

Prüfbericht-Nr.: <i>Test Report No.:</i>	10050022 001	Auftrags-Nr.: <i>Order No.:</i>	114029061 Seite 1 von 35 Page 1 of 35
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	November 12, 2014
Auftraggeber: <i>Client:</i>	Adonit Co., Ltd., 9F-2, No.99, Fuxing N. Rd., Songshan Dist, Taipei City, Taiwan 10595, R.O.C.		
Prüfgegenstand: <i>Test item:</i>	Bluetooth Touch Pen		
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	050(Jot Script)		
Auftrags-Inhalt: <i>Order content:</i>	FCC/NCC/IC Test report		
Prüfgrundlage: <i>Test specification:</i>	FCC 47CFR Part 15: Subpart C Section 15.247 RSS-210 (12-2010) A8 NCC Low-power Radio-frequency Devices Technical Regulations LP0002(2011)		
Wareneingangsdatum: <i>Date of receipt:</i>	01/12/2015		
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000161042-001 A000153957-002		
Prüfzeitraum: <i>Testing period:</i>	28-Jan-2015 - 3-Feb-2015		
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Laboratory Taipei		
Prüflaboratorium: <i>Testing laboratory:</i>	TUV Rheinland Taiwan Ltd.		
Prüfergebnis*: <i>Test result*:</i>	Pass		
geprüft von / tested by: 2015-02-05 Arvin Ho/Department Manager <i>Datum Name / Stellung Unterschrift</i> <i>Date Name / Position Signature</i>		kontrolliert von / reviewed by: 2015-02-05 Rene Charton/Senior Project Manager <i>Datum Name / Stellung Unterschrift</i> <i>Date Name / Position 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>	
<p>* 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</p> <p>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</p>			
<p>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></p>			

v04

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

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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: 10050022APPENDIX P)

Appendix D: Test Result of Radiated Emissions
(File Name: 10050022APPENDIX D)

Test Specifications

The following standards were applied.

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 RSS-210 Issue 8, December 2010 RSS-Gen, Issue 4, November 2014 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
IC Canada Registration No.: 9465A-1
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

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until	Used for test items
EMI Test Receiver	R&S	ESR7	101062	30-Aug-15	Spurious Emission and Frequency Band Edge
Bilog Antenna	TESEQ	CBL6111D	29802	4-Jul-15	Spurious Emission and Frequency Band Edge
Spectrum Analyzer	R&S	FSV 40	100921	16-Dec-15	6dB Bandwidth, Output Power, Power Density, Cond. Spurious Emissions, Rad. Spurious Emission
Spectrum Analyzer	Agilent	N9010A	MY53470241	19-Feb-15	6dB Bandwidth, Output Power, Power Density, Cond. Spurious Emissions, Rad. Spurious Emission
Horn Antenna	ETS-Lindgren	3117	138160	12-Jan-17	Spurious Emission and Frequency Band Edge
Horn Antenna (18GHz~40GHz)	COM-POWER	AH840	101031	29-Oct-15	Spurious Emission and Frequency Band Edge
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	22-Aug-15	Spurious Emission and Frequency Band Edge
Preamplifier (18 GHz -40 GHz)	COM-POWER	PAM-840	461257	25-Aug-15	Spurious Emission and Frequency Band Edge
Pre-Amplifier (1GHz~18GHz)	EM Electronics	EM30180	60558	3-Nov-15	Spurious Emission and Frequency Band Edge
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	21-Oct-15	Spurious Emission and Frequency Band Edge
EMI Test Receiver	R&S	ESCI7	100797	27-Dec-15	Mains Spurious Emission
LISN (1 phase)	R&S	ENV216	101243	30-May-15	Mains Spurious Emission
LISN	Rolf Heine	NNB-2/16Z	99080	25-Aug-15	Mains Spurious Emission

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 in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular schedule using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements .

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-7}$
RF power, conducted	± 1.5 dB
RF power density, conducted	± 3 dB
spurious emissions, conducted	± 3 dB
all emissions, radiated	± 6 dB
Temperature	± 1 °C
Humidity	± 5 %
DC and low frequency voltages	± 3 %

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 Touch Pen
Type Designation	050(Jot Script)
Brand Name	Adonit
FCC ID	ZCC-J10006
Canada ID	11771A-J10006

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequencies	2402~2480 MHz
Channel Spacing	2 MHz
Channel number	40
Operation Voltage	3.7 V (Li-Ion)
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

- Circuit Diagram
- Instruction Manual
- 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 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: A000153957-002

Radiation: A000161042-001

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	HP	HSTNN-Q78C-3	CNF0339QBM

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

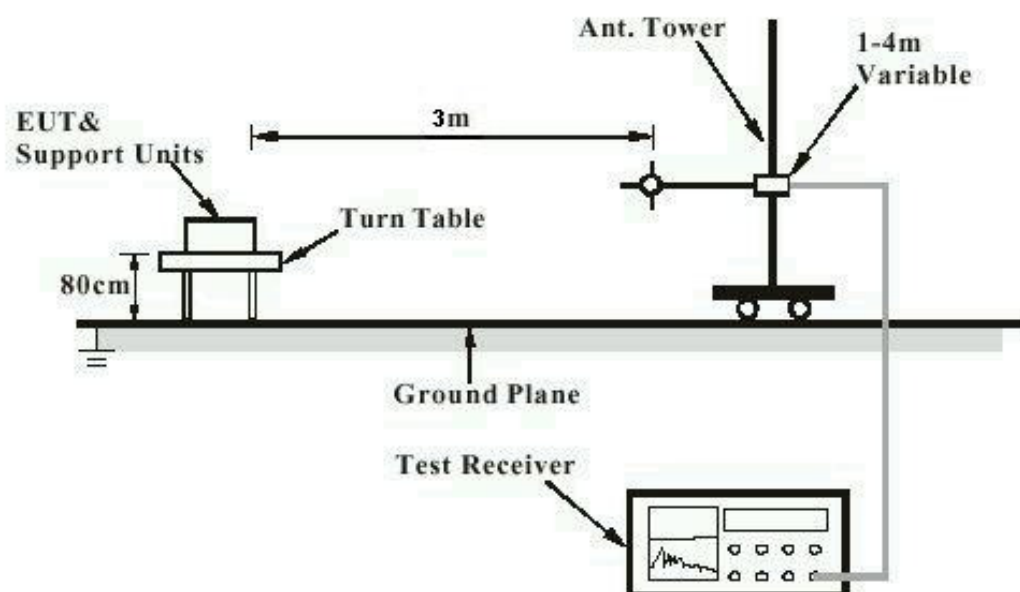


Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)

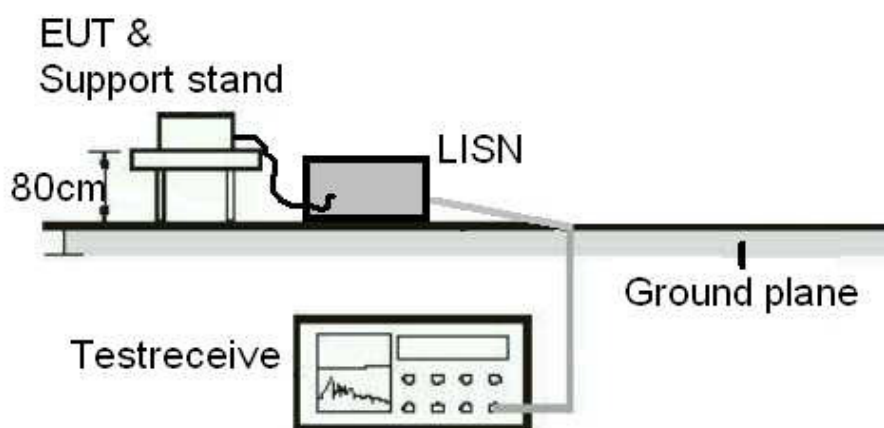
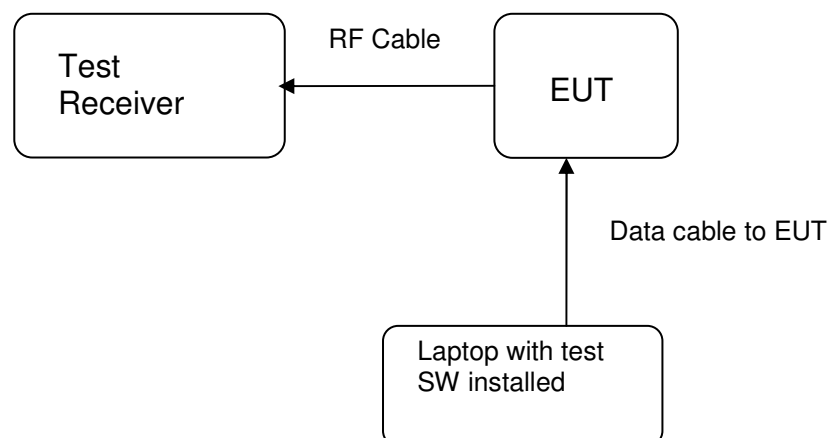


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Passed**

Test standard	:	LP0002(2011): 2.2, 3.10.1, (3) FCC Part 15.247(b)(4), Part 15.203 and RSS- Gen 8.3
Requirement	:	use of approved antennas only 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 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 : 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 : 20-24 °C
 Relative humidity : 50-65 %
 Atmospheric pressure : 100-103 kPa

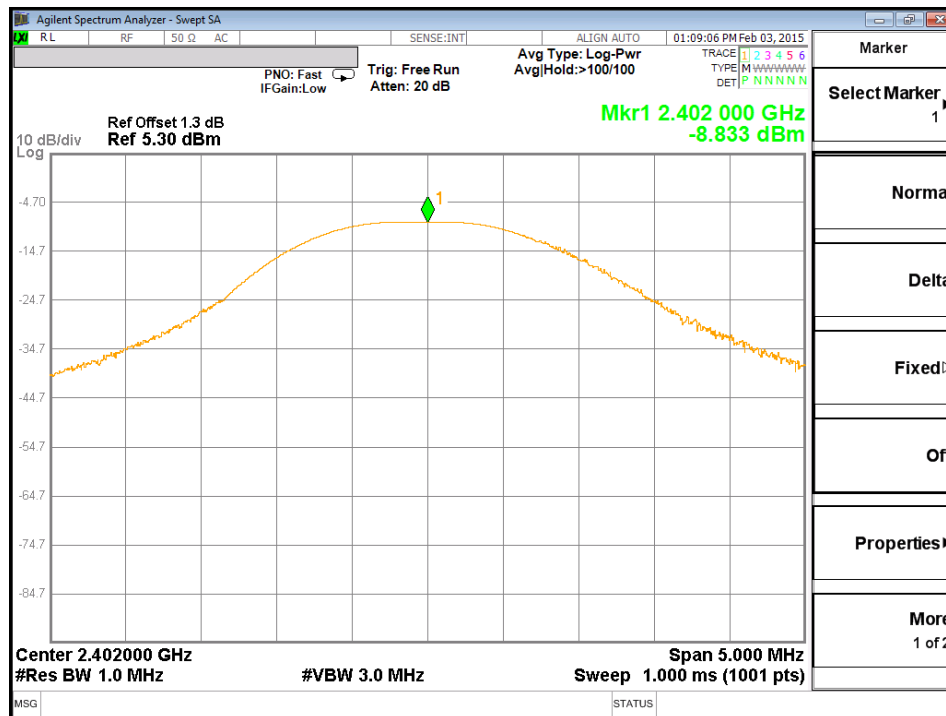
Table 6: Test result of Peak Output Power

Channel	Channel Frequency (MHz)	Output Power		Limit
		(dBm)	(W)	(W)
Low Channel	2402	-8.83	0.0001	1
Middle Channel	2440	-7.67	0.0002	1
High Channel	2480	-6.22	0.0002	1

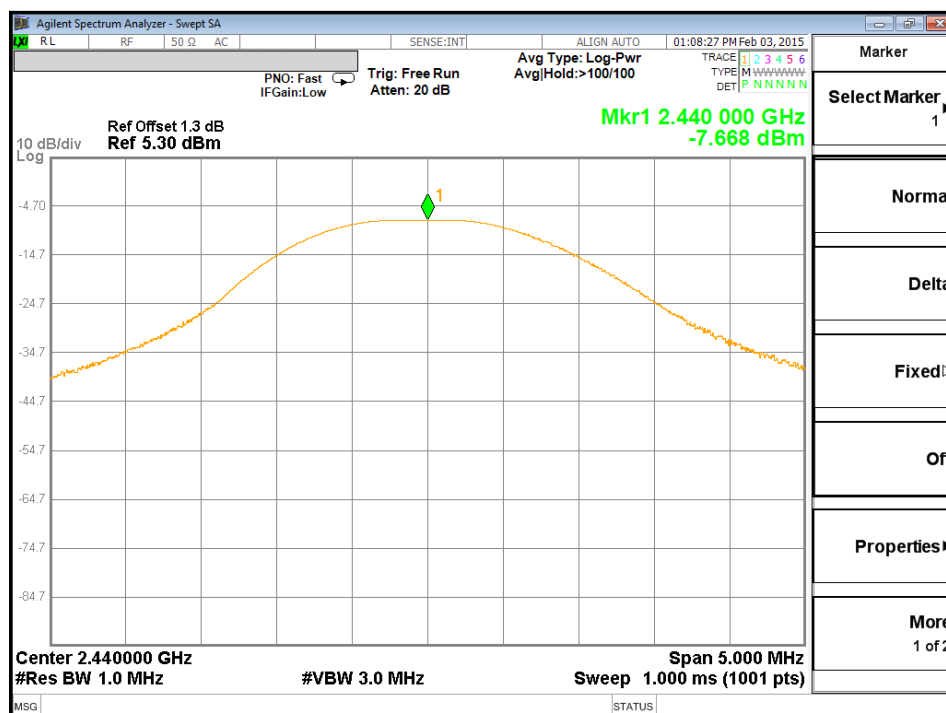
Pmax: 0.238 mW

Test Plot of Output Power

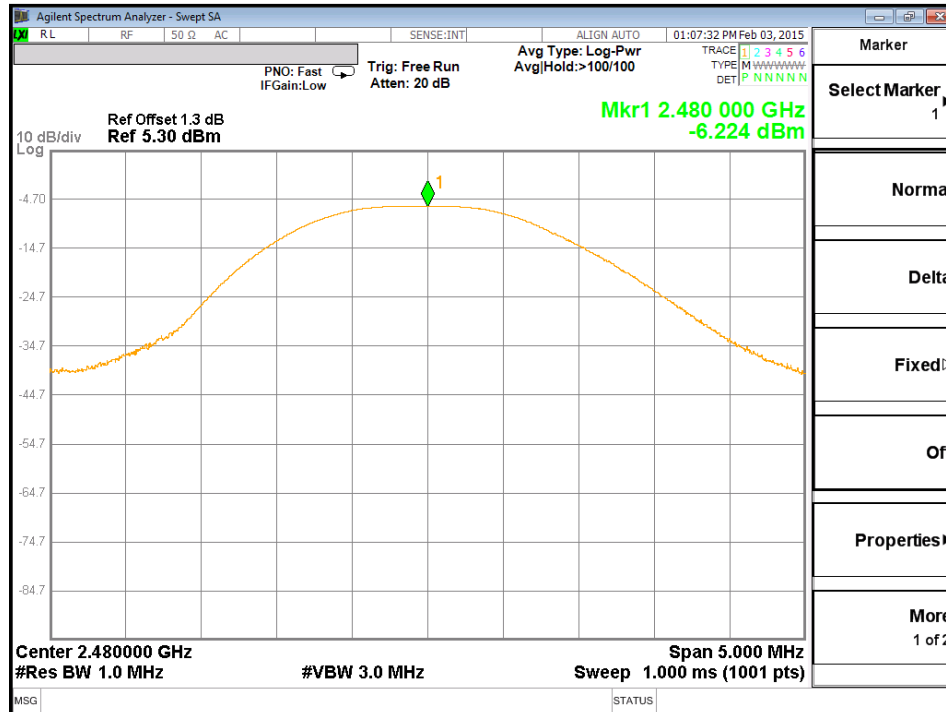
Low Channel



Middle Channel



High Channel



5.1.3 6dB Bandwidth and 99% 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 : 20-24°C
 Relative humidity : 50-65%
 Atmospheric pressure : 100-103 kPa

Table 7: Test result of 6dB Bandwidth

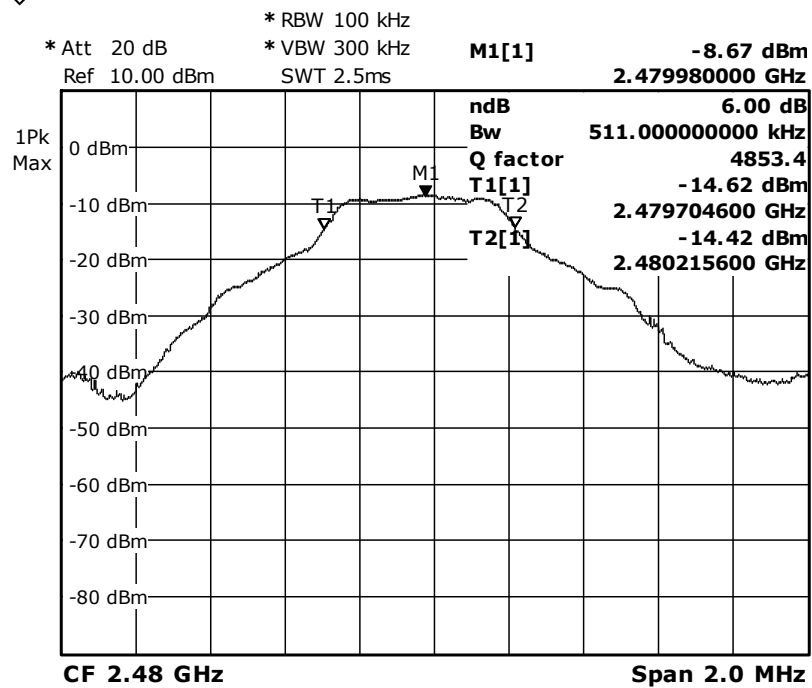
Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low Channel	2402	507	500	Pass
Mid Channel	2440	511	500	Pass
High Channel	2480	511	500	Pass

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

Channel	Channel Frequency (MHz)	99% Bandwidth (kHz)
Low Channel	2402	1137.7
Mid Channel	2440	1067.8
High Channel	2480	1007.9

Date: 5.FEB.2015 03:42:32

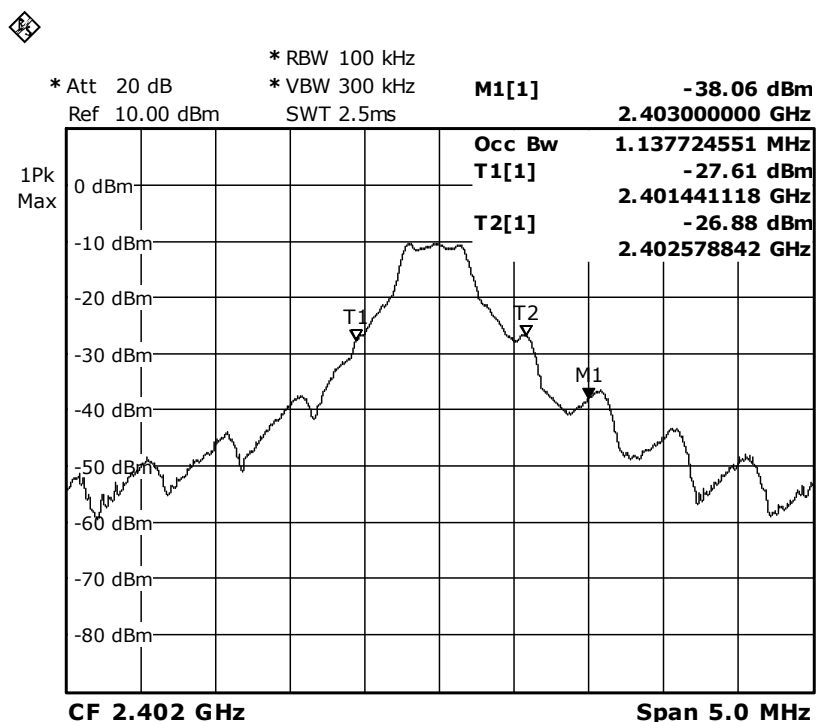
High Channel



Date: 5.FEB.2015 03:42:10

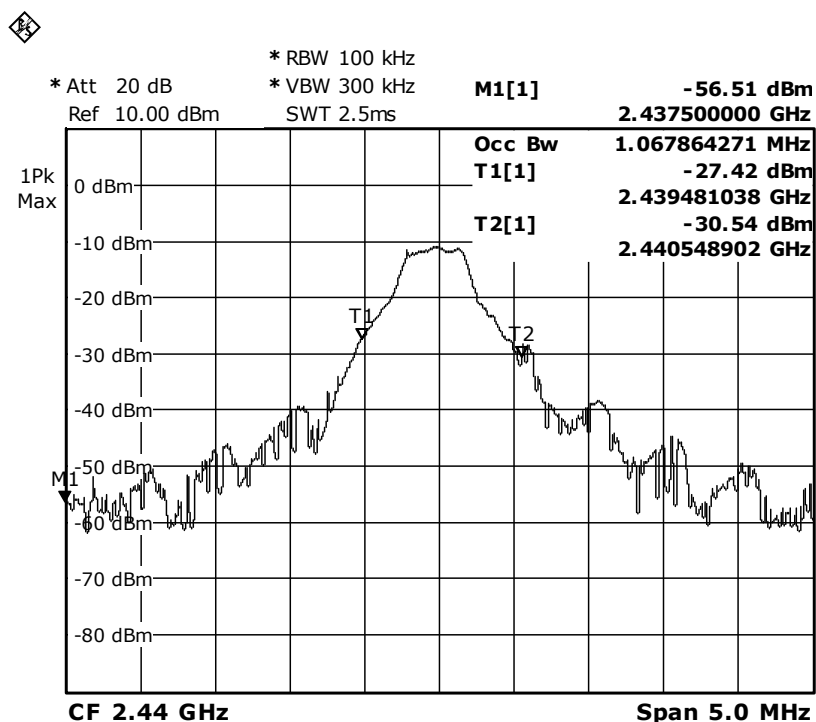
Test Plot of 99% Bandwidth

Low Channel



Date: 5.FEB.2015 03:40:17

Middle Channel



Date: 5.FEB.2015 03:40:36

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

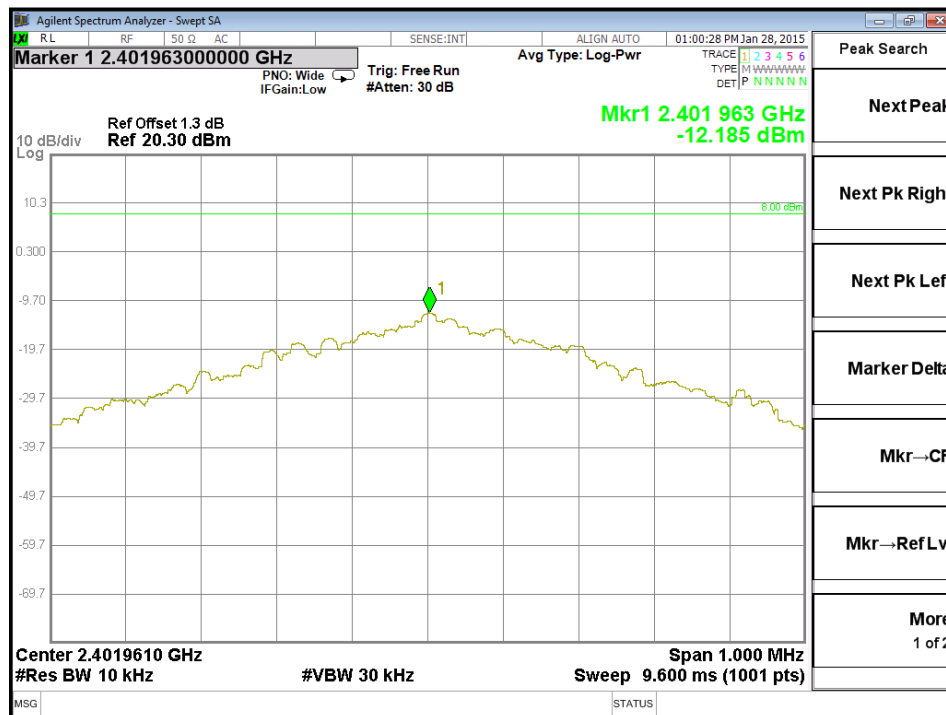
Test Channel : Low/ Middle/ High
Operation Mode : A
Ambient temperature : 20-24°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103 kPa

Table 9: Test result of Power Density

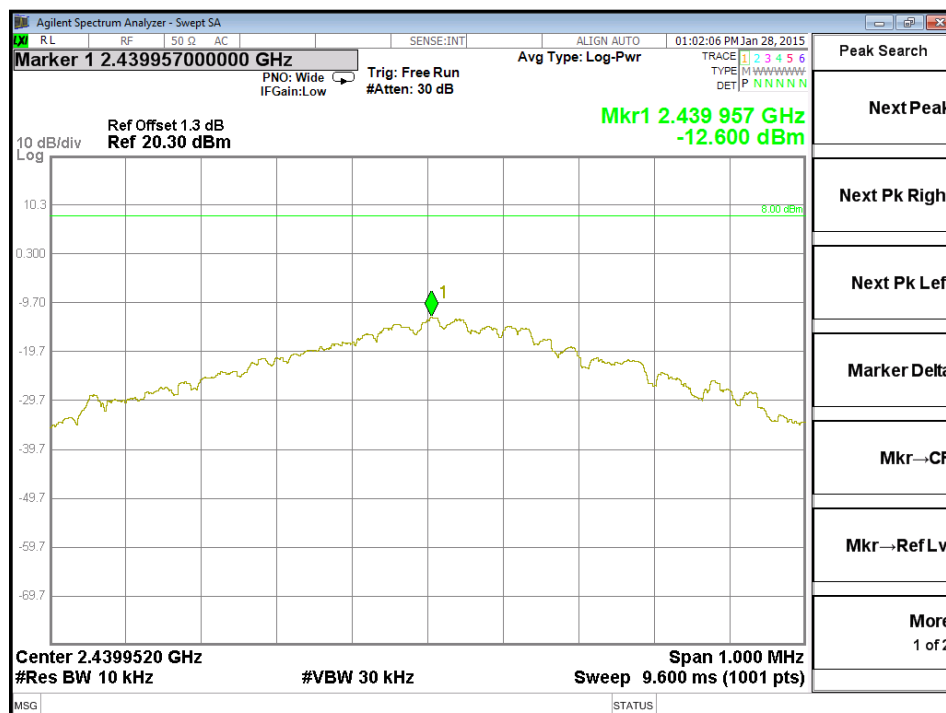
Channel	Channel Frequency (MHz)	Power Density	Limit
		(dBm)	(dBm)
Low Channel	2402	-12.185	8
Middle Channel	2442	-12.6	8
High Channel	2480	-10.04	8

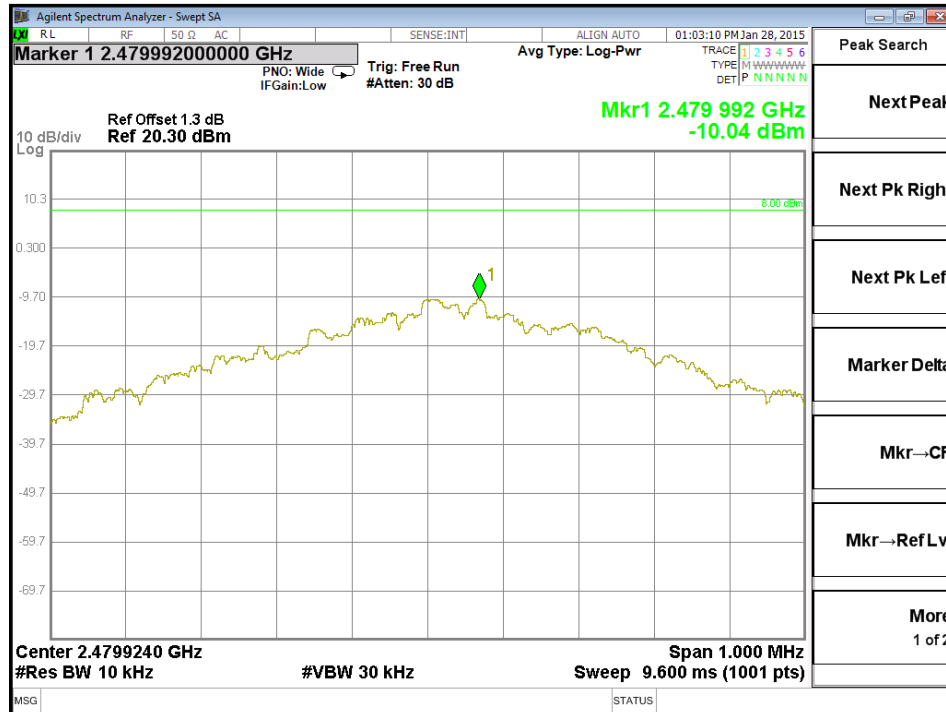
Test Plot of Power Density

Low Channel



Middle Channel



High Channel


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

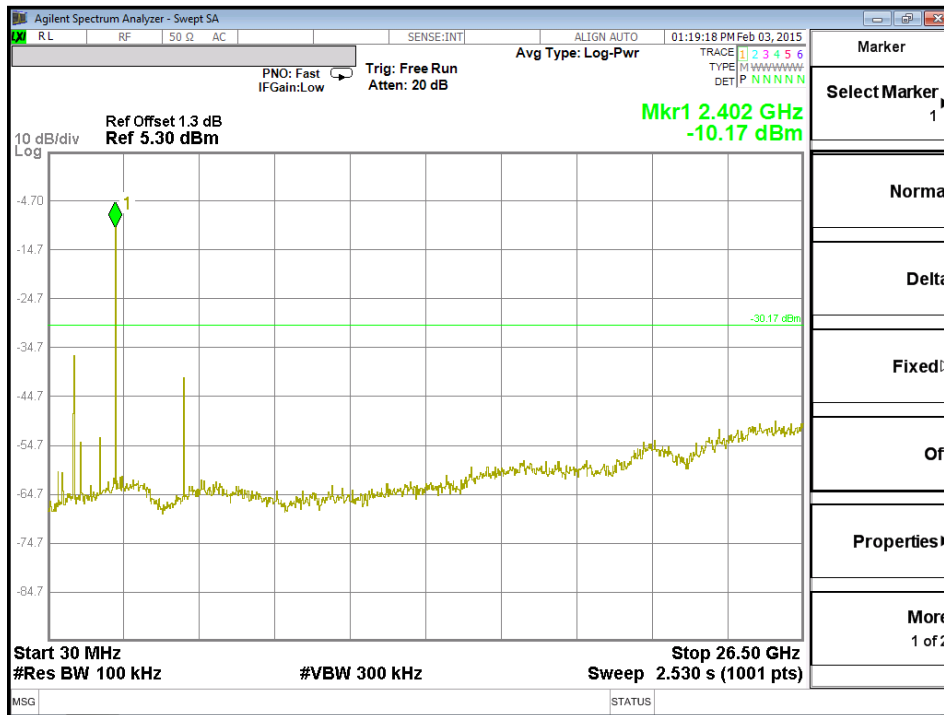
Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	20-24°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103 kPa

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

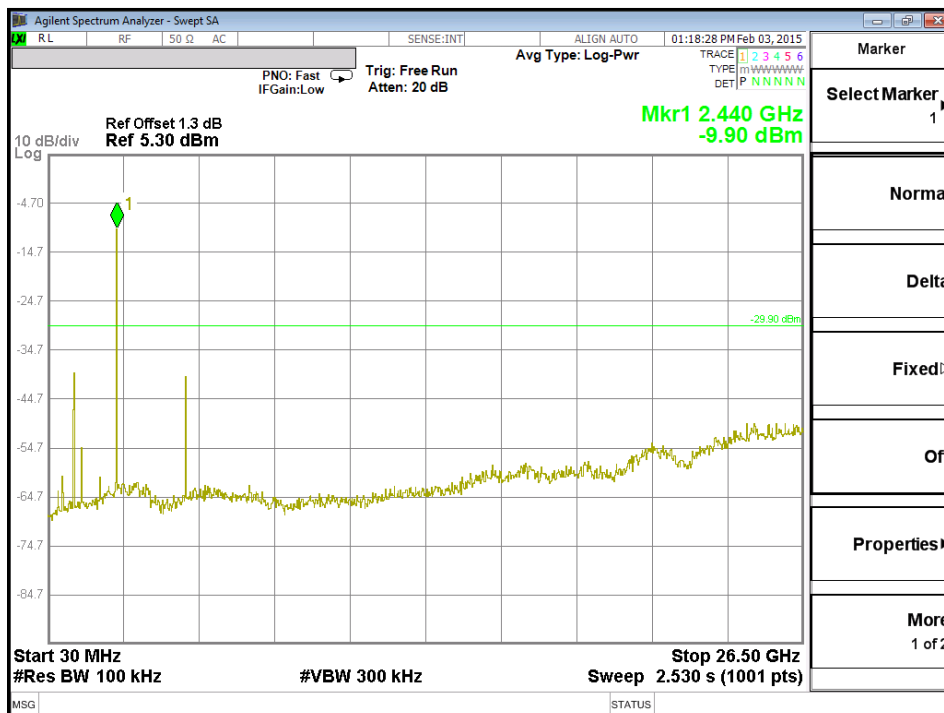
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

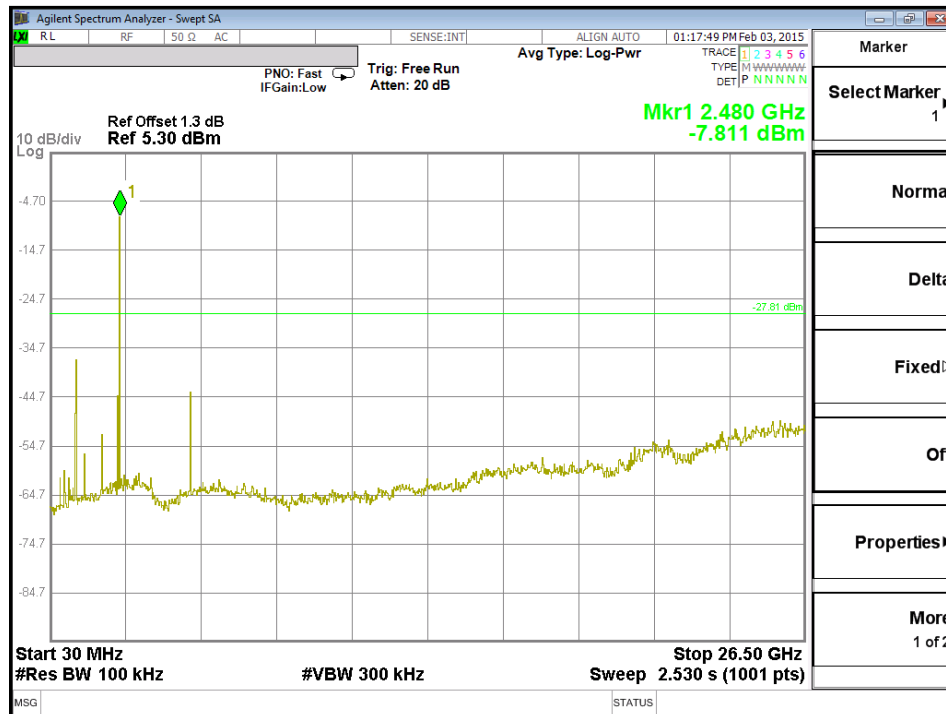
Test Plot 100kHz Conducted Emissions

Low Channel



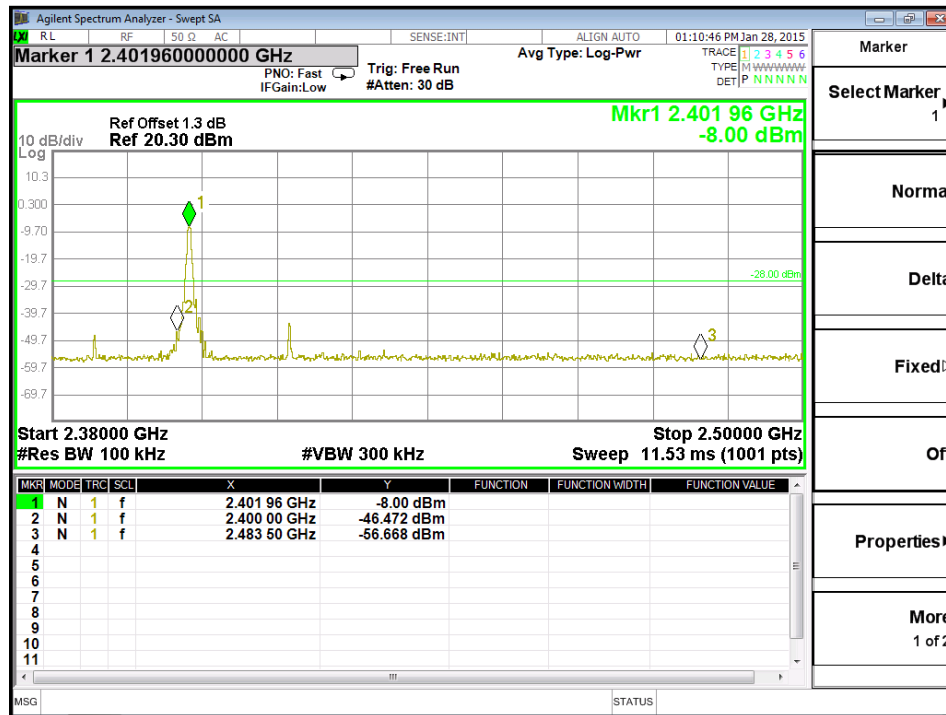
Middle Channel



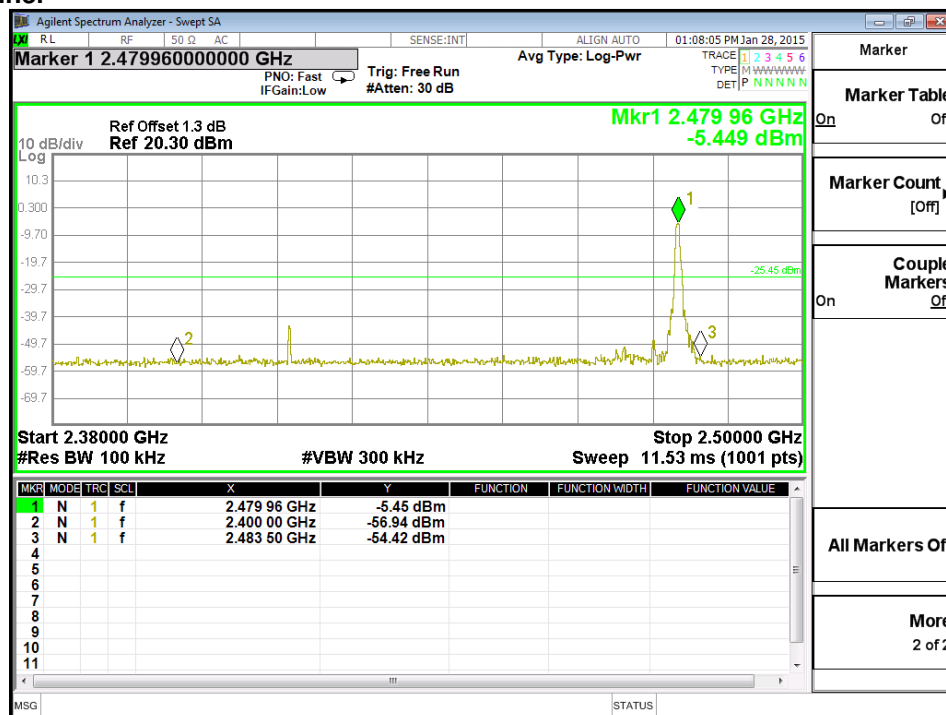
High Channel


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 8.9 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, B

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

For details refer to Appendix D.

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 worst-case Axis orientation is 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

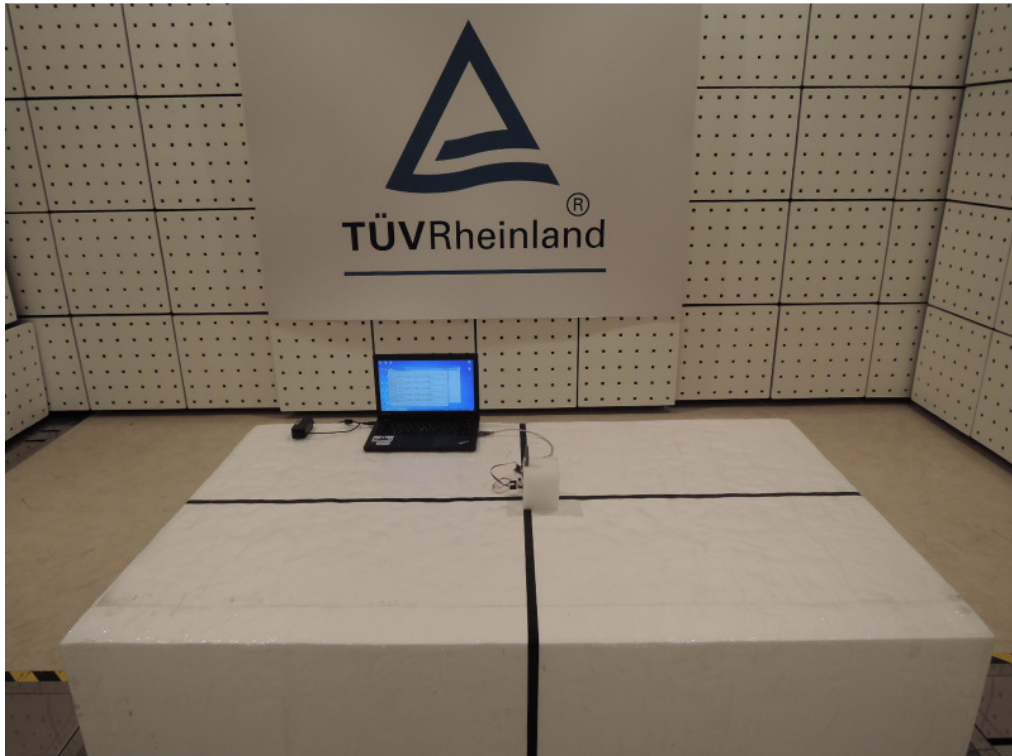
RESULT:**Passed**

Test standard : FCC KDB Publication 447498 D01 v05

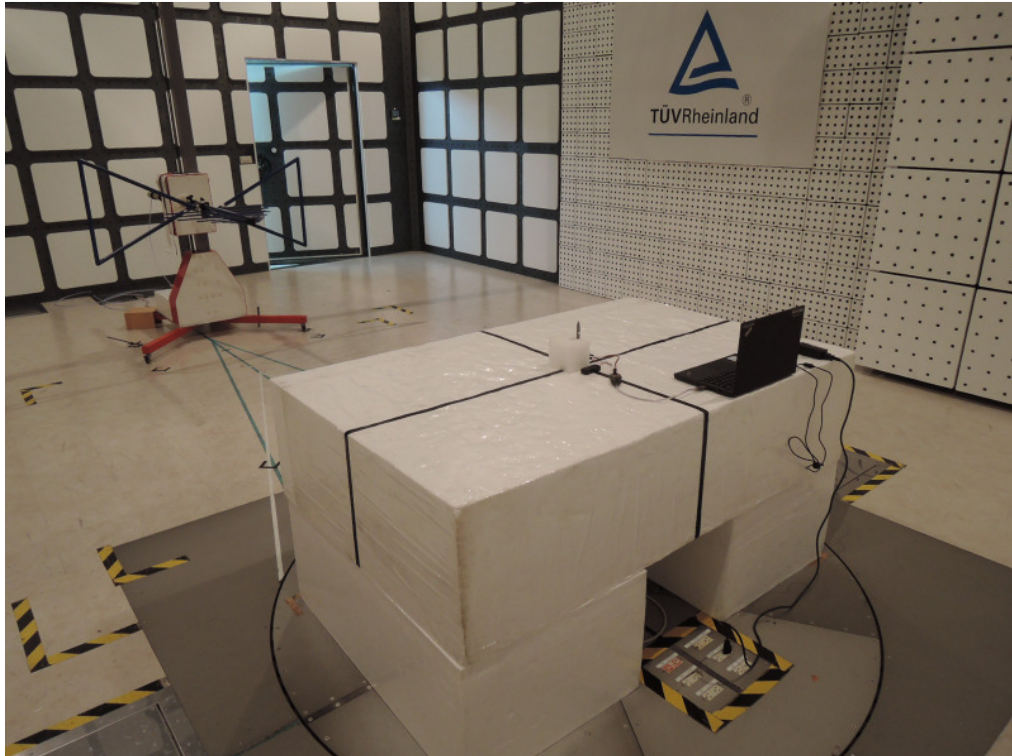
Since maximum peak output power of the transmitter is $0.238 \text{ mW} < 1 \text{ mW}$, hence the EUT is excluded from SAR evaluation according to FCC KDB publication 447498 D01 v05: Mobile Portable RF Exposure.

7. Photographs of the Test Set-Up

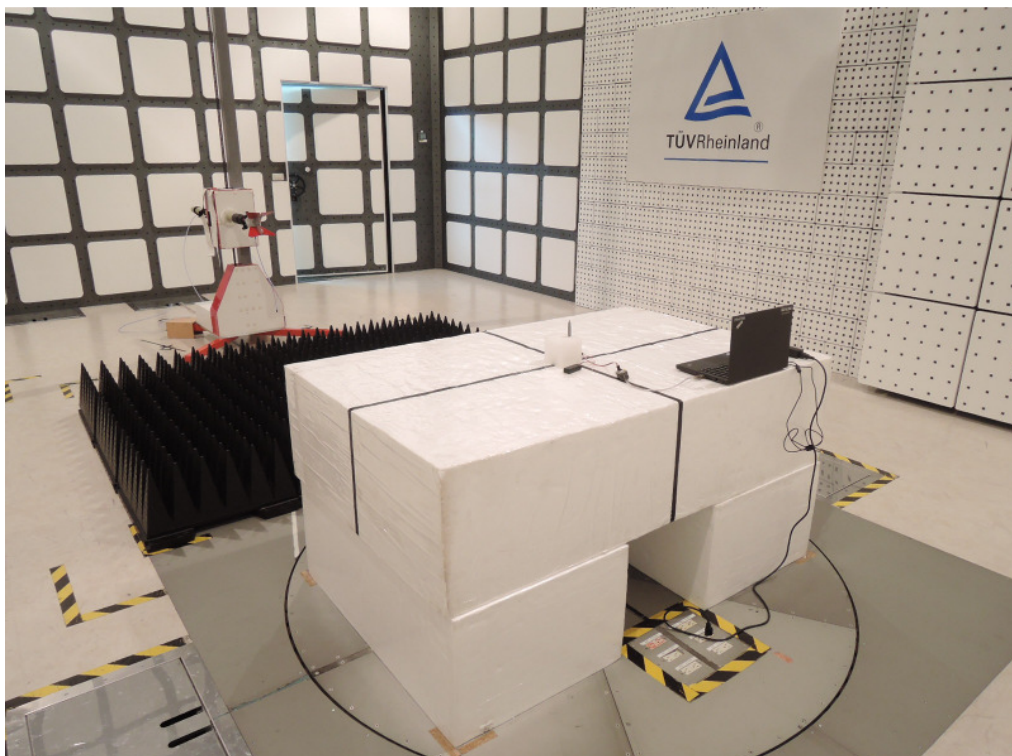
Photograph 1: Set-up for Spurious Emissions (Front View)



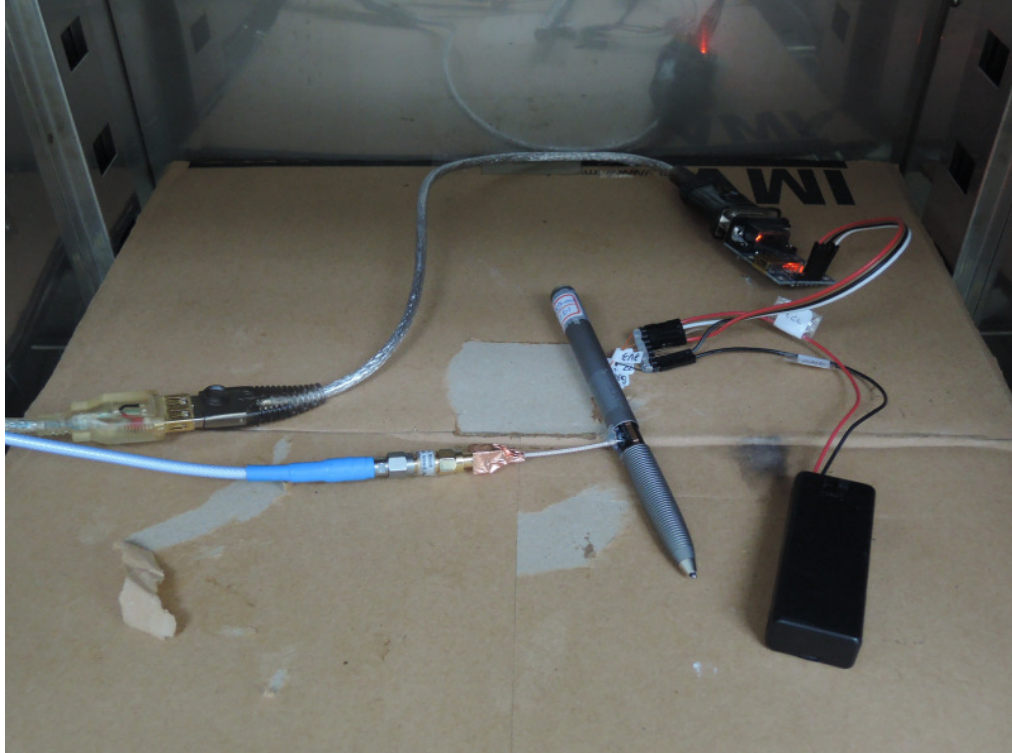
Photograph 2: Set-up for Spurious Emissions (Back View 1)



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



Photograph 4: Set-up for Conducted testing



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