ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Applicant:	Withings 2 rue Maurice Hartmann, 92130 Issy-les-Moulineaux, FRANCE
Manufacturer:	Withings 2 rue Maurice Hartmann, 92130 Issy-les-Moulineaux, FRANCE
Product Name:	SCT02
Brand Name:	Withings
Model No.:	SCT02
Model Difference:	N/A
Report Number:	TERF2404001092E2
FCC ID	XNASCT02
Date of EUT Received:	April 19, 2024
Date of Test:	April 19, 2024～May 21, 2024
Issue Date:	June 26, 2024

Approved By _____

Vito Pei

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 §15.247.

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
TERF2404001092E2	00	Original.	June 12, 2024	Susan Lin	
TERF2404001092E2	01	Update chapter 1.3	June 26, 2024	Susan Lin	*

Note:

1、 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:	SCT02
Brand Name:	Withings
Model No.:	SCT02
Model Difference:	N/A
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.:	A47EFA2E681C
Power Supply:	3.7Vdc from Battery or 5Vdc from USB Port
Test Software (Name/Version):	Tera Term Version 4.84
Mac address:	CONDUCTED: a4:7e:fa:2e:68:28 RADIATED: a4:7e:fa:2e:68:18

1.2 RF Specification

WLAN 2.4GHz

Wi-Fi	Frequency Range	Channels	Rated Power (dBm)		Modulation Technology
			Peak	Avg.	
802.11b	2412~2462	11	14.29	11.98	DSSS
802.11g	2412~2462	11	23.73	14.47	OFDM
802.11n_HT20	2412~2462	11	23.70	14.32	OFDM
Modulation type:		CCK, DQPSK, DBPSK for DSSS in 802.11b			
		64QAM, 16QAM, QPSK, BPSK for OFDM in 802.11g,11n			
Data Rate:		802.11b: 1/2/5.5/11 Mbps			
		802.11g: 6/9/12/18/24/36/48/54 Mbps			
		802.11n_HT20:up to 72.2Mbps			

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1.3 Antenna Designation

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
PCB	Withings	BCM9Fractal	2412~2462	2.8

Note: Antenna information is provided by the applicant.

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1.4 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247
FCC KDB 558074 D01 15.247 Meas Guidance v05r02
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		
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 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. 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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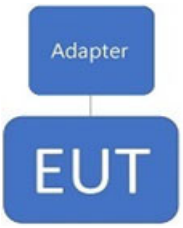
2.5 Test Configuration

Conduction Setup



Conducted Setup

Radiated Setup

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	Lapo	WT-02CA	N/A	N/A	N/A
USB Cable	I Max	USB-C1200	N/A	N/A	N/A

Conducted Emission Test Site: Conducted D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	T14	P0003332	N/A	N/A
Type C Cable	MI	SJX10ZM	N/A	N/A	N/A
Test kit	YA HORNG	PC23H019	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
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(a)(2)	Emission Bandwidth	Compliant
§15.209 §15.247(d)	Conducted Band Edge and Spurious Emission	Compliant
§15.209 §15.247(d)	Radiated Band Edge and Spurious Emission	Compliant
§15.205	Restricted Bands	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.203	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operating Frequencies

2400~2483.5 MHz	
20MHz	
CH	Freq. (MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

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4.2 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.
3. Investigation has been done on all the possible configurations for searching the worst case.

   The given UE is pre-scanned among below modes.

Modulation		Transmission Chain								Single Transmission Spatial	
V	802.11 b	V	Ch0		Ch1		Ch2		Ch3	V	1TX
V	802.11 g	V	Ch0		Ch1		Ch2		Ch3	V	1TX
V	802.11 n	V	Ch0		Ch1		Ch2		Ch3	V	1TX
	802.11 ac		Ch0		Ch1		Ch2		Ch3		1TX
	802.11 ax		Ch0		Ch1		Ch2		Ch3		1TX

4. Therefore, below summary is the modes of test configuration that yield the highest reading and generate the highest emission chosen to carry out the relevantly mandatory test items.

CONDUCTED TEST					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 11	1,6,11	DSSS	1	ch0
802.11g	1 to 11	1,6,11	OFDM	6	ch0
802.11n_HT20	1 to 11	1,6,11	OFDM	MCS0	ch0

TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11g	1 to 11	6	OFDM	6	ch0

TRANSMIT RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 11	1,6,11	DSSS	1	ch0
802.11g	1 to 11	1,6,11	OFDM	6	ch0
802.11n_HT20	1 to 11	1,6,11	OFDM	MCS0	ch0

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.

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty		
AC Power Line Conducted Emission	+/-	1.54	dB
Output Power measurement	+/-	0.97	dB
Emission Bandwidth	+/-	1.38	Hz
Conducted emission measurement	+/-	0.77	dB
Peak Power Density	+/-	0.61	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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6 MEASUREMENT EQUIPMENT USED

6.1 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	04/22/2024	04/21/2025
EMI Test Receiver	R&S	ESCI	101342	04/29/2024	04/28/2025
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2024	03/26/2025
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2024	03/26/2025
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

6.2 Conducted Measurement

Conducted Emission Test Site: Conducted D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	04/03/2024	04/02/2025
Power Meter	Anritsu	ML2496A	1512003	09/08/2023	09/07/2024
Power Sensor	Anritsu	MA2411B	1339378	09/08/2023	09/07/2024
Power Sensor	Anritsu	MA2411B	1339379	09/08/2023	09/07/2024
Test Software	SGS Taiwan	Radio Test Software	Ver.21	N.C.R	N.C.R
Attenuator	Woken	WATT-218FS-10	RF20	11/15/2023	11/14/2024
Attenuator	Woken	WATT-218FS-10	RF21	11/15/2023	11/14/2024
Attenuator	Woken	WATT-218FS-10	RF22	11/15/2023	11/14/2024
DC Block	MITEQ	W70289-5108	RF159	11/15/2023	11/14/2024

6.3 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
Active Loop Antenna	COM-POWER	AL-130R	10160105	12/04/2023	12/03/2024
3m Site NSA	SGS	966 chamber C	N/A	03/02/2024	03/01/2025
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	04/10/2024	04/09/2025
EMI Test Receiver	R&S	ESCI	101342	04/29/2024	04/28/2025
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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7 CONDUCTED EMISSION TEST

7.1 Standard Applicable

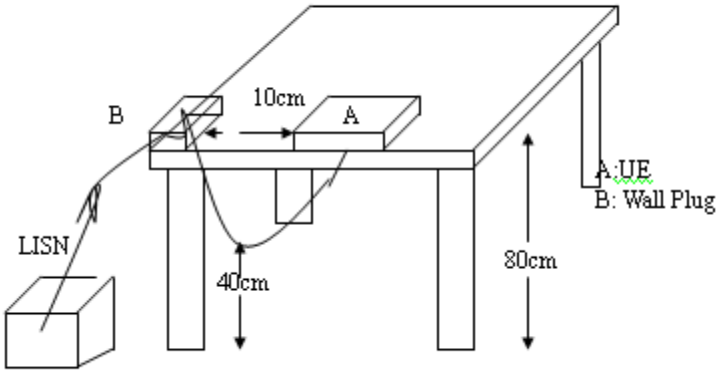
Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

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.		

7.2 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.

7.3 Test Setup



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7.4 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

7.5 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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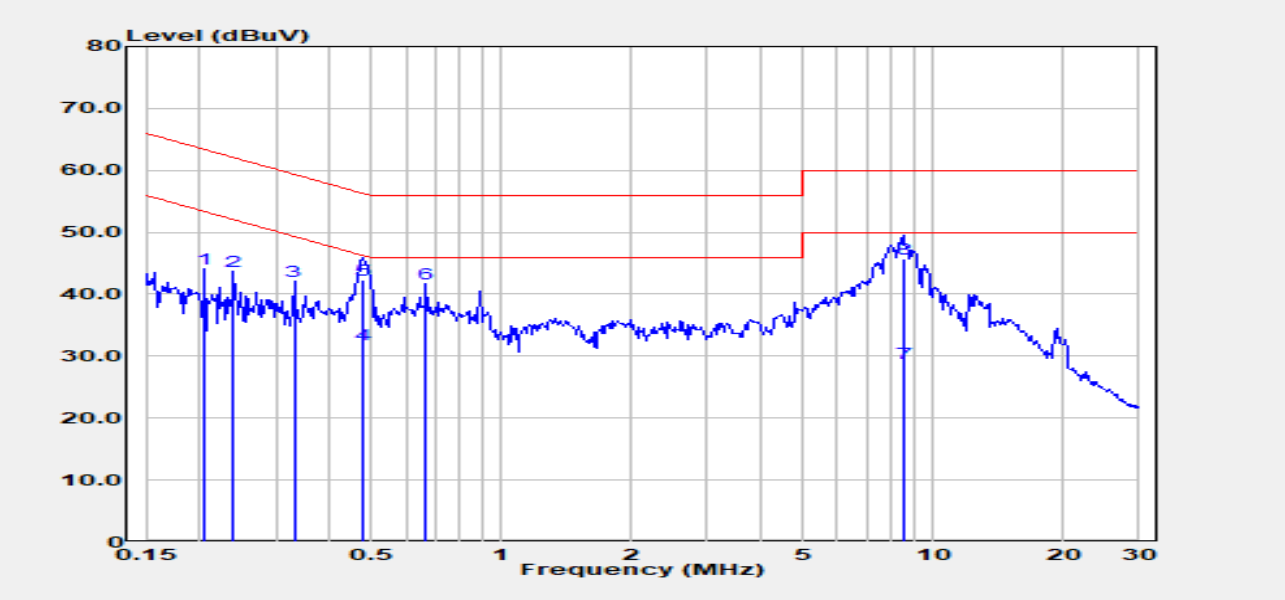
AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number	:TERF2404001092E2	Test Site	:Conduction C
Test Mode	:2.4G	Test Date	:2024-05-10
Power	:120V/60Hz	Temp./Humi.	:23.2℃/53%
Probe	:L1	Engineer	:Howard Haung



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.205	Peak	33.49	10.68	44.17	63.39	-19.22
0.239	Peak	33.13	10.67	43.80	62.12	-18.32
0.330	Peak	31.41	10.65	42.06	59.44	-17.38
0.476	Average	21.30	10.63	31.93	46.41	-14.47
0.476	QP	31.70	10.63	42.33	56.41	-14.07
0.668	Peak	30.96	10.66	41.62	56.00	-14.38
8.538	Average	18.00	10.97	28.97	50.00	-21.03
8.538	QP	34.80	10.97	45.77	60.00	-14.23

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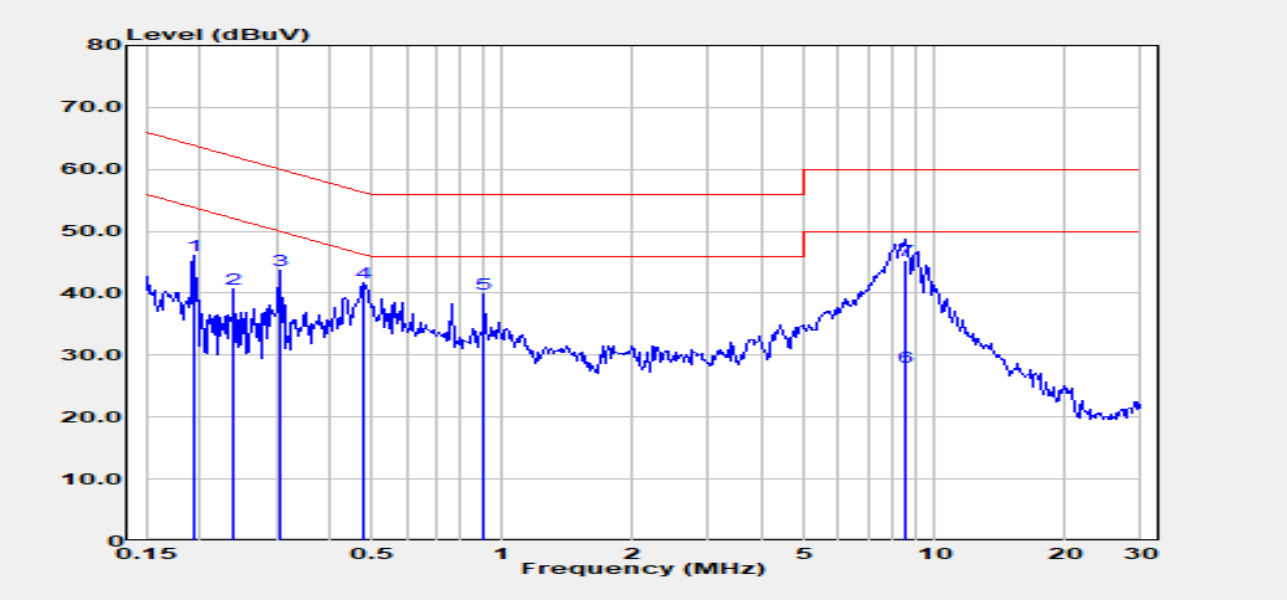
Report Number	:TERF2404001092E2	Test Site	:Conduction C
Test Mode	:2.4G	Test Date	:2024-05-10
Power	:120V/60Hz	Temp./Humi.	:23.2℃/53%
Probe	:N	Engineer	:Howard Haung



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.194	Peak	35.53	10.67	46.20	63.88	-17.68
0.239	Peak	30.14	10.66	40.79	62.12	-21.33
0.306	Peak	32.97	10.64	43.61	60.08	-16.47
0.476	Peak	31.04	10.62	41.66	56.41	-14.75
0.908	Peak	29.20	10.68	39.88	56.00	-16.12
8.538	Average	17.10	11.00	28.10	50.00	-21.90
8.538	QP	34.30	11.00	45.30	60.00	-14.70

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8 PEAK OUTPUT POWER MEASUREMENT

8.1 Standard Applicable

8.1.1 Duty Cycle

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

8.1.2 FCC

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt.

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

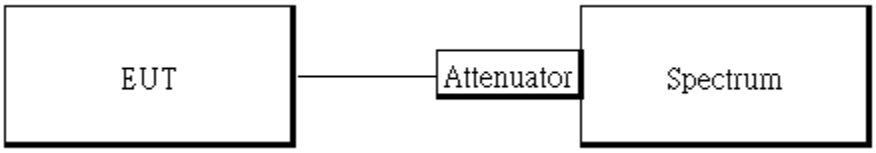
In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

Note:

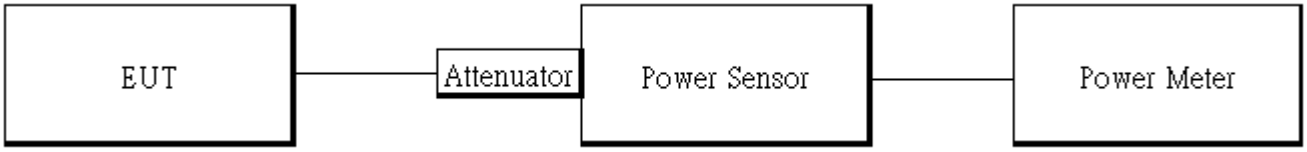
When the antenna gain is greater than 6 dBi, the power limit attenuated accordingly.

8.2 Test Setup

8.2.1 Duty Cycle



8.2.2 Output Power:



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8.3 Measurement Procedure

8.3.1 Duty Cycle:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

8.3.2 Output Power

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
   Power Meter:
   It is used as the auxiliary test equipment to conduct the output power measurement.
4. Record the max. Reading as observed from Spectrum or Power Meter.

**** Note: The duty cycle factor and below is compensated to obtain the maximum value of measurement in average.***

8.4 Measurement Result

8.4.1 Duty Cycle:

Mode	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11b	98.87	0.05	0.12	0.01
802.11g	93.25	0.30	0.72	1.00
802.11n_20	92.83	0.32	0.76	1.00

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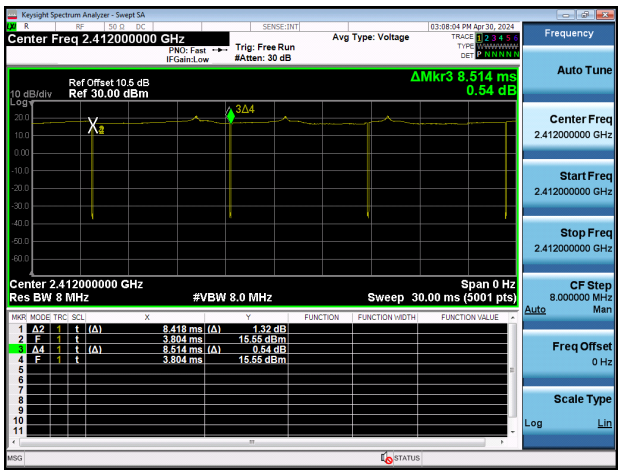
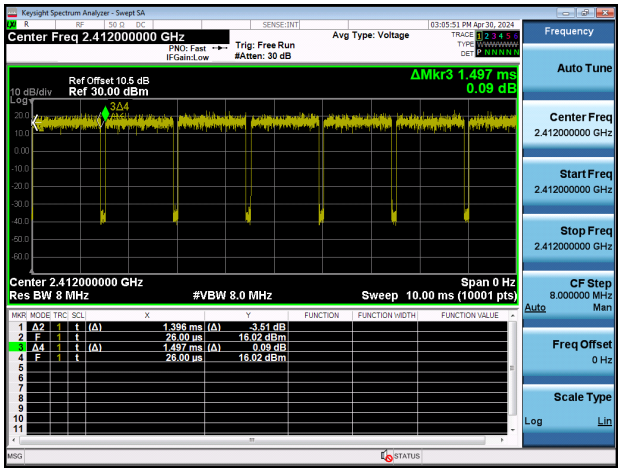
8.4.2 Duty Cycle test plots

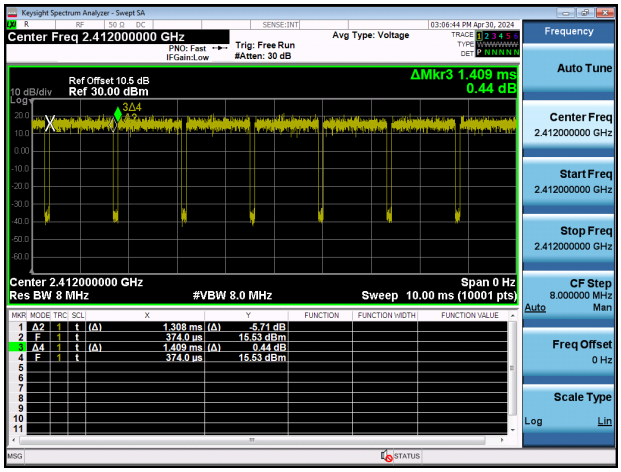
802.11b_20MHz_Chain0_2412MHz



802.11g_20MHz_Chain0_2412MHz



802.11n_20MHz_Chain0_2412MHz



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8.4.3 Output Power

802.11b Ch0						
CH	Freq. (MHz)	Data Rate	Power Setting	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	13	**14.29**	30.00	PASS
6	2437	1	12	13.20	30.00	PASS
11	2462	1	11	12.32	30.00	PASS
802.11b Ch0						
CH	Freq. (MHz)	Data Rate	Power Setting	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	13	**11.98**	30.00	PASS
6	2437	1	12	10.90	30.00	PASS
11	2462	1	11	9.97	30.00	PASS

802.11g Ch0						
CH	Freq. (MHz)	Data Rate	Power Setting	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	14	23.19	30.00	PASS
6	2437	6	15	**23.73**	30.00	PASS
11	2462	6	14	22.93	30.00	PASS
802.11g Ch0						
CH	Freq. (MHz)	Data Rate	Power Setting	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	14	13.57	30.00	PASS
6	2437	6	15	**14.47**	30.00	PASS
11	2462	6	14	13.40	30.00	PASS

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802.11n_HT_20M Ch0						
CH	Freq. (MHz)	Data Rate	Power Setting	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	15	**23.70**	30.00	PASS
6	2437	MCS0	14	22.90	30.00	PASS
11	2462	MCS0	14	22.94	30.00	PASS
802.11n_HT_20M Ch0						
CH	Freq. (MHz)	Data Rate	Power Setting	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	15	**14.32**	30.00	PASS
6	2437	MCS0	14	13.40	30.00	PASS
11	2462	MCS0	14	13.55	30.00	PASS

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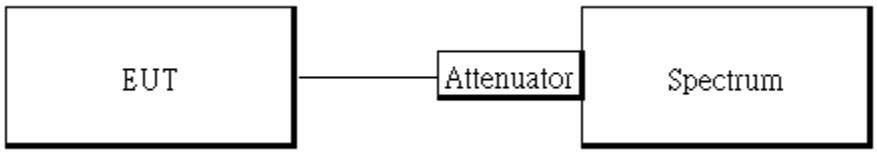
9 EMISSION BANDWIDTH MEASUREMENT

9.1 Standard Applicable

The minimum 6 dB bandwidth shall be at least 500 kHz.

9.2 Test Setup



9.3 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.

9.3.1 6dB BW measurements

1. The testing follows the Measurement Procedure of the KDB 558074 D01.
2. Set the spectrum analyzer as
   RBW= 100 kHz ,
   VBW = 3 X RBW,
   Span= 2 to 5 times of the OBW,
   Sweep=auto, Detector = Peak, and Max hold.
3. Mark the upper and lower frequencies of -6dB.
4. Repeat above procedures until all test default channel is completed.

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9.4 Measurement Result:

9.4.1 6dB BW measurements

802.11b Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	**9077.00**	≧ 500	PASS
2437	9076.00	≧ 500	PASS
2462	9060.00	≧ 500	PASS

802.11g Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	15150.00	≧ 500	PASS
2437	**15160.00**	≧ 500	PASS
2462	15150.00	≧ 500	PASS

802.11n_HT_20M Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	**15170.00**	≧ 500	PASS
2437	15150.00	≧ 500	PASS
2462	15140.00	≧ 500	PASS

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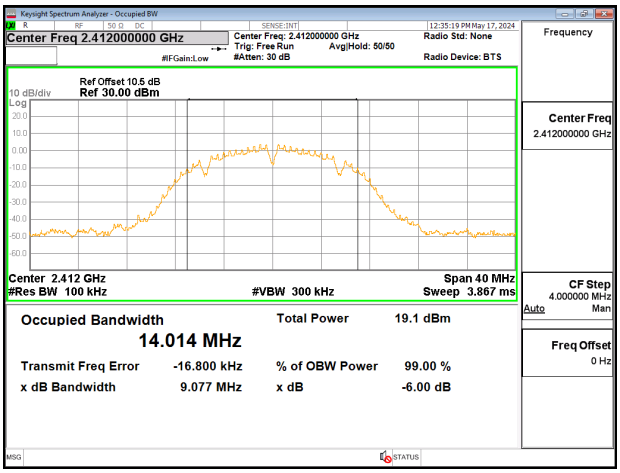
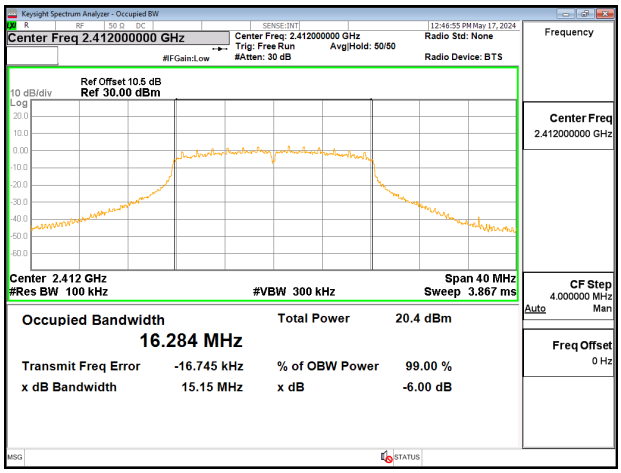
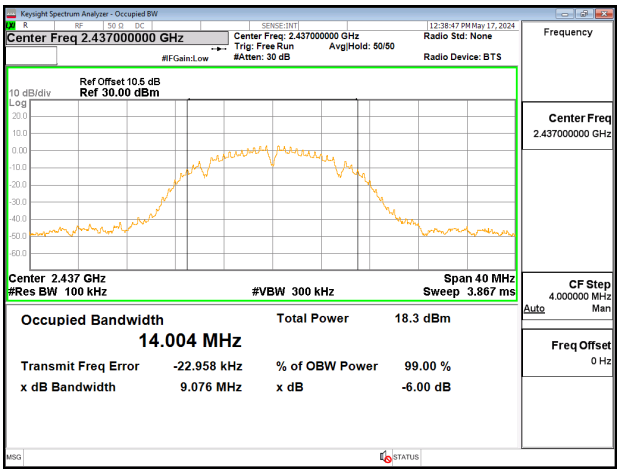
802.11b_20MHz_Chain0_2412MHz



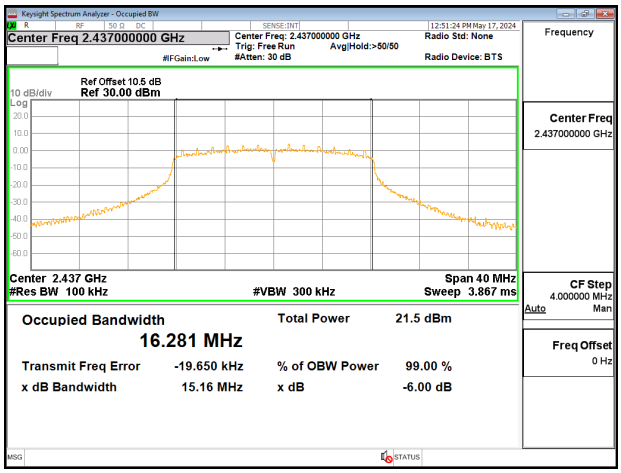
802.11g_20MHz_Chain0_2412MHz



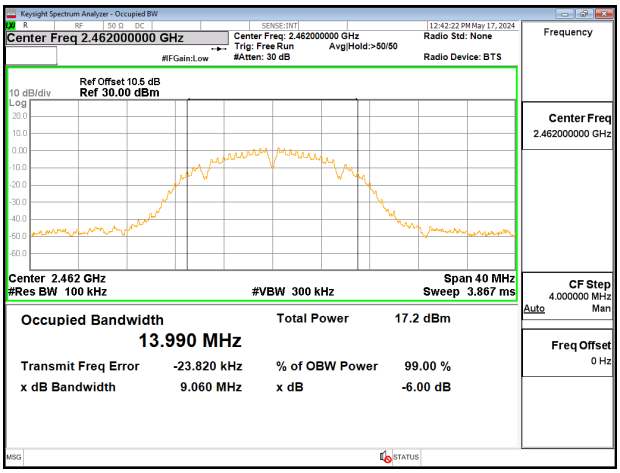
802.11b_20MHz_Chain0_2437MHz



802.11g_20MHz_Chain0_2437MHz



802.11b_20MHz_Chain0_2462MHz



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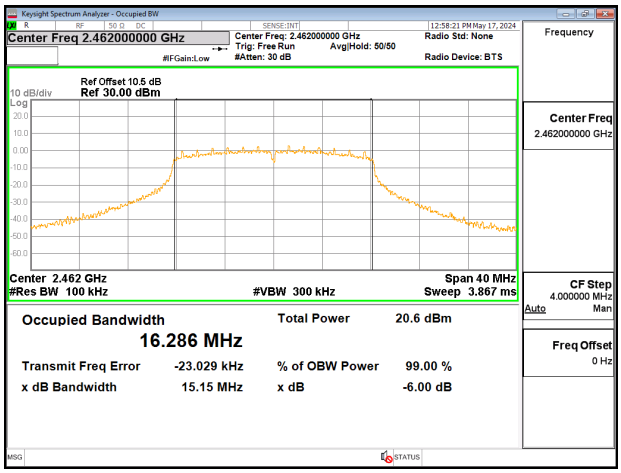

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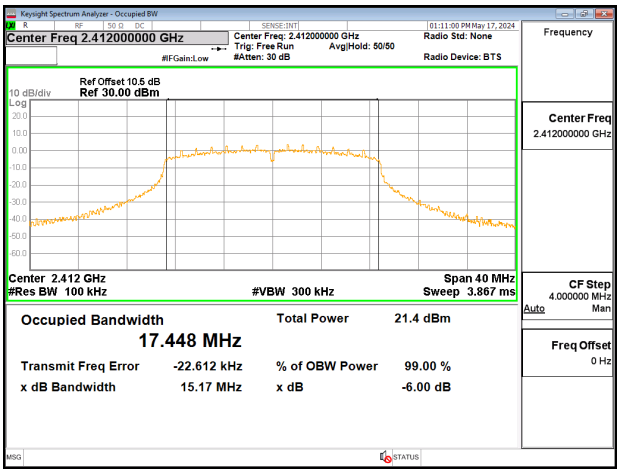
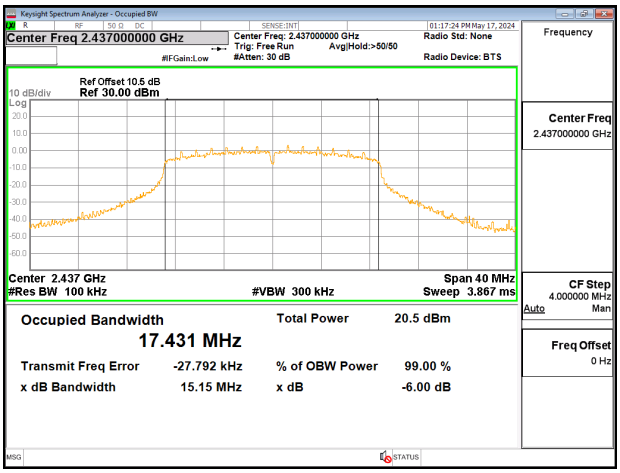
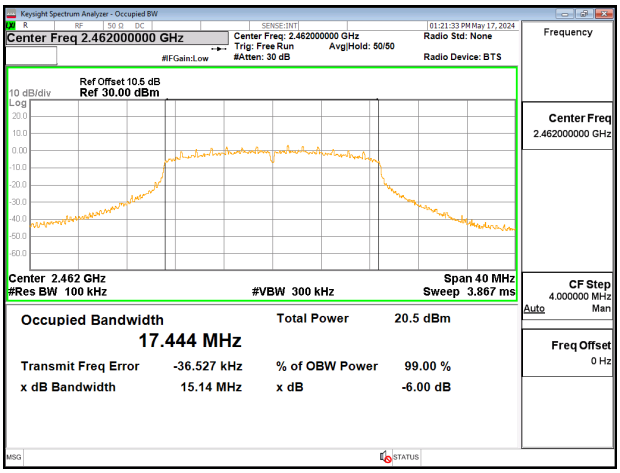
802.11n_20MHz_Chain0_2412MHz



802.11n_20MHz_Chain0_2437MHz



802.11n_20MHz_Chain0_2462MHz



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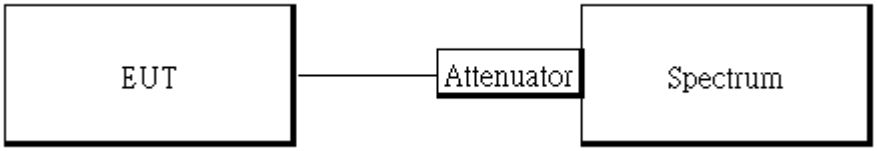
10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

10.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

10.2 Test Setup



10.3 Measurement Procedure

10.3.1 Reference Level of Emission Limit:

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 100kHz & VBW = 300 kHz.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

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10.3.2 Conducted Band Edge:

1. To connect Antenna Port of EUT to Spectrum.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Detector = Peak, Sweep = auto
6. Mark the highest reading of the emission as the reference level measurement.
7. Set DL as the limit = reading on marker of reference level measurement -20dBm
8. Mark the highest readings of the emissions outside of 2400MHz~2483.5MHz.
9. Repeat above procedures until all default test channel (low, middle, and high) was complete.

Conducted Spurious Emission:

1. To connect Antenna Port of EUT to Spectrum
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Set RBW = 100 kHz & VBW= 300 kHz, Detector =Peak, Sweep = Auto.
4. Allow trace to fully stabilize.
5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
6. Repeat above procedures until all default test channel measured were complete.

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10.4 Measurement Result

802.11b Ch0

Reference Level of Limit		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	3.62	-16.38
2437	2.78	-17.22
2462	1.67	-18.33

802.11g Ch0

Reference Level of Limit		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	2.87	-17.13
2437	3.90	-16.10
2462	2.93	-17.07

802.11n_HT_20M Ch0

Reference Level of Limit		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	4.07	-15.93
2437	3.16	-16.84
2462	3.01	-16.99

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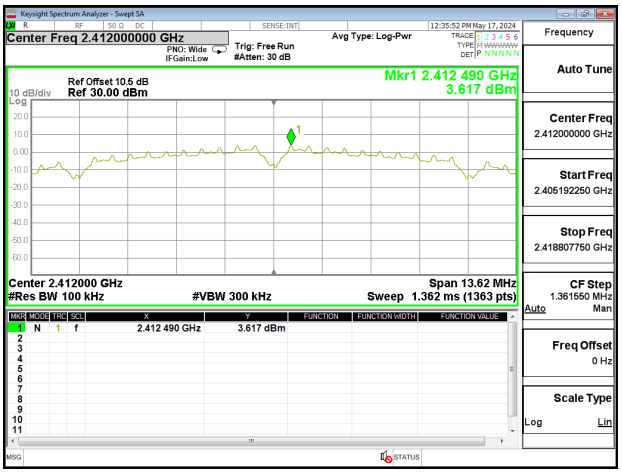
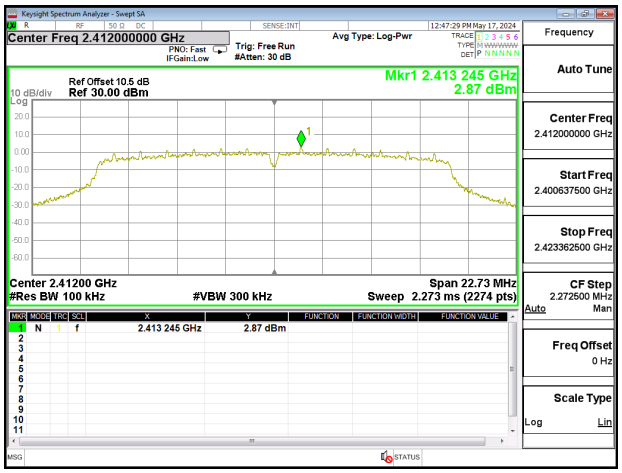
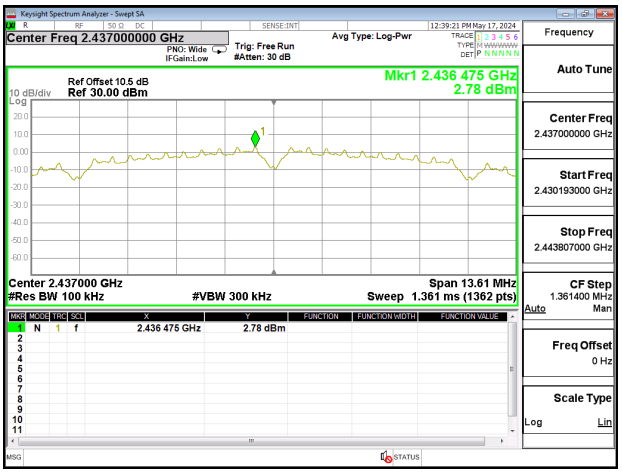
802.11b_20MHz_Chain0_2412MHz



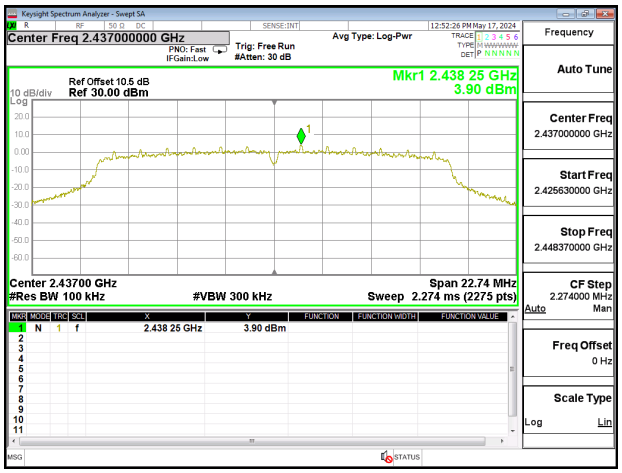
802.11g_20MHz_Chain0_2412MHz



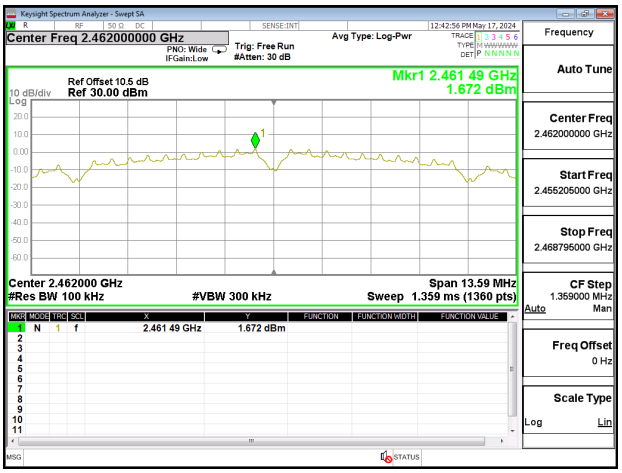
802.11b_20MHz_Chain0_2437MHz



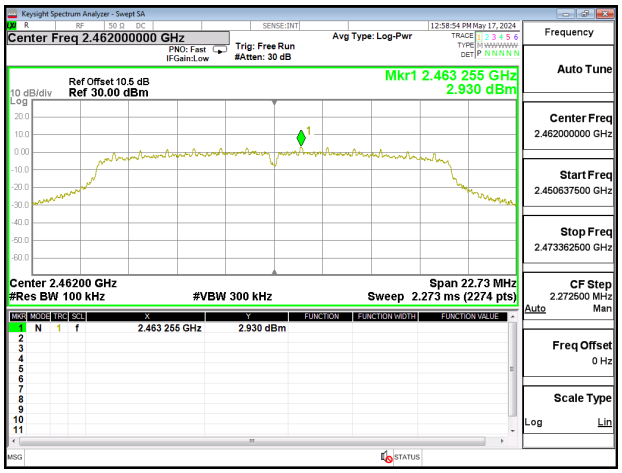
802.11g_20MHz_Chain0_2437MHz



802.11b_20MHz_Chain0_2462MHz



802.11g_20MHz_Chain0_2462MHz



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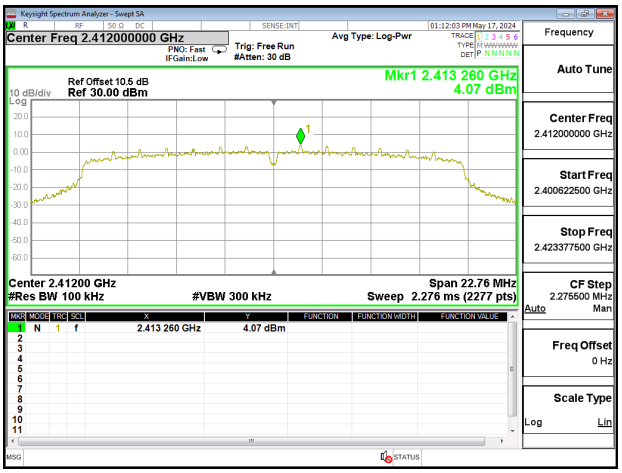
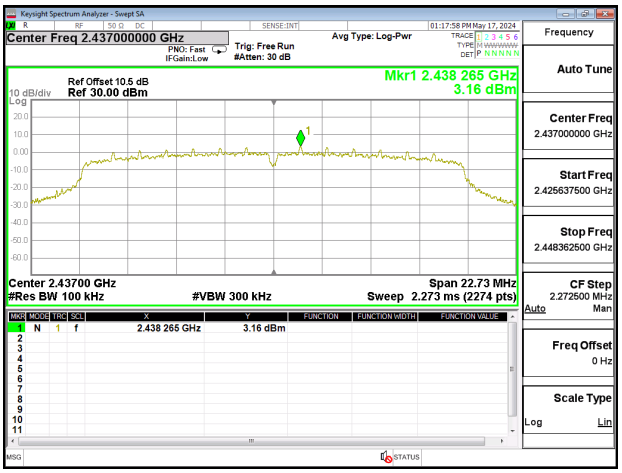
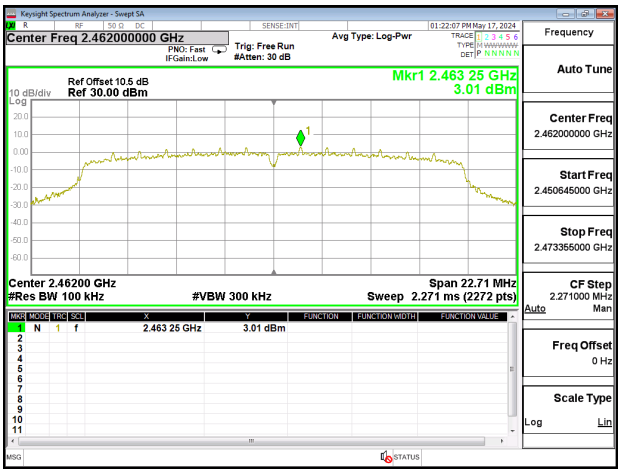
802.11n_20MHz_Chain0_2412MHz



802.11n_20MHz_Chain0_2437MHz



802.11n_20MHz_Chain0_2462MHz



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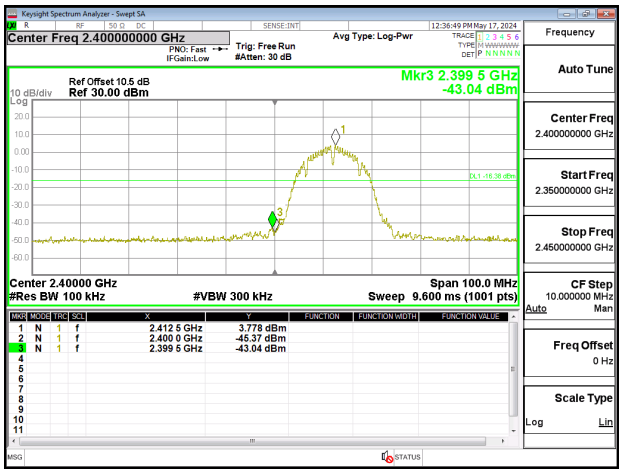
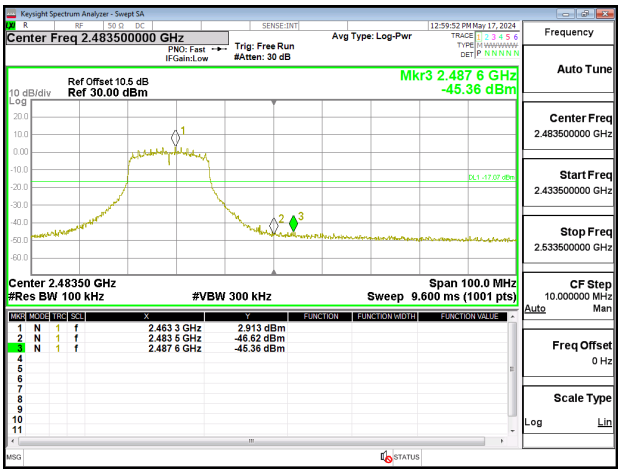
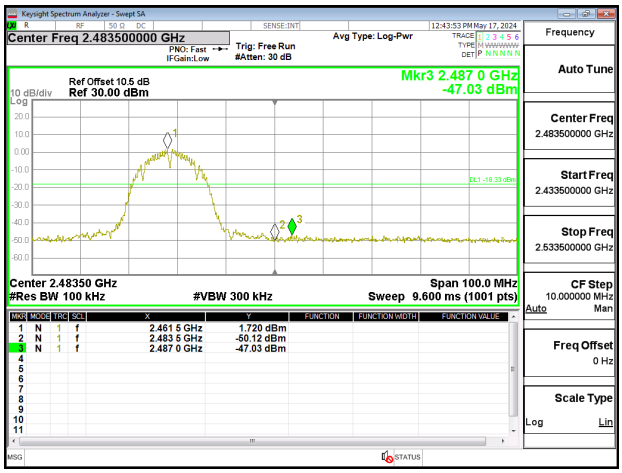
802.11b_20MHz_Chain0_2412MHz



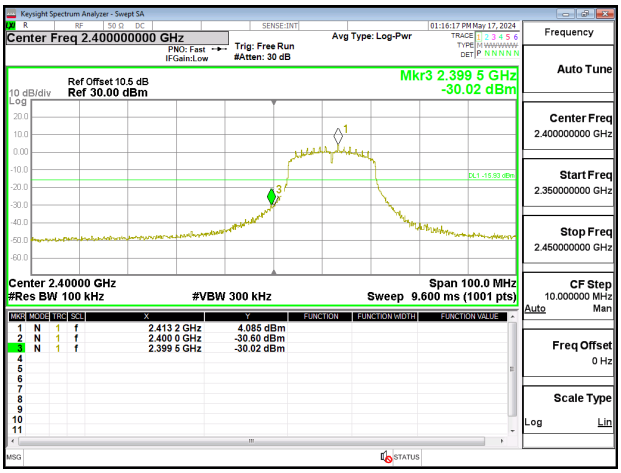
802.11g_20MHz_Chain0_2462MHz



802.11b_20MHz_Chain0_2462MHz



802.11n_20MHz_Chain0_2412MHz



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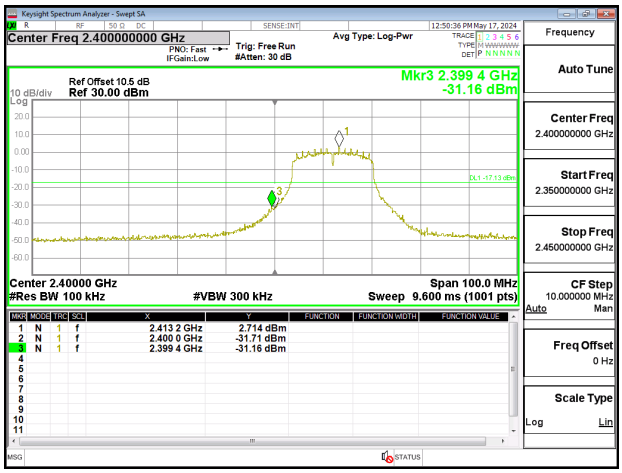

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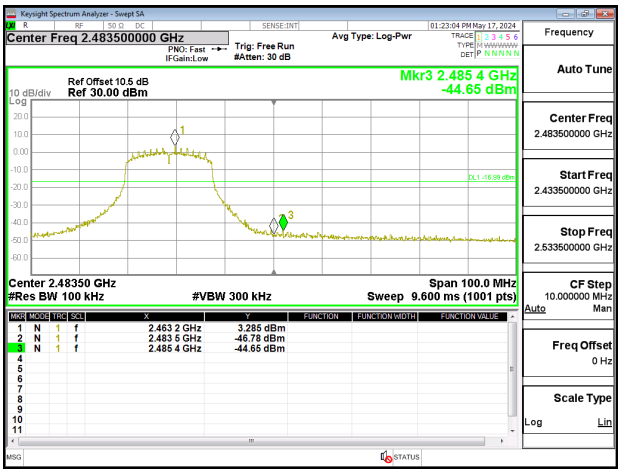

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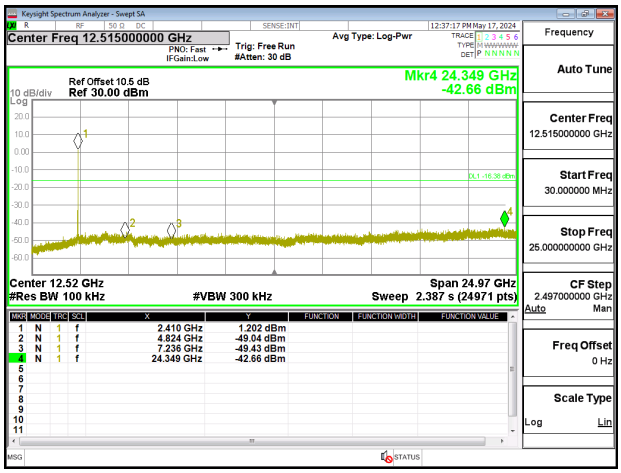
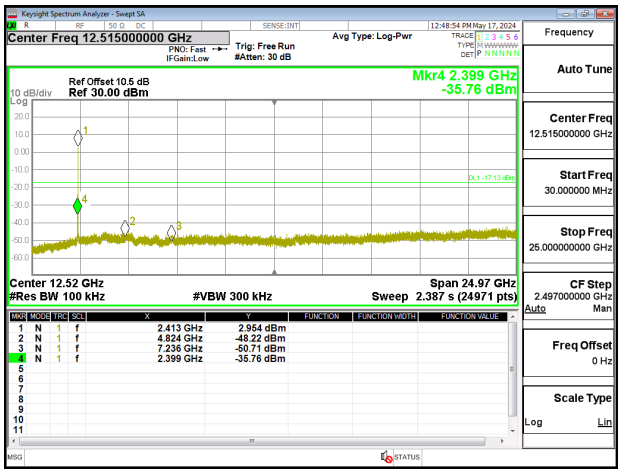
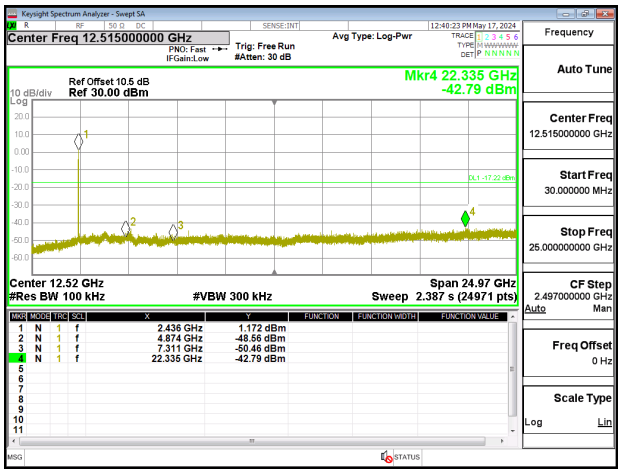
802.11b_20MHz_Chain0_2412MHz



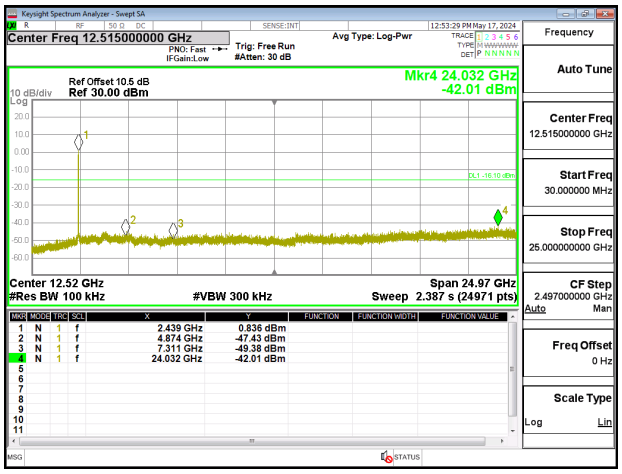
802.11g_20MHz_Chain0_2412MHz



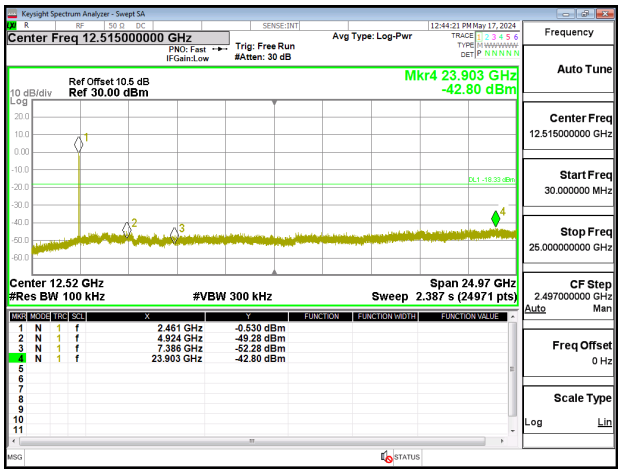
802.11b_20MHz_Chain0_2437MHz



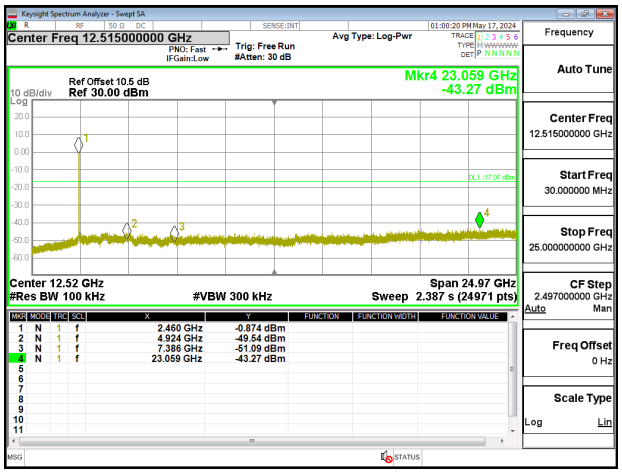
802.11g_20MHz_Chain0_2437MHz



802.11b_20MHz_Chain0_2462MHz



802.11g_20MHz_Chain0_2462MHz



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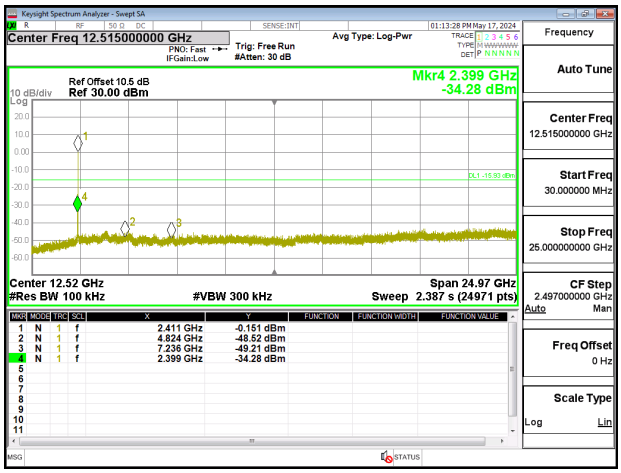
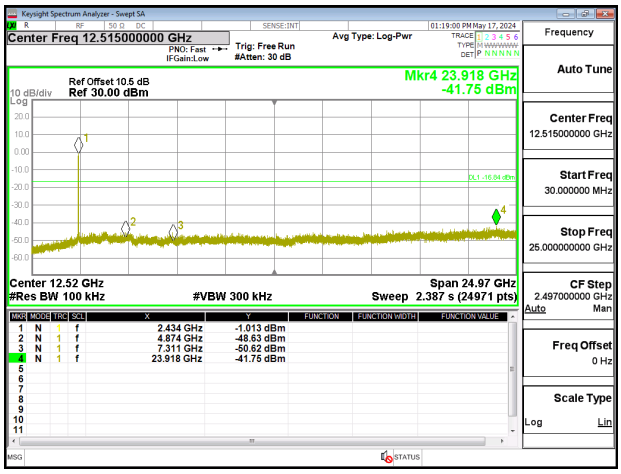
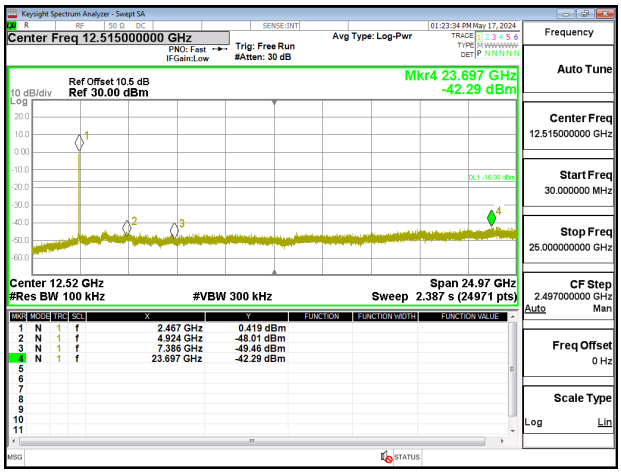
802.11n_20MHz_Chain0_2412MHz



802.11n_20MHz_Chain0_2437MHz



802.11n_20MHz_Chain0_2462MHz



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11 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

11.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 limit as below.

And according to §15.33(a) (1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.

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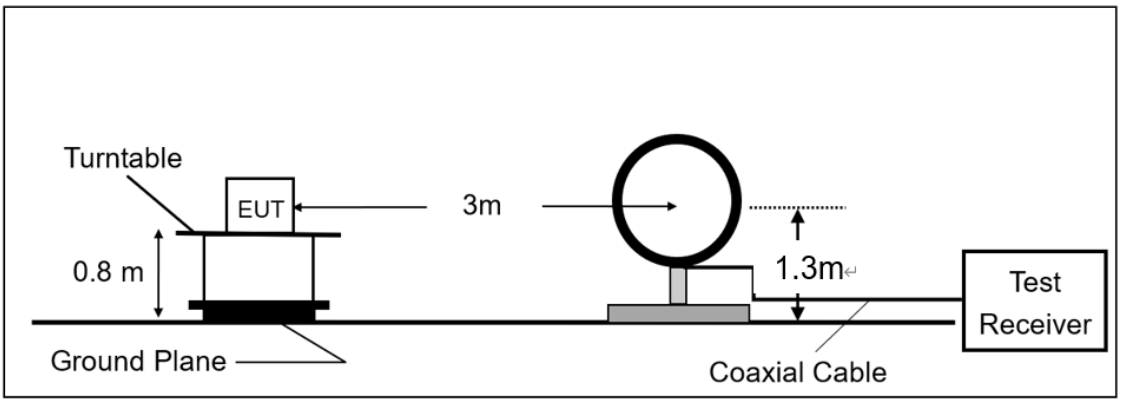
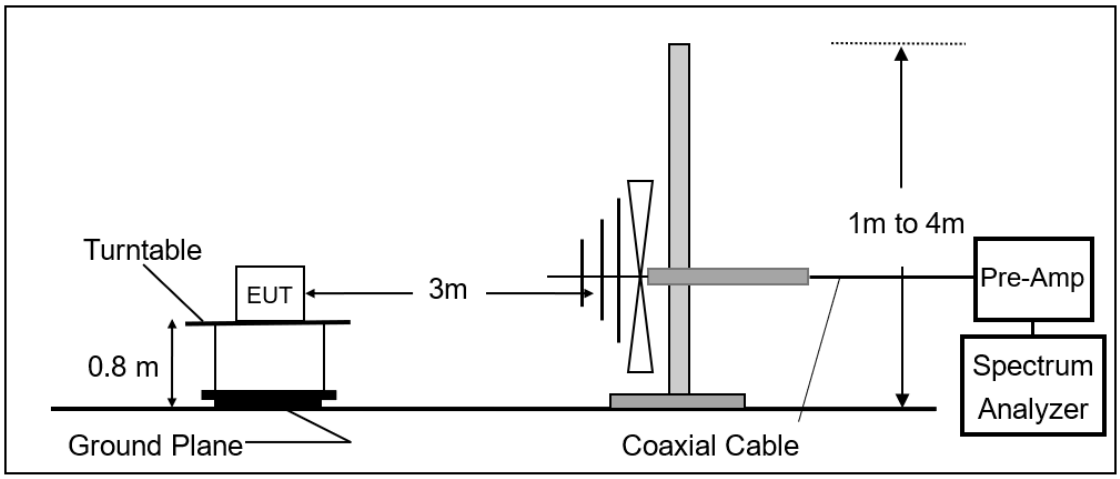
11.2 Test Setup

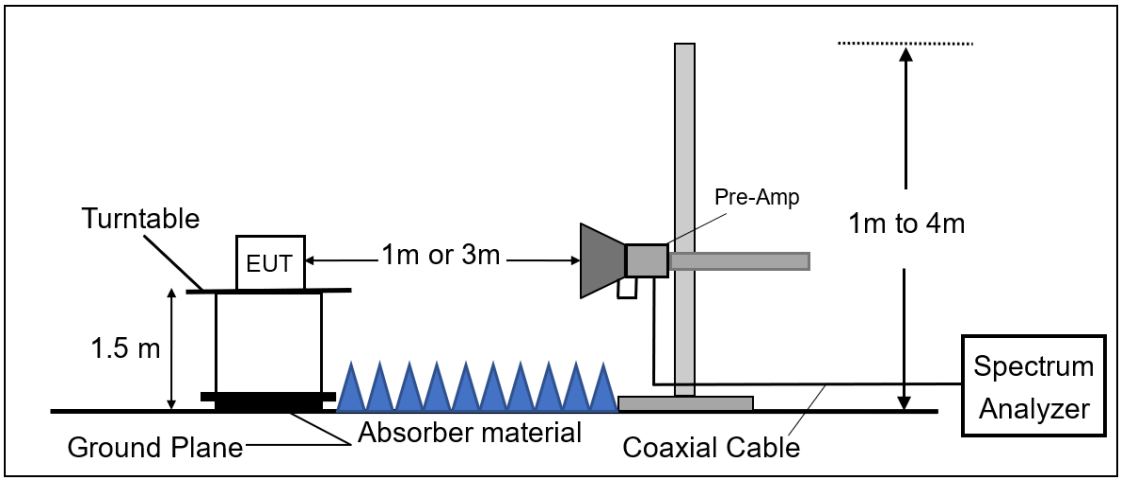
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz.



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



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



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11.3 Measurement Procedure

1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
2. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plane.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
5. Set the spectrum analyzer as RBW=100 kHz and VBW=300 kHz for Peak Detector (PK) at frequency between 30MHz and 1 GHz.
6. Use receiver mode as RBW=120 kHz for Quasi-peak (QP) at frequency between 30MHz and 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Maximum Emission Measurements at frequency above 1 GHz.
8. 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.
9. 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.
10. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
11. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
12. Repeat above procedures until all default test channel measured were complete.

11.4 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

*The limit of the emission level is expressed in dBuV/m, which converts 20*log(uV/m)*

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

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

11.5 Test Results of Radiated Spurious Emissions from 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

11.6 Measurement Result

Note:

1. *Refer to next page spectrum analyzer data chart and tabular data sheets.*
2. *Measurements are completed at peak and average level, the mark of average is the highest emission in restricted bands*

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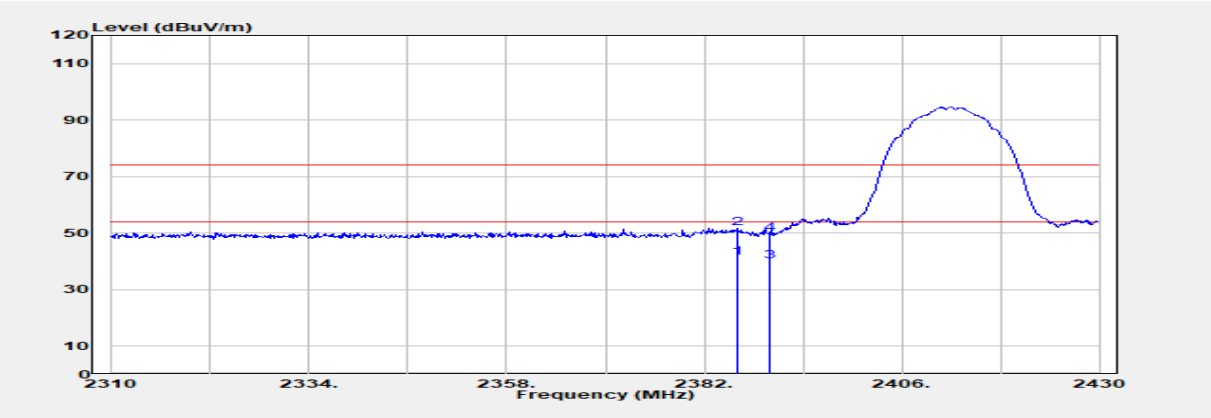
11.6.1 Radiated Band Edge Measurement Result

Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11b	Test Date	:2024-05-15
Test Frequency	:2412 MHz	Temp./Humi.	:21.8℃/59%
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
2386.080	Average	45.52	-4.22	41.31	54.00	-12.69
2386.080	Peak	55.96	-4.22	51.74	74.00	-22.26
2390.000	Average	44.31	-4.25	40.06	54.00	-13.94
2390.000	Peak	54.13	-4.25	49.88	74.00	-24.12

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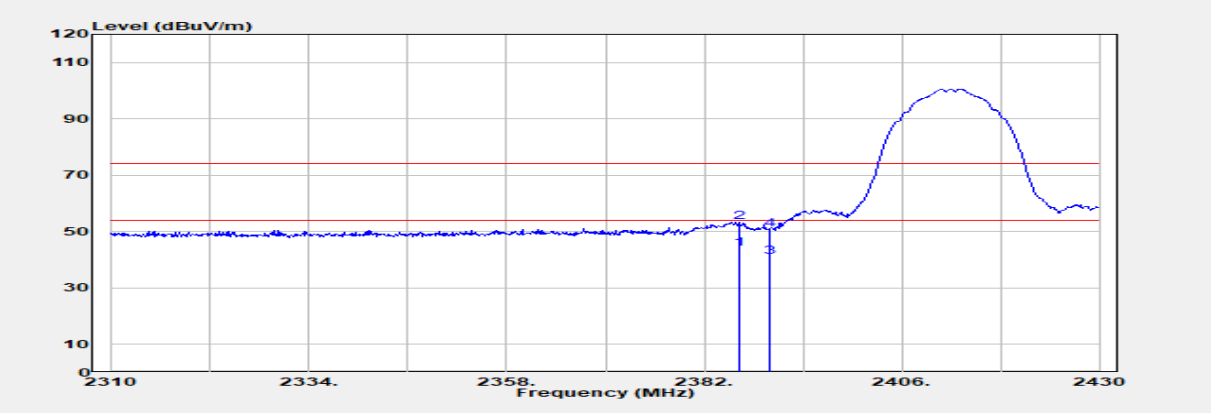
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11b	Test Date	:2024-05-15
Test Frequency	:2412 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2386.320	Average	48.07	-4.22	43.86	54.00	-10.14
2386.320	Peak	57.46	-4.22	53.25	74.00	-20.75
2390.000	Average	45.36	-4.25	41.11	54.00	-12.89
2390.000	Peak	55.06	-4.25	50.82	74.00	-23.18

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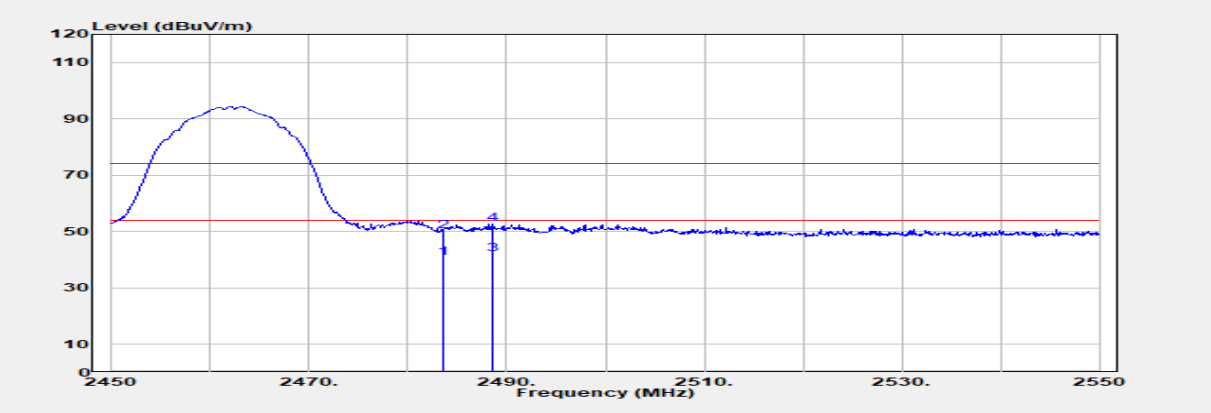
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11b	Test Date	:2024-05-15
Test Frequency	:2462 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2483.500	Average	44.36	-3.82	40.54	54.00	-13.46
2483.500	Peak	53.89	-3.82	50.07	74.00	-23.93
2488.600	Average	45.64	-3.77	41.88	54.00	-12.12
2488.600	Peak	56.30	-3.77	52.54	74.00	-21.46

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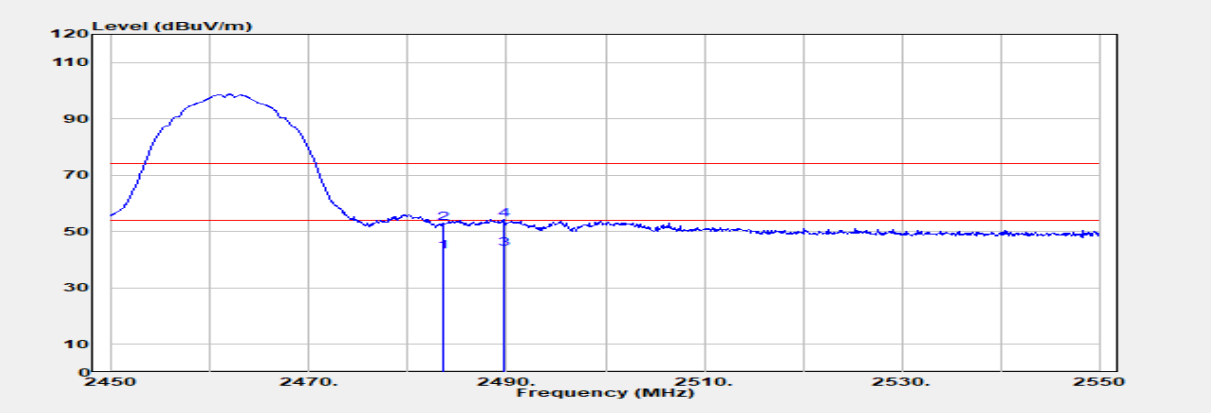
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11b	Test Date	:2024-05-15
Test Frequency	:2462 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2483.500	Average	46.85	-3.82	43.03	54.00	-10.97
2483.500	Peak	56.86	-3.82	53.04	74.00	-20.96
2489.700	Average	47.58	-3.76	43.83	54.00	-10.17
2489.700	Peak	57.92	-3.76	54.17	74.00	-19.83

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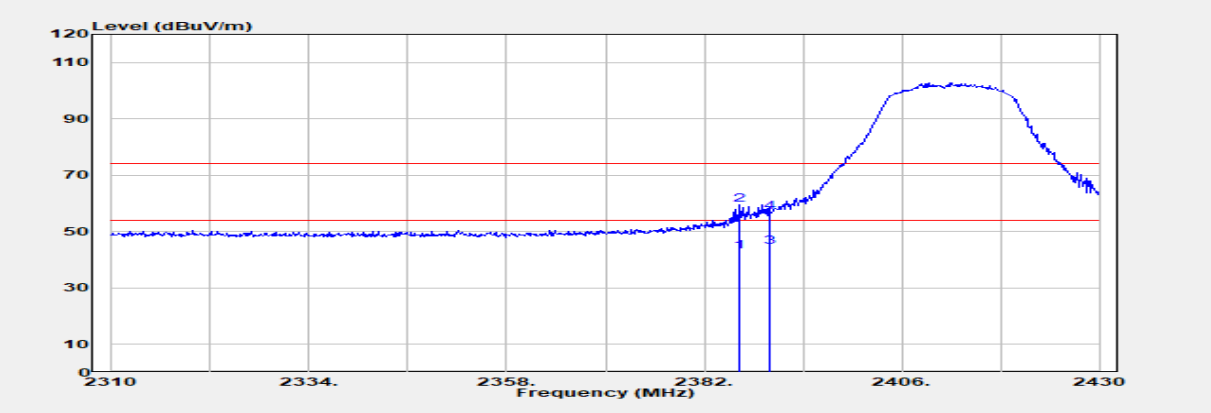
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11g	Test Date	:2024-05-15
Test Frequency	:2412 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2386.320	Average	47.04	-4.22	42.82	54.00	-11.18
2386.320	Peak	63.85	-4.22	59.63	74.00	-14.37
2390.000	Average	48.96	-4.25	44.71	54.00	-9.29
2390.000	Peak	61.15	-4.25	56.91	74.00	-17.09

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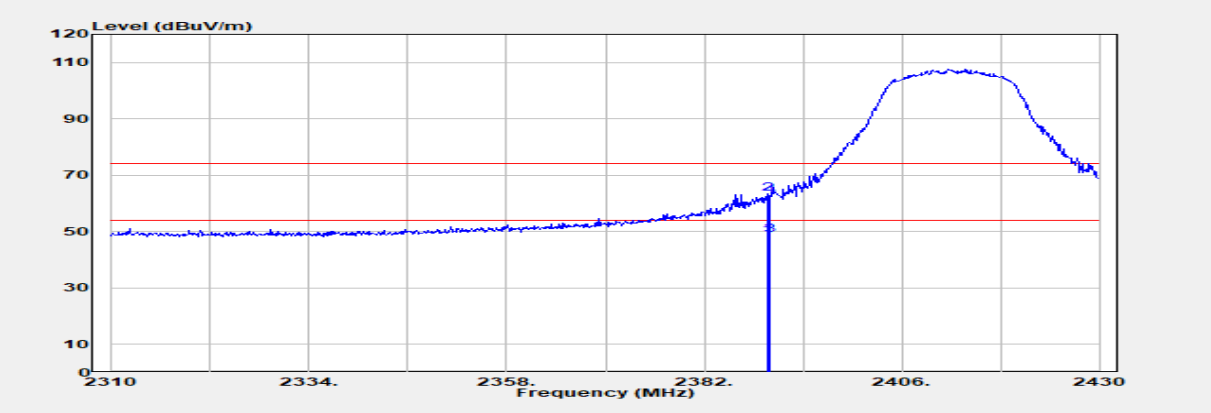
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11g	Test Date	:2024-05-15
Test Frequency	:2412 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2389.800	Average	52.85	-4.25	48.60	54.00	-5.40
2389.800	Peak	67.78	-4.25	63.53	74.00	-10.47
2390.000	Average	53.03	-4.25	48.78	54.00	-5.22
2390.000	Peak	67.07	-4.25	62.82	74.00	-11.18

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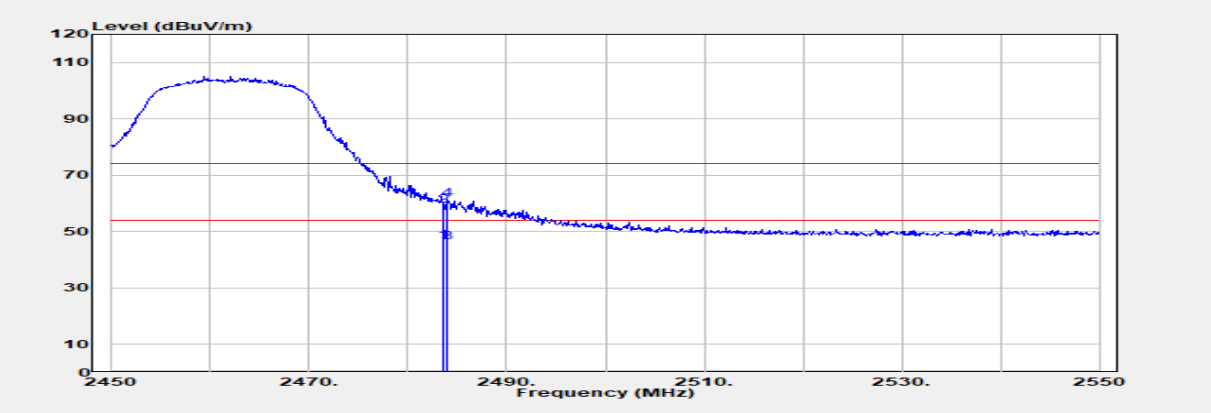
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11g	Test Date	:2024-05-15
Test Frequency	:2462 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2483.500	Average	50.28	-3.82	46.46	54.00	-7.54
2483.500	Peak	63.05	-3.82	59.23	74.00	-14.77
2483.900	Average	50.07	-3.82	46.26	54.00	-7.74
2483.900	Peak	65.27	-3.82	61.46	74.00	-12.54

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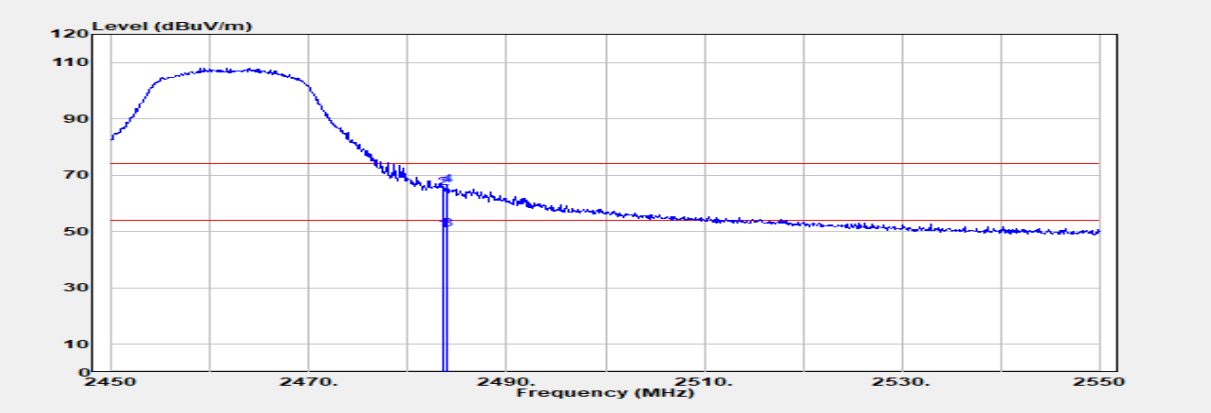
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11g	Test Date	:2024-05-15
Test Frequency	:2462 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2483.500	Average	54.39	-3.82	50.57	54.00	-3.43
2483.500	Peak	69.08	-3.82	65.26	74.00	-8.74
2483.900	Average	54.57	-3.82	50.76	54.00	-3.24
2483.900	Peak	70.14	-3.82	66.32	74.00	-7.68

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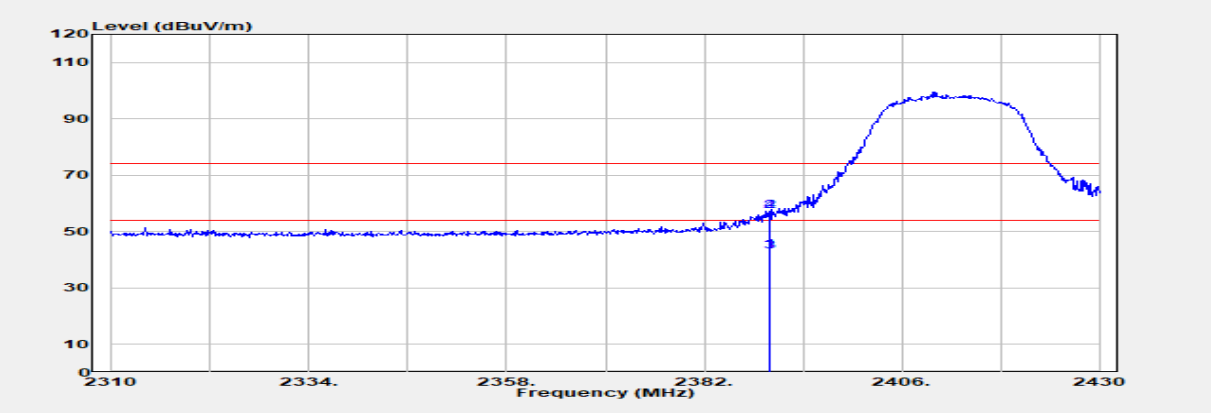
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11n20	Test Date	:2024-05-15
Test Frequency	:2412 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2389.920	Average	47.36	-4.25	43.11	54.00	-10.89
2389.920	Peak	61.46	-4.25	57.22	74.00	-16.78
2390.000	Average	47.10	-4.25	42.85	54.00	-11.15
2390.000	Peak	61.34	-4.25	57.09	74.00	-16.91

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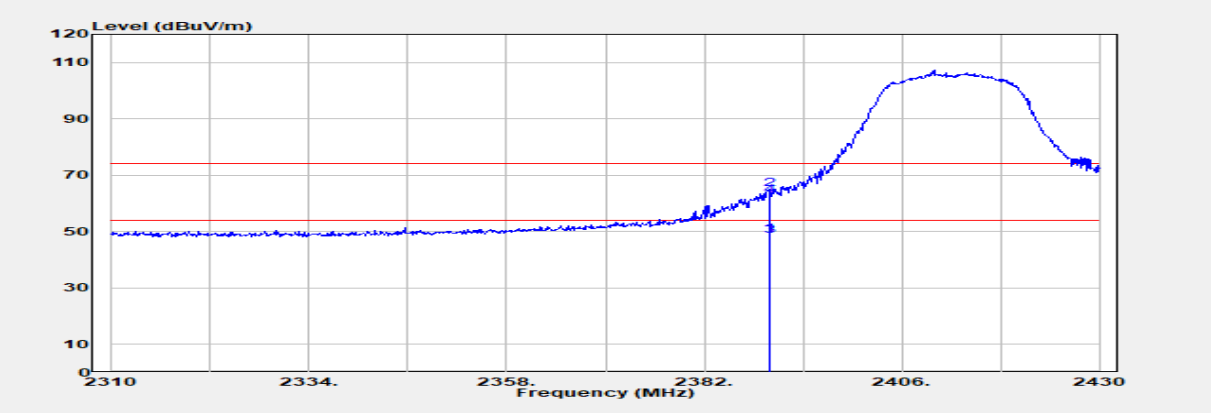
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11n20	Test Date	:2024-05-15
Test Frequency	:2412 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2389.920	Average	52.99	-4.25	48.74	54.00	-5.26
2389.920	Peak	69.23	-4.25	64.98	74.00	-9.02
2390.000	Average	52.77	-4.25	48.53	54.00	-5.47
2390.000	Peak	67.02	-4.25	62.78	74.00	-11.22

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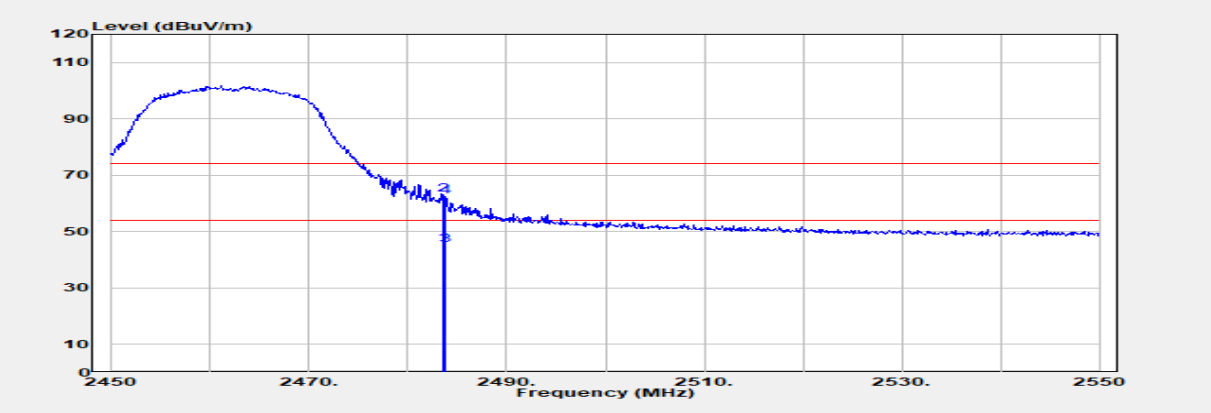
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11n20	Test Date	:2024-05-15
Test Frequency	:2462 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2483.500	Average	49.32	-3.82	45.50	54.00	-8.50
2483.500	Peak	66.84	-3.82	63.02	74.00	-10.98
2483.800	Average	49.06	-3.82	45.24	54.00	-8.76
2483.800	Peak	66.25	-3.82	62.43	74.00	-11.57

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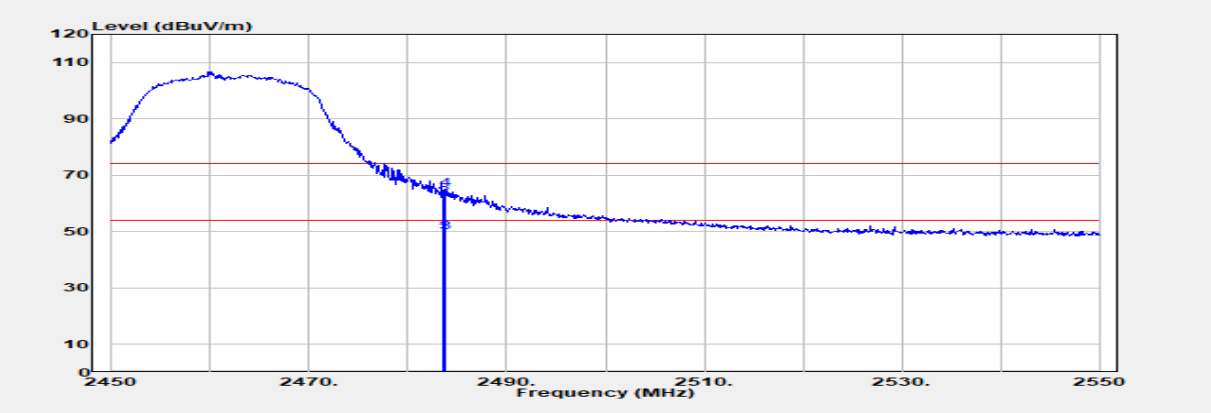
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11n20	Test Date	:2024-05-15
Test Frequency	:2462 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2483.500	Average	53.29	-3.82	49.47	54.00	-4.53
2483.500	Peak	65.87	-3.82	62.05	74.00	-11.95
2483.800	Average	53.58	-3.82	49.76	54.00	-4.24
2483.800	Peak	68.97	-3.82	65.16	74.00	-8.84

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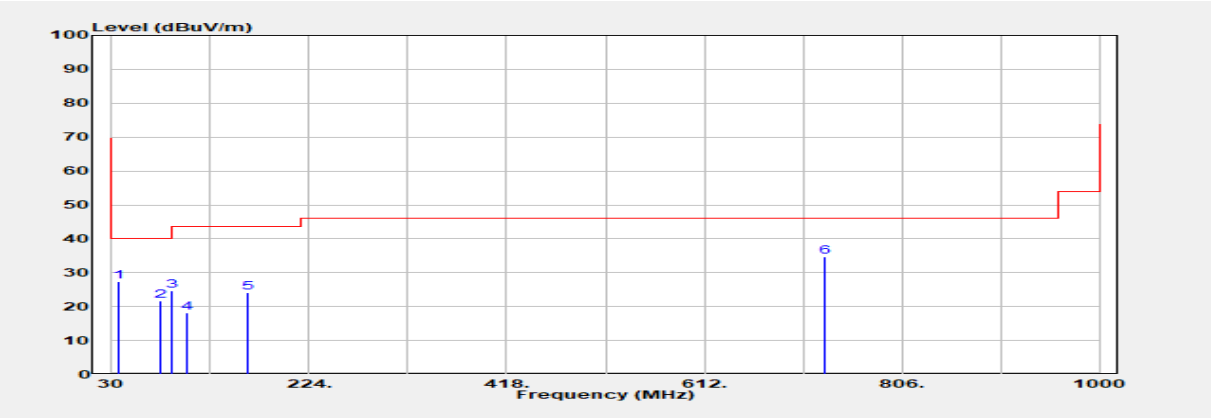
11.6.2 Spurious Emission:

Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11g	Test Date	:2024-05-15
Test Frequency	:2437 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	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
36.790	Peak	44.59	-17.19	27.40	40.00	-12.60
77.530	Peak	41.66	-19.89	21.77	40.00	-18.23
89.170	Peak	46.42	-21.72	24.70	43.50	-18.80
103.720	Peak	38.21	-20.10	18.11	43.50	-25.39
162.890	Peak	40.20	-15.96	24.24	43.50	-19.26
730.340	Peak	39.44	-4.70	34.75	46.00	-11.25

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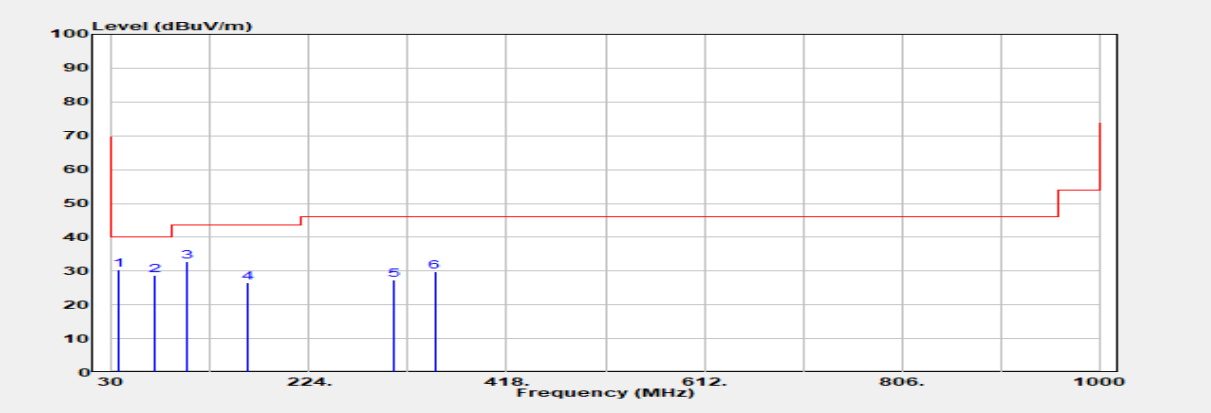
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11g	Test Date	:2024-05-15
Test Frequency	:2437 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
36.790	Peak	47.57	-17.19	30.38	40.00	-9.62
72.680	Peak	47.50	-18.72	28.78	40.00	-11.22
104.690	Peak	52.73	-19.84	32.89	43.50	-10.61
162.890	Peak	42.39	-15.96	26.43	43.50	-17.07
307.420	Peak	41.94	-14.61	27.33	46.00	-18.67
347.190	Peak	43.69	-13.81	29.88	46.00	-16.12

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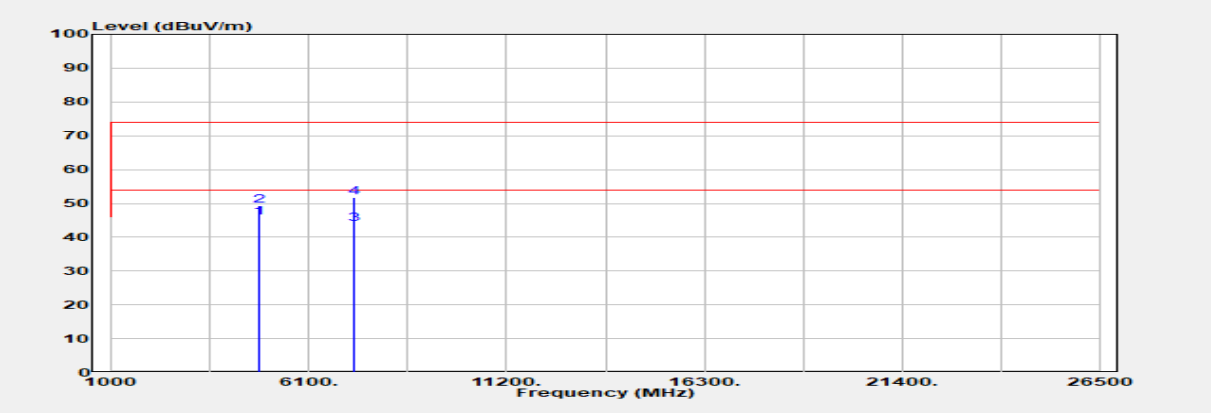
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11b	Test Date	:2024-05-15
Test Frequency	:2412 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4824.000	Average	45.14	0.60	45.73	54.00	-8.27
4824.000	Peak	48.71	0.60	49.31	74.00	-24.69
7236.000	Average	37.18	6.76	43.94	54.00	-10.06
7236.000	Peak	44.88	6.76	51.64	74.00	-22.36

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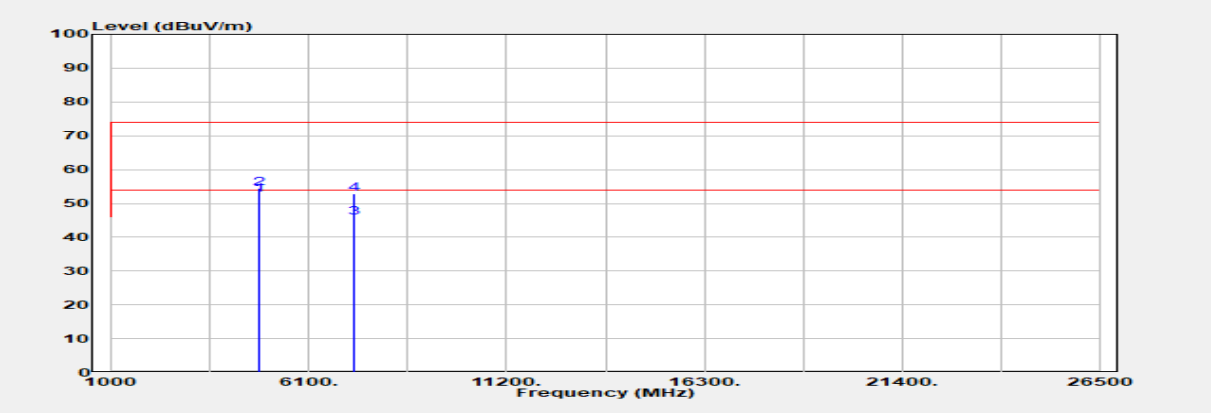
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11b	Test Date	:2024-05-15
Test Frequency	:2412 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4824.000	Average	51.86	0.60	52.46	54.00	-1.54
4824.000	Peak	53.92	0.60	54.52	74.00	-19.48
7236.000	Average	39.06	6.76	45.83	54.00	-8.17
7236.000	Peak	46.02	6.76	52.78	74.00	-21.22

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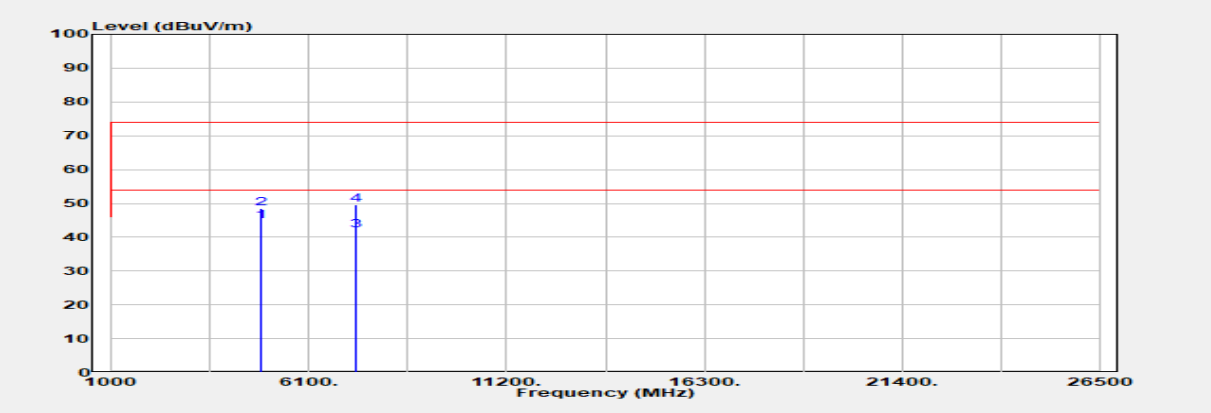
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11b	Test Date	:2024-05-15
Test Frequency	:2437 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4874.000	Average	44.28	0.44	44.72	54.00	-9.28
4874.000	Peak	47.99	0.44	48.43	74.00	-25.57
7311.000	Average	35.62	6.49	42.11	54.00	-11.89
7311.000	Peak	43.05	6.49	49.54	74.00	-24.46

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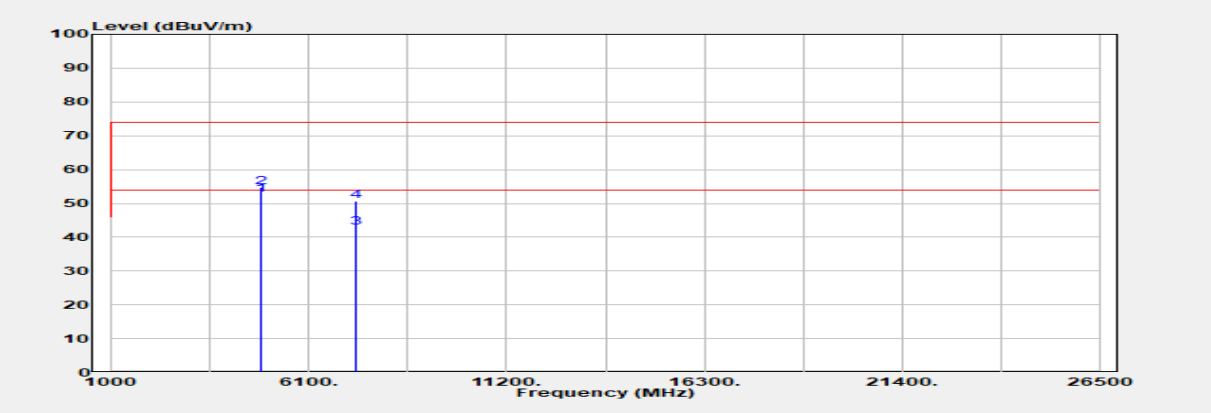
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11b	Test Date	:2024-05-15
Test Frequency	:2437 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4874.000	Average	52.19	0.44	52.63	54.00	-1.37
4874.000	Peak	54.19	0.44	54.63	74.00	-19.37
7311.000	Average	36.38	6.49	42.86	54.00	-11.14
7311.000	Peak	44.13	6.49	50.62	74.00	-23.38

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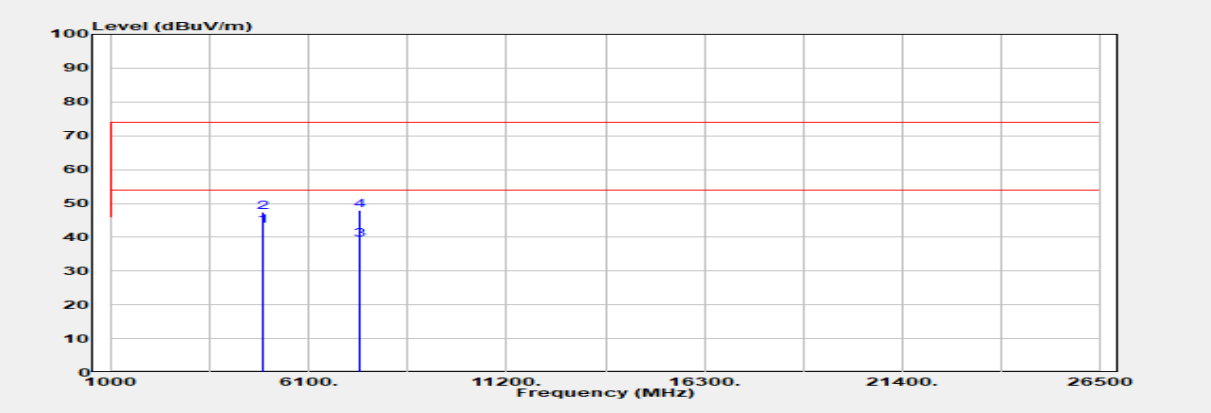
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11b	Test Date	:2024-05-15
Test Frequency	:2462 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4924.000	Average	42.96	0.49	43.45	54.00	-10.55
4924.000	Peak	46.81	0.49	47.30	74.00	-26.70
7386.000	Average	33.18	6.20	39.38	54.00	-14.62
7386.000	Peak	41.79	6.20	47.99	74.00	-26.01

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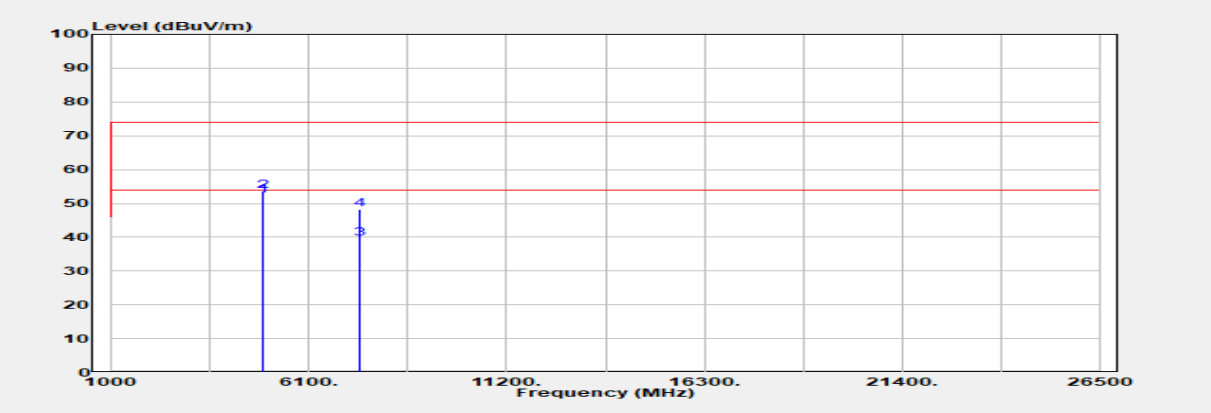
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11b	Test Date	:2024-05-15
Test Frequency	:2462 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4924.000	Average	51.92	0.49	52.41	54.00	-1.59
4924.000	Peak	53.08	0.49	53.57	74.00	-20.43
7386.000	Average	33.36	6.20	39.56	54.00	-14.44
7386.000	Peak	42.13	6.20	48.33	74.00	-25.67

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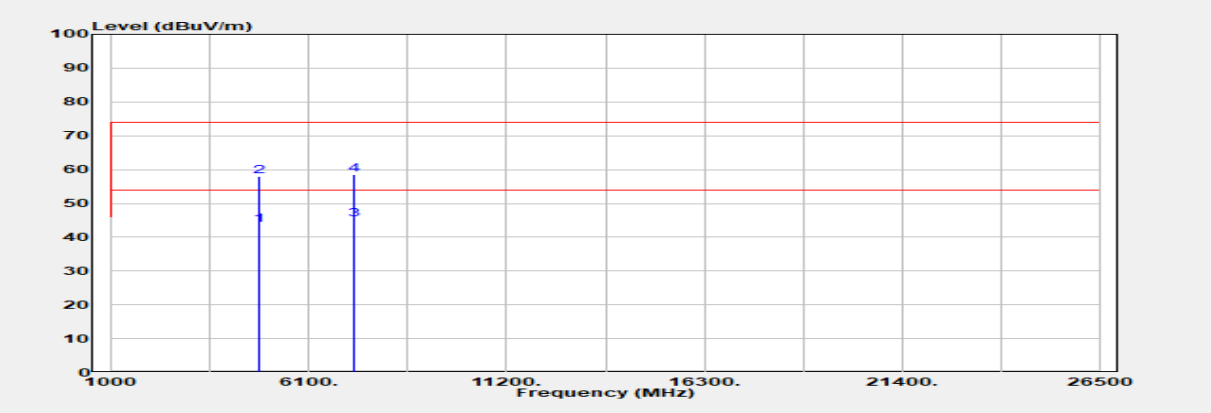
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11g	Test Date	:2024-05-15
Test Frequency	:2412 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4824.000	Average	43.16	0.60	43.75	54.00	-10.25
4824.000	Peak	57.42	0.60	58.01	74.00	-15.99
7236.000	Average	38.41	6.76	45.18	54.00	-8.82
7236.000	Peak	51.70	6.76	58.46	74.00	-15.54

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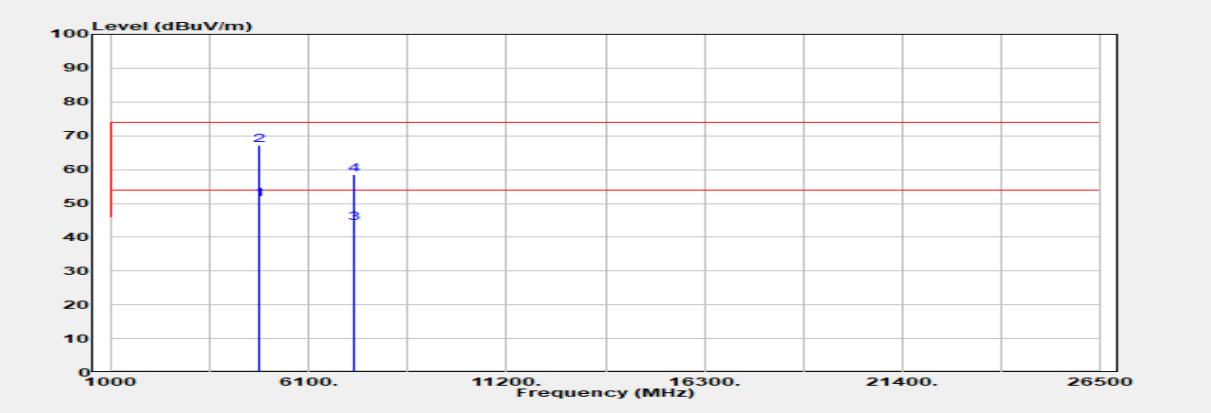
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11g	Test Date	:2024-05-15
Test Frequency	:2412 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4824.000	Average	50.61	0.60	51.20	54.00	-2.80
4824.000	Peak	66.73	0.60	67.33	74.00	-6.67
7236.000	Average	37.35	6.76	44.11	54.00	-9.89
7236.000	Peak	51.70	6.76	58.46	74.00	-15.54

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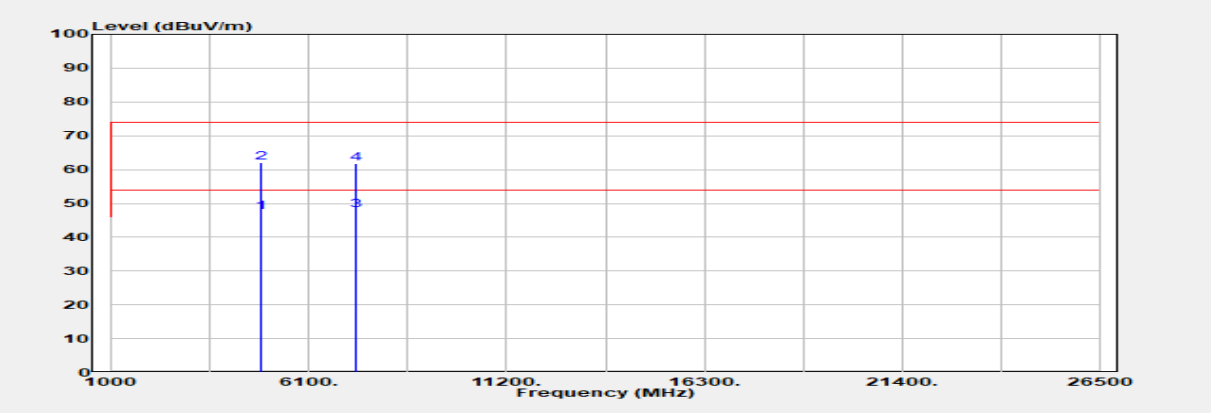
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11g	Test Date	:2024-05-15
Test Frequency	:2437 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4874.000	Average	46.86	0.44	47.30	54.00	-6.70
4874.000	Peak	61.49	0.44	61.93	74.00	-12.07
7311.000	Average	41.48	6.49	47.97	54.00	-6.03
7311.000	Peak	55.26	6.49	61.74	74.00	-12.26

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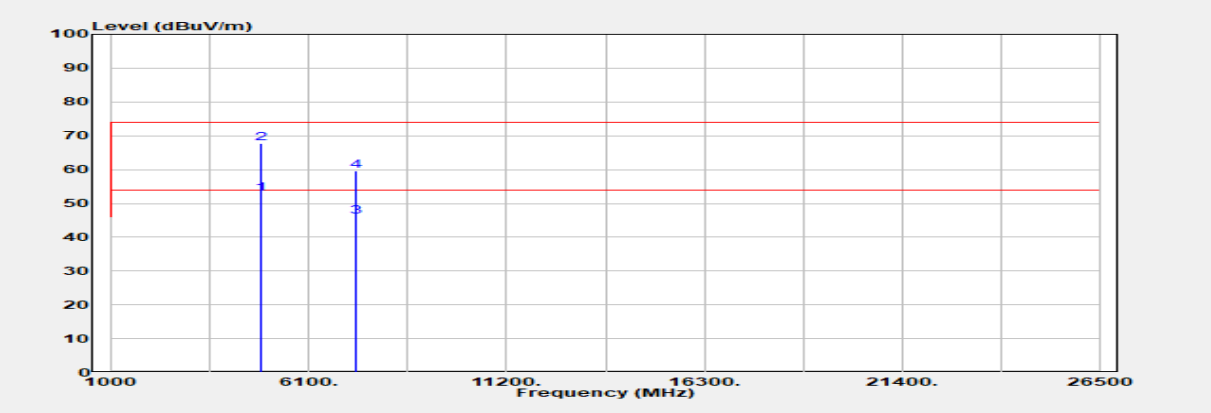
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11g	Test Date	:2024-05-15
Test Frequency	:2437 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Huang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4874.000	Average	52.41	0.44	52.85	54.00	-1.15
4874.000	Peak	67.40	0.44	67.85	74.00	-6.15
7311.000	Average	39.62	6.49	46.11	54.00	-7.89
7311.000	Peak	53.24	6.49	59.73	74.00	-14.27

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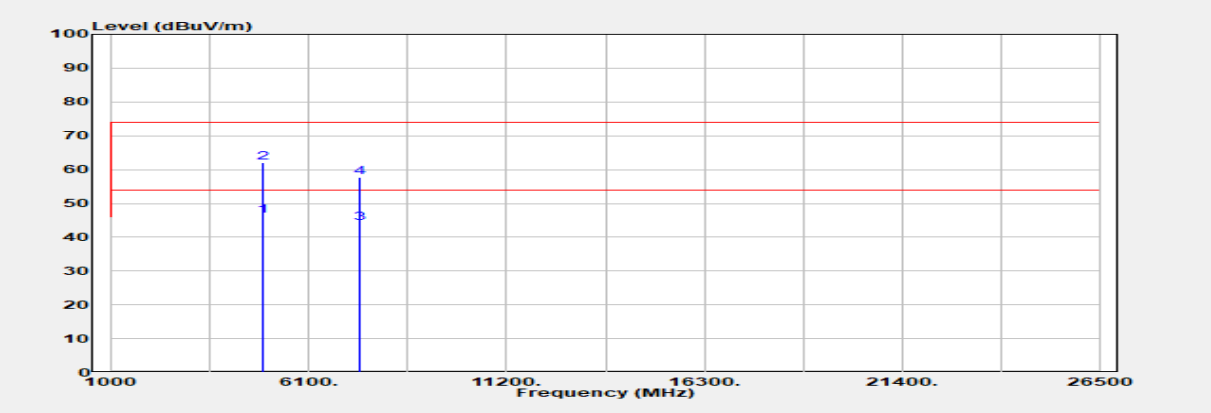
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11g	Test Date	:2024-05-15
Test Frequency	:2462 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Haung



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4924.000	Average	45.98	0.49	46.47	54.00	-7.53
4924.000	Peak	61.60	0.49	62.09	74.00	-11.91
7386.000	Average	37.85	6.20	44.05	54.00	-9.95
7386.000	Peak	51.40	6.20	57.60	74.00	-16.41

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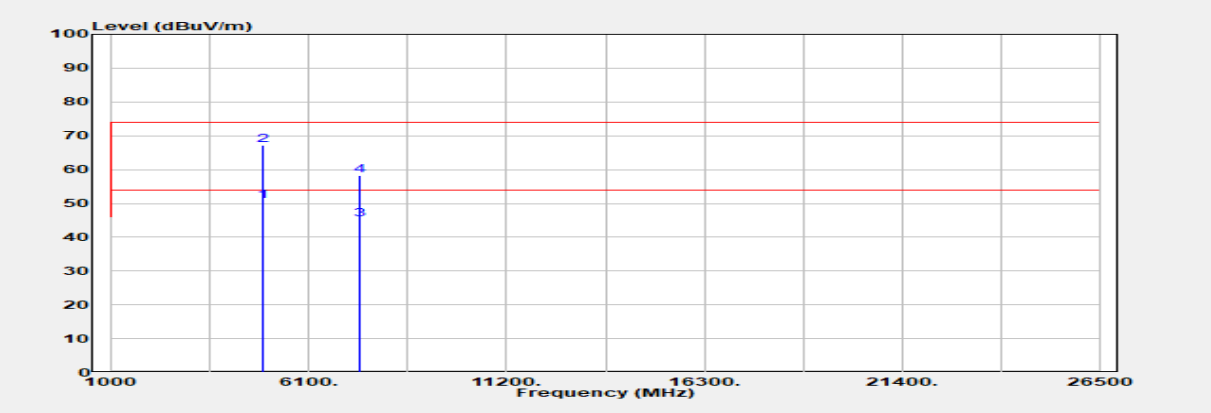
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11g	Test Date	:2024-05-15
Test Frequency	:2462 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Haung



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4924.000	Average	50.23	0.49	50.72	54.00	-3.28
4924.000	Peak	66.61	0.49	67.10	74.00	-6.90
7386.000	Average	39.02	6.20	45.22	54.00	-8.78
7386.000	Peak	51.96	6.20	58.16	74.00	-15.84

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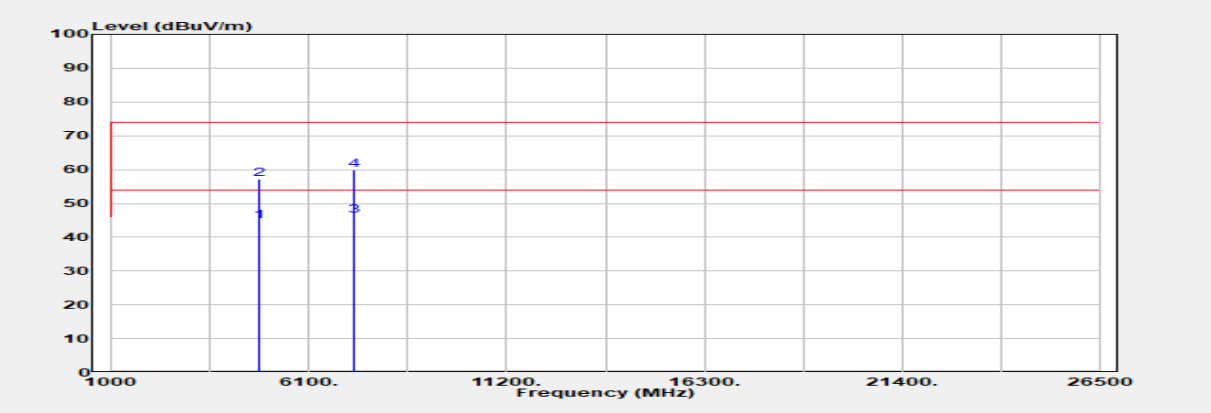
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11n20	Test Date	:2024-05-15
Test Frequency	:2412 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Haung



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4824.000	Average	44.18	0.60	44.77	54.00	-9.23
4824.000	Peak	56.57	0.60	57.17	74.00	-16.83
7236.000	Average	39.61	6.76	46.37	54.00	-7.63
7236.000	Peak	53.00	6.76	59.76	74.00	-14.24

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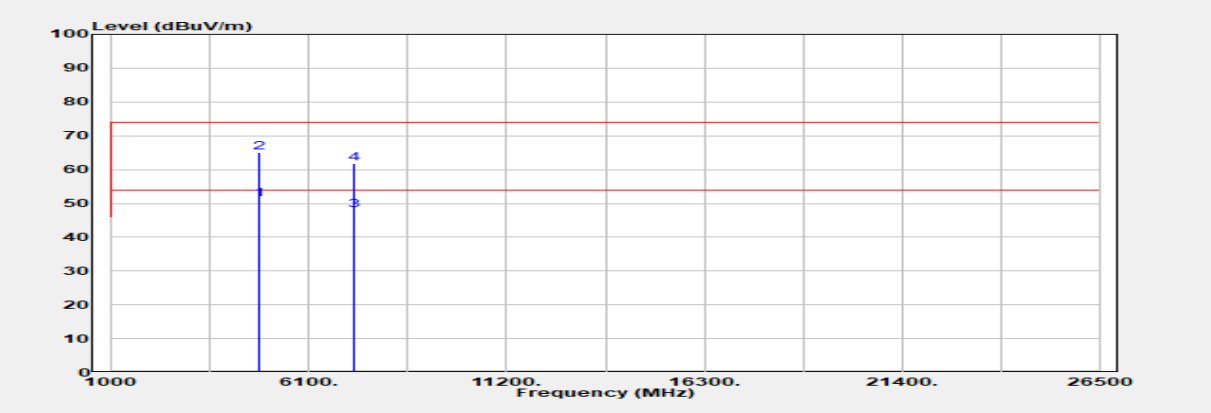
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11n20	Test Date	:2024-05-15
Test Frequency	:2412 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Haung



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4824.000	Average	50.59	0.60	51.18	54.00	-2.82
4824.000	Peak	64.57	0.60	65.16	74.00	-8.84
7236.000	Average	41.32	6.76	48.08	54.00	-5.92
7236.000	Peak	55.11	6.76	61.87	74.00	-12.13

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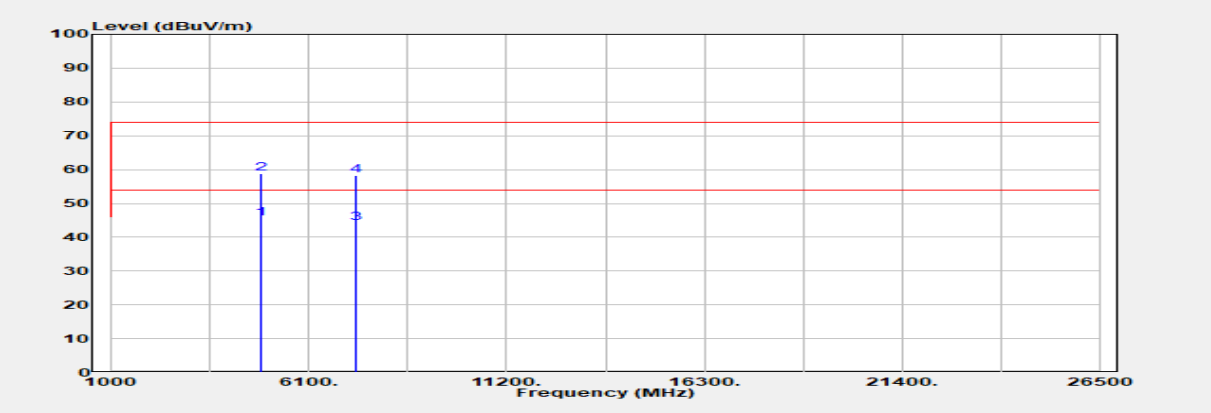
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11n20	Test Date	:2024-05-15
Test Frequency	:2437 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Haung



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4874.000	Average	45.05	0.44	45.49	54.00	-8.51
4874.000	Peak	58.29	0.44	58.73	74.00	-15.27
7311.000	Average	37.59	6.49	44.08	54.00	-9.92
7311.000	Peak	51.75	6.49	58.24	74.00	-15.76

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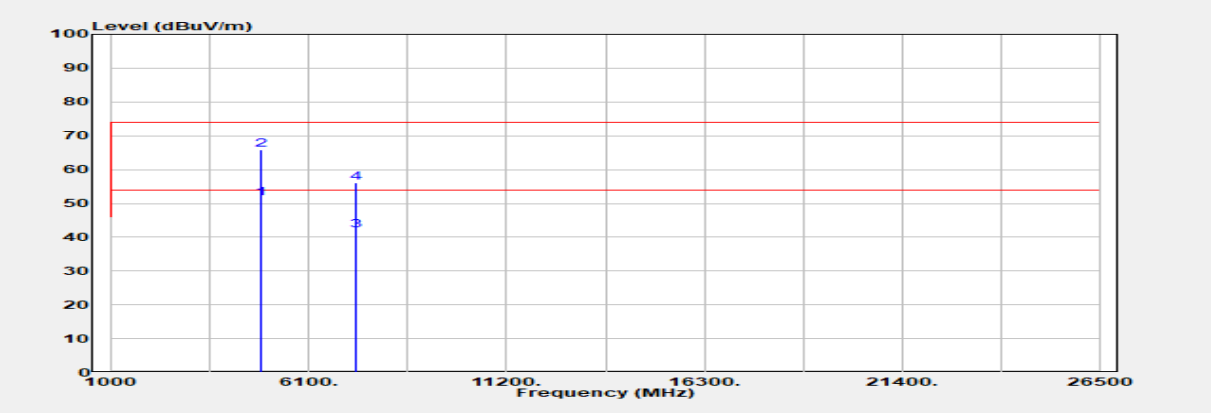
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11n20	Test Date	:2024-05-15
Test Frequency	:2437 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Haung



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4874.000	Average	51.02	0.44	51.46	54.00	-2.54
4874.000	Peak	65.30	0.44	65.74	74.00	-8.26
7311.000	Average	35.56	6.49	42.05	54.00	-11.95
7311.000	Peak	49.55	6.49	56.04	74.00	-17.96

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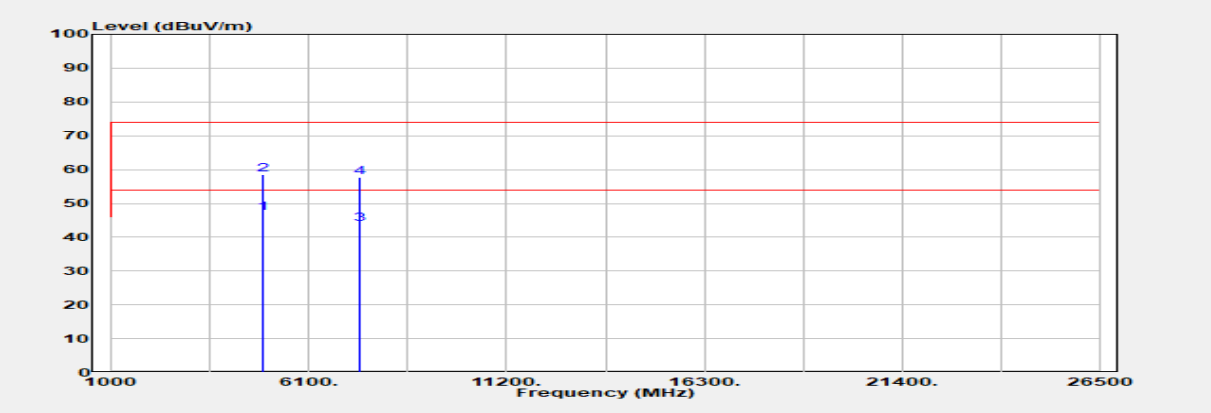
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11n20	Test Date	:2024-05-15
Test Frequency	:2462 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Haung



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4924.000	Average	46.58	0.49	47.07	54.00	-6.93
4924.000	Peak	58.18	0.49	58.67	74.00	-15.33
7386.000	Average	37.74	6.20	43.94	54.00	-10.06
7386.000	Peak	51.41	6.20	57.61	74.00	-16.39

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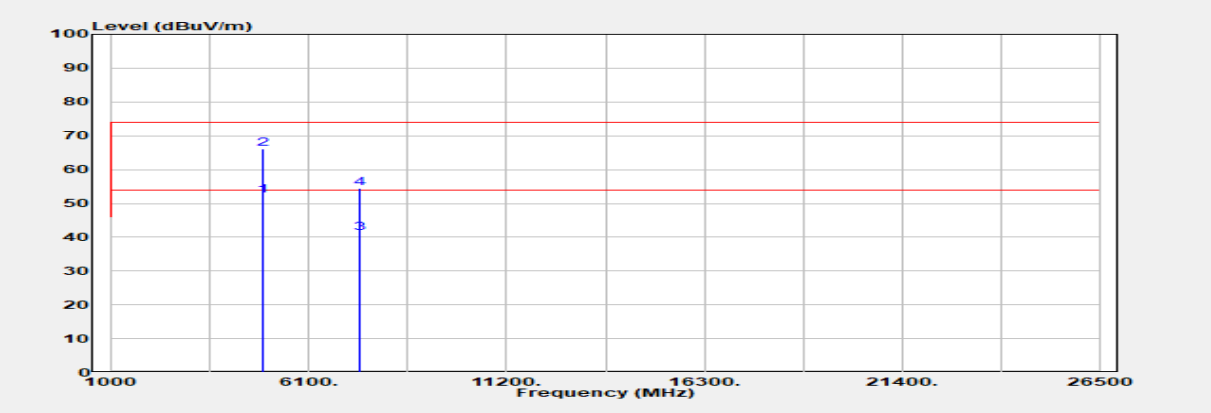
Report Number	:TERF2404001092E2	Test Site	:SAC C
Operation Mode	:802.11n20	Test Date	:2024-05-15
Test Frequency	:2462 MHz	Temp./Humi.	:21.8℃/59%
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Howard Haung



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4924.000	Average	51.68	0.49	52.17	54.00	-1.83
4924.000	Peak	65.54	0.49	66.03	74.00	-7.97
7386.000	Average	34.99	6.20	41.19	54.00	-12.81
7386.000	Peak	48.15	6.20	54.35	74.00	-19.65

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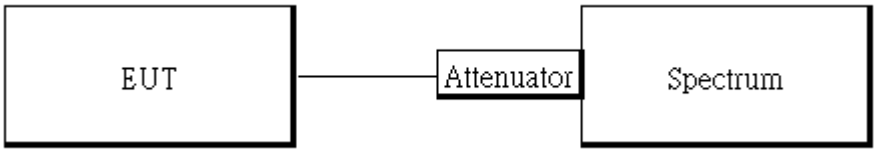
12 POWER SPECTRAL DENSITY

12.1 Standard Applicable

Per Part 15.247 (e)

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

12.2 Test Setup



12.3 Measurement Procedure

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 3 kHz & VBW = 10 kHz.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

Note:

1. When the antenna gain is greater than 6 dBi, the power spectral density limit attenuated accordingly.

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12.4 Power spectral density

POWER DENSITY 802.11b				
Freq. (MHz)	Ch0 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-11.23	-11.23	8.00	PASS
2437	-11.58	-11.58	8.00	PASS
2462	-13.28	-13.28	8.00	PASS

POWER DENSITY 802.11g				
Freq. (MHz)	Ch0 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-11.5	-11.50	8.00	PASS
2437	-11.24	-11.24	8.00	PASS
2462	-10.47	-10.47	8.00	PASS

POWER DENSITY 802.11n HT20				
Freq. (MHz)	Ch0 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-11.04	-11.04	8.00	PASS
2437	-11.39	-11.39	8.00	PASS
2462	-11.28	-11.28	8.00	PASS

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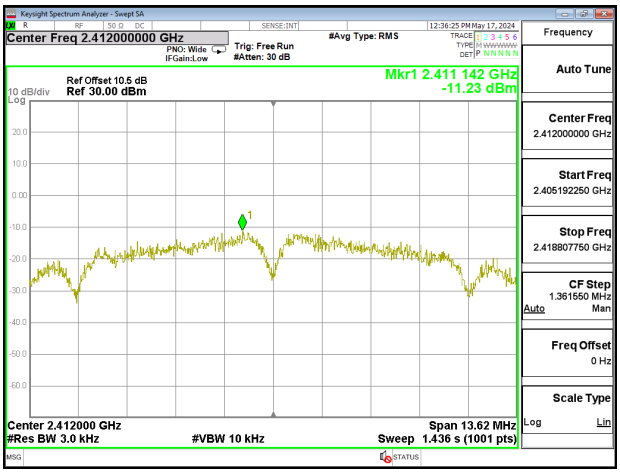
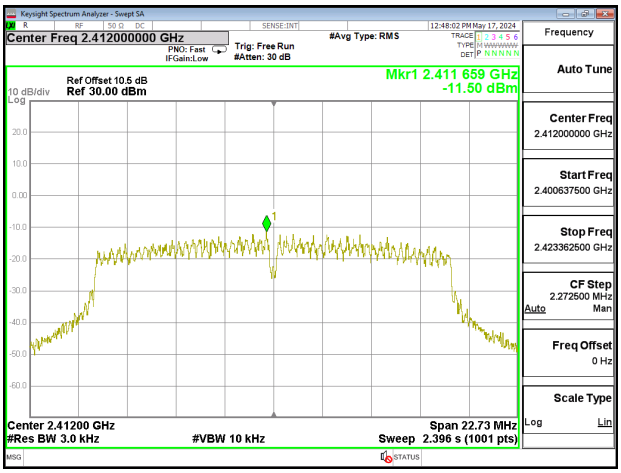
802.11b_20MHz_Chain0_2412MHz



802.11g_20MHz_Chain0_2412MHz



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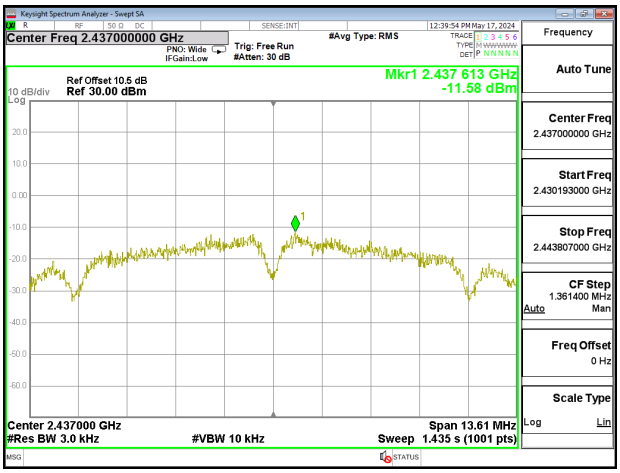

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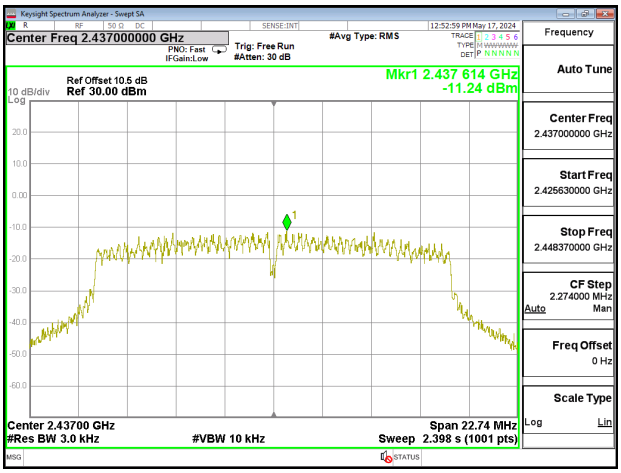
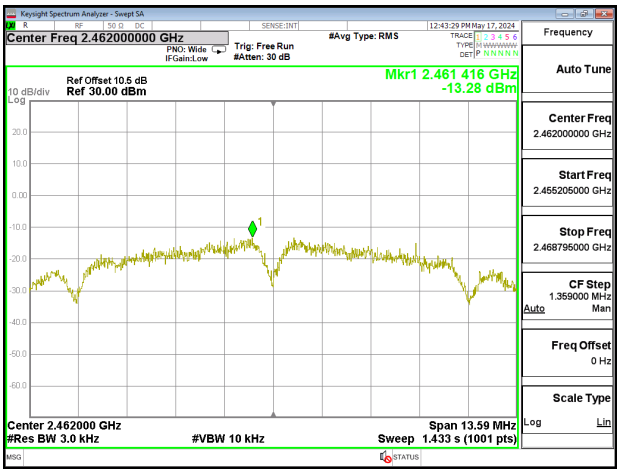
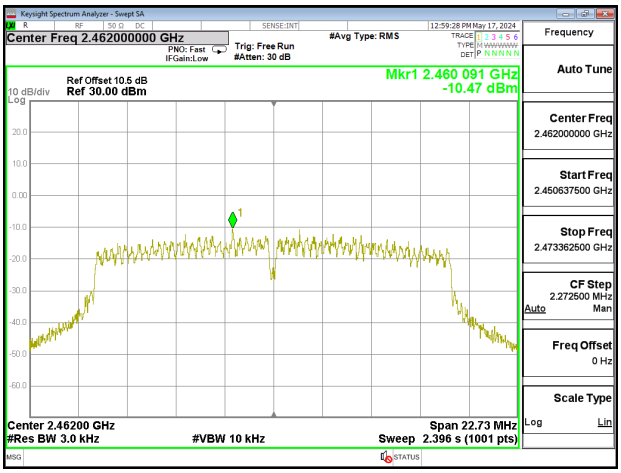


802.11b_20MHz_Chain0_2462MHz



802.11g_20MHz_Chain0_2462MHz



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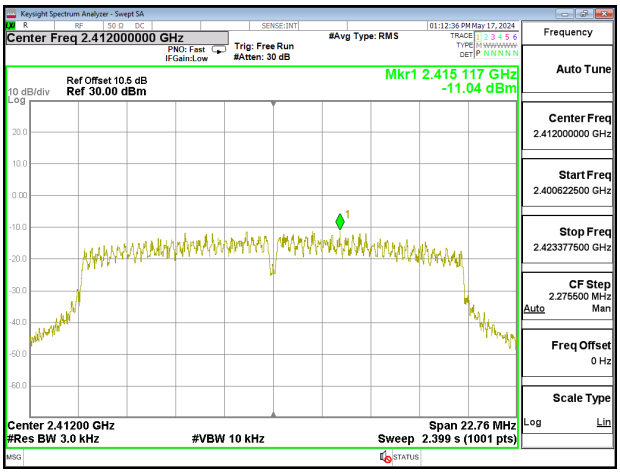
802.11n_20MHz_Chain0_2412MHz



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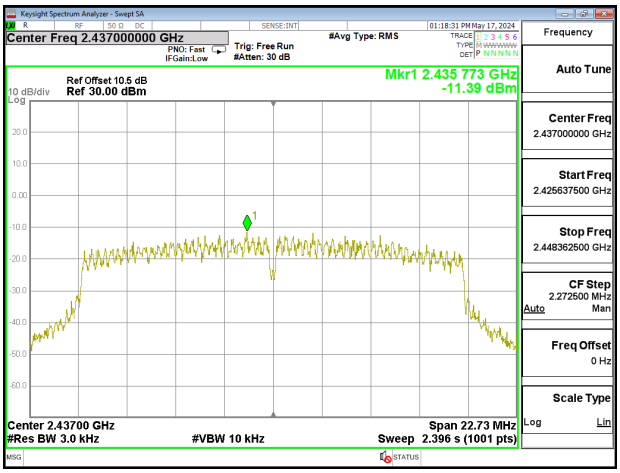
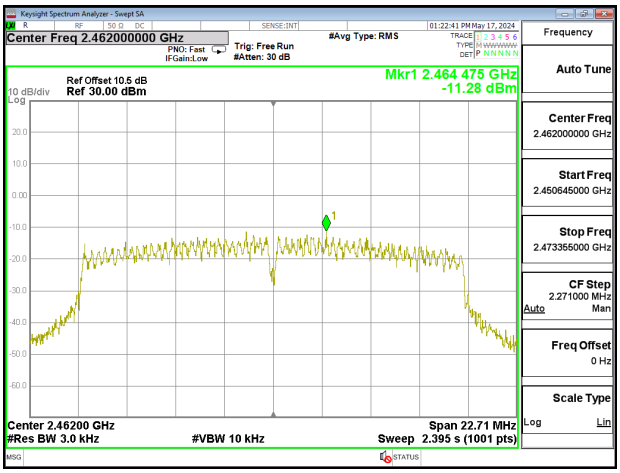


802.11n_20MHz_Chain0_2462MHz



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13 ANTENNA REQUIREMENT

13.1 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.

13.2 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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