

FCC PART 15B

TEST REPORT

For

SZ DJI BaiWang Technology Co.,Ltd

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FCC ID: 2AHAY-WM3301601

Report Type: Original Report	Product Type: Phantom 4
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Report Number:	RDG151217002-00B
Report Date:	2015-12-21
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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).

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The SZ DJI BaiWang Technology Co.,Ltd 's product, model number: WM330A (FCC ID: 2AHAY-WM3301601) (the "EUT") in this report was a *Phantom 4*, which was measured approximately: 50cm (L) x 50 cm (W) x 18.5 cm(H), rated input voltage: DC 15.2V from lithium battery, the battery can remove from the EUT and charged by adapter. The highest operating frequency is 2476.5MHz.

Adapter 1 information: dji

Model: PH4C100

Input: AC 100-240V, 1.4A, 50-60Hz

Output: DC 17.5V, 5.7A

Manufacture: Shenzhen Huntkey Electronics Co., Ltd.

Adapter 2 information: dji

Model: PH4C100

Input: AC 100-240V, 1.4A, 50-60Hz

Output: DC 17.5V, 5.7A

Manufacture: AcTel Electronics (Dong Guan) Co., Ltd.

** All measurement and test data in this report was gathered from production sample serial number: 151217002. (Assigned by BACL.Dongguan). The EUT was received on 2015-12-08*

Objective

This report is prepared on behalf of SZ DJI BaiWang Technology Co.,Ltd in accordance with Part 2, Subpart J, Part 15, Subparts A and B of the Federal Communications Commission rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2AHAY-WM3301601.

Submitted with the Part of a system with FCC ID: SS3-GL3001510.

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 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).

Equipment Modifications

No modification was made to the EUT.

Test Software Configuration

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

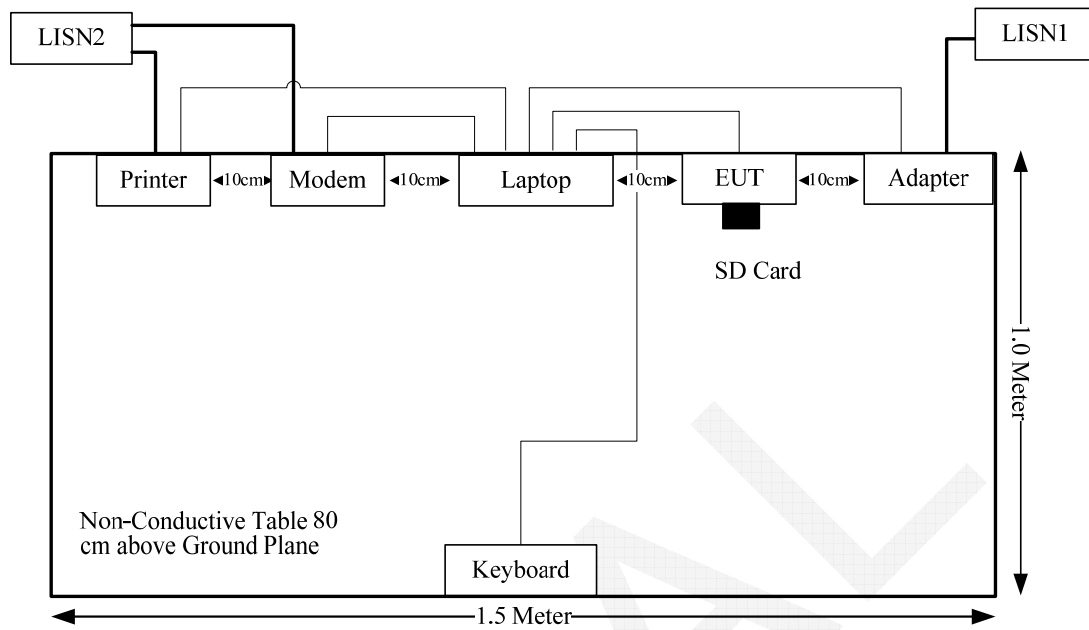
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
HP	Printer	C3941A	JPTVOB2337
DELL	Keyboard	L100	CNORH656658907BL05DC
SAST	Modem	AEM-2100	0293
Kingston	Micro SD card	8GB	/

Support Cable List and Details

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	1.8	USB Port of Laptop	Keyboard
USB Cable	no	no	1.0	USB Port of Laptop	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 - 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:

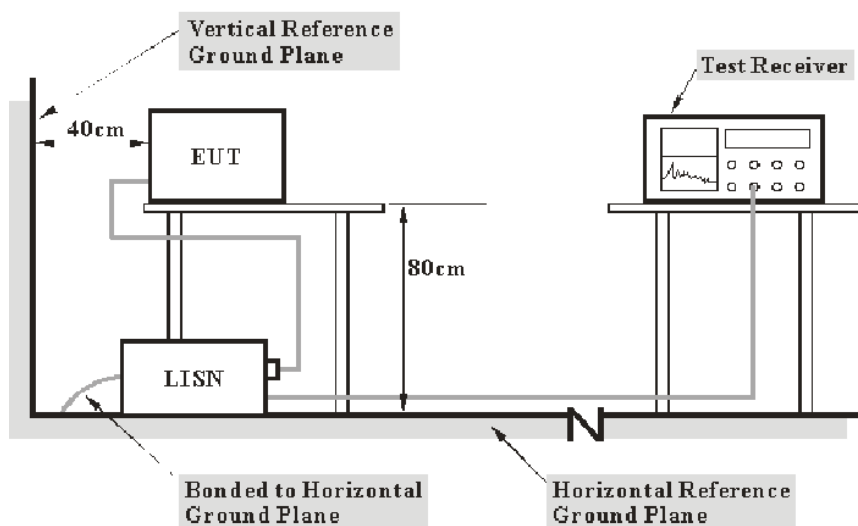
- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit.

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

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 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	2015-10-20	2016-10-20
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:

$$V_C = V_R + A_C + VDF$$

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:

10.5 dB at 0.184529 MHz in the Line conducted mode

Test Data

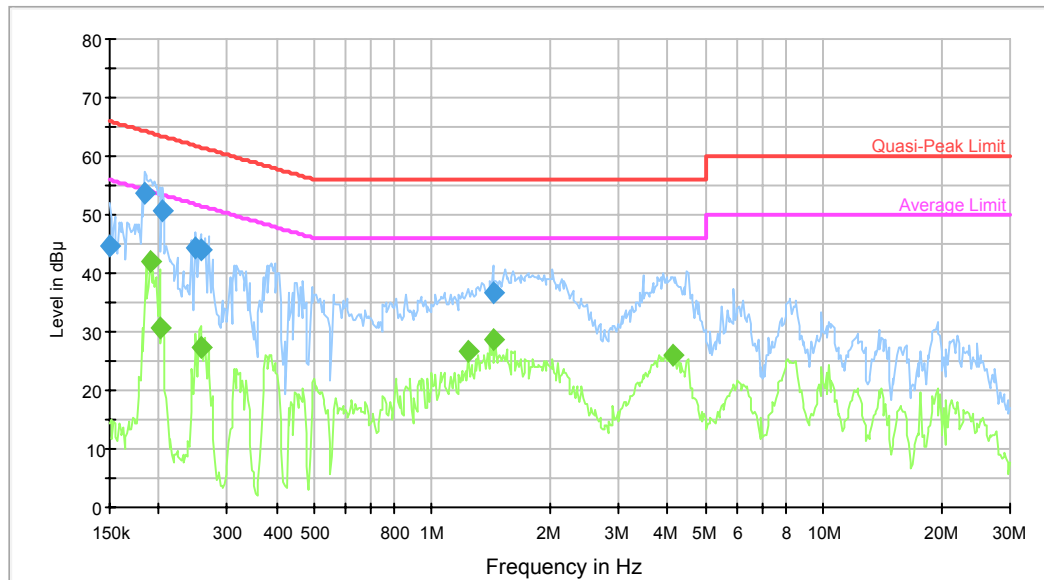
Environmental Conditions

Temperature:	23.7 °C
Relative Humidity:	42 %
ATM Pressure:	101.2kPa

The testing was performed by Allen Qiao on 2015-12-09.

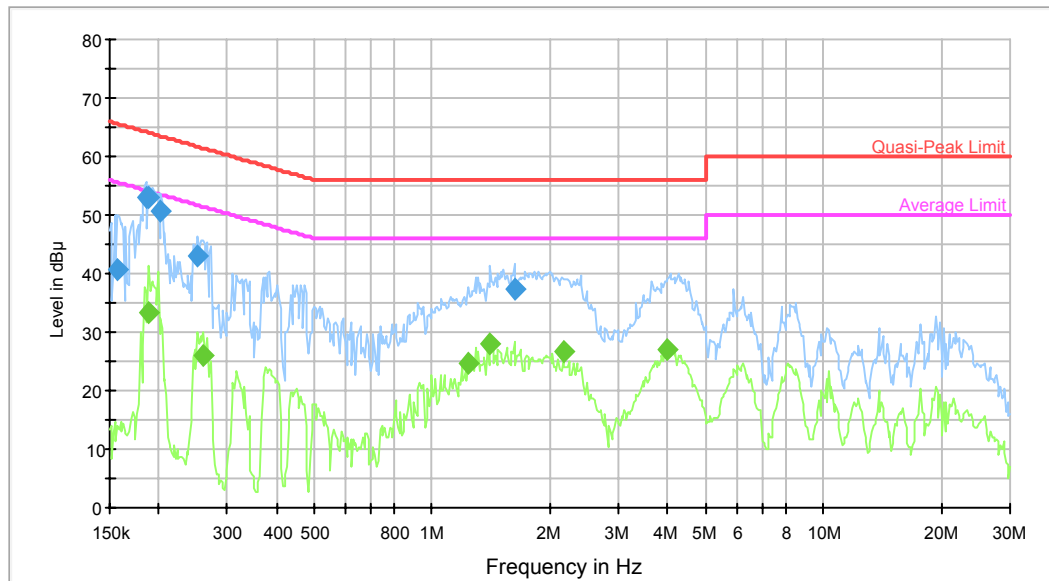
Test Mode: Downloading

Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	44.8	9.000	L1	9.8	21.2	66.0	Compliance
0.184529	53.8	9.000	L1	9.7	10.5	64.3	Compliance
0.204669	50.6	9.000	L1	9.7	12.8	63.4	Compliance
0.249785	44.4	9.000	L1	9.7	17.4	61.8	Compliance
0.255827	44.0	9.000	L1	9.7	17.6	61.6	Compliance
1.430284	36.6	9.000	L1	9.8	19.4	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.190505	42.0	9.000	L1	9.7	12.0	54.0	Compliance
0.201433	30.8	9.000	L1	9.7	22.8	53.6	Compliance
0.255827	27.3	9.000	L1	9.7	24.3	51.6	Compliance
1.239175	26.6	9.000	L1	9.8	19.4	46.0	Compliance
1.430284	28.6	9.000	L1	9.8	17.4	46.0	Compliance
4.127365	25.9	9.000	L1	9.9	20.1	46.0	Compliance

Neutral:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.157346	40.7	9.000	N	9.7	24.9	65.6	Compliance
0.186006	53.1	9.000	N	9.7	11.1	64.2	Compliance
0.188994	52.9	9.000	N	9.7	11.2	64.1	Compliance
0.203045	50.6	9.000	N	9.7	12.9	63.5	Compliance
0.251783	43.2	9.000	N	9.7	18.5	61.7	Compliance
1.624765	37.4	9.000	N	9.8	18.6	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.188994	33.5	9.000	N	9.7	20.6	54.1	Compliance
0.259937	26.1	9.000	N	9.7	25.3	51.4	Compliance
1.239175	24.8	9.000	N	9.8	21.2	46.0	Compliance
1.407671	27.9	9.000	N	9.8	18.1	46.0	Compliance
2.164561	26.8	9.000	N	9.8	19.2	46.0	Compliance
3.997889	26.8	9.000	N	9.9	19.2	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_{cispr} 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_{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 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

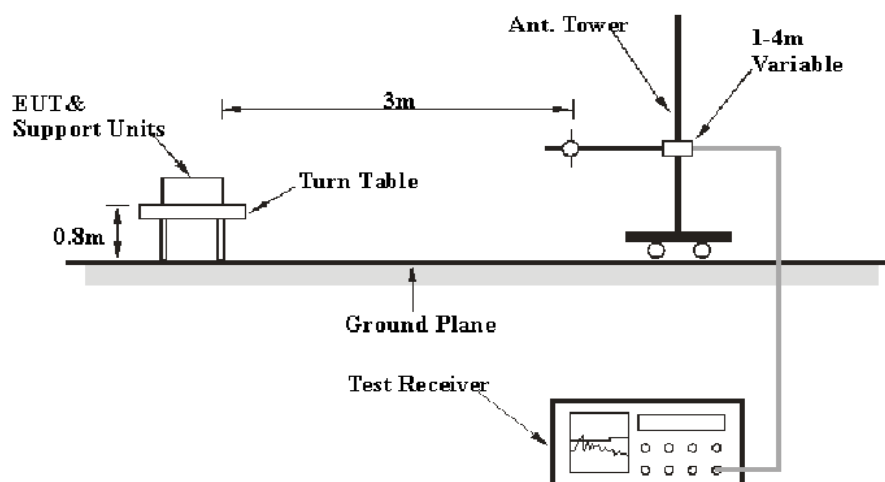
6G~18GHz: 5.23 dB

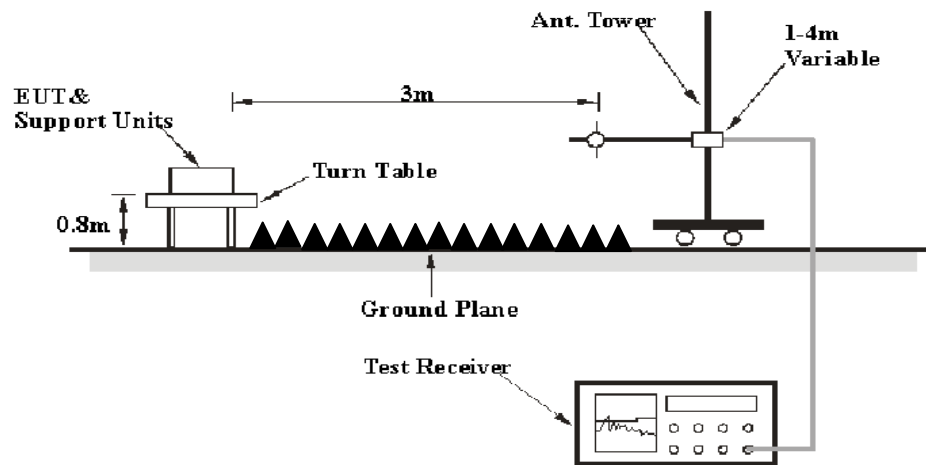
Table 2 – Values of U_{cispr}

Measurement	U_{cispr}
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 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.

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

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

According to FCC 15.33 requirements, the system was measured from 30 MHz to 13 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 1GHz	1MHz	3 MHz	/	Peak
	1MHz	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 Quasi-peak detection mode for 30 MHz to 1 GHz, Peak and average detection mode above 1 GHz.

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 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	2015-02-19	2016-02-19
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).

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109, Class B, with the worst margin reading of:

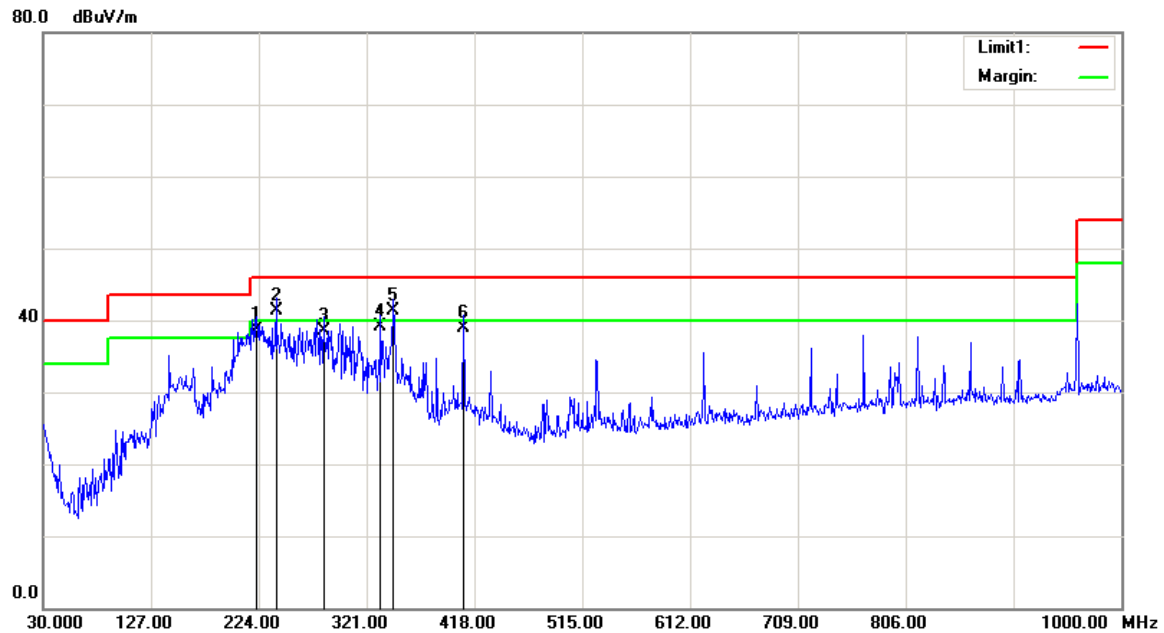
4.60 dB at 239.5200 MHz in the Horizontal polarization

Test Data

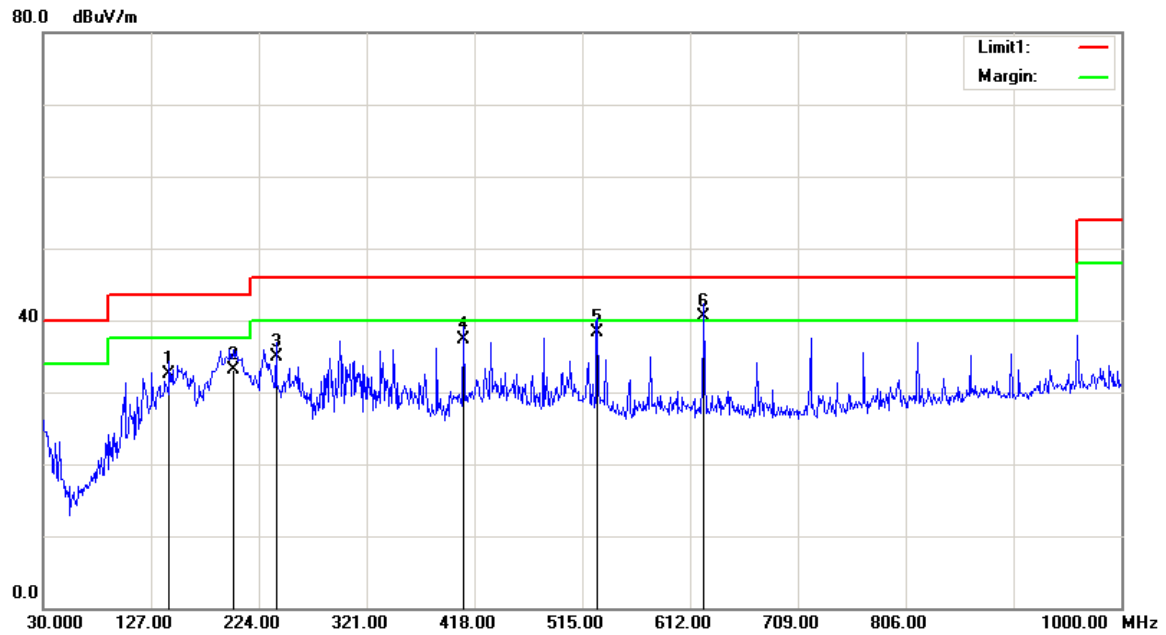
Environmental Conditions

Temperature:	21.6 °C
Relative Humidity:	50 %
ATM Pressure:	101.1 kPa

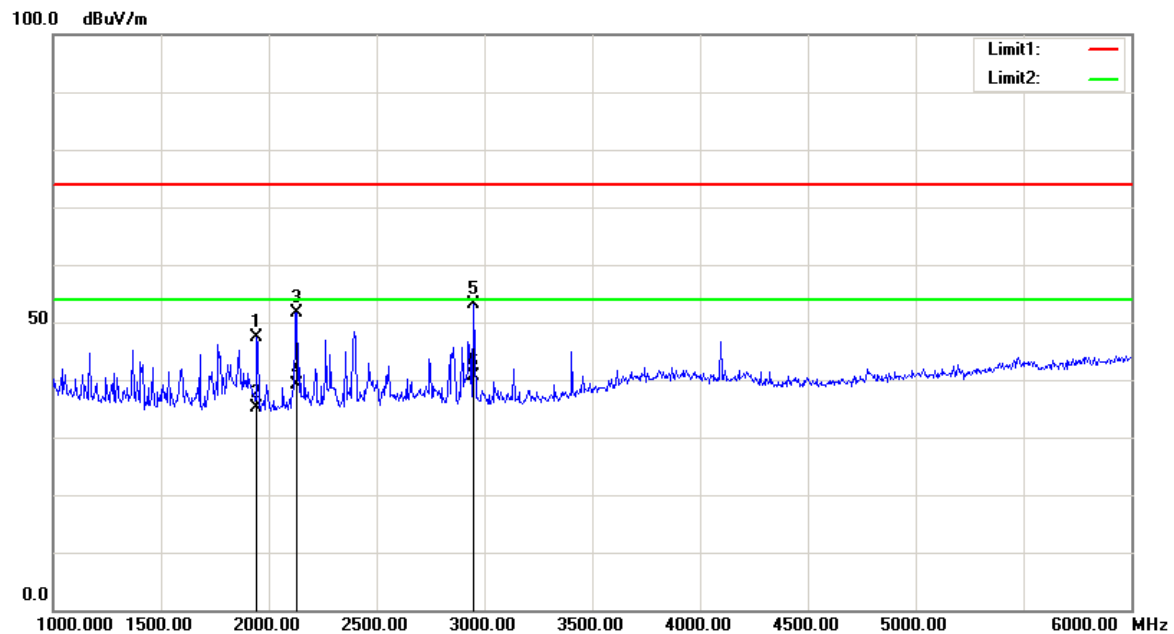
The testing was performed by Allen Qiao on 2015-12-10.

1) Below 1GHz:*Downloading:***Horizontal:**

Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
222.0600	46.77	QP	-8.07	38.70	46.00	7.30
239.5200	48.81	QP	-7.41	41.40	46.00	4.60
282.2000	44.29	QP	-5.69	38.60	46.00	7.40
333.6100	43.92	QP	-4.72	39.20	46.00	6.80
345.2500	45.73	QP	-4.43	41.30	46.00	4.70
408.3000	41.82	QP	-2.92	38.90	46.00	7.10

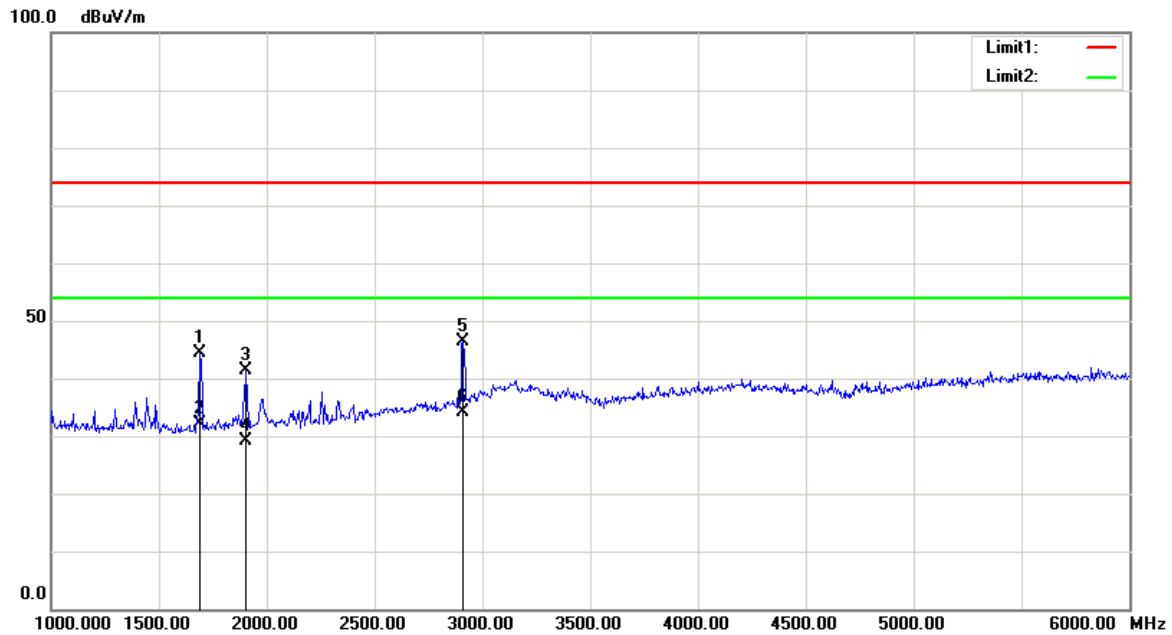
Vertical:

Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
143.4900	39.49	QP	-6.99	32.50	43.50	11.00
201.6900	40.34	QP	-7.14	33.20	43.50	10.30
239.5200	42.31	QP	-7.41	34.90	46.00	11.10
408.3000	40.22	QP	-2.92	37.30	46.00	8.70
528.5800	39.32	QP	-0.92	38.40	46.00	7.60
624.6100	39.96	QP	0.64	40.60	46.00	5.40

Horizontal:

Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1947.500	43.82	peak	3.53	47.35	74.00	26.65
1947.500	31.49	AVG	3.53	35.02	54.00	18.98
2132.500	47.63	peak	3.92	51.55	74.00	22.45
2132.500	35.22	AVG	3.92	39.14	54.00	14.86
2952.500	46.65	peak	6.42	53.07	74.00	20.93
2952.500	34.10	AVG	6.42	40.52	54.00	13.48

Note: For above 6 GHz, all radiated emissions are 20 dB below the limit or are on the system noise floor level.

Vertical:

Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1692.500	45.15	peak	-0.81	44.34	74.00	29.66
1692.500	32.88	AVG	-0.81	32.07	54.00	21.93
1907.500	41.39	peak	-0.04	41.35	74.00	32.65
1907.500	29.15	AVG	-0.04	29.11	54.00	24.89
2912.500	40.88	peak	5.52	46.40	74.00	27.60
2912.500	28.50	AVG	5.52	34.02	54.00	19.98

Note: For above 6 GHz, all radiated emissions are 20 dB below the limit or are on the system noise floor level.

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