

**ELECTROMAGNETIC EMISSIONS  
COMPLIANCE REPORT**

**Applicant:** Acrox Technologies Co., Ltd.  
4F., No. 89, Minshan St., Neihu Dist., Taipei City 114, Taiwan,  
R.O.C

**Manufacturer:** Acrox Technologies Co., Ltd.  
4F., No. 89, Minshan St., Neihu Dist., Taipei City 114, Taiwan,  
R.O.C

**Product Name:** HP Wireless Mouse

**Brand Name:** hp

**Model No.:** TPA-A004M

**Report Number:** TERF2401000267E2

**FCC ID** PRDMU132

**Date of EUT Received:** Jan. 25, 2024

**Date of Test:** Jan. 31, 2024 ~ Feb. 22, 2024

**Issue Date:** Mar. 15, 2024

Approved By \_\_\_\_\_

Jay Lin

**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT comply with FCC rule part §15.249.

The results of this report relate only to the sample identified in this report.

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Revision History					
Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2401000267E2	00	Original	Mar. 15, 2024	Yami Kuo	

**Note:**

- 1、The remark "\*" indicates modification of the report upon requests from certification body.

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## Contents

<b>1</b>	<b>GENERAL INFORMATION .....</b>	<b>4</b>
<b>2</b>	<b>SYSTEM TEST CONFIGURATION.....</b>	<b>6</b>
<b>3</b>	<b>SUMMARY OF TEST RESULTS .....</b>	<b>9</b>
<b>4</b>	<b>DESCRIPTION OF TEST MODES .....</b>	<b>10</b>
<b>5</b>	<b>THE WORST TEST MODES AND CHANNEL DETAILS.....</b>	<b>11</b>
<b>6</b>	<b>MEASUREMENT UNCERTAINTY .....</b>	<b>12</b>
<b>7</b>	<b>MEASUREMENT EQUIPMENT USED.....</b>	<b>13</b>
<b>8</b>	<b>AC POWER LINE CONDUCTED EMISSION TEST.....</b>	<b>14</b>
<b>9</b>	<b>RADIATED EMISSION TEST.....</b>	<b>18</b>
<b>10</b>	<b>EMISSION BANDWIDTH .....</b>	<b>40</b>
<b>8</b>	<b>ANTENNA REQUIREMENT .....</b>	<b>44</b>

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## 1 GENERAL INFORMATION

### 1.1 Product Description

Product Name:	HP Wireless Mouse
Brand Name:	hp
Model No.:	TPA-A004M
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.:	00001
Power Supply:	3.8Vdc from Super capacitor or 5Vdc from USB Port
Test Software (Name/Version)	default

### 1.2 RF Specification

Radio Technology:	2.4GHz Short Range Radio
Frequency Range:	2405 – 2476MHz
Channel number:	12 channels
Modulation type:	GFSK
Transmit Power:	92.99 dBuV/m at 3m (Avg) 95.90 dBuV/m at 3m (Peak)

### 1.3 Antenna Designation

Antenna Type	Freq. (MHz)	Peak Antenna Gain (dBi)
PCB	2402 - 2480	0.05

**Note:** Antenna information is provided by the applicant.

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### 1.4 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.249  
ANSI C63.10:2013

### 1.5 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	
		SAC 2		
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
	Conducted 6			
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
Conducted F				
Conducted G				

**Note:** Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

### 1.6 Special Accessories

There are no special accessories used while test was conducted.

### 1.7 Equipment Modifications

There was no modification incorporated into the EUT.

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## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

#### 2.3.3 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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## 2.4 Measurement Results Explanation Example

### 2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m\*6m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

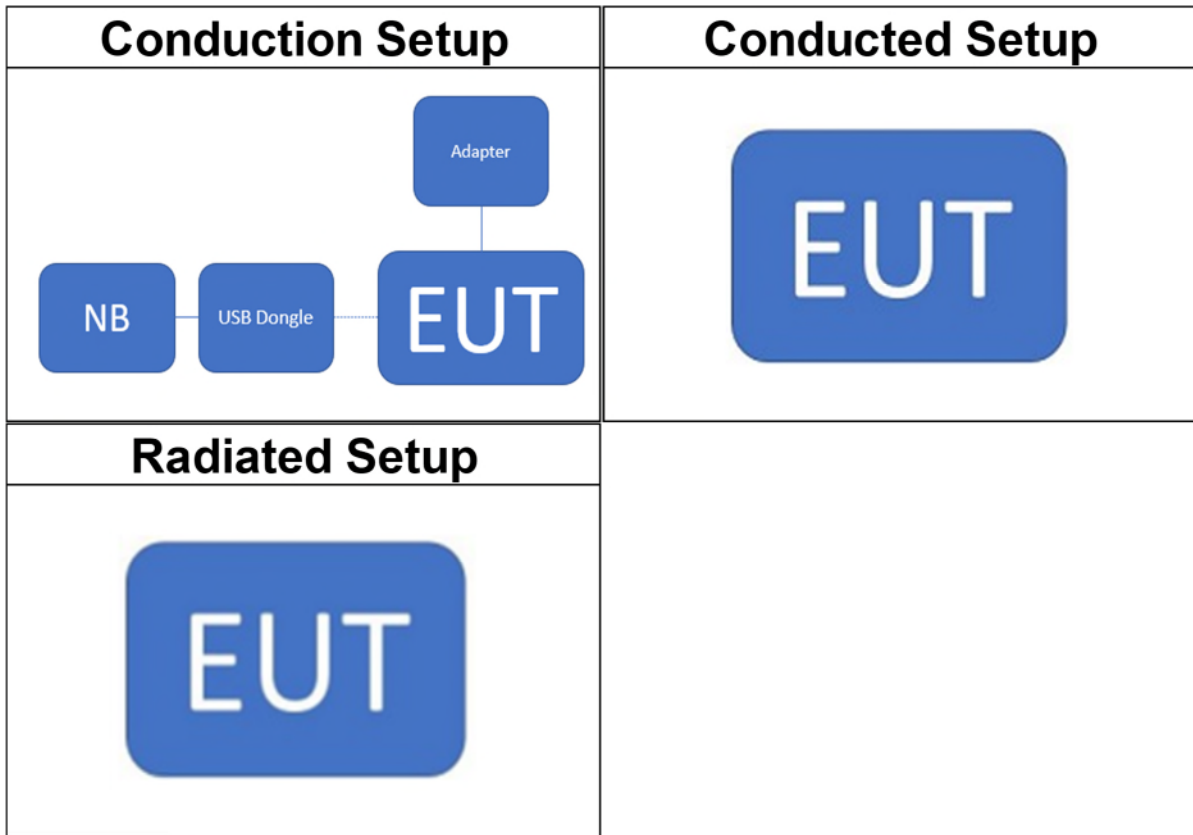
### 2.4.2 For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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2.5 Test Configuration



2.6 Control Unit(s)

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	T14	P0003332	N/A	N/A
USB Cable	ACROX	USBC	N/A	N/A	N/A
Adapter	Lapo	WT-02CA	N/A	N/A	N/A

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### 3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.205 §15.249(a)(e) §15.209	Radiated Emission	Compliant
§15.215(c)	Emission Bandwidth	Compliant
§15.203	Antenna Requirement	Compliant

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## 4 DESCRIPTION OF TEST MODES

### 4.1 Operating Frequencies

Channel	Frequency(MHz)
0	2405
1	2407
2	2408
3	2422
4	2423
5	2427
6	2447
7	2451
8	2452
9	2473
10	2474
11	2476

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## 5 THE WORST TEST MODES AND CHANNEL DETAILS

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

### RADIATED EMISSION TEST:

TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHz)		
MODE	AVAILABLE CHANNEL	TESTED CHANNEL
2.4GHz	0 to 11	6
TRANSMIT RADIATED EMISSION TEST (ABOVE 1 GHz)		
MODE	AVAILABLE CHANNEL	TESTED CHANNEL
2.4GHz	0 to 11	0,6,11
RECEIVE RADIATED EMISSION TEST (BELOW 1 GHz)		
MODE	AVAILABLE CHANNEL	TESTED CHANNEL
2.4GHz	0 to 11	6
RECEIVE RADIATED EMISSION TEST (ABOVE 1 GHz)		
MODE	AVAILABLE CHANNEL	TESTED CHANNEL
2.4GHz	0 to 11	6

**Note:** The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

### ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST					
MODE	AVAILABLE CHANNEL	TESTED FREQUENCY	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
2.4G	0~11	2405, 2447, 2476	GFSK	N/A	MAIN

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## 6 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 1.54 dB
Emission Bandwidth	+/- 1.38 Hz
Conducted emission measurement	+/- 0.77 dB
Temperature	+/- 0.6 °C
Humidity	+/- 3 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty				
Polarization: Vertical	+/-	1.89	dB	9kHz~30MHz
	+/-	4.15	dB	30MHz - 1000MHz
	+/-	3.43	dB	1GHz - 18GHz
	+/-	3.86	dB	18GHz - 40GHz
Polarization: Horizontal	+/-	1.89	dB	9kHz~30MHz
	+/-	4.02	dB	30MHz - 1000MHz
	+/-	3.43	dB	1GHz - 18GHz
	+/-	3.86	dB	18GHz - 40GHz
Radiated Spurious Emission	+/-	2	dB	33GHz-50GHz
	+/-	1.59	dB	50GHz-60GHz
	+/-	1.7	dB	60GHz-90GHz
	+/-	1.64	dB	90GHz-140GHz
	+/-	3.83	dB	140GHz-220GHz

### Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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## 7 MEASUREMENT EQUIPMENT USED

### 7.1 Emission from AC power line

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
LISN	SCHWARZBECK Mess-Elektronik	NSLK8127	973	04/20/2023	04/19/2024
EMI Test Receiver	R&S	ESCI	101342	04/24/2023	04/23/2024
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2023	03/26/2024
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2023	03/26/2024
Test Software	audix	e3	E3 20923 SGS Ver.9 ( C )	N.C.R	N.C.R

### 7.2 Conducted Measurement

Conducted Emission Test Site: Conducted E					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	07/07/2023	07/06/2024
Attenuator	Marvelous	MVE2213-10	RF06	11/15/2023	11/14/2024
DC Block	PASTERNAK	PE8210	RF157	11/15/2023	11/14/2024

### 7.3 Radiated Measurement

Radiated Emission Test Site: SAC C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-300	11/02/2023	11/01/2024
Horn Antenna	Schwarzbeck	BBHA9170	184	12/28/2023	12/27/2024
Horn Antenna	Schwarzbeck	BBHA9120D	1187	01/24/2024	01/23/2025
Loop Antenna	ETS.LINDGREN	6502	143303	05/23/2023	05/22/2024
3m Site NSA	SGS	966 chamber C	N/A	03/02/2023	03/01/2024
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	04/11/2023	04/10/2024
Test Software	audix	e3	E3 20923 SGS Ver.9 ( C )	N.C.R	N.C.R
Pre-Amplifier	EMC Instruments	EMC330	980096	11/15/2023	11/14/2024
Pre-Amplifier	EMC Instruments	EMC118A45SE	980789	11/15/2023	11/14/2024
Pre-Amplifier	EMC Instruments	EMC18405SEE	980881	11/15/2023	11/14/2024
Attenuator	Woken	WATT-218FS-10	RF17	11/15/2023	11/14/2024
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	MY17388/4	11/15/2023	11/14/2024
Coaxial Cable	Huber+Suhner	RG 214/U	W22.03	11/15/2023	11/14/2024

**NOTE:** N.C.R refers to Not Calibrated Required.

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## 8 AC POWER LINE CONDUCTED EMISSION TEST

### 8.1 Applicable Standard:

Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits (dBuV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

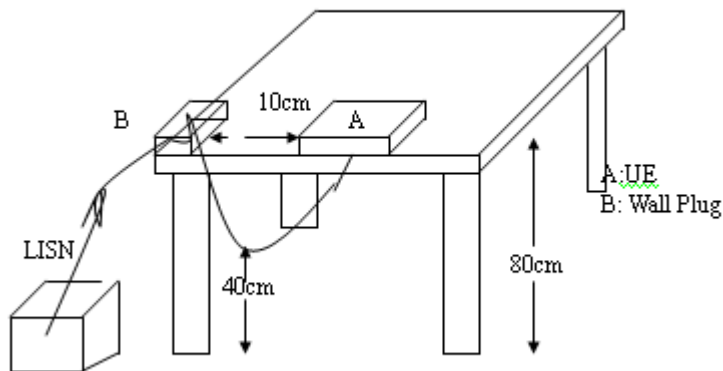
Note

- The lower limit shall apply at the transition frequencies
- The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### 8.2 EUT Setup:

- The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- The LISN was connected with 120Vac/60Hz power source.

### 8.3 Test Setup



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#### 8.4 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed

#### 8.5 Measurement Result:

Note: Refer to next page for measurement data and plots.

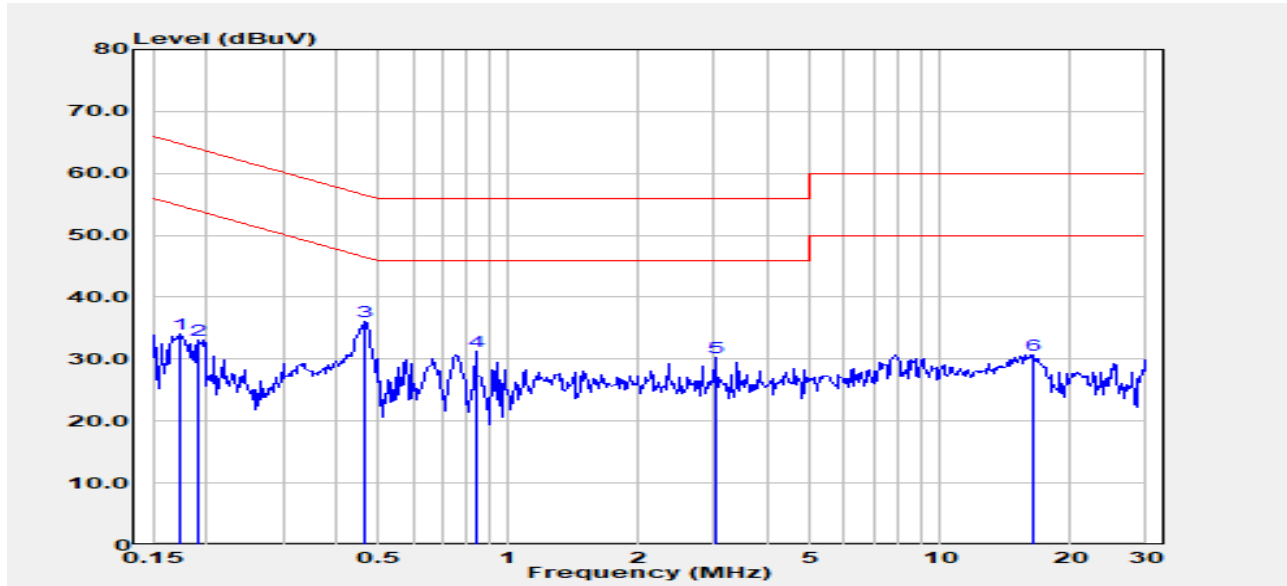
Note2: The \* reveals the worst-case results that closest to the limit.

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### AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number	:TERF2401000267E2	Test Site	:Conduction C
Test Mode	:2.4G	Test Date	:2024-02-22
Power	:120V/60Hz	Temp./Humi.	:22.8°C/52%
Probe	:L1	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.173	Peak	23.37	10.65	34.02	64.80	-30.78
0.190	Peak	22.45	10.65	33.10	64.03	-30.92
0.464	Peak	25.54	10.62	36.16	56.62	-20.46
0.841	Peak	20.64	10.67	31.31	56.00	-24.69
3.005	Peak	19.40	10.85	30.25	56.00	-25.75
16.417	Peak	19.65	11.10	30.76	60.00	-29.24

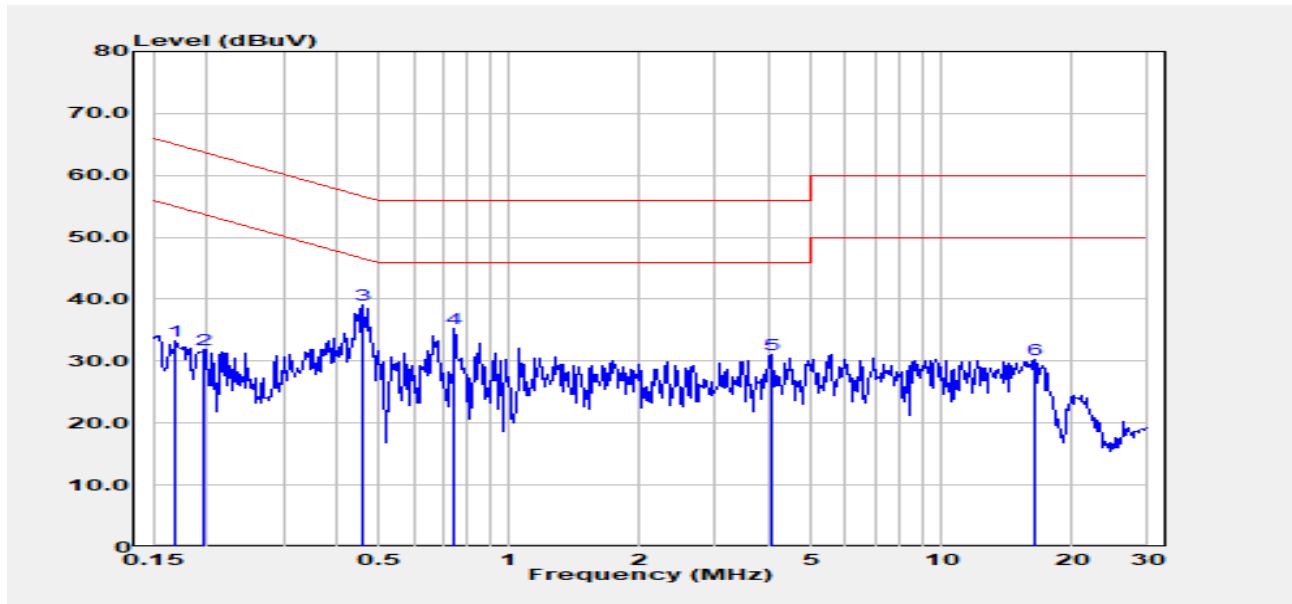
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Report Number	:TERF2401000267E2	Test Site	:Conduction C
Test Mode	:2.4G	Test Date	:2024-02-22
Power	:120V/60Hz	Temp./Humi.	:22.8°C/52%
Probe	:N	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V	Limit dB $\mu$ V	Margin dB
0.169	Peak	22.55	10.66	33.21	65.01	-31.81
0.197	Peak	21.30	10.65	31.95	63.74	-31.80
0.456	Peak	28.41	10.61	39.01	56.76	-17.75
0.747	Peak	24.74	10.64	35.38	56.00	-20.62
4.044	Peak	20.19	10.88	31.07	56.00	-24.93
16.417	Peak	19.17	11.10	30.27	60.00	-29.73

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## 9 RADIATED EMISSION TEST

### 9.1 Applicable Standard

1. Only spurious emissions are permitted in any of the frequency bands listed in §15.205.
2. The field strength of fundamental and harmonic emissions, measured at 3 m, shall not exceed 50 mV/m and 0.5 mV/m respectively.
3. Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in §15.209, whichever is less stringent.

### 9.2 Measurement Procedure

#### 9.2.1 Duty Factor

1. Place the EUT on the table and set it in transmitting mode.
2. Set span = Zero
3. RBW = 8MHz, VBW = 8MHz,
4. Detector = Peak

#### 9.2.2 Radiated Emission

1. The EUT was placed on a turn table with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. Set the spectrum analyzer as RBW=100 kHz and VBW=300 kHz for Peak Detector (PK) at frequency between 30MHz and 1 GHz.
5. Use receiver mode as RBW=120 kHz for Quasi-peak (QP) at frequency between 30MHz and 1 GHz.
6. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Maximum Emission Measurements at frequency above 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Emission Measurements at frequency above 1 GHz.
8. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

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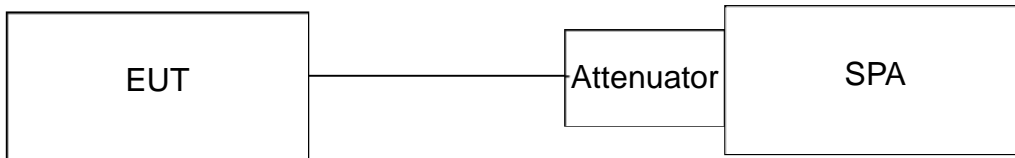
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10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

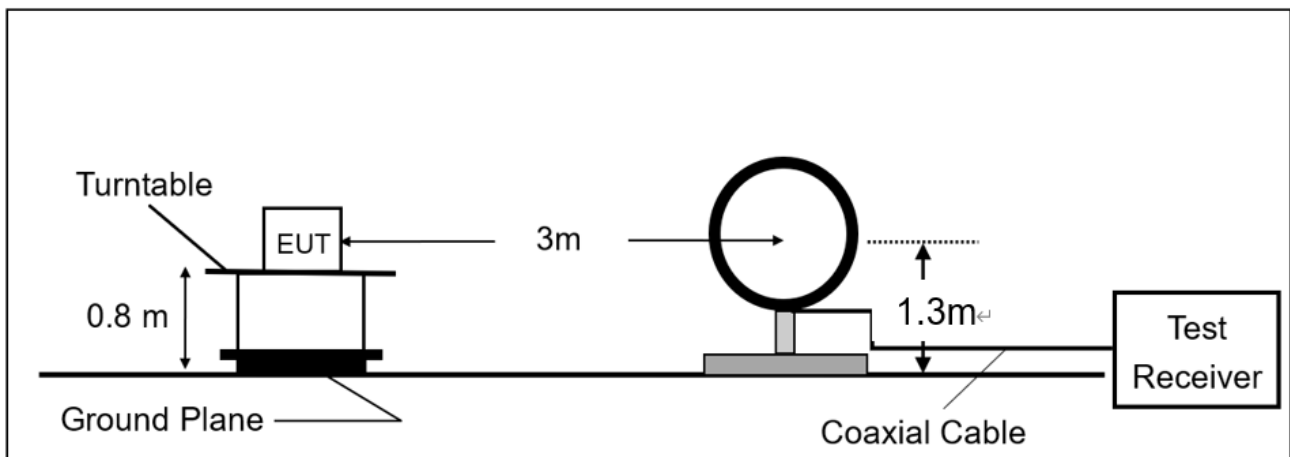
11. Repeat above procedures until all default test channel measured were complete.

### 9.3 Test Setup

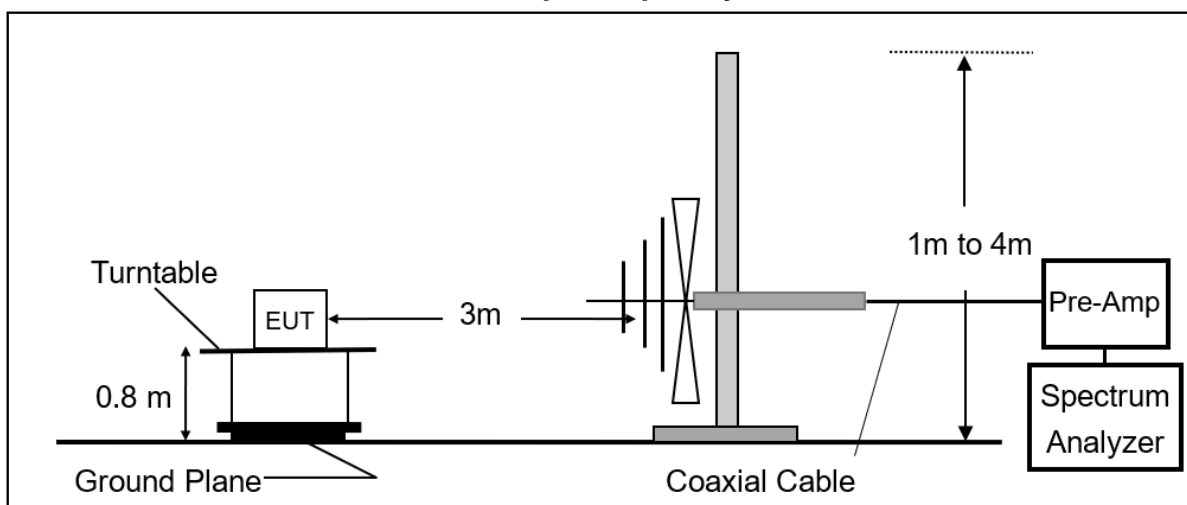
#### 9.3.1 Duty Factor



#### 9.3.2 Radiated Emission Test Set-Up, Frequency Below 30MHz.



#### 9.3.3 Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.

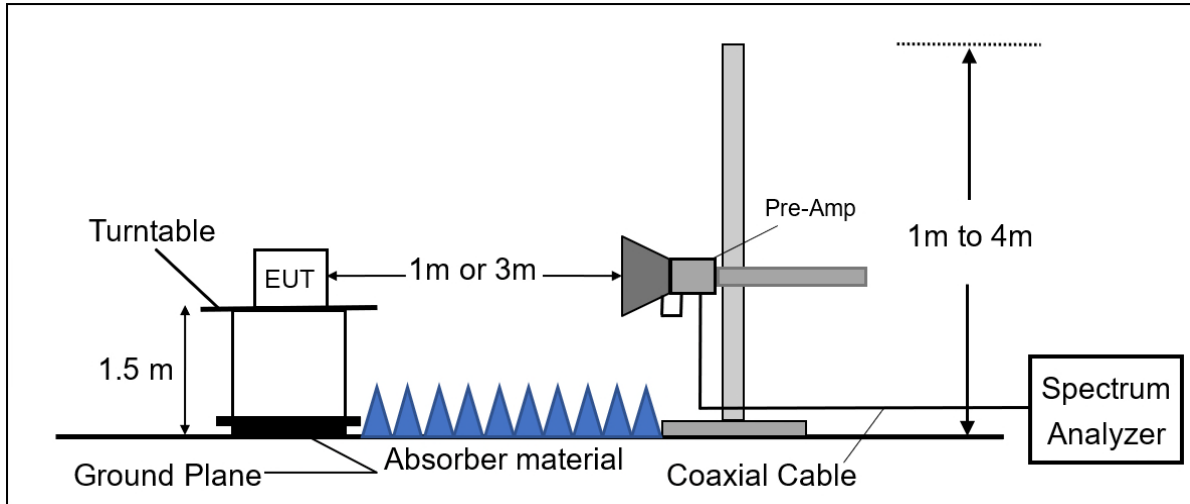


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### 9.3.4 Radiated Emission Test Set-Up, Frequency Above 1GHz.



### 9.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

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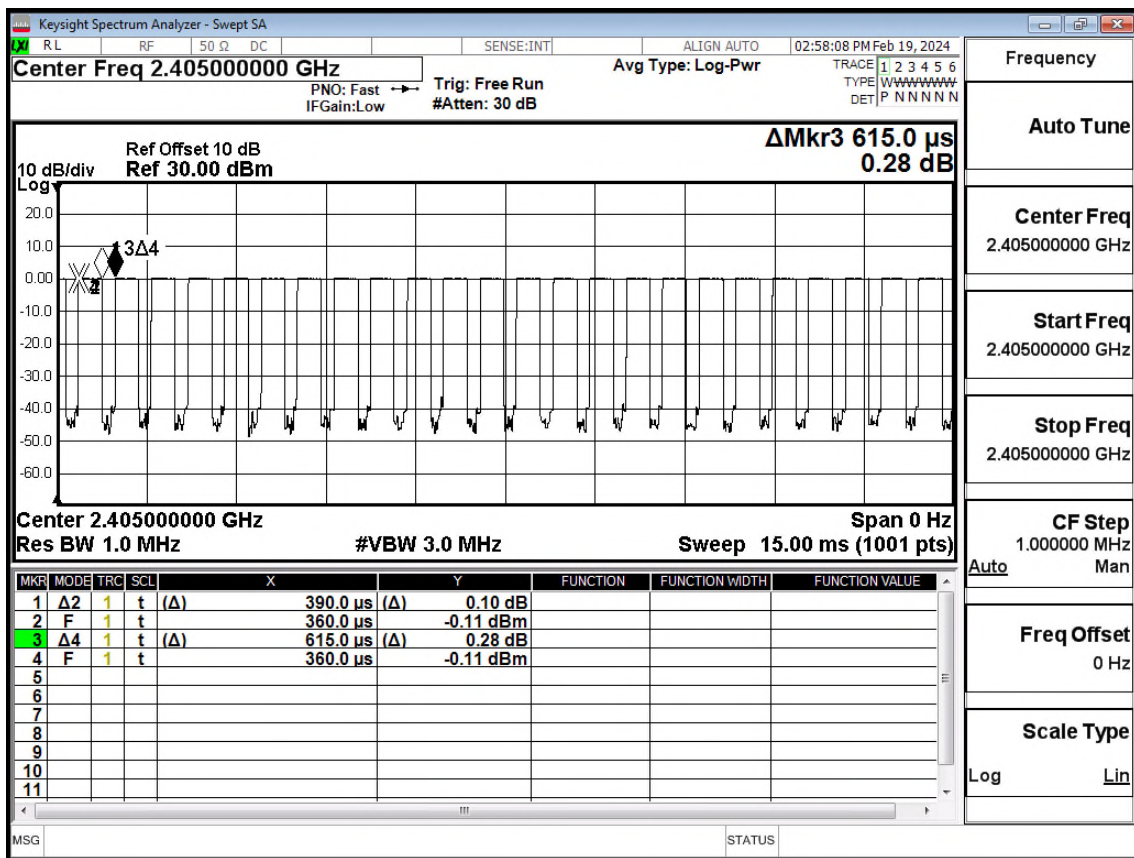
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9.5 Measurement Result

9.6 Duty Factor:

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log ( 1/Duty Cycle )	1/T (kHz)	VBW setting (kHz)
2.4G	63.41	1.98	2.56	3.00

2405MHz



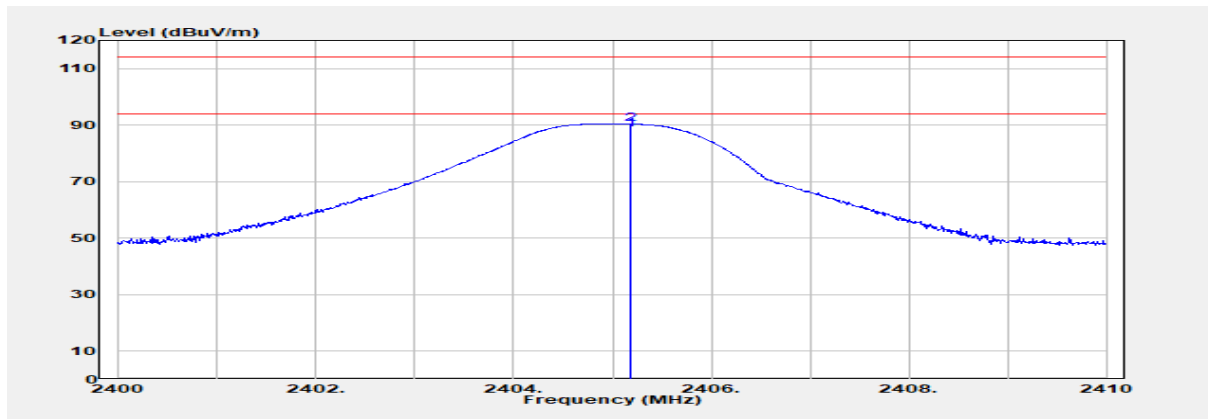
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### 9.6.1 Field Strength of the Fundamental Signal

Report Number	:TERF2401000267E2	Test Site	:SAC C
Operation Mode	:2.4GHz	Test Date	:2024-02-21
Test Frequency	:2405 MHz	Temp./Humi.	:20.0°C/62%
Test Mode	:Main	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2405.180	Average	92.74	-4.31	88.43	94.00	-5.57
2405.180	Peak	94.63	-4.31	90.31	114.00	-23.69

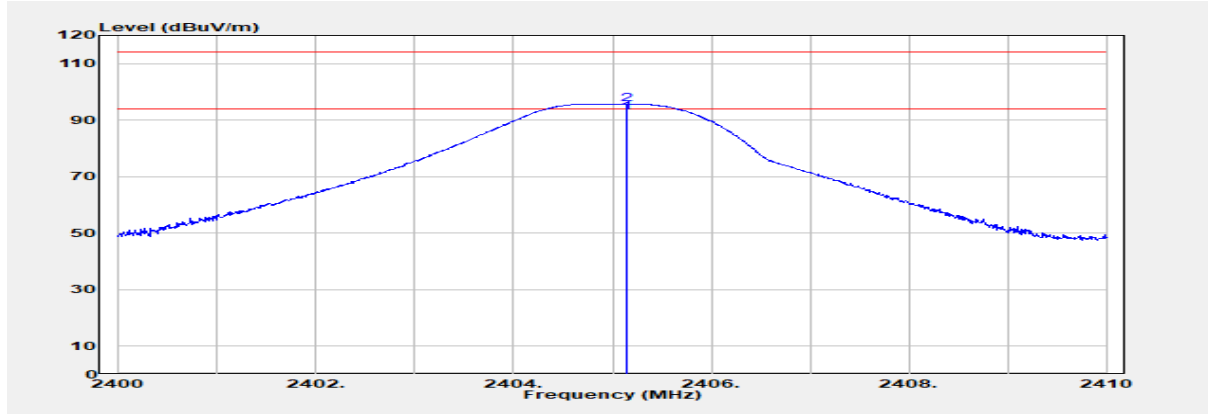
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2405 MHz  
 Test Mode :Main  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Horizontal  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2405.150	Average	97.16	-4.31	92.84	94.00	-1.16
2405.150	Peak	100.05	-4.31	95.74	114.00	-18.26

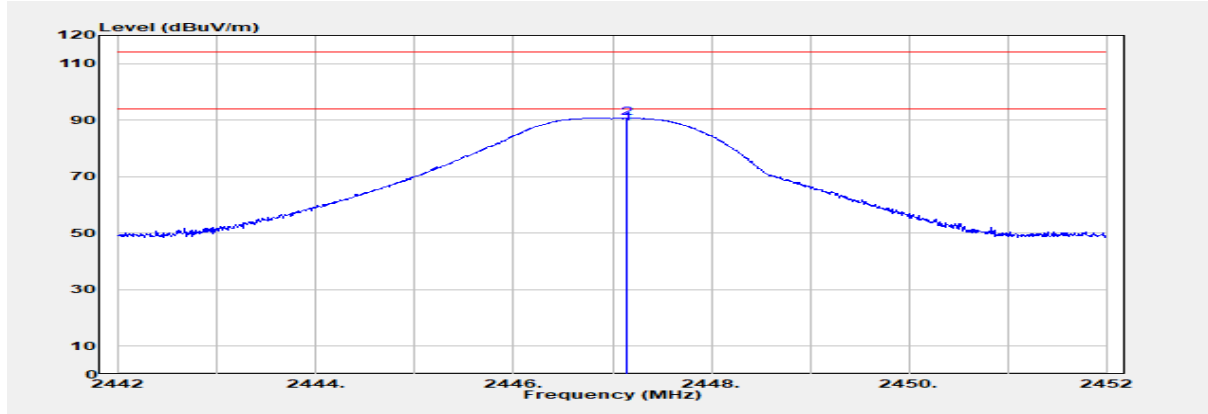
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2447 MHz  
 Test Mode :Main  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Vertical  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2447.150	Average	92.96	-4.17	88.78	94.00	-5.22
2447.150	Peak	94.88	-4.17	90.70	114.00	-23.30

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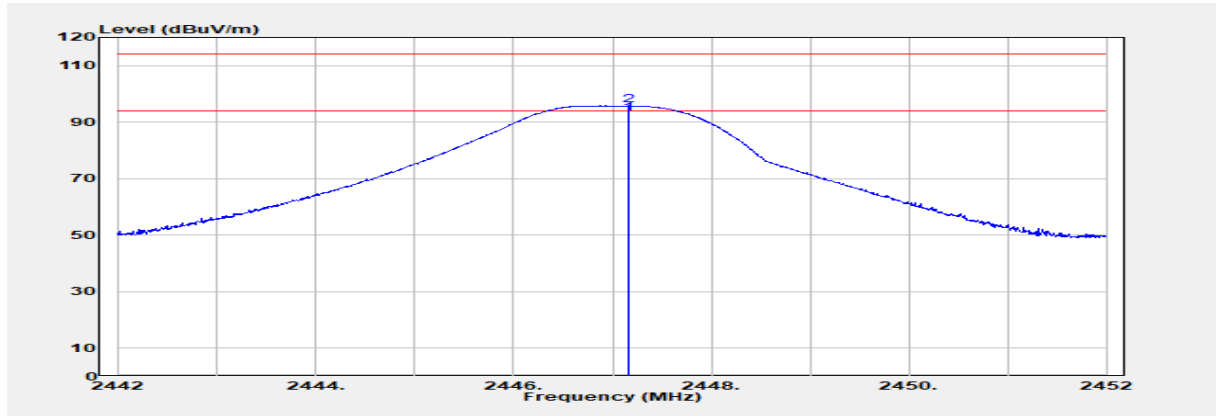
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2447 MHz  
 Test Mode :Main  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Horizontal  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2447.160	Average	97.16	-4.17	92.99	94.00	-1.01
2447.160	Peak	99.95	-4.17	95.78	114.00	-18.22

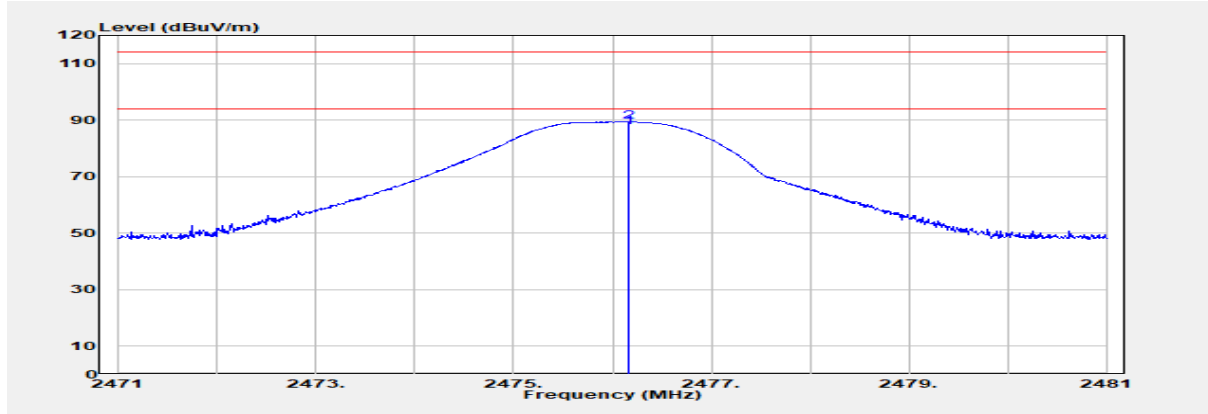
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2476 MHz  
 Test Mode :Main  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Vertical  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2476.160	Average	91.36	-3.90	87.47	94.00	-6.53
2476.160	Peak	93.21	-3.90	89.32	114.00	-24.68

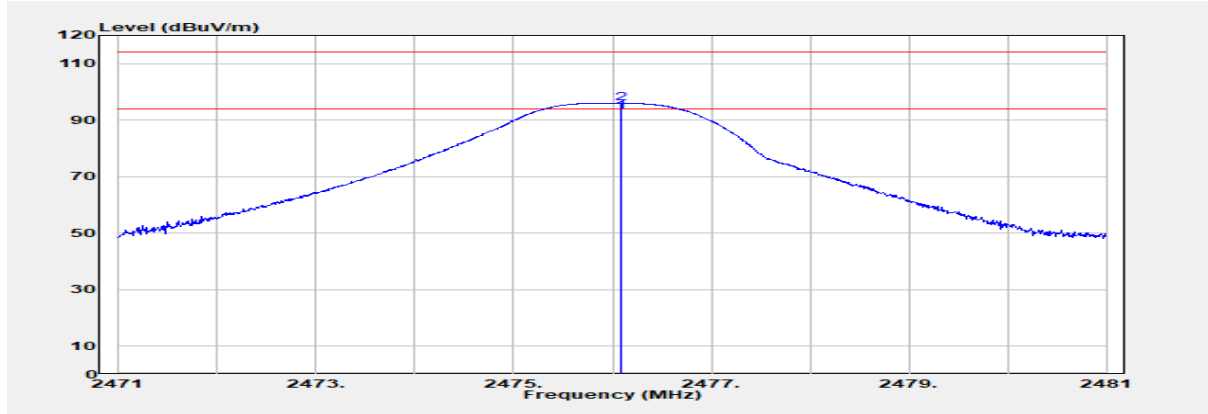
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2476 MHz  
 Test Mode :Main  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Horizontal  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2476.080	Average	96.78	-3.90	92.88	94.00	-1.12
2476.080	Peak	99.80	-3.90	95.90	114.00	-18.10

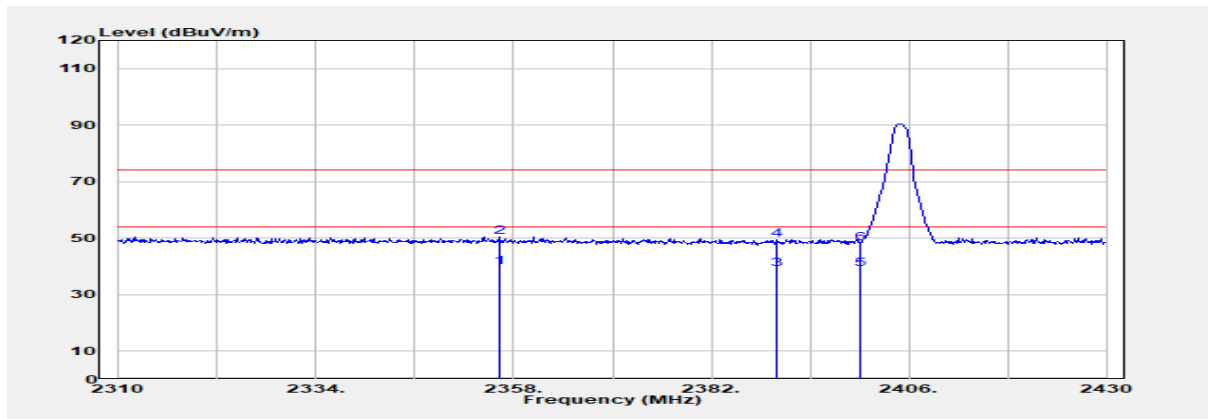
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9.6.2 Restricted bands around fundamental frequency

Report Number	:TERF2401000267E2	Test Site	:SAC C
Operation Mode	:2.4GHz	Test Date	:2024-02-21
Test Frequency	:2405 MHz	Temp./Humi.	:20.0°C/62%
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2356.320	Average	43.56	-3.97	39.58	54.00	-14.42
2356.320	Peak	54.54	-3.97	50.57	74.00	-23.43
2390.000	Average	43.24	-4.25	38.99	54.00	-15.01
2390.000	Peak	53.62	-4.25	49.38	74.00	-24.62
2400.000	Average	43.39	-4.33	39.06	54.00	-14.94
2400.000	Peak	52.58	-4.33	48.25	74.00	-25.75

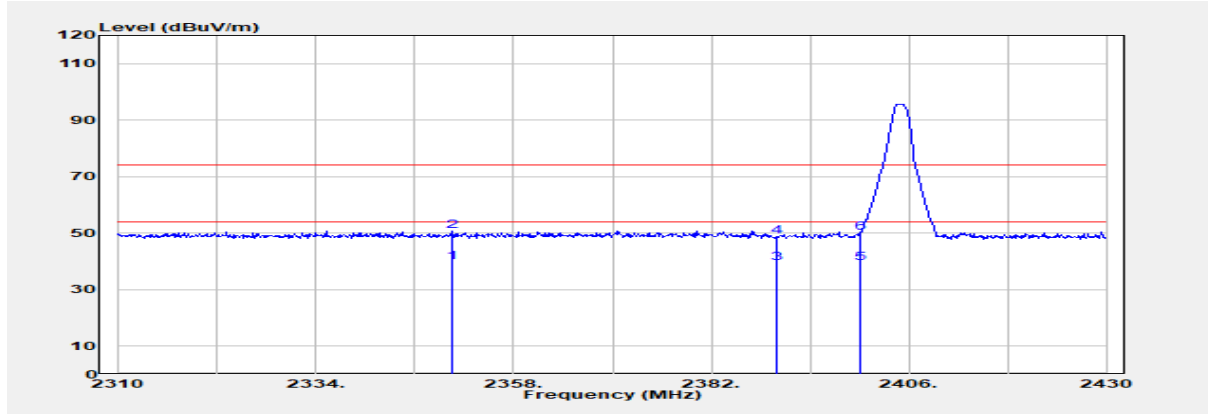
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2405 MHz  
 Test Mode :Bandedge  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Horizontal  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2350.440	Average	43.54	-3.92	39.61	54.00	-14.39
2350.440	Peak	54.80	-3.92	50.88	74.00	-23.12
2390.000	Average	43.60	-4.25	39.35	54.00	-14.65
2390.000	Peak	53.11	-4.25	48.87	74.00	-25.13
2400.000	Average	43.76	-4.33	39.43	54.00	-14.57
2400.000	Peak	54.27	-4.33	49.94	74.00	-24.06

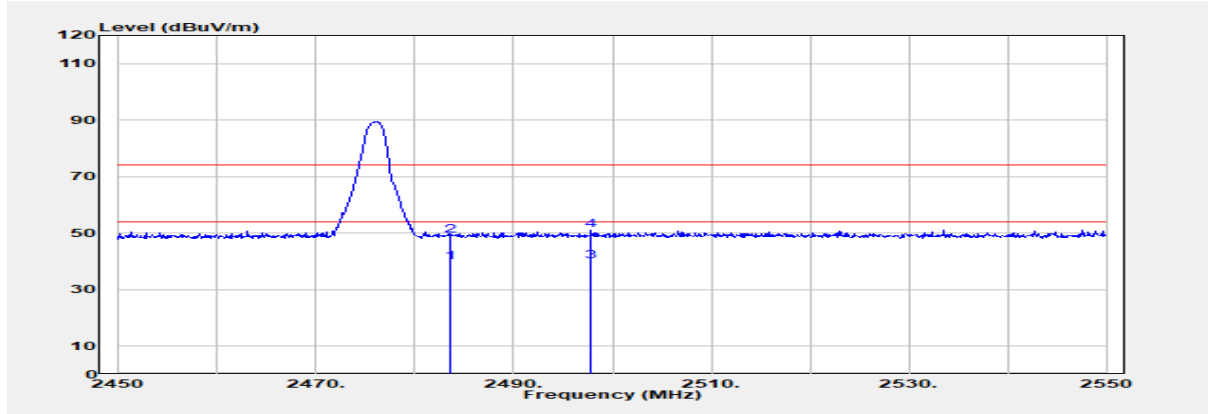
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2476 MHz  
 Test Mode :Bandedge  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Vertical  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2483.500	Average	43.63	-3.82	39.81	54.00	-14.19
2483.500	Peak	52.87	-3.82	49.05	74.00	-24.95
2497.800	Average	43.52	-3.67	39.85	54.00	-14.15
2497.800	Peak	54.88	-3.67	51.21	74.00	-22.79

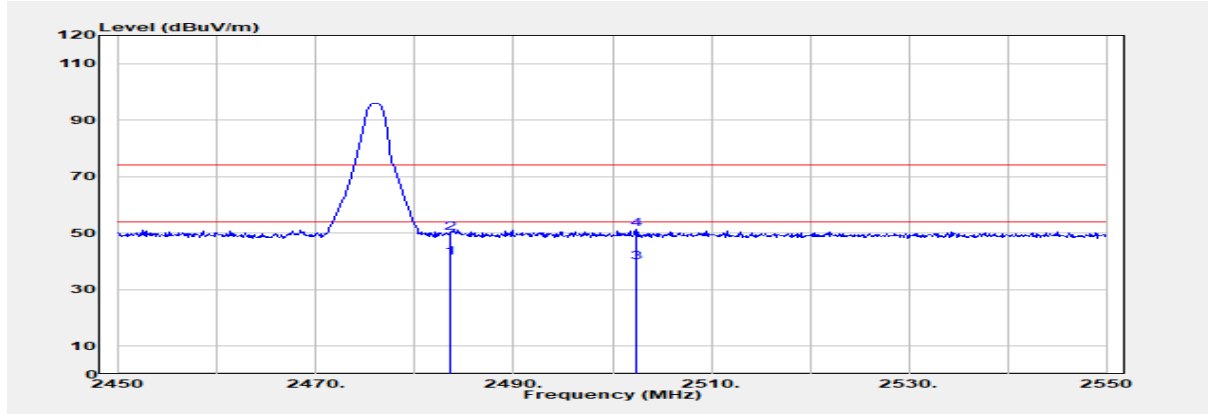
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2476 MHz  
 Test Mode :Bandedge  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Horizontal  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2483.500	Average	44.96	-3.82	41.14	54.00	-12.86
2483.500	Peak	54.05	-3.82	50.23	74.00	-23.77
2502.400	Average	43.40	-3.65	39.75	54.00	-14.25
2502.400	Peak	54.95	-3.65	51.30	74.00	-22.70

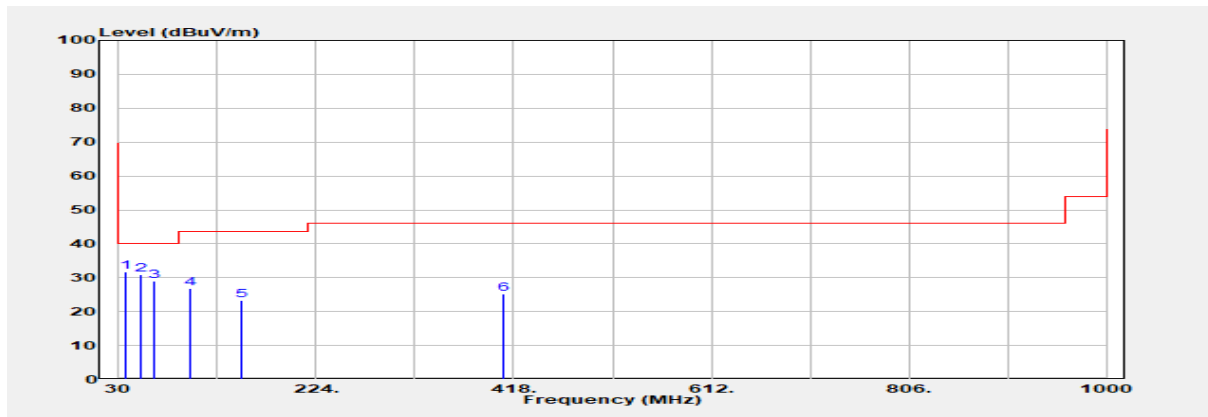
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### 9.6.3 Radiated Spurious Emission Measurement Result

Report Number	:TERF2401000267E2	Test Site	:SAC C
Operation Mode	:2.4GHz	Test Date	:2024-02-21
Test Frequency	:2447 MHz	Temp./Humi.	:20.0°C/62%
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
36.790	Peak	48.99	-17.19	31.81	40.00	-8.19
51.340	Peak	46.24	-15.29	30.95	40.00	-9.05
64.920	Peak	46.49	-17.55	28.93	40.00	-11.07
100.810	Peak	47.40	-20.56	26.84	43.50	-16.66
150.280	Peak	38.97	-15.53	23.44	43.50	-20.06
408.300	Peak	37.13	-11.81	25.32	46.00	-20.68

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

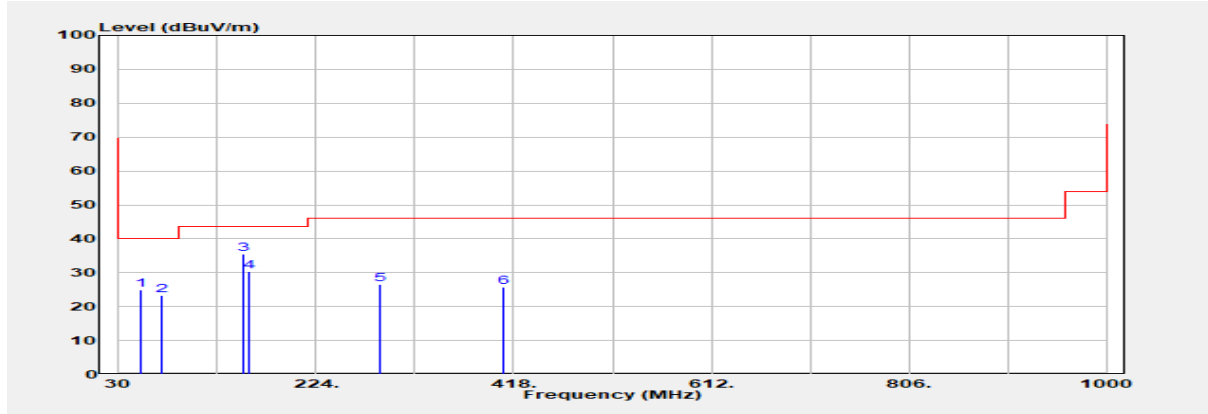
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2447 MHz  
 Test Mode :Tx  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Horizontal  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
51.340	Peak	40.36	-15.29	25.06	40.00	-14.94
71.710	Peak	41.62	-18.42	23.19	40.00	-16.81
152.220	Peak	51.03	-15.62	35.41	43.50	-8.09
158.040	Peak	46.09	-15.80	30.29	43.50	-13.21
287.050	Peak	41.71	-15.21	26.50	46.00	-19.50
408.300	Peak	37.63	-11.81	25.83	46.00	-20.17

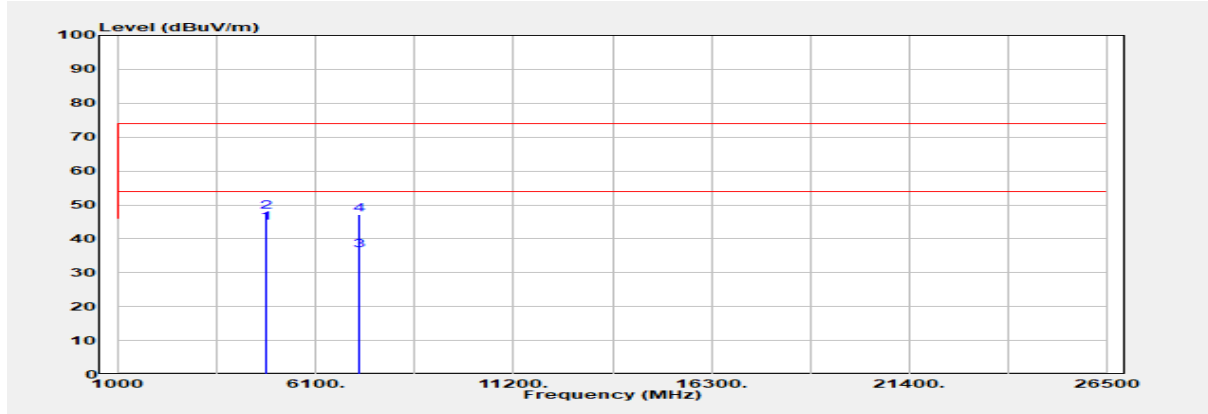
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2405 MHz  
 Test Mode :Tx  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Vertical  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4810.000	Average	43.95	0.64	44.59	54.00	-9.41
4810.000	Peak	47.43	0.64	48.07	74.00	-25.93
7215.000	Average	29.84	6.85	36.69	54.00	-17.31
7215.000	Peak	40.20	6.85	47.05	74.00	-26.95

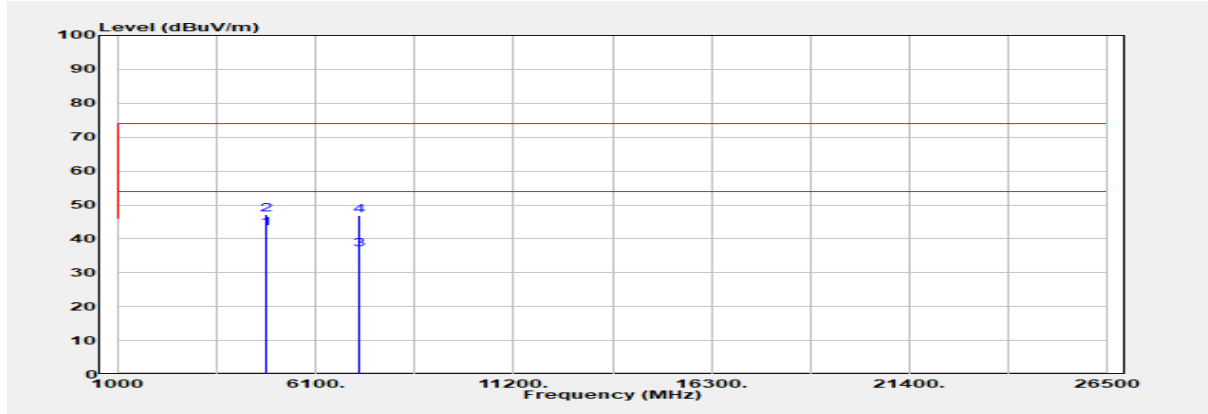
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2405 MHz  
 Test Mode :Tx  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Horizontal  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4810.000	Average	42.33	0.64	42.97	54.00	-11.03
4810.000	Peak	46.57	0.64	47.21	74.00	-26.79
7215.000	Average	30.07	6.85	36.92	54.00	-17.08
7215.000	Peak	39.96	6.85	46.82	74.00	-27.18

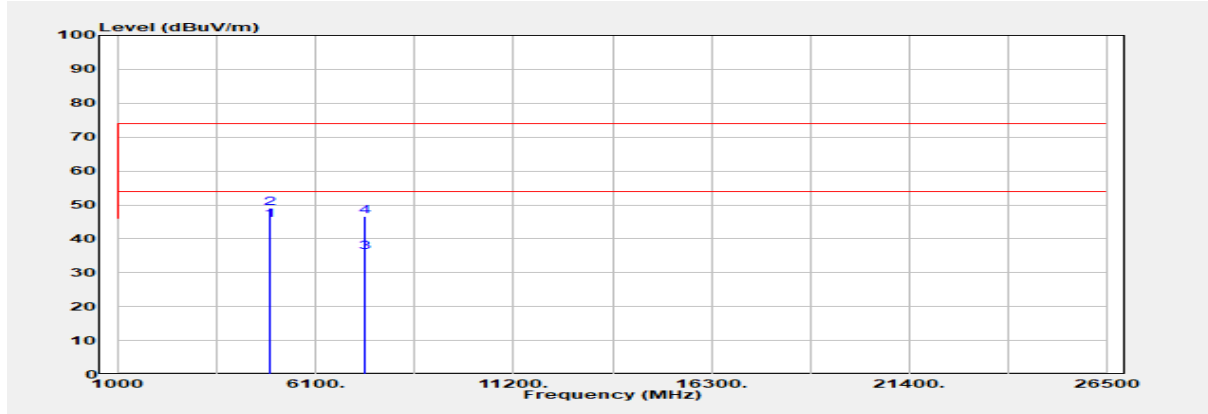
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2447 MHz  
 Test Mode :Tx  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Vertical  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4894.000	Average	45.10	0.38	45.48	54.00	-8.52
4894.000	Peak	48.76	0.38	49.14	74.00	-24.86
7341.000	Average	29.81	6.27	36.07	54.00	-17.93
7341.000	Peak	40.34	6.27	46.61	74.00	-27.39

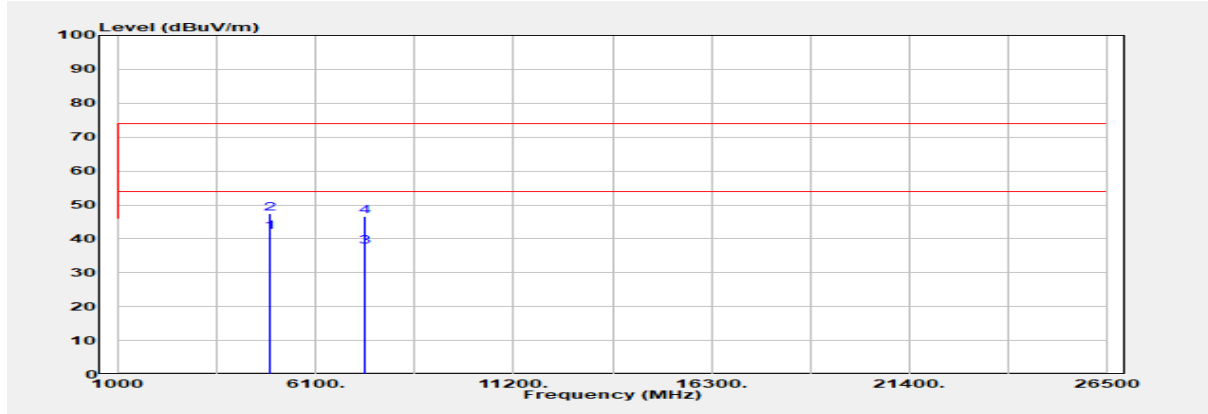
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2447 MHz  
 Test Mode :Tx  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Horizontal  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4894.000	Average	41.66	0.38	42.04	54.00	-11.96
4894.000	Peak	46.93	0.38	47.31	74.00	-26.69
7341.000	Average	31.50	6.27	37.77	54.00	-16.23
7341.000	Peak	40.27	6.27	46.54	74.00	-27.46

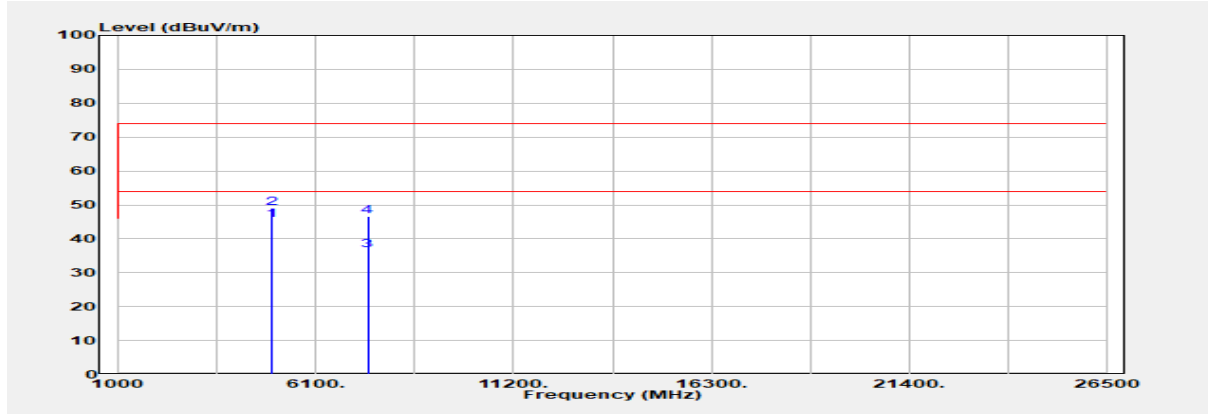
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2476 MHz  
 Test Mode :Tx  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Vertical  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4952.000	Average	44.98	0.64	45.62	54.00	-8.38
4952.000	Peak	48.33	0.64	48.98	74.00	-25.02
7428.000	Average	30.12	6.42	36.54	54.00	-17.46
7428.000	Peak	40.13	6.42	46.55	74.00	-27.45

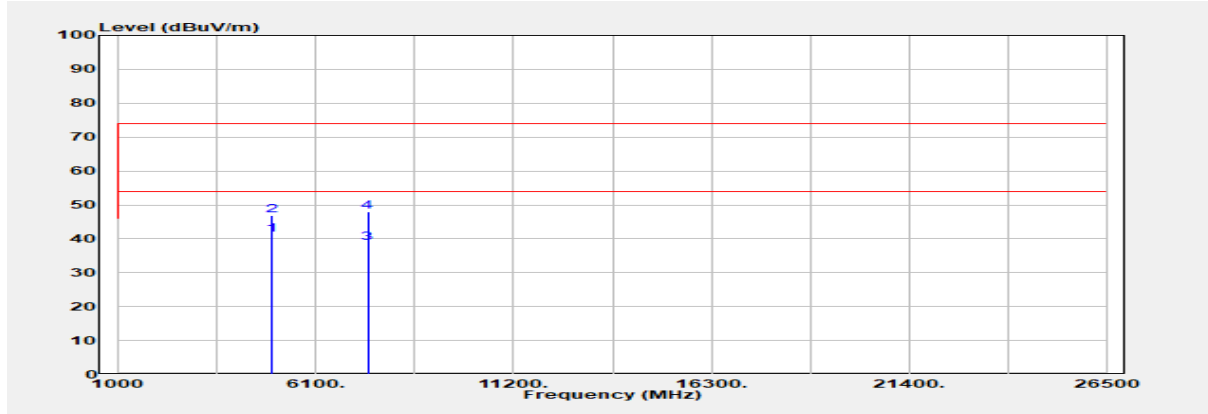
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Report Number :TERF2401000267E2  
 Operation Mode :2.4GHz  
 Test Frequency :2476 MHz  
 Test Mode :Tx  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2024-02-21  
 Temp./Humi. :20.0°C/62%  
 Antenna Pol. :Horizontal  
 Engineer :Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4952.000	Average	40.54	0.64	41.18	54.00	-12.82
4952.000	Peak	46.33	0.64	46.97	74.00	-27.03
7428.000	Average	32.44	6.42	38.86	54.00	-15.14
7428.000	Peak	41.58	6.42	48.01	74.00	-25.99

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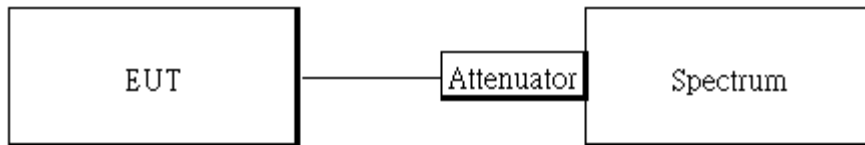
## 10 EMISSION BANDWIDTH

### 10.1 Applicable Standard

§2.1049 (h) & 15.215(c)

- (c) 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. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

### 10.1 Test Setup



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## 10.2 Measurement Procedure

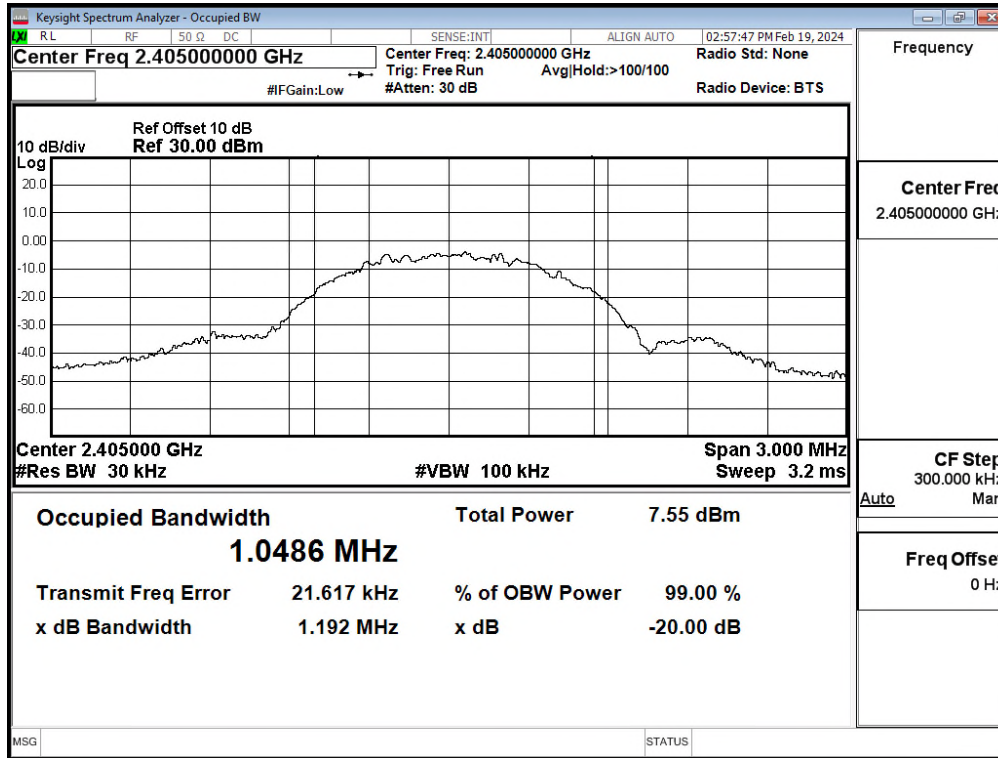
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as  
 RBW=1% of the approximate emission bandwidth,  
 VBW = 3 times RBW,  
 Span= 2 to 5 times of the OBW.  
 Sweep=auto  
 Detector = Peak, and Max hold
4. Turn on the -20 dB Bandwidth function, max reading.

## 10.3 Measurement Results:

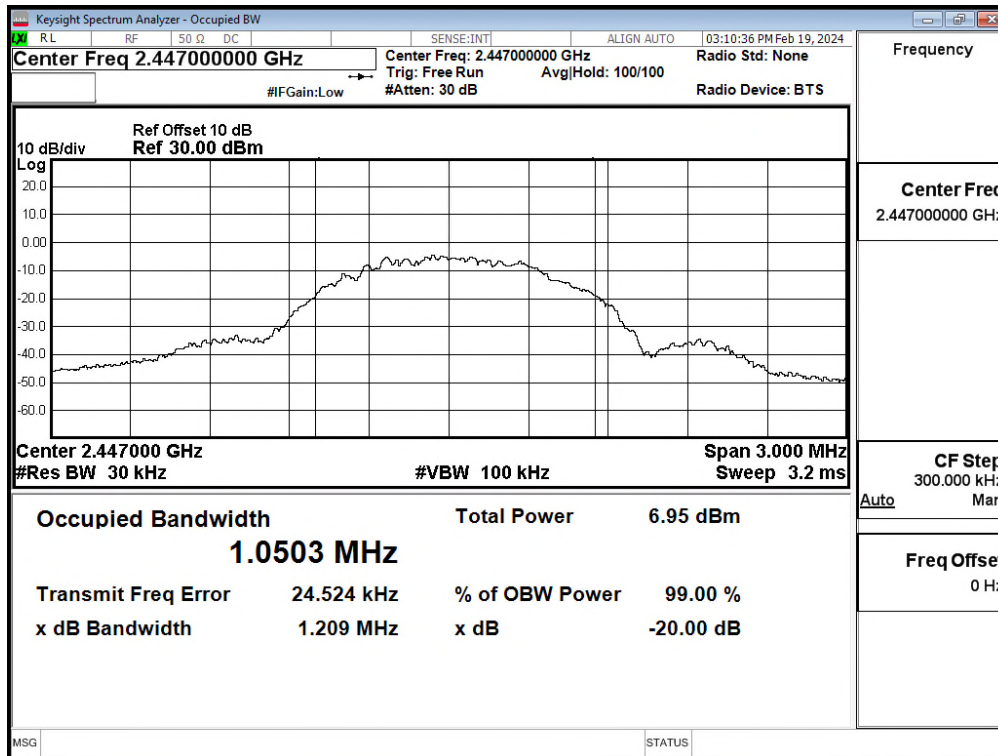
Frequency (MHz)	20dB Bandwidth (MHz)
2405	1.192
2447	1.209
2476	1.21

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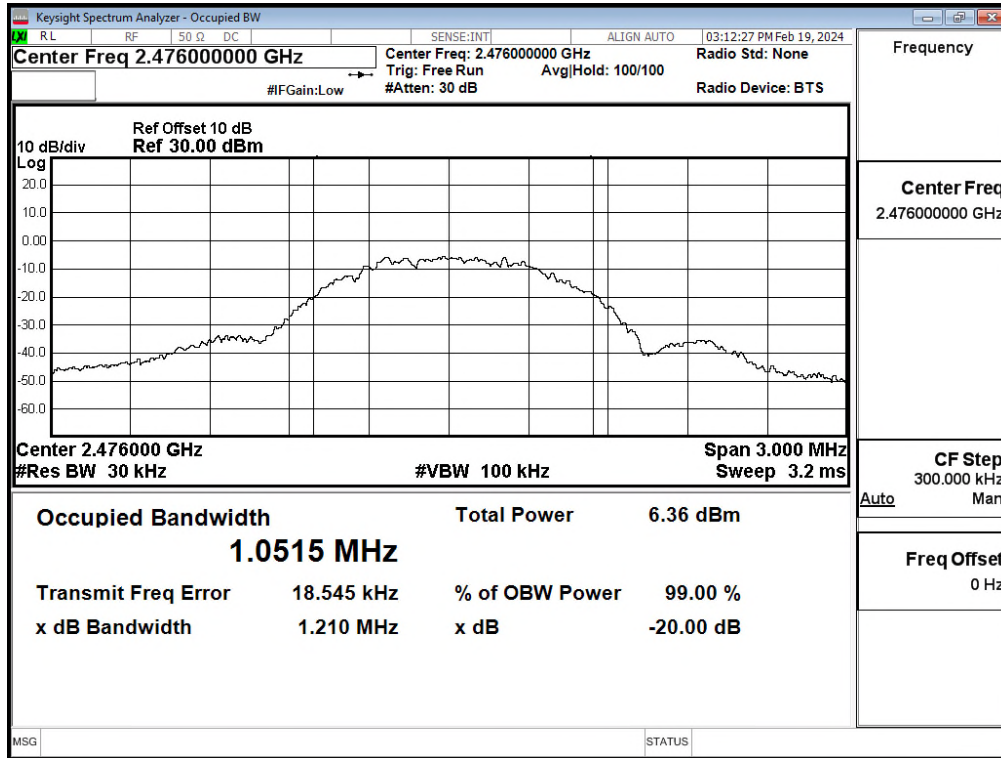
## CH Mid



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## 8 ANTENNA REQUIREMENT

### 8.1 Standard Applicable:

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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. 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.

### 10.4 Antenna Connected Construction:

The antenna complies with this requirement and no consideration of replacement. Please see EUT photo for details.

*~ End of Report ~*

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