

FCC PART 15.249
MEASUREMENT AND TEST REPORT
FOR
Penclic AB

Vendev. 90, 7tr182 32, Danderyd, Sweden

FCC ID: ZRQ-R2

Report Concerns: Original Report	Equipment Type: Penclic wireless Mouse	
Model:	<u>R2</u>	
Report No.:	<u>STR11078089I</u>	
Test Date:	<u>2011-07-11 to 2011-07-25</u>	
Issue Date:	<u>2011-07-26</u>	
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Approved & Authorized By:	<u>Jandy so / PSQ Manager</u>	<i>Jandyso</i>
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by SEM.Test Compliance Service Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Penclic AB
 Address of applicant: Vendev. 90, 7tr182 32, Danderyd, Sweden

Manufacturer: SUNSONNY INTERNATIONAL GROUP LIMITED
 Address of manufacturer: NO.68, Meihua Road, Eastern Area, Baishixia industrial Park, Fuyong Town, Bao' an District, Shenzhen, China

General Description of E.U.T

Items	Description
EUT Description:	Penclic wireless Mouse
Trade Name:	Penclic
Model No.:	R2
Rated Voltage:	DC 1.5V with USB charging port
Rated Current:	22 mA
Frequency Range:	2405MHz~2476MHz
Antenna Type:	Integral Antenna
For more information refer to the circuit diagram form and the user's manual.	

The test data is gathered from a production sample, provided by the manufacturer..

1.2 Test Standards

The following report is prepared on behalf of the Penclic AB in accordance with FCC Part 15, Subpart B, Subpart C, and section 15.107, 15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.107,15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the Operating Instructions and let the EUT keep transmitting.

1.4 Test Facility

- **FCC – Registration No.: 994117**

SEM.Test Compliance Services Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 994117.

- **Industry Canada (IC) Registration No.: 7673A**

The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

- **CNAS Registration No.: L4062**

Shenzhen SEM.Test Electronics Service Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C (518101)

1.5 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components. The test software is started while the whole system is on.

1.6 Accessories Equipment List and Details

Description	Manufacturer	Model	Serial Number
Notebook	ASUS	X50R	74N0AS297138

1.7 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB Power Cable	0.7	Unshielded	Without Core

2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.207 (a)	Conducted Emission	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.209	Radiated Emission	Compliant
§15.249(a)	Field Strength	Compliant
§15.249(d)	Out of Band Emission	Compliant

3. §15.203 - ANTENNA REQUIREMENT

3.1 Standard Applicable

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.2 Test Result

This product has an integral antenna, fulfill the requirement of this section.

4. §15.207 CONDUCTED EMISSIONS

4.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

4.2 Test Equipment List and Details

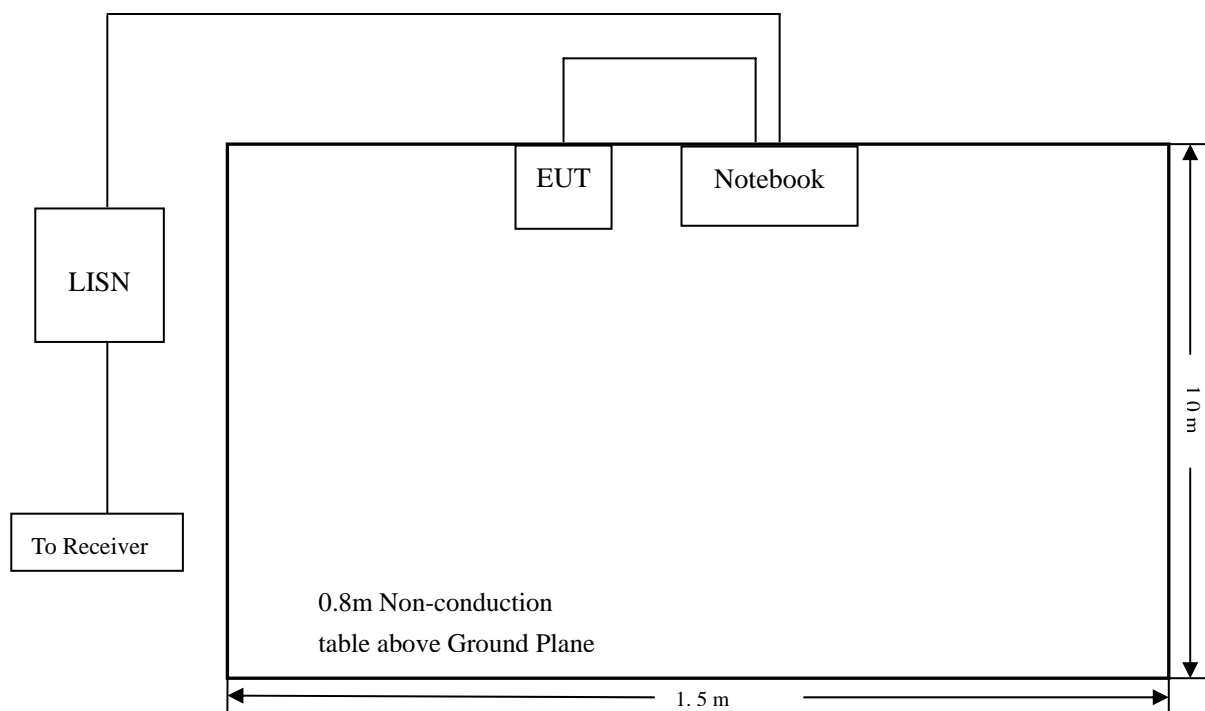
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2010-12-20	2011-12-19
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2010-12-20	2011-12-19
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2010-12-20	2011-12-19

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

4.3 Test Procedure

Test is conducting under the description of ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

4.4 Basic Test Setup Block Diagram



4.5 Environmental Conditions

Temperature:	20° C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

4.6 Summary of Test Results/Plots

According to the data in section 4.7, the EUT complied with the FCC Part 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

-10.82 dB μ V at 0.318 MHz in the Neutral, QP detector, 0.15-30MHz

4.7 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

Conducted Disturbance

EUT: Penclic Wireless Mouse

M/N: R2

Operating Condition: Charging

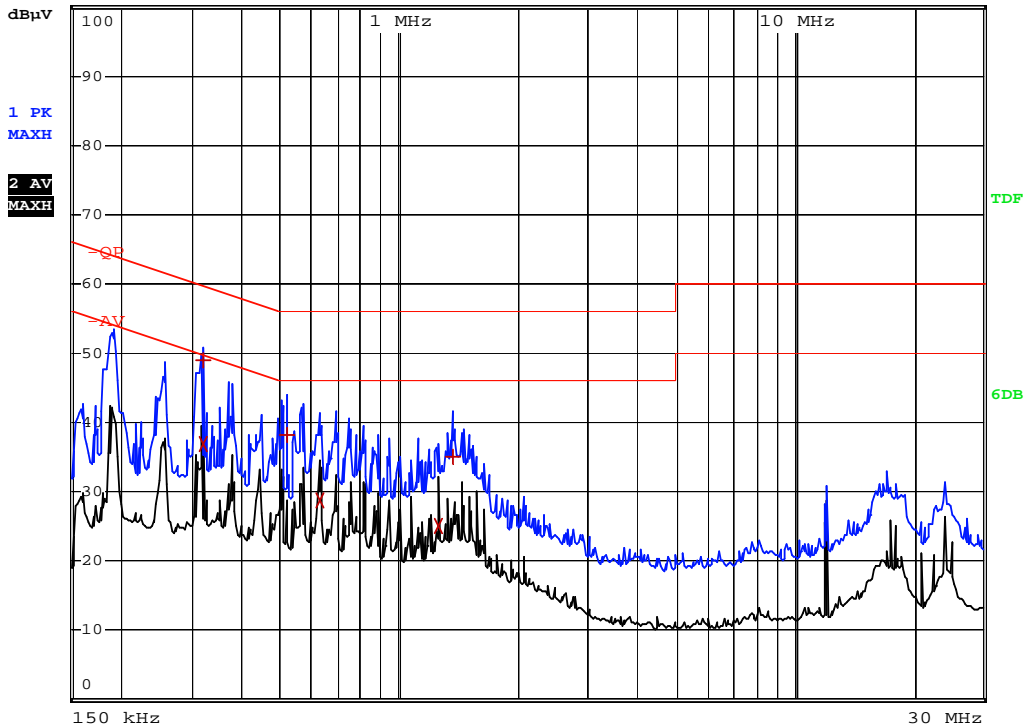
Test Specification: L

Comment: AC 120V/60Hz



RBW 9 kHz
MT 5 s

Att 10 dB AUTO



EDIT PEAK LIST (Final Measurement Results)			
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
Trace1:	-QP		
Trace2:	-AV		
Trace3:	---		
1 Quasi Peak	318 kHz	48.93	-10.82
2 Average	318 kHz	36.83	-12.92
1 Quasi Peak	522 kHz	38.20	-17.79
2 Average	630 kHz	28.78	-17.21
2 Average	1.262 MHz	24.99	-21.00
1 Quasi Peak	1.374 MHz	34.93	-21.06

Plot of Conducted Emissions Test Data

Conducted Disturbance

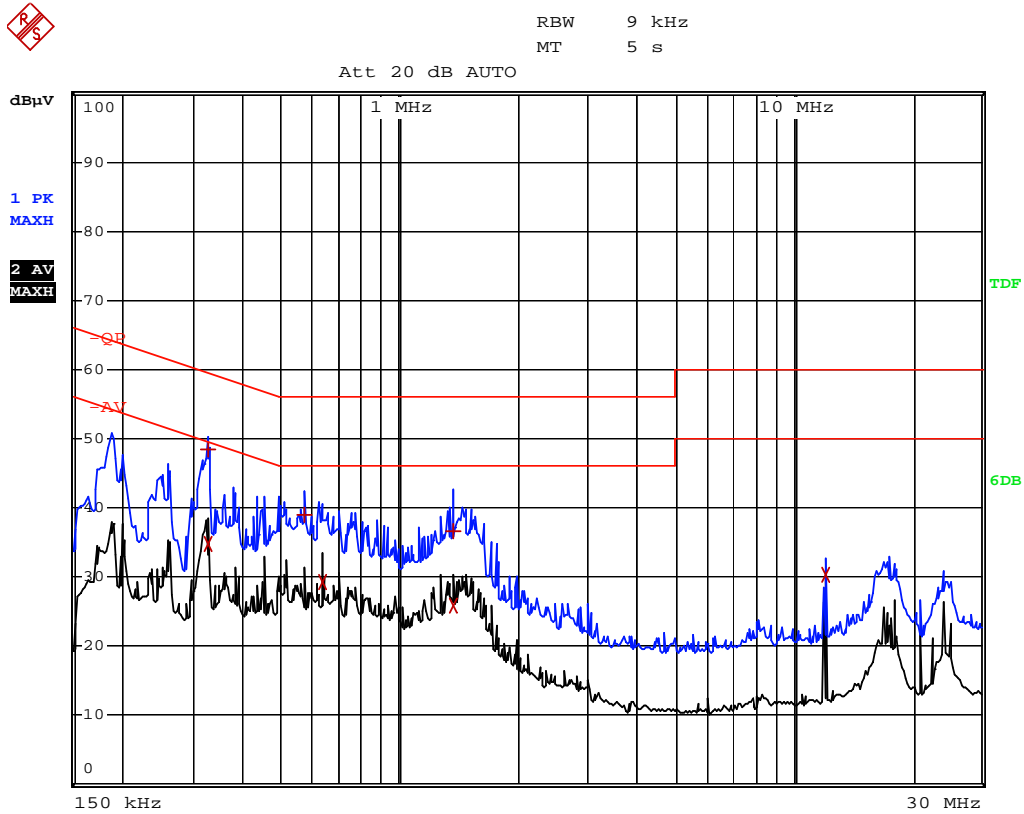
EUT: Penclic wireless Mouse

M/N: R2

Operating Condition: Charging

Test Specification: N

Comment: AC 120V/60Hz



EDIT PEAK LIST (Final Measurement Results)			
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
Trace1: -QP			
Trace2: -AV			
Trace3: ---			
1 Quasi Peak	326 kHz	48.40	-11.15
2 Average	326 kHz	34.87	-14.68
1 Quasi Peak	574 kHz	39.02	-16.97
2 Average	638 kHz	29.15	-16.84
1 Quasi Peak	1.374 MHz	36.59	-19.40
2 Average	1.374 MHz	25.82	-20.17
2 Average	11.994 MHz	30.30	-19.69

5. §15.205, §15.209, §15.249 (a)- RADIATED EMISSION

5.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ± 5.10 dB.

5.2 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of fundamental (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 20 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN 15.209,WHICHEVER IS THE LESSER ATTENUATION.

Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

5.3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-12-20	2011-12-19
EMI Test Receiver	R&S	ESVB	825471/005	2010-12-20	2011-12-19
Positioning Controller	C&C	CC-C-1F	N/A	2010-12-20	2011-12-19
RF Switch	EM	EMSW18	SW060023	2010-12-20	2011-12-19
Pre-amplifier	Agilent	8447F	3113A06717	2010-12-20	2011-12-19
Pre-amplifier	Compliance Direction	PAP-0118	24002	2010-12-20	2011-12-19
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2011-01-09	2012-01-08
Horn Antenna	ETS	3117	00086197	2011-01-09	2012-01-08

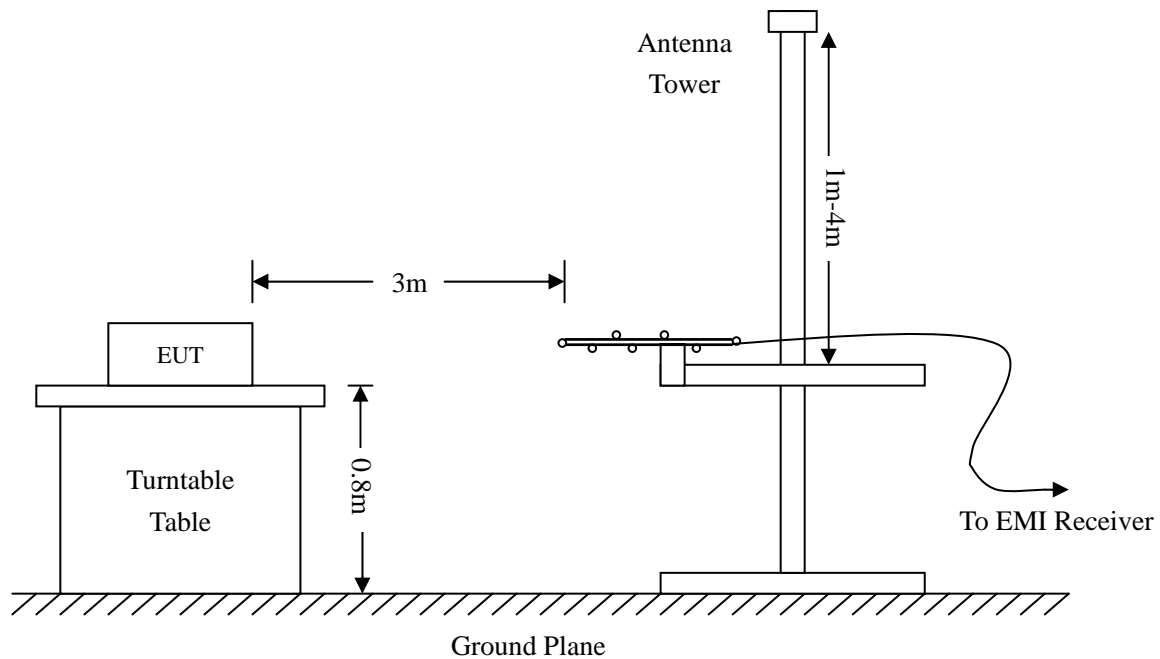
Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

5.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.205 15.249(a) and FCC Part 15.209 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



5.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBµV means the emission is 6dBµV below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

5.6 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

5.7 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.249 standards, and had the worst margin of:

-6.61 dB μ V at 30.6379 MHz in the Horizontal polarization, 30 MHz to 25 GHz, 3Meters

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Plot of Radiation Emissions Test

Radiated Disturbance

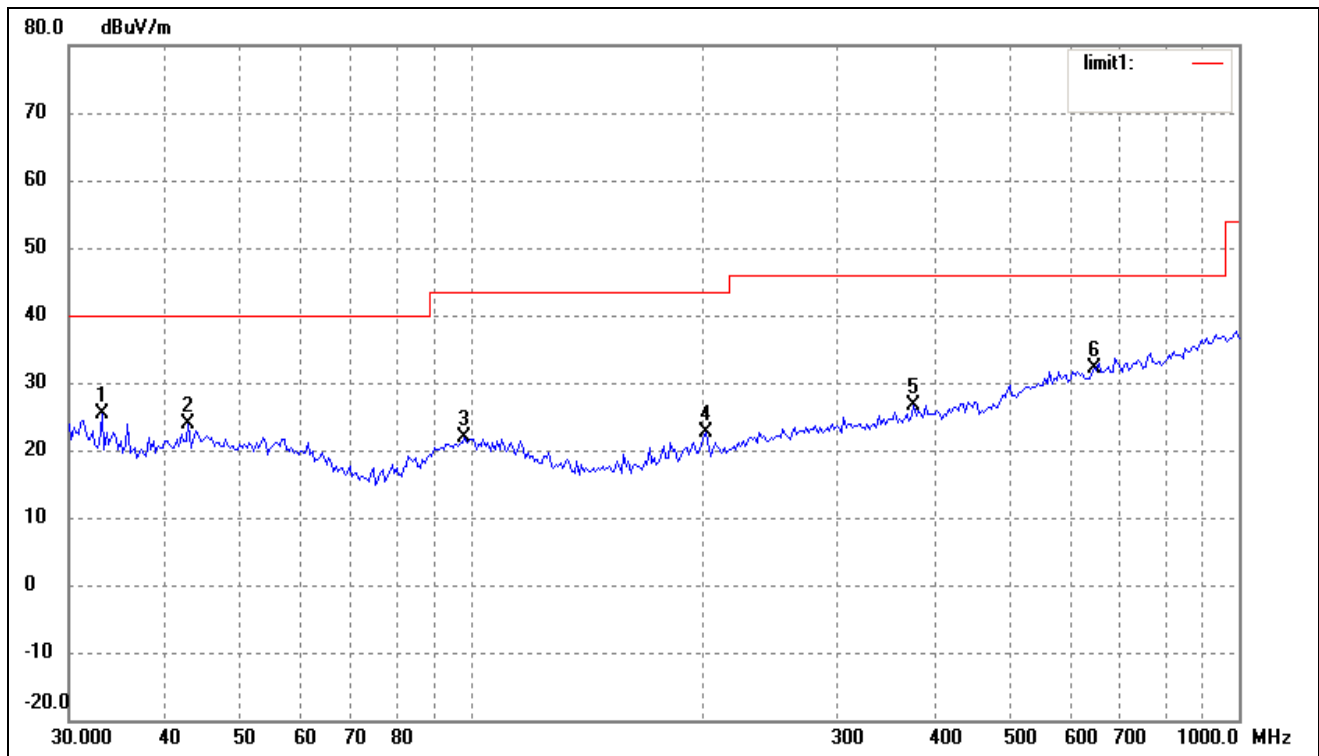
EUT: Penclic wireless Mouse

M/N: R2

Operating Condition: Transmitting Low Channel

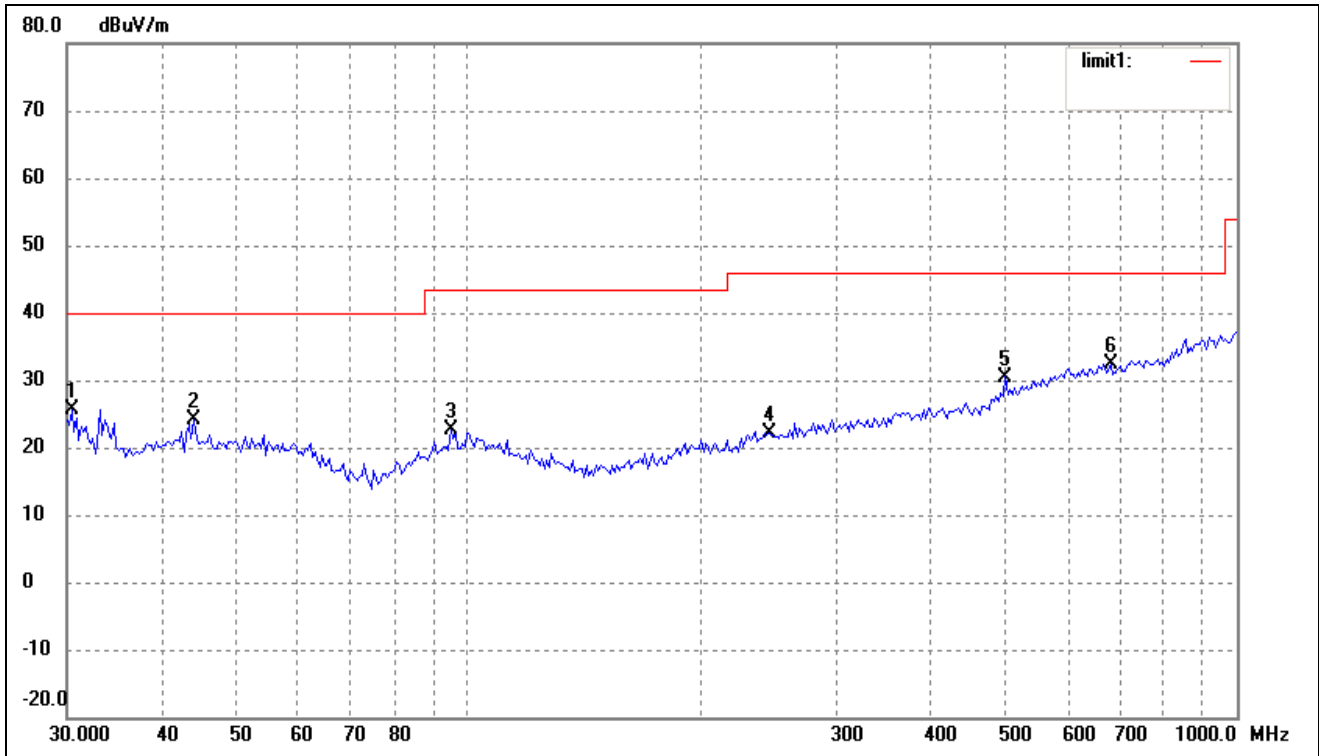
Test Specification: Horizontal & Vertical

Horizontal:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.0950	18.66	6.77	25.43	40.00	-14.57	360	100	peak
2	42.8997	15.63	8.20	23.83	40.00	-16.17	360	100	peak
3	98.1419	13.56	8.30	21.86	43.50	-21.64	360	100	peak
4	202.1005	15.90	6.66	22.56	43.50	-20.94	360	100	peak
5	377.2590	15.37	11.16	26.53	46.00	-19.47	360	100	peak
6	647.3856	15.08	17.07	32.15	46.00	-13.85	360	100	peak

Vertical:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	30.4238	18.89	6.77	25.66	40.00	-14.34	360	100	peak
2	43.8119	16.02	8.21	24.23	40.00	-15.77	360	100	peak
3	94.7601	14.66	8.01	22.67	43.50	-20.83	360	100	peak
4	245.9509	13.55	8.58	22.13	46.00	-23.87	360	100	peak
5	499.4247	16.14	14.36	30.50	46.00	-15.50	360	100	peak
6	684.7454	15.11	17.38	32.49	46.00	-13.51	360	100	peak

Plot of Radiation Emissions Test

Radiated Disturbance

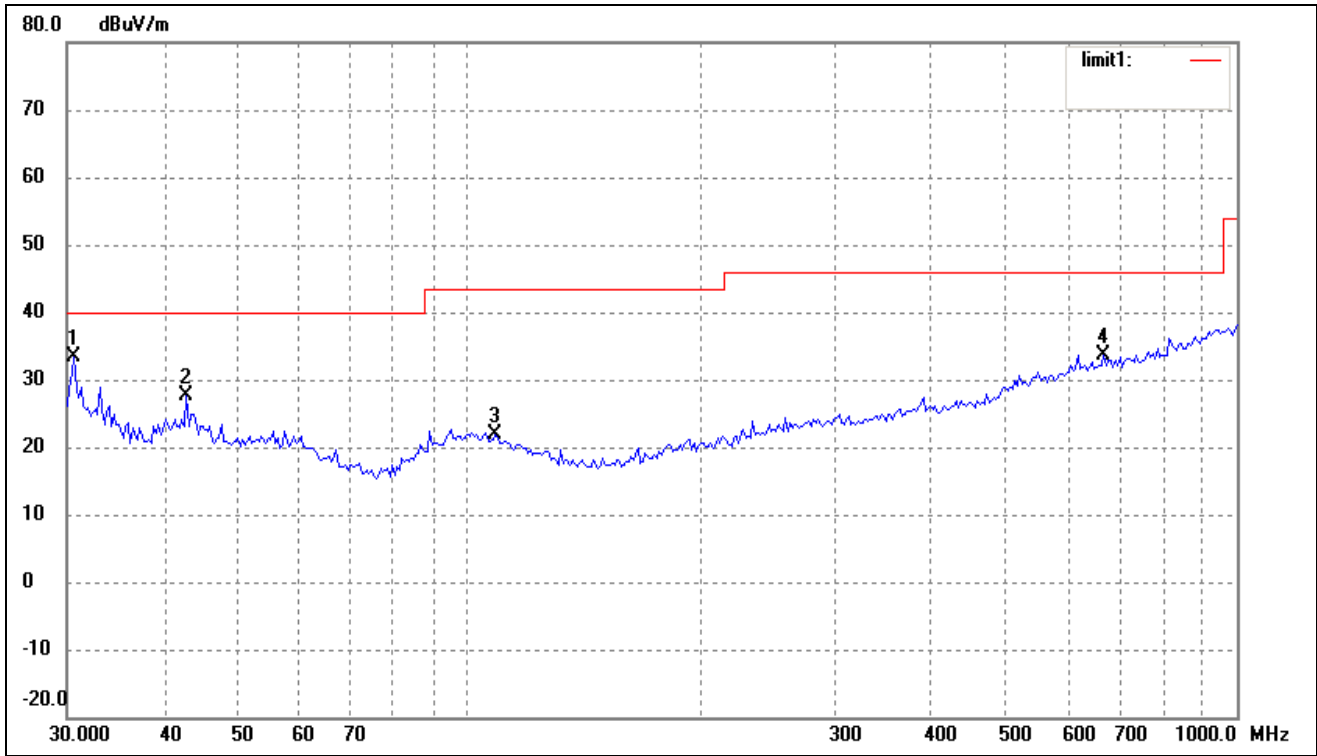
EUT: Penclic wireless Mouse

M/N: R2

Operating Condition: Transmitting Middle Channel

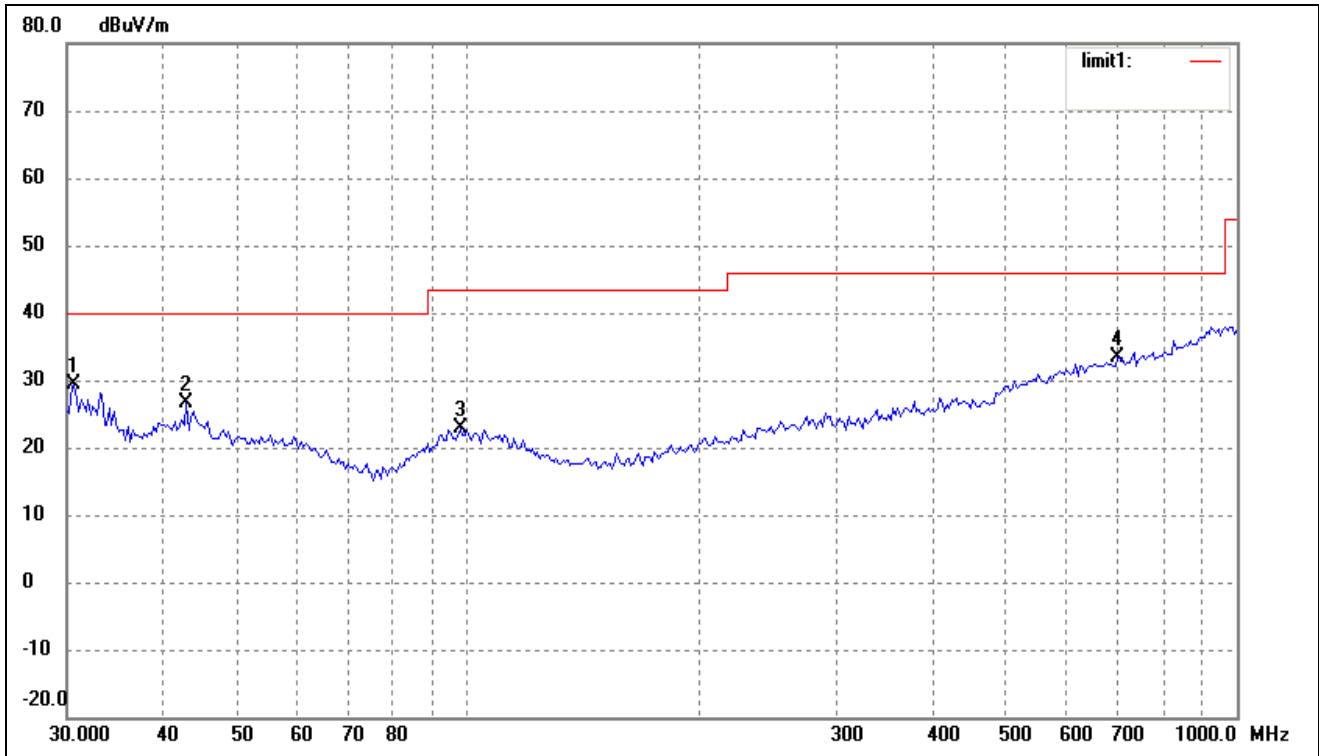
Test Specification: Horizontal & Vertical

Horizontal:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	30.6379	26.62	6.77	33.39	40.00	-6.61	360	100	peak
2	42.8998	19.33	8.20	27.53	40.00	-12.47	360	100	peak
3	108.2667	14.03	7.73	21.76	43.50	-21.74	360	100	peak
4	670.4893	16.44	17.26	33.70	46.00	-12.30	360	100	peak

Vertical:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	30.6379	22.59	6.77	29.36	40.00	-10.64	360	100	peak
2	42.8998	18.47	8.20	26.67	40.00	-13.33	360	100	peak
3	97.4560	14.65	8.23	22.88	43.50	-20.62	360	100	peak
4	699.3046	15.88	17.49	33.37	46.00	-12.63	360	100	peak

Plot of Radiation Emissions Test

Radiated Disturbance

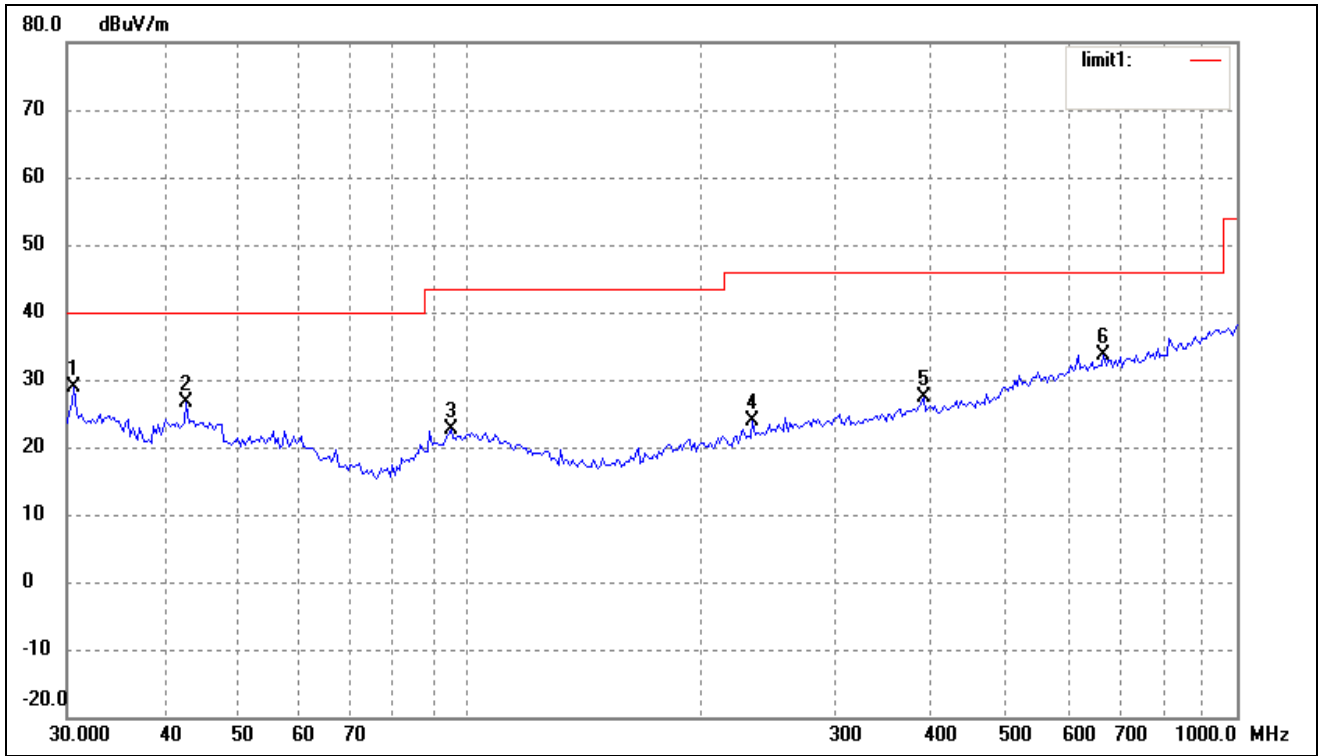
EUT: Pencil wireless Mouse

M/N: R2

Operating Condition: Transmitting High Channel

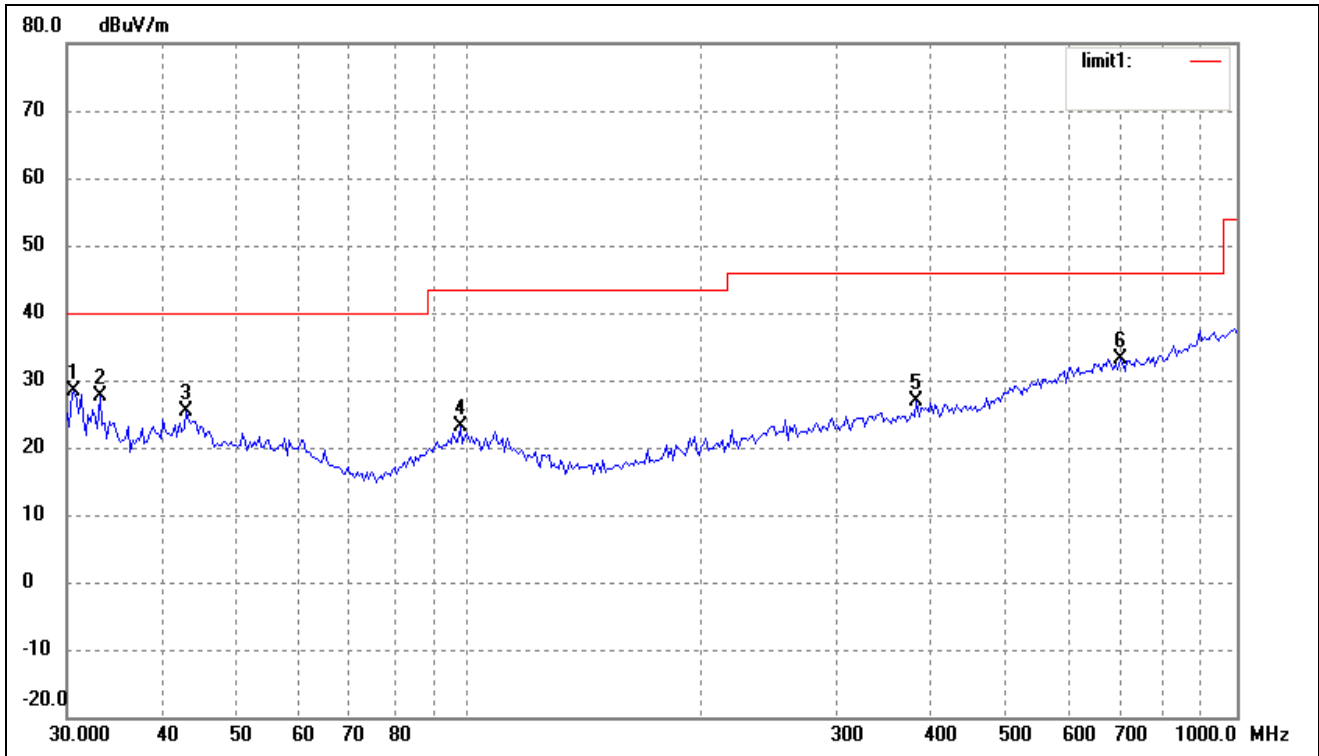
Test Specification: Horizontal & Vertical

Horizontal:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	30.6376	22.12	6.77	28.89	40.00	-11.11	360	100	peak
2	42.8997	18.33	8.20	26.53	40.00	-13.47	360	100	peak
3	94.7600	14.60	8.01	22.61	43.50	-20.89	360	100	peak
4	234.1682	15.88	8.10	23.98	46.00	-22.02	360	100	peak
5	390.7225	16.05	11.31	27.36	46.00	-18.64	360	100	peak
6	670.4891	16.44	17.26	33.70	46.00	-12.30	360	100	peak

Vertical:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	30.6379	21.52	6.77	28.29	40.00	-11.71	360	100	peak
2	33.0950	20.89	6.77	27.66	40.00	-12.34	360	100	peak
3	42.8998	17.06	8.20	25.26	40.00	-14.74	360	100	peak
4	97.4560	14.78	8.23	23.01	43.50	-20.49	360	100	peak
5	382.5879	15.62	11.23	26.85	46.00	-19.15	360	100	peak
6	704.2261	15.53	17.56	33.09	46.00	-12.91	360	100	peak

Spurious Emission Above 1GHz

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (1G to 25GHz)										
4810.0	AV	44.9	57	H	34.1	5.2	33.0	41.2	54	-12.8
4810.0	AV	46.2	35	V	34.1	5.2	33.0	42.5	54	-11.5
4810.0	PK	51.6	65	H	34.1	5.2	33.0	54.5	74	-19.5
4810.0	PK	51.8	98	V	34.1	5.2	33.0	55.3	74	-18.7
7215.0	AV	42.2	60	H	37.4	6.1	33.5	45.5	54	-8.5
7215.0	AV	43.2	79	V	37.4	6.1	33.5	46.2	54	-7.8
7215.0	PK	46.0	256	H	37.4	6.1	33.5	49.0	74	-25.0
7215.0	PK	48.6	185	V	37.4	6.1	33.5	51.2	74	-22.7
2405.0	AV	60.2	45	H	29.1	3.7	34.0	63.0	94	-31.0
2405.0	AV	61.4	359	V	29.1	3.7	34.0	64.9	94	-29.1
2405.0	PK	78.7	78	H	29.1	3.7	34.0	81.6	114	-32.4
2405.0	PK	90.1	44	V	29.1	3.7	34.0	93.9	114	-20.1
Middle Channel (1G to 25GHz)										
4878.0	AV	39.4	24	H	34.1	5.2	33	42.5	54	-11.5
4878.0	AV	40.1	341	V	34.1	5.2	33	43.3	54	-10.7
4878.0	PK	50.2	177	H	34.1	5.2	33	53.7	74	-20.3
4878.0	PK	49.4	28	V	34.1	5.2	33	51.3	74	-22.7
7317.0	AV	43.4	325	H	37.4	6.1	33.5	46.5	54	-7.5
7317.0	AV	39.4	91	V	37.4	6.1	33.5	44.3	54	-9.7
7317.0	PK	48.4	77	H	37.4	6.1	33.5	51.5	74	-22.5
7317.0	PK	51.8	267	V	37.4	6.1	33.5	53.3	74	-20.7
2439.0	AV	60.3	33	H	29.1	3.7	34	63.5	94	-30.5
2439.0	AV	57.3	34	V	29.1	3.7	34	60.4	94	-33.6
2439.0	PK	93.2	164	H	29.1	3.7	34	81.7	114	-32.3
2439.0	PK	87.1	159	V	29.1	3.7	34	90.3	114	-23.7

High Channel (1G to 25GHz)										
4952.0	AV	38.2	17	H	34.1	5.2	33.0	41.9	54	-12.1
4952.0	AV	39.4	13	V	34.1	5.2	33.0	42.7	54	-11.3
4952.0	PK	50.1	50	H	34.1	5.2	33.0	53.5	74	-20.5
4952.0	PK	51.8	59	V	34.1	5.2	33.0	54.3	74	-19.7
7428.0	AV	43.2	355	H	37.4	6.1	33.5	46.5	54	-7.5
7428.0	AV	41.1	66	V	37.4	6.1	33.5	44.2	54	-9.8
7428.0	PK	46.2	269	H	37.4	6.1	33.5	49.5	74	-24.5
7428.0	PK	47.2	64	V	37.4	6.1	33.5	50.3	74	-23.7
2476.0	AV	58.3	63	H	29.1	3.7	34.0	61.5	94	-32.5
2476.0	AV	61.7	85	V	29.1	3.7	34.0	65.3	94	-28.7
2476.0	PK	76.2	85	H	29.1	3.7	34.0	79.8	114	-34.2
2476.0	PK	82.9	55	V	29.1	3.7	34.0	85.4	114	-28.6

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4. Emissions 20dB lower than the limit are not reported.

6. §15.249(b) OUT OF BAND EMISSIONS

6.1 Standard Applicable

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

6.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-12-20	2011-12-19
EMI Test Receiver	R&S	ESVB	825471/005	2010-12-20	2011-12-19
Positioning Controller	C&C	CC-C-1F	N/A	2010-12-20	2011-12-19
RF Switch	EM	EMSW18	SW060023	2010-12-20	2011-12-19
Pre-amplifier	Agilent	8447F	3113A06717	2010-12-20	2011-12-19
Pre-amplifier	Compliance Direction	PAP-0118	24002	2010-12-20	2011-12-19
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2011-01-09	2012-01-08
Horn Antenna	ETS	3117	00086197	2011-01-09	2012-01-08

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

6.3 Test Procedure

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2438.5MHz, than mark the higher-level emission for comparing with the FCC rules.

6.4 Environmental Conditions

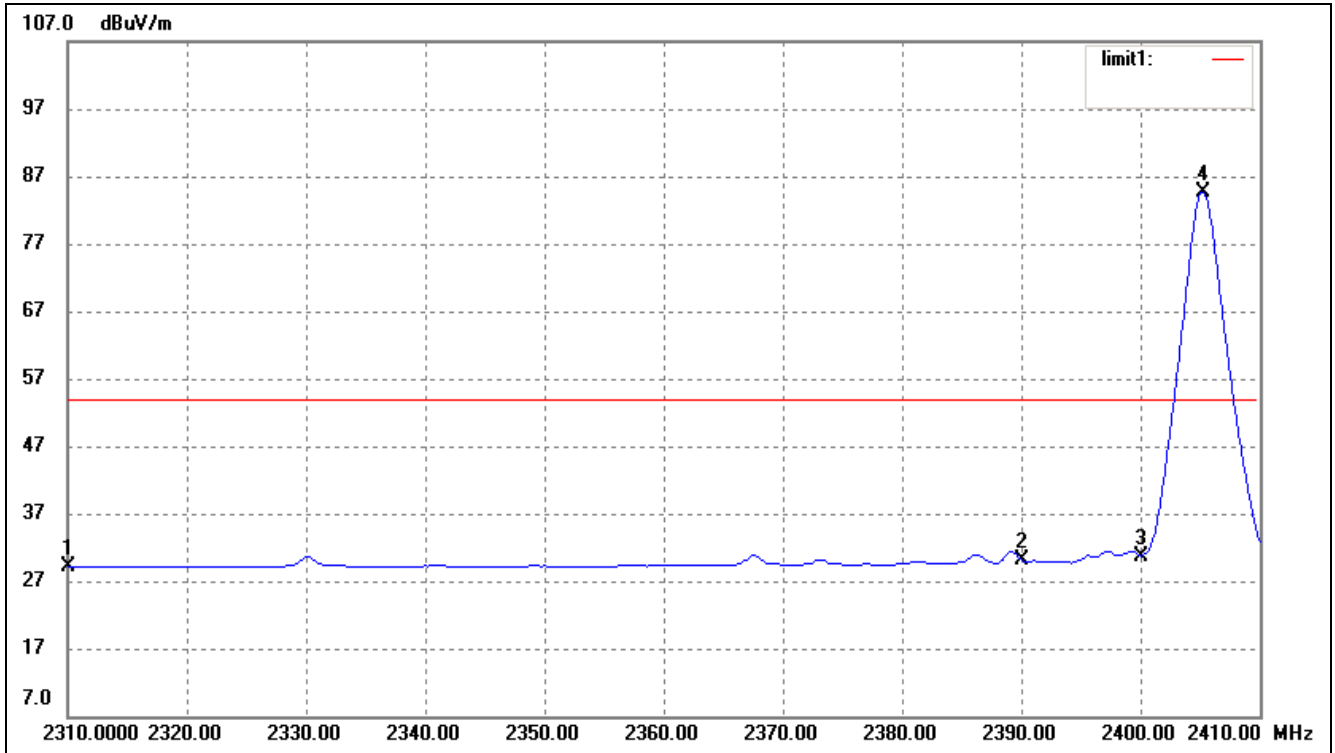
Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

6.5 Summary of Test Results/Plots

Frequency MHz	Limit dBuV	Result
Low Edge	<54	Pass
High Edge	<54	Pass

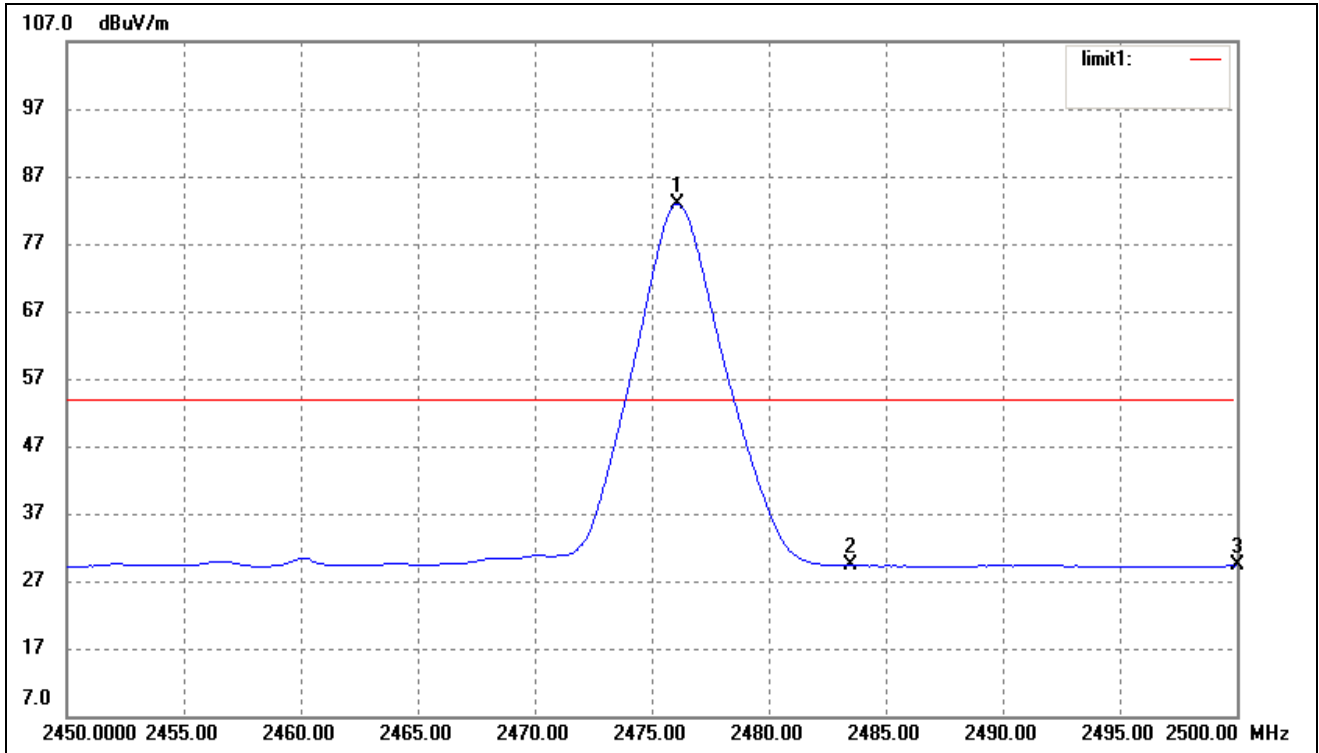
The edge emissions are below the FCC 15.209 Limits. Please refer to the test plots below.

Lowest Bandedge



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	36.57	-7.51	29.06	54.00	-24.94	Ave Detector
	2310.000	49.81	-7.51	48.32	74.00	-25.68	Peak Detector
2	2390.000	37.45	-7.34	30.11	54.00	-23.89	Ave Detector
	2390.000	47.71	-7.34	55.05	74.00	-18.95	Peak Detector
3	2400.000	38.06	-7.31	30.75	54.00	-23.25	Ave Detector
	2400.000	45.79	-7.31	53.21	74.00	-20.79	Peak Detector
4	2405.200	91.91	-7.30	84.61			Ave Detector

Highest Bandedge



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2476.100	89.93	-7.14	82.79			Ave Detector
2	2483.500	36.43	-7.13	29.30	54.00	-24.70	Ave Detector
	2483.500	41.11	-7.13	48.24	74.00	-25.76	Peak Detector
3	2500.000	36.38	-7.08	29.30	54.00	-24.70	Ave Detector
	2500.000	39.18	-7.08	48.26	74.00	-25.74	Peak Detector

***** END OF REPORT *****