FCC PART 15.249

TEST REPORT

For

Zeeva International Limited

Suite 1007B,10th Floor, Exchange Tower, 33 Wang Chiu Road, Kowloon Bay, Hong Kong

FCC ID: 2ADM5-MO-0030

Report Type:	**Product Type:**
Original Report	WIRELESS ARC MOUSE

Report Number:	RSZ191011830-00
Report Date:	2020-02-14
Reviewed By:	Kieron Luo RF Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	WIRELESS ARC MOUSE
Tested Model	MO-0030
Multiple Model	MO-0029, MO-0028, MO-0027, MO-0026
UPC Number	192234035764
SKU Number	3222502
Frequency Range	2403MHz~2479MHz
Modulation Technique	GFSK
Antenna Specification	-10 dBi
Voltage Range	DC 2 * 1.5 V AAA battery
Date of Test	2019-11-20 to 2020-02-14
Sample serial number	RSZ191011830-RF-S1(Assigned by BACL, Shenzhen)
Received date	2019-10-11
Sample/EUT Status	Good condition

Notes: This series products model: MO-0029, MO-0028, MO-0027, MO-0026 and MO-0030 are identical schematics. Model MO-0030 was selected for fully testing, the detailed information can be referred to the declaration which was stated and guaranteed by the applicant.

Objective

This type approval report is prepared on behalf of *Zeeva International Limited* 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 Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

Part of system submission with FCC ID: 2ADM5-U2.

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 radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Output Power with Power meter		±0.73dB
RF conducted test with spectrum		±1.6dB
AC Power Lines Conducted Emissions		±1.95dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±1℃
Humidity		±6%
Supply voltages		±0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, 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.: 342867, the FCC Designation No.: CN1221.

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

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing by manufacturer.

4 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2403	2	2440
1	2439	3	2479

Channel 0, Channel 1 and Channel 3 were selected for testing.

EUT Exercise Software

No software was used.

Equipment Modifications

No modifications were made to the unit tested.

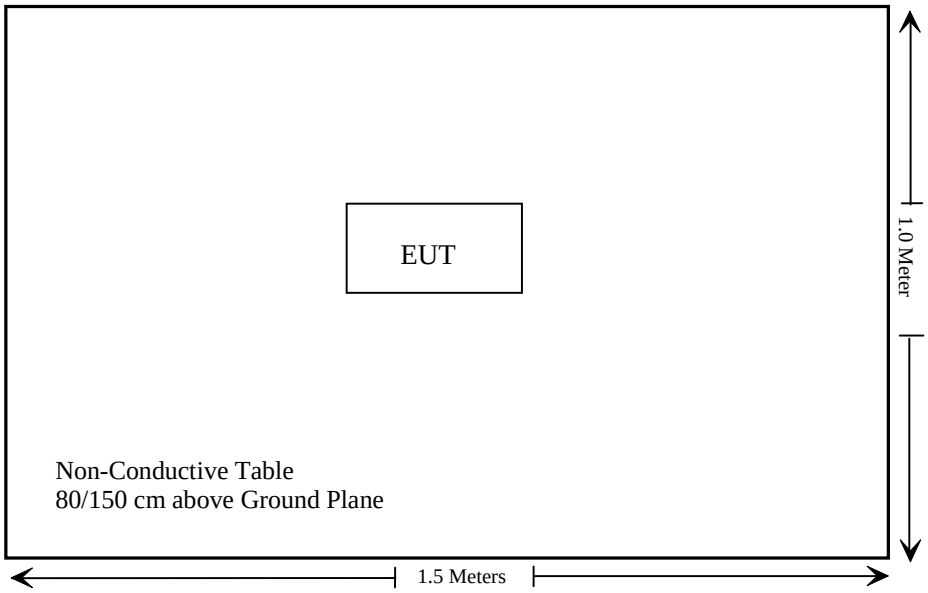
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
N/A	N/A	N/A	N/A

Support Cable Descriptions

Cable Description	Length (m)	From/Port	To
N/A	N/A	N/A	N/A

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(d)	Radiated Emissions& Outside of Band Emission	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

Not Applicable: The EUT was powered by battery only.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
A.H. System	Horn Antenna	SAS-200/571	135	2018-09-01	2021-08-31
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2019-07-22	2020-07-21
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
COM-POWER	Pre-amplifier	PA-122	181919	2019-11-12	2020-11-12
Sonoma Instrument	Amplifier	310N	186238	2019-11-12	2020-11-12
Rohde & Schwarz	EMI Test Receiver	ESR3	102455	2019-07-09	2020-07-08
UTiFLEX MICRO-C0AX	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2019-11-12	2020-11-12
Ducommun Technologies	RF Cable	104PEA	218124002	2019-11-12	2020-11-12
Ducommun Technologies	RF Cable	RG-214	1	2019-11-19	2020-05-21
Ducommun Technologies	RF Cable	RG-214	2	2019-11-12	2020-11-12
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-28
Heatsink Required	Amplifier	QLW-18405536-J0	15964001002	2019-11-12	2020-11-12
Sinoscite	Band Reject Filter	BSF2402-2480MN-0898-001	99632	2019-11-12	2020-11-12

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Antenna Connector Construction

The EUT has one PCB antenna which was permanently attached, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC§15.205, §15.209 & §15.249(d) - 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.

As per FCC§15.249 (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.

Test Equipment Setup

The spectrum analyzer or receiver is set as:

Below 1000MHz:

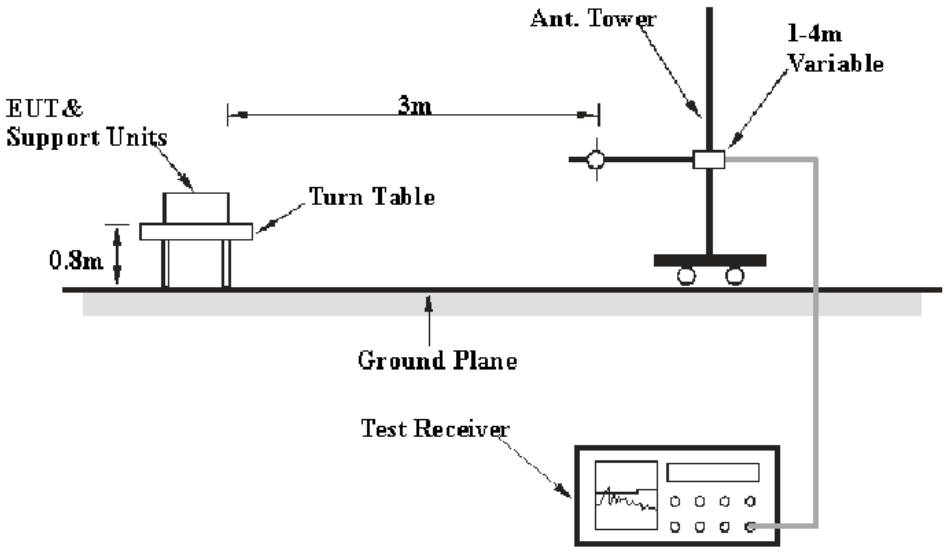
RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000MHz:

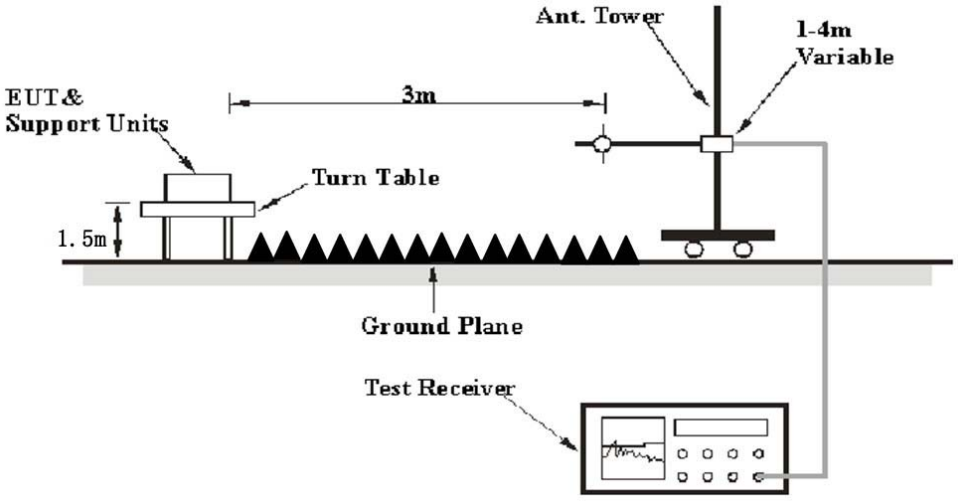
Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

EUT Setup

Below 1GHz:



Above 1GHz:



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 C63.10-2013. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

Test Procedure

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

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane for below 1GHz or 1.5 meter for above 1GHz, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

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:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the EUT complied with the FCC Part 15.205, 15.209 & §15.249

Test Data

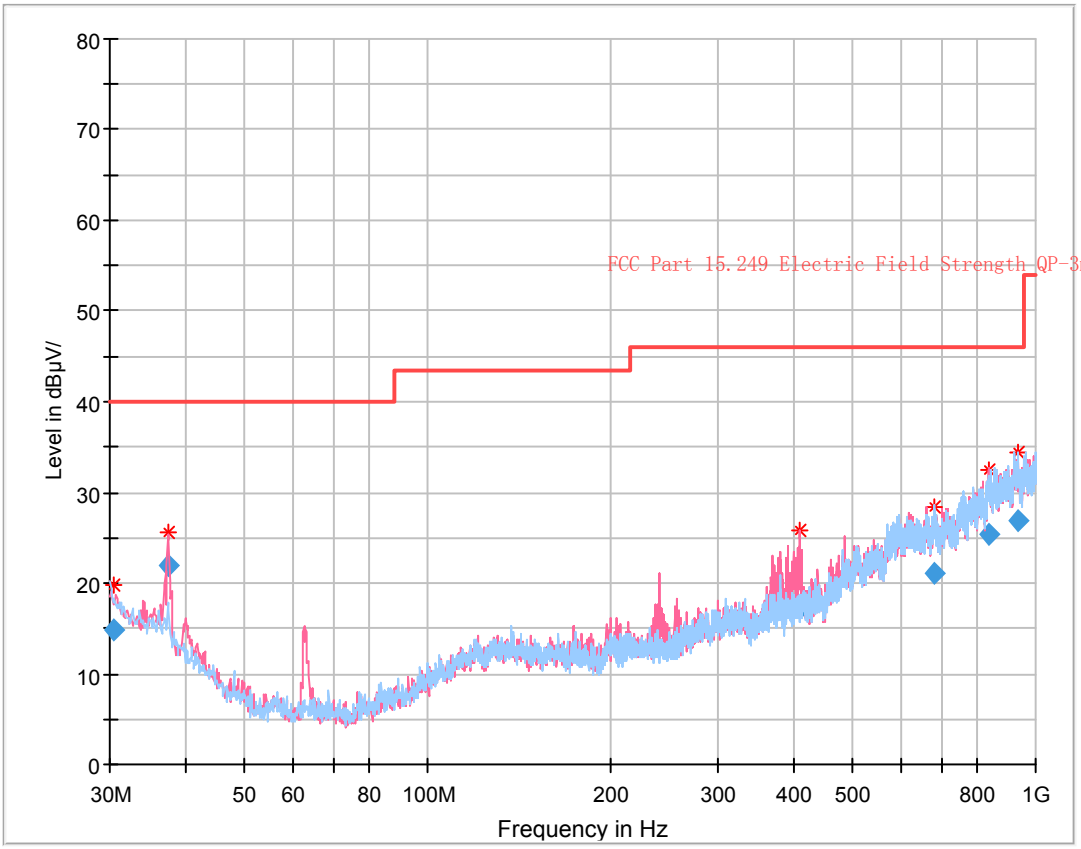
Environmental Conditions

Temperature:	23~26 ℃
Relative Humidity:	51~56 %
ATM Pressure:	100.8~101.0 kPa

The testing was performed by Zero Yan on 2019-11-22 for below 1G and Curry Xiang on 2019-11-20 for above 1G.

Test Mode: Transmitting

30MHz – 1 GHz:



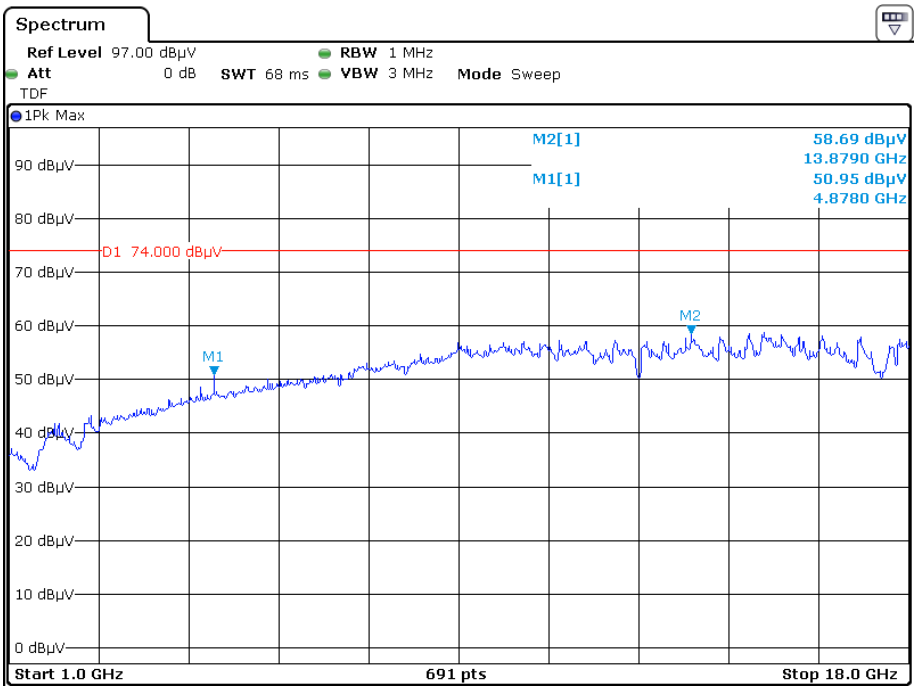
Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
30.372312	14.77	389.0	H	0.0	-7.9	40.00	25.23
37.513125	22.01	308.0	V	284.0	-12.2	40.00	17.99
409.275875	17.16	106.0	V	159.0	-9.9	46.00	28.84
680.802125	21.09	231.0	H	192.0	-1.4	46.00	24.91
839.000375	25.29	279.0	V	105.0	2.8	46.00	20.71
936.438500	26.93	278.0	H	0.0	4.8	46.00	19.07

1 GHz - 25 GHz:

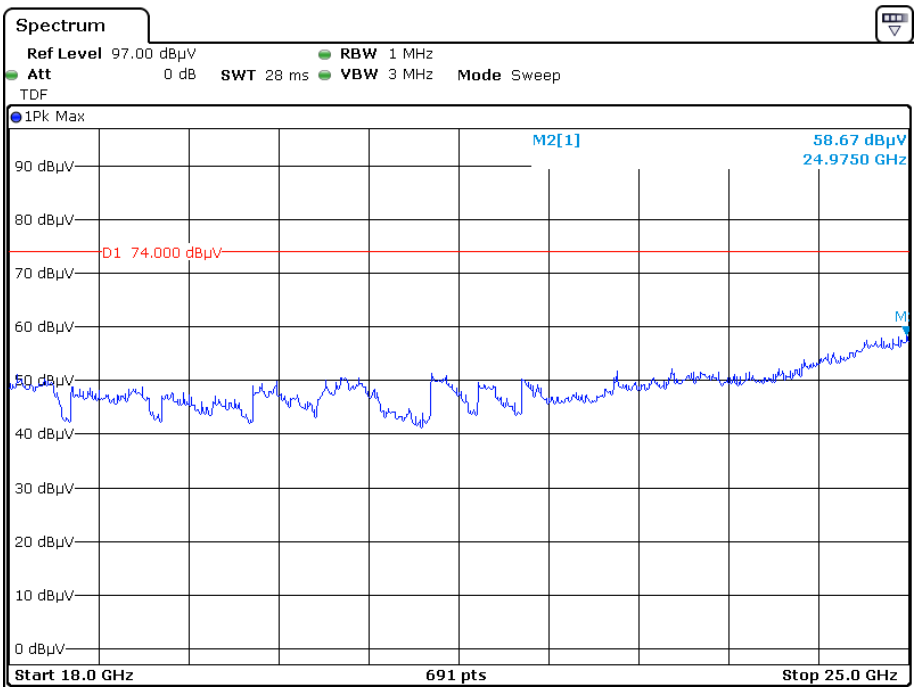
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.249&15.209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2403 MHz)									
2403.00	62.32	PK	209	1.7	H	-0.36	61.96	114	52.04
2403.00	60.45	Ave.	209	1.7	H	-0.36	60.09	94	33.91
2403.00	55.89	PK	183	1.6	V	-0.36	55.53	114	58.47
2403.00	53.07	Ave.	183	1.6	V	-0.36	52.71	94	41.29
2400.00	29.13	PK	254	1.7	H	31.87	61.00	74	13.00
2400.00	14.62	Ave.	254	1.7	H	31.87	46.49	54	7.51
2382.30	28.09	PK	2	2.4	H	31.87	59.96	74	14.04
2382.30	14.78	Ave.	2	2.4	H	31.87	46.65	54	7.35
2493.37	28.3	PK	128	1.1	H	32.13	60.43	74	13.57
2493.37	15.11	Ave.	128	1.1	H	32.13	47.24	54	6.76
4806.00	46.93	PK	21	1.9	H	5.40	52.33	74	21.67
4806.00	41.75	Ave.	21	1.9	H	5.40	47.15	54	6.85
Middle Channel (2439 MHz)									
2439.00	62.75	PK	55	1.8	H	-0.26	62.49	114	51.51
2439.00	60.51	Ave.	55	1.8	H	-0.26	60.25	94	33.75
2439.00	56.71	PK	69	2.5	V	-0.26	56.45	114	57.55
2439.00	54.56	Ave.	69	2.5	V	-0.26	54.30	94	39.70
4878.00	46.61	PK	117	1.7	H	6.43	53.04	74	20.96
4878.00	41.30	Ave.	117	1.7	H	6.43	47.73	54	6.27
High Channel (2479 MHz)									
2479.00	60.54	PK	339	2.0	H	-0.15	60.39	114	53.61
2479.00	58.66	Ave.	339	2.0	H	-0.15	58.51	94	35.49
2479.00	56.72	PK	75	1.2	V	-0.15	56.57	114	57.43
2479.00	54.91	Ave.	75	1.2	V	-0.15	54.76	94	39.24
2367.02	28.21	PK	153	1.5	H	31.87	60.08	74	13.92
2367.02	14.85	Ave.	153	1.5	H	31.87	46.72	54	7.28
2490.08	28.16	PK	330	2.3	H	32.13	60.29	74	13.71
2490.08	14.67	Ave.	330	2.3	H	32.13	46.80	54	7.20
4958.00	46.02	PK	192	2.2	H	6.95	52.97	74	21.03
4958.00	40.31	Ave.	192	2.2	H	6.95	47.26	54	6.74

Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) +cable loss – amplifier factor
Margin = Limit- Corr. Amplitude
The emission more than20dB below the limit was not required to be recorded.

Pre-scan with Middle channel Peak
Horizontal

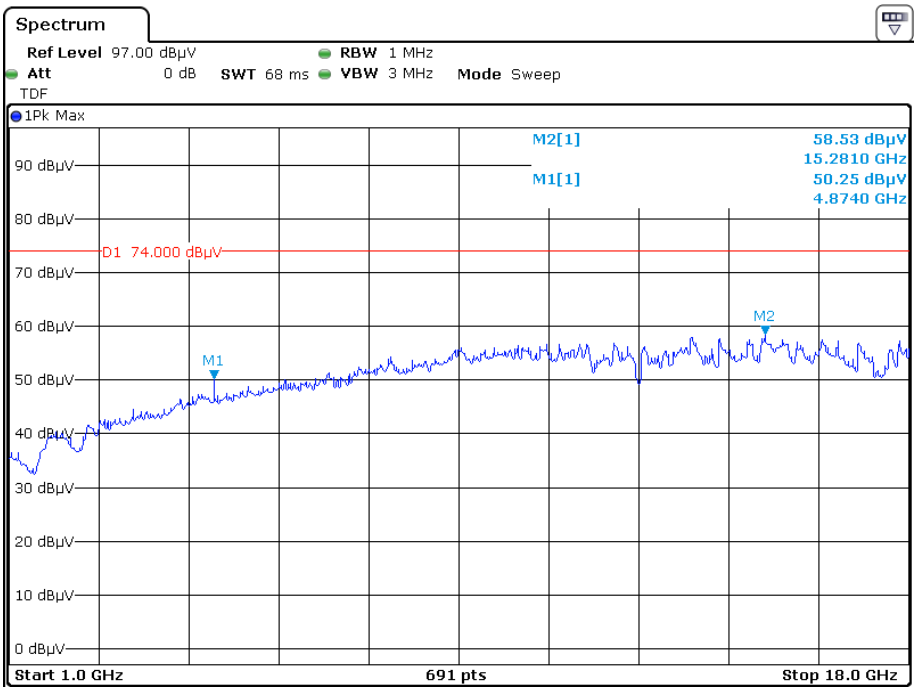


Date: 20.NOV.2019 20:52:55

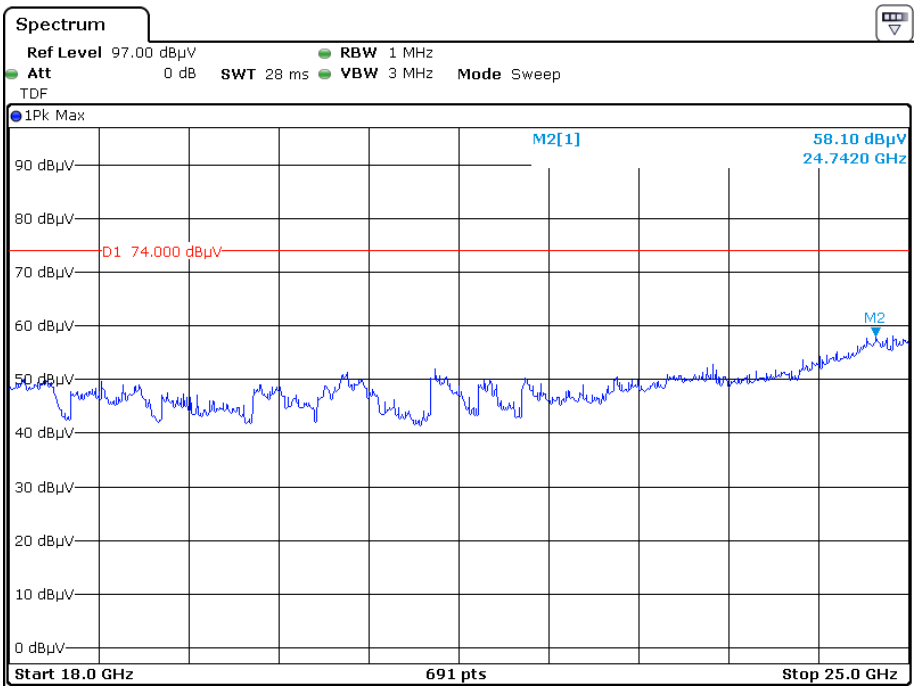


Date: 20.NOV.2019 21:41:04

Vertical

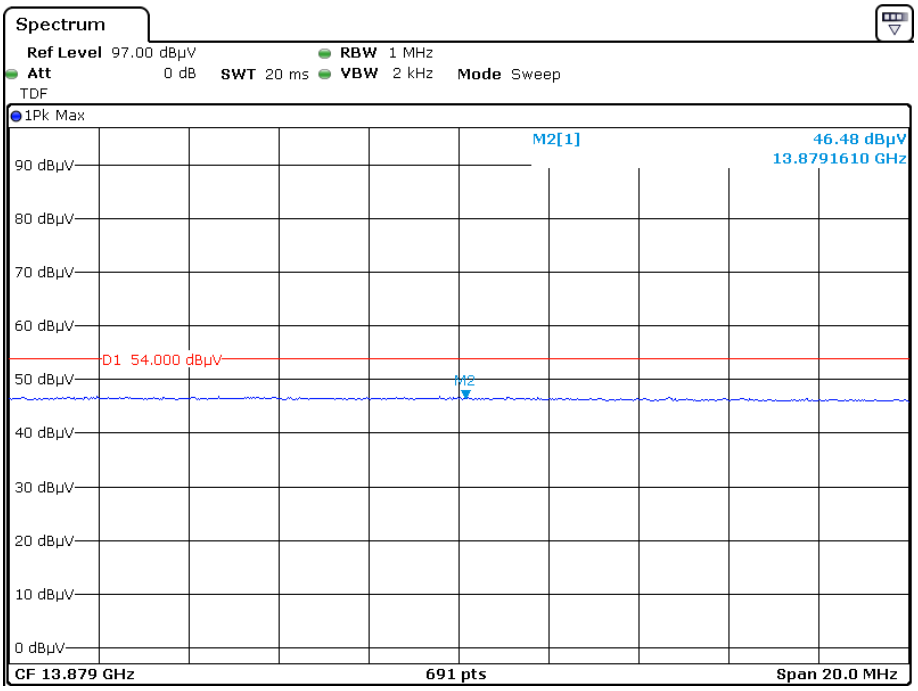


Date: 20.NOV.2019 21:01:06

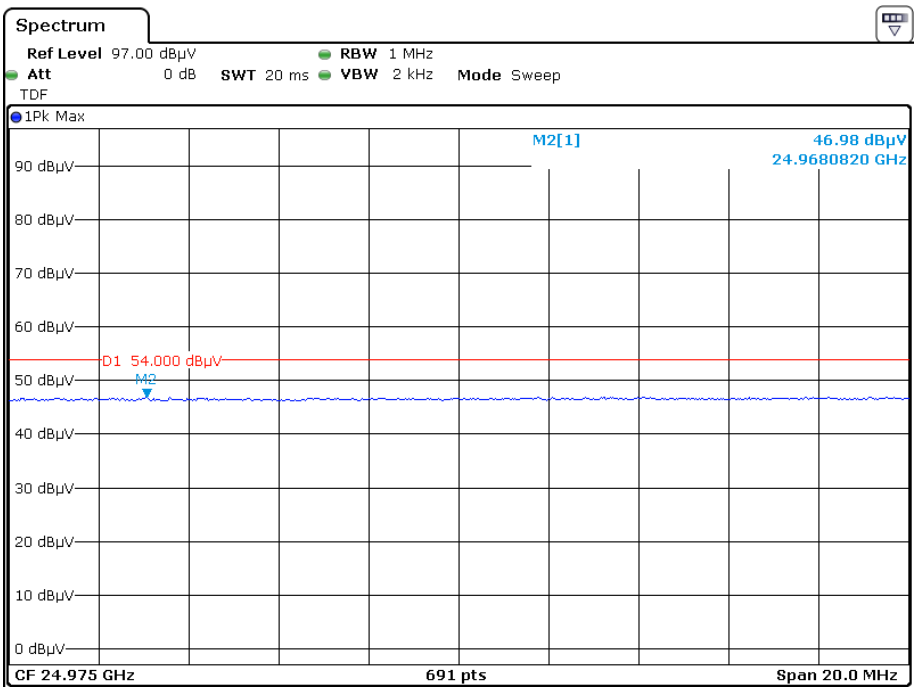


Date: 20.NOV.2019 21:47:59

Average value for the peak point at pre-scan
Horizontal

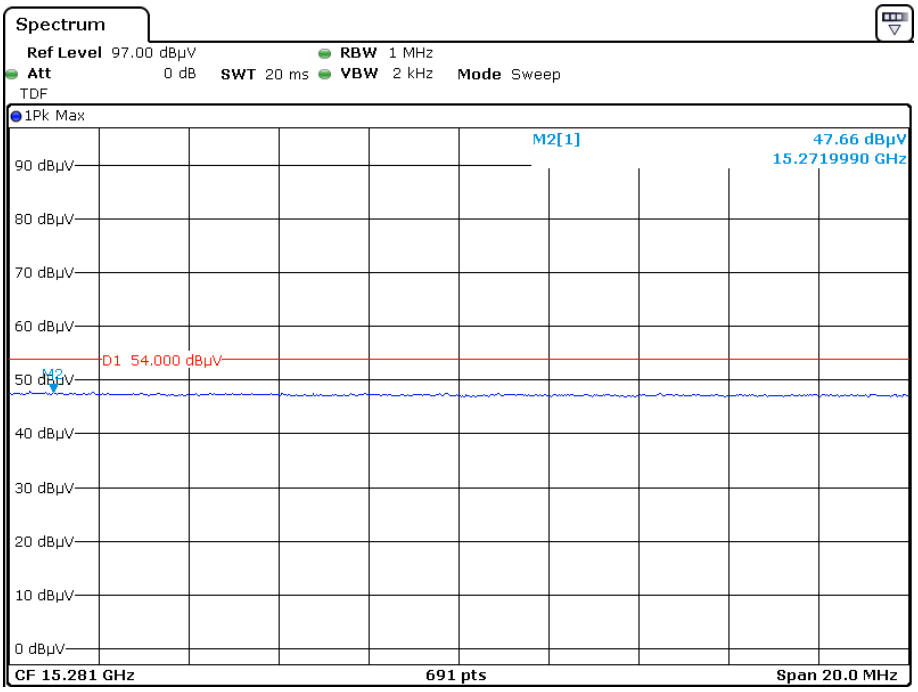


Date: 20.NOV.2019 20:57:15

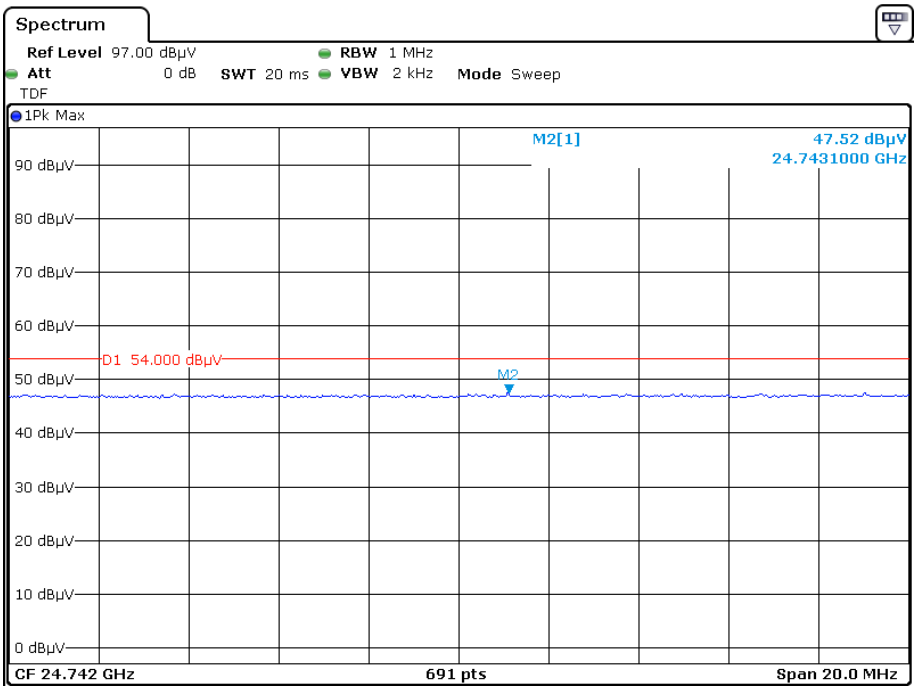


Date: 20.NOV.2019 21:44:27

Vertical



Date: 20.NOV.2019 21:05:45



Date: 20.NOV.2019 21:51:36

FCC§15.215(c) - 20dB EMISSION BANDWIDTH

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 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. 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 indicated 20dB bandwidth.

4. Repeat above procedures until all frequencies measured were complete.

Test Data

Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

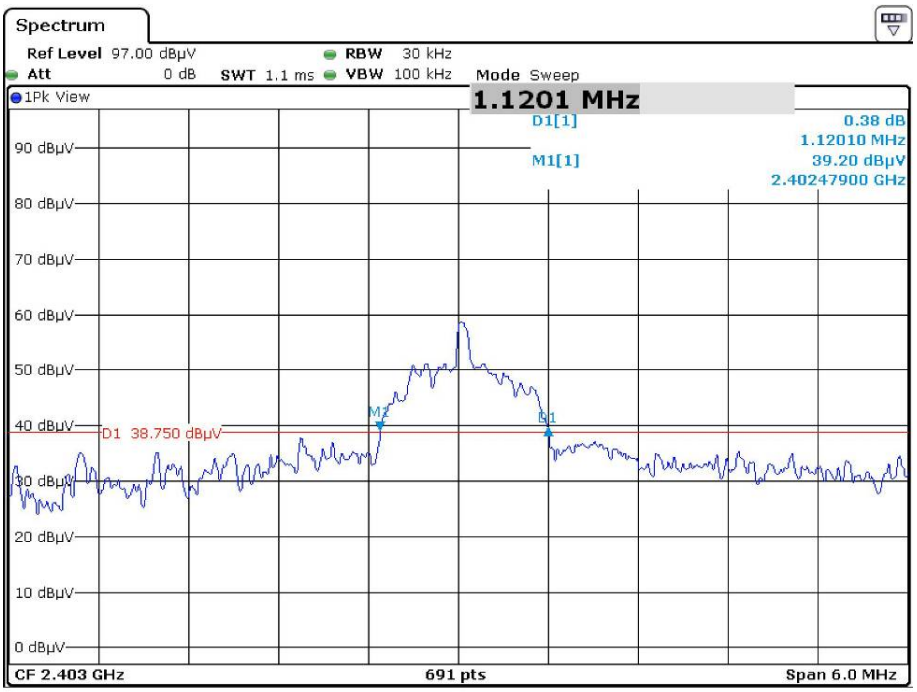
The testing was performed by Curry Xiang on 2020-02-14.

Test Mode: Transmitting

Please refer to the following table and plots.

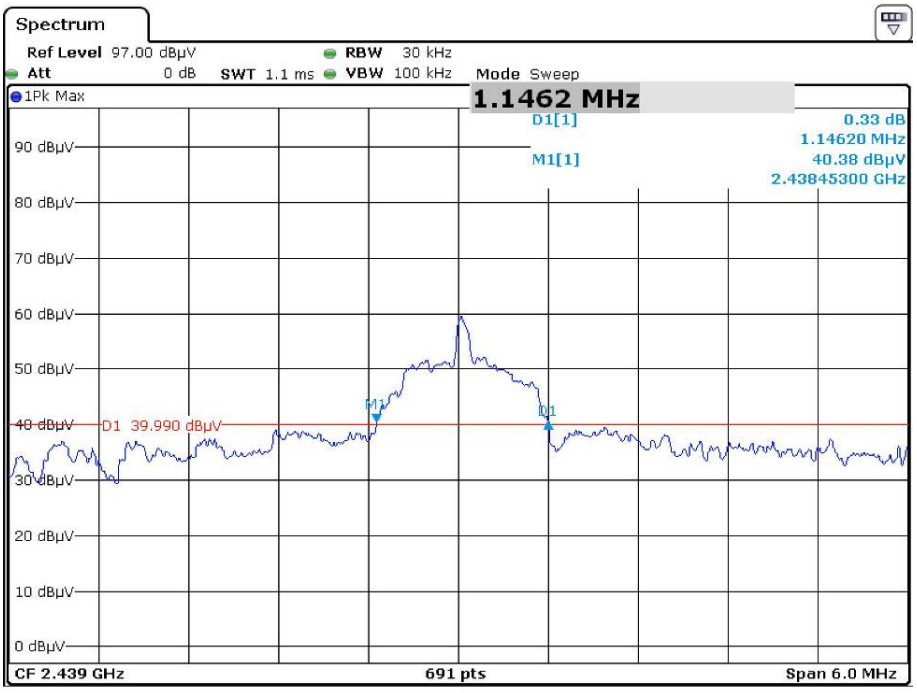
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2403	1.12
Middle	2439	1.15
High	2479	1.17

Low Channel



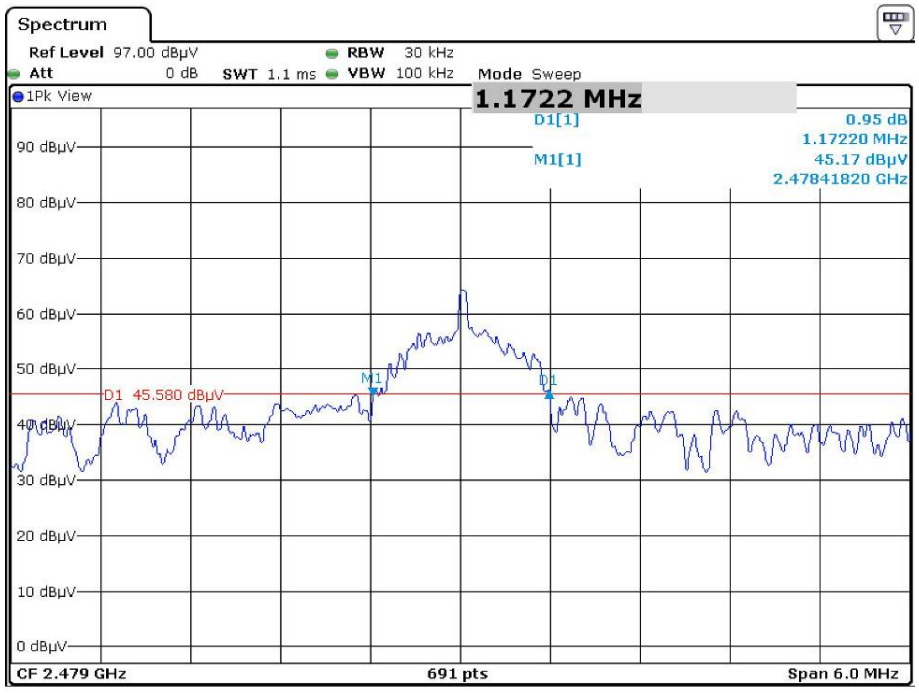
Date: 14.FEB.2020 15:04:57

Middle Channel



Date: 14.FEB.2020 15:13:42

High Channel



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