

## FCC Part 15C Compliance Test Report

|                                                         |                                                                                                                                                                                                                                                                                 |                                   |                                                                                                                               |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Report no.:</b>                                 | FCC15CWLAN_RM-1075_04                                                                                                                                                                                                                                                           | <b>Date of Report:</b>            | 06-Feb-2015                                                                                                                   |
| <b>Number of pages:</b>                                 | 37                                                                                                                                                                                                                                                                              | <b>Customer's Contact person:</b> | Tero Huhtala                                                                                                                  |
| <b>Testing laboratory:</b>                              | TCC Microsoft Tampere Laboratory<br>P.O.Box 403<br>Visiokatu 3<br>FIN-33101 TAMPERE, FINLAND<br>Tel. +358 71 800 8000<br>Fax. +358 71 804 6880                                                                                                                                  | <b>Customer:</b>                  | Microsoft<br>P.O.Box 403<br>Visiokatu 4<br>FIN-33720 TAMPERE, FINLAND<br>Tel. +358 (0) 7180 46800<br>Fax. +358 (0) 7180 46880 |
| <b>FCC listing no.:</b>                                 | 94436                                                                                                                                                                                                                                                                           |                                   |                                                                                                                               |
| <b>IC recognition no.:</b>                              | 661AK-1                                                                                                                                                                                                                                                                         |                                   |                                                                                                                               |
| <b>Tested devices/ accessories:</b>                     | Phone RM-1075 / Battery BV-T5C / AC charger AC-20E / Headset WH-108                                                                                                                                                                                                             |                                   |                                                                                                                               |
| <b>FCC ID:</b>                                          | PYATAA                                                                                                                                                                                                                                                                          | <b>IC:</b>                        | -                                                                                                                             |
| <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), DTS procedures KDB 558074, IC standards, RSS-210 (Issue 8, December 2010). 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 Microsoft.                        |                                   |                                                                                                                               |
| <b>Test Results:</b>                                    | The EUT complies with the requirements in respect of all parameters subject to the test. The test results relate only to devices specified in this document                                                                                                                     |                                   |                                                                                                                               |
| <b>Date and signature for the contents:</b>             |                                                                                                                                                                                                                                                                                 |                                   |                                                                                                                               |

Timo Raiskio, Engineer, EMC & SAR

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

|                               |                                                       |
|-------------------------------|-------------------------------------------------------|
| Date of receipt               | 16-Jan-2015                                           |
| Testing completed             | 21-Jan-2015                                           |
| The customer's contact person | Tero Huhtala                                          |
| Test Plan referred to         | T:\Projects\RM-1075\TestPlan\RS_testplan_RM-1075.xlsm |
| Notes                         | -                                                     |
| Document name                 | T:\Projects\RM-1075\EMC\FCC15CWLAN_RM-1075_04.docx    |

### 1.1. EUT and Accessory Information

The EUT is a mobile phone with following features:

GSM/WCDMA/WLAN/Bluetooth

The EUT is tested with maximum rated TX power.

Devices under tests

| Product    | Type           | SN                          | HW   | MV | SW                      | DUT   |
|------------|----------------|-----------------------------|------|----|-------------------------|-------|
| Phone      | RM-1075        | 004402479016929             | 1690 | -  | 02156.00000.14506.01000 | 43250 |
| Phone      | RM-1075        | 004402479019865             | 1690 | -  | 02156.00000.14506.01000 | 43253 |
| Battery    | BV-T5C         | 08407                       | -    | -  | -                       | 43256 |
| AC charger | AC-20E Phihong | 4868673411351126902;0675628 | -    | -  | -                       | 43135 |
| Headset    | WH-108         | -                           | -    | -  | -                       | 43136 |
| Phone      | RM-1075        | 004402479019881             | 1690 | -  | 02156.00000.14506.01000 | 43254 |
| Battery    | BV-T5C         | 08659                       | -    | -  | -                       | 43257 |
| AC charger | AC-20E         | 4090494156670711801;0675628 | -    | -  | -                       | 43229 |
| Headset    | WH-108         | 4235VFA                     | -    | -  | -                       | 43230 |

### 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), 15.205(b) | A8.5                          | Band edge compliance of RF emissions | PASSED |
| 15.247(d)            | A8.5                          | Spurious RF conducted emissions      | PASSED |
| 15.247(d), 15.209    | A8.5                          | Spurious radiated emissions          | PASSED |
| 15.207               | 7.2.4                         | AC powerline conducted emissions     | PASSED |
| 15.247(a)(2)         | A8.2(a)                       | 6dB(bandwidth)                       | PASSED |
| 15.247(e)            | A8.2(b)                       | 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 Microsoft Laboratory.

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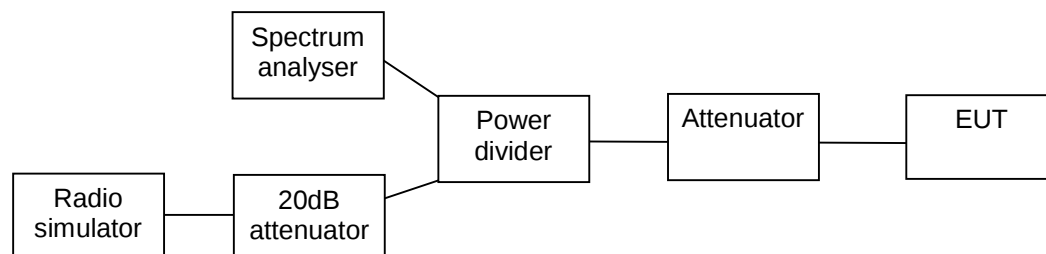
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|           |                              |           |
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## 2. Conducted peak output power (FCC §15.247(b)(1), RSS-210 A8.4(4))

|                                                        |                                                           |
|--------------------------------------------------------|-----------------------------------------------------------|
| <b>EUT with DUT number</b>                             | RM-1075, DUT 43250                                        |
| <b>Accessories with DUT numbers</b>                    | BV-T5C, DUT 43256 ; AC-20E, DUT 43229 ; WH-108, DUT 43230 |
| <b>Operation Voltage [V] / [Hz]</b>                    | 115 / 60                                                  |
| <b>Results</b>                                         | PASSED                                                    |
| <b>Remarks</b>                                         | -                                                         |
| <b>Temp [°C] / Humidity [%RH] / Air Pressure [kPa]</b> | 21 / 48 / 101.9                                           |
| <b>Date of measurements</b>                            | 19-Jan-2015                                               |
| <b>Measured by</b>                                     | Timo Raiskio                                              |

### 2.1. Test Setup



### 2.2. 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

| Frequency range [MHz]        | Limit [W] | Limit [dBm] |
|------------------------------|-----------|-------------|
| 2400 – 2483.5<br>5725 - 5850 | $\leq 1$  | $\leq 30$   |

### 2.3. Power results summary, all modes

| Channel / f <sub>c</sub> [MHz] | Mode    | Modulation | Data rate        | Level [dBm] |
|--------------------------------|---------|------------|------------------|-------------|
| 6 / 2437                       | 802.11b | BPSK       | 1 Mbps           | 20.97       |
| 6 / 2437                       | 802.11b | QPSK       | 2 Mbps           | 21.26       |
| 6 / 2437                       | 802.11b | QPSK       | 5.5 Mbps         | 22.8        |
| 6 / 2437                       | 802.11b | QPSK       | 11 Mbps          | 24          |
| 6 / 2437                       | 802.11g | BPSK       | 6 Mbps           | 24.11       |
| 6 / 2437                       | 802.11g | BPSK       | 9 Mbps           | 24.18       |
| 6 / 2437                       | 802.11g | QPSK       | 12 Mbps          | 23.74       |
| 6 / 2437                       | 802.11g | QPSK       | 18 Mbps          | 23.79       |
| 6 / 2437                       | 802.11g | 16QAM      | 24 Mbps          | 24.33       |
| 6 / 2437                       | 802.11g | 16QAM      | 36 Mbps          | 23.25       |
| 6 / 2437                       | 802.11g | 16QAM      | 48 Mbps          | 22.43       |
| 6 / 2437                       | 802.11g | 16QAM      | 54 Mbps          | 21.26       |
| 6 / 2437                       | 802.11n | BPSK       | 6.5 / 7.25 Mbps  | 24.22       |
| 6 / 2437                       | 802.11n | QPSK       | 13.0 / 14.4 Mbps | 23.76       |
| 6 / 2437                       | 802.11n | QPSK       | 19.5 / 21.7 Mbps | 23.85       |
| 6 / 2437                       | 802.11n | 16QAM      | 26.0 / 28.9 Mbps | 24.17       |
| 6 / 2437                       | 802.11n | 16QAM      | 39.0 / 43.3 Mbps | 22.17       |
| 6 / 2437                       | 802.11n | 64QAM      | 52.0 / 57.8 Mbps | 21.26       |
| 6 / 2437                       | 802.11n | 64QAM      | 58.5 / 65.0 Mbps | 21.31       |
| 6 / 2437                       | 802.11n | 64QAM      | 65.0 / 72.2 Mbps | 18.97       |

### 2.4. Power results summary, selected modes

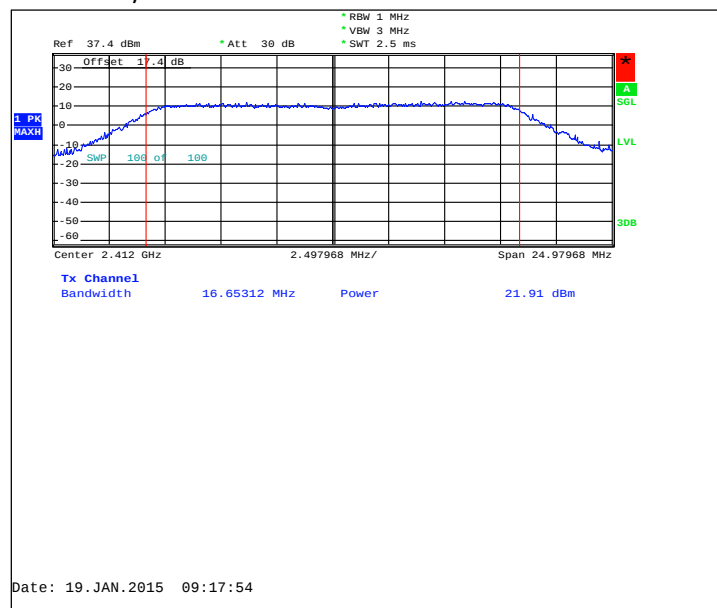
| Channel / f <sub>c</sub> [MHz] | Mode    | Modulation | Data rate       | Level [dBm] |
|--------------------------------|---------|------------|-----------------|-------------|
| 1 / 2412                       | 802.11g | 16QAM      | 24 Mbps         | 21.91       |
| 6 / 2437                       | 802.11g | 16QAM      | 24 Mbps         | 24.33       |
| 11 / 2462                      | 802.11g | 16QAM      | 24 Mbps         | 19.39       |
| 1 / 2412                       | 802.11n | BPSK       | 6.5 / 7.25 Mbps | 22.03       |
| 6 / 2437                       | 802.11n | BPSK       | 6.5 / 7.25 Mbps | 24.22       |
| 11 / 2462                      | 802.11n | BPSK       | 6.5 / 7.25 Mbps | 19.13       |

## 2.5. WLAN Test results

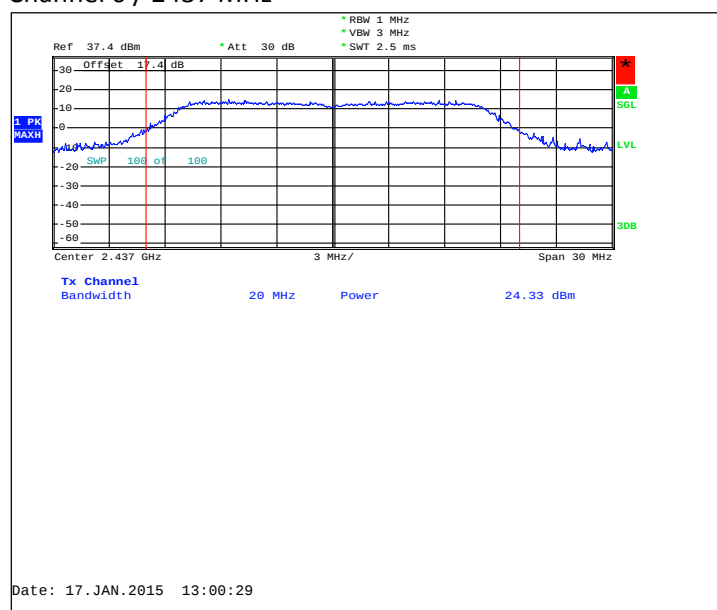
### 2.5.1 802.11g mode, 16QAM modulation, 24 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | P [dBm] | P [mW]  | Result |
|--------------------------------|---------|---------|--------|
| 1 / 2412                       | 21.91   | 155.239 | PASSED |
| 6 / 2437                       | 24.33   | 271.019 | PASSED |
| 11 / 2462                      | 19.39   | 86.896  | PASSED |

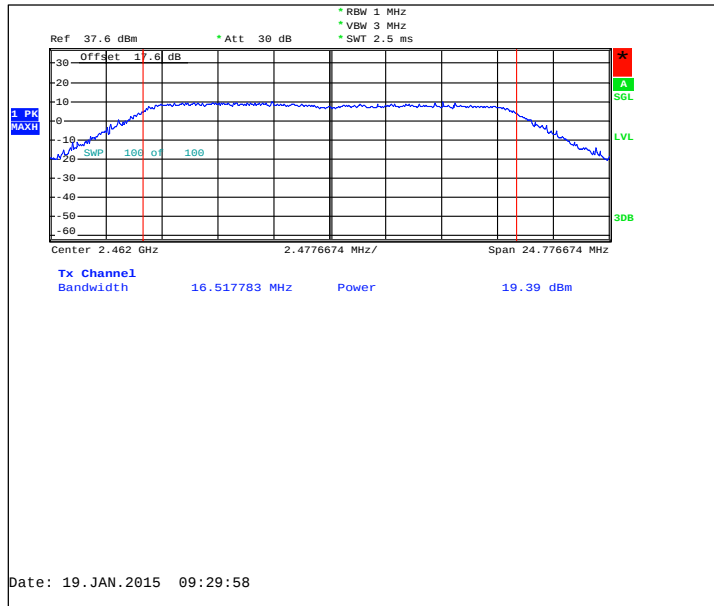
#### Channel 1 / 2412 MHz



#### Channel 6 / 2437 MHz



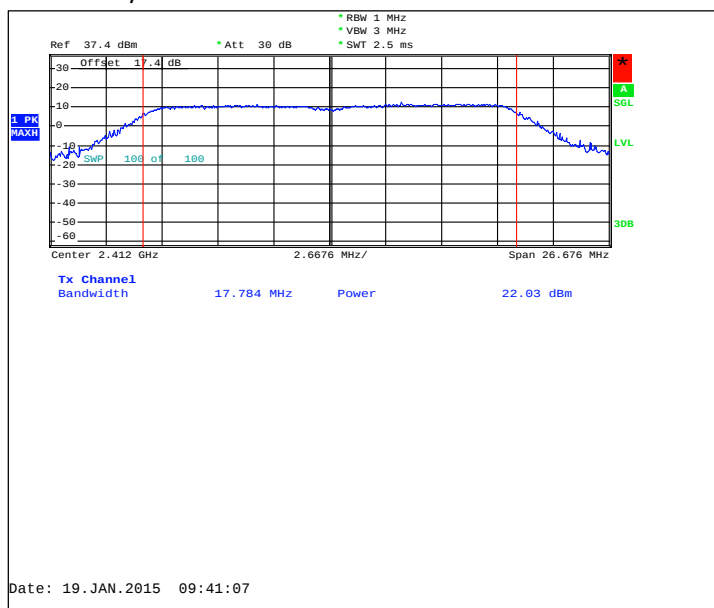
## Channel 11 / 2462 MHz



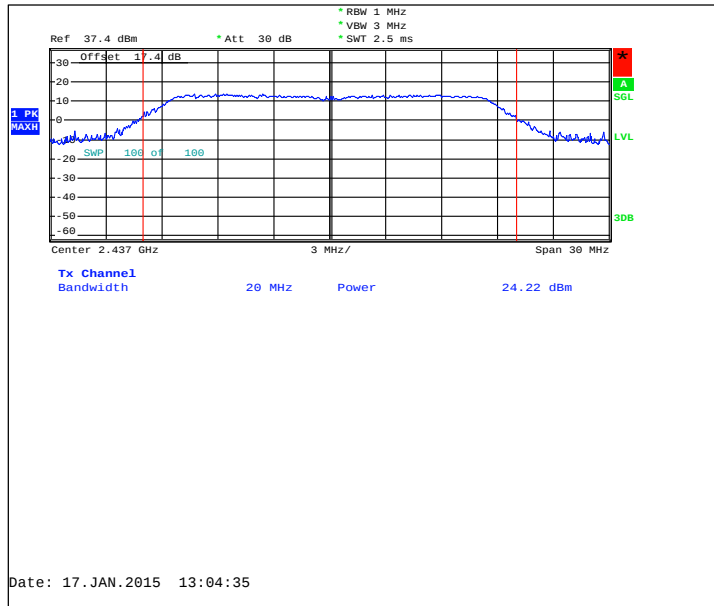
## 2.5.2 802.11n mode, BPSK modulation, 6.5 / 7.25 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | P [dBm] | P [mW]  | Result |
|--------------------------------|---------|---------|--------|
| 1 / 2412                       | 22.03   | 159.588 | PASSED |
| 6 / 2437                       | 24.22   | 264.241 | PASSED |
| 11 / 2462                      | 19.13   | 81.846  | PASSED |

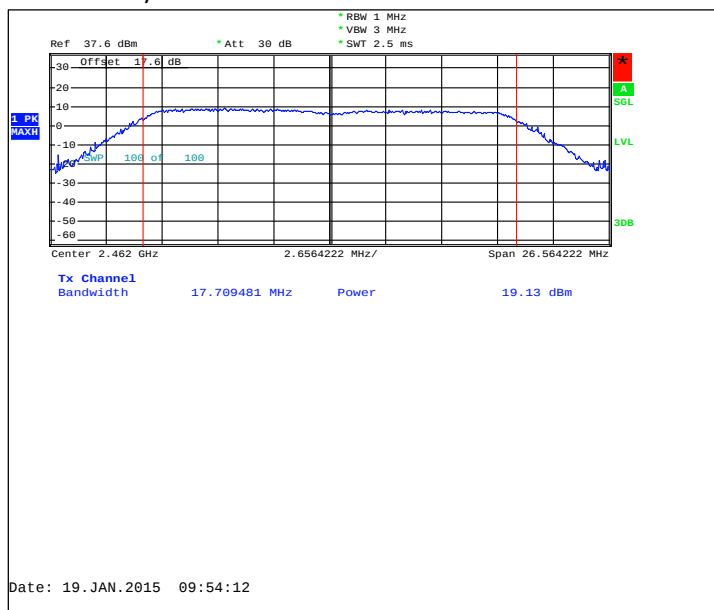
## Channel 1 / 2412 MHz



## Channel 6 / 2437 MHz



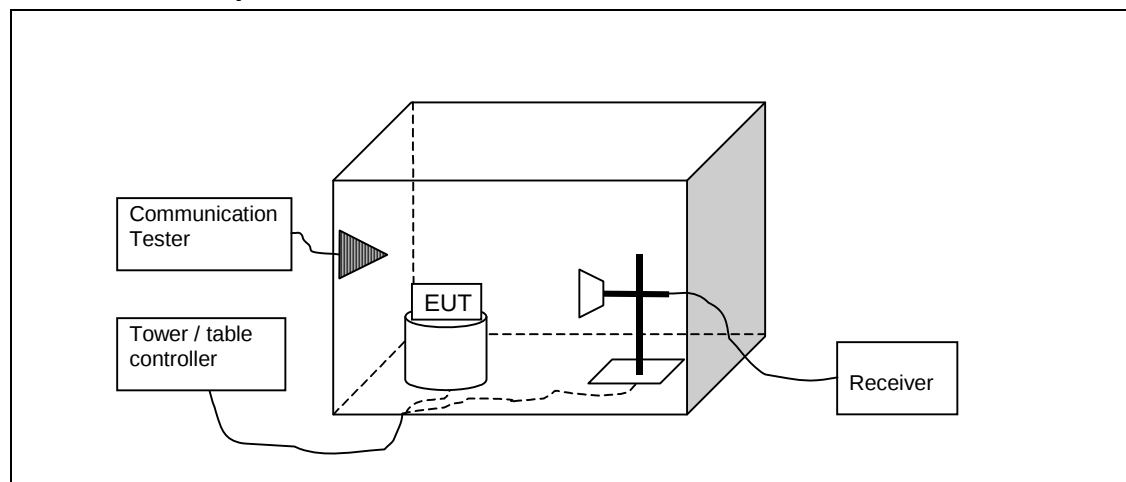
## Channel 11 / 2462 MHz



### 3. Band edge compliance of RF emissions (FCC 15.247(d), 15.205(b), RSS-210 A8.5)

|                                                 |                                                                   |
|-------------------------------------------------|-------------------------------------------------------------------|
| EUT with DUT number                             | RM-1075, DUT 43253                                                |
| Accessories with DUT numbers                    | BV-T5C, DUT 43256 ; AC-20E Phihong, DUT 43135 ; WH-108, DUT 43136 |
| Operation Voltage [V] / [Hz]                    | 115 / 60                                                          |
| Results                                         | PASSED                                                            |
| Remarks                                         | -                                                                 |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 20 / 37 / 103                                                     |
| Date of measurements                            | 21-Jan-2015                                                       |
| Measured by                                     | Timo Raiskio                                                      |

#### 3.1.1 Test setup



#### 3.2. Test method and limit

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

The measurement results are obtained as described below:

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

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

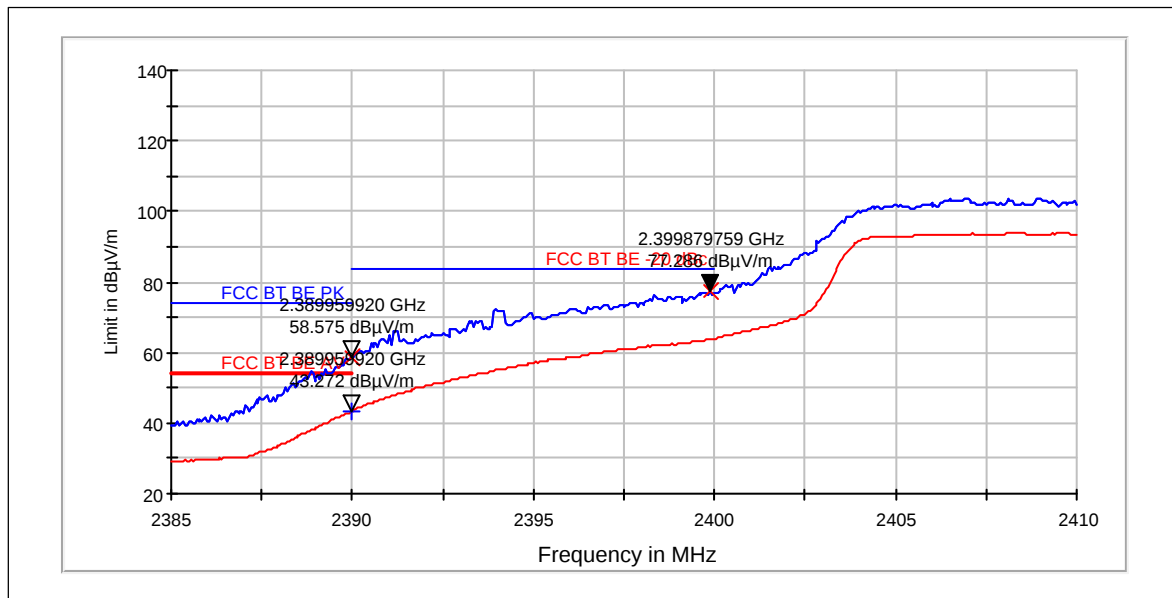
Limits for band edge compliance of RF emissions measurements (3 m measurement distance)

| Frequency range [MHz]       | Limit                              |
|-----------------------------|------------------------------------|
| Below 2390 and above 2483.5 | 54 dBuV/m (avg) and 74 dBuV/m (pk) |
| 2390 - 2400                 | -20 dBc (pk)                       |

### 3.3. WLAN test results

#### 3.3.1 802.11g, 16QAM modulation, 24 Mbps data rate.

Channel 1 / 2412 MHz



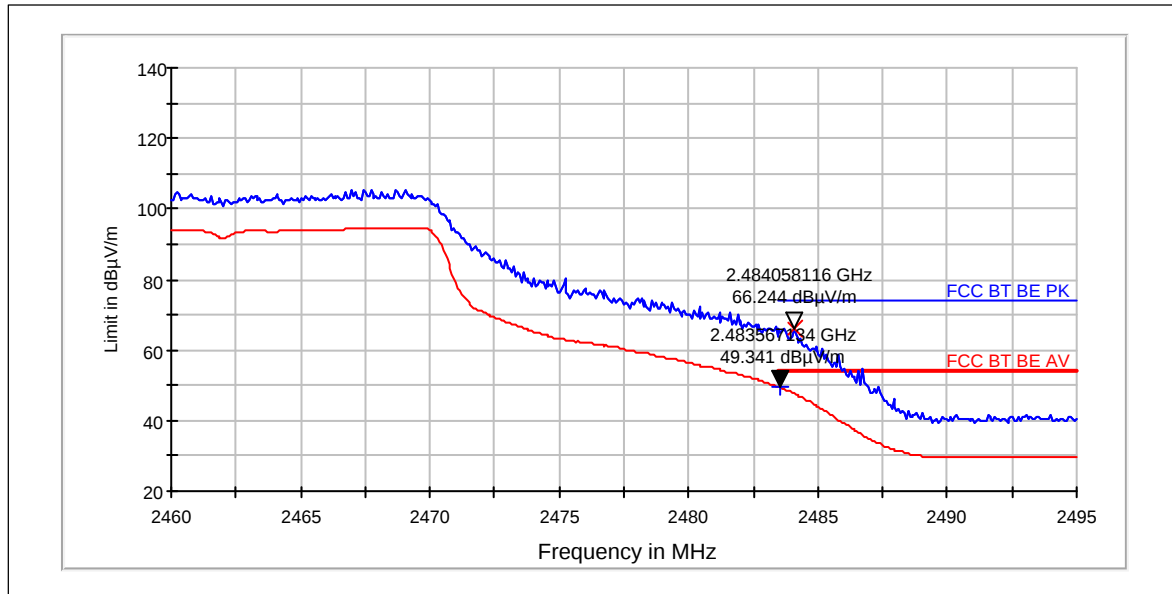
Peak (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dBμV/m] | E [μV/m] | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Results |
|-----------------|------------|----------|------------------------|-----------------------|---------|
| 2390            | 58.58      | 848.692  | 68.37                  | -9.79                 | PASSED  |
| 2400            | 77.29      | 7316.443 | 87.08                  | -9.79                 | 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] | Results |
|-----------------|------------|----------|------------------------|-----------------------|---------|
| 2390            | 43.27      | 145.747  | 53.06                  | -9.79                 | PASSED  |

Channel 11 / 2462 MHz



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

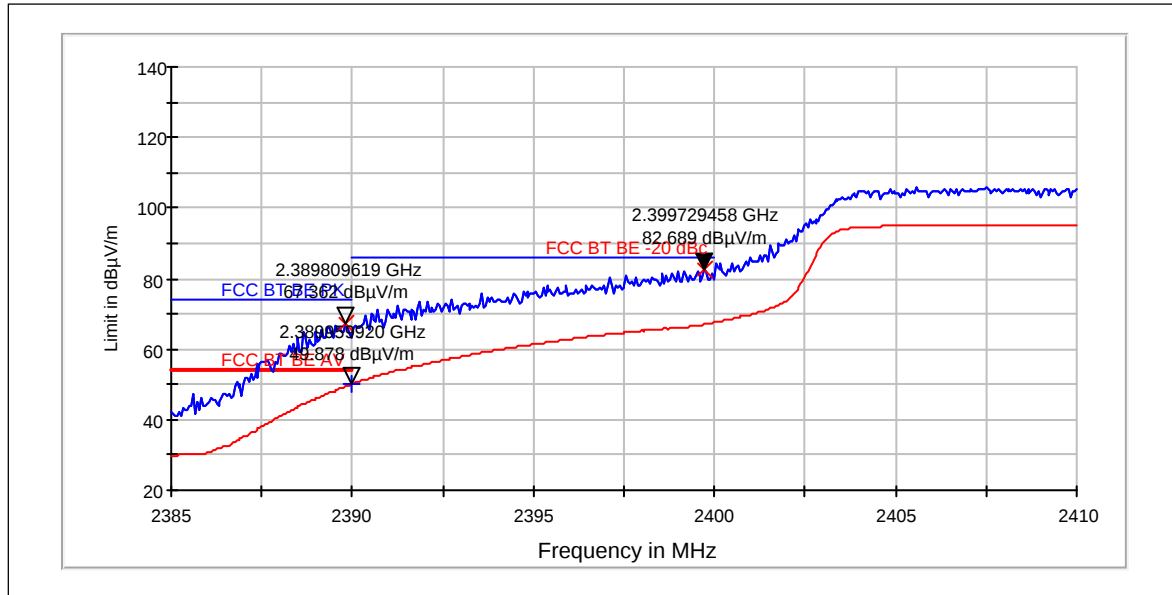
| Frequency [MHz] | E [dBμV/m] | E [μV/m] | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Results |
|-----------------|------------|----------|------------------------|-----------------------|---------|
| 2484            | 66.24      | 2052.107 | 76.07                  | -9.83                 | PASSED  |

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] | Results |
|-----------------|------------|----------|------------------------|-----------------------|---------|
| 2484            | 49.34      | 293.123  | 59.17                  | -9.83                 | PASSED  |

### 3.3.2 802.11n, BPSK modulation, 6.5 / 7.25 Mbps data rate.

Channel 1 / 2412 MHz



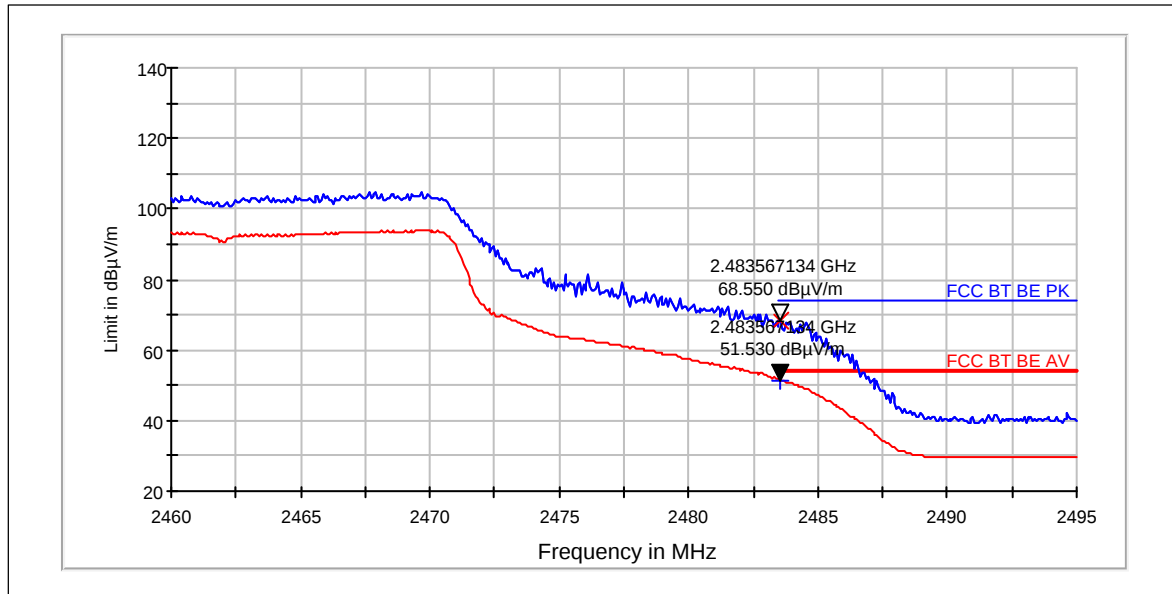
Peak (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dBμV/m] | E [μV/m]  | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Results |
|-----------------|------------|-----------|------------------------|-----------------------|---------|
| 2390            | 67.36      | 2333.995  | 77.15                  | -9.79                 | PASSED  |
| 2400            | 82.69      | 13628.561 | 92.48                  | -9.79                 | 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] | Results |
|-----------------|------------|----------|------------------------|-----------------------|---------|
| 2390            | 49.88      | 311.817  | 59.67                  | -9.79                 | 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] | Results |
|-----------------|------------|----------|------------------------|-----------------------|---------|
| 2484            | 68.55      | 2676.086 | 78.38                  | -9.83                 | PASSED  |

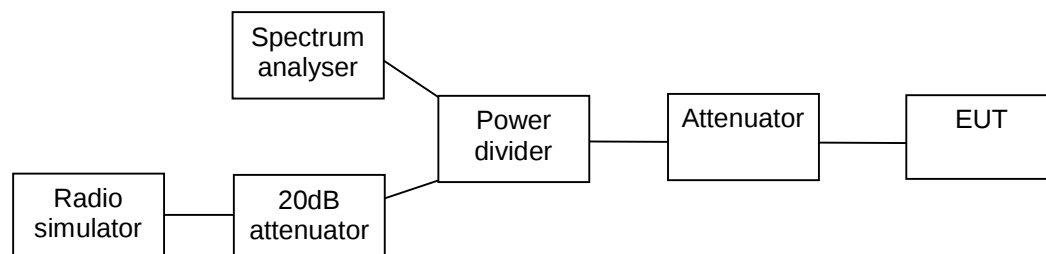
Average (RBW: 1 MHz, VBW: 1 MHz)

| Frequency [MHz] | E [dBμV/m] | E [μV/m] | U <sub>RX</sub> [dBμV] | A <sub>TOT</sub> [dB] | Results |
|-----------------|------------|----------|------------------------|-----------------------|---------|
| 2484            | 51.53      | 377.138  | 61.36                  | -9.83                 | PASSED  |

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

|                                                        |                                                           |
|--------------------------------------------------------|-----------------------------------------------------------|
| <b>EUT with DUT number</b>                             | RM-1075, DUT 43250                                        |
| <b>Accessories with DUT numbers</b>                    | BV-T5C, DUT 43256 ; AC-20E, DUT 43229 ; WH-108, DUT 43230 |
| <b>Operation Voltage [V] / [Hz]</b>                    | 115 / 60                                                  |
| <b>Results</b>                                         | PASSED                                                    |
| <b>Remarks</b>                                         | -                                                         |
| <b>Temp [°C] / Humidity [%RH] / Air Pressure [kPa]</b> | 21 / 48 / 101.9                                           |
| <b>Date of measurements</b>                            | 19-Jan-2015                                               |
| <b>Measured by</b>                                     | Timo Raiskio                                              |

##### 4.1. Test Setup



##### 4.2. Test method and limit

The measurement is made according to Public notice KDB 558 074 and IC standard RSS-210.

The reference level for the -20 dBc measurement was obtained as instructed in section 11.2 of the KDB 558074, using span of 1.5 times the OBW.

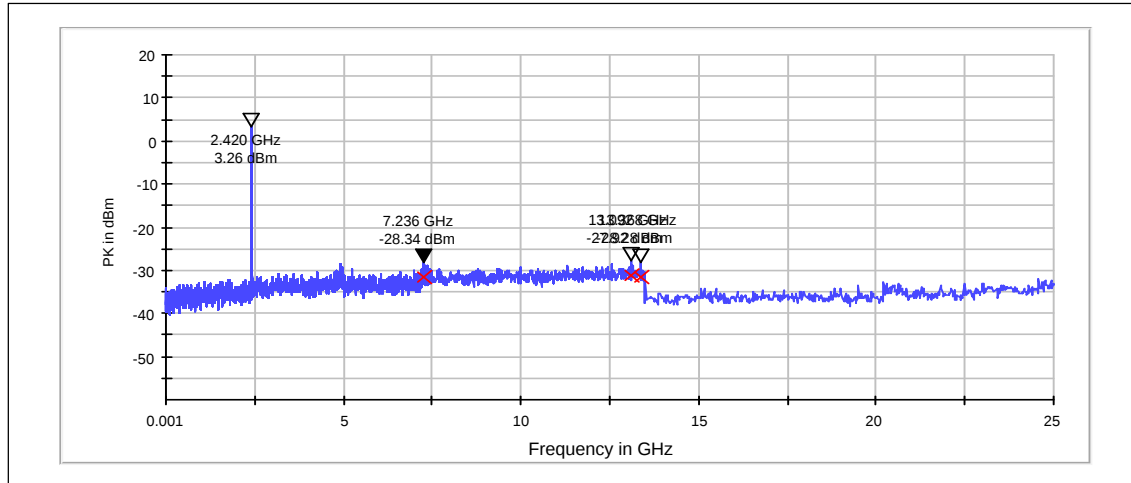
Limits for spurious RF conducted emissions measurements

| Frequency range [MHz] | Limit [dBc] |
|-----------------------|-------------|
| 1 – 25000             | <= -20      |

### 4.3. WLAN Test results

#### 4.3.1 802.11g mode, 16QAM modulation, 24 Mbps data rate

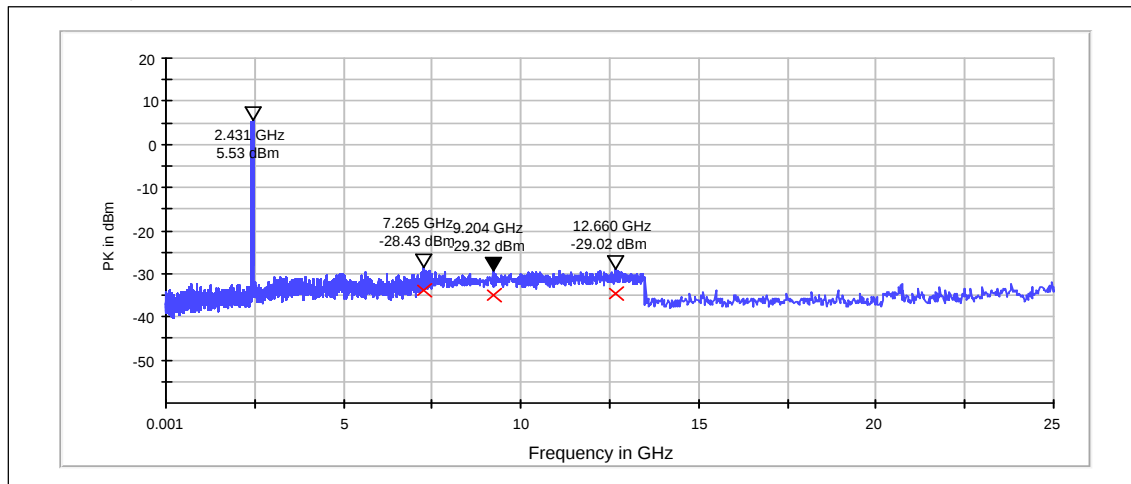
Channel 1 / 2412 MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

| Frequency [MHz] | P [dBc] | Result |
|-----------------|---------|--------|
| 13092.000       | -31.18  | PASSED |
| 13368.000       | -31.54  | PASSED |
| 7236.000        | -31.60  | PASSED |

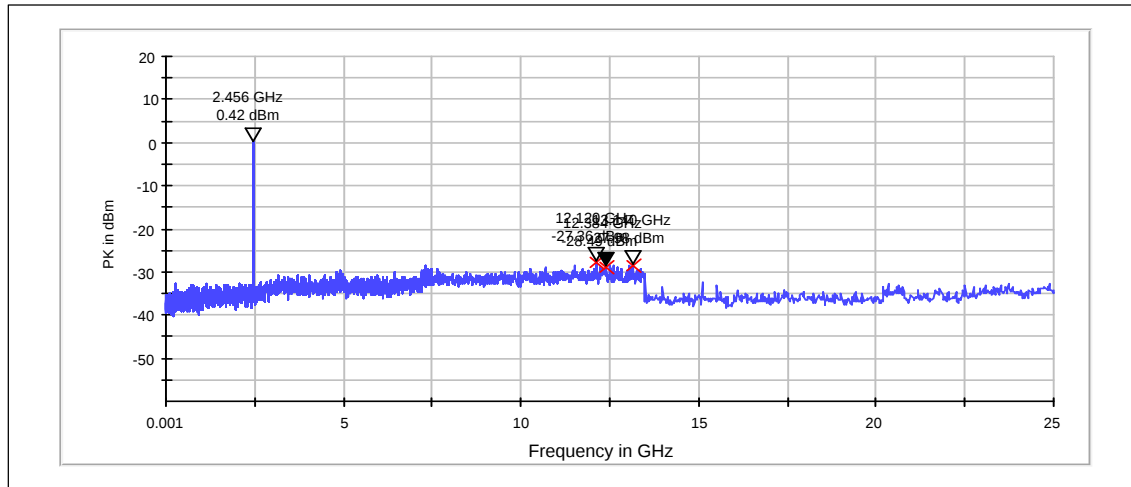
Channel 6 / 2437 MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

| Frequency [MHz] | P [dBc] | Result |
|-----------------|---------|--------|
| 7265.400        | -33.96  | PASSED |
| 12660.000       | -34.54  | PASSED |
| 9204.000        | -34.84  | PASSED |

Channel 11 / 2462 MHz

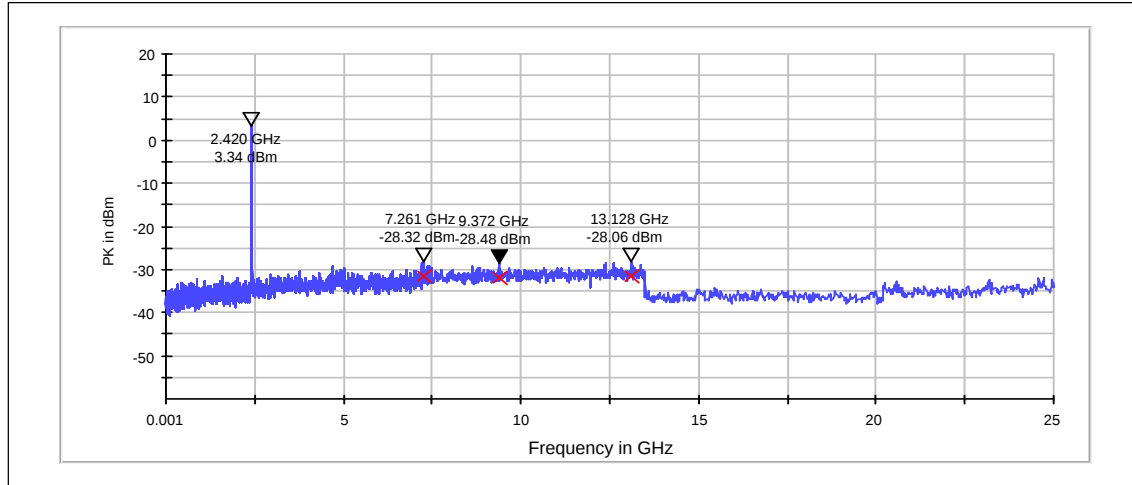


Peak (RBW: 100 kHz, VBW: 300 kHz)

| Frequency [MHz] | P [dBc] | Result |
|-----------------|---------|--------|
| 12120.000       | -27.78  | PASSED |
| 13140.000       | -28.40  | PASSED |
| 12384.000       | -28.91  | PASSED |

#### 4.3.2 802.11n mode, BPSK modulation, 6.5 / 7.25 Mbps data rate

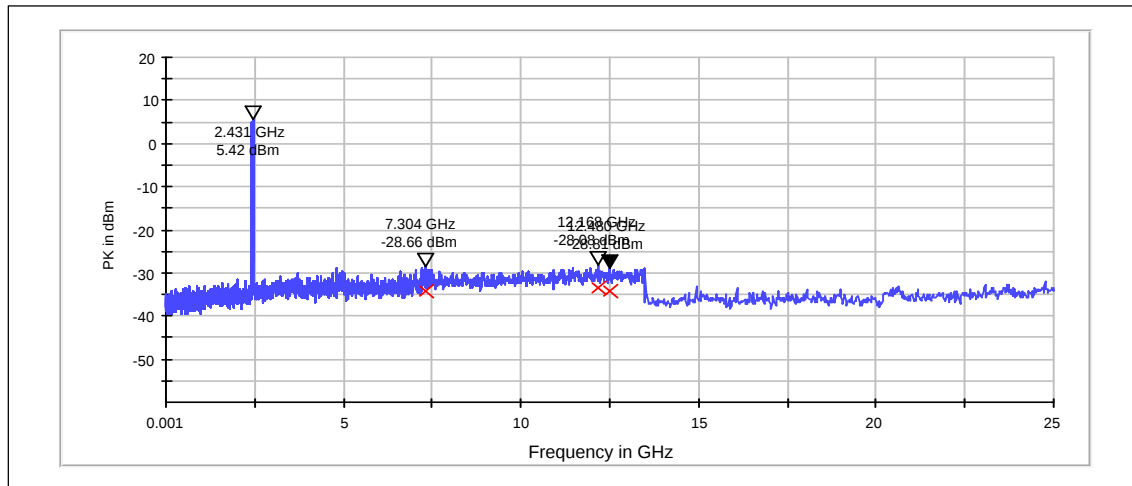
Channel 1 / 2412 MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

| Frequency [MHz] | P [dBc] | Result |
|-----------------|---------|--------|
| 13128.000       | -31.40  | PASSED |
| 7261.200        | -31.66  | PASSED |
| 9372.000        | -31.82  | PASSED |

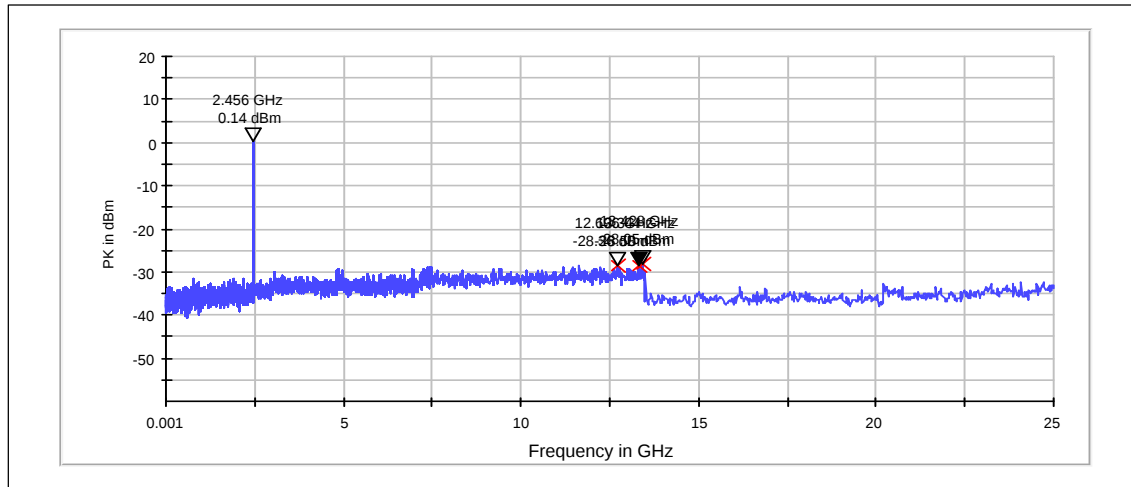
Channel 6 / 2437 MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

| Frequency [MHz] | P [dBc] | Result |
|-----------------|---------|--------|
| 12168.000       | -33.50  | PASSED |
| 7303.800        | -34.08  | PASSED |
| 12480.000       | -34.23  | PASSED |

Channel 11 / 2462 MHz



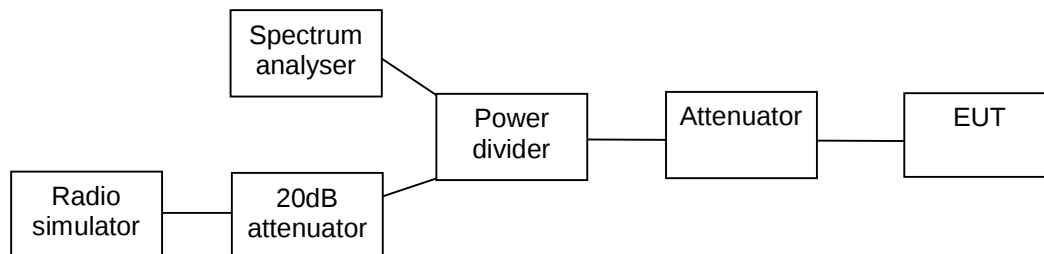
Peak (RBW: 100 kHz, VBW: 300 kHz)

| Frequency [MHz] | P [dBc] | Result |
|-----------------|---------|--------|
| 13428.000       | -28.19  | PASSED |
| 12696.000       | -28.50  | PASSED |
| 13344.000       | -28.64  | PASSED |

## 5. 6dB(bandwidth) (FCC §15.247(a)(2), RSS-210 A8.2(a))

|                                                 |                                                           |
|-------------------------------------------------|-----------------------------------------------------------|
| EUT with DUT number                             | RM-1075, DUT 43250                                        |
| Accessories with DUT numbers                    | BV-T5C, DUT 43256 ; AC-20E, DUT 43229 ; WH-108, DUT 43230 |
| Operation Voltage [V] / [Hz]                    | 115 / 60                                                  |
| Results                                         | PASSED                                                    |
| Remarks                                         | -                                                         |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 21 / 48 / 101.9                                           |
| Date of measurements                            | 19-Jan-2015                                               |
| Measured by                                     | Timo Raiskio                                              |

### 5.1. Test Setup



### 5.2. 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

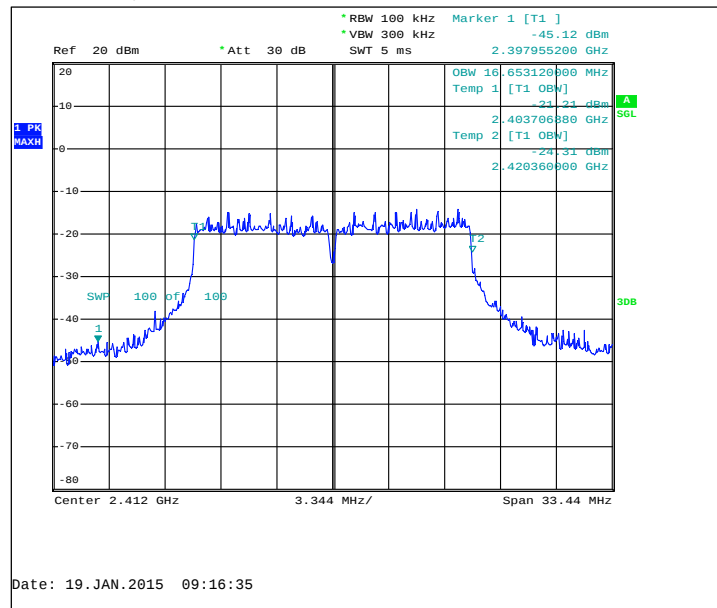
| Limit [kHz] |
|-------------|
| >= 500      |

### 5.3. WLAN Test results

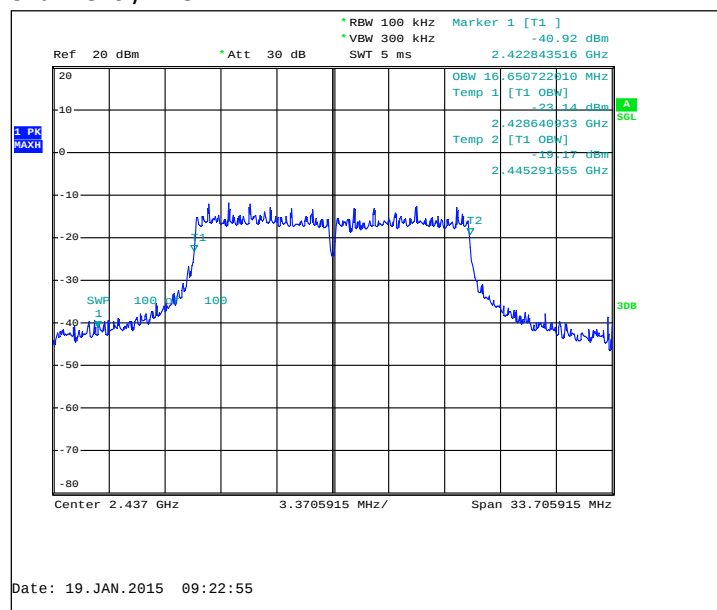
#### 5.3.1 802.11g mode, 16QAM modulation, 24 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | 6 dB bandwidth [kHz] | Result |
|--------------------------------|----------------------|--------|
| 1 / 2412                       | 16653.1              | PASSED |
| 6 / 2437                       | 16650.7              | PASSED |
| 11 / 2462                      | 16517.8              | PASSED |

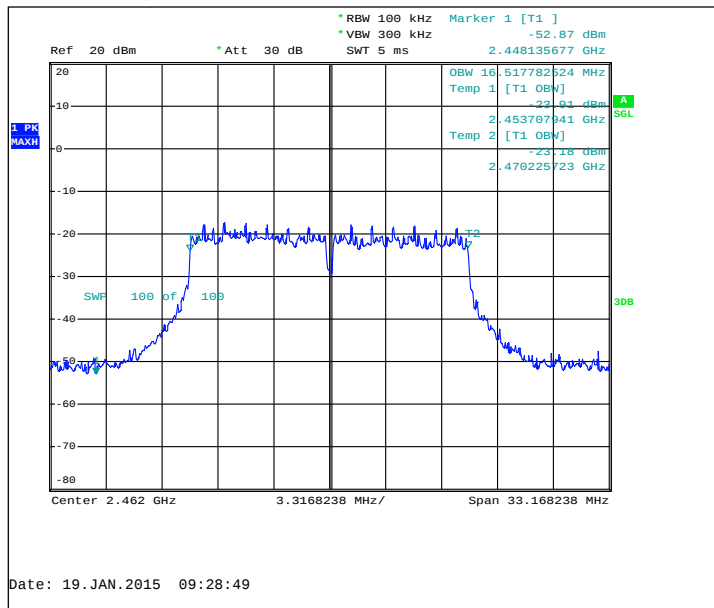
##### Channel 1 / 2412 MHz



##### Channel 6 / 2437 MHz



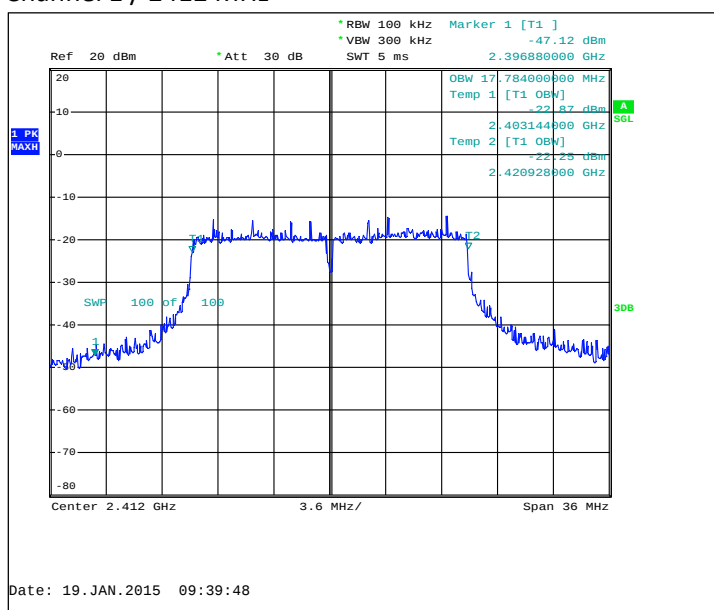
### Channel 11 / 2462 MHz



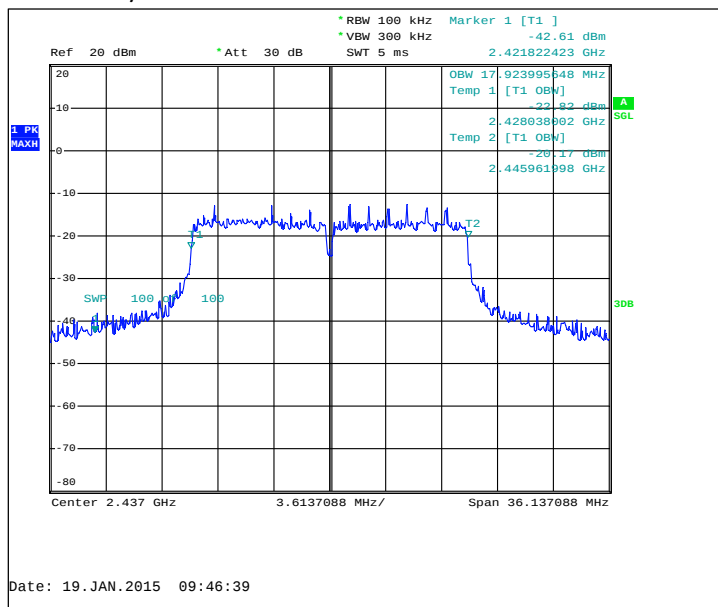
### 5.3.2 802.11n mode, BPSK modulation, 6.5 / 7.25 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | 6 dB bandwidth [kHz] | Result |
|--------------------------------|----------------------|--------|
| 1 / 2412                       | 17784                | PASSED |
| 6 / 2437                       | 17924                | PASSED |
| 11 / 2462                      | 17709.5              | PASSED |

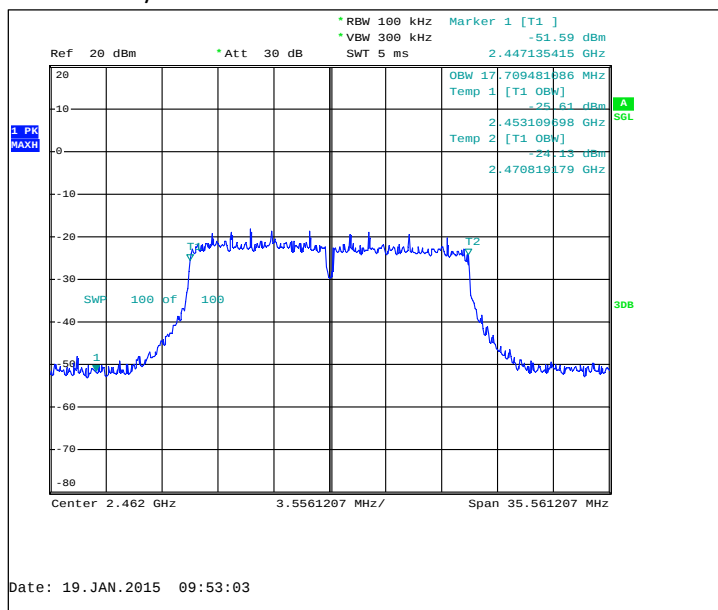
### Channel 1 / 2412 MHz



## Channel 6 / 2437 MHz



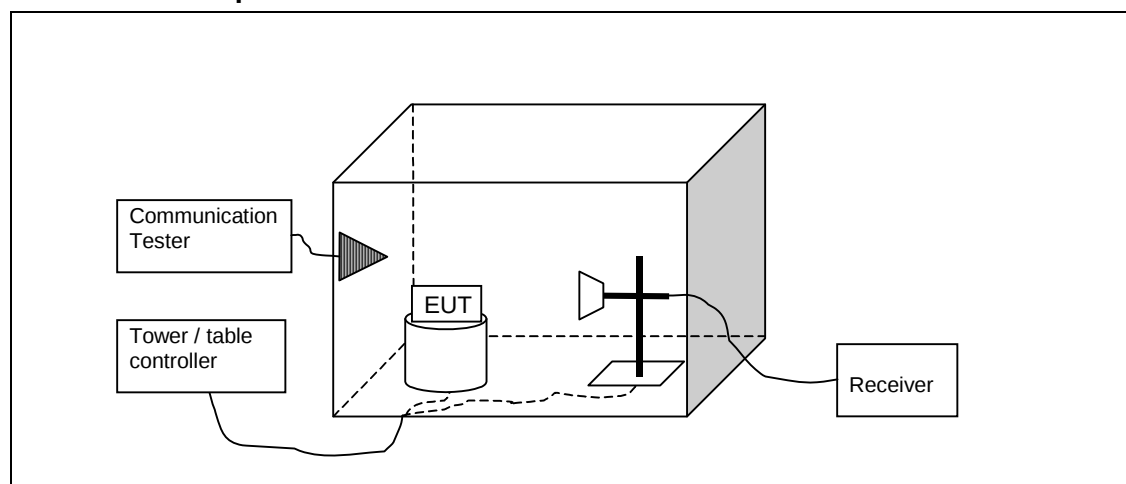
## Channel 11 / 2462 MHz



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

|                                                 |                                                                  |
|-------------------------------------------------|------------------------------------------------------------------|
| EUT with DUT number                             | RM-1075, DUT 43253                                               |
| Accessories with DUT numbers                    | BV-T5C, DUT 43256 ; AC-20E Pihong, DUT 43135 ; WH-108, DUT 43136 |
| Operation Voltage [V] / [Hz]                    | 115 / 60                                                         |
| Results                                         | PASSED                                                           |
| Remarks                                         | -                                                                |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 20 / 37 / 103                                                    |
| Date of measurements                            | 21-Jan-2015                                                      |
| Measured by                                     | Timo Raiskio                                                     |

### 6.1.1 Test setup



### 6.2. 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 is made up to 10th harmonic of the EUT highest TX channel.

The measurement results are obtained as described below:

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

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

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

| Frequency range [MHz] | Limit [ $\mu V/m$ ] | Limit [dB $\mu V/m$ ] | 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       |

### 6.3. WLAN test results

#### 6.3.1 802.11g, 16QAM modulation, 24 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 4822.4          | 42.39      | 131.674  | 47.09                  | -4.7                  | 74             | 31.59  | PASSED  |
| 7234            | 45.32      | 184.502  | 44.42                  | 0.9                   | 95             | 49.91  | 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 4822.4          | 29.48      | 29.785   | 34.18                  | -4.7                  | 54             | 24.5   | PASSED  |
| 7234            | 32.63      | 42.806   | 31.73                  | 0.9                   | ---            | ---    | PASSED  |

Channel 6 / 2437 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 30.15           | 27.39      | 23.415   | 48.09                  | -20.7                 | 40             | 12.61  | PASSED  |
| 35.848          | 28.64      | 27.04    | 51.74                  | -23.1                 | 40             | 11.36  | 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 4881.7          | 42.1       | 127.35   | 46.3                   | -4.2                  | 74             | 31.88  | PASSED  |
| 7319.1          | 46.12      | 202.302  | 44.82                  | 1.3                   | 74             | 27.86  | 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 4881.7          | 28.84      | 27.669   | 33.04                  | -4.2                  | 54             | 25.14  | PASSED  |
| 7319.1          | 32.41      | 41.735   | 31.11                  | 1.3                   | 54             | 21.57  | 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 4924.8          | 44.69      | 171.593  | 48.79                  | -4.1                  | 74             | 29.29  | PASSED  |
| 7387.7          | 45.25      | 183.021  | 43.75                  | 1.5                   | 74             | 28.73  | 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 4924.8          | 30.54      | 33.651   | 34.64                  | -4.1                  | 54             | 23.44  | PASSED  |
| 7387.7          | 32.08      | 40.179   | 30.58                  | 1.5                   | 54             | 21.9   | PASSED  |

Channel 1 / 2412 MHz

### 6.3.2 802.11n, BPSK modulation, 6.5 / 7.25 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 4823.7          | 42.88      | 139.316  | 47.58                  | -4.7                  | 74             | 31.1   | PASSED  |
| 7237.4          | 48.24      | 258.226  | 47.24                  | 1                     | 95             | 46.99  | 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 4823.7          | 29.98      | 31.55    | 34.68                  | -4.7                  | 54             | 24     | PASSED  |
| 7237.4          | 34.5       | 53.088   | 33.5                   | 1                     | ---            | ---    | PASSED  |

## Channel 6 / 2437 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 30.03           | 18.96      | 8.872    | 39.56                  | -20.6                 | 40             | 21.04  | PASSED  |
| 948.419         | 22.41      | 13.198   | 37.81                  | -15.4                 | 46             | 23.61  | 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 4881.4          | 42.34      | 130.918  | 46.54                  | -4.2                  | 74             | 31.64  | PASSED  |
| 7319.1          | 46.25      | 205.353  | 44.95                  | 1.3                   | 74             | 27.73  | 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 4881.4          | 28.9       | 27.861   | 33.1                   | -4.2                  | 54             | 25.08  | PASSED  |
| 7319.1          | 33.01      | 44.72    | 31.71                  | 1.3                   | 54             | 20.97  | 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 4923.5          | 48.87      | 277.651  | 52.97                  | -4.1                  | 74             | 25.11  | PASSED  |
| 7385            | 45.35      | 185.14   | 43.85                  | 1.5                   | 74             | 28.63  | 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] | Limit [dBμV/m] | Margin | Results |
|-----------------|------------|----------|------------------------|-----------------------|----------------|--------|---------|
| 4923.5          | 34.11      | 50.757   | 38.21                  | -4.1                  | 54             | 19.87  | PASSED  |
| 7385            | 32.4       | 41.687   | 30.9                   | 1.5                   | 54             | 21.58  | PASSED  |

## 7. AC powerline conducted emissions (FCC §15.207, RSS-210 7.2.4)

|                                                 |                                                           |
|-------------------------------------------------|-----------------------------------------------------------|
| EUT with DUT number                             | RM-1075, DUT 43254                                        |
| Accessories with DUT numbers                    | BV-T5C, DUT 43257 ; AC-20E, DUT 43229 ; WH-108, DUT 43230 |
| Operation Voltage [V] / [Hz]                    | 115 / 60                                                  |
| Results                                         | PASSED                                                    |
| Remarks                                         | -                                                         |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 22 / 38 / 101.1                                           |
| Date of measurements                            | 21-Jan-2015                                               |
| Measured by                                     | Jari Jantunen                                             |

### 7.1. Test Setup



### 7.2. Test method and limit

The measurement is made according to procedure 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.

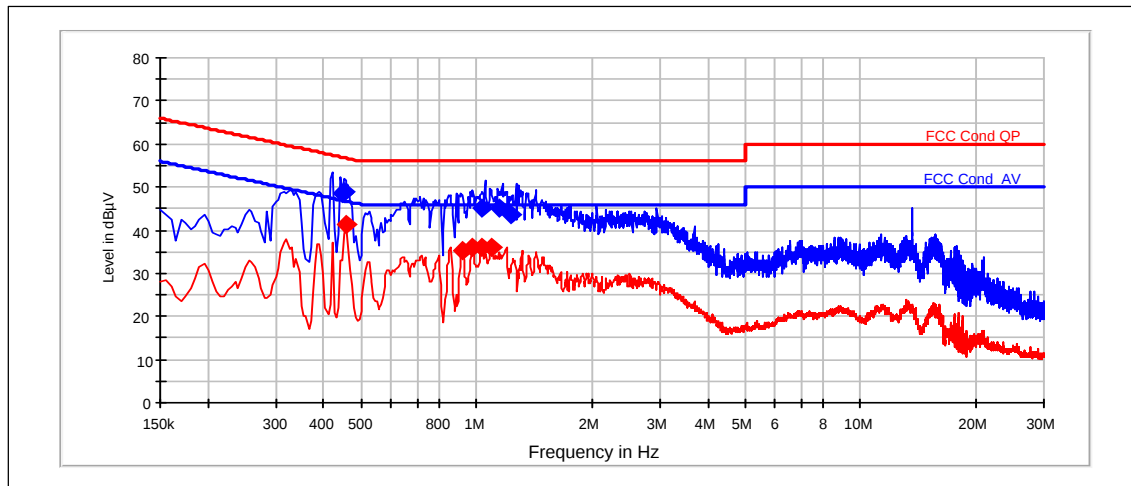
CISPR 22 Class B limits

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

### 7.3. WLAN Test results

#### 7.3.1 802.11g, 16QAM modulation, 24 Mbps data rate.

Channel 6 / 2437 MHz



QuasiPeak (RBW: 9 kHz)

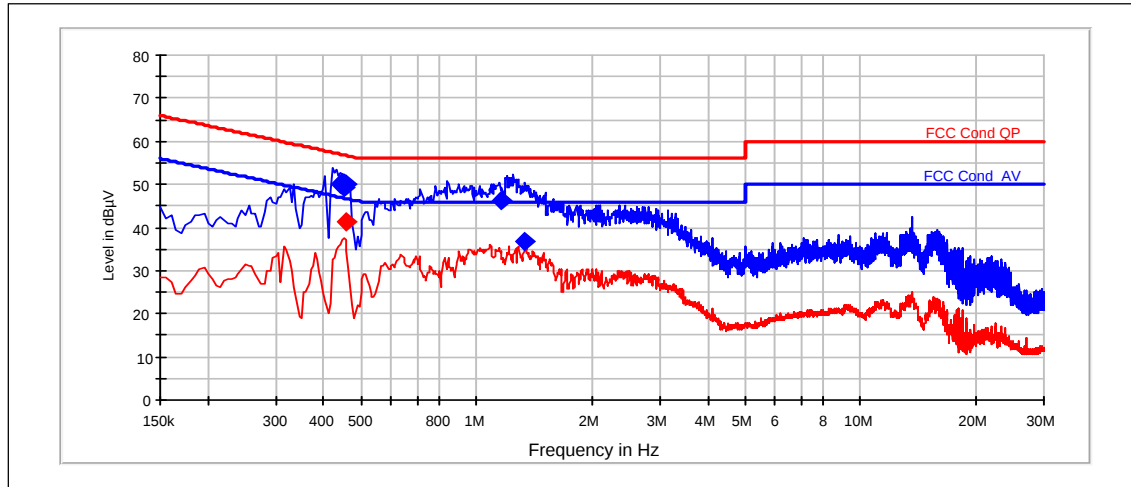
| Frequency [MHz] | U [dBμV] | Line | Result |
|-----------------|----------|------|--------|
| 0.445           | 48.58    | L1   | PASSED |
| 0.45            | 49.08    | L1   | PASSED |
| 1.035           | 44.97    | L1   | PASSED |
| 1.15            | 44.98    | L1   | PASSED |
| 1.235           | 43.67    | L1   | PASSED |

Average (RBW: 9 kHz)

| Frequency [MHz] | U [dBμV] | Line | Result |
|-----------------|----------|------|--------|
| 0.46            | 41.29    | L1   | PASSED |
| 0.915           | 35.39    | L1   | PASSED |
| 0.975           | 36.03    | L1   | PASSED |
| 1.03            | 35.93    | L1   | PASSED |
| 1.09            | 35.94    | L1   | PASSED |

### 7.3.2 802.11n mode, BPSK modulation, 6.5 / 7.25 Mbps data rate

Channel 6 / 2437 MHz



QuasiPeak (RBW: 9 kHz)

| Frequency [MHz] | U [dBμV] | Line | Result |
|-----------------|----------|------|--------|
| 0.44            | 50.08    | L1   | PASSED |
| 0.445           | 50.61    | L1   | PASSED |
| 0.45            | 49.21    | L1   | PASSED |
| 0.455           | 49.92    | L1   | PASSED |
| 1.16            | 46.1     | L1   | PASSED |
| 1.335           | 36.86    | N    | PASSED |

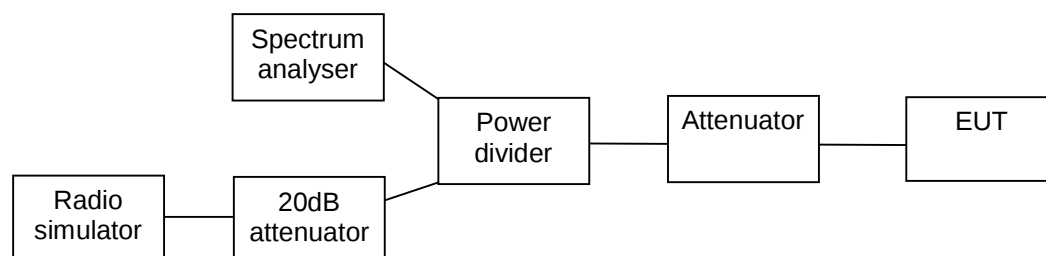
Average (RBW: 9 kHz)

| Frequency [MHz] | U [dBμV] | Line | Result |
|-----------------|----------|------|--------|
| 0.455           | 41.31    | L1   | PASSED |

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

|                                                 |                                                           |
|-------------------------------------------------|-----------------------------------------------------------|
| EUT with DUT number                             | RM-1075, DUT 43250                                        |
| Accessories with DUT numbers                    | BV-T5C, DUT 43256 ; AC-20E, DUT 43229 ; WH-108, DUT 43230 |
| Operation Voltage [V] / [Hz]                    | 115 / 60                                                  |
| Results                                         | PASSED                                                    |
| Remarks                                         | -                                                         |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 21 / 48 / 101.9                                           |
| Date of measurements                            | 19-Jan-2015                                               |
| Measured by                                     | Timo Raiskio                                              |

### 8.1. Test Setup



### 8.2. 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

| Limit [dBm] @ 3 kHz |
|---------------------|
| $\leq 8$            |

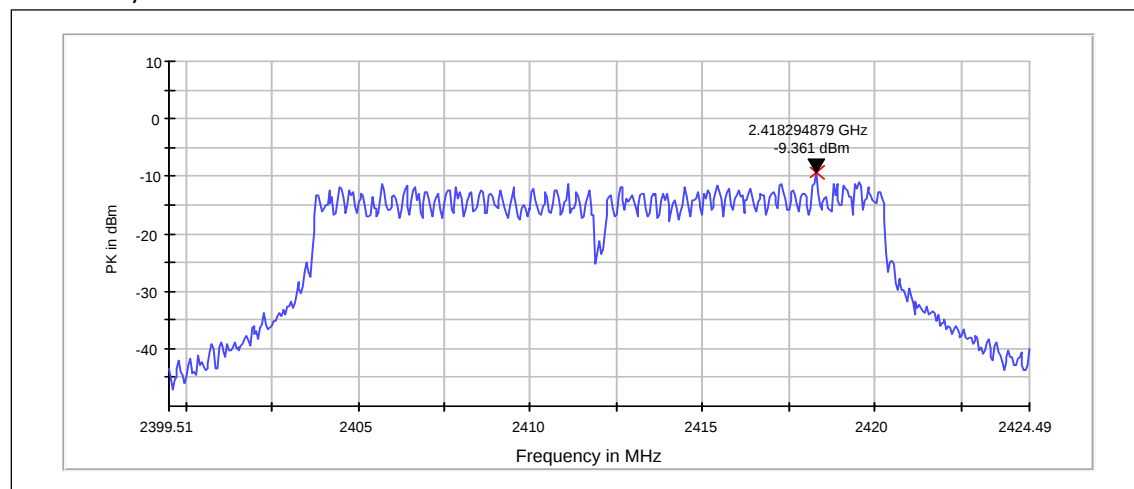
### 8.3. WLAN Test results

#### 8.3.1 802.11g mode, 16QAM modulation, 24 Mbps data rate

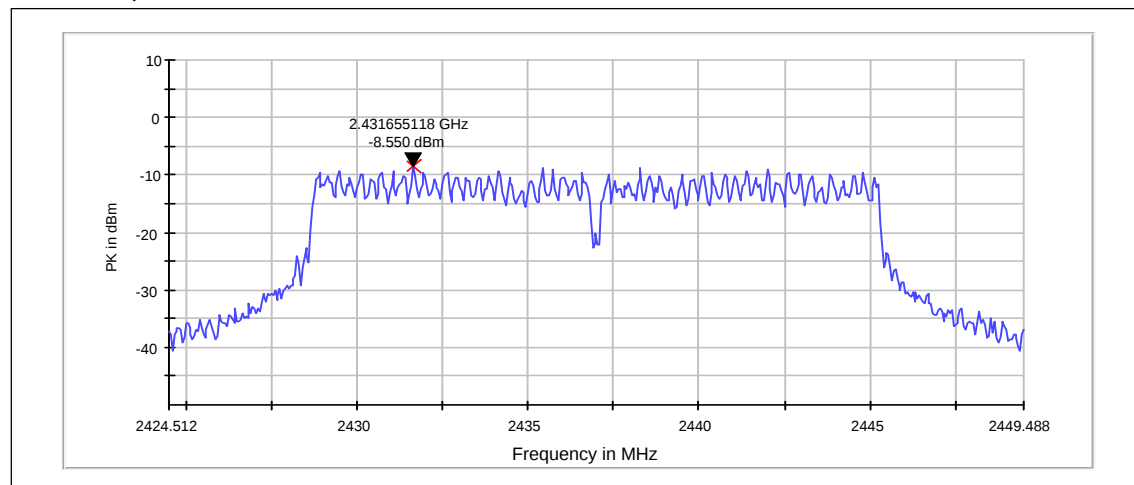
Peak (RBW: 3 kHz, VBW: 10 kHz, Max hold)

| Channel / f <sub>c</sub> [MHz] | P [dBm] | Result |
|--------------------------------|---------|--------|
| 1 / 2412                       | -9.36   | PASSED |
| 6 / 2437                       | -8.55   | PASSED |
| 11 / 2462                      | -13.94  | PASSED |

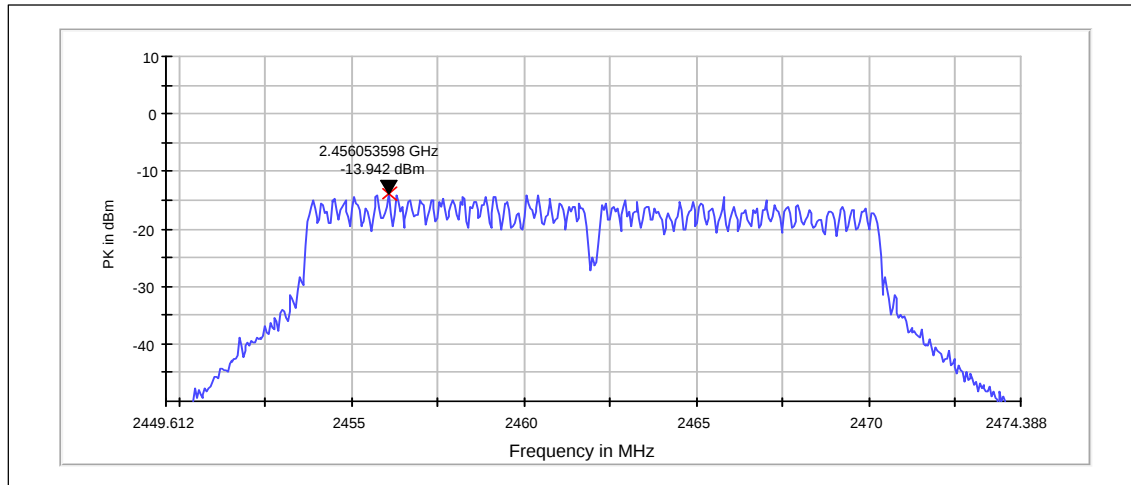
Channel 1 / 2412 MHz



Channel 6 / 2437 MHz



### Channel 11 / 2462 MHz

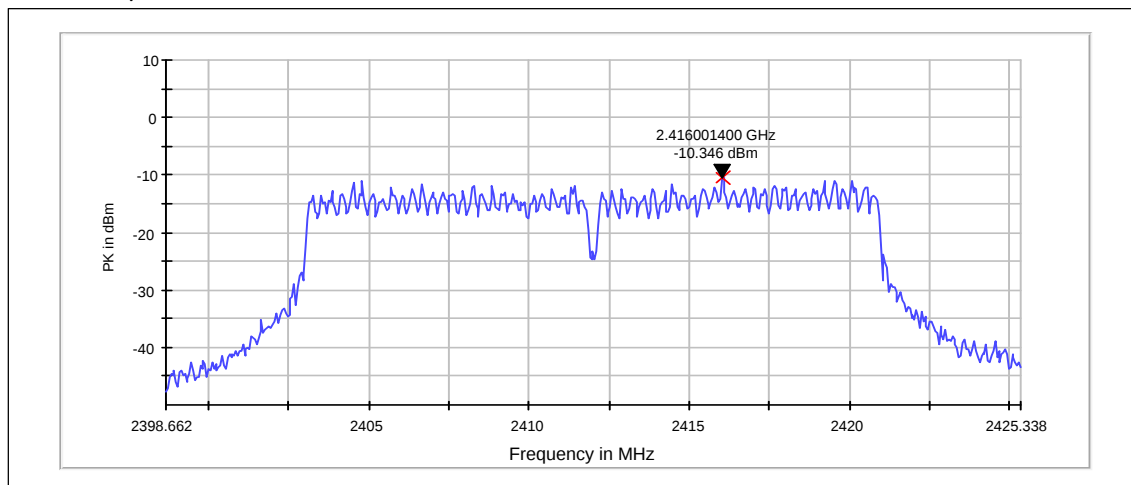


### 8.3.2 802.11n mode, BPSK modulation, 6.5 / 7.25 Mbps data rate

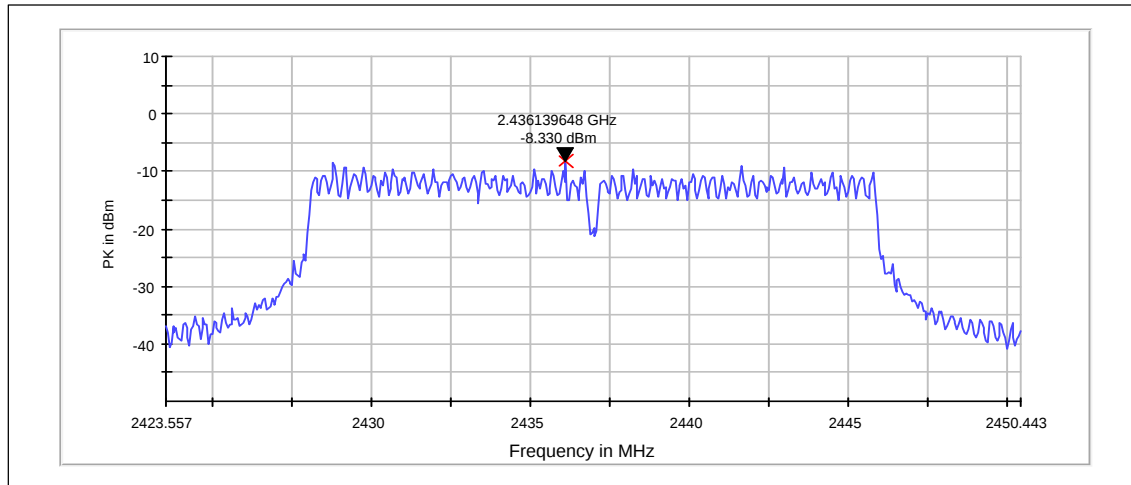
Peak (RBW: 3 kHz, VBW: 10 kHz, Max hold)

| Channel / $f_c$ [MHz] | P [dBm] | Result |
|-----------------------|---------|--------|
| 1 / 2412              | -10.35  | PASSED |
| 6 / 2437              | -8.33   | PASSED |
| 11 / 2462             | -13.11  | PASSED |

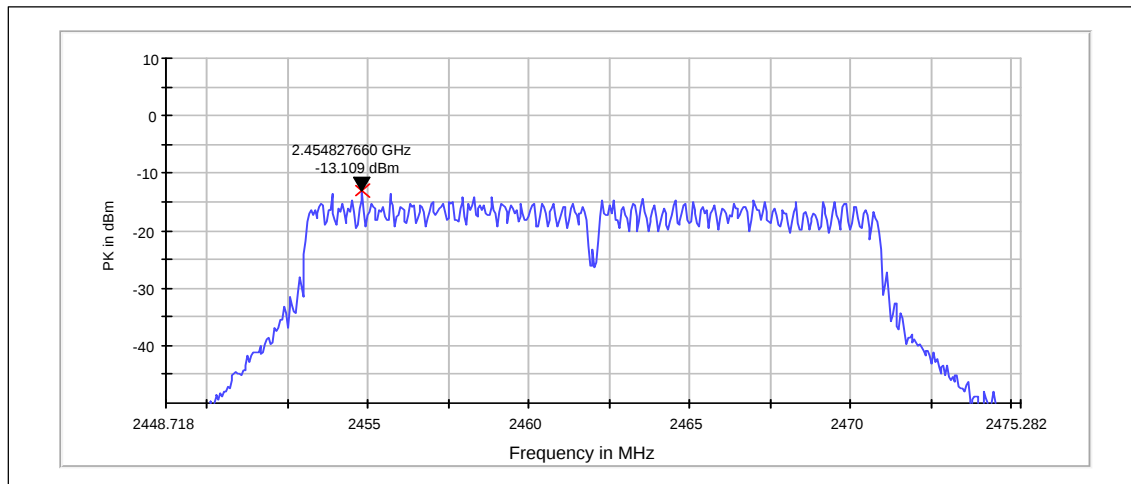
### Channel 1 / 2412 MHz



### Channel 6 / 2437 MHz



### Channel 11 / 2462 MHz



## 9. Test Equipment

### 9.1. Conducted measurements

| Eq. No   | Equipment                           | Type        | Manufacturer  | Used in                 |
|----------|-------------------------------------|-------------|---------------|-------------------------|
| TM38112  | Power supply                        | 6632A       | Agilent       | 22/24/27, 15C, 15E      |
| TM38114  | Power supply                        | 6632A       | Agilent       | 22/24/27, 15C, 15E      |
| TM210233 | Communication Tester                | CMU200      | R&S           | 22/24/27                |
| TM30600  | Impulse limiter                     | ESH3-Z2     | R&S           | 15C, 15B                |
| TM26490  | LISN 50 µH                          | ESH3-Z5     | R&S           | 15C, 15B                |
| TM26491  | LISN 50 µH                          | ESH3-Z5     | R&S           | 15C, 15B                |
| TM37610  | Spectrum Analyzer                   | FSU26       | R&S           | 22/24/27, 15C, 15E      |
| TM23007  | Oscilloscope                        | TDS684B     | Tektronix     | 15E                     |
| TM22806  | Battery                             | BAT 20/E    | Fiskars       | 15C, 15B                |
| TM22805  | UPS                                 | PS 20/1.2   | Fiskars       | 15C, 15B                |
| -        | Temperature and humidity logger     | 175-H2      | Testo         | 15C, 15B                |
| -        | Temperature and humidity logger     | 175-H2      | Testo         | 22/24/27, 15C           |
| -        | Air pressure and temperature logger | 635-2       | Testo         | 22/24/27, 15C, 15B      |
| -        | Air pressure sensor                 | 0638-1835   | Testo         | 22/24/27, 15C, 15B      |
| -        | Temperature test chamber            | VT 4002     | Vötsch        | 22/24/27                |
| 2001     | Bluetooth tester                    | CBT         | R&S           | 15C, 15B                |
| 2009     | LISN 50 µH                          | ENV216      | R&S           | 15C, 15B                |
| 2010     | LISN 50 µH                          | ENV216      | R&S           | 15C, 15B                |
| 2012     | Power splitter                      | 11667B      | Agilent       | 22/24/27, 15C           |
| 2013     | Attenuator                          | 8493C       | Agilent       | 22/24/27, 15C           |
| 2014     | Attenuator                          | 8493C       | Agilent       | 22/24/27, 15C           |
| 2019     | Power splitter                      | ZN2PD-9G-S+ | Mini-Circuits | 15E                     |
| 2020     | Power splitter                      | ZN2PD-9G-S+ | Mini-Circuits | 15E                     |
| 2021     | Communication Tester                | CMW500      | R&S           | 22/24/27                |
| 2022     | Communication Tester                | CMU200      | R&S           | 22/24/27                |
| 2023     | Spectrum Analyzer                   | ESMI-RF     | R&S           | 15B/15C                 |
| 2024     | Analyzer display unit               | ESAI-D      | R&S           | 15B/15C                 |
| 2026     | Signal Generator                    | SMF 100A    | R&S           | 22/24/27, 15C, 15E, 15B |
| -        | Bluetooth tester                    | CBT         | R&S           | 15C, 15B                |
| -        | Communication Tester                | CMU200      | R&S           | 22/24/27, 15B           |

### 9.2. Radiated measurements

| Eq. No  | Equipment               | Type        | Manufacturer | Used in                 |
|---------|-------------------------|-------------|--------------|-------------------------|
| -       | Antenna                 | BBHA 9120 D | Schwarzbeck  | 22/24/27, 15C           |
| TM38845 | Receiver                | ESIB 26     | R&S          | 22/24/27, 15C, 15E, 15B |
| -       | Antenna                 | HL562       | R&S          | 22/24/27, 15C, 15E, 15B |
| -       | Turntable               | 2188        | EMCO         | 22/24/27, 15C, 15E, 15B |
| -       | Turntable controller    | 2090        | EMCO         | 22/24/27, 15C, 15E, 15B |
| -       | RF system panel         | OSP130      | R&S          | 22/24/27, 15C, 15E, 15B |
| -       | Mini mast               | 2075-2      | ETS Lindgren | 22/24/27, 15C, 15B      |
| TM38843 | Mini mast               | 2075        | Emco         | 22/24/27, 15C, 15B      |
| TM38842 | Antenna mast controller | 2090        | Emco         | 22/24/27, 15C, 15B      |
| TM30643 | LISN 50 µH              | LISN-5-20-2 | FCC          | 22/24/27, 15C, 15B      |
| TM30644 | LISN 50 µH              | LISN-5-20-2 | FCC          | 22/24/27, 15C, 15B      |

| Eq. No  | Equipment                           | Type                                   | Manufacturer | Used in                 |
|---------|-------------------------------------|----------------------------------------|--------------|-------------------------|
| -       | Temperature and humidity logger     | 175-H2                                 | Testo        | 22/24/27, 15C, 15B      |
| -       | Air pressure and temperature logger | 635-2                                  | Testo        | 22/24/27, 15C, 15B      |
| -       | Air pressure sensor                 | 0638-1835                              | Testo        | 22/24/27, 15C, 15B      |
| TM37523 | Preamplifier                        | AMF-4D-10M-3G-25-20P                   | Miteq        | 22/24/27, 15C, 15B      |
| TM37498 | Preamplifier                        | AMF-5D-020180-26-10P                   | Miteq        | 22/24/27, 15C, 15B      |
| TM30599 | Semi anechoic chamber               | UNKNOWN                                | TDK          | 22/24/27, 15C, 15B      |
| TM22638 | Power supply                        | OL63743-901                            | -            | 22/24/27, 15C, 15E, 15B |
| TM38066 | High pass filter                    | WHKX3.0/18G-12SS                       | Wainwright   | 22/24/27, 15C, 15E, 15B |
| 2028    | High pass filter                    | WHKX 1.0/15G-12SS                      | Wainwright   | 22/24/27, 15C, 15E, 15B |
| TM37545 | Tunable notch filter                | 800.0/960.0-0.2/40-8SSK                | Wainwright   | 22                      |
| TM26512 | Tunable notch filter                | WRCD1850/1910-0.2/40-10SSK             | Wainwright   | 24                      |
| -       | Band reject filter                  | WRCG1877/1883-1870/1890-40/6EE         | Wainwright   | 24                      |
| -       | Band reject filter                  | WRCG1729.4/1735.4-1722.4/1742.4-40/6SS | Wainwright   | 27                      |
| TM23892 | Controller                          | G-1000SDX                              | Yaesu        | 22/24/27, 15C, 15E      |
| 2001    | Bluetooth tester                    | CBT                                    | R&S          | 15C, 15B                |
| 2002    | Communication Tester                | CMU200                                 | R&S          | 22/24/27, 15B           |
| 6023    | Antenna                             | VUBA 9117                              | Schwarzbeck  | 22/24/27                |
| 2021    | Communication Tester                | CMW500                                 | R&S          | 22/24/27                |
| 2025    | Antenna                             | HFH2-Z2                                | R&S          | 15C                     |
| 2026    | Signal Generator                    | SMF 100A                               | R&S          | 22/24/27, 15C, 15E, 15B |
| 2052    | Antenna                             | BBHA 9120 D                            | Schwarzbeck  | 22/24/27, 15C, 15B, 15E |
| -       | Antenna                             | QSH18S20                               | Q-Par        | 22/24/27, 15C, 15B, 15E |
| -       | Antenna                             | QSH20S20                               | Q-Par        | 22/24/27, 15C, 15B, 15E |
| -       | Antenna                             | QSH20S20                               | Q-Par        | 22/24/27, 15C, 15B, 15E |
| -       | Bluetooth tester                    | CBT                                    | R&S          | 15C, 15B                |