| | | | | |
|---|---|---|---|---|
| **Prüfbericht-Nr.:** *Test Report No.:* | **10043710 001** | **Auftrags-Nr.:** *Order No.:* | 114011232 | Seite 1 von 34 *Page 1 of 34* |
| **Kunden-Referenz-Nr.:** *Client Reference No.:* | N/A | **Auftragsdatum:** *Order date:* | June 20, 2013 | |
| **Auftraggeber:** *Client:* | Adonit Co., Ltd., Rm. A, 9F No.107 Sec.4 Ren-Ai Rd.,Da-An Dist. Taipei 10689, Taiwan, R.O.C. | | | |
| **Prüfgegenstand:** *Test item:* | Bluetooth Pen | | | |
| **Bezeichnung / Typ-Nr.:** *Identification / Type No.:* | Jot Script | | | |
| **Auftrags-Inhalt:** *Order content:* | FCC Part 15C Test report | | | |
| **Prüfgrundlage:** *Test specification:* | FCC 47CFR Part 15: Subpart C Section 15.247<br>RSS-210 (12-2010) A8 | | | |

| | |
|---|---|
| **Wareneingangsdatum:** *Date of receipt:* | 8/29/2013 |
| **Prüfmuster-Nr.:** *Test sample No.:* | A000022608-001<br>A000022757-001 |
| **Prüfzeitraum:** *Testing period:* | 23-Sep-2013 - 25-Sep-2013 |
| **Ort der Prüfung:** *Place of testing:* | EMC Laboratory Taipei |
| **Prüflaboratorium:** *Testing laboratory:* | TUV Rheinland Taiwan Ltd. |
| **Prüfergebnis*:** *Test result*:* | Pass |

| **geprüft von** / *tested by:* | | | **kontrolliert von** / *reviewed by:* | | |
|---|---|---|---|---|---|
| 2013-10-08 | Danny S. C. Sung/Project Manager | | 2013-10-08 | Rene Charton/Senior Project Manager | |
| **Datum** *Date* | **Name / Stellung** *Name / Position* | **Unterschrift** *Signature* | **Datum** *Date* | **Name / Stellung** *Name / Position* | **Unterschrift** *Signature* |

**Sonstiges** / *Other:*

**Zustand des Prüfgegenstandes bei Anlieferung:** Prüfmuster vollständig und unbeschädigt
*Condition of the test item at delivery:* *Test item complete and undamaged*

| | | | | | |
|---|---|---|---|---|---|
| * Legende: | 1 = sehr gut | 2 = gut | 3 = befriedigend | 4 = ausreichend | 5 = mangelhaft |
| | P(ass) = entspricht o.g. Prüfgrundlage(n) | | F(ail) = entspricht nicht o.g. Prüfgrundlage(n) | N/A = nicht anwendbar | N/T = nicht getestet |
| *Legend:* | *1 = very good* | *2 = good* | *3 = satisfactory* | *4 = sufficient* | *5 = poor* |
| | *P(ass) = passed a.m. test specification(s)* | | *F(ail) = failed a.m. test specification(s)* | *N/A = not applicable* | *N/T = not tested* |

# TEST SUMMARY

**5.1.1 ANTENNA REQUIREMENT**
*RESULT: Passed*

**5.1.2 PEAK OUTPUT POWER**
*RESULT: Passed*

**5.1.3 6DB BANDWIDTH AND 99% BANDWIDTH**
*RESULT: Passed*

**5.1.4 POWER DENSITY**
*RESULT: Passed*

**5.1.5 CONDUCTED SPURIOUS EMISSIONS AND FREQUENCY BAND EDGE MEASURED IN 100KHZ BANDWIDTH**
*RESULT: Passed*

**5.1.6 SPURIOUS EMISSION**
*RESULT: Passed*

**6.1.1 ELECTROMAGNETIC FIELDS**
*RESULT: Passed*

# Contents

# 1. General Remarks

## 1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

**Appendix PI: Photo Documentation internal view**
**(File Name: 10043710APPENDIX PI)**
**Appendix PE: Photo Documentation external view**
**(File Name: 10043710APPENDIX PE)**
**Appendix D: Test Result of Radiated Emissions**
**(File Name: 10043710APPENDIX D)**

Test Specifications

The following standards were applied (in bold: product standards, otherwise: basic standards).

**Table 1: Applied Standard and Test Levels**

| **Radio** |
|---|
| FCC CFR47 Part 15: Subpart C Section 15.247<br>ANSI C63.10:2009, KDB558074 D01 DTS Meas Guidance v02 |

# 2. Test Sites

## 2.1 Test Facilities

TUV Rheinland Taiwan Ltd.

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

FCC Registration No.: 365730
TAF Accredited NCC Test Lab. No.:0759
TAF ISO17025 Certification effective periods: 2010-Jul-1st to 2013-Jun-30th

Testing Laboratory
0759

## 2.2 List of Test and Measurement Instruments

**Table 2: List of Test and Measurement Equipment**

| Kind of Equipment | Manufacturer | Type | S/N | Calibrated until |
|---|---|---|---|---|
| EMI Test Receiver | R&S | ESCI 7 | 100797 | 20-Dec-13 |
| Bilog Antenna | TESEQ | CBL6111D | 29802 | 29-Jun-14 |
| Spectrum Analyzer | R&S | FSV 40 | 100921 | 13-Dec-13 |
| Horn Antenna | ETS-Lindgren | 3117 | 138160 | 10-Jan-14 |
| Horn Antenna (18GHz~40GHz) | COM-POWER | AH840 | 101031 | 2-Nov-13 |
| Preamplifier (30MHz -1GHz) | HP | 8447F | 2805A03335 | 2-Sep-14 |
| Preamplifier (18 GHz -40 GHz) | COM-POWER | PAM-840 | 461257 | 2-Sep-14 |
| Pre-Amplifier (1GHz~18GHz) | EM Electronics | EM30180 | 60558 | 12-Nov-13 |
| Loop Antenna | Schwarzbeck | FMZB 1513 | 1513-076 | 28-Sep-14 |

## 2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

## 2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

## 2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements are ±3dB.

**Table 3:** Emission Measurement Uncertainty

| Parameter | Uncertainty |
|---|---|
| Radio Frequency | ± 1 x $10^{-7}$ |
| RF power, conducted | ± 1 dB |
| Adjacent channel power | ± 3 dB |
| Radiated emission of transmitter, valid up to 26 GHz | ± 6 dB |
| Radiated emission of receiver, valid up to 26 GHz | ± 6 dB |
| Temperature | ± 2 ºC |
| Humidity | ± 10 % |

# 3. General Product Information

## 3.1 Product Function and Intended Use

The EUT is a Touch Pen which can be used to draw on the touch screen of a portable device which needs to have a Bluetooth 4.0 RF interface. The pen can transmit the pen status (touch pressure) to the portable device through the built-in Bluetooth LE transmitter.
For details refer to the User Guide, Data Sheet and Circuit Diagram.

## 3.2 System Details and Ratings

### Table 4: Basic Information of EUT

| Item | EUT information |
|---|---|
| Kind of Equipment | Bluetooth Pen |
| Type Designation | Jot Script |
| | |
| FCC ID | ZCC-J10003 |

### Table 5: Technical Specification of EUT

| Technical Specification | Value |
|---|---|
| Operating Frequency | 2402~2480 MHz |
| Channel Spacing | 2 MHz |
| Channel number | 40 |
| Operation Voltage | 1.5 V |
| Modulation | GFSK |
| Antenna gain | 0.5 dBi |

## 3.3 Independent Operation Modes

Basic operation modes are:

A. Transmitting
    1. Low channel
    2. Middle channel
    3. High channel
B. Receiving
C. Standby
D. Off

## 3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

## 3.5 Submitted Documents

- Bill of Material
- PCB Layout
- Photo Document
- Technical Description
- Circuit Diagram
- Instruction Manual
- Rating Label

# 4. Test Set-up and Operation Modes

## 4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

## 4.2 Test Operation and Test Software

Setup for testing: Test samples are provided with a SPI interface which makes it possible to control them through a test software installed on a notebook computer.

This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed in section 3.3 as appropriate

The samples were used as follows:
Conducted: **A000022757-001**
Radiation: **A000022608-001**

Full test was applied on all test modes, but only worst case was shown.

## 4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

| Kind of Equipment | Manufacturer | Model Name | S/N |
|---|---|---|---|
| Laptop | MSI | MS-1453 | MX-233TWK1008000096 |

## 4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

## 4.5 Test Setup Diagram

**Diagram of Measurement Configuration for Radiation Test**

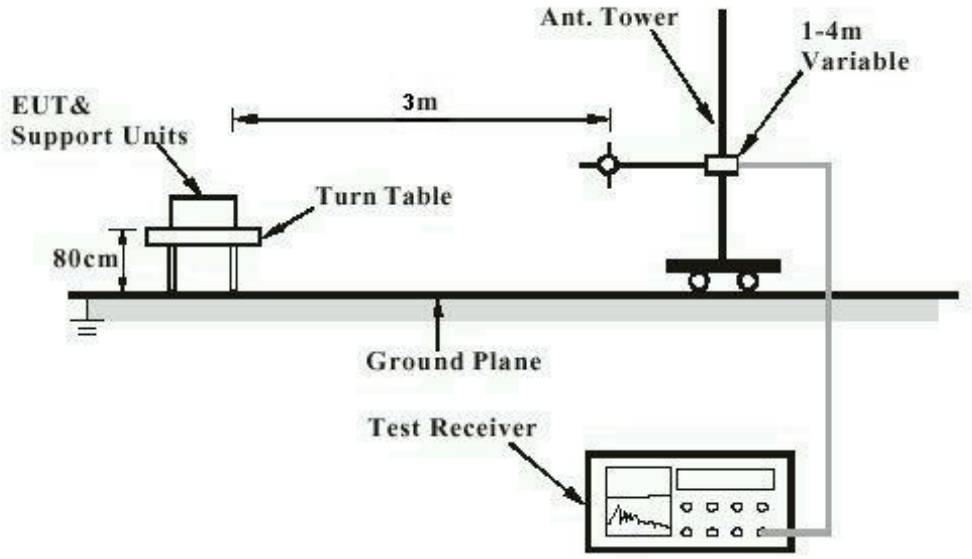


**Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)**

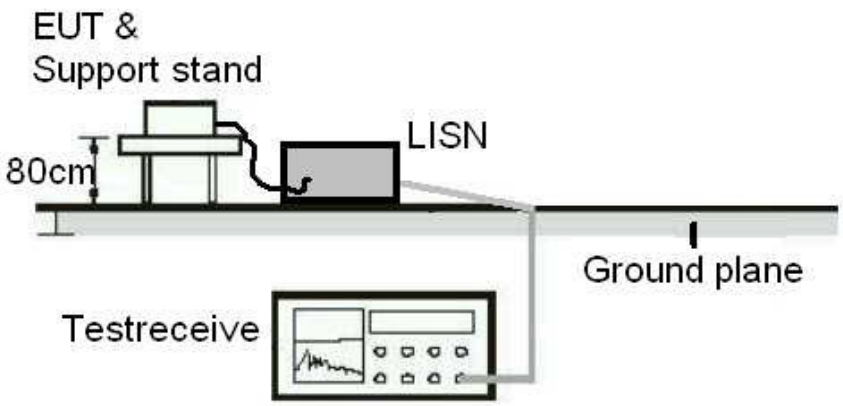
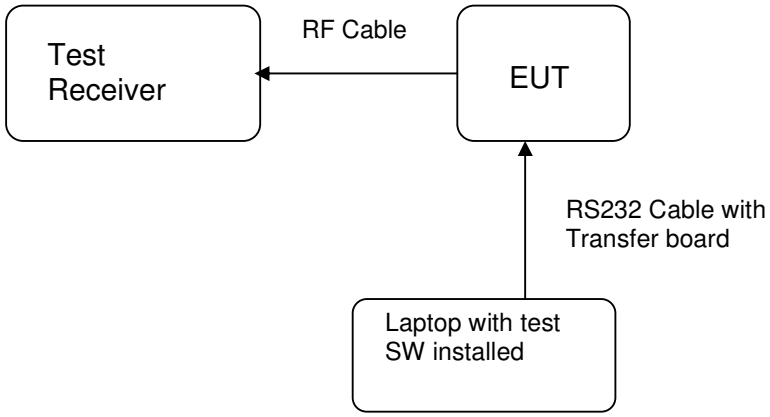



**Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement**



# 5. Test Results

## 5.1 Transmitter Requirement & Test Suites

### 5.1.1 Antenna Requirement

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | FCC Part 15.247(b)(4), Part 15.203 and RSS-Gen 7.1.4 |
| Limit | : | the use of antennas with directional gains that do not exceed 6 dBi |

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 0.5 dBi dBi. The antenna is a Chip Antenna soldered to the PCB with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

## 5.1.2 Peak Output Power

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | FCC Part 15.247(b)(3), RSS-210 A8.4(4) |
| Basic standard | : | ANSI C63.10:2009, KDB558074 |
| Limit | : | 1 Watt |
| Kind of test site | : | Shielded room |

**Test setup**

| | | |
|---|---|---|
| Test Channel | : | Low/ Middle/ High |
| Operation Mode | : | A |

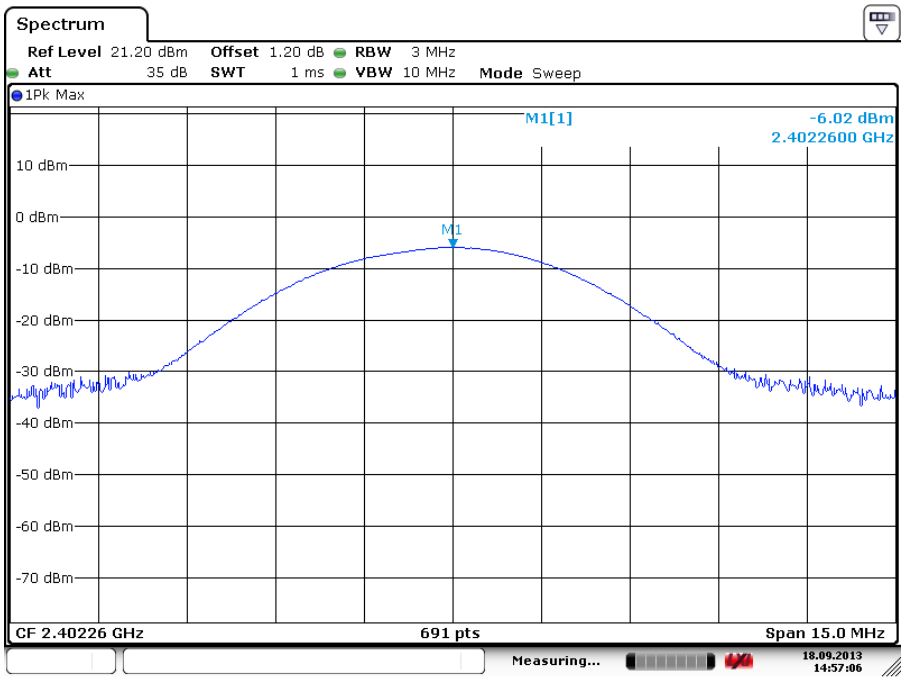
| | | |
|---|---|---|
| Ambient temperature | : | 22-26 °C |
| Relative humidity | : | 50-65 % |
| Atmospheric pressure | : | 100-103 kPa |

**Table 6: Test result of Peak Output Power, GFSK modulation**

| Channel | Channel Frequency (MHz) | Peak Output Power | | Limit |
|---|---|---|---|---|
| | | (dBm) | (W) | (W ) |
| Low Channel | 2402 | -6.02 | 0.0003 | 1 |
| Mid Channel | 2442 | -4.38 | 0.0004 | 1 |
| High Channel | 2480 | -3.99 | 0.0004 | 1 |

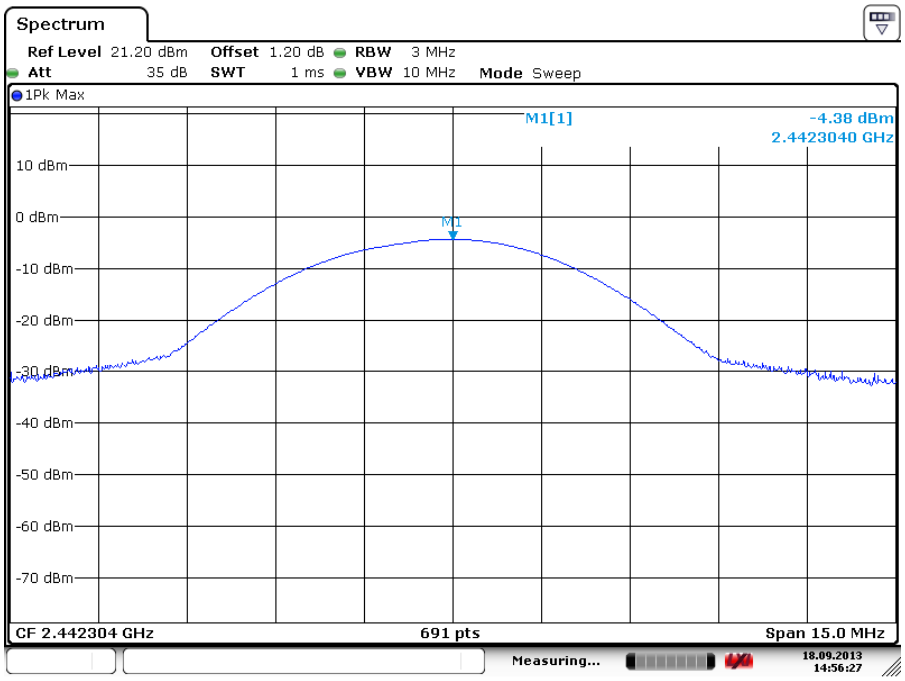
# Test Plot of Peak Output Power, GFSK modulation

## Low Channel



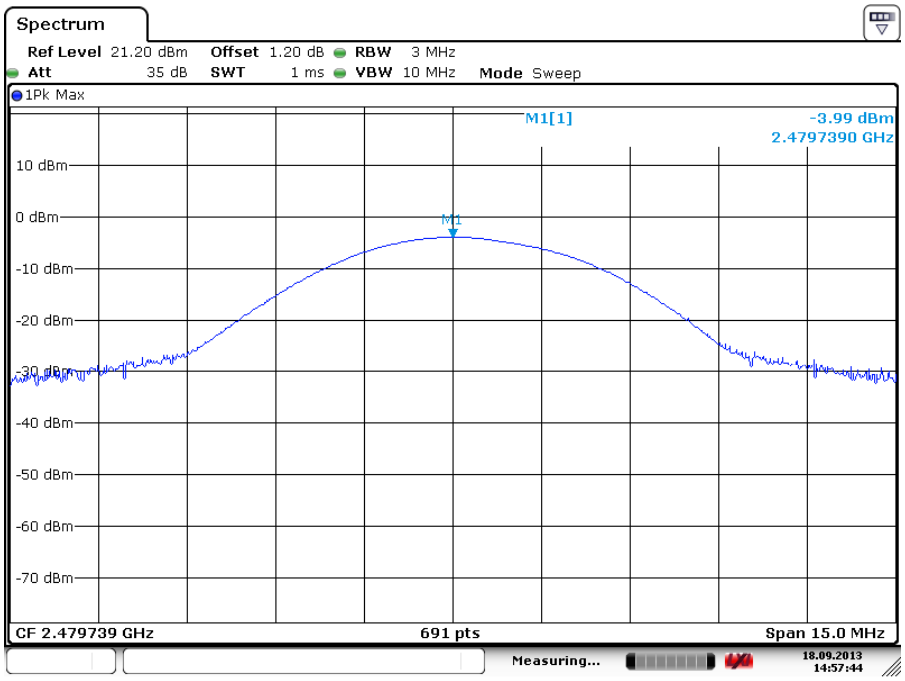

Date: 18.SEP.2013 14:57:05

## Middle Channel




Date: 18.SEP.2013 14:56:27

### High Channel




Date: 18.SEP.2013 14:57:44

## 5.1.3 6dB Bandwidth and 99% Bandwidth

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | FCC Part 15.247(a)(2), RSS-210 A8.2(1) |
| Basic standard | : | ANSI C63.10:2009, KDB558074 |
| Kind of test site | : | Shielded room |

**Test setup**

| | | |
|---|---|---|
| Test Channel | : | Low/ Middle/ High |
| Operation Mode | : | A |

| | | |
|---|---|---|
| Ambient temperature | : | 22-26°C |
| Relative humidity | : | 50-65% |
| Atmospheric pressure | : | 100-103 kPa |

**Table 7: Test result of 6 dB Bandwidth, GFSK modulation**

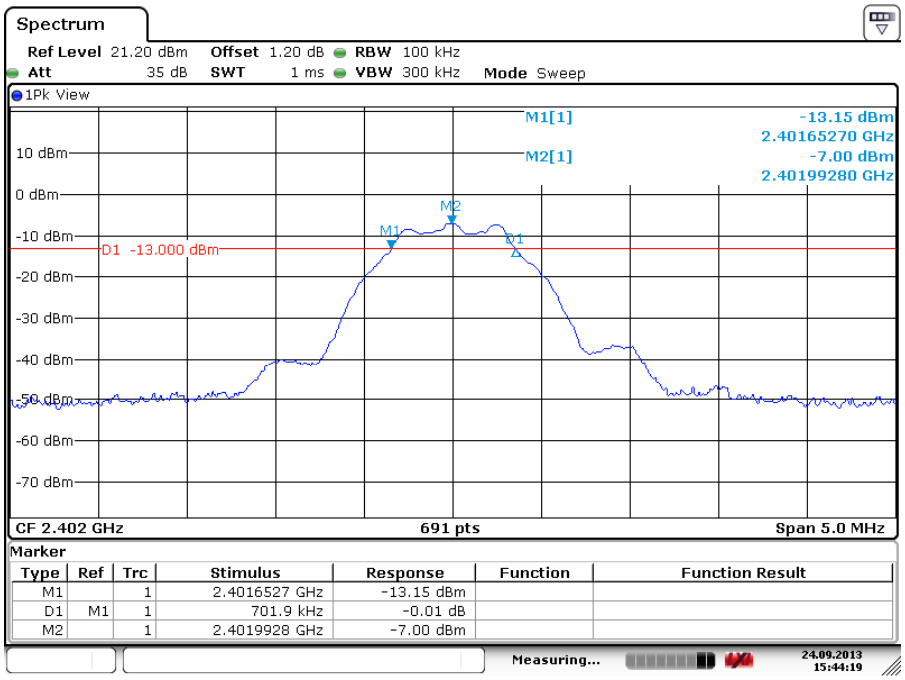
| Channel | Channel Frequency (MHz) | 6 dB Bandwidth (kHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| Low Channel | 2402 | 701.9 | > 500 | Pass |
| Mid Channel | 2442 | 687.4 | > 500 | Pass |
| High Channel | 2480 | 694.7 | > 500 | Pass |

**Table 8: Test result of 99% Bandwidth, GFSK modulation**

| Channel | Channel Frequency (MHz) | 99% Bandwidth (MHz) | |
|---|---|---|---|
| Low Channel | 2402 | 1.020 | |
| Mid Channel | 2442 | 1.020 | |
| High Channel | 2480 | 1.005 | |

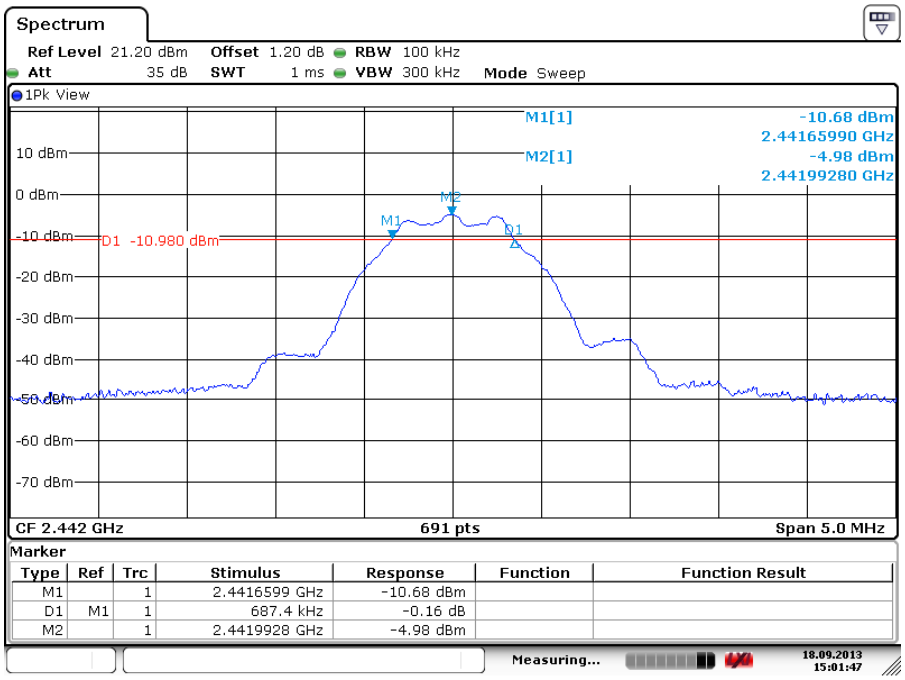
# Test Plot of 6dB Bandwidth, GFSK modulation

## Low Channel



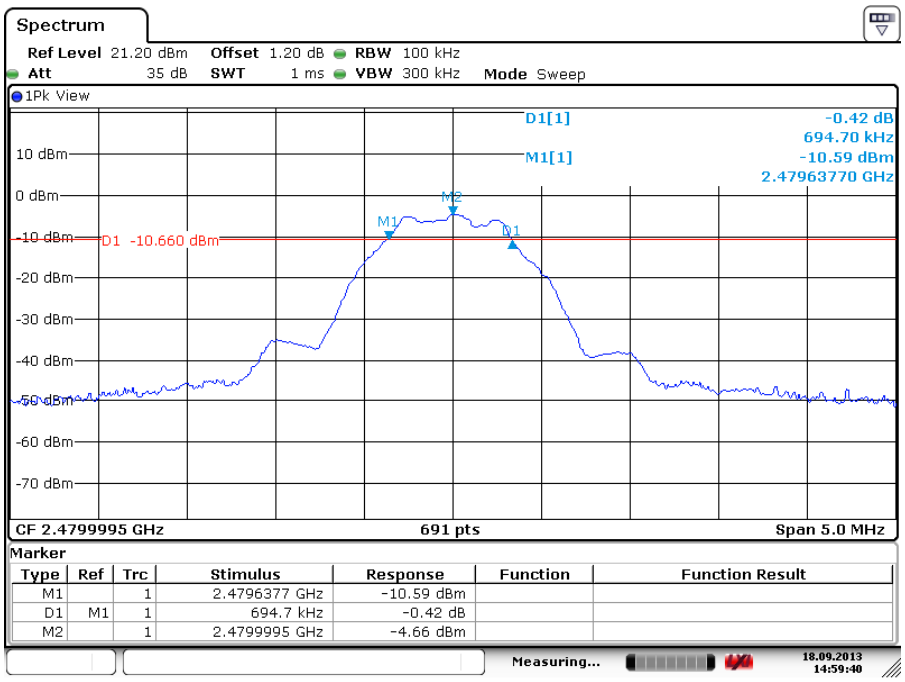

Date: 24.SEP.2013 15:44:19

## Middle Channel




Date: 18.SEP.2013 15:01:47

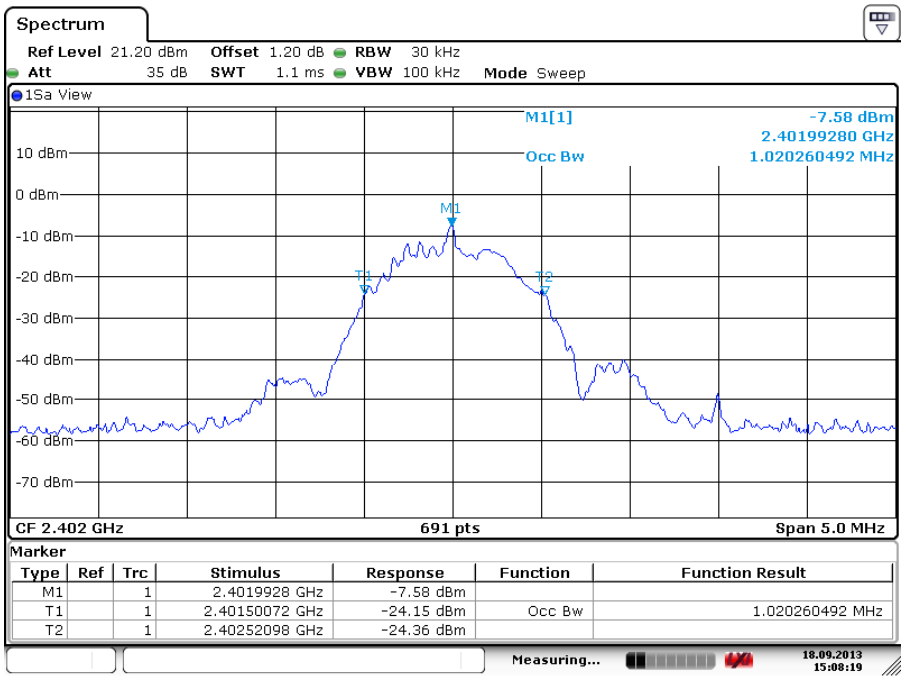
### High Channel




Date: 18.SEP.2013 14:59:40

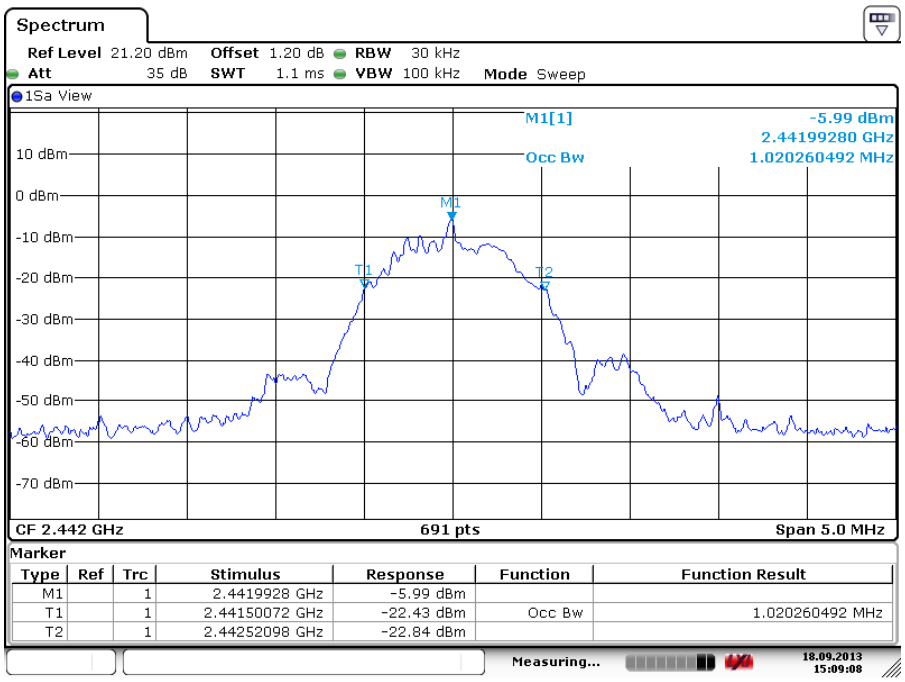
## Test Plot of 99% Bandwidth, GFSK modulation

### Low Channel



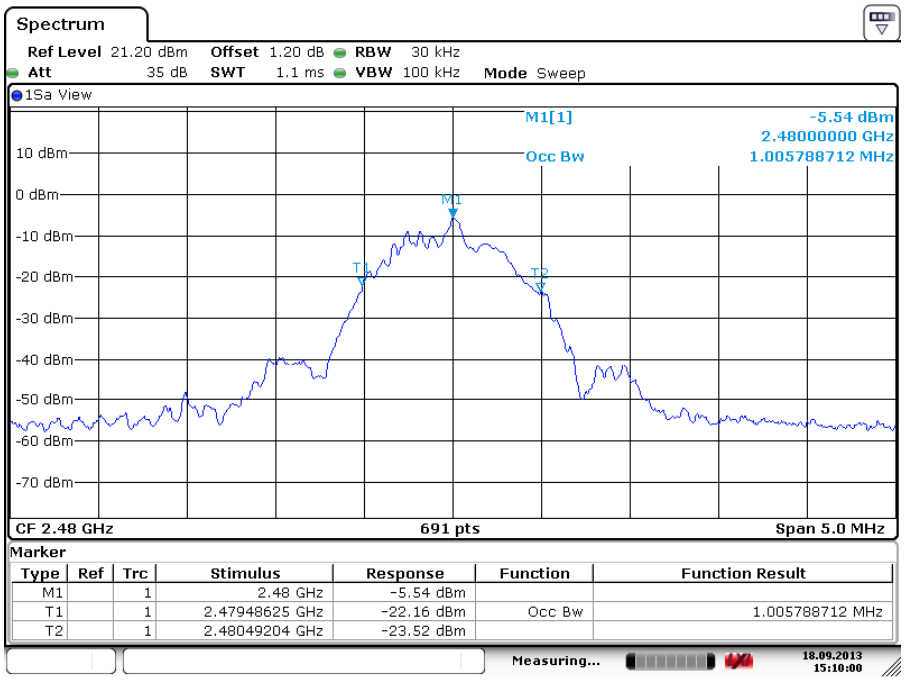

Date: 18.SEP.2013 15:08:19

### Middle Channel




Date: 18.SEP.2013 15:09:07

## High Channel




Date: 18.SEP.2013 15:10:00

## 5.1.4 Power Density

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | FCC Part 15.247(e) , RSS-210 A8.2(2) |
| Basic standard | : | ANSI C63.10:2009, KDB558074 |
| Kind of test site | : | Shielded room |

**Test setup**

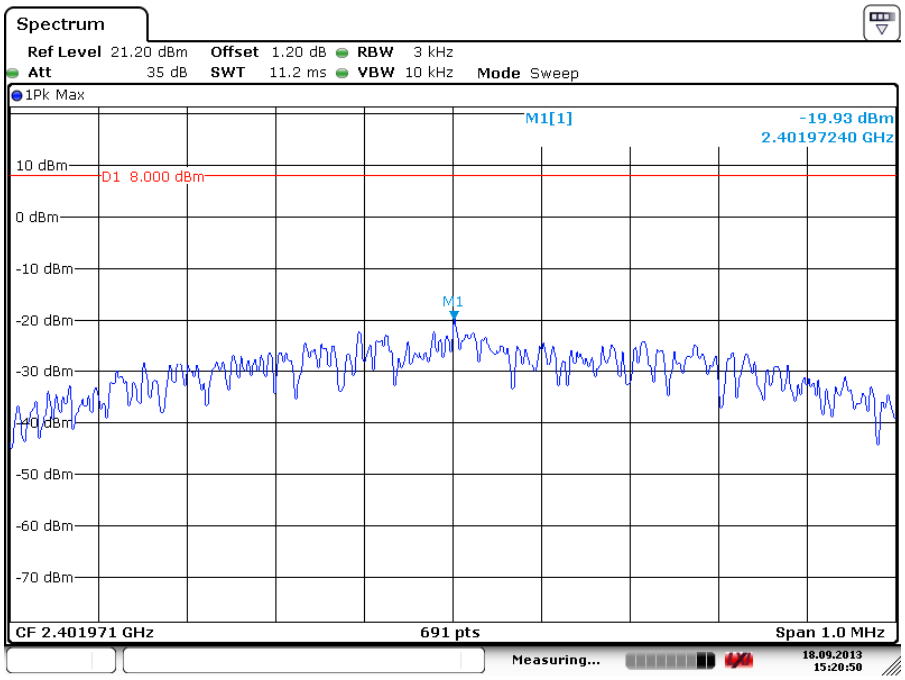
| | | |
|---|---|---|
| Test Channel | : | Low/ Middle/ High |
| Operation Mode | : | A |
| Ambient temperature | : | 22-26°C |
| Relative humidity | : | 50-65% |
| Atmospheric pressure | : | 100-103 kPa |

**Table 9: Test result of Power Density, GFSK modulation**

| Channel | Channel Frequency (MHz) | Peak Power Density (dBm/100kHz) | Peak Power Density (dBm/3kHz) | Limit (dBm/ 3kHz) | Result |
|---|---|---|---|---|---|
| Low Channel | 2402 | -4.7 | -19.93 | 8 | Pass |
| Mid Channel | 2442 | -3.46 | -18.69 | 8 | Pass |
| High Channel | 2480 | -4.68 | -19.91 | 8 | Pass |

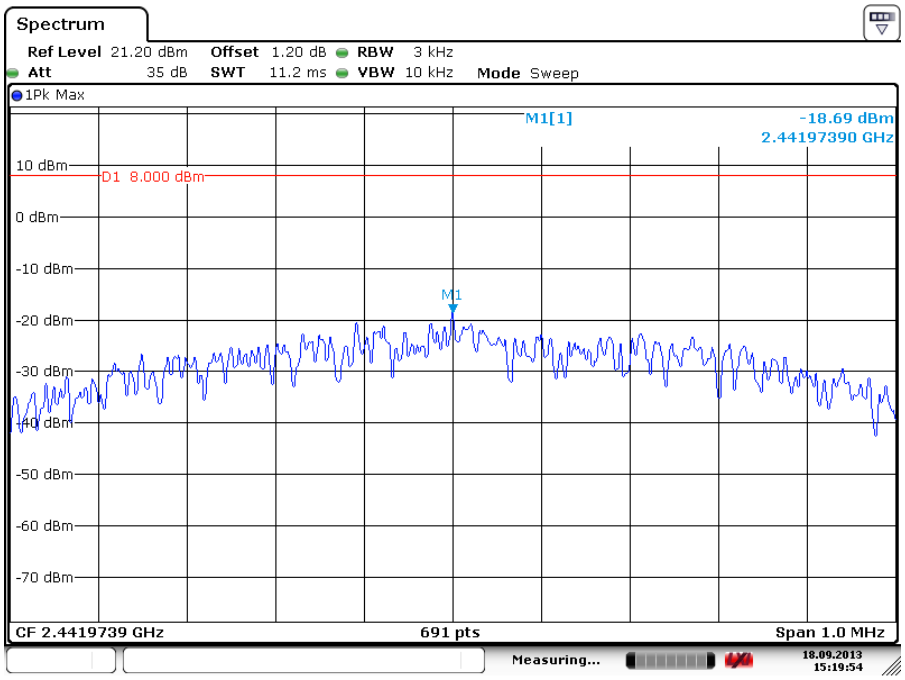
# Test Plot of Power Density, GFSK modulation

## Low Channel



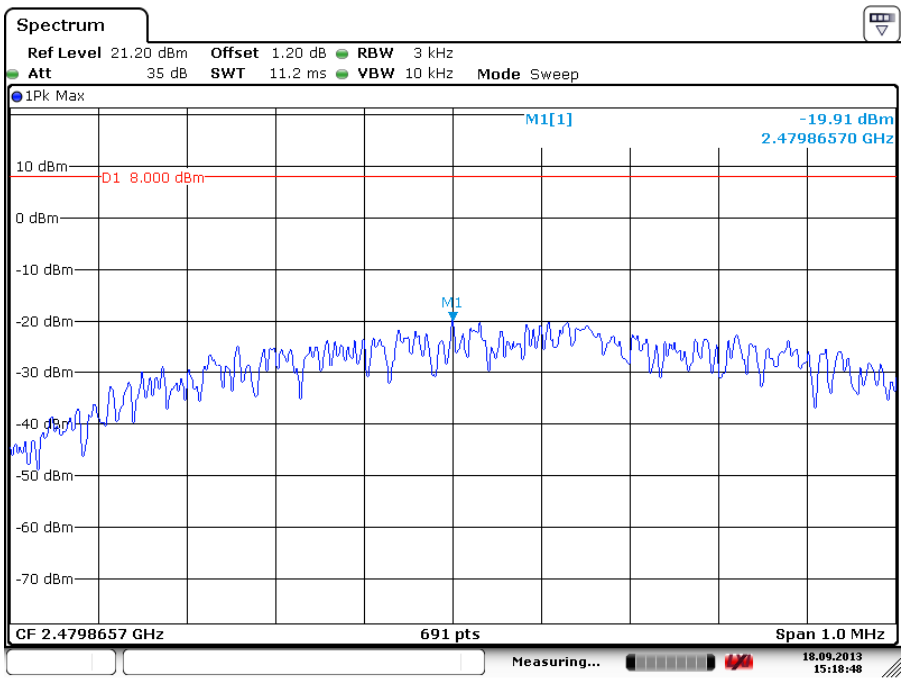

Date: 18.SEP.2013 15:20:50

## Middle Channel




Date: 18.SEP.2013 15:19:54

## High Channel




Date: 18.SEP.2013 15:18:47

## 5.1.5 Conducted spurious emissions and Frequency Band Edge measured in 100kHz Bandwidth

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | FCC part 15.247(d), RSS-210 A8.5 |
| Basic standard | : | ANSI C63.10:2009, KDB558074 |
| Limit | : | 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power) |
| Kind of test site | : | Shielded room |

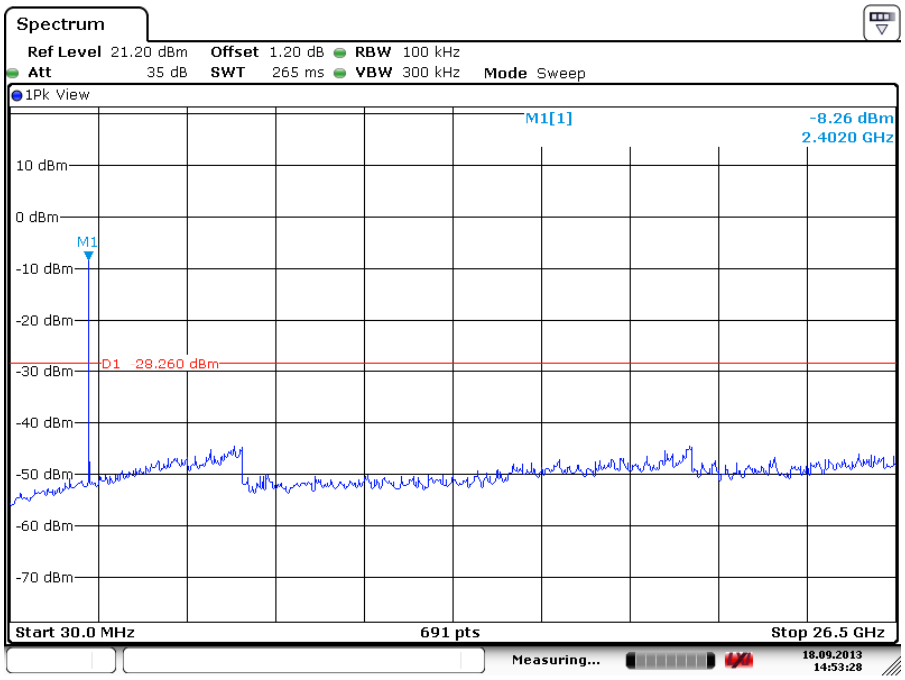
**Test setup**

| | | |
|---|---|---|
| Test Channel | : | Low/ High |
| Operation mode | : | A |
| Ambient temperature | : | 22-26°C |
| Relative humidity | : | 50-65% |
| Atmospheric pressure | : | 100-103 kPa |

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achived as well.
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

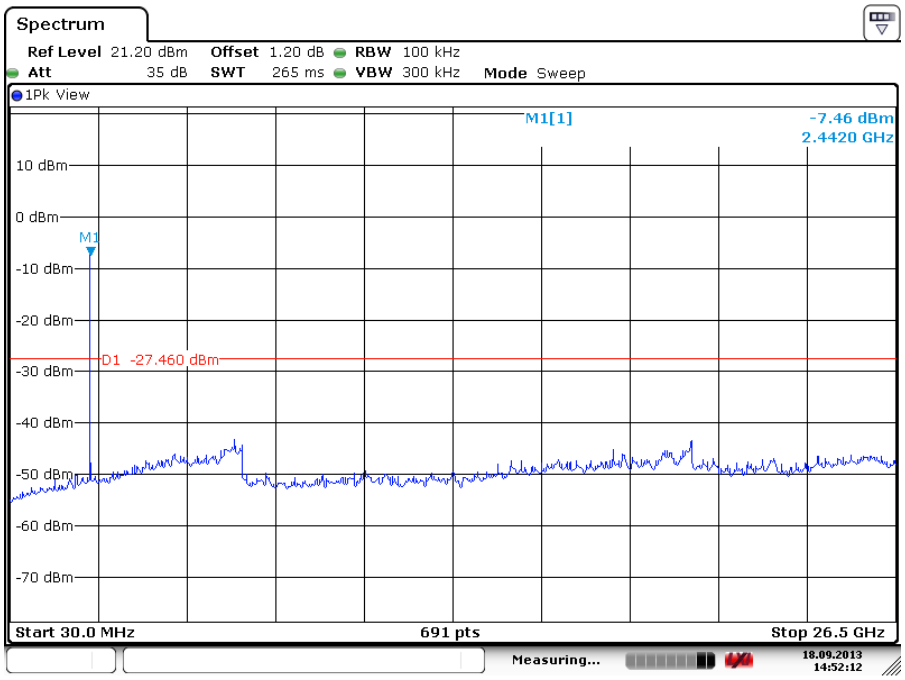
# Test Plot of 100kHz Conducted Emissions, GFSK modulation

## Low Channel



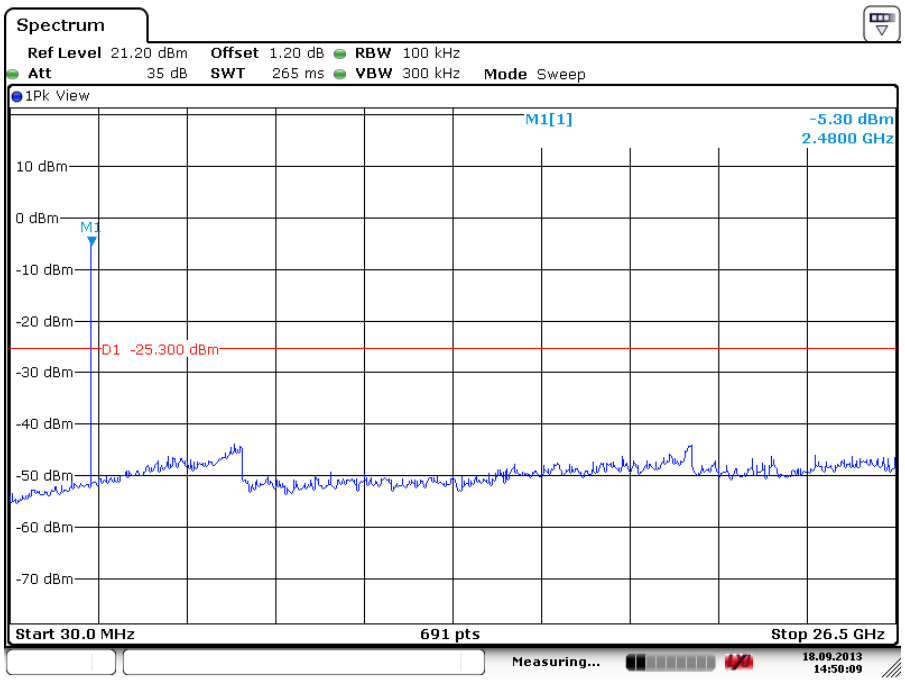

Date: 18.SEP.2013 14:53:28

## Middle Channel




Date: 18.SEP.2013 14:52:12

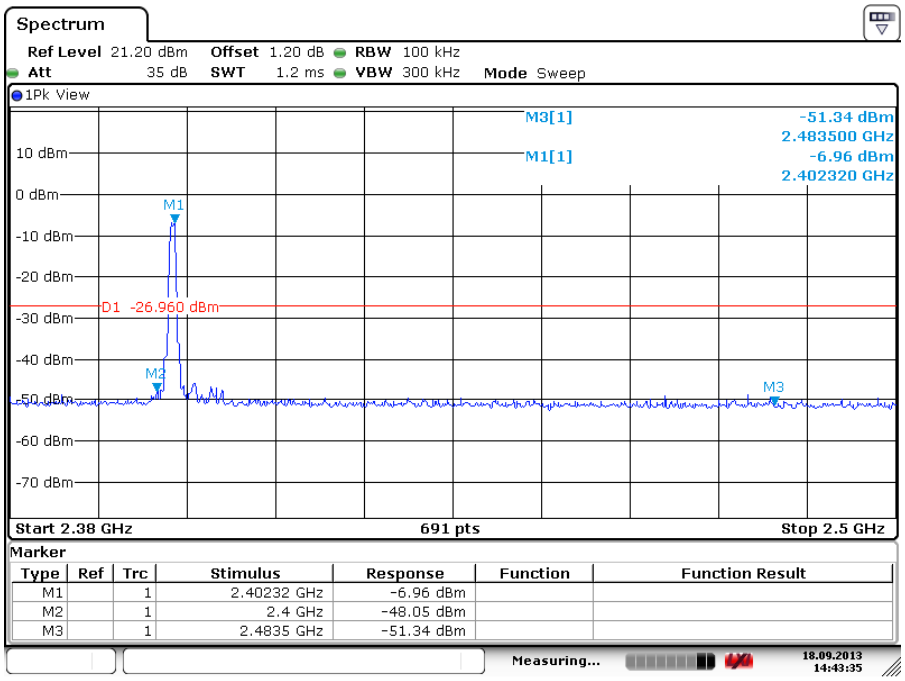
### High Channel




Date: 18.SEP.2013 14:50:09

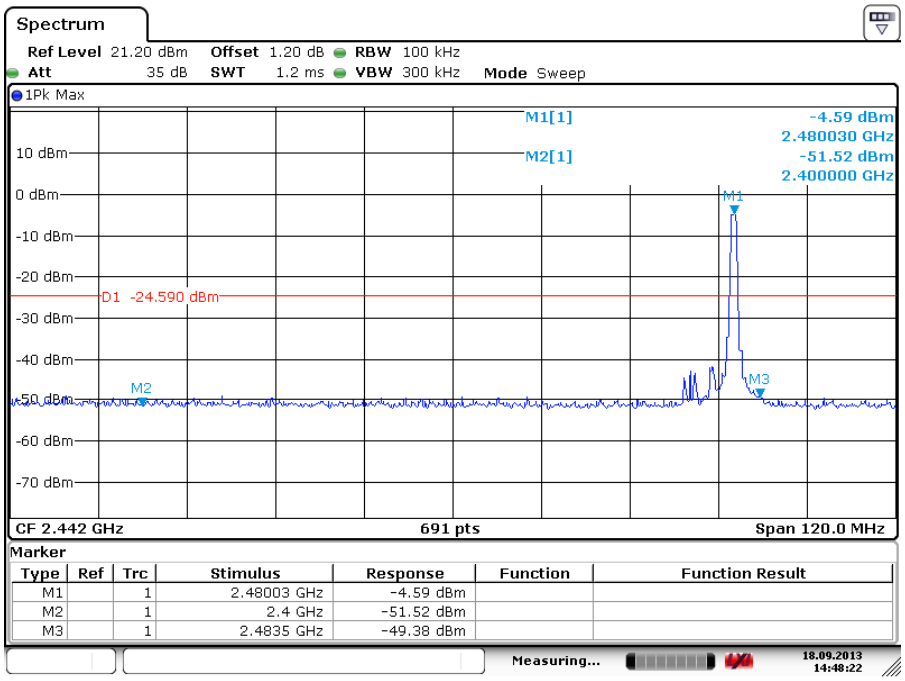
# Test Plot of 100kHz Bandwidth of Frequency Band Edge, GFSK modulation

## Low Channel




Date: 18.SEP.2013 14:43:35

## High Channel




Date: 18.SEP.2013 14:48:21

## 5.1.6 Spurious Emission

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | FCC part 15.247(d), FCC 15.205, FCC 15.209, RSS-210 2.2, RSS-210 A8.5 and RSS-Gen 7.2.1 |
| Basic standard | : | ANSI C63.10: 2009 |
| Limits | : | Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a), must comply with the radiated emission limits specified in FCC 15.209(a). Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in FCC 15.209(a) and FCC 15.249(a). |
| Kind of test site | : | 3m Semi-Anechoic Chamber |

**Test setup**

| | | |
|---|---|---|
| Test Channel | : | Low/ Middle/ High |
| Operation mode | : | A, C |

Remark: Testing was carried out within frequency range 30MHz to the tenth harmonic.

For details refer to Appendix D.

The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The X Axis orientation is the worst-case and recorded in this test report. Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

# 6. Safety Human exposure

## 6.1 Radio Frequency Exposure Compliance

### 6.1.1 Electromagnetic Fields

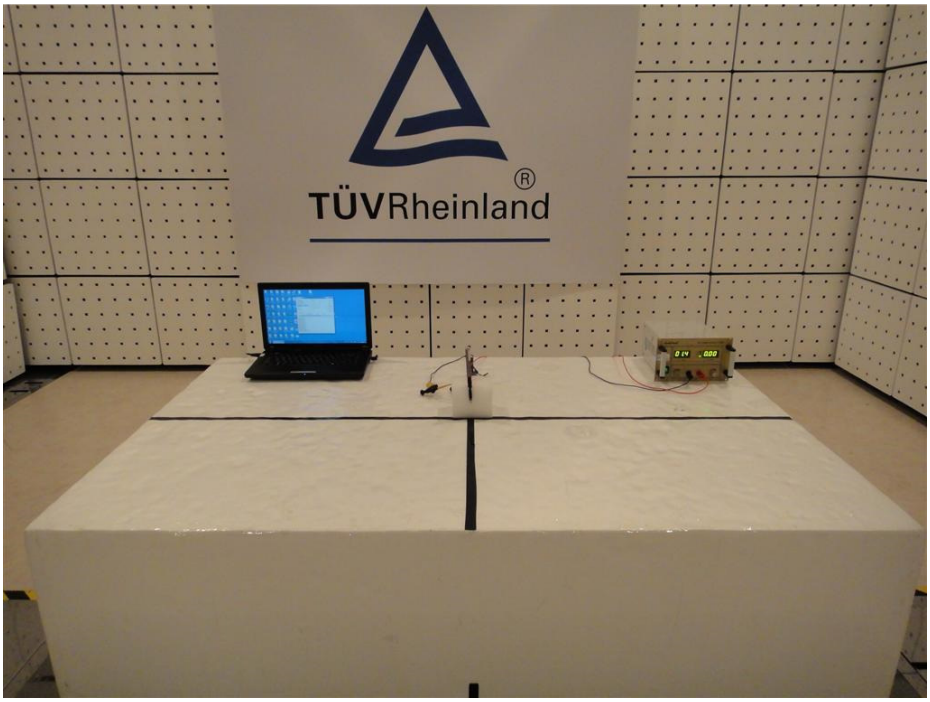
**RESULT:** **Passed**

Test standard : FCC KDB Publication 447498 D01 v05

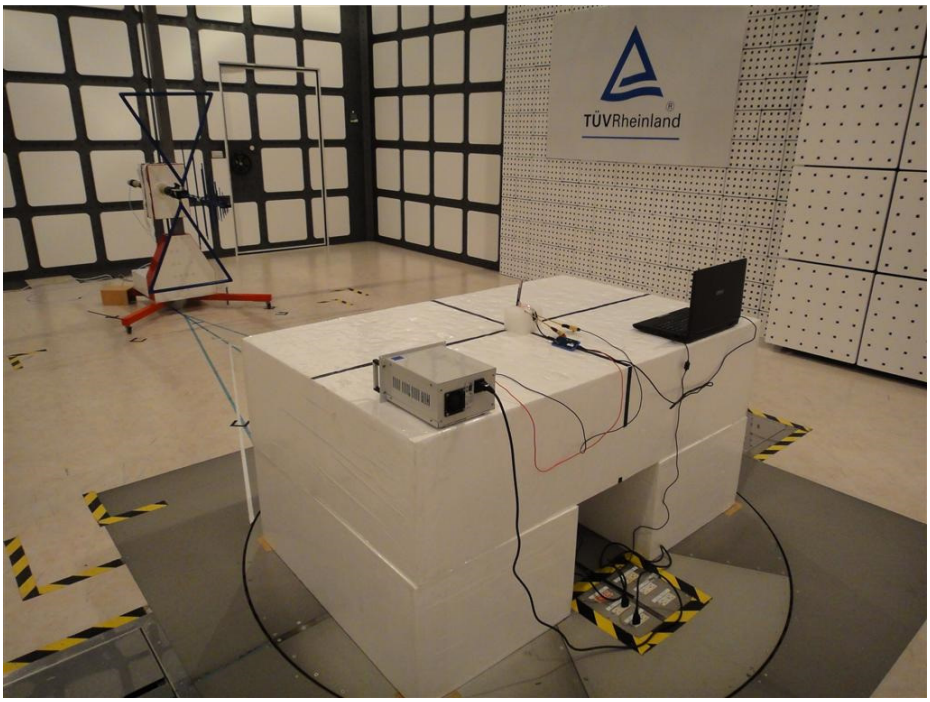
Since maximum peak output power of the transmitter is 0.4 mW < 1mW, hence the EUT is exclueded from SAR evaluation according to FCC KDB publication 447498 D01 v05: Mobile Portable RF Exposure.

# 7. Photographs of the Test Set-Up

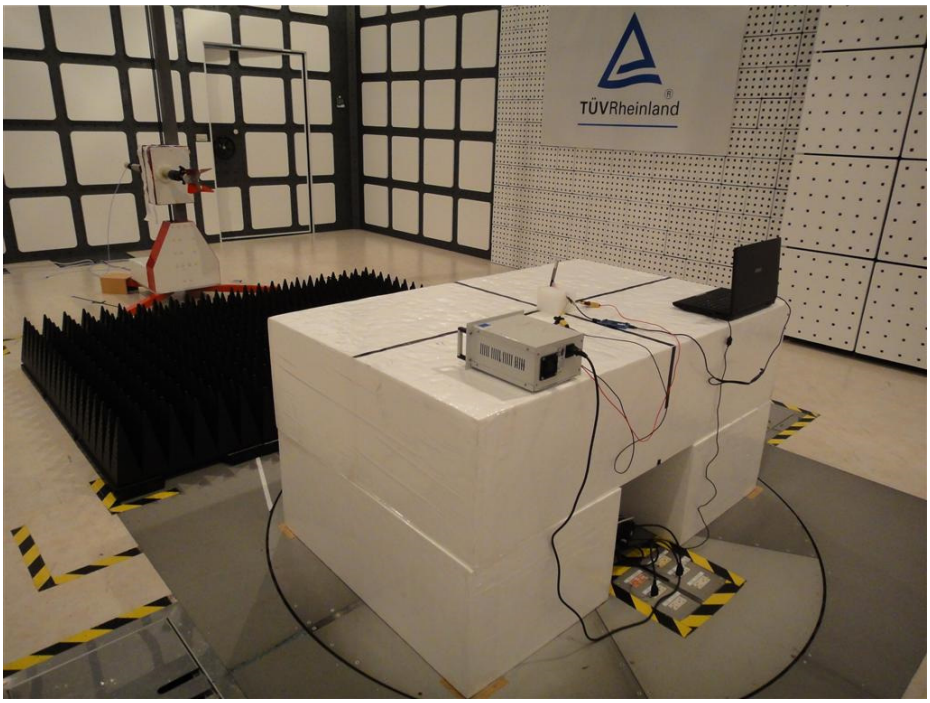
**Photograph 1: Set-up for Spurious Emissions (Front View)**



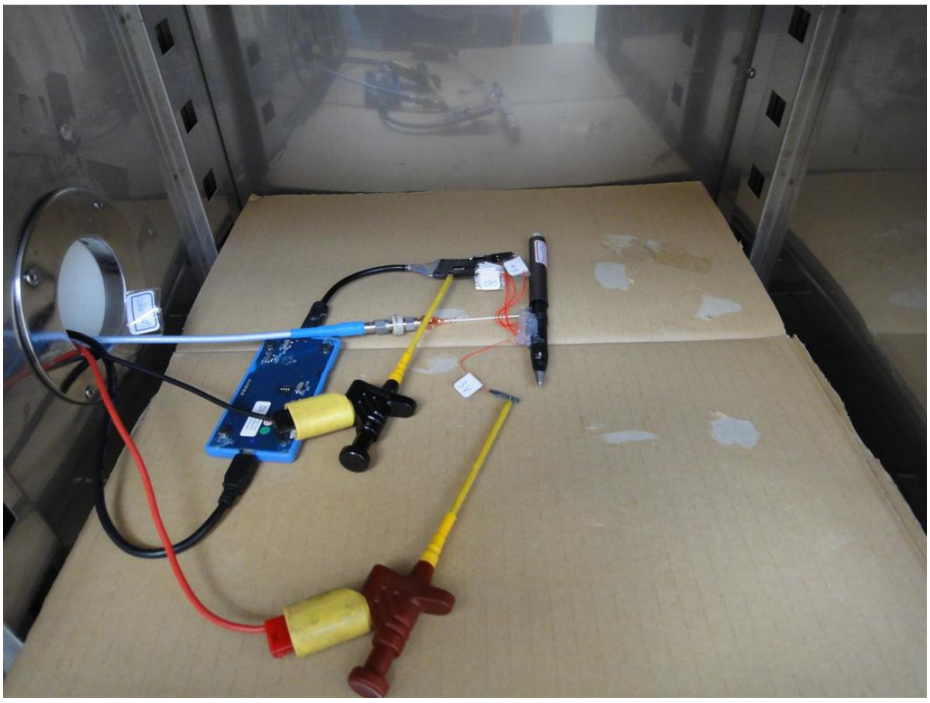
## Photograph 2: Set-up for Spurious Emissions (Back View 1)



### Photograph 3: Set-up for Spurious Emissions (Back View 2)




### Photograph 4: Set-up for Conducted testing



# 8. List of Tables



# 9. List of Photographs