

## FCC Part 15C Compliance Test Report

|                                                         |                                                                                                                                                                                                                                                      |                                   |                                                                                                                                           |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Report no.:</b>                                 | Tre_FCC_0642_01.doc                                                                                                                                                                                                                                  | <b>Date of Report:</b>            | 20.10.2006                                                                                                                                |
| <b>Number of pages:</b>                                 | 25                                                                                                                                                                                                                                                   | <b>Customer's Contact person:</b> | Jorma Hanni                                                                                                                               |
| <b>Testing laboratory:</b>                              | TCC Nokia Tampere Laboratory<br>P.O. Box 68<br>Sinitaival 5<br>FIN-33720 TAMPERE, FINLAND<br>Tel. +358 (0) 7180 46800<br>Fax. +358 (0) 7180 46880                                                                                                    | <b>Customer:</b>                  | Nokia Corporation<br>P.O. Box 300<br>Yrityspellontie 6<br>FIN-90230 OULU, FINLAND<br>Tel. +358 (0) 7180 08000<br>Fax. +358 (0) 7180 58300 |
| <b>FCC listing no.:</b>                                 | 94436                                                                                                                                                                                                                                                |                                   |                                                                                                                                           |
| <b>IC recognition no.:</b>                              | 3608                                                                                                                                                                                                                                                 |                                   |                                                                                                                                           |
| <b>Tested devices/ accessories:</b>                     | <b>GSM phone RM-188 / Dummy battery BTD-8</b>                                                                                                                                                                                                        |                                   |                                                                                                                                           |
| <b>FCC ID:</b>                                          | LJPRM-188                                                                                                                                                                                                                                            | <b>IC:</b>                        | 661E-RM188                                                                                                                                |
| <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), IC standards RSS-GEN and RSS-210. Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".               |                                   |                                                                                                                                           |
| <b>Documentation:</b>                                   | The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia. |                                   |                                                                                                                                           |
| <b>Test Results:</b>                                    | <b>The EUT complies with the requirements in respect of all parameters subject to the test.</b><br>The test results relate only to devices specified in this document.                                                                               |                                   |                                                                                                                                           |
| <b>Date and signature for the contents:</b>             |                                                                                                                                                                                                                                                      |                                   |                                                                                                                                           |

Jari Jantunen, System Manager

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

|                               |                                                              |
|-------------------------------|--------------------------------------------------------------|
| Date of receipt               | 12.7.2006                                                    |
| Testing completed             | 19.7.2006                                                    |
| The customer's contact person | Jorma Hanni                                                  |
| Test Plan referred to         | \\EMC\\TESTPLAN\\                                            |
| Notes                         | -                                                            |
| Document name                 | T:\\Projects\\RM-198\\EMC\\Results\\FCC\\Tre_FCC_0629_02.doc |

### 1.1. EUT and Accessory Information

The EUT is a quadri band (GSM850/900/1800/1900) mobile phone with GPRS, EGPRS and Bluetooth. Bluetooth is tested with maximum rated TX power.

| Product       | Type   | SN              | HW   | MV | SW   | DUT   |
|---------------|--------|-----------------|------|----|------|-------|
| GSM phone     | RM-198 | 004400871669832 | 1101 | -  | 3.11 | 40750 |
| Dummy Battery | BTD-8  | -               | -    | -  | -    | 40772 |

### 1.2. Summary of Test Results

#### Bluetooth:

| Section in CFR 47 | Section in RSS-GEN or RSS-210 | Name of the test                     | Result |
|-------------------|-------------------------------|--------------------------------------|--------|
| 15.247(b)(1)      | A8.4 (2)                      | Peak output power                    | PASSED |
| 15.247(c)         | A8.5                          | Band edge compliance of RF emissions | NP     |
| 15.247(c)         | A8.5                          | Spurious RF conducted emissions      | PASSED |
| 15.247(c), 15.209 | A8.5                          | Spurious radiated emissions          | NP     |
| 15.207            | 7.2.2                         | AC powerline conducted emissions     | NP     |
| 15.247(a)(1)      | A8.1 (1)                      | 20 dB bandwidth                      | PASSED |
| 15.247(a)(1)      | A8.1 (2)                      | Carrier frequency separation         | PASSED |
| 15.247(a)(1)(iii) | A8.1 (4)                      | Number of hopping frequencies        | PASSED |
| 15.247(a)(1)(iii) | A8.1 (4)                      | Time of occupancy                    | PASSED |

PASSED

The EUT complies with the essential requirements in the standard.

FAILED

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

NP

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

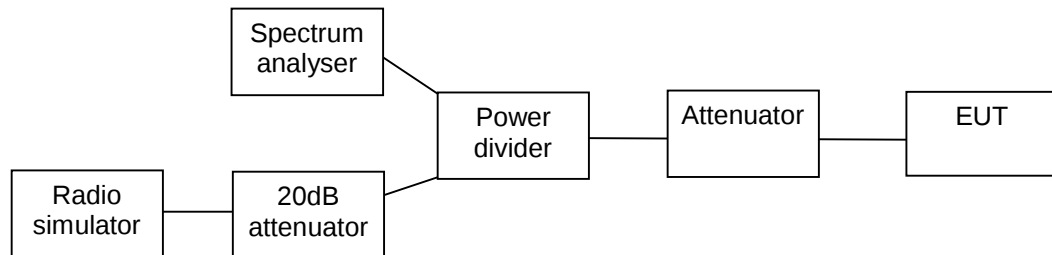
*The test results of 661E-RM198 are re-used for certification of the 661E-RM188. The table above indicates the results, which will be re-used.*

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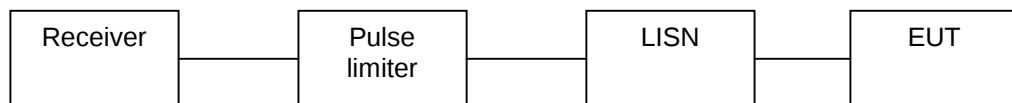
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## 2. Test setups

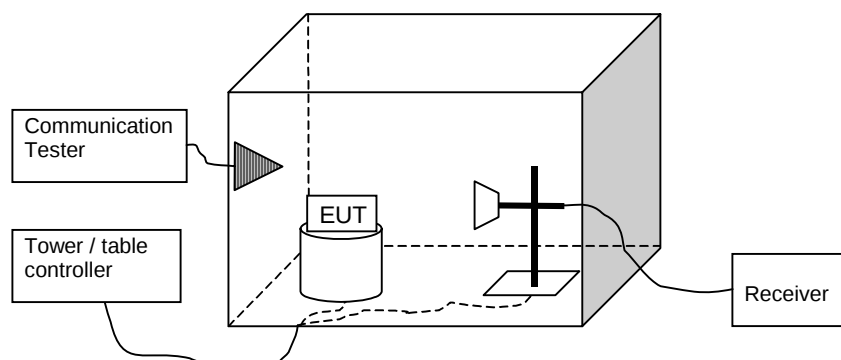
### 2.1. Conducted RF test setup



### 2.2. AC powerline conducted emissions test setup



### 2.3. Spurious radiated emissions test setup



### 3. Peak output power (FCC §15.247(b)(1), RSS-210 A8.4 (2))

|                                                 |                  |
|-------------------------------------------------|------------------|
| EUT with DUT number                             | RM-209 DUT 40750 |
| Accessories with DUT numbers                    | BTD-8 DUT 40772  |
| Operation Voltage [V] / [Hz]                    | 3.9 V DC         |
| Result                                          | PASSED           |
| Remarks                                         | -                |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 21 / 44 / 100.8  |
| Date of measurements                            | 18.7.2006        |
| Measured by                                     | Juho Tuohino     |

#### 3.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210.

Limits for peak output power measurements

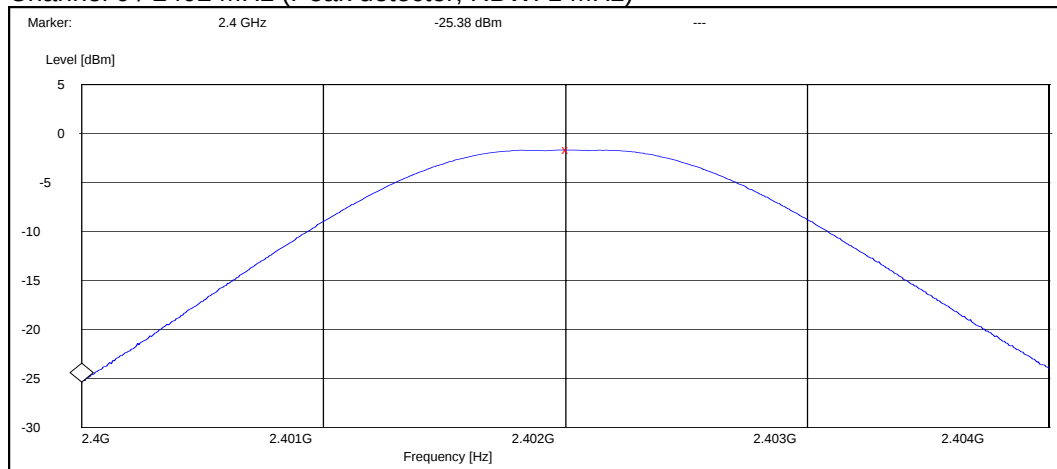
| Frequency range [MHz] | Limit [W] | Limit [dBm] |
|-----------------------|-----------|-------------|
| 2400 – 2483.5         | $\leq 1$  | $\leq 30$   |

## 3.2. Bluetooth Test results

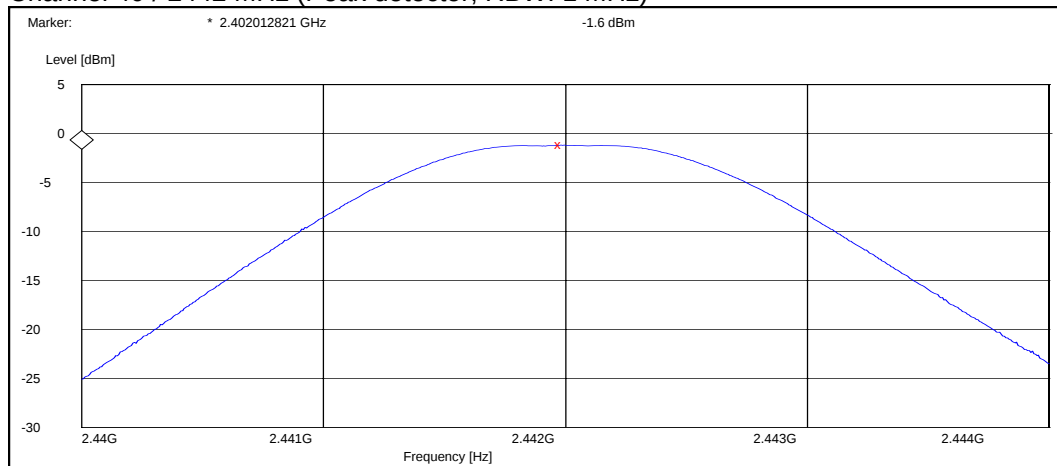
### 3.2.1 GSKF modulation, PRBS packet type

| Channel / $f_c$ [MHz] | P [dBm] | P [mW] | Result |
|-----------------------|---------|--------|--------|
| 0 / 2402              | -1.60   | 0.692  | PASSED |
| 40 / 2442             | -1.10   | 0.776  | PASSED |
| 78 / 2480             | -0.20   | 0.955  | PASSED |

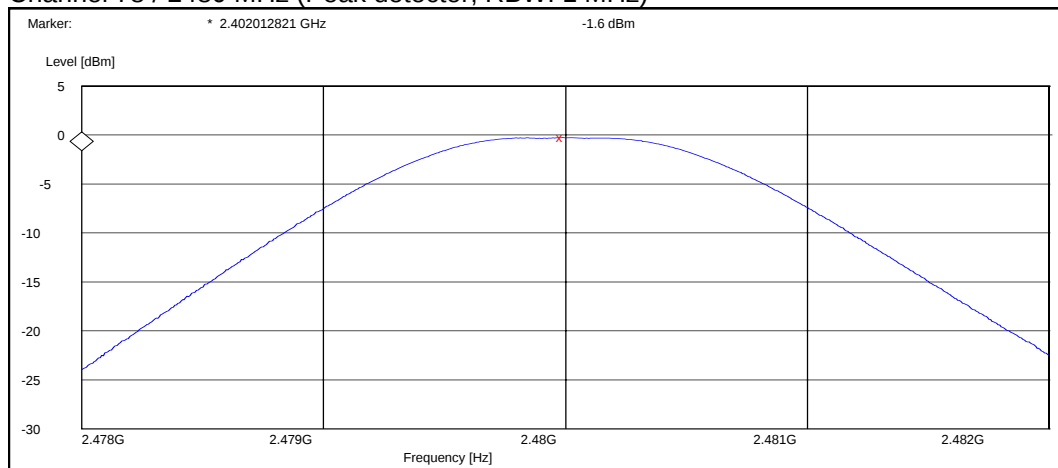
Channel 0 / 2402 MHz (Peak detector, RBW: 1 MHz)



Channel 40 / 2442 MHz (Peak detector, RBW: 1 MHz)



Channel 78 / 2480 MHz (Peak detector, RBW: 1 MHz)



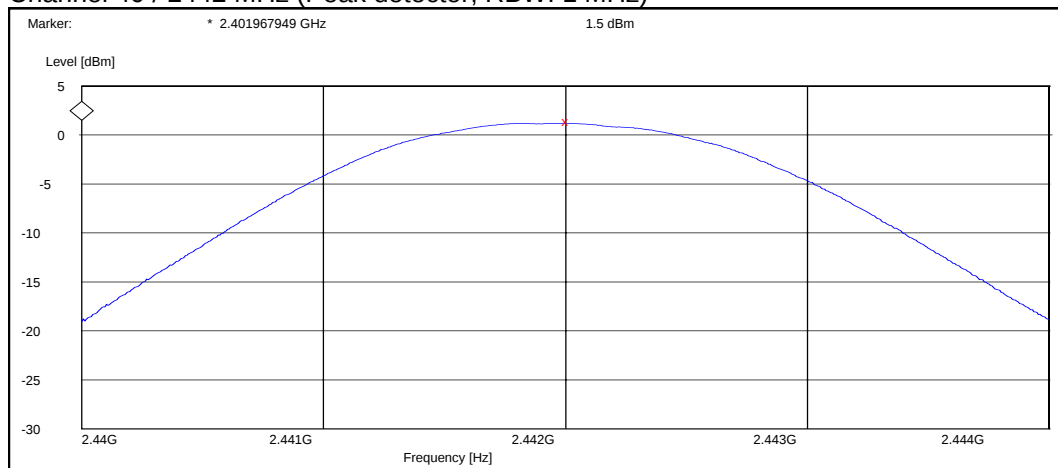
### 3.2.2 8DPSK modulation, PRBS packet type

| Channel / $f_c$ [MHz] | P [dBm] | P [mW] | Result |
|-----------------------|---------|--------|--------|
| 0 / 2402              | 1.50    | 1.413  | PASSED |
| 40 / 2442             | 1.40    | 1.380  | PASSED |
| 78 / 2480             | 1.80    | 1.514  | PASSED |

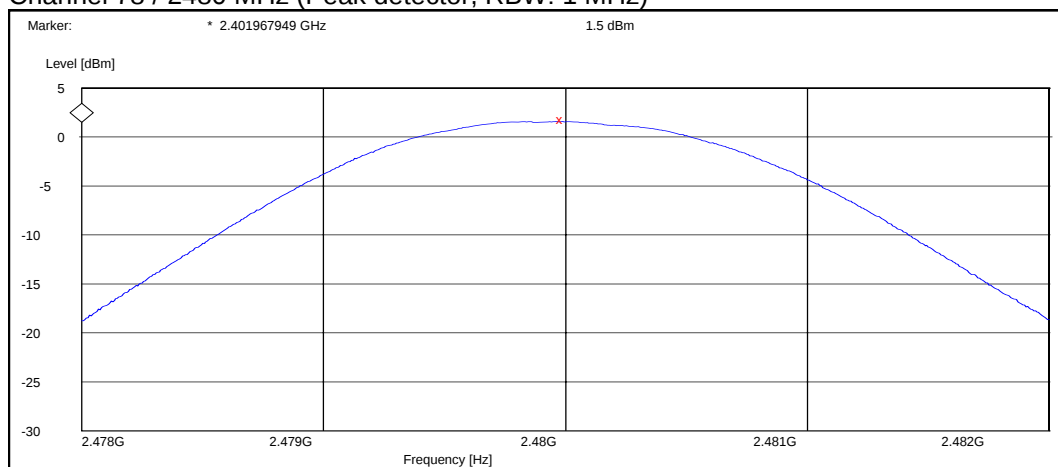
Channel 0 / 2402 MHz (Peak detector, RBW: 1 MHz)



Channel 40 / 2442 MHz (Peak detector, RBW: 1 MHz)



Channel 78 / 2480 MHz (Peak detector, RBW: 1 MHz)



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

|                                                    |                  |
|----------------------------------------------------|------------------|
| EUT with DUT number                                | RM-209 DUT 40750 |
| Accessories with DUT numbers                       | BTD-8 DUT 40772  |
| Operation Voltage [V] / [Hz]                       | 3.9 V DC         |
| Result                                             | PASSED           |
| Remarks                                            | -                |
| Temp [°C] / Humidity [%RH] /<br>Air Pressure [kPa] | 21 / 44 / 100.8  |
| Date of measurements                               | 18.7.2006        |
| Measured by                                        | Juho Tuohino     |

##### 4.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210.

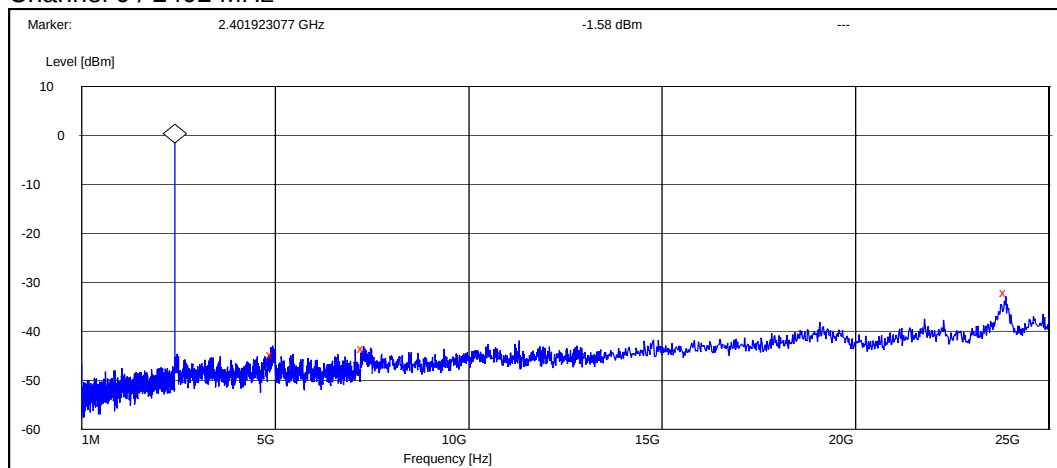
Limits for spurious RF conducted emissions measurements

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

## 4.2. Bluetooth Test results

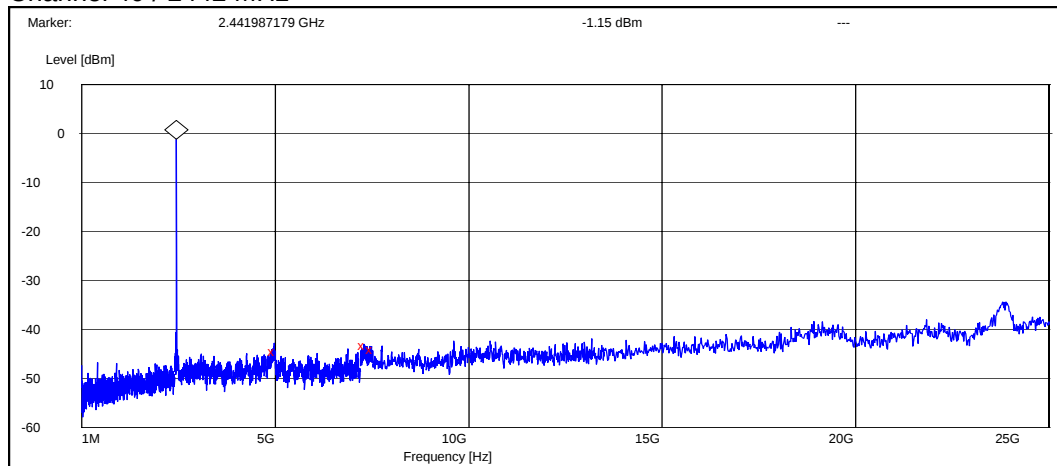
### 4.2.1 GFSK modulation, PRBS packet type

Channel 0 / 2402 MHz



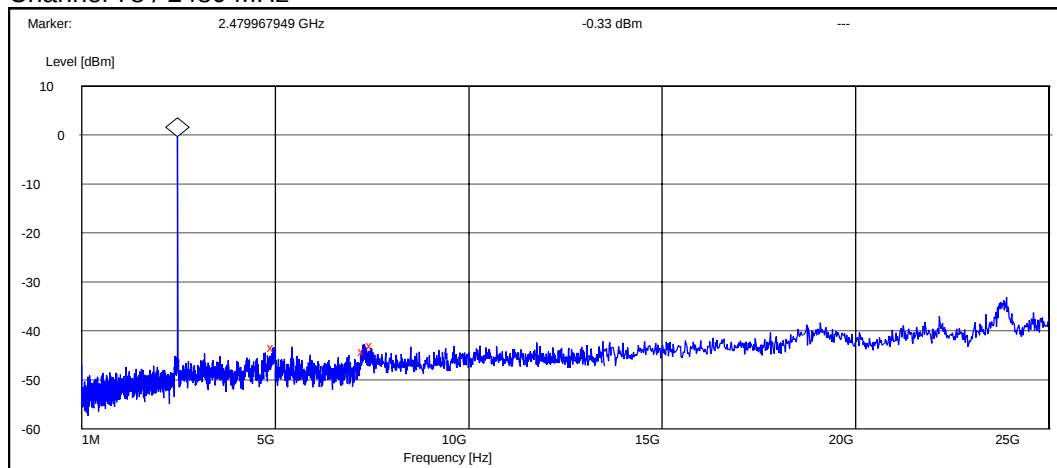
| Frequency [MHz] | P [dBc]    | Result |
|-----------------|------------|--------|
| 4933.653846     | -43.019193 | PASSED |
| 7288.942308     | -41.819193 | PASSED |
| 23875.801282    | -30.519193 | PASSED |

Channel 40 / 2442 MHz



| Frequency [MHz] | P [dBc]    | Result |
|-----------------|------------|--------|
| 4973.717949     | -43.346505 | PASSED |
| 7294.230769     | -42.146505 | PASSED |
| 7500.000000     | -42.846505 | PASSED |

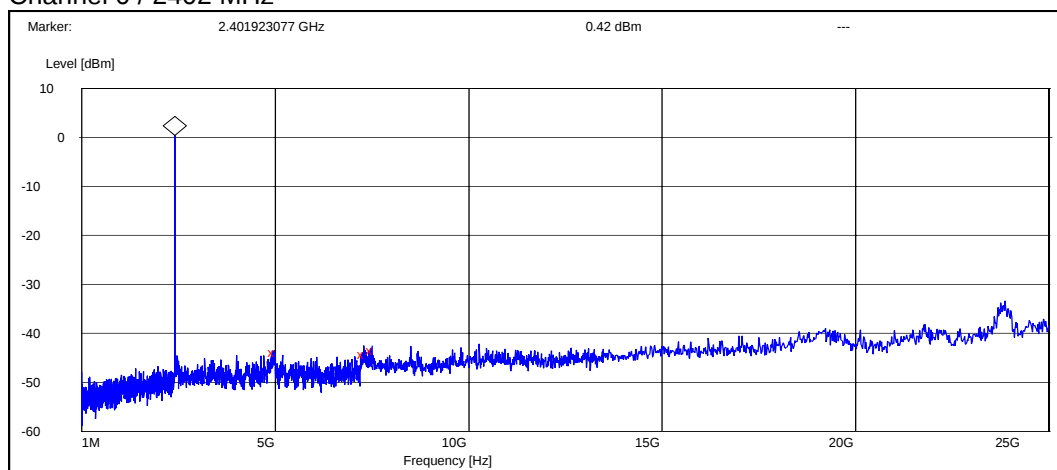
Channel 78 / 2480 MHz



| Frequency [MHz] | P [dBc]    | Result |
|-----------------|------------|--------|
| 4966.346154     | -42.972903 | PASSED |
| 7294.230769     | -43.872903 | PASSED |
| 7500.000000     | -42.672903 | PASSED |

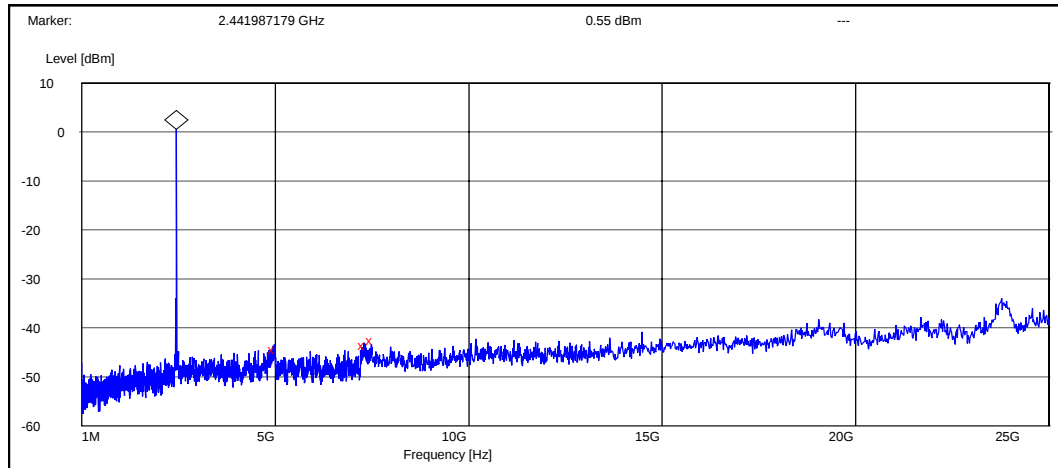
#### 4.2.2 8DPSK modulation, PRBS packet type

Channel 0 / 2402 MHz



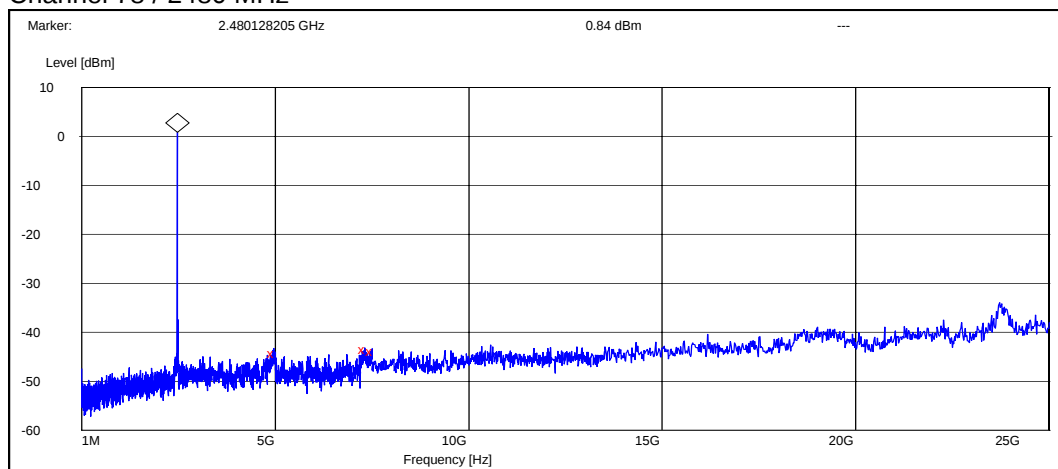
| Frequency [MHz] | P [dBc]    | Result |
|-----------------|------------|--------|
| 4983.012821     | -44.319658 | PASSED |
| 7285.096154     | -44.819658 | PASSED |
| 7500.000000     | -43.919658 | PASSED |

### Channel 40 / 2442 MHz



| Frequency [MHz] | P [dBc]    | Result |
|-----------------|------------|--------|
| 4982.692308     | -44.847493 | PASSED |
| 7304.807692     | -44.147493 | PASSED |
| 7500.000000     | -43.047493 | PASSED |

### Channel 78 / 2480 MHz



| Frequency [MHz] | P [dBc]    | Result |
|-----------------|------------|--------|
| 4957.371795     | -45.135611 | PASSED |
| 7308.173077     | -44.235611 | PASSED |
| 7500.000000     | -44.735611 | PASSED |

## 5. 20 dB bandwidth (FCC §15.247(a)(1), RSS-210 A8.1 (1))

|                                                        |                  |
|--------------------------------------------------------|------------------|
| <b>EUT with DUT number</b>                             | RM-209 DUT 40750 |
| <b>Accessories with DUT numbers</b>                    | BTD-8 DUT 40772  |
| <b>Operation Voltage [V] / [Hz]</b>                    | 3.9 V DC         |
| <b>Result</b>                                          | PASSED           |
| <b>Remarks</b>                                         | -                |
| <b>Temp [°C] / Humidity [%RH] / Air Pressure [kPa]</b> | 21 / 44 / 100.8  |
| <b>Date of measurements</b>                            | 18.7.2006        |
| <b>Measured by</b>                                     | Juho Tuohino     |

### 5.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210.

Limits for 20 dB bandwidth measurements

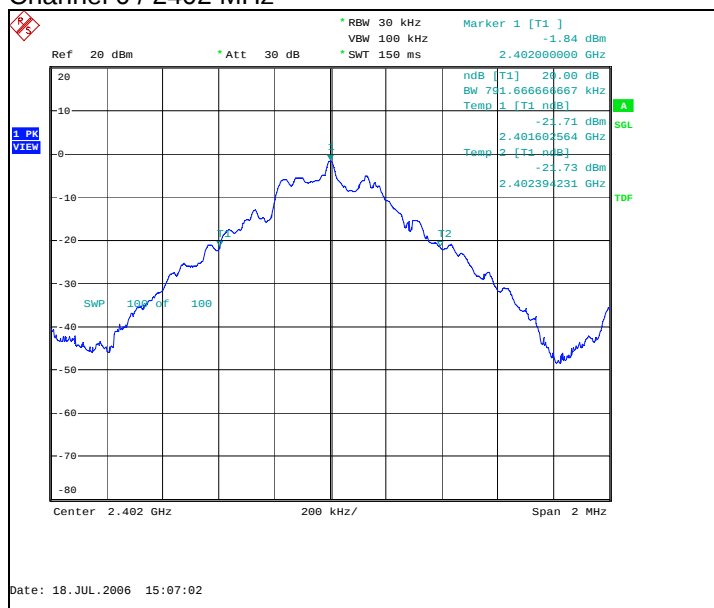
| <b>Limit [MHz]</b> |
|--------------------|
| N/A                |

## 5.2. Bluetooth Test results

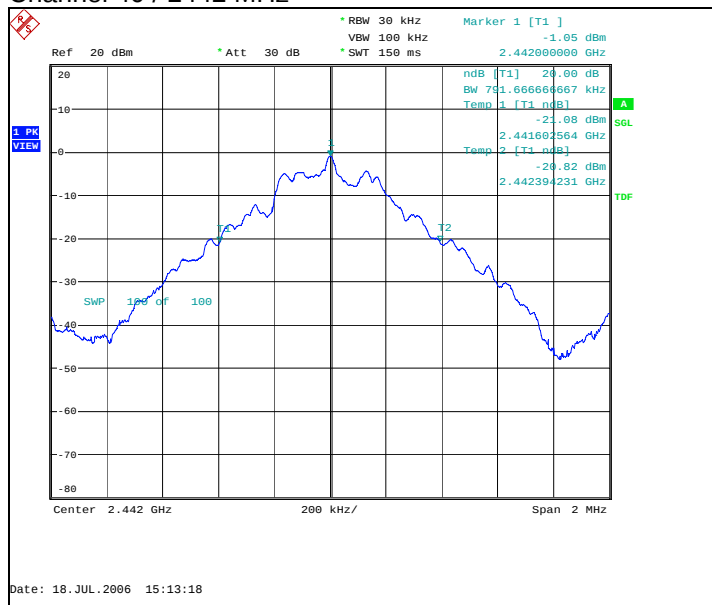
### 5.2.1 GFSK modulation, PRBS packet type

| Channel / $f_c$ [MHz] | 20 dB bandwidth [kHz] | Result |
|-----------------------|-----------------------|--------|
| 0 / 2402              | 791.667               | PASSED |
| 40 / 2442             | 791.667               | PASSED |
| 78 / 2480             | 794.872               | PASSED |

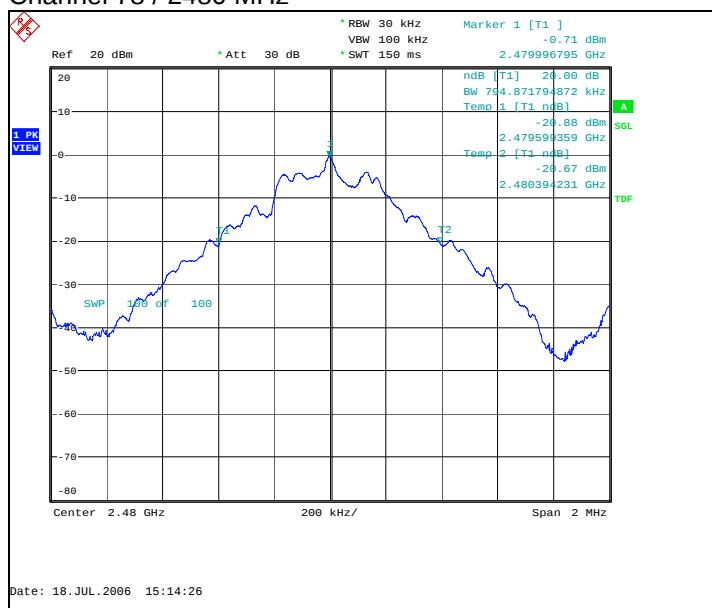
Channel 0 / 2402 MHz



### Channel 40 / 2442 MHz



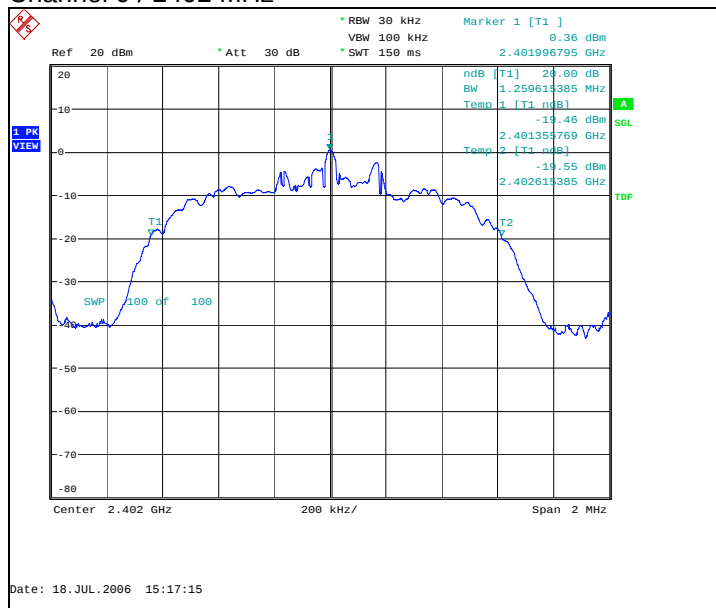
### Channel 78 / 2480 MHz



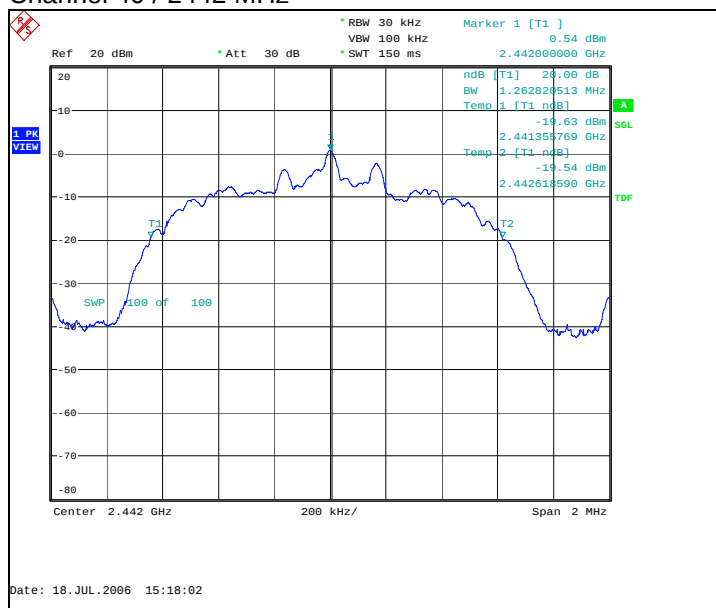
## 5.2.2 8DPSK modulation, PRBS packet type

| Channel / f <sub>c</sub> [MHz] | 20 dB bandwidth [kHz] | Result |
|--------------------------------|-----------------------|--------|
| 0 / 2402                       | 1259.615              | PASSED |
| 40 / 2442                      | 1262.821              | PASSED |
| 78 / 2480                      | 1262.821              | PASSED |

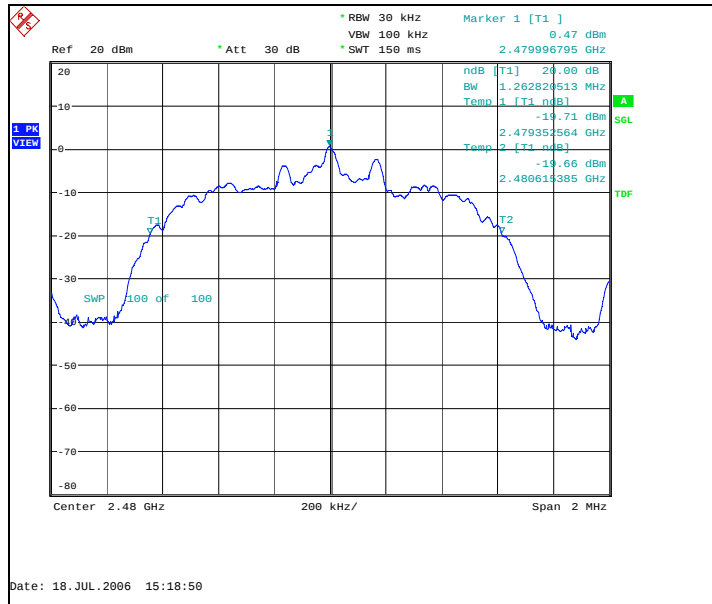
Channel 0 / 2402 MHz



Channel 40 / 2442 MHz



Channel 78 / 2480 MHz



## 6. Carrier frequency separation (FCC §15.247(a)(1), RSS-210 A8.1 (2))

|                                                 |                  |
|-------------------------------------------------|------------------|
| EUT with DUT number                             | RM-209 DUT 40750 |
| Accessories with DUT numbers                    | BTD-8 DUT 40772  |
| Operation Voltage [V] / [Hz]                    | 3.9 V DC         |
| Result                                          | PASSED           |
| Remarks                                         | -                |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 21 / 44 / 100.8  |
| Date of measurements                            | 18.7.2006        |
| Measured by                                     | Juho Tuohino     |

### 6.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210.

Limits for carrier frequency separation measurements

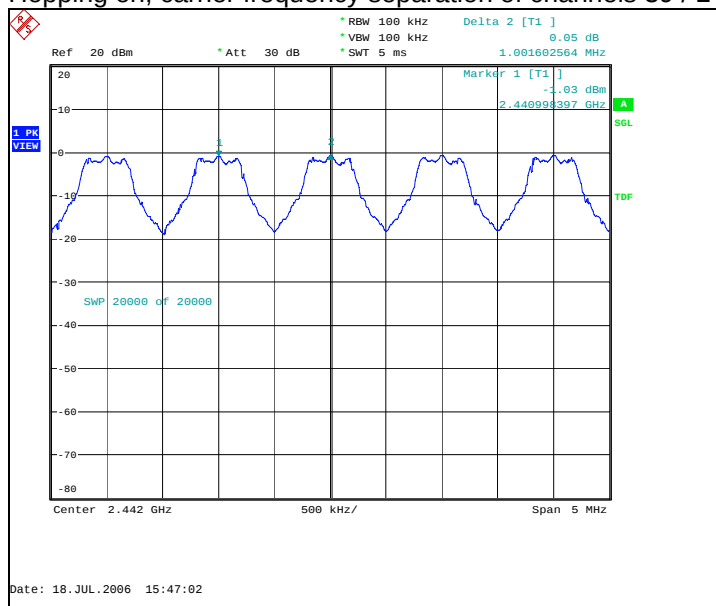
| Limit [MHz]                                  |
|----------------------------------------------|
| $\geq 0.025$ or $2/3$ of the 20 dB bandwidth |

### 6.2. Bluetooth Test results

#### 6.2.1 GFSK modulation, PRBS packet type

| Carrier frequency separation [kHz] | Result |
|------------------------------------|--------|
| 1001.603                           | PASSED |

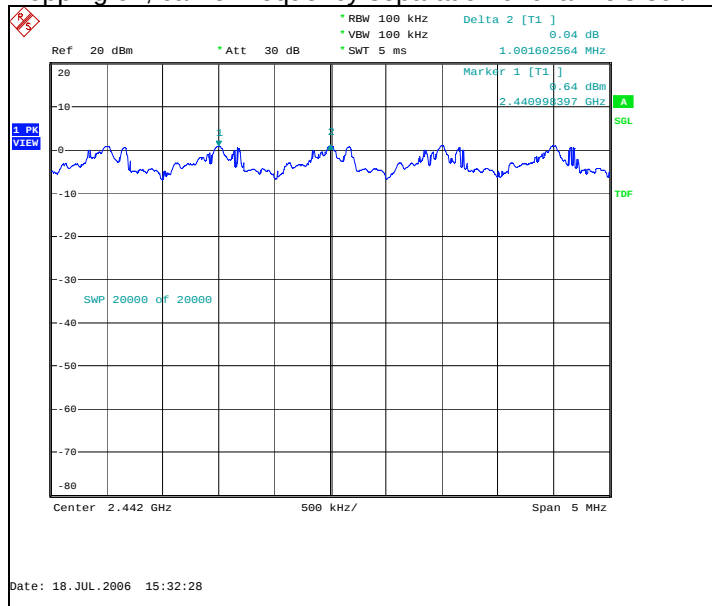
Hopping on, carrier frequency separation of channels 39 / 2441 MHz and 40 / 2442 MHz



## 6.2.2 8DPSK modulation, PRBS packet type

| Carrier frequency separation [kHz] | Result |
|------------------------------------|--------|
| 1001.603                           | PASSED |

Hopping on, carrier frequency separation of channels 39 / 2441 MHz and 40 / 2442 MHz



## 7. Number of hopping frequencies (FCC §15.247(a)(1)(iii), RSS-210 A8.1 (4))

|                                                 |                  |
|-------------------------------------------------|------------------|
| EUT with DUT number                             | RM-209 DUT 40750 |
| Accessories with DUT numbers                    | BTD-8 DUT 40772  |
| Operation Voltage [V] / [Hz]                    | 3.9 V DC         |
| Result                                          | PASSED           |
| Remarks                                         | -                |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 22 / 44 / 101.4  |
| Date of measurements                            | 19.7.2006        |
| Measured by                                     | Juho Tuohino     |

### 7.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210.

Limits for number of hopping frequencies measurements

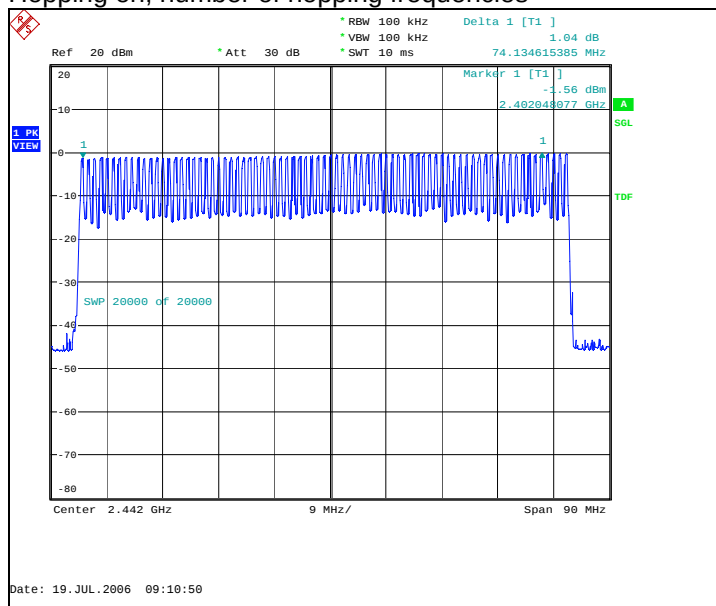
| Limit [number] |
|----------------|
| ≥ 15           |

### 7.2. Bluetooth Test results

#### 7.2.1 GFSK modulation, PRBS packet type

| Measured number of hopping frequencies | Result |
|----------------------------------------|--------|
| 79.00                                  | PASSED |

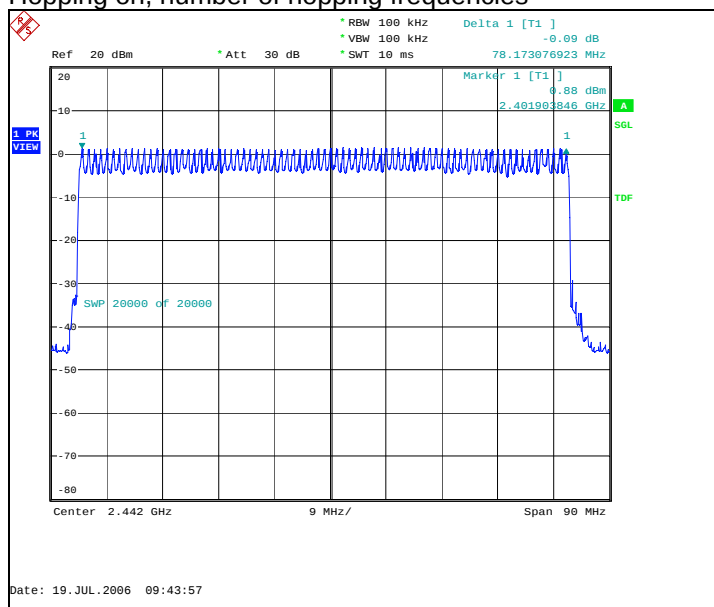
Hopping on, number of hopping frequencies



## 7.2.2 8DPSK modulation, PRBS packet type

| Measured number of hopping frequencies | Result |
|----------------------------------------|--------|
| 78.00                                  | PASSED |

### Hopping on, number of hopping frequencies



## 8. Time of occupancy (FCC §15.247(a)(1)(iii), RSS-210 A8.1 (4))

|                                                        |                  |
|--------------------------------------------------------|------------------|
| <b>EUT with DUT number</b>                             | RM-209 DUT 40750 |
| <b>Accessories with DUT numbers</b>                    | BTD-8 DUT 40772  |
| <b>Operation Voltage [V] / [Hz]</b>                    | 3.9 V DC         |
| <b>Result</b>                                          | PASSED           |
| <b>Remarks</b>                                         | -                |
| <b>Temp [°C] / Humidity [%RH] / Air Pressure [kPa]</b> | 22 / 44 / 101.4  |
| <b>Date of measurements</b>                            | 19.7.2006        |
| <b>Measured by</b>                                     | Juho Tuohino     |

### 8.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210 as follows:

The total time of occupancy is get by multiplying the measured number of transmissions occurred during 31.6 second period with the duration of one transmission.

Limits for time of occupancy measurements

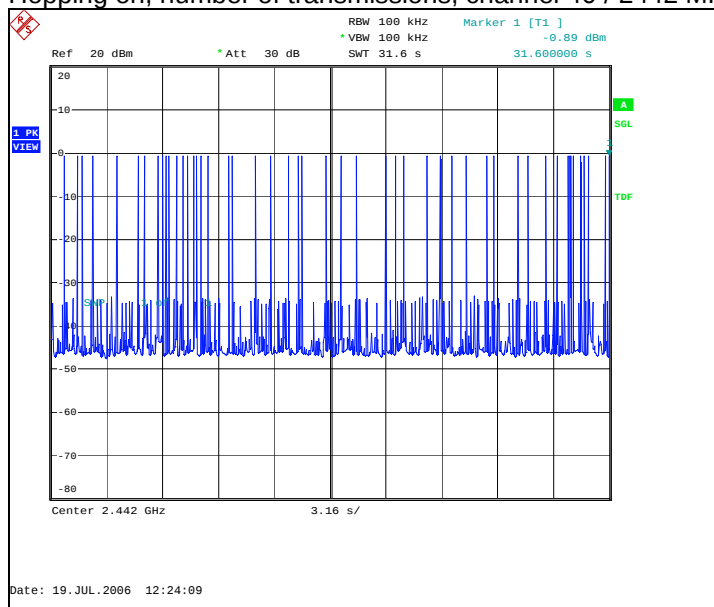
| Limit [s] |
|-----------|
| ≤ 0.4     |

## 8.2. Bluetooth test results

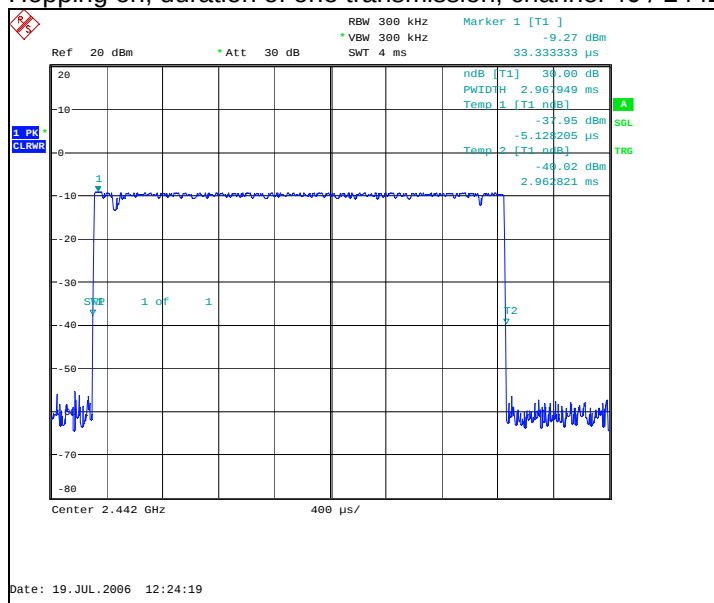
### 8.2.1 GFSK modulation, PRBS packet type

| Measured number of transmissions | Duration of one transmission [ $\mu$ s] | Time of occupancy [s] | Result |
|----------------------------------|-----------------------------------------|-----------------------|--------|
| 50.00                            | 2968                                    | 0.148397              | PASSED |

Hopping on, number of transmissions, channel 40 / 2442 MHz



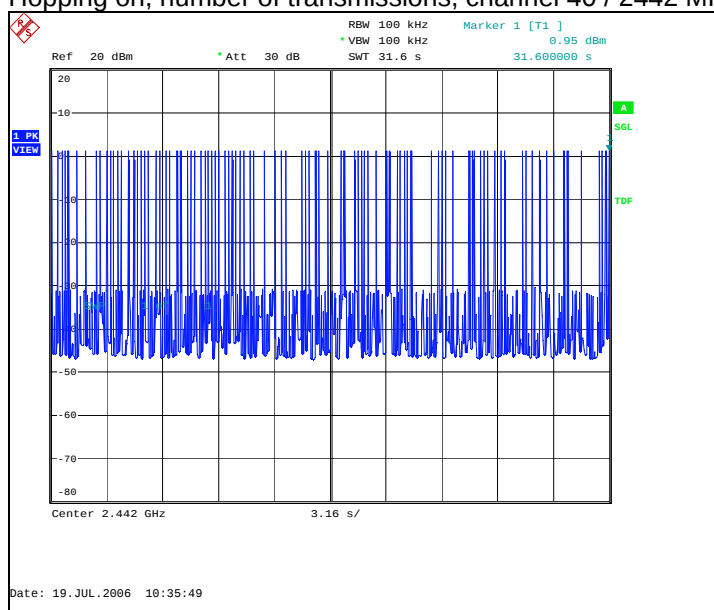
Hopping on, duration of one transmission, channel 40 / 2442 MHz



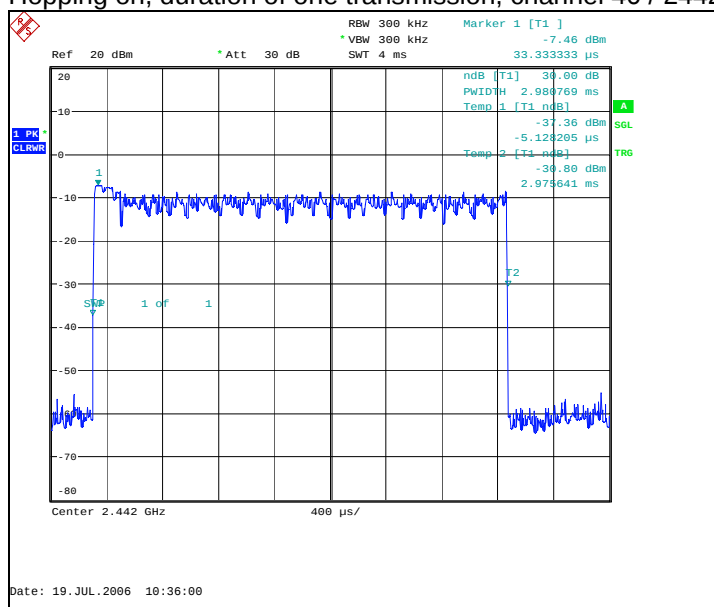
## 8.2.2 8DPSK modulation, PRBS packet type

| Measured number of transmissions | Duration of one transmission [ $\mu$ s] | Time of occupancy [s] | Result |
|----------------------------------|-----------------------------------------|-----------------------|--------|
| 94.00                            | 2981                                    | 0.280192              | PASSED |

Hopping on, number of transmissions, channel 40 / 2442 MHz



Hopping on, duration of one transmission, channel 40 / 2442 MHz



## 9. Test Equipment

### 9.1. Conducted measurements

| Eq. No  | Equipment                  | Type      | Manufacturer    | Used in   |
|---------|----------------------------|-----------|-----------------|-----------|
| TM37610 | Spectrum analyzer          | FSU       | R&S             | 15C,22/24 |
| TM37678 | Radio communication tester | CMU-200   | R&S             | 15C,22/24 |
|         | Attenuator 10 dB           | 6251.17.A | Huber+Suhner AG | 15C,22/24 |
| TM22901 | Step attenuator 110dB      | 8496A     | Agilent         | 15C,22/24 |
| TM37499 | Power splitter             | 11667A    | Agilent         | 15C,22/24 |
|         | Temperature chamber        | VT4002    | Vötsch          | 15C,22/24 |
| TM38112 | DC power supply            | 6632A     | Agilent         | 15C,22/24 |
| TM38111 | Multimeter                 | 34401A    | Agilent         | 15C,22/24 |
| TM38845 | EMI receiver               | ESI 40    | R&S             | 15B,15C   |
| TM37773 | Radio communication tester | CMU-200   | R&S             | 15B,15C   |
| TM38631 | Signal generator           | 83640L    | Agilent         | 15B,15C   |
| TM38114 | DC power supply            | 6632A     | Agilent         | 15B,15C   |
| TM22835 | Multimeter                 | 87        | Fluke           | 15B,15C   |
| TM30600 | Pulse Limiter              | ESH3-Z2   | R&S             | 15B,15C   |
| TM26490 | LISN 50 µH                 | ESH3-Z5/  | R&S             | 15B,15C   |
| TM30636 | LISN 50 µH                 | L2-16/    | PMM             | 15B,15C   |

### 9.2. Radiated measurements

| Eq. No  | Equipment                       | Type                          | Manufacturer | Used in        |
|---------|---------------------------------|-------------------------------|--------------|----------------|
| TM30599 | 3m semi-anechoic chamber        |                               | TDK          | 15B,15C, 22/24 |
| TM38845 | EMI receiver                    | ESI 40                        | R&S          | 15B,15C, 22/24 |
| TM37498 | Preamplifier                    | AMF-5D-020180-26-10P          | MITEQ        | 15B,15C, 22/24 |
| TM37523 | Preamplifier                    | AMF-4D-10M-3G-25-20P          | MITEQ        | 15B,15C, 22/24 |
| TM37516 | Biconilog antenna               | HL562                         | R&S          | 15B,15C, 22/24 |
| TM26496 | Double ridged waveguide antenna | 3115                          | EMCO         | 15B,15C, 22/24 |
| TM39158 | Horn antenna                    | 3116                          | EMCO         | 15B,15C, 22/24 |
| TM26492 | Reference dipole set            | UHAP/VHAP                     | Schwarzbeck  | 15B,15C, 22/24 |
| TM37501 | Dipole antenna                  | 3125-870                      | EMCO         | 22/24          |
| TM37502 | Dipole antenna                  | 3125-1880                     | EMCO         | 22/24          |
| TM37773 | Radio communication tester      | CMU-200                       | R&S          | 15B,15C, 22/24 |
| TM38631 | Signal generator                | 83640L                        | Agilent      | 15B,15C, 22/24 |
| TM38066 | High pass filter                | 4HC3000/18000-3-KK            | Trilithic    | 15B,15C, 22/24 |
|         | High pass filter                | WHK2010-10SS                  | Trilithic    | 15B,15C, 22/24 |
|         | Low pass filter                 | WLK1750-10SS                  | Trilithic    | 15B,15C, 22/24 |
| TM26511 | Tunable notch filter            | WRCA870                       | Wainwright   | 22/24          |
| TM38215 | Tunable notch filter            | WRCD1850/1910-0.2/40          | Wainwright   | 22/24          |
| TM38214 | Band reject filter              | WRCT 2402/2480-2400/2483.5-30 | Wainwright   | 15C            |
| TM30642 | Turntable controller            | HD-100                        | Deisel       | 15B,15C, 22/24 |
| TM26500 | Turntable                       | DS412                         | Deisel       | 15B,15C, 22/24 |
| TM38842 | Antenna mast controller         | 2090                          | EMCO         | 15B,15C, 22/24 |
| TM38843 | Antenna mast                    | 2075                          | EMCO         | 15B,15C, 22/24 |
| TM38114 | DC power supply                 | 6632A                         | Agilent      | 15B,15C, 22/24 |
| TM22835 | Multimeter                      | 87                            | Fluke        | 15B,15C, 22/24 |