

RF Test Report

Project Number: 4942239**Proposal: SUW-202112002041****Report Number: 4942239EMC03****Revision Level: 0****Client: Risk Band LLC****Equipment Under Test: Wearable Emergency Device****Model Name: ARIES****Model Number: RBD30060****FCC ID: 2AHZ7-300602022****IC: 21986-300602022****Applicable Standards: ANSI C63.10: 2013 (FCC Part 15 Subpart C, § 15.247)****RSS-247, Issue 2****RSS-GEN Issue 5****Report issued on: 12 January 2023****Test Result: Compliant**

FOR THE SCOPE OF ACCREDITATION UNDER CERTIFICATE NUMBER: 3212.01

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1 Summary of Test Results

Test Description	Test Specification		Test Result
Bandwidth	15.247(a)(2)	RSS-247 5.2(a) RSS-GEN 6.7	Compliant
Peak Output Power	15.247(b)(3)	RSS-247 5.4 (d)	Compliant
Power Spectral Density	15.247(e)	RSS-247 5.2 (b)	Compliant
Conducted Spurious Emissions / Band Edge	15.247(d)	RSS-247 5.5	Compliant
Field Strength of Spurious Radiation	15.247(d)	RSS-247 5.5	Compliant
Emissions in Restricted Frequency Bands	15.205, 15.209	RSS-GEN 8.9, 8.10	Compliant
Antenna Requirement	15.203	RSS-GEN 6.8	Compliant ¹
AC Powerline Conducted Emissions	15.107, 15.207	RSS-GEN 8.8	Compliant

1) The device utilizes an internal surface-mount antenna.

1.1 Modifications Required for Compliance

None

2 General Information

2.1 Client Information

Name: Risk Band LLC
Address: 1000 Johnnie Dobbs Blvd., Suite 103-312
City, State, Zip, Country: Mount Pleasant, SC, 29464, USA

2.2 Test Laboratory

Name: SGS North America, Inc.
Address: 620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country: Suwanee, GA 30024, USA

Accrediting Body: A2LA
Type of lab: Testing Laboratory
Certificate Number: 3212.01
Designation Number: US1126
CAB Identifier: US0186

2.3 General Information of EUT

Equipment Under Test: Wearable Emergency Device
Model Name: ARIES
Model Number: RBD30060
Serial Number: 220512-00013 (Conducted), 220526-00011 (Radiated)

Frequency Range: 2412 – 2462 MHz
Data Modes: 802.11b, 802.11g, 802.11nHT20
Antenna: SMT Antenna, 2.1dBi (Antenova, P/N: A5839)

Rated Voltage: 3.7Vdc
Test Voltage: 3.7Vdc

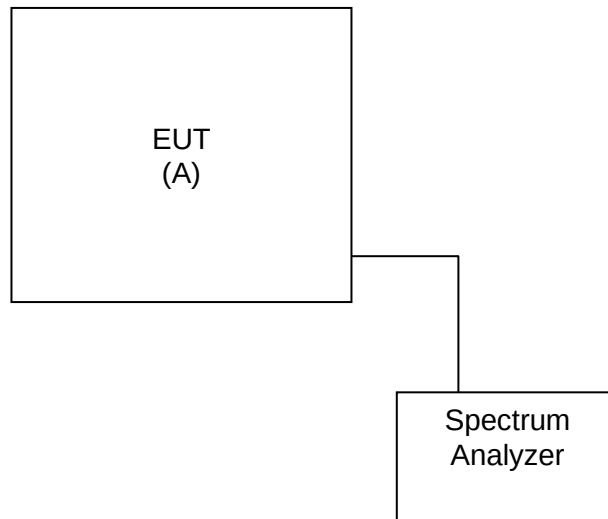
Sample Received Date: 26 July 2022
Dates of testing: 05 – 26 August 2022

2.4 Operating Modes and Conditions

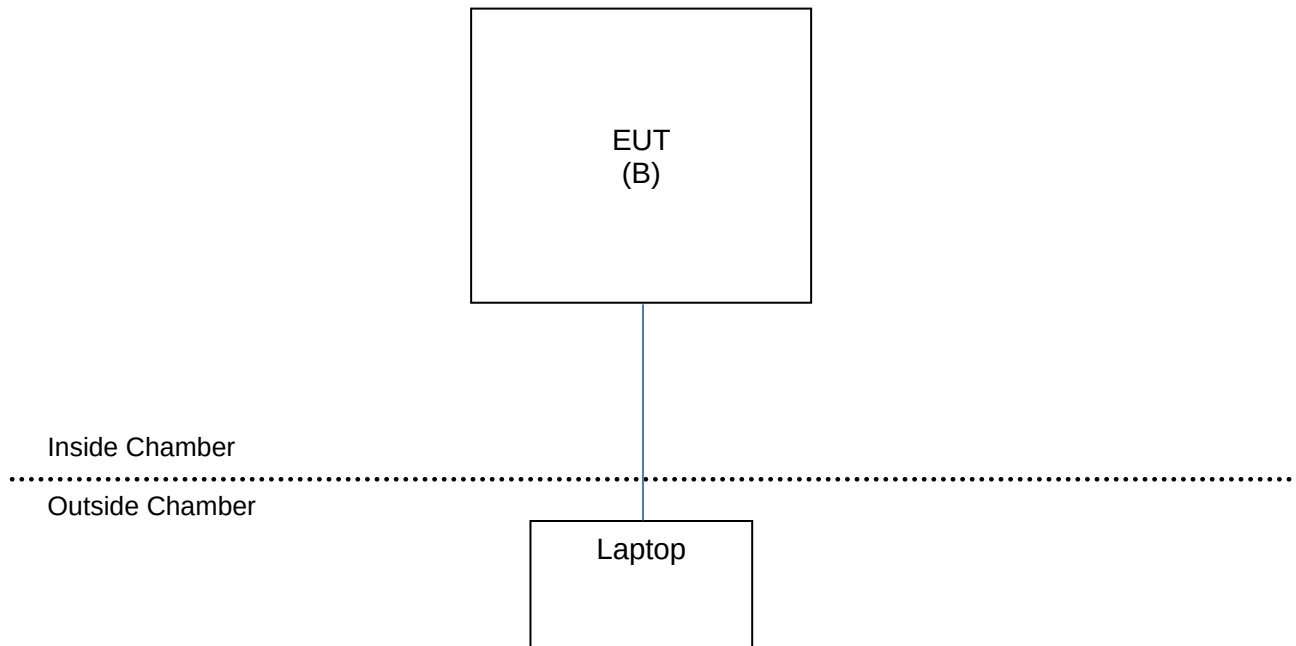
The EUT was connected via USB to a laptop loaded with ESP32 EspressIF software. Using a terminal program, the EUT was first placed into Direct Test Mode (DTM). Once in DTM, the EspressIF software was used to control the modulation, packet-type, channel, and hopping mode. During testing, the device was configured to transmit at a power setting of 5. For radiated spurious emissions the worst-case orientation was with the EUT on its side (X-Axis).

- 802.11b, 1Mbps (Power setting Attenuation 24)
- 802.11g, 12Mbps (Power setting Attenuation 10)
- 802.11nHT20, MCS2 (Power setting Attenuation 10)

2.5 EUT Connection Block Diagram – Conducted Measurements



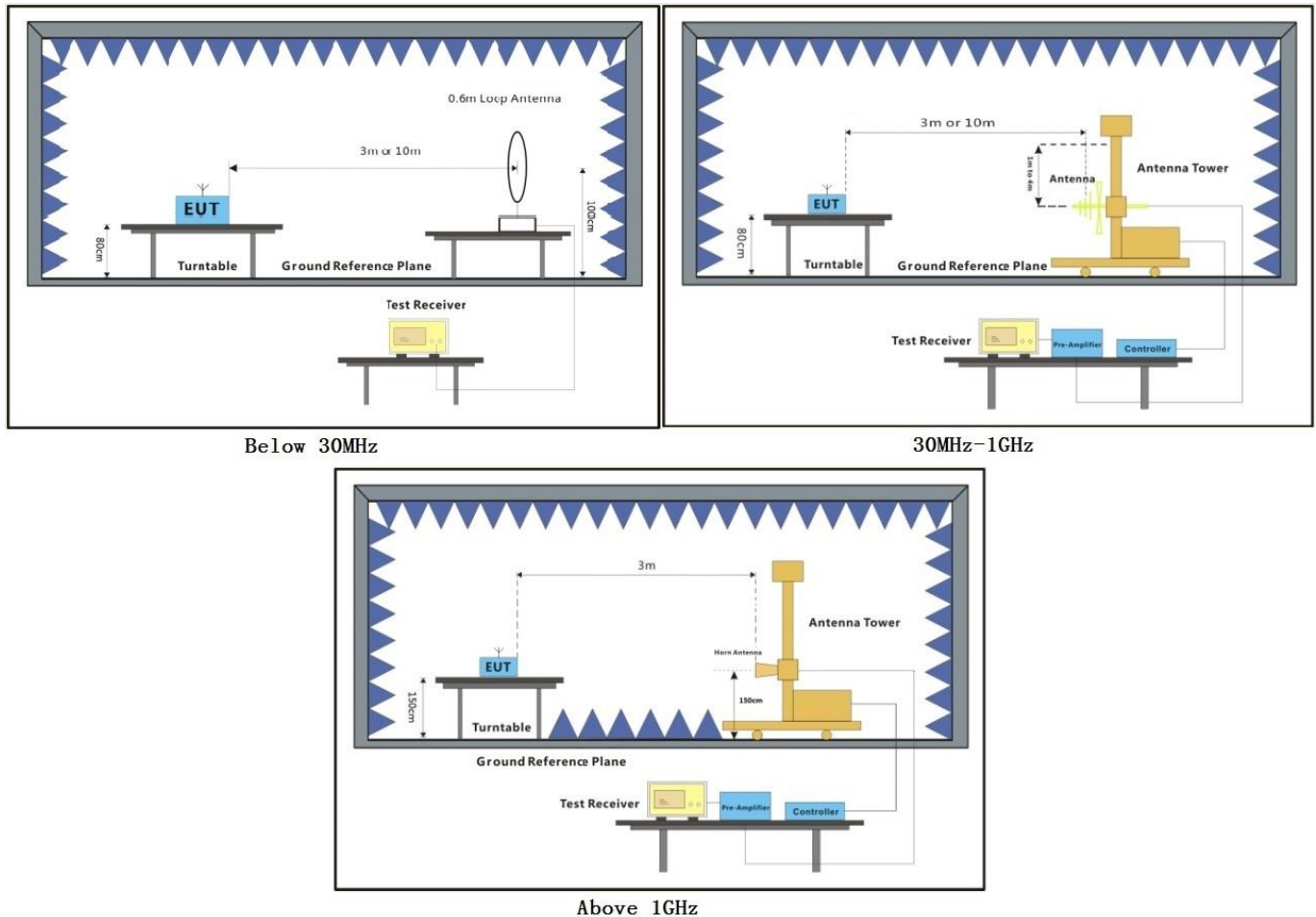
2.6 EUT Connection Block Diagram – Radiated Measurements



2.7 System Configurations

Device reference	Manufacturer	Description	Model Number	Serial Number
A	Risk Band LLC	Wearable Emergency Device	RBD30060	220512-00013
B	Risk Band LLC	Wearable Emergency Device	RBD30060	220526-00011

2.8 Configuration Diagrams (Radiated)



3 Bandwidth

3.1 Test Result

Test Description	Test Specification		Test Result
6 dB Bandwidth 99% Occupied Bandwidth	15.247(a)(2)	RSS-247 5.2(a) RSS-GEN 6.7	Compliant

3.2 Test Method

The procedures from ANSI C63.10: 2013 clause 11.8 and 558074 D01 DTS Meas Guidance v05r2 were used to determine the 6 dB bandwidth.

The procedures from ANSI C63.10: 2013 clause 6.9.2 were used to measure the 99% Occupied Bandwidth.

3.3 Test Site

EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.8 °C

Relative Humidity: 49.6 %

Atmospheric Pressure: 98.0 kPa

3.4 Test Equipment

Test End Date: 8/23/2022

Tester: JP

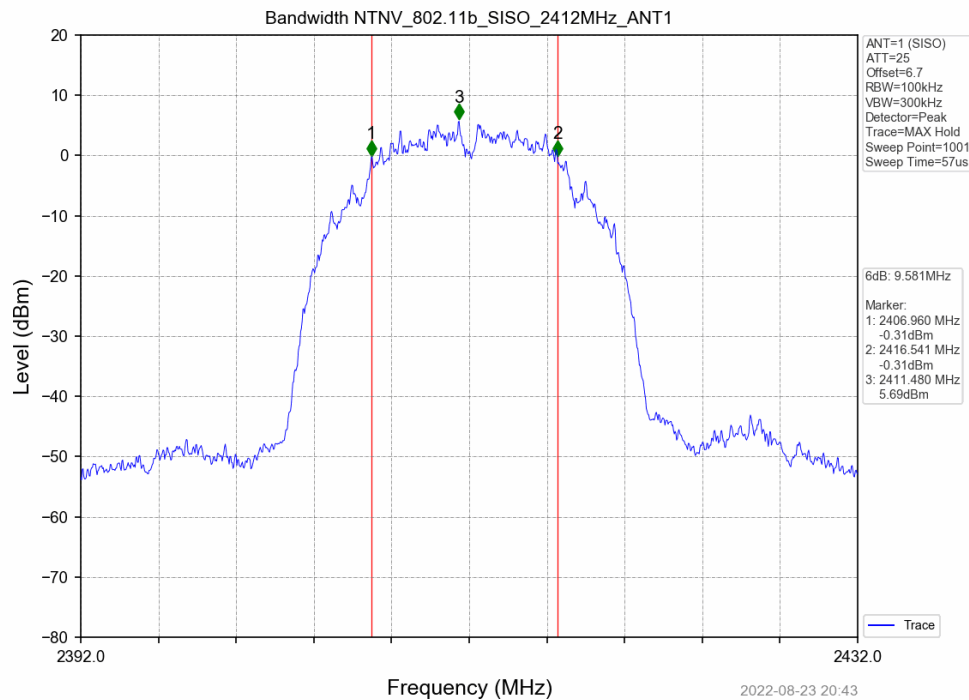
Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
ATTENUATOR, 6DB	BW-S6W2	MINI-CIRCUITS	15023	7-Oct-2021	7-Oct-2022
RF CABLE SMA TO SMA, 0.01-40GHZ	084-0505-059	TELEDYNE STORM	20109	16-Mar-2022	16-Mar-2023
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	4-Jan-2022	4-Jan-2024

3.5 Test Data – 6dB Bandwidth

Frequency (MHz)	Mode	ANT No	6dB BW (MHz)	Limit (MHz)	Verdict
2412	802.11b	1	9.581	>500kHz	PASS
2437	802.11b	1	9.576	>500kHz	PASS
2462	802.11b	1	9.581	>500kHz	PASS
2412	802.11g	1	16.517	>500kHz	PASS
2437	802.11g	1	16.517	>500kHz	PASS
2462	802.11g	1	16.518	>500kHz	PASS
2412	802.11n20	1	17.106	>500kHz	PASS
2437	802.11n20	1	17.106	>500kHz	PASS
2462	802.11n20	1	17.112	>500kHz	PASS

Sample Plot

Low Channel – 802.11b (2412MHz)

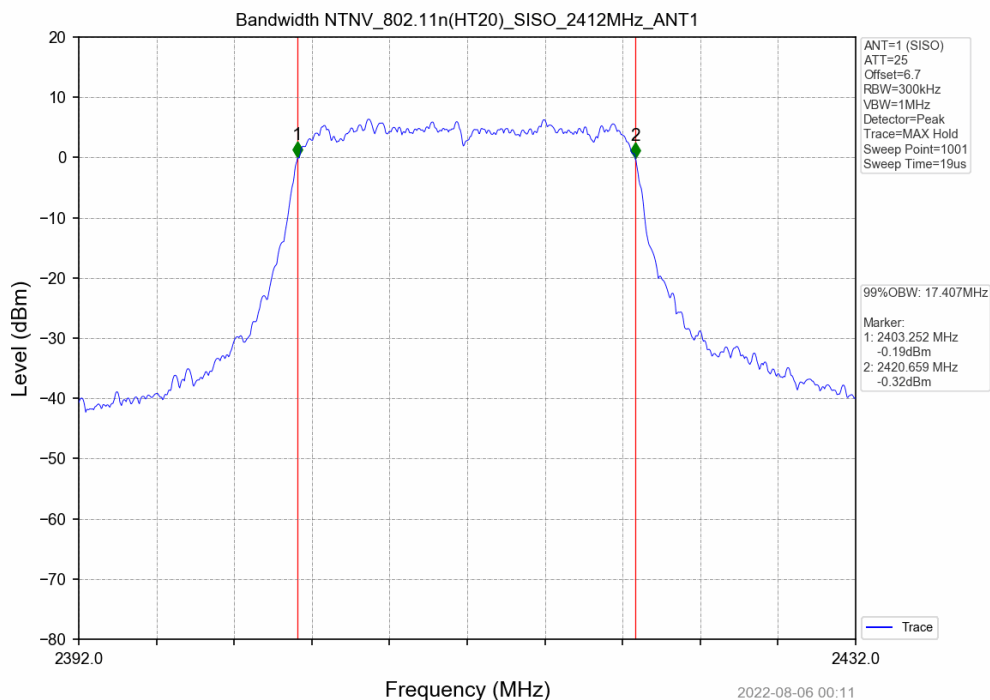


3.6 Test Data – 99% Bandwidth

Frequency (MHz)	TX Type	ANT No.	OBW (MHz)	Verdict
2412	802.11b	1	13.049	Reported
2437	802.11b	1	12.972	Reported
2462	802.11b	1	12.996	Reported
2412	802.11g	1	16.582	Reported
2437	802.11g	1	16.576	Reported
2462	802.11g	1	16.583	Reported
2412	802.11n20	1	17.407	Reported
2437	802.11n20	1	17.392	Reported
2462	802.11n20	1	17.405	Reported

Sample Plot

Low Channel – 802.11n (2412MHz)



4 Peak Output Power

4.1 Test Result

Test Description	Test Specification		Test Result
Peak Output Power	15.247(b)(3)	RSS-247 S5.4 (d)	Compliant

4.2 Test Method

Fundamental peak power measurements were recorded using the procedures from ANSI C63.10: 2013 clause 11.9 and KDB 558074 D01 Measurement Guidance v05r2.

Limit

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. For using antennas with greater than 6dBi of gain, the limit is reduced in dB by the amount the gain exceeds 6dBi (e.g. for a 7.4dBi antenna, the limit is reduced from 30dBm to 28.6dBm)

4.3 Test Site

EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.8 °C

Relative Humidity: 49.6 %

Atmospheric Pressure: 98.0 kPa

4.4 Test Equipment

Test End Date: 8/23/2022

Tester: JP

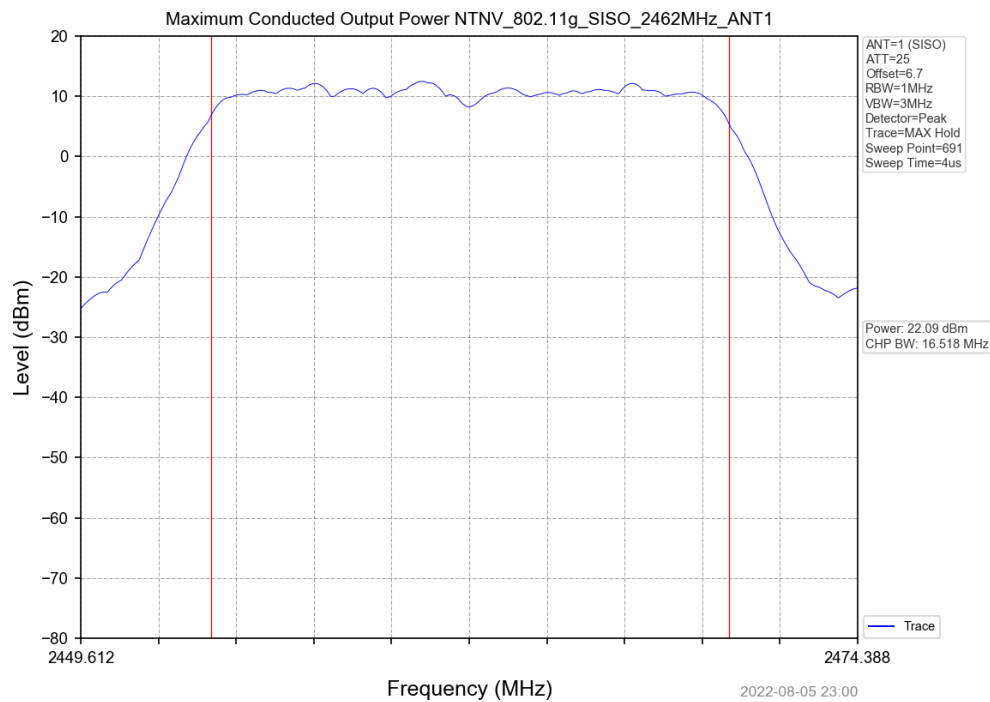
Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
ATTENUATOR, 6DB	BW-S6W2	MINI-CIRCUITS	15023	7-Oct-2021	7-Oct-2022
RF CABLE SMA TO SMA, 0.01-40GHZ	084-0505-059	TELEDYNE STORM	20109	16-Mar-2022	16-Mar-2023
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	4-Jan-2022	4-Jan-2024

4.5 Test Data

Frequency (MHz)	TX Type	ANT No.	Peak Output Power (dBm)	Limit (dBm)	Verdict
2412	802.11b	1	16.41	30	PASS
2437	802.11b	1	16.19	30	PASS
2462	802.11b	1	16.20	30	PASS
2412	802.11g	1	21.75	30	PASS
2437	802.11g	1	21.46	30	PASS
2462	802.11g	1	22.09	30	PASS
2412	802.11n20	1	21.59	30	PASS
2437	802.11n20	1	21.70	30	PASS
2462	802.11n20	1	21.81	30	PASS

Sample Plot

High Channel – 802.11g (2437MHz)



5 Power Spectral Density

5.1 Test Result

Test Description	Test Specification		Test Result
Power Spectral Density	15.247(e)	RSS-247 S5.2 (b)	Compliant

5.2 Test Method

Power spectral density measurements were recorded using the procedures from ANSI C63.10: 2013 clause 11.10 and KDB 558074 D01 Measurement Guidance v05r2.

Limit

The limit is 8 dBm.

5.3 Test Site

EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.8 °C

Relative Humidity: 49.6 %

Atmospheric Pressure: 98.0 kPa

5.4 Test Equipment

Test End Date: 8/23/2022

Tester: JP

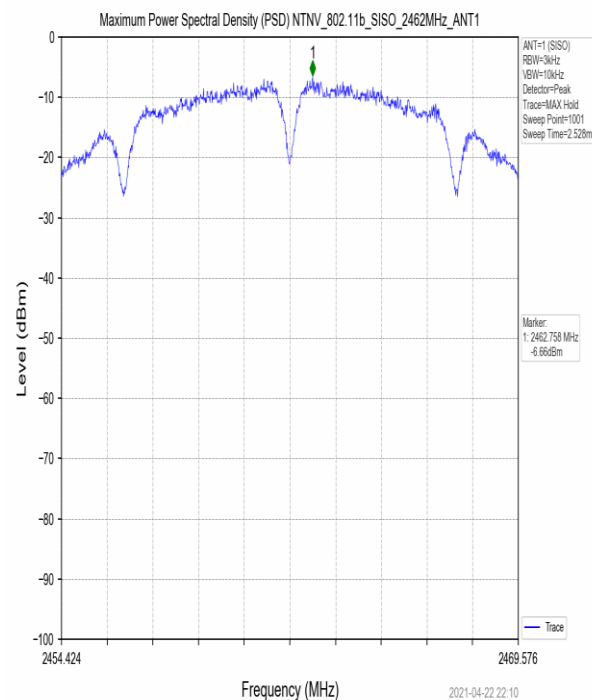
Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
ATTENUATOR, 6DB	BW-S6W2	MINI-CIRCUITS	15023	7-Oct-2021	7-Oct-2022
RF CABLE SMA TO SMA, 0.01-40GHZ	084-0505-059	TELEDYNE STORM	20109	16-Mar-2022	16-Mar-2023
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	4-Jan-2022	4-Jan-2024

5.5 Test Data

Frequency (MHz)	TX Type	ANT No.	Peak PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
2412	802.11b	1	-9.67	≤8	PASS
2437	802.11b	1	-9.89	≤8	PASS
2462	802.11b	1	-9.80	≤8	PASS
2412	802.11g	1	-11.54	≤8	PASS
2437	802.11g	1	-11.59	≤8	PASS
2462	802.11g	1	-11.13	≤8	PASS
2412	802.11n20	1	-11.43	≤8	PASS
2437	802.11n20	1	-11.55	≤8	PASS
2462	802.11n20	1	-11.13	≤8	PASS

Sample Plot

Mid Channel – 802.11b, Port WF2 (2437MHz)



6 Conducted Spurious Emissions / Band Edge

6.1 Test Result

Test Description	Test Specification		Test Result
Conducted Spurious Emissions	15.247(d)	RSS-247 S5.5	Compliant

6.2 Test Method

Spurious emissions in non-restricted frequency bands were recorded using the methods defined in ANSI C63.10: 2013 clause 11.11 and KDB 558074 D01 Measurement Guidance v05r2.

Lowest, middle, and highest channels were investigated.

Because the maximum conducted peak output power was used to determine compliance with the output power limits, the limit in any 100 kHz band outside of the authorized band is 20 dB below the maximum in-band peak level.

6.3 Test Site

EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.8 °C

Relative Humidity: 49.6 %

Atmospheric Pressure: 98.0 kPa

6.4 Test Equipment

Test End Date: 8/23/2022

Tester: JP

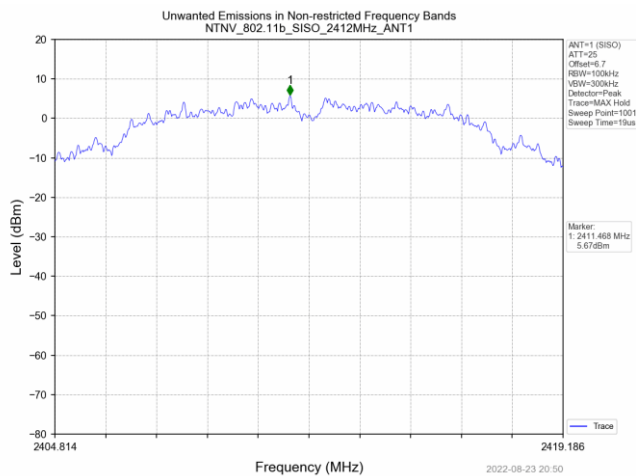
Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
ATTENUATOR, 6DB	BW-S6W2	MINI-CIRCUITS	15023	7-Oct-2021	7-Oct-2022
RF CABLE SMA TO SMA, 0.01-40GHZ	084-0505-059	TELEDYNE STORM	20109	16-Mar-2022	16-Mar-2023
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	4-Jan-2022	4-Jan-2024

6.5 Test Data

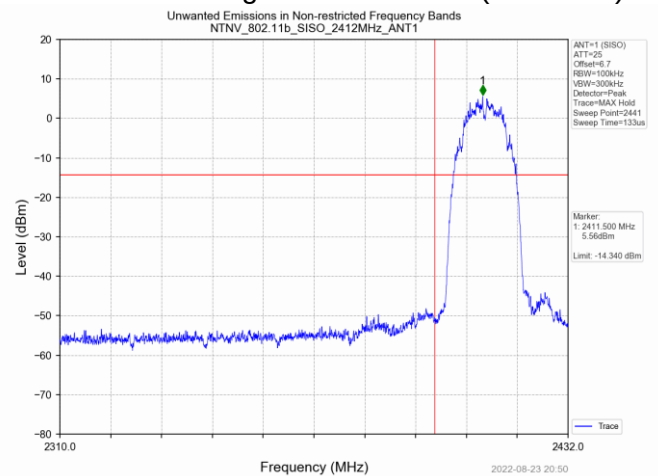
Frequency (MHz)	TX Type	ANT No.	Spurious Conducted Emission (dBm)	Limit (dBm)	Verdict
2412	802.11b	1	Refer to test graph	-14.34	PASS
2437	802.11b	1	Refer to test graph	-14.34	PASS
2462	802.11b	1	Refer to test graph	-14.34	PASS
2412	802.11g	1	Refer to test graph	-18.03	PASS
2437	802.11g	1	Refer to test graph	-18.03	PASS
2462	802.11g	1	Refer to test graph	-18.03	PASS
2412	802.11n20	1	Refer to test graph	-18.48	PASS
2437	802.11n20	1	Refer to test graph	-18.48	PASS
2462	802.11n20	1	Refer to test graph	-18.48	PASS

802.11b

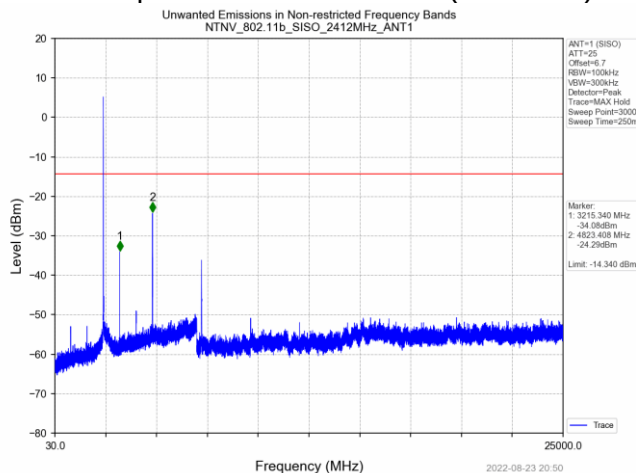
In-Band Reference



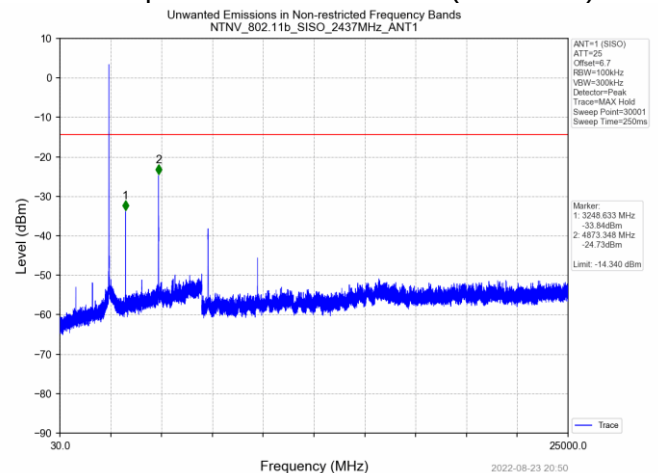
Lower Band Edge - Low Channel (2412MHz)



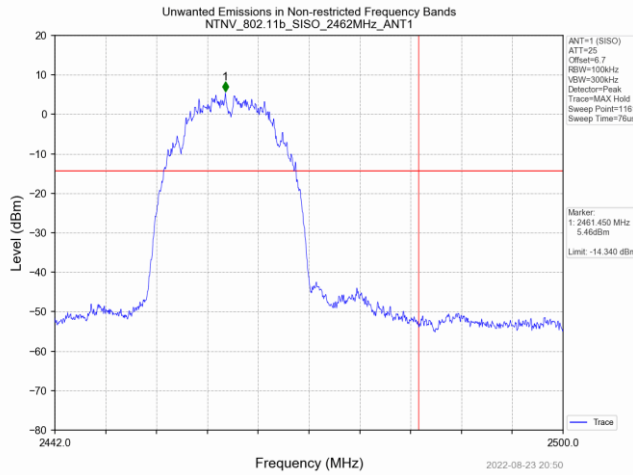
Full Spectrum - Low Channel (2412MHz)



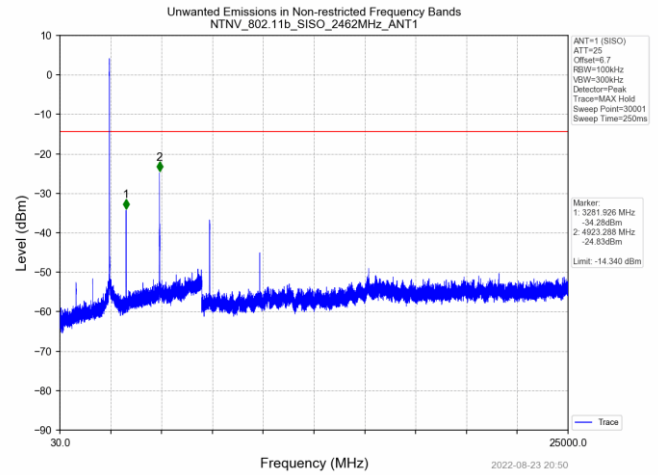
Full Spectrum - Mid Channel (2437MHz)



Upper Band Edge – High Channel (2462MHz)

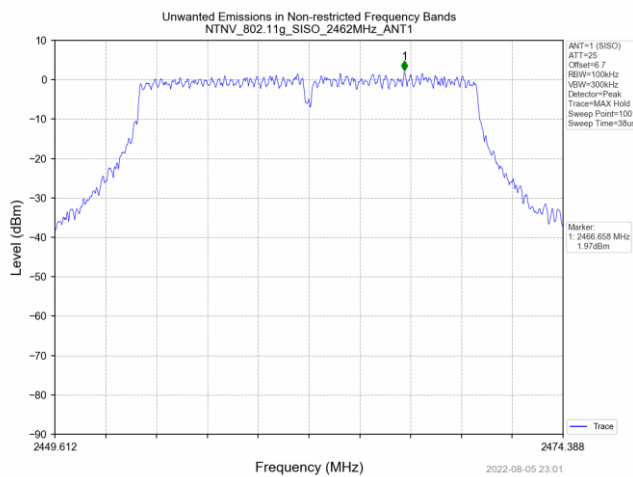


Full Spectrum - High Channel (2462MHz)

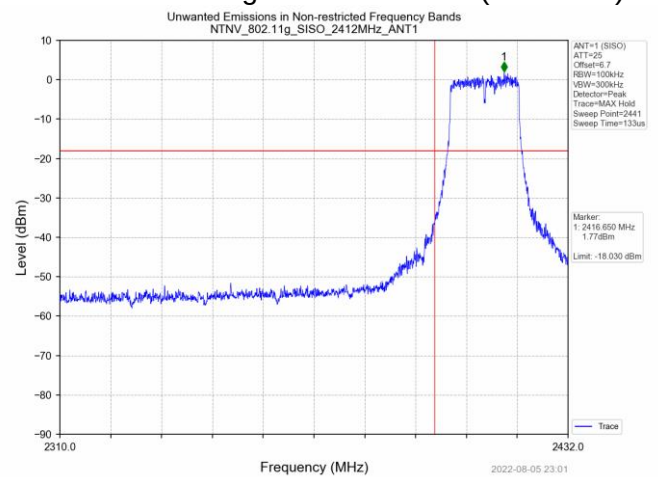


802.11g

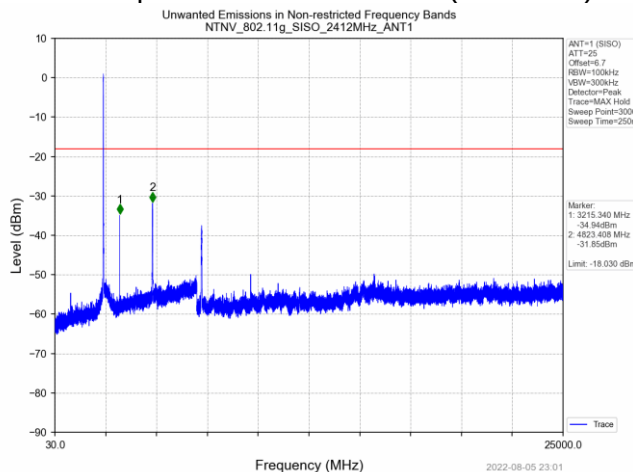
In-Band Reference



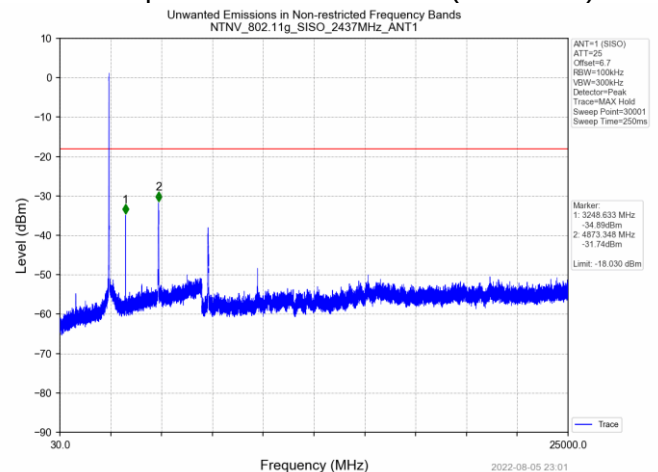
Lower Band Edge - Low Channel (2412MHz)



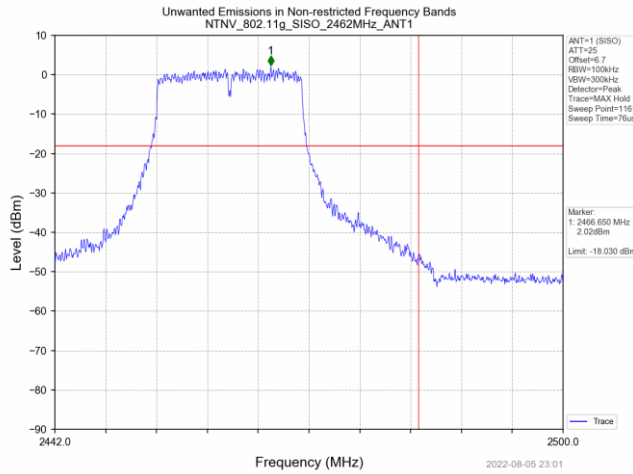
Full Spectrum - Low Channel (2412MHz)



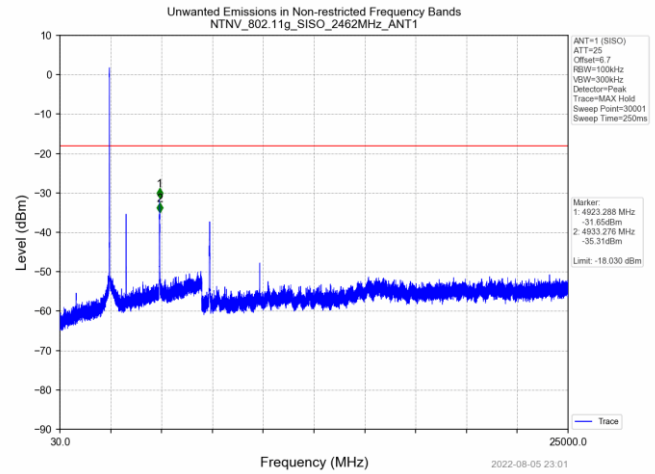
Full Spectrum - Mid Channel (2437MHz)



Upper Band Edge – High Channel (2462MHz)

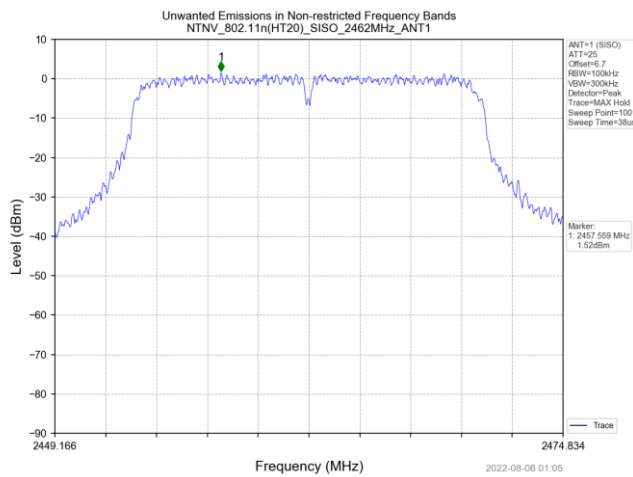


Full Spectrum - High Channel (2462MHz)

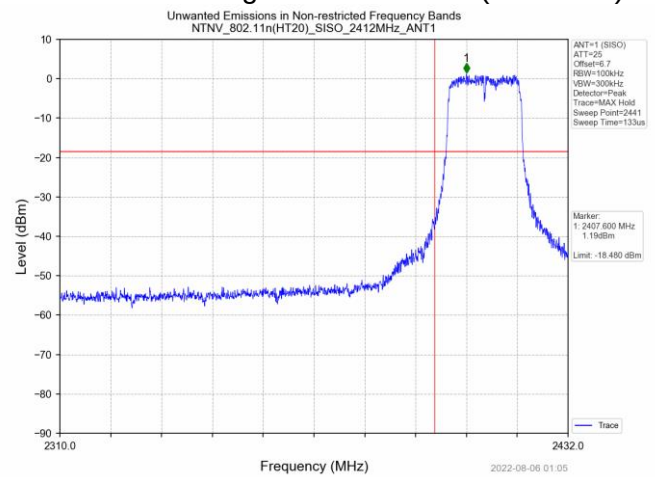


802.11n20

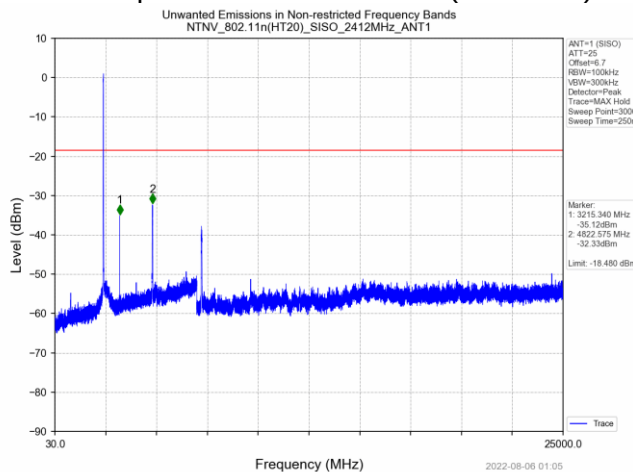
In-Band Reference



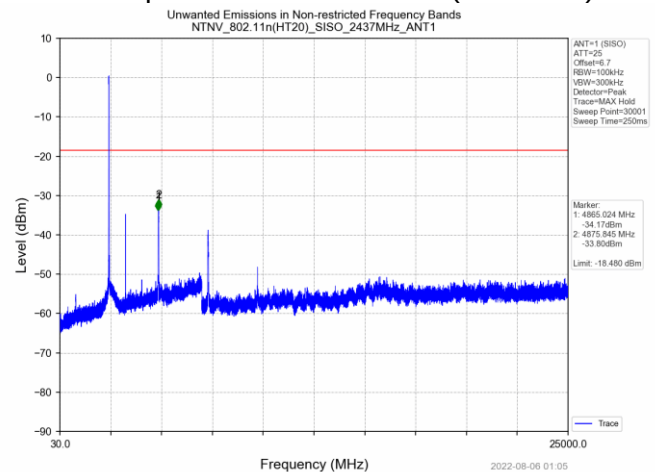
Lower Band Edge - Low Channel (2412MHz)



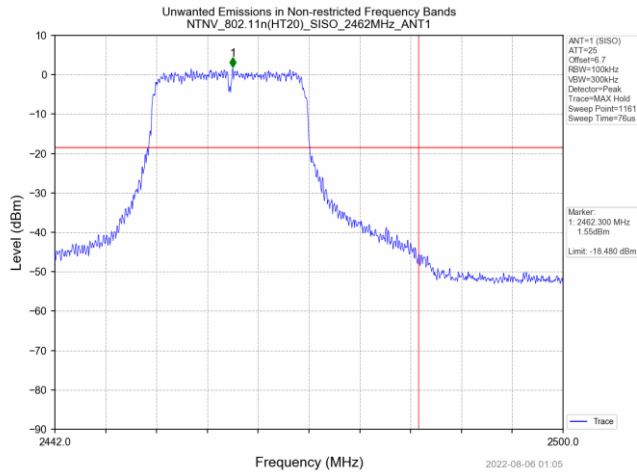
Full Spectrum - Low Channel (2412MHz)



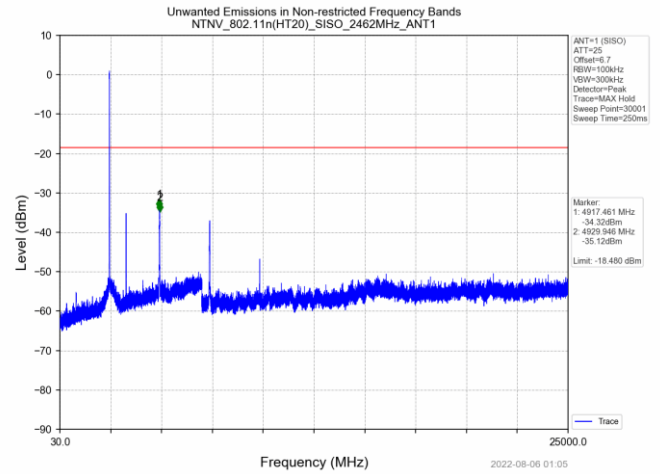
Full Spectrum - Mid Channel (2437MHz)



Upper Band Edge – High Channel (2462MHz)



Full Spectrum - High Channel (2462MHz)



7 Field Strength of Spurious Radiation (Restricted Bands)

7.1 Test Result

Test Description	Test Specification		Test Result
Radiated Spurious Emissions	15.247(d) and 15.209	RSS-247 S5.5	Compliant

7.2 Test Method

The measurement methods defined in ANSI C63.10: 2013 were used.

Lowest, middle, and highest channels were investigated – the device was commanded to continuously transmit on low, middle, and high channels. The test system reported the following duty-cycles used for correcting the average measurements:

- 802.11b – 100% (0dB)
- 802.11g – 100% (0dB)

Test distance:

- 9k to 30 MHz – The EUT to measurement antenna distance was 3 meters
- 30 to 1000 MHz - The EUT to measurement antenna distance was 3 meters
- 1 to 18 GHz - The EUT to measurement antenna distance was 3 meters
- 18 to 26 GHz - The EUT to measurement antenna distance was 3 meters

Limits within restricted bands of operation:

Frequency	Limits ⁽¹⁾		Peak Limits dBuV/m
	Microvolts/m	dBuV/m	
30 - 88 MHz	100	40 ⁽²⁾	--
88 - 216 MHz	150	43.5 ⁽²⁾	--
216 - 960 MHz	200	46 ⁽²⁾	--
960 - 1000 MHz	500	54 ⁽²⁾	--
1 - 40 GHz	500	54 ⁽³⁾	74

(1) These limits are applicable to emissions outside of the intentional transmit frequency band.

(2) Quasi-peak limit

(3) Average limit

7.3 Test Site

10m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions

Temperature: 22.2 °C

Relative Humidity: 48.6 %

Atmospheric Pressure: 98.2 kPa

7.4 Test Equipment

Test End Date: 8/26/2022

Tester: AB/JP

Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
PASSIVE LOOP ANTENNA, 9KHZ -	6512	ETS LINDGREN	20151	16-Mar-2022	16-Mar-2023
N TO N RF CABLE	NC12-N1N1-276	MEGAPHASE	22000	10-Jan-2022	10-Jan-2023
RF CABLE	UC-N-MM-275	MAURY MICROWAVE	17015	25-Aug-2021	25-Aug-2022
RF CABLE NM TO NM, 0.01-18GHZ	90-195-079	TELEDYNE STORM	20124	14-Feb-2022	14-Feb-2023
BROADBAND PREAMPLIFIER 9KHZ-	BBV 9745	SCHWARZBECK MESS	20157	16-Mar-2022	16-Mar-2023
FILTER, HIGH PASS, >2800MHZ	HPM50111	MICRO-TRONICS	22017	16-Jun-2022	16-Jun-2023
ANTENNA, BILOG	JB6	SUNOL	B079690	19-Apr-2022	19-Apr-2024
RF CABLE	SF106	HUBER & SUHNER	B079713	26-Aug-2021	26-Aug-2022
RF CABLE	SUCOFLEX 100	HUBER & SUHNER	B108523	26-Aug-2021	26-Aug-2022
LOW NOISE AMPLIFIER	ZKL-2+	MINI-CIRCUITS	B079800	18-Oct-2021	18-Oct-2022
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	29-Jul-2022	29-Jul-2024
RF CABLE, NM TO NM.	90-195-276	TELEDYNE STORM	21020	16-Mar-2022	16-Mar-2023
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	7-Oct-2021	7-Oct-2022
RECEIVER	ESRP	ROHDE & SCHWARZ	S/N: 101065	17-Dec-2020	17-Dec-2022
RECEIVER	ESW44	ROHDE & SCHWARZ	S/N: 101894	26-Oct-2021	12-Mar-2023

Note: Cable 17015 was used for testing on 23-Aug-2022

Software:

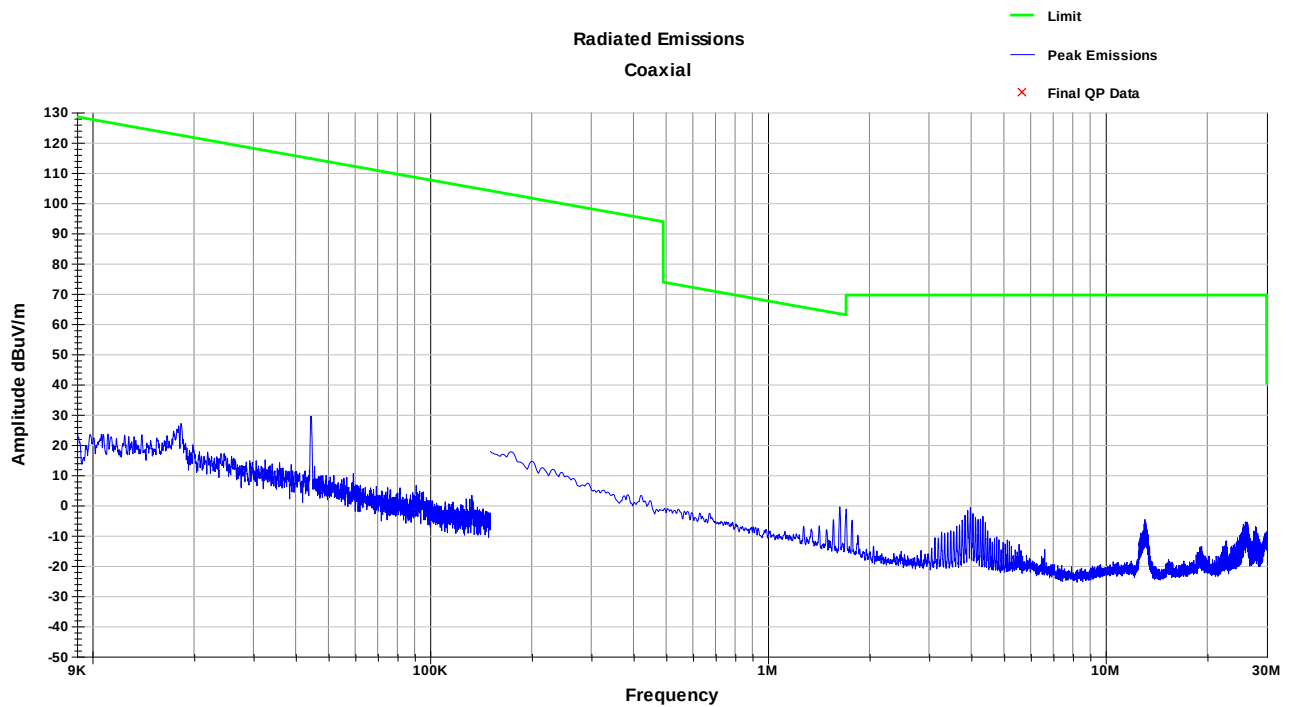
RSE 9k - 30M 220804 Dated 04 August 2022

RSE 30-1000 MHz T7 220318 Dated 18 March 2022

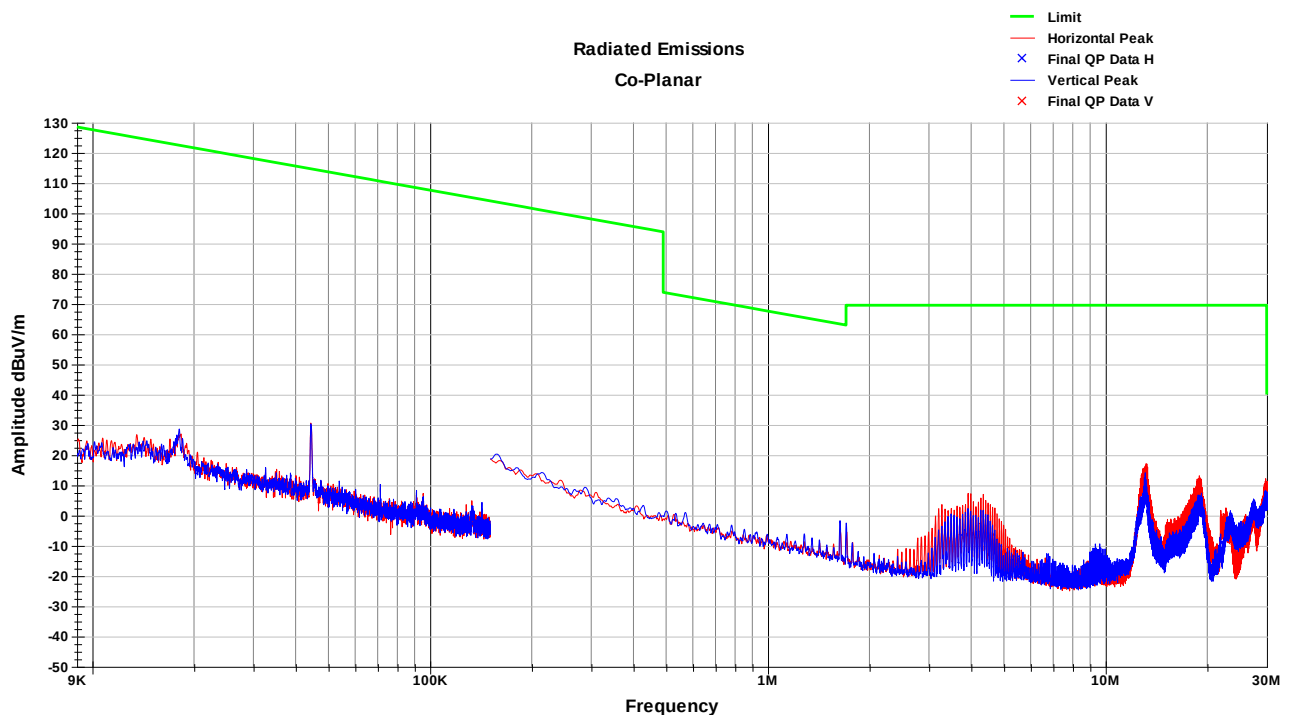
RSE 1-18 GHz T7 210212 Dated 12 February 2021

7.5 Test Data – Peak Plots

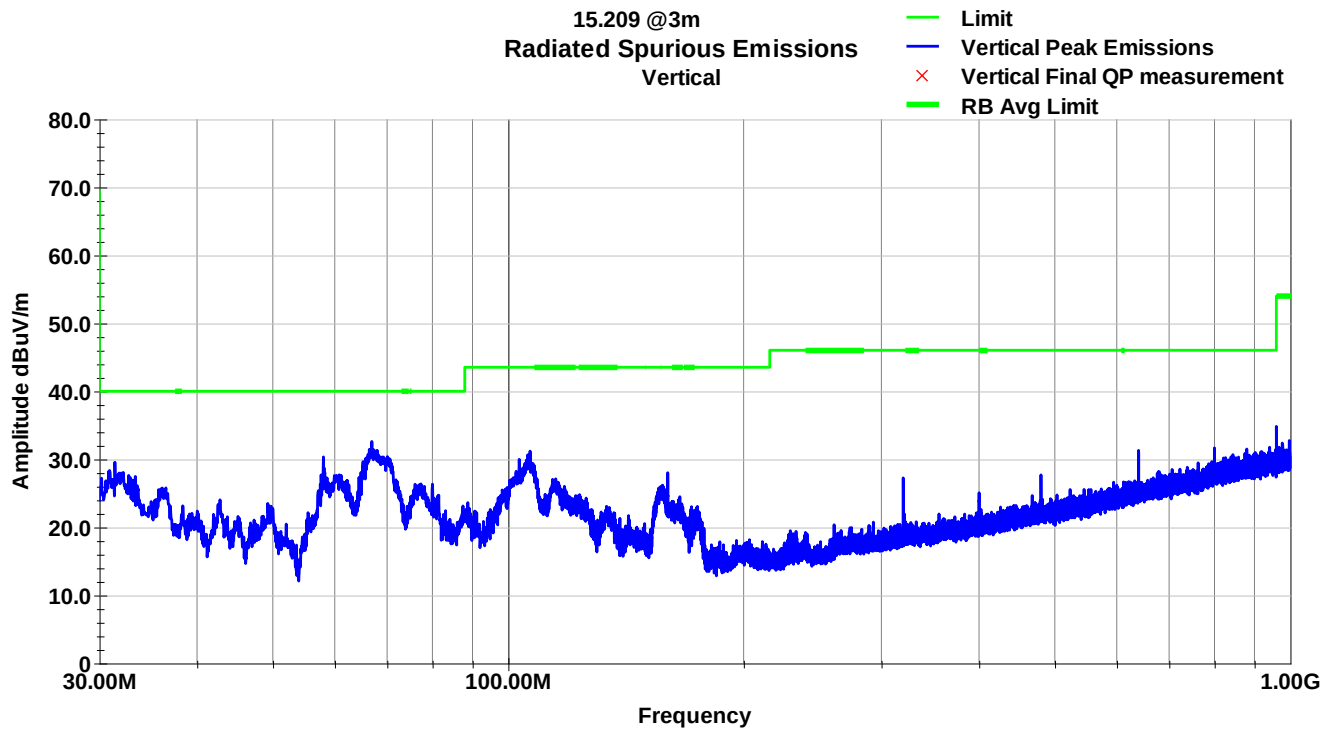
Between 9kHz and 1000MHz, there was no significant deviation with respect to axis, modulation, or channel
Co-Axial Radiated Spurious Emissions – 9kHz-30MHz (802.11b LCH)



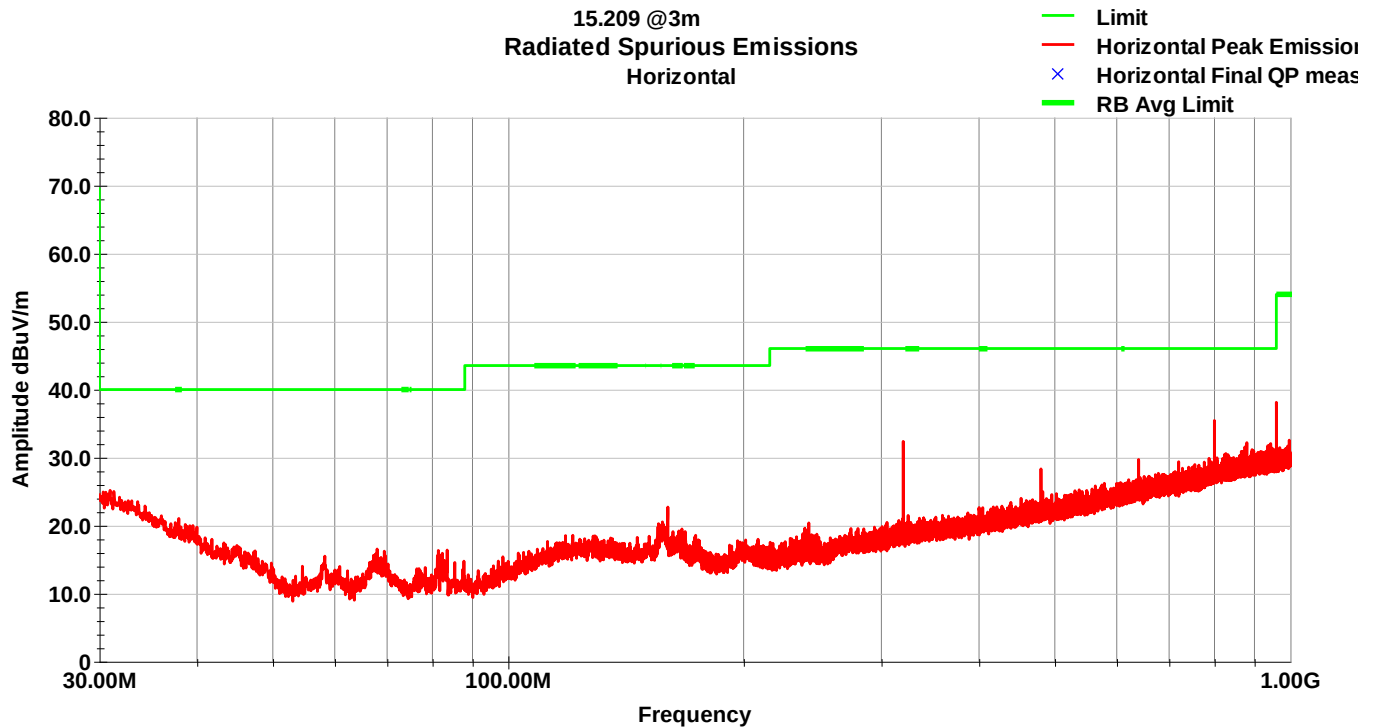
Co-Planar Radiated Spurious Emissions – 9kHz-30MHz (802.11b LCH)



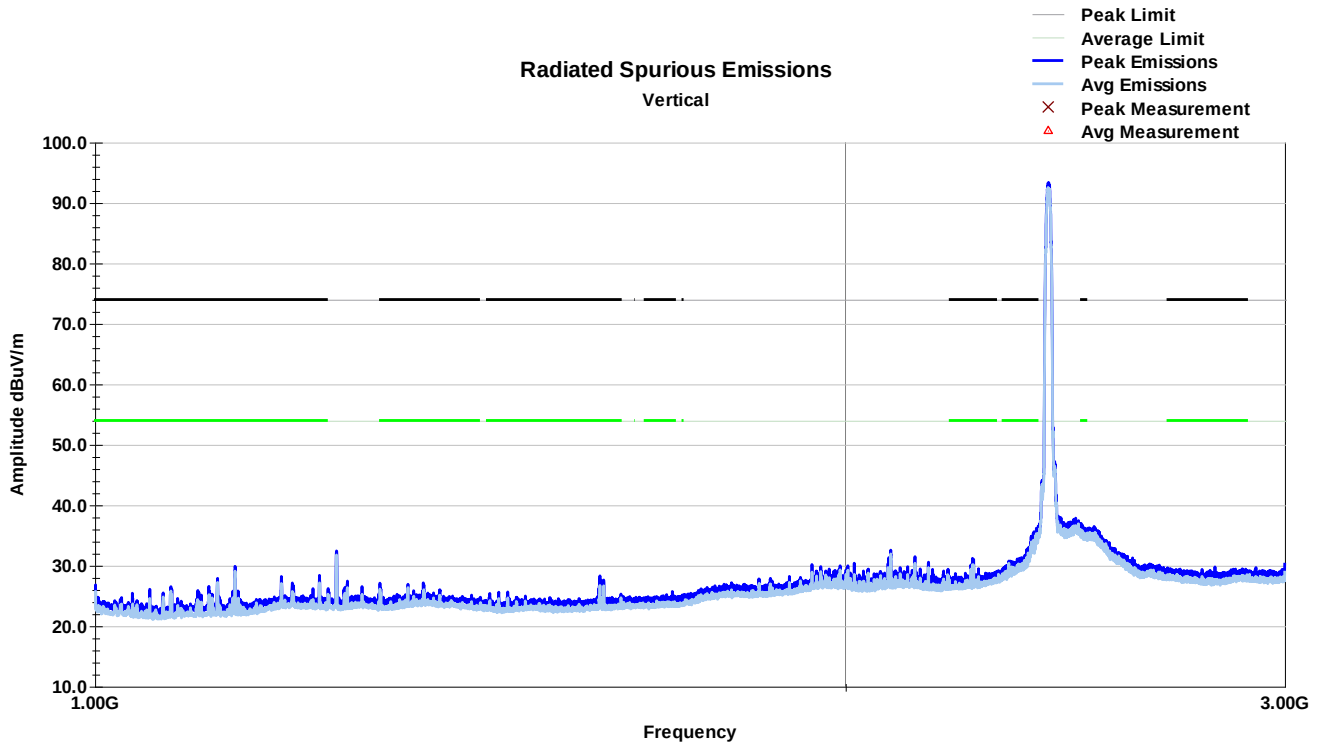
Vertical Radiated Spurious Emissions – 30-1000MHz (802.11b LCH)



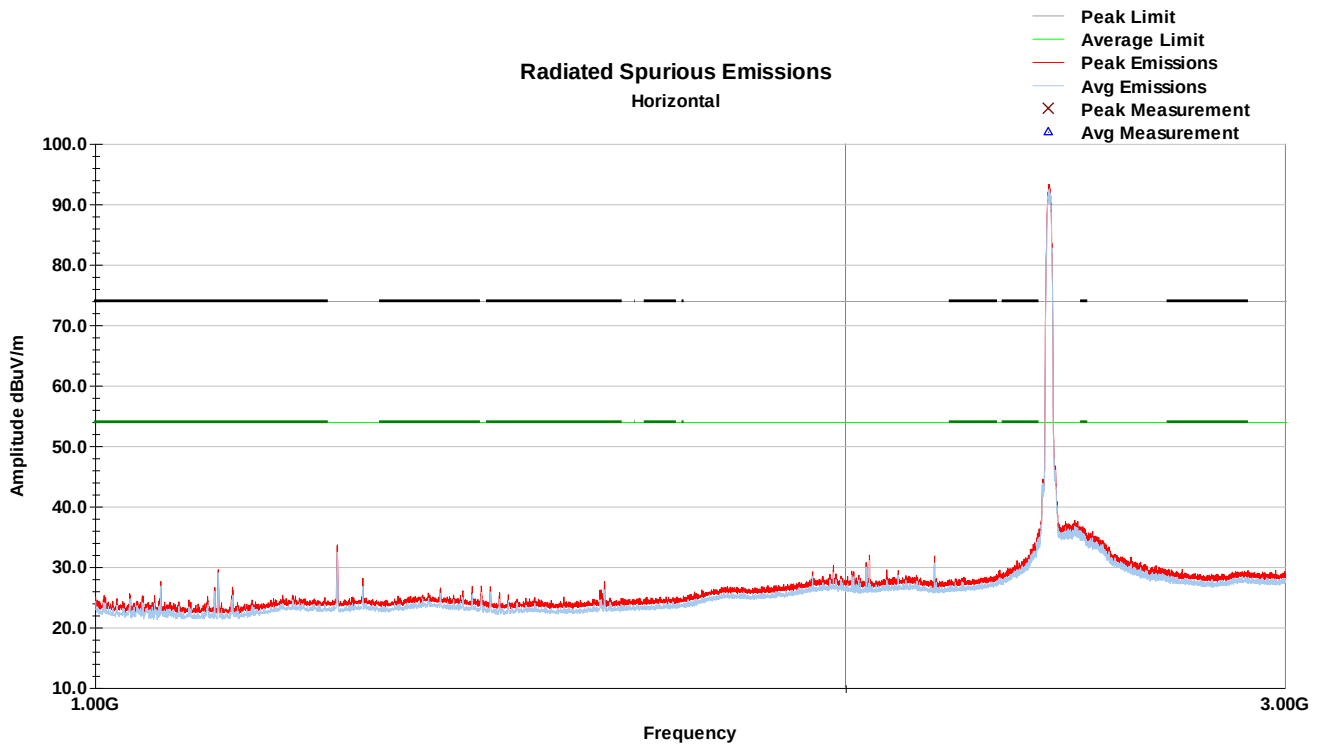
Horizontal Radiated Spurious Emissions – 30-1000MHz (802.11b LCH)



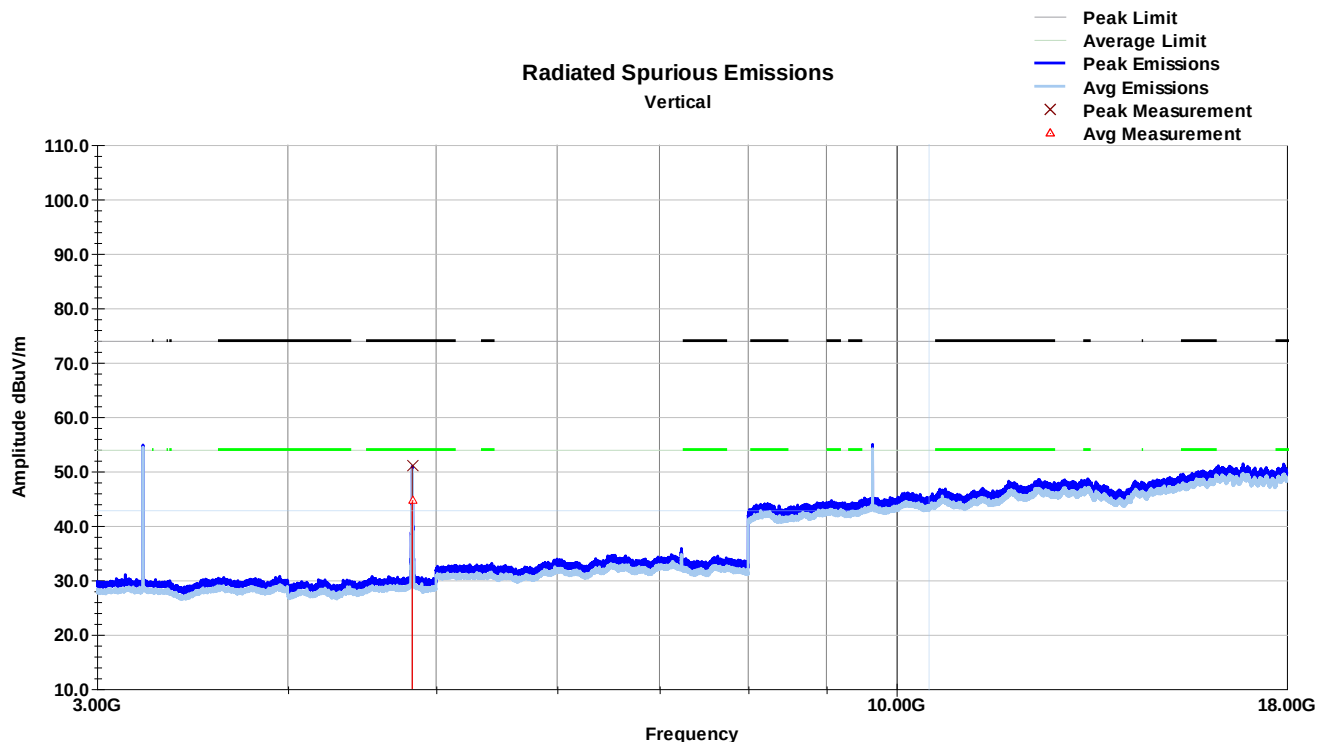
Vertical Radiated Spurious Emissions – 1-3GHz (802.11b LCH)



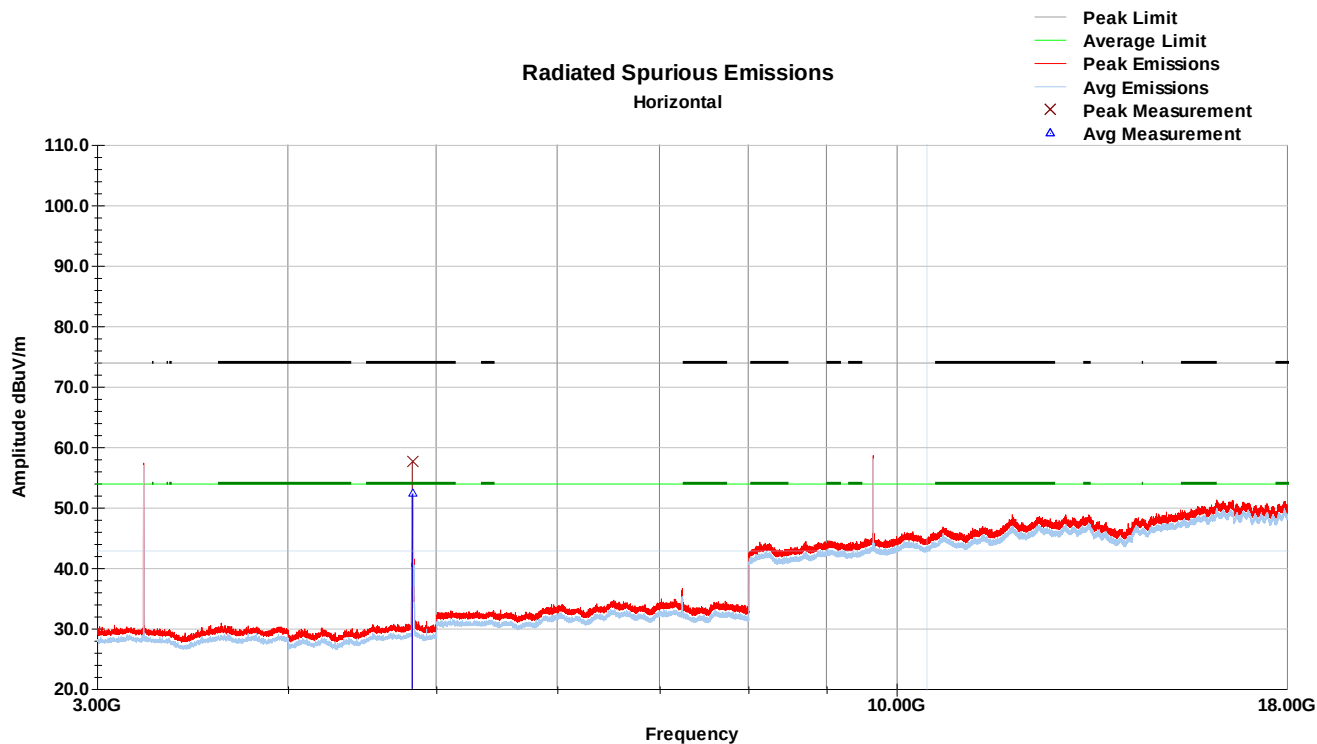
Horizontal Radiated Spurious Emissions – 1-3GHz (802.11b LCH)



Vertical Radiated Spurious Emissions – 3-18GHz (802.11b LCH)

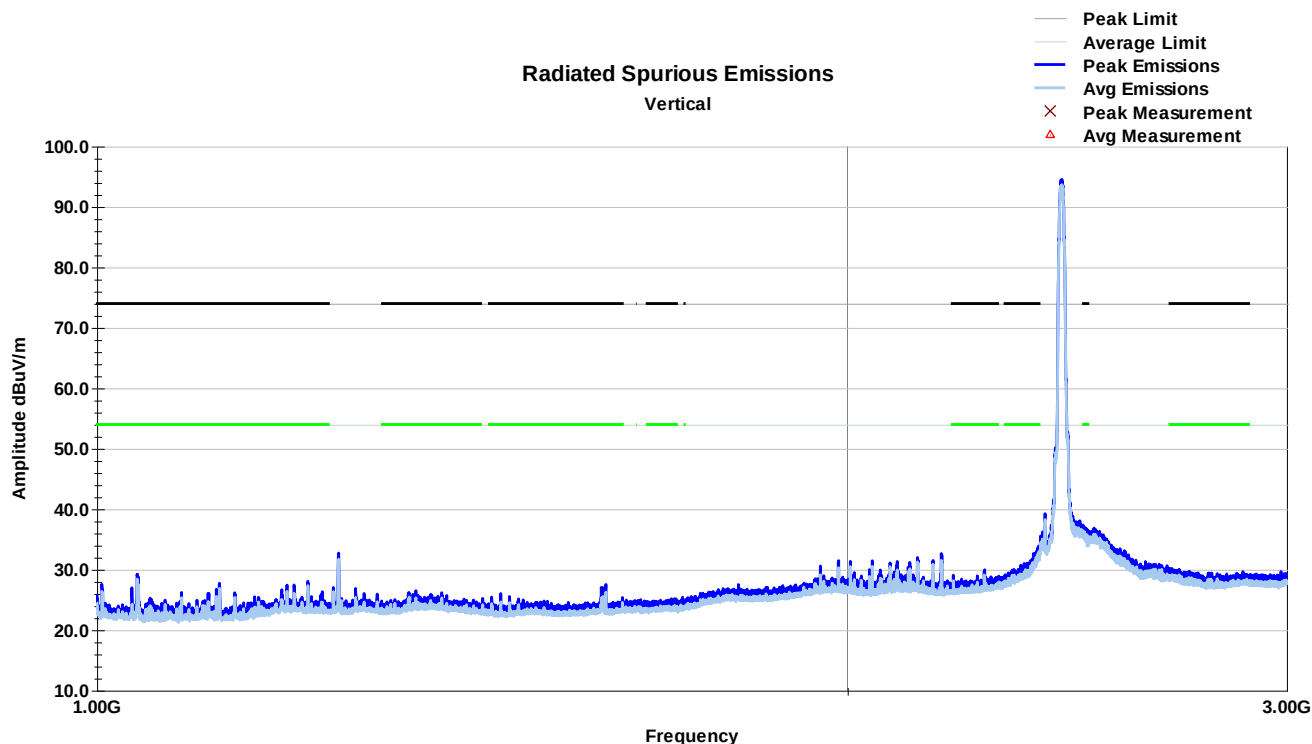


Horizontal Radiated Spurious Emissions – 3-18GHz (802.11b LCH)

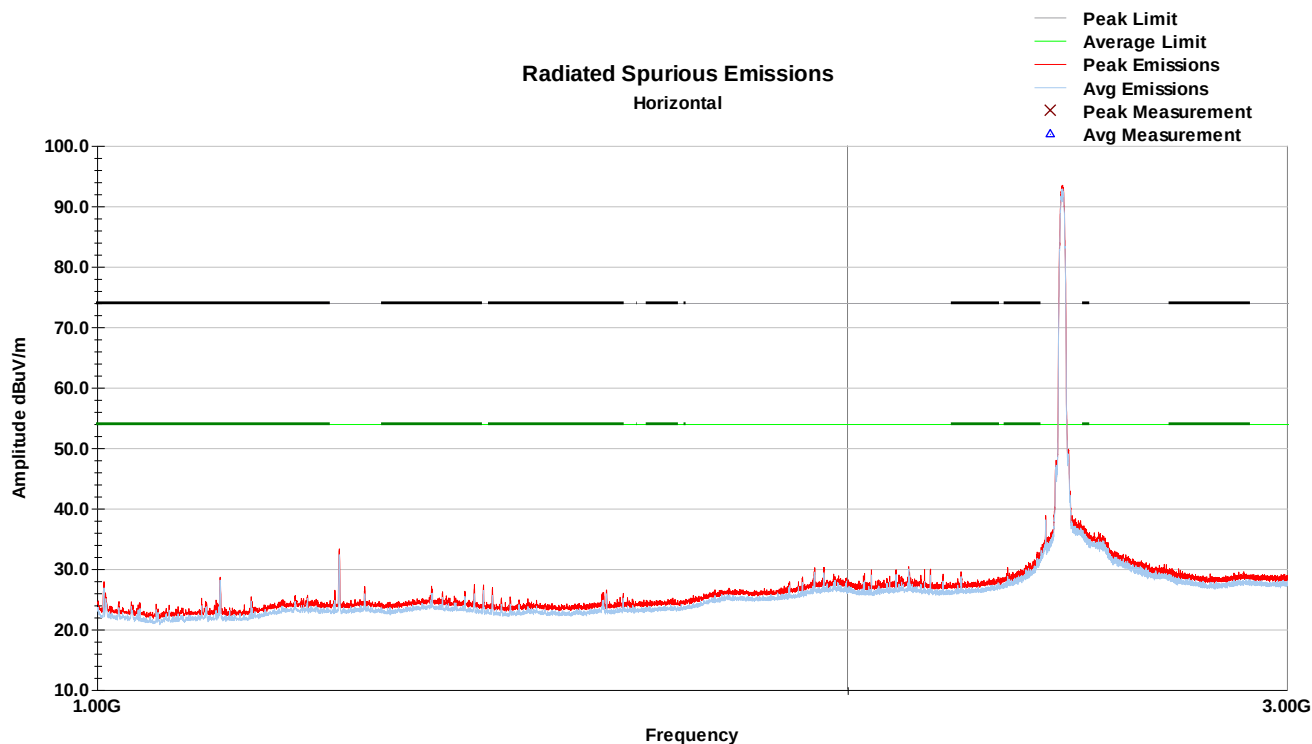


Other spurious emissions were not in restricted bands

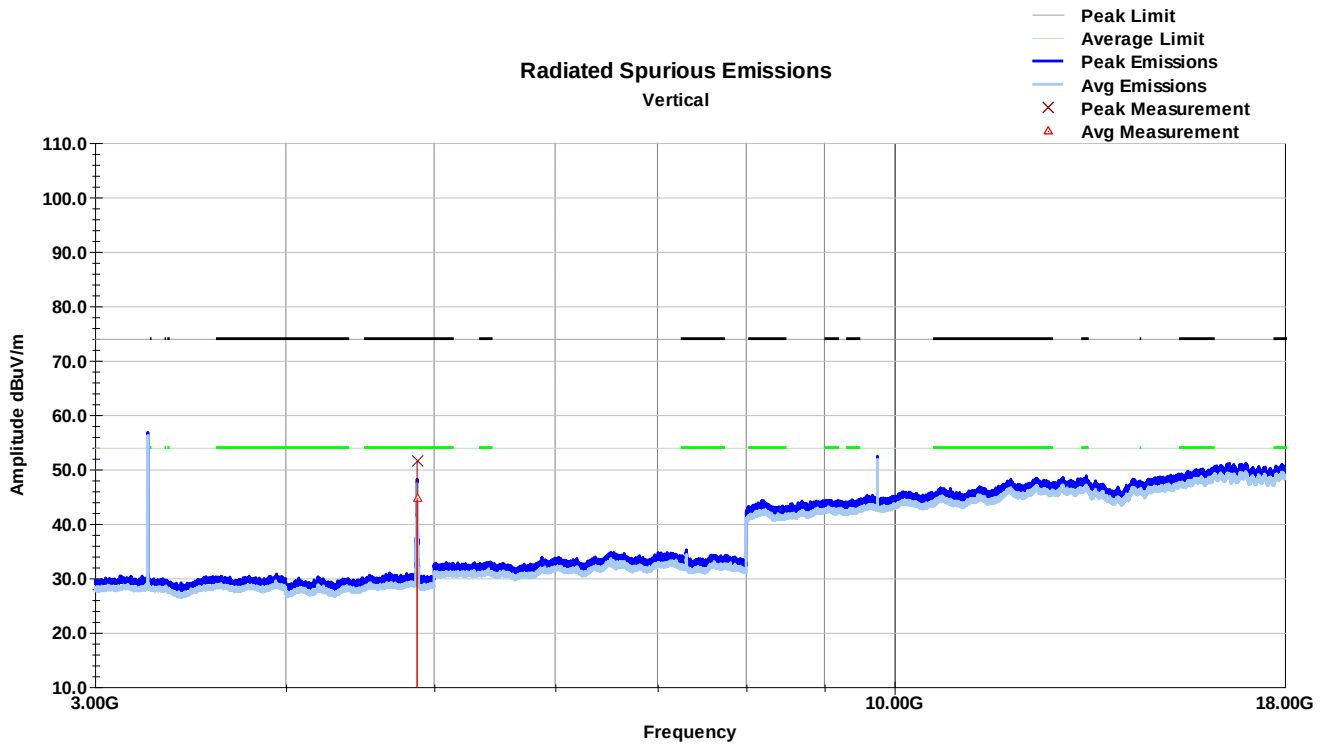
Vertical Radiated Spurious Emissions – 1-3GHz (802.11b MCH)



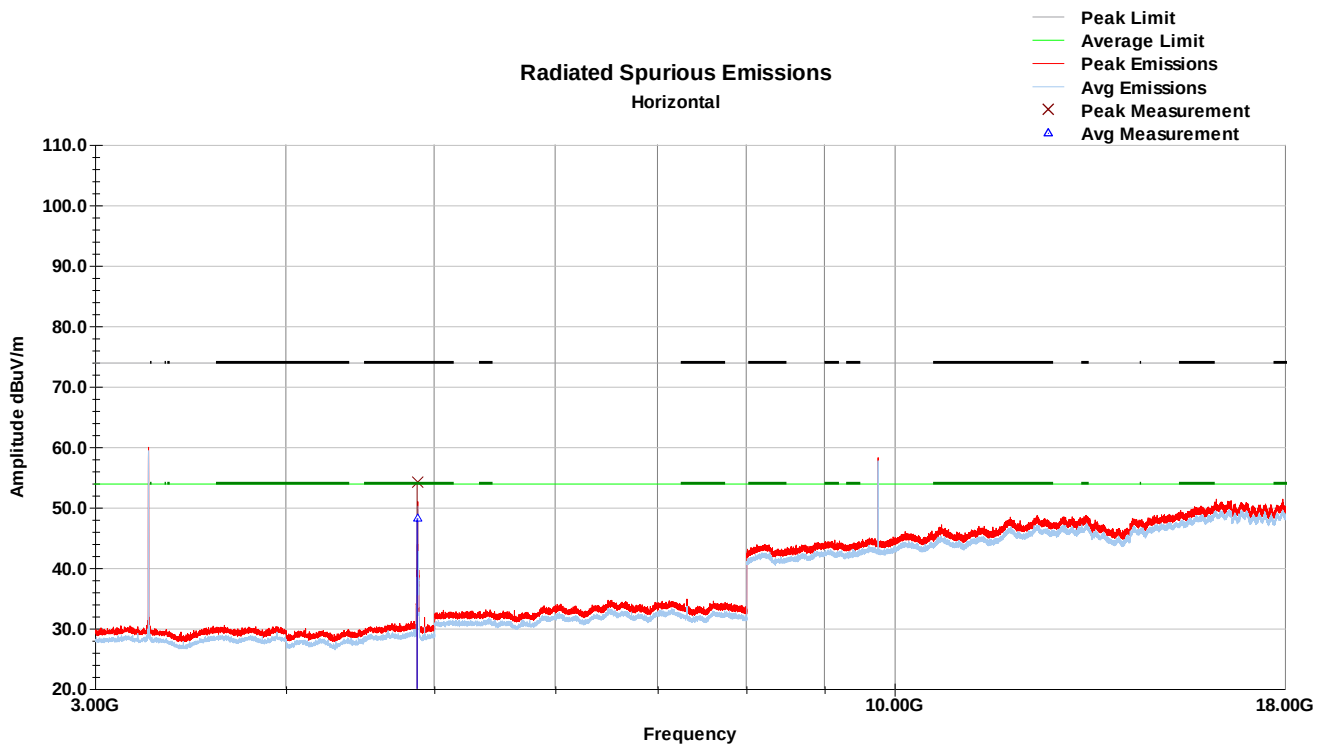
Horizontal Radiated Spurious Emissions – 1-3GHz (802.11b MCH)



Vertical Radiated Spurious Emissions – 3-18GHz (802.11b MCH)

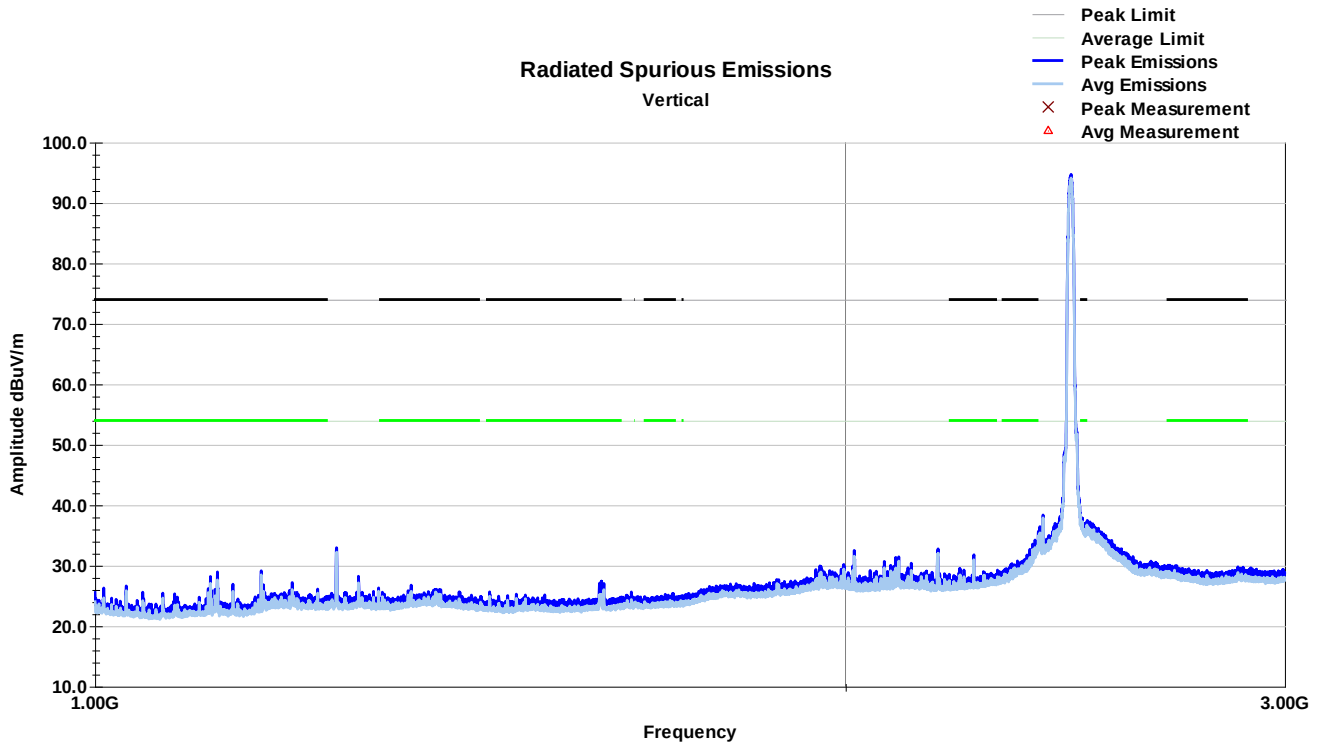


Horizontal Radiated Spurious Emissions – 3-18GHz (802.11b MCH)

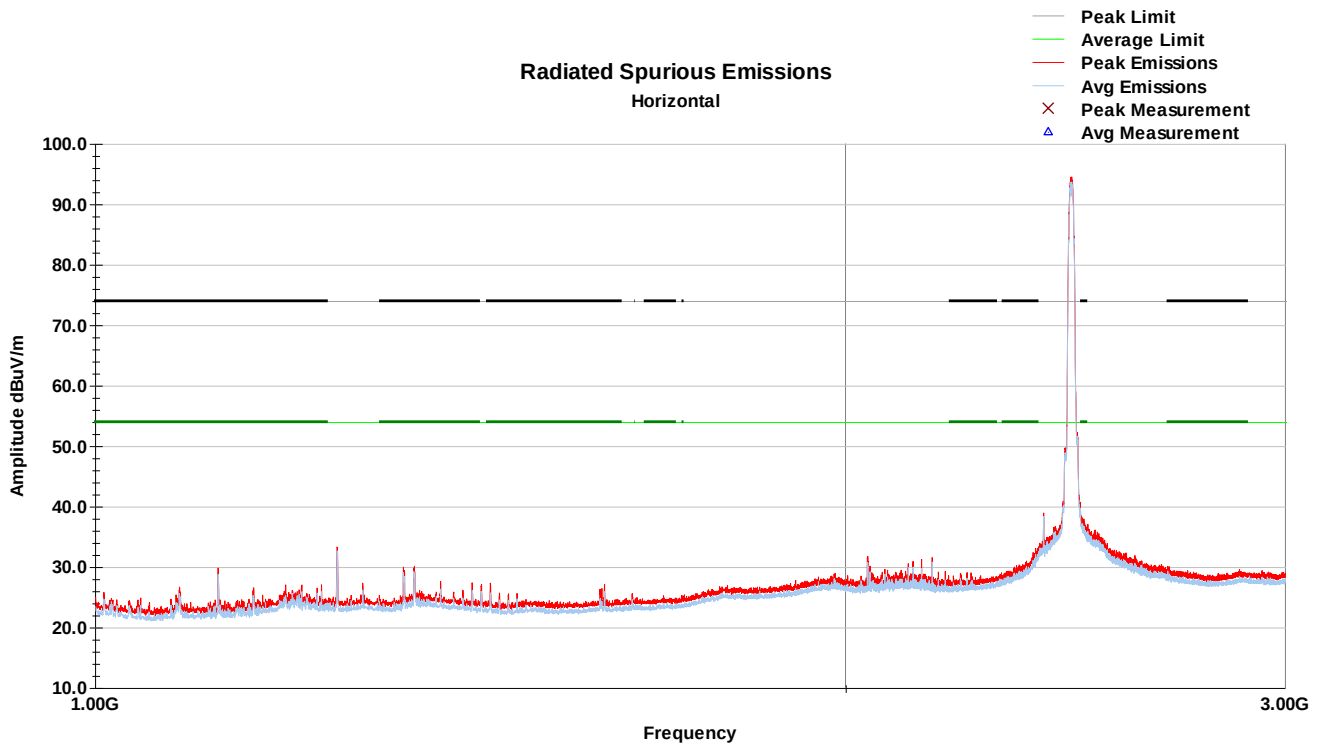


Other spurious emissions were not in restricted bands

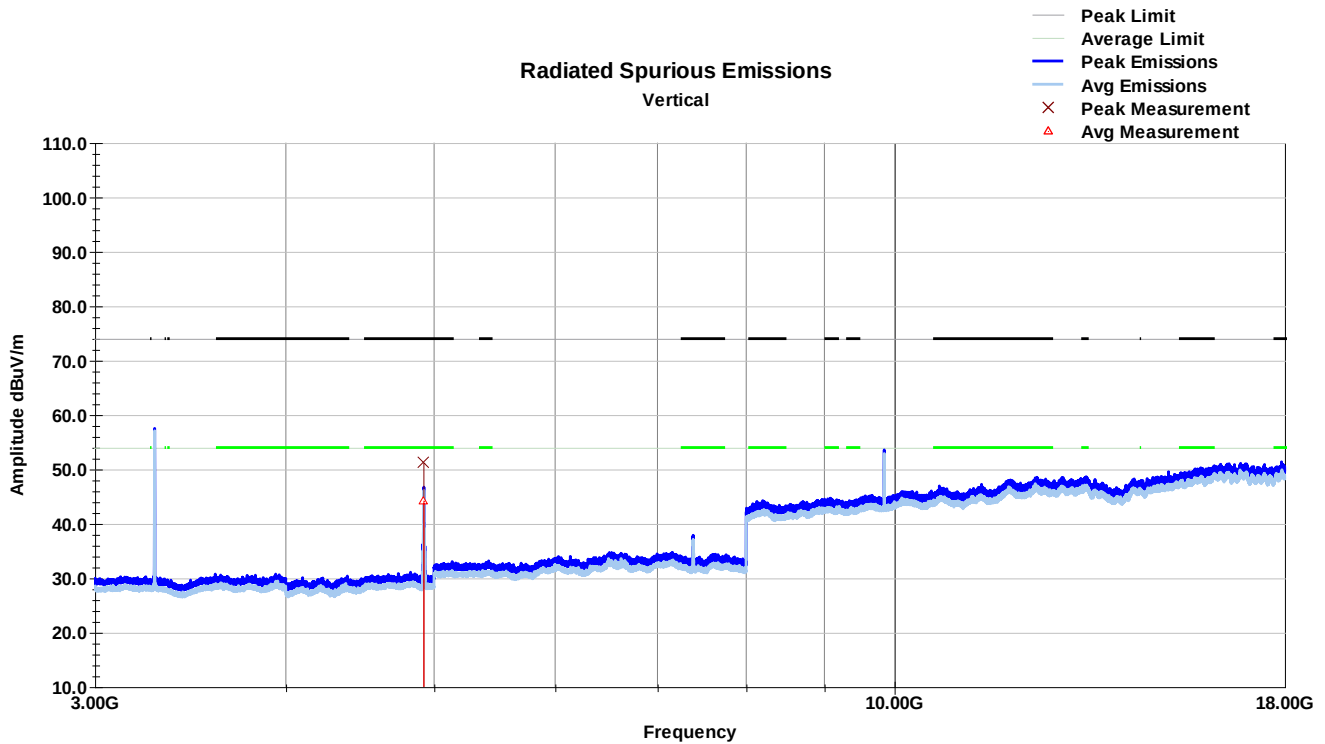
Vertical Radiated Spurious Emissions – 1-3GHz (802.11b HCH)



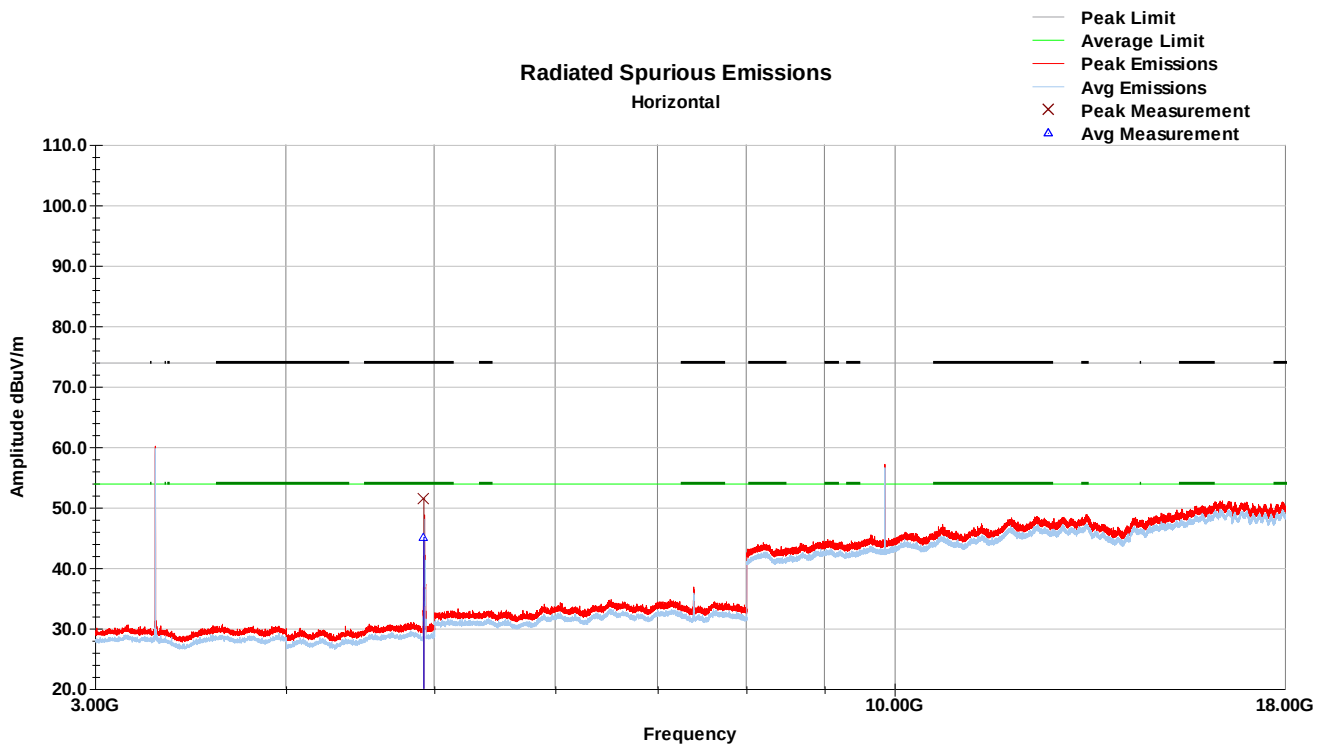
Horizontal Radiated Spurious Emissions – 1-3GHz (802.11b HCH)



Vertical Radiated Spurious Emissions – 3-18GHz (802.11b HCH)

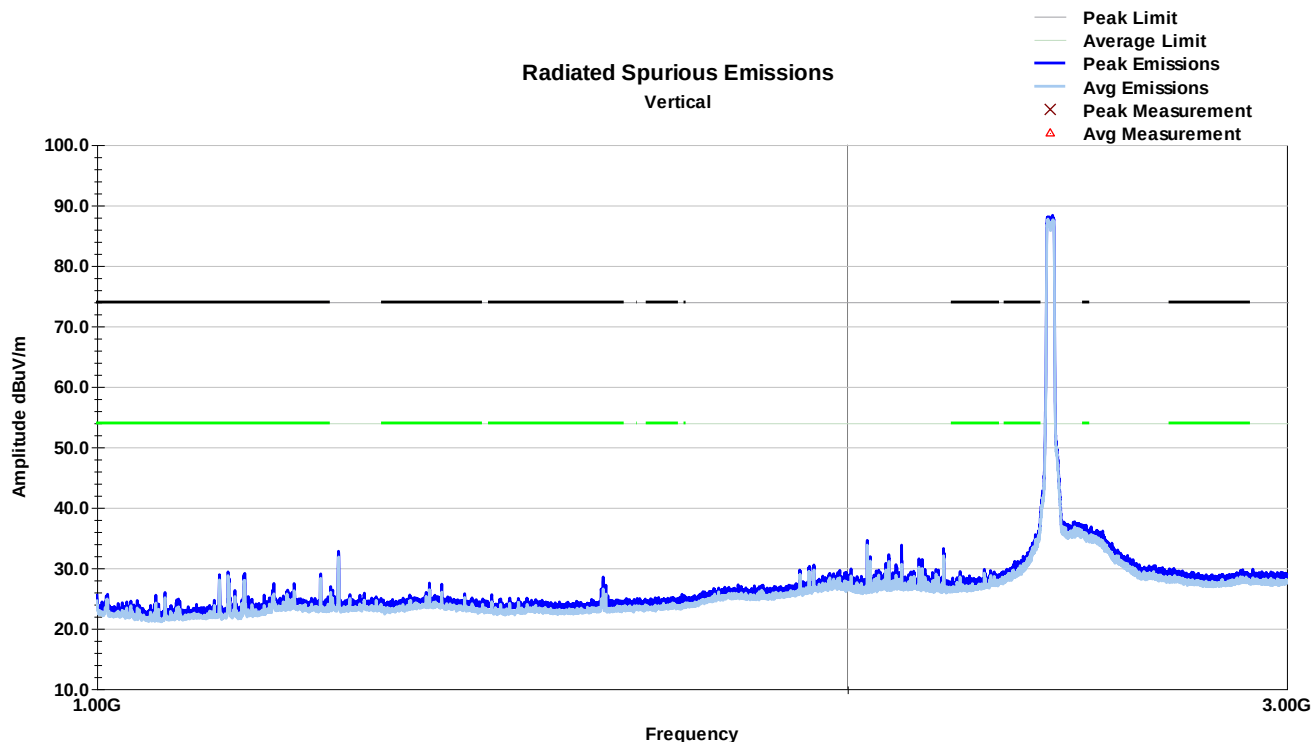


Horizontal Radiated Spurious Emissions – 3-18GHz (802.11b HCH)

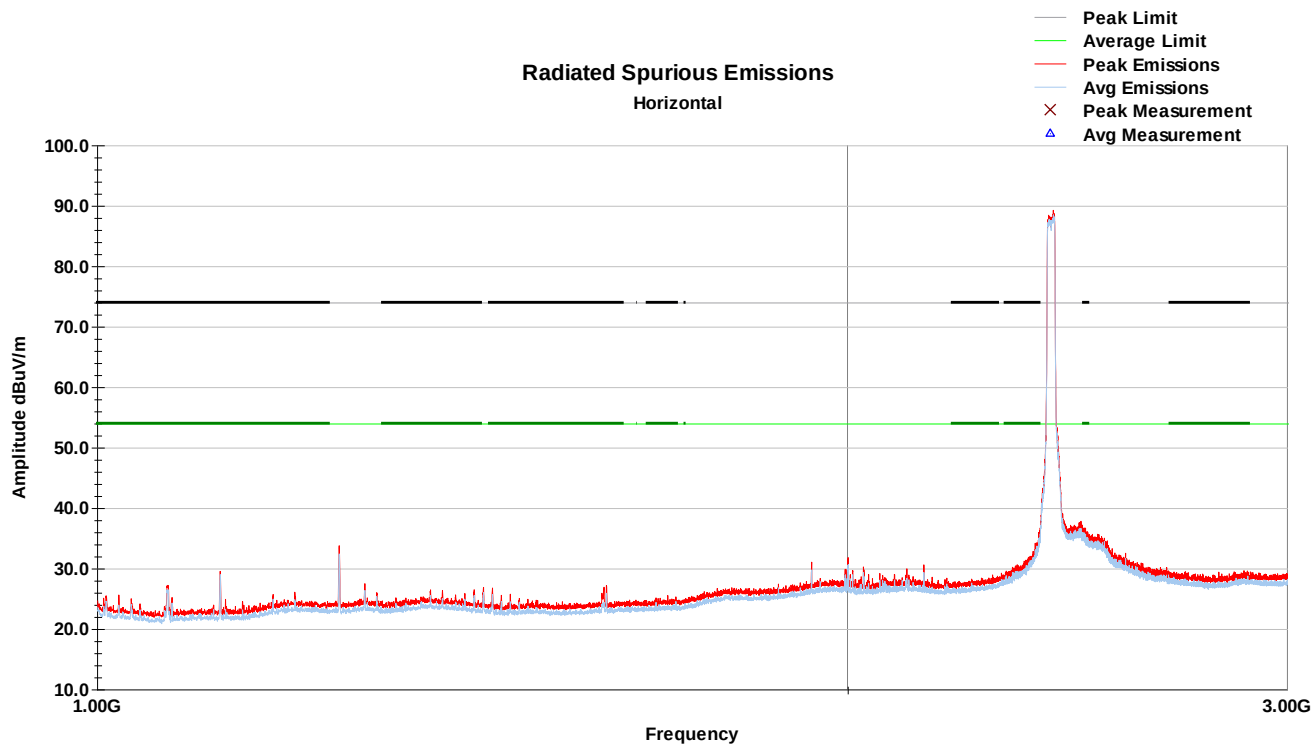


Other spurious emissions were not in restricted bands

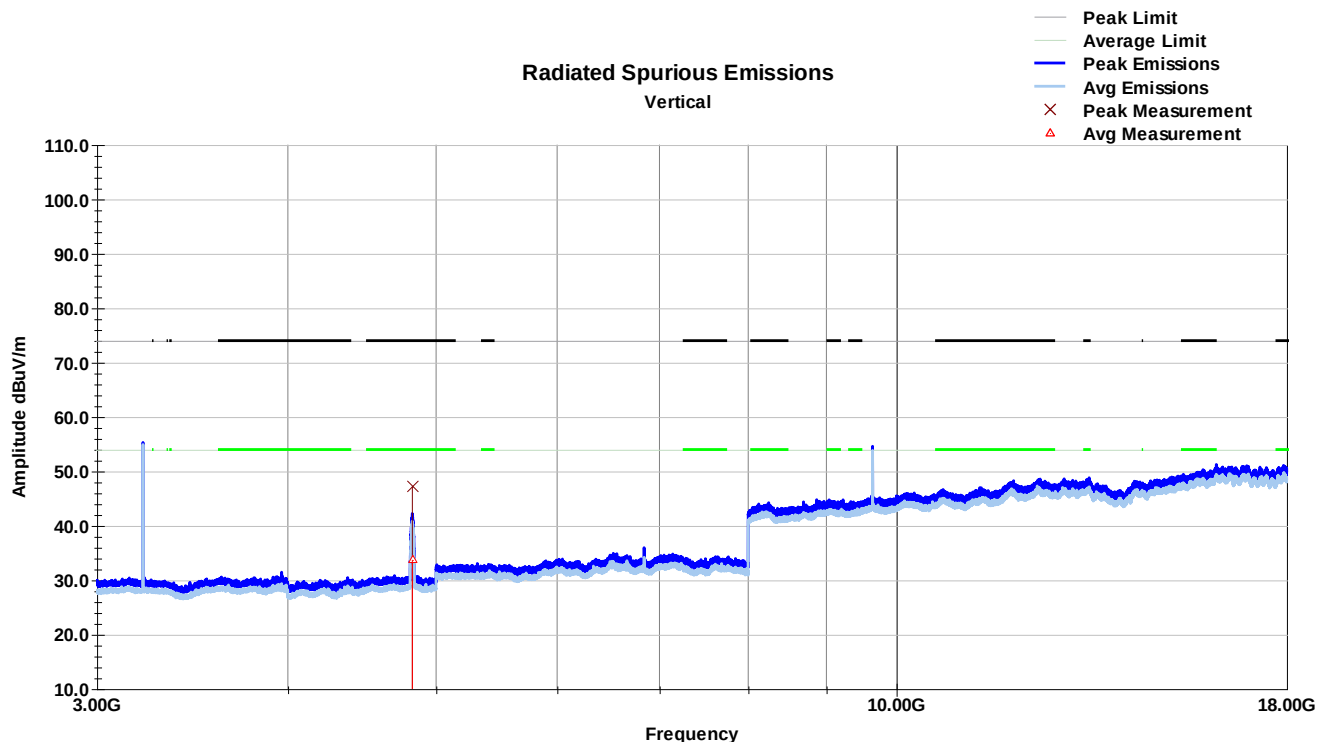
Vertical Radiated Spurious Emissions – 1-3GHz (802.11g LCH)



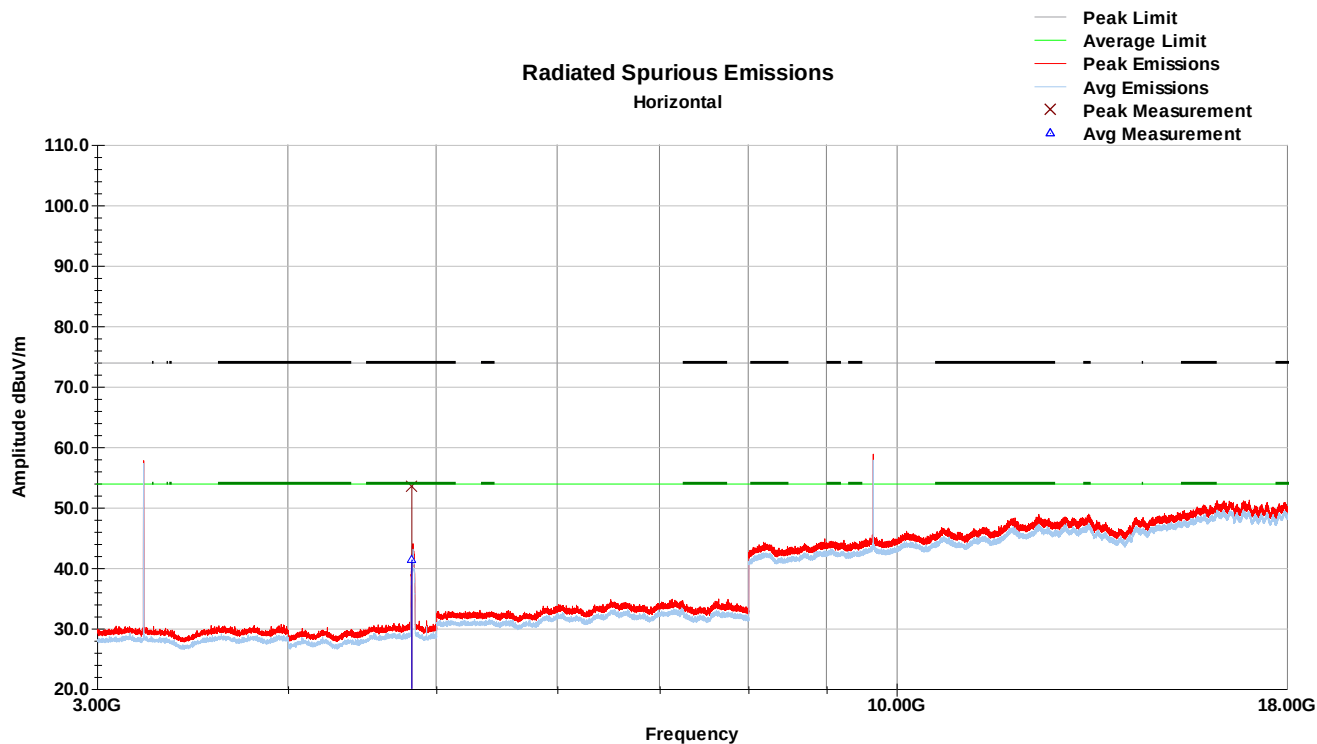
Horizontal Radiated Spurious Emissions – 1-3GHz (802.11g LCH)



Vertical Radiated Spurious Emissions – 3-18GHz (802.11g LCH)

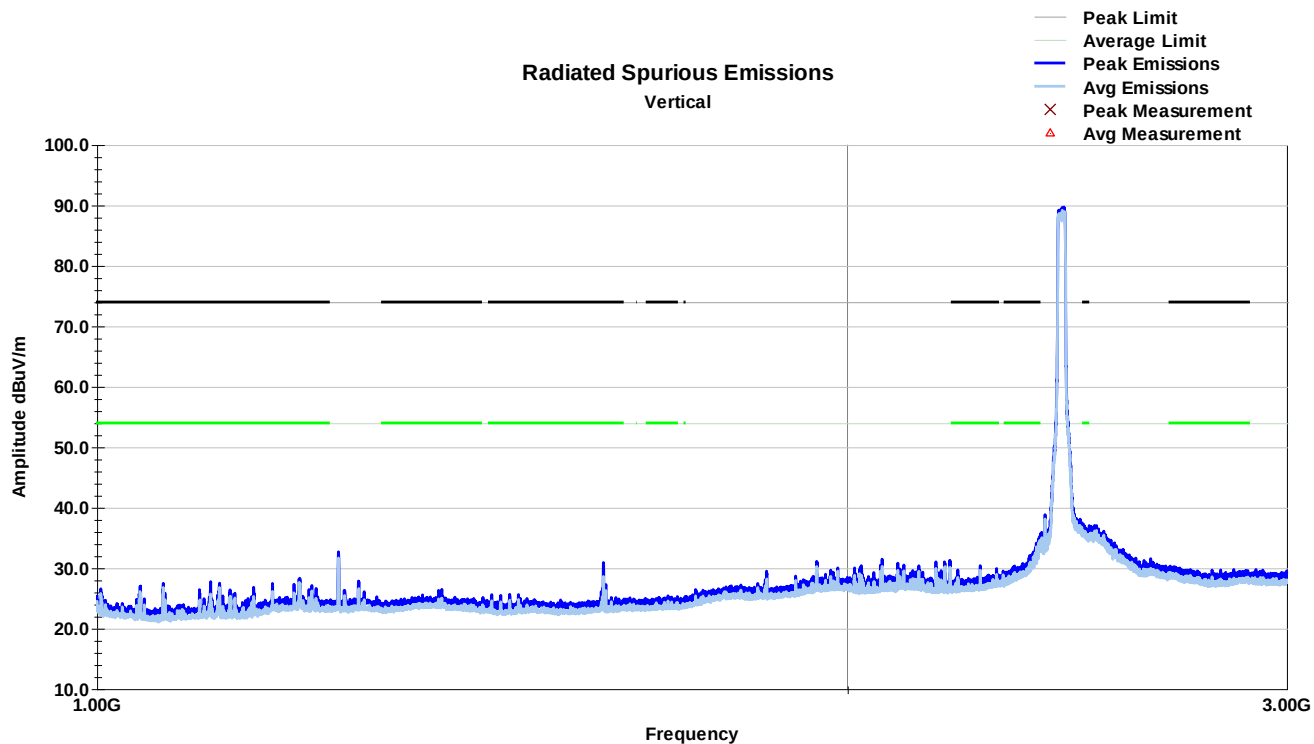


Horizontal Radiated Spurious Emissions – 3-18GHz (802.11g LCH)

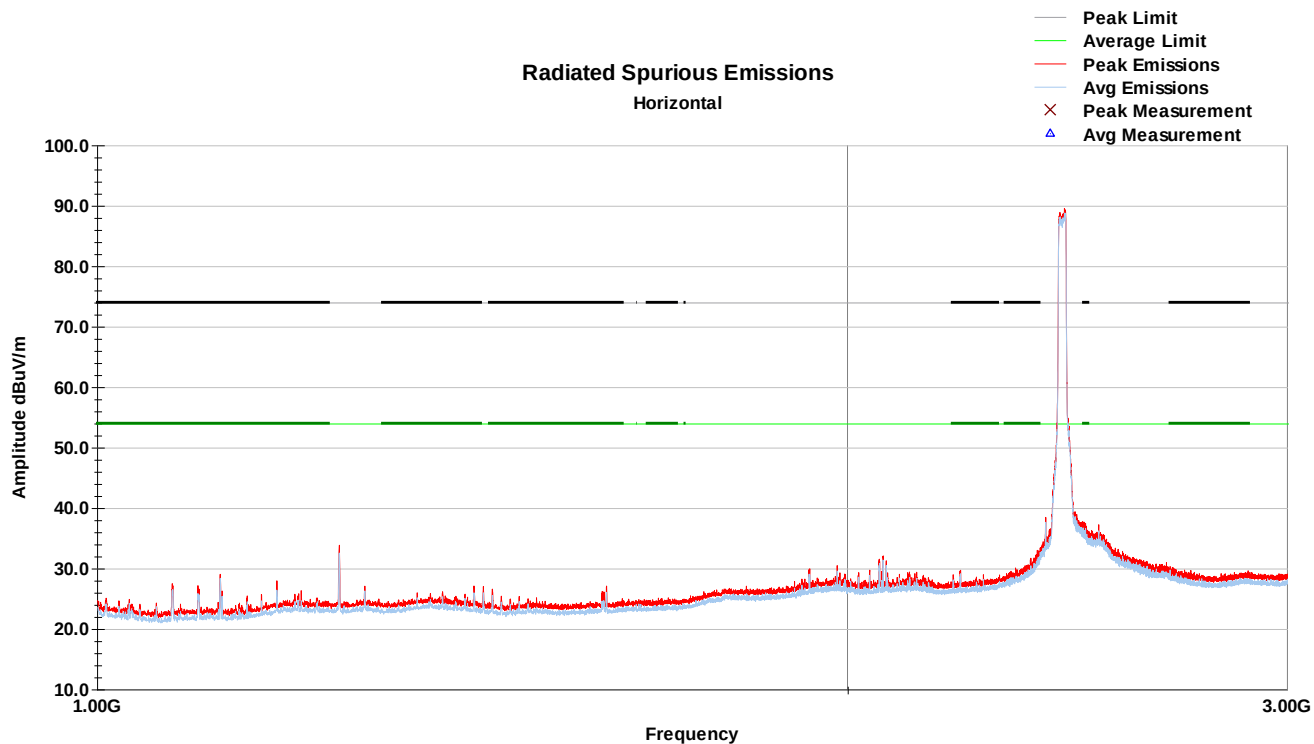


Other spurious emissions were not in restricted bands

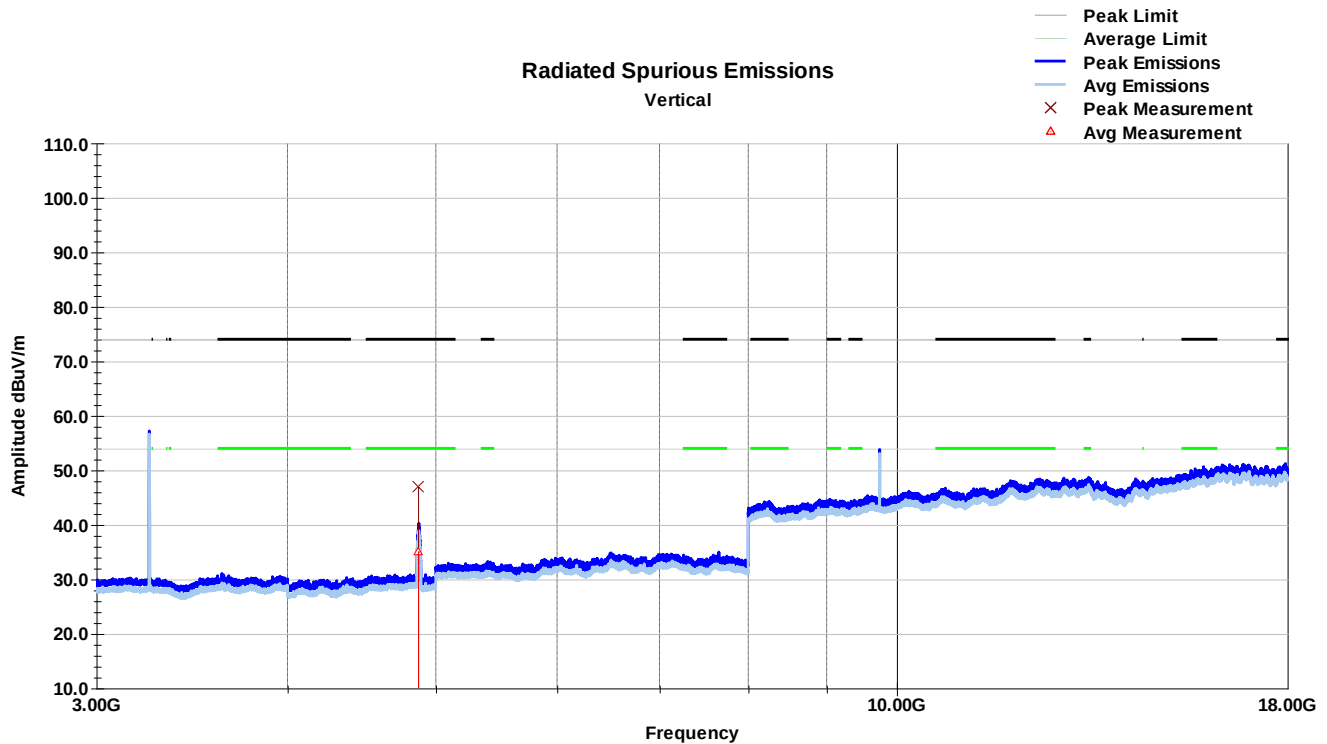
Vertical Radiated Spurious Emissions – 1-3GHz (802.11g MCH)



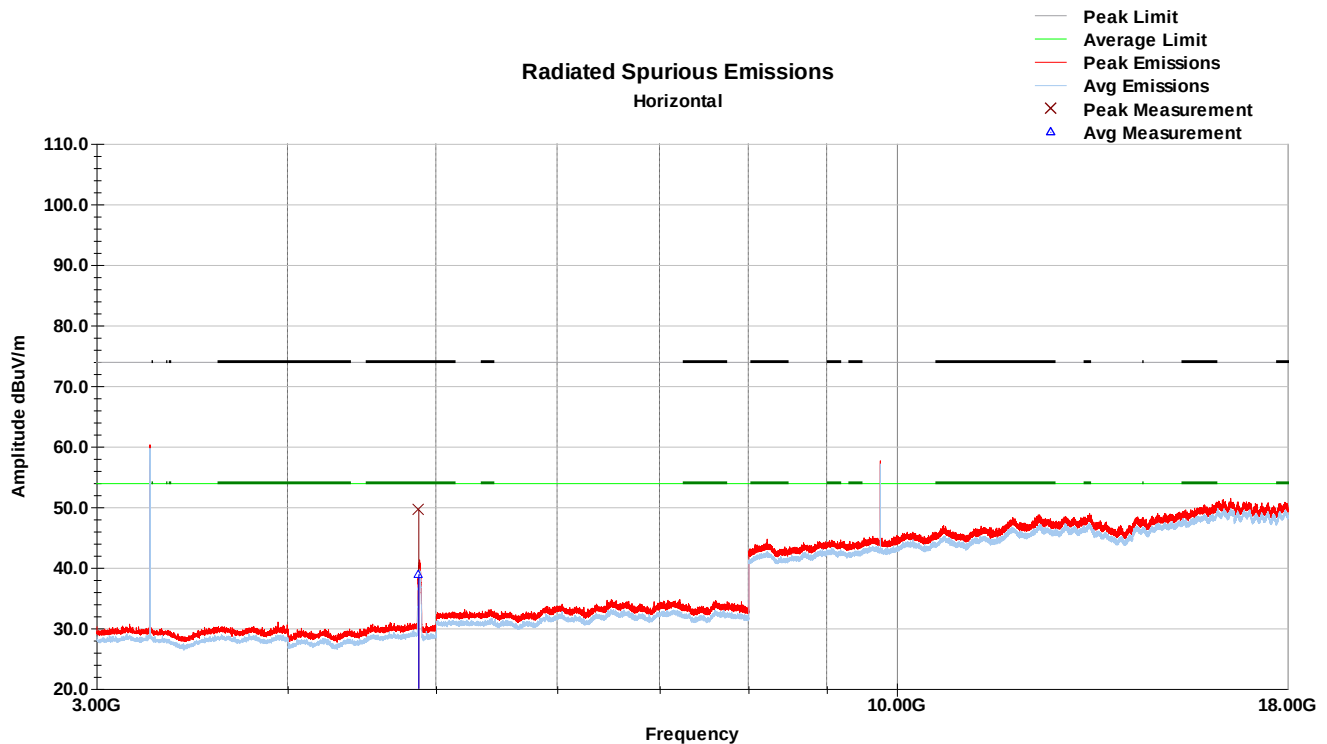
Horizontal Radiated Spurious Emissions – 1-3GHz (802.11g MCH)



Vertical Radiated Spurious Emissions – 3-18GHz (802.11g MCH)

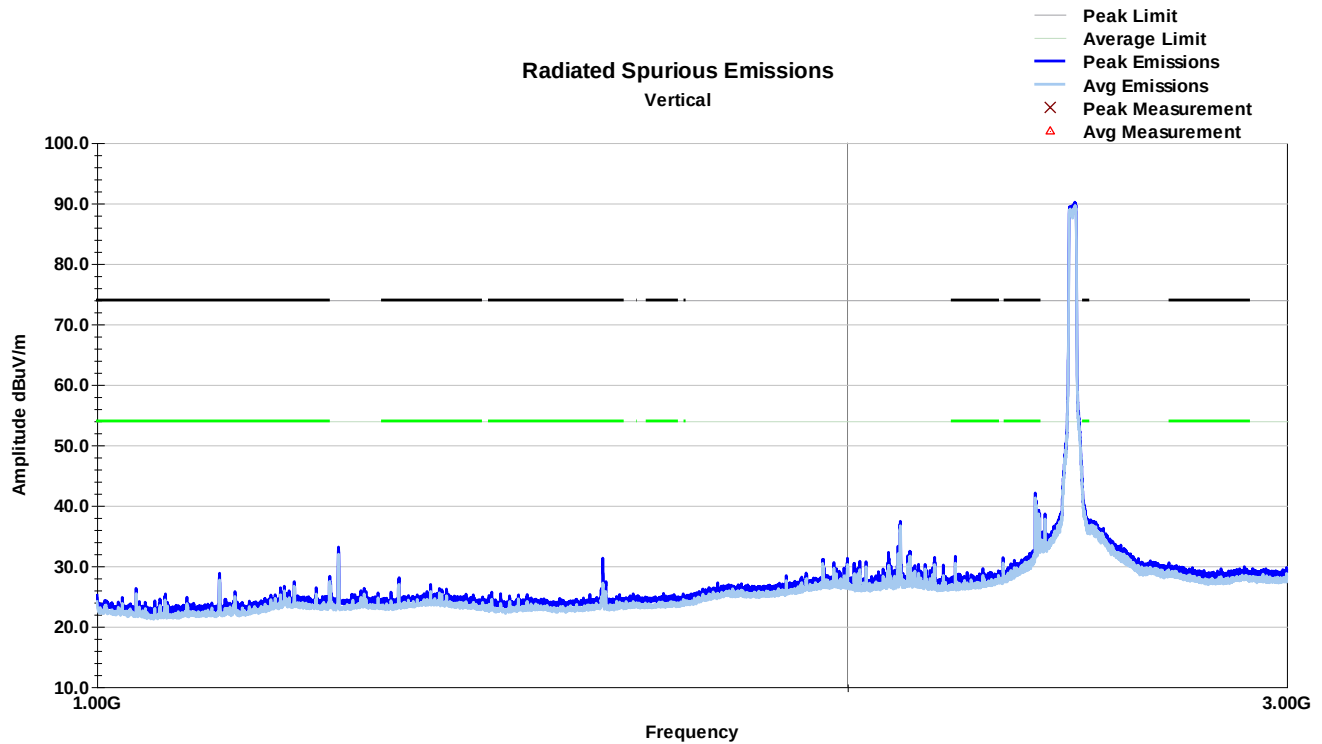


Horizontal Radiated Spurious Emissions – 3-18GHz (802.11g MCH)

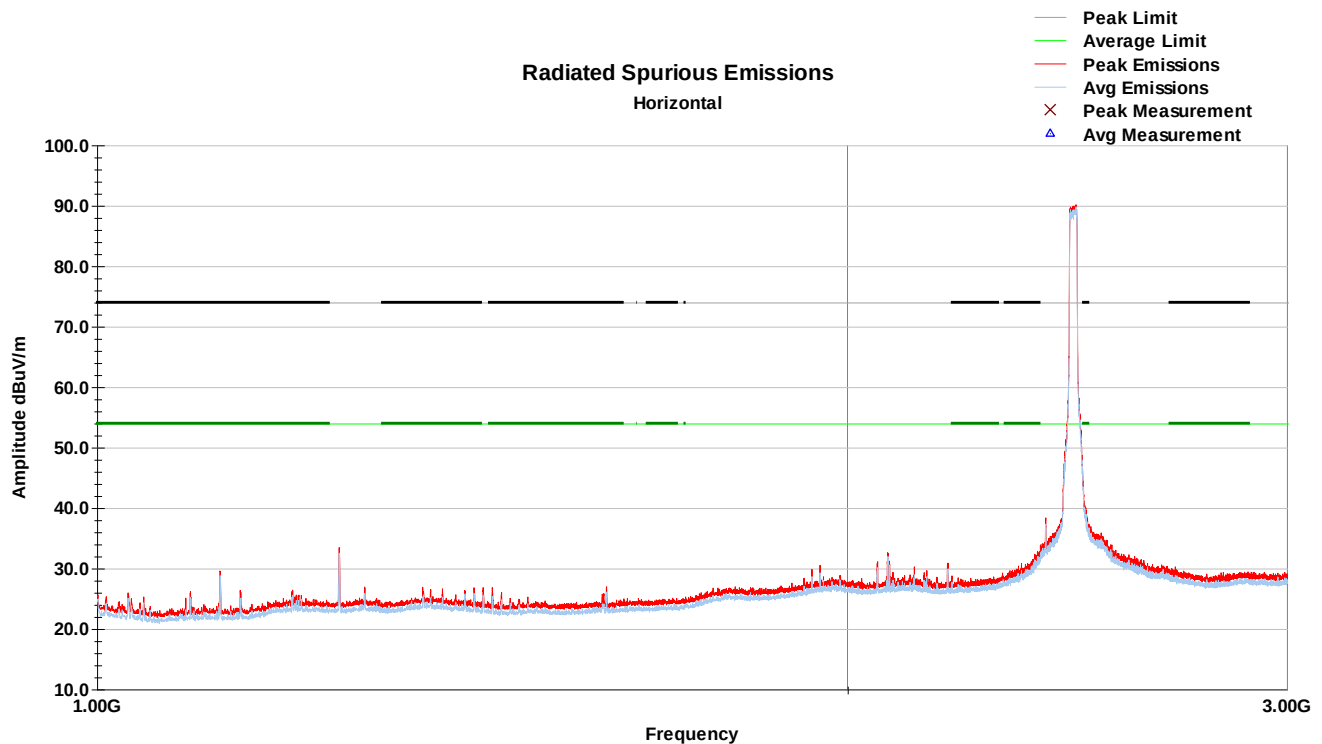


Other spurious emissions were not in restricted bands

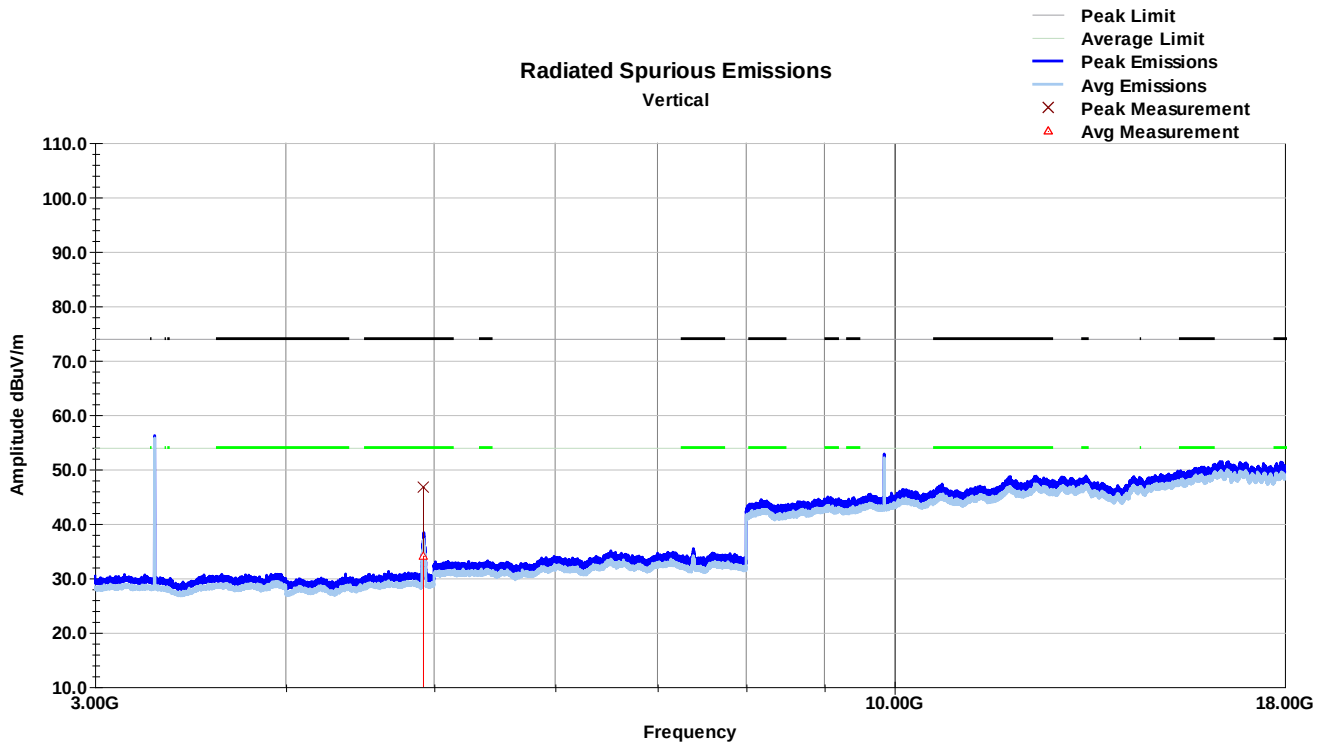
Vertical Radiated Spurious Emissions – 1-3GHz (802.11g HCH)



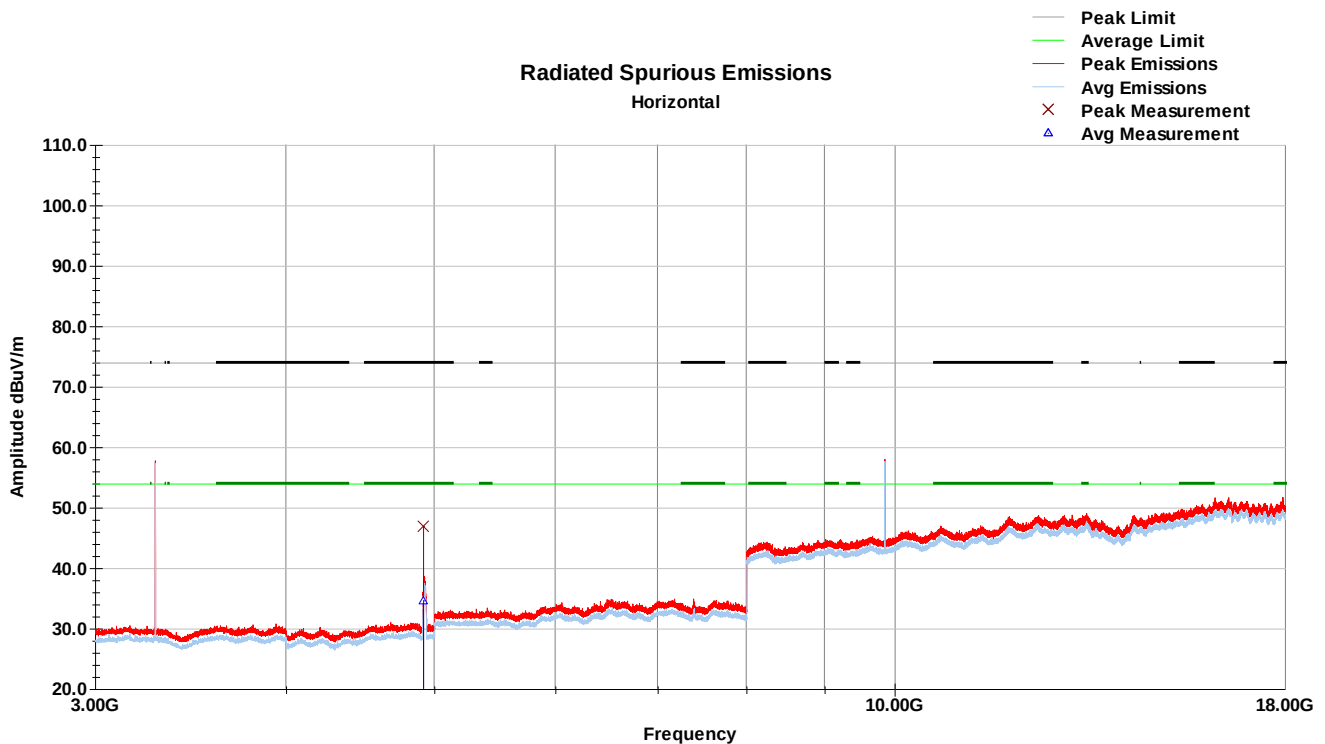
Horizontal Radiated Spurious Emissions – 1-3GHz (802.11g HCH)



Vertical Radiated Spurious Emissions – 3-18GHz (802.11g HCH)



Horizontal Radiated Spurious Emissions – 3-18GHz (802.11g HCH)



Other spurious emissions were not in restricted bands

7.6 Test Data – Tabular Data

Frequency MHz	Raw dBμV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	DCCF (dB)	Final dBμV/m	Limit dBμV/m	Margin dB	Detector
802.11b Low Channel (2412MHz)												
4824.00	54.9	V	117.0	250.0	34.6	3.5	42.0	0.0	51.0	74.0	-23.0	Peak
4824.00	48.5	V	117.0	250.0	34.6	3.5	42.0	0.0	44.6	54.0	-9.4	Average
4824.00	61.4	H	125.0	125.0	34.6	3.5	42.0	0.0	57.5	74.0	-16.5	Peak
4824.00	56.1	H	125.0	125.0	34.6	3.5	42.0	0.0	52.2	54.0	-1.8	Average
802.11b Mid Channel (2437MHz)												
4874.00	55.4	V	210.0	250.0	34.5	3.5	42.0	0.0	51.4	74.0	-22.6	Peak
4874.00	48.6	V	210.0	250.0	34.5	3.5	42.0	0.0	44.6	54.0	-9.4	Average
4874.00	58.0	H	63.0	250.0	34.5	3.5	42.0	0.0	54.0	74.0	-20.0	Peak
4874.00	52.1	H	63.0	250.0	34.5	3.5	42.0	0.0	48.1	54.0	-5.9	Average
802.11b High Channel (2627MHz)												
4924.00	55.2	V	194.0	250.0	34.4	3.5	42.0	0.0	51.1	74.0	-22.9	Peak
4924.00	48.2	V	194.0	250.0	34.4	3.5	42.0	0.0	44.1	54.0	-9.9	Average
4924.00	55.5	H	59.0	250.0	34.4	3.5	42.0	0.0	51.4	74.0	-22.6	Peak
4924.00	49.1	H	59.0	250.0	34.4	3.5	42.0	0.0	45.0	54.0	-9.0	Average
Final (Peak) = Raw + AF + CL - Amp												
Final (Avg) = Raw + AF + CL - Amp + DCCF												
Margin = Final - Limit												

8 Emissions in Restricted Frequency Bands (Band Edge)

8.1 Test Result

Test Description	Test Specification		Test Result
Restricted Band Emissions	15.205 / 15.209	RSS-GEN S8.9 / 8.10	Compliant

8.2 Test Method

Field strength measurements were performed at the restricted band edges of 2390MHz and 2483.5MHz for each modulation. Measurements were made using the conducted methods defined in ANSI C63.10, Section 11.12.2.

The test system reported the following duty-cycles used for correcting the average measurements:

- 802.11b – 100% (0dB)
- 802.11g – 100% (0dB)
- 802.11n(HT20) – 100% (0dB)

8.3 Test Site

EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.8 °C

Relative Humidity: 49.6 %

Atmospheric Pressure: 98.0 kPa

8.4 Test Equipment

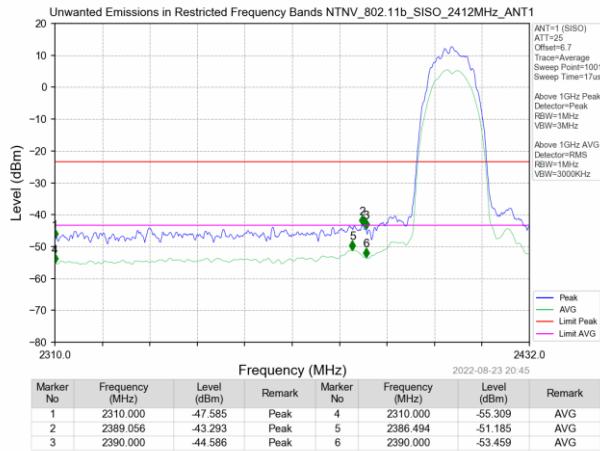
Test End Date: 8/23/2022

Tester: JP

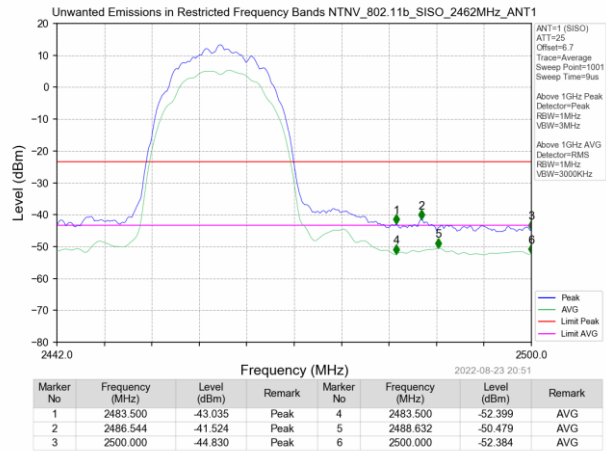
Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
ATTENUATOR, 6DB	BW-S6W2	MINI-CIRCUITS	15023	7-Oct-2021	7-Oct-2022
RF CABLE SMA TO SMA, 0.01-40GHZ	084-0505-059	TELEDYNE STORM	20109	16-Mar-2022	16-Mar-2023
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	4-Jan-2022	4-Jan-2024

8.5 Test Data – Restricted Band Edges

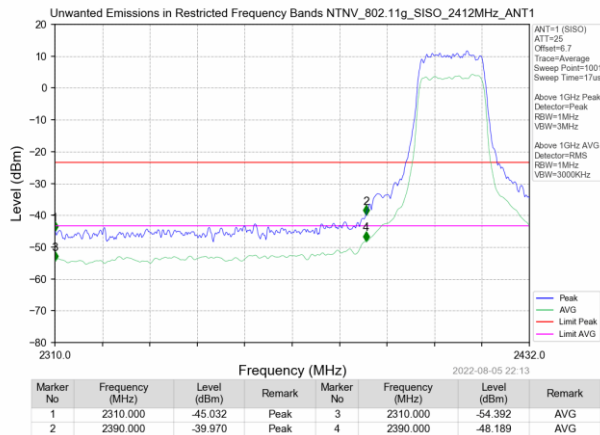
Low Channel – 802.11b



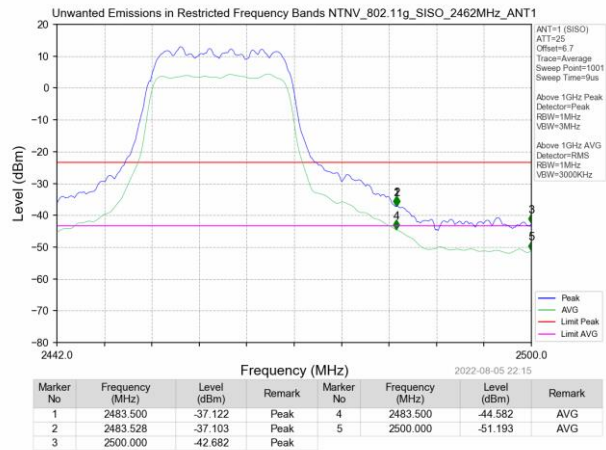
High Channel – 802.11b



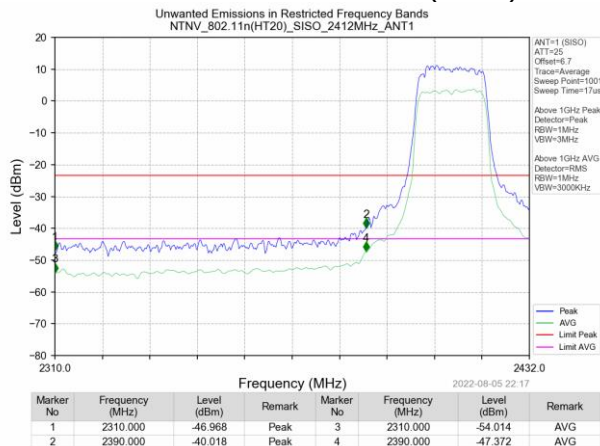
Low Channel – 802.11g



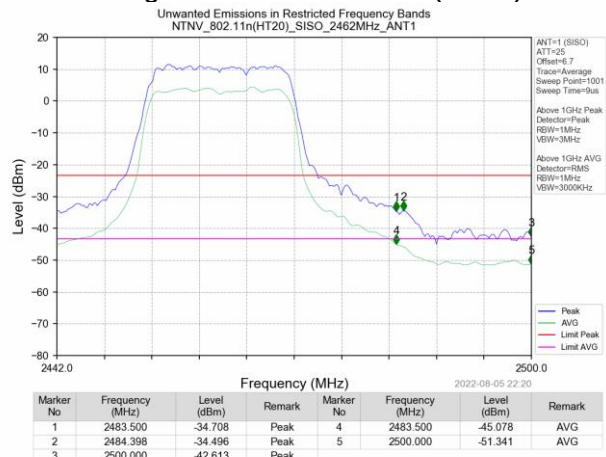
High Channel – 802.11g



Low Channel – 802.11n(HT20)



High Channel – 802.11n(HT20)



9 Conducted Emissions

9.1 Test Result

Test Description	Classification	Basic Standards	Test Result
Conducted Emissions	B	ANSI C63.4 / RSS-GEN	Compliant

9.2 Test Method

With the receiver's Resolution Bandwidth (RBW) set to 9 kHz, exploratory scans were performed over the measuring frequency range (0.15MHz to 30MHz) using a max hold mode incorporating a Peak detector and using the TILE! software. The final test data was measured using a 9kHz RBW in conjunction with a Quasi-Peak detector and Average detector and compared against the limits indicated in the table below.

Frequency Range	Limits (dBμV)
0.15 to 0.5 MHz	Quasi-Peak 66 to 56 / Average 56 to 46
0.5 to 5 MHz	Quasi-Peak 56 / Average 46
5 to 30 MHz	Quasi-Peak 60 / Average 50

9.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.0 °C

Relative Humidity: 47.9 %

Atmospheric Pressure: 98.14 kPa

9.4 Test Equipment

Test End Date: 24-Aug-2022

Tester: AB

Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
LINE IMPEDANCE STABILIZATION NETWORK	NNB 51	TESEQ	B085882	15-Apr-2022	15-Apr-2023
RF CABLE	UC-N-MM-78	MAURY MICROWAVE	17017	25-Aug-2021	25-Aug-2022
EMI RECEIVER	ESW44	ROHDE & SCHWARZ	B079793	26-Oct-2021	12-Mar-2023

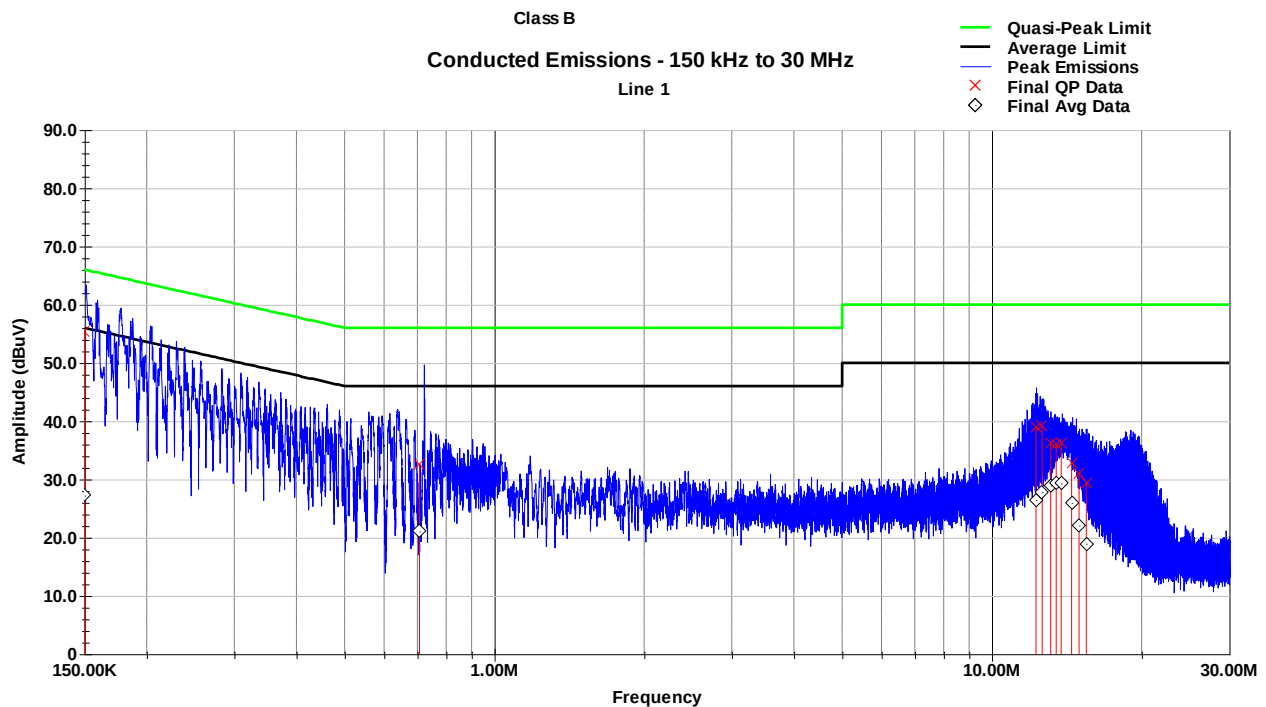
Note: Refer to equipment list for calibration intervals.

Software:

TILE! software profile "Conducted Emissions T7 220318.TIL" dated 18 03 2022

9.5 Test Data

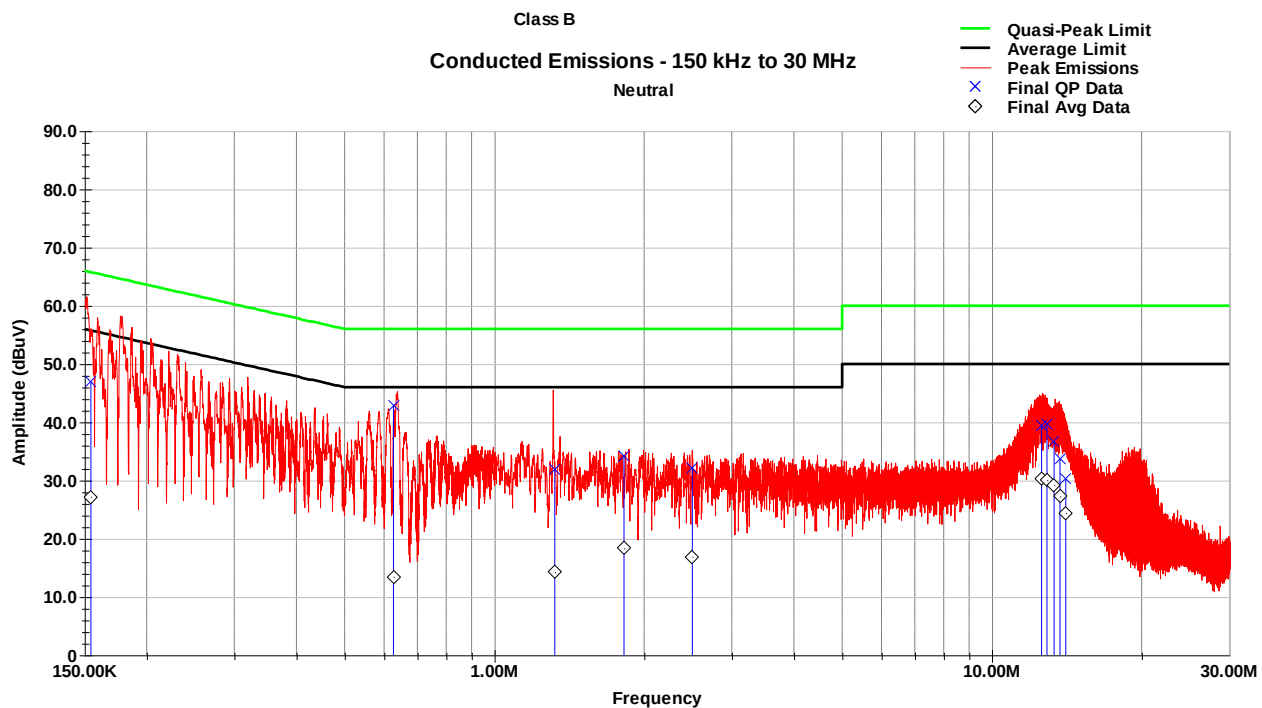
Line 1 Conducted Emissions – Peak Plot



Line 1 Conducted Emissions – Tabular Data

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.150	55.5	66.0	-10.5	27.2	56.0	-28.8
0.707	32.6	56.0	-23.4	21.0	46.0	-25.0
12.261	38.9	60.0	-21.1	26.5	50.0	-23.5
12.620	39.1	60.0	-20.9	27.9	50.0	-22.1
13.128	36.2	60.0	-23.8	29.0	50.0	-21.0
13.463	36.1	60.0	-23.9	29.5	50.0	-20.5
13.784	36.2	60.0	-23.8	29.3	50.0	-20.7
14.460	32.8	60.0	-27.2	25.9	50.0	-24.1
14.973	31.1	60.0	-28.9	22.0	50.0	-28.0
15.483	29.3	60.0	-30.7	19.0	50.0	-31.0

Neutral Conducted Emissions – Peak Plot



Neutral Conducted Emissions – Tabular Data

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.154	46.9	65.7	-18.8	27.2	55.7	-28.5
0.627	42.9	56.0	-13.1	13.5	46.0	-32.5
1.322	31.9	56.0	-24.1	14.3	46.0	-31.7
1.822	34.1	56.0	-21.9	18.3	46.0	-27.7
2.499	32.1	56.0	-23.9	16.9	46.0	-29.1
12.586	39.4	60.0	-20.6	30.3	50.0	-19.7
12.903	39.7	60.0	-20.3	30.1	50.0	-19.9
13.334	36.6	60.0	-23.4	29.2	50.0	-20.8
13.703	33.6	60.0	-26.4	27.3	50.0	-22.7
14.075	30.3	60.0	-29.7	24.4	50.0	-25.6

10 Measurement Uncertainty

The measurement uncertainty figures are be calculated in accordance with TR 100 028-1 [2] and correspond to an expansion factor (coverage factor) $k = 2$ (which provide confidence levels of 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Parameter	Expanded Uncertainty for Normal k factor equal to 2	
	Required	Laboratory Actual
Radio Frequency	$\pm 1 \times 10^{-5}$	$\pm 9.8 \times 10^{-8}$
total RF power, conducted	± 1.5 dB	± 1.2 dB
RF power density, conducted	± 3 dB	± 0.7 dB
spurious emissions, conducted	± 3 dB	± 2.1 dB
all emissions, radiated	± 6 dB	± 4.8 dB
temperature	$\pm 1^{\circ}\text{C}$	$\pm 0.5^{\circ}\text{C}$
humidity	± 5 %	± 3.5 %
DC and low frequency voltages	± 3 %	± 0.4 %

11 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	12 January 2023