

## FCC Part 22 Compliance Test Report

|                                                         |                                                                                                                                                                                                                                                                                    |                                   |                                                                                                                                                 |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Report no.:</b>                                 | Tre_FCC_0919_06.doc                                                                                                                                                                                                                                                                | <b>Date of Report:</b>            | 13-May-2009                                                                                                                                     |
| <b>Number of pages:</b>                                 | 13                                                                                                                                                                                                                                                                                 | <b>Customer's Contact person:</b> | Asko Pasanen                                                                                                                                    |
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| <b>FCC listing no.:</b>                                 | 94436                                                                                                                                                                                                                                                                              |                                   |                                                                                                                                                 |
| <b>IC recognition no.:</b>                              | 661AK-1                                                                                                                                                                                                                                                                            |                                   |                                                                                                                                                 |
| <b>Tested devices/ accessories:</b>                     | <b>Phone RM-485 / Battery BL-5K, AC charger AC-10E, Audio adapter AD-54, Headset HS-83</b>                                                                                                                                                                                         |                                   |                                                                                                                                                 |
| <b>FCC ID:</b>                                          | QURRM-485                                                                                                                                                                                                                                                                          | <b>IC:</b>                        | 661AC-RM485                                                                                                                                     |
| <b>Supplement reports:</b>                              | -                                                                                                                                                                                                                                                                                  |                                   |                                                                                                                                                 |
| <b>Testing has been carried out in accordance with:</b> | <b>CFR 47, FCC rules Part 22, TIA-603-C-2004 and IC standards RSS-GEN (Issue 2, June 2007) and RSS-132 (Issue 2, September 2005). Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".</b> |                                   |                                                                                                                                                 |
| <b>Documentation:</b>                                   | The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia.                               |                                   |                                                                                                                                                 |
| <b>Test Results:</b>                                    | <b>The EUT complies with the requirements in respect of all parameters subject to the test.</b><br>The test results relate only to devices specified in this document.                                                                                                             |                                   |                                                                                                                                                 |
| <b>Date and signature for the contents:</b>             |                                                                                                                                                                                                                                                                                    |                                   |                                                                                                                                                 |

**Jari Jantunen, Test System Manager**

## 1. Summary for FCC Part 22 Compliance Test Report

|                               |                                                        |
|-------------------------------|--------------------------------------------------------|
| Date of receipt               | 05-May-2009                                            |
| Testing completed             | 08-May-2009                                            |
| The customer's contact person | Asko Pasanen                                           |
| Test Plan referred to         | T:\Projects\RM-485\TestPlan_RS\RS_testplan_RM-485.xls  |
| Notes                         | -                                                      |
| Document name                 | T:\Projects\RM-485\EMC\Results\FCC\Tre_FCC_0919_06.doc |

### 1.1. EUT and Accessory Information

The EUT is a 7-band (GSM850/900/1800/1900 and WCDMA Band I/II(1900)/V(850)) mobile phone with GPRS, EGPRS, Bluetooth, WLAN and FM transmitter. The EUT is tested with maximum rated TX power, modulated with pseudo random bit sequence (PRBS9).

| Product       | Type   | SN                          | HW   | MV | SW     | DUT   |
|---------------|--------|-----------------------------|------|----|--------|-------|
| Phone         | RM-485 | 004401103549545             | 0831 | -  | 10.007 | 41864 |
| Phone         | RM-485 | 004401103548992             | 0831 | -  | 10.051 | 41880 |
| Battery       | BL-5K  | 4620408441L20113832;0670580 | -    | -  | -      | 41865 |
| AC charger    | AC-10E | 3997918112240401180;0675408 | -    | -  | -      | 41479 |
| Audio adapter | AD-54  | -                           | -    | -  | -      | 41867 |
| Headset       | HS-83  | -                           | -    | -  | -      | 41866 |

### 1.2. Summary of Test Results

#### WCDMA 850 (Band V):

| Section in CFR 47     | Section in RSS-GEN or RSS-132 | Name of the test                           | Result |
|-----------------------|-------------------------------|--------------------------------------------|--------|
| §2.1046(a), 22.913(a) | 4.4                           | Conducted RF output power                  | NP     |
| §22.913(a)            | 4.4                           | Radiated RF output power                   | PASSED |
| §2.1049(h)            | 4.6.1                         | 99 % occupied bandwidth                    | PASSED |
| §22.917(a)            | 4.5                           | Band edge compliance                       | PASSED |
| §22.917(a), §2.1051   | 4.5                           | Spurious emissions at antenna terminals    | NP     |
| §22.917(a), §2.1053   | 4.5                           | Spurious radiated emissions                | PASSED |
| §2.1055(a)            | 4.3                           | Frequency stability, temperature variation | NP     |
| §2.1055(d)            | 4.3                           | Frequency stability, voltage variation     | NP     |

PASSED

FAILED

NP

The EUT complies with the essential requirements in the standard.

The EUT does not comply with the essential requirements in the standard.

The test was not performed by the TCC Nokia Tampere Laboratory.

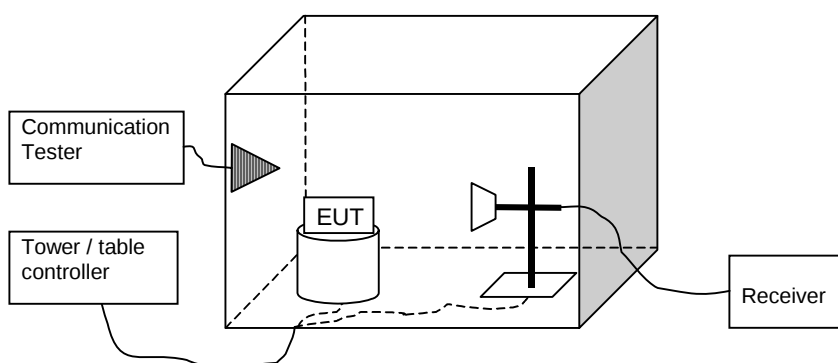
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## 2. Radiated RF output power (FCC §22.913(a), RSS-132 4.4)

|                                                 |                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------|
| EUT with DUT number                             | RM-485 DUT 41864                                                    |
| Accessories with DUT numbers                    | BL-5K DUT 41865, AC-10E DUT 41479, AD-54 DUT 41867, HS-83 DUT 41866 |
| Operation Voltage [V] / [Hz]                    | 115 / 60                                                            |
| Result                                          | PASSED                                                              |
| Remarks                                         | Slide open/closed                                                   |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 21 / 46 / 100.5                                                     |
| Date of measurements                            | 05-May-2009                                                         |
| Measured by                                     | Jari Jantunen                                                       |

### 2.1. Test setup



### 2.2. Test method and limit

The measurement is made according to TIA-603-C-2004 as follows:

The measurement is performed in the Anechoic Chamber with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system. The turntable is rotated 360 degrees and this is repeated for both horizontal and vertical receive antenna polarizations.

The EUT is placed on a nonconductive plate at 170 cm height.

The substitution method is used. Substitution values at each frequencies are measured beforehand and saved to the test software.

The substitution corrections are obtained as described below:

$$A_{SUBST} = P_{SUBST\_TX} - P_{SUBST\_RX} - L_{SUBST\_CABLES} + G_{SUBST\_TX\_ANT}$$

Where  $A_{SUBST}$  is the final substitution correction including receive antenna gain.  $P_{SUBST\_TX}$  is signal generator level,  $P_{SUBST\_RX}$  is receiver level,  $L_{SUBST\_CABLES}$  is cable losses including both TX and RX cables and  $G_{SUBST\_TX\_ANT}$  is substitution antenna gain.

The measurement results are obtained as described below:

$$P [dBm] = P_{MEAS} + A_{TOT}$$

Where  $P_{MEAS}$  is receiver reading in dBm and  $A_{TOT}$  is total correction factor including cable loss and substitution correction ( $A_{TOT} = L_{CABLES} + A_{SUBST}$ ).

Limits for radiated RF output power measurements

| Frequency range [MHz] | Limit [W] | Limit [dBm] |
|-----------------------|-----------|-------------|
| 824 - 849             | 7         | 38.5        |

### 2.3. WCDMA 850 Test results slide open

| Channel / $f_c$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Result |
|-----------------------|-----------|---------|------------------|----------------|--------------|--------|
| 4132 / 826.4          | 17.60     | 0.058   | - 14.10          | 31.70          | VERTICAL     | PASSED |
| 4175 / 835.0          | 18.30     | 0.068   | - 13.10          | 31.40          | HORIZONTAL   | PASSED |
| 4233 / 846.6          | 19.10     | 0.081   | - 12.40          | 31.50          | HORIZONTAL   | PASSED |

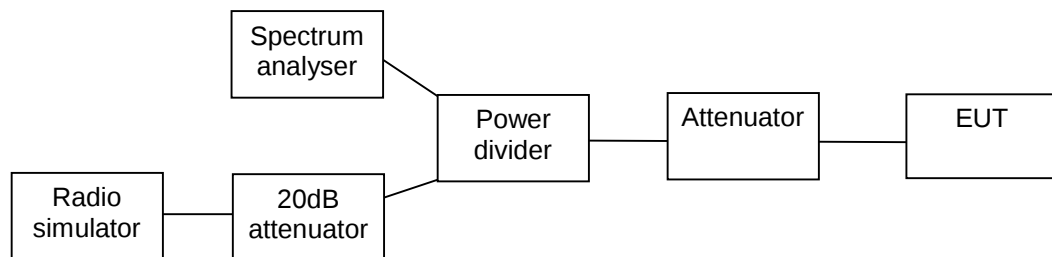
### 2.4. WCDMA 850 Test results slide closed

| Channel / $f_c$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Result |
|-----------------------|-----------|---------|------------------|----------------|--------------|--------|
| 4132 / 826.4          | 12.40     | 0.017   | - 19.30          | 31.70          | VERTICAL     | PASSED |
| 4175 / 835.0          | 13.10     | 0.020   | - 18.60          | 31.70          | VERTICAL     | PASSED |
| 4233 / 846.6          | 14.70     | 0.030   | - 16.80          | 31.50          | VERTICAL     | PASSED |

### 3. 99 % occupied bandwidth (FCC §2.1049(h), RSS-GEN 4.6.1)

|                                                 |                  |
|-------------------------------------------------|------------------|
| EUT with DUT number                             | RM-485 DUT 41880 |
| Accessories with DUT numbers                    | BL-5K DUT 41865  |
| Operation Voltage [V] / [Hz]                    | Nominal          |
| Result                                          | PASSED           |
| Remarks                                         | -                |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 21 / 43 / 100.9  |
| Date of measurements                            | 08-May-2009      |
| Measured by                                     | Jari Jantunen    |

#### 3.1. Test setup



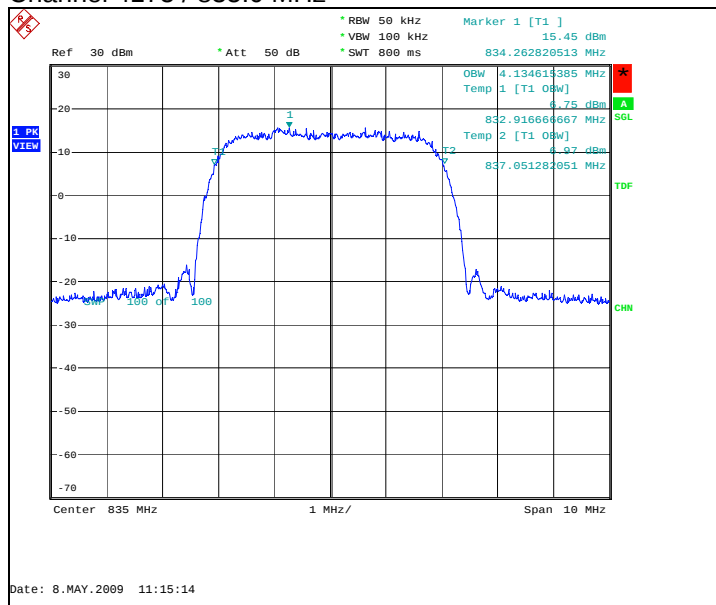
#### 3.2. Test method and limit

The measurement is made according to FCC rules part 22 and IC standard RSS-GEN.

### 3.3. WCDMA 850 Test results

| Operation mode (TX on) | 99% occupied bandwidth [kHz] |
|------------------------|------------------------------|
| FDD                    | 4134.615                     |

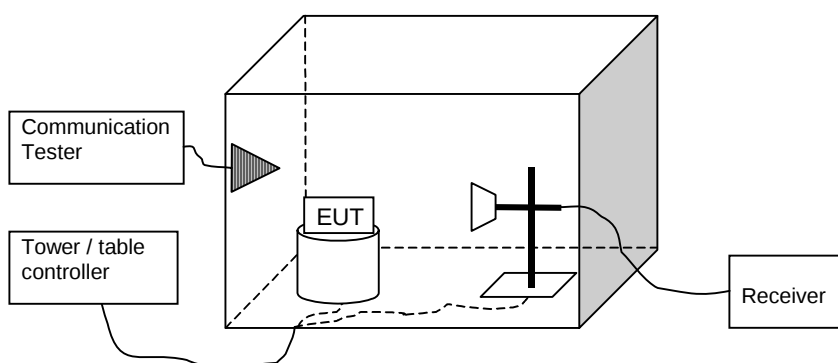
Channel 4175 / 835.0 MHz



#### 4. Band edge compliance (FCC §22.917(a), RSS-132 4.5)

|                                                 |                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------|
| EUT with DUT number                             | RM-485 DUT 41864                                                    |
| Accessories with DUT numbers                    | BL-5K DUT 41865, AC-10E DUT 41479, AD-54 DUT 41867, HS-83 DUT 41866 |
| Operation Voltage [V] / [Hz]                    | 115 / 60                                                            |
| Result                                          | PASSED                                                              |
| Remarks                                         | Slide open                                                          |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 21 / 46 / 100.5                                                     |
| Date of measurements                            | 05-May-2009                                                         |
| Measured by                                     | Jari Jantunen                                                       |

##### 4.1. Test setup



##### 4.2. Test method and limit

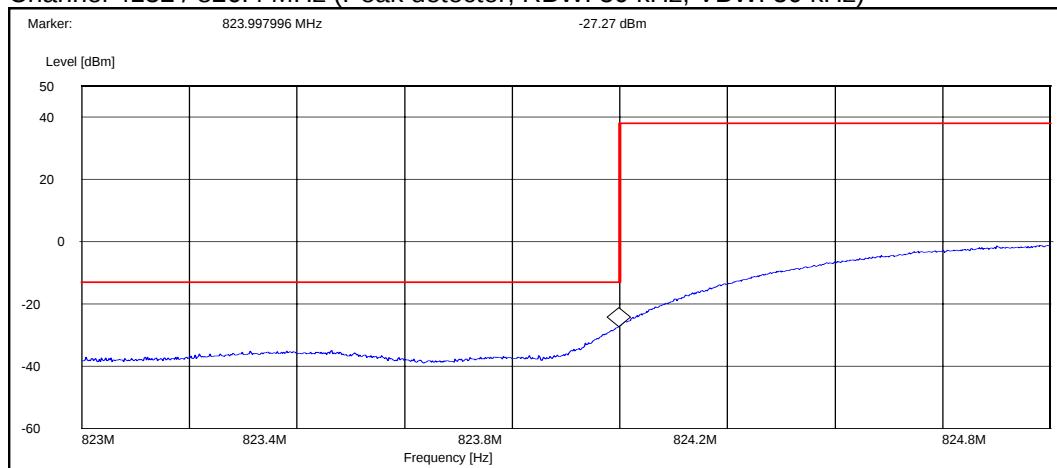
The measurement is made according to FCC rules part 22 and IC standard RSS-132.

Limits for band edge compliance measurements

| Operation band | Frequency range [MHz]   | Limit [dBm] |
|----------------|-------------------------|-------------|
| WCDMA 850      | Below 824 and above 849 | -13         |

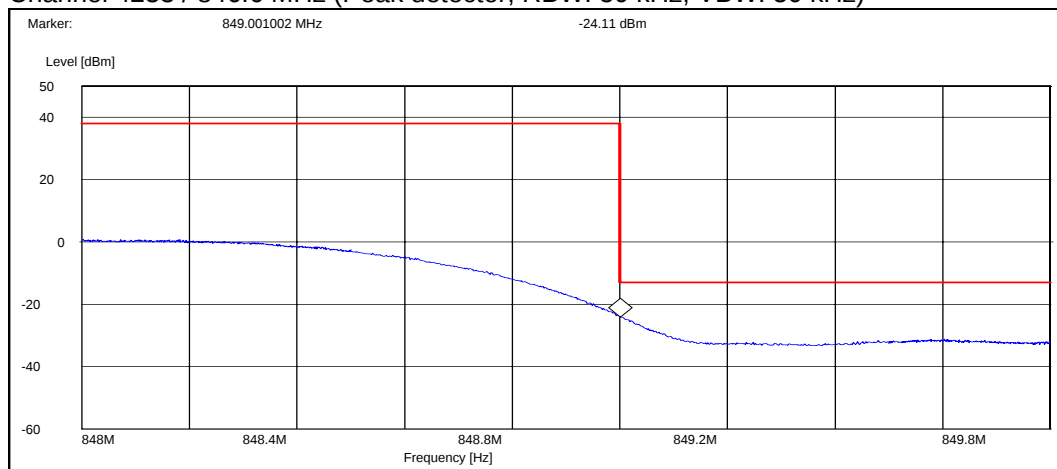
### 4.3. WCDMA 850 Test results

Channel 4132 / 826.4 MHz (Peak detector, RBW: 50 kHz, VBW: 50 kHz)



| Operation mode (TX on) | Channel / $f_c$ [MHz] | P [dBm] |
|------------------------|-----------------------|---------|
| FDD                    | 4132 / 826.4          | -27.30  |

Channel 4233 / 846.6 MHz (Peak detector, RBW: 50 kHz, VBW: 50 kHz)

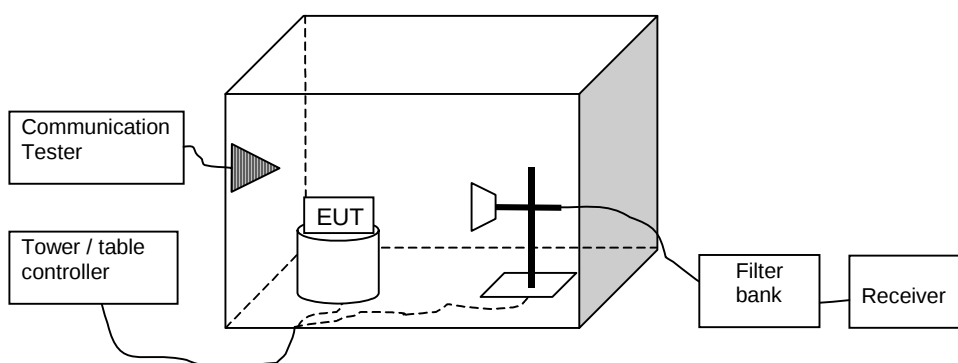


| Operation mode (TX on) | Channel / $f_c$ [MHz] | P [dBm] |
|------------------------|-----------------------|---------|
| FDD                    | 4233 / 846.6          | -24.10  |

## 5. Spurious radiated emissions (FCC §22.917(a), §2.1053, RSS-132 4.5)

|                                                 |                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------|
| EUT with DUT number                             | RM-485 DUT 41864                                                    |
| Accessories with DUT numbers                    | BL-5K DUT 41865, AC-10E DUT 41479, AD-54 DUT 41867, HS-83 DUT 41866 |
| Operation Voltage [V] / [Hz]                    | 115 / 60                                                            |
| Result                                          | PASSED                                                              |
| Remarks                                         | Slide open/closed                                                   |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 21 / 46 / 100.5                                                     |
| Date of measurements                            | 05-May-2009                                                         |
| Measured by                                     | Jari Jantunen                                                       |

### 5.1. Test setup



### 5.2. Test method and limit

The measurement is made according to TIA-603-C-2004 as follows:

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system.

The Final Measurement is performed in the Semi-Anechoic Chamber with conducting metal floor, if the Preliminary Measurement results are closer than 20 dB to the permissible value.

The EUT is placed at nonconductive plate at the turntable center.

For each suspected frequency, the turntable is rotated 360 degrees and antenna is scanned from 1 to 4 m. This is repeated for both horizontal and vertical receive antenna polarizations.

The emissions less than 20 dB below the permissible value are reported.

The substitution method is used. Substitution values at each frequencies are measured beforehand and saved to the test software.

The substitution corrections are obtained as described below:

$$A_{SUBST} = P_{SUBST\_TX} - P_{SUBST\_RX} - L_{SUBST\_CABLES} + G_{SUBST\_TX\_ANT}$$

Where  $A_{SUBST}$  is the final substitution correction including receive antenna gain.  $P_{SUBST\_TX}$  is signal generator level,  $P_{SUBST\_RX}$  is receiver level,  $L_{SUBST\_CABLES}$  is cable losses including both TX and RX cables and  $G_{SUBST\_TX\_ANT}$  is substitution antenna gain.

The measurement results are obtained as described below:

$$P [dBm] = P_{MEAS} + A_{TOT}$$

Where  $P_{MEAS}$  is receiver reading in dBm and  $A_{TOT}$  is total correction factor including cable loss, preamplifier gain and substitution correction ( $A_{TOT} = L_{CABLES} - G_{PREAMP} + A_{SUBST}$ ).

Limits for spurious radiated emissions measurements

| Operation band | Frequency range [MHz] | Limit [dBm] |
|----------------|-----------------------|-------------|
| WCDMA 850      | 30 - 8500             | -13         |

### 5.3. WCDMA 850 Test results

Channel 4175 / 835.0 MHz

| Frequency [MHz] | P [dBm] | P [μW]  | P <sub>MEAS</sub> [dBm] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|---------|---------|-------------------------|-----------------------|--------------|--------|
| 1672.437876     | -54.20  | 0.00380 | - 47.90                 | - 6.30                | HORIZONTAL   | PASSED |
| 2504.909820     | -49.50  | 0.01122 | - 50.50                 | 1.00                  | HORIZONTAL   | PASSED |
| 3347.689379     | -59.30  | 0.00117 | - 63.80                 | 4.50                  | VERTICAL     | PASSED |

## 6. Test Equipment

### 6.1. Conducted measurements

| Eq. No  | Equipment                  | Type        | Manufacturer | Used in            |
|---------|----------------------------|-------------|--------------|--------------------|
| TM30597 | Power splitter             | 11667A      | Agilent      | 22/24/27, 15C      |
| TM37499 | Power splitter             | 11667A      | Agilent      | 22/24/27, 15C      |
| TM38111 | Multimeter                 | 34401A      | Agilent      | 22/24/27, 15C      |
| TM38112 | DC power supply            | 6632A       | Agilent      | 22/24/27, 15C      |
| TM22901 | Attenuator                 | 8496A       | Agilent      | 22/24/27, 15C      |
| TM30636 | Artificial mains net       | L2-16       | PMM          | 15C, 15B           |
| TM37678 | Radio communication tester | CMU-200     | R&S          | 22/24/27, 15C, 15B |
| TM37773 | Radio communication tester | CMU-200     | R&S          | 22/24/27, 15C, 15B |
| TM30600 | Pulse Limiter              | ESH3-Z2     | R&S          | 15C, 15B           |
| TM26490 | LISN 50 $\mu$ H            | ESH3-Z5     | R&S          | 15C, 15B           |
| TM37610 | Spectrum analyzer          | FSU         | R&S          | 22/24/27, 15C      |
| TM22835 | Multimeter                 | 87          | Fluke        | 15C, 15B           |
| TM37500 | Microwave switch system    | 7116-MSW    | Keithley     | 22/24/27, 15C, 15B |
| TM22638 | Power supply               | OL63743-901 | Transmatic   | 22/24/27, 15C, 15B |
|         | Temperature chamber        | VT4002      | Vötsch       | 22/24/27, 15C      |
| 2058    | EMI Test receiver          | ESPC        | R&S          | 15C, 15B           |
| 2001    | Bluetooth tester           | CBT         | R&S          | 22/24/27, 15C, 15B |
| 2002    | Radio communication tester | CMU-200     | R&S          | 22/24/27, 15C, 15B |

### 6.2. Radiated measurements

| Eq. No  | Equipment                       | Type                          | Manufacturer   | Used in            |
|---------|---------------------------------|-------------------------------|----------------|--------------------|
| TM30599 | 3m semi-anechoic chamber        |                               | TDK            | 22/24/27, 15C, 15B |
| TM38845 | EMI receiver                    | ESI 40                        | R&S            | 22/24/27, 15C, 15B |
| TM37498 | Preamplifier                    | AMF-5D-020180-26-10P          | MITEQ          | 22/24/27, 15C, 15B |
| TM37523 | Preamplifier                    | AMF-4D-10M-3G-25-20P          | MITEQ          | 22/24/27, 15C, 15B |
| TM37516 | Biconilog antenna               | HL562                         | R&S            | 22/24/27, 15C, 15B |
| TM26496 | Double ridged waveguide antenna | 3115                          | EMCO           | 22/24/27, 15C, 15B |
| TM39158 | Horn antenna                    | 3116                          | EMCO           | 22/24/27, 15C, 15B |
| TM26492 | Reference dipole set            | UHAP/VHAP                     | Schwarzbeck    | 22/24/27, 15C, 15B |
| TM37501 | Dipole antenna                  | 3125-870                      | EMCO           | 22/24/27           |
| TM37502 | Dipole antenna                  | 3125-1880                     | EMCO           | 22/24/27           |
| TM37773 | Radio communication tester      | CMU-200                       | R&S            | 22/24/27, 15C, 15B |
| TM38631 | Signal generator                | 83640L                        | Agilent        | 22/24/27, 15C, 15B |
| TM38066 | High pass filter                | 4HC3000/18000-3-KK            | Trilithic      | 22/24/27, 15C, 15B |
| TM26511 | Tunable notch filter            | WRCA870                       | Wainwright     | 22/24/27           |
| TM38215 | Tunable notch filter            | WRCD1850/1910-0.2/40          | Wainwright     | 22/24/27           |
| TM38214 | Band reject filter              | WRCT 2402/2480-2400/2483.5-30 | Wainwright     | 15C                |
| TM30642 | Mast/Turntable controller       | HD-100                        | Deisel         | 22/24/27, 15C, 15B |
| TM26500 | Turntable                       | DS412                         | Deisel         | 22/24/27, 15C, 15B |
| TM38842 | Antenna mast controller         | 2090                          | EMCO           | 22/24/27, 15C, 15B |
| TM38843 | Antenna mast                    | 2075                          | EMCO           | 22/24/27, 15C, 15B |
| TM38114 | DC power supply                 | 6632A                         | Agilent        | 22/24/27, 15C, 15B |
| TM38323 | Preamplifier                    | PA-02 18-26 GHz               | EMC Automation | 22/24/27, 15C, 15B |
| TM37678 | Radio communication tester      | CMU-200                       | R&S            | 22/24/27, 15C, 15B |
| TM22638 | Power supply                    | OL63743-901                   | Transmatic     | 22/24/27, 15C, 15B |
| TM23892 | Yaesu controller                | G-1000SDX                     | Yaesu          | 22/24/27, 15C, 15B |
| 2001    | Bluetooth tester                | CBT                           | R&S            | 22/24/27, 15C, 15B |

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| Eq. No | Equipment                  | Type    | Manufacturer | Used in            |
|--------|----------------------------|---------|--------------|--------------------|
| 2002   | Radio communication tester | CMU-200 | R&S          | 22/24/27, 15C, 15B |