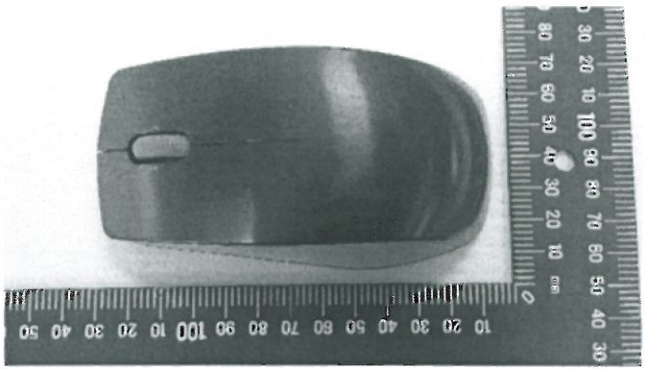
Prüfbericht-Nr.: *Test Report No.:*	**10050705 001**	**Auftrags-Nr.:** *Order No.:*	114034271	Seite 1 von 23 *Page 1 of 23*
Kunden-Referenz-Nr.: *Client Reference No.:*	N/A	**Auftragsdatum:** *Order date:*	9-Apr-2015	
Auftraggeber: *Client:*	Logitech Far East Ltd, No. 2, Creation Road IV Science-Based Industrial Park			
Prüfgegenstand: *Test item:*	2.4 GHz Cordless Mouse			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	M-R0058			
Auftrags-Inhalt: *Order content:*	FCC Part15C / IC / NCC LP0002 Test report			
Prüfgrundlage: *Test specification:*	FCC 47CFR Part 15: Subpart C Section 15.249 RSS-210 issue 8 (12-2010) Annex 2.9 NCC Low-power Radio-frequency Devices Technical Regulations LP0002(2011)			

Wareneingangsdatum: *Date of receipt:*	3-Apr-2015
Prüfmuster-Nr.: *Test sample No.:*	A000187041-003
Prüfzeitraum: *Testing period:*	7-Apr-2015 - 10-Apr-2015
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:*		
2015-04-23	Arvin Ho/Department Manager		2015-04-23	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: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *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*

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.
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.
V04

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT
RESULT: *Passed*

5.1.2 FIELD STRENGTH OF FUNDAMENTAL
RESULT: *Passed*

5.1.3 99% BANDWIDTH
RESULT: *Passed*

5.1.4 SPURIOUS EMISSION
RESULT: *Passed*

5.2.1 SPURIOUS EMISSION
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 P: Photo Documentation
(File Name: 10050705APPENDIX P)
Appendix D: Test Result of Radiated Emissions
(File Name: 10050705APPENDIX D)

Test Specifications
The following standards were applied.

Table 1: Applied Standard and Test Levels

Radio
FCC 47CFR Part 15: Subpart C Section 15.249 RSS-210 Issue 8, December 2010 RSS-Gen, Issue 4, November 2014 ANSI C63.10:2009 NCC Low-power Radio-frequency Devices Technical Regulations LP0002(2011)(100年6月28日)

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
EMI Test Receiver	R&S	ESR7	101062	30-Aug-15
Bilog Antenna	TESEQ	CBL6111D	29802	4-Jul-15
Spectrum Analyzer	R&S	FSV 40	100921	16-Dec-15
Spectrum Analyzer	Agilent	N9010A	MY53470241	30-Mar-16
Horn Antenna	ETS-Lindgren	3117	138160	11-Jan-16
Horn Antenna (18GHz~40GHz)	COM-POWER	AH840	101031	29-Oct-15
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	22-Aug-15
Preamplifier (18 GHz -40 GHz)	COM-POWER	PAM-840	461257	25-Aug-15
Pre-Amplifier (1GHz~18GHz)	EM Electronics	EM30180	60558	3-Nov-15
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	21-Oct-15
EMI Test Receiver	R&S	ESCI7	100797	27-Dec-15
LISN (1 phase)	R&S	ENV216	101243	30-May-15
LISN	Rolf Heine	NNB-2/16Z	99080	25-Aug-15

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
RF power, conducted	± 1.5 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 Wireless Mouse. It contains a 2.4GHz compatible module enabling the user to communicate data through a Wireless interface.
For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 Ratings and System Details

Table 4: Basic Information of EUT

Item	EUT information
Kind of Equipment	2.4 GHz Cordless Mouse
Type Designation	M-R0058
Brand Name	Lenovo
FCC ID	JNZMR0058
Canada ID	4418A-MR0058

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequencies	2405MHz-2474MHz
Channel Spacing	2 MHz minimum
Channel number	12
Operation Voltage	2.7
Modulation	GFSK

3.3 Independent Operation Modes

Basic operation modes are:

A. Transmitting
   1. Low channel
   2. Middle channel
   3. High channel

B. Receiving
   1. Low channel
   2. Middle channel
   3. High channel

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 emission 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 modefied firmware which makes it possible to control them through a Num-Lock key from keyboard.

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.

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:

None.

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

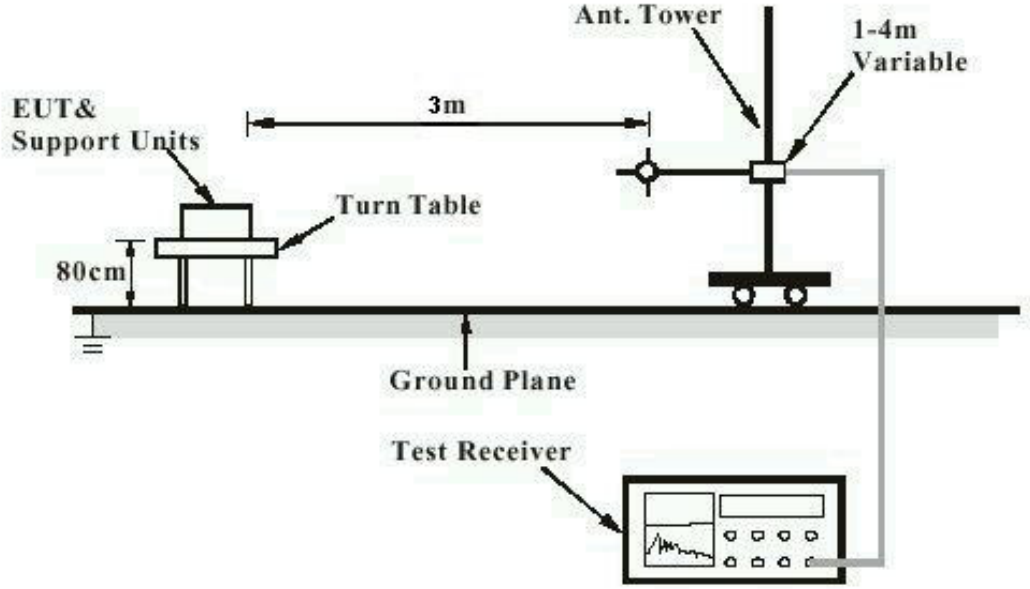
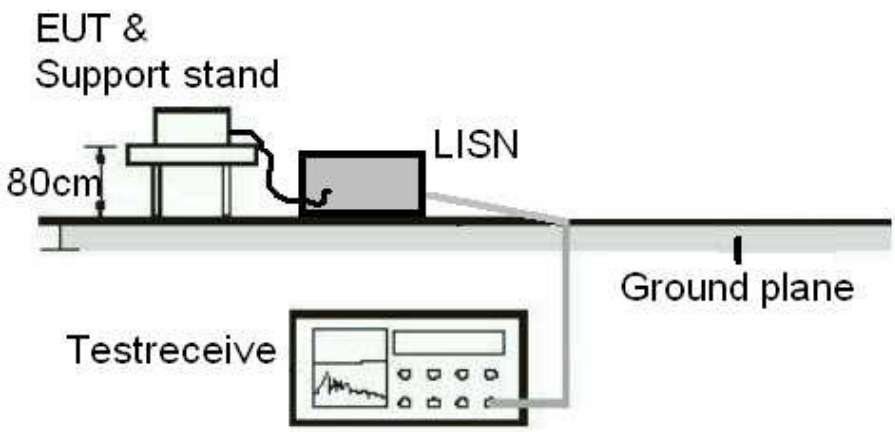


Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Passed**

Standard	:	LP0002(2011): 2.2 Part 15.203 and RSS-Gen 7.1.4
Requirement	:	use of approved antennas only

The antenna is a printed PCB trace 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 Field strength of fundamental

RESULT: **Passed**

Test standard	:	FCC Part 15.249(a), RSS-210 A2.9 LP0002: 3.10.2(2)
Basic standard	:	ANSI C63.10:2009
Kind of test site	:	Semi-Anechoic Chamber

Test setup

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

Atmospheric pressure	:	100-103 kPa

In the table below the maximum results found are reported.

For detailed results of all frequencies tested, please refer to Appendix D.

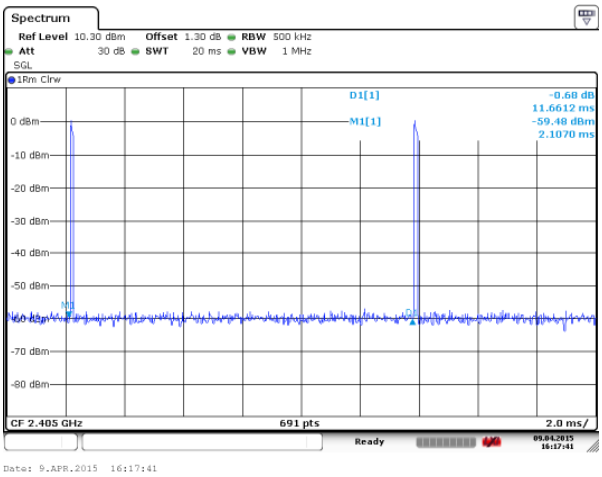
Table 6: Test result of Field strength of fundamental

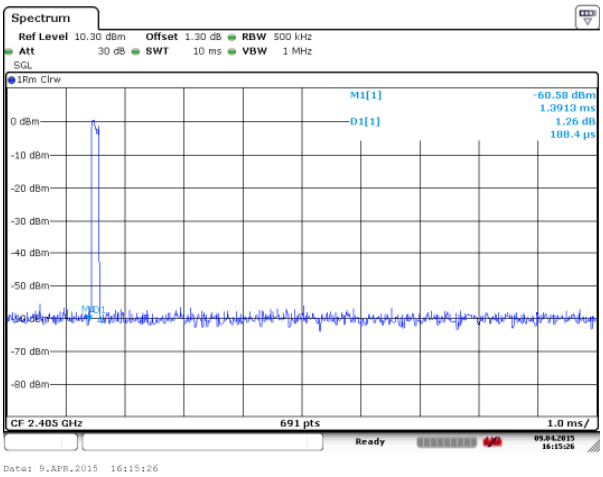
Channel Frequency (MHz)	Test result			
	Level (dBuV/m)	Limit (dBuV/m)	Antenna orientation	Detector
2405	96.96	114	Horizontal	Peak
2405	*61.16 **	94		*Average*
2405	83.23	114	Vertical	Peak
2405	*<83.23*	94		*Average*
2444	96.75	114	Horizontal	Peak
2444	*60.95 **	94		*Average*
2444	83.21	114	Vertical	Peak
2444	*<83.21*	94		*Average*
2474	96.36	114	Horizontal	Peak
2474	*60.56 **	94		*Average*
2474	83.34	114	Vertical	Peak
2474	*<83.34*	94		*Average*

*Duty Cycle correction Factor: 20dB log (188/11661) =35.8dB

Remark: For details of peak measurements refer to Appendix D.

Duty Cycle Measurement:





5.1.3 99% Bandwidth

RESULT: **Passed**

Test standard	:	RSS-Gen
Basic standard	:	ANSI C63.10:2009
Kind of test site	:	Semi-Anechoic Chamber

Test setup

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

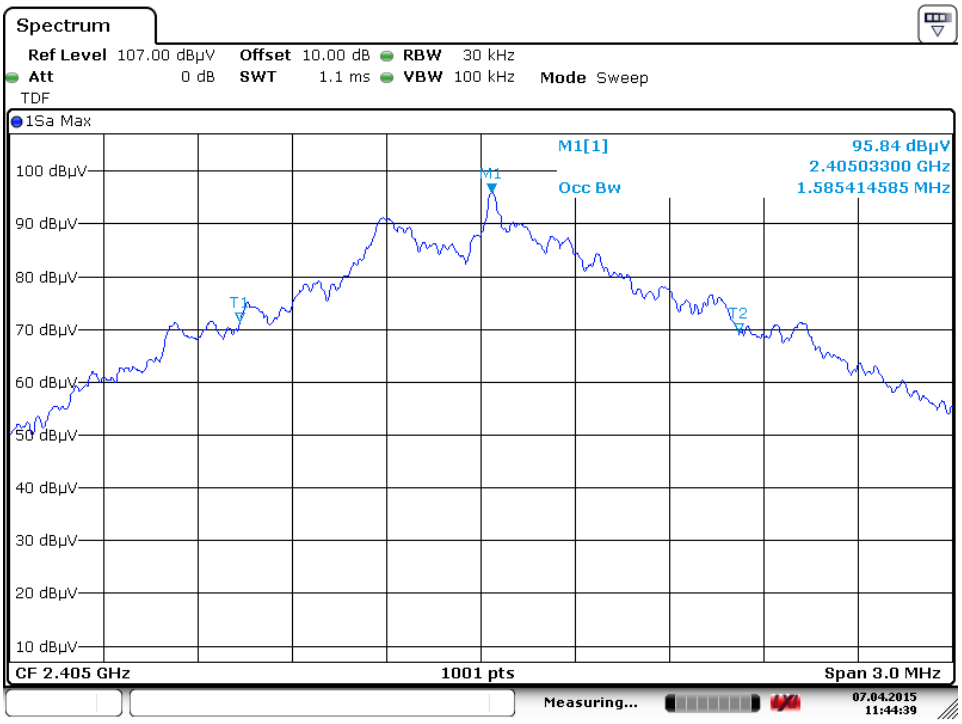
Ambient temperature	:	22-26 °C
Relative humidity	:	50-65 %
Atmospheric pressure	:	100-103 kPa

Table 7: Test result of 99% Bandwidth,

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)
Low Channel	2405	1.59
Mid Channel	2444	1.65
High Channel	2474	1.55

Test Plot of 99% Bandwidth

Low Channel



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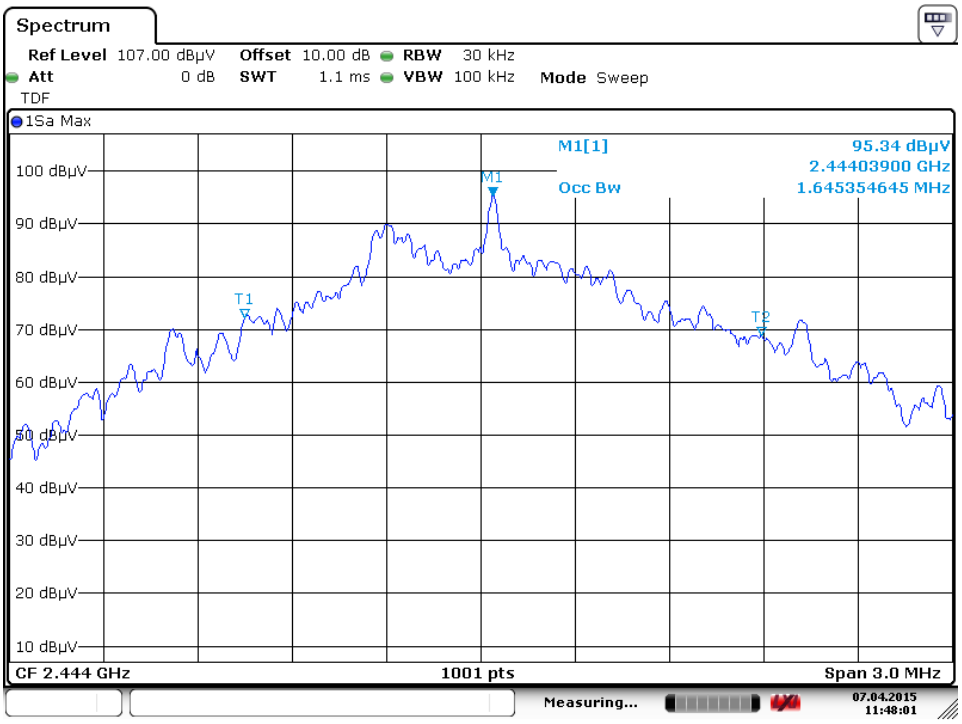
Middle Channel



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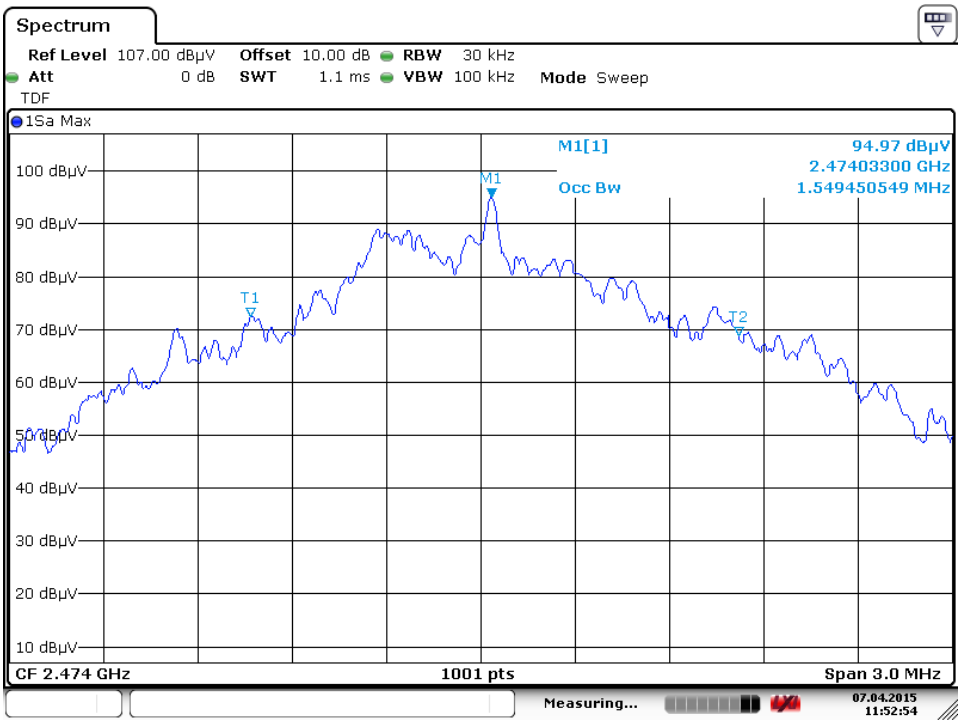
High Channel



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5.1.4 Spurious Emission

RESULT: **Passed**

Test standard	:	FCC part 15.249(d), FCC 15.205, FCC 15.209, RSS-210 2.2, RSS-210 A2.9(b), RSS-Gen 7.2.1 LP0002: 2.8
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

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

For details refer to Appendix D.

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 Receiver Requirement

5.2.1 Spurious Emission

RESULT: **Passed**

Test standard	:	FCC part 15.249(d), FCC 15.205, FCC 15.209, RSS-210 2.2, RSS-210 A2.9(b), RSS-Gen 7.2.1 LP0002: 2.8
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	:	B

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

For details refer to Appendix D.

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.

7. List of Tables

8. List of Photographs