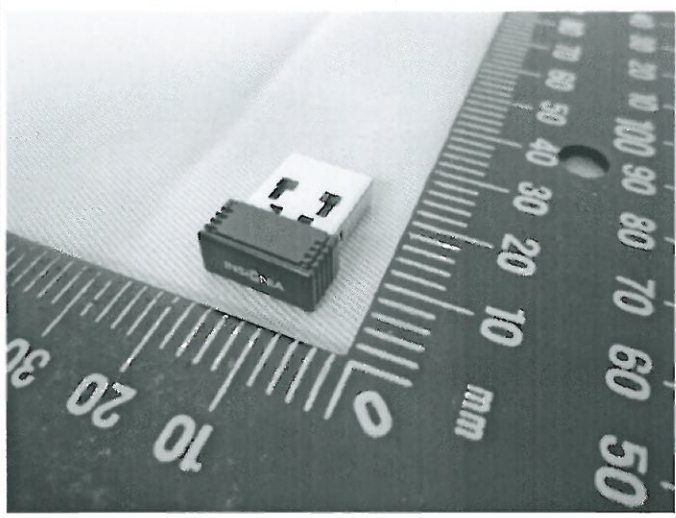


Prüfbericht-Nr.: Test Report No.:	10044961 001	Auftrags-Nr.: Order No.:	114017241	Seite 1 von 18 Page 1 of 18
Kunden-Referenz-Nr.: Client Reference No.:	392213	Auftragsdatum: Order date.:	13 Dec. 2013	
Auftraggeber: Client:	Acrox Technologies Co., Ltd. 4F., No. 89, Minshan St., Neihu Dist., Taipei City 114, Taiwan, R.O.C.			
Prüfgegenstand: Test item:	2.4GHz Dongle			
Bezeichnung / Typ-Nr.: Identification / Type No.:	MQ6			
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:	24 Dec. 2013			
Prüfmuster-Nr.: Test sample No.:	A000033193-005			
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:		
 14 Jan. 2014 Neil J. N. Tsai/ Senior Project Engineer Datum Name/Stellung Unterschrift Date Name/Position Signature		 14 Jan. 2014 Max Y. C. Yao/ Department Manager Datum Name/Stellung Unterschrift Date Name/Position 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 specifications(s) F(ail) = failed a.m. test specifications(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. <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>				

V04

Prüfbericht - Nr.: 10044961 001
Test Report No.

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Page 2 of 18

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

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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	Test Receiver	Rohde & Schwarz	ESCI7	100797	2014/12/23
2	LISN (1 phase)	Rohde & Schwarz	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	Rohde & Schwarz	ESR7	101062	2014/09/01
2	Spectrum Analyzer	Rohde & Schwarz	FSV-40	1000921	2014/12/09
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	EM01G18G	060558	2014/10/24
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 Notebook 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:	MQ6
Input Voltage:	5Vdc via USB
Protection Class:	Class III for USB Dongle; Class I for Host Notebook

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) PCB Layout
- 3) Rating Label

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 Notebook, and enable the wireless function to test at normal link operation mode for control host Notebook. The host Notebook 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
Notebook	HP	HSTNN-Q78C-3	CNF0339QBM	DoC
Printer	HP	VCVRA-1004	CN0C711HY9	DoC
HDD	SONY	HD-EG5	XCV0S5K28013161	DoC
Ear/Microphone	i-Acon	CW-010MV	N/A	N/A
DC Fan	SUNON	KD1208PTS1	N/A	N/A
2.4GHz mouse	Acrox	NS-PNM5003-SV	N/A	DoC

4.4 Countermeasures to achieve EMC compliance

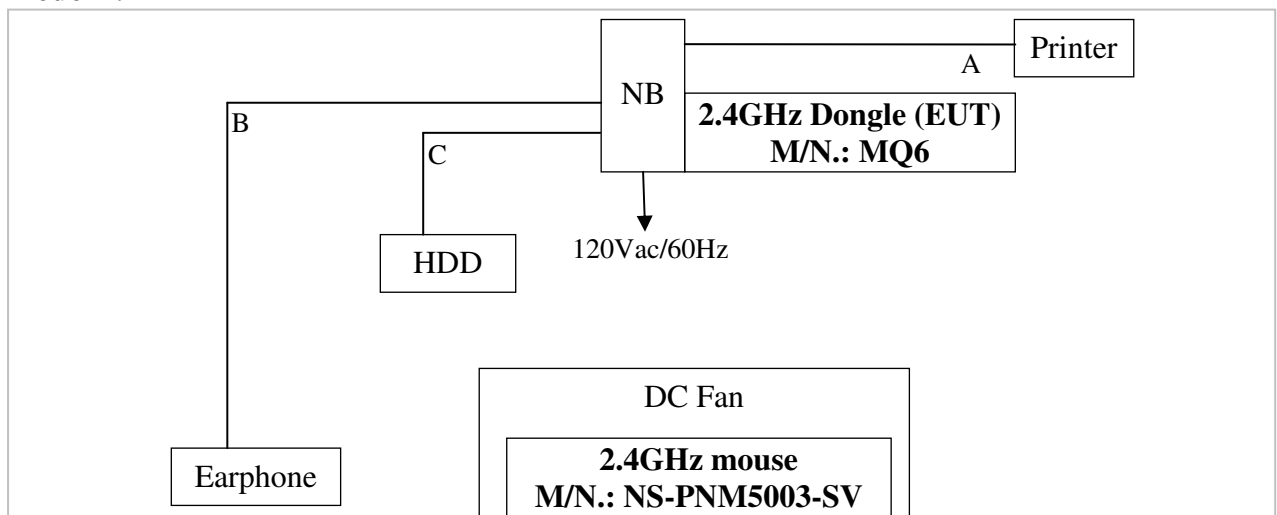
The test sample which has been tested contained the noise suppression parts as described in the constructional data form or technical construction file or refer to the attachment photo document of test report. No additional measures were employed to achieve compliance.

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	USB cable	Shielded, 1.7m
B	Audio cable	Non shielded, 2m
C	USB cable	Shielded, 0.6m

5 Test Results EMISSION

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

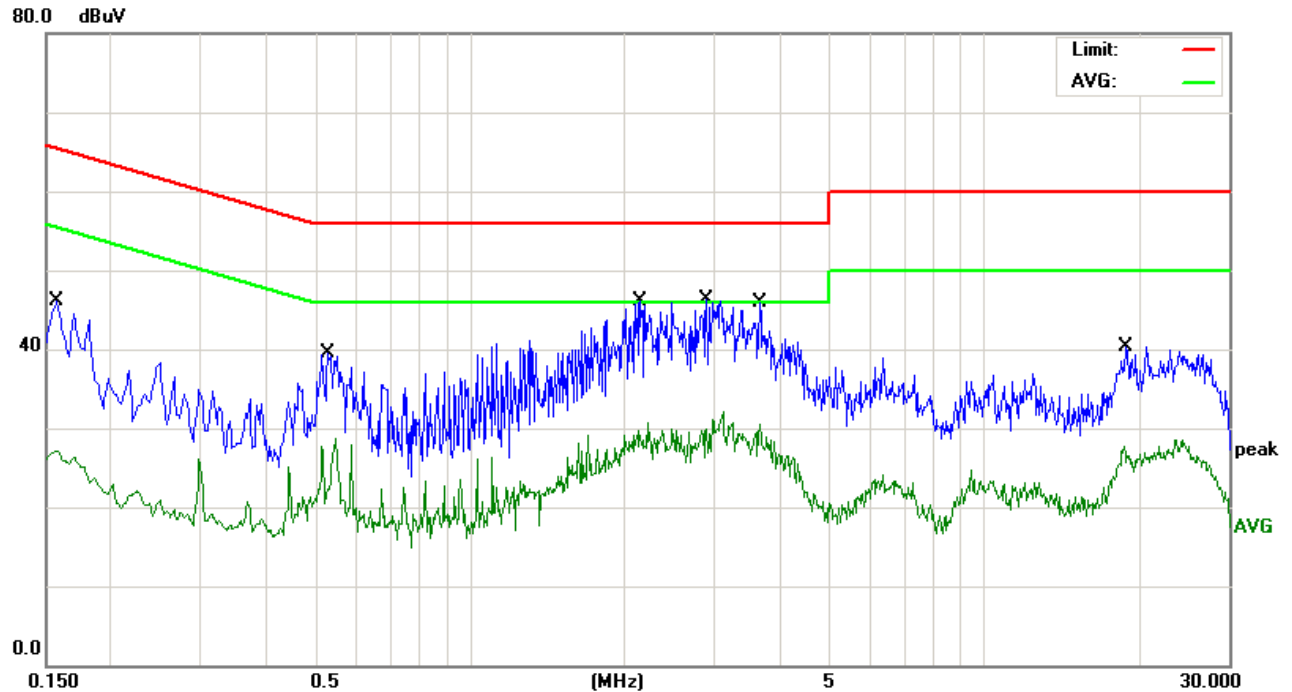
RESULT:**PASS**

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:

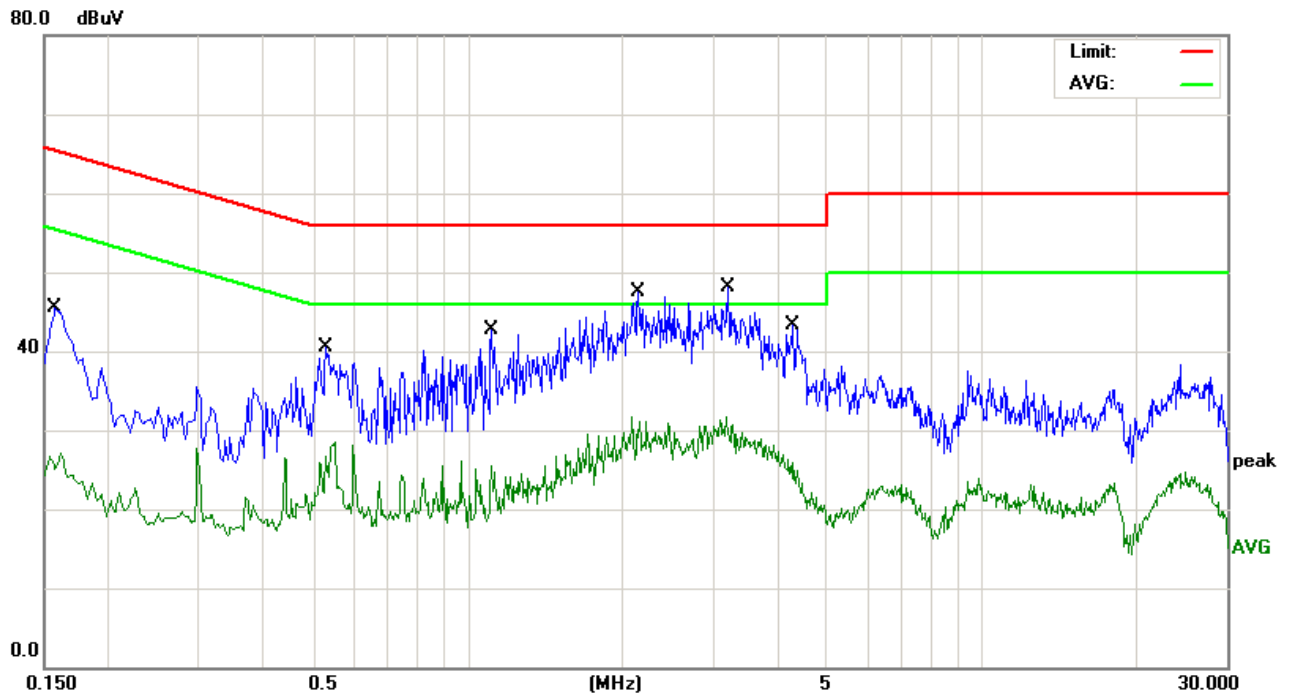
Date of Testing : 27 Dec. 2013
Input Voltage : See 3.2
Operational Mode : See 4.2
Temperature 16 °C
Relative Humidity 55 %

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	0.1580	9.62	31.61	41.23	65.56	-24.33	QP	P	
2	0.1580	9.62	16.16	25.78	55.56	-29.78	AVG	P	
3	0.5299	9.59	26.88	36.47	56.00	-19.53	QP	P	
4	0.5299	9.59	13.79	23.38	46.00	-22.62	AVG	P	
5	2.1540	9.62	30.15	39.77	56.00	-16.23	QP	P	
6	2.1540	9.62	18.10	27.72	46.00	-18.28	AVG	P	
7	2.8980	9.64	28.30	37.94	56.00	-18.06	QP	P	
8	2.8980	9.64	17.69	27.33	46.00	-18.67	AVG	P	
9	3.6660	9.64	27.52	37.16	56.00	-18.84	QP	P	
10	3.6660	9.64	16.63	26.27	46.00	-19.73	AVG	P	
11	18.8500	9.76	22.34	32.10	60.00	-27.90	QP	P	
12	18.8500	9.76	14.16	23.92	50.00	-26.08	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	0.1580	9.59	29.91	39.50	65.56	-26.06	QP	P	
2	0.1580	9.59	15.07	24.66	55.56	-30.90	AVG	P	
3	0.5299	9.57	27.96	37.53	56.00	-18.47	QP	P	
4	0.5299	9.57	14.14	23.71	46.00	-22.29	AVG	P	
5	1.1140	9.57	26.25	35.82	56.00	-20.18	QP	P	
6	1.1140	9.57	12.50	22.07	46.00	-23.93	AVG	P	
7	2.1500	9.58	31.27	40.85	56.00	-15.15	QP	P	
8	2.1500	9.58	18.04	27.62	46.00	-18.38	AVG	P	
9	3.2220	9.61	27.77	37.38	56.00	-18.62	QP	P	
10	3.2220	9.61	17.92	27.53	46.00	-18.47	AVG	P	
11	4.2980	9.61	23.06	32.67	56.00	-23.33	QP	P	
12	4.2980	9.61	12.13	21.74	46.00	-24.26	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)

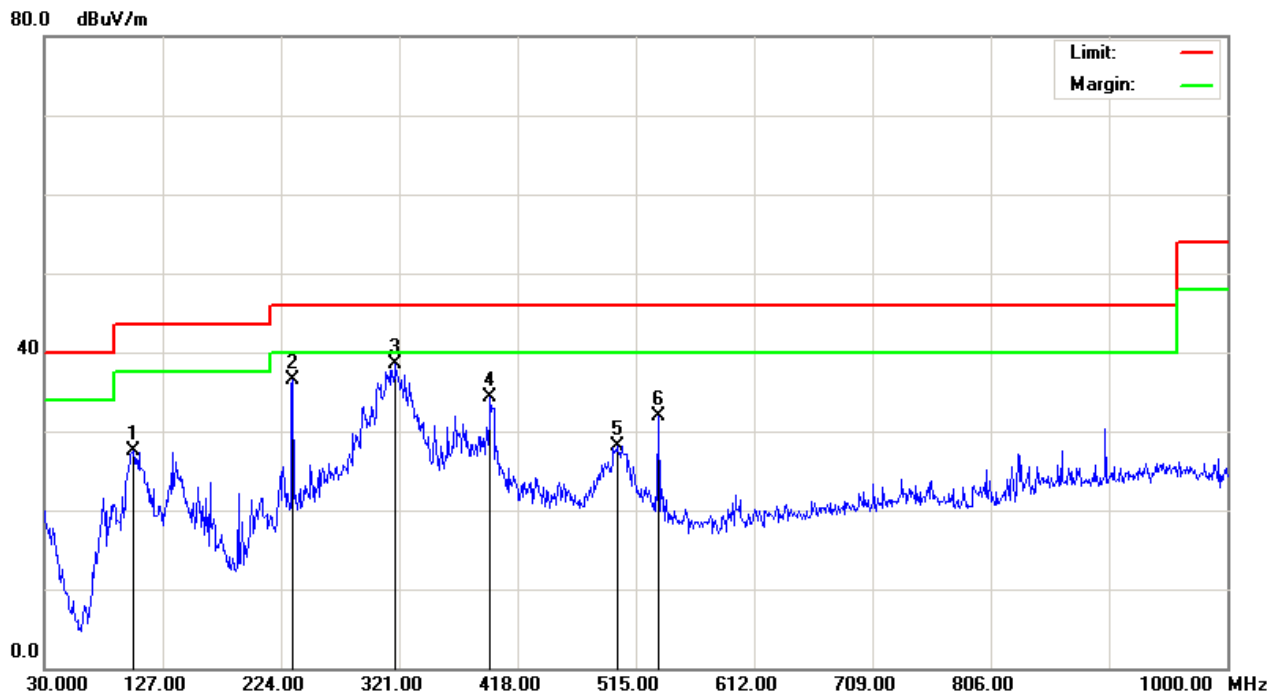
Test Setup

The following setup caused the highest disturbance:

Date of Testing : 27 Dec. 2013
Input Voltage : See 3.2
Operational Mode : See 4.2
Temperature 18 °C
Relative Humidity 61 %

The highest frequency generated or used in the device or on which the operates or tunes of the EUT:

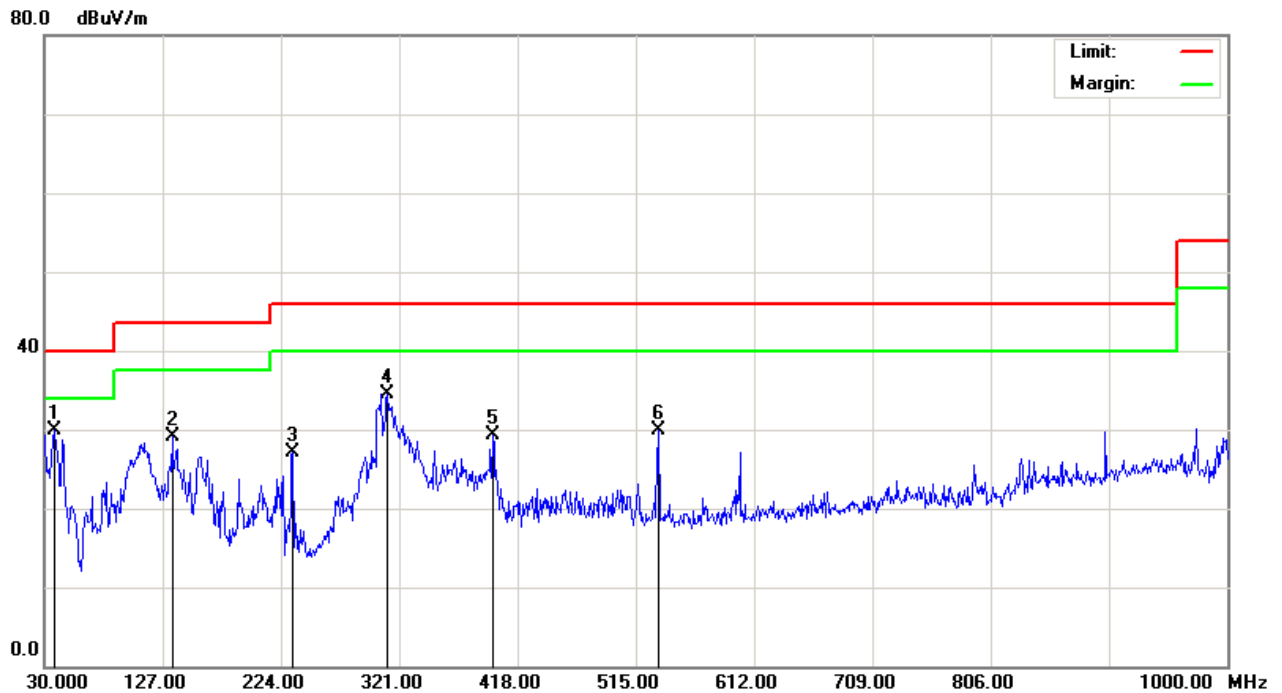
- ☐ below 1.705M, measuring up to 30MHz
☒ 1.705-108M, measuring up to 1000MHz
☐ 108-500MHz, measuring up to 2000MHz
☐ 500-1000MHz, measuring up to 5000MHz
☐ above 1000MHz, measuring up to 5th harmonic of the highest frequency or 40GHz, whichever is lower.

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	102.7500	-14.91	42.35	27.44	43.50	-16.06	QP	100	142	P	
2	233.7000	-13.23	49.75	36.52	46.00	-9.48	QP	100	214	P	
3	318.0899	-10.07	48.62	38.55	46.00	-7.45	QP	100	214	P	
4	395.6900	-8.68	42.94	34.26	46.00	-11.74	QP	100	306	P	
5	499.4800	-7.31	35.48	28.17	46.00	-17.83	QP	100	122	P	
6	533.4299	-7.02	38.92	31.90	46.00	-14.10	QP	100	147	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	38.7300	-10.90	40.86	29.96	40.00	-10.04	QP	100	233	P	
2	134.7600	-12.86	41.99	29.13	43.50	-14.37	QP	100	249	P	
3	233.7000	-13.23	40.35	27.12	46.00	-18.88	QP	100	241	P	
4	311.3000	-10.19	44.65	34.46	46.00	-11.54	QP	100	141	P	
5	397.6300	-8.65	38.00	29.35	46.00	-16.65	QP	100	136	P	
6	533.4300	-7.02	36.88	29.86	46.00	-16.14	QP	100	154	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



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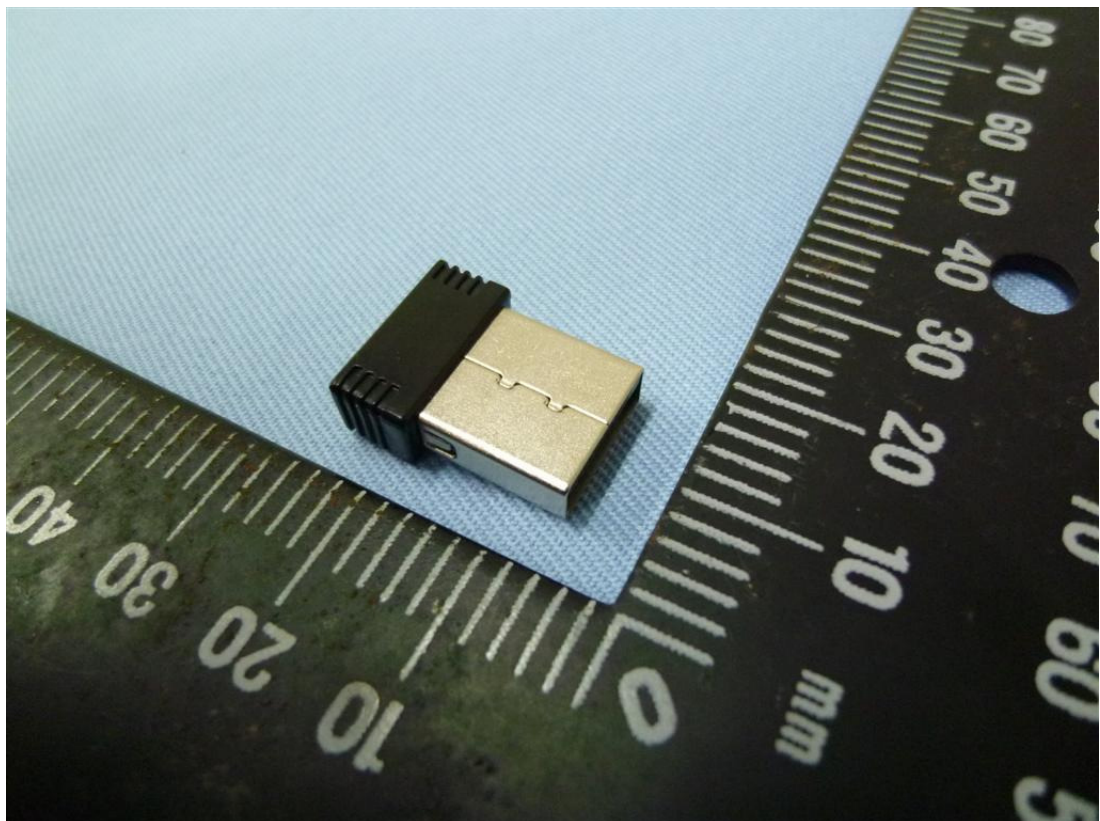
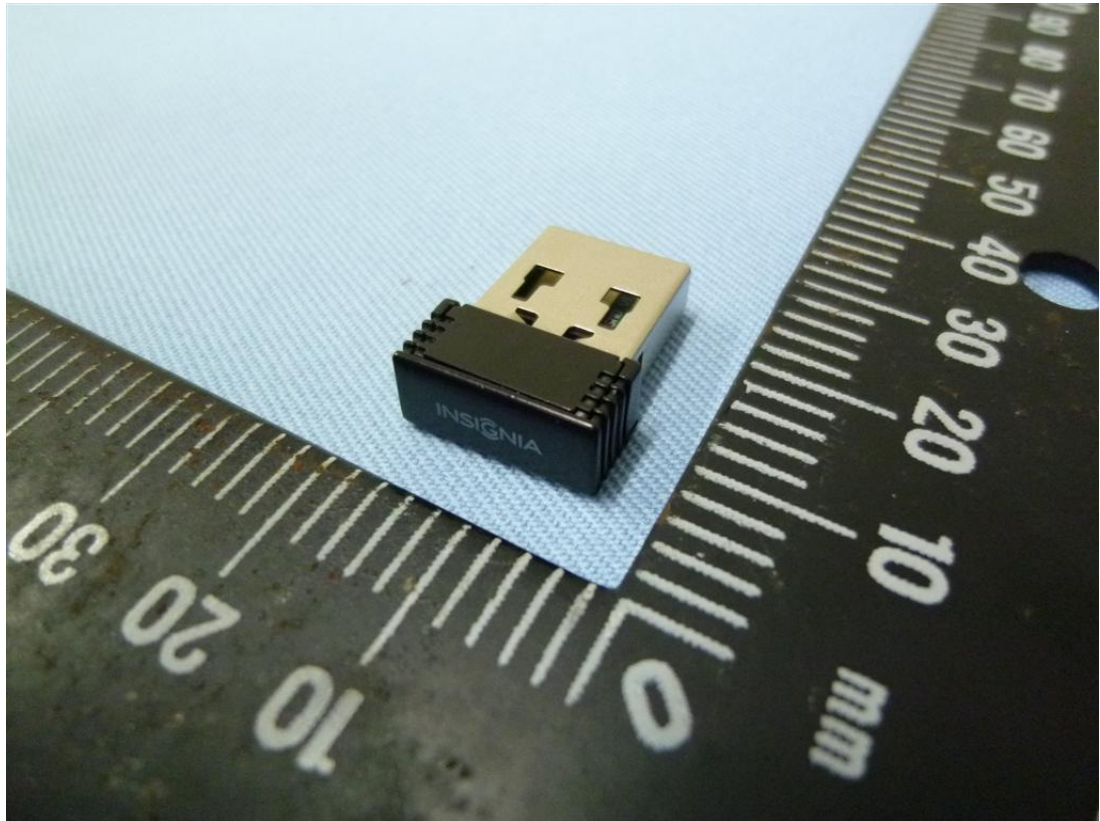
FIGURE 1: CONDUCTED EMISSION, AC MAINS; 0.15 – 30 MHz	11
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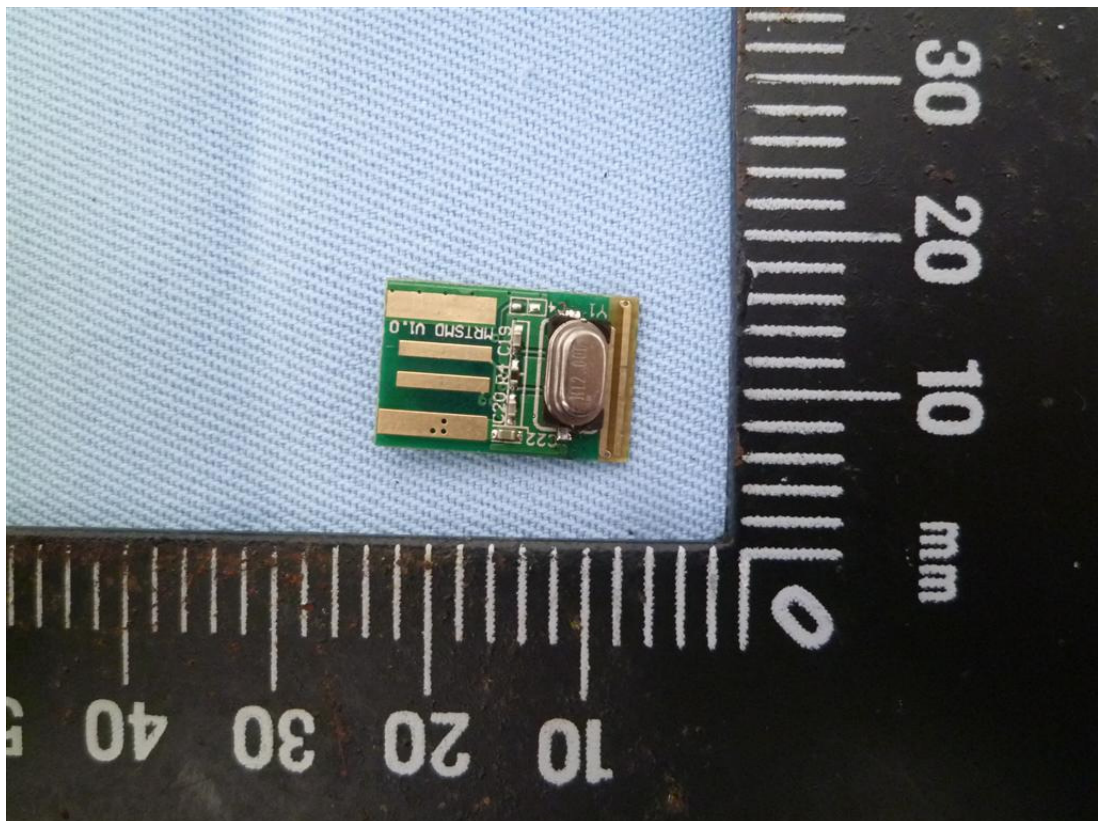
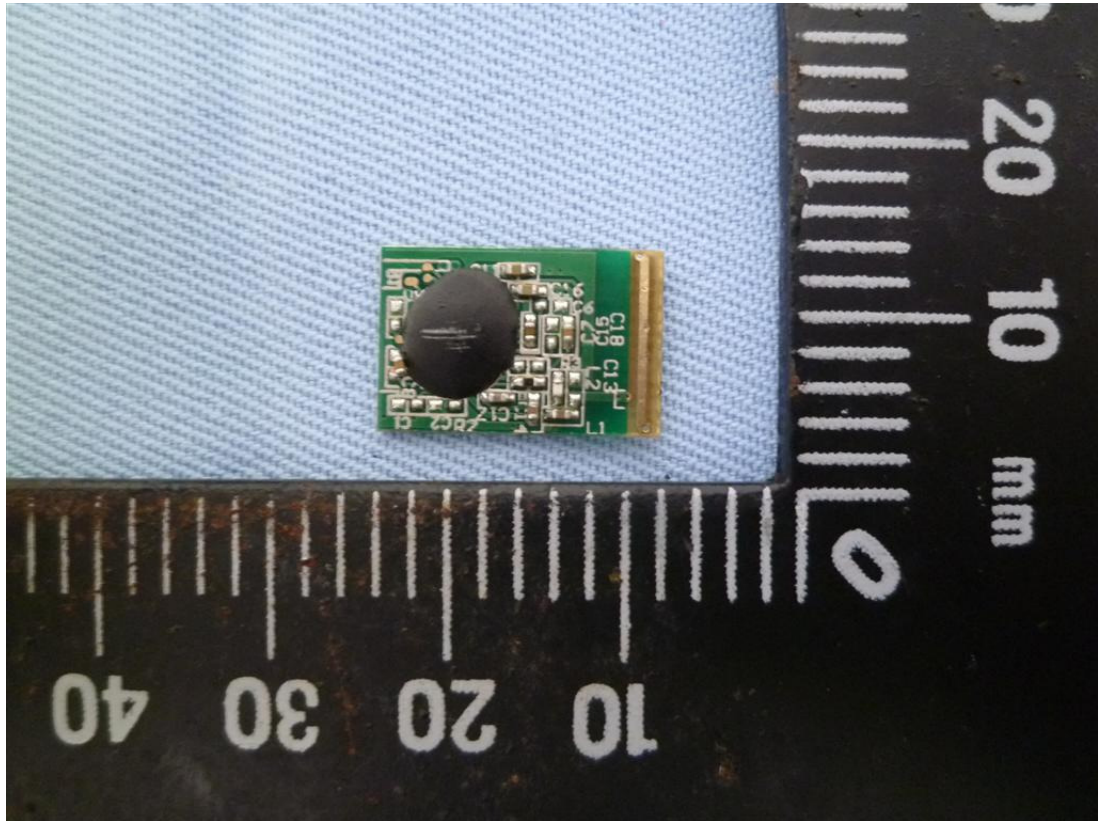
Product: 2.4GHz Dongle

Type Designation: MQ6



Product: 2.4GHz Dongle

Type Designation: MQ6



Product: 2.4GHz Dongle

Type Designation: MQ6

