

FCC PART 15.249

TEST REPORT

For

SZ DJI TECHNOLOGY CO., LTD

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Shenzhen, Guangdong, China

FCC ID: SS3-GL658C1504

Report Type: Original Report		Product Type: Remote Controller	
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Report Number:	RDG150422008-00B		
Report Date:	2015-04-29		
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *SZ DJI TECHNOLOGY CO., LTD*'s product, model *GL658C(FCC ID: SS3-GL658C1504)*, or the "EUT" as referred to in this report is a *Remote Controller* (Called C1 by applicant), which measures approximately: 18.2cm (L) x17.14 cm (W) x 10.52 cm(H), rated input voltage: DC 7.4V from lithium rechargeable battery or DC 26.3V or DC26.1V from adapter.

Adapter information: dji
Model: A14-100P1A
Input: AC 100-240V, 1.4A, 50-60Hz
Output: DC 26.3V, 3.83A

Adapter information: dji
Model: ADE018
Input: AC 100-240V, 2.9A, 50-60Hz
Output: DC 26.1V, 6.9A

** The measurement and test data of Spurious Emissions in this report was gathered from production sample serial number: 150422008, (Assigned by BACL). The EUT was received on 2015-04-14.*

Objective

This type approval report is prepared on behalf of *SZ DJI TECHNOLOGY CO., LTD* in accordance with Part 2-Subpart J, and Part 15-Subparts A, B and C of the Federal Communications Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: SS3-GL658C1504
Submitted with the Part of a system with ID: SS3-TP14061504

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, 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 C63.4-2009.

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.

FEMVA

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in Engineering Mode, which was provided by the manufacturer.

The system employed 17 channels in the frequency range 5738-5808MHz, which were provided by the manufacturer:

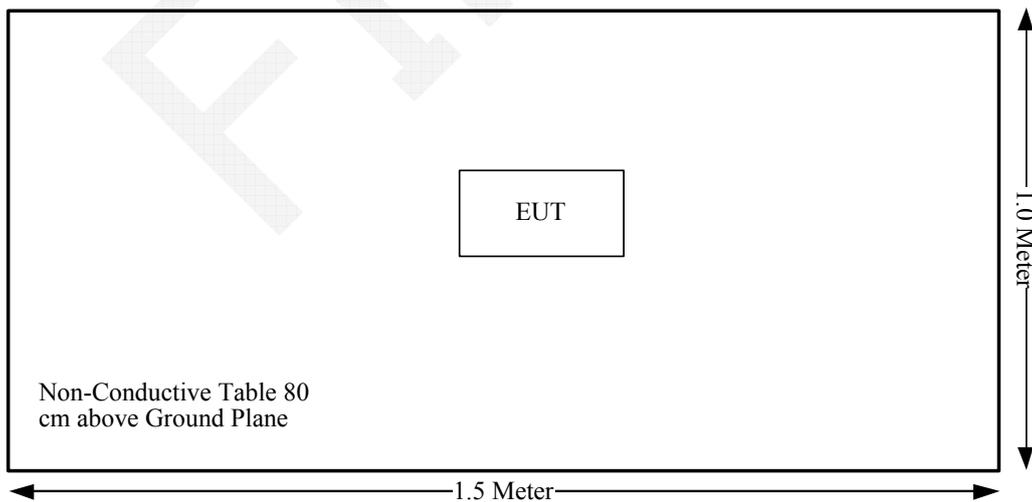
Channel	Frequency (MHz)						
1	5738	6	5762	11	5783	16	5803
2	5743	7	5763	12	5788	17	5808
3	5748	8	5768	13	5793	/	/
4	5753	9	5773	14	5796	/	/
5	5758	10	5778	15	5798	/	/

EUT was tested with Channel 5738 MHz, 5773 MHz and 5808 MHz

EUT Exercise Software

The software: SScm32 was used in the test. The system configured maximum power as default setting and switched the channel by software commands.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	Not Applicable
15.205, §15.209, §15.249	Radiated Emissions	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance
§15.249(d)	Outside of Band Emission (50dB attenuation)	Compliance

Not Applicable: The EUT is battery operated equipment.

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

Antenna Connector Construction

The EUT have an integral antenna arrangement for [transmitting@5.8G](#) Band, and the antenna gain is 1.5 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliant.

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FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS

Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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 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

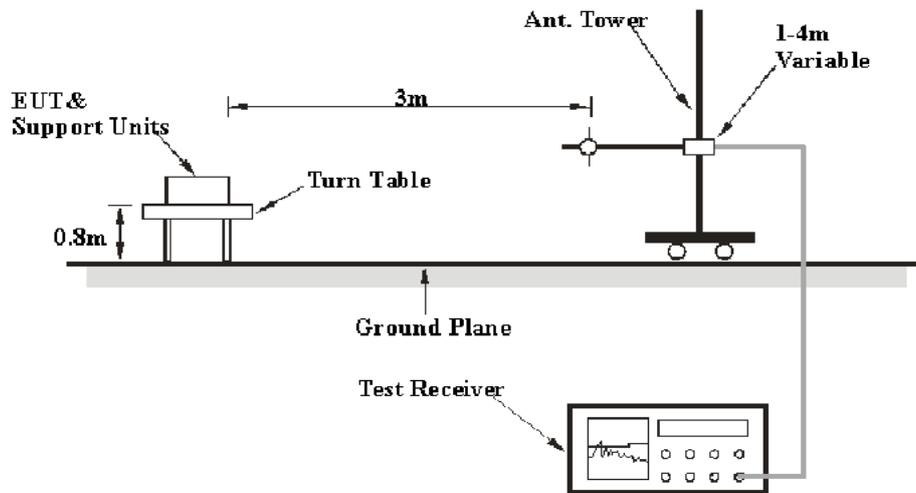
6G~18GHz: 5.23 dB

Table 1 – Values of U_{cispr}

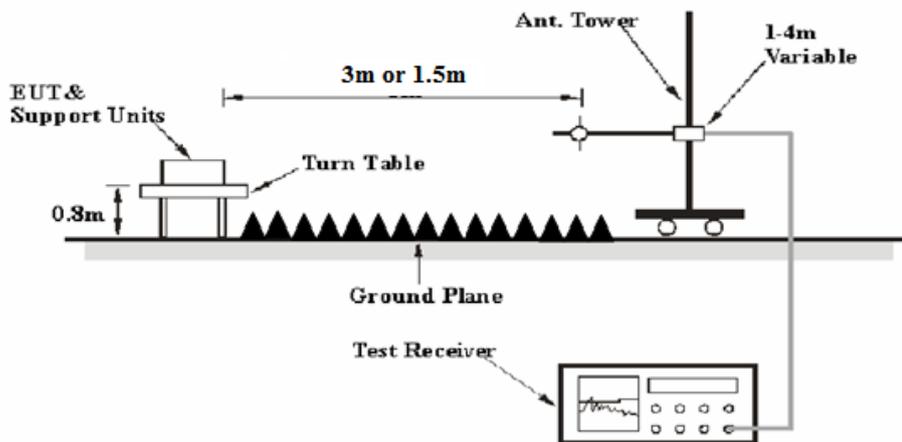
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

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

Test Equipment Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were 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

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

All data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak and average detection mode above 1 GHz.

According to C63.4, the above 1G test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1.5m

Distance extrapolation factor = $20 \log(\text{specific distance [3m]}/\text{test distance [1.5m]})$ dB

Extrapolation result = Corrected Amplitude (dB μ V/m) - distance extrapolation factor (6dB)

Corrected Amplitude & Margin 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:

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

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	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	E4440A	SG43360054	2014-12-04	2015-12-04
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
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-01 1302	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2014-09-06	2015-09-06

* **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 Part 15.209 & 15.205 & 15.249, with the worst margin reading of:

3.51 dB at 5738 MHz in the Vertical polarization

Test Data**Environmental Conditions**

Temperature:	23.8°C
Relative Humidity:	66 %
ATM Pressure:	100.9kPa

The testing was performed by Allen Qiao on 2015-04-27.

Test Mode: Transmitting (the test distance is 1.5m for above 1GHz, 3m for below 1GHz)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB(1/m))						
Frequency: 5738MHz										
5738	64.16	PK	H	32.15	5.55	0.00	101.86	95.86	114.00	18.14
5738	53.52	AV	H	32.15	5.55	0.00	91.22	85.22	94.00	8.78
5738	69.12	PK	V	32.15	5.55	0.00	106.82	100.82	114.00	13.18
5738	58.79	AV	V	32.15	5.55	0.00	96.49	90.49	94.00	3.51
5706	27.64	PK	V	32.15	5.60	0.00	65.39	59.39	74.00	14.61
5706	15.23	AV	V	32.15	5.60	0.00	52.98	46.98	54.00	7.02
11476	32.17	PK	V	37.88	8.92	26.15	52.82	46.82	74.00	27.18
11476	18.04	AV	V	37.88	8.92	26.15	38.69	32.69	54.00	21.31
17214	30.14	PK	V	40.78	13.81	25.63	59.10	53.10	74.00	20.90
17214	17.65	AV	V	40.78	13.81	25.63	46.61	40.61	54.00	13.39
2136	34.58	PK	V	24.95	3.19	27.35	35.37	29.37	74.00	44.63
2136	22.04	AV	V	24.95	3.19	27.35	22.83	16.83	54.00	37.17
3414	35.62	PK	V	28.52	5.11	27.20	42.05	36.05	74.00	37.95
3414	22.58	AV	V	28.52	5.11	27.20	29.01	23.01	54.00	30.99
720.64	39.50	QP	V	20.88	3.26	22.32	41.32	41.32	46.00	4.68
Frequency: 5773MHz										
5773	63.17	PK	H	32.15	5.48	0.00	100.80	94.80	114.00	19.20
5773	52.42	AV	H	32.15	5.48	0.00	90.05	84.05	94.00	9.95
5773	68.27	PK	V	32.15	5.48	0.00	105.90	99.90	114.00	14.10
5773	57.96	AV	V	32.15	5.48	0.00	95.59	89.59	94.00	4.41
11546	31.95	PK	V	37.90	8.93	26.09	52.69	46.69	74.00	27.31
11546	17.90	AV	V	37.90	8.93	26.09	38.64	32.64	54.00	21.36
17319	30.13	PK	V	41.41	13.20	25.63	59.11	53.11	74.00	20.89
17319	17.50	AV	V	41.41	13.20	25.63	46.48	40.48	54.00	13.52
2136	34.31	PK	V	24.95	3.19	27.35	35.10	29.10	74.00	44.90
2136	21.81	AV	V	24.95	3.19	27.35	22.60	16.60	54.00	37.40
3414	35.38	PK	V	28.52	5.11	27.20	41.81	35.81	74.00	38.19
3414	22.30	AV	V	28.52	5.11	27.20	28.73	22.73	54.00	31.27
720.64	39.10	QP	V	20.88	3.26	22.32	40.92	40.92	46.00	5.08
Frequency: 5808MHz										
5808	61.36	PK	H	32.16	5.55	0.00	99.07	93.07	114.00	20.93
5808	50.25	AV	H	32.16	5.55	0.00	87.96	81.96	94.00	12.04
5808	66.71	PK	V	32.16	5.55	0.00	104.42	98.42	114.00	15.58
5808	56.18	AV	V	32.16	5.55	0.00	93.89	87.89	94.00	6.11
5875	27.65	PK	V	32.18	5.97	0.00	65.80	59.80	74.00	14.20
5875	15.36	AV	V	32.18	5.97	0.00	53.51	47.51	54.00	6.49
11616	31.74	PK	V	37.90	8.91	25.95	52.60	46.60	74.00	27.40
11616	17.87	AV	V	37.90	8.91	25.95	38.73	32.73	54.00	21.27
17424	29.93	PK	V	42.04	12.59	25.55	59.01	53.01	74.00	20.99
17424	17.36	AV	V	42.04	12.59	25.55	46.44	40.44	54.00	13.56
2136	34.17	PK	V	24.95	3.19	27.35	34.96	28.96	74.00	45.04
2136	21.71	AV	V	24.95	3.19	27.35	22.50	16.50	54.00	37.50
3414	35.13	PK	V	28.52	5.11	27.20	41.56	35.56	74.00	38.44
3414	22.23	AV	V	28.52	5.11	27.20	28.66	22.66	54.00	31.34
720.64	39.30	QP	V	20.88	3.26	22.32	41.12	41.12	46.00	4.88

FCC §15.215(c) – 20 dB BANDWIDTH TESTING

Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09

* **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

Temperature:	24.3 °C
Relative Humidity:	51 %
ATM Pressure:	101kPa

* The testing was performed by Allen Qiao on 2015-04-22..

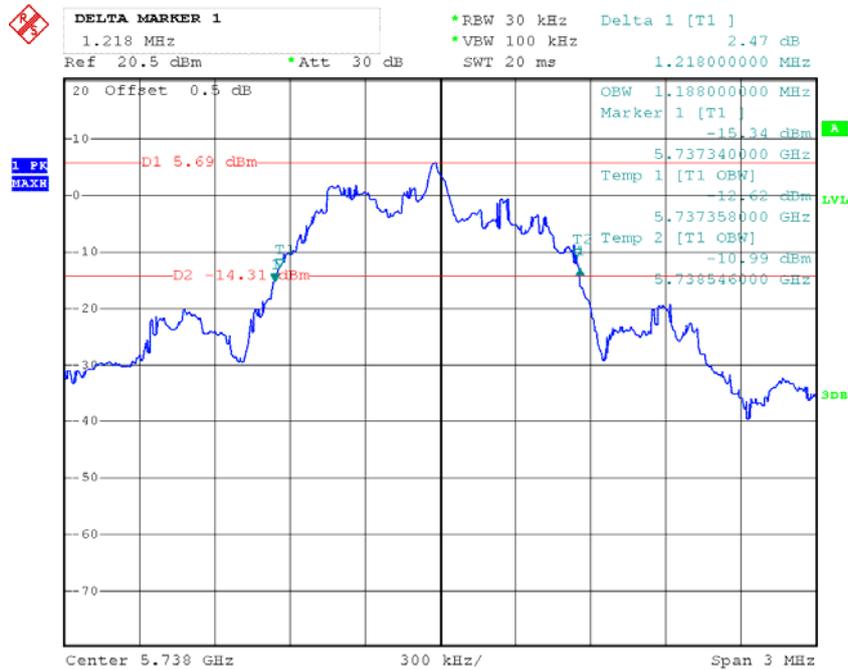
Test Result: Compliant.

Please refer to following tables and plots

Test Mode: Transmitting

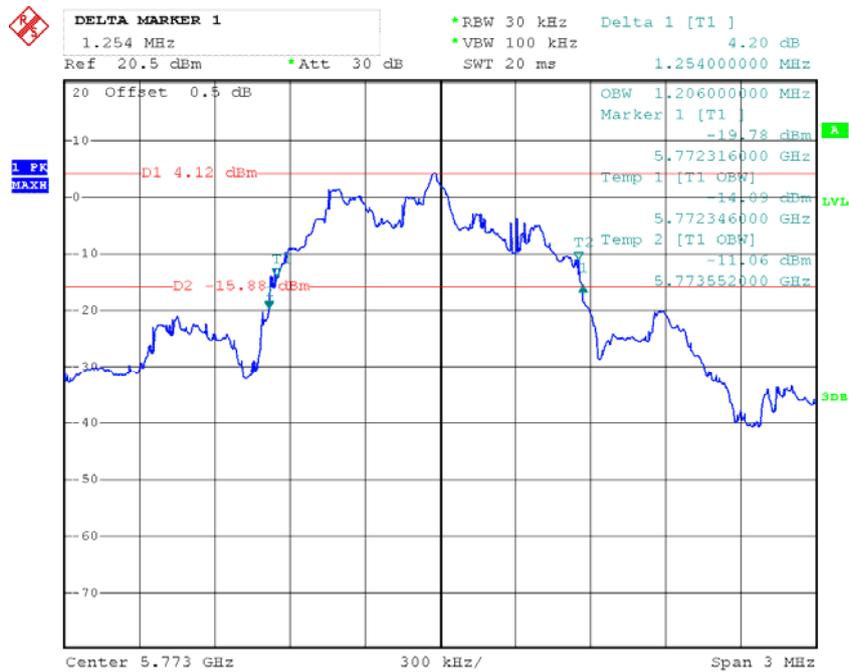
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	5738	1.218
Middle	5773	1.254
High	5808	1.260

Low Channel



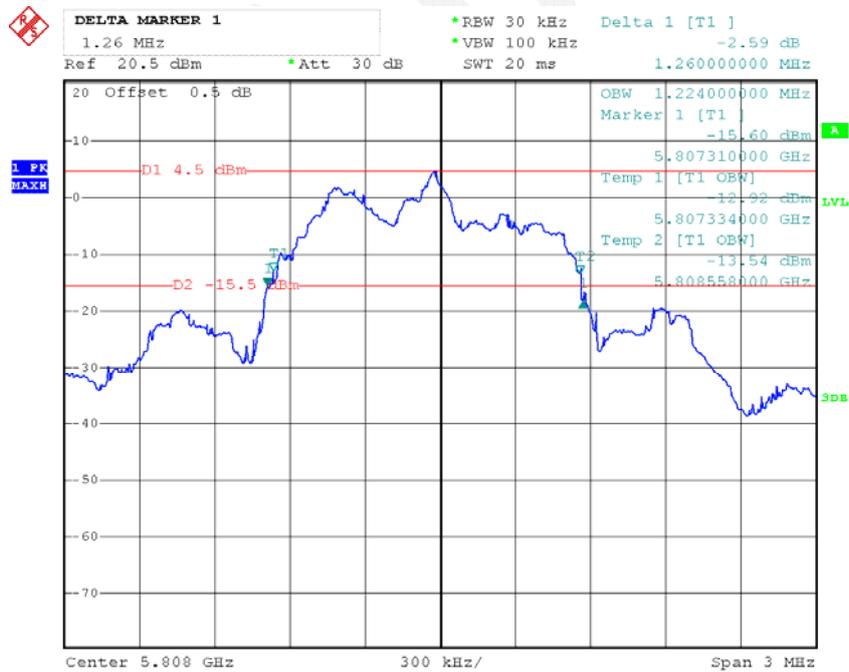
Date: 22.APR.2015 15:35:52

Middle Channel



Date: 22.APR.2015 15:38:08

High Channel



Date: 22.APR.2015 15:44:22

FCC§15.249(d) - OUT OF BAND EMISSION (50 dB ATTENUATION)

Applicable Standard

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09

* **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

Temperature:	24.3 °C
Relative Humidity:	51 %
ATM Pressure:	101kPa

* The testing was performed by Allen Qiao on 2015-04-22..

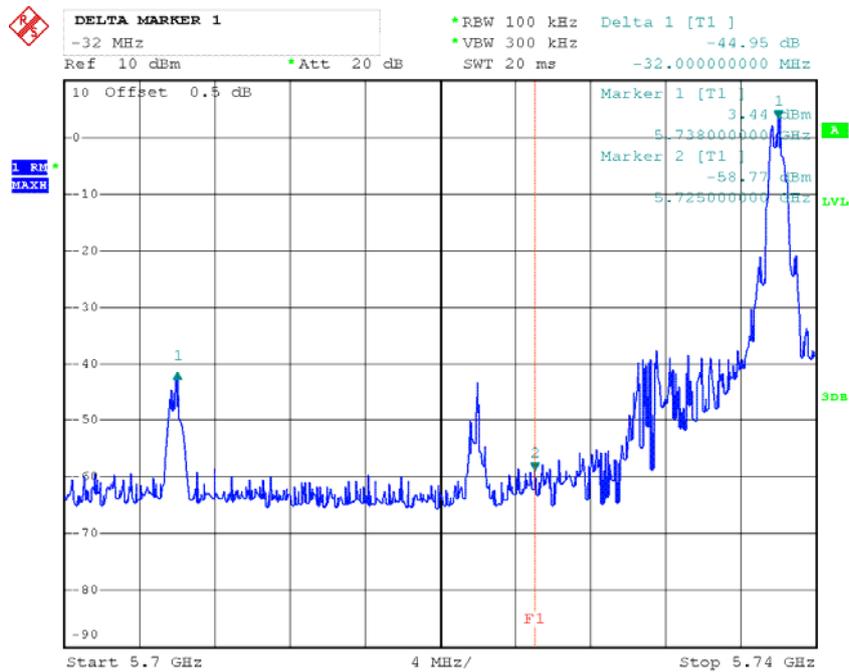
Test Result: Compliant.

Please refer to the following table and plots:

Band Edge	Delta Peak to Band Emission (dBc)	Delta Limit (dBc)
Left	44.95 ^{note}	50
Right	63.58	50

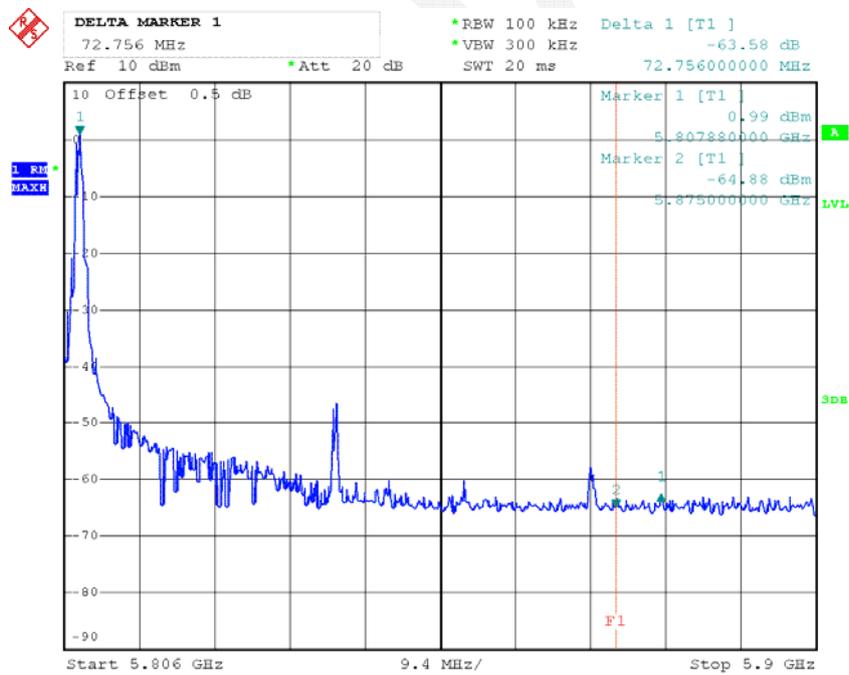
Note: The band edge emission compliant with the general radiated emission limits in §15.209, please refer to radiated emissions test section.

Band Edge, Left Side



Date: 22.APR.2015 16:04:49

Band Edge, Right Side



Date: 22.APR.2015 16:03:08

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