TÜVRheinland®

Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**10039675 001**		**Seite 1 von 30** *Page 1 of 30*
Auftraggeber: *Client:*	**Adonit Co., Ltd.** Rm. A, 9F No.107 Sec.4 Ren-Ai Rd.,Da-An Dist. Taipei 10689, Taiwan, R.O.C.		
Gegenstand der Prüfung: *Test item:*	Bluetooth touch pen		
Bezeichnung: *Identification:*	032	**Serien-Nr.:** *Serial No.:*	N/A
Wareneingangs-Nr.: *Receipt No.:*	TPE78531	**Eingangsdatum:** *Date of receipt:*	26 Nov. 2012
Zustand des Prüfgegenstandes bei Anlieferung: **Condition of test item at delivery:**	The sample is ok for testing and not damaged		
Prüfort: *Testing location:*	**TÜV Rheinland Taiwan Ltd.** 11F., No.758, Sec. 4, Bade Rd., Songshan Dist., Taipei City 105 Taiwan **FCC Registration No.: 365730**		
Prüfgrundlage: *Test specification:*	**FCC CFR47 Part 15: Subpart C Section 15.247**		
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test item passed the test specification(s).*		
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland Taiwan Ltd.** **11F., No.758, Sec. 4, Bade Rd., Songshan Dist., Taipei City 105, Taiwan, R.O.C.**		

geprüft/ *tested by:*			**kontrolliert/** *reviewed by:*		
2013-01-21	Arvin Ho/Department Manager		2013-01-24	Rene Charton/Senior Project Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges/ *Other Aspects:*

Abkürzungen:				*Abbreviations:*			
	P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*
	F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*
	N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*
	N/T	=	*nicht getestet*		*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
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 4
1.1 Complementary Materials 4
2. Test Sites 5
2.1 Test Facilities 5
2.2 List of Test and Measurement Instruments 6
2.3 Traceability 6
2.4 Calibration 7
2.5 Measurement Uncertainty 7
3. General Product Information 8
3.1 Product Function and Intended Use 8
3.2 Ratings and System Details 8
3.3 Independent Operation Modes 9
3.4 Noise Generating and Noise Suppressing Parts 9
3.5 Submitted Documents 9
4. Test Set-up and Operation Modes 10
4.1 Principle of Configuration Selection 10
4.2 Test Operation and Test Software 10
4.3 Special Accessories and Auxiliary Equipment 10
4.4 Countermeasures to achieve EMC Compliance 11
4.5 Test Setup Diagram 11
5. Test Results 13
5.1 Transmitter Requirement & Test Suites 13
5.1.1 Antenna Requirement 13
5.1.2 Peak Output Power 14
5.1.3 6dB Bandwidth 17
5.1.4 Power Density 20
5.1.5 Conducted spurious emissions and Frequency Band Edge measured in 100kHz Bandwidth 23
5.1.6 Spurious Emission 26
6. Safety Human exposure 27
6.1 Radio Frequency Exposure Compliance 27
6.1.1 Electromagnetic Fields 27
7. Photographs of the Test Set-Up 28
8. List of Tables 30
9. List of Photographs 30

1. General Remarks

1.1 Complementary Materials

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

Appendix 1: Photo
(File:10039675APPENDIX1)
Appendix 2: Test Result of Radiated Emissions
(File:10039675APPENDIX2)

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 ANSI C63.4:2009, 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	1166.5950K07-100797-Pt	20-Dec-13
Bilog Antenna	TESEQ	CBL6111D	29802	29-Jun-13
Pre-Amplifier	HP	8447F	2805A03335	14-Sep-13
Spectrum Analyzer	R&S	FSV 40	100921	13-Dec-13
Horn Antenna (1GHz~18GHz)	COM-POWER	AHA118	701251	28-Sep-13
Horn Antenna (18GHz~40GHz)	COM-POWER	AH840	101031	2-Nov-13
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	14-Sep-13
Preamplifier (18 GHz -40 GHz)	COMPOWER	PAM-840	461257	17-Sep-13
Power meter	R&S	NRVD	100439	27-Mar-13
Power sensor	R&S	NRV-Z1	100013	27-Mar-13
Temp. & Humid. Chamber	Giant Force	GCT-099-40-S	MAF0103-007	13-May-13
Signal Generator	R&S	SMU200	104260	13-Aug-13
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	28-Sep-13

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 tested sample is a “Bluetooth touch pen”, which is used to control iPhone/iPad via Bluetooth connection. This sample can also be charged via USB port of host PC. For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 Ratings and System Details

Table 4: Technical Specification of EUT

Technical Specification	Value
Kind of Equipment	Bluetooth touch pen
Brand Name	Adonit Co., Ltd.
FCC ID	ZCC-J10002
Type Designation	032
Operating Frequencies	2402 MHz ~ 2480 MHz
Channel Spacing	2 MHz
Channel number	40
Operation Voltage	3.3 V
Modulation	GFSK
Antenna gain	0.5 dBi

3.3 Independent Operation Modes

The 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

Test operation refers to test setup in chapter 4. All testing were performed according to the procedures in ANSI C63.10: 2009 and DA 00-705 of March 30, 2000.

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	MSI4532 (CX420MX)	CX420 MX-233TWK 1008000096

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

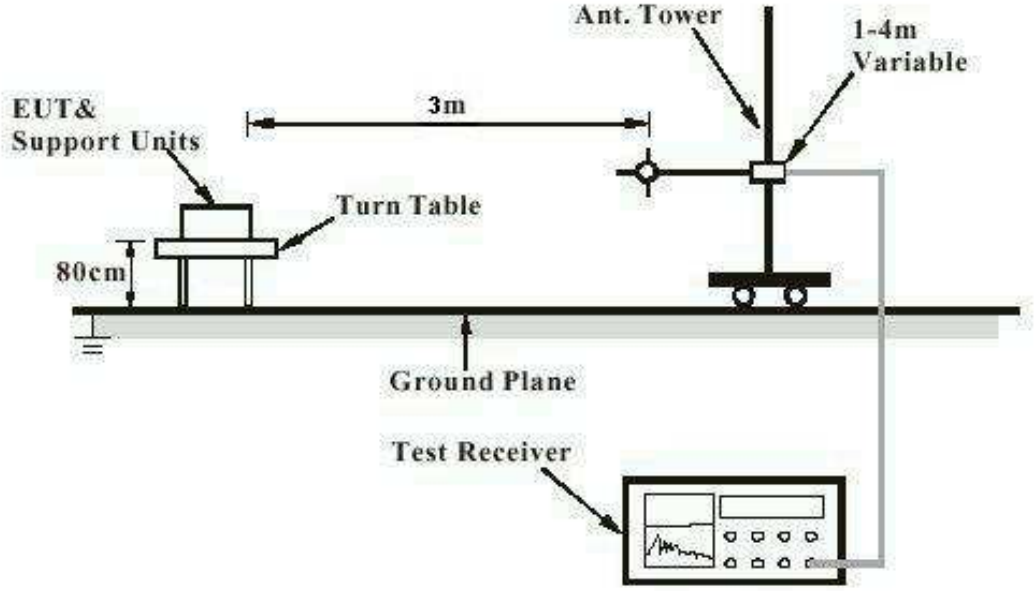


Diagram of Measurement Equipment Configuration for Mains Conduction Measurement

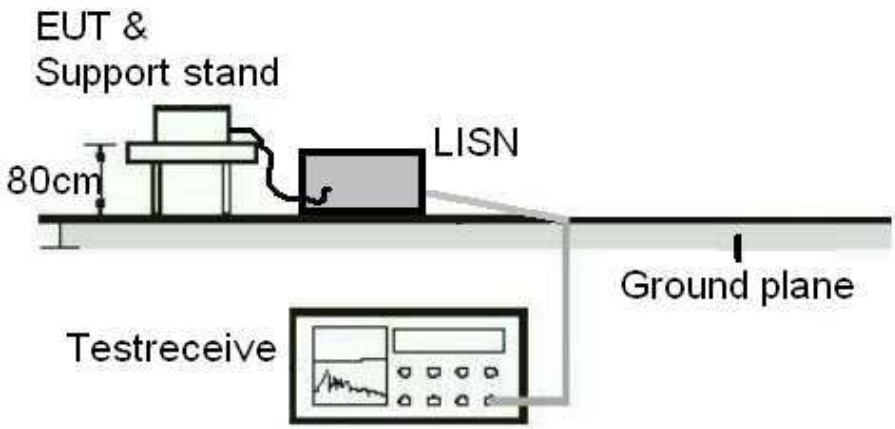
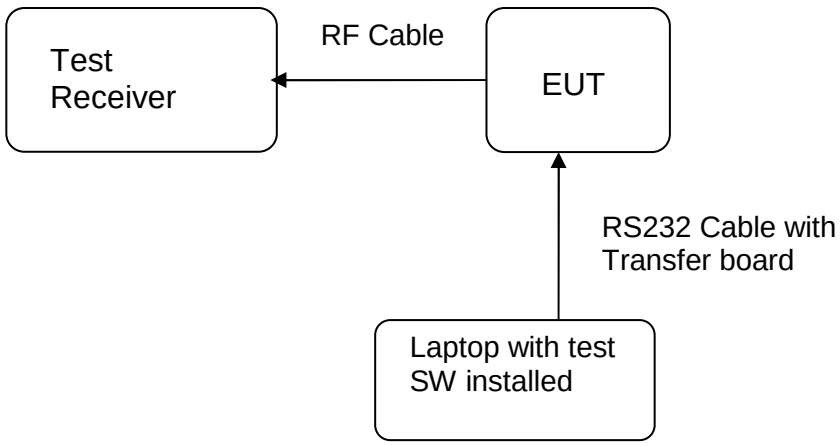


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Passed**

Test date	:	2012-12-12
Test standard	:	FCC Part 15.247(b)(4), Part 15.203
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an internal antenna with an directional gain of 0.5 dBi, and the antenna is a printed PCB trace with no possibility of replacement. Therefore, the EUT is considered to comply the provision.

Refer to EUT photo for details.

5.1.2 Peak Output Power

RESULT: **Passed**

Test date	:	2012-12-12
Test standard	:	FCC Part 15.247(b)(1)
Basic standard	:	ANSI C63.4:2009, KDB558074
Limit	:	1 Watt
Kind of test site	:	Shielded room

Test setup

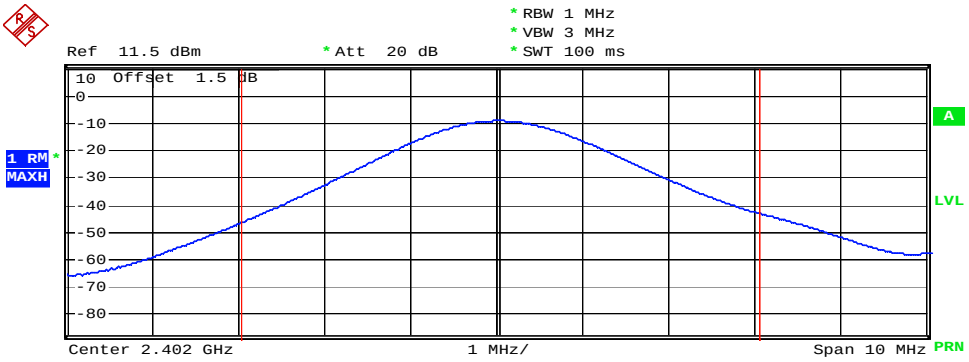
Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

Table 5: Test result of Peak Output Power, GFSK modulation

Channel	Channel Frequency	Peak Output Power		Limit
	(MHz)	(dBm)	(W)	(W)
Low Channel	2402	-7.72	0.0002	1
Middle Channel	2442	-5.78	0.0003	1
High Channel	2480	-5.29	0.0003	1

Test Plot of Peak Output Power, GFSK modulation

Low Channel



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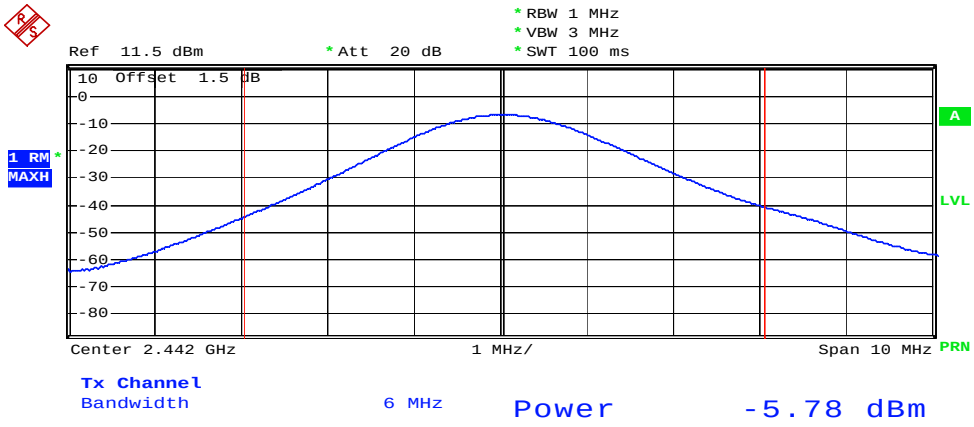
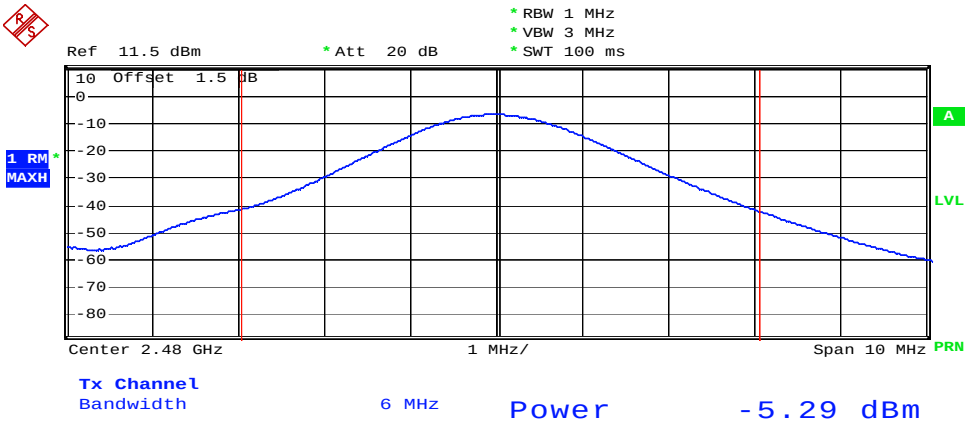
Middle Channel



Date: 12.DEC.2012 13:11:00

High Channel



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5.1.3 6dB Bandwidth

RESULT: **Passed**

Date of testing	:	2012-12-12
Test standard	:	FCC Part 15.247(a)(1)
Basic standard	:	ANSI C63.4:2009, KDB558074
Kind of test site	:	Shielded room

Test setup

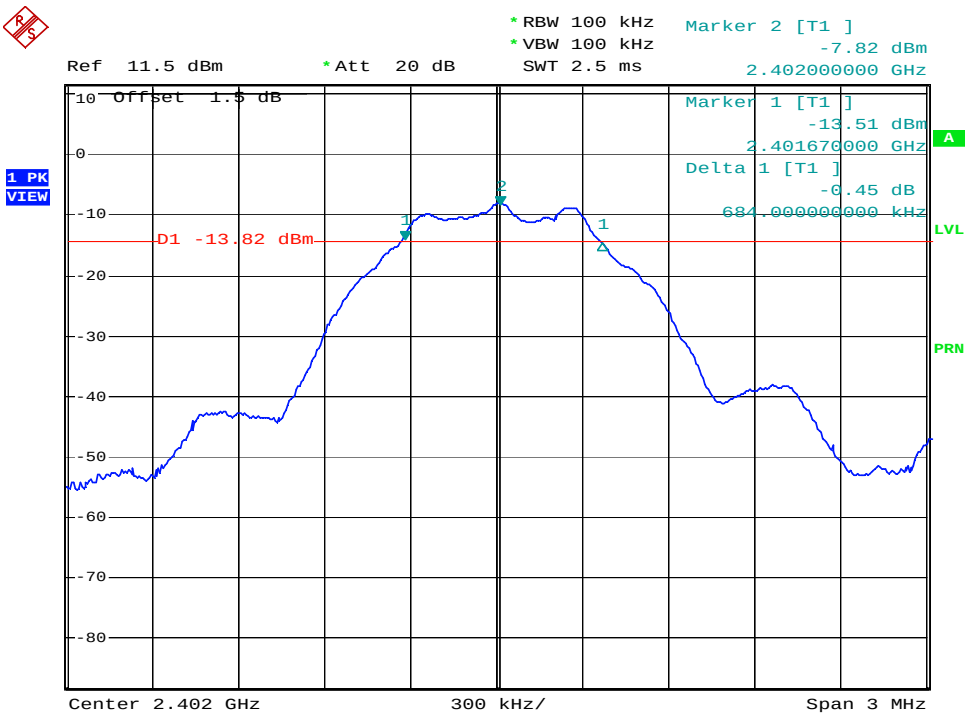
Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

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

Channel	Channel Frequency (MHz)	6 dB Bandwidth (kHz)	Limit (MHz)	Result
Low Channel	2402	684	/	Pass
Mid Channel	2442	684	/	Pass
High Channel	2480	690	/	Pass

Test Plot of 6dB Bandwidth, GFSK modulation

Low Channel



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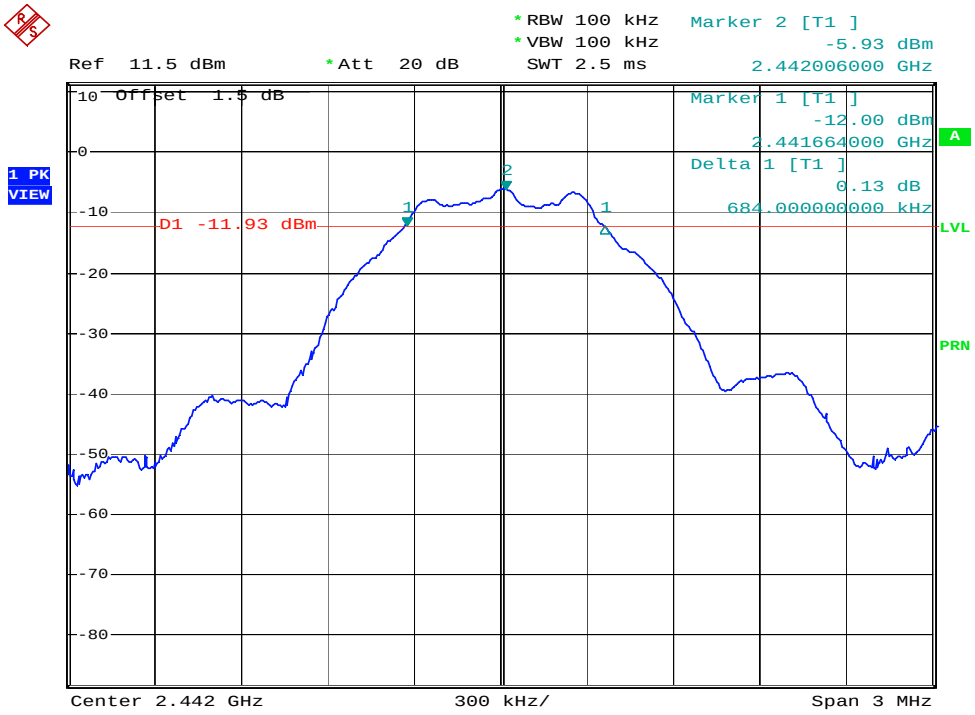
Middle Channel



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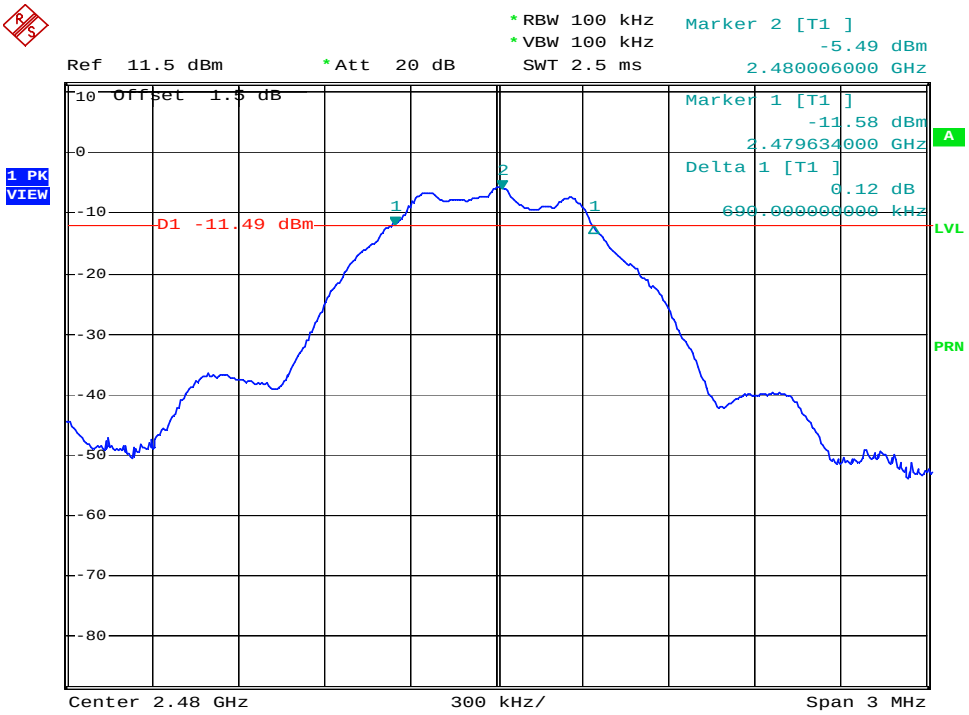
High Channel



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5.1.4 Power Density

RESULT: **Passed**

Date of testing	:	2012-12-12
Test standard	:	FCC Part 15.247(e)
Basic standard	:	ANSI C63.4:2009, KDB558074
Kind of test site	:	Shielded room

Test setup

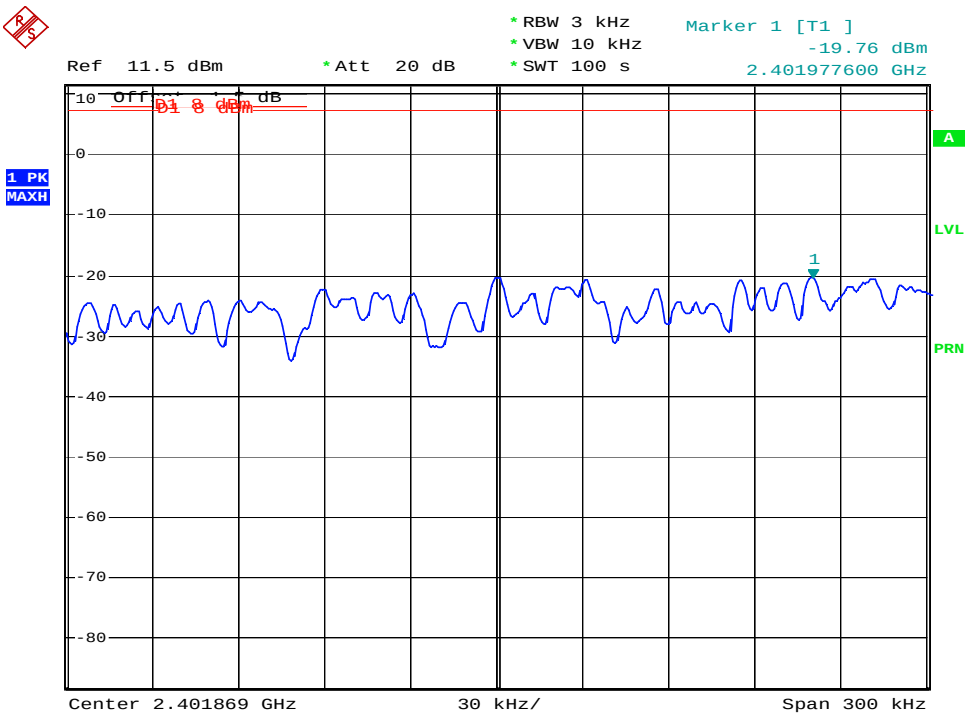
Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

Table 7: Test result of Power Density, GFSK modulation

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	2402	-19.76	8	Pass
Mid Channel	2442	-18.14	8	Pass
High Channel	2480	-17.89	8	Pass

Test Plot of Power Density, GFSK modulation

Low Channel



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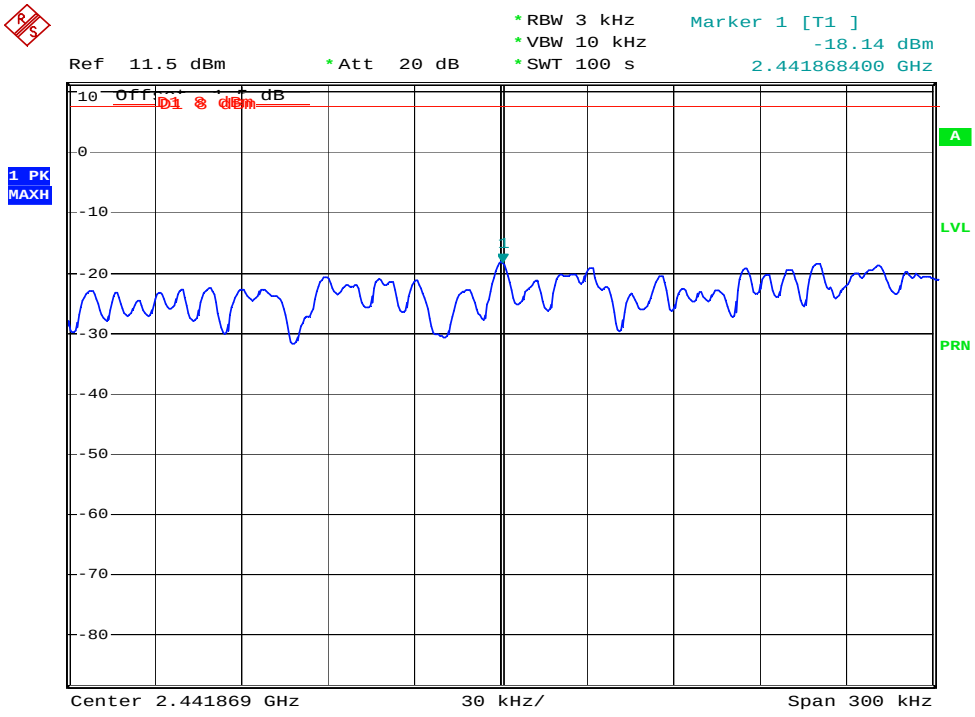
Middle Channel



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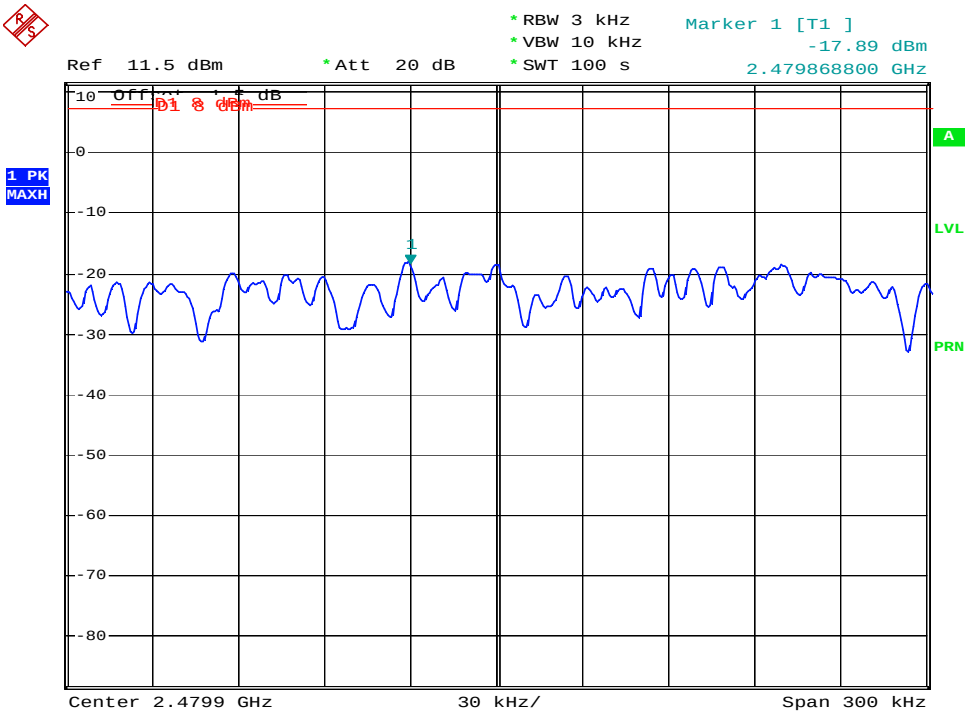
High Channel



Date: 12.DEC.2012 13:36:39

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

RESULT: **Passed**

Date of testing	:	2012-12-12
Test standard	:	FCC part 15.247(d)
Basic standard	:	ANSI C63.4:2009, 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

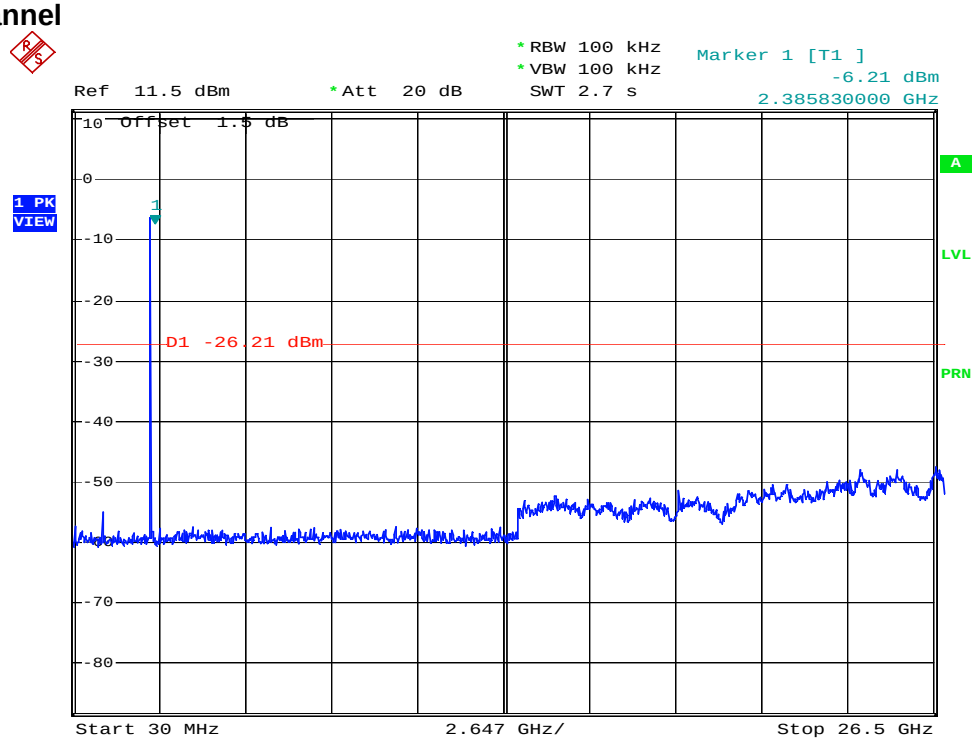
Test setup

Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 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



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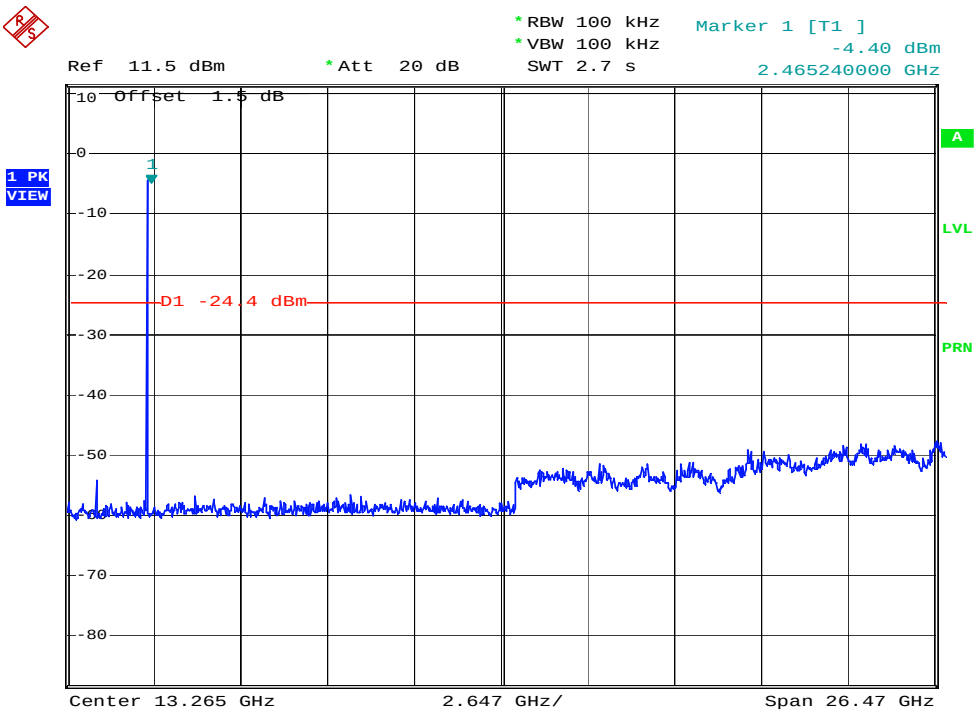
High Channel



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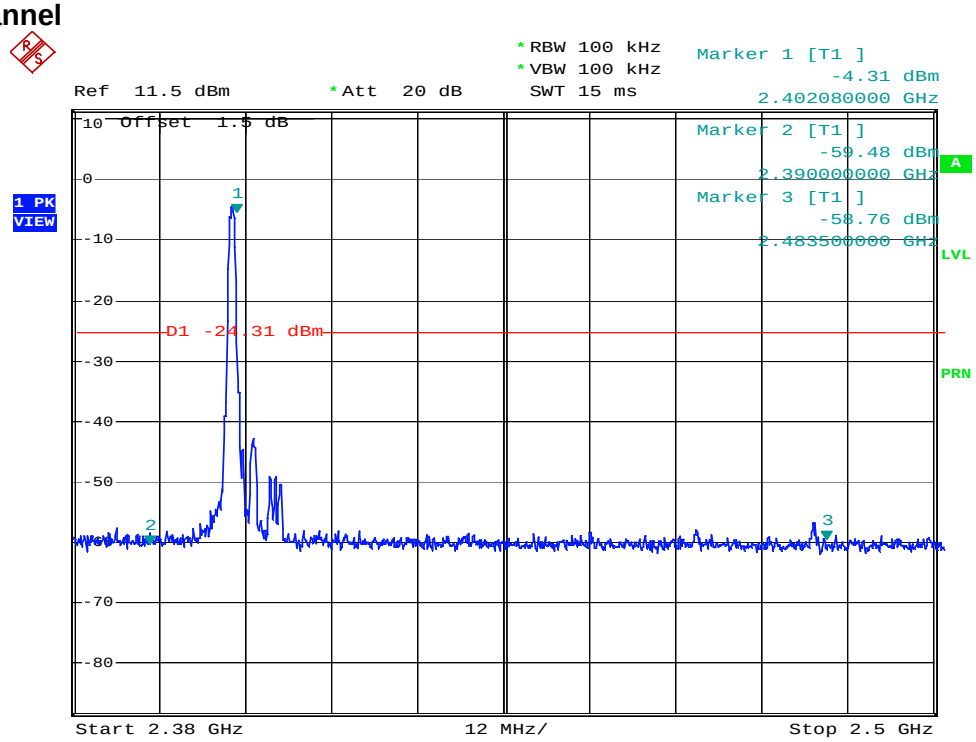
Test Plot of 100kHz Bandwidth of Frequency Band Edge, GFSK modulation

Low Channel



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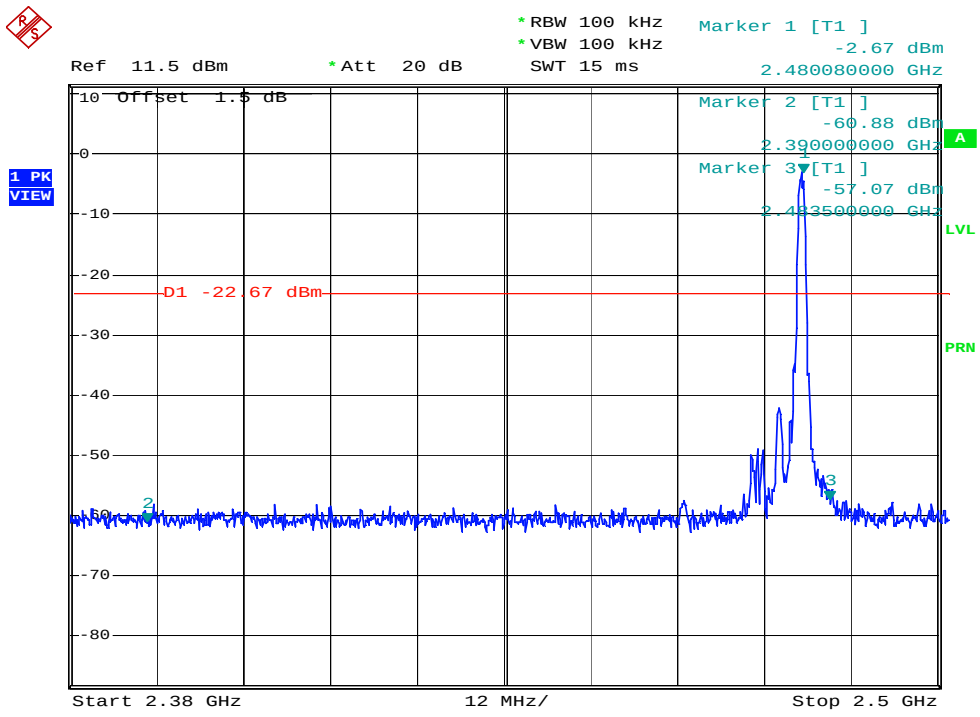
High Channel



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5.1.6 Spurious Emission

RESULT: **Passed**

Date of testing	:	2012-12-12
Test standard	:	FCC part 15.247(d), FCC 15.205, FCC 15.209
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
Ambient temperature	:	24℃
Relative humidity	:	56%
Atmospheric pressure	:	102 kPa

Remark: Testing was carried out within frequency range 30MHz to the tenth harmonic. For details refer to Appendix 2. 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

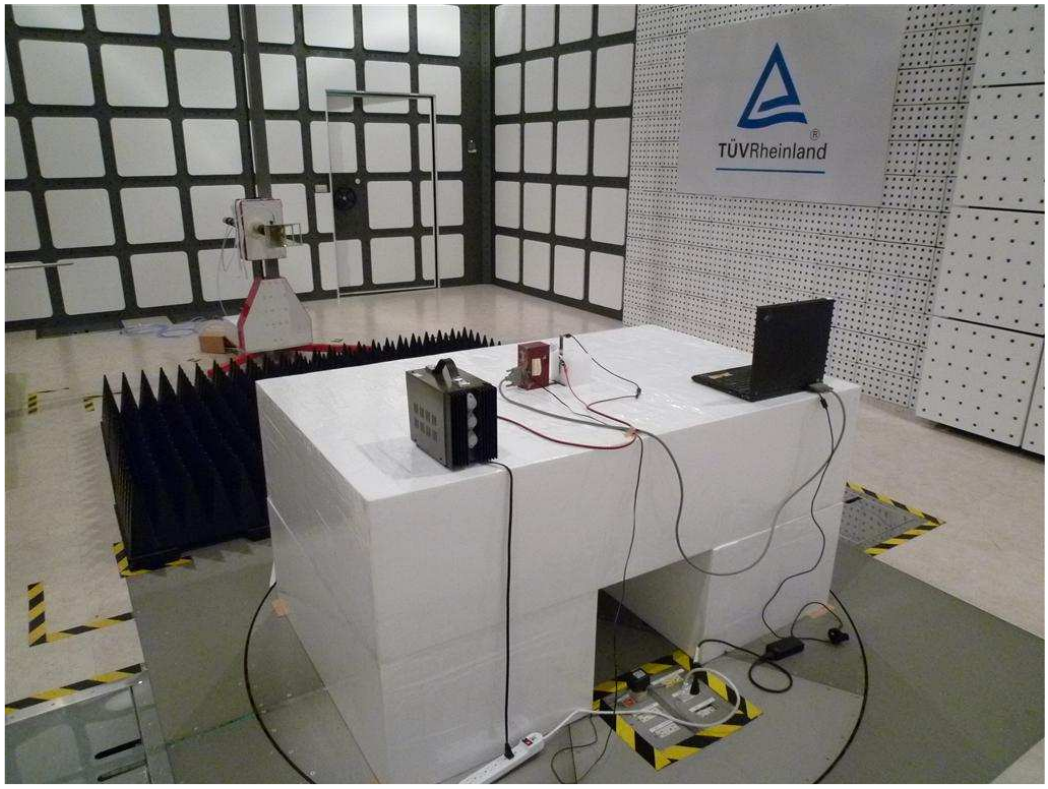
Since maximum peak output power of the transmitter is 0.3 mW<1mW, hence the EUT is exclueded from SAR evaluation according to FCC KDB publication 447498 D01v05: Mobile Portable RF Exposure.

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

Table 1: Applied Standard and Test Levels 4
Table 2: List of Test and Measurement Equipment 6
Table 3: Emission Measurement Uncertainty....7
Table 4: Technical Specification of EUT 8
Table 6: Test result of Peak Output Power, GFSK modulation....14
Table 7: Test result of 20dB Bandwidth, GFSK modulation....17
Table 8: Test result of Power Density, GFSK modulation....20

9. List of Photographs

Photograph 1: Set-up for Spurious Emissions (Front View)....28
Photograph 2: Set-up for Spurious Emissions (Back View 1)....28
Photograph 3: Set-up for Spurious Emissions (Back View 2)....29
Photograph 4: Set-up for Conducted testing....29