

**ELECTROMAGNETIC EMISSIONS  
COMPLIANCE REPORT**

**Applicant:** Darfon Electronics Corp.  
167, Shanying Road, Gueishan, Taoyuan 333, Taiwan

**Product Name:** Wireless Mouse

**Brand Name:** HP

**Model No.:** TPA-D003M

**Model Difference:** N/A

**Report Number:** TERF2210002052E2

**FCC ID** O62-TPAD003M

**Date of EUT Received:** October 21, 2022

**Date of Test:** November 14, 2022 ~ November 30, 2022

**Issue Date:** January 09, 2023

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
TERF2210002052E2	00	Original	December 13, 2022	Tiffany Kao	
TERF2210002052E2	01	Updated address and section 5	January 09, 2023	Tiffany Kao	*

**Note:**

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

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## 1 GENERAL INFORMATION

### 1.1 Product Description

Product Name:	Wireless Mouse
Brand Name:	HP
Model No.:	TPA-D003M
Model Difference:	N/A
Hardware Version:	V06
Firmware Version:	V1.0.22
EUT Series No.:	9CH228001V
Power Supply:	3.7 Vdc from Rechargeable Li-Polymer Battery or 5Vdc from USB Port
Test Software (Name/Version)	PXI_LinK_EMI_Tool_V2.0.0

### 1.2 RF Specification

Radio Technology:	2.4GHz Short Range Radio
Frequency Range:	2405 – 2476MHz
Channel number:	12 channels
Modulation type:	GFSK
Transmit Power:	92.29dBμV/m

### 1.3 Antenna Designation

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
Chip	Unicorn Technologies Corp.	AA055U	2405-2476	0.7

#### Note:

1. 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	TW3702
		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				
<p><b>Note:</b> 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.</p>				

### 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.

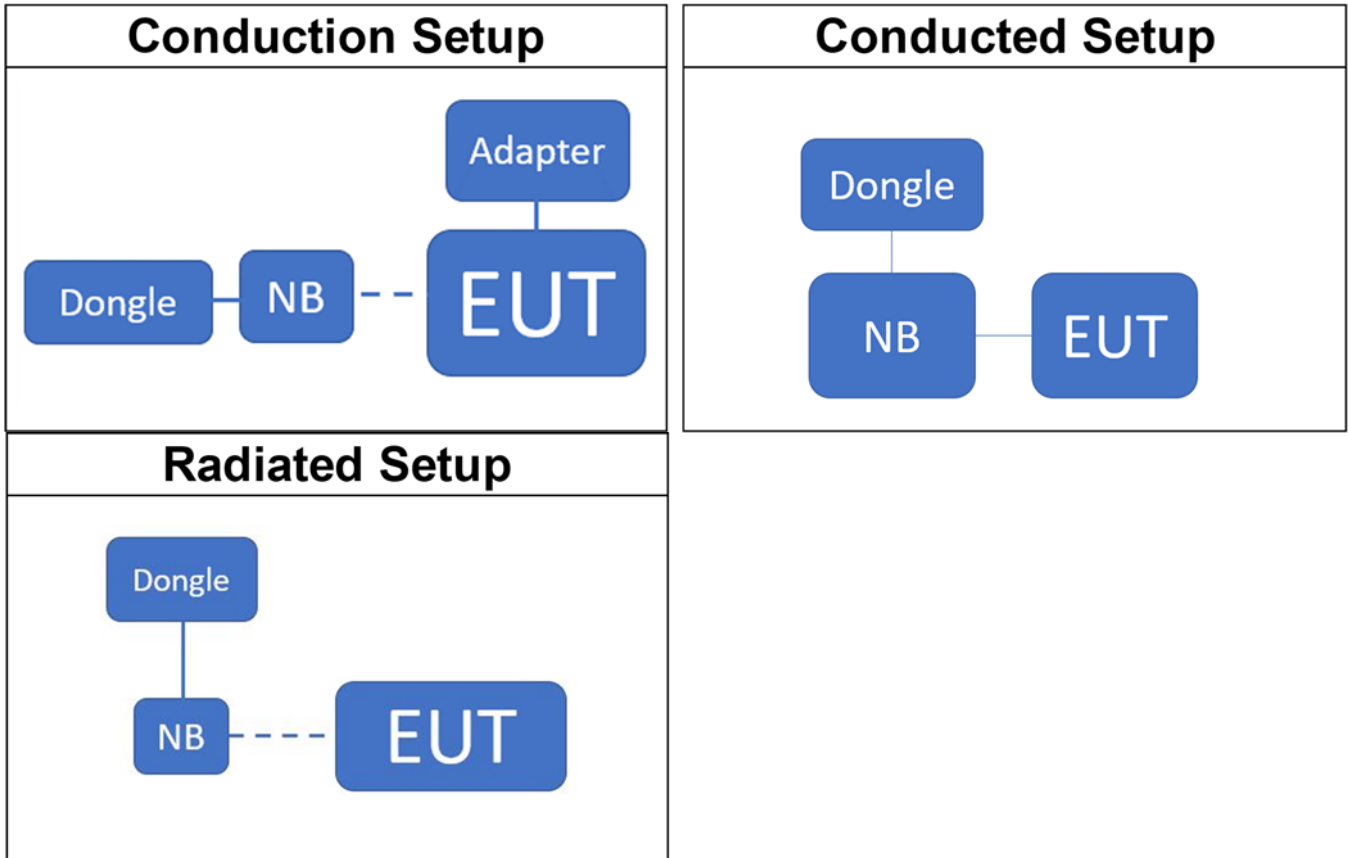
### 2.4.2 For all conducted test items:

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



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## 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.
Adapter	Sony	AC-0400-TW	3504600	N/A	N/A
Notebook	Lenovo	L440	P0000367	N/A	N/A
USB Cable	Suzhou Keli Science&Technol ogy Development Co.,Ltd.	21445	P0000367	N/A	N/A
Dongle	HP	TPA-D003D	N/A	N/A	N/A
Conducted Emission Test Site: Conducted C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Dongle	HP	TPA-D003D	N/A	N/A	N/A
USB cable	Suzhou Keli Science&Technology Development Co.,Ltd.	21445	N/A	N/A	N/A
Notebook	Lenovo	L480	P0002332	N/A	N/A
Radiated Emission Test Site: SAC C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	L440	P0000367	N/A	N/A
Dongle	HP	TPA-D003D	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
§15.249(a)(e) §15.249(a), 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
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:

RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
SRD 2.4G	0~11	6	GFSK	1	SISO
RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
SRD 2.4G	0~11	0, 6, 11	GFSK	1	SISO

**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 CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
SRD 2.4G	0~11	0, 6, 11	GFSK	1	SISO

### CONDUCTED EMISSION TEST:

AC POWER-LINE CONDUCTED EMISSION					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
SRD 2.4G	0 to 11	6	GFSK	1	SISO

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## 6 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.34 dB
Emission Bandwidth	+/- 1.53 Hz
Undesignable radiated emission measurement	+/- 1.68 dB
Temperature	+/- 0.4 °C
Humidity	+/- 3.5 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty		
Polarization: Vertical	+/- 2.57 dB	9kHz~30MHz
	+/- 4.85 dB	30MHz - 1000MHz
	+/- 4.45 dB	1GHz - 18GHz
	+/- 4.24 dB	18GHz - 40GHz
Polarization: Horizontal	+/- 2.57 dB	9kHz~30MHz
	+/- 4.37 dB	30MHz - 1000MHz
	+/- 4.45 dB	1GHz - 18GHz
	+/- 4.24 dB	18GHz - 40GHz

### 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	04/13/2022	04/12/2023
EMI Test Receiver	R&S	ESCI	101342	04/25/2022	04/24/2023
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2022	03/26/2023
Coaxial Cable	EMC Instruments Corp	EMC5D-BM-BM- 3000	1401004	03/27/2022	03/26/2023
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 C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071570	06/01/2022	05/31/2023
Power Meter	Anritsu	ML2496A	1326001	08/11/2022	08/10/2023
Power Sensor	Anritsu	MA2411B	1315048	08/11/2022	08/10/2023
Power Sensor	Anritsu	MA2411B	1315049	08/11/2022	08/10/2023
Attenuator	Marvelous	MVE2213-10	RF06	11/18/2021	11/17/2022
Attenuator	Marvelous	MVE2213-10	RF06	11/16/2022	11/15/2023
Attenuator	Marvelous	MVE2213-10	RF13	11/18/2021	11/17/2022
Attenuator	Marvelous	MVE2213-10	RF13	11/16/2022	11/15/2023
Attenuator	Woken	WATT-218FS-10	RF22	11/18/2021	11/17/2022
Attenuator	Woken	WATT-218FS-10	RF22	11/16/2022	11/15/2023
DC Block	MITEQ	W70289-5108	RF159	11/18/2021	11/17/2022
DC Block	MITEQ	W70289-5108	RF159	11/16/2022	11/15/2023
Splitter	RF-LAMBDA	RFLT2W1G18G	18112200217	11/18/2021	11/17/2022
Splitter	RF-LAMBDA	RFLT2W1G18G	18112200217	11/16/2022	11/15/2023

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### 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	10/19/2022	10/18/2023
Horn Antenna	Schwarzbeck	BBHA9170	184	12/16/2021	12/15/2022
Horn Antenna	SCHWARZBECK	BBHA9120D	1187	01/06/2022	01/05/2023
Loop Antenna	ETS.LINDGREN	6502	143303	05/14/2022	05/13/2023
EMI Test Receiver	R&S	ESU 40	100363	04/28/2022	04/27/2023
Pre-Amplifier	EMC Instruments	EMC330	980096	11/16/2022	11/15/2023
Pre-Amplifier	EMC Instruments	EMC0011830	980199	11/16/2022	11/15/2023
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/27/2022	10/26/2023
Attenuator	Marvelous	WATT-218FS-10	RF20	11/16/2022	11/15/2023
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	11/16/2022	11/15/2023
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	11/16/2022	11/15/2023
Test Software	audix	e3	20923 sgs Ver.9	N.C.R	N.C.R

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

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## 8 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

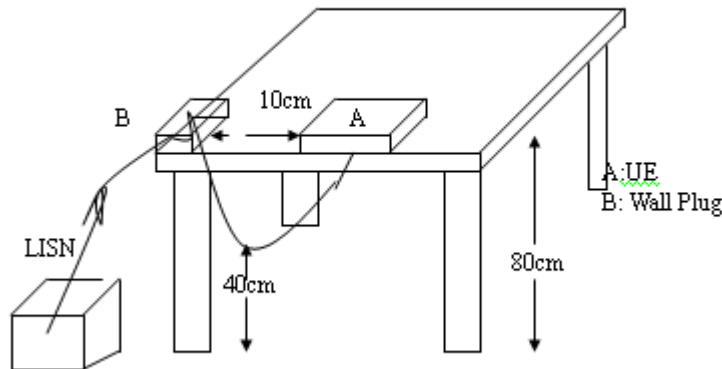
Note

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

### 8.2 EUT Setup:

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

### 8.3 Test Setup



### 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

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## 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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台灣檢驗科技股份有限公司

t (886-2) 2299-3279

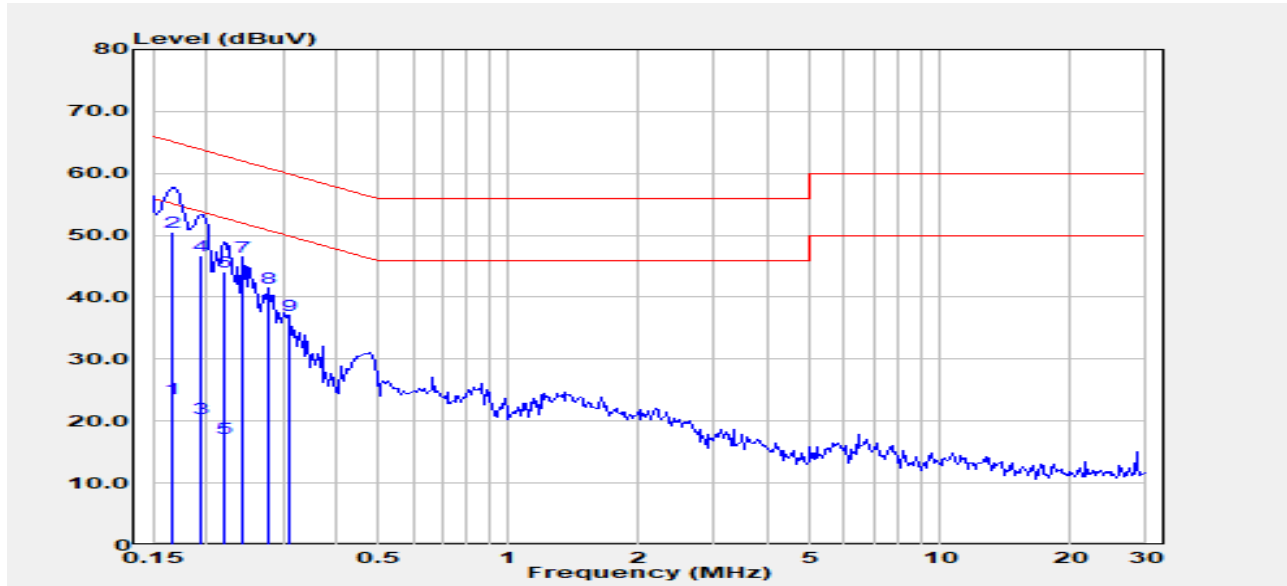
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### AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number	:TERF2210002052E2	Test Site	:Conduction C
Test Mode	:SRD 2.4G	Test Date	:2022-11-14
Power	:120V/60Hz	Temp./Humi.	:24.8/56
Probe	:L1	Engineer	:Andy Wang



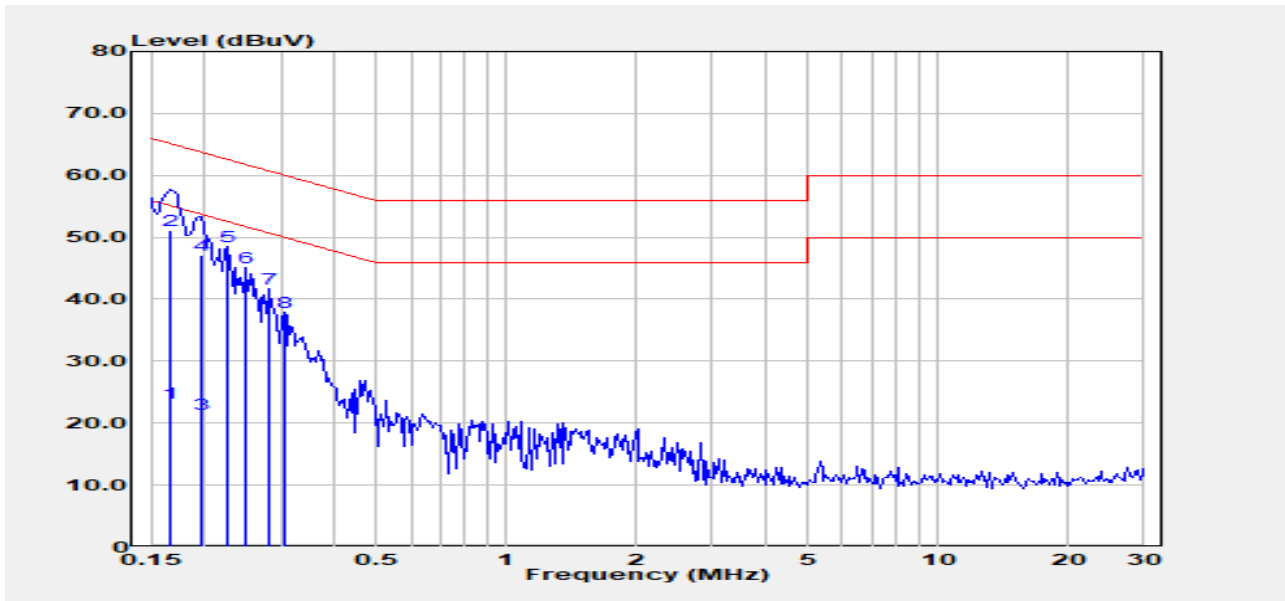
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.167	Average	13.30	10.30	23.60	55.12	-31.52
0.167	QP	40.20	10.30	50.50	65.12	-14.62
0.193	Average	10.20	10.30	20.50	53.89	-33.39
0.193	QP	36.40	10.30	46.70	63.89	-17.19
0.220	Average	6.90	10.30	17.20	52.83	-35.63
0.220	QP	33.90	10.30	44.20	62.83	-18.63
0.242	Peak	36.18	10.30	46.48	62.04	-15.56
0.277	Peak	31.13	10.30	41.44	60.90	-19.46
0.312	Peak	26.74	10.30	37.05	59.93	-22.88

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Report Number	:TERF2210002052E2	Test Site	:Conduction C
Test Mode	:SRD 2.4G	Test Date	:2022-11-14
Power	:120V/60Hz	Temp./Humi.	:24.8/56
Probe	:N	Engineer	:Andy Wang



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
0.167	Average	12.90	10.31	23.21	55.12	-31.91
0.167	QP	40.90	10.31	51.21	65.12	-13.91
0.195	Average	11.20	10.30	21.50	53.80	-32.30
0.195	QP	36.90	10.30	47.20	63.80	-16.60
0.224	Peak	38.26	10.30	48.56	62.66	-14.10
0.249	Peak	34.88	10.31	45.19	61.78	-16.59
0.280	Peak	31.38	10.31	41.69	60.81	-19.12
0.305	Peak	27.53	10.31	37.84	60.10	-22.26

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## 9 RADIATED EMISSION TEST

### 9.1 Applicable Standard

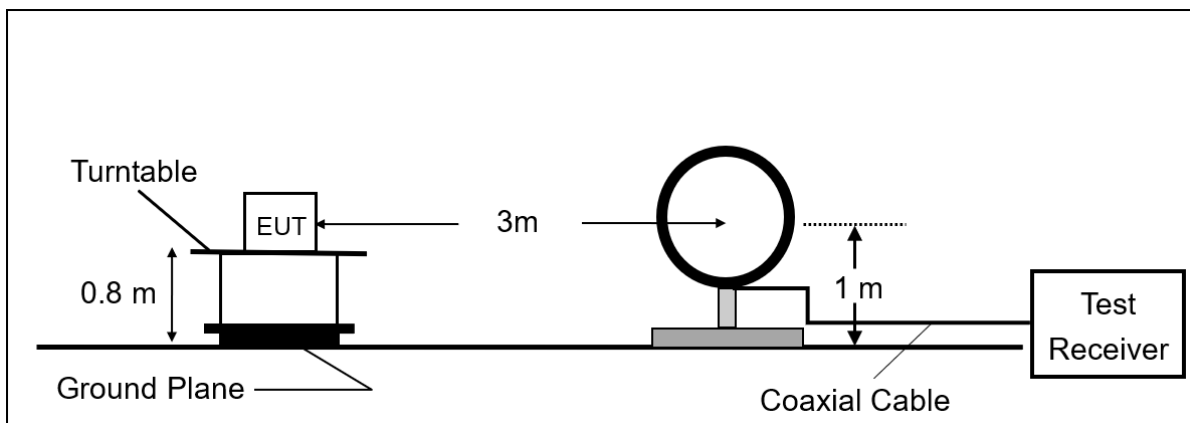
1. Only spurious emissions are permitted in any of the frequency bands listed in §15.205.
2. The field strength of fundamental and harmonic emissions, measured at 3 m, shall not exceed 50 mV/m and 0.5 mV/m respectively.
3. Emissions radiated outside of the specified frequency bands, except for harmonic 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

1. The EUT was placed on a turntable with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

### 9.3 Test Setup

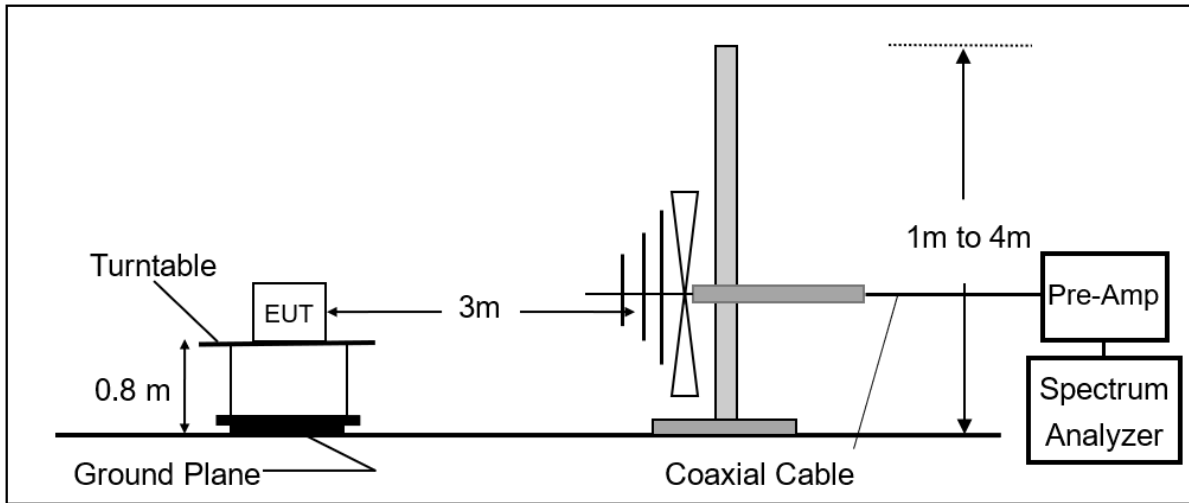
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz.



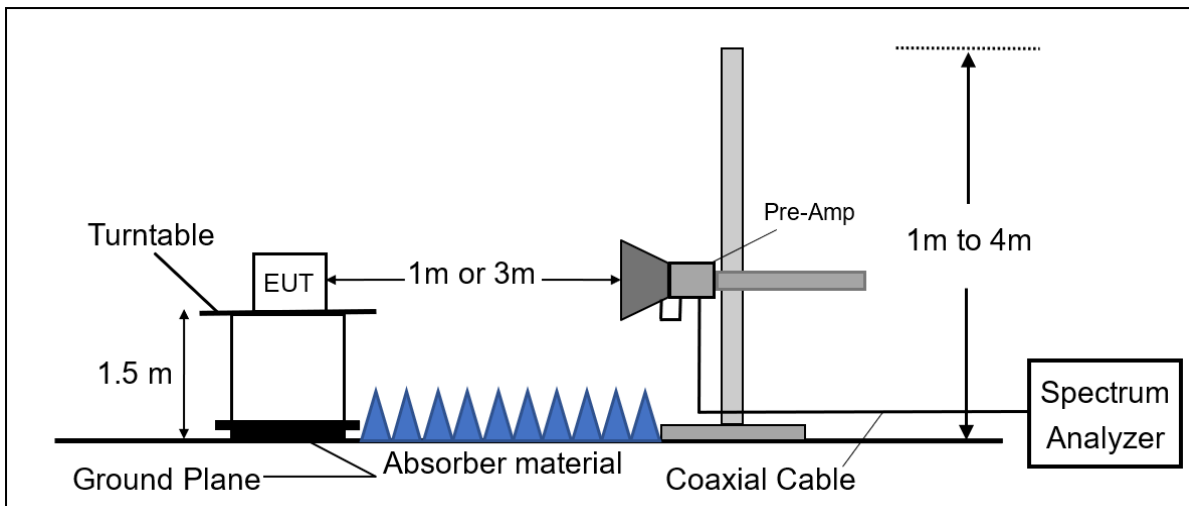
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(B) Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



(C) 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	

$$\text{Actual FS(dB}\mu\text{V/m)} = \text{SPA. Reading level(dB}\mu\text{V)} + \text{Factor(dB)}$$

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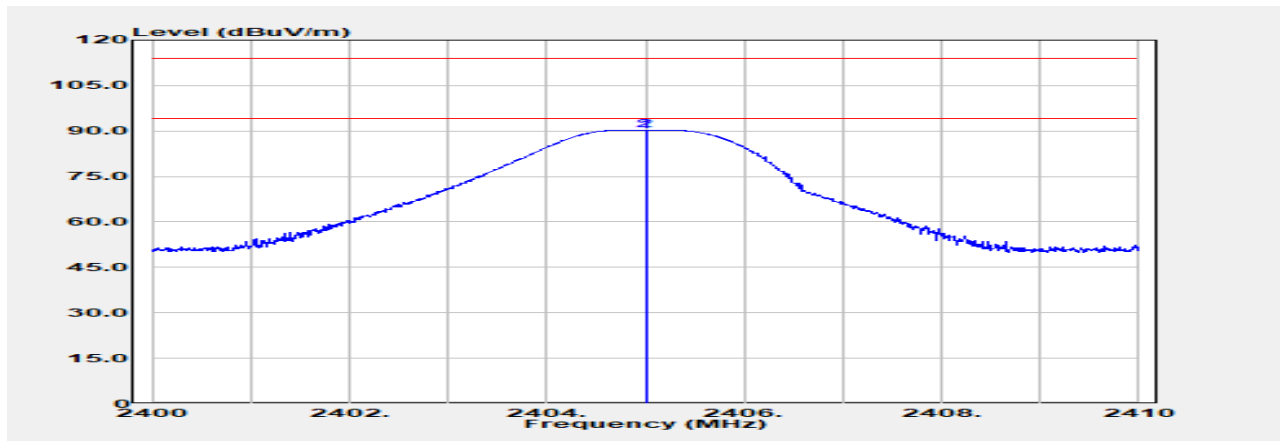
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$$\text{Factor(dB)} = \text{Antenna Factor(dB}\mu\text{V/m)} + \text{Cable Loss(dB)} - \text{Pre\_Amplifier Gain(dB)}$$

## 9.5 Measurement Result

### 9.5.1 Field Strength of the Fundamental Signal

Report Number	:TERF2210002052E2	Test Site	:SAC C
Operation Mode	:SRD 2.4G	Test Date	:2022-11-25
Test Frequency	:2405 MHz	Temp./Humi.	:23.7/68
Test Mode	:Main	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq. MHz	Detector Mode PK/QP/AVG	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2405.000	Average	85.82	4.09	89.91	94.00	-4.09
2405.000	Peak	86.25	4.09	90.34	114.00	-23.66

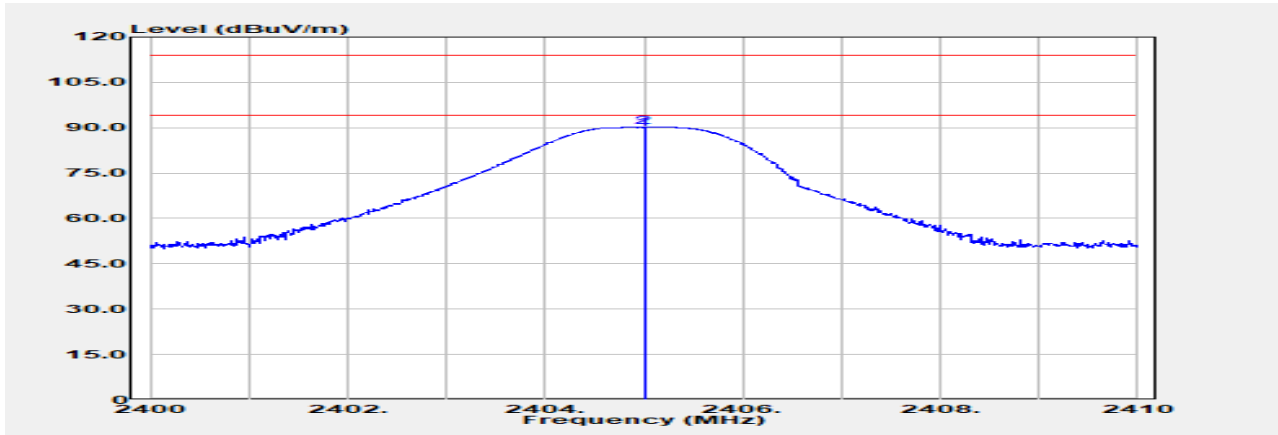
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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2405 MHz  
 Test Mode :Main  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-25  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Horizontal  
 Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AVG	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2405.000	Average	85.63	4.09	89.72	94.00	-4.28
2405.000	Peak	86.05	4.09	90.14	114.00	-23.86

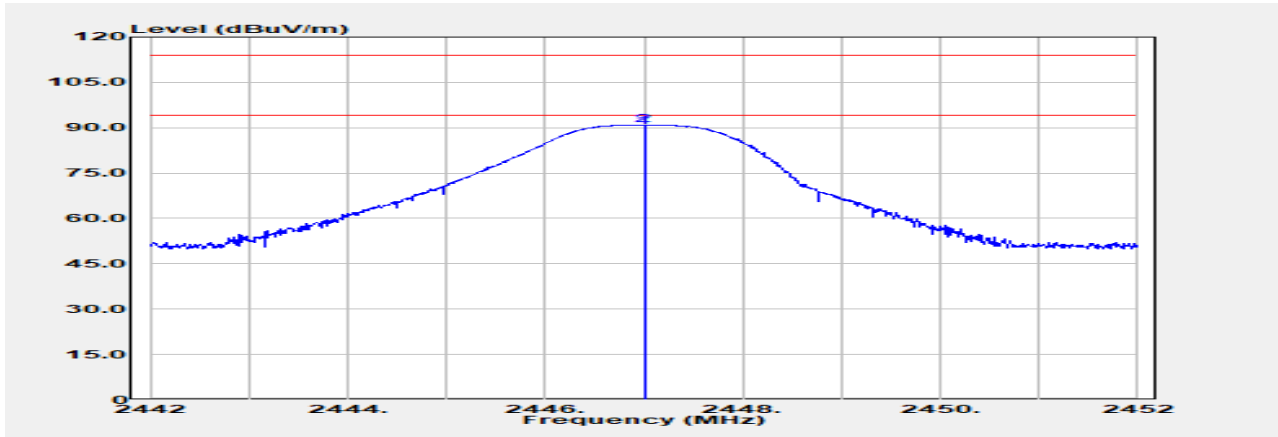
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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2447 MHz  
 Test Mode :Main  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-25  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Vertical  
 Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AVG	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2447.000	Average	86.07	4.28	90.35	94.00	-3.65
2447.000	Peak	86.52	4.28	90.80	114.00	-23.20

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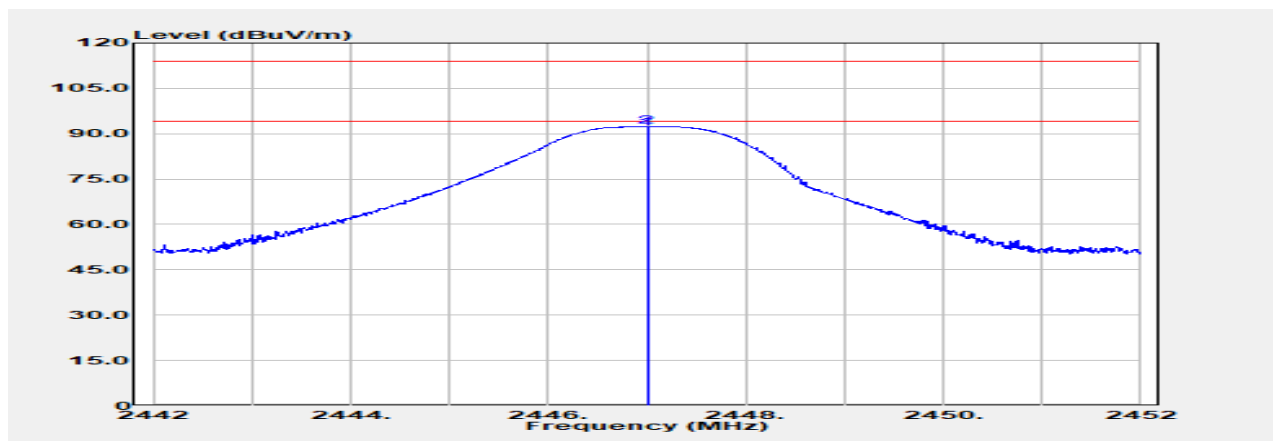
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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2447 MHz  
 Test Mode :Main  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-25  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Horizontal  
 Engineer :Andy Wang



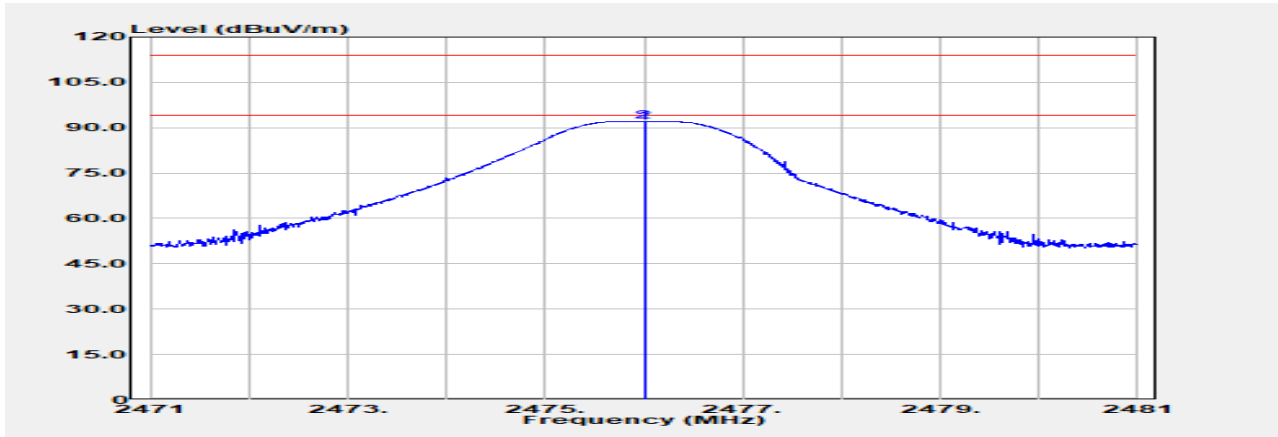
Freq. MHz	Detector Mode PK/QP/AVG	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2447.000	Average	87.56	4.28	91.84	94.00	-2.16
2447.000	Peak	88.01	4.28	92.29	114.00	-21.71

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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2476 MHz  
 Test Mode :Main  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-25  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Vertical  
 Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AVG	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2476.000	Average	87.37	4.22	91.59	94.00	-2.41
2476.000	Peak	87.93	4.22	92.15	114.00	-21.85

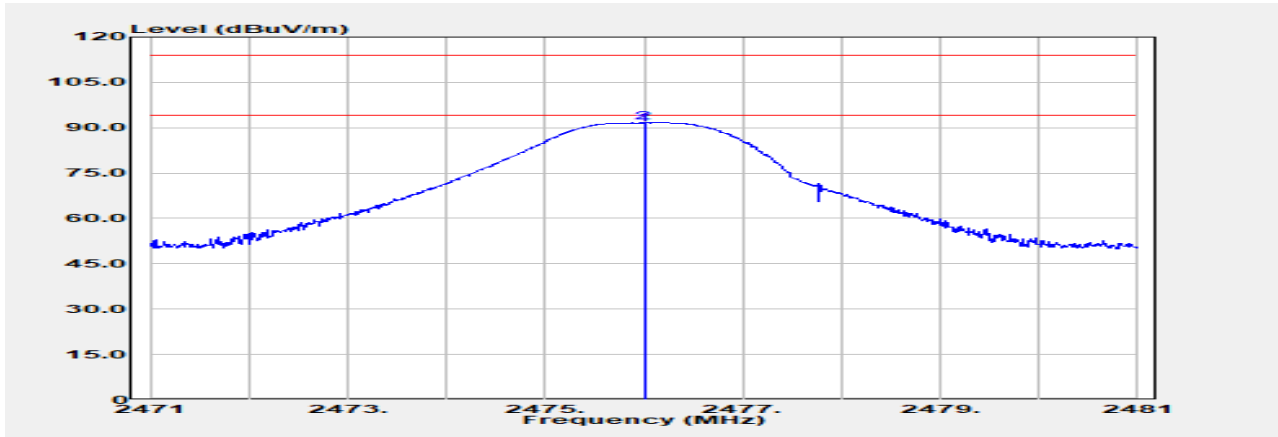
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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2476 MHz  
 Test Mode :Main  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-25  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Horizontal  
 Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AVG	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2476.000	Average	86.94	4.22	91.16	94.00	-2.84
2476.000	Peak	87.43	4.22	91.65	114.00	-22.35

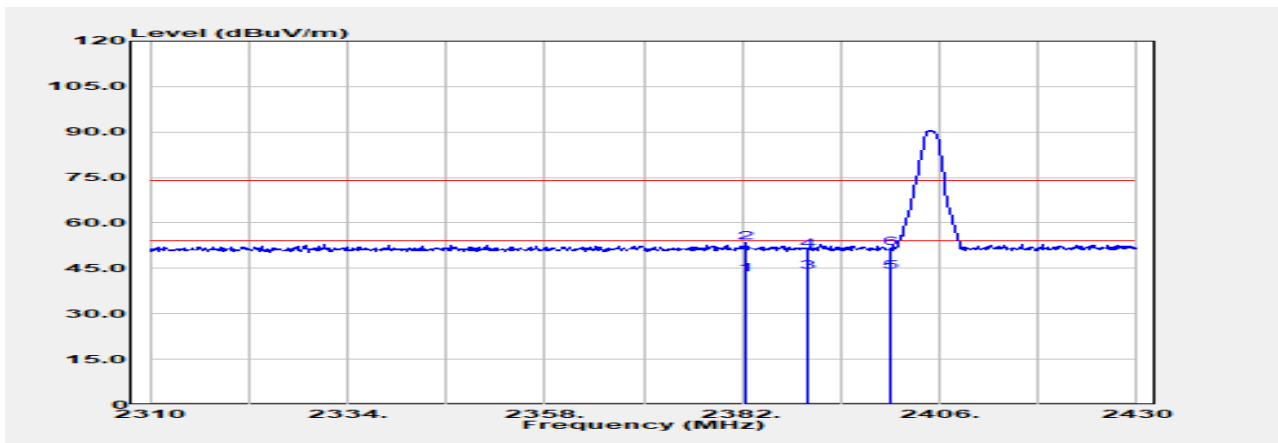
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### 9.5.2 Restricted bands around fundamental frequency

Report Number	:TERF2210002052E2	Test Site	:SAC C
Operation Mode	:SRD 2.4G	Test Date	:2022-11-25
Test Frequency	:2405 MHz	Temp./Humi.	:23.7/68
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



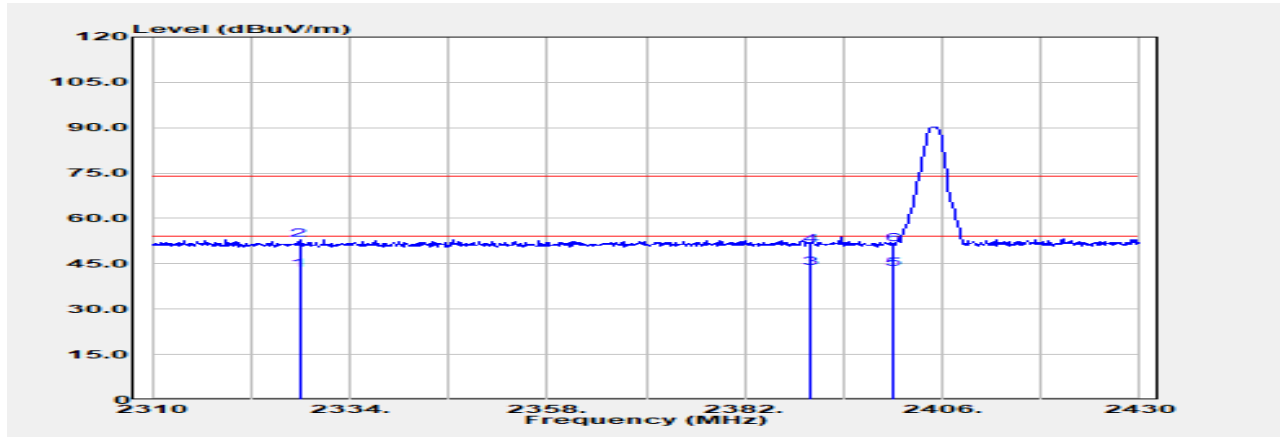
Freq. MHz	Detector Mode PK/QP/AVG	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2382.480	Average	39.15	4.00	43.16	54.00	-10.84
2382.480	Peak	49.40	4.00	53.40	74.00	-20.60
2390.000	Average	39.74	4.03	43.77	54.00	-10.23
2390.000	Peak	47.05	4.03	51.08	74.00	-22.92
2400.000	Average	39.78	4.07	43.85	54.00	-10.15
2400.000	Peak	47.71	4.07	51.78	74.00	-22.22

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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2405 MHz  
 Test Mode :Bandedge  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-25  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Horizontal  
 Engineer :Andy Wang



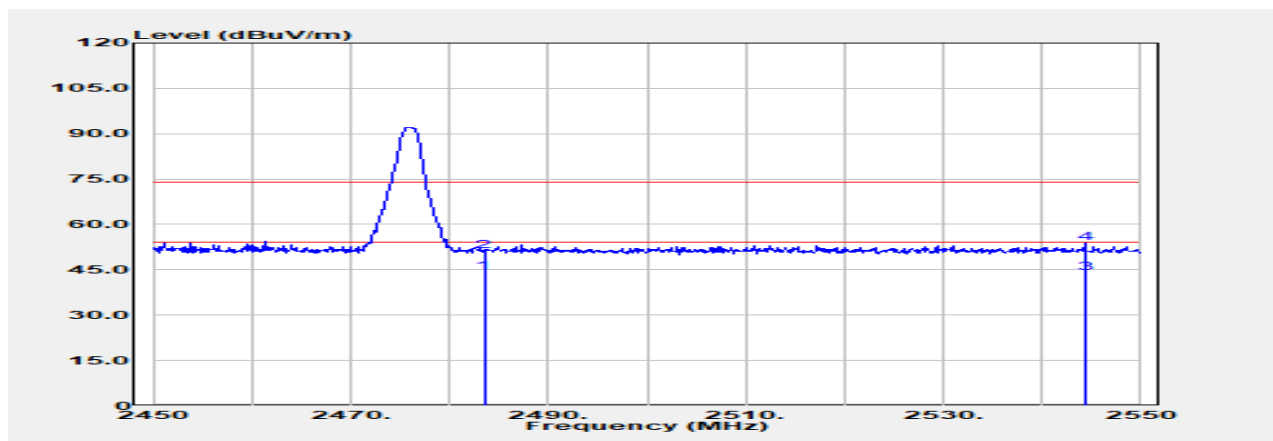
Freq. MHz	Detector Mode PK/QP/AVG	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2327.880	Average	39.08	3.99	43.07	54.00	-10.93
2327.880	Peak	48.89	3.99	52.88	74.00	-21.12
2390.000	Average	39.52	4.03	43.55	54.00	-10.45
2390.000	Peak	47.00	4.03	51.03	74.00	-22.97
2400.000	Average	39.28	4.07	43.35	54.00	-10.65
2400.000	Peak	47.23	4.07	51.30	74.00	-22.70

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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2476 MHz  
 Test Mode :Bandedge  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-25  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Vertical  
 Engineer :Andy Wang



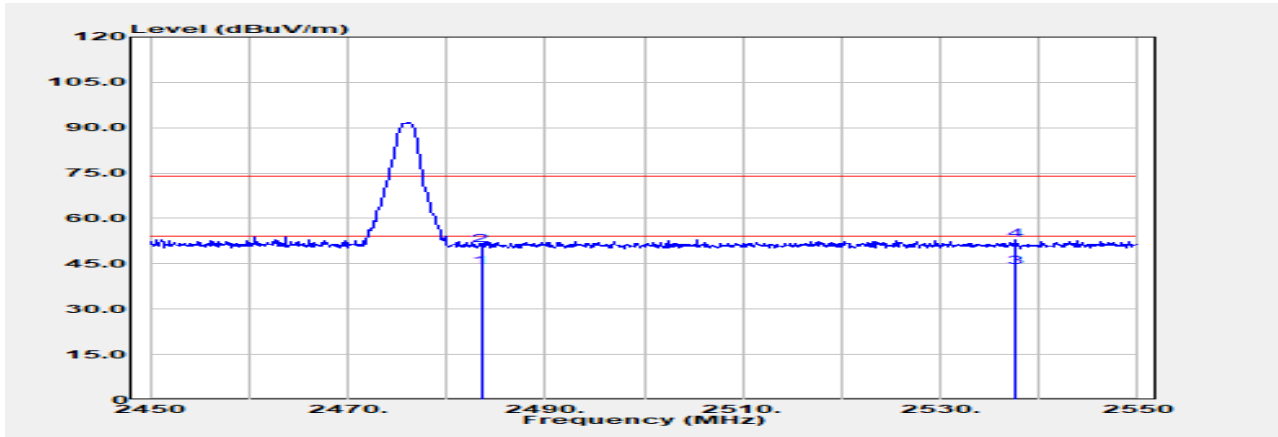
Freq. MHz	Detector Mode PK/QP/AVG	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2483.500	Average	39.90	4.20	44.10	54.00	-9.90
2483.500	Peak	46.94	4.20	51.14	74.00	-22.86
2544.300	Average	39.72	4.30	44.02	54.00	-9.98
2544.300	Peak	49.39	4.30	53.69	74.00	-20.31

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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2476 MHz  
 Test Mode :Bandedge  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-25  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Horizontal  
 Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AVG	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	39.82	4.20	44.02	54.00	-9.98
2483.500	Peak	47.07	4.20	51.27	74.00	-22.73
2537.700	Average	39.54	4.28	43.82	54.00	-10.18
2537.700	Peak	48.63	4.28	52.91	74.00	-21.09

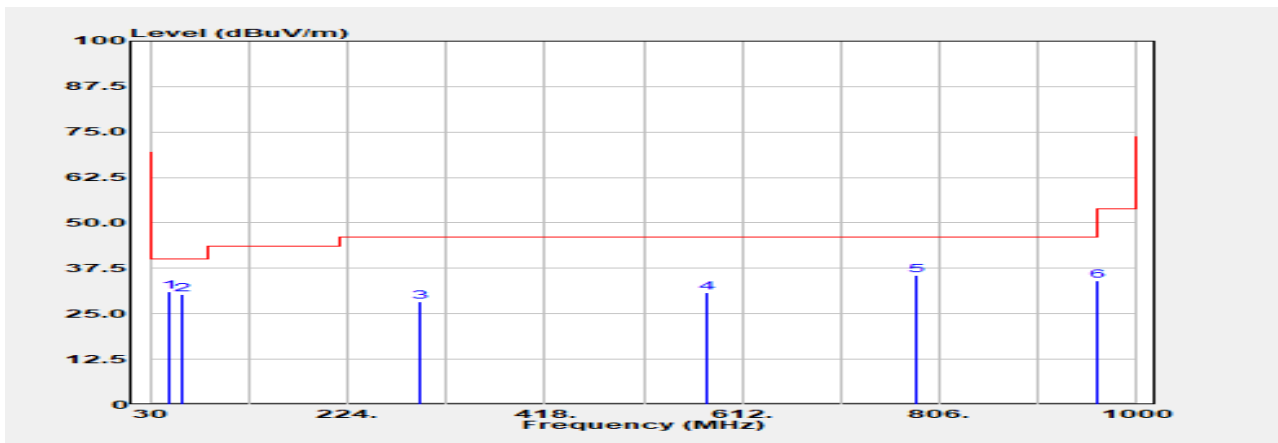
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### 9.5.3 Radiated Spurious Emission Measurement Result

Report Number	:TERF2210002052E2	Test Site	:SAC C
Operation Mode	:SRD 2.4G	Test Date	:2022-11-28
Test Frequency	:2447 MHz	Temp./Humi.	:23.8/75
Test Mode	:Tx	Antenna Pol.	:VERTICAL
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq. MHz	Detector Mode PK/QP/AVG	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
49.400	Peak	43.87	-12.82	31.05	40.00	-8.95
61.040	Peak	44.08	-13.66	30.43	40.00	-9.57
295.780	Peak	39.67	-11.44	28.23	46.00	-17.77
576.110	Peak	34.62	-3.72	30.91	46.00	-15.09
783.690	Peak	34.60	0.93	35.53	46.00	-10.47
960.230	Peak	30.08	3.95	34.03	54.00	-19.97

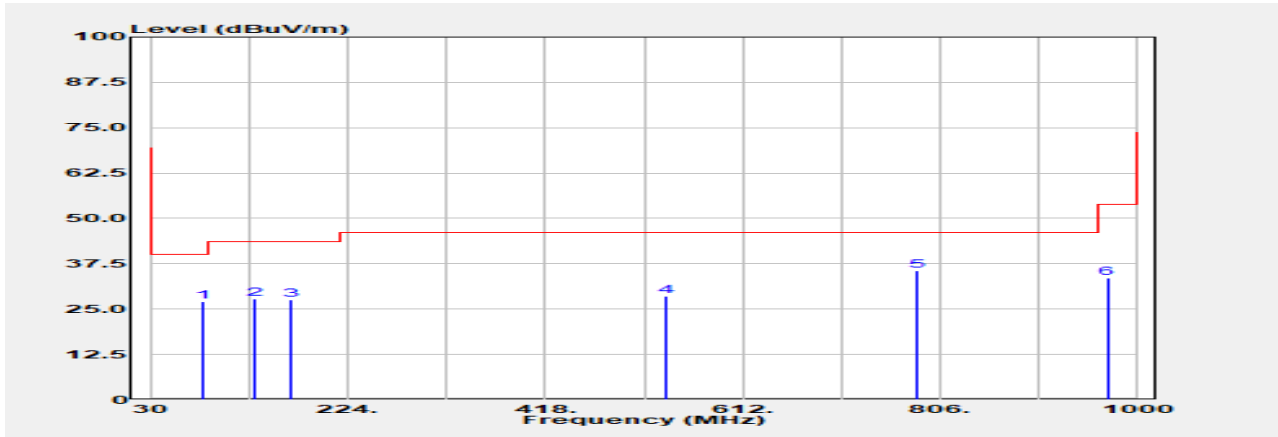
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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2447 MHz  
 Test Mode :Tx  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-28  
 Temp./Humi. :23.8/75  
 Antenna Pol. :HORIZONTAL  
 Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AVG	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
81.410	Peak	45.20	-18.24	26.96	40.00	-13.04
132.820	Peak	41.39	-13.57	27.82	43.50	-15.68
167.740	Peak	40.13	-12.60	27.53	43.50	-15.97
536.340	Peak	32.67	-4.21	28.46	46.00	-17.54
783.690	Peak	34.71	0.93	35.64	46.00	-10.36
969.930	Peak	29.90	3.69	33.59	54.00	-20.41

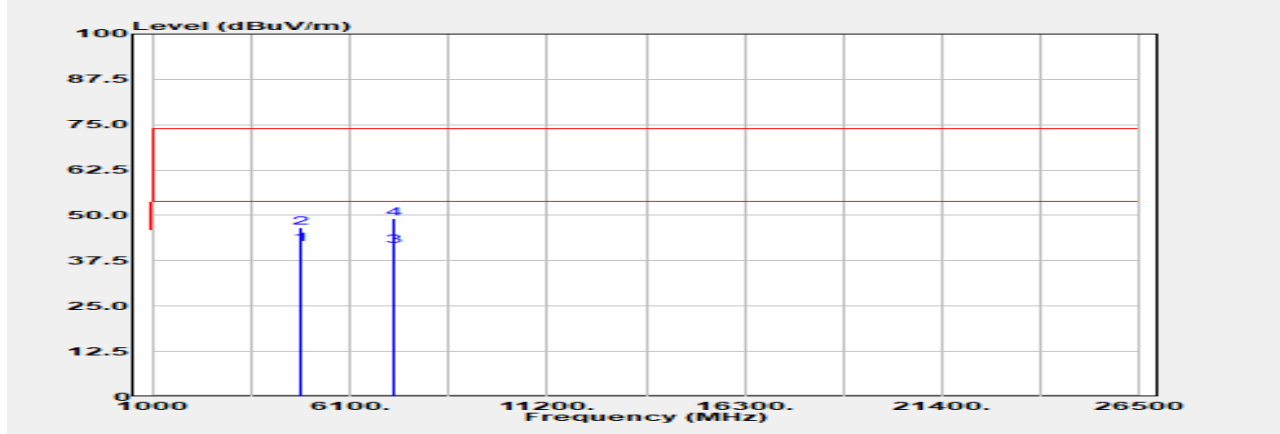
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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2405 MHz  
 Test Mode :Tx  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-26  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Vertical  
 Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AVG	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	29.64	12.41	42.05	54.00	-11.95
4810.000	Peak	34.31	12.41	46.72	74.00	-27.28
7215.000	Average	21.64	19.86	41.49	54.00	-12.51
7215.000	Peak	29.18	19.86	49.04	74.00	-24.96

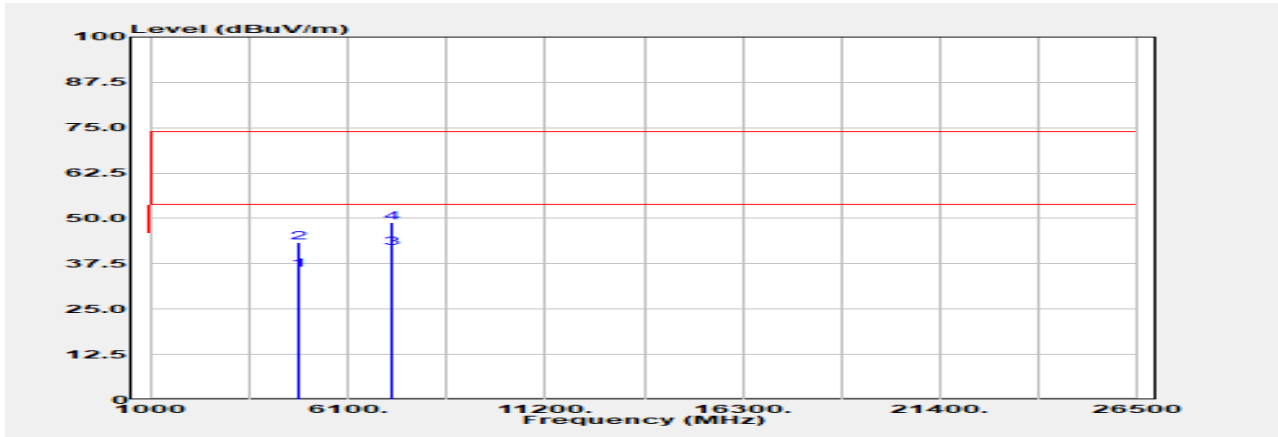
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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2405 MHz  
 Test Mode :Tx  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-26  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Horizontal  
 Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AVG	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	23.35	12.41	35.77	54.00	-18.23
4810.000	Peak	30.89	12.41	43.30	74.00	-30.70
7215.000	Average	21.99	19.86	41.84	54.00	-12.16
7215.000	Peak	29.01	19.86	48.86	74.00	-25.14

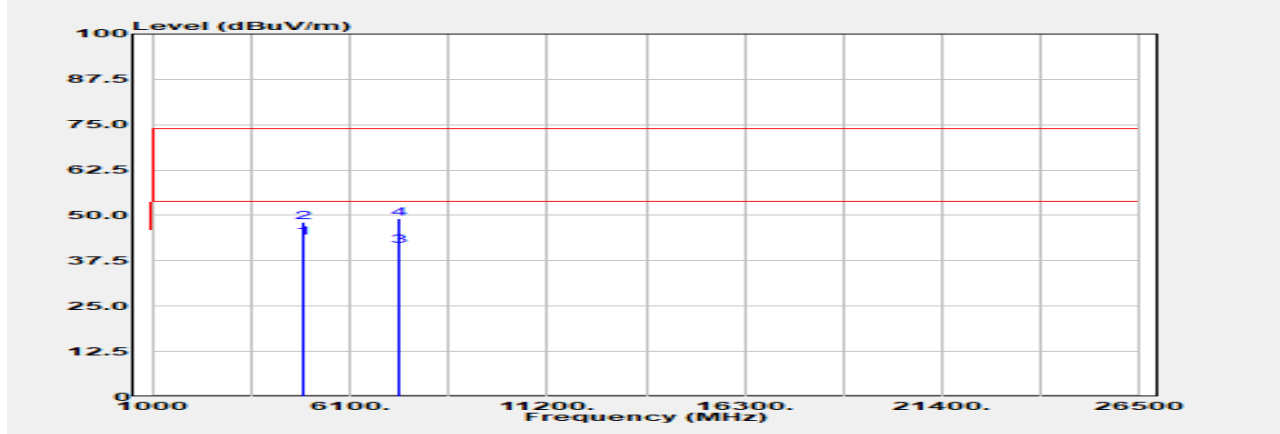
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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2447 MHz  
 Test Mode :Tx  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-26  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Vertical  
 Engineer :Andy Wang



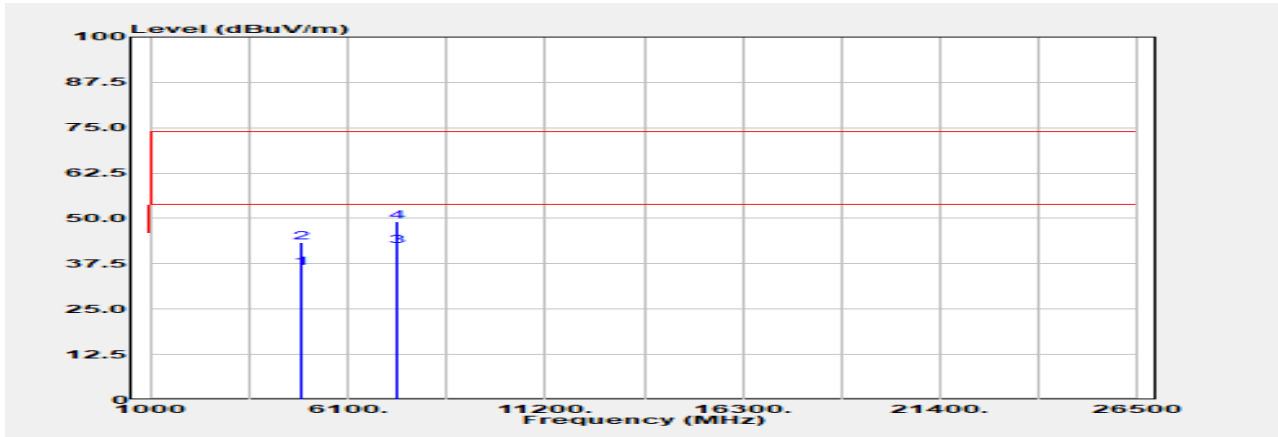
Freq. MHz	Detector Mode PK/QP/AVG	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4894.000	Average	31.51	12.45	43.96	54.00	-10.04
4894.000	Peak	35.60	12.45	48.05	74.00	-25.95
7341.000	Average	21.01	20.70	41.71	54.00	-12.29
7341.000	Peak	28.47	20.70	49.17	74.00	-24.83

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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2447 MHz  
 Test Mode :Tx  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-26  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Horizontal  
 Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AVG	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	24.01	12.45	36.46	54.00	-17.54
4894.000	Peak	30.84	12.45	43.29	74.00	-30.71
7341.000	Average	21.70	20.70	42.41	54.00	-11.59
7341.000	Peak	28.38	20.70	49.08	74.00	-24.92

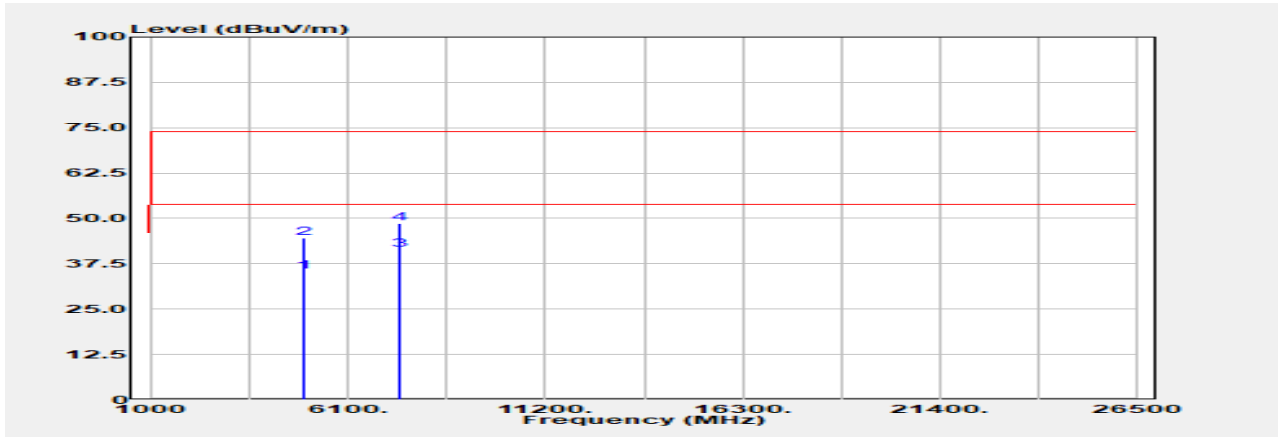
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Report Number :TERF2210002052E2  
 Operation Mode :SRD 2.4G  
 Test Frequency :2476 MHz  
 Test Mode :Tx  
 EUT Pol :E2 Plane

Test Site :SAC C  
 Test Date :2022-11-26  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Vertical  
 Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AVG	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	22.95	12.42	35.37	54.00	-18.63
4952.000	Peak	32.19	12.42	44.61	74.00	-29.39
7428.000	Average	20.71	20.62	41.33	54.00	-12.67
7428.000	Peak	28.10	20.62	48.73	74.00	-25.27

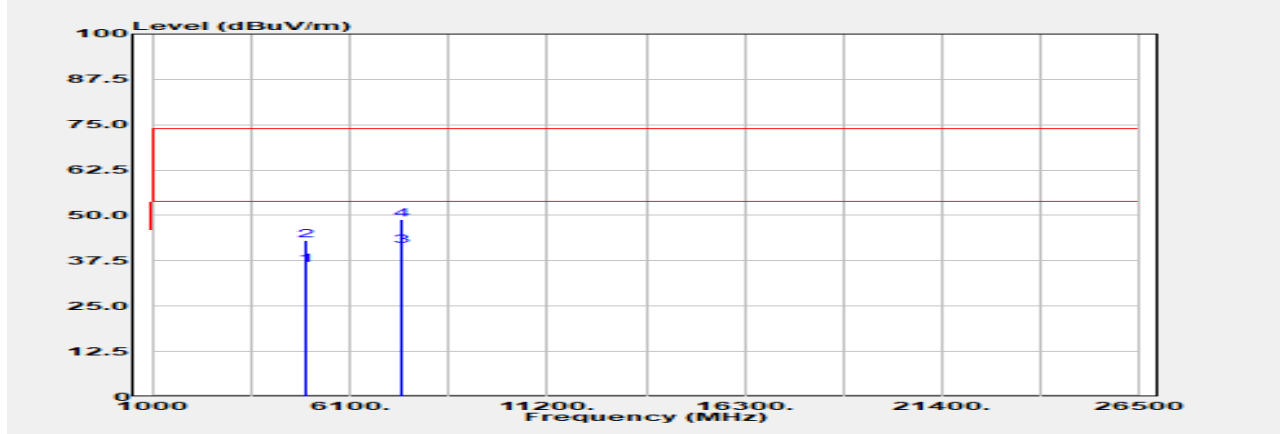
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Test Site :SAC C  
 Test Date :2022-11-26  
 Temp./Humi. :23.7/68  
 Antenna Pol. :Horizontal  
 Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AVG	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4952.000	Average	24.00	12.42	36.42	54.00	-17.58
4952.000	Peak	30.64	12.42	43.06	74.00	-30.94
7428.000	Average	20.93	20.62	41.55	54.00	-12.45
7428.000	Peak	28.37	20.62	48.99	74.00	-25.01

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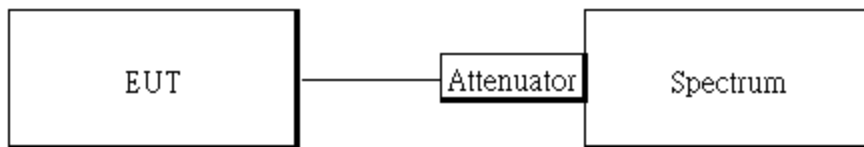
## 10 EMISSION BANDWIDTH

### 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



### 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.

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**10.3 Measurement Results:**

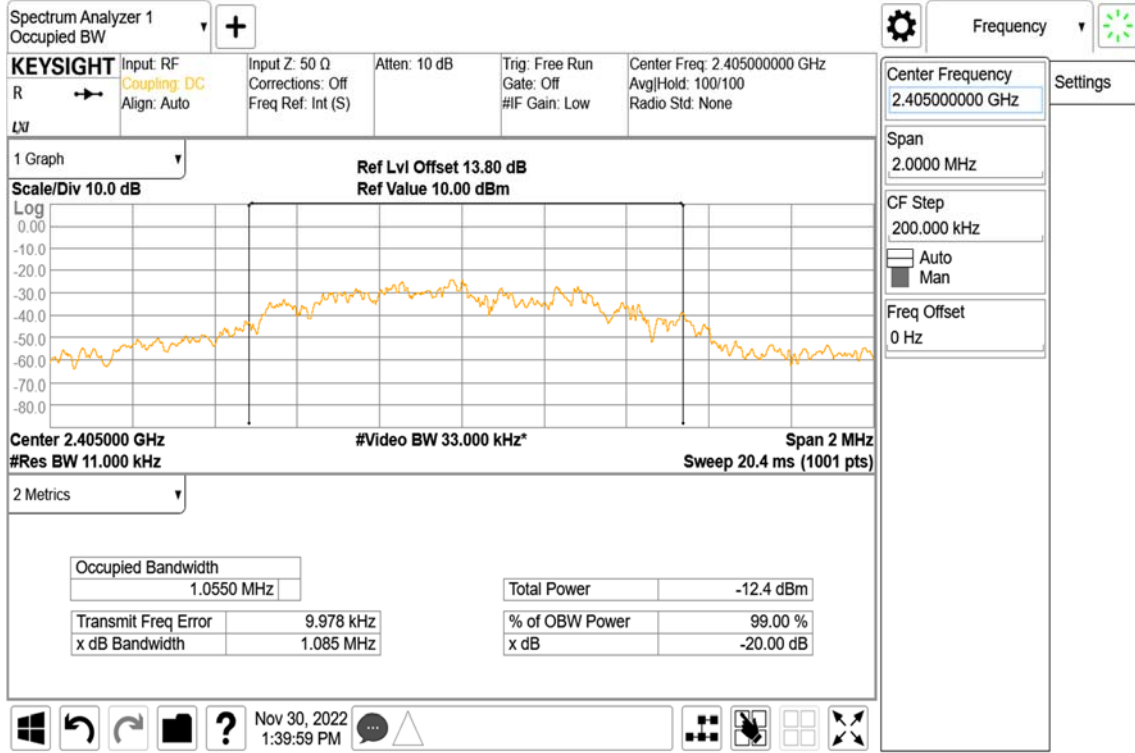
Frequency (MHz)	20dB Bandwidth (MHz)
2405	1.085
2447	1.080
2476	1.040

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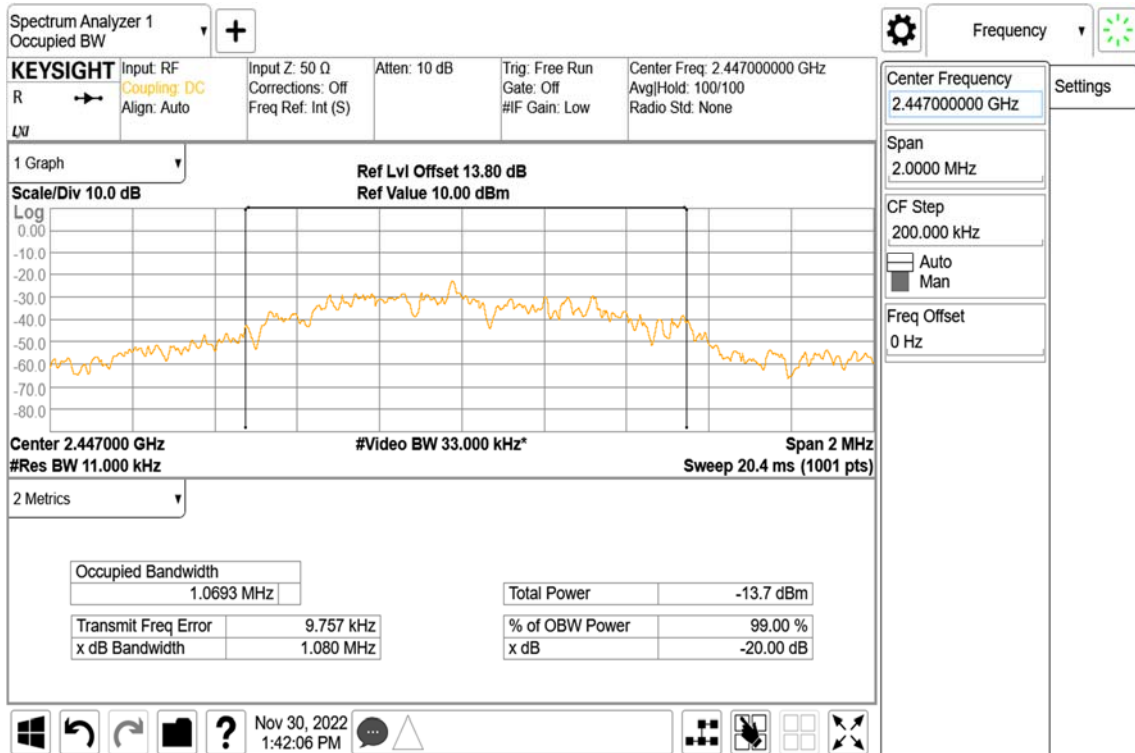
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## CH Low



## CH Mid

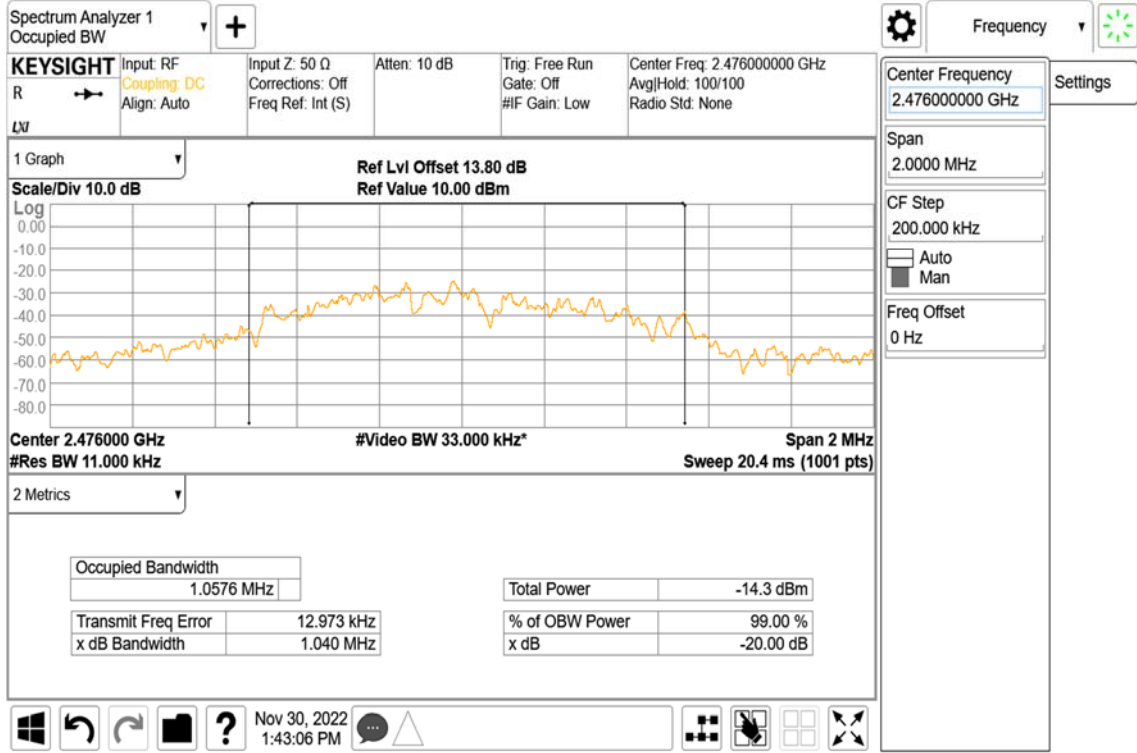


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## CH High



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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.

### 8.2 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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