

## FCC Part 22/24 Compliance Test Report

|                                                         |                                                                                                                                                                                                                                                                                                                       |                                   |                                                                                                                                                   |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Report no.:</b>                                 | FCC22&24_RM-481_02.doc                                                                                                                                                                                                                                                                                                | <b>Date of Report:</b>            | 09-Sep-2010                                                                                                                                       |
| <b>Number of pages:</b>                                 | 12                                                                                                                                                                                                                                                                                                                    | <b>Customer's Contact person:</b> | Lasse Vaattovaara                                                                                                                                 |
| <b>Testing laboratory:</b>                              | TCC Nokia Tampere Laboratory<br>P.O. Box 68<br>Sinitaival 5<br>FIN-33720 TAMPERE, FINLAND<br>Tel. +358 (0) 7180 46800<br>Fax. +358 (0) 7180 46880                                                                                                                                                                     | <b>Customer:</b>                  | Nokia Corporation<br>P.O.Box(86)<br>Joensuunkatu 7H / Kiila 1B<br>FIN-24101 SALO, FINLAND<br>Tel. +358 (0) 7180 08000<br>Fax. +358 (0) 7180 45220 |
| <b>FCC listing no.:</b>                                 | 94436                                                                                                                                                                                                                                                                                                                 |                                   |                                                                                                                                                   |
| <b>IC recognition no.:</b>                              | 661AK-1                                                                                                                                                                                                                                                                                                               |                                   |                                                                                                                                                   |
| <b>Tested devices/ accessories:</b>                     | <b>Phone RM-481 / Battery BP-4L / Headset HS-48 / AC charger AC-10E / Dummy Battery SD-32</b>                                                                                                                                                                                                                         |                                   |                                                                                                                                                   |
| <b>FCC ID:</b>                                          | PYARM-481X                                                                                                                                                                                                                                                                                                            | <b>IC:</b>                        | 661V-RM481                                                                                                                                        |
| <b>Supplement reports:</b>                              | -                                                                                                                                                                                                                                                                                                                     |                                   |                                                                                                                                                   |
| <b>Testing has been carried out in accordance with:</b> | CFR 47, FCC rules Parts 22 and 24, TIA-603-C-2004 and IC standards RSS-GEN (Issue 2, June 2007), RSS-132 (Issue 2, September 2005) and RSS-133 (Issue 5, February 2009). Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit". |                                   |                                                                                                                                                   |
| <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>             |                                                                                                                                                                                                                                                                                                                       |                                   |                                                                                                                                                   |

**Teuvo Miettinen, Test Engineer, EMC**

## 1. Summary for FCC Part 22/24 Compliance Test Report

|                               |                                                        |
|-------------------------------|--------------------------------------------------------|
| Date of receipt               | 21.4.2009                                              |
| Testing completed             | 24-Apr-2009                                            |
| The customer's contact person | Teuvo Miettinen                                        |
| Test Plan referred to         | T:\Projects\RM-469\TestPlan_RS\RS_testplan_RM-469.xls  |
| Notes                         | -                                                      |
| Document name                 | T:\Projects\RM-469\EMC\Results\FCC\Tre_FCC_0917_11.doc |

### 1.1. EUT and Accessory Information

The EUT is a 6-band (GSM850/900/1800/1900 and WCDMA Band I/V) mobile phone with GPRS, EGPRS, Bluetooth and WLAN. 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-469 | 004401106673482             | 4100 | -  | 021.001 | 41846 |
| Battery       | BP-4L  | 3932138517560829214;0670519 | -    | -  | -       | 41848 |
| Headset       | HS-48  | 0694581840143102747         | -    | -  | -       | 41850 |
| AC charger    | AC-10E | 3997918367090504565;0675408 | -    | -  | -       | 41849 |
| Dummy Battery | SD-32  | -                           | -    | -  | -       | 41249 |

### 1.2. Summary of Test Results

#### GSM 850:

| 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                   | NP     |
| §2.1049(h)            | 4.6.1                         | 99 % occupied bandwidth                    | PASSED |
| §22.917(a)            | 4.5                           | Band edge compliance                       | NP     |
| §22.917(a), §2.1051   | 4.5                           | Spurious emissions at antenna terminals    | NP     |
| §22.917(a), §2.1053   | 4.5                           | Spurious radiated emissions                | NP     |
| §2.1055(a)            | 4.3                           | Frequency stability, temperature variation | PASSED |
| §2.1055(d)            | 4.3                           | Frequency stability, voltage variation     | PASSED |

**GSM 1900:**

| Section in CFR 47   | Section in RSS-GEN or RSS-133 | Name of the test                           | Result |
|---------------------|-------------------------------|--------------------------------------------|--------|
| §2.1046(a)          | 6.4                           | Conducted RF output power                  | NP     |
| §24.232(b)          | 6.4                           | Radiated RF output power                   | NP     |
| §2.1049(h)          | 4.6.1                         | 99 % occupied bandwidth                    | PASSED |
| §24.238(a)          | 6.5                           | Band edge compliance                       | NP     |
| §24.238(a), §2.1051 | 6.5                           | Spurious emissions at antenna terminals    | NP     |
| §24.238(a), §2.1053 | 6.5                           | Spurious radiated emissions                | NP     |
| §2.1055(a)          | 6.3                           | Frequency stability, temperature variation | PASSED |
| §2.1055(d)          | 6.3                           | Frequency stability, voltage variation     | PASSED |

PASSED

The EUT complies with the essential requirements in the standard.

FAILED

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

NP

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

*The test results of PYARM-469 are re-used for certification of the PYARM-481. The table above indicates the results, which will be re-used.*

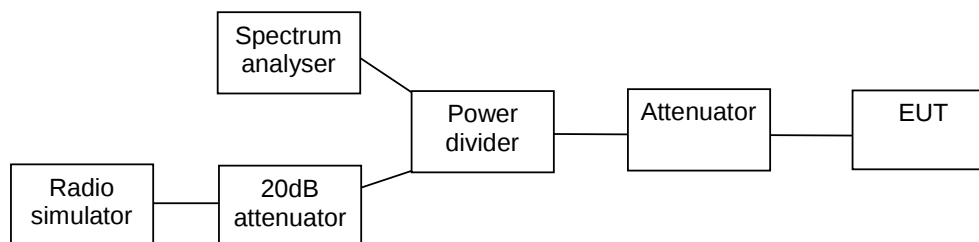
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## 2. 99 % occupied bandwidth (FCC §2.1049(h), RSS-GEN 4.6.1)

|                                                 |                                                      |
|-------------------------------------------------|------------------------------------------------------|
| EUT with DUT number                             | RM-469 DUT 41846                                     |
| Accessories with DUT numbers                    | BP-4L DUT 41848 / AC-10E DUT 41849 / HS-48 DUT 41850 |
| Operation Voltage [V] / [Hz]                    | 115/60                                               |
| Result                                          | PASSED                                               |
| Remarks                                         | -                                                    |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 20/ 45 / 103.0                                       |
| Date of measurements                            | 21-Apr-2009                                          |
| Measured by                                     | Jari Jantunen                                        |

### 2.1. Test setup



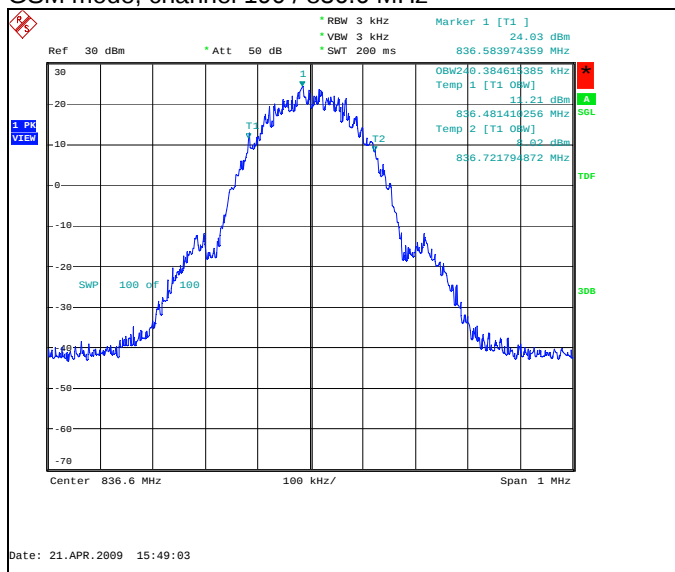
### 2.2. Test method and limit

The measurement is made according to FCC rules parts 22 and 24 and IC standard RSS-GEN.

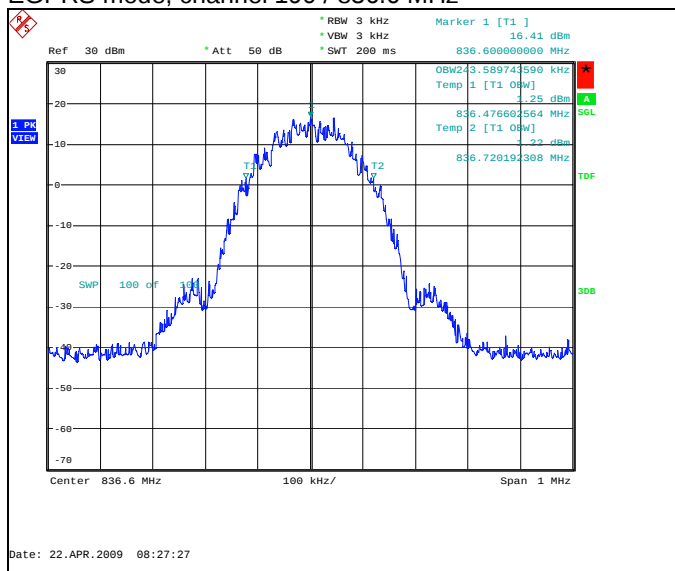
## 2.3. GSM 850 Test results

| Operation mode (TX on) | 99% occupied bandwidth [kHz] |
|------------------------|------------------------------|
| GSM                    | 240.385                      |
| EGPRS                  | 243.590                      |

GSM mode, channel 190 / 836.6 MHz



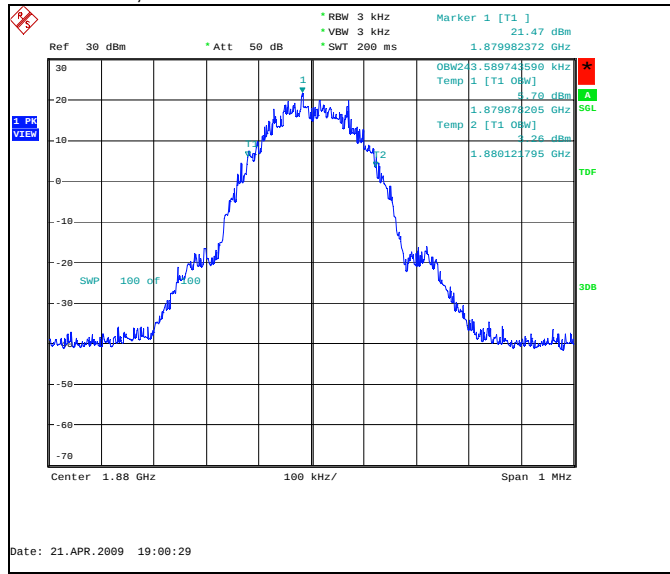
EGPRS mode, channel 190 / 836.6 MHz



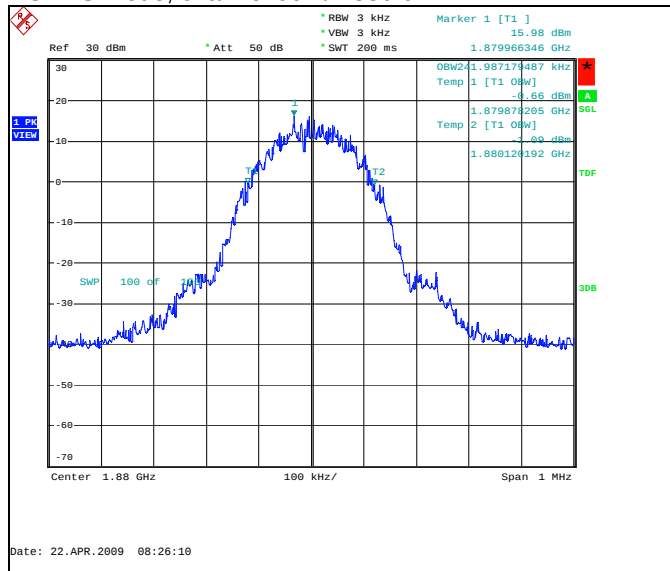
## 2.4. GSM 1900 Test results

| Operation mode (TX on) | 99% occupied bandwidth [kHz] |
|------------------------|------------------------------|
| GSM                    | 243.590                      |
| EGPRS                  | 241.987                      |

GSM mode, channel 661 / 1880.0 MHz



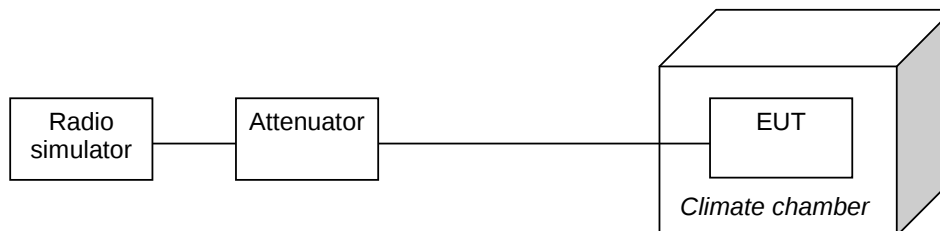
EGPRS mode, channel 661 / 1880.0 MHz



### 3. Frequency stability, temperature variation (FCC §2.1055(a), RSS-132 4.3, RSS-133 6.3)

|                                                        |                                                      |
|--------------------------------------------------------|------------------------------------------------------|
| <b>EUT with DUT number</b>                             | RM-469 DUT 41846                                     |
| <b>Accessories with DUT numbers</b>                    | BP-4L DUT 41848 / AC-10E DUT 41849 / HS-48 DUT 41850 |
| <b>Operation Voltage [V] / [Hz]</b>                    | 115/60                                               |
| <b>Result</b>                                          | PASSED                                               |
| <b>Remarks</b>                                         | -                                                    |
| <b>Temp [°C] / Humidity [%RH] / Air Pressure [kPa]</b> | 20/ 45 / 103.0                                       |
| <b>Date of measurements</b>                            | 21-Apr-2009                                          |
| <b>Measured by</b>                                     | Jari Jantunen                                        |

#### 3.1. Test setup



#### 3.2. Test method and limit

The measurement is made according to FCC rules parts 22 and 24 and IC standards RSS-132 and RSS-133 as follows:

- The climate chamber temperature is set to the maximum value and the temperature is allowed to stabilize.
- The EUT is placed in the chamber.
- The EUT is set in idle mode for 15 minutes.
- The EUT is set to transmit.
- The transmit frequency error was measured immediately.
- The steps c - e were repeated for each temperature.

Limits for frequency stability, temperature variation measurements

| <b>Frequency deviation [ppm]</b> |
|----------------------------------|
| $\pm 2.5$                        |

### 3.3. GSM 850 Test results

GSM mode, channel 190 / 836.6 MHz

| Temperature [°C] | Deviation [Hz] | Deviation [ppm] |
|------------------|----------------|-----------------|
| 50               | -30            | -0.0359         |
| 40               | -24            | -0.0287         |
| 30               | -27            | -0.0323         |
| 20               | -25            | -0.0299         |
| 10               | -15            | -0.0179         |
| 0                | 29             | 0.0347          |
| -10              | -7             | -0.0084         |
| -20              | -12            | -0.0143         |
| -30              | -19            | -0.0227         |

### 3.4. GSM 1900 Test results

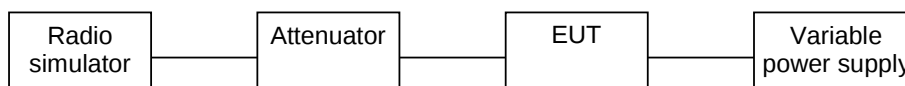
GSM mode, channel 661 / 1880.0 MHz

| Temperature [°C] | Deviation [Hz] | Deviation [ppm] |
|------------------|----------------|-----------------|
| 50               | -40            | -0.0213         |
| 40               | -56            | -0.0298         |
| 30               | -45            | -0.0239         |
| 20               | -30            | -0.0160         |
| 10               | 27             | 0.0144          |
| 0                | 58             | 0.0309          |
| -10              | 29             | 0.0154          |
| -20              | -30            | -0.0160         |
| -30              | -34            | -0.0181         |

#### 4. Frequency stability, voltage variation (FCC §2.1055(d), RSS-132 4.3, RSS-133 6.3)

|                                                        |                                                      |
|--------------------------------------------------------|------------------------------------------------------|
| <b>EUT with DUT number</b>                             | RM-469 DUT 41846                                     |
| <b>Accessories with DUT numbers</b>                    | BP-4L DUT 41848 / AC-10E DUT 41849 / HS-48 DUT 41850 |
| <b>Operation Voltage [V] / [Hz]</b>                    | 115/60                                               |
| <b>Result</b>                                          | PASSED                                               |
| <b>Remarks</b>                                         | -                                                    |
| <b>Temp [°C] / Humidity [%RH] / Air Pressure [kPa]</b> | 20/ 45 / 103.0                                       |
| <b>Date of measurements</b>                            | 21-Apr-2009                                          |
| <b>Measured by</b>                                     | Jari Jantunen                                        |

##### 4.1. Test setup



##### 4.2. Test method and limit

The measurement is made according to FCC rules parts 22 and 24 and IC standards RSS-132 and RSS-133 as follows:

The EUT battery was replaced with an adjustable power supply. The frequency stability was measured at nominal voltage and at the battery cut-off point.

Limits for frequency stability, voltage variation measurements

| Frequency deviation [ppm] |
|---------------------------|
| ± 2.5                     |

##### 4.3. GSM 850 Test results

GSM mode, channel 190 / 836.6 MHz

| Voltage level [V]            | Deviation [Hz] | Deviation [ppm] |
|------------------------------|----------------|-----------------|
| Battery cut-off point / 3.40 | -22            | -0.0263         |
| Nominal / 3.70               | -29            | -0.0347         |

##### 4.4. GSM 1900 Test results

GSM mode, channel 661 / 1880.0 MHz

| Voltage level [V]            | Deviation [Hz] | Deviation [ppm] |
|------------------------------|----------------|-----------------|
| Battery cut-off point / 3.40 | -50            | -0.0266         |
| Nominal / 3.70               | -48            | -0.0255         |

## 5. Test Equipment

### 5.1. 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 |

### 5.2. 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 |