

## FCC Part 15C Compliance Test Report

|                                                         |                                                                                                                                                                                                                                                                                                                                      |                                   |                                                                                                                                       |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Report no.:</b>                                 | Tre_FCC_0836_18.doc                                                                                                                                                                                                                                                                                                                  | <b>Date of Report:</b>            | 20-Oct-2008                                                                                                                           |
| <b>Number of pages:</b>                                 | 29                                                                                                                                                                                                                                                                                                                                   | <b>Customer's Contact person:</b> | Kari Koskela                                                                                                                          |
| <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 7<br>FIN-24101 SALO, FINLAND<br>Tel. +358 (0) 7180 08000<br>Fax. +358 (0) 7180 44277 |
| <b>FCC listing no.:</b>                                 | 94436                                                                                                                                                                                                                                                                                                                                |                                   |                                                                                                                                       |
| <b>IC recognition no.:</b>                              | 3608                                                                                                                                                                                                                                                                                                                                 |                                   |                                                                                                                                       |
| <b>Tested devices/ accessories:</b>                     | <b>Phone RM-413 / Battery BL-4U / AC-Charger AC-8E / Headset HS-43</b>                                                                                                                                                                                                                                                               |                                   |                                                                                                                                       |
| <b>FCC ID:</b>                                          | PYARM-413                                                                                                                                                                                                                                                                                                                            | <b>IC:</b>                        | 661V-RM413                                                                                                                            |
| <b>Supplement reports:</b>                              | -                                                                                                                                                                                                                                                                                                                                    |                                   |                                                                                                                                       |
| <b>Testing has been carried out in accordance with:</b> | CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2003), Public Notice DA 00-705, DTS procedures KDB 558074, IC standards RSS-GEN (Issue 2, June 2007) and RSS-210 (Issue 7, June 2007). 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>             |                                                                                                                                                                                                                                                                                                                                      |                                   |                                                                                                                                       |

**Jari Jantunen, Test System Manager**

## 1. Summary for FCC Part 15C Compliance Test Report

|                               |                                                        |
|-------------------------------|--------------------------------------------------------|
| Date of receipt               | 05-Sep-2008                                            |
| Testing completed             | 17-Sep-2008                                            |
| The customer's contact person | Kari Koskela                                           |
| Test Plan referred to         | T:\Projects\RM-413\TestPlan_RS                         |
| Notes                         | -                                                      |
| Document name                 | T:\Projects\RM-413\EMC\Results\FCC\Tre_FCC_0836_18.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 and WLAN. Bluetooth and WLAN are tested with maximum rated TX power.

| Product    | Type   | SN              | HW   | MV | SW       | DUT   |
|------------|--------|-----------------|------|----|----------|-------|
| Phone      | RM-413 | 004401100161484 | 0321 | -  | 008.32.2 | 41646 |
| Phone      | RM-413 | 004401100161286 | 0321 | -  | 008.32.2 | 41647 |
| Battery    | BL-4U  | -               | -    | -  | -        | 41642 |
| Battery    | BL-4U  | -               | -    | -  | -        | 41614 |
| AC-Charger | AC-8E  | -               | -    | -  | -        | 41659 |
| AC-Charger | AC-8E  | -               | -    | -  | -        | 41650 |
| Headset    | HS-43  | -               | -    | -  | -        | 41663 |
| Headset    | HS-43  | -               | -    | -  | -        | 41648 |

### 1.2. Summary of Test Results

#### WLAN:

| Section in CFR 47 | Section in RSS-GEN or RSS-210 | Name of the test                     | Result |
|-------------------|-------------------------------|--------------------------------------|--------|
| 15.247(b)(1)      | A8.4 (4)                      | Conducted peak output power          | PASSED |
| 15.247(d)         | A8.5                          | Band edge compliance of RF emissions | NP     |
| 15.247(d)         | A8.5                          | Spurious RF conducted emissions      | PASSED |
| 15.247(d), 15.209 | A8.5                          | Spurious radiated emissions          | PASSED |
| 15.207            | 7.2.2                         | AC powerline conducted emissions     | PASSED |
| 15.247(a)(2)      | A8.2 (1)                      | 6 dB bandwidth                       | PASSED |
| 15.247(e)         | A8.2 (2)                      | Power spectral density               | PASSED |

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.

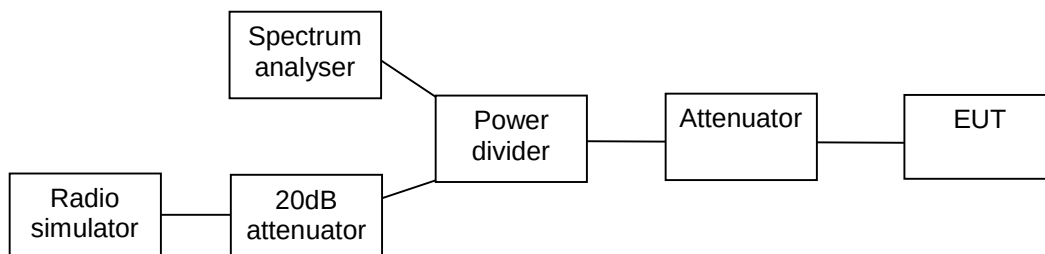
The test was not performed by the TCC Nokia Tampere Laboratory.

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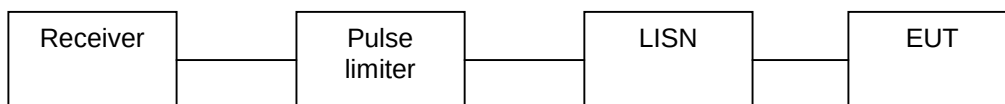
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## 2. Test setups

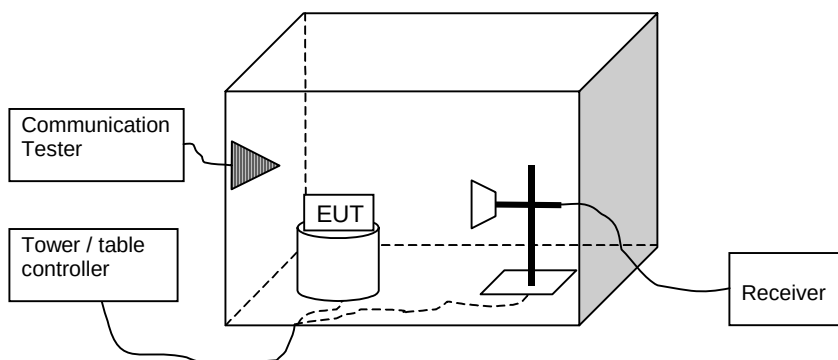
### 2.1. Conducted RF test setup



### 2.2. AC powerline conducted emissions test setup



### 2.3. Radiated test setup



### 3. Conducted peak output power (FCC §15.247(b)(1), RSS-210 A8.4 (4))

|                                                        |                                                   |
|--------------------------------------------------------|---------------------------------------------------|
| <b>EUT with DUT number</b>                             | RM-413 DUT 41646                                  |
| <b>Accessories with DUT numbers</b>                    | AC-8E DUT 41645, BL-4U DUT 41642, HS-43 DUT 41643 |
| <b>Operation Voltage [V] / [Hz]</b>                    | Nominal                                           |
| <b>Result</b>                                          | PASSED                                            |
| <b>Remarks</b>                                         | -                                                 |
| <b>Temp [°C] / Humidity [%RH] / Air Pressure [kPa]</b> | 20 / 50 / 101,7                                   |
| <b>Date of measurements</b>                            | 08-Sep-2008                                       |
| <b>Measured by</b>                                     | Timo Raiskio                                      |

#### 3.1. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-210.

Limits for conducted peak output power measurements

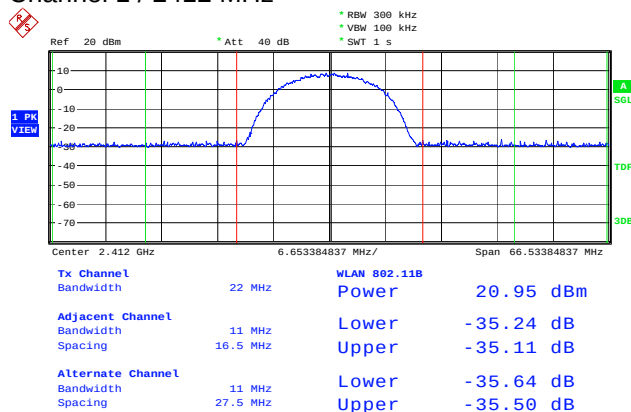
| <b>Frequency range [MHz]</b> | <b>Limit [W]</b> | <b>Limit [dBm]</b> |
|------------------------------|------------------|--------------------|
| 2400 – 2483.5                | ≤ 1              | ≤ 30               |

## 3.2. WLAN Test results

### 3.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

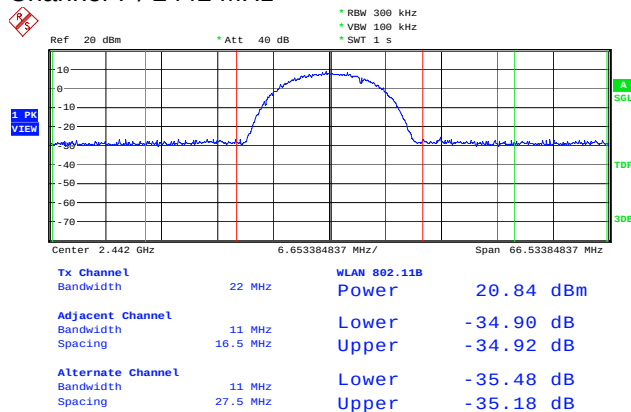
| Channel / $f_c$ [MHz] | P [dBm] | P [W] | Result |
|-----------------------|---------|-------|--------|
| 1 / 2412              | 20.95   | 0.124 | PASSED |
| 7 / 2442              | 20.84   | 0.121 | PASSED |
| 11 / 2462             | 21.34   | 0.136 | PASSED |

Channel 1 / 2412 MHz



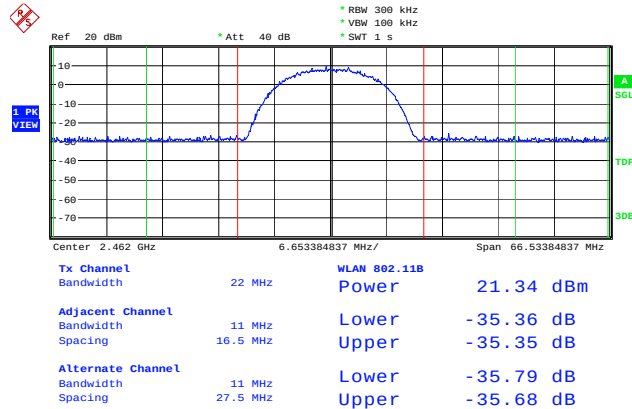
Date: 3.OCT.2008 10:45:11

Channel 7 / 2442 MHz



Date: 3.OCT.2008 10:44:31

### Channel 11 / 2462 MHz

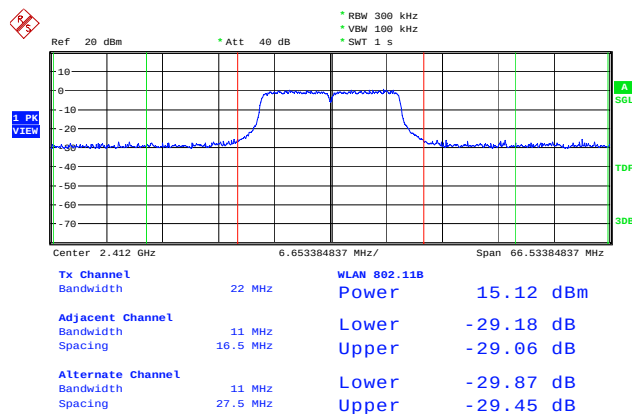


Date: 3.OCT.2008 10:43:47

### 3.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

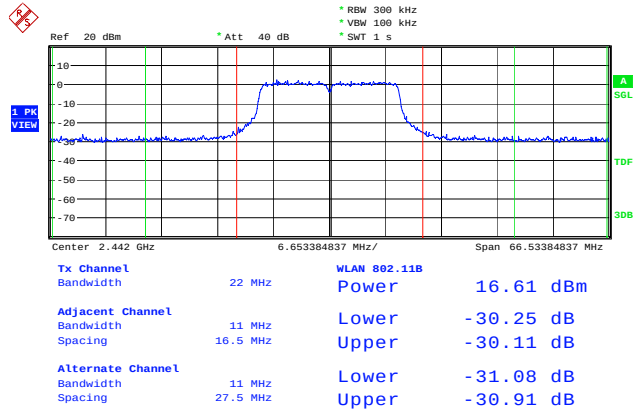
| Channel / $f_c$ [MHz] | P [dBm] | P [W] | Result |
|-----------------------|---------|-------|--------|
| 1 / 2412              | 15.12   | 0.033 | PASSED |
| 7 / 2442              | 16.61   | 0.046 | PASSED |
| 11 / 2462             | 15.83   | 0.038 | PASSED |

### Channel 1 / 2412 MHz



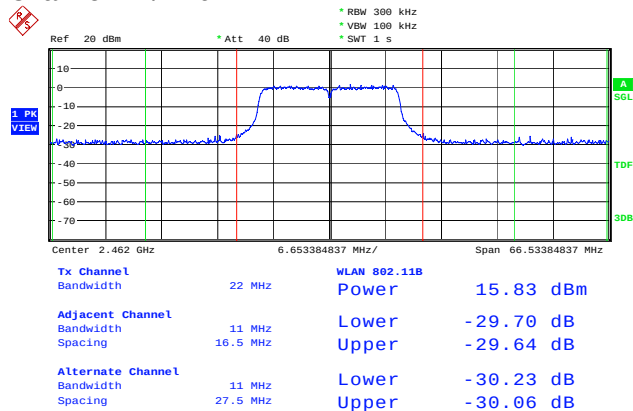
Date: 3.OCT.2008 10:33:18

### Channel 7 / 2442 MHz



Date: 3.OCT.2008 10:34:11

### Channel 11 / 2462 MHz



Date: 3.OCT.2008 10:34:57



#### 4. Spurious RF conducted emissions (FCC §15.247(d), RSS-210 A8.5)

|                                                        |                                                   |
|--------------------------------------------------------|---------------------------------------------------|
| <b>EUT with DUT number</b>                             | RM-413 DUT 41646                                  |
| <b>Accessories with DUT numbers</b>                    | AC-8E DUT 41645, BL-4U DUT 41642, HS-43 DUT 41643 |
| <b>Operation Voltage [V] / [Hz]</b>                    | Nominal                                           |
| <b>Result</b>                                          | PASSED                                            |
| <b>Remarks</b>                                         | -                                                 |
| <b>Temp [°C] / Humidity [%RH] / Air Pressure [kPa]</b> | 20 / 50 / 101,7                                   |
| <b>Date of measurements</b>                            | 08-Sep-2008                                       |
| <b>Measured by</b>                                     | Timo Raiskio                                      |

##### 4.1. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-210.

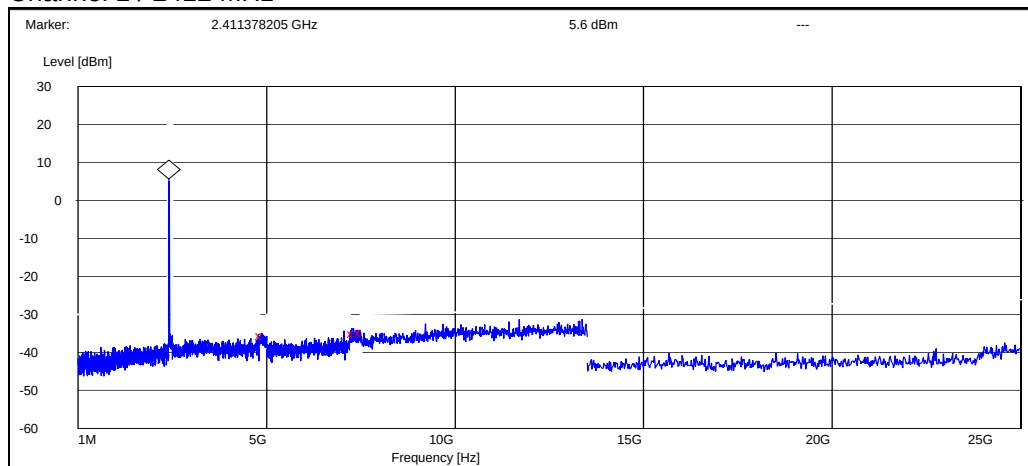
Limits for spurious RF conducted emissions measurements

| <b>Frequency range [MHz]</b> | <b>Limit [dBc]</b> |
|------------------------------|--------------------|
| 1 – 25000                    | ≤ -20              |

## 4.2. WLAN Test results

### 4.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

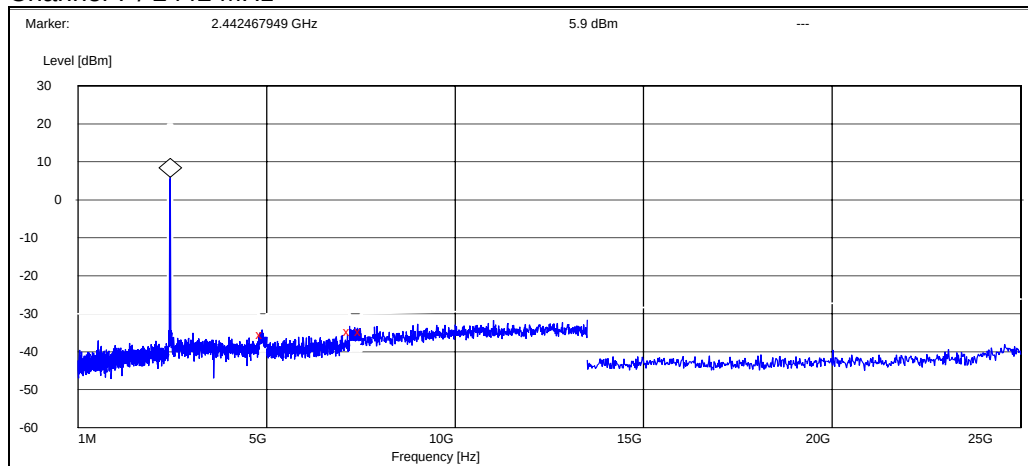
Channel 1 / 2412 MHz



Peak (RBW: 100 kHz, VBW: 100 kHz)

| Frequency [MHz] | P [dBc]    | Result |
|-----------------|------------|--------|
| 4869.871795     | -41.202094 | PASSED |
| 7293.750000     | -40.702094 | PASSED |
| 7500.000000     | -40.402094 | PASSED |

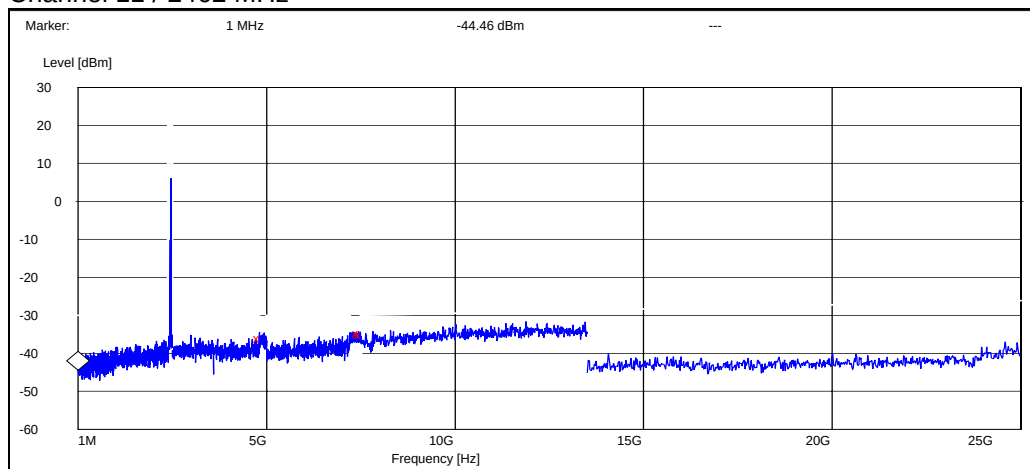
Channel 7 / 2442 MHz



Peak (RBW: 100 kHz, VBW: 100 kHz)

| Frequency [MHz] | P [dBc]    | Result |
|-----------------|------------|--------|
| 4882.371795     | -41.304250 | PASSED |
| 7206.250000     | -40.604250 | PASSED |
| 7500.000000     | -40.604250 | PASSED |

#### Channel 11 / 2462 MHz

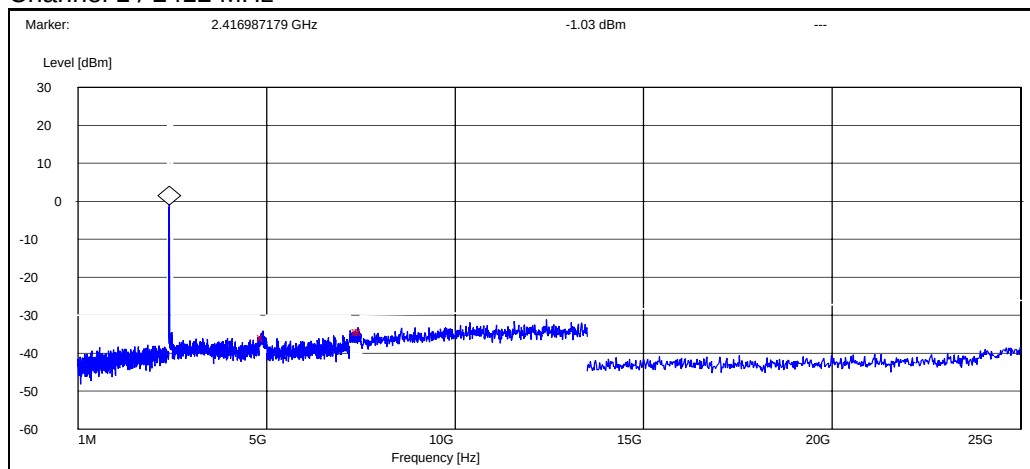


Peak (RBW: 100 kHz, VBW: 100 kHz)

| Frequency [MHz] | P [dBc]   | Result |
|-----------------|-----------|--------|
| 4807.692308     | -38.45629 | PASSED |
| 7436.057692     | -39.75629 | PASSED |
| 7500.000000     | -39.45629 | PASSED |

#### 4.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

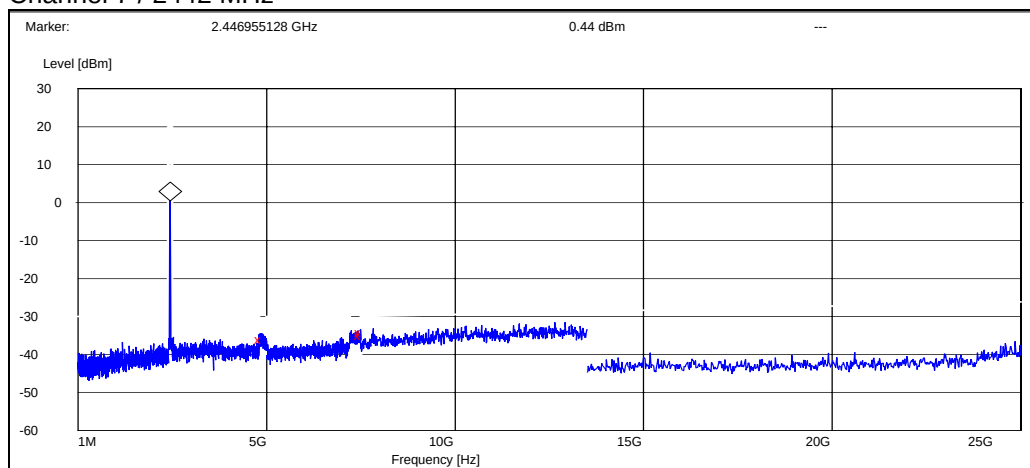
##### Channel 1 / 2412 MHz



Peak (RBW: 100 kHz, VBW: 100 kHz)

| Frequency [MHz] | P [dBc]    | Result |
|-----------------|------------|--------|
| 4907.051282     | -34.767024 | PASSED |
| 7418.269231     | -33.267024 | PASSED |
| 7500.000000     | -33.267024 | PASSED |

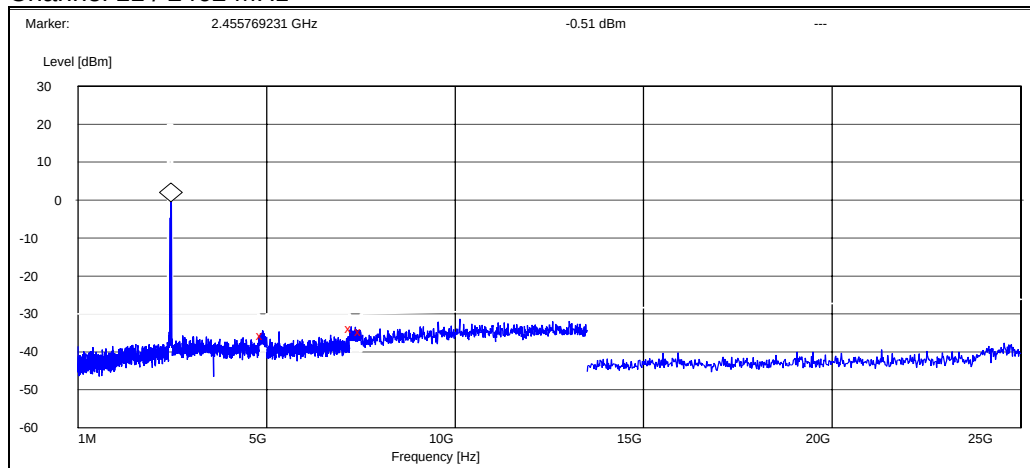
Channel 7 / 2442 MHz



Peak (RBW: 100 kHz, VBW: 100 kHz)

| Frequency [MHz] | P [dBc]    | Result |
|-----------------|------------|--------|
| 4846.794872     | -36.443210 | PASSED |
| 7489.423077     | -35.443210 | PASSED |
| 7500.000000     | -34.643210 | PASSED |

Channel 11 / 2462 MHz



Peak (RBW: 100 kHz, VBW: 100 kHz)

| Frequency [MHz] | P [dBc]    | Result |
|-----------------|------------|--------|
| 4894.230769     | -35.189224 | PASSED |
| 7240.384615     | -33.289224 | PASSED |
| 7500.000000     | -34.189224 | PASSED |

## 5. Spurious radiated emissions (FCC §15.247(d), §15.209, RSS-210 A8.5)

|                                                        |                                                     |
|--------------------------------------------------------|-----------------------------------------------------|
| <b>EUT with DUT number</b>                             | RM-413 DUT 41647                                    |
| <b>Accessories with DUT numbers</b>                    | AC-8E DUT 41659 / BL-4U DUT 41614 / HS-43 DUT 41663 |
| <b>Operation Voltage [V] / [Hz]</b>                    | 115 / 60                                            |
| <b>Result</b>                                          | PASSED                                              |
| <b>Remarks</b>                                         | -                                                   |
| <b>Temp [°C] / Humidity [%RH] / Air Pressure [kPa]</b> | 24 / 47 / 103.0                                     |
| <b>Date of measurements</b>                            | 17-Sep-2008                                         |
| <b>Measured by</b>                                     | Jari Jantunen                                       |

### 5.1. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-210 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 measurement results are obtained as described below:

$$E [\mu V/m] = U_{RX} + A_{TOT}$$

Where  $U_{RX}$  is receiver reading and  $A_{TOT}$  is total correction factor including cable loss, antenna factor and preamplifier gain ( $A_{TOT} = L_{CABLES} + AF - G_{PREAMP}$ ).

Limits for spurious radiated emissions measurements (3 m measurement distance)

| Frequency range [MHz] | Limit [ $\mu\text{V/m}$ ] | Limit [dB $\mu\text{V/m}$ ] | Detector   |
|-----------------------|---------------------------|-----------------------------|------------|
| 30 – 88               | 100                       | 40                          | Quasi peak |
| 88 – 216              | 150                       | 43.5                        | Quasi peak |
| 216 – 960             | 200                       | 46                          | Quasi peak |
| 960 – 1000            | 500                       | 54                          | Quasi peak |
| Above 1000            | 500                       | 54                          | Average    |
| Above 1000            | 5000                      | 74                          | Peak       |

## 5.2. WLAN Test results

### 5.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel 1 / 2412 MHz

Peak (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dB $\mu\text{V/m}$ ] | E [ $\mu\text{V/m}$ ] | U <sub>RX</sub> [dB $\mu\text{V}$ ] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|-------------------------|-----------------------|-------------------------------------|-----------------------|--------------|--------|
| 4824.000000     | 58.00                   | 794.33                | 60.00                               | -2.0                  | HORIZONTAL   | PASSED |
| 7236.000000     | 48.60                   | 269.15                | 46.00                               | 2.6                   | VERTICAL     | PASSED |

Average (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dB $\mu\text{V/m}$ ] | E [ $\mu\text{V/m}$ ] | U <sub>RX</sub> [dB $\mu\text{V}$ ] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|-------------------------|-----------------------|-------------------------------------|-----------------------|--------------|--------|
| 4824.000000     | 45.00                   | 177.83                | 47.00                               | -2.0                  | HORIZONTAL   | PASSED |
| 7236.000000     | 36.20                   | 64.57                 | 33.60                               | 2.6                   | VERTICAL     | PASSED |

Channel 7 / 2442 MHz

Quasi peak (RBW: 100 kHz, VBW: 100 kHz)

| Frequency [MHz] | E [dB $\mu\text{V/m}$ ] | E [ $\mu\text{V/m}$ ] | U <sub>RX</sub> [dB $\mu\text{V}$ ] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|-------------------------|-----------------------|-------------------------------------|-----------------------|--------------|--------|
| 37.895391       | 24.10                   | 16.03                 | 38.20                               | -14.1                 | VERTICAL     | PASSED |
| 75.169940       | 14.80                   | 5.50                  | 38.40                               | -23.6                 | HORIZONTAL   | PASSED |

Peak (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dB $\mu\text{V/m}$ ] | E [ $\mu\text{V/m}$ ] | U <sub>RX</sub> [dB $\mu\text{V}$ ] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|-------------------------|-----------------------|-------------------------------------|-----------------------|--------------|--------|
| 4884.269539     | 49.20                   | 288.40                | 51.60                               | -2.4                  | HORIZONTAL   | PASSED |
| 7317.637275     | 50.80                   | 346.74                | 47.90                               | 2.9                   | HORIZONTAL   | PASSED |
| 7333.667335     | 50.70                   | 342.77                | 47.80                               | 2.9                   | HORIZONTAL   | PASSED |
| 12195.892786    | 61.20                   | 1 148.15              | 51.60                               | 9.6                   | VERTICAL     | PASSED |
| 12211.420842    | 60.80                   | 1 096.48              | 51.10                               | 9.7                   | VERTICAL     | PASSED |
| 17998.991984    | 53.30                   | 462.38                | 33.80                               | 19.5                  | VERTICAL     | PASSED |

Average (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dBμV/m] | E [μV/m] | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|------------|----------|------------------------|-----------------------|--------------|--------|
| 4884.269539     | 37.90      | 78.52    | 40.30                  | -2.4                  | HORIZONTAL   | PASSED |
| 7317.637275     | 40.20      | 102.33   | 37.30                  | 2.9                   | HORIZONTAL   | PASSED |
| 7334.167335     | 40.50      | 105.93   | 37.60                  | 2.9                   | HORIZONTAL   | PASSED |
| 12196.392786    | 48.10      | 254.10   | 38.50                  | 9.6                   | VERTICAL     | PASSED |
| 12210.420842    | 50.50      | 334.97   | 40.80                  | 9.7                   | VERTICAL     | PASSED |
| 17991.991984    | 40.60      | 107.15   | 21.10                  | 19.5                  | VERTICAL     | PASSED |

Channel 11 / 2462 MHz

Peak (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dBμV/m] | E [μV/m] | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|------------|----------|------------------------|-----------------------|--------------|--------|
| 4924.000000     | 48.00      | 251.19   | 50.30                  | -2.3                  | VERTICAL     | PASSED |
| 7386.000000     | 52.00      | 398.11   | 48.60                  | 3.4                   | HORIZONTAL   | PASSED |

Average (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dBμV/m] | E [μV/m] | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|------------|----------|------------------------|-----------------------|--------------|--------|
| 4924.000000     | 34.80      | 54.95    | 37.10                  | -2.3                  | VERTICAL     | PASSED |
| 7386.000000     | 40.40      | 104.71   | 37.00                  | 3.4                   | HORIZONTAL   | PASSED |

## 5.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel 1 / 2412 MHz

Peak (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dBμV/m] | E [μV/m] | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|------------|----------|------------------------|-----------------------|--------------|--------|
| 4824.000000     | 53.40      | 467.74   | 55.40                  | -2.0                  | HORIZONTAL   | PASSED |
| 7236.000000     | 46.80      | 218.78   | 44.20                  | 2.6                   | VERTICAL     | PASSED |

Average (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dBμV/m] | E [μV/m] | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|------------|----------|------------------------|-----------------------|--------------|--------|
| 4824.000000     | 40.00      | 100.00   | 42.00                  | -2.0                  | HORIZONTAL   | PASSED |
| 7236.000000     | 41.70      | 121.62   | 39.10                  | 2.6                   | VERTICAL     | PASSED |

Channel 7 / 2442 MHz

Quasi peak (RBW: 100 kHz, VBW: 100 kHz)

| Frequency [MHz] | E [dBμV/m] | E [μV/m] | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|------------|----------|------------------------|-----------------------|--------------|--------|
| 37.695391       | 20.80      | 10.96    | 34.70                  | -13.9                 | VERTICAL     | PASSED |

Peak (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dBμV/m] | E [μV/m] | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|------------|----------|------------------------|-----------------------|--------------|--------|
| 4885.767535     | 58.80      | 870.96   | 61.20                  | -2.4                  | HORIZONTAL   | PASSED |
| 7278.551102     | 43.50      | 149.62   | 40.70                  | 2.8                   | HORIZONTAL   | PASSED |
| 7284.569138     | 43.70      | 153.11   | 40.90                  | 2.8                   | VERTICAL     | PASSED |
| 7406.815631     | 43.80      | 154.88   | 40.10                  | 3.7                   | HORIZONTAL   | PASSED |
| 7427.847695     | 43.70      | 153.11   | 40.00                  | 3.7                   | VERTICAL     | PASSED |
| 17995.497996    | 54.10      | 506.99   | 34.60                  | 19.5                  | VERTICAL     | PASSED |

Average (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dBμV/m] | E [μV/m] | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|------------|----------|------------------------|-----------------------|--------------|--------|
| 4883.267535     | 43.40      | 147.91   | 45.80                  | -2.4                  | HORIZONTAL   | PASSED |
| 7276.051102     | 30.00      | 31.62    | 27.20                  | 2.8                   | HORIZONTAL   | PASSED |
| 7287.569138     | 30.00      | 31.62    | 27.20                  | 2.8                   | VERTICAL     | PASSED |
| 7411.815631     | 30.50      | 33.50    | 26.80                  | 3.7                   | HORIZONTAL   | PASSED |
| 7423.347695     | 30.70      | 34.28    | 27.00                  | 3.7                   | VERTICAL     | PASSED |
| 17996.997996    | 40.60      | 107.15   | 21.10                  | 19.5                  | VERTICAL     | PASSED |

Channel 11 / 2462 MHz

Peak (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dBμV/m] | E [μV/m] | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|------------|----------|------------------------|-----------------------|--------------|--------|
| 4924.000000     | 44.60      | 169.82   | 46.90                  | -2.3                  | HORIZONTAL   | PASSED |
| 7386.000000     | 61.00      | 1 122.02 | 57.60                  | 3.4                   | HORIZONTAL   | PASSED |

Average (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dBμV/m] | E [μV/m] | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Polarisation | Result |
|-----------------|------------|----------|------------------------|-----------------------|--------------|--------|
| 4924.000000     | 31.70      | 38.46    | 34.00                  | -2.3                  | HORIZONTAL   | PASSED |
| 7386.000000     | 47.50      | 237.14   | 44.10                  | 3.4                   | HORIZONTAL   | PASSED |



## 6. AC powerline conducted emissions (FCC §15.207, RSS-GEN 7.2.2)

|                                                        |                                                     |
|--------------------------------------------------------|-----------------------------------------------------|
| <b>EUT with DUT number</b>                             | RM-413 DUT 41647                                    |
| <b>Accessories with DUT numbers</b>                    | AC-8E DUT 41659 / BL-4U DUT 41614 / HS-43 DUT 41663 |
| <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 / 40 / 103.0                                     |
| <b>Date of measurements</b>                            | 17-Sep-2008                                         |
| <b>Measured by</b>                                     | Jari Jantunen                                       |

### 6.1. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-GEN as follows:

The EUT is placed on a wooden table 80 cm above the reference groundplane.

The EUT is connected via LISN to a test power supply.

The measurement results are obtained as described below:

$$U [dB\mu V] = U_{RX} + A_{TOT}$$

Where  $U_{RX}$  is receiver reading and  $A_{TOT}$  is total correction factor including cable and pulse limiter attenuations.

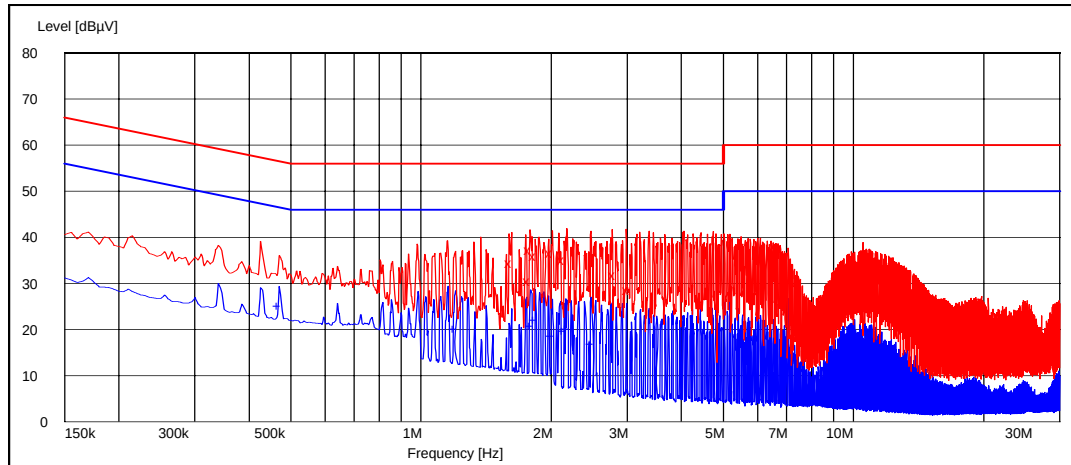
CISPR 22 Class B limits

| <b>Frequency range [MHz]</b> | <b>Quasi peak limit [dBμV]</b> | <b>Average limit [dBμV]</b> |
|------------------------------|--------------------------------|-----------------------------|
| 0.15 - 0.5                   | 66 - 56                        | 56 - 46                     |
| 0.5 - 5                      | 56                             | 46                          |
| 5 - 30                       | 60                             | 50                          |

## 6.2. WLAN Test results

### 6.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel 7 / 2442 MHz



Quasi peak (RBW: 9 kHz)

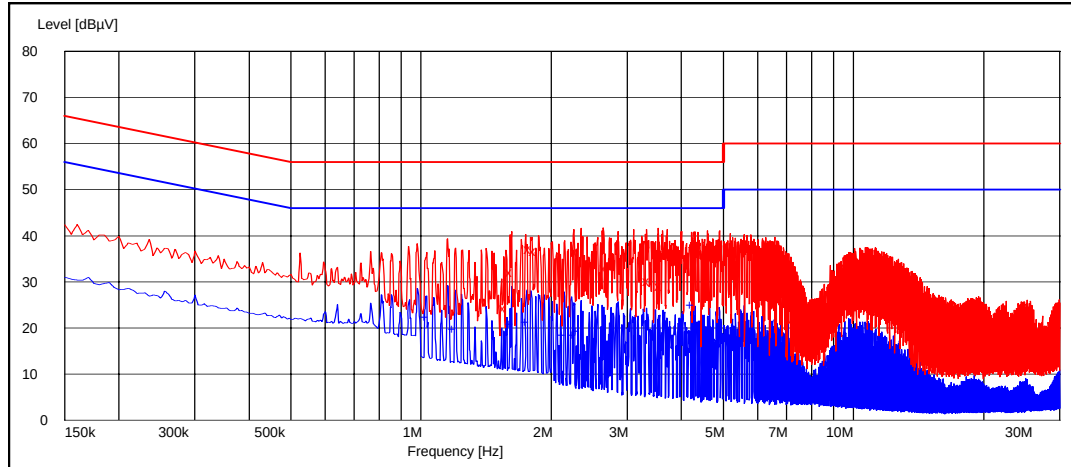
| Frequency [MHz] | U [dBμV] | Line | Result |
|-----------------|----------|------|--------|
| 1.615000        | 34.50    | L1   | PASSED |
| 1.780000        | 30.60    | L1   | PASSED |
| 1.790000        | 37.20    | L1   | PASSED |
| 1.835000        | 36.00    | L1   | PASSED |
| 2.005000        | 36.70    | L1   | PASSED |
| 2.135000        | 35.00    | L1   | PASSED |
| 2.805000        | 31.80    | L1   | PASSED |
| 3.025000        | 28.50    | N    | PASSED |

Average (RBW: 9 kHz)

| Frequency [MHz] | U [dBμV] | Line | Result |
|-----------------|----------|------|--------|
| 0.470000        | 25.00    | L1   | PASSED |
| 1.200000        | 20.10    | N    | PASSED |
| 1.800000        | 20.70    | L1   | PASSED |
| 1.835000        | 22.00    | L1   | PASSED |
| 2.015000        | 18.70    | N    | PASSED |
| 2.140000        | 19.80    | L1   | PASSED |
| 2.180000        | 20.10    | L1   | PASSED |
| 2.485000        | 16.80    | L1   | PASSED |

## 6.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel 7 / 2442 MHz



Quasi peak (RBW: 9 kHz)

| Frequency [MHz] | U [dBμV] | Line | Result |
|-----------------|----------|------|--------|
| 1.570000        | 24.40    | N    | PASSED |
| 1.620000        | 32.10    | N    | PASSED |
| 1.790000        | 37.10    | L1   | PASSED |
| 1.835000        | 36.60    | L1   | PASSED |
| 2.300000        | 36.40    | L1   | PASSED |
| 2.680000        | 33.00    | L1   | PASSED |
| 3.370000        | 30.10    | N    | PASSED |
| 3.585000        | 29.10    | N    | PASSED |

Average (RBW: 9 kHz)

| Frequency [MHz] | U [dBμV] | Line | Result |
|-----------------|----------|------|--------|
| 1.030000        | 22.40    | L1   | PASSED |
| 1.195000        | 19.80    | L1   | PASSED |
| 1.620000        | 20.90    | L1   | PASSED |
| 1.760000        | 21.40    | L1   | PASSED |
| 2.145000        | 18.40    | N    | PASSED |
| 2.270000        | 18.50    | N    | PASSED |
| 2.305000        | 19.30    | L1   | PASSED |
| 4.240000        | 24.90    | L1   | PASSED |

## 7. 6 dB bandwidth (FCC §15.247(a)(2), RSS-210 A8.2 (1))

|                                                        |                                                   |
|--------------------------------------------------------|---------------------------------------------------|
| <b>EUT with DUT number</b>                             | RM-413 DUT 41646                                  |
| <b>Accessories with DUT numbers</b>                    | AC-8E DUT 41645, BL-4U DUT 41642, HS-43 DUT 41643 |
| <b>Operation Voltage [V] / [Hz]</b>                    | Nominal                                           |
| <b>Result</b>                                          | PASSED                                            |
| <b>Remarks</b>                                         | -                                                 |
| <b>Temp [°C] / Humidity [%RH] / Air Pressure [kPa]</b> | 20 / 50 / 101,7                                   |
| <b>Date of measurements</b>                            | 08-Sep-2008                                       |
| <b>Measured by</b>                                     | Timo Raiskio                                      |

### 7.1. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-210.

Limits for 6 dB bandwidth measurements

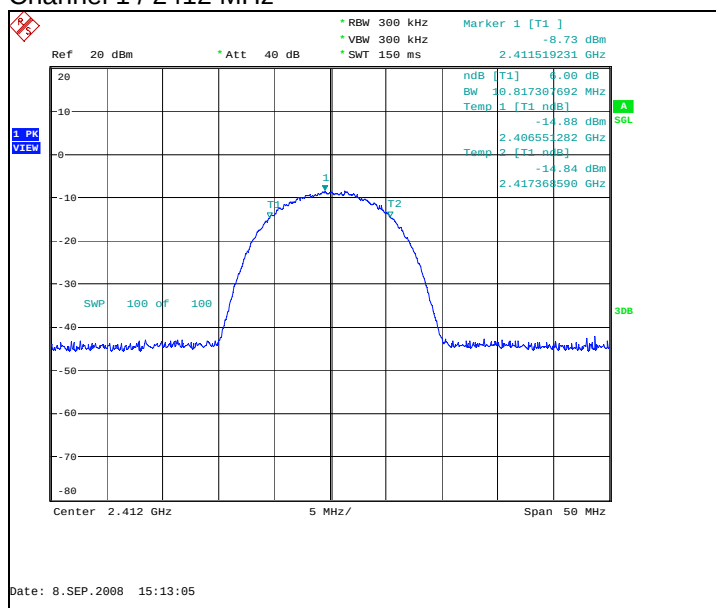
| <b>Limit [kHz]</b> |
|--------------------|
| ≥ 500              |

## 7.2. WLAN test results

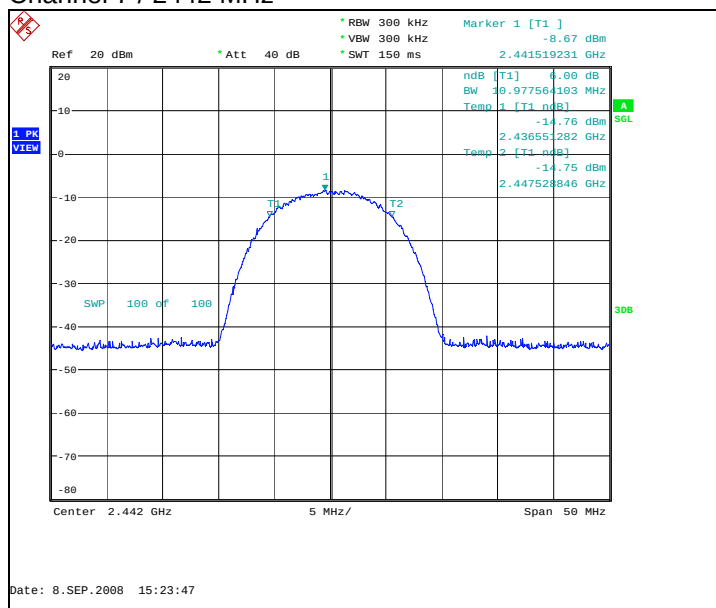
### 7.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

| Channel / $f_c$ [MHz] | 6 dB bandwidth [kHz] | Result |
|-----------------------|----------------------|--------|
| 1                     | 10817.308            | PASSED |
| 7                     | 10977.564            | PASSED |
| 11                    | 10817.308            | PASSED |

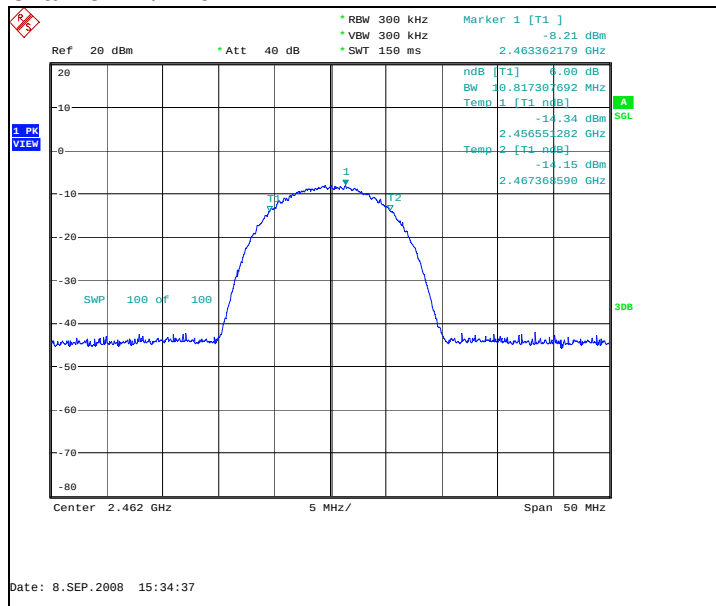
Channel 1 / 2412 MHz



Channel 7 / 2442 MHz



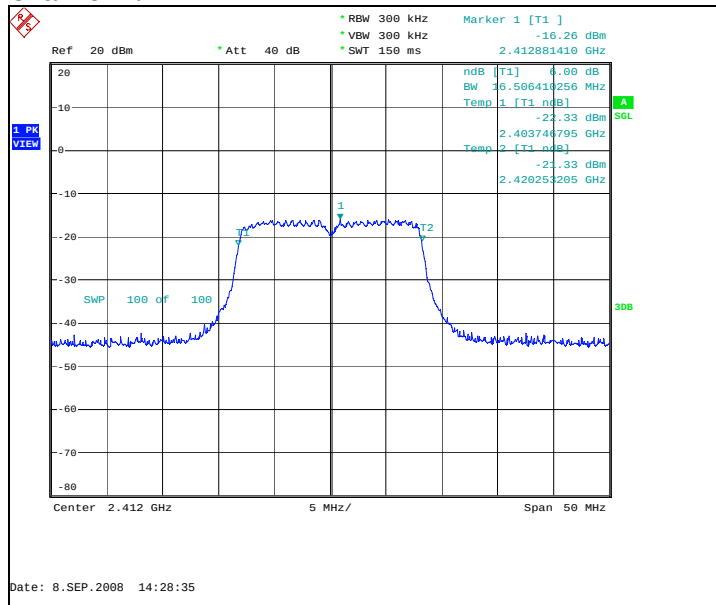
### Channel 11 / 2462 MHz



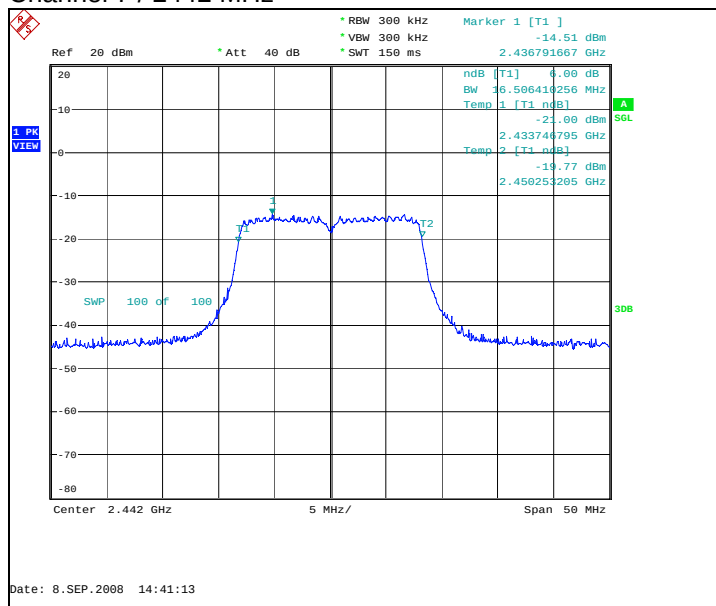
### 7.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

| Channel / $f_c$ [MHz] | 6 dB bandwidth [kHz] | Result |
|-----------------------|----------------------|--------|
| 1                     | 16506.410            | PASSED |
| 7                     | 16506.410            | PASSED |
| 11                    | 16506.410            | PASSED |

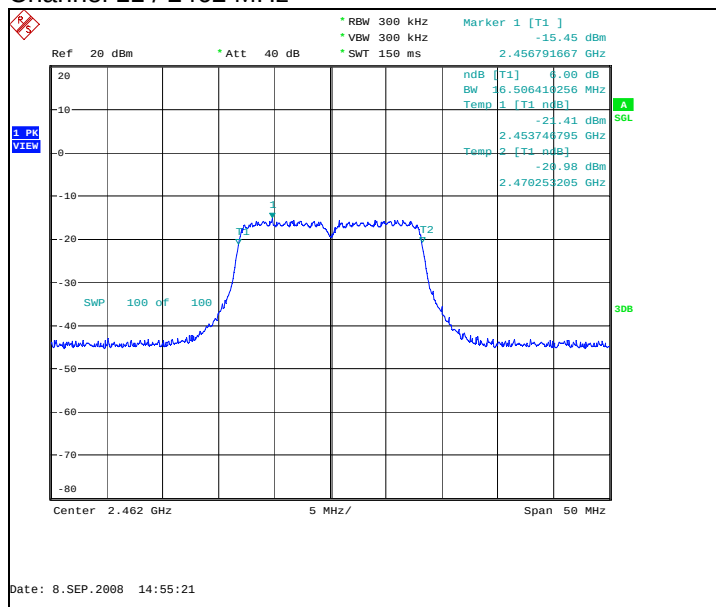
### Channel 1 / 2412 MHz



### Channel 7 / 2442 MHz



### Channel 11 / 2462 MHz



## 8. Power spectral density (FCC §15.247(e), RSS-210 A8.2 (2))

|                                                        |                                                   |
|--------------------------------------------------------|---------------------------------------------------|
| <b>EUT with DUT number</b>                             | RM-413 DUT 41646                                  |
| <b>Accessories with DUT numbers</b>                    | AC-8E DUT 41645, BL-4U DUT 41642, HS-43 DUT 41643 |
| <b>Operation Voltage [V] / [Hz]</b>                    | Nominal                                           |
| <b>Result</b>                                          | PASSED                                            |
| <b>Remarks</b>                                         | -                                                 |
| <b>Temp [°C] / Humidity [%RH] / Air Pressure [kPa]</b> | 20 / 50 / 101,7                                   |
| <b>Date of measurements</b>                            | 08-Sep-2008                                       |
| <b>Measured by</b>                                     | Timo Raiskio                                      |

### 8.1. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-210.

Limits for power spectral density measurements

| <b>Limit [dBm] @ 3 kHz</b> |
|----------------------------|
| ≤ 8                        |

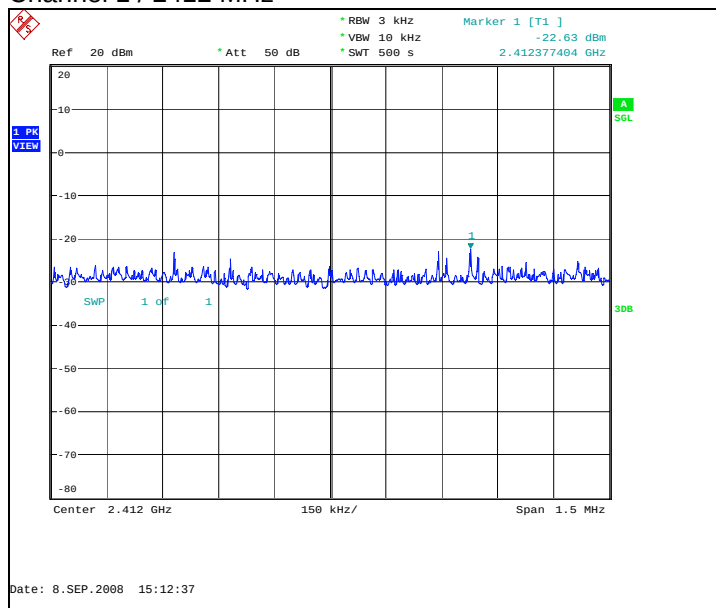


## 8.2. WLAN test results

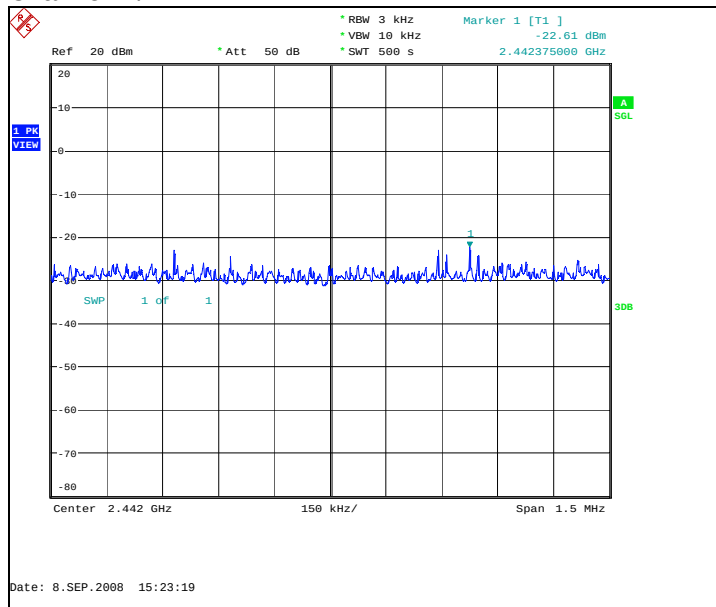
### 8.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

| Channel / $f_c$ [MHz] | P [dBm] | Result |
|-----------------------|---------|--------|
| 1 / 2412              | -22.63  | PASSED |
| 7 / 2442              | -22.61  | PASSED |
| 11 / 2462             | -22.35  | PASSED |

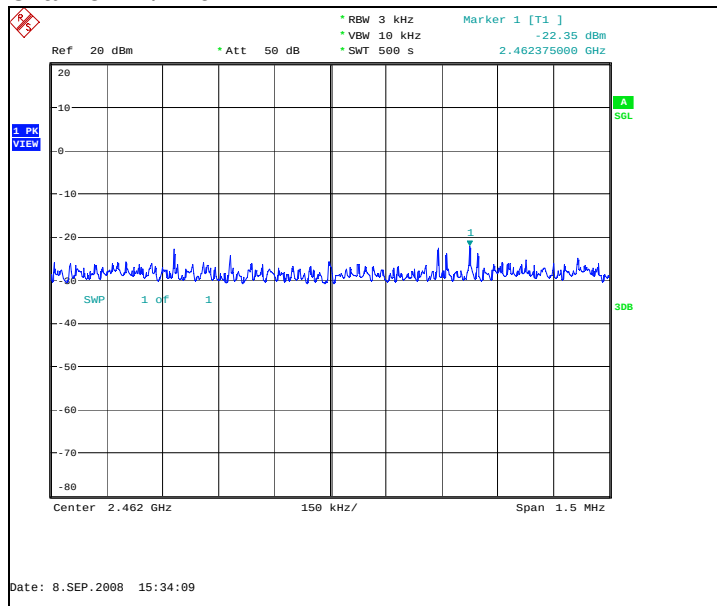
Channel 1 / 2412 MHz



Channel 7 / 2442 MHz



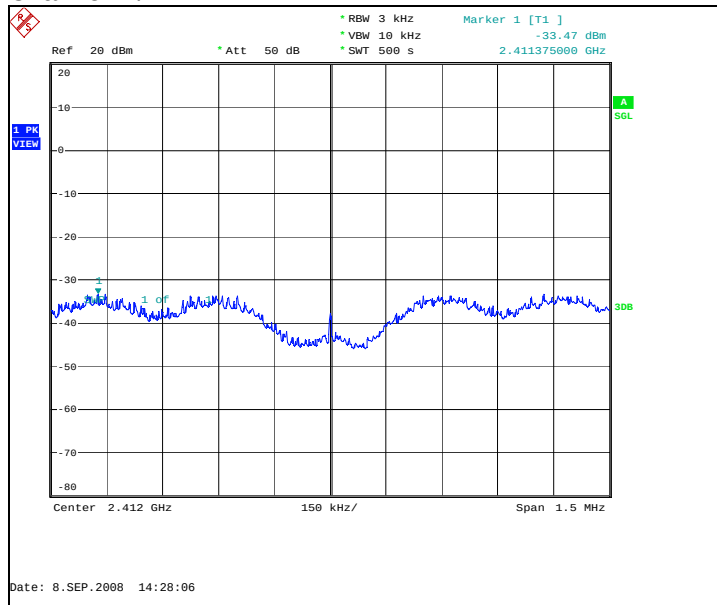
Channel 11 / 2462 MHz



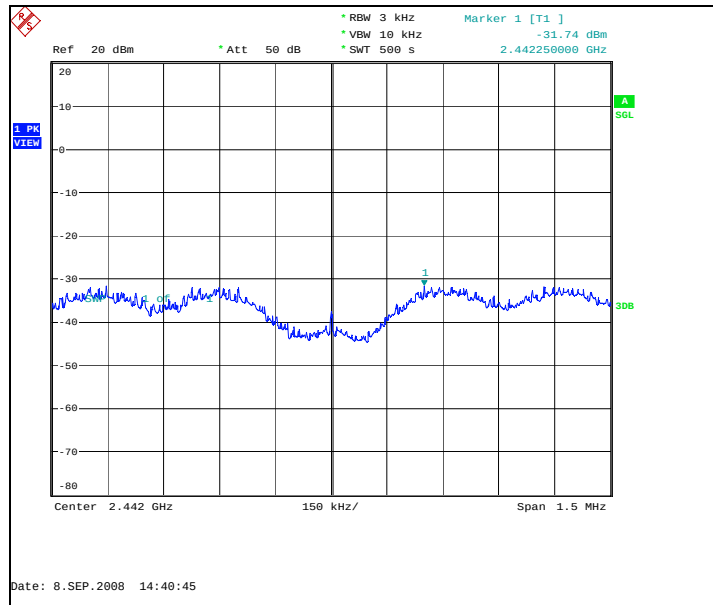
## 8.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

| Channel / $f_c$ [MHz] | P [dBm] | Result |
|-----------------------|---------|--------|
| 1 / 2412              | -33.47  | PASSED |
| 7 / 2442              | -31.74  | PASSED |
| 11 / 2462             | -32.65  | PASSED |

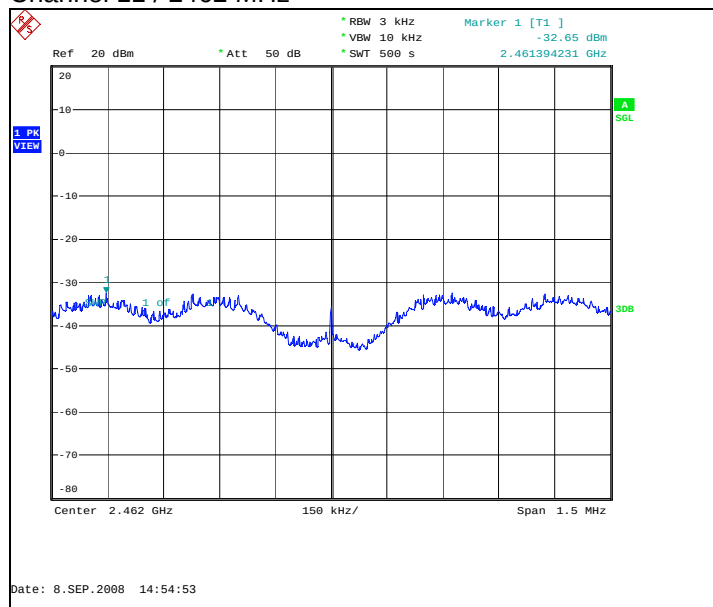
Channel 1 / 2412 MHz



### Channel 7 / 2442 MHz



### Channel 11 / 2462 MHz



## 9. Test Equipment

### 9.1. 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 |

### 9.2. 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 |