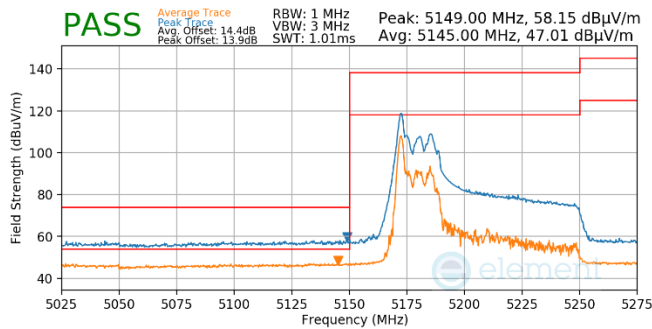


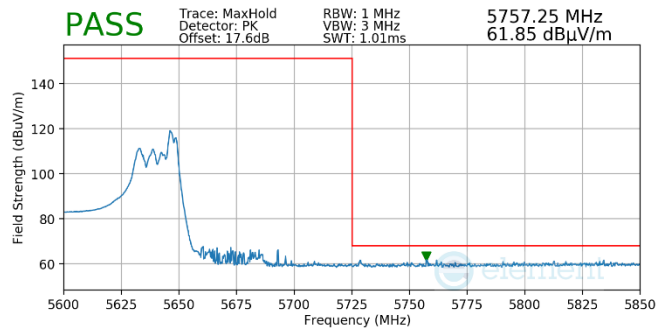
### 7.6.13 CDD Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209; RSS-Gen [8.9]

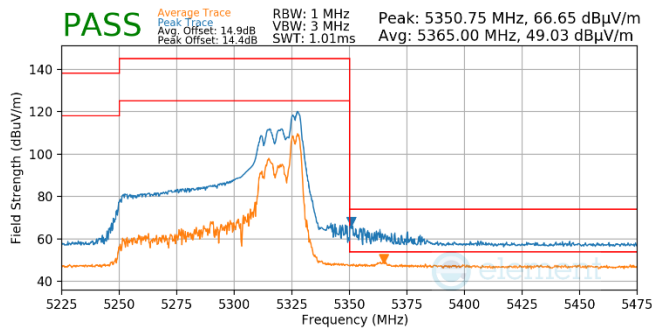
#### RU26/RU52



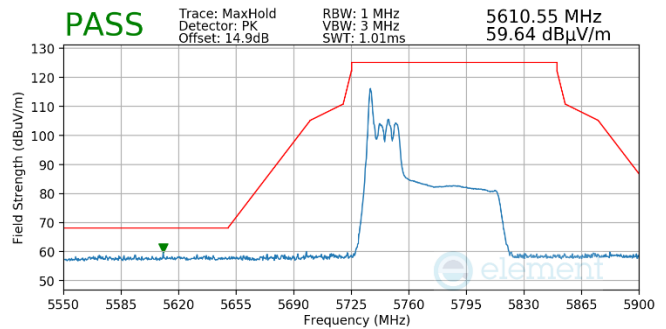
Plot 7-554. CDD (Pk & Avg, RU26, Index 0, Ch.42, MCS11)



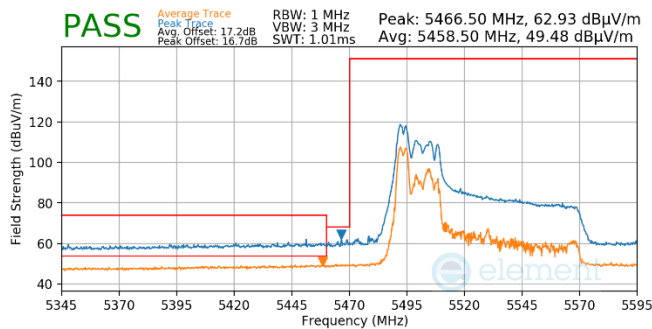
Plot 7-557. CDD (Pk & Avg, RU52, Index 36, Ch.122, MCS11) (FCC only)



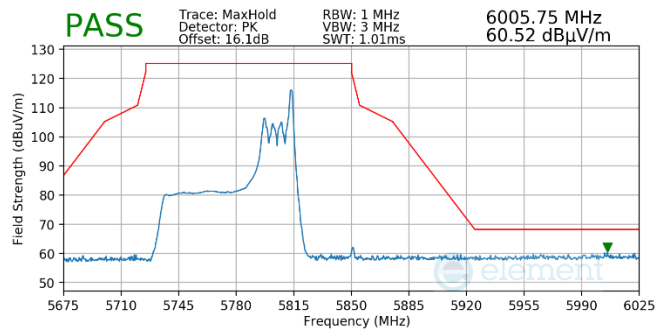
Plot 7-555. CDD (Pk & Avg, RU52, Index 52, Ch.58, MCS11)



Plot 7-558. CDD (Pk, RU26, Index 0, Ch.155, MCS11)



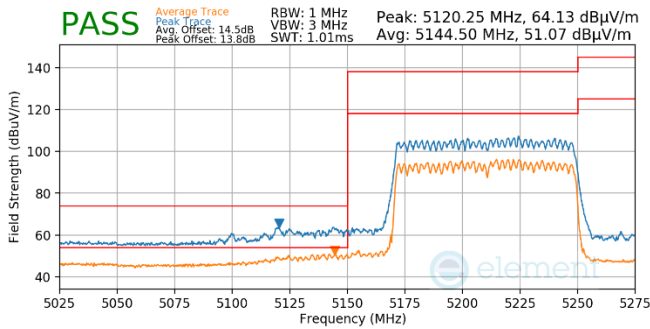
Plot 7-556. CDD (Pk & Avg, RU52, Index 37, Ch.106, MCS11)



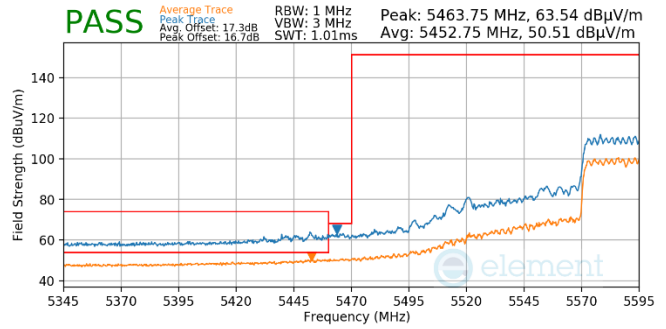
Plot 7-559. CDD (Pk, RU26, Index 36, Ch.155, MCS11)

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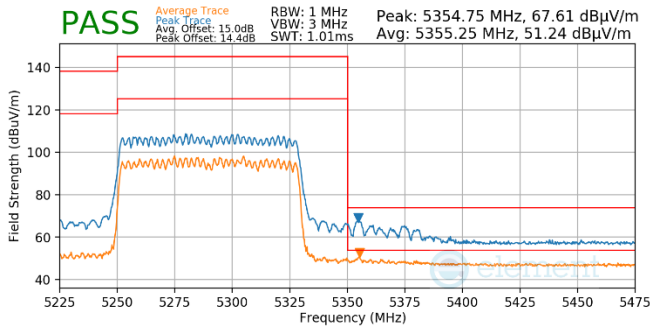
# RU996



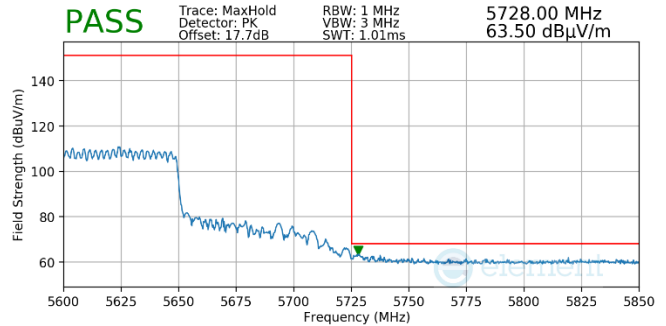
Plot 7-560. CDD (Pk & Avg, RU996, Index 67, Ch.42, MCS11)



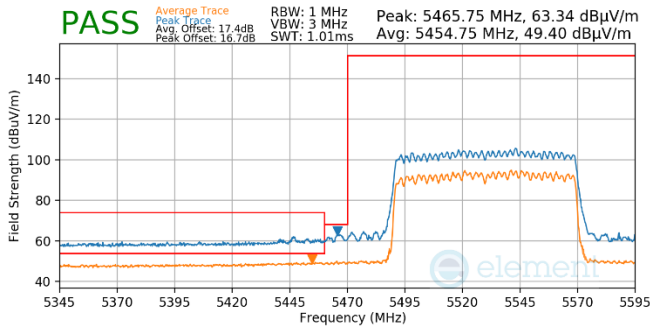
Plot 7-563. (FCC Only) CDD (Pk & Avg, RU996, Index 67, Ch.122, MCS11)



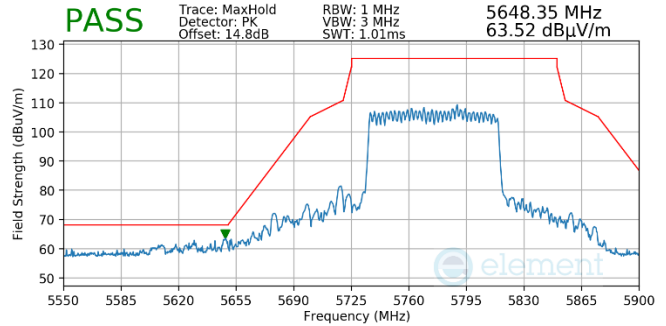
Plot 7-561. CDD (Pk & Avg, RU996, Index 67, Ch.58, MCS11)



Plot 7-564. (FCC Only) CDD (Pk, RU996, Index 67, Ch.122, MCS11)

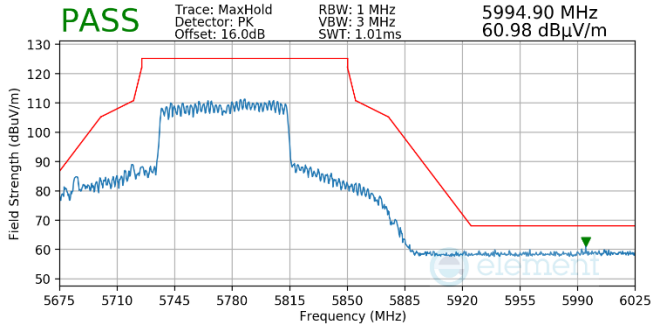


Plot 7-562. CDD (Pk & Avg, RU996, Index 67, Ch.106, MCS11)



Plot 7-565. CDD (Pk, RU996, Index 67, Ch.155, MCS11)

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## 7.7 Radiated Spurious Emissions – Below 1GHz

§15.209; RSS-Gen [8.9]

### Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

**All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 7 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-181 per Section 15.209 and RSS-Gen (8.9).**

Frequency	Field Strength [ $\mu$ V/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

**Table 7-181. Radiated Limits**

### Test Procedures Used

ANSI C63.10-2013

### Test Settings

#### Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 120kHz (for emissions from 30MHz – 1GHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

#### Peak Field Strength Measurements

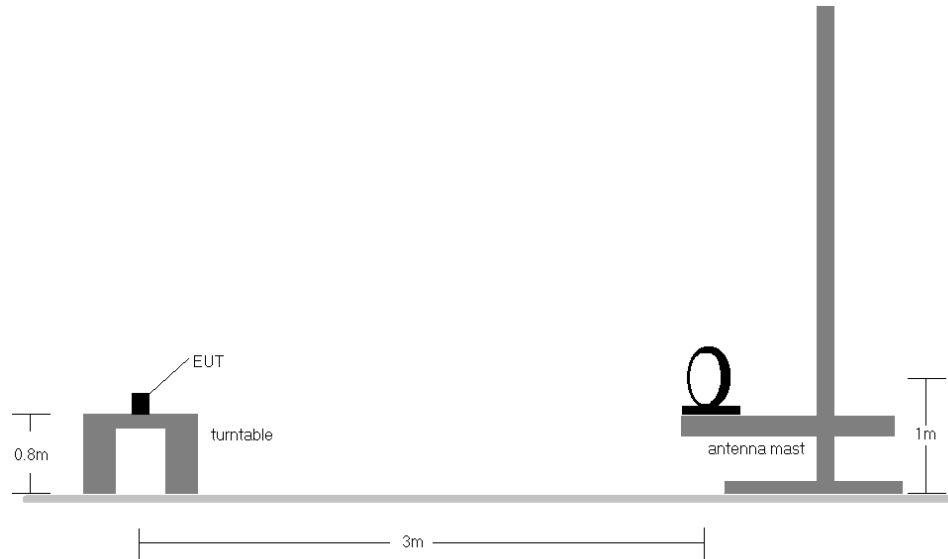
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 120kHz (for emissions from 30MHz – 1GHz)
3. VBW = 300kHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

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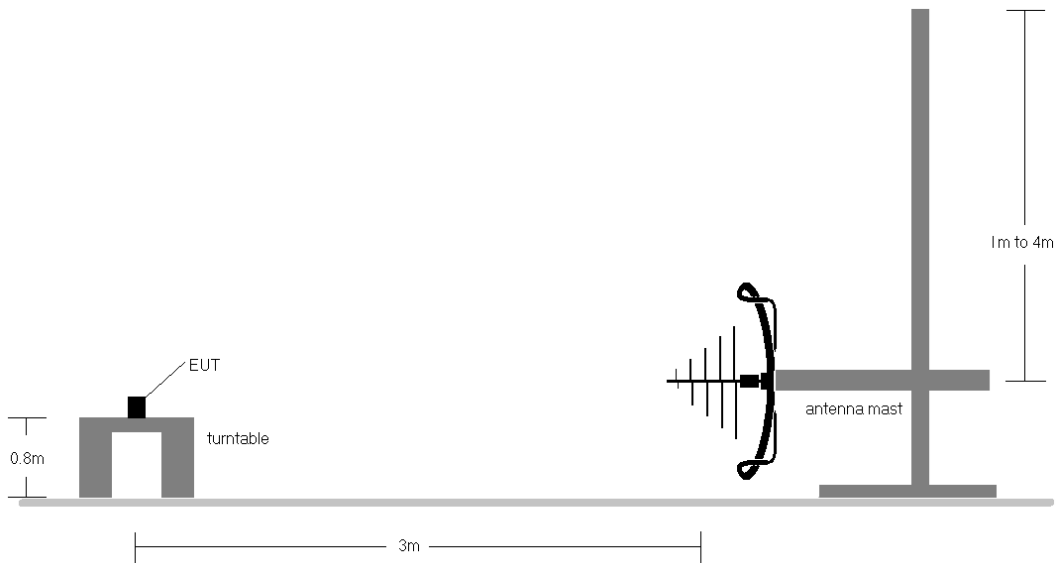
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**Test Setup**


The EUT and measurement equipment were set up as shown in the diagrams below.



**Figure 7-6. Radiated Test Setup < 30MHz**



**Figure 7-7. Radiated Test Setup < 1GHz**

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**Test Notes**

1. All emissions lying in restricted bands specified in §15.205 and RSS-Gen (8.10) are below the limit shown in Table 7-181.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes. For below 30MHz the loop antenna was positioned in 3 orthogonal planes (X front, Y side, Z top) to determine the orientation resulting in the worst case emissions.
3. This unit was tested with its standard battery.
4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector for emissions within 6dB of the limit.
5. Emissions were measured at a 3 meter test distance.
6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
7. No spurious emissions were detected within 20dB of the limit below 30MHz.
8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
9. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. There were no emissions detected in the 30MHz – 1GHz frequency range, as shown in the subsequent plots.
10. All antenna configurations and data rates were investigated and only the worst case are reported.
11. Both configurations below were investigated, and the worst case has been reported.
  - a. EUT powered by AD/DC adaptor to USB-C Power Pack to Magnetic Charging Cable
  - b. EUT powered by host PC via USB-C Power Pack to Magnetic Charging Cable

**Sample Calculations**

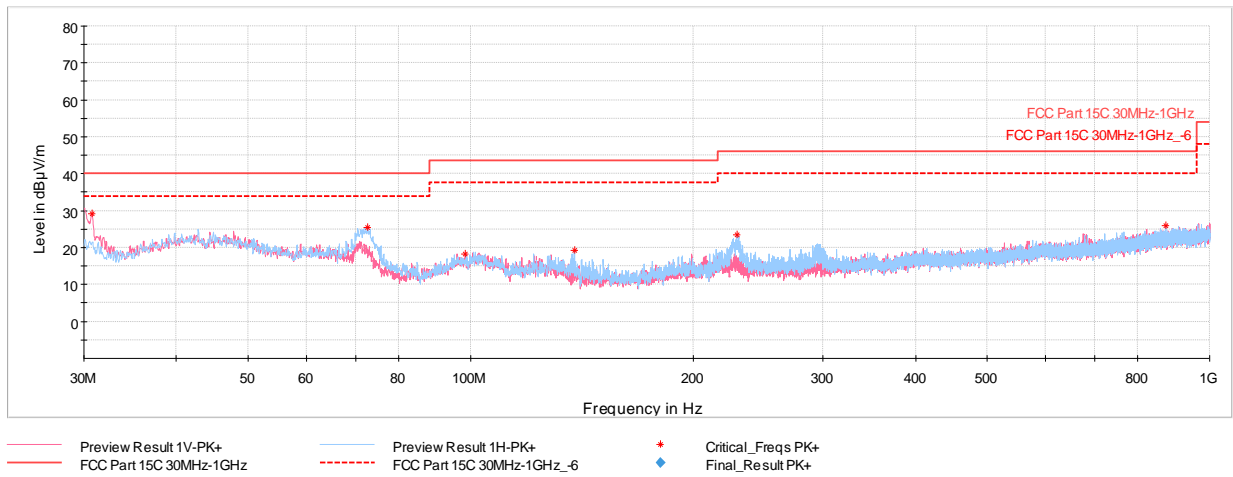
**Determining Spurious Emissions Levels**

- Field Strength Level  $_{[dB_{\mu V/m}]} = \text{Analyzer Level }_{[dBm]} + 107 + \text{AFCL }_{[dB/m]}$
- $\text{AFCL }_{[dB/m]} = \text{Antenna Factor }_{[dB/m]} + \text{Cable Loss }_{[dB]} - \text{Preamplifier Gain }_{[dB]}$
- $\text{Margin }_{[dB]} = \text{Field Strength Level }_{[dB_{\mu V/m}]} - \text{Limit }_{[dB_{\mu V/m}]}$

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## CDD Radiated Spurious Emissions (Below 1GHz)

§15.209; RSS-Gen [8.9]

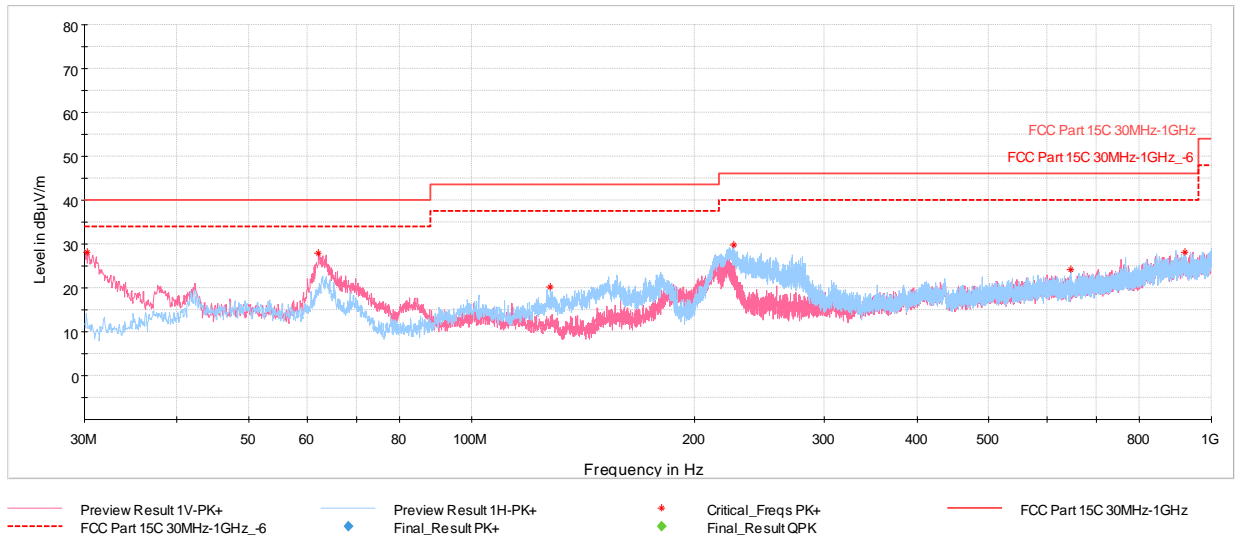


Plot 7-567. RSE below 1GHz CDD (RU26 – Ch.36), with AC/DC Adapter

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
30.78	Max Peak	V	200	329	-58.35	-19.59	29.06	40.00	-10.94
72.63	Max Peak	H	300	192	-60.26	-21.22	25.52	40.00	-14.48
98.43	Max Peak	V	200	152	-70.43	-18.40	18.17	43.52	-25.35
138.20	Max Peak	H	200	214	-66.31	-21.42	19.27	43.52	-24.25
229.24	Max Peak	H	100	181	-66.60	-17.02	23.38	46.02	-22.64
873.27	Max Peak	H	300	3	-76.39	-4.74	25.87	46.02	-20.15

Table 7-182. RSE below 1GHz CDD (RU26 – Ch.36), with AC/DC Adapter

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**Plot 7-568. RSE below 1GHz CDD (RU242 – Ch.149), with AC/DC Adapter**

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
30.19	Max Peak	V	100	0	-62.97	-15.86	32.79	40.00	-7.21
62.16	Max Peak	V	100	283	-65.62	-13.55	33.19	40.00	-6.81
127.92	Max Peak	H	200	265	-71.17	-15.66	20.91	43.52	-22.61
225.94	Max Peak	H	100	6	-65.05	-12.11	28.58	46.02	-17.44
646.39	Max Peak	H	300	46	-79.40	-3.53	36.87	46.02	-9.15
919.64	Max Peak	H	100	66	-80.48	1.54	32.15	46.02	-13.87

**Table 7-183. RSE below 1GHz CDD (RU242– Ch.149), with AC/DC Adapter**

FCC ID: BCGA2117 IC: 579C-A2117		<b>MEASUREMENT REPORT (CERTIFICATION)</b>		Approved by: Technical Manager
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## 7.8 AC Line Conducted Emissions Measurement

§15.207; RSS-Gen [8.8]

### Test Overview and Limit

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for AC Line conducted spurious emissions. All data rates and modes were investigated for AC Line conducted spurious emissions.

**All conducted emissions must not exceed the limits shown in the table below, per Section 15.207 and RSS-Gen (8.8).**

Frequency of emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

**Table 7-184. Conducted Limits**

\*Decreases with the logarithm of the frequency.

### Test Procedures Used

ANSI C63.10-2013, Subclause 6.2

### Test Settings

#### Quasi-Peak Measurements

1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

#### Average Measurements

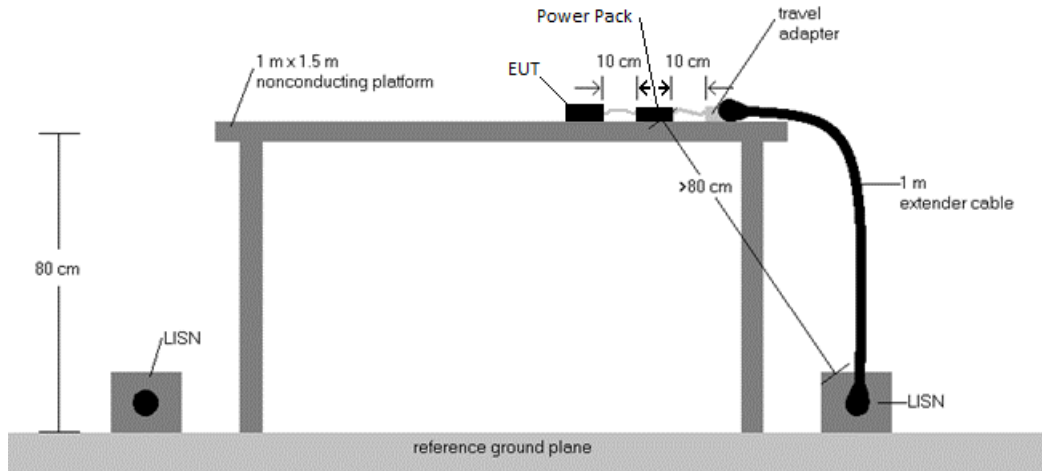
1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = RMS
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

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## Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



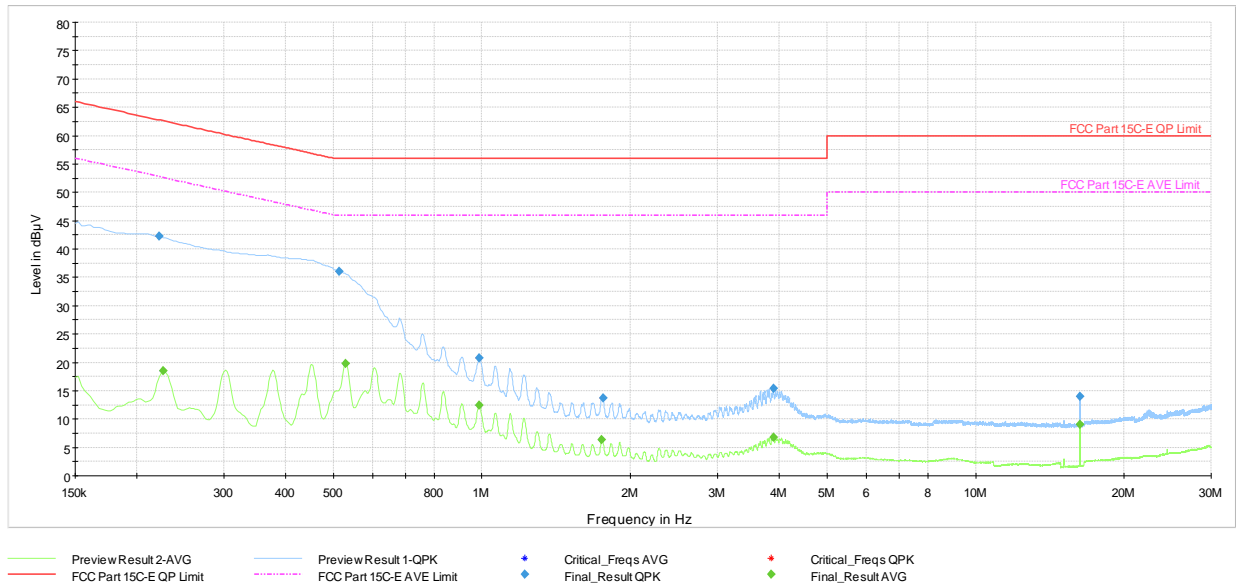
**Figure 7-8. Test Instrument & Measurement Setup**

## Test Notes

1. All modes of operation were investigated and the worst-case emissions are reported. The emissions found were not affected by the choice of channel used during testing.
2. Both configurations below were investigated, and the worst case has been reported.
  - a. EUT powered by AD/DC adaptor to USB-C Power Pack to Magnetic Charging Cable
  - b. EUT powered by host PC via USB-C Power Pack to Magnetic Charging Cable
3. The limit for an intentional radiator from 150kHz to 30MHz are specified in 15.207 and RSS-Gen (8.8).
4.  $\text{Corr. (dB)} = \text{Cable loss (dB)} + \text{LISN insertion factor (dB)}$
5.  $\text{QP/AV Level (dB}\mu\text{V)} = \text{QP/AV Analyzer/Receiver Level (dB}\mu\text{V)} + \text{Correction Factor (dB)}$
6.  $\text{Margin (dB)} = \text{QP/AV Level (dB}\mu\text{V)} - \text{QP/AV Limit (dB}\mu\text{V)}$
7. Traces shown in plots are made using quasi-peak and average detectors.
8. Deviations to the Specifications: None.

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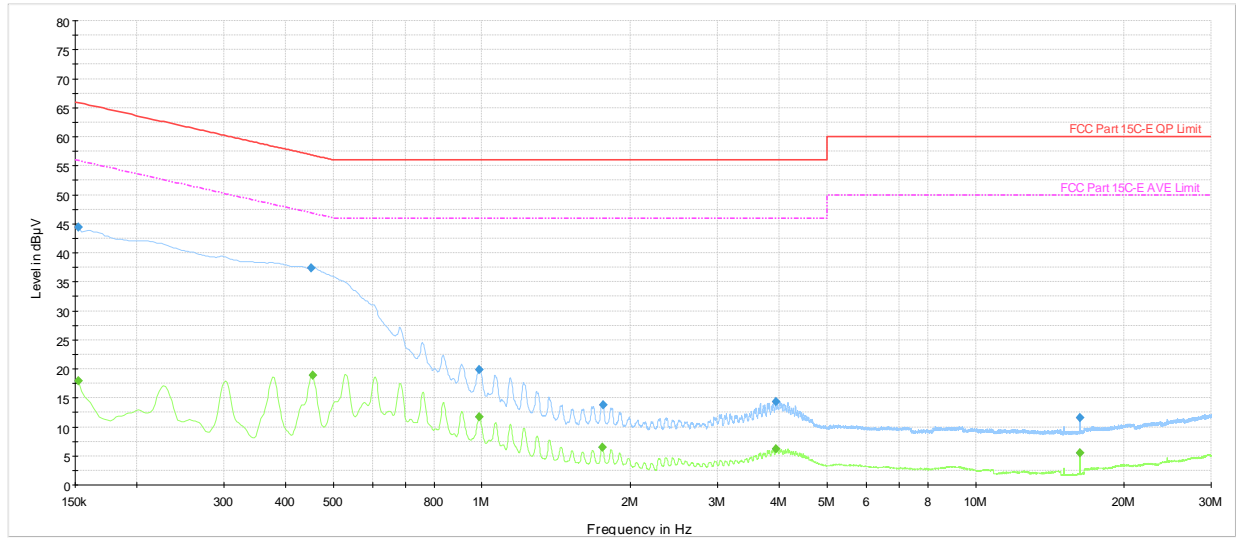


**Plot 7-569. AC Line Conducted Plot with 11ax UNII Band 1 – RU26 – Ch.36 (L1) with AC/DC Adapter**

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.222	FINAL	42.2	—	62.74	-20.53	L1	GND
0.227	FINAL	—	18.51	52.58	-34.06	L1	GND
0.515	FINAL	36.0	—	56.00	-19.99	L1	GND
0.530	FINAL	—	19.84	46.00	-26.16	L1	GND
0.987	FINAL	20.8	—	56.00	-35.21	L1	GND
0.987	FINAL	—	12.49	46.00	-33.51	L1	GND
1.748	FINAL	—	6.39	46.00	-39.61	L1	GND
1.759	FINAL	13.7	—	56.00	-42.29	L1	GND
3.892	FINAL	15.4	—	56.00	-40.64	L1	GND
3.892	FINAL	—	6.83	46.00	-39.17	L1	GND
16.269	FINAL	—	8.98	50.00	-41.02	L1	GND
16.269	FINAL	14.0	—	60.00	-46.01	L1	GND

**Table 7-185. AC Line Conducted with 11ax UNII Band 1 – RU26 – Ch.36 (L1) with AC/DC Adapter**

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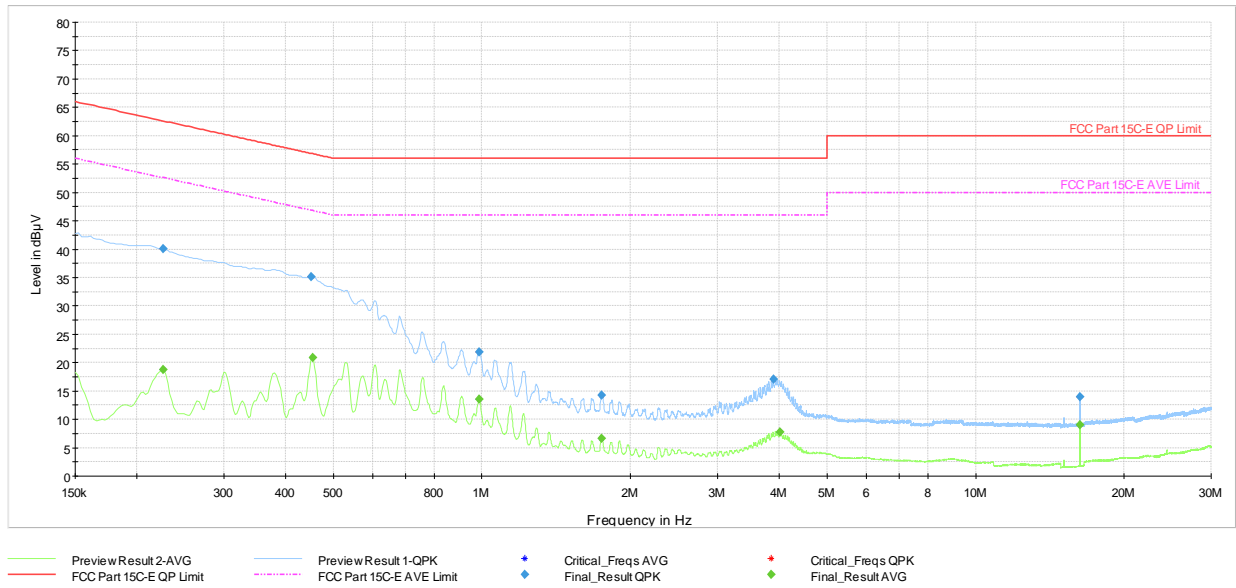
— Preview Result 2-AVG      — Preview Result 1-QPK      ◆ Critical\_Freqs AVG      ◆ Critical\_Freqs QPK  
— FCC Part 15C-E QP Limit      — FCC Part 15C-E AVE Limit      ◆ Final\_Result QPK      ◆ Final\_Result AVG

**Plot 7-570. AC Line Conducted Plot with 11ax UNII Band 1 – RU26 – Ch.36 (N) with AC/DC Adapter**

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.152	FINAL	—	17.88	55.88	-37.99	N	GND
0.152	FINAL	44.4	—	65.88	-21.45	N	GND
0.452	FINAL	37.5	—	56.85	-19.40	N	GND
0.454	FINAL	—	18.83	46.81	-27.98	N	GND
0.987	FINAL	19.9	—	56.00	-36.10	N	GND
0.987	FINAL	—	11.66	46.00	-34.34	N	GND
1.752	FINAL	—	6.45	46.00	-39.55	N	GND
1.761	FINAL	13.8	—	56.00	-42.24	N	GND
3.935	FINAL	14.4	—	56.00	-41.63	N	GND
3.941	FINAL	—	6.16	46.00	-39.84	N	GND
16.274	FINAL	—	5.46	50.00	-44.54	N	GND
16.274	FINAL	11.6	—	60.00	-48.41	N	GND

**Table 7-186. AC Line Conducted with 11ax UNII Band 1 – RU26 – Ch.36 (N) with AC/DC Adapter**

FCC ID: BCGA2117 IC: 579C-A2117		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
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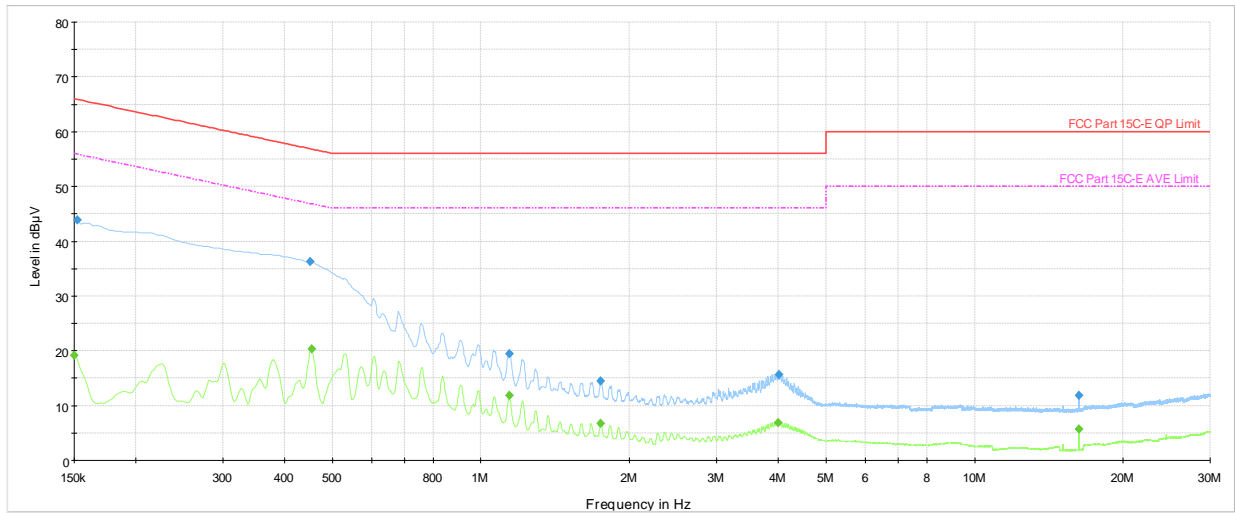


**Plot 7-571. AC Line Conducted Plot with 11ax UNII Band 3 – RU242 – Ch.149 (L1) with AC/DC Adapter**

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.227	FINAL	—	18.77	52.58	-33.80	L1	GND
0.227	FINAL	40.1	—	62.58	-22.49	L1	GND
0.452	FINAL	35.1	—	56.85	-21.71	L1	GND
0.454	FINAL	—	20.94	46.81	-25.87	L1	GND
0.987	FINAL	—	13.56	46.00	-32.44	L1	GND
0.987	FINAL	21.9	—	56.00	-34.12	L1	GND
1.745	FINAL	14.2	—	56.00	-41.78	L1	GND
1.745	FINAL	—	6.67	46.00	-39.33	L1	GND
3.892	FINAL	17.1	—	56.00	-38.91	L1	GND
4.009	FINAL	—	7.73	46.00	-38.27	L1	GND
16.260	FINAL	—	9.07	50.00	-40.93	L1	GND
16.260	FINAL	14.0	—	60.00	-45.99	L1	GND

**Table 7-187. AC Line Conducted with 11ax UNII Band 3 – RU242 – Ch.149 (L1) with AC/DC Adapter**

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**Plot 7-572. AC Line Conducted Plot with 11ax UNII Band 3 – RU26 – Ch.149 (N) with AC/DC Adapter**

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.150	FINAL	—	19.18	56.00	36.82	N	GND
0.152	FINAL	43.8	—	65.88	-22.05	N	GND
0.452	FINAL	36.2	—	56.85	-20.62	N	GND
0.454	FINAL	—	20.35	46.81	-26.45	N	GND
1.142	FINAL	—	11.79	46.00	-34.21	N	GND
1.142	FINAL	19.5	—	56.00	-36.51	N	GND
1.745	FINAL	14.4	—	56.00	-41.57	N	GND
1.748	FINAL	—	6.71	46.00	-39.29	N	GND
4.007	FINAL	—	6.88	46.00	-39.12	N	GND
4.011	FINAL	15.7	—	56.00	-40.28	N	GND
16.265	FINAL	—	5.66	50.00	-44.34	N	GND
16.265	FINAL	11.9	—	60.00	-48.14	N	GND

**Table 7-188. AC Line Conducted with 11ax UNII Band 3 – RU26 – Ch.149 (N) with AC/DC Adapter**

FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-06.BCG	Test Dates: 2/20/2023 - 5/9/2023	EUT Type: Head Mounted Device	Page 262 of 263

## 8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Apple Head Mounted Device FCC ID: BCGA2117** and **IC: 579C-A2117** is in compliance with is in compliance with Part 15 Subpart E (15.407) of the FCC Rules and RSS-247 of the Innovation, Science and Economic Development Canada Rules.

<b>FCC ID:</b> BCGA2117 <b>IC:</b> 579C-A2117	 <b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2302130007-06.BCG	<b>Test Dates:</b> 2/20/2023 - 5/9/2023	<b>EUT Type:</b> Head Mounted Device
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