



FCC PART 15.249

TEST REPORT

For

JEM ACCESSORIES INC.

32 Brunswick Avenue Edison, NJ 08817, United States

FCC ID: 2AHAS-PCA21001R

Report Type: Original Report	Product Type: USB dongle
Report Number: SZ3210701-26493E-00	
Report Date: 2021-07-19	
Reviewed By: RF Engineer	Jacob Kong <i>Jacob Kong</i>
Prepared By: Bay Area Compliance Laboratories Corp. (Shenzhen) 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn	

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	USB dongle
Tested Model	PCA2-1001-AST
Frequency Range	2402-2480MHz
Maximum E-Field Strength	83.32dBuV/m@3m
Antenna Specification*	0dBi(It is provided by the applicant)
Voltage Range	DC 5.0V
Date of Test	2021-07-15
Sample serial number	SZ3210701-26493E-RF-S1 (Assigned by BAACL, Shenzhen)
Received date	2021-07-01
Sample/EUT Status	Good condition

Objective

This test report is 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, 15.215 and 15.249 rules.

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°C
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 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, 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.

Frequency List

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402	21	2442
2	2404	10	2444
3	2406
...
...
...	...	38	2476
19	2438	39	2478
20	2440	40	2480

EUT was test in channel 1, 20, 40.

EUT Exercise Software

“SE67T_Test_v161*” software was used and the power level set was default*. The software and power level was provided by applicant.

Equipment Modifications

No modifications were made to the unit tested.

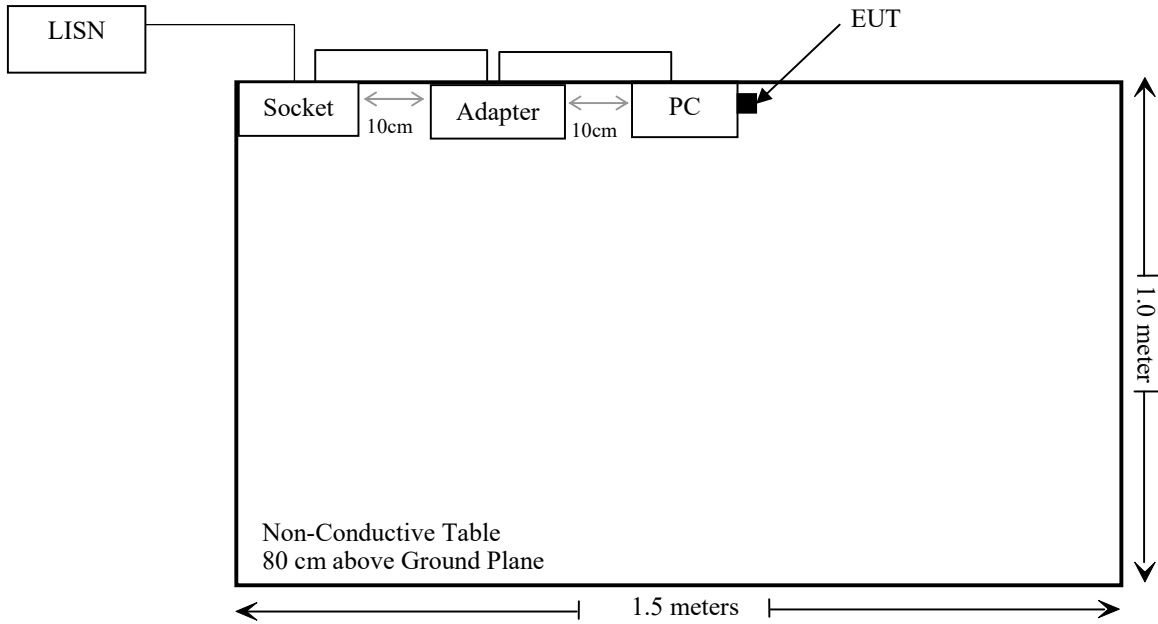
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
BULL	Socket	GN-212	A37209315081183
DELL	PC	Latitude E5430	JG3NLV1
DELL	Adapter	PA-10	Unkown

Support Cable Descriptions

Cable Description	Length (m)	From/Port	To
Unshielded un-detachable AC cable	1.0	socket	LISN
Unshielded un-detachable DC cable	1.0	Adapter	PC
Unshielded detachable A C cable	1.8	Socket	Adapter

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conduction Emissions	Compliant
15.205, §15.209, §15.249(d)	Radiated Emissions& Outside of Band Emission	Compliant
§15.215 (c)	20 dB Bandwidth	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted emission					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2021/07/07	2022/07/06
Rohde & Schwarz	LISN	ENV216	101613	2021/07/07	2022/07/06
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2020/11/29	2021/11/28
Unknown	CE Cable	CE Cable	UF A210B-1-0720-504504	2020/11/29	2021/11/28
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2020/08/04	2021/08/03
Sonoma instrument	Pre-amplifier	310 N	186238	2020/08/04	2021/08/03
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2020/12/22	2023/12/21
Unknown	Cable 2	RF Cable 2	F-03-EM197	2020/11/29	2021/11/28
Unknown	Cable	Chamber Cable 1	F-03-EM236	2020/11/29	2021/11/28
Rohde & Schwarz	Auto test software	EMC 32	V9.10.00	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2021/07/06	2022/07/05
COM-POWER	Pre-amplifier	PA-122	181919	2020/11/29	2021/11/28
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2020/11/28	2021/11/27
Sunol Sciences	Horn Antenna	3115	9107-3694	2021/01/15	2024/01/14
the electro-Mechanics Co	Horn Antenna	3116	9510-2270	2019/10/13	2022/10/12
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2020/11/29	2021/11/28
Unknown	RF Cable	W1101-EQ1 OUT	F-19-EM005	2020/11/29	2021/11/28
SNSD	Band Reject filter	BSF2402-2480MN-0898-001	2.4G filter	2021/04/20	2022/04/20

* **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 antenna which was permanently attached and the antenna gain is 0dBi, fulfill the requirement of this section. Please refer to the EUT photos.

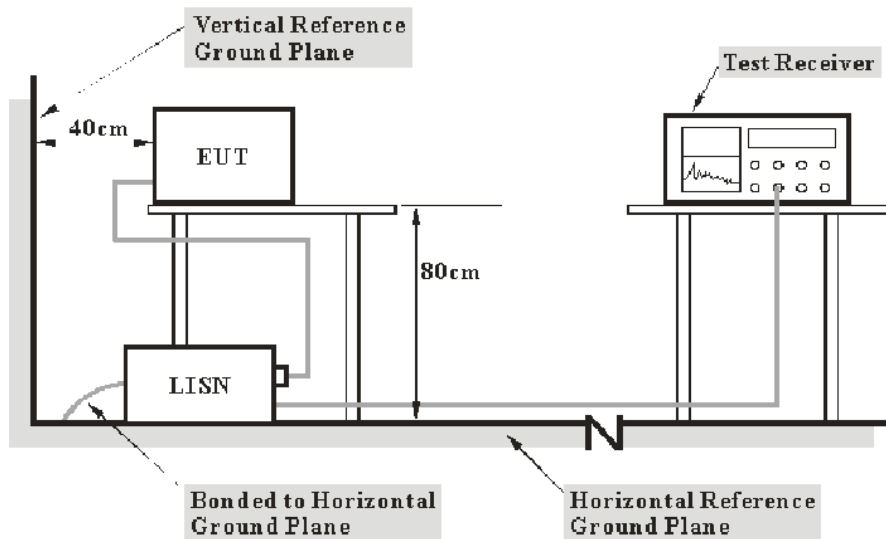
Result: Compliant.

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 EUT complied with the FCC Part 15.207,

Test Data

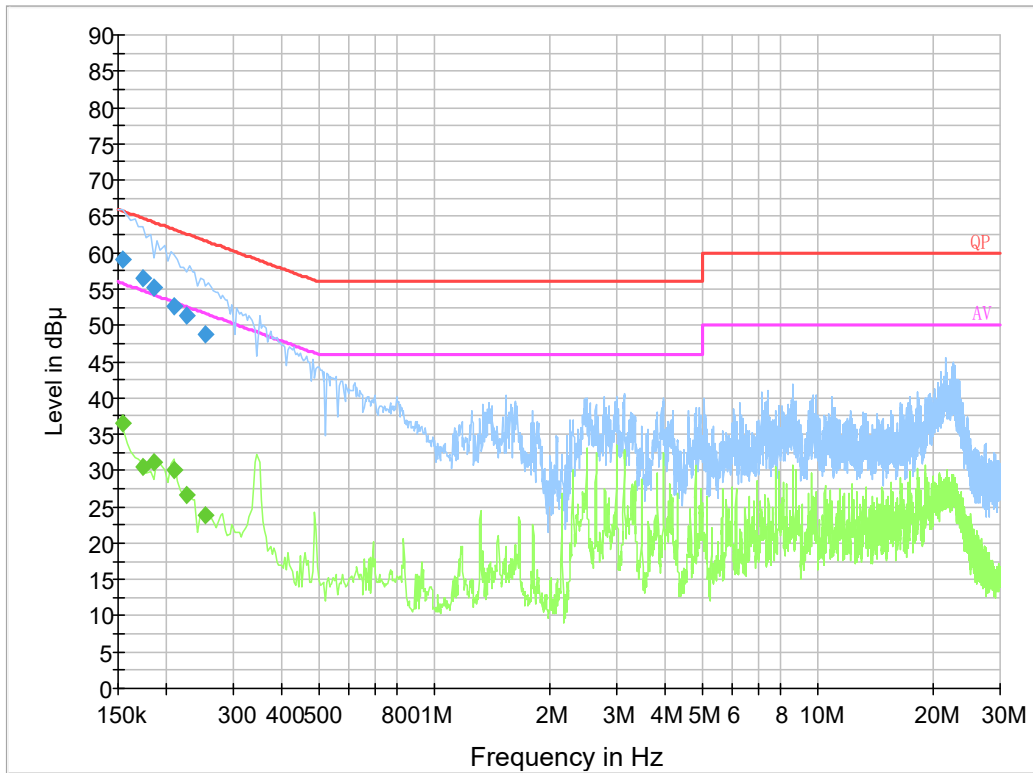
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	66 %
ATM Pressure:	101.0 kPa

The testing was performed by Haiguo Li on 2021-07-15.

EUT Operation Mode: Transmitting

AC 120V/60 Hz, Line



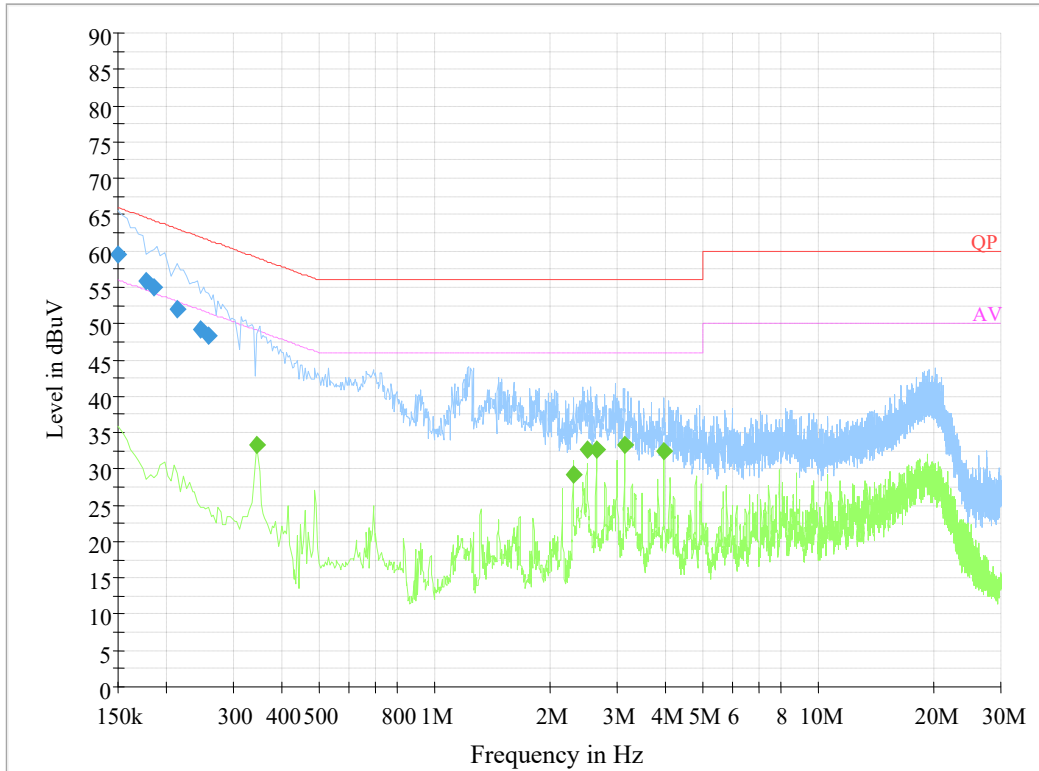
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154000	59.0	9.000	L1	19.8	6.8	65.8
0.173500	56.5	9.000	L1	19.9	8.3	64.8
0.185500	55.1	9.000	L1	19.8	9.1	64.2
0.209500	52.6	9.000	L1	19.8	10.6	63.2
0.225500	51.2	9.000	L1	19.8	11.4	62.6
0.253500	48.8	9.000	L1	19.8	12.8	61.6

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154000	36.5	9.000	L1	19.8	19.3	55.8
0.173500	30.6	9.000	L1	19.9	24.2	54.8
0.185500	31.2	9.000	L1	19.8	23.0	54.2
0.209500	30.1	9.000	L1	19.8	23.1	53.2
0.225500	26.7	9.000	L1	19.8	25.9	52.6
0.253500	23.8	9.000	L1	19.8	27.8	51.6

AC 120V/60 Hz, Neutral



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	59.4	9.000	N	19.8	6.6	66.0
0.177500	55.8	9.000	N	19.8	8.8	64.6
0.185500	55.0	9.000	N	19.8	9.2	64.2
0.213500	52.0	9.000	N	19.8	11.1	63.1
0.245500	49.2	9.000	N	19.8	12.7	61.9
0.257500	48.4	9.000	N	19.8	13.1	61.5

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.346000	33.4	9.000	N	19.8	15.7	49.1
2.306000	29.3	9.000	N	19.8	16.7	46.0
2.506000	32.7	9.000	N	19.8	13.3	46.0
2.650000	32.6	9.000	N	19.8	13.4	46.0
3.142000	33.2	9.000	N	19.9	12.8	46.0
3.978000	32.4	9.000	N	19.9	13.6	46.0

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:

$$\text{RBW} = 100 \text{ kHz} / \text{VBW} = 300 \text{ kHz} / \text{Sweep} = \text{Auto}$$

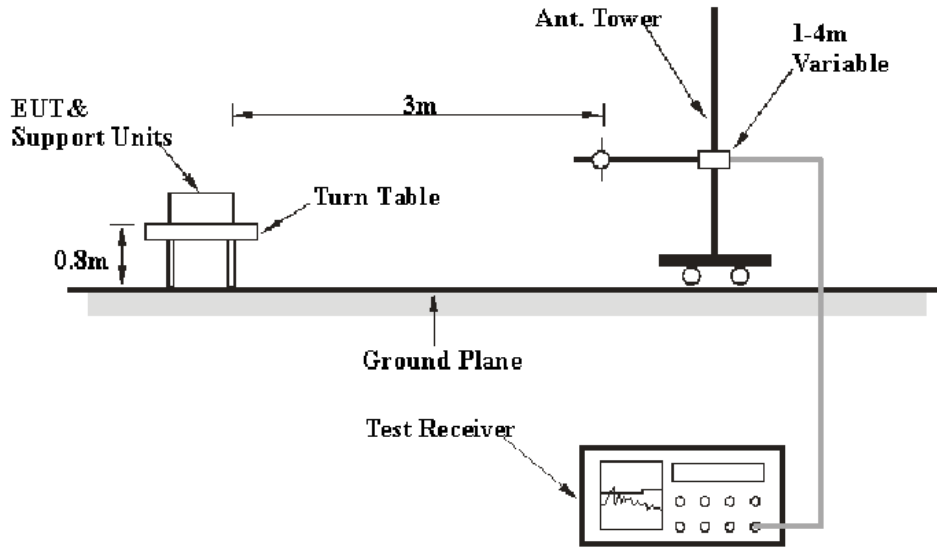
Above 1000MHz:

$$\text{Peak: RBW} = 1\text{MHz} / \text{VBW} = 3\text{MHz} / \text{Sweep} = \text{Auto}$$

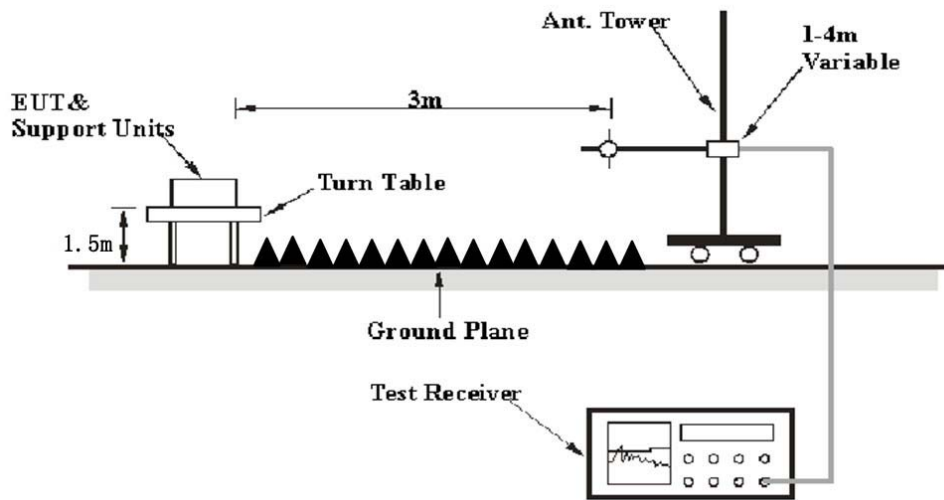
$$\text{Average: RBW} = 1\text{MHz} / \text{VBW} = 10\text{Hz} / \text{Sweep} = \text{Auto}$$

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 meter, 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

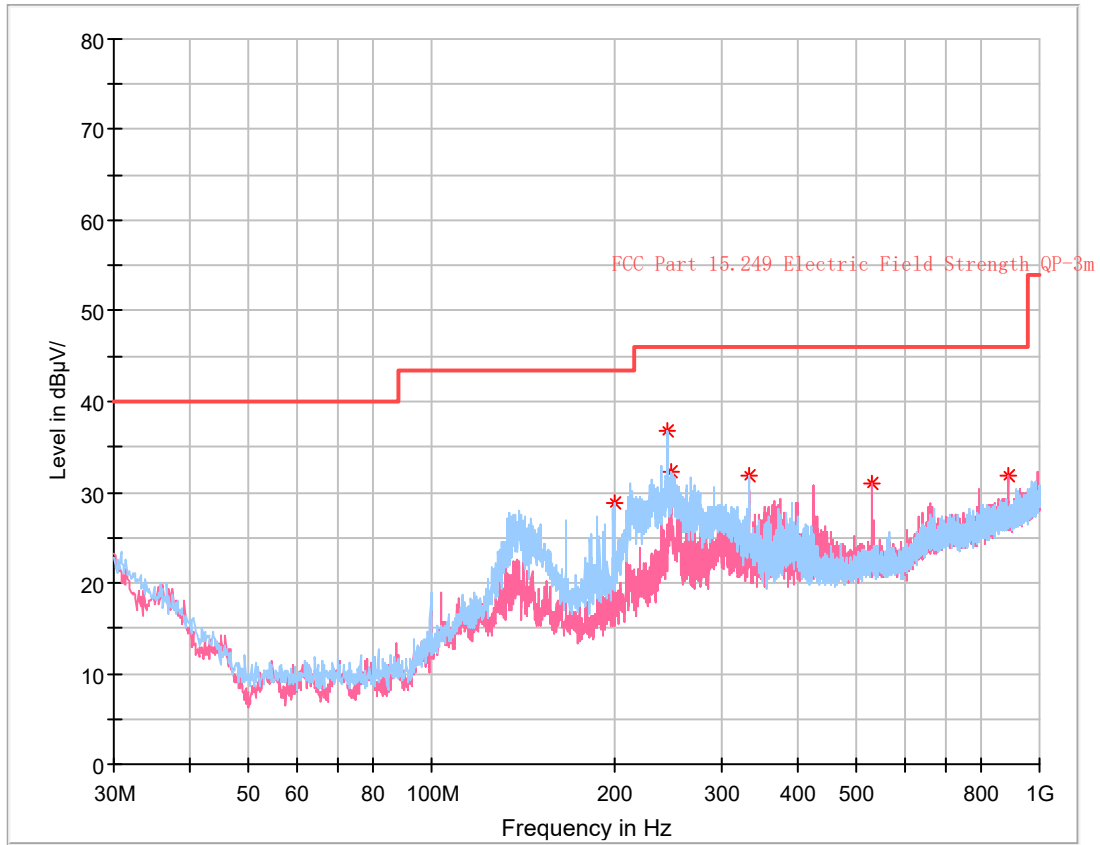
Environmental Conditions

Temperature:	27.4~30 °C
Relative Humidity:	45~53 %
ATM Pressure:	101.0 kPa

The testing was performed by Willian Wang on 2021-07-15 for below 1GHz and Bruce Lin on 2021-07-15 for above 1GHz.

Test Mode: Transmitting

30MHz – 1 GHz: (Low channel was worst case)



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
199.75000	28.76	43.50	14.74	100.0	H	88.0	-11.1
244.73375	36.85	46.00	9.15	100.0	H	88.0	-11.8
247.28000	32.29	46.00	13.71	100.0	H	258.0	-11.8
333.00375	31.75	46.00	14.25	100.0	H	88.0	-9.2
531.36875	31.05	46.00	14.95	100.0	V	105.0	-4.7
890.99625	31.92	46.00	14.08	300.0	V	27.0	0.9

1 GHz - 25 GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m)	FCC Part 15.249	
	Reading (dBµV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
Low Channel(2402MHz)									
2402.00	50.91	PK	66	1.3	H	31.87	82.78	114.0	31.22
2402.00	49.11	Ave.	66	1.3	H	31.87	80.98	94.0	13.02
2402.00	44.35	PK	38	2.3	V	31.87	76.22	114.0	37.78
2402.00	42.31	Ave.	38	2.3	V	31.87	74.18	94.0	19.82
2400.00	31.89	PK	150	1.2	H	31.87	63.76	74	10.24
2400.00	19.28	Ave.	150	1.2	H	31.87	51.15	54	2.85
2484.24	28.97	PK	131	1.8	H	32.13	61.10	74	12.90
2484.24	14.61	Ave.	131	1.8	H	32.13	46.74	54	7.26
4804.00	48.18	PK	71	1.3	H	6.28	54.46	74	19.54
4804.00	39.52	Ave.	71	1.3	H	6.28	45.80	54	8.20
Middle Channel(2440MHz)									
2440.00	51.35	PK	72	1.3	H	31.97	83.32	114	30.68
2440.00	49.35	Ave.	72	1.3	H	31.97	81.32	94	12.68
2440.00	47.85	PK	186	1.4	V	31.97	79.82	114	34.18
2440.00	44.98	Ave.	186	1.4	V	31.97	76.95	94	17.05
4880.00	48.21	PK	289	1.5	H	6.76	54.97	74	19.03
4880.00	40.95	Ave.	289	1.5	H	6.76	47.71	54	6.29
High Channel(2480 MHz)									
2480.00	50.12	PK	177	2.4	H	32.13	82.25	114	31.75
2480.00	49.09	Ave.	177	2.4	H	32.13	81.22	94	12.78
2480.00	48.88	PK	197	1.7	V	32.13	81.01	114	32.99
2480.00	47.88	Ave.	197	1.7	V	32.13	80.01	94	13.99
2389.82	29.07	PK	45	2.1	H	31.87	60.94	74	13.06
2389.82	14.71	Ave.	45	2.1	H	31.87	46.58	54	7.42
2483.62	29.62	PK	160	1.0	H	32.13	61.75	74	12.25
2483.62	14.53	Ave.	160	1.0	H	32.13	46.66	54	7.34
4960.00	48.59	PK	329	1.8	H	6.80	55.39	74	18.61
4960.00	41.71	Ave.	329	1.8	H	6.80	48.51	54	5.49

Note:

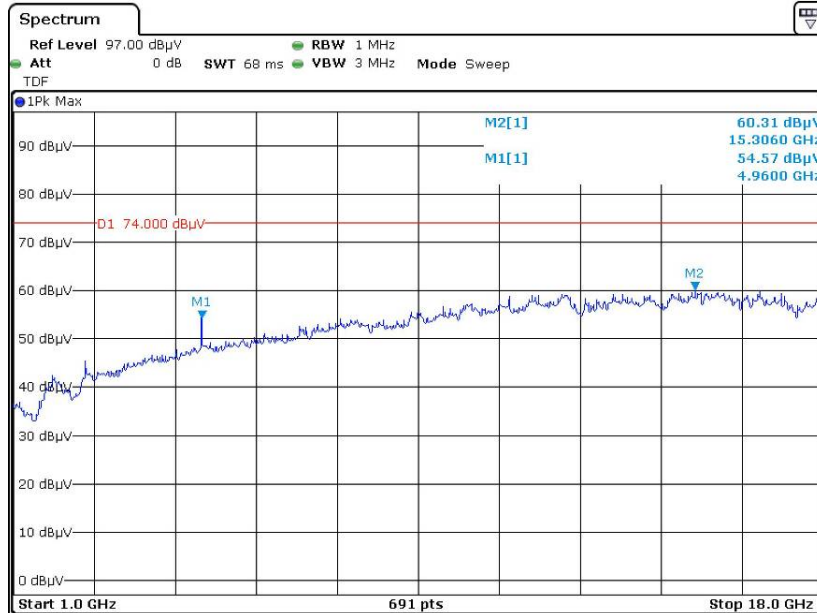
Corrected Amplitude = Corrected Factor + Reading

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

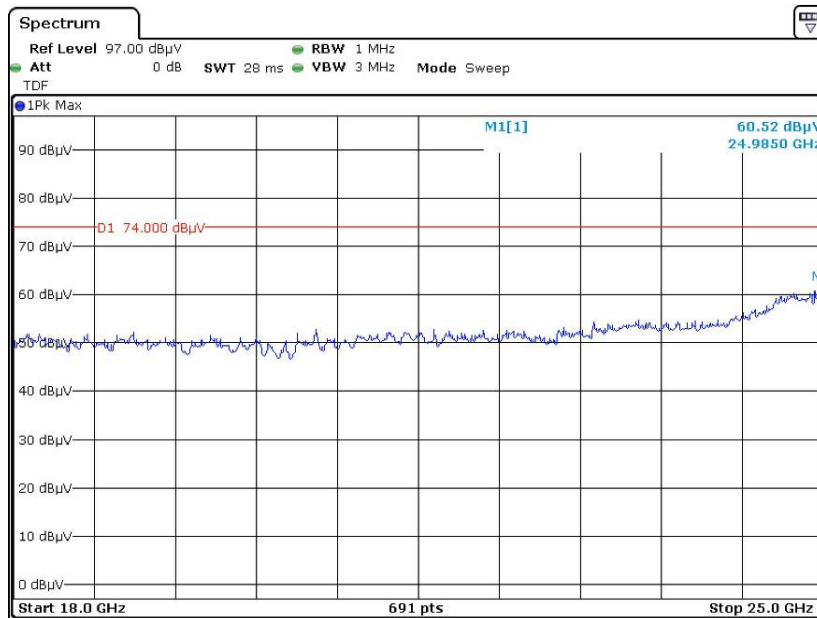
Margin = Limit- Corr. Amplitude

The emission more than20dB below the limit was not required to be recorded.

Pre-scan with high channel Peak Horizontal

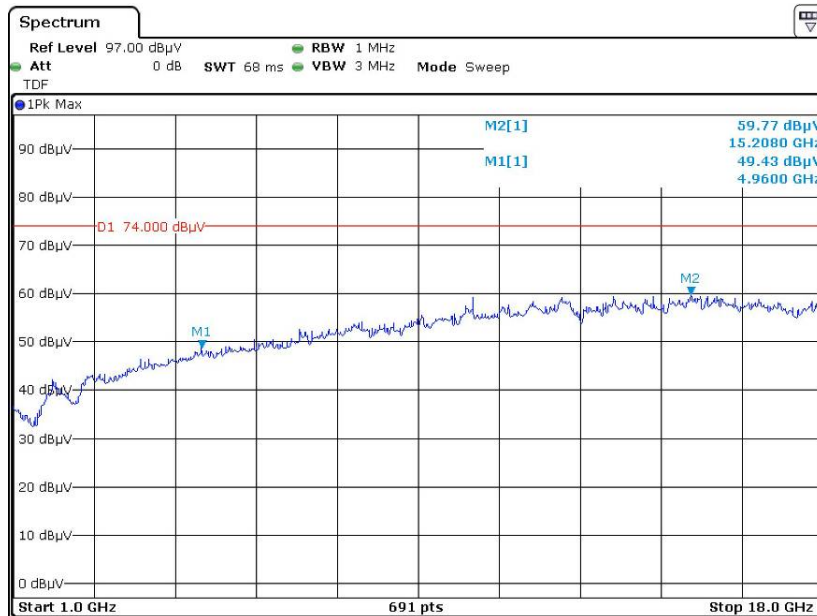


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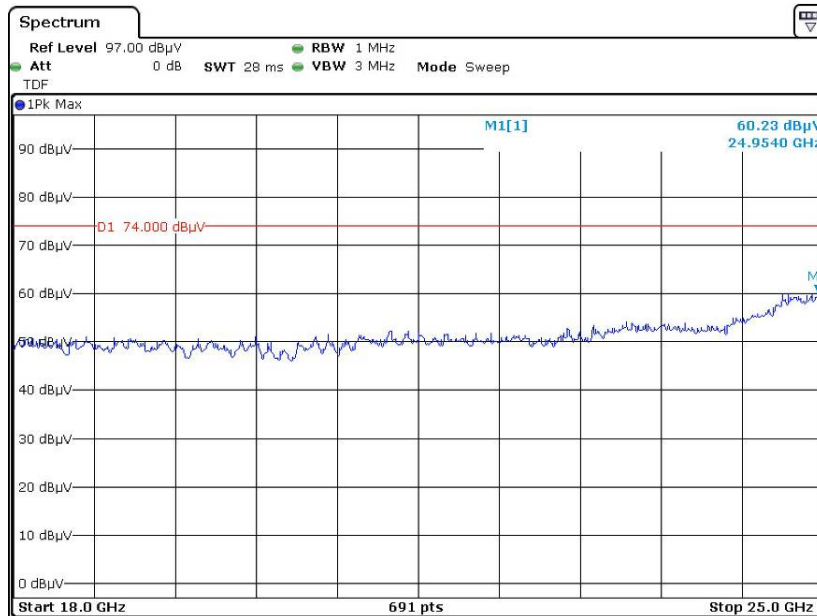


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Vertical

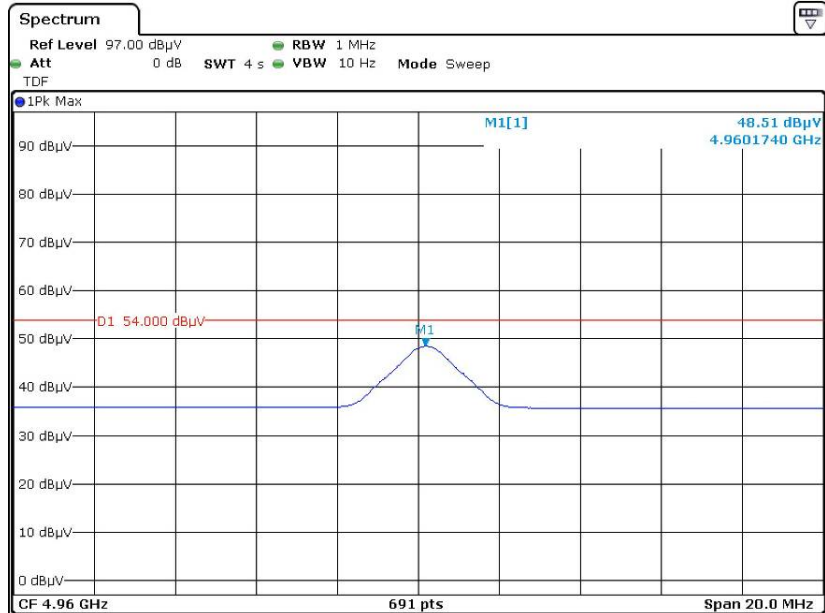


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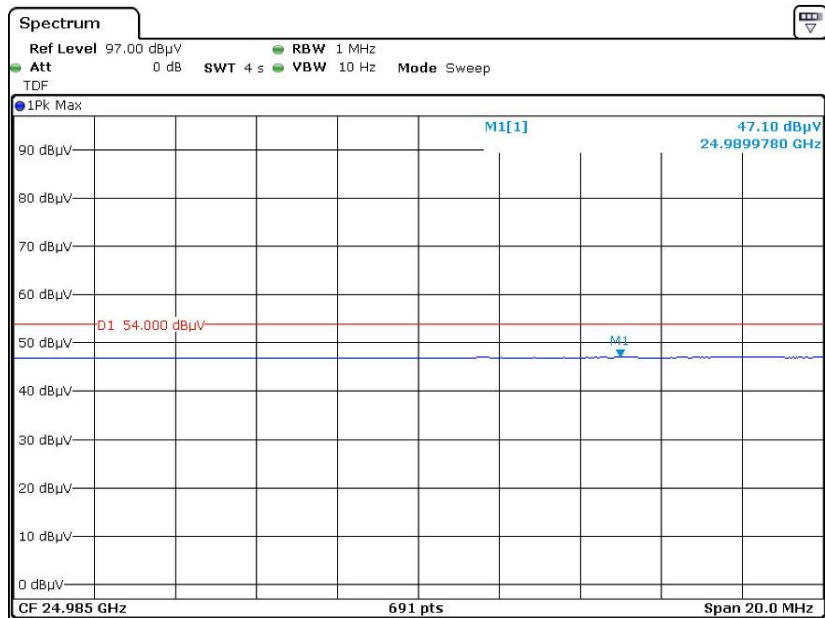


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Average Horizontal

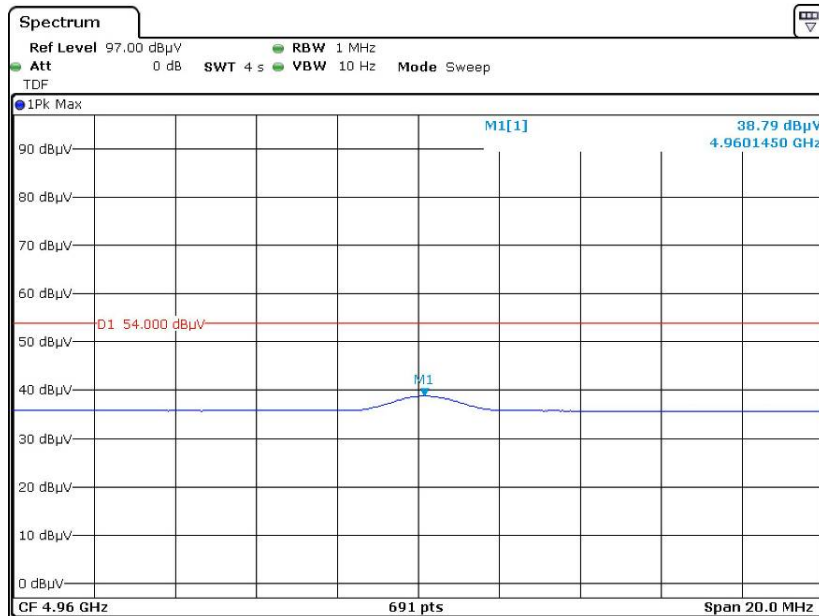


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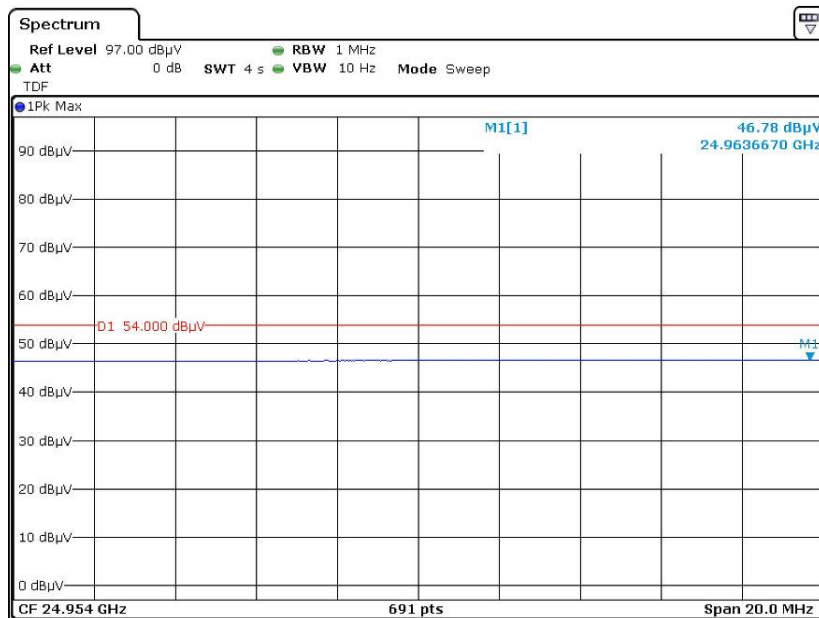


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Vertical



Date: 15.JUL.2021 17:40:27



Date: 15.JUL.2021 18:26:50

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

ANSI C63.10-2013 Section 6.9

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

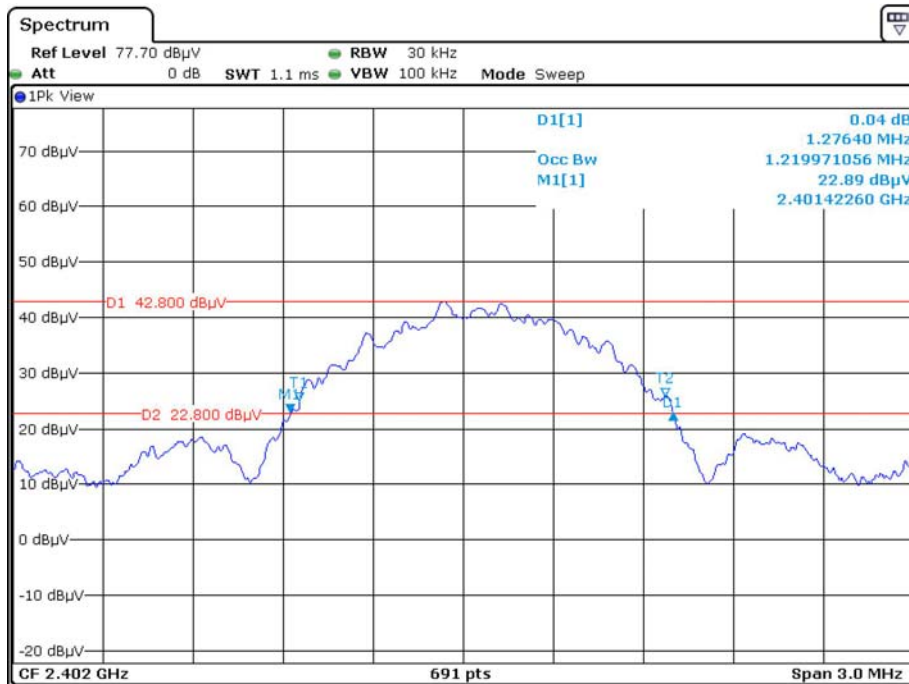
The testing was performed by Bruce Lin on 2021-07-15.

Test Mode: Transmitting

Please refer to the following table and plots.

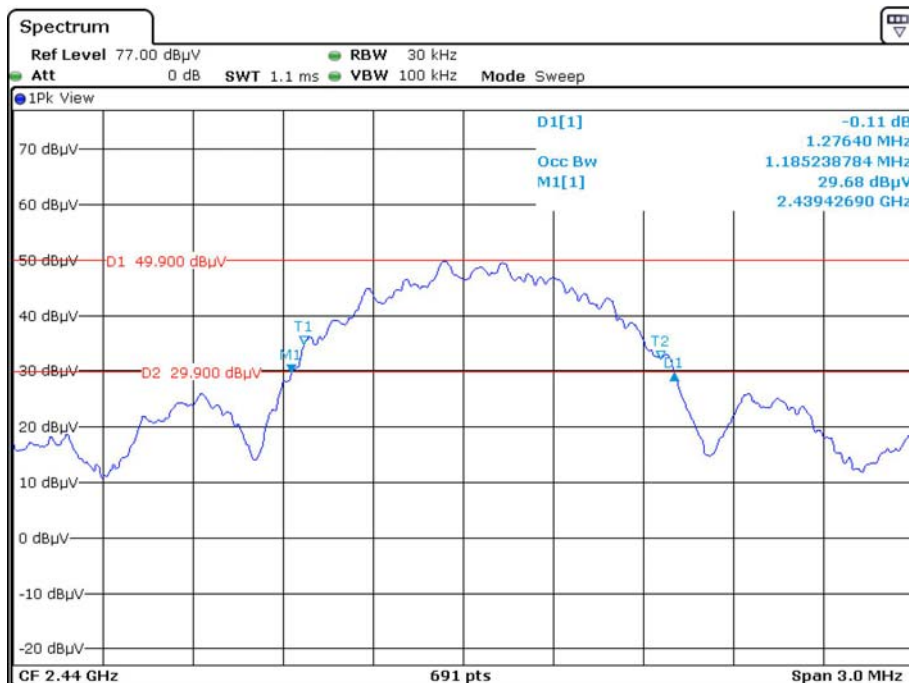
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	1.276
Middle	2440	1.276
High	2480	1.276

Low Channel



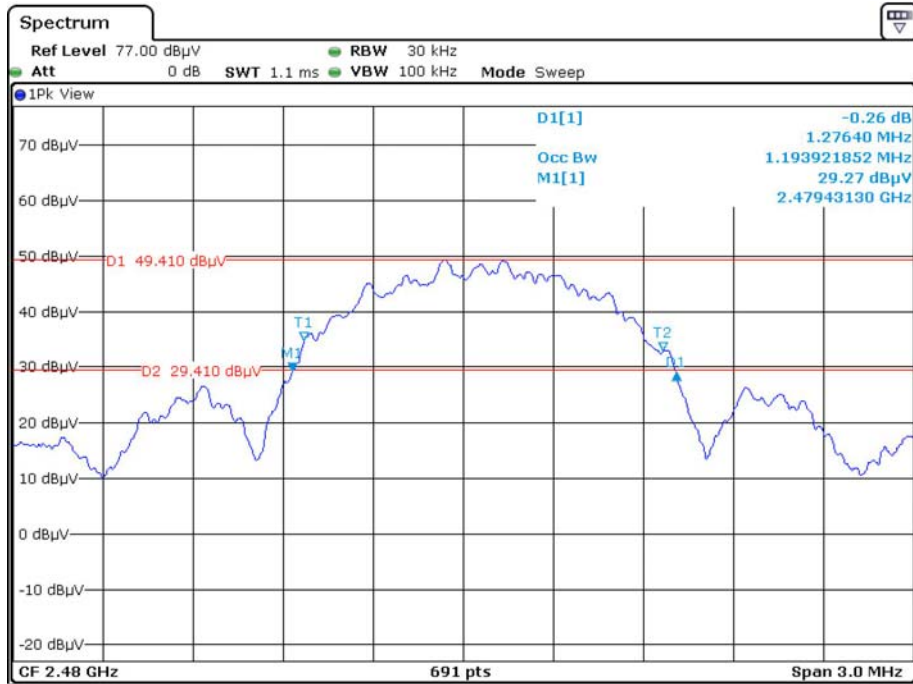
Date: 15.JUL.2021 16:45:29

Middle Channel



Date: 15.JUL.2021 17:04:43

High Channel



Date: 15.JUL.2021 17:24:34

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