

FCC Test Report

Product Name	Notebook
Model No	SF20GM3, SFxxxxxxxxxx (x=0~9;A~Z;a~z;- _)
FCC ID	WL6-SFX0GMX

Applicant	ELITEGROUP COMPUTER SYSTEMS CO., LTD
Address	No.239, Sec. 2, Ti Ding Blvd., Taipei, Taiwan

Date of Receipt	Dec. 10, 2020
Issued Date	Feb. 01, 2021
Report No.	20C0384R-E3032110125
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test Report

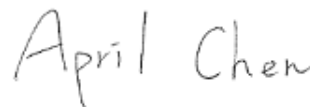
Issued Date: Feb. 01, 2021

Report No.: 20C0384R-E3032110125



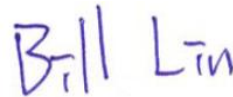
Product Name	Notebook
Applicant	ELITEGROUP COMPUTER SYSTEMS CO., LTD
Address	No.239, Sec. 2, Ti Ding Blvd., Taipei, Taiwan
Manufacturer	Golden Elite Technology (SHENZHEN) Co., Ltd.
Model No.	SF20GM3, SFxxxxxxxxxx (x=0~9;A~Z;a~z;- _)
FCC ID.	WL6-SFX0GMX
EUT Rated Voltage	AC 100-240V, 50-60Hz
EUT Test Voltage	AC 120V / 60Hz
Trade Name	ECS ELITEGROUP
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E ANSI C63.4: 2014, ANSI C63.10: 2013 KDB Publication 789033
Test Result	Complied

Documented By :



(Senior Adm. Specialist / April Chen)

Tested By :



(Engineer / Bill Lin)

Approved By :



(Director / Vincent Lin)

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Revision History

Report No.	Version	Description	Issued Date
20C0384R-E3032110125	V1.0	Initial issue of report.	2021-02-01

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Notebook
Trade Name	ECS ELITEGROUP
FCC ID.	WL6-SFX0GMX
Model No.	SF20GM3, SFxxxxxxxxxx (x=0~9;A~Z;a~z;-_)
Frequency Range	802.11a/n-20MHz: 5180-5240MHz 802.11n-40MHz: 5190-5230MHz 802.11ac-80MHz: 5210MHz
Number of Channels	802.11a/n-20MHz: 4; 802.11n-40MHz: 2 802.11ac-80MHz: 1
Data Rate	802.11a: 6 - 54Mbps 802.11n: up to 150Mbps 802.11ac-80MHz: up to 433.3MHz
Channel Control	Auto
Type of Modulation	802.11a/n/ac: OFDM, BPSK, QPSK, 16QAM, 64QAM, 256QAM
Antenna Type	PIFA Antenna
Antenna Gain	Refer to the table "Antenna List"
Power Adapter	MFR: SunWard, M/N: AD24BUH120200 Input: AC 100-240V, 50-60Hz 0.7A MAX Output: 12V $\overline{\text{---}}$ 2.0A Cable out: Non-Shielded, 1.5m

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	WGT	13-130PFW8055(QS)	PIFA Antenna	2.82dBi for 5.150-5.250 GHz

Note: The antenna of EUT is conform to FCC 15.203.

802.11a/n-20MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 36:	5180 MHz	Channel 40:	5200 MHz	Channel 44:	5220 MHz	Channel 48:	5240 MHz

802.11n-40MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency
Channel 38:	5190 MHz	Channel 46:	5230 MHz

802.11ac-80MHz Center Working Frequency of Each Channel:

Channel	Frequency
Channel 42:	5210 MHz

Note:

1. This device is a Notebook with a built-in 2.4 GHz and 5 GHz WLAN and Bluetooth V5.0, V3.0, V2.1+EDR transceiver, this report for 5GHz WLAN.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report.
4. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.

Test Mode	Mode 1: Transmit (802.11a-6Mbps) Mode 2: Transmit (802.11n-20BW 7.2Mbps) Mode 3: Transmit (802.11n-40BW 15Mbps) Mode 4: Transmit (802.11ac-80BW 32.5Mbps)
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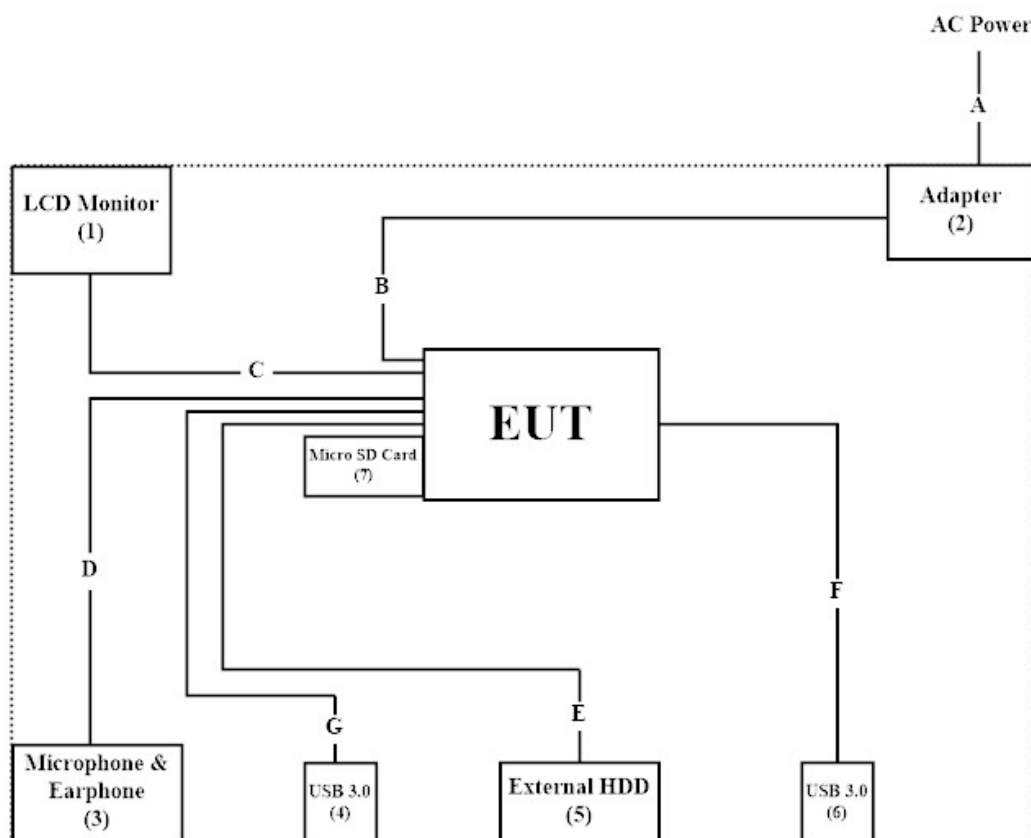
1.2. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	LCD Monitor	Lenovo	T24d	V5CZ4272	Non-Shielded, 1.8m
2	Adapter	SunWard	AD24BUH120200	N/A	N/A
3	Microphone & Earphone	PCHOME	N/A	N/A	N/A
4	USB 3.0	Transcend	TS1TSJ25M3	D468623809	N/A
5	External HDD	SanDisk	SanDisk Extreme 900	N/A	N/A
6	USB 3.0	Transcend	TS1TSJ25M3	D468623808	N/A
7	Micro SD Card 1GB	SanDisk	N/A	0801002841D2N	N/A

Signal Cable Type	Signal cable Description
A	Power Cable
B	Power Cable
C	HDMI Cable
D	Microphone & Earphone Cable
E	USB Cable
F	USB Cable
G	USB Cable

1.3. Configuration of tested System



1.4. EUT Exercise Software

1. Setup the EUT as shown in Section 1.3.
2. Execute software “DRTU Ver.11.1941.0.10270” on the EUT.
3. Configure the test mode, the test channel, and the data rate.
4. Press “OK” to start the continuous Transmit.
5. Verify that the EUT works properly.

1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Conducted Emission	Temperature (°C)	10~40 °C	21.9 °C
	Humidity (%RH)	10~90 %	57.8 %
Radiated Emission	Temperature (°C)	10~40 °C	21.5 °C
	Humidity (%RH)	10~90 %	63.5 %
Conductive	Temperature (°C)	10~40 °C	22 °C
	Humidity (%RH)	10~90 %	55 %

USA : FCC Registration Number: TW0023

Canada : IC Registration Number: 25880

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
New Taipei City 24457, Taiwan, R.O.C.
Phone number : 886-2-2602-7968
Fax number : 866-2-2602-3286
Email address : info.tw@dekra.com
Website : <http://www.dekra.com.tw>

1.6. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	EMI Test Receiver	R&S	ESR7	101601	2020.05.28	2021.05.27
X	Two-Line V-Network	R&S	ENV216	101306	2020.03.25	2021.03.24
X	Two-Line V-Network	R&S	ENV216	101307	2020.04.17	2021.04.16
X	Coaxial Cable	DEKRA	RG400_BNC	RF001	2020.05.24	2021.05.23

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : DEKRA Testing System V2.0.

For Conducted measurements /ASR2

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSV30	103464	2020.02.11	2021.02.10
X	Peak Power Analyzer	KEYSIGHT	8900B	MY51000539	2020.05.13	2021.05.12
X	Power Sensor	KEYSIGHT	N1923A	MY59240002	2020.05.22	2021.05.21
X	Power Sensor	KEYSIGHT	N1923A	MY59240003	2020.05.22	2021.05.21

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : DEKRA Conduction Test System V9.0.5.

For Radiated measurements /ACB2

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	AMETEK	HLA6121	49611	2020.03.16	2021.03.15
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2020.07.20	2021.07.19
X	Horn Antenna	ETS-Lindgren	3117	00201366	2020.09.21	2021.09.20
X	Horn Antenna	ETS-Lindgren	3117	00203761	2020.11.23	2021.11.22
X	Horn Antenna	Com-Power	AH-840	101087	2020.06.08	2021.06.07
X	Pre-Amplifier	EMCI	EMC001330	980301	2020.06.04	2021.06.03
X	Pre-Amplifier	EMCI	EMC051845SE	980632	2020.08.21	2021.08.20
X	Pre-Amplifier	EMCI	EMC05820SE	980310	2020.06.24	2021.06.23
X	Pre-Amplifier	EMCI	EMC184045SE	980314	2020.06.10	2021.06.09
	Filter	MICRO TRONICS	BRM50702	G251	2020.09.17	2021.09.16
X	Filter	MICRO TRONICS	BRM50716	G188	2020.09.17	2021.09.16
X	EMI Test Receiver	R&S	ESR7	101601	2020.05.28	2021.05.27
X	Spectrum Analyzer	R&S	FSV40	101148	2020.03.16	2021.03.15
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2020.07.03	2021.07.02
X	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2020.06.10	2021.06.09

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : DEKRA Testing System V2.0.

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document, and is described in each test chapter of this report.

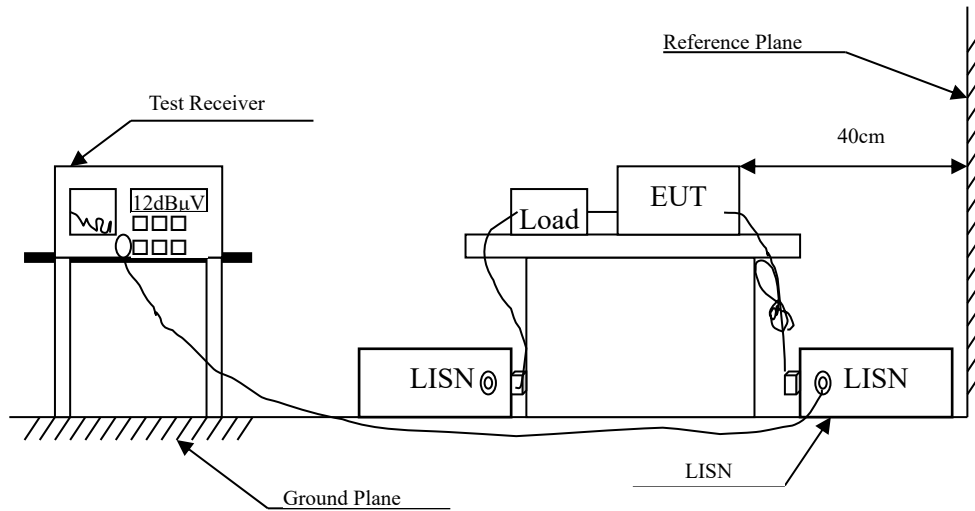
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	Uncertainty	
Conducted Emission	± 3.42 dB	
Maximun conducted output power	Power Meter ± 0.91 dB	Spectrum Analyzer ± 2.53 dB
Power Density	± 2.53 dB	
Radiated Emission	Under 1GHz ± 4.06 dB	Above 1GHz ± 3.73 dB
Band Edge	Under 1GHz ± 4.06 dB	Above 1GHz ± 3.73 dB
Occupied Bandwidth	± 682.83 Hz	
Duty Cycle	± 2.31 ms	

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dB μ V) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

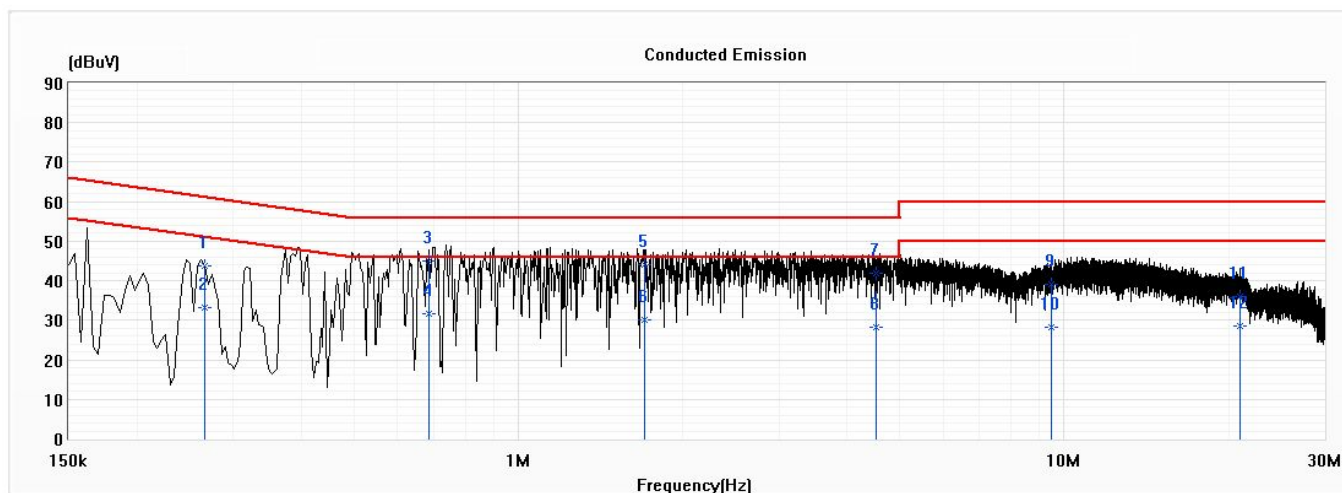
Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4:2014 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.4. Test Result of Conducted Emission

Product : Notebook
 Test Item : Conducted Emission Test
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5210MHz)
 Test Date : 2021/01/28

Line1



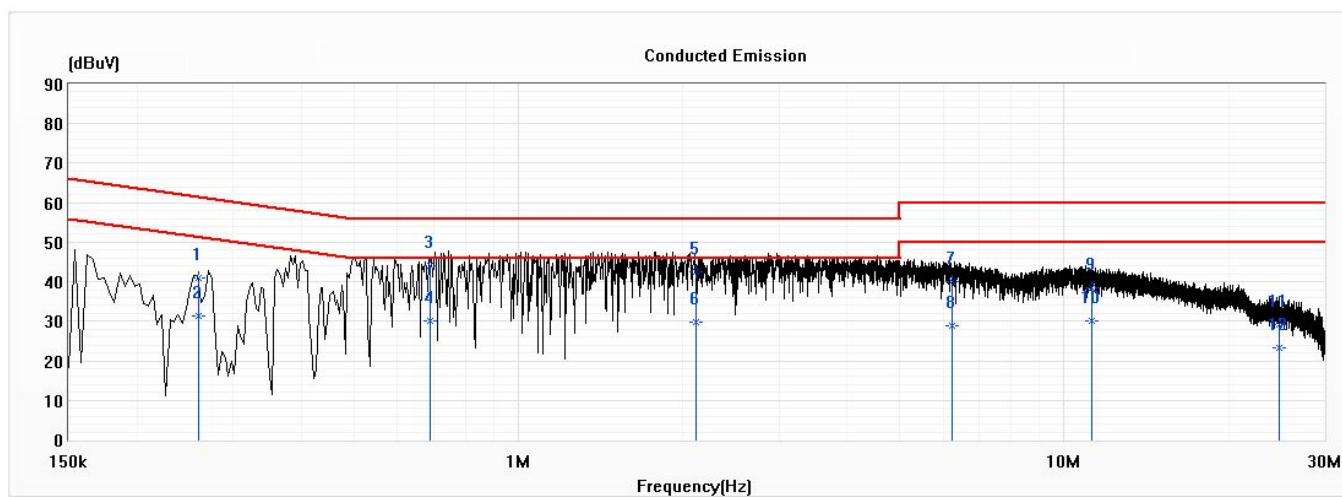
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.266	43.90	61.23	-17.33	34.25	9.65	QP
2	0.266	33.32	51.23	-17.91	23.66	9.65	AV
*3	0.687	44.93	56.00	-11.07	35.26	9.67	QP
4	0.687	31.71	46.00	-14.29	22.03	9.67	AV
5	1.703	44.22	56.00	-11.78	34.51	9.71	QP
6	1.703	30.03	46.00	-15.97	20.32	9.71	AV
7	4.532	41.86	56.00	-14.14	32.07	9.78	QP
8	4.532	28.11	46.00	-17.89	18.32	9.78	AV
9	9.460	39.24	60.00	-20.76	29.36	9.88	QP
10	9.460	28.10	50.00	-21.90	18.22	9.88	AV
11	21.009	36.08	60.00	-23.92	26.11	9.97	QP
12	21.009	28.65	50.00	-21.35	18.68	9.97	AV

Remark:

1. "*" means this data is the worst emission level; "!" means this data is over limit.
2. Emission Level=Reading Level + Correct Factor(Correct Factor=LISN Factor+Cable Loss).
3. Margin=Emission Level-Limit

Product : Notebook
 Test Item : Conducted Emission Test
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5210MHz)
 Test Date : 2021/01/28

N



No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.259	40.87	61.46	-20.60	31.20	9.67	QP
2	0.259	31.30	51.46	-20.16	21.63	9.67	AV
*3	0.688	44.01	56.00	-11.99	34.34	9.68	QP
4	0.688	30.13	46.00	-15.87	20.46	9.68	AV
5	2.114	42.66	56.00	-13.34	32.93	9.73	QP
6	2.114	29.82	46.00	-16.18	20.08	9.73	AV
7	6.241	39.96	60.00	-20.04	30.12	9.83	QP
8	6.241	28.72	50.00	-21.28	18.89	9.83	AV
9	11.227	38.46	60.00	-21.54	28.53	9.93	QP
10	11.227	29.95	50.00	-20.05	20.02	9.93	AV
11	24.826	29.22	60.00	-30.78	19.15	10.08	QP
12	24.826	23.16	50.00	-26.84	13.09	10.08	AV

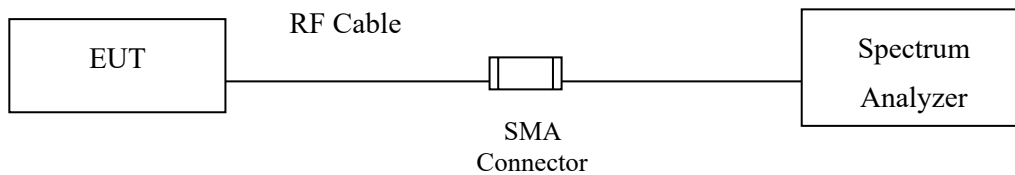
Remark:

1. "*" means this data is the worst emission level; "!" means this data is over limit.
2. Emission Level=Reading Level + Correct Factor(Correct Factor=LISN Factor+Cable Loss).
3. Margin=Emission Level-Limit

3. Maximun conducted output power

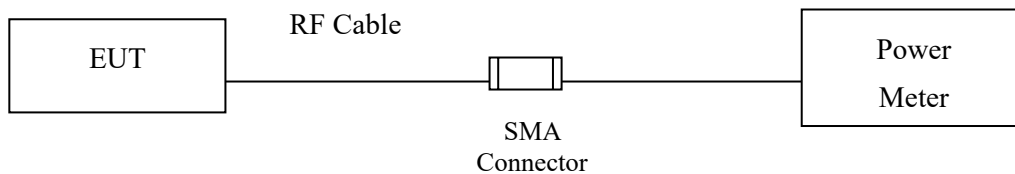
3.1. Test Setup

99% Occupied Bandwidth

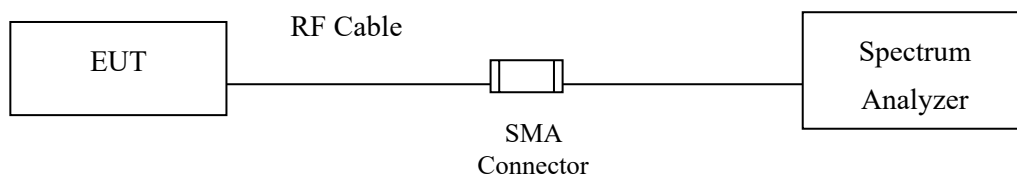


Conduction Power Measurement

Conduction Power Measurement (for 802.11an)



Conduction Power Measurement (for 802.11ac)



3.2. Limits

For the band 5.15-5.25 GHz,

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W, provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 99% emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple colocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

3.3. Test Procedure

As an alternative to FCC KDB-789033, the EUT maximum conducted output power was measured with an average power meter employing a video bandwidth greater the 6dB BW of the emission under test. Maximum conducted output power was read directly from the meter across all data rates, and across three channels within each sub-band. Special care was used to make sure that the EUT was transmitting in continuous mode. This method exceeds the limitations of FCC KDB-789033, and provides more accurate measurements.

802.11an (BW \leq 40MHz) Maximum conducted output power using KDB 789033 section E)3)b) Method PM-G (Measurement using a gated RF average power meter)

Note: the power meter have a video bandwidth that is greater than or equal to the measurement bandwidth, (Anritsu/ MA2411B video bandwidth: 65MHz)

802.11ac (BW=80MHz) Maximum conducted output power using KDB 789033 section E)2)b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep).

When transmitted signals consist of two or more non-contiguous spectrum segments (e.g., 80+80 MHz mode) or when a single spectrum segment of a transmission crosses the boundary between two adjacent U-NII bands, KDB 644545 D03 section D) procedure is used for measurements.

3.4. Test Result of Maximum conducted output power

Product : Notebook
 Test Item : Maximum conducted output power
 Test Mode : Mode 1: Transmit (802.11a-6Mbps)
 Test Date : 2021/01/28

Cable loss=1dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
		Measurement Level (dBm)							
36	5180	17.27	--	--	--	--	--	--	--
40	5200	20.8	20.77	20.73	20.68	20.63	20.56	20.50	20.44
48	5240	20.74	--	--	--	--	--	--	--

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
36	5180	--	17.27	24	--
40	5200	--	20.80	24	--
48	5240	--	20.74	24	--

Note: Power Output Value =Reading value on average power meter + cable loss

Product : Notebook
 Test Item : Maximum conducted output power
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)
 Test Date : 2021/01/28

Cable loss=1dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	Data Rate (Mbps)							
		7.2	14.4	21.7	28.9	43.3	57.8	65	72.2
		Measurement Level (dBm)							
36	5180	17.26	--	--	--	--	--	--	--
40	5200	20.71	20.64	20.61	20.55	20.49	20.45	20.41	20.36
48	5240	20.7	--	--	--	--	--	--	--

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
36	5180	--	17.26	24	--
40	5200	--	20.71	24	--
48	5240	--	20.70	24	--

Note: Power Output Value =Reading value on average power meter + cable loss

Product : Notebook
 Test Item : Maximum conducted output power
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)
 Test Date : 2021/01/28

Cable loss=1dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	Data Rate (Mbps)							
		15	30	45	60	90	120	135	150
		Measurement Level (dBm)							
38	5190	17.81	--	--	--	--	--	--	--
46	5230	20.96	20.90	20.84	20.79	20.72	20.67	20.60	20.56

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
38	5190	--	17.81	24	--
46	5230	--	20.96	24	--

Note: Power Output Value =Reading value on average power meter + cable loss

Product : Notebook
 Test Item : Maximum conducted output power
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps)
 Test Date : 2021/01/28

Cable loss=1dB		Maximum conducted output power									
Channel No	Frequency (MHz)	Data Rate (Mbps)									
		VTH0	VTH1	VTH2	VTH3	VTH4	VTH5	VTH6	VTH7	VTH8	VTH9
42	5210	18.2	18.14	18.10	18.06	18.03	17.96	17.90	17.86	17.81	17.76

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

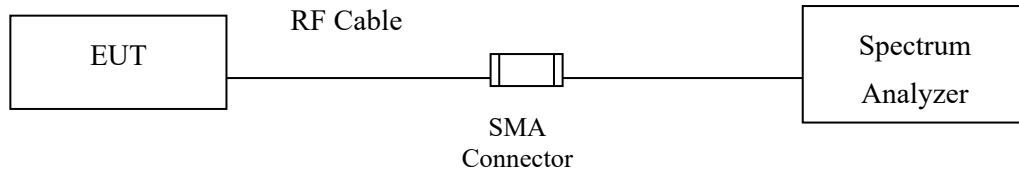
Maximum conducted output power Measurement

Channel No	Frequency Range	26dB Bandwidth	Output Power	Output Power Limit		Result
	(MHz)	(MHz)	(dBm)	(dBm)	dBm+10log(BW)	
42	5210	--	18.20	24	--	Pass

Note: Power Output Value = Reading value on Spectrum Analyzer + cable loss

4. Peak Power Spectral Density

4.1. Test Setup



4.2. Limits

For the band 5.15-5.25 GHz,

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.+

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

4.3. Test Procedure

The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

The Peak Power Spectral Density using KDB 789033 section F) procedure, Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer.

SA-1 method is selected to run the test.

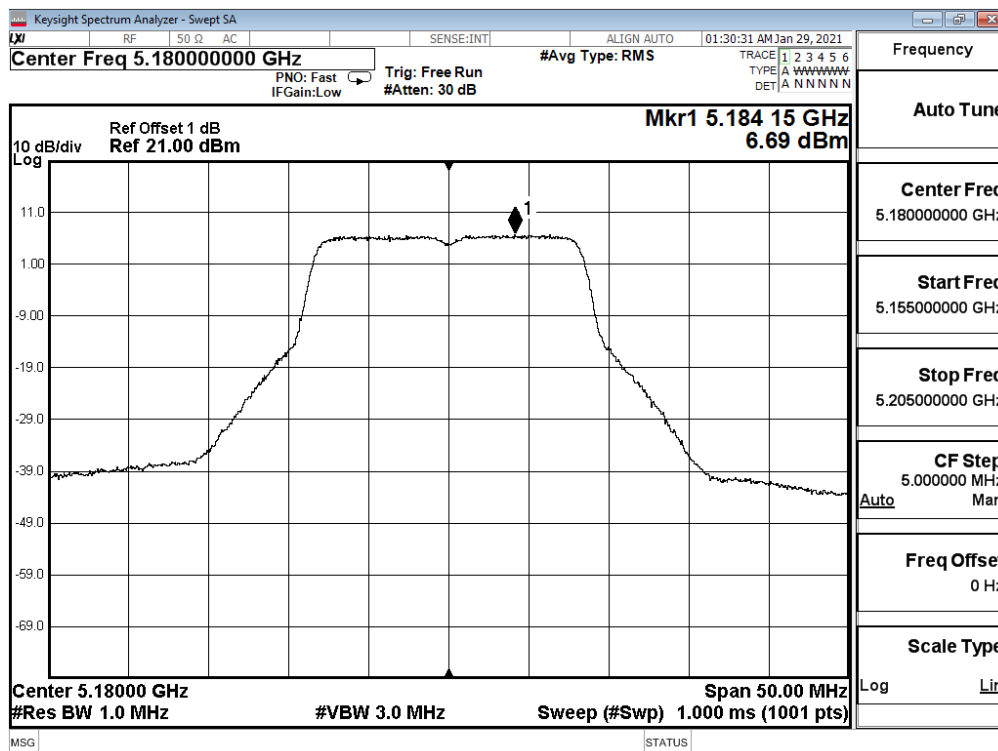
For the band 5.725-5.85 GHz, Scale the observed power level to an equivalent value in 500 kHz by adjusting (increase) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(500\text{ kHz}/100\text{ kHz}) = 6.98\text{ dB}$.

4.4. Test Result of Peak Power Spectral Density

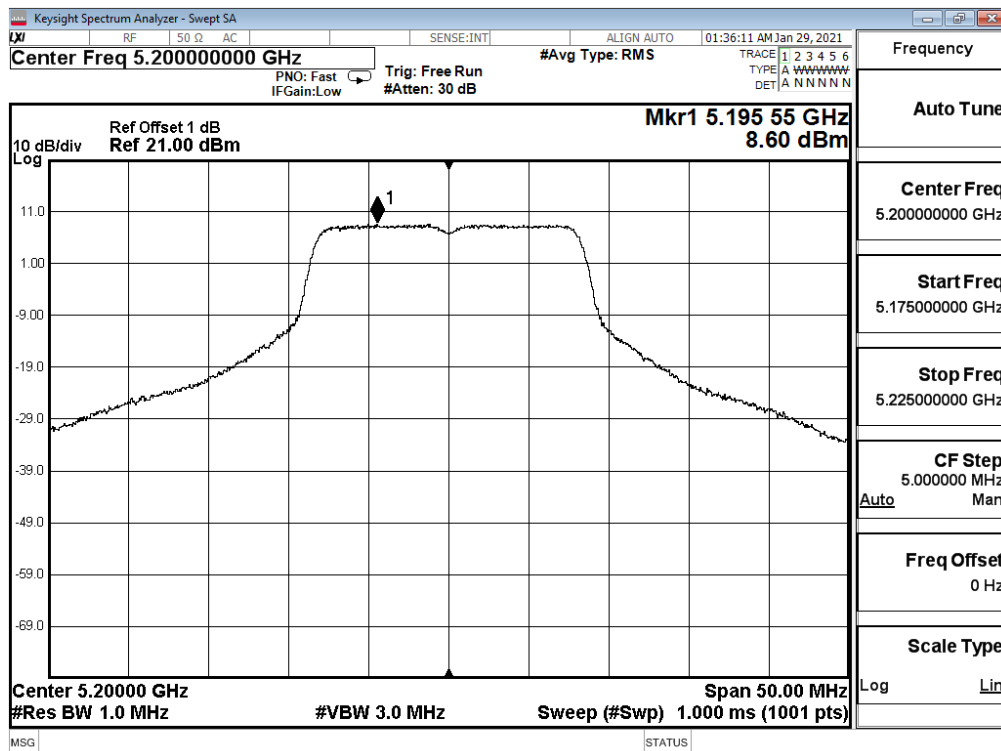
Product : Notebook
 Test Item : Peak Power Spectral Density
 Test Mode : Mode 1: Transmit (802.11a-6Mbps)
 Test Date : 2021/01/28

Channel Number	Frequency (MHz)	PPSD/MHz (dBm)	Duty Factor (dB)	Total PPSD/MHz (dBm)	Required Limit (dBm)	Result
36	5180	6.69	0.09	6.78	<11	Pass
40	5200	8.60	0.09	8.69	<11	Pass
48	5240	8.15	0.09	8.24	<11	Pass

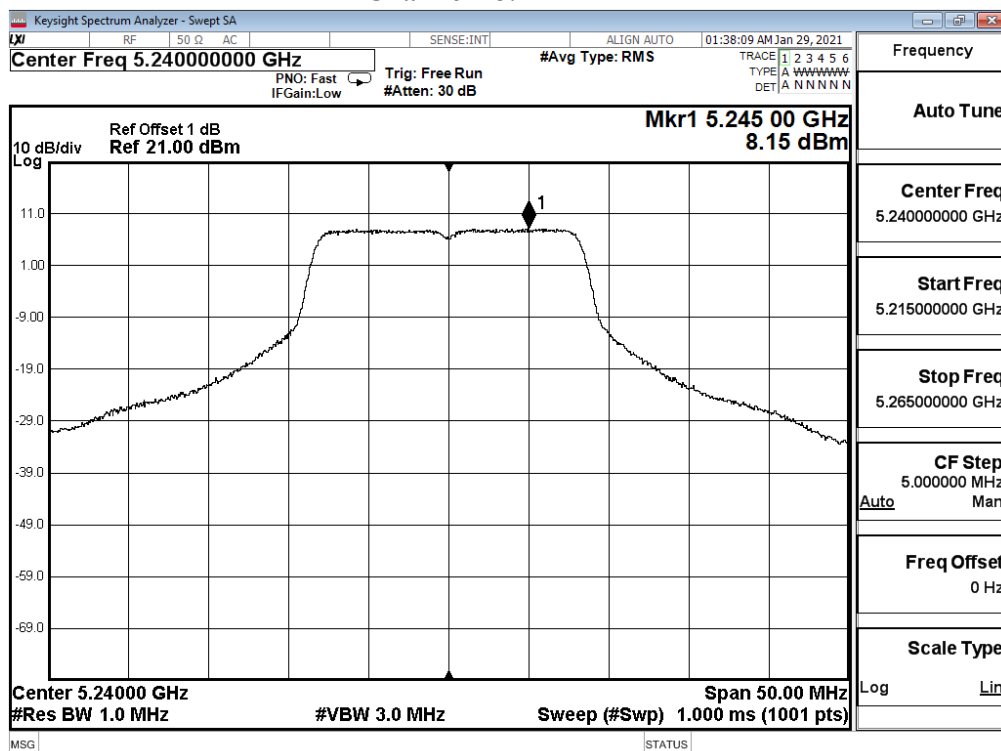
Channel 36:



Channel 40:



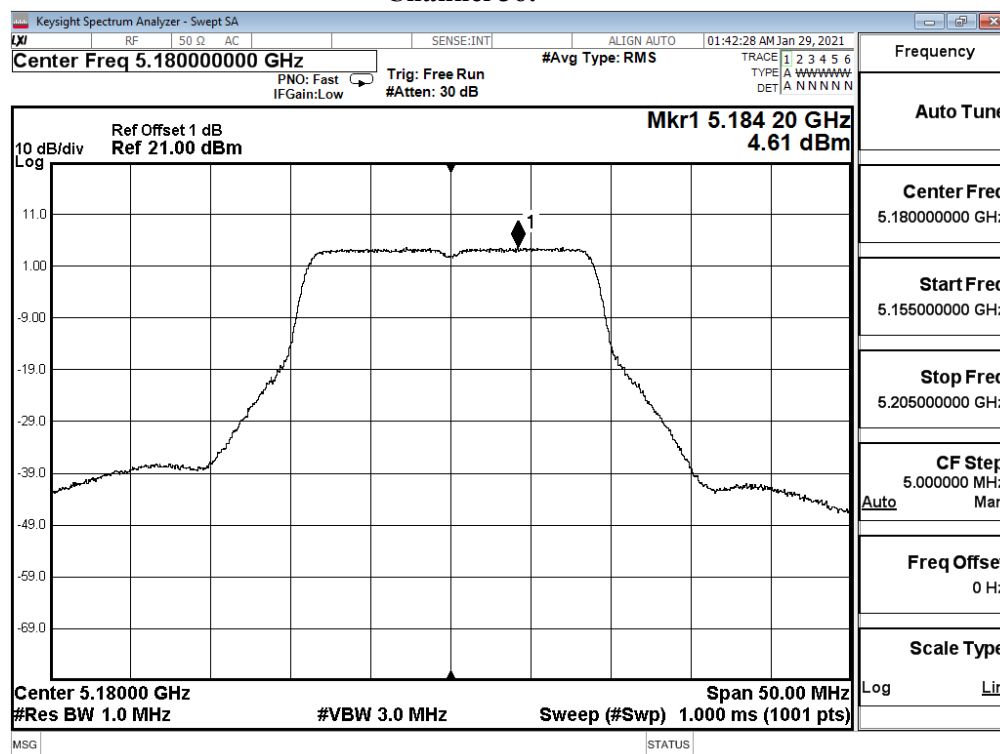
Channel 48:



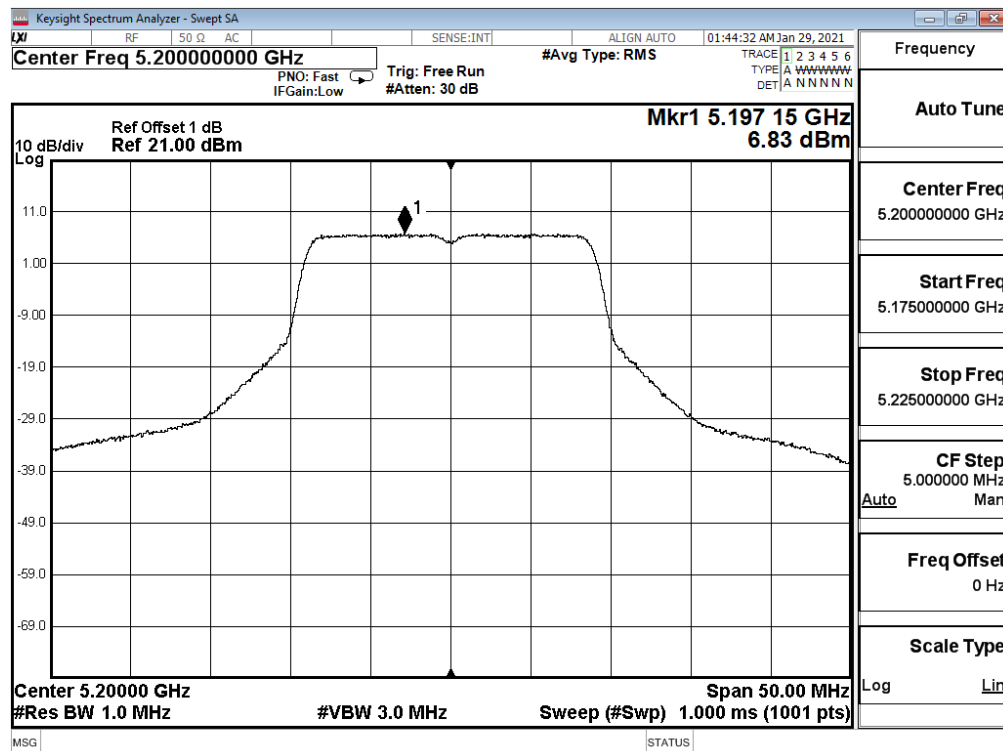
Product : Notebook
 Test Item : Peak Power Spectral Density
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)
 Test Date : 2021/01/28

Channel Number	Frequency (MHz)	PPSD/MHz (dBm)	Duty Factor (dB)	Total PPSD/MHz (dBm)	Required Limit (dBm)	Result
36	5180	4.61	0.10	4.71	<11	Pass
40	5200	6.83	0.10	6.93	<11	Pass
48	5240	7.55	0.10	7.65	<11	Pass

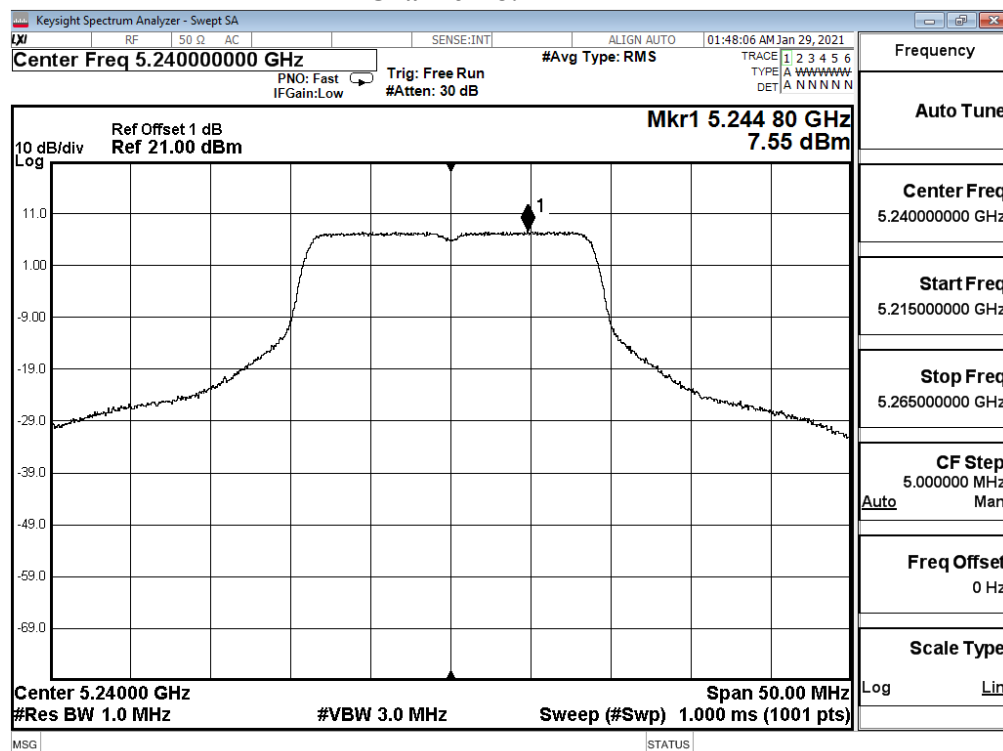
Channel 36:



Channel 40:



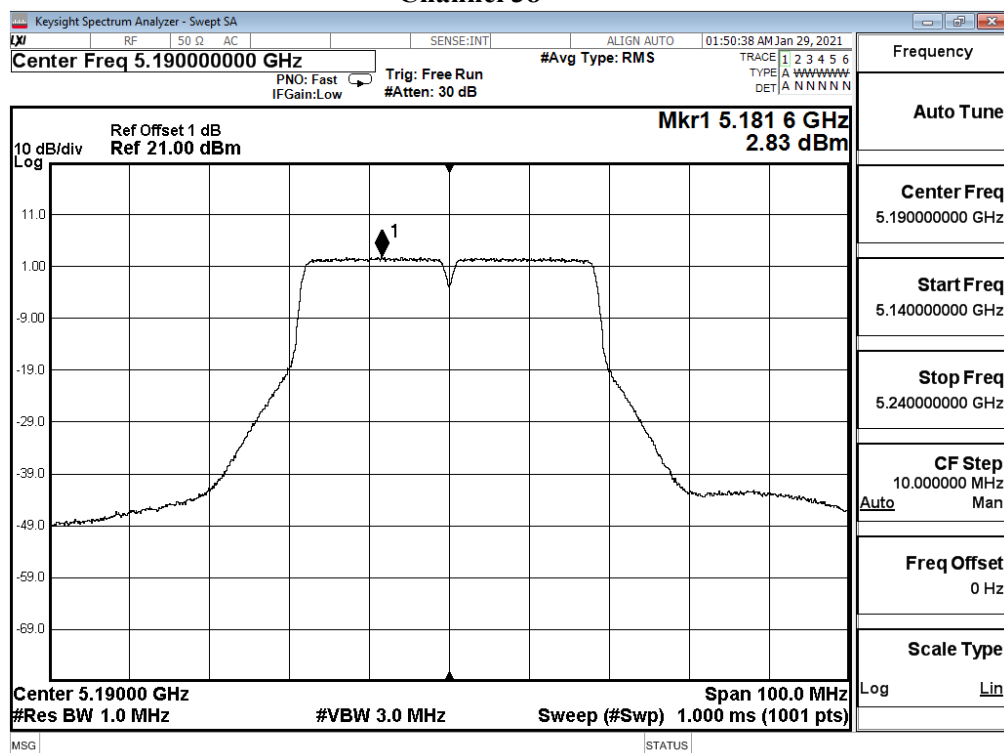
Channel 48:



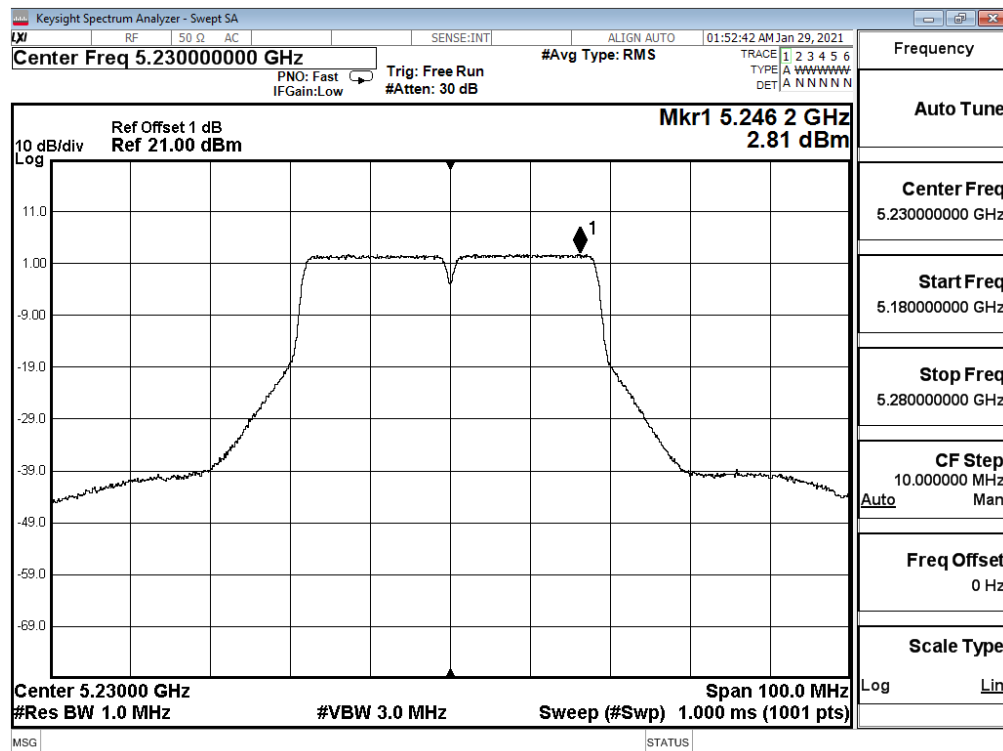
Product : Notebook
 Test Item : Peak Power Spectral Density
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)
 Test Date : 2021/01/28

Channel Number	Frequency (MHz)	PPSD/MHz (dBm)	Duty Factor (dB)	Total PPSD/MHz (dBm)	Required Limit (dBm)	Result
38	5190	2.83	0.20	3.03	<11	Pass
46	5230	2.81	0.20	3.01	<11	Pass

Channel 38



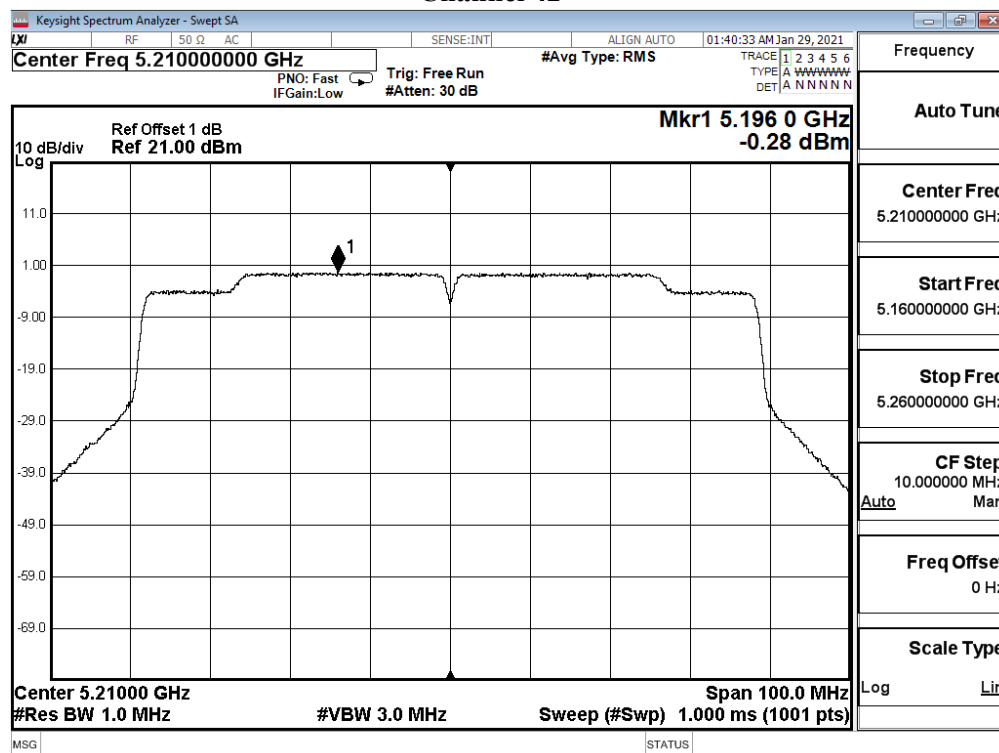
Channel 46



Product : Notebook
 Test Item : Peak Power Spectral Density
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps)
 Test Date : 2021/01/28

Channel Number	Frequency (MHz)	PPSD/MHz (dBm)	Duty Factor (dB)	Total PPSD/MHz (dBm)	Required Limit (dBm)	Result
42	5210	-0.28	0.40	0.12	<11	Pass

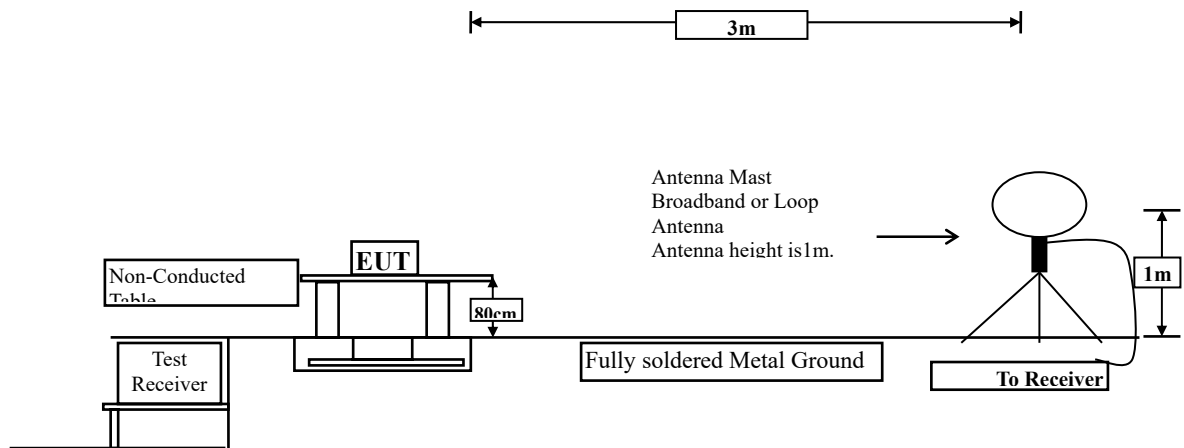
Channel 42



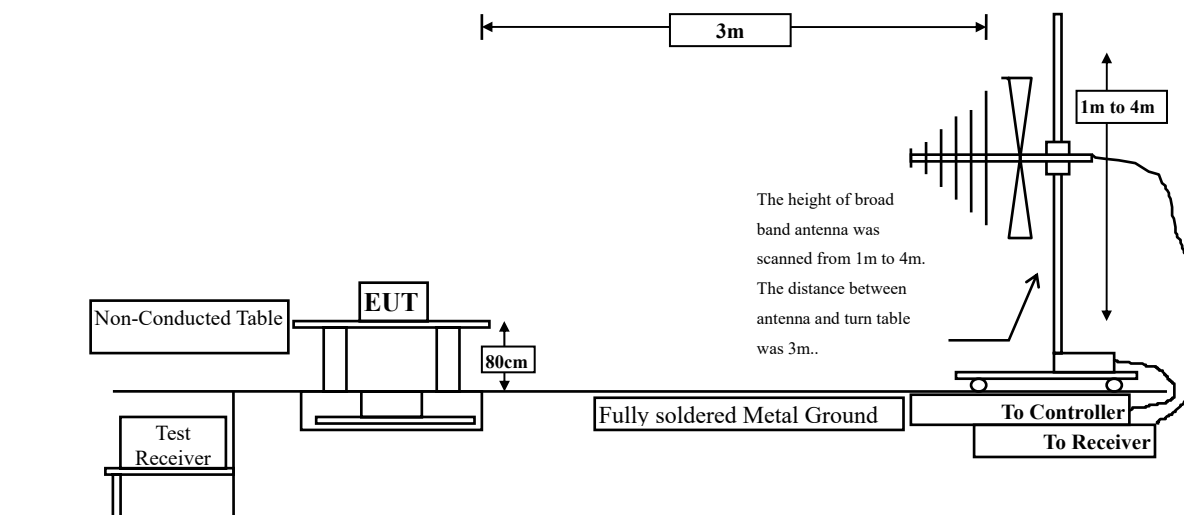
5. Radiated Emission

5.1. Test Setup

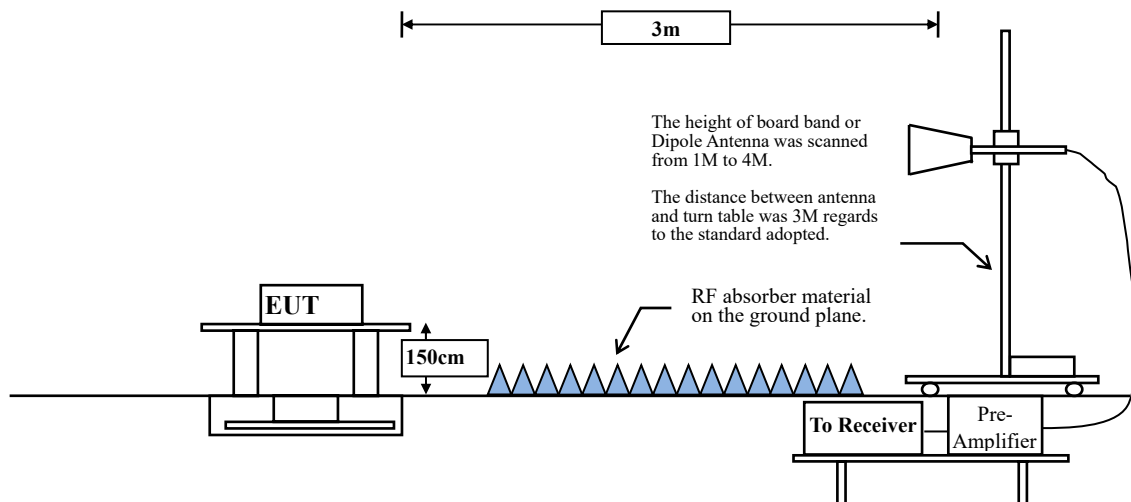
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



5.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
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

Remarks: E field strength (dB μ V/m) = 20 log E field strength (uV/m)

5.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to FCC KDB-789033 test procedure for compliance to FCC 47CFR 15. 407 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to KDB 789033 section II.G.5 Procedure for Unwanted Maximum Emissions
Measurements above 1000 MHz.

RBW = 1MHz.

VBW \geq 3MHz.

According to KDB 789033 section II.G.6 Procedures for Average Unwanted Emissions
Measurements above 1000 MHz.

RBW = 1MHz.

VBW = 10Hz, when duty cycle \geq 98 %

VBW \geq 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

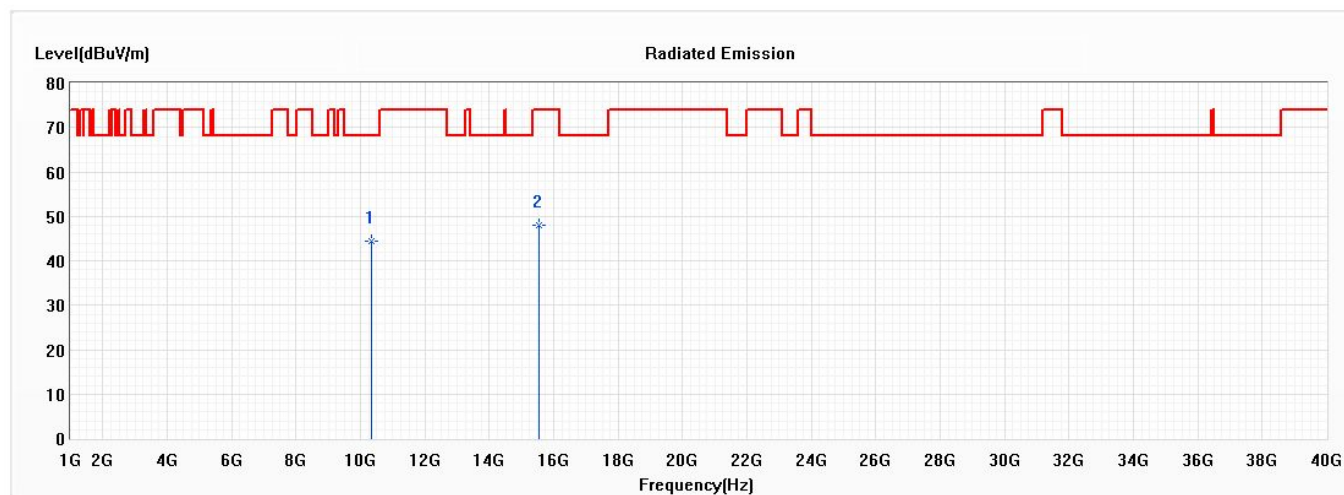
5GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11 a	97.85	2.0450	489	500
802.11 n20	97.70	1.9100	524	1000
802.11 n40	95.43	0.9390	1065	2000
802.11 ac80	98.93	11.0145	91	10

Note: Duty Cycle Refer to Section 7.

5.4. Test Result of Radiated Emission

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
 Test Date : 2021/01/21

Horizontal



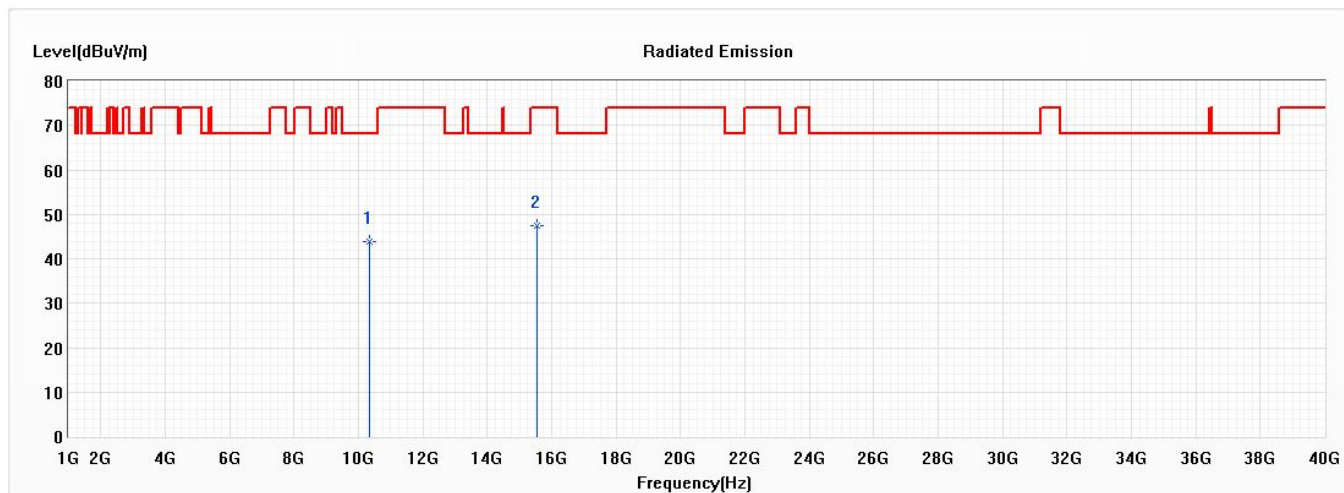
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	10360.000	44.47	68.22	-23.75	54.53	-10.06	PK
2	15540.000	47.97	74.00	-26.03	51.86	-3.89	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
 Test Date : 2021/01/21

Vertical



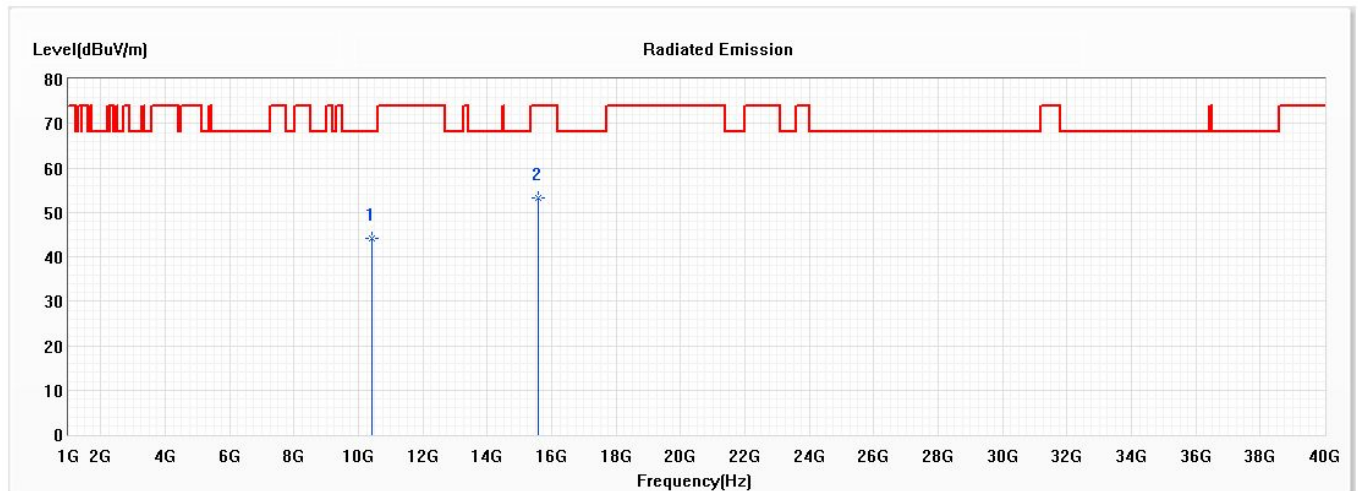
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	10360.000	43.98	68.22	-24.24	54.04	-10.06	PK
2	15540.000	47.55	74.00	-26.45	51.44	-3.89	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5200MHz)
 Test Date : 2021/01/21

Horizontal



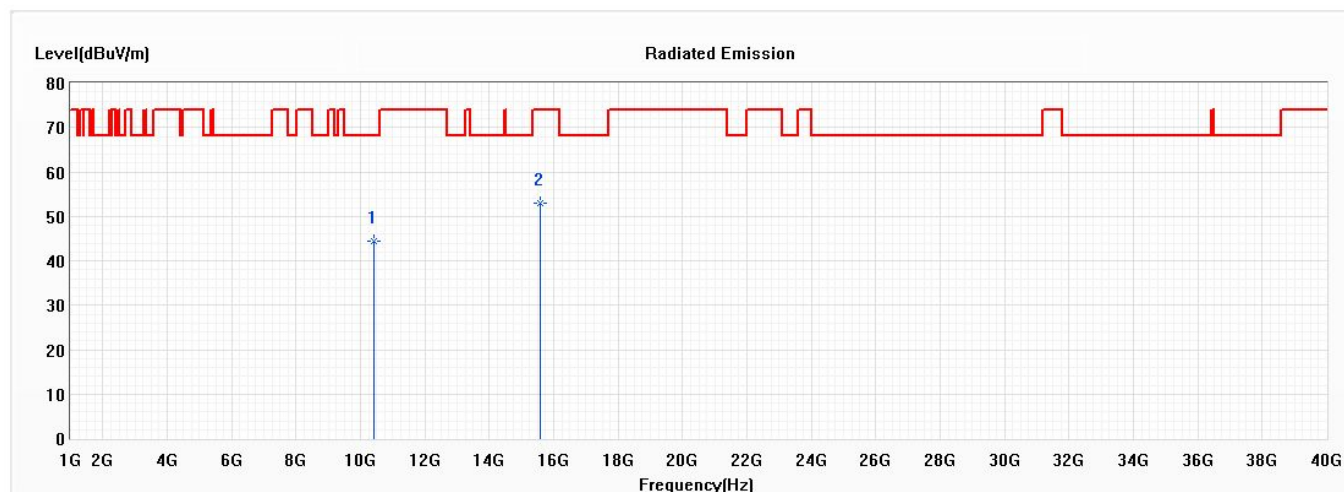
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	10400.000	44.09	68.22	-24.13	54.06	-9.97	PK
* 2	15600.000	53.30	74.00	-20.70	57.03	-3.73	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5200MHz)
 Test Date : 2021/01/21

Vertical



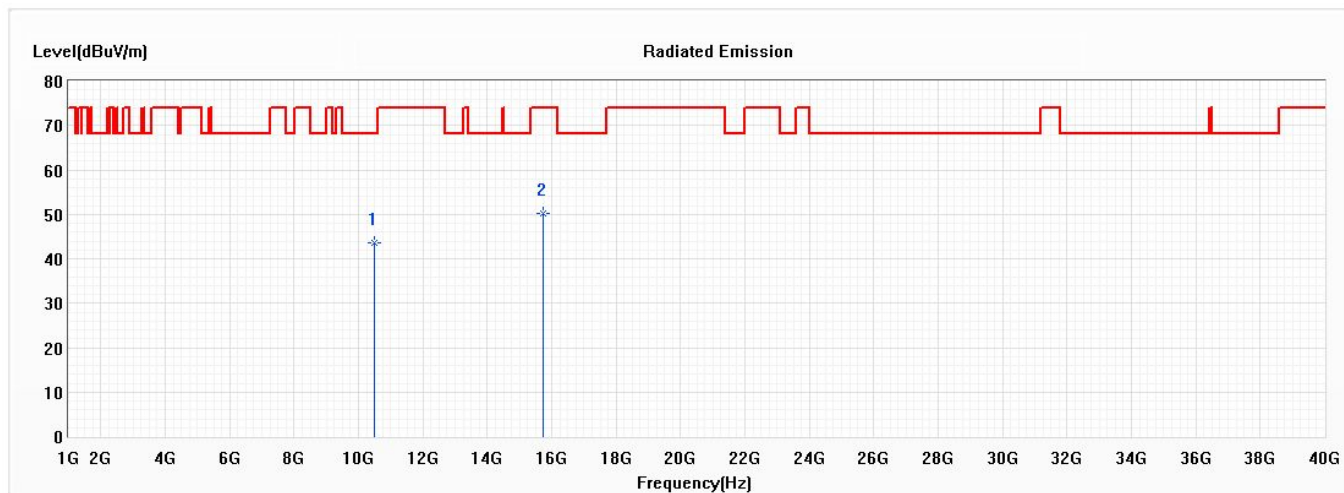
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	10400.000	44.35	68.22	-23.87	54.32	-9.97	PK
* 2	15600.000	53.06	74.00	-20.94	56.79	-3.73	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5240MHz)
 Test Date : 2021/01/21

Horizontal



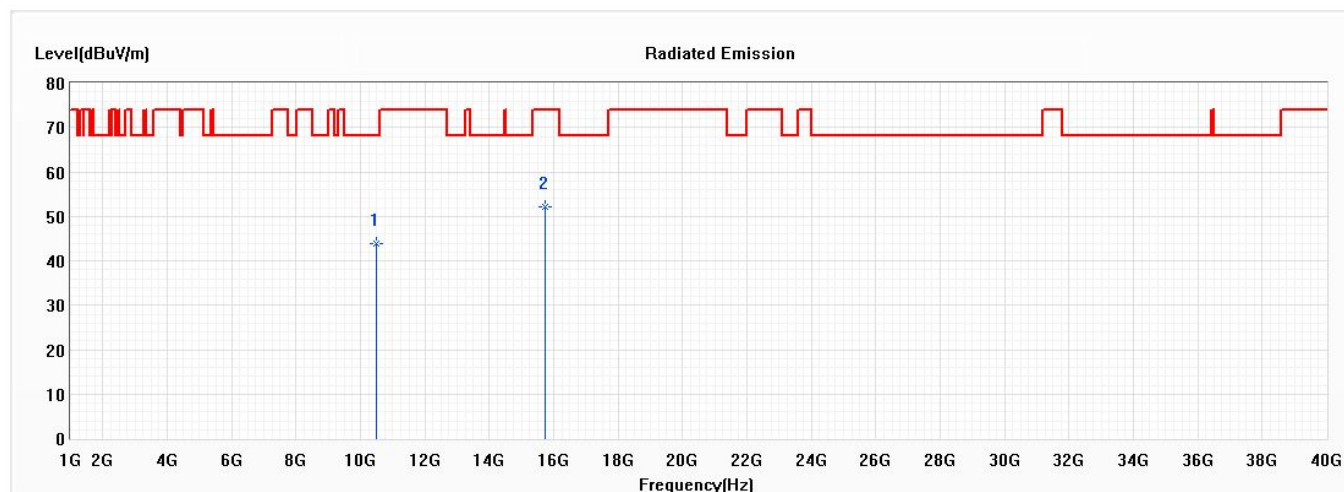
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	10480.000	43.67	68.22	-24.55	53.55	-9.88	PK
* 2	15720.000	50.29	74.00	-23.71	53.63	-3.34	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5240MHz)
 Test Date : 2021/01/21

Vertical



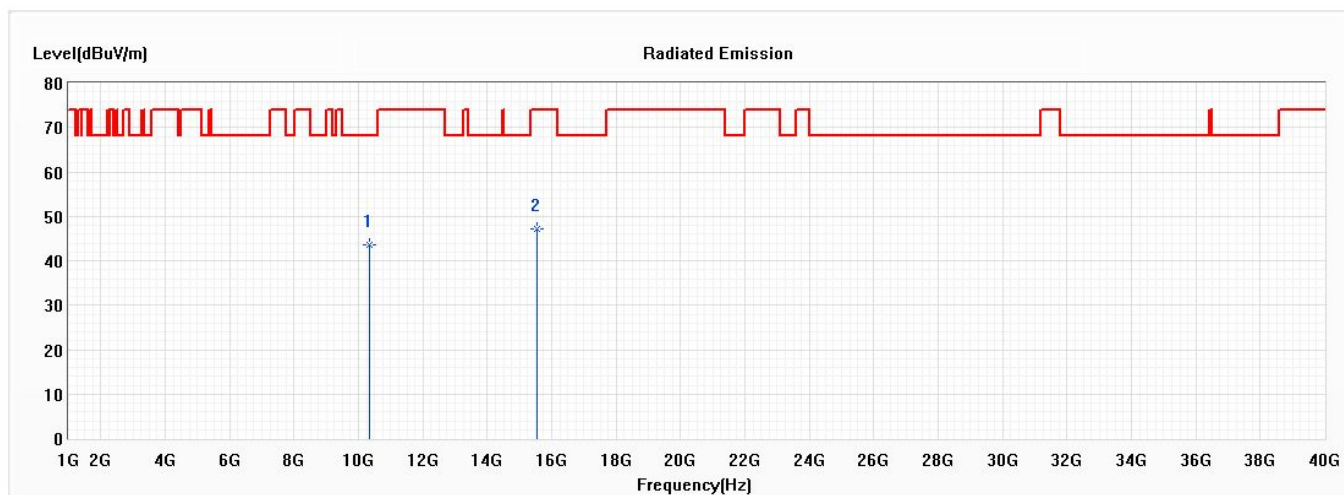
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	10480.000	43.83	68.22	-24.39	53.71	-9.88	PK
* 2	15720.000	52.21	74.00	-21.79	55.55	-3.34	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5180MHz)
 Test Date : 2021/01/21

Horizontal



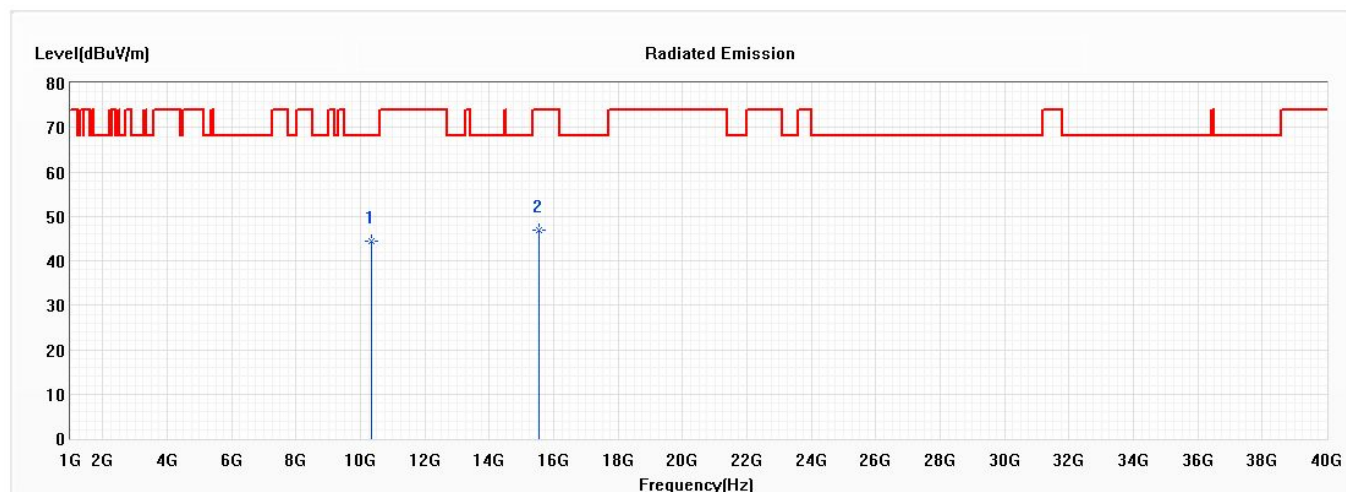
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	10360.000	43.62	68.22	-24.60	53.68	-10.06	PK
2	15540.000	47.28	74.00	-26.72	51.17	-3.89	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5180MHz)
 Test Date : 2021/01/21

Vertical



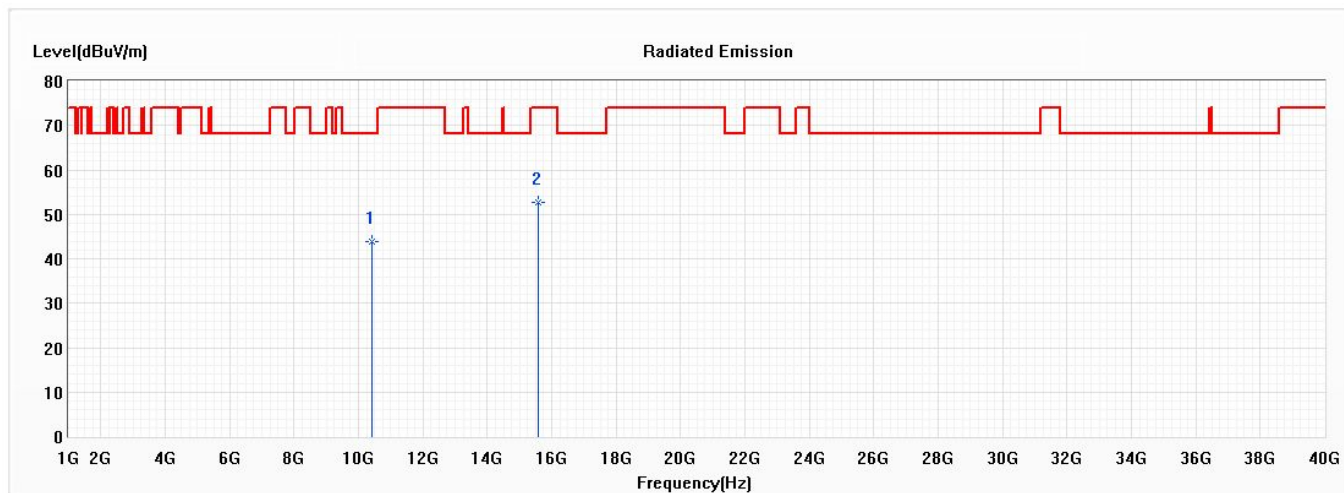
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	10360.000	44.40	68.22	-23.82	54.46	-10.06	PK
2	15540.000	46.98	74.00	-27.02	50.87	-3.89	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5200MHz)
 Test Date : 2021/01/21

Horizontal



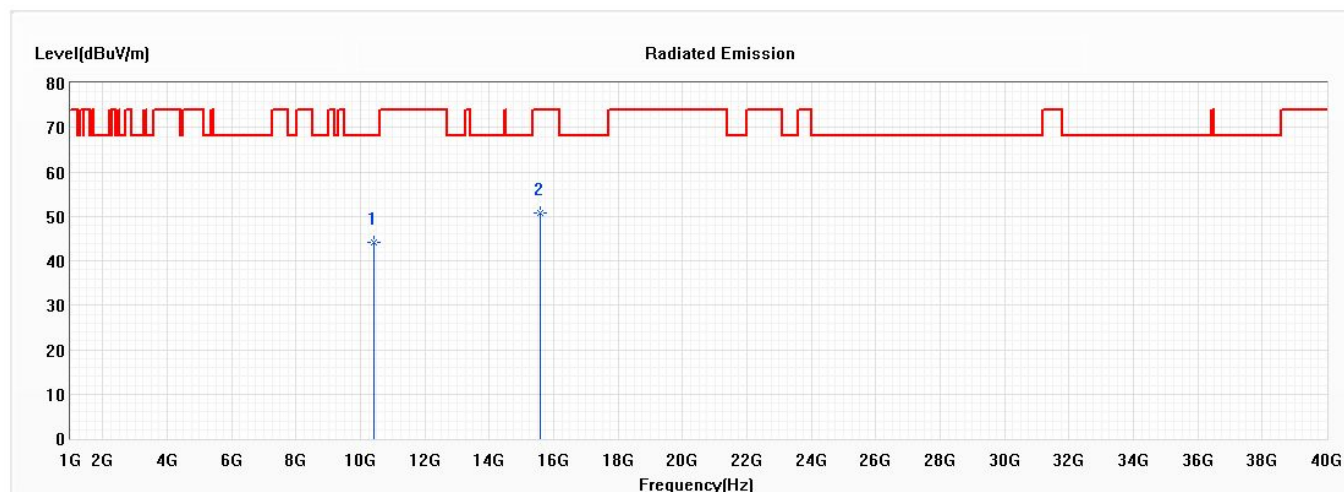
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	10400.000	43.77	68.22	-24.45	53.74	-9.97	PK
* 2	15600.000	52.58	74.00	-21.42	56.31	-3.73	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5200MHz)
 Test Date : 2021/01/21

Vertical



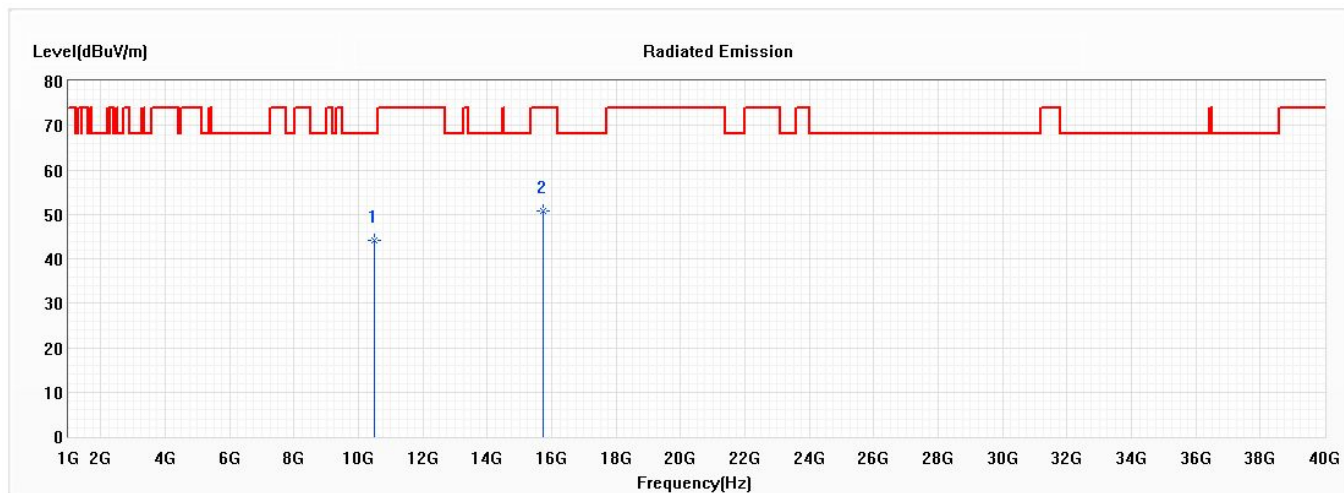
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	10400.000	44.18	68.22	-24.04	54.15	-9.97	PK
* 2	15600.000	50.73	74.00	-23.27	54.46	-3.73	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5240MHz)
 Test Date : 2021/01/21

Horizontal



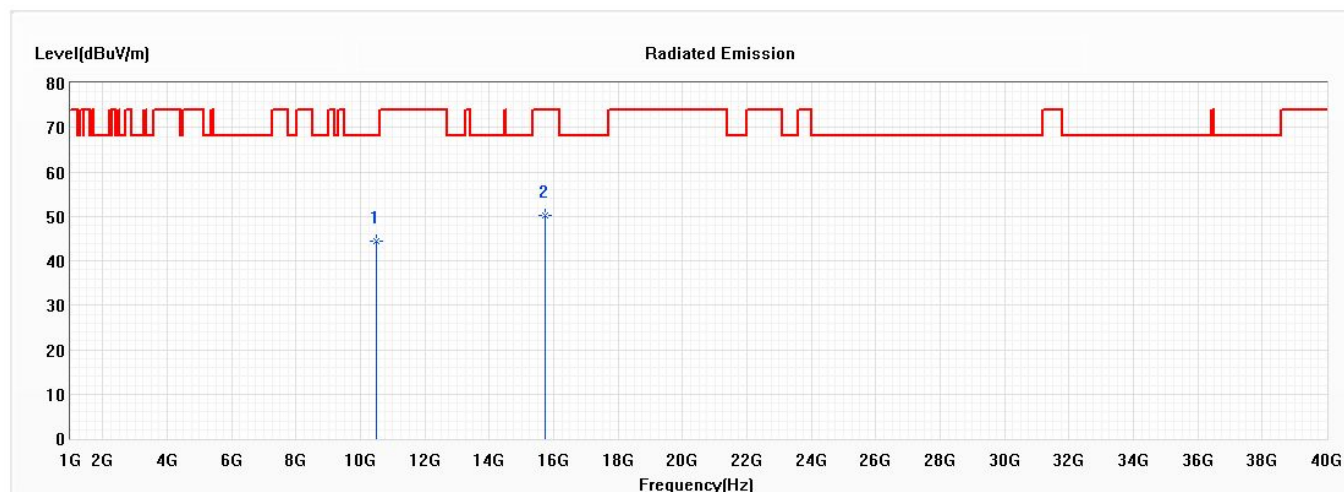
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	10480.000	44.16	68.22	-24.06	54.04	-9.88	PK
* 2	15720.000	50.71	74.00	-23.29	54.05	-3.34	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5240MHz)
 Test Date : 2021/01/21

Vertical



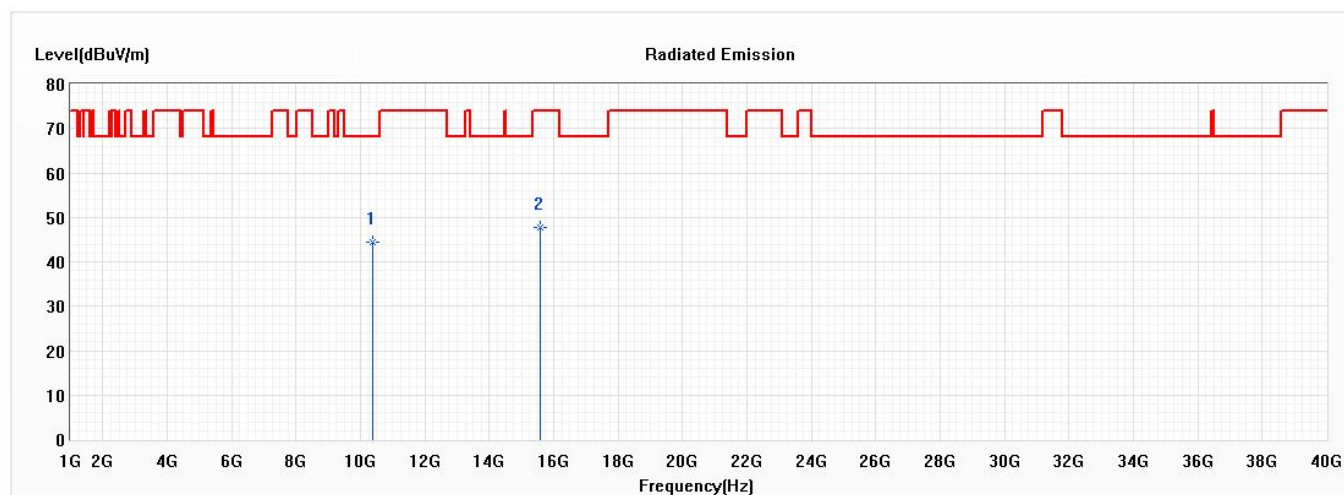
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	10480.000	44.49	68.22	-23.73	54.37	-9.88	PK
2	15720.000	50.10	74.00	-23.90	53.44	-3.34	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)
 Test Date : 2021/01/21

Horizontal



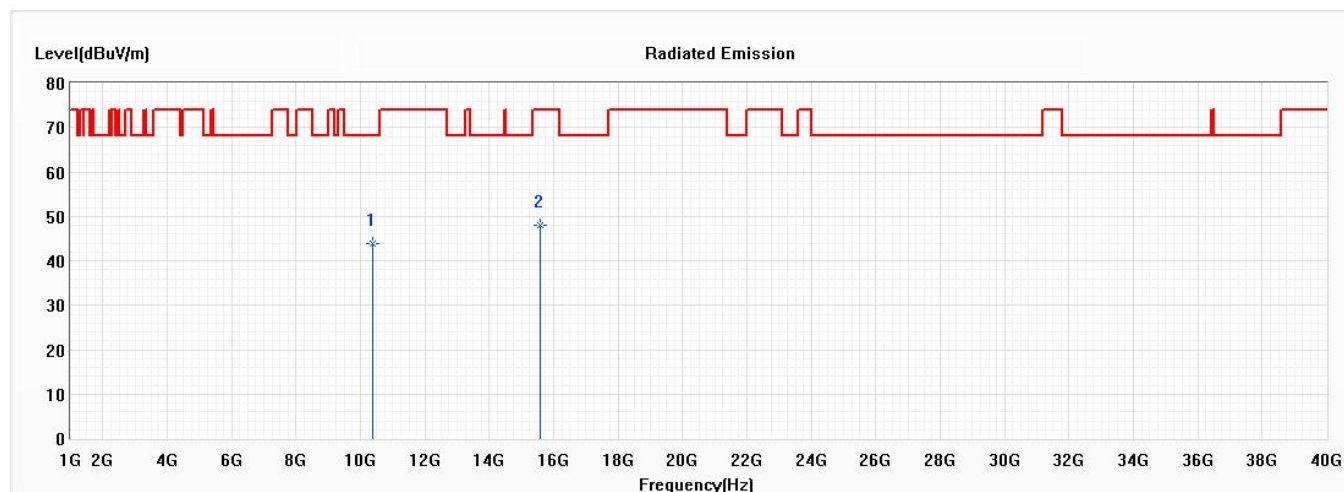
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	10380.000	44.33	68.22	-23.89	54.34	-10.01	PK
2	15570.000	47.82	74.00	-26.18	51.57	-3.75	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)
 Test Date : 2021/01/21

Vertical



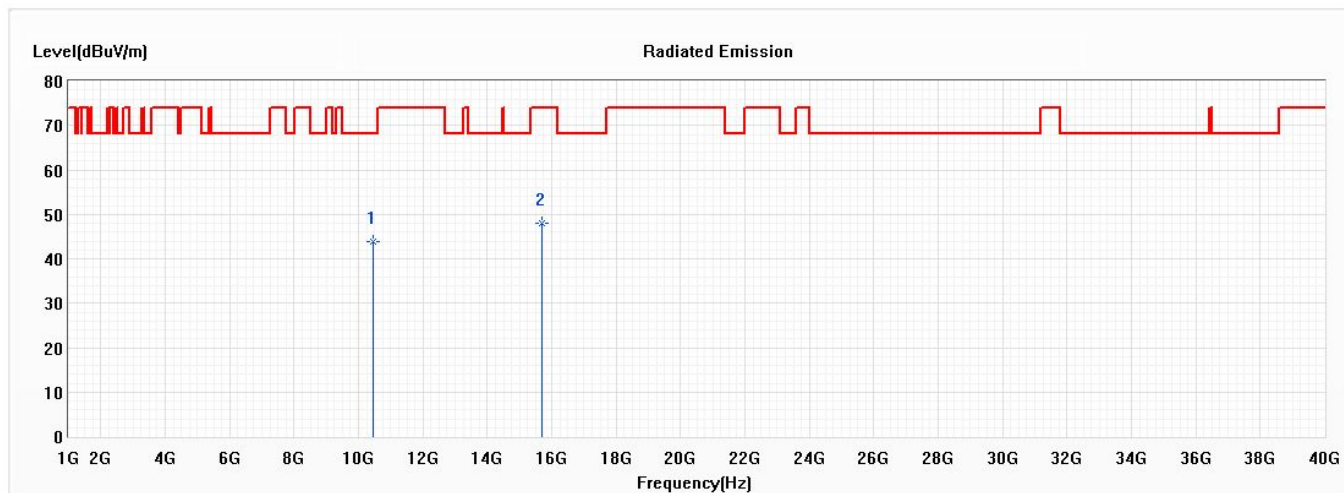
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	10380.000	43.88	68.22	-24.34	53.89	-10.01	PK
2	15570.000	48.05	74.00	-25.95	51.80	-3.75	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5230MHz)
 Test Date : 2021/01/21

Horizontal



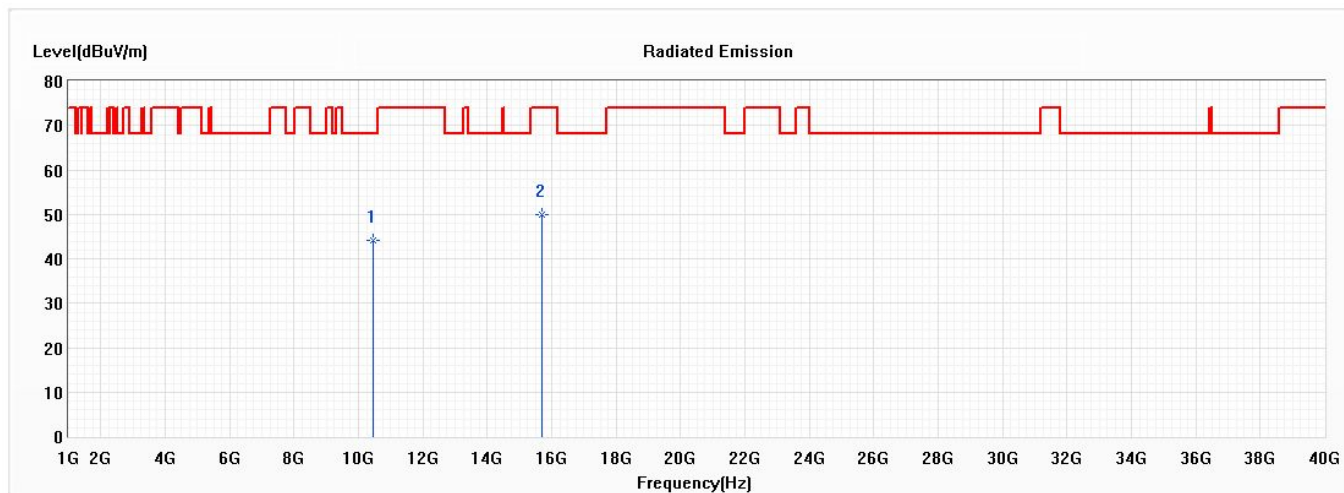
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	10460.000	43.87	68.22	-24.35	53.79	-9.92	PK
2	15690.000	47.98	74.00	-26.02	51.32	-3.34	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5230MHz)
 Test Date : 2021/01/21

Vertical



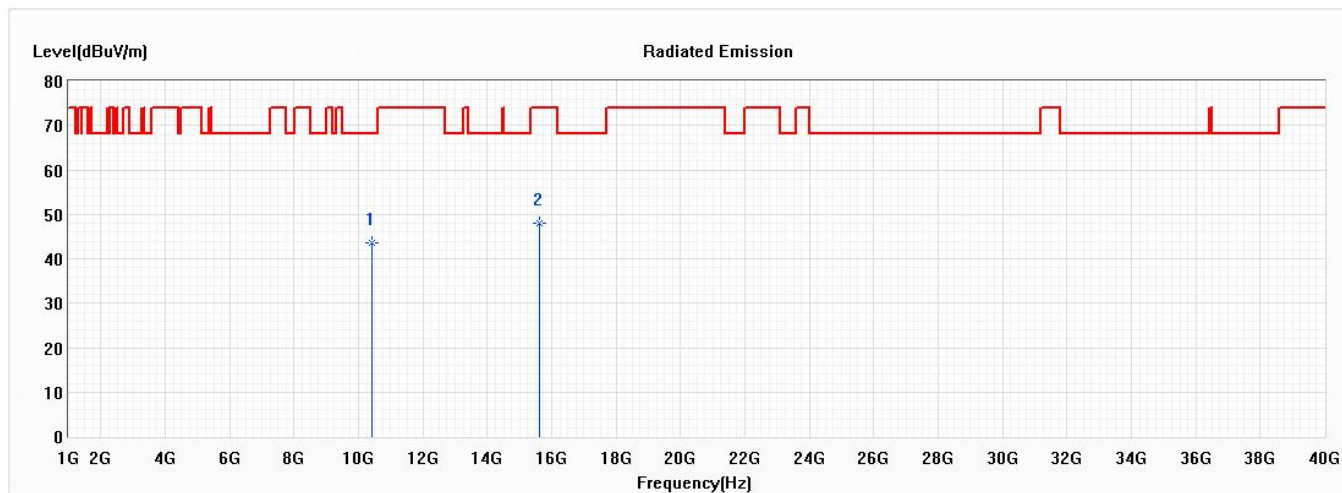
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	10460.000	44.27	68.22	-23.95	54.19	-9.92	PK
2	15690.000	49.96	74.00	-24.04	53.30	-3.34	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5210MHz)
 Test Date : 2021/01/21

Horizontal



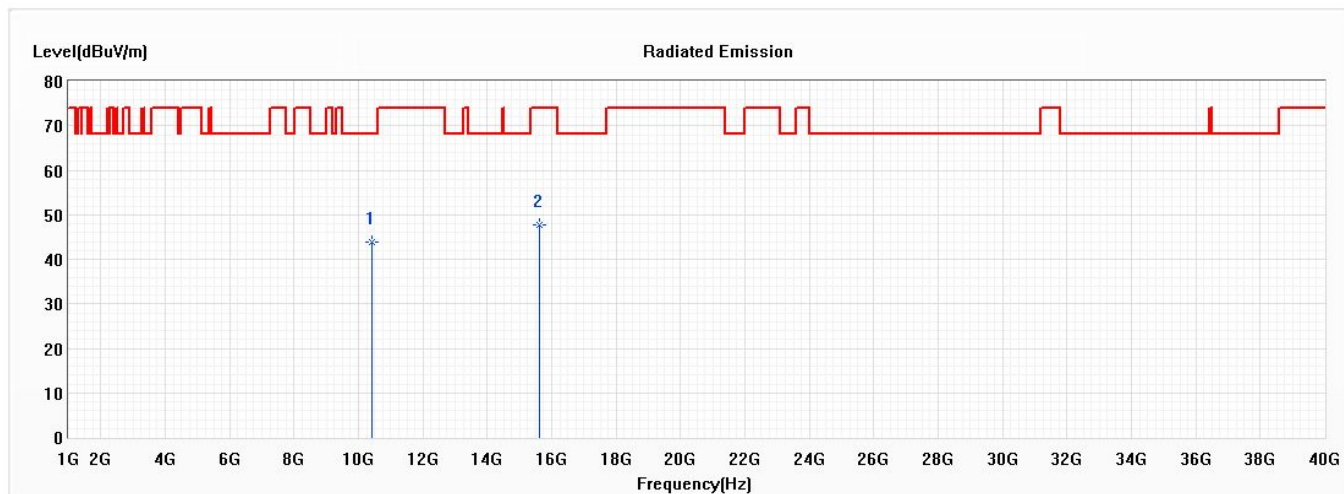
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	10420.000	43.56	68.22	-24.66	53.54	-9.98	PK
2	15630.000	47.99	74.00	-26.01	51.63	-3.64	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5210MHz)
 Test Date : 2021/01/21

Vertical



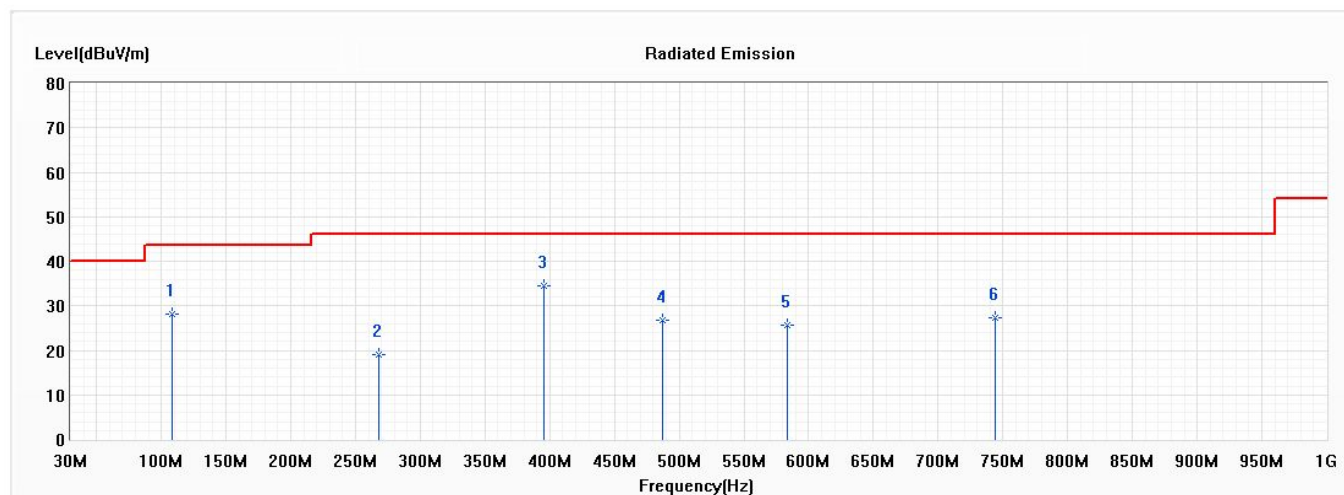
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	10420.000	43.76	68.22	-24.46	53.74	-9.98	PK
2	15630.000	47.78	74.00	-26.22	51.42	-3.64	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Notebook
 Test Item : General Radiated Emission
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5210MHz)
 Test Date : 2021/01/22

Horizontal



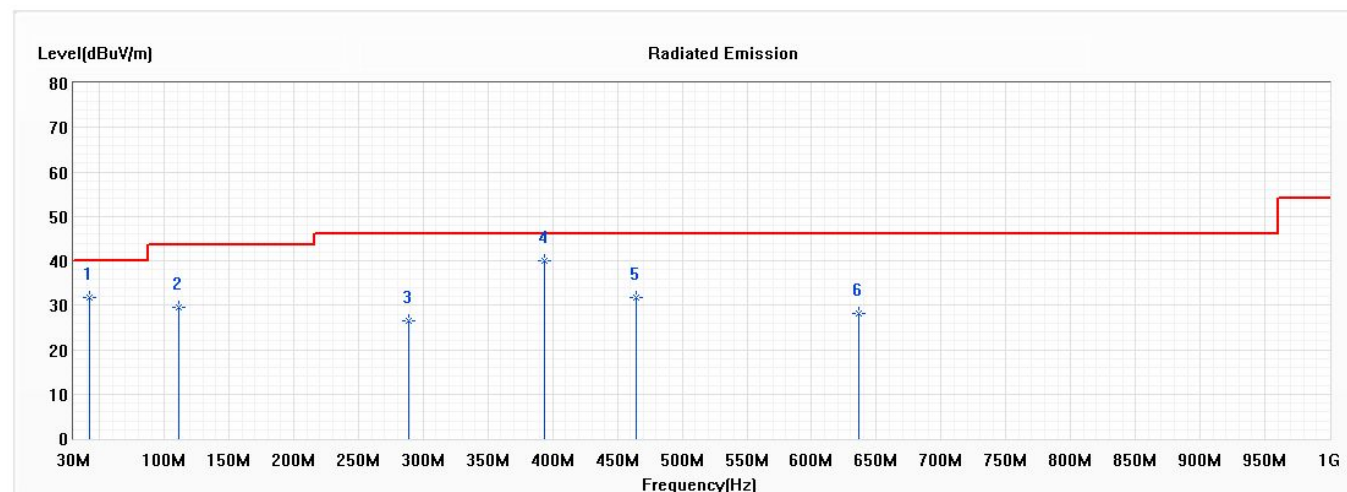
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	108.725	28.02	43.50	-15.48	42.35	-14.33	QP
2	267.580	19.15	46.00	-26.85	30.22	-11.07	QP
* 3	395.507	34.40	46.00	-11.60	41.84	-7.44	QP
4	486.884	26.82	46.00	-19.18	32.39	-5.57	QP
5	583.884	25.77	46.00	-20.23	29.26	-3.49	QP
6	744.145	27.21	46.00	-18.79	28.56	-1.35	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product : Notebook
 Test Item : General Radiated Emission
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5210MHz)
 Test Date : 2021/01/22

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	42.652	31.59	40.00	-8.41	42.38	-10.79	QP
2	111.536	29.46	43.50	-14.04	43.46	-14.00	QP
3	288.667	26.56	46.00	-19.44	36.73	-10.17	QP
* 4	394.101	40.02	46.00	-5.98	47.50	-7.48	QP
5	464.391	31.86	46.00	-14.14	37.82	-5.96	QP
6	635.899	28.04	46.00	-17.96	31.05	-3.01	QP

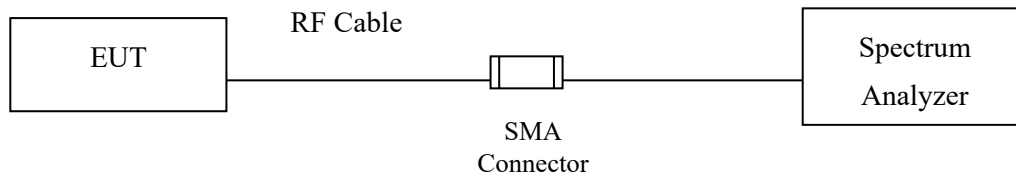
Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

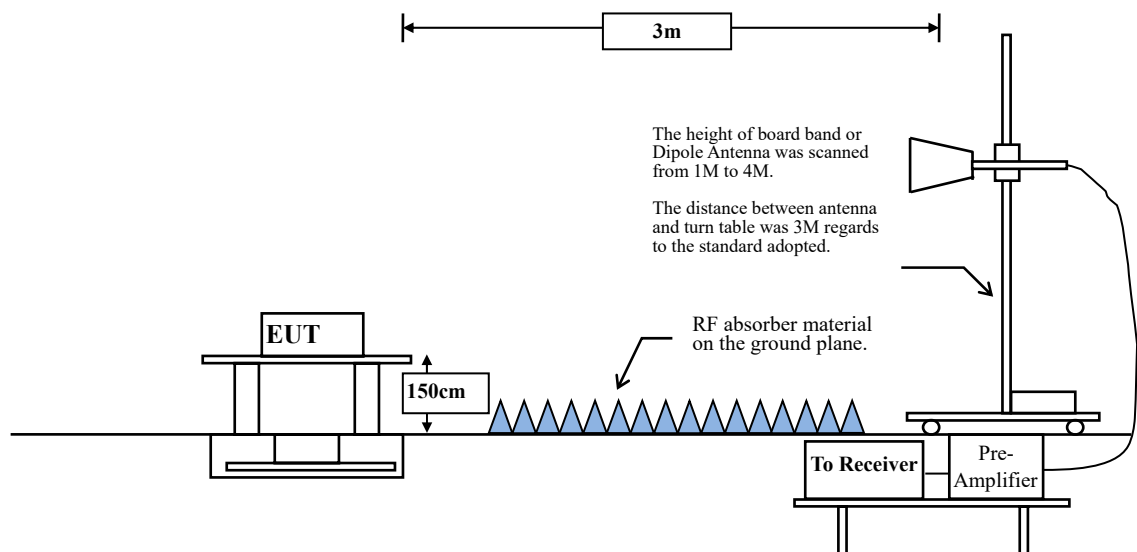
6. Band Edge

6.1. Test Setup

RF Conducted Measurement:



RF Radiated Measurement:



6.2. Limits

The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209:

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m @3m	dBµV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks :

1. RF Voltage (dBµV) = 20 log RF Voltage (uV)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

6.3. Test Procedure

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2013 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz. The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

RBW and VBW Parameter setting:

According to KDB 789033 section II.G.5 Procedure for Unwanted Maximum Emissions
Measurements above 1000 MHz.

RBW = 1MHz.

VBW \geq 3MHz.

According to KDB 789033 section II.G.6 Procedures for Average Unwanted Emissions
Measurements above 1000 MHz.

RBW = 1MHz.

VBW = 10Hz, when duty cycle \geq 98 %

VBW \geq 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

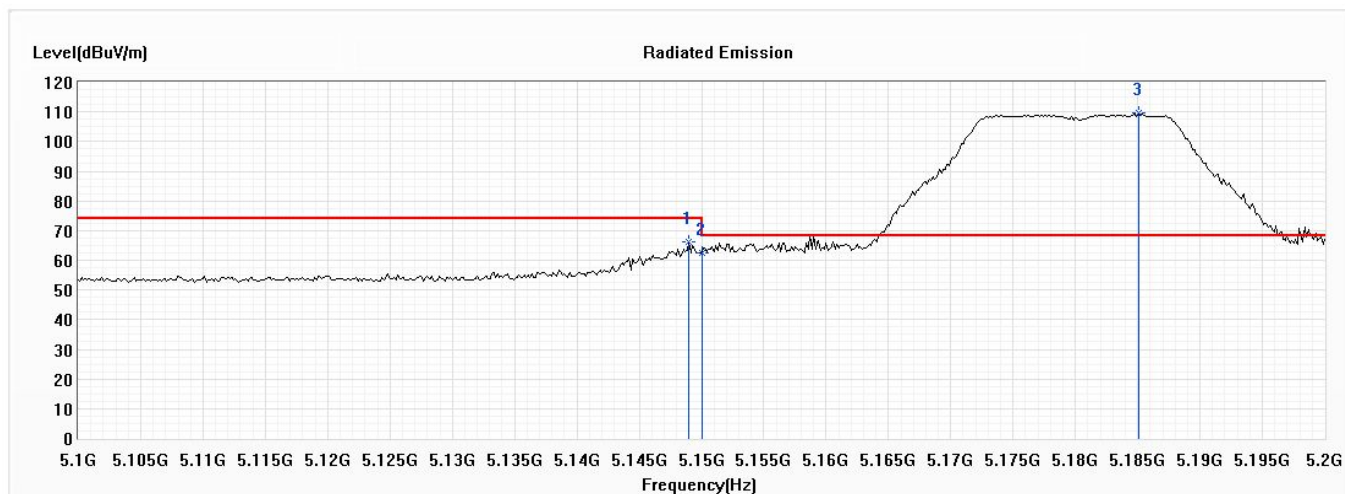
5GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11 a	97.85	2.0450	489	500
802.11 n20	97.70	1.9100	524	1000
802.11 n40	95.43	0.9390	1065	2000
802.11 ac80	98.93	11.0145	91	10

Note: Duty Cycle Refer to Section 7.

6.4. Test Result of Band Edge

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
 Test Date : 2021/01/21

Horizontal



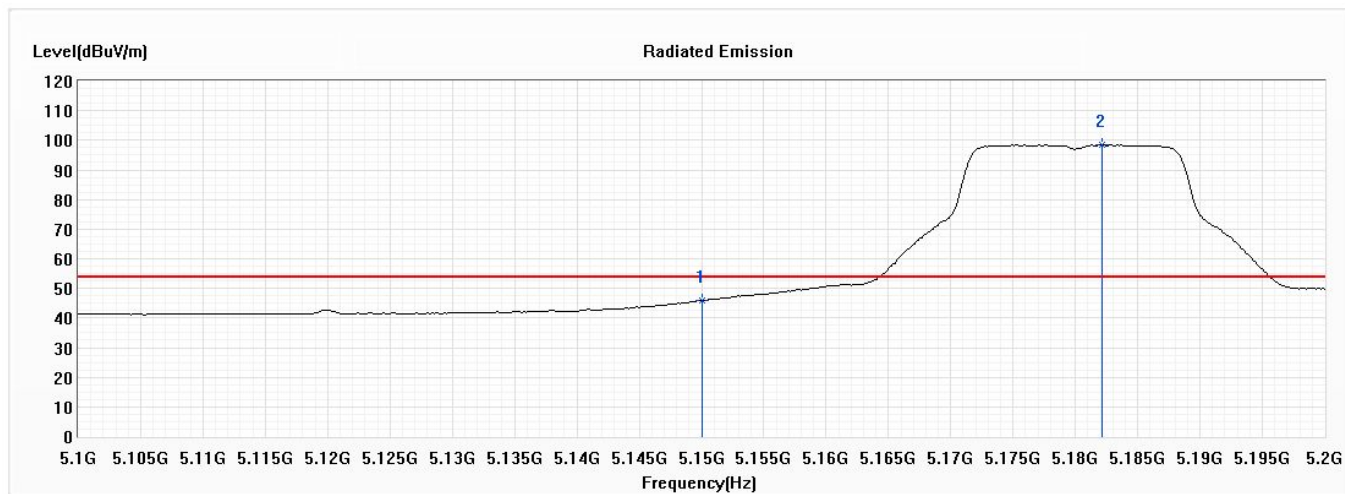
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5148.986	66.34	74.00	-7.66	49.06	17.28	PK
2	5150.000	62.54	74.00	-11.46	45.26	17.28	PK
! 3	5185.072	109.70	--	--	92.02	17.68	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
 Test Date : 2021/01/21

Horizontal



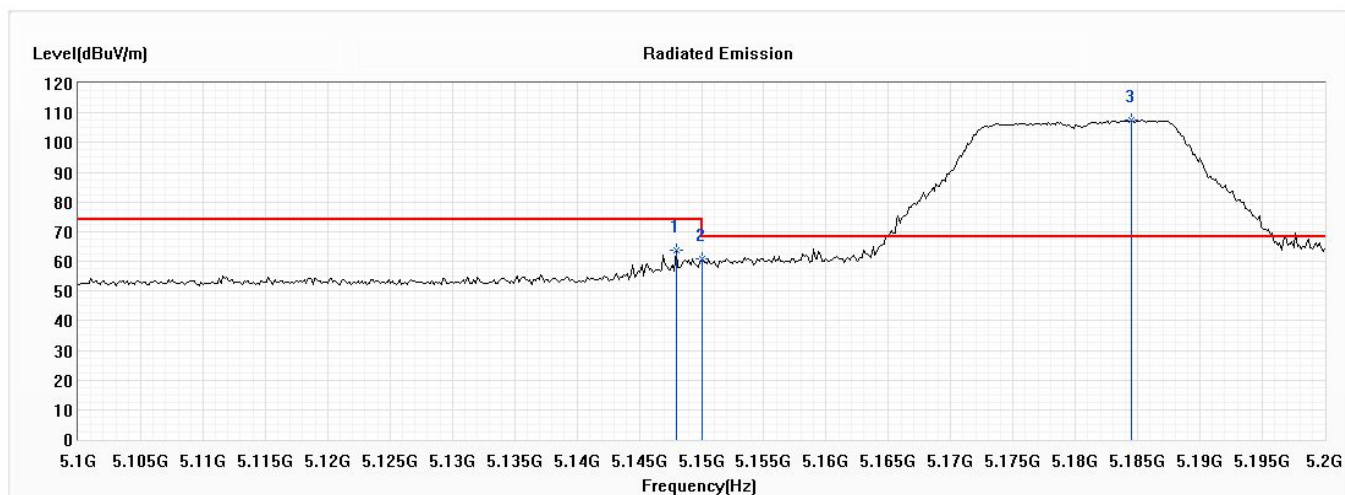
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5150.000	45.78	54.00	-8.22	28.50	17.28	AV
! 2	5182.174	98.42	--	--	80.79	17.63	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
 Test Date : 2021/01/21

Vertical



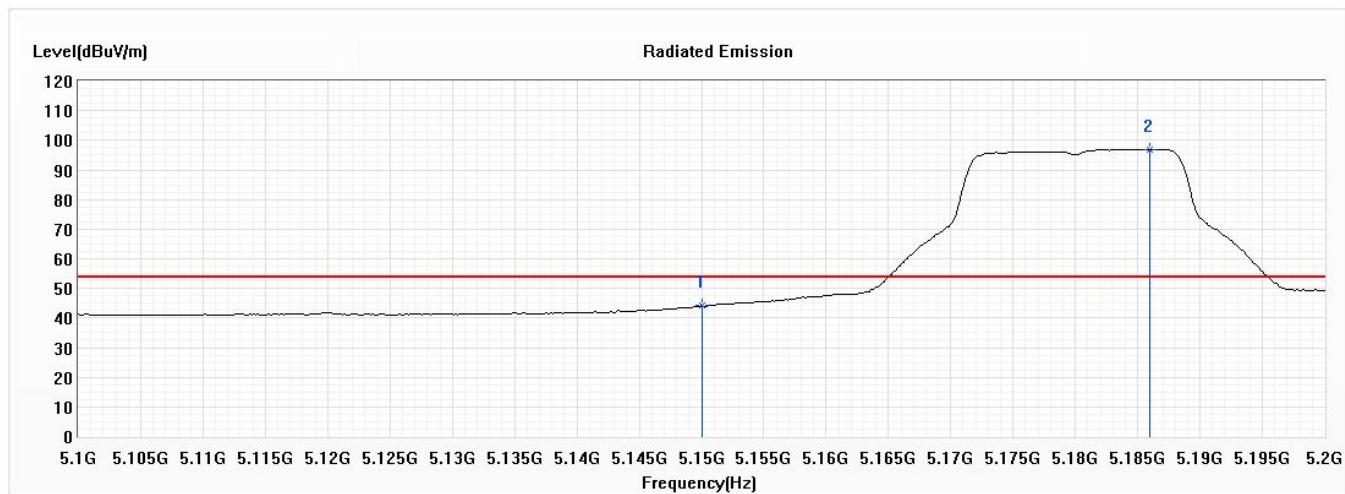
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5147.971	63.54	74.00	-10.46	46.27	17.27	PK
2	5150.000	60.66	74.00	-13.34	43.38	17.28	PK
! 3	5184.493	107.76	--	--	90.08	17.68	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
 Test Date : 2021/01/21

Vertical



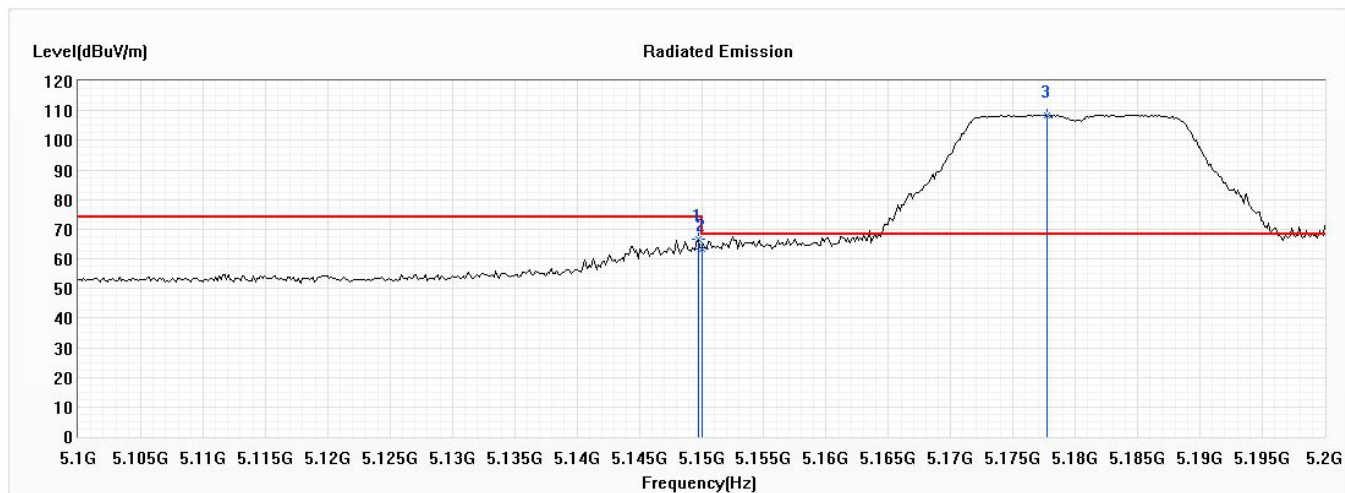
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5150.000	44.12	54.00	-9.88	26.84	17.28	AV
! 2	5185.942	96.97	--	--	79.28	17.69	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5180MHz)
 Test Date : 2021/01/21

Horizontal



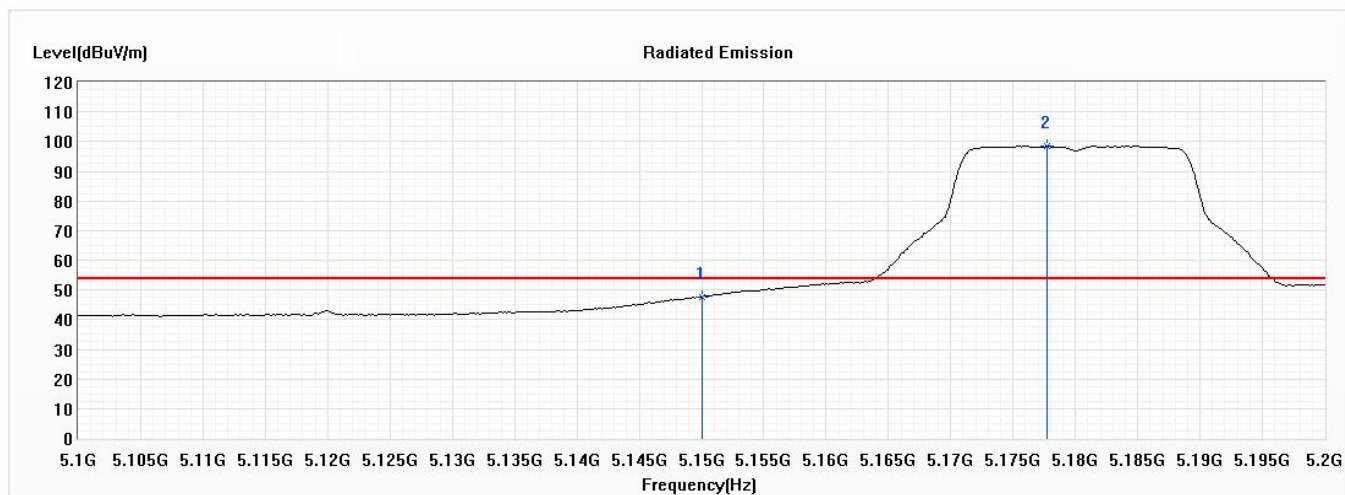
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5149.710	66.57	74.00	-7.43	49.29	17.28	PK
2	5150.000	63.35	74.00	-10.65	46.07	17.28	PK
! 3	5177.681	108.59	--	--	91.01	17.58	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5180MHz)
 Test Date : 2021/01/21

Horizontal



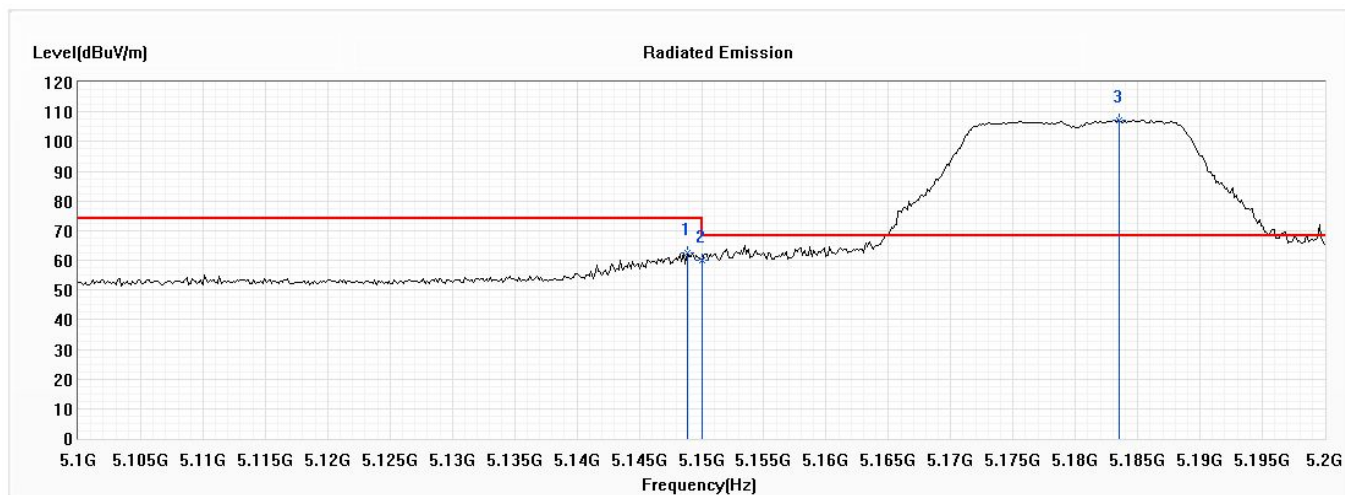
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5150.000	47.77	54.00	-6.23	30.49	17.28	AV
! 2	5177.681	98.45	--	--	80.87	17.58	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5180MHz)
 Test Date : 2021/01/21

Vertical



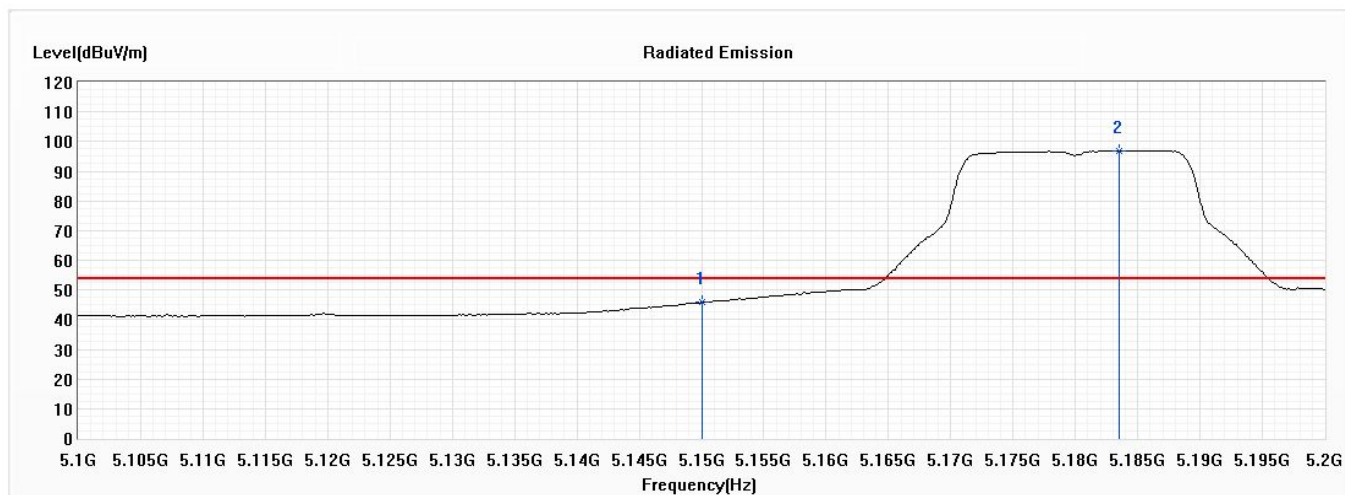
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5148.841	62.40	74.00	-11.60	45.12	17.28	PK
2	5150.000	60.16	74.00	-13.84	42.88	17.28	PK
! 3	5183.478	107.21	--	--	89.56	17.65	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5180MHz)
 Test Date : 2021/01/21

Vertical



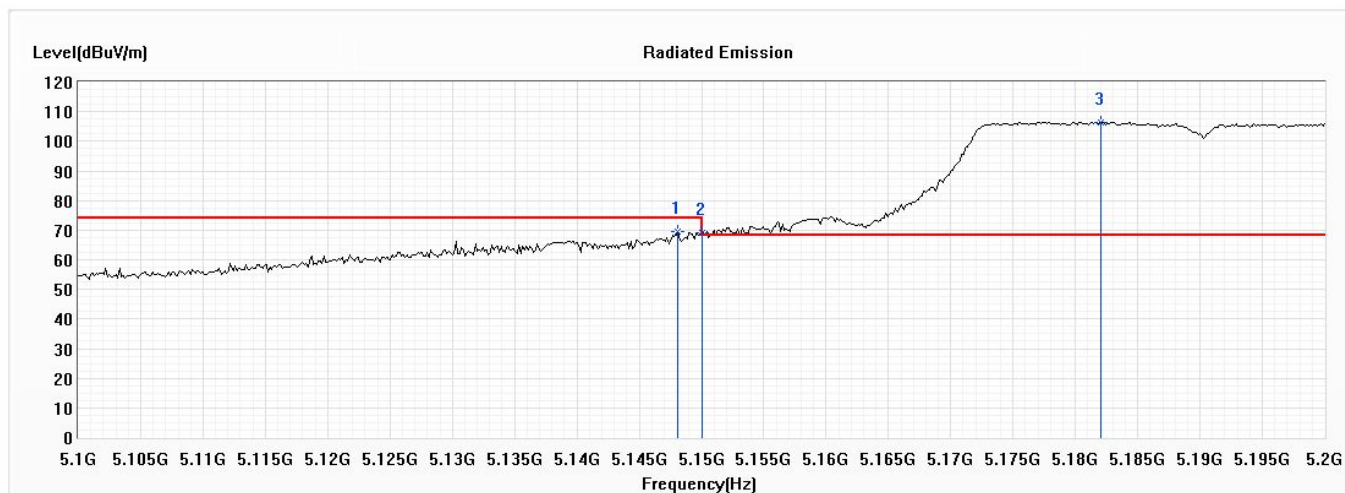
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5150.000	45.88	54.00	-8.12	28.60	17.28	AV
! 2	5183.478	97.01	--	--	79.36	17.65	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)
 Test Date : 2021/01/21

Horizontal



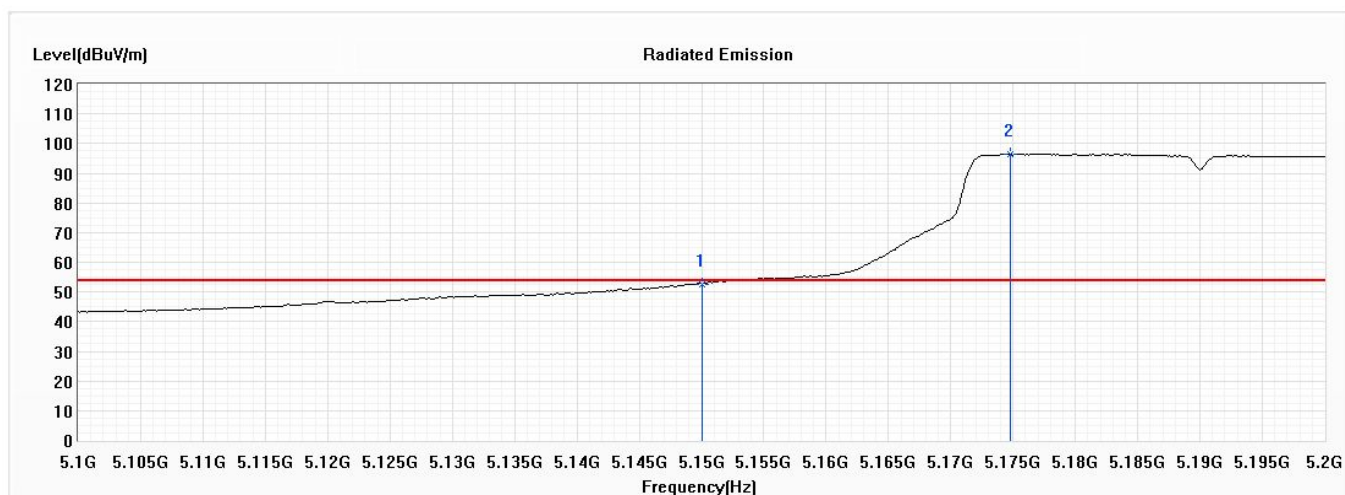
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5148.116	69.55	74.00	-4.45	52.28	17.27	PK
2	5150.000	69.30	74.00	-4.70	52.02	17.28	PK
! 3	5182.029	106.52	--	--	88.89	17.63	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)
 Test Date : 2021/01/21

Horizontal



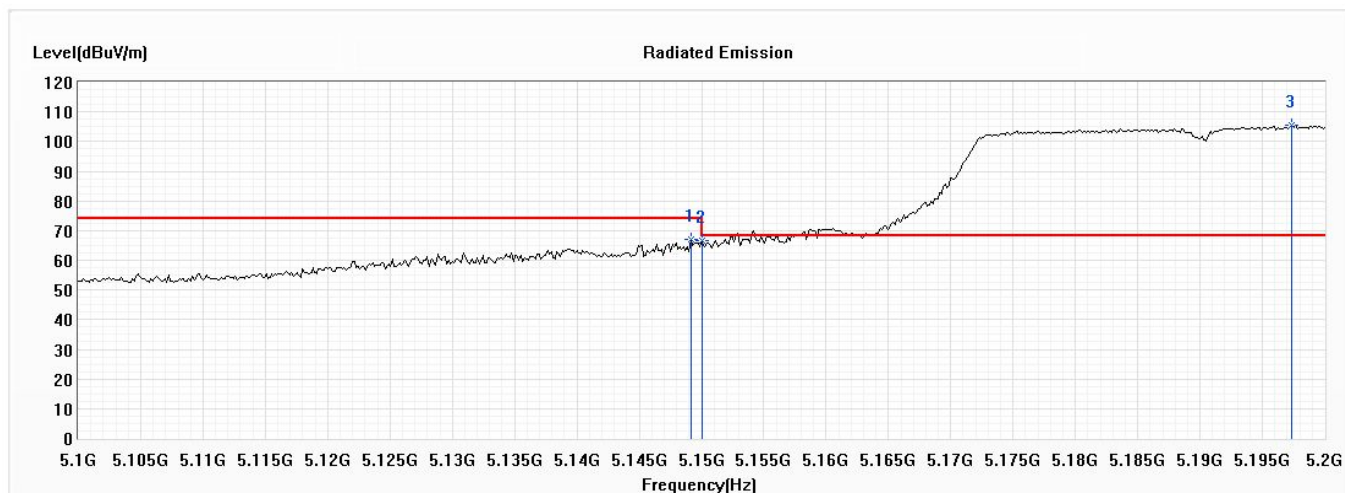
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5150.000	52.70	54.00	-1.30	35.42	17.28	AV
! 2	5174.783	96.42	--	--	78.89	17.53	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)
 Test Date : 2021/01/21

Vertical



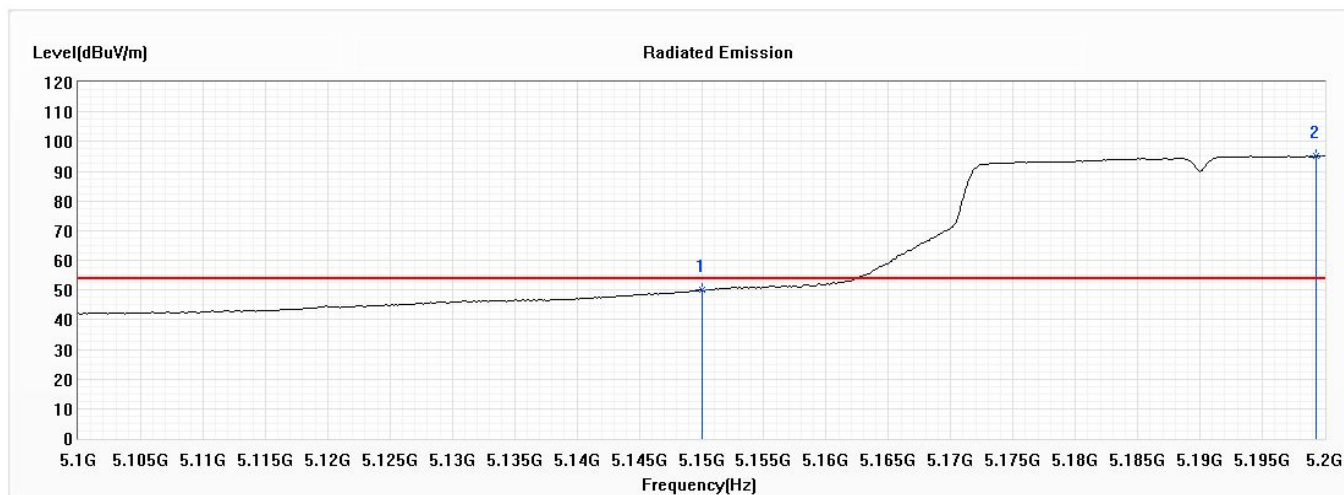
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5149.130	67.04	74.00	-6.96	49.76	17.28	PK
2	5150.000	66.56	74.00	-7.44	49.28	17.28	PK
! 3	5197.391	105.35	--	--	87.59	17.76	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)
 Test Date : 2021/01/21

Vertical



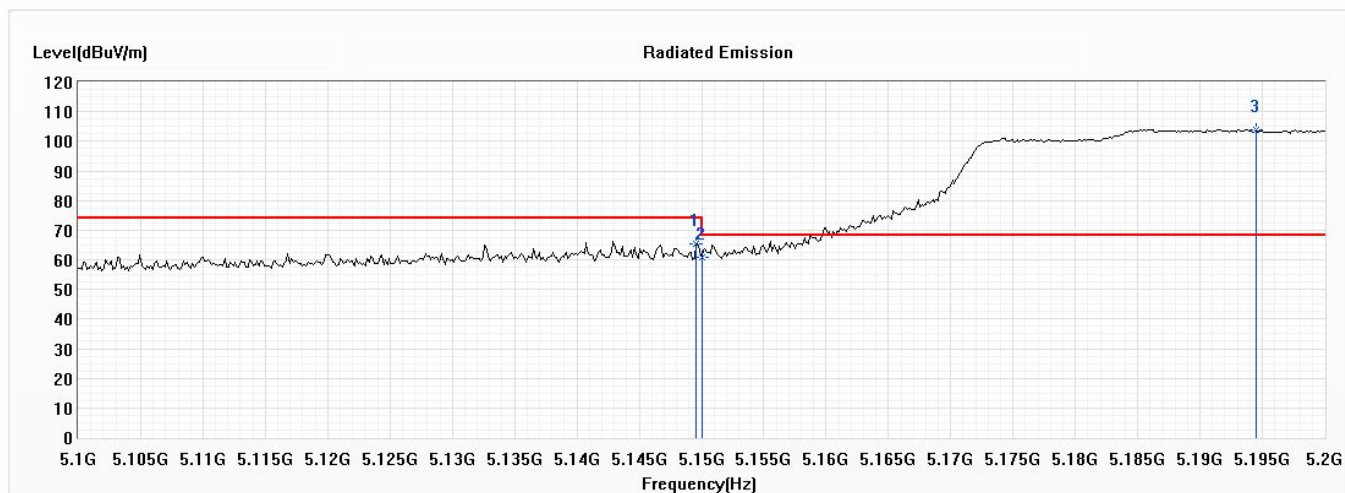
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5150.000	49.92	54.00	-4.08	32.64	17.28	AV
! 2	5199.275	95.09	--	--	77.31	17.78	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5210MHz)
 Test Date : 2021/01/21

Horizontal



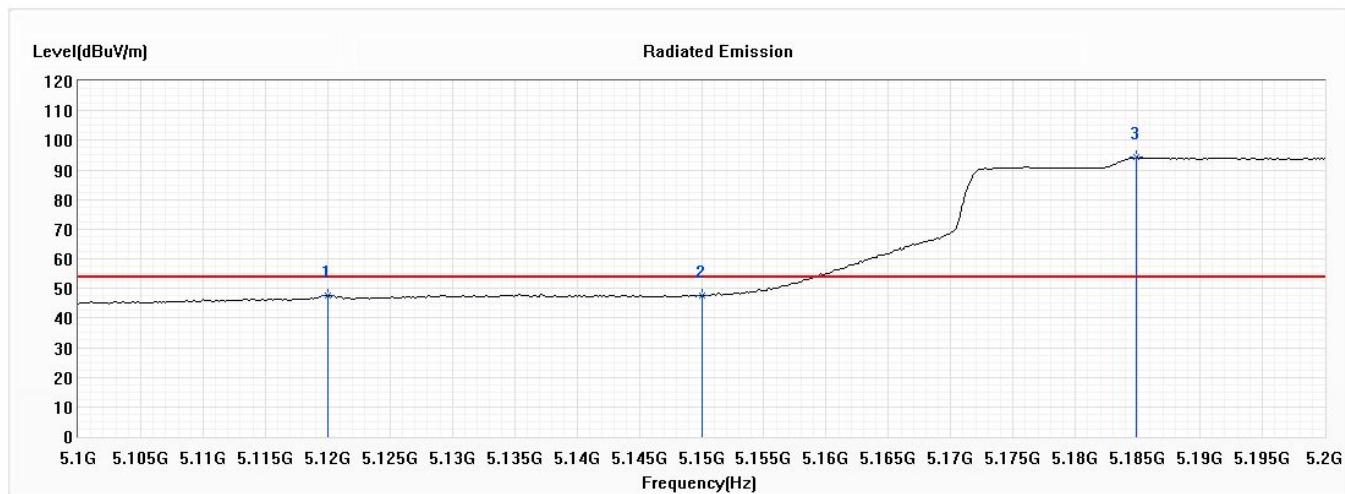
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5149.565	65.28	74.00	-8.72	48.00	17.28	PK
2	5150.000	60.67	74.00	-13.33	43.39	17.28	PK
! 3	5194.493	104.03	--	--	86.27	17.76	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5210MHz)
 Test Date : 2021/01/21

Horizontal



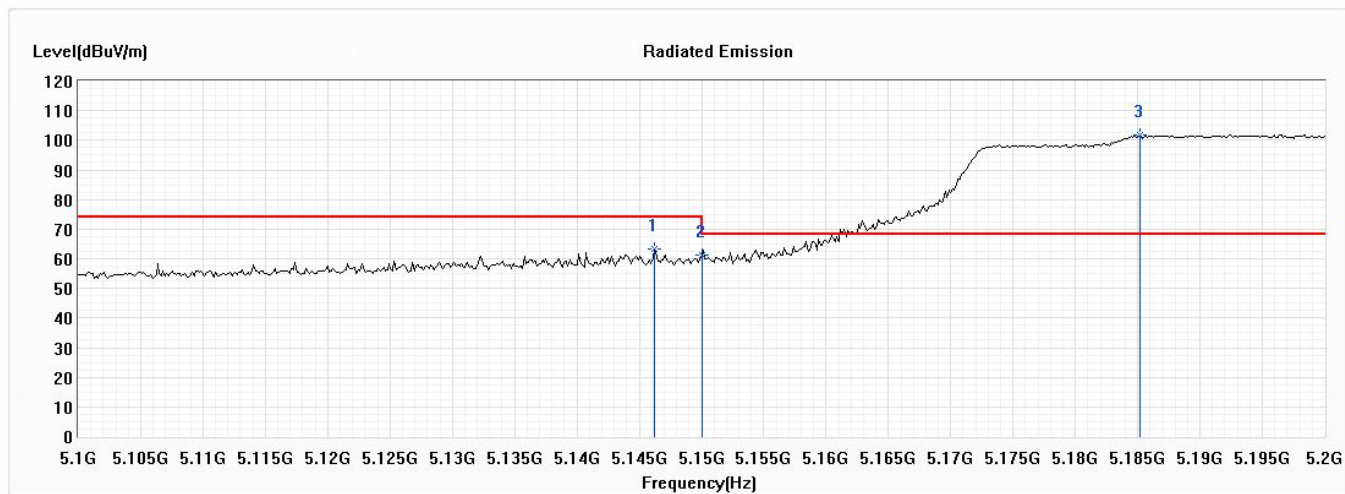
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5120.000	47.66	54.00	-6.34	30.42	17.24	AV
2	5150.000	47.52	54.00	-6.48	30.24	17.28	AV
! 3	5184.928	94.15	--	--	76.47	17.68	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5210MHz)
 Test Date : 2021/01/21

Vertical



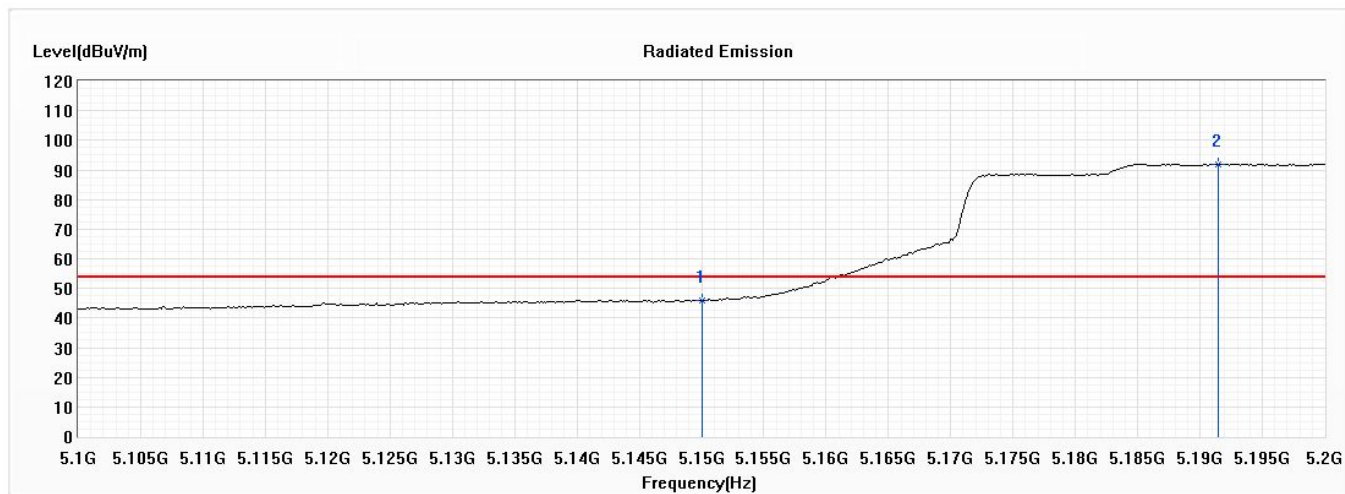
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5146.232	63.42	74.00	-10.58	46.16	17.26	PK
2	5150.000	61.44	74.00	-12.56	44.16	17.28	PK
! 3	5185.217	101.84	--	--	84.16	17.68	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5210MHz)
 Test Date : 2021/01/21

Vertical



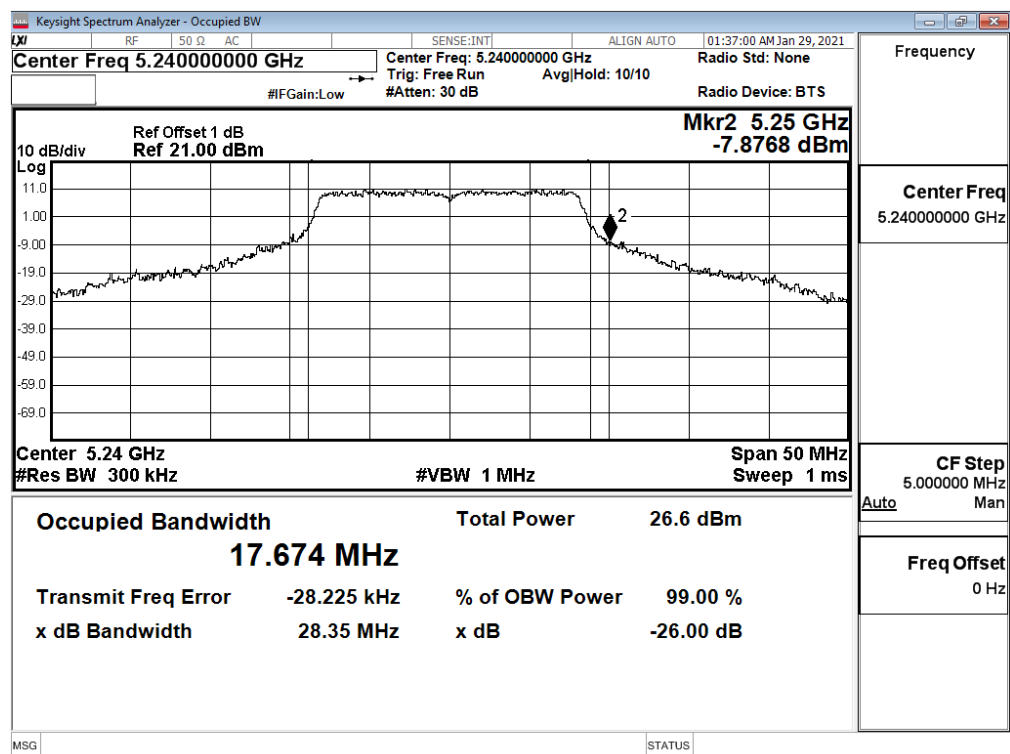
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5150.000	45.73	54.00	-8.27	28.45	17.28	AV
! 2	5191.449	91.95	--	--	74.21	17.74	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

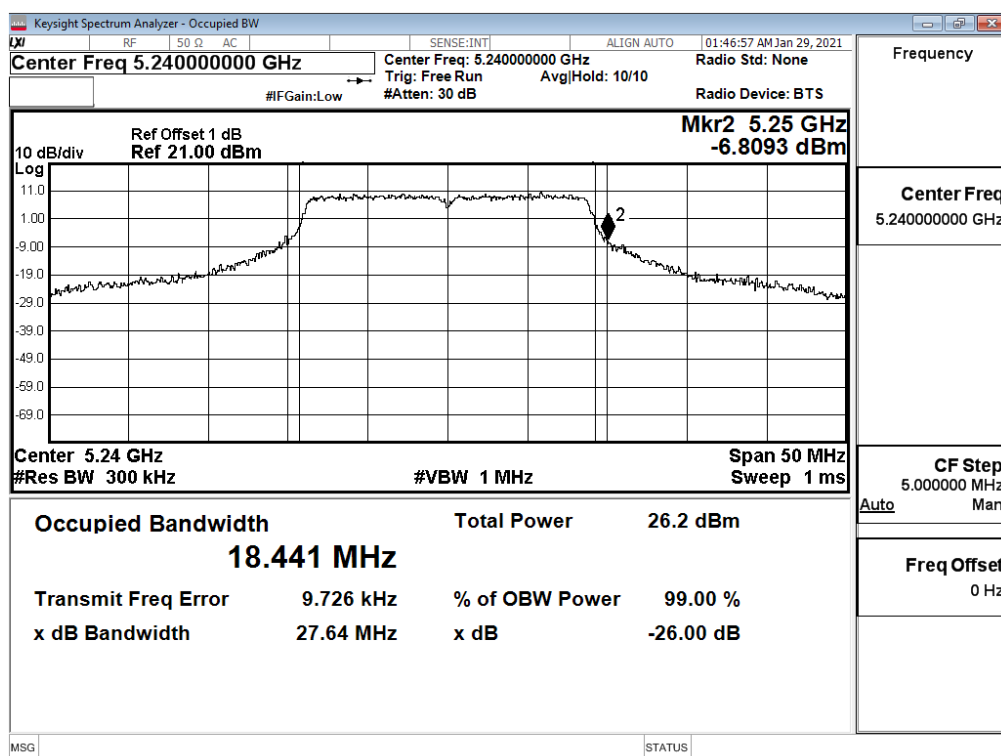
Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5240MHz)
 Test Date : 2021/01/29

Test Frequency (MHz)	Limit (MHz)	Result
5240	<5250	PASS



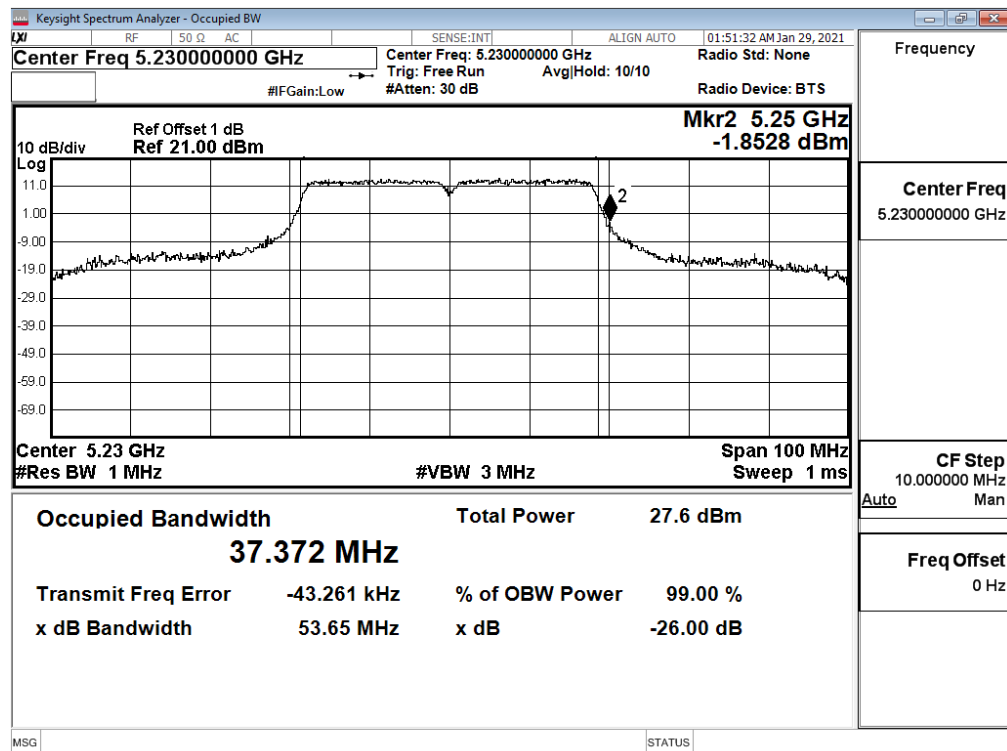
Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5240MHz)
 Test Date : 2021/01/29

Test Frequency (MHz)	Limit (MHz)	Result
5240	<5250	PASS



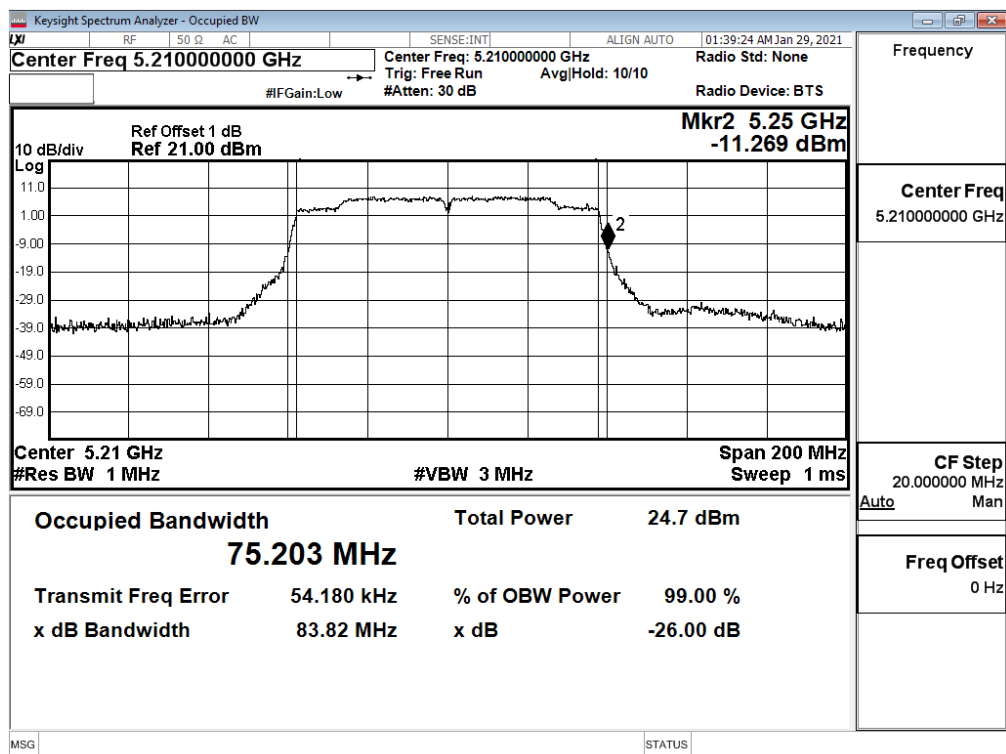
Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5230MHz)
 Test Date : 2021/01/29

Test Frequency (MHz)	Limit (MHz)	Result
5230	<5250	PASS



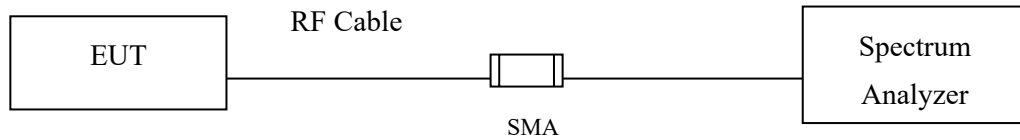
Product : Notebook
 Test Item : Band Edge Data
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5210MHz)
 Test Date : 2021/01/29

Test Frequency (MHz)	Limit (MHz)	Result
5210	<5250	PASS



7. Duty Cycle

7.1. Test Setup



7.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to U-NII test procedure of KDB789033 for compliance to FCC 47CFR 15.407 requirements.

7.3. Test Result of Duty Cycle

Product : Notebook
Test Item : Duty Cycle
Test Mode : Transmit

Duty Cycle Formula:

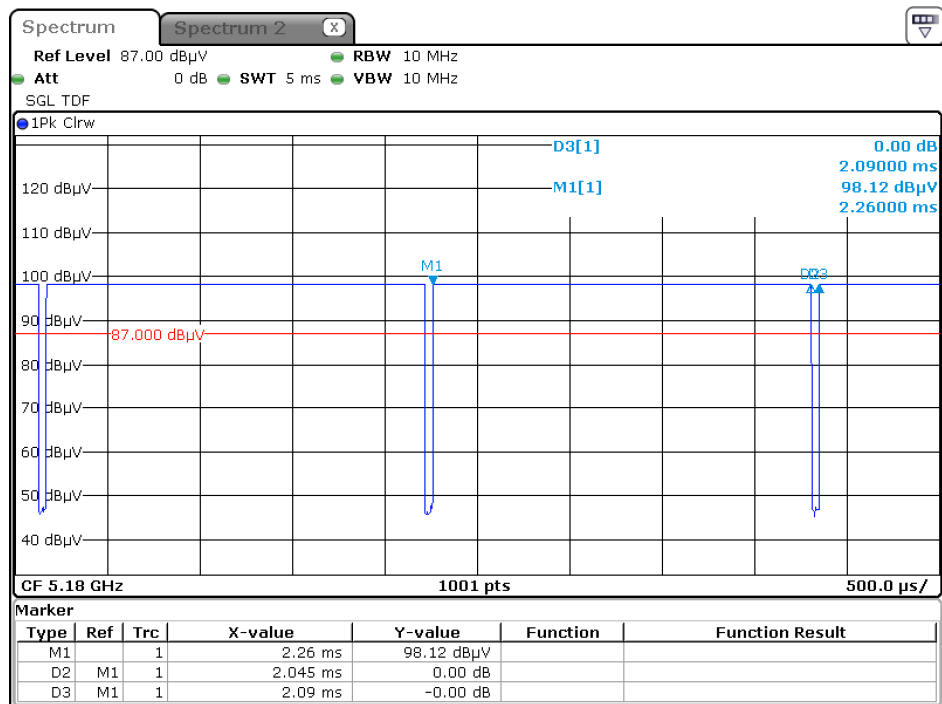
Duty Cycle = $Ton / (Ton + Toff)$

Duty Factor = $10 \text{ Log } (1/\text{Duty Cycle})$

Results:

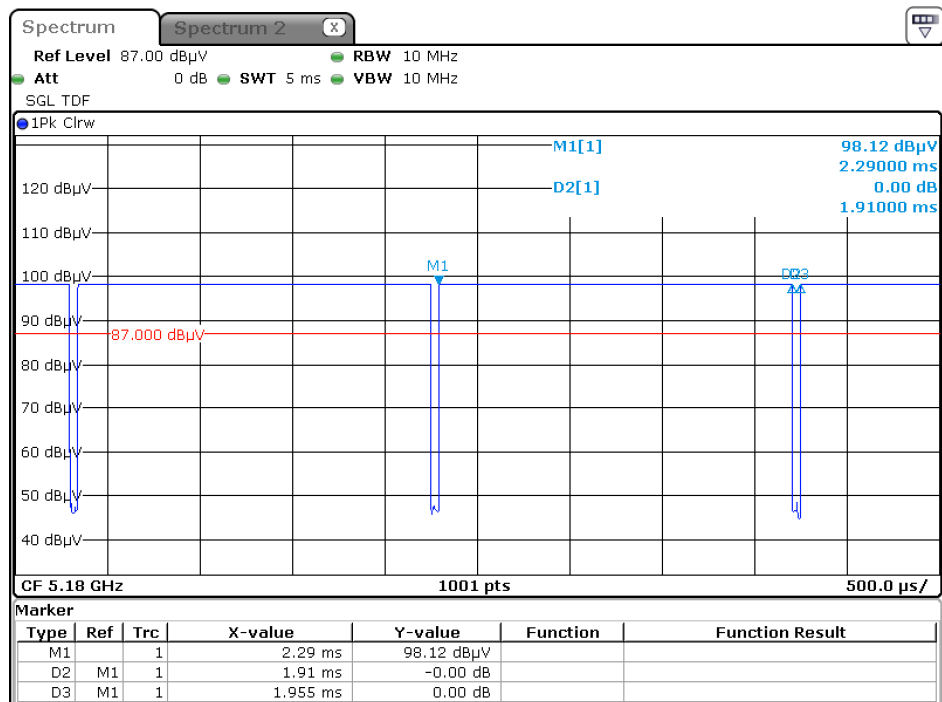
5GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11 a	2.0450	2.0900	97.85	0.09
802.11 n20	1.9100	1.9550	97.70	0.10
802.11 n40	0.9390	0.9840	95.43	0.20
802.11 ac80	11.0145	11.1340	98.93	0.05

802.11a



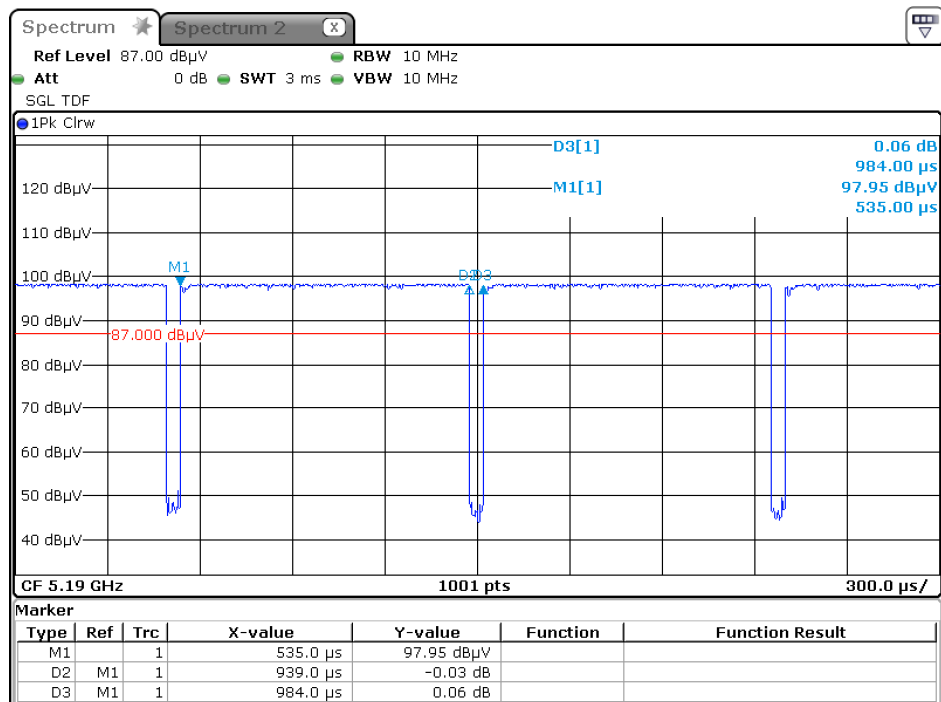
Date: 15.JAN.2021 03:57:22

802.11n20



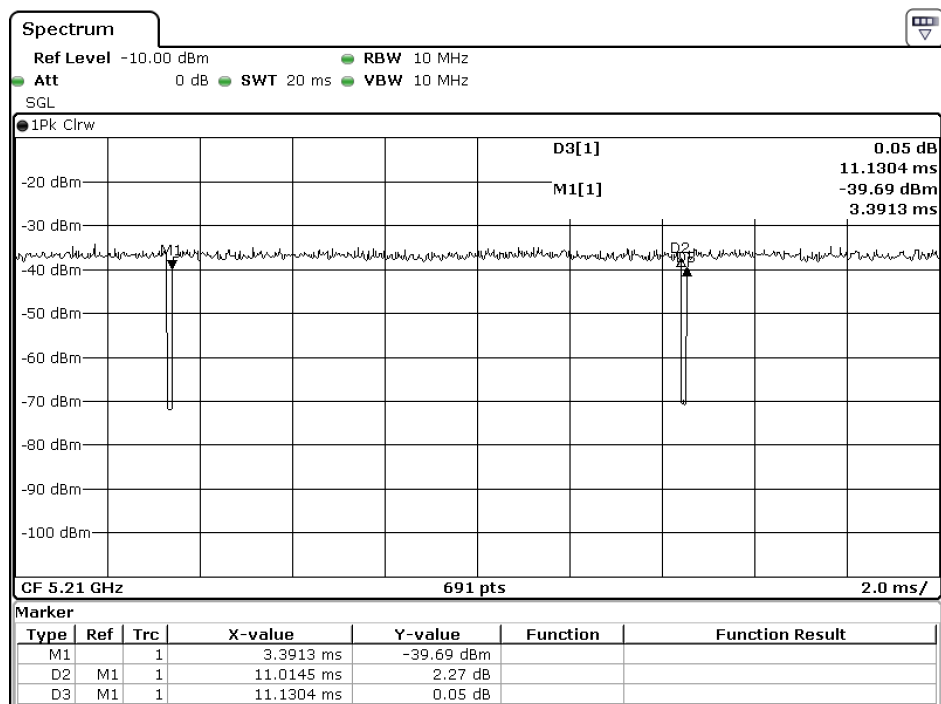
Date: 15.JAN.2021 04:00:54

802.11n40



Date: 15.JAN.2021 04:05:23

802.11ac80



Date: 3.FEB.2021 10:19:59

8. EMI Reduction Method During Compliance Testing

No modification was made during testing.