

# FCC PART 18 TEST REPORT

For

## Monitorling Limited

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**FCC ID: 2AGQD-HB45W**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Hibu Wireless Charging Base
<b>Test Engineer:</b> Star Xie	<i>Star Xie</i>
<b>Report Number:</b> RDG151030007-00	
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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *Monitorling Limited*'s product, model number: *HB45W (FCC ID: 2AGQD-HB45W)* or the "EUT" in this report is a *Hibu Wireless Charging Base*, which was measured approximately: 4.75 cm (L) x 4.75 cm (W) x 1.2 cm (H), the rated with input voltage: DC 5.0V from adapter. The highest operating frequency is 67 KHz.

*\*All measurement and test data in this report was gathered from production sample serial number: 151030007 (Assigned by BACL, Dongguan). The EUT supplied by the applicant was received on 2015-11-12*

### Objective

This report is prepared on behalf of *Monitorling Limited* in accordance with Part 2-Subpart J, and Part 18-Subparts A, B and C of the Federal Communications Commission's rules and regulations.

The objective of the manufacturer is to determine compliance with FCC Part 18 limits.

### Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2AGQD-HB45B.

### Test Methodology

All measurements contained in this report were conducted with MP-5, FCC Methods of Measurements of Radio Noise Emissions from ISM Equipment, February 1986. All measurements were performed at Bay Area Compliance Laboratory Corporation. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### 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 06, 2015.

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.

## OPERATING CONDITION/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.

### Special Accessories

No special accessory was used.

### Equipment Modifications

No modification was made to the EUT tested.

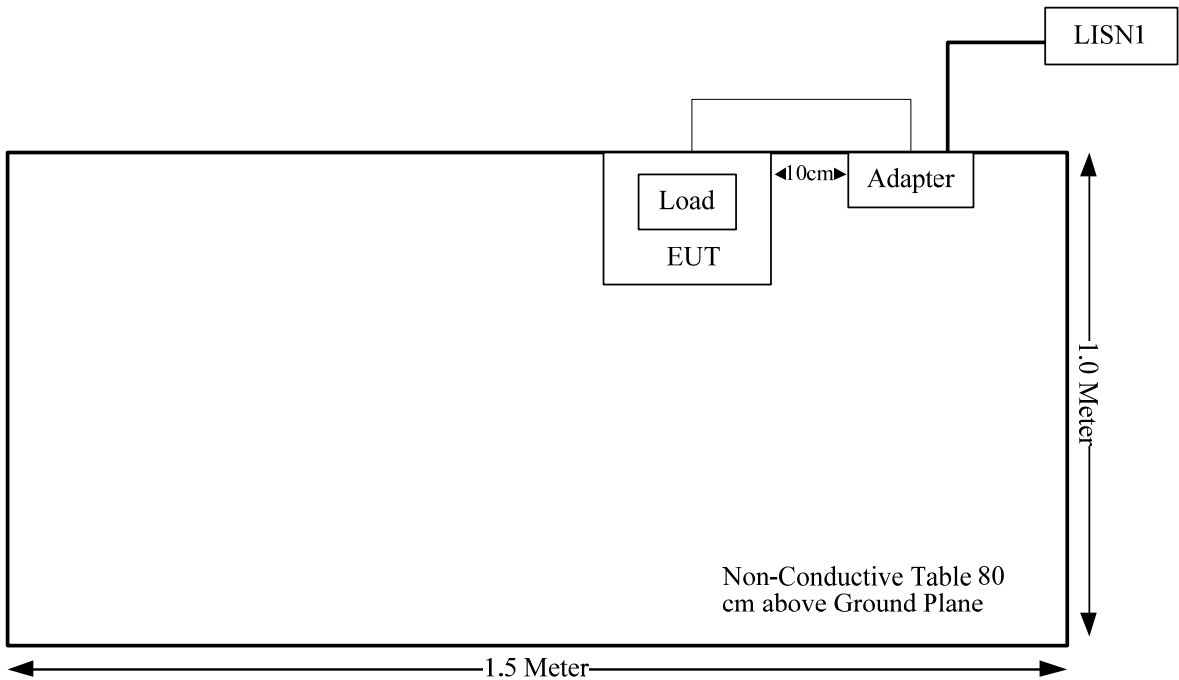
### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
N/A	Adapter	HNBC050100	N/A
Monitorlinq	Load	HB45B	N/A

### External Cable

Cable Description	Length (m)	From Port	To
Unshielded Undetachable USB Cable	1.5m	USB port of Adapter	EUT

Block Diagram of Test Setup



**SUMMARY OF TEST RESULT**

FCC Rules	Description of Test	Results
§18.307	AC Line Conducted Emissions	Compliance
§18.305	Field Strength	Compliance

## FCC §18.307 - AC LINE CONDUCTED EMISSIONS

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are Receiver, cable loss, and LISN.

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 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  $U_{cisp}$  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 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  $U_{cisp}$

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

### Applicable Standard

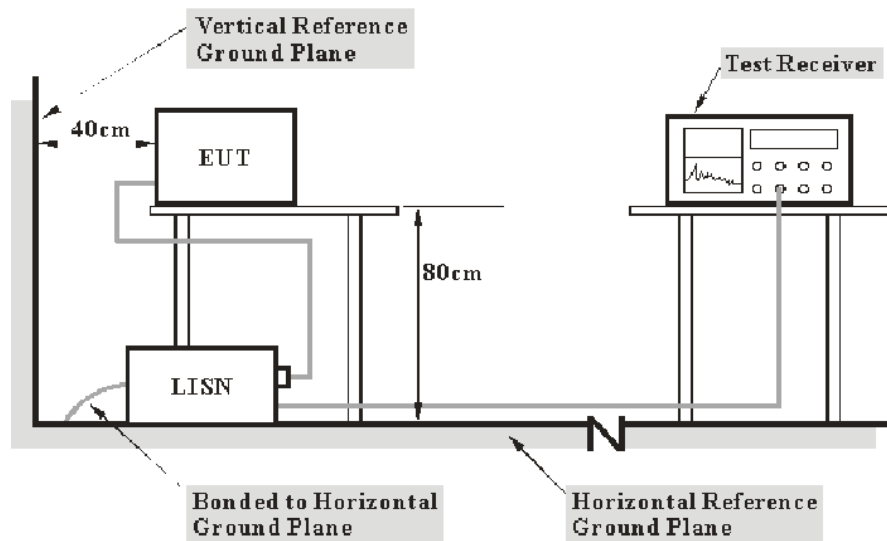
Conduction limits. For the following equipment, when designed to be connected to the public utility (AC) power line the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies shall not exceed the limits in the following tables. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN).

All other part 18 consumer devices:

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

\* Decreases with the logarithm of the frequency \*The tighter limits shall apply at the boundary between two frequency ranges

## 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 MP-5: 1986 measurement procedure. Specification used was with the FCC Part 18 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 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 9 kHz to 30 MHz.

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

Frequency Range	IF B/W
9 kHz – 150 kHz	200 Hz
150 kHz – 30 MHz	9 kHz

## Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

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

All final data was recorded in the Quasi-Peak detection and Average detection mode.



### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2015-10-20	2016-10-20
R&S	L.I.S.N	ESH2-Z5	892107/021	2015-06-09	2016-06-09
R&S	Two-line V-network	ENV 216	3560.6550.12	2014-12-11	2015-12-11
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).

### Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

Herein,

$V_C$ : corrected voltage amplitude

$V_R$ : reading voltage amplitude

$A_C$ : attenuation caused by cable loss

VDF: voltage division factor of AMN or ISN

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 18.307(a), the worst margin reading as below:

**15.1 dB at 0.412647 MHz in the Line conducted**

### Test Data

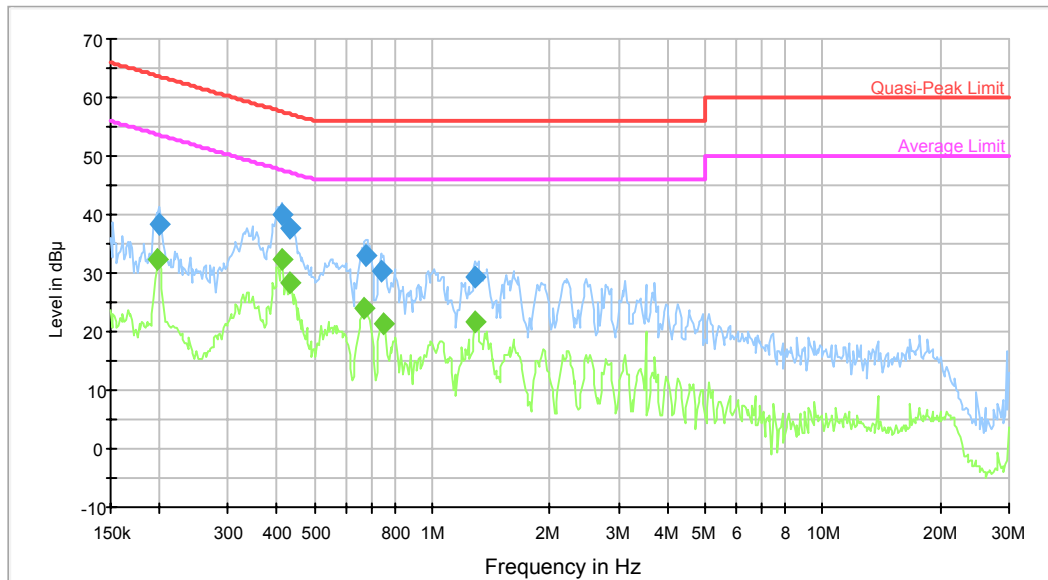
#### Environmental Conditions

Temperature:	26.9°C
Relative Humidity:	50 %
ATM Pressure:	100.8 kPa

Testing was performed by Star Xie on 2015-11-17

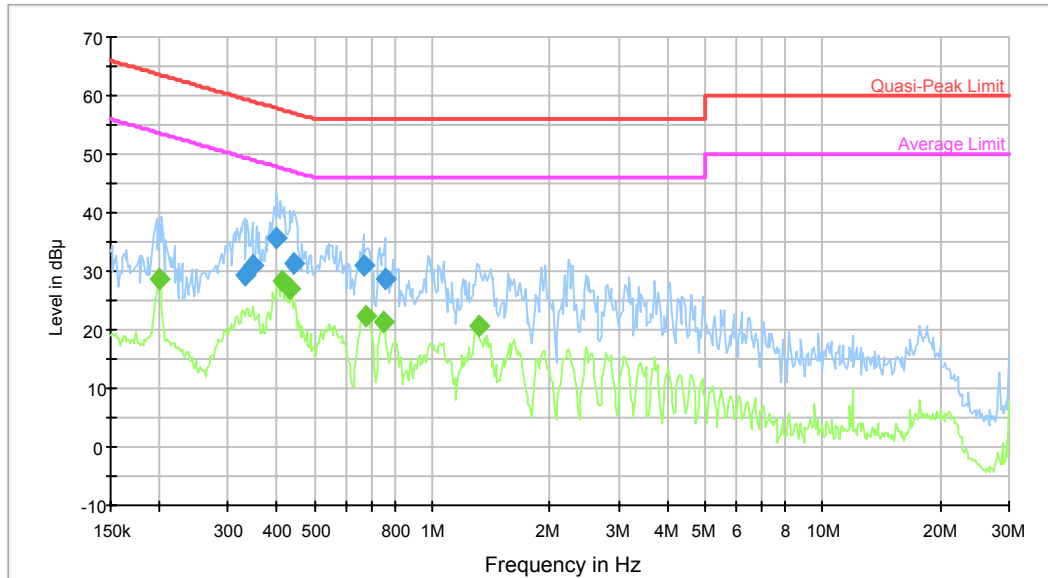
Test Mode: Running

Line:



Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.199835	38.5	9.000	L1	0.2	25.1	63.6	Compliance
0.412647	40.0	9.000	L1	0.2	17.6	57.6	Compliance
0.432855	37.6	9.000	L1	0.2	19.6	57.2	Compliance
0.676289	33.1	9.000	L1	0.2	22.9	56.0	Compliance
0.738241	30.4	9.000	L1	0.2	25.6	56.0	Compliance
1.289541	29.4	9.000	L1	0.2	26.6	56.0	Compliance

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.198249	32.4	9.000	L1	0.2	21.3	53.7	Compliance
0.412647	32.5	9.000	L1	0.2	15.1	47.6	Compliance
0.432855	28.3	9.000	L1	0.2	18.9	47.2	Compliance
0.670921	24.1	9.000	L1	0.2	21.9	46.0	Compliance
0.750100	21.3	9.000	L1	0.2	24.7	46.0	Compliance
1.289541	21.7	9.000	L1	0.2	24.3	46.0	Compliance

**Neutral:**

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.330129	29.4	9.000	N	0.2	30.0	59.4	Compliance
0.346296	30.9	9.000	N	0.2	28.2	59.1	Compliance
0.399703	35.6	9.000	N	0.2	22.3	57.9	Compliance
0.439808	31.4	9.000	N	0.2	25.7	57.1	Compliance
0.665597	30.9	9.000	N	0.2	25.1	56.0	Compliance
0.756101	28.8	9.000	N	0.2	27.2	56.0	Compliance

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.199835	28.5	9.000	N	0.2	25.1	53.6	Compliance
0.412647	28.3	9.000	N	0.2	19.3	47.6	Compliance
0.432855	27.0	9.000	N	0.2	20.2	47.2	Compliance
0.676289	22.4	9.000	N	0.2	23.6	46.0	Compliance
0.750100	21.3	9.000	N	0.2	24.7	46.0	Compliance
1.310256	20.6	9.000	N	0.3	25.4	46.0	Compliance

## FCC §18.305 – FIELD STRENGTH

### 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 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  $U_{cisp}$  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

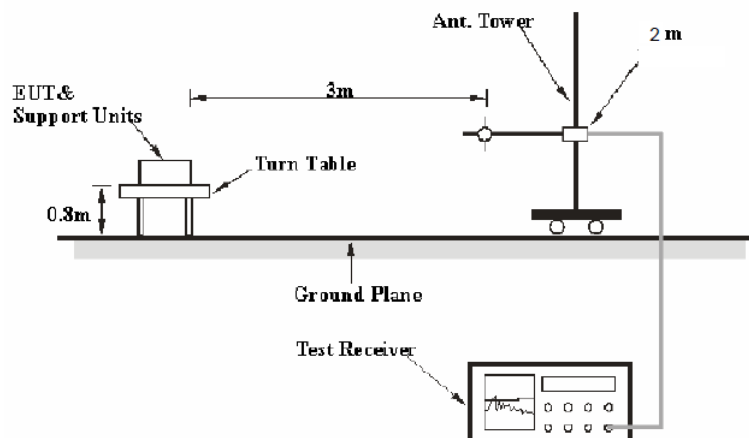
Table 1 – Values of  $U_{cisp}$

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

### Applicable Standard

FCC §18.305(b)

### EUT Setup



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the FCC MP - 5.

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

### EMI Test Receiver Setup and Spectrum Analyzer Setup

The system was investigated from 9 kHz to 1000 MHz.

During the radiated emission test, the EMI test receiver and Spectrum Analyzer were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
9 kHz – 150 kHz	200 Hz	1 kHz	200 Hz	QP
150 kHz – 30 MHz	9 kHz	30 kHz	9 kHz	QP
30MHz – 1000 MHz	100 kHz	300 kHz	120kHz	QP

### Test Procedure

During the conducted emission test, the adapter was connected to the AC floor outlet.

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

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

### Corrected Amplitude Calculation

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

$$\text{Corrected Amplitude} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss}$$

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

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

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2015-05-09	2016-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
The Electro-Mechanics Company	Passive Loop Antenna	6512	9706-1206	2014-11-30	2017-11-29

\* 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).

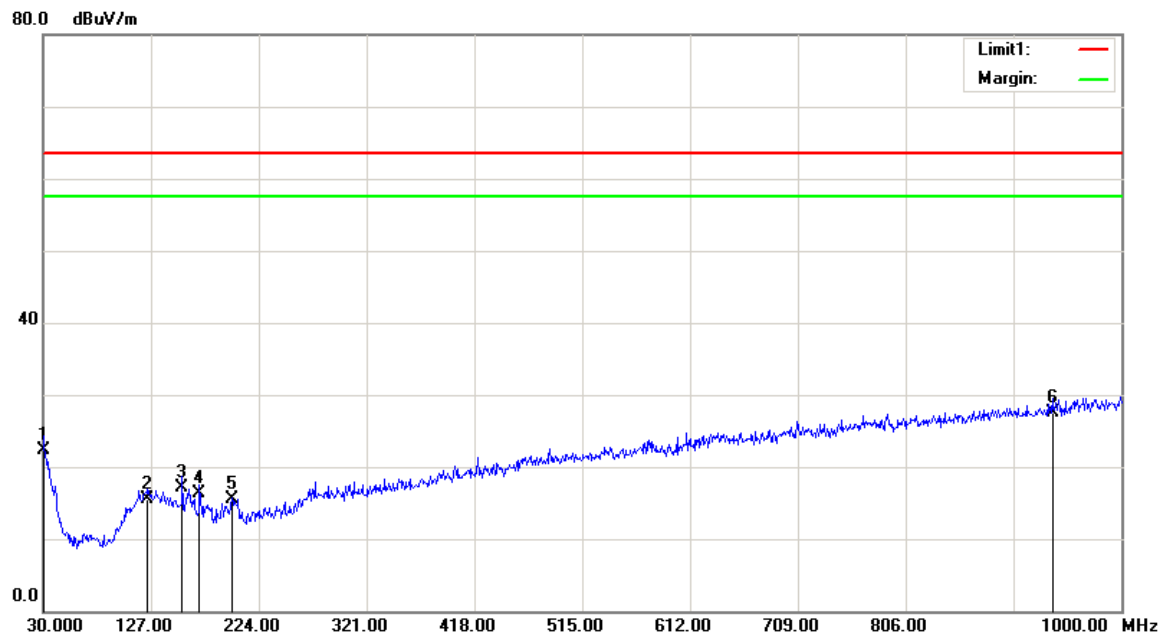
**Test Data****Environmental Conditions**

<b>Temperature:</b>	26.7°C
<b>Relative Humidity:</b>	57 %
<b>ATM Pressure:</b>	100.8 kPa

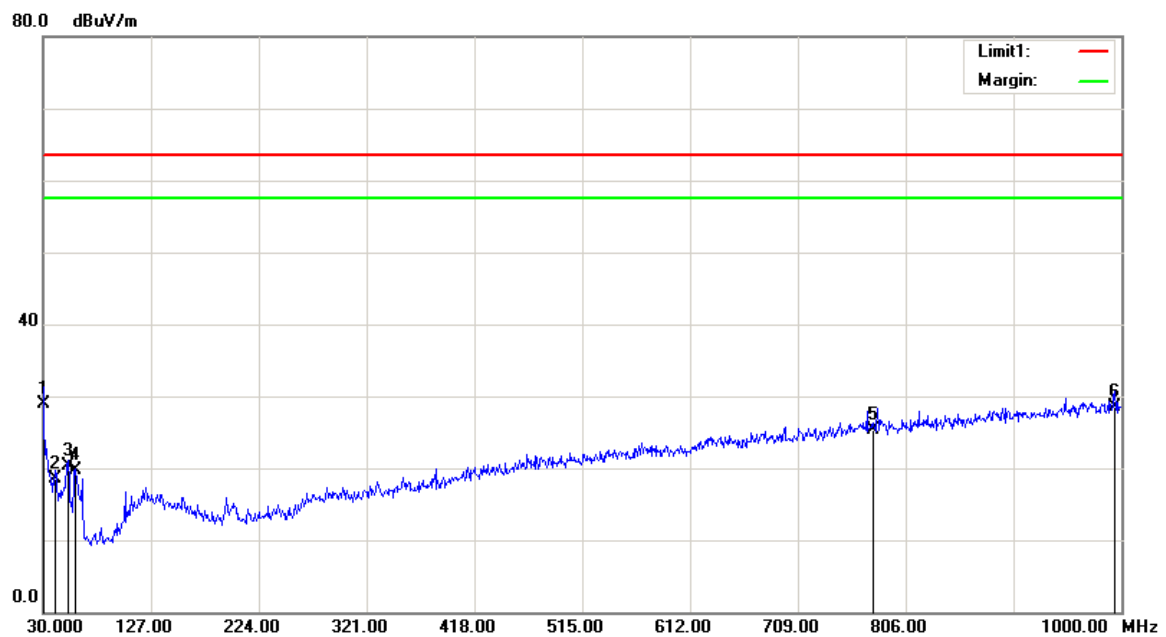
Testing was performed by Star Xie on 2015-11-17

**9kHz-30MHz:**

Frequency MHz	Receiver		Rx Antenna Factor dB(1/m)	Cable loss dB	Amplifier Gain dB	Corrected Amplitude dBμV/m	Limit dBμV/m	Margin dB
	Reading dBμV	Detector PK/QP/AV						
0.067	2.26	QP	70.24	0.02	00.00	72.52	103.50	30.98
0.134	12.23	QP	64.34	0.02	21.06	55.53	103.50	47.97
0.201	19.47	QP	61.25	0.03	21.60	59.15	103.50	44.35
0.268	21.55	QP	58.17	0.03	22.15	57.60	103.50	45.90
3.194	40.82	QP	38.17	0.17	21.50	57.66	103.50	45.84
3.732	36.83	QP	36.99	0.18	21.47	52.53	103.50	50.97

**30 MHz – 1000 MHz***Test Mode: Running***Horizontal**

Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.0000	21.56	QP	0.74	22.30	63.50	41.20
124.0900	21.55	QP	-5.95	15.60	63.50	47.90
155.1300	24.65	QP	-7.45	17.20	63.50	46.30
170.6500	24.73	QP	-8.33	16.40	63.50	47.10
199.7500	23.31	QP	-7.81	15.50	63.50	48.00
937.9200	23.19	QP	4.31	27.50	63.50	36.00

**Vertical**

Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.0000	28.26	QP	0.74	29.00	63.50	34.50
40.6700	25.76	QP	-7.26	18.50	63.50	45.00
52.3100	33.14	QP	-12.84	20.30	63.50	43.20
59.1000	32.94	QP	-13.24	19.70	63.50	43.80
776.9000	23.24	QP	2.16	25.40	63.50	38.10
994.1800	23.42	QP	5.08	28.50	63.50	35.00

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