

FCC PART 15.249

TEST REPORT

For

GODOX PHOTO EQUIPMENT CO.LTD

19th Floor,Room 1902,Building Jinshan,5033 Shennan East Road,Luohu District,Shenzhen 518001,China

FCC ID: 2ABYNX2T

Report Type: Original Report	Product Name: TTL Wireless Flash Trigger
Report Number: RDG190529001-00B	
Report Date: 2019-06-19	
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* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk “*” .

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	3
MEASUREMENT UNCERTAINTY.....	4
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
JUSTIFICATION	5
EUT EXERCISE SOFTWARE	5
EQUIPMENT MODIFICATIONS	5
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS	5
SUPPORT CABLE LIST AND DETAILS	5
BLOCK DIAGRAM OF TEST SETUP	6
SUMMARY OF TEST RESULTS	7
FCC§15.203 - ANTENNA REQUIREMENT.....	8
APPLICABLE STANDARD	8
ANTENNA CONNECTOR CONSTRUCTION	8
FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS	9
APPLICABLE STANDARD	9
EUT SETUP	9
TEST EQUIPMENT SETUP.....	10
TEST PROCEDURE	11
CORRECTED AMPLITUDE & MARGIN CALCULATION	11
TEST EQUIPMENT LIST AND DETAILS.....	11
TEST DATA	12
FCC §15.215(C) – 20 DB BANDWIDTH TESTING.....	17
APPLICABLE STANDARD	17
TEST PROCEDURE	17
TEST EQUIPMENT LIST AND DETAILS.....	17
TEST DATA	17

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	TTL Wireless Flash Trigger
EUT Model:	X2TC
Multiple Models:	X2TN, X2TS, X2TO, X2TF, X2TP
Operation Frequency:	2412.99-2464.52 MHz
Modulation Type:	MSK
Rated Input Voltage:	DC3V from battery
External Dimension:	72mm(L)*70mm(W)*58mm(H)
Serial Number:	190529001
EUT Received Date:	2019-06-03

Notes: Model X2TC was selected for fully testing, the detailed information about the difference among X2TN, X2TS, X2TO, X2TF, X2TP and model X2TC can be referred to the declaration letter which was stated and guaranteed by the manufacturer.

Objective

This type approval report is prepared on behalf of **GODOX PHOTO EQUIPMENT 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)

FCC Part 15.247 DTS submission with FCC ID: 2ABYNX2T

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	$\pm 5\%$
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	$\pm 1^{\circ}\text{C}$
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 0.4\%$
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 lab has been recognized as the FCC accredited lab 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 lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

SYSTEM TEST CONFIGURATION

Justification

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

The device employs total 32 channels, please refer the circuit description.

2412.99MHz, 2437.99 MHz, 2464.52 MHz was selected for test.

EUT Exercise Software

No software was used in test.

Equipment Modifications

No modifications were made to the EUT.

Local Support Equipment List and Details

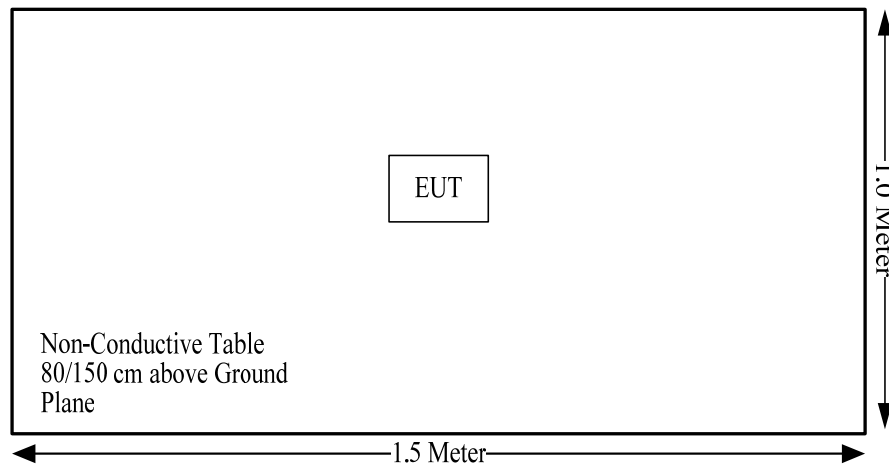
Manufacturer	Description	Model	Serial Number
Cannon	Camera	/	/
GODOX	Wireless Original Flash Trigger	TT585C	/

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
/	/	/	/	/	/

Block Diagram of Test Setup

Radiated Emissions:



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: this device is powered by battery.

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, and the antenna gain is 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:

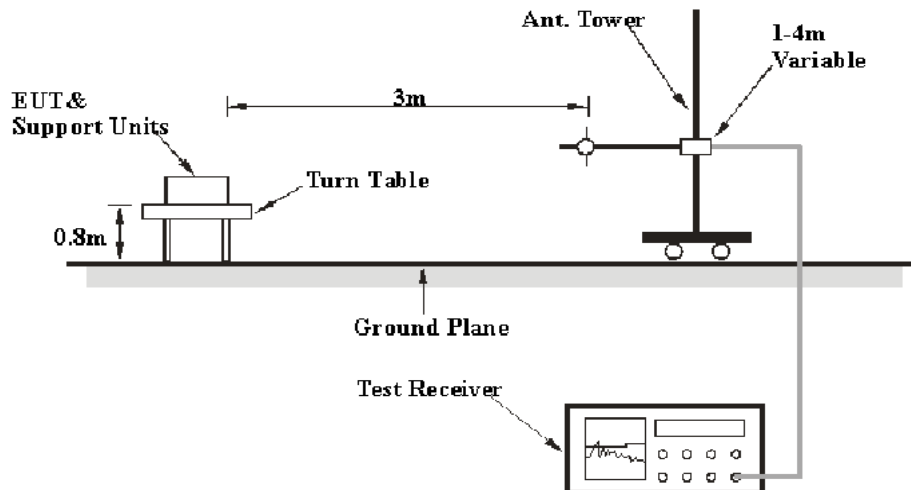
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

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

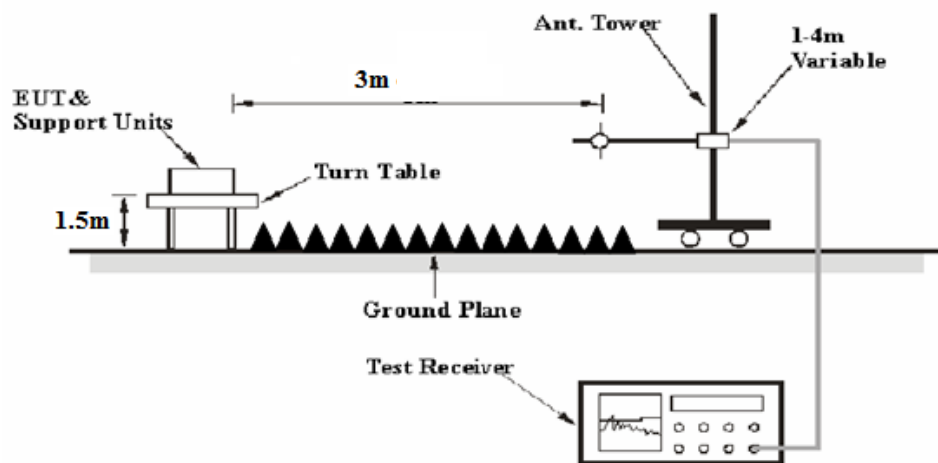
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission below 1GHz tests were performed in the 3 meters chamber test site A, above 1GHz tests were performed in the 3 meters chamber test site B, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.249 limits.

Test Equipment Setup

The system was investigated from 30 MHz to 25 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

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

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 30 MHz to 1GHz, peak and average detection mode above 1 GHz.

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	2018-12-10	2019-12-10
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	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2018-09-05	2019-09-05
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-01-04	2020-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2018-06-27	2019-06-27
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2018-06-27	2019-06-27
E-Microwave	Band-stop Filters	OBSF-2400-2483.5-S	OE01601525	2018-06-16	2019-06-16
Micro-tronics	High Pass Filter	HPM50111	S/N-G217	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**

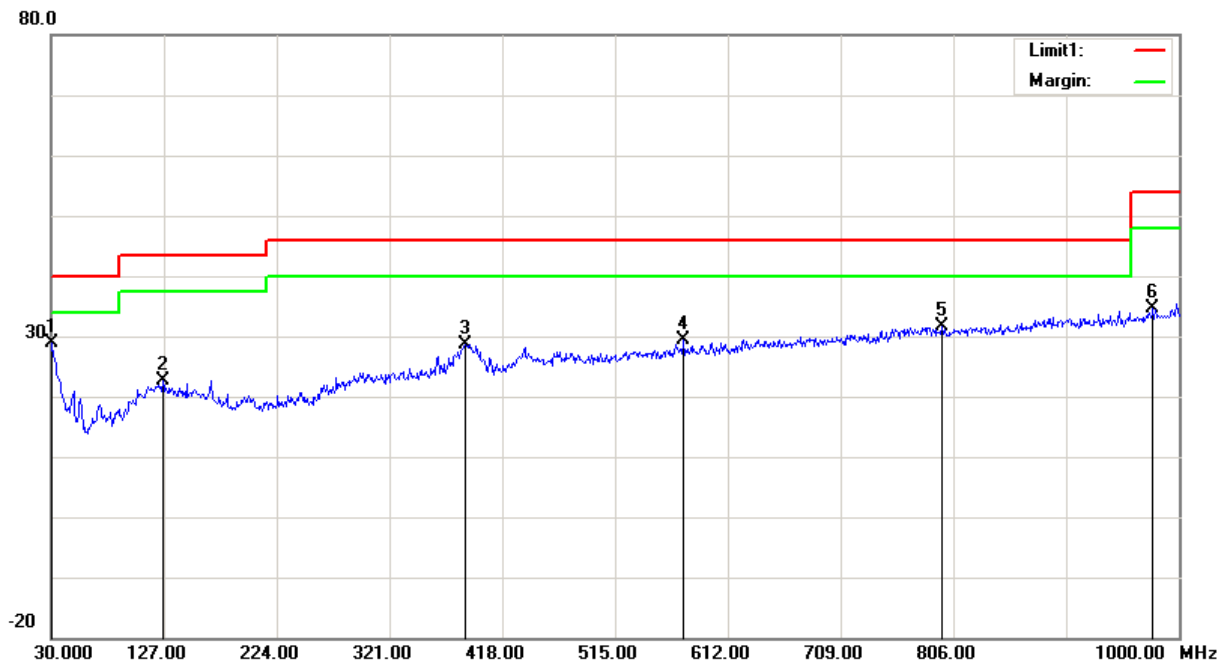
Temperature:	26.4°C
Relative Humidity:	64 %
ATM Pressure:	101.0kPa

* The testing was performed by Lucy Lu on 2019-06-05.

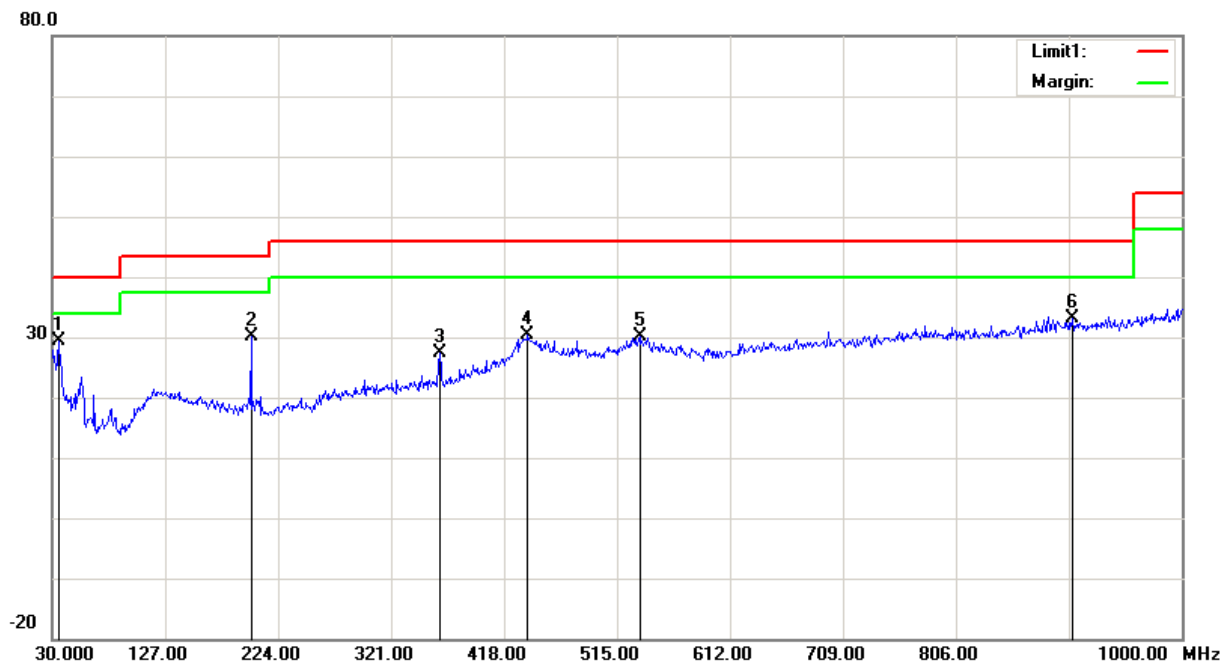
Test Mode: Transmitting

1) 30MHz-1GHz (High channel is the worst):

Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.9700	27.85	peak	0.91	28.76	40.00	11.24
126.0300	27.27	peak	-4.69	22.58	43.50	20.92
385.9900	31.11	peak	-2.38	28.73	46.00	17.27
574.1700	28.28	peak	1.07	29.35	46.00	16.65
796.3000	27.40	peak	4.31	31.71	46.00	14.29
977.6900	33.22	peak	1.29	34.51	54.00	19.49

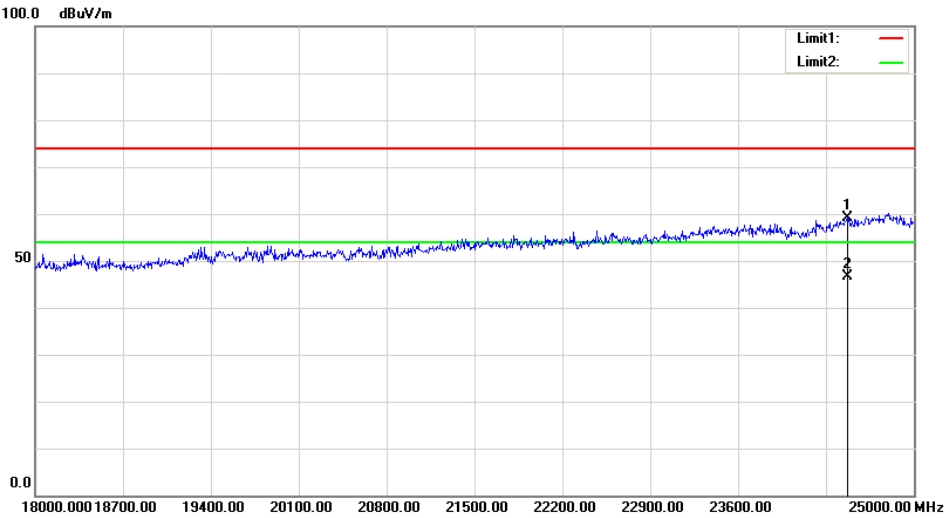
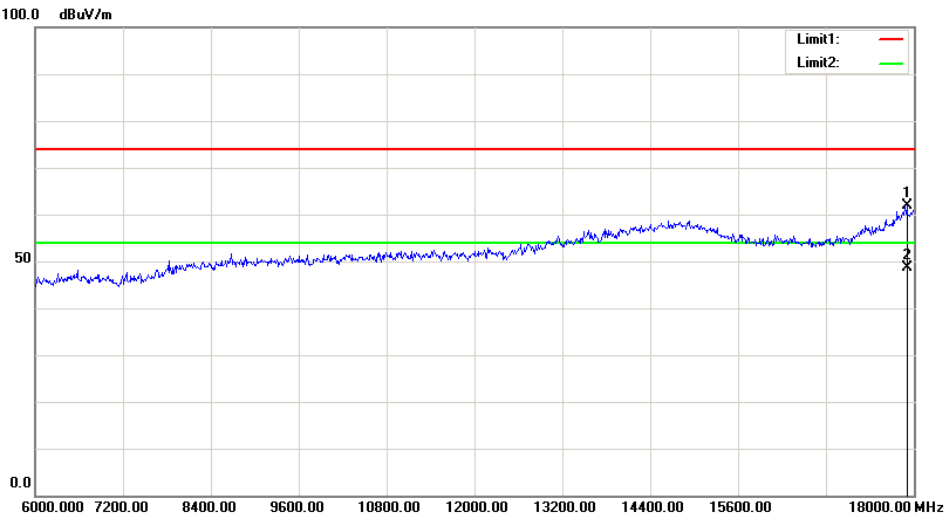
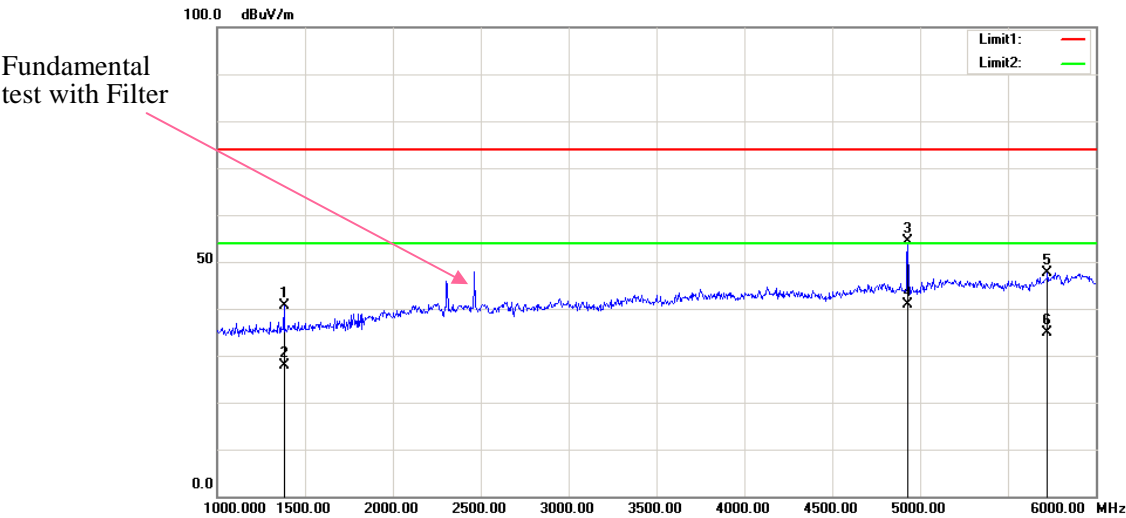
Vertical:

Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
35.8200	32.02	peak	-2.59	29.43	40.00	10.57
200.7200	36.12	peak	-5.88	30.24	43.50	13.26
362.7100	30.18	peak	-2.81	27.37	46.00	18.63
438.3700	31.60	peak	-1.22	30.38	46.00	15.62
534.4000	29.79	peak	0.32	30.11	46.00	15.89
905.9100	33.04	peak	0.20	33.24	46.00	12.76

2) 1GHz-25GHz

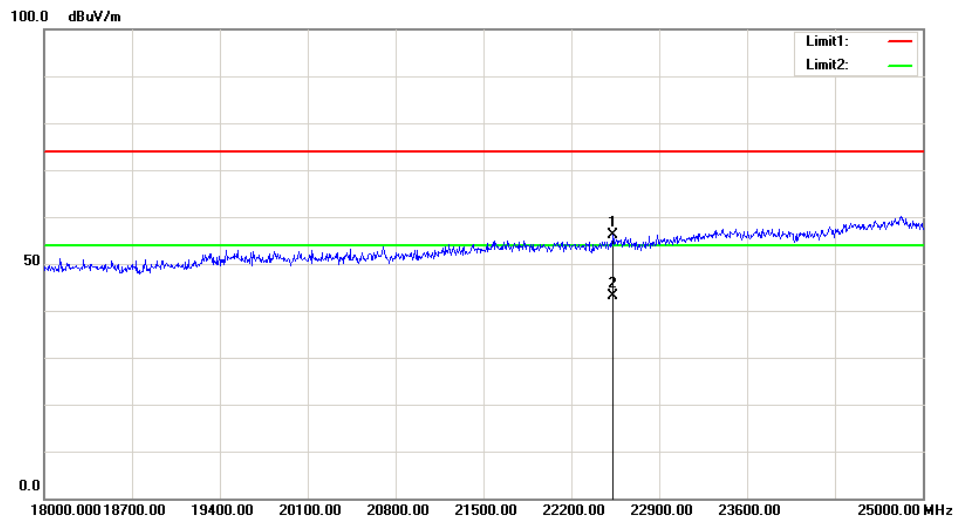
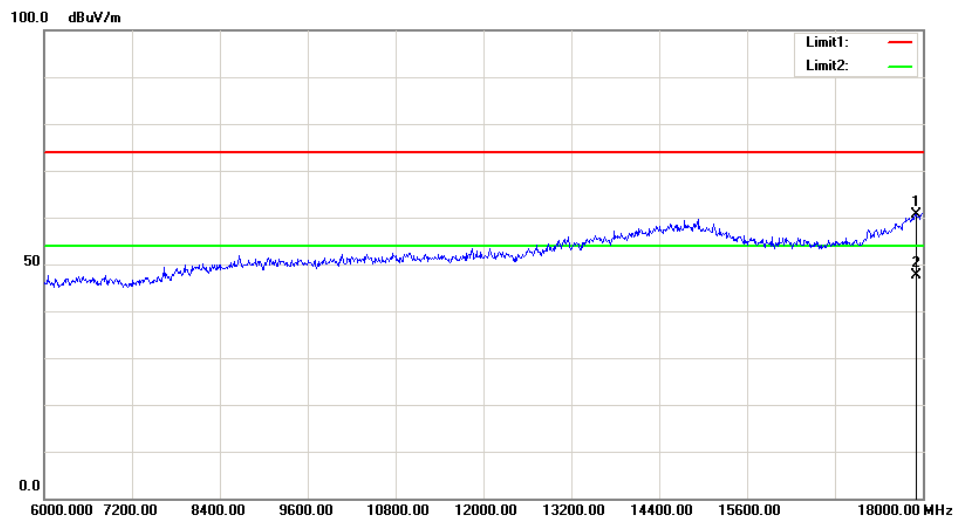
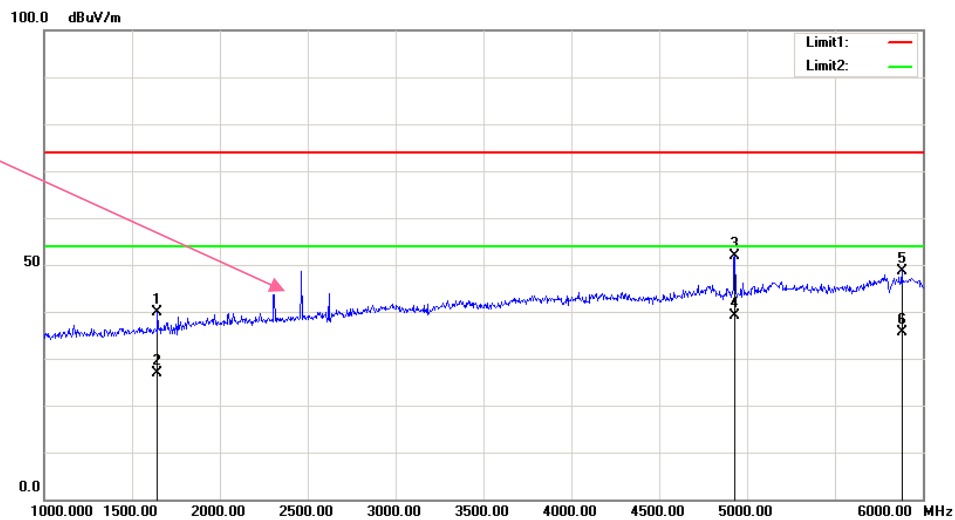
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412.99 MHz									
2412.99	69.39	PK	H	28.13	1.81	0.00	99.33	113.98	14.65
2412.99	54.27	AV	H	28.13	1.81	0.00	84.21	93.98	9.77
2412.99	59.29	PK	V	28.13	1.81	0.00	89.23	113.98	24.75
2412.99	44.35	AV	V	28.13	1.81	0.00	74.29	93.98	19.69
2400.00	34.43	PK	H	28.10	1.80	0.00	64.33	74.00	9.67
2400.00	12.94	AV	H	28.10	1.80	0.00	42.84	54.00	11.16
4825.98	53.03	PK	H	32.95	3.20	37.20	51.98	74.00	22.02
4825.98	39.61	AV	H	32.95	3.20	37.20	38.56	54.00	15.44
7238.97	44.00	PK	H	35.82	4.76	37.27	47.31	74.00	26.69
7238.97	31.40	AV	H	35.82	4.76	37.27	34.71	54.00	19.29
Middle Channel: 2437.99 MHz									
2437.99	68.77	PK	H	28.18	1.82	0.00	98.77	113.98	15.21
2437.99	53.65	AV	H	28.18	1.82	0.00	83.65	93.98	10.33
2437.99	60.64	PK	V	28.18	1.82	0.00	90.64	113.98	23.34
2437.99	45.56	AV	V	28.18	1.82	0.00	75.56	93.98	18.42
4875.98	54.30	PK	H	33.05	3.27	37.21	53.41	74.00	20.59
4875.98	40.38	AV	H	33.05	3.27	37.21	39.49	54.00	14.51
7313.97	44.26	PK	H	36.02	4.63	37.37	47.54	74.00	26.46
7313.97	31.29	AV	H	36.02	4.63	37.37	34.57	54.00	19.43
High Channel: 2464.52 MHz									
2464.52	68.36	PK	H	28.23	1.83	0.00	98.42	113.98	15.56
2464.52	54.21	AV	H	28.23	1.83	0.00	84.27	93.98	9.71
2464.52	60.05	PK	V	28.23	1.83	0.00	90.11	113.98	23.87
2464.52	44.92	AV	V	28.23	1.83	0.00	74.98	93.98	19.00
2483.50	31.00	PK	H	28.27	1.84	0.00	61.11	74.00	12.89
2483.50	14.56	AV	H	28.27	1.84	0.00	44.67	54.00	9.33
4929.04	55.20	PK	H	33.16	3.27	37.23	54.40	74.00	19.60
4929.04	41.64	AV	H	33.16	3.27	37.23	40.84	54.00	13.16
7393.56	44.73	PK	H	36.22	4.50	37.47	47.98	74.00	26.02
7393.56	31.89	AV	H	36.22	4.50	37.47	35.14	54.00	18.86

Test plots (High channel):
Horizontal



Vertical

Fundamental
test with 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	FSV40	101474	2019-01-09	2020-01-09
Unknown	Coaxial Cable	C-SJ00-0010	C0010/04	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:	26.1 °C
Relative Humidity:	52 %
ATM Pressure:	100.5 kPa

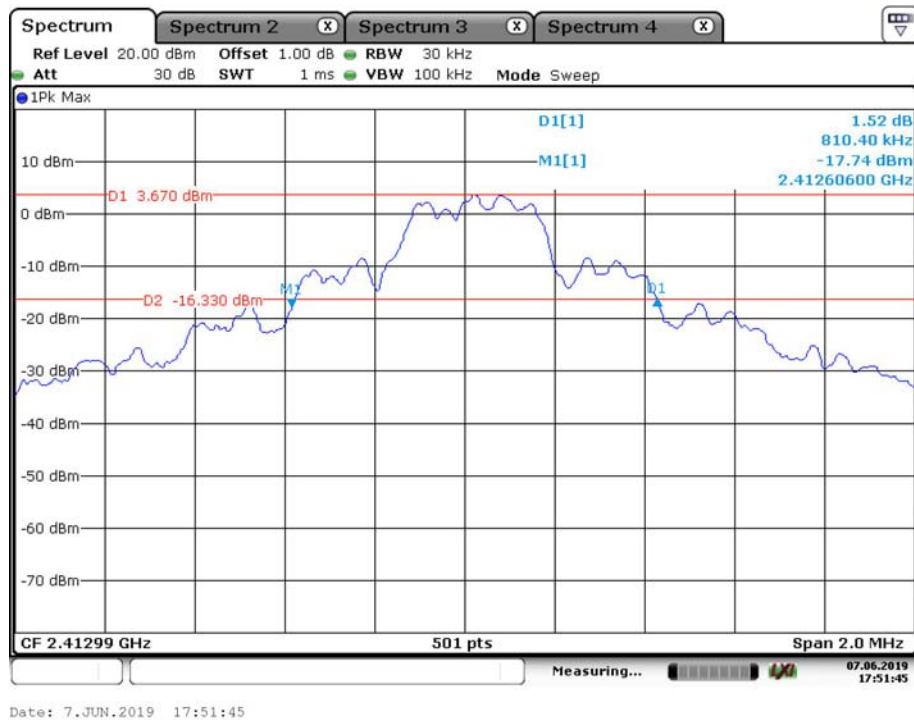
The testing was performed by Carrie He on 2019-06-07.

Test Result: Compliant.

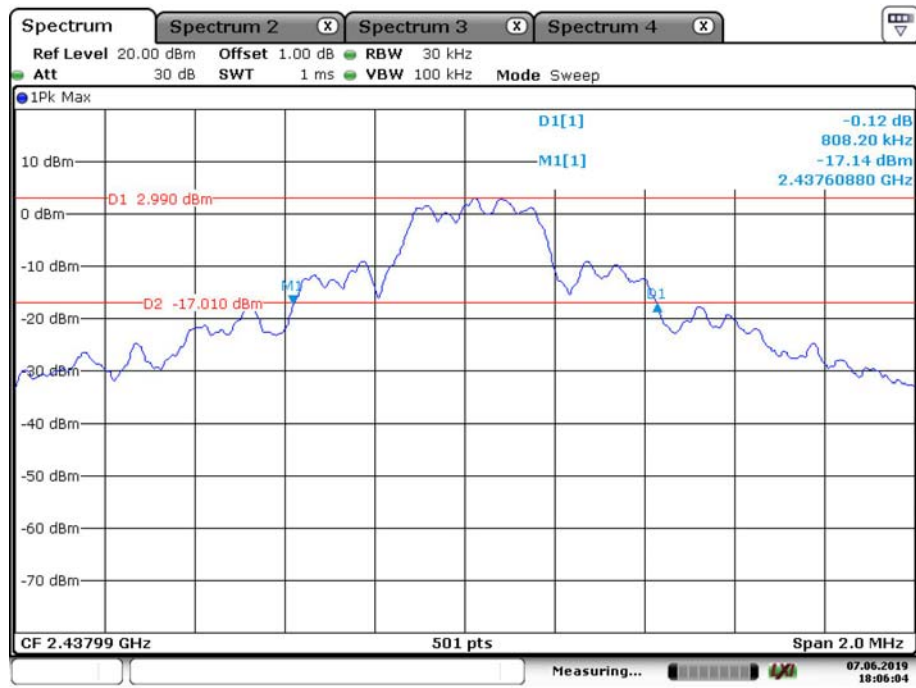
Please refer to following tables and plots

Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2412.99	0.810
Middle	2437.99	0.808
High	2464.52	0.800

Low Channel

Middle Channel



Date: 7.JUN.2019 18:06:04

High Channel



Date: 7.JUN.2019 18:07:33

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