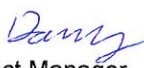



<b>Prüfbericht-Nr.:</b> <i>Test Report No.:</i>	<b>10044048 001</b>	<b>Auftrags-Nr.:</b> <i>Order No.:</i>	<b>114014502</b>	Seite 1 von 20 <i>Page 1 of 20</i>
<b>Kunden-Referenz-Nr.:</b> <i>Client Reference No.:</i>	N/A	<b>Auftragsdatum:</b> <i>Order date:</i>	September 9, 2013	
<b>Auftraggeber:</b> <i>Client:</i>	ACROX Technologies Co., Ltd., 4F., No.89, Minshan St., Neihu Dist., Taipei City 114, Taiwan, R.O.C.			
<b>Prüfgegenstand:</b> <i>Test item:</i>	2.4 GHz Mouse			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type No.:</i>	NS-WLM1451-SV , XX-WLM1451-XX (X=0~9 or A~Z)			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	FCC and IC Test report			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	FCC 47CFR Part 15: Subpart C Section 15.249 RSS-210 issue 8 (12-2010) Annex 2.9			
<b>Wareneingangdatum:</b> <i>Date of receipt:</i>	9/27/2013			
<b>Prüfmuster-Nr.:</b> <i>Test sample No.:</i>	A000024807-002			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	15-Oct-2013 - 16-Oct-2013			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	EMC Laboratory Taipei			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	TUV Rheinland Taiwan Ltd.			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass			
<b>geprüft von / tested by:</b>		<b>kontrolliert von / reviewed by:</b>		
2013-10-25 Danny S. C. Sung/Project Manager		2013-10-25 Rene Charton/Senior Project Manager		
<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>	<b>Unterschrift</b> <i>Signature</i>	<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>
				
<b>Sonstiges / Other:</b>				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
<p><b>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.</b>  <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>				

## TEST SUMMARY

### **5.1.1 FIELD STRENGTH OF FUNDAMENTAL**

*RESULT: Passed*

### **5.1.2 99% BANDWIDTH**

*RESULT: Passed*

### **5.1.3 SPURIOUS EMISSION**

*RESULT: Passed*

## Contents

<b>1.</b>	<b>GENERAL REMARKS .....</b>	<b>4</b>
<b>1.1</b>	<b>COMPLEMENTARY MATERIALS.....</b>	<b>4</b>
<b>2.</b>	<b>TEST SITES .....</b>	<b>5</b>
<b>2.1</b>	<b>TEST FACILITIES .....</b>	<b>5</b>
<b>2.2</b>	<b>LIST OF TEST AND MEASUREMENT INSTRUMENTS.....</b>	<b>6</b>
<b>2.3</b>	<b>TRACEABILITY .....</b>	<b>6</b>
<b>2.4</b>	<b>CALIBRATION .....</b>	<b>7</b>
<b>2.5</b>	<b>MEASUREMENT UNCERTAINTY .....</b>	<b>7</b>
<b>3.</b>	<b>GENERAL PRODUCT INFORMATION.....</b>	<b>8</b>
<b>3.1</b>	<b>PRODUCT FUNCTION AND INTENDED USE .....</b>	<b>8</b>
<b>3.2</b>	<b>RATINGS AND SYSTEM DETAILS.....</b>	<b>8</b>
<b>3.3</b>	<b>INDEPENDENT OPERATION MODES.....</b>	<b>9</b>
<b>3.4</b>	<b>NOISE GENERATING AND NOISE SUPPRESSING PARTS .....</b>	<b>9</b>
<b>3.5</b>	<b>SUBMITTED DOCUMENTS.....</b>	<b>9</b>
<b>4.</b>	<b>TEST SET-UP AND OPERATION MODES.....</b>	<b>10</b>
<b>4.1</b>	<b>PRINCIPLE OF CONFIGURATION SELECTION .....</b>	<b>10</b>
<b>4.2</b>	<b>TEST OPERATION AND TEST SOFTWARE.....</b>	<b>10</b>
<b>4.3</b>	<b>SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT .....</b>	<b>10</b>
<b>4.4</b>	<b>COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE.....</b>	<b>11</b>
<b>4.5</b>	<b>TEST SETUP DIAGRAM .....</b>	<b>11</b>
<b>5.</b>	<b>TEST RESULTS .....</b>	<b>13</b>
<b>5.1</b>	<b>TRANSMITTER REQUIREMENT &amp; TEST SUITES .....</b>	<b>13</b>
5.1.1	<i>Field strength of fundamental.....</i>	<i>13</i>
5.1.2	<i>99% Bandwidth .....</i>	<i>15</i>
5.1.3	<i>Spurious Emission .....</i>	<i>17</i>
<b>6.</b>	<b>PHOTOGRAPHS OF THE TEST SET-UP.....</b>	<b>18</b>
<b>7.</b>	<b>LIST OF TABLES .....</b>	<b>20</b>
<b>8.</b>	<b>LIST OF PHOTOGRAPHS.....</b>	<b>20</b>

## 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 Documentation**

(File Name: 10044048APPENDIX P)

**Appendix D: Test Result of Radiated Emissions**

(File Name: 10044048APPENDIX D)

Test Specifications

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

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

<b>Radio</b>
--------------

FCC 47CFR Part 15: Subpart C Section 15.249
---

RSS-210 issue 8 (12-2010) Annex 2.9
-------------------------------------

ANSI C63.4:2009
-----------------

## 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**

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until	Used for test items
EMI Test Receiver	R&S	ESCI 7	100797	20-Dec-13	Spurious Emission and Frequency Band Edge
Bilog Antenna	TESEQ	CBL6111D	29802	29-Jun-14	Spurious Emission and Frequency Band Edge
Spectrum Analyzer	R&S	FSV 40	100921	13-Dec-13	6dB Bandwidth, Output Power, Power Density, Cond. Spurious Emissions, Rad. Spurious Emission
Horn Antenna	ETS-Lindgren	3117	138160	10-Jan-14	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)	COM-POWER	PAM-840	461257	2-Sep-14	Spurious Emission and Frequency Band Edge
Pre-Amplifier (1GHz~18GHz)	EM Electronics	EM30180	60558	12-Nov-13	Spurious Emission and Frequency Band Edge
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	28-Sep-14	Spurious Emission and Frequency Band Edge
EMI Test Receiver	R&S	ESCI	101094	29-Aug-14	Mains Spurious Emission
LISN (1 phase)	R&S	ENV216	101243	5-Jun-14	Mains Spurious Emission
LISN	Rolf Heine	NNB-2/16Z	99080	30-Aug-14	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 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 EUT is a set of Wireless mouse which sends control information to a Wireless Dongle that can be inserted into a Computer. The first two letters "XX" of model name means the abbreviation of brand name. And the last two letters "XX" of model name means the abbreviation of color. For example, It could be "SV" for silver; "BK" for black; "BU" for blue and "RD" for red. This report covers the Mouse and the version tested is NS-WLM1451-SV. 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 Mouse
Type Designation	NS-WLM1451-SV , XX-WLM1451-XX (X=0~9 or A~Z)
Brand Name	
FCC ID	PRDMU22 Canada ID IC::6180A-GOG

**Table 5: Technical Specification of EUT**

Technical Specification	Value
Operating Frequencies	2408 2440 2474 MHz
Channel Spacing	2 MHz minimum
Channel number	32
Operation Voltage	3V
Modulation	FSK



### **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: The production line Test samples are provided with an internal test mode

.

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:

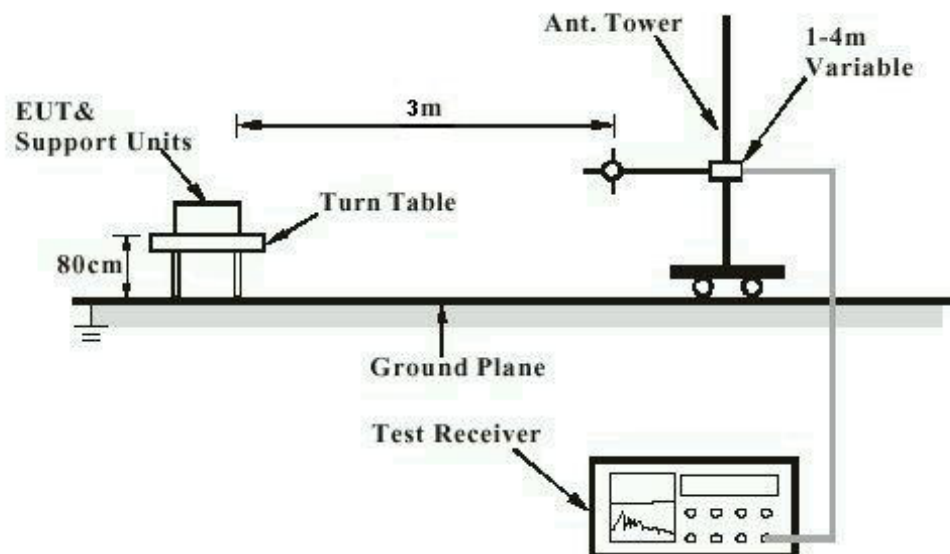
Kind of Equipment	Manufacturer	Model Name	S/N
--	--	--	--

## 4.4 Countermeasures to achieve EMC Compliance

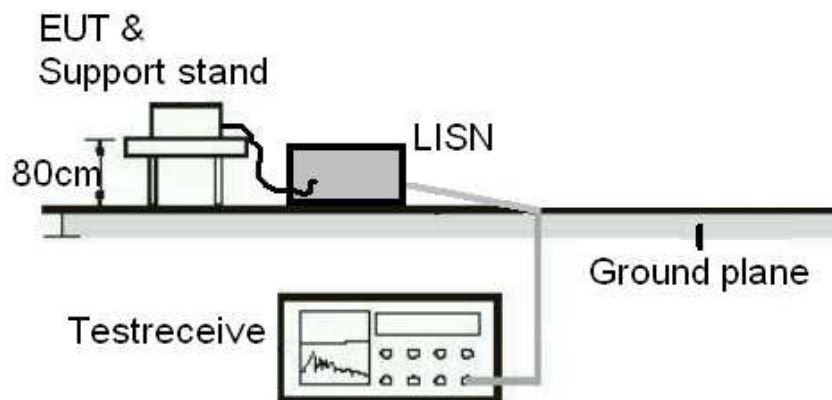
The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

## 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 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
2408	91.00	114	Horizontal	Peak
2408	90.86	94		Average
2408	82.89	114	Vertical	Peak
2408	81.82	94		Average
2440	92.33	114	Horizontal	Peak
2440	92.10	94		Average
2440	86.71	114	Vertical	Peak
2440	85.76	94		Average
2474	92.65	114	Horizontal	Peak
2474	91.06	94		Average
2474	88.55	114	Vertical	Peak
2474	87.37	94		Average

Remark: For details refer to Appendix D.

**5.1.2 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

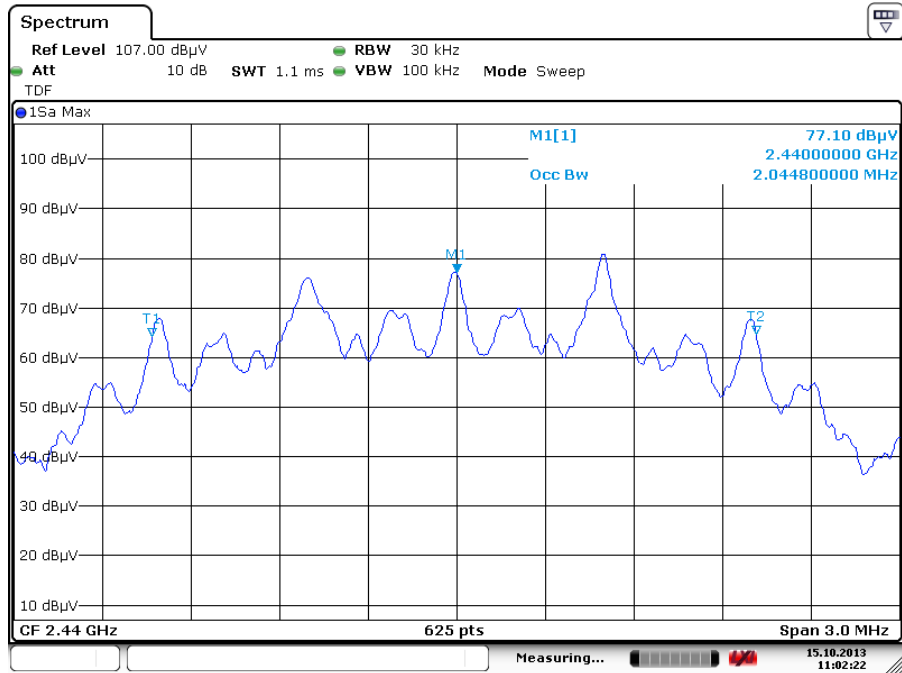
Ambient temperature : 22-26 °C  
Relative humidity : 50-65 %  
Atmospheric pressure : 100-103 kPa

**Table 7: Test result of 99% Bandwidth,**

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	
Mid Channel	2440	2.044	

### Test Plot of 99% Bandwidth

#### Middle Channel



Date: 15.OCT.2013 11:02:23



### 5.1.3 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

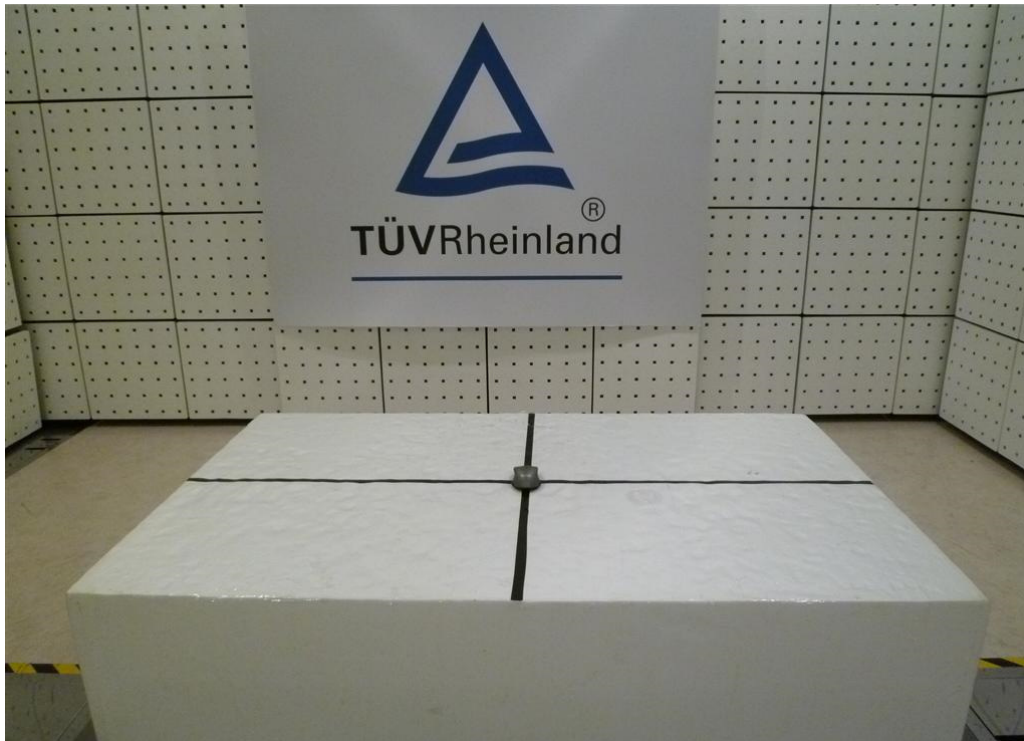
Remark: Testing was carried out within frequency range 30MHz to the tenth harmonic.

For details refer to Appendix D.

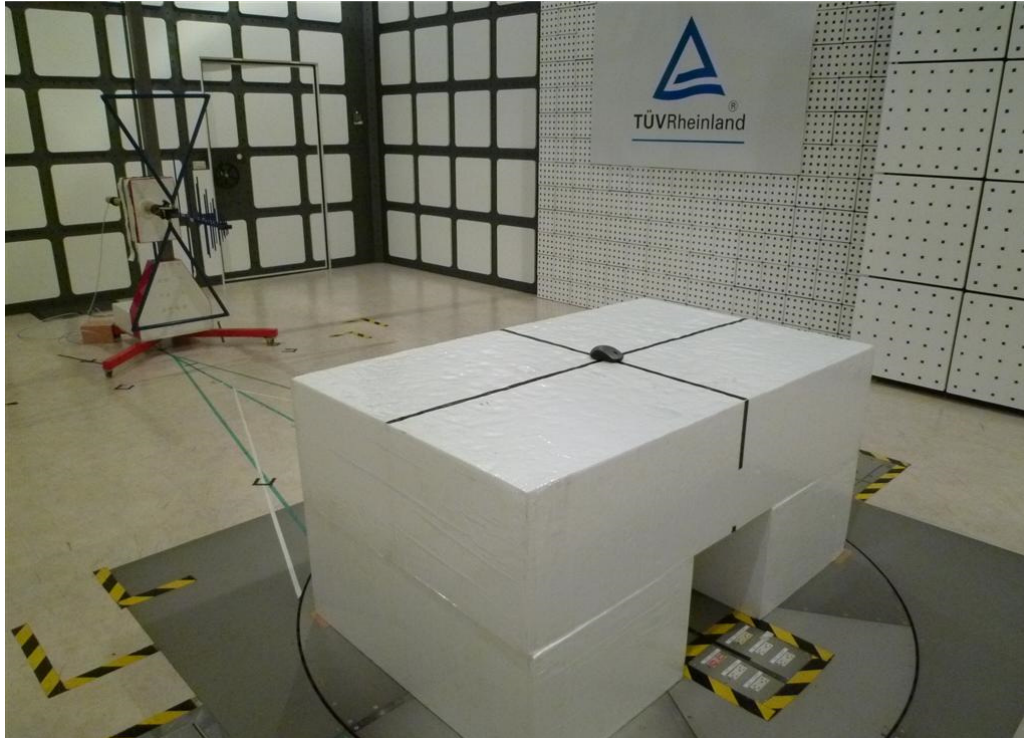
The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The X Axis orientation is the worst-case and recorded in this test report. Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested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

## 6. Photographs of the Test Set-Up

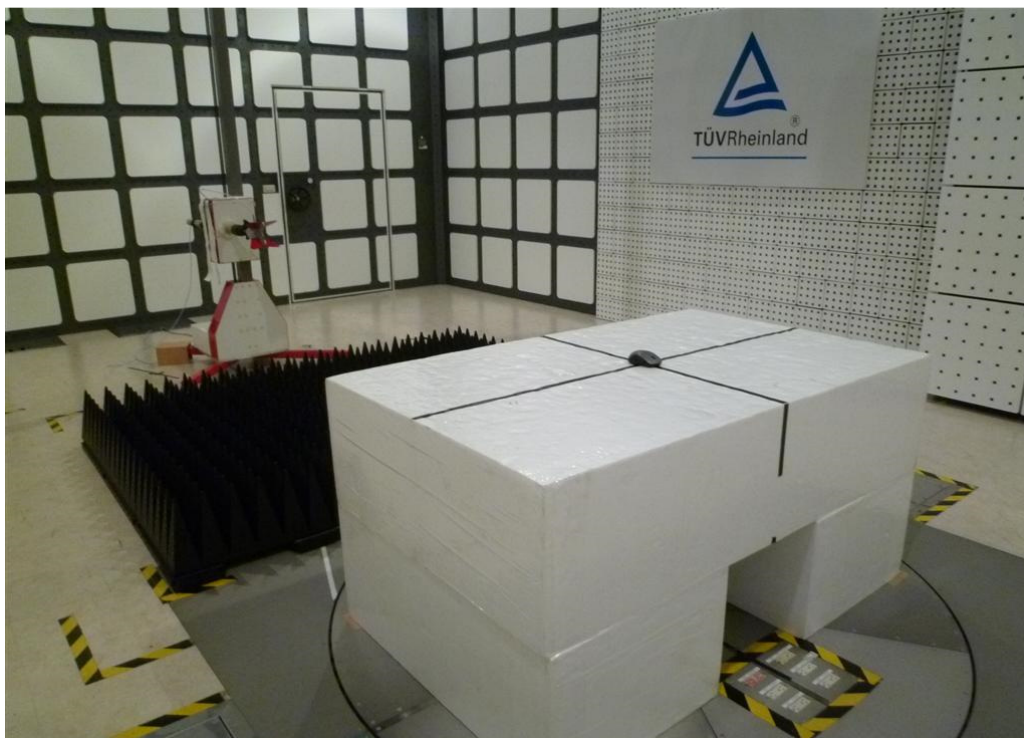
Photograph 1: Set-up for Spurious Emissions (Front View)



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



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



## 7. 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: Basic Information of EUT .....	8
Table 5: Technical Specification of EUT .....	8
Table 6: Test result of Field strength of fundamental.....	14
Table 7: Test result of 99% Bandwidth,.....	15

## 8. List of Photographs

Photograph 1: Set-up for Spurious Emissions (Front View).....	18
Photograph 2: Set-up for Spurious Emissions (Back View 1 TX) .....	19
Photograph 3: Set-up for Spurious Emissions (Back View 2 TX) .....	19