FCC PART 15.247
RSS-GEN ISSUE 5, FEBRUARY 2021 AMENDMENT2
RSS-247 ISSUE 3, AUGUST 2023

TEST REPORT

For

FCC: Quanzhou WenTeLai Import and Export Trade Co., Ltd.

Room 2207, Building 1, Vanke Phase I, No. 209 Fuxi Road, Fengze District, Quanzhou City, Fujian Province, China

IC: Quanzhou WenTeLai Import and Export Trade Co., Ltd.

Room 2207, Building 1, Vanke Phase I, No. 209 Fuxi Road, Fengze District Quanzhou City Fujian 362000 China

FCC ID: 2BH4T-VP01
IC: 33323-VP01

Report Type:	**Product Name:**
Original Report	Vertical Vibration Exercise Plate

Report Number:	2407A42902E-RF-01
Report Date:	2025-03-13
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Approved By:	Miles Chen
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REPORT REVISION HISTORY

Number of Revisions	Report No.	Version	Issue Date	Description
0	2407A42902E-RF-01	R1V1	2025-03-13	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	FCC: Quanzhou WenTeLai Import and Export Trade Co., Ltd. IC: Quanzhou WenTeLai Import and Export Trade Co., Ltd.
Product Name:	Vertical Vibration Exercise Plate
Tested Model:	VP-01
HVIN:	VP01
Power Supply:	AC 120V/60Hz
Maximum Peak Conducted Output Power:	-2.2 dBm
Frequency Range:	2402~2480MHz
Modulation Technique:	GFSK
Antenna Type:	PCB Antenna
★Maximum Antenna Gain:	-1.42 dBi
EUT Received Status:	Good
Note: *1. The Maximum Antenna Gain was declared by manufacturer.* *2. All measurement and test data in this report was gathered from production sample serial number: 2W7C-1 (Assigned by the BACL(Xiamen). The EUT supplied by the applicant was received on 2024-12-18)*	

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Xiamen) to collect test data is located on the Unit 102, No. 902 Meifeng South Road, Binhai West Avenue, Science and Technology Innovation Park, Torch High tech Zone XiaMen.

Bay Area Compliance Laboratories Corp. (Xiamen) Lab is accredited to ISO/IEC 17025 by A2LA (Certificate Number: 7134.01) and the lab has been recognized as the FCC accredited lab under the KDB 974614 D01, the FCC Designation No. : CN1384.

Bay Area Compliance Laboratories Corp. (Xiamen) Lab is accredited to ISO/IEC 17025 by A2LA (Certificate Number: 7134.01) and the lab has been recognized as the IC accredited lab under the KDB 974614 D01, the IC Designation No. : CN0176.

Measurement Uncertainty

Item		U_{lab}
Conducted Emission	150kHz-30MHz	2.33 dB
Radiated Emission	9kHz-30MHz	2.59 dB
	30MHz~1GHz	4.79 dB
	1GHz~6GHz	4.6 dB
	6GHz-18GHz	5.42 dB
	18GHz~26.5GHz	5.47 dB
Occupied Channel Bandwidth		0.053 kHz
Transmitter Conducted Power(Conducted RF power)		0.624 dB
Conducted Spurious Emission		2.52 dB
Power Spectral Density		0.61 dB
Duty Cycle		1 %
Temperature		1 ℃
Humidity		5 %
Supply voltages		1 %

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.

SYSTEM TEST CONFIGURATION

Test Mode and Voltage

The system was configured for testing in a typical mode (as normally used by a typical user).	
Test mode:	Test mode 1: Transmitting
Test voltage:	Test mode 1: AC 120V/60Hz
Remark:	During all emission tests, the EUT was configured to measure its highest possible emission level and the worst case's test data was presented in this test report.

Description of Test Configuration

For BLE mode, 40 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

EUT was tested with Channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

★EUT Exercise Software

RF Test Tool: sscom5.13.1

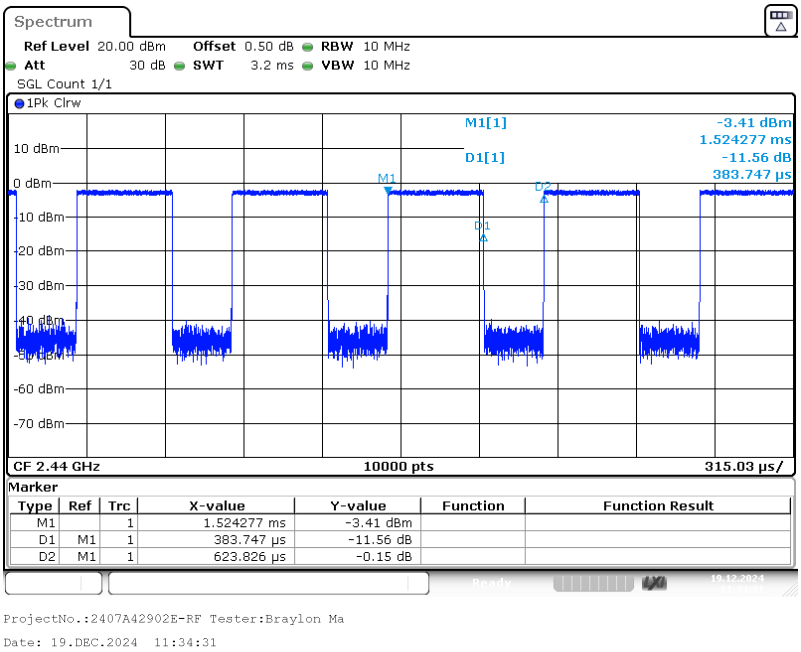
Mode	Power level		
	Low channel	Middle channel	High channel
BLE 1Mbps	default	default	default

Duty Cycle

Test Mode:	Transmitting	**Test Engineer:**	Braylon Ma
Test Date:	2024-12-19	**Test Voltage:**	AC 120V/60Hz
Test Result:	Compliance	**Environment:**	Temp.: 22.8°C Humi.: 41% Atm.: 99.9kPa

Mode	Test Frequency (MHz)	Ton (ms)	Ton+Toff (ms)	Duty Cycle (%)	1/Ton (Hz)	VBW Setting (kHz)
BLE	2440	0.384	0.624	61.54	2604	3

Middle Channel



Support Equipment List and Details

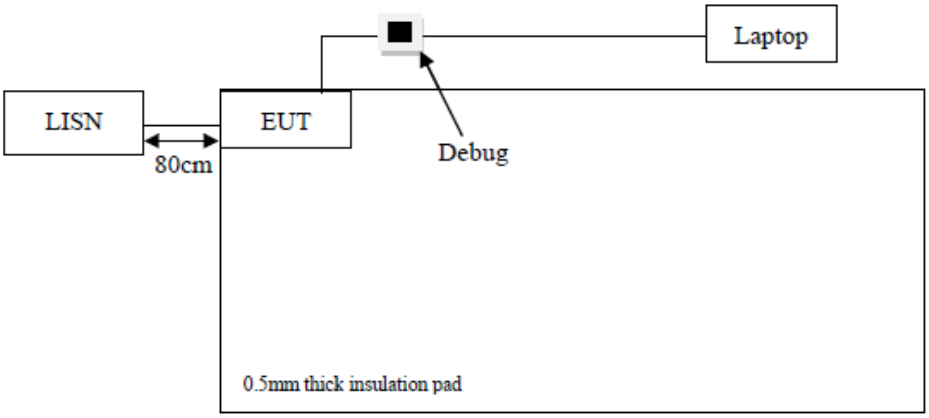
Manufacturer	Description	Model	Serial Number
Lenovo	Laptop	T480	PF1P5K4F
Unknown	Debug	Unknown	Unknown

External I/O Cable

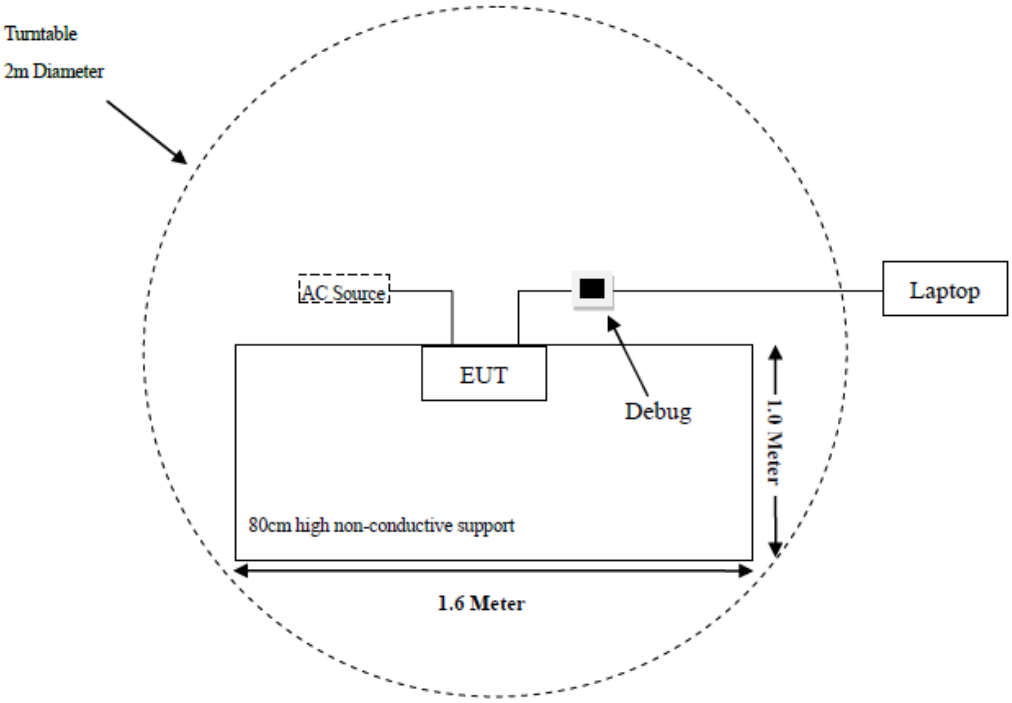
Cable Description	Length (m)	From Port	To
Cable	0.1	EUT	Debug
USB Cable	10	Debug	Laptop

Block Diagram of Test Setup

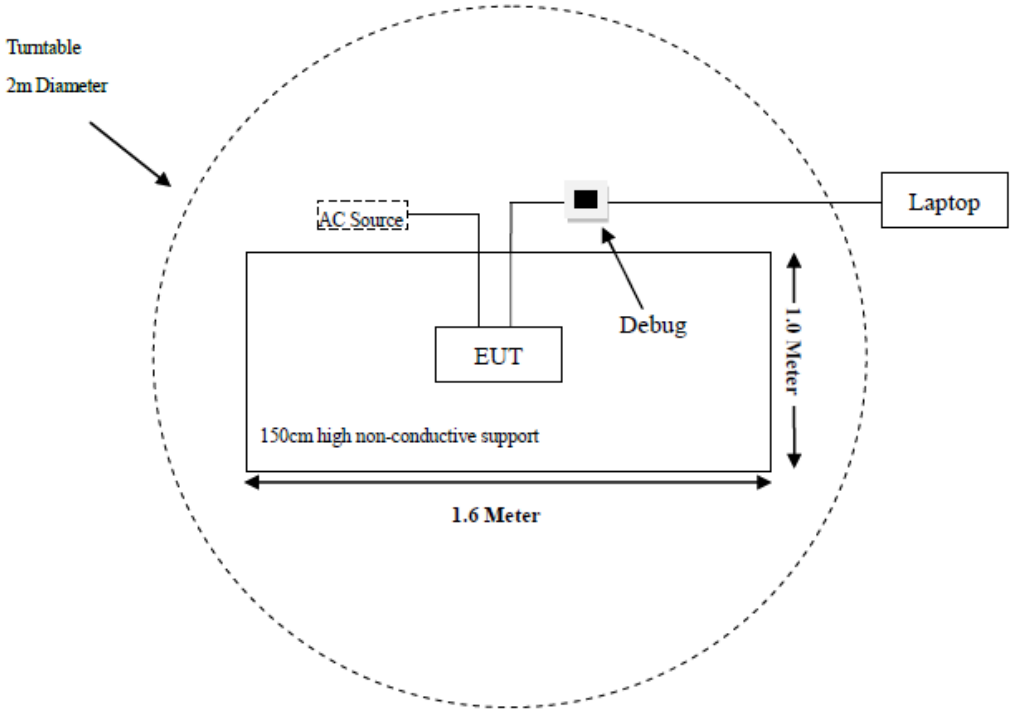
Conducted Emission:



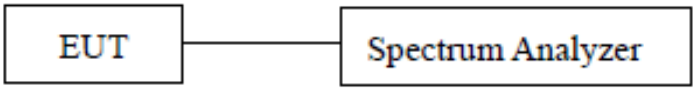
Radiated Emission:
Below 1GHz:



Above 1GHz:



RF Conduction:



Note: The cable assembly insertion loss of 0.5dB was entered as an offset in the Spectrum Analyzer. (Actual cable loss was unavailable at the time of testing, therefore loss of 0.5dB was assumed as worst case.) This was later verified to be true by laboratory.

SUMMARY OF TEST RESULTS

Standard(s)/Rule(s)	Description of Test	Result
FCC §15.203 RSS-Gen Issue 5 Clause 6.8	Antenna Requirement	Compliance
FCC §15.207 (a) RSS-Gen Issue 5 Clause 8.8	AC Line Conducted Emissions	Compliance
FCC §15.205, §15.209, §15.247(d) RSS-247 Issue 3 Clause 5.5 RSS-Gen Issue 5 Clause 8.10	Spurious Emissions	Compliance
FCC §15.247 (a)(2) RSS-247 Clause 5.2 a)	6 dB Emission Bandwidth	Compliance
RSS-Gen Issue 5 Clause 6.7	99% Occupied Bandwidth	Compliance
FCC §15.247(b)(3) RSS-247 Clause 5.4 d)	Maximum Conducted Output Power	Compliance
FCC §15.247(d) RSS-247 Clause 5.5	100 kHz Bandwidth of Frequency Band Edge	Compliance
FCC §15.247(e) RSS-247 Clause 5.2 b)	Power Spectral Density	Compliance

TEST EQUIPMENT LIST

Test Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions					
EMI Test Receiver	Rohde & Schwarz	ESR	103105	2024/03/29	2025/03/28
LISN	Rohde & Schwarz	ENV216	100129	2024/03/29	2025/03/28
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	0357.8810.54	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	XH400T-N-4M	CC001	2024/03/29	2025/03/28
Test Software	Audix	E3	18621a	N/A	N/A
Radiated Emissions Below 1GHz					
EMI Test Receiver	Rohde & Schwarz	ESR	103103	2024/03/29	2025/03/28
Loop Antenna	Rohde & Schwarz	HFH2-Z2	830749/001	2023/07/27	2026/07/26
Antenna	Sunol Sciences	JB6	A122022-5	2023/07/27	2026/07/26
Amplifier	Sonoma	310B	120903	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	XH400T-N-4M	CC002	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	XH460B-N-2M	CC006	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	XH460B-N-12M	CC007	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	HFH2-CC	335.3609	2024/03/29	2025/03/28
Test Software	Audix	E3	18621a	N/A	N/A
Radiated Emissions Above 1 GHz					
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102051	2024/03/29	2025/03/28
Filter Switch Unit	Decentest	DT7220FSU	DS79904	2024/02/23	2025/02/22
Multiplex Switch Test & Control Set	Decentest	DT7220SCU	DS79901	2024/02/23	2025/02/22
Horn Aantenna	EMCO	3115	9002-3355	2024/11/19	2027/11/18
Preamplifier	A.H.Systems	PAM-0118P	489	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	XH800A-N-6M	CC003	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	XH800A-N-1M	CC005	2024/03/29	2025/03/28
Horn Antenna	EMCO	3116	9407-2232	2023/07/31	2026/07/30
Preamplifier	A.H.Systems	PAM-1840	200	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	XH360A-2.92-3M	CC008	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	XH360A-2.92-1M	CC009	2024/03/29	2025/03/28
Test Software	Audix	E3	18621a	N/A	N/A
RF Conducted Test					
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102051	2024/03/29	2025/03/28
Coaxial Cable	N/A	N/A	N/A	Each time	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Xiamen) 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 & RSS-Gen Clause 6.8 - 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to RSS-Gen Clause 6.8 The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent is otropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer. The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

Antenna Connector Construction

The EUT has one PCB antenna arrangement for BLE, which was permanently attached and the antenna gain is -1.42 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

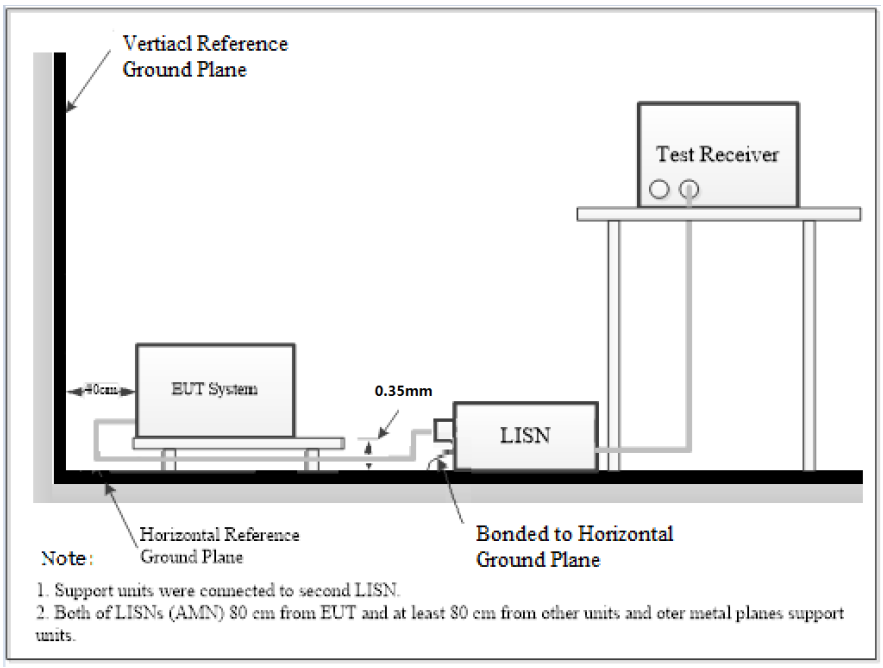
Result: Compliance

FCC §15.207 (a) & RSS-Gen Clause 8.8 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207, RSS-Gen Clause 8.8

EUT Setup



The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207, RSS-Gen limits.

The spacing between the peripherals was 10 cm.

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

During the conducted emission test, the adapter was connected to the outlet of the LISN.

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.

Result &Margin Calculation

The result is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation from the Meter Reading. The basic equation is as follows:

Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
Result (dBμV) = Reading (dBμV) + Factor (dB)

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 (dB) = Limit (dBμV) –Result (dBμV)

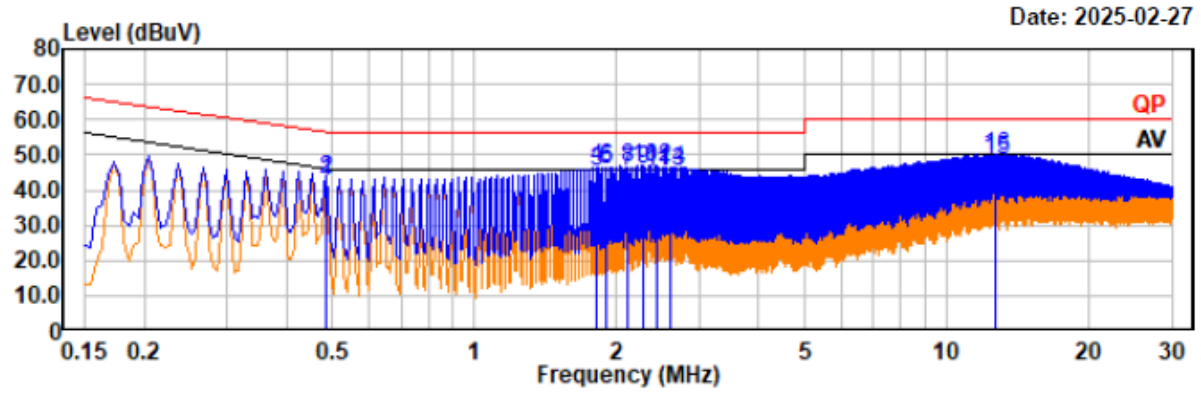
Test Data

Temperature:	21.6 ℃
Relative Humidity:	54 %
ATM Pressure:	100.1 kPa
Test Date:	2025-02-27
Test Engineer:	Spike Gao

EUT operation mode: Transmitting in BLE middle channel (worst case)

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2440MHz
EUT Model: VP-01

Temp/Humi/ATM: 21.6℃/54%/100.1kPa
Tested by: Spike Gao
Power Source: AC 120V/60Hz

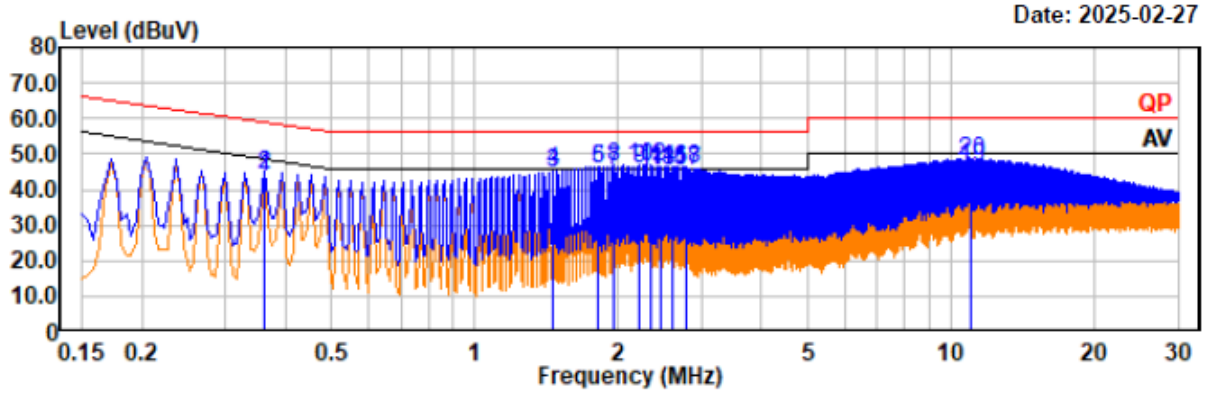


Trace: 1
Condition: QP RBW:9kHz
AV RBW:9kHz

Freq MHz	Reading dBuV	Factor dB	Result dBuV	Limit dBuV	Margin dB	Phase	Remark
0.49	22.06	20.32	42.38	46.22	3.84	Line	Average
0.49	22.88	20.32	43.20	56.22	13.02	Line	QP
1.81	24.01	20.97	44.98	46.00	1.02	Line	Average
1.81	25.17	20.97	46.14	56.00	9.86	Line	QP
1.90	24.53	21.00	45.53	46.00	0.47	Line	Average
1.90	25.15	21.00	46.15	56.00	9.85	Line	QP
2.12	24.34	21.02	45.36	46.00	0.64	Line	Average
2.12	25.28	21.02	46.30	56.00	9.70	Line	QP
2.28	24.60	21.01	45.61	46.00	0.39	Line	Average
2.28	25.32	21.01	46.33	56.00	9.67	Line	QP
2.44	24.40	21.01	45.41	46.00	0.59	Line	Average
2.44	25.15	21.01	46.16	56.00	9.84	Line	QP
2.59	24.36	21.00	45.36	46.00	0.64	Line	Average
2.59	24.93	21.00	45.93	56.00	10.07	Line	QP
12.68	27.72	21.02	48.74	50.00	1.26	Line	Average
12.68	28.43	21.02	49.45	60.00	10.55	Line	QP

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2440MHz
EUT Model: VP-01

Temp/Humi/ATM: 21.6℃/54%/100.1kPa
Tested by: Spike Gao
Power Source: AC 120V/60Hz



Trace: 1
Condition: QP RBW:9kHz
AV RBW:9kHz

Freq MHz	Reading dBuV	Factor dB	Result dBuV	Limit dBuV	Margin dB	Phase	Remark
0.36	22.80	20.56	43.36	48.69	5.33	Neutral	Average
0.36	23.79	20.56	44.35	58.69	14.34	Neutral	QP
1.46	23.89	20.94	44.83	46.00	1.17	Neutral	Average
1.46	24.30	20.94	45.24	56.00	10.76	Neutral	QP
1.81	24.49	21.07	45.56	46.00	0.44	Neutral	Average
1.81	24.98	21.07	46.05	56.00	9.95	Neutral	QP
1.97	24.39	21.12	45.51	46.00	0.49	Neutral	Average
1.97	25.07	21.12	46.19	56.00	9.81	Neutral	QP
2.22	24.52	21.10	45.62	46.00	0.38	Neutral	Average
2.22	25.22	21.10	46.32	56.00	9.68	Neutral	QP
2.34	24.32	21.09	45.41	46.00	0.59	Neutral	Average
2.34	25.15	21.09	46.24	56.00	9.76	Neutral	QP
2.47	24.42	21.08	45.50	46.00	0.50	Neutral	Average
2.47	24.96	21.08	46.04	56.00	9.96	Neutral	QP
2.59	24.44	21.07	45.51	46.00	0.49	Neutral	Average
2.59	24.82	21.07	45.89	56.00	10.11	Neutral	QP
2.78	24.47	21.04	45.51	46.00	0.49	Neutral	Average
2.78	24.71	21.04	45.75	56.00	10.25	Neutral	QP
10.95	25.62	20.88	46.50	50.00	3.50	Neutral	Average
10.95	27.11	20.88	47.99	60.00	12.01	Neutral	QP

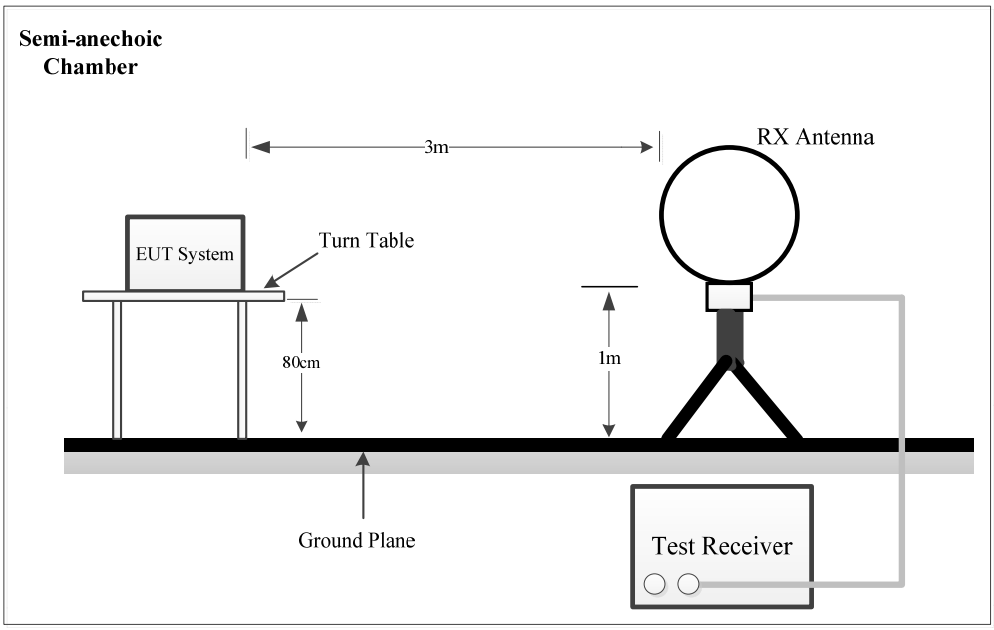
FCC §15.209, §15.205 & §15.247(d) & RSS-247 ISSUE 3 Clause 5.5, RSS-GEN ISSUE5 CLAUSE 8.10 - SPURIOUS EMISSIONS

Applicable Standard

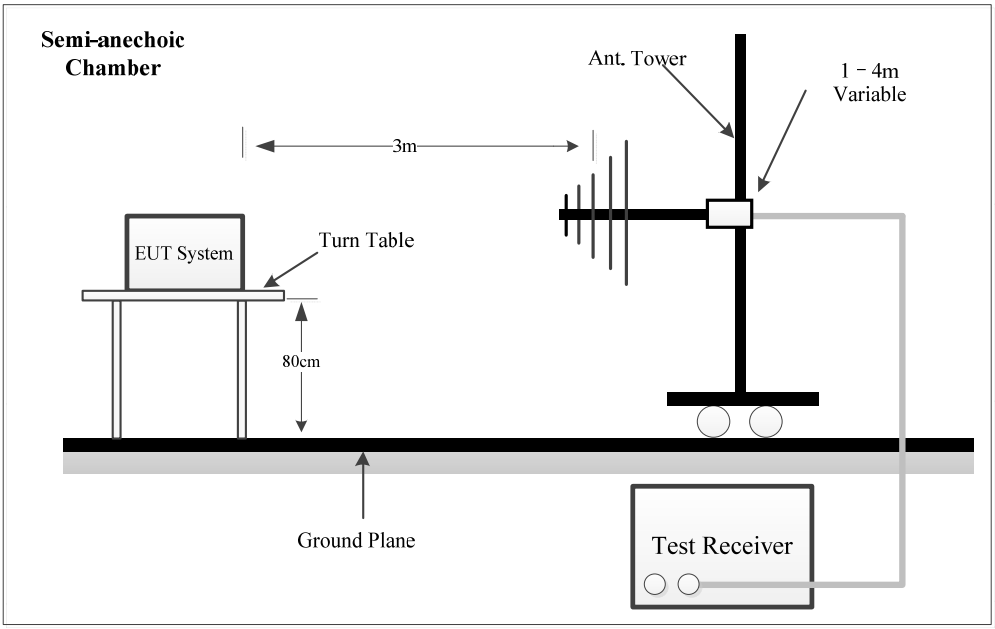
FCC §15.247 (d); §15.209; §15.205; RSS-247 Issue 3 Clause 5.5; RSS-Gen Issue5 Clause 8.10

EUT Setup

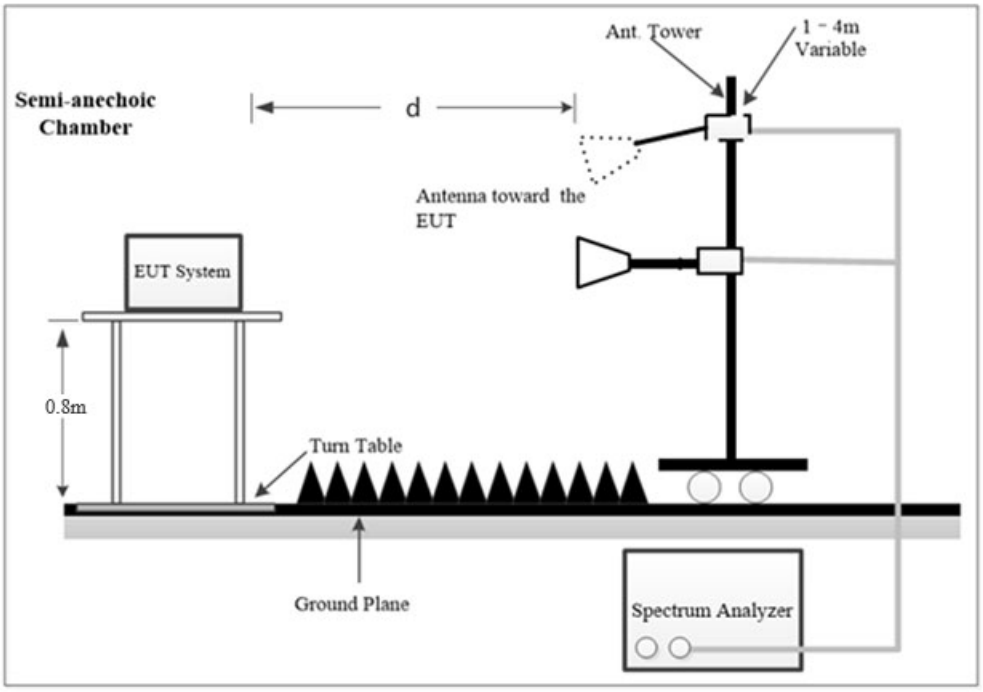
9 kHz-30MHz:



30MHz -1 GHz:



Above 1GHz:



The radiated emission tests using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, FCC 15.247, RSS-247, RSS-Gen limits.

NOTE: d is testing distance;
For Radiated Emission test (1GHz-18GHz) and Bandedge Emission test, which was performed at 3 m distance.

For Radiated Emission test (18GHz-25GHz), which was performed at 1.0 m distance, according to ANSI C63.10-2013, the test result shall be extrapolated to the specified distance using an extrapolation Factor of 20dB/decade from 3m to 1.0m.
Distance extrapolation Factor =20 log (specific distance [3m]/test distance [1.0m]) dB= 9.54 dB

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Below 1GHz:

Frequency Range	RBW	VBW	Measurement
9 kHz – 150 kHz	300Hz	1 kHz	PK
	200Hz	/	QP
150 kHz – 30 MHz	10 kHz	30 kHz	PK
	9kHz	/	QP
30 MHz – 1000 MHz	100 kHz	300 kHz	PK
	120kHz	/	QP

Above 1GHz:
Pre-scan:

Duty Cycle	RBW	VBW	Measurement	Detector
Any	1MHz	3MHz	PK	PK
＞98%	1MHz	5kHz	AV	PK
＜98%	1MHz	1/T, not less than 5kHz	AV	PK

Final measurement for emission identified during the pre-scan:

Duty Cycle	RBW	VBW	Measurement	Detector
Any	1MHz	3MHz	PK	PK
＞98%	1MHz	10Hz	AV	PK
＜98%	1MHz	1/T	AV	PK

Note: T is minimum transmission duration

Test Procedure

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

For each measurement antenna alignment, the EUT shall be rotated through 0° to 360°on a turntable. The report shall list the six emissions with the smallest margin relative to the limit, for each of the three antenna orientations (parallel, perpendicular, and ground parallel) unless the margin is greater than 20 dB, then the following statement shall be made: “all emissions were greater than 20 dB below the limit.”

Below 1GHz, if the measured peak level of the emissions that the measuring receiver reading level plus corrected factor is at least 6 dB below the QP emission limit, there's no need to record the measured QP level of the emissions in the report.

Above 1GHz, if the measured peak level of the emissions that the measuring receiver reading level plus corrected factor is below the AV emission limit, there's no need to record the measured AV level of the emissions in the report.

Result &Margin Calculation

The Result 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:

For 9 kHz to 18GHz Radiated emission test
Factor (dB/m) =Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

For 18GHz to 25GHz Radiated emission test and Bandedge emissions test
Factor (dB/m) =Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB) - Extrapolation factor (dB)

Extrapolation factor=9.54dB (distance=1m)

Result (dBμV/m) = Reading (dBμV) + Factor (dB/m)

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 (dB) = Limit (dBμV/m) –Result (dBμV/m)

The spurious emission from 9 kHz-30MHz of IC RSS-Gen standard, the unit of final result on the test plots are dBμV/m, so the limit should be added by 51.5dB from dBμA/m to dBμV/m.

Test Data

Please refer to the below table and plots.

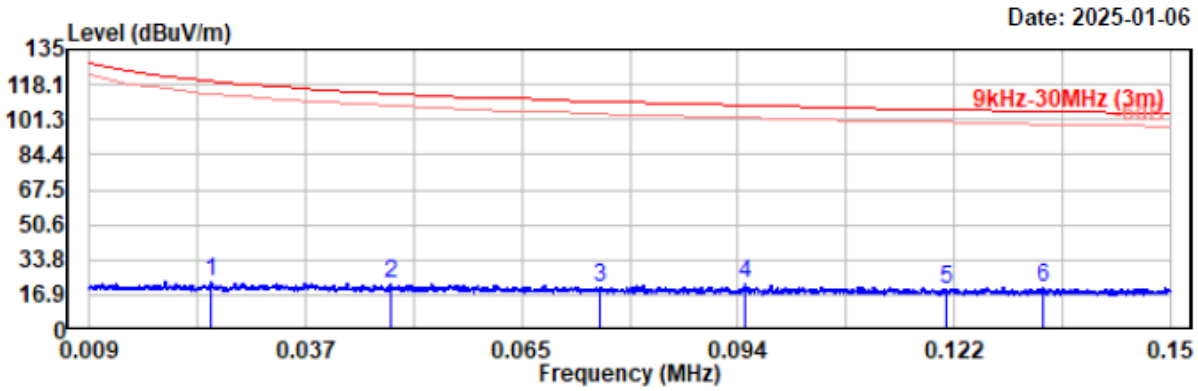
Frequency Range:	Below 1 GHz	Above 1 GHz
Temperature:	21.4℃	21.4℃
Relative Humidity:	51%	51%
ATM Pressure:	100.1kPa	100.1kPa
Test Date:	2025-01-06	2025-01-06
Test Engineer:	Wlif Wu	Wlif Wu

1) 9 kHz~30MHz

EUT operation mode: Transmitting in BLE middle channel in parallel (worst case)

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2440MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

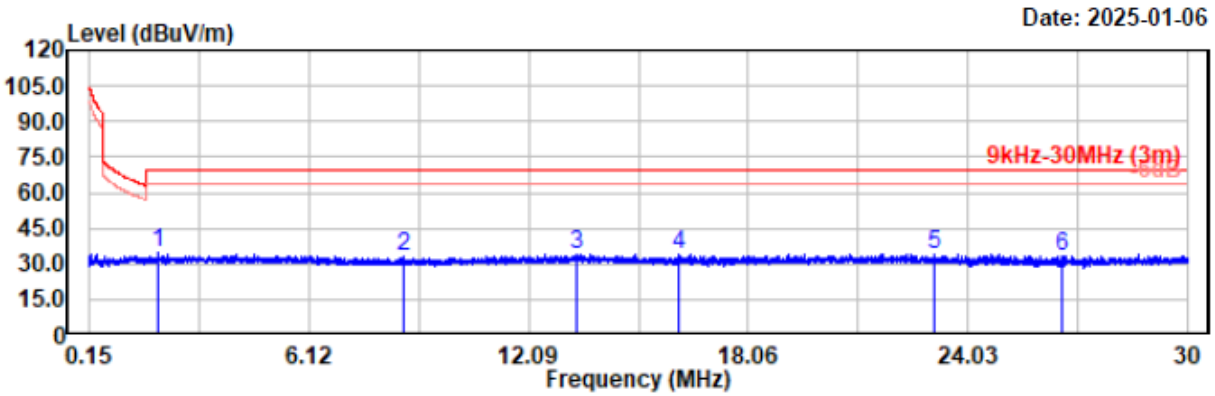


Condition: PK RBW:300Hz VBW:1kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Remark
0.025	3.13	19.86	22.99	119.73	96.74	Peak
0.048	2.30	19.91	22.21	113.94	91.73	Peak
0.076	1.18	19.75	20.93	110.04	89.11	Peak
0.094	2.60	19.78	22.38	108.10	85.72	Peak
0.121	0.10	19.73	19.83	105.97	86.14	Peak
0.133	0.92	19.73	20.65	105.10	84.45	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2440MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz



Condition: PK RBW:10kHz VBW:30kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Remark
2.013	14.81	19.57	34.38	69.58	35.20	Peak
8.690	13.31	19.69	33.00	69.58	36.58	Peak
13.418	14.38	19.74	34.12	69.58	35.46	Peak
16.165	14.24	19.84	34.08	69.58	35.50	Peak
23.129	14.16	20.17	34.33	69.58	35.25	Peak
26.612	13.11	20.14	33.25	69.58	36.33	Peak

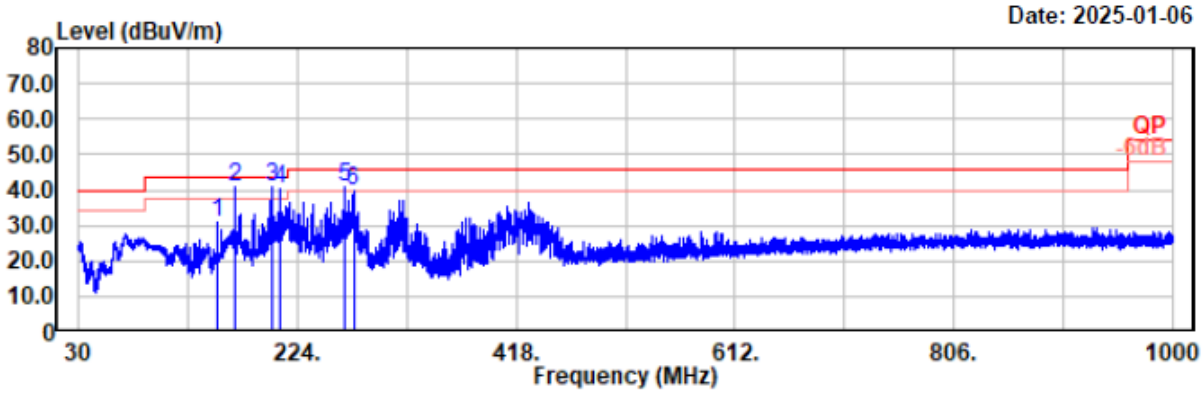
Note: dBuV/m=dBuA/m+51.5dB

2) 30MHz -1GHz

EUT operation mode: Transmitting in BLE middle channel (worst case)

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2440MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

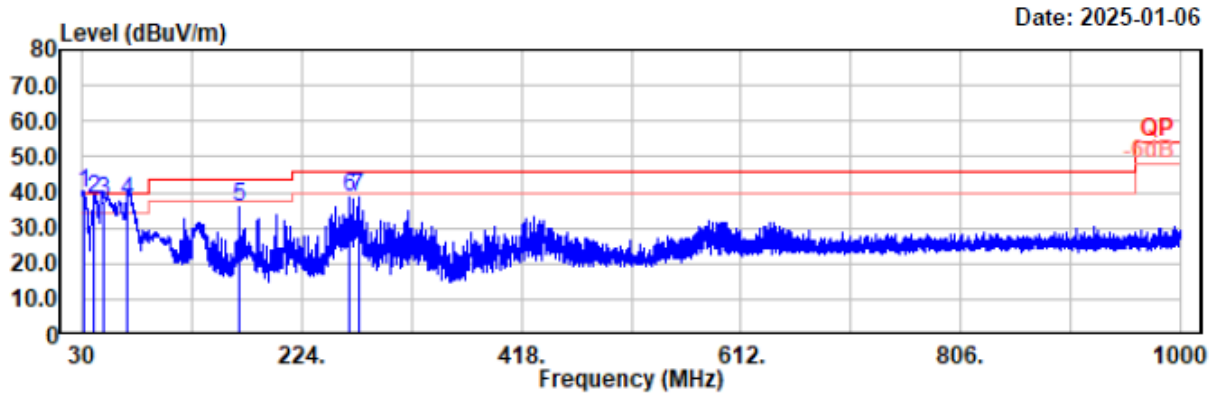


Condition: PK RBW:100kHz VBW:300kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
152.71	42.24	-11.29	30.95	43.50	12.55	Horizontal	QP
168.90	52.58	-11.84	40.74	43.50	2.76	Horizontal	QP
201.11	52.59	-11.79	40.80	43.50	2.70	Horizontal	QP
209.06	52.68	-12.52	40.16	43.50	3.34	Horizontal	QP
265.61	51.10	-10.24	40.86	46.00	5.14	Horizontal	QP
273.66	49.40	-9.68	39.72	46.00	6.28	Horizontal	QP

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2440MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz



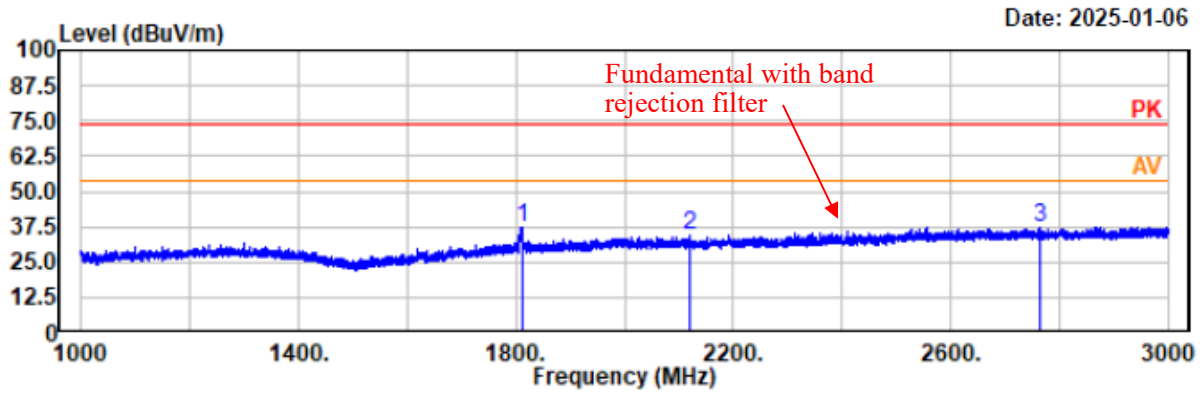
Condition: PK RBW:100kHz VBW:300kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
31.55	46.05	-6.16	39.89	40.00	0.11	Vertical	QP
40.67	50.34	-12.12	38.22	40.00	1.78	Vertical	QP
48.12	54.66	-16.90	37.76	40.00	2.24	Vertical	QP
70.36	54.51	-17.06	37.45	40.00	2.55	Vertical	QP
168.90	47.97	-11.84	36.13	43.50	7.37	Vertical	QP
265.71	49.09	-10.23	38.86	46.00	7.14	Vertical	QP
273.66	48.04	-9.68	38.36	46.00	7.64	Vertical	QP

3) 1GHz~3GHz

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2402MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

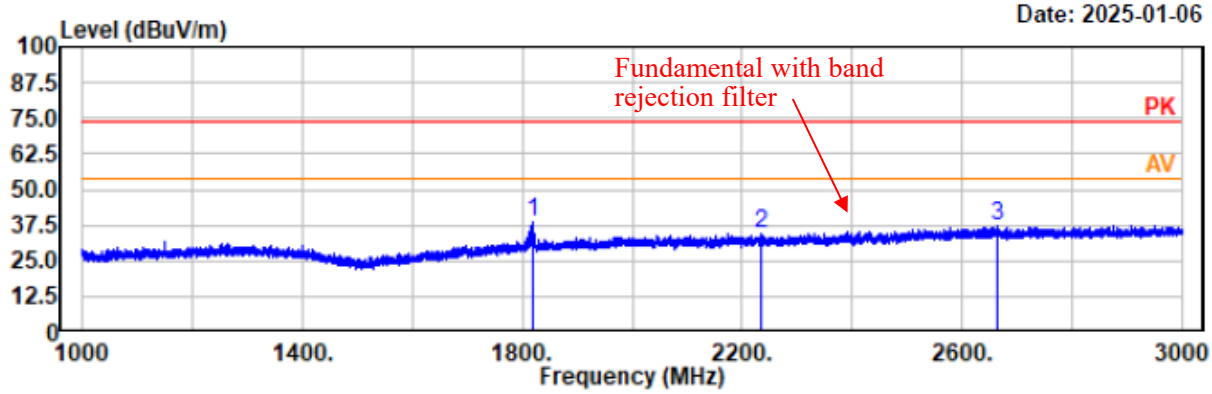


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
1811.80	50.92	-13.47	37.45	74.00	36.55	horizontal	Peak
2118.80	46.26	-11.73	34.53	74.00	39.47	horizontal	Peak
2764.20	46.68	-9.29	37.39	74.00	36.61	horizontal	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2402MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

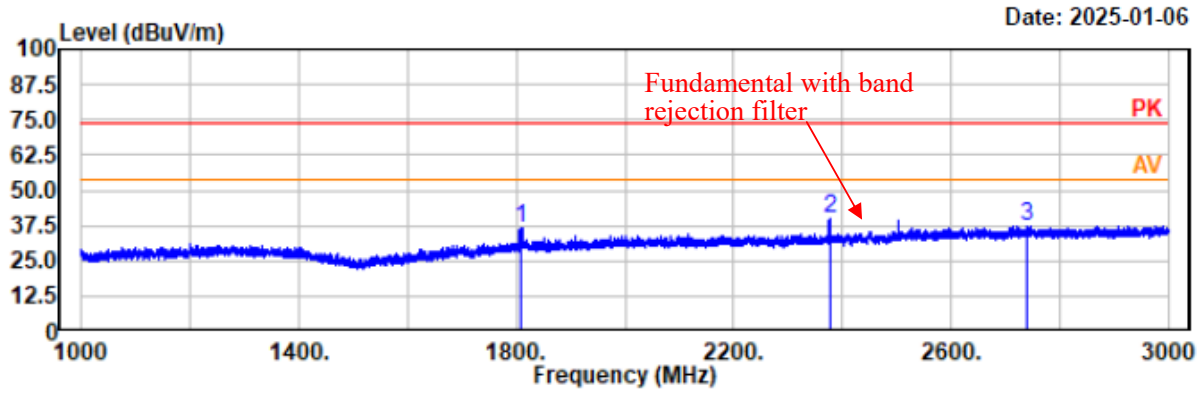


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
1818.60	51.73	-13.44	38.29	74.00	35.71	vertical	Peak
2234.60	45.82	-11.30	34.52	74.00	39.48	vertical	Peak
2665.20	47.13	-9.61	37.52	74.00	36.48	vertical	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2440MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

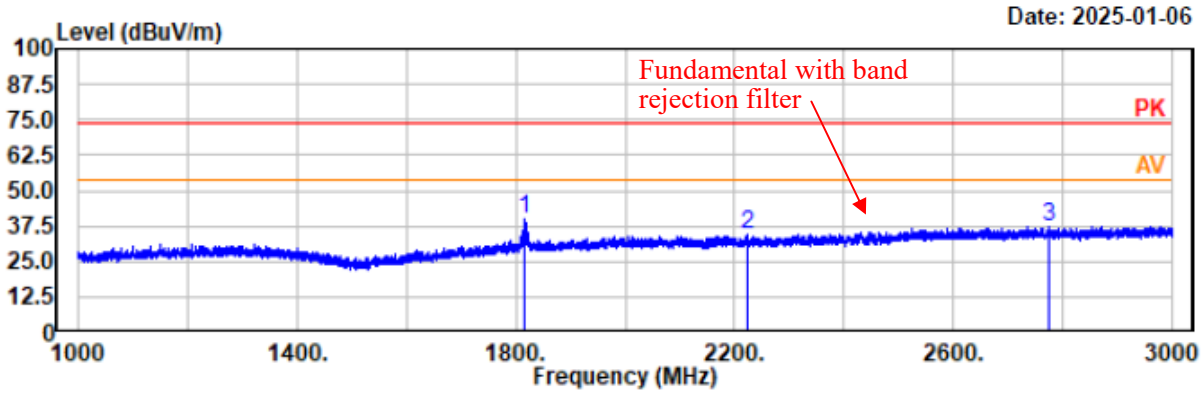


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
1809.80	50.09	-13.47	36.62	74.00	37.38	horizontal	Peak
2376.20	50.76	-10.71	40.05	74.00	33.95	horizontal	Peak
2739.00	46.56	-9.38	37.18	74.00	36.82	horizontal	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2440MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

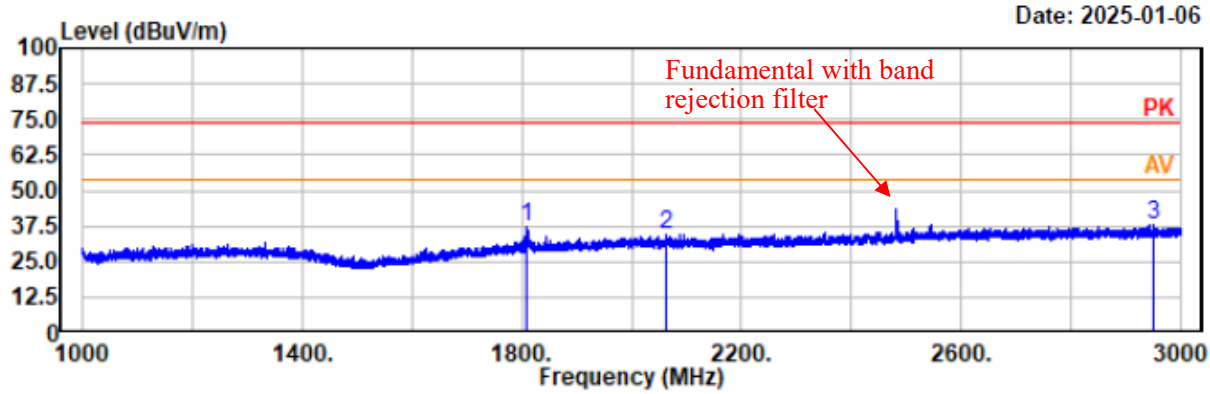


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
1817.20	53.24	-13.45	39.79	74.00	34.21	vertical	Peak
2224.60	45.77	-11.32	34.45	74.00	39.55	vertical	Peak
2775.20	46.76	-9.25	37.51	74.00	36.49	vertical	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2480MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

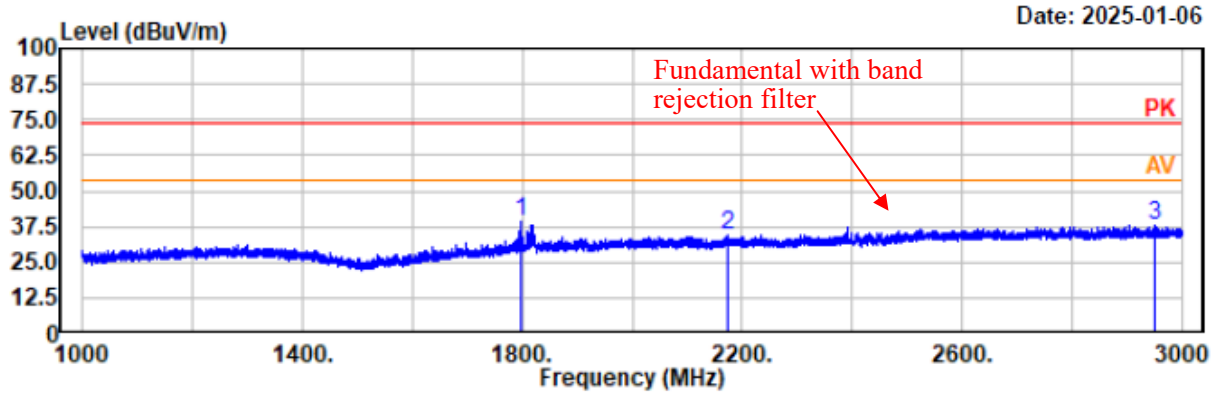


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
1810.00	50.81	-13.47	37.34	74.00	36.66	horizontal	Peak
2064.20	46.57	-12.03	34.54	74.00	39.46	horizontal	Peak
2950.40	46.25	-8.52	37.73	74.00	36.27	horizontal	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2480MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz



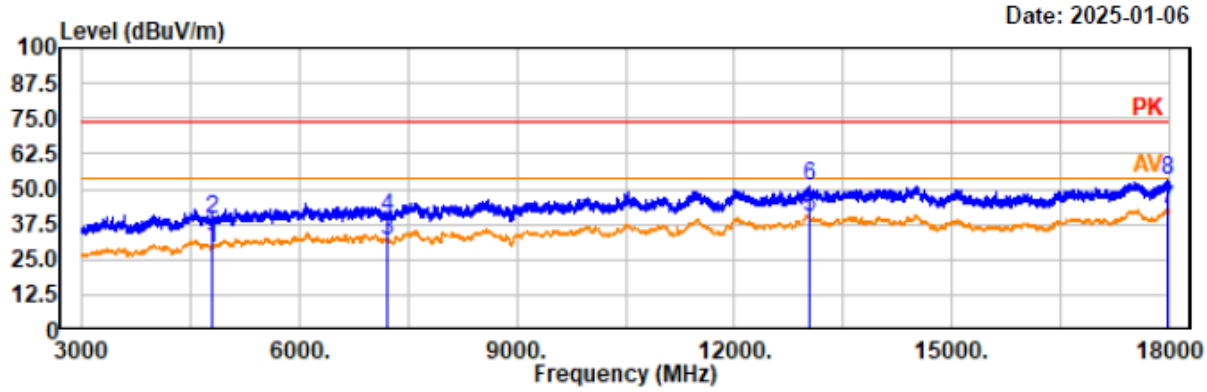
Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
1799.20	52.65	-13.52	39.13	74.00	34.87	vertical	Peak
2175.20	46.04	-11.50	34.54	74.00	39.46	vertical	Peak
2949.20	46.48	-8.52	37.96	74.00	36.04	vertical	Peak

4) 3GHz~18GHz

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2402MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

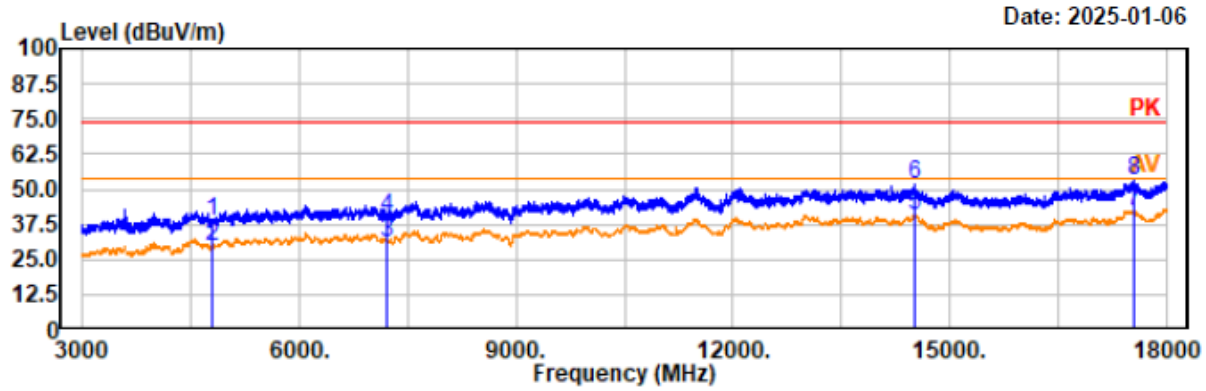


Trace: 1
Condition: PK RBW:1MHz VBW:3MHz SWT:auto
AV RBW:1MHz VBW:5kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4804.00	33.70	-4.45	29.25	54.00	24.75	horizontal	Average
4804.00	43.56	-4.45	39.11	74.00	34.89	horizontal	Peak
7206.00	33.15	-1.73	31.42	54.00	22.58	horizontal	Average
7206.00	41.62	-1.73	39.89	74.00	34.11	horizontal	Peak
13026.00	35.06	5.16	40.22	54.00	13.78	horizontal	Average
13026.00	45.63	5.16	50.79	74.00	23.21	horizontal	Peak
17979.00	34.85	7.71	42.56	54.00	11.44	horizontal	Average
17979.00	45.54	7.71	53.25	74.00	20.75	horizontal	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2402MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

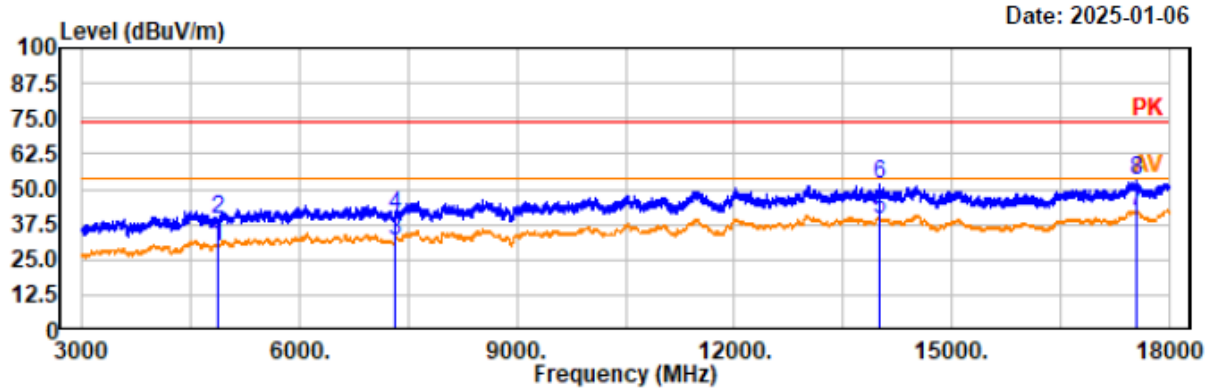


Trace: 1
Condition: PK RBW:1MHz VBW:3MHz SWT:auto
AV RBW:1MHz VBW:5kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4804.00	42.85	-4.45	38.40	74.00	35.60	vertical	Peak
4804.00	33.93	-4.45	29.48	54.00	24.52	vertical	Average
7206.00	32.87	-1.73	31.14	54.00	22.86	vertical	Average
7206.00	41.69	-1.73	39.96	74.00	34.04	vertical	Peak
14524.50	35.54	4.96	40.50	54.00	13.50	vertical	Average
14524.50	46.73	4.96	51.69	74.00	22.31	vertical	Peak
17559.00	35.70	6.49	42.19	54.00	11.81	vertical	Average
17559.00	46.32	6.49	52.81	74.00	21.19	vertical	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2440MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

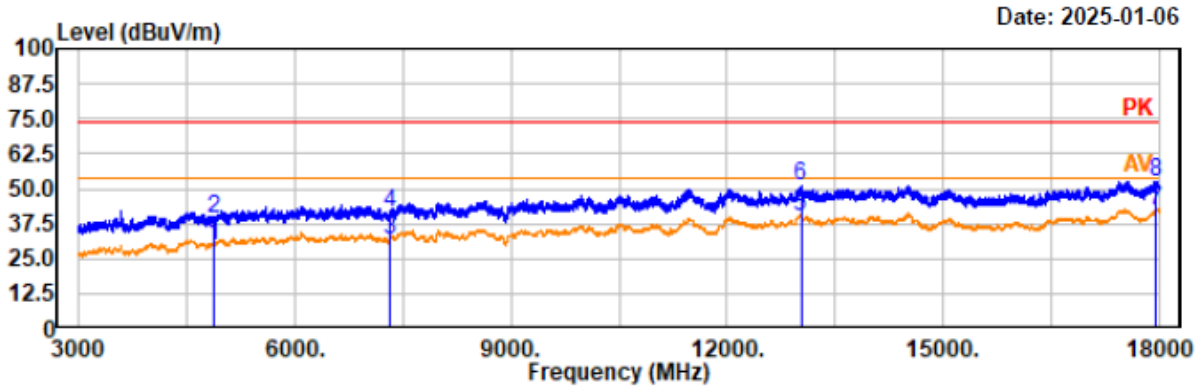


Trace: 1
Condition: PK RBW:1MHz VBW:3MHz SWT:auto
AV RBW:1MHz VBW:5kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4880.00	34.19	-4.25	29.94	54.00	24.06	horizontal	Average
4880.00	43.43	-4.25	39.18	74.00	34.82	horizontal	Peak
7320.00	33.38	-1.61	31.77	54.00	22.23	horizontal	Average
7320.00	42.56	-1.61	40.95	74.00	33.05	horizontal	Peak
14007.00	34.26	5.10	39.36	54.00	14.64	horizontal	Average
14007.00	46.32	5.10	51.42	74.00	22.58	horizontal	Peak
17544.00	35.87	6.43	42.30	54.00	11.70	horizontal	Average
17544.00	46.57	6.43	53.00	74.00	21.00	horizontal	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2440MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

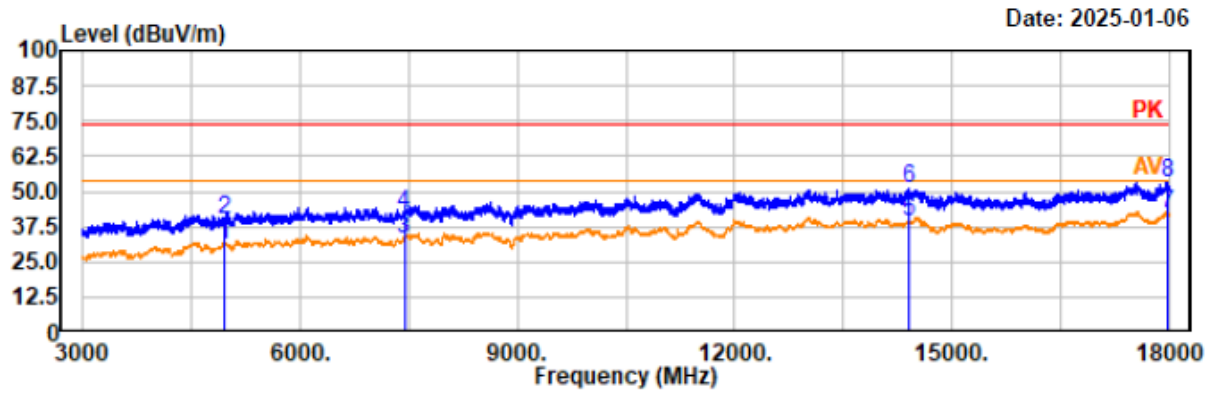


Trace: 1
Condition: PK RBW:1MHz VBW:3MHz SWT:auto
AV RBW:1MHz VBW:5kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4880.00	33.96	-4.25	29.71	54.00	24.29	vertical	Average
4880.00	43.61	-4.25	39.36	74.00	34.64	vertical	Peak
7320.00	33.51	-1.61	31.90	54.00	22.10	vertical	Average
7320.00	42.68	-1.61	41.07	74.00	32.93	vertical	Peak
13024.50	35.07	5.15	40.22	54.00	13.78	vertical	Average
13024.50	45.60	5.15	50.75	74.00	23.25	vertical	Peak
17964.00	34.53	7.68	42.21	54.00	11.79	vertical	Average
17964.00	44.99	7.68	52.67	74.00	21.33	vertical	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2480MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

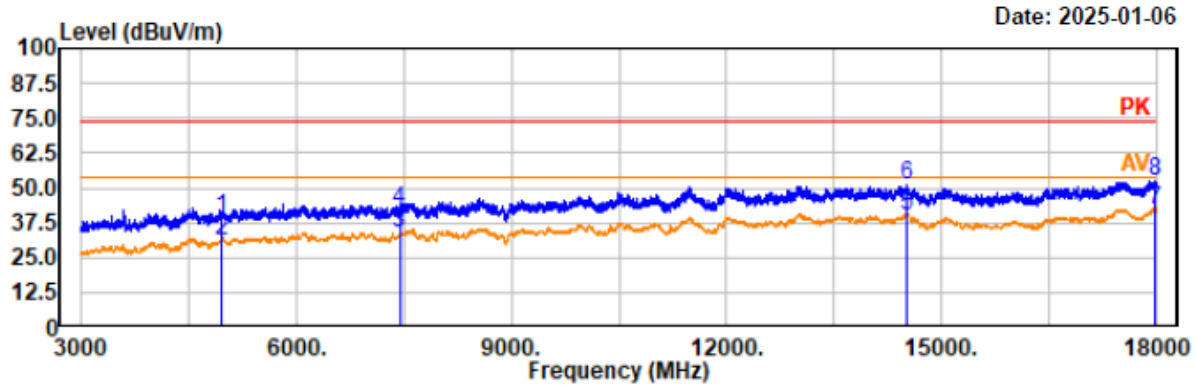


Trace: 1
Condition: PK RBW:1MHz VBW:3MHz SWT:auto
AV RBW:1MHz VBW:5kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4960.00	35.26	-4.01	31.25	54.00	22.75	horizontal	Average
4960.00	44.25	-4.01	40.24	74.00	33.76	horizontal	Peak
7440.00	34.87	-1.59	33.28	54.00	20.72	horizontal	Average
7440.00	43.88	-1.59	42.29	74.00	31.71	horizontal	Peak
14407.50	34.04	5.12	39.16	54.00	14.84	horizontal	Average
14407.50	46.23	5.12	51.35	74.00	22.65	horizontal	Peak
17976.00	34.37	7.71	42.08	54.00	11.92	horizontal	Average
17976.00	45.53	7.71	53.24	74.00	20.76	horizontal	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2480MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz



Trace: 1
Condition: PK RBW:1MHz VBW:3MHz SWT:auto
AV RBW:1MHz VBW:5kHz SWT:auto

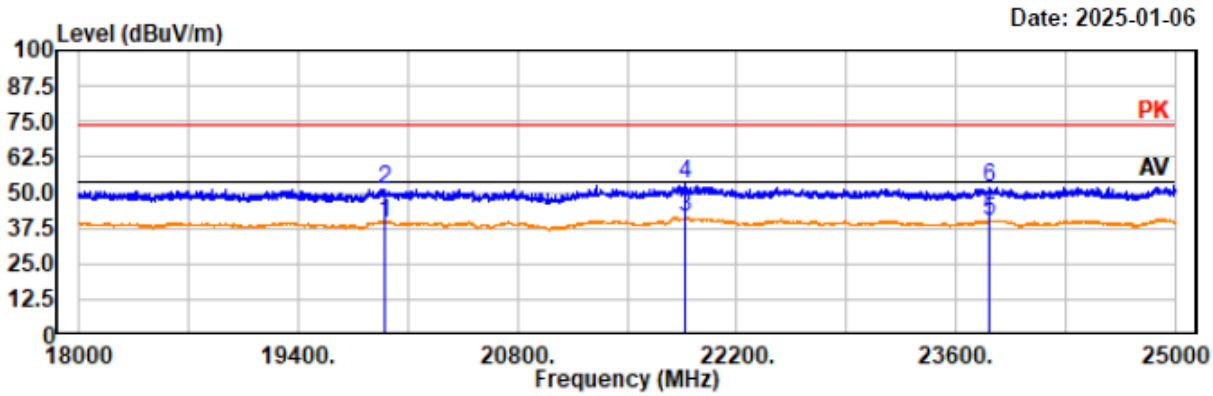
Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4960.00	43.40	-4.01	39.39	74.00	34.61	vertical	Peak
4960.50	34.86	-4.01	30.85	54.00	23.15	vertical	Average
7440.00	35.11	-1.59	33.52	54.00	20.48	vertical	Average
7440.00	43.39	-1.59	41.80	74.00	32.20	vertical	Peak
14514.00	35.13	4.97	40.10	54.00	13.90	vertical	Average
14514.00	46.17	4.97	51.14	74.00	22.86	vertical	Peak
17967.00	34.22	7.69	41.91	54.00	12.09	vertical	Average
17967.00	44.85	7.69	52.54	74.00	21.46	vertical	Peak

5) 18GHz~25GHz

EUT operation mode: Transmitting in BLE middle channel (worst case)

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2440MHz
EUT Model: VP-01
Test distance: 1m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

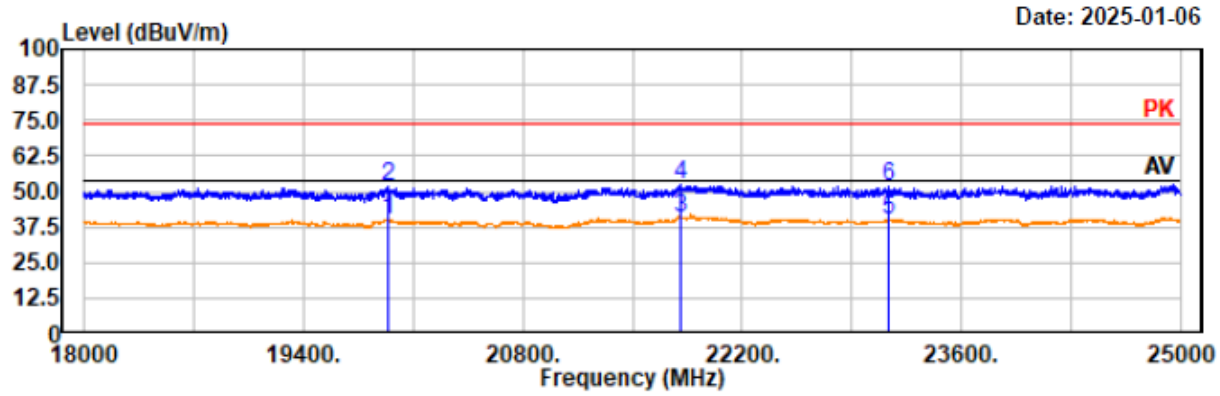


Trace: 1
Condition: PK RBW:1MHz VBW:3MHz SWT:auto
AV RBW:1MHz VBW:5kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
19947.00	39.62	-0.04	39.58	54.00	14.42	horizontal	Average
19947.00	51.32	-0.04	51.28	74.00	22.72	horizontal	Peak
21867.60	39.52	1.63	41.15	54.00	12.85	horizontal	Average
21867.60	51.37	1.63	53.00	74.00	21.00	horizontal	Peak
23810.20	38.05	1.71	39.76	54.00	14.24	horizontal	Average
23810.20	50.07	1.71	51.78	74.00	22.22	horizontal	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2440MHz
EUT Model: VP-01
Test distance: 1m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz



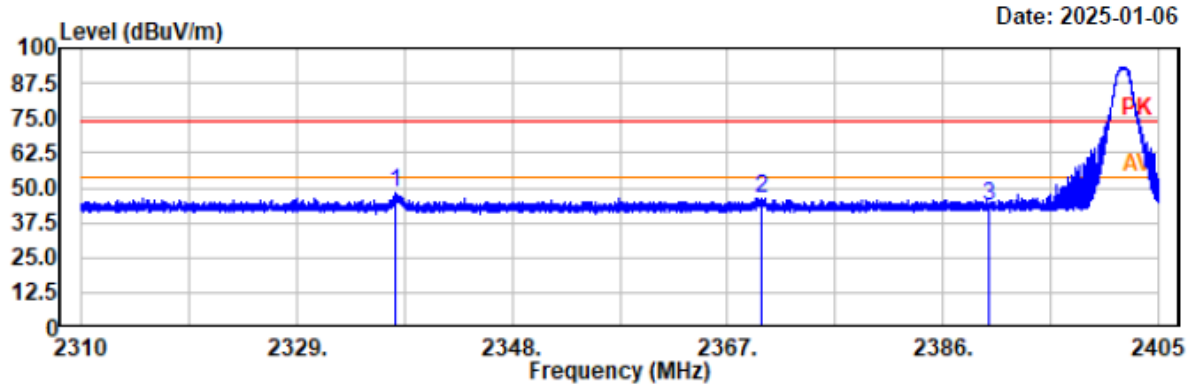
Trace: 1
Condition: PK RBW:1MHz VBW:3MHz SWT:auto
AV RBW:1MHz VBW:5kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
19942.60	39.95	-0.04	39.91	54.00	14.09	vertical	Average
19942.60	51.76	-0.04	51.72	74.00	22.28	vertical	Peak
21801.60	39.42	1.48	40.90	54.00	13.10	vertical	Average
21801.60	50.90	1.48	52.38	74.00	21.62	vertical	Peak
23130.40	38.32	1.39	39.71	54.00	14.29	vertical	Average
23130.40	50.62	1.39	52.01	74.00	21.99	vertical	Peak

Restricted Bands Emissions:

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2402MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

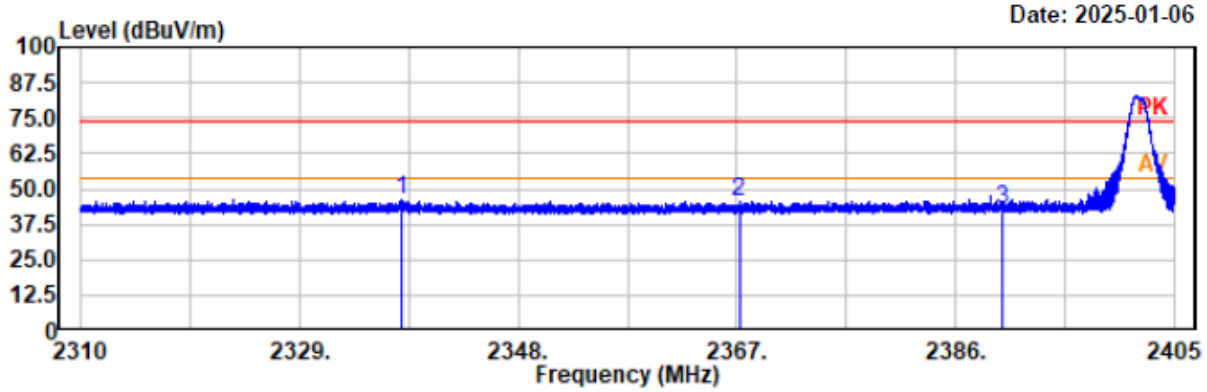


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2337.74	49.10	-0.86	48.24	74.00	25.76	horizontal	Peak
2370.05	47.08	-0.73	46.35	74.00	27.65	horizontal	Peak
2390.00	44.21	-0.63	43.58	74.00	30.42	horizontal	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2402MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

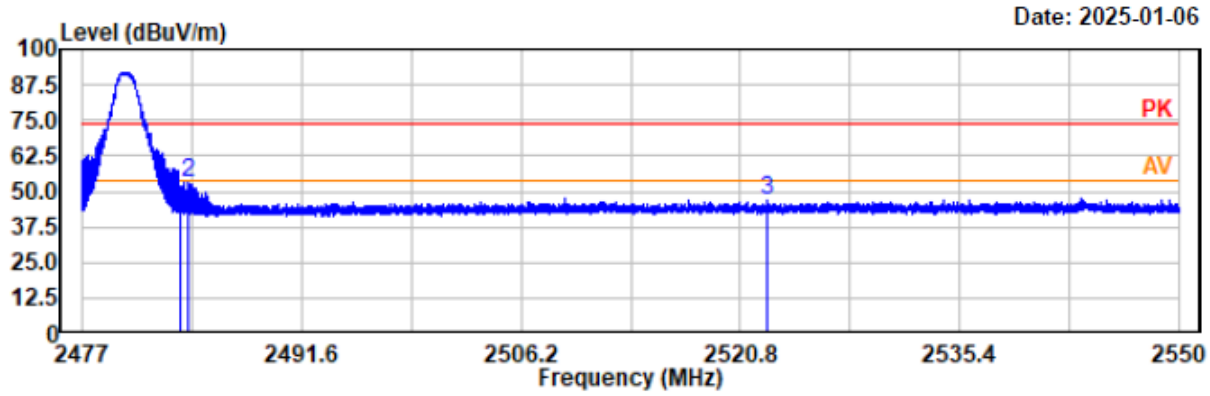


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2337.93	47.01	-0.86	46.15	74.00	27.85	vertical	Peak
2367.20	46.48	-0.74	45.74	74.00	28.26	vertical	Peak
2390.00	43.37	-0.63	42.74	74.00	31.26	vertical	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2480MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz

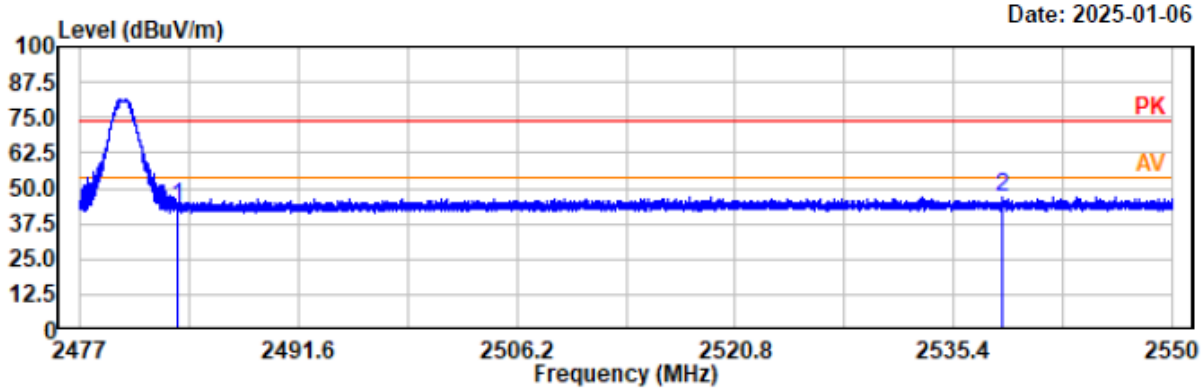


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	43.29	-0.17	43.12	74.00	30.88	horizontal	Peak
2483.98	53.26	-0.16	53.10	74.00	20.90	horizontal	Peak
2522.60	46.66	-0.05	46.61	74.00	27.39	horizontal	Peak

Project No.: 2407A42902E-RF
Test Mode: BLE 1M 2480MHz
EUT Model: VP-01
Test distance: 3m

Temp/Humi/ATM: 21.4℃/51%/100.1kPa
Tested by: Wlif Wu
Power Source: AC 120V/60Hz



Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	43.35	-0.17	43.18	74.00	30.82	vertical	Peak
2538.64	47.11	-0.03	47.08	74.00	26.92	vertical	Peak

FCC §15.247(a) (2) & RSS-247 ISSUE 3 Clause 5.2 a) - 6 dB EMISSION BANDWIDTH

Applicable Standard

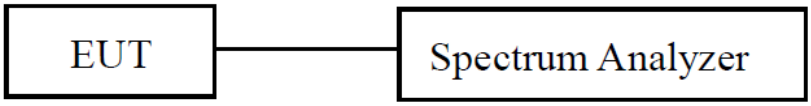
FCC§15.247 (a)(2)

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

RSS-247 ISSUE 3 Clause 5.2 a)

The minimum 6 dB bandwidth shall be 500 kHz.

EUT Setup



Test Procedure

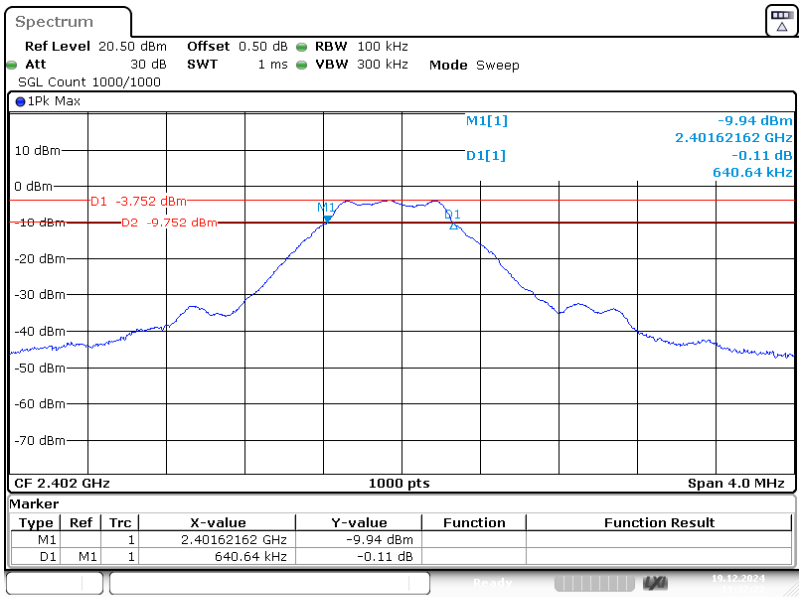
According to ANSI C63.10-2013 Section 11.8

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Data

Test Mode:	Transmitting	**Test Engineer:**	Braylon Ma
Test Date:	2024-12-19	**Test Voltage:**	AC 120V/60Hz
Test Result:	Compliance	**Environment:**	Temp.: 22.8℃ Humi.: 41% Atm.: 99.9kPa
Test Channel	**Test Frequency (MHz)**	**6 dB Bandwidth (MHz)**	**Limit (MHz)**
Lowest	2402	0.641	⩾0.5
Middle	2440	0.637	⩾0.5
Highest	2480	0.633	⩾0.5

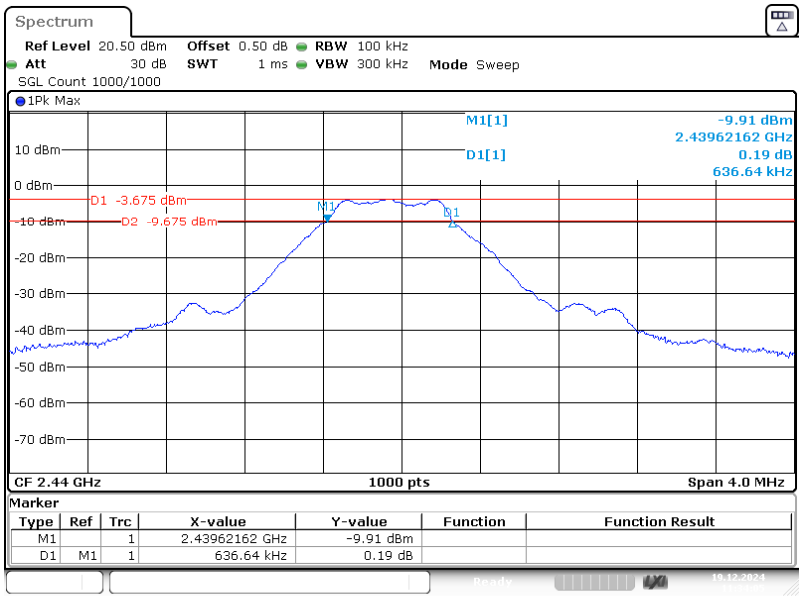
Low Channel



ProjectNo.:2407A42902E-RF Tester:Braylon Ma

Date: 19.DEC.2024 11:32:23

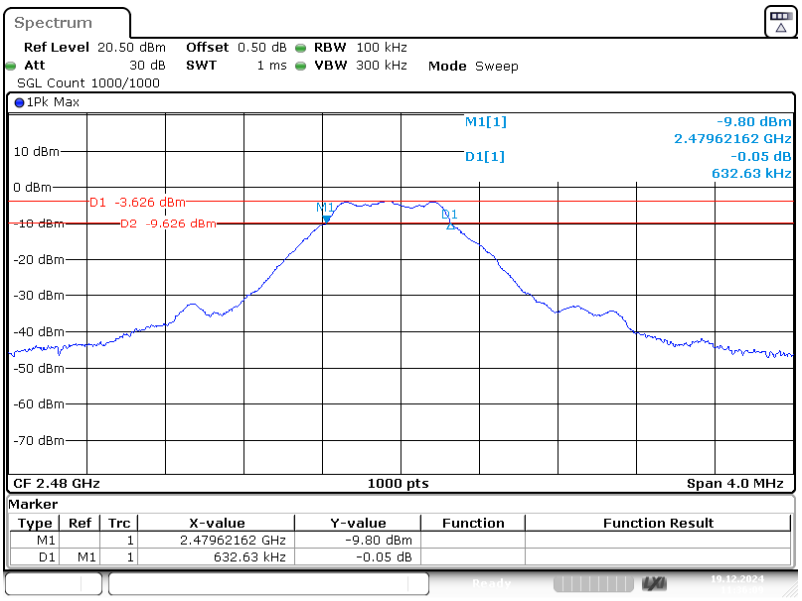
Middle Channel



ProjectNo.:2407A42902E-RF Tester:Braylon Ma

Date: 19.DEC.2024 11:34:05

High Channel



ProjectNo.:2407A42902E-RF Tester:Braylon Ma

Date: 19.DEC.2024 11:36:09

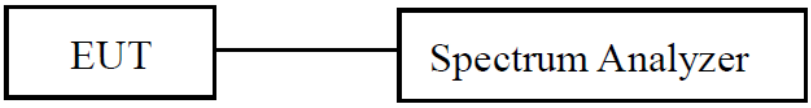
RSS-GEN ISSUE 5 Clause 6.7 – 99% OCCUPIED BANDWIDTH

Applicable Standard

According to RSS-GEN Issue 5 Clause 6.7

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

EUT Setup



Test Procedure

The following conditions shall be observed for measuring the occupied bandwidth:

1. The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
2. The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.
3. The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine the occupied if the device is not transmitting continuously.
4. The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted. Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

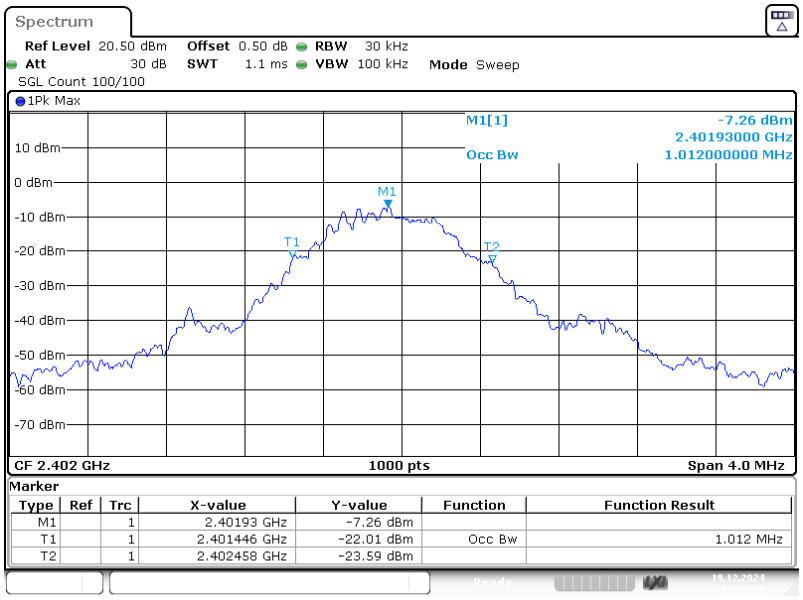
For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

Test Data

Test Mode:	Transmitting	**Test Engineer:**	Braylon Ma
Test Date:	2024-12-19	**Test Voltage:**	AC 120V/60Hz
Test Result:	Compliant	**Environment:**	Temp.: 22.8℃ Humi.: 41% Atm.: 99.9kPa

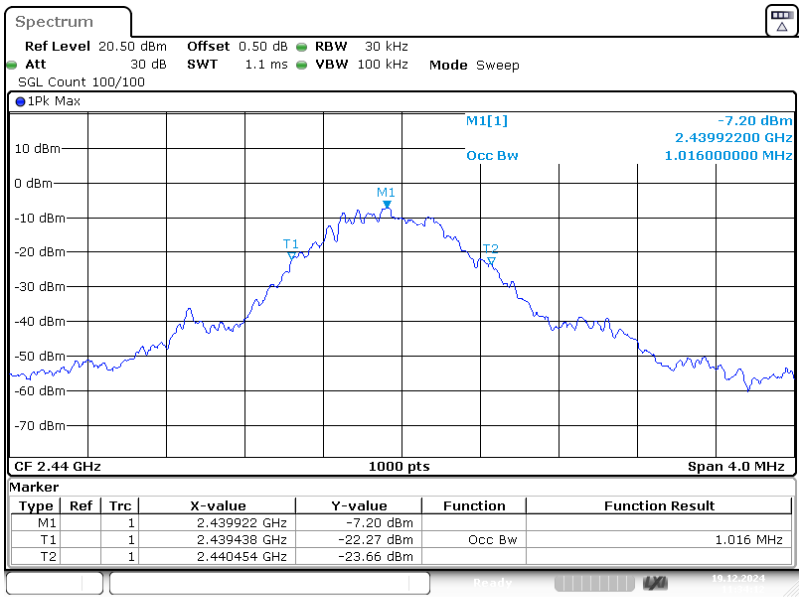
Channel	**Frequency (MHz)**	**99% Occupied Bandwidth (MHz)**
BLE Mode(1Mbps)		
Low	2402	1.012
Middle	2440	1.016
High	2480	1.016

Low Channel



ProjectNo.:2407A42902E-RF Tester:Braylon Ma
Date: 19.DEC.2024 11:32:29

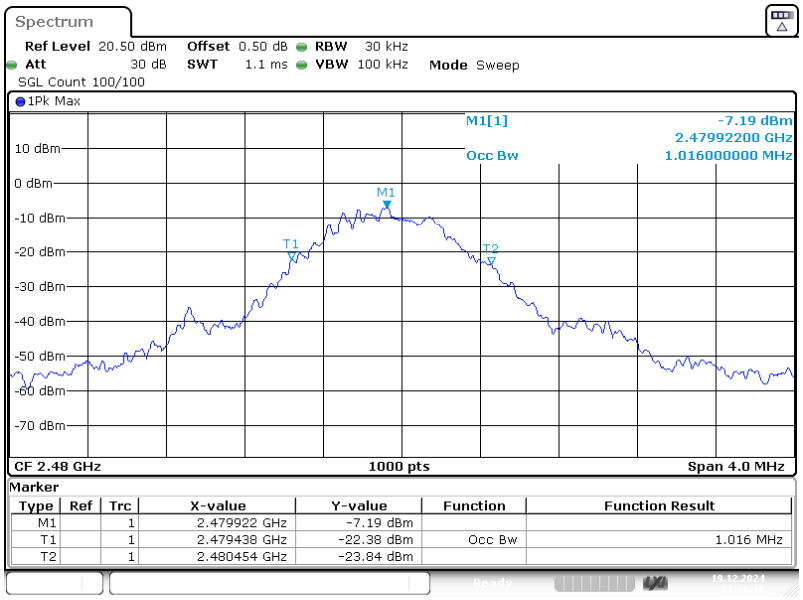
Middle Channel



ProjectNo.:2407A42902E-RF Tester:Braylon Ma

Date: 19.DEC.2024 11:34:12

High Channel



ProjectNo.:2407A42902E-RF Tester:Braylon Ma

Date: 19.DEC.2024 11:36:16

FCC §15.247(b) (3) & RSS-247 ISSUE 3 Clause 5.4 d) – MAXIMUM CONDUCTED OUTPUT POWER

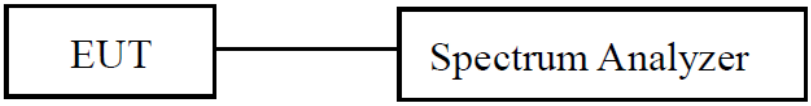
Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to RSS-247 Clause 5.4 d, for DTSs employing digital modulation techniques operating in the bands 902-928 MHz and2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna lements. The average must not include any time intervals during which the transmitter is off or transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode.

EUT Setup



Test Procedure

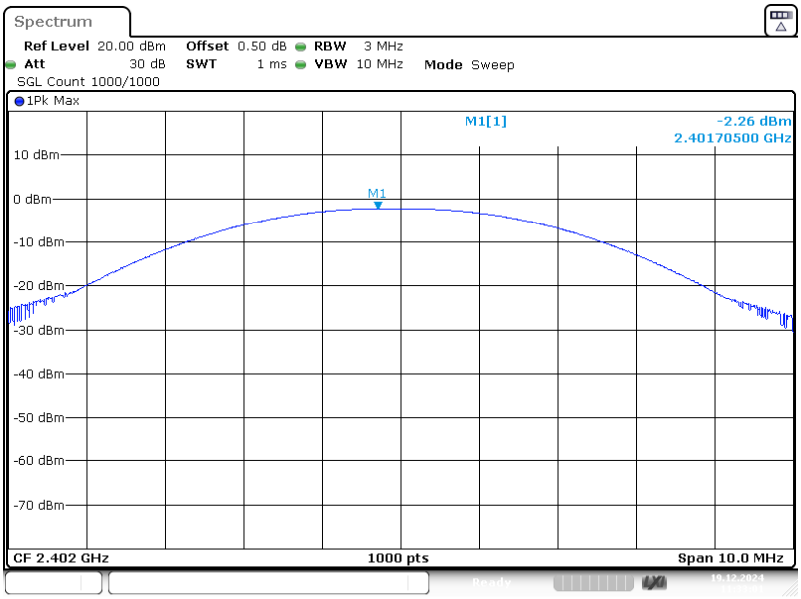
According to ANSI C63.10-2013 Section 11.9.1.1
The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:
a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ [3 × RBW].
c) Set span ≥ [3 × RBW].
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

Test Data

Test Mode:	Transmitting	**Test Engineer:**	Braylon Ma
Test Date:	2024-12-19	**Test Voltage:**	AC 120V/60Hz
Test Result:	Compliance	**Environment:**	Temp.: 22.8℃ Humi.: 41% Atm.: 99.9kPa
Test Channel	**Test Frequency (MHz)**	**Maximum Peak Conducted Output Power(dBm)**	**Limit (dBm)**
Lowest	2402	-2.26	≤30
Middle	2440	-2.20	≤30
Highest	2480	-2.21	≤30
Antenna gain(dBi):	-1.42	Max.EIRP(dBm):	-3.62
EIRP Limit for RSS-247:36 dBm			

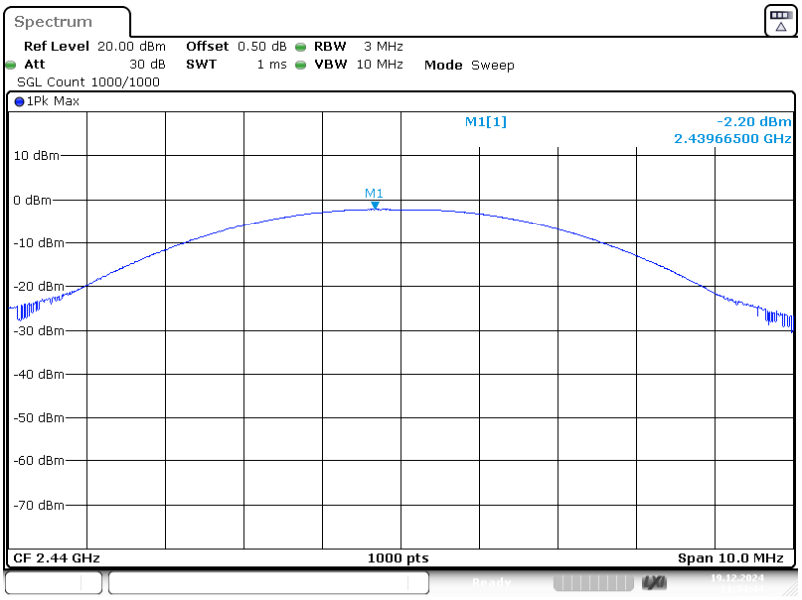
Please refer to the below plots:

Lowest Channel



ProjectNo.:2407A42902E-RF Tester:Braylon Ma
Date: 19.DEC.2024 11:33:01

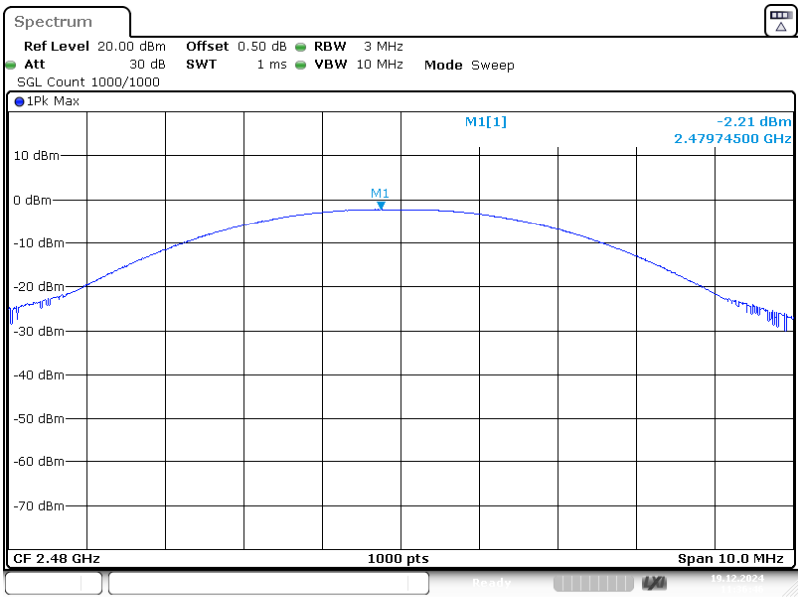
Middle Channel



ProjectNo.:2407A42902E-RF Tester:Braylon Ma

Date: 19.DEC.2024 11:34:44

Highest Channel



ProjectNo.:2407A42902E-RF Tester:Braylon Ma

Date: 19.DEC.2024 11:36:46

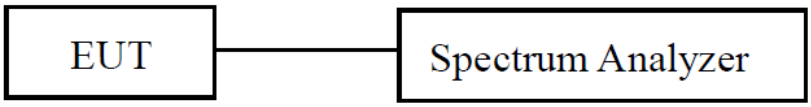
FCC §15.247(d) & RSS-247 ISSUE 3 Clause 5.5– 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

FCC §15.247 (d)
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

RSS-247 Issue 3 Clause 5.5
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required

EUT Setup



Test Procedure

FCC §15.247 (d)
According to ANSI C63.10-2013 Section 11.11
a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

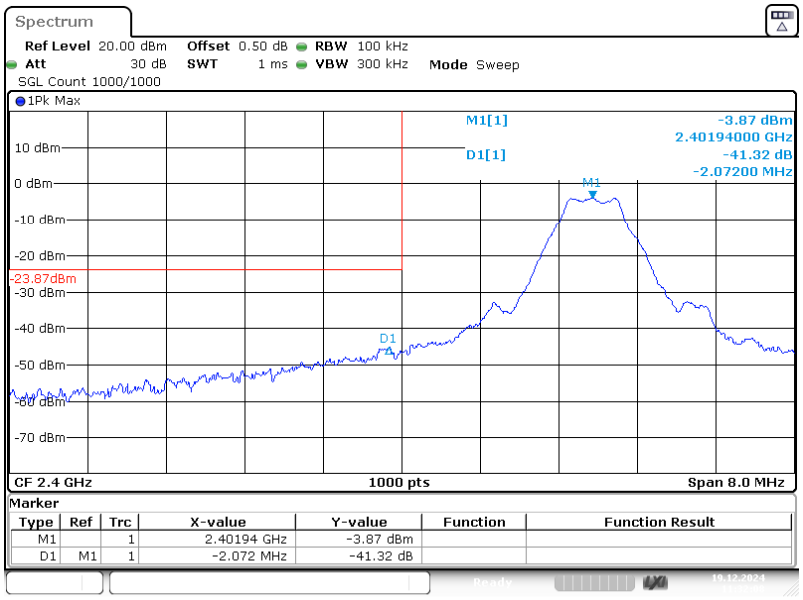
RSS-247 Issue 3 Clause 5.5
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW and VBW of spectrum analyzer to 100 kHz and 300kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Data

Test Mode:	Transmitting	**Test Engineer:**	Braylon Ma
Test Date:	2024-12-19	**Test Voltage:**	AC 120V/60Hz
Test Result:	Compliance	**Environment:**	Temp.: 22.8°C Humi.: 41% Atm.: 99.9kPa

Please refer to the below plots:

Lowest Channel



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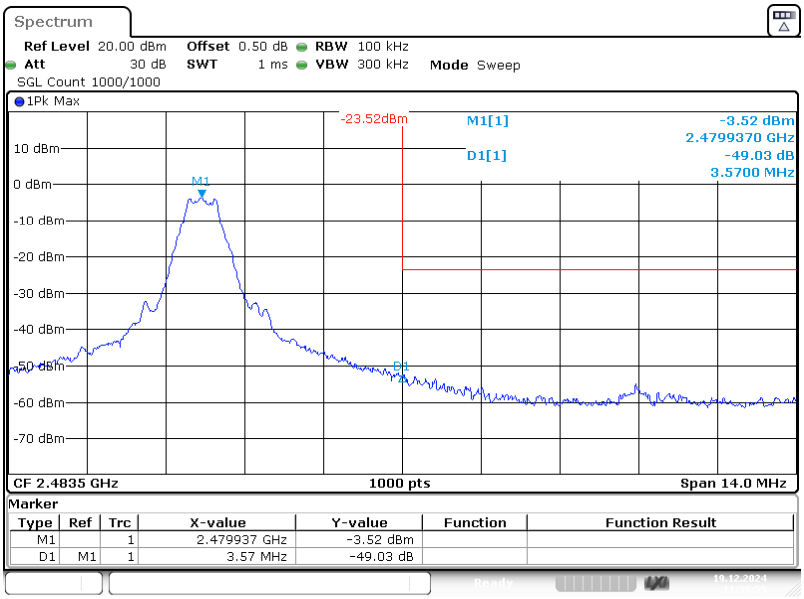
Highest Channel



ProjectNo.:2407A42902E-RF Tester:Braylon Ma

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FCC §15.247(e) & RSS-247 ISSUE 3 CLAUSE5.2 b) - POWER SPECTRAL DENSITY

Applicable Standard

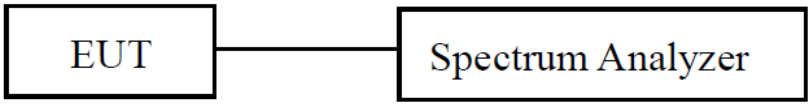
FCC §15.247 (e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

RSS-247 Clause5.2 b

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

EUT Setup



Test Procedure

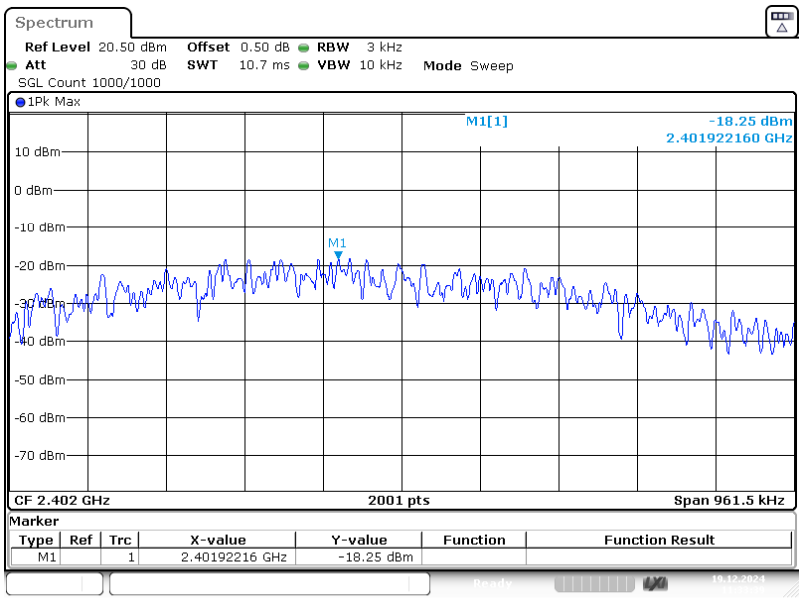
According to ANSI C63.10-2013 Section 11.10.2

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ [3 ×RBW].
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

Test Data

Test Mode:	Transmitting	Test Engineer:	Braylon Ma
Test Date:	2024-12-19	Test Voltage:	AC 120V/60Hz
Test Result:	Compliance	Environment:	Temp.: 22.8℃ Humi.: 41% Atm.: 99.9kPa
Test Channel	**Test Frequency (MHz)**	**Power Spectral Density (dBm/3kHz)**	**Limit (dBm/3kHz)**
Lowest	2402	-18.25	≤8.00
Middle	2440	-18.21	≤8.00
Highest	2480	-18.20	≤8.00

Lowest Channel



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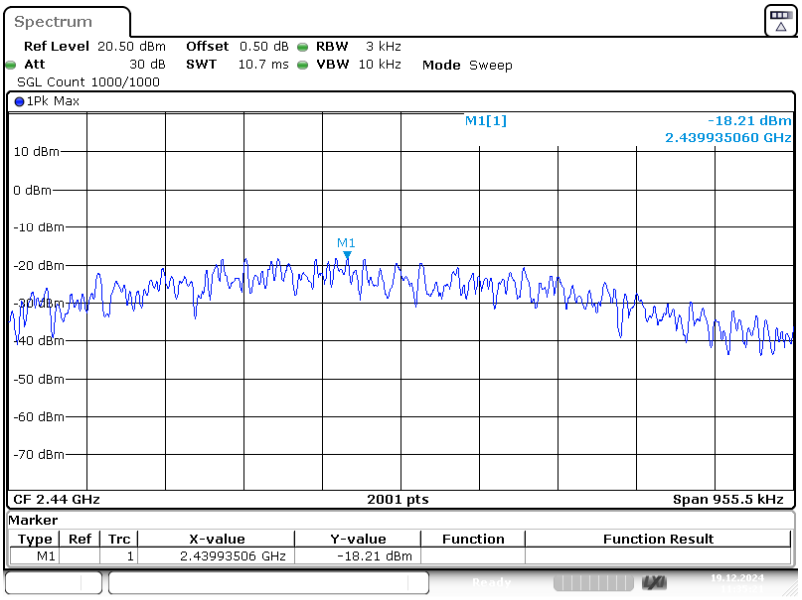
Middle Channel



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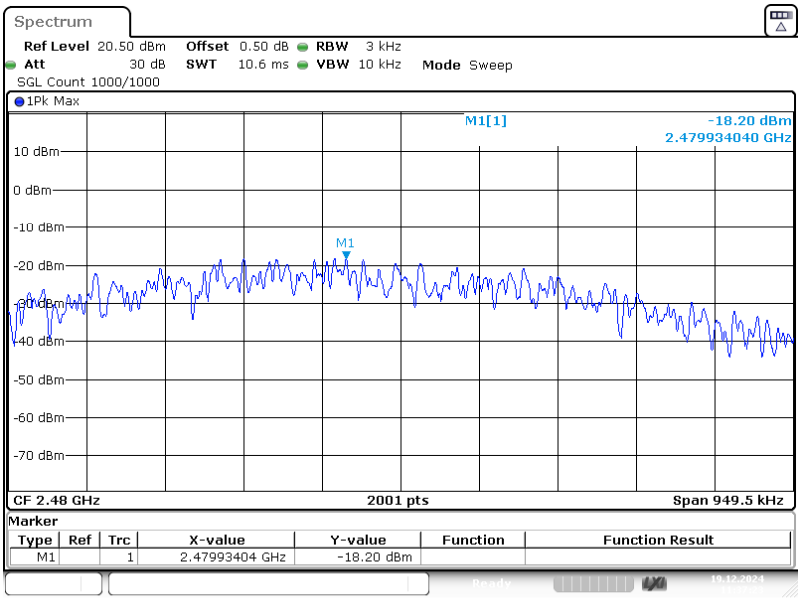
Highest Channel



ProjectNo.:2407A42902E-RF Tester:Braylon Ma

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EUT PHOTOGRAPHS

Please refer to the attachment 2407A42902E-RF-EXP EUT EXTERNAL PHOTOGRAPHS and 2407A42902E-RF-INP EUT INTERNAL PHOTOGRAPHS.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2407A42902E-RF-TSP SETUP PHOTOGRAPHS.

Declarations

1. Bay Area Compliance Laboratories Corp. (Xiamen) is not responsible for authenticity of any information provided by the applicant. Information from the applicant that may affect test results are marked with an asterisk "★".

2. Unless otherwise stated, the results shown in this test report refer only to the sample(s) tested.

3. Unless required by the rule provided by the applicant or product regulations, then decision rule in this report did not consider the uncertainty.

4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor k=2 with the 95% confidence interval.

5. This report cannot be reproduced except in full, without prior written approval of Bay Area Compliance Laboratories Corp. (Xiamen).

6. This report is valid only with a valid digital signature. The digital signature may be available only under the adobe software above version 7.0.

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