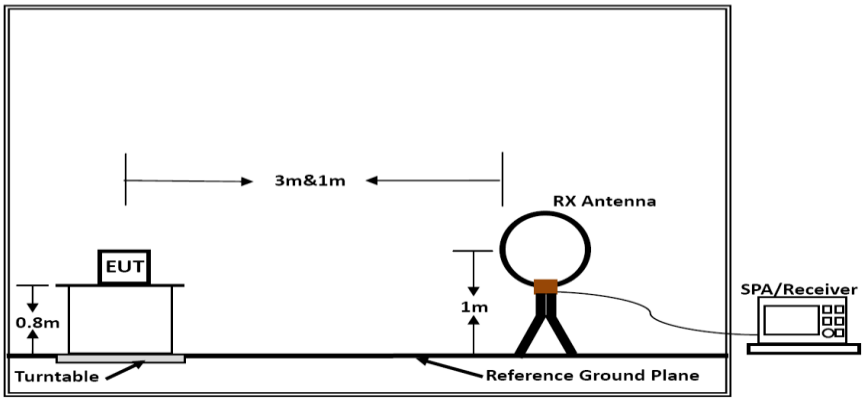
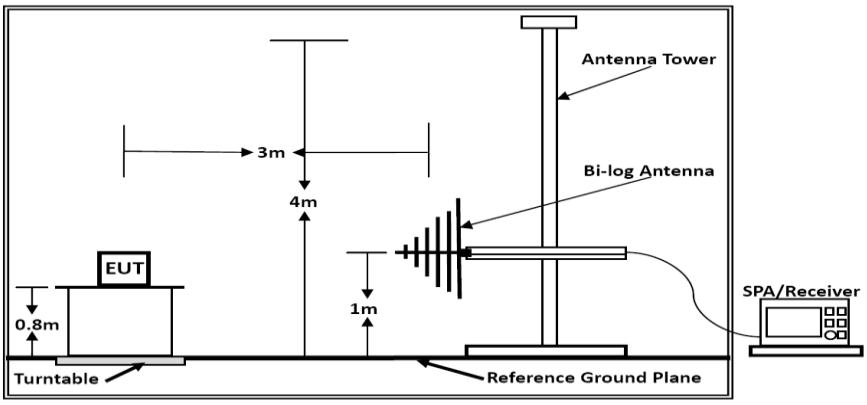
5.5.4. Test Setup Layout

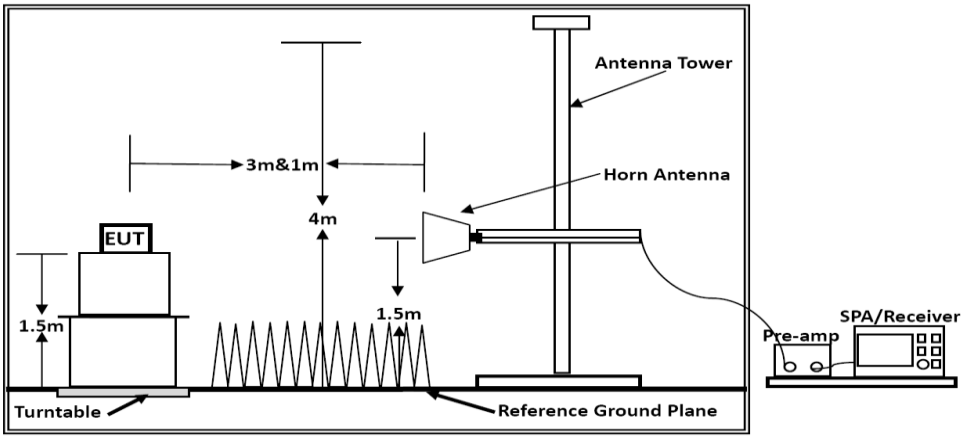
For radiated emissions below 30MHz



Below 30MHz



Below 1GHz



Above 1GHz

Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.5.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.5.6. Results of Radiated Emissions (9 KHz~30MHz)

Temperature	25℃	Humidity	60%
Test Engineer	Aking Jin	Configurations	IEEE 802.11a/n/ac

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

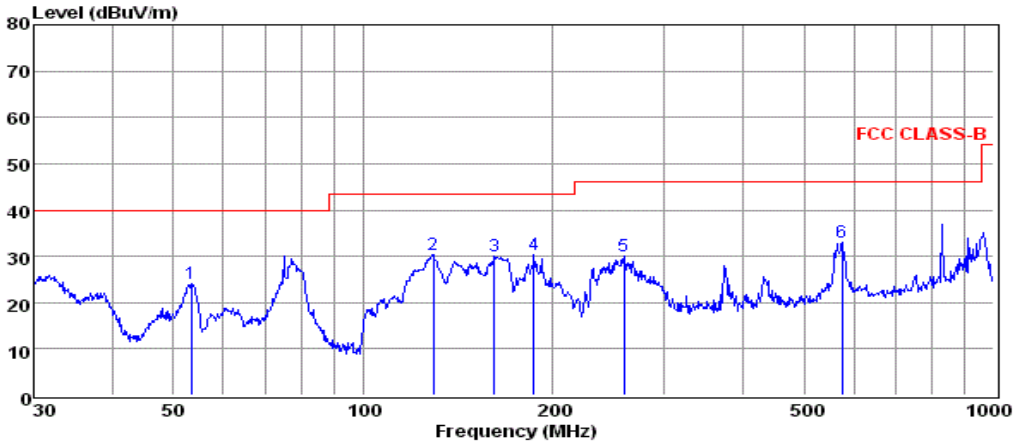
Limit line = specific limits (dBuV) + distance extrapolation factor.

5.5.7. Results of Radiated Emissions (30MHz~1GHz)

Temperature	25℃	Humidity	60%
Test Engineer	Aking Jin	Configurations	IEEE 802.11a, 5240MHz

Test result for IEEE 802.11a-5240MHz

Vertical:

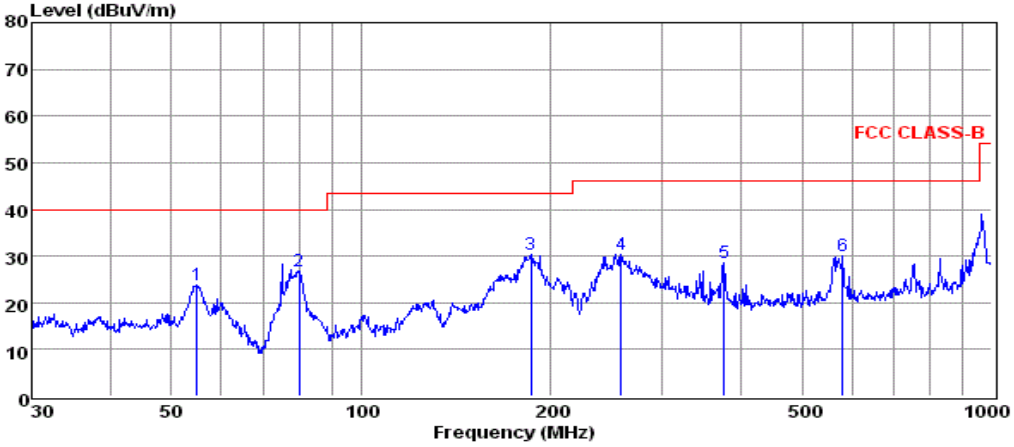


pol: VERTICAL

	Freq MHz	Reading dBuV	CabLos dB	Antfac dB/m	Measured dBuV/m	Limit dBuV/m	Over dB	Remark
1	53.32	10.52	0.46	13.10	24.08	40.00	-15.92	QP
2	129.01	20.53	0.67	9.08	30.28	43.50	-13.22	QP
3	161.47	20.48	0.75	8.71	29.94	43.50	-13.56	QP
4	186.44	19.05	0.98	10.25	30.28	43.50	-13.22	QP
5	259.23	16.85	1.01	12.05	29.91	46.00	-16.09	QP
6	574.63	13.54	1.49	17.98	33.01	46.00	-12.99	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Horizontal:



pol: HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	54.83	10.44	0.46	13.03	23.93	40.00	-16.07	QP
2	79.80	17.73	0.65	8.51	26.89	40.00	-13.11	QP
3	185.79	19.46	0.70	10.19	30.35	43.50	-13.15	QP
4	258.33	17.34	1.01	12.05	30.40	46.00	-15.60	QP
5	375.94	12.91	1.10	14.56	28.57	46.00	-17.43	QP
6	580.70	10.37	1.44	18.09	29.90	46.00	-16.10	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Note:

Pre-scan all modes and recorded the worst case results in this report (IEEE 802.11a-5240MHz).

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

5.5.8. Results for Radiated Emissions (Above 1GHz)

Remark: Measured all modes and recorded worst case;

IEEE 802.11a/ Antenna Chain 0

Channel 36/5180 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.54	54.31	37.31	39.35	5.61	57.88	68.20	-10.32	Peak	Horizontal
15.54	43.93	37.31	39.35	5.61	47.50	54.00	-6.50	Average	Horizontal
15.54	56.53	37.31	39.35	5.61	60.10	68.20	-8.10	Peak	Vertical
15.54	39.15	37.31	39.35	5.61	42.72	54.00	-11.28	Average	Vertical

Channel 44 / 5220 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.60	53.48	37.42	39.46	5.77	57.21	68.20	-10.99	Peak	Horizontal
15.60	43.43	37.42	39.46	5.77	47.16	54.00	-6.84	Average	Horizontal
15.60	57.53	37.42	39.46	5.77	61.26	68.20	-6.94	Peak	Vertical
15.60	38.76	37.42	39.46	5.77	42.49	54.00	-11.51	Average	Vertical

Channel 48 / 5240 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.72	54.57	37.59	39.88	5.89	58.17	68.20	-10.03	Peak	Horizontal
15.72	44.23	37.59	39.88	5.89	47.83	54.00	-6.17	Average	Horizontal
15.72	57.23	37.59	39.88	5.89	60.83	68.20	-7.37	Peak	Vertical
15.72	41.09	37.59	39.88	5.89	44.69	54.00	-9.31	Average	Vertical

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IEEE 802.11n-HT20/Combined Antenna Chain 0 and Antenna Chain 1

Channel 36 / 5180 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.54	54.72	37.31	39.35	5.61	58.29	68.20	-9.91	Peak	Horizontal
15.54	43.46	37.31	39.35	5.61	47.03	54.00	-6.97	Average	Horizontal
15.54	57.46	37.31	39.35	5.61	61.03	68.20	-7.17	Peak	Vertical
15.54	40.31	37.31	39.35	5.61	43.88	54.00	-10.12	Average	Vertical

Channel 44 / 5220 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.60	53.55	37.42	39.46	5.77	57.28	68.20	-10.92	Peak	Horizontal
15.60	42.44	37.42	39.46	5.77	46.17	54.00	-7.83	Average	Horizontal
15.60	58.59	37.42	39.46	5.77	62.32	68.20	-5.88	Peak	Vertical
15.60	39.05	37.42	39.46	5.77	42.78	54.00	-11.22	Average	Vertical

Channel 48 / 5240 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.72	55.50	37.59	39.88	5.89	59.10	68.20	-9.10	Peak	Horizontal
15.72	44.76	37.59	39.88	5.89	48.36	54.00	-5.64	Average	Horizontal
15.72	58.18	37.59	39.88	5.89	61.78	68.20	-6.42	Peak	Vertical
15.72	40.67	37.59	39.88	5.89	44.27	54.00	-9.73	Average	Vertical

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IEEE 802.11ac VHT20/ Combined Antenna Chain 0 and Antenna Chain 1

Channel 36 / 5180 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.54	55.40	37.31	39.35	5.61	58.97	68.20	-9.23	Peak	Horizontal
15.54	43.23	37.31	39.35	5.61	46.80	54.00	-7.20	Average	Horizontal
15.54	57.53	37.31	39.35	5.61	61.10	68.20	-7.10	Peak	Vertical
15.54	40.84	37.31	39.35	5.61	44.41	54.00	-9.59	Average	Vertical

Channel 44 / 5220 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.60	54.73	37.42	39.46	5.77	58.46	68.20	-9.74	Peak	Horizontal
15.60	42.38	37.42	39.46	5.77	46.11	54.00	-7.89	Average	Horizontal
15.60	57.63	37.42	39.46	5.77	61.36	68.20	-6.84	Peak	Vertical
15.60	39.07	37.42	39.46	5.77	42.80	54.00	-11.20	Average	Vertical

Channel 48 / 5240 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.72	54.56	37.59	39.88	5.89	58.16	68.20	-10.04	Peak	Horizontal
15.72	40.17	37.59	39.88	5.89	43.77	54.00	-10.23	Average	Horizontal
15.72	57.82	37.59	39.88	5.89	61.42	68.20	-6.78	Peak	Vertical
15.72	40.04	37.59	39.88	5.89	43.64	54.00	-10.36	Average	Vertical

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IEEE 802.11n HT40 / Antenna Chain 0 and Antenna Chain 1

Channel 38 / 5190 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.57	54.43	37.31	39.35	5.61	58.00	68.20	-10.20	Peak	Horizontal
15.57	42.49	37.31	39.35	5.61	46.06	54.00	-7.94	Average	Horizontal
15.57	57.87	37.31	39.35	5.61	61.44	68.20	-6.76	Peak	Vertical
15.57	39.42	37.31	39.35	5.61	42.99	54.00	-11.01	Average	Vertical

Channel 46 / 5230 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.69	53.15	37.42	39.46	5.77	56.88	68.20	-11.32	Peak	Horizontal
15.69	42.66	37.42	39.46	5.77	46.39	54.00	-7.61	Average	Horizontal
15.69	57.26	37.42	39.46	5.77	60.99	68.20	-7.21	Peak	Vertical
15.69	39.11	37.42	39.46	5.77	42.84	54.00	-11.16	Average	Vertical

IEEE 802.11ac VHT40 / Antenna Chain 0 and Antenna Chain 1

Channel 38 / 5190 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.57	55.62	37.31	39.35	5.61	59.19	68.20	-9.01	Peak	Horizontal
15.57	42.74	37.31	39.35	5.61	46.31	54.00	-7.69	Average	Horizontal
15.57	57.27	37.31	39.35	5.61	60.84	68.20	-7.36	Peak	Vertical
15.57	40.68	37.31	39.35	5.61	44.25	54.00	-9.75	Average	Vertical

Channel 46 / 5230 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.69	54.95	37.42	39.46	5.77	58.68	68.20	-9.52	Peak	Horizontal
15.69	43.38	37.42	39.46	5.77	47.11	54.00	-6.89	Average	Horizontal
15.69	58.24	37.42	39.46	5.77	61.97	68.20	-6.23	Peak	Vertical
15.69	38.88	37.42	39.46	5.77	42.61	54.00	-11.39	Average	Vertical

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IEEE 802.11ac VHT80 / Antenna Chain 0 and Antenna Chain 1

Channel 42 / 5210 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.63	55.48	37.31	39.35	5.61	59.05	68.20	-9.15	Peak	Horizontal
15.63	42.78	37.31	39.35	5.61	46.35	54.00	-7.65	Average	Horizontal
15.63	57.28	37.31	39.35	5.61	60.85	68.20	-7.35	Peak	Vertical
15.63	40.58	37.31	39.35	5.61	44.15	54.00	-9.85	Average	Vertical

Notes:

1. *Measuring frequencies from 9 KHz ~40 GHz, No emission found between lowest internal used/generated frequencies to 30MHz.*
2. *Radiated emissions measured in frequency range from 9 KHz ~40GHz were made with an instrument using Peak detector mode.*
3. *Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11a VHT20, IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;*

5.6. Power line conducted emissions

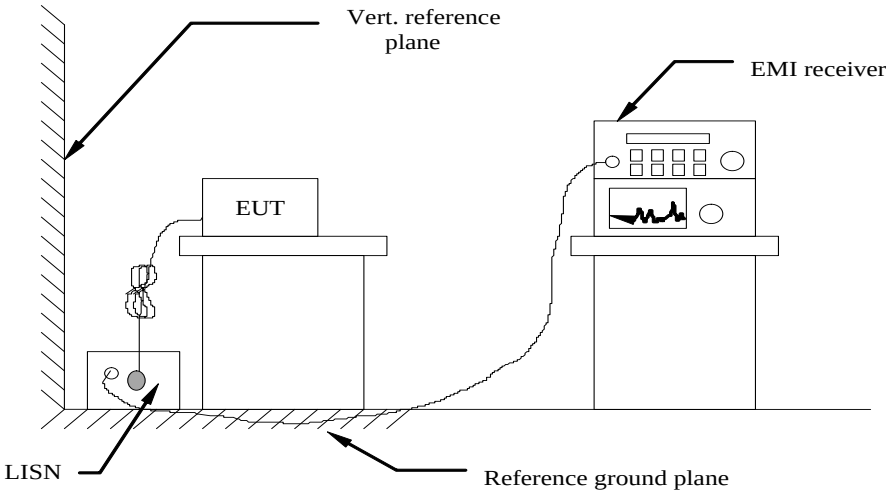
5.6.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

* Decreasing linearly with the logarithm of the frequency

5.6.2 Block Diagram of Test Setup

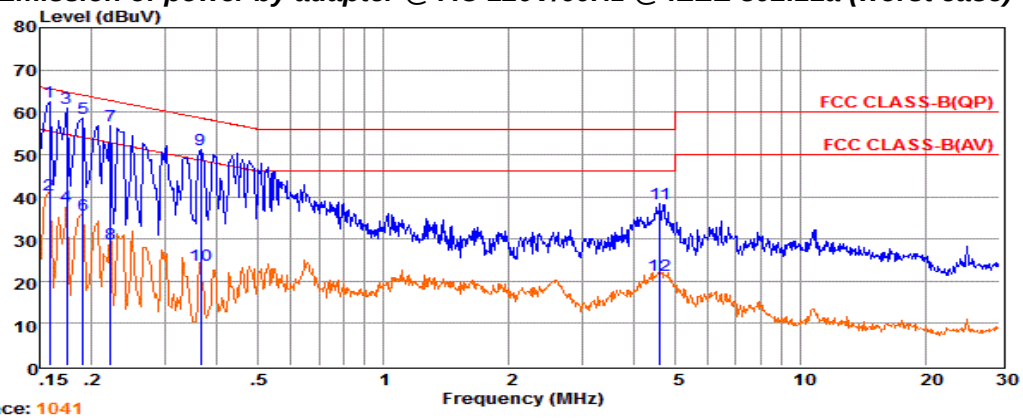


5.6.3 Test Results

PASS.

The test data please refer to following page.

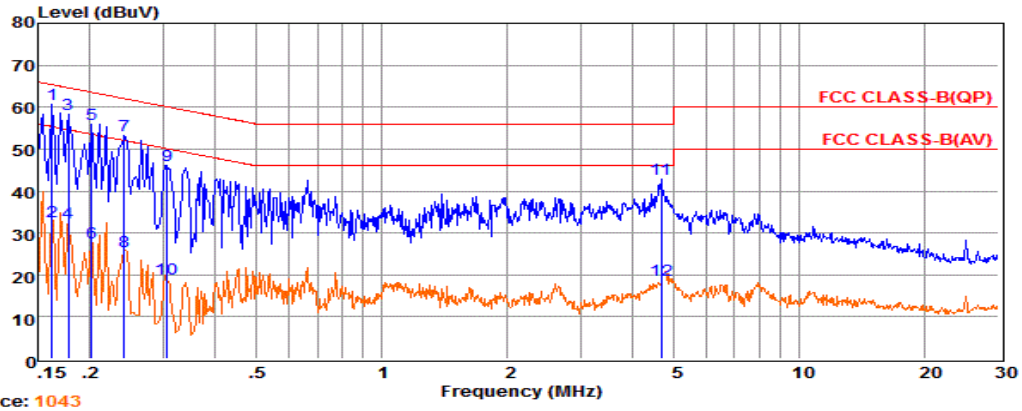
AC Conducted Emission of power by adapter @ AC 120V/60Hz @ IEEE 802.11a (worst case)



Trace: 1041
Power Rating: AC 120V/60Hz
Pol: NEUTRAL

	Freq MHz	Reading dBuV	LISNFac dB	CabLos dB	Aux2Fac dB	Measured dB	Limit dBuV	Over dBuV	Remark dB
1	0.16	42.76	9.68	0.02	10.00	62.46	65.56	-3.10	QP
2	0.16	20.81	9.68	0.02	10.00	40.51	55.55	-15.04	Average
3	0.17	41.17	9.64	0.02	10.00	60.83	64.77	-3.94	QP
4	0.17	18.21	9.64	0.02	10.00	37.87	54.76	-16.89	Average
5	0.19	38.93	9.61	0.02	10.00	58.56	64.02	-5.46	QP
6	0.19	15.98	9.61	0.02	10.00	35.61	54.02	-18.41	Average
7	0.22	37.27	9.59	0.03	10.00	56.89	62.74	-5.85	QP
8	0.22	9.16	9.59	0.03	10.00	28.78	52.74	-23.96	Average
9	0.37	31.53	9.61	0.03	10.00	51.17	58.61	-7.44	QP
10	0.37	4.07	9.61	0.03	10.00	23.71	48.60	-24.89	Average
11	4.60	18.62	9.66	0.06	10.00	38.34	56.00	-17.66	QP
12	4.60	1.80	9.66	0.06	10.00	21.52	46.00	-24.48	Average

Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

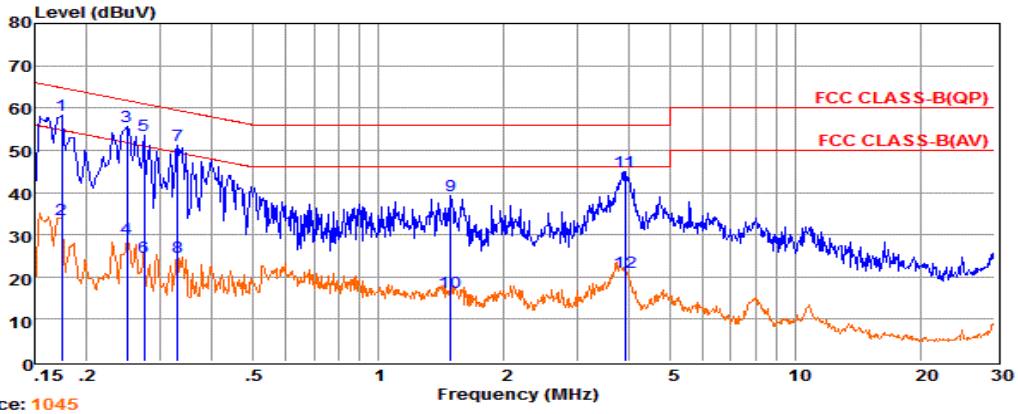


Trace: 1043
Power Rating: AC 120V/60Hz
Pol: LINE

	Freq MHz	Reading dBuV	LISNFac dB	CabLos dB	Aux2Fac dB	Measured dB	Limit dBuV	Over dBuV	Remark dB
1	0.16	40.97	9.59	0.02	10.00	60.58	65.34	-4.76	QP
2	0.16	13.08	9.59	0.02	10.00	32.69	55.33	-22.64	Average
3	0.18	38.78	9.61	0.02	10.00	58.41	64.59	-6.18	QP
4	0.18	12.93	9.61	0.02	10.00	32.56	54.59	-22.03	Average
5	0.20	36.37	9.63	0.02	10.00	56.02	63.54	-7.52	QP
6	0.20	7.93	9.63	0.02	10.00	27.58	53.53	-25.95	Average
7	0.24	33.69	9.63	0.03	10.00	53.35	62.04	-8.69	QP
8	0.24	6.04	9.63	0.03	10.00	25.70	52.04	-26.34	Average
9	0.31	26.40	9.63	0.03	10.00	46.06	60.06	-14.00	QP
10	0.31	-0.65	9.63	0.03	10.00	19.01	50.06	-31.05	Average
11	4.67	22.97	9.65	0.06	10.00	42.68	56.00	-13.32	QP
12	4.67	-0.84	9.65	0.06	10.00	18.87	46.00	-27.13	Average

Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

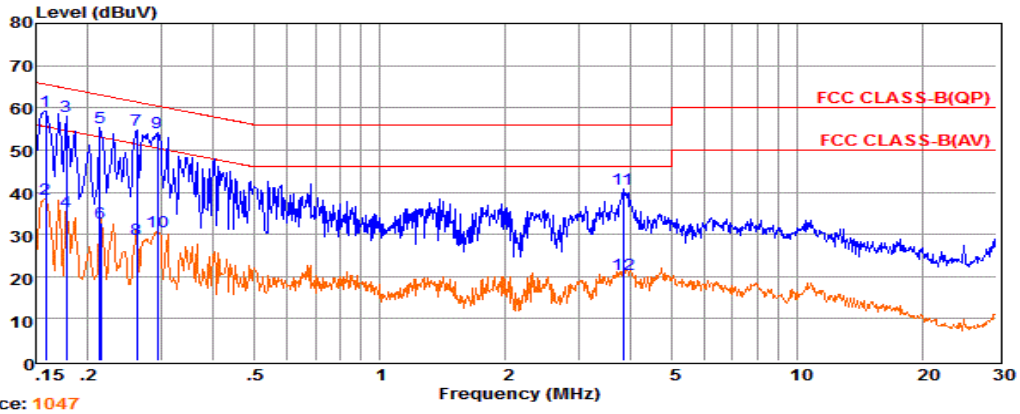
AC Conducted Emission of power by adapter @ AC 240V/60Hz @ IEEE 802.11a (worst case)



Trace: 1045
Power Rating: AC 240V/60Hz
Pol: LINE

	Freq MHz	Reading dBuV	LISNFac dB	CabLos dB	Aux2Fac dB	Measured dB	Limit dBuV	Over dBuV	Remark dB
1	0.17	38.66	9.60	0.02	10.00	58.28	64.77	-6.49	QP
2	0.17	13.92	9.60	0.02	10.00	33.54	54.76	-21.22	Average
3	0.25	35.96	9.63	0.03	10.00	55.62	61.78	-6.16	QP
4	0.25	9.49	9.63	0.03	10.00	29.15	51.77	-22.62	Average
5	0.27	33.76	9.63	0.03	10.00	53.42	60.98	-7.56	QP
6	0.27	4.90	9.63	0.03	10.00	24.56	50.98	-26.42	Average
7	0.33	31.38	9.62	0.03	10.00	51.03	59.44	-8.41	QP
8	0.33	5.09	9.62	0.03	10.00	24.74	49.44	-24.70	Average
9	1.49	19.47	9.64	0.05	10.00	39.16	56.00	-16.84	QP
10	1.49	-3.38	9.64	0.05	10.00	16.31	46.00	-29.69	Average
11	3.90	25.12	9.65	0.06	10.00	44.83	56.00	-11.17	QP
12	3.90	1.31	9.65	0.06	10.00	21.02	46.00	-24.98	Average

Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.



Trace: 1047
Power Rating: AC 240V/60Hz
Pol: NEUTRAL

	Freq MHz	Reading dBuV	LISNFac dB	CabLos dB	Aux2Fac dB	Measured dB	Limit dBuV	Over dBuV	Remark dB
1	0.16	39.54	9.68	0.02	10.00	59.24	65.56	-6.32	QP
2	0.16	18.54	9.68	0.02	10.00	38.24	55.55	-17.31	Average
3	0.18	38.45	9.64	0.02	10.00	58.11	64.59	-6.48	QP
4	0.18	15.64	9.63	0.02	10.00	35.29	54.59	-19.30	Average
5	0.21	35.81	9.59	0.03	10.00	55.43	63.05	-7.62	QP
6	0.21	13.14	9.59	0.03	10.00	32.76	53.05	-20.29	Average
7	0.26	35.15	9.60	0.03	10.00	54.78	61.38	-6.60	QP
8	0.26	9.34	9.60	0.03	10.00	28.97	51.38	-22.41	Average
9	0.29	34.52	9.60	0.03	10.00	54.15	60.41	-6.26	QP
10	0.29	10.97	9.60	0.03	10.00	30.60	50.41	-19.81	Average
11	3.82	21.11	9.65	0.06	10.00	40.82	56.00	-15.18	QP
12	3.82	0.77	9.65	0.06	10.00	20.48	46.00	-25.52	Average

Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

****Note: Pre-scan all modes and recorded the worst case results in this report (IEEE 802.11a).*

5.7 Undesirable Emissions Measurement

5.7.1 LIMIT

According to ξ15.407 (b) Undesirable emission limits. Except as shown in paragraph (b) (7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(a) 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 e.i.r.p. of −27 dBm/MHz.

(b) 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 e.i.r.p. of −27 dBm/MHz.

(c) 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 e.i.r.p. of −27 dBm/MHz.

(d) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

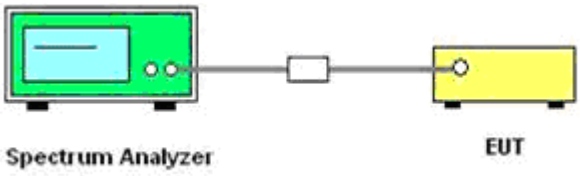
(e) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(f) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(g) The provisions of §15.205 apply to intentional radiators operating under this section.

(h) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

5.7.2 TEST CONFIGURATION



5.7.3 TEST PROCEDURE

According to KDB789033 D02 General UNII Test Procedures New Rules v01 Section G: Unwanted Emission Measurement

1. Unwanted Emissions in the Restricted Bands

a) For all measurements, follow the requirements in section II.G.3. “General Requirements for Unwanted Emissions Measurements.”

b) At frequencies below 1000 MHz, use the procedure described in section II.G.4. “Procedure for Unwanted Emissions Measurements below 1000 MHz.”

c) At frequencies above 1000 MHz, measurements performed using the peak and average measurement procedures described in sections II.G.5. and II.G.6, respectively, must satisfy the respective peak and average limits. If all peak measurements satisfy the average limit, then average measurements are not required.

d) For conducted measurements above 1000 MHz, EIRP shall be computed as specified in section II.G.3.b) and then field strength shall be computed as follows (see KDB Publication 412172):

i) E[dBμV/m] = EIRP[dBm] - 20 log (d[meters]) + 104.77, where E = field strength and d = distance at which field strength limit is specified in the rules;

ii) E[dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters

e) For conducted measurements below 1000 MHz, the field strength shall be computed as specified in d), above, and then an additional 4.7 dB shall be added as an upper bound on the field strength that would be observed on a test range with a ground plane for frequencies between 30 MHz and 1000 MHz, or an additional 6 dB shall be added for frequencies below 30 MHz.

2. Unwanted Emissions that fall Outside of the Restricted Bands

a) For all measurements, follow the requirements in section II.G.3. “General Requirements for Unwanted Emissions Measurements.”

b) At frequencies below 1000 MHz, use the procedure described in section II.G.4. “Procedure for Unwanted Emissions Measurements below 1000 MHz.”

c) At frequencies above 1000 MHz, use the procedure for maximum emissions described in section II.G.5., “Procedure for Unwanted Maximum Unwanted Emissions Measurements Above 1000 MHz.”

d) Section 15.407(b) (1-3) specifies the unwanted emissions limit for the U-NII-1 and 2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz. However, an out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz dBm/MHz peak emission limit.

i) Section 15.407(b) (4) specifies the unwanted emissions limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b) (4) (i). An alternative to the band emissions mask is specified in Section 15.407(b) (4) (ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the alternative limit.

e) If radiated measurements are performed, field strength is then converted to EIRP as follows:

i) EIRP = ((E×d) ^2) / 30

Where:

- E is the field strength in V/m;
- d is the measurement distance in meters;
- EIRP is the equivalent isotopically radiated power in watts;

ii) Working in dB units, the above equation is equivalent to:

EIRP [dBm] = E [dBμV/m] + 20 log (d [meters]) - 104.77

iii) Or, if d is 3 meters:

EIRP [dBm] = E [dBμV/m] - 95.23

3) Radiated versus Conducted Measurements.

The unwanted emission limits in both the restricted and non-restricted bands are based on radiated measurements; however, as an alternative, antenna-port conducted measurements in conjunction with cabinet emissions tests will be permitted to demonstrate compliance provided that the following steps are performed:

(i) Cabinet emissions measurements. A radiated test shall be performed to ensure that cabinet emissions are below the emission limits. For the cabinet-emission measurements the antenna may be replaced by a termination matching the nominal impedance of the antenna.

(ii) Impedance matching. Conducted tests shall be performed using equipment that matches the nominal impedance of the antenna assembly used with the EUT.

(iii) EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater.3 However, for devices that operate in multiple bands using the same transmit antenna, the highest gain of the antenna within the operating band nearest to the out-of-band frequency being measured may be used in lieu of the overall highest gain when measuring emissions at frequencies within 20% of the absolute frequency at the nearest edge of that band, but in no case shall a value less than 2 dBi be selected.

(v) EIRP adjustments for multiple outputs. For devices with multiple outputs occupying the same or overlapping frequency ranges in the same band (e.g., MIMO or beamforming devices), compute the total EIRP as follows:

- Compute EIRP for each output, as described in (iii), above.
- Follow the procedures specified in KDB Publication 662911 for summing emissions across the outputs or adjusting emission levels measured on individual outputs by 10 log (N_{ANT}), where N_{ANT} is the number of outputs.
- Add the array gain term specified in KDB Publication 662911 for out-of-band and spurious signals.

(iv) Direction of maximum emission.

For all radiated emissions tests, measurements shall correspond to the direction of maximum emission level for each measured emission (see ANSI C63.10 for guidance).

5.7.4 TEST RESULTS

For Antenna Chain 0

IEEE 802.11a								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
4500.000	-60.761	2.000	0.000	36.499	Peak	74.00	-37.501	PASS
4500.000	-71.875	2.000	0.000	25.385	Average	54.00	-28.615	PASS
5150.000	-46.734	2.000	0.000	50.526	Peak	74.00	-23.474	PASS
5150.000	-57.004	2.000	0.000	40.256	Average	54.00	-13.744	PASS
5350.000	-54.753	2.000	0.000	42.507	Peak	74.00	-31.493	PASS
5350.000	-64.289	2.000	0.000	32.971	Average	54.00	-21.029	PASS
5460.000	-57.282	2.000	0.000	39.978	Peak	74.00	-34.022	PASS
5460.000	-67.286	2.000	0.000	29.974	Average	54.00	-24.026	PASS

IEEE 802.11n HT20								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
4500.000	-62.450	2.000	0.000	34.810	Peak	74.00	-39.190	PASS
4500.000	-72.488	2.000	0.000	24.772	Average	54.00	-29.228	PASS
5150.000	-47.691	2.000	0.000	49.569	Peak	74.00	-24.431	PASS
5150.000	-58.773	2.000	0.000	38.487	Average	54.00	-15.513	PASS
5350.000	-57.276	2.000	0.000	39.984	Peak	74.00	-34.016	PASS
5350.000	-64.134	2.000	0.000	33.126	Average	54.00	-20.874	PASS
5460.000	-59.681	2.000	0.000	37.579	Peak	74.00	-36.421	PASS
5460.000	-67.265	2.000	0.000	29.995	Average	54.00	-24.005	PASS

IEEE 802.11ac VHT20								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
4500.000	-61.870	2.000	0.000	35.390	Peak	74.00	-38.610	PASS
4500.000	-72.335	2.000	0.000	24.925	Average	54.00	-29.075	PASS
5150.000	-49.676	2.000	0.000	47.584	Peak	74.00	-26.416	PASS
5150.000	-58.713	2.000	0.000	38.547	Average	54.00	-15.453	PASS
5350.000	-56.040	2.000	0.000	41.220	Peak	74.00	-32.780	PASS
5350.000	-66.212	2.000	0.000	31.048	Average	54.00	-22.952	PASS
5460.000	-60.722	2.000	0.000	36.538	Peak	74.00	-37.462	PASS
5460.000	-69.647	2.000	0.000	27.613	Average	54.00	-26.387	PASS

IEEE 802.11n HT40								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
4500.000	-62.177	2.000	0.000	35.083	Peak	74.00	-38.917	PASS
4500.000	-72.492	2.000	0.000	24.768	Average	54.00	-29.232	PASS
5150.000	-42.029	2.000	0.000	55.231	Peak	74.00	-18.769	PASS
5150.000	-51.124	2.000	0.000	46.136	Average	54.00	-7.864	PASS
5350.000	-56.675	2.000	0.000	40.585	Peak	74.00	-33.415	PASS
5350.000	-66.827	2.000	0.000	30.433	Average	54.00	-23.567	PASS
5460.000	-59.608	2.000	0.000	37.652	Peak	74.00	-36.348	PASS
5460.000	-69.488	2.000	0.000	27.772	Average	54.00	-26.228	PASS

IEEE 802.11ac VHT40								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
4500.000	-63.058	2.000	0.000	34.202	Peak	74.00	-39.798	PASS
4500.000	-72.452	2.000	0.000	24.808	Average	54.00	-29.192	PASS
5150.000	-39.381	2.000	0.000	57.879	Peak	74.00	-16.121	PASS
5150.000	-52.602	2.000	0.000	44.658	Average	54.00	-9.342	PASS
5350.000	-57.289	2.000	0.000	39.971	Peak	74.00	-34.029	PASS
5350.000	-66.721	2.000	0.000	30.539	Average	54.00	-23.461	PASS
5460.000	-59.728	2.000	0.000	37.532	Peak	74.00	-36.468	PASS
5460.000	-69.415	2.000	0.000	27.845	Average	54.00	-26.155	PASS

IEEE 802.11ac VHT80								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
4500.000	-62.221	2.000	0.000	35.039	Peak	74.00	-38.961	PASS
4500.000	-71.612	2.000	0.000	25.648	Average	54.00	-28.352	PASS
5150.000	-46.597	2.000	0.000	50.663	Peak	74.00	-23.337	PASS
5150.000	-57.700	2.000	0.000	39.560	Average	54.00	-14.440	PASS
5350.000	-55.761	2.000	0.000	41.499	Peak	74.00	-32.501	PASS
5350.000	-67.248	2.000	0.000	30.012	Average	54.00	-23.988	PASS
5460.000	-58.814	2.000	0.000	38.446	Peak	74.00	-35.554	PASS
5460.000	-69.250	2.000	0.000	28.010	Average	54.00	-25.990	PASS

For Antenna Chain 1

IEEE 802.11a								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
4500.000	-62.047	2.000	0.000	35.213	Peak	74.00	-38.787	PASS
4500.000	-71.871	2.000	0.000	25.389	Average	54.00	-28.611	PASS
5150.000	-47.003	2.000	0.000	50.257	Peak	74.00	-23.743	PASS
5150.000	-57.158	2.000	0.000	40.102	Average	54.00	-13.898	PASS
5350.000	-55.414	2.000	0.000	41.846	Peak	74.00	-32.154	PASS
5350.000	-64.117	2.000	0.000	33.143	Average	54.00	-20.857	PASS
5460.000	-57.459	2.000	0.000	39.801	Peak	74.00	-34.199	PASS
5460.000	-67.286	2.000	0.000	29.974	Average	54.00	-24.026	PASS

IEEE 802.11n HT20								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
4500.000	-62.898	2.000	0.000	34.362	Peak	74.00	-39.638	PASS
4500.000	-72.479	2.000	0.000	24.781	Average	54.00	-29.219	PASS
5150.000	-49.388	2.000	0.000	47.872	Peak	74.00	-26.128	PASS
5150.000	-58.407	2.000	0.000	38.853	Average	54.00	-15.147	PASS
5350.000	-54.637	2.000	0.000	42.623	Peak	74.00	-31.377	PASS
5350.000	-64.243	2.000	0.000	33.017	Average	54.00	-20.983	PASS
5460.000	-58.776	2.000	0.000	38.484	Peak	74.00	-35.516	PASS
5460.000	-67.199	2.000	0.000	30.061	Average	54.00	-23.939	PASS

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IEEE 802.11ac VHT20								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
4500.000	-63.892	2.000	0.000	33.368	Peak	74.00	-40.632	PASS
4500.000	-72.379	2.000	0.000	24.881	Average	54.00	-29.119	PASS
5150.000	-50.733	2.000	0.000	46.527	Peak	74.00	-27.473	PASS
5150.000	-58.942	2.000	0.000	38.318	Average	54.00	-15.682	PASS
5350.000	-56.647	2.000	0.000	40.613	Peak	74.00	-33.387	PASS
5350.000	-66.589	2.000	0.000	30.671	Average	54.00	-23.329	PASS
5460.000	-60.077	2.000	0.000	37.183	Peak	74.00	-36.817	PASS
5460.000	-69.902	2.000	0.000	27.358	Average	54.00	-26.642	PASS

IEEE 802.11n HT40								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
4500.000	-61.518	2.000	0.000	35.742	Peak	74.00	-38.258	PASS
4500.000	-72.359	2.000	0.000	24.901	Average	54.00	-29.099	PASS
5150.000	-36.207	2.000	0.000	61.053	Peak	74.00	-12.947	PASS
5150.000	-50.128	2.000	0.000	47.132	Average	54.00	-6.868	PASS
5350.000	-57.555	2.000	0.000	39.705	Peak	74.00	-34.295	PASS
5350.000	-66.957	2.000	0.000	30.303	Average	54.00	-23.697	PASS
5460.000	-60.384	2.000	0.000	36.876	Peak	74.00	-37.124	PASS
5460.000	-69.743	2.000	0.000	27.517	Average	54.00	-26.483	PASS

IEEE 802.11ac VHT40								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
4500.000	-62.499	2.000	0.000	34.761	Peak	74.00	-39.239	PASS
4500.000	-72.135	2.000	0.000	25.125	Average	54.00	-28.875	PASS
5150.000	-40.523	2.000	0.000	56.737	Peak	74.00	-17.263	PASS
5150.000	-53.737	2.000	0.000	43.523	Average	54.00	-10.477	PASS
5350.000	-57.109	2.000	0.000	40.151	Peak	74.00	-33.849	PASS
5350.000	-66.859	2.000	0.000	30.401	Average	54.00	-23.599	PASS
5460.000	-59.181	2.000	0.000	38.079	Peak	74.00	-35.921	PASS
5460.000	-69.603	2.000	0.000	27.657	Average	54.00	-26.343	PASS

IEEE 802.11ac VHT80								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
4500.000	-61.495	2.000	0.000	35.765	Peak	74.00	-38.235	PASS
4500.000	-71.915	2.000	0.000	25.345	Average	54.00	-28.655	PASS
5150.000	-46.788	2.000	0.000	50.472	Peak	74.00	-23.528	PASS
5150.000	-57.182	2.000	0.000	40.078	Average	54.00	-13.922	PASS
5350.000	-58.289	2.000	0.000	38.971	Peak	74.00	-35.029	PASS
5350.000	-66.978	2.000	0.000	30.282	Average	54.00	-23.718	PASS
5460.000	-58.302	2.000	0.000	38.958	Peak	74.00	-35.042	PASS
5460.000	-69.370	2.000	0.000	27.890	Average	54.00	-26.110	PASS

For Combined Antenna Chain 0 and Antenna Chain 1

IEEE 802.11n HT20										
Frequency (MHz)	Conducted Power (dBm)			Directional Gain (dB)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
	Antenna 0	Antenna 1	Sum							
4500.000	-62.450	-62.898	-59.658	5.010*	0.000	40.612	Peak	74.00	-33.388	PASS
4500.000	-72.488	-72.479	-69.473	5.010*	0.000	30.797	Average	54.00	-23.203	PASS
5150.000	-47.691	-49.388	-45.447	5.010*	0.000	54.823	Peak	74.00	-19.177	PASS
5150.000	-58.773	-58.407	-55.576	5.010*	0.000	44.694	Average	54.00	-9.306	PASS
5350.000	-57.276	-54.637	-52.749	5.010*	0.000	47.521	Peak	74.00	-26.479	PASS
5350.000	-64.134	-64.243	-61.178	5.010*	0.000	39.092	Average	54.00	-14.908	PASS
5460.000	-59.681	-58.776	-56.195	5.010*	0.000	44.075	Peak	74.00	-29.925	PASS
5460.000	-67.265	-67.199	-64.222	5.010*	0.000	36.048	Average	54.00	-17.952	PASS

IEEE 802.11ac VHT20										
Frequency (MHz)	Conducted Power (dBm)			Directional Gain (dB)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
	Antenna 0	Antenna 1	Sum							
4500.000	-61.870	-63.892	-59.754	5.010*	0.000	40.516	Peak	74.00	-33.484	PASS
4500.000	-72.335	-72.379	-69.347	5.010*	0.000	30.923	Average	54.00	-23.077	PASS
5150.000	-49.676	-50.733	-47.162	5.010*	0.000	53.108	Peak	74.00	-20.892	PASS
5150.000	-58.713	-58.942	-55.816	5.010*	0.000	44.454	Average	54.00	-9.546	PASS
5350.000	-56.040	-56.647	-53.323	5.010*	0.000	46.947	Peak	74.00	-27.053	PASS
5350.000	-66.212	-66.589	-63.386	5.010*	0.000	36.884	Average	54.00	-17.116	PASS
5460.000	-60.722	-60.077	-57.377	5.010*	0.000	42.893	Peak	74.00	-31.107	PASS
5460.000	-69.647	-69.902	-66.762	5.010*	0.000	33.508	Average	54.00	-20.492	PASS

IEEE 802.11n HT40										
Frequency (MHz)	Conducted Power (dBm)			Directional Gain (dB)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
	Antenna 0	Antenna 1	Sum							
4500.000	-62.177	-61.518	-58.825	5.010*	0.000	41.445	Peak	74.00	-32.555	PASS
4500.000	-72.492	-72.359	-69.415	5.010*	0.000	30.855	Average	54.00	-23.145	PASS
5150.000	-42.029	-36.207	-35.197	5.010*	0.000	65.073	Peak	74.00	-8.927	PASS
5150.000	-51.124	-50.128	-47.587	5.010*	0.000	52.683	Average	54.00	-1.317	PASS
5350.000	-56.675	-57.555	-54.082	5.010*	0.000	46.188	Peak	74.00	-27.812	PASS
5350.000	-66.827	-66.957	-63.881	5.010*	0.000	36.389	Average	54.00	-17.611	PASS
5460.000	-59.608	-60.384	-56.968	5.010*	0.000	43.302	Peak	74.00	-30.698	PASS
5460.000	-69.488	-69.743	-66.603	5.010*	0.000	33.667	Average	54.00	-20.333	PASS

IEEE 802.11ac VHT40										
Frequency (MHz)	Conducted Power (dBm)			Directional Gain (dB)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
	Antenna 0	Antenna 1	Sum							
4500.000	-63.058	-62.499	-59.759	5.010*	0.000	40.511	Peak	74.00	-33.489	PASS
4500.000	-72.452	-72.135	-69.280	5.010*	0.000	30.990	Average	54.00	-23.010	PASS
5150.000	-39.381	-40.523	-36.904	5.010*	0.000	63.366	Peak	74.00	-10.634	PASS
5150.000	-52.602	-53.737	-50.122	5.010*	0.000	50.148	Average	54.00	-3.852	PASS
5350.000	-57.289	-57.109	-54.188	5.010*	0.000	46.082	Peak	74.00	-27.918	PASS
5350.000	-66.721	-66.859	-63.779	5.010*	0.000	36.491	Average	54.00	-17.509	PASS
5460.000	-59.728	-59.181	-56.436	5.010*	0.000	43.834	Peak	74.00	-30.166	PASS
5460.000	-69.415	-69.603	-66.498	5.010*	0.000	33.772	Average	54.00	-20.228	PASS

IEEE 802.11ac VHT80										
Frequency (MHz)	Conducted Power (dBm)			Directional Gain (dB)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
	Antenna 0	Antenna 1	Sum							
4500.000	-62.221	-61.495	-58.833	5.010*	0.000	41.437	Peak	74.00	-32.563	PASS
4500.000	-71.612	-71.915	-68.751	5.010*	0.000	31.519	Average	54.00	-22.481	PASS
5150.000	-46.597	-46.788	-43.681	5.010*	0.000	56.589	Peak	74.00	-17.411	PASS
5150.000	-57.700	-57.182	-54.423	5.010*	0.000	45.847	Average	54.00	-8.153	PASS
5350.000	-55.761	-58.289	-53.833	5.010*	0.000	46.437	Peak	74.00	-27.563	PASS
5350.000	-67.248	-66.978	-64.101	5.010*	0.000	36.169	Average	54.00	-17.831	PASS
5460.000	-58.814	-58.302	-55.540	5.010*	0.000	44.730	Peak	74.00	-29.270	PASS
5460.000	-69.250	-69.370	-66.299	5.010*	0.000	33.971	Average	54.00	-20.029	PASS

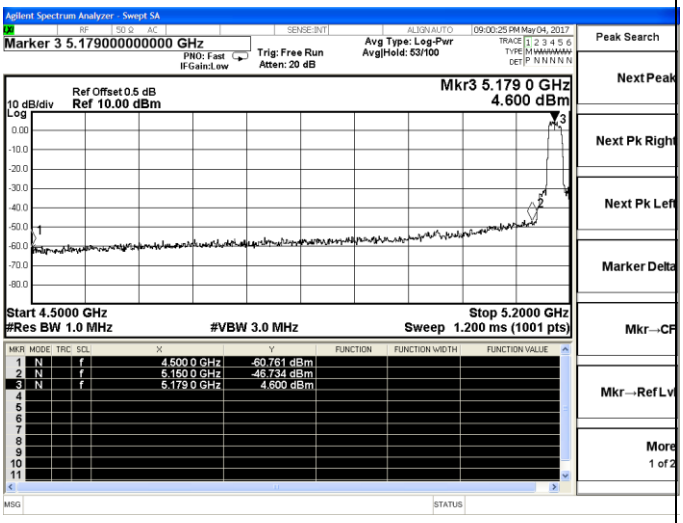
Remark:

1. *Measured Undesirable emission at difference data rate for each mode and recorded worst case for each mode.*
2. *Test results including cable loss;*
3. *Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11a VHT20, IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;*
4. *For MIMO with CCD technology device, The Directional Gain= Gain of individual transmit antennas (dBi) + Array gain;*
   Array gain = 10 log (N_{ant}), where N_{ant} is the number of transmit antennas.
5. **5.01=2.00+10*log(2).*
6. *Covert Radiated E Level At 3m = Conducted average power + Directional Gain + 104.8-20*log(3);*
7. *Please refer to following test plots;*

Undesirable emission

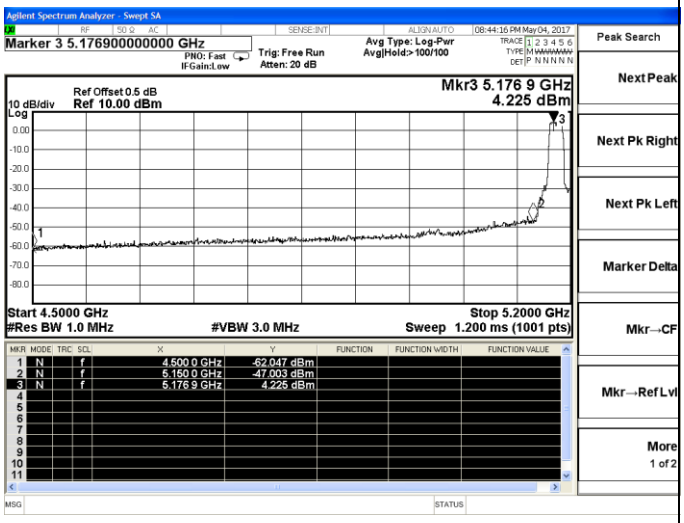
IEEE 802.11a

Antenna Chain 0

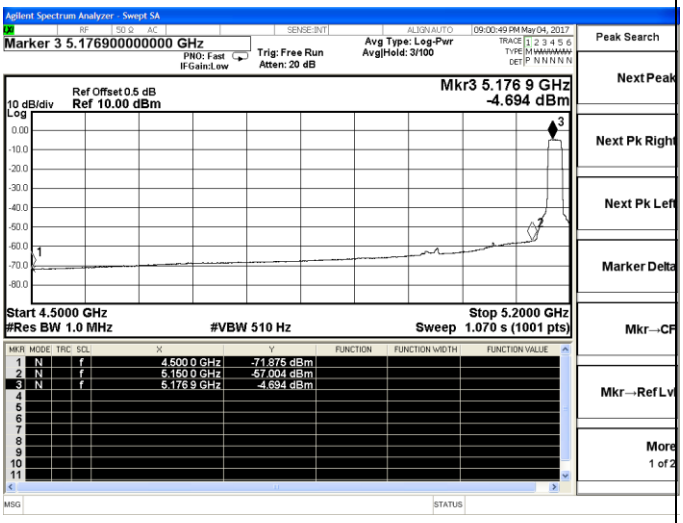


Channel 36 / 5180 MHz – Peak

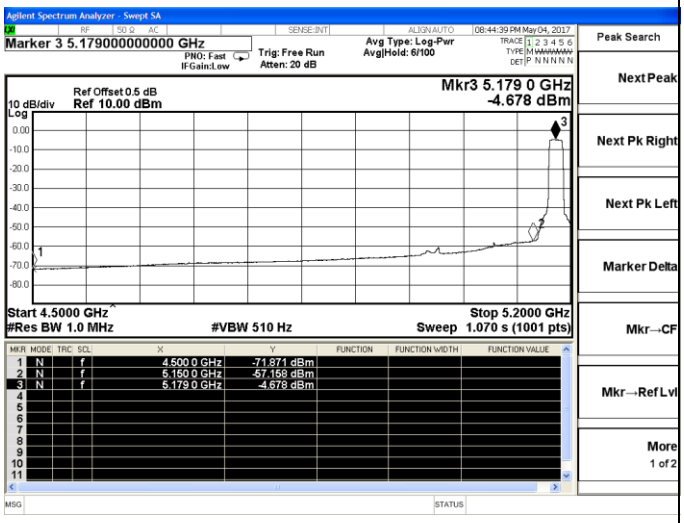
Antenna Chain 1



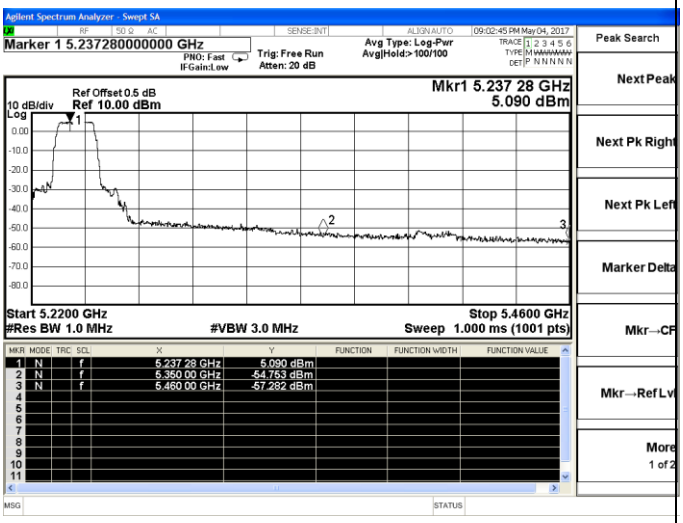
Channel 36 / 5180 MHz – Peak



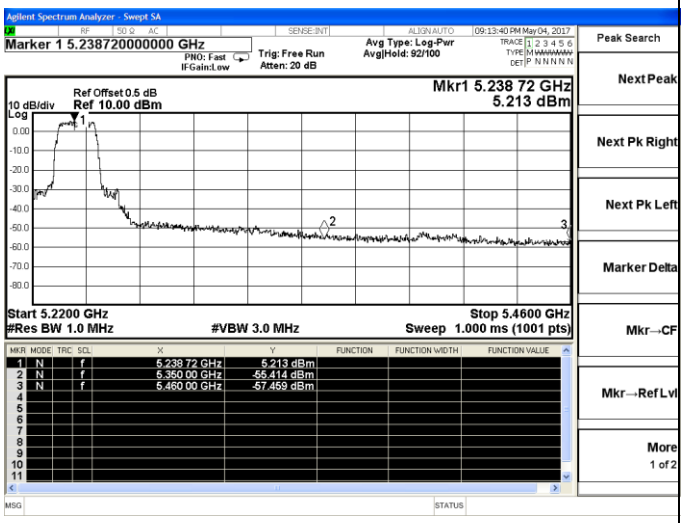
Channel 36 / 5180 MHz – Average



Channel 36 / 5180 MHz – Average



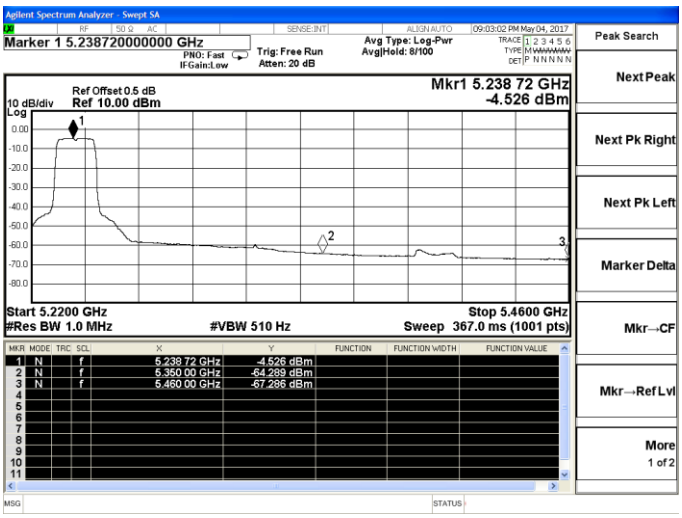
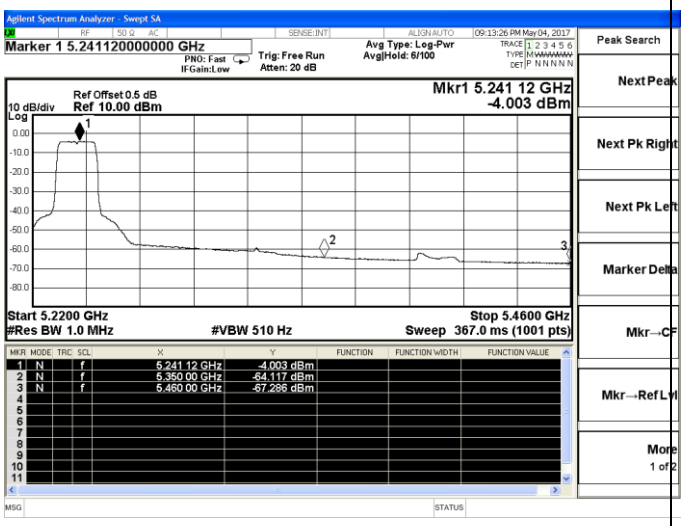
Channel 48 / 5240 MHz – Peak



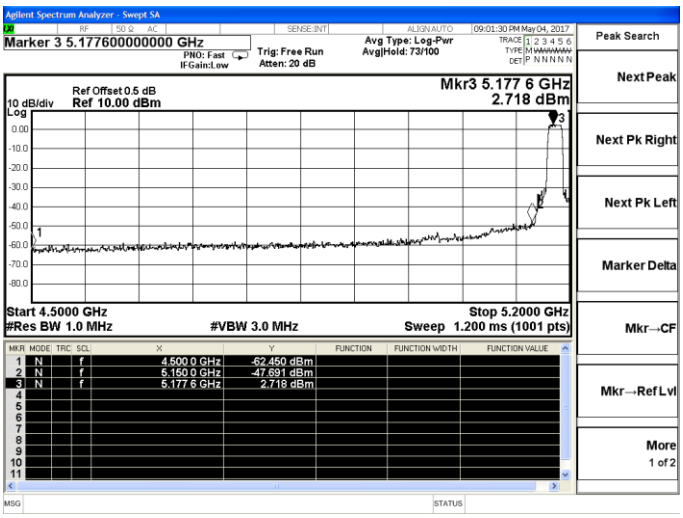
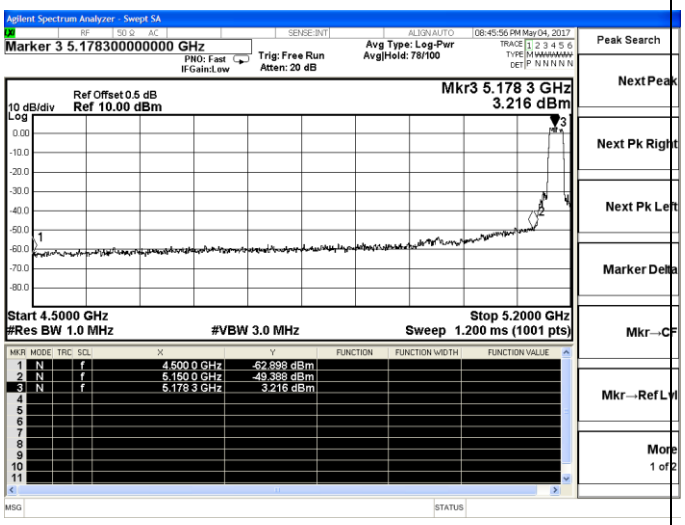
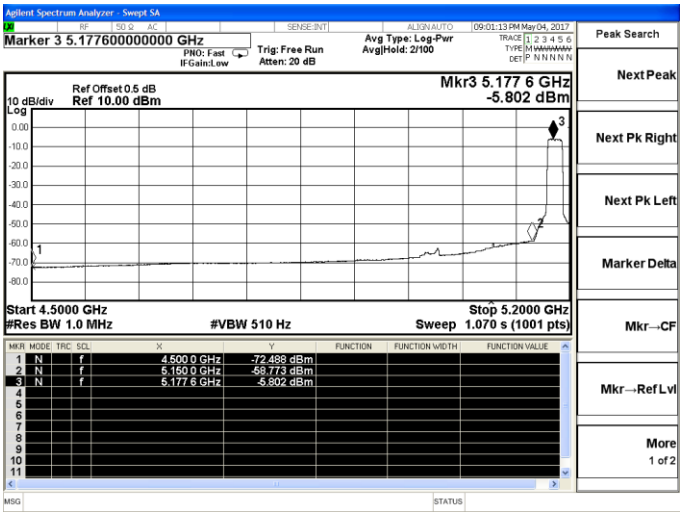
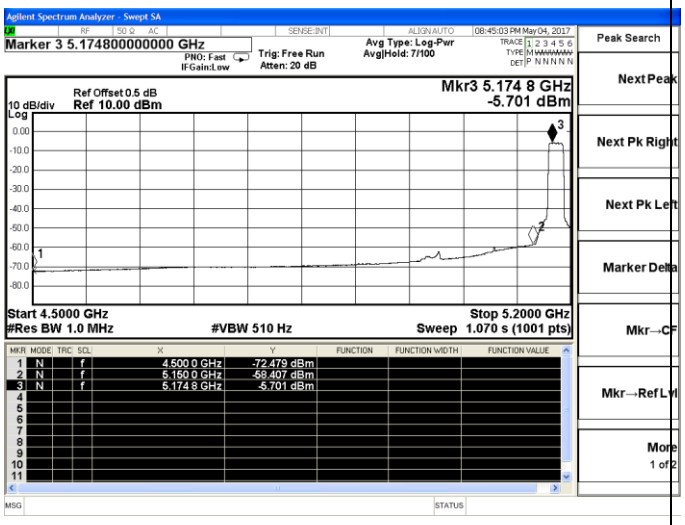
Channel 48 / 5240 MHz – Peak

Undesirable emission

IEEE 802.11a

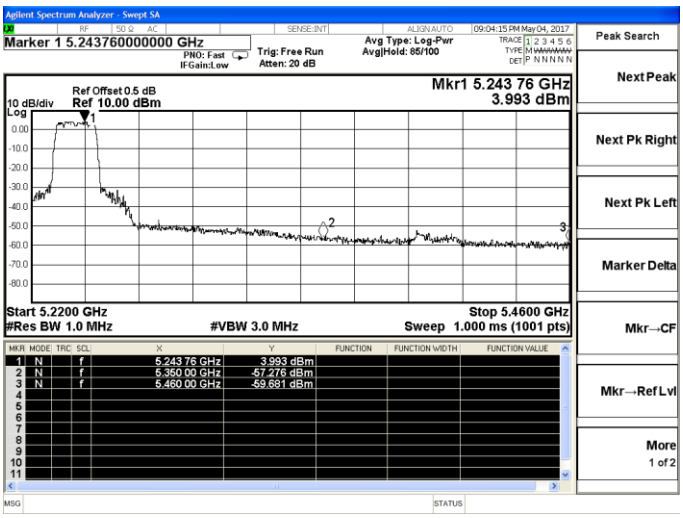
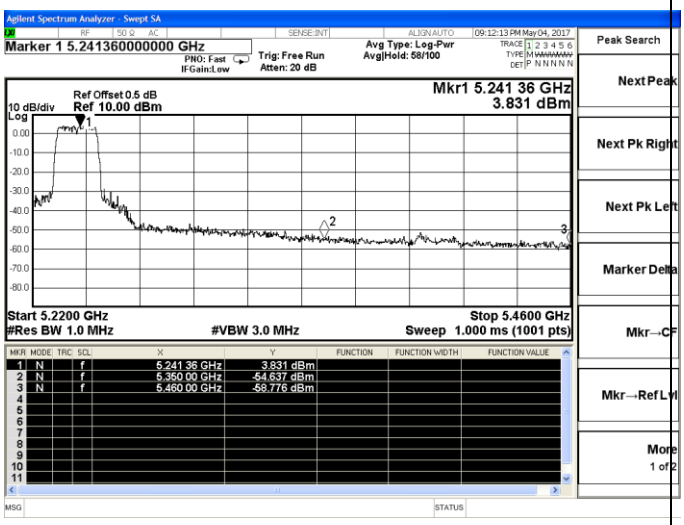
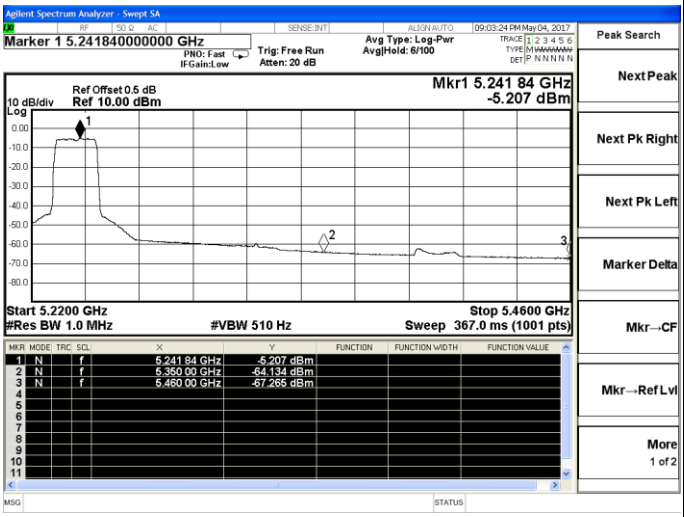
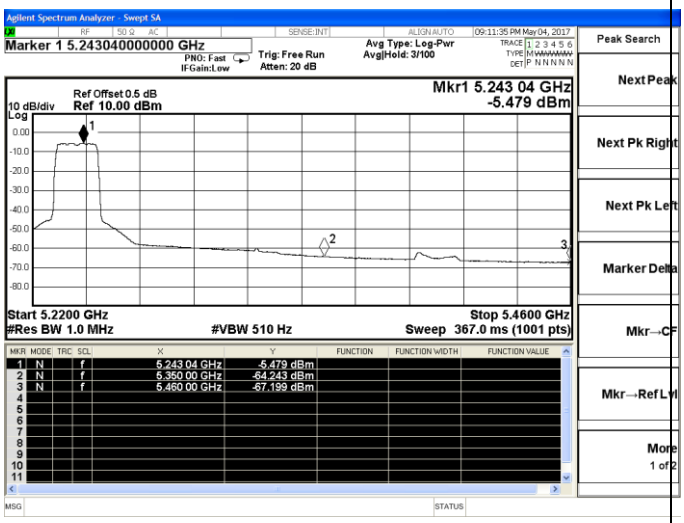
Antenna Chain 0	Antenna Chain 1
	
Channel 48 / 5240 MHz – Average	Channel 48 / 5240 MHz – Average

IEEE 802.11n HT20

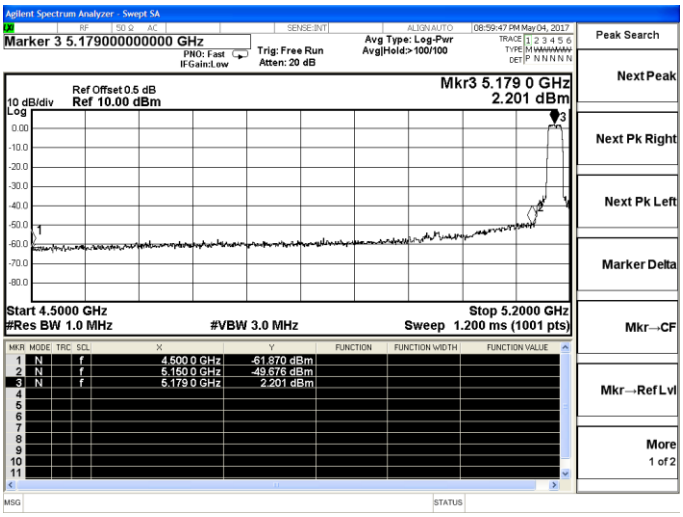
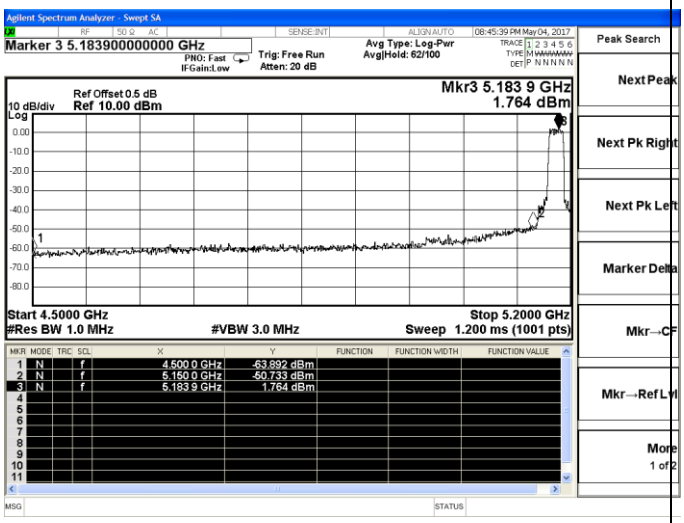
	
Channel 36 / 5180 MHz – Peak	Channel 36 / 5180 MHz – Peak
	
Channel 36 / 5180 MHz – Average	Channel 36 / 5180 MHz – Average

Undesirable emission

IEEE 802.11n HT20

Antenna Chain 0	Antenna Chain 1
	
Channel 48 / 5240 MHz – Peak	Channel 48 / 5240 MHz – Peak
	
Channel 48 / 5240 MHz – Average	Channel 48 / 5240 MHz – Average

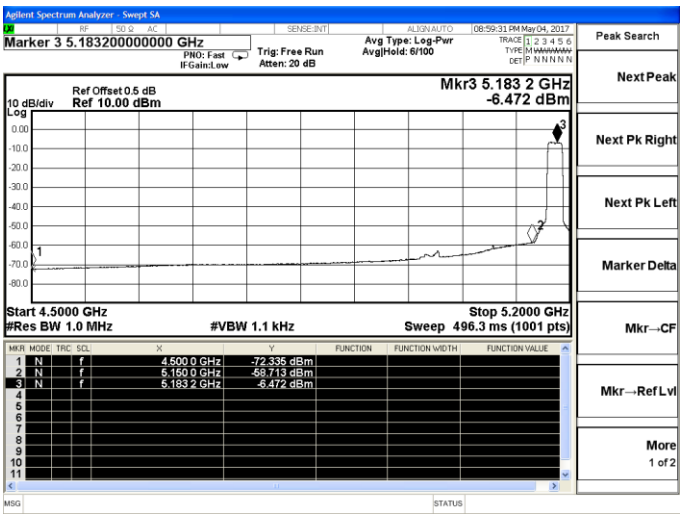
IEEE 802.11ac VHT20

	
Channel 36 / 5180 MHz – Peak	Channel 36 / 5180 MHz – Peak

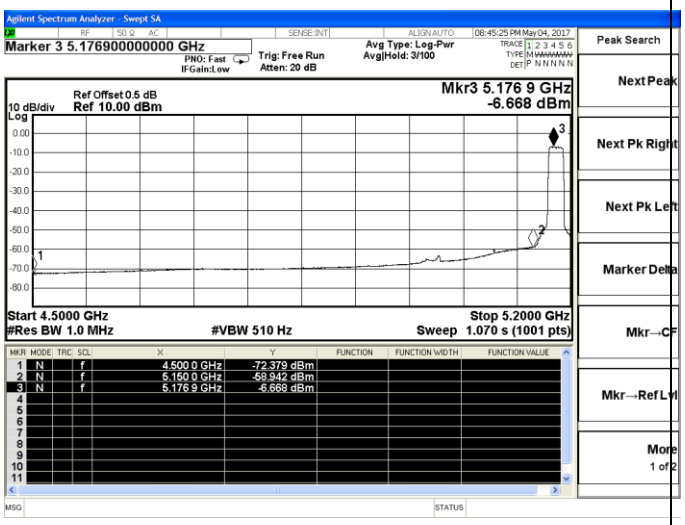
Undesirable emission

IEEE 802.11ac VHT20

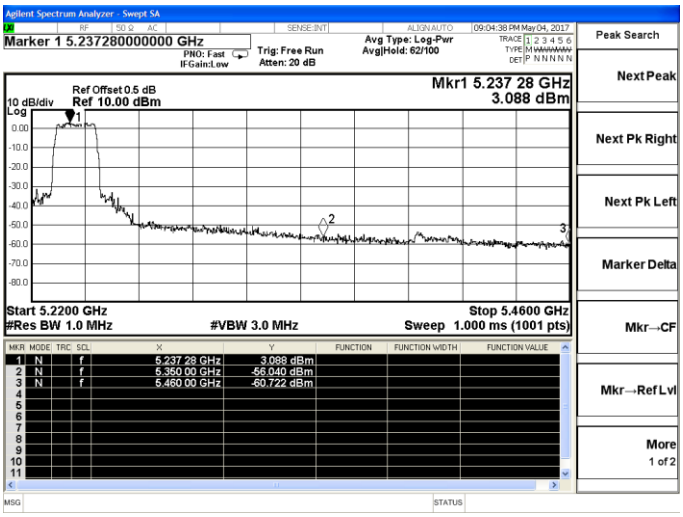
Antenna Chain 0



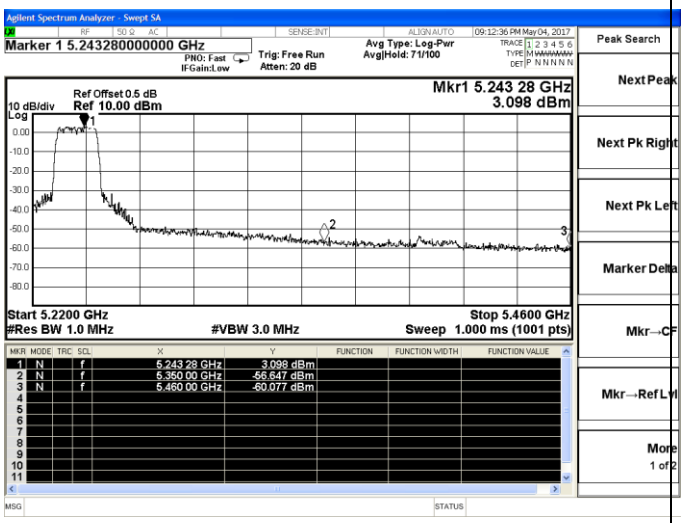
Antenna Chain 1



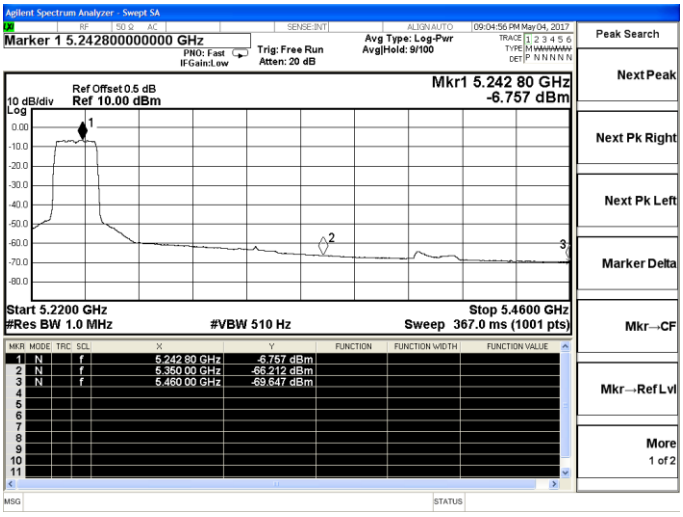
Channel 36 / 5180 MHz – Average



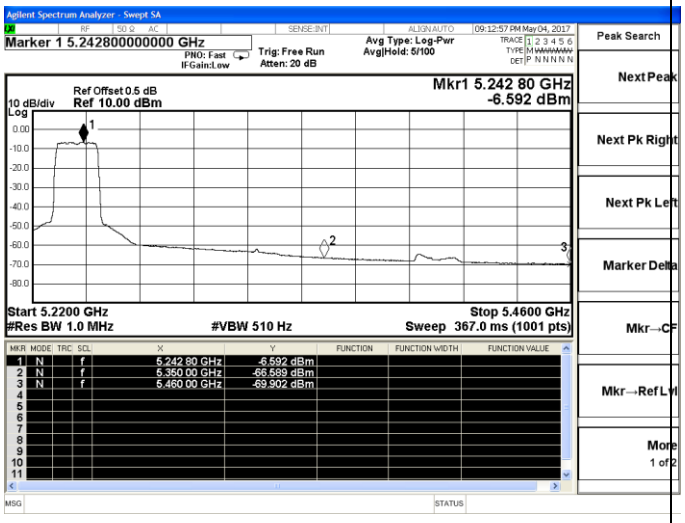
Channel 36 / 5180 MHz – Average



Channel 48 / 5240 MHz – Peak



Channel 48 / 5240 MHz – Peak



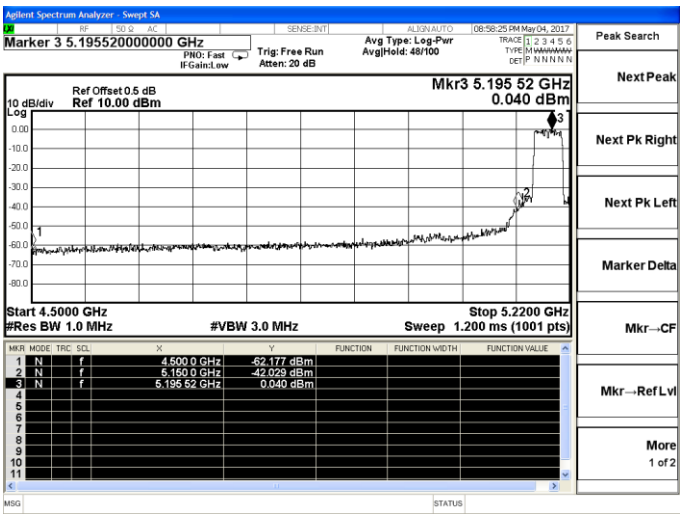
Channel 48 / 5240 MHz – Average

Channel 48 / 5240 MHz – Average

Undesirable emission

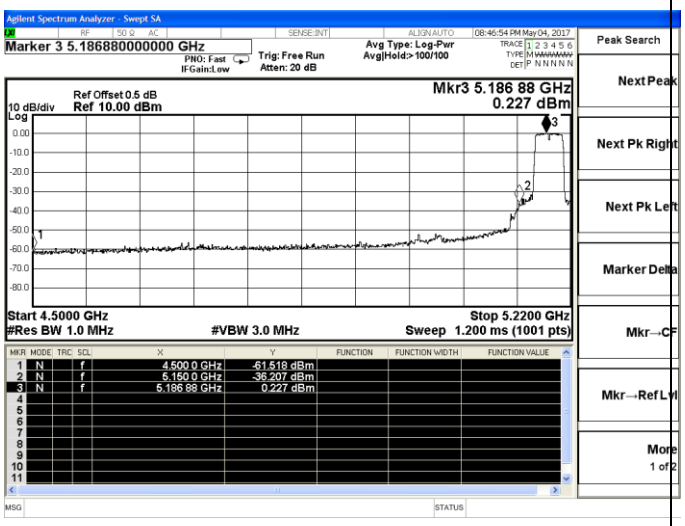
IEEE 802.11n HT40

Antenna Chain 0

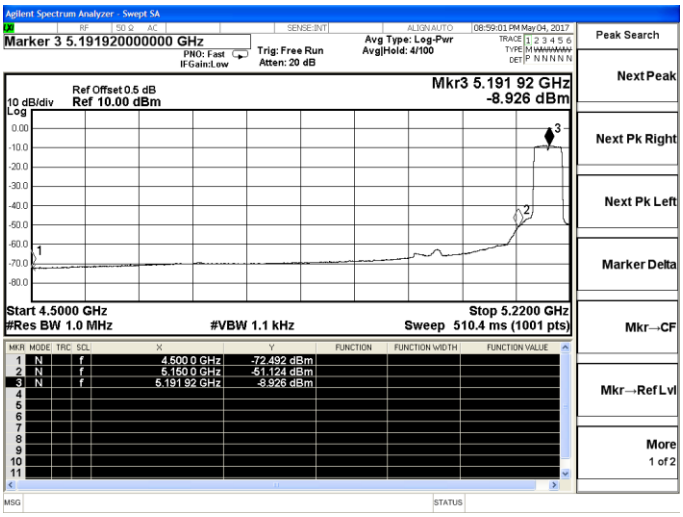


Channel 38 / 5190 MHz – Peak

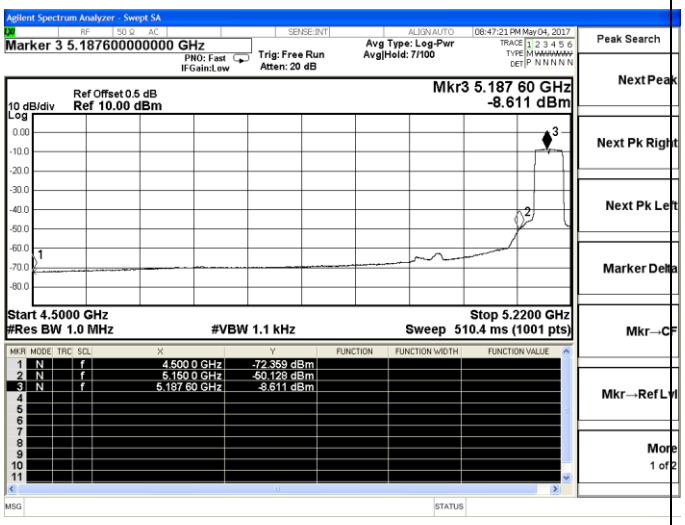
Antenna Chain 1



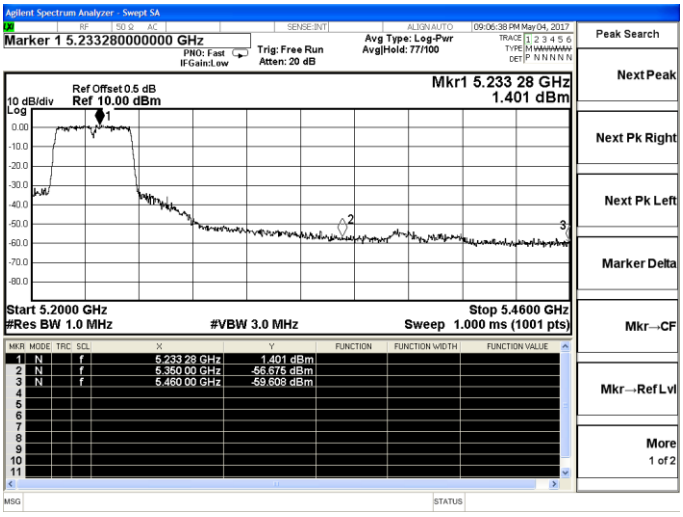
Channel 38 / 5190 MHz – Peak



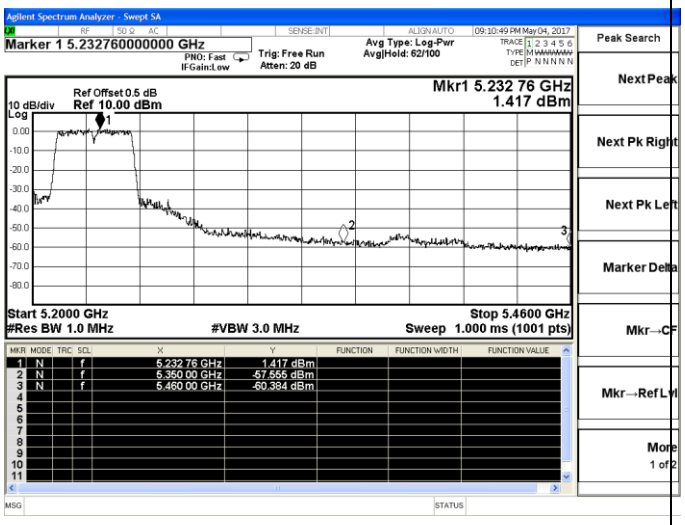
Channel 38 / 5190 MHz – Average



Channel 38 / 5190 MHz – Average



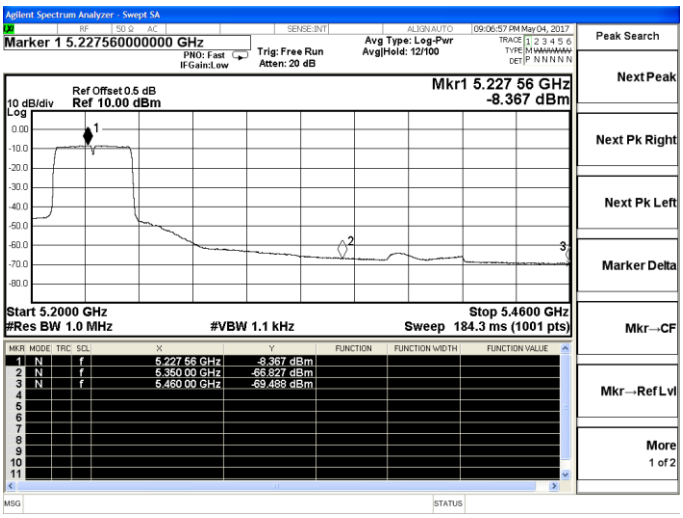
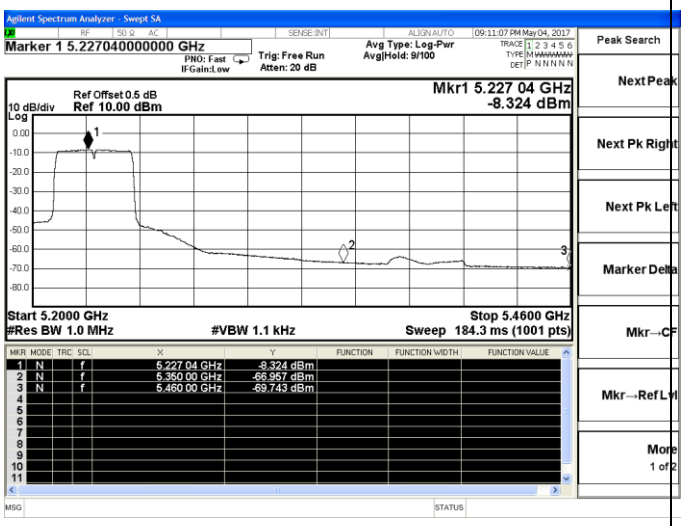
Channel 46 / 5230 MHz – Peak



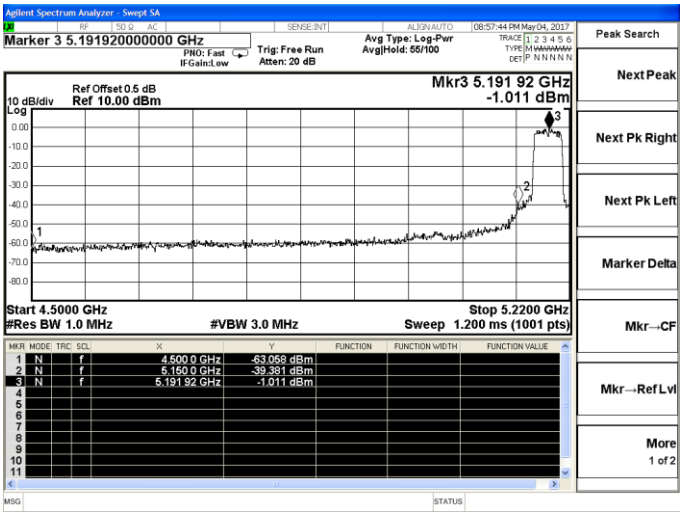
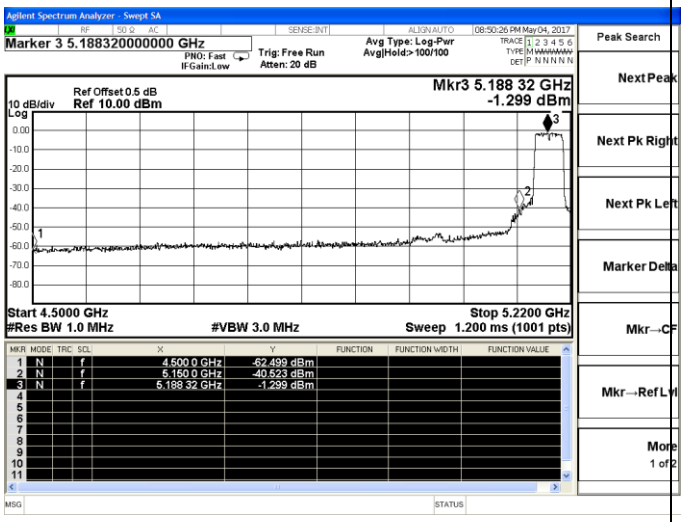
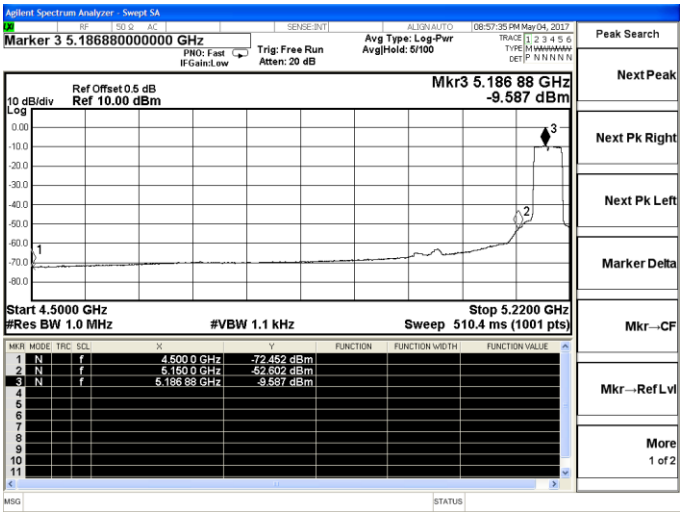
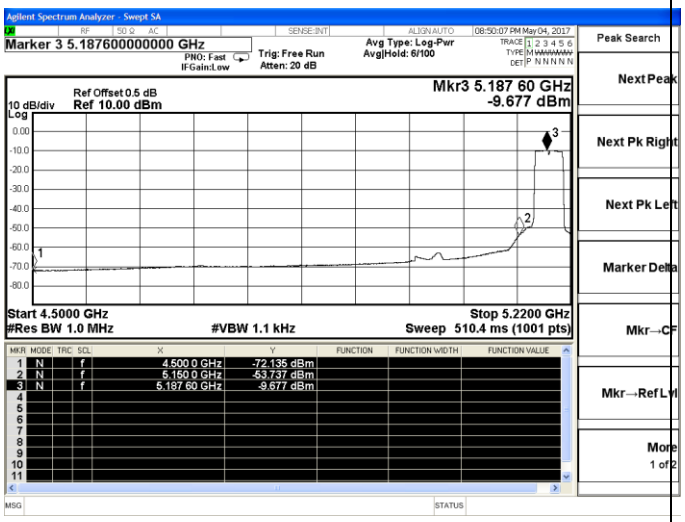
Channel 46 / 5230 MHz – Peak

Undesirable emission

IEEE 802.11n HT40

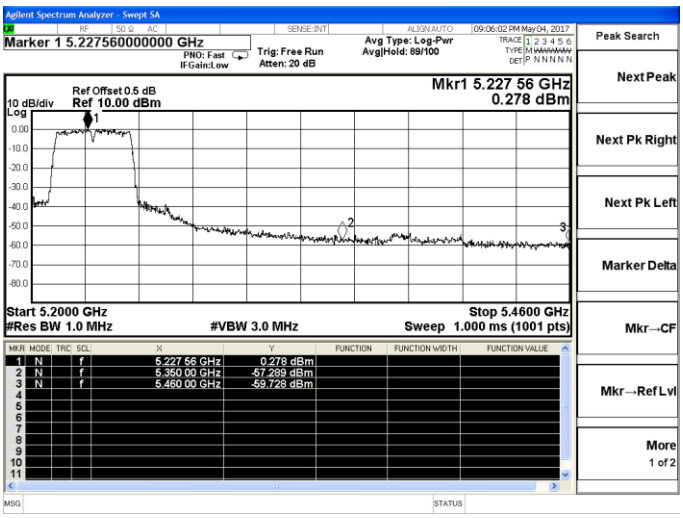
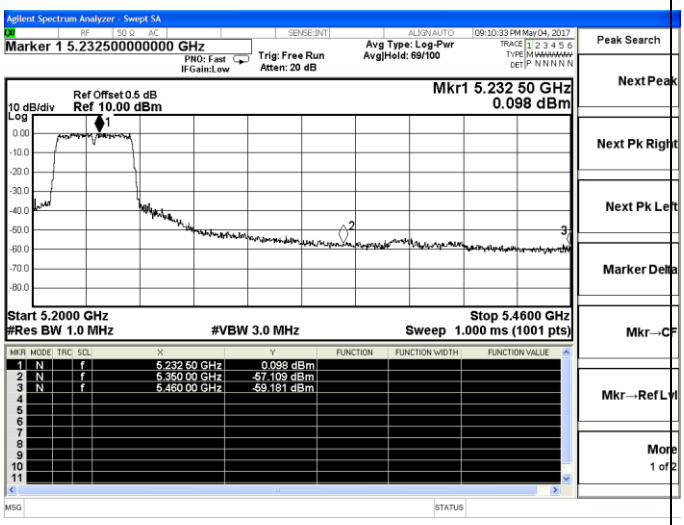
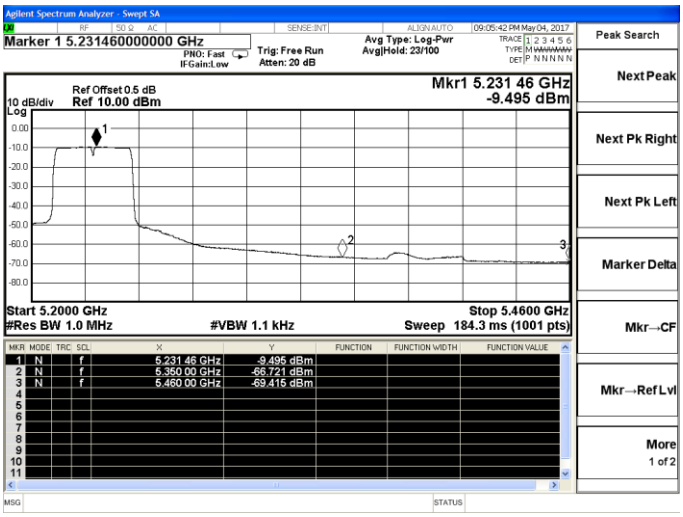
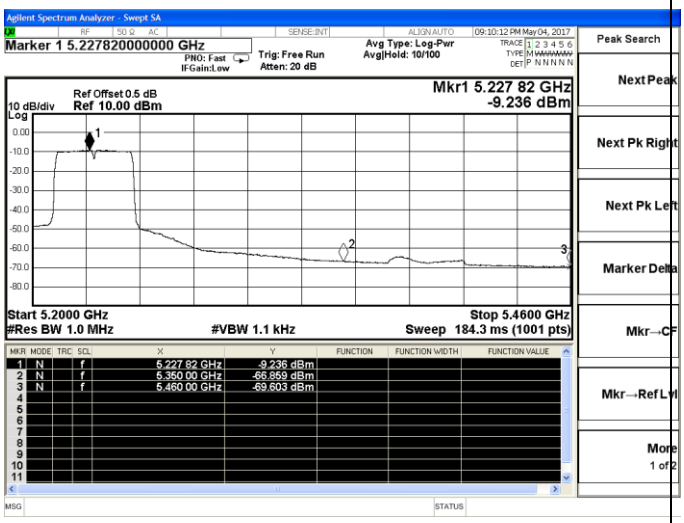
Antenna Chain 0	Antenna Chain 1
	
Channel 46 / 5230 MHz – Average	Channel 46 / 5230 MHz – Average

IEEE 802.11ac VHT40

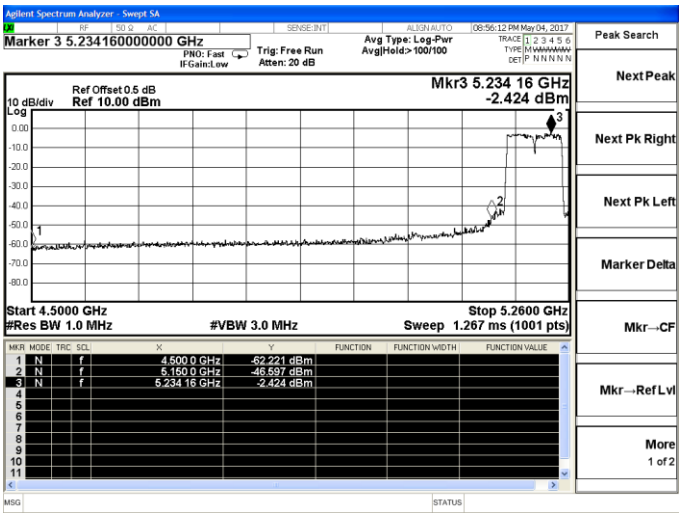
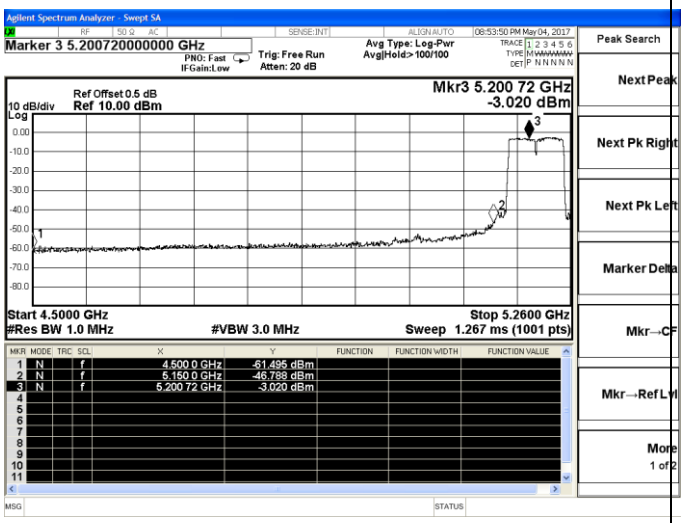
	
Channel 38 / 5190 MHz – Peak	Channel 38 / 5190 MHz – Peak
	
Channel 38 / 5190 MHz – Average	Channel 38 / 5190 MHz – Average

Undesirable emission

IEEE 802.11ac VHT40

Antenna Chain 0	Antenna Chain 1
	
Channel 46 / 5230 MHz – Peak	Channel 46 / 5230 MHz – Peak
	
Channel 46 / 5230 MHz – Average	Channel 46 / 5230 MHz – Average

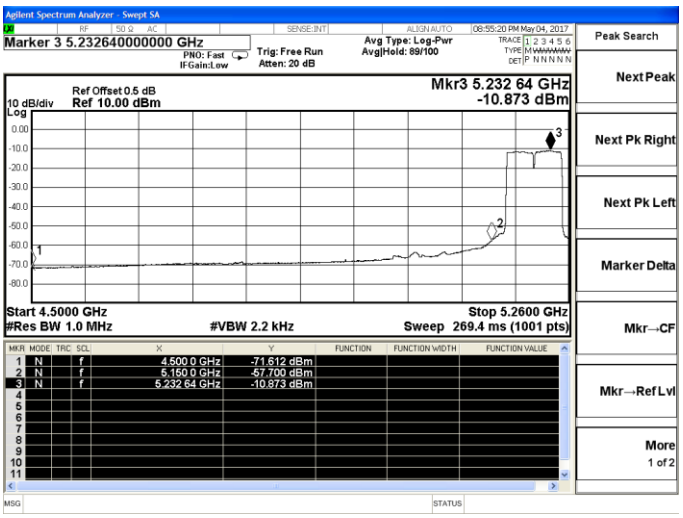
IEEE 802.11ac VHT80

	
Channel 42 / 5210 MHz – Peak	Channel 42 / 5210 MHz – Peak

Undesirable emission

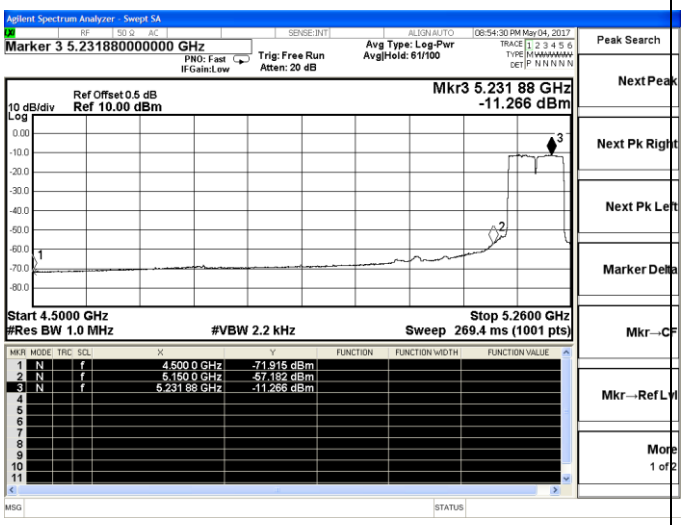
IEEE 802.11ac VHT80

Antenna Chain 0

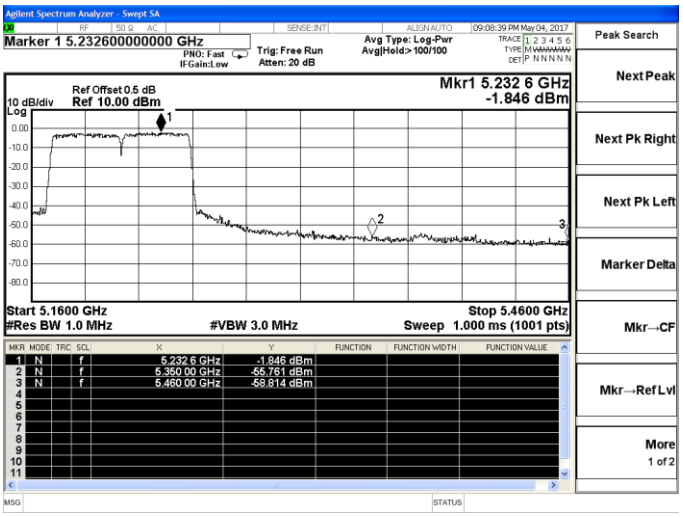


Channel 42 / 5210 MHz – Average

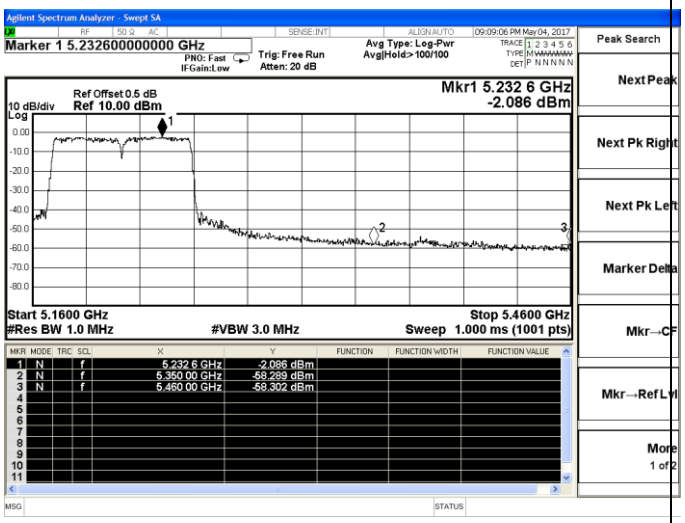
Antenna Chain 1



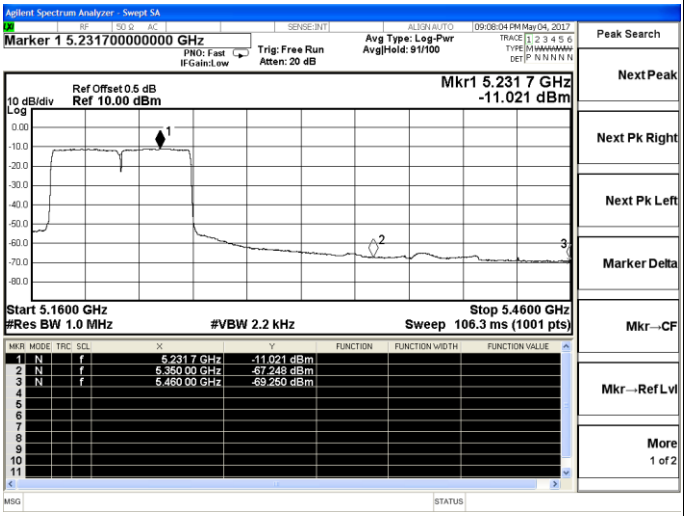
Channel 42 / 5210 MHz – Average



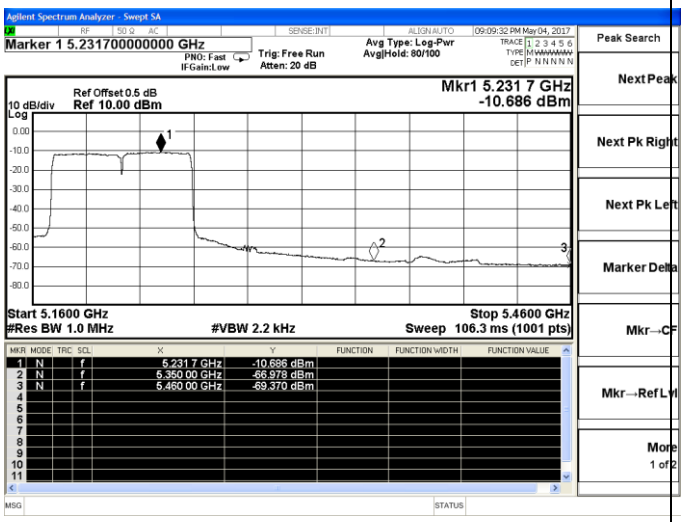
Channel 42 / 5210 MHz – Peak



Channel 42 / 5210 MHz – Peak



Channel 42 / 5210 MHz – Average



Channel 42 / 5210 MHz – Average

5.8. Antenna Requirements

5.8.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.8.2. Antenna Connector Construction

The directional gains of antenna used for transmitting is 2.0dBi which is a PIFA antenna and no consideration of replacement. Please see EUT photo for details.

5.8.3. Results: Compliance.

6. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal Date	Due Date
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	June 18, 2016	June 17, 2017
Signal analyzer	Agilent	E4448A(External mixers to 40GHz)	US44300469	9kHz~40GHz	July 16, 2016	July 15, 2017
Signal analyzer	Agilent	N9020A	MY50510140	9kHz~26.5GHz	October 27, 2017	October 27, 2017
LISN	MESS Tec	NNB-2/16Z	99079	9KHz-30MHz	June 18, 2016	June 17, 2017
LISN (Support Unit)	EMCO	3819/2NM	9703-1839	9KHz-30MHz	June 18, 2016	June 17, 2017
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9KHz-30MHz	June 18, 2016	June 17, 2017
ISN	SCHAFFNER	ISN ST08	21653	9KHz-30MHz	June 18, 2016	June 17, 2017
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30M-18GHz 3m	June 18, 2016	June 17, 2017
Amplifier	SCHAFFNER	COA9231A	18667	9kHz-2GHzz	June 18, 2016	June 17, 2017
Amplifier	Agilent	8449B	3008A02120	1GHz-26.5GHz	July 16, 2016	July 15, 2017
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5GHz-40GHz	July 16, 2016	July 15, 2017
Loop Antenna	R&S	HFH2-Z2	860004/001	9k-30MHz	June 18, 2016	June 17, 2017
By-log Antenna	SCHWARZBEC	VULB9163	9163-470	30MHz-1GHz	June 10, 2016	June 09, 2017
Horn Antenna	EMCO	3115	6741	1GHz-18GHz	June 10, 2016	June 09, 2017
Horn Antenna	SCHWARZBEC	BBHA9170	BBHA9170154	15GHz-40GHz	June 10, 2016	June 09, 2017
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz-1GHz	June 18, 2016	June 17, 2017
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz-40GHz	June 18, 2016	June 17, 2017
Power Meter	Anritsu	ML2495A	1204011	N/A	June 18, 2016	June 17, 2017
Power Sensor	Anritsu	MA2411B	1126166	N/A	June 18, 2016	June 17, 2017
AC Power Source	HPC	HPA-500E	HPA-9100024	AC 0~300V	June 18, 2016	June 17, 2017
DC power source	GW	GPC-6030D	C671845	DC 1V-60V	June 18, 2016	June 17, 2017
Temp. and Humidify Chamber	Giant Force	GTH-225-20-S	MAB0103-00	N/A	June 18, 2016	June 17, 2017
RF CABLE-1m	JYE Bao	RG142	CB034-1m	20MHz-7GHz	June 18, 2016	June 17, 2017
RF CABLE-2m	JYE Bao	RG142	CB)35-2m	20MHz-1GHz	June 18, 2016	June 17, 2017
EMC Test	Audix	E3	N/A	N/A	N/A	N/A
Note: All equipment through GRGT EST calibration						

7. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

8. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

9. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

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