



TESTING LABORATORY
CERTIFICATE #4820.01



FCC PART 15.249

TEST REPORT

For

Xiamen Huoshiquan Import & Export CO., LTD

Room 703, No. 813-2 Xiahe Road, Siming District, XIAMEN, China

FCC ID: 2AJ55HOLYSTONEDG

Report Type: Original Report	Product Name: RC Quadcopter
Report Number:	RXM180428051-00A
Report Date:	2018-07-25
Reviewed By:	Jerry Zhang EMC Manager
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* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk “*”.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	RC Quadcopter
EUT Model:	F181G
Multiple Models:	HS100G, HS100PRO, HS100U, HS100S, HS100C, HS100W, HS100D, HS100B, HS100M, HS161, HS161G, HS162, HS162G, HS163, HS163G, HS164, HS164G, HS166, HS166G, HS167, HS167G, HS168, HS168G, HS169, HS169G, HS150G, HS150M, HS150S, HS150PRO, HS150P, HS230, HS230G, HS230C, HS230W, HS230B, HS230S, HS230U, HS230PRO, HS230P, HS700, HS700G, HS700PRO, HS700W, HS700U, HS700C, HS700B, HS700S, HS710, HS710G, HS710S, HS710W, HS710C, HS710B, HS710D, HS710PRO, HS720, HS720G, HS730, HS730G, HS740, HS740G, HS750, HS750G, HS760, HS760G, HS770, HS770G, HS780, HS780G, HS790, HS790G, HS500, HS500G, HS510, HS510G, HS520, HS520G, HS530, HS530G, HS540, HS540G, HS600, HS600G, HS610, HS610G, HS620, HS620G, HS630, HS630G, HS640, HS640G, HS120D, HS120G, HS120PRO, HS130D, HS130G, HS130PRO, HS210, HS240, HS280, HS310, HS350, HS360, HS380, HS410, HS440, HS480, HS490, HS510, HS530, HS550, HS620, HS640, HS650, HS660, HS670, HS710, HS760, HS770, HS800, HS830, HS840, HS850, HS870, HS880, HS900, HS920, HS950, HS960
FCC ID:	2AJ55HOLYSTONEDG
Rated Input Voltage:	DC 3.7V from battery
External Dimension:	300mm(L)*300mm(W)*105mm(H)
Serial Number:	180428051
EUT Received Date:	2018.05.01

Note: The series product are electrically identical, we selected F181G fully test, and please refer to the declaration letter for details.

Objective

This type approval report is prepared on behalf of *Xiamen Huoshiquan Import & Export CO., LTD* in accordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

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

Related Submittal(s)/Grant(s)

Part of system submissions with FCC ID: 2AJ55HOLYSTONEDY.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

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

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
Unwanted Emissions, radiated	30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical 1G~6GHz: 4.45 dB, 6G~26.5GHz: 5.23 dB
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

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 Industry Area, Tangxia, Dongguan, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured in swept mode for testing which was provided by the manufacturer.

The device only operates on frequency: 5790 MHz.

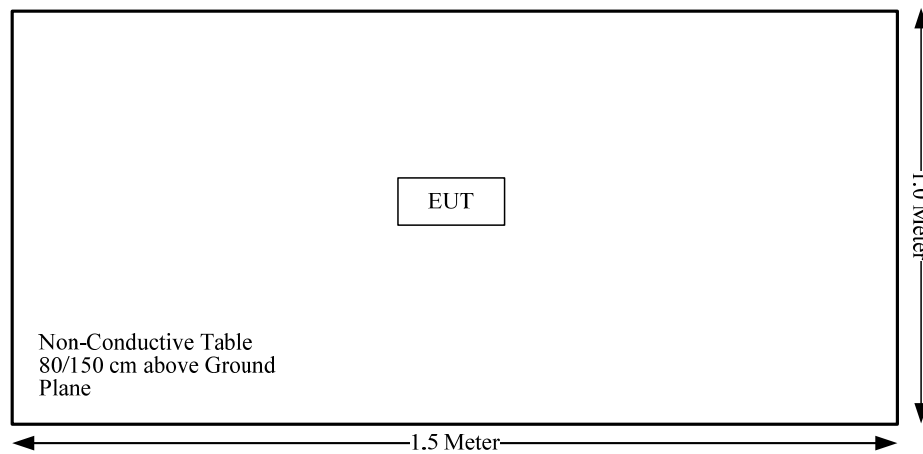
EUT Exercise Software

No software was used in test, the device was configured to engineer mode by manufacturer.

Equipment Modifications

No modifications were made to the EUT.

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

Not Applicable: the device was powered by battery, the battery should be removed when charging.

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 has one internal antenna arrangement for 5790MHz transmission, and the antenna gain is 4.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliant.

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:

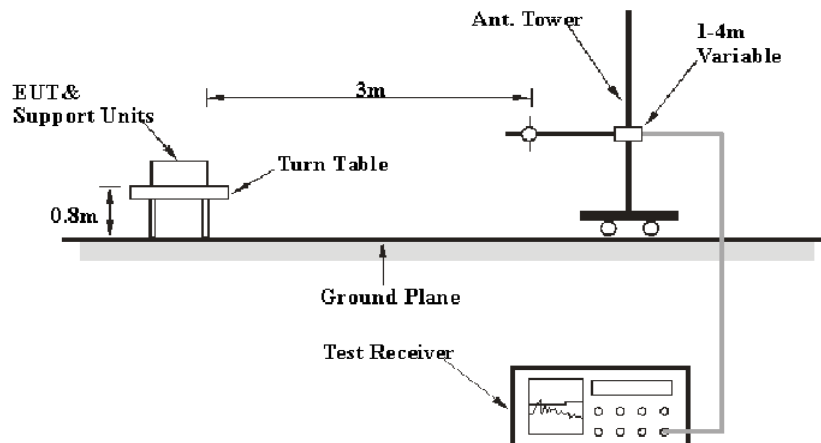
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

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

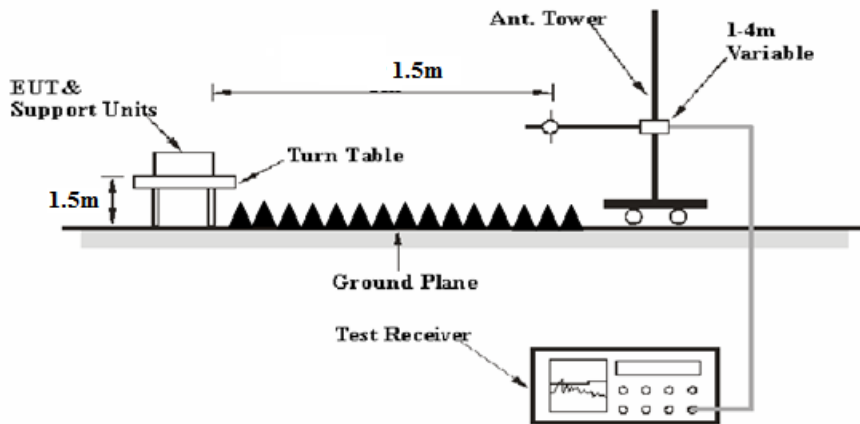
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

EUT Setup

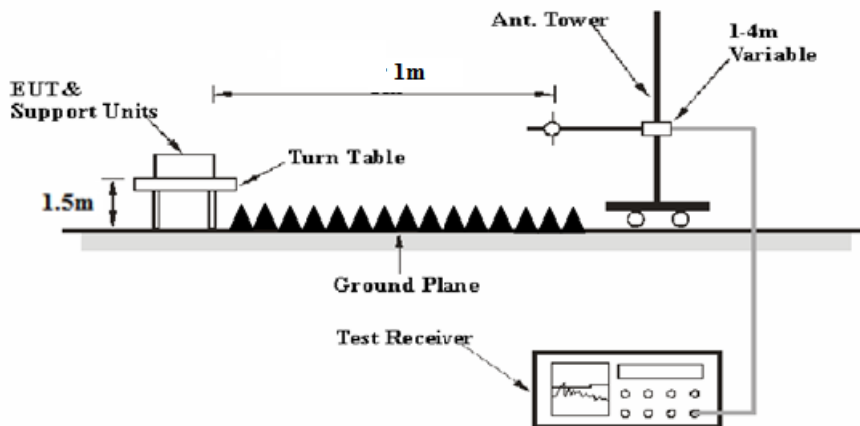
Below 1 GHz:



1-26.5 GHz:



26.5-40 GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, FCC 15.249 limits.

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

Test Procedure

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

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

According to C63.10, the above 1G test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1.5m or 1m

Distance extrapolation factor = $20 \log (\text{specific distance [3m]}/\text{test distance [1.5m]})$ dB= 6.02 dB
or

Distance extrapolation factor = $20 \log (\text{specific distance [3m]}/\text{test distance [1m]})$ dB= 9.54 dB

All emissions under the average limit and under the noise floor have not recorded in the report.

Corrected Amplitude & Margin Calculation

For the range 30MHz-1GHz, 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:

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

For the range 1GHz-40GHz, Test performed at 1.5m, the Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading and the Distance extrapolation factor. The basic equation is as follows:

$$\begin{aligned} &\text{Extrapolation result} \\ &= \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain} - \text{Distance extrapolation factor} \end{aligned}$$

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:

$$\text{Margin} = \text{Limit} - \text{Extrapolation result}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-12-11	2018-12-11
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
HP	Amplifier	8447D	2727A05902	2017-09-05	2018-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2018-01-04	2019-01-04
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-08	2018-12-08
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-01 1302	2016-11-18	2019-11-18
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2018-06-27	2019-06-27
MITEQ	Amplifier	AFS42-00101800- 25-S-42	2001271	2017-09-05	2018-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2018-06-27	2019-06-27
Sinoscite	Bandstop Filters	BSF5150-5850MN- 0899-003	0899003	2018-05-06	2019-05-06
Mini Circuits	High Pass Filter	VHF-6010+	31118	2018-06-16	2019-06-16

* **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**

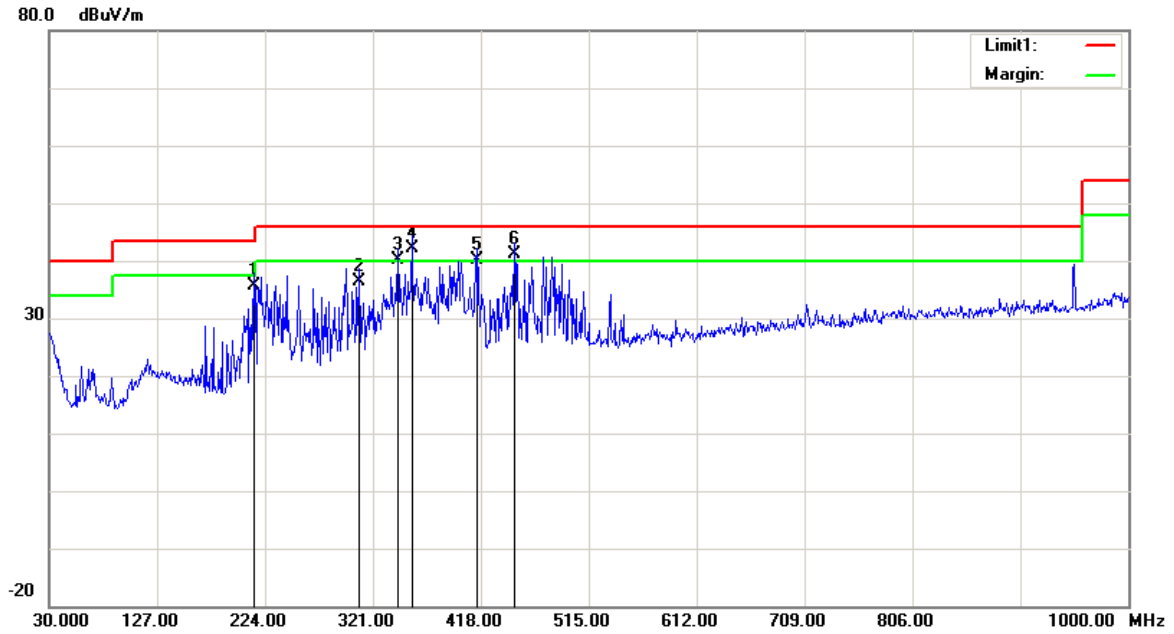
Temperature:	26.5 °C
Relative Humidity:	40 %
ATM Pressure:	99.8 kPa

The testing was performed by Blake Yang on 2018-07-18.

Test Mode: Transmitting

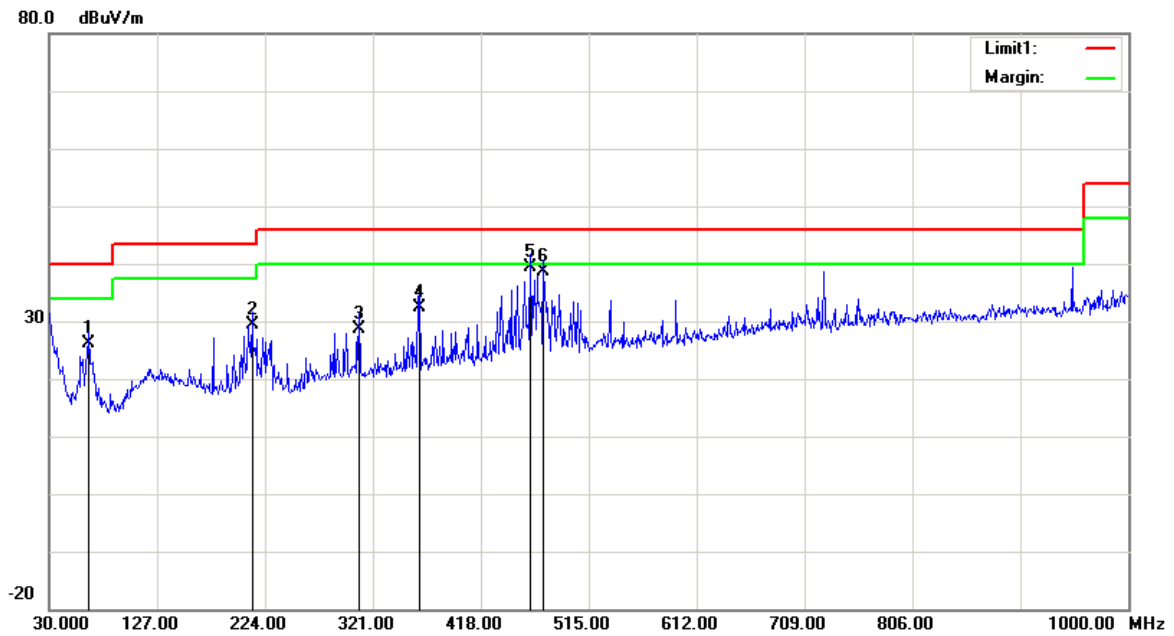
1) 30MHz-1GHz:

Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
214.3000	42.79	QP	-7.19	35.60	43.50	7.90
308.3900	40.20	QP	-3.90	36.30	46.00	9.70
343.3100	43.48	QP	-3.28	40.20	46.00	5.80
355.9200	45.04	QP	-2.94	42.10	46.00	3.90
415.0900	41.91	QP	-1.71	40.20	46.00	5.80
448.0700	42.42	QP	-1.22	41.20	46.00	4.80

Vertical:



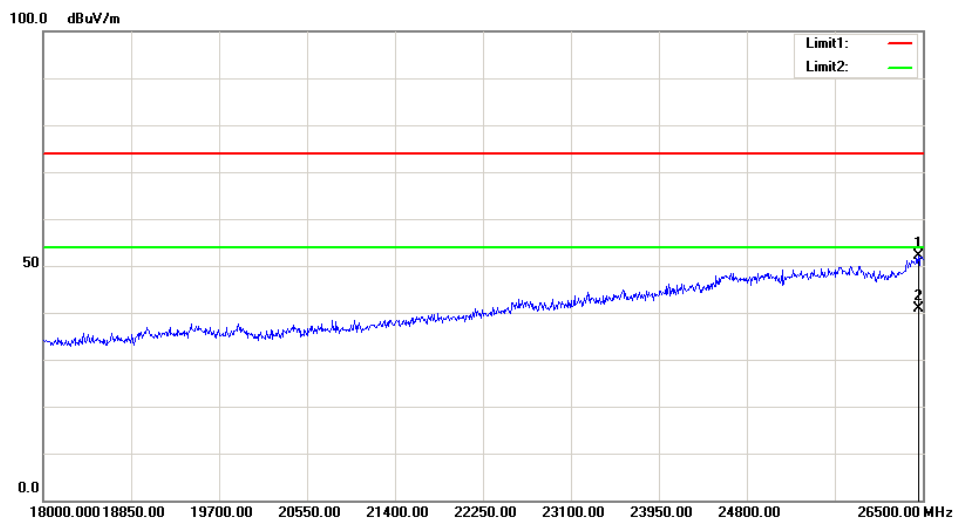
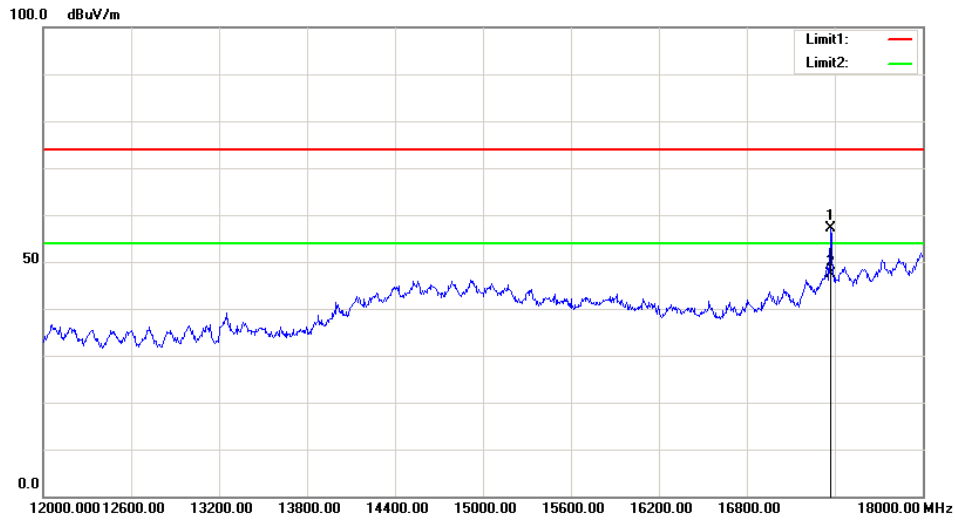
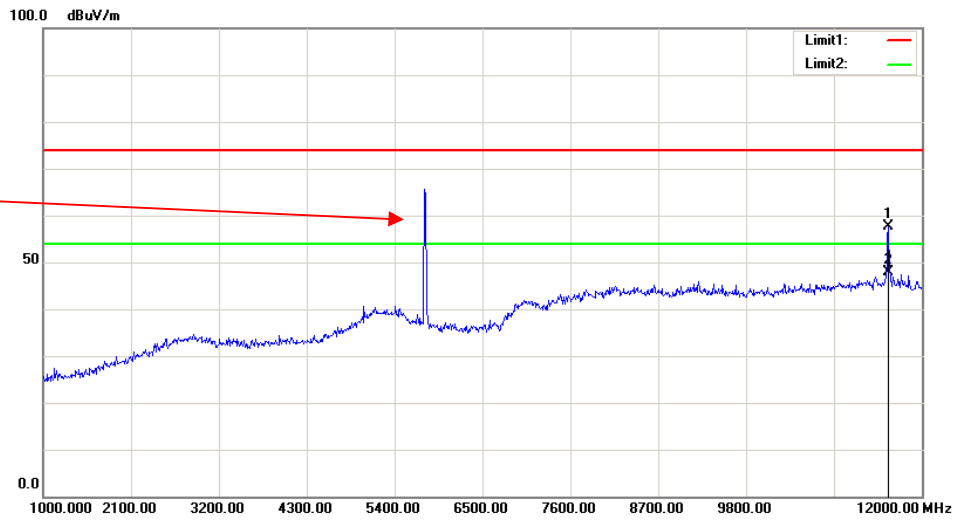
Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
65.8900	37.86	QP	-11.76	26.10	40.00	13.90
212.3600	36.82	QP	-7.32	29.50	43.50	14.00
308.3900	32.50	QP	-3.90	28.60	46.00	17.40
362.7100	35.28	QP	-2.78	32.50	46.00	13.50
462.6200	40.14	QP	-0.74	39.40	46.00	6.60
474.2600	39.02	QP	-0.42	38.60	46.00	7.40

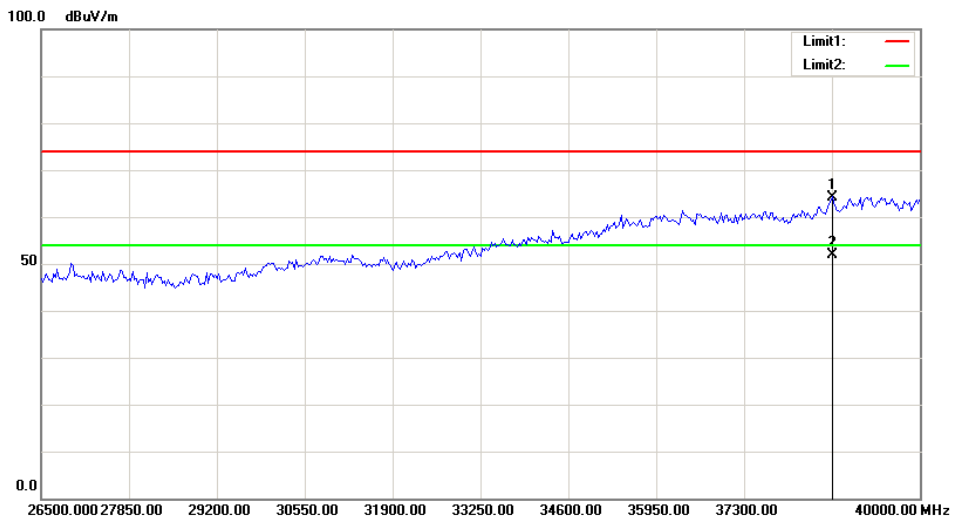
2) 1GHz-40GHz

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	Polar (H/V)	Factor (dB(1/m))						
Test Frequency: 5790 MHz										
5790.00	50.16	PK	H	34.22	3.71	0.00	88.09	82.07	113.98	31.91
5790.00	44.12	AV	H	34.22	3.71	0.00	82.05	76.03	93.98	17.95
5790.00	58.80	PK	V	34.22	3.71	0.00	96.73	90.71	113.98	23.27
5790.00	53.31	AV	V	34.22	3.71	0.00	91.24	85.22	93.98	8.76
5725.00	27.99	PK	V	34.19	3.69	0.00	65.87	59.85	74.00	14.15
5725.00	13.85	AV	V	34.19	3.69	0.00	51.73	45.71	54.00	8.29
5875.00	26.93	PK	V	34.25	3.77	0.00	64.95	58.93	74.00	15.07
5875.00	14.29	AV	V	34.25	3.77	0.00	52.31	46.29	54.00	7.71
11580.00	58.08	PK	V	39.00	6.62	37.45	66.25	60.23	74.00	13.77
11580.00	48.78	AV	V	39.00	6.62	37.45	56.95	50.93	54.00	3.07
17370.00	52.45	PK	V	42.35	8.82	38.51	65.11	59.09	74.00	14.91
17370.00	43.54	AV	V	42.35	8.82	38.51	56.20	50.18	54.00	3.82

Test plots Horizontal

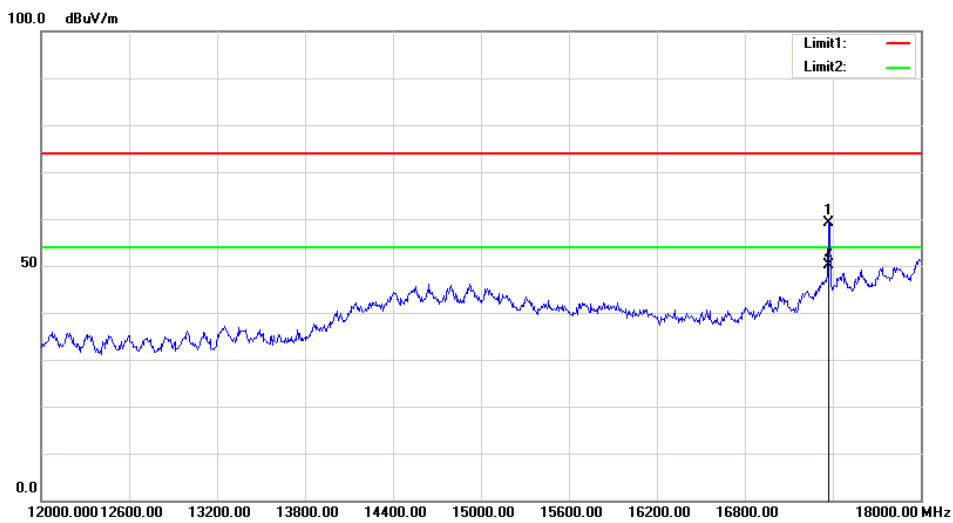
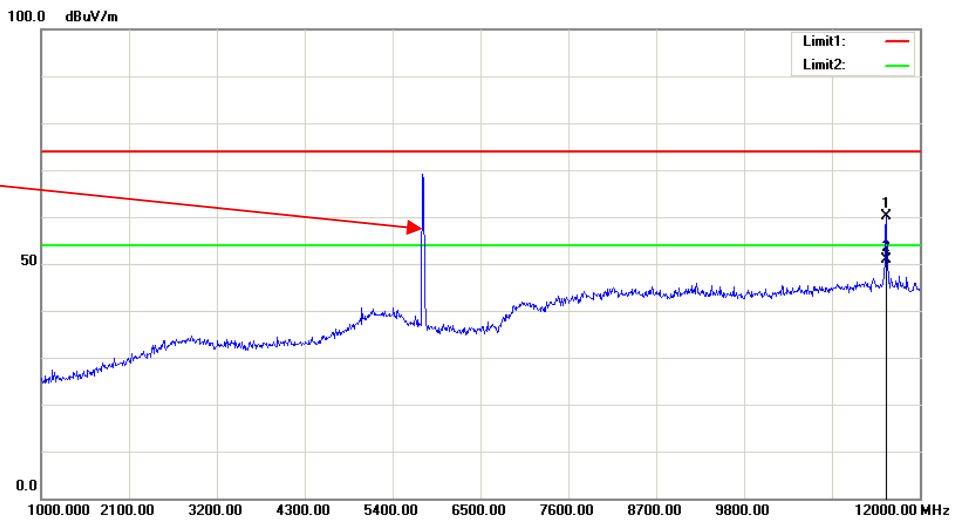
Fundamental
Test with Band
Rejection Filter

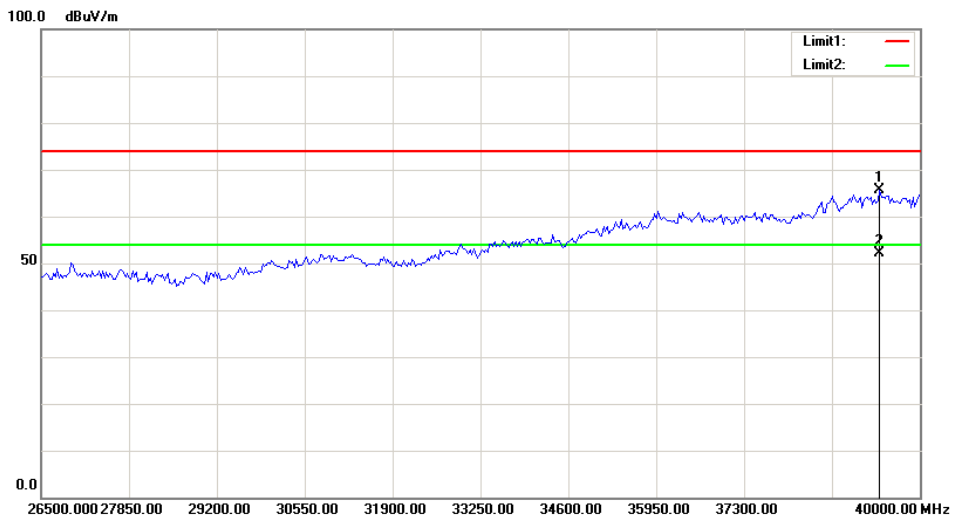
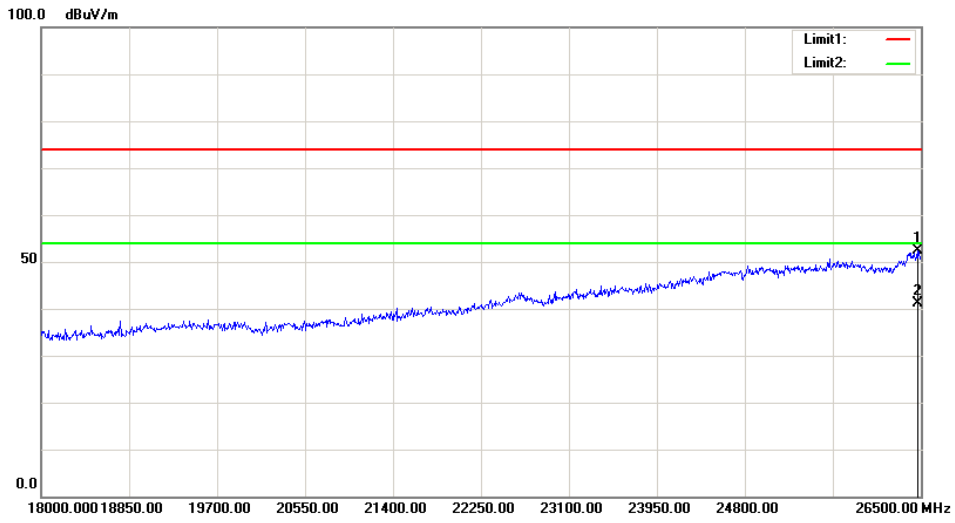




Vertical

Fundamental Test with Band Rejection Filter





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. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
3. 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	FSU 26	200256	2018-01-04	2019-01-04
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	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 Data

Environmental Conditions

Temperature:	27.4 °C
Relative Humidity:	60 %
ATM Pressure:	100.3 kPa

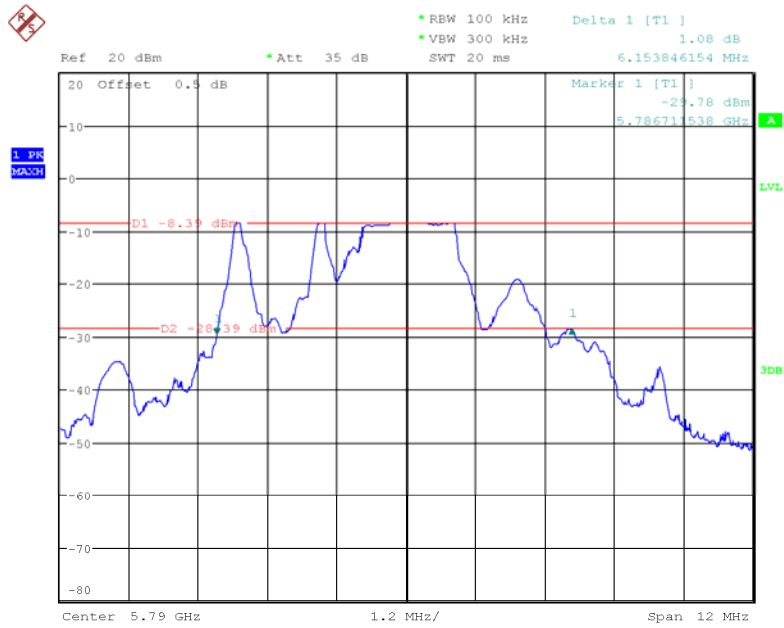
The testing was performed by Emily Wang on 2018-07-20.

Test Result: Compliant.

Please refer to following tables and plots

Test Mode: Transmitting

Frequency (MHz)	20 dB Bandwidth (MHz)
5790	6.154



Date: 20.JUL.2018 17:12:42

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