

FCC RF Test Report

Test Report Number	SRR-20041521-LC-FCC-UNII-R2
FCC ID	2AGZ3S00911
Applicant	Starry Inc.
Applicant Address	38 Chauncy St Ste 200, Boston, MA 02111
Product Name	Starry Launch
Model (s)	S00911, S00912
Date of Receipt	05/26/2020
Date of Test	06/01/2020 – 07/14/2020
Report Issue Date	07/30/2020
Test Standards	47CFR Part 15.407
Test Result	PASS
	<p>Issued by:</p> <p>Vista Compliance Laboratories 1261 Puerta Del Sol, San Clemente, CA 92673 USA www.vista-compliance.com</p>
 <hr/> <p>Daniel Bruno (Test Technician)</p>	 <hr/> <p>David Zhang (Technical Manager)</p>
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REVISION HISTORY

Report Number	Version	Description	Issued Date
SRR-20041521-LC-FCC-UNII	Original	Initial report	07/14/2020
SRR-20041521-LC-FCC-UNII-R1	R1	First revised report	07/24/2020
SRR-20041521-LC-FCC-UNII-R2	R2	Second revised report	07/30/2020

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1 Test Summary

Test Item	Test Requirement	Test Method	Result
26 dB Bandwidth	47CFR Part 15, Subpart E Section 15.407 (a)	ANSI C63.10 (2013)	Pass
Occupied Bandwidth	47CFR Part 15, Subpart E Section 15.407 (a)	ANSI C63.10 (2013)	Pass
Maximum Conducted Output Power	47CFR Part 15, Subpart E Section 15.407 (a)	ANSI C63.10 (2013)	Pass
Power Spectral Density	47CFR Part 15, Subpart E Section 15.407 (a)	ANSI C63.10 (2013)	Pass
Radiated Spurious Emission	47CFR Part 15, Subpart E Section 15.407 (b)	ANSI C63.10 (2013)	Pass
Radiated Band-Edge into Restricted Frequency Bands	47CFR Part 15, Subpart C Section 15.205, 15.209 47CFR Part 15, Subpart E Section 15.407 (b)	ANSI C63.10 (2013)	Pass

2 General Information

2.1 Applicant

Applicant	Starry, Inc.
Applicant address	38 Chauncy St Ste 200, Boston, MA 02111
Manufacturer	Shenzhen Spacetek Technology Co, Ltd
Manufacturer Address	3F, NO 2 Huafeng first science & technology Park, SanWei, Baoan District Shenzhen, China

2.2 Product information

Product Name	Starry Launch
Model Number	S00911
Family Models	S00912
Serial Number	1948070488 (Radiated Sample), 1948070494 (Conducted Sample)
Frequency Band	802.11a/n-20MHz: 5180-5320MHz, 5500-5720MHz, 5725-5825MHz 802.11n-40MHz: 5190-5310MHz, 5510-5710MHz, 5755-5795MHz 802.11ac: 5210-5290MHz, 5530-5690MHz, 5775MHz
Type of modulation	802.11a/n/ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Equipment Class	DTS, U-NII
Antenna Information	Integral Antenna, 5 dBi (2 x 2 MIMO)
Clock Frequencies	N/A
Input Power	100-240VAC, 50/6-Hz 0.3A
Power Adapter Manufacturer/Model	-/MKS-1201000S
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Simultaneous Transmission	2.4GHz & 5GHz
Additional Info	N/A

2.3 Test standard and method

Test standard	47CFR Part 15.407, Subpart E
Test method	ANSI C63.10 (2013) 789033 D02 General UNII Test Procedures New Rules v02r01

3 Test Site Information

Lab performing tests	Vista Laboratories, Inc.
Lab Address	1261 Puerta Del Sol, San Clemente, CA 92673 USA
Phone Number	+1 (949) 393-1123
Website	www.vista-compliance.com

Test Condition	Temperature	Humidity	Atmospheric Pressure
RF Testing	23.5°C	58.2%	996 mbar

4 Modification of EUT / Deviations from Standards

N/A

5 Test Configuration and Operation

5.1 EUT Test Configuration

The EUT is powered by an internal battery. EUT was set to continuous transmission mode during TX testing.

The following software was used for testing and to monitor EUT performance

Software	Description
EMISoft Vasona	EMC/RF Spurious emission test software used during testing

5.2 Supporting Equipment

Description	Manufacturer	Model #	Serial #
Laptop	Dell	Latitude E6440	FFF4JC2

6 Uncertainty of Measurement

Test item	Measurement Uncertainty (dB)
RF Conducted Measurement (30MHz - 18GHz)	±1.5 dB
Radiated Emission (30MHz-1GHz)	±4.6 dB
Radiated Emission (1-18GHz)	±4.9 dB
Radiated Emission (18-40GHz)	±3.5 dB

7 Test Results

7.1 26 dB Bandwidth

7.1.1 Requirement

§ 15.407 (a)

This section is for reporting purpose only. There are no restriction limits for bandwidth.

7.1.2 Test Setup



7.1.3 Test Procedure

According to subclause 12.4.1 of ANSI C63.10-2013:

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 26 dB, if the functionality described above (i.e., RBW , VBW \geq 3 x RBW, peak detector with maximum hold) is implemented by the instrumentation function.

- 1) Set RBW = approximately 1% of the emission bandwidth.
- 2) Set the VBW > RBW.
- 3) Detector = peak.
- 4) Trace mode = max hold.
- 5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

7.1.4 Test Result

U-NII-2A Band

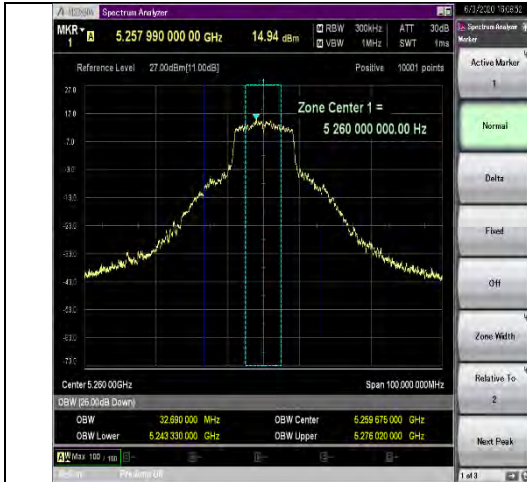
Mode/Band width	Channel	Frequency (MHz)	Data rate	Measured Bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
11a	52	5260	6Mbps	32690	N/A	N/A
11a	60	5300	6Mbps	31110	N/A	N/A
11a	64	5320	6Mbps	35190	N/A	N/A
11n-20MHz	52	5260	MCS0	34930	N/A	N/A
11n-20MHz	60	5300	MCS0	34550	N/A	N/A
11n-20MHz	64	5320	MCS0	33250	N/A	N/A
11n-40MHz	54	5270	MCS0	58250	N/A	N/A
11n-40MHz	62	5310	MCS0	52710	N/A	N/A
11ac-80MHz	58	5290	VHC-MCS0	139160	N/A	N/A

U-NII-2C Band

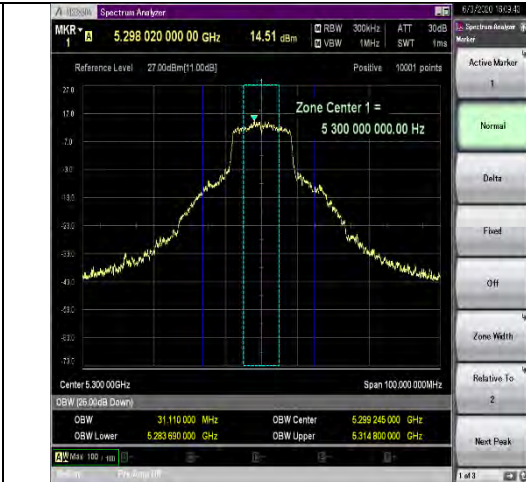
Mode/Band width	Channel	Frequency (MHz)	Data rate	Measured Bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
11a	100	5500	6Mbps	35720	N/A	N/A
11a	116	5580	6Mbps	34830	N/A	N/A
11a	140	5700	6Mbps	35440	N/A	N/A
11n-20MHz	100	5500	MCS0	36940	N/A	N/A
11n-20MHz	116	5580	MCS0	35980	N/A	N/A
11n-20MHz	140	5700	MCS0	38430	N/A	N/A
11n-40MHz	102	5510	MCS0	69770	N/A	N/A
11n-40MHz	118	5590	MCS0	77090	N/A	N/A
11n-40MHz	134	5670	MCS0	73560	N/A	N/A
11ac-80MHz	106	5530	VHC-MCS0	153560	N/A	N/A
11ac-80MHz	122	5610	VHC-MCS0	163460	N/A	N/A

Cross-Band Channel

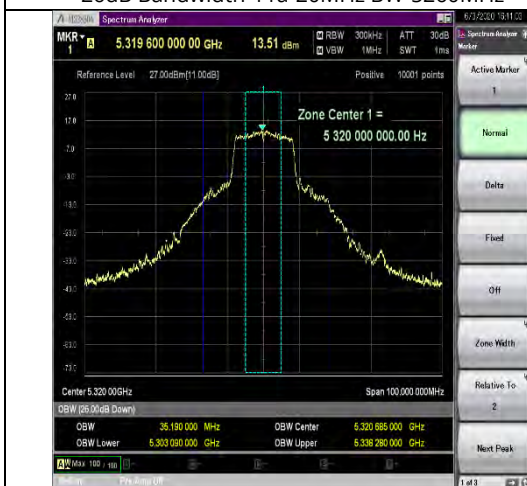
Mode/Band width	Channel	Frequency (MHz)	Data rate	Measured Bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
11a	144	5720	6Mbps	36570	N/A	N/A
11n	144	5720	MCS0	33650	N/A	N/A
11n-40MHz	142	5710	MCS0	68700	N/A	N/A
11ac-80MHz	138	5690	VHC-MCS0	167140	N/A	N/A



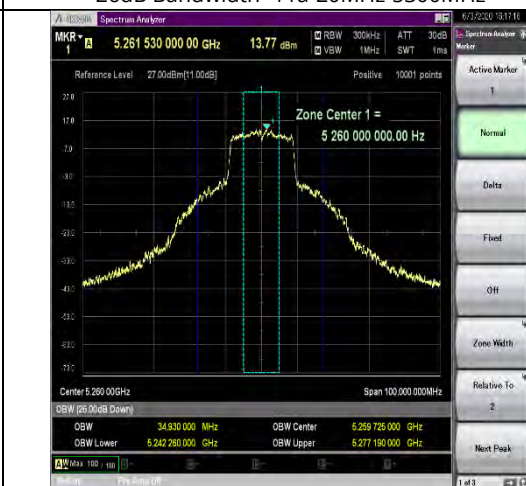
26dB Bandwidth-11a-20MHz BW-5260MHz



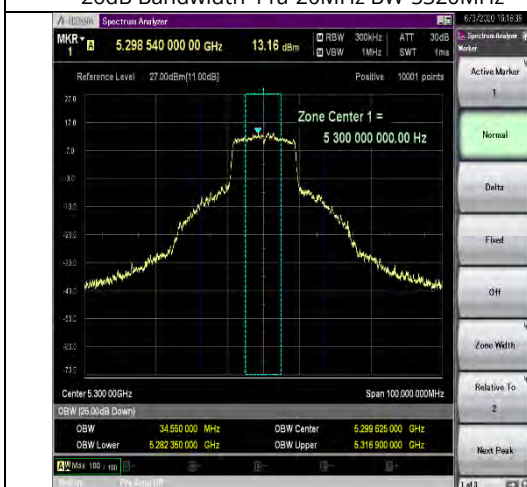
26dB Bandwidth -11a-20MHz-5300MHz



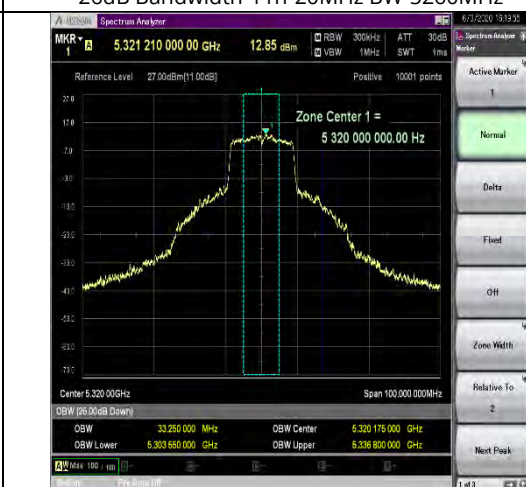
26dB Bandwidth-11a-20MHz BW-5320MHz



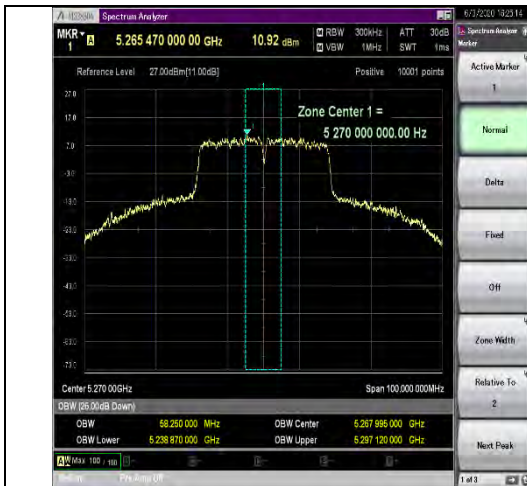
26dB Bandwidth-11n-20MHz BW-5260MHz



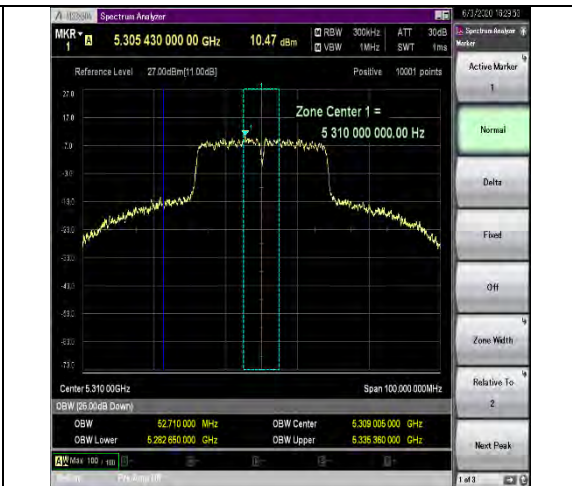
26dB Bandwidth-11n-20MHz BW-5300MHz



26dB Bandwidth-11n-20MHz BW-5320MHz



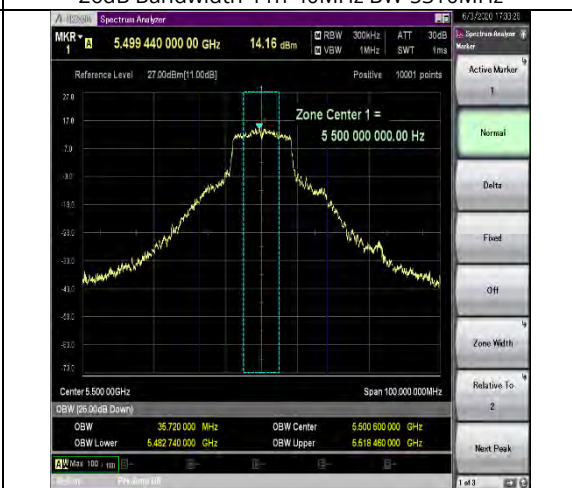
26dB Bandwidth-11n-40MHz BW-5270MHz



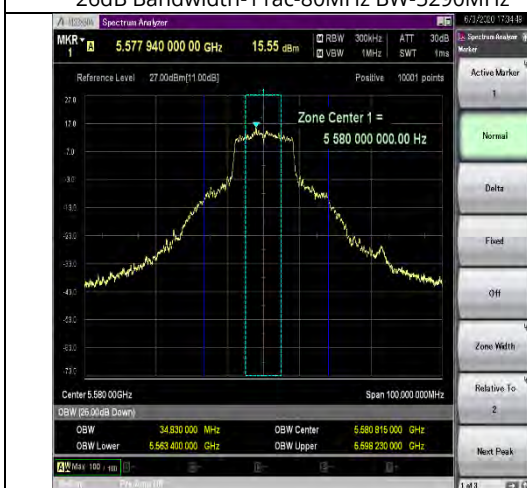
26dB Bandwidth-11n-40MHz BW-5310MHz



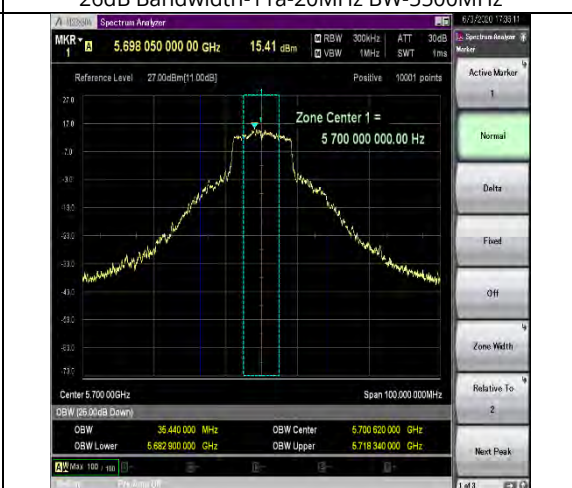
26dB Bandwidth-11ac-80MHz BW-5290MHz



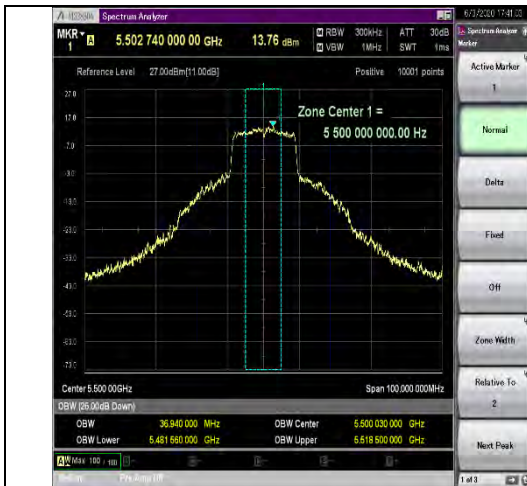
26dB Bandwidth-11a-20MHz BW-5500MHz



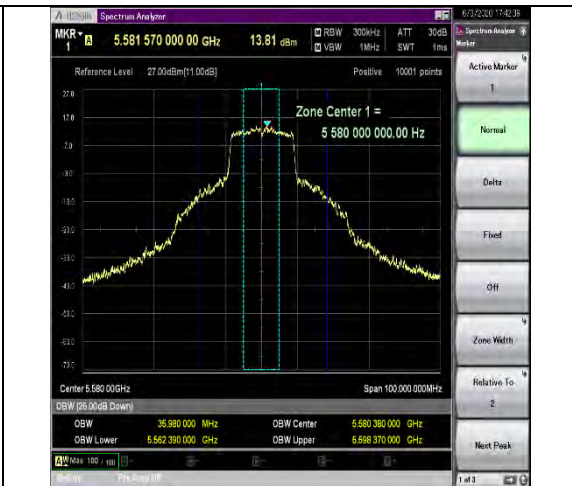
26dB Bandwidth-11a-20MHz BW-5580MHz



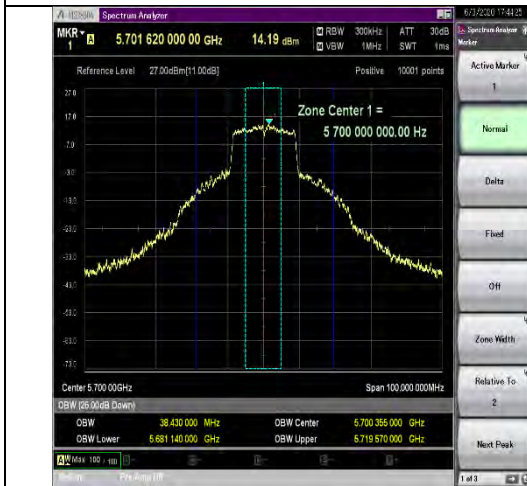
26dB Bandwidth-11a-20MHz BW-5700MHz



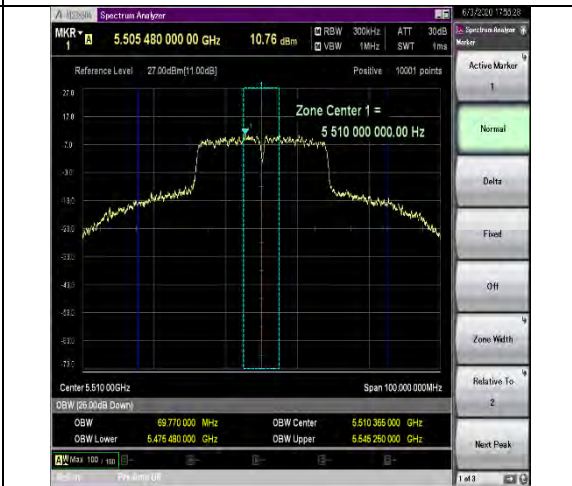
26dB Bandwidth-11n-20MHz BW-5500MHz



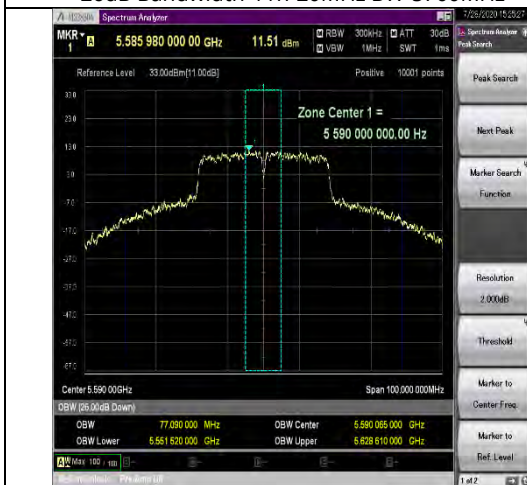
26dB Bandwidth-11n-20MHz BW-5580MHz



26dB Bandwidth-11n-20MHz BW-5700MHz



26dB Bandwidth-11n-40MHz BW-5510MHz



26dB Bandwidth-11n-40MHz BW-5590MHz



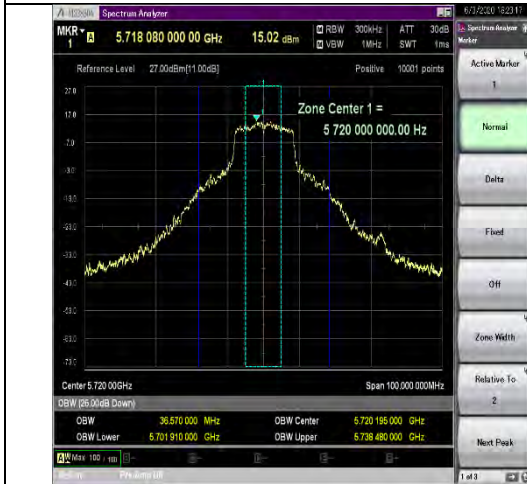
26dB Bandwidth-11n-40MHz BW-5670MHz



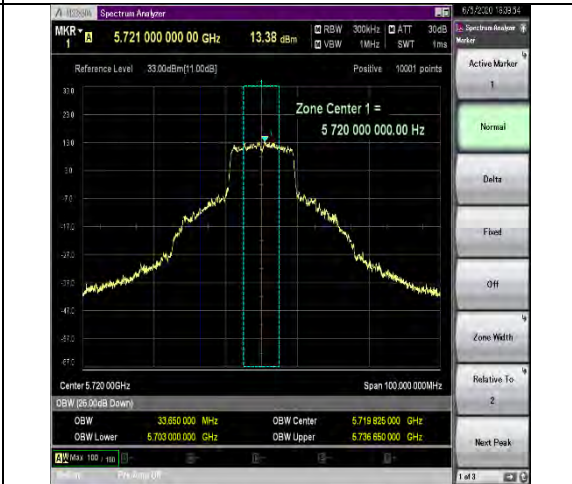
26dB Bandwidth-11ac-80MHz BW-5530MHz



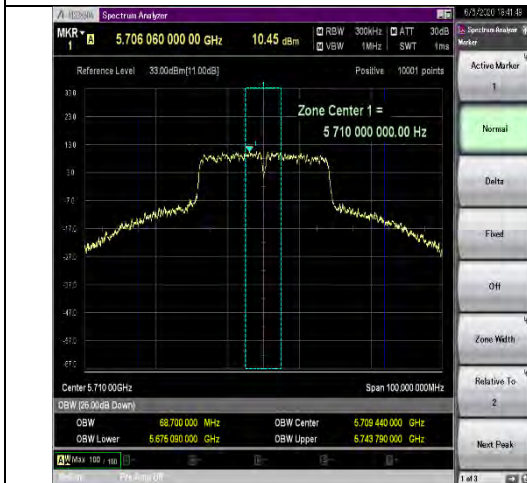
26dB Bandwidth-11ac-80MHz BW-5610MHz



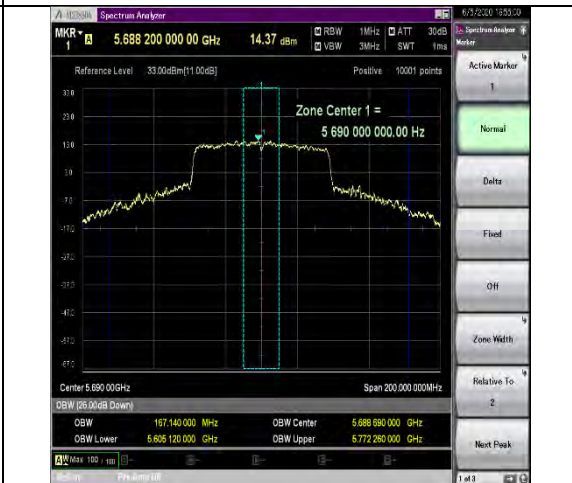
26dB Bandwidth-11a-20MHz BW-5720MHz



26dB Bandwidth-11n-20MHz BW-5720MHz



26dB Bandwidth-11n-40MHz BW-5710MHz



26dB Bandwidth-11ac-80MHz BW-5690MHz

7.2 Occupied Bandwidth (99%)

7.2.1 Requirement

The 99% OBW is for reporting purpose only. The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

7.2.2 Test Procedure

According to subclause 6.9.3 of ANSI C63.10-2013:

1. Set RBW = 1% to 5% of the actual occupied BW.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Span = large enough to capture all products of the modulation process
7. Allow the trace to stabilize.
8. Use automatic bandwidth measurement capability on instrument to obtain BW result.

7.2.3 Test Setup



7.2.4 Test Result

U-NII-2A Band

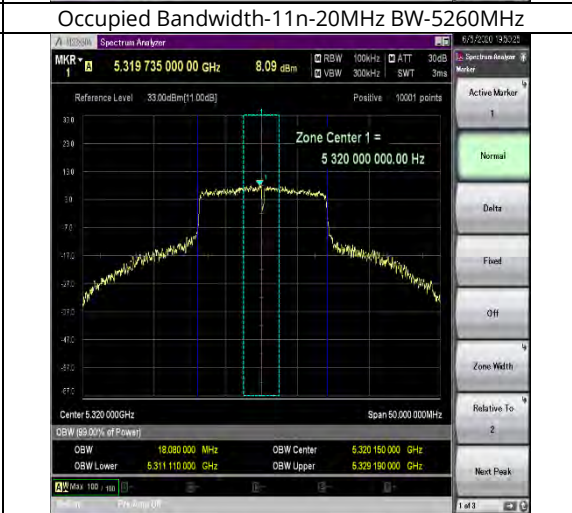
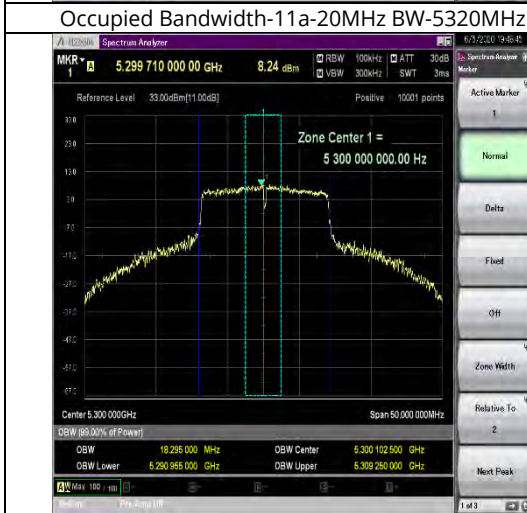
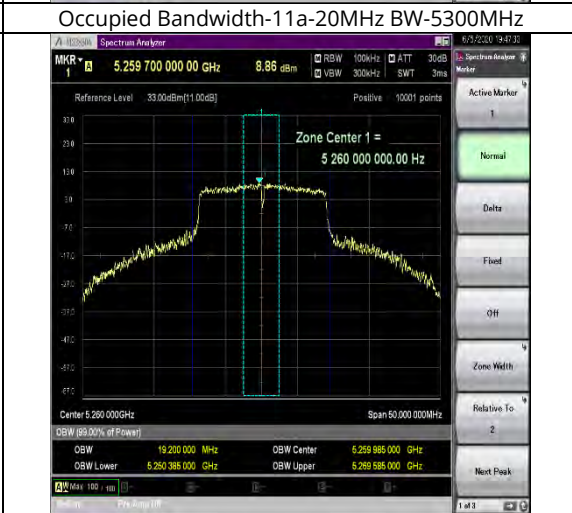
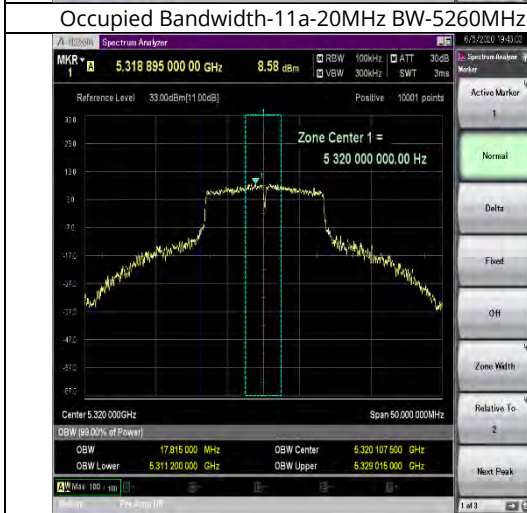
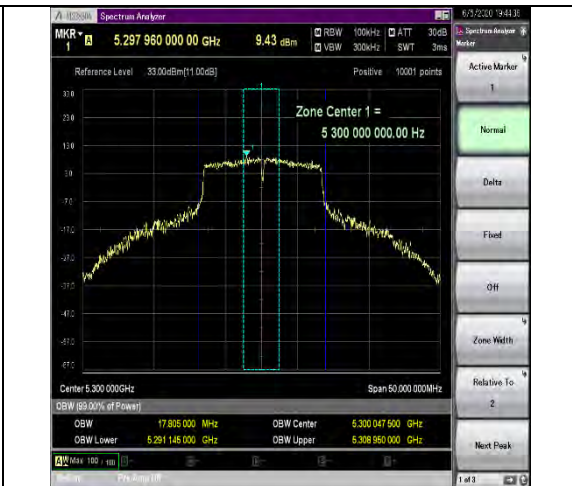
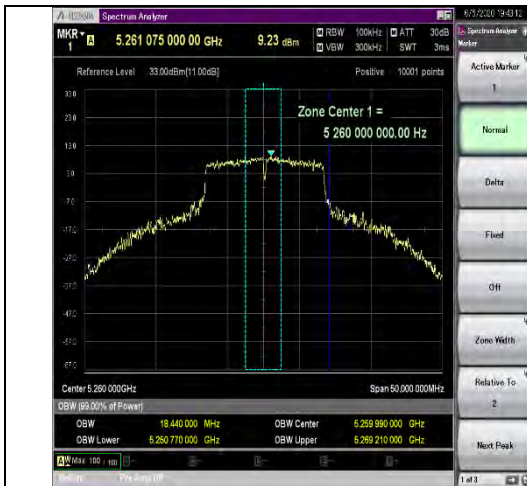
Mode/Band width	Channel	Frequency (MHz)	Data rate	Measured Bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
11a	52	5260	6Mbps	18440	N/A	N/A
11a	60	5300	6Mbps	17805	N/A	N/A
11a	64	5320	6Mbps	17815	N/A	N/A
11n-20MHz	52	5260	MCS0	19200	N/A	N/A
11n-20MHz	60	5300	MCS0	18295	N/A	N/A
11n-20MHz	64	5320	MCS0	18080	N/A	N/A
11n-40MHz	54	5270	MCS0	36800	N/A	N/A
11n-40MHz	62	5310	MCS0	36570	N/A	N/A
11ac-80MHz	58	5290	VHC-MCS0	78020	N/A	N/A

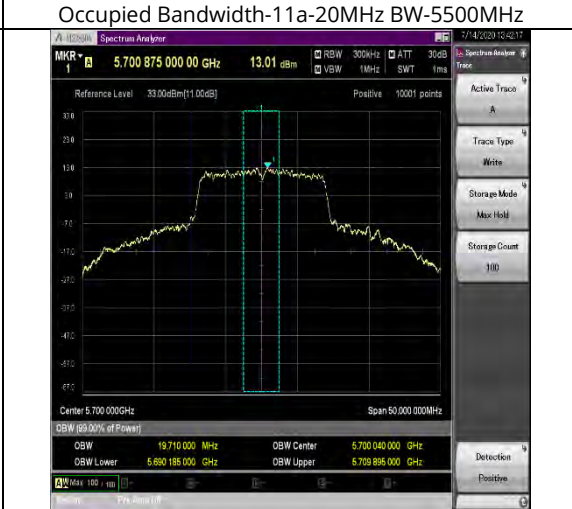
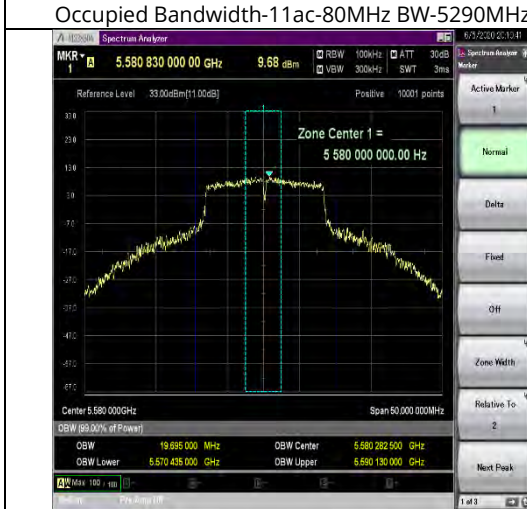
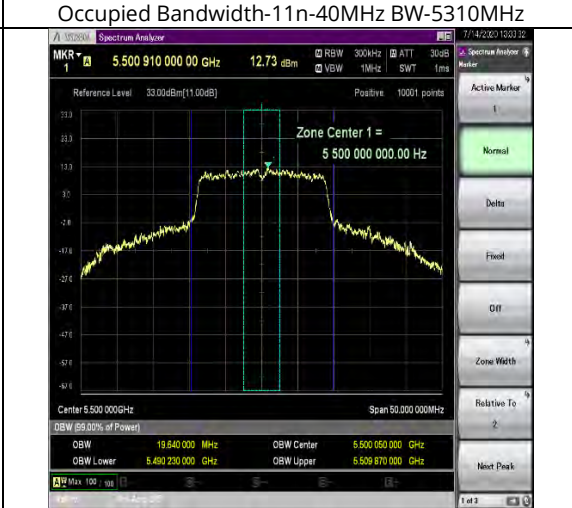
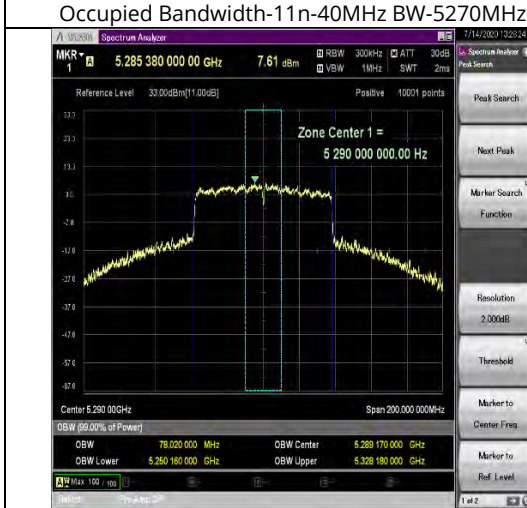
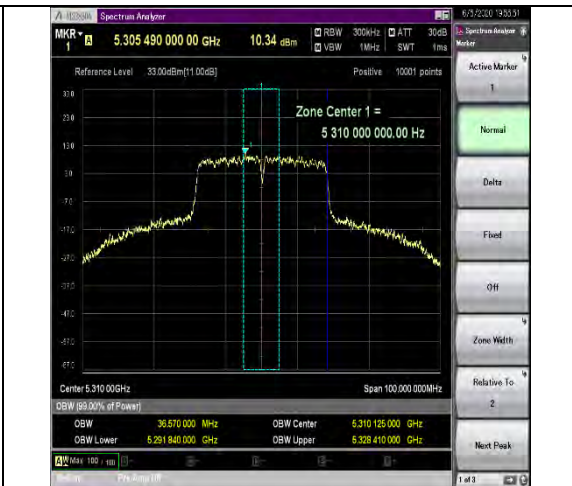
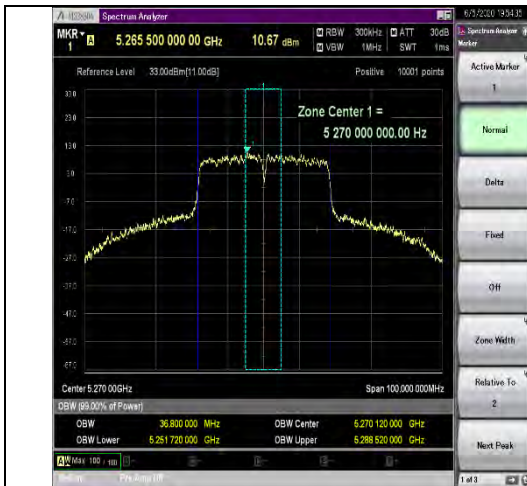
U-NII-2C Band

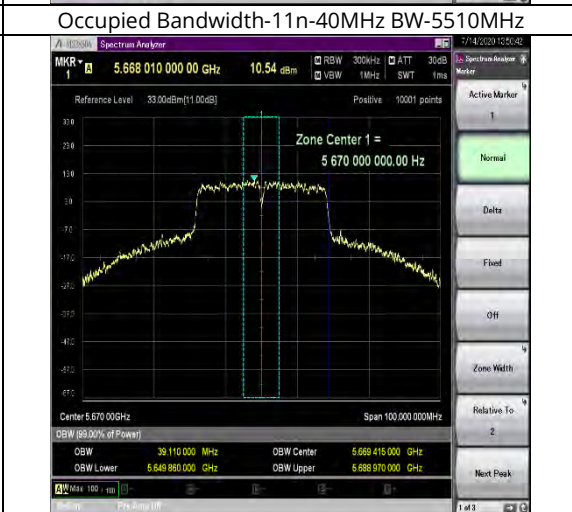
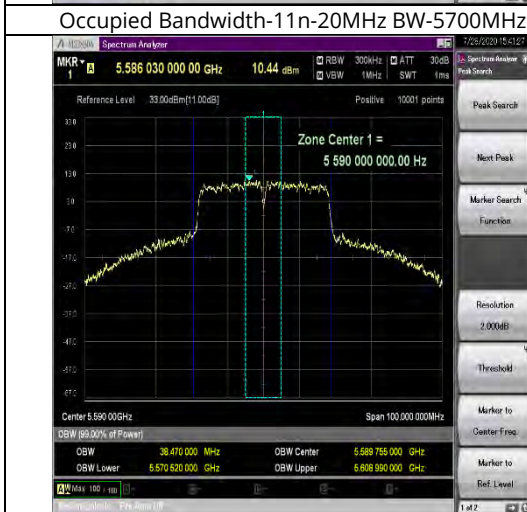
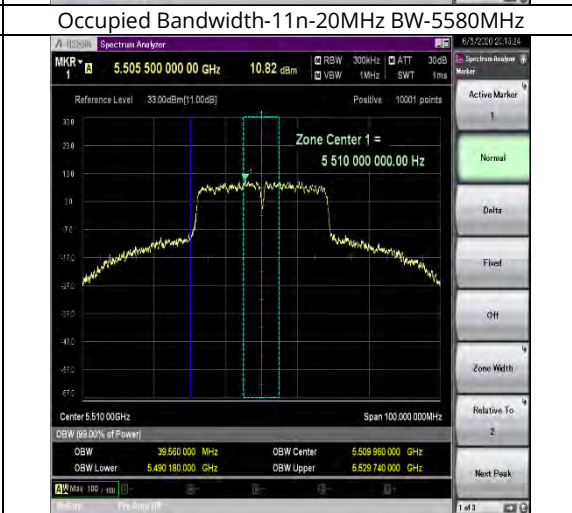
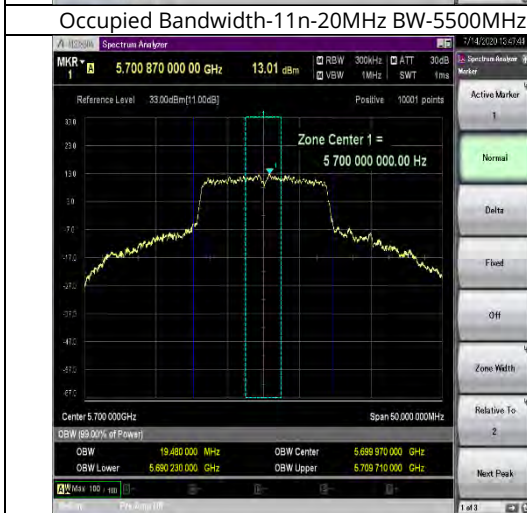
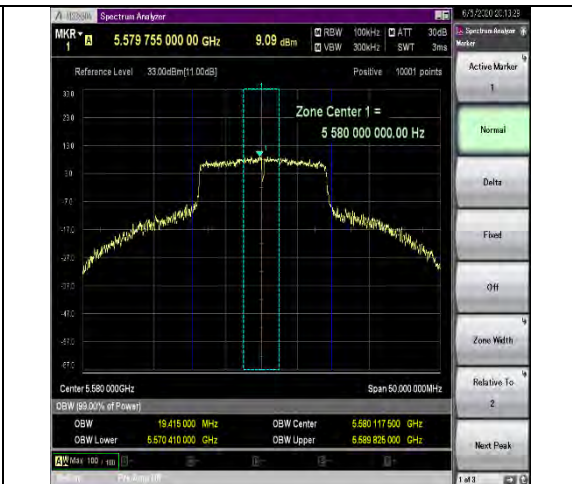
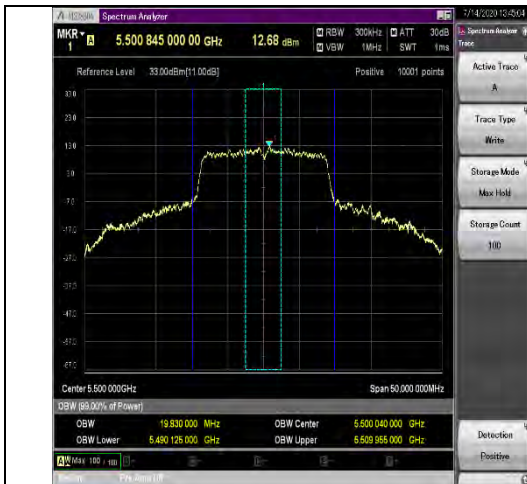
Mode/Band width	Channel	Frequency (MHz)	Data rate	Measured Bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
11a	100	5500	6Mbps	19640	N/A	N/A
11a	116	5580	6Mbps	19695	N/A	N/A
11a	140	5700	6Mbps	19710	N/A	N/A
11n-20MHz	100	5500	MCS0	19830	N/A	N/A
11n-20MHz	116	5580	MCS0	19415	N/A	N/A
11n-20MHz	140	5700	MCS0	19480	N/A	N/A
11n-40MHz	102	5510	MCS0	39560	N/A	N/A
11n-40MHz	118	5590	MCS0	38470	N/A	N/A
11n-40MHz	134	5670	MCS0	39110	N/A	N/A
11ac-80MHz	106	5530	VHC-MCS0	78660	N/A	N/A
11ac-80MHz	122	5610	VHC-MCS0	79480	N/A	N/A

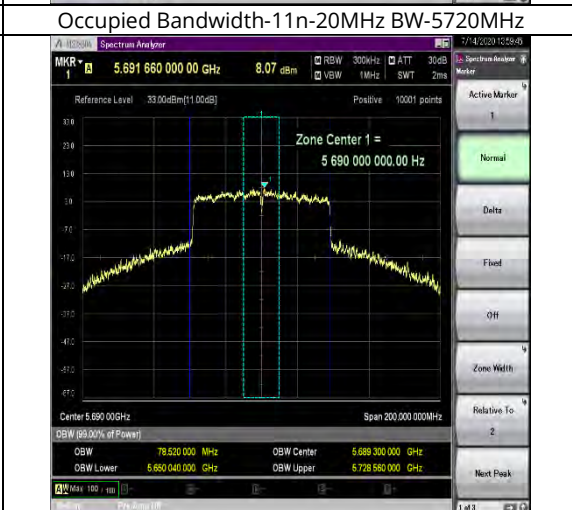
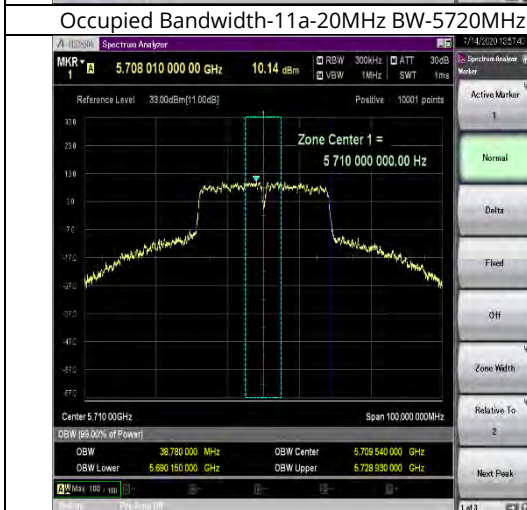
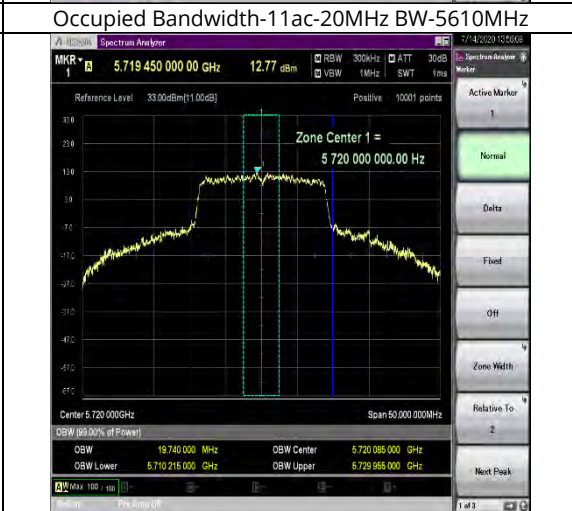
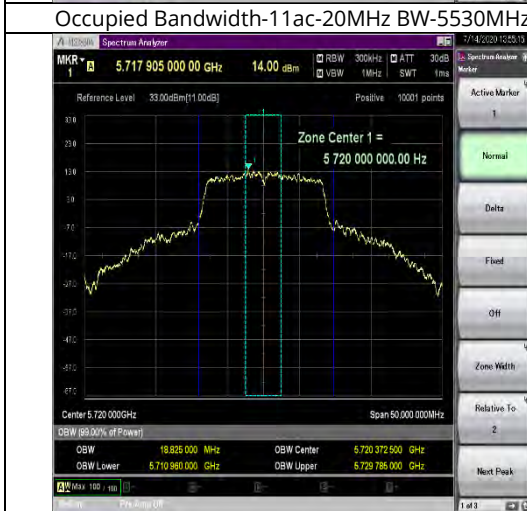
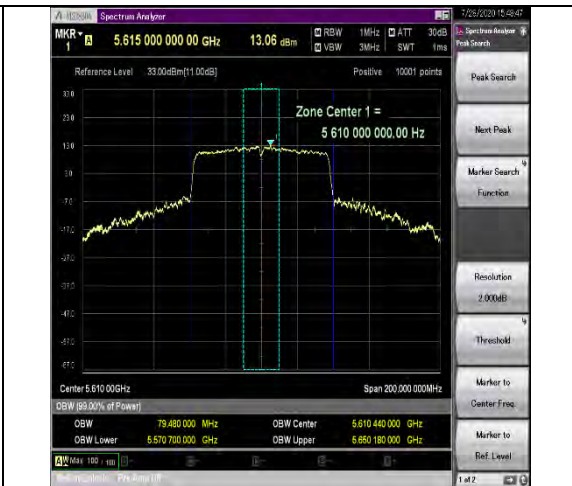
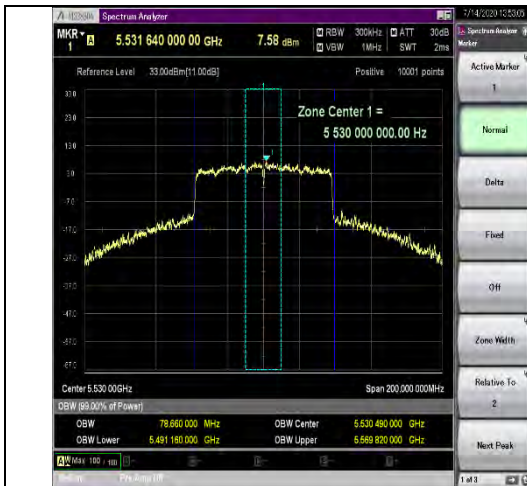
Cross-Band Channel

Mode/Band width	Channel	Frequency (MHz)	Data rate	Measured Bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
11a	144	5720	6Mbps	18825	N/A	N/A
11n-20MHz	144	5720	MCS0	19740	N/A	N/A
11n-40MHz	142	5710	MCS0	38780	N/A	N/A
11ac-80MHz	138	5690	VHC-MCS0	78520	N/A	N/A









Occupied Bandwidth-11n-40MHz BW-5710MHz

Occupied Bandwidth-11ac-20MHz BW-5690MHz

7.3 Maximum Conducted Output Power

7.3.1 Requirement

§ 15.407 (a)

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 26 dB emission bandwidth in megahertz.

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

7.3.2 Test Setup



7.3.3 Test Procedure

According to subclause 12.3.2.2 of ANSI C63.10-2013:

- 1) Set span to encompass the entire 26 dB EBW or 99% OBW of the signal.
- 2) Set RBW = 1MHz
- 3) Set VBW \geq 3 MHz.
- 4) Number of points in sweep \geq $[2 \times \text{span} / \text{RBW}]$. (This gives bin-to-bin spacing \leq $\text{RBW} / 2$, so that narrow band signals are not lost between frequency bins.)
- 5) Sweep time = auto
- 6) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- 7) If transmit duty cycle $<$ 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle \geq 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run."
- 8) Trace average at least 100 traces in power averaging (rms) mode.

- 9) Compute power by integrating the spectrum across the 26 dB EBW or 99% OBW of the signal using the instrument's band power measurement function, with band limits set equal to the EBW or OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW or 99% OBW of the spectrum.

7.3.4 Test Result

U-NII-2A Band

Mode/Bandwidth	Channel	Frequency (MHz)	Data Rate	TX1 Power (dBm)	TX2 Power (dBm)	Highest or Total Power (dBm)	Max Output Power (dBm)	Result
11a	52	5260	6Mbps	19.08	18.69	19.08	22	Pass
11a	60	5300	6Mbps	18.88	18.58	18.88	22	Pass
11a	64	5320	6Mbps	14.64	14.24	14.64	22	Pass
11n-20MHz	52	5260	MCS0	17.15	16.78	19.98	22	Pass
11n-20MHz	60	5300	MCS0	17.12	16.73	19.94	22	Pass
11n-20MHz	64	5320	MCS0	13.55	13.19	16.38	22	Pass
11n-40MHz	54	5270	MCS0	19.14	18.72	21.95	22	Pass
11n-40MHz	62	5310	MCS0	8.23	8.01	11.13	22	Pass
11ac-80MHz	58	5290	VHC-MCS0	7.58	7.32	10.46	22	Pass

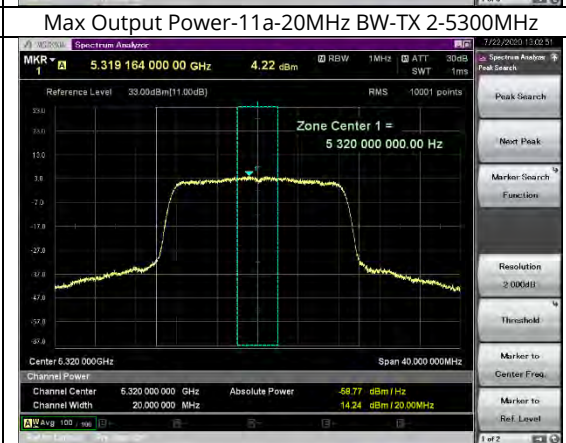
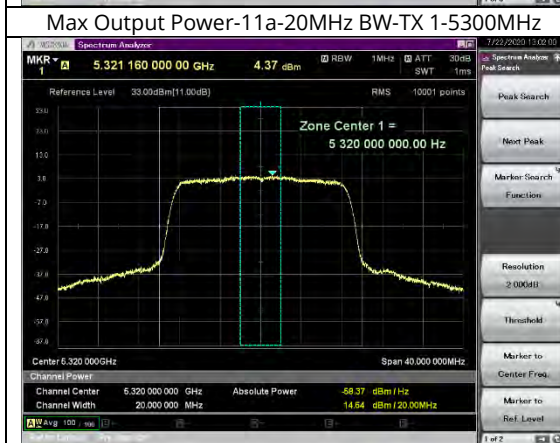
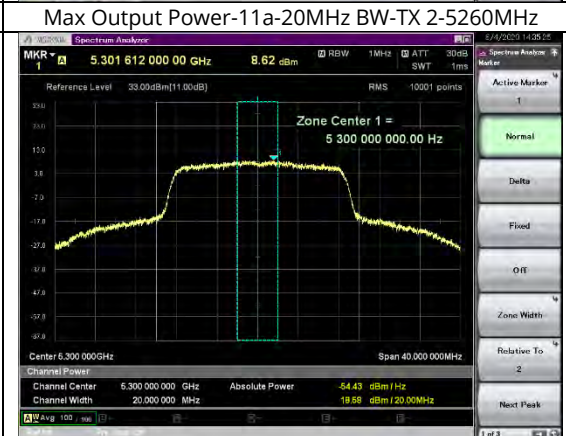
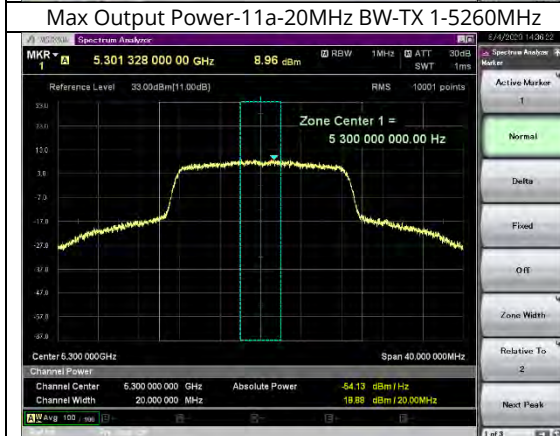
U-NII-2C Band

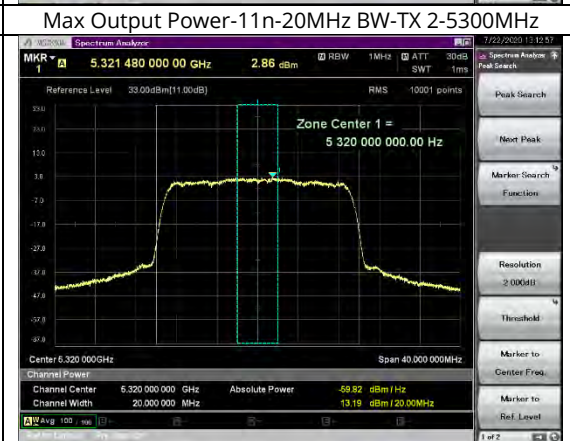
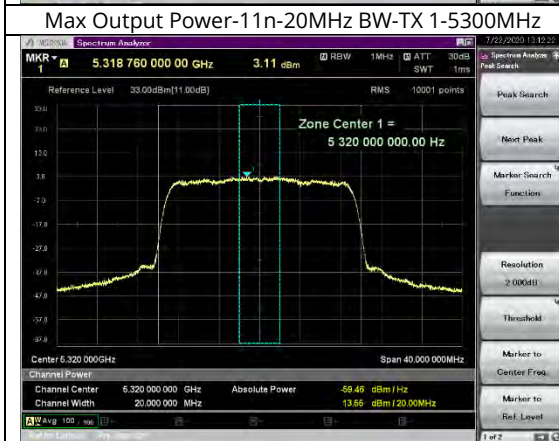
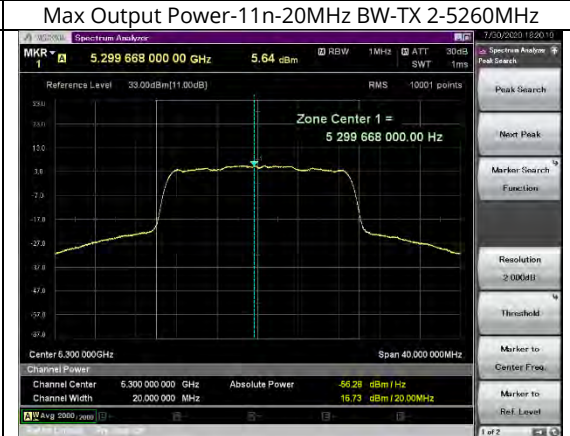
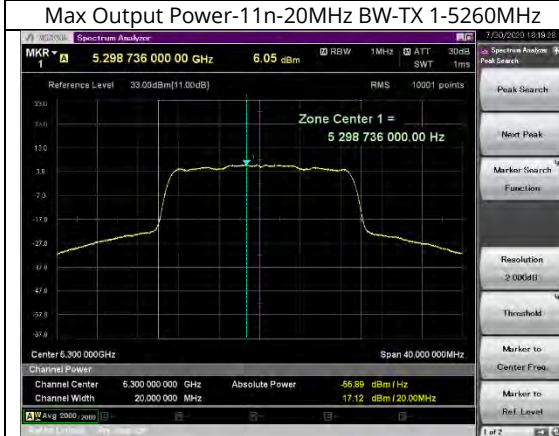
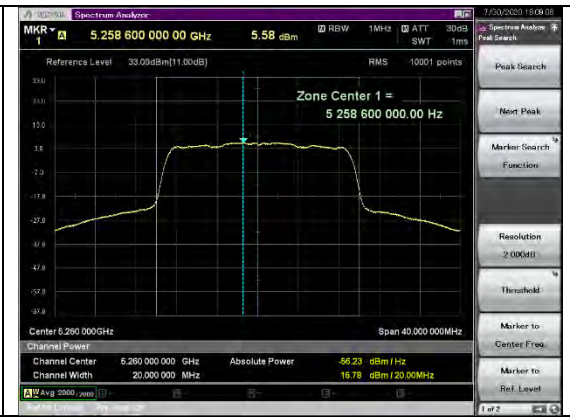
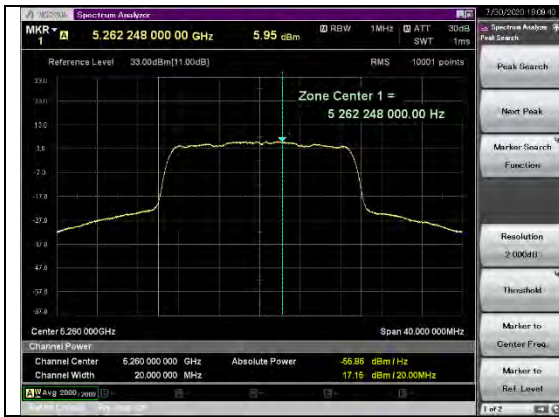
Mode/Bandwidth	Channel	Frequency (MHz)	Data Rate	TX1 Power (dBm)	TX2 Power (dBm)	Highest or Total Power (dBm)	Max Output Power (dBm)	Result
11a	100	5500	6Mbps	17.89	18.37	18.37	22	Pass
11a	116	5580	6Mbps	19.61	19.25	19.61	22	Pass
11a	140	5700	6Mbps	18.90	18.41	18.90	22	Pass
11n-20MHz	100	5500	MCS0	16.72	17.02	19.88	22	Pass
11n-20MHz	116	5580	MCS0	16.80	16.65	19.74	22	Pass
11n-20MHz	140	5700	MCS0	16.00	15.49	18.76	22	Pass
11n-40MHz	102	5510	MCS0	13.41	13.65	16.54	22	Pass
11n-40MHz	118	5590	MCS0	17.87	17.80	20.85	22	Pass
11n-40MHz	134	5670	MCS0	17.97	17.47	20.74	22	Pass
11ac-80MHz	106	5530	VHC-MCS0	8.69	8.33	11.52	22	Pass
11ac-80MHz	122	5610	VHC-MCS0	17.73	17.38	20.57	22	Pass

Cross-Band Channel

Mode/Bandwidth	Channel	Frequency (MHz)	Data Rate	TX1 Power (dBm)	TX2 Power (dBm)	Highest or Total Power (dBm)	Max Output Power (dBm)	Result
11a	144	5720	6Mbps	18.51	18.16	18.51	22	Pass
11n-20MHz	144	5720	MCS0	17.19	16.67	19.95	22	Pass
11n-40MHz	142	5710	MCS0	19.00	18.52	21.78	22	Pass
11ac-80MHz	138	5690	VHC-MCS0	18.05	17.62	20.85	22	Pass

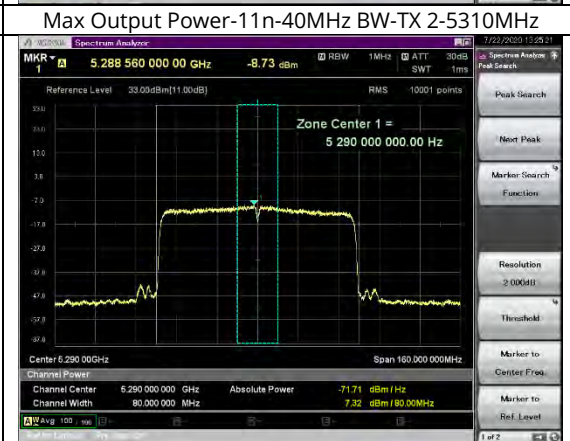
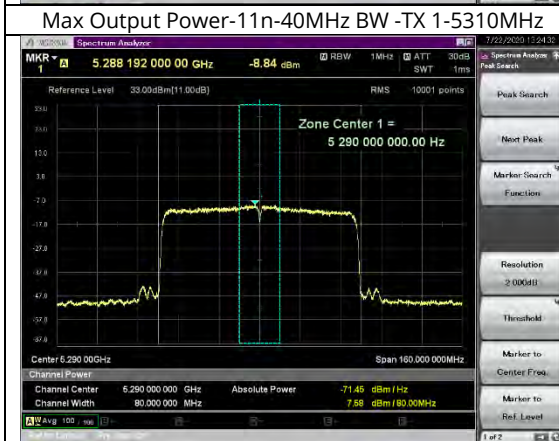
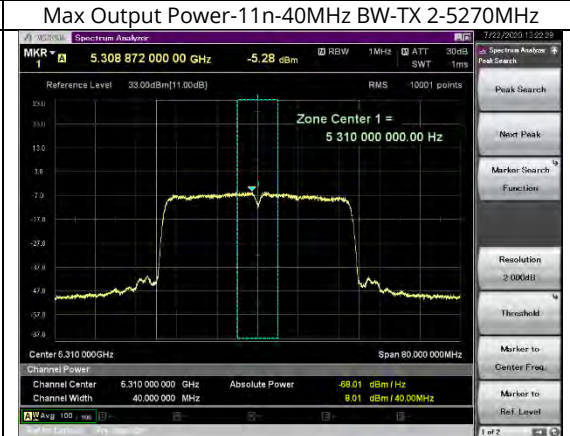
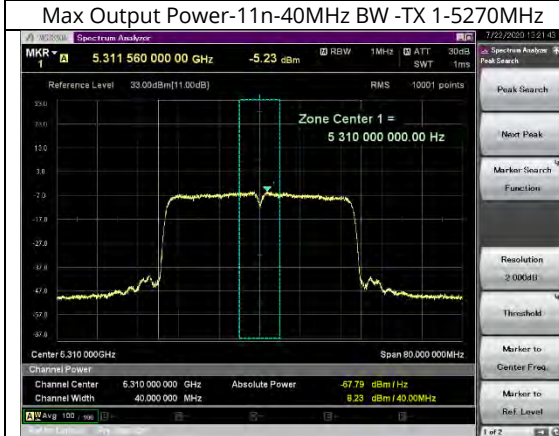
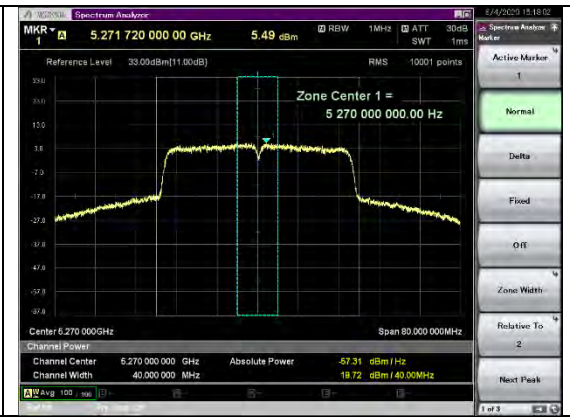
EUT is 2x2 MIMO with 5 dBi gain for each antenna. The total directional gain is 8 dBi which exceeds 6 dBi by 2 dB. The PSD and Maximum Output Power limit is reduced by 2 dB accordingly.

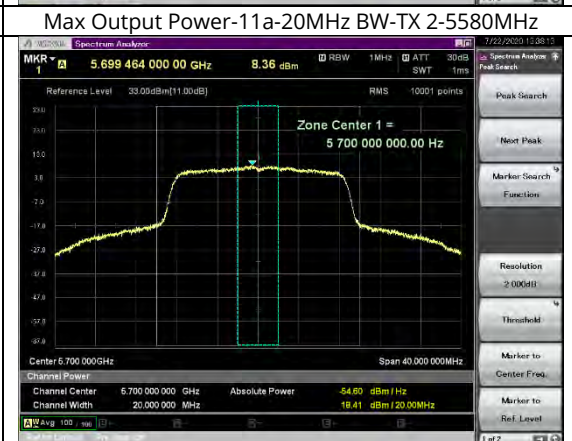
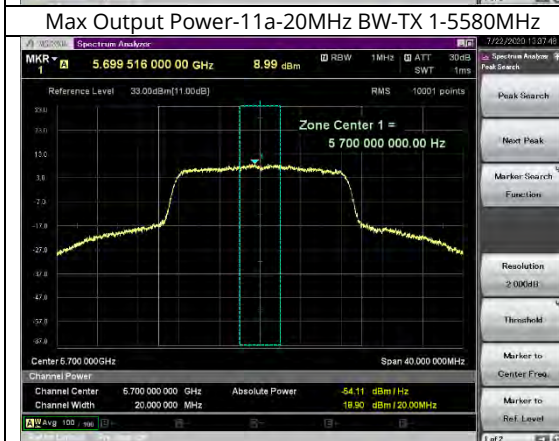
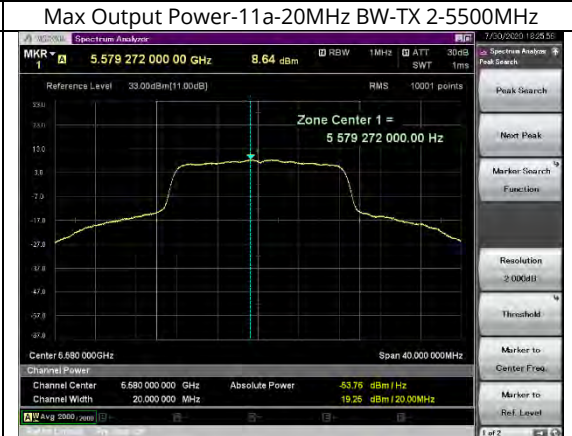
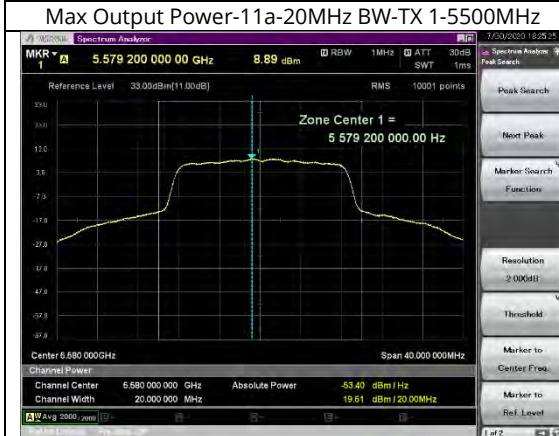
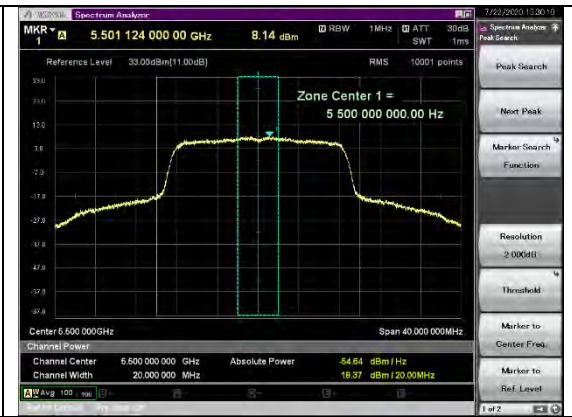


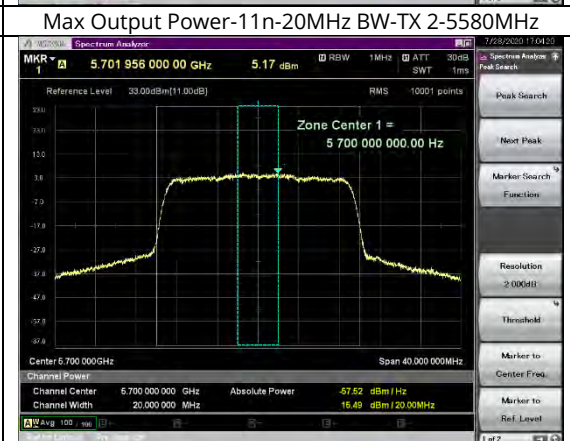
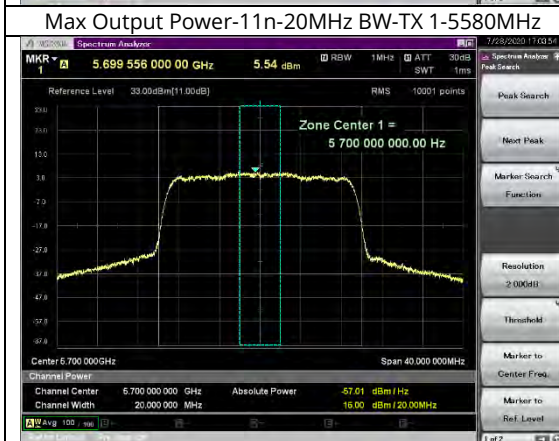
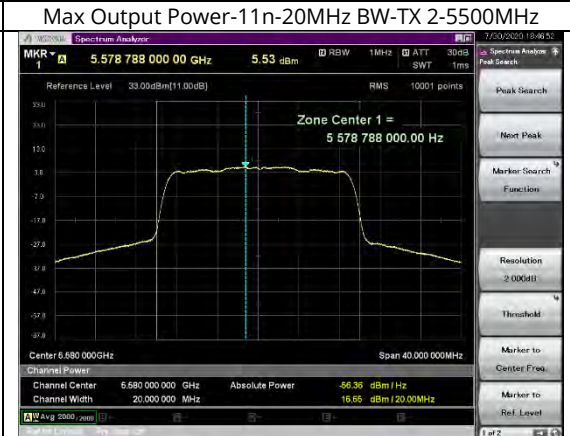
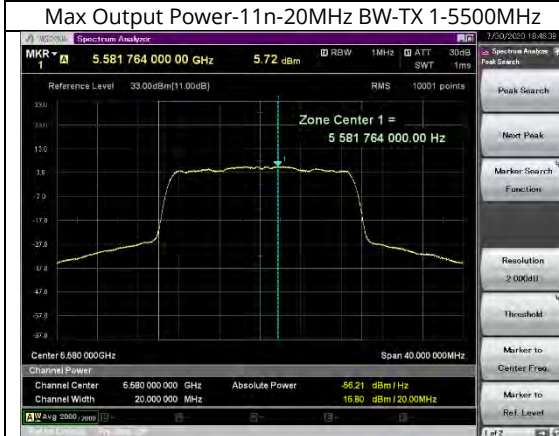
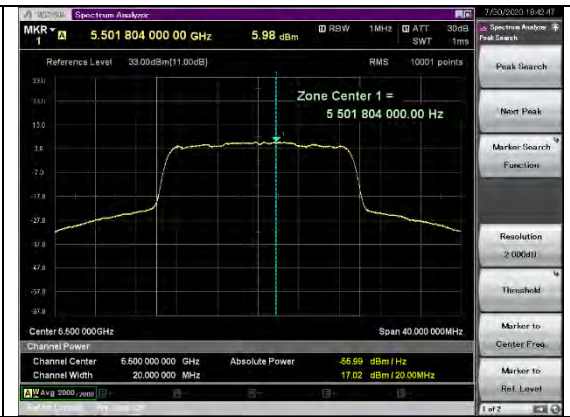


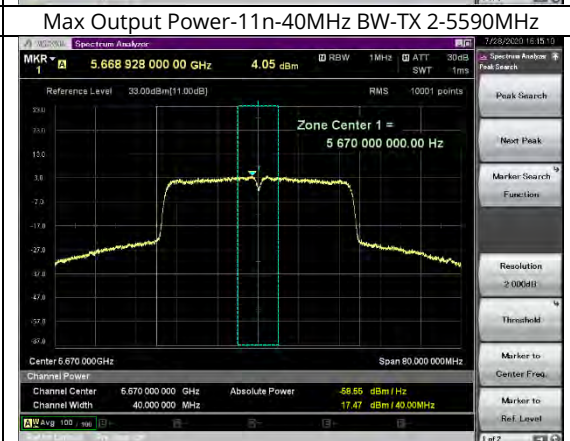
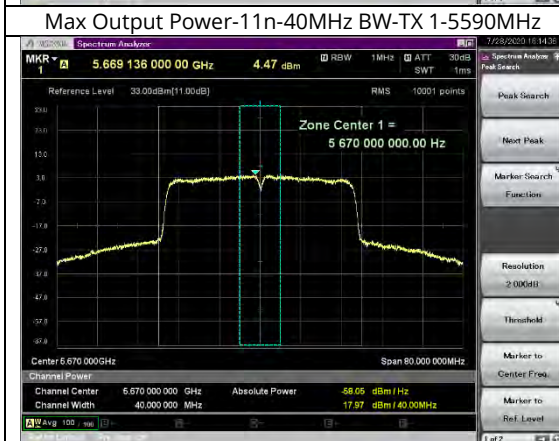
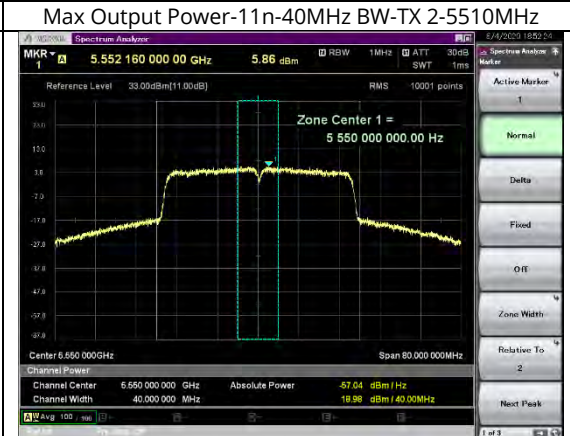
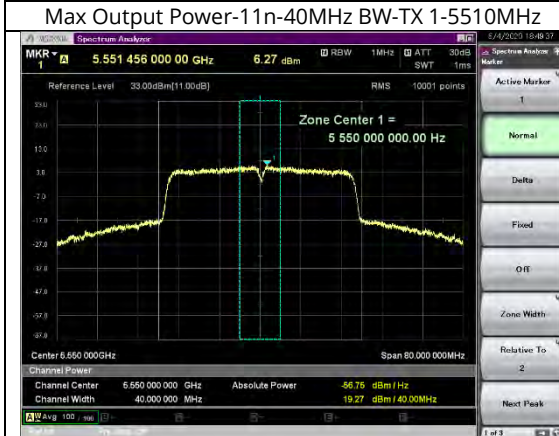
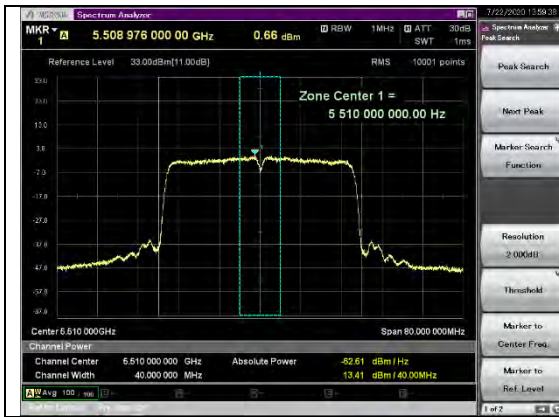
Max Output Power-11n-20MHz BW-TX 1-5320MHz

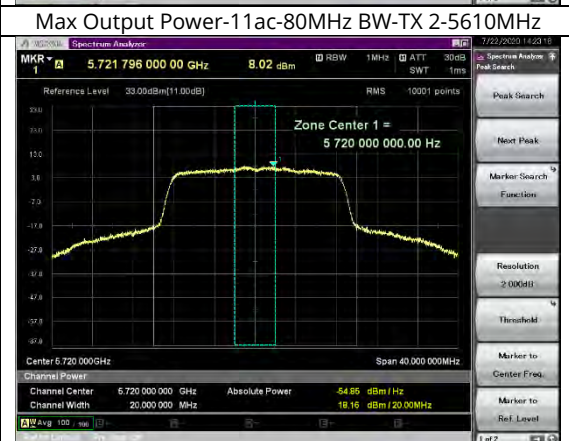
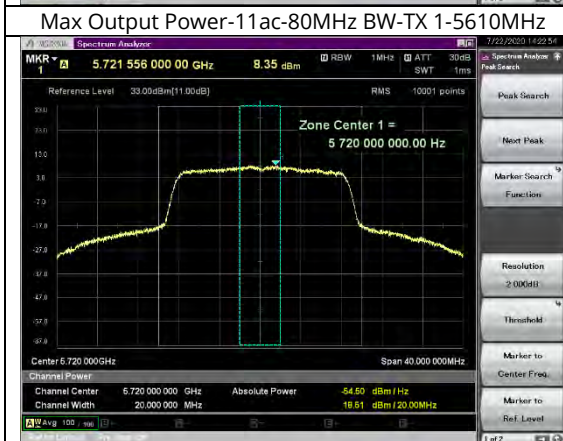
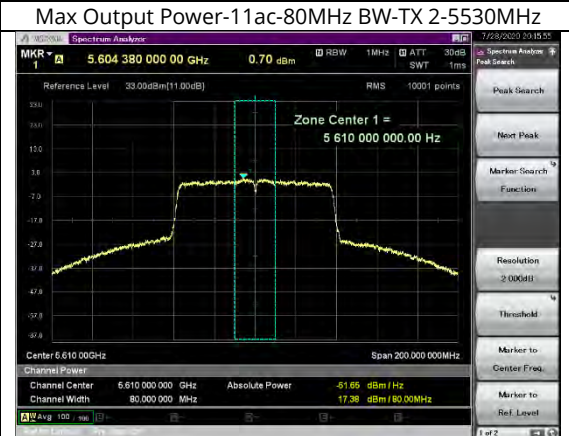
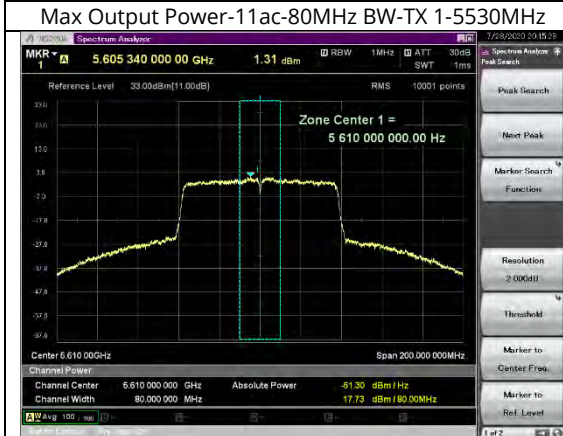
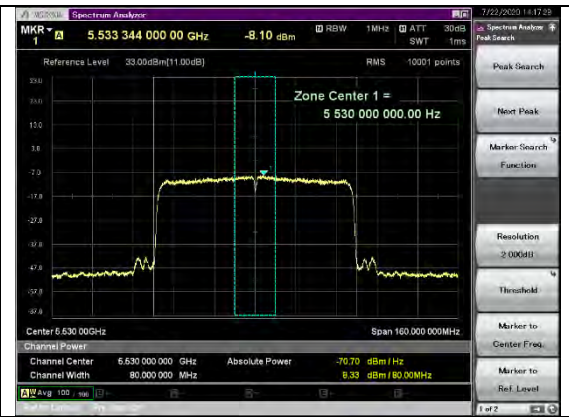
Max Output Power-11n-20MHz BW-TX 2-5320MHz

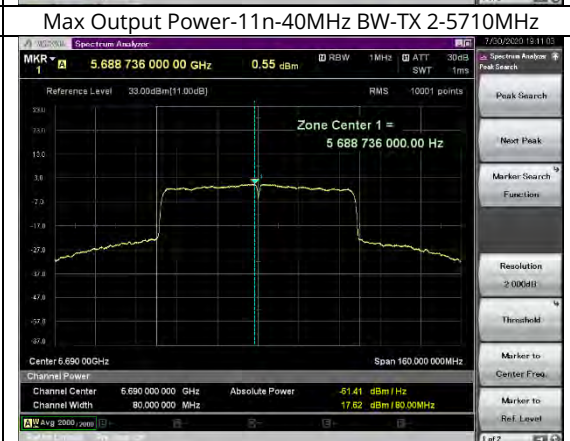
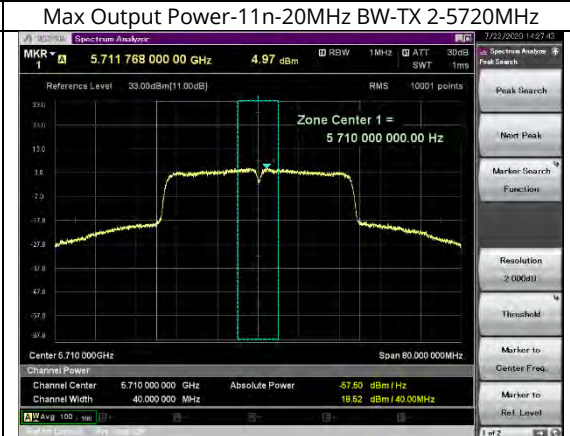
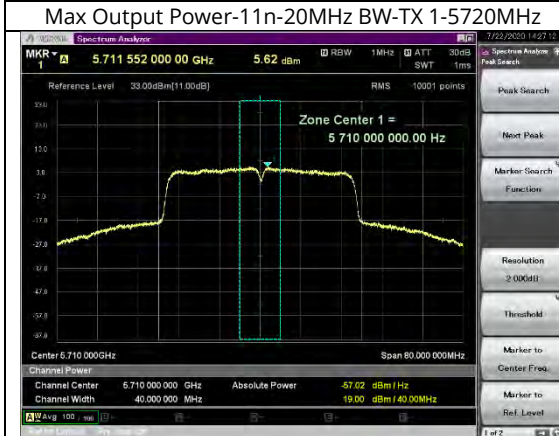
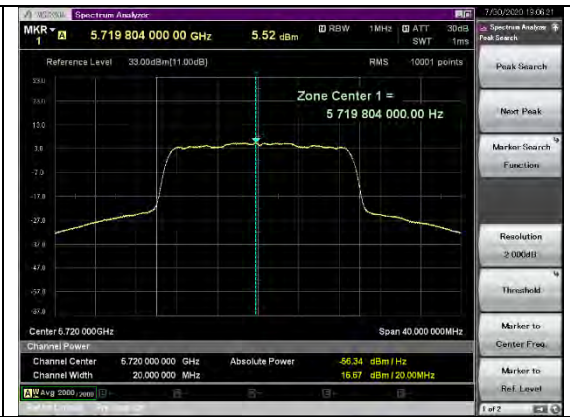












7.4 Power Spectral Density

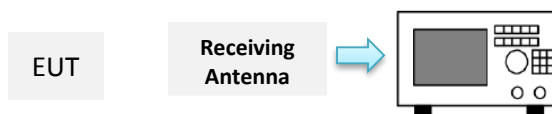
7.4.1 Requirement

§ 15.407 (a)

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 1MHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.4.2 Test Setup



7.4.3 Test Procedure

According to subclause 12.5 of ANSI C63.10-2013:

- 1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in 12.3.2 for measuring maximum conducted output power using a spectrum analyzer or EMI receiver; that is, select the appropriate test method (SA-1, SA-2, SA-3, or their respective alternatives) and apply it up to, but not including, the step labeled, "Compute power...." (This procedure is required even if the maximum conducted output power measurement was performed using the power meter method PM.)
- 2) Use the peak search function on the instrument to find the peak of the spectrum.
- 3) Make the following adjustments to the peak value of the spectrum, if applicable:
 - a. If method SA-2 or SA-2A was used, then add $[10 \log (1 / D)]$, where D is the duty cycle, to the peak of the spectrum.
 - b. If method SA-3A was used and the linear mode was used in step h) of 12.3.2.7, add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
- 4) The result is the PPSD.
- 5) The procedure in item a) through item c) requires the use of 1 MHz resolution bandwidth to satisfy the 1 MHz measurement bandwidth specified by some regulatory authorities.⁹⁵ This requirement also permits use of resolution bandwidths less than 1 MHz "provided that the measured power is integrated to show the total power over the measurement bandwidth" (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 1 MHz bandwidth, the following adjustments to the procedures apply:
 - a. Set $RBW \geq 1 / T$, where T is defined in 12.2 a).
 - b. Set $VBW \geq [3 \times RBW]$.
 - c. Care shall be taken such that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

7.4.4 Test Result

U-NII-2A Band

Mode	Channel	Frequency (MHz)	Data rate	TX1 PSD (dBm/MHz)	TX2 PSD (dBm/MHz)	Highest or Total PSD (dBm/MHz)	Max PSD (dBm/MHz)	Result
11a	52	5260	6Mbps	8.21	7.98	8.21	9	Pass
11a	60	5300	6Mbps	8.96	8.62	8.96	9	Pass
11a	64	5320	6Mbps	4.37	4.22	4.37	9	Pass
11n-20M	52	5260	MCS0	5.95	5.58	8.78	9	Pass
11n-20M	60	5300	MCS0	6.05	5.64	8.86	9	Pass
11n-20M	64	5320	MCS0	3.11	2.86	6.00	9	Pass
11n-40M	54	5270	MCS0	6.05	5.49	8.79	9	Pass
11n-40M	62	5310	MCS0	-5.23	-5.28	-2.24	9	Pass
11ac-80M	58	5290	VHC-MCS0	-8.84	-8.73	-5.77	9	Pass

U-NII-2C Band

Mode	Channel	Frequency (MHz)	Data rate	TX1 PSD (dBm/MHz)	TX2 PSD (dBm/MHz)	Highest or Total PSD (dBm/MHz)	Max PSD (dBm/MHz)	Result
11a	100	5500	6Mbps	8.15	8.14	8.15	9	Pass
11a	116	5580	6Mbps	8.89	8.64	8.89	9	Pass
11a	140	5700	6Mbps	8.99	8.36	8.99	9	Pass
11n-20M	100	5500	MCS0	5.51	5.98	8.76	9	Pass
11n-20M	116	5580	MCS0	5.72	5.53	8.64	9	Pass
11n-20M	140	5700	MCS0	5.54	5.17	8.37	9	Pass
11n-40M	102	5510	MCS0	0.66	0.09	3.39	9	Pass
11n-40M	118	5590	MCS0	4.53	4.36	7.46	9	Pass
11n-40M	134	5670	MCS0	4.47	4.05	7.28	9	Pass
11ac-80M	106	5530	VHC-MCS0	-7.74	-8.10	-4.91	9	Pass
11ac-80M	122	5610	VHC-MCS0	1.31	0.70	4.03	9	Pass

Cross-Band Channel

Mode	Channel	Frequency (MHz)	Data rate	TX1 PSD (dBm/MHz)	TX2 PSD (dBm/MHz)	Highest or Total PSD (dBm/MHz)	Max PSD (dBm/MHz)	Result
11a	144	5720	6Mbps	8.35	8.02	8.35	9	Pass
11n	144	5720	MCS0	6.12	5.52	8.84	9	Pass
11n-40M	142	5710	MCS0	5.62	4.97	8.32	9	Pass
11ac-80M	138	5690	VHC-MCS0	1.15	0.55	3.87	9	Pass

For test plots, refer to Maximum Conducted Output Power.

EUT is 2x2 MIMO with 5 dBi gain for each antenna. The total directional gain is 8 dBi which exceeds 6 dBi by 2 dB.

The PSD and Maximum Output Power limit is reduced by 2 dB accordingly.

7.5 Radiated Spurious Emission

7.5.1 Requirement

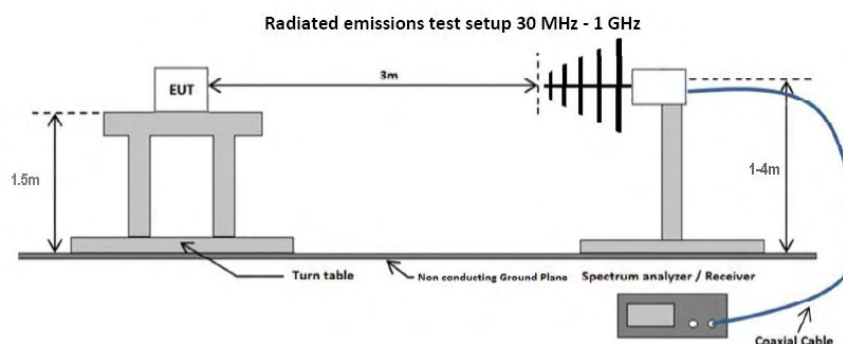
§ 15.407 (a)

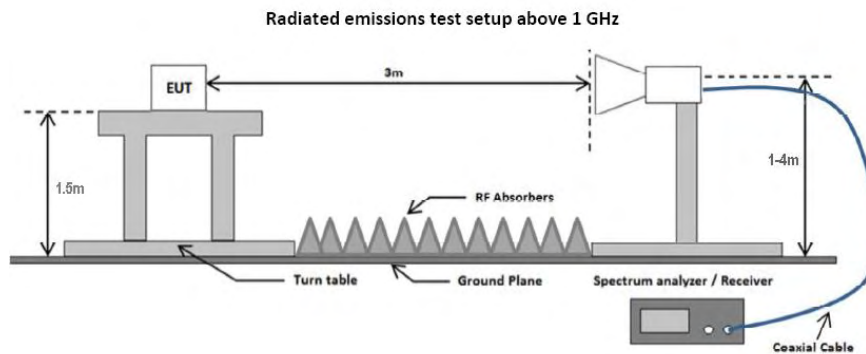
- 1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- 2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
- 3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- 4) For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.
- 5) Restricted band, emission must also comply with the radiated emission limits specified in 15.209

Attenuation below the general limits specified in §15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Frequency Range (MHZ)	Field Strength ($\mu\text{V}/\text{m}$)
0.009~0.490	2400/F(kHz)
0.490~1.705	24000/F(kHz)
1.705~30.0	30
30 - 88	100
88 - 216	150
216 960	200
Above 960	500

7.5.2 Test Setup





7.5.3 Test Procedure

According to subclause 12.7, radiated spurious emission measurements, in ANSI C63.10-2013:

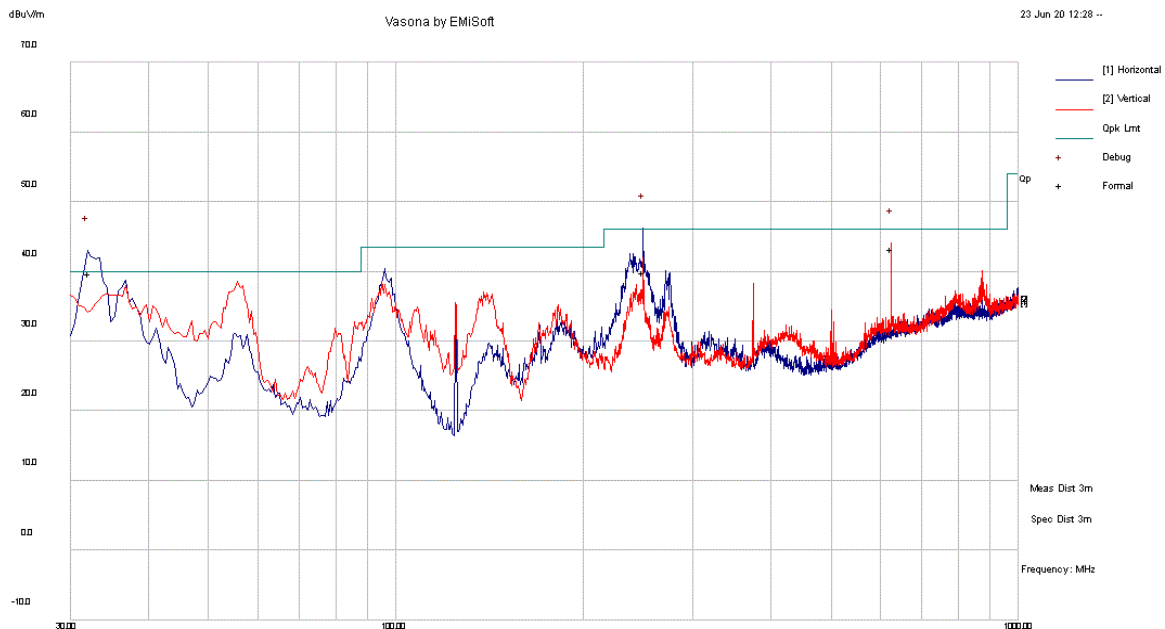
- 1) The EUT was switched on and allowed to warm up to its normal operating condition.
- 2) The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
 - a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT was chosen.
 - b. The EUT was then rotated to the direction that gave the maximum emission.
 - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
- 3) The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 300Hz for frequencies below 150kHz.
- 4) The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10kHz for frequency between 150kHz-30MHz.
- 5) The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection at frequency between 30MHz-1GHz.
- 6) The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with peak detection for peak and average measurement at frequency above 1GHz.
- 7) Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

7.5.4 Test Result

RADIATED SPURIOUS EMISSION BELOW 30MHz

Test Standard:	15.407	Mode:	RSE-Below 1GHz-11a-Ch. 60
Frequency Range:	30 MHz - 1 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

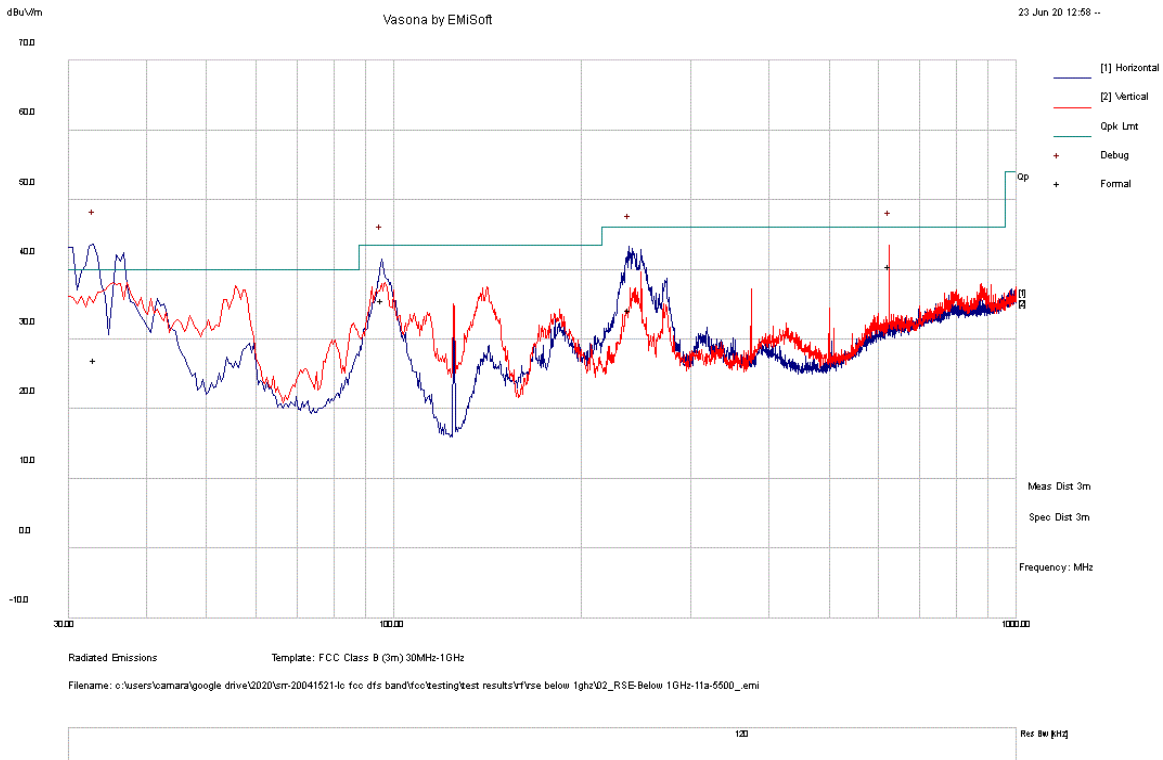
Radiated Spurious Emission-Below 1GHz-11a-20MHz BW-5300MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
32.12	53.99	2.30	-16.58	39.71	Quasi Max	H	397	35	40.00	-0.29	Pass
249.95	53.69	5.25	-18.99	39.95	Quasi Max	H	127	0	46.00	-6.05	Pass
625.01	45.69	7.20	-9.57	43.33	Quasi Max	V	163	209	46.00	-2.67	Pass

Test Standard:	15.407	Mode:	RSE-Below 1GHz-11a-Ch. 100
Frequency Range:	30 MHz - 1 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

Radiated Spurious Emission-Below 1GHz-11a-20MHz BW-5500MHz

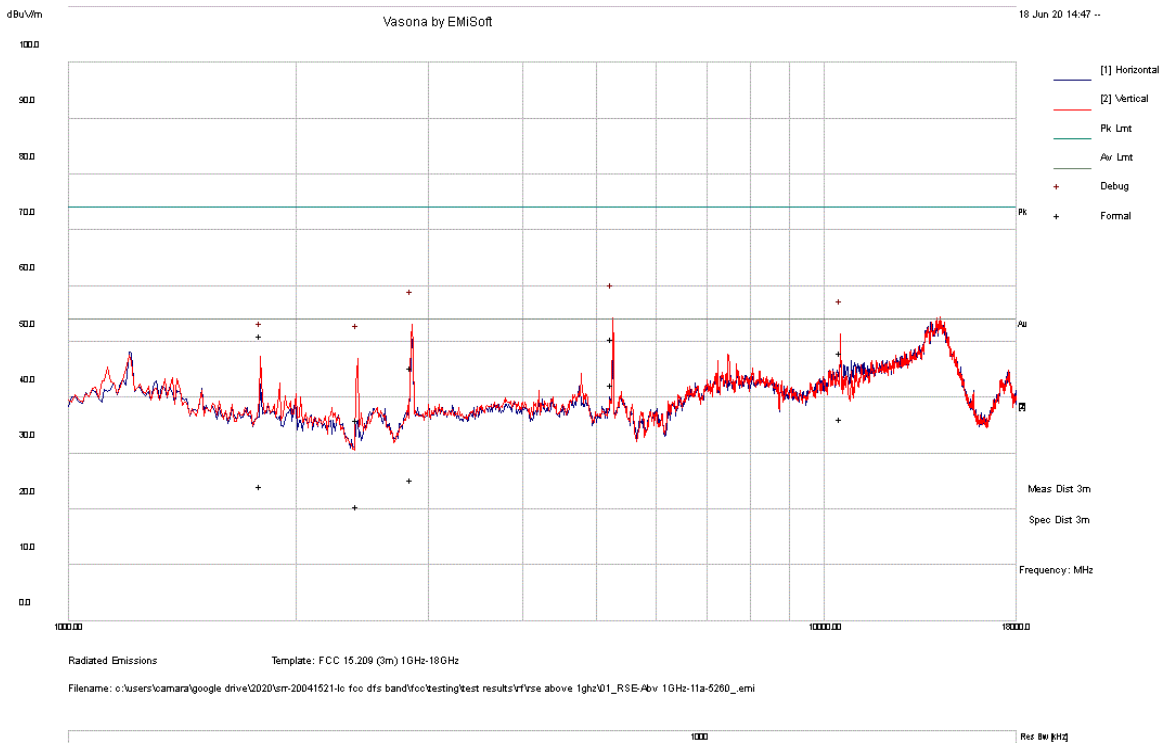


Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
33.11	41.94	2.33	-17.15	27.12	Quasi Max	H	227	185	40.00	-12.88	Pass
95.57	56.11	3.51	-24.03	35.59	Quasi Max	H	169	170	43.50	-7.91	Pass
624.99	42.92	7.20	-9.57	40.56	Quasi Max	V	152	209	46.00	-5.44	Pass
238.51	48.65	5.14	-19.52	34.27	Quasi Max	H	185	8	46.00	-11.73	Pass

RADIATED SPURIOUS EMISSION ABOVE 1GHZ

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11a-Ch. 52
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

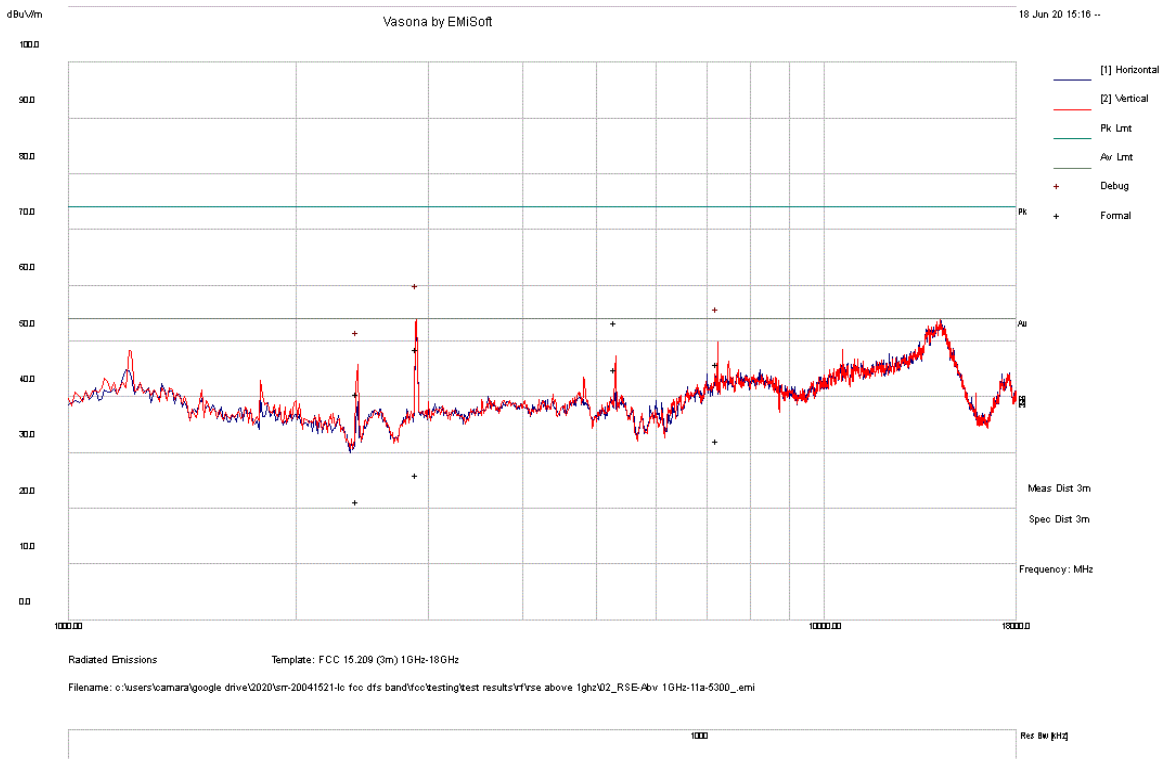
Radiated Spurious Emission-Above 1GHz-11a-20MHz BW-5260MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5251.93	33.98	17.47	-0.96	50.49	Peak Max	V	200	354	74.00	-23.51	Pass
2849.06	38.16	15.17	-7.98	45.36	Peak Max	V	360	90	74.00	-28.64	Pass
10521.16	22.81	23.16	2.08	48.05	Peak Max	V	268	270	74.00	-25.95	Pass
1798.35	45.60	14.48	-9.05	51.03	Peak Max	V	184	358	74.00	-22.97	Pass
2411.13	30.76	14.72	-9.41	36.08	Peak Max	V	386	167	74.00	-37.92	Pass
5251.93	25.87	17.47	-0.96	42.37	Average Max	V	200	354	54.00	-11.63	Pass
2849.06	18.04	15.17	-7.98	25.24	Average Max	V	360	90	54.00	-28.76	Pass
10521.16	10.98	23.16	2.08	36.22	Average Max	V	268	270	54.00	-17.78	Pass
1798.35	18.80	14.48	-9.05	24.23	Average Max	V	184	358	54.00	-29.77	Pass
2411.13	15.23	14.72	-9.41	20.55	Average Max	V	386	167	54.00	-33.45	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11a-Ch. 60
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

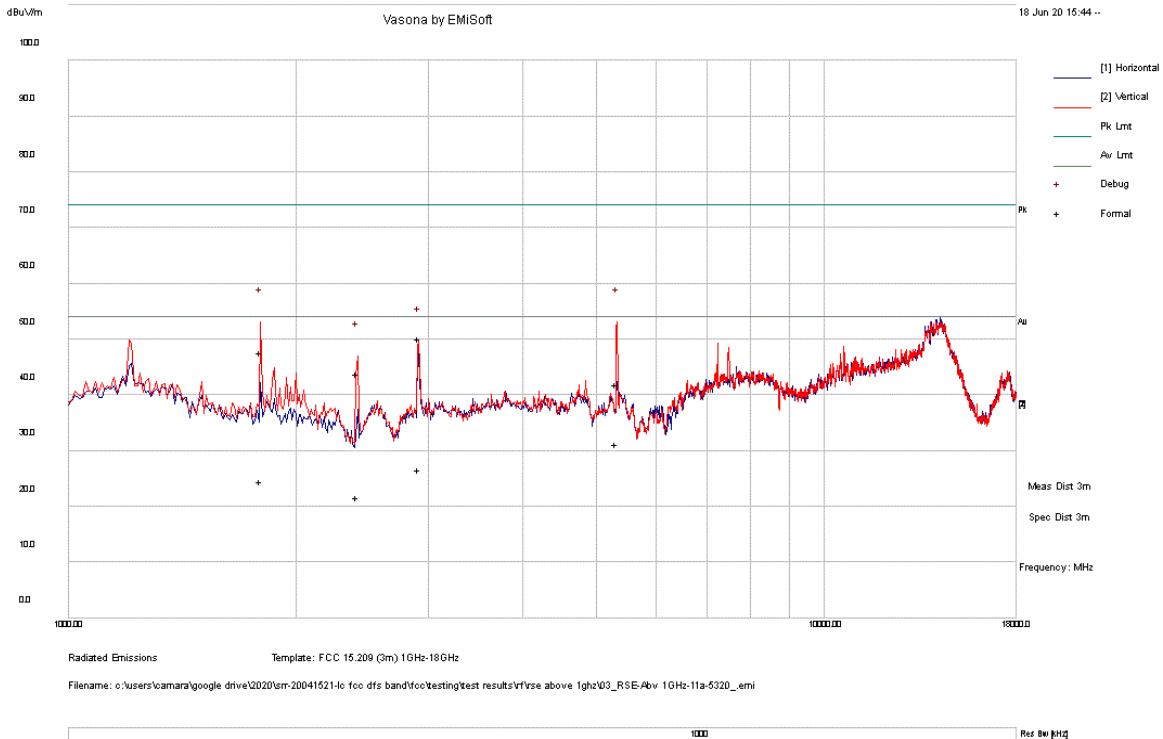
Radiated Spurious Emission-Above 1GHz-11a-20MHz BW-5300MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
2889.68	41.18	15.21	-7.74	48.65	Peak Max	V	373	69	74.00	-25.35	Pass
7235.88	24.20	20.51	1.21	45.93	Peak Max	V	299	178	74.00	-28.07	Pass
5303.17	36.66	17.48	-0.70	53.44	Peak Max	V	174	293	74.00	-20.56	Pass
2411.35	35.32	14.72	-9.41	40.63	Peak Max	V	116	136	74.00	-33.37	Pass
2889.68	18.60	15.21	-7.74	26.07	Average Max	V	373	69	54.00	-27.93	Pass
7235.88	10.39	20.51	1.21	32.11	Average Max	V	299	178	54.00	-21.89	Pass
5303.17	28.24	17.48	-0.70	45.02	Average Max	V	174	293	54.00	-8.98	Pass
2411.35	15.89	14.72	-9.41	21.21	Average Max	V	116	136	54.00	-32.79	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11a-Ch. 64
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

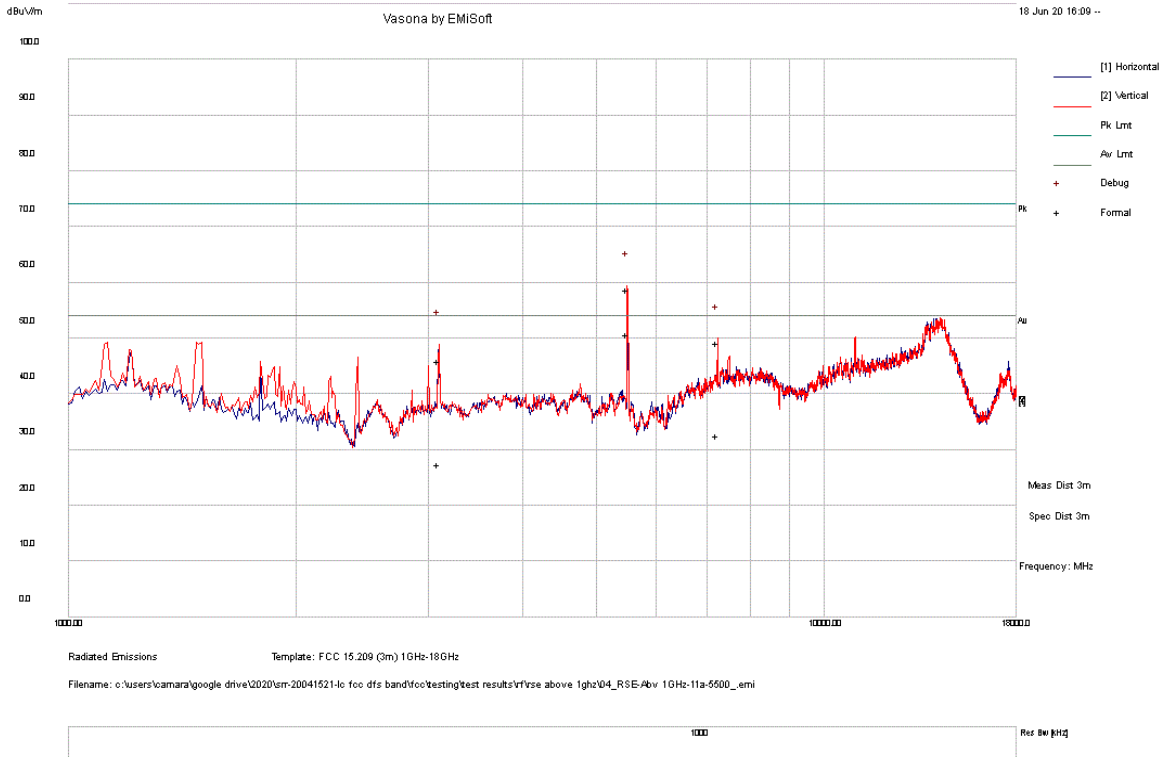
Radiated Spurious Emission-Above 1GHz-11a-20MHz BW-5320MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1798.33	42.22	14.48	-9.05	47.64	Peak Max	V	379	0	74.00	-26.36	Pass
5322.5	25.11	17.49	-0.62	41.97	Peak Max	V	0	108	74.00	-32.03	Pass
2911.25	42.59	15.23	-7.62	50.21	Peak Max	V	229	27	74.00	-23.79	Pass
2412.64	38.48	14.73	-9.41	43.80	Peak Max	V	158	60	74.00	-30.20	Pass
1798.33	19.03	14.48	-9.05	24.45	Average Max	V	379	0	54.00	-29.55	Pass
5322.5	14.31	17.49	-0.62	31.18	Average Max	V	0	108	54.00	-22.83	Pass
2911.25	18.98	15.23	-7.62	26.60	Average Max	V	229	27	54.00	-27.40	Pass
2412.64	16.29	14.73	-9.41	21.61	Average Max	V	158	60	54.00	-32.39	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11a-Ch. 100
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

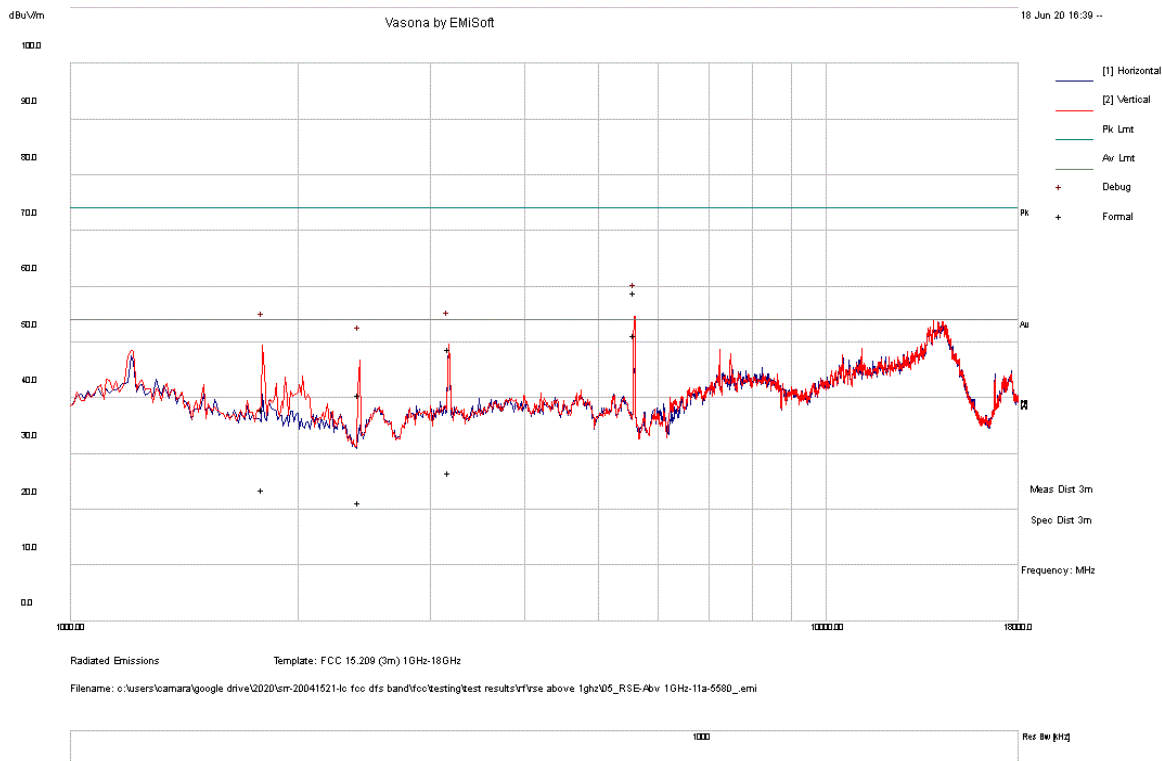
Radiated Spurious Emission-Above 1GHz-11a-20MHz BW-5500MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5493.13	41.73	17.53	-0.42	58.84	Peak Max	V	119	188	74.00	-15.16	Pass
7237.28	27.54	20.52	1.21	49.27	Peak Max	V	268	340	74.00	-24.73	Pass
3091.16	37.23	15.43	-6.62	46.04	Peak Max	V	206	336	74.00	-27.96	Pass
5493.13	33.66	17.53	-0.42	50.77	Average Max	V	119	188	54.00	-3.23	Pass
7237.28	10.76	20.52	1.21	32.49	Average Max	V	268	340	54.00	-21.51	Pass
3091.16	18.64	15.43	-6.62	27.45	Average Max	V	206	336	54.00	-26.55	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11a-Ch. 116
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

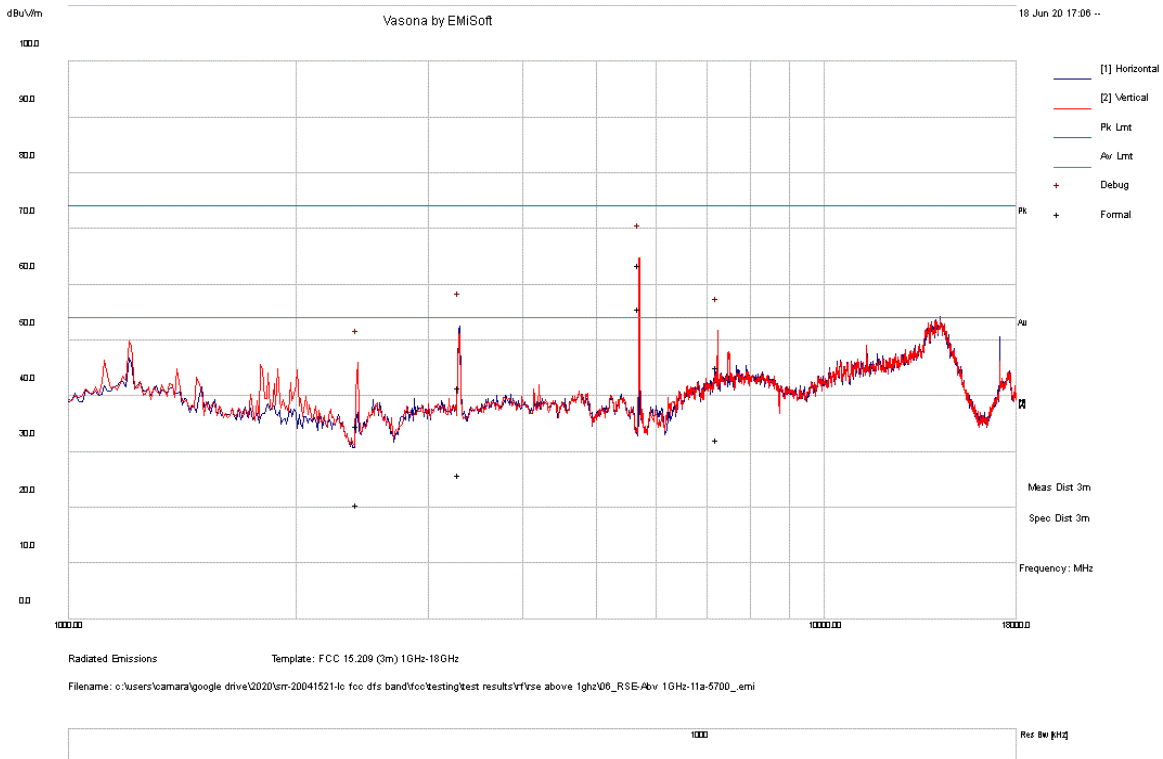
Radiated Spurious Emission-Above 1GHz-11a-20MHz BW-5580MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5579.42	41.53	17.75	-0.38	58.90	Peak Max	V	169	241	74.00	-15.10	Pass
3168.5	39.83	15.52	-6.58	48.77	Peak Max	V	274	208	74.00	-25.23	Pass
1797.61	32.56	14.48	-9.06	37.98	Peak Max	V	209	209	74.00	-36.02	Pass
2411.29	35.29	14.72	-9.41	40.61	Peak Max	V	138	236	74.00	-33.39	Pass
5579.42	33.90	17.75	-0.38	51.27	Average Max	V	169	241	54.00	-2.73	Pass
3168.5	17.61	15.52	-6.58	26.55	Average Max	V	274	208	54.00	-27.45	Pass
1797.61	18.20	14.48	-9.06	23.62	Average Max	V	209	209	54.00	-30.38	Pass
2411.29	15.97	14.72	-9.41	21.29	Average Max	V	138	236	54.00	-32.71	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11a-Ch. 140
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

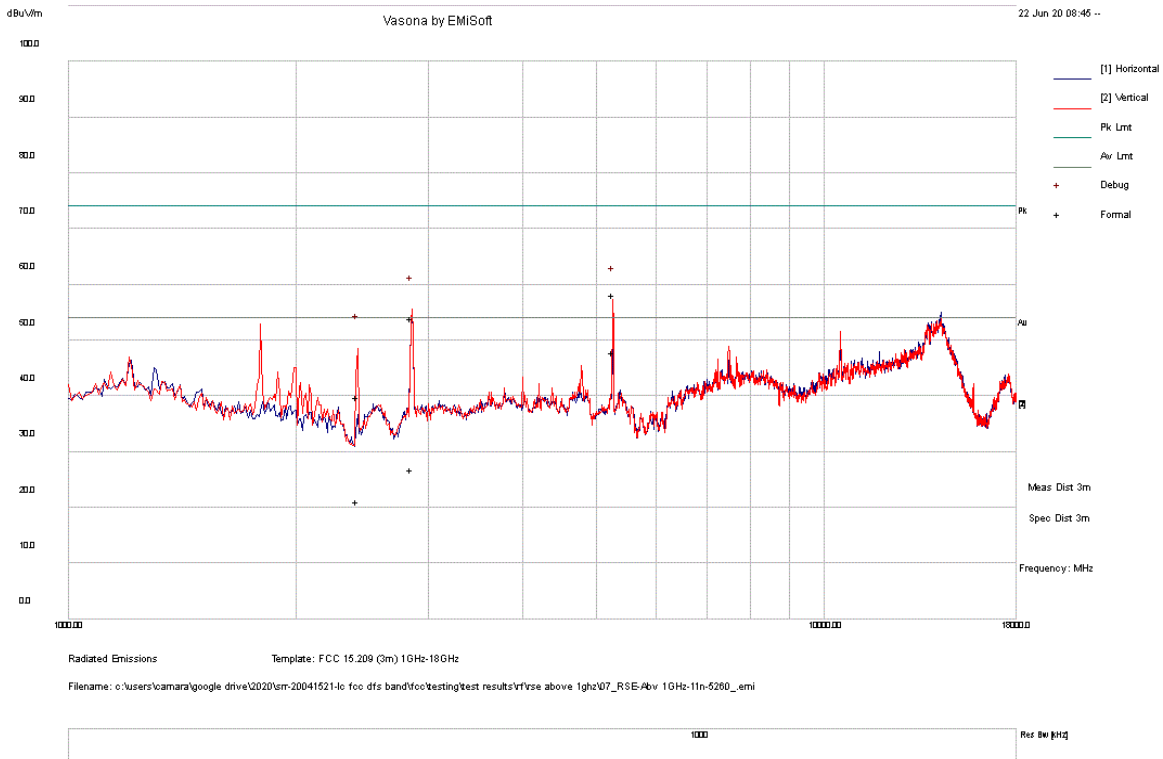
Radiated Spurious Emission-Above 1GHz-11a-20MHz BW-5700MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5698.18	45.75	18.07	-0.26	63.55	Peak Max	V	141	248	74.00	-10.45	Pass
3293.5	32.09	15.66	-6.23	41.53	Peak Max	H	100	177	74.00	-32.47	Pass
7236.51	23.53	20.51	1.21	45.26	Peak Max	V	237	292	74.00	-28.74	Pass
2411.9	29.28	14.73	-9.41	34.60	Peak Max	V	400	78	74.00	-39.40	Pass
5698.18	34.85	18.07	-0.26	52.65	Average Max	V	141	248	54.00	-1.35	Pass
3293.5	16.49	15.66	-6.23	25.92	Average Max	H	100	177	54.00	-28.08	Pass
7236.51	10.52	20.51	1.21	32.24	Average Max	V	237	292	54.00	-21.76	Pass
2411.9	15.16	14.73	-9.41	20.48	Average Max	V	400	78	54.00	-33.52	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11n-Ch. 52
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

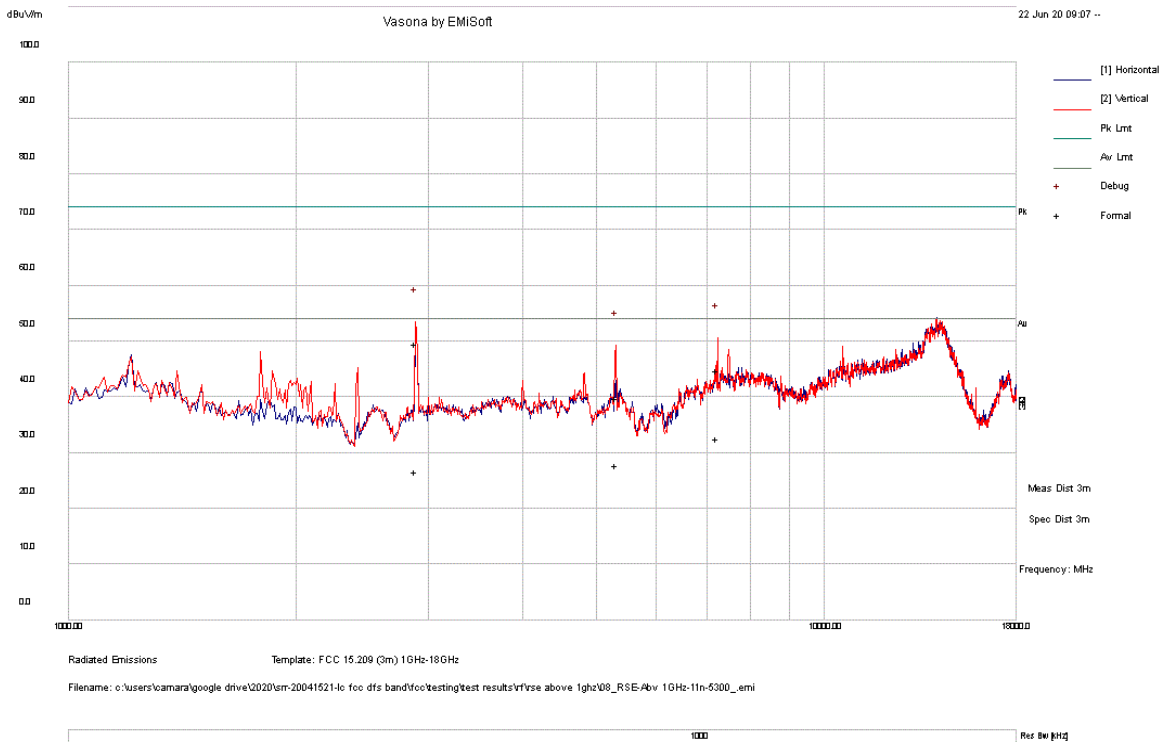
Radiated Spurious Emission-Above 1GHz-11n-20MHz BW-5260MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5258.64	41.55	17.47	-0.92	58.09	Peak Max	V	182	61	74.00	-15.91	Pass
2847.18	46.78	15.17	-7.99	53.97	Peak Max	V	154	211	74.00	-20.03	Pass
2412.49	34.46	14.73	-9.41	39.78	Peak Max	V	132	102	74.00	-34.22	Pass
5258.64	31.31	17.47	-0.92	47.86	Average Max	V	182	61	54.00	-6.15	Pass
2847.18	19.67	15.17	-7.99	26.85	Average Max	V	154	211	54.00	-27.15	Pass
2412.49	15.75	14.73	-9.41	21.07	Average Max	V	132	102	54.00	-32.93	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11n-Ch. 60
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

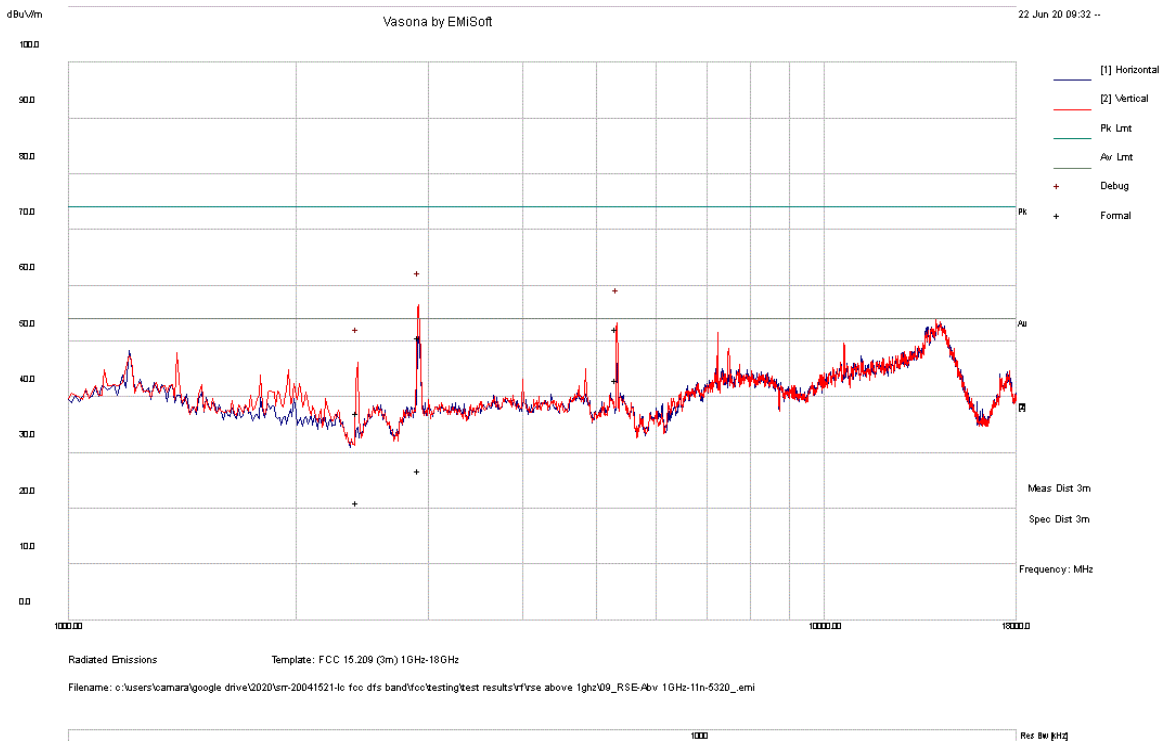
Radiated Spurious Emission-Above 1GHz-11n-20MHz BW-5300MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
2881.66	42.17	15.21	-7.79	49.58	Peak Max	V	231	1	74.00	-24.42	Pass
7235.23	23.10	20.51	1.21	44.82	Peak Max	V	396	350	74.00	-29.18	Pass
5312.59	23.06	17.48	-0.66	39.89	Peak Max	V	367	87	74.00	-34.12	Pass
2881.66	19.15	15.21	-7.79	26.57	Average Max	V	231	1	54.00	-27.43	Pass
7235.23	10.78	20.51	1.21	32.50	Average Max	V	396	350	54.00	-21.50	Pass
5312.59	10.95	17.48	-0.66	27.77	Average Max	V	367	87	54.00	-26.23	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11n-Ch. 64
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

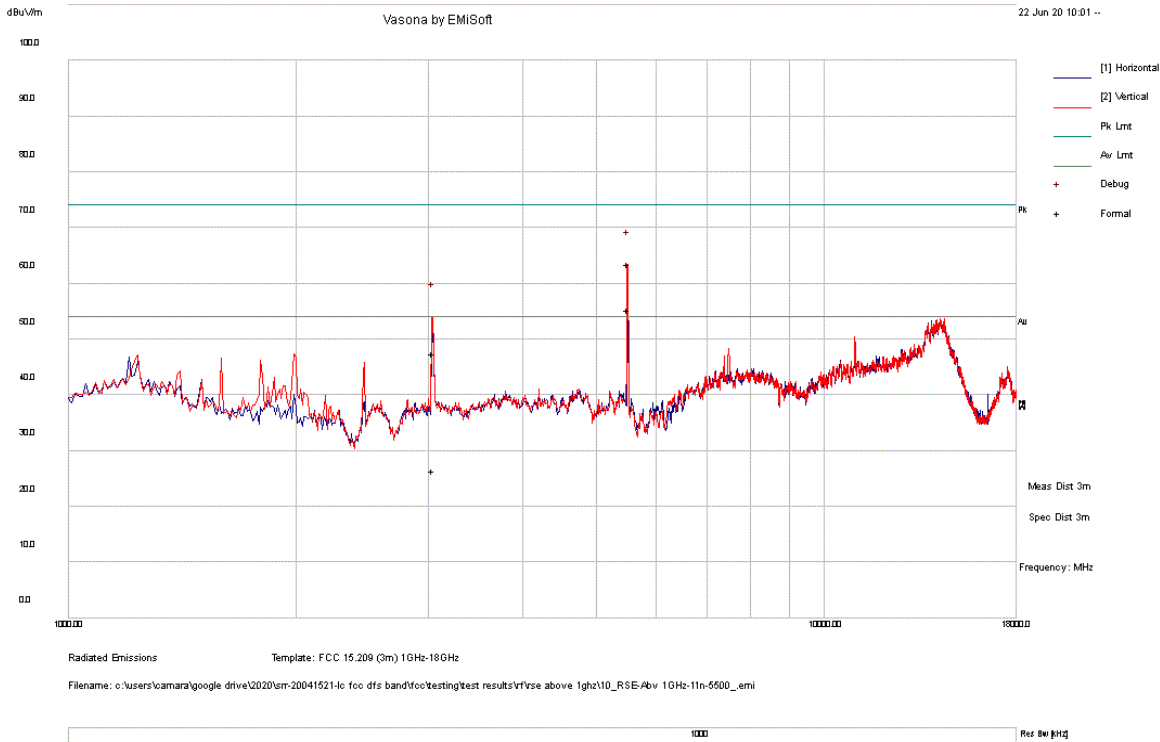
Radiated Spurious Emission-Above 1GHz-11n-20MHz BW-5320MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
2910.61	43.03	15.23	-7.62	50.63	Peak Max	V	353	186	74.00	-23.37	Pass
5322.94	35.40	17.49	-0.62	52.26	Peak Max	V	199	320	74.00	-21.74	Pass
2411.44	31.74	14.72	-9.41	37.06	Peak Max	V	332	302	74.00	-36.94	Pass
2910.61	19.31	15.23	-7.62	26.91	Average Max	V	353	186	54.00	-27.09	Pass
5322.94	26.14	17.49	-0.62	43.01	Average Max	V	199	320	54.00	-10.99	Pass
2411.44	15.71	14.72	-9.41	21.03	Average Max	V	332	302	54.00	-32.97	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11n-Ch. 100
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

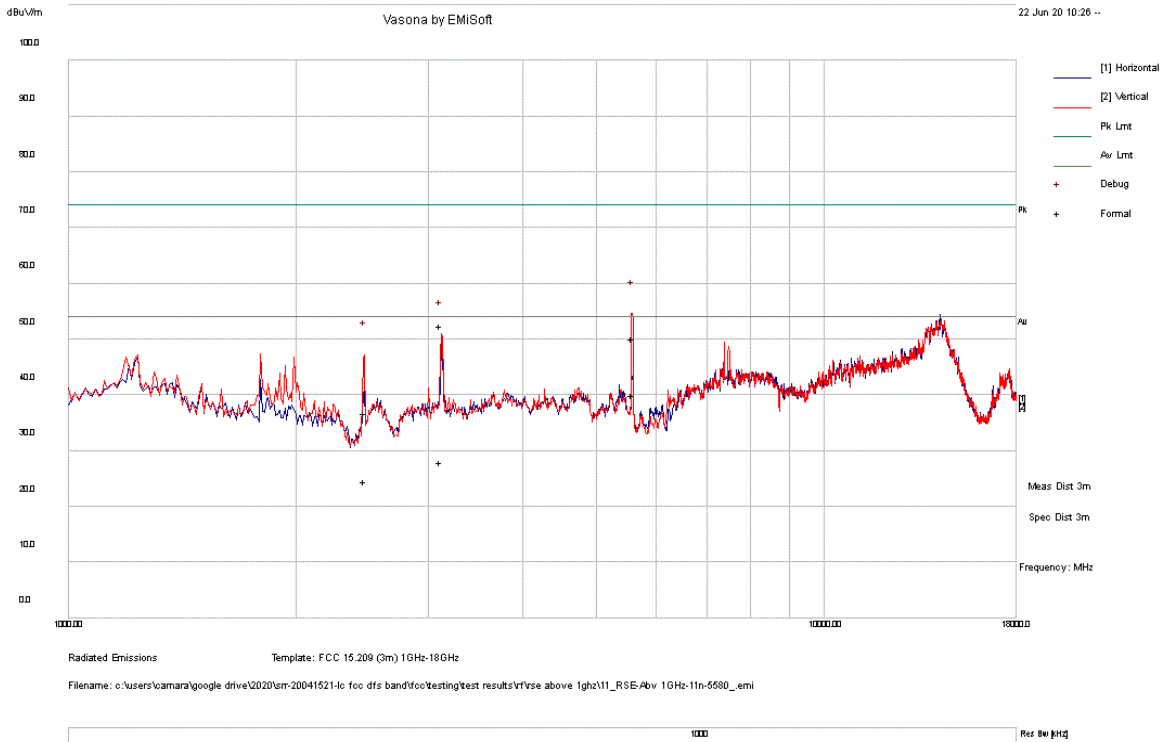
RSE-Above 1GHz-11n-20MHz BW-5500MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5503.01	46.41	17.54	-0.41	63.54	Peak Max	V	159	250	74.00	-10.46	Pass
3039.23	39.03	15.36	-6.87	47.53	Peak Max	V	284	274	74.00	-26.47	Pass
5503.01	35.13	17.54	-0.41	52.26	Average Max	V	159	250	54.00	-1.74	Pass
3039.23	18.03	15.36	-6.87	26.52	Average Max	V	284	274	54.00	-27.48	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11n-Ch. 116
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

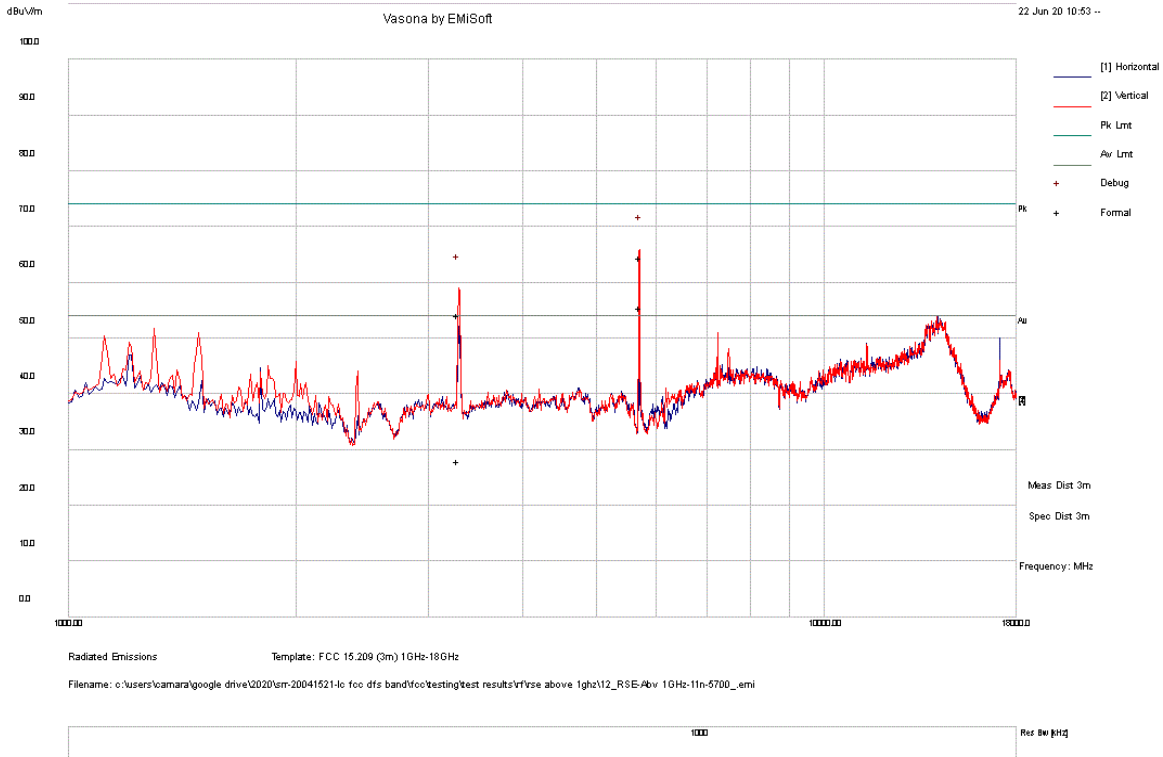
Radiated Spurious Emission-Above 1GHz-11n-20MHz BW-5580MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5577.65	32.70	17.74	-0.38	50.06	Peak Max	V	238	29	74.00	-23.94	Pass
3115.06	43.51	15.46	-6.56	52.41	Peak Max	V	236	8	74.00	-21.60	Pass
2464.95	31.34	14.78	-9.26	36.86	Peak Max	V	348	189	74.00	-37.14	Pass
5577.65	22.63	17.74	-0.38	39.99	Average Max	V	238	29	54.00	-14.01	Pass
3115.06	19.04	15.46	-6.56	27.93	Average Max	V	236	8	54.00	-26.07	Pass
2464.95	18.99	14.78	-9.26	24.52	Average Max	V	348	189	54.00	-29.49	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11n-Ch. 140
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

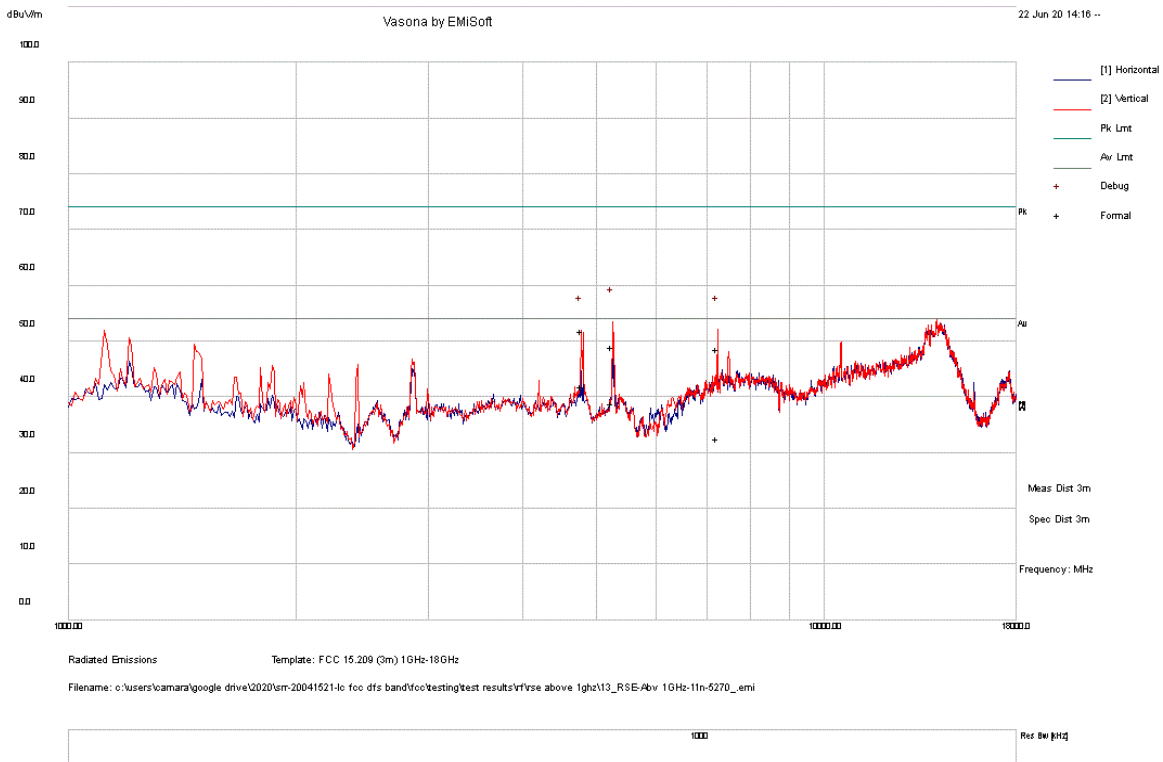
Radiated Spurious Emission-Above 1GHz-11n-20MHz BW-5700MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5707.66	46.57	18.09	-0.24	64.42	Peak Max	V	182	97	74.00	-9.58	Pass
3285.53	44.77	15.66	-6.28	54.15	Peak Max	V	276	42	74.00	-19.85	Pass
5707.66	34.64	18.09	-0.24	52.49	Average Max	V	182	97	54.00	-1.51	Pass
3285.53	18.59	15.66	-6.28	27.96	Average Max	V	276	42	54.00	-26.04	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11n-Ch. 54
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

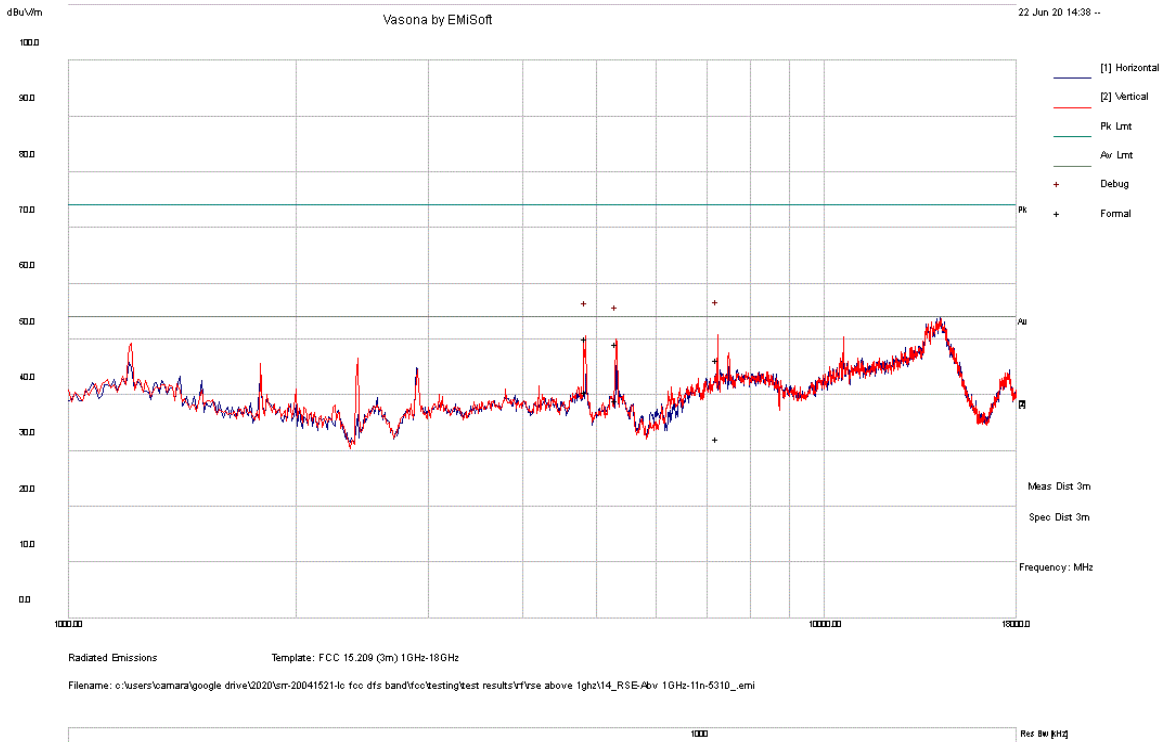
Radiated Spurious Emission-Above 1GHz-11n-40MHz BW-5270MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5251.97	32.50	17.47	-0.96	49.01	Peak Max	V	220	5	74.00	-24.99	Pass
7237.0	26.80	20.51	1.21	48.53	Peak Max	V	113	211	74.00	-25.47	Pass
4773.73	37.00	17.34	-2.39	51.95	Peak Max	V	215	232	74.00	-22.05	Pass
5251.97	22.46	17.47	-0.96	38.97	Average Max	V	220	5	54.00	-15.03	Pass
7237.0	10.83	20.51	1.21	32.56	Average Max	V	113	211	54.00	-21.44	Pass
4773.73	26.91	17.34	-2.39	41.86	Average Max	V	215	232	54.00	-12.14	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11n-Ch. 62
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

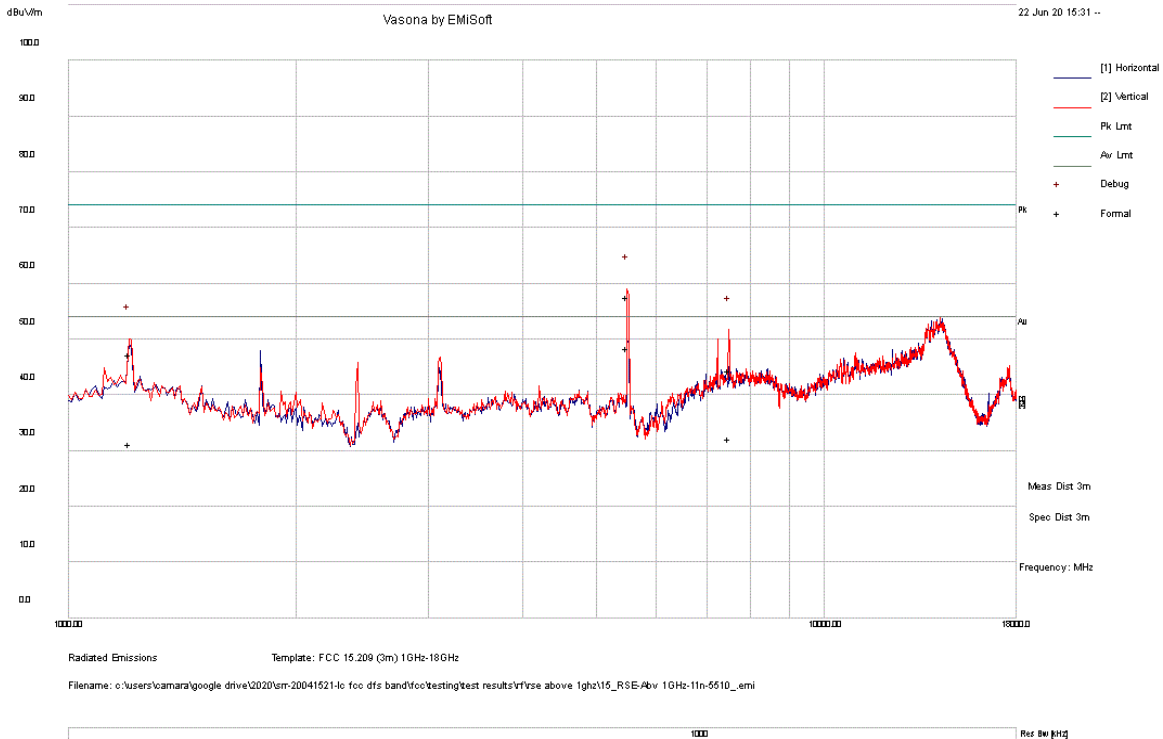
Radiated Spurious Emission-Above 1GHz-11n-40MHz BW-5310MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
7235.93	24.60	20.51	1.21	46.33	Peak Max	V	218	21	74.00	-27.68	Pass
4845.59	35.03	17.36	-2.15	50.24	Peak Max	V	175	164	74.00	-23.76	Pass
5315.28	32.31	17.48	-0.65	49.15	Peak Max	V	137	118	74.00	-24.85	Pass
7235.93	10.49	20.51	1.21	32.21	Average Max	V	218	21	54.00	-21.79	Pass
4845.59	25.39	17.36	-2.15	40.60	Average Max	V	175	164	54.00	-13.41	Pass
5315.28	22.14	17.48	-0.65	38.98	Average Max	V	137	118	54.00	-15.02	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11n-Ch. 102
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

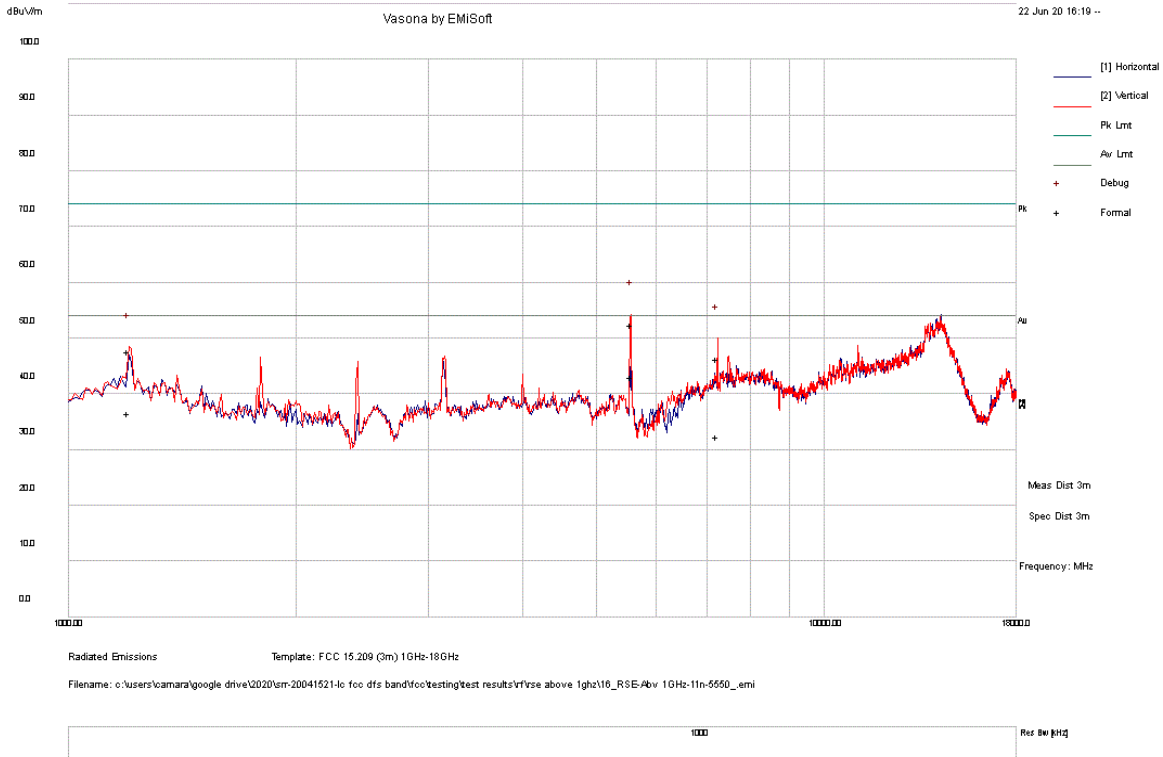
Radiated Spurious Emission-Above 1GHz-11n-40MHz BW-5510MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5495.43	40.43	17.53	-0.41	57.54	Peak Max	V	227	340	74.00	-16.46	Pass
7490.41	22.48	21.00	0.86	44.34	Peak Max	V	112	110	74.00	-29.66	Pass
1203.53	38.30	14.31	-5.27	47.35	Peak Max	V	396	1	74.00	-26.65	Pass
5495.43	31.30	17.53	-0.41	48.41	Average Max	V	227	340	54.00	-5.59	Pass
7490.41	10.32	21.00	0.86	32.17	Average Max	V	112	110	54.00	-21.83	Pass
1203.53	22.23	14.31	-5.27	31.27	Average Max	V	396	1	54.00	-22.73	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11n-Ch. 110
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

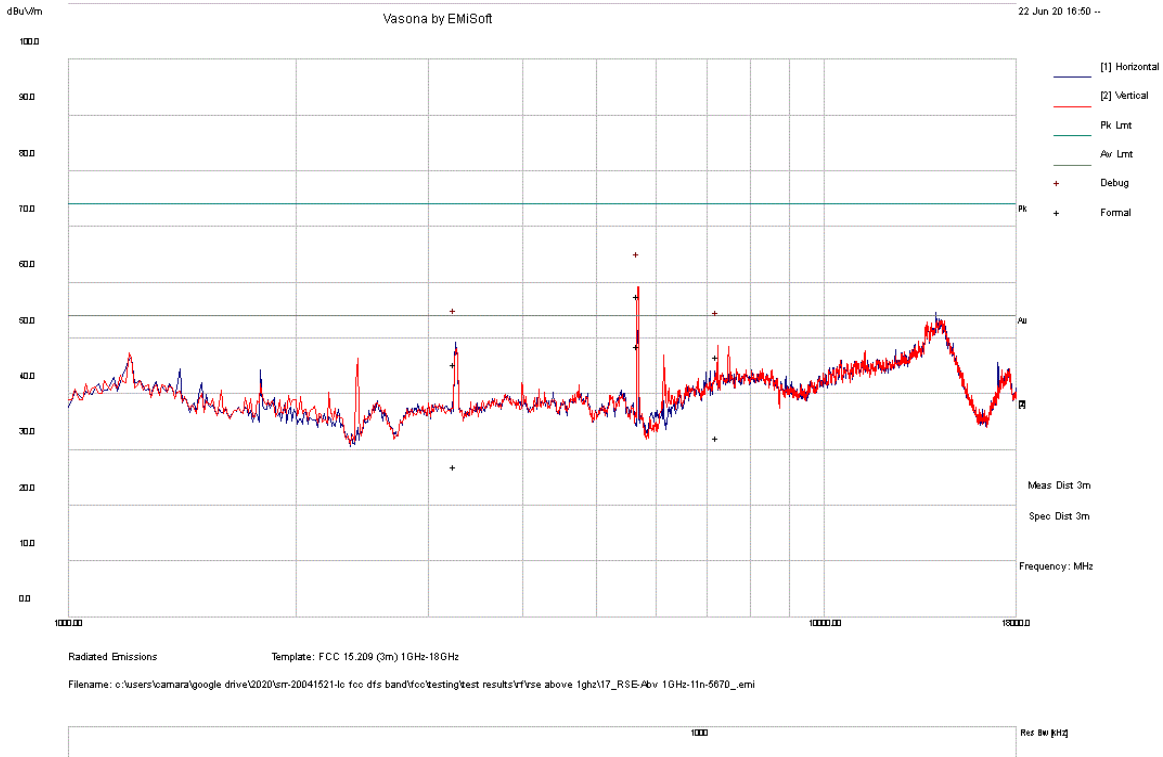
Radiated Spurious Emission-Above 1GHz-11n-40MHz BW-5550MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5558.55	35.14	17.69	-0.39	52.44	Peak Max	V	200	51	74.00	-21.56	Pass
7235.74	24.63	20.51	1.21	46.35	Peak Max	V	335	0	74.00	-27.65	Pass
1200.32	38.50	14.30	-5.24	47.57	Peak Max	V	152	274	74.00	-26.43	Pass
5558.55	25.70	17.69	-0.39	43.00	Average Max	V	200	51	54.00	-11.00	Pass
7235.74	10.66	20.51	1.21	32.39	Average Max	V	335	0	54.00	-21.61	Pass
1200.32	27.49	14.30	-5.24	36.56	Average Max	V	152	274	54.00	-17.44	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11n-Ch. 134
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

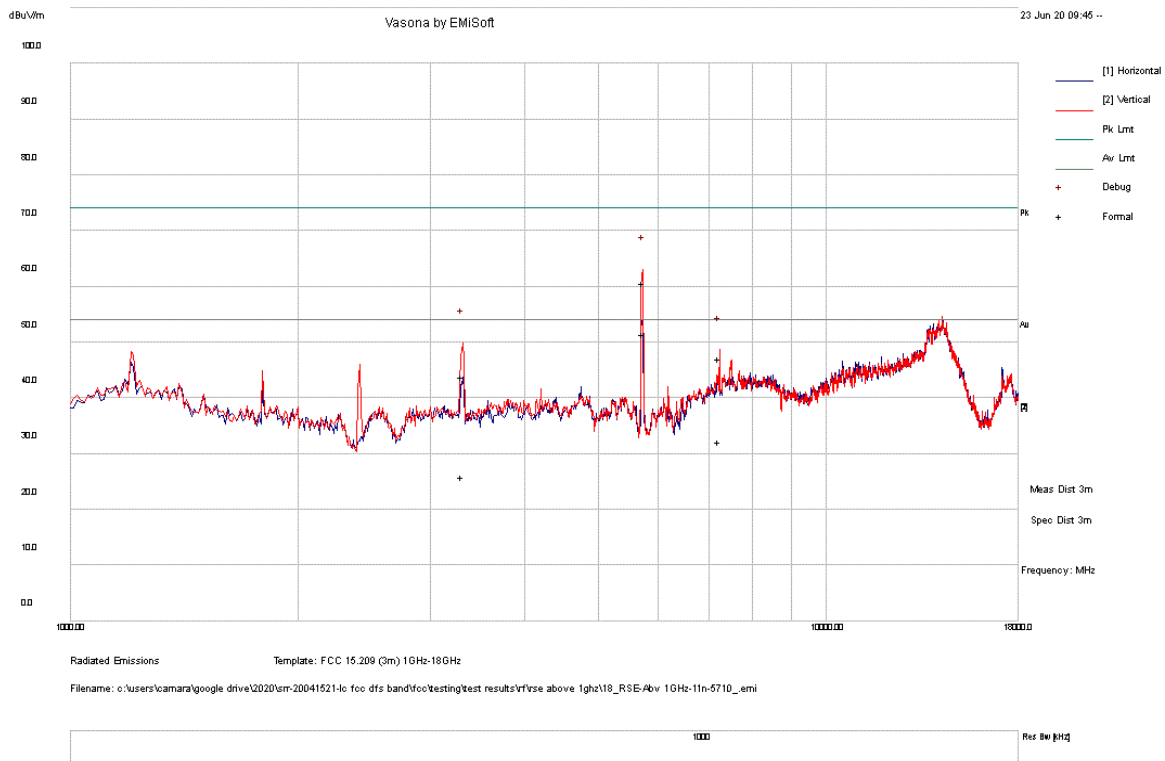
Radiated Spurious Emission-Above 1GHz-11n-40MHz BW-5670MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5684.81	39.90	18.03	-0.28	57.65	Peak Max	V	213	46	74.00	-16.35	Pass
3250.5	36.27	15.62	-6.52	45.37	Peak Max	H	158	137	74.00	-28.63	Pass
7237.97	25.01	20.52	1.21	46.74	Peak Max	V	137	291	74.00	-27.27	Pass
5684.81	30.81	18.03	-0.28	48.56	Average Max	V	213	46	54.00	-5.44	Pass
3250.5	17.92	15.62	-6.52	27.02	Average Max	H	158	137	54.00	-26.98	Pass
7237.97	10.51	20.52	1.21	32.24	Average Max	V	137	291	54.00	-21.76	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11n-Ch. 142
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

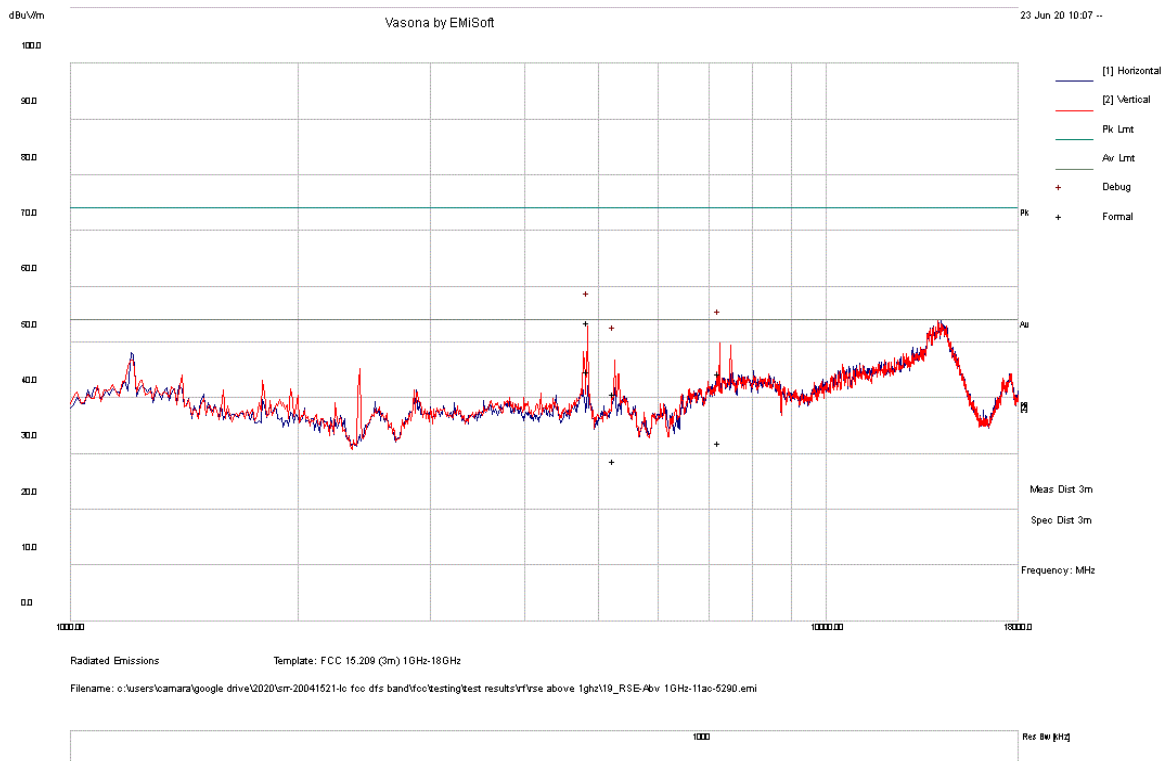
Radiated Spurious Emission-Above 1GHz-11n-40MHz BW-5710MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5726.4	42.64	18.14	-0.20	60.57	Peak Max	V	161	276	74.00	-13.43	Pass
3307.08	34.37	15.68	-6.15	43.90	Peak Max	V	400	39	74.00	-30.10	Pass
7235.67	25.28	20.51	1.21	47.00	Peak Max	V	156	286	74.00	-27.00	Pass
5726.4	33.46	18.14	-0.20	51.40	Average Max	V	161	276	54.00	-2.60	Pass
3307.08	16.33	15.68	-6.15	25.86	Average Max	V	400	39	54.00	-28.14	Pass
7235.67	10.41	20.51	1.21	32.13	Average Max	V	156	286	54.00	-21.87	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11ac-Ch. 58
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

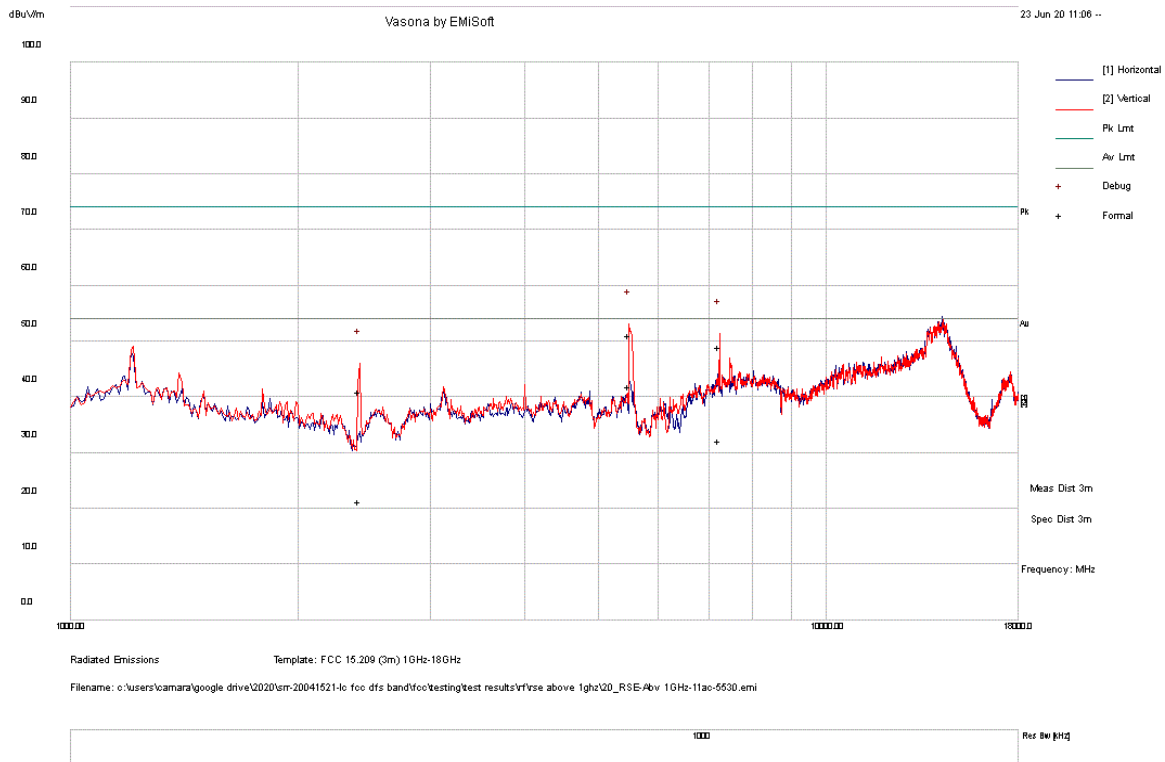
Radiated Spurious Emission-Above 1GHz-11ac-80MHz BW-5290MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
4845.96	38.33	17.36	-2.15	53.54	Peak Max	V	226	0	74.00	-20.46	Pass
7237.35	22.72	20.52	1.21	44.45	Peak Max	V	265	0	74.00	-29.55	Pass
5251.98	24.26	17.47	-0.96	40.77	Peak Max	V	352	19	74.00	-33.23	Pass
4845.96	29.67	17.36	-2.15	44.88	Average Max	V	226	0	54.00	-9.12	Pass
7237.35	10.18	20.52	1.21	31.90	Average Max	V	265	0	54.00	-22.10	Pass
5251.98	12.19	17.47	-0.96	28.69	Average Max	V	352	19	54.00	-25.31	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11ac-Ch. 106
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

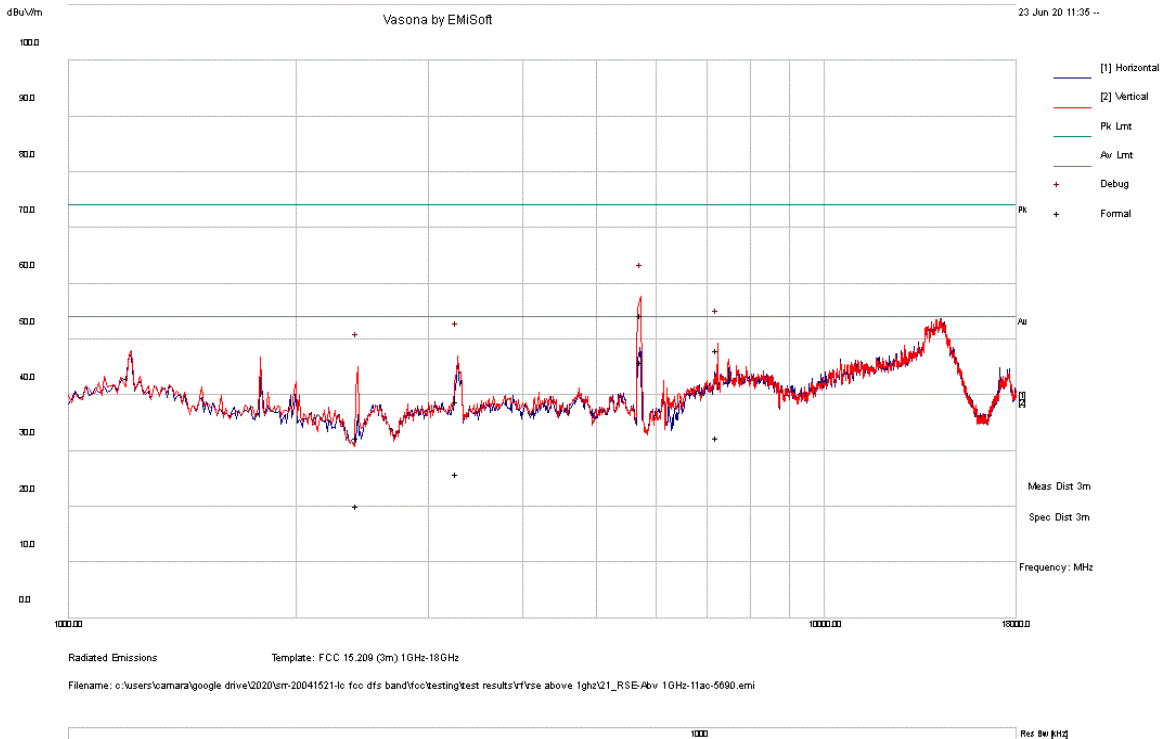
Radiated Spurious Emission-Above 1GHz-11ac-80MHz BW-5530MHz



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5494.47	34.08	17.53	-0.42	51.19	Peak Max	V	169	304	74.00	-22.81	Pass
7236.05	27.32	20.51	1.21	49.04	Peak Max	V	149	115	74.00	-24.96	Pass
2411.15	35.65	14.72	-9.41	40.97	Peak Max	V	101	232	74.00	-33.03	Pass
5494.47	24.83	17.53	-0.42	41.95	Average Max	V	169	304	54.00	-12.05	Pass
7236.05	10.48	20.51	1.21	32.21	Average Max	V	149	115	54.00	-21.79	Pass
2411.15	15.93	14.72	-9.41	21.25	Average Max	V	101	232	54.00	-32.75	Pass

Test Standard:	15.407	Mode:	RSE-Abv 1GHz-11ac-Ch. 138
Frequency Range:	1 GHz - 18 GHz	Test Date:	06/01/2020 - 06/23/2020
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

Radiated Spurious Emission-Above 1GHz-11ac-80MHz BW-5690MHz

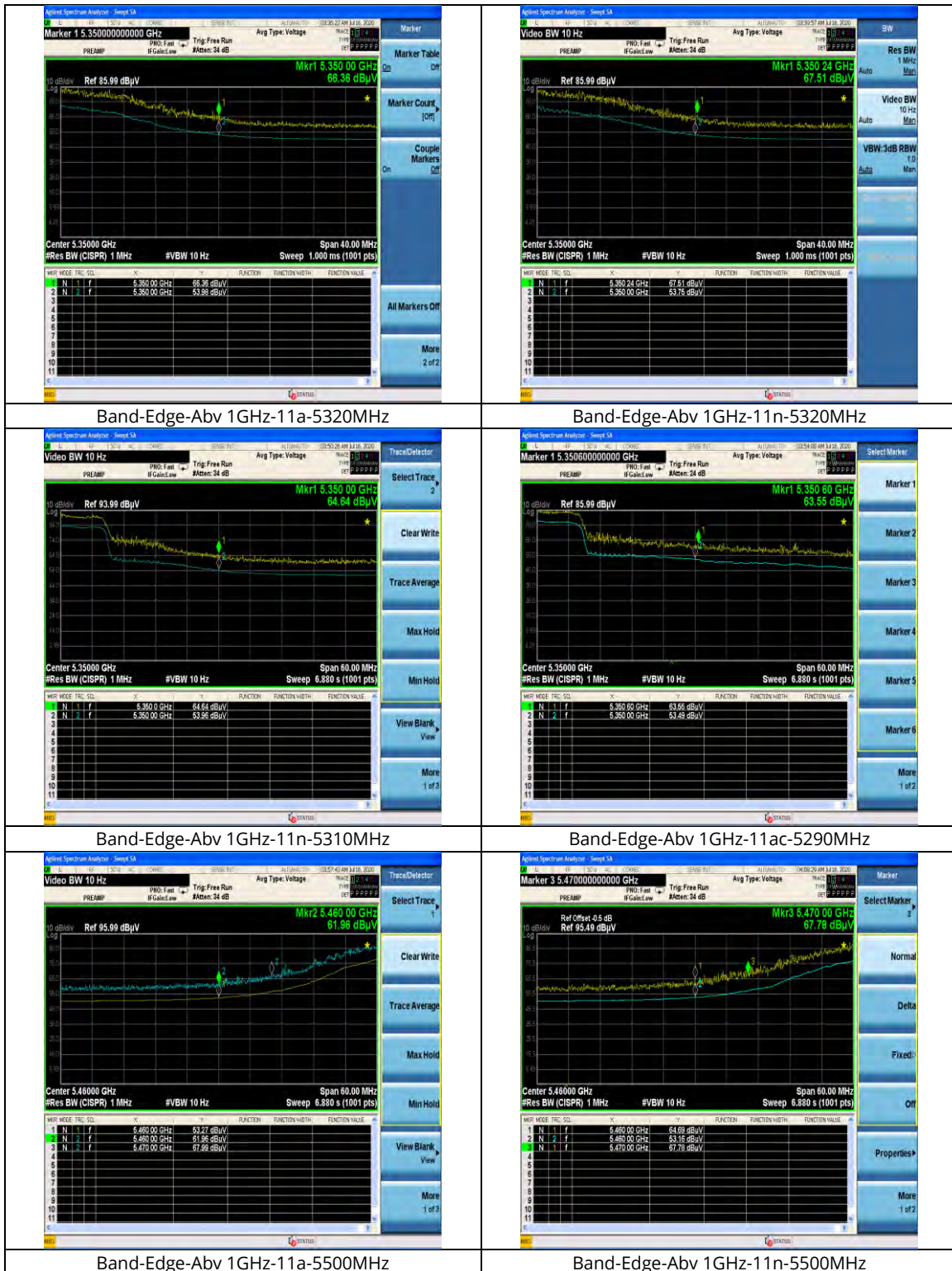


Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
5726.13	36.38	18.14	-0.21	54.32	Peak Max	V	129	267	74.00	-19.68	Pass
7235.09	26.23	20.51	1.21	47.95	Peak Max	V	184	158	74.00	-26.05	Pass
3272.91	29.56	15.64	-6.37	38.83	Peak Max	V	393	279	74.00	-35.17	Pass
2411.69	27.02	14.73	-9.41	32.34	Peak Max	V	385	122	74.00	-41.66	Pass
5726.13	28.01	18.14	-0.21	45.94	Average Max	V	129	267	54.00	-8.06	Pass
7235.09	10.65	20.51	1.21	32.38	Average Max	V	184	158	54.00	-21.62	Pass
3272.91	16.60	15.64	-6.37	25.87	Average Max	V	393	279	54.00	-28.13	Pass
2411.69	14.86	14.73	-9.41	20.18	Average Max	V	385	122	54.00	-33.82	Pass

18GHz - 40GHz test result

Note: no substantial emission is found other than the noise floor.

Radiated Band Edge measurement result





Band-Edge-Abv 1GHz-11n-5510MHz



Band-Edge-Abv 1GHz-11ac-5530MHz



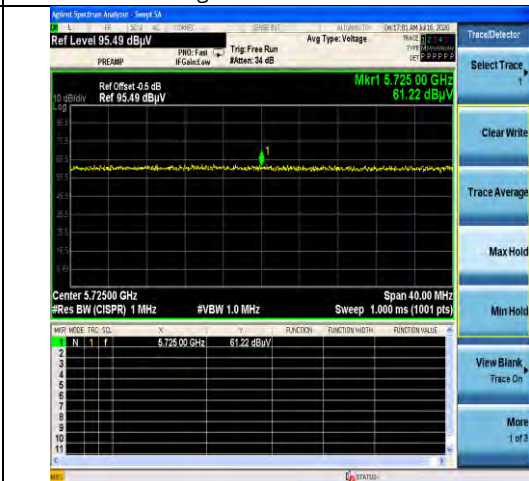
Band-Edge-Abv 1GHz-11a-5700MHz



Band-Edge-Abv 1GHz-11n-5700MHz



Band-Edge-Abv 1GHz-11n-5670MHz



Band-Edge-Abv 1GHz-11ac-5530MHz

8 EUT and Test Setup Photos



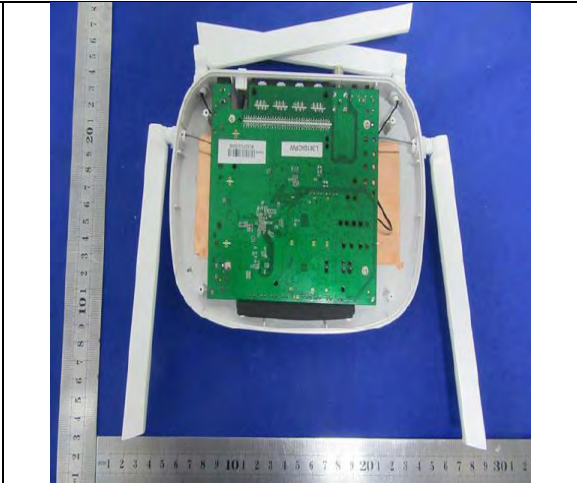
EUT-External



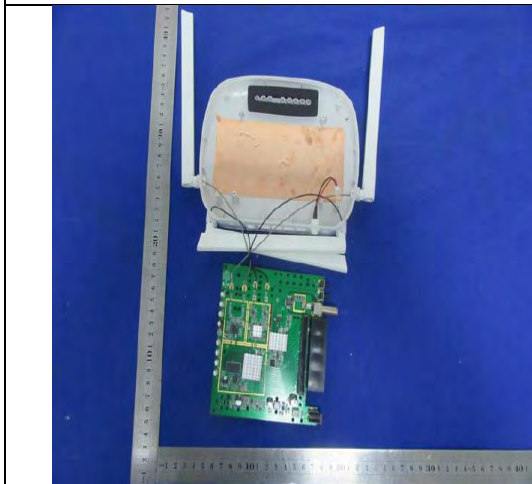
EUT-External



EUT-Internal



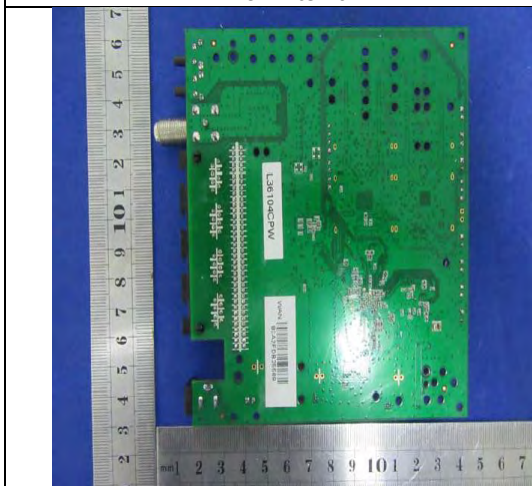
EUT-Internal



EUT-Internal



EUT-Internal



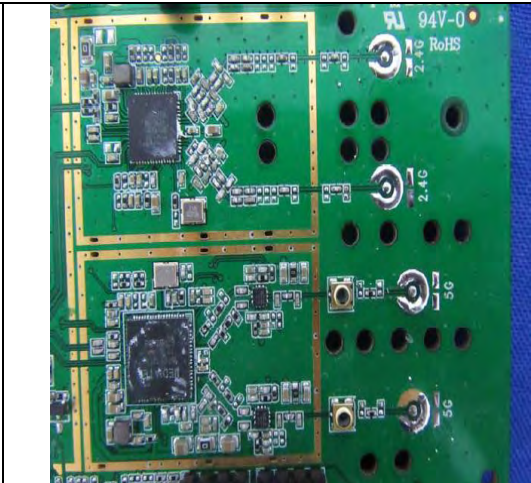
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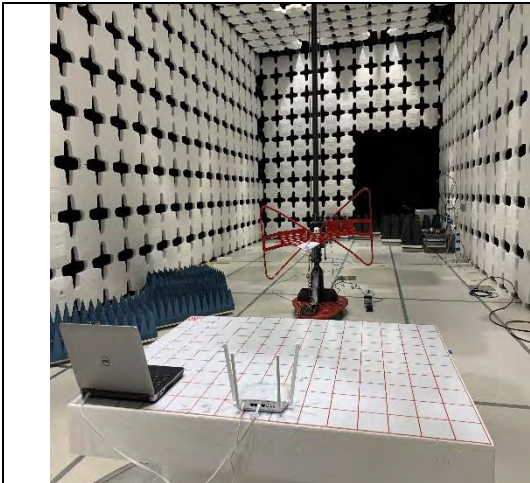
EUT-Internal



EUT-Internal



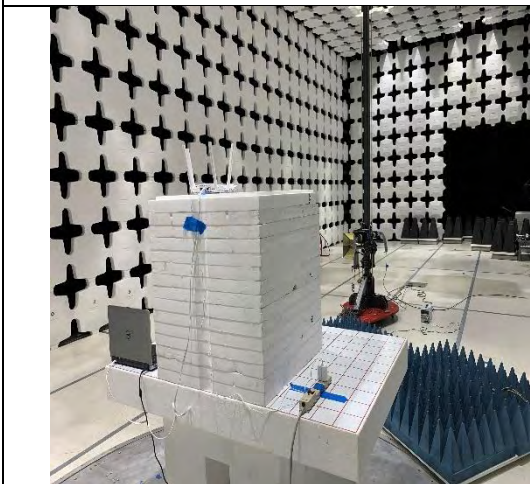
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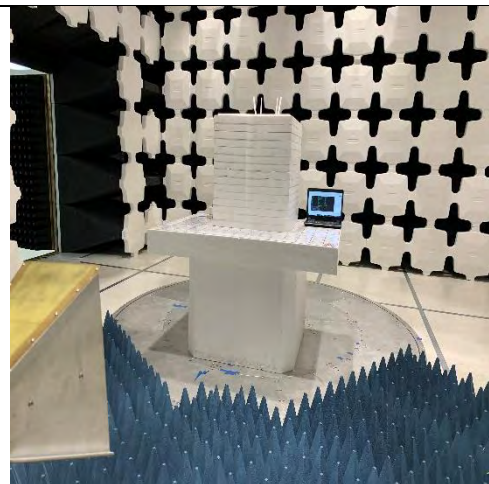
RSE-Below 1GHz-Back



RSE-Below 1GHz-Front



RSE-Above 1GHz-Back



RSE-Above 1GHz-Front

9 Test Instrument List

Equipment	Manufacturer	Model	Instrument Number	Cal. Date	Cal. Due
Semi-Anechoic Chamber	ETS-Lindgren	10M	VL001	10/18/19	10/18/20
Shielding Control Room	ETS-Lindgren	Series 81	VL006	N/A	N/A
Spectrum Analyzer	Anritsu	MS2830A	6201145210	5/15/2020	5/15/2021
Spectrum Analyzer	Keysight	N9020A	MY50110074	6/17/2020	6/17/2021
EMC Test Receiver	R&S	ESL6	100230	6/17/2020	6/17/2021
LISN (9KHz – 30MHz)	EMCO	3816/2	9705-1066	5/4/20	5/4/21
Bi-Log Antenna	ETS-Lindgren	3142E	217921	11/15/2019	11/15/2020
Horn Antenna (1-18GHz)	Electro-Metrics	EM-6961	6292	5/14/2020	5/14/2021
Horn Antenna (18-40GHz)	Com-Power	AH-840	101109	5/14/2020	5/14/2021
Preamplifier	RF Bay, Inc.	LPA-10-20	11180621	7/15/2019	7/15/2020
True RMS Multi-meter	UNI-T	UT181A	C173014829	5/5/2020	5/5/2021
Temp / Humidity / Pressure Meter	PCE Instruments	PCE-THB 40	R062028	5/15/2020	5/15/2021
RF Attenuator	Pasternack	PE7005-3	VL061	7/16/2019	7/16/2020
Preamplifier 100KHz - 40GHz	Aeroflex	33711-392-77150-11	064	7/16/2019	7/16/2020
EM Center Control	ETS-Lindgren	7006-001	160136	N/A	N/A
Turn Table	ETS-Lindgren	2181-3.03	VL002	N/A	N/A
Boresight Antenna Tower	ETS-Lindgren	2171B	VL003	N/A	N/A
Loop Antenna (9k-30MHz)	Com-Power	AL-130	121012	5/16/20	5/16/21
RE test cable(below 6GHz)	Vista	RE-6GHz-01	RE-6GHz-01	7/16/2019	7/16/2020
RE test cable (1-18GHz)	PhaseTrack	II-240	RE-18GHz-01	7/16/2019	7/16/2020
RE test cable (>18GHz)	Sucoflex	104	344903/4	7/16/2019	7/16/2020
Pulse limiter	Com-Power	LIT-930A	531727	7/16/2019	7/16/2020
CE test cable #1	FIRST RF	FRF-C-1002-001	CE-6GHz-01	7/16/2019	7/16/2020
CE test cable#2	FIRST RF	FRF-C-1002-001	CE-6GHz-02	7/16/2019	7/16/2020