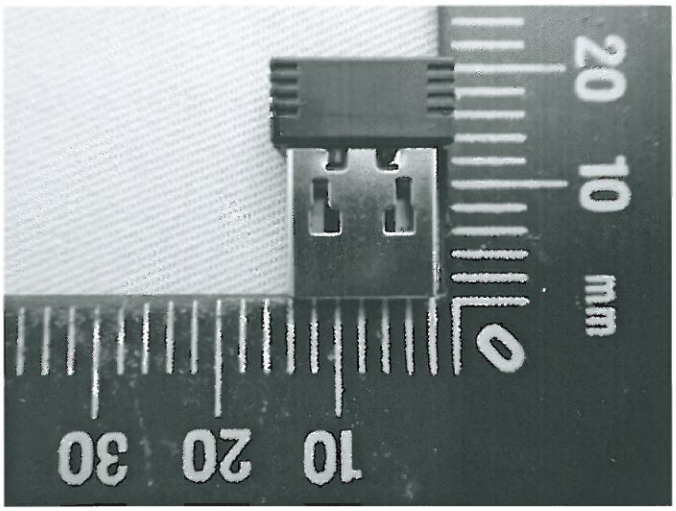
Prüfbericht-Nr.: *Test Report No.:*	10043931 001	**Auftrags-Nr.:** *Order No.:*	114014502	Seite 1 von 18 *Page 1 of 18*
Kunden-Referenz-Nr.: *Client Reference No.:*	392213	**Auftragsdatum:** *Order date.:*	14 Aug. 2013	
Auftraggeber: *Client:*	Acrox Technologies Co., Ltd. 4F., No. 89, Minshan St., Neihu Dist., Taipei City 114, Taiwan, R.O.C.			
Prüfgegenstand: *Test item:*	2.4GHz dongle			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	RX8			
Auftrags-Inhalt: *Order content:*	TUV Rheinland - EMC service			
Prüfgrundlage: *Test specification:*	FCC 47 CFR Part 15, Subpart B:2012 ICES-003:Issue5:2012			

Wareneingangsdatum: *Date of receipt:*	08 Oct. 2013
Prüfmuster-Nr.: *Test sample No.:*	A000024807-006
Prüfzeitraum: *Testing period:*	Refer to test report
Ort der Prüfung: *Place of testing:*	TÜV Rheinland Taiwan Ltd. (Taipei)
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland Taiwan Ltd.
Prüfergebnis*: *Test result*:*	Pass



geprüft von / *tested by:*			**kontrolliert von** / *reviewed by:*		
25 Oct. 2013	Neil J. N. Tsai/ Senior Project Engineer		25 Oct. 2013	Max Y. C. Yao/ Department 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 P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhalt N/T = nicht getestet
Legend:	1 = very good P(ass) = passed a.m. test specifications(s)	2 = good	3 = satisfactory F(ail) = failed a.m. test specifications(s)	4 = sufficient N/A = not applicable	5 = poor N/T = not tested

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Mail: service@de.tuv.com · Web: www.tuv.com

TEST SUMMARY

5.1 CONDUCTED EMISSION PER SECTION 15.107, FCC 47 CFR PART 15 SUBPART B

RESULT: Pass

5.2 RADIATED EMISSION PER SECTION 15.109, FCC 47 CFR PART 15 SUBPART B

RESULT: Pass

Contents

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report.

2 Test Sites

2.1 Test Facilities

TÜV Rheinland Taiwan Ltd.
11F., No.758, Sec. 4, Bade Rd., Songshan Dist., Taipei City 105, Taiwan, R.O.C.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facilities and has found these test sites to be in compliance with the requirements under 47 CFR section 2.948. The registration number: 365730.

The Industry Canada has reviewed the technical characteristics of the radiated and conducted emission facilities and has found these test sites to be in compliance with the Canadian requirements. The filing number: 9465A.

The test facility is accredited by TAF (member of ILAC), under number 0759 according to ISO/IEC 17025:2005.

TÜV Rheinland Taiwan Ltd. is accredited by the Federal Communications Commission as a Conformity Assessment Body under Designation Number TW1065 and Test Firm Registration#: 799772.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

For EMI/ Conduction Measurement (Taipei: Shield Room)

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibration Due Date
1	EMI Test Receiver	R&S	ESCI	101094	2014/08/29
2	LISN (1 phase)	R&S	ENV216	101243	2014/06/05
3	LISN	Rolf Heine	NNB-2/16Z	99080	2014/08/30
4	Telecom ISN 2 Line	FCC	FCC-TLISN-T2-02-09	101169	2014/08/29
5	Telecom ISN 8 Line	FCC	FCC-TLISN-T8-02-09	101167	2014/08/29
6	4 balance telecom pair ISN	FCC	F-070306-1057-1	101166	2014/08/29

For EMI/Radiation Measurement (Taipei: Semi-Anechoic Chamber)

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibration Due Date
1	Test Receiver	R&S	ESCI7	100797	2013/12/20
2	Spectrum Analyzer	R&S	FSV-40	1000921	2013/12/13
3	Pre-Amplifier	HP	8447F	2805A03335	2014/09/02
4	Pre-Amplifier	Com-Power	PAM-840	461257	2014/09/02
5	Pre-Amplifier	EM Electronics	EM30180	060558	2013/11/12
6	Bilog Antenna	TESEQ	CBL6111D	29802	2014/06/29
7	Horn Antenna	ETS-Lindgren	3117	00138160	2014/01/10
8	Horn Antenna	Com-Power	AH-840	101029	2014/09/19
9	Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	2014/09/28

Conformance of the used measurement and test equipment with the requirements of ISO/IEC 17025:2005 has been confirmed before testing.

2.3 Calibration

All equipment requiring calibration is calibrated periodically by the manufacturer or accredited calibration services according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.4 Abbreviations

PASS	means 'complied with requirement'	**N/A**	means 'not applicable'
FAIL	means 'not complied'	**N.C.R.**	means 'no calibration required'

2.5 Measurement Uncertainty

Table 2: Measurement Uncertainty

Testing Item	Frequency Range	Uncertainty
Conducted Emission (Shield Room)	150kHz - 30MHz	2.47 dB
Radiated Emission (966 Chamber: 3m)	30MHz - 1000MHz	2.80 dB

Note:
The uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3 General Product Information

3.1 Product Function and Intended Use

The tested sample is a **"2.4GHz dongle"**, which is intended to enable wireless connectivity with a Host PC and **"2.4GHz mouse"**. The tested sample enables you to control vertical and horizontal scrolling using the tilt wheel.

Product Specification:
Wireless Frequency: 2.4GHz ~ 2.4835GHz

3.2 Rating and Physical Characteristics

Type Designation:	RX8
Input Voltage:	5Vdc via USB
Protection Class:	III for USB Dongle; I for Host PC

3.3 Noise Generating or Sources of Interference

1) IC circuits
2) Y1: 12MHz Crystal

Please refer to attachment photo document for detail

3.4 Noise Suppressing Parts

Please refer to Attachment Photo Documentation for details.

3.5 Submitted Documents

1) Circuit diagram
2) Block diagram

4 Test Set-up and Operation Modes

4.1 Test Methodology

The test methodology used is based on the requirement of 47 CFR PART 15, section 15.31, 15.33, 15.35, 15.107 and 15.109, or of ICES-003.

The test methods, which have been used, are based on ANSI C63.4 or CAN/CSA-CEI/IEC CISPR 22.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Independent and Test Operation Modes

The 2.4GHz dongle was connected to a host PC, and enable the wireless function to test at normal link operation mode for control PC. The host PC was run the software “EMCTEST” to display “H” in the screen. The 2.4GHz dongle and mouse were on operation mode, using the DC fan to enable 2.4GHz mouse

The basic operation mode is:
A. Normal link

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C 63.4 or in CAN/CSA-CEI/IEC CISPR22.

Refer to Test setup in chapter 4.5.

4.3 Special Accessories and Auxiliary Equipment

The EUT was tested as an independent unit with the following equipment:

Description	Manufacturer	Model No.	Remark	Certification
PC	Lenovo	AD1	R8L45MN	DoC
Monitor	CHIMEI	22VD	22VDAGIW50440109	DoC
Printer	HP	VCVRA-1004	CN0C711HY9	DoC
Modem	Galileo	AL-56ERM	0MERM46A0156	DoC
Keyboard	Lenovo	KU-0225	1017037	DoC

4.4 Countermeasures to achieve EMC compliance

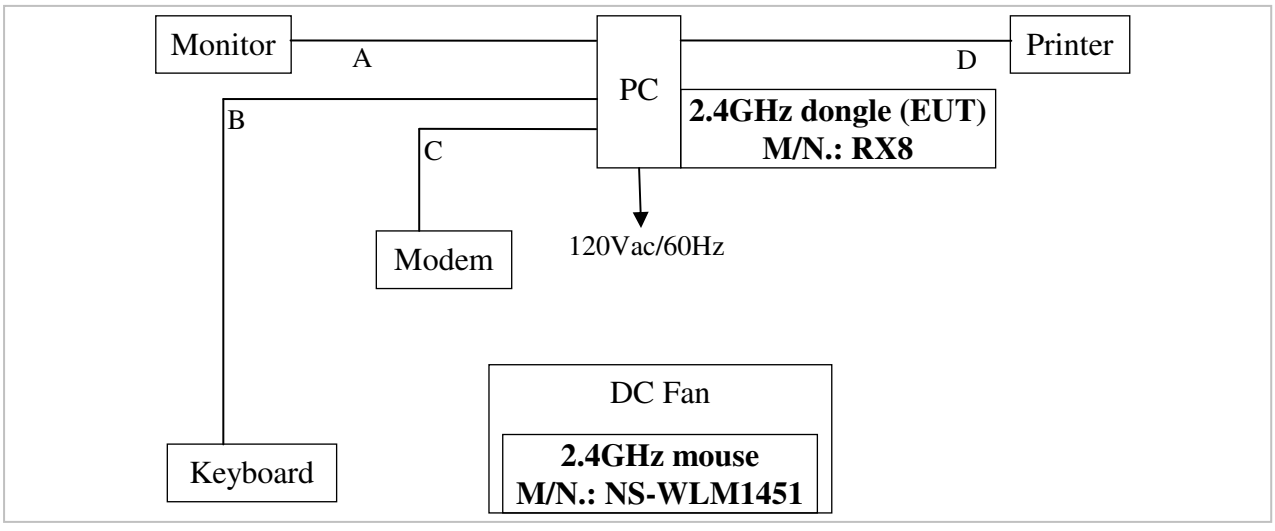
The test sample which has been tested contained the noise suppression parts as described in the constructional data form or technical construction file or refer to the attachment photo document of test report. No additional measures were employed to achieve compliance.

4.5 Test Setup

The test setup was realized on a table of 80cm height during all the tests.

The test arrangement is configured and set according to manufacturer's installations.

Mode A:



Signal Cable Type		Signal Cable Description
A	D-SUB cable	Shielded, 1.8m
B	USB cable	Shielded, 1.8m
C	RS232 cable	Shielded, 0.9m
D	USB cable	Shielded, 1.7m

5 Test Results E M I S S I O N

5.1 Conducted Emission per section 15.107, 47 CFR part 15 subpart B

RESULT:	**PASS**

Port:		AC Mains
Test Procedure	:	ANSI C63.4 (2009) Clause 7.3
Deviations from standard test procedure	:	None
Frequency Range	:	0.15 – 30MHz
Limits	:	FCC Part 15 Subpart B Section 15.107 (a) class B
Kind of Test Site	:	Conducted Room (Shield)

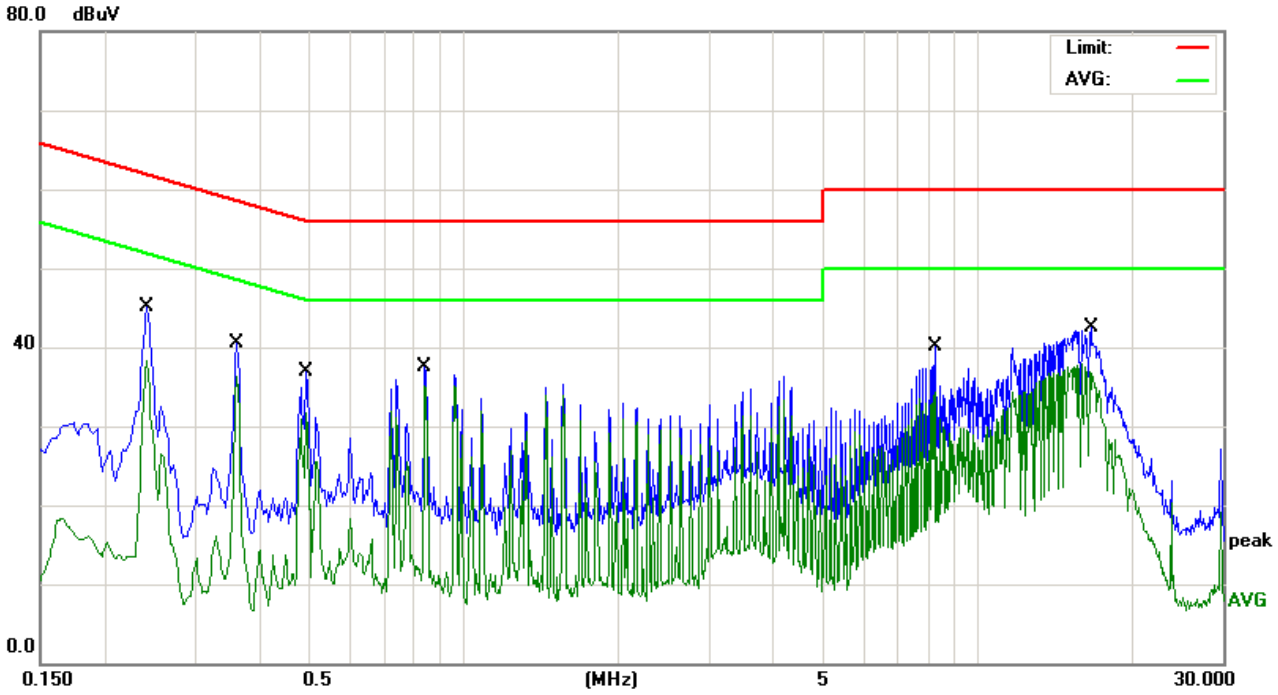
Test Setup

The following setup caused the highest disturbance:

Date of Testing	:	04 Oct. 2013
Input Voltage	:	See 3.2
Operational Mode	:	See 4.2
Temperature		25 ºC
Relative Humidity		54 %

Figure 1: Conducted Emission, AC Mains; 0.15 – 30 MHz

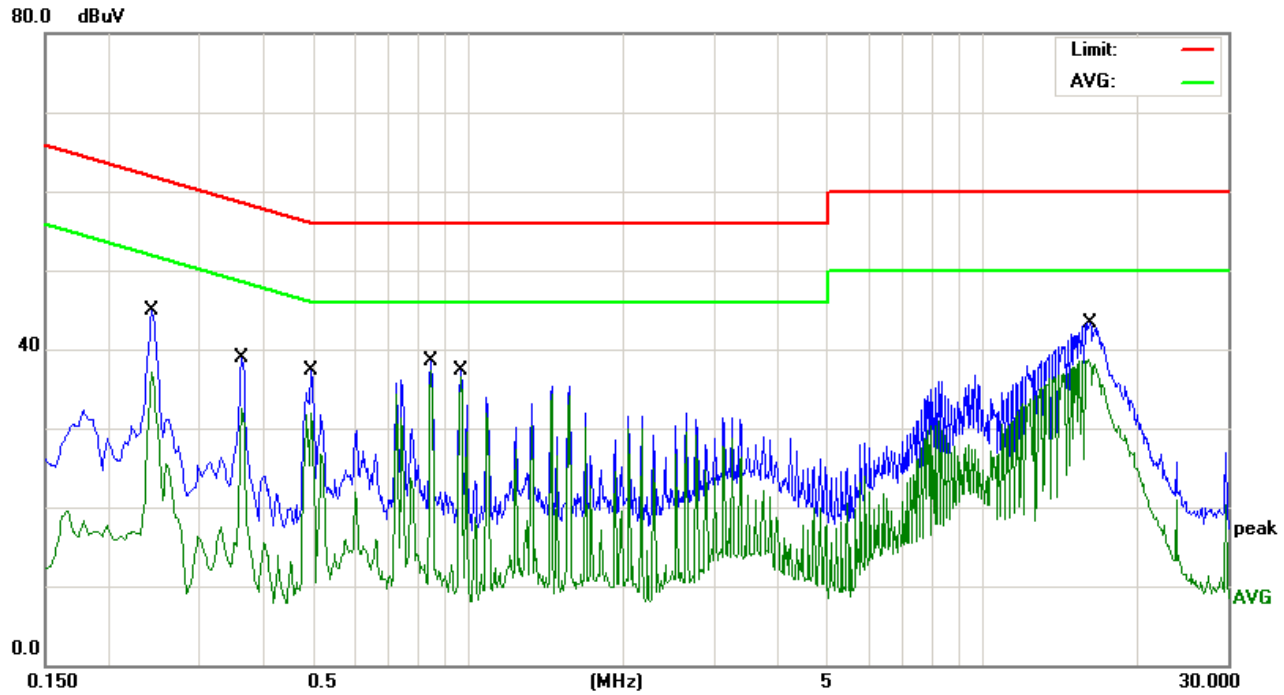
Phase L1



No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2420	9.60	34.27	43.87	62.02	-18.15	QP	P	
2	0.2420	9.60	27.80	37.40	52.02	-14.62	AVG	P	
3	0.3620	9.59	29.76	39.35	58.68	-19.33	QP	P	
4	0.3620	9.59	26.82	36.41	48.68	-12.27	AVG	P	
5	0.4940	9.59	23.69	33.28	56.10	-22.82	QP	P	
6	0.4940	9.59	21.97	31.56	46.10	-14.54	AVG	P	
7	0.8420	9.60	25.67	35.27	56.00	-20.73	QP	P	
8	0.8420	9.60	25.03	34.63	46.00	-11.37	AVG	P	
9	8.3139	9.69	20.63	30.32	60.00	-29.68	QP	P	
10	8.3139	9.69	15.66	25.35	50.00	-24.65	AVG	P	
11	16.6299	9.79	23.47	33.26	60.00	-26.74	QP	P	
12	16.6299	9.79	17.80	27.59	50.00	-22.41	AVG	P	

Note 1: Level = Reading + Factor
Note 2: Margin = Level – Limit

Phase N



No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2420	9.57	33.75	43.32	62.02	-18.70	QP	P	
2	0.2420	9.57	26.80	36.37	52.02	-15.65	AVG	P	
3	0.3620	9.57	27.15	36.72	58.68	-21.96	QP	P	
4	0.3620	9.57	22.93	32.50	48.68	-16.18	AVG	P	
5	0.4940	9.57	24.04	33.61	56.10	-22.49	QP	P	
6	0.4940	9.57	22.29	31.86	46.10	-14.24	AVG	P	
7	0.8460	9.57	27.70	37.27	56.00	-18.73	QP	P	
8	0.8460	9.57	27.64	37.21	46.00	-8.79	AVG	P	
9	0.9660	9.57	26.61	36.18	56.00	-19.82	QP	P	
10	0.9660	9.57	26.48	36.05	46.00	-9.95	AVG	P	
11	16.1899	9.79	27.59	37.38	60.00	-22.62	QP	P	
12	16.1899	9.79	24.04	33.83	50.00	-16.17	AVG	P	

Note 1: Level = Reading + Factor
Note 2: Margin = Level - Limit

5.2 Radiated Emission per section 15.109, 47 CFR part 15 subpart B

RESULT:	**PASS**

Port: Enclosure
Test Procedure : ANSI C63.4 (2009) Clause 8.3
Deviations from standard test procedure : None
Frequency Range : 30 – 1000MHz
Limits : FCC Part 15 Subpart B Section 15.109 (a) class B

Kind of Test Site : 966 Semi-anechoic chamber (3m distance)

Test Setup

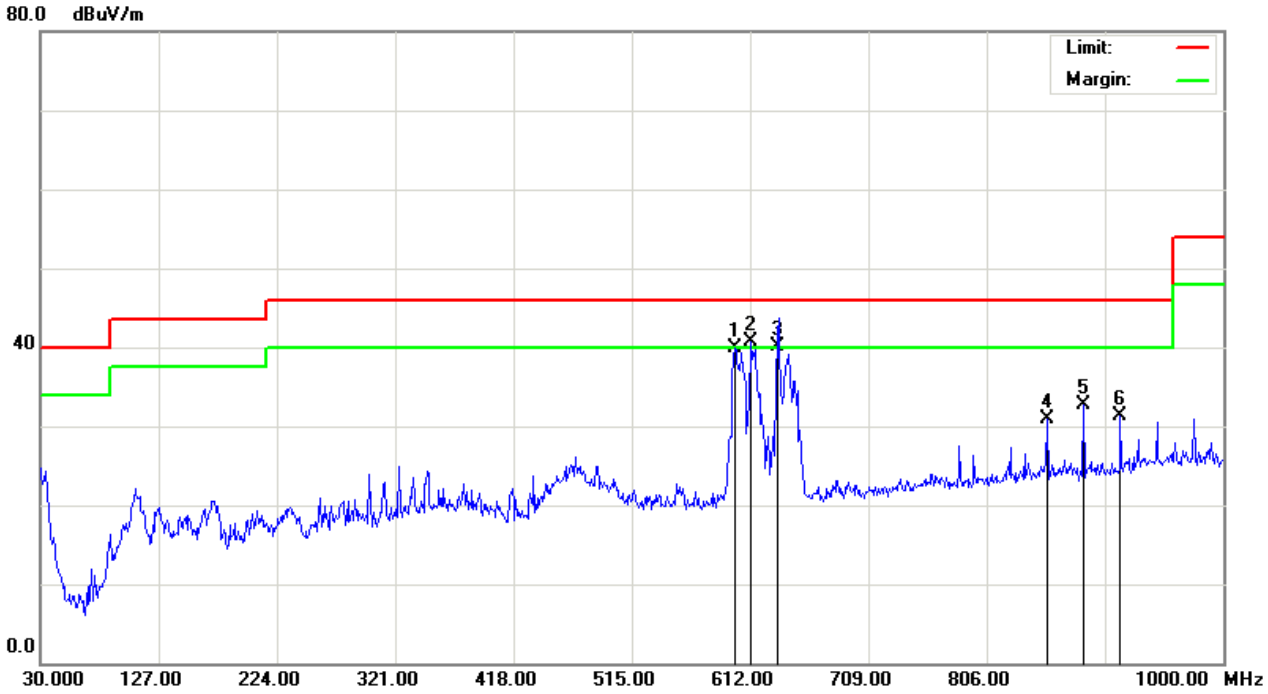
The following setup caused the highest disturbance:

Date of Testing : 15 Oct. 2013
Input Voltage : See 3.2
Operational Mode : See 4.2
Temperature 22 ºC
Relative Humidity 57 %

The highest frequency generated or used in the device or on which the operates or tunes of the EUT:
☐ below 1.705M, measuring up to 30MHz
☒ 1.705-108M, measuring up to 1000MHz
☐ 108-500MHz, measuring up to 2000MHz
☐ 500-1000MHz, measuring up to 5000MHz
☐ above 1000MHz, measuring up to 5th harmonic of the hightest frequency or 40GHz, whichever is lower.

Figure 2: Radiated Emission; 30 – 1000 MHz

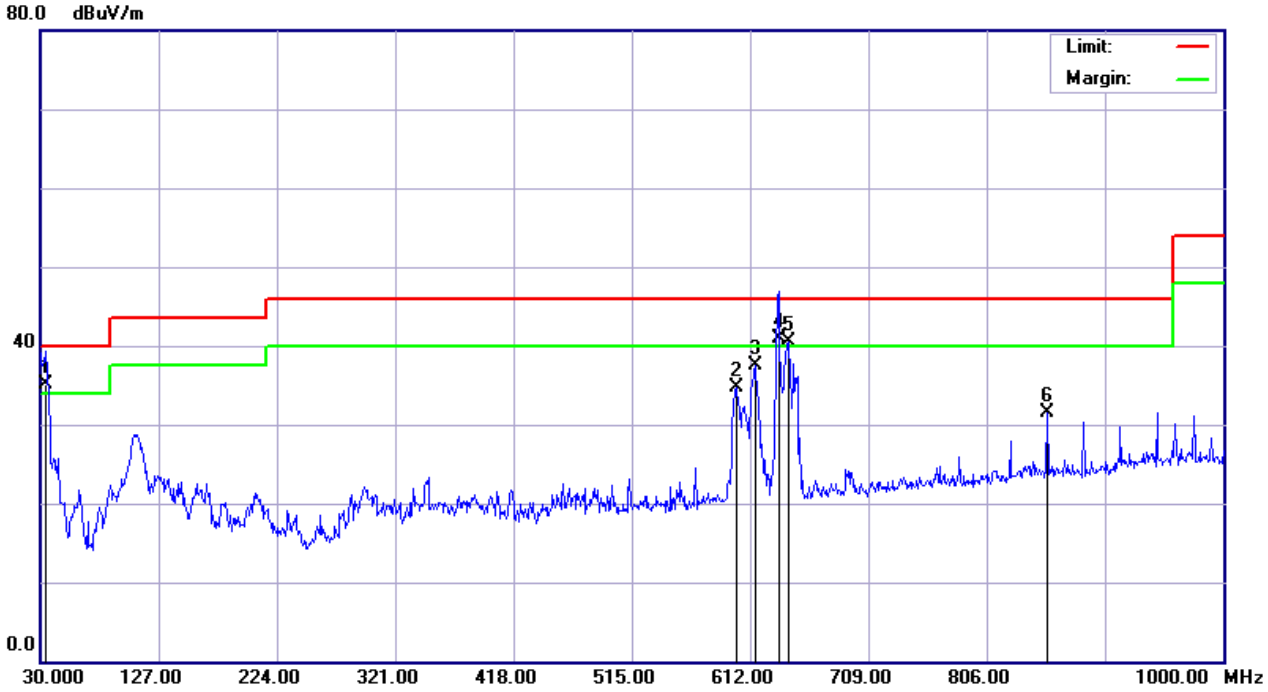
Horizontal



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (◦)	P/F	Remark
1	599.3899	-5.98	45.95	39.97	46.00	-6.03	QP	400	230	P	
2	612.9699	-5.84	46.54	40.70	46.00	-5.30	QP	400	217	P	
3	635.2799	-5.62	45.72	40.10	46.00	-5.90	QP	300	333	P	
4	855.4700	-2.43	33.43	31.00	46.00	-15.00	QP	100	141	P	
5	885.5399	-2.23	34.85	32.62	46.00	-13.38	QP	100	136	P	
6	915.6100	-1.63	33.01	31.38	46.00	-14.62	QP	100	301	P	

Note 1: Level = Reading + Factor
Note 2: Margin = Level - Limit

Vertical



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (◦)	P/F	Remark
1	34.8500	-8.74	43.94	35.20	40.00	-4.80	QP	100	261	P	
2	600.3600	-5.97	40.63	34.66	46.00	-11.34	QP	400	224	P	
3	615.8800	-5.81	43.37	37.56	46.00	-8.44	QP	100	360	P	
4	635.2800	-5.62	46.52	40.90	46.00	-5.10	QP	300	47	P	
5	643.0400	-5.54	46.10	40.56	46.00	-5.44	QP	200	81	P	
6	855.4700	-2.43	34.01	31.58	46.00	-14.42	QP	200	336	P	

Note 1: Level = Reading + Factor
Note 2: Margin = Level - Limit

6 Photographs of Test Setup

Picture 1: Conducted Emission, AC Mains; 0.15 – 30 MHz

Picture 2: Radiated Emission, 30 - 1000 MHz

7 List of Tables

8 List of Figures

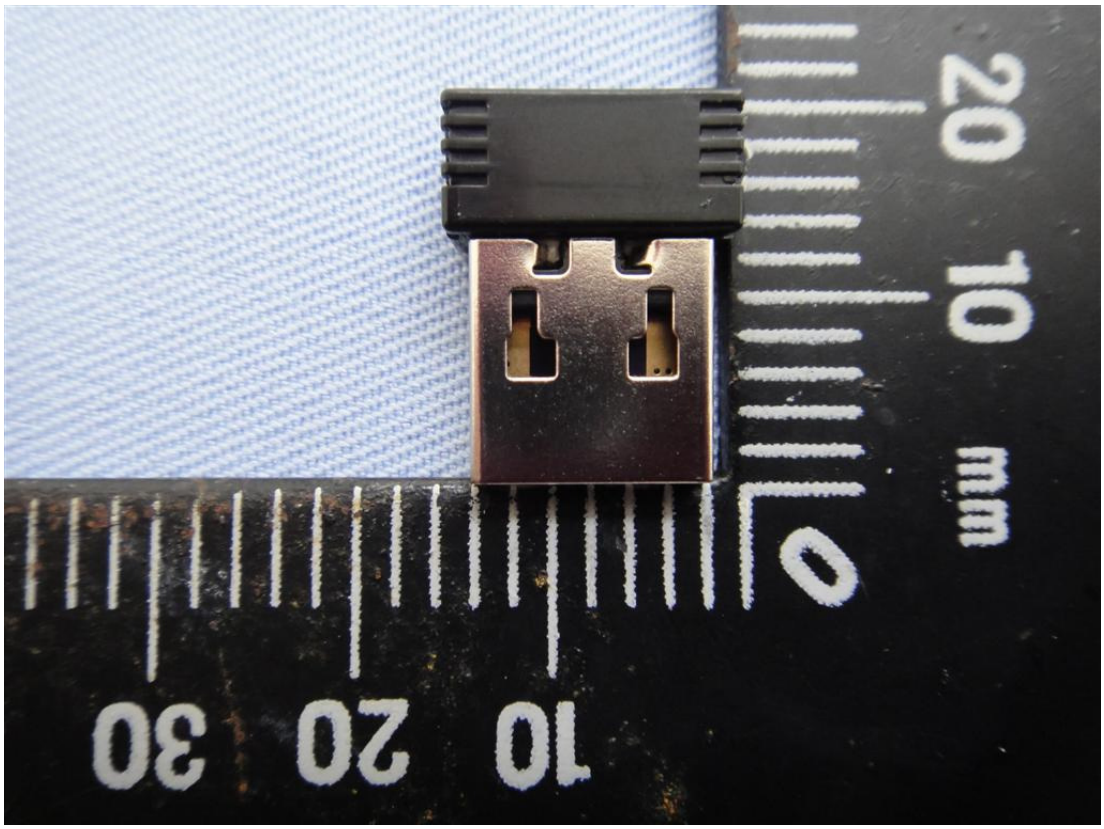
9 List of Pictures

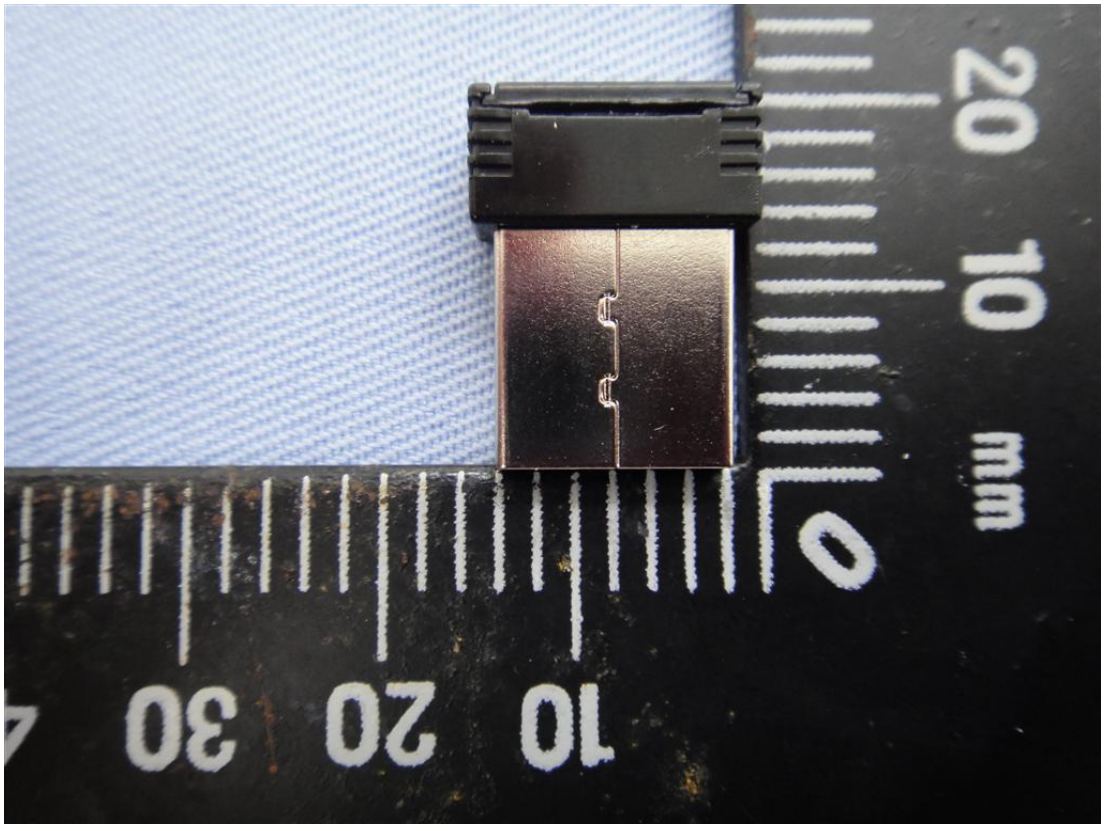
ATTACHMENT **Photo Documentation**

Report No.: 10043931 001

Product: 2.4GHz dongle

Type Designation: RX8





Product: 2.4GHz dongle

Type Designation: RX8