

Prüfbericht-Nr.: <i>Test Report No.:</i>	10042988 001	Auftrags-Nr.: <i>Order No.:</i>	114011502	Seite 1 von 34 <i>Page 1 of 34</i>
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	June 28, 2013	
Auftraggeber: <i>Client:</i>	Tiny Finder Co., Ltd., 6F-4, No. 147 JianGuo N. Road, Sec. 2, Taipei 104, Taiwan			
Prüfgegenstand: <i>Test item:</i>	tinyFinder			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	XA01			
Auftrags-Inhalt: <i>Order content:</i>	FCC Test report			
Prüfgrundlage: <i>Test specification:</i>	FCC 47CFR Part 15: Subpart C Section 15.247 NCC Low-power Radio-frequency Devices Technical Regulations LP0002(2011)			
Wareneingangsdatum: <i>Date of receipt:</i>	8/2/2013			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000016775-001			
Prüfzeitraum: <i>Testing period:</i>	August 6, 2013 - September 13, 2013			
Ort der Prüfung: <i>Place of testing:</i>	EMC Laboratory Taipei			
Prüflaboratorium: <i>Testing laboratory:</i>	TUV Rheinland Taiwan Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
2013-09-16 Danny S. C. Sung/Project Manager <i>Datum</i> <i>Name / Stellung</i> <i>Unterschrift</i> <i>Date</i> <i>Name / Position</i> <i>Signature</i>		2013-09-16 Rene Charton/Senior Project Manager <i>Datum</i> <i>Name / Stellung</i> <i>Unterschrift</i> <i>Date</i> <i>Name / Position</i> <i>Signature</i>		
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft <i>P(ass) = entspricht o.g. Prüfgrundlage(n)</i> <i>F(ail) = entspricht nicht o.g. Prüfgrundlage(n)</i> <i>N/A = nicht anwendbar</i> <i>N/T = nicht getestet</i> Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor <i>P(ass) = passed a.m. test specification(s)</i> <i>F(ail) = failed a.m. test specification(s)</i> <i>N/A = not applicable</i> <i>N/T = not tested</i>				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

V04

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*

5.2.1 MAINS CONDUCTED EMISSIONS

RESULT: *N/A*

Contents

1.	GENERAL REMARKS	5
1.1	COMPLEMENTARY MATERIALS.....	5
2.	TEST SITES	6
2.1	TEST FACILITIES	6
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS.....	7
2.3	TRACEABILITY	8
2.4	CALIBRATION	8
2.5	MEASUREMENT UNCERTAINTY	8
3.	GENERAL PRODUCT INFORMATION.....	9
3.1	PRODUCT FUNCTION AND INTENDED USE	9
3.2	SYSTEM DETAILS AND RATINGS.....	9
3.3	INDEPENDENT OPERATION MODES.....	10
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS	10
3.5	SUBMITTED DOCUMENTS.....	10
4.	TEST SET-UP AND OPERATION MODES	11
4.1	PRINCIPLE OF CONFIGURATION SELECTION	11
4.2	TEST OPERATION AND TEST SOFTWARE.....	11
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	11
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE.....	12
4.5	TEST SETUP DIAGRAM	12
5.	TEST RESULTS	14
5.1	TRANSMITTER REQUIREMENT & TEST SUITES	14
5.1.1	<i>Antenna Requirement</i>	<i>14</i>
5.1.2	<i>Peak Output Power</i>	<i>15</i>
5.1.3	<i>6dB Bandwidth</i>	<i>18</i>
5.1.4	<i>Power Density</i>	<i>21</i>
5.1.5	<i>Conducted spurious emissions and Frequency Band Edge measured in 100kHz Bandwidth.....</i>	<i>24</i>
5.1.6	<i>Spurious Emission</i>	<i>28</i>
5.2	MAINS EMISSIONS.....	29
5.2.1	<i>Mains Conducted Emissions.....</i>	<i>29</i>
6.	SAFETY HUMAN EXPOSURE	30
6.1	RADIO FREQUENCY EXPOSURE COMPLIANCE	30
6.1.1	<i>Electromagnetic Fields.....</i>	<i>30</i>

7.	PHOTOGRAPHS OF THE TEST SET-UP.....	31
8.	LIST OF TABLES	34
9.	LIST OF PHOTOGRAPHS.....	34

1. General Remarks

1.1 Complementary Materials

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

Appendix P: Photo Documentation internal view
(File Name: 10042988APPENDIX P)

Appendix D: Test Result of Radiated Emissions
(File Name: 10042988APPENDIX D)

Test Specifications

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

Table 1: Applied Standard and Test Levels

Radio
NCC Low-power Radio-frequency Devices Technical Regulations LP0002(2011)(100年6月28日)
FCC CFR47 Part 15: Subpart C Section 15.247
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: 2013-Jul-1st to 2016-Jun-30th



Testing Laboratory
0759

2.2 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

	Manufacturer	Type	S/N	Calibrated until	Used for test items
EMI Test Receiver	R&S	ESCI 7	1166.5950K07-100797-Pt	20-Dec-13	Spurious Emission and Frequency Band Edge
Bilog Antenna	TESEQ	CBL6111D	29802	29-Jun-14	Spurious Emission and Frequency Band Edge
Pre-Amplifier	HP	8447F	2805A03335	2-Sep-14	Spurious Emission and Frequency Band Edge
Spectrum Analyzer	R&S	FSV 40	100921	13-Dec-13	6dB Bandwidth Output Power Power Density Conducted Spurious Emissions Spurious Emission
Horn Antenna	ETS-Lindgren	3117	00138160	10-Jan-15	Spurious Emission and Frequency Band Edge
Horn Antenna (18GHz~40GHz)	COM-POWER	AH840	101031	2-Nov-13	Spurious Emission and Frequency Band Edge
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	2-Sep-14	Spurious Emission and Frequency Band Edge
Preamplifier (18 GHz -40 GHz)	COMPOWER	PAM-840	461257	2-Sep-14	Spurious Emission and Frequency Band Edge

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 basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements are $\pm 3\text{dB}$.

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-7}$
RF power, conducted	$\pm 1 \text{ dB}$
Adjacent channel power	$\pm 3 \text{ dB}$
Radiated emission of transmitter, valid up to 26 GHz	$\pm 6 \text{ dB}$
Radiated emission of receiver, valid up to 26 GHz	$\pm 6 \text{ dB}$
Temperature	$\pm 2 \text{ }^{\circ}\text{C}$
Humidity	$\pm 10 \%$

3. General Product Information

3.1 Product Function and Intended Use

The tinyFinder is a Bluetooth device that helps to track the position of valuable things in the vicinity of a smart phone.

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	tinyFinder
Type Designation	XA01
Brand Name	tinyFinder
FCC ID	2AAKU-XA01

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequencies	2402~2480MHz
Channel Spacing	2 MHz
Channel number	40
Operation Voltage	3 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 | - Circuit Diagram |
| - PCB Layout | - Instruction Manual |
| - Photo Document | - Rating Label |
| - Technical Description | |

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 serial 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: same as radiated, modified

Radiation: A000016775-001

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

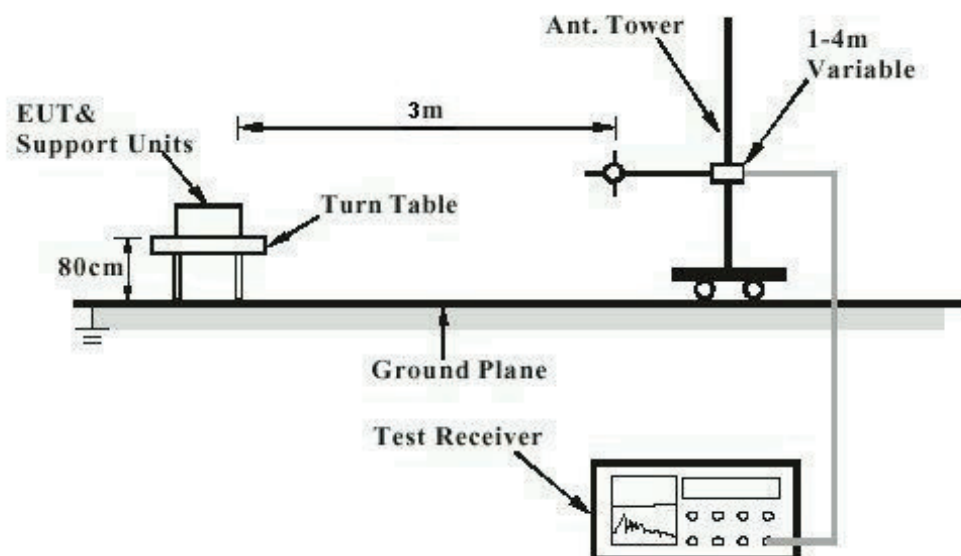


Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)

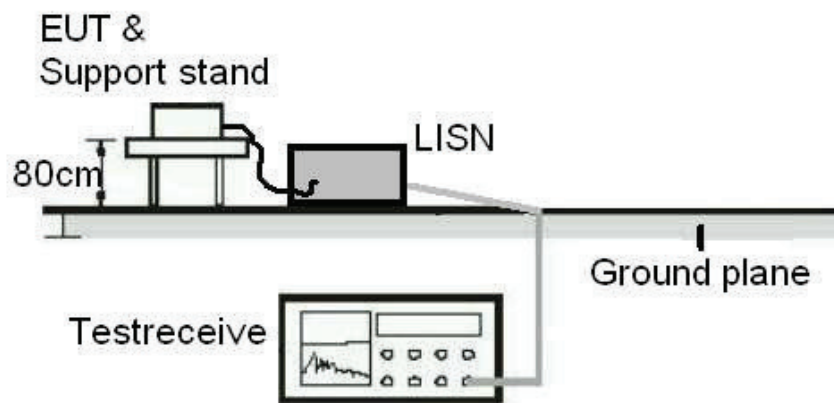
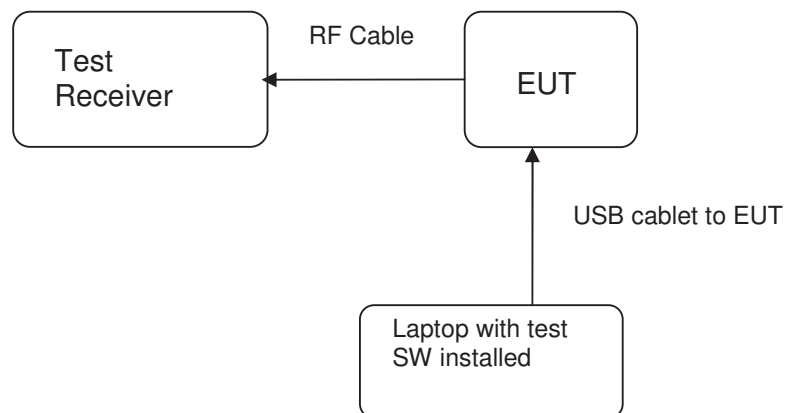


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Passed**

Test standard	:	LP0002(2011): 3.10.1, (3) 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. The antenna is a Chip Antenna soldered to the PCB with no possibility of replacement 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 : LP0002(2011): 3.10.1, (2)
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

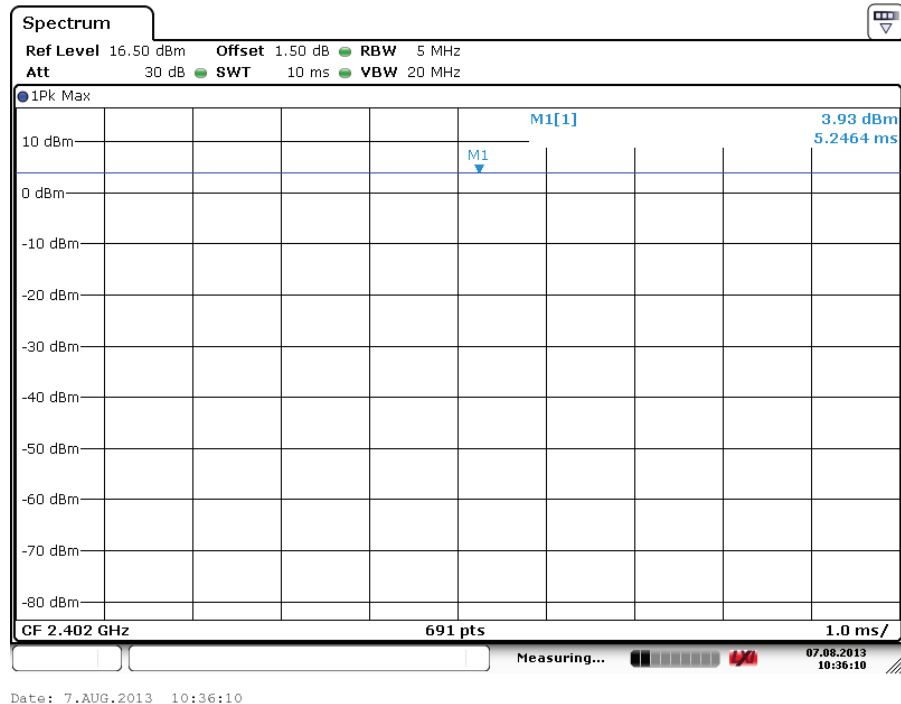
Ambient temperature : 22-26 °C
Relative humidity : 50-65 %
Atmospheric pressure : 100-103 kPa

Table 6: Test result of Peak Output Power

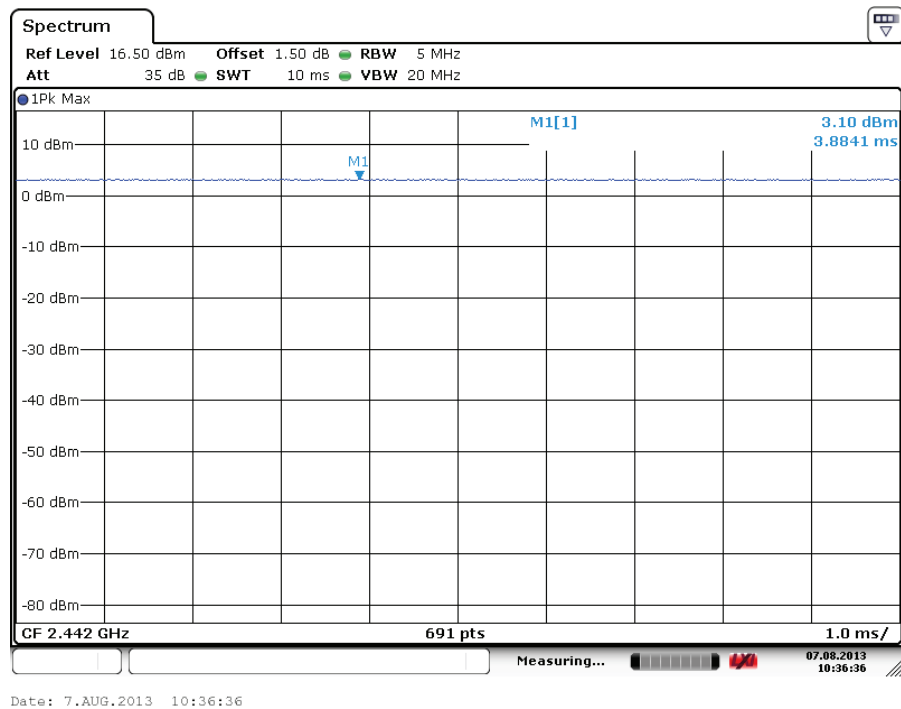
Channel	Channel Frequency (MHz)	Output Power		Limit
		(dBm)	(W)	(W)
Low Channel	2402	3.93	0.0025	1
Middle Channel	2442	3.10	0.0020	1
High Channel	2480	2.15	0.0016	1

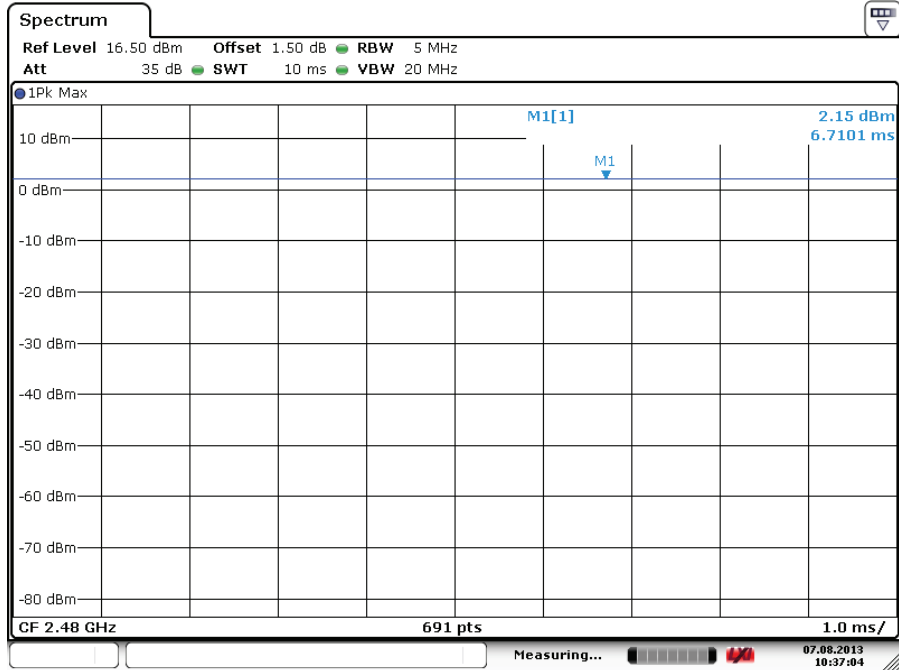
Test Plot of Output Power

Low Channel



Middle Channel



High Channel


Date: 7.AUG.2013 10:37:04

5.1.3 6dB Bandwidth

RESULT:**Passed**

Test standard : LP0002(2011): 3.10.1, (5)
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

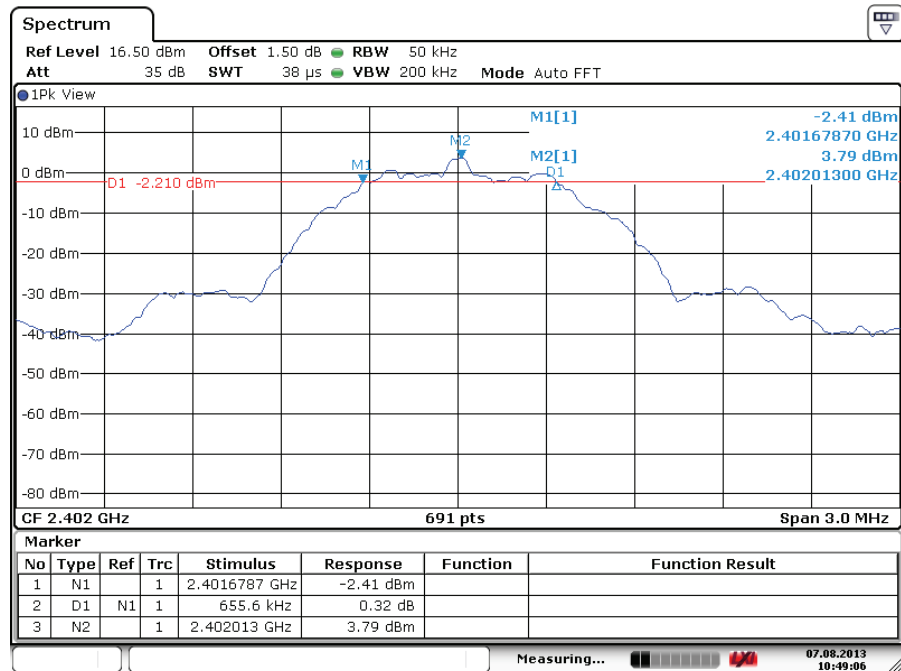
Ambient temperature : 22-26°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103 kPa

Table 7: Test result of 6dB Bandwidth

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	2402	0.656	0.5	Pass
Mid Channel	2442	0.643	0.5	Pass
High Channel	2480	0.643	0.5	Pass

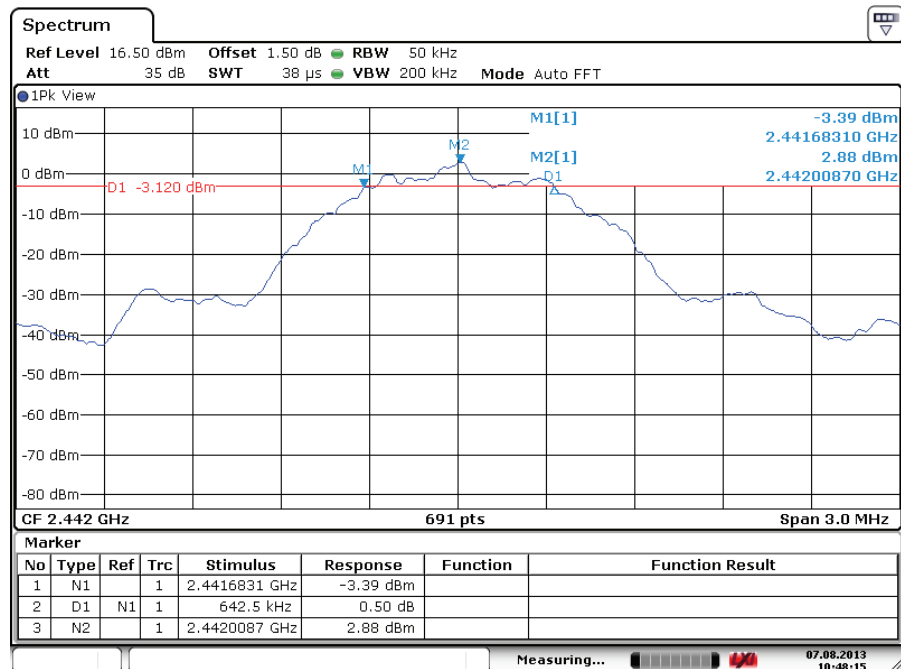
Test Plot of 6dB Bandwidth

Low Channel

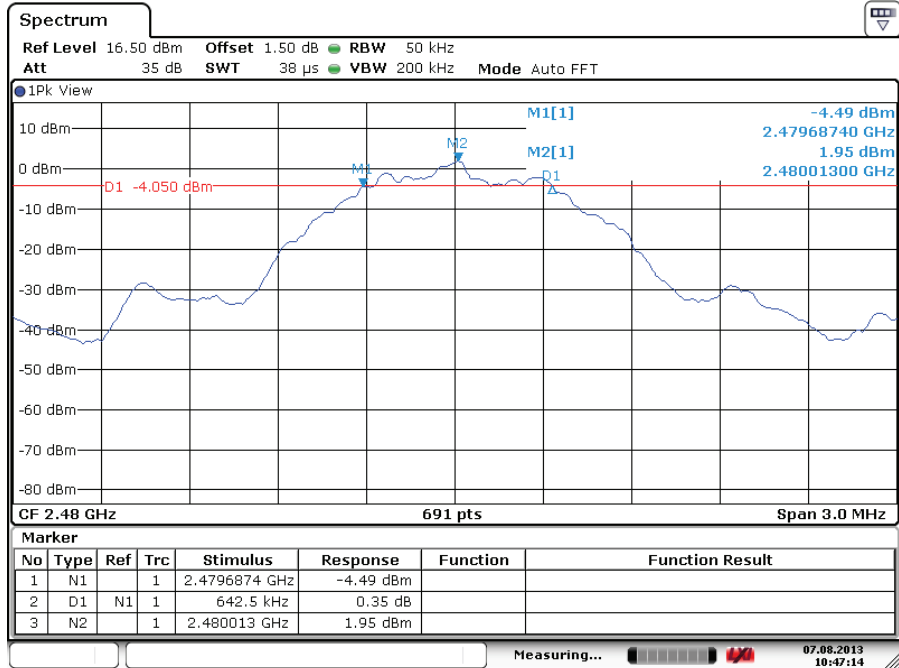


Date: 7.AUG.2013 10:49:06

Middle Channel



Date: 7.AUG.2013 10:48:15

High Channel


Date: 7.AUG.2013 10:47:15

5.1.4 Power Density

RESULT:**Passed**

Test standard : LP0002(2011): 3.10.1, (6.2.2)
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

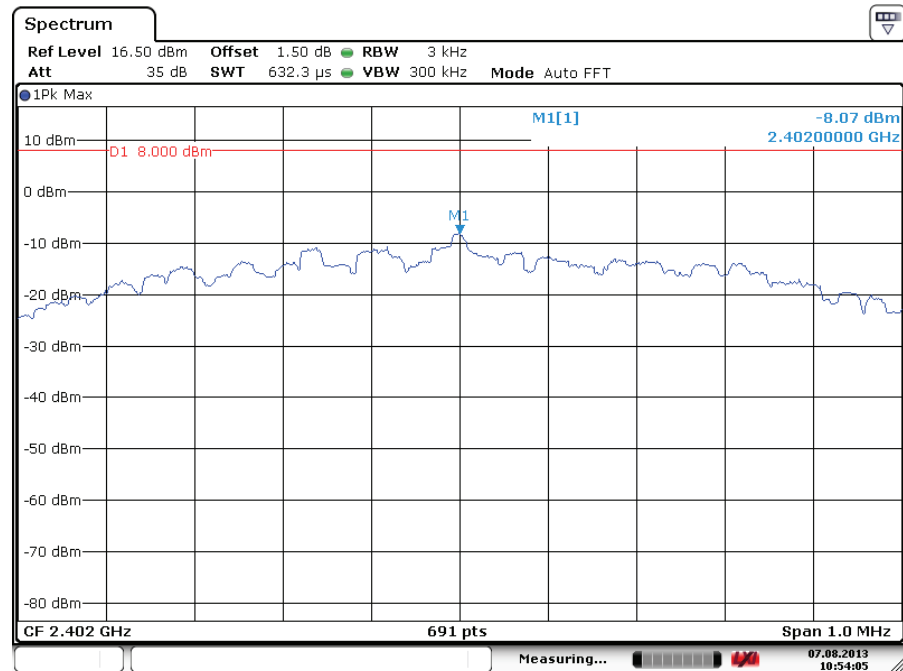
Test Channel : Low/ Middle/ High
Operation Mode : A
Ambient temperature : 22-26°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103 kPa

Table 8: Test result of Power Density

Channel	Channel Frequency (MHz)	Power Density	Limit
		(dBm)	(dBm)
Low Channel	2402	-8.07	8
Middle Channel	2442	-10.16	8
High Channel	2480	-10.59	8

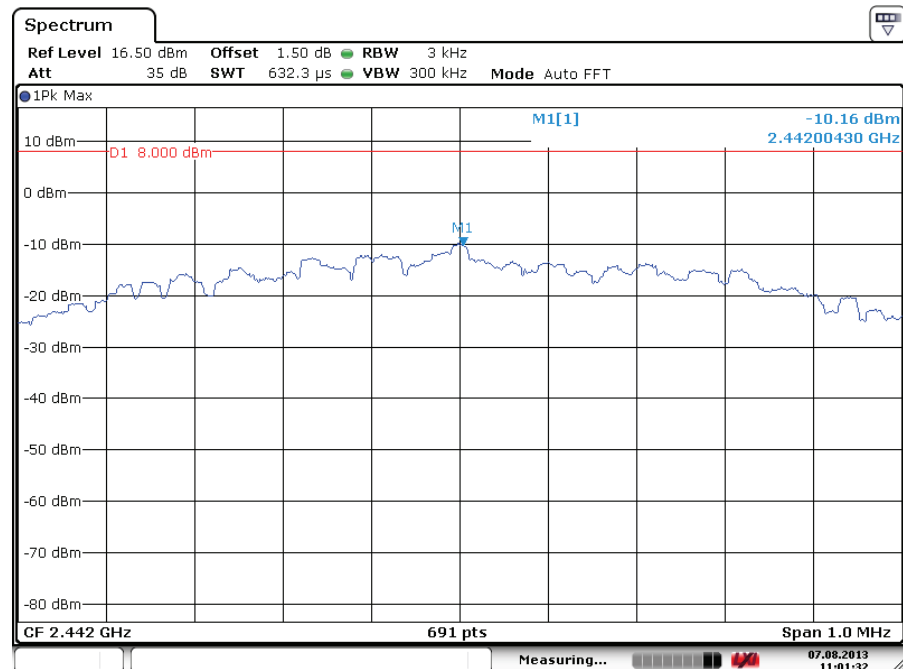
Test Plot of Power Density

Low Channel



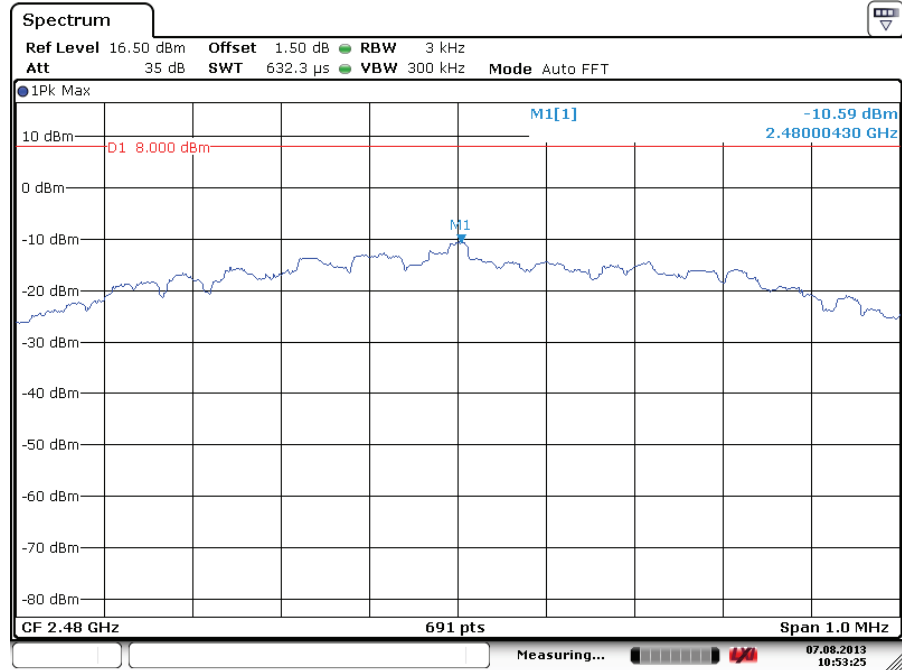
Date: 7.AUG.2013 10:54:05

Middle Channel



Date: 7.AUG.2013 11:01:32

High Channel



Date: 7.AUG.2013 10:53:25

**5.1.5 Conducted spurious emissions and Frequency Band Edge
measured in 100kHz Bandwidth****RESULT:****Passed**

Test standard	:	LP0002(2011): 3.10.1, (5) 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

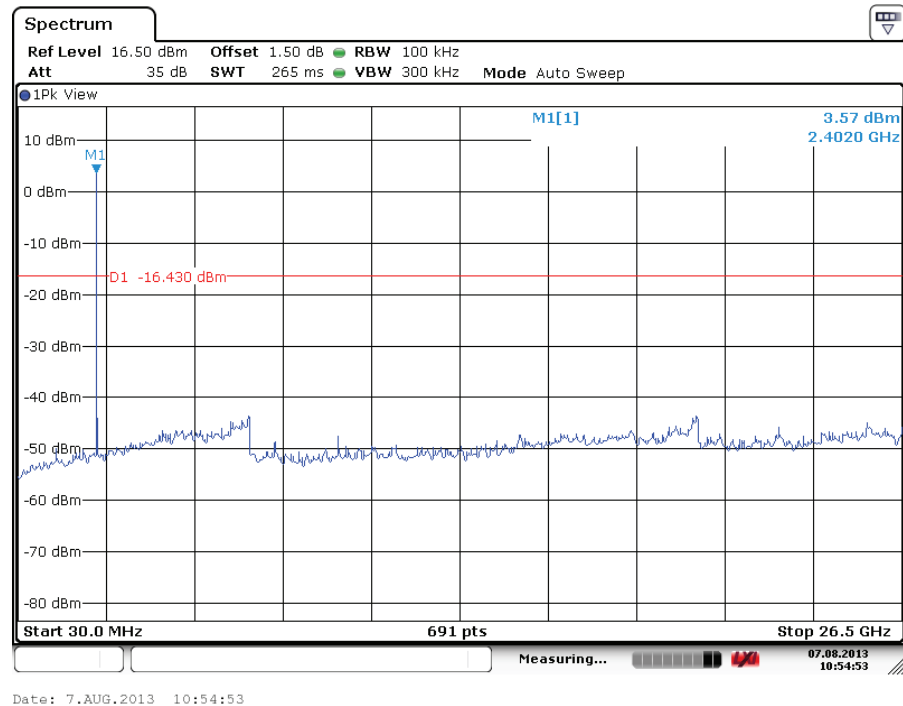
Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	22-26°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103 kPa

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achieved as well.

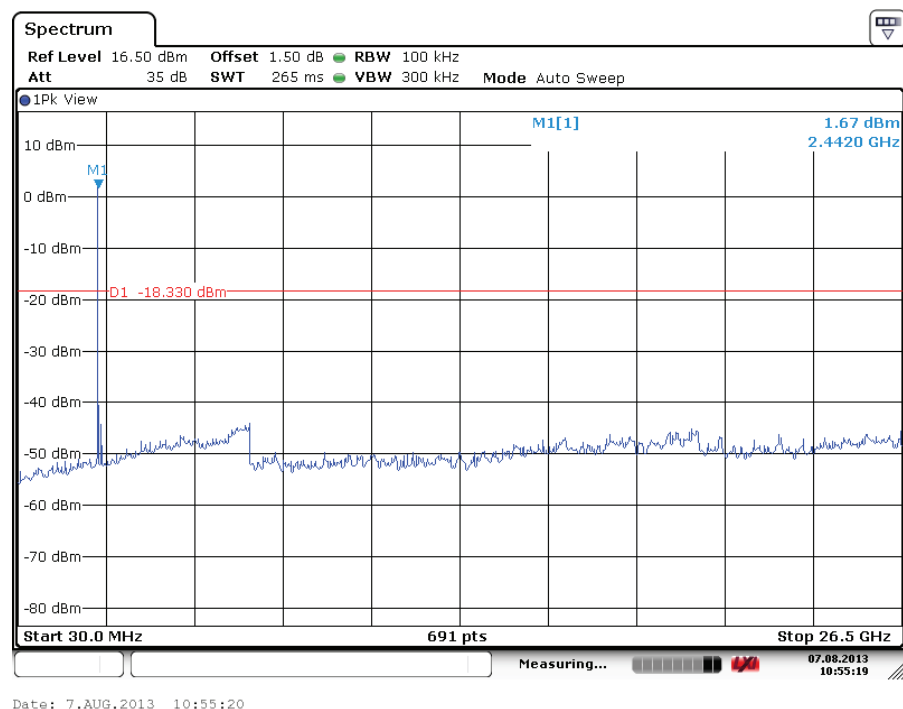
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

Test Plot 100kHz Conducted Emissions

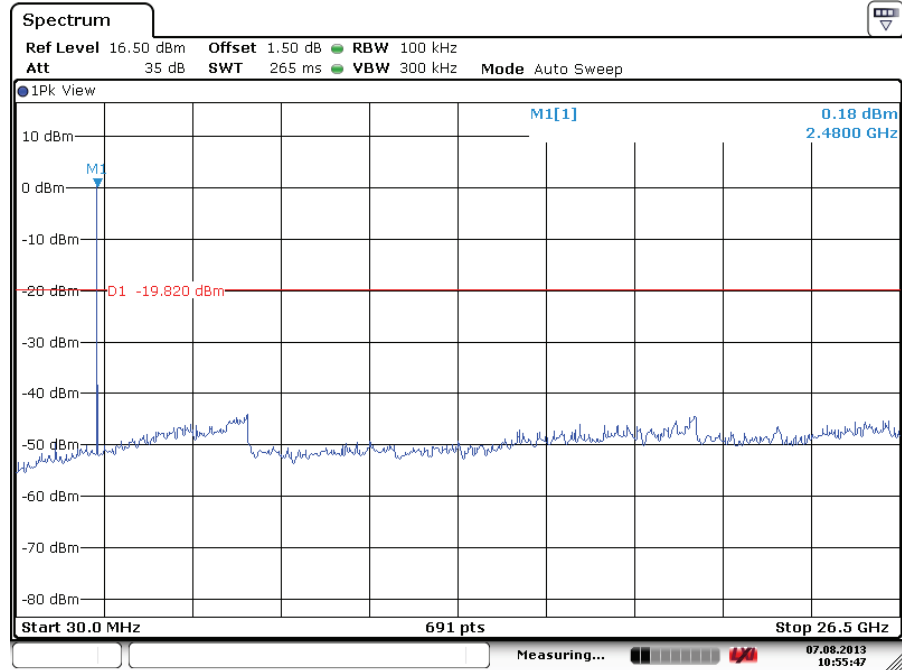
Low Channel



Middle Channel



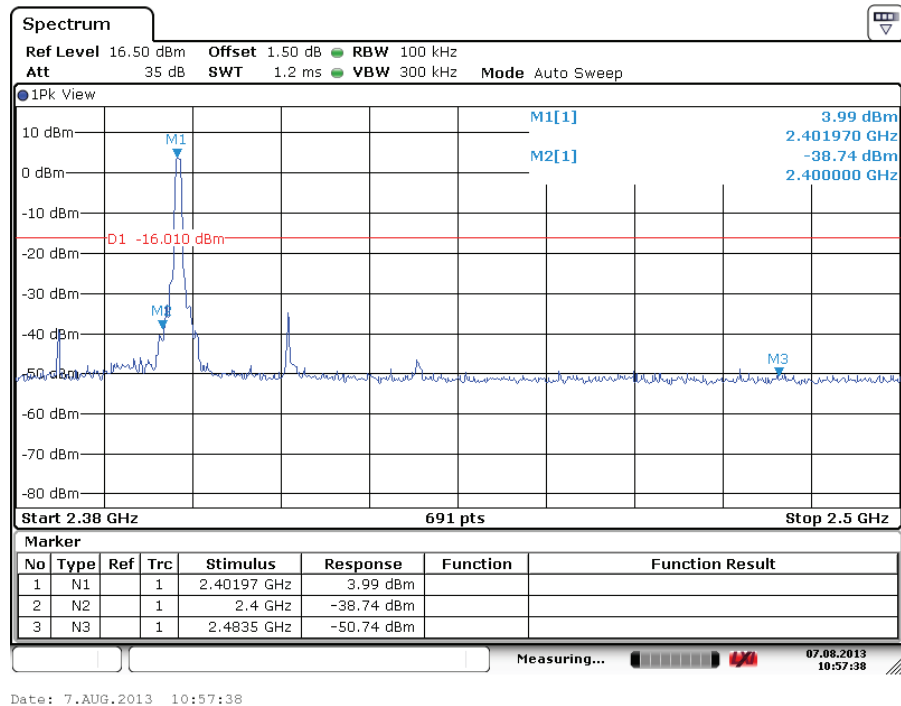
High Channel



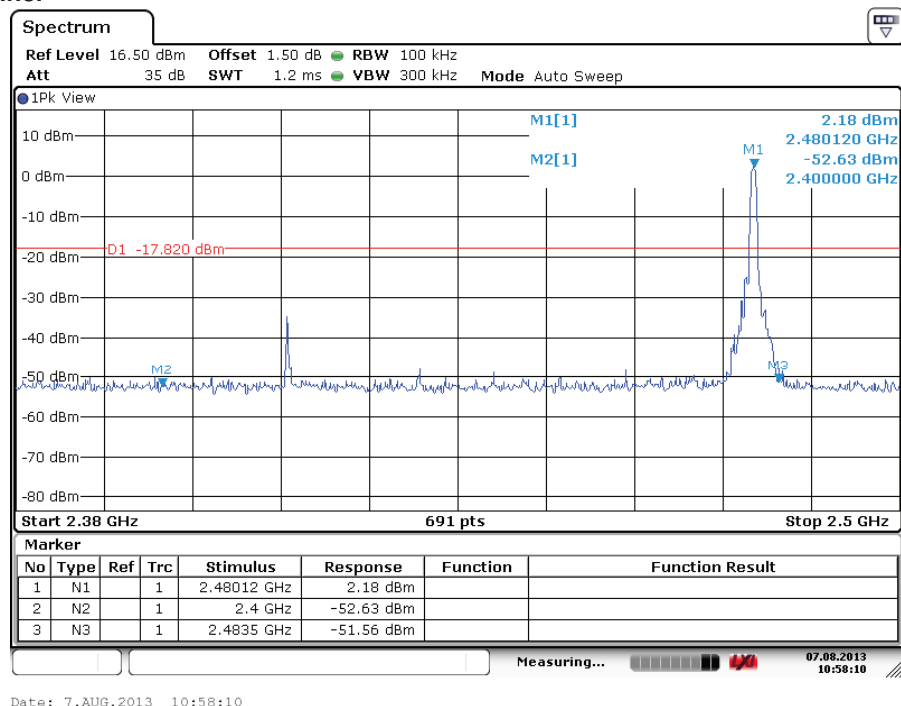
Date: 7.AUG.2013 10:55:48

Test Plot 100kHz RBW of Band Edge

Low Channel



High Channel



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 LP0002(2011): 3.10.1, (5)
Basic standard	:	ANSI C63.10: 2009
Limits	:	Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and RSS-210 2.7 (Table 1), must comply with the radiated emission limits specified in FCC 15.209(a) and RSS-210 2.7 (Table 2 and 3). Radiated emissions which fall in the restricted bands, as defined in LP0002(2011): 2.7, must comply with the radiated emission limits specified in LP0002(2011): 2.8 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), RSS-210 2.7 (Table 2 and 3) and RSS-210 A2.9(a). Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in LP0002(2011): 2.8
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.

5.2 Mains Emissions

5.2.1 Mains Conducted Emissions

RESULT:**N/A**

Test standard	:	FCC Part 15.207 FCC Part 15.107 LP0002(2011): 2.3
Limits	:	Mains Conducted emissions as defined in above standards
Kind of test site	:	Shielded Room

Test setup

Test Channel	:	Middle
Operation mode	:	A

Remark: This test is Not Applicable because the EUT is battery powered.

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

According to KDB447498 10 D01v05:

SAR evaluation, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

Frequency Band: 2400-2483.5 MHz
Maximum Power fed to Antenna: 1.8 mW

Separation distances:

Antenna feed center to outside surface of enclosure: > 2.5 mm

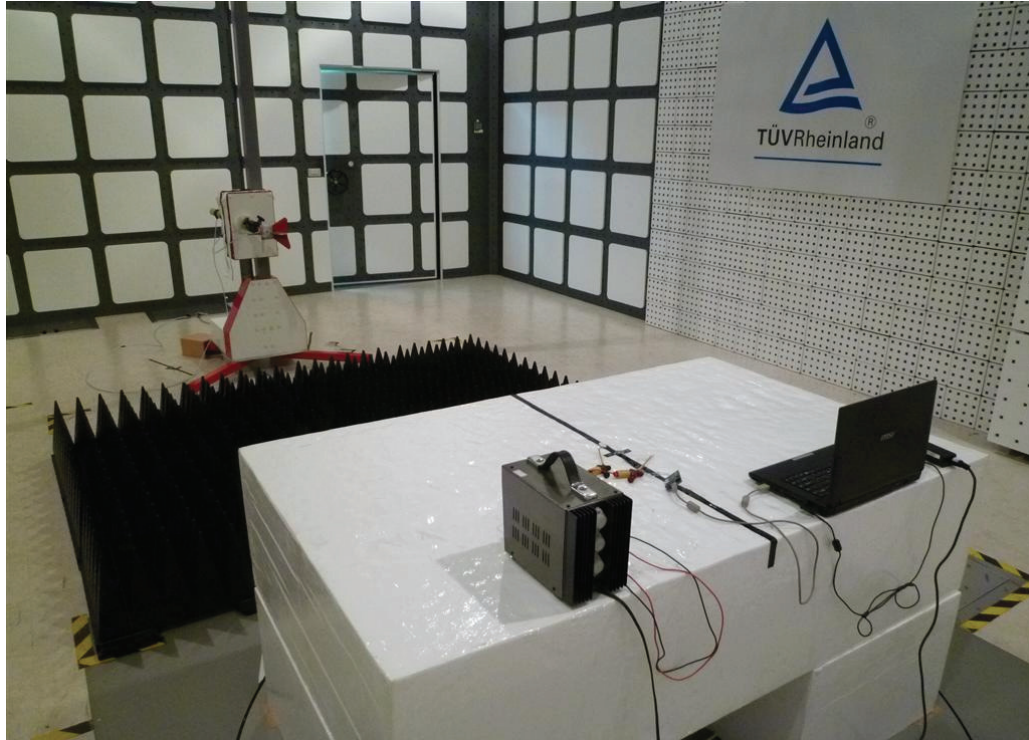
MHz	5	10	15	20	25	mm
2450	10	19	29	38	48	SAR Test Exclusion Threshold (mW)

7. Photographs of the Test Set-Up

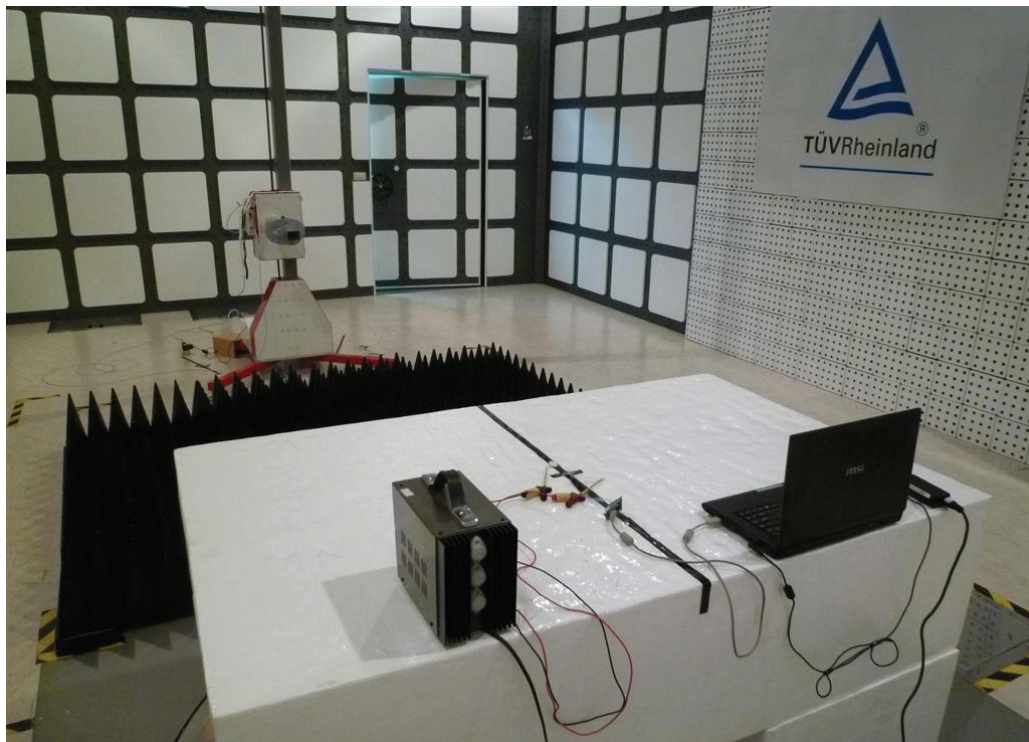
Photograph 1: Set-up for Spurious Emissions (Front View)



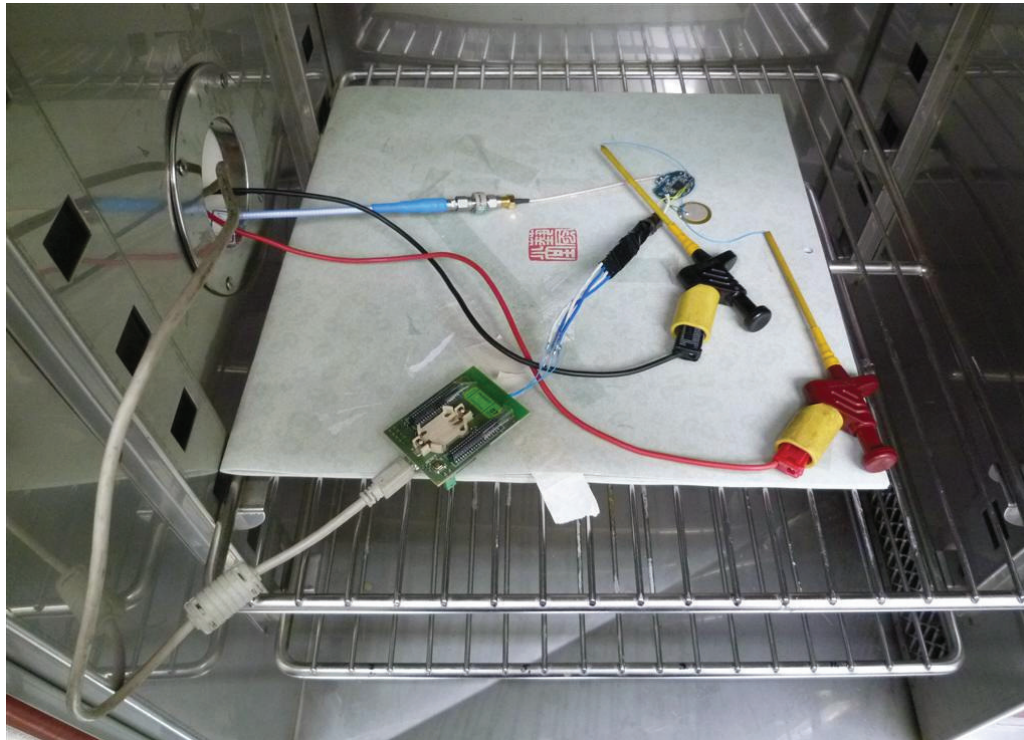
Photograph 2: Set-up for Spurious Emissions (Back View 1)



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	5
Table 2: List of Test and Measurement Equipment	7
Table 3: Emission Measurement Uncertainty.....	8
Table 4: Basic Information of EUT	9
Table 5: Technical Specification of EUT	9
Table 6: Test result of Peak Output Power	15
Table 7: Test result of 6dB Bandwidth	18
Table 8: Test result of Power Density	21

9. List of Photographs

Photograph 1: Set-up for Spurious Emissions (Front View).....	31
Photograph 2: Set-up for Spurious Emissions (Back View 1)	30
Photograph 3: Set-up for Spurious Emissions (Back View 2)	31
Photograph 4: Set-up for Conducted testing	31
Photograph 5: Set-up for for Mains Conducted testing Back	32
Photograph 6: Set-up for for Mains Conducted testing Front.....	32