

TEST REPORT

Applicant Name: Shenzhen Jiayz photo industrial ., Ltd
Address: A16 Building, Intelligent Terminal Industrial Park of Silicon Valley Power, Guanlan, Longhua District, Shenzhen, China
Report Number: 2401Y27183E-RF-00
FCC ID: 2ARN3-122911TX

Test Standard (s)

FCC PART 15.247

Sample Description

Product Type: Wireless Microphone
Model No.: Saramonic Ultra TX
Multiple Model(s) No.: N/A
Trade Mark: Saramonic
Date Received: 2024/10/11
Issue Date: 2025/01/10

Test Result:

Pass▲

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

Prepared and Checked By:

Wills Yu

Wills Yu
RF Engineer

Approved By:

Michelle Zeng

Michelle Zeng
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 cannot be reproduced except in full, without prior written approval of the Company. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested. 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.

This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP or any agency of the U.S. Government.

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

Bay Area Compliance Laboratories Corp. (Shenzhen)

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

Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY	4
GENERAL INFORMATION.....	5
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	5
OBJECTIVE	5
TEST METHODOLOGY	5
MEASUREMENT UNCERTAINTY	6
TEST FACILITY	6
SYSTEM TEST CONFIGURATION	7
DESCRIPTION OF TEST CONFIGURATION	7
EUT EXERCISE SOFTWARE	7
SPECIAL ACCESSORIES	7
EQUIPMENT MODIFICATIONS	8
SUPPORT EQUIPMENT LIST AND DETAILS	8
EXTERNAL I/O CABLE	8
BLOCK DIAGRAM OF TEST SETUP	8
SUMMARY OF TEST RESULTS	10
TEST EQUIPMENT LIST	11
FCC §15.247 (I)&§1.1307 (B) & §2.1093 - RF EXPOSURE	13
APPLICABLE STANDARD	13
MEASUREMENT RESULT	13
FCC §15.203 - ANTENNA REQUIREMENT	14
APPLICABLE STANDARD	14
ANTENNA CONNECTOR CONSTRUCTION	14
FCC §15.207 (A) - AC LINE CONDUCTED EMISSIONS	15
APPLICABLE STANDARD	15
EUT SETUP	15
EMI TEST RECEIVER SETUP	15
TEST PROCEDURE	16
FACTOR & OVER LIMIT CALCULATION	16
TEST DATA	16
FCC §15.205, §15.209&§15.247(D) – RADIATED EMISSIONS	19
APPLICABLE STANDARD	19
EUT SETUP	19
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	20
TEST PROCEDURE	21
FACTOR & OVER LIMIT/MARGIN CALCULATION	21
TEST DATA	21
FCC §15.247(A) (1) - CHANNEL SEPARATION TEST	47
APPLICABLE STANDARD	47
TEST PROCEDURE	47
TEST DATA	48

FCC §15.247(A) (1) - 20DBEMISSION BANDWIDTH.....	50
APPLICABLE STANDARD	50
TEST PROCEDURE	50
TEST DATA	51
FCC §15.247(A) (1) (III) - QUANTITY OF HOPPING CHANNEL TEST.....	54
APPLICABLE STANDARD	54
TEST PROCEDURE	54
TEST DATA	55
FCC §15.247(A) (1) (III) - TIME OF OCCUPANCY (DWELL TIME).....	57
APPLICABLE STANDARD	57
TEST PROCEDURE	57
TEST DATA	57
FCC §15.247(B) (1) - PEAK OUTPUT POWER MEASUREMENT	60
APPLICABLE STANDARD	60
TEST PROCEDURE	60
TEST DATA	61
FCC §15.247(D) - BAND EDGES TESTING.....	65
APPLICABLE STANDARD	65
TEST PROCEDURE	65
TEST DATA	65
EUT PHOTOGRAPHS.....	70
TEST SETUP PHOTOGRAPHS	71

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	2401Y27183E-RF-00	Original Report	2025/01/10

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Wireless Microphone
Tested Model	Saramonic Ultra TX
Multiple Model(s)	N/A
Frequency Range	2402-2480MHz
Maximum conducted peak output power	6.85dBm
Modulation Technique	GFSK
Antenna Specification [#]	Antenna 1: -2.7dBi; Antenna 2:-3dBi (provided by the applicant)
Voltage Range	DC 3.85V from battery or DC 5V from Charging Contacts or DC 5V from type-C Charging port
Sample serial number	2SN4-1 for RF Conducted Test 2SN4-2 for Conducted & Radiated Emissions (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	N/A

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 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)
RF Frequency		56.6Hz(k=2, 95% level of confidence)
RF output power, conducted		0.86dB(k=2, 95% level of confidence)
Unwanted Emission, conducted		1.60dB(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9 kHz~150 KHz	3.63dB(k=2, 95% level of confidence)
	150 kHz ~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°C
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 in an engineering mode.

Channel list[#]

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	/	/

Channel 0, 39, 78 was tested.

The device supports SISO only

EUT Exercise Software

“rftest_b2411112.exe”[#] exercise software was used and the power level is 6[#]. The software and power level was provided by the applicant.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

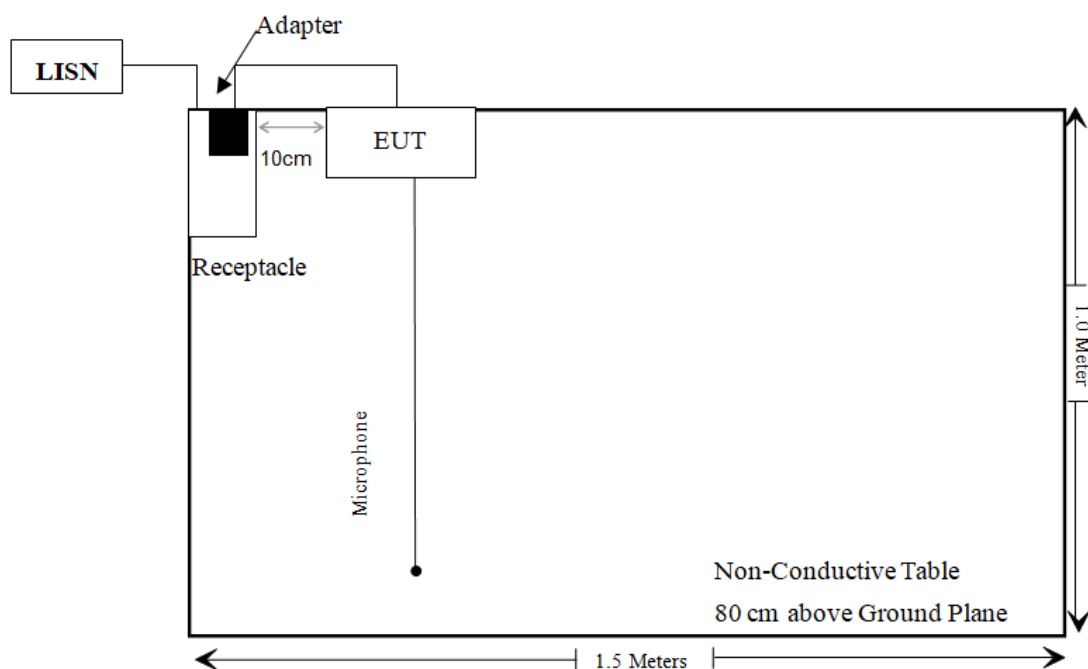
Manufacturer	Description	Model	Serial Number
Unknown	Adapter	S015BTU0500200	Unknown
Jiayz photo	Microphone	Unknown	Unknown
Oupu	Receptacle	Unknown	Unknown

External I/O Cable

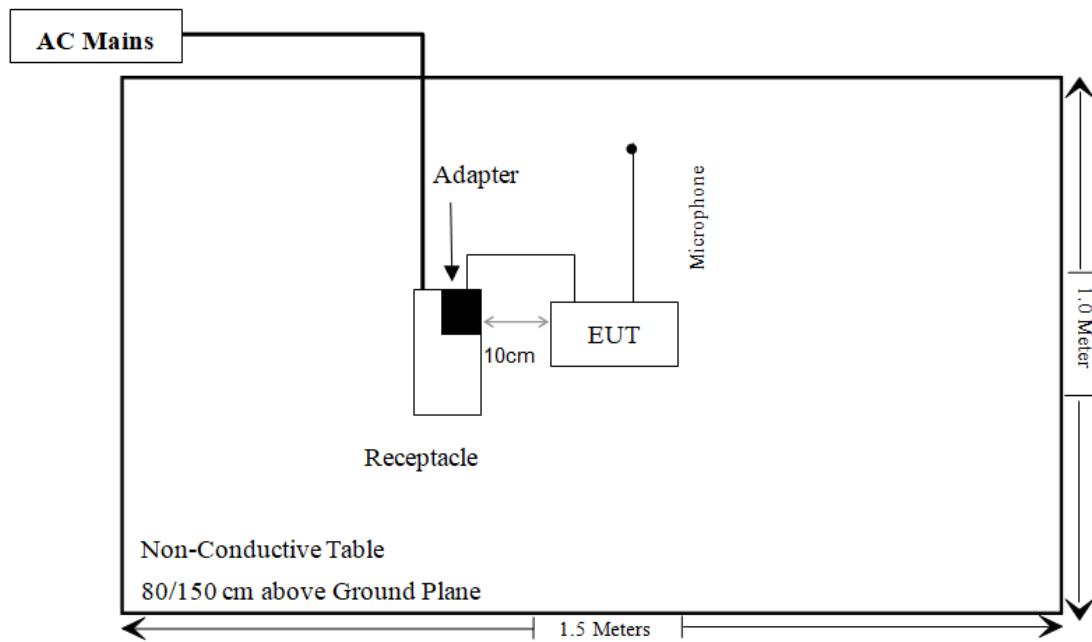
Cable Description	Length (m)	From/Port	To
Un-shielding Detachable USB Cable	0.3	EUT	Adapter
Un-shielding Un-detachable AC Cable	1.0	Receptacle	LISN/AC Mains
Un-shielding Detachable audio Cable	1.0	EUT	Microphone

Block Diagram of Test Setup

For conducted emission:



For Radiated Emissions:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC§15.247 (i), §1.1307 (b) (1) & §2.1093	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207(a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209 & §15.247(d)	Radiated Emissions	Compliant
§15.247(a)(1)	20dBEmission Bandwidth	Compliant
§15.247(a)(1)	Channel Separation Test	Compliant
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliant
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
§15.247(b)(1)	Peak Output Power Measurement	Compliant
§15.247(d)	Band edges	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2024/01/16	2025/01/15
Rohde & Schwarz	LISN	ENV216	101613	2024/01/16	2025/01/15
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	2024/01/16	2025/01/15
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	2024/05/21	2025/05/20
Unknown	Cable	PNG214	1354	2024/05/21	2025/05/20
Audix	EMI Test software	E3	19821b(V9)	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2024/03/27	2025/03/26
COM-POWER	Pre-amplifier	PA-122	181919	2024/06/18	2025/06/17
Schwarzbeck	Horn Antenna	BBHA9120D (1201)	1143	2023/07/26	2026/07/25
Unknown	RF Cable	KMSE	735	2024/06/18	2025/06/17
Unknown	RF Cable	UFA147	219661	2024/06/18	2025/06/17
JD	Multiplex Switch Test Control Set	DT7220FSU	DQ77926	2024/06/18	2025/06/17
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	2024/06/18	2025/06/17

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
R&S	Spectrum Analyzer	FSU26	200120	2024/01/08	2025/01/07
R&S	Spectrum Analyzer	FSU26	200120	2024/12/04	2025/12/03
MARCONI	10dB Attenuator	6534/3	2942	2024/06/27	2025/06/26

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC§15.247 (i)&§1.1307 (b) &§2.1093 - RF EXPOSURE

Applicable Standard

According to FCC §2.1093 and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance V06

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

1. $f(\text{GHz})$ is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

Measurement Result

Mode	Frequency (MHz)	Max tune-up conducted power [#] (dBm)	Max tune-up conducted power [#] (mW)	Distance (mm)	Calculated value	Threshold (1-g SAR)	SAR Test Exclusion
GFSK	2402-2480	7.0	5.01	5	1.6	3.0	Yes

Note: The Max tune-up conducted power[#] was declared and provided by the manufacturer

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 two internal antennas arrangement which was permanently attached; fulfill the requirement of this section. Please refer to the EUT photos.

Mode	Antenna Type	Antenna Gain [#]	Impedance
Antenna 1	FPC	-2.7dBi	50Ω
Antenna 2	PIFA	-3dBi	50Ω

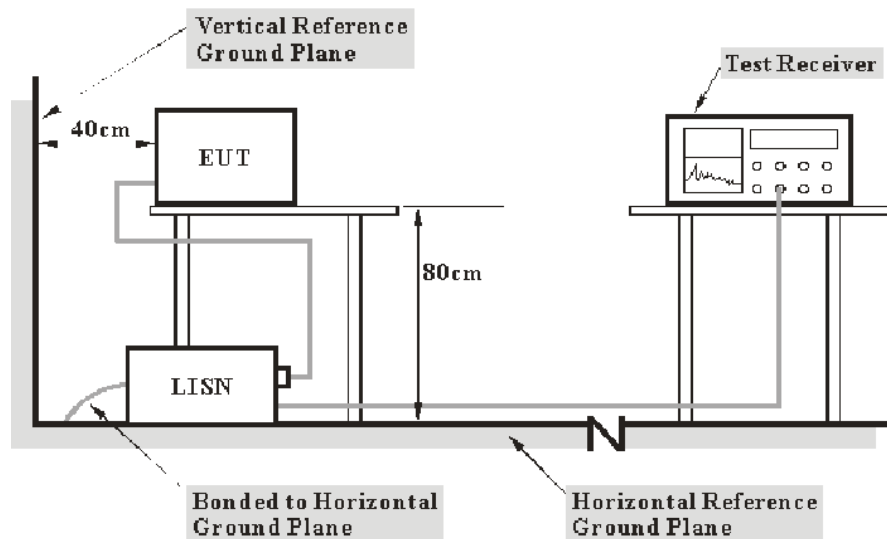
Result: Compliant

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

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:

$$\text{Factor} = \text{LISN VDF} + \text{Cable Loss}$$

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:

$$\begin{aligned}\text{Over Limit} &= \text{Level} - \text{Limit} \\ \text{Level} &= \text{Read Level} + \text{Factor}\end{aligned}$$

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

Test Data

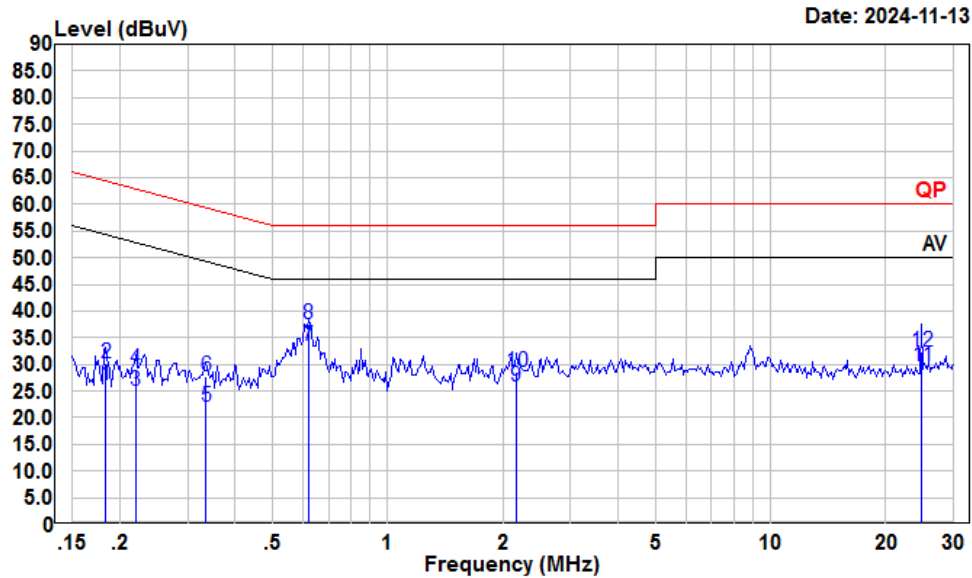
Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55 %
ATM Pressure:	101 kPa

The testing was performed by Macy Shi on 2024-11-13.

EUT operation mode: Transmitting (Maximum output Power mode, 2459 MHz with antenna 2)

AC 120V/60 Hz, Line



Condition: Line

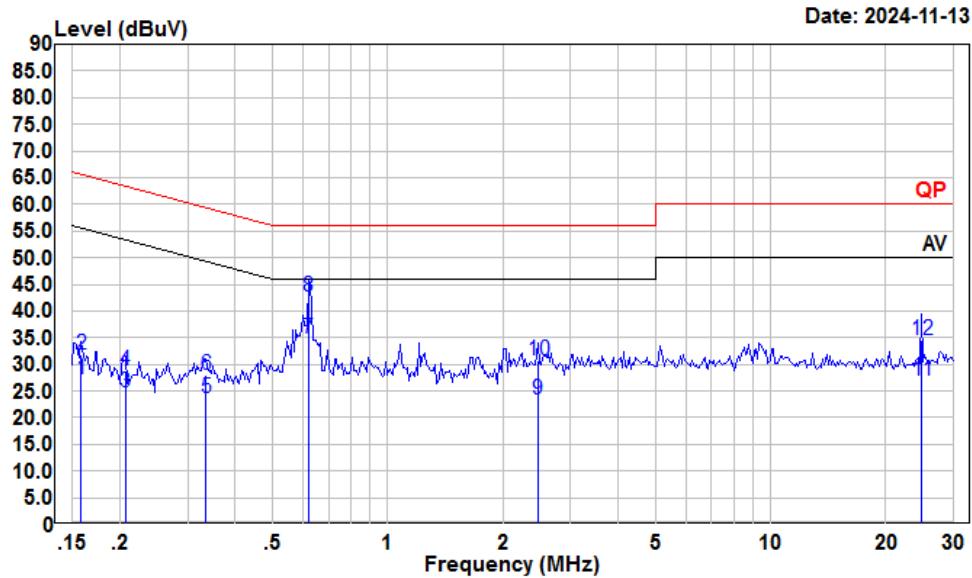
Project : 2401Y27183E-RF

tester : Macy.shi

Note : Transmitting

	Freq	Read Level	LISN Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.183	5.09	26.02	10.83	10.10	54.33	-28.31	Average
2	0.183	9.28	30.21	10.83	10.10	64.33	-34.12	QP
3	0.220	4.20	25.06	10.77	10.09	52.83	-27.77	Average
4	0.220	8.32	29.18	10.77	10.09	62.83	-33.65	QP
5	0.336	1.24	21.99	10.63	10.12	49.31	-27.32	Average
6	0.336	6.91	27.66	10.63	10.12	59.31	-31.65	QP
7	0.621	12.85	33.48	10.50	10.13	46.00	-12.52	Average
8	0.621	16.91	37.54	10.50	10.13	56.00	-18.46	QP
9	2.167	4.97	25.72	10.57	10.18	46.00	-20.28	Average
10	2.167	7.79	28.54	10.57	10.18	56.00	-27.46	QP
11	24.790	8.86	29.74	10.69	10.19	50.00	-20.26	Average
12	24.790	11.37	32.25	10.69	10.19	60.00	-27.75	QP

AC 120V/60 Hz, Neutral



Condition: Neutral

Project : 2401Y27183E-RF

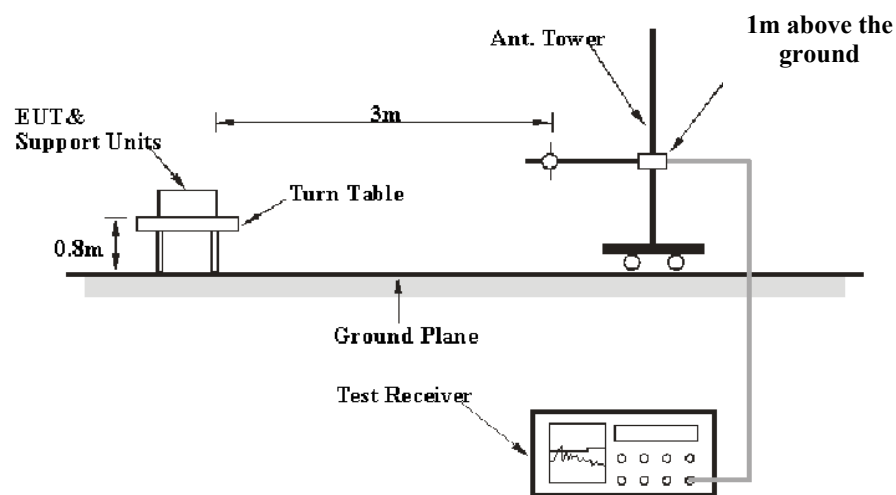
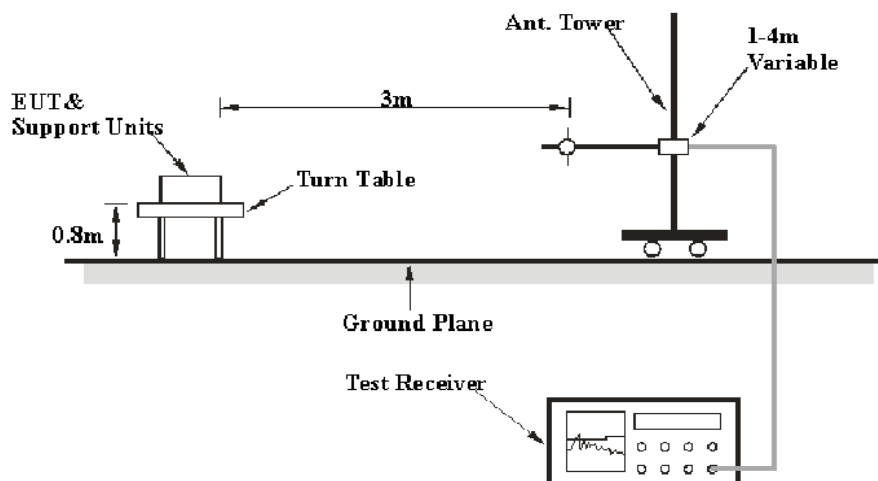
tester : Macy.shi

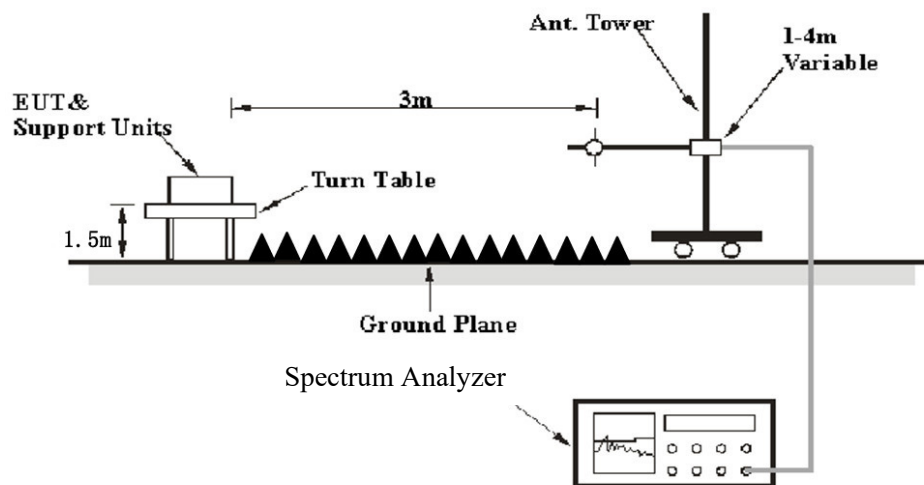
Note : Transmitting

	Freq	Read Level	LISN Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.158	6.59	27.27	10.56	10.12	55.56	-28.29	Average
2	0.158	11.03	31.71	10.56	10.12	65.56	-33.85	QP
3	0.206	4.32	24.82	10.41	10.09	53.36	-28.54	Average
4	0.206	8.28	28.78	10.41	10.09	63.36	-34.58	QP
5	0.336	2.91	23.60	10.57	10.12	49.31	-25.71	Average
6	0.336	7.37	28.06	10.57	10.12	59.31	-31.25	QP
7	0.621	13.87	34.70	10.70	10.13	46.00	-11.30	Average
8	0.621	21.99	42.82	10.70	10.13	56.00	-13.18	QP
9	2.461	2.92	23.49	10.40	10.17	46.00	-22.51	Average
10	2.461	10.08	30.65	10.40	10.17	56.00	-25.35	QP
11	24.790	6.18	26.96	10.59	10.19	50.00	-23.04	Average
12	24.790	13.64	34.42	10.59	10.19	60.00	-25.58	QP

FCC §15.205, §15.209&§15.247(d) – RADIATED EMISSIONS**Applicable Standard**

FCC §15.205; §15.209; §15.247(d)

EUT Setup**9 kHz-30MHz:****30MHz-1GHz:**

Above 1GHz:

The radiated emission tests were performed in the 3meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209 and FCC 15.247 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
Above 1 GHz	Harmonics			
	1MHz	3 MHz	/	PK
	Average Emission Level=Peak Emission Level+20*log(Duty cycle)			
	Other Emissions			
	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Average

For Duty cycle measurement:

Use the duty cycle factor correction factor method per 15.35(c).

Duty cycle=On time/100milliseconds, On time= $N_1 \cdot L_1 + N_2 \cdot L_2 + \dots + N_{n-1} \cdot L_{n-1} + N_n \cdot L_n$,

Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulse, etc.

Test Procedure

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

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:

$$\text{Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Over Limit or 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 margin calculation is as follows:

$$\begin{aligned}\text{Margin/Over Limit} &= \text{Corrected Amplitude/Level-Limit} \\ \text{Corrected Amplitude/Level} &= \text{Reading} + \text{Factor}\end{aligned}$$

Test Data

Environmental Conditions

Temperature:	23~25.1 °C
Relative Humidity:	48~58 %
ATM Pressure:	101.0 kPa

The testing was performed by Carl Zhu on 2024-11-12 and 2024-11-29 for below 1GHz and Karl Xu and Dylan Yang from 2024-11-25 to 2025-01-10 for above 1GHz.

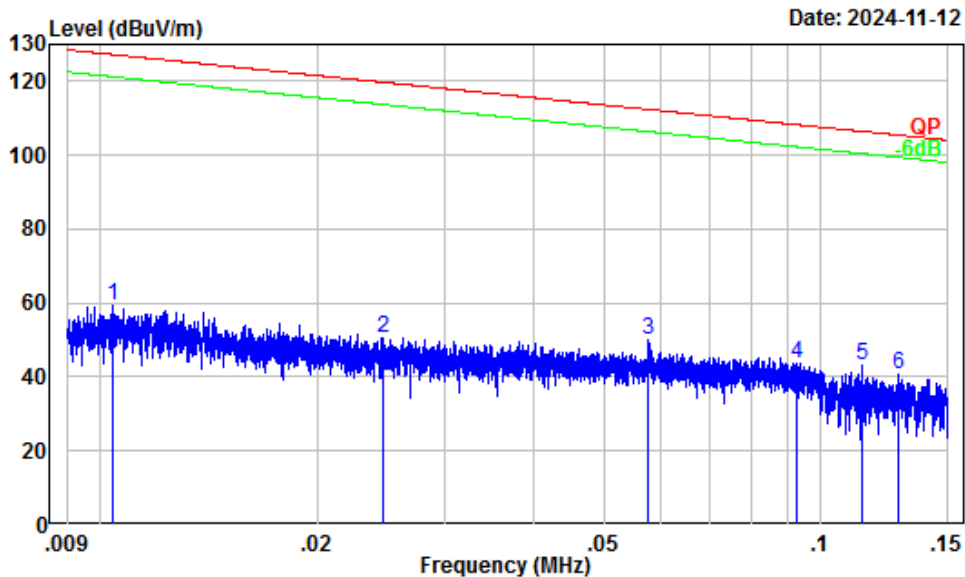
EUT operation mode: Transmitting

Note: Pre-scan in the X, Y and Z axes of orientation, the worst case Z-axis of orientation was recorded.

Antenna 1**9 kHz-30MHz:** (Maximum output power mode, 2457 MHz)

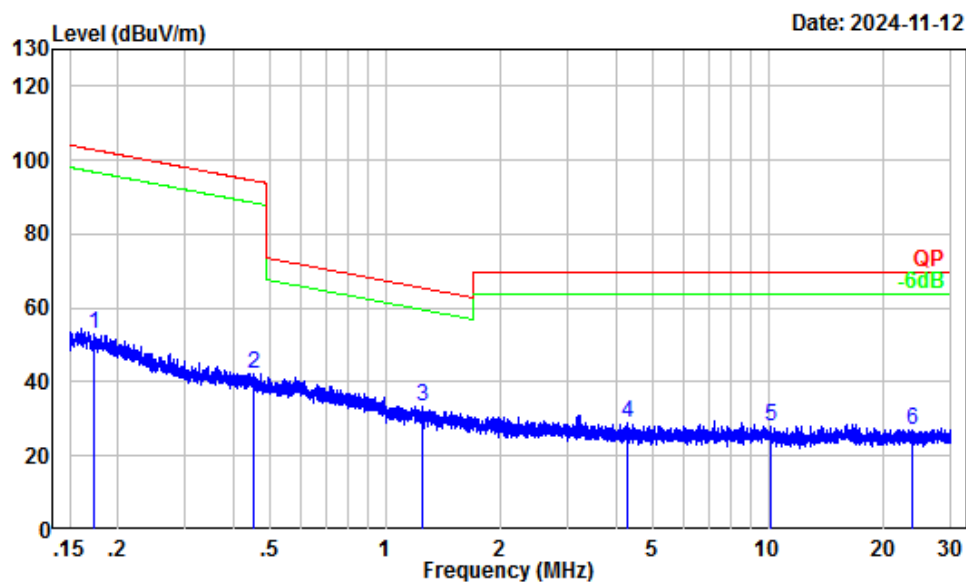
Note: When the test result of peak was less than the limit of QP/Average more than 6dB, just peak value were recorded.

Parallel (worst case)



Site : Chamber A
Condition : 3m
Project Number: 2401Y27183E-RF
Test Mode : Transmitting
Tester : Carl Zhu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.01	32.22	26.98	59.20	127.26	-68.06	Peak
2	0.02	29.52	21.17	50.69	119.77	-69.08	Peak
3	0.06	25.63	24.55	50.18	112.38	-62.20	Peak
4	0.09	22.52	21.38	43.90	108.27	-64.37	Peak
5	0.11	21.16	21.81	42.97	106.45	-63.48	Peak
6	0.13	20.35	20.35	40.70	105.46	-64.76	Peak

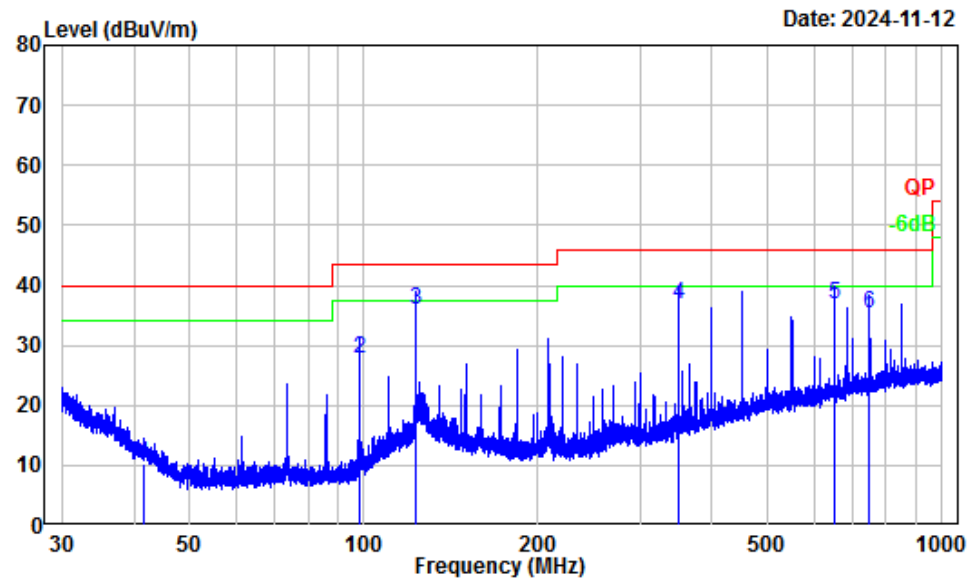


Site : Chamber A
 Condition : 3m
 Project Number: 2401Y27183E-RF
 Test Mode : Transmitting
 Tester : Carl Zhu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.17	17.63	35.44	53.07	102.79	-49.72	Peak
2	0.45	7.30	35.09	42.39	94.49	-52.10	Peak
3	1.24	0.51	32.92	33.43	65.53	-32.10	Peak
4	4.31	-2.73	31.45	28.72	69.54	-40.82	Peak
5	10.16	-2.80	30.92	28.12	69.54	-41.42	Peak
6	23.67	-3.10	30.24	27.14	69.54	-42.40	Peak

30MHz-1GHz: (Maximum output power mode, 2457 MHz)

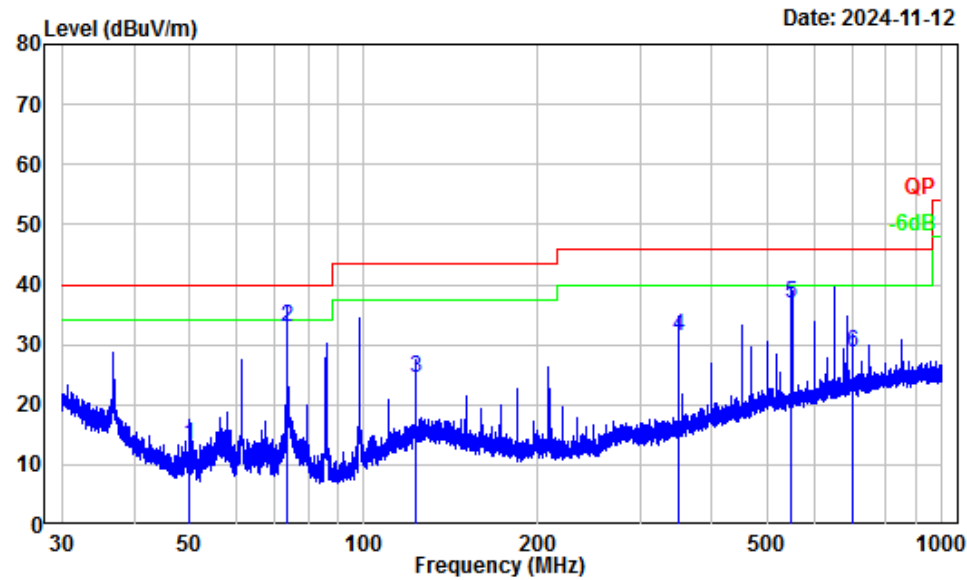
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number: 2401Y27183E-RF
Test Mode : Transmitting
Tester : Carl Zhu

Freq Factor		Read Level	Level	Limit Line	Over Limit	Remark
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	41.60 -13.55	23.94	10.39	40.00	-29.61	QP
2	98.31 -16.41	44.10	27.69	43.50	-15.81	QP
3	122.89 -11.15	46.95	35.80	43.50	-7.70	QP
4	350.02 -10.16	46.90	36.74	46.00	-9.26	QP
5	650.23 -4.13	41.08	36.95	46.00	-9.05	QP
6	750.11 -2.88	38.18	35.30	46.00	-10.70	QP

Vertical



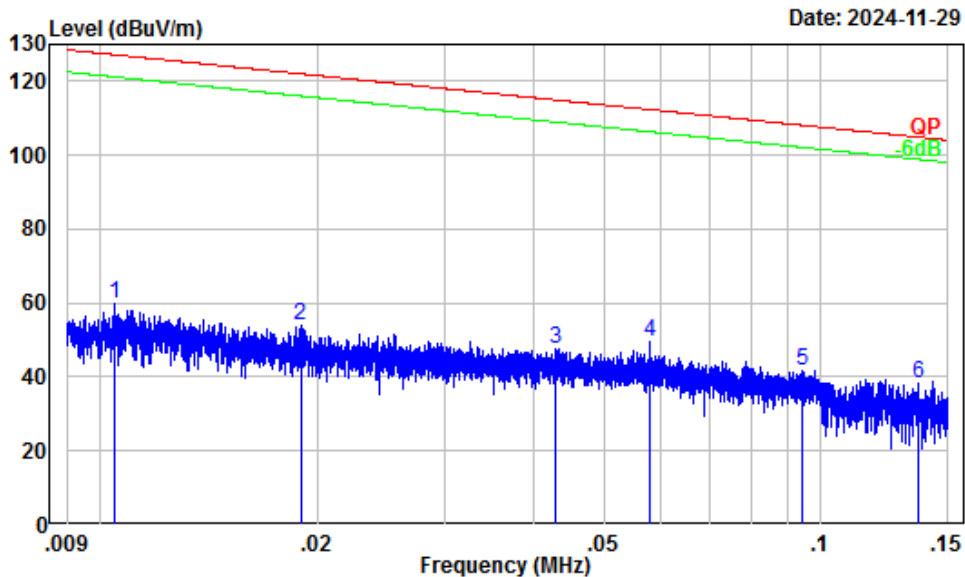
Site : Chamber A
Condition : 3m Vertical
Project Number: 2401Y27183E-RF
Test Mode : Transmitting
Tester : Carl Zhu

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	49.95	-17.91	31.30	13.39	40.00	-26.61	QP
2	73.71	-17.85	50.83	32.98	40.00	-7.02	QP
3	122.89	-11.15	35.57	24.42	43.50	-19.08	QP
4	350.02	-10.16	41.68	31.52	46.00	-14.48	QP
5	549.98	-5.43	42.12	36.69	46.00	-9.31	QP
6	700.22	-3.52	32.29	28.77	46.00	-17.23	QP

Antenna 2**9 kHz-30MHz:** (Maximum output power mode, 2459 MHz)

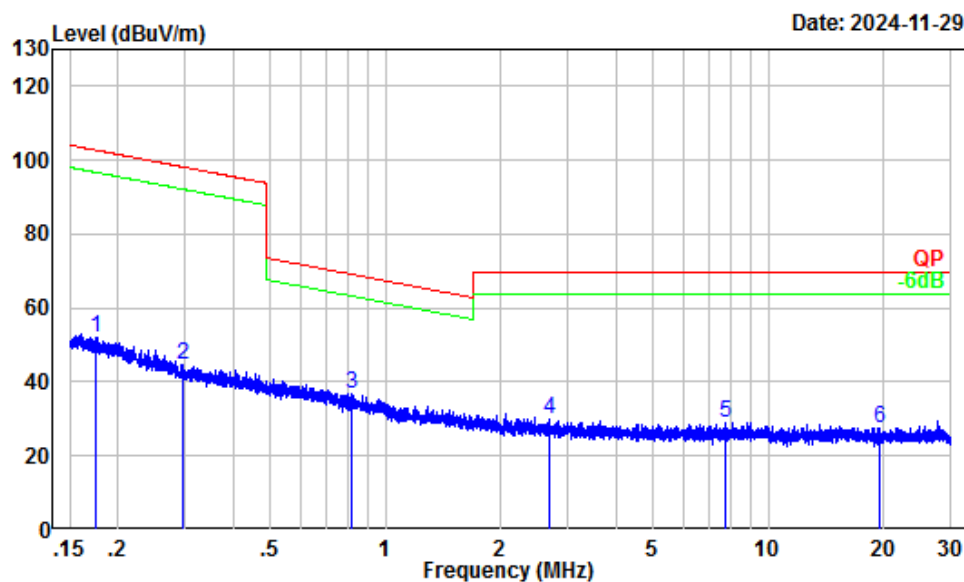
Note: When the test result of peak was less than the limit of QP/Average more than 6dB, just peak value were recorded.

Parallel (worst case)



Site : Chamber A
Condition : 3m
Project Number : 2401Y27183E-RF
Test Mode : Transmitting
Detector Peak RBW: 0.3KHz VBW:1KHz
Tester : Carl Zhu

	Freq	Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.01	32.20	27.66	59.86	127.18	-67.32	Peak
2	0.02	30.59	23.20	53.79	122.04	-68.25	Peak
3	0.04	27.16	20.54	47.70	114.98	-67.28	Peak
4	0.06	25.61	23.75	49.36	112.35	-62.99	Peak
5	0.09	22.41	19.21	41.62	108.13	-66.51	Peak
6	0.14	19.86	18.35	38.21	104.91	-66.70	Peak

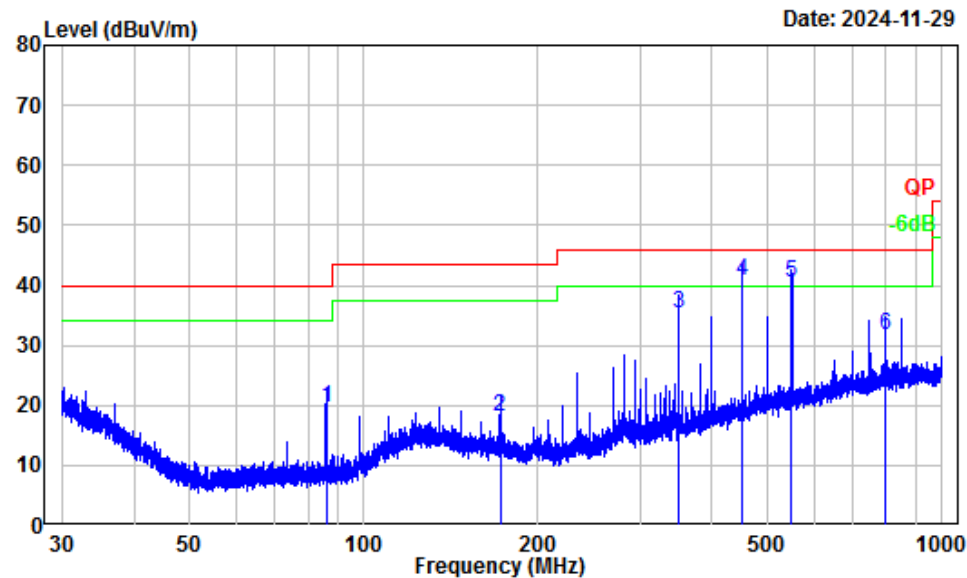


Site : Chamber A
 Condition : 3m
 Project Number : 2401Y27183E-RF
 Test Mode : Transmitting
 Detector Peak RBW: 10KHz VBW:30KHz
 Tester : Carl Zhu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.18	17.52	34.58	52.10	102.70	-50.60	Peak
2	0.30	10.36	34.50	44.86	98.14	-53.28	Peak
3	0.82	2.55	34.13	36.68	69.23	-32.55	Peak
4	2.68	-1.97	31.86	29.89	69.54	-39.65	Peak
5	7.71	-2.99	31.93	28.94	69.54	-40.60	Peak
6	19.48	-3.05	30.74	27.69	69.54	-41.85	Peak

30MHz-1GHz: (Maximum output power mode, 2459 MHz)

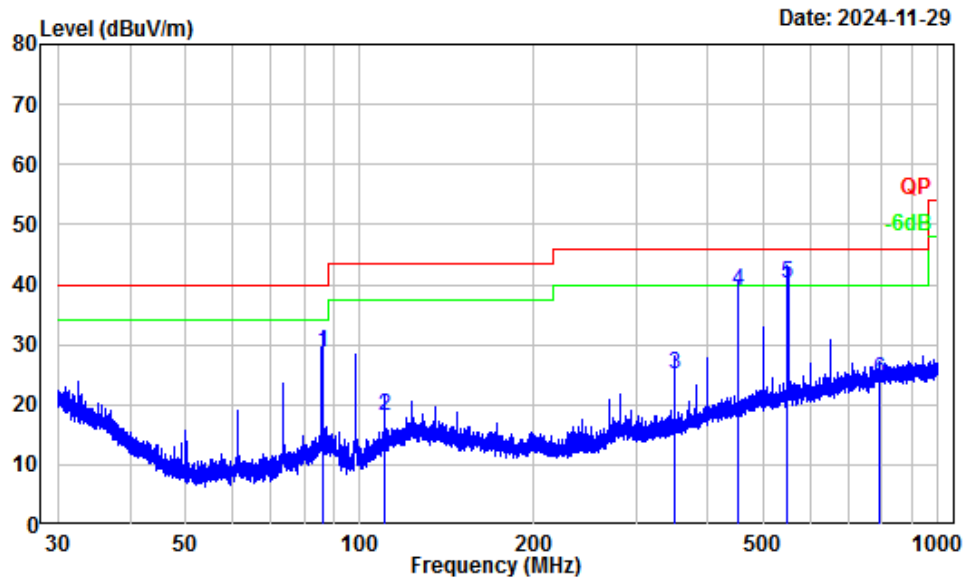
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number : 2401Y27183E-RF
Test Mode : Transmitting
Detector QP RBW: 120KHz
Tester : Carl Zhu

Freq Factor		Read Level	Level	Limit Line	Over Limit	Remark
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	86.01 -18.08	37.56	19.48	40.00	-20.52	QP
2	171.99 -13.19	31.40	18.21	43.50	-25.29	QP
3	350.02 -10.16	45.57	35.41	46.00	-10.59	QP
4	450.15 -7.53	48.16	40.63	46.00	-5.37	QP
5	549.98 -5.43	45.94	40.51	46.00	-5.49	QP
6	800.03 -2.14	33.93	31.79	46.00	-14.21	QP

Vertical



Site : Chamber A
Condition : 3m Vertical
Project Number : 2401Y27183E-RF
Test Mode : Transmitting
Detector QP RBW: 120KHz
Tester : Carl Zhu

	Freq Factor		Read Level	Limit Level	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	86.01	-18.08	46.90	28.82	40.00	-11.18 QP
2	110.62	-12.96	31.13	18.17	43.50	-25.33 QP
3	350.02	-10.16	35.30	25.14	46.00	-20.86 QP
4	450.15	-7.53	46.36	38.83	46.00	-7.17 QP
5	549.98	-5.43	45.59	40.16	46.00	-5.84 QP
6	794.44	-2.24	26.39	24.15	46.00	-21.85 QP

Above 1GHz:

Frequency (MHz)	Reading (dBμV)	Detector (PK/AV)	Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Antenna 1							
Low Channel(2402MHz)							
4804.00	46.69	PK	H	2.42	49.11	74	-24.89
4804.00	46.71	PK	V	2.42	49.13	74	-24.87
Middle Channel(2441MHz)							
4882.00	47.08	PK	H	2.58	49.66	74	-24.34
4882.00	46.85	PK	V	2.58	49.43	74	-24.57
High Channel(2480MHz)							
4960.00	48.09	PK	H	2.68	50.77	74	-23.23
4960.00	47.32	PK	V	2.68	50.00	74	-24.00
Antenna 2							
Low Channel(2402MHz)							
4804.00	46.99	PK	H	2.42	49.41	74	-24.59
4804.00	47.32	PK	V	2.42	49.74	74	-24.26
Middle Channel(2441MHz)							
4882.00	47.08	PK	H	2.58	49.66	74	-24.34
4882.00	47.35	PK	V	2.58	49.93	74	-24.07
High Channel(2480MHz)							
4960.00	47.28	PK	H	2.68	49.96	74	-24.04
4960.00	47.46	PK	V	2.68	50.14	74	-23.86

Note:

Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

Corrected Amplitude/Level = Corrected Factor + Reading

Margin = Corrected Amplitude/Level – Limit

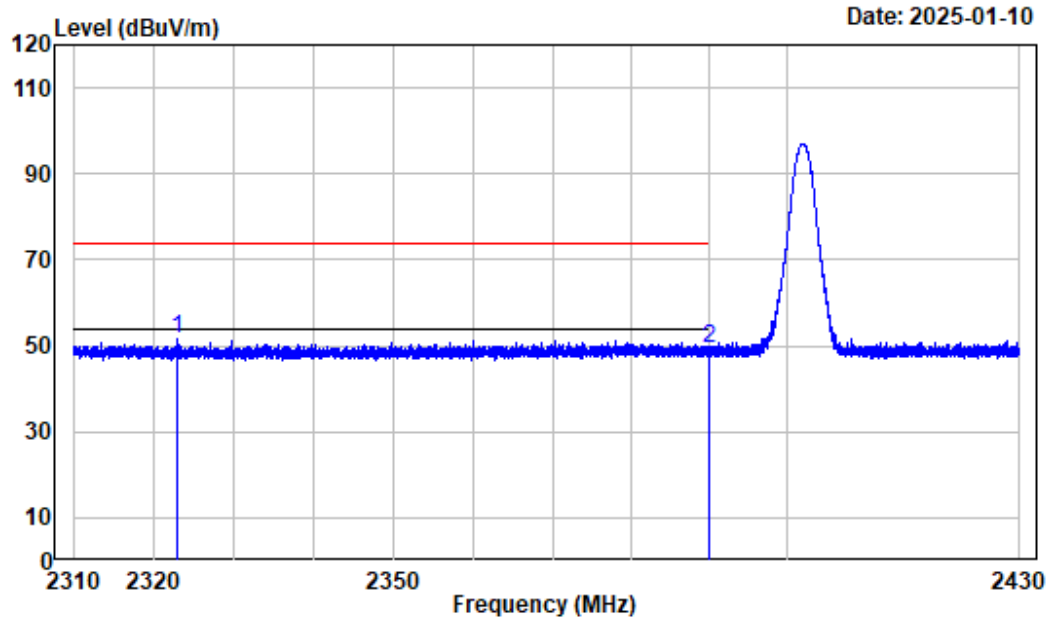
The test result of peak was 20dB below to the limit of peak, which can be compliant to the average limit, so just peak value was recorded.

Other emissions which were more than 20dB below limit or on noise floor level was not recorded.

Test plots for Band Edge Measurements (Radiated):

Antenna 1

Test Channel:	2402MHz	Ant. Polar. :	Horizontal
---------------	---------	---------------	------------



Condition : Horizontal
Project No. : 2401Y27183E-RF
Tester : Dylan Yang
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : GFSK_2402

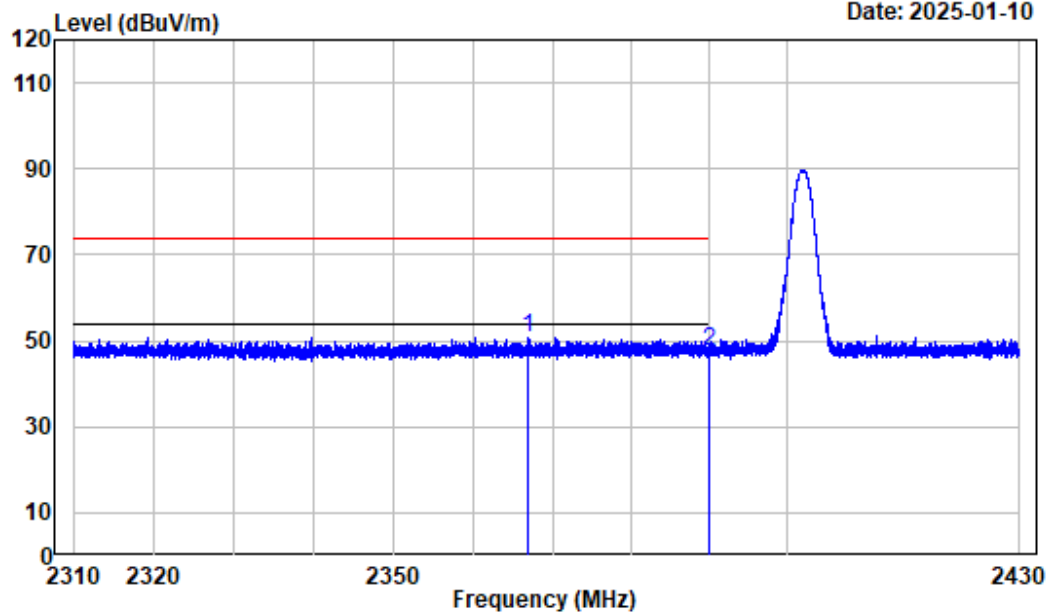
Freq Factor		Read	Limit	Over	Remark
		Level	Level	Line	
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1 2322.992	-10.82	62.62	51.80	74.00	-22.20 peak
2 2390.000	-10.98	60.24	49.26	74.00	-24.74 Peak

Test Channel:

2402MHz

Ant. Polar. :

Vertical



Condition : Vertical

Project No. : 2401Y27183E-RF

Tester : Dylan Yang

Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak

Note : GFSK_2402

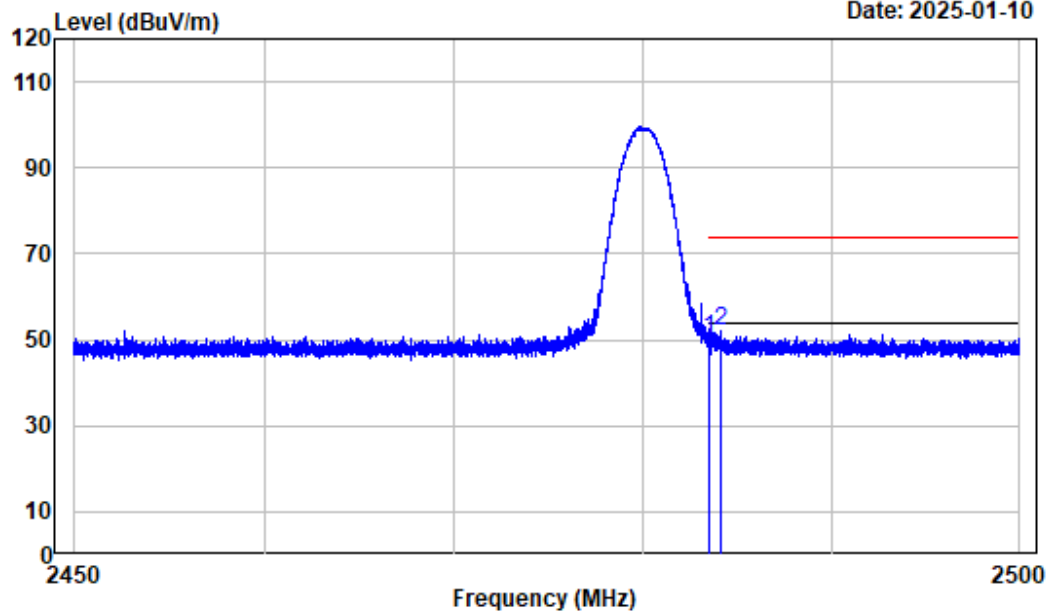
	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2366.857	-10.92	61.69	50.77	74.00	-23.23	Peak
2	2390.000	-10.98	58.64	47.66	74.00	-26.34	Peak

Test Channel:

2480MHz

Ant. Polar. :

Horizontal



Condition : Horizontal

Project No. : 2401Y27183E-RF

Tester : Dylan Yang

Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak

Note : GFSK_2480

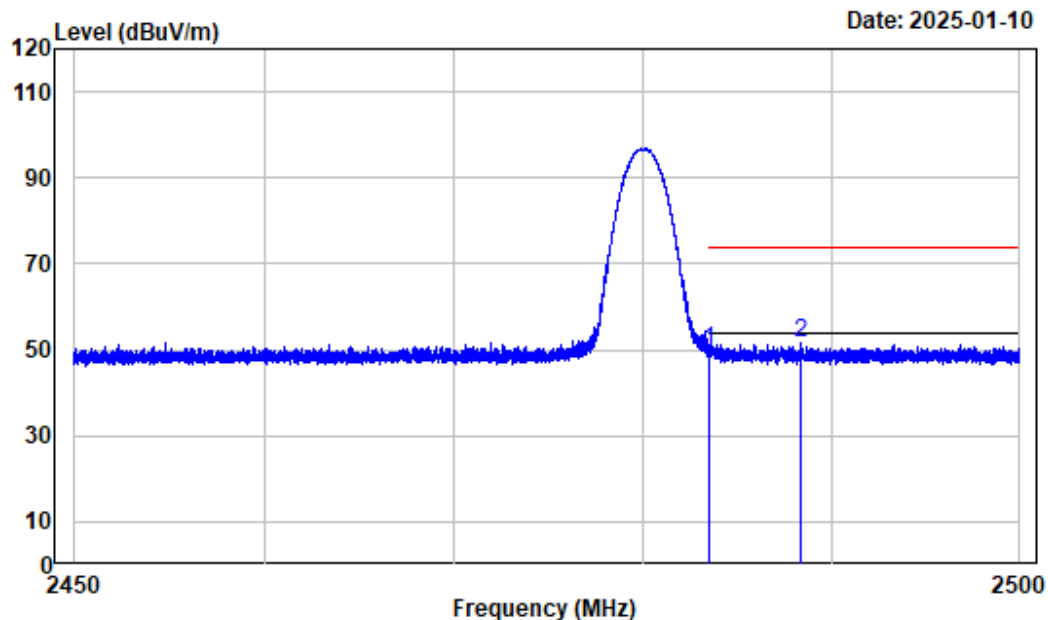
		Read		Limit	Over	Remark
Freq Factor		Level	Level	Line	Limit	
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.500	-10.97	61.34	50.37	74.00	-23.63 Peak
2	2484.129	-10.97	62.91	51.94	74.00	-22.06 Peak

Test Channel:

2480MHz

Ant. Polar. :

Vertical



Condition : Vertical

Project No. : 2401Y27183E-RF

Tester : Dylan Yang

Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak

Note : GFSK_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.500	-10.97	60.82	49.85	74.00	-24.15	Peak
2	2488.355	-10.98	62.53	51.55	74.00	-22.45	Peak

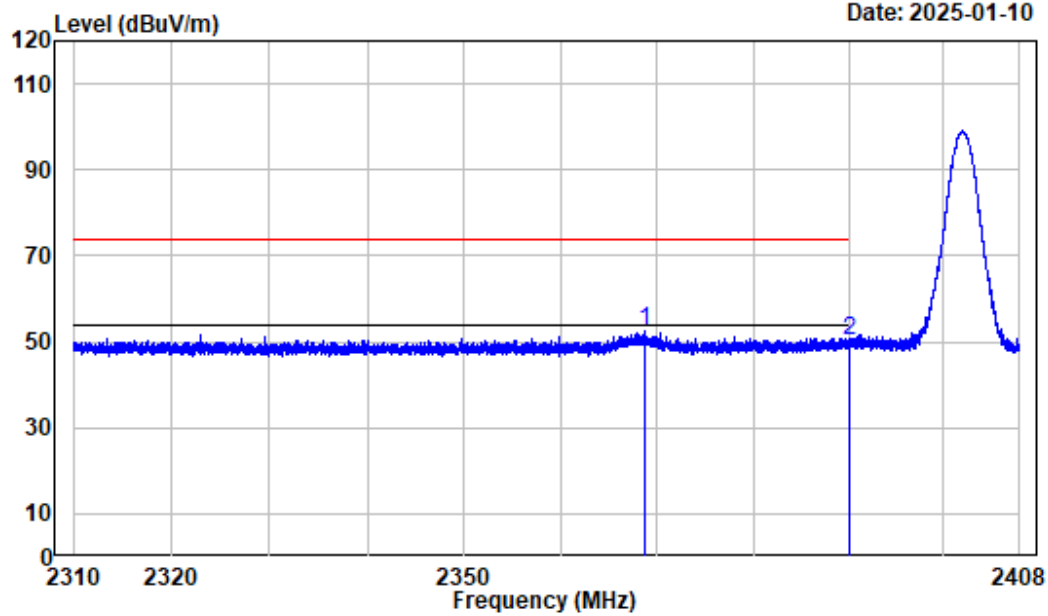
Antenna 2

Test Channel:

2402MHz

Ant. Polar. :

Horizontal



Condition : Horizontal

Project No. : 2401Y27183E-RF_ANT2

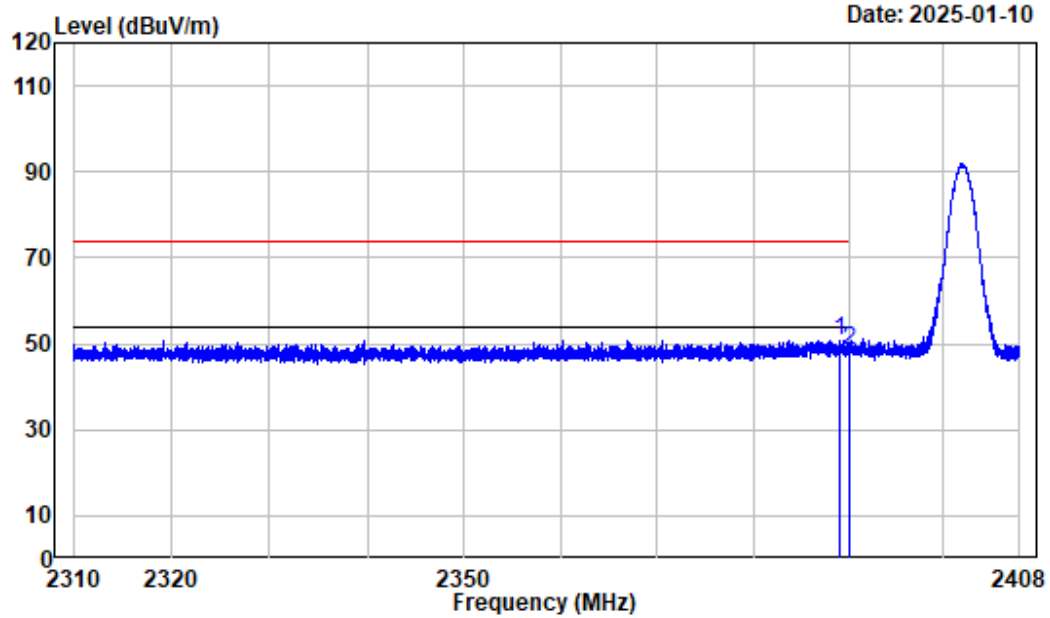
Tester : Dylan Yang

Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak

Note : GFSK_2402

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2368.672	-10.94	63.28	52.34	74.00	-21.66	Peak
2	2390.000	-10.98	61.07	50.09	74.00	-23.91	Peak

Test Channel: 2402MHz Ant. Polar. : Vertical



Condition : Vertical
 Project No. : 2401Y27183E-RF_ANT2
 Tester : Dylan Yang
 Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
 Note : GFSK_2402

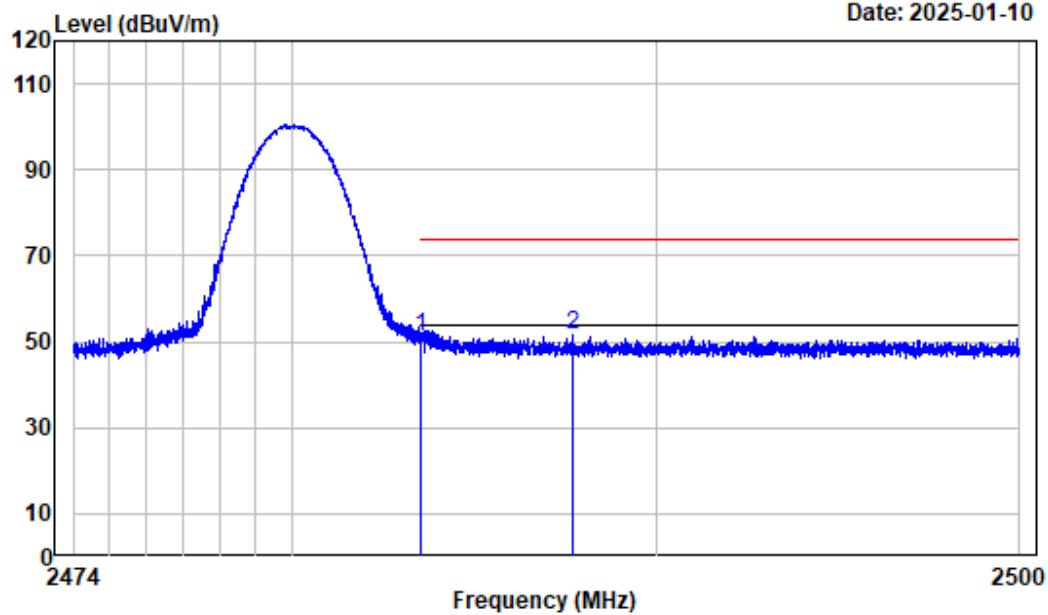
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2389.075	-10.98	61.78	50.80	74.00	-23.20	Peak
2	2390.000	-10.98	59.55	48.57	74.00	-25.43	Peak

Test Channel:

2480MHz

Ant. Polar. :

Horizontal



Condition : Horizontal

Project No. : 2401Y27183E-RF_ANT2

Tester : Dylan Yang

Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak

Note : GFSK_2480

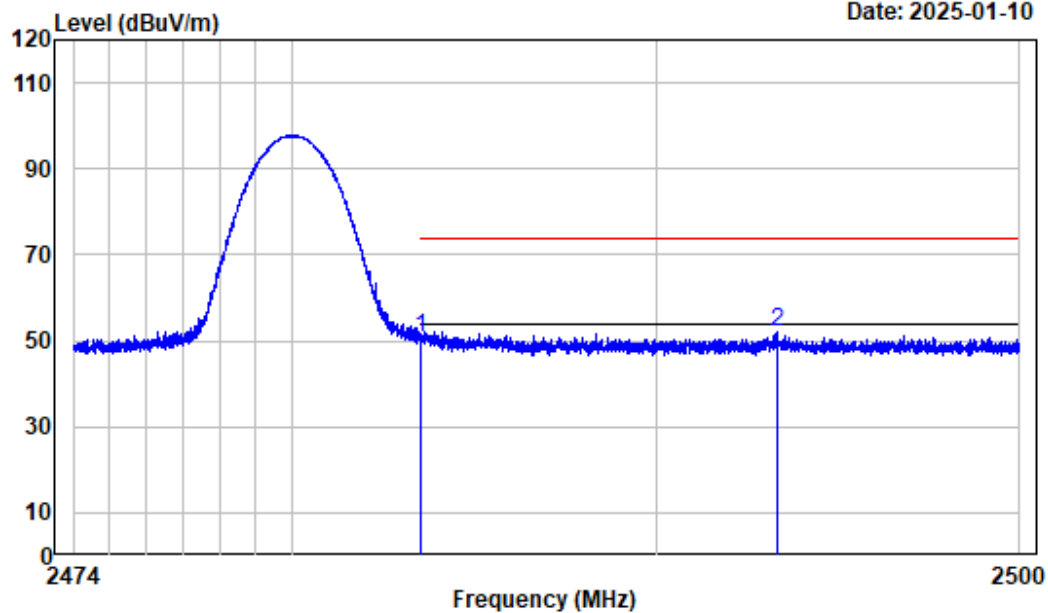
		Read		Limit	Over	Remark
Freq Factor		Level	Level	Line	Limit	
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1 2483.500	-10.97	62.21	51.24	74.00	-22.76	Peak
2 2487.711	-10.98	62.77	51.79	74.00	-22.21	Peak

Test Channel:

2480MHz

Ant. Polar. :

Vertical



Condition : Vertical

Project No. : 2401Y27183E-RF_ANT2

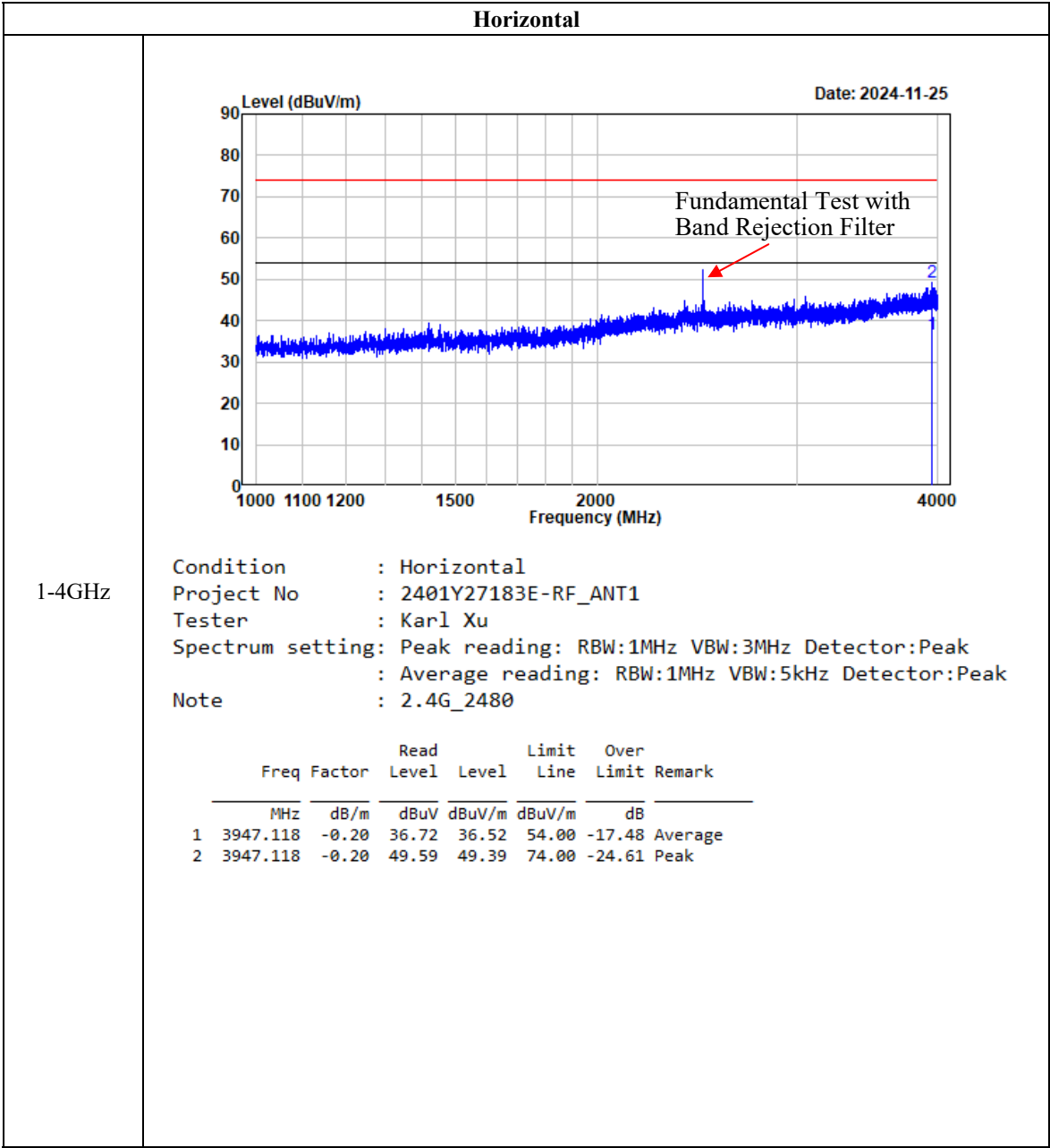
Tester : Dylan Yang

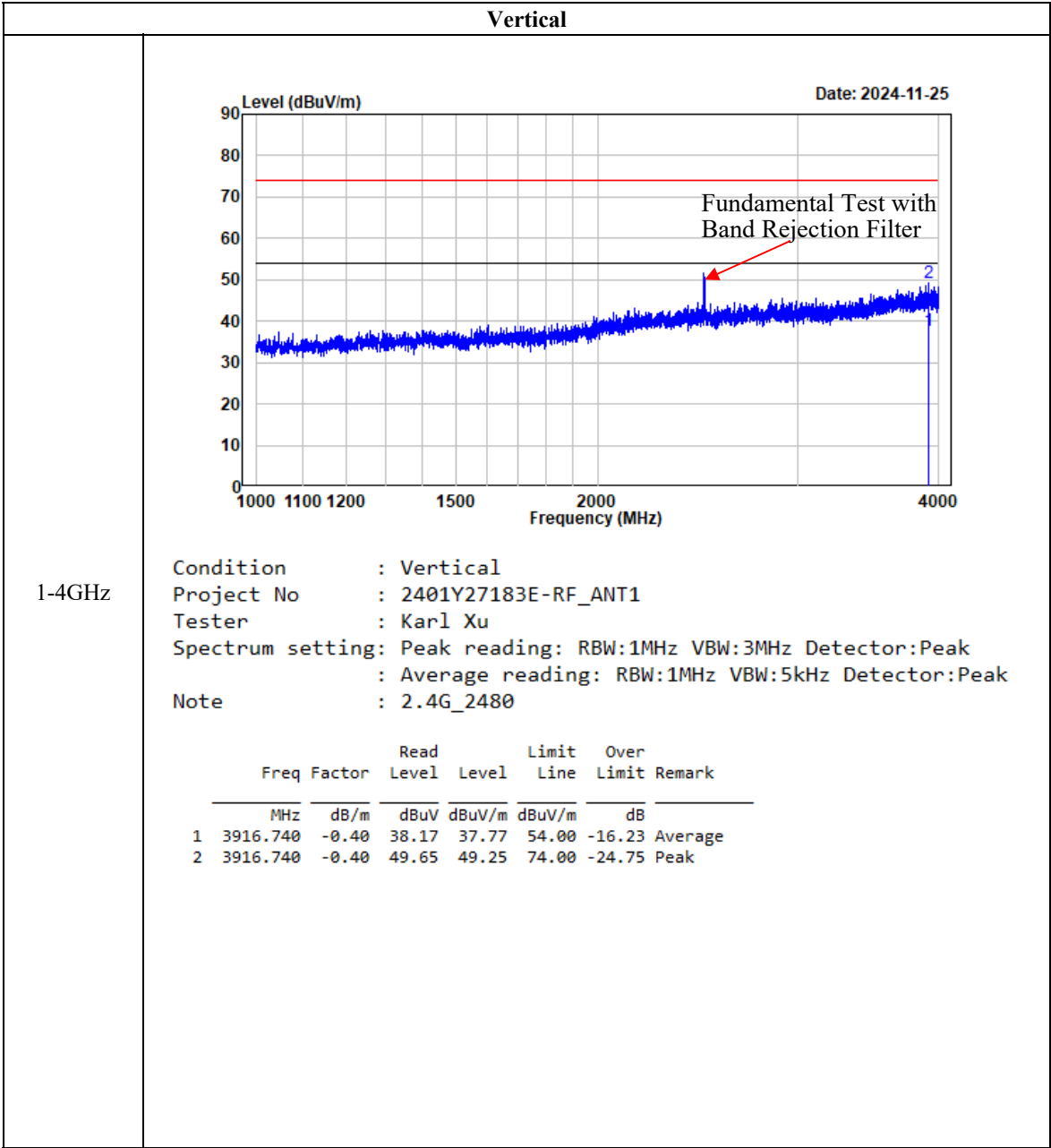
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak

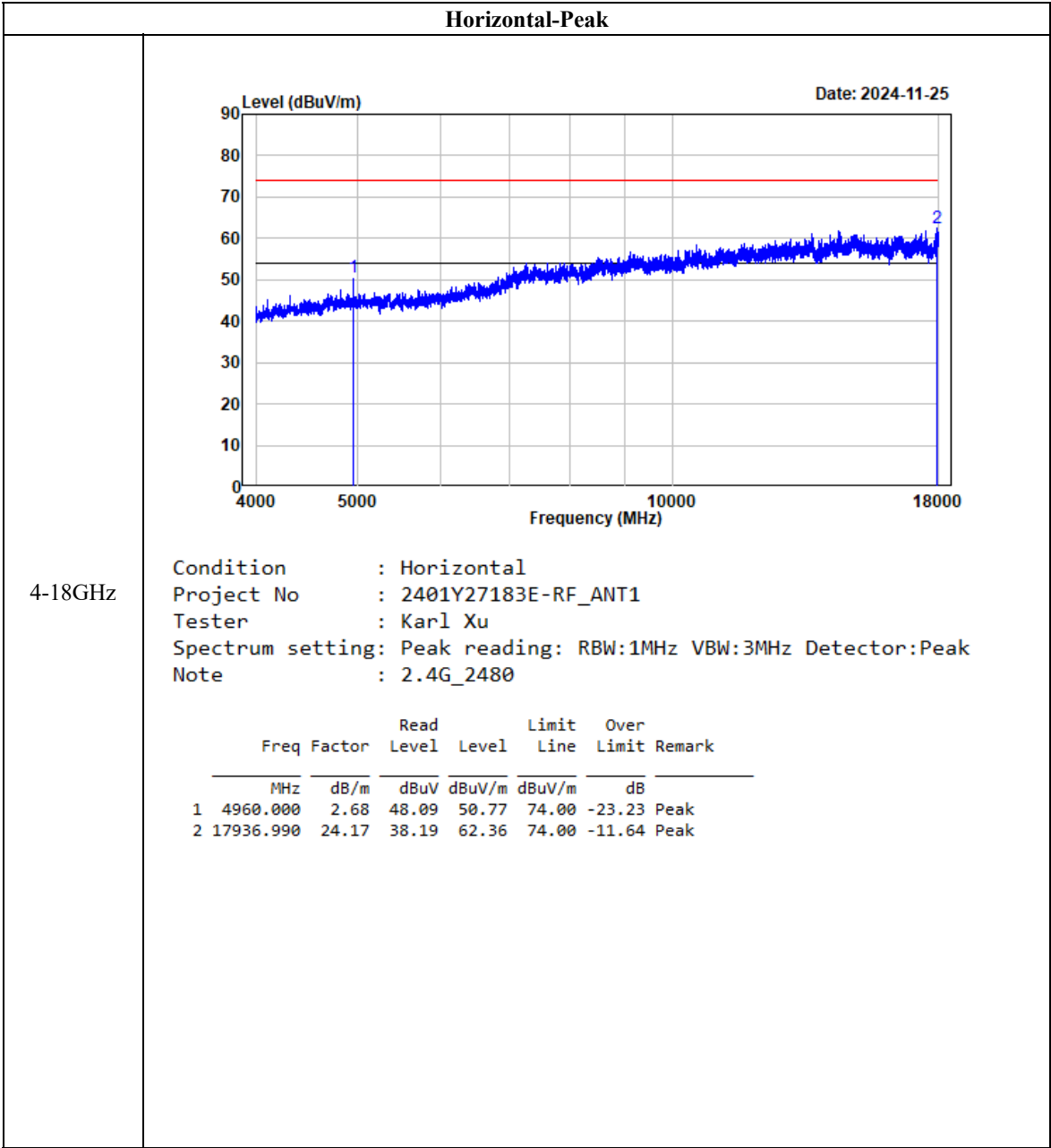
Note : GFSK_2480

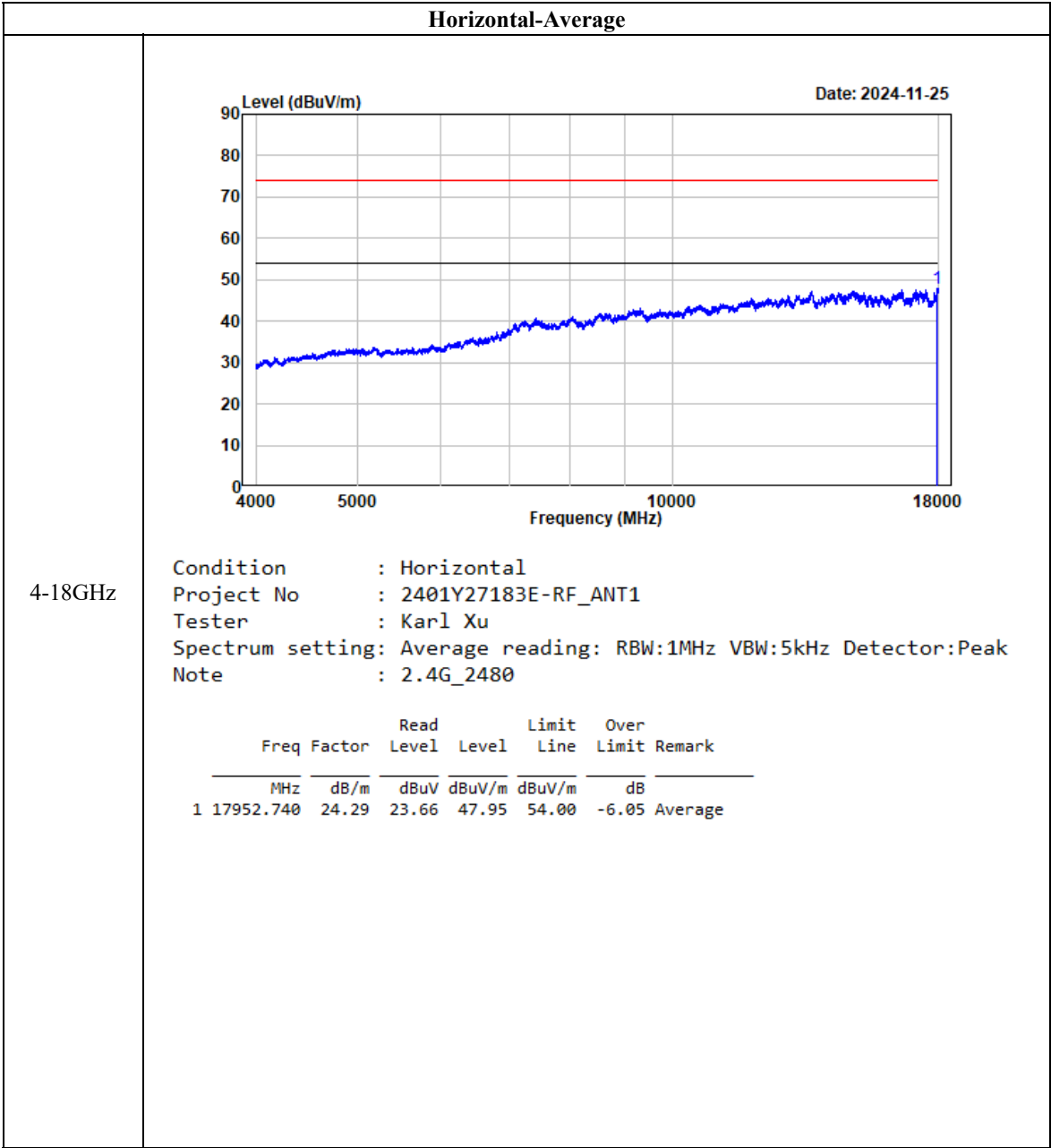
	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.500	-10.97	61.62	50.65	74.00	-23.35	Peak
2	2493.305	-11.00	63.05	52.05	74.00	-21.95	Peak

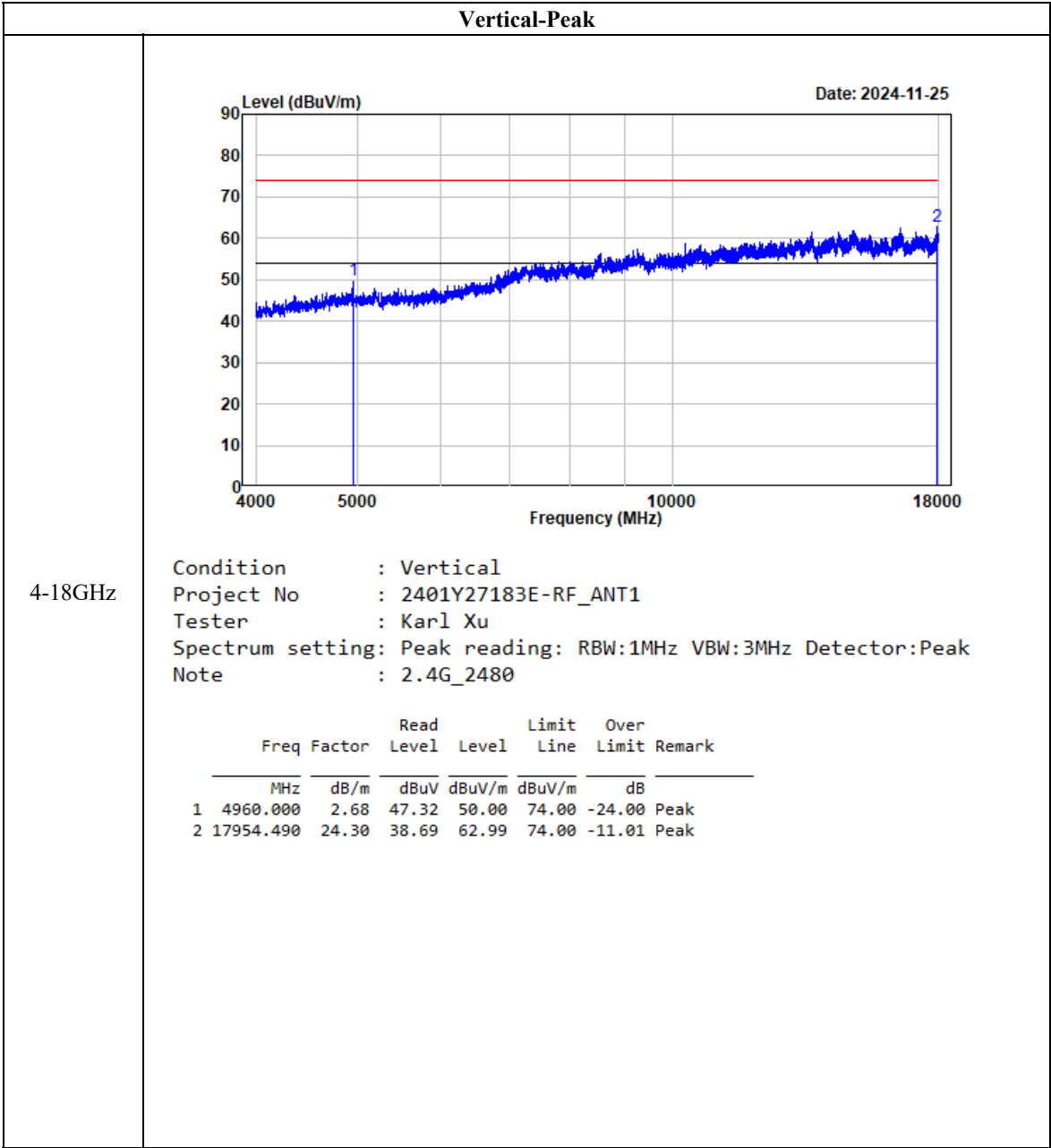
Test plots for Harmonic and Emissions Measurements (Worst case, High channel for antenna 1):

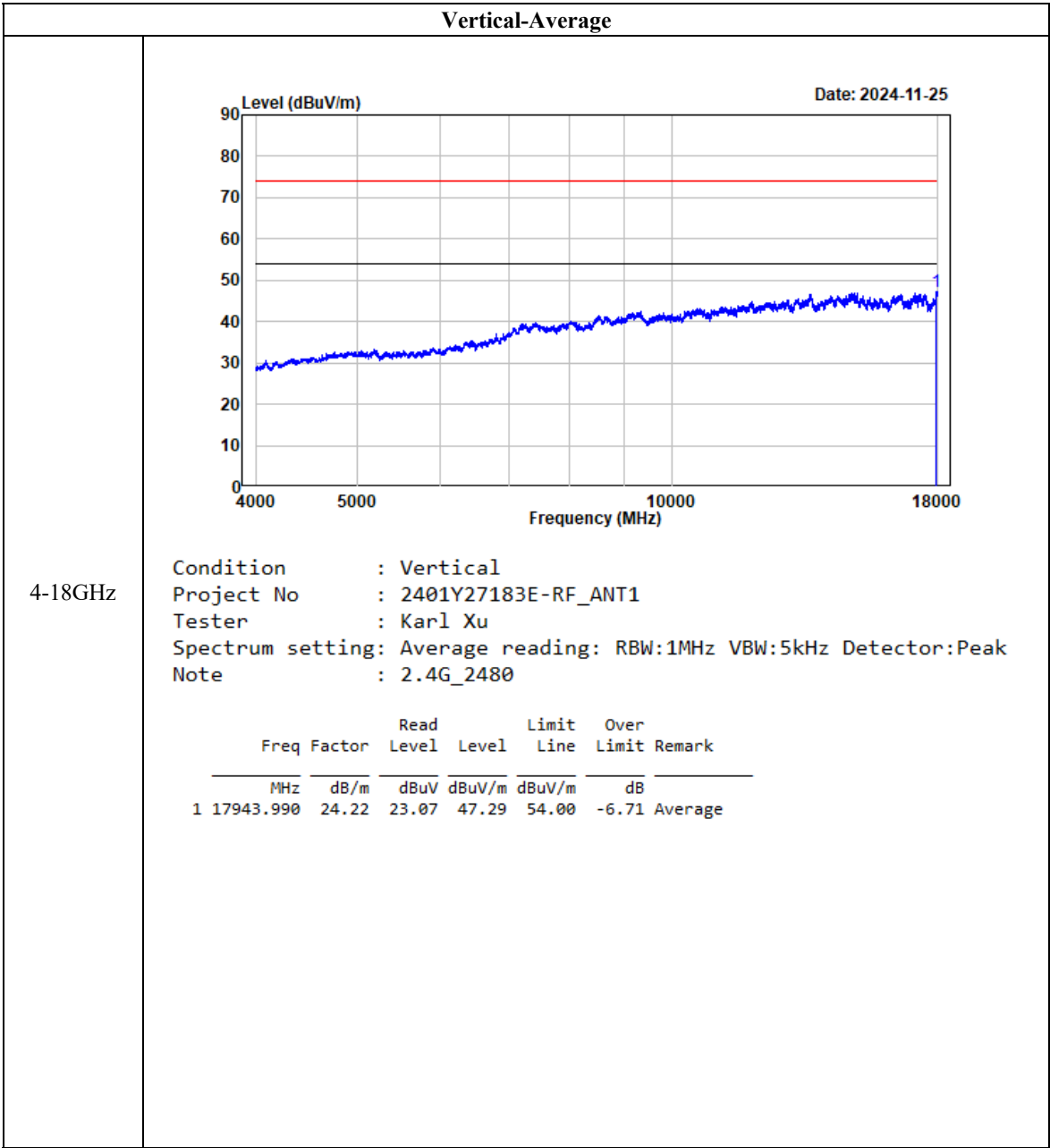


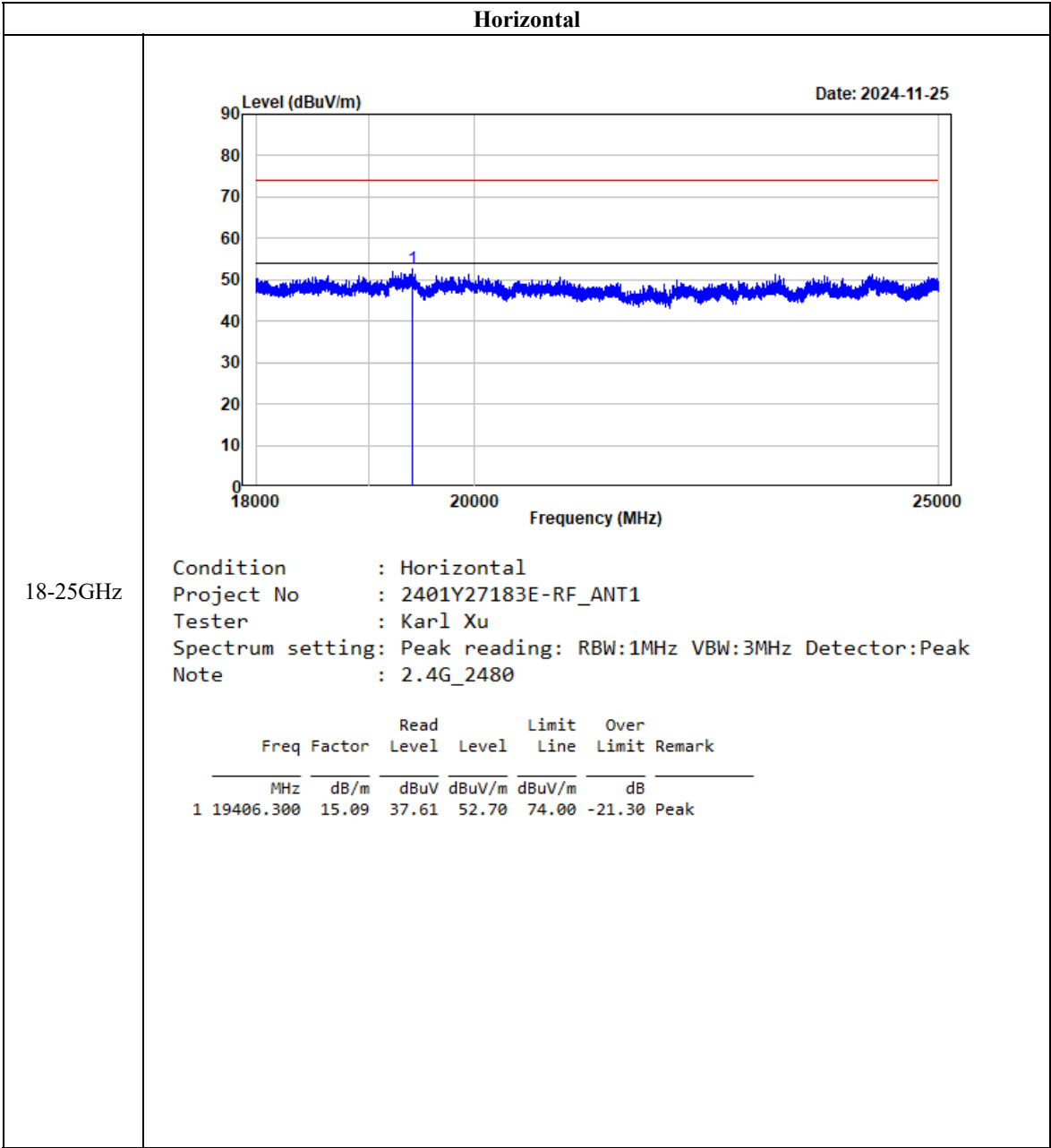


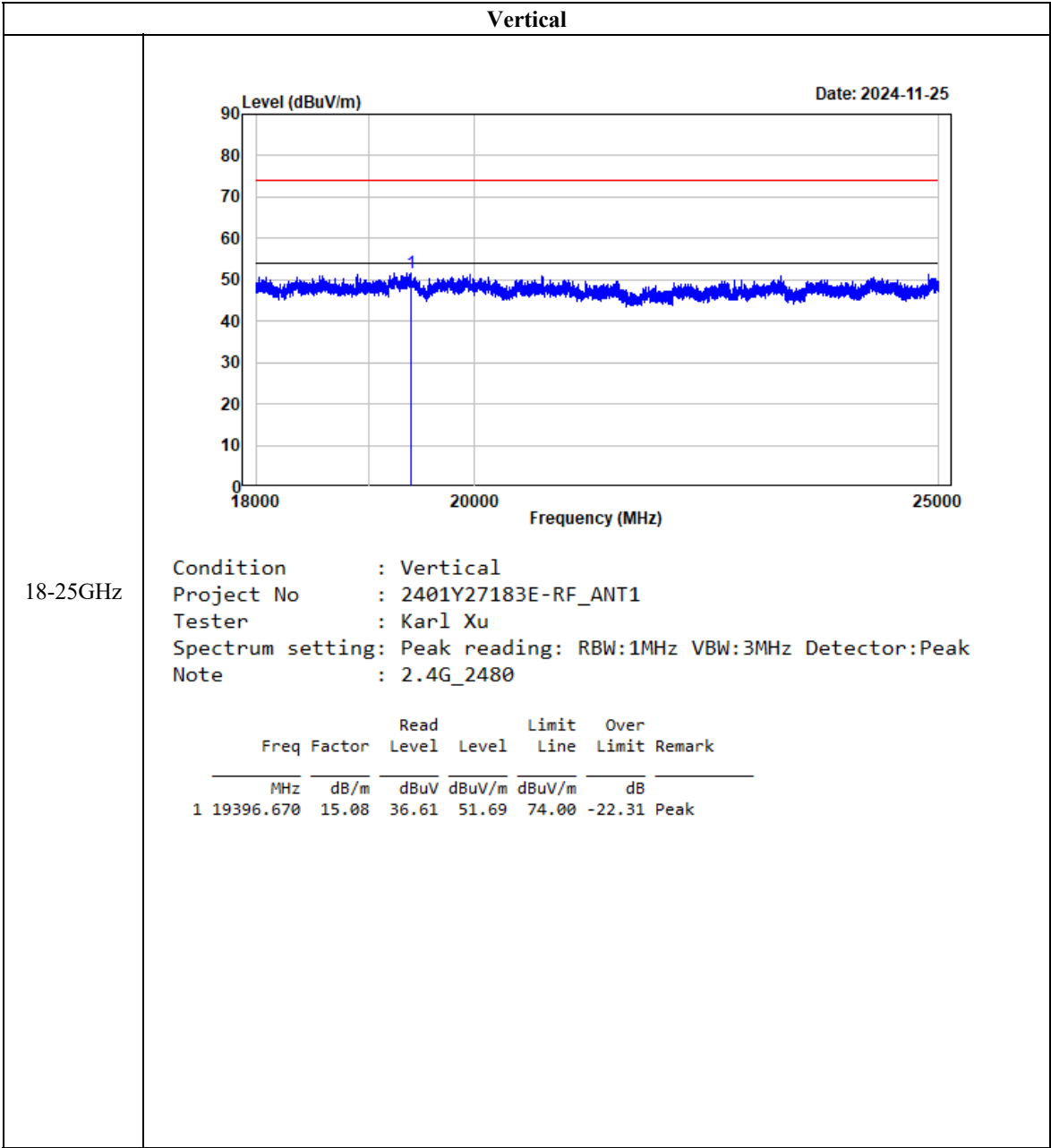












FCC §15.247(a) (1) - CHANNEL SEPARATION TEST

Applicable Standard

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

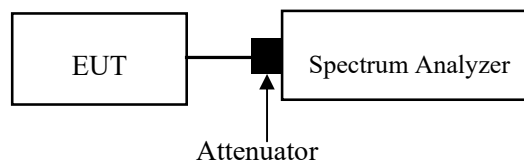
Test Procedure

Test Method: ANSI C63.10-2013 Clause 7.8.2

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- a) Span: Wide enough to capture the peaks of two adjacent channels.
- b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- c) Video (or average) bandwidth (VBW) $\geq$ RBW.
- d) Sweep: Auto.
- e) Detector function: Peak.
- f) Trace: Max hold.
- g) Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined.



Note: The limit is $\frac{2}{3} \times 20$ dB bandwidth

Test Data**Environmental Conditions**

Temperature:	25.6 °C
Relative Humidity:	34%
ATM Pressure:	101.5 kPa

The testing was performed by Brian Li on 2025-01-06.

EUT operation mode: Transmitting

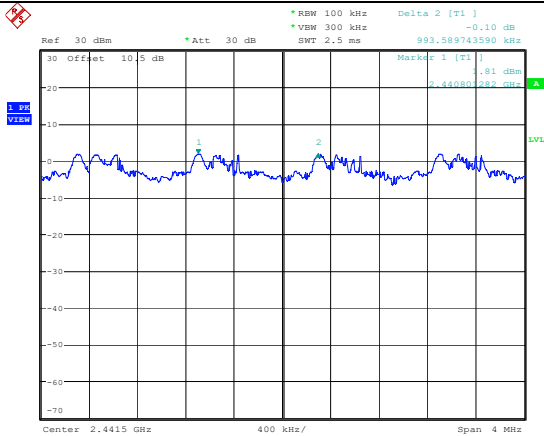
Test Result: Compliant

Antenna	Test Mode	Test Frequency (MHz)	Channel Separation (MHz)	Limits (MHz)
Antenna 1	GFSK	2441	0.994	0.874
Antenna 2	GFSK	2441	1.006	0.875

Please refer to the below plots:

Antenna 1

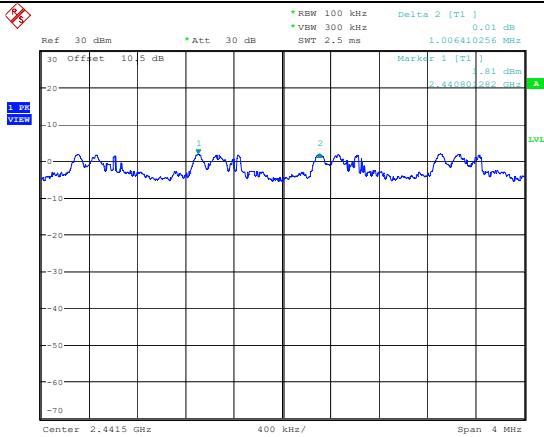
Hop_Middle
Channel



ProjectNo.:2401Y27183E-RF Tester:Brian Li
Date: 6,JAN.2025 19:57:29

Antenna 2

Hop_Middle
Channel



ProjectNo.:2401Y27183E-RF-ANT2 Tester:Brian Li
Date: 6,JAN.2025 19:33:13

FCC §15.247(a) (1) - 20dBEMISSION BANDWIDTH

Applicable Standard

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

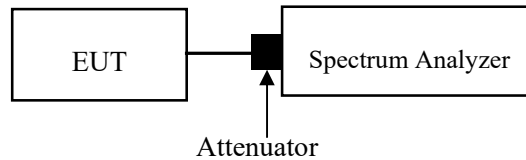
Test Procedure

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

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (\text{OBW}/\text{RBW})]$ below the reference level.
- d) Steps a) through c) might require iteration to adjust within the specified tolerances.
- e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “–xx dB down” requirement; that is, if the requirement calls for measuring the –20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.
- f) Set detection mode to peak and trace mode to max hold.
- g) Determine the reference value: Set the EUT to transmit an un-modulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
- h) Determine the “–xx dB down amplitude” using $[(\text{reference value}) - \text{xx}]$. Alternatively, this calculation may be made by using the marker-delta function of the instrument.
- i) If the reference value is determined by an un-modulated carrier, then turn the EUT modulation on, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “- xx dB down amplitude” determined in step h). If a marker is below this “-xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “- xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).



Test Data

Environmental Conditions

Temperature:	25.6 °C
Relative Humidity:	34 %
ATM Pressure:	101.5 kPa

The testing was performed by Brian Li on 2025-01-06.

EUT operation mode: Transmitting

Test Result: Compliant

Antenna	Mode	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
Antenna 1	GFSK	2402	1.308
		2441	1.311
		2480	1.303
Antenna 2	GFSK	2402	1.313
		2441	1.311
		2480	1.288

Please refer to the below plots:

20 dB Bandwidth

Channel	Center Frequency (GHz)	Bandwidth (kHz)	Span (MHz)	Ref (dBm)	Att (dB)	Marker 1 (GHz)	Marker 1 (dBm)	Marker 2 (GHz)	Marker 2 (dBm)	Delta 2 (dB)
Low Channel	2.402	300	3	30	30	2.40130652	-21.91	2.40130652	-21.91	0.08
Middle Channel	2.441	300	3	30	30	2.440308654	-20.64	2.440308654	-20.64	0.08
High Channel	2.48	300	3	30	30	2.47531518	-19.31	2.47531518	-19.31	0.08

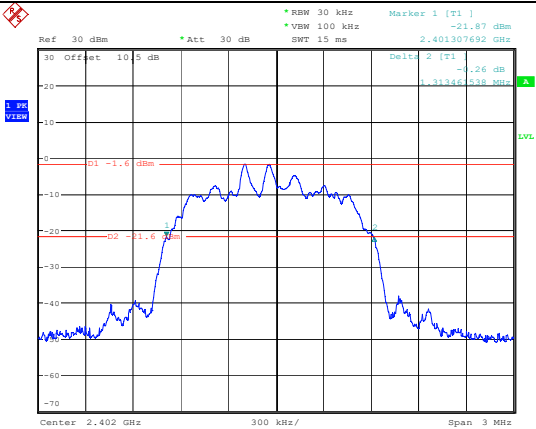
ProjectNo.:2401Y27183E-RF Tester:Brian Li
Date: 6.JAN.2025 19:05:18

ProjectNo.:2401Y27183E-RF Tester:Brian Li
Date: 6.JAN.2025 19:07:26

ProjectNo.:2401Y27183E-RF Tester:Brian Li
Date: 6.JAN.2025 19:08:41

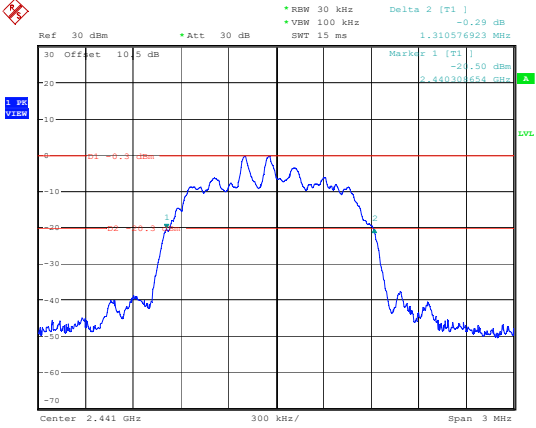
Antenna 2
20 dB Bandwidth

Low Channel



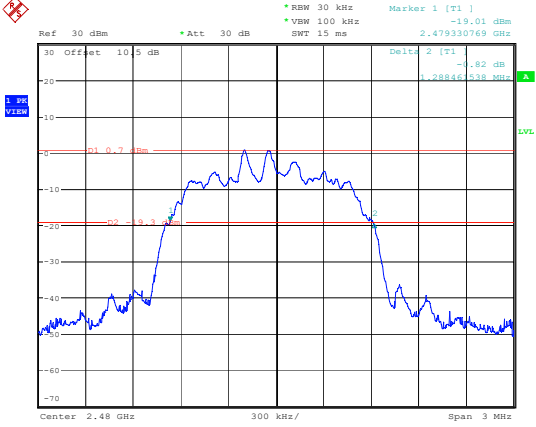
ProjectNo.:2401Y27183E-RF-ANT2 Tester:Brian Li
Date: 6.JAN.2025 19:13:06

Middle Channel



ProjectNo.:2401Y27183E-RF-ANT2 Tester:Brian Li
Date: 6.JAN.2025 19:11:55

High Channel



ProjectNo.:2401Y27183E-RF-ANT2 Tester:Brian Li
Date: 6.JAN.2025 19:10:32

FCC §15.247(a) (1) (iii) - QUANTITY OF HOPPING CHANNEL TEST

Applicable Standard

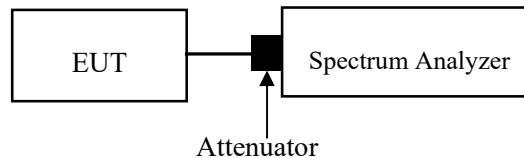
Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 7.8.3

- a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- c) VBW $\geq$ RBW.
- d) Sweep: Auto.
- e) Detector function: Peak.
- f) Trace: Max hold.

It might prove necessary to break the span up into sub ranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels.



Test Data

Environmental Conditions

Temperature:	27 °C
Relative Humidity:	60 %
ATM Pressure:	101.0 kPa

The testing was performed by Brian Li on 2024-11-25.

EUT operation mode: Transmitting

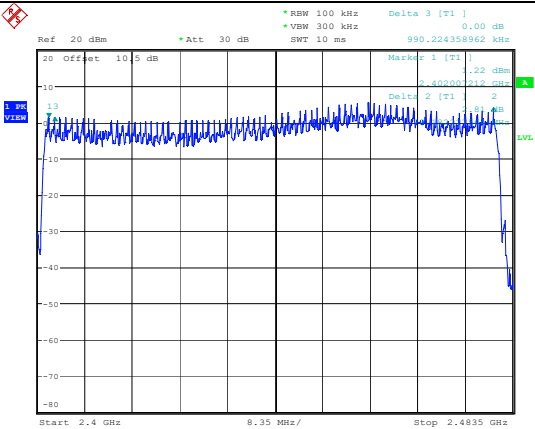
Test Result: Compliant

Antenna	Mode	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
Antenna 1& 2	GFSK	2400-2483.5	79	≥15

Antenna 1

Hopping Channel

GFSK

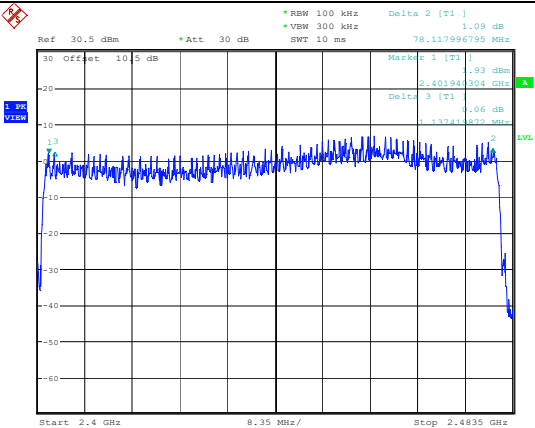


ProjectNo.:2401Y27183E-RF Tester:Brian Li
Date: 25.NOV.2024 14:02:30

Antenna 2

Hopping Channel

GFSK



ProjectNo.:2401Y27183E-RF-ANT2 Tester:Brian Li
Date: 25.NOV.2024 14:54:58

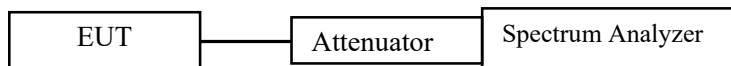
FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)**Applicable Standard**

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 7.8.4

1. The EUT was worked in channel hopping.
2. Set the RBW to: 1MHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Set the span to 0Hz.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Recorded the time of single pulses

**Test Data****Environmental Conditions**

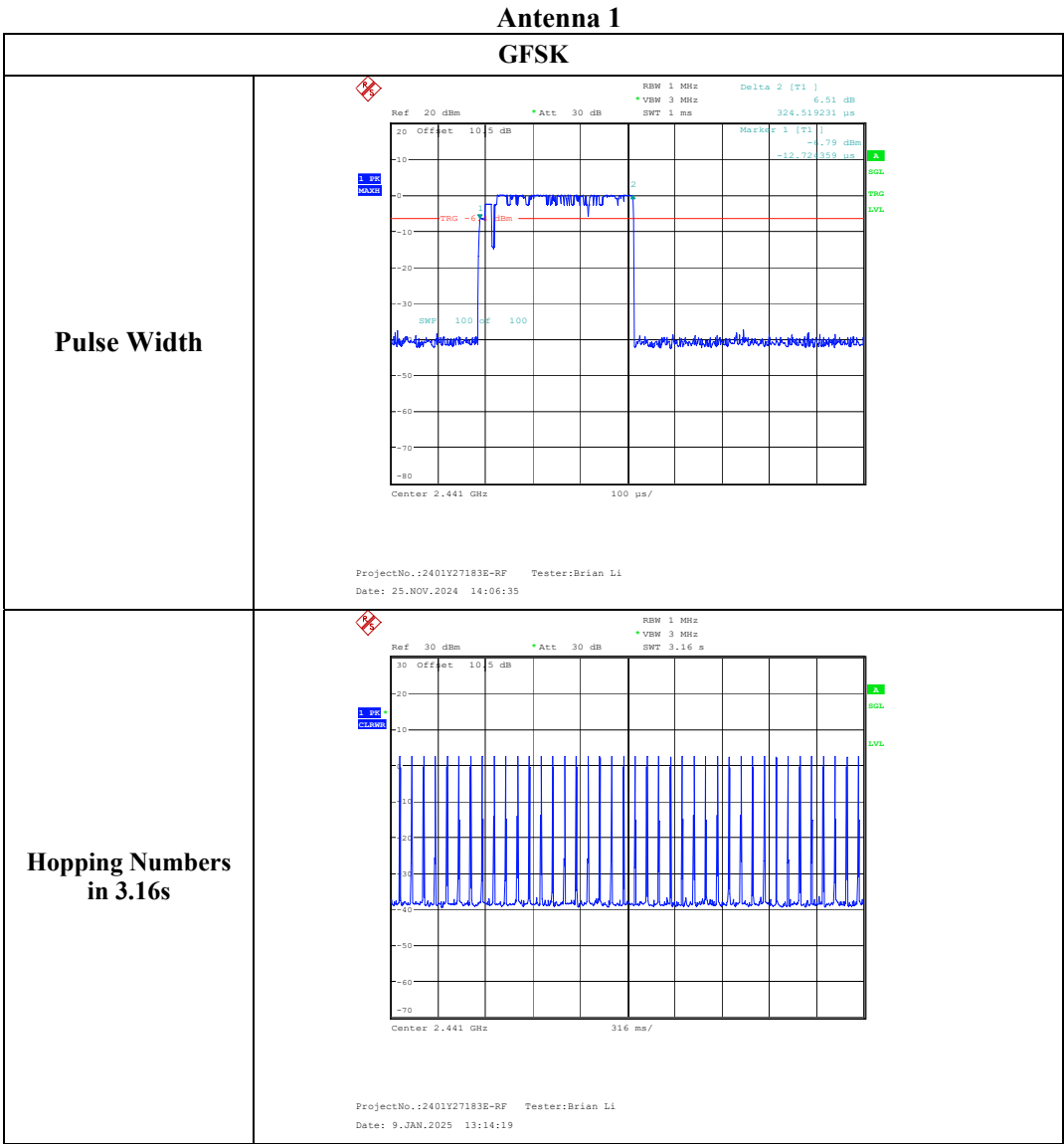
Temperature:	24.3~27.0 °C
Relative Humidity:	35.2~60 %
ATM Pressure:	101.0~101.3 kPa

The testing was performed by Brian Li from 2024-11-25 to 2025-01-09.

EUT operation mode: Transmitting

Test Result: Compliant

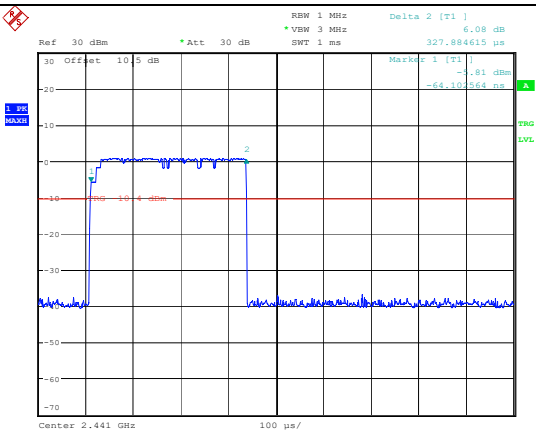
Antenna	Test Frequency (MHz)	Pulse Width (ms)	Observation time (s)	Hopping Numbers in Observation time	Dwell Time (s)	Limit (s)
Antenna 1	Hop_2441	0.325	31.6	560	0.182	0.400
Antenna 2	Hop_2441	0.328	31.6	560	0.184	0.400
Note 1: Observation time= Hopping Channel Number× 0.4 Note 2: Dwell Time = Pulse width *Hopping Numbers in Observation time Note 3: Hopping Numbers in Observation time = Hopping Numbers in 3.16s*10						



Antenna 2

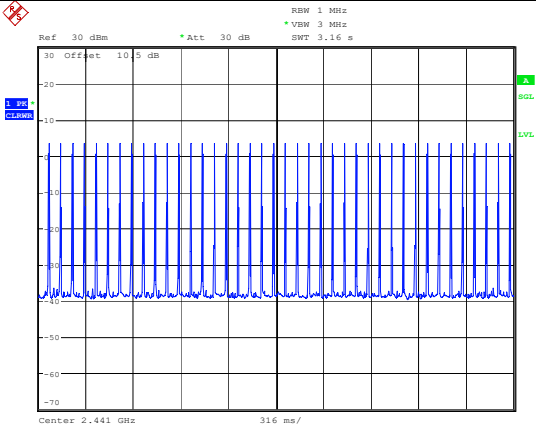
GFSK

Pulse Width



ProjectNo.:2401Y27183E-RF-ant2 Tester:Brian Li
Date: 13.DEC.2024 13:55:07

Hopping Numbers
in 3.16s



ProjectNo.:2401Y27183E-RF-ANT2 Tester:Brian Li
Date: 9.JAN.2025 13:11:24

FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 7.8.5

This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:

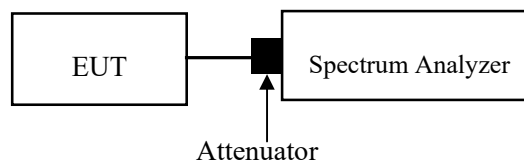
a) Use the following spectrum analyzer settings:

- 1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
- 2) RBW > 20 dB bandwidth of the emission being measured.
- 3) VBW $\geq$ RBW.
- 4) Sweep: Auto.
- 5) Detector function: Peak.
- 6) Trace: Max hold.

b) Allow trace to stabilize.

c) Use the marker-to-peak function to set the marker to the peak of the emission.

d) The indicated level is the peak output power, after any corrections for external attenuators and cables.



Note: A short RF cable with low cable loss connected to the EUT antenna port, which was provided by client or lab, the cable loss was add with offset into test equipment, the total offset consists of attenuator and/or RF cable loss

Test Data

Environmental Conditions

Temperature:	25~27 °C
Relative Humidity:	55~60 %
ATM Pressure:	101.0~101.5 kPa

The testing was performed by Brian Li from 2024-11-25 to 2025-01-02.

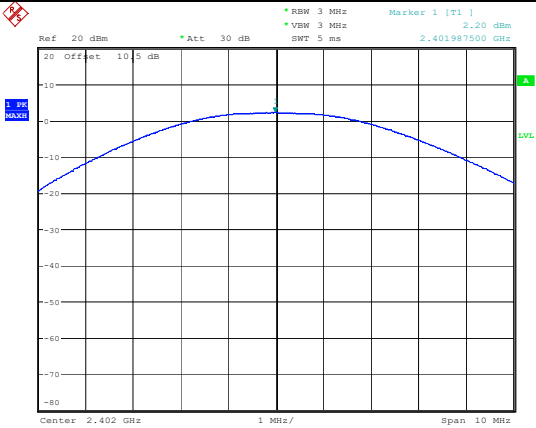
EUT operation mode: Transmitting

Test Result: Compliant

Antenna	Mode	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)
Antenna 1	GFSK	2402	2.20	21
		2441	2.88	21
		2457	5.92	21
		2480	4.92	21
Antenna 2	GFSK	2402	2.82	21
		2441	3.81	21
		2459	6.85	21
		2480	6.20	21

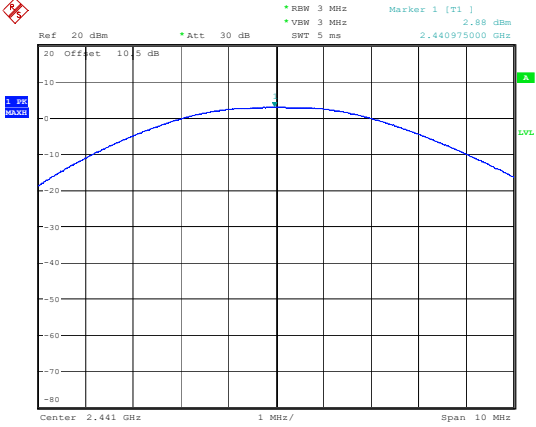
Antenna 1

Low Channel



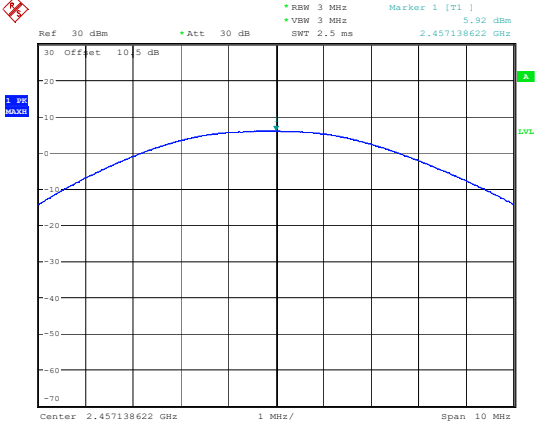
ProjectNo.:2401Y27183E-RF Tester:Brian Li
Date: 25.NOV.2024 12:50:22

Middle Channel

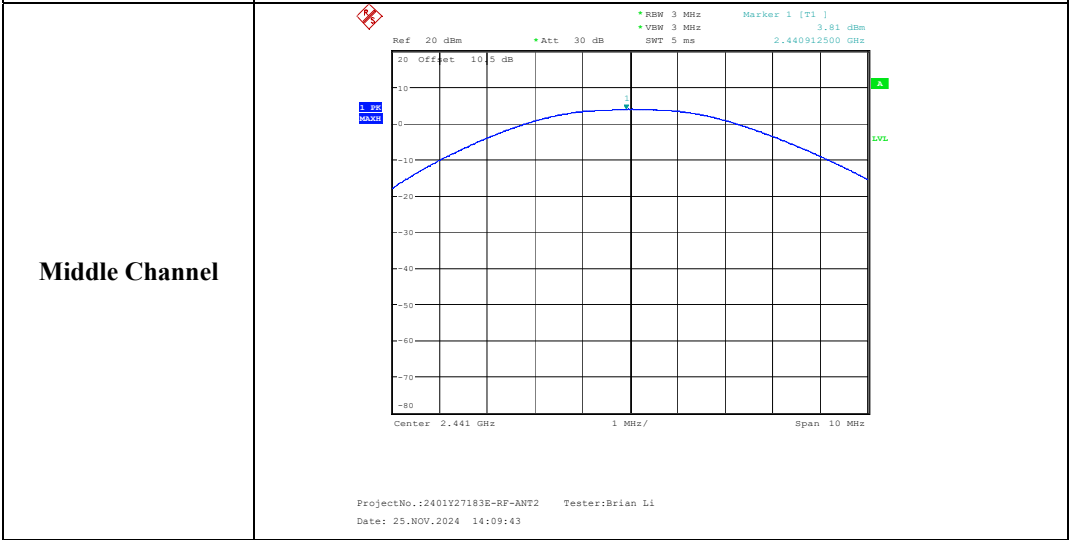
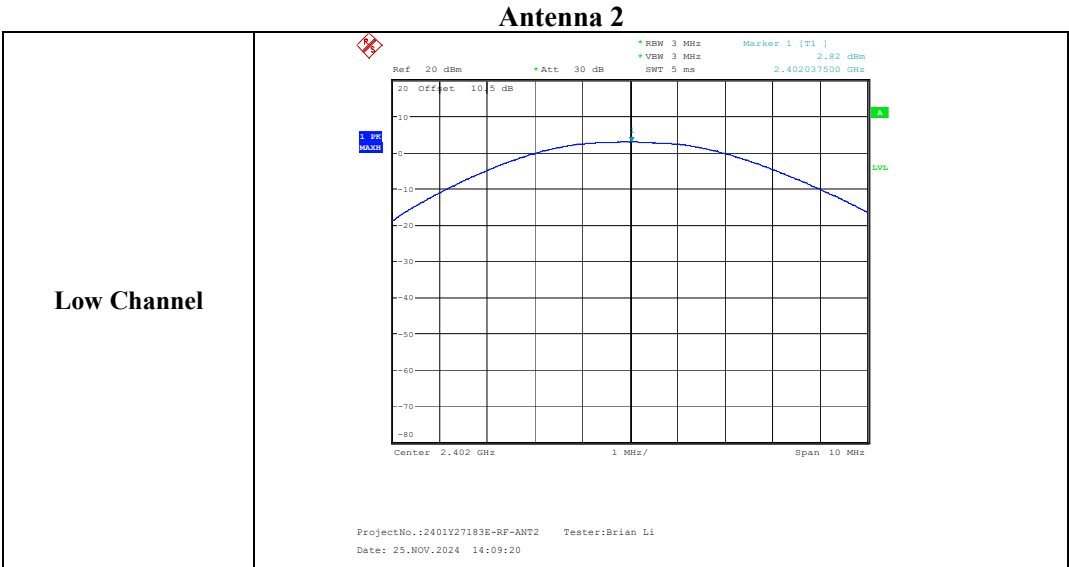
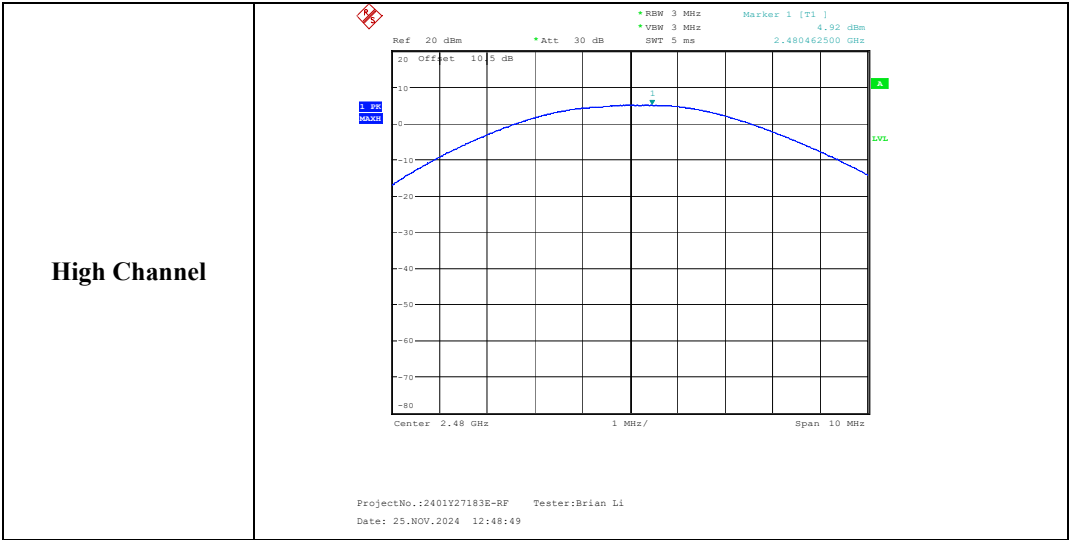


ProjectNo.:2401Y27183E-RF Tester:Brian Li
Date: 25.NOV.2024 12:49:36

Channel Frequency
2457 MHz



ProjectNo.:2401Y27183E-RF Tester:Brian Li
Date: 2.JAN.2025 13:16:33



Ref 30 dBm Att 30 dB SMT 2.5 ms Marker 1 [T1] 6.85 dBm

1.92 MAX

Center 2.459012019 GHz 1 MHz/ Span 10 MHz

*SRW 3 MHz Marker 1 [T1] 6.20 dBm
 *VBW 3 MHz 2.480037500 GHz
 Ref 20 dBm Att 30 dB SMT 5 ms

20 Offset 10 5 dB
 -10
 -20
 -30
 -40
 -50
 -60
 -70
 -80

1.99 MHz
 MAXH

Center 2.48 GHz 1 MHz/
 Span 10 MHz

Version 3.0

FCC §15.247(d) - BAND EDGES TESTING

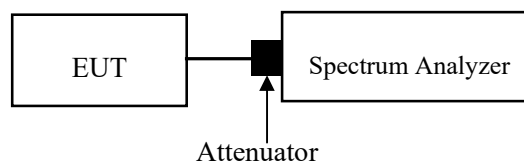
Applicable Standard

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)).

Test Procedure

Test Method: ANSI C63.10-2013 Clause 7.8.6 & Clause 6.10

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 100 kHz 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

Environmental Conditions

Temperature:	24.3~27.0 °C
Relative Humidity:	35.2~60 %
ATM Pressure:	101.0~101.3 kPa

The testing was performed by Brian Li from 2024-12-16 to 2025-01-09.

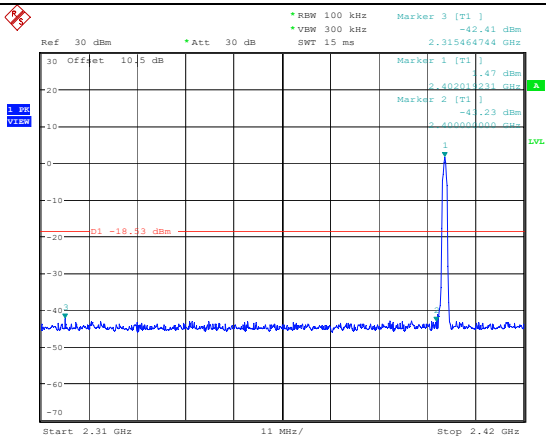
EUT operation mode: Transmitting

Test Result: Compliant

Antenna 1

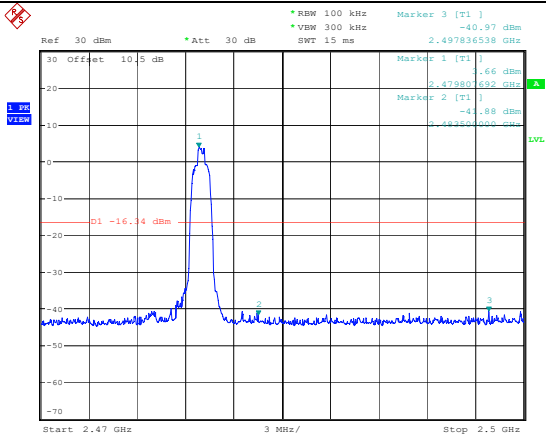
Band Edge, Single Channel

GFSK,
Left Side

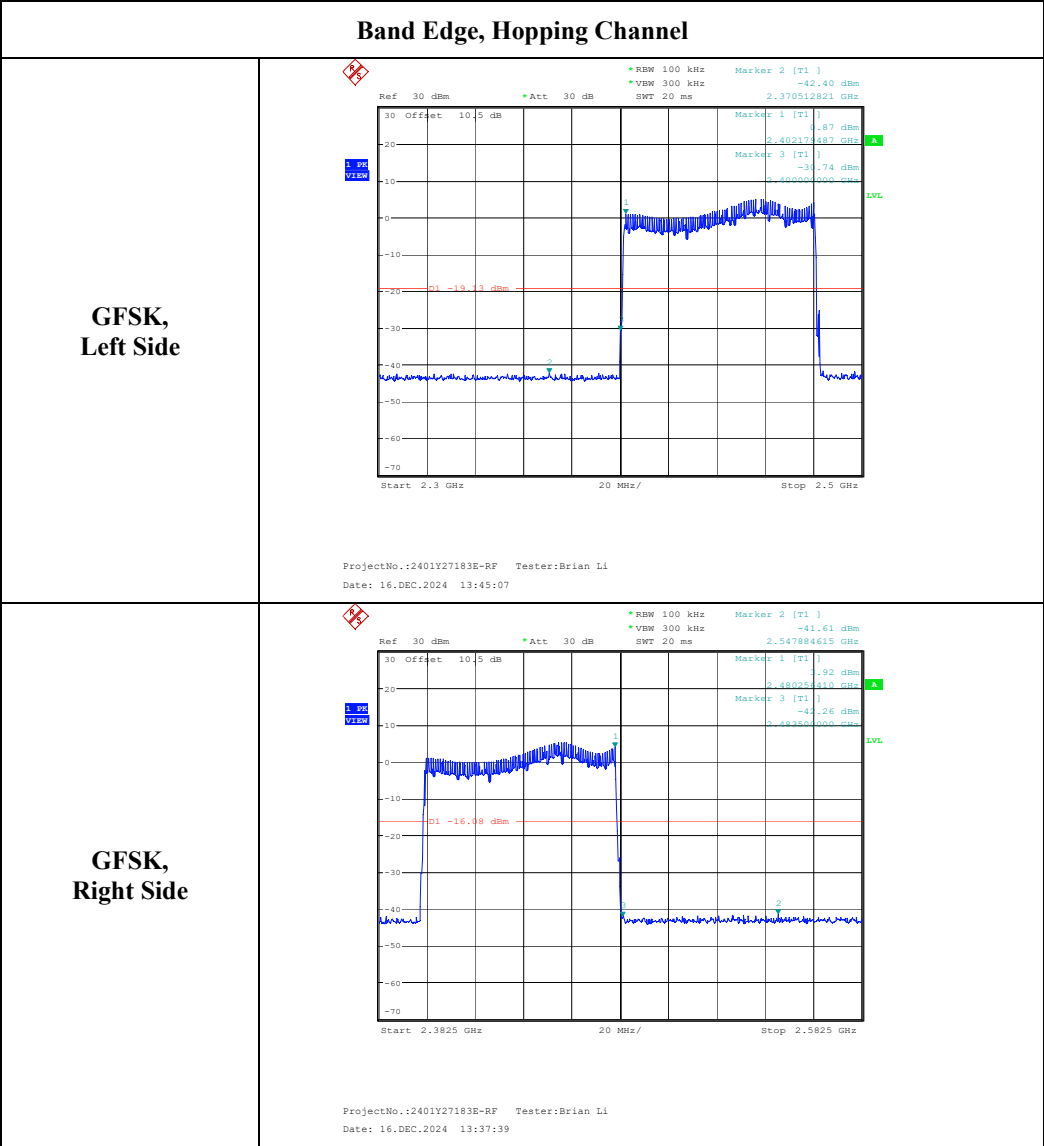


ProjectNo.:2401Y27183E-RF Tester:Brian Li
Date: 9.JAN.2025 09:42:12

GFSK,
Right Side



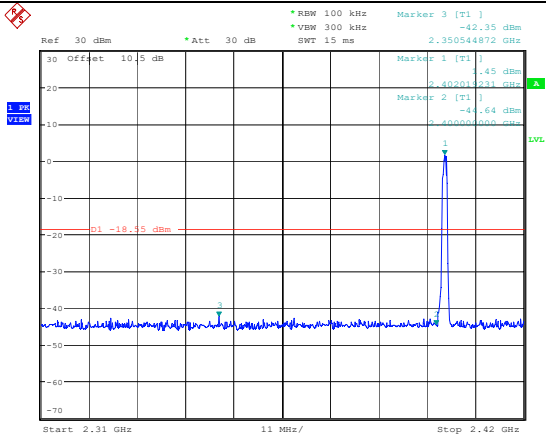
ProjectNo.:2401Y27183E-RF Tester:Brian Li
Date: 9.JAN.2025 09:47:50



Antenna 2

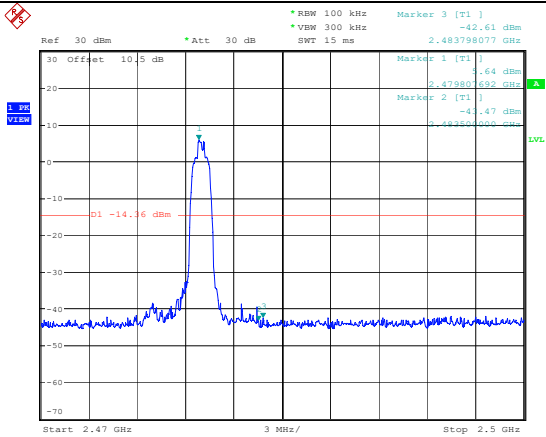
Band Edge, Single Channel

GFSK,
Left Side

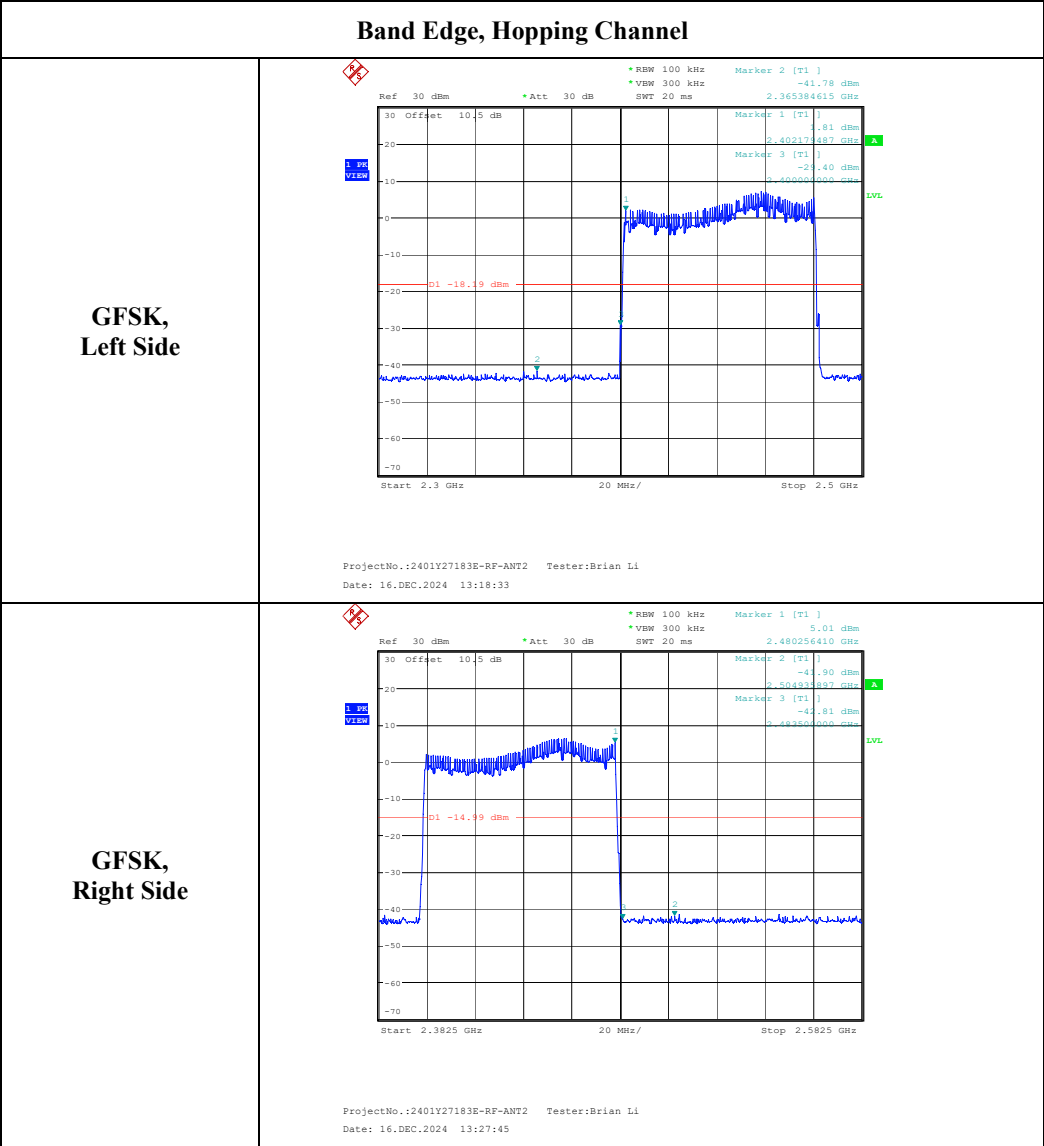


ProjectNo.:2401Y27183E-RF-ANT2 Tester:Brian Li
Date: 9.JAN.2025 09:56:45

GFSK,
Right Side



ProjectNo.:2401Y27183E-RF-ANT2 Tester:Brian Li
Date: 9.JAN.2025 09:52:12



EUT PHOTOGRAPHS

Please refer to the attachment 2401Y27183E-RF External photo and 2401Y27183E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2401Y27183E-RF Test Setup photo.

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