



## FCC PART 15 B

### TEST REPORT

For

**ioSafe, Inc.**

12760 Earhart Rd., Auburn, California, USA

**FCC ID: 2AEQ3-SOLOG3**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Hard Disk
<b>Test Engineer:</b> <u>Star Xie</u> <i>Star Xie</i>	
<b>Report Number:</b> <u>RDG150417002-00</u>	
<b>Report Date:</b> <u>2015-06-03</u>	
<b>Reviewed By:</b> <u>Harry Wu</u> <i>Harry Wu</i> EMC Leader	
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

## **TABLE OF CONTENTS**

<b>GENERAL INFORMATION.....</b>	<b>3</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....	3
OBJECTIVE .....	3
TEST METHODOLOGY .....	3
TEST FACILITY.....	4
<b>SYSTEM TEST CONFIGURATION.....</b>	<b>5</b>
DESCRIPTION OF TEST CONFIGURATION .....	5
EUT EXERCISE SOFTWARE .....	5
EQUIPMENT MODIFICATIONS .....	5
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS .....	5
SUPPORT CABLE LIST AND DETAILS .....	5
CONFIGURATION OF TEST SETUP .....	6
<b>SUMMARY OF TEST RESULTS.....</b>	<b>7</b>
<b>FCC§15.107 - CONDUCTED EMISSIONS.....</b>	<b>8</b>
MEASUREMENT UNCERTAINTY .....	8
EUT SETUP .....	8
EMI TEST RECEIVER SETUP.....	9
TEST EQUIPMENT LIST AND DETAILS.....	9
TEST PROCEDURE .....	9
CORRECTED AMPLITUDE & MARGIN CALCULATION .....	9
TEST RESULTS SUMMARY.....	10
TEST DATA .....	10
<b>FCC §15.109 - RADIATED SPURIOUS EMISSIONS .....</b>	<b>13</b>
MEASUREMENT UNCERTAINTY .....	13
EUT SETUP .....	13
EMI TEST RECEIVER SETUP.....	14
TEST PROCEDURE .....	15
TEST EQUIPMENT LIST AND DETAILS.....	15
CORRECTED AMPLITUDE & MARGIN CALCULATION .....	15
TEST RESULTS SUMMARY.....	15
TEST DATA .....	16

## **GENERAL INFORMATION**

### **Product Description for Equipment Under Test (EUT)**

The *ioSafe, Inc.*'s product, model number: *ioSafe Solo G3* (FCC ID: 2AEQ3-SOLOG3) (the "EUT") in this report was a *Hard Disk*, which was measured approximately: 11.0" (L) x 5.0"(W) x7.1"(H), rated input voltage: DC 12V from adapter.

Adapter information: DURA MICRO INC

Model: DM5133

Input: AC100-240V~50-60Hz, 1.0A

Output: DC12V, 2A

*All measurement and test data in this report was gathered from production sample serial number: 150417002 (Assigned by BACL, Dongguan). The EUT was received on 2015-04-20.*

### **Objective**

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

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

### **Test Methodology**

All measurements contained in this report were conducted with ANSI C63.4-2014, 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.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Dongguan).

### 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

### Description of Test Configuration

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

### EUT Exercise Software

The software “winthrax.exe” was used during test.

### Equipment Modifications

No modification was made to the EUT tested.

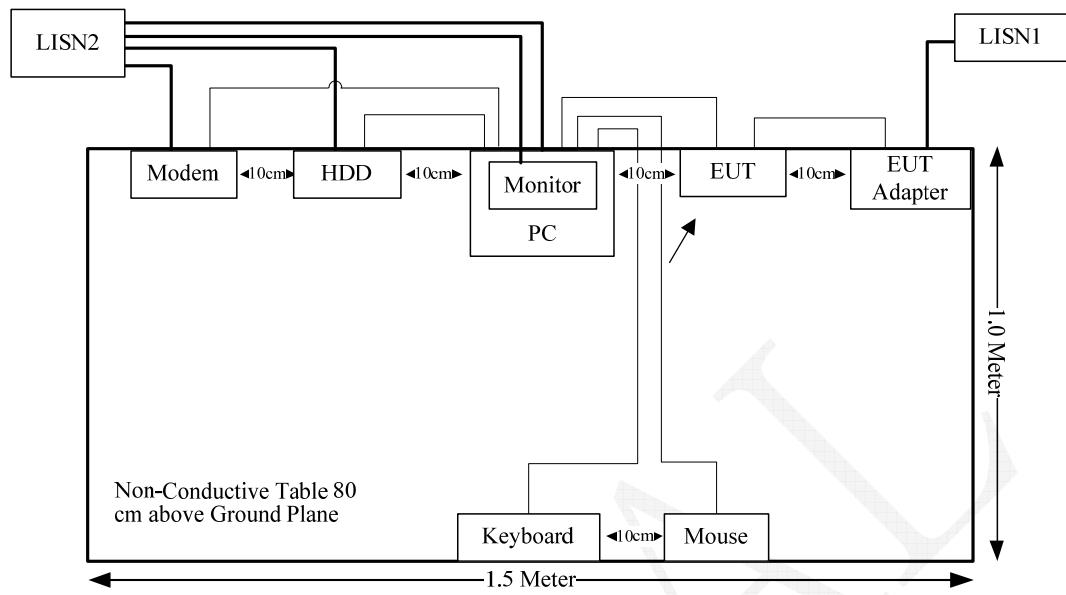
### Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
HP	PC	N/A	N/A
DELL	Monitor	1708FPt	CN-OF534H-71618-86C-BJW Q-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	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

## Configuration of Test Setup



## SUMMARY OF TEST RESULTS

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

## FCC§15.107 - 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  $U_{\text{lab}}$  is less than or equal to  $U_{\text{cisp}}$  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  $U_{\text{lab}}$  is greater than  $U_{\text{cisp}}$  of Table 1, then:

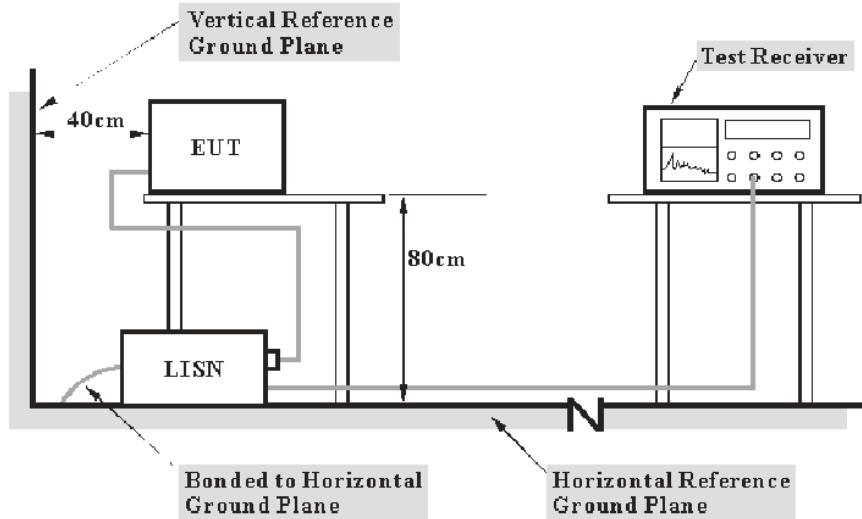
- compliance is deemed to occur if no measured disturbance level, increased by  $(U_{\text{lab}} - U_{\text{cisp}})$ , exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by  $(U_{\text{lab}} - U_{\text{cisp}})$ , exceeds the disturbance limit.

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  $U_{\text{cisp}}$

Measurement	$U_{\text{cisp}}$
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 B 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 of laptop was connected to a 120V/60Hz AC 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	2014-10-20	2015-10-20
R&S	L.I.S.N	ESH3-Z5	843331/015	2014-06-09	2015-06-09
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).

### Test Procedure

During the conducted emission test, the adapter of laptop 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:

$$V_C = V_R + A_C + VDF$$

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 15 B Class B, with the worst margin reading of:

**6.4 dB at 0.491712 MHz in the Neutral conducted mode**

## Test Data

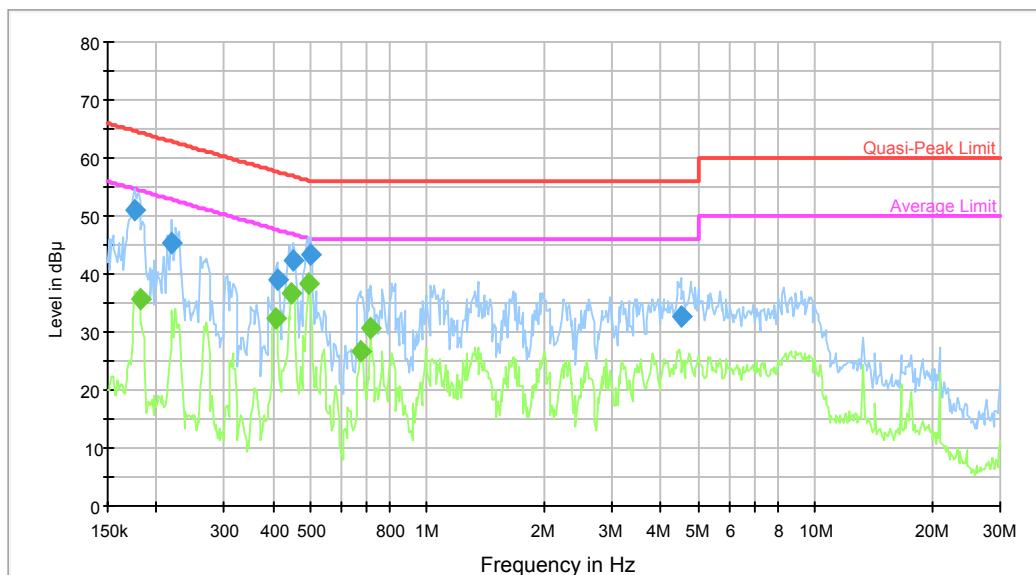
### Environmental Conditions

<b>Temperature:</b>	25.4 °C
<b>Relative Humidity:</b>	57 %
<b>ATM Pressure:</b>	100.8kPa

*The testing was performed by Star Xie on 2015-04-21.*

*Test Mode: Downloading*

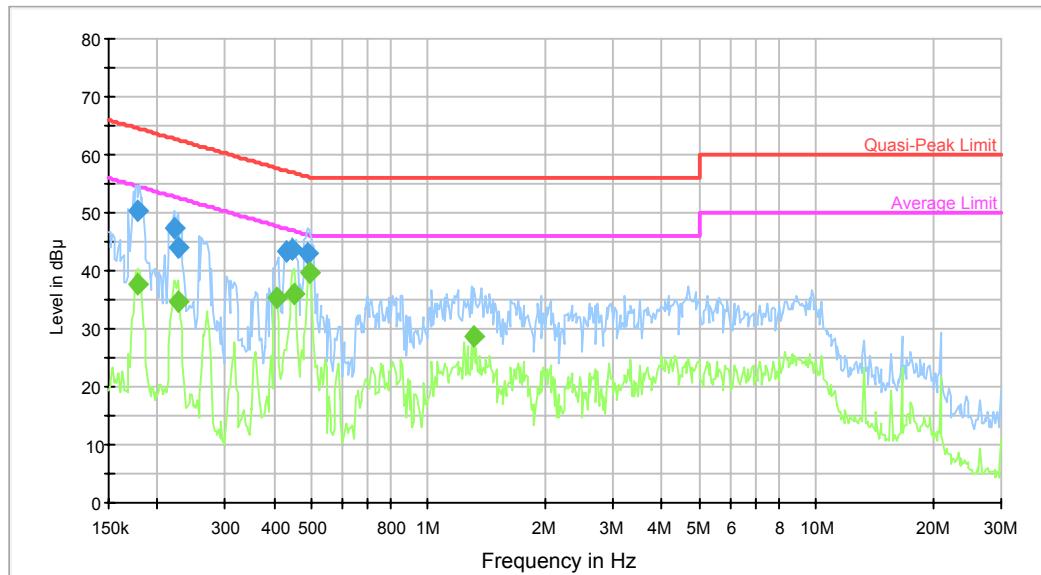
**AC120V, 60Hz, Line:**



Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.175915	50.9	9.000	L1	10.2	13.8	64.7	Compliance
0.219886	45.4	9.000	L1	10.2	17.4	62.8	Compliance
0.409372	38.9	9.000	L1	10.2	18.8	57.7	Compliance
0.450448	42.3	9.000	L1	10.2	14.6	56.9	Compliance
0.499611	43.2	9.000	L1	10.1	12.8	56.0	Compliance
4.505456	32.8	9.000	L1	10.7	23.2	56.0	Compliance

Frequency (MHz)	Average (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.181612	35.6	9.000	L1	10.2	18.8	54.4	Compliance
0.406123	32.2	9.000	L1	10.2	15.5	47.7	Compliance
0.446873	36.6	9.000	L1	10.2	10.3	46.9	Compliance
0.495646	38.3	9.000	L1	10.1	7.8	46.1	Compliance
0.670921	26.6	9.000	L1	10.4	19.4	46.0	Compliance
0.715082	30.6	9.000	L1	10.4	15.4	46.0	Compliance

**AC120V, 60Hz, Neutral:**



Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.177322	50.4	9.000	N	10.2	14.2	64.6	Compliance
0.221645	47.2	9.000	N	10.2	15.6	62.8	Compliance
0.227007	44.1	9.000	N	10.2	18.5	62.6	Compliance
0.429420	43.3	9.000	N	10.2	14.0	57.3	Compliance
0.446873	43.6	9.000	N	10.2	13.3	56.9	Compliance
0.487810	42.9	9.000	N	10.1	13.3	56.2	Compliance

Frequency (MHz)	Average (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.178741	37.5	9.000	N	10.2	17.0	54.5	Compliance
0.227007	34.5	9.000	N	10.2	18.1	52.6	Compliance
0.406123	35.4	9.000	N	10.2	12.3	47.7	Compliance
0.450448	35.9	9.000	N	10.2	11.0	46.9	Compliance
0.491712	39.7	9.000	N	10.1	6.4	46.1	Compliance
1.310256	28.8	9.000	N	10.4	17.2	46.0	Compliance

## FCC §15.109 - RADIATED SPURIOUS EMISSIONS

### Measurement Uncertainty

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

If  $U_{\text{lab}}$  is less than or equal to  $U_{\text{cisp}}$  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  $U_{\text{lab}}$  is greater than  $U_{\text{cisp}}$  of Table 1, then:

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

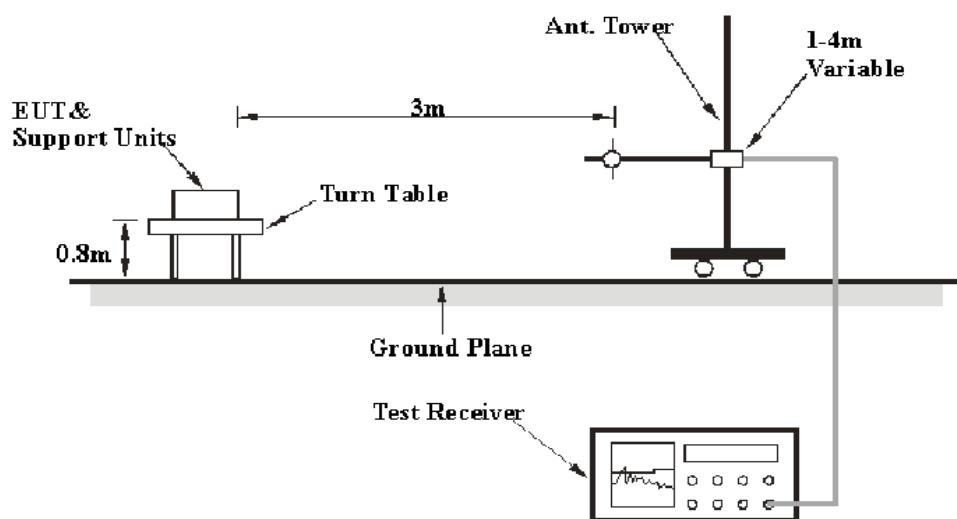
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:30M~200MHz: 5.0 dB; 200M~1GHz: 6.2 dB; 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB

Table 1 – Values of  $U_{\text{cisp}}$

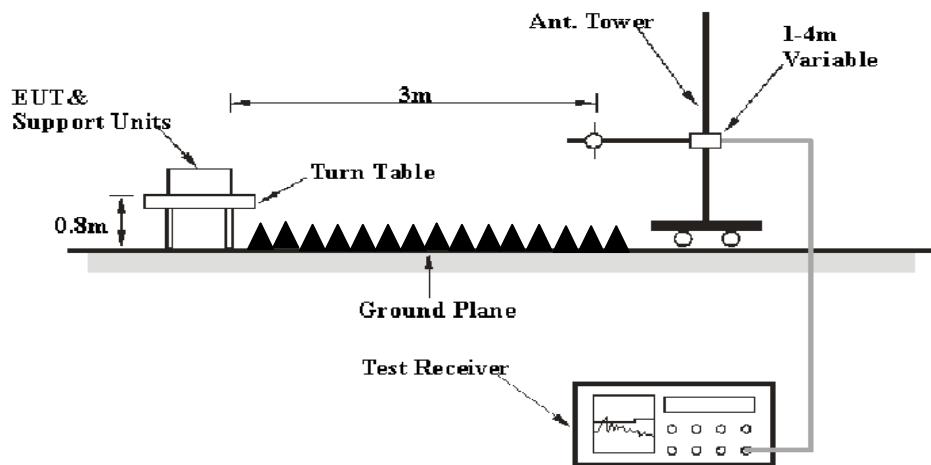
Measurement	$U_{\text{cisp}}$
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

### EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were 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.

### EMI Test Receiver Setup

The system was investigated from 30 MHz to 6 GHz.

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	1 MHz	3 MHz	/	Peak
	1 MHz	10 Hz	/	Ave.

## Test Procedure

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, 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	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
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09
ETS-Lindgren	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2015-02-19	2016-02-19

\* **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 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 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:

**6.9 dB at 30.0000MHz in the Vertical polarization**

## Test Data

### Environmental Conditions

Temperature:	24.5 °C
Relative Humidity:	65%
ATM Pressure:	101 kPa

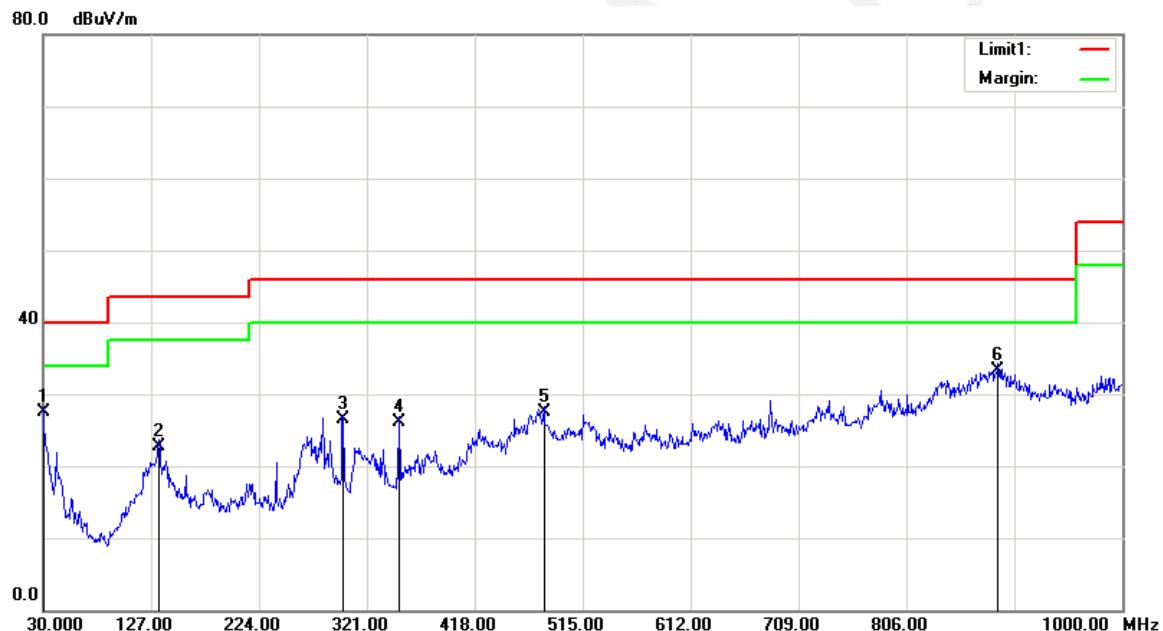
The testing was performed by Star Xie from 2015-04-22.

Test Result: Compliance

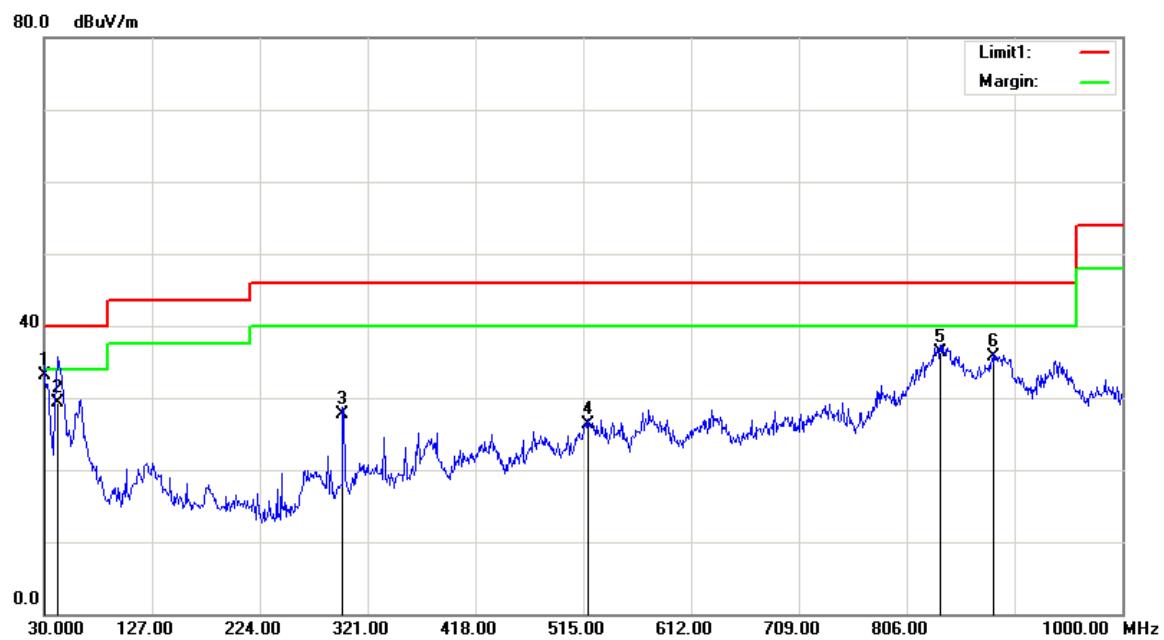
Test Mode: Downloading

#### 1) Below 1GHz:

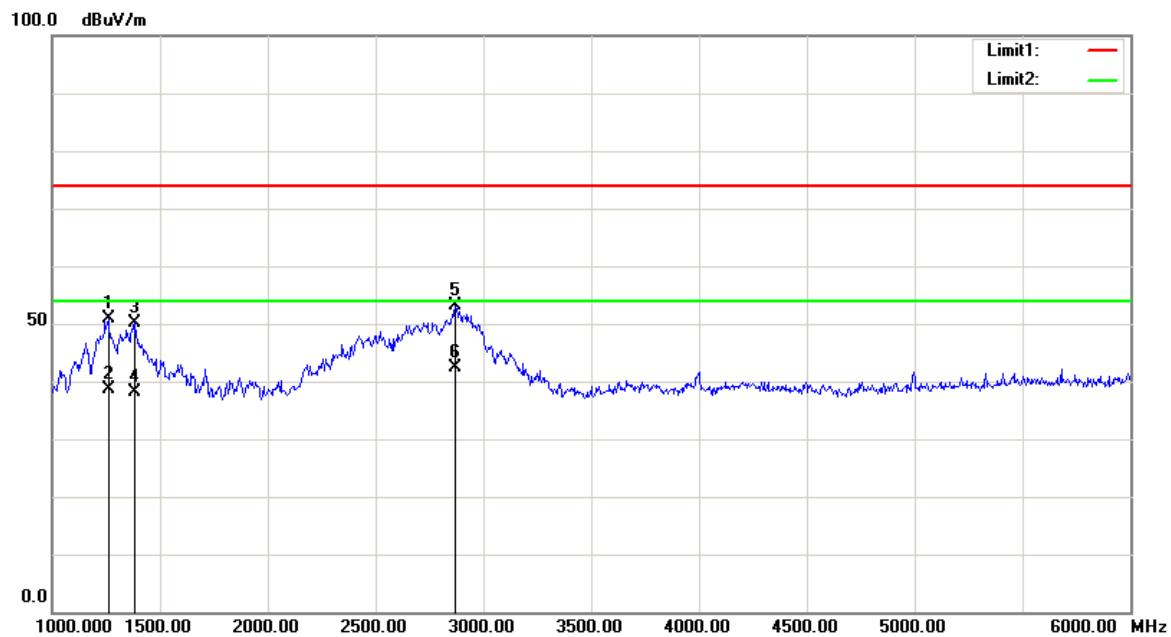
##### Horizontal



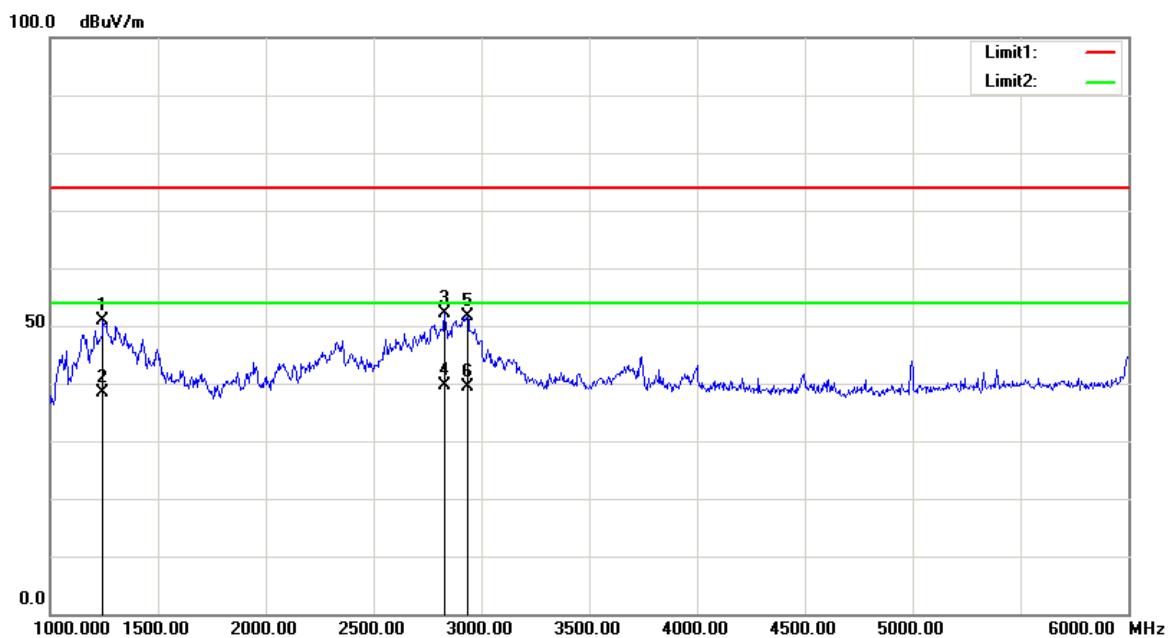
Frequency (MHz)	Receiver Reading (dB $\mu$ V)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
30.000	24.12	QP	3.38	27.50	40.00	12.50
133.7900	28.61	QP	-5.91	22.70	43.50	20.80
299.6600	32.47	QP	-5.97	26.50	46.00	19.50
350.1000	31.04	QP	-4.94	26.10	46.00	19.90
480.0800	29.03	QP	-1.43	27.60	46.00	18.40
888.4500	29.58	QP	3.82	33.40	46.00	12.60

**Vertical**

Frequency (MHz)	Receiver Reading (dB $\mu$ V)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
30.0000	29.72	QP	3.38	33.10	40.00	6.90
42.6100	37.79	QP	-8.49	29.30	40.00	10.70
298.6900	33.77	QP	-5.97	27.80	46.00	18.20
518.8800	27.83	QP	-1.43	26.40	46.00	19.60
836.0700	33.10	QP	3.20	36.30	46.00	9.70
884.5700	32.19	QP	3.61	35.80	46.00	10.20

**2) Above 1GHz:****Horizontal**

Frequency (MHz)	Receiver Reading (dB $\mu$ V)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
1262.500	51.87	peak	-0.98	50.89	74.00	23.11
1262.500	39.65	AVG	-0.98	38.67	54.00	15.33
1387.500	50.74	peak	-0.60	50.14	74.00	23.86
1387.500	38.72	AVG	-0.60	38.12	54.00	15.88
2870.000	48.13	peak	4.95	53.08	74.00	20.92
2870.000	37.32	AVG	4.95	42.27	54.00	11.73

**Vertical**

Frequency (MHz)	Receiver Reading (dB $\mu$ V)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
1247.500	51.81	peak	-1.04	50.77	74.00	23.23
1247.500	39.37	AVG	-1.04	38.33	54.00	15.67
2832.500	47.74	peak	4.32	52.06	74.00	21.94
2832.500	35.35	AVG	4.32	39.67	54.00	14.33
2935.000	45.64	peak	5.89	51.53	74.00	22.47
2935.000	33.53	AVG	5.89	39.42	54.00	14.58

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