

# TEST REPORT

Applicant Name: Zhongshan Trusting E-commerce Co., Ltd.  
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Town, Zhongshan, Guangdong, China  
Report Number: 2401W89045E-RF-00A  
FCC ID: 2BK2U-TK2401

## Test Standard (s)

FCC PART 15.249

## Sample Description

Product Type: AI MOUSE  
Model No.: TK2401  
Multiple Model(s) No.: N/A  
Trade Mark: THINKKEEN  
Date Received: 2024/08/13  
Issue Date: 2024/11/26

Test Result:	Pass▲
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▲ In the configuration tested, the EUT complied with the standards above.

## Prepared and Checked By:

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Bruce Lin  
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.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	2401W89045E-RF-00A	Original Report	2024/11/26

## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

Product	AI MOUSE
Tested Model	TK2401
Multiple Model(s)	N/A
Frequency Range	2402-2480MHz
Maximum E-field strength	87.96 dBuV/m@3m
Modulation Technique	GFSK
Voltage Range	DC 3.70V from battery or DC 5V from USB port
Sample serial number	2PUP-6 for Conducted and Radiated Emissions Test 2PUP-7 for RF Conducted Test (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, 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		±5%
RF output power, conducted		0.72 dB(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9kHz~150 kHz	3.94dB(k=2, 95% level of confidence)
	150 kHz ~30MHz	3.84dB(k=2, 95% level of confidence)
Radiated Emissions	9kHz - 30MHz	3.30dB(k=2, 95% level of confidence)
	30MHz~200MHz (Horizontal)	4.48dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	4.55dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	4.85dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.05dB(k=2, 95% level of confidence)
	1GHz - 6GHz	5.35dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.44dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.16dB(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 by manufacturer.

### Frequency Channel List:

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

Note: Test on Channel 0, 19 and 39.

### EUT Exercise Software

“EMI-Test\_Tool.exe”<sup>#</sup> exercise software was used and the power level is 1.7<sup>#</sup>. 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

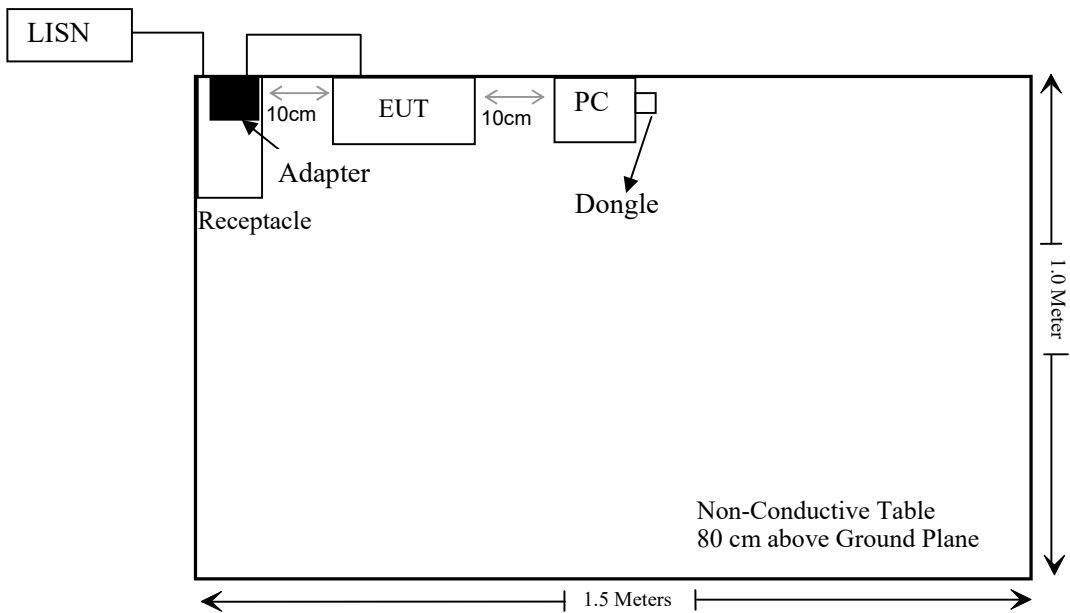
Manufacturer	Description	Model	Serial Number
Lenovo	PC	TIANYI510Pro-18ICB	R3NO28B21001
Huajin	Adapter	HJ-0501000E1-US	Unknown
BULL	Receptacle	GN-415K	5503290068073
Zhongshan Trusting E-commerce Co., Ltd.	Dongle	TK2401-1	Unknown

Support Cable Descriptions

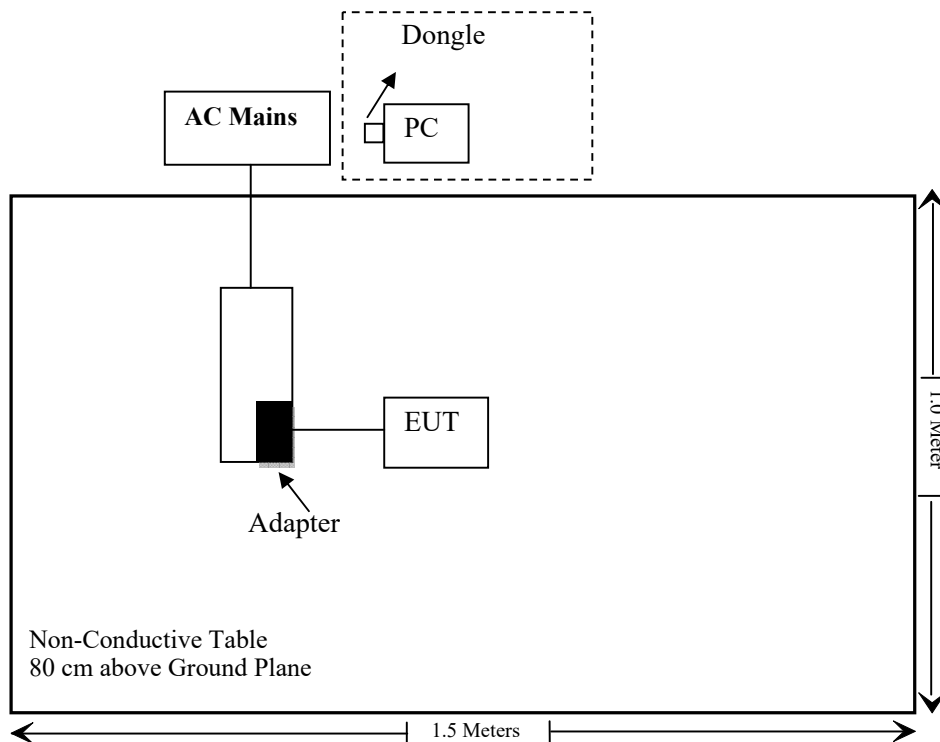
Cable Description	Length (m)	From Port	To
Un-shielding Detachable USB Cable	0.8	Adapter	EUT
Unshielded Un-detachable AC cable	1.0	Receptacle	LISN/AC Mains

Block Diagram of Test Setup

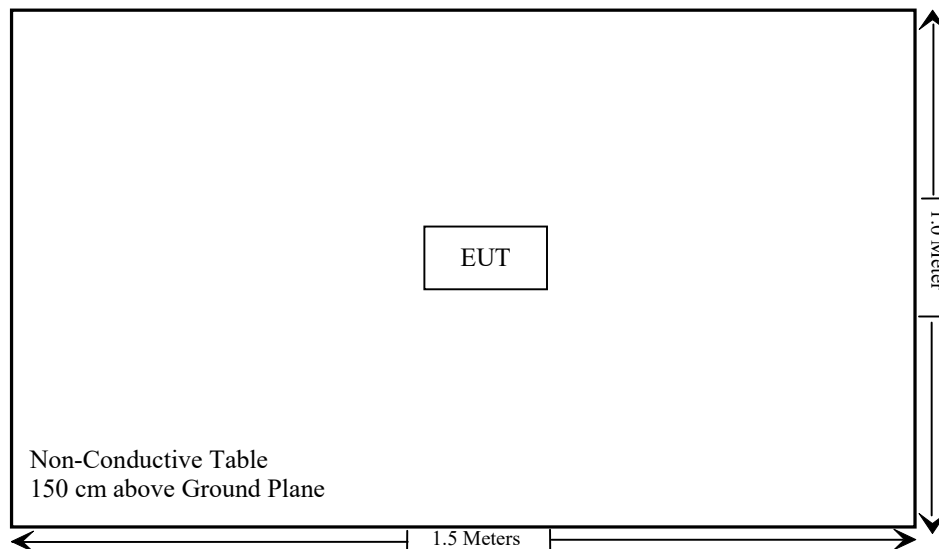
For Conducted Emissions:



For Radiated Emissions below 1GHz:



For Radiated Emissions above 1GHz:





**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
§1.1307 (b) (1) & §2.1093	RF Exposure	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
<b>Conducted Emissions Test</b>					
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
<b>Radiated Emissions Test</b>					
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	2026	2023/09/18	2026/09/17
UTIFLEX	RF Cable	NO. 13	232308-001	2024/06/18	2025/06/17
Audix	EMI Test software	E3	191218(V9)	NCR	NCR

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
R&S	Spectrum Analyzer	FSV40-N	102259	2024/01/16	2025/01/15
WEINSCHEL	3dB Attenuator	Unknown	F-03-EM220	2024/06/27	2025/06/26
Micro-Tronics	RF Cable	8082176	W6111	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).

## §1.1307 (b) (1) & §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  $\leq 50$  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  $\leq 7.5$  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

For worst case:

Mode	Frequency (MHz)	Maximum E-Field (dBuV/m@3m)	Maximum EIRP(dBm)	Maximum Tune-up EIRP <sup>#</sup> (dBm)	Maximum Tune-up EIRP <sup>#</sup> (mW)	Distance (mm)	Calculated value	Threshold (1-g SAR)	SAR Test Exclusion
2.4G	2402-2480	87.96	-7.24	-7.00	0.20	5	0.1	3	Yes

Note: EIRP = E-Field – 95.2 @3m

Note: The maximum tune-up EIRP<sup>#</sup> were declared and provided by the applicant.

**Result: Compliant**

## **FCC§15.203 - ANTENNA REQUIREMENT**

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### **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 a PCB antenna which was permanently attached and the maximum antenna gain<sup>#</sup> is -0.42445dBi, fulfill the requirement of this section. Please refer to the EUT photos.

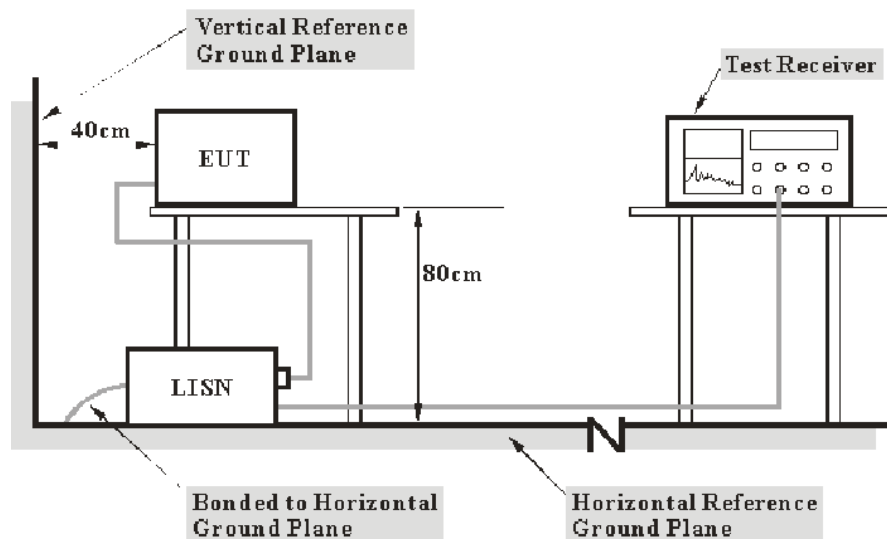
**Result: Compliant.**

## 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:

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

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

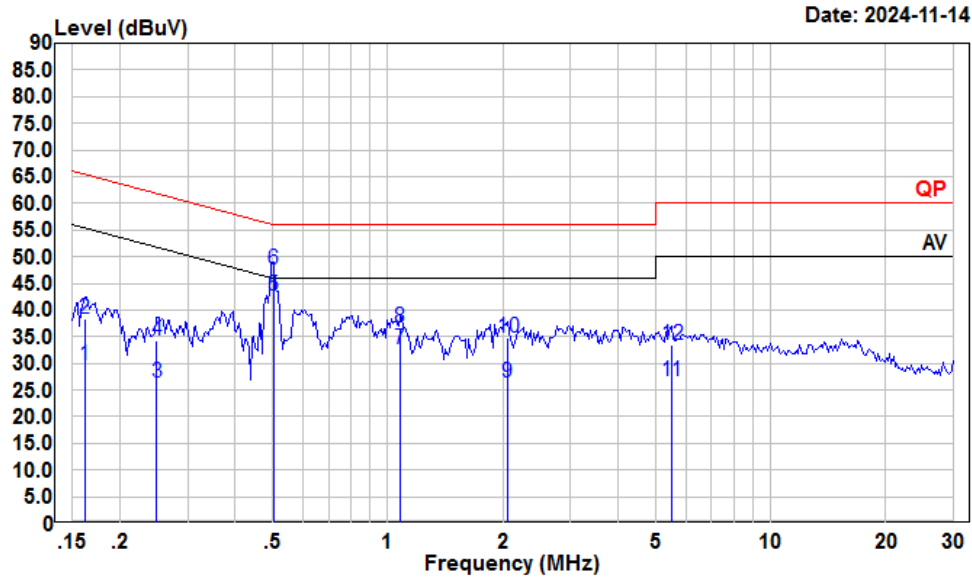
### Environmental Conditions

Temperature:	26 °C
Relative Humidity:	56 %
ATM Pressure:	101 kPa

*The testing was performed by Macy Shi on 2024-11-14.*

*EUT operation mode: Transmitting (Maximum output power mode, High channel)*

## AC 120V/60 Hz, Line



Condition: Line

Project : 2401W89045E-RF

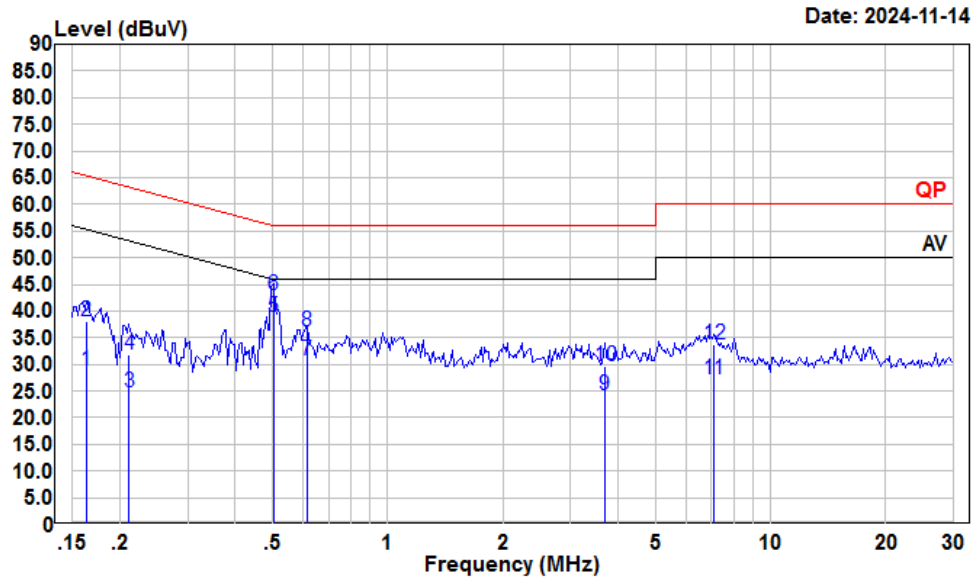
tester : Macy.shi

Note : Transmitting

	Freq	Read Level	LISN Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.162	8.65	29.63	10.87	10.11	55.38	-25.75	Average
2	0.162	17.42	38.40	10.87	10.11	65.38	-26.98	QP
3	0.249	5.64	26.45	10.73	10.08	51.78	-25.33	Average
4	0.249	13.33	34.14	10.73	10.08	61.78	-27.64	QP
5	0.502	22.02	42.66	10.50	10.14	46.00	-3.34	Average
6	0.502	26.84	47.48	10.50	10.14	56.00	-8.52	QP
7	1.077	12.04	32.58	10.42	10.12	46.00	-13.42	Average
8	1.077	16.23	36.77	10.42	10.12	56.00	-19.23	QP
9	2.055	5.53	26.31	10.59	10.19	46.00	-19.69	Average
10	2.055	13.98	34.76	10.59	10.19	56.00	-21.24	QP
11	5.505	6.16	26.75	10.41	10.18	50.00	-23.25	Average
12	5.505	12.93	33.52	10.41	10.18	60.00	-26.48	QP



## AC 120V/60 Hz, Neutral



Condition: Neutral

Project : 2401W89045E-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	0.163	8.25	28.90	10.54	10.11	55.30	-26.40	Average
2	0.163	17.36	38.01	10.54	10.11	65.30	-27.29	QP
3	0.211	4.17	24.68	10.42	10.09	53.18	-28.50	Average
4	0.211	11.27	31.78	10.42	10.09	63.18	-31.40	QP
5	0.502	18.07	38.91	10.70	10.14	46.00	-7.09	Average
6	0.502	22.26	43.10	10.70	10.14	56.00	-12.90	QP
7	0.614	9.88	30.70	10.70	10.12	46.00	-15.30	Average
8	0.614	15.30	36.12	10.70	10.12	56.00	-19.88	QP
9	3.681	3.59	24.19	10.40	10.20	46.00	-21.81	Average
10	3.681	8.99	29.59	10.40	10.20	56.00	-26.41	QP
11	7.100	6.32	27.21	10.70	10.19	50.00	-22.79	Average
12	7.100	12.84	33.73	10.70	10.19	60.00	-26.27	QP

## 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:

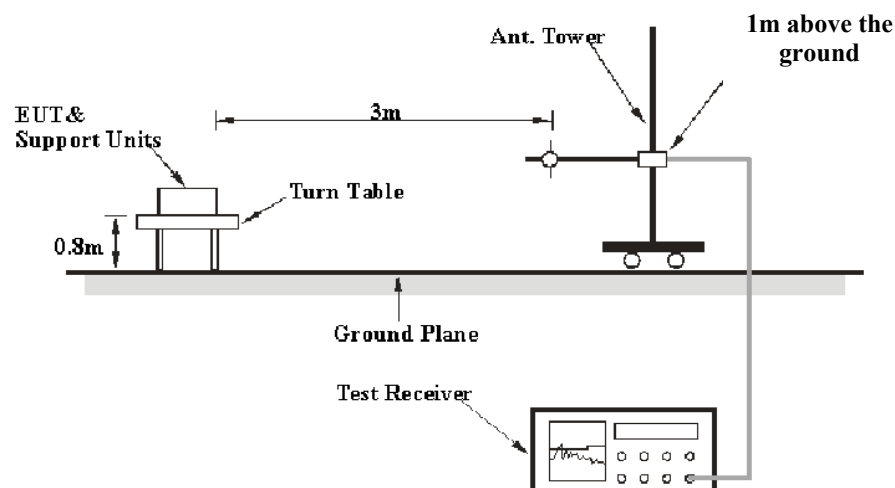
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

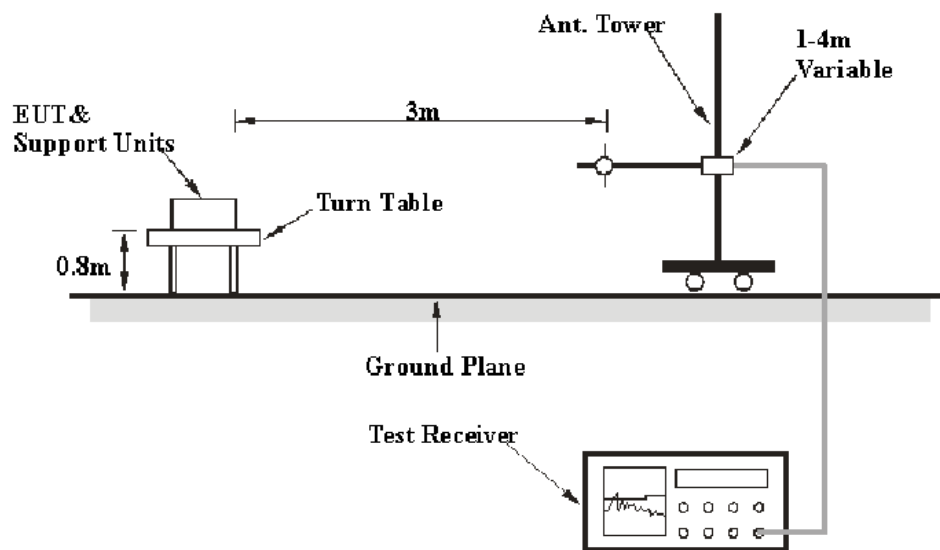
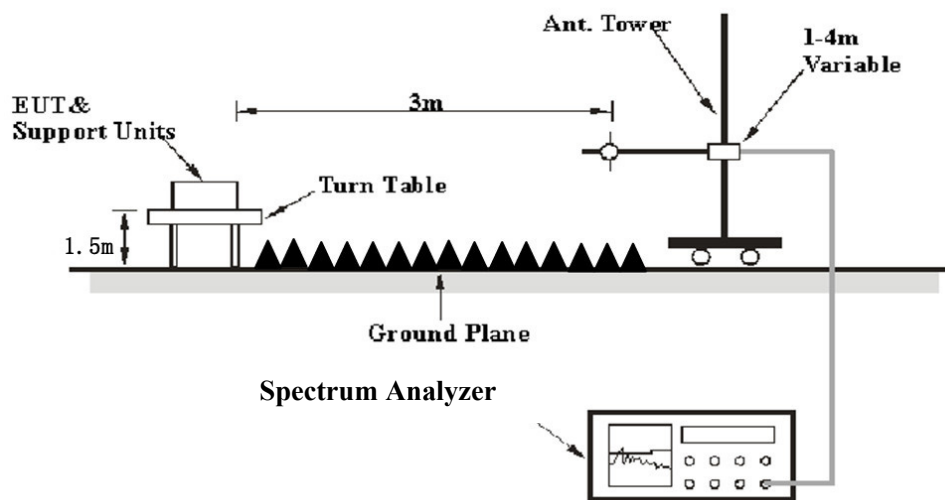
As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

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
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	≥10 Hz	/	AV

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:

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

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:

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

## Test Data

### Environmental Conditions

Temperature:	24~25.1 °C
Relative Humidity:	52 %
ATM Pressure:	101 kPa

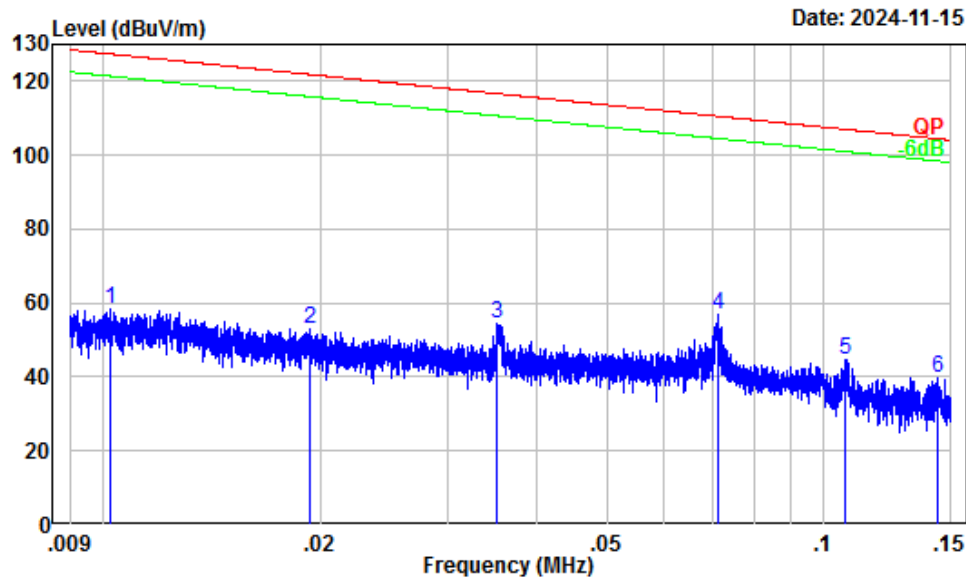
*The testing was performed by Carl Zhu from 2024-11-15 to 2024-11-26 for below 1GHz and Karl Xu on 2024-11-14 for above 1GHz.*

*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*

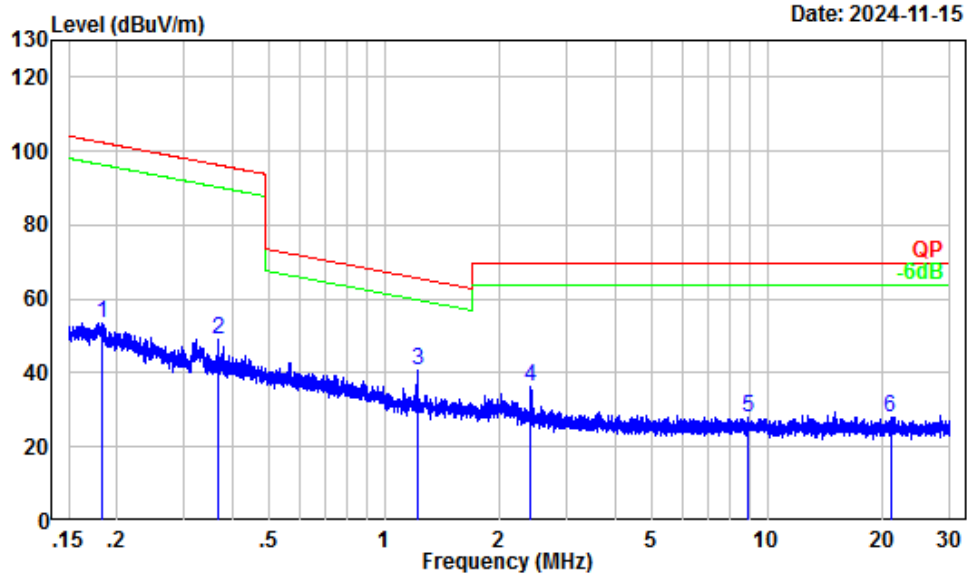
9 kHz-30MHz: (Maximum output power mode, High channel)

Parallel (worst case)



Site : Chamber A  
Condition : 3m  
Project Number: 2401W89045E-RF  
Test Mode : Transmitting  
Tester : Carl Zhu

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.01	32.26	26.25	58.51	127.41	-68.90	Peak
2	0.02	30.53	22.42	52.95	121.89	-68.94	Peak
3	0.04	27.95	26.57	54.52	116.66	-62.14	Peak
4	0.07	24.28	32.47	56.75	110.56	-53.81	Peak
5	0.11	21.59	23.01	44.60	107.01	-62.41	Peak
6	0.14	19.44	20.22	39.66	104.47	-64.81	Peak

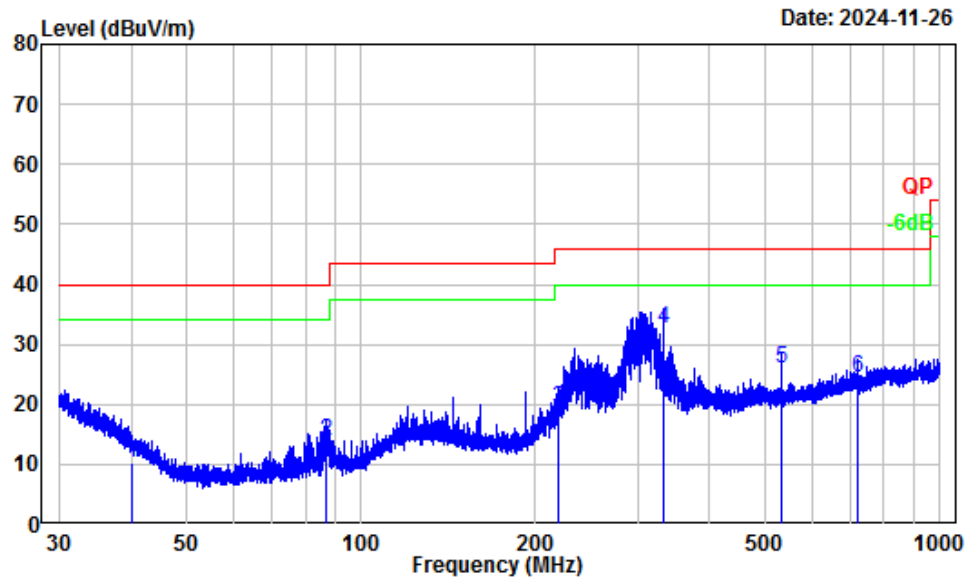


Site : Chamber A  
Condition : 3m  
Project Number: 2401W89045E-RF  
Test Mode : Transmitting  
Tester : Carl Zhu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.18	17.05	36.44	53.49	102.32	-48.83	Peak
2	0.37	8.93	40.13	49.06	96.31	-47.25	Peak
3	1.22	0.59	39.89	40.48	65.73	-25.25	Peak
4	2.42	-1.83	38.05	36.22	69.54	-33.32	Peak
5	8.92	-2.91	31.01	28.10	69.54	-41.44	Peak
6	20.98	-3.10	31.05	27.95	69.54	-41.59	Peak

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

Horizontal

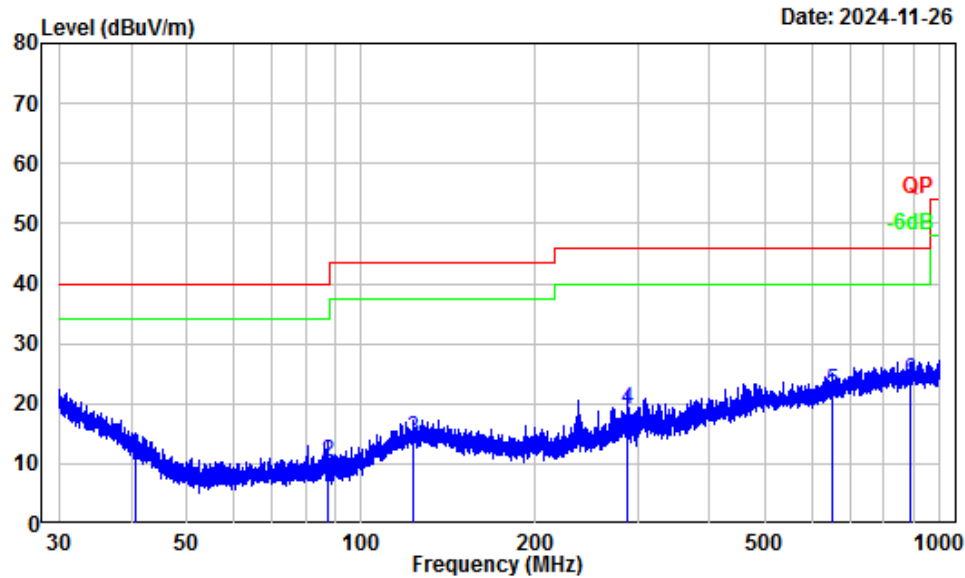


Site : Chamber A  
Condition : 3m Horizontal  
Project Number: 2401W89045E-RF  
Test Mode : Transmitting  
Tester : Carl Zhu

	Freq Factor		Read Level	Level	Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	40.22	-12.53	22.85	10.32	40.00	-29.68	QP
2	86.88	-18.08	31.89	13.81	40.00	-26.19	QP
3	218.88	-14.20	33.57	19.37	46.00	-26.63	QP
4	332.66	-10.60	43.34	32.74	46.00	-13.26	QP
5	531.73	-5.77	31.66	25.89	46.00	-20.11	QP
6	721.73	-3.20	27.67	24.47	46.00	-21.53	QP



Vertical



Site : Chamber A  
Condition : 3m Vertical  
Project Number: 2401W89045E-RF  
Test Mode : Transmitting  
Tester : Carl Zhu

Freq Factor		Read Level	Limit Level	Over Limit	Remark
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	40.84	-12.97	24.13	11.16	40.00 -28.84 QP
2	87.49	-18.08	28.37	10.29	40.00 -29.71 QP
3	123.05	-11.14	25.28	14.14	43.50 -29.36 QP
4	287.99	-11.22	30.19	18.97	46.00 -27.03 QP
5	651.94	-4.08	26.15	22.07	46.00 -23.93 QP
6	889.95	-1.42	25.33	23.91	46.00 -22.09 QP

**Above 1GHz:**

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
Low Channel							
2402	85.12	PK	H	-3.21	81.91	114	-32.09
2402	89.21	PK	V	-3.21	86.00	114	-28.00
4804.00	58.34	PK	H	2.42	60.76	74	-13.24
4804.00	50.03	AV	H	2.42	52.45	54	-1.55
4804.00	54.41	PK	V	2.42	56.83	74	-17.17
4804.00	43.71	AV	V	2.42	46.13	54	-7.87
Middle Channel							
2440.00	85.57	PK	H	-3.19	82.38	114	-31.62
2440.00	90.47	PK	V	-3.19	87.28	114	-26.72
4880.00	55.67	PK	H	2.58	58.25	74	-15.75
4880.00	45.97	AV	H	2.58	48.55	54	-5.45
4880.00	53.69	PK	V	2.58	56.27	74	-17.73
4880.00	43.52	AV	V	2.58	46.10	54	-7.90
High Channel							
2480	85.72	PK	H	-3.17	82.55	114	-31.45
2480	91.13	PK	V	-3.17	87.96	114	-26.04
4960.00	54.43	PK	H	2.69	57.12	74	-16.88
4960.00	44.78	AV	H	2.69	47.47	54	-6.53
4960.00	53.38	PK	V	2.69	56.07	74	-17.93
4960.00	43.41	AV	V	2.69	46.10	54	-7.90

**Note:**

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

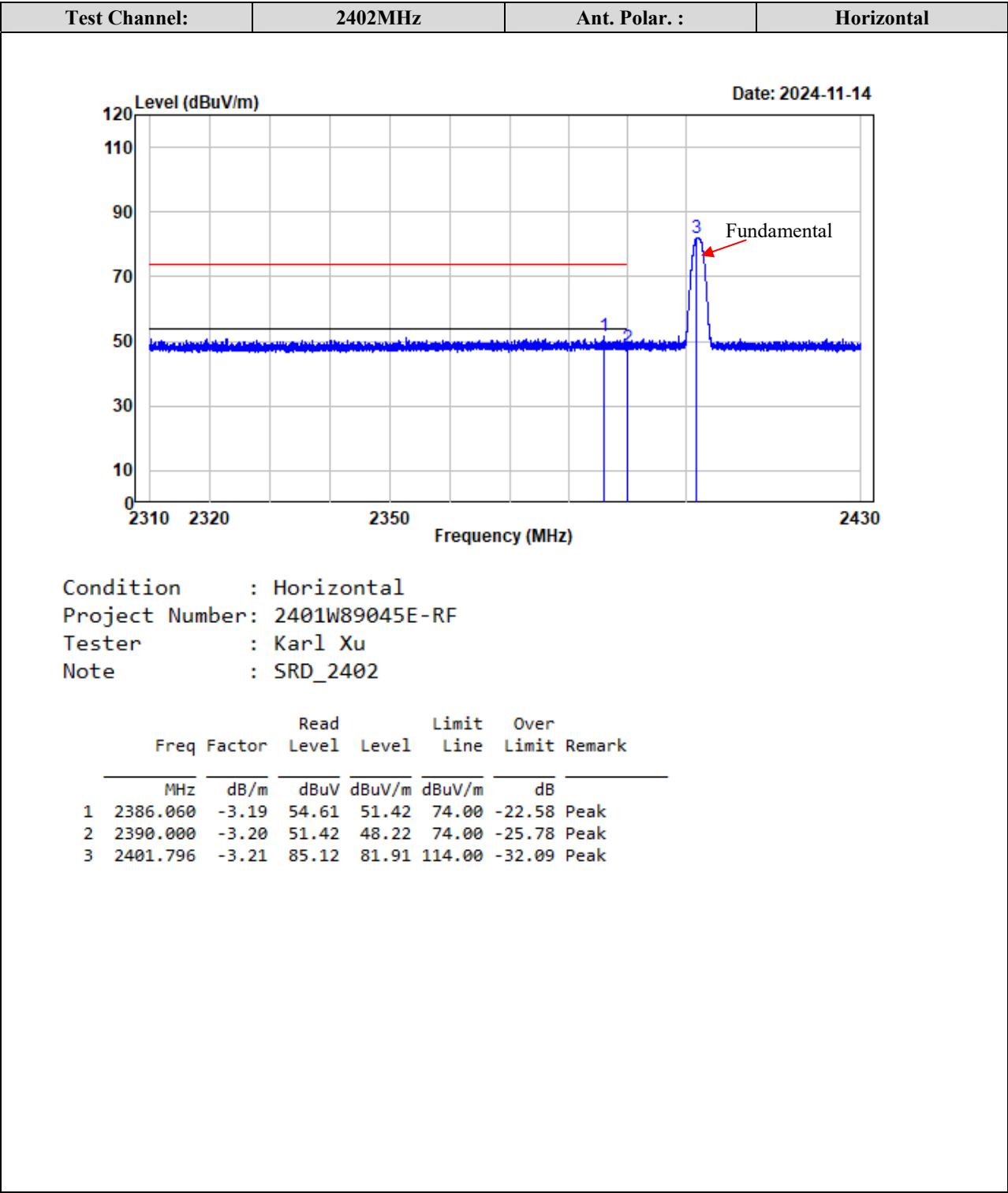
Absolute Level (Corrected Amplitude) = Factor + Reading

Margin = Absolute Level - Limit

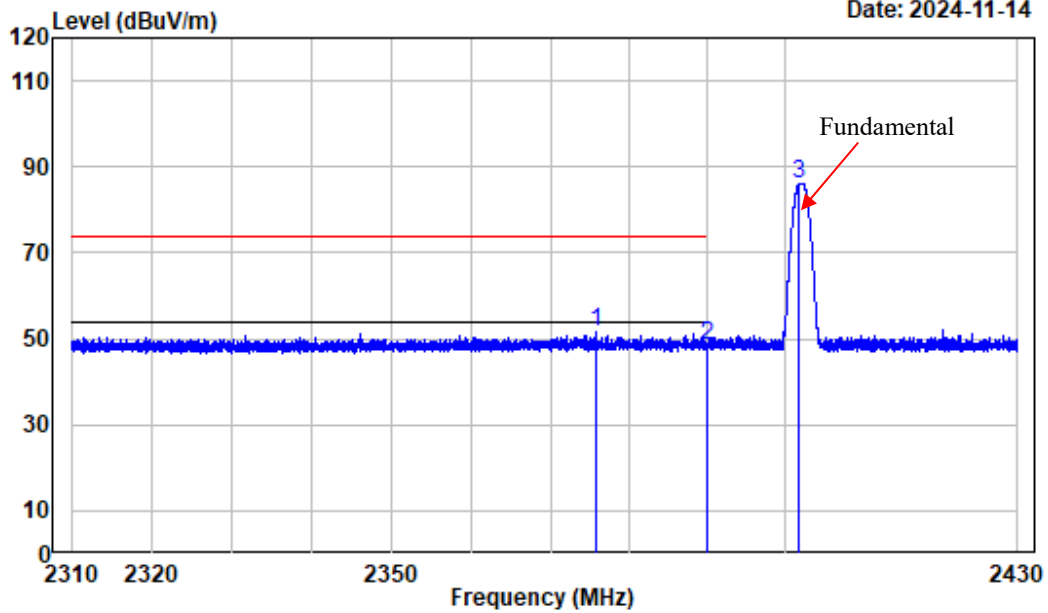
The other spurious emission which is 20dB to the limit or in noise floor level was not recorded.

Note: for the fundamental, the peak value can meet the limit of the average value.

Test plots for Band Edge Measurements (Radiated):

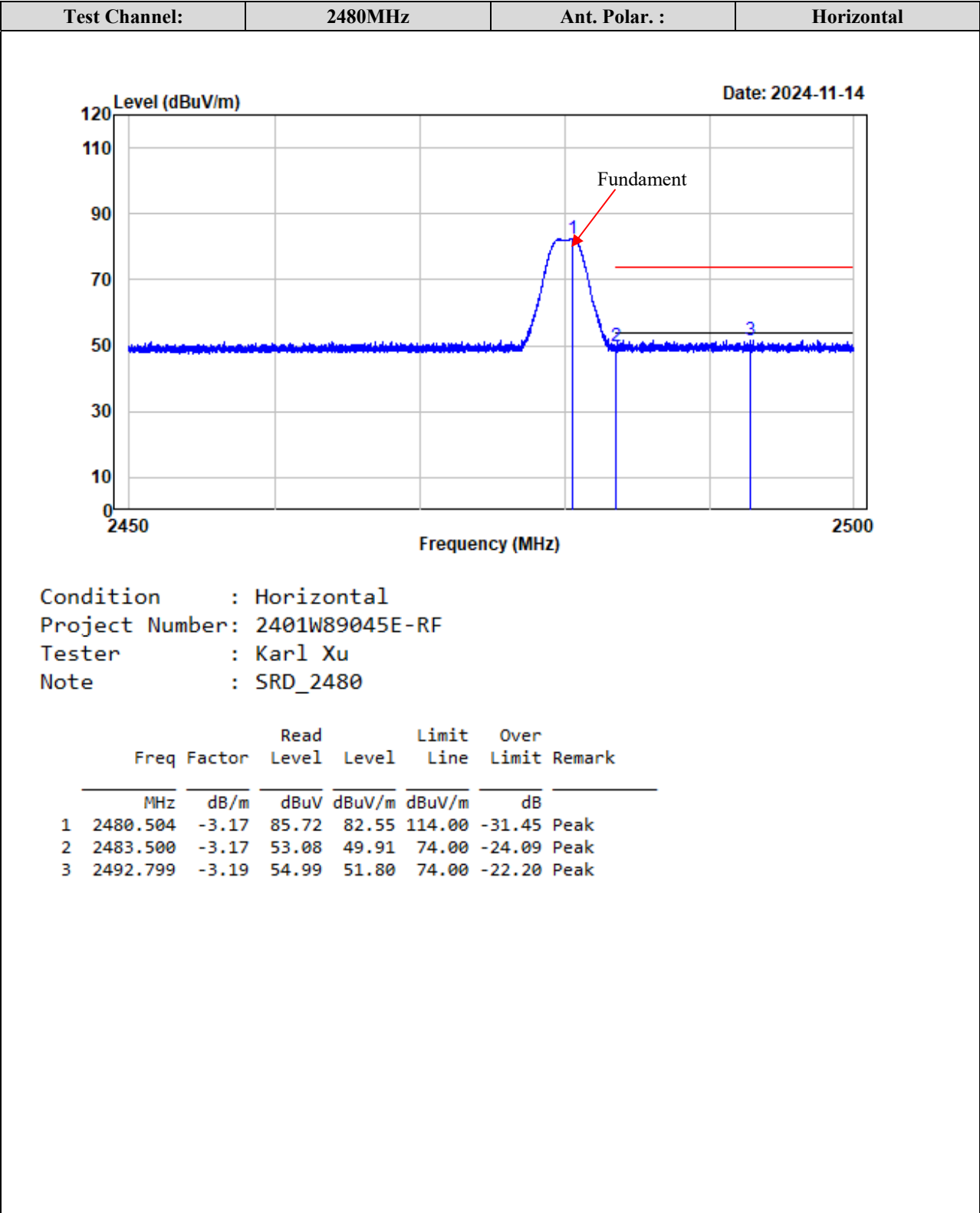


Test Channel: 2402MHz Ant. Polar. : Vertical

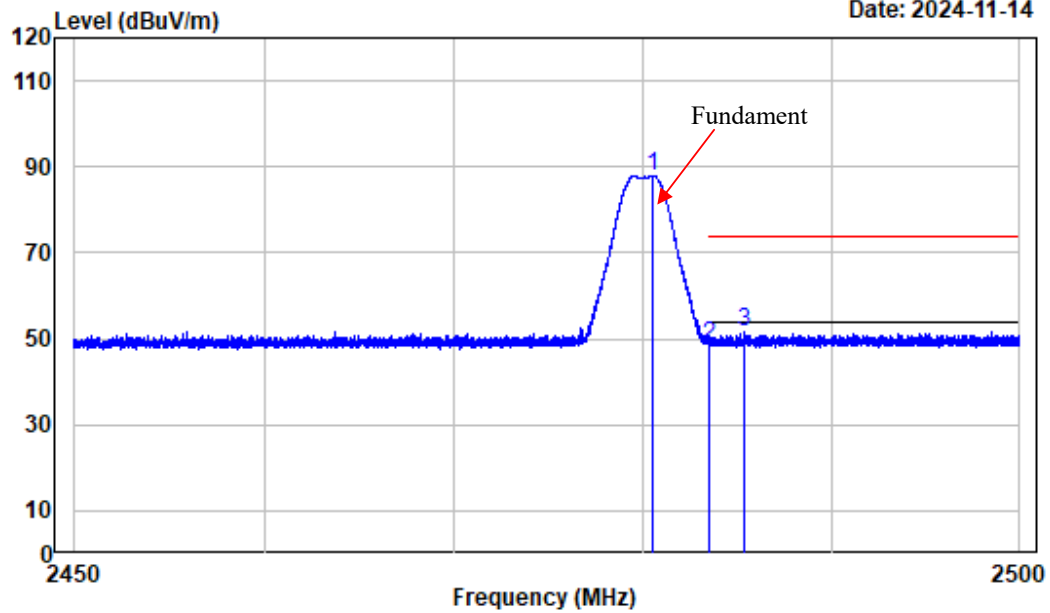


Condition : Vertical  
 Project Number: 2401W89045E-RF  
 Tester : Karl Xu  
 Note : SRD\_2402

	Freq	Factor	Read Level	Limit Level	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	2375.768	-3.18	54.68	51.50	74.00	-22.50 Peak
2	2390.000	-3.20	51.87	48.67	74.00	-25.33 Peak
3	2401.796	-3.21	89.21	86.00	114.00	-28.00 Peak



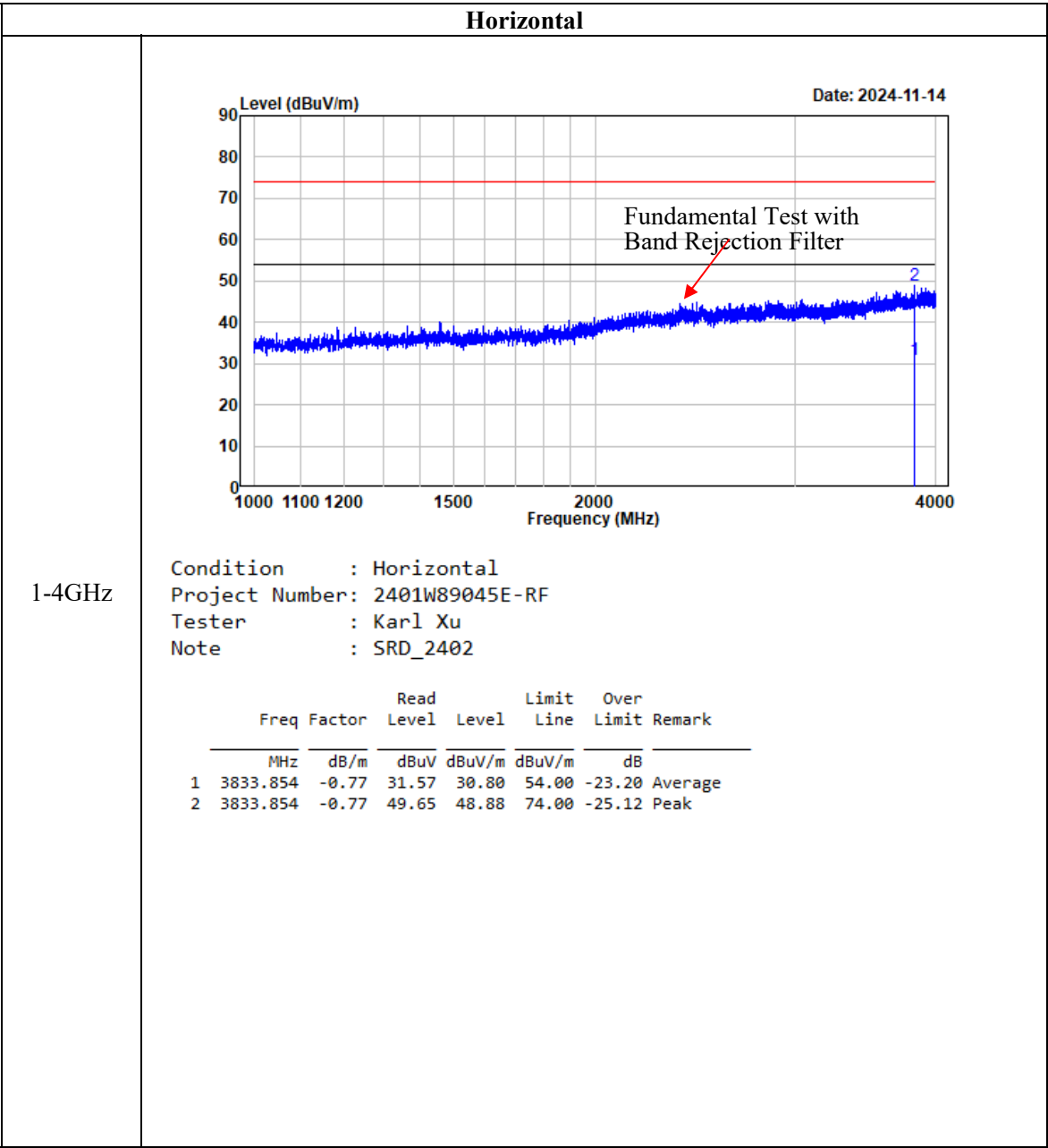
Test Channel: 2480MHz Ant. Polar. : Vertical

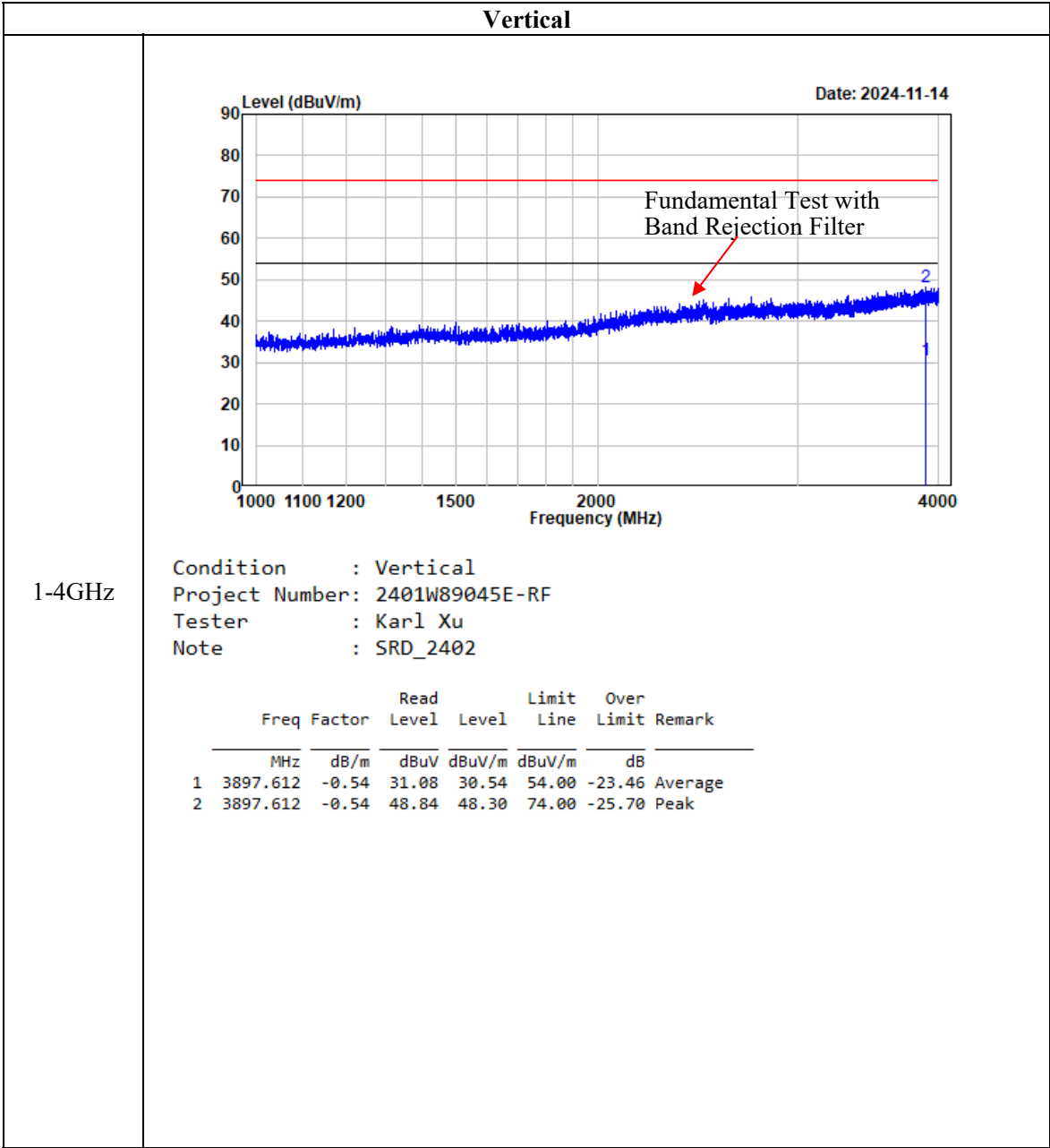


Condition : Vertical  
 Project Number: 2401W89045E-RF  
 Tester : Karl Xu  
 Note : SRD\_2480

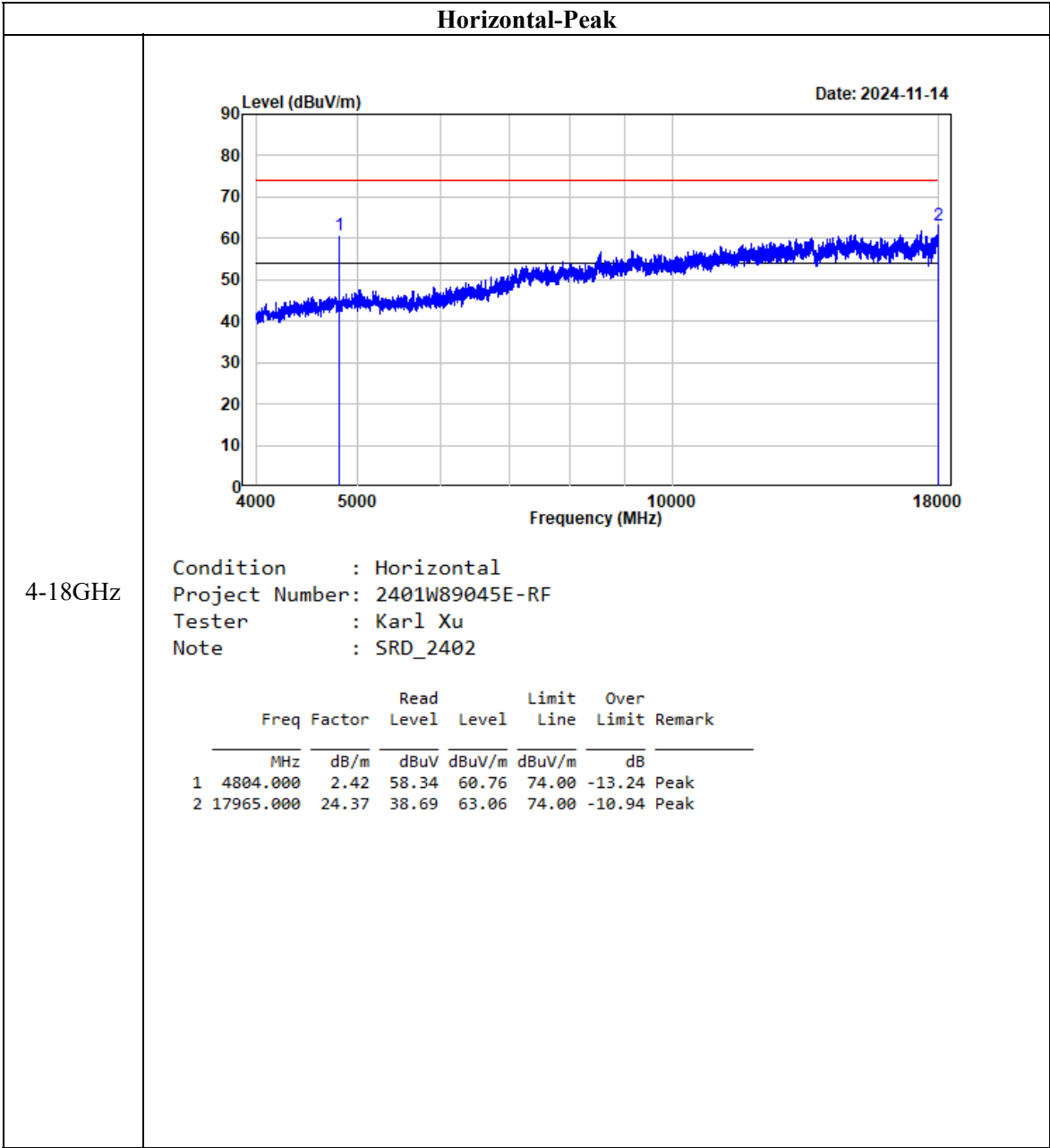
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2480.485	-3.17	91.13	87.96	114.00	-26.04	Peak
2	2483.500	-3.17	51.46	48.29	74.00	-25.71	Peak
3	2485.348	-3.17	54.73	51.56	74.00	-22.44	Peak

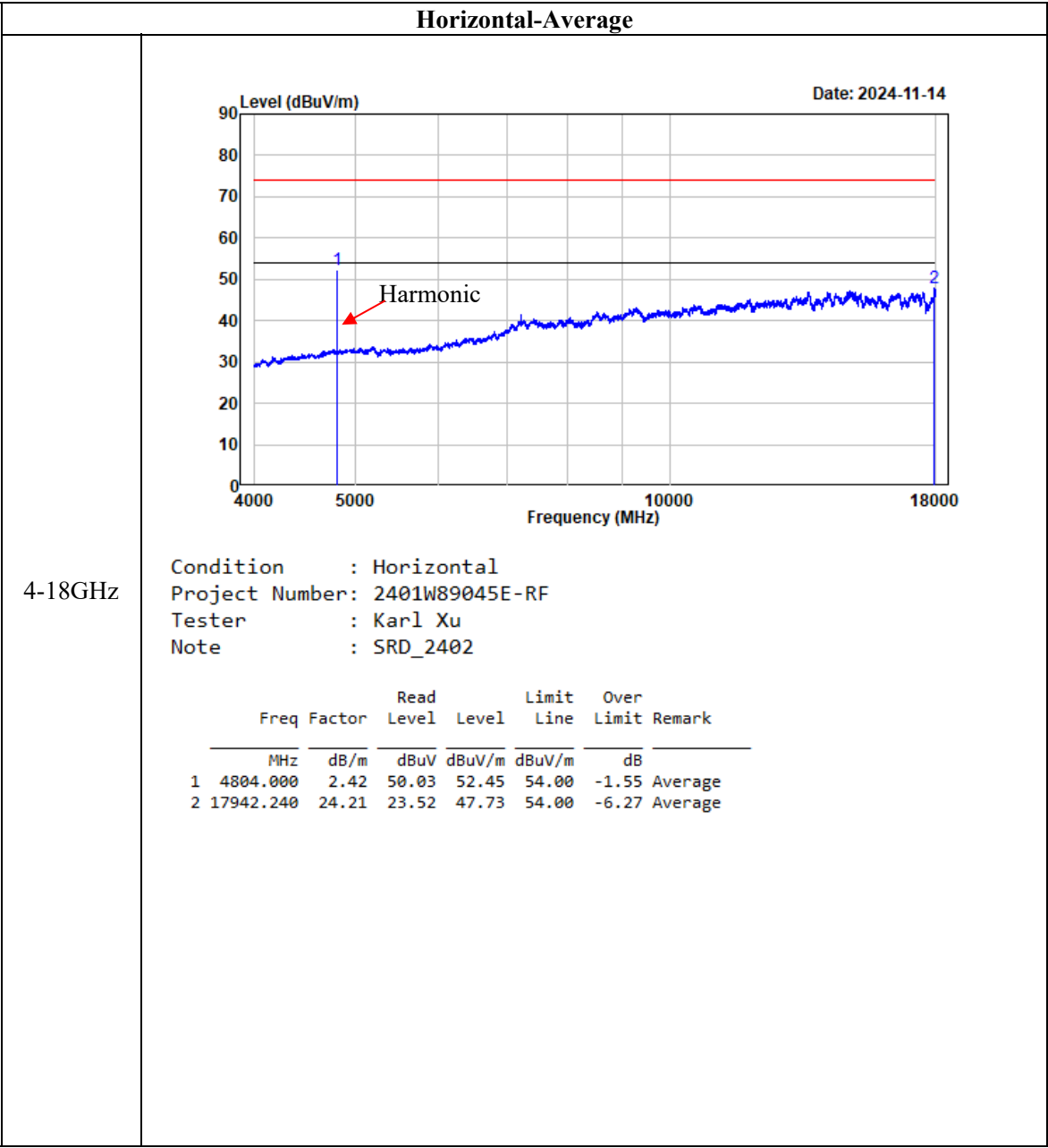
Listed with the worst harmonic margin test plot:

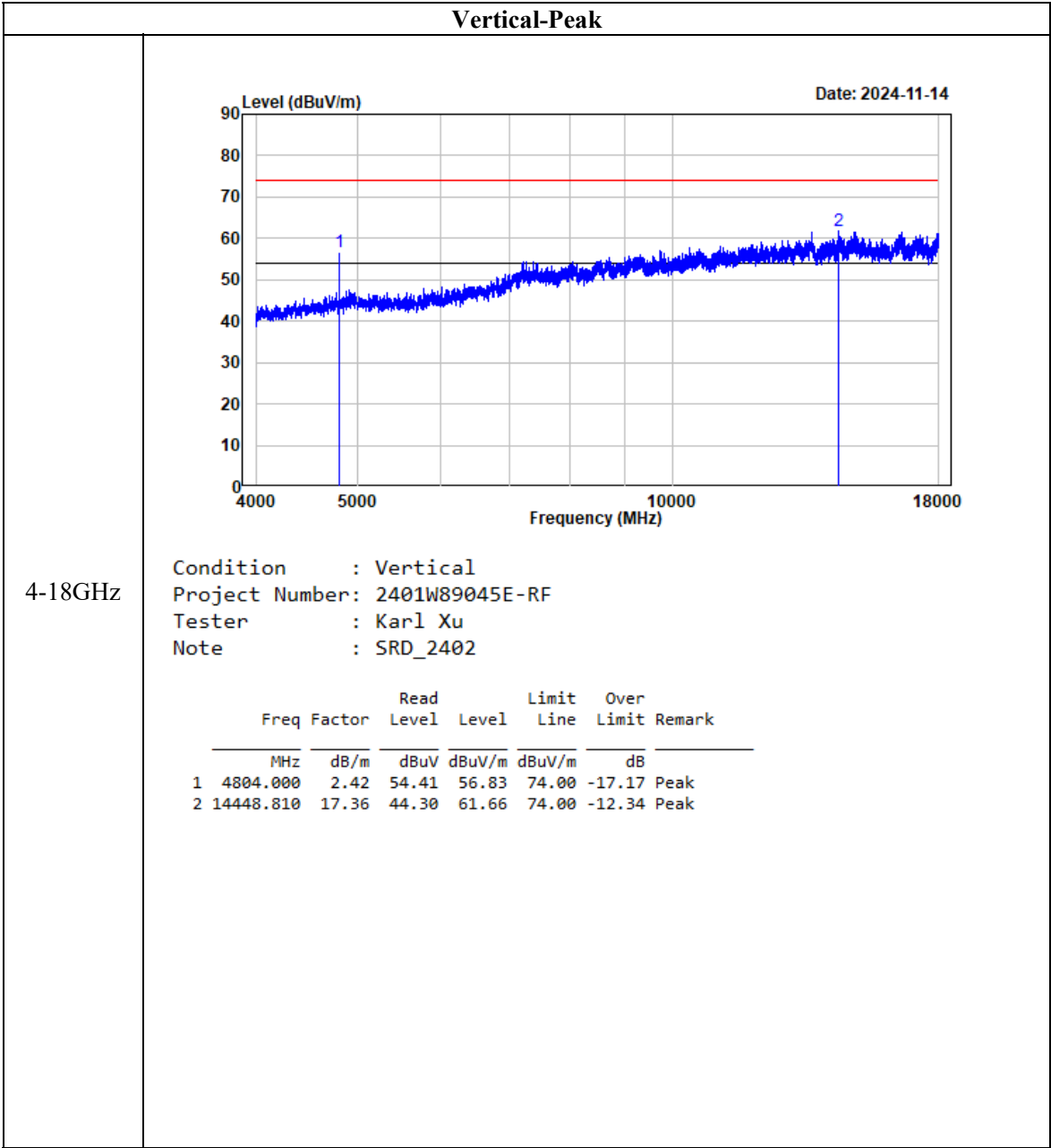


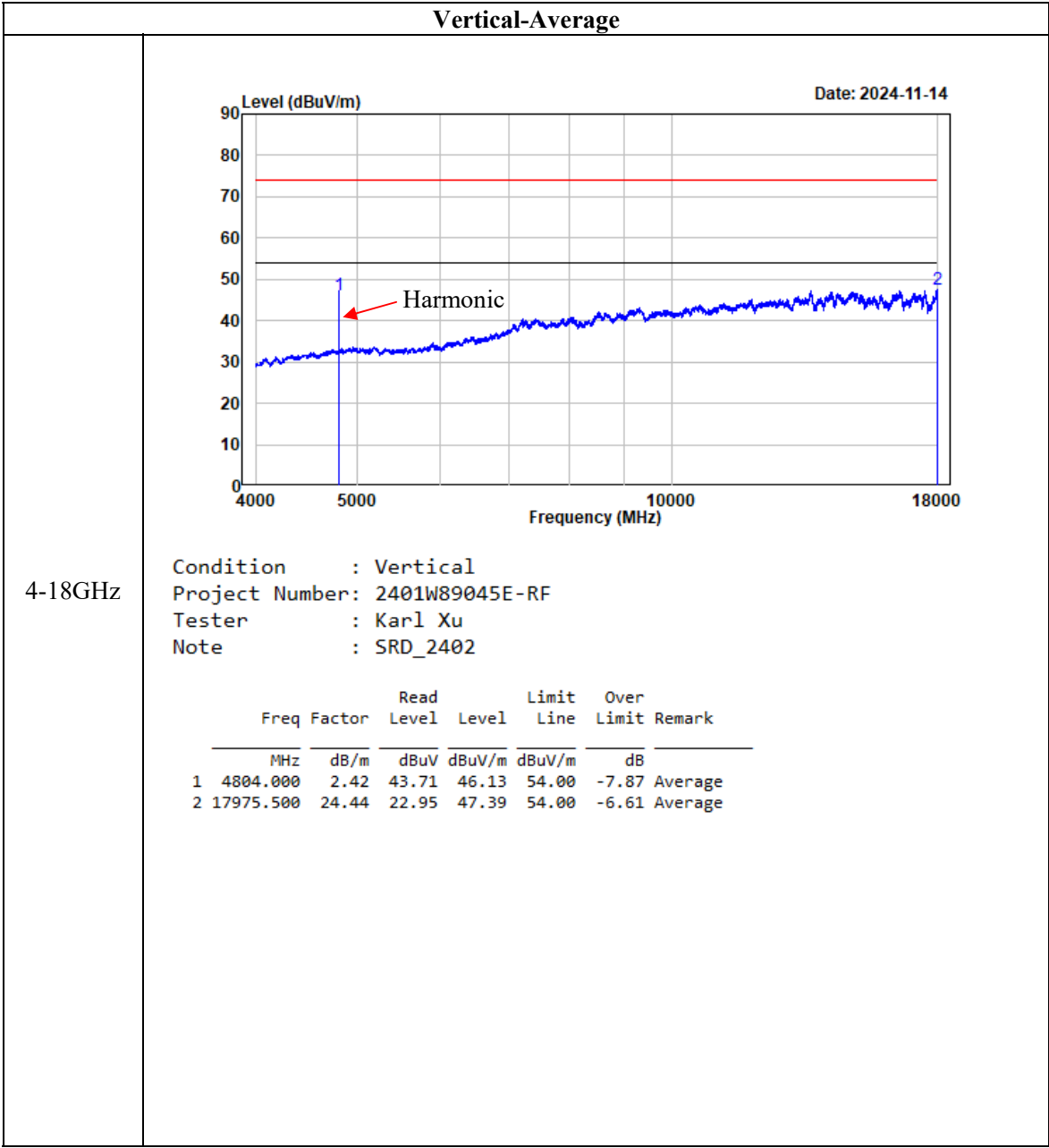


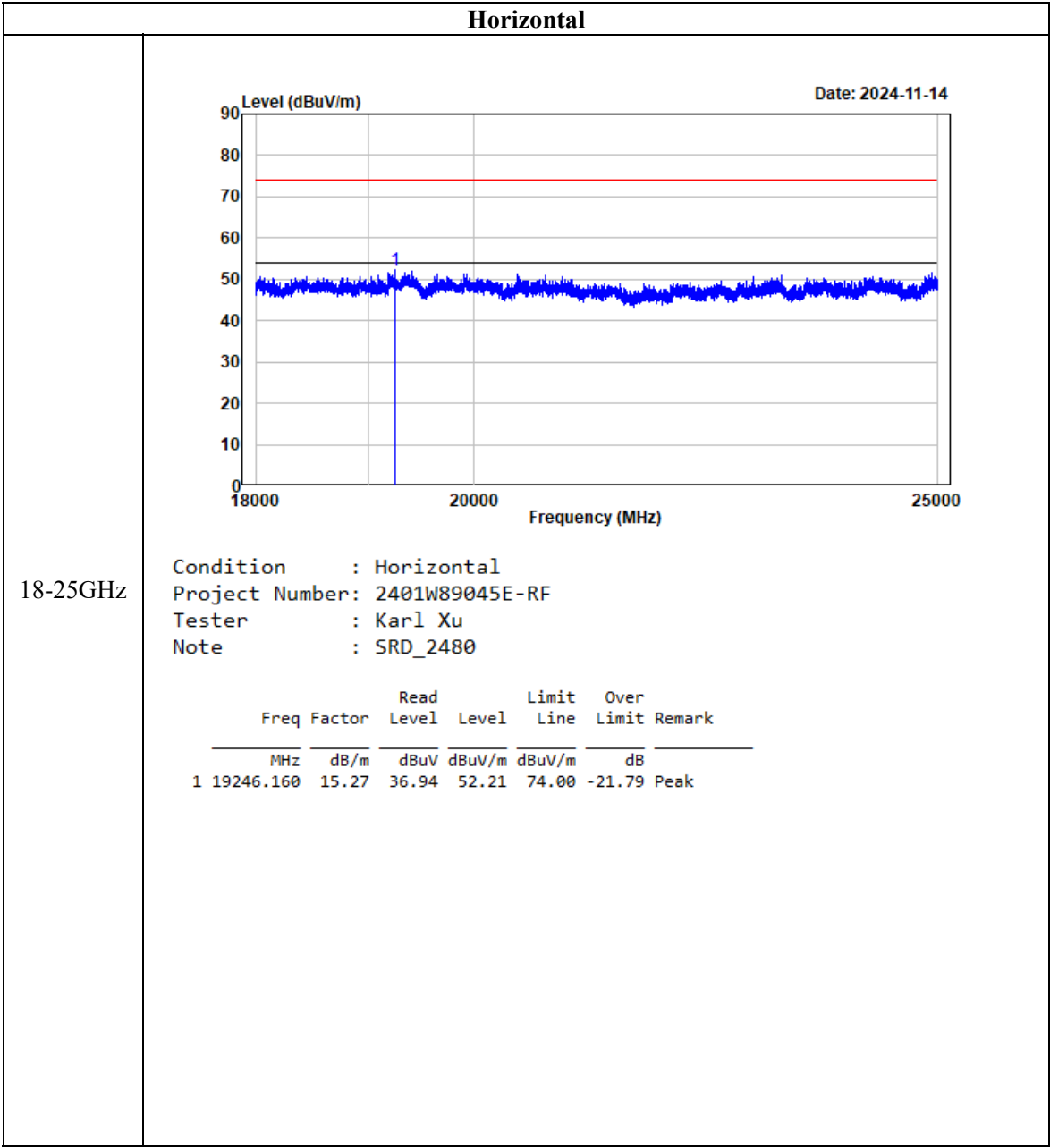


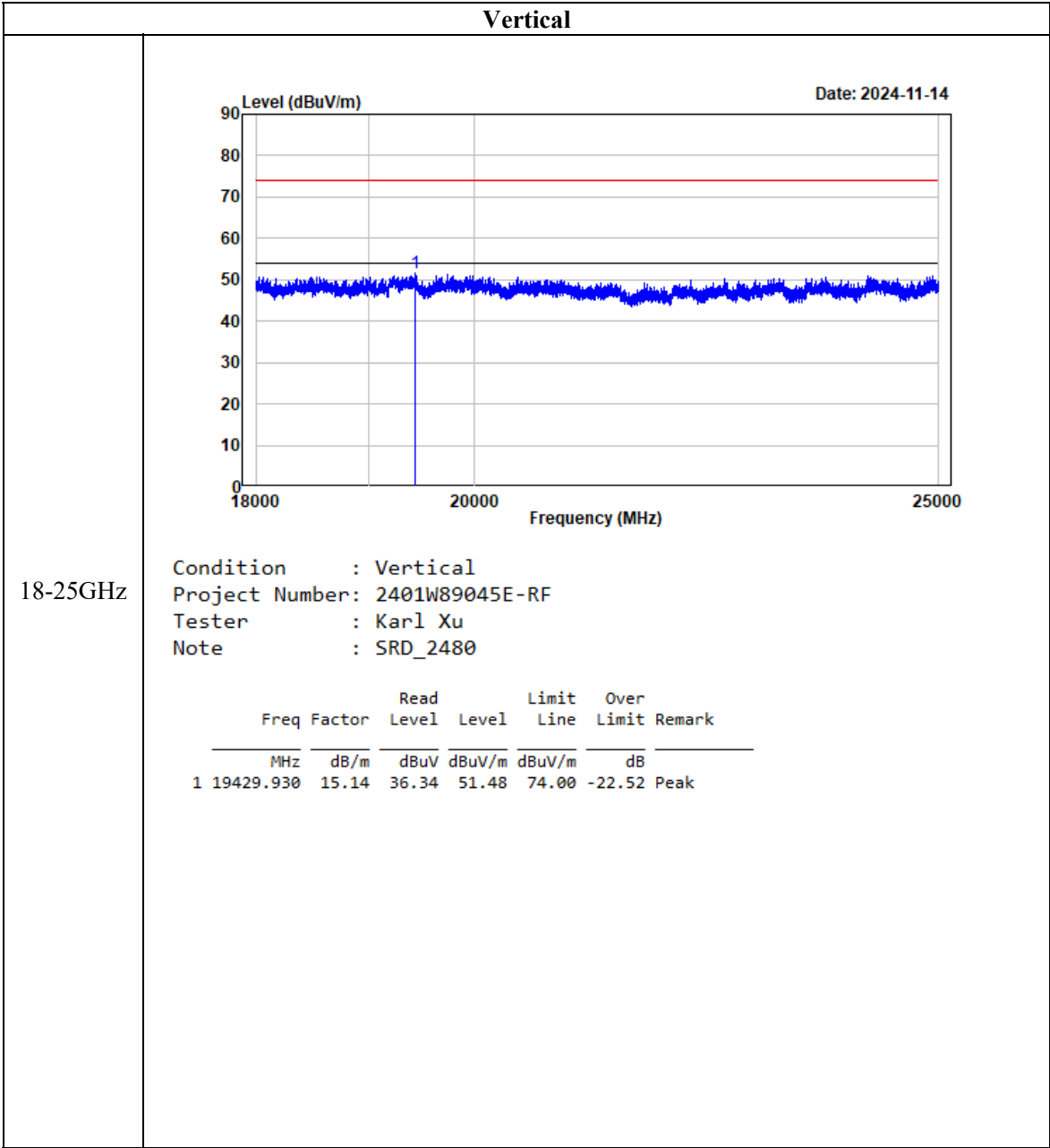












## FCC§15.215(c) - 20dB EMISSION BANDWIDTH

### Applicable Standard

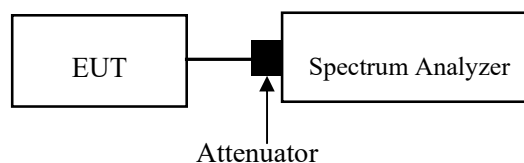
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific 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:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101 kPa

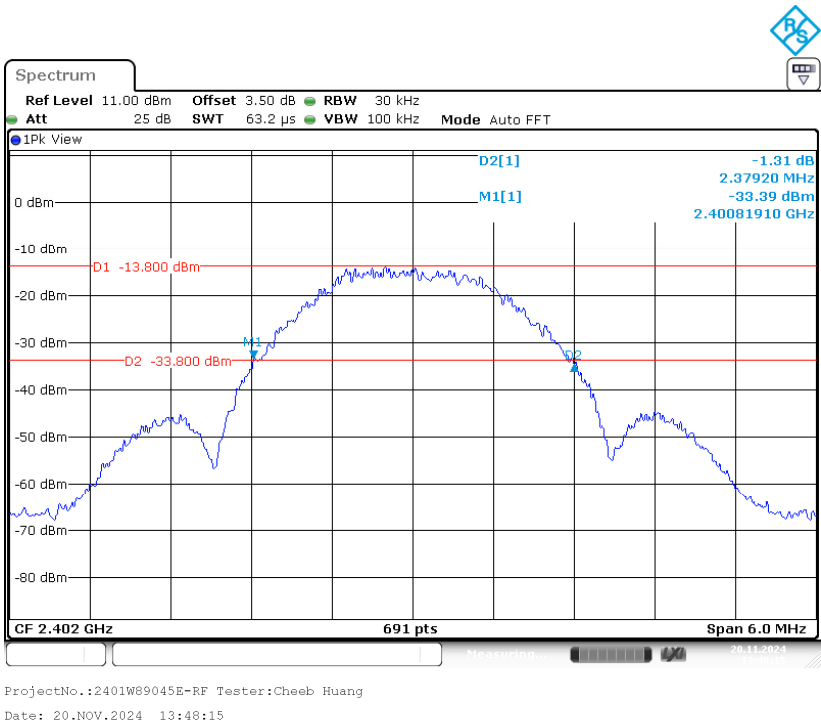
The testing was performed by Cheeb Huang on 2024-11-20.

EUT operation mode: Transmitting

Please refer to the following table and plots.

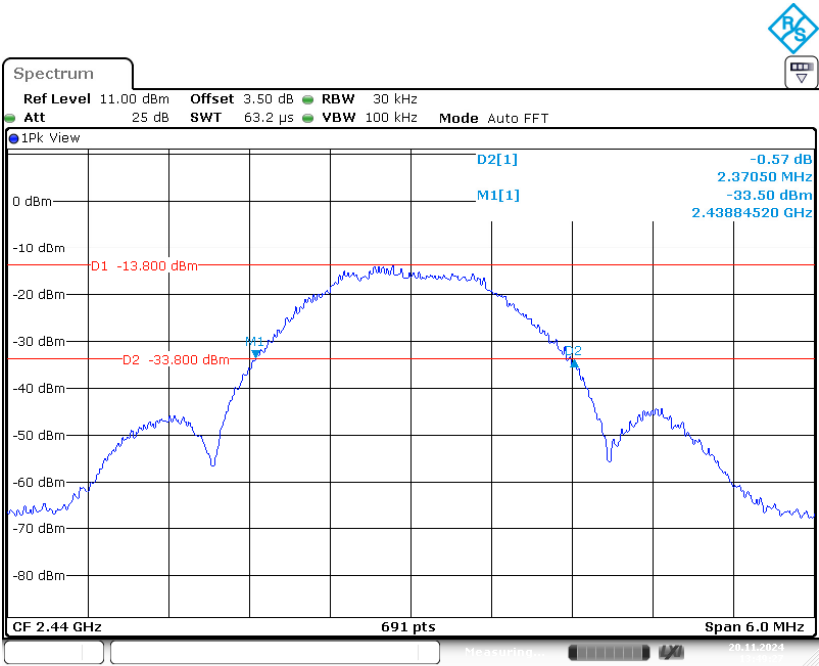
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	2.379
Middle	2440	2.371
High	2480	2.301

Low channel



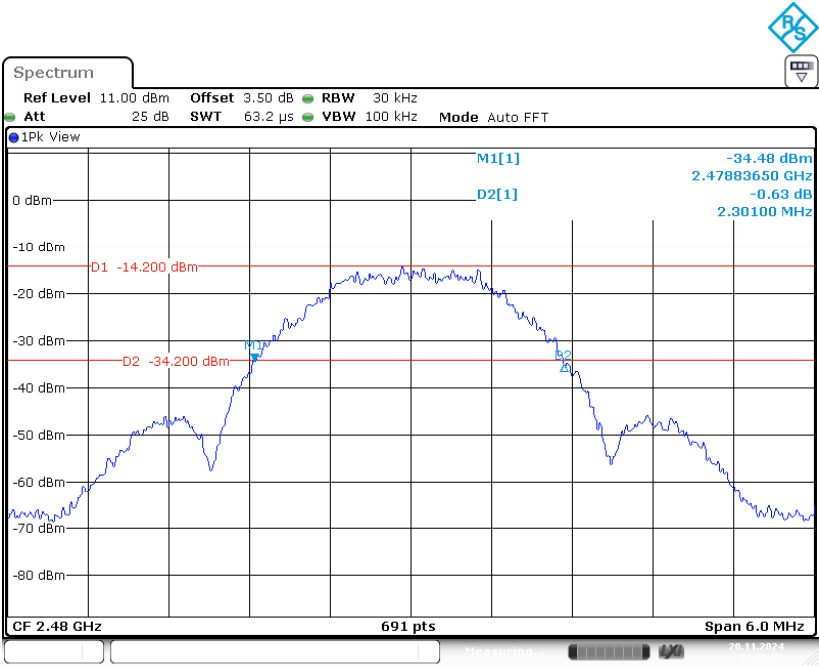


Middle Channel



ProjectNo.:2401W89045E-RF Tester:Cheeb Huang  
Date: 20.NOV.2024 13:49:26

High Channel



ProjectNo.:2401W89045E-RF Tester:Cheeb Huang  
Date: 20.NOV.2024 13:50:57

## **EUT PHOTOGRAPHS**

Please refer to the attachment 2401W89045E-RF External photo and 2401W89045E-RF Internal photo.

## **TEST SETUP PHOTOGRAPHS**

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Please refer to the attachment 2401W89045E-RF Test Setup photo.

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