







**PARTIAL TEST REPORT**  
No.: 2-0023-11-1-7a

According to:  
**FCC Regulations**  
 Part 15.107&15.111, Part 15.109 Class B  
**IC-Regulations**  
 RSS-132 Issue 2 & RSS-133 Issue 5  
 RSS-Gen, Issue 3

for  
 Research In Motion Limited  
  
 smartphone REA71UW  
  
 smartphone REB71UW

| Laboratory Accreditation and Listings  |   |  |   |
|--|---|--|---|
| <br><b>DAkks</b><br>Deutsche<br>Akkreditierungsstelle<br>D-PL-12047-01-01   | <br>FEDERAL COMMUNICATIONS COMMISSION<br>USA<br>Reg. No.: 736496<br>MRA US-EU 0003 | <br>Industry Canada<br>Reg. No.: 3462D-1<br>Reg. No.: 3462D-2<br>Reg. No.: 3462D-3 | <br>Voluntary Controls for<br>Electromagnetic Emissions<br>Reg. No.: R-2665, R-2666<br>C-2914, T-1967, G-301 |
| <br><b>WiFi</b><br>ALLIANCE<br>AUTHORIZED<br>RF LABORATORY  | <br><b>CTIA Authorized Test Lab</b><br>LAB CODE 20011130-00                       |  |   |
| accredited according to DIN EN ISO/IEC 17025   |   |  |   |
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40

### 1. Summary of test results

The test results apply exclusively to the test samples as presented in chapter 3.1. The CETECOM GmbH does not assume responsibility for any conclusions and generalizations taken in conjunction with other specimens or samples of the type of the item presented to tests.

The presented Smartphone includes GSM/(E)GPRS 850/1900 and W-CDMA Band II and V respective W-CDMA Band IV technology. This test report shows tests results performed in IDLE Mode only. Following tests have been performed to show compliance with applicable FCC Part 15.107 class B, 15.109 class B and 15.207 (10-1-10 Edition) and RSS-Gen standards.

#### 1.1. RX Mode TESTS OVERVIEW FCC Part 15 and Canada IC Standards (RSS)

| TEST CASES                            | PORT   | REFERENCES & LIMITS         |  |  | EUT set-up                  | EUT op-mode          | Result |
|---------------------------------------|--|-----------------------------|--|--|-----------------------------|----------------------|--------|
|                                       |  | FCC Standard                | RSS Section  | TEST LIMIT   |                             |                      |        |
| AC-Power Lines<br>Conducted Emissions | AC-Power lines                                 | §15.107<br>§15.207          | RSS-Gen, Issue 3:<br>Chapter 7.2.4   | FCC §15.107 class B limits<br>§15.207 limits<br><br>IC: Table 4, Chapter 7.2.4 | 1 + 2 + 3<br>+ 4 + 5 +<br>6 | 1 + 2 + 3<br>+ 5 + 6 | Passed |
| RECEIVER<br>Radiated emissions        | Cabinet +<br>Interconnecting cables (radiated) | §15.109<br>§15.33<br>§15.35 | RSS-132,<br>Issue 2: 4.6<br>RSS-Gen,<br>Issue 3: 6.1<br><br>RSS-133,<br>Issue 5: 6.6 | FCC 15.109 class B limits<br><br>IC-limits:<br>Table 1, Chapter 6              | 1 + 2 + 3<br>+ 4 + 5 +<br>6 | 1 + 2 + 3<br>+ 5 + 6 | Passed |
| RECEIVER<br>Conducted emissions       | Antenna terminal (conducted)                   | §2.1051<br>§15.111          | RSS-Gen: 6.2<br>RSS-132: 4.6<br>RSS-133: 6.7(b)<br>RSS-139: 6.6                      | 43+10log(P) dBc<br>IC: < 2 nW/4kHz (30<F<1000MHz)<br>< 5nW/4kHz (F > 1GHz)     | 7 + 8                       | 1 + 2 + 3<br>+ 4 + 5 | Passed |

Remark: --

**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 requirements as shown in above table are met in accordance with enumerated standards.

.....  
Dipl.-Ing. W. Richter  
Responsible for test section

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.....  
Dipl.-Ing. B. Taslica  
Responsible for test report

## 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. W. Richter   |
| Deputy:                             | Dipl.-Ing. J. Schmitt   |
| Laboratory accreditations/Listings: | DAkkS-Registration No. D-PL-12047-01-01<br>FCC-Registration No.: 736496, MRA US-EU 0003<br>IC-Registration No. 3462D-1, 3462D-2, 3462D-3<br>VCCI Reg. No. R-2665, R-2666, C-2914, T-1967, G-301 |

### 2.2. Test location

#### 2.2.1. Test laboratory "CTC"

|               |   |
|---------------|---|
| Company name: | see chapter 2.1. Identification of the testing laboratory |
|---------------|---|

### 2.3. Organizational items

|   |                         |
|---|-------------------------|
| Order No.:                                      | 2-0023-11-1             |
| Responsible for test report and project leader: | Dipl.-Ing. B. Taslica   |
| Receipt of EUT:                                 | 2011-08-15              |
| Date(s) of test:                                | 2011-08-16 - 2011-09-29 |
| Date of report:                                 | 2011-10-07              |
| -----   |                         |
| Version of template:                            | 11.05 _All.Dotm         |

### 2.4. Applicant's details

|                   |   |
|-------------------|---|
| Applicant's name: | Research In Motion Limited                              |
| Address:          | 440 Phillip Street<br>N2L 5R9 Waterloo ON<br><br>CANADA |
| Contact person:   | Mr. Masud Attayi  |

### 2.5. Manufacturer's details

|                      |   |
|----------------------|---|
| Manufacturer's name: | Research In Motion Limited                              |
| Address:             | 295 Phillip Street<br>N2L 3W8 Waterloo ON<br><br>CANADA |

### 3. Equipment under test (EUT)

#### 3.1. Additional declaration and description of main EUT

|                        |   |  |                                      |
|------------------------|---|--|--------------------------------------|
| Main function          | Smartphone  |  |                                      |
| Type                   | REA71UW   |  |                                      |
| TX-frequency range     | GSM 850: 824 – 849MHz (Uplink), 869-894MHz (Downlink)<br>GSM1900: 1850-1910MHz (Uplink), 1930-1990MHz (Downlink)<br>FDD Band 2: 1852.4–1907.6 MHz (Uplink), 1930-1990MHz (Downlink)<br>FDD Band 5: 826.4-846.6 MHz (Uplink), 869-894MHz (Downlink)  |  |                                      |
| Type of modulation     | GSM-mode: GMSK<br>GPRS-Mode: 8-PSK<br>FDD-Mode Release99: QPSK<br>FDD Mode Release 5+6: 16QAM additionally  |  |                                      |
| Number of channels     | GSM 850: 128 – 251, 125 channels<br>GSM1900: 512 – 810, 300 channels<br>FDD Band 2: UARFCN range 9262 – 9400 – 9538<br>FDD Band 5: UARFCN range 4132 – 4183 – 4233  |  |                                      |
| EMISSION DESIGNATOR(S) | 246KGXW (GSM850)<br>248KGXW (EDGE850)<br>243KG7W (GSM1900)<br>246KG7W (EDGE 1900)   |  |                                      |
| Antenna Type           | <input checked="" type="checkbox"/> Integrated<br><input type="checkbox"/> External, no RF- connector<br><input type="checkbox"/> External, separate RF-connector   |  |                                      |
| FCC-ID                 | L6AREA70UW  |  |                                      |
| IC                     | 2503A-REA70UW   |  |                                      |
| Installed option       | <input checked="" type="checkbox"/> GSM900 and GSM1800 Bands (not usable in USA/Canada)<br><input checked="" type="checkbox"/> W-LAN, Bluetooth®<br><input checked="" type="checkbox"/> battery charging option<br><input checked="" type="checkbox"/> GPS (not tested within this test report) |  |                                      |
| Power supply           |   |  |                                      |
| Special EMI components | --  |  |                                      |
| EUT sample type        | <input type="checkbox"/> Production   | <input checked="" type="checkbox"/> Pre-Production | <input type="checkbox"/> Engineering |

|                        |   |  |                                      |
|------------------------|---|--|--------------------------------------|
| Main function          | Smartphone  |  |                                      |
| Type                   | REB71UW   |  |                                      |
| TX-frequency range     | GSM 850: 824 – 849MHz (Uplink), 869-894MHz (Downlink)<br>GSM1900: 1850-1910MHz (Uplink), 1930-1990MHz (Downlink)<br>FDD Band 4: 1712.4–1752.6 MHz (Uplink), 2110-2155MHZ (Downlink)   |  |                                      |
| Type of modulation     | GSM-mode: GMSK<br>GPRS-Mode: 8-PSK<br>FDD-Mode Release99: QPSK<br>FDD Mode Release 5+6: 16QAM additionally  |  |                                      |
| Number of channels     | GSM 850: 128 – 251, 125 channels<br>GSM1900: 512 – 810, 300 channels<br>FDD Band 4: UARFCN range 1312 – 1450 – 1513   |  |                                      |
| EMISSION DESIGNATOR(S) | 246KGXW (GSM850)<br>248KGXW (EDGE850)<br>243KG7W (GSM1900)<br>246KG7W (EDGE 1900)   |  |                                      |
| Antenna Type           | <input checked="" type="checkbox"/> Integrated<br><input type="checkbox"/> External, no RF- connector<br><input type="checkbox"/> External, separate RF-connector   |  |                                      |
| FCC-ID                 | L6AREB70UW  |  |                                      |
| IC                     | 2503A-REB70UW   |  |                                      |
| Installed option       | <input checked="" type="checkbox"/> GSM900 and GSM1800 Bands (not usable in USA/Canada)<br><input checked="" type="checkbox"/> W-LAN, Bluetooth®<br><input checked="" type="checkbox"/> battery charging option<br><input checked="" type="checkbox"/> GPS (not tested within this test report) |  |                                      |
| Power supply           |   |  |                                      |
| Special EMI components | --  |  |                                      |
| EUT sample type        | <input type="checkbox"/> Production   | <input checked="" type="checkbox"/> Pre-Production | <input type="checkbox"/> Engineering |

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

| Short description*) | EUT        | Type    | S/N serial number   | HW hardware status | SW software status                          |
|---------------------|------------|---------|---------------------|--------------------|---|
| EUT A               | smartphone | REA71UW | Sample 27           | Rev1               | v7.0.0.368<br>PL: 9.32.0.13<br>Bundle: 1755 |
| EUT B               | smartphone | REA71UW | 0044011384593<br>14 | Rev2               | v7.0.0.368<br>PL: 9.32.0.13<br>Bundle: 1755 |
| EUT C               | smartphone | REB71UW | 004401138460<br>353 | Rev2               | v7.0.0.378<br>PL: 9.32.0.13<br>Bundle: 1755 |

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

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

| AE short description *) | Auxiliary Equipment                             | Type          | S/N serial number | HW hardware status | SW software status |
|-------------------------|---|---------------|-------------------|--------------------|--------------------|
| SHS1                    | Premium Stereo Headset                          | HDW-15766-005 | N/A               | N/A                | N/A                |
| SHS2                    | 2nd gen Standard Stereo Headset (Hoisdén)       | HDW-24529-001 | N/A               | N/A                | N/A                |
| SHS3                    | 2nd gen Standard Stereo Headset (AAC)           | HDW-24529-001 | N/A               | N/A                | N/A                |
| SHS4                    | Bluetooth Headset                               | HDW-25937-001 | N/A               | N/A                | N/A                |
| CH1                     | Cobra Fixed Blade (Flextronics) Rev1 (1.2m USB) | HDW-24481-001 | N/A               | N/A                | N/A                |
| CH2                     | Cobra Fixed Blade (Flextronics) Rev2            | HDW-24481-001 | N/A               | N/A                | N/A                |
| CH3                     | Cobra Fixed Blade (Phihong)                     | HDW-24481-001 | N/A               | N/A                | N/A                |
| CH4                     | NA Folding Blade (1.8 Amp)                      | HDW-34724-001 | N/A               | N/A                | N/A                |
| CH5                     | NA Folding Blade - LC                           | HDW-44303-001 | N/A               | N/A                | N/A                |
| CH6                     | Worldwide Captive Cable Charger - 750mA         | HDW-17957-003 | N/A               | N/A                | N/A                |
| CH7                     | Cobra EU Charger                                | HDW-29713-001 | N/A               | N/A                | N/A                |
| CH8                     | Cobra UK Charger                                | HDW-29714-001 | N/A               | N/A                | N/A                |
| CH9                     | Fixed Blade EU Charger                          | HDW-44303-002 | N/A               | N/A                | N/A                |

N/A: not announced

| AE short description *) | Auxiliary Equipment      | Type          | S/N serial number | HW hardware status | SW software status |
|-------------------------|--------------------------|---------------|-------------------|--------------------|--------------------|
| USB_1                   | 1.2m USB Cable           | HDW-28109-003 | N/A               | N/A                | N/A                |
| USB_2                   | 0.3m USB Cable           | HDW-28109-001 | N/A               | N/A                | N/A                |
| USB_3                   | USB Y-Cable              | HDW-19137-002 | N/A               | N/A                | N/A                |
| EBC                     | External Battery Charger | HDW-24478-001 | N/A               | N/A                | N/A                |

\*) AE short description is used to simplify the identification of the auxiliary equipment in this test report.  
N/A: not announced

### 3.4. EUT set-ups

| EUT set-up no. *) | Combination of EUT and AE           | Remarks |
|-------------------|-------------------------------------|---------|
| Set. 1            | EUT A + SHS_1 + CHR_6 + USB_1       |         |
| Set. 2            | EUT A + SHS_2 + CHR_2 + USB_2       |         |
| Set. 3            | EUT A + SHS_3 + CHR_3 + USB_2       |         |
| Set. 4            | EUT A + SHS_4 + CHR_6 + USB_3 + EBC |         |
| Set. 5            | EUT A + SHS_1 + CHR_4 + USB_1       |         |
| Set. 6            | EUT A + SHS_2 + CHR_5 + USB_2       |         |
| Set. 7            | EUT B + Dummy battery               |         |
| Set. 8            | EUT C + Dummy battery               |         |

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



### 3.5. EUT operating modes

| EUT operating mode no. *) | Description of operating modes           | Additional information   |
|---------------------------|--|--|
| op. 1                     | GSM 850<br>Idle mode<br>BCCH 50          | The mobile station is synchronized to the Broadcast Control Channel (BCCH) and listening to the Common Control Channel (CCCH). Periodic location update is disabled. |
| op. 2                     | GSM 1900<br>Idle mode<br>BCCH 651        | The mobile station is synchronized to the Broadcast Control Channel (BCCH) and listening to the Common Control Channel (CCCH).                                       |
| op. 3                     | <b>UMTS UTRA/<br/>FDD 2</b><br>IDLE-MODE | The mobile is synchronized to the UMTS base station.   |
| op. 4                     | <b>UMTS UTRA/<br/>FDD 4</b><br>IDLE-MODE | The mobile is synchronized to the UMTS base station.   |
| op. 5                     | <b>UMTS UTRA/<br/>FDD 5</b><br>IDLE-MODE | The mobile is synchronized to the UMTS base station.   |
| op. 6                     | Charging battery                         | Charging standard battery. This operating mode is combined with other op. modes.   |

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

### 3.6. Parameter Settings on mobile phone and base station CMU200

Following settings apply to the MS during the measurements in **GSM/(E)GPRS-Mode** only:

| Parameter   | Traffic Mode  | Idle Mode         |
|---|---|-------------------|
| Traffic Channels mobile station (EUT)                   | GSM 850 TCH <sub>MS</sub> = 128/ 192 /251<br>GSM 1900 TCH <sub>MS</sub> = 512 / 681 / 810 | --                |
| maximum power level (PCL)                               | GSM 850: PCL = 5 (2 Watt)<br>GSM 1900: PCL = 0 (1 Watt)                                   | --                |
| Modulation  | GSM: GMSK-Modulation Scheme<br>EDGE: 8-PSK Modulation Scheme                              | --                |
| DTX   | off   | --                |
| Bitstream   | PRBS 2E9-1 (pseudo-random-sequence) – CCITT 0.153   |                   |
| Timeslot  | 3   |                   |
| Hopping   | off   |                   |
| Timeslot (slot mode)                                    | GSM-Mode: single<br>GPRS-Mode: maximum allowed<br>uplink slots no. according MS class     |                   |
| Maximum data transmission rate, single time slot        | GSM: 17,6 kBit/s Slot<br>EDGE: 59,2 kBit/s Slot   |                   |
| Speech transcoding (Traffic Mode)                       | Full rate Version 1   |                   |
| Mode  | BCCH and TCH  |                   |
| BCCH – base station (CMU,CMD)                           | GSM 850: 182<br>GSM 1900: 651   |                   |
| TCH – base station (CMD, CMU)                           | auto  |                   |
| Power level TCH – base station (used timeslot level)    | - 70 dBm  |                   |
| Power level BCCH – base station (control channel level) | - 80 dBm  |                   |
| External attenuation RF/AF-Input/Output                 | Accord. calibration prior to measurements   |                   |
| Mobile Country Code                                     | 310   | 310               |
| BS_AG_BLKS_RES  | Not applicable  | 0                 |
| Paging reorganisation                                   |   | Off (0)           |
| Signalling channel                                      |   | SDCCH             |
| Location Update   |   | Auto              |
| Cell access   |   | Disabled (barred) |
|   |   |                   |

Following settings apply to the UE (EUT) during the measurements in **FDD-Mode** only:

| Parameter  | Traffic Mode  | Idle Mode |
|--|---|-----------|
| UARFCN UE Uplink (EUT)<br>(according TS34.108)   | FDD 2 = 9262/ 9400/ 9538<br>FDD4<br>FDD 5 = 4132/ 4183/ 4233  | --        |
| UARFCN Node B (downlink)<br>(according TS34.108) | FDD 2 = 9663/ 9800/ 9937<br>FDD 5 = 4358/ 4040/ 4457<br>FDD 4 = 1538/ 1675/ 1737  |           |
| UE power class                                   | Class 3 (+24dBm), Class 4 (+21dBm) nominal  |           |
| HSDPA UE category/ HSUPA category                |   |           |
| Maximum power                                    | FDD 2/4/5 12.2kbps RMC -> all TPC bits up ("1")<br>HSDPA-mode = accord. Subtests 1,2,3,4 defined in 3GPP TS34.121<br>HSUPA mode = accord. Subtests 1,2,3,4,5 defined in 3GPP TS34.121 | --        |
| Modulation                                       | 12.2kbps RMC-mode: QPSK-Modulation Scheme<br>HSDPA/HSUPA = QPSK and 16 QAM Modulation Scheme is applicable  | --        |
| Compression mode                                 | Off   | --        |
| Bitstream  | PRBS 2E9-1 (pseudo-random-sequence) – CCITT 0.153   |           |
| Maximum data transmission rate:                  | GSM: 17,6 kBit/s Slot<br>EDGE: 59,2 kBit/s Slot<br>FDD: according defined UE category   |           |
| Node B Downlink physical channels settings       | According Table E.5.1/E.5.1A in 3GPP TS34.121   |           |
| External attenuation RF/AF-Input/Output          | Accord. Set-up calibration prior to measurements  |           |

**Settings for CMU (general)**

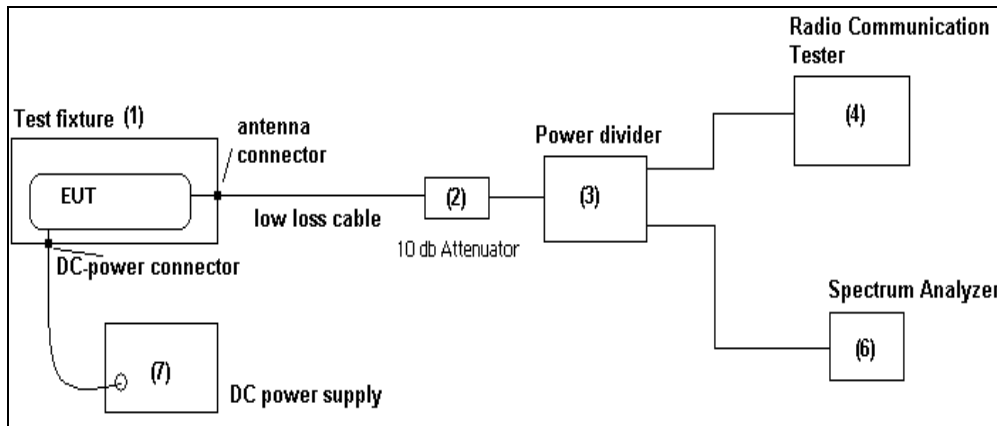
|                 |             |  |
|-----------------|-------------|--|
| Repetition      | Continuous  |  |
| Stop condition  | None        |  |
| Display mode    | Max./Min    |  |
| Statistic Count | 1000 Bursts |  |
| Decoder         | Standard    |  |

Additional settings on the base stations CMU200 for frequency stability measurements

## 4. DESCRIPTION OF TEST SET-UP'S

### 4.1. Mode Test Set-up for conducted measurements

The EUT's RF-signal is coupled out by a suitable antenna coupling connector (1). The signal is first 10 dB attenuated (2) before it is 0° divided by a power divider (3). One of the signal path is connected to the communication base station (4), other branch is connected to the spectrum – analyzer (5). The specific attenuation losses for both signal paths/branches are determined prior to the measurement within a set-up calibration. These are then taken into account by correcting the measurement readings on the spectrum-analyzer.



**Schematic: Test set-up conducted**

Following modified test set-up schematic apply for tests performed inside the climatic chamber: (Frequency stability)

## 4.2. Test set-up for radiated measurements

Please see below description and schematic for radiated measurements used set-up.

### MEASUREMENT METHOD (30 MHz <math>f < 1\text{ GHz}</math>):

A EMI analyzer together with a broadband antenna was used in order to identify the emissions from the EUT by positioning the antenna close to the EUT surfaces. The interconnecting cables and equipment position were varied in

order to maximize the emissions. Then most critical frequencies are recorded for further investigations. Based on the exploratory measurements, the most critical frequencies are re-measured by maintaining the EUT's operating mode, cable position, etc. The EUT was placed on a non-conductive support of 0.8 m height. By rotating the turntable angle in

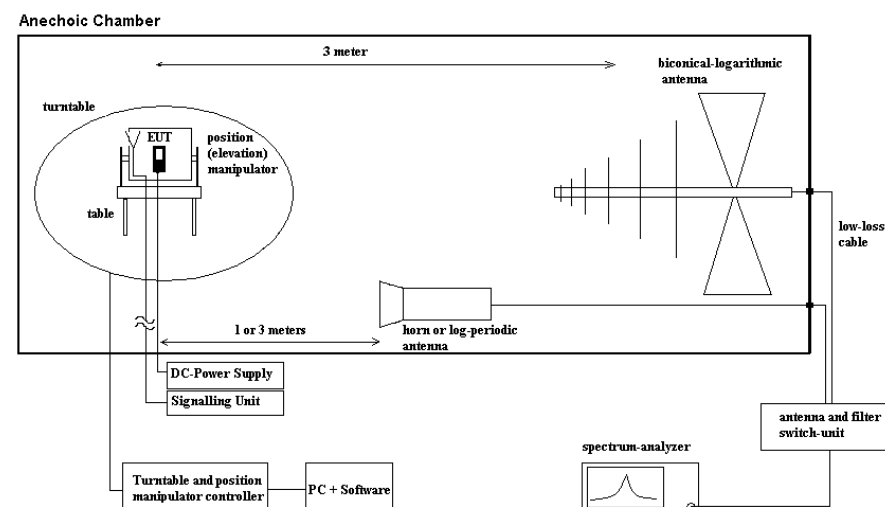
the range 0 to 360 degree, the EUT itself either over 3-orthogonal axis (not defined usage position) or 2-orthogonal axis (defined usage position) and the measurement antenna height from 1 meter to 4 meters, the maximized emissions are recorded. The measurements are performed for both polarizations of the measuring antenna: horizontal and vertical.

### MEASUREMENT METHOD (1 GHz <math>f < 26.5\text{ GHz}</math>):

The EUT and accessories are placed on a non-conducting tipping table of 0.8 meter height (semi-anechoic chamber) or 1.55m height (fully-anechoic chamber) which is situated in the middle of the turntable. The turntable can rotate the device under test 360 degree, the tipping table can rotate the device from laid to standing position. This way the device under test can be rotated in all three orthogonal planes in order to maximize the detected emissions. The turn- and tipping table are controlled by a controller unit. All positions manipulations are software controlled from a operator PC.

The measurements are performed for both receiving antenna polarisations: vertical and horizontal.

Up to 18 GHz a measurement distance of 3 meters is used, above 18 GHz the distance is 1 meter. A biconical-logarithmic antenna up to 1 GHz and a logarithmic-periodic antenna for frequencies above 1 GHz up to 26.5 GHz is used. For frequencies above 26.5 GHz a horn antenna is used, pls. compare the equipment list for more details.



The EUT is powered either by a external DC-supply with nominal voltage or a AC/DC power supply as accessory. The communication signalling (if necessary for operation) is performed from outside the chamber with a communication test simulator (CMU200 from Rohde&Schwarz) and a signalling antenna place near the EUT.

### Schematic: radiated measurements test set-up

## 5. Measurements

### 5.1. Conducted emissions on AC-Power lines

#### TEST LOCATION AND EQUIPMENT (for reference numbers please see chapter 'List of test equipment')

|               |   |  |   |
|---------------|---|--|---|
| test location | <input checked="" type="checkbox"/> CETECOM Essen (Chapter 2.2.1) | <input type="checkbox"/> Please see Chapter 2.2.2                | <input type="checkbox"/> Please see Chapter 2.2.3   |
| test site     | <input type="checkbox"/> 333 EMI field                            | <input checked="" type="checkbox"/> 348 EMI cond.                |   |
| receiver      | <input type="checkbox"/> 001 ESS                                  | <input checked="" type="checkbox"/> 377 ESCS 30                  |   |
| LISN          | <input checked="" type="checkbox"/> 005 ESH2-Z5                   | <input type="checkbox"/> 007 ESH3-Z6                             | <input type="checkbox"/> 300 ESH3-Z5 & 50Ω used for AE<br><input type="checkbox"/> no LISN for AE |
| signaling     | <input type="checkbox"/> 392 MT8820A                              | <input checked="" type="checkbox"/> 436 CMU                      | <input type="checkbox"/> 547 CMU  |
| line voltage  | <input type="checkbox"/> 230 V 50 Hz via public mains             | <input checked="" type="checkbox"/> 060 110 V 60 Hz via PAS 5000 |   |

#### STANDARDS AND LIMITS: PART 15, SUBPART B, §15.107, §15.207, CANADA: RSS-Gen, ANSI C63.4:2009

| Frequency [MHz] | Conducted limit Class B [dBμV] |           |
|-----------------|--------------------------------|-----------|
|                 | QUASI-Peak                     | AVERAGE   |
| 0.15 – 0.5      | 66 to 56*                      | 56 to 46* |
| 0.5 – 5         | 56                             | 46        |
| 5 – 30          | 60                             | 50        |

Remark: \* decreases with the logarithm of the frequency

#### TEST CONDITION AND MEASUREMENT PROCEDURES TEST SET-UP

|                                  |  |  |  |
|----------------------------------|--|--|--|
| link to test system (if used):   | <input checked="" type="checkbox"/> air link   | <input type="checkbox"/> cable connection  | <input type="checkbox"/>                       |
| EUT-grounding                    | <input checked="" type="checkbox"/> none   | <input type="checkbox"/> with power supply   | <input type="checkbox"/> additional connection |
| Equipment set up                 | <input checked="" type="checkbox"/> table top<br>(40 cm distance to reference ground plane (wall))   | <input type="checkbox"/> floor standing<br>EUT stands isolated on reference ground plane (floor) |  |
| Climatic conditions              | Temperature: (22±3°C)  | Rel. humidity: (40±20)%  |  |
| EMI-Receiver (Analyzer) Settings | Span/Range: 150 kHz to 30 MHz<br>RBW: 9 kHz<br>Detector/Mode: Max PEAK-hold, repetitive scan for preliminary testing<br>Quasi-Peak Detector and Average-Detector for final measurement according ANSI 63.4, CISPR 16 |  |  |

Devices which can be connected to the public AC-power network, should be tested against the radio frequency voltage conducted back into the AC-power line in the frequency range 150kHz to 30 MHz. Compliance should be tested by measuring the radio frequency voltage between each power line and ground at the power terminals in the stated frequency range.

A 500hm/50μH line impedance stabilization network (LISN) is used therefore. The EUT power input leads are connected through the LISN to the AC-power source. The LISN enclosure is electrically connected to the GND-plane. The measuring instrument is connected to the coaxial output of the LISN.

Tabletop devices were set-up on a 80 cm height over reference ground plane, floor standing equipment 10 cm raised above ground plane.

Measurements have been performed on each phase line and neutral line of the devices AC-power lines. The EUT was power supplied with 110 V/60Hz.

The EUT was tested in the defined operating mode and installed (connected) to accessory equipment according the general description of use given by the applicant.

**Preliminary testing** as a first step, determines the worst-case phase line (neutral or phase) as well as the most critical amplitude by changing the operating mode. A complete frequency-sweep is performed with PK-Detector.

**Final testing** for power phases and critical frequencies (Margin to AV- or QP limit lower than 3dB) as a second step includes measurements either on discrete frequency components with receivers detector set to Quasi-Peak and Average per frequency component or a complete frequency sweep with corresponding detector.

**MEASUREMENT RESULTS**

| EUT Type and S/N or EUT set-up no. |   | EUT set-up: see below               |                            |  |   |
|------------------------------------|---|-------------------------------------|----------------------------|--|---|
| EUT operating mode                 |   | EUT operating mode: see below       |                            |  |   |
| Diagram No.                        | Command or EUT operating mode or operating mode no. | Detector (Peak, CISPR AV, CISPR QP) | Power line (L1, L2, L3, N) | Additional (scan-) information (e.g. Pre-test Fast scan, Maxhold, Final measurement) | Result (passed / failed /final measurem. necessary) |
| 1.1                                | EUT set-up 1<br>EUT op. mode 1 + 6                  | Peak, CISPR AV, CISPR QP            | L1, N                      | Pre-test Fast scan, Maxhold<br>Final measurement<br>(please see diagram)             | passed  |
| 1.2                                | EUT set-up 2<br>EUT op. mode 2 + 6                  | Peak, CISPR AV, CISPR QP            | L1, N                      | Pre-test Fast scan, Maxhold<br>Final measurement<br>(please see diagram)             | passed  |
| 1.3                                | EUT set-up 3<br>EUT op. mode 3 + 6                  | Peak, CISPR AV, CISPR QP            | L1, N                      | Pre-test Fast scan, Maxhold<br>Final measurement<br>(please see diagram)             | passed  |
| 1.4                                | EUT set-up 4<br>EUT op. mode 4 + 6                  | Peak, CISPR AV, CISPR QP            | L1, N                      | Pre-test Fast scan, Maxhold<br>Final measurement<br>(please see diagram)             | passed  |
| 1.5                                | EUT set-up 5<br>EUT op. mode 1 + 6                  | Peak, CISPR AV, CISPR QP            | L1, N                      | Pre-test Fast scan, Maxhold<br>Final measurement<br>(please see diagram)             | passed  |
| 1.6                                | EUT set-up 6<br>EUT op. mode 2 + 6                  | Peak, CISPR AV, CISPR QP            | L1, N                      | Pre-test Fast scan, Maxhold<br>Final measurement<br>(please see diagram)             | passed  |

Remarks: The diagram contains the maximum values from L 1 + N

Margin to Limit for verdict:  $M = L_T - R_R + C_{Loss}$

Abbreviations used:

- $R_R$  : Receiver readings in dB $\mu$ V
- $C_{Loss}$ : cable loss
- $L_T$  : Limit in dB $\mu$ V

**VERDICT**

Summary of measurement results for conducted emissions on AC-Power lines: Passed

## 5.2. Radiated field strength emissions, 30 MHz - 1 GHz

### TEST LOCATION AND EQUIPMENT (for reference numbers please see chapter 'List of test equipment')

|                 |  |  |  |
|-----------------|--|--|--|
| test location   | <input checked="" type="checkbox"/> CETECOM Essen (Chapter. 2.2.1) | <input type="checkbox"/> Please see Chapter. 2.2.2               | <input type="checkbox"/> Please see Chapter. 2.2.3   |
| test site       | <input checked="" type="checkbox"/> 441 EMI SAR                    | <input type="checkbox"/> 487 SAR NSA                             |  |
| receiver        | <input checked="" type="checkbox"/> 377 ESCS30                     | <input checked="" type="checkbox"/> 001 ESS                      | <input type="checkbox"/>   |
| spectr. analys. | <input type="checkbox"/> 584 FSU                                   | <input type="checkbox"/> 120 FSEM                                | <input type="checkbox"/> 264 FSEK  |
| antenna         | <input type="checkbox"/> 574 BTA-L                                 | <input type="checkbox"/> 133 EMCO3115                            | <input type="checkbox"/> 302 BBHA9170 <input type="checkbox"/> 289 CBL 6141 <input type="checkbox"/> 030 HFH-Z2 <input type="checkbox"/> 477 GPS     |
| signaling       | <input type="checkbox"/> 392 MT8820A                               | <input type="checkbox"/> 436 CMU                                 | <input type="checkbox"/> 547 CMU   |
| otherwise       | <input type="checkbox"/> 400 FTC40x15E                             | <input type="checkbox"/> 401 FTC40x15E                           | <input type="checkbox"/> 110 USB LWL <input checked="" type="checkbox"/> 482 Filter Matrix   |
| DC power        | <input type="checkbox"/> 456 EA 3013A                              | <input type="checkbox"/> 457 EA 3013A                            | <input type="checkbox"/> 459 EA 2032-50 <input type="checkbox"/> 268 EA- 3050 <input type="checkbox"/> 494 AG6632A <input type="checkbox"/> 498 NGPE |
| line voltage    | <input type="checkbox"/> 230 V 50 Hz via public mains              | <input checked="" type="checkbox"/> 060 110 V 60 Hz via PAS 5000 |  |

### STANDARDS AND LIMITS: CFR 47, PART 15B, §15.109, RSS-Gen, ANSI 63.4:2009

| Frequency [MHz] | Radiated emission limits, Class B, 3 meters |                     |
|-----------------|---|---------------------|
|                 | QUASI-Peak [microvolts/meter]               | QUASI-Peak [dBµV/m] |
| 30-88           | 100   | 40                  |
| 88-216          | 150   | 43,5                |
| 216-960         | 200   | 46,0                |
| above 960       | 500   | 54,0                |

### TEST CONDITION AND MEASUREMENT TEST SET-UP

|                                  |   |  |  |
|----------------------------------|---|--|--|
| link to test system (if used):   | <input checked="" type="checkbox"/> air link  | <input type="checkbox"/> cable connection  | <input type="checkbox"/>                       |
| EUT-grounding                    | <input checked="" type="checkbox"/> none  | <input type="checkbox"/> with power supply | <input type="checkbox"/> additional connection |
| Equipment set up                 | <input checked="" type="checkbox"/> table top 0.8m height   | <input type="checkbox"/> floor standing    |  |
| Climatic conditions              | Temperature: (22±3°C)   |  | Rel. humidity: (40±20)%                        |
| EMI-Receiver (Analyzer) Settings | Span/Range: 30 MHz to 1 GHz<br>RBW/VBW: 120 kHz / (auto)<br>Detector/ Mode: PEAK, TRACE max-hold mode, repetitive scan<br>Quasi-Peak, for final measurement for critical measurements |  |  |

### GENERAL MEASUREMENT PROCEDURES:

The measurement test set-up and test procedure are in accordance with the provisions described in ANSI 63.4: 2009

The *Equipment under Test* (EUT) set-up to defined operating mode and installed (connected) to accessory equipment according the general description of use given by the applicant.



**MEASUREMENT RESULTS**

| EUT Type and S/N<br>EUT set-up no. |  | EUT set-up 1  |   |                               |  |
|------------------------------------|--|---|---|-------------------------------|--|
| Diagram No.                        | Test parameter: Frequency range 30 MHz – 1000 MHz<br>IF Bandwidth at 6 dB: 120 kHz,  | Op. mode  | Result  |                               |  |
| 2.01                               | <b>Pre-measurement, variation of turntable positions</b><br>Searching critical frequencies for determined critical operating mode with peak detector, repetitive scan and max-hold mode. The antenna heights are 1.0 m + 1.82 m (both heights for all measured turntable positions). |   | Op. mode 1 + 6  | Final measurement carried out |  |
|                                    | Polarisation of antenna:   | <input type="checkbox"/> horizontal<br><input type="checkbox"/> vertical<br><input checked="" type="checkbox"/> horizontal and vertical   |   |                               |  |
|                                    | Receiving antenna directed to EUT side:<br>(Turntable position during pre-measurement)   | <input checked="" type="checkbox"/> front (0°)<br><input checked="" type="checkbox"/> right (90°)<br><input checked="" type="checkbox"/> rear (180°)<br><input checked="" type="checkbox"/> left (270°) | <input checked="" type="checkbox"/> EUT tipping device in vertical position (= 0°) used |                               |  |
|                                    |  | <input checked="" type="checkbox"/> under (0°)<br><input checked="" type="checkbox"/> top (180°)  | <input checked="" type="checkbox"/> EUT tipping device in horiz. position (= 90°) used  |                               |  |
|                                    | Critical frequencies found:  | <input type="checkbox"/> no, margin to limit > 6 dB with PK detector<br><input checked="" type="checkbox"/> yes, final measurement with QP detector carried out   |   |                               |  |
|                                    | <b>Step 3: Final measurement at critical frequencies</b><br>(to find the worst case with Peak and CISPR QP detector)   |   |   |                               |  |
| Antenna height:                    | <input checked="" type="checkbox"/> moved from 1.0 m to 4.0 m continuously   |   | passed  |                               |  |
| Turntable:                         | <input checked="" type="checkbox"/> turned from 0° to 360° continuously  |   |   |                               |  |
| EUT Tipping device:                | Please see Step 2  |   |   |                               |  |

Remarks:

- Mounting position / usual operating position is defined => under and top side of EUT are not measured
- Signals over limit are due to wanted GSM 850 MHz signals and will be ignored.

| EUT Type and S/N<br>EUT set-up no. |  | EUT set-up 2  |   |                               |  |
|------------------------------------|--|---|---|-------------------------------|--|
| Diagram No.                        | Test parameter: Frequency range 30 MHz – 1000 MHz<br>IF Bandwidth at 6 dB: 120 kHz,  | Op. mode  | Result  |                               |  |
| 2.02                               | <b>Pre-measurement, variation of turntable positions</b><br>Searching critical frequencies for determined critical operating mode with peak detector, repetitive scan and max-hold mode. The antenna heights are 1.0 m + 1.82 m (both heights for all measured turntable positions). |   | Op. mode 2 + 6  | Final measurement carried out |  |
|                                    | Polarisation of antenna:   | <input type="checkbox"/> horizontal<br><input type="checkbox"/> vertical<br><input checked="" type="checkbox"/> horizontal and vertical   |   |                               |  |
|                                    | Receiving antenna directed to EUT side:<br>(Turntable position during pre-measurement)   | <input checked="" type="checkbox"/> front (0°)<br><input checked="" type="checkbox"/> right (90°)<br><input checked="" type="checkbox"/> rear (180°)<br><input checked="" type="checkbox"/> left (270°) | <input checked="" type="checkbox"/> EUT tipping device in vertical position (= 0°) used |                               |  |
|                                    |  | <input checked="" type="checkbox"/> under (0°)<br><input checked="" type="checkbox"/> top (180°)  | <input checked="" type="checkbox"/> EUT tipping device in horiz. position (= 90°) used  |                               |  |
|                                    | Critical frequencies found:  | <input type="checkbox"/> no, margin to limit > 6 dB with PK detector<br><input checked="" type="checkbox"/> yes, final measurement with QP detector carried out   |   |                               |  |
|                                    | <b>Step 3: Final measurement at critical frequencies</b><br>(to find the worst case with Peak and CISPR QP detector)   |   |   |                               |  |
| Antenna height:                    | <input checked="" type="checkbox"/> moved from 1.0 m to 4.0 m continuously   |   | passed  |                               |  |
| Turntable:                         | <input checked="" type="checkbox"/> turned from 0° to 360° continuously  |   |   |                               |  |
| EUT Tipping device:                | Please see Step 2  |   |   |                               |  |

Remarks:

- Mounting position / usual operating position is defined => under and top side of EUT are not measured
- Signals over limit are due to wanted GSM 900 MHz signals and will be ignored.

| EUT Type and S/N<br>EUT set-up no. |  | EUT set-up 3  |   |                               |
|------------------------------------|--|---|---|-------------------------------|
| Diagram No.                        | Test parameter: Frequency range 30 MHz – 1000 MHz<br>IF Bandwidth at 6 dB: 120 kHz,  | Op. mode  | Result  |                               |
| 2.03                               | <b>Pre-measurement, variation of turntable positions</b><br>Searching critical frequencies for determined critical operating mode with peak detector, repetitive scan and max-hold mode. The antenna heights are 1.0 m + 1.82 m (both heights for all measured turntable positions). |   | Op. mode 3 + 6  | Final measurement carried out |
|                                    | Polarisation of antenna:   | <input type="checkbox"/> horizontal<br><input type="checkbox"/> vertical<br><input checked="" type="checkbox"/> horizontal and vertical   |   |                               |
|                                    | Receiving antenna directed to EUT side:<br>(Turntable position during pre-measurement)   | <input checked="" type="checkbox"/> front (0°)<br><input checked="" type="checkbox"/> right (90°)<br><input checked="" type="checkbox"/> rear (180°)<br><input checked="" type="checkbox"/> left (270°) | <input checked="" type="checkbox"/> EUT tipping device in vertical position (= 0°) used |                               |
|                                    |  | <input checked="" type="checkbox"/> under (0°)<br><input checked="" type="checkbox"/> top (180°)  | <input checked="" type="checkbox"/> EUT tipping device in horiz. position (= 90°) used  |                               |
|                                    | Critical frequencies found:  | <input type="checkbox"/> no, margin to limit > 6 dB with PK detector<br><input checked="" type="checkbox"/> yes, final measurement with QP detector carried out   |   |                               |
|                                    | <b>Step 3: Final measurement at critical frequencies</b><br>(to find the worst case with Peak and CISPR QP detector)   |   |   |                               |
|                                    | Antenna height:  | <input checked="" type="checkbox"/> moved from 1.0 m to 4.0 m continuously  |   | passed                        |
| Turntable:                         | <input checked="" type="checkbox"/> turned from 0° to 360° continuously  |   |   |                               |
| EUT Tipping device:                | Please see Step 2  |   |   |                               |

Remarks:

- Mounting position / usual operating position is defined => under and top side of EUT are not measured
- Signals over limit are due to wanted GSM 850 MHz signals and will be ignored.

| EUT Type and S/N<br>EUT set-up no. |  | EUT set-up 4  |   |                               |
|------------------------------------|--|---|---|-------------------------------|
| Diagram No.                        | Test parameter: Frequency range 30 MHz – 1000 MHz<br>IF Bandwidth at 6 dB: 120 kHz,  | Op. mode  | Result  |                               |
| 2.04                               | <b>Pre-measurement, variation of turntable positions</b><br>Searching critical frequencies for determined critical operating mode with peak detector, repetitive scan and max-hold mode. The antenna heights are 1.0 m + 1.82 m (both heights for all measured turntable positions). |   | Op. mode 4 + 6  | Final measurement carried out |
|                                    | Polarisation of antenna:   | <input type="checkbox"/> horizontal<br><input type="checkbox"/> vertical<br><input checked="" type="checkbox"/> horizontal and vertical   |   |                               |
|                                    | Receiving antenna directed to EUT side:<br>(Turntable position during pre-measurement)   | <input checked="" type="checkbox"/> front (0°)<br><input checked="" type="checkbox"/> right (90°)<br><input checked="" type="checkbox"/> rear (180°)<br><input checked="" type="checkbox"/> left (270°) | <input checked="" type="checkbox"/> EUT tipping device in vertical position (= 0°) used |                               |
|                                    |  | <input checked="" type="checkbox"/> under (0°)<br><input checked="" type="checkbox"/> top (180°)  | <input checked="" type="checkbox"/> EUT tipping device in horiz. position (= 90°) used  |                               |
|                                    | Critical frequencies found:  | <input type="checkbox"/> no, margin to limit > 6 dB with PK detector<br><input checked="" type="checkbox"/> yes, final measurement with QP detector carried out   |   |                               |
|                                    | <b>Step 3: Final measurement at critical frequencies</b><br>(to find the worst case with Peak and CISPR QP detector)   |   |   |                               |
|                                    | Antenna height:  | <input checked="" type="checkbox"/> moved from 1.0 m to 4.0 m continuously  |   | passed                        |
| Turntable:                         | <input checked="" type="checkbox"/> turned from 0° to 360° continuously  |   |   |                               |
| EUT Tipping device:                | Please see Step 2  |   |   |                               |

Remarks:

- Mounting position / usual operating position is defined => under and top side of EUT are not measured
- Signals over limit are due to wanted GSM 900 MHz signals and will be ignored.

| EUT Type and S/N<br>EUT set-up no. |  | EUT set-up 5  |   |                               |
|------------------------------------|--|---|---|-------------------------------|
| Diagram No.                        | Test parameter: Frequency range 30 MHz – 1000 MHz<br>IF Bandwidth at 6 dB: 120 kHz,  | Op. mode  | Result  |                               |
| 2.05                               | <b>Pre-measurement, variation of turntable positions</b><br>Searching critical frequencies for determined critical operating mode with peak detector, repetitive scan and max-hold mode. The antenna heights are 1.0 m + 1.82 m (both heights for all measured turntable positions). |   | Op. mode 1 + 6  | Final measurement carried out |
|                                    | Polarisation of antenna:   | <input type="checkbox"/> horizontal<br><input type="checkbox"/> vertical<br><input checked="" type="checkbox"/> horizontal and vertical   |   |                               |
|                                    | Receiving antenna directed to EUT side:<br>(Turntable position during pre-measurement)   | <input checked="" type="checkbox"/> front (0°)<br><input checked="" type="checkbox"/> right (90°)<br><input checked="" type="checkbox"/> rear (180°)<br><input checked="" type="checkbox"/> left (270°) | <input checked="" type="checkbox"/> EUT tipping device in vertical position (= 0°) used |                               |
|                                    |  | <input checked="" type="checkbox"/> under (0°)<br><input checked="" type="checkbox"/> top (180°)  | <input checked="" type="checkbox"/> EUT tipping device in horiz. position (= 90°) used  |                               |
|                                    | Critical frequencies found:  | <input type="checkbox"/> no, margin to limit > 6 dB with PK detector<br><input checked="" type="checkbox"/> yes, final measurement with QP detector carried out   |   |                               |
|                                    | <b>Step 3: Final measurement at critical frequencies</b><br>(to find the worst case with Peak and CISPR QP detector)   |   |   |                               |
|                                    | Antenna height:  | <input checked="" type="checkbox"/> moved from 1.0 m to 4.0 m continuously  |   | passed                        |
| Turntable:                         | <input checked="" type="checkbox"/> turned from 0° to 360° continuously  |   |   |                               |
| EUT Tipping device:                | Please see Step 2  |   |   |                               |

Remarks:

- Mounting position / usual operating position is defined => under and top side of EUT are not measured
- Signals over limit are due to wanted GSM 850 MHz signals and will be ignored.

| EUT Type and S/N<br>EUT set-up no. |  | EUT set-up 6  |   |                               |
|------------------------------------|--|---|---|-------------------------------|
| Diagram No.                        | Test parameter: Frequency range 30 MHz – 1000 MHz<br>IF Bandwidth at 6 dB: 120 kHz,  | Op. mode  | Result  |                               |
| 2.06                               | <b>Pre-measurement, variation of turntable positions</b><br>Searching critical frequencies for determined critical operating mode with peak detector, repetitive scan and max-hold mode. The antenna heights are 1.0 m + 1.82 m (both heights for all measured turntable positions). |   | Op. mode 2 + 6  | Final measurement carried out |
|                                    | Polarisation of antenna:   | <input type="checkbox"/> horizontal<br><input type="checkbox"/> vertical<br><input checked="" type="checkbox"/> horizontal and vertical   |   |                               |
|                                    | Receiving antenna directed to EUT side:<br>(Turntable position during pre-measurement)   | <input checked="" type="checkbox"/> front (0°)<br><input checked="" type="checkbox"/> right (90°)<br><input checked="" type="checkbox"/> rear (180°)<br><input checked="" type="checkbox"/> left (270°) | <input checked="" type="checkbox"/> EUT tipping device in vertical position (= 0°) used |                               |
|                                    |  | <input checked="" type="checkbox"/> under (0°)<br><input checked="" type="checkbox"/> top (180°)  | <input checked="" type="checkbox"/> EUT tipping device in horiz. position (= 90°) used  |                               |
|                                    | Critical frequencies found:  | <input type="checkbox"/> no, margin to limit > 6 dB with PK detector<br><input checked="" type="checkbox"/> yes, final measurement with QP detector carried out   |   |                               |
|                                    | <b>Step 3: Final measurement at critical frequencies</b><br>(to find the worst case with Peak and CISPR QP detector)   |   |   |                               |
|                                    | Antenna height:  | <input checked="" type="checkbox"/> moved from 1.0 m to 4.0 m continuously  |   | passed                        |
| Turntable:                         | <input checked="" type="checkbox"/> turned from 0° to 360° continuously  |   |   |                               |
| EUT Tipping device:                | Please see Step 2  |   |   |                               |

Remarks:

- Mounting position / usual operating position is defined => under and top side of EUT are not measured
- Signals over limit are due to wanted GSM 900 MHz signals and will be ignored.

|   |   |
|---|---|
| <p><b>Margin to Limit:</b></p> $M = L_T - R_R + C_F + D_F$ $= L_T - R_R + (AF_{ANTENNA} + Cable_{LOSS}) + D_F$ <p>Remark: positive margin means passed result</p> | <p><b>Abbreviations used:</b></p> <ul style="list-style-type: none"> <li>• <math>R_R</math> : Receiver readings in dB<math>\mu</math>V/m</li> <li>• CF: Transducer in dB = AF (antenna factor) + CL (cable loss)</li> <li>• <math>D_F</math> : distance correction factor (if different measurement distance used than specified in the standard)</li> <li>• <math>L_T</math> : Limit in dB<math>\mu</math>V/m</li> </ul> |
|---|---|

**VERDICT**

Summary of measurement results for radiated emissions above 30 MHz and below 1 GHz : Passed

### 5.3. Radiated emissions, above 1GHz

#### TEST LOCATION AND EQUIPMENT (for reference numbers please see chapter 'List of test equipment')

|                 |   |   |  |   |  |                                  |
|-----------------|---|---|--|---|--|----------------------------------|
| test site       | <input type="checkbox"/> 441 EMI SAR                  | <input type="checkbox"/> 348 EMI cond.      | <input checked="" type="checkbox"/> 443 EMI FAR                  | <input type="checkbox"/> 347 Radio.lab.       | <input type="checkbox"/> 337 OATS        | <input type="checkbox"/>         |
| equipment       | <input type="checkbox"/> 331 HC 4055                  | <input type="checkbox"/>                    | <input type="checkbox"/>   | <input type="checkbox"/>                      | <input type="checkbox"/>                 | <input type="checkbox"/>         |
| spectr. analys. | <input type="checkbox"/> 584 FSU                      | <input type="checkbox"/> 120 FSEM           | <input type="checkbox"/> 264 FSEK                                | <input checked="" type="checkbox"/> 489 ESU   | <input type="checkbox"/>                 | <input type="checkbox"/>         |
| antenna meas    | <input type="checkbox"/> 574 BTA-L                    | <input type="checkbox"/> 289 CBL 6141       | <input checked="" type="checkbox"/> 608 HL 562                   | <input checked="" type="checkbox"/> 549 HL025 | <input type="checkbox"/> 302 BBHA9170    | <input type="checkbox"/> 477 GPS |
| antenna meas    | <input type="checkbox"/> 123 HUF-Z2                   | <input type="checkbox"/> 132 HUF-Z3         | <input type="checkbox"/> 030 HFH-Z2                              | <input type="checkbox"/>                      | <input type="checkbox"/>                 | <input type="checkbox"/>         |
| antenna subst   | <input type="checkbox"/> 071 HUF-Z2                   | <input type="checkbox"/> 020 EMCO3115       | <input type="checkbox"/> 063 LP 3146                             | <input type="checkbox"/> 303 BBHA9170         | <input type="checkbox"/>                 | <input type="checkbox"/>         |
| power meter     | <input type="checkbox"/> 009 NRV                      | <input type="checkbox"/> 010 URV5-Z2        | <input type="checkbox"/> 011 URV5-Z2                             | <input type="checkbox"/>                      | <input type="checkbox"/>                 | <input type="checkbox"/>         |
| signalgener.    | <input type="checkbox"/> 008 SMG                      | <input type="checkbox"/> 140 SMHU           | <input type="checkbox"/> 263 SMP04                               | <input type="checkbox"/>                      | <input type="checkbox"/>                 | <input type="checkbox"/>         |
| power meter     | <input type="checkbox"/> 262 NRV-S                    | <input type="checkbox"/> 266 NRV-Z31        | <input type="checkbox"/> 265 NRV-Z33                             | <input type="checkbox"/> 261 NRV-Z55          | <input type="checkbox"/> 356 NRV-Z1      | <input type="checkbox"/>         |
| multimeter      | <input type="checkbox"/> 341 Fluke 112                | <input type="checkbox"/>                    | <input type="checkbox"/>   | <input type="checkbox"/>                      | <input type="checkbox"/>                 | <input type="checkbox"/>         |
| signaling       | <input type="checkbox"/> 392 MT8820A                  | <input checked="" type="checkbox"/> 436 CMU | <input type="checkbox"/> 547 CMU                                 |   |  |                                  |
| DCpower         | <input type="checkbox"/> 086 LNG50-10                 | <input type="checkbox"/> 087 EA3013         | <input type="checkbox"/> 354 NGPE 40                             | <input type="checkbox"/> 349 car battery      | <input type="checkbox"/> 350 Car battery | <input type="checkbox"/>         |
| line voltage    | <input type="checkbox"/> 230 V 50 Hz via public mains |   | <input checked="" type="checkbox"/> 060 110 V 60 Hz via PAS 5000 |   |  |                                  |

#### STANDARDS AND LIMITS: CFR 47, §15.109 (CLASS B), RSS-Gen, ANSI C63.4:2009

| Frequency [MHz] | Radiated emission limits, 3 meters measurement distance |             |                         |               |
|-----------------|---|-------------|-------------------------|---------------|
|                 | AV [microvolts/meter]                                   | AV [dBµV/m] | Peak [microvolts/meter] | Peak [dBµV/m] |
| above 1GHz      | 500   | 54.0        | 5000                    | 74.0          |

#### TEST CONDITION AND MEASUREMENT TEST SET-UP

|                                |  |  |  |
|--------------------------------|--|--|--|
| link to test system (if used): | <input checked="" type="checkbox"/> air link   | <input type="checkbox"/> cable connection  | <input type="checkbox"/>                       |
| EUT-grounding                  | <input checked="" type="checkbox"/> none   | <input type="checkbox"/> with power supply | <input type="checkbox"/> additional connection |
| Equipment set up               | <input checked="" type="checkbox"/> table top 1.5m height  |  | <input type="checkbox"/> floor standing        |
| Climatic conditions            | Temperature: (22±3°C)  |  | Rel. humidity: (40±20)%                        |
| Spectrum-Analyzer settings     | Span/Frequency range :<br>GSM850: 1..12.75 GHz +single frequencies determined in step 1<br>GSM1900: 1..18GHz+single frequencies determined in step 1<br>RBW/VBW: 1 MHz / 3 MHz<br>Detector/ Mode: Peak, MAX-hold, repetitive scan for exploratory measurement<br>PEAK/ AVERAGE, for final measurement for critical frequencies<br>Antenna Polarisation Horizontal / Vertical |  |  |

#### GENERAL MEASUREMENT PROCEDURES:

The measurement test set-up and test procedure are in accordance with the provisions described in ANSI 63.4: 2009 (RX)

The *Equipment under Test* (EUT) was placed on a non-conductive positioning table of 0.8 or 1.5 meter height depending from the frequency range. The measuring distance was set to 3 meter for frequencies up to 18GHz and 1 meter above 18GHz.

The EUT was set-up to defined operating mode and installed (connected) to accessory equipment according the general description of use given by the applicant.

For the upper frequency measurement range, it was assumed that the highest frequency generated in the device is same as the highest operable TX-frequency in GSM850 or GSM1900 Mode (848.8MHz or 1909.8 MHz). For practical reasons the upper frequency limit was set to 12.75 or respective 18GHz.

**1. Step exploratory measurement:** see above description as in the frequency range lower 1GHz.

**2. Step Final Measurement(1 GHz < f < 18 GHz):** On the Worst-Case EUT configuration, frequency components with a margin lower than 6 dB to the limits, will be re-measured by maintaining the EUT's operating mode, cable position, etc.. For find the worst-case emission, the turntable was changed in the range 0 to 360 degree and the EUT itself either over 3-orthogonal axis (not defined usage position) or 2-orthogonal axis (defined usage position). The measurements are performed for both polarizations of the measuring antenna: horizontal and vertical.

| Set-up No.:     |                       |                      | EUT set-up 1           |                 |                 |                     |          |                          |                              |                 |  |
|-----------------|-----------------------|----------------------|------------------------|-----------------|-----------------|---------------------|----------|--------------------------|------------------------------|-----------------|--|
| Operating Mode: |                       |                      | Op. mode 1 + 6         |                 |                 |                     |          |                          |                              |                 |  |
| Diagram no.     | Start-Frequency (MHz) | Stop-Frequency (MHz) | MaxPeak (dB $\mu$ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Antenna height (cm) | Polarity | Turntable position (deg) | Corr. (dB) (C <sub>F</sub> ) | Margin (dB) (M) | Limit (dB $\mu$ V/m) (L <sub>T</sub> ) |
| 2.07            | 1000                  | 2800                 | Please see diagram     |                 |                 |                     |          |                          |                              |                 | Passed                                 |
| 2.08            | 1000                  | 5000                 | Please see diagram     |                 |                 |                     |          |                          |                              |                 | Passed                                 |

Remarks:

| Set-up No.:     |                       |                      | EUT set-up 2           |                 |                 |                     |          |                          |                              |                 |  |
|-----------------|-----------------------|----------------------|------------------------|-----------------|-----------------|---------------------|----------|--------------------------|------------------------------|-----------------|--|
| Operating Mode: |                       |                      | Op. mode 2 + 6         |                 |                 |                     |          |                          |                              |                 |  |
| Diagram no.     | Start-Frequency (MHz) | Stop-Frequency (MHz) | MaxPeak (dB $\mu$ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Antenna height (cm) | Polarity | Turntable position (deg) | Corr. (dB) (C <sub>F</sub> ) | Margin (dB) (M) | Limit (dB $\mu$ V/m) (L <sub>T</sub> ) |
| 2.09            | 1000                  | 2800                 | Please see diagram     |                 |                 |                     |          |                          |                              |                 | Passed                                 |
| 2.10            | 1000                  | 10000                | Please see diagram     |                 |                 |                     |          |                          |                              |                 | Passed                                 |

Remarks:

| Set-up No.:     |                       |                      | EUT set-up 3           |                 |                 |                     |          |                          |                              |                 |  |
|-----------------|-----------------------|----------------------|------------------------|-----------------|-----------------|---------------------|----------|--------------------------|------------------------------|-----------------|--|
| Operating Mode: |                       |                      | Op. mode 3 + 6         |                 |                 |                     |          |                          |                              |                 |  |
| Diagram no.     | Start-Frequency (MHz) | Stop-Frequency (MHz) | MaxPeak (dB $\mu$ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Antenna height (cm) | Polarity | Turntable position (deg) | Corr. (dB) (C <sub>F</sub> ) | Margin (dB) (M) | Limit (dB $\mu$ V/m) (L <sub>T</sub> ) |
| 2.11            | 1000                  | 2800                 | Please see diagram     |                 |                 |                     |          |                          |                              |                 | Passed                                 |
| 2.12            | 1000                  | 10000                | Please see diagram     |                 |                 |                     |          |                          |                              |                 | Passed                                 |

Remarks:

| Set-up No.:     |                       |                      | EUT set-up 4       |                 |                 |                     |          |                          |                              |                 |                                  |
|-----------------|-----------------------|----------------------|--------------------|-----------------|-----------------|---------------------|----------|--------------------------|------------------------------|-----------------|----------------------------------|
| Operating Mode: |                       |                      | Op. mode 4 + 6     |                 |                 |                     |          |                          |                              |                 |                                  |
| Diagram no.     | Start-Frequency (MHz) | Stop-Frequency (MHz) | MaxPeak (dBµV/m)   | Meas. Time (ms) | Bandwidth (kHz) | Antenna height (cm) | Polarity | Turntable position (deg) | Corr. (dB) (C <sub>F</sub> ) | Margin (dB) (M) | Limit (dBµV/m) (L <sub>T</sub> ) |
| 2.13            | 1000                  | 2800                 | Please see diagram |                 |                 |                     |          |                          |                              |                 | Passed                           |
| 2.14            | 1000                  | 5000                 | Please see diagram |                 |                 |                     |          |                          |                              |                 | Passed                           |

Remarks:

| Set-up No.:     |                       |                      | EUT set-up 5       |                 |                 |                     |          |                          |                              |                 |                                  |
|-----------------|-----------------------|----------------------|--------------------|-----------------|-----------------|---------------------|----------|--------------------------|------------------------------|-----------------|----------------------------------|
| Operating Mode: |                       |                      | Op. mode 1 + 6     |                 |                 |                     |          |                          |                              |                 |                                  |
| Diagram no.     | Start-Frequency (MHz) | Stop-Frequency (MHz) | MaxPeak (dBµV/m)   | Meas. Time (ms) | Bandwidth (kHz) | Antenna height (cm) | Polarity | Turntable position (deg) | Corr. (dB) (C <sub>F</sub> ) | Margin (dB) (M) | Limit (dBµV/m) (L <sub>T</sub> ) |
| 2.15            | 1000                  | 2800                 | Please see diagram |                 |                 |                     |          |                          |                              |                 | Passed                           |
| 2.16            | 1000                  | 5000                 | Please see diagram |                 |                 |                     |          |                          |                              |                 | Passed                           |

Remarks:

| Set-up No.:     |                       |                      | EUT set-up 6       |                 |                 |                     |          |                          |                              |                 |                                  |
|-----------------|-----------------------|----------------------|--------------------|-----------------|-----------------|---------------------|----------|--------------------------|------------------------------|-----------------|----------------------------------|
| Operating Mode: |                       |                      | Op. mode 2 + 6     |                 |                 |                     |          |                          |                              |                 |                                  |
| Diagram no.     | Start-Frequency (MHz) | Stop-Frequency (MHz) | MaxPeak (dBµV/m)   | Meas. Time (ms) | Bandwidth (kHz) | Antenna height (cm) | Polarity | Turntable position (deg) | Corr. (dB) (C <sub>F</sub> ) | Margin (dB) (M) | Limit (dBµV/m) (L <sub>T</sub> ) |
| 2.17            | 1000                  | 2800                 | Please see diagram |                 |                 |                     |          |                          |                              |                 | Passed                           |
| 2.18            | 1000                  | 10000                | Please see diagram |                 |                 |                     |          |                          |                              |                 | Passed                           |

Remarks:

|   |   |
|---|---|
| <p><b>Margin to Limit:</b></p> $M = L_T - R_R + C_F + D_F$ $= L_T - R_R + (AF_{ANTENNA} + Cable_{LOSS}) + D_F$ <p>Remark: positive margin means passed result</p> | <p><b>Abbreviations used:</b></p> <ul style="list-style-type: none"> <li>• R<sub>R</sub> : Receiver readings in dBµV/m</li> <li>• C<sub>F</sub>: Transducer in dB = AF (antenna factor) + CL (cable loss)</li> <li>• D<sub>F</sub> : distance correction factor (if different measurement distance used than specified in the standard)</li> <li>• L<sub>T</sub> : Limit in dBµV/m</li> </ul> |
|---|---|

**VERDICT**

Summary of measurement results for radiated emissions above 1 GHz : Passed

### 5.4. Conducted emissions on antenna port (RX-Mode)

**Test location and equipment** (for reference numbers please see chapter 'List of test equipment')

|                 |  |  |  |
|-----------------|--|--|--|
| test location   | <input checked="" type="checkbox"/> CETECOM Essen (Chapter. 2.2.1)   | <input type="checkbox"/> Please see Chapter. 2.2.2 | <input type="checkbox"/> Please see Chapter. 2.2.3   |
| test site       | <input type="checkbox"/> 441 EMI SAR   | <input type="checkbox"/> 487 SAR NSA               | <input type="checkbox"/> 337 OATS <input checked="" type="checkbox"/> 347 Radio.lab.   |
| receiver        | <input type="checkbox"/> 377 ESCS30  | <input type="checkbox"/> 001 ESS                   | <input checked="" type="checkbox"/> ESU  |
| spectr. analys. | <input type="checkbox"/> 574 FSU   | <input type="checkbox"/> 120 FSEM                  | <input type="checkbox"/> 264 FSEK  |
| signaling       | <input type="checkbox"/> 392 MT8820A   | <input type="checkbox"/> 436 CMU                   | <input type="checkbox"/> 547 CMU   |
| power supply    | <input type="checkbox"/> 456 EA 3013A  | <input type="checkbox"/> 457 EA 3013A              | <input type="checkbox"/> 459 EA 2032-50 <input type="checkbox"/> 268 EA- 3050 <input type="checkbox"/> 494 AG6632A <input checked="" type="checkbox"/> 498 NGPE 40 |
| otherwise       | <input type="checkbox"/> 400 FTC40x15E   | <input type="checkbox"/> 401 FTC40x15E             | <input type="checkbox"/> 110 USB LWL <input checked="" type="checkbox"/> 482 Filter Matrix   |
| line voltage    | <input type="checkbox"/> 230 V 50 Hz via public mains <input checked="" type="checkbox"/> 060 110 V 60 Hz via PAS 5000 |  |  |

#### Standards and Limits: CFR 47, §15.111(a), RSS-132, RSS-133, RSS-Gen

| Standard        | conducted emission limits on antenna port |               |
|-----------------|---|---------------|
|                 | Value / [nW]                              | Value / [dBm] |
| FCC: §15.111(a) | 2 nW for all frequencies                  | -57 dBm       |
| RSS-Gen         | 2 nW below 1GHz                           | -57 dBm       |
| RSS-132         | 5 nW about 1GHz                           | -53 dBm       |
| RSS-133         |   |               |

#### Test condition and measurement test set-up

|                                  |                                   |  |
|----------------------------------|-----------------------------------|--|
| link to test system (if used):   | <input type="checkbox"/> Air-link | <input checked="" type="checkbox"/> cable connection |
| Climatic conditions              | Temperature: (22±3°C)             | Rel. humidity: (40±20)%                              |
| EMI-Receiver (Analyzer) Settings | Please see diagram                |  |

#### GENERAL MEASUREMENT PROCEDURES:

The measurement test set-up and test procedure are in accordance with the provisions described in ANSI C63.4: 2009

The *Equipment under Test* (EUT) set-up to defined operating mode and installed (connected) to accessory equipment according the general description of use given by the applicant.

**The test set-up 7 + 8 for conducted measurements was used**

#### 5.4.1. Conducted emissions on antenna port, §15.111(a) and Canada requirements, RSS-132, Issue 2, §4.6

##### 5.4.1.1. IDLE GSM850

| BCCH channel = 182 (Downlink)  |                                      |                             |                        |  |                  |                     |             |                       |
|--------------------------------|--------------------------------------|-----------------------------|------------------------|--|------------------|---------------------|-------------|-----------------------|
| Sweep frequency range: [MHz]   | Diagram number                       | Frequency of emission [MHz] | Transducer factor [dB] | Correction factor for Canada only (RBW:3kHz->4kHz) | Result FCC [dBm] | Result Canada [dBm] | Limit [dBm] | Verdict               |
| Sweep 1<br>150kHz..<br>1000MHz | Please see chapter 1.4.1 in annex A1 | --                          | --                     | + 1.25 dB  | <-70.0           | <-68.75             | -57         | Passed <sup>2.)</sup> |
| Sweep 2<br>1 .. 10 GHz         |                                      | --                          | --                     |  | <-63.44          | <-64.69             | -53         | Passed                |
| Sweep 3<br>10 to<br>26,5GHz    |                                      | 15.654 GHz                  | --                     |  | -54.66           | -55.91              | -53         | Passed <sup>3.)</sup> |

Remark: Please see diagrams in Annex A1 for more details

2.) Peak from measurement set-up, BCCH carrier of base station

3.) internal spurious component from measurement set-up



**5.4.1.2. IDLE W-CDMA Band V**

| BCCH channel = at 880MHz       |                                      |                             |                        |  |                  |                     |             |                       |
|--------------------------------|--------------------------------------|-----------------------------|------------------------|--|------------------|---------------------|-------------|-----------------------|
| Sweep frequency range: [MHz]   | Diagram number                       | Frequency of emission [MHz] | Transducer factor [dB] | Correction factor for Canada only (RBW:3kHz->4kHz) | Result FCC [dBm] | Result Canada [dBm] | Limit [dBm] | Verdict               |
| Sweep 1<br>150kHz..<br>1000MHz | Please see chapter 1.4.3 in annex A1 | --                          | --                     | + 1.25 dB  | <-70.0           | <-68.75             | -57         | Passed <sup>2.)</sup> |
| Sweep 2<br>1 .. 10 GHz         |                                      | 6.6227                      | --                     |  | <-62.15          | <-63.4              | -53         | Passed                |
| Sweep 3<br>10 to<br>26,5GHz    |                                      | 15.654 GHz                  | --                     |  | -55.04           | -56.29              | -53         | Passed                |

Remark: Please see diagrams in separated Annex A1 for more details

- 2.) Peak from measurement set-up, BCCH carrier of base station
- 3.) internal spurious component from measurement set-up

**5.4.2. Conducted emissions on antenna port, Canada requirements, RSS-133, Issue 5, §6.6**

**5.4.2.1. IDLE GSM 1900**

| BCCH channel = 651 (downlink)  |                                      |                             |                        |  |                  |                     |             |                       |
|--------------------------------|--------------------------------------|-----------------------------|------------------------|--|------------------|---------------------|-------------|-----------------------|
| Sweep frequency range: [MHz]   | Diagram number                       | Frequency of emission [MHz] | Transducer factor [dB] | Correction factor for Canada only (RBW:3kHz->4kHz) | Result FCC [dBm] | Result Canada [dBm] | Limit [dBm] | Verdict               |
| Sweep 1<br>150kHz..<br>1000MHz | Please see chapter 1.4.2 in annex A1 | --                          | --                     | + 1.25 dB  | <-70.57          | <-69.32             | -57         | Passed                |
| Sweep 2<br>1 .. 10 GHz         |                                      | --                          | --                     |  | <-63.44          | <-64.68             | -53         | Passed <sup>2.)</sup> |
| Sweep 3<br>10 to<br>26,5GHz    |                                      | 15.654 GHz                  | --                     |  | -54.95           | -56.2               | -53         | Passed <sup>3.)</sup> |

Remark: Please see diagrams in separated Annex A1 for more details

- 2.) Peak from measurement set-up, BCCH carrier of base station
- 3.) internal spurious component from measurement set-up

**5.4.2.2. IDLE W-CDMA Band IV**

| BCCH channel = at 2118MHz      |                                      |                             |                        |  |                  |                     |             |                       |
|--------------------------------|--------------------------------------|-----------------------------|------------------------|--|------------------|---------------------|-------------|-----------------------|
| Sweep frequency range: [MHz]   | Diagram number                       | Frequency of emission [MHz] | Transducer factor [dB] | Correction factor for Canada only (RBW:3kHz->4kHz) | Result FCC [dBm] | Result Canada [dBm] | Limit [dBm] | Verdict               |
| Sweep 1<br>150kHz..<br>1000MHz | Please see chapter 1.4.4 in annex A1 | --                          | --                     | + 1.25 dB  | <-70.17          | <-68.92             | -57         | Passed                |
| Sweep 2<br>1 .. 10 GHz         |                                      | --                          | --                     |  | <-63.0           | <-64.25             | -53         | Passed <sup>2.)</sup> |
| Sweep 3<br>10 to<br>26,5GHz    |                                      | 15.654 GHz                  | --                     |  | -55.71           | -55.96              | -53         | Passed                |

Remark: Please see diagrams in separated Annex A1 for more details

- 2.) Peak from measurement set-up, BCCH carrier of base station
- 3.) internal spurious component from measurement set-up

**5.4.2.3. IDLE W-CDMA Band II**

| BCCH channel = at 1955MHz      |                                      |                             |                        |  |                  |                     |             |                       |
|--------------------------------|--------------------------------------|-----------------------------|------------------------|--|------------------|---------------------|-------------|-----------------------|
| Sweep frequency range: [MHz]   | Diagram number                       | Frequency of emission [MHz] | Transducer factor [dB] | Correction factor for Canada only (RBW:3kHz->4kHz) | Result FCC [dBm] | Result Canada [dBm] | Limit [dBm] | Verdict               |
| Sweep 1<br>150kHz..<br>1000MHz | Please see chapter 1.4.5 in annex A1 | 759.55                      | --                     | + 1.25 dB  | <-70.02          | <-68.77             | -57         | Passed                |
| Sweep 2<br>1 .. 10 GHz         |                                      | 6.6227                      | --                     |  | <-63             | <-64.25             | -53         | Passed <sup>2.)</sup> |
| Sweep 3<br>10 to<br>26,5GHz    |                                      | 15.654 GHz                  | --                     |  | -55.12           | -56.37              | -53         | Passed                |

Remark: Please see diagrams in separated Annex A1 for more details

- 2.) Peak from measurement set-up, BCCH carrier of base station
- 3.) internal spurious component from measurement set-up

**Verdict**

Summary of conducted measurement on antenna port: passed

### 5.5. Measurement uncertainties

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 it's contribution to the overall uncertainty according it's statistical distribution calculated.

Following table shows expectable uncertainties for each measurement type performed.

| Measurement  | Frequency range   | Calculated uncertainty based on a confidence level of 95% | Remarks:            |
|--|-------------------|---|---------------------|
| RF-Power Output conducted                                  | 9 kHz .. 20 GHz   | 1.0 dB  | --                  |
| RF-Power Output radiated                                   | 30 MHz .. 4 GHz   | 3.17 dB   | Substitution method |
| Conducted RF-emissions on antenna ports                    | 9 kHz .. 20 GHz   | 1.0 dB  | --                  |
| Radiated RF-emissions enclosure                            | 150 kHz .. 30 MHz | 5.0 dB  | Magnetic field      |
|  | 30 MHz .. 1 GHz   | 4.2 dB  | E-Field             |
|  | 1 GHz .. 18GHz    | 4.8 dB  | E-Field             |
|  | 1 GHz .. 20 GHz   | 3.17 dB   | Substitution method |
| Occupied bandwidth   | 9 kHz .. 4 GHz    | 0.1272 ppm<br>(Delta Marker method)                       | Frequency error     |
|  |                   | 1 dB  | Power               |
| Emission bandwidth   | 9 kHz .. 4 GHz    | 0.1272 ppm<br>(Delta Marker method)                       | Frequency error     |
|  |                   | 1 dB  | Power               |
| Frequency stability  | 9 kHz .. 20 GHz   | 0.0636 ppm  | --                  |
| Conducted emissions on AC-mains port (U <sub>CISPR</sub> ) | 9 kHz .. 150 kHz  | 4.0 dB  | --                  |
|  | 150 kHz .. 30 MHz | 3.6 dB  | --                  |

**Table : measurement uncertainties, valid for conducted/radiated measurements**

### 6. Accreditation details of CETECOM's laboratories and test sites

| Ref.-No.                        | Accreditation Certificate                     | Valid for laboratory area or test site  | Accreditation Body  |
|---------------------------------|---|---|---|
| -                               | D-PL-12047-01-01                              | All laboratories and test sites of CETECOM GmbH, Essen  | DAKKS, Deutsche Akkreditierungsstelle GmbH  |
| 337<br>487<br>558               | 736496  | Radiated Measurements 30 MHz to 1 GHz, 3m+10m OATS  | FCC, Federal Communications Commission<br>Laboratory Division, USA<br>(MRA US-EU 0003)      |
| 348<br>348                      |   | Radiated Measurements 30 MHz to 1 GHz, 3m SAR<br>Radiated Measurements above 1 GHz, 3 m Fully Anechoic Chamber<br>Mains Ports Conducted Interference Measurements<br>Telecommunication Ports Conducted Interference Measurements                                    |   |
| 337<br>487<br>550<br>558        | 3462D-1<br>3462D-2<br>3462D-2<br>3462D-3      | Radiated Measurements 30 MHz to 1 GHz, 3m + 10m OATS<br>Radiated Measurements 30 MHz to 1 GHz, 3m SAR<br>Radiated Measurements 1 GHz to 6 GHz, 3m SAR<br>Radiated Measurements above 1 GHz ,3 m Fully Anechoic Chamber  | IC, Industry Canada Certification and Engineering Bureau                                    |
| 337<br>487<br>550<br>348<br>348 | R-2665<br>R-2666<br>G-301<br>C-2914<br>T-1967 | Radiated Measurements 30 MHz to 1 GHz, 3m+10m OATS<br>Radiated Measurements 30 MHz to 1GHz, 3m SAR<br>Radiated Measurements 1GHz to 6 GHz, 3m SAR<br>Mains Ports Conducted Interference Measurements<br>Telecommunication Ports Conducted Interference Measurements | VCCI, Voluntary Control Council for Interference by Information Technology Equipment, Japan |

## 7. Instruments and Ancillary

### 7.1. Used equipment “CTC”

The “Ref.-No” in the left column of the following tables allows the clear identification of the laboratory equipment.

#### 7.1.1. Test software and firmware of equipment

| Ref.-No. | Equipment                               | Type                         | Serial-No.     | Version of Firmware or Software during the test  |
|----------|---|------------------------------|----------------|--|
| 001      | Emi Test Receiver                       | ESS                          | 825132/017     | Firm.= 1.21 , OTP=2.0, GRA=2.0   |
| 012      | Signal Generator (EMS-cond.)            | SMY 01                       | 839069/027     | Firm.= V 2.02  |
| 013      | Power Meter (EMS cond.)                 | NRVD                         | 839111/003     | Firm.= V 1.51  |
| 017      | Digital Radiocommunication Tester       | CMD 60 M                     | 844365/014     | Firmware = V 3.52 .22.01.99, DECT = D2.87 13.01.99   |
| 053      | Audio Analyzer                          | UPA3                         | 860612/022     | Firm. V 4.3  |
| 119      | RT Harmonics Analyzer dig. Flickermeter | B10                          | G60547         | Firm.= V 3.1DHG  |
| 140      | Signal Generator                        | SMHU                         | 831314/006     | Firm.= 3.21  |
| 261      | Thermal Power Sensor                    | NRV-Z55                      | 825083/0008    | EPROM-Datum 02.12.04, SE EE 1 B  |
| 262      | Power Meter                             | NRV-S                        | 825770/0010    | Firm.= 2.6   |
| 263      | Signal Generator                        | SMP 04                       | 826190/0007    | Firm.=3.21   |
| 264      | Spectrum Analyzer                       | FSEK 30                      | 826939/005     | Bios=2.1, Analyzer= 3.20   |
| 295      | Racal Digital Radio Test Set            | 6103                         | 1572           | UNIT Firmware= 4.04, SW-Main=4.04, SW-BBP=1.04, SW-DSP=1.02, Hardboot=1.02, Softboot=2.02                    |
| 298      | Univ. Radio Communication Tester        | CMU 200                      | 832221/091     | R&S Test Firmware =3.53 /3.54 (current Testsoftw. f. all band used   |
| 323      | Digital Radiocommunication Tester       | CMD 55                       | 825878/0034    | Firm.= 3.52 .22.01.99  |
| 331      | Climatic Test Chamber -40/+80 Grad      | HC 4055                      | 43146          | TSI 1.53   |
| 335      | System-CTC-EMS-Conducted                | System EMS Conducted         | -              | EMC 32 V 8.40  |
| 340      | Digital Radiocommunication Tester       | CMD 55                       | 849709/037     | Firm.= 3.52 .22.01.99  |
| 355      | Power Meter                             | URV 5                        | 891310/027     | Firm.= 1.31  |
| 365      | 10V Insertion Unit 50 Ohm               | URV5-Z2                      | 100880         | Eprom Data = 31.03.08  |
| 366      | Ultra Compact Simulator                 | UCS 500 M4                   | V0531100594    | Firm. UCS 500=001925/3.06a02, rc=ISMIEC 4.10   |
| 371      | Bluetooth Tester                        | CBT32                        | 100153         | CBT V5.30+ SW-Option K55   |
| 377      | Emi Test Receiver                       | ESCS 30                      | 100160         | Firm.= 2.30, OTP= 02.01, GRA= 02.36  |
| 378      | Broadband RF Field Monitor              | RadiSense III                | 03D00013SNO-08 | Firm.= V.03D13   |
| 383      | Signal Generator                        | SME 03                       | 842 828 /034   | Firm.= 4.61  |
| 389      | Digital Multimeter                      | Keithley 2000                | 0583926        | Firm. = A13 (Mainboard) A02 (Display)  |
| 392      | Radio Communication Tester              | MT8820A                      | 6K00000788     | Firm.= 4.50 #005, IPL=4.01#001,OS=4.02#001, GSM=4.41#013, W-CDMA= 4.54#004, scenario= 4.52#002               |
| 436      | Univ. Radio Communication Tester        | CMU 200                      | 103083         | R&S Test Firmware Base=5.14, Mess-Software= GSM:5.14 WCDMA:5.14 (current Testsoftw. F. all band to be used , |
| 441      | CTC-SAR-EMI Cable Loss                  | System EMI field (SAR) Cable | -              | EMC 32 Version 8.40  |
| 442      | CTC-SAR-EMS                             | System EMS field (SAR)       | -              | EMC 32 Version 8.40  |
| 443      | CTC-FAR-EMI-RSE                         | System CTC-FAR-EMI-RSE       | -              | Spuri 7.2.5 or EMC 32 Ver. 8.40  |
| 444      | CTC-FAR-EMS field                       | System-EMS-Field (FAR)       | -              | EMC 32 Version 8.40  |
| 460      | Univ. Radio Communication Tester        | CMU 200                      | 108901         | R&S Test Firmware Base=5.14, GSM=5.14 WCDMA=5.14 (current Testsoftw.,f. all band to be used,                 |
| 489      | Emi Test Receiver                       | ESU40                        | 1000-30        | Firmware=4.43 SP3, Bios=V5.1-16-3, Spec. =01.00  |
| 491      | ESD Simulator dito                      | ESD dito                     | dito307022     | V 2.30   |
| 524      | Voltage Drop Simulator                  | VDS 200                      | 0196-16        | Software Nr. 000037 Version V4.20a01   |
| 526      | Burst Generator                         | EFT 200 A                    | 0496-06        | Software Nr. 000034 Version V2.32  |
| 527      | Micro Pulse Generator                   | MPG 200 B                    | 0496-05        | Software-Nr. 000030 Version V2.43  |
| 528      | Load Dump Simulator                     | LD 200B                      | 0496-06        | Software-Nr. 000031 Version V2.35a01   |
| 546      | Univ. Radio Communication Tester        | CMU 200                      | 106436         | R&S Test Firmware Base=5.14, GSM=5.14 WCDMA=5.14 (current Testsoftw.,f. all band to be used                  |
| 547      | Univ. Radio Communication Tester        | CMU 200                      | 835390/014     | R&S Test Firmware Base=V5.1403 (current Testsoftw., f. all band used, GSM = 5.14 WCDMA: = 5.14               |
| 584      | Spectrum Analyzer                       | FSU 8                        | 100248         | 2.82_SP3   |
| 594      | Univ. Radio Communication Tester        | CMW500                       | 101757         | Firmware Base=2.0.20.9, LTE=2.0.20.8. CDMA= 2.0.10   |
| 597      | Univ. Radio Communication Tester        | CMU 200                      | 100347         | R&S Test Firmware Base=5.01, GSM=5.02 WCDMA= not installed, Mainboard= µP1=V.850                             |
| 598      | Spectrum Analyzer                       | FSEM 30 (Reserve)            | 831259/013     | Firmware Bios 3.40 , Analyzer 3.40 Sp 2  |

7.1.2. Single instruments and test systems

| Ref.-No. | Equipment                               | Type                      | Serial-No.      | Manufacturer          | Interval of calibration | Remark | Cal due    |
|----------|---|---------------------------|-----------------|-----------------------|-------------------------|--------|------------|
| 001      | Emi Test Receiver                       | ESS                       | 825132/017      | Rohde & Schwarz       | 12 M                    | -      | 31.03.2012 |
| 005      | AC - LISN (50 Ohm/50µH, test site 1)    | ESH2-Z5                   | 861741/005      | Rohde & Schwarz       | 24/12 M                 | -      | 31.03.2012 |
| 007      | DC - LISN (50 Ohm/5µH)                  | ESH3-Z6                   | 892563/002      | Rohde & Schwarz       | 24/12 M                 | -      | 31.03.2012 |
| 009      | Power Meter (EMS-radiated)              | NRV                       | 863056/017      | Rohde & Schwarz       | 24 M                    | -      | 31.03.2013 |
| 016      | Line Impedance Simulating Network       | Op. 24-D                  | B6366           | Spitzenberger+Spies   | 36 M                    | -      | 31.03.2013 |
| 020      | Horn Antenna 18 GHz (Subst 1)           | 3115                      | 9107-3699       | EMCO                  | 36/12 M                 | -      | 31.03.2013 |
| 021      | Loop Antenna (H-Field)                  | 6502                      | 9206-2770       | EMCO                  | 36 M                    | -      | 31.03.2013 |
| 030      | Loop Antenna (H-field)                  | HFH-Z2                    | 879604/026      | Rohde & Schwarz       | 36 M                    | -      | 31.03.2012 |
| 033      | RF-current probe (100kHz-30MHz)         | ESH2-Z1                   | 879581/18       | Rohde & Schwarz       | 24 M                    | -      | 31.03.2013 |
| 057      | relay-switch-unit (EMS system)          | RSU                       | 494440/002      | Rohde & Schwarz       | pre-m                   | 1a     |            |
| 060      | power amplifier (DC-2kHz)               | PAS 5000                  | B6363           | Spitzenberger+Spies   | -                       | 3      |            |
| 066      | notch filter (WCDMA; FDD1)              | WRCT 1900/2200-5/40-10EEK | 5               | Wainwright GmbH       | 12 M                    | 1c     | 30.06.2012 |
| 086      | DC - power supply, 0 -10 A              | LNG 50-10                 | -               | Heinzinger Electronic | pre-m                   | 2      |            |
| 087      | DC - power supply, 0 -5 A               | EA-3013 S                 | -               | Elektro Automatik     | pre-m                   | 2      |            |
| 090      | Helmholtz coil: 2x10 coils in series    | -                         | -               | RWTÜV                 | -                       | 4      |            |
| 091      | USB-LWL-Converter                       | OLS-1                     | 007/2006        | Ing. Büro Scheiba     | -                       | 4      |            |
| 099      | passive voltage probe                   | ESH2-Z3                   | 299.7810.52     | Rohde & Schwarz       | 36 M                    | -      | 31.03.2012 |
| 100      | passive voltage probe                   | Probe TK 9416             | without         | Schwarzbeck           | 36 M                    | -      | 31.03.2012 |
| 110      | USB-LWL-Converter                       | OLS-1                     | -               | Ing. Büro Scheiba     | -                       | 4      |            |
| 119      | RT Harmonics Analyzer dig. Flickermeter | B10                       | G60547          | BOCONSULT             | 36 M                    | -      | 31.03.2013 |
| 134      | horn antenna 18 GHz (Subst 2)           | 3115                      | 9005-3414       | EMCO                  | 12 M                    | -      | 31.03.2012 |
| 136      | adjustable dipole antenna (Dipole 1)    | 3121C-DB4                 | 9105-0697       | EMCO                  | 12 M                    | -      | 31.03.2012 |
| 140      | Signal Generator                        | SMHU                      | 831314/006      | Rohde & Schwarz       | 24 M                    | -      | 31.03.2012 |
| 248      | attenuator                              | SMA 6dB 2W                | -               | Radiall               | pre-m                   | 2      |            |
| 249      | attenuator                              | SMA 10dB 10W              | -               | Radiall               | pre-m                   | 2      |            |
| 252      | attenuator                              | N 6dB 12W                 | -               | Radiall               | pre-m                   | 2      |            |
| 256      | attenuator                              | SMA 3dB 2W                | -               | Radiall               | pre-m                   | 2      |            |
| 257      | hybrid                                  | 4031C                     | 04491           | Narda                 | pre-m                   | 2      |            |
| 260      | hybrid coupler                          | 4032C                     | 11342           | Narda                 | pre-m                   | 2      |            |
| 261      | Thermal Power Sensor                    | NRV-Z55                   | 825083/0008     | Rohde & Schwarz       | 24/12 M                 | -      | 31.03.2012 |
| 262      | Power Meter                             | NRV-S                     | 825770/0010     | Rohde & Schwarz       | 24 M                    | -      | 31.03.2012 |
| 263      | Signal Generator                        | SMP 04                    | 826190/0007     | Rohde & Schwarz       | 36 M                    | -      | 31.03.2013 |
| 264      | Spectrum Analyzer                       | FSEK 30                   | 826939/005      | Rohde & Schwarz       | 12 M                    | -      | 31.03.2014 |
| 265      | peak power sensor                       | NRV-Z33, Model 04         | 840414/009      | Rohde & Schwarz       | 24 M                    | -      | 31.03.2012 |
| 266      | peak power sensor                       | NRV-Z31, Model 04         | 843383/016      | Rohde & Schwarz       | 24 M                    | -      | 31.03.2012 |
| 267      | notch filter GSM 850                    | WRCA 800/960-6EEK         | 9               | Wainwright GmbH       | pre-m                   | 2      |            |
| 268      | AC/DC power supply                      | EA 3050-A                 | 9823636         | Elektro Automatik     | pre-m                   | 2      |            |
| 270      | termination                             | 1418 N                    | BB6935          | Weinschel             | pre-m                   | 2      |            |
| 271      | termination                             | 1418 N                    | BE6384          | Weinschel             | pre-m                   | 2      |            |
| 272      | attenuator (20 dB) 50 W                 | Model 47                  | BF6239          | Weinschel             | pre-m                   | 2      |            |
| 273      | attenuator (10 dB) 100 W                | Model 48                  | BF9229          | Weinschel             | pre-m                   | 2      |            |
| 274      | attenuator (10 dB) 50 W                 | Model 47 (10 dB) 50 W     | BG0321          | Weinschel             | pre-m                   | 2      |            |
| 275      | DC-Block                                | Model 7003 (N)            | C5129           | Weinschel             | pre-m                   | 2      |            |
| 276      | DC-Block                                | Model 7006 (SMA)          | C7061           | Weinschel             | pre-m                   | 2      |            |
| 279      | power divider                           | 1515 (SMA)                | LH855           | Weinschel             | pre-m                   | 2      |            |
| 287      | pre-amplifier 25MHz - 4GHz              | AMF-2D-100M4G-35-10P      | 379418          | Miteq                 | 12 M                    | 1c     | 30.06.2012 |
| 291      | high pass filter GSM 850/900            | WHJ 2200-4EE              | 14              | Wainwright GmbH       | 12 M                    | 1c     | 30.06.2012 |
| 298      | Univ. Radio Communication Tester        | CMU 200                   | 832221/091      | Rohde & Schwarz       | pre-m                   | 3      |            |
| 300      | AC LISN (50 Ohm/50µH, 1-phase)          | ESH3-Z5                   | 892 239/020     | Rohde & Schwarz       | 24/12 M                 | -      | 31.03.2012 |
| 301      | attenuator (20 dB) 50W, 18GHz           | 47-20-33                  | AW0272          | Lucas Weinschel       | pre-m                   | 2      |            |
| 302      | horn antenna 40 GHz (Meas 1)            | BBHA9170                  | 155             | Schwarzbeck           | 36 M                    | -      | 31.03.2014 |
| 303      | horn antenna 40 GHz (Subst 1)           | BBHA9170                  | 156             | Schwarzbeck           | 36 M                    | -      | 31.03.2014 |
| 331      | Climatic Test Chamber -40/+80 Grad      | HC 4055                   | 43146           | Heraeus Vötsch        | 24 M                    | -      | 30.11.2012 |
| 341      | Digital Multimeter                      | Fluke 112                 | 81650455        | Fluke                 | 24 M                    | -      | 31.03.2012 |
| 342      | Digital Multimeter                      | Voltcraft M-4660A         | IB 255466       | Voltcraft             | 24 M                    | -      | 31.03.2013 |
| 347      | laboratory site                         | radio lab.                | -               | -                     | -                       | 5      |            |
| 348      | laboratory site                         | EMI conducted             | -               | -                     | -                       | 5      |            |
| 354      | DC - Power Supply 40A                   | NGPE 40/40                | 448             | Rohde & Schwarz       | pre-m                   | 2      |            |
| 355      | Power Meter                             | URV 5                     | 891310/027      | Rohde & Schwarz       | 24 M                    | -      | 31.03.2012 |
| 356      | power sensor                            | NRV-Z1                    | 882322/014      | Rohde & Schwarz       | 24 M                    | -      | 31.03.2013 |
| 357      | power sensor                            | NRV-Z1                    | 861761/002      | Rohde & Schwarz       | 24 M                    | -      | 31.03.2013 |
| 373      | V-Network 5µH/50 Ohm                    | ESH3-Z6                   | 100535          | Rohde & Schwarz       | 24/12 M                 | -      | 31.03.2012 |
| 376      | Horn Antenna 6 GHz                      | BBHA9120 E                | BBHA 9120 E 179 | Schwarzbeck           | 12 M                    | -      | 31.03.2012 |
| 377      | Emi Test Receiver                       | ESCS 30                   | 100160          | Rohde & Schwarz       | 12 M                    | -      | 31.03.2012 |
| 389      | Digital Multimeter                      | Keithley 2000             | 0583926         | Keithley              | 24 M                    | -      | 31.03.2013 |
| 392      | Radio Communication Tester              | MT8820A                   | 6K00000788      | Anritsu               | 12 M                    | -      | 31.03.2012 |
| 431      | Model 7405                              | Near-Field Probe Set      | 9305-2457       | EMCO                  | -                       | 4      |            |
| 436      | Univ. Radio Communication Tester        | CMU 200                   | 103083          | Rohde & Schwarz       | 12 M                    | -      | 31.03.2012 |
| 441      | CTC-SAR-EMI Cable Loss                  | System EMI field (SAR)    | -               | CETECOM               | 12 M                    | 5      | 31.08.2012 |

| Ref.-No. | Equipment                               | Type                          | Serial-No.   | Manufacturer                | Interval of calibration | Remark | Cal due    |
|----------|---|-------------------------------|--------------|-----------------------------|-------------------------|--------|------------|
|          |   | Cable                         |              |                             |                         |        |            |
| 443      | CTC-FAR-EMI-RSE                         | System CTC-FAR-EMI-RSE        | -            | ETS-Lindgren/CETECOM        | 12 M                    | 5      | 30.06.2012 |
| 448      | notch filter WCDMA_FDD II               | WRCT 1850.0/2170.0-5/40-10SSK | 5            | Wainwright Instruments GmbH | 12 M                    | 1c     | 30.06.2012 |
| 449      | notch filter WCDMA FDD V                | WRCT 824.0/894.0-5/40-8SSK    | 1            | Wainwright                  | 12 M                    | 1c     | 30.06.2012 |
| 454      | Oscilloscope                            | HM 205-3                      | 9210 P 29661 | Hameg                       | -                       | 4      |            |
| 456      | DC-Power supply 0-5 A                   | EA 3013 S                     | 207810       | Elektro Automatik           | pre-m                   | 2      |            |
| 459      | DC -Power supply 0-5 A , 0-32 V         | EA-PS 2032-50                 | 910722       | Elektro Automatik           | pre-m                   | 2      |            |
| 460      | Univ. Radio Communication Tester        | CMU 200                       | 108901       | Rohde & Schwarz             | 12 M                    | -      | 31.03.2012 |
| 463      | Universal source                        | HP3245A                       | 2831A03472   | Agilent                     | -                       | 4      |            |
| 466      | Digital Multimeter                      | Fluke 112                     | 89210157     | Fluke USA                   | 24 M                    | -      | 31.03.2012 |
| 467      | Digital Multimeter                      | Fluke 112                     | 89680306     | Fluke USA                   | 24 M                    | -      | 31.03.2012 |
| 468      | Digital Multimeter                      | Fluke 112                     | 90090455     | Fluke USA                   | 24 M                    | -      | 31.03.2012 |
| 477      | ReRadiating GPS-System                  | AS-47                         | -            | Automotive Cons. Fink       | -                       | 3      |            |
| 480      | power meter (Fula)                      | NRVS                          | 838392/031   | Rohde & Schwarz             | 24 M                    | -      | 31.03.2013 |
| 482      | filter matrix                           | Filter matrix SAR 1           | -            | CETECOM (Brl)               | -                       | 1d     |            |
| 484      | pre-amplifier 2,5 - 18 GHz              | AMF-5D-02501800-25-10P        | 1244554      | Miteq                       | 12 M                    | -      | 30.07.2012 |
| 487      | System CTC NSA-Verification SAR-EMI     | System EMI field (SAR) NSA    | -            | ETS Lindgren/CETECOM        | 12 M                    | -      | 30.09.2012 |
| 489      | Emi Test Receiver                       | ESU40                         | 1000-30      | Rohde & Schwarz             | 12 M                    | -      | 31.03.2012 |
| 502      | band reject filter                      | WRCG 1709/1786-1699/1796-     | SN 9         | Wainwright                  | pre-m                   | 2      |            |
| 503      | band reject filter                      | WRCG 824/849-814/859-60/10SS  | SN 5         | Wainwright                  | pre-m                   | 2      |            |
| 512      | notch filter GSM 850                    | WRCA 800/960-02/40-6EEK       | SN 24        | Wainwright                  | 12 M                    | 1c     | 30.06.2012 |
| 517      | relais switch matrix                    | HF Relais Box Keithley System | SE 04        | Keithley                    | pre-m                   | 2      |            |
| 523      | Digital Multimeter                      | L4411A                        | MY46000154   | Agilent                     | 24 M                    | -      | 31.03.2013 |
| 529      | 6 dB Broadband resistive power divider  | Model 1515                    | LH 855       | Weinschel                   | pre-m                   | 2      |            |
| 530      | 10 dB Broadband resistive power divider | R 416110000                   | LOT 9828     | -                           | pre-m                   | 2      |            |
| 546      | Univ. Radio Communication Tester        | CMU 200                       | 106436       | R&S                         | 12 M                    | -      | 31.03.2012 |
| 547      | Univ. Radio Communication Tester        | CMU 200                       | 835390/014   | Rohde & Schwarz             | 12 M                    | -      | 31.03.2012 |
| 548      | Digital-Barometer                       | GBP 2300                      | without      | Greisinger GmbH             | 36/12 M                 | -      | 31.03.2012 |
| 549      | Log.Per-Antenna                         | HL025                         | 1000060      | Rohde & Schwarz             | 36/12 M                 | -      | 31.03.2012 |
| 552      | high pass filter 2,8-18GHz              | WHKX 2.8/18G-10SS             | 4            | Wainwright                  | 12 M                    | 1c     | 30.07.2012 |
| 558      | System CTC FAR S-VSWR                   | System CTC FAR S-VSWR         | -            | CTC                         | 24 M                    | -      | 31.07.2013 |
| 574      | Biconilog Hybrid Antenna                | BTA-L                         | 980026L      | Frankonia                   | 36/12 M                 | -      | 30.03.2013 |
| 584      | Spectrum Analyzer                       | FSU 8                         | 100248       | Rohde & Schwarz             | 12 M                    | -      | 31.03.2012 |
| 594      | Univ. Radio Communication Tester        | CMW500                        | 101757       | Rohde & Schwarz             | 24 M                    | -      | 31.03.2012 |
| 597      | Univ. Radio Communication Tester        | CMU 200                       | 100347       | Rohde & Schwarz             | 12 M                    | -      | 31.03.2012 |
| 598      | Spectrum Analyzer                       | FSEM 30 (Reserve)             | 831259/013   | Rohde & Schwarz             | 24 M                    | -      | 13.01.2013 |
| 600      | power meter                             | NRVD (Reserve)                | 834501/018   | Rohde & Schwarz             | 24 M                    | -      | 31.03.2013 |
| 601      | medium-sensitivity diode sensor         | NRV-Z5 (Reserve)              | 8435323/003  | Rohde & Schwarz             | 24 M                    | -      | 12.01.2013 |
| 602      | peak power sensor                       | NRV-Z32 (Reserve)             | 835080       | Rohde & Schwarz             | 24 M                    | -      | 12.01.2013 |
| 608      | UltraLog-Antenna                        | HL 562                        | 830547/009   | Rohde & Schwarz             | 36/12 M                 | -      | 31.03.2014 |
| 611      | DC power supply                         | E3632A                        | KR 75305854  | Agilent                     | pre-m                   | 2      |            |
| 612      | DC power supply                         | E3632A                        | MY 40001321  | Agilent                     | pre-m                   | 2      |            |
| 613      | Attenuator                              | R416120000 20dB 10W           | Lot. 9828    | Radiall                     | pre-m                   | 2      |            |

### 7.1.3. Legend

| Note / remarks |     | Calibrated during system calibration:   |
|----------------|-----|---|
|                | 1a  | System CTC-SAR-EMS (Ref.-No. 442)   |
|                | 1b  | System-CTC-EMS-Conducted (Ref.-No. 335)   |
|                | 1c  | System CTC-FAR-EMI-RSE (Ref.-No . 443)  |
|                | 1d  | System CTC-SAR-EMI (Ref.-No . 441)  |
|                | 1e  | System CTC-OATS (EMI radiated) (Ref.-No. 337)   |
|                | 1 f | System CTC-CTIA-OTA (Ref.-No . 420)   |
|                | 1 g | System CTC-FAR-EMS (Ref.-No . 444)  |
|                | 2   | Calibration or equipment check immediately before measurement                             |
|                | 3   | Regulatory maintained equipment for functional check or support purpose                   |
|                | 4   | Ancillary equipment without calibration e.g. mechanical equipment or monitoring equipment |
|                | 5   | Test System   |

|                         |      |          |
|-------------------------|------|----------|
| Interval of calibration | 12 M | 12 month |
|-------------------------|------|----------|

|  |         |   |
|--|---------|---|
|  | 24 M    | 24 month  |
|  | 36 M    | 36 month  |
|  | 24/12 M | Calibration every 24 months, between this every 12 months internal validation |
|  | 36/12 M | Calibration every 36 months, between this every 12 months internal validation |
|  | Pre-m   | Check before starting the measurement   |
|  | -       | Without calibration   |