

# ELECTROMAGNETIC EMISSIONS **COMPLIANCE REPORT**



Applicant:	Darfon Electronics Corp. 167, Shanying Road, Gueishan, Taoyuan 333, Taiwan
Product Name:	Dongle
Brand Name:	HP
Model No.:	TPA-D003D
Model Difference:	N/A
Report Number:	TERF2210002064E2
FCC ID	O62-TPAD003D
Date of EUT Received:	October 21, 2022
Date of Test:	November 14, 2022 ~ November 30, 2022
Issue Date:	January 10, 2022

Approved By

Jav 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		
TERF2210002064E2	00	Original	December 13, 2022	Violetta Tang			
TERF2210002064E2	01	Updated address and section 5	January 09, 2022	Violetta Tang	*		
TERF2210002064E2	02	Updated section 7.3 and memos of section 9	January 10, 2022	Violetta Tang	*		

### Note:

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

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#### **GENERAL INFORMATION** 1

#### 1.1 **Product Description**

Product Name:	Dongle
Brand Name:	HP
Model No.:	TPA-D003D
Model Difference:	N/A
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.:	9CH2280031
Power Supply:	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:	91.61dBµV/m

### 1.3 Antenna Designation

Antenna	Supplier	Antenna	Freq.	Peak Antenna
Type		Part No.	(MHz)	Gain (dBi)
Chip	Unictorn Technologies Corp.	CW324S	2405-2476	0.3

Note: Antenna information is provided by the applicant.

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#### **Test Methodology of Applied Standards** 1.4

FCC Part 15, Subpart C §15.249

ANSI C63.10:2013

#### 1.5 **Test Facility**

Laboratory	Test Site Address	Test Site Name	FCC Designa- tion number	IC CAB identifier
		SAC 1		
		SAC 2		
		SAC 3		
	No. 124 Mu Kung Dood, Now Toingi	Conduction 1		
	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New	Conducted 1	TW0027	
	Taipei City, Taiwan.	Conducted 2	100027	
	Taiper City, Taiwan.	Conducted 3		TW3702
		Conducted 4	-	
		Conducted 5		
SGS Taiwan Ltd.		Conducted 6		
Central RF Lab.		Conduction C		
(TAF code 3702)		SAC C	TW0028	
		SAC D		
		SAC G		
		Conducted A		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conducted B		
	Tabyuan City, Taiwan 555	Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
		Conducted G		

#### 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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#### SYSTEM TEST CONFIGURATION 2

#### 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 a 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 a 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.

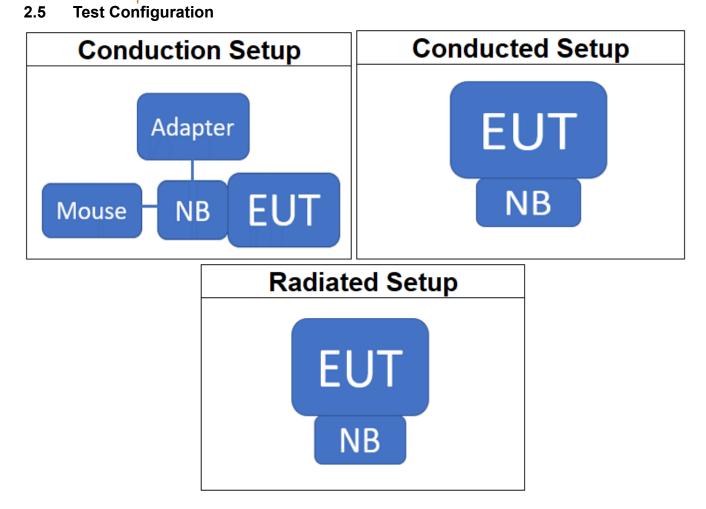
### 2.4.2 For all conducted test items:

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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#### Control Unit(s) 2.6

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	L440	P0000367	N/A	N/A
Mouse	HP	TPA-D003M	9CH239004Y	N/A	N/A
USB Cable	Suzhou Keli Science&Techn ology Development Co.,Ltd.	21445	N/A	N/A	N/A
Conducted Emission Test Site: Conducted C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	T14	P0003332	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	

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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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#### **DESCRIPTION OF TEST MODES** 4

#### 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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#### THE WORST TEST MODES AND CHANNEL DETAILS 5

- 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 TES	ST (ABOVE 1 GH	z)		
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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#### **MEASUREMENT UNCERTAINTY** 6

Test Items	Ur	ncertaint	:y
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	
	+/-	2.57	dB	9kHz~30MHz	
Polarization: Horizontal	+/-	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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#### MEASUREMENT EQUIPMENT USED 7

#### 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	

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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		
Pre-Amplifier	EMC Instruments	EMC330	980096	11/18/2021	11/17/2022		
Pre-Amplifier	EMC Instruments	EMC0011830	980199	11/18/2021	11/17/2022		
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/27/2021	10/26/2022		
Attenuator	Marvelous	WATT-218FS-10	RF20	11/18/2021	11/17/2022		
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	11/18/2021	11/17/2022		
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	11/18/2021	11/17/2022		
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	Limits (dBuV)				
MHz	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					

Note

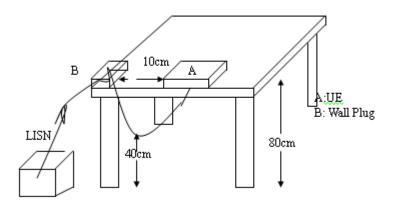
1. The lower limit shall apply at the transition frequencies

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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AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number	:TERF22100	002064E2	Test Site	:Conductio	on C	
Test Mode	:SRD 2.4G		Test Date	:2022-11-1	5	
Power	:120V/60Hz		Temp./Humi	. :24.8/56		
Probe	:L1		Engineer	:Andy War	ng	
			-	-	-	
80 Level (	dBuV)					
70.0						
60.0						
50.0 4 1 0	Willing			10 "N		
40.0	- Welland	1	9	M	41	
30.0	רויאיזייי ד	Manufallehansway	Mar and the second s	w w v	MA I	
20.0						
10.0						
10.0						
0.15	0.5	1 Freque	2 5 ncy (MHz)	10	20 30	
Freq.	Detector	Spectrum		Actual	Limit	Margin
Troq.		eading Level		FS	Linne	margin
MHz	PK/QP/AV	dBµV	dB	dBµV	dBµV	dB
0.400		04.40	40.07	44.07		
0.160 0.160	Average QP	34.10 43.70		44.37 53.97	55.47 65.47	-11.10 -11.50
0.174	Average	30.70		40.97	54.77	-13.80
0.174	QP	39.30		49.57	64.77	-15.20
0.195	Average	27.40	-	37.67	53.80	-16.13
0.195	QP	36.80		47.07	63.80	-16.73
0.263	Average	22.10	10.28	32.38	51.34	-18.95
0.263	QP	31.20	10.28	41.48	61.34	-19.85
2.012	Peak	28.65		39.82	56.00	-16.18
13.841	Peak	35.20	10.76	45.96	60.00	-14.04

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Report Number Test Mode Power Probe	:TERF22 :SRD 2.4 :120V/60 :N	G	Test Si Test Da Temp./ Engine	ate :2022 Humi. :24.8	duction C 2-11-15 /56 y Wang	
80 Level (	dBuV)					
70.0						
60.0						
50.0 2 4						
40.0	Pro des		9		<u>A</u>	
5	- Intwin	when when the second of the second of the	m	mm	1mg	
30.0		A CONTRACTOR OF				
20.0					- Ve	
10.0						
0.15						
0.15	0.	.5 1 Freque	2 ency (MHz)	5 10	0 20 30	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz I	Mode PK/QP/AV	Reading Level dBμV	dB	FS dBµV	dBµV	dB
		abp	uD.	dDµ (	αρμ (	
0.156	Average	31.90	10.28	42.18	55.65	-13.47
0.156	QP	40.30	10.28	50.58	65.65	-15.07
0.180	Average	27.70	10.27	37.97	54.50	-16.53
0.180	QP	37.10	10.27	47.37	64.50	-17.13
0.193	Average	23.90	10.27	34.17	53.89	-19.72
0.193	QP	34.76	10.27	45.03	63.89	-18.86
0.239	Average	19.90	10.28	30.18	52.13	-21.95
0.239	QP	29.70	10.28	39.98	62.13	-22.15
3.603	Peak	29.71	10.72	40.43	56.00	-15.57
13.841	Average	27.10	10.72	37.82	50.00	-12.18
13.841	QP	29.80	10.72	40.52	60.00	-19.48

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#### RADIATED EMISSION TEST 9

#### 9.1 Applicable Standard

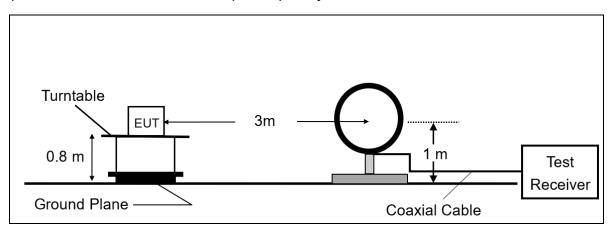
- 1. Only spurious emissions are permitted in any of the frequency bands listed in §15.205.
- 2. The field strength of fundamental and harmonic emissions, measured at 3 m, shall not exceed 50 mV/m and 0.5 mV/m respectively.
- 3. Emissions radiated outside of the specified frequency bands, except for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



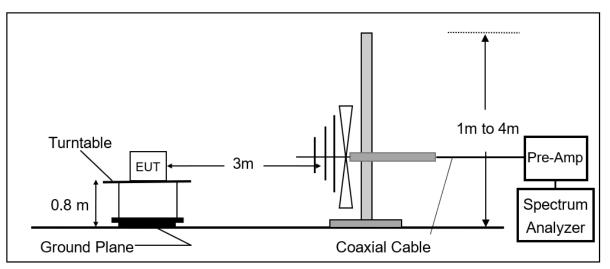
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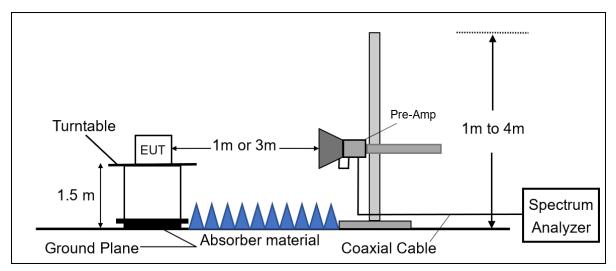
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(B) Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



(C) Radiated Emission Test Set-Up, Frequency Above 1GHz.



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#### 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

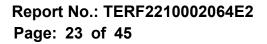
Where	0	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Actual FS(dB $\mu$ V/m) = SPA. Reading level(dB $\mu$ V) + Factor(dB) Factor(dB) = Antenna Factor(dBµV/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

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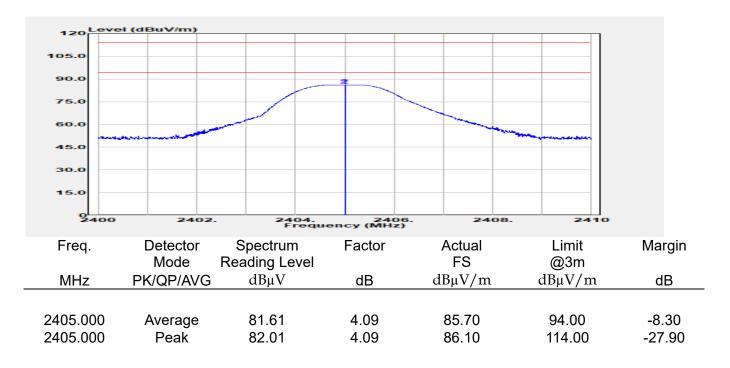




#### 9.5 **Measurement Result**

#### Field Strength of the Fundamental Signal 9.5.1

Report Number	:TERF2210002064E2	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
Set	:0		



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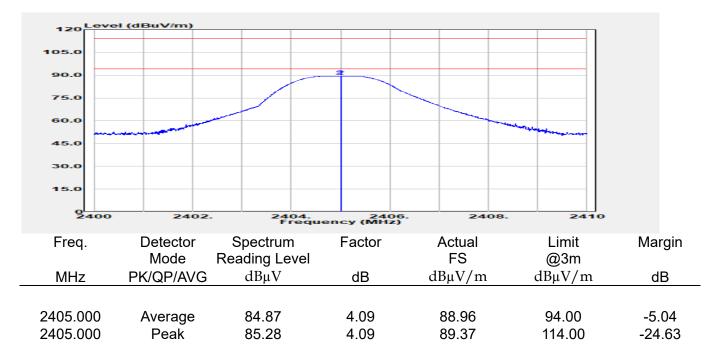
f (886-2) 2298-0488

Report No.: TERF2210002064E2 Page: 24 of 45



ERF2210002064E2
RD 2.4G
405 MHz
lain
2 Plane

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



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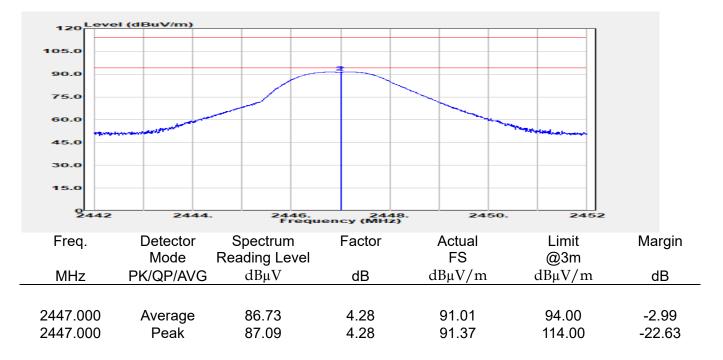
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Report No.: TERF2210002064E2 Page: 25 of 45



Report Number	:TERF2210002064E2
Operation Mode	:SRD 2.4G
Test Frequency	:2447 MHz
Test Mode	:Main
EUT Pol	:E2 Plane
Set	:0

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



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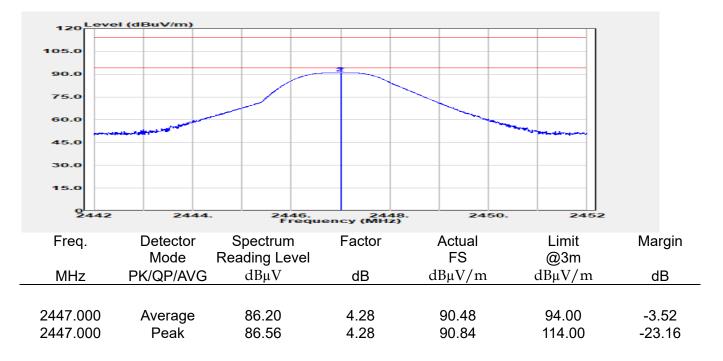
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Report No.: TERF2210002064E2 Page: 26 of 45



Report Number	:TERF2210002064E2
Operation Mode	:SRD 2.4G
Test Frequency	:2447 MHz
Test Mode	:Main
EUT Pol	:E2 Plane
Set	:0
Test Frequency Test Mode EUT Pol	:2447 MHz :Main :E2 Plane

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



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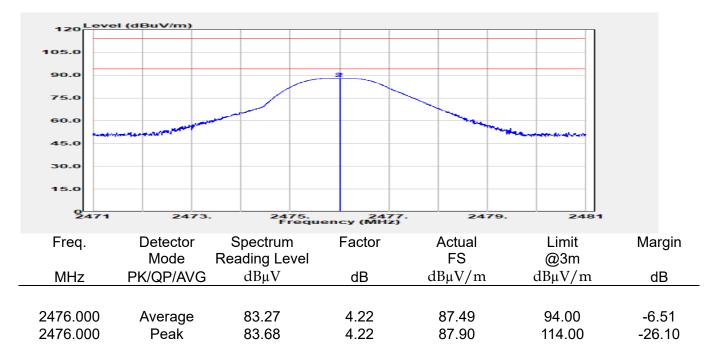
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Report No.: TERF2210002064E2 Page: 27 of 45



Report Number	:TERF2210002064E2
Operation Mode	:SRD 2.4G
Test Frequency	:2476 MHz
Test Mode	:Main
EUT Pol	:E2 Plane
Set	:0

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



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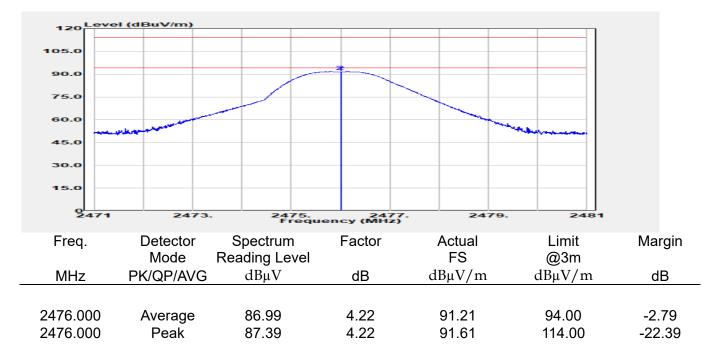
f (886-2) 2298-0488

Report No.: TERF2210002064E2 Page: 28 of 45



Report Number	:TERF2210002064E2
Operation Mode	:SRD 2.4G
Test Frequency	:2476 MHz
Test Mode	:Main
EUT Pol	:E2 Plane
Set	:0
Test Frequency Test Mode EUT Pol	:2476 MHz :Main :E2 Plane

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



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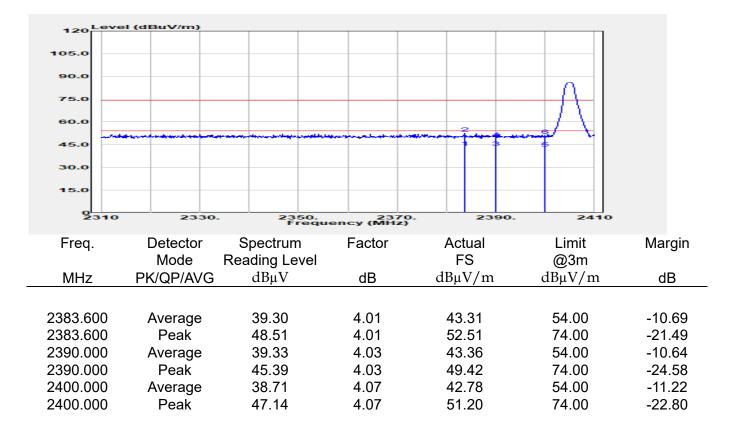
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#### 9.5.2 Restricted bands around fundamental frequency

Report Number	:TERF2210002064E2
<b>Operation Mode</b>	:SRD 2.4G
Test Frequency	:2405 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane
Set	:0

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



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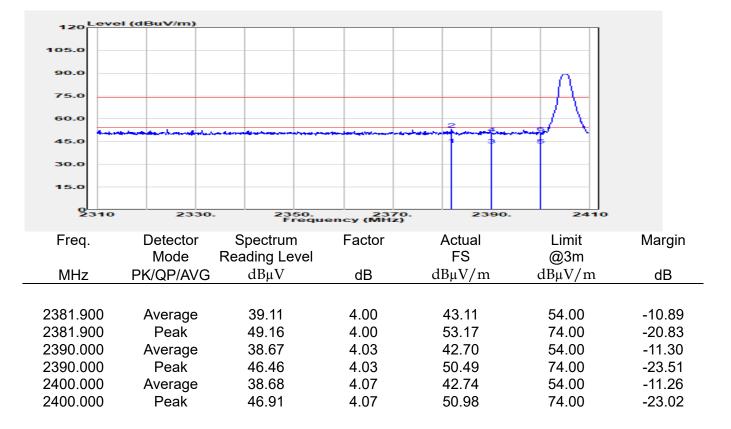
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Report No.: TERF2210002064E2 Page: 30 of 45



Report Number	:TERF2210002064E2
Operation Mode	:SRD 2.4G
Test Frequency	:2405 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane
Set	:0

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



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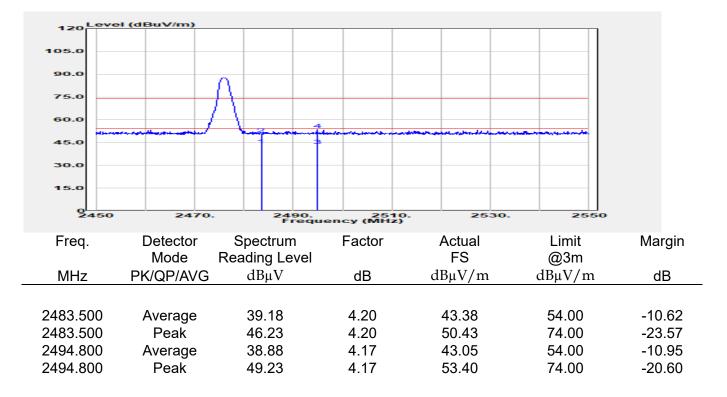
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:TERF2210002064E2
:SRD 2.4G
:2476 MHz
:Bandedge
:E2 Plane
:0

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



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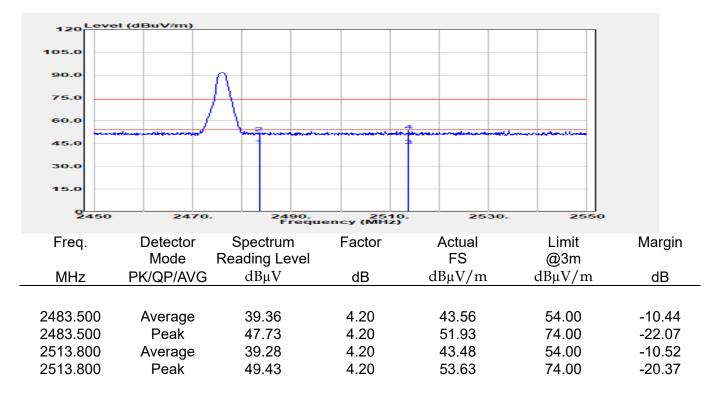
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Report No.: TERF2210002064E2 Page: 32 of 45



Report Number	:TERF2210002064E2
Operation Mode	:SRD 2.4G
Test Frequency	:2476 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane
Set	:0

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



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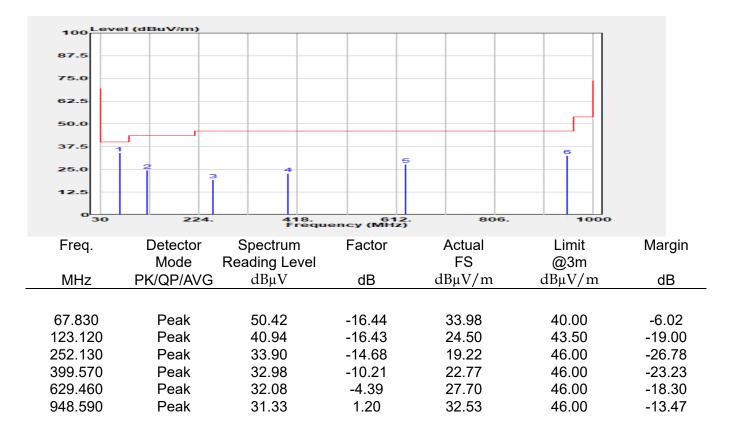
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#### 9.5.3 **Radiated Spurious Emission Measurement Result**

Report Number	:TERF2210002064E2
<b>Operation Mode</b>	:SRD 2.4G
Test Frequency	:2447 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane
Set	:0

:SAC C Test Site :2022-11-14 Test Date Temp./Humi. :24.6/67 Antenna Pol. :VERTICAL Engineer :Andy Wang



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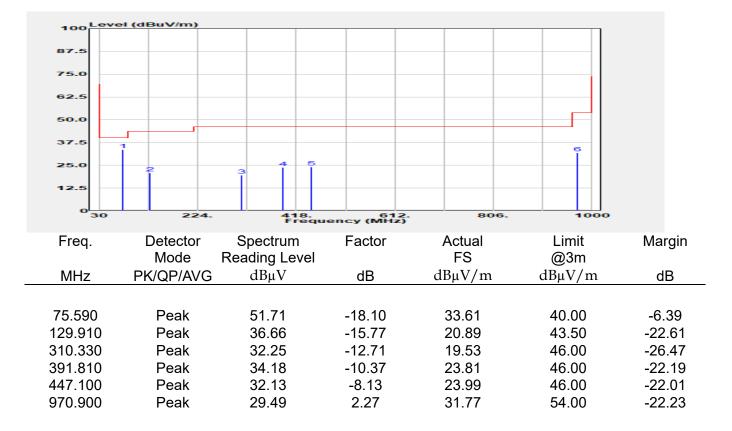
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Report No.: TERF2210002064E2 Page: 34 of 45



Report Number	:TERF2210002064E2
Operation Mode	:SRD 2.4G
Test Frequency	:2447 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane
Set	:0

Test Site	:SAC C
Test Date	:2022-11-14
Temp./Humi.	:24.6/67
Antenna Pol.	:HORIZONTAL
Engineer	:Andy Wang



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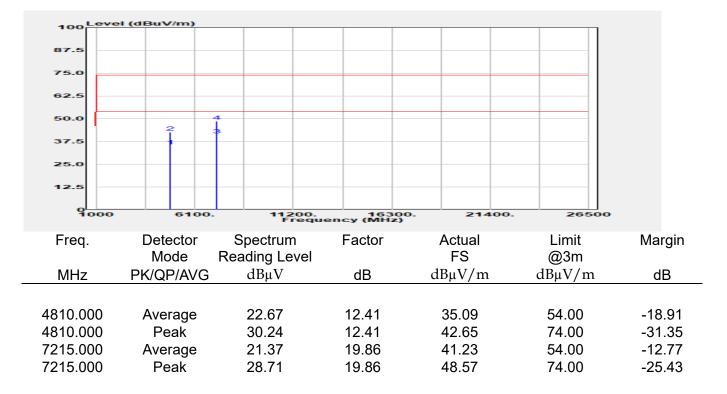
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Report No.: TERF2210002064E2 Page: 35 of 45



R	Report Number	:TERF2210002064E2
С	peration Mode	:SRD 2.4G
Т	est Frequency	:2405 MHz
Т	est Mode	:Tx
E	UT Pol	:E2 Plane
S	et	:0

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



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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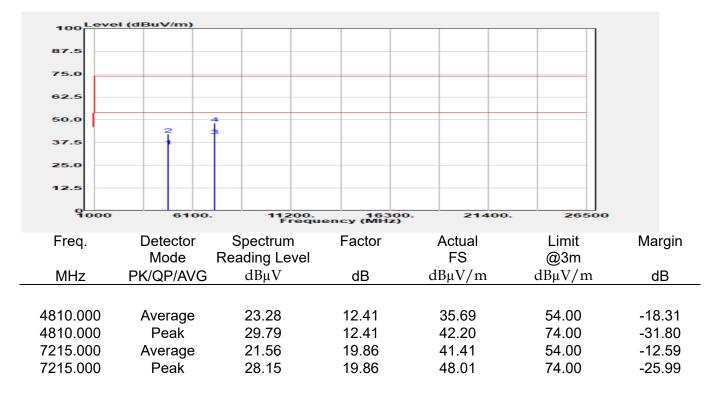
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Report No.: TERF2210002064E2 Page: 36 of 45



TERF2210002064E2
SRD 2.4G
2405 MHz
Тх
E2 Plane
0

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



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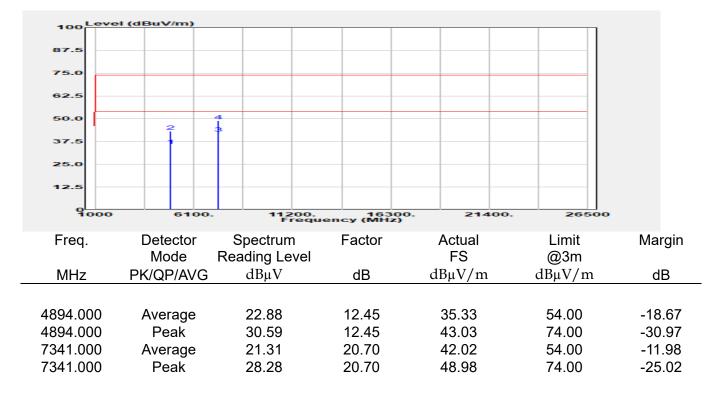
f (886-2) 2298-0488

Report No.: TERF2210002064E2 Page: 37 of 45



Report Number	:TERF2210002064E2
Operation Mode	:SRD 2.4G
Test Frequency	:2447 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane
Set	:0

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



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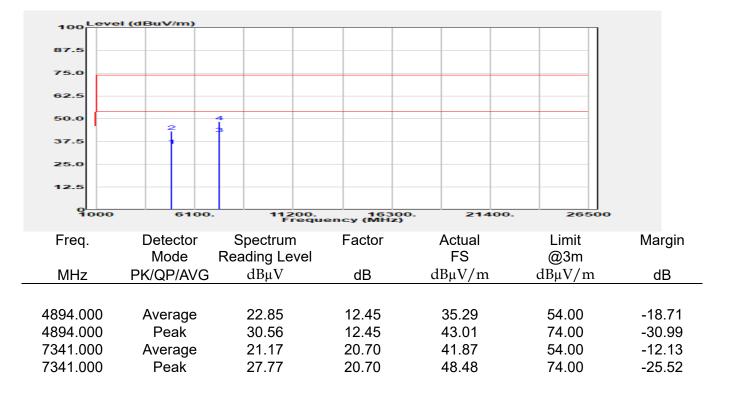
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Report No.: TERF2210002064E2 Page: 38 of 45



:TERF2210002064E2
:SRD 2.4G
:2447 MHz
:Tx
:E2 Plane
:0

Test Site	:SAC C
Test Date	:2022-11-25
Temp./Humi.	:23.7/68
Antenna Pol.	:Horizontal
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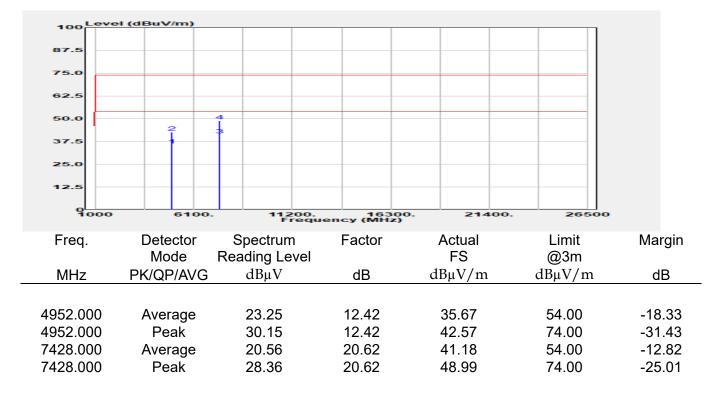
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Report No.: TERF2210002064E2 Page: 39 of 45



064E2

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



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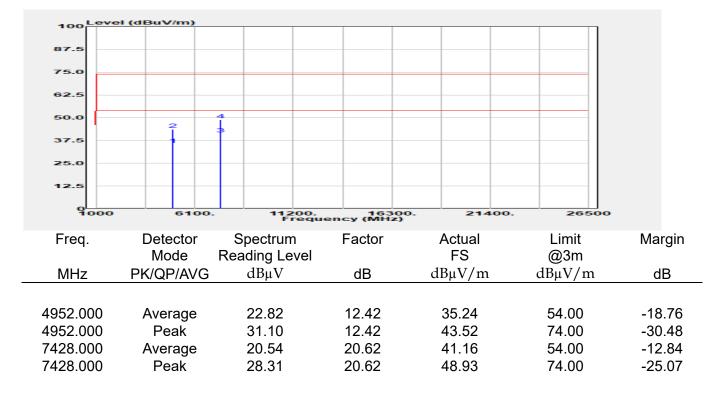
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TERF2210002064E2
SRD 2.4G
2476 MHz
Tx
E2 Plane
0

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



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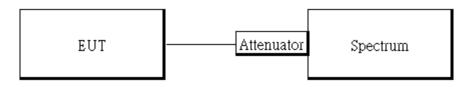
# **10 EMISSION BANDWIDTH**

### 10.1 Applicable Standard

§2.1049 (h) & 15.215(c)

Intentional radiators operating under the alternative provisions to the general emis-(c) sion 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.
- 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	1.047
2447	1.044
2476	1.037

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### **CH** Low



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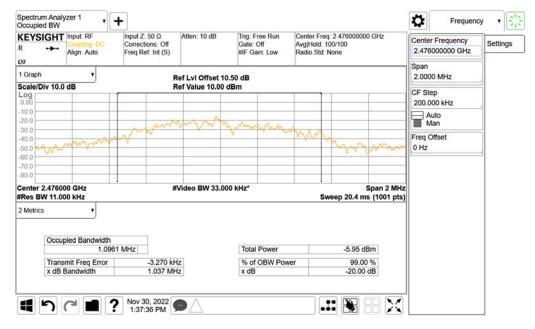
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### **CH High**



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# **11 ANTENNA REQUIREMENT**

### 11.1 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.

### **11.2** 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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