TESTING LABORATORY
CERTIFICATE # 4821.01

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-U1

Report Type:	Product Type:
Original Report	WIRELESS MOUSE USB DONGLE

Report Number:	RSZ181120830-00
Report Date:	2018-12-10
Reviewed By:	Rocky Kang 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

Note: This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA* or any agency of the Federal Government. * 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)

The *Zeeva International Limited's* product, model number: *MO-0026 (FCC ID: 2ADM5-U1, UPC Number: 192234013960 & 192234015322, SKU Number: 3077690 & 3117132)* in this report is a *WIRELESS MOUSE USB DONGLE*, which was measured approximately: *1.8 cm (L) * 1.4 cm (W) * 0.6 cm (H)*, rated with input voltage: DC 5.0 V.

Notes: This series products model: MO-0027 and MO-0026 are electrically identical. Model MO-0026 was selected for fully testing, the detailed information can be referred to the declaration letter.

**All measurement and test data in this report was gathered from production sample serial number: 181120830 (Assigned by BACL,Shenzhen). The EUT supplied by the applicant was received on 2018-11-20.*

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, 15.207, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

Submitted with part of a system with FCC ID: 2ADM5-MO-0026.

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	±0.5dB
RF conducted test with spectrum	±1.5dB
All emissions, radiated	±4.88dB
Temperature	±3℃
Humidity	±6%
Supply voltages	±0.4%

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.

8 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2405	5	2457
2	2411	6	2463
3	2417	7	2469
4	2451	8	2475

Channel 1, Channel 4 and Channel 8 were selected for testing.

EUT Exercise Software

"HID_Tool_1203_v1.0.2.exe" software was used.

Equipment Modifications

No modifications were made to the unit tested.

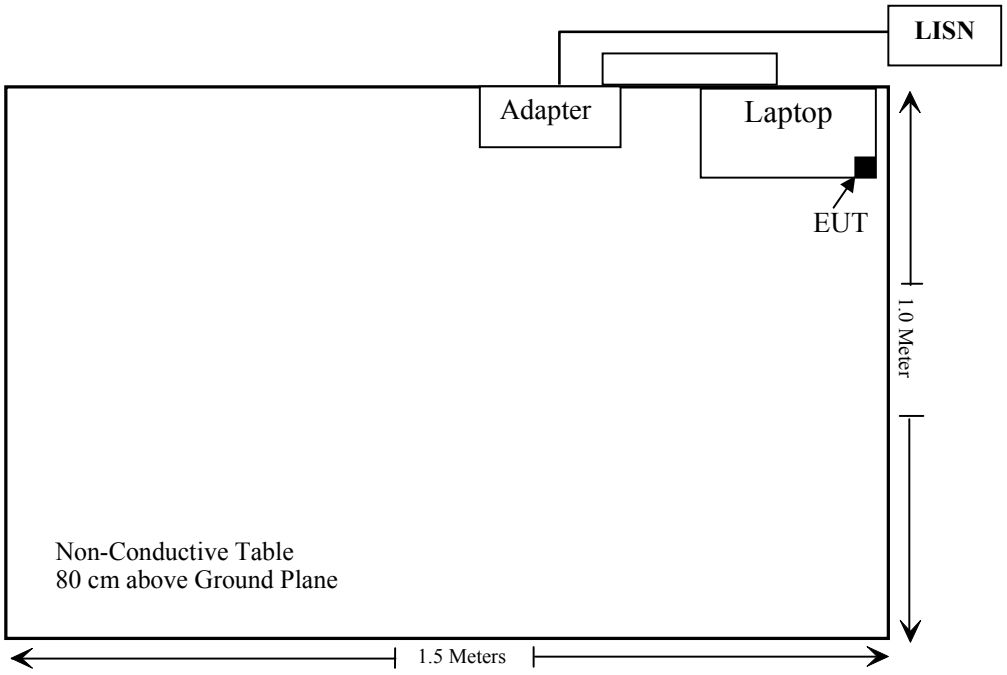
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Lenovo	Laptop	Y430P	Unknown

Support Cable Descriptions

Cable Description	Length (m)	From/Port	To
Un-shielded detachable DC cable	1.0	Adapter	Laptop

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	2018-08-04	2019-08-04
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2017-12-21	2018-12-21
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2018-11-21	2019-05-12
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	Signal Analyzer	FSEM	845987/005	2018-06-23	2019-06-23
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
COM-POWER	Pre-amplifier	PA-122	181919	2018-11-22	2019-05-22
Sonoma instrument	Amplifier	310N	186238	2018-11-12	2019-11-12
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
Ducommun technologies	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2018-08-01	2019-02-01
Ducommun technologies	RF Cable	104PEA	218124002	2018-11-21	2019-05-21
Ducommun technologies	RF Cable	RG-214	1	2018-11-19	2019-05-21
Ducommun technologies	RF Cable	RG-214	2	2018-11-22	2019-05-22
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-28
Heatsink Required	Amplifier	QLW-18405536-J0	15964001002	2018-08-01	2019-02-01
Sinoscite	Band Reject Filter	BSF2402-2480MN-0898-001	99632	2018-11-21	2019-05-21

*** 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 and the antenna gain is 4 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

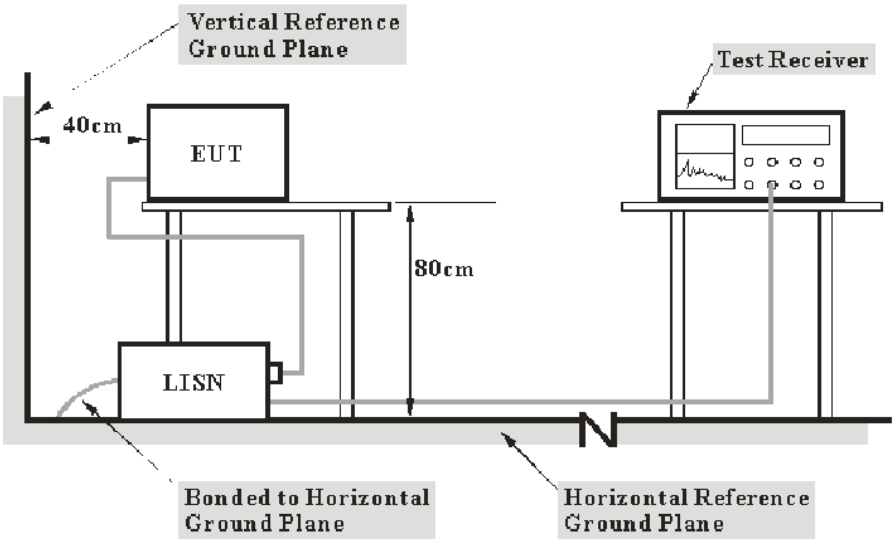
Result: Compliance.

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:

Correction Factor = LISN VDF + Cable Loss + 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:

Margin = Limit – Corrected Amplitude

Test Results Summary

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

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL., $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

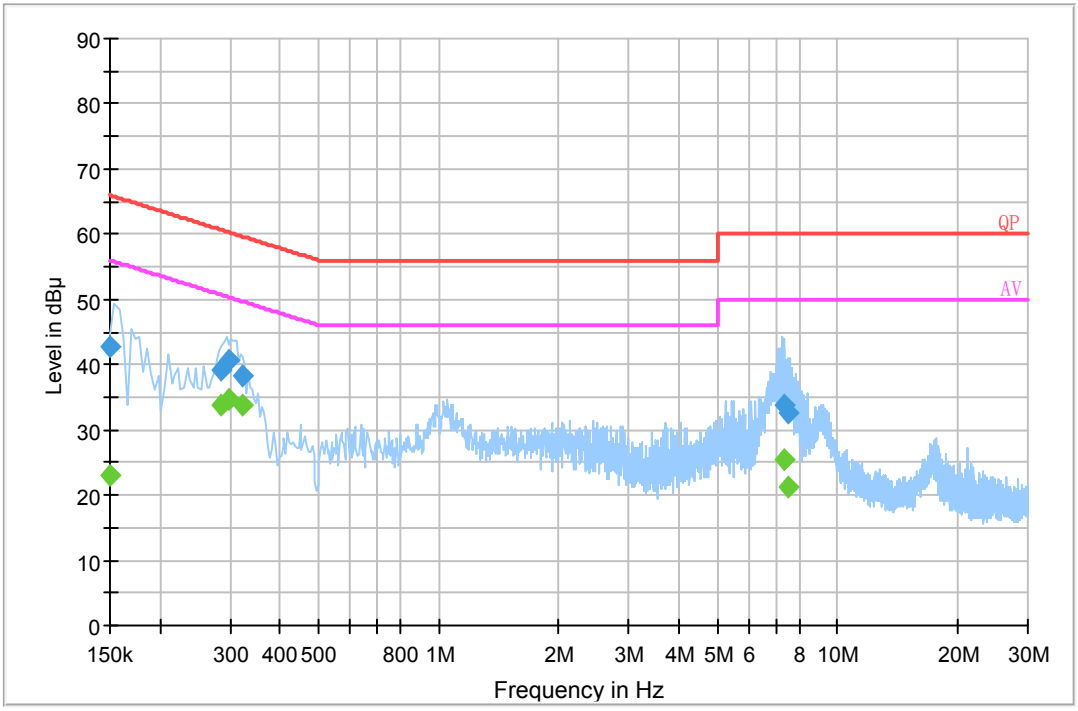
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Shawn Xiao on 2018-12-07.

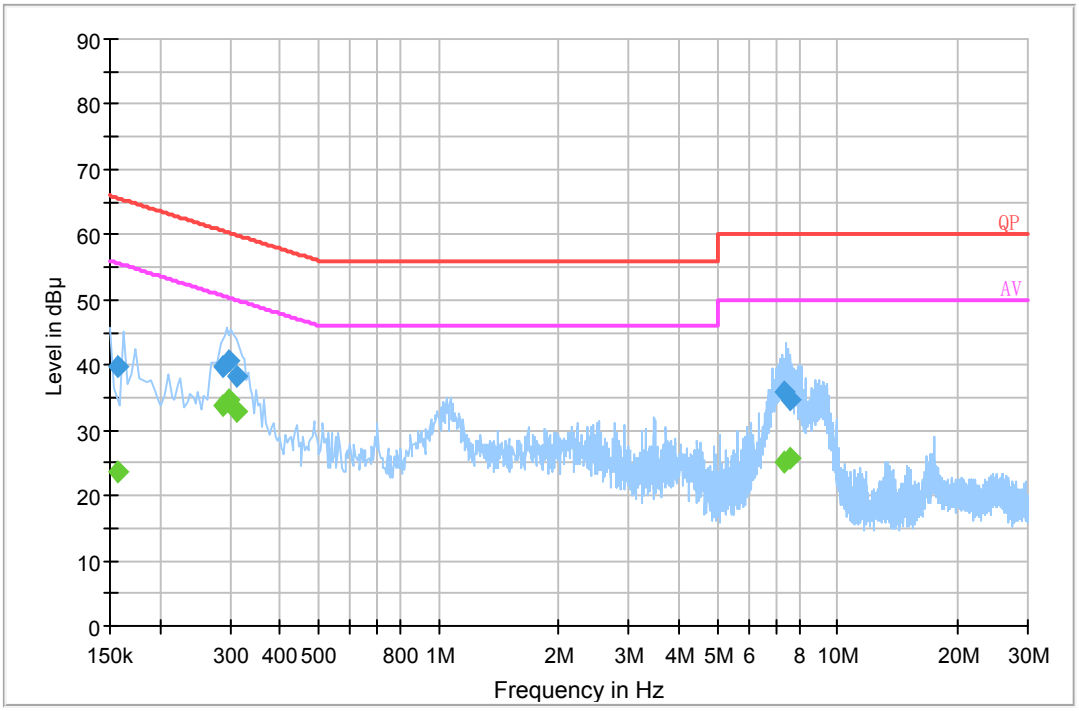
EUT Operation Mode: Transmitting

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Remark (PK/QP/Ave.)
0.150000	42.9	19.8	66.0	23.1	QP
0.285500	39.3	19.8	60.7	21.4	QP
0.297470	40.6	19.8	60.3	19.7	QP
0.321230	38.2	19.8	59.7	21.5	QP
7.376470	33.9	20.1	60.0	26.1	QP
7.544390	32.5	20.1	60.0	27.5	QP
0.150000	23.1	19.8	56.0	32.9	Ave.
0.285500	33.7	19.8	50.7	17	Ave.
0.297470	34.6	19.8	50.3	15.7	Ave.
0.321230	33.6	19.8	49.7	16.1	Ave.
7.376470	25.5	20.1	50.0	24.5	Ave.
7.544390	21.1	20.1	50.0	28.9	Ave.

AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Remark (PK/QP/Ave.)
0.157500	39.7	19.7	65.6	25.9	QP
0.286500	39.6	19.8	60.6	21	QP
0.297500	40.7	19.8	60.3	19.6	QP
0.313230	38.2	19.8	59.9	21.7	QP
7.334430	35.8	20.1	60.0	24.2	QP
7.587610	34.8	20.1	60.0	25.2	QP
0.157500	23.6	19.7	55.6	32	Ave.
0.286500	33.8	19.8	50.6	16.8	Ave.
0.297500	34.7	19.8	50.3	15.6	Ave.
0.313230	32.9	19.8	49.9	17	Ave.
7.334430	25.0	20.1	50.0	25	Ave.
7.587610	25.8	20.1	50.0	24.2	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:

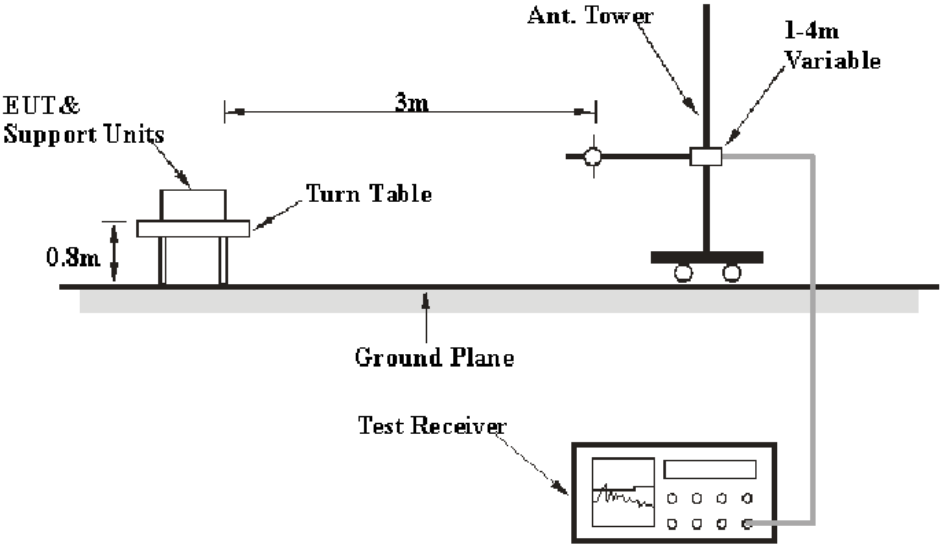
RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000MHz:

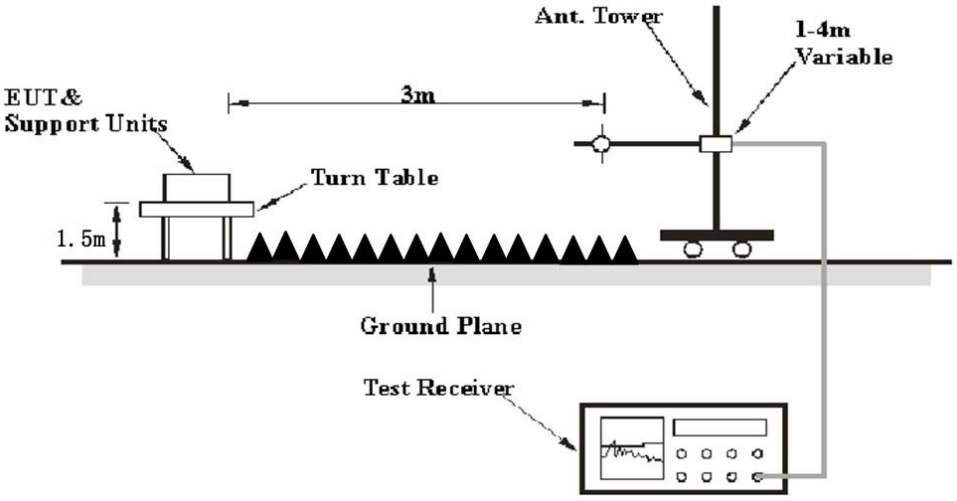
Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

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:

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 data in the following table, the EUT complied with the FCC Part 15.205, 15.209 & §15.249

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

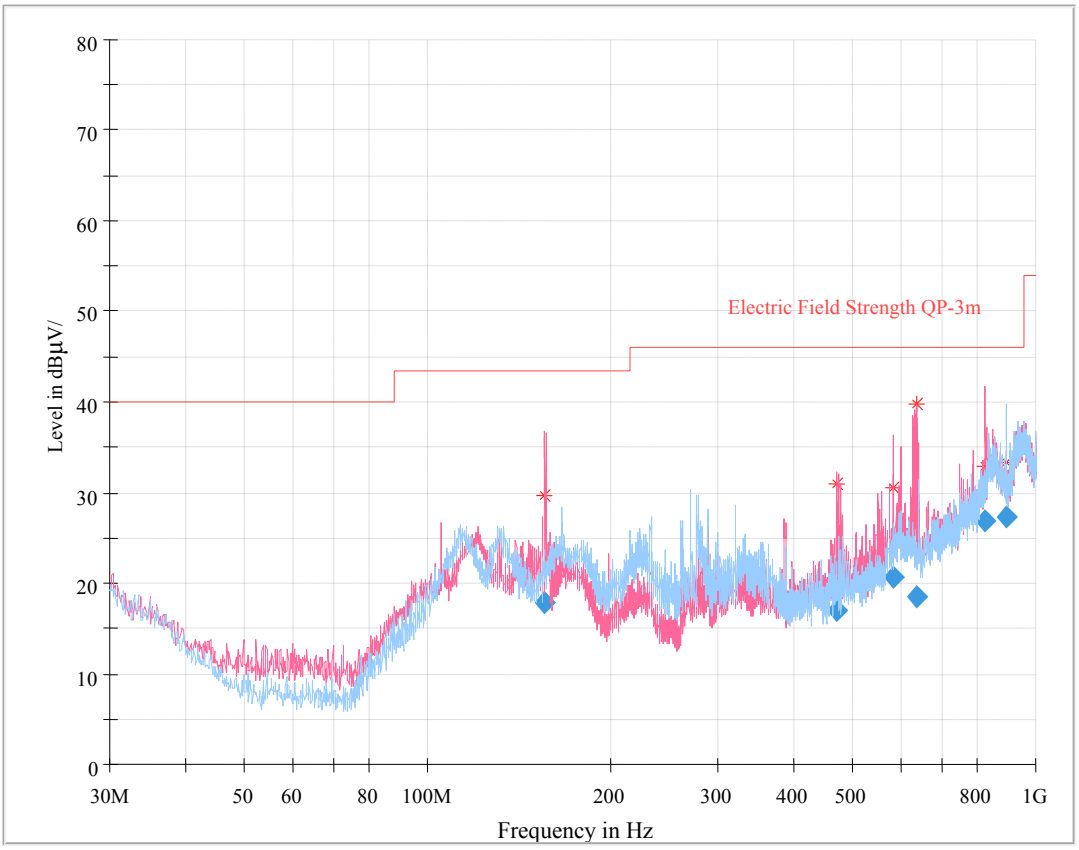
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Shawn Xiao on 2018-12-05.

Test Mode: Transmitting

30MHz – 1 GHz (worst case is high channel):



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
155.483250	17.83	205.0	V	354.0	-14.3	43.50	25.67
471.133250	17.05	123.0	V	96.0	-7.8	46.00	28.95
583.538625	20.54	100.0	V	240.0	-2.8	46.00	25.46
636.731250	18.57	113.0	V	288.0	-3.0	46.00	27.43
828.327500	26.98	147.0	V	110.0	4.7	46.00	19.02
892.790000	27.32	118.0	H	135.0	4.5	46.00	18.68

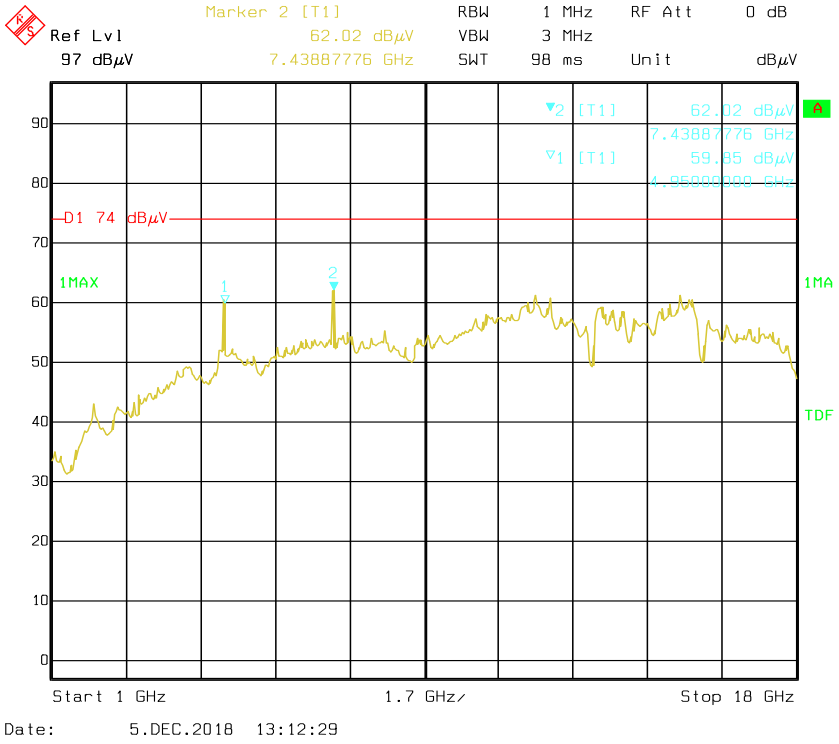
1 GHz - 25 GHz:

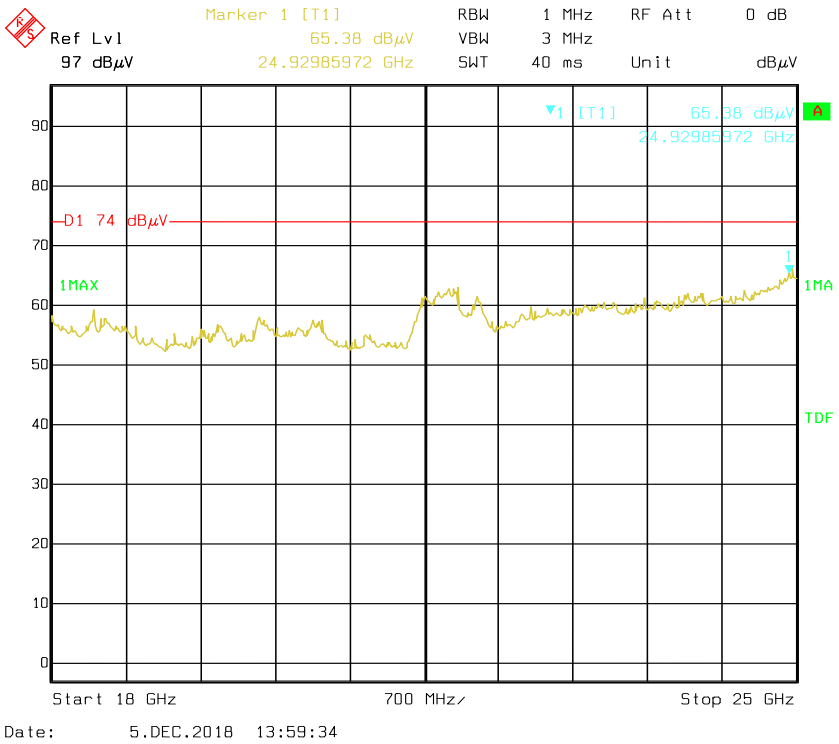
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.249&15.209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2405 MHz)									
2405.00	49.02	PK	31	1.8	H	33.00	82.02	114	31.98
2405.00	46.03	Ave.	31	1.8	H	33.00	79.03	94	14.97
2405.00	39.02	PK	202	2.1	V	33.00	72.02	114	41.98
2405.00	35.95	Ave.	202	2.1	V	33.00	68.95	94	25.05
2376.43	27.61	PK	62	1.5	H	33.00	60.61	74	13.39
2376.43	13.54	Ave.	62	1.5	H	33.00	46.54	54	7.46
2484.66	26.86	PK	217	1.2	H	33.20	60.06	74	13.94
2484.66	13.44	Ave.	217	1.2	H	33.20	46.64	54	7.36
4810.00	52.95	PK	204	2.4	H	7.88	60.83	74	13.17
4810.00	42.39	Ave.	204	2.4	H	7.88	50.27	54	3.73
7215.00	47.86	PK	161	1.3	H	15.88	63.74	74	10.26
7215.00	36.88	Ave.	161	1.3	H	15.88	52.76	54	1.24
9620.00	44.96	PK	308	2.4	H	18.96	63.92	74	10.08
9620.00	31.68	Ave.	308	2.4	H	18.96	50.64	54	3.36
Middle Channel (2451 MHz)									
2451.00	50.10	PK	290	2.5	H	33.10	83.20	114	30.80
2451.00	46.80	Ave.	290	2.5	H	33.10	79.90	94	14.10
2451.00	36.00	PK	38	1.2	V	33.10	69.10	114	44.90
2451.00	33.30	Ave.	38	1.2	V	33.10	66.40	94	27.60
4902.00	51.16	PK	283	2.3	H	9.21	60.37	74	13.63
4902.00	40.32	Ave.	283	2.3	H	9.21	49.53	54	4.47
7353.00	48.50	PK	171	1.1	H	14.69	63.19	74	10.81
7353.00	37.22	Ave.	171	1.1	H	14.69	51.91	54	2.09
9804.00	44.60	PK	331	1.8	H	18.40	63.00	74	11.00
9804.00	31.64	Ave.	331	1.8	H	18.40	50.04	54	3.96

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)
High Channel (2475 MHz)									
2475.00	49.21	PK	74	1.0	H	33.20	82.41	114	31.59
2475.00	46.14	Ave.	74	1.0	H	33.20	79.34	94	14.66
2475.00	40.89	PK	83	1.2	V	33.20	74.09	114	39.91
2475.00	36.77	Ave.	83	1.2	V	33.20	69.97	94	24.03
2345.59	27.42	PK	189	2.0	H	32.97	60.39	74	13.61
2345.59	13.63	Ave.	189	2.0	H	32.97	46.60	54	7.40
2496.45	27.51	PK	227	1.8	H	33.20	60.71	74	13.29
2496.45	13.51	Ave.	227	1.8	H	33.20	46.71	54	7.29
4950.00	55.79	PK	232	1.5	H	9.07	64.86	74	9.14
4950.00	42.24	Ave.	232	1.5	H	9.07	51.31	54	2.69
7425.00	50.63	PK	43	2.3	H	14.79	65.42	74	8.58
7425.00	39.11	Ave.	43	2.3	H	14.79	53.90	54	0.10
9900.00	43.00	PK	127	1.1	H	19.32	62.32	74	11.68
9900.00	28.64	Ave.	127	1.1	H	19.32	47.96	54	6.04

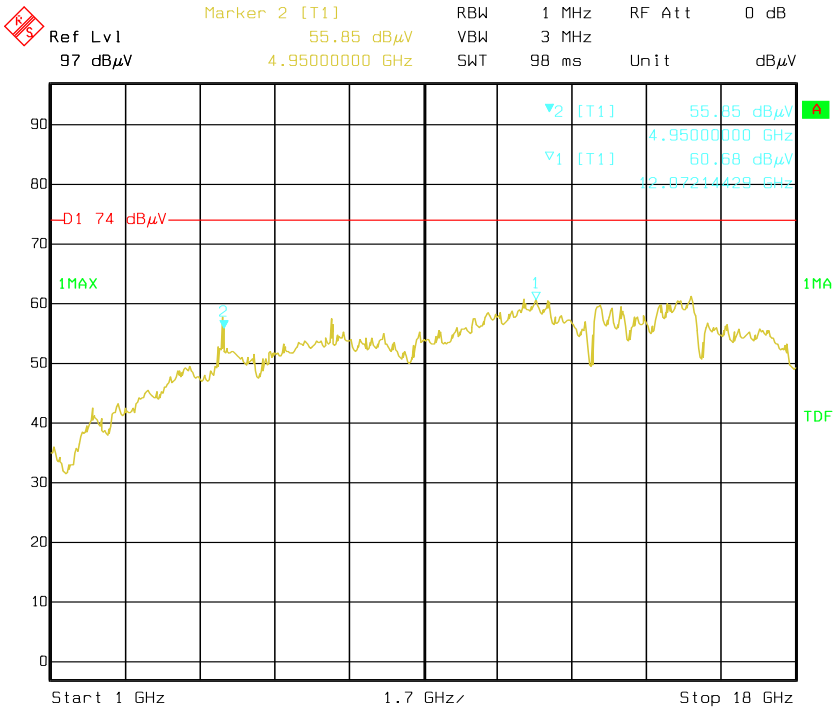
Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) +cable loss – amplifier factor
Margin = Limit- Corr. Amplitude
The emission more than20dB below the limit was not required to be recorded.

Pre-scan with high channel Peak
Horizontal





Vertical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SWT 98 ms
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1MAX
1MA
TDF
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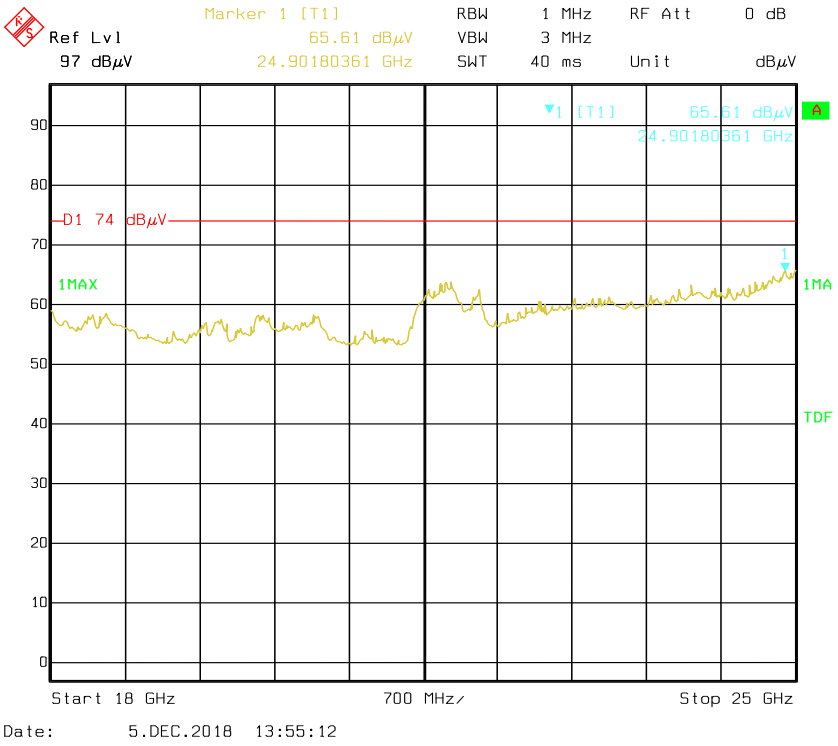
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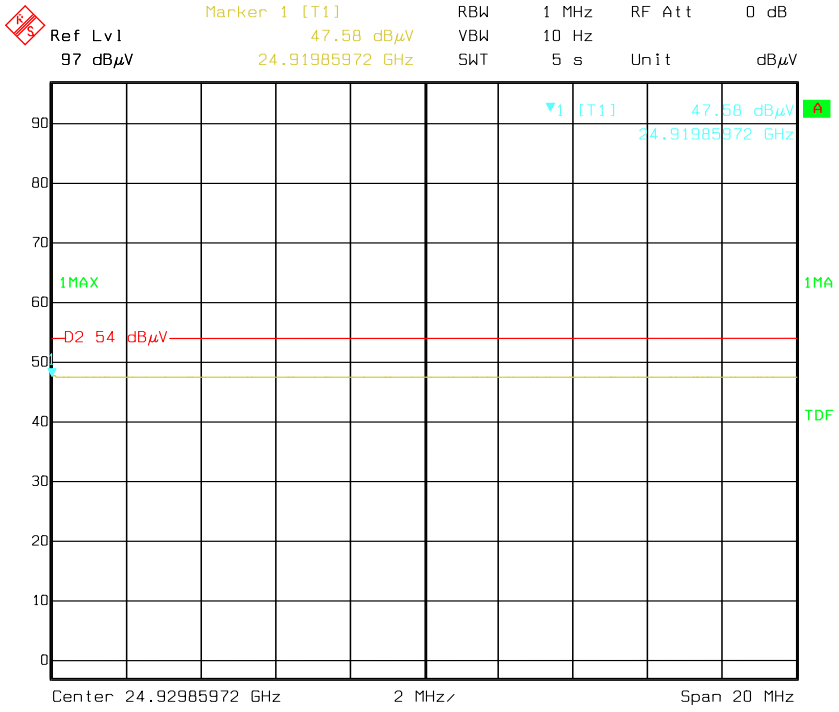
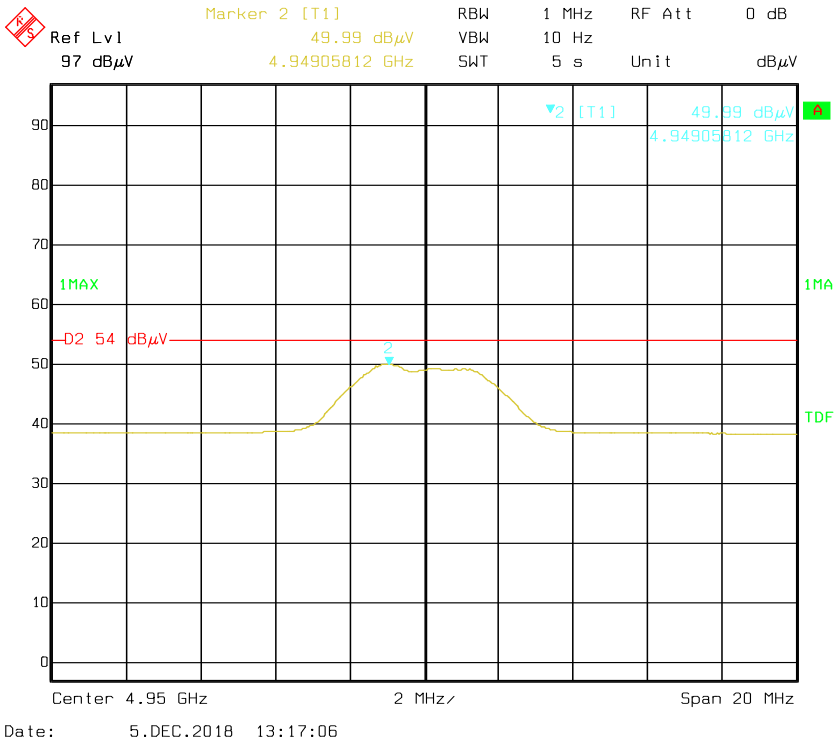
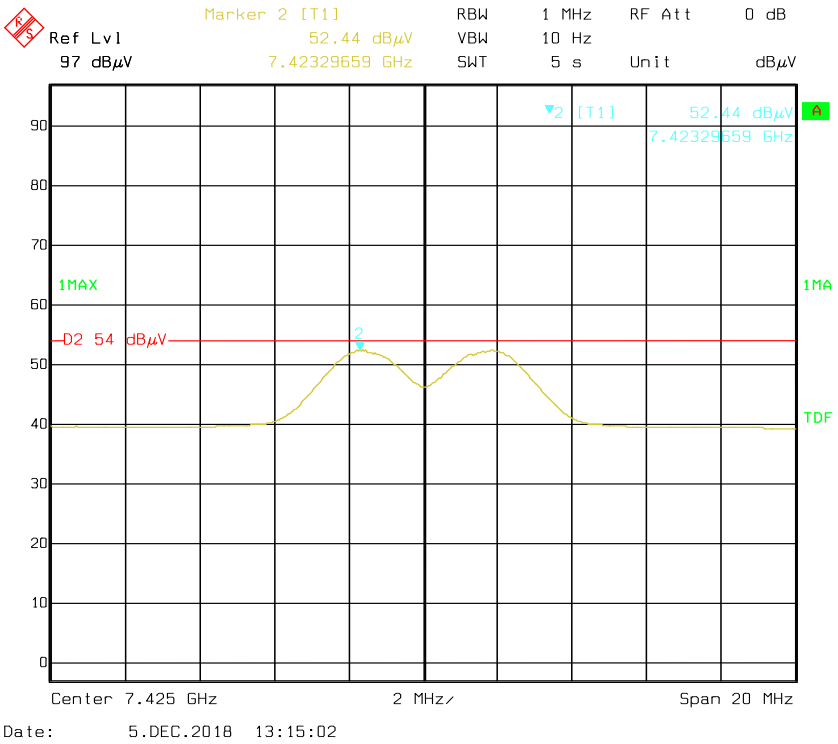
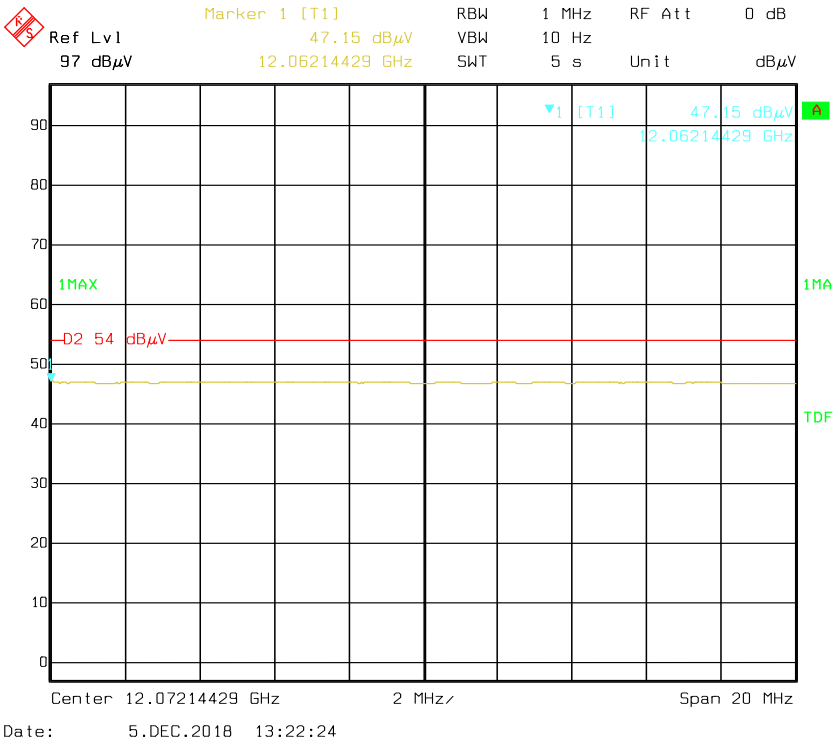
Average value for the peak point at pre-scan
Horizontal

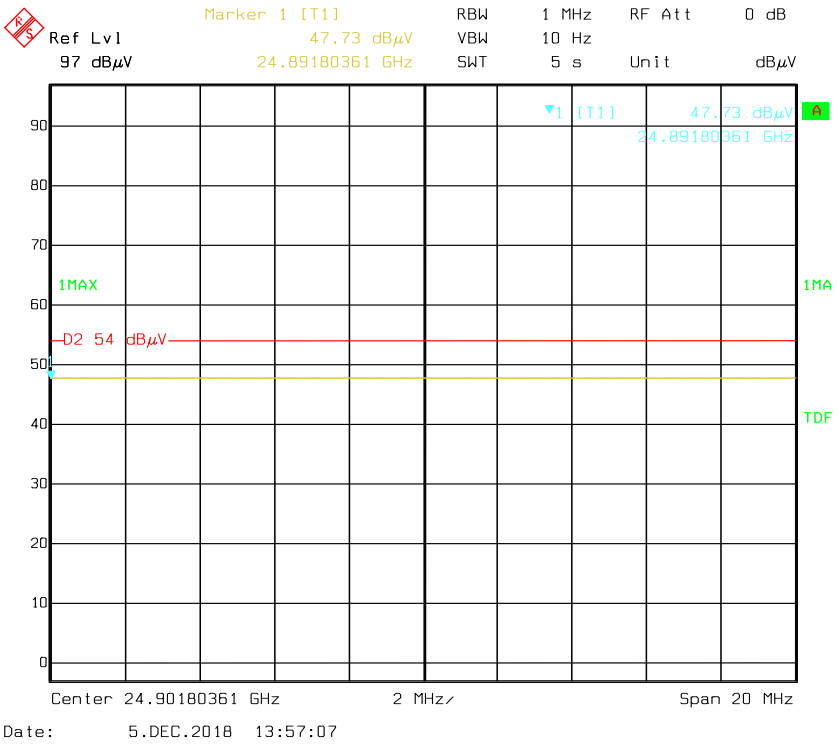


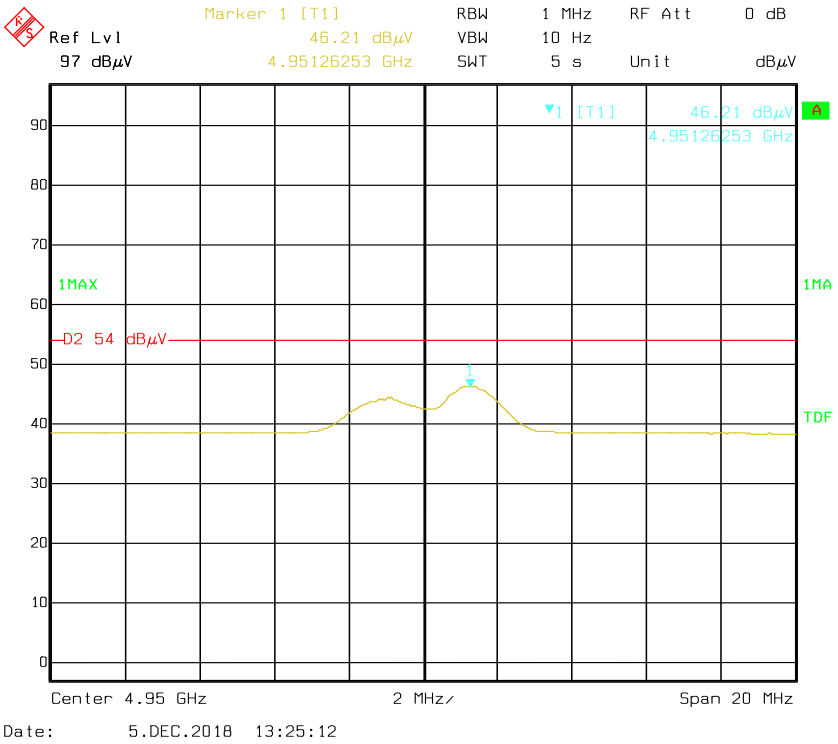



Marker 2 [T1]
Ref Lvl
97 dBµV
52.44 dBµV
7.42329659 GHz
RBW 1 MHz
VBW 10 Hz
SWT 5 s
RF Att 0 dB
Unit dBµV
2 [T1] 52.44 dBµV
7.42329659 GHz
1MAX
D2 54 dBµV
1MA
TDF
Center 7.425 GHz
2 MHz/
Span 20 MHz
Date: 5.DEC.2018 13:15:02

Vertical


Marker 1 [T1]
Ref Lvl
97 dBµV
47.15 dBµV
12.06214429 GHz
RBW 1 MHz
VBW 10 Hz
SWT 5 s
RF Att 0 dB
Unit dBµV
1 [T1] 47.15 dBµV
12.06214429 GHz
1MAX
D2 54 dBµV
1MA
TDF
Center 12.07214429 GHz
2 MHz/
Span 20 MHz
Date: 5.DEC.2018 13:22:24


Marker 1 [T1]
Ref Lvl
97 dBµV
47.73 dBµV
24.89180361 GHz
RBW 1 MHz
VBW 10 Hz
SWT 5 s
RF Att 0 dB
Unit dBµV
1 [T1] 47.73 dBµV
24.89180361 GHz
1MAX
D2 54 dBµV
1MA
TDF
Center 24.90180361 GHz
2 MHz/
Span 20 MHz
Date: 5.DEC.2018 13:57:07


Marker 1 [T1]
Ref Lvl
97 dBµV
46.21 dBµV
4.95126253 GHz
RBW 1 MHz
VBW 10 Hz
SWT 5 s
RF Att 0 dB
Unit dBµV
1 [T1] 46.21 dBµV
4.95126253 GHz
1MAX
D2 54 dBµV
1MA
TDF
Center 4.95 GHz
2 MHz/
Span 20 MHz
Date: 5.DEC.2018 13:25:12

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:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

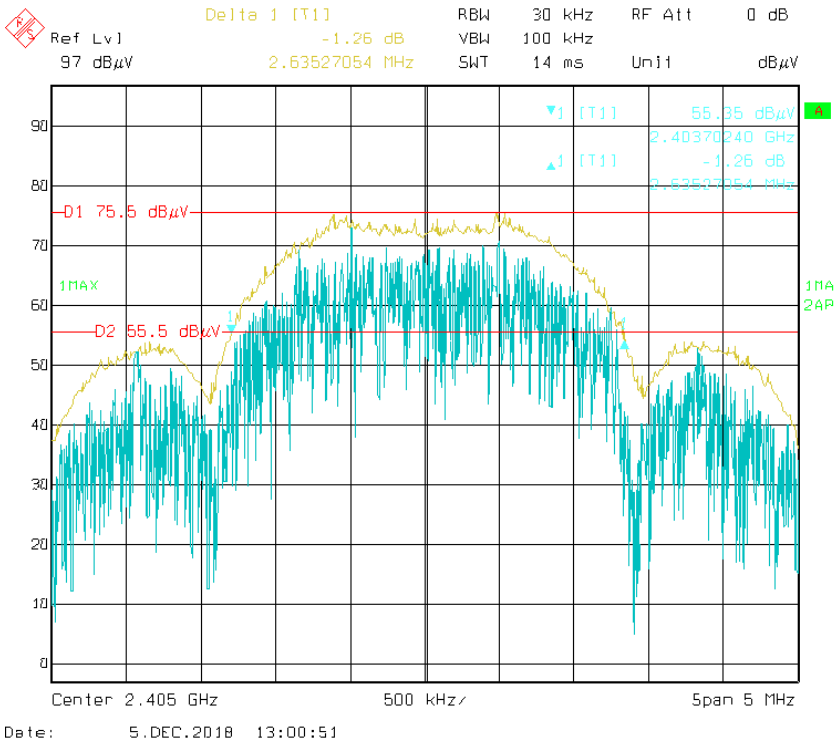
The testing was performed by Shawn Xiao on 2018-12-05.

Test Mode: Transmitting

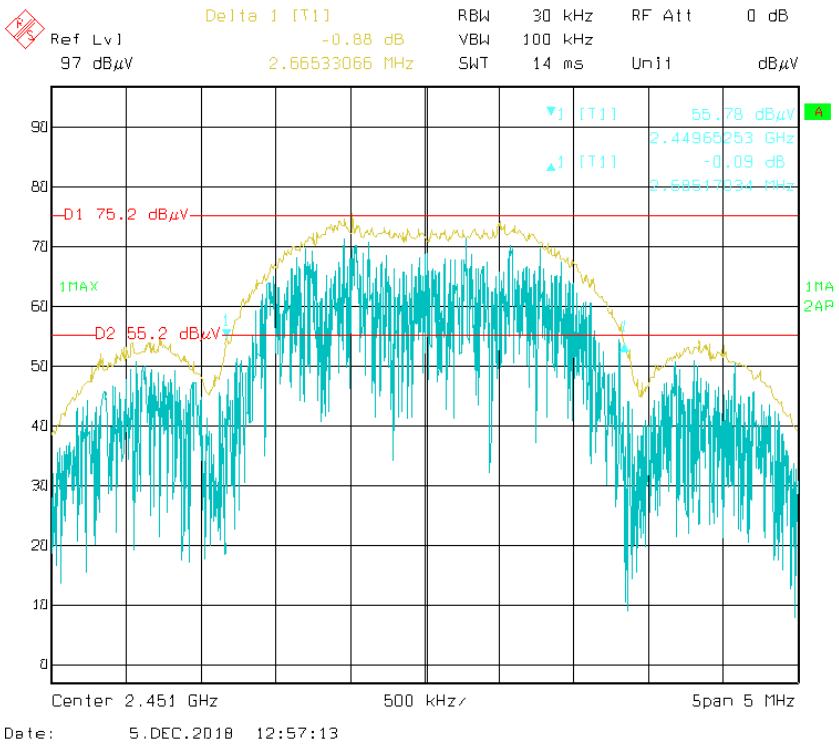
Please refer to the following table and plots.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2405	2.635
Middle	2451	2.685
High	2475	2.625

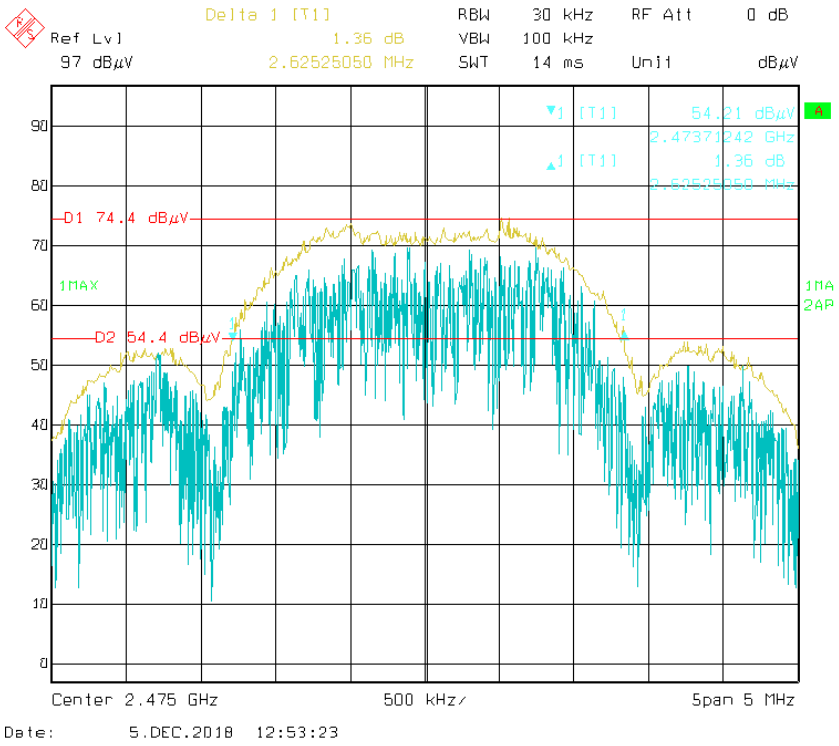
Low Channel



Middle Channel



High Channel



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