <b>Description of Reference Document (supplied by applicant)</b>                            | <b>Version</b>   | <b>Total Pages</b>                       |
| Datasheet_WAVE_ROW_Low_9825130_04_20210125  | 2021-01-25   | 32                                       |

### 3.3 Worst case identification

| UMTS mode | Data rate |
|-----------|-----------|
| --        | --        |

### 3.4 Modifications on Test sample

|   |    |
|---|----|
| <b>Additions/deviations or exclusions</b> | -- |
|---|----|

## 4 Measurements

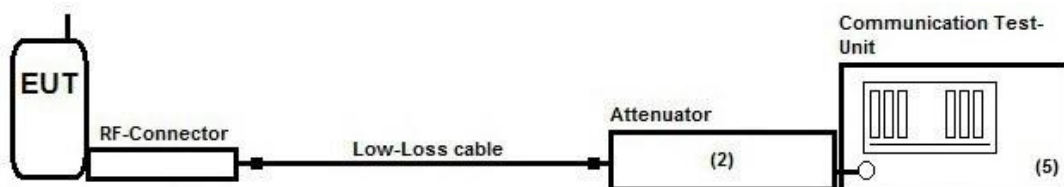
### 4.1 Conducted RF output power

#### 4.1.1 Description of the general test setup and methodology, see below example:

Following modified test set-up apply for tests performed inside the climatic chamber (frequency stability) or conducted RF-carrier power-measurement. The EUT RF-Signal is directly connected over suitable RF-connector over low-loss cable and an attenuator (2) to the cellular radio communication test-unit. (5).

The measurements were performed with the integrated power measurement function of the communication test-unit. (5).

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables *Summary of Test Results* and *Summary of Test Methods* on page 5)

#### EUT settings

The EUT was instructed to send with maximum power (if adjustable) according applicants instructions.  
The measurements were made at the low, middle and high carrier frequencies of each of the supported operating band within the designated range within the allowed channel bandwidths. Choosing three TX-carrier frequencies of the mobile phone, should be sufficient to demonstrate compliance

#### 4.1.2 Measurement Location

|           |                             |
|-----------|-----------------------------|
| Test site | 120911 - Radio Laboratory 2 |
|-----------|-----------------------------|

#### 4.1.3 Limit

| Frequency Range [MHz] | Limit [W] | Limit [dBm] |
|-----------------------|-----------|-------------|
| 824 – 849             | 7 ERP     | 38.5        |
| 1710 – 1755           | 1 EiRP    | 30          |
| 1850 – 1910           | 2 EiRP    | 33          |

**4.1.4 Result**

| <b>RMC99 - FDD2</b> |                       |                     |                    |                 |
|---------------------|-----------------------|---------------------|--------------------|-----------------|
|                     | ARFCN-Frequency [MHz] | Peak detektor [dBm] | RMS detektor [dBm] | PAR Faktor [dB] |
| Channel 9262        | 1852.4                | 22.35               | 19.11              | 3.24            |
| Channel 9400        | 1880.0                | 22.72               | 18.92              | 3.80            |
| Channel 9538        | 1907.6                | 21.72               | 18.79              | 2.93            |

| <b>RMC99 - FDD4</b> |                       |                     |                    |                 |
|---------------------|-----------------------|---------------------|--------------------|-----------------|
|                     | ARFCN-Frequency [MHz] | Peak detektor [dBm] | RMS detektor [dBm] | PAR Faktor [dB] |
| Channel 1312        | 1712.4                | 23.85               | 20.05              | 3.8             |
| Channel 1450        | 1740                  | 23.56               | 20.12              | 3.4             |
| Channel 1513        | 1752.6                | 23.36               | 19.66              | 3.7             |

| <b>RMC99 - FDD 5</b> |                       |                     |                    |                 |
|----------------------|-----------------------|---------------------|--------------------|-----------------|
|                      | ARFCN-Frequency [MHz] | Peak detektor [dBm] | RMS detektor [dBm] | PAR Faktor [dB] |
| Channel 4132         | 826.4                 | 24.39               | 20.60              | 3.8             |
| Channel 4185         | 837                   | 24.28               | 20.48              | 3.8             |
| Channel 4233         | 846.6                 | 24.60               | 20.56              | 4.0             |

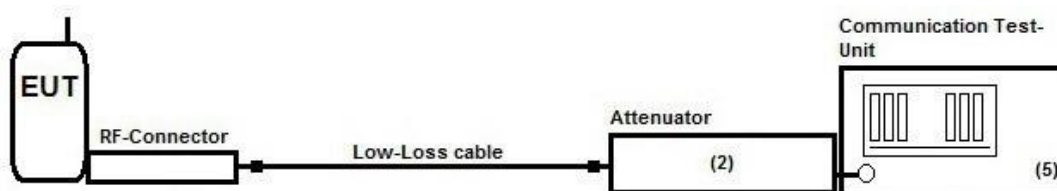
## 4.2 Peak to Average ratio (PAPR)

### 4.2.1 Description of the general test setup and methodology, see below example:

Following modified test set-up apply for tests performed inside the climatic chamber (frequency stability) or conducted RF-carrier power-measurement. The EUT RF-Signal is directly connected over suitable RF-connector over low-loss cable and an attenuator (2) to the cellular radio communication test-unit. (5).

The measurements were performed with the integrated power measurement function of the communication test-unit. (5).

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables *Summary of Test Results* and *Summary of Test Methods* on page 5)

#### EUT settings

The EUT was set to highest transmit power condition.

### 4.2.2 Measurement Location

|           |                             |
|-----------|-----------------------------|
| Test site | 120911 - Radio Laboratory 2 |
|-----------|-----------------------------|

### 4.2.3 Limit

|                                  |
|----------------------------------|
| Peak to average power ratio [dB] |
| ≤ 13                             |

### 4.2.4 Result

| Band      | Mode      | PAPR [dB] | Result |
|-----------|-----------|-----------|--------|
| W-CDMA II | W-CDMA II | 4.0       | PASSED |
| W-CDMA IV | W-CDMA IV | 3.8       | PASSED |
| W-CDMA V  | W-CDMA V  | 3.8       | PASSED |

Remark: for more information and graphical plot see annex A1 [CETECOM\\_TR20-1-0060701T67a\\_A1](#)

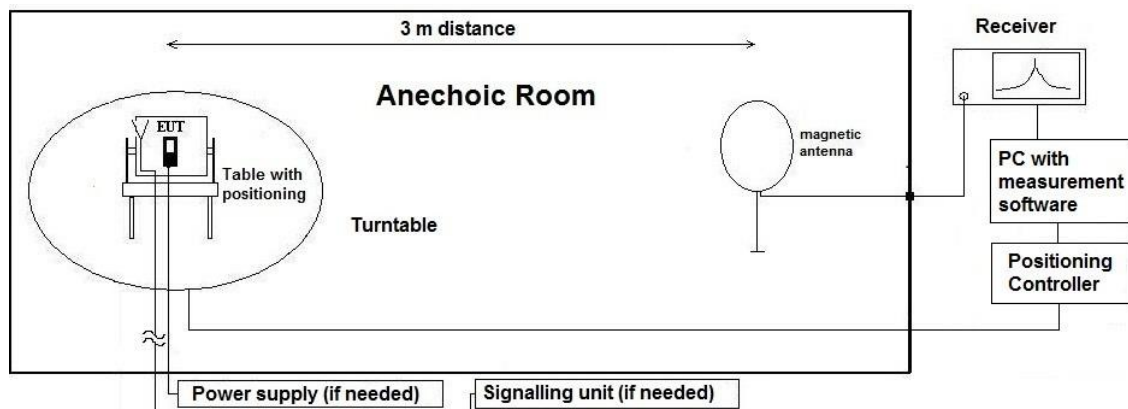
## 4.3 Radiated field strength emissions below 30 MHz

### 4.3.1 Description of the general test setup and methodology, see below example:

Evaluating the radiated field emissions are done first by an exploratory emission measurement and a final measurement for most critical frequencies determined.

The loop antenna was placed at 1 m height above ground plane and 3 m measurement distance from set-up for investigations. Because of reduced measurement distance, correction data were applied, as stated in chapter "General Limit - Radiated field strength emissions below 30 MHz". The tests are performed in the semi anechoic room recognized by the regulatory commission.

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
(See *Tables Summary of Test Results* and *Summary of Test Methods* on page 5)

#### Exploratory, preliminary measurements

The EUT and its associated accessories are placed on a non-conductive position manipulator (tipping device) of 0.8 m height which is placed on the turntable. By rotating the turntable (step 90°, range 0° to 360°) and the EUT itself either on 3-orthogonal axis (portable equipment) or 2-orthogonal axis (defined operational position of EUT), the emission spectrum was recorded.

The loop antenna was moved at least to 2-perpendicular axes (antenna vector in direction of EUT and parallel to EUT) in order to maximize the emissions. The results are documented in a diagram. Critical frequencies (low margin to limit) are saved within a data reduction table for further investigations. If various operating modes are supported, further investigations are made to find the worst-case. Also the interconnection cables and equipment position were varied in order to maximize the emissions.

#### Final measurement on critical frequencies

Based on the exploratory measurements, the most critical frequencies are re-measured by maintaining the EUT's worst-case operation mode, cable position, etc.

First a frequency zoom around the critical frequency is done to locate the frequency more precisely. After this step, for all identified critical frequencies, the maximum peak was determined.



Following parameters were varied: the turntable angle continuously in the range 0 to 360 degree, the EUT itself either over 3-orthogonal axis (not defined usage position) or 2-orthogonal axis (defined usage position).

On the determined worst-case position, a final measurement with necessary bandwidth and detector according standard has been carried out.

**Formula:**

$$E_C = E_R + AF + C_L + D_F - G_A$$

$$M = L_T - E_C$$

AF = Antenna factor

C<sub>L</sub> = Cable loss

D<sub>F</sub> = Distance correction factor (if used)

E<sub>C</sub> = Electrical field – corrected value

E<sub>R</sub> = Receiver reading

G<sub>A</sub> = Gain of pre-amplifier (if used)

L<sub>T</sub> = Limit

M = Margin

All units are dB-units, positive margin means value is below limit.

### 4.3.2 Correction factors due to reduced meas. distance (f < 30 MHz):

The used correction factors when the measurement distance is reduced compared to regulatory measurement distance, are calculated according Extrapolation formulas valid for EUT's with maximum dimension of 0.625xLambda. Formula 2+3+4 as presented in ANSI C63.10, Chapter 6.4.4 are used for the calculations of proper extrapolation factors

| Frequency Range | f [kHz/MHz] | Lambda [m] | Far-Field Point [m] | Distance Limit accord. 15.209 [m] | 1st Condition (dmeas < Dnear-field) | 2nd Condition (Limit distance bigger dnear-field) | Distance Correction accord. Formula |               |        |
|-----------------|-------------|------------|---------------------|-----------------------------------|-------------------------------------|---|-------------------------------------|---------------|--------|
| kHz             | 9           | 33333.33   | 5305.17             | 300                               | fulfilled                           | not fulfilled                                     | -80.00                              |               |        |
|                 | 10          | 30000.00   | 4774.65             |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |               |        |
|                 | 20          | 15000.00   | 2387.33             |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |               |        |
|                 | 30          | 10000.00   | 1591.55             |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |               |        |
|                 | 40          | 7500.00    | 1193.66             |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |               |        |
|                 | 50          | 6000.00    | 954.93              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |               |        |
|                 | 60          | 5000.00    | 795.78              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |               |        |
|                 | 70          | 4285.71    | 682.09              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |               |        |
|                 | 80          | 3750.00    | 596.83              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |               |        |
|                 | 90          | 3333.33    | 530.52              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |               |        |
|                 | 100         | 3000.00    | 477.47              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |               |        |
|                 | 125         | 2400.00    | 381.97              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |               |        |
|                 | 200         | 1500.00    | 238.73              |                                   | fulfilled                           | fulfilled   | -78.02                              |               |        |
|                 | 300         | 1000.00    | 159.16              |                                   | fulfilled                           | fulfilled   | -74.49                              |               |        |
|                 | 400         | 750.00     | 119.37              |                                   | fulfilled                           | fulfilled   | -72.00                              |               |        |
|                 | 490         | 612.24     | 97.44               |                                   | fulfilled                           | fulfilled   | -70.23                              |               |        |
|                 | MHz         | 500        | 600.00              |                                   | 95.49                               | 30  | fulfilled                           | not fulfilled | -40.00 |
|                 |             | 600        | 500.00              |                                   | 79.58                               |   | fulfilled                           | not fulfilled | -40.00 |
| 700             |             | 428.57     | 68.21               | fulfilled                         | not fulfilled                       |   | -40.00                              |               |        |
| 800             |             | 375.00     | 59.68               | fulfilled                         | not fulfilled                       |   | -40.00                              |               |        |
| 900             |             | 333.33     | 53.05               | fulfilled                         | not fulfilled                       |   | -40.00                              |               |        |
| 1.00            |             | 300.00     | 47.75               | fulfilled                         | not fulfilled                       |   | -40.00                              |               |        |
| 1.59            |             | 188.50     | 30.00               | fulfilled                         | not fulfilled                       |   | -40.00                              |               |        |
| 2.00            |             | 150.00     | 23.87               | fulfilled                         | fulfilled                           |   | -38.02                              |               |        |
| 3.00            |             | 100.00     | 15.92               | fulfilled                         | fulfilled                           |   | -34.49                              |               |        |
| 4.00            |             | 75.00      | 11.94               | fulfilled                         | fulfilled                           |   | -32.00                              |               |        |
| 5.00            |             | 60.00      | 9.55                | fulfilled                         | fulfilled                           |   | -30.06                              |               |        |
| 6.00            |             | 50.00      | 7.96                | fulfilled                         | fulfilled                           |   | -28.47                              |               |        |
| 7.00            |             | 42.86      | 6.82                | fulfilled                         | fulfilled                           |   | -27.13                              |               |        |
| 8.00            |             | 37.50      | 5.97                | fulfilled                         | fulfilled                           |   | -25.97                              |               |        |
| 9.00            |             | 33.33      | 5.31                | fulfilled                         | fulfilled                           |   | -24.95                              |               |        |
| 10.00           |             | 30.00      | 4.77                | fulfilled                         | fulfilled                           |   | -24.04                              |               |        |
| 10.60           |             | 28.30      | 4.50                | fulfilled                         | fulfilled                           |   | -23.53                              |               |        |
| 11.00           |             | 27.27      | 4.34                | fulfilled                         | fulfilled                           |   | -23.21                              |               |        |
| 12.00           |             | 25.00      | 3.98                | fulfilled                         | fulfilled                           |   | -22.45                              |               |        |
| 13.56           |             | 22.12      | 3.52                | fulfilled                         | fulfilled                           |   | -21.39                              |               |        |
| 15.00           |             | 20.00      | 3.18                | fulfilled                         | fulfilled                           |   | -20.51                              |               |        |
| 15.92           |             | 18.85      | 3.00                | fulfilled                         | fulfilled                           |   | -20.00                              |               |        |
| 17.00           |             | 17.65      | 2.81                | not fulfilled                     | fulfilled                           |   | -20.00                              |               |        |
| 18.00           |             | 16.67      | 2.65                | not fulfilled                     | fulfilled                           |   | -20.00                              |               |        |
| 20.00           |             | 15.00      | 2.39                | not fulfilled                     | fulfilled                           |   | -20.00                              |               |        |
| 21.00           |             | 14.29      | 2.27                | not fulfilled                     | fulfilled                           |   | -20.00                              |               |        |
| 23.00           |             | 13.04      | 2.08                | not fulfilled                     | fulfilled                           |   | -20.00                              |               |        |
| 25.00           |             | 12.00      | 1.91                | not fulfilled                     | fulfilled                           |   | -20.00                              |               |        |
| 27.00           |             | 11.11      | 1.77                | not fulfilled                     | fulfilled                           |   | -20.00                              |               |        |
| 29.00           |             | 10.34      | 1.65                | not fulfilled                     | fulfilled                           |   | -20.00                              |               |        |
| 30.00           | 10.00       | 1.59       | not fulfilled       | fulfilled                         | -20.00                              |   |                                     |               |        |

### 4.3.3 Measurement Location

|           |  |
|-----------|--|
| Test site | 120901 - SAC - Radiated Emission <1GHz |
|-----------|--|

### 4.3.4 Limit

| Radiated emissions limits, 3 meters |                                  |   |              |            |           |
|-------------------------------------|----------------------------------|---|--------------|------------|-----------|
| Frequency Range [MHz]               | Limit [ $\mu\text{V}/\text{m}$ ] | Limit [ $\text{dB}\mu\text{V}/\text{m}$ ] | Distance [m] | Detector   | RBW [kHz] |
| 0.009 – 0.09                        | 2400 / f [kHz]                   | 67.6 – 20Log(f) (kHz)                     | 300          | Pk & Avg   | 0.2       |
| 0.09 – 0.11                         | 2400 / f [kHz]                   | 67.6 – 20Log(f) (kHz)                     | 300          | Quasi peak | 0.2       |
| 0.11 – 0.15                         | 2400 / f [kHz]                   | 67.6 – 20Log(f) (kHz)                     | 300          | Pk & Avg   | 0.2       |
| 0.15 – 0.49                         | 2400 / f [kHz]                   | 67.6 – 20Log(f) (kHz)                     | 300          | Pk & Avg   | 9         |
| 0.49 – 1.705                        | 24000 / f [kHz]                  | 87.6 – 20Log(f) (kHz)                     | 30           | Quasi peak | 9         |
| 1.705 - 30                          | 30                               | 29.5                                      | 30           | Quasi peak | 9         |

\*Remark: In Canada same limits apply, just unit reference is different

### 4.3.5 Result

| Diagram              | Band         | Mode | Maximum Level [ $\text{dB}\mu\text{V}/\text{m}$ ]<br>Frequency Range 0.009 – 30 MHz | Result |
|----------------------|--------------|------|---|--------|
| <a href="#">2.01</a> | UMTS Band II | 1    | 21.02   | Passed |
| <a href="#">2.02</a> | UMTS Band II | 1    | 18.39   | Passed |
| <a href="#">2.03</a> | UMTS BAND V  | 2    | 20.76   | Passed |
| <a href="#">2.04</a> | UMTS BAND V  | 2    | 20.00   | Passed |
| <a href="#">2.05</a> | UMTS BAND IV | 3    | 19.68   | Passed |
| <a href="#">2.06</a> | UMTS BAND IV | 3    | 17.67   | Passed |

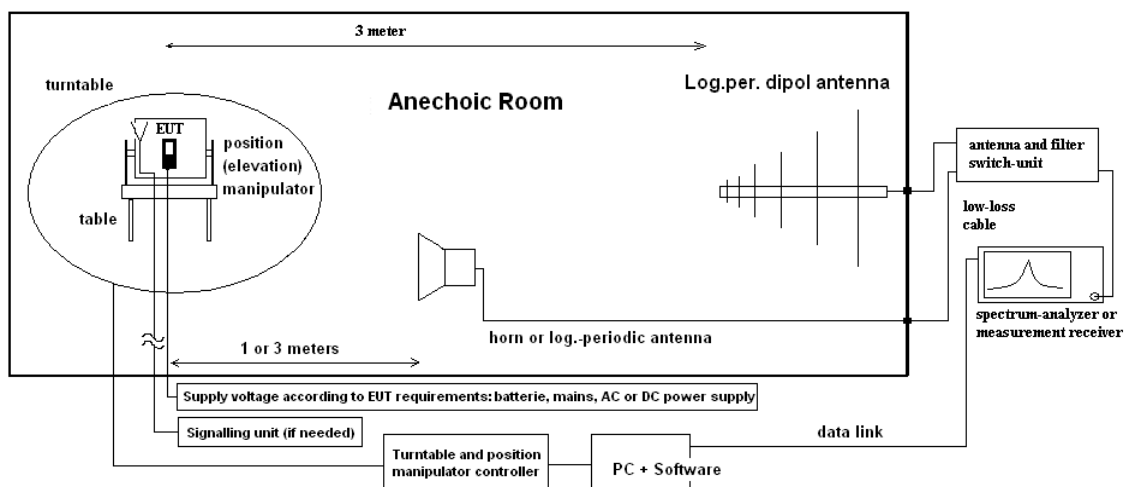
Remark: for more information and graphical plot see annex A1 **CETECOM\_TR20-1-0060701T67a\_A1**

## 4.4 Radiated spurious emissions

### 4.4.1 Description of the general test setup and methodology, see below example:

Evaluating the emissions have to be done first by an exploratory emissions measurement and a final measurement for most critical frequencies. The tests are performed in a CISPR 16-1-4:2010 compliant fully anechoic room (FAR) recognized by the regulatory commission. The measurement distance was set to 3 meter for frequencies up to 18 GHz and 2 meter above 18 GHz. A logarithmic periodic antenna is used for the frequency range 30 MHz to 1 GHz. Horn antennas are used for frequency range 1 GHz to 40 GHz. The EUT is aligned within 3 dB beam width of the measurement antenna with three orthogonal axis measurements on the EUT.

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables *Summary of Test Results* and *Summary of Test Methods* on page 5)

##### Exploratory, preliminary measurements

The EUT and its associated accessories are placed on a non-conductive position manipulator (tipping device) of 1.50 m height which is placed on the turntable. By rotating the turntable (range 0° to 360°, step 45°) and the EUT itself on 3-orthogonal axis (the emission spectrum and its characteristics was recorded with an EMI-receiver, broadband antenna and software).

The measurements are performed in horizontal and vertical polarization of the measurement antennas. The results are documented in a diagram. Critical frequencies (low margin to limit) are saved within a table for further investigations. If various operating modes are supported, further investigations are made to find the worst-case of them. Also the interconnection cables and equipment position were varied in order to maximize the emissions.

##### Final measurement on critical frequencies

Based on the exploratory measurements, the most critical frequencies are re-measured by main-taining the EUT's worst-case operation mode, cable position, etc.

First a frequency zoom around the critical frequency is done to locate the frequency more precisely. After this step, for all identified critical frequencies, the maximum peak was determined.

Following parameters were varied: the turntable angle continuously in the range 0 to 360 degree, the EUT itself over 3-orthogonal axis and the height for EUT with large dimensions.

On the determined worst-case position, a final measurement with necessary bandwidth and detector according standard has been carried out.

The readings on the spectrum analyzer are corrected with conversion value between field strength and E(I)RP, so the readings shown are equivalent to ERP/EIRP values. Critical measurements near the limit are re-measured with a substitution method accord. ANSI/TIA/EIA 603 C/D

**Formula:**

$$P_{EIRP} = P_{MEAS} + C_L + FSL - G_{PreA} - G_{ANT} \quad (1)$$

$P_{MEAS}$  = measured power at instrument

M = Margin

$L_T$  = Limit

FSL = Free Space loss = Function(frequency, measurement distance)

$$M = L_T - P_{EIRP}$$

$C_L$  = cable loss

$G_{PreA}$  = Gain of pre-amplifier (if used)

$G_{ANT}$  = Gain of antenna in [dBi]

All units are dB-units, positive margin means value is below limit.

**4.4.2 Measurement Location**

|           |                                    |
|-----------|------------------------------------|
| Test site | 120904 - FAC1 - Radiated Emissions |
|-----------|------------------------------------|

**4.4.3 Limit**

| Frequency Range [MHz] | Limit [dBm] | Detector [MaxHold] | RBW / VBW [MHz] |
|-----------------------|-------------|--------------------|-----------------|
| 30 - 8500             | -13         | Peak               | 1 / 3           |
| 30 - 17500            | -13         | Peak               | 1 / 3           |
| 30 - 19100            | -13         | Peak               | 1 / 3           |

**4.4.4 Result**

| Diagram               | Band       | Mode | 30 to 1000 MHz | 1 to 2.8 GHz   | 2.8 to 10 <sup>th</sup> Harmonics | Stop Freq [MHz] | Result |
|-----------------------|------------|------|----------------|----------------|-----------------------------------|-----------------|--------|
| <a href="#">8.01</a>  | UMTS FDDII | 1    | No peaks found | No peaks found | No peaks found                    | 18000           | Passed |
| <a href="#">8.01a</a> | UMTS FDDII | 1    | No peaks found | No peaks found | No peaks found                    | 19500           | Passed |
| <a href="#">8.02</a>  | UMTS FDDII | 1    | No peaks found | No peaks found | No peaks found                    | 18000           | Passed |
| <a href="#">8.02a</a> | UMTS FDDII | 1    | No peaks found | No peaks found | No peaks found                    | 19500           | Passed |
| <a href="#">8.03</a>  | UMTS FDDIV | 2    | No peaks found | No peaks found | No peaks found                    | 18000           | Passed |
| <a href="#">8.04</a>  | UMTS FDDIV | 2    | No peaks found | No peaks found | No peaks found                    | 18000           | Passed |
| <a href="#">8.05</a>  | UMTS FDDV  | 3    | No peaks found | No peaks found | No peaks found                    | 9000            | Passed |
| <a href="#">8.06</a>  | UMTS FDDV  | 3    | No peaks found | No peaks found | No peaks found                    | 9000            | Passed |

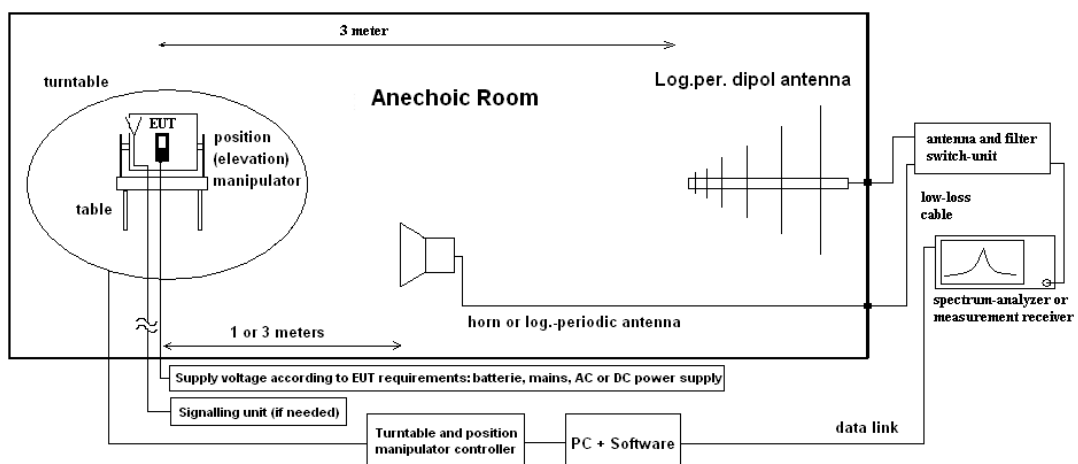
Remark: for more information and graphical plot see annex A1 **CETECOM\_TR20-1-0060701T67a\_A1**

## 4.5 Radiated Band Edge

### 4.5.1 Description of the general test setup and methodology, see below example:

Evaluating the emissions have to be done first by an exploratory emissions measurement and a final measurement for most critical frequencies. The tests are performed in a CISPR 16-1-4:2010 compliant fully anechoic room (FAR) recognized by the regulatory commission. The measurement distance was set to 3 meter for frequencies up to 18 GHz and 2 meter above 18 GHz. A logarithmic periodic antenna is used for the frequency range 30 MHz to 1 GHz. Horn antennas are used for frequency range 1 GHz to 40 GHz. The EUT is aligned within 3 dB beam width of the measurement antenna with three orthogonal axis measurements on the EUT

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables *Summary of Test Results* and *Summary of Test Methods* on page 5)

See chapter Radiated Spurious Emission for Test method.

### 4.5.2 Measurement Location

|           |                                    |
|-----------|------------------------------------|
| Test site | 120904 - FAC1 - Radiated Emissions |
|-----------|------------------------------------|

### 4.5.3 Limit

| Frequency Range [MHz]     | Limit [dBm] | Detector [MaxHold] | RBW / VBW [kHz] |
|---------------------------|-------------|--------------------|-----------------|
| Below 824 and above 849   | -13         | Peak               | 3 / 3           |
| Below 1710 and above 1755 | -13         | Peak               | 3 / 3           |
| Below 1850 and above 1910 | -13         | Peak               | 3 / 3           |

#### 4.5.4 Result

| Diagram               | Band        | Mode | Edge [Low / High] | Value [dBm]    | Result |
|-----------------------|-------------|------|-------------------|----------------|--------|
| <a href="#">9.201</a> | UMTS FDD II | 1    | Low               | No peaks found | Passed |
| <a href="#">9.202</a> | UMTS FDD II | 1    | High              | No peaks found | Passed |
| <a href="#">9.401</a> | UMTS FDD IV | 2    | Low               | No peaks found | Passed |
| <a href="#">9.402</a> | UMTS FDD IV | 2    | High              | No peaks found | Passed |
| <a href="#">9.501</a> | UMTS FDD V  | 3    | Low               | No peaks found | Passed |
| <a href="#">9.502</a> | UMTS FDD V  | 3    | High              | No peaks found | Passed |

Remark: for more information and graphical plot see annex A1 **CETECOM\_TR20-1-0060701T67a\_A1**

#### 4.6 Results from external laboratory

|      |   |
|------|---|
| None | - |
|------|---|

#### 4.7 Opinions and interpretations

|      |   |
|------|---|
| None | - |
|------|---|

#### 4.8 List of abbreviations

|      |   |
|------|---|
| None | - |
|------|---|

### 5 Equipment lists

| ID    | Description                                      | Manufacturer                          | SerNo       | Cal due date       |
|-------|--|---------------------------------------|-------------|--------------------|
|       | <b>120901 - SAC - Radiated Emission &lt;1GHz</b> |                                       |             | <b>2025-Jul-21</b> |
| 20574 | Biconilog Hybrid Antenna BTA-L                   | Frankonia GmbH                        | 980026L     | 2022-May-03        |
| 20487 | CETECOM Semi Anechoic Chamber < 1GHz             | ETS-Lindgren GmbH                     | -           | 2025-Jul-15        |
| 20620 | EMI Test Receiver ESU26                          | Rohde & Schwarz Messgerätebau GmbH    | 100362      | 2022-May-21        |
| 20482 | filter matrix Filter matrix SAR 1                | CETECOM GmbH                          | -           | -                  |
| 25038 | Loop Antenna HFH2-Z2                             | Rohde & Schwarz Messgerätebau GmbH    | 879824/13   | 2022-Apr-07        |
| 20885 | Power Supply EA3632A                             | Agilent Technologies Deutschland GmbH | 75305850    | -                  |
|       | <b>120904 - FAC1 - Radiated Emissions</b>        |                                       |             |                    |
| 20341 | Digital Multimeter Fluke 112                     | Fluke Deutschland GmbH                | 81650455    | 2022-May-25        |
| 20489 | EMI Test Receiver ESU40                          | Rohde & Schwarz Messgerätebau GmbH    | 1000-30     | 2022-May-19        |
| 20254 | High Pass Filter 5HC 2600/12750-1.5KK            | Trilithic                             | 23042       | -                  |
| 20868 | High Pass Filter AFH-07000                       | AtlanTecRF                            | 16071300004 | -                  |
| 20291 | High Pass Filter WHJ 2200-4EE                    | Wainwright Instruments GmbH           | 14          | -                  |
| 20020 | Horn Antenna 3115 (Subst 1)                      | EMCO Elektronik GmbH                  | 9107-3699   | 2021-Jul-19        |
| 20302 | Horn Antenna BBHA9170 (Meas 1)                   | Schwarzbeck Mess-Elektronik OHG       | 155         | 2023-Apr-15        |
| 20549 | Log. Per. Antenna HL025                          | Rohde & Schwarz Messgerätebau GmbH    | 1000060     | 2021-Jul-31        |
| 20720 | Measurement Software EMC32 [FAC]                 | Rohde & Schwarz Messgerätebau GmbH    | V10.xx      | -                  |
| 20512 | Notch Filter WRCA 800/960-02/40-6EEK (GSM 850)   | Wainwright Instruments GmbH           | 24          | -                  |
| 20290 | Notch Filter WRCA 901,9/903,1SS                  | Wainwright Instruments GmbH           | 3RR         | -                  |
| 20122 | Notch Filter WRCB 1747/1748                      | Wainwright Instruments GmbH           | 12          | -                  |
| 20121 | Notch Filter WRCB 1879,5/1880,5EE                | Wainwright Instruments GmbH           | 15          | -                  |
| 20448 | Notch Filter WRCT 1850.0/2170.0-5/40-10SSK       | Wainwright Instruments GmbH           | 5           | -                  |



| ID    | Description  | Manufacturer                          | SerNo          | Cal due date |
|-------|--|---------------------------------------|----------------|--------------|
| 20066 | Notch Filter WRCT 1900/2200-5/40-10EEK                         | Wainwright Instruments GmbH           | 5              | -            |
| 20449 | Notch Filter WRCT 824.0/894.0-5/40-8SSK                        | Wainwright Instruments GmbH           | 1              | -            |
| 20700 | PC ctc662012 [FAC]   | Dell Inc.                             | -              | -            |
| 20611 | Power Supply E3632A  | Agilent Technologies Deutschland GmbH | KR 75305854    | -            |
| 20338 | Pre-Amplifier 100MHz - 26GHz JS4-00102600-38-5P                | Miteq Inc.                            | 838697         | -            |
| 20484 | Pre-Amplifier 2,5GHz - 18GHz AMF-5D-02501800-25-10P            | Miteq Inc.                            | 1244554        | -            |
| 20287 | Pre-Amplifier 25MHz - 4GHz AMF-2D-100M4G-35-10P                | Miteq Inc.                            | 379418         | -            |
| 20670 | Radio Communication Tester CMU200                              | Rohde & Schwarz Messgerätebau GmbH    | 106833         | 2022-Jun-16  |
| 20690 | Spectrum Analyzer FSU  | Rohde & Schwarz Messgerätebau GmbH    | 100302/026     | 2023-May-20  |
| 20439 | Ultrabroadband-Antenna HL562                                   | Rohde & Schwarz Messgerätebau GmbH    | 100248         | 2023-Mar-10  |
| 20793 | Wideband Radio Communication Tester CMW500                     | Rohde & Schwarz Messgerätebau GmbH    | 163673         | 2023-Jul-02  |
|       | <b>120910 - Radio Laboratory 1 (TS 8997)</b>                   |                                       |                |              |
| 20904 | Climatic Chamber ClimeEvent C/1000/70a/5                       | Weiss Umwelttechnik GmbH              | 58226223240010 | 2022-May-09  |
| 20872 | NRX Power Meter  | Rohde & Schwarz Messgerätebau GmbH    | 101831         | 2022-Jan-28  |
| 20805 | Open Switch and control Platform OSP B157WX 40GHz 8Port Switch | Rohde & Schwarz Messgerätebau GmbH    | 101264         | 2023-May-13  |
| 20691 | Open Switch and control Platform OSP120                        | Rohde & Schwarz Messgerätebau GmbH    | 101056         | 2023-May-13  |
| 20866 | Signal Analyzer FSV3030  | Rohde & Schwarz Messgerätebau GmbH    | 101247         | 2021-Sep-09  |
| 20687 | Signal Generator SMF 100A                                      | Rohde & Schwarz Messgerätebau GmbH    | 102073         | 2022-May-25  |
| 20559 | Vector Signal Generator SMU200A                                | Rohde & Schwarz Messgerätebau GmbH    | 103736         | 2023-May-20  |
| 20594 | Wideband Radio Communication Tester CMW500                     | Rohde & Schwarz Messgerätebau GmbH    | 101757         | 2022-May-30  |

## 6 Measurement Uncertainty valid for conducted/radiated measurements

The reported uncertainties are calculated based on the standard uncertainty multiplied with the appropriate coverage factor  $k$ , such that a confidence level of approximately 95% is achieved. For uncertainty determination, each component used in the concrete measurement set-up was taken in account and its contribution to the overall uncertainty according its statistical distribution calculated.

| RF-Measurement                               | Reference | Frequency range      | Calculated uncertainty based on a confidence level of 95% |        |      |      |      |    | Remarks                   |
|--|-----------|----------------------|---|--------|------|------|------|----|---------------------------|
| Conducted emissions<br>(U <sub>CISPR</sub> ) | -         | 9 kHz - 150 kHz      | 4.0 dB  |        |      |      |      |    | -                         |
|  |           | 150 kHz - 30 MHz     | 3.6 dB  |        |      |      |      |    |                           |
| Power Output radiated                        | -         | 30 MHz - 4 GHz       | 3.17 dB   |        |      |      |      |    | Substitution method       |
| Power Output conducted                       | -         | Set-up No.           | Cel-C1  | Cel-C2 | BT1  | W1   | W2   | -- | -                         |
|  |           | 9 kHz - 12.75 GHz    | N/A   | 0.60   | 0.7  | 0.25 | N/A  | -- |                           |
|  |           | 12.75 GHz - 26.5 GHz | N/A   | 0.82   | --   | N/A  | N/A  | -- |                           |
| Conducted emissions on RF-port               | -         | 9 kHz - 2.8 GHz      | 0.70  | N/A    | 0.70 | N/A  | 0.69 | -- | N/A - not applicable      |
|  |           | 2.8 GHz - 12.75 GHz  | 1.48  | N/A    | 1.51 | N/A  | 1.43 | -- |                           |
|  |           | 12.75 GHz - 18 GHz   | 1.81  | N/A    | 1.83 | N/A  | 1.77 | -- |                           |
|  |           | 18 GHz - 26.5 GHz    | 1.83  | N/A    | 1.85 | N/A  | 1.79 | -- |                           |
| Occupied bandwidth                           | -         | 9 kHz - 4 GHz        | 0.1272 ppm (Delta Marker)                                 |        |      |      |      |    | Frequency error           |
|  |           |                      | 1.0 dB  |        |      |      |      |    | Power                     |
| Emission bandwidth                           | -         | 9 kHz - 4 GHz        | 0.1272 ppm (Delta Marker)                                 |        |      |      |      |    | Frequency error           |
|  | -         |                      | See above: 0.70 dB  |        |      |      |      |    | Power                     |
| Frequency stability                          | -         | 9 kHz - 20 GHz       | 0.0636 ppm  |        |      |      |      |    | -                         |
| Radiated emissions Enclosure                 | -         | 150 kHz - 30 MHz     | 5.01dB  |        |      |      |      |    | Magnetic field strength   |
|  |           | 30 MHz - 1 GHz       | 5.83 dB   |        |      |      |      |    | Electrical Field strength |
|  |           | 1 GHz - 18 GHz       | 4.91 dB   |        |      |      |      |    |                           |
|  |           | 18-26.5 GHz          | 5.06 dB   |        |      |      |      |    |                           |

## 7 Versions of test reports (change history)

| Version | Applied changes  | Date of release |
|---------|--|-----------------|
| --      | Initial release  | 2021-Jul-19     |
| C1      | <ul style="list-style-type: none"><li>➤ Chapter 3.2, Antenna gain has been updated,</li><li>➤ Chapter 5, Equipment List has been verified and Calibration date has been updated.</li></ul> | 2021-Jul-27     |
| --      | --   | --              |

**End Of Test Report**