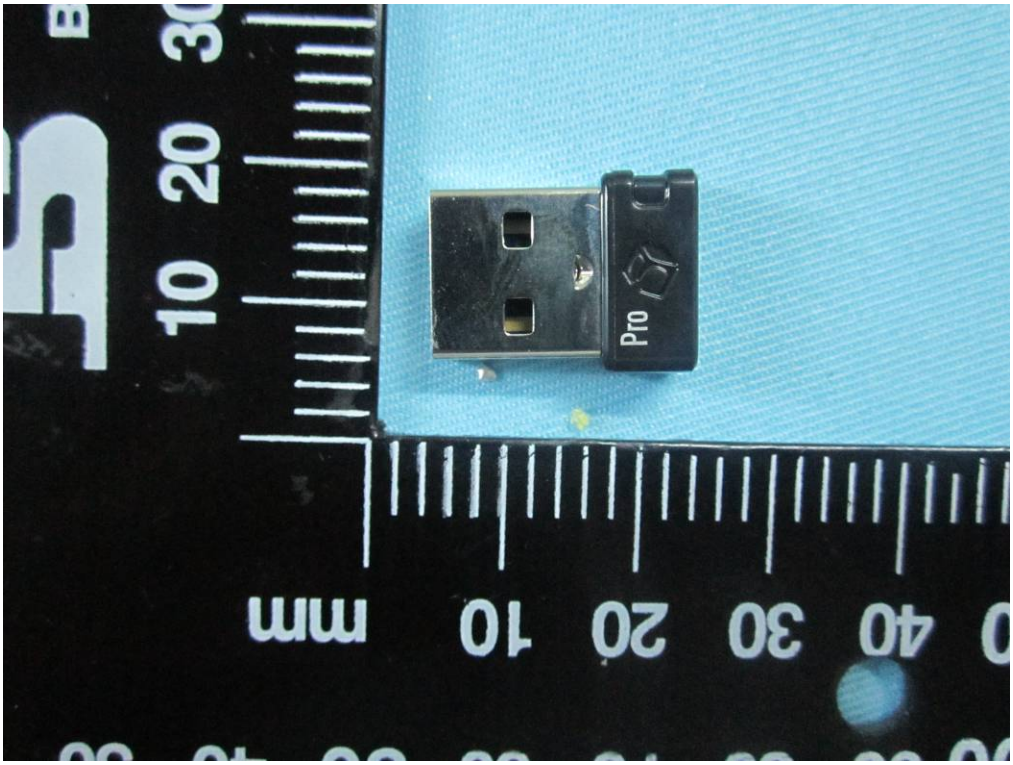
3Dconnexion

USB Receiver

Main Model: 3DX-600048
Serial Model: N/A

June 18, 2014

Report No.: 14070248-FCC-E2
(This report supersedes NONE)



Modifications made to the product : None

This Test Report is Issued Under the Authority of:		
Kahn Yang	Alex Liu	
Kahn Yang **Compliance Engineer**	**Alex Liu** **Technical Manager**	

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Test result presented in this test report is applicable to the representative sample only.

EMC Test Report

To:FCC Part 15 Subpart B Class B: 2013, ANSI C63.4: 2009

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Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

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Country/Region	Scope
USA	EMC , RF/Wireless , Telecom
Canada	EMC, RF/Wireless , Telecom
Taiwan	EMC, RF, Telecom , Safety
Hong Kong	RF/Wireless ,Telecom
Australia	EMC, RF, Telecom , Safety
Korea	EMI, EMS, RF , Telecom, Safety
Japan	EMI, RF/Wireless, Telecom
Singapore	EMC , RF , Telecom
Europe	EMC, RF, Telecom , Safety

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CONTENTS

1 EXECUTIVE SUMMARY & EUT INFORMATION

The purpose of this test programme was to demonstrate compliance of the 3Dconnexion, USB Receiver and Model: 3DX-600048 against the current Stipulated Standards. The USB Receiver has demonstrated compliance with the FCC Part 15 Subpart B Class B: 2013, ANSI C63.4: 2009.

EUT Information

EUT Description	:	**USB Receiver**
Main Model	:	**3DX-600048**
Serial Model	:	**N/A**
Antenna Gain	:	**-2.36 dBi**
Input Power	:	**Battery:** **Model: LF253** **Spec: 3.7V 2000mAh** **Limited charger voltage: 4.2V** **Input: USB 5V**
Classification Per Stipulated Test Standard	:	**Class B Emission Product Per FCC Part 15 Subpart B Class B: 2013, ANSI C63.4: 2009**

2 TECHNICAL DETAILS

Purpose	**Compliance testing of USB Receiverwith stipulated standards**
Applicant / Client	**3Dconnexion** **5 Ave. des Citronniers, Monaco**
Manufacturer	**Xiamen Intretech Inc** **No. 588, Jiahe road, Xiamen, Fujian, China**
Laboratory performing the tests	**SIEMIC (Shenzhen-China) Laboratories** **Zone A, Floor 1, Building 2, Wan Ye Long Technology Park, South Side of Zhoushi Road, Bao'an District, Shenzhen, Guangdong, China** **Tel: +86-0755-2601 4629 / 2601 4953** **Fax: +86-0755-2601 4953-810** **Email: China@siemic.com.cn**
Test report reference number	**14070248-FCC-E2**
Date EUT received	**June 03, 2014**
Standard applied	**FCC Part 15 Subpart B Class B: 2013, ANSI C63.4: 2009**
Dates of test	**June 04 to June 09, 2014**
No of Units	**#1**
Equipment Category	**JBP**
Trade Name	**3Dconnexion**
RF Operating Frequency (ies)	**2404-2477 MHz**
Number of Channels	**5**
Modulation	**GFSK**
FCC ID	**2AAHQ-SMPW-RC**

3 MODIFICATION

NONE

4 TEST SUMMARY

The product was tested in accordance with the following specifications.
All testing has been performed according to below product classification:

Class B Emission Product

Test Results Summary

Emissions			
Test Standard	**Description**	**Product Class**	**Pass / Fail**
FCC Part 15 Subpart B Class B: 2013, ANSI C63.4: 2009	Conducted Emissions	See Above	Pass
FCC Part 15 Subpart B Class B: 2013, ANSI C63.4: 2009	Radiated Emissions	See Above	Pass

All measurement uncertainty is not taken into consideration for all presented test result.

5 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

5.1 Conducted Emissions Test Result

Note:

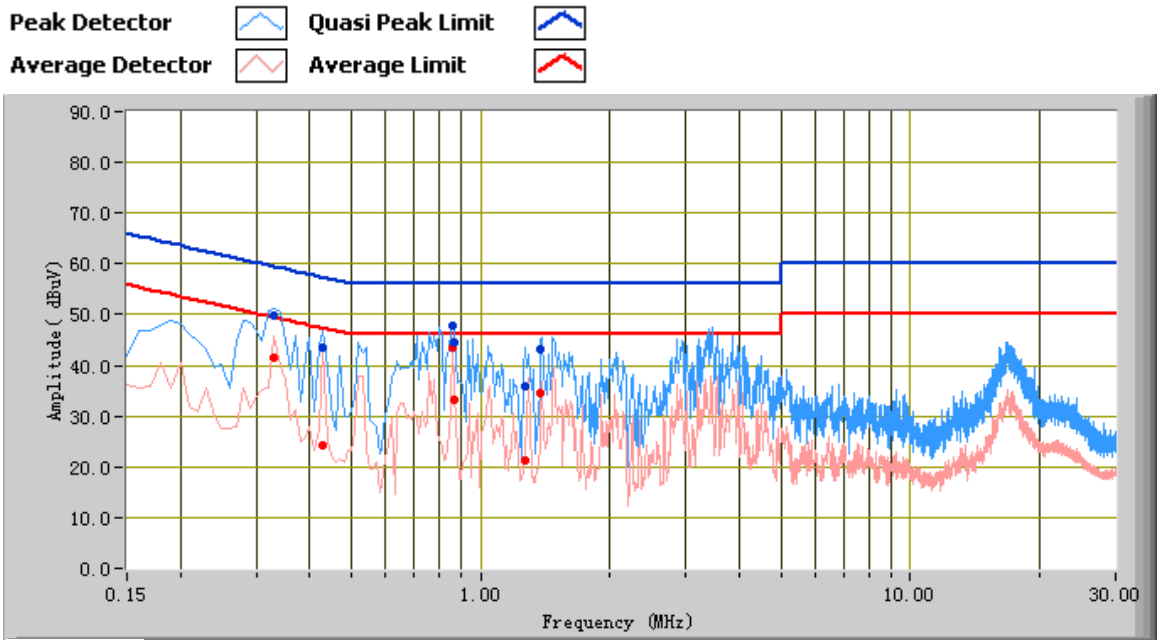
1. All possible modes of operation were investigated. Only the several worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is ±3.86dB.
4. Environmental Conditions

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1018mbar

5. Test date : June 04, 2014
   Tested By : Kahn Yang

Test Result: Pass

Test Mode:	Running

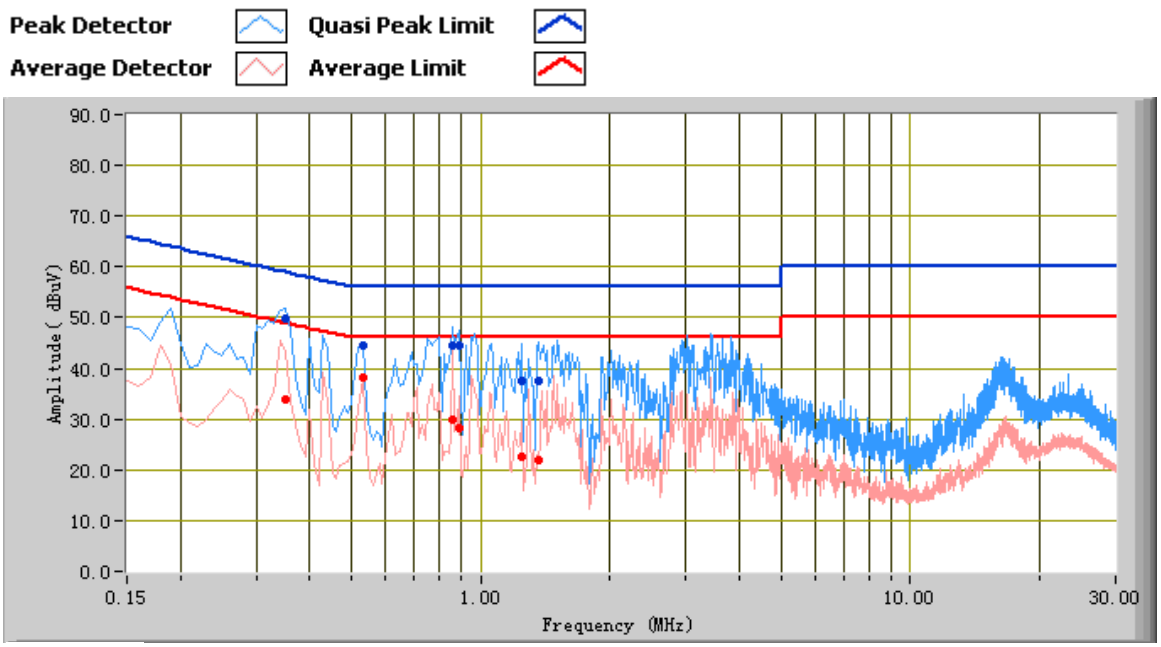


Test Data

Phase Line Plot at 120V AC, 60Hz

Frequency (MHz)	Quasi Peak (dBuV)	Limit (dBuV)	Margin (dB)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Factors (dB)
0.86	47.81	56.00	-8.19	43.62	46.00	-2.38	10.37
0.33	49.66	59.45	-9.79	41.42	49.45	-8.03	11.34
0.87	44.64	56.00	-11.36	33.05	46.00	-12.95	10.36
0.43	43.64	57.25	-13.61	24.22	47.25	-23.03	10.86
1.38	43.27	56.00	-12.73	34.57	46.00	-11.43	10.33
1.27	35.79	56.00	-20.21	21.38	46.00	-24.62	10.31

Test Mode:	Running



Test Data

Phase Natural Plot at 120V AC, 60Hz

Frequency (MHz)	Quasi Peak (dBuV)	Limit (dBuV)	Margin (dB)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Factors (dB)
0.35	49.80	58.96	-9.16	33.85	48.96	-15.11	11.25
0.86	44.41	56.00	-11.59	29.86	46.00	-16.14	10.37
0.89	44.34	56.00	-11.66	28.27	46.00	-17.73	10.35
0.53	44.53	56.00	-11.47	38.13	46.00	-7.87	10.55
1.36	37.67	56.00	-18.33	21.95	46.00	-24.05	10.32
1.24	37.55	56.00	-18.45	22.42	46.00	-23.58	10.30

5.2 Radiated Emissions Test Result

Note:

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz (QP only @ 3m & 10m) is +6dB/-6dB (for EUTs < 0.5m X 0.5m X 0.5m).
4. Environmental Conditions

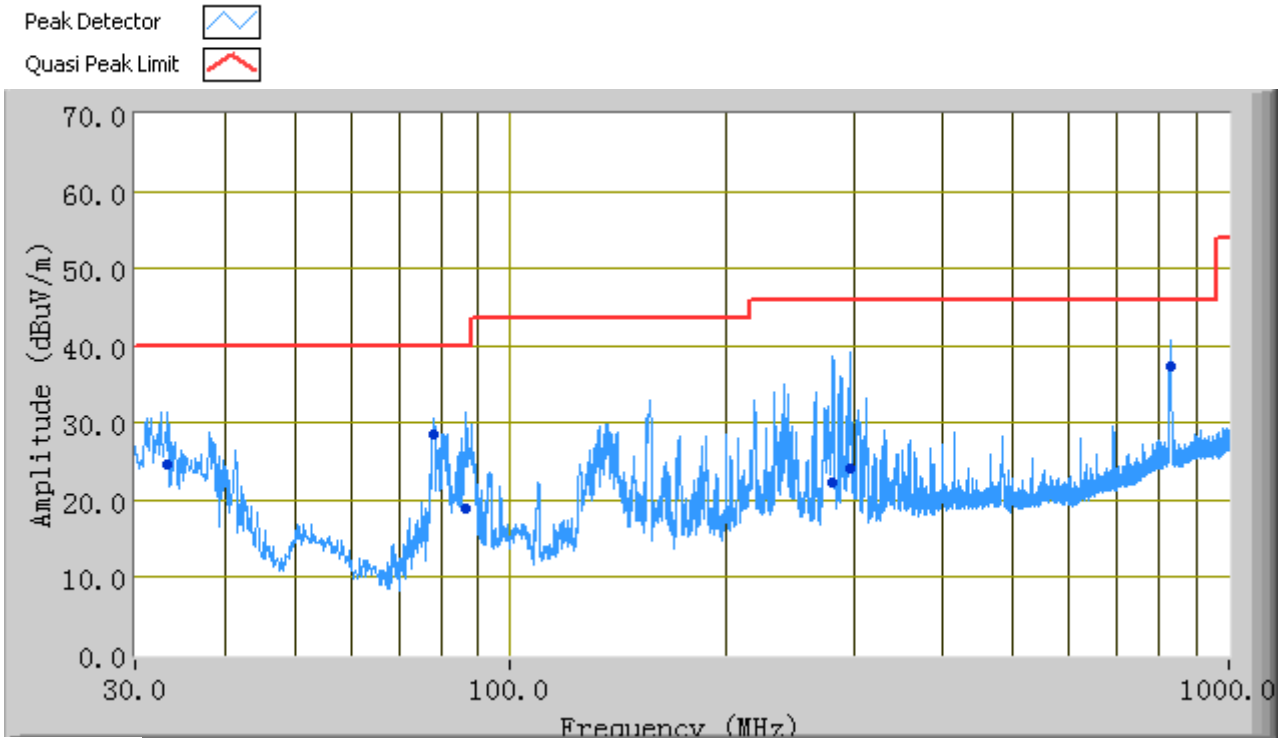
Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1009mbar

5. Test date : June 09, 2014
   Tested By : Kahn Yang

Test Result: Pass

Test Mode:	Charging

Below 1GHz



Test Data

Frequency (MHz)	Quasi Peak (dBuV/m)	Azimuth	Polarity(H/V)	Height (cm)	Factors (dB)	Limit (dBuV)	Margin (dB)
827.74	37.31	207.00	V	217.00	3.84	46.00	-8.69
296.68	24.00	360.00	H	161.00	-6.72	46.00	-22.00
281.04	22.26	2.00	H	112.00	-6.95	46.00	-23.74
86.36	18.99	174.00	H	155.00	-13.78	40.00	-21.01
33.32	24.57	181.00	V	214.00	-3.30	40.00	-15.43
78.18	28.46	229.00	H	170.00	-13.72	40.00	-11.54

Note: The data above 1 GHz which below 20 dB to the limit was not recorded.

Annex A. TEST INSTRUMENTATION & GENERAL PROCEDURES

Annex A.i. TEST INSTRUMENTATION

Instrument	Model	Serial #	Calibration Date	Calibration Due Date
AC Line Conducted Emissions				
EMI test receiver	ESCS30	8471241027	05/27/2014	05/26/2015
Line Impedance Stabilization Network	LI-125A	191106	11/14/2013	11/13/2014
Line Impedance Stabilization Network	LI-125A	191107	11/14/2013	11/13/2014
LISN	ISN T800	34373	01/11/2014	01/10/2015
Transient Limiter	LIT-153	531118	09/02/2013	09/01/2014
Radiated Emissions				
EMI test receiver	ESL6	100262	11/23/2013	11/22/2014
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	09/02/2013	09/01/2014
Microwave Preamplifier (0.5～18GHz)	PAM-118	443008	09/02/2013	09/01/2014
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/23/2013	09/22/2014
Double Ridge Horn Antenna	AH-118	71259	11/20/2013	11/19/2014

Annex A.ii. AC LINE CONDUCTED EMISSIONS TEST DESCRIPTION

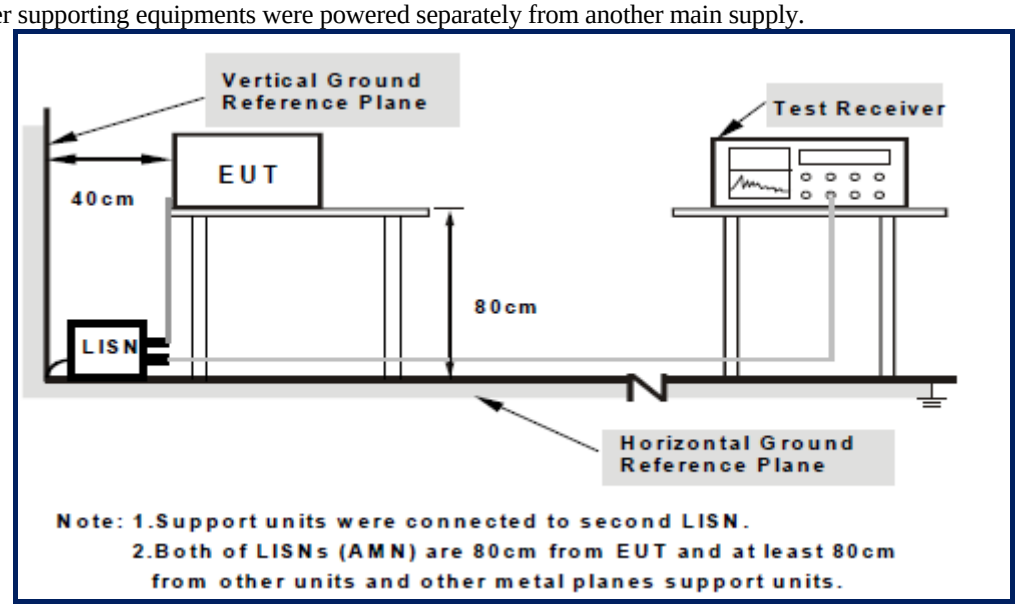
Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B.

2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.

3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.

4. All other supporting equipments were powered separately from another main supply.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration1

Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.

2. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.

3. High peaks, relative to the limit line, were then selected.

4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made.

5. Steps 2 to 4 were then repeated for the LIVE line (for AC mains) or DC line (for DC power).

Description of Conducted Emission Program

This EMC Measurement software run LabView automation software and offers a common user interface for electromagnetic interference (EMI) measurements. This software is a modern and powerful tool for controlling and monitoring EMI test receivers and EMC test systems. It guarantees reliable collection, evaluation, and documentation of measurement results. Basically, this program will run a pre-scan measurement before it proceeds with the final measurement. The pre-scan routine will run the common scan range from 150 kHz to 30 MHz; the program will first start a peak and average scan on selectable measurement time and step size. After the program complete the pre-scan, this program will perform the Quasi Peak and Average measurement, based on the pre-scan peak data reduction result.

Sample Calculation Example

At 20 MHz limit = 250 μV = 47.96 dBμV

Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.20 dB

Q-P reading obtained directly from EMI Receiver = 40.00 dBμV
(Calibrated for system losses)

Therefore, Q-P margin = 47.96 – 40.00 = 7.96 i.e. **7.96 dB below limit**

Annex A. iii. RADIATED EMISSIONS TEST DESCRIPTION

EUT Characterisation

EUT characterisation, over the frequency range from 30MHz to 10th Harmonic, was done in order to minimise radiated emissions testing time while still maintaining high confidence in the test results.

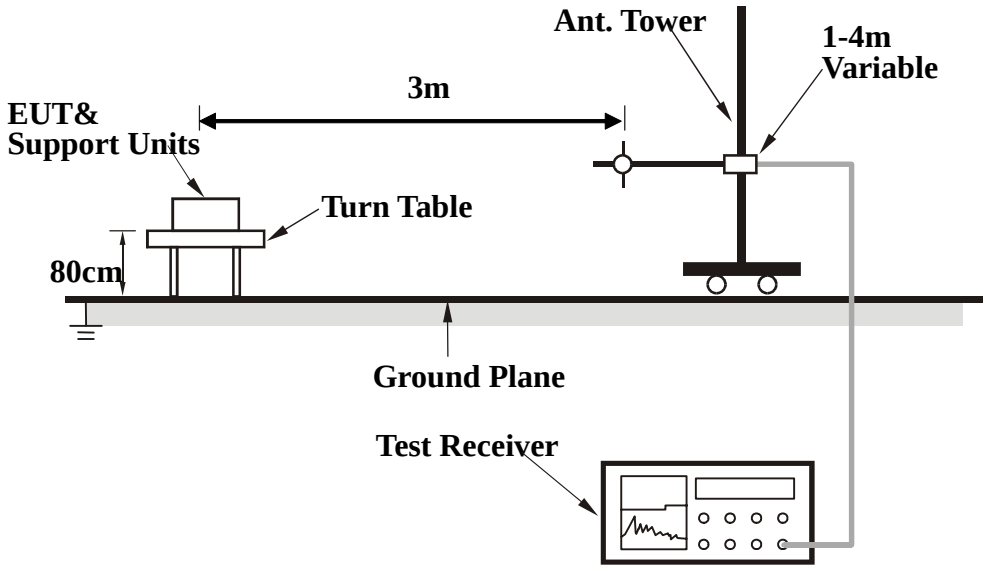
The EUT was placed in the chamber, at a height of about 0.8 m on a turntable. Its radiated emissions frequency profile was observed, using a spectrum analyzer /receiver with the appropriate broadband antenna placed 3m away from the EUT. Radiated emissions from the EUT were maximised by rotating the turntable manually, changing the antenna polarisation and manipulating the EUT cables while observing the frequency profile on the spectrum analyzer / receiver. Frequency points at which maximum emissions occurred; clock frequencies and operating frequencies were then noted for the formal radiated emissions test at the Open Area Test Site (OATS) or 3m EMC chamber.

Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5mX1.0mX0.8m high, non-conductive table.

2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.

3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration2

Test Method

The following procedure was performed to determine the maximum emission axis of EUT:
1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

Final Radiated Emission Measurement
1. Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function.

2. For emission frequencies measured below 1GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on an open test site. As the same purpose, for emission frequencies measured above 1GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.

3. For emission frequencies measured below and above 1GHz, set the spectrum analyzer on a 100kHz and 1MHz resolution bandwidth respectively for each frequency measured in step 2.

4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0° to 360° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.

5. Repeat step 4 until all frequencies need to be measured was complete.

6. Repeat step 5 with search antenna in vertical polarized orientations.

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Peak	100kHz	100kHz
Above 1000	Peak	1MHz	1MHz
	Average	1MHz	10Hz

Sample Calculation Example

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

Peak = Reading + Corrected Factor

where
Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)
And the average value is

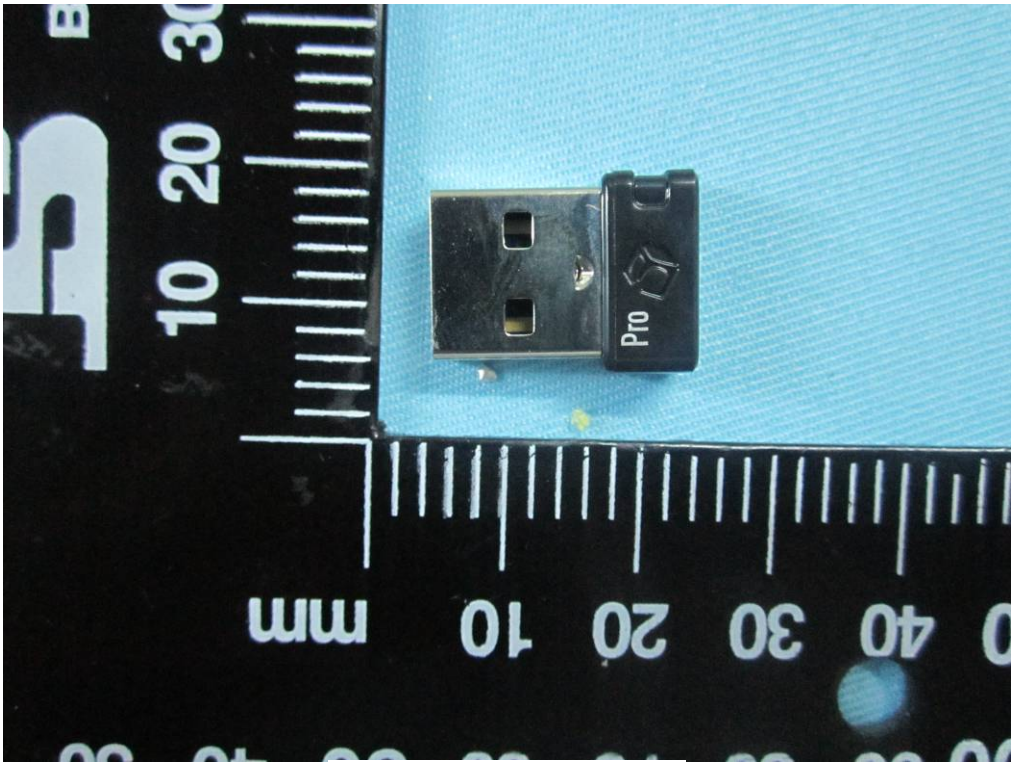
Average = Peak Value + Duty Factor or
Set RBW = 1MHz, VBW = 10Hz.

Note:
If the measured frequencies are fall in the restricted frequency band, the limit employed must be quasi peak value when frequencies are below or equal to 1GHz. And the measuring instrument is set to quasi peak detector function.

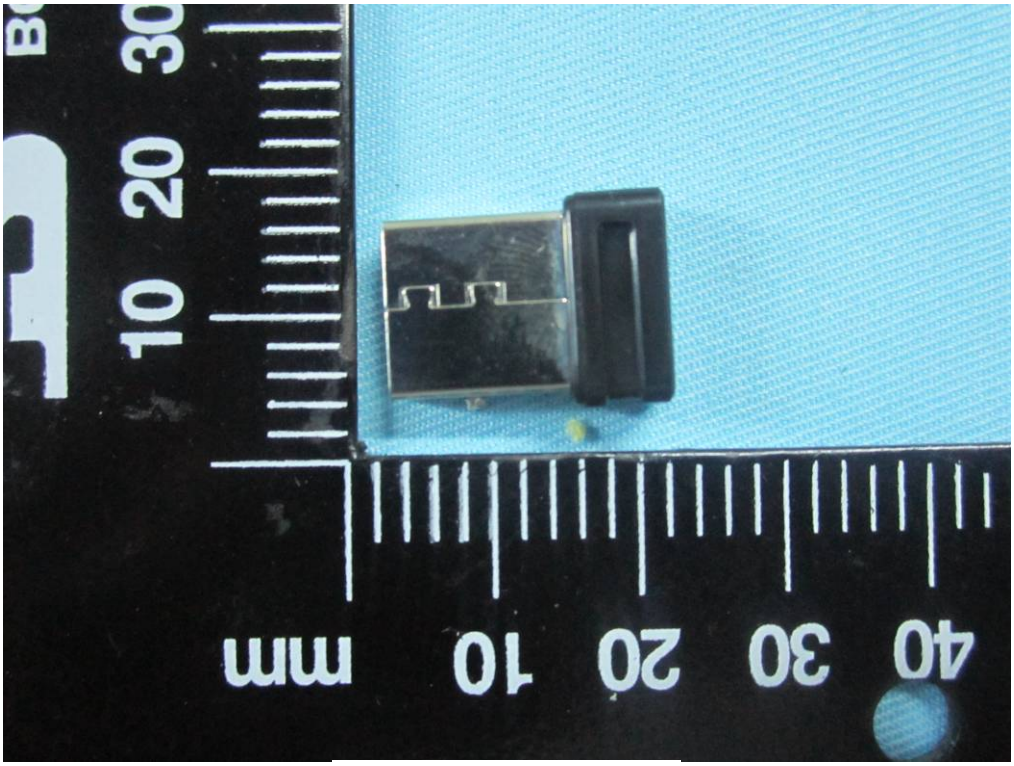
Annex B. EUT AND TEST SETUP PHOTOGRAPHS

Annex B.i. Photograph 1: EUT External Photo

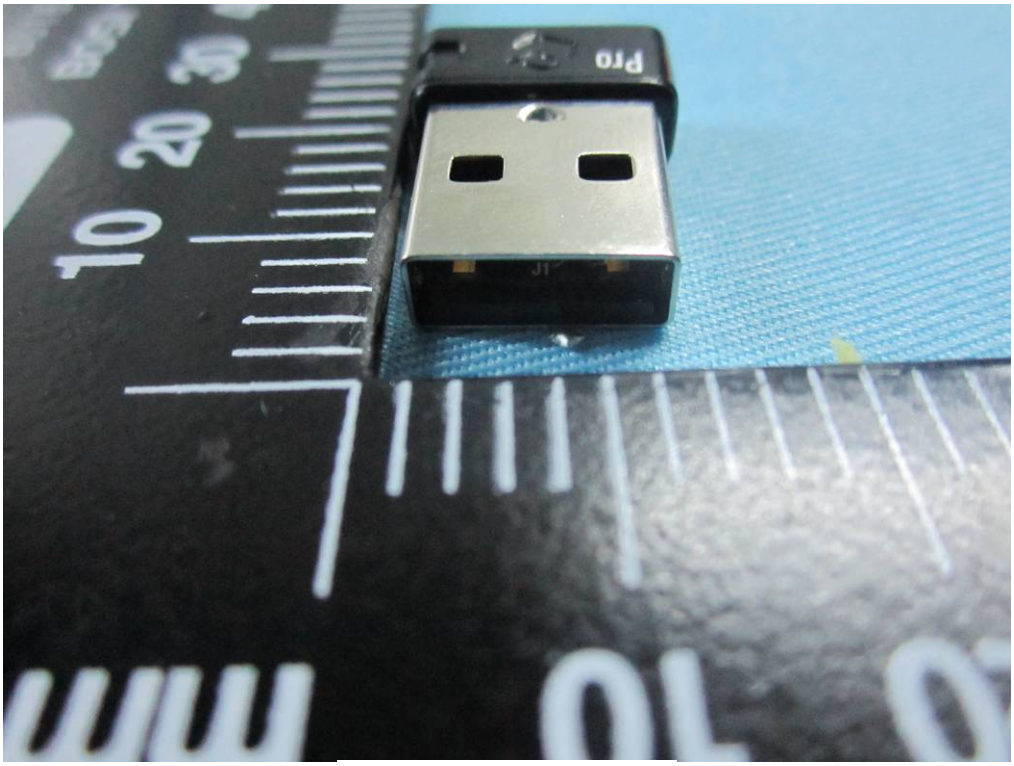
Whole Package - Top View



USB Receiver - Front View



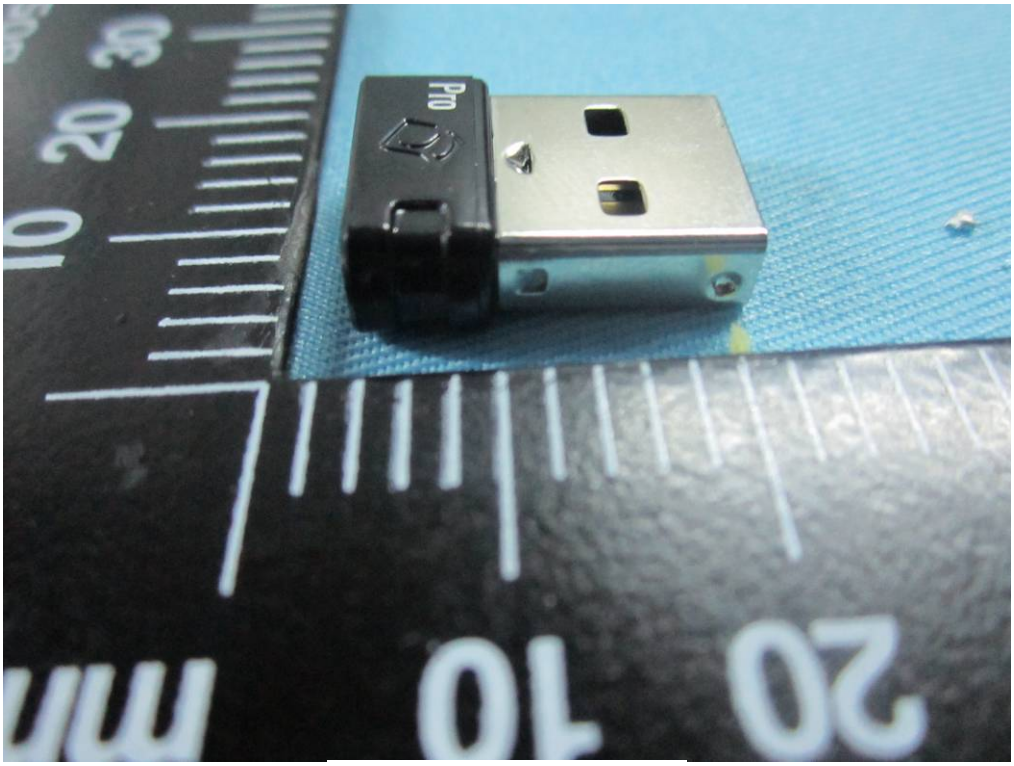
USB Receiver - Rear View



USB Receiver - Top View

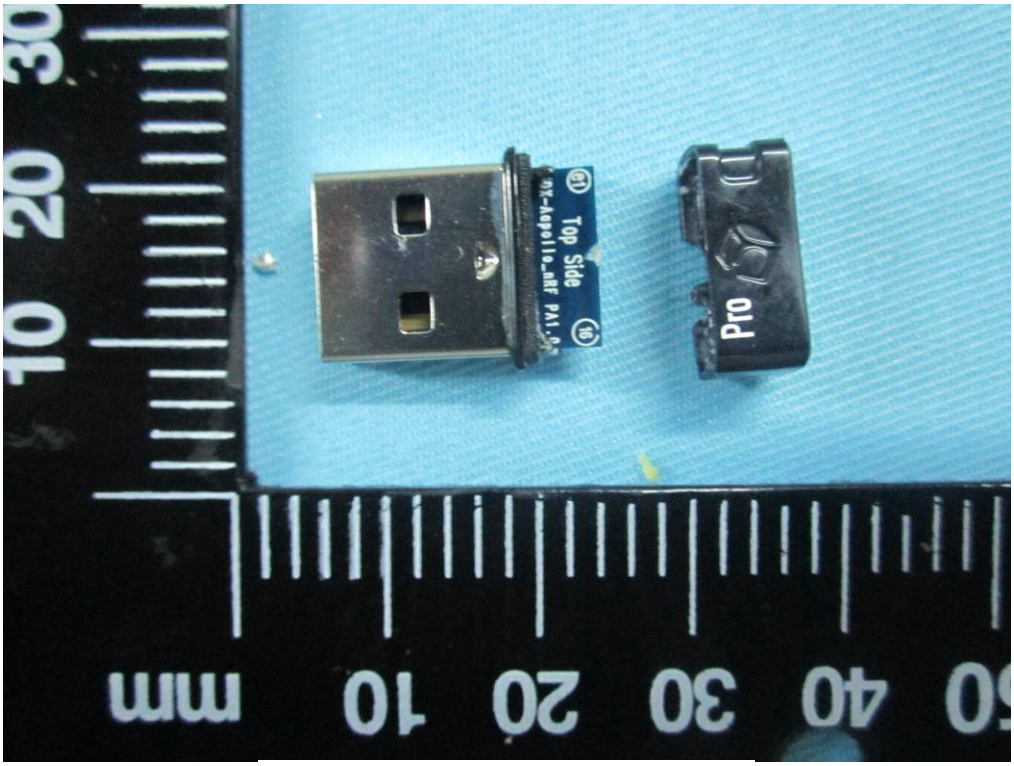
USB Receiver - Bottom View

USB Receiver - Left View

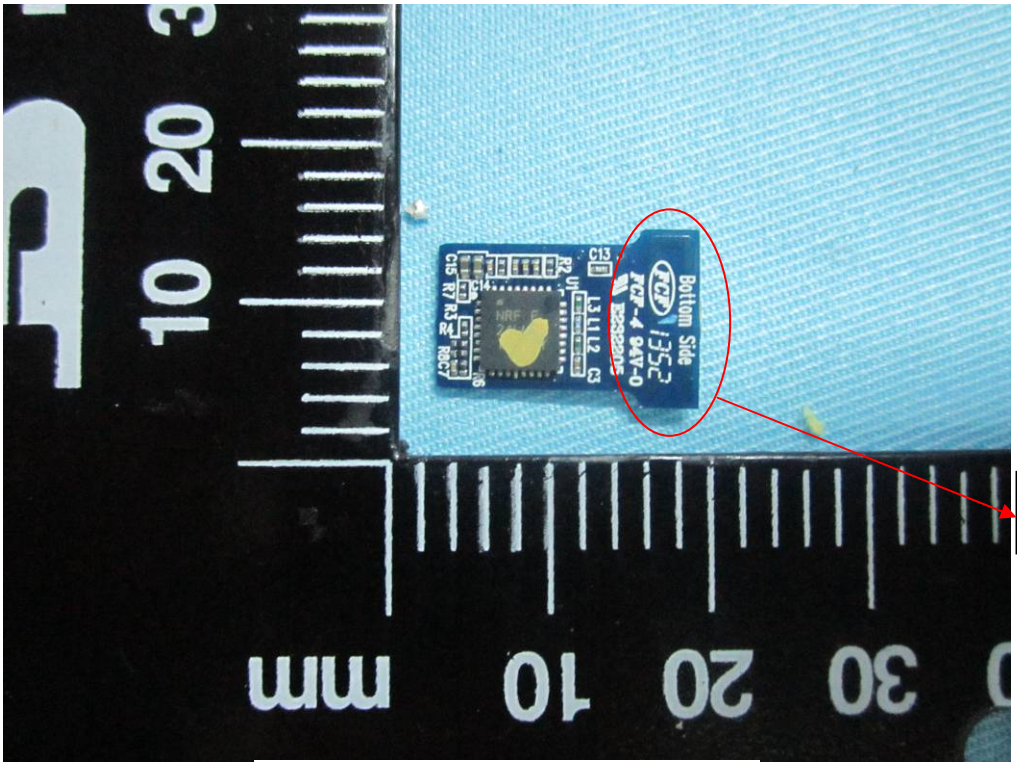


USB Receiver - Right View

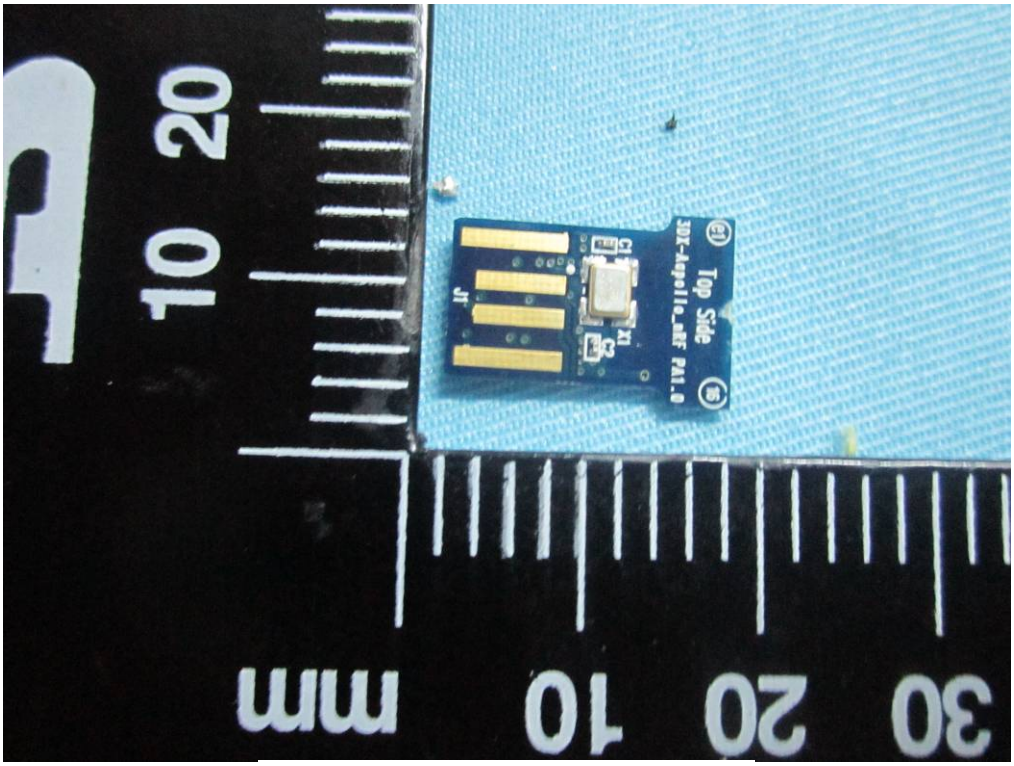
Annex B.i. Photograph 2: EUT Internal Photo



USB Receiver Cover Off - Front View



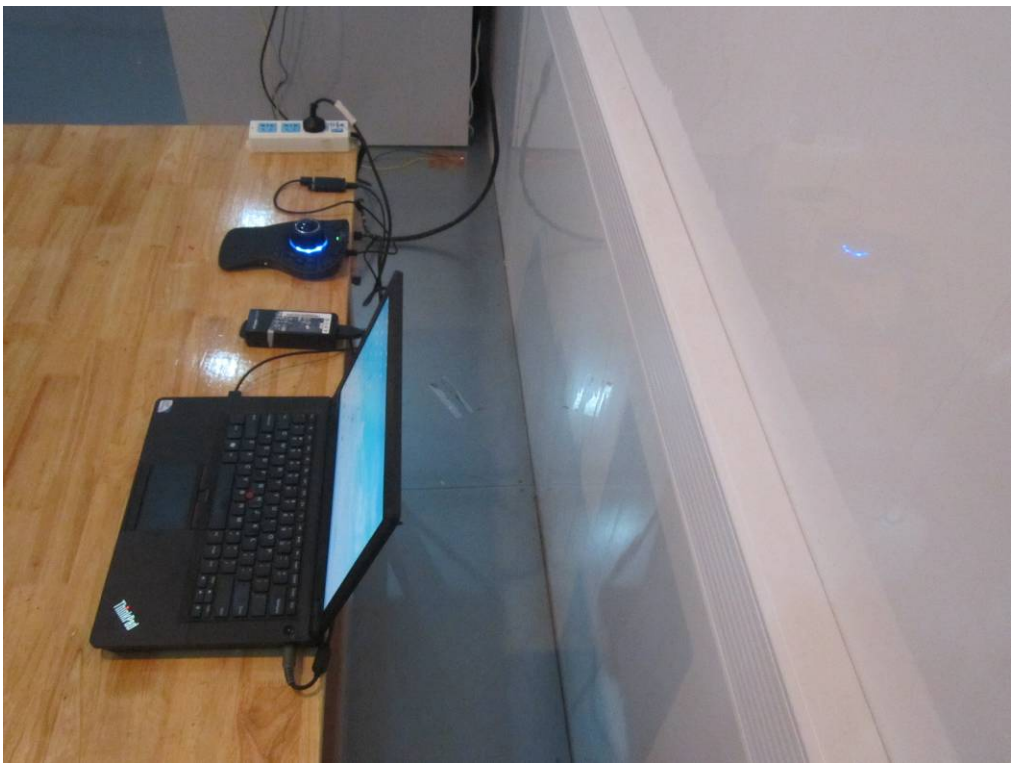
USB Receiver Mainboard - Front View



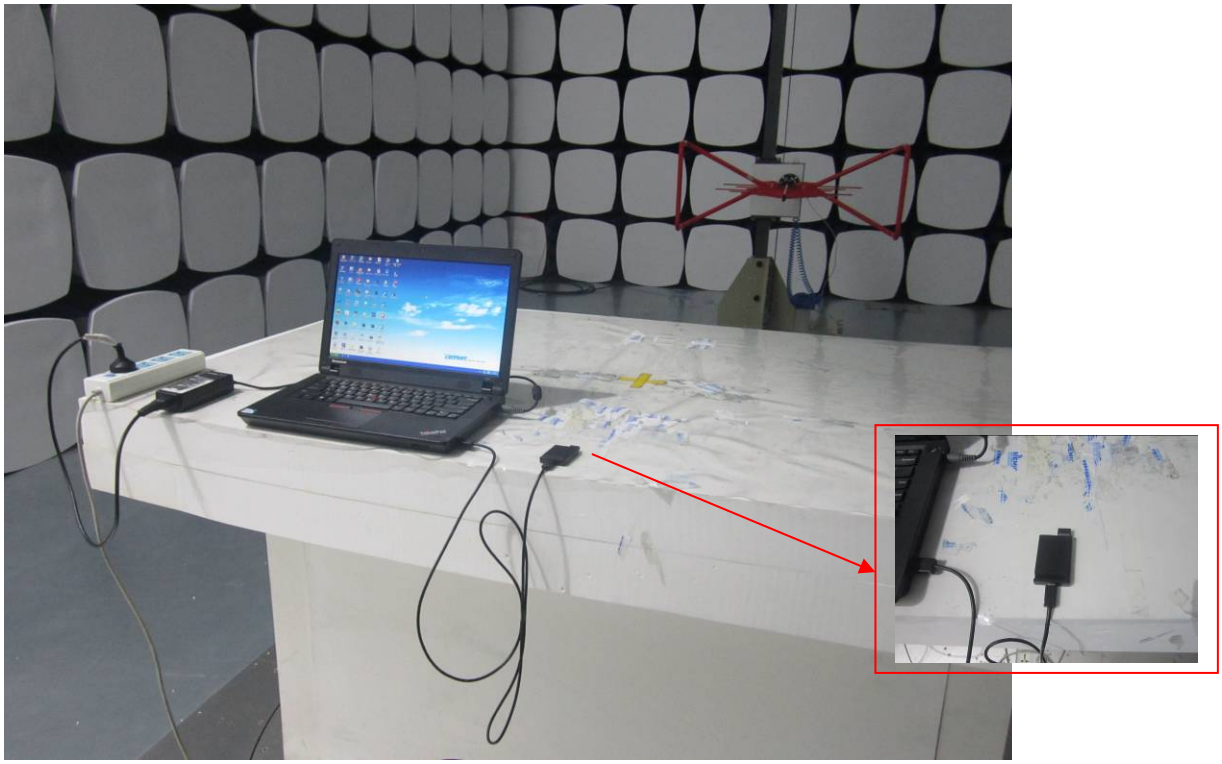
USB Receiver Mainboard - Rear View

Annex B.iii. Photograph: Test Setup Photo

Conducted Emissions Test Setup Front View (3Dconnexion USB HUB(Model:3DX-600049) has been tested)



Conducted Emissions Test Setup Side View (3Dconnexion USB HUB(Model:3DX-600049) has been tested)



Radiated Spurious Emissions Test Setup Below 1GHz - Front View
(3Dconnexion USB HUB(Model:3DX-600049) has been tested)

Radiated Spurious Emissions Test Setup Above 1GHz –Front View
(3Dconnexion USB HUB(Model:3DX-600049) has been tested)

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

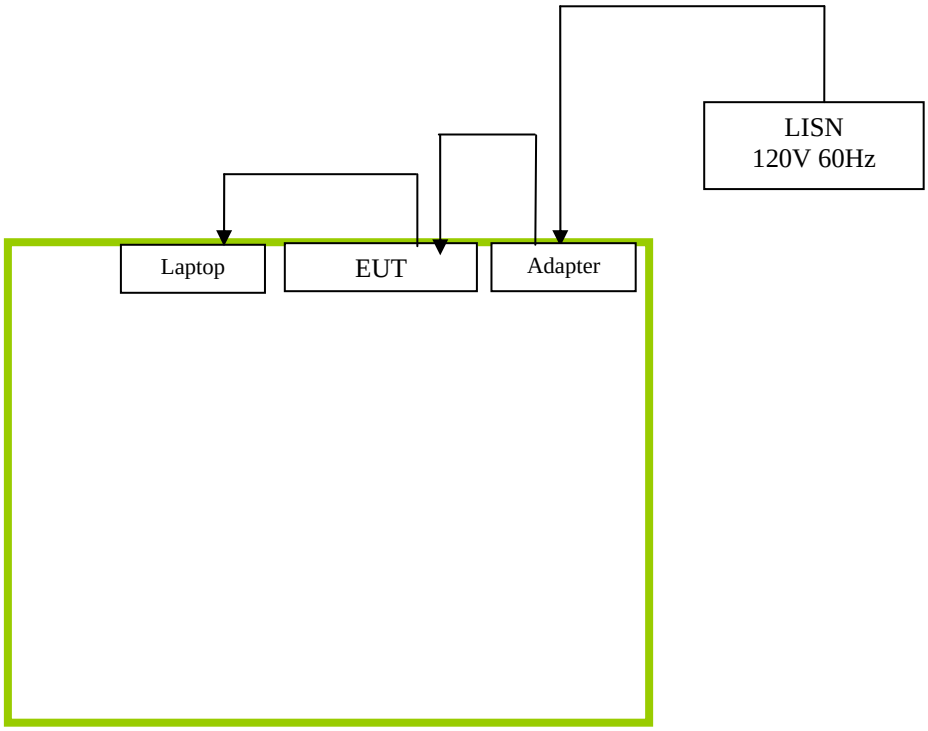
EUT TEST CONDITIONS

Annex C. i. SUPPORTING EQUIPMENT DESCRIPTION

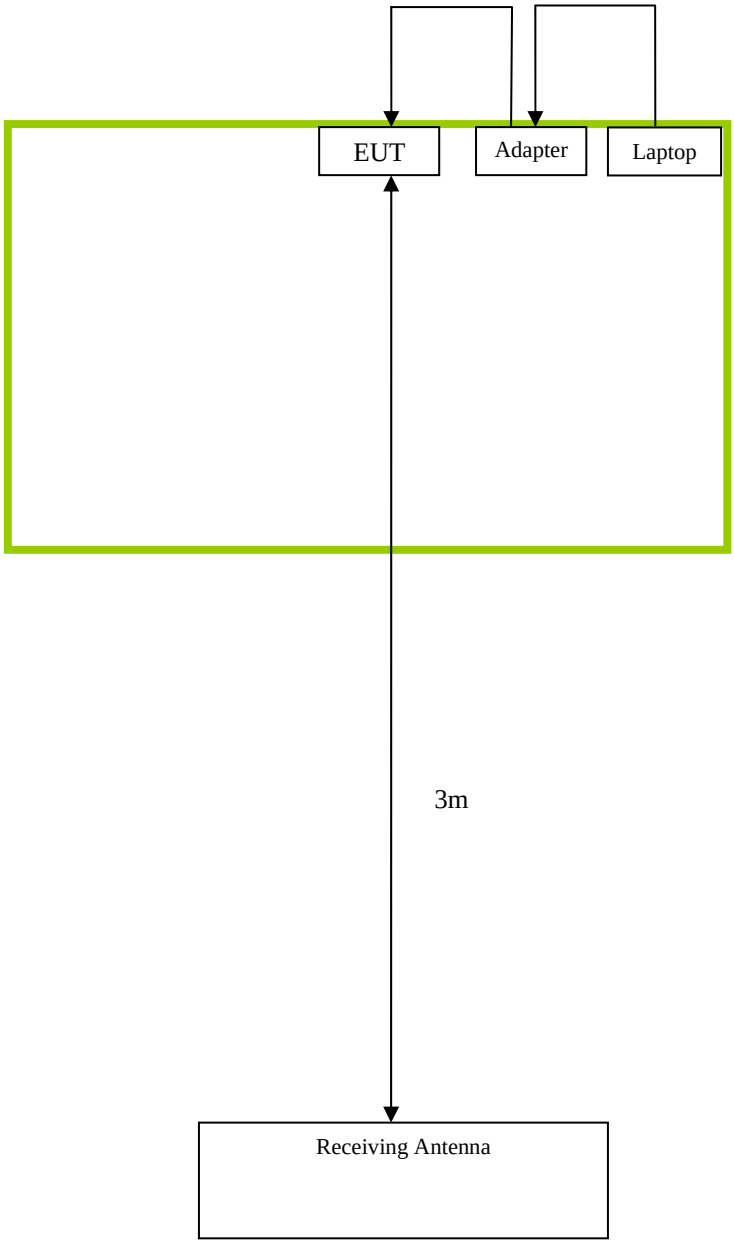
The following is a description of supporting equipment and details of cables used with the EUT.

Equipment Description (Including Brand Name)	Model & Serial Number	Cable Description (List Length, Type & Purpose)
Lenovo Laptop	E40& 0579A52	N/A

Block Configuration Diagram for Conducted Emissions
Mode: Charging & Downloading



Block Configuration Diagram for Radiated Emissions
Mode: Charging & Downloading



Annex C.ii. EUT OPERATING CONDITIONS

The following is the description of how the EUT is exercised during testing.

Test	Description Of Operation
Emissions	Charging

Annex D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PART LIST

Please see attachment

Annex E. DECLARATION OF SIMILARITY

NONE