

FCC PART 15B TEST REPORT

For

ioSafe, Inc.

12760 Earhart Rd., Auburn, California, USA

FCC ID: 2AEQ3-SOLOPRO

Report Type: Original Report	Product Type: Hard Disk
Test Engineer:	Star Xie
Report Number:	RDG150417006-00
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Reviewed By:	Harry Wu EMC Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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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
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS	4
SUPPORT CABLE LIST AND DETAILS	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.....	14
CORRECTED AMPLITUDE & MARGIN CALCULATION	14
TEST RESULTS SUMMARY	14
TEST DATA	14

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *ioSafe, Inc.*'s product, model number: *ioSafe SoloPro* (FCC ID: 2AEQ3-SOLOPRO) (or the "EUT") in this report was a *Hard Disk*, which was measured approximately: 11.0" (L) x 5.0" (W) x 7.1" (H), rated input voltage: DC12V charging from adapter.

Adapter Information:

Model: DM5133

Input : AC 100-240V, 50/60Hz 1.0A

Output: DC 12V, 2A

** All measurement and test data in this report was gathered from production sample serial number: 150417006 (Assigned by applicant). The EUT was received on 2015-04-22.*

Objective

This report is prepared on behalf of *ioSafe, 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 submittal(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 06, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

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

The software “Winthrax Version 3.07” was used during test.

Equipment Modifications

No modification was made to the EUT tested.

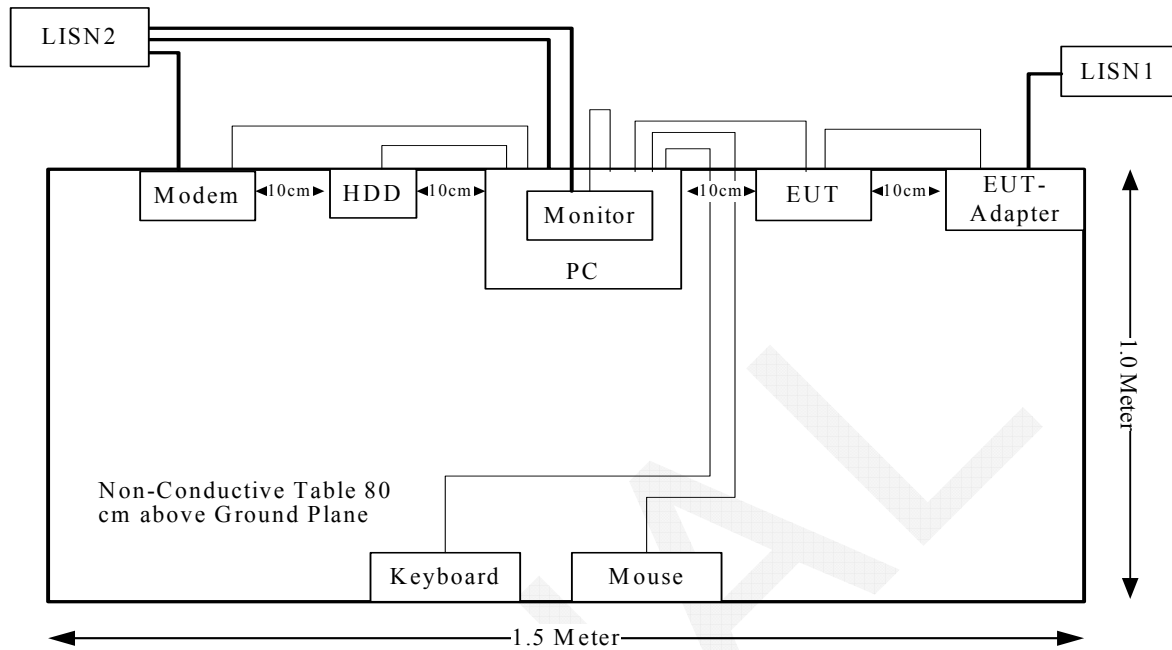
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
HP	PC	N/A	N/A
DELL	Monitor	1708FPt	CN-OF534H-71618-86C-BJWQ-AOO
DELL	Keyboard	SK-8115	CN-0J4628-71616-52H-0RT6
HP	Mouse	M-UV96	265986-003
SAST	Modem	AEM-2100	090200213
TOSHIBA	HDD	DTP105	247BSYVUSRE8

Support Cable List and Details

Cable Description	Length (m)	From / Port	To
Shielded Detachable VGA Cable	2.0	VGA Port of PC	Monitor
Shielded Detachable Serial Cable	1.5	Serial Port of PC	Modem
Shielded Detachable Keyboard Cable	2.0	Usb Port of PC	Keyboard
Shielded Detachable Mouse Cable	1.8	Usb Port of PC	Mouse
Shielded Detachable Usb Cable	0.5	Usb Port of PC	HDD
Shielded Detachable Usb Cable	2.0	Usb Port of PC	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:

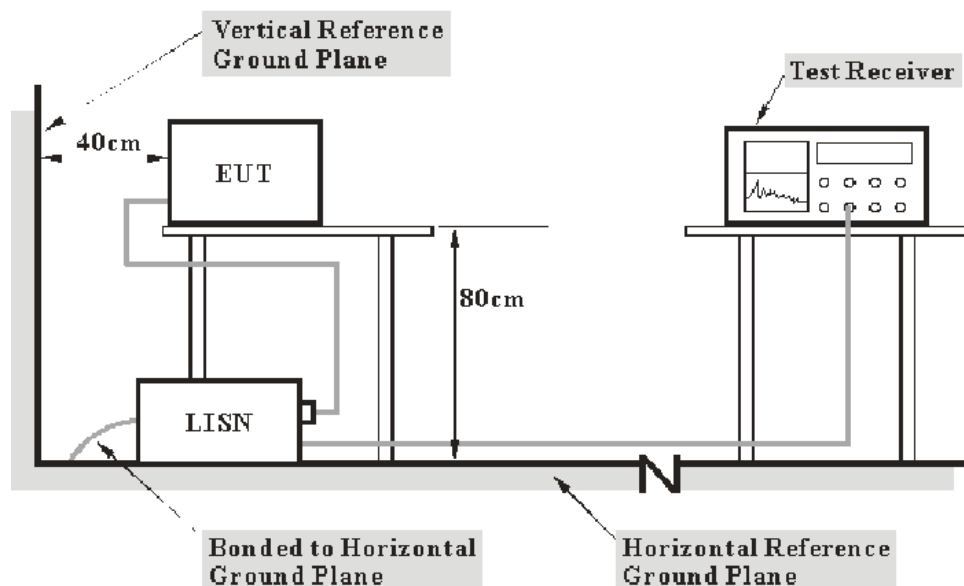
- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

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 C63.4-2014 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 30MHz.

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	2015-12-10	2016-12-09
R&S	L.I.S.N	ESH2-Z5	892107/021	2015-07-16	2016-07-15
R&S	Two-line V-network	ENV 216	3560.6550.12	2015-11-26	2016-11-25
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:

8.3 dB at 0.439808 MHz in the Line conducted mode

Test Data

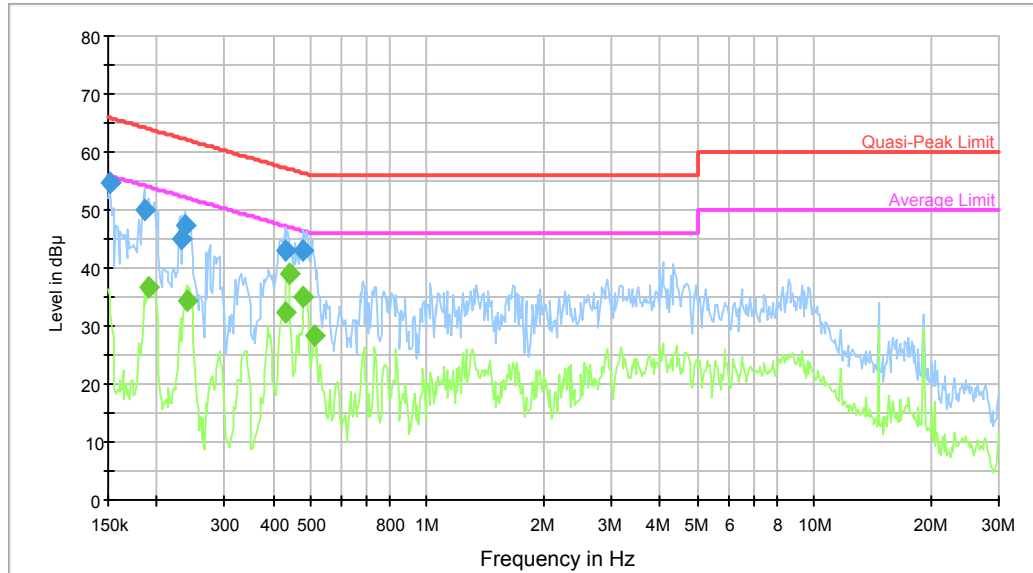
Environmental Conditions

Temperature:	25.4 °C
Relative Humidity:	57 %
ATM Pressure:	100.8 kPa

The testing was performed by Star Xie on 2016-02-28.

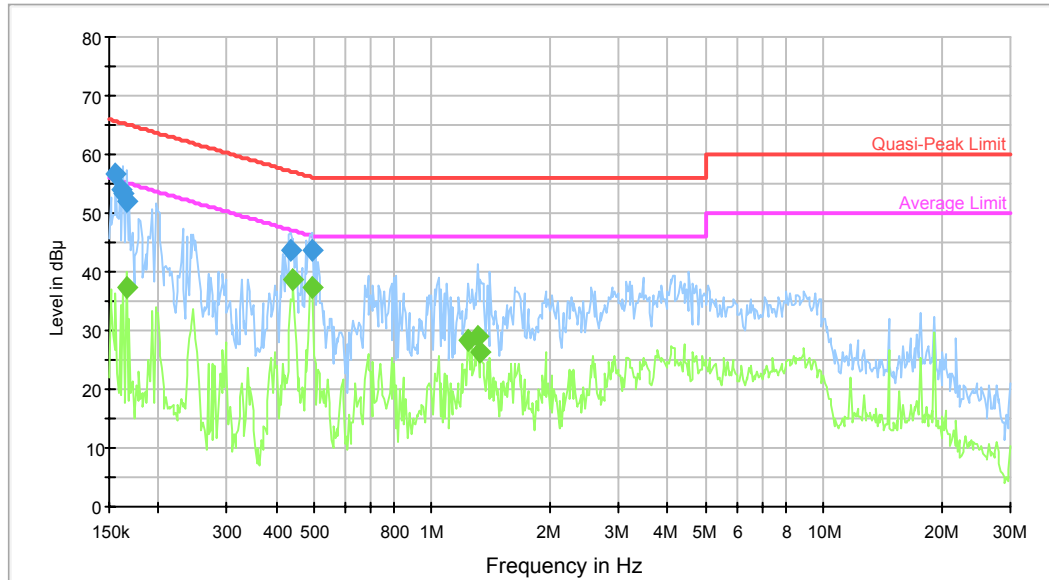
Test mode: USB Downloading

AC 120V/60Hz, Line:



Frequency (MHz)	QuasiPeak (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.151200	54.8	9.000	L1	10.2	11.1	65.9	Compliance
0.186006	50.0	9.000	L1	10.2	14.2	64.2	Compliance
0.230654	45.1	9.000	L1	10.2	17.3	62.4	Compliance
0.236234	47.2	9.000	L1	10.2	15.0	62.2	Compliance
0.429420	43.0	9.000	L1	10.2	14.3	57.3	Compliance
0.480097	43.1	9.000	L1	10.1	13.2	56.3	Compliance

Frequency (MHz)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.190505	36.6	9.000	L1	10.2	17.4	54.0	Compliance
0.240029	34.4	9.000	L1	10.2	17.7	52.1	Compliance
0.429420	32.3	9.000	L1	10.2	15.0	47.3	Compliance
0.439808	38.8	9.000	L1	10.2	8.3	47.1	Compliance
0.480097	35.1	9.000	L1	10.1	11.2	46.3	Compliance
0.511698	28.2	9.000	L1	10.1	17.8	46.0	Compliance

AC 120V/60Hz, Neutral:

Frequency (MHz)	QuasiPeak (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.156097	56.6	9.000	N	10.2	9.1	65.7	Compliance
0.159873	54.0	9.000	N	10.2	11.5	65.5	Compliance
0.162441	53.3	9.000	N	10.2	12.0	65.3	Compliance
0.166371	52.0	9.000	N	10.2	13.1	65.1	Compliance
0.436318	43.7	9.000	N	10.2	13.4	57.1	Compliance
0.495646	43.8	9.000	N	10.1	12.3	56.1	Compliance

Frequency (MHz)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.166371	37.3	9.000	N	10.2	17.8	55.1	Compliance
0.443327	38.6	9.000	N	10.2	8.4	47.0	Compliance
0.495646	37.5	9.000	N	10.1	8.6	46.1	Compliance
1.239175	28.4	9.000	N	10.4	17.6	46.0	Compliance
1.310256	28.9	9.000	N	10.4	17.1	46.0	Compliance
1.331304	26.2	9.000	N	10.4	19.8	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

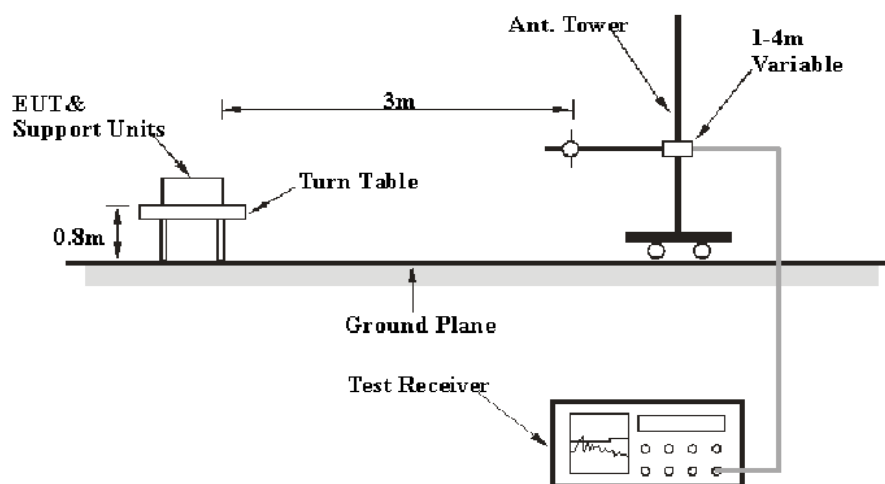
6G~18GHz: 5.23 dB

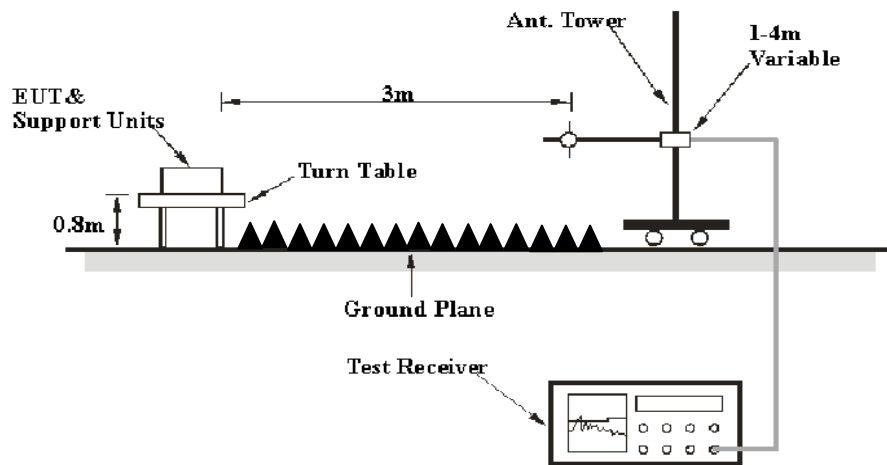
Table 2 – Values of U_{cisp}

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:



Above 1GHz:

The radiated emission test was performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. 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 was 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 6GHz.

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
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

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 Quasi-peak detection mode for 30 MHz to 1 GHz, Peak and average detection mode above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2015-08-03	2016-08-02
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
ETS-Lindgren	Horn Antenna	3115	9808-5557	2015-09-06	2018-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2016-02-19	2017-02-19
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:

5.20 dB at 30.0000 MHz in the Vertical polarization for below 1G,

Test Data

Environmental Conditions

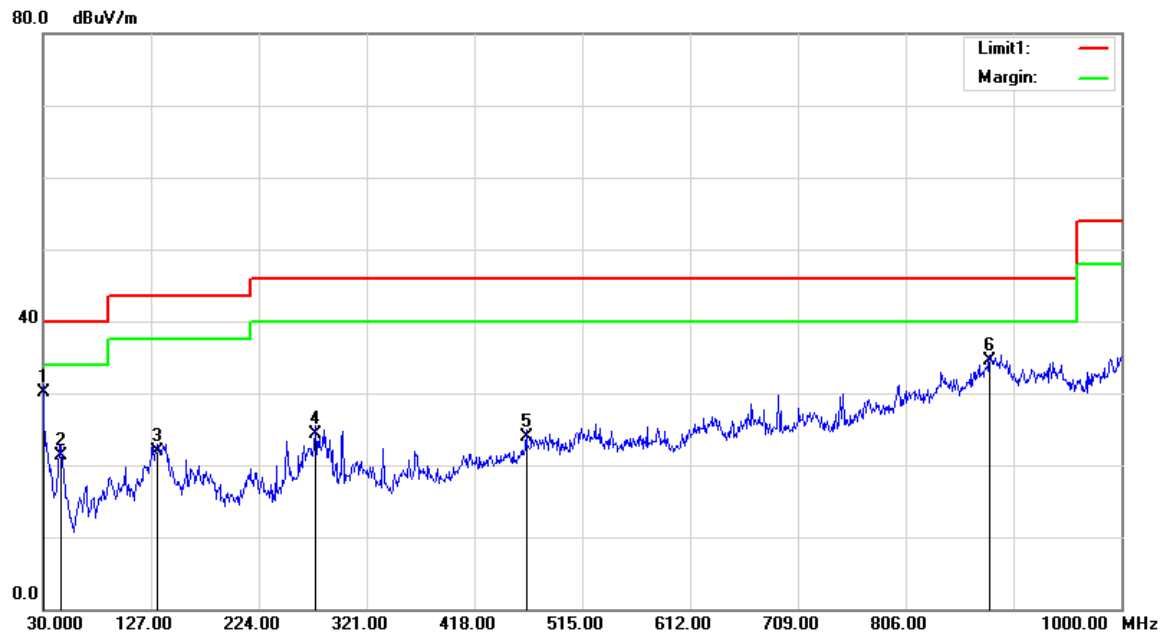
Temperature:	24.1 °C
Relative Humidity:	64 %
ATM Pressure:	101 kPa

The testing was performed by Star Xie on 2016-02-27 .

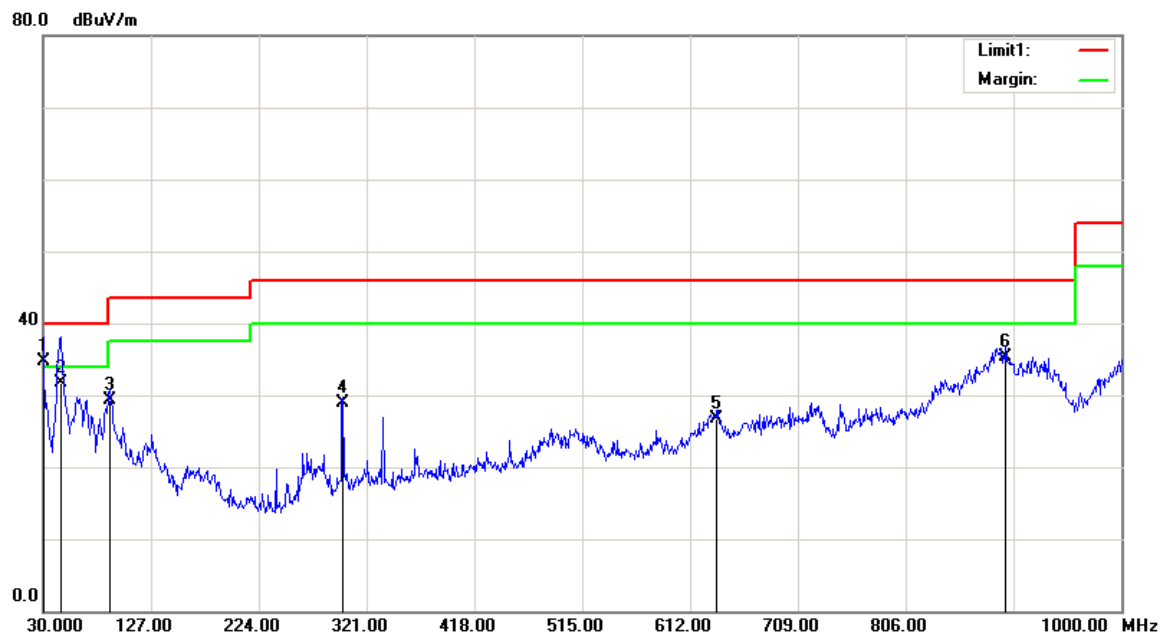
Test mode: Running

1) Below 1GHz

Horizontal:



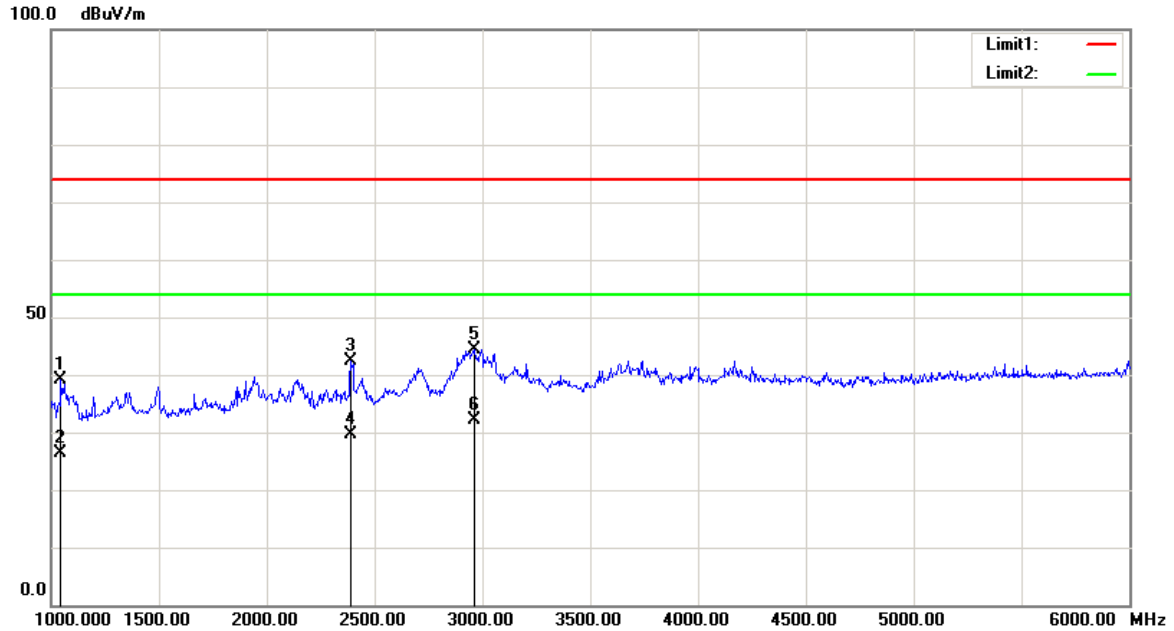
Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Correction Factor (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.0000	26.72	QP	3.38	30.10	40.00	9.90
46.4900	32.06	QP	-10.66	21.40	40.00	18.60
132.8200	27.76	QP	-5.86	21.90	43.50	21.60
275.4100	30.44	QP	-6.14	24.30	46.00	21.70
464.5600	25.81	QP	-1.91	23.90	46.00	22.10
881.6600	31.12	QP	3.38	34.50	46.00	11.50

Vertical:

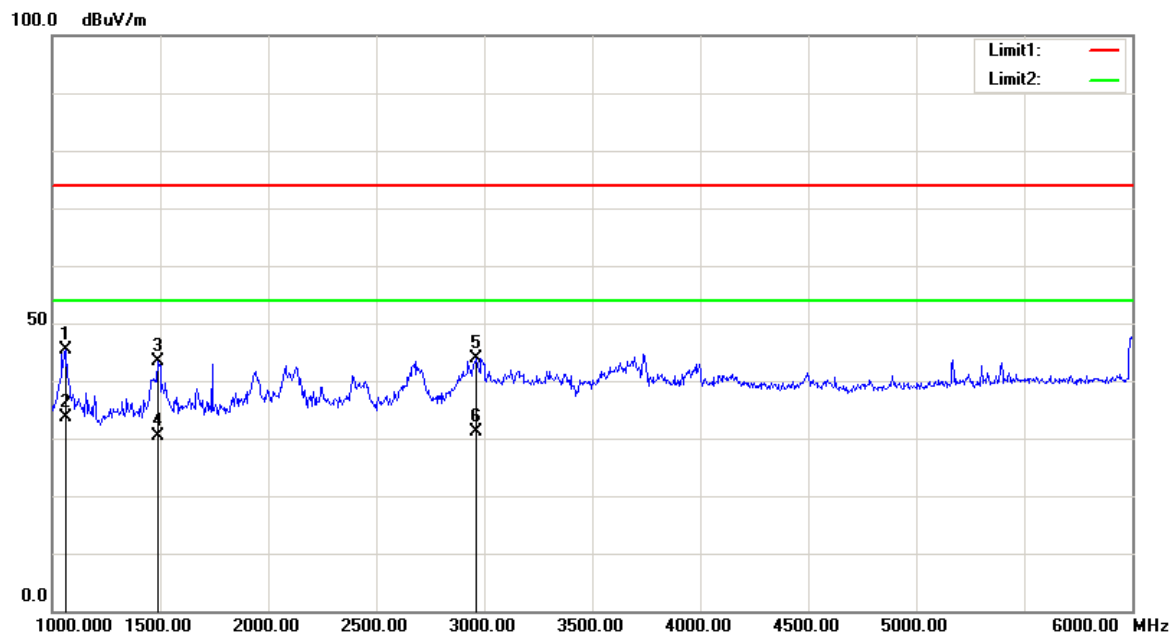
Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Correction Factor (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.0000	31.42	QP	3.38	34.80	40.00	5.20
45.5200	41.91	QP	-10.21	31.70	40.00	8.30
90.1400	41.44	QP	-12.04	29.40	43.50	14.10
299.6600	34.97	QP	-5.97	29.00	46.00	17.00
636.2500	26.09	QP	0.71	26.80	46.00	19.20
896.2100	31.42	QP	3.98	35.40	46.00	10.60

2) Above 1GHz

Horizontal:



Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Correction Factor (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1047.500	40.23	PK	-1.15	39.08	74.00	34.92
1047.500	27.48	Ave	-1.15	26.33	54.00	27.67
2392.500	40.42	PK	1.94	42.36	74.00	31.64
2392.500	27.70	Ave	1.94	29.64	54.00	24.36
2962.500	38.23	PK	6.22	44.45	74.00	29.55
2962.500	25.80	Ave	6.22	32.02	54.00	21.98

Vertical:

Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Correction Factor (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1065.000	46.39	PK	-1.13	45.26	74.00	28.74
1065.000	34.81	Ave	-1.13	33.68	54.00	20.32
1492.500	44.51	PK	-1.16	43.35	74.00	30.65
1492.500	31.61	Ave	-1.16	30.45	54.00	23.55
2967.500	37.71	PK	6.26	43.97	74.00	30.03
2967.500	24.76	Ave	6.26	31.02	54.00	22.98

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