# FCC Part 15C Compliance Test Report

| | | | |
|---|---|---|---|
| **Test Report no.:** | FCC15CWLAN_RM-730_02.docx | **Date of Report:** | 01-Jul-2011 |
| **Number of pages:** | 41 | **Customer's Contact person:** | Wang Ying-Echo |
| **Testing laboratory:** | TCC Nokia Copenhagen Laboratory<br>Frederikskaj<br>1790 COPENHAGEN V<br>DENMARK<br>Tel. +45 33 292929<br>Fax. +45 33 292934 | **Customer:** | Nokia Corporation<br>Beijing Economic and Technological Development Area<br>No.5 Donghuan Zhonglu<br>Beijing<br>PRC China 100176<br>Tel. +86 10 8711 8888<br>Fax. +86 10 8711 4550 |
| **FCC listing no.:**<br>**IC recognition no.:** | 99059<br>661AL-1 | | |
| **Tested devices/ accessories:** | **Phone RM-730 / AC-Charger AC-8E / Battery BL-4D / Headset WH-102** | | |
| **FCC ID:** | QTLRM-730 | **IC:** | 661AB-RM730 |
| **Supplement reports:** | - | | |
| **Testing has been carried out in accordance with:** | **CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2003), Public Notice DA 00-705, 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".** | | |
| **Documentation:** | 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. | | |
| **Test Results:** | **The EUT complies with the requirements in respect of all parameters subject to the test.**<br>The test results relate only to devices specified in this document | | |
| **Date and signature for the contents:** | Digitally signed by Ruben Hansen<br>DN: cn=Ruben Hansen, o=TCC NOKIA, ou=EMC, email=ruben.hansen@nokia.com, c=DK<br>Date: 2011.07.13 07:26:42 +02'00' | | |

**Ruben Hansen, System Manager, EMC**

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

| | |
|---|---|
| **Date of receipt** | 25-May-2011 |
| **Testing completed** | 23-Jun-2011 |
| **The customer's contact person** | Wang Ying-Echo |
| **Test Plan referred to** | T:\Projects\RM-730\TestPlan\RS_testplan_RM-730.xls |
| **Notes** | - |
| **Document name** | T:\Projects\RM-730\EMC\FCC15CWLAN_RM-730_02.docx |

## 1.1. EUT and Accessory Information

The EUT is a 5-band (GSM850/900/1800/1900) and WCDMA Band (1900) mobile phone with GPRS, EGPRS, HSDPA, HSUPA and WLAN and Bluetooth. Bluetooth and WLAN are tested with maximum rated TX power.

| Product | Type | SN | HW | MV | SW | DUT |
|---|---|---|---|---|---|---|
| Phone | RM-730 | 008600/08/003879/6 | 0201 | - | 022.001 | 23642 |
| AC-Charger | AC-8E | 409049842593040129 3;0675387 | - | - | - | 23705 |
| Battery | BL-4D | 4620401117N20510672;0670605 | - | - | - | 23624 |
| Headset | WH-102 | 06943250432H2610503 | - | - | - | 23613 |
| Phone | RM-730 | 008600/08/003891/1 | 0201 | - | 022.001 | 23647 |
| Battery | BL-4D | 4620401117N20510664;0670605 | - | - | - | 23629 |
| AC-Charger | AC-8C | 488475038317050732 6;0675391 | - | - | - | 23623 |

## 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(0.4(4)) | Conducted peak output power | Passed |
| 15.247(d) | A8(0.5) | Band edge compliance of RF emissions | Passed |
| 15.247(d) | A8(0.5) | Spurious RF conducted emissions | Passed |
| 15.247(d), 15.209 | A8(0.5) | Spurious radiated emissions | Passed |
| 15.207 | 7.2.2 | AC powerline conducted emissions | Passed |
| 15.247(a)(2) | A8(0.1(1)) | 6dB(bandwidth) | Passed |
| 15.247(e) | A8(0.1(2)) | Power spectral density | Passed |

PASSED The EUT complies with the essential requirements in the standard.
FAILED The EUT does not comply with the essential requirements in the standard.
NP The test was not performed by the TCC Nokia Laboratory.



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

# CONTENTS



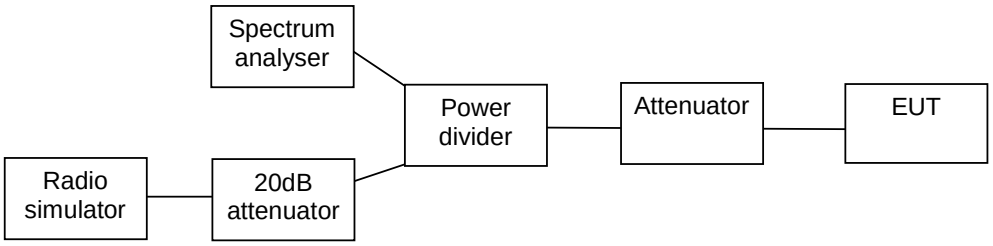



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

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

| | |
|---|---|
| **EUT with DUT number** | RM-730, DUT 23642 |
| **Accessories with DUT numbers** | AC-8E, DUT 23705 ; BL-4D, DUT 23624 ; WH-102, DUT 23613 |
| **Operation Voltage [V] / [Hz]** | 115 / 60 |
| **Results** | Passed |
| **Remarks** | None |
| **Temp [°C] / Humidity [%RH] / Air Pressure [kPa]** | 22 / 43 /100 |
| **Date of measurements** | 30-May-2011 |
| **Measured by** | Ruben Hansen |

## 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 | <= 1 | <= 30 |



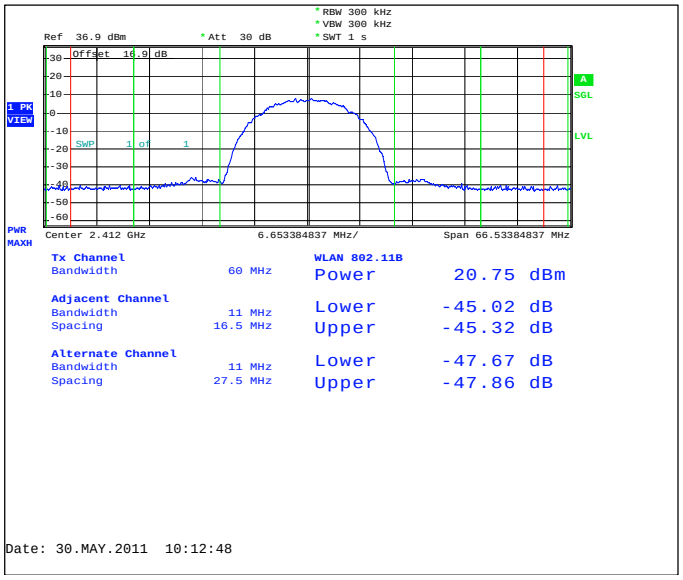
TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

## 2.3. WLAN Test results

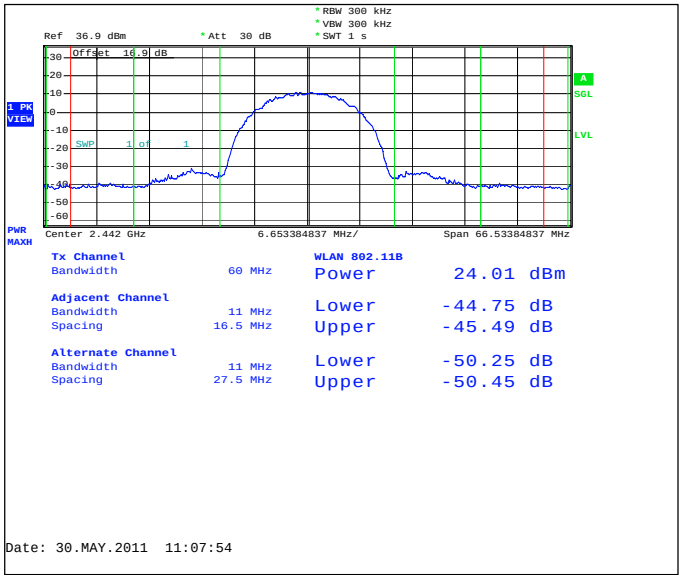
### 2.3.1 DSSS mode, 11 Mbps data rate

| Channel / $f_C$ [MHz] | P [dBm] | P [mW] | Result |
|---|---|---|---|
| 1 / 2412 | 20.75 | 118.85 | PASSED |
| 7 / 2442 | 24.01 | 251.768 | PASSED |
| 11 / 2462 | 20.19 | 104.472 | PASSED |

Channel 1 / 2412 MHz



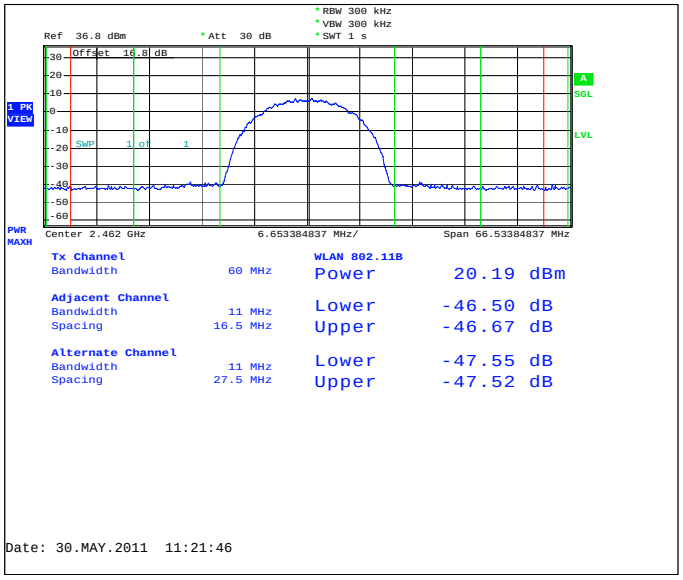

Channel 7 / 2442 MHz






TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

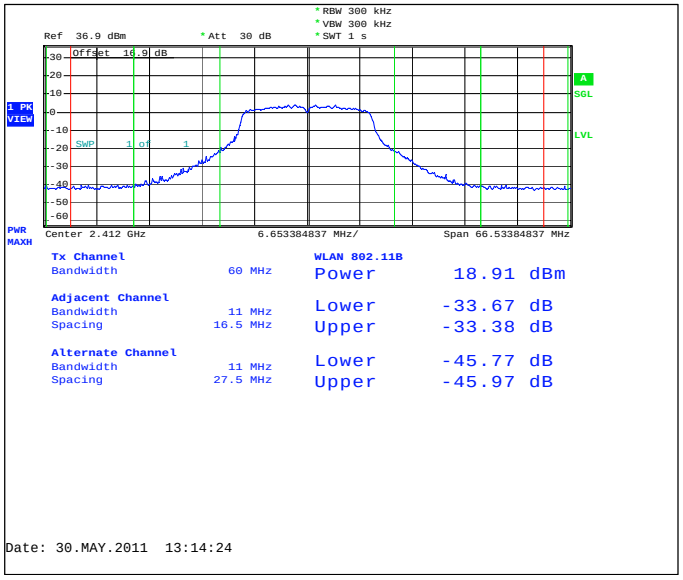
Channel 11 / 2462 MHz




## 2.3.2 OFDM mode, 6 Mbps data rate

| Channel / $f_C$ [MHz] | P [dBm] | P [mW] | Result |
|---|---|---|---|
| 1 / 2412 | 18.91 | 77.804 | PASSED |
| 7 / 2442 | 22.78 | 189.671 | PASSED |
| 11 / 2462 | 18.58 | 72.111 | PASSED |

Channel 1 / 2412 MHz

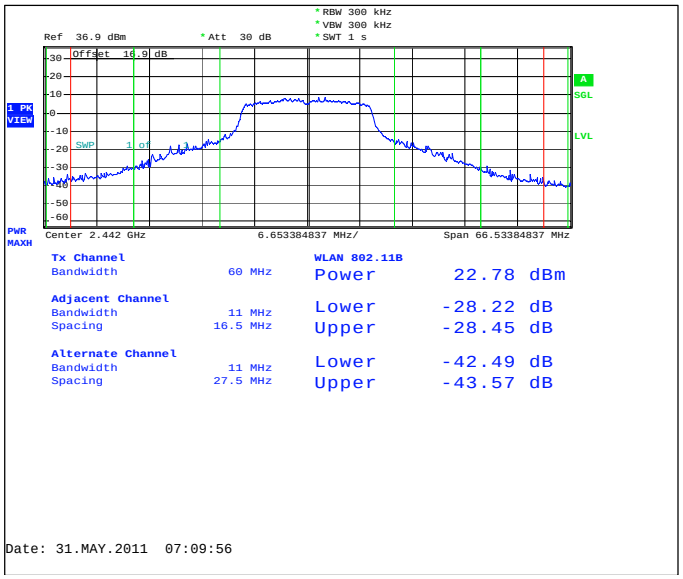




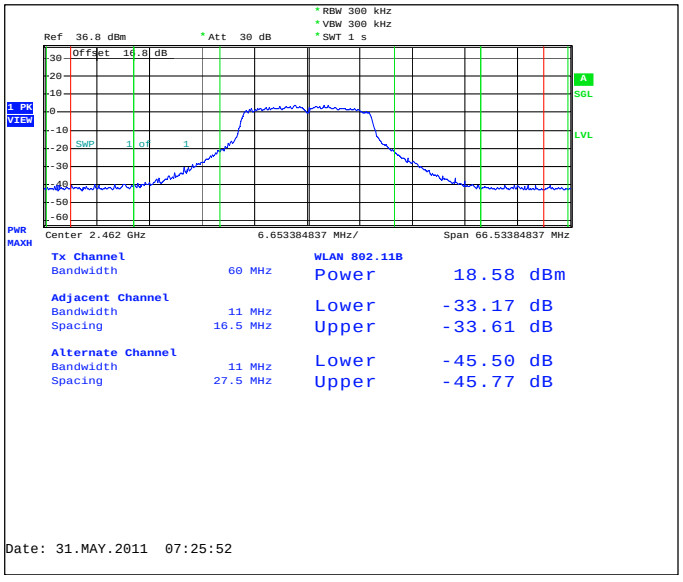


TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

## Channel 7 / 2442 MHz




## Channel 11 / 2462 MHz





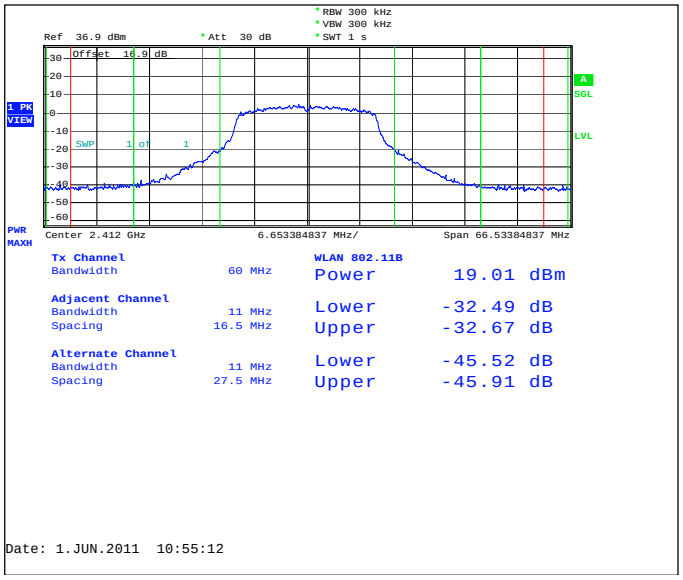


TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

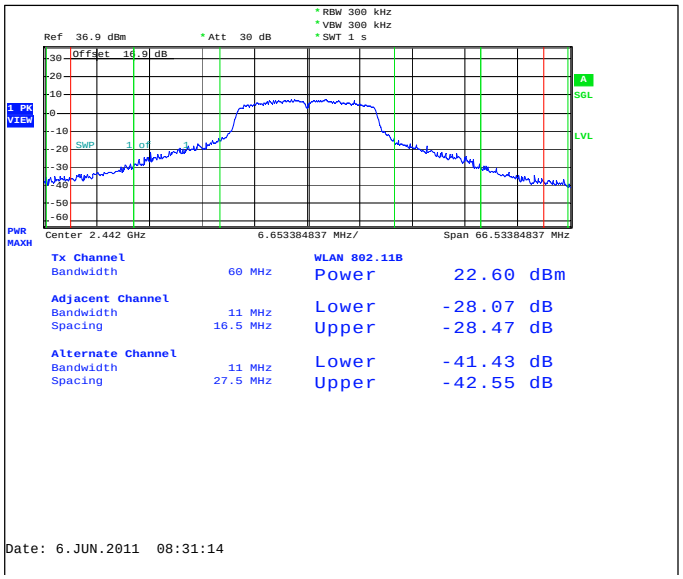
### 2.3.3 802.11n mode, MCS0

| Channel / $f_C$ [MHz] | P [dBm] | P [mW] | Result |
|---|---|---|---|
| 1 / 2412 | 19.01 | 79.616 | PASSED |
| 7 / 2442 | 22.6 | 181.97 | PASSED |
| 11 / 2462 | 18.42 | 69.502 | PASSED |

Channel 1 / 2412 MHz




Channel 7 / 2442 MHz

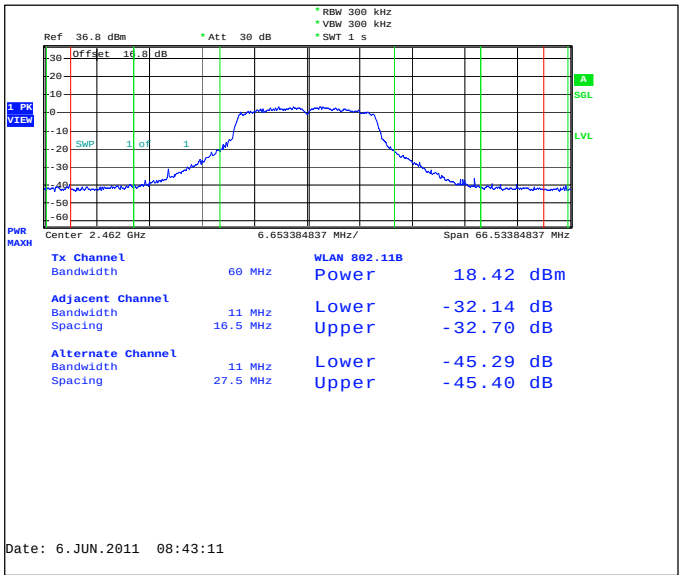






TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

Channel 11 / 2462 MHz





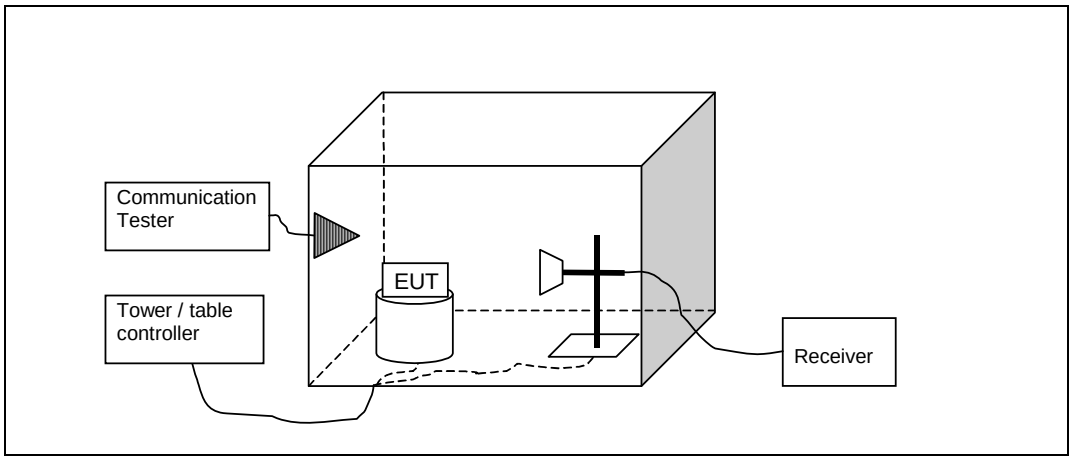


TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

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

| | |
|---|---|
| **EUT with DUT number** | RM-730, DUT 23647 |
| **Accessories with DUT numbers** | BL-4D, DUT 23629 ; WH-102, DUT 23613 ; AC-8C, DUT 23623 ; |
| **Operation Voltage [V] / [Hz]** | 115 / 60 |
| **Results** | Passed |
| **Remarks** | None |
| **Temp [°C] / Humidity [%RH] / Air Pressure [kPa]** | 22 / 43 /100 |
| **Date of measurements** | 23-Jun-2011 |
| **Measured by** | Christian Andersen |

### 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.

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

| Frequency range [MHz] | Limit Average [dBµV/m] | Limit Peak [dBµV/m] |
|---|---|---|
| Below 2390 and above 2483.5 | <=54 | <=74 |



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

## 3.3. WLAN Test results

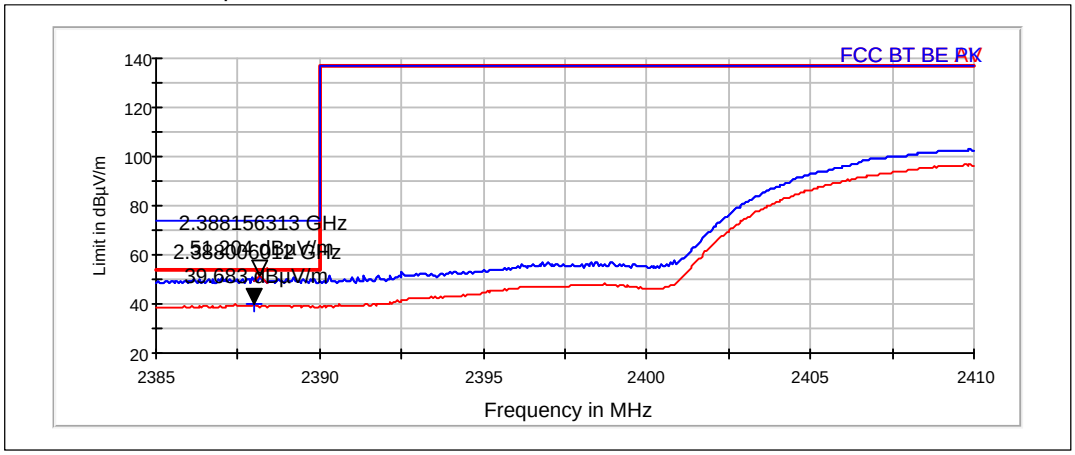
Average (RBW: 1 MHz, VBW: 1 MHz)

| Channel / $f_C$ [MHz] | E [dBµV/m] | Result |
|---|---|---|
| 1 / 2412 (DSSS) | 39.68 | Passed |
| 11 / 2462 (DSSS) | 39.46 | Passed |
| 1 / 2412 (OFDM) | 44.48 | Passed |
| 11 / 2462 (OFDM) | 42.35 | Passed |
| 1 / 2412 (n-mode) | 45.48 | Passed |
| 11 / 2462 (n-mode) | 44.36 | Passed |

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

| Channel / $f_C$ [MHz] | E [dBµV/m] | Result |
|---|---|---|
| 1 / 2412 (DSSS) | 51.2 | Passed |
| 11 / 2462 (DSSS) | 51.61 | Passed |
| 1 / 2412 (OFDM) | 59.56 | Passed |
| 11 / 2462 (OFDM) | 57.5 | Passed |
| 1 / 2412 (n-mode) | 60.18 | Passed |
| 11 / 2462 (n-mode) | 59.19 | Passed |

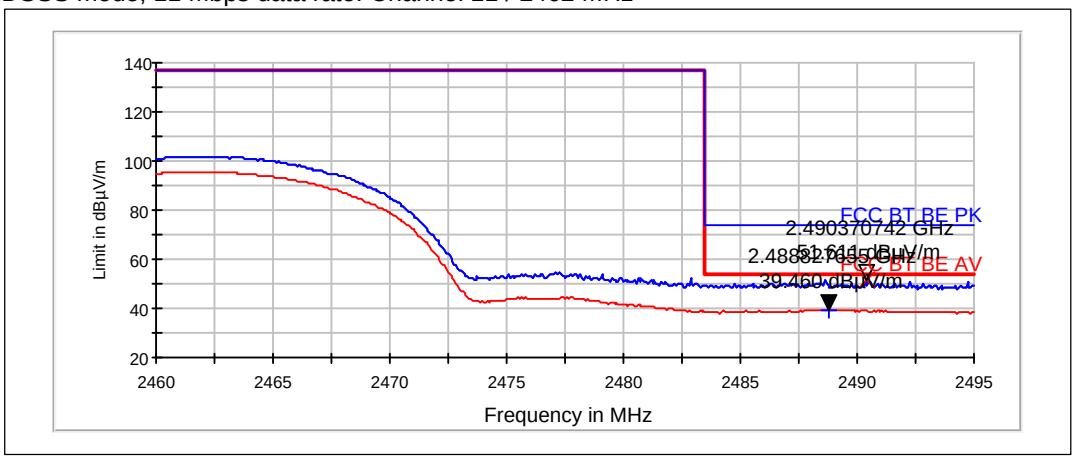
DSSS mode, 11 Mbps data rate. Channel 1 / 2412 MHz



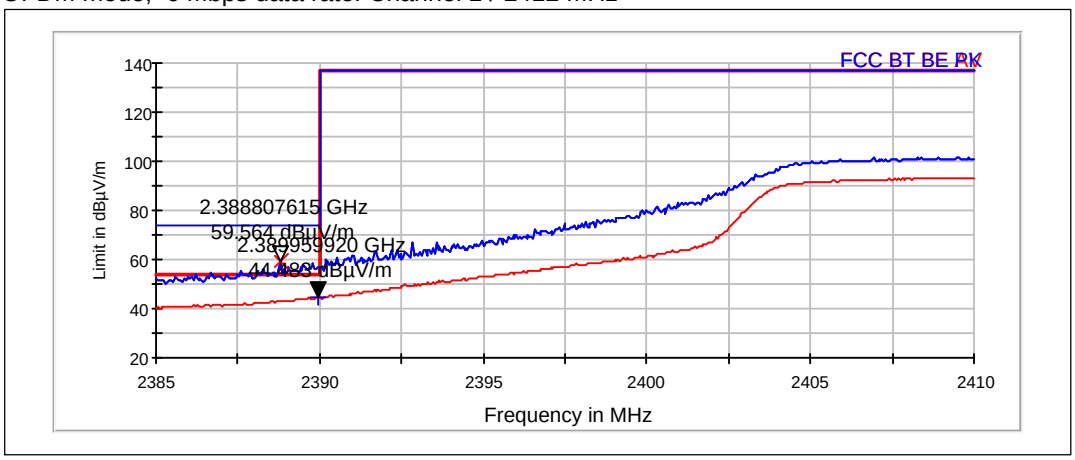



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

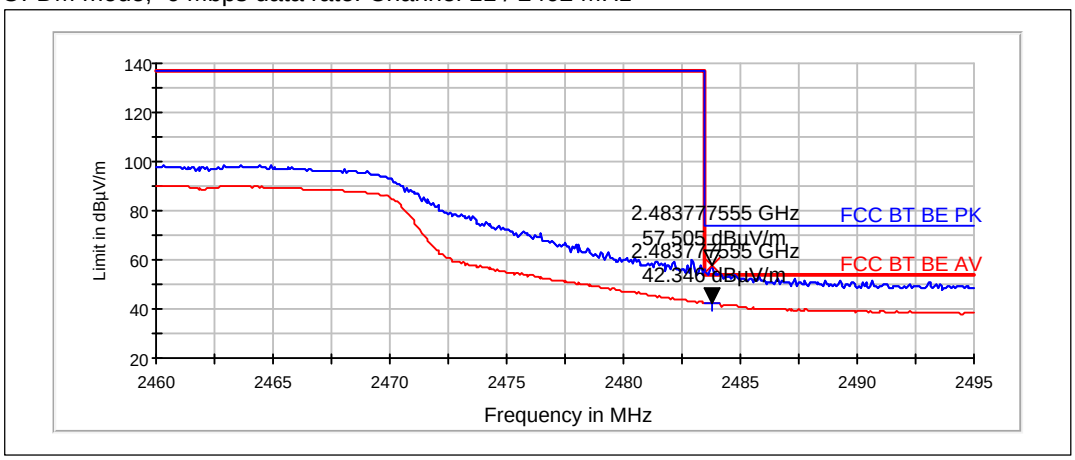
DSSS mode, 11 Mbps data rate. Channel 11 / 2462 MHz




OFDM mode, 6 Mbps data rate. Channel 1 / 2412 MHz




OFDM mode, 6 Mbps data rate. Channel 11 / 2462 MHz

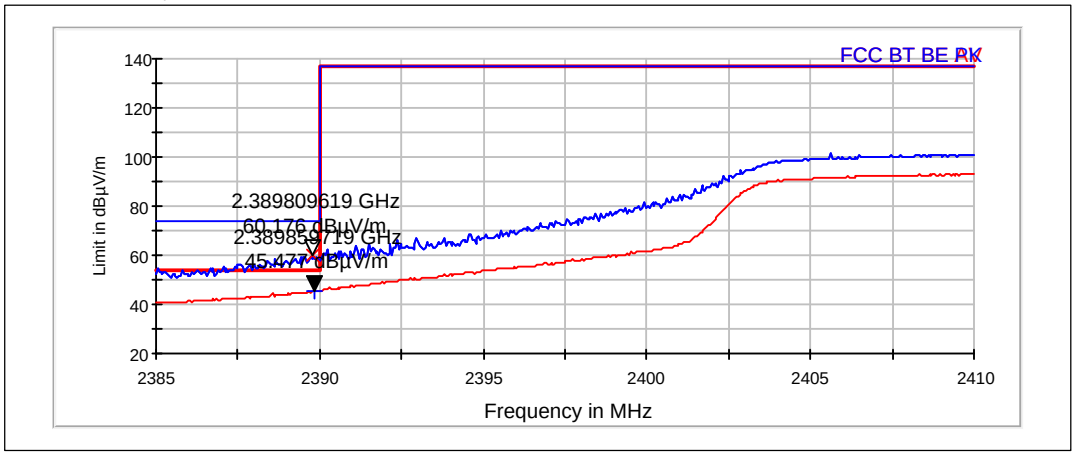




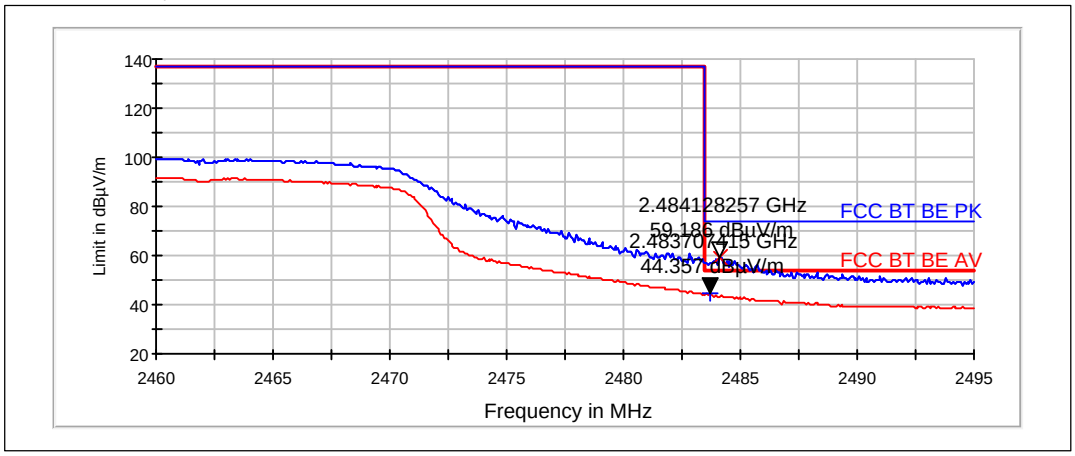


TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

802.11n mode, MCS0 modulation. Channel 1 / 2412 MHz




802.11n mode, MCS0 modulation. Channel 11 / 2462 MHz





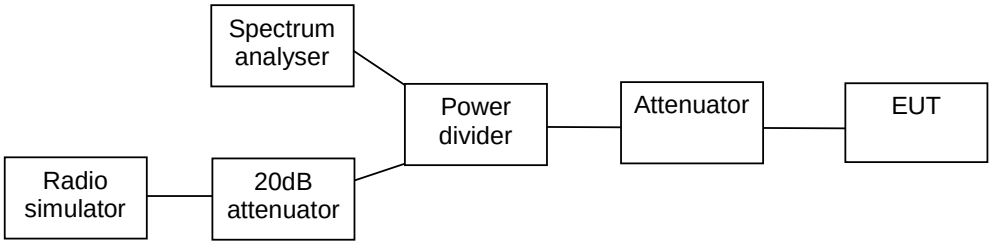


TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

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

| | |
|---|---|
| **EUT with DUT number** | RM-730, DUT 23642 |
| **Accessories with DUT numbers** | AC-8E, DUT 23705 ; BL-4D, DUT 23624 ; WH-102, DUT 23613 |
| **Operation Voltage [V] / [Hz]** | 115 / 60 |
| **Results** | Passed |
| **Remarks** | None |
| **Temp [°C] / Humidity [%RH] / Air Pressure [kPa]** | 22 / 43 /100 |
| **Date of measurements** | 30-May-2011 |
| **Measured by** | Ruben Hansen |

## 4.1. Test Setup




## 4.2. Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210.

Limits for spurious RF conducted emissions measurements

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

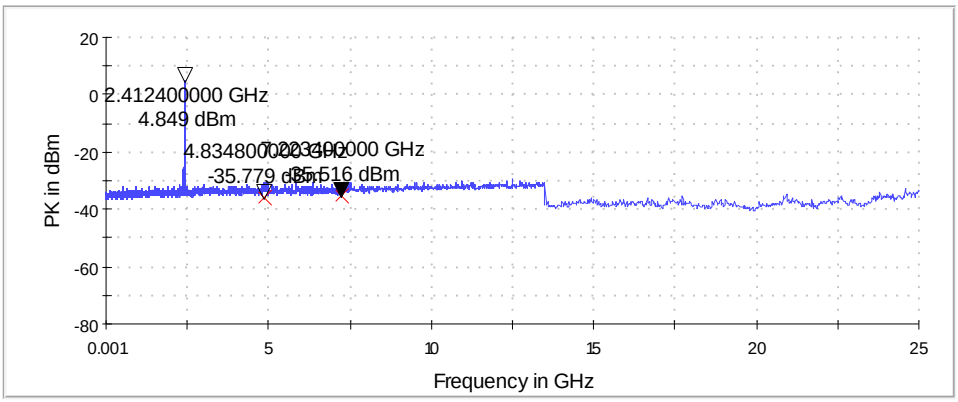


TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

## 4.3. WLAN Test results

### 4.3.1 DSSS mode, 11 Mbps data rate

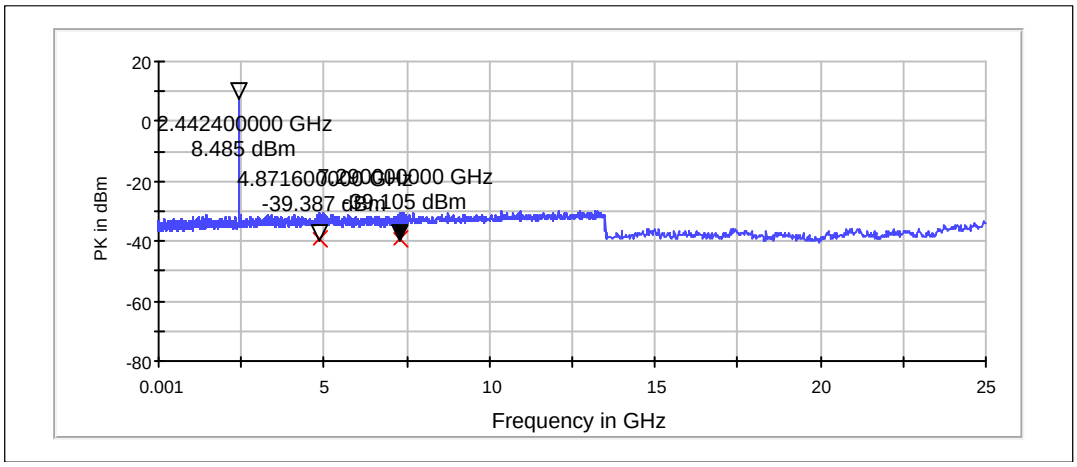
Channel 1 / 2412 MHz




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

| Frequency [MHz] | P [dBc] | Result |
|---|---|---|
| 4834.8 | -35.78 | PASSED |
| 7223.4 | -35.5 | PASSED |

Channel 7 / 2442 MHz



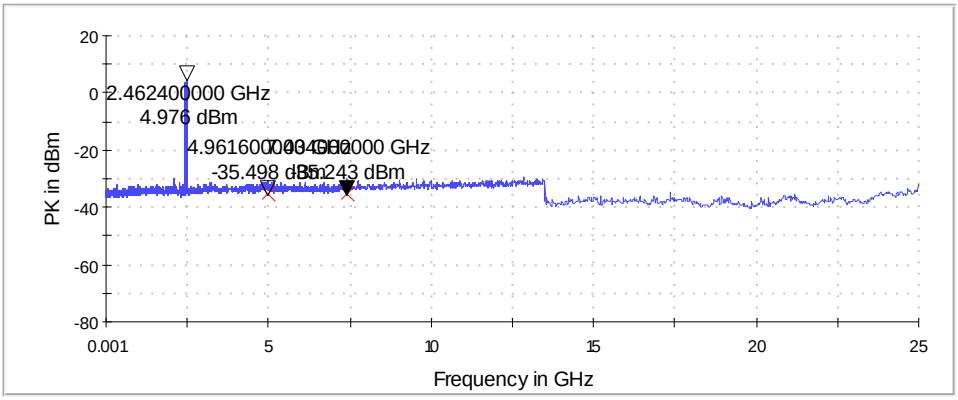

Peak (RBW: 100 kHz, VBW: 100 kHz)

| Frequency [MHz] | P [dBc] | Result |
|---|---|---|
| 4871.6 | -39.39 | PASSED |
| 7290 | -39.1 | PASSED |



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

Channel 11 / 2462 MHz

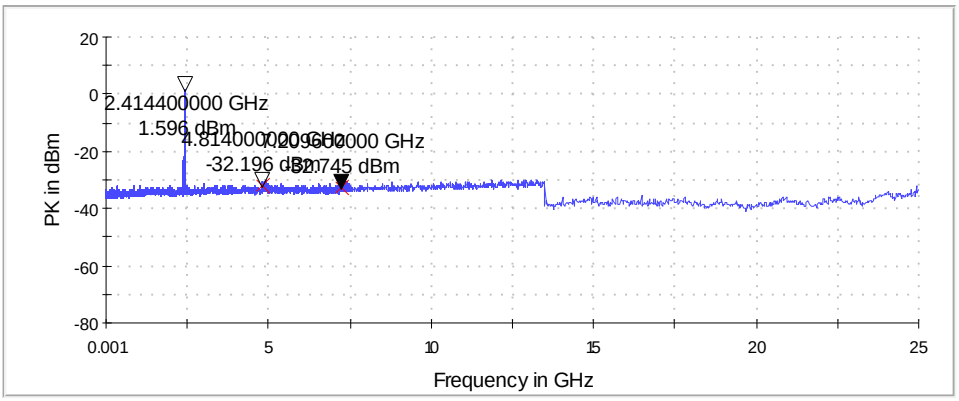



Peak (RBW: 100 kHz, VBW: 100 kHz)

| Frequency [MHz] | P [dBc] | Result |
|---|---|---|
| 4961.6 | -35.5 | PASSED |
| 7434 | -35.24 | PASSED |

### 4.3.2 OFDM mode, 6 Mbps data rate

Channel 1 / 2412 MHz



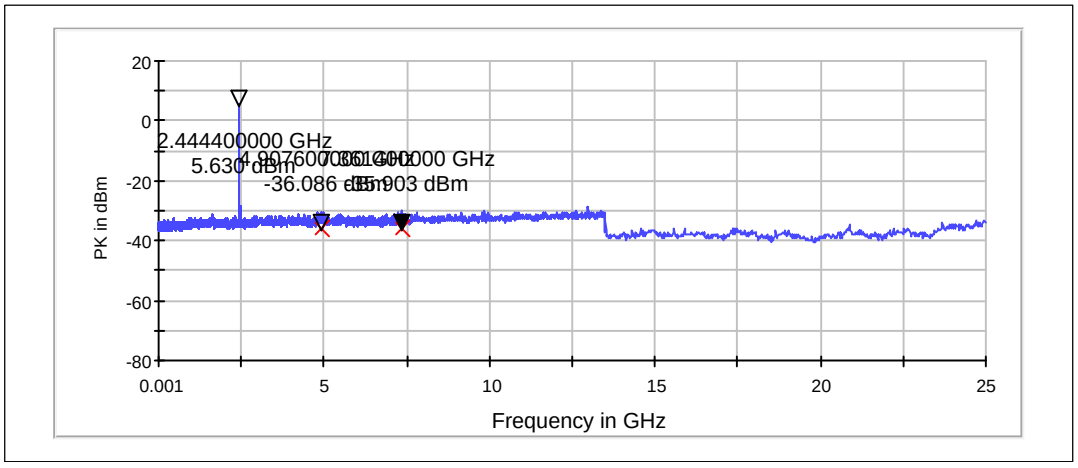

Peak (RBW: 100 kHz, VBW: 100 kHz)

| Frequency [MHz] | P [dBc] | Result |
|---|---|---|
| 4814 | -32.2 | PASSED |
| 7209.6 | -32.75 | PASSED |



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

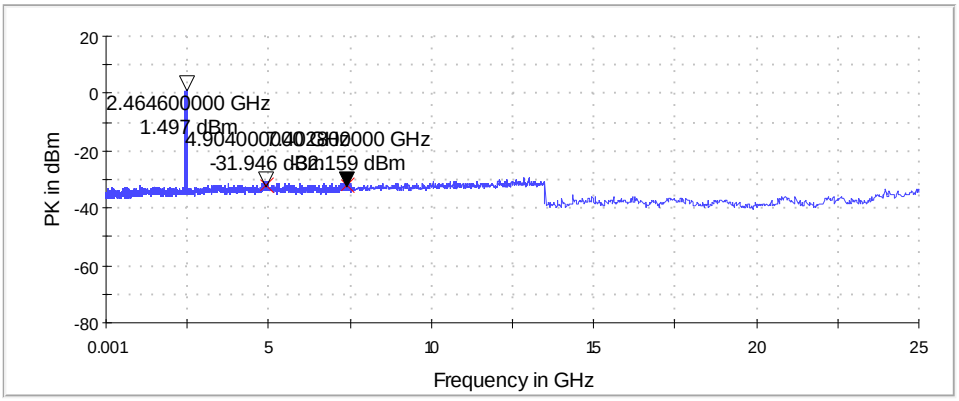
Channel 7 / 2442 MHz




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

| Frequency [MHz] | P [dBc] | Result |
|---|---|---|
| 4907.6 | -36.09 | PASSED |
| 7361.4 | -35.9 | PASSED |

Channel 11 / 2462 MHz




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

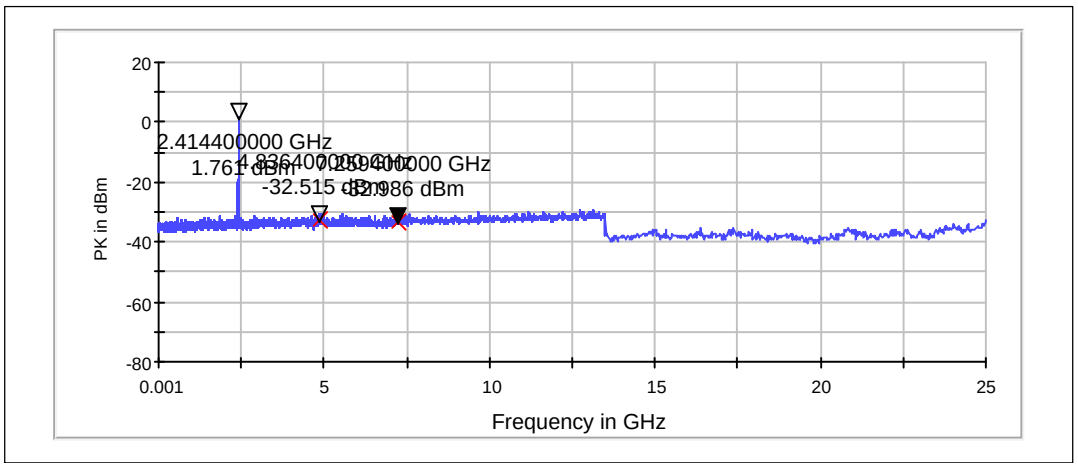
| Frequency [MHz] | P [dBc] | Result |
|---|---|---|
| 4904 | -31.95 | PASSED |
| 7402.8 | -32.16 | PASSED |




TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

### 4.3.3 802.11n mode, MCS0 modulation

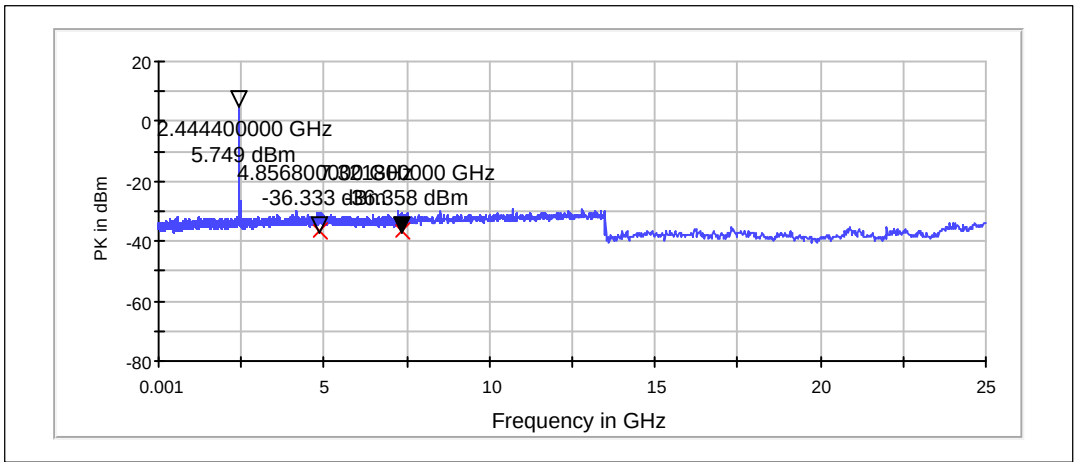
Channel 1 / 2412 MHz




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

| Frequency [MHz] | P [dBc] | Result |
|---|---|---|
| 4836.4 | -32.51 | PASSED |
| 7259.4 | -32.99 | PASSED |

Channel 7 / 2442 MHz



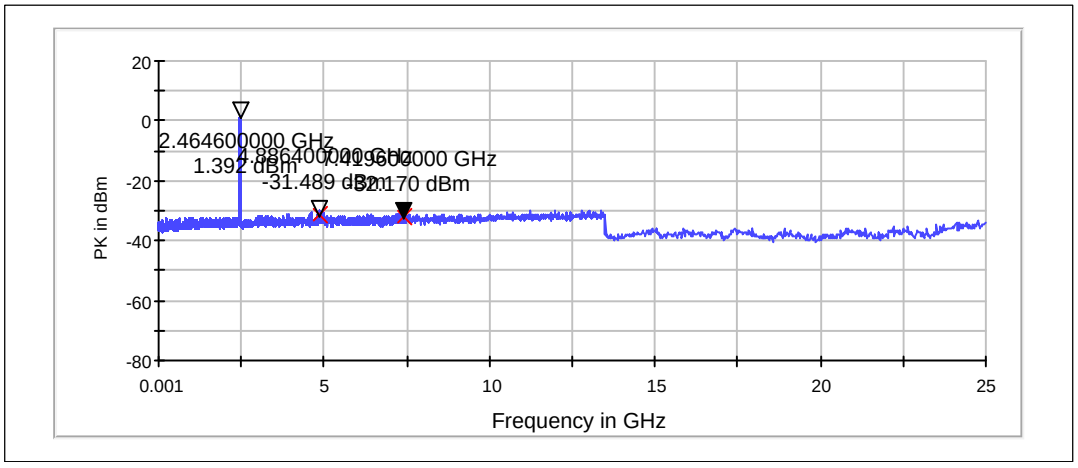

Peak (RBW: 100 kHz, VBW: 100 kHz)

| Frequency [MHz] | P [dBc] | Result |
|---|---|---|
| 4856.8 | -36.33 | PASSED |
| 7321.8 | -36.36 | PASSED |



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

Channel 11 / 2462 MHz




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

| Frequency [MHz] | P [dBc] | Result |
|---|---|---|
| 4886.4 | -31.49 | PASSED |
| 7419.6 | -32.17 | PASSED |

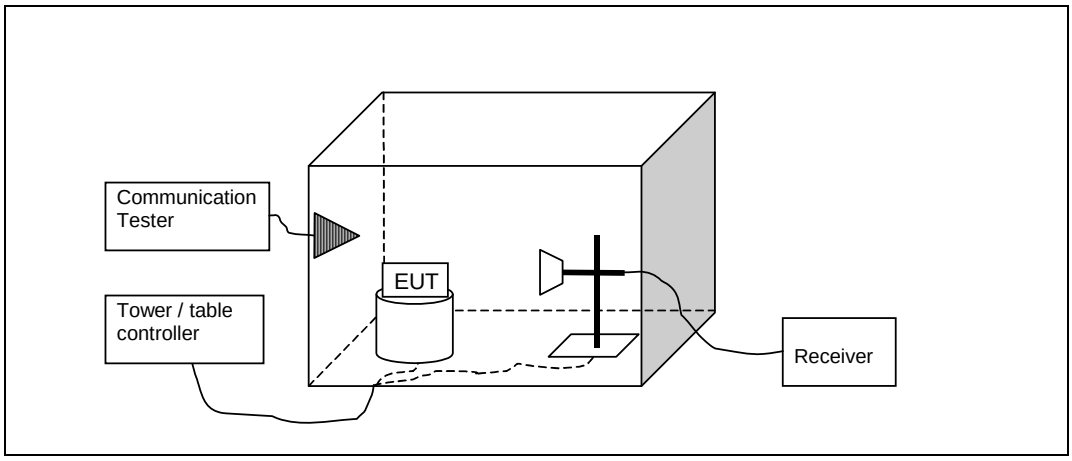


TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

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

| | |
|---|---|
| **EUT with DUT number** | RM-730, DUT 23647 |
| **Accessories with DUT numbers** | BL-4D, DUT 23629 ; AC-8C, DUT 23623 ; WH-102, DUT 23613 |
| **Operation Voltage [V] / [Hz]** | 115 / 60 |
| **Results** | Passed |
| **Remarks** | None |
| **Temp [°C] / Humidity [%RH] / Air Pressure [kPa]** | 22 / 43 /100 |
| **Date of measurements** | 15-Jun-2011 |
| **Measured by** | Christian Andersen |

### 5.1.1 Test Setup




## 5.2. 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.



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

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 ($A_{TOT} = L_{CABLES} + A_F - G_{PREAMP}$ ).

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

| Frequency range [MHz] | Limit [µV/m] | Limit [dBµV/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 |



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

## 5.3. WLAN Test results

### 5.3.1 DSSS mode, 11 Mbps data rate

Channel 1 / 2412 MHz

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 4824.1 | 48.28 | 259.448 | 46.4 | 1.88 | VERTICAL | Passed |
| 7236.6 | 48.15 | 255.447 | 37.74 | 10.41 | HORIZONTAL | Passed |

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 4824.1 | 33.95 | 49.814 | 32.07 | 1.88 | VERTICAL | Passed |
| 7236.6 | 35.02 | 56.344 | 24.61 | 10.41 | HORIZONTAL | Passed |

Channel 7 / 2442 MHz

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 30.09 | 22.56 | 13.425 | 29.64 | -7.08 | VERTICAL | Passed |
| 30.15 | 31.79 | 38.86 | 38.9 | -7.11 | VERTICAL | Passed |
| 30.51 | 32.55 | 42.428 | 39.88 | -7.33 | VERTICAL | Passed |
| 31.77 | 32.01 | 39.834 | 40.09 | -8.08 | VERTICAL | Passed |
| 31.83 | 32.64 | 42.875 | 40.76 | -8.12 | VERTICAL | Passed |
| 32.024 | 26.03 | 20.024 | 34.26 | -8.23 | VERTICAL | Passed |
| 32.07 | 32.79 | 43.591 | 41.05 | -8.26 | VERTICAL | Passed |

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 3919.44 | 38.91 | 88.186 | 39.79 | -0.88 | HORIZONTAL | Passed |
| 3937.972 | 38.65 | 85.556 | 39.54 | -0.89 | HORIZONTAL | Passed |

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 3919.44 | 26 | 19.941 | 26.88 | -0.88 | HORIZONTAL | Passed |
| 3937.972 | 25.93 | 19.792 | 26.82 | -0.89 | HORIZONTAL | Passed |



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

Channel 11 / 2462 MHz

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 4924.1 | 45.18 | 181.51 | 42.7 | 2.48 | HORIZONTAL | Passed |
| 7387.9 | 49.26 | 290.302 | 37.21 | 12.05 | VERTICAL | Passed |

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 4924.1 | 31.9 | 39.355 | 29.42 | 2.48 | HORIZONTAL | Passed |
| 7387.9 | 36.2 | 64.558 | 24.15 | 12.05 | VERTICAL | Passed |

### 5.3.2 OFDM mode, 6 Mbps data rate

Channel 1 / 2412 MHz

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 4824.6 | 43.16 | 143.797 | 41.27 | 1.89 | VERTICAL | Passed |
| 7237.6 | 47.52 | 237.602 | 37.07 | 10.45 | VERTICAL | Passed |

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 4824.6 | 30.04 | 31.75 | 28.15 | 1.89 | VERTICAL | Passed |
| 7237.6 | 34.87 | 55.424 | 24.42 | 10.45 | VERTICAL | Passed |

Channel 7 / 2442 MHz

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 30 | 33.8 | 48.984 | 40.82 | -7.02 | VERTICAL | Passed |
| 30.24 | 33.54 | 47.528 | 40.71 | -7.17 | VERTICAL | Passed |
| 30.27 | 33.77 | 48.815 | 40.96 | -7.19 | VERTICAL | Passed |
| 30.27 | 33.81 | 49.034 | 41 | -7.19 | VERTICAL | Passed |
| 30.3 | 32.97 | 44.499 | 40.17 | -7.2 | VERTICAL | Passed |
| 30.3 | 34 | 50.096 | 41.2 | -7.2 | VERTICAL | Passed |
| 31.98 | 33.12 | 45.29 | 41.32 | -8.2 | VERTICAL | Passed |



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 3902.509 | 38.78 | 86.846 | 39.65 | -0.87 | HORIZONTAL | Passed |
| 3933.469 | 38.64 | 85.477 | 39.53 | -0.89 | HORIZONTAL | Passed |

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 3902.509 | 25.63 | 19.116 | 26.5 | -0.87 | HORIZONTAL | Passed |
| 3933.469 | 25.66 | 19.182 | 26.55 | -0.89 | HORIZONTAL | Passed |

Channel 11 / 2462 MHz

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 4925.5 | 43.92 | 157.018 | 41.4 | 2.52 | HORIZONTAL | Passed |
| 7388 | 49.39 | 294.849 | 37.33 | 12.06 | HORIZONTAL | Passed |

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 4925.5 | 31.03 | 35.584 | 28.51 | 2.52 | HORIZONTAL | Passed |
| 7388 | 36.21 | 64.64 | 24.15 | 12.06 | HORIZONTAL | Passed |

### 5.3.3 802.11n mode, MCS0 modulation

Channel 1 / 2412 MHz

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 4825.5 | 41.42 | 117.733 | 39.53 | 1.89 | HORIZONTAL | Passed |
| 7235.5 | 48.15 | 255.535 | 37.74 | 10.41 | HORIZONTAL | Passed |

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 4825.5 | 28.53 | 26.696 | 26.64 | 1.89 | HORIZONTAL | Passed |
| 7235.5 | 34.77 | 54.765 | 24.36 | 10.41 | HORIZONTAL | Passed |



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

Channel 7 / 2442 MHz 802.11n

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 30 | 21.27 | 11.578 | 28.29 | -7.02 | VERTICAL | Passed |
| 32.04 | 23.24 | 14.518 | 31.48 | -8.24 | VERTICAL | Passed |
| 32.054 | 22.59 | 13.473 | 30.84 | -8.25 | VERTICAL | Passed |
| 32.77 | 27.19 | 22.893 | 35.87 | -8.68 | VERTICAL | Passed |
| 34.801 | 21.24 | 11.532 | 31.13 | -9.89 | VERTICAL | Passed |
| 44.62 | 29.34 | 29.312 | 45.26 | -15.92 | VERTICAL | Passed |
| 45.332 | 22.44 | 13.25 | 38.83 | -16.39 | VERTICAL | Passed |

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 3925.751 | 38.4 | 83.167 | 39.28 | -0.88 | HORIZONTAL | Passed |
| 3937.072 | 39.37 | 93.046 | 40.26 | -0.89 | HORIZONTAL | Passed |

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 3925.751 | 25.74 | 19.358 | 26.62 | -0.88 | HORIZONTAL | Passed |
| 3937.072 | 25.73 | 19.337 | 26.62 | -0.89 | HORIZONTAL | Passed |

Channel 11 / 2462 MHz 802.11n

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 4924.4 | 44.02 | 158.818 | 41.52 | 2.5 | HORIZONTAL | Passed |
| 7386.9 | 50.04 | 317.541 | 38.01 | 12.03 | HORIZONTAL | Passed |

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

| Frequency [MHz] | E [dBµV/m] | E [µV/m] | $U_{RX}$ [dBµV] | $A_{TOT}$ [dB] | Polarisation | Result |
|---|---|---|---|---|---|---|
| 4924.4 | 30.59 | 33.857 | 28.09 | 2.5 | HORIZONTAL | Passed |
| 7386.9 | 36.12 | 63.996 | 24.09 | 12.03 | HORIZONTAL | Passed |

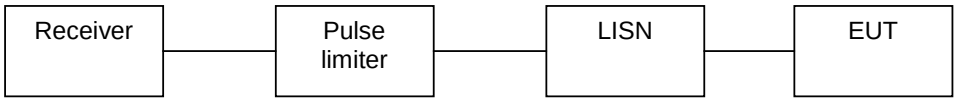


TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

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

| | |
|---|---|
| **EUT with DUT number** | RM-730, DUT 23647 |
| **Accessories with DUT numbers** | BL-4D, DUT 23629 ; AC-8C, DUT 23623; WH-102, DUT 23613 |
| **Operation Voltage [V] / [Hz]** | 115 / 60 |
| **Results** | Passed |
| **Remarks** | None |
| **Temp [°C] / Humidity [%RH] / Air Pressure [kPa]** | 22 / 43 /100 |
| **Date of measurements** | 07-Jun-2011 |
| **Measured by** | Bo Moltved Christiansen |

## 6.1. Test Setup




## 6.2. Test method and limit
The measurement is made according to Public notice DA 00-705 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:

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

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 |

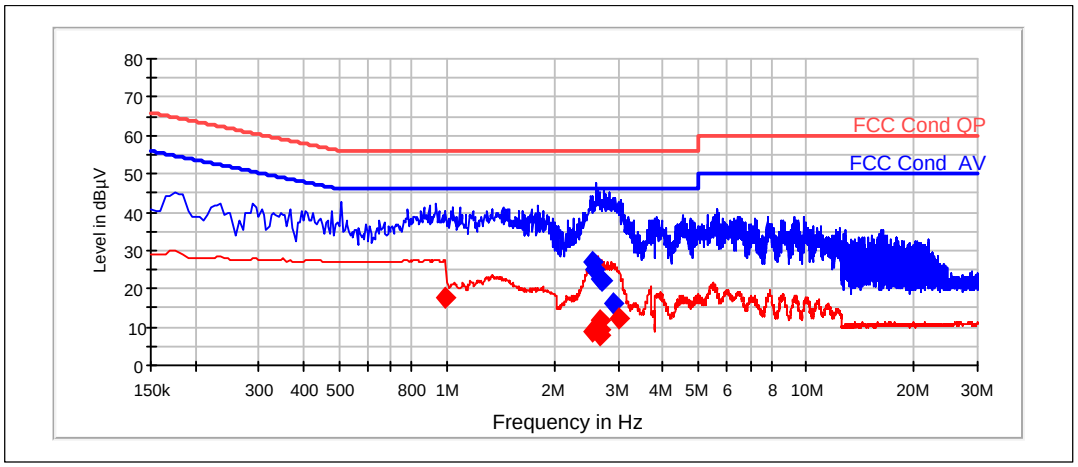


TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

## 6.3. WLAN Test results

### 6.3.1 DSSS mode, modulation, 11 Mbps data rate

Channel 40 / 2442 MHz




QuasiPeak (RBW: 9 kHz)

| Frequency [MHz] | U [dBµV] | Line | Result |
|---|---|---|---|
| 2.53 | 27.21 | N | PASSED |
| 2.58 | 25.27 | N | PASSED |
| 2.665 | 22.61 | N | PASSED |
| 2.69 | 22.09 | N | PASSED |
| 2.895 | 16.32 | L1 | PASSED |

Average (RBW: 9 kHz)

| Frequency [MHz] | U [dBµV] | Line | Result |
|---|---|---|---|
| 0.995 | 17.54 | N | PASSED |
| 2.54 | 8.76 | N | PASSED |
| 2.655 | 9.43 | N | PASSED |
| 2.66 | 11.88 | N | PASSED |
| 2.685 | 7.85 | N | PASSED |
| 2.995 | 12.07 | N | PASSED |



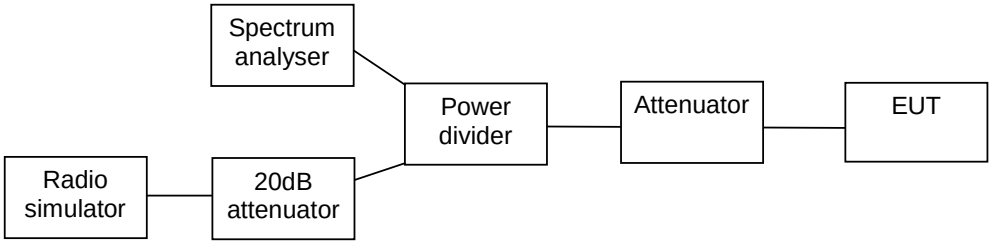
TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

# 7. 6 dB bandwidth

**(FCC §15.247(a)(2), RSS-210 A8.2 (1))**

| | |
|---|---|
| **EUT with DUT number** | RM-730, DUT 23642 |
| **Accessories with DUT numbers** | AC-8E, DUT 23705 ; BL-4D, DUT 23624 ; WH-102, DUT 23613 |
| **Operation Voltage [V] / [Hz]** | 115 / 60 |
| **Results** | Passed |
| **Remarks** | None |
| **Temp [°C] / Humidity [%RH] / Air Pressure [kPa]** | 22 / 43 /100 |
| **Date of measurements** | 30-May-2011 |
| **Measured by** | Ruben Hansen |

## 7.1. Test Setup




## 7.2. 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 |



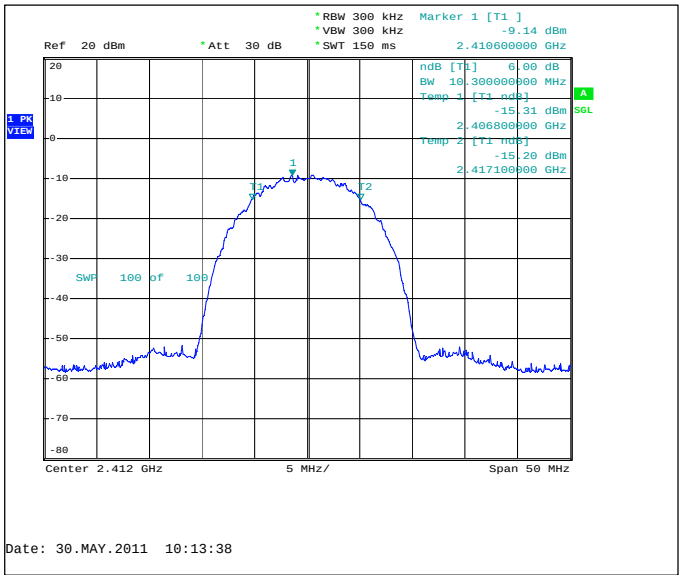
TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

## 7.3. WLAN Test results

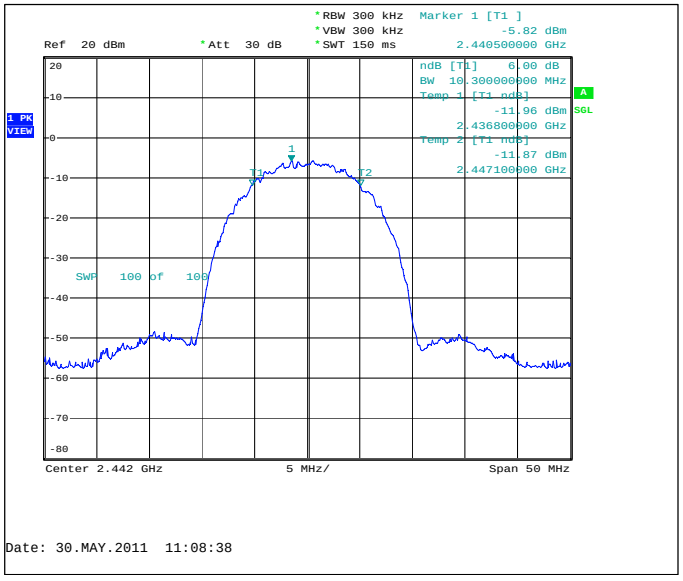
### 7.3.1 DSSS mode, 11 Mbps data rate

| Channel / $f_C$ [MHz] | 6 dB bandwidth [kHz] | Result |
|---|---|---|
| 1 / 2412 | 10300 | PASSED |
| 7 / 2442 | 10300 | PASSED |
| 11 / 2462 | 10200 | PASSED |

Channel 1 / 2412 MHz




Channel 7 / 2442 MHz

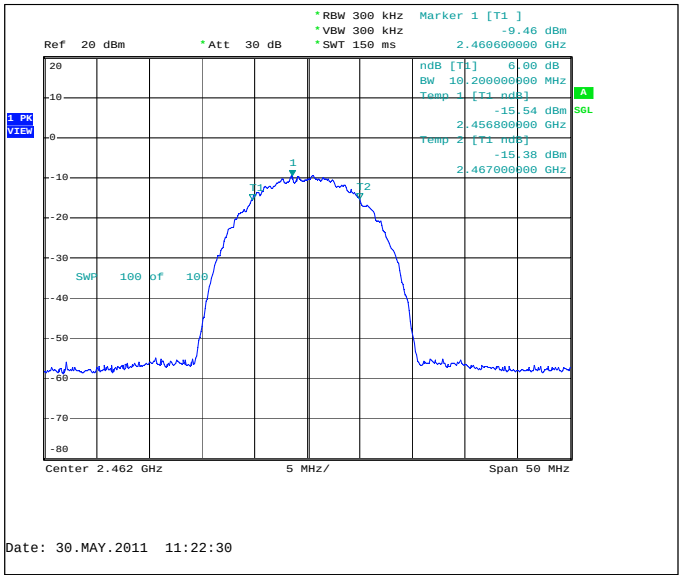






TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

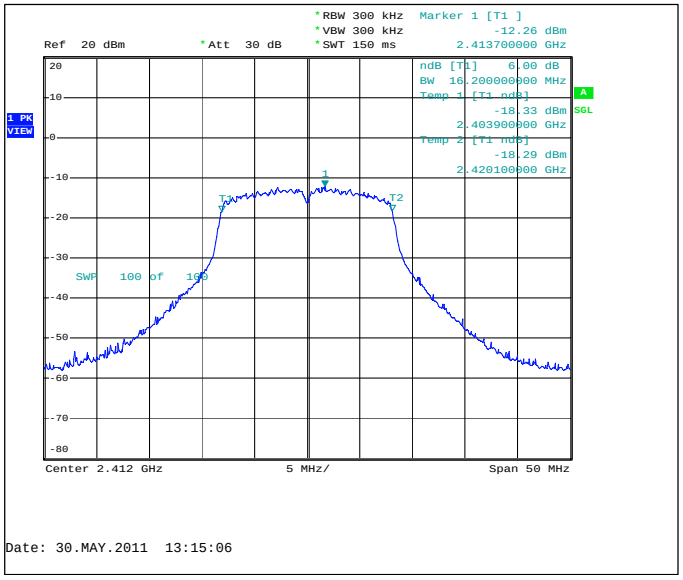
Channel 11 / 2462 MHz




## 7.3.2 OFDM mode, 6 Mbps data rate

| Channel / $f_C$ [MHz] | 6 dB bandwidth [kHz] | Result |
|---|---|---|
| 1 / 2412 | 16200 | PASSED |
| 7 / 2442 | 16200 | PASSED |
| 11 / 2462 | 16200 | PASSED |

Channel 1 / 2412 MHz

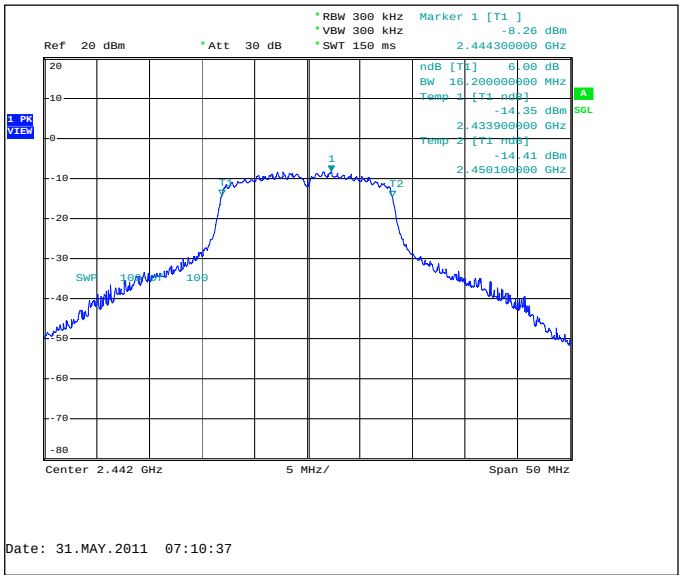




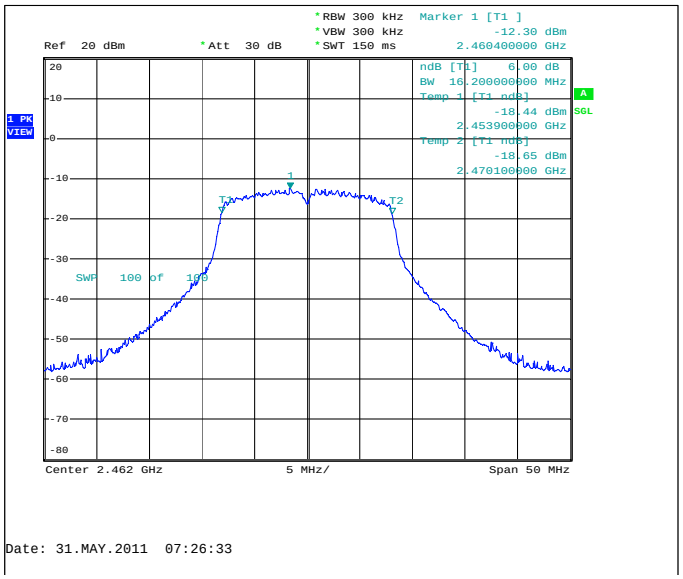


TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

Channel 7 / 2442 MHz




Channel 11 / 2462 MHz



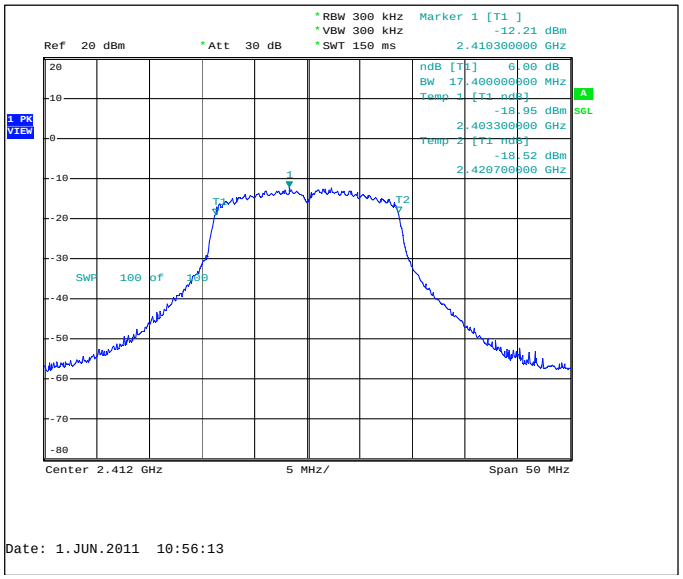

### 7.3.3 802.11n mode, MCS0 modulation

| Channel / $f_C$ [MHz] | 6 dB bandwidth [kHz] | Result |
|---|---|---|
| 1 / 2412 | 17400 | PASSED |
| 7 / 2442 | 17400 | PASSED |
| 11 / 2462 | 17400 | PASSED |

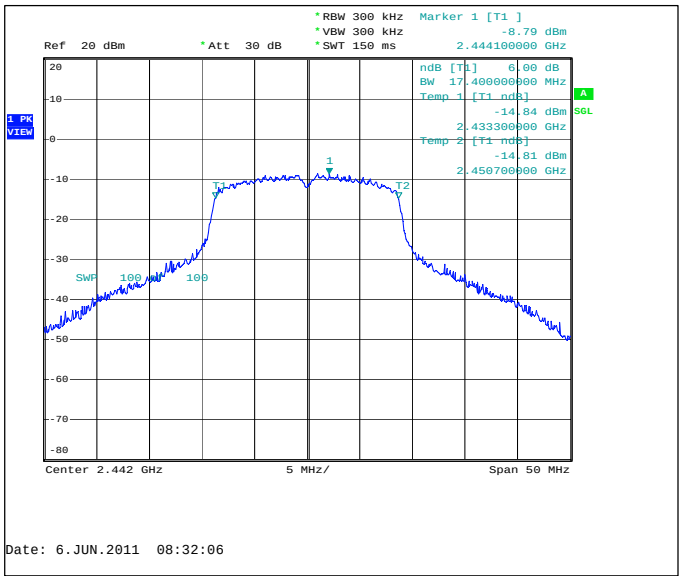


TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

Channel 1 / 2412 MHz




Channel 7 / 2442 MHz

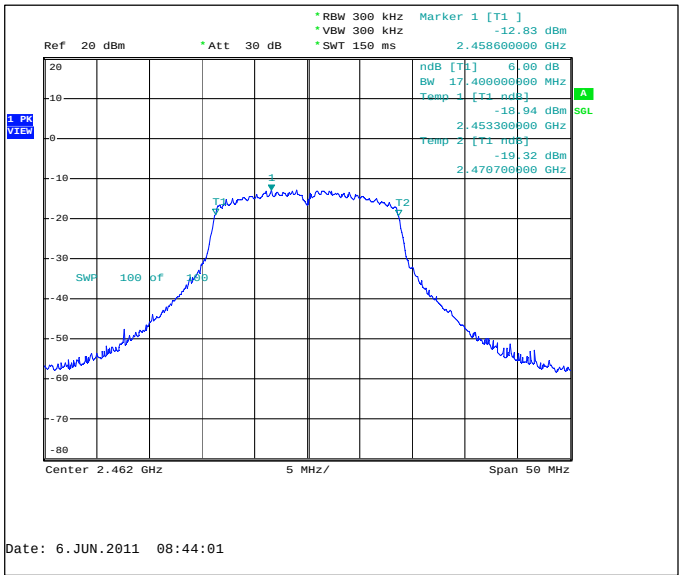






TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

Channel 11 / 2462 MHz





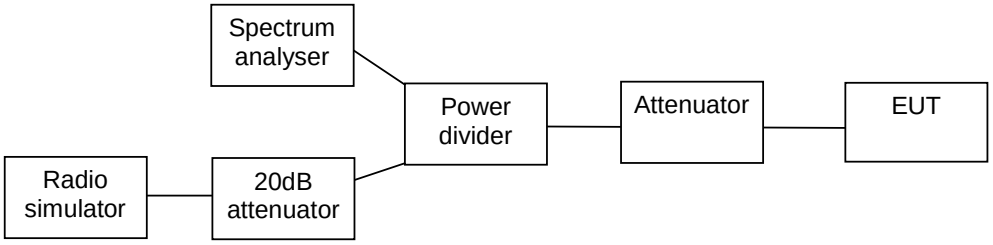


TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

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

| | |
|---|---|
| **EUT with DUT number** | RM-730, DUT 23642 |
| **Accessories with DUT numbers** | AC-8E, DUT 23705 ; BL-4D, DUT 23624 ; WH-102, DUT 23613 |
| **Operation Voltage [V] / [Hz]** | 115 / 60 |
| **Results** | Passed |
| **Remarks** | None |
| **Temp [°C] / Humidity [%RH] / Air Pressure [kPa]** | 22 / 43 /100 |
| **Date of measurements** | 30-May-2011 |
| **Measured by** | Ruben Hansen |

## 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 |
|---|
| <= 8 |



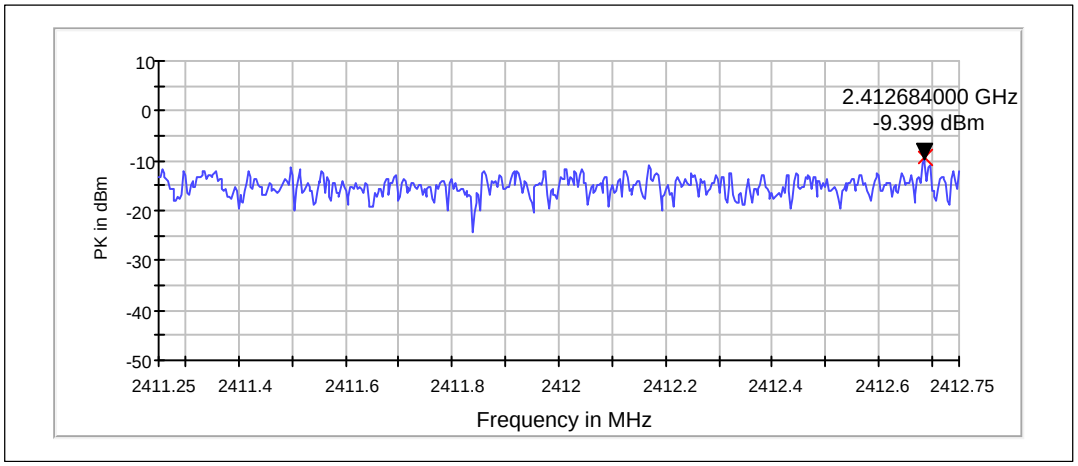
TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

## 8.3. WLAN Test results

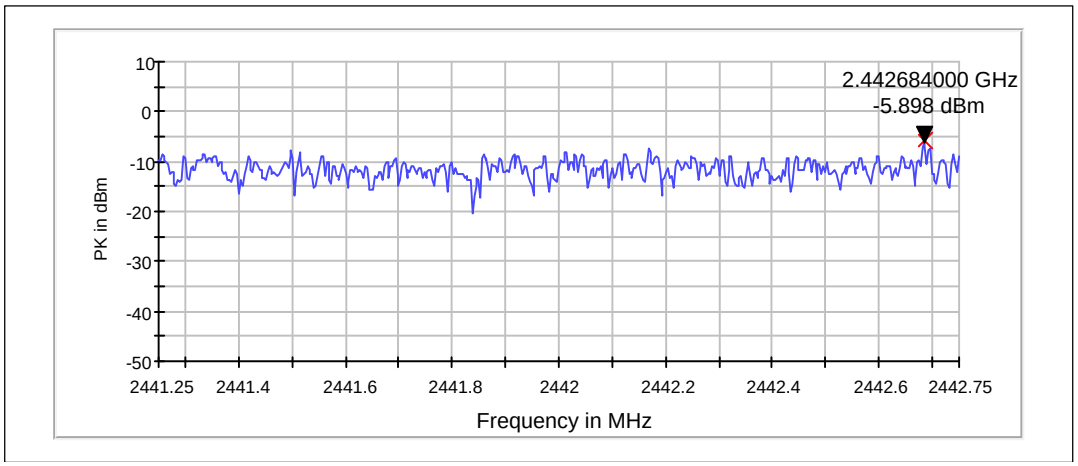
### 8.3.1 DSSS mode, 11 Mbps data rate

| Channel / $f_C$ [MHz] | P [dBm] | Result |
|---|---|---|
| 1 / 2412 | -9.4 | PASSED |
| 7 / 2442 | -5.9 | PASSED |
| 11 / 2462 | -9.6 | PASSED |

Channel 1 / 2412 MHz



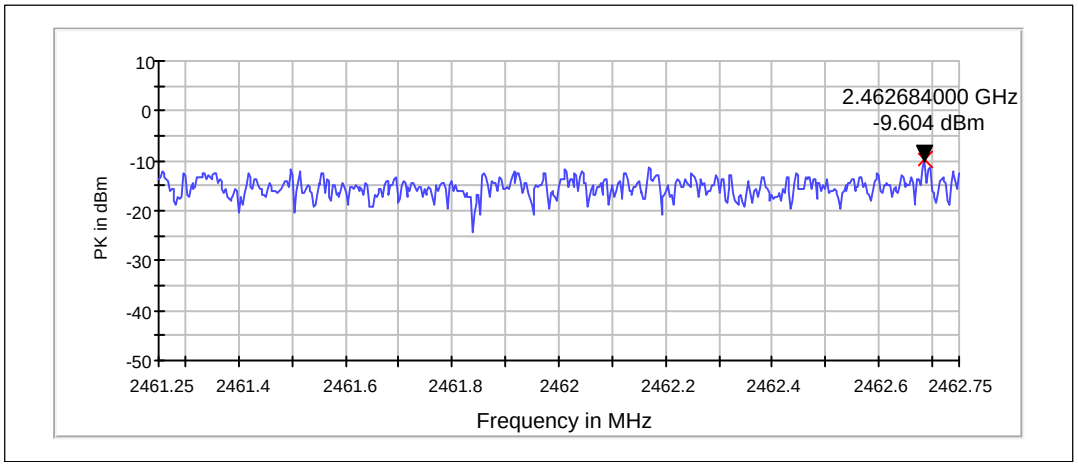

Channel 7 / 2442 MHz






TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

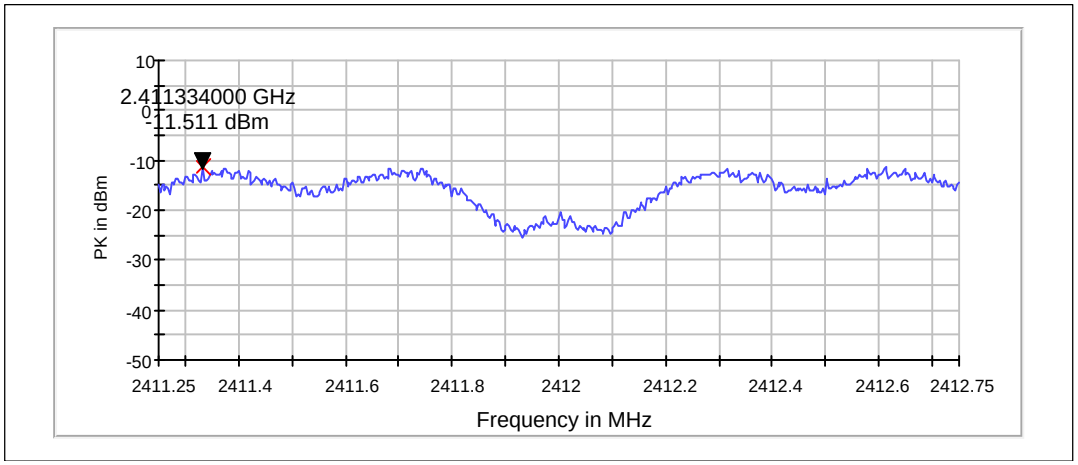
Channel 11 / 2462 MHz




### 8.3.2 OFDM mode, 6 Mbps data rate

| Channel / $f_C$ [MHz] | P [dBm] | Result |
|---|---|---|
| 1 / 2412 | -11.51 | PASSED |
| 7 / 2442 | -7.56 | PASSED |
| 11 / 2462 | -11.81 | PASSED |

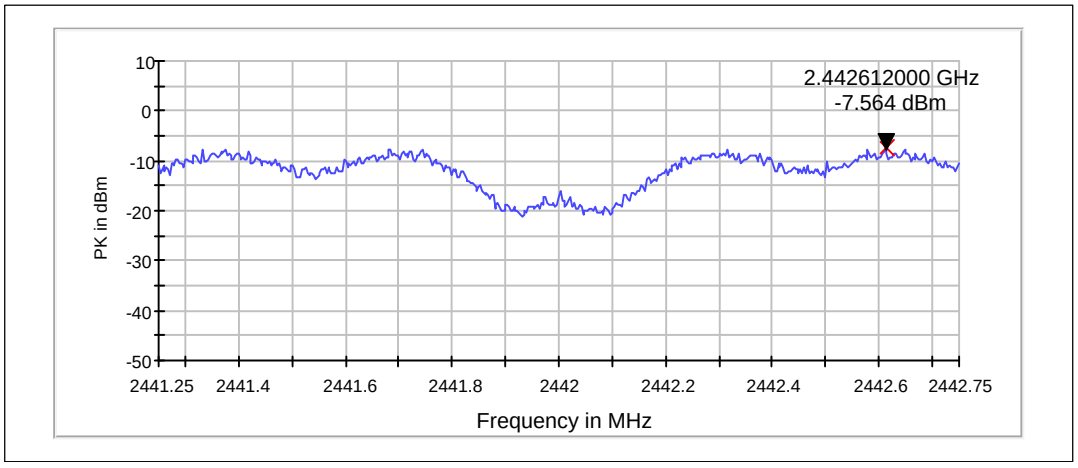
Channel 1 / 2412 MHz



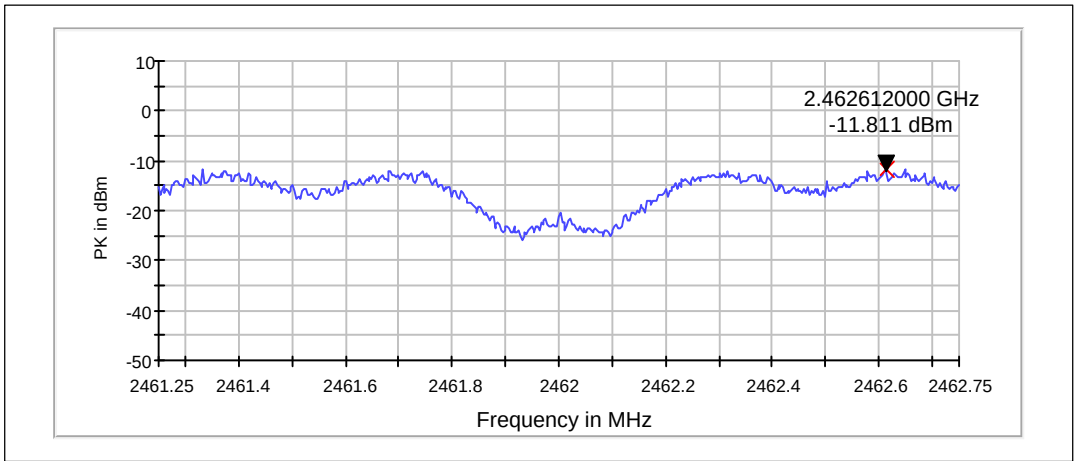



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

Channel 7 / 2442 MHz




Channel 11 / 2462 MHz





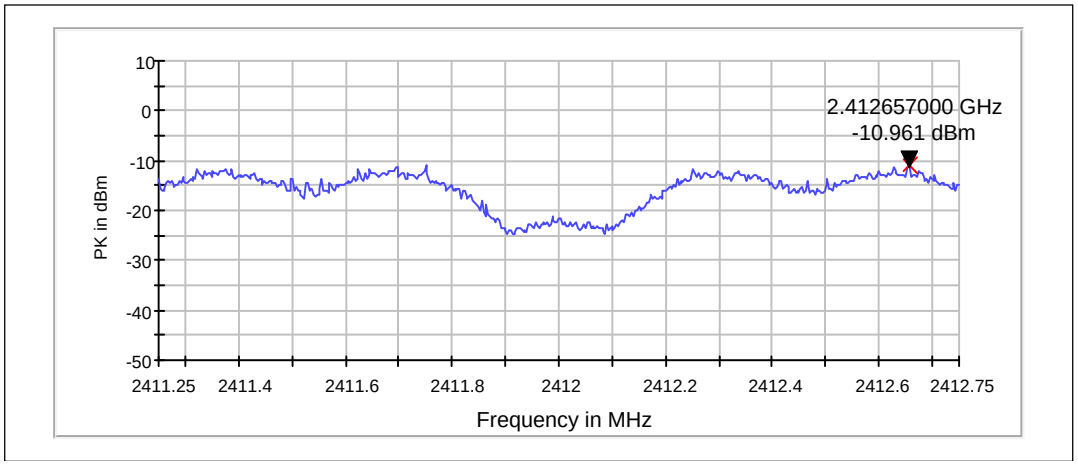


TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

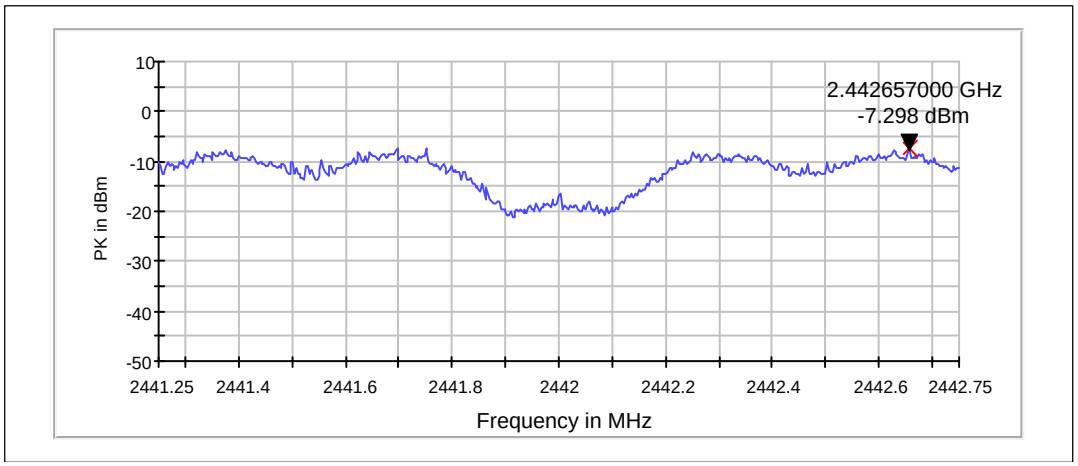
### 8.3.3 802.11n mode, MCS0 modulation

| Channel / $f_C$ [MHz] | P [dBm] | Result |
|---|---|---|
| 1 / 2412 | -10.96 | PASSED |
| 7 / 2442 | -7.3 | PASSED |
| 11 / 2462 | -11.33 | PASSED |

Channel 1 / 2412 MHz



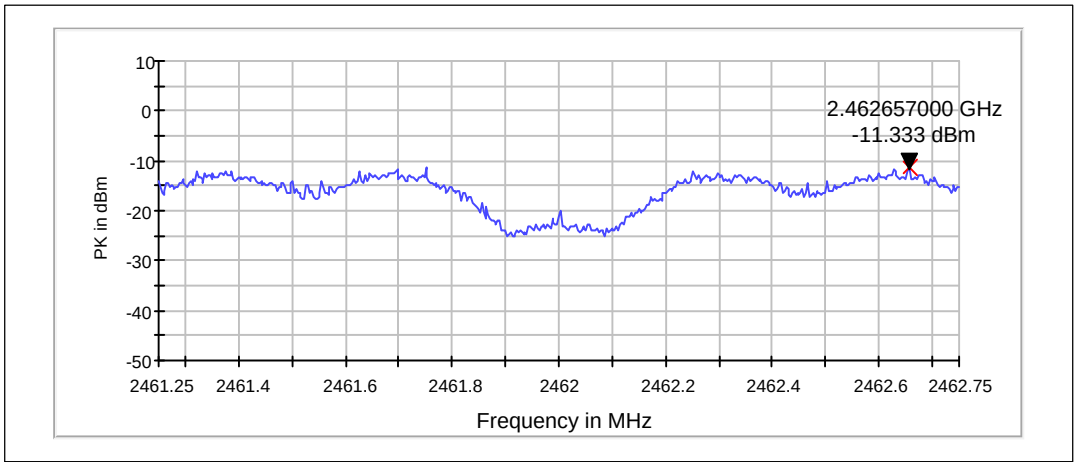

Channel 7 / 2442 MHz






TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

Channel 11 / 2462 MHz







TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

# 9. Test Equipment

## 9.1. Conducted measurements

| Eq. No | Equipment | Type | Manufacturer | Used in |
|---|---|---|---|---|
| 13037 | Power Supply 0-15V 10A | EA3012 | LP Instruments | 15C, 15B |
| 13357 | Signal Generator | SMP02 | Rohde&Schwarz | 22/24/27, 15C, 15B |
| 13513 | Pulse Limiter | ESH3Z2 | Rohde&Schwarz | 15C, 15B |
| 13666 | Receiver | ESPC | Rohde&Schwarz | 15C, 15B |
| 13935 | LISN | ESH3-Z5 | Rohde&Schwarz | 15C, 15B |
| 20682 | LISN | ESH3-Z5 | Rohde&Schwarz | 15C, 15B |
| 16601 | Communication Tester | CMU200 | Rohde&Schwarz | 22/24/27, 15C, 15B |
| 16995 | Directional Coupler 20dB 0,5-2,0 GHz SMA Conn. | 1538RA-20 | Weinschel | 15C, 15B |
| 18772 | Shielded Chamber | RFD-100 | ETS-Lindgren | 15C, 15B |
| 18772 | Shielded Chamber | RFD-100 | ETS-Lindgren | 15C, 15B |
| 19116 | Power splitter | - | various | 22/24/27, 15C, 15B |
| 19171 | Communication Tester | CMU200 | Rohde&Schwarz | 15C, 15B |
| 19625 | Climatic Chamber | VT4002EMC | Vötsch | 22/24/27, 15C, 15B |
| 19678 | Spectrum Analyzer | FSP | Rohde&Schwarz | 22/24/27, 15C, 15B |
| 20168 | Bluetooth Tester | CBT | Rohde&Schwarz | 22/24/27, 15C, 15B |
| 20543 | UPS. 700V/A 490W | PW 9120 700i | Powerware | 22/24/27, 15C, 15B |
| 20544 | Transformer. 230/115V | - | Nokia | 22/24/27, 15C, 15B |
| 20739 | Communication Tester | CMU200 | Rohde&Schwarz | 15C, 15B |

## 9.2. Radiated measurements

| Eq. No | Equipment | Type | Manufacturer | Used in |
|---|---|---|---|---|
| 13077 | Power Supply | EA-3016 | - | 22/24/27, 15C, 15B |
| 13799 | Signal Generator | SMP02 | Rohde&Schwarz | 22/24/27, 15C, 15B |
| 13936 | Band reject filter | WRCD1747.5-0.2/40-10SS | Wainwright Instruments | 22/24/27, 15C, 15B |
| 13937 | Band reject filter | WRCA902.4-0.2/40-6SS | Wainwright Instruments | 22/24/27, 15C, 15B |
| 14021 | Relay Dual 6 Chnl µWave Mux | 10-785-522 | - | 22/24/27, 15C, 15B |
| 14114 | Highpass Filter | WHK1000-12SS | Wainwright Instruments | 22/24/27, 15C, 15B |
| 14187 | Band reject filter | WRCD1747.5-0.2/40-10SS | Wainwright | 22/24/27, 15C, 15B |
| 14188 | Band reject filter | WRCA902.4-0.2/40-6SS | Wainwright | 22/24/27, 15C, 15B |
| 14900 | Antenna Controller | HD100 | HD GmbH | 22/24/27, 15C, 15B |
| 15191 | Turntable Contoller Unit | G-800SDX | YAESU | 22/24/27, 15C, 15B |
| 15742 | Programmable Relay Switching System | ---------- | Pickering | 22/24/27, 15C, 15B |
| 16633 | Band reject filter | WRCD1880.0-0.2/40-10SS | Wainwright | 22/24/27, 15C, 15B |
| 16948 | Dual 6 Channel MUX Microwave Relay SMA 50 Ohm | 10-785-522 | Pickering | 22/24/27, 15C, 15B |
| 16949 | Dual 6 Channel MUX Microwave Relay SMA 50 Ohm | 10-785-522 | Pickering | 22/24/27, 15C, 15B |
| 17644 | Dual 6 Channel MUX Microwave Relay SMA 50 Ohm | 10-785-522 | Pickering | 22/24/27, 15C, 15B |
| 18416 | Communication Tester | CMU200 | Rohde&Schwarz | 22/24/27, 15C, 15B |
| 18773 | Anechoic chamber | RFD-100 | ETS-Lindgren | 22/24/27, 15C, 15B |
| 18774 | Anechoic chamber | RFSD-F/A-100 | ETS-Lindgren | 22/24/27, 15C, 15B |



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934

| Eq. No | Equipment | Type | Manufacturer | Used in |
|---|---|---|---|---|
| 18792 | Mast/turntable controller | 2090 | ETS-EMCO | 22/24/27, 15C, 15B |
| 18860 | Antenna | HL562 | Rohde&Schwarz | 22/24/27, 15C, 15B |
| 19151 | High Pass Filter | WHJS3000-10SS | Wainwright | 22/24/27, 15C, 15B |
| 19587 | Band reject filter | WRCG2400/2483-2390/2493-35/10SS | Wainwright | 22/24/27, 15C, 15B |
| 19966 | Antenna | HFH2-Z2 | Rohde&Schwarz | 15C, 15B |
| 20078 | Relay 2x6 Chnl µWave Mux | 10-785B-522 | Pickering | 22/24/27, 15C, 15B |
| 20114 | Band reject filter | WRCG1737/1743-1733/1747-40/6SS | Wainwright | 22/24/27, 15C, 15B |
| 20115 | Band reject filter | - | Wainwright | 22/24/27, 15C, 15B |
| 20116 | Band reject filter | WRCG832/83/-825/845-40/5SS | Wainwright | 22/24/27, 15C, 15B |
| 20168 | Bluetooth Tester | CBT | Rohde&Schwarz | 22/24/27, 15C, 15B |
| 20543 | UPS. 700V/A 490W | PW 9120 700i | Powerware | 22/24/27, 15C, 15B |
| 20544 | Transformer. 230/115V | - | Nokia | 22/24/27, 15C, 15B |
| 20698 | Antenna | BBHA 9120 D | SCHWARZBECK | 22/24/27, 15C, 15B |
| - | Relay Dual 6 Chnl µWave Mux | 10-785-522 | - | 22/24/27, 15C, 15B |



TCC Nokia Copenhagen Laboratory
Frederikskaj
1790 COPENHAGEN V
DENMARK
Tel. +45 33 292929
Fax. +45 33 292934