

FCC PART 15B TEST REPORT

For

X-Z LAB, INC.

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FCC ID: 2AC7P-113

Report Type: Original Report	Product Type: Router
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TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST FACILITY	3
SYSTEM TEST CONFIGURATION.....	4
JUSTIFICATION	4
EUT EXERCISE SOFTWARE	4
EQUIPMENT MODIFICATIONS	4
SUPPORT EQUIPMENT LIST AND DETAILS	4
EXTERNAL I/O CABLE.....	4
BLOCK DIAGRAM OF TEST SETUP	5
SUMMARY OF TEST RESULTS	6
FCC §15.107 – AC LINE CONDUCTED EMISSIONS	7
MEASUREMENT UNCERTAINTY	7
EUT SETUP	7
EMI TEST RECEIVER SETUP.....	8
TEST EQUIPMENT LIST AND DETAILS.....	8
TEST PROCEDURE	8
CORRECTED AMPLITUDE & MARGIN CALCULATION	8
TEST RESULTS SUMMARY	9
TEST DATA	9
FCC §15.109 - RADIATED EMISSIONS	12
MEASUREMENT UNCERTAINTY	12
EUT SETUP	12
EMI TEST RECEIVER SETUP.....	13
TEST PROCEDURE	13
TEST EQUIPMENT LIST AND DETAILS.....	13
CORRECTED AMPLITUDE & MARGIN CALCULATION	13
TEST RESULTS SUMMARY	14
TEST DATA	14

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *X-Z LAB, INC.*'s product, model *IoT-Cloud* (FCC ID: 2AC7P-113) (or the "EUT") in this report is a Router, named *IoT-Cloud* by applicant, which was measured approximately: 14.0cm (L) x 12.0cm (W) x 3.0cm (H), rated input voltage: DC 5.0V from adapter. The highest operating frequency is 72 MHz.

Adapter information: Ktec
Model: KSAS0120500200HU
Input: AC 100-240V, 50/60Hz, 0.4A
Output: DC 5.0V, 2.0A

** All measurement and test data in this report was gathered from production sample serial number: 141023051 (Assigned by BACL, Dongguan). The EUT was received on 2014-10-24.*

Objective

This report is prepared on behalf of *X-Z LAB, INC.* in accordance with Part 2, Subpart J, Part 15, Subparts A and B of the Federal Communications Commission's rules.

The objective of the manufacturer is to determine compliance with FCC Part 15B, Class B.

Related Submittal(s)/Grant(s)

No related grant(s).

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communications Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

EUT Exercise Software

No exercise software was used.

Equipment Modifications

No modification was made to the EUT.

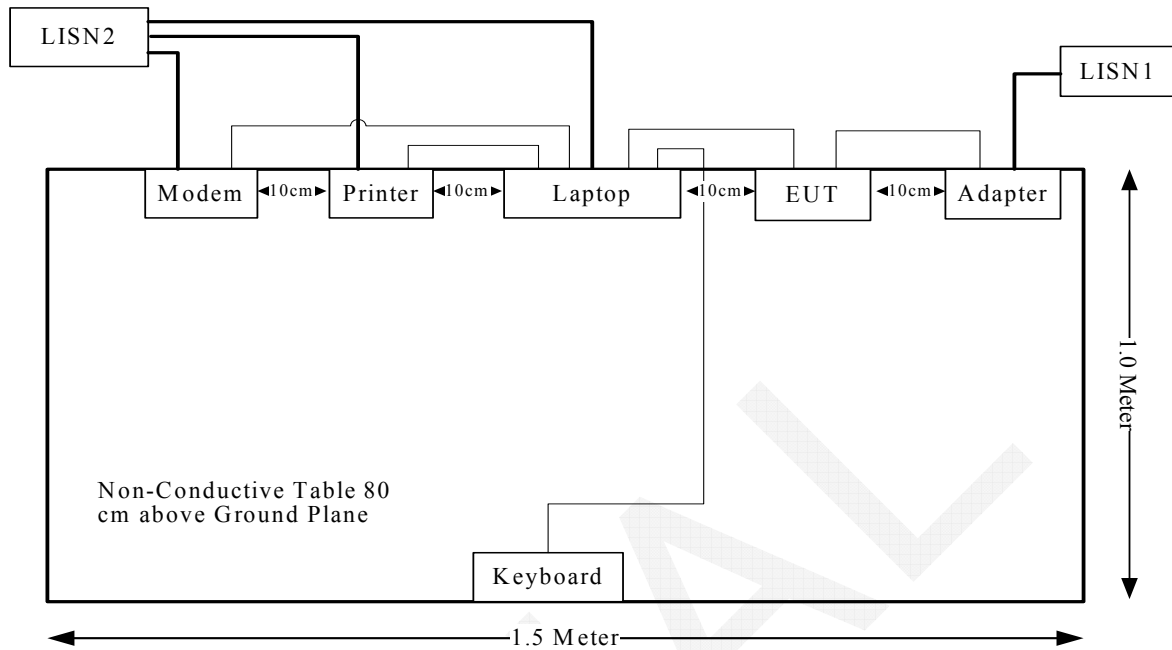
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
HP	Printer	C3941A	JPTVOB2337
DELL	Keyboard	L100	CNORH656658907BL05DC
SAST	Modem	AEM-2100	0293

External I/O Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Serial Cable	Yes	No	1.2	Serial Port of Laptop	Modem
Parallel Cable	Yes	No	1.2	Parallel Port of Laptop	Printer
Keyboard Cable	Yes	No	1.5	USB Port of Laptop	Keyboard
RJ45 Cable	Yes	No	1.0	RJ45 Port of Laptop	EUT
Adapter Output Cable	No	No	1.6	Adapter	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Emissions	Compliance

FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} of Table 1, then:

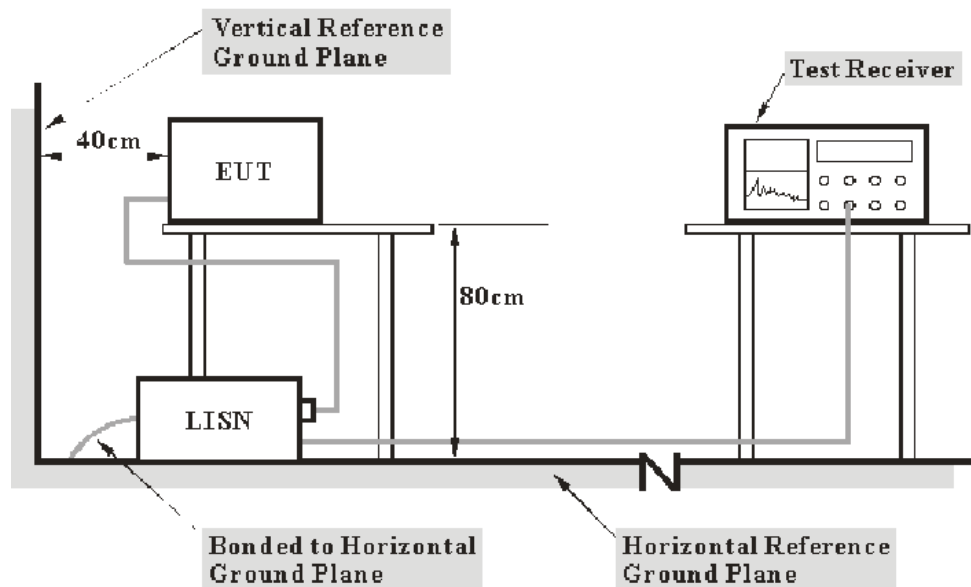
- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.46 dB (150 kHz to 30 MHz).

Table 1 – Values of U_{cispr}

Measurement	U_{cispr}
Conducted disturbance at mains port using AMN (150 kHz to 30 MHz)	3.4 dB

EUT Setup



- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.107 Class B limits.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2013-11-20	2014-11-20
R&S	L.I.S.N	ESH3-Z5	843331/015	N/A	N/A
R&S	Two-line V-network	ENV 216 (For EUT)	3560.6550.12	2014-01-22	2015-01-22
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the first LISN and the other support equipments were connected to the outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

V_C (cord. Reading): corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF: voltage division factor of AMN
C_f: Correction Factor

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15 B Class B, with the worst margin reading of:

10.5 dB at 0.255827MHz in the **Neutral** conducted mode

Test Data

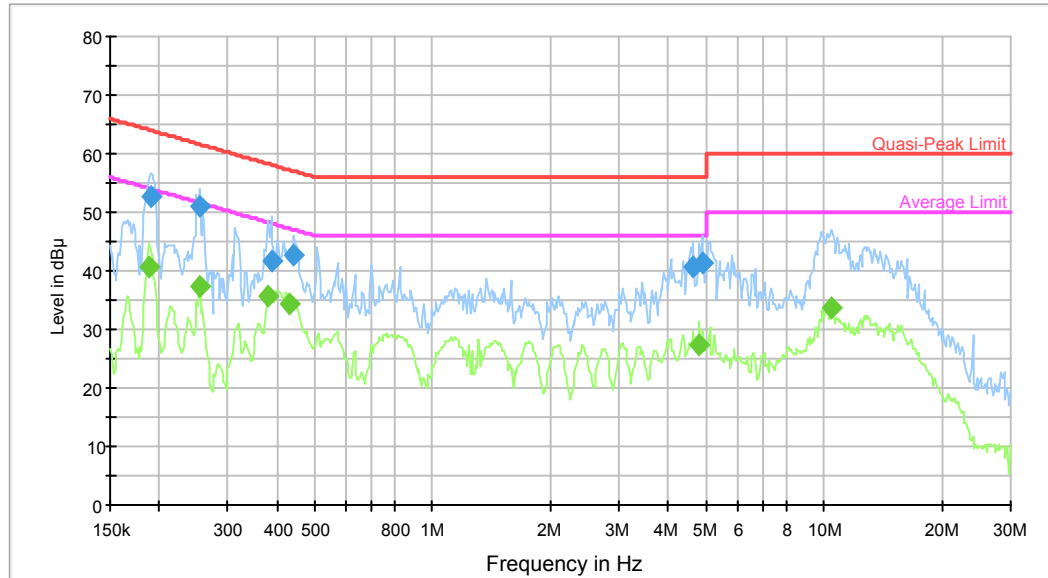
Environmental Conditions

Temperature:	26.7°C
Relative Humidity:	46%
ATM Pressure:	101.2 kPa

The testing was performed by Dean Liu on 2014-10-27

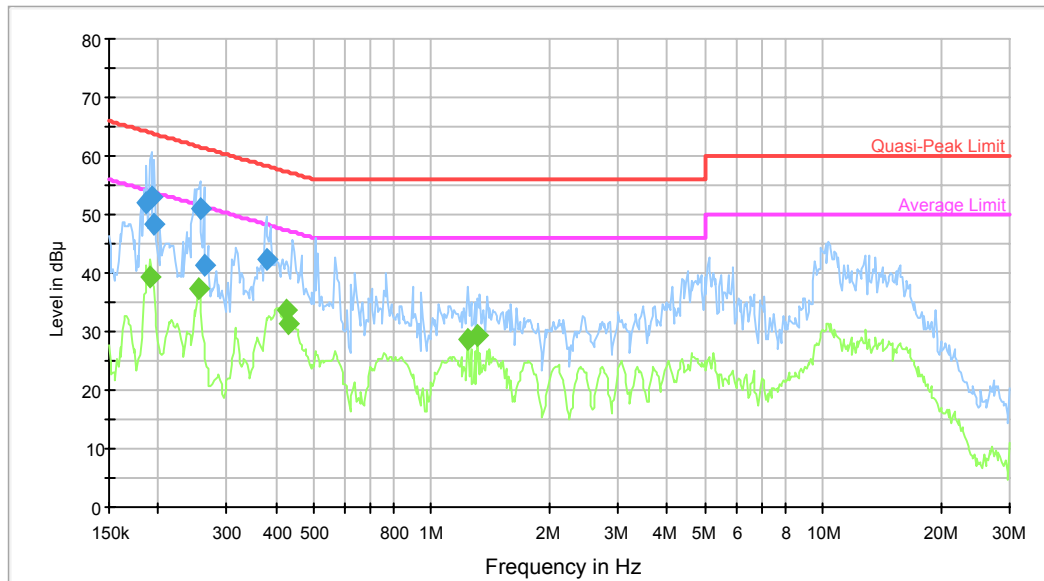
Test mode: Normal Link

AC 120V/60Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.190505	52.6	9.000	L1	10.6	11.4	64.0	Compliance
0.253797	50.9	9.000	L1	10.7	10.7	61.6	Compliance
0.387164	41.6	9.000	L1	10.6	16.5	58.1	Compliance
0.443327	42.5	9.000	L1	10.5	14.5	57.0	Compliance
4.651370	40.6	9.000	L1	10.7	15.4	56.0	Compliance
4.879149	41.3	9.000	L1	10.7	14.7	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.188994	40.7	9.000	L1	10.6	13.3	54.1	Compliance
0.253797	37.2	9.000	L1	10.7	14.4	51.6	Compliance
0.381043	35.6	9.000	L1	10.6	12.7	48.3	Compliance
0.432855	34.3	9.000	L1	10.5	12.9	47.2	Compliance
4.802010	27.5	9.000	L1	10.7	18.5	46.0	Compliance
10.484680	33.8	9.000	L1	10.6	16.2	50.0	Compliance

AC 120V/60Hz, Neutral:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.187494	51.8	9.000	N	11.1	12.3	64.1	Compliance
0.192030	52.9	9.000	N	11.2	11.0	63.9	Compliance
0.195114	48.4	9.000	N	11.2	15.5	63.8	Compliance
0.255827	51.1	9.000	N	11.2	10.5	61.6	Compliance
0.262017	41.2	9.000	N	11.2	20.2	61.4	Compliance
0.378019	42.3	9.000	N	10.9	16.0	58.3	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.190505	39.5	9.000	N	11.1	14.5	54.0	Compliance
0.253797	37.3	9.000	N	11.2	14.3	51.6	Compliance
0.426011	33.6	9.000	N	10.7	13.8	47.3	Compliance
0.432855	31.4	9.000	N	10.6	15.8	47.2	Compliance
1.239175	28.6	9.000	N	10.5	17.4	46.0	Compliance
1.310256	29.4	9.000	N	10.5	16.6	46.0	Compliance

FCC §15.109 - RADIATED EMISSIONS

Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cisp} of Table 2, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cisp} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:

30M~200MHz: 5.0 dB

200M~1GHz: 6.2 dB

1G~6GHz: 4.45 dB

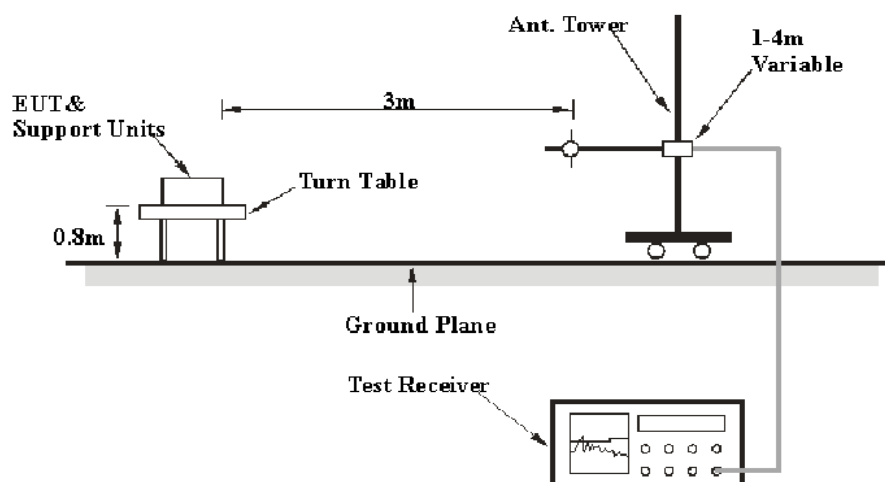
6G~18GHz: 5.23 dB

Table 2 – Values of U_{cisp}

Measurement	U_{cisp}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1 GHz:



The radiated emission tests was performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15.109, Class B limits.

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

The adapter connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

According to FCC 15.33 requirements, the system was measured from 30 MHz to 1GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	120 kHz	300 kHz	120kHz	QP

Test Procedure

For the radiated emissions test, the adapter was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The data was recorded in the Quasi-peak detection mode for below 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2014-05-09	2015-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Corrected Amplitude & Margin Calculation

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

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15 B Class B, with the worst margin reading of:

4.40 dB at 30.0000 MHz in the Vertical polarization

Test Data

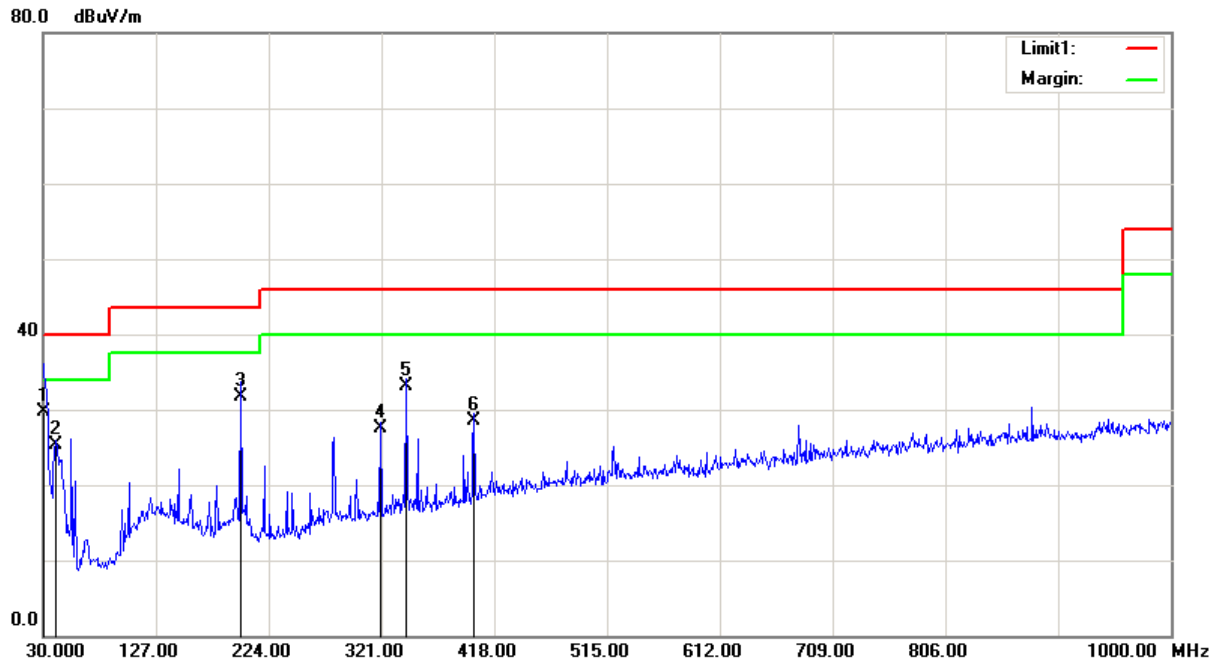
Environmental Conditions

Temperature:	26.2 °C
Relative Humidity:	54 %
ATM Pressure:	100.1 kPa

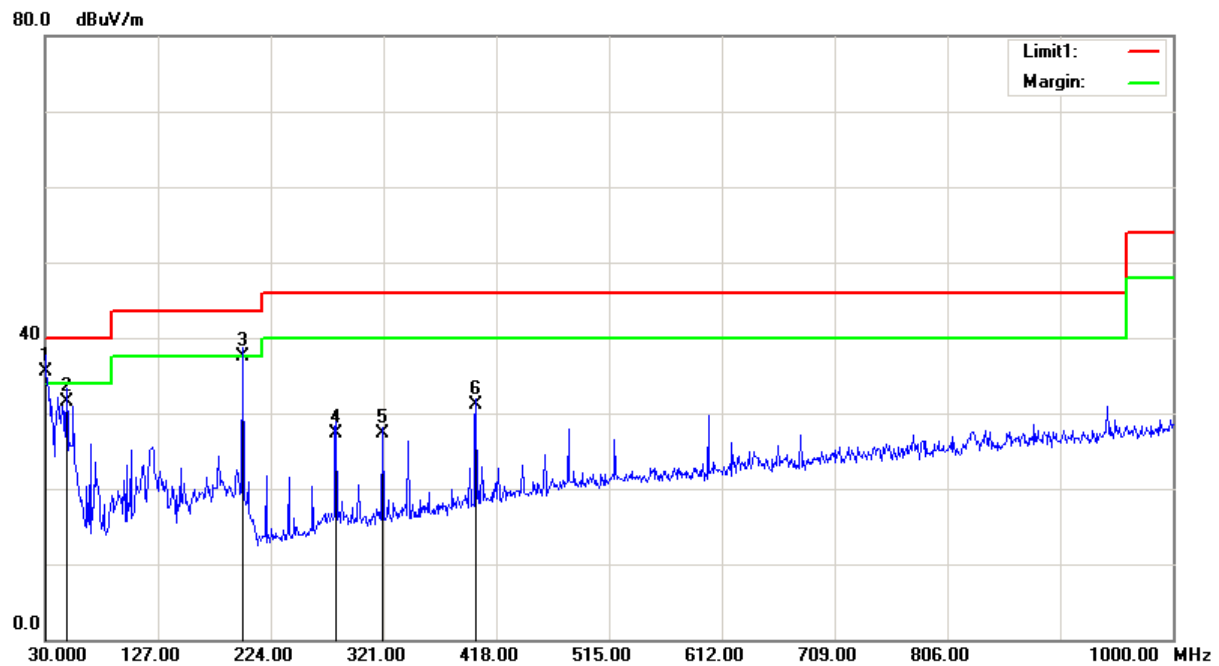
The testing was performed by Dean Liu on 2014-10-30

Test mode: Normal Link

Horizontal:



Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Correction Factor (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.0000	26.42	QP	3.38	29.80	40.00	10.20
40.6700	32.19	QP	-6.89	25.30	40.00	14.70
199.7500	38.97	QP	-7.17	31.80	43.50	11.70
320.0300	33.09	QP	-5.49	27.60	46.00	18.40
342.3400	38.35	QP	-5.25	33.10	46.00	12.90
400.5400	32.26	QP	-3.66	28.60	46.00	17.40

Vertical:

Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Correction Factor (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.0000	32.22	QP	3.38	35.60	40.00	4.40*
48.4300	43.02	QP	-11.42	31.60	40.00	8.40
199.7500	44.77	QP	-7.17	37.60	43.50	5.90
280.2600	33.29	QP	-5.99	27.30	46.00	18.70
320.0300	32.79	QP	-5.49	27.30	46.00	18.70
400.5400	34.76	QP	-3.66	31.10	46.00	14.90

*Within measurement uncertainty!

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