RADIO TEST REPORT

Product	:	Wi-Fi 6E BT M.2 Module
Model Name	:	WNFQ-268AXI(BT)
Series Model	:	WNFQ-268AX(BT)
FCC ID	:	RYK-WNFQ268AXBT
Test Regulation	:	FCC 47 CFR Part 15 Subpart C (Section 15.247)
Received Date	:	2021/9/3
Test Date	:	2021/9/6 ~ 2021/11/10
Issued Date	:	2022/1/28
Applicant	:	SparkLAN Communications, Inc. 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan (R.O.C.)
Issued By	:	Underwriters Laboratories Taiwan Co., Ltd. Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Testing Laboratory
3398

REVISION HISTORY

Original Test Report No.: 4790042400-US-R0-V0

Rev.	Test report No.	Date	Page revised	Contents
Original	4790042400-US-R0-V0	2022/1/28	-	Initial issue

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1. Attestation of Test Results

APPLICANT:	SparkLAN Communications, Inc. 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan (R.O.C.)
MANUFACTURER:	SparkLAN Communications, Inc. 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan (R.O.C.)
EUT DESCRIPTION:	Wi-Fi 6E BT M.2 Module
BRAND:	SparkLAN
MODEL:	WNFQ-268AXI(BT)
SERIES MODEL:	WNFQ-268AX(BT)
SAMPLE STAGE:	Engineering Verification Test sample
DATE of TESTED:	2021/9/6 ~ 2021/11/10

APPLICABLE STANDARDS	
STANDARD	**Test Results**
FCC 47 CFR PART 15 Subpart C (Section 15.247)	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Sally Lu Date : 2022/1/28
Project Handler

Approved and Authorized By:

Waternil Guan Date : 2022/1/28
Engineer

2. Summary of Test Results

Summary of Test Results		
FCC Clause	**Test Items**	**Result**
15.247(a)(2)	6dB Bandwidth	PASS
15.247(b)	Conducted Output Power	PASS
15.247(e)	Power Spectral Density	PASS
15.247(d)	Antenna Port Emission	PASS
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS
15.207	AC Power Conducted Emission	PASS
15.203	Antenna Requirement	PASS

3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB558074 D01 Meas Guidance v05r02, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013 and KDB 662911 D01 Multiple Transmitter Output v02r01.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.

5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

Measurement	Frequency	Uncertainty
Conducted disturbance at mains terminals ports	150kHz ~ 30MHz	±3.1 dB
RF Conducted	9 kHz - 40GHz	±1.9 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	±1.9 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	±5.4 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	±4.7 dB

6. Equipment under Test

6.1. Description of EUT

Product	Wi-Fi 6E BT M.2 Module
Brand Name	SparkLAN
Model Name	WNFQ-268AXI(BT)
Series Model	WNFQ-268AX(BT)
Operating Frequency	2412MHz ~ 2462MHz
Modulation	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDMA
Transfer Rate	802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n: up to MCS15 802.11ax: up to MCS11
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20), 802.11ax (HE20) 7 for 802.11n (HT40), 802.11ax (HE40)
Maximum Output Power	**Non-Beamforming mode:** 802.11b: 25.38 dBm 802.11g: 26.96 dBm 802.11ax (HE20): 26.96 dBm 802.11ax (HE40): 22.86 dBm **Beamforming mode:** 802.11ax (HE20): 26.66 dBm 802.11ax (HE40): 22.44 dBm
Normal Voltage	3.3 Vdc
S/N	21765J2100036
Sample ID	4158081

Note:

1. The models difference table as below:

Model	Difference
WNFQ-268AXI(BT)	WNFQ-268AXI(BT) Operating Temp -40~+75; WNFQ-268AX(BT) Operating Temp -10~+65 In addition, the sample has A-E key and E key versions. Only the golden finger is different.
WNFQ-268AX(BT)	

*Except above change, there is no change to technical construction that is included circuit diagram, PCB Layout, components and component layout, all electrical construction, and mechanical construction.

2. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	Tx,Rx Function
802.11b	2TX,2RX
802.11g	2TX,2RX
802.11n (HT20)	2TX,2RX
802.11n (HT40)	2TX,2RX
802.11ax (HE20)	2TX,2RX
802.11ax (HE40)	2TX,2RX

* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ax mode for HE20 / HE40, therefore investigated worst case to representative mode in test report.

3. The EUT contains following accessory devices:

Product	Brand	Model	Description
Antenna 1	SparkLAN	AD-500AX	-
Antenna 2	SparkLAN	AD-501AX	-
Antenna 3	SparkLAN	AD-502AX	-
Antenna 4	SparkLAN	AD-503AX	-
Antenna 5	JOHANSON	2450AD18A6050	-
Antenna 6	SparkLAN	AD-504AX	-
Antenna 7	SparkLAN	AD-505AX	-

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual.

6.2. Channel List

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20), 802.11ax (HE20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	-	-

7 channels are provided for 802.11n (HT40), 802.11ax (HE40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	7	2442
4	2427	8	2447
5	2432	9	2452
6	2437	-	-

6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	23~26°C/ 60~65%RH	3.3Vdc	2021/09/06~ 2021/11/10	Mike Cai
Radiated Spurious Emission	966-2	23~26°C/ 60~65%RH	3.3Vdc	2021/09/06~ 2021/11/10	Mike Cai
AC power Line Conducted Emission	SR1	23~26°C/ 60~65%RH	3.3Vdc	2021/09/16~ 2021/11/10	Mike Cai

FCC Test Firm Registration Number: 498077

6.4. Description of Available Antennas

Ant. No.	Transmitter Circuit	Brand Name	Model Name	Ant. Type	Frequency Band (MHz)	Maximum Gain (dBi)	Remark
1	Chain (0)+(1)	SparkLAN	AD-500AX	Dipole	2400~2483	2.65	RP-SMA
					5150~5250	4.35	
					5250~5350	4.35	
					5470~5725	4.35	
					5725~5850	4.81	
					5925~6425	4.98	
					6425~6525	4.85	
					6525~6875	4.79	
					6875~7125	4.82	
2	Chain (0)+(1)	SparkLAN	AD-501AX	Dipole	2400~2483	3.7	RP-SMA
					5150~5850	5	
					5925~7125	5	
3	Chain (0)+(1)	SparkLAN	AD-502AX	PIFA	2400~2483	3.5	IPEX
					5150~5850	5	
					5925~7125	3.9	
4	Chain (0)+(1)	SparkLAN	AD-503AX	Dipole	2400~2483	3.7	RP-SMA
					5150~5850	5	
					5925~7125	5	
5	Chain (0)+(1)	JOHANSON	2450AD18A6050	CHIP	2400~2483	2	NA
					5150~5850	1.5	
					5925~7125	2.7	
6	Chain (0)+(1)	SparkLAN	AD-504AX	Dipole	2400~2483	2.67	I-PEX
					5150~5250	4.35	
					5250~5350	3.83	
					5470~5725	4.7	
					5725~5850	4.87	
					5925~6425	4.91	
					6425~6525	4.85	
					6525~6875	4.94	
					6875~7125	4.94	
7	Chain (0)+(1)	SparkLAN	AD-505AX	Dipole	2400~2483	2.67	I-PEX
					5150~5250	4.35	
					5250~5350	3.83	
					5470~5725	4.7	
					5725~5850	4.87	
					5925~6425	4.91	
					6425~6525	4.85	
					6525~6875	4.94	
					6875~7125	4.94	

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.

6.5. Test Mode Applicability and Tested Channel Detail

- The fundamental of the dipole antenna was investigated in two orthogonal (lay and stand), it was determined that stand mode was worst-case. Therefore, all final radiated testing was performed with the dipole antenna in stand mode.
- For AC power line conducted emissions, the pre-scan has been determined by AC power 120Vac/60Hz (worst case)
- The antennas AD-501AX, AD-503AX has the highest gain, the following conducted tests are all carried out using this antenna gain.
- For radiated tests, following Radiated versus Conducted Measurements Guidance, radiated emissions measurements test was done with 50ohm terminator on antenna port
- For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- For below 1 GHz radiated emission and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Non-Beamforming mode:

Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Emissions (Above 1GHz)	802.11b	DSSS	DBPSK	1 to 11	1,6,11	1 Mbps
	802.11g	OFDM	BPSK	1 to 11	1,6,11	6 Mbps
	802.11ax20	OFDMA	BPSK	1 to 11	1,6,11	HE0
	802.11ax40	OFDMA	BPSK	3 to 9	3,6,9	HE0
Radiated Emissions (Below 1GHz)	802.11b	DSSS	DBPSK	1 to 11	6	1 Mbps
AC Power Line Conducted Emission	802.11b	DSSS	DBPSK	1 to 11	6	1 Mbps
*Antenna Port Conducted Measurement	802.11b	DSSS	DBPSK	1 to 11	1,6,11	1 Mbps
	802.11g	OFDM	BPSK	1 to 11	1,6,11	6 Mbps
	802.11ax20	OFDMA	BPSK	1 to 11	1,6,11	HE0
	802.11ax40	OFDMA	BPSK	3 to 9	3,6,9	HE0
Conducted Emissions (Above 1GHz)	802.11b	DSSS	DBPSK	1 to 11	1,6,11	1 Mbps
	802.11g	OFDM	BPSK	1 to 11	1,6,11	6 Mbps
	802.11ax20	OFDMA	BPSK	1 to 11	1,6,11	HE0
	802.11ax40	OFDMA	BPSK	3 to 9	3,6,9	HE0
Conducted Emissions (Below 1GHz)	802.11b	DSSS	DBPSK	1 to 11	6	1 Mbps

*Note: For Antenna Port Conducted Measurement item, Inner channels only test Power and Conducted Out of Band Emission.

Beamforming mode:

Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
*Antenna Port Conducted Measurement	802.11ax20	OFDMA	BPSK	1 to 11	1,6,11	HE0
	802.11ax40	OFDMA	BPSK	3 to 9	3,6,9	HE0

*Note: For Antenna Port Conducted Measurement item, Inner channels only test Power and Conducted Out of Band Emission.
*Note: The worse spurious emissions test and maximum output power was found in Non-Beamforming mode. Therefore Beamforming mode only the test data of the RF output power were recorded in this report.

Simultaneously transmission condition:

Condition	Technology	
1	WLAN (2.4GHz)	WLAN (5GHz)
2	WLAN (2.4GHz)	WLAN (6GHz)

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

6.6. Duty cycle

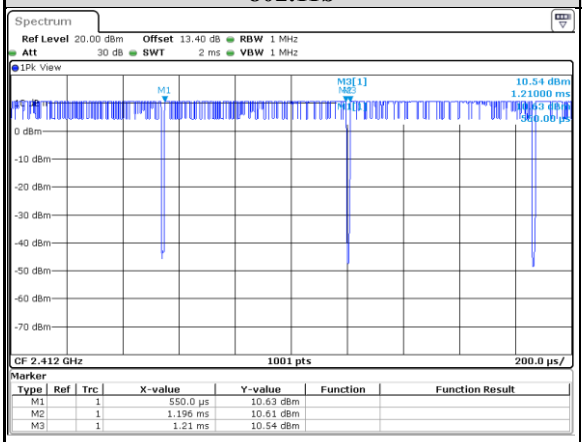
802.11b: Duty cycle = 0.646/0.66 = 0.979, Duty factor(dB) = 10 * log(1/0.979) = 0.1

802.11g: Duty cycle = 1.965/2 = 0.983 duty cycle of test signal is ≥ 98 %, duty factor is not required.

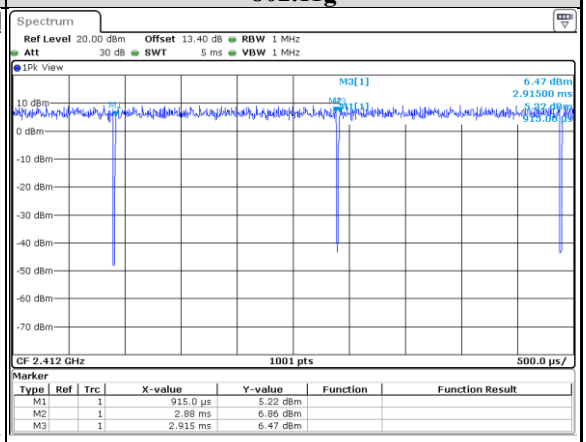
802.11ax(HE20): Duty cycle = 1/1 = 1 duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11ax(HE40): Duty cycle = 1/1 = 1 duty cycle of test signal is ≥ 98 %, duty factor is not required.

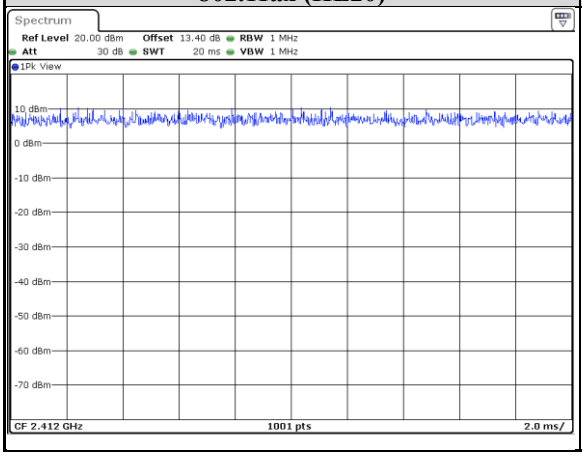
802.11b



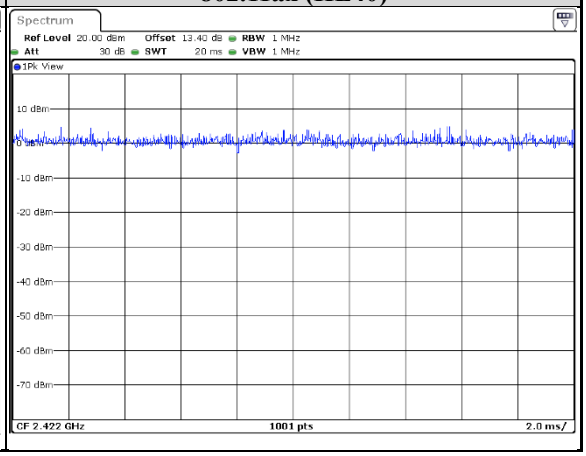
802.11g



802.11ax (HE20)



802.11ax (HE40)



7. Test Equipment

Test Equipment List					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Expired date**
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070827	2020/11/11	2021/11/10
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2020/12/11	2021/12/10
Loop Antenna	ETS lindgren	6502	00213440	2020/12/25	2021/12/24
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	2021/1/13	2022/1/12
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2020/12/30	2021/12/29
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2020/12/30	2021/12/29
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2021/6/8	2022/6/7
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2021/2/3	2022/2/2
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2021/5/19	2022/5/18
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	2021/1/22	2022/1/21
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	2021/1/22	2022/1/21

Test Equipment List					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Expired date**
Antenna Port Conducted Measurement					
Spectrum Analyzer	Keysight	N9010A	MY56070834	2020/11/6	2021/11/5
				2021/10/29	2022/10/28
Pulse Power Sensor	Anritsu	MA2411B	1531202	2020/12/21	2021/12/20
Power Meter	Anritsu	ML2495A	1645002	2020/12/21	2021/12/20
AC power Line Conducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2020/11/17	2021/11/16
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2021/8/30	2022/8/29
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2021/8/26	2022/8/25
Cables	TITAN	CFD200	T0732ACFD20 020A300-1	2021/3/2	2022/3/1

UL Software		
Description	**Name**	**Version**
Radiated measurement	e3	6.191211 (V6)
Conducted measurement	RF Conducted Test Tools	ver 2.4.0.620b
AC power Line Conducted Emission	EZ_EMC	UL-3A1.2

8. Description of Test Setup

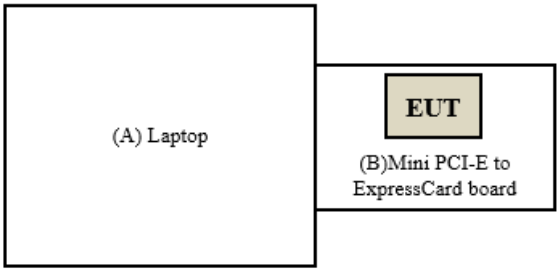
Support Equipment

ID	Equipment	Brand Name	Model Name	S/N	Remark
A	Laptop	Lenovo	E6430	2MMN3X1	Provide by lab
B	Mini PCI-E to ExpressCard board	SparkLAN	Card-01	001	N/A

Test Setup

Controlled using a bespoke application (QSPR_Version 5.0-00197) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.

Setup Diagram for Test



Under Table

Remote Site

9. Test Results

9.1. 6dB Bandwidth

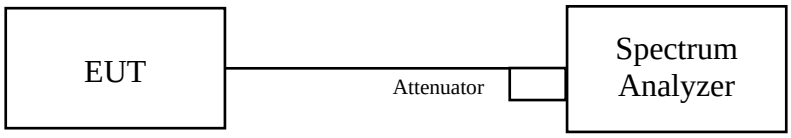
Requirements

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

Test procedure

a. Set resolution bandwidth (RBW) = 100kHz.
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	8.07	8.11	0.5	PASS
6	2437	7.79	7.55	0.5	PASS
11	2462	7.07	8.07	0.5	PASS

802.11g

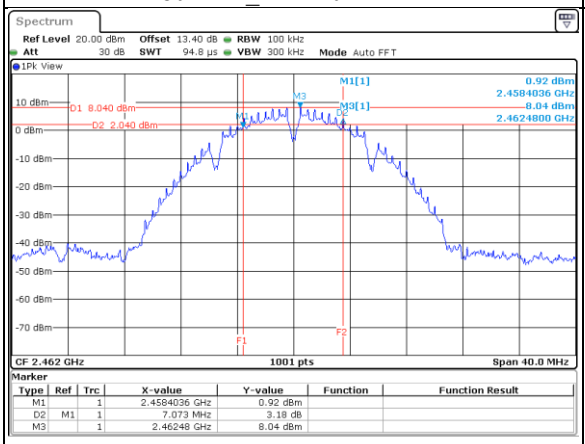
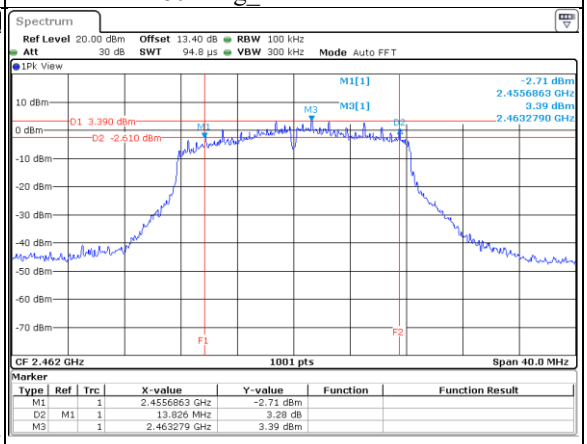
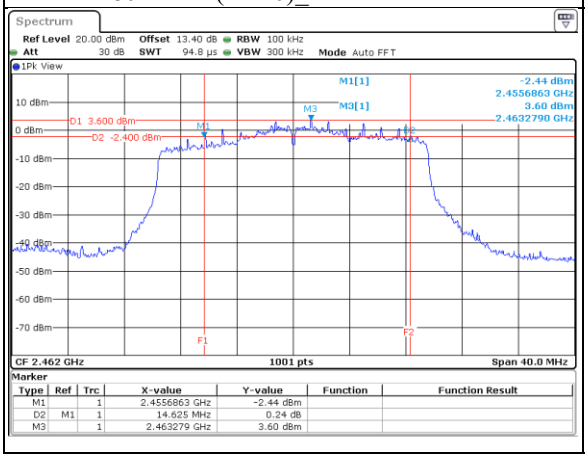
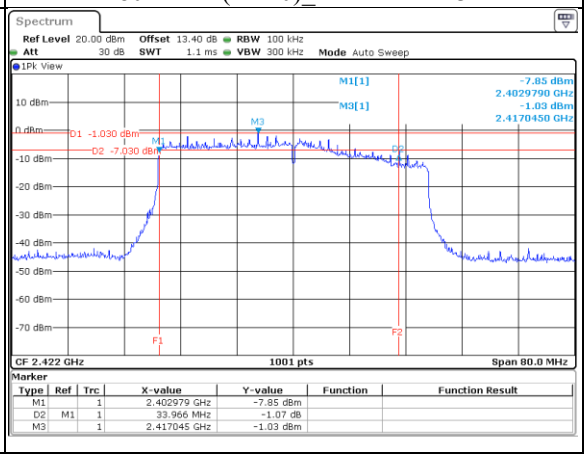
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.11	15.66	0.5	PASS
6	2437	15.11	15.70	0.5	PASS
11	2462	15.07	13.83	0.5	PASS

802.11ax (HE20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	18.58	16.90	0.5	PASS
6	2437	16.10	16.62	0.5	PASS
11	2462	18.10	14.63	0.5	PASS

802.11ax (HE40)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.56	33.97	0.5	PASS
6	2437	36.04	37.96	0.5	PASS
9	2452	36.60	35.41	0.5	PASS

Spectrum Plot of Worst Value	
802.11b_Chain 0 / CH11	802.11g_Chain 1 / CH11
	
802.11ax (HE20)_Chain 1 / CH11	802.11ax (HE40)_Chain 1 / CH3
	

9.2. Conducted Output Power

Requirements

For systems using digital modulation in the 2400-2483.5 MHz bands: 1 Watt.

Note:

1. Directional Gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$ +...+$10^{Gn/20}$)^2 / Nant] dBi.

   N*a*nt: Number of Transmit Antennas
   G1, G2,..., Gn: Gain of Individual Antennas

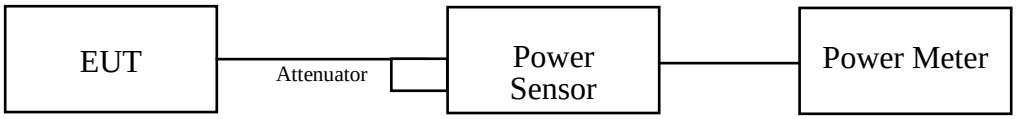
2. Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

   Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
   Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
   Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

Test Procedure

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Test Setup



The loss between RF output port of the EUT and the input port of the Power Meter has been taken into consideration.

Test Data

Non-Beamforming mode

Peak Power

802.11b

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	20.86	19.73	215.774	23.34	30	PASS
6	2437	23.21	21.33	345.144	25.38	30	PASS
11	2462	20.31	18.83	183.654	22.64	30	PASS

802.11g

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.56	20.49	255.27	24.07	30	PASS
6	2437	24.01	23.88	496.592	26.96	30	PASS
11	2462	21.45	20.63	255.27	24.07	30	PASS

802.11ax (HE20)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.56	20.57	257.04	24.10	30	PASS
6	2437	24.08	23.81	496.592	26.96	30	PASS
11	2462	23.79	21.91	394.457	25.96	30	PASS

802.11ax (HE40)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	18.54	18.21	137.721	21.39	30	PASS
6	2437	20.13	19.54	193.197	22.86	30	PASS
9	2452	19.33	19.41	172.982	22.38	30	PASS

Average Power (Reference Only)

802.11b

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	18.26	17.04	117.49	20.70
6	2437	20.68	18.69	190.985	22.81
11	2462	17.65	16.33	101.158	20.05

802.11g

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	15.20	14.44	60.954	17.85
6	2437	18.35	17.01	118.577	20.74
11	2462	15.33	14.37	61.518	17.89

802.11ax (HE20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	14.39	13.67	50.816	17.06
6	2437	17.45	16.37	98.855	19.95
11	2462	15.45	14.02	60.256	17.80

802.11ax (HE40)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	12.17	11.34	30.13	14.79
6	2437	13.21	12.29	37.844	15.78
9	2452	12.86	11.89	34.754	15.41

Beamforming mode

Peak Power

802.11ax (HE20)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.11	20.12	231.739	23.65	30	PASS
6	2437	23.80	23.49	463.447	26.66	30	PASS
11	2462	23.31	21.49	354.813	25.50	30	PASS

802.11ax (HE40)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	18.14	17.72	124.451	20.95	30	PASS
6	2437	19.75	19.09	175.388	22.44	30	PASS
9	2452	18.90	19.05	158.125	21.99	30	PASS

Average Power (Reference Only)

802.11ax (HE20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	13.95	13.24	45.92	16.62
6	2437	17.00	15.96	89.536	19.52
11	2462	14.97	13.52	53.951	17.32

802.11ax (HE40)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	11.76	11.05	27.733	14.43
6	2437	12.93	11.86	34.995	15.44
9	2452	12.52	11.61	32.359	15.10

9.3. Power Spectral Density

Requirements

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz (If G_{TX} > 6 dBi, then PSD = 8 – (G_{TX} – 6)).

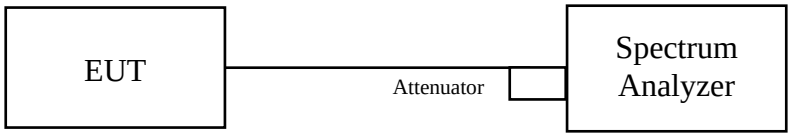
Note:
1. PSD = power spectral density that he same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz.
2. G_{TX} = the maximum transmitting antenna directional gain in dBi.
3. Directional Gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$ +...+$10^{Gn/20}$)^2 / Nant] dBi.

   N*a*nt: Number of Transmit Antennas
   G1, G2,..., Gn: Gain of Individual Antennas

Test procedure

a. Set analyzer center frequency to DTS channel center frequency.
b. Set the span to 1.5 times the DTS bandwidth.
c. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d. Set the VBW ≥ 3 × RBW.
e. Detector = peak.
f. Sweep time = auto couple.
g. Trace mode = max hold.
h. Allow trace to fully stabilize.
i. Use the peak marker function to determine the maximum amplitude level within the RBW.

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

802.11b

TX Chain	Channel	Frequency (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-5.10	3.01	-2.09	7.29	PASS
	6	2437	-2.08	3.01	0.93	7.29	PASS
	11	2462	-5.55	3.01	-2.54	7.29	PASS
1	1	2412	-5.29	3.01	-2.28	7.29	PASS
	6	2437	-3.41	3.01	-0.40	7.29	PASS
	11	2462	-5.94	3.01	-2.93	7.29	PASS

Note:

1. Directional gain = 6.71 dBi > 6 dBi, so the limit shall be reduced.

802.11g

TX Chain	Channel	Frequency (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-10.29	3.01	-7.28	7.29	PASS
	6	2437	-6.83	3.01	-3.82	7.29	PASS
	11	2462	-10.01	3.01	-7.00	7.29	PASS
1	1	2412	-10.19	3.01	-7.18	7.29	PASS
	6	2437	-6.81	3.01	-3.80	7.29	PASS
	11	2462	-9.98	3.01	-6.97	7.29	PASS

Note:

1. Directional gain = 6.71 dBi > 6 dBi, so the limit shall be reduced.

802.11ax (HE20)

TX Chain	Channel	Frequency (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-10.56	3.01	-7.55	7.29	PASS
	6	2437	-7.27	3.01	-4.26	7.29	PASS
	11	2462	-9.03	3.01	-6.02	7.29	PASS
1	1	2412	-10.56	3.01	-7.55	7.29	PASS
	6	2437	-6.84	3.01	-3.83	7.29	PASS
	11	2462	-8.96	3.01	-5.95	7.29	PASS

Note:

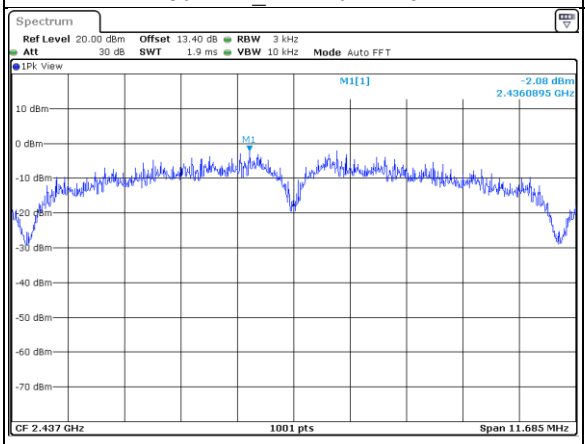
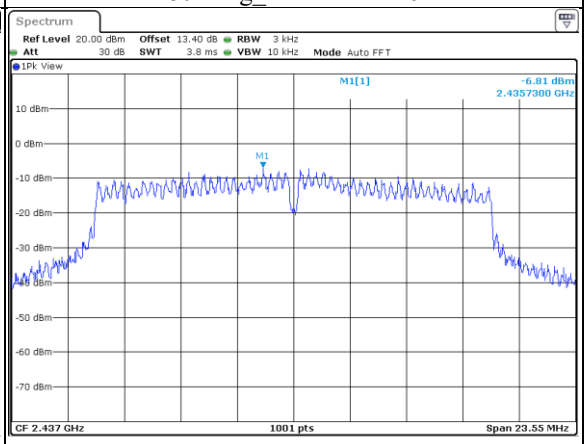
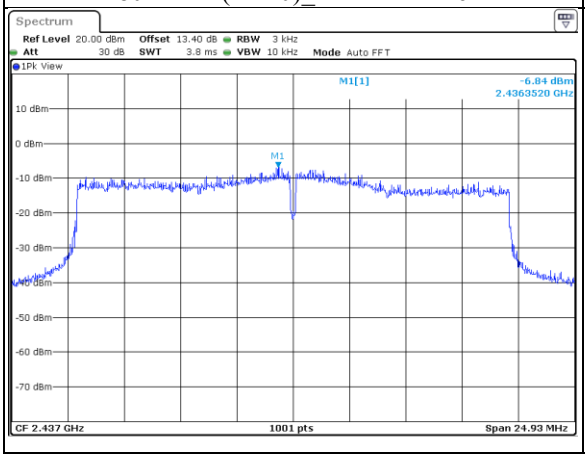
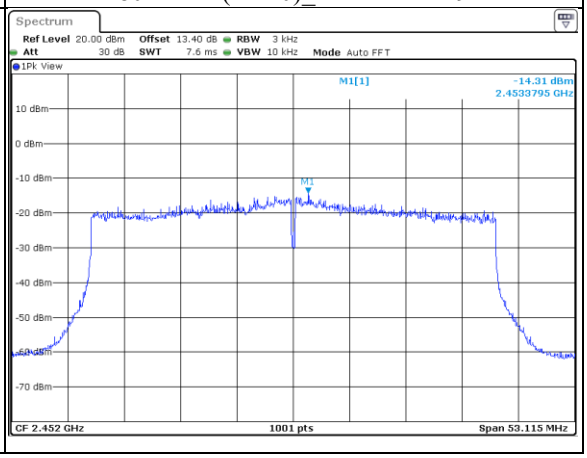
1. Directional gain = 6.71 dBi > 6 dBi, so the limit shall be reduced.

802.11ax (HE40)

TX Chain	Channel	Frequency (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	3	2422	-15.70	3.01	-12.69	7.29	PASS
	6	2437	-14.42	3.01	-11.41	7.29	PASS
	9	2452	-15.62	3.01	-12.61	7.29	PASS
1	3	2422	-15.77	3.01	-12.76	7.29	PASS
	6	2437	-15.34	3.01	-12.33	7.29	PASS
	9	2452	-14.31	3.01	-11.30	7.29	PASS

Note:

1. Directional gain = 6.71 dBi > 6 dBi, so the limit shall be reduced.

Spectrum Plot of Worst Value	
802.11b_Chain 0 / CH6	802.11g_Chain 1 / CH6
	
802.11ax (HE20)_Chain 1 / CH6	802.11ax (HE40)_Chain 1 / CH9
	

9.4. Conducted Out of Band Emission

Requirements

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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b) (3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209 (a) is not required.

Test procedure

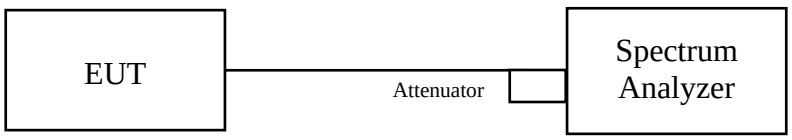
Measurement Procedure REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 300 kHz.
3. Set the span to 1.5 times the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

Measurement Procedure OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

Test Setup



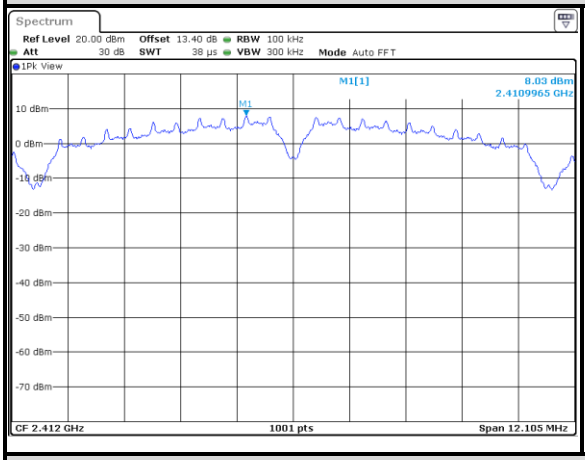
The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

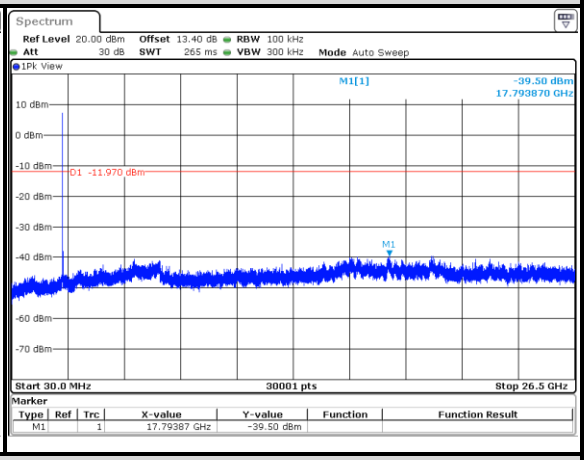
Test Data

802.11b

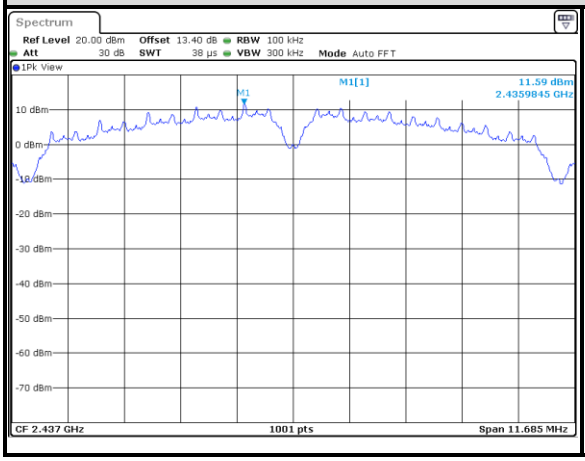
Chain 0

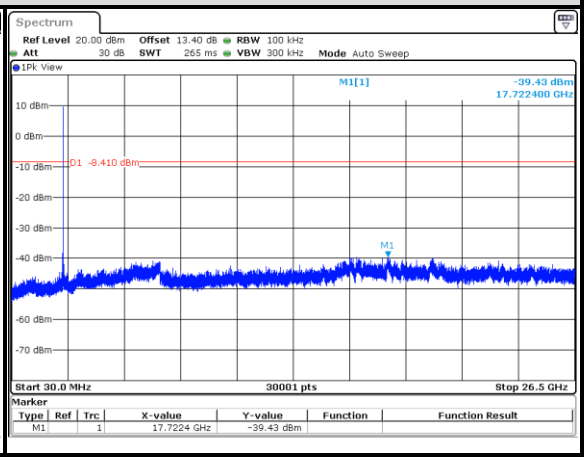
Ch 1



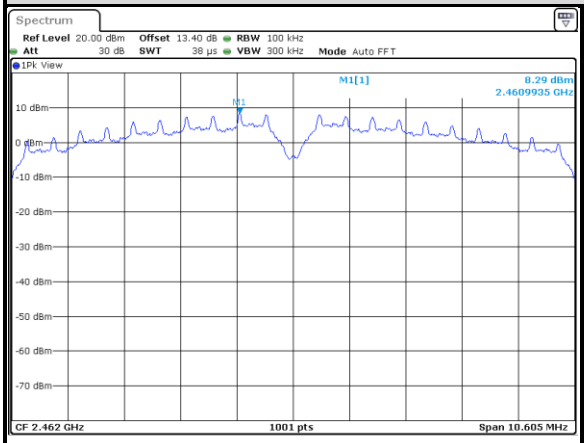


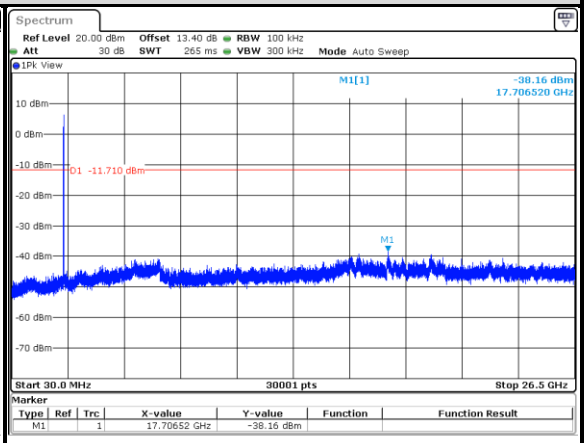
Ch 6



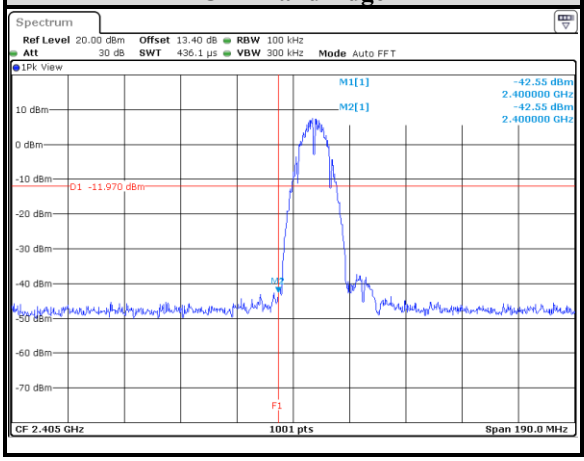


Ch 11

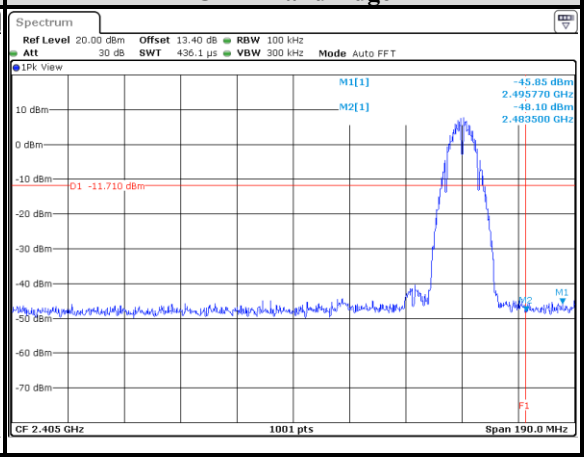




Ch 1 Band Edge

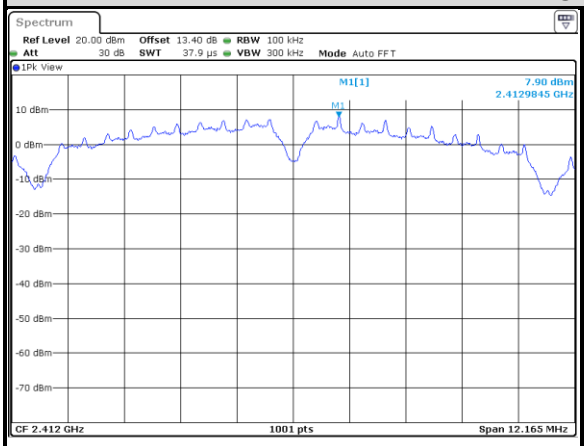


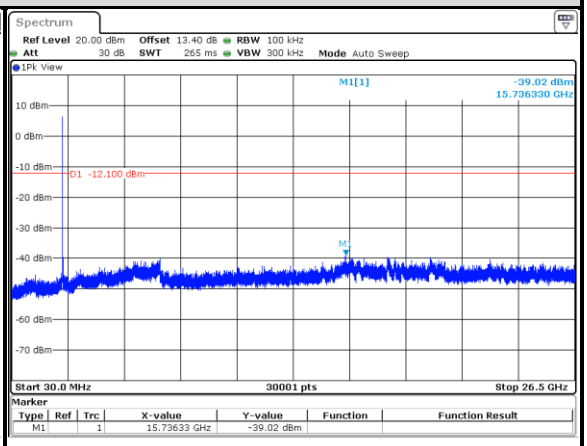
Ch 11 Band Edge



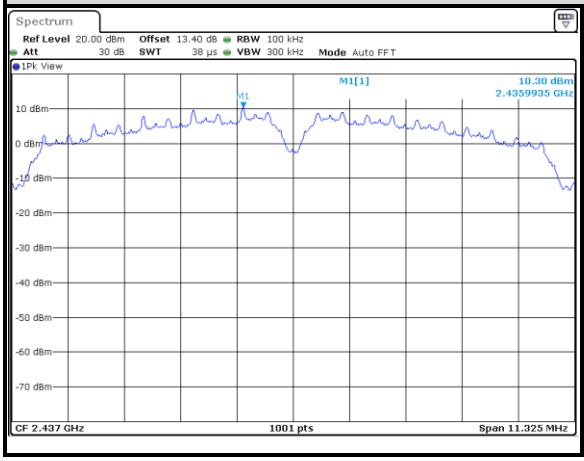
Chain 1

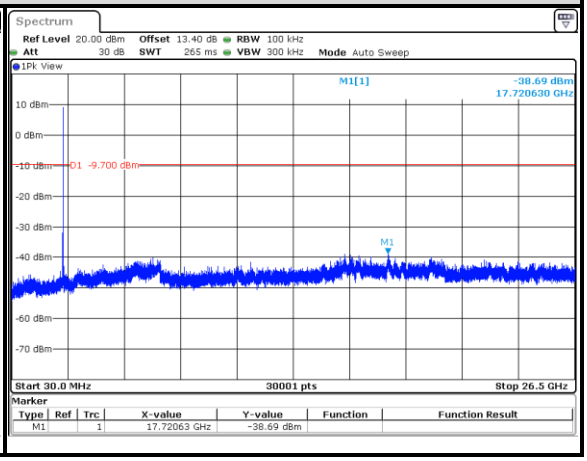
Ch 1



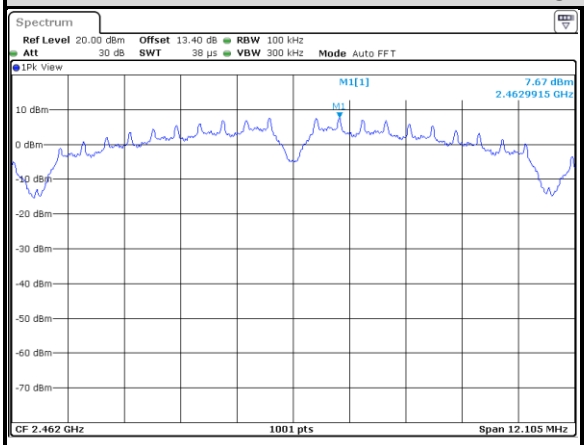


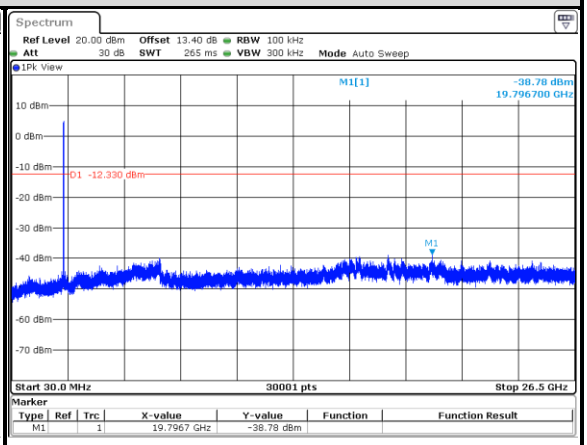
Ch 6



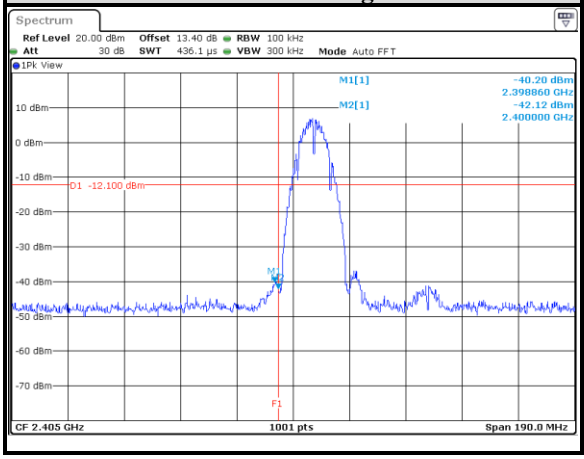


Ch 11

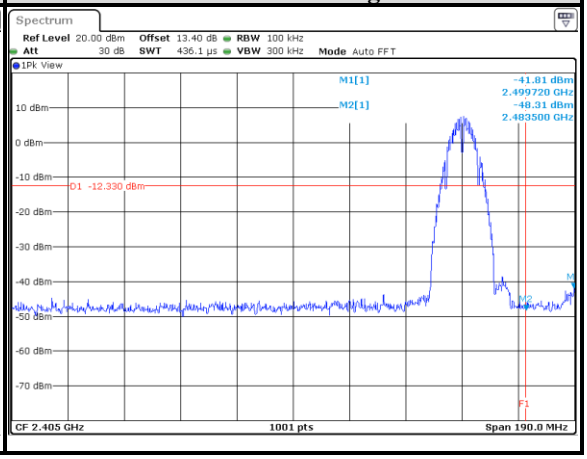




Ch 1 Band Edge



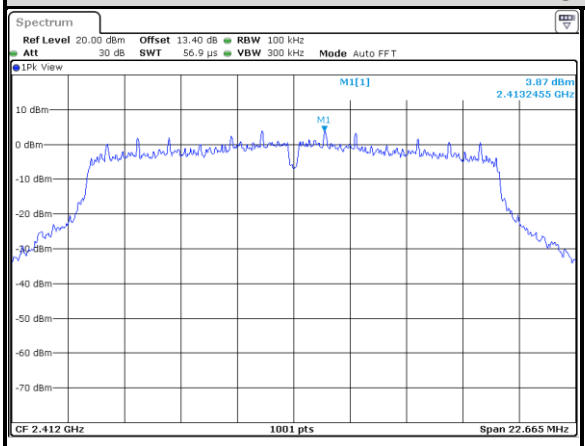
Ch 11 Band Edge

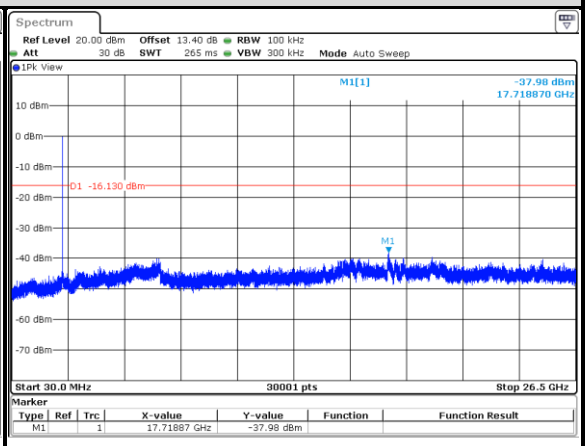


802.11g

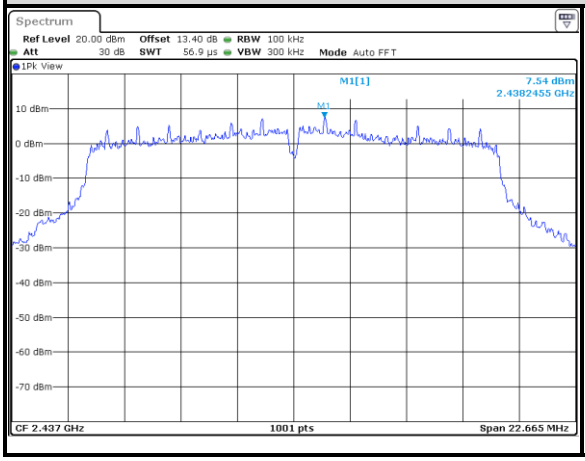
Chain 0

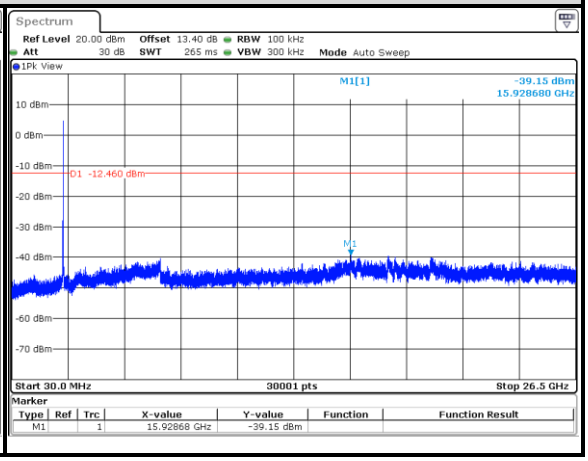
Ch 1



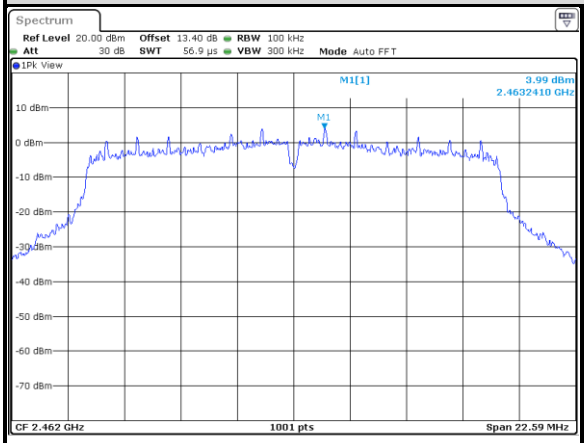


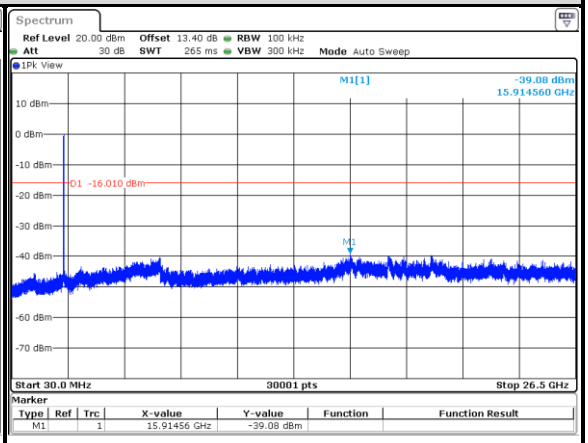
Ch 6



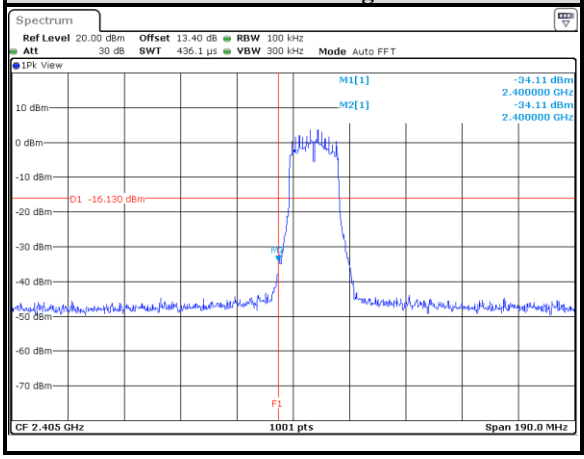


Ch 11

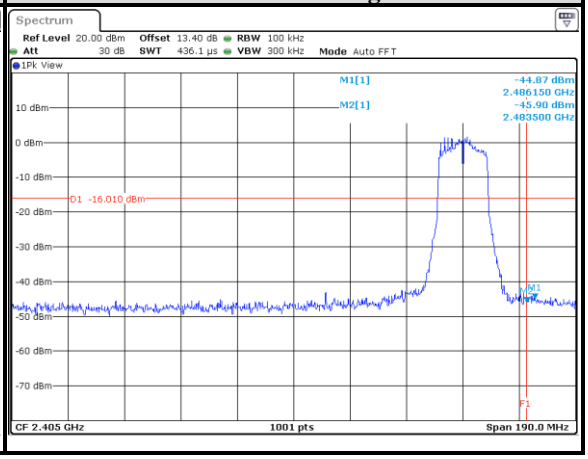




Ch 1 Band Edge

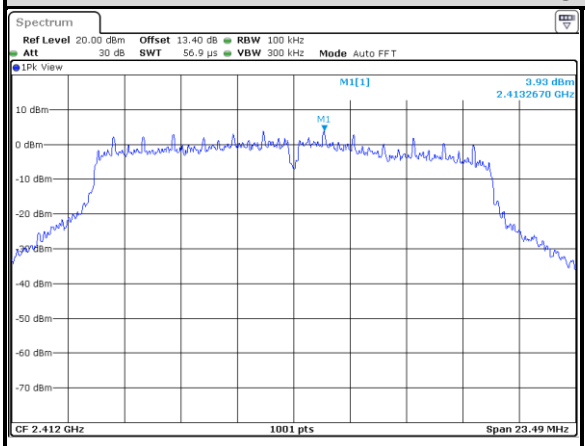


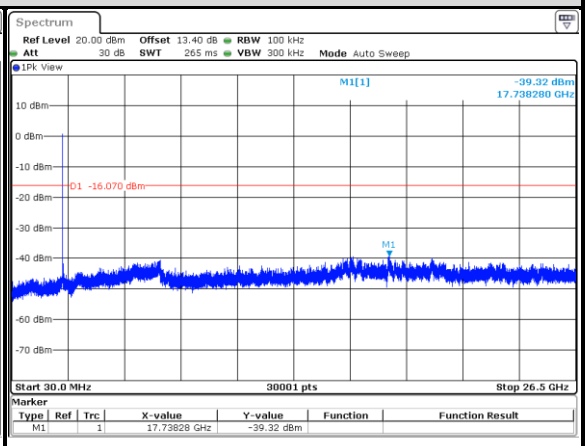
Ch 11 Band Edge



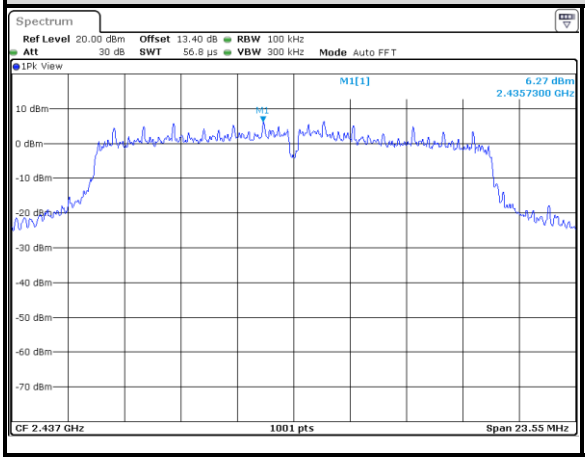
Chain 1

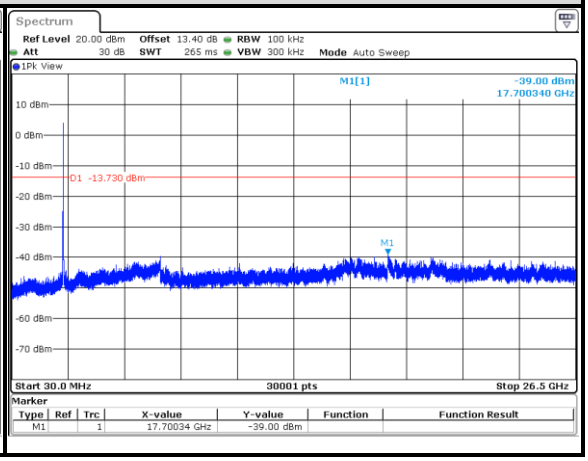
Ch 1



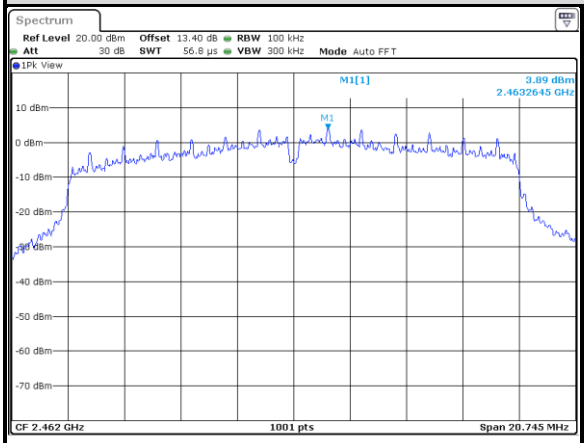


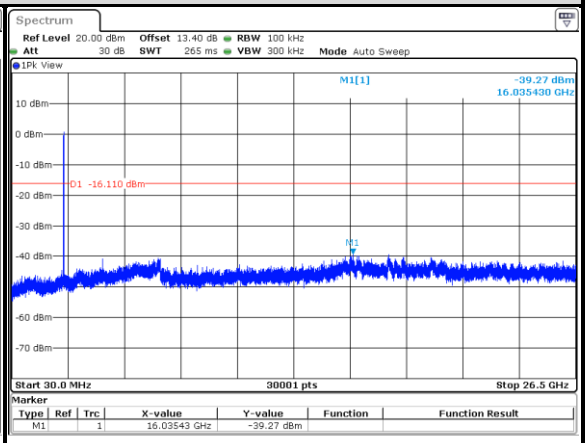
Ch 6



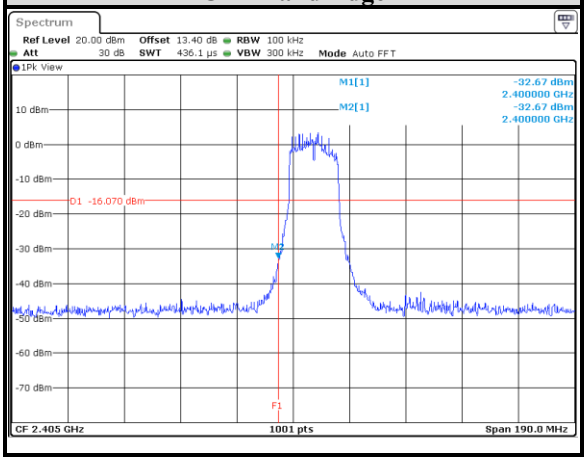


Ch 11

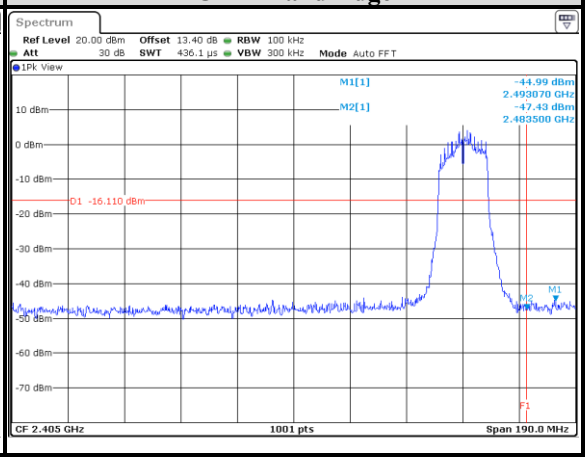




Ch 1 Band Edge



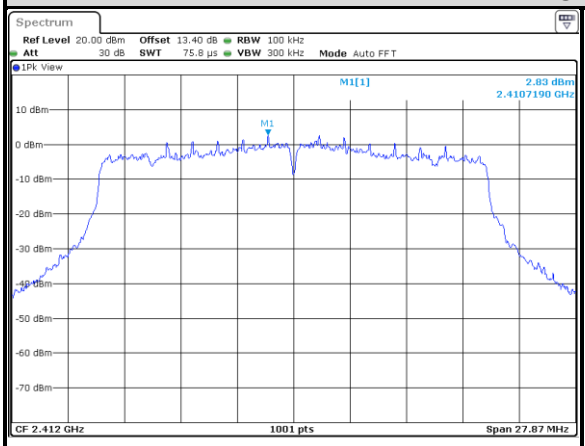
Ch 11 Band Edge

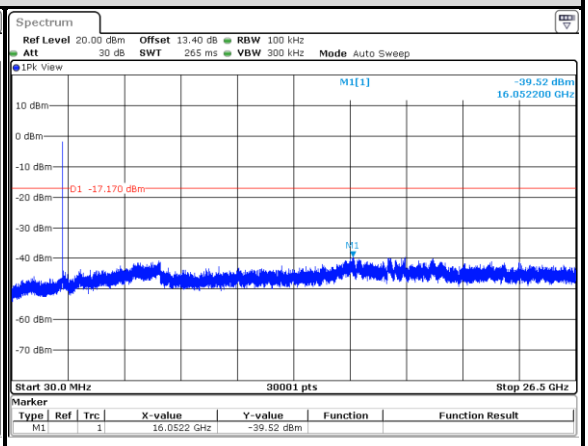


802.11ax (HE20)

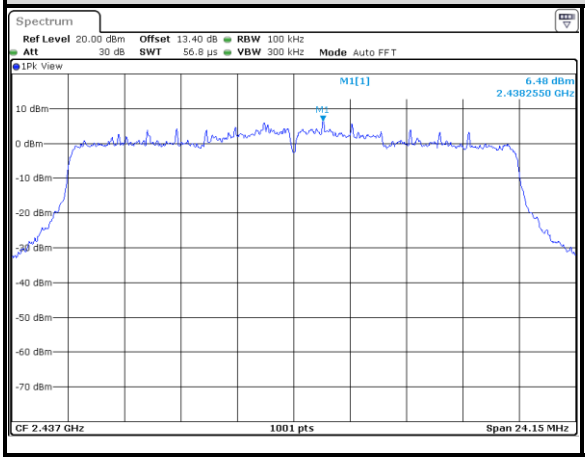
Chain 0

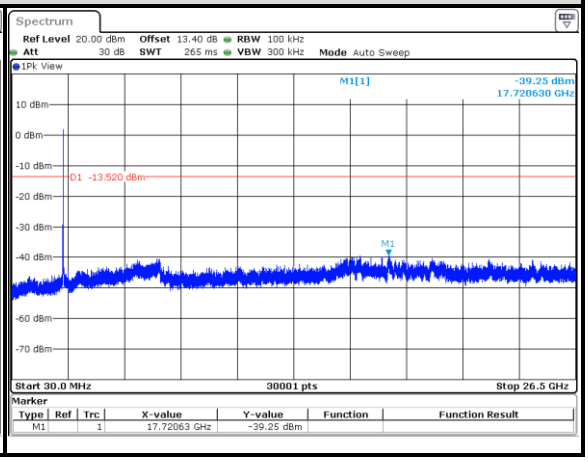
Ch 1



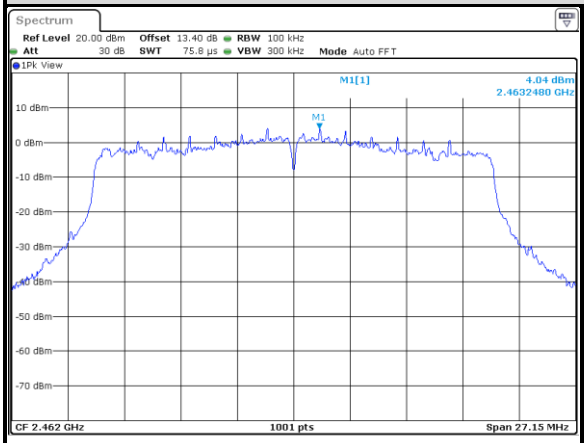


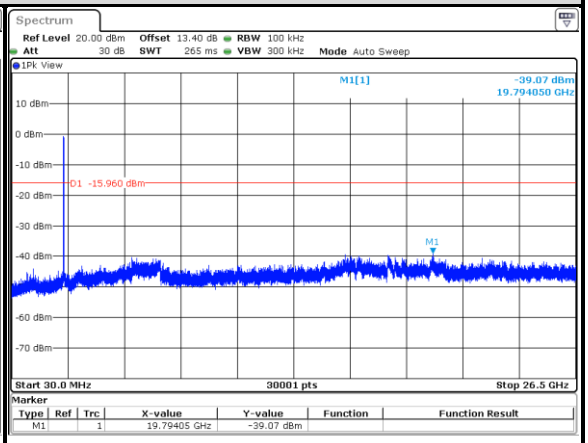
Ch 6



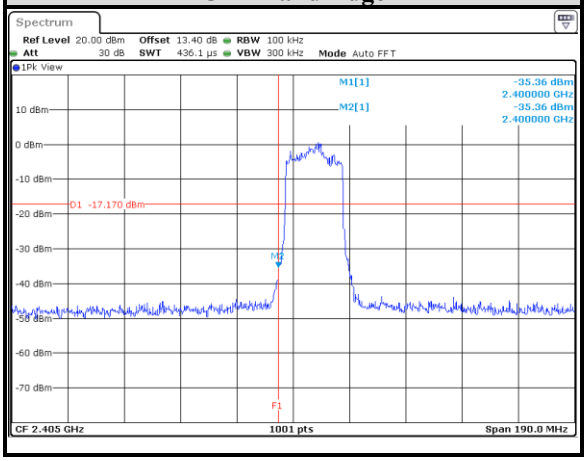


Ch 11

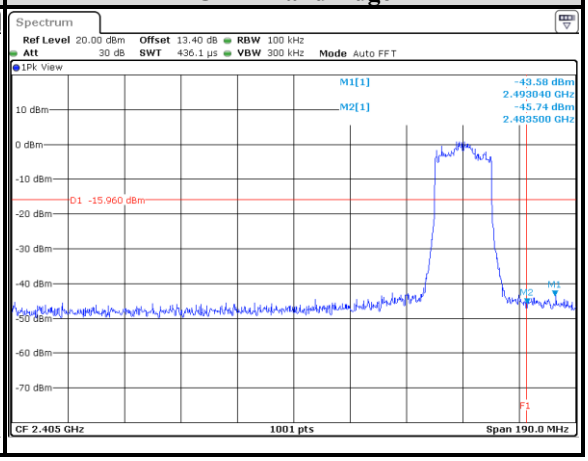




Ch 1 Band Edge

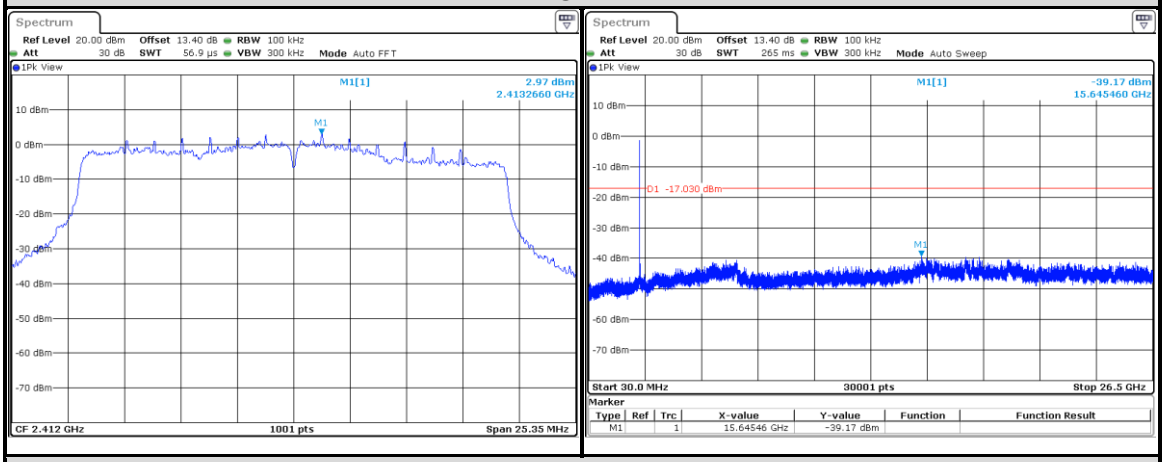


Ch 11 Band Edge

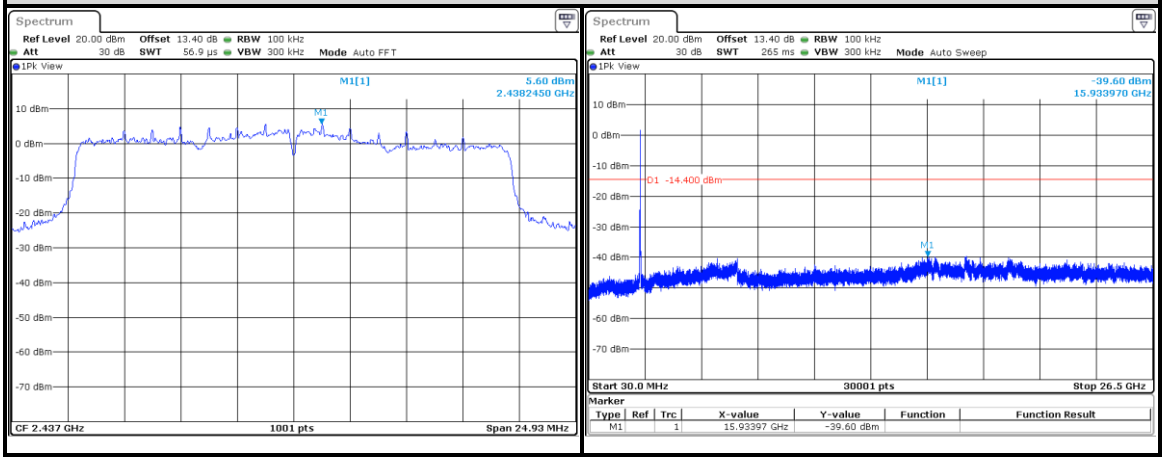


Chain 1

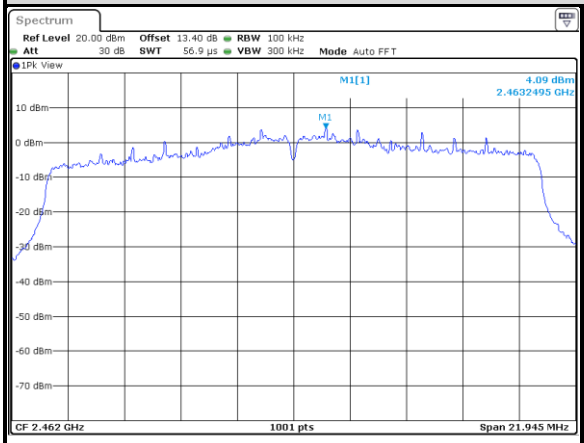
Ch 1

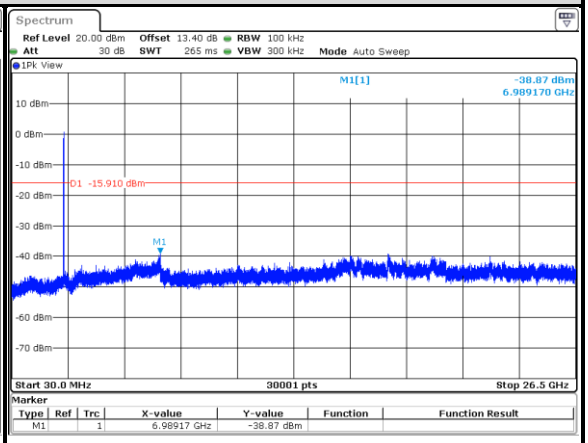


Ch 6

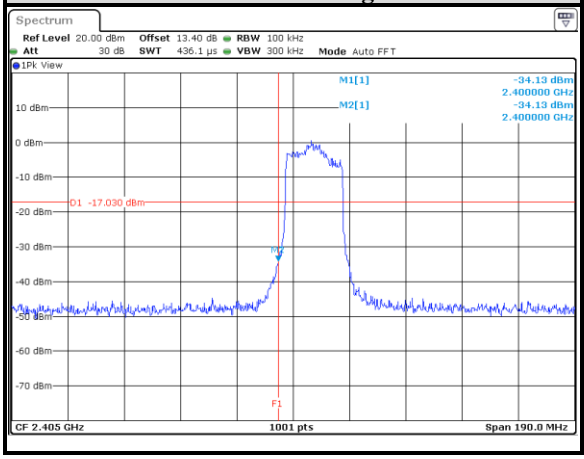


Ch 11

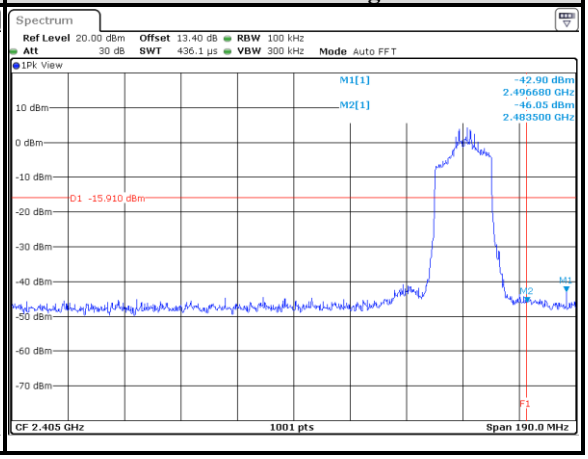




Ch 1 Band Edge



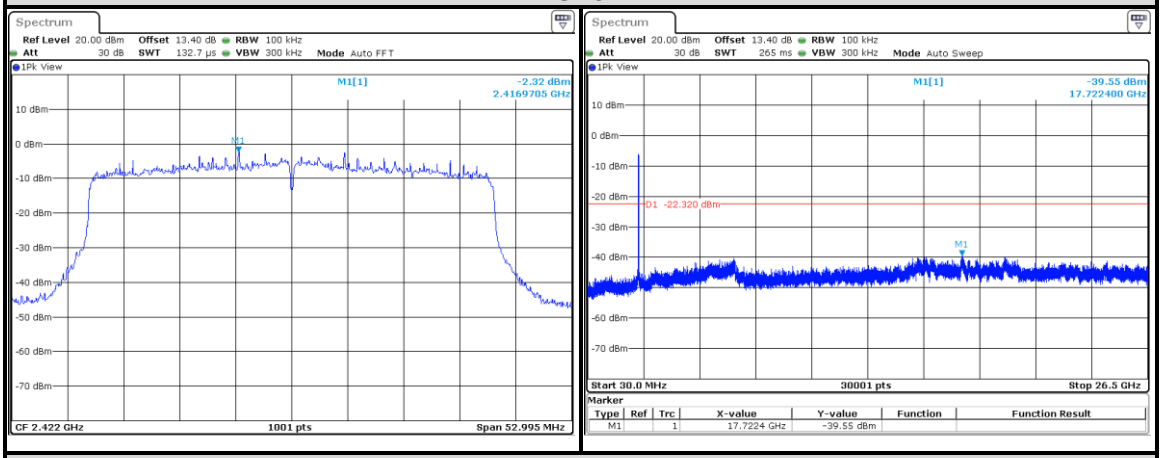
Ch 11 Band Edge



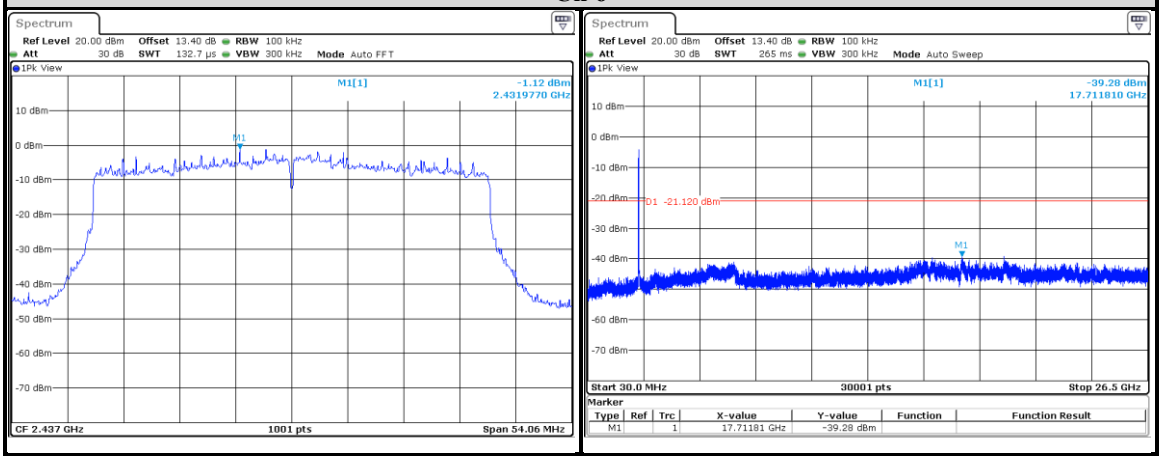
802.11ax (HE40)

Chain 0

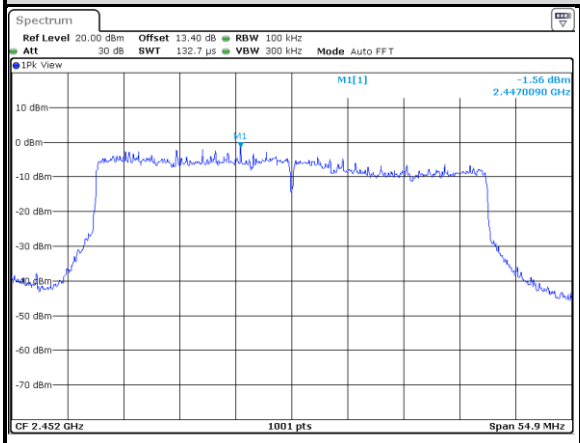
Ch 3

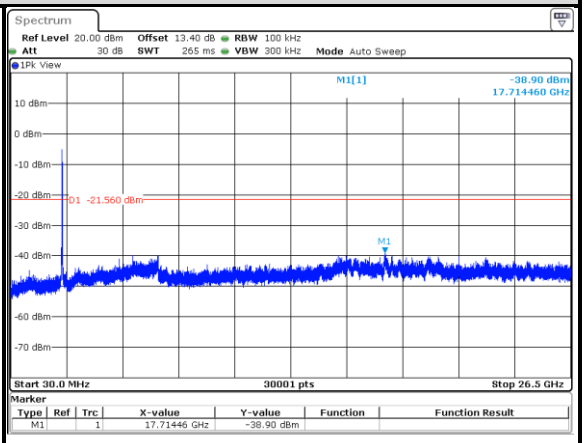


Ch 6

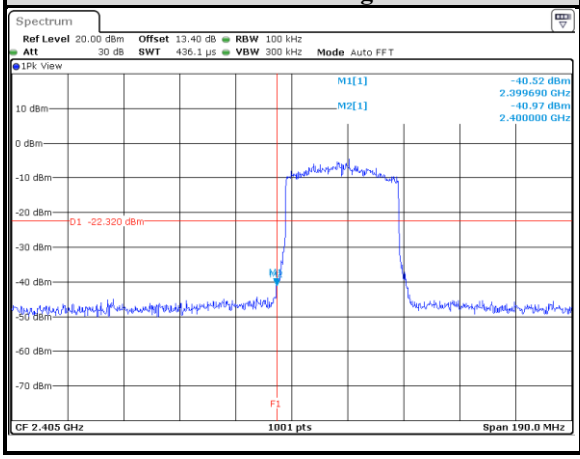


Ch 9

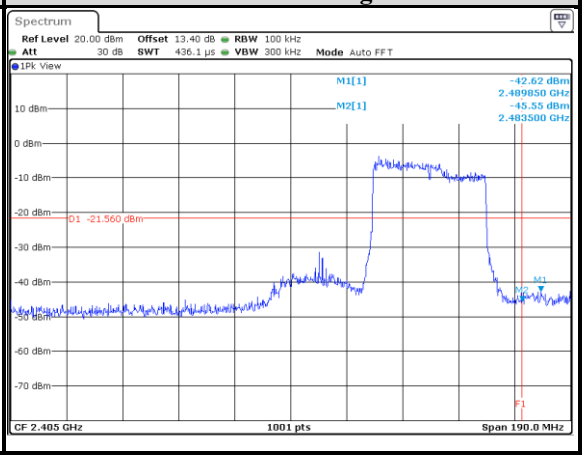




Ch 3 Band Edge

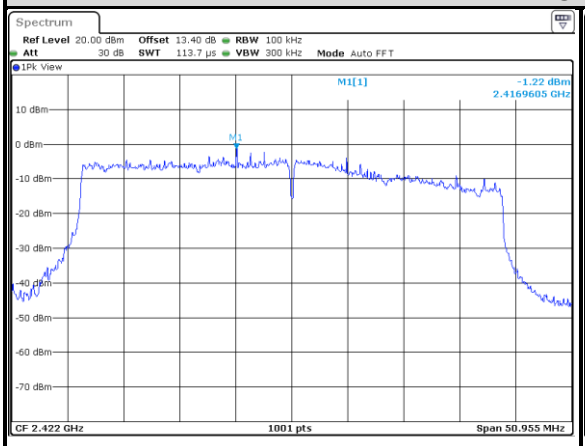


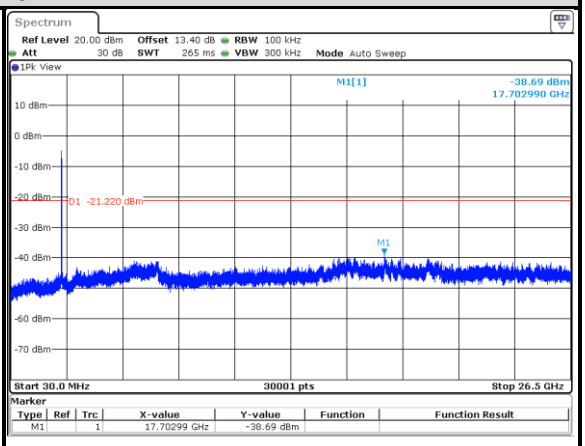
Ch 9 Band Edge



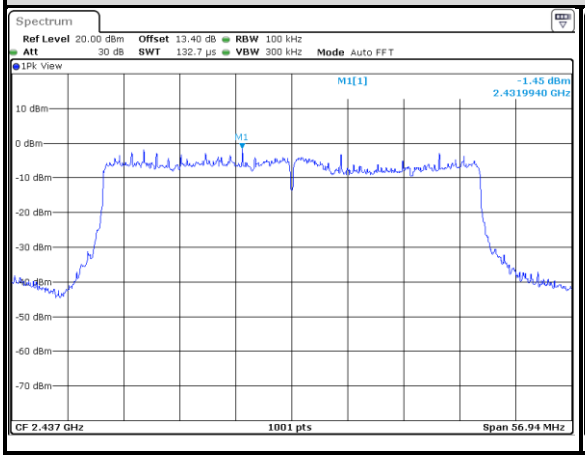
Chain 1

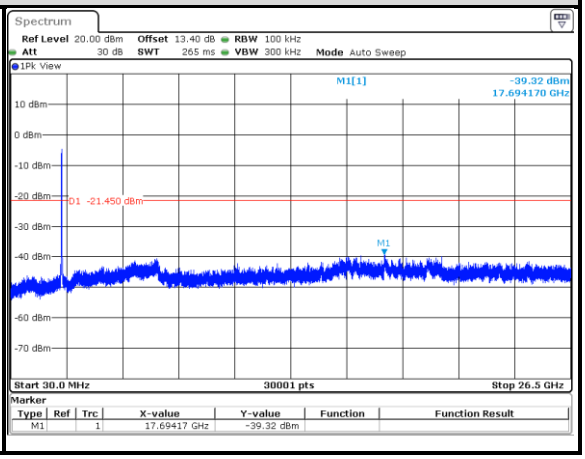
Ch 3



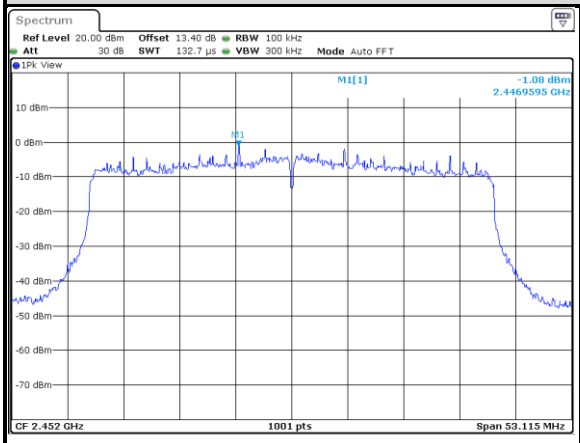


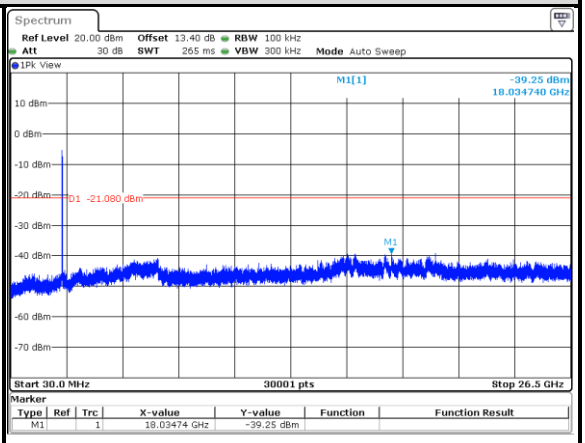
Ch 6



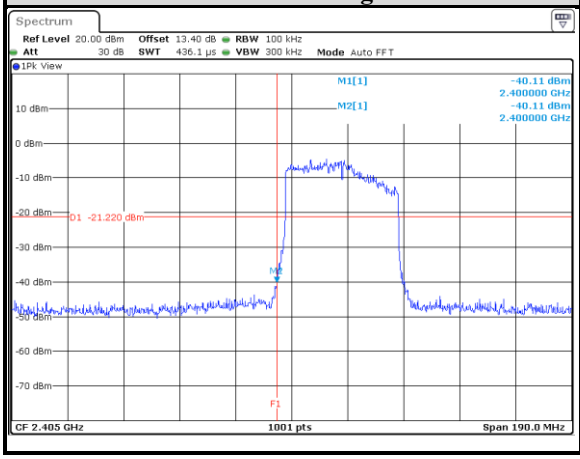


Ch 9

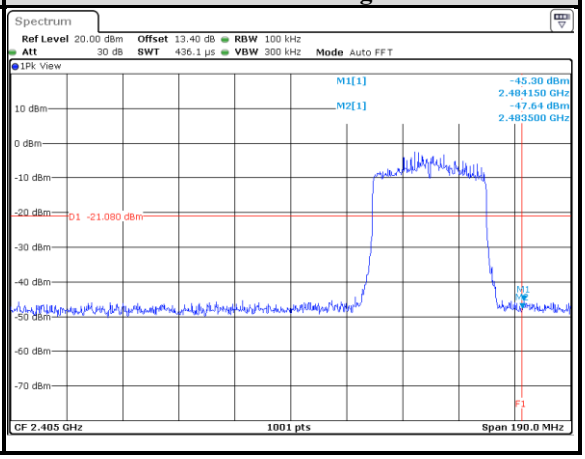




Ch 3 Band Edge



Ch 9 Band Edge



9.5. Radiated Spurious Emission

Requirements

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequency(MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	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.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Test Procedures

Following FCC KDB 558074 D01 DTS Meas. Guidance:
Radiated versus Conducted Measurements.
The unwanted emission limits in both the restricted and non-restricted bands are based on antenna-port conducted measurements in conjunction with cabinet emissions tests are permitted to demonstrate compliance.
The following steps was performed:

a. Cabinet emissions measurements. Radiated measurement was performed to ensure that cabinet emissions are below the emission limits. For the cabinet-emission measurements the antenna was replaced by a termination matching the nominal impedance of the antenna.
b. Conducted tests was performed using equipment that matches the nominal impedance of the antenna assembly used with the EUT
c. EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater
d. EIRP adjustments for multiple outputs. (Follow the procedures specified in FCC KDB Publication 662911)

For Radiated Emission

[For 9 kHz ~ 30 MHz]

e. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
f. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
g. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
h. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
i. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

[For above 30 MHz]

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
b. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.

Configuration	Average	
	RBW	VBW
802.11b	1MHz	2kHz
802.11g		10Hz
802.11ax (HE20)		10Hz
802.11ax (HE40)		10Hz

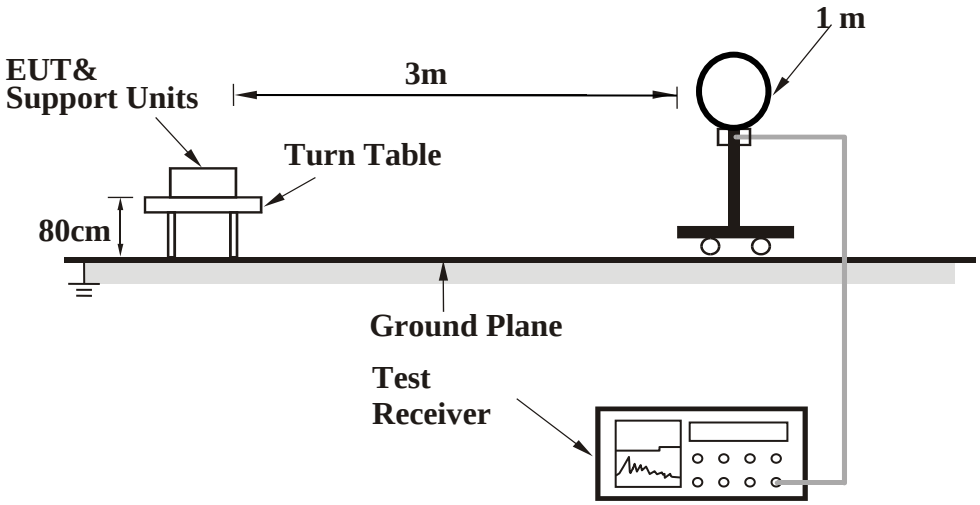
Note: Refer to section 6.6 for duty cycle.

d. All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported, the other emission levels were low against the limit.
e. Test data of Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
f. Test data of Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
g. Test data of Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
h. Test data of Notation "@" = Fundamental Frequency
i. Test data of Notation " * " = The peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.

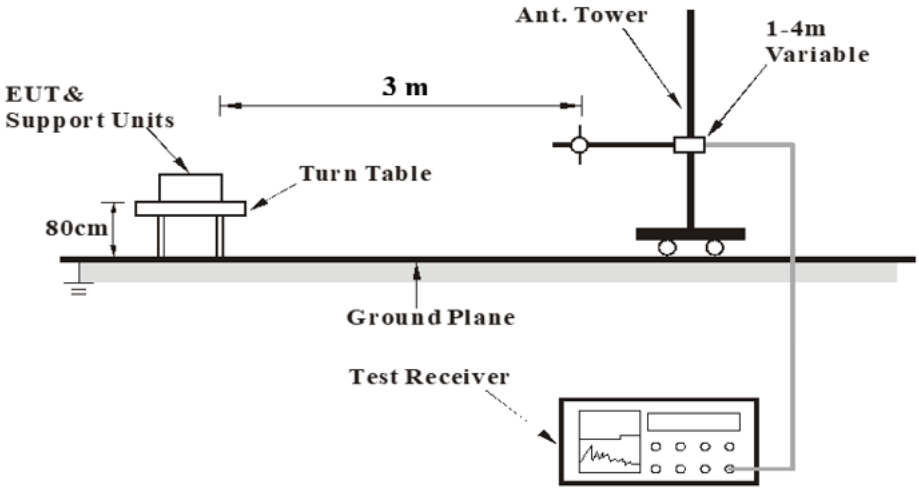
Test Setup

For Radiated Test Method:

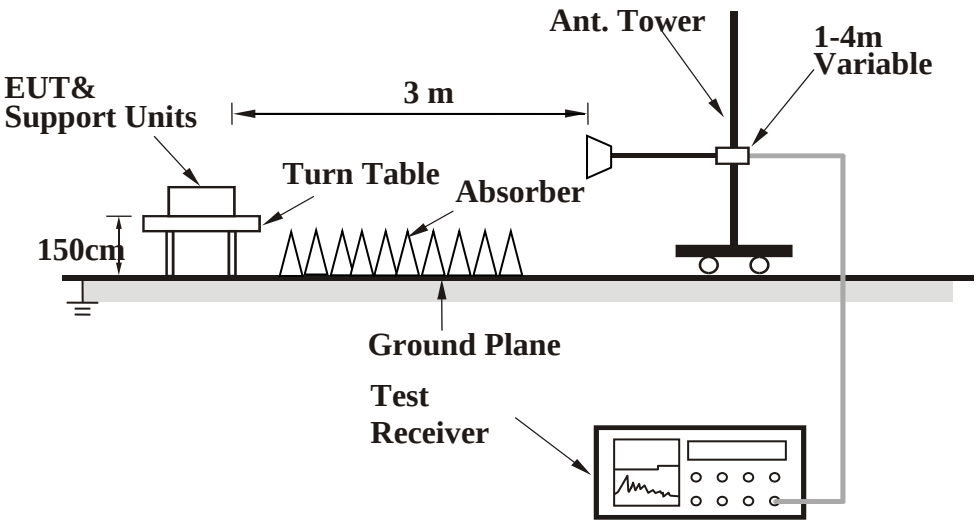
<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >

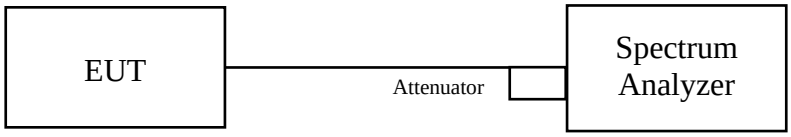


<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations.

For Conducted Test Method:



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

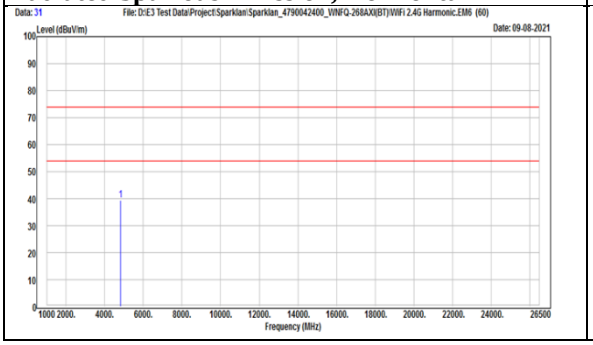
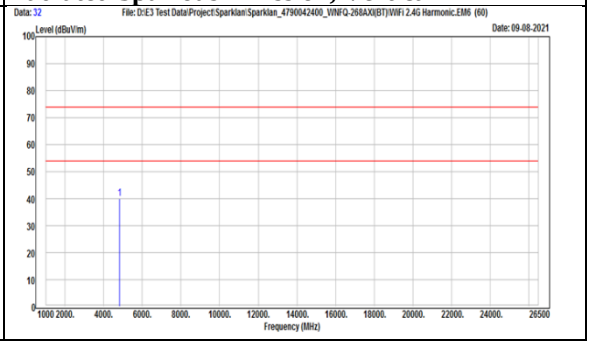
Radiated method

The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation)

Above 1 GHz

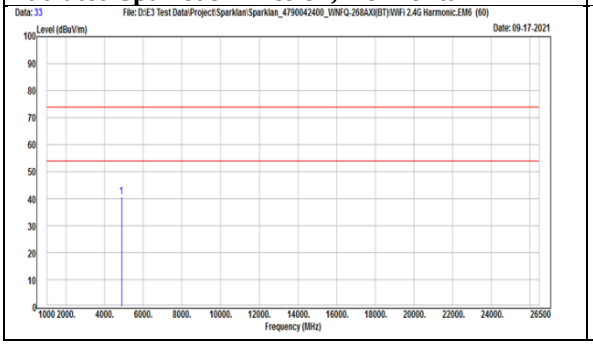
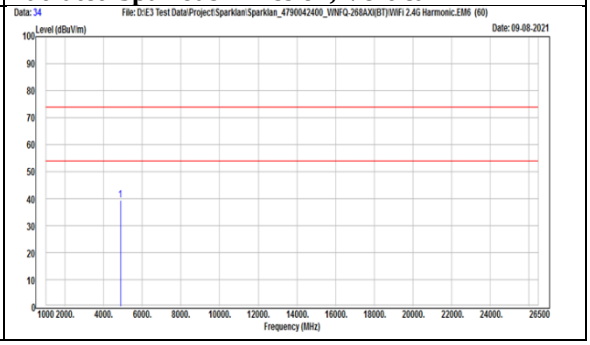
Mode	802.11b	Channel	1

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	*	4824	36.71	2.55	39.26	74	-34.74	PK
Vertical	*	4824	37.49	2.55	40.04	74	-33.96	PK

TX, 802.11b (Ch 1) Radiated Spurious Emission, Horizontal	TX, 802.11b (Ch 1) Radiated Spurious Emission, Vertical
	

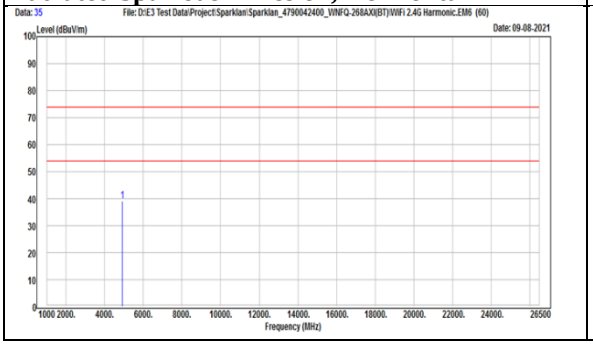
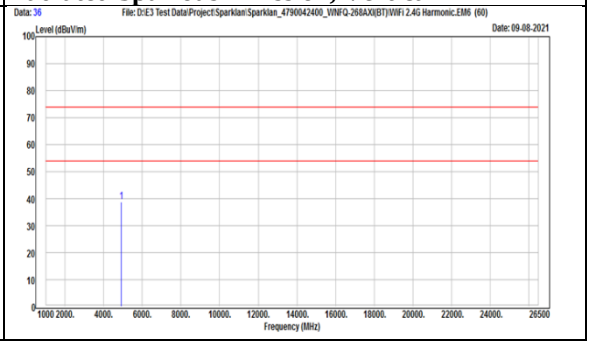
Mode	802.11b	Channel	6

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	*	4874	37.88	2.66	40.54	74	-33.46	PK
Vertical	*	4874	36.64	2.66	39.3	74	-34.7	PK

TX, 802.11b (Ch 6) Radiated Spurious Emission, Horizontal	TX, 802.11b (Ch 6) Radiated Spurious Emission, Vertical
	

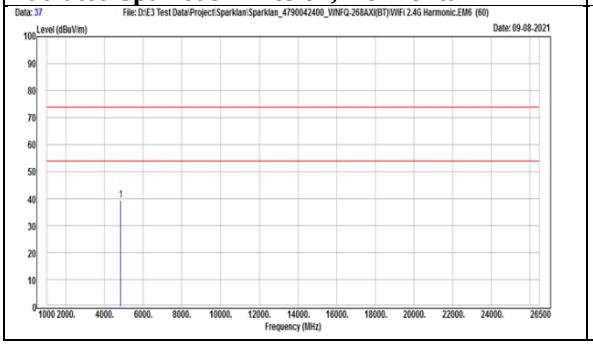
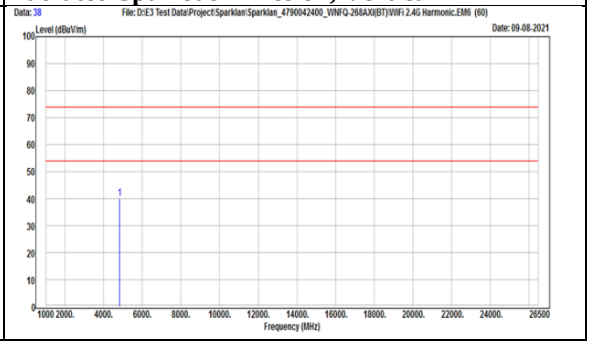
Mode	802.11b	Channel	11

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	*	4924	36.47	2.61	39.08	74	-34.92	PK
Vertical	*	4924	36.2	2.61	38.81	74	-35.19	PK

TX, 802.11b (Ch 11) Radiated Spurious Emission, Horizontal	TX, 802.11b (Ch 11) Radiated Spurious Emission, Vertical
	

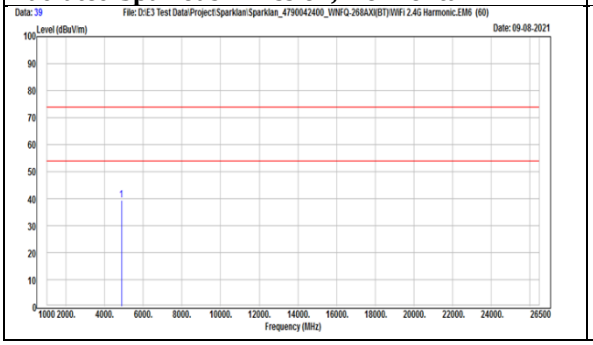
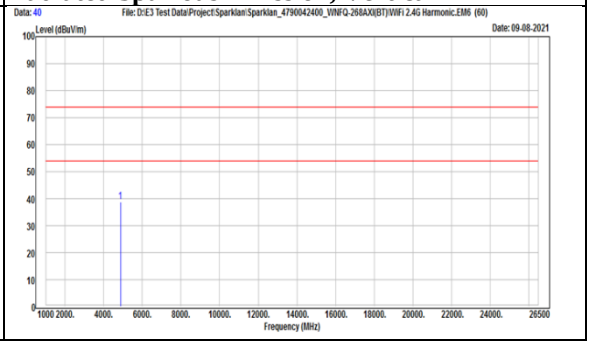
Mode	802.11g	Channel	1

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	*	4824	36.75	2.55	39.3	74	-34.7	PK
Vertical	*	4824	37.3	2.55	39.85	74	-34.15	PK

TX, 802.11g (Ch 1) Radiated Spurious Emission, Horizontal	TX, 802.11g (Ch 1) Radiated Spurious Emission, Vertical
	

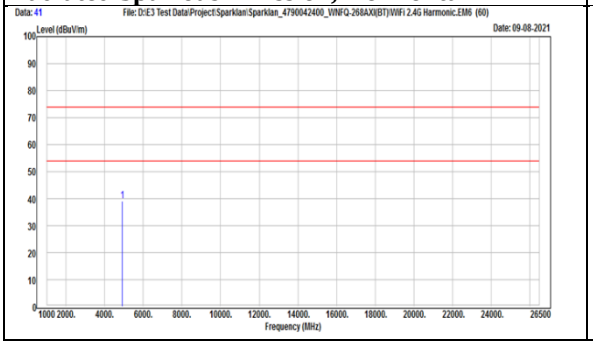
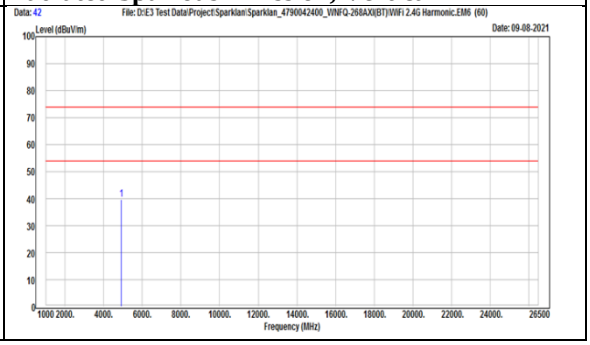
Mode	802.11g	Channel	6

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	*	4874	36.68	2.66	39.34	74	-34.66	PK
Vertical	*	4874	36.23	2.66	38.89	74	-35.11	PK

TX, 802.11g (Ch 6) Radiated Spurious Emission, Horizontal	TX, 802.11g (Ch 6) Radiated Spurious Emission, Vertical
	

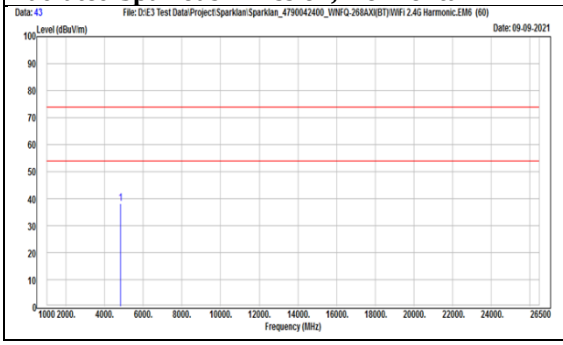
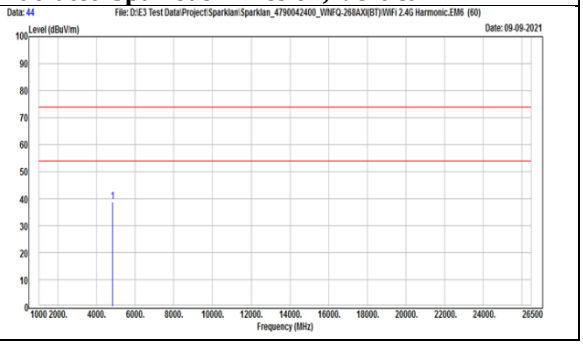
Mode	802.11g	Channel	11

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	*	4924	36.44	2.61	39.05	74	-34.95	PK
Vertical	*	4924	36.97	2.61	39.58	74	-34.42	PK

TX, 802.11g (Ch 11) Radiated Spurious Emission, Horizontal	TX, 802.11g (Ch 11) Radiated Spurious Emission, Vertical
	

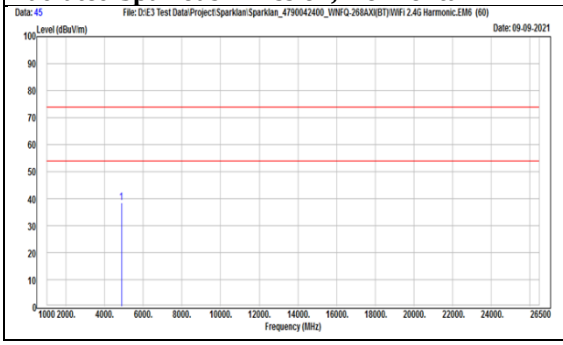
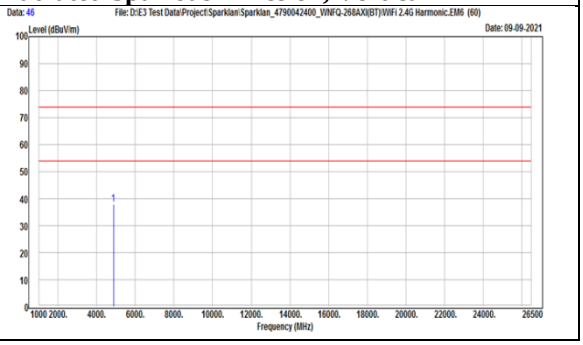
Mode	802.11ax(HE20)	Channel	1

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	*	4824	35.65	2.55	38.2	74	-35.8	PK
Vertical	*	4824	36.28	2.55	38.83	74	-35.17	PK

TX, 802.11ax(HE20) (Ch 1) Radiated Spurious Emission, Horizontal	TX, 802.11ax(HE20) (Ch 1) Radiated Spurious Emission, Vertical
	

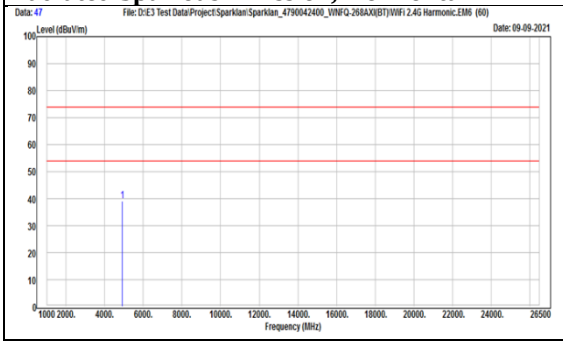
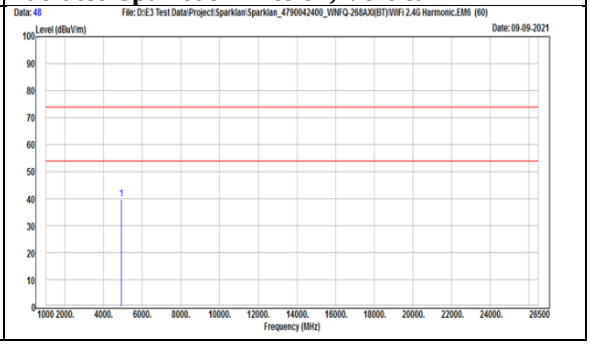
Mode	802.11ax(HE20)	Channel	6

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	*	4874	35.93	2.66	38.59	74	-35.41	PK
Vertical	*	4874	35.37	2.66	38.03	74	-35.97	PK

TX, 802.11ax(HE20) (Ch 6) Radiated Spurious Emission, Horizontal	TX, 802.11ax(HE20) (Ch 6) Radiated Spurious Emission, Vertical
	

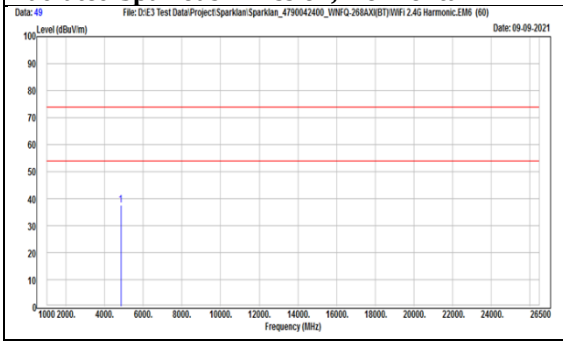
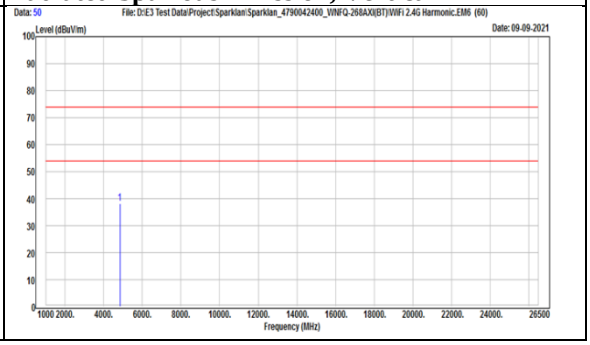
Mode	802.11ax(HE20)	Channel	11

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	*	4924	36.6	2.61	39.21	74	-34.79	PK
Vertical	*	4924	37.18	2.61	39.79	74	-34.21	PK

TX, 802.11ax(HE20) (Ch 11) Radiated Spurious Emission, Horizontal	TX, 802.11ax(HE20) (Ch 11) Radiated Spurious Emission, Vertical
	

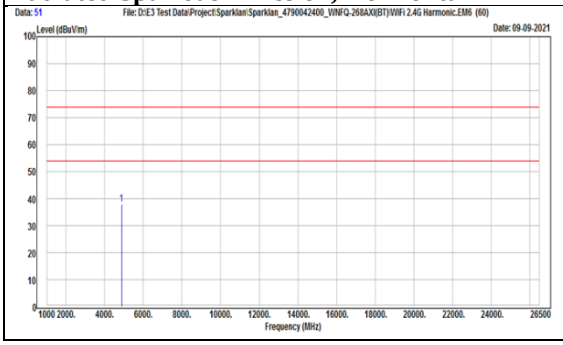
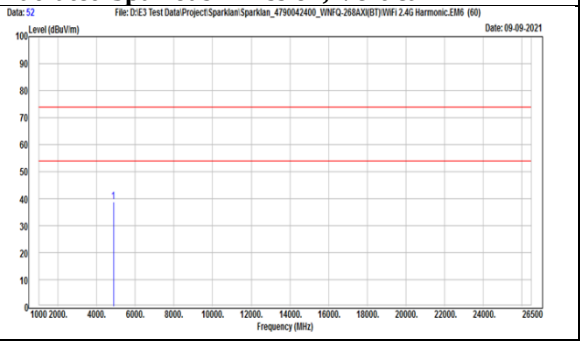
Mode	802.11ax(HE40)	Channel	3

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	*	4844	35.02	2.66	37.68	74	-36.32	PK
Vertical	*	4844	35.44	2.66	38.1	74	-35.9	PK

TX, 802.11ax(HE40) (Ch 3) Radiated Spurious Emission, Horizontal	TX, 802.11ax(HE40) (Ch 3) Radiated Spurious Emission, Vertical
	

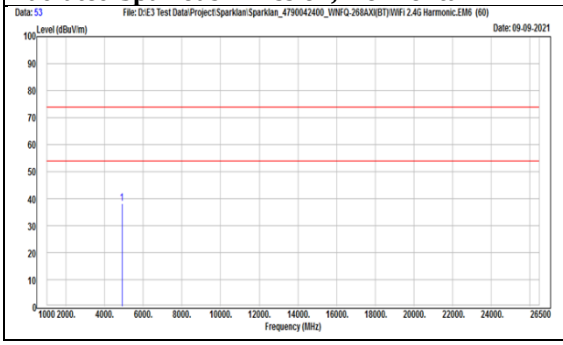
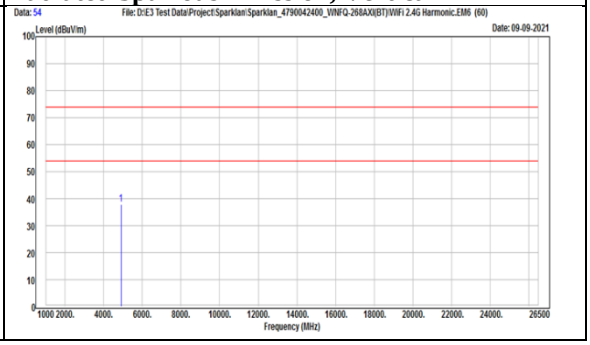
Mode	802.11ax(HE40)	Channel	6

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	*	4874	35.23	2.66	37.89	74	-36.11	PK
Vertical	*	4874	36.18	2.66	38.84	74	-35.16	PK

TX, 802.11ax(HE40) (Ch 6) Radiated Spurious Emission, Horizontal	TX, 802.11ax(HE40) (Ch 6) Radiated Spurious Emission, Vertical
	

Mode	802.11ax(HE40)	Channel	9

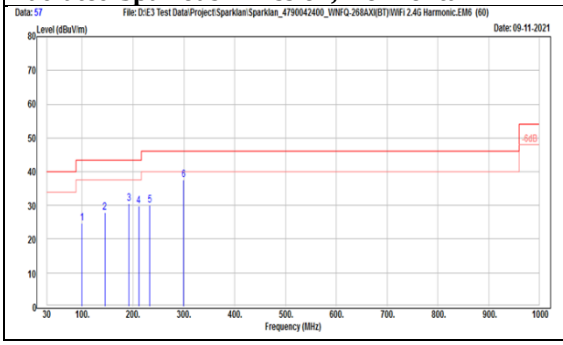
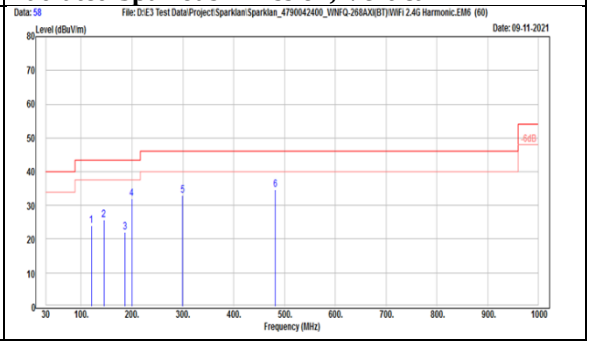
Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	*	4904	35.54	2.63	38.17	74	-35.83	PK
Vertical	*	4904	35.37	2.63	38	74	-36	PK

TX, 802.11ax(HE40) (Ch 9) Radiated Spurious Emission, Horizontal	TX, 802.11ax(HE40) (Ch 9) Radiated Spurious Emission, Vertical
	

Below 1 GHz

Mode	802.11b	Channel	6

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		99.84	41.26	-16.45	24.81	43.5	-18.69	PK
		144.46	39.58	-11.81	27.77	43.5	-15.73	PK
		191.99	43.78	-13.26	30.52	43.5	-12.98	PK
		211.39	43.55	-13.61	29.94	43.5	-13.56	PK
		232.73	42.46	-12.4	30.06	46	-15.94	PK
		299.66	47.57	-9.94	37.63	46	-8.37	PK
Vertical		120.21	38.27	-14.3	23.97	43.5	-19.53	PK
		144.46	37.47	-11.81	25.66	43.5	-17.84	PK
		186.17	35.05	-12.89	22.16	43.5	-21.34	PK
		199.75	45.96	-13.91	32.05	43.5	-11.45	PK
		299.66	43.01	-9.94	33.07	46	-12.93	PK
		482.02	39.67	-5.1	34.57	46	-11.43	PK

TX, 802.11b (Ch 6) Radiated Spurious Emission, Horizontal	TX, 802.11b (Ch 6) Radiated Spurious Emission, Vertical
	

Conducted method

The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).

Conducted Measurement Reading value has been considered factor offset during the test, detail information as below:

a. The composite gain will be used when signal support the correlated signal.

(Composite gain = Gain + Array Gain = 3.7 + 10*log(2) = 6.71dBi)

b. In restricted bands below 1000 MHz, add upper bound on ground plane reflection:

For f = 30 – 1000 MHz, add 4.7 dB.

c. Following KDB 662911 D01, E)3)a)(iii) Measure add 10*log(N_{ANT}) dB, where N_{ANT} is the number of outputs = 10*log(2) = 3.01dBi.

Conducted Measurement correct value is coming across equation for converting the Field Strength to EIRP, detail information as below:

a. The test reading used dBuV, converted by dBm = dBuV–107dB. (Conversions for 50ohm systems)

b. Emission Result (dBuV/m), converted by E (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8 dB.
Where d is the measurement distance, in 3 m.
Where dBm = dBuV–107 dB.
Thus:

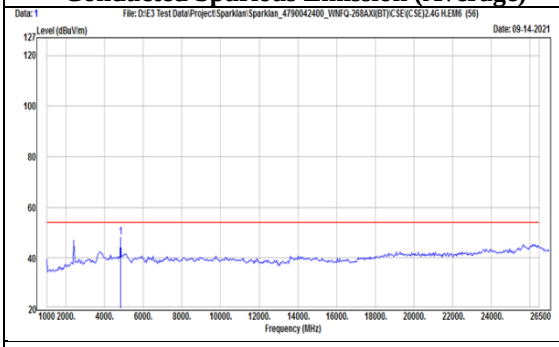
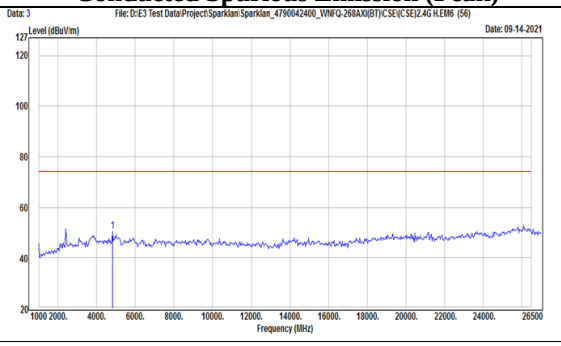
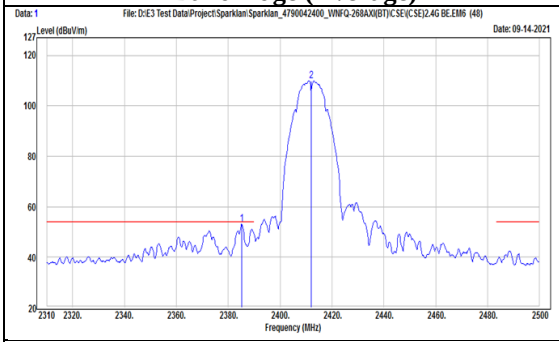
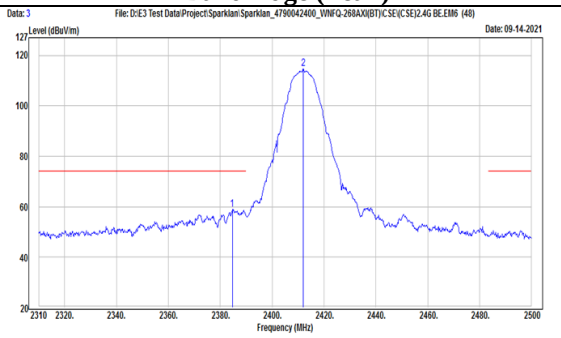
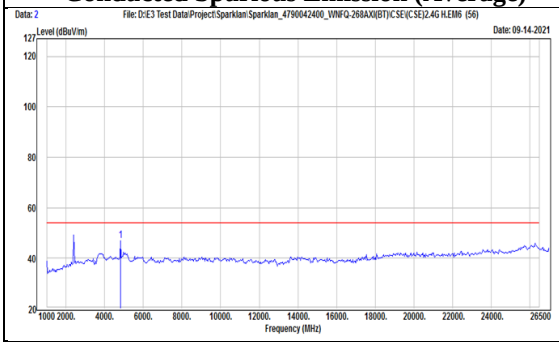
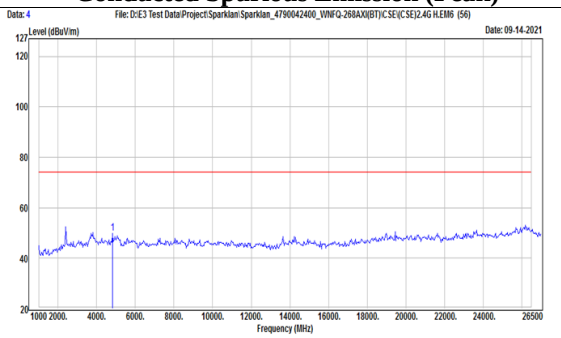
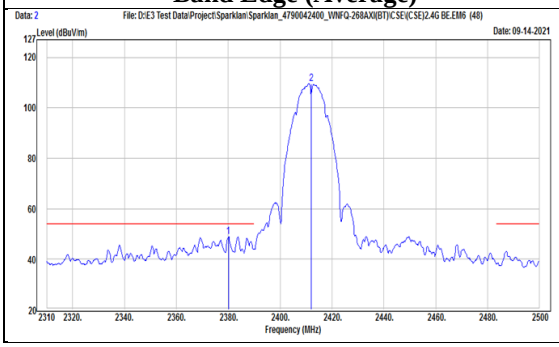
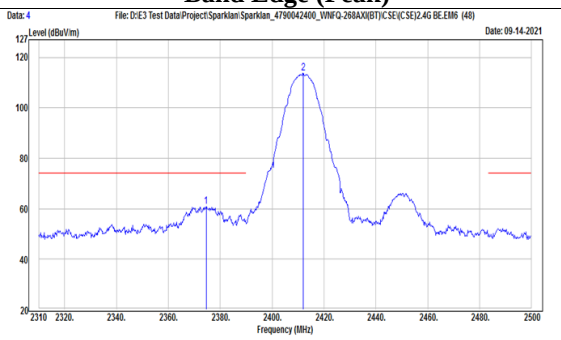
E (dBuV/m) = dBuV–107 – 20log(3) + 104.8
= dBuV–11.74

Correct Factor = –11.74 (dB/m)

Above 1 GHz

Mode	802.11b	Channel	1

TX Chain	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit	Margin	Remark
Chain 0		2384.67	70.79	-11.74	59.05	74	-14.95	PK
		2385.24	64.73	-11.74	52.99	54	-1.01	AVG
	@	2412	126.43	-11.74	114.69	N/A	N/A	PK
	@	2412	121.68	-11.74	109.94	N/A	N/A	AVG
		4824	62.19	-11.74	50.45	74	-23.55	PK
		4824	59.96	-11.74	48.22	54	-5.78	AVG
Chain 1		2374.6	72.63	-11.74	60.89	74	-13.11	PK
		2380.11	60.64	-11.74	48.9	54	-5.1	AVG
	@	2412	125.53	-11.74	113.79	N/A	N/A	PK
	@	2412	121.2	-11.74	109.46	N/A	N/A	AVG
		4824	61.55	-11.74	49.81	74	-24.19	PK
		4824	58.59	-11.74	46.85	54	-7.15	AVG

Tx, 802.11b (Ch 1), Chain 0 Conducted Spurious Emission (Average)	Tx, 802.11b (Ch 1), Chain 0 Conducted Spurious Emission (Peak)
	
Tx, 802.11b (Ch 1), Chain 0 Band Edge (Average)	**Tx, 802.11b (Ch 1), Chain 0 Band Edge (Peak)**
	
Tx, 802.11b (Ch 1), Chain 1 Conducted Spurious Emission (Average)	**Tx, 802.11b (Ch 1), Chain 1 Conducted Spurious Emission (Peak)**
	
Tx, 802.11b (Ch 1), Chain 1 Band Edge (Average)	**Tx, 802.11b (Ch 1), Chain 1 Band Edge (Peak)**
	

Mode	802.11b	Channel	6

TX Chain	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Chain 0		2375.17	70.8	-11.74	59.06	74	-14.94	PK
		2375.17	62.63	-11.74	50.89	54	-3.11	AVG
	@	2437	127.15	-11.74	115.41	N/A	N/A	PK
	@	2437	122.43	-11.74	110.69	N/A	N/A	AVG
		2487.46	64.64	-11.74	52.9	54	-1.1	AVG
		2488.6	70.53	-11.74	58.79	74	-15.21	PK
		4874	61.12	-11.74	49.38	74	-24.62	PK
		4874	57.79	-11.74	46.05	54	-7.95	AVG
Chain 1		2378.97	56.53	-11.74	44.79	54	-9.21	AVG
		2389.61	67.29	-11.74	55.55	74	-18.45	PK
	@	2437	126.65	-11.74	114.91	N/A	N/A	PK
	@	2437	121.91	-11.74	110.17	N/A	N/A	AVG
		2483.66	66.36	-11.74	54.62	74	-19.38	PK
		2486.7	57.26	-11.74	45.52	54	-8.48	AVG
		4874	64.75	-11.74	53.01	54	-0.99	AVG
		4874	66.73	-11.74	54.99	74	-19.01	PK