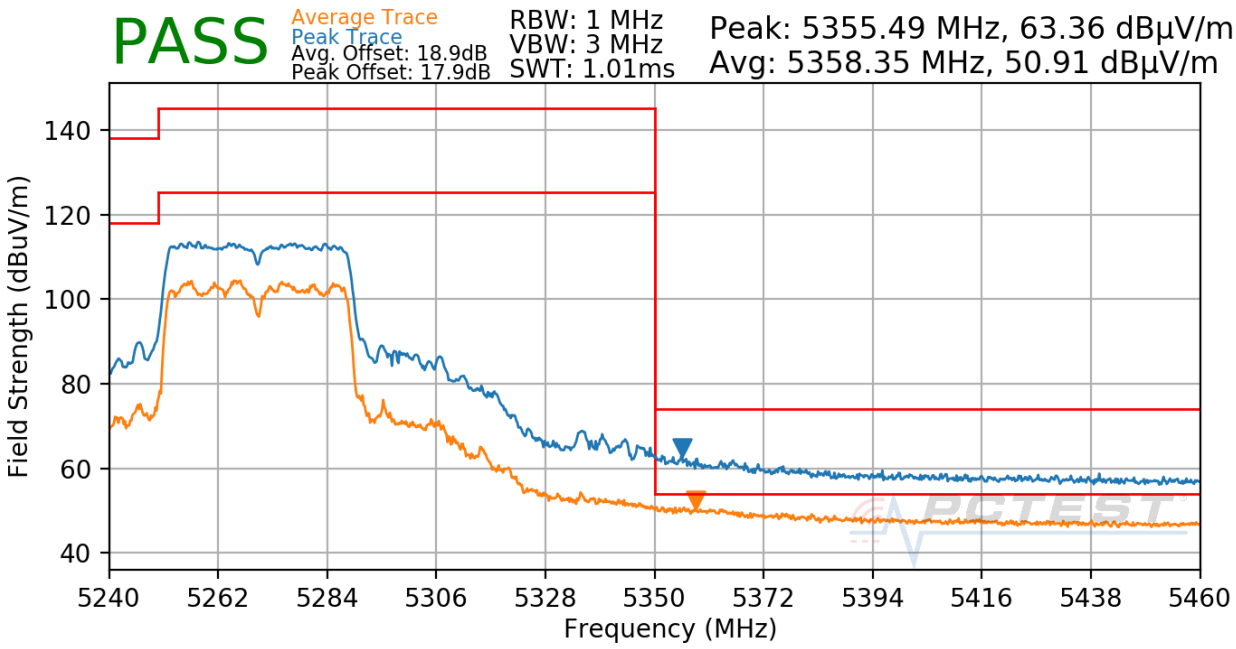
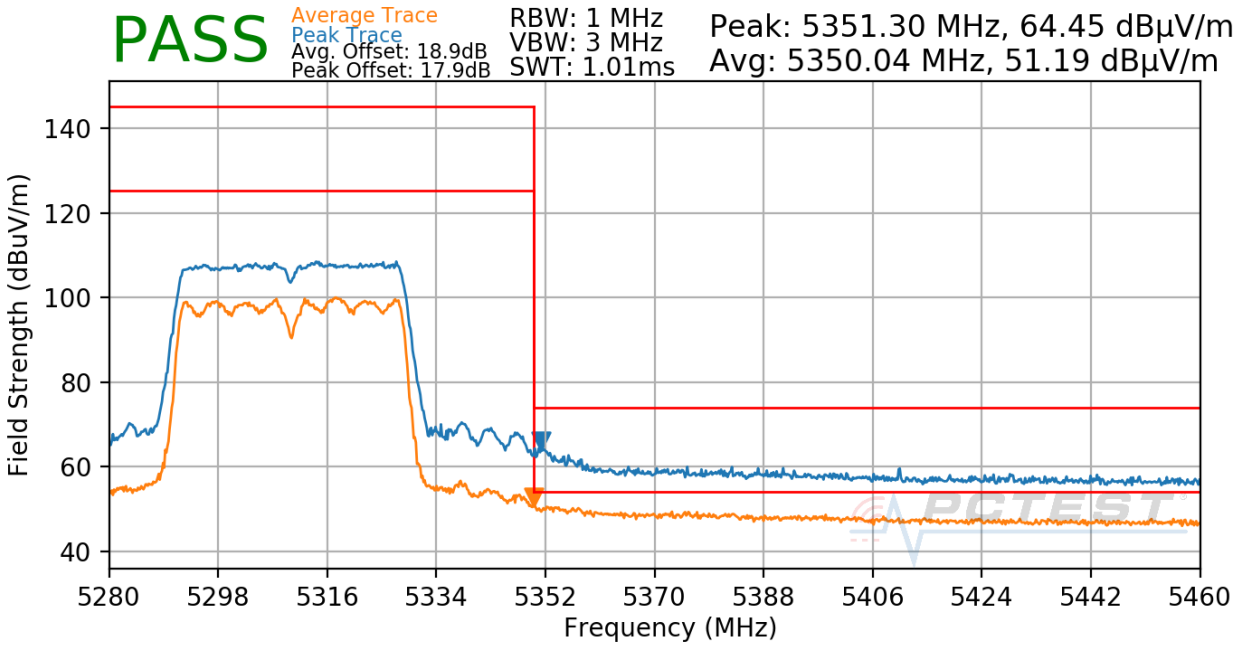
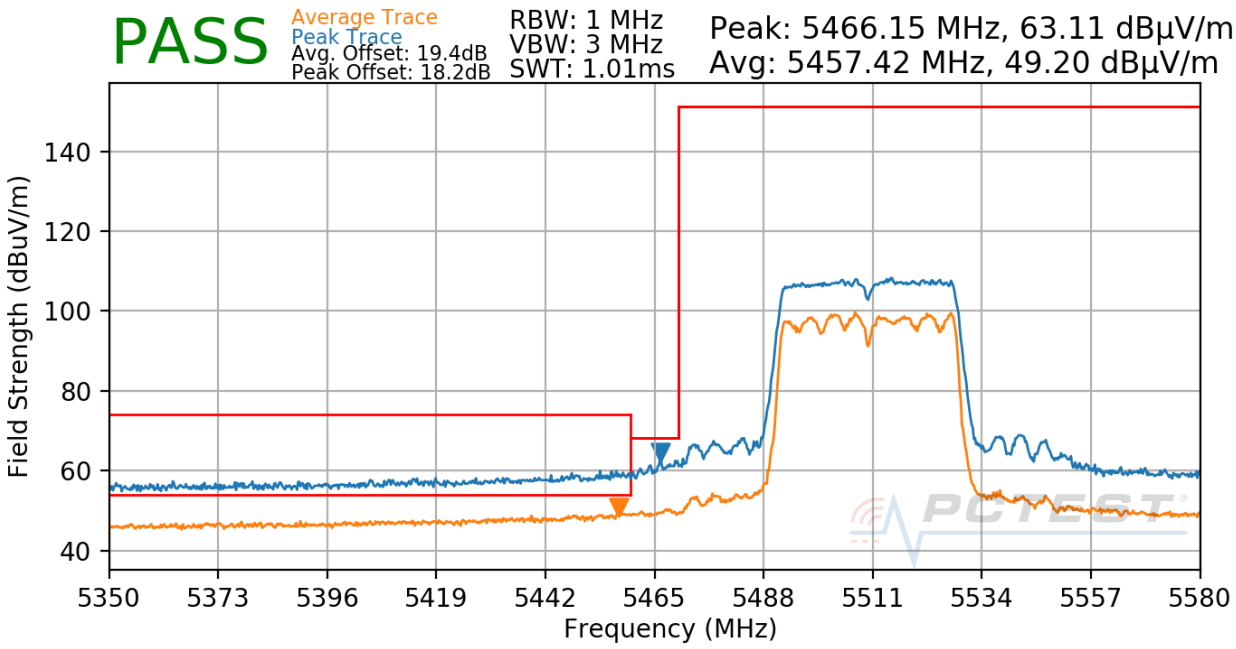


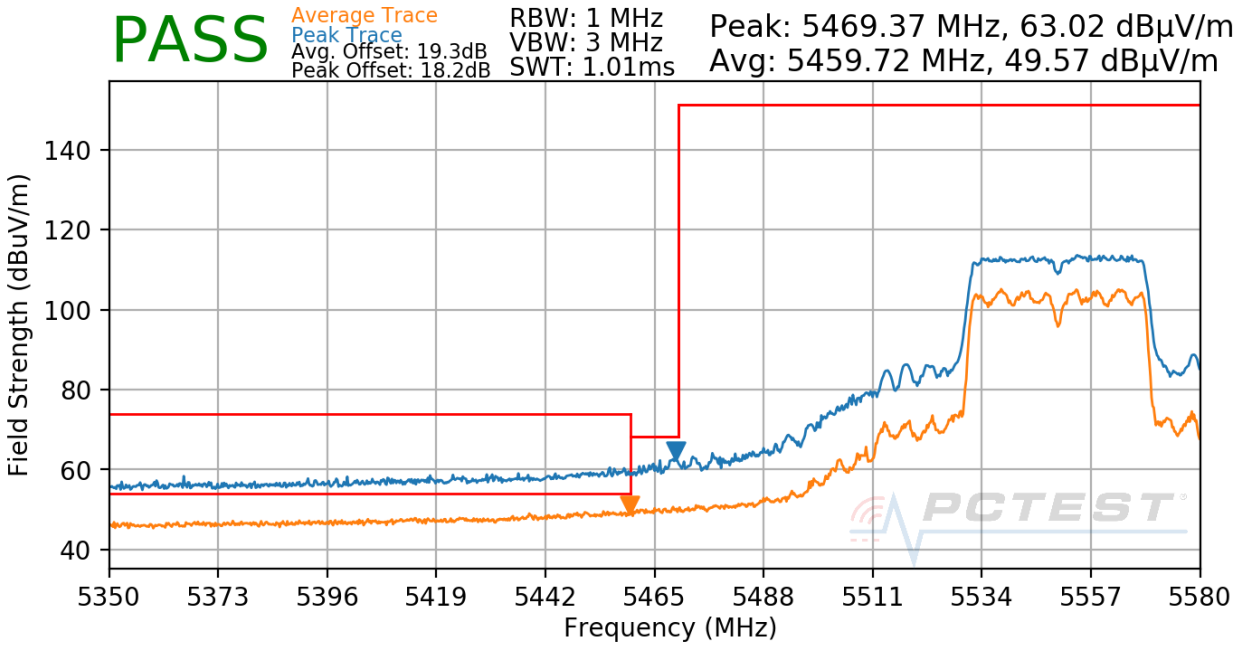
Plot 7-203. CDD (Pk & Avg, Ch.54, 802.11n, MCS15)



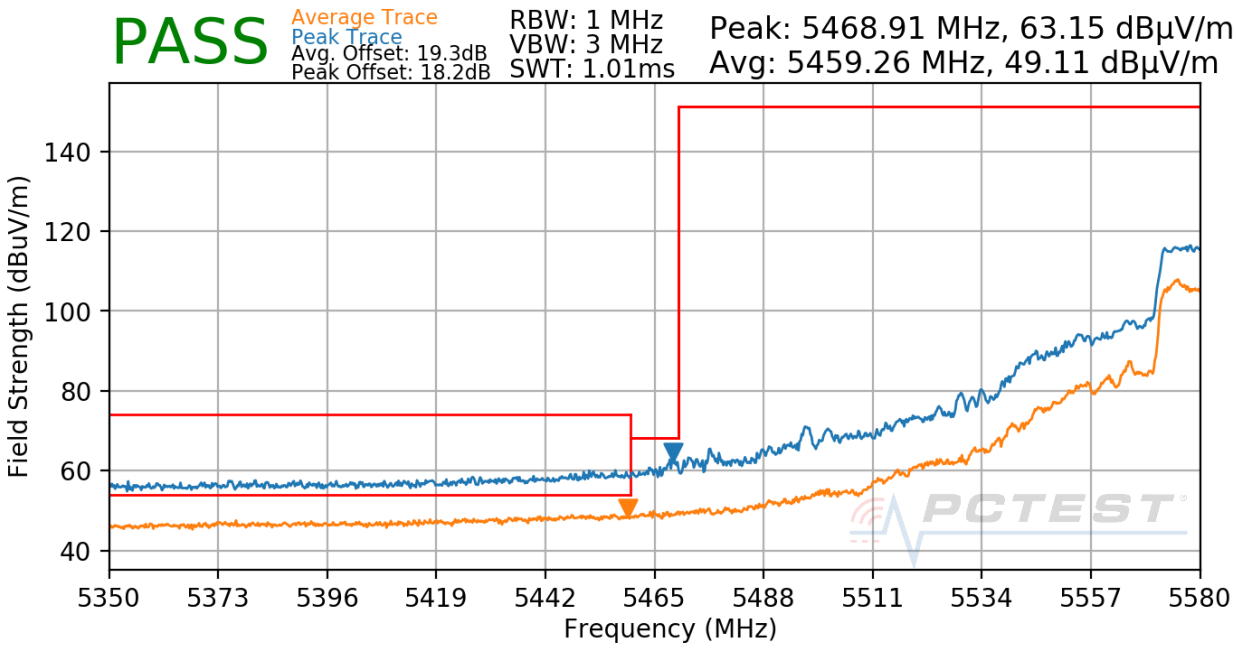
Plot 7-204. CDD (Pk & Avg, Ch.62, 802.11n, MCS15)



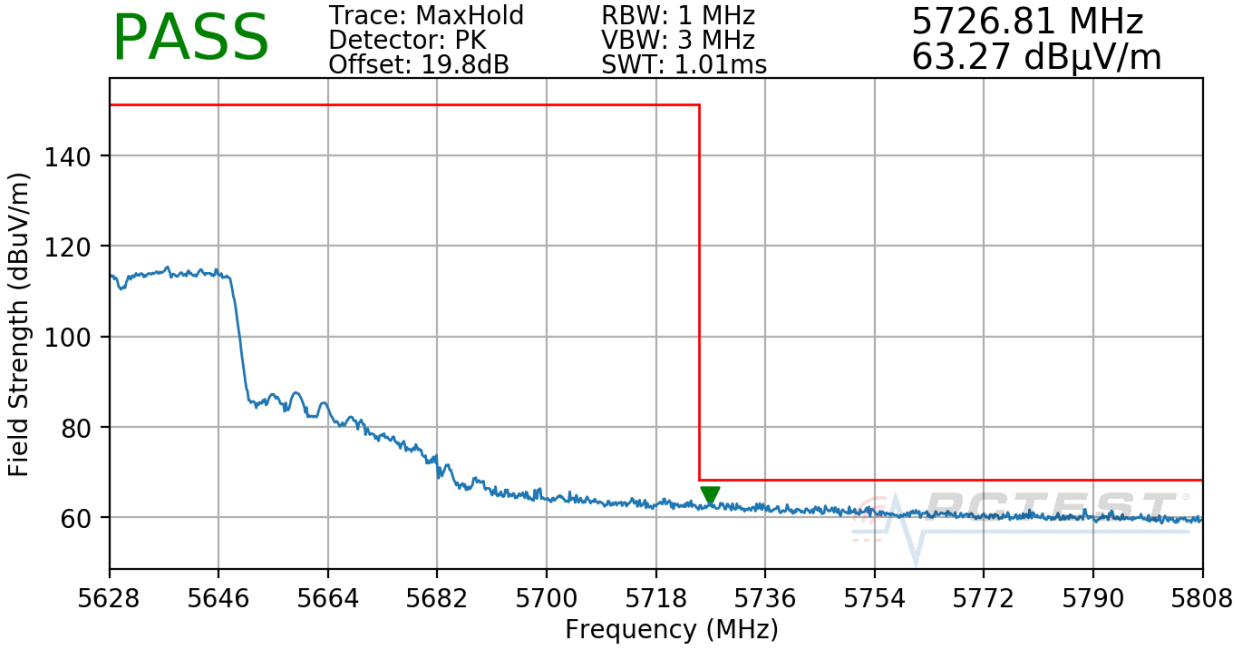
Plot 7-205. CDD (Pk & Avg, Ch.102, 802.11n, MCS15)



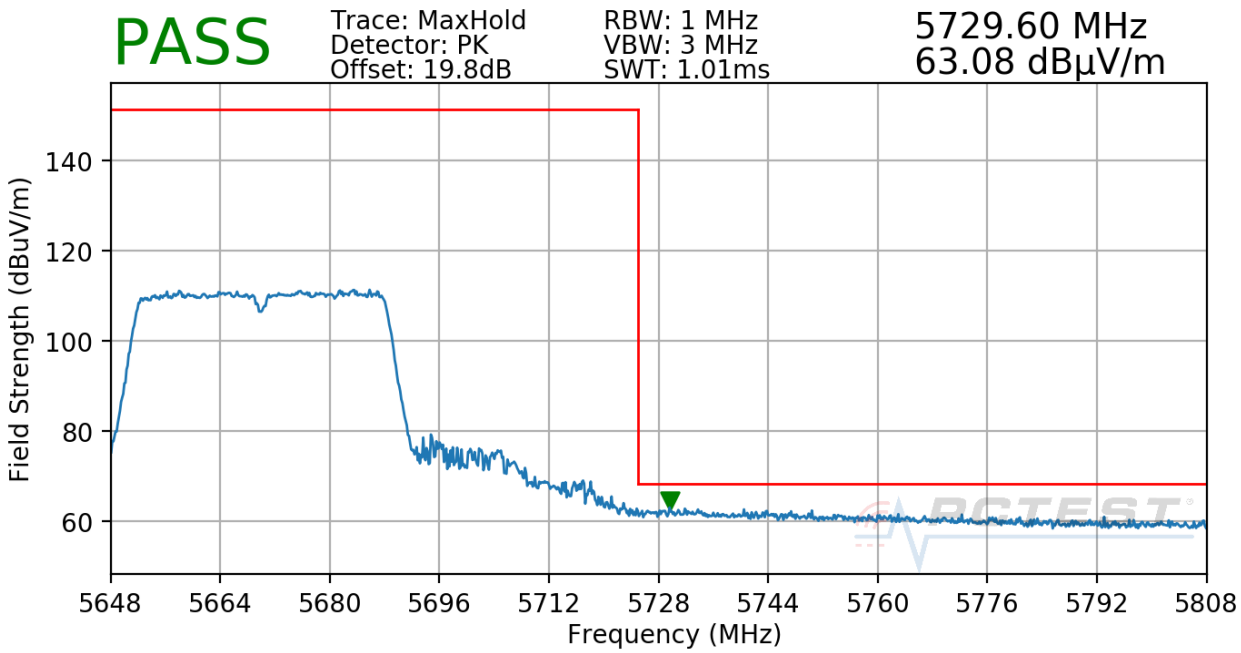
Plot 7-206. CDD (Pk & Avg, Ch.110, 802.11n, MCS15)



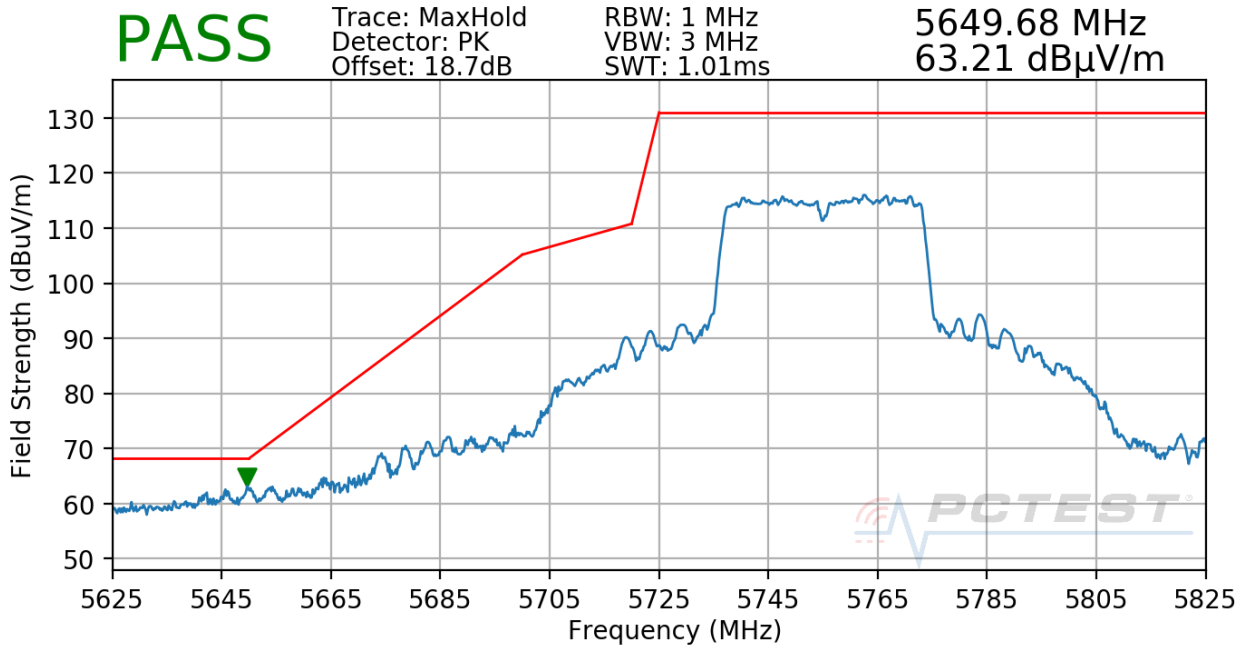
Plot 7-207. (FCC Only) CDD (Pk & Avg, Ch.118, 802.11n, MCS15)



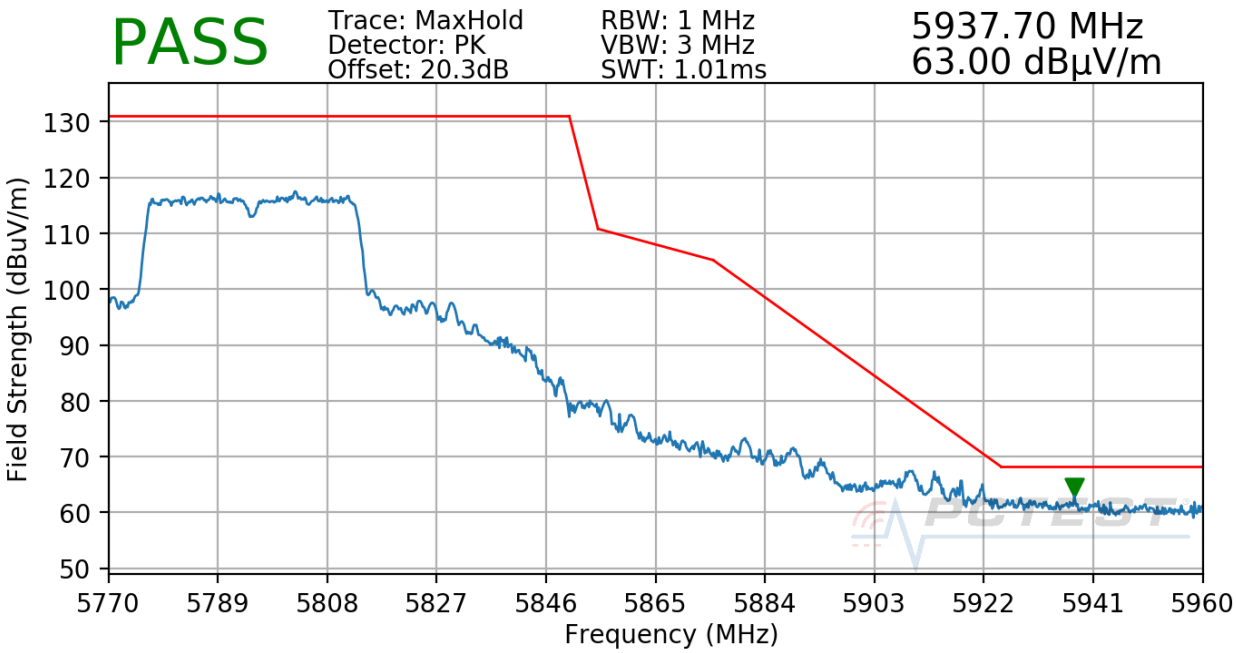
Plot 7-208. (FCC Only) CDD (Pk, Ch.126, 802.11n, MCS15)



Plot 7-209. CDD (Pk, Ch.134, 802.11n, MCS15)



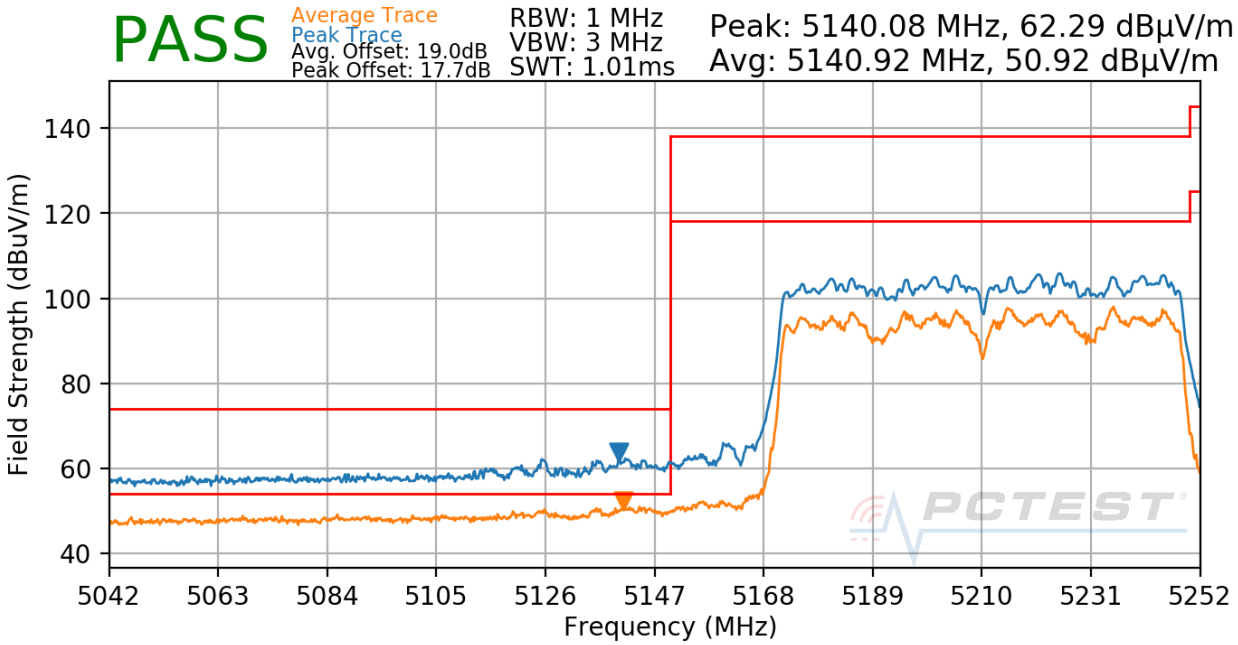
Plot 7-210. CDD (Pk, Ch.151, 802.11n, MCS15)



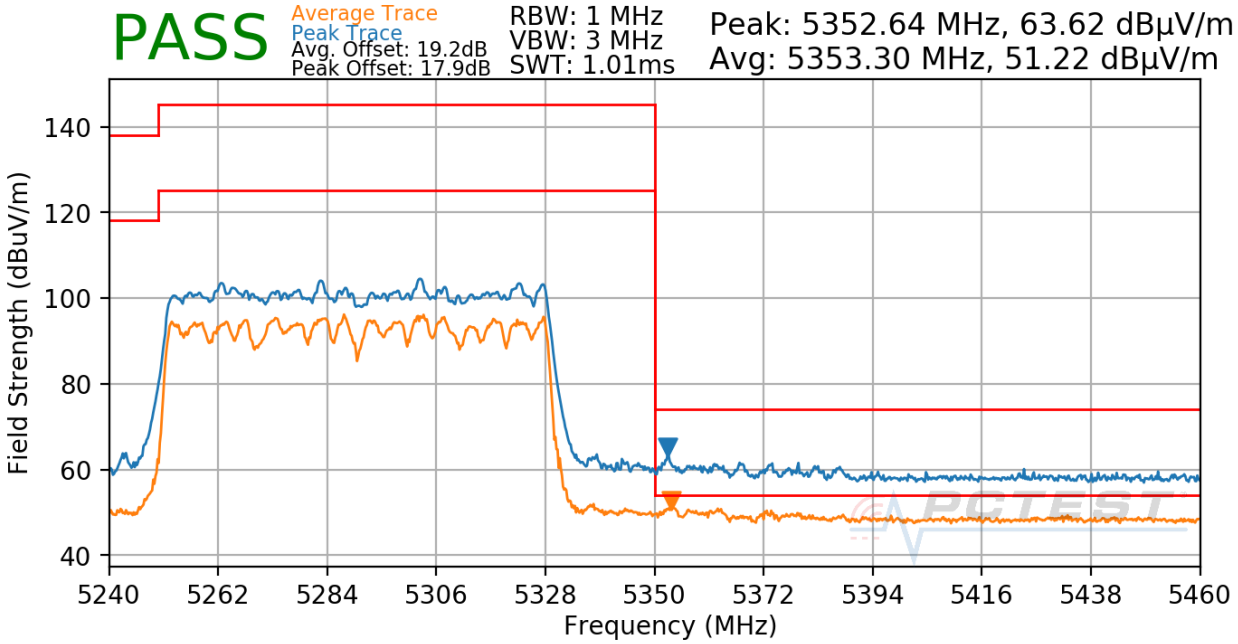
Plot 7-211. CDD (Pk, Ch.159, 802.11n, MCS15)

7.6.13 CDD Radiated Band Edge Measurements (80MHz BW)

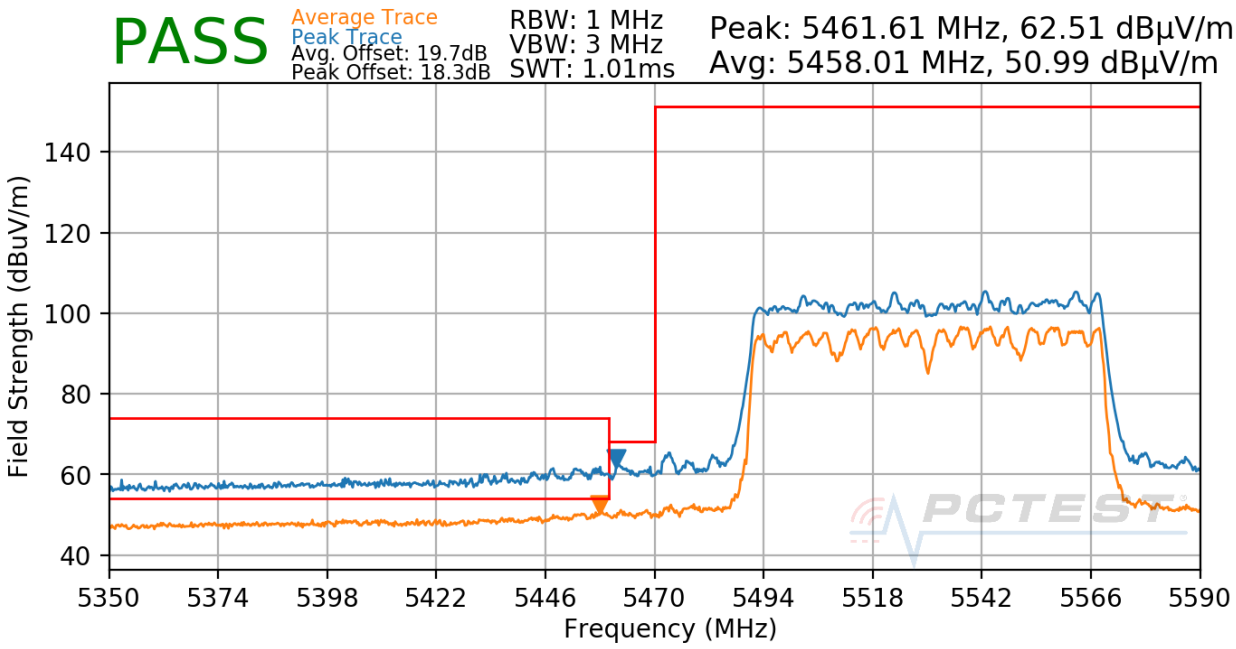
§15.407(b.1)(b.2) §15.205 §15.209; RSS-Gen [8.9]



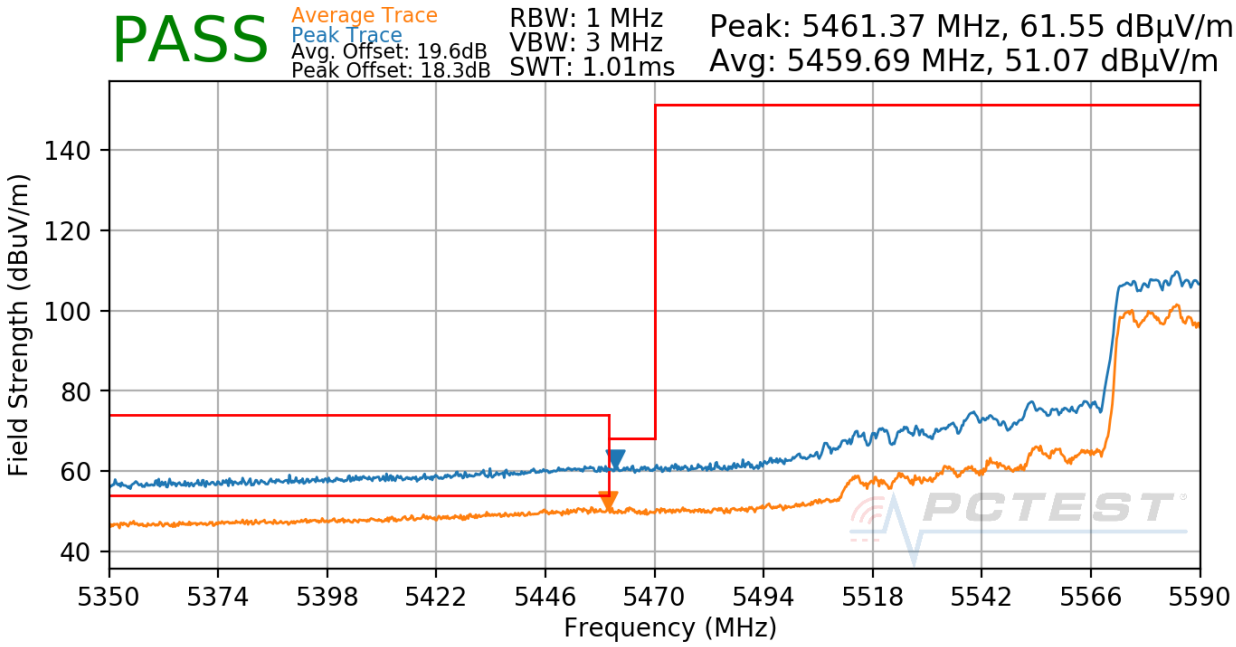
Plot 7-212. CDD (Pk & Avg, Ch.42, 802.11ac, MCS9)



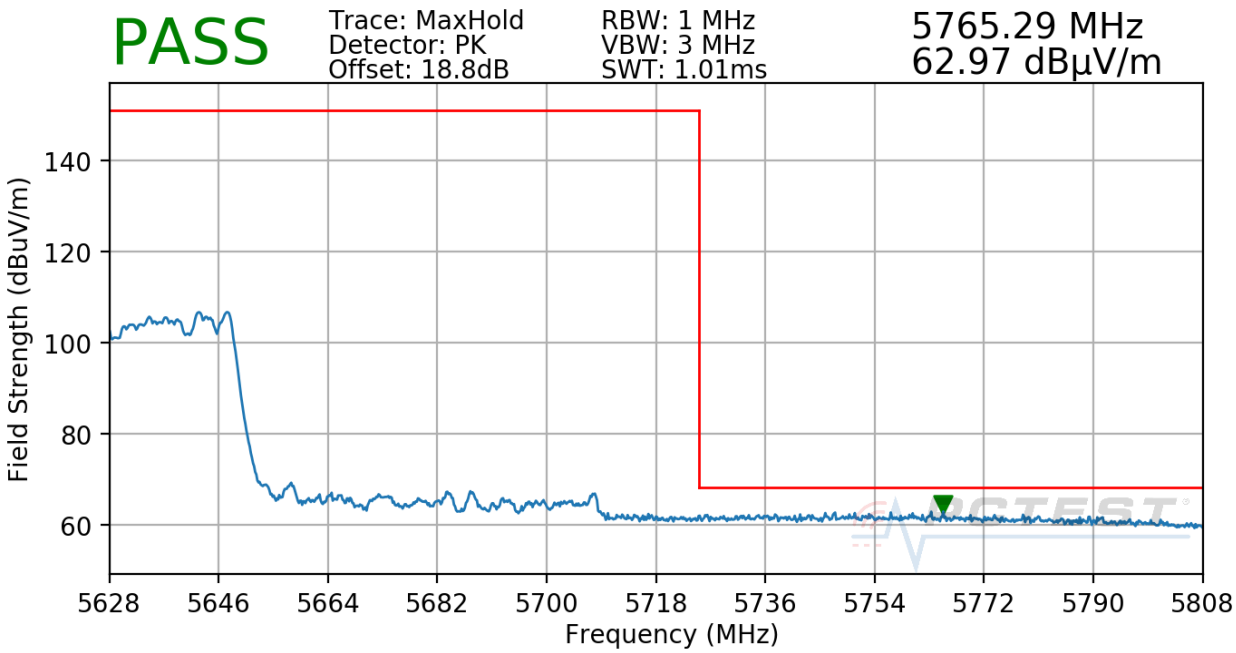
Plot 7-213. CDD (Pk & Avg, Ch.58, 802.11ac, MCS9)



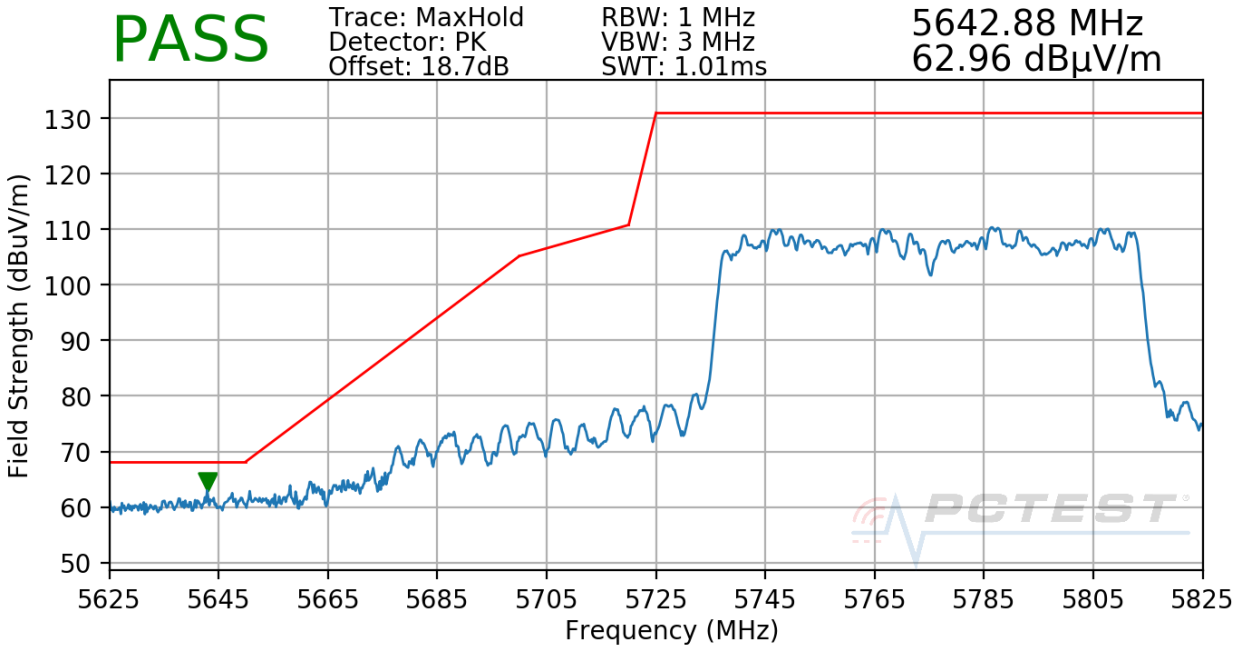
Plot 7-214. CDD (Pk & Avg, Ch.106, 802.11ac, MCS9)



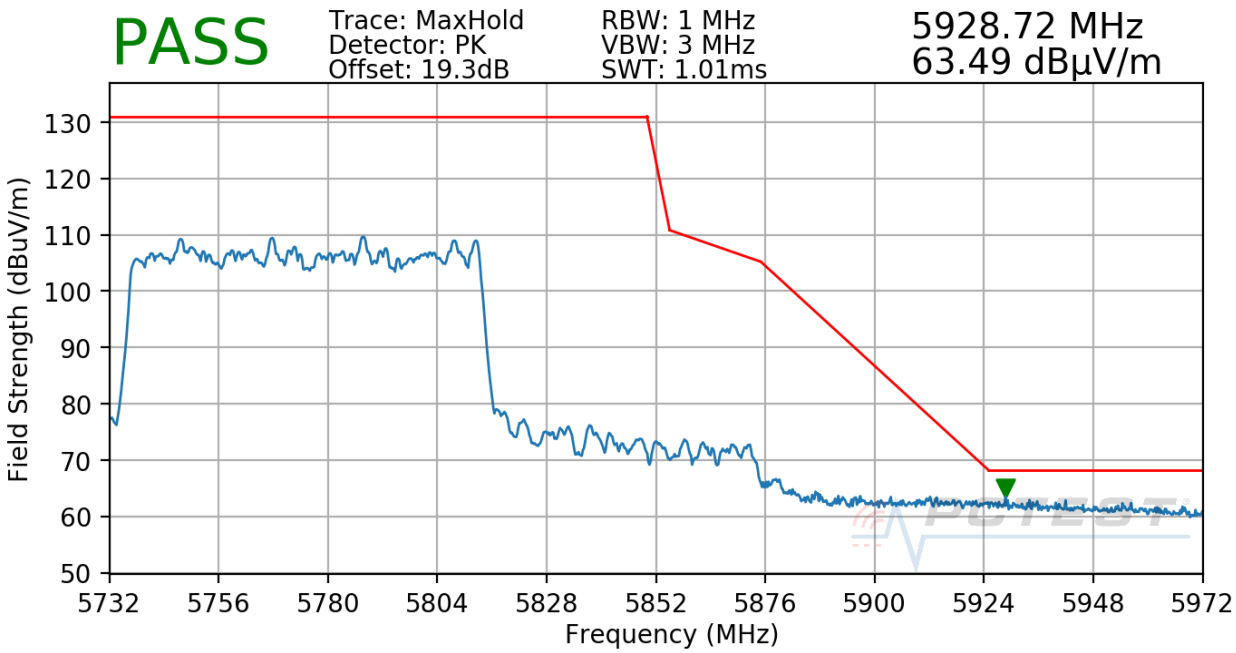
Plot 7-215. (FCC Only) CDD (Pk & Avg, Ch.122 (Low), 802.11ac, MCS9)



Plot 7-216. (FCC Only) CDD (Pk & Avg, Ch.122 (High), 802.11ac, MCS9)



Plot 7-217. CDD (Pk, Ch.155 (Low), 802.11ac, MCS9)



Plot 7-218. CDD (Pk, Ch.155 (High), 802.11ac, MCS9)

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 7-75 per Section 15.209 and RSS-Gen (8.9).

Frequency	Field Strength [µV/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 7-75. 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 = quasi-peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Test Setup

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

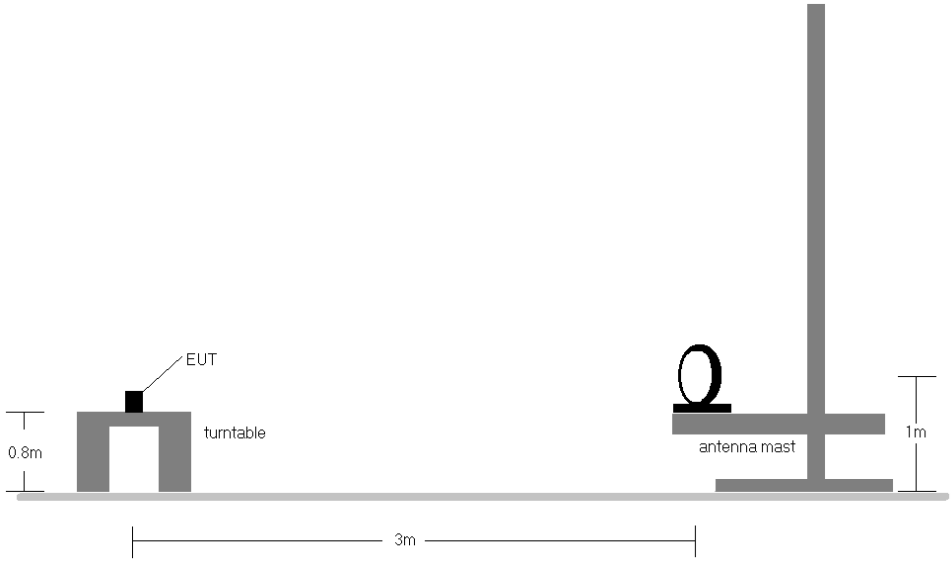


Figure 7-6. Radiated Test Setup < 30MHz

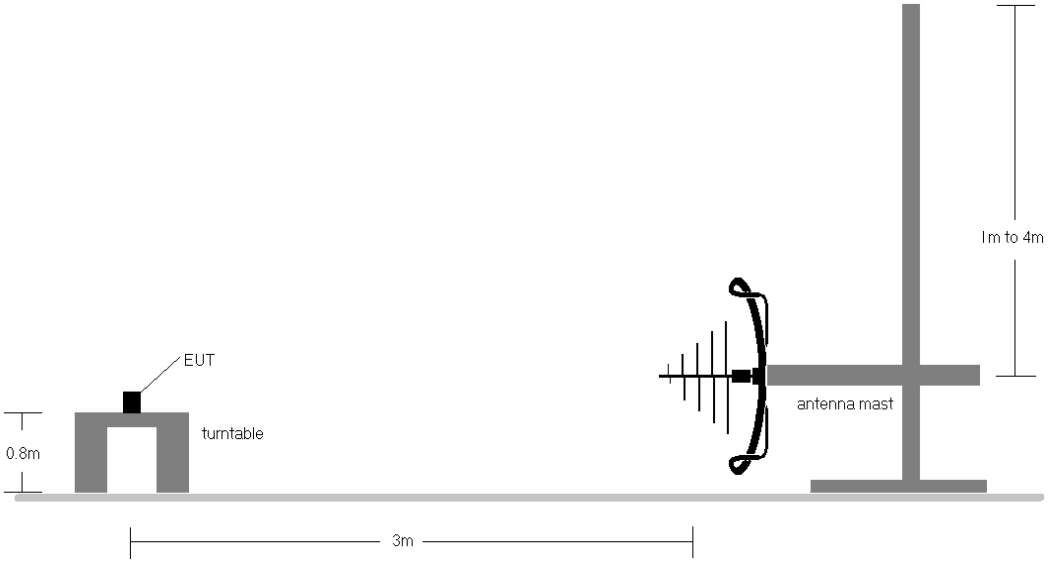


Figure 7-7. Radiated Test Setup < 1GHz

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 7-75.
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 on emissions that were 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. Both configurations below were investigated, and the worst case has been reported.
    a. EUT powered by AC/DC adaptor via USB-C cable with wire charger
    b. EUT powered by host PC via USB-C cable with wire charger
10. All antenna configurations were investigated and only the worst case is reported.
11. The unit was tested with all possible modes and only the highest emission is reported.

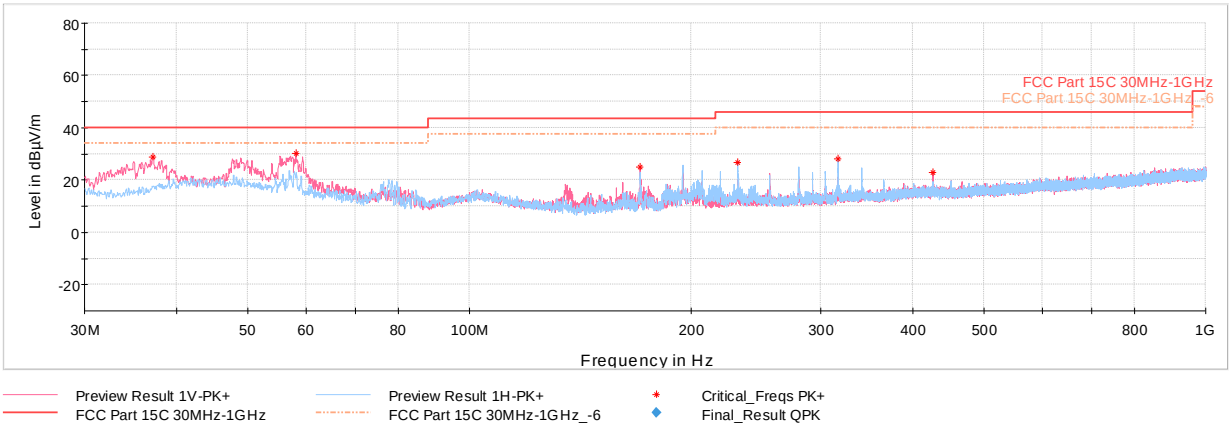
Sample Calculations

Determining Spurious Emissions Levels

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

CDD Radiated Spurious Emissions Measurements (Below 1GHz)

§15.209; RSS-Gen [8.9]



Plot 7-219. Radiated Spurious Emissions below 1GHz CDD, 802.11n, 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]
37.13	Max-Peak	V	100	262	-63.06	-15.14	28.80	40.00	-11.20
58.13	Max-Peak	V	100	357	-62.46	-14.33	30.21	40.00	-9.79
170.51	Max-Peak	V	100	63	-64.46	-17.58	24.96	43.52	-18.57
231.37	Max-Peak	H	100	251	-65.97	-14.29	26.74	46.02	-19.28
316.64	Max-Peak	H	100	199	-66.77	-12.24	27.99	46.02	-18.03
426.44	Max-Peak	H	250	228	-74.44	-9.59	22.97	46.02	-23.05

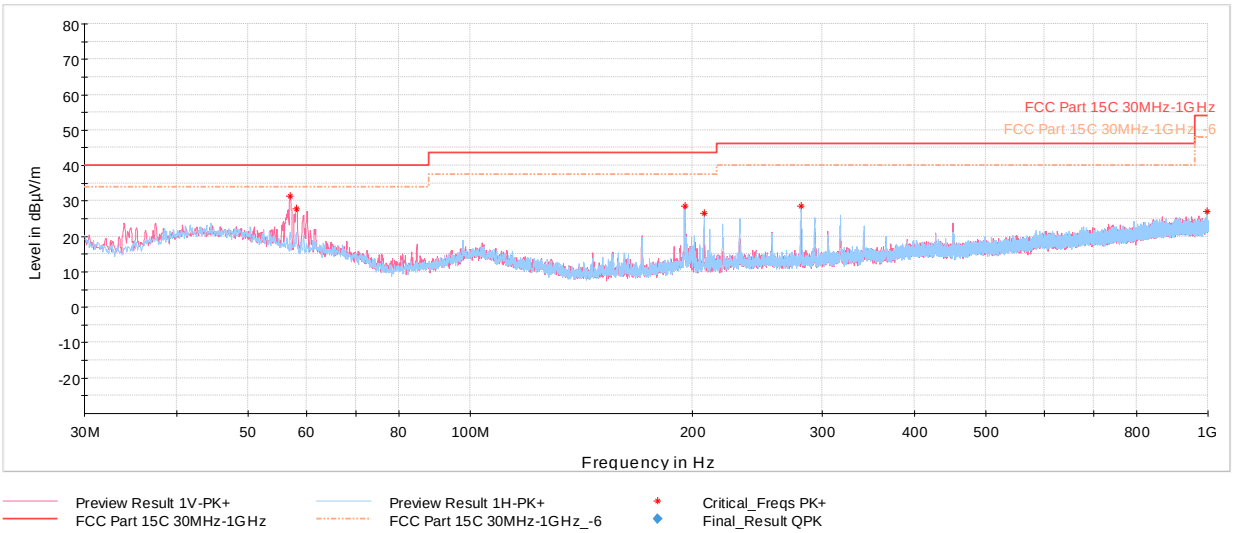
Table 7-76. Radiated Spurious Emissions below 1GHz, 802.11n, Ch.36 with AC/DC Adapter

7.7.1 Simultaneous Tx Radiated Spurious Emissions Measurements (Below 1GHz)

§15.209; RSS-Gen [8.9]

Description	Bluetooth	802.11a/n/ac 5GHz
Antenna	A	A
Channel	78	36
Operating Frequency (MHz)	2480	5180
Data Rate (Mbps)	1.0	MCS0
Mode	GFSK/ePa	802.11n

Table 7-12. Worst Case Simultaneous Transmission Configuration



Plot 7-39. Radiated Spurious Emissions Simultaneous Tx Below 1GHz, 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]
57.01	Max Peak	V	100	81	-61.62	-14.01	31.37	40.00	-8.63
58.13	Max Peak	V	100	356	-64.75	-14.33	27.92	40.00	-12.08
195.39	Max Peak	V	100	0	-63.21	-15.14	28.65	43.52	-14.87
207.46	Max Peak	H	100	297	-64.94	-15.58	26.48	43.52	-17.04
280.75	Max Peak	H	100	324	-65.23	-13.29	28.48	46.02	-17.54
997.38	Max Peak	H	250	267	-78.80	-1.22	26.98	53.98	-27.00

Table 7-13. Radiated Simultaneous Emission Tx Below 1GHz with AC/DC Adapter

7.8 AC Line-Conducted Emissions Measurement

§15.407; 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. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.

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 (dBµV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

Table 7-77. Conducted Limits

*Decreases with the logarithm of the frequency.

Test Procedures Used

ANSI C63.10-2013, Section 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

Test Setup

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

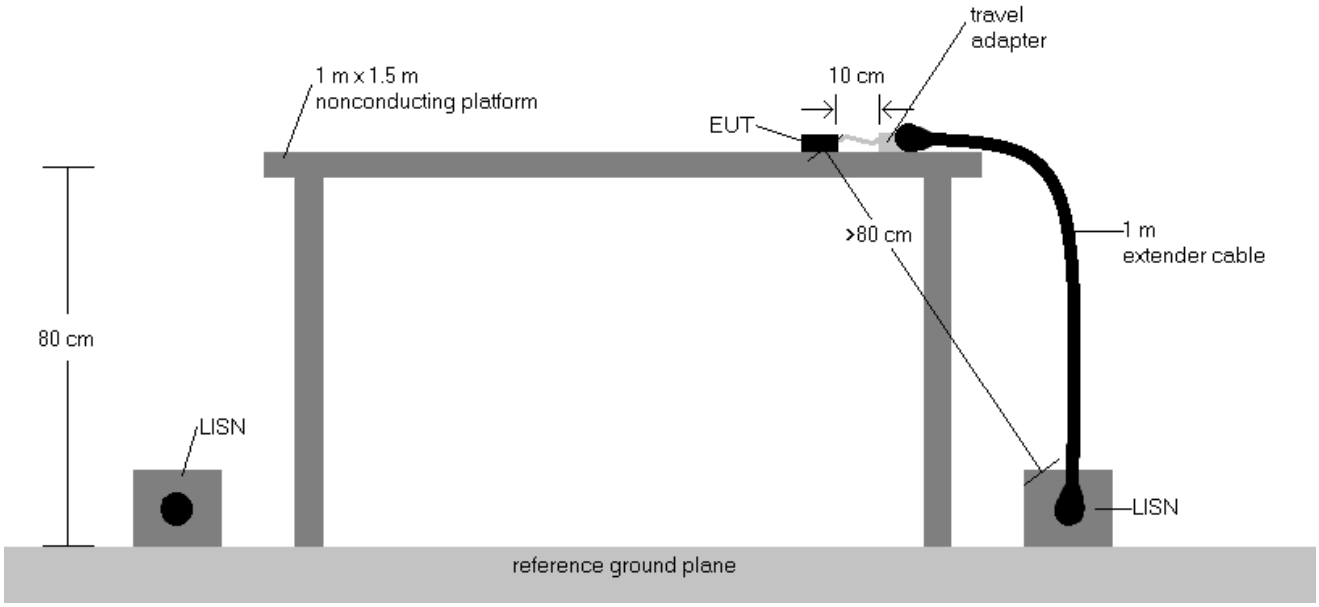
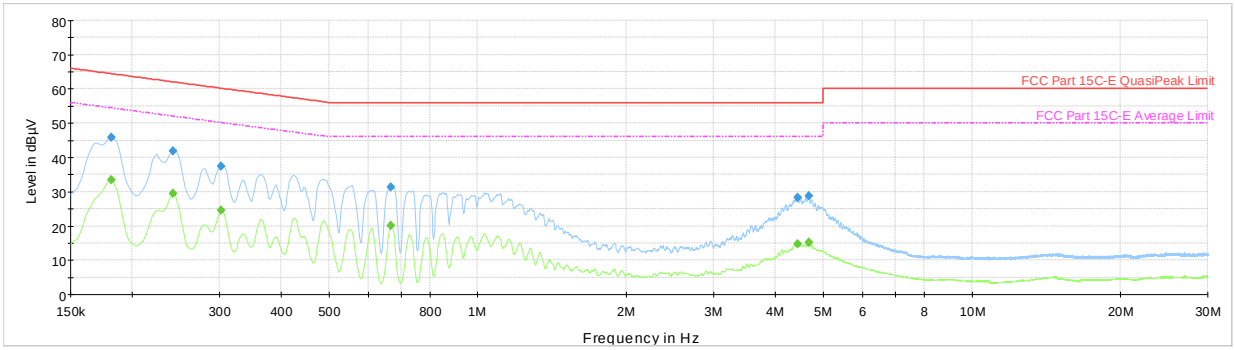


Figure 7-8. Test Instrument & Measurement Setup

Test Notes

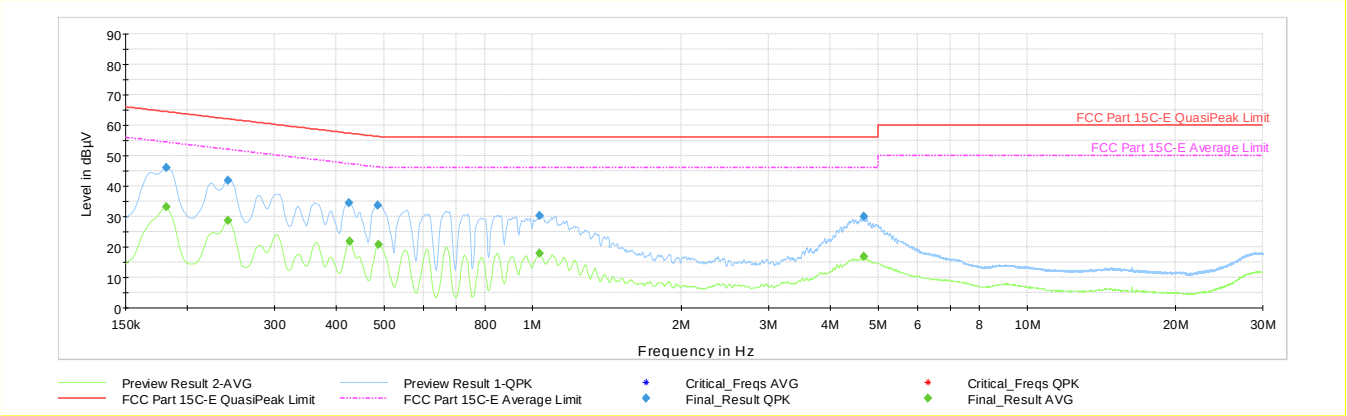
1. All modes of operation were investigated and the worst-case emissions are reported. The emissions found were not affected by the choice of channel used during testing.
2. Both configurations below were investigated, and the worst case has been reported.
    a. EUT powered by AC/DC adaptor via USB-C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



Plot 7-220. AC Line Conducted Plot with 802.11n CDD – Ch.36 (L1), with AC/DC adapter

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.182	FINAL	45.9	—	64.42	-18.49	L1	GND
0.182	FINAL	—	33.43	54.42	-20.99	L1	GND
0.242	FINAL	42.0	—	62.02	-20.04	L1	GND
0.242	FINAL	—	29.37	52.02	-22.65	L1	GND
0.303	FINAL	—	24.64	50.16	-25.52	L1	GND
0.303	FINAL	37.5	—	60.16	-22.66	L1	GND
0.668	FINAL	—	20.12	46.00	-25.88	L1	GND
0.668	FINAL	31.3	—	56.00	-24.68	L1	GND
4.441	FINAL	—	14.63	46.00	-31.37	L1	GND
4.448	FINAL	28.4	—	56.00	-27.64	L1	GND
4.670	FINAL	28.7	—	56.00	-27.34	L1	GND
4.673	FINAL	—	15.18	46.00	-30.82	L1	GND

Table 7-78. AC Line Conducted Data with 802.11n CDD – Ch.36 (L1) with AC/DC adapter



Plot 7-221. AC Line Conducted Plot with 802.11n CDD – Ch.36 (N), with AC/DC adapter

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.182	FINAL	46.1	—	64.42	-18.33	N	GND
0.182	FINAL	—	33.04	54.42	-21.37	N	GND
0.242	FINAL	41.9	—	62.02	-20.08	N	GND
0.242	FINAL	—	28.81	52.02	-23.21	N	GND
0.425	FINAL	34.5	—	57.36	-22.84	N	GND
0.427	FINAL	—	21.77	47.32	-25.55	N	GND
0.485	FINAL	33.7	—	56.25	-22.54	N	GND
0.488	FINAL	—	20.91	46.21	-25.30	N	GND
1.032	FINAL	—	17.82	46.00	-28.18	N	GND
1.032	FINAL	30.2	—	56.00	-25.79	N	GND
4.670	FINAL	—	16.82	46.00	-29.18	N	GND
4.673	FINAL	30.0	—	56.00	-26.03	N	GND

Table 7-79. AC Line Conducted Data with 802.11n CDD – Ch.36 (N), with AC/DC adapter

8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Apple Tablet Device FCC ID: BCGA2602** and **IC: 579C-A2602** 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.