TEST REPORT

Applicant Name:	Huaibei Makera Technology Co., Ltd
Address:	1st floor, building C1, e-commerce Industrial Park, Suixi Economic Development Zone, Suixi County, Huaibei City, Anhui Province, China
Report Number:	2401Z66868E-RF-00B
FCC ID:	2A8Z8-CA1

Test Standard (s)

FCC PART 15.249

Sample Description

Product Type:	CARVERA AIR Desktop CNC Machine
Model No.:	CA1
Multiple Model(s) No.:	N/A
Trade Mark:	N/A
Date Received:	2024-11-06
Issue Date:	2025-01-25

Test Result:	Pass▲

▲ In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Jack Zeng

RF Engineer

Approved By:

Nancy Wang

RF Supervisor

Note: The information marked # is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.

This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "▼".

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	2401Z66868E-RF-00B	Original Report	2025-01-25

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	CARVERA AIR Desktop CNC Machine
Tested Model	CA1
Multiple Model(s)	N/A
Frequency Range	2405-2480MHz
Maximum E-field strength	81.60dBuV/m@3m
Modulation Technique	O-QPSK
Antenna Specification[#]	3dBi (provided by the applicant)
Voltage Range	AC 120V/60Hz
Sample serial number	2UG3-1 for Conducted and Radiated Emissions Test
Sample/EUT Status	Good condition
Adapter Information	N/A

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 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 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.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		109.2kHz(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9kHz-150kHz	3.63dB(k=2, 95% level of confidence)
	150kHz-30MHz	3.66dB(k=2, 95% level of confidence)
Radiated Emissions	0.009MHz~30MHz	3.60dB(k=2, 95% level of confidence)
	30MHz~200MHz (Horizontal)	5.32dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	5.43dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	5.77dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.73dB(k=2, 95% level of confidence)
	1GHz - 6GHz	5.34dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.40dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.64dB(k=2, 95% level of confidence)
Temperature		±1℃
Humidity		±1%
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 lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 715558, the FCC Designation No. : CN5045.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing by manufacturer.

Frequency Channel List:

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	**2405**	5	2425	9	2445	13	2465
2	2410	6	2430	10	2450	14	2470
3	2415	7	2435	11	2455	15	2475
4	2420	**8**	**2440**	12	2460	**16**	**2480**

Note: Test on Channel 1, 8 and 16.

EUT Exercise Software

"Carvera controller" exercise software was used and the power level is "Default#". The software and power level was provided by the applicant.

Equipment Modifications

No modifications were made to the unit tested.

Support Equipment List and Details

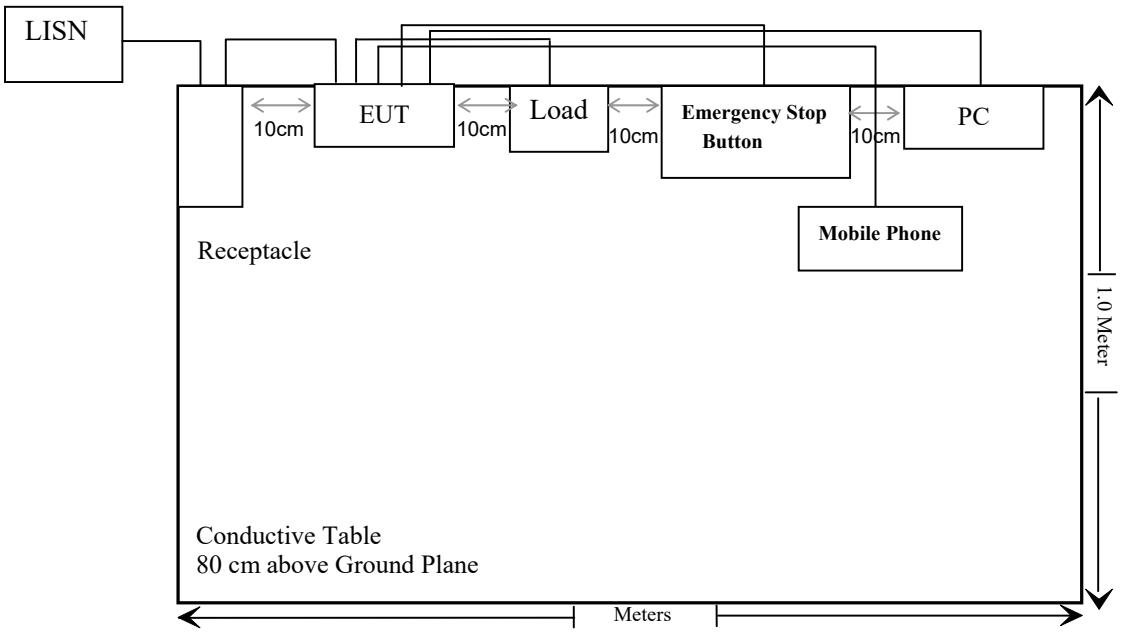
Manufacturer	Description	Model	Serial Number
iKU	Smartphone	X9	12345ab
GREATWALL	PC	NF50AL	2457EF36
Unknown	Load	Unknown	Unknown
Unknown	Emergency Stop Button	Unknown	Unknown

Support Cable Descriptions

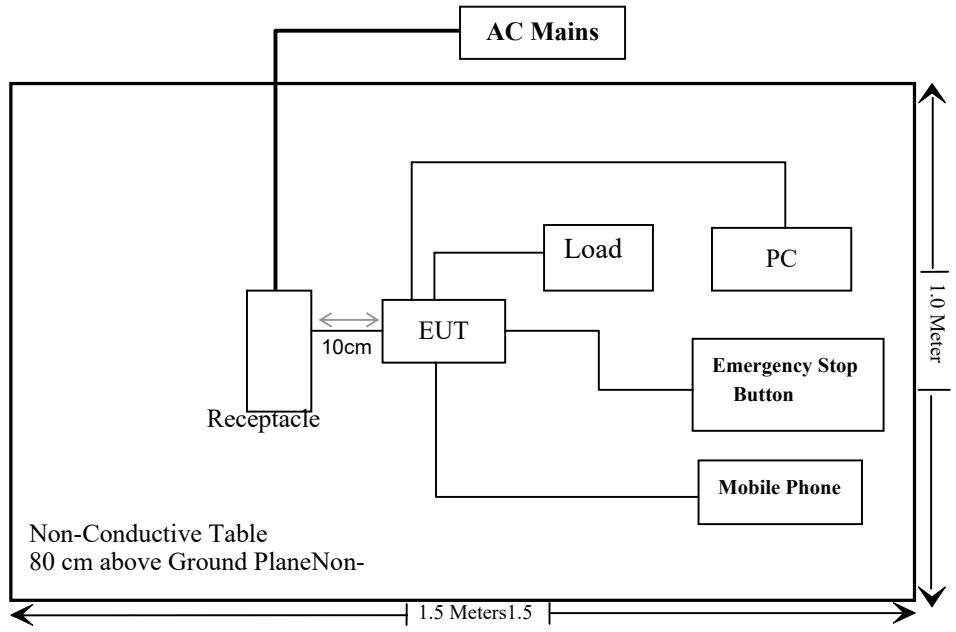
Cable Description	Length (m)	From/Port	To
Unshielded un-detachable AC cable	1.2	EUT	Mains
Unshielded un-detachable USB cable	1.0	EUT	PC
Unshielded un-detachable USB cable	1.0	EUT	Smartphone
Unshielded un-detachable DC cable	1.0	EUT	Load
Unshielded un-detachable DC cable	1.0	EUT	Emergency Stop Button

Block Diagram of Test Setup

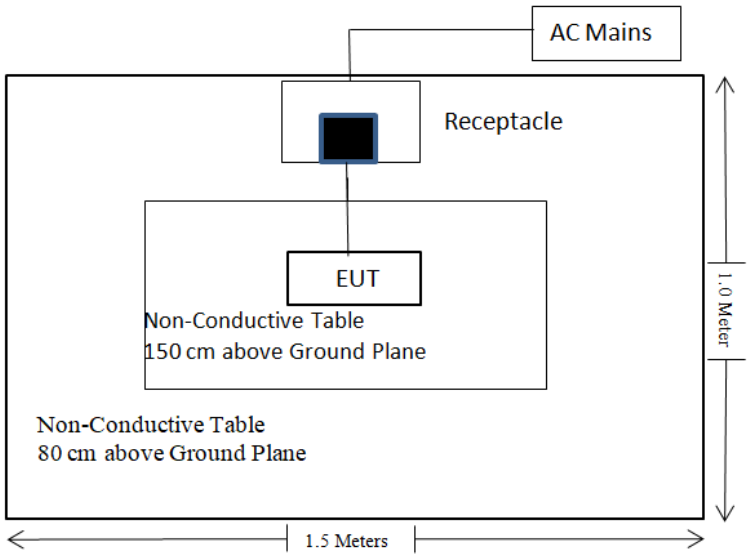
For Conducted Emissions:



For Radiated Emissions below 1GHz:



For Radiated Emissions above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b) (3) & §2.1091	Maximum Permissible Exposure(MPE)	Compliant
§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 Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2024/12/04	2025/12/03
Rohde & Schwarz	LISN	ENV216	101613	2024/12/04	2025/12/03
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2024/05/21	2025/05/20
Unknown	CE Cable	Unknown	UF A210B-1-0720-504504	2024/05/21	2025/05/20
Audix	EMI Test software	E3	191218(V9)	NCR	NCR
Radiated Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR3	102455	2024/12/04	2025/12/03
Sonoma instrument	Pre-amplifier	310 N	186238	2024/05/21	2025/05/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2026/07/19
Unknown	Cable	Chamber A Cable 1	N/A	2024/06/18	2025/06/17
Unknown	Cable	XH500C	J-10M-A	2024/06/18	2025/06/17
BACL	Active Loop Antenna	1313-1A	4031911	2024/05/14	2027/05/13
Unknown	Cable	2Y194	0735	2024/12/04	2025/12/03
Unknown	Cable	PNG214	1354	2024/12/04	2025/12/03
Audix	EMI Test software	E3	19821b(V9)	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2024/03/27	2025/03/26
A.H.System	Preamplifier	PAM-0118P	489	2024/11/15	2025/11/14
Schwarzbeck	Horn Antenna	BBHA9120D(1201)	1143	2023/07/26	2026/07/25
Unknown	RF Cable	KMSE	735	2024/12/06	2025/12/05
Unknown	RF Cable	UFA147	219661	2024/12/06	2025/12/05
Unknown	RF Cable	XH750A-N	J-10M	2024/12/06	2025/12/05
JD	Filter Switch Unit	DT7220FSU	DS79906	2024/09/09	2025/09/08
JD	Multiplex Switch Test Control Set	DT7220SCU	DS79903	2024/09/09	2025/09/08
A.H.System	Pre-amplifier	PAM-1840VH	190	2024/06/18	2025/06/17
Electro-Mechanics Co	Horn Antenna	3116	9510-2270	2023/09/18	2026/09/17
UTIFLEX	RF Cable	NO. 13	232308-001	2024/12/18	2025/12/17
Audix	EMI Test software	E3	191218(V9)	NCR	NCR

*** 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).

RF EXPOSURE EVALUATION

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

According to KDB 447498 D04 Interim General RF Exposure Guidance v01.

MPE-Based Exemption:
General frequency and separation-distance dependent MPE-based effective radiated power(ERP) thresholds are in Table B.1 [Table 1 of § 1.1307(b)(3)(i)(C)] to support an exemptionfrom further evaluation from 300 kHz through 100 GHz.

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.

Ris the minimum separation distance in meters
f = frequency in MHz

Result

Mode	Frequency (MHz)	EIRP (dBm)	Tune Up EIRP (dBm)	Tune Up ERP (dBm)	Tune Up ERP (mW)	Evaluation Distance (m)	ERP Limit (mW)
2.4G Radio	2405-2480	-13.6	-13.0	-15.15	0.03	0.2	768

Note 1: The maximum E-Field is 81.60dBuV/m @ 3m, so the EIRP = (81.6-95.2)dBm=-13.6dBm
Note 2: The tune up EIRP was declared by the applicant.
Note 3: ERP=EIRP-2.15

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant

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.

Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Antenna Connector Construction

The EUT has one internal antenna which was permanently attached and the antenna gain[#] is 3dBi, fulfill the requirement of this section. Please refer to the EUT photos.

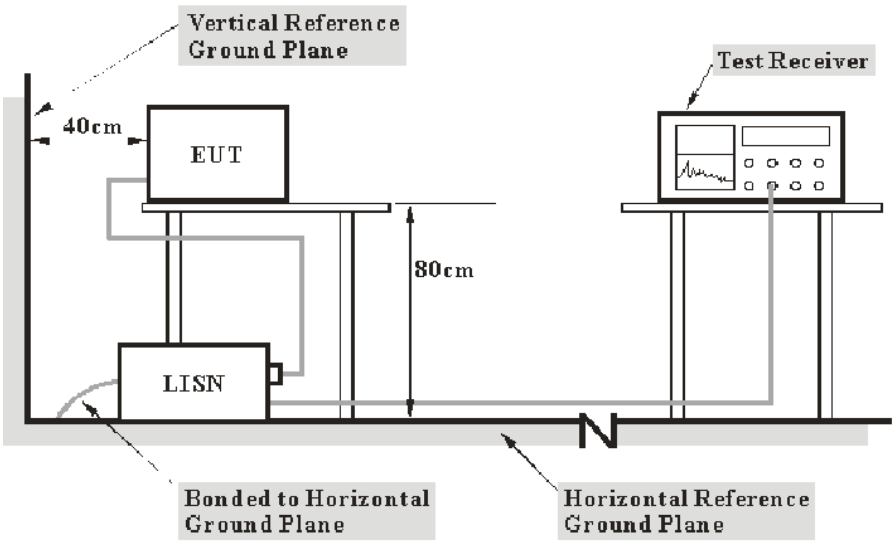
Result: Compliant.

FCC §15.207 (a) - AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

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 ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

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.

Factor & Over Limit Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Factor = LISN VDF + Cable Loss

The "**Over limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit
Level = Read Level + Factor

Note: The term "cable loss" refers to the combination of a cable and a 10dB transient limiter (attenuator).

Test Data

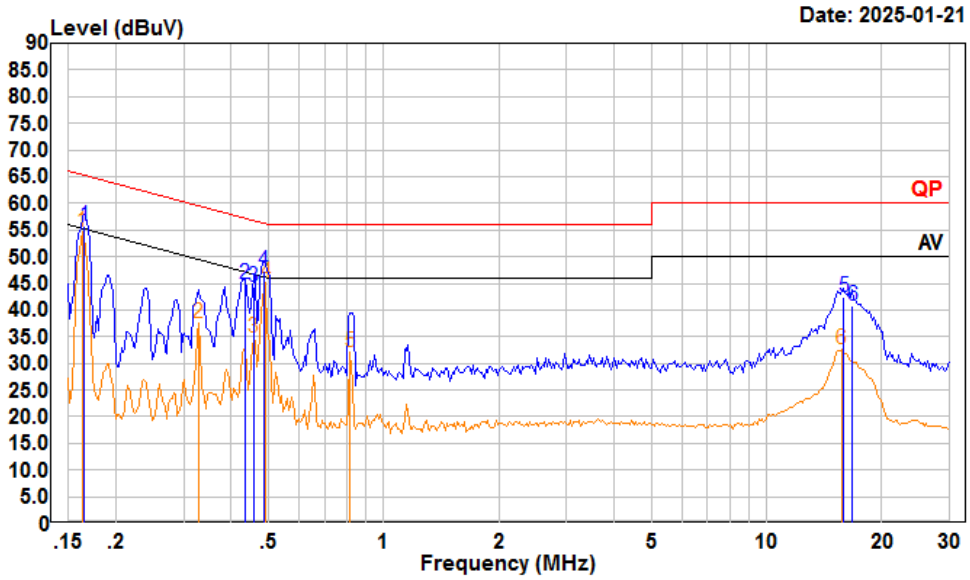
Environmental Conditions

Temperature:	23.9 ℃
Relative Humidity:	38 %
ATM Pressure:	101.1 kPa

The testing was performed by Macy Shi on 2025-01-21.

EUT operation mode: Transmitting (Worst case is low channel)

AC 120V/60 Hz, Line



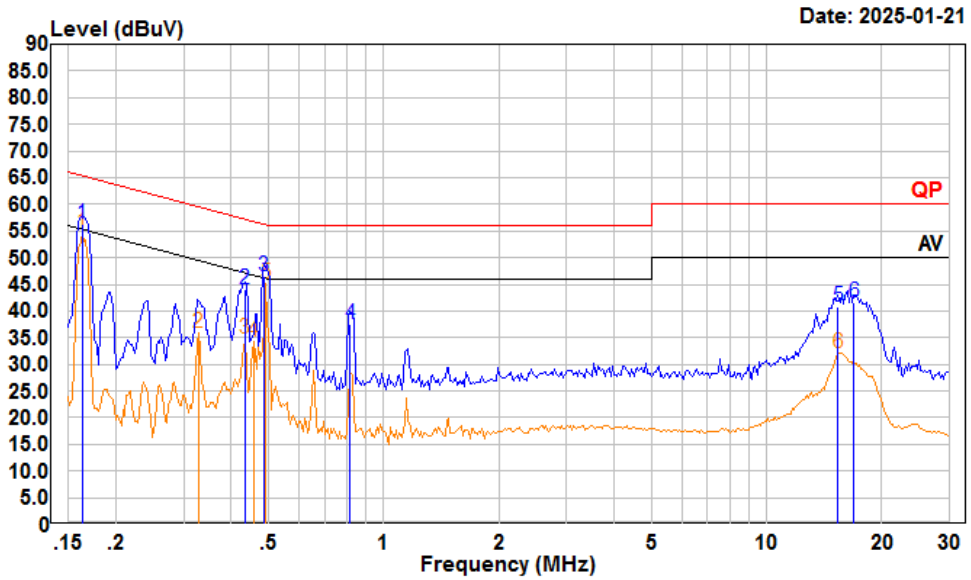
Trace: 1

Condition: Line
Project : 2401Z66868E-RF
tester : Macy.shi Note:Transmitting
Setting : RBW:9kHz VBW:Auto SWT:Auto

	Freq	Read Level	LISN Level	Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.165	34.40	55.74	11.23	10.11	65.21	-9.47	QP
2	0.433	23.70	44.86	11.05	10.11	57.20	-12.34	QP
3	0.456	23.30	44.45	11.03	10.12	56.76	-12.31	QP
4	0.486	26.10	47.24	11.01	10.13	56.23	-8.99	QP
5	15.885	21.10	42.41	11.10	10.21	60.00	-17.59	QP
6	16.750	19.60	40.90	11.10	10.20	60.00	-19.10	QP

	Freq	Read Level	LISN Level	Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.163	33.31	54.65	11.23	10.11	55.30	-0.65	Average
2	0.329	16.17	37.43	11.14	10.12	49.49	-12.06	Average
3	0.456	13.76	34.91	11.03	10.12	46.76	-11.85	Average
4	0.491	24.07	45.22	11.01	10.14	46.14	-0.92	Average
5	0.817	10.73	31.99	11.14	10.12	46.00	-14.01	Average
6	15.718	11.23	32.54	11.10	10.21	50.00	-17.46	Average

AC 120V/60 Hz, Neutral



Trace: 1

Condition: Neutral
Project : 2401Z66868E-RF
tester : Macy.shi Note:Transmitting
Setting : RBW:9kHz VBW:Auto SWT:Auto

	Freq	Read Level	LISN Level	Cable Factor	Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.163	36.10	56.42	10.21	10.11	65.30	-8.88	QP
2	0.433	23.71	44.01	10.19	10.11	57.20	-13.19	QP
3	0.486	26.30	46.55	10.12	10.13	56.23	-9.68	QP
4	0.817	16.99	37.44	10.33	10.12	56.00	-18.56	QP
5	15.388	20.69	40.74	9.83	10.22	60.00	-19.26	QP
6	16.928	21.50	41.63	9.93	10.20	60.00	-18.37	QP

	Freq	Read Level	LISN Level	Cable Factor	Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.163	34.43	54.75	10.21	10.11	55.30	-0.55	Average
2	0.329	15.33	35.82	10.37	10.12	49.49	-13.67	Average
3	0.433	14.45	34.75	10.19	10.11	47.20	-12.45	Average
4	0.456	14.09	34.37	10.16	10.12	46.76	-12.39	Average
5	0.491	24.94	45.19	10.11	10.14	46.14	-0.95	Average
6	15.388	12.11	32.16	9.83	10.22	50.00	-17.84	Average

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:

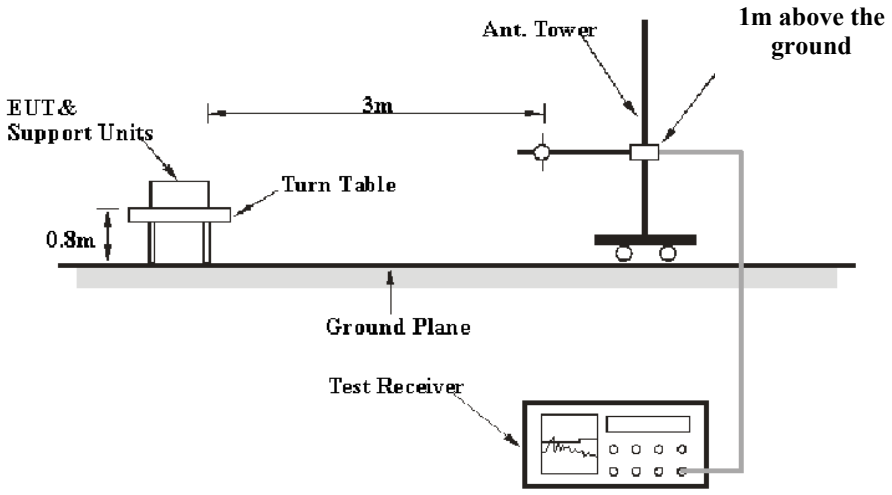
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

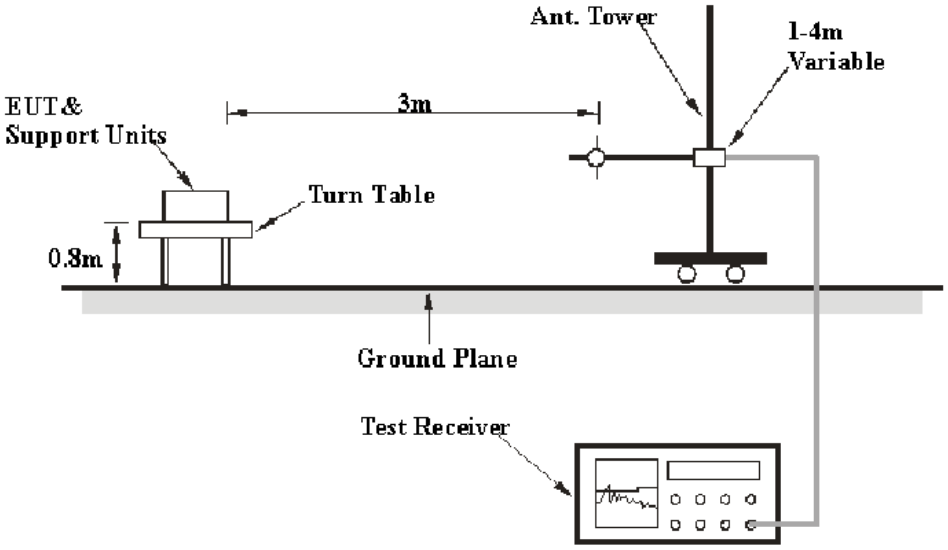
As per FCC§15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

EUT Setup

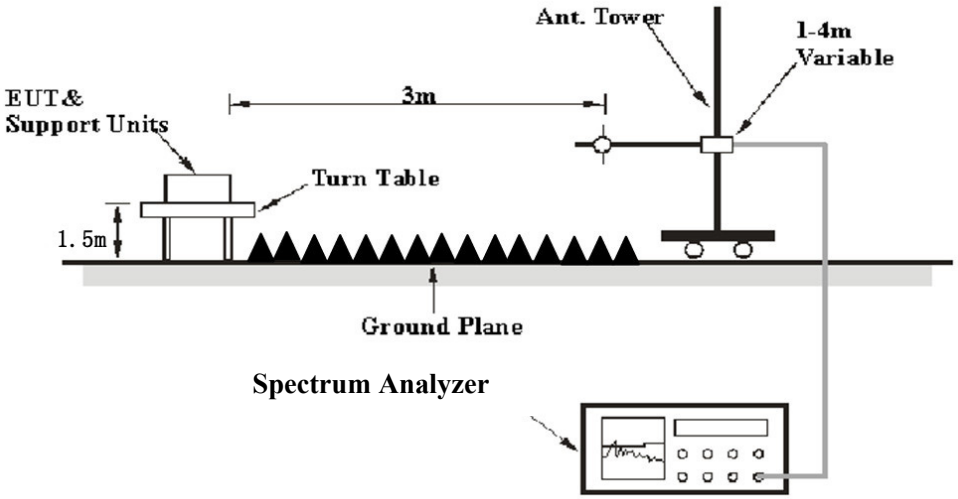
9 kHz-30MHz:



30MHz-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.

EMI Test Receiver & Spectrum Analyzer Setup

The EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

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

1-25GHz:
Pre-scan

Measurement	RBW	Video B/W
PK	1MHz	3 MHz
AV	1MHz	1 kHz

Final measurement for emission identified during pre-scan

Measurement	RBW	Video B/W
PK	1MHz	3 MHz
AV	1MHz	10 Hz

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

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.

All final data was recorded in Quasi-peak detection mode except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz, average detection modes for frequency bands 9–90 kHz and 110–490 kHz, peak and average detection modes for frequencies above 1 GHz.

For 9 kHz-30MHz, 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.

All emissions under the average limit and under the noise floor have not recorded in the report.

Factor & Over Limit/Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit; Margin = Limit–Corrected Amplitude
Level / Corrected Amplitude = Read Level + Factor

Test Data

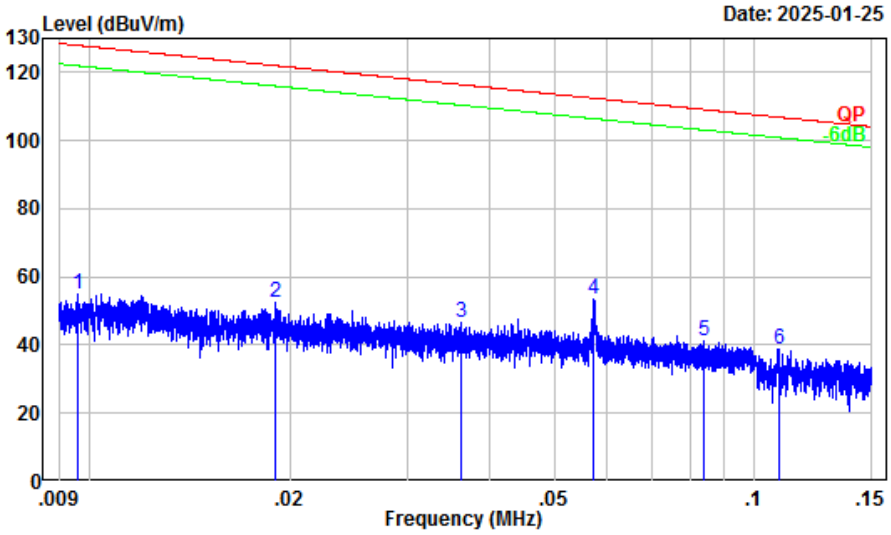
Environmental Conditions

Temperature:	24.1~24.2 ℃
Relative Humidity:	40~50.1 %
ATM Pressure:	101.3~101.4 kPa

The testing was performed by Jack Liu on 2025-01-25 for below 1GHz and Visen Wu from 2024-12-30 to 2025-01-23 for above 1GHz.

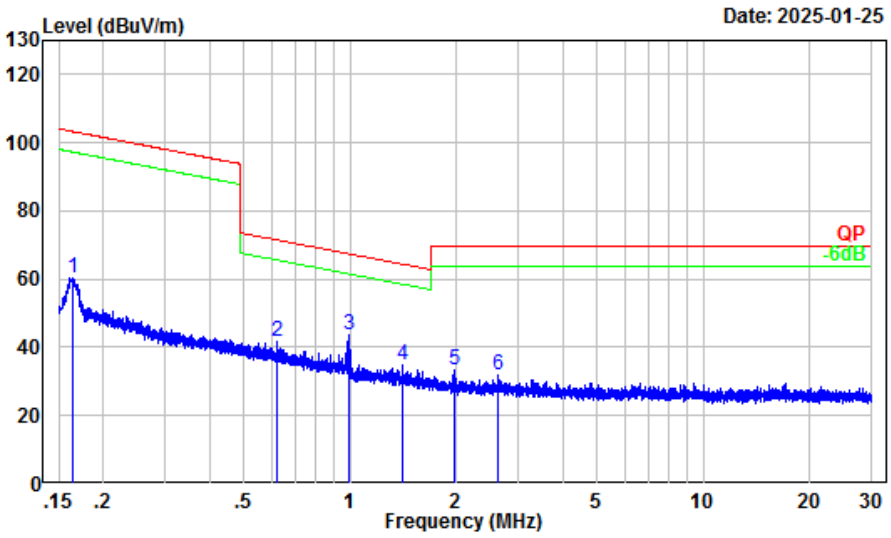
EUT operation mode: Transmitting

9 kHz-30MHz: (Low channel in the Parallel was worst case)



Site : Chamber A
Condition : 3m
Project Number : 2401Z66868E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 0.3/1kHz
Tester : Jack Liu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.01	32.37	22.40	54.77	127.94	-73.17	Peak
2	0.02	30.57	21.88	52.45	121.99	-69.54	Peak
3	0.04	27.85	18.87	46.72	116.42	-69.70	Peak
4	0.06	25.66	27.92	53.58	112.43	-58.85	Peak
5	0.08	23.13	18.07	41.20	109.13	-67.93	Peak
6	0.11	21.46	17.31	38.77	106.85	-68.08	Peak

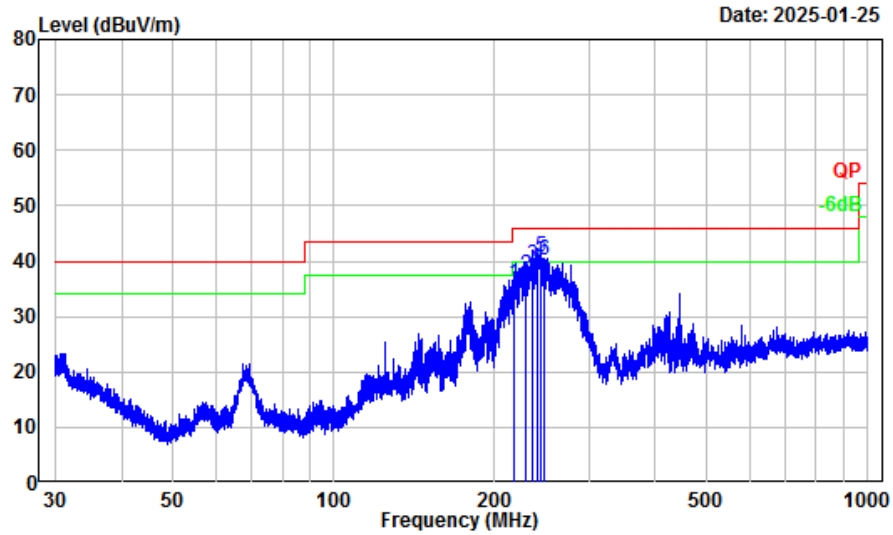


Site : Chamber A
Condition : 3m
Project Number : 2401Z66868E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 10/30kHz
Tester : Jack Liu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.16	18.20	42.32	60.52	103.28	-42.76	Peak
2	0.62	4.90	36.81	41.71	71.69	-29.98	Peak
3	0.99	1.28	42.27	43.55	67.56	-24.01	Peak
4	1.41	0.05	34.76	34.81	64.41	-29.60	Peak
5	1.98	-1.55	34.88	33.33	69.54	-36.21	Peak
6	2.63	-1.95	33.87	31.92	69.54	-37.62	Peak

30MHz-1GHz (worst case at Low channel)

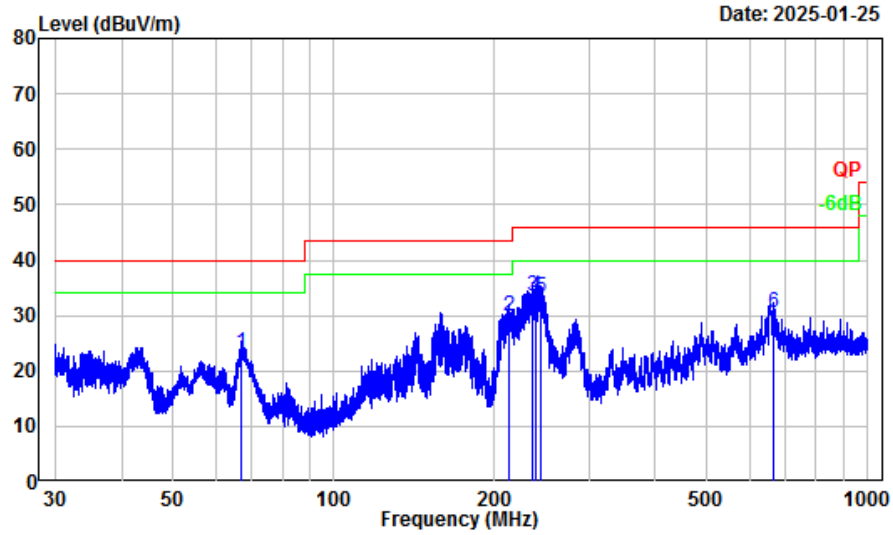
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number : 2401Z66868E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 100/300kHz
Tester : Jack Liu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	217.83	-14.20	50.10	35.90	46.00	-10.10	QP
2	229.09	-13.90	51.20	37.30	46.00	-8.70	QP
3	234.68	-13.56	52.70	39.14	46.00	-6.86	QP
4	239.78	-13.33	52.10	38.77	46.00	-7.23	QP
5	243.38	-13.24	53.90	40.66	46.00	-5.34	QP
6	248.44	-13.13	53.30	40.17	46.00	-5.83	QP

Vertical



Site : Chamber A
Condition : 3m Vertical
Project Number : 2401Z66868E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 100/300kHz
Tester : Jack Liu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	66.97	-17.88	41.26	23.38	40.00	-16.62	QP
2	213.20	-14.14	44.05	29.91	43.50	-13.59	QP
3	236.13	-13.49	46.92	33.43	46.00	-12.57	QP
4	239.36	-13.35	46.74	33.39	46.00	-12.61	QP
5	243.91	-13.24	46.54	33.30	46.00	-12.70	QP
6	665.51	-3.87	34.26	30.39	46.00	-15.61	QP

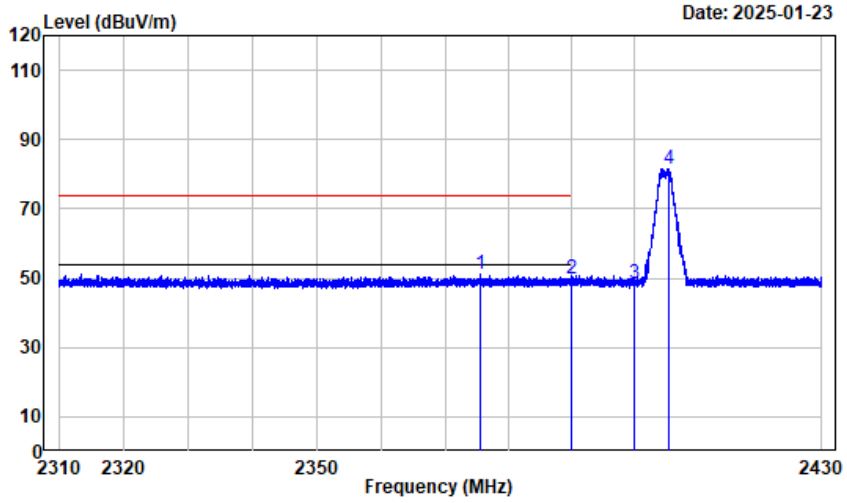
Above 1GHz:

Frequency (MHz)	Reading (dBμV)	PK/AV	Polar (H/V)	Factor (dB/m)	Absolute Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low Channel							
2405.00	92.60	PK	H	-11.00	81.60	114	-32.40
2405.00	87.01	PK	V	-11.00	76.01	114	-37.99
4810.00	52.08	PK	H	-7.79	44.29	74	-29.71
4810.00	52.36	PK	V	-7.79	44.57	74	-29.43
Middle Channel							
2440.00	90.53	PK	H	-10.93	79.60	114	-34.40
2440.00	85.47	PK	V	-10.93	74.54	114	-39.46
4880.00	52.36	PK	H	-7.59	44.77	74	-29.23
4880.00	54.48	PK	V	-7.59	46.89	74	-27.11
High Channel							
2480.00	86.09	PK	H	-10.97	75.12	114	-38.88
2480.00	81.70	PK	V	-10.97	70.73	114	-43.27
4960.00	52.59	PK	H	-7.56	45.03	74	-28.97
4960.00	54.03	PK	V	-7.56	46.47	74	-27.53

Note:
Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Absolute Level (Corrected Amplitude） = Factor + Reading
Margin = Absolute Level - Limit
The other spurious emission which is 20dB to the limit or in noise floor level was not recorded. The peak emission was less than the average emission limit, so the Average emission was not tested.

Test plots for Band Edge Measurements (Radiated):

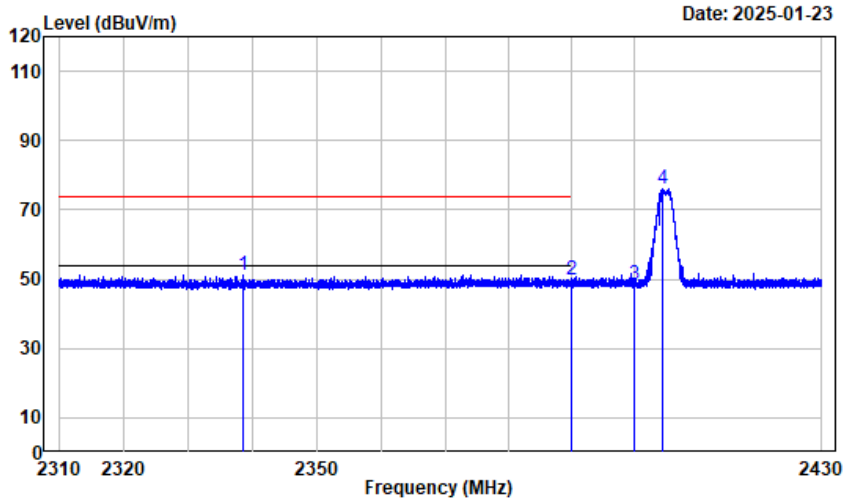
Test Channel:	2405MHz	Ant. Polar. :	Horizontal



Condition : Horizontal
Project No. : 2401Z66868E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : 2405MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2375.438	-10.95	62.19	51.24	74.00	-22.76	Peak
2	2390.000	-10.98	60.60	49.62	74.00	-24.38	Peak
3	2400.000	-11.01	59.57	48.56	74.00	-25.44	Peak
4	2405.442	-11.00	92.60	81.60	114.00	-32.40	Peak

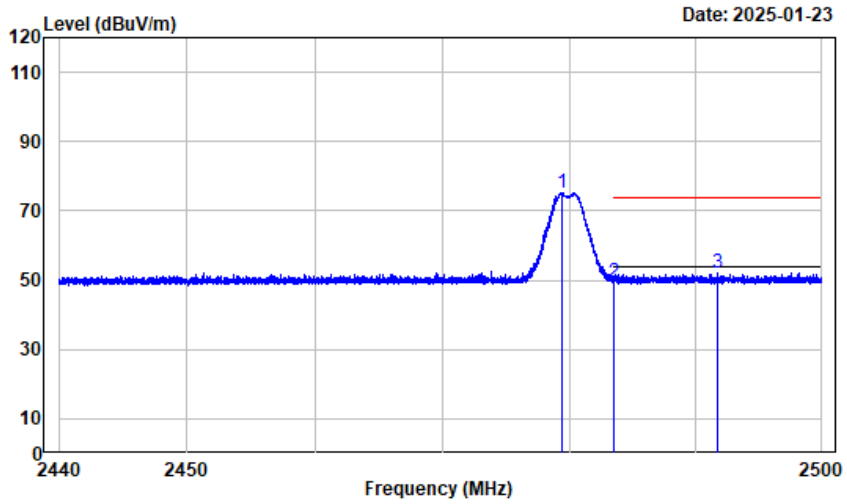
Test Channel:	2405MHz	Ant. Polar. :	Vertical



Condition : Vertical
Project No. : 2401Z66868E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : 2405MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2338.489	-10.86	62.18	51.32	74.00	-22.68	Peak
2	2390.000	-10.98	60.81	49.83	74.00	-24.17	Peak
3	2400.000	-11.01	59.43	48.42	74.00	-25.58	Peak
4	2404.422	-11.00	87.01	76.01	114.00	-37.99	Peak

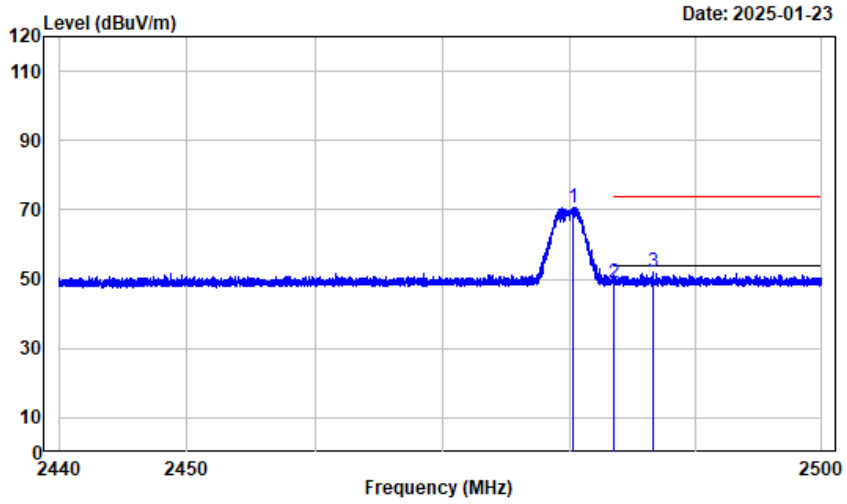
Test Channel:	2480MHz	Ant. Polar. :	Horizontal



Condition : Horizontal
Project No. : 2401Z66868E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : 2480MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2479.455	-10.97	86.09	75.12	114.00	-38.88	Peak
2	2483.500	-10.97	60.42	49.45	74.00	-24.55	Peak
3	2491.711	-10.98	62.95	51.97	74.00	-22.03	Peak

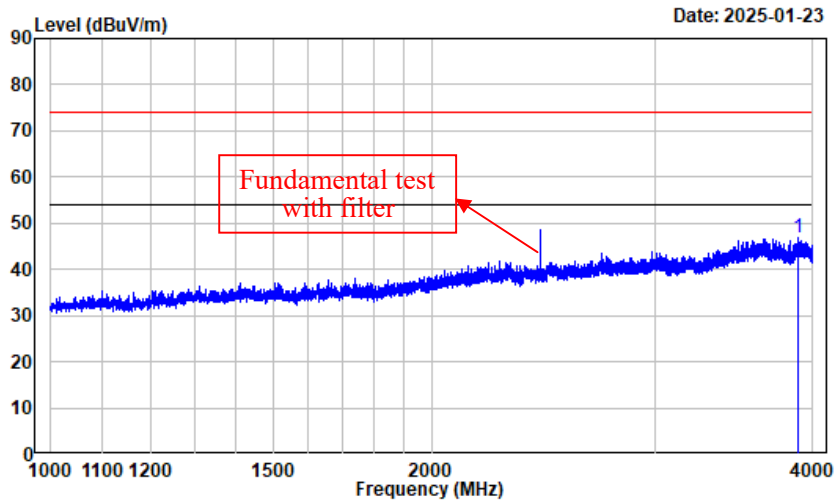
Test Channel:	2480MHz	Ant. Polar. :	Vertical

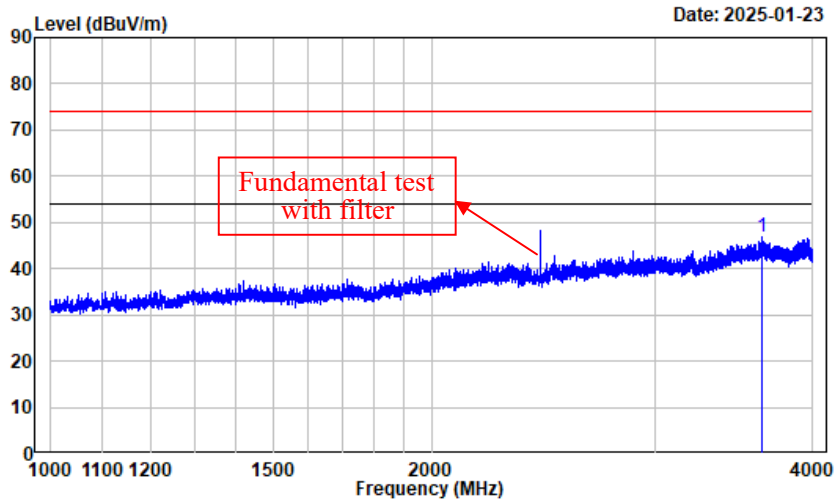


Condition : Vertical
Project No. : 2401Z66868E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : 2480MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2480.258	-10.97	81.70	70.73	114.00	-43.27	Peak
2	2483.500	-10.97	59.98	49.01	74.00	-24.99	Peak
3	2486.648	-10.97	62.92	51.95	74.00	-22.05	Peak

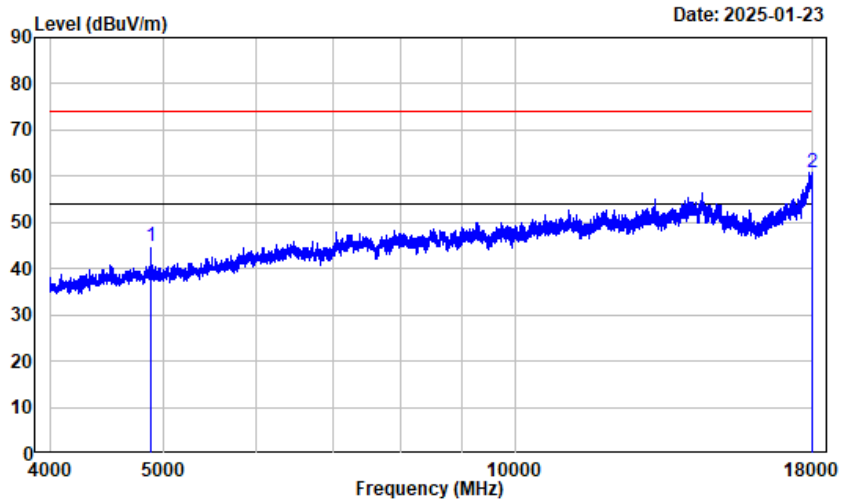
Listed with the worst harmonic margin test plot:

Horizontal	
1-4GHz	 Condition : Horizontal Project No. : 2401Z66868E-RF Tester : Visen Wu Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak Note : 2440MHz Freq / Factor / Read Level / Limit Level / Limit Line / Over Limit / Remark MHz / dB/m / dBuV / dBuV/m / dBuV/m / dB 1 3896.862 -9.83 56.77 46.94 74.00 -27.06 Peak

Vertical	
1-4GHz	 Condition : Vertical Project No. : 2401Z66868E-RF Tester : Visen Wu Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak Note : 2440MHz Freq / Factor / Read Level / Limit Level / Limit Line / Over Limit / Remark MHz / dB/m / dBuV / dBuV/m / dBuV/m / dB 1 3651.206 -9.77 56.48 46.71 74.00 -27.29 Peak

Horizontal-Peak

4-18GHz

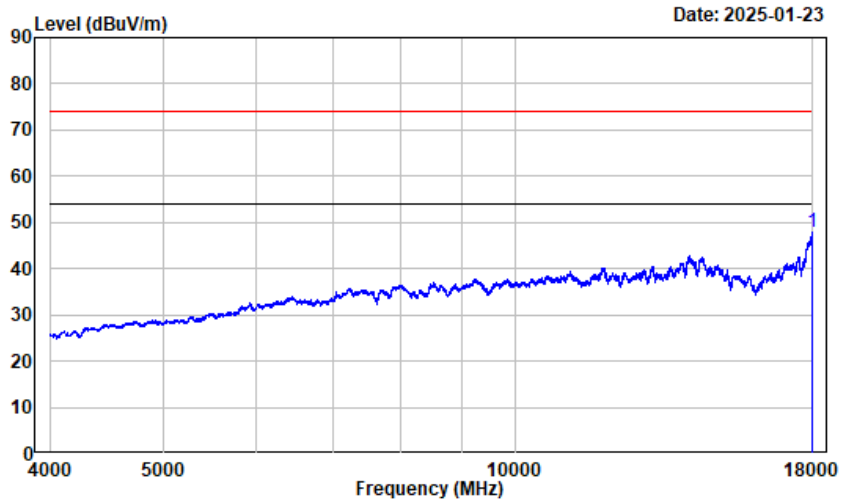


Condition : Horizontal
Project No. : 2401Z66868E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : 2440MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4880.000	-7.59	52.36	44.77	74.00	-29.23	Peak
2	17993.000	13.17	47.62	60.79	74.00	-13.21	Peak

Horizontal-Average

4-18GHz

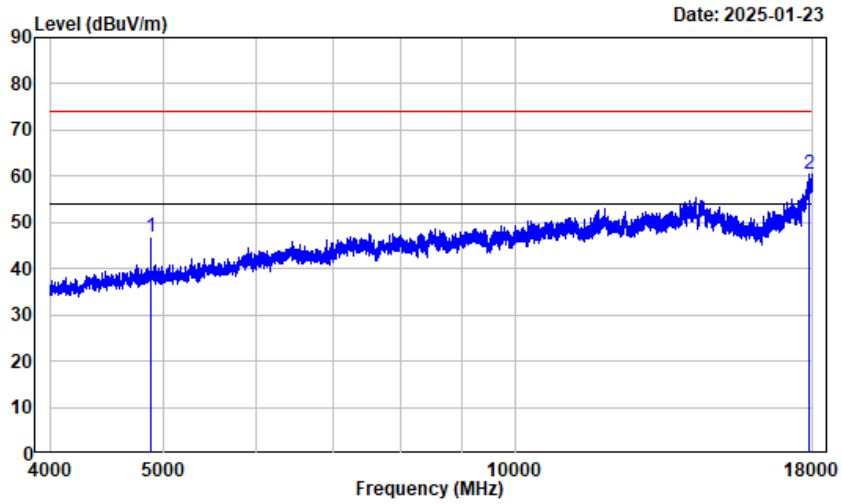


Condition : Horizontal
Project No. : 2401Z66868E-RF
Tester : Visen Wu
Spectrum setting: Average reading: RBW:1MHz VBW:1kHz Detector:Peak
Note : 2440MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	17993.000	13.17	34.59	47.76	54.00	-6.24	Average

Vertical-Peak

4-18GHz

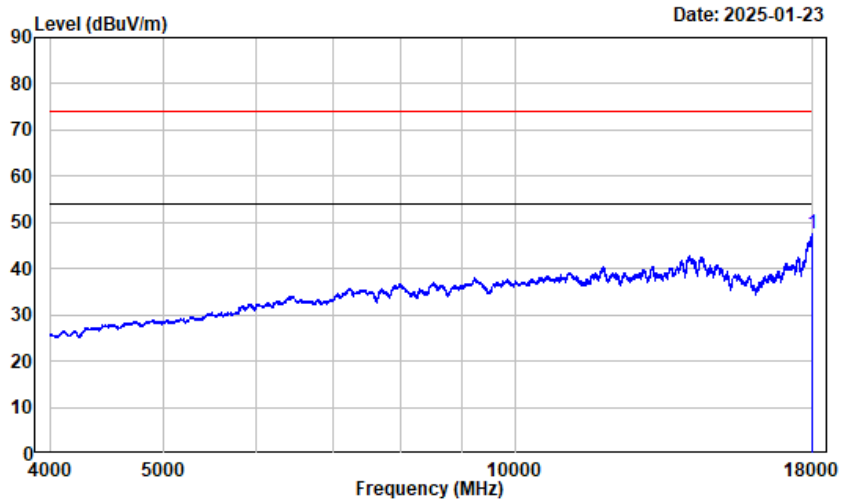


Condition : Vertical
Project No. : 2401Z66868E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : 2440MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4880.000	-7.60	54.49	46.89	74.00	-27.11	Peak
2	17880.980	12.36	48.11	60.47	74.00	-13.53	Peak

Vertical-Average

4-18GHz

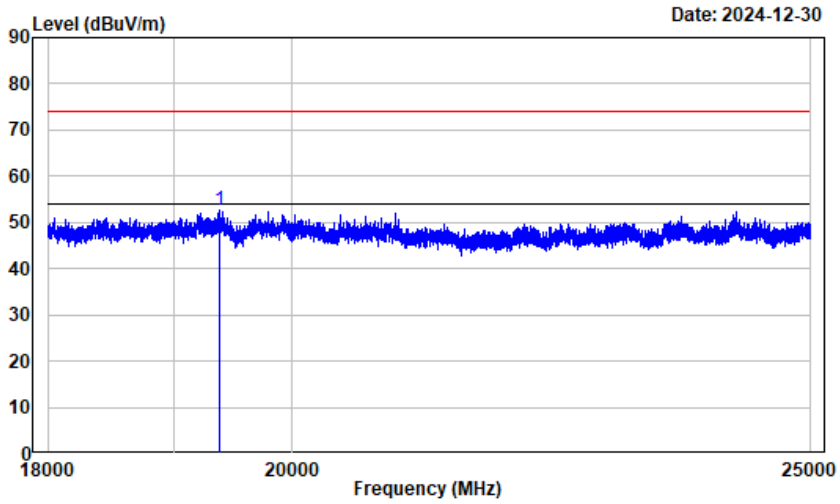


Condition : Vertical
Project No. : 2401Z66868E-RF
Tester : Visen Wu
Spectrum setting: Average reading: RBW:1MHz VBW:1kHz Detector:Peak
Note : 2440MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	17994.750	13.17	34.39	47.56	54.00	-6.44	Average

Horizontal

18-25GHz

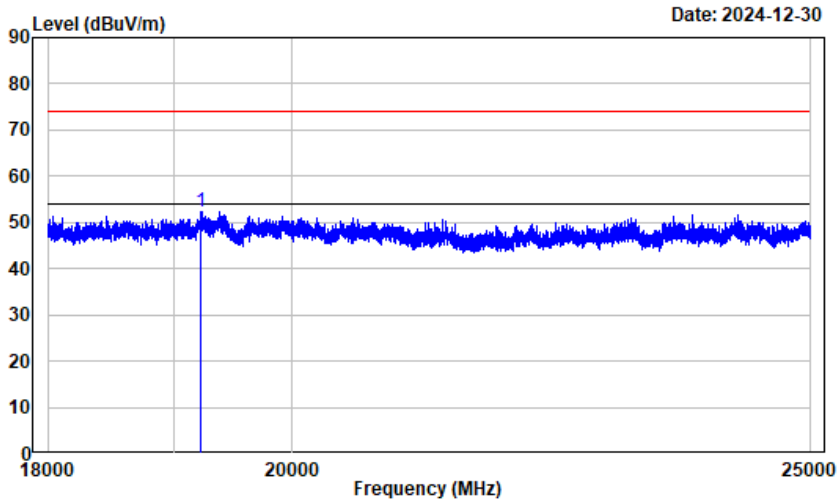


Condition : Horizontal
Project No. : 2401Z66868E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : 2440MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	19382.670	15.11	37.49	52.60	74.00	-21.40	Peak

Vertical

18-25GHz



Condition : Vertical
Project No. : 2401Z66868E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : 2440MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	19227.780	15.30	37.06	52.36	74.00	-21.64	Peak

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

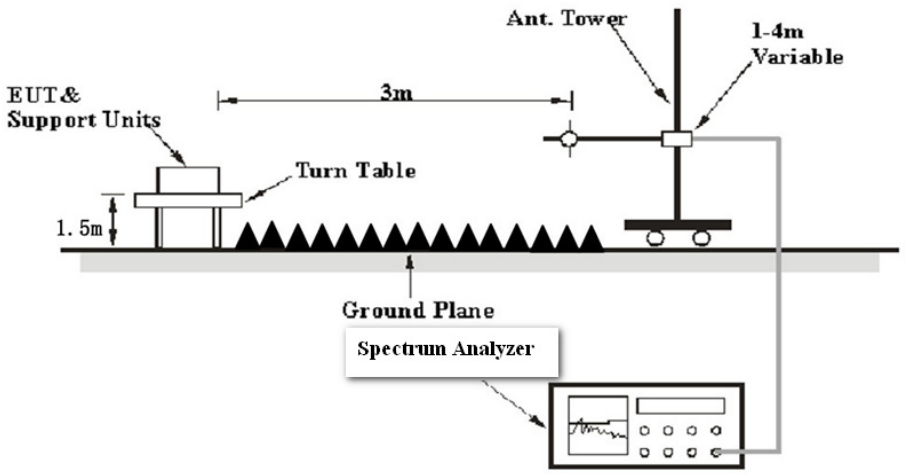
Test Method: ANSI C63.10-2013 Clause 7.8.7 & Clause 6.9.2

The following conditions shall be observed for measuring the occupied bandwidth and 20 dB bandwidth:
• The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

• 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.

• 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 / 20 dB bandwidth if the device is not transmitting continuously.

• The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW/ 20dB bandwidth and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.



Test Data

Environmental Conditions

Temperature:	24.2 ℃
Relative Humidity:	50.1 %
ATM Pressure:	101.3 kPa

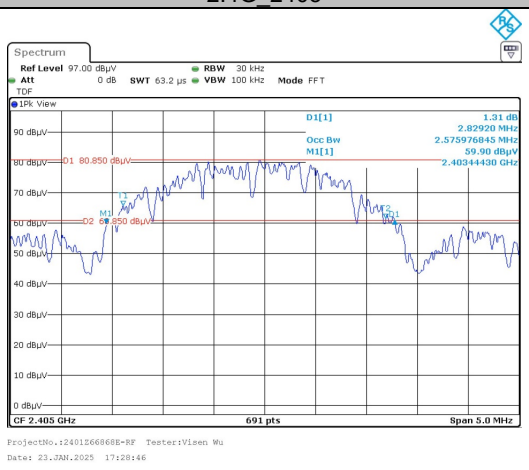
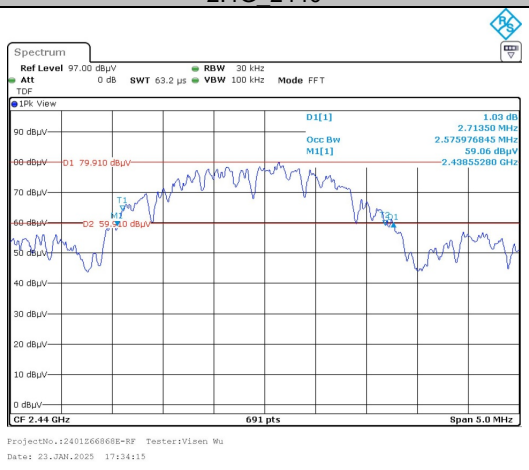
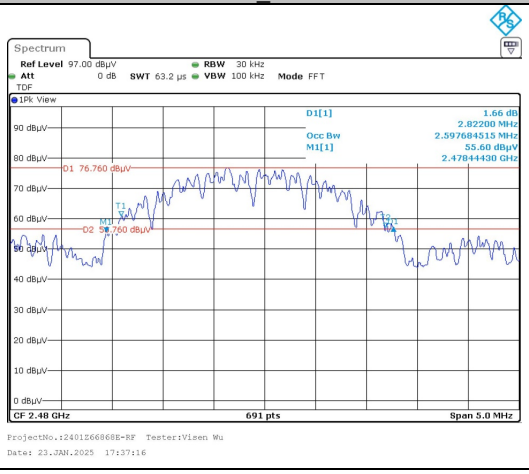
The testing was performed by Visen Wu on 2025-01-23.

EUT operation mode: Transmitting

Please refer to the following table and plots.

Frequency[MHz]	20dB EBW[MHz]
2405	2.829
2440	2.714
2480	2.822

Test Graphs

2.4G_2405

2.4G_2440

2.4G_2480


EUT PHOTOGRAPHS

Please refer to the attachment 2401Z66868E-RF External photo and 2401Z66868E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2401Z66868E-RF Test Setup photo.

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