



FCC PART 15.249 TEST REPORT

For

Shenzhen Jiayz photo industrial.,Ltd

A16 Building, Intelligent Terminal Industrial Park of Sililcon Valley Power, Guanlan, Longhua
District, Shenzhen, China

FCC ID: 2ARN3-BLINK500TX

Report Type: Original Report	Product Type: 2.4GHz Wireless Microphone
Report Number: RSZ190826810-00C	
Report Date: 2019-12-17	
Reviewed By: RF Engineer	Kieron Luo 
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	2.4GHz Wireless Microphone
Model	Blink500 TX
Frequency Range	2406-2474MHz
Modulation Technique	GFSK
Antenna Specification	2.0 dBi
Voltage Range	DC 3.7V from Battery
Date of Test	2019/09/04 to 2019/12/16
Sample serial number	RSZ190826810-RF-3 (Assigned by BAACL)
Received date	2019/08/26
Sample/EUT Status	Good condition

Objective

This type approval report is prepared on behalf of **Shenzhen Jiayz photo industrial, 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 Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

FCC Part15.249 DXX submittal(s) with FCC ID: 2ARN3-BLINK500RX.
FCC Part15.249 DXX submittal(s) with FCC ID: 2ARN3-BLINK500RXDI.

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, and the power level is default.

18 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2406	10	2442
2	2410	11	2446
3	2414	12	2450
4	2418	13	2454
5	2422	14	2458
6	2426	15	2462
7	2430	16	2466
8	2434	17	2470
9	2438	18	2474

Channel 1, Channel 9 and Channel 18 were selected for testing.

EUT Exercise Software

No software was used.

Equipment Modifications

No modifications were made to the unit tested.

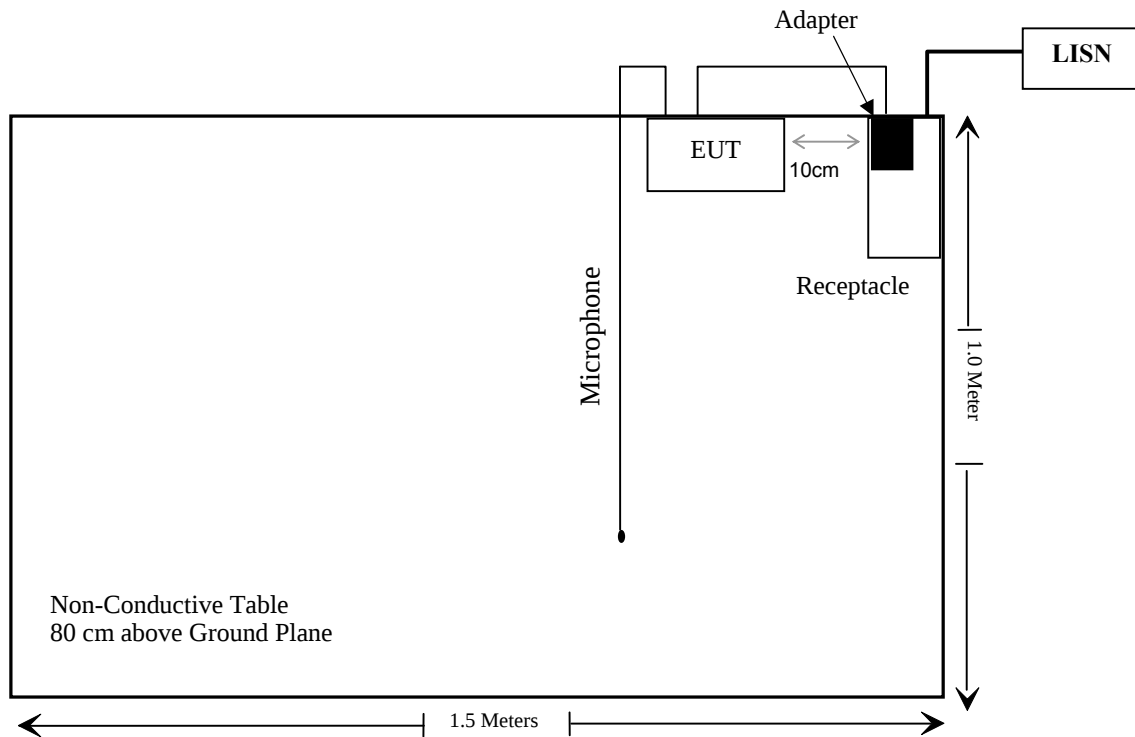
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Dongguan Aohai Power Technology Co.,Ltd	Adapter	A8-501000	/

Support Cable Descriptions

Cable Description	Length (m)	From/Port	To
Un-shielding Detachable USB Cable	0.3	EUT	Adapter

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	Compliance
15.205, §15.209, §15.249(d)	Radiated Emissions& Outside of Band Emission	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2019-07-11	2020-07-11
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2019-01-25	2020-01-25
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2019-03-02	2020-03-01
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
Radiated Emission Test					
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
N/A	RF Cable	Cable 1	N/A	2019-04-20	2020-04-20
N/A	RF Cable	Cable 4	EC-007	2019-04-20	2020-04-20
Ducommun technologies	RF Cable	RG-214	1	2019-11-12	2020-11-12
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	Notch Filter	BSF2402-2480MN-0898-001	99632	2019-11-12	2020-11-12
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR
RF Conducted Test					
WEINSCHL	3dB Attenuator	6231	666	Each Time	
Rohde & Schwarz	Spectrum Analyzer	FSU26	200120	2019-03-02	2020-03-01
Ducommun technologies	RF Cable	RG-214	3	Each Time	

* **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 internal PCB antenna which was permanently attached and the antenna gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

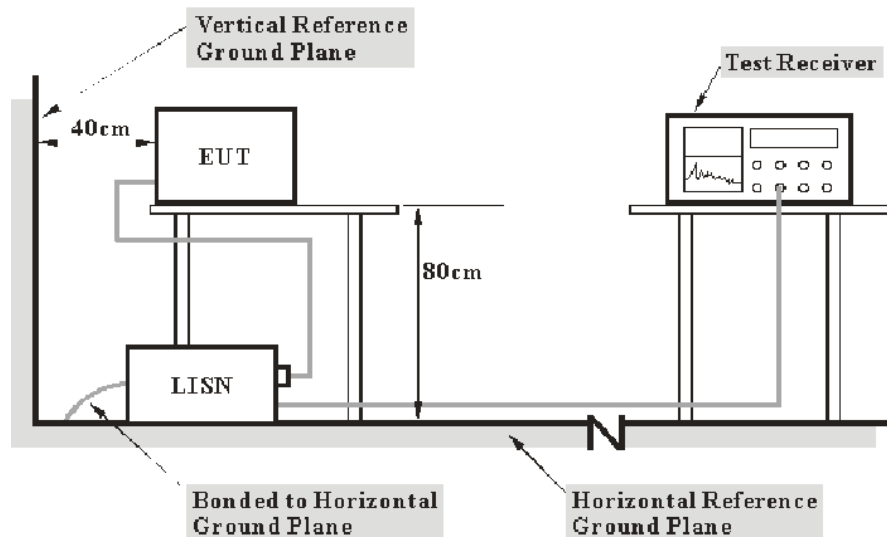
Result: Compliance.

FCC §15.207 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC §15.207

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 measurement procedure of EUT setup is according with per ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

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 Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

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

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.207.

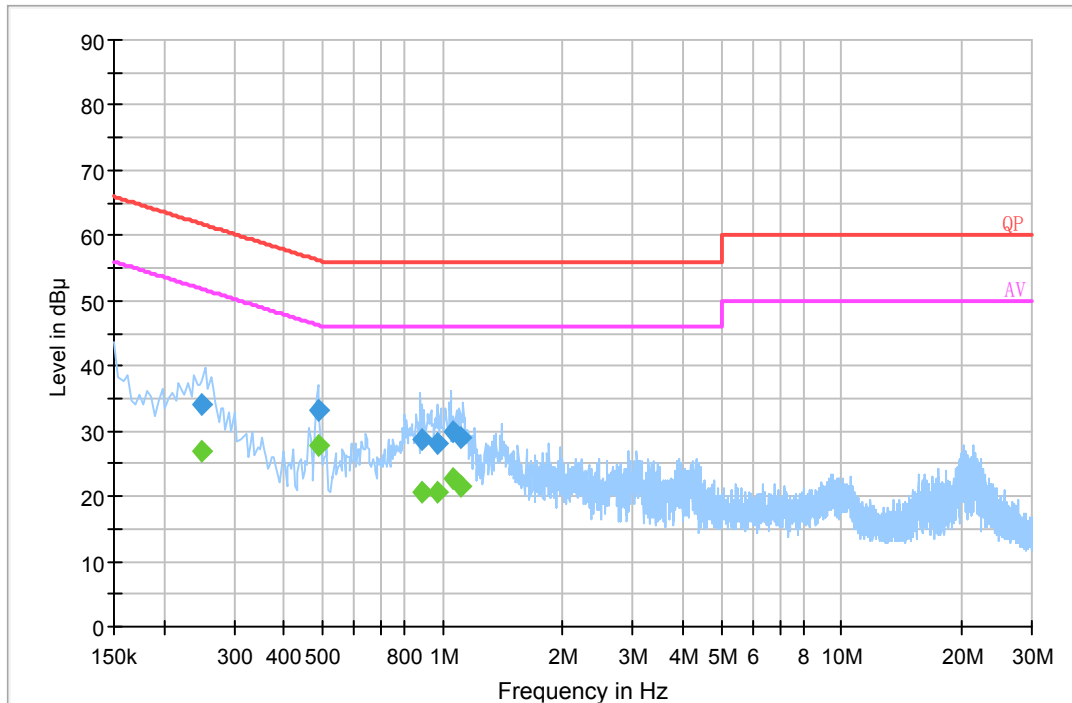
Test Data

Environmental Conditions

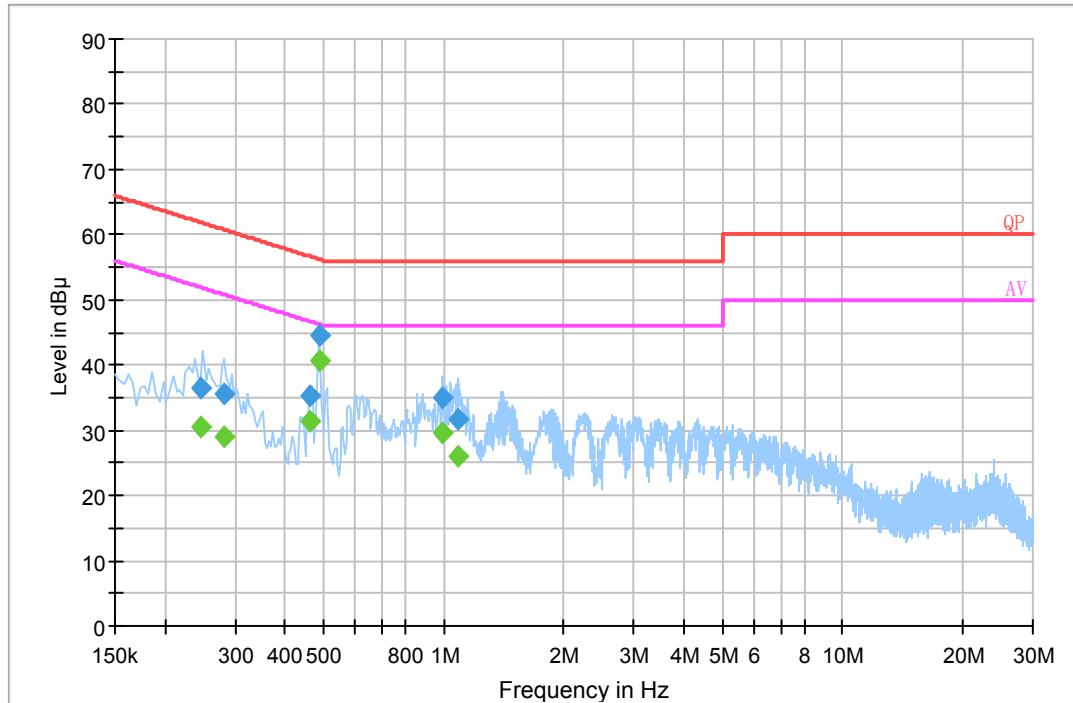
Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Kiki Geng on 2019-09-04

EUT Operation Mode: Charging & Transmitting

AC 120V/60 Hz, Line

Frequency (MHz)	Corrected Amplitude (dBμV)	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Remark (PK/QP/Ave.)
0.249500	34.0	19.8	61.8	27.8	QP
0.486710	33.3	19.8	56.2	22.9	QP
0.888770	28.8	19.8	56.0	27.2	QP
0.975390	28.0	19.9	56.0	28.0	QP
1.062250	29.8	19.9	56.0	26.2	QP
1.113110	28.9	19.8	56.0	27.1	QP
0.249500	27.0	19.8	51.8	24.8	Ave.
0.486710	27.8	19.8	46.2	18.4	Ave.
0.888770	20.8	19.8	46.0	25.2	Ave.
0.975390	20.6	19.9	46.0	25.4	Ave.
1.062250	22.9	19.9	46.0	23.1	Ave.
1.113110	21.4	19.8	46.0	24.6	Ave.

AC 120V/60 Hz, Neutral

Frequency (MHz)	Corrected Amplitude (dBμV)	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Remark (PK/QP/Ave.)
0.245500	36.6	19.8	61.9	25.3	QP
0.281500	35.6	19.7	60.8	25.2	QP
0.463010	35.2	19.8	56.6	21.4	QP
0.486710	44.5	19.8	56.2	11.7	QP
0.995030	34.9	19.8	56.0	21.1	QP
1.089650	31.6	19.8	56.0	24.4	QP
0.245500	30.5	19.8	51.9	21.4	Ave.
0.281500	28.9	19.7	50.8	21.9	Ave.
0.463010	31.5	19.8	46.6	15.1	Ave.
0.486710	40.7	19.8	46.2	5.5	Ave.
0.995030	29.7	19.8	46.0	16.3	Ave.
1.089650	26.2	19.8	46.0	19.8	Ave.

Note:

- 1) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
The corrected factor has been input into the transducer of the test software.
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

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

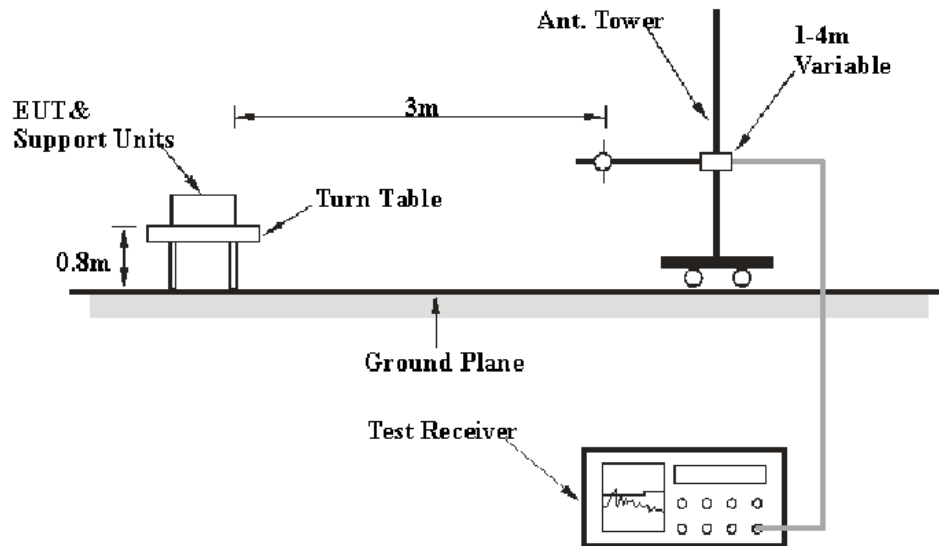
Above 1000MHz:

Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto

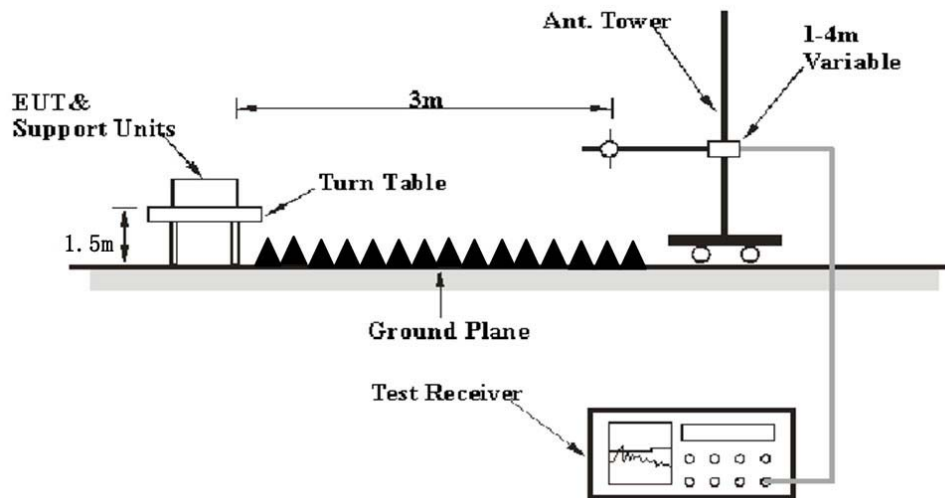
Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

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:

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

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 Results Summary

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

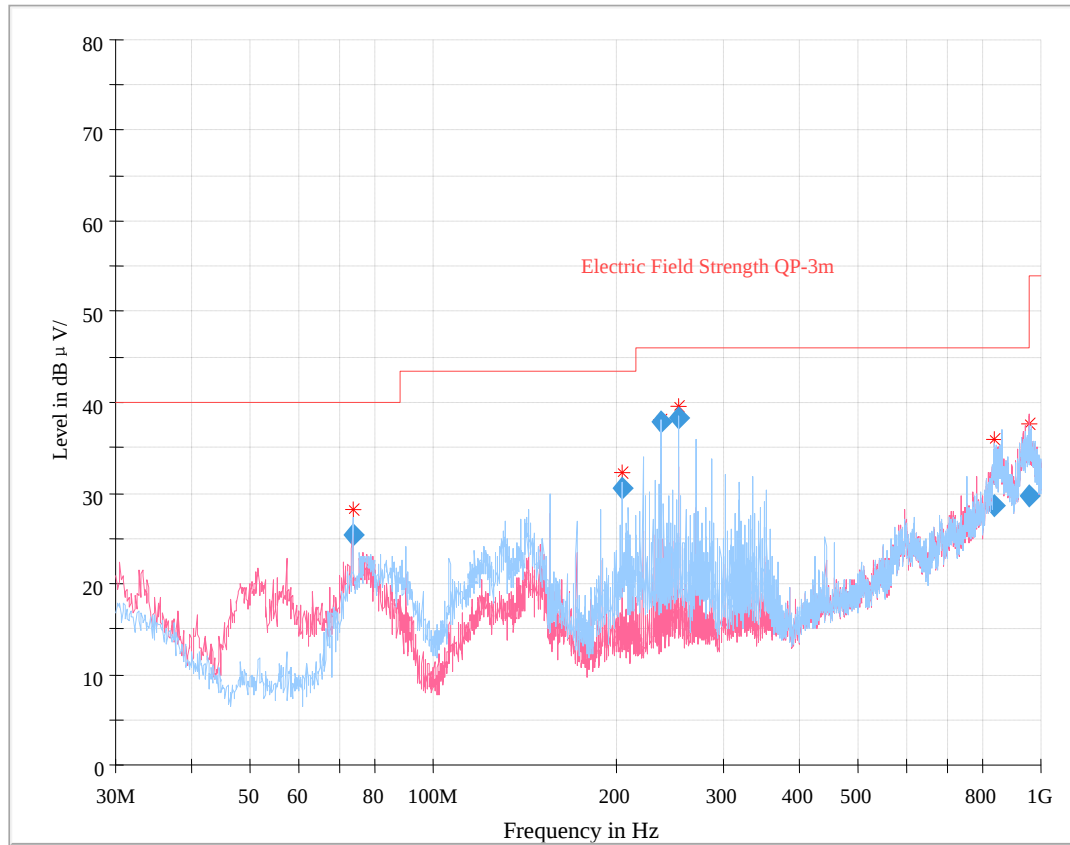
Test Data

Environmental Conditions

Temperature:	21~26 °C
Relative Humidity:	50~57 %
ATM Pressure:	100.5~101.4 kPa

The testing was performed by Steven Lan on 2019-09-06 for below 1GHz and Charlie Cha on 2019-12-16 for above 1GHz.

Test Mode: Transmitting

30MHz – 1 GHz:

Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
73.709375	25.31	361.0	H	13.0	-20.4	40.00	14.69
204.793875	30.62	170.0	H	234.0	-13.9	43.50	12.88
237.558250	37.92	131.0	H	153.0	-14.1	46.00	8.08
253.936250	38.22	102.0	H	158.0	-13.8	46.00	7.78
838.227750	28.57	137.0	V	0.0	5.8	46.00	17.43
958.866375	29.59	114.0	V	0.0	9.3	46.00	16.41

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 (2406 MHz)									
2406.00	66.38	PK	38	2.2	H	31.87	98.25	114	15.75
2406.00	61.58	Ave.	38	2.2	H	31.87	93.45	94	0.55
2406.00	57.24	PK	230	1.4	V	31.87	89.11	114	24.89
2406.00	52.68	Ave.	230	1.4	V	31.87	84.55	94	9.45
2400.00	28.92	PK	171	1.6	H	31.87	60.79	74	13.21
2400.00	14.48	AV	171	1.6	H	31.87	46.35	54	7.65
2341.66	28.79	PK	48	1.4	H	31.64	60.43	74	13.57
2341.66	14.29	Ave.	48	1.4	H	31.64	45.93	54	8.07
2487.52	29.19	PK	149	2.4	H	32.13	61.32	74	12.68
2487.52	14.63	Ave.	149	2.4	H	32.13	46.76	54	7.24
4812.00	48.30	PK	273	2.3	H	5.40	53.70	74	20.3
4812.00	37.86	Ave.	273	2.3	H	5.40	43.26	54	10.74
Middle Channel (2438 MHz)									
2438.00	64.37	PK	162	1.6	H	31.97	96.34	114	17.66
2438.00	60.12	Ave.	162	1.6	H	31.97	92.09	94	1.91
2438.00	55.07	PK	218	2.0	V	31.97	87.04	114	26.96
2438.00	51.29	Ave.	218	2.0	V	31.97	83.26	94	10.74
4876.00	51.49	PK	81	1.8	H	6.43	57.92	74	16.08
4876.00	40.57	Ave.	81	1.8	H	6.43	47.00	54	7.00
High Channel (2474 MHz)									
2474.00	64.51	PK	173	2.1	H	32.13	96.64	114	17.36
2474.00	60.04	Ave.	173	2.1	H	32.13	92.17	94	1.83
2474.00	55.48	PK	17	1.4	V	32.13	87.61	114	26.39
2474.00	51.62	Ave.	17	1.4	V	32.13	83.75	94	10.25
2398.32	28.44	PK	32	1.5	H	31.87	60.31	74	13.69
2398.32	14.38	AV	32	1.5	H	31.87	46.25	54	7.75
2352.61	28.35	PK	206	2.0	H	31.77	60.12	74	13.88
2352.61	14.32	Ave.	206	2.0	H	31.77	46.09	54	7.91
2488.19	28.41	PK	90	1.1	H	32.13	60.54	74	13.46
2488.19	14.19	Ave.	90	1.1	H	32.13	46.32	54	7.68
4948.00	51.51	PK	16	1.4	H	6.43	57.94	74	16.06
4948.00	41.04	Ave.	16	1.4	H	6.43	47.47	54	6.53

Note:

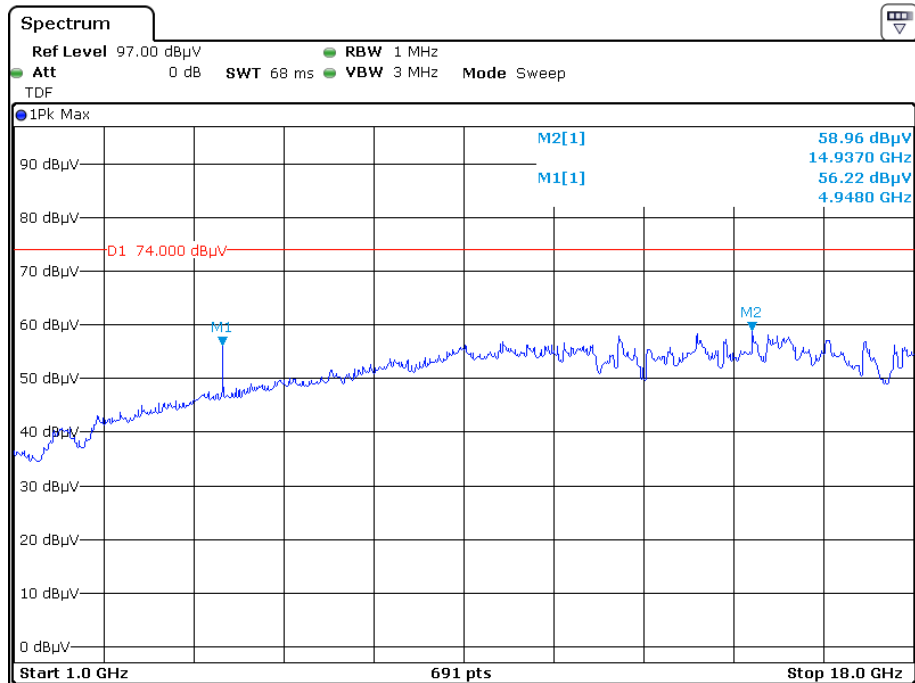
Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) +cable loss – amplifier factor

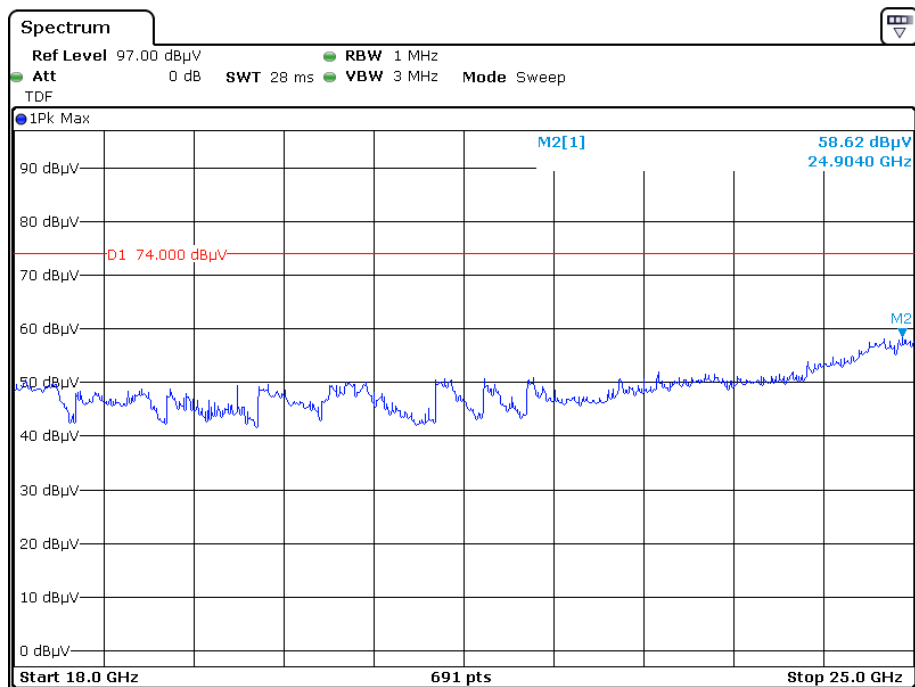
Margin = Limit- Corr. Amplitude

The emission more than 20dB below the limit was not required to be recorded.

Pre-scan with High channel Peak Horizontal

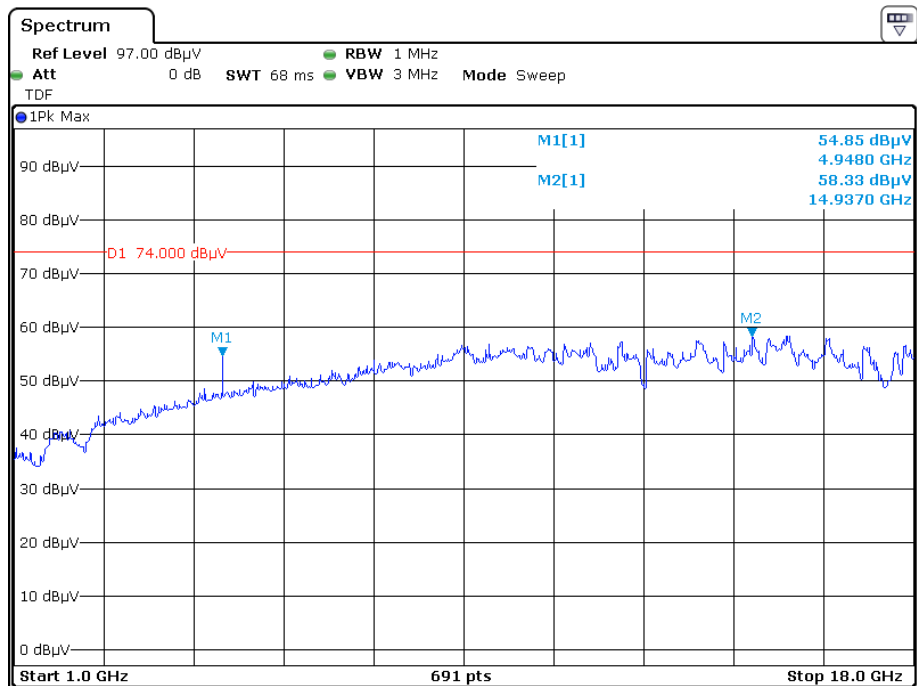


Date: 16.DEC.2019 22:12:00

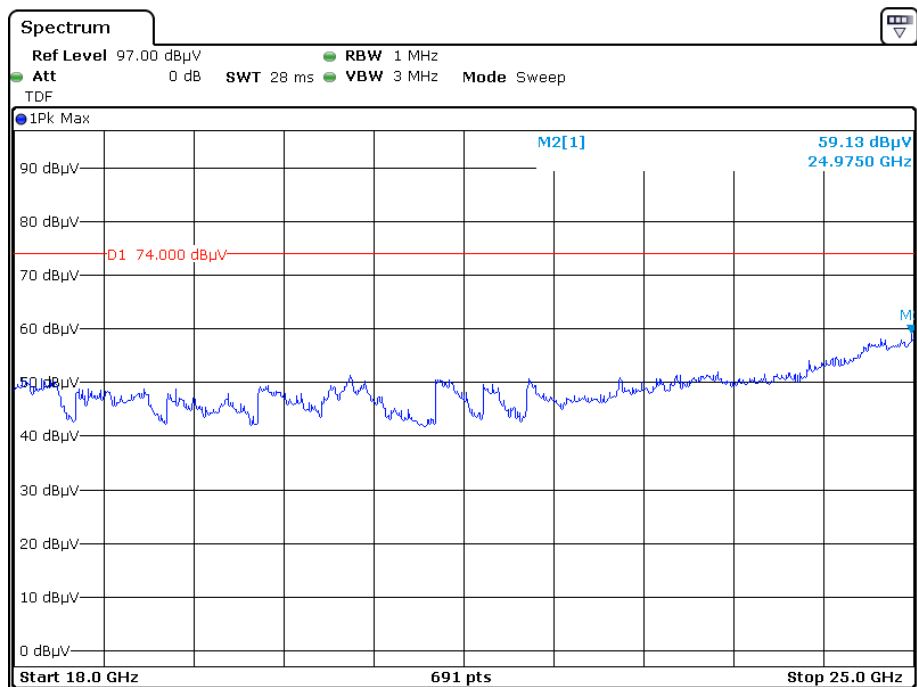


Date: 16.DEC.2019 23:11:52

Vertical

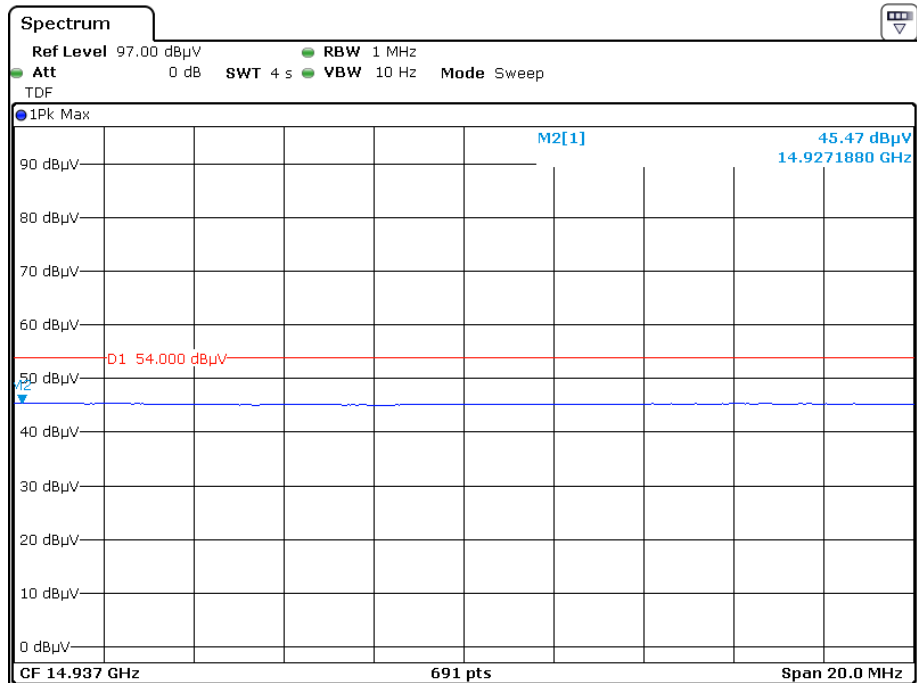


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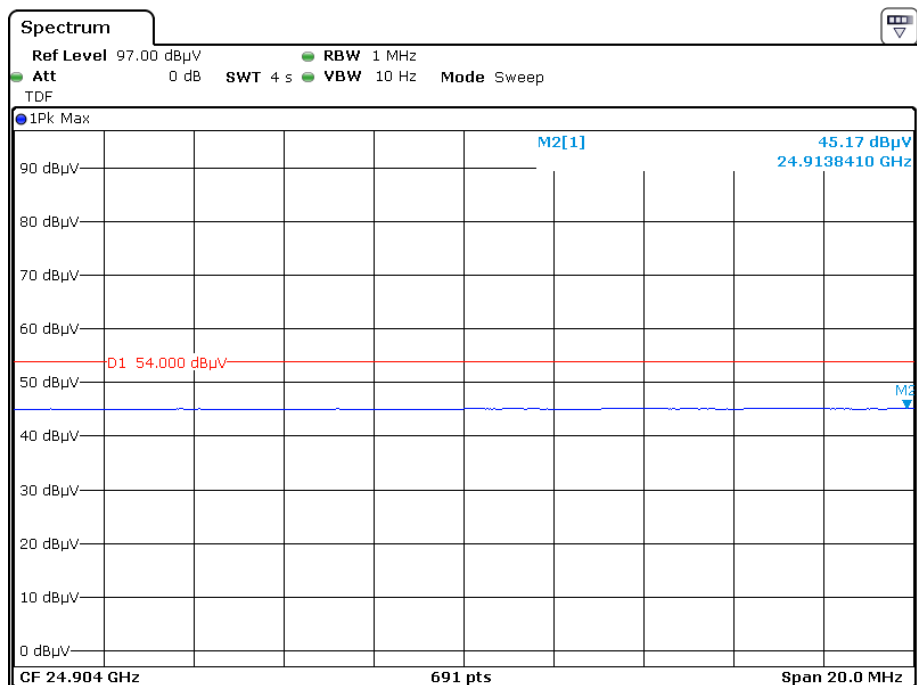


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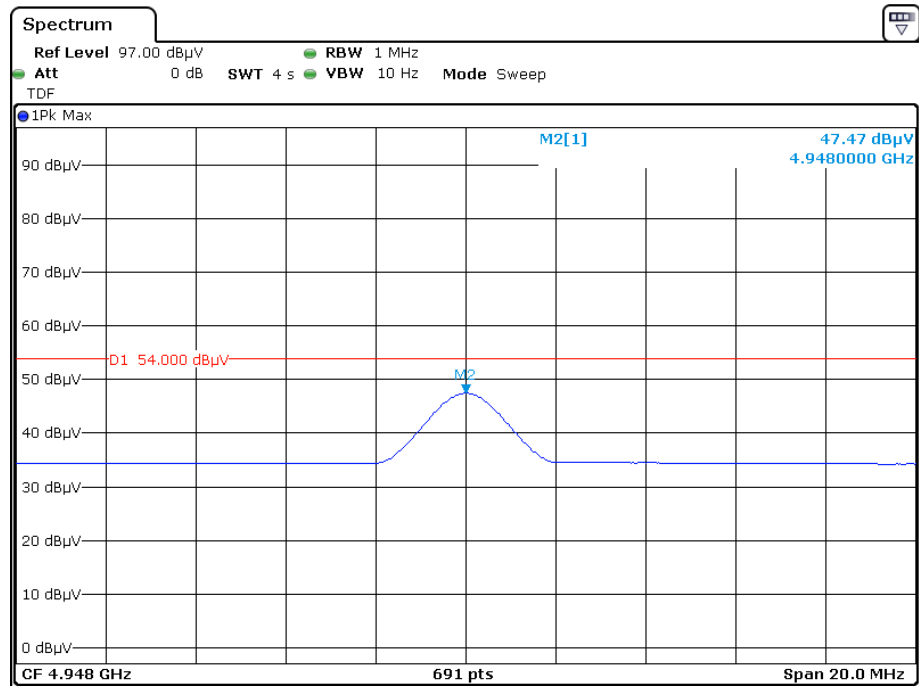
**Average value for the peak point at pre-scan
Horizontal**



Date: 16.DEC.2019 22:15:27

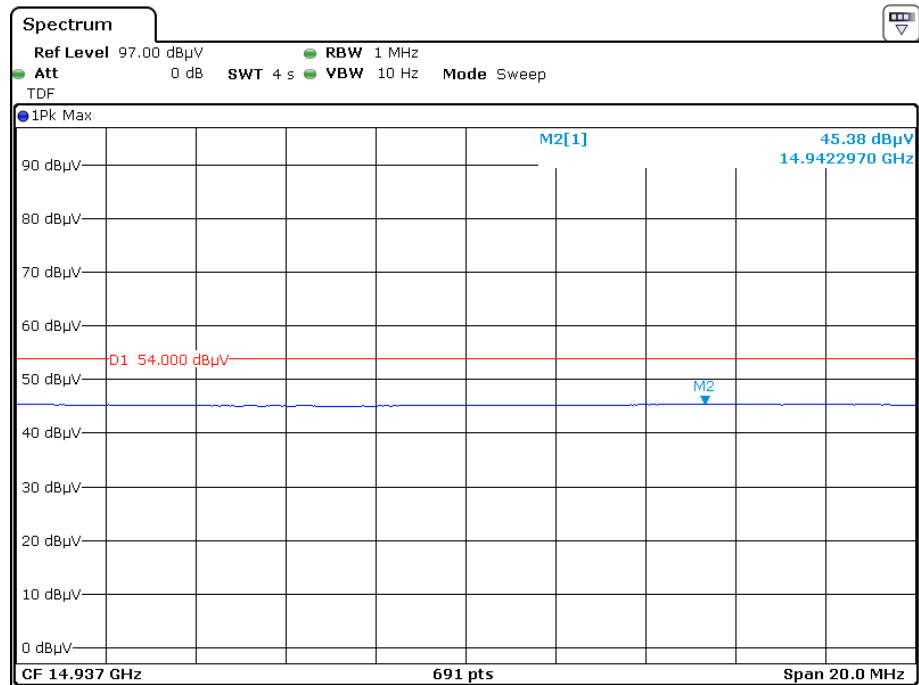


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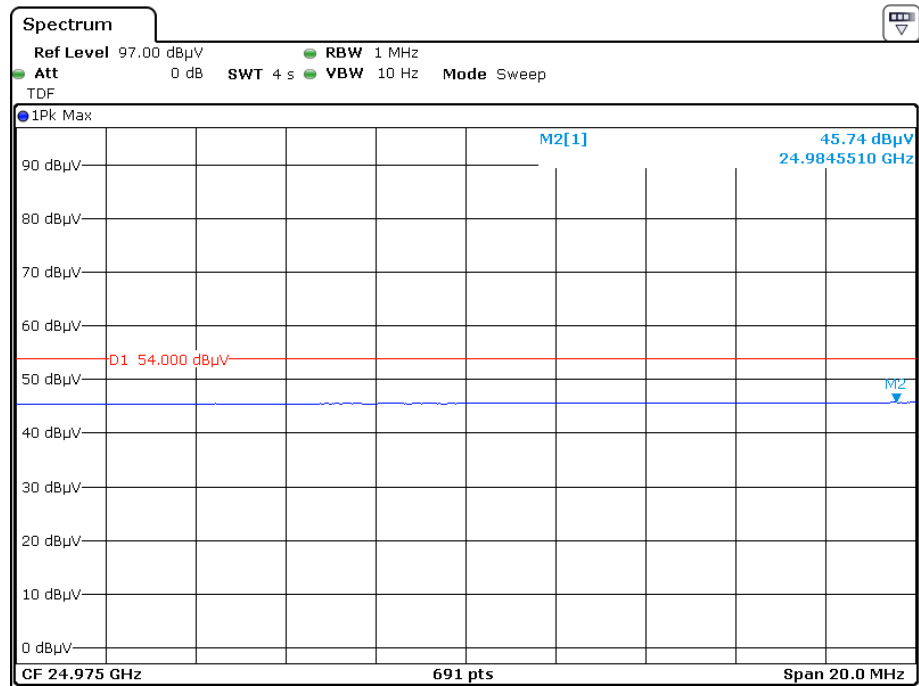


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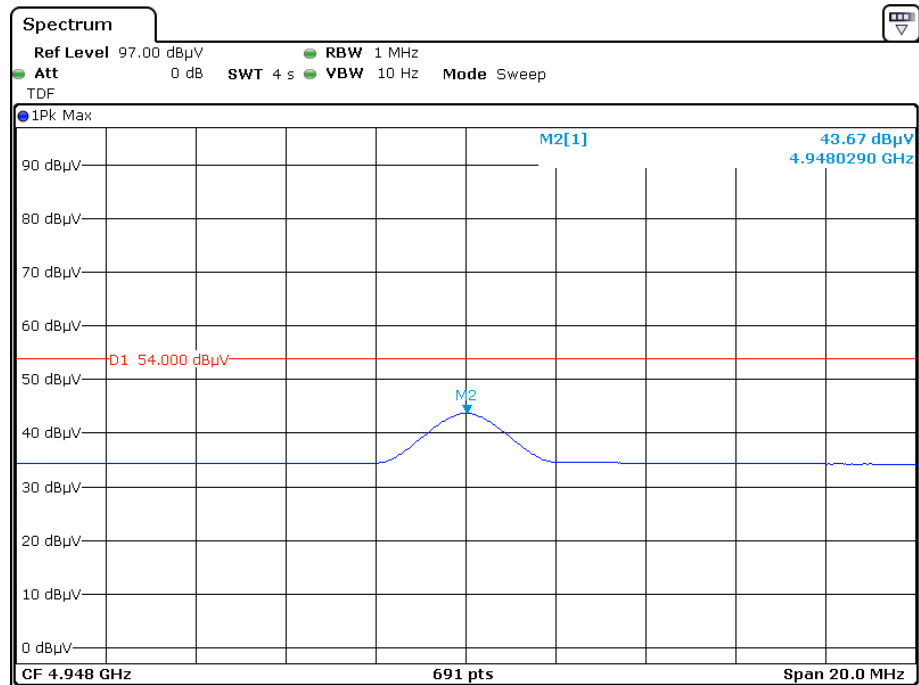
Vertical



Date: 16.DEC.2019 22:24:40



Date: 16.DEC.2019 23:22:52



Date: 16.DEC.2019 22:28:54

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:	24 °C
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

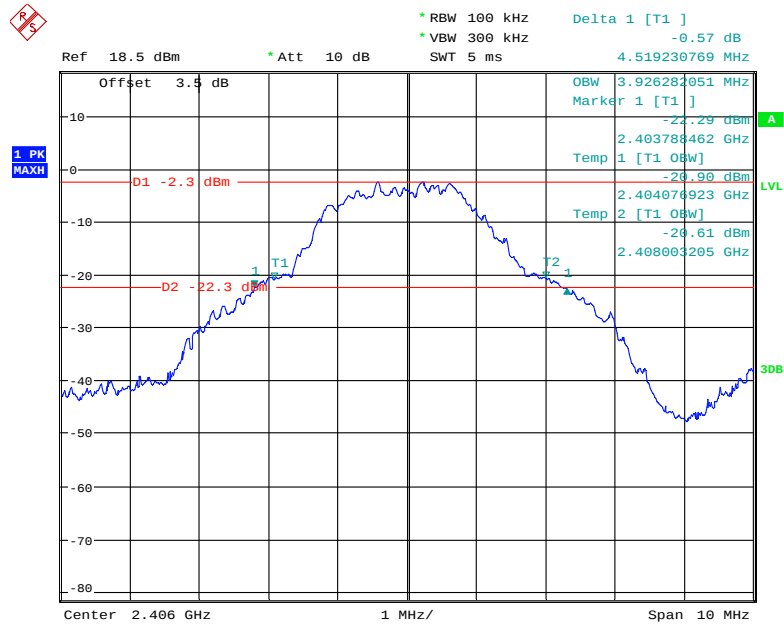
The testing was performed by James Fu on 2019-11-29.

Test Mode: Transmitting

Please refer to the following table and plots.

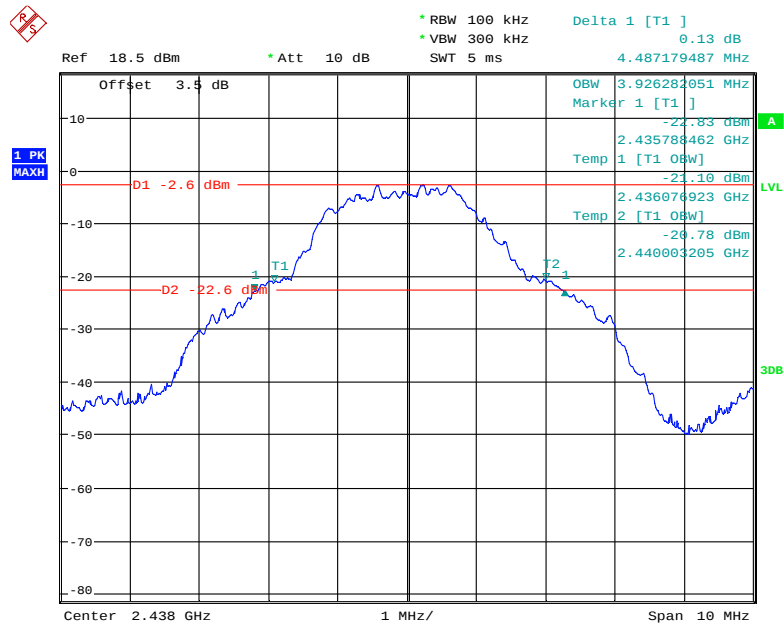
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2406	4.52
Middle	2438	4.49
High	2474	4.49

Low Channel



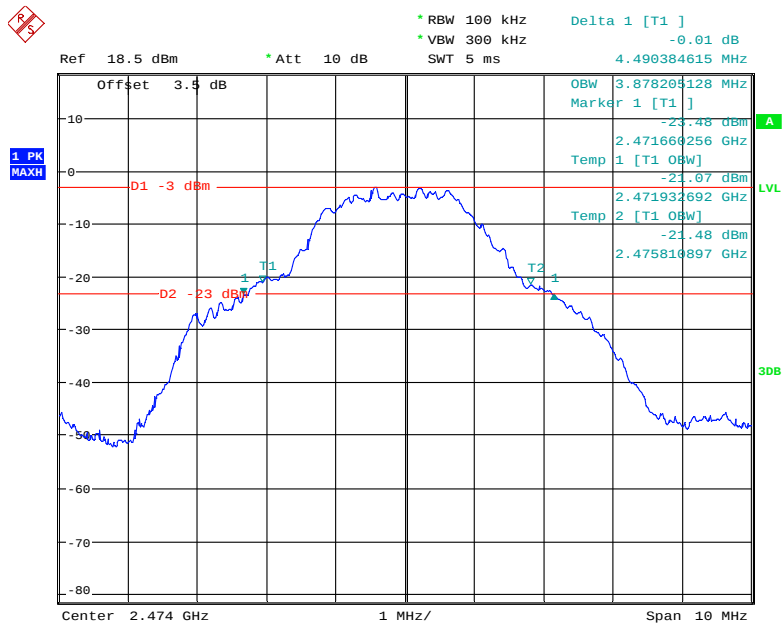
Date: 29.NOV.2019 20:24:17

Middle Channel



Date: 29.NOV.2019 20:21:19

High Channel



Date: 29.NOV.2019 20:23:18

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