

CFR 47 FCC Part 15.249

TEST REPORT

Product : **VersaPoint Wireless Keyboard**

Trade Name : N/A

Model Number : VP632X

FCC ID : RAC4571B01

Prepared for

PRECISION SQUARED TECHNOLOGY CORPORATION

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Remark :

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The test results in the report only to the tested sample.

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Statement of Compliance

Applicant: PRECISION SQUARED TECHNOLOGY CORPORATION

Manufacturer: UNION ASIAN LIMITED

Product: VersaPoint Wireless Keyboard

Model No.: VP632X

Tested Power Supply: DC 3V

Date of Final Test: Sep. 19, 2012

Revision of Report: Rev. 03

Configuration of Measurements and Standards Used :

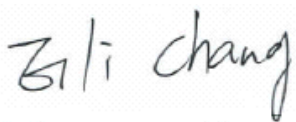
FCC Rules and Regulations Part 15 Subpart C

I HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in ANSI C63.4, and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

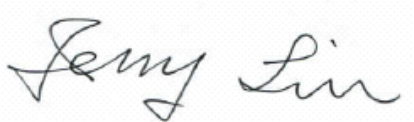
Note: 1. The result of the testing report relate only to the item tested.

2. The testing report shall not be reproduced expect in full, without the written approval of IETC

Report Issued: 2012/10/23

Project Engineer: 

Elli Chang

Approved: 

Jerry Liu

1 General Information

1.1 Description of Equipment Under Test

Product	: VersaPoint Wireless Keyboard
Model Number	: VP632X
Applicant	: PRECISION SQUARED TECHNOLOGY CORPORATION 5F-7, No.2, Jian 8th Rd., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)
Manufacturer	: UNION ASIAN LIMITED NO.40, Qing-Xi, San-Xing Industrial area, Dong Guan City, Guang Dong, China
Operating Frequency	: 2405MHz ~ 2470MHz
Channel Number	: Refer to section 1.2
Type of Modulation	: GFSK
Antenna description	: This device uses PCB Print antenna. The antenna is integral to the device, thereby meeting the requirement of FCC 15.203.
Date of Test	: Sep. 10 ~19, 2012
Additional Description	: 1. The model VP632X is representative selected in the test and included in this report. 2. The difference between all model included in this report is for different market; the rest parts are identical. 3. For more detail specification about EUT, please refer to the user's manual.

1.2 Table for Carrier Frequencies

CH No.	1	2	3	4	5	6	7	8	9	10	11
CF (MHz)	2405	2408	2411	2432	2435	2439	2441	2462	2465	2468	2470

1.3 Details of Tested Supporting System

1.3.1 Personal Computer

PC31

Model Number : SGH017PFWL
CPU Speed : Intel Core 2 Duo E5400
RAM : 2GB DDR3 1333MHz
EMC Compliance : CE, TUV, NCC, BSMI: R33275
Hard Disk Driver : 250GB Serial ATA2 3.0Gb/s 7200rpm
Manufacturer : HP
Switching Power Supply : LiteOn, PS-4321-9HP, 320W
Power Cord : Non-shielded, Detachable, 1.8m, w/o core

1.3.2 Monitor

MT28

Model Number : CMV 92GH 19"
Serial Number : 92GHAGCN9120288
EMC Compliance : FCC, CE, BSMI: R31374, UL, TUV
Manufacturer : CHIMEI
Power Cord : Non-shielded, Detachable, 1.8m, w/o core
D-Sub cable : Shielded, Detachable, 1.8 m, with core

1.3.3 Mouse

USB62

Model Number : M-U0028
Serial Number : N/A
EMC Compliance : FCC, CE, BSMI T41126, VCCI
Manufacturer : LOGITECH
Data Cable : Non-shielded, Un-detachable, 1.8m

1.3.4 Printer

PR04

Model Number : C20SX
Serial Number : DW4Y038113
EMC Compliance : BSMI 3902E004
Manufacturer : EPSON
Data Cable : Shielded, Detachable, 1.8m
Power Cord : Non-shielded, Un-detachable, 1.8m

1.3.5 Dongle

Model Number : VP6496R
Manufacturer : Smklink
Product Information : FCC ID: IE3VP64XXR06

1.3.6 Test Cable

USB Cable : Non-shielded, Detachable, 1.5m, w/o core

1.4 Test Facility

- Site Description** : ☑Conduction 1 ☑OATS 2
- Name of Firm** : Interocean EMC Technology Corp.
- Company web** : <http://www.ietc.com.tw>
- Site 1, 2, 3 Location** : No.5-2, Lin 1, Tin-Fu Tsun, Lin-Kou Hsiang,
Taipei County, Taiwan, R.O.C.
- Site Filing** :
- Federal Communication Commissions – USA
Registration No.: 96399 (OATS 1 & 2)
Registration No.: 518958 (OATS 3)
Designation No.: TW1020
 - Voluntary Control Council for Interference by Information
Technology Equipment (VCCI) – Japan
Member No.: 1349
Registration No. (Conducted Room): C-1094
Registration No. (Conducted Room): T-1562
Registration No. (OATS 1): R-1040; G-274
Registration No. (OATS 2): R-1041
 - Industry Canada (IC)
OUR FILE: 46405-4437 Submission: 145171
Registration No. (OATS 1): Site# 4437A-1
Registration No. (OATS 2): Site# 4437A-2
Registration No. (OATS 3): Site# 4437A-3
- Site Accreditation** :
- Bureau of Standards and Metrology and Inspection (BSMI) –
Taiwan, R.O.C.
Accreditation No.:
SL2-IN-E-0026 for CNS13438 / CISPR22
SL2-R1-E-0026 for CNS13439 / CISPR13
SL2-R2-E-0026 for CNS13439 / CISPR13
SL2-A1-E-0026 for CNS13783-1 / CISPR14-1
SL2-L1-E-0026 for CNS 14115 / CISPR 15
 - Taiwan Accreditation Foundation (TAF)
Accreditation No.: 1113
 - TÜV NORD
Certificate No: TNTW0801R-04



1.5 Test Equipment

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSP40	100478	2013/05/29
Preamplifier	Agilent	8449B	3008A01434	2013/05/02
Preamplifier	Agilent	83050A	3950A00225	2012/09/07
Horn Antenna	COM-POWER	AH-118	10081	2014/05/29
Horn Antenna	Schwarzbeck	BBHA 9120	9120D-583	2013/05/01
Horn Antenna	Schwarzbeck	BBHA 9170	213	2014/07/24
Wide Bandwidth Sensor	Anritsu	MA2491A	728133	2013/12/27
Power Meter	Anritsu	ML2495A	736010	2013/12/27
Temp & Humidity chamber	GIAN FORCE	GTH-150-40-2P-U	MAA0305-012	2013/05/24
Cable	HARBOUR	27478LL142	CBL22	2012/09/28
Cable	EM Electronics	CBL29	CBL29	2012/09/28
EMI Test Receiver	R&S	ESCS 30	830245/027	2012/10/05
RF Cable	HARBOUR	RG58/U	CBL40	2012/11/09
L.I.S.N.	Schwarzbeck	NNLK8121	8121417	2013/08/07
L.I.S.N.	R&S	ESH3-Z5	100176	2013/07/29
EMI Test Receiver	R&S	ESCI	100836	2013/08/08
Biconical Antenna	Schwarzbeck	BBA 9106	VHA 9103-2419	2013/03/28
Log Antenna	Schwarzbeck	UHALP 9108 A	0739	2013/03/28
Pre-Amplifier	SCHAFFNER	CPA9231A	3351	2013/01/17
RF Cable	IETC	8DFB	CBL14	2013/07/12

Note: The above equipments are within the valid calibration period.

1.6 Summary of Measurement

Report Clause	Test Parameter	Reference Document CFR47 Part15	Results
2	20dB Bandwidth test	§15.215	Pass
3	RF Radiated spurious emission test	§15.249(a)(c)(d)	Pass
4	Emission on the Band Edge	§15.249(d)	Pass
5	AC Power Line Conducted Emission test	§15.207	Pass

1.7 Justification

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of the frequency band were all arrive limit requirement, thus we evaluate the EUT pass the specified test.

1.8 Test Step of EUT

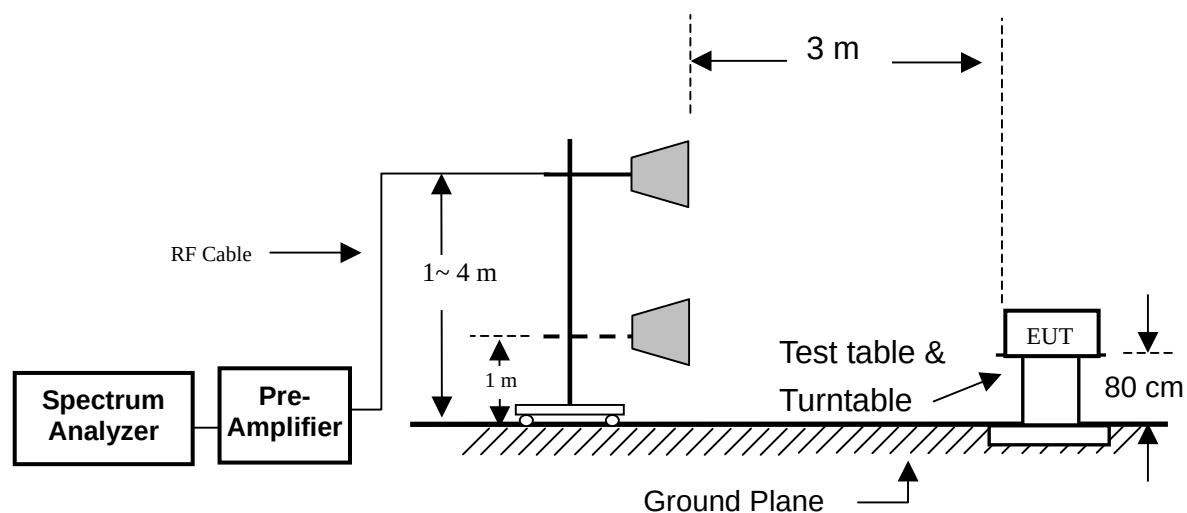
- 1.8.1 Link the test fixture to PC (USB Connector).
- 1.8.2 Keep pressing Enter button on EUT, put in the battery, turn on the EUT power, and release the Enter button.
- 1.8.3 Use of test fixture paired with EUT, and EUT will do continuous emission when pairing is work.
- 1.8.4 Use of test fixture switching to the low, medium, and high test mode.
- 1.8.5 Executed the test.

2 20dB Bandwidth test

2.1 Limit

According to FCC 15.215 requirement, there was no regulation limit and for reference purpose.

2.2 Configuration of Measurement



2.3 Test Procedure

The 20dB bandwidth per FCC §15.215 was measured using spectrum analyzer with the resolutions bandwidth set at 100 kHz, the video bandwidth $\geq$ RBW, and the SPAN may equal to approximately 2 to 3 time the 20dB bandwidth.

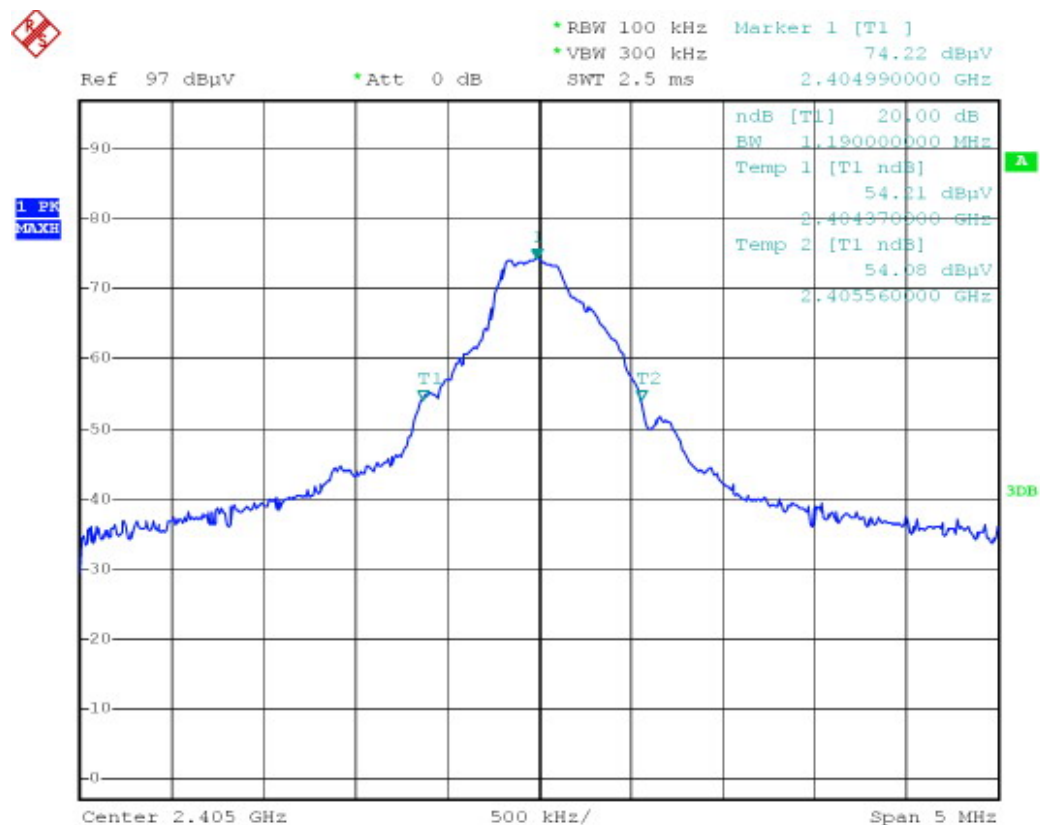
2.4 Test Result

PASS.

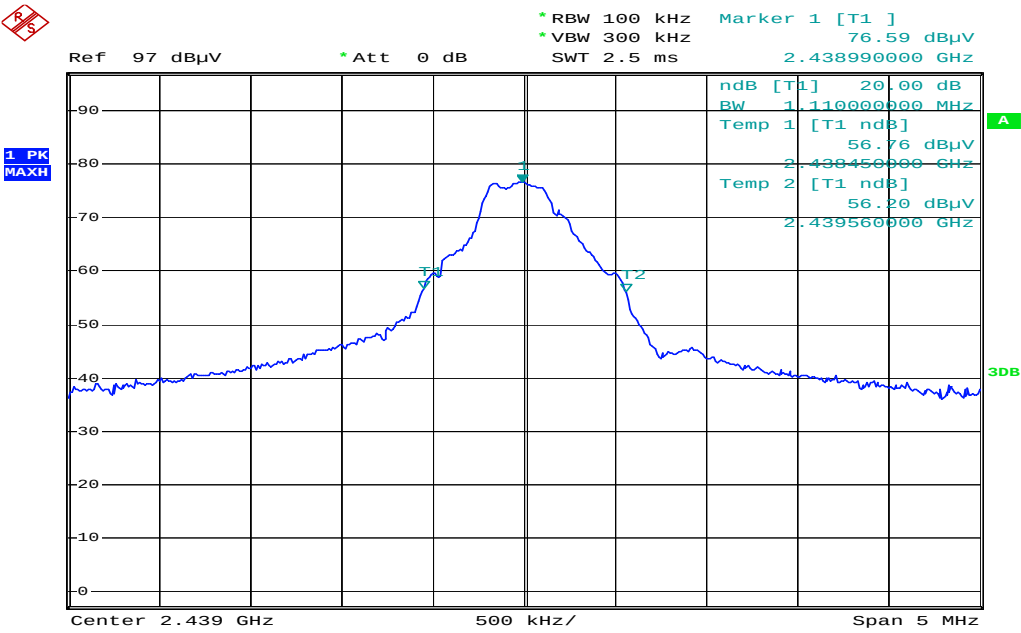
The final test data is shown as following pages.

Test CH		20dB Bandwidth (MHz)
Modulation	Frq. (MHz)	
GFSK	2405	1.190
	2439	1.110
	2470	1.120

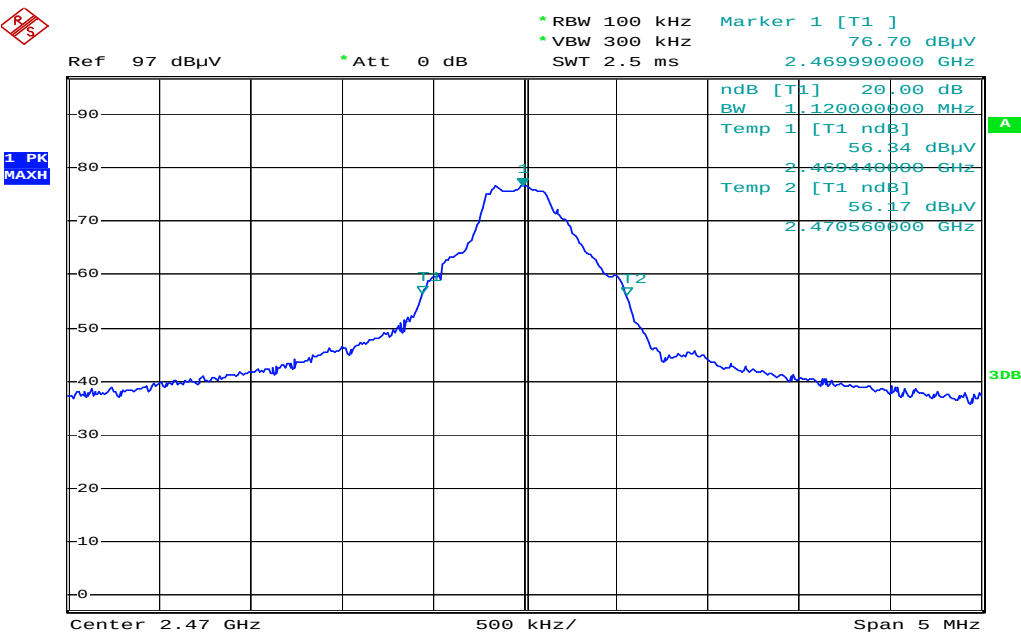
2405MHz 20dB BW



2439MHz 20dB BW



2470MHz 20dB BW



3 RF Radiated spurious emission test

3.1 Limit

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

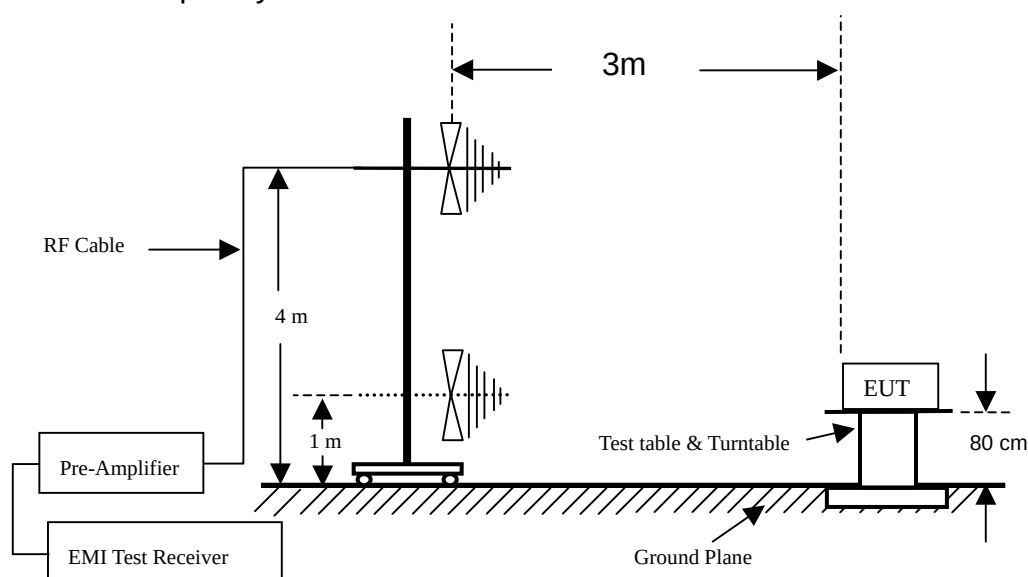
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

For intentional radiator, the radiated emission shall comply with §15.209(a).

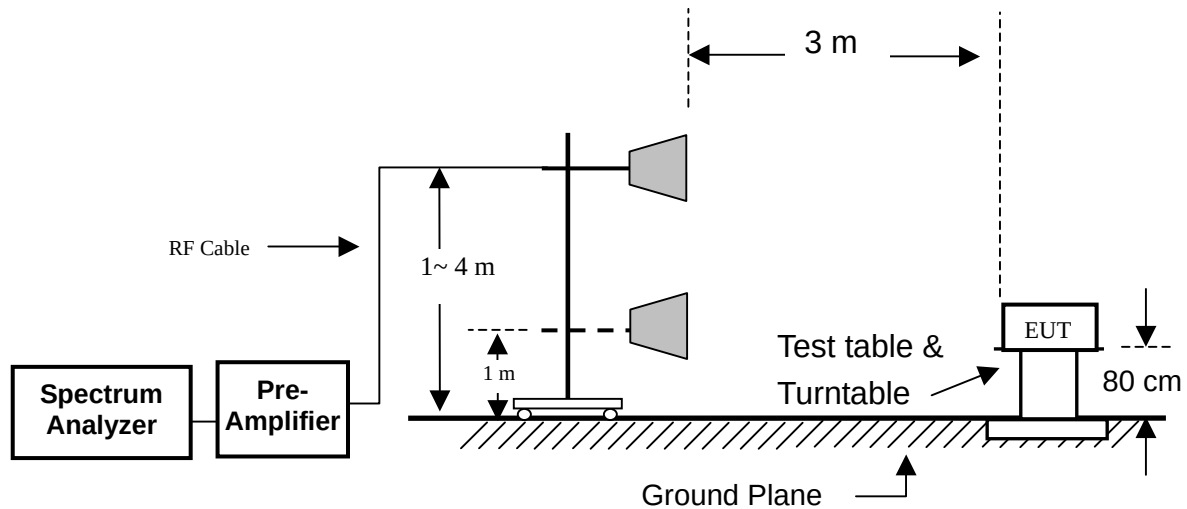
Frequency (MHz)	Field strength dB(μ V/m)	Measurement distance (meters)
1.705~30.0	29.5	30
30 ~ 88	40	3
88~216	43.5	3
216~960	46	3
Above 960	54	3

3.2 Configuration of Measurement

Measurement Frequency under 1GHz



Measurement Frequency above 1GHz



3.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003.

Radiated emission measurements were performed from 30MHz to 25GHz. Spectrum Analyzer set as below: For frequency range from 30MHz to 1GHz: RBW=100kHz or greater. For frequencies above 1GHz: set RBW=VBW=1MHz for peak detector and RBW=1MHz, VBW=10Hz for average detector.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meter and down to 1 meter.

3.4 The description of operation mode

Setup EUT to continuously transmit signal with 100% duty cycle during the test period.

3.5 Test Result

PASS.

The final test data is shown on as following pages.

Radiated spurious emission

Fundamental Emissions

Low channel								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamplifier (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
2405	H	61.05	0.00	31.78	92.83	94	-1.17	PK
2405	V	62.11	0.00	31.78	93.89	94	-0.11	PK

Middle channel								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamplifier (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
2439	H	61.09	0.00	31.91	93.00	94	-1.00	PK
2439	V	61.72	0.00	31.91	93.63	94	-0.37	PK

High channel								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamplifier (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
2470	H	61.01	0.00	32.03	93.04	94	-0.96	PK
2470	V	61.17	0.00	32.03	93.20	94	-0.80	PK

Remark :

1. Corrected Level = Reading – Preamplifier + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss

Radiated spurious emission

Test Environment

Ambient temperature : 27.2°C

Relative humidity : 50%

Radiated Emission below 1GHz

After verifying low, middle and high channel (2405MHz, 2439MHz and 2470MHz), the worse case was found at low channel, the data will present on report.

Worst case: Low channel								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamplifier (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
118.950	H	42.15	29.82	14.26	26.59	43.52	-16.93	QP
163.670	H	41.67	30.09	17.51	29.09	43.52	-14.43	QP
208.390	H	38.99	29.97	19.91	28.93	43.52	-14.59	QP
260.500	H	39.48	30.04	21.57	31.01	46.02	-15.01	QP
305.050	H	42.00	29.80	17.77	29.97	46.02	-16.05	QP
381.430	H	40.02	29.45	20.20	30.77	46.02	-15.25	QP
68.290	V	47.96	30.42	7.69	25.23	40.00	-14.77	QP
138.520	V	41.99	29.99	16.99	28.99	43.52	-14.53	QP
186.420	V	38.59	29.76	19.57	28.40	43.52	-15.12	QP
246.360	V	37.28	30.03	21.23	28.48	46.02	-17.54	QP
263.290	V	40.88	30.05	21.80	32.63	46.02	-13.39	QP
330.750	V	40.72	29.71	18.13	29.14	46.02	-16.88	QP

Remark : Corrected Level = Reading + Correction Factor – Preamplifier

Correction Factor = Antenna Factor + Cable Loss

The present spurious only show those points are above noise level and the frequency range test from 30MHz to 1GHz.

Radiated spurious emission

Radiated Emission above 1GHz

Low Channel								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamplifier (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
4810	H	38.06	27.43	37.21	47.84	54	-6.16	PK
7215	H	35.58	26.89	42.95	51.64	54	-2.36	PK
*9620	H	32.95	26.34	46.53	53.14	54	-0.86	PK
4810	V	39.86	27.43	37.21	49.64	54	-4.36	PK
7215	V	36.59	26.89	42.95	52.65	54	-1.35	PK
*9620	V	33.17	26.34	46.53	53.36	54	-0.64	PK

Middle Channel								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamplifier (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
4878	H	37.49	27.45	37.38	47.42	54	-6.58	PK
7317	H	35.57	26.90	43.27	51.94	54	-2.06	PK
*9756	H	32.67	26.32	46.88	53.23	54	-0.77	PK
4878	V	39.60	27.45	37.38	49.53	54	-4.47	PK
7317	V	35.81	26.90	43.27	52.18	54	-1.82	PK
*9756	V	32.78	26.32	46.88	53.34	54	-0.66	PK

High Channel								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamplifier (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
4940	H	37.46	27.48	37.53	47.51	54	-6.49	PK
7410	H	35.17	26.92	43.55	51.80	54	-2.20	PK
*9880	H	32.51	26.31	47.20	53.40	54	-0.60	PK
4940	V	38.88	27.48	37.53	48.93	54	-5.07	PK
7410	V	36.49	26.92	43.55	53.12	54	-0.88	PK
*9880	V	32.47	26.31	47.20	53.36	54	-0.64	PK

Remark : Corrected Level = Reading + Correction Factor – Preamp

Correction Factor = Antenna Factor + Cable Loss

* Mark indicated background noise level.

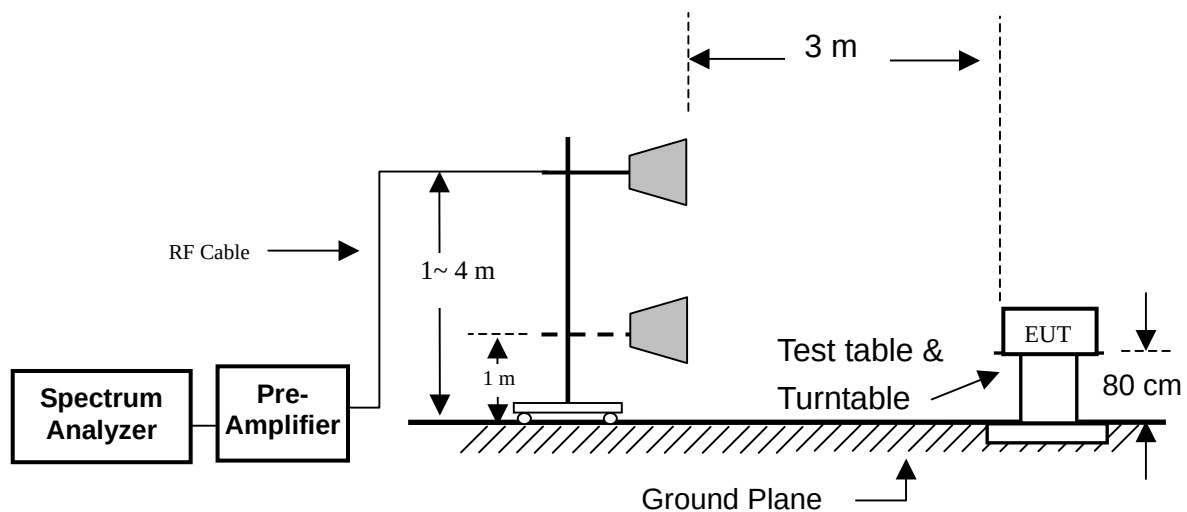
4 Emission on the Band Edge test

4.1 Limit

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.

4.2 Configuration of Measurement

Measurement Frequency above 1GHz



4.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003.

Set RBW =1M, VBW= RBW for peak, and VBW=10Hz for average.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meter and down to 1 meter.

4.4 Test Result

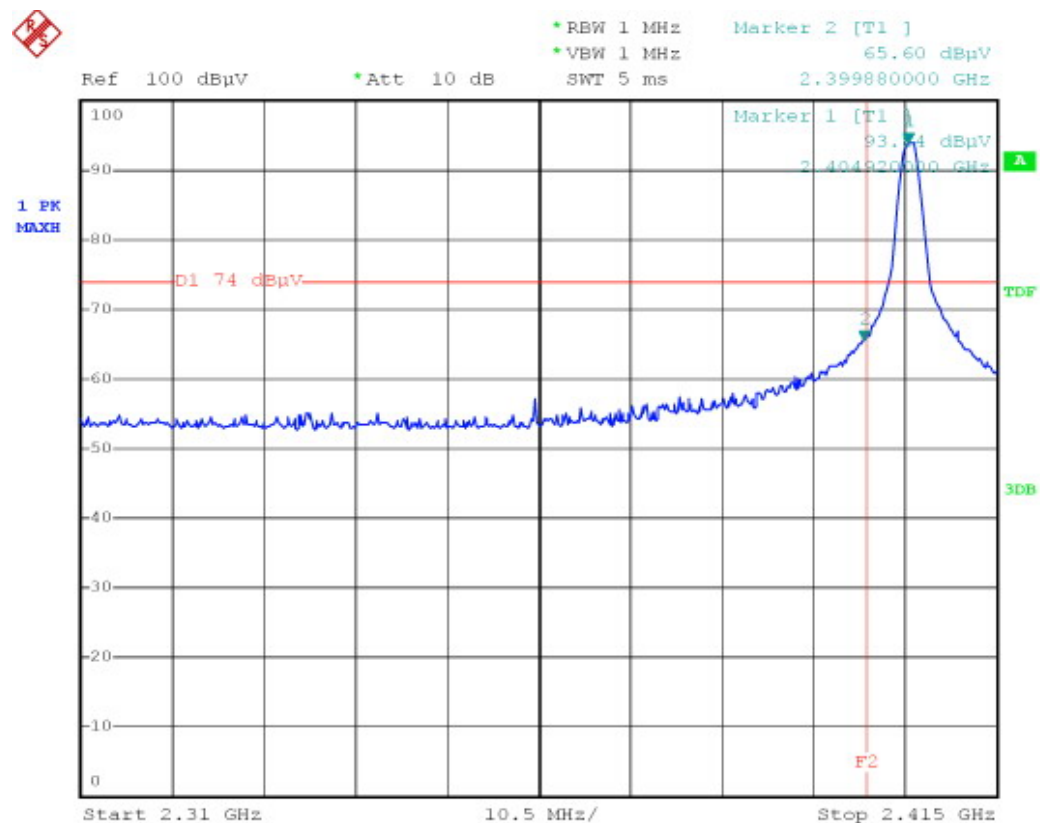
PASS.

The final test data is shown on as following pages.

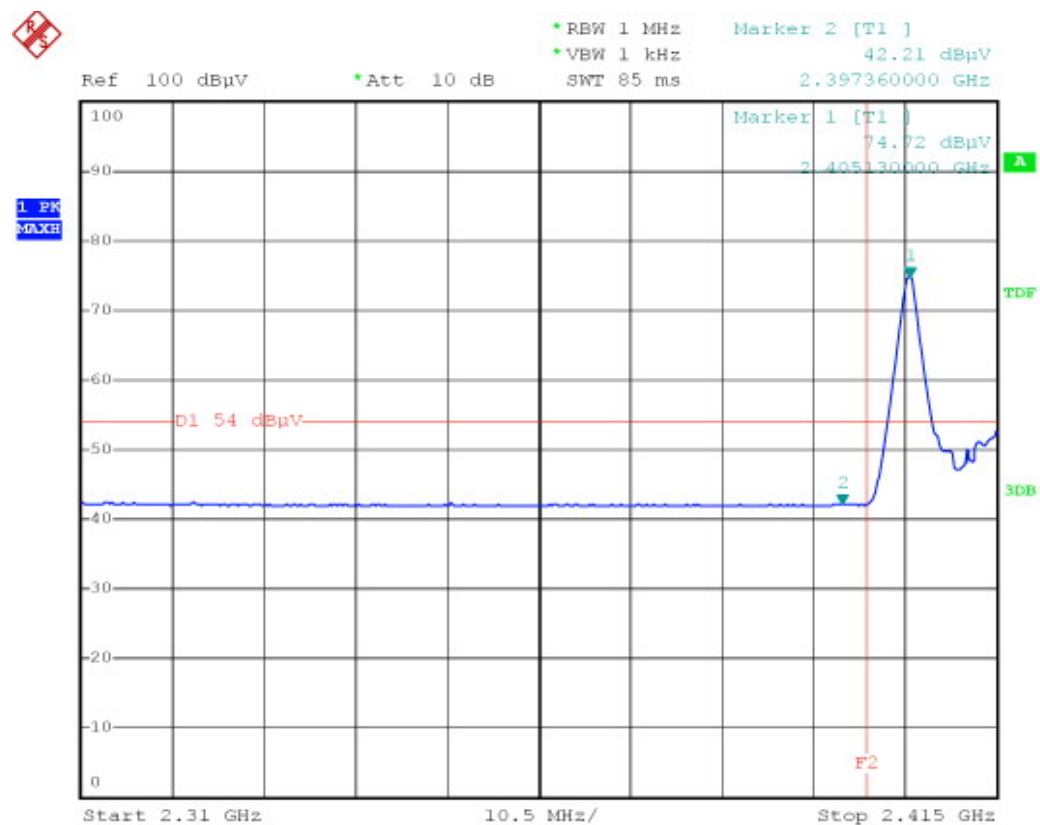
Band edge

Frequency	Restrict Freq. Band (MHz)	Maximum level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector Mode
2405	2310~2400	65.60	74	-8.4	PK
2405	2310~2400	42.21	54	-11.79	AV
2470	2483.5~2500	57.58	74	-16.42	PK
2470	2483.5~2500	41.75	54	-12.25	AV

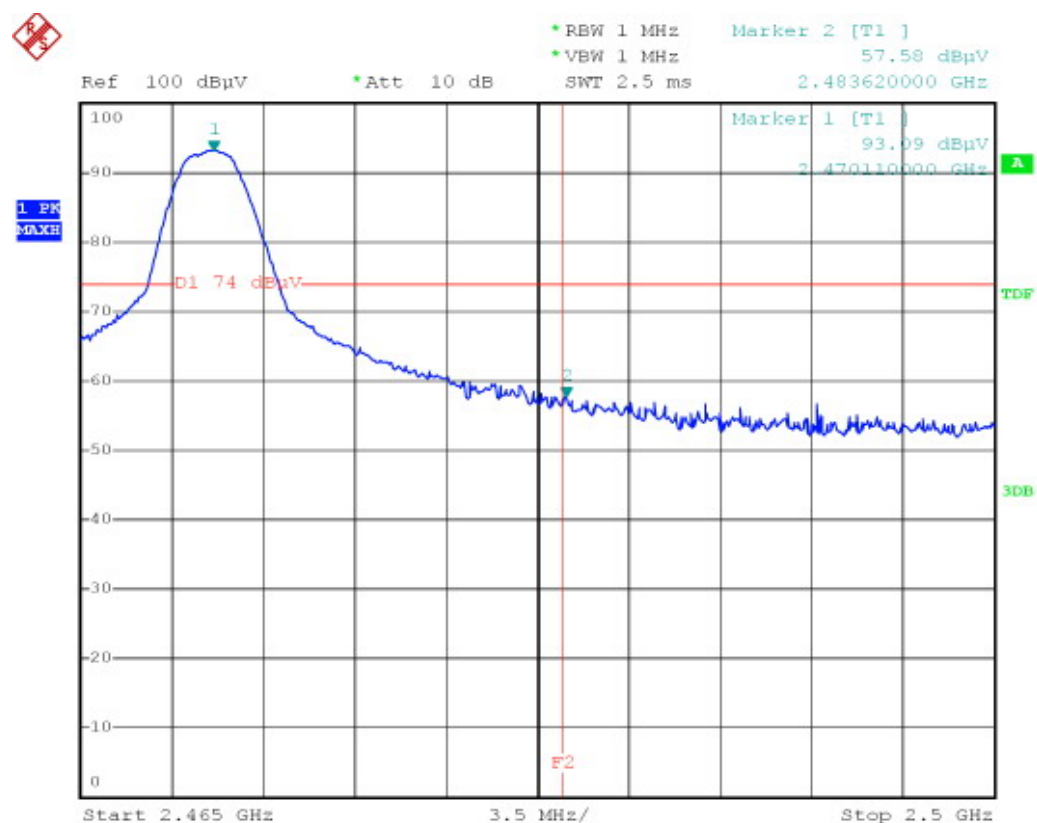
2405MHz PK



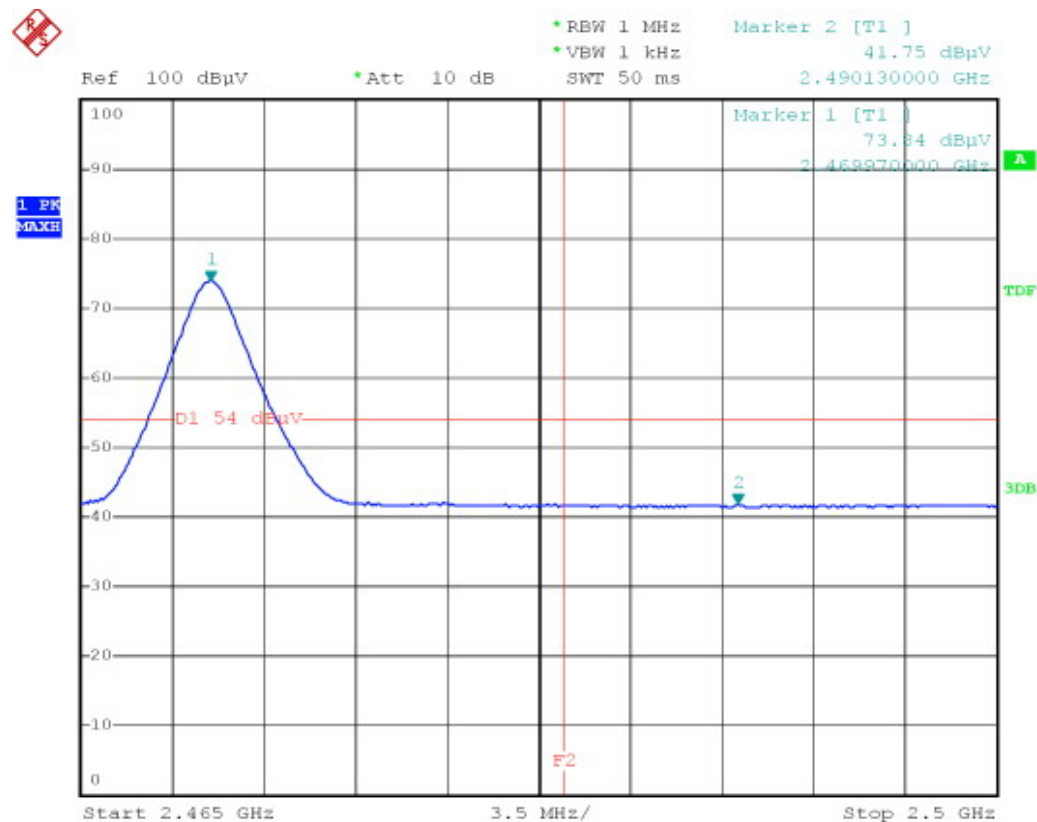
2405MHz AV



2470MHz PK



2470MHz AV



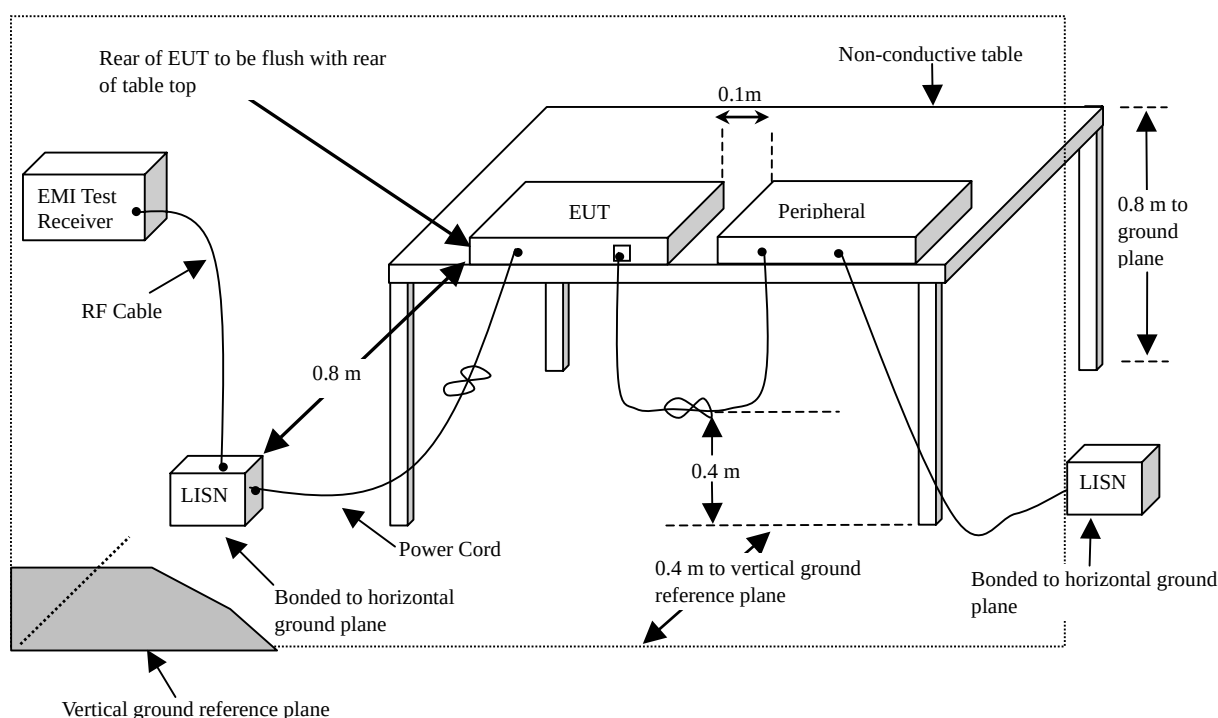
5 AC Power Line Conducted Emission test

5.1 Limits

Frequency (MHz)	Quasi-Peak (dB μ V)	Average (dB μ V)
0.15 to 0.5	66 to 56	56 to 46
> 0.5 to 5	56	46
> 5 to 30	60	50

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

5.2 Configuration of Measurement



5.3 Test Procedures

- 1) The EUT was placed 80cm height above ground on a non-conductive table and vertical conducting plane located 40cm to the rear of the EUT.
- 2) The EUT was connected to the main power through Line Impedance Stabilization Networks (LISN). This setup provided a 50ohm/50mH coupling impedance for the measuring equipment. The auxiliary equipment will place in secondary LISN.
- 3) Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement.

5.4 Test Result

PASS.

The final test data is shown as following pages.

Power Line Conducted Test Data

EUT: VersaPoint Wireless Keyboard

CLIENT: PRECISION

MODEL: VP632X

RATING: From PC

Temperature: 25.1 °C

Humidity: 55 %

POLARITY: Line

DISTANCE:

Serial No.:

FILE/DATA#: PRECISION.emi/16

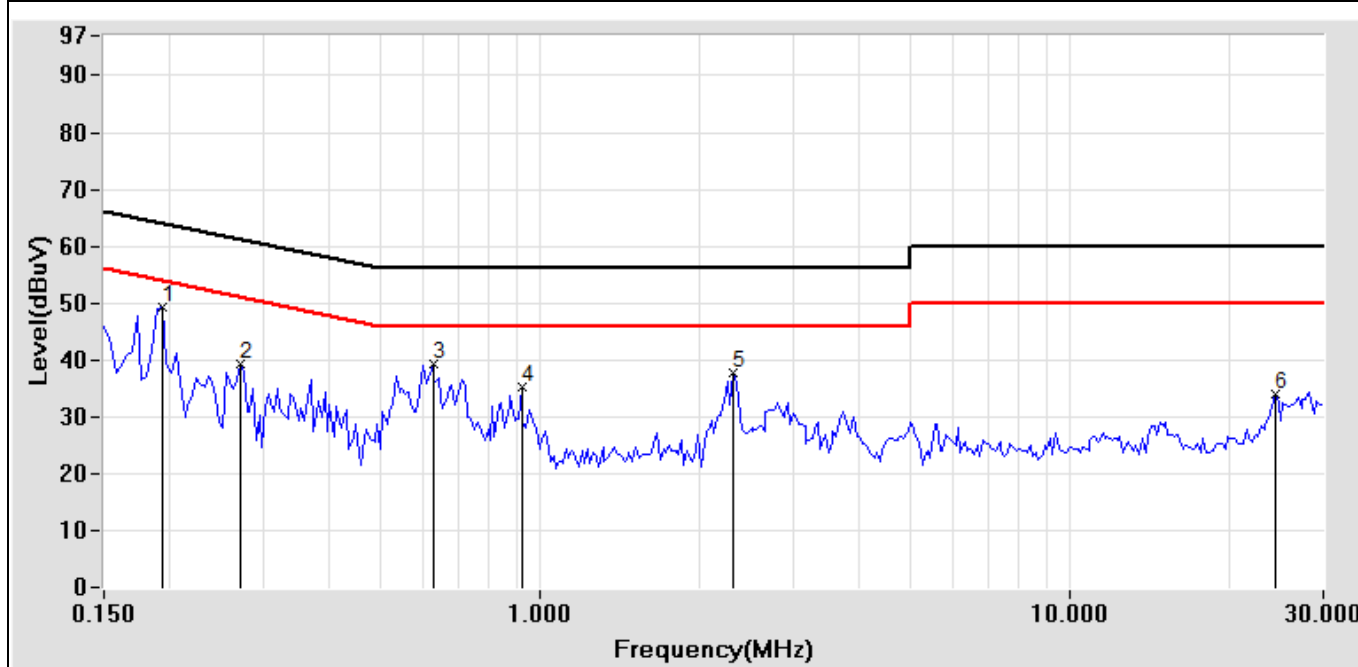
OPERATOR: Elli

TEST SITE: Conduction 1

Frequency (MHz)	Factor (dB)	Meter Reading (dBμV)		Emission Level (dBμV)		Limits (dBμV)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.193	0.23	47.19	41.15	47.42	41.38	63.91	53.91	-16.49	-12.53
0.271	0.23	36.26	31.99	36.49	32.22	61.09	51.09	-24.60	-18.87
0.627	0.24	35.66	29.84	35.90	30.08	56.00	46.00	-20.10	-15.92
0.920	0.25	29.47	24.37	29.72	24.62	56.00	46.00	-26.28	-21.38
2.302	0.20	34.54	28.78	34.74	28.98	56.00	46.00	-21.26	-17.02
24.275	1.35	26.58	16.65	27.93	18.00	60.00	50.00	-32.07	-32.00

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



Test Mode: Working Mode

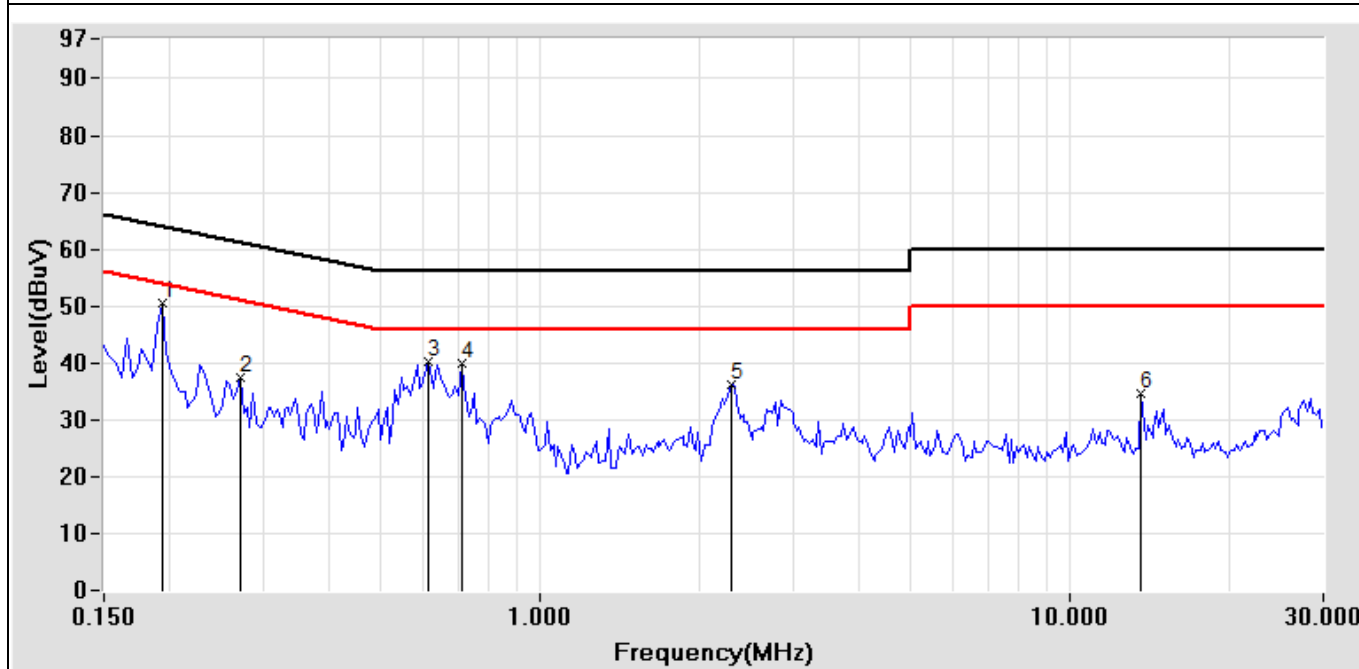
Power Line Conducted Test Data

EUT: VersaPoint Wireless Keyboard	POLARITY: Neutral
CLIENT: PRECISION	DISTANCE:
MODEL: VP632X	Serial No.:
RATING: From PC	FILE/DATA#: PRECISION.emi/17
Temperature: 25.1 °C	OPERATOR: Elli
Humidity: 55 %	TEST SITE: Conduction1

Frequency (MHz)	Factor (dB)	Meter Reading (dBμV)		Emission Level (dBμV)		Limits (dBμV)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.193	0.25	47.29	41.90	47.54	42.15	63.91	53.91	-16.37	-11.76
0.271	0.25	35.12	29.99	35.37	30.24	61.09	51.09	-25.72	-20.85
0.615	0.27	37.39	31.26	37.66	31.53	56.00	46.00	-18.34	-14.47
0.709	0.27	36.16	28.76	36.43	29.03	56.00	46.00	-19.57	-16.97
2.287	0.24	31.63	26.07	31.87	26.31	56.00	46.00	-24.13	-19.69
13.560	0.77	38.43	23.24	39.20	24.01	60.00	50.00	-20.80	-25.99

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



Test Mode: Working Mode