

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



Applicant: Murata Manufacturing Co., Ltd.
10-1, Higashikotari, Nagaokakyo-shi, Kyoto 617-8555 Japan

Manufacturer: Murata Manufacturing Co., Ltd.
10-1, Higashikotari, Nagaokakyo-shi, Kyoto 617-8555 Japan

Product Name: Communication Module

Brand Name: muRata

Model No.: For FCC :
LBES5PL2EL, LBEE5PL2DL
For ISSED :
LBES5PL2EL-SANT, LBES5PL2EL-DANT,
LBEE5PL2DL-SANT, LBEE5PL2DL-DANT

Model Difference: Refer to section 1.8

Report Number: TERF2211002513E2

FCC ID VPYLBES5PL2EL

IC: 772C-LBES5PL2EL

Date of EUT Received: Nov. 25, 2022

Date of Test: Dec. 13, 2022 ~ Feb. 17, 2023

Issue Date: Mar. 22, 2023

Approved By

Arno Hsieh

Arno Hsieh

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, ISSED RSS-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
TERF2211002513E2	00	Original	Mar. 07, 2023	Yami Kuo	
TERF2211002513E2	01	Revise applicant's address and model difference	Mar. 22, 2023	Yami Kuo	*

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.
- 2、Variant information of model numbers is provided by the applicant, test results of this report are applicable to the sample EUT(s) received.

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	Communication Module	
Brand Name:	muRata	
Model No.:	For FCC	LBES5PL2EL, LBEE5PL2DL
	For ISCED	LBES5PL2EL-SANT, LBES5PL2EL-DANT, LBEE5PL2DL-SANT, LBEE5PL2DL-DANT
Model Difference:	Refer to section 1.8	
Hardware Version:	1	
Firmware Version:	N/A	
EUT Series No.:	L#4	
Power Supply:	3.3Vdc, 1.8Vdc	
Test Software (Name/Version)	Tera Term V4.106	

1.2 RF Specification

WLAN	Frequency Range (MHz)	Channels	Rated Power (dBm)		Modulation Technology
			Peak	Avg.	
802.11b	2412~2462	11	21.81	19.80	DSSS
802.11g	2412~2462	11	22.99	17.90	OFDM
802.11n20	2412~2462	11	22.89	16.94	OFDM
802.11ax20	2412~2462	11	23.05	16.88	OFDMA
Modulation type:		CCK, DQPSK, DBPSK for DSSS			
		64QAM, 16QAM, QPSK, BPSK for OFDM			
		1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDMA			
Data Rate:		802.11 b: 1/2/5.5/11 Mbps			
		802.11 g: 6/9/12/18/24/36/48/54 Mbps			
		802.11 n_20MHz: up to 72.2Mbps			
		802.11 ax_20MHz: up to 143.4Mbps			

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WLAN 2.4GHz for IC

WLAN	Frequency Range (MHz)	Channels	Rated Power (dBm)		Rated Power in dBm (EIRP)	Modulation Technology
			Peak	Avg.		
802.11b	2412~2462	11	21.81	19.80	23.40	DSSS
802.11g	2412~2462	11	22.99	17.90	21.50	OFDM
802.11n20	2412~2462	11	22.89	16.94	20.54	OFDM
802.11ax20	2412~2462	11	23.05	16.88	20.48	OFDMA
Modulation type:		CCK, DQPSK, DBPSK for DSSS				
		64QAM, 16QAM, QPSK, BPSK for OFDM				
		1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDMA				
Data Rate:		802.11 b: 1/2/5.5/11 Mbps				
		802.11 g: 6/9/12/18/24/36/48/54 Mbps				
		802.11 n_20MHz: up to 72.2Mbps				
		802.11 ax_20MHz: up to 143.4Mbps				

1.3 Antenna Designation

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
Dipole	Molex	146153	2400~2500	3.2
	Molex	219611	2400~2500	2.67
	Unictron	WT32D1-KX	2400~2500	3
	Inventek	W24P-U	2400~2500	3.2
Monopole	Murata	Type2EL_Antenna	2400~2500	3.6

Note:

1. Pre-scanned was done on the above antennas, measurements were demonstrated by using the antenna with the highest gain as the worst case scenarios.
2. 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

RSS-247 issue 2 Feb. 2017

RSS-Gen, issue 5 April, 2018

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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1.8 Model Difference

1. There are 4 HVINs with 2 PMNs as below

- a. The LBES5PL2EL-SANT and LBES5PL2EL-DANT are electrically identical.

HVIN	PMN	Chip on C101	RF functions
LBES5PL2EL-SANT	LBES5PL2EL	IW612	WLAN 2.4GHz,5GHz, BT,BLE, IEEE802.15.4
LBES5PL2EL-DANT			

- b. The LBEE5PL2DL-SANT and LBEE5PL2DL-DANT are electrically identical.

HVIN	PMN	Chip on C101	RF functions
LBEE5PL2DL-SANT	LBEE5PL2DL	IW611	WLAN 2.4GHz,5GHz, BT,BLE
LBEE5PL2DL-DANT			

2. In addition, there are 2 HMNs, the differences between the HMN(s) are

HMN	HVIN	Antenna connector(s)	WLAN	BT	BLE	IEEE802.15.4
P2ML10229-D	LBES5PL2EL-DANT	2 (ANT0, ANT1)	ANT0	ANT1	ANT1	ANT1
	LBEE5PL2DL-DANT					NA
P2ML10229-S	LBES5PL2EL-SANT	1 (ANT0)	ANT0	ANT0	ANT0	ANT0
	LBEE5PL2DL-SANT					NA

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

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

2.3.2 Conducted Test (RF)

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

2.3.3 Radiated Emissions

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

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2.4 Measurement Results Explanation Example

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

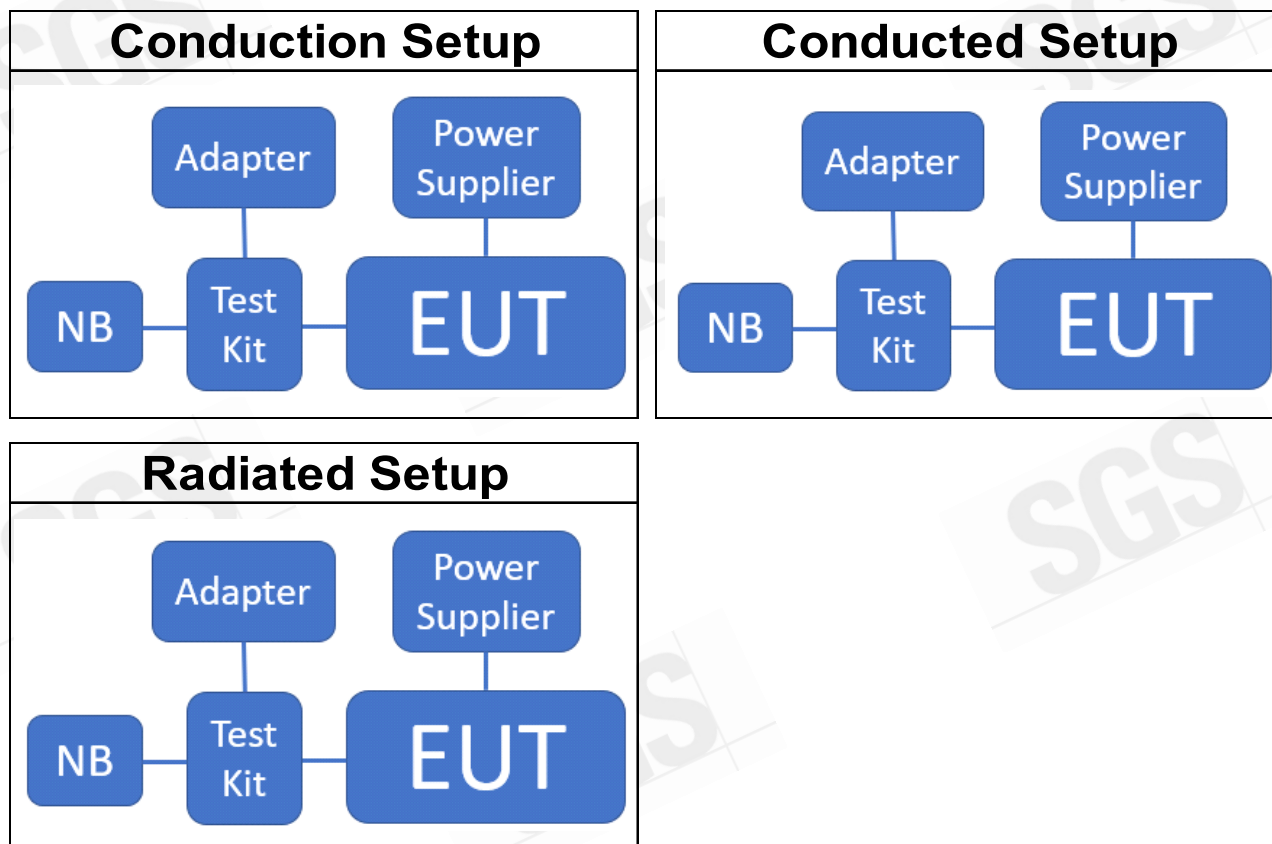
Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

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

2.4.2 For all conducted test items:

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

2.5 Test Configuration



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2.6 Control Unit(s)

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	T440p	P0000665	N/A	N/A
USB Cable	ZHUANG SHAN CHUAN	E333601	N/A	N/A	N/A
Adapter	EDACPOWER	EA1045CR	N/A	N/A	N/A
Conducted Emission Test Site: Conducted D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
USB Cable	ZHUANG SHAN	E333601	N/A	N/A	N/A
Adapter	EDACPOWER	EA1045CR	N/A	N/A	N/A
Notebook	Lenovo	T420	S0012599	N/A	N/A
Radiated Emission Test Site: SAC C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	T440p	P0000665	N/A	N/A
USB Cable	ZHUANG SHAN CHUAN	E333601	N/A	N/A	N/A
Adapter	EDACPOWER	EA1045CR	N/A	N/A	N/A

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3 SUMMARY OF TEST RESULTS

FCC Rules	ISED Rules	Description Of Test	Result
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	RSS-247 §5.4 d	Peak Output Power	Compliant
§15.247(a)(2)	RSS-247 §5.2 a RSS-Gen §6.7	Emission Bandwidth	Compliant
§15.205 §15.209 §15.247(d)	RSS-247 §5.5 RSS-Gen §8.9 RSS-Gen §8.10 RSS-Gen §6.13	Radiated & Conducted Band Edge and Spurious Emission	Compliant
§15.247(e)	RSS-247 §5.2 b	Power Spectral Density	Compliant
§15.203	N/A	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operatin Frequencies

Modulation of BW 20MHz	
CHANNEL	FREQUENCY (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 gevin UE is pre-scanned among below modes.

Modulation		Transmission Chain							Single Transmission Spatial		Multi Transmission Spatial	
v	802.11 b	v	Ch0		Ch1		Ch2		Ch3	v	1TX	2TX
v	802.11 g	v	Ch0		Ch1		Ch2		Ch3	v	1TX	2TX
v	802.11 n	v	Ch0		Ch1		Ch2		Ch3	v	1TX	2TX
v	802.11 ax	v	Ch0		Ch1		Ch2		Ch3	v	1TX	2TX

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.
5. Observations have been done for 802.11 ax available RU configurations below and found that the lowest, highest and Full RU results higher emissions. Only one RU can be enabled at any given time.

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802.11ax	20MHz			
RU type	26-tone RU		52-tone RU	
RU index and subcarrier range	RU0	[-12t: -9t]	RU37	[-12t: -7t]
	RU1	[-9t: -7t]	RU38	[-6t: -1t]
	RU2	[-6t: -4t]	RU39	[1t: 6t]
	RU3	[-4t: -1t]	RU40	[7t: 12t]
	RU4	[-1t: -4, 4: 1t]	RU41	N/A
	RU5	[1t: 4t]	RU42	N/A
	RU6	[4t: 6t]	RU43	N/A
	RU7	[7t: 9t]	RU44	N/A
	RU8	[9t: 12t]	RU45	N/A
	RU9	N/A	RU46	N/A
	RU10	N/A	RU47	N/A
	RU11	N/A	RU48	N/A
	RU12	N/A	RU49	N/A
	RU13	N/A	RU50	N/A
	RU14	N/A	RU51	N/A
	RU15	N/A	RU52	N/A
	RU16	N/A		
	RU17	N/A	106-tone RU	
	RU18	N/A	RU53	[-12t: -1t]
	RU19	N/A	RU54	[1t: 12t]
	RU20	N/A	RU55	N/A
	RU21	N/A	RU56	N/A
	RU22	N/A	RU57	N/A
	RU23	N/A	RU58	N/A
	RU24	N/A	RU59	N/A
	RU25	N/A	RU60	N/A
	RU26	N/A		
	RU27	N/A	242-tone RU	
	RU28	N/A	RU61	[-12t: -2, 2: 12t]
	RU29	N/A	RU62	N/A
	RU30	N/A	RU63	N/A
	RU31	N/A	RU64	N/A
	RU32	N/A		
	RU33	N/A		
	RU34	N/A		
	RU35	N/A		
	RU36	N/A		

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Conducted					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 11	1,2,3,6,9,10,11	DSSS	1	ch0
802.11g	1 to 11	1,2,3,4,5,6,8,9,10,11	OFDM	6	ch0
802.11n (HT20)	1 to 11	1,2,3,4,6,8,9,10,11	OFDM	MCS0	ch0
802.11ax (HE20)	1 to 11	1,2,3,4,5,6,9,10,11	OFDMA	MCS0	ch0

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
802.11n (HT20)	1 to 11	6	OFDM	MCS0	CH0

RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 11	1,2,5,6,11	DSSS	1	CH0
802.11g	1 to 11	1,2,3,4,8,9,10,11	OFDM	6	CH0
802.11n (HT20)	1 to 11	1,2,3,4,6,8,9,10,11	OFDM	MCS0	CH0

RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11ax (HE20)	1 to 11	1,2,3,4,9,10,11	OFDMA	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	+/- 2.32 dB
Output Power measurement	+/- 1 dB
Emission Bandwidth	+/- 1.53 Hz
Undesignable radiated emission measurement	+/- 1.68 dB
Peak Power Density	+/- 2.16 dB
Temperature	+/- 0.7 °C
Humidity	+/- 3 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty			
Polarization: Vertical	+/-	2.8 dB	9kHz~30MHz
	+/-	4.82 dB	30MHz - 1000MHz
	+/-	4.37 dB	1GHz - 18GHz
	+/-	4.21 dB	18GHz - 40GHz
Polarization: Horizontal	+/-	2.8 dB	9kHz~30MHz
	+/-	4.54 dB	30MHz - 1000MHz
	+/-	4.37 dB	1GHz - 18GHz
	+/-	4.21 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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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	04/13/2022	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
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2022	03/26/2023
DC Power Supply	Agilent	E3640A	MY53170008	09/12/2022	09/11/2023
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	N9010B	MY59071573	05/16/2022	05/15/2023
Power Meter	Anritsu	ML2496A	1512003	07/26/2022	07/25/2023
Power Sensor	Anritsu	MA2411B	1339378	07/26/2022	07/25/2023
Power Sensor	Anritsu	MA2411B	1339379	07/26/2022	07/25/2023
DC Power Supply	Agilent	E3640A	MY53170008	09/12/2022	09/11/2023
Test Software	SGS Taiwan	Radio Test Software	Ver.21	N.C.R	N.C.R
Attenuator	Woken	WATT-218FS-10	RF17	11/16/2022	11/15/2023
Attenuator	Woken	WATT-218FS-10	RF18	11/16/2022	11/15/2023
Switch E-Channel	E-Channel	ETF-1801 RF Switch	EC2100175	11/16/2022	11/15/2023
DC Block	PASTERNAK	PE8210	RF158	11/16/2022	11/15/2023

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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	11/11/2022	11/10/2023
Horn Antenna	Schwarzbeck	BBHA9170	185	08/22/2022	08/21/2023
Horn Antenna	Schwarzbeck	BBHA9120D	1187	01/12/2023	01/11/2024
Loop Antenna	ETS.LINDGREN	6502	143303	05/14/2022	05/13/2023
3m Site NSA	SGS	966 chamber C	N/A	03/02/2022	03/01/2023
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	04/01/2022	03/31/2023
DC Power Supply	Agilent	E3640A	MY53170008	09/12/2022	09/11/2023
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R
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	EMC18405SEE	980881	10/25/2022	10/24/2023
Attenuator	Woken	WATT-218FS-10	RF16	11/16/2022	11/15/2023
Coaxial Cable	Huber Suhner	EMC106-SM-SM-9100	150704	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

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

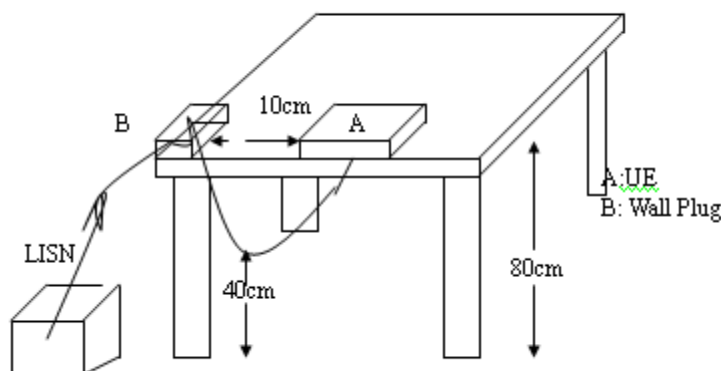
Note

- 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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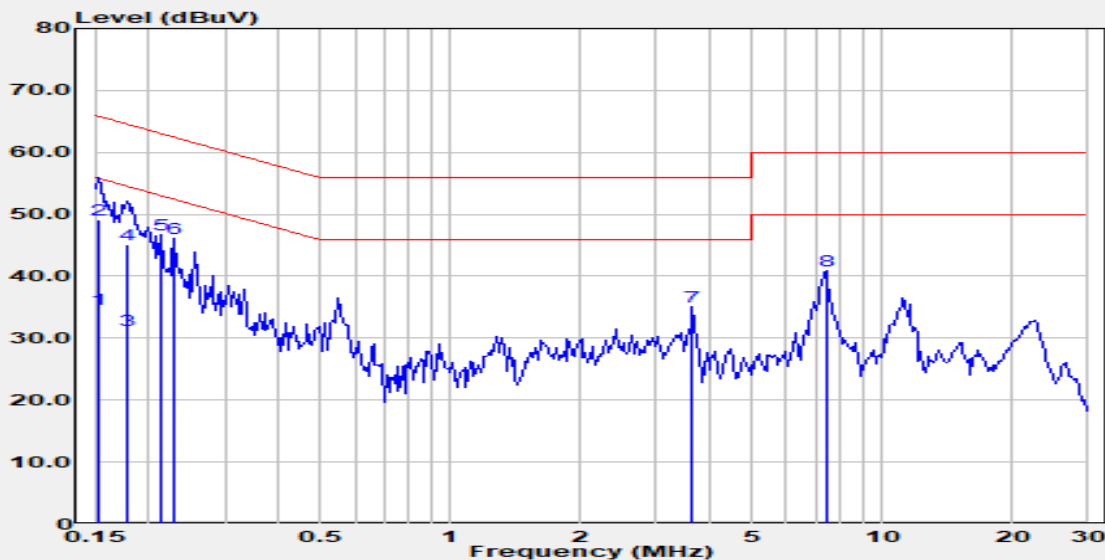
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number :TERF2211002513E2 Test Site :Conduction C
Test Mode :2.4G Test Date :2023-02-15
Power :120/60Hz Temp./Humi. :22.4/61
Probe :L1 Engineer :Andy Wang



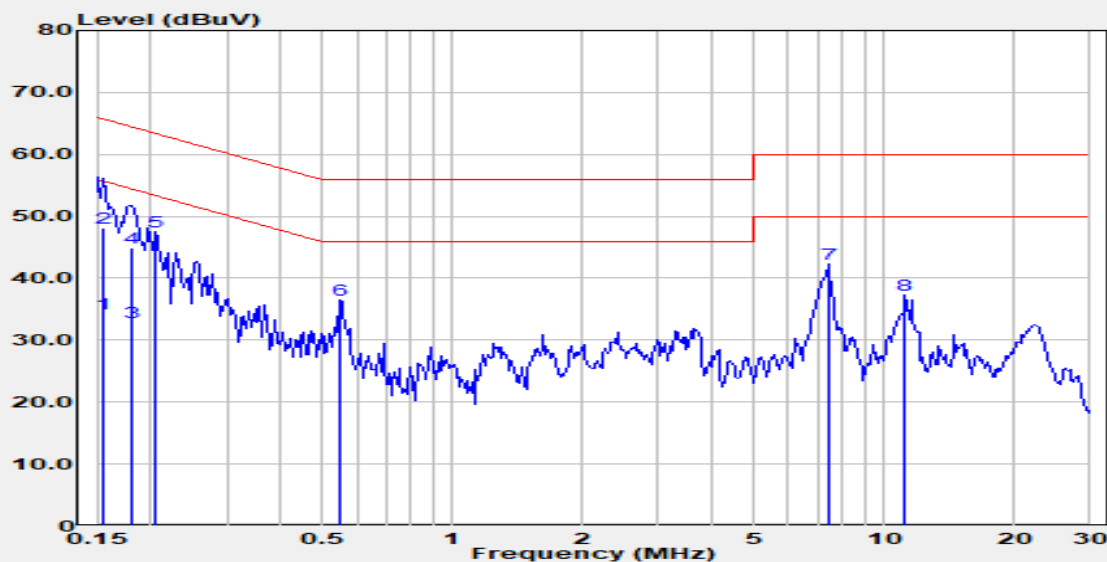
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS		
	PK/QP/AV	dB μ V	dB	dB μ V	dB μ V	dB
0.153	Average	24.50	10.27	34.77	55.82	-21.05
0.153	QP	38.80	10.27	49.07	65.82	-16.75
0.178	Average	21.10	10.27	31.37	54.59	-23.22
0.178	QP	34.90	10.27	45.17	64.59	-19.42
0.213	Peak	36.50	10.27	46.77	63.10	-16.32
0.229	Peak	35.79	10.28	46.07	62.48	-16.41
3.642	Peak	24.31	10.75	35.06	56.00	-20.94
7.407	Peak	30.25	10.61	40.86	60.00	-19.14

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Report Number	:TERF2211002513E2	Test Site	:Conduction C
Test Mode	:2.4G	Test Date	:2023-02-15
Power	:120/60Hz	Temp./Humi.	:22.4/61
Probe	:N	Engineer	:Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS		
MHz	PK/QP/AV	dB μ V	dB	dB μ V	dB μ V	dB
0.155	Average	24.10	10.28	34.38	55.74	-21.36
0.155	QP	37.90	10.28	48.18	65.74	-17.56
0.180	Average	22.60	10.27	32.87	54.50	-21.63
0.180	QP	34.70	10.27	44.97	64.50	-19.53
0.204	Peak	37.27	10.27	47.54	63.45	-15.91
0.546	Peak	26.27	10.31	36.58	56.00	-19.42
7.407	Peak	31.68	10.56	42.24	60.00	-17.76
11.198	Peak	26.59	10.65	37.24	60.00	-22.76

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8 PEAK OUTPUT POWER MEASUREMENT

8.1 Standard Applicable

8.2 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.

8.3 Output Power

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt and the e.i.r.p. shall not exceed 4 W.

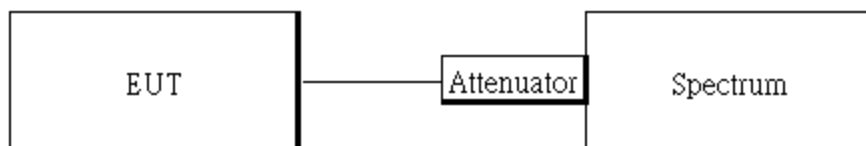
If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

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.

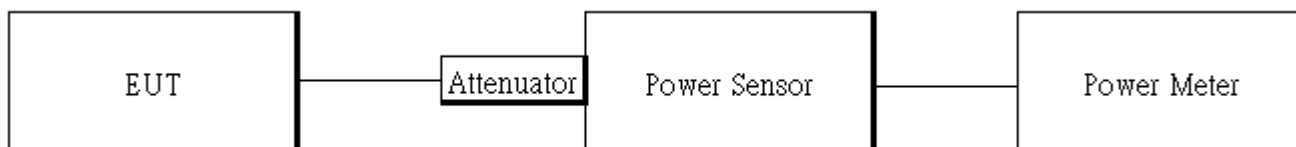
The antenna gain is not greater than 6 dBi. Therefore, reduction of power is not required.

8.4 Test Setup

8.4.1 Duty Cycle



8.4.2 Output Power:



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8.5 Measurement Procedure

8.5.1 Duty Cycle:

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

8.5.2 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.**

8.6 Measurement Result

8.6.1 Duty Cycle:

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11b	99.86	0.01	0.12	0.01
802.11g	98.96	0.05	0.70	0.01
802.11n_20	98.82	0.05	0.75	0.01
802.11ax_20	98.58	0.06	0.96	0.01

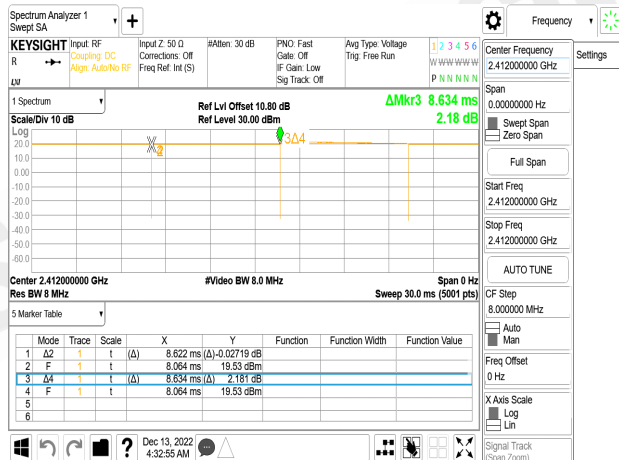
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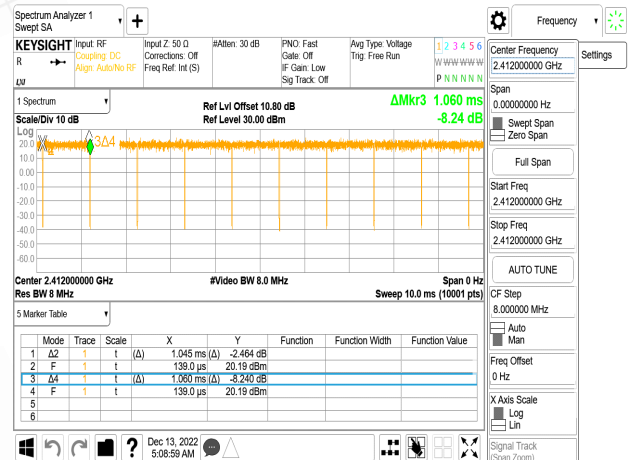
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8.6.2 Duty Cycle test plots

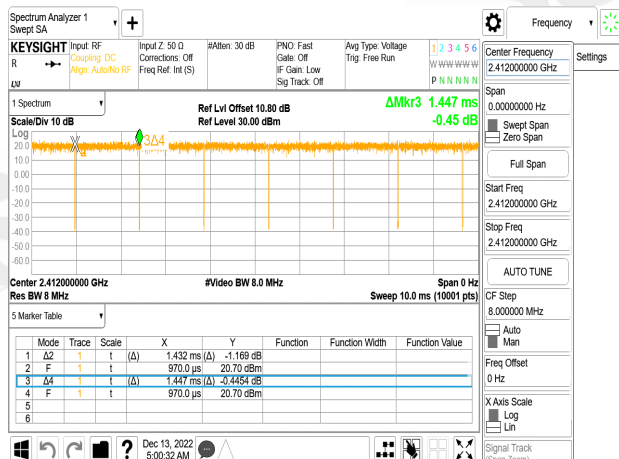
802.11b_20MHz_Chain0_2412MHz



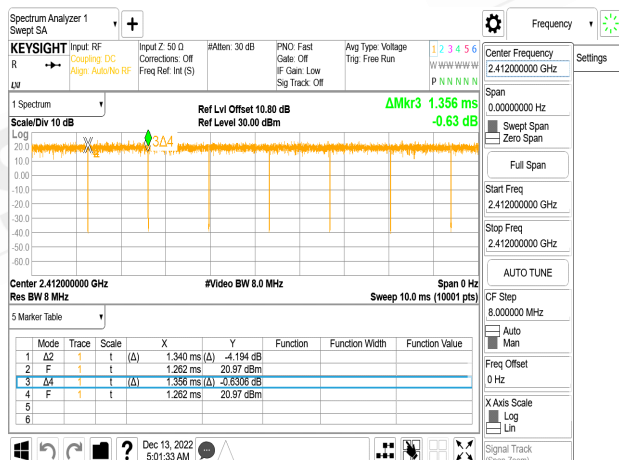
802.11ax_20MHz_Chain0_2412MHz



802.11g_20MHz_Chain0_2412MHz



802.11n_20MHz_Chain0_2412MHz



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8.6.3 Output Power

802.11b Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	19	20.36	30.00	PASS
2	2417	1	20.75	21.35	30.00	PASS
3	2422	1	21.5	21.81	30.00	PASS
6	2437	1	21.5	21.80	30.00	PASS
9	2452	1	21.5	21.72	30.00	PASS
10	2457	1	21	21.29	30.00	PASS
11	2462	1	20	20.79	30.00	PASS
802.11b Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	19	17.92	30.00	PASS
2	2417	1	20.75	18.98	30.00	PASS
3	2422	1	21.5	19.80	30.00	PASS
6	2437	1	21.5	19.72	30.00	PASS
9	2452	1	21.5	19.64	30.00	PASS
10	2457	1	21	18.98	30.00	PASS
11	2462	1	20	18.55	30.00	PASS

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802.11g Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	14.75	22.66	30.00	PASS
2	2417	6	15.75	22.86	30.00	PASS
3	2422	6	17	22.96	30.00	PASS
4	2427	6	18	22.91	30.00	PASS
5	2432	6	18.25	22.97	30.00	PASS
6	2437	6	18.5	22.69	30.00	PASS
8	2447	6	18.25	22.99	30.00	PASS
9	2452	6	17	22.82	30.00	PASS
10	2457	6	17	22.78	30.00	PASS
11	2462	6	15	22.36	30.00	PASS
802.11g Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	14.75	13.87	30.00	PASS
2	2417	6	15.75	14.90	30.00	PASS
3	2422	6	17	15.83	30.00	PASS
4	2427	6	18	16.99	30.00	PASS
5	2432	6	18.25	16.97	30.00	PASS
6	2437	6	18.5	17.90	30.00	PASS
8	2447	6	18.25	17.52	30.00	PASS
9	2452	6	17	15.94	30.00	PASS
10	2457	6	17	15.97	30.00	PASS
11	2462	6	15	13.83	30.00	PASS

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802.11n_HT_20M Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	14.25	22.41	30.00	PASS
2	2417	MCS0	14.5	22.88	30.00	PASS
3	2422	MCS0	16.5	22.80	30.00	PASS
4	2427	MCS0	17.75	22.87	30.00	PASS
6	2437	MCS0	18	22.56	30.00	PASS
8	2447	MCS0	18	22.89	30.00	PASS
9	2452	MCS0	17	22.67	30.00	PASS
10	2457	MCS0	15.5	22.58	30.00	PASS
11	2462	MCS0	13.75	22.22	30.00	PASS
802.11n_HT_20M Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	14.25	12.82	30.00	PASS
2	2417	MCS0	14.5	13.75	30.00	PASS
3	2422	MCS0	16.5	15.58	30.00	PASS
4	2427	MCS0	17.75	16.78	30.00	PASS
6	2437	MCS0	18	16.91	30.00	PASS
8	2447	MCS0	18	16.94	30.00	PASS
9	2452	MCS0	17	15.89	30.00	PASS
10	2457	MCS0	15.5	14.76	30.00	PASS
11	2462	MCS0	13.75	12.92	30.00	PASS

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802.11ax_HE_20M Ch0

CH	Freq. (MHz)	Data Rate	RU_full Config	Power set	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	RU_full	12.75	22.69	30.00	PASS
			SU	13.5	22.56	30.00	PASS
			26/0	13.25	22.30	30.00	PASS
			26/8	13.5	22.43	30.00	PASS
			52/37	13.5	22.57	30.00	PASS
			52/40	14	22.32	30.00	PASS
			106/53	14	22.36	30.00	PASS
			106/54	14	22.28	30.00	PASS
2	2417	MCS0	RU_full	14	22.79	30.00	PASS
			SU	14.5	22.57	30.00	PASS
			26/0	14	22.91	30.00	PASS
			26/8	14	22.67	30.00	PASS
			52/37	14	22.93	30.00	PASS
			52/40	14	22.80	30.00	PASS
			106/53	14	22.83	30.00	PASS
			106/54	14	22.76	30.00	PASS
3	2422	MCS0	RU_full	16	23.03	30.00	PASS
			SU	16	23.05	30.00	PASS
4	2427	MCS0	RU_full	16.5	22.56	30.00	PASS
			SU	17	22.89	30.00	PASS
5	2432	MCS0	RU_full	17	22.95	30.00	PASS
			SU	17	22.98	30.00	PASS
6	2437	MCS0	RU_full	17.5	22.54	30.00	PASS
			SU	17.5	22.96	30.00	PASS
9	2452	MCS0	RU_full	16	22.21	30.00	PASS
			SU	16	22.35	30.00	PASS
10	2457	MCS0	RU_full	14.5	22.67	30.00	PASS
			SU	15	22.13	30.00	PASS
			26/8	14	22.64	30.00	PASS
			26/0	14	22.39	30.00	PASS
			52/40	14	22.60	30.00	PASS
			52/37	14	22.41	30.00	PASS
			106/54	14	22.51	30.00	PASS
			106/53	14	22.49	30.00	PASS
11	2462	MCS0	RU_full	13.5	22.35	30.00	PASS
			SU	13.5	22.16	30.00	PASS
			26/8	13	22.05	30.00	PASS
			26/0	13	22.09	30.00	PASS
			52/40	13	22.12	30.00	PASS
			52/37	13.5	22.31	30.00	PASS
			106/54	13	22.16	30.00	PASS
			106/53	13	22.02	30.00	PASS

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802.11ax_HE_20M Ch0

CH	Freq. (MHz)	Data Rate	RU_full Config	Power set	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	RU_full	12.75	11.94	30.00	PASS
			SU	13.5	12.88	30.00	PASS
			26/0	13.25	12.68	30.00	PASS
			26/8	13.5	12.83	30.00	PASS
			52/37	13.5	12.79	30.00	PASS
			52/40	14	12.68	30.00	PASS
			106/53	14	12.65	30.00	PASS
			106/54	14	12.71	30.00	PASS
2	2417	MCS0	RU_full	14	13.57	30.00	PASS
			SU	14.5	13.75	30.00	PASS
			26/0	14	13.75	30.00	PASS
			26/8	14	13.70	30.00	PASS
			52/37	14	13.52	30.00	PASS
			52/40	14	13.58	30.00	PASS
			106/53	14	13.60	30.00	PASS
			106/54	14	13.55	30.00	PASS
3	2422	MCS0	RU_full	16	15.50	30.00	PASS
			SU	16	15.58	30.00	PASS
4	2427	MCS0	RU_full	16.5	15.98	30.00	PASS
			SU	17	16.54	30.00	PASS
5	2432	MCS0	RU_full	17	16.78	30.00	PASS
			SU	17	16.84	30.00	PASS
6	2437	MCS0	RU_full	17.5	16.79	30.00	PASS
			SU	17.5	16.88	30.00	PASS
9	2452	MCS0	RU_full	16	15.59	30.00	PASS
			SU	16	15.77	30.00	PASS
10	2457	MCS0	RU_full	14.5	13.94	30.00	PASS
			SU	15	14.74	30.00	PASS
			26/8	14	13.70	30.00	PASS
			26/0	14	13.90	30.00	PASS
			52/40	14	13.81	30.00	PASS
			52/37	14	13.99	30.00	PASS
			106/54	14	13.93	30.00	PASS
			106/53	14	13.97	30.00	PASS
11	2462	MCS0	RU_full	13.5	12.75	30.00	PASS
			SU	13.5	12.97	30.00	PASS
			26/8	13	12.71	30.00	PASS
			26/0	13	12.74	30.00	PASS
			52/40	13	12.69	30.00	PASS
			52/37	13.5	12.66	30.00	PASS
			106/54	13	12.72	30.00	PASS
			106/53	13	12.70	30.00	PASS

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802.11b Ch0

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	1	17.92	3.60	21.52	36	PASS
2	2417	1	18.98	3.60	22.58	36	PASS
3	2422	1	19.80	3.60	23.40	36	PASS
6	2437	1	19.72	3.60	23.32	36	PASS
9	2452	1	19.64	3.60	23.24	36	PASS
10	2457	1	18.98	3.60	22.58	36	PASS
11	2462	1	18.55	3.60	22.15	36	PASS

802.11g Ch0

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	6	13.87	3.60	17.47	36	PASS
2	2417	6	14.90	3.60	18.50	36	PASS
3	2422	6	15.83	3.60	19.43	36	PASS
4	2427	6	16.99	3.60	20.59	36	PASS
5	2432	6	16.97	3.60	20.57	36	PASS
6	2437	6	17.90	3.60	21.50	36	PASS
8	2447	6	17.52	3.60	21.12	36	PASS
9	2452	6	15.94	3.60	19.54	36	PASS
10	2457	6	15.97	3.60	19.57	36	PASS
11	2462	6	13.83	3.60	17.43	36	PASS

802.11n_HT_20M Ch0

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	12.82	3.60	16.42	36	PASS
2	2417	MCS0	13.75	3.60	17.35	36	PASS
3	2422	MCS0	15.58	3.60	19.18	36	PASS
4	2427	MCS0	16.78	3.60	20.38	36	PASS
6	2437	MCS0	16.91	3.60	20.51	36	PASS
8	2447	MCS0	16.94	3.60	20.54	36	PASS
9	2452	MCS0	15.89	3.60	19.49	36	PASS
10	2457	MCS0	14.76	3.60	18.36	36	PASS
11	2462	MCS0	12.92	3.60	16.52	36	PASS

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802.11ax_HE_20M Ch0								
CH	Freq. (MHz)	Data Rate	RU_full Config	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit	RESULT
1	2412	MCS0	RU_full	11.94	3.60	15.54	36	PASS
			SU	12.88	3.60	16.48	36	PASS
			26/0	12.68	3.60	16.28	36	PASS
			26/8	12.83	3.60	16.43	36	PASS
			52/37	12.79	3.60	16.39	36	PASS
			52/40	12.68	3.60	16.28	36	PASS
			106/53	12.65	3.60	16.25	36	PASS
			106/54	12.71	3.60	16.31	36	PASS
2	2417	MCS0	RU_full	13.57	3.60	17.17	35	PASS
			SU	13.75	3.60	17.35	36	PASS
			26/0	13.75	3.60	17.35	37	PASS
			26/8	13.70	3.60	17.30	38	PASS
			52/37	13.52	3.60	17.12	39	PASS
			52/40	13.58	3.60	17.18	40	PASS
			106/53	13.60	3.60	17.20	41	PASS
			106/54	13.55	3.60	17.15	42	PASS
3	2422	MCS0	RU_full	15.50	3.60	19.10	36	PASS
			SU	15.58	3.60	19.18	36	PASS
4	2427	MCS0	RU_full	15.98	3.60	19.58	35	PASS
			SU	16.54	3.60	20.14	36	PASS
6	2437	MCS0	RU_full	16.79	3.60	20.39	36	PASS
			SU	16.88	3.60	20.48	36	PASS
9	2452	MCS0	RU_full	15.59	3.60	19.19	36	PASS
			SU	15.77	3.60	19.37	36	PASS
10	2457	MCS0	RU_full	13.94	3.60	17.54	35	PASS
			SU	14.74	3.60	18.34	36	PASS
			26/8	13.70	3.60	17.30	37	PASS
			26/0	13.90	3.60	17.50	38	PASS
			52/40	13.81	3.60	17.41	39	PASS
			52/37	13.99	3.60	17.59	40	PASS
			106/54	13.93	3.60	17.53	41	PASS
			106/53	13.97	3.60	17.57	42	PASS
11	2462	MCS0	RU_full	12.75	3.60	16.35	36	PASS
			SU	12.97	3.60	16.57	36	PASS
			26/8	12.71	3.60	16.31	36	PASS
			26/0	12.74	3.60	16.34	36	PASS
			52/40	12.69	3.60	16.29	36	PASS
			52/37	12.66	3.60	16.26	36	PASS
			106/54	12.72	3.60	16.32	36	PASS
			106/53	12.70	3.60	16.30	36	PASS

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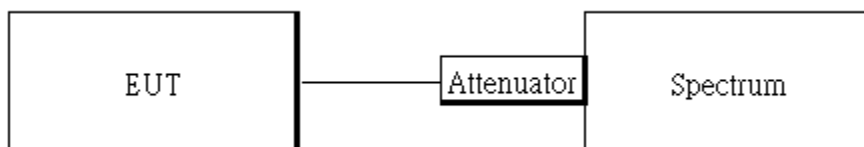
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9 EMISSION BANDWIDTH MEASUREMENT

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 FCC 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.

9.3.2 ISED measurements

1. The testing follows the Measurement Procedure of the RSS-Gen section 6.7.
2. Set the spectrum analyzer as
RBW= 1 % to 5% of 99% and -6dB Bandwidth ,
VBW $\geq$ 3 X RBW,
Span= large enough to capture all products of the modulation process
Sweep=auto, Detector = Peak, and Max hold.
3. Mark the upper and lower frequencies of 99% and -6dB.
4. Repeat above procedures until all test default channel is completed.

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9.4 6dB Bandwidth

802.11b Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	10110.00	≥ 500	PASS
2437	10090.00	≥ 500	PASS
2462	10100.00	≥ 500	PASS

802.11g Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	16400.00	≥ 500	PASS
2437	16380.00	≥ 500	PASS
2462	16390.00	≥ 500	PASS

802.11n_HT_20M Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	17540.00	≥ 500	PASS
2437	17340.00	≥ 500	PASS
2462	17540.00	≥ 500	PASS

802.11ax_HE_20M Ch0

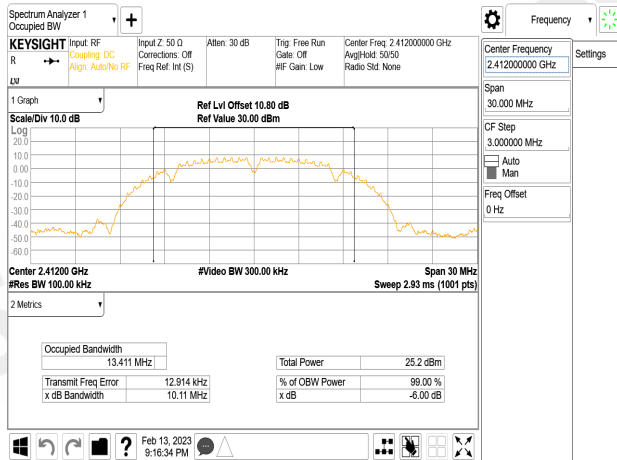
Freq. (MHz)	RU Config	6dB BW (kHz)	Limit (kHz)	Result
2412	SU	18430.00	≥ 500	PASS
2437	SU	18420.00	≥ 500	PASS
2642	SU	18340.00	≥ 500	PASS

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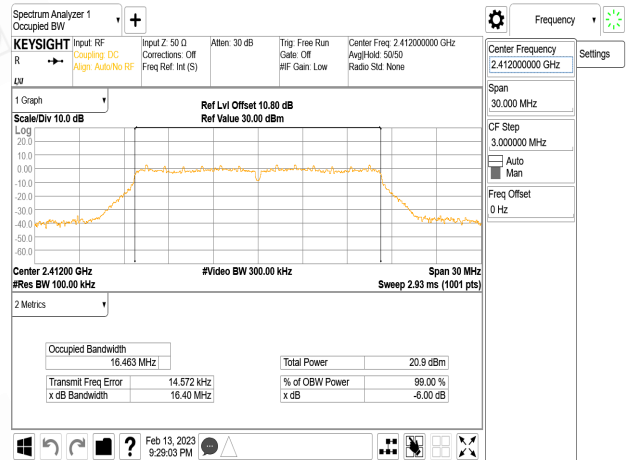
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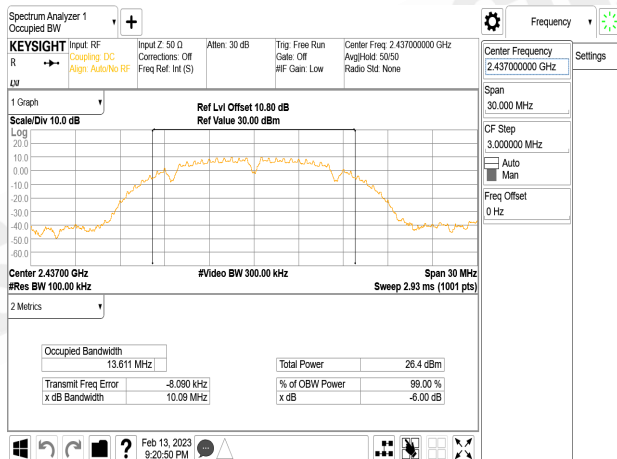
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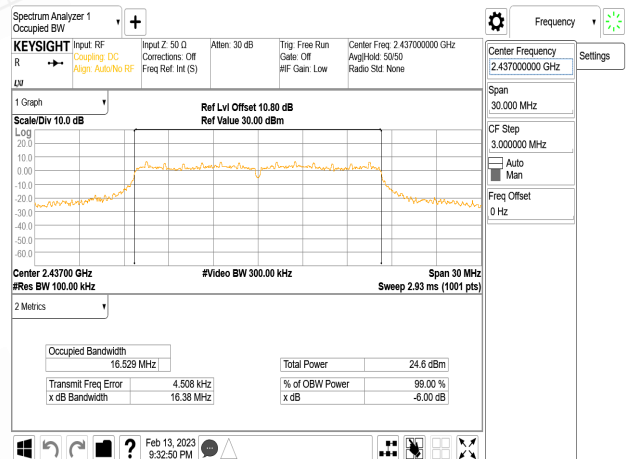
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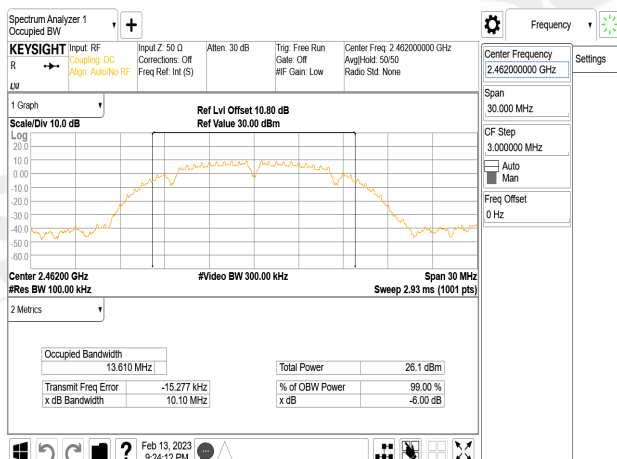
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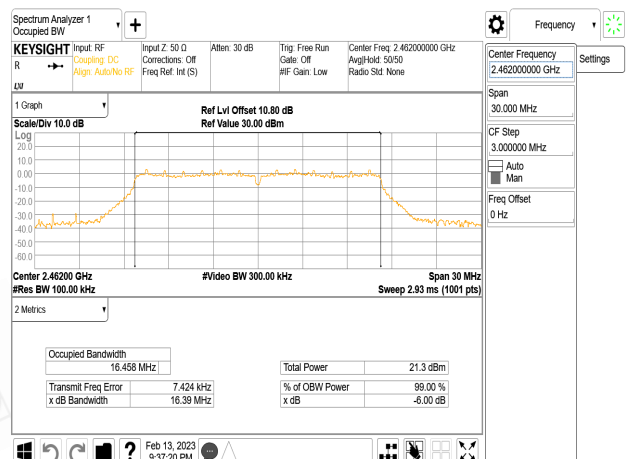
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802.11b_20MHz_Chain0_2462MHz



802.11g_20MHz_Chain0_2462MHz

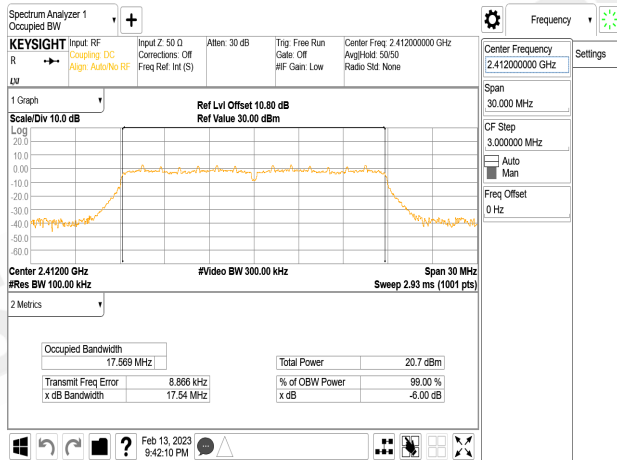


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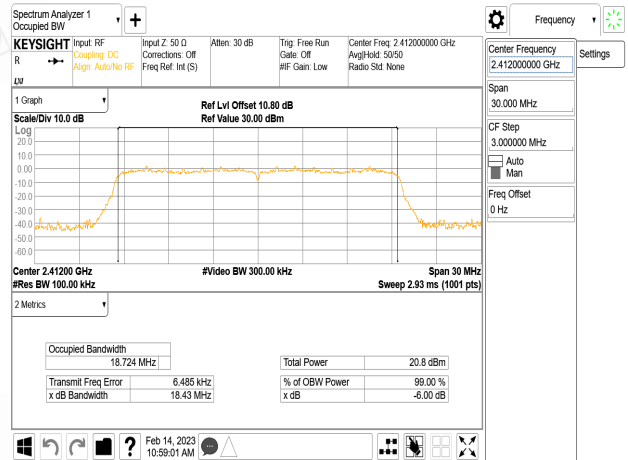
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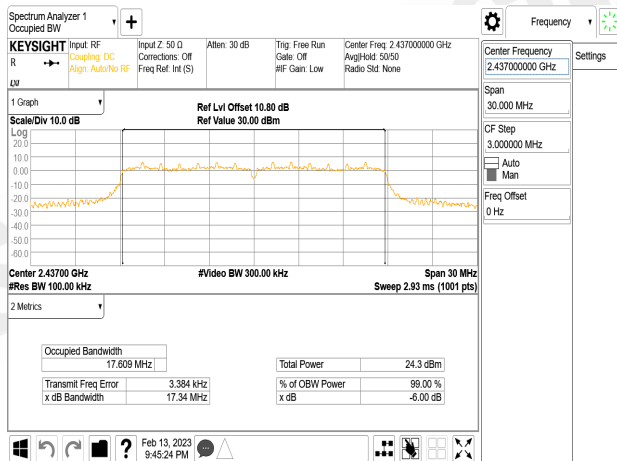
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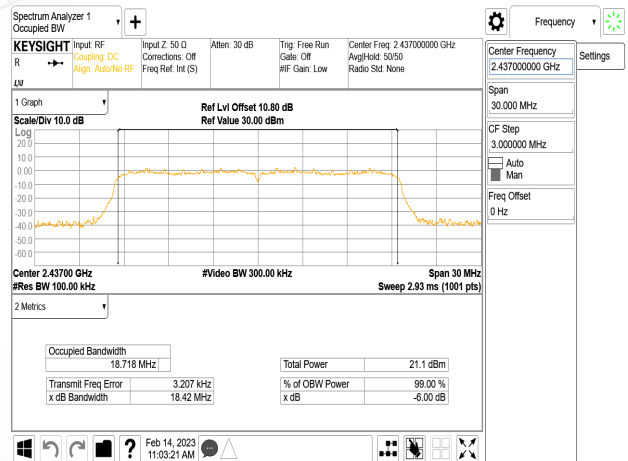
802.11ax_20MHz_Chain0_2412MHz



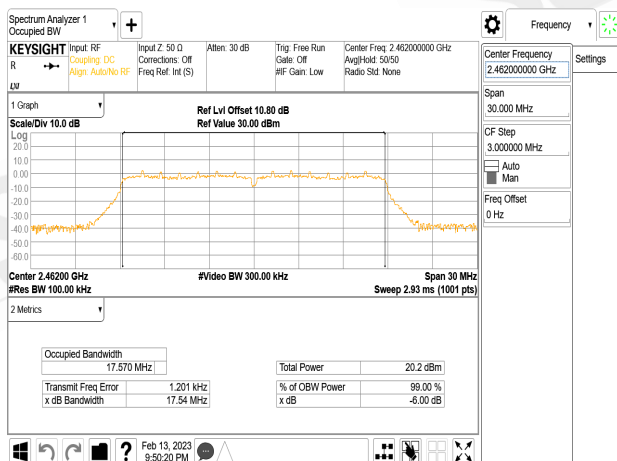
802.11n_20MHz_Chain0_2437MHz



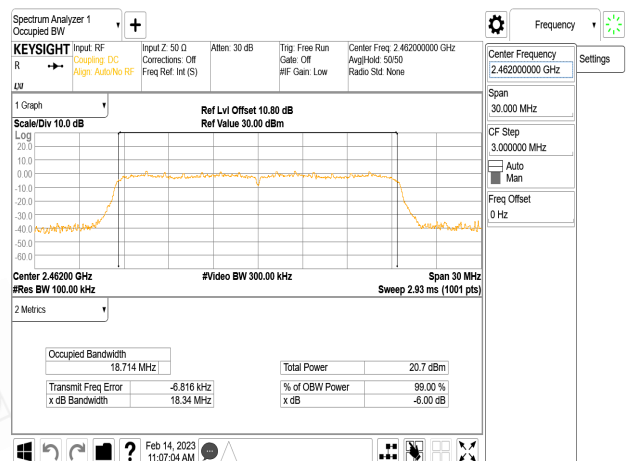
802.11ax_20MHz_Chain0_2437MHz



802.11n_20MHz_Chain0_2462MHz



802.11ax_20MHz_Chain0_2462MHz



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9.5 99% Bandwidth

802.11b Ch0

Freq. (MHz)	99% BW (MHz)
2412	13.43
2437	13.752
2462	13.681

802.11g Ch0

Freq. (MHz)	99% BW (MHz)
2412	16.767
2437	16.938
2462	16.762

802.11n_HT20M Ch0

Freq. (MHz)	99% BW (MHz)
2412	17.67
2437	17.801
2462	17.66

802.11ax_HE20M Ch0

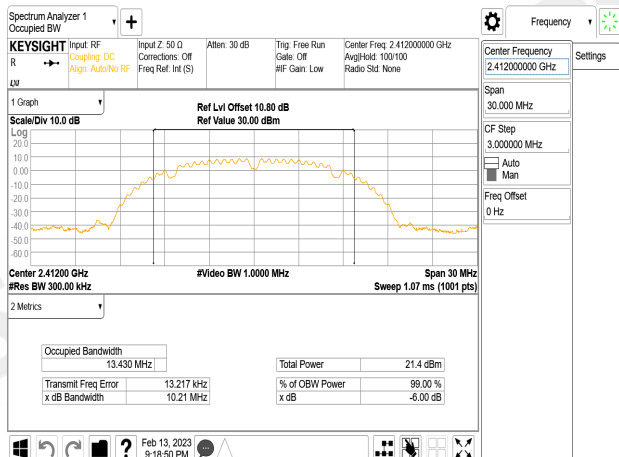
Freq. (MHz)	RU Config	99% BW (MHz)
2412	SU	18.768
2437	SU	18.789
2462	SU	18.782

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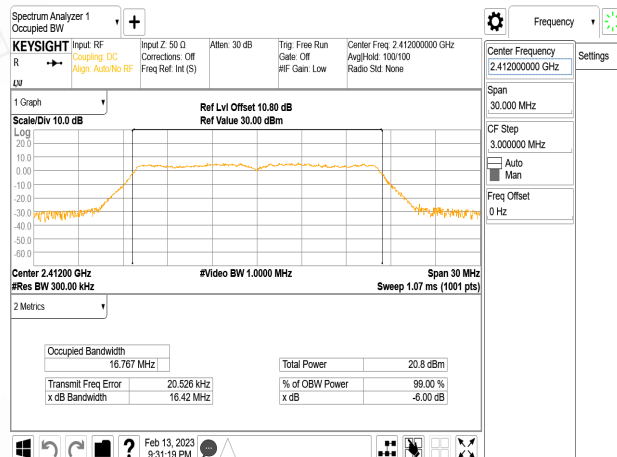
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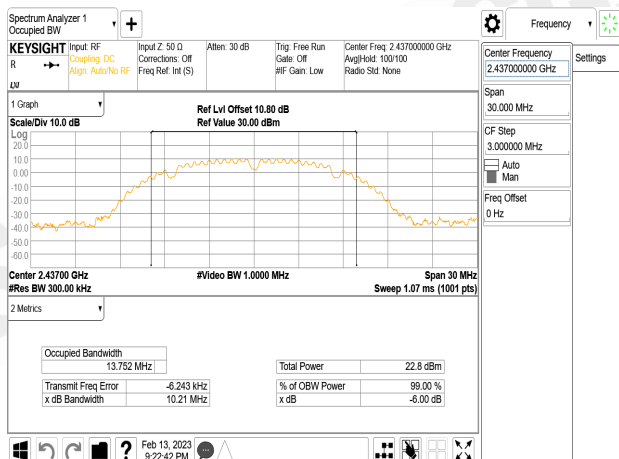
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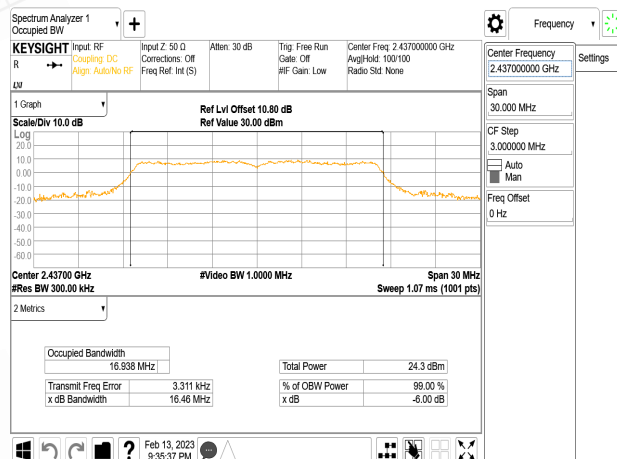
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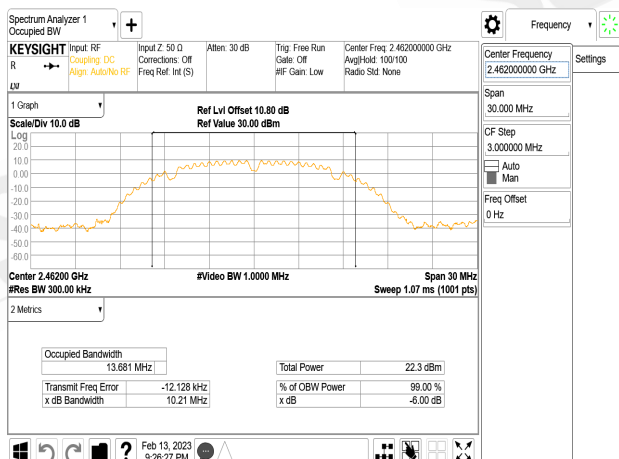
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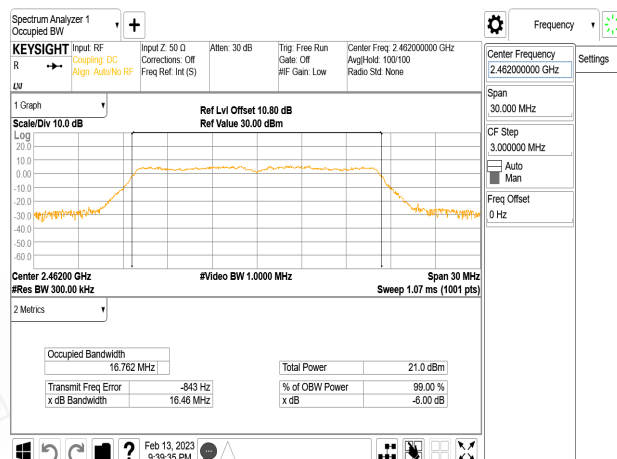
802.11g_20MHz_Chain0_2437MHz



802.11b_20MHz_Chain0_2462MHz



802.11g_20MHz_Chain0_2462MHz

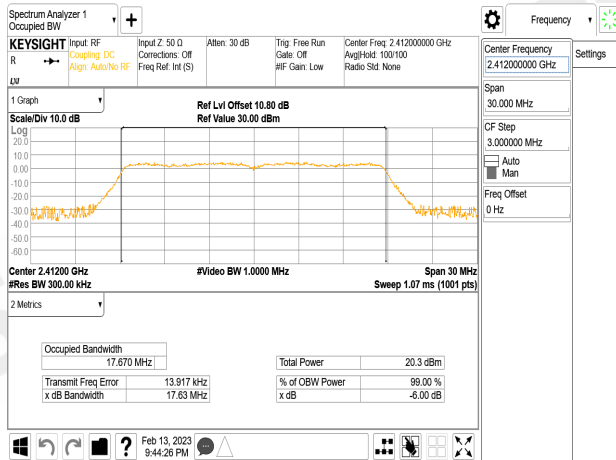


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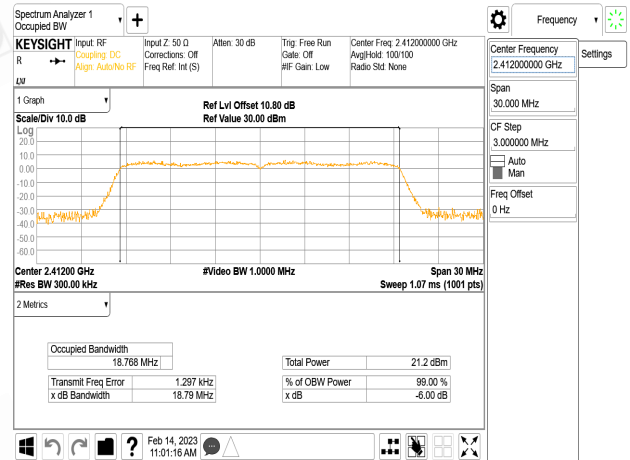
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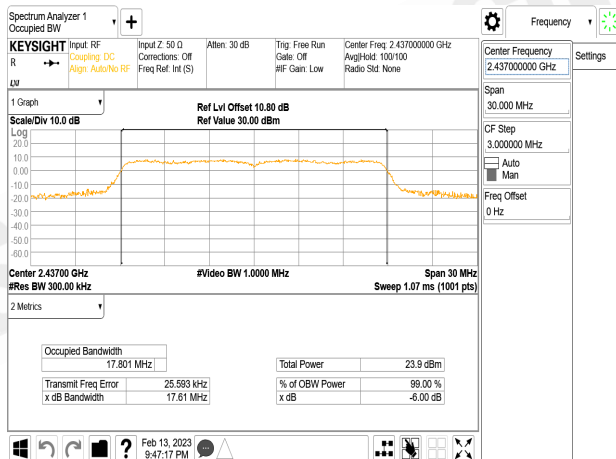
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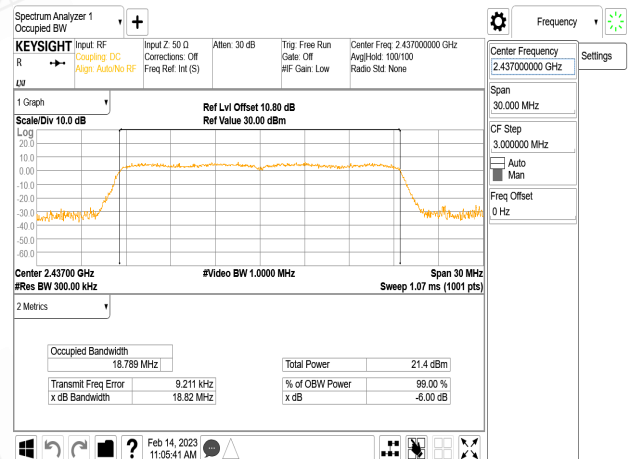
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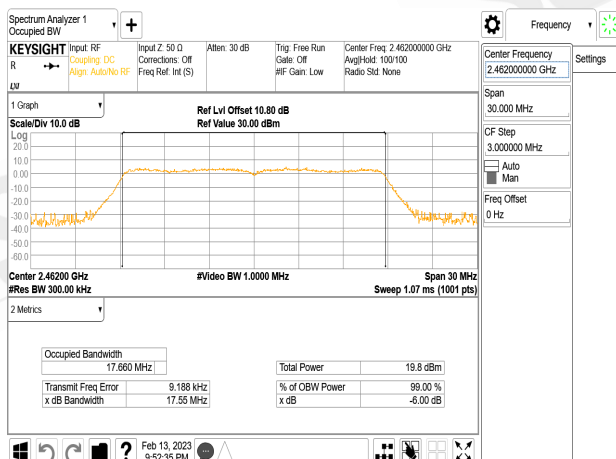
802.11n_20MHz_Chain0_2437MHz



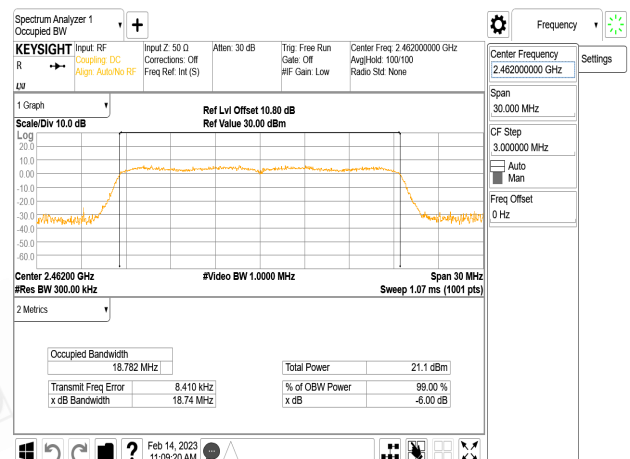
802.11ax_20MHz_Chain0_2437MHz



802.11n_20MHz_Chain0_2462MHz



802.11ax_20MHz_Chain0_2462MHz



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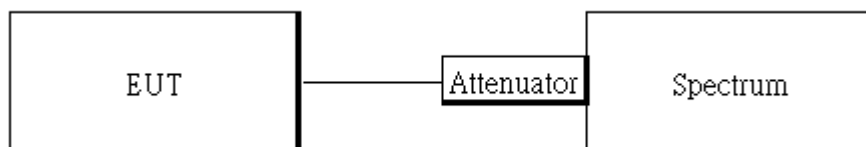
10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

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) & RSS-Gen §8.10, must also comply with the radiated emission limits specified in §15.209(a) & RSS-Gen §8.9.

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	8.61	-11.39
2437	8.81	-11.19
2462	9.46	-10.54

802.11g Ch0

Reference Level of Limit 802.11g mode		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	2.86	-17.14
2437	6.64	-13.36
2462	3.22	-16.78

802.11n_HT_20M Ch0

Reference Level of Limit 802.11n20 MODE		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	2.70	-17.30
2437	6.39	-13.61
2462	2.22	-17.78

802.11ax_HE_20M Ch0

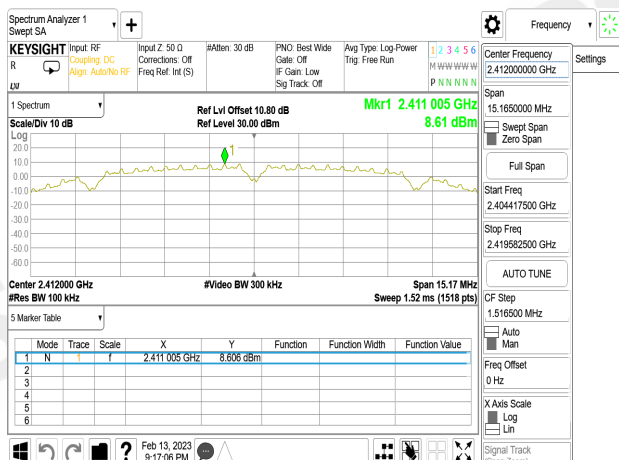
Reference Level of Limit 802.11ax20 mode		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	1.77	-18.23
2437	6.07	-13.93
2462	1.69	-18.31

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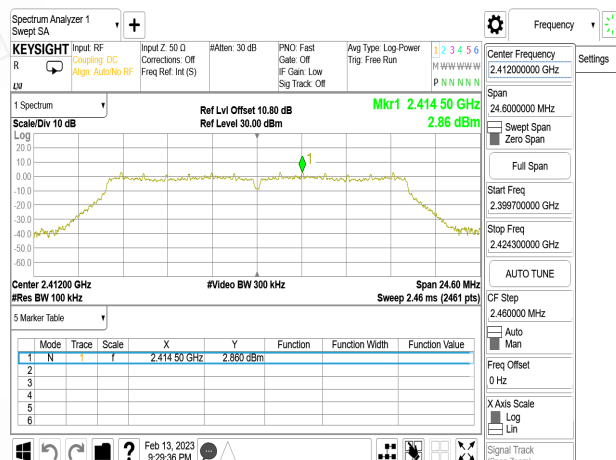
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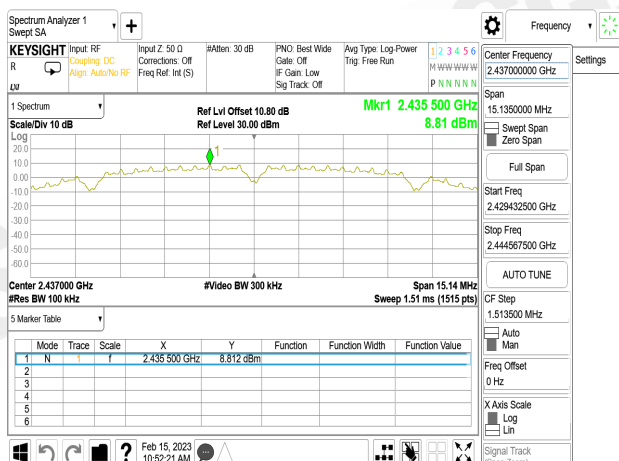
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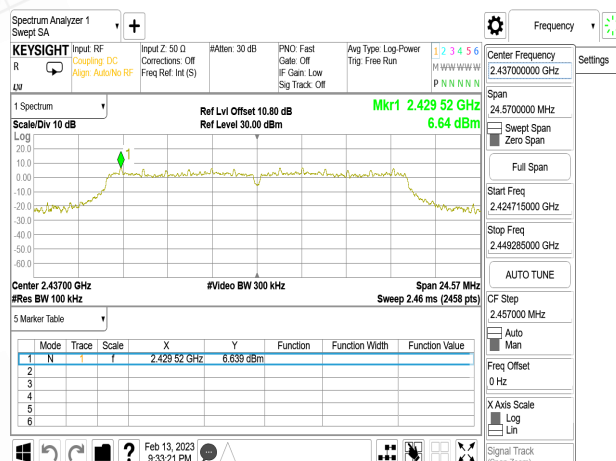
802.11g_20MHz_Chain0_2412MHz



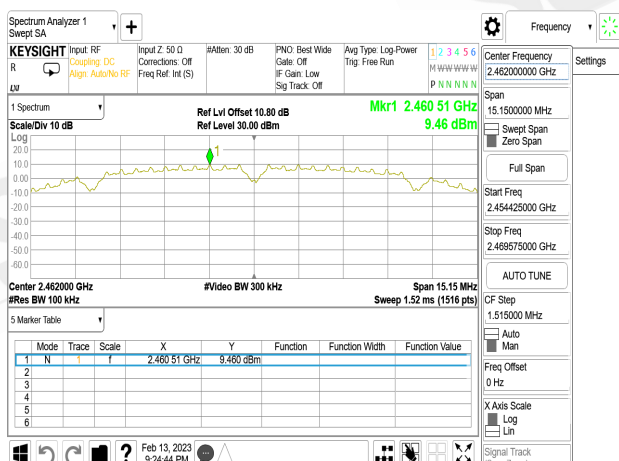
802.11b_20MHz_Chain0_2437MHz



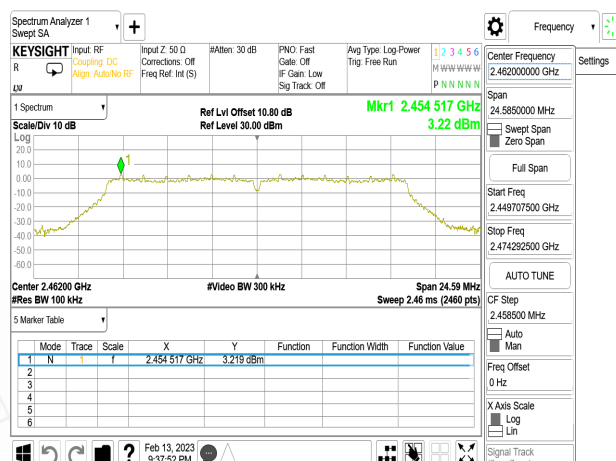
802.11g_20MHz_Chain0_2437MHz



802.11b_20MHz_Chain0_2462MHz



802.11g_20MHz_Chain0_2462MHz

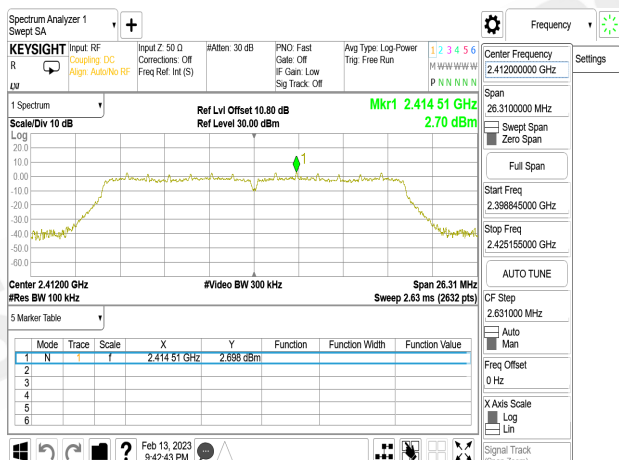


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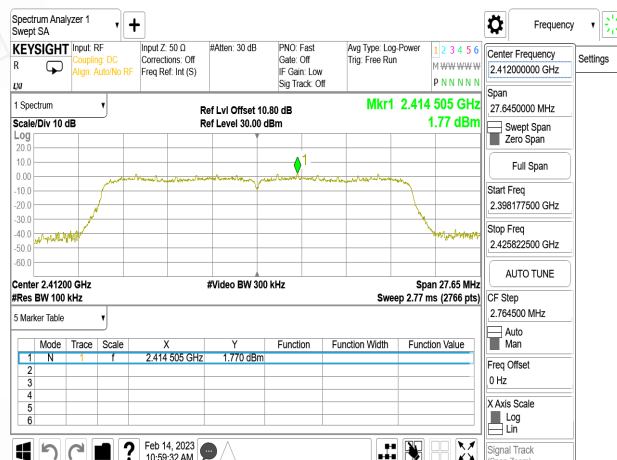
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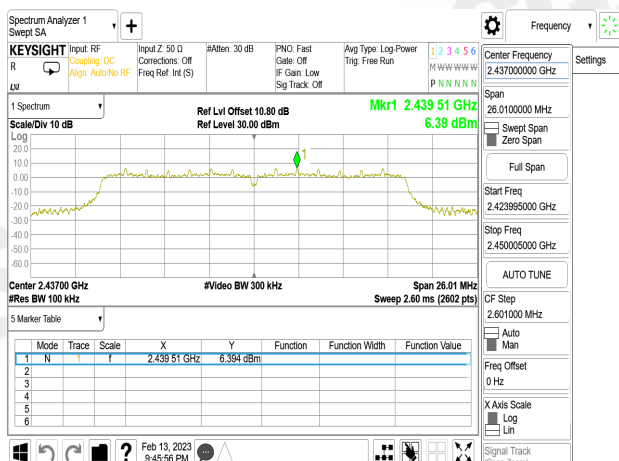
802.11n_20MHz_Chain0_2412MHz



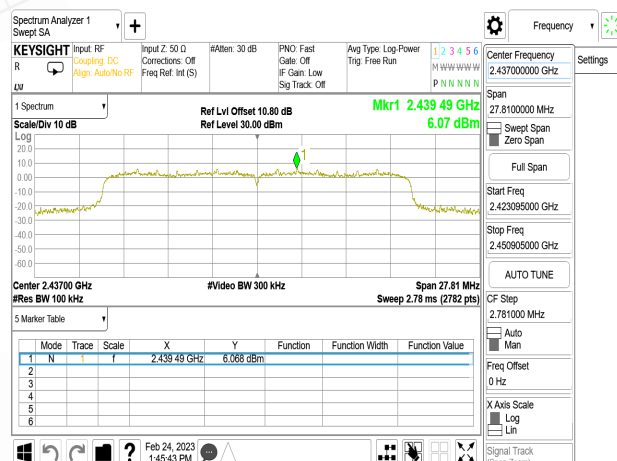
802.11ax_20MHz_Chain0_2412MHz



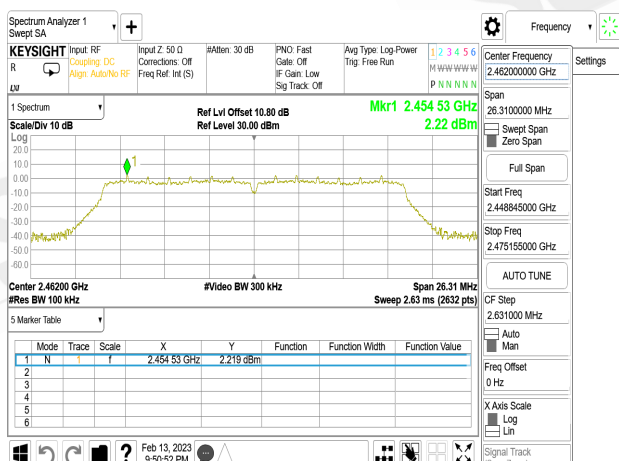
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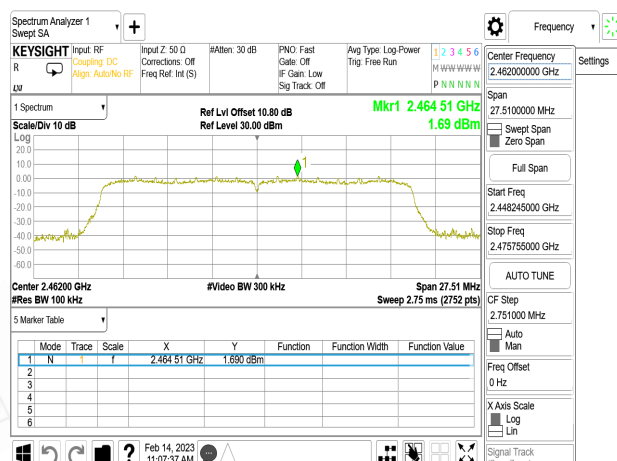
802.11ax_20MHz_Chain0_2437MHz



802.11n_20MHz_Chain0_2462MHz



802.11ax_20MHz_Chain0_2462MHz



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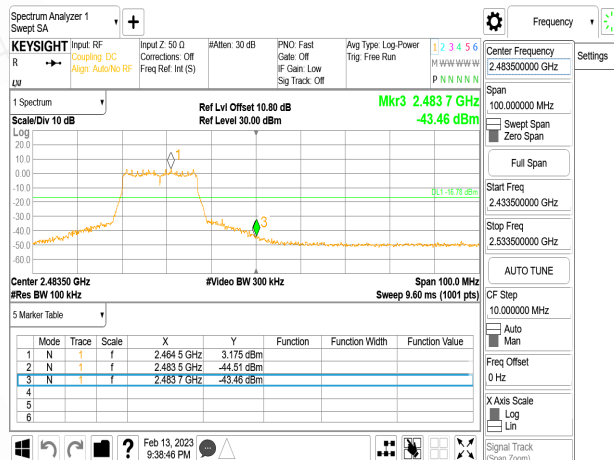
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802.11b_20MHz_Chain0_2412MHz



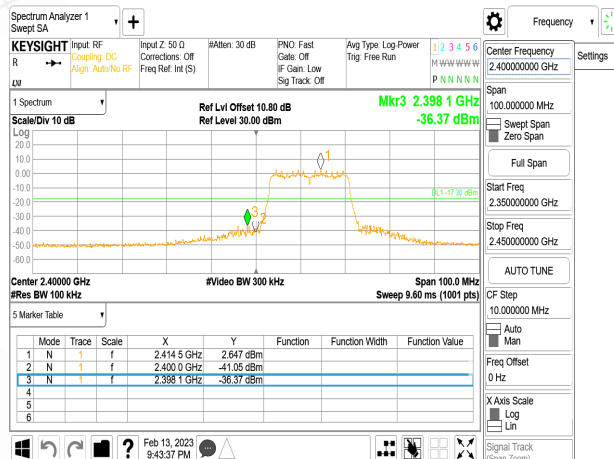
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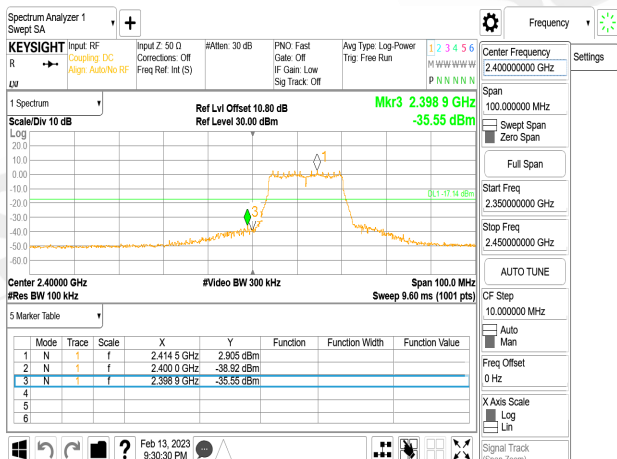
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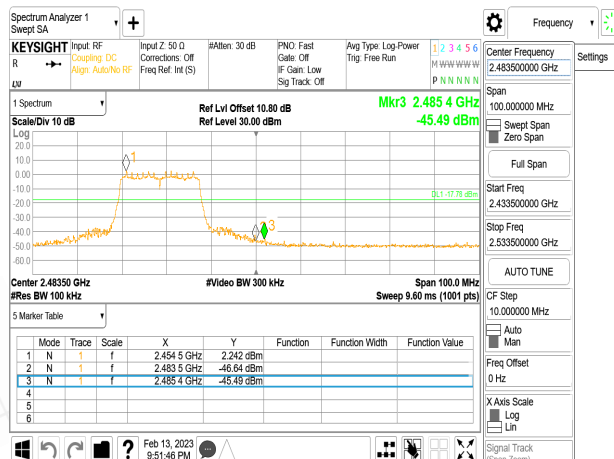
802.11n_20MHz_Chain0_2412MHz



802.11g_20MHz_Chain0_2412MHz



802.11n_20MHz_Chain0_2462MHz

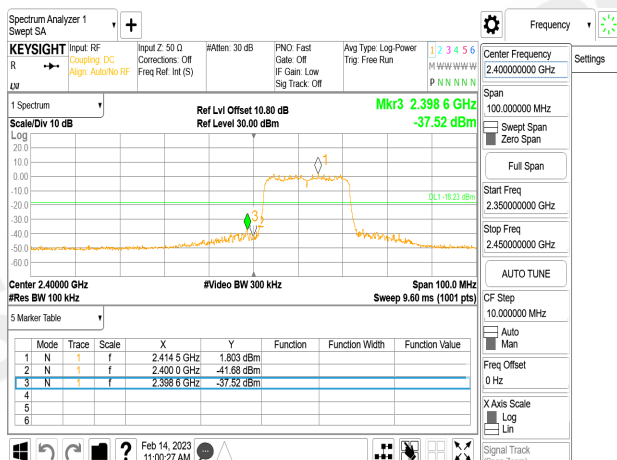


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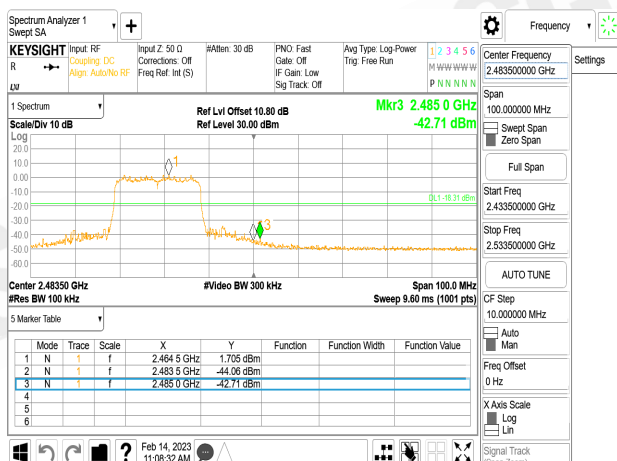
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802.11ax_20MHz_Chain0_2412MHz



802.11ax_20MHz_Chain0_2462MHz

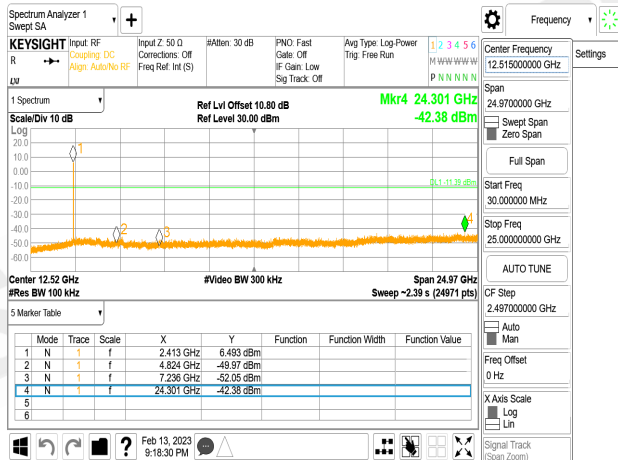


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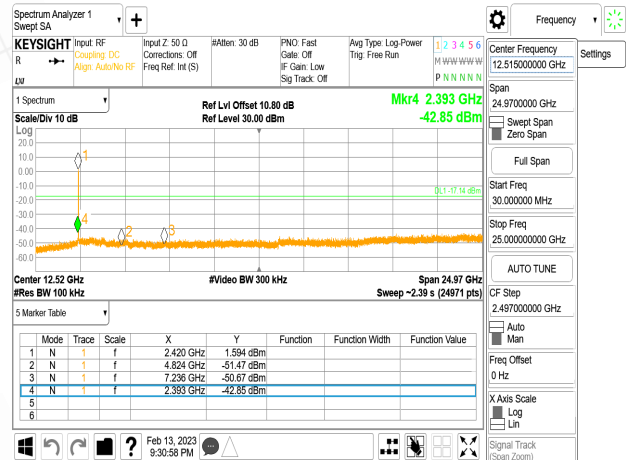
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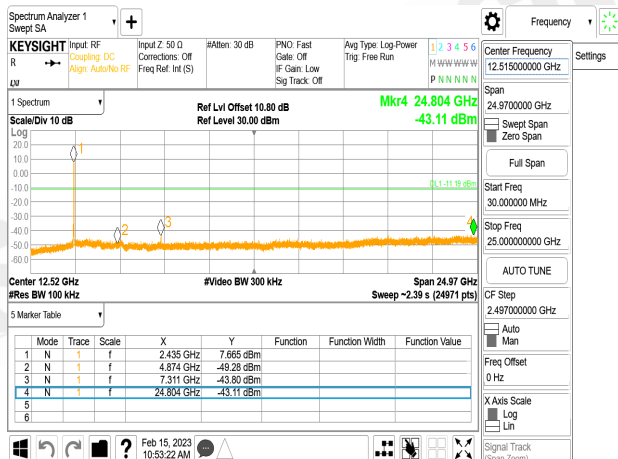
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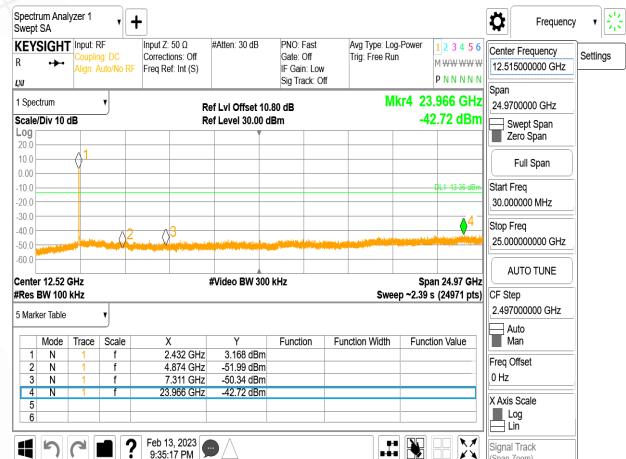
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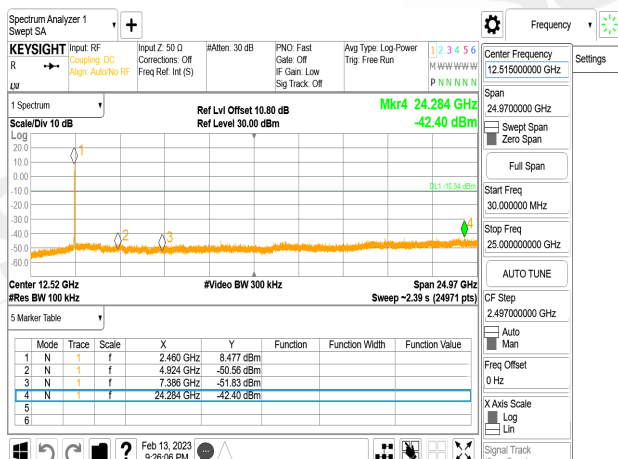
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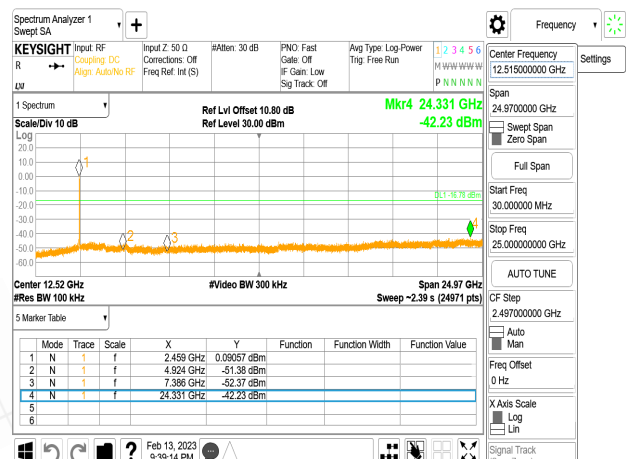
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802.11b_20MHz_Chain0_2462MHz



802.11g_20MHz_Chain0_2462MHz

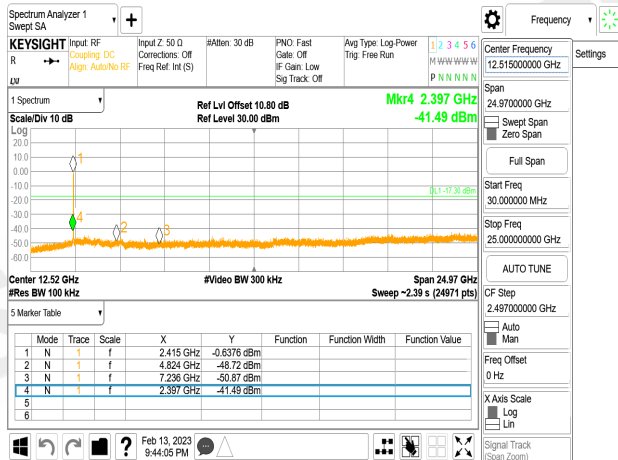


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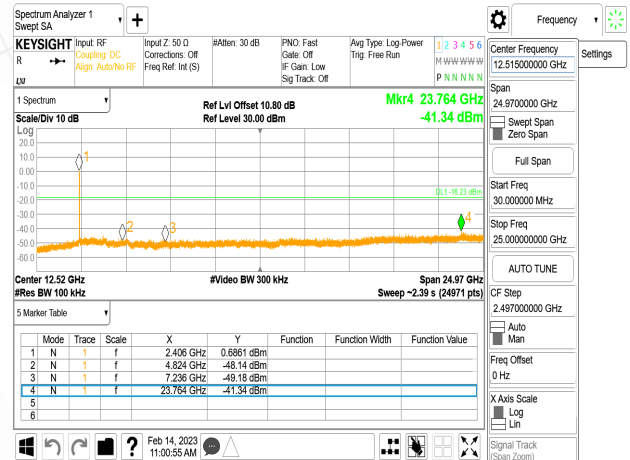
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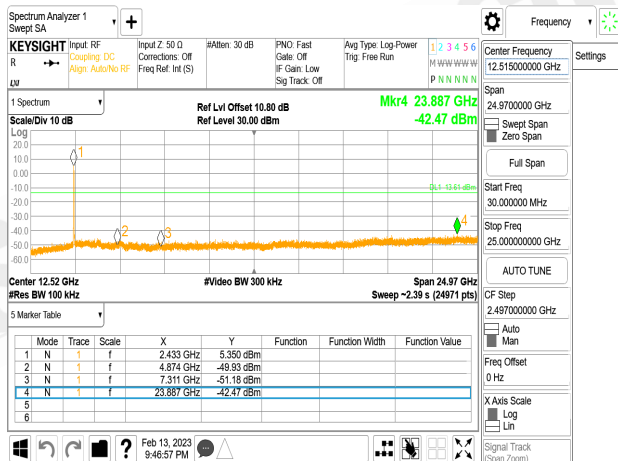
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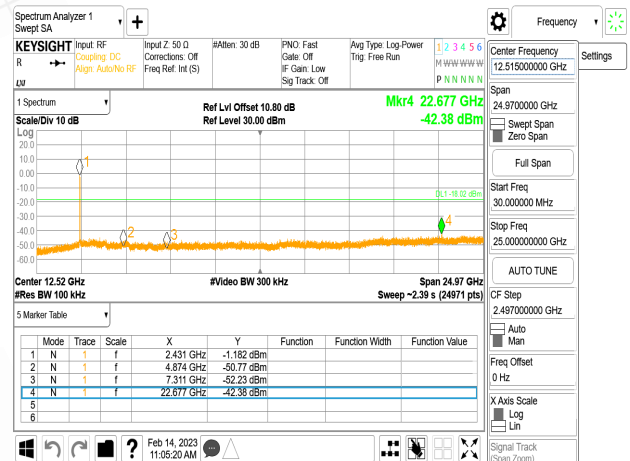
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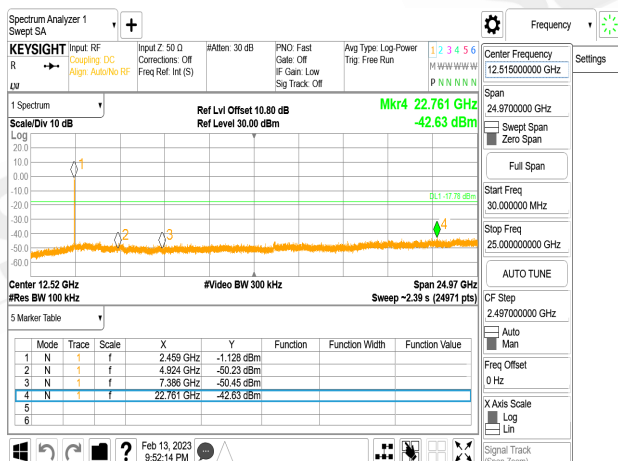
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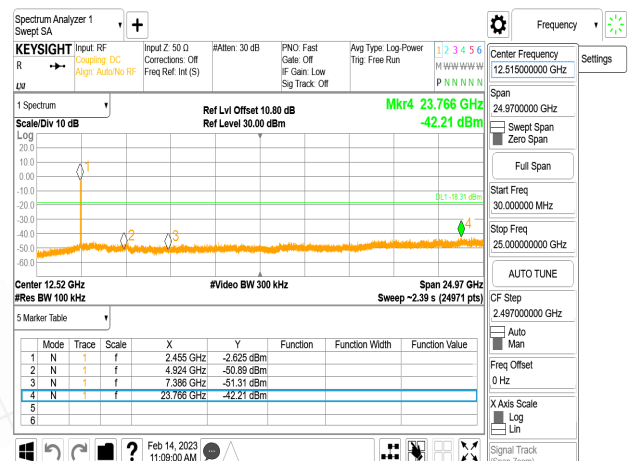
802.11ax_20MHz_Chain0_2437MHz



802.11n_20MHz_Chain0_2462MHz



802.11ax_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 and RSS-Gen §8.9 Table 5 and 6 limit as below.

And according to §15.33(a) (1) & RSS-Gen §6.13.2.a, 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.

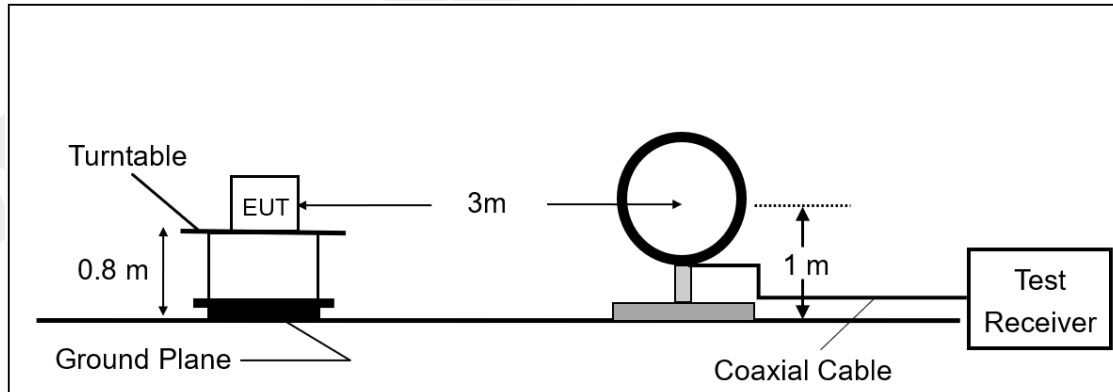
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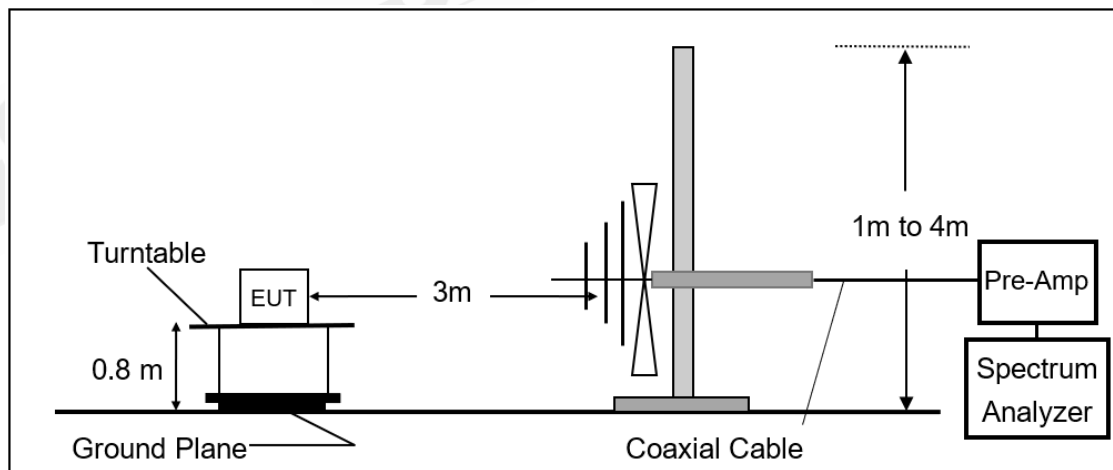
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11.2 Test Setup

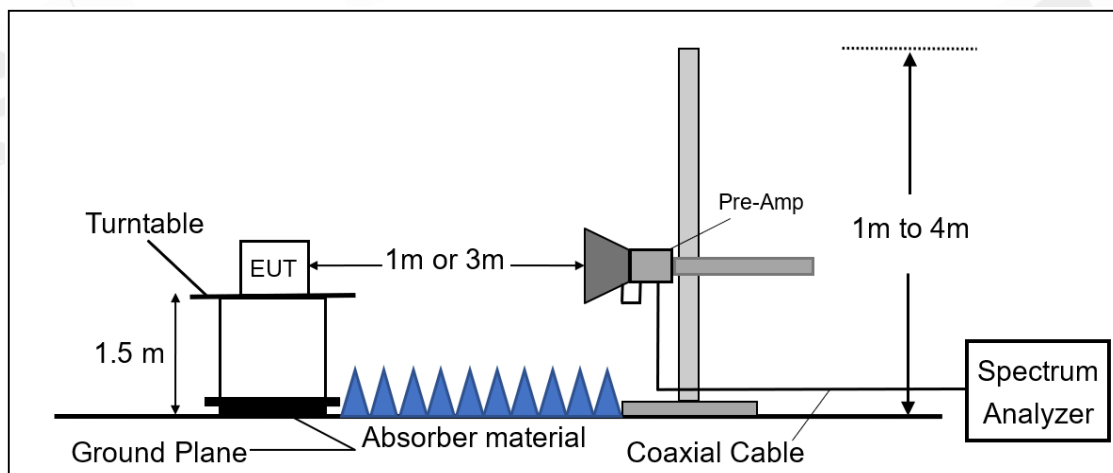
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz.



(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.

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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 $20 \cdot \log(uV/m)$

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) & RSS-GEN §6.13.2 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

ANT0(monopole)

Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11b

Test Date :2023-02-08

Test Frequency :2412 MHz

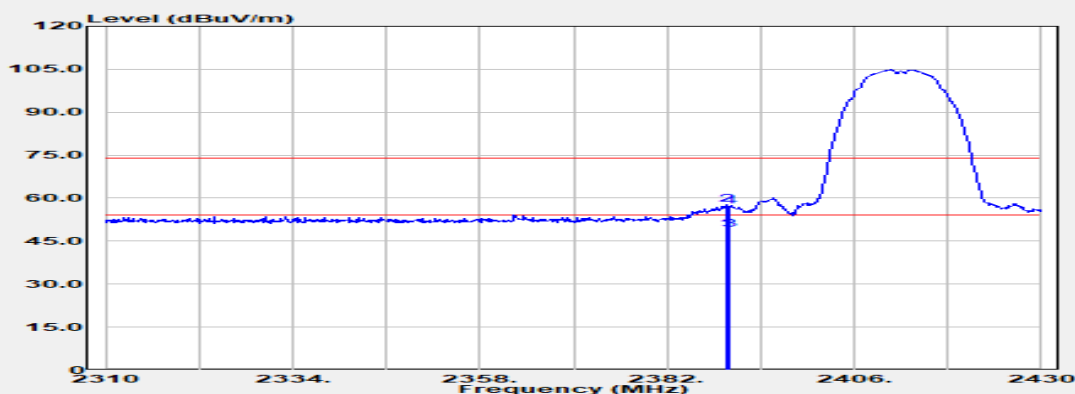
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
2389.800	Average	44.93	4.03	48.96	54.00	-5.04
2389.800	Peak	53.58	4.03	57.62	74.00	-16.38
2390.000	Average	44.96	4.03	48.99	54.00	-5.01
2390.000	Peak	53.22	4.03	57.25	74.00	-16.75

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Report Number :TERF2211002513E2

Operation Mode :802.11b

Test Frequency :2412 MHz

Test Mode :Bandedge

EUT Pol :E2 Plane

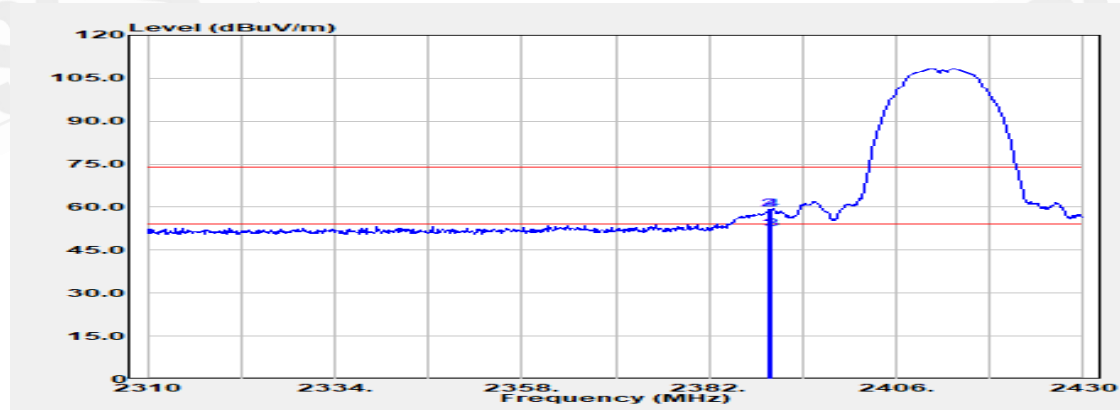
Test Site :SAC C

Test Date :2023-02-08

Temp./Humi. :24.5/61

Antenna Pol. :Horizontal

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2389.800	Average	48.28	4.03	52.31	54.00	-1.69
2389.800	Peak	55.35	4.03	59.38	74.00	-14.62
2390.000	Average	48.26	4.03	52.29	54.00	-1.71
2390.000	Peak	55.30	4.03	59.33	74.00	-14.67

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Report Number :TERF2211002513E2

Operation Mode :802.11b

Test Frequency :2417 MHz

Test Mode :Bandedge

EUT Pol :E2 Plane

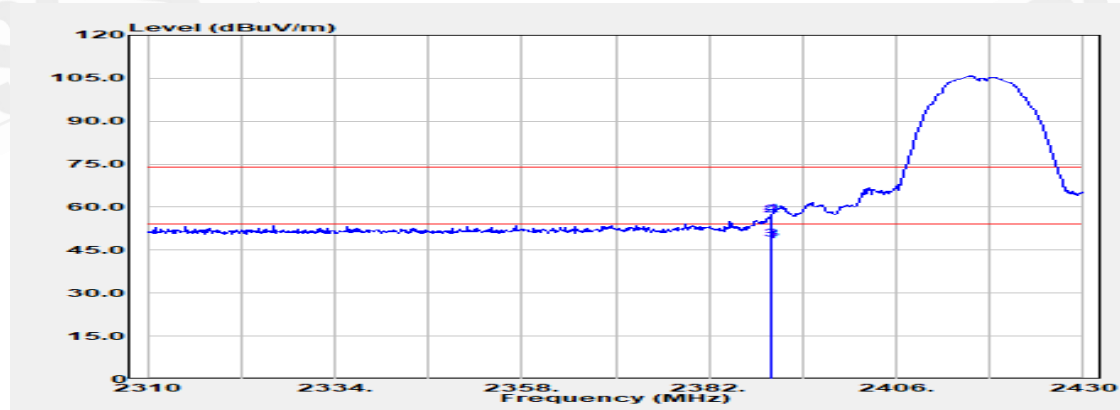
Test Site :SAC C

Test Date :2023-02-08

Temp./Humi. :24.5/61

Antenna Pol. :Vertical

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
2389.920	Average	44.22	4.03	48.25	54.00	-5.75
2389.920	Peak	53.11	4.03	57.14	74.00	-16.86
2390.000	Average	44.60	4.03	48.63	54.00	-5.37
2390.000	Peak	53.49	4.03	57.52	74.00	-16.48

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11b

Test Date :2023-02-08

Test Frequency :2417 MHz

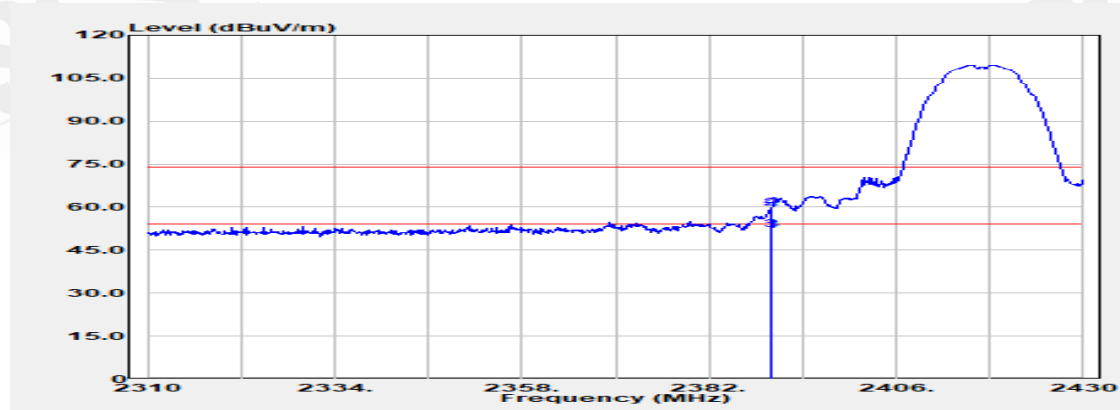
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2389.920	Average	47.62	4.03	51.65	54.00	-2.35
2389.920	Peak	55.44	4.03	59.48	74.00	-14.52
2390.000	Average	48.04	4.03	52.07	54.00	-1.93
2390.000	Peak	55.81	4.03	59.85	74.00	-14.15

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11b

Test Date :2023-02-08

Test Frequency :2422 MHz

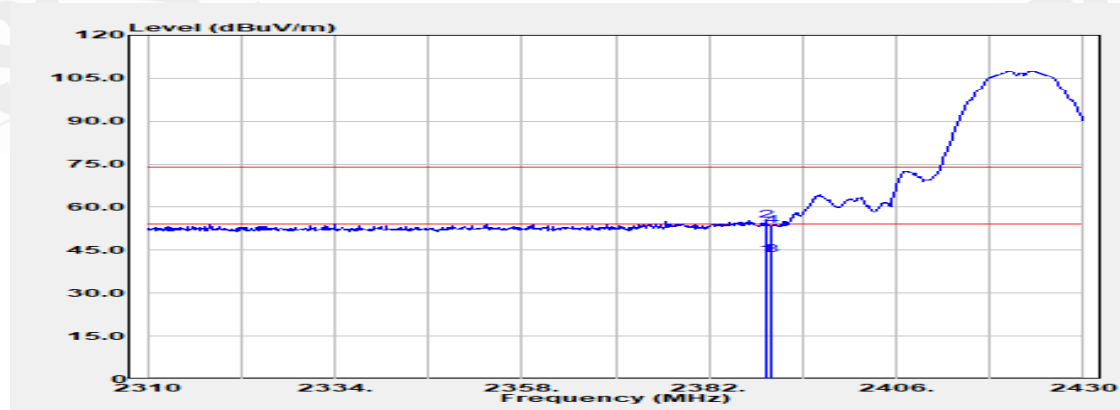
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2389.200	Average	39.19	4.03	43.22	54.00	-10.78
2389.200	Peak	51.27	4.03	55.30	74.00	-18.70
2390.000	Average	39.40	4.03	43.44	54.00	-10.56
2390.000	Peak	49.41	4.03	53.44	74.00	-20.56

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11b

Test Date :2023-02-08

Test Frequency :2422 MHz

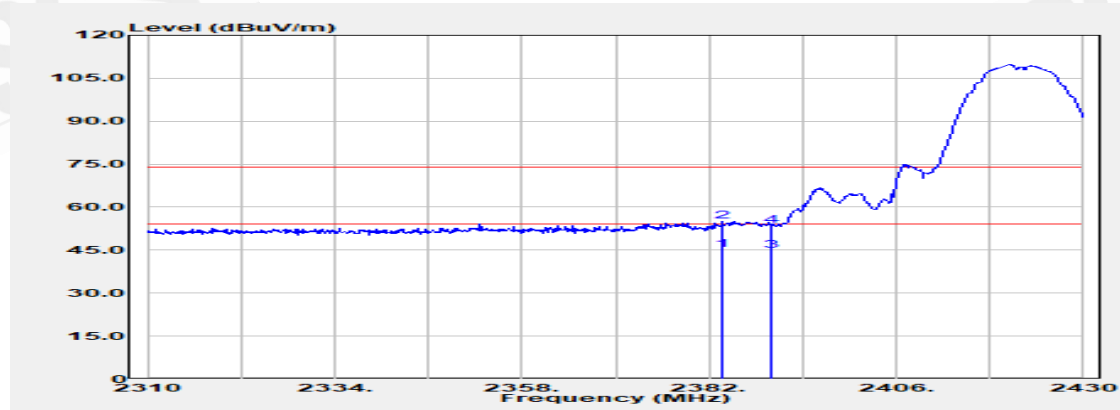
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2383.680	Average	41.01	4.01	45.02	54.00	-8.98
2383.680	Peak	51.06	4.01	55.07	74.00	-18.93
2390.000	Average	40.84	4.03	44.87	54.00	-9.13
2390.000	Peak	49.56	4.03	53.60	74.00	-20.40

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Member of SGS Group

Report Number :TERF2211002513E2

Operation Mode :802.11b

Test Frequency :2452 MHz

Test Mode :Bandedge

EUT Pol :E2 Plane

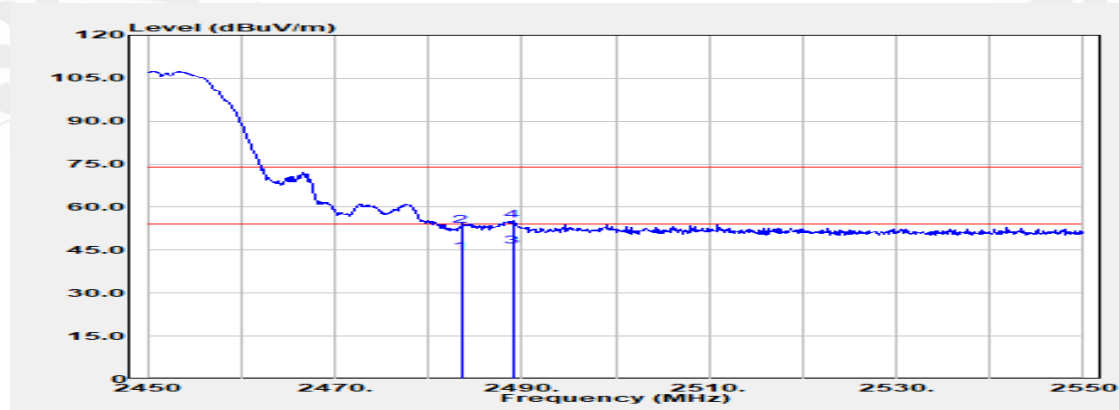
Test Site :SAC C

Test Date :2023-02-08

Temp./Humi. :24.5/61

Antenna Pol. :Vertical

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.500	Average	40.14	4.20	44.35	54.00	-9.65
2483.500	Peak	49.29	4.20	53.49	74.00	-20.51
2489.000	Average	42.27	4.19	46.46	54.00	-7.54
2489.000	Peak	51.08	4.19	55.26	74.00	-18.74

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Report Number :TERF2211002513E2

Operation Mode :802.11b

Test Frequency :2452 MHz

Test Mode :Bandedge

EUT Pol :E2 Plane

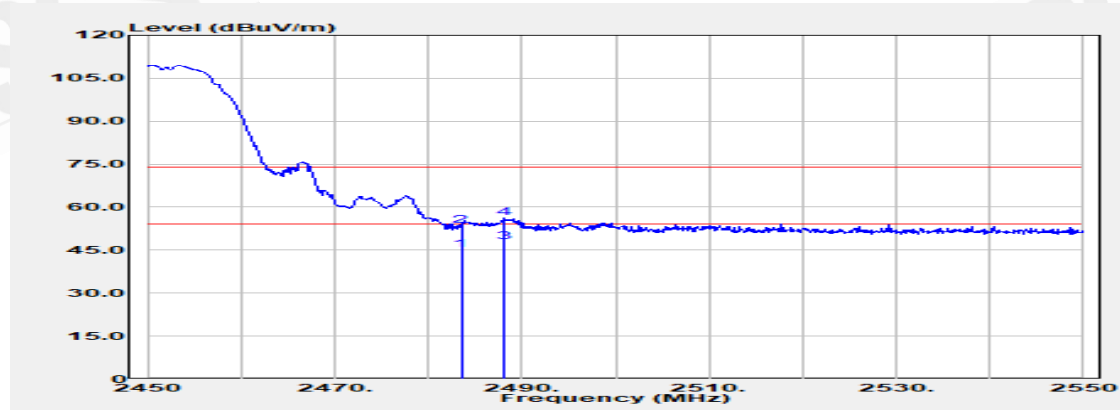
Test Site :SAC C

Test Date :2023-02-08

Temp./Humi. :24.5/61

Antenna Pol. :Horizontal

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2483.500	Average	40.93	4.20	45.13	54.00	-8.87
2483.500	Peak	49.47	4.20	53.67	74.00	-20.33
2488.200	Average	43.51	4.19	47.69	54.00	-6.31
2488.200	Peak	51.93	4.19	56.12	74.00	-17.88

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11b

Test Date :2023-02-08

Test Frequency :2457 MHz

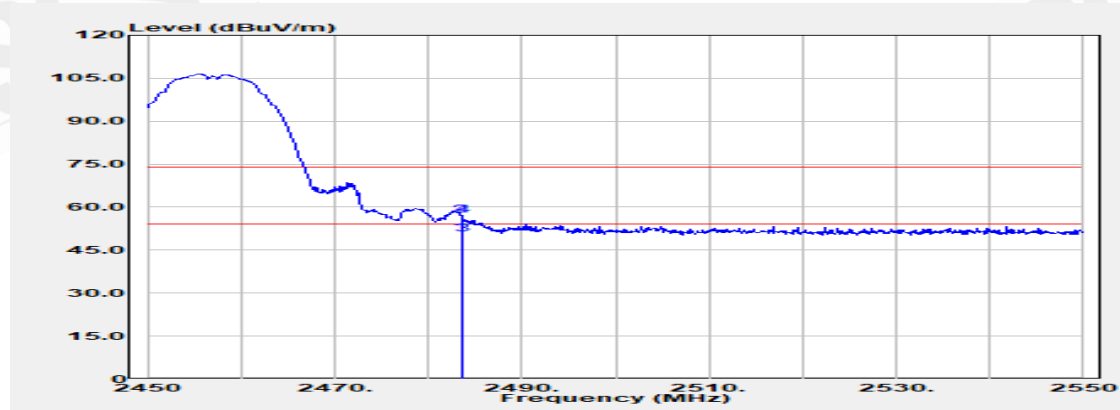
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2483.500	Average	46.63	4.20	50.83	54.00	-3.17
2483.500	Peak	52.82	4.20	57.02	74.00	-16.98
2483.600	Average	46.19	4.20	50.39	54.00	-3.61
2483.600	Peak	52.81	4.20	57.01	74.00	-16.99

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Report Number :TERF2211002513E2

Operation Mode :802.11b

Test Frequency :2457 MHz

Test Mode :Bandedge

EUT Pol :E2 Plane

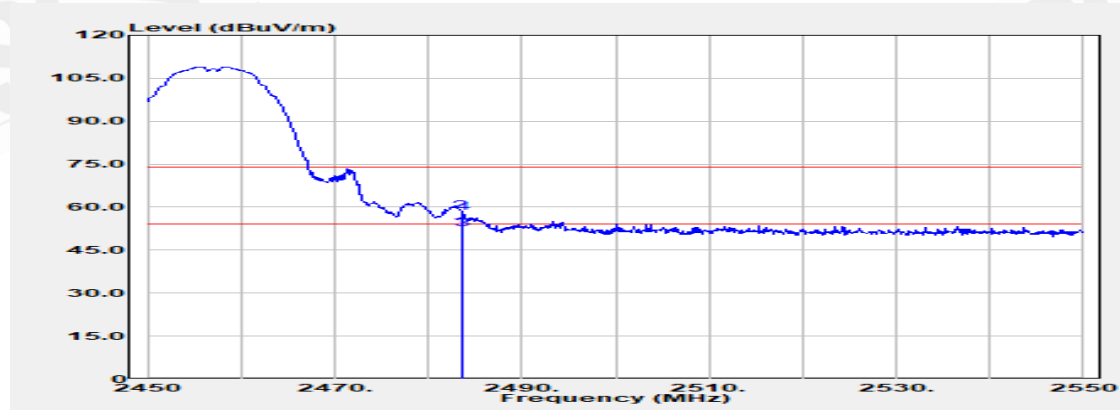
Test Site :SAC C

Test Date :2023-02-08

Temp./Humi. :24.5/61

Antenna Pol. :Horizontal

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2483.500	Average	48.71	4.20	52.91	54.00	-1.09
2483.500	Peak	54.44	4.20	58.64	74.00	-15.36
2483.600	Average	48.17	4.20	52.37	54.00	-1.63
2483.600	Peak	53.95	4.20	58.15	74.00	-15.85

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Report Number :TERF2211002513E2

Operation Mode :802.11b

Test Frequency :2462 MHz

Test Mode :Bandedge

EUT Pol :E2 Plane

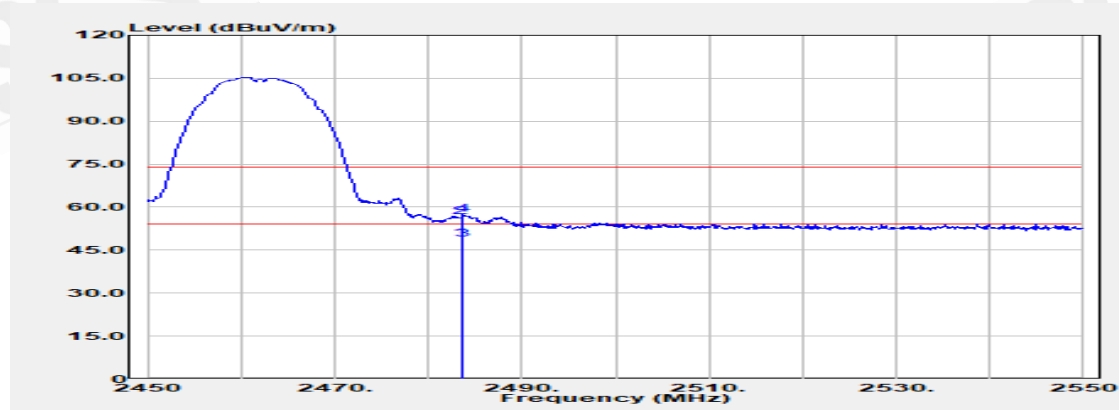
Test Site :SAC C

Test Date :2023-02-08

Temp./Humi. :24.5/61

Antenna Pol. :Vertical

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2483.500	Average	44.69	4.20	48.89	54.00	-5.11
2483.500	Peak	52.36	4.20	56.56	74.00	-17.44
2483.600	Average	44.54	4.20	48.74	54.00	-5.26
2483.600	Peak	53.09	4.20	57.29	74.00	-16.71

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Report Number :TERF2211002513E2

Operation Mode :802.11b

Test Frequency :2462 MHz

Test Mode :Bandedge

EUT Pol :E2 Plane

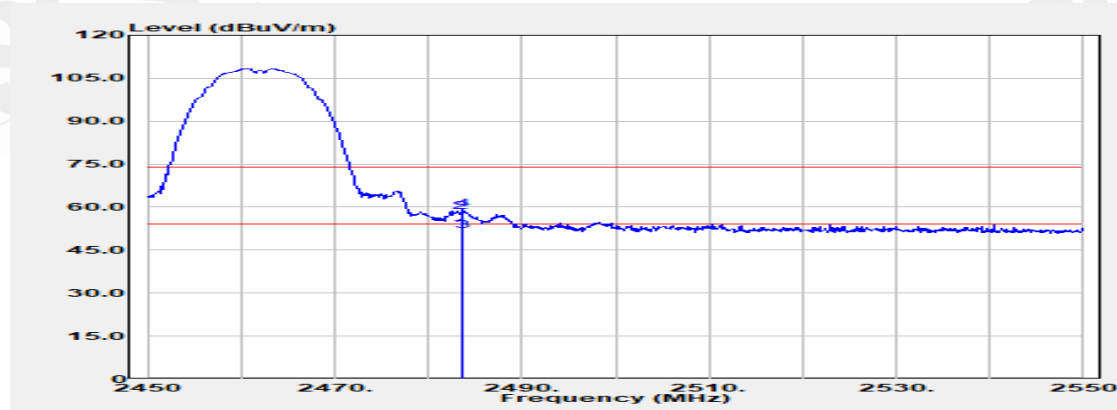
Test Site :SAC C

Test Date :2023-02-08

Temp./Humi. :24.5/61

Antenna Pol. :Horizontal

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.500	Average	47.98	4.20	52.18	54.00	-1.82
2483.500	Peak	54.11	4.20	58.31	74.00	-15.69
2483.700	Average	47.39	4.20	51.59	54.00	-2.41
2483.700	Peak	54.94	4.20	59.14	74.00	-14.86

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2412 MHz

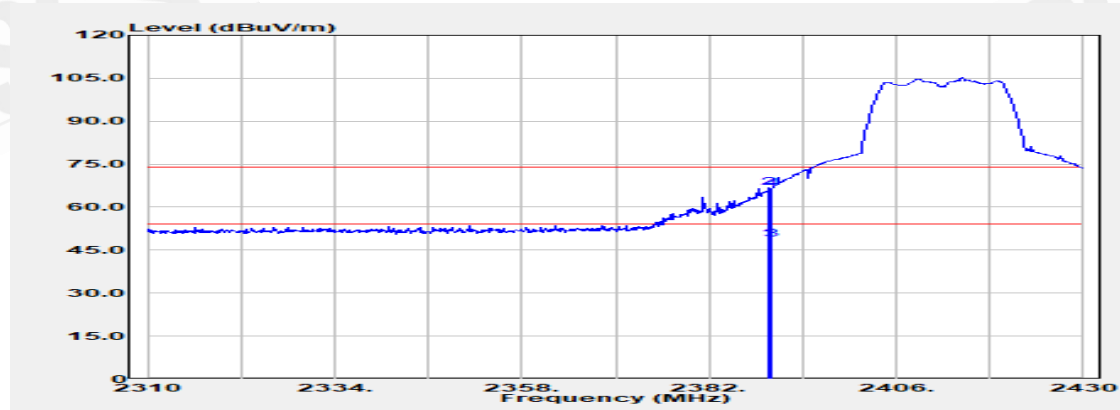
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2389.800	Average	44.73	4.03	48.76	54.00	-5.24
2389.800	Peak	62.69	4.03	66.72	74.00	-7.28
2390.000	Average	44.63	4.03	48.66	54.00	-5.34
2390.000	Peak	62.46	4.03	66.49	74.00	-7.51

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2412 MHz

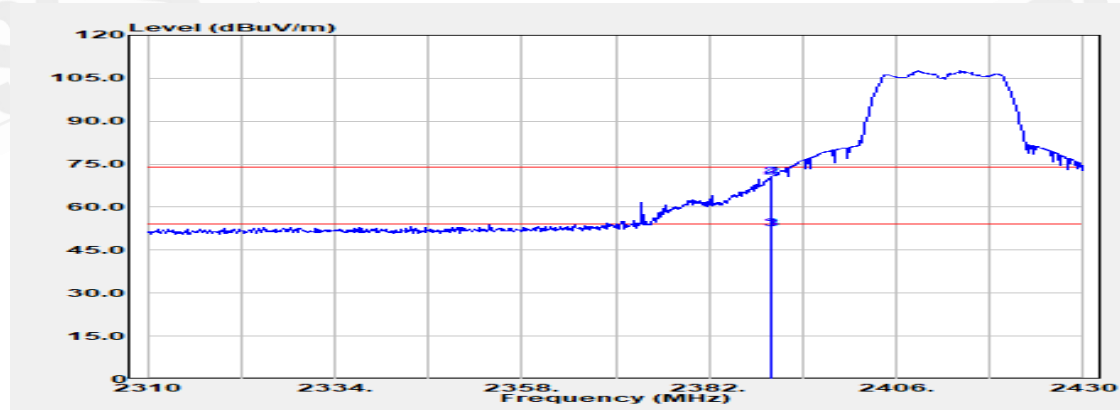
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2389.920	Average	48.33	4.03	52.36	54.00	-1.64
2389.920	Peak	66.24	4.03	70.27	74.00	-3.73
2390.000	Average	48.22	4.03	52.25	54.00	-1.75
2390.000	Peak	66.28	4.03	70.31	74.00	-3.69

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2417 MHz

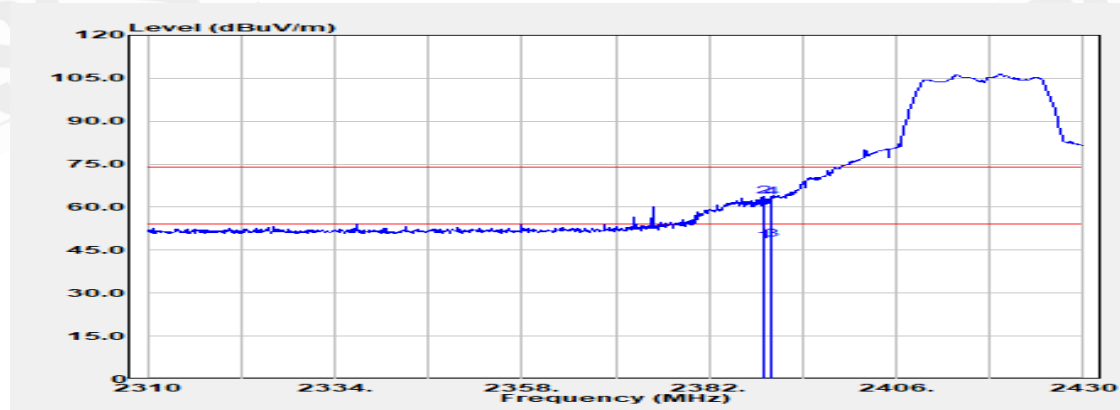
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2389.080	Average	44.08	4.03	48.10	54.00	-5.90
2389.080	Peak	59.80	4.03	63.82	74.00	-10.18
2390.000	Average	44.55	4.03	48.58	54.00	-5.42
2390.000	Peak	59.30	4.03	63.33	74.00	-10.67

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2417 MHz

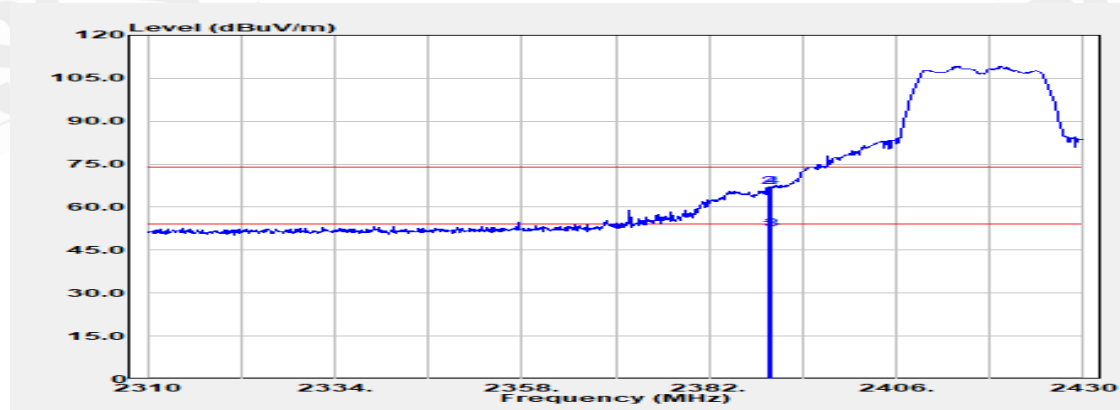
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2389.800	Average	48.12	4.03	52.15	54.00	-1.85
2389.800	Peak	63.05	4.03	67.08	74.00	-6.92
2390.000	Average	48.25	4.03	52.29	54.00	-1.71
2390.000	Peak	62.95	4.03	66.98	74.00	-7.02

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Member of SGS Group

Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2422 MHz

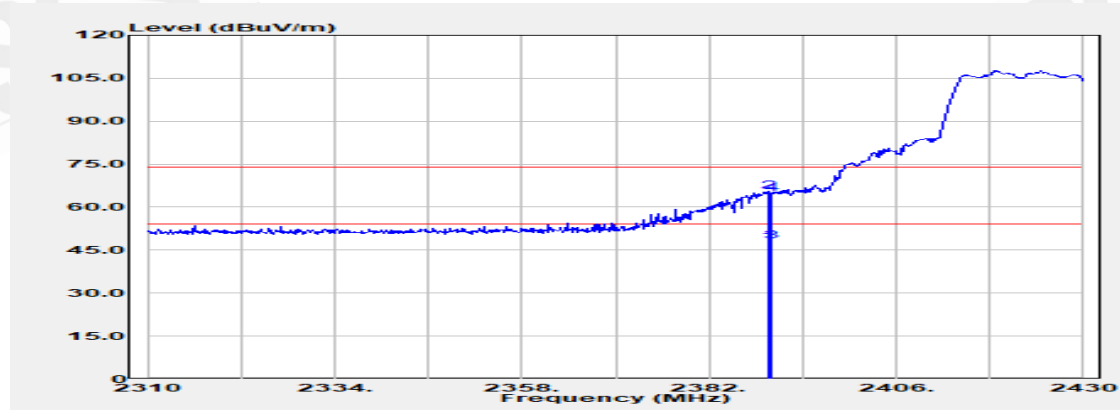
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2389.800	Average	43.83	4.03	47.86	54.00	-6.14
2389.800	Peak	61.46	4.03	65.49	74.00	-8.51
2390.000	Average	44.18	4.03	48.21	54.00	-5.79
2390.000	Peak	60.71	4.03	64.74	74.00	-9.26

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2422 MHz

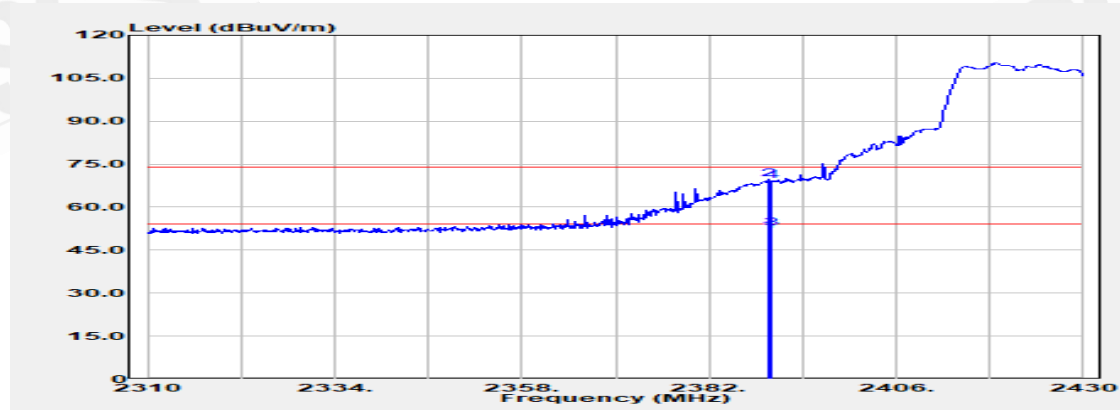
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2389.800	Average	47.55	4.03	51.58	54.00	-2.42
2389.800	Peak	65.63	4.03	69.66	74.00	-4.34
2390.000	Average	48.68	4.03	52.71	54.00	-1.29
2390.000	Peak	65.27	4.03	69.30	74.00	-4.70

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Report Number :TERF2211002513E2

Operation Mode :802.11g

Test Frequency :2427 MHz

Test Mode :Bandedge

EUT Pol :E2 Plane

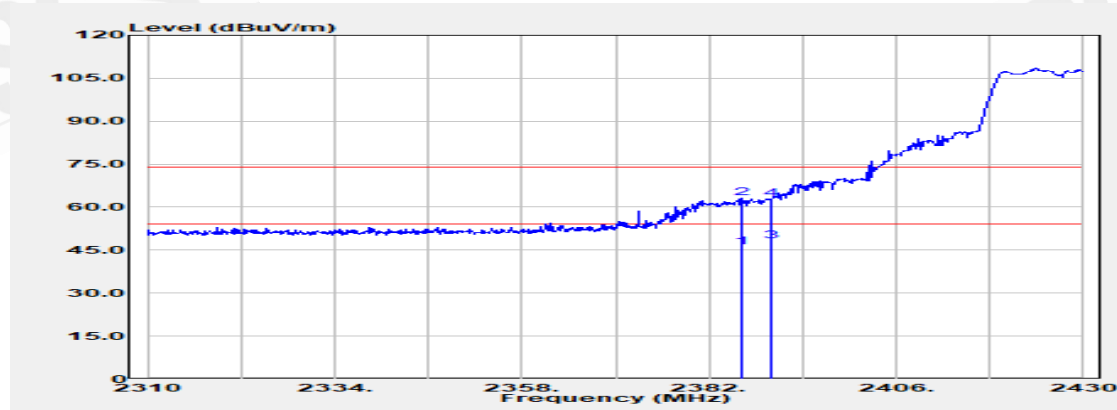
Test Site :SAC C

Test Date :2023-02-08

Temp./Humi. :24.5/61

Antenna Pol. :Vertical

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2386.200	Average	41.90	4.02	45.92	54.00	-8.08
2386.200	Peak	59.16	4.02	63.18	74.00	-10.82
2390.000	Average	44.18	4.03	48.21	54.00	-5.79
2390.000	Peak	58.74	4.03	62.77	74.00	-11.23

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2427 MHz

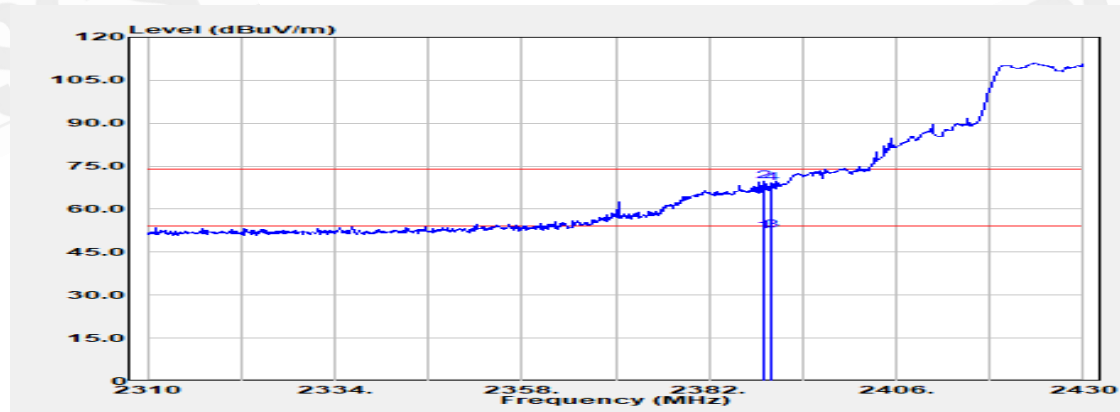
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2388.960	Average	48.28	4.03	52.31	54.00	-1.69
2388.960	Peak	65.62	4.03	69.65	74.00	-4.35
2390.000	Average	48.47	4.03	52.50	54.00	-1.50
2390.000	Peak	65.16	4.03	69.20	74.00	-4.80

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2432 MHz

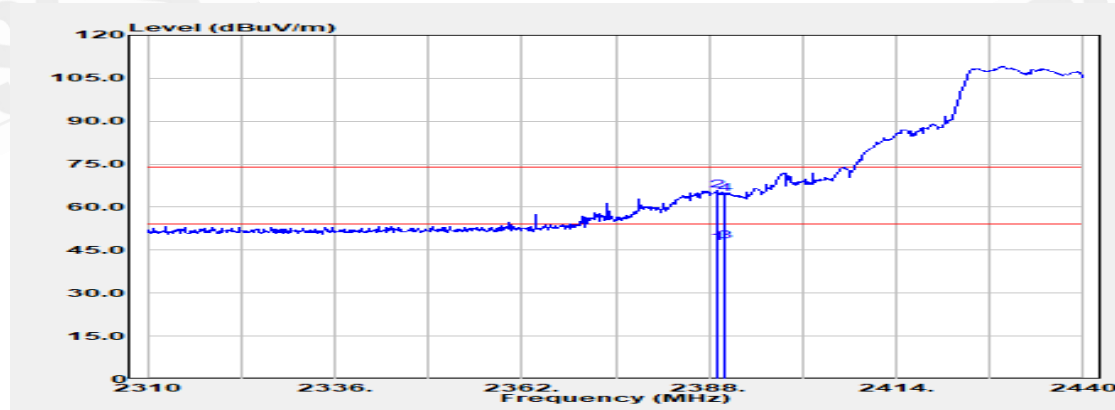
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2389.170	Average	43.55	4.03	47.57	54.00	-6.43
2389.170	Peak	61.71	4.03	65.74	74.00	-8.26
2390.000	Average	44.01	4.03	48.04	54.00	-5.96
2390.000	Peak	60.61	4.03	64.64	74.00	-9.36

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2432 MHz

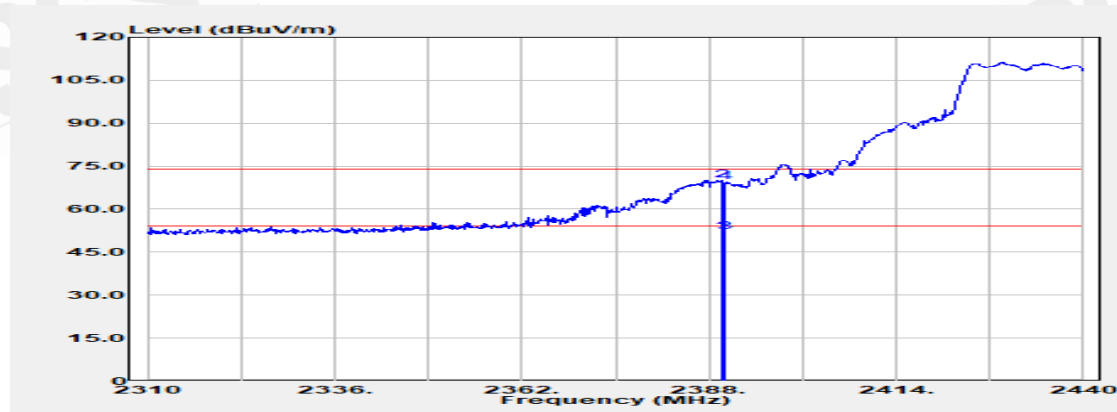
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2389.690	Average	47.88	4.03	51.91	54.00	-2.09
2389.690	Peak	66.16	4.03	70.19	74.00	-3.81
2390.000	Average	48.11	4.03	52.14	54.00	-1.86
2390.000	Peak	65.30	4.03	69.33	74.00	-4.67

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2437 MHz

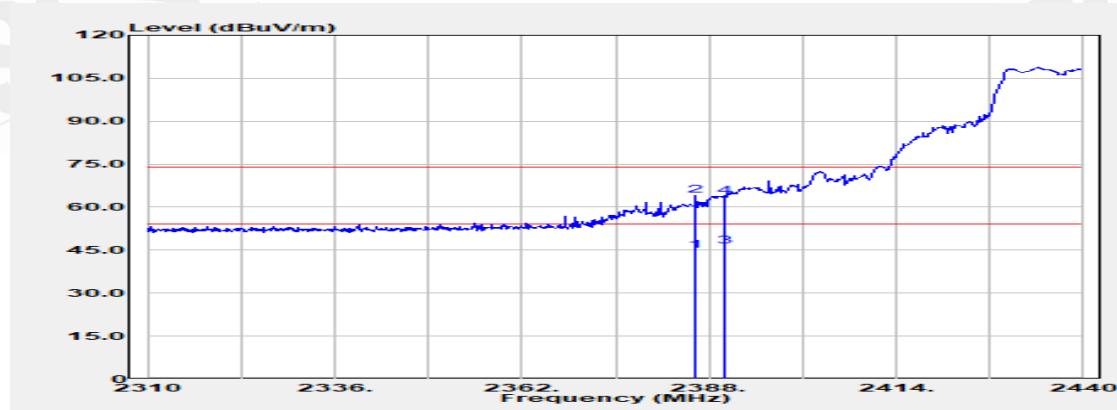
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2386.180	Average	40.73	4.02	44.75	54.00	-9.25
2386.180	Peak	59.92	4.02	63.94	74.00	-10.06
2390.000	Average	42.33	4.03	46.36	54.00	-7.64
2390.000	Peak	59.59	4.03	63.62	74.00	-10.38

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2437 MHz

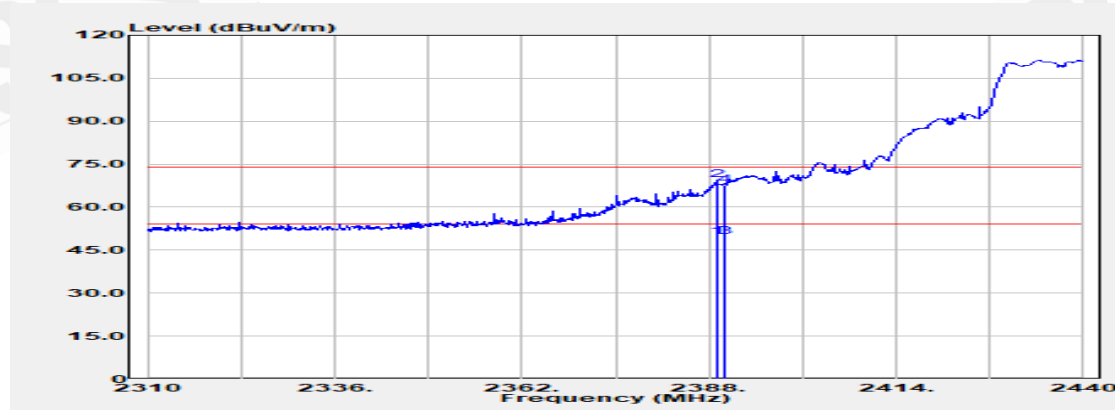
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2389.040	Average	45.48	4.03	49.51	54.00	-4.49
2389.040	Peak	65.49	4.03	69.52	74.00	-4.48
2390.000	Average	45.48	4.03	49.51	54.00	-4.49
2390.000	Peak	63.60	4.03	67.63	74.00	-6.37

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2447 MHz

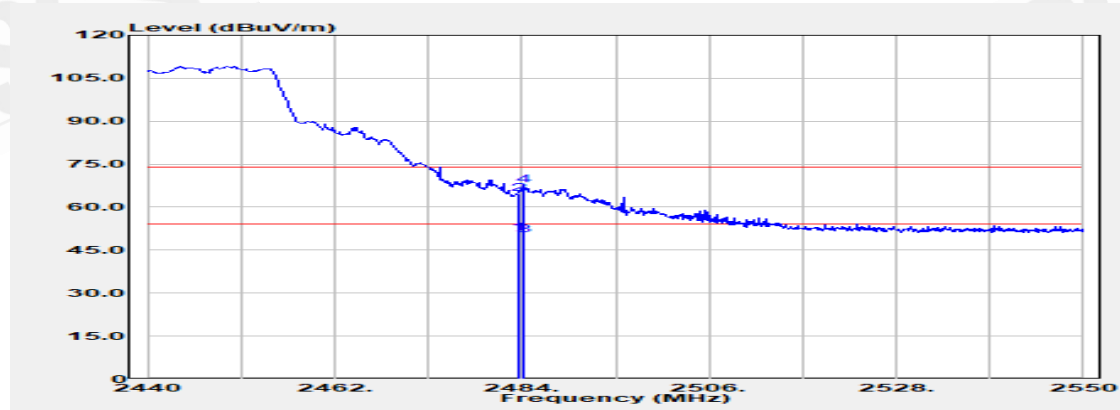
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.500	Average	46.52	4.20	50.72	54.00	-3.28
2483.500	Peak	60.52	4.20	64.72	74.00	-9.28
2484.330	Average	45.90	4.20	50.10	54.00	-3.90
2484.330	Peak	63.35	4.20	67.55	74.00	-6.45

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Report Number :TERF2211002513E2

Operation Mode :802.11g

Test Frequency :2447 MHz

Test Mode :Bandedge

EUT Pol :E2 Plane

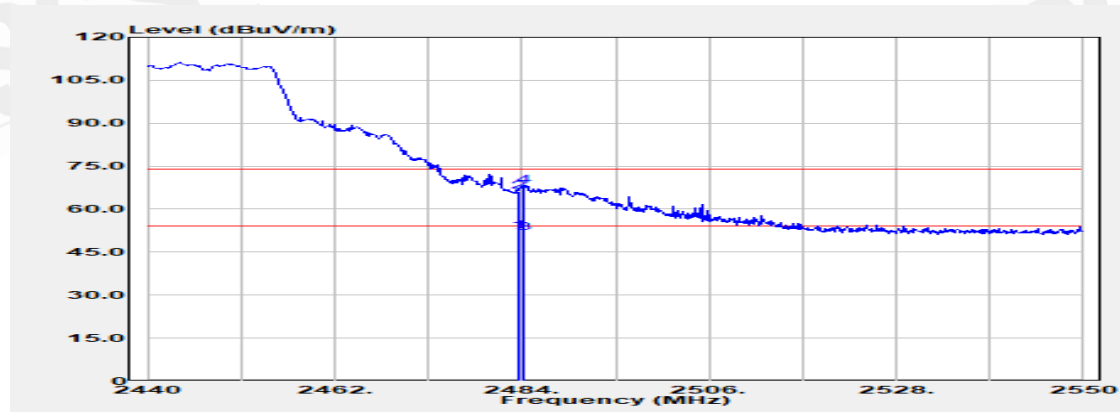
Test Site :SAC C

Test Date :2023-02-08

Temp./Humi. :24.5/61

Antenna Pol. :Horizontal

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
2483.500	Average	48.25	4.20	52.45	54.00	-1.55
2483.500	Peak	61.86	4.20	66.06	74.00	-7.94
2484.330	Average	47.51	4.20	51.71	54.00	-2.29
2484.330	Peak	64.06	4.20	68.26	74.00	-5.74

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2452 MHz

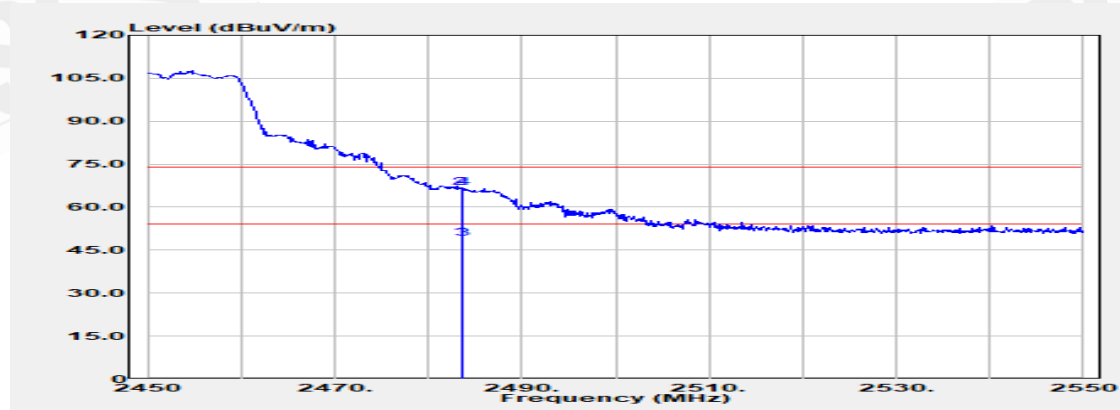
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.500	Average	45.02	4.20	49.22	54.00	-4.78
2483.500	Peak	62.65	4.20	66.86	74.00	-7.14
2483.600	Average	44.82	4.20	49.02	54.00	-4.98
2483.600	Peak	62.42	4.20	66.62	74.00	-7.38

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2452 MHz

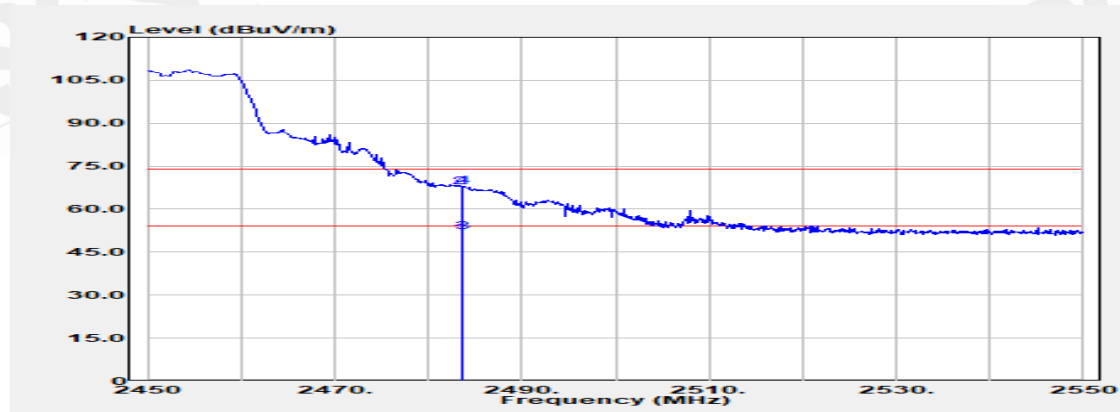
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.500	Average	47.25	4.20	51.45	54.00	-2.55
2483.500	Peak	63.49	4.20	67.69	74.00	-6.31
2483.700	Average	47.84	4.20	52.04	54.00	-1.96
2483.700	Peak	63.88	4.20	68.08	74.00	-5.92

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Report Number :TERF2211002513E2

Operation Mode :802.11g

Test Frequency :2457 MHz

Test Mode :Bandedge

EUT Pol :E2 Plane

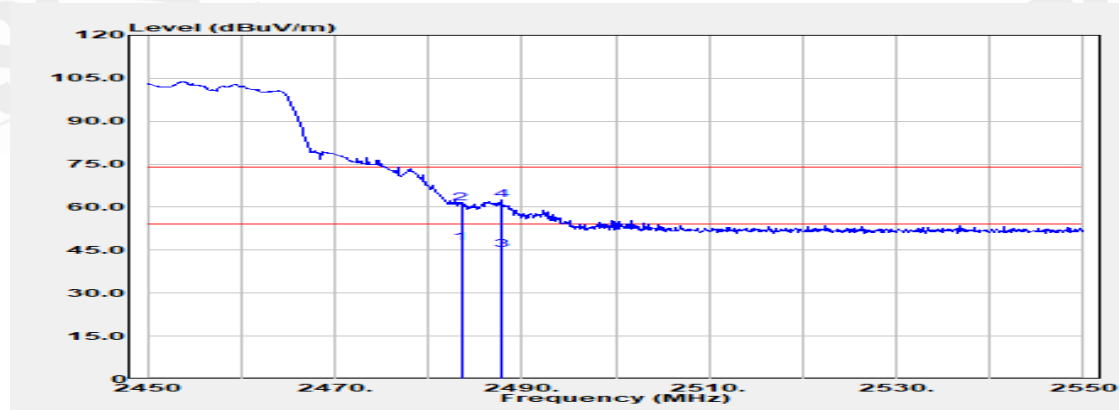
Test Site :SAC C

Test Date :2023-02-08

Temp./Humi. :24.5/61

Antenna Pol. :Vertical

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.500	Average	43.34	4.20	47.54	54.00	-6.46
2483.500	Peak	57.04	4.20	61.24	74.00	-12.76
2487.700	Average	40.95	4.19	45.14	54.00	-8.86
2487.700	Peak	58.28	4.19	62.46	74.00	-11.54

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2457 MHz

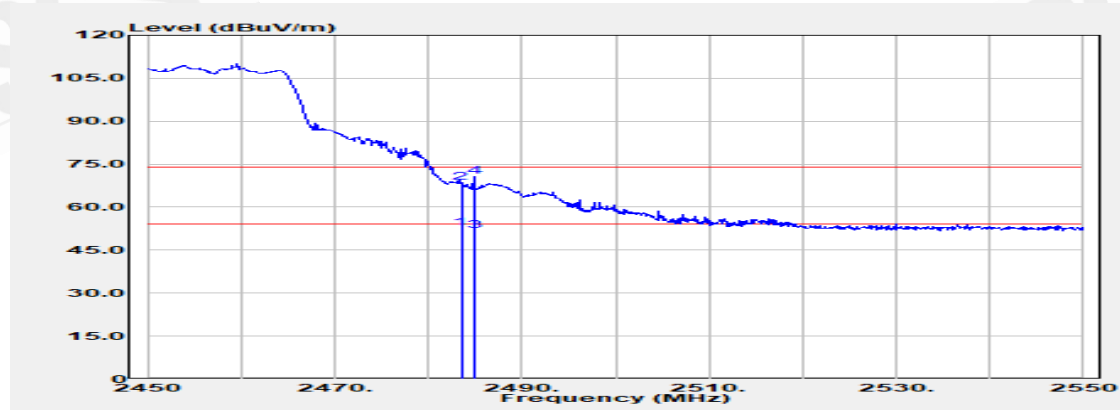
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.500	Average	48.50	4.20	52.70	54.00	-1.30
2483.500	Peak	64.42	4.20	68.62	74.00	-5.38
2484.900	Average	47.66	4.20	51.86	54.00	-2.14
2484.900	Peak	66.34	4.20	70.54	74.00	-3.46

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2462 MHz

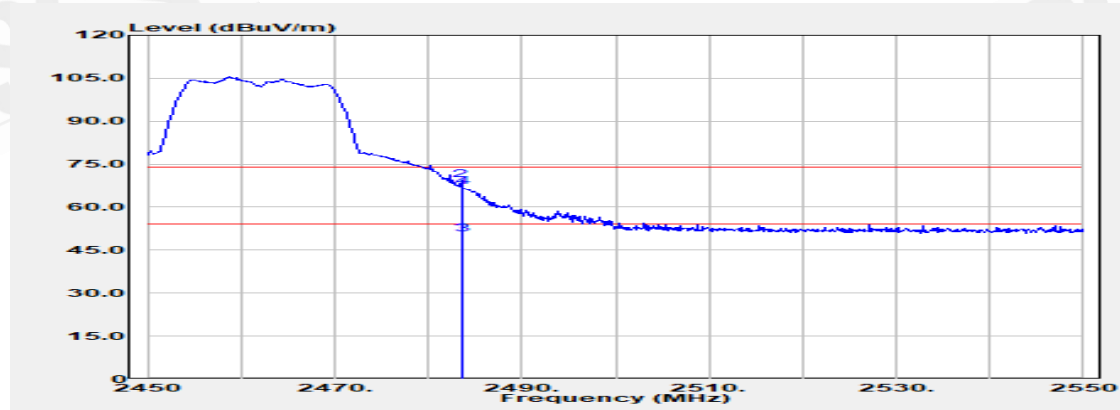
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.500	Average	46.72	4.20	50.92	54.00	-3.08
2483.500	Peak	65.29	4.20	69.49	74.00	-4.51
2483.700	Average	46.26	4.20	50.46	54.00	-3.54
2483.700	Peak	62.83	4.20	67.03	74.00	-6.97

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11g

Test Date :2023-02-08

Test Frequency :2462 MHz

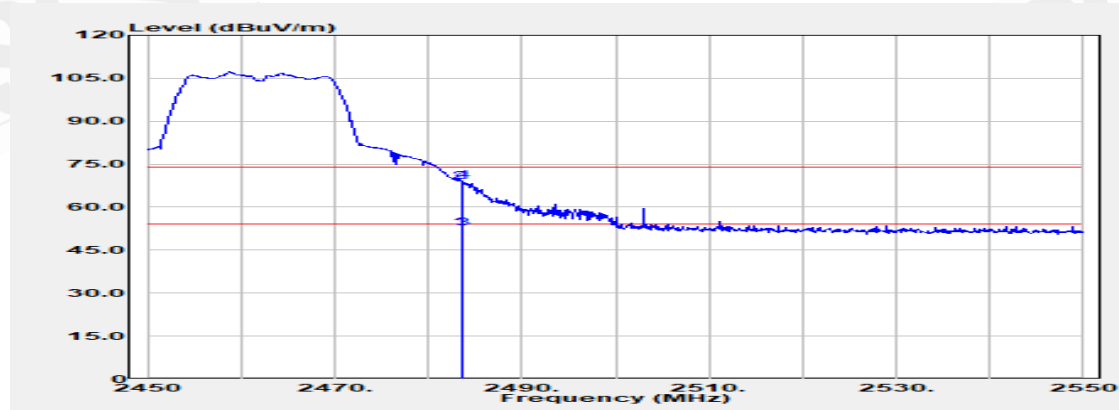
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2483.500	Average	48.51	4.20	52.71	54.00	-1.29
2483.500	Peak	64.69	4.20	68.90	74.00	-5.10
2483.600	Average	48.39	4.20	52.59	54.00	-1.41
2483.600	Peak	65.11	4.20	69.31	74.00	-4.69

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11n20

Test Date :2023-02-08

Test Frequency :2412 MHz

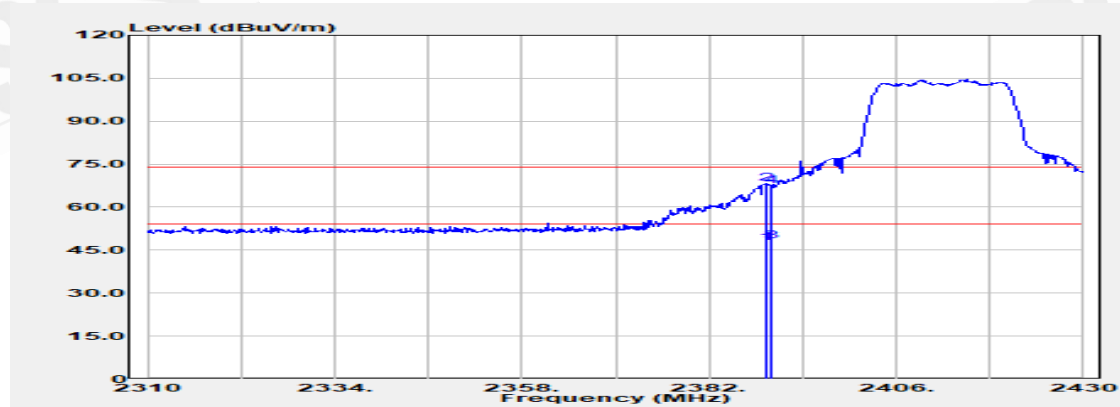
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2389.440	Average	43.60	4.03	47.63	54.00	-6.37
2389.440	Peak	64.11	4.03	68.14	74.00	-5.86
2390.000	Average	43.95	4.03	47.99	54.00	-6.01
2390.000	Peak	63.20	4.03	67.23	74.00	-6.77

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11n20

Test Date :2023-02-08

Test Frequency :2412 MHz

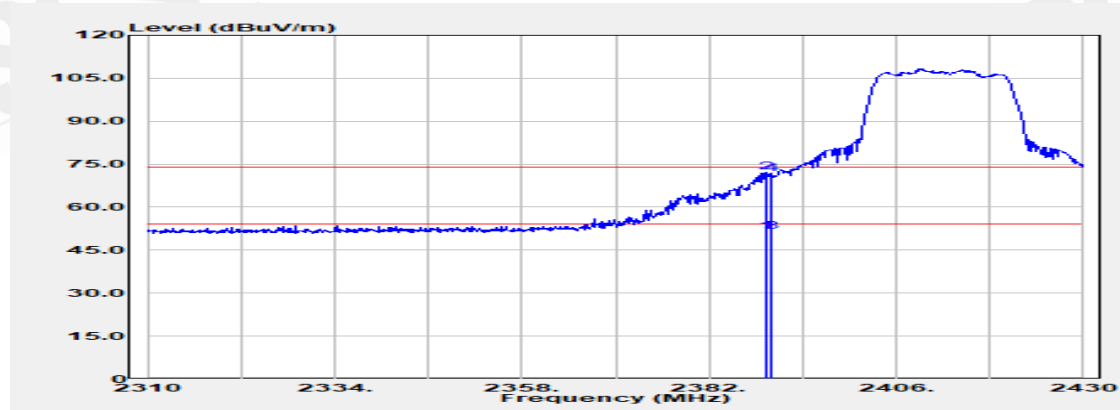
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2389.200	Average	47.43	4.03	51.46	54.00	-2.54
2389.200	Peak	68.06	4.03	72.08	74.00	-1.92
2390.000	Average	47.51	4.03	51.54	54.00	-2.46
2390.000	Peak	67.42	4.03	71.45	74.00	-2.55

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11n20

Test Date :2023-02-08

Test Frequency :2417 MHz

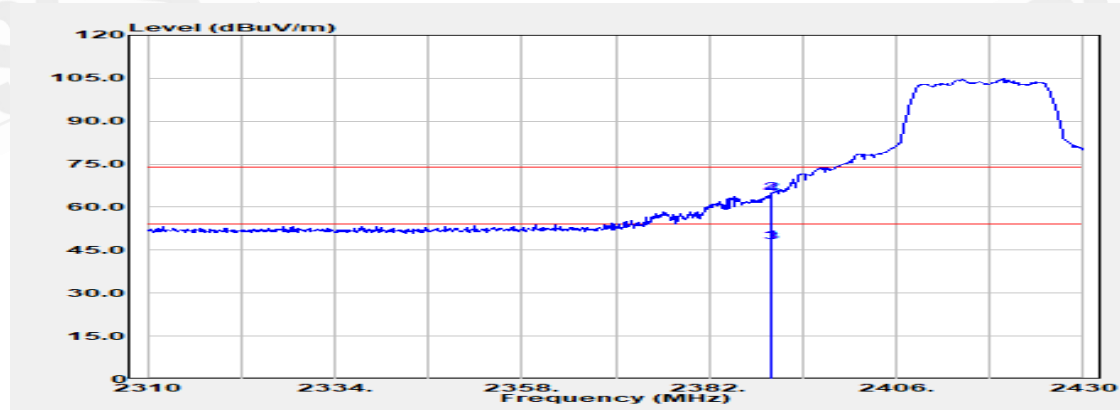
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2389.920	Average	43.99	4.03	48.02	54.00	-5.98
2389.920	Peak	61.00	4.03	65.03	74.00	-8.97
2390.000	Average	43.69	4.03	47.72	54.00	-6.28
2390.000	Peak	60.69	4.03	64.72	74.00	-9.28

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Report Number :TERF2211002513E2

Operation Mode :802.11n20

Test Frequency :2417 MHz

Test Mode :Bandedge

EUT Pol :E2 Plane

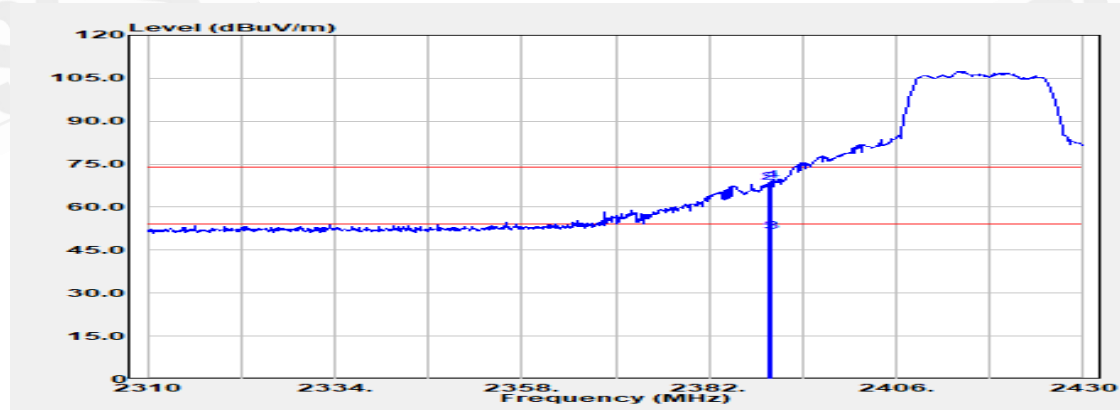
Test Site :SAC C

Test Date :2023-02-08

Temp./Humi. :24.5/61

Antenna Pol. :Horizontal

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2389.800	Average	47.14	4.03	51.17	54.00	-2.83
2389.800	Peak	64.63	4.03	68.66	74.00	-5.34
2390.000	Average	47.28	4.03	51.31	54.00	-2.69
2390.000	Peak	65.04	4.03	69.07	74.00	-4.93

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11n20

Test Date :2023-02-08

Test Frequency :2422 MHz

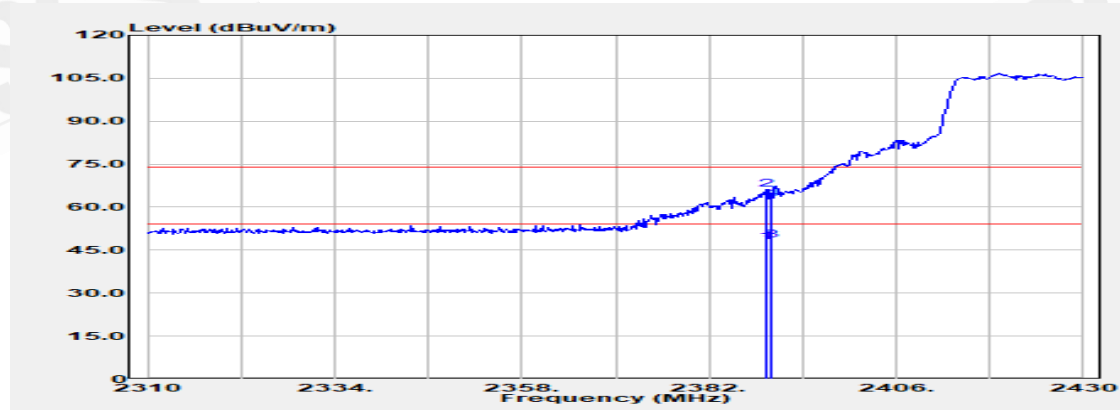
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2389.440	Average	43.74	4.03	47.77	54.00	-6.23
2389.440	Peak	62.09	4.03	66.12	74.00	-7.88
2390.000	Average	44.24	4.03	48.27	54.00	-5.73
2390.000	Peak	58.85	4.03	62.89	74.00	-11.11

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Report Number :TERF2211002513E2

Test Site :SAC C

Operation Mode :802.11n20

Test Date :2023-02-08

Test Frequency :2422 MHz

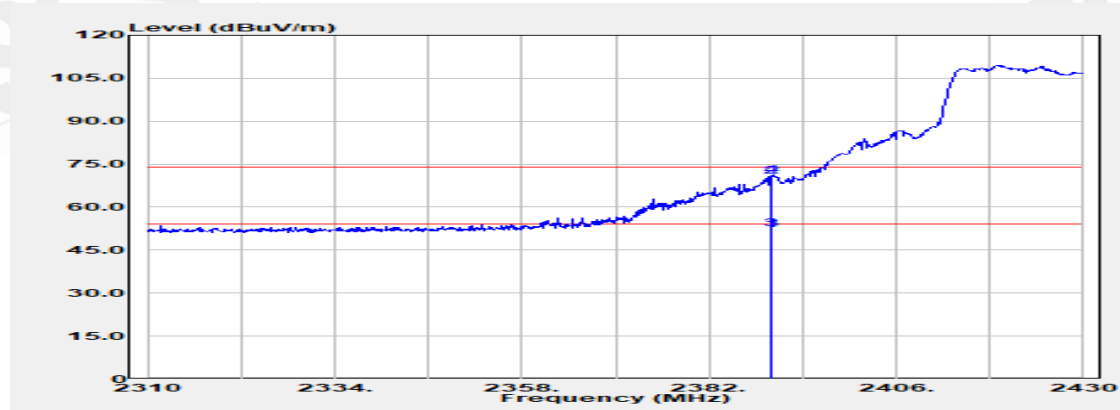
Temp./Humi. :24.5/61

Test Mode :Bandedge

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Andy Wang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2389.920	Average	48.12	4.03	52.15	54.00	-1.85
2389.920	Peak	66.79	4.03	70.82	74.00	-3.18
2390.000	Average	48.21	4.03	52.24	54.00	-1.76
2390.000	Peak	67.09	4.03	71.12	74.00	-2.88

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