

EUT Test Condition		Measurement Detail	
Channel	Channel 151	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

<Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5755	93.27	92.36	0.91	-----	-----	150	359	Average
5755	99.63	98.72	0.91	-----	-----	150	359	Peak
11510	47.97	49.32	-1.35	54	-6.03	149	237	Average
11510	55.71	57.06	-1.35	74	-18.29	149	237	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5755	93.58	92.67	0.91	-----	-----	118	115	Average
5755	100.84	99.93	0.91	-----	-----	118	115	Peak
11510	48.68	50.03	-1.35	54	-5.32	154	171	Average
11510	56.97	58.32	-1.35	74	-17.03	154	171	Peak

<Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5616.975	49.66	48.92	0.74	68.2	-18.54	150	359	Peak
5658.775	48.82	48.16	0.66	74.72	-25.9	150	359	Peak
5922.4	49.45	48.15	1.3	70.12	-20.67	150	359	Peak
5984.625	50.89	49.54	1.35	68.2	-17.31	150	359	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5555.7	49.43	48.59	0.84	68.2	-18.77	118	115	Peak
5657.35	49.05	48.39	0.66	73.66	-24.61	118	115	Peak
5920.975	49.5	48.2	1.3	71.17	-21.67	118	115	Peak
5933.8	50.68	49.38	1.3	68.2	-17.52	118	115	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 5755 MHz: Fundamental Frequency
- *: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

EUT Test Condition		Measurement Detail	
Channel	Channel 159	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

<Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5795	94.83	93.88	0.95	-----	-----	107	335	Average
5795	101.69	100.74	0.95	-----	-----	107	335	Peak
11590	46.74	48.54	-1.8	54	-7.26	137	138	Average
11590	54.57	56.37	-1.8	74	-19.43	137	138	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5795	94.75	93.8	0.95	-----	-----	118	115	Average
5795	101.4	100.45	0.95	-----	-----	118	115	Peak
11590	47.71	49.51	-1.8	54	-6.29	167	173	Average
11590	55.46	57.26	-1.8	74	-18.54	167	173	Peak

<Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5618.4	49.81	49.07	0.74	68.2	-18.39	107	335	Peak
5659.725	49.06	48.39	0.67	75.42	-26.36	107	335	Peak
5915.75	49.37	48.07	1.3	75.02	-25.65	107	335	Peak
5968	50.34	49	1.34	68.2	-17.86	107	335	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5588.95	49.92	49.13	0.79	68.2	-18.28	118	115	Peak
5655.45	50.01	49.36	0.65	72.25	-22.24	118	115	Peak
5915.275	49.91	48.61	1.3	75.37	-25.46	118	115	Peak
5967.525	50.7	49.36	1.34	68.2	-17.5	118	115	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 5795 MHz: Fundamental Frequency
- *: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

802.11ac (VHT80)

EUT Test Condition		Measurement Detail	
Channel	Channel 42	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5150	48.63	48.21	0.42	54	-5.37	118	9	Average
5150	56	55.58	0.42	74	-18	118	9	Peak
5210	88.87	88.75	0.12	-----	-----	118	9	Average
5210	96.31	96.19	0.12	-----	-----	118	9	Peak
5350	39.28	38.95	0.33	54	-14.72	118	9	Average
5350	47.48	47.15	0.33	74	-26.52	118	9	Peak
10420	57.8	59.54	-1.74	68.2	-10.4	154	163	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5150	47.73	47.31	0.42	54	-6.27	126	117	Average
5150	55.5	55.08	0.42	74	-18.5	126	117	Peak
5210	89.39	89.27	0.12	-----	-----	126	117	Average
5210	96.39	96.27	0.12	-----	-----	126	117	Peak
5350	40.24	39.91	0.33	54	-13.76	126	117	Average
5350	46.16	45.83	0.33	74	-27.84	126	117	Peak
10420	57.24	58.98	-1.74	68.2	-10.96	154	138	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 5210 MHz: Fundamental Frequency
- *: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

EUT Test Condition		Measurement Detail	
Channel	Channel 58	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5150	39.67	39.25	0.42	54	-14.33	122	8	Average
5150	47.4	46.98	0.42	74	-26.6	122	8	Peak
5290	88.99	88.82	0.17	-----	-----	122	8	Average
5290	96.14	95.97	0.17	-----	-----	122	8	Peak
5350	47.67	47.34	0.33	54	-6.33	122	8	Average
5350	53.28	52.95	0.33	74	-20.72	122	8	Peak
10580	57.25	58.82	-1.57	68.2	-10.95	116	156	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5150	39.58	39.16	0.42	54	-14.42	113	115	Average
5150	45.83	45.41	0.42	74	-28.17	113	115	Peak
5290	91.61	91.44	0.17	-----	-----	113	115	Average
5290	98.85	98.68	0.17	-----	-----	113	115	Peak
5350	51.83	51.5	0.33	54	-2.17	113	115	Average
5350	59.1	58.77	0.33	74	-14.9	113	115	Peak
10580	56.94	58.51	-1.57	68.2	-11.26	184	156	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 5290 MHz: Fundamental Frequency
- *: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

EUT Test Condition		Measurement Detail	
Channel	Channel 106	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5460	52.43	51.68	0.75	54	-1.57	130	141	Average
5460	60.82	60.07	0.75	74	-13.18	130	141	Peak
5470	63.14	62.37	0.77	68.2	-5.06	130	141	Peak
5530	92.47	91.61	0.86	-----	-----	130	141	Average
5530	99.58	98.72	0.86	-----	-----	130	141	Peak
5725	46.2	45.33	0.87	68.2	-22	130	141	Peak
11060	47.83	49.18	-1.35	54	-6.17	143	165	Average
11060	56.01	57.36	-1.35	74	-17.99	143	165	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5460	53.45	52.7	0.75	54	-0.55	125	117	Average
5460	63.41	62.66	0.75	74	-10.59	125	117	Peak
5470	65.26	64.49	0.77	68.2	-2.94	125	117	Peak
5530	94.79	93.93	0.86	-----	-----	125	117	Average
5530	102.12	101.26	0.86	-----	-----	125	117	Peak
5725	47.24	46.37	0.87	68.2	-20.96	125	117	Peak
11060	47.8	49.15	-1.35	54	-6.2	130	144	Average
11060	55.92	57.27	-1.35	74	-18.08	130	144	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 5530 MHz: Fundamental Frequency
- *: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

EUT Test Condition		Measurement Detail	
Channel	Channel 122	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5460	40.32	39.57	0.75	54	-13.68	119	144	Average
5460	49.1	48.35	0.75	74	-24.9	119	144	Peak
5470	49.44	48.67	0.77	68.2	-18.76	119	144	Peak
5610	92.47	91.74	0.73	-----	-----	119	144	Average
5610	99.89	99.16	0.73	-----	-----	119	144	Peak
5725	48.96	48.09	0.87	68.2	-19.24	119	144	Peak
11220	48.82	50.48	-1.66	54	-5.18	138	163	Average
11220	57.7	59.36	-1.66	74	-16.3	138	163	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5460	40.73	39.98	0.75	54	-13.27	137	118	Average
5460	50.59	49.84	0.75	74	-23.41	137	118	Peak
5470	49.33	48.56	0.77	68.2	-18.87	137	118	Peak
5610	94.27	93.54	0.73	-----	-----	137	118	Average
5610	101.92	101.19	0.73	-----	-----	137	118	Peak
5725	47.41	46.54	0.87	68.2	-20.79	137	118	Peak
11220	48.18	49.84	-1.66	54	-5.82	114	114	Average
11220	57.09	58.75	-1.66	74	-16.91	114	114	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 5610 MHz: Fundamental Frequency
- *: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

EUT Test Condition		Measurement Detail	
Channel	Channel 138	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5460	40.4	39.65	0.75	54	-13.6	120	336	Average
5460	48.92	48.17	0.75	74	-25.08	120	336	Peak
5470	48.5	47.73	0.77	68.2	-19.7	120	336	Peak
5690	92.03	91.24	0.79	-----	-----	120	336	Average
5690	98.42	97.63	0.79	-----	-----	120	336	Peak
5862.4	50.84	49.64	1.2	68.2	-17.36	120	336	Peak
11380	48.62	50.04	-1.42	54	-5.38	152	134	Average
11380	57.29	58.71	-1.42	74	-16.71	152	134	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5460	40.77	40.02	0.75	54	-13.23	124	115	Average
5460	49.44	48.69	0.75	74	-24.56	124	115	Peak
5470	48.71	47.94	0.77	68.2	-19.49	124	115	Peak
5690	94.43	93.64	0.79	-----	-----	124	115	Average
5690	101.61	100.82	0.79	-----	-----	124	115	Peak
5853.4	50.1	48.93	1.17	68.2	-18.1	124	115	Peak
11380	48.22	49.64	-1.42	54	-5.78	155	23	Average
11380	57.16	58.58	-1.42	74	-16.84	155	23	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 5690 MHz: Fundamental Frequency
- *: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

EUT Test Condition		Measurement Detail	
Channel	Channel 155	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

<Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5775	90.84	89.9	0.94	-----	-----	103	335	Average
5775	98.07	97.13	0.94	-----	-----	103	335	Peak
11550	47.58	49.18	-1.6	54	-6.42	142	119	Average
11550	55.98	57.58	-1.6	74	-18.02	142	119	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5775	91.46	53.02	38.44	-----	-----	116	115	Average
5775	98.62	60.18	38.44	-----	-----	116	115	Peak
11550	47.45	49.05	-1.6	54	-6.55	120	178	Average
11550	55.16	56.76	-1.6	74	-18.84	120	178	Peak

<Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5550.95	50.69	49.82	0.87	68.2	-17.51	103	335	Peak
5658.775	51.21	50.55	0.66	74.72	-23.51	103	335	Peak
5921.45	49.98	48.68	1.3	70.82	-20.84	103	335	Peak
5996.5	51.25	49.87	1.38	68.2	-16.95	103	335	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5587.05	50.23	49.43	0.8	68.2	-17.97	116	115	Peak
5657.825	51.71	51.05	0.66	74.01	-22.3	116	115	Peak
5918.6	50.04	48.74	1.3	72.92	-22.88	116	115	Peak
5959.925	50.32	49	1.32	68.2	-17.88	116	115	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 5775 MHz: Fundamental Frequency
- *: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

9 kHz ~ 30 MHz Data:

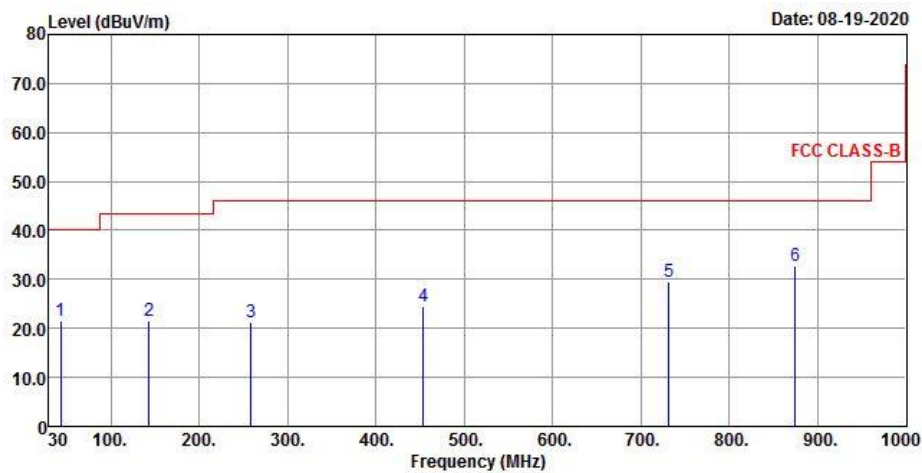
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

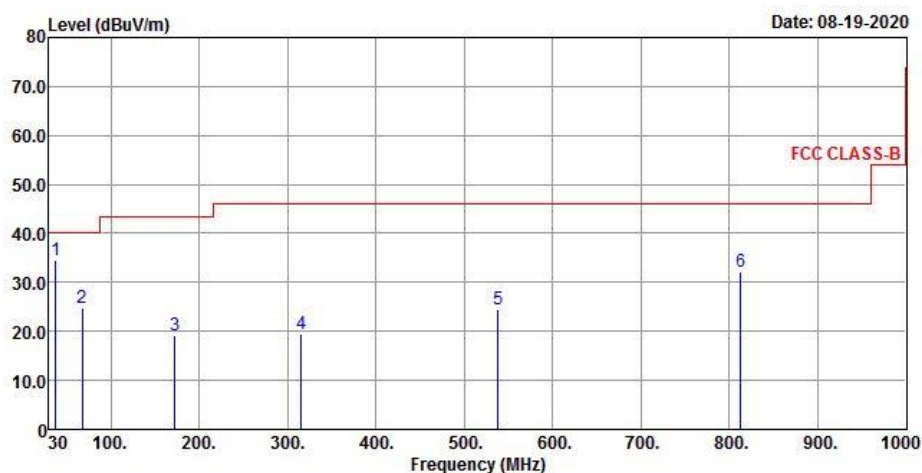
802.11ac (VHT80)

EUT Test Condition		Measurement Detail	
Channel	Channel 106	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
43.58	21.61	33.53	-11.92	40	-18.39	104	230	QP
143.49	21.56	33.47	-11.91	43.5	-21.94	120	167	QP
258.92	21.3	34.02	-12.72	46	-24.7	115	196	QP
453.89	24.4	30.75	-6.35	46	-21.6	117	188	QP
731.31	29.66	29.23	0.43	46	-16.34	133	135	QP
874.87	32.8	30.02	2.78	46	-13.2	148	236	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
37.76	34.56	46.83	-12.27	40	-5.44	148	164	QP
67.83	24.87	38.44	-13.57	40	-15.13	119	119	QP
172.59	19.27	31.86	-12.59	43.5	-24.23	140	112	QP
315.18	19.54	30.14	-10.6	46	-26.46	108	227	QP
538.28	24.41	29.2	-4.79	46	-21.59	133	83	QP
812.79	32.05	30.07	1.98	46	-13.95	129	69	QP

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- The emission levels of other frequencies were very low against the limit

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

- Note: 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 11, 2019	Dec. 10, 2020
RF signal cable Woken	5D-FB	Cable-cond1-01	Sep. 05, 2019	Sep. 04, 2020
LISN/AMN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 20, 2020	Feb. 19, 2021
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 28, 2020	Aug. 27, 2021
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 1.
 3. The VCCI Site Registration No. is C-12040.

4.2.3 Test Procedures

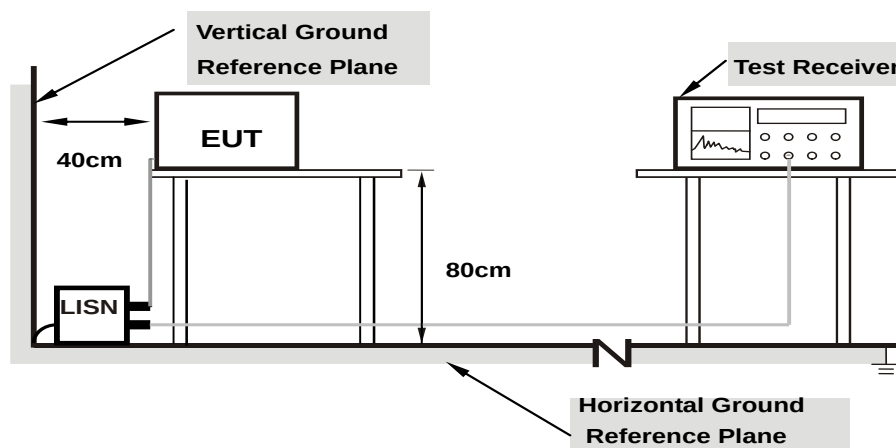
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit -20 dB) was not recorded.

Note: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



- Note:** 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

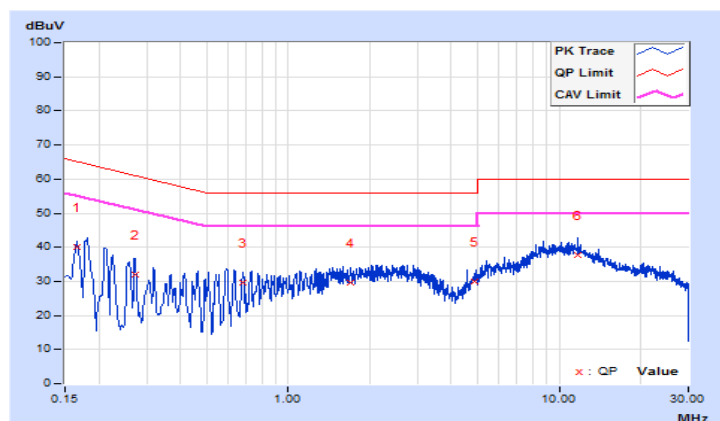
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 70%RH
Tested by	Getaz Yang		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16600	9.63	30.56	16.23	40.19	25.86	65.16	55.16	-24.97	-29.30
2	0.27134	9.63	22.43	5.79	32.06	15.42	61.08	51.08	-29.02	-35.66
3	0.67800	9.66	19.90	13.58	29.56	23.24	56.00	46.00	-26.44	-22.76
4	1.70600	9.72	19.86	11.72	29.58	21.44	56.00	46.00	-26.42	-24.56
5	4.85800	9.80	20.06	10.21	29.86	20.01	56.00	46.00	-26.14	-25.99
6	11.65000	9.88	27.84	20.08	37.72	29.96	60.00	50.00	-22.28	-20.04

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

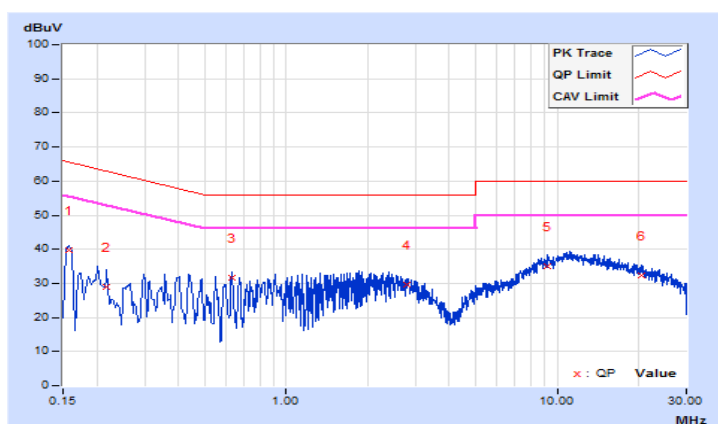


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 70%RH
Tested by	Getaz Yang		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15770	9.66	30.04	15.75	39.70	25.41	65.58	55.58	-25.88	-30.17
2	0.21800	9.64	19.15	2.71	28.79	12.35	62.89	52.89	-34.10	-40.54
3	0.63000	9.68	22.06	10.50	31.74	20.18	56.00	46.00	-24.26	-25.82
4	2.78599	9.78	19.80	8.39	29.58	18.17	56.00	46.00	-26.42	-27.83
5	9.15800	9.90	25.19	16.23	35.09	26.13	60.00	50.00	-24.91	-23.87
6	20.47800	10.03	22.25	13.88	32.28	23.91	60.00	50.00	-27.72	-26.09

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



4.3 Transmit Power Measurement

4.3.1 Limits of Transmit Power Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p $\leq$ 125 mW (21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
	✓	Mobile and Portable client device	250 mW (24 dBm)
U-NII-2A		✓	250 mW (24 dBm) or 11 dBm + 10 log B*
U-NII-2C		✓	250 mW (24 dBm) or 11 dBm + 10 log B*
U-NII-3		✓	1 Watt (30 dBm)

*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

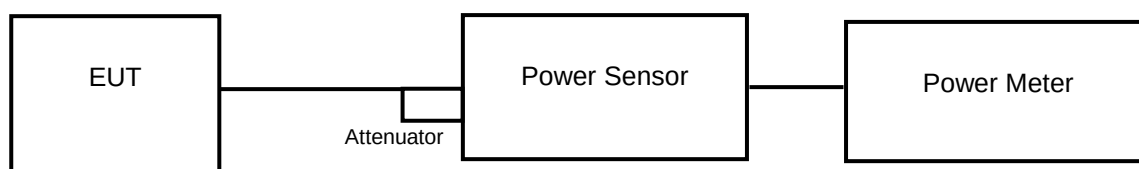
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20 MHz channel widths with $N_{ANT} \geq 5$.

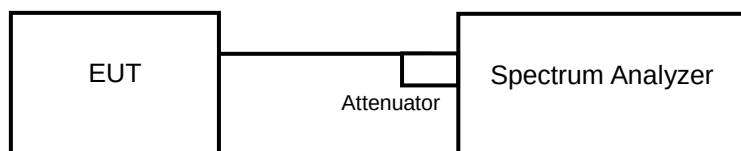
For power measurements on all other devices: Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.

4.3.2 Test Setup

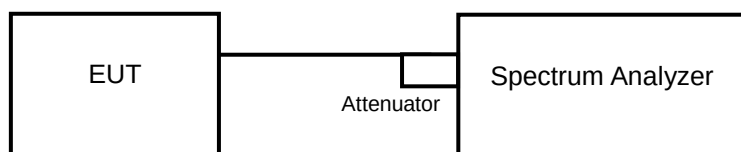
<Power Output Measurement>



or



<26 dB Bandwidth>



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

Average Power Measurement

<802.11a, 802.11n (HT20), 802.11n (HT40)>

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

<802.11ac (VHT80)>

- a. Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99 % occupied bandwidth) of the signal.
- b. Set sweep trigger to “free run”.
- c. Set RBW = 1 MHz.
- d. Set VBW $\geq$ 3 MHz
- e. Number of points in sweep $\geq$ 2 Span / RBW.
- f. Sweep time $\leq$ (number of points in sweep) * T
- g. Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
- h. Detector = RMS.
- i. Trace mode = max hold.
- j. Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.
- k. Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum

26 dB Bandwidth

- a. Set RBW = approximately 1 % of the emission bandwidth.
- b. Set the VBW $\geq$ 3 x RBW.
- c. Detector = Peak.
- d. Trace mode = max hold.
- e. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Results

Power Output:

802.11a

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	14.95	14.78	61.322	17.88	24	Pass
40	5200	15.43	15.40	69.588	18.43	24	Pass
48	5240	15.23	15.12	65.851	18.19	24	Pass
52	5260	15.45	15.43	69.989	18.45	24	Pass
60	5300	15.23	15.20	66.456	18.23	24	Pass
64	5320	14.82	14.79	60.469	17.82	24	Pass
100	5500	12.84	12.78	38.198	15.82	24	Pass
116	5580	13.54	13.30	43.974	16.43	24	Pass
140	5700	12.98	12.68	38.396	15.84	24	Pass
144	5720 (U-NII-2C)	10.11	8.65	17.585	12.45	23.28	Pass
144	5720 (U-NII-3)	2.87	1.96	3.507	5.45	30	Pass
149	5745	10.95	10.69	24.167	13.83	30	Pass
157	5785	13.69	13.34	44.966	16.53	30	Pass
165	5825	13.65	13.30	44.554	16.49	30	Pass

Note:

For U-NII-2A, U-NII-2C Band:

Chain 0

1. $11 \text{ dBm} + 10\log(23.43) = 24.70 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(23.04) = 24.62 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(22.58) = 24.54 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(22.62) = 24.54 \text{ dBm} > 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(22.97) = 24.61 \text{ dBm} > 24 \text{ dBm}$.
6. $11 \text{ dBm} + 10\log(22.66) = 24.55 \text{ dBm} > 24 \text{ dBm}$.
7. $11 \text{ dBm} + 10\log(16.94) = 23.28 \text{ dBm} < 24 \text{ dBm}$.

Chain 1

1. $11 \text{ dBm} + 10\log(30.08) = 25.78 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(27.24) = 25.35 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(25.51) = 25.07 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(23.10) = 24.64 \text{ dBm} > 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(23.74) = 24.75 \text{ dBm} > 24 \text{ dBm}$.
6. $11 \text{ dBm} + 10\log(25.73) = 25.10 \text{ dBm} > 24 \text{ dBm}$.
7. $11 \text{ dBm} + 10\log(18.36) = 23.64 \text{ dBm} < 24 \text{ dBm}$.

802.11n (HT20)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	14.78	14.64	59.168	17.72	24	Pass
40	5200	15.41	15.35	69.03	18.39	24	Pass
48	5240	15.35	15.18	67.238	18.28	24	Pass
52	5260	15.46	15.43	70.07	18.46	24	Pass
60	5300	15.36	15.38	68.87	18.38	24	Pass
64	5320	14.72	14.69	59.093	17.72	24	Pass
100	5500	12.76	12.69	37.458	15.74	24	Pass
116	5580	13.46	13.26	43.366	16.37	24	Pass
140	5700	12.98	12.84	39.092	15.92	24	Pass
144	5720 (U-NII-2C)	9.57	8.96	16.928	12.29	23.36	Pass
144	5720 (U-NII-3)	3.31	2.84	4.066	6.09	30	Pass
149	5745	10.95	10.68	24.14	13.83	30	Pass
157	5785	13.65	13.30	44.554	16.49	30	Pass
165	5825	13.65	13.26	44.358	16.47	30	Pass

Note:

For U-NII-2A, U-NII-2C Band:

Chain 0

1. $11 \text{ dBm} + 10\log(23.41) = 24.69 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(23.51) = 24.71 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(23.43) = 24.70 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(23.16) = 24.65 \text{ dBm} > 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(23.93) = 24.79 \text{ dBm} > 24 \text{ dBm}$.
6. $11 \text{ dBm} + 10\log(24.43) = 24.88 \text{ dBm} > 24 \text{ dBm}$.
7. $11 \text{ dBm} + 10\log(17.25) = 23.36 \text{ dBm} < 24 \text{ dBm}$.

Chain 1

1. $11 \text{ dBm} + 10\log(28.62) = 25.57 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(27.30) = 25.36 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(25.95) = 25.14 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(24.09) = 24.82 \text{ dBm} > 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(24.86) = 24.96 \text{ dBm} > 24 \text{ dBm}$.
6. $11 \text{ dBm} + 10\log(25.53) = 25.07 \text{ dBm} > 24 \text{ dBm}$.
7. $11 \text{ dBm} + 10\log(21.65) = 24.35 \text{ dBm} > 24 \text{ dBm}$.

802.11n (HT40)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	10.89	10.90	24.577	13.91	24	Pass
46	5230	12.98	12.87	39.225	15.94	24	Pass
54	5270	12.80	12.76	37.935	15.79	24	Pass
62	5310	10.98	10.78	24.499	13.89	24	Pass
102	5510	9.97	9.83	19.547	12.91	24	Pass
110	5550	12.85	12.81	38.374	15.84	24	Pass
134	5670	12.94	12.84	38.91	15.90	24	Pass
142	5710 (U-NII-2C)	9.63	8.56	16.361	12.14	24	Pass
142	5710 (U-NII-3)	-0.76	-1.92	1.4821	1.71	30	Pass
151	5755	10.94	10.75	24.302	13.86	30	Pass
159	5795	12.96	12.78	38.737	15.88	30	Pass

Note:

For U-NII-2A, U-NII-2C Band:

Chain 0

1. $11 \text{ dBm} + 10\log(42.68) = 27.30 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(42.63) = 27.30 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(42.52) = 27.29 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(42.32) = 27.27 \text{ dBm} > 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(42.02) = 27.23 \text{ dBm} > 24 \text{ dBm}$.
6. $11 \text{ dBm} + 10\log(35.99) = 26.56 \text{ dBm} > 24 \text{ dBm}$.

Chain 1

1. $11 \text{ dBm} + 10\log(42.04) = 27.24 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(42.37) = 27.27 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(41.93) = 27.23 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(41.77) = 27.21 \text{ dBm} > 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(41.77) = 27.21 \text{ dBm} > 24 \text{ dBm}$.
6. $11 \text{ dBm} + 10\log(36.25) = 26.59 \text{ dBm} > 24 \text{ dBm}$.

802.11ac (VHT80)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	11.78	11.70	29.857	14.75	24	Pass
58	5290	12.86	12.71	37.983	15.80	24	Pass
106	5530	12.92	12.75	38.425	15.85	24	Pass
122	5610	12.93	12.85	38.909	15.90	24	Pass
138	5690 (U-NII-2C)	8.67	8.73	14.827	11.71	24	Pass
138	5690 (U-NII-3)	-3.89	-4.76	0.7425	-1.29	30	Pass
155	5775	11.90	11.76	30.485	14.84	30	Pass

Note:

For U-NII-2A, U-NII-2C Band:

Chain 0

1. $11 \text{ dBm} + 10\log(83.16) = 30.20 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(83.23) = 30.20 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(76.42) = 29.83 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(83.16) = 30.20 \text{ dBm} > 24 \text{ dBm}$.

Chain 1

1. $11 \text{ dBm} + 10\log(84.08) = 30.25 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(84.08) = 30.25 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(77.66) = 29.90 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(84.08) = 30.25 \text{ dBm} > 24 \text{ dBm}$.

26 dB Bandwidth:

802.11a

Channel	Frequency (MHz)	26 dBc Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	23.90	26.88
40	5200	24.67	31.53
48	5240	23.02	27.45
52	5260	23.43	30.08
60	5300	23.04	27.24
64	5320	22.58	25.51
100	5500	22.62	23.10
116	5580	22.97	23.74
140	5700	22.66	25.73
144	5720 (U-NII-2C)	16.94	18.36
144	5720 (U-NII-3)	5.90	9.51

802.11n (HT20)

Channel	Frequency (MHz)	26 dBc Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	23.86	27.79
40	5200	24.85	31.95
48	5240	23.81	27.65
52	5260	23.41	28.62
60	5300	23.51	27.30
64	5320	23.43	25.95
100	5500	23.16	24.09
116	5580	23.93	24.86
140	5700	24.43	25.53
144	5720 (U-NII-2C)	17.25	21.65
144	5720 (U-NII-3)	7.62	11.60

802.11n (HT40)

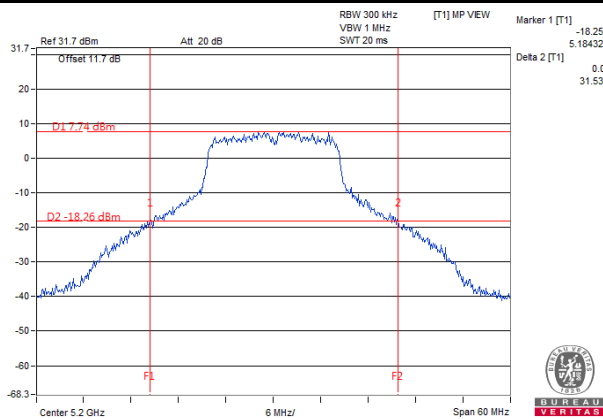
Channel	Frequency (MHz)	26 dBc Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	42.09	42.16
46	5230	42.29	41.96
54	5270	42.68	42.04
62	5310	42.63	42.37
102	5510	42.52	41.93
110	5550	42.32	41.77
134	5670	42.02	41.77
142	5710 (U-NII-2C)	35.99	36.25
142	5710 (U-NII-3)	6.14	8.24

802.11ac (VHT80)

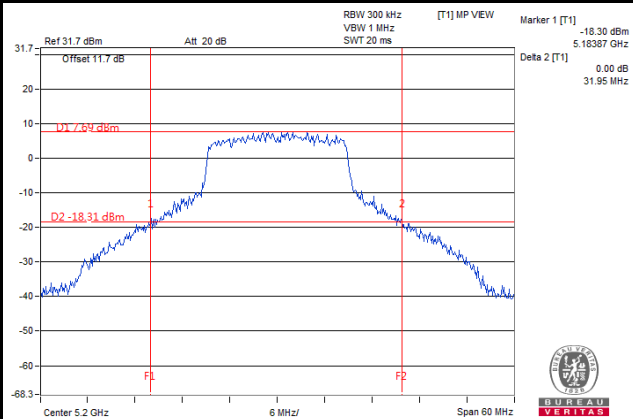
Channel	Frequency (MHz)	26 dBc Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	83.14	83.22
58	5290	83.16	83.55
106	5530	83.16	84.08
122	5610	83.23	84.08
138	5690 (U-NII-2C)	76.42	77.66
138	5690 (U-NII-3)	7.36	24.39

Spectrum Plot of Worst Value

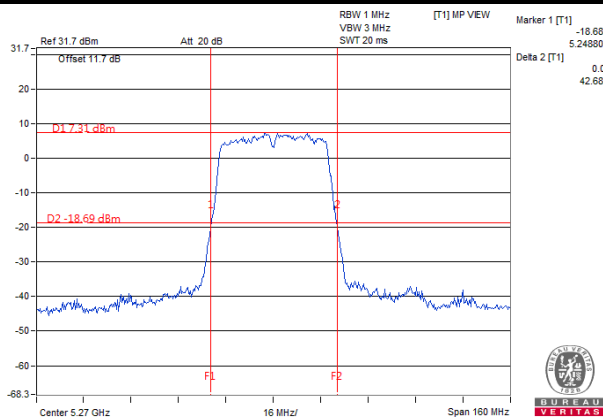
802.11a



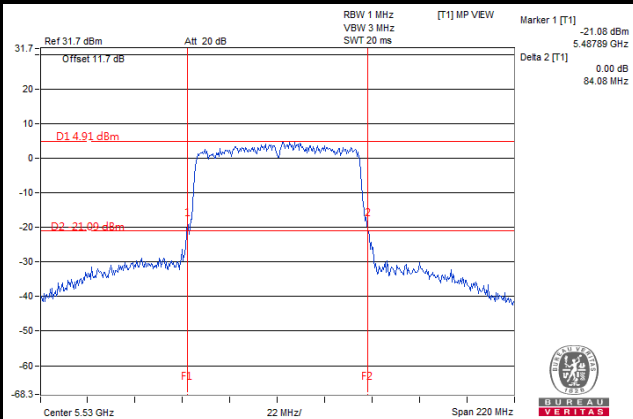
802.11n (HT20)



802.11n (HT40)

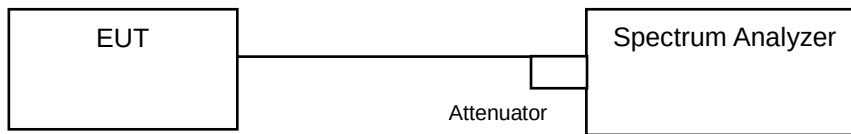


802.11ac (VHT80)



4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1 % to 5 % of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to SAMPLE. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

4.4.4 Test Results

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	16.80	16.92
40	5200	16.80	18.00
48	5240	16.68	17.04
52	5260	16.80	17.28
60	5300	16.80	17.28
64	5320	16.56	16.92
100	5500	16.56	16.80
116	5580	16.56	16.56
140	5700	16.68	17.04
144	5720 (U-NII-2C)	13.28	13.52
144	5720 (U-NII-3)	3.40	3.52
149	5745	16.73	16.64
157	5785	16.64	16.93
165	5825	16.80	17.04

802.11n (HT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.88	18.12
40	5200	18.00	18.36
48	5240	17.88	18.24
52	5260	17.88	18.24
60	5300	17.76	18.24
64	5320	18.00	18.00
100	5500	17.88	17.88
116	5580	17.88	17.88
140	5700	17.76	17.88
144	5720 (U-NII-2C)	14.00	14.24
144	5720 (U-NII-3)	3.88	4.24
149	5745	17.98	17.79
157	5785	17.88	18.17
165	5825	17.79	18.08

802.11n (HT40)

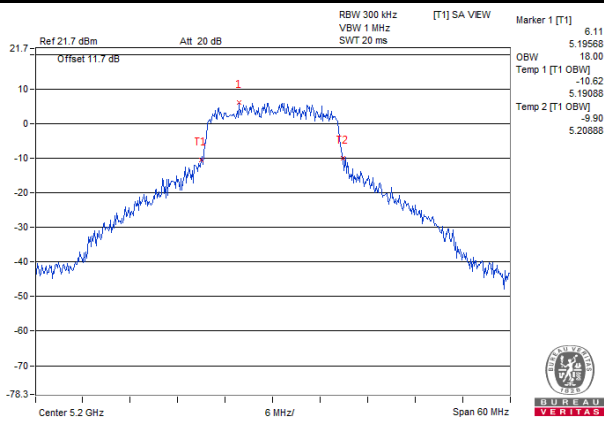
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.48	36.48
46	5230	36.48	36.72
54	5270	36.72	36.48
62	5310	36.48	36.48
102	5510	36.48	36.48
110	5550	36.48	36.72
134	5670	36.48	36.72
142	5710 (U-NII-2C)	33.24	33.48
142	5710 (U-NII-3)	3.24	3.24
151	5755	36.72	36.48
159	5795	36.72	36.72

802.11ac (VHT80)

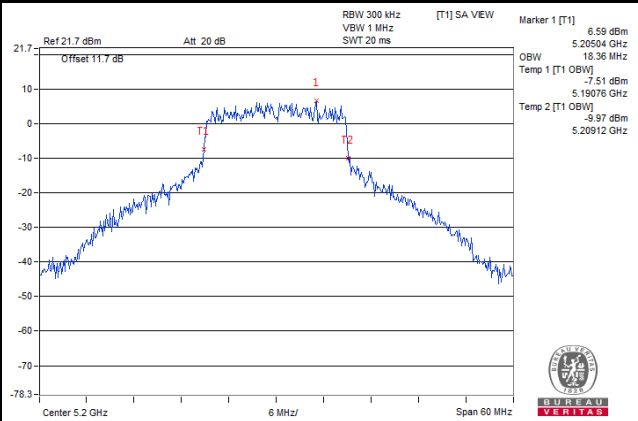
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	75.84	75.84
58	5290	75.84	75.84
106	5530	76.32	75.84
122	5610	75.84	75.36
138	5690 (U-NII-2C)	72.92	72.92
138	5690 (U-NII-3)	2.92	2.92
155	5775	75.77	75.38

Spectrum Plot of Worst Value

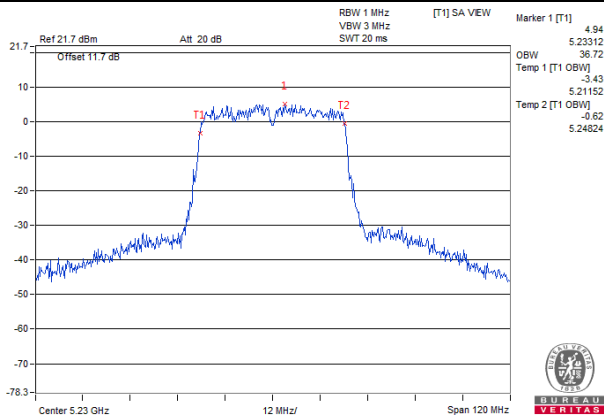
802.11a



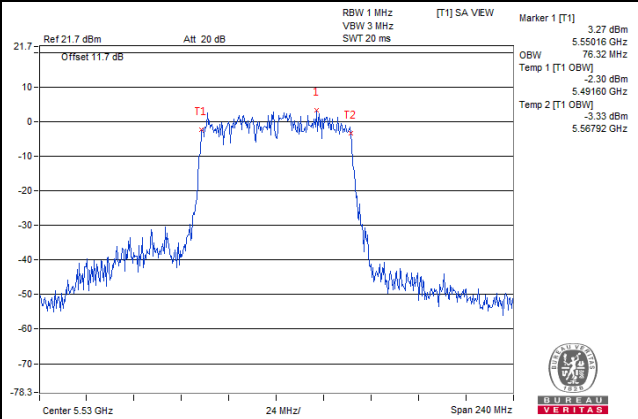
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)

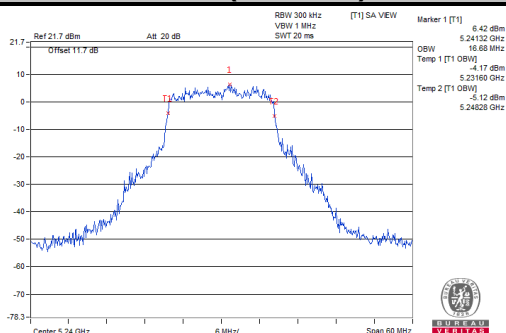


Chain 0

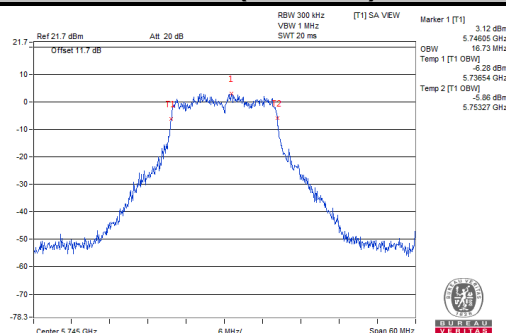
Spectrum Plot for Nearby DFS Band

802.11a

Ch 48 (5240 MHz)

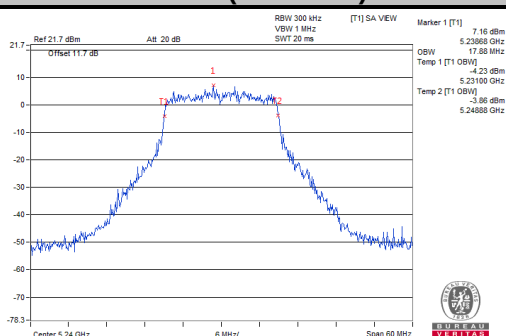


Ch 149 (5745 MHz)

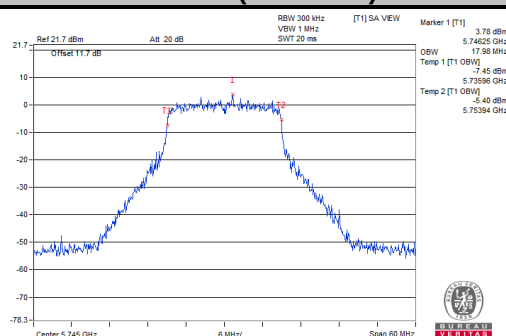


802.11n (HT20)

Ch 48 (5240 MHz)

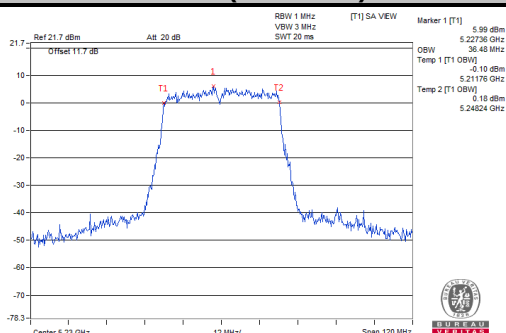


Ch 149 (5745 MHz)

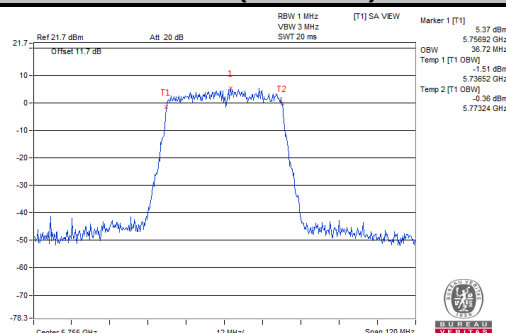


802.11n (HT40)

Ch 46 (5230 MHz)

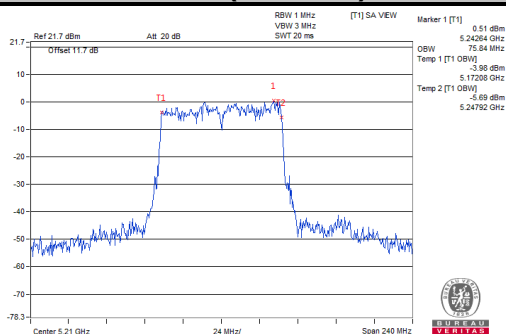


Ch 151 (5755 MHz)

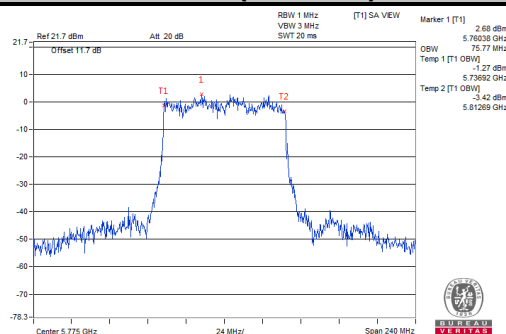


802.11ac (VHT80)

Ch 42 (5210 MHz)



Ch 155 (5775 MHz)

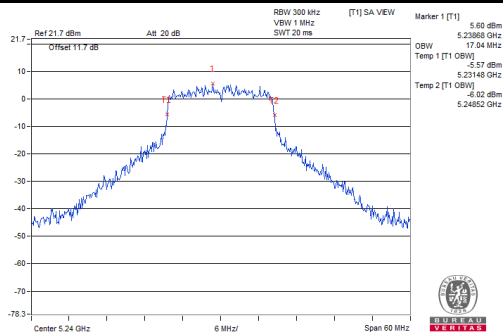


Chain 1

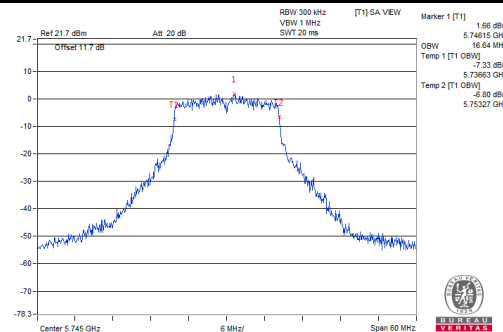
Spectrum Plot for Nearby DFS Band

802.11a

Ch 48 (5240 MHz)

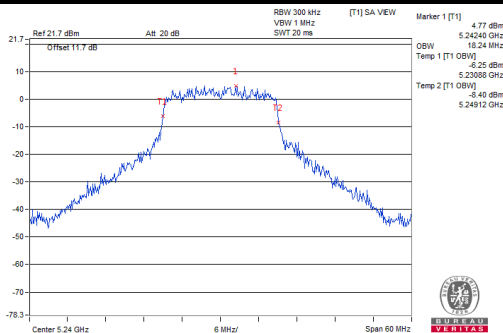


Ch 149 (5745 MHz)

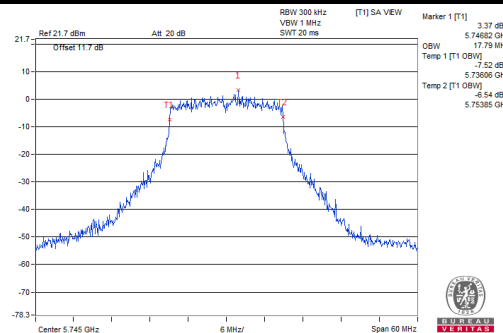


802.11n (HT20)

Ch 48 (5240 MHz)

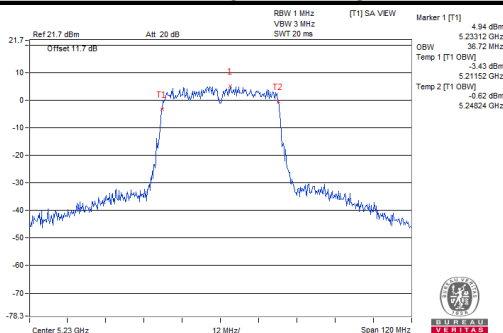


Ch 149 (5745 MHz)

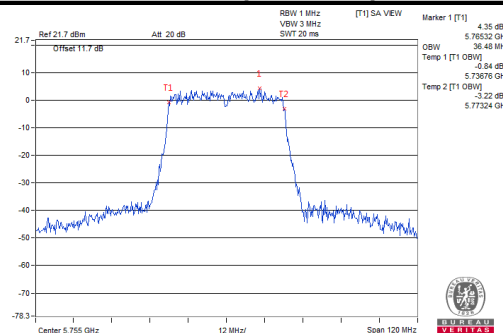


802.11n (HT40)

Ch 46 (5230 MHz)

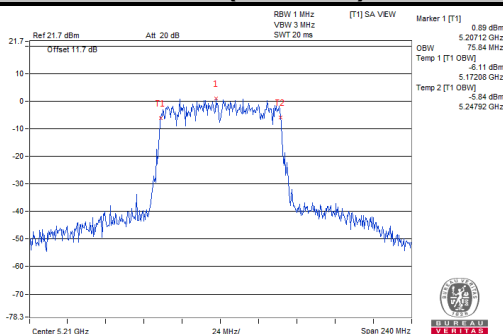


Ch 151 (5755 MHz)

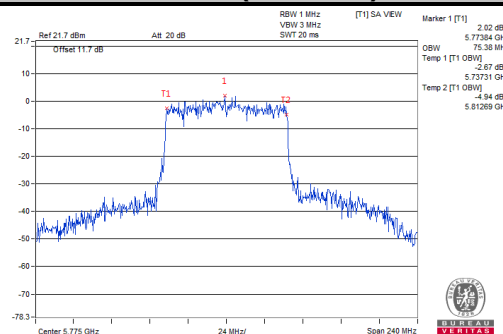


802.11ac (VHT80)

Ch 42 (5210 MHz)



Ch 155 (5775 MHz)

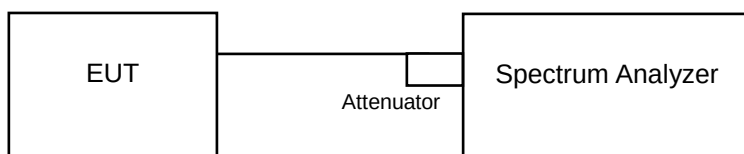


4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	17 dBm/MHz
		Fixed point-to-point Access Point	
		Indoor Access Point	
	√	Mobile and Portable client device	11 dBm/MHz
U-NII-2A	√		11 dBm/MHz
U-NII-2C	√		11 dBm/MHz
U-NII-3	√		30 dBm/500 kHz

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

For U-NII-1, U-NII-2A, U-NII-2C band:

Using method SA-2

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW $\geq$ 3 RBW, Detector = RMS
3. Sweep time = auto, trigger set to "free run".
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value and add 10 log (1/duty cycle)

※ For U-NII-3:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW $\geq$ 1 RBW, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(500 \text{ kHz} / 300 \text{ kHz})$.
5. Sweep time = auto, trigger set to "free run".
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value and add 10 log (1/duty cycle)

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

For U-NII-1, U-NII-2A, U-NII-2C Band 802.11a

Channel	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	1.17	1.03	0.12	4.23	11	Pass
40	5200	2.46	2.01	0.12	5.37	11	Pass
48	5240	2.64	2.27	0.12	5.59	11	Pass
52	5260	2.28	1.99	0.12	5.27	11	Pass
60	5300	2.38	2.10	0.12	5.37	11	Pass
64	5320	2.05	1.76	0.12	5.04	11	Pass
100	5500	0.46	0.20	0.12	3.46	11	Pass
116	5580	1.46	1.04	0.12	4.39	11	Pass
140	5700	1.23	0.60	0.12	4.06	11	Pass
144	5720 (U-NII-2C)	1.60	0.37	0.12	4.16	11	Pass

Note:

1. Method E) 2) a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 3.79 dBi <= 6dBi, so there is no need to reduce the power density limit.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

Channel	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	1.01	0.83	0.42	4.35	11	Pass
40	5200	2.23	1.76	0.42	5.43	11	Pass
48	5240	1.71	1.20	0.42	4.89	11	Pass
52	5260	1.73	1.37	0.42	4.98	11	Pass
60	5300	2.00	1.82	0.42	5.34	11	Pass
64	5320	0.99	0.52	0.42	4.19	11	Pass
100	5500	0.18	0.04	0.42	3.54	11	Pass
116	5580	0.42	0.26	0.42	3.77	11	Pass
140	5700	0.48	0.39	0.42	3.87	11	Pass
144	5720 (U-NII-2C)	1.45	0.70	0.42	4.52	11	Pass

Note:

1. Method E) 2) a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 3.79 dBi $\leq$ 6dBi, so there is no need to reduce the power density limit.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

Channel	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
38	5190	-5.85	-6.22	0.43	-2.59	11	Pass
46	5230	-3.97	-4.51	0.43	-0.79	11	Pass
54	5270	-3.62	-4.10	0.43	-0.41	11	Pass
62	5310	-5.93	-5.95	0.43	-2.50	11	Pass
102	5510	-6.91	-7.10	0.43	-3.56	11	Pass
110	5550	-3.03	-3.27	0.43	0.29	11	Pass
134	5670	-3.29	-3.56	0.43	0.02	11	Pass
142	5710 (U-NII-2C)	-3.30	-4.28	0.43	-0.32	11	Pass

Note:

1. Method E) 2) a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 3.79 dBi $\leq$ 6dBi, so there is no need to reduce the power density limit.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

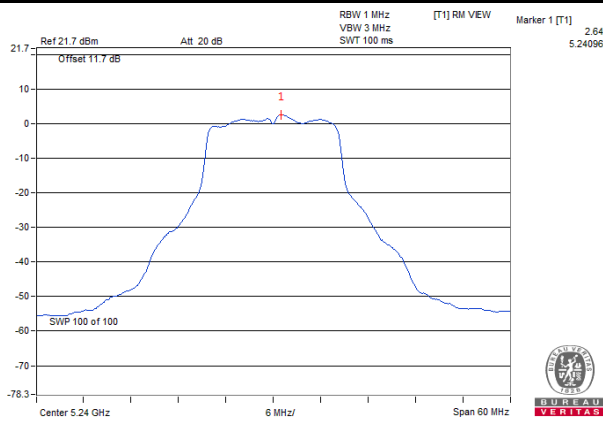
Channel	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-8.12	-8.31	0.47	-4.73	11	Pass
58	5290	-6.28	-6.86	0.47	-3.08	11	Pass
106	5530	-6.11	-6.32	0.47	-2.73	11	Pass
122	5610	-6.11	-6.39	0.47	-2.77	11	Pass
138	5690 (U-NII-2C)	-6.39	-6.76	0.47	-3.09	11	Pass

Note:

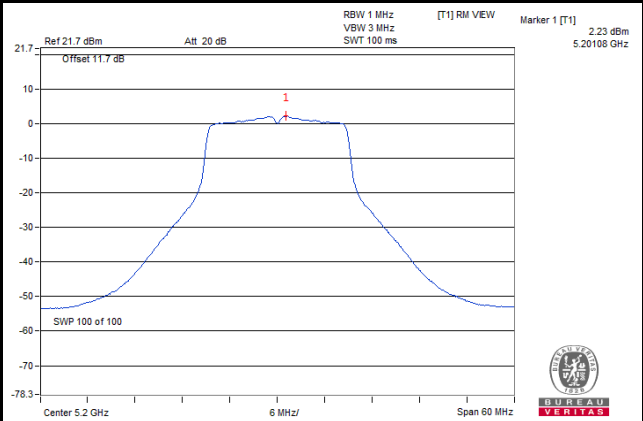
- Method E) 2) a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- The directional gain = 3.79 dBi $\leq$ 6dBi, so there is no need to reduce the power density limit.
- Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

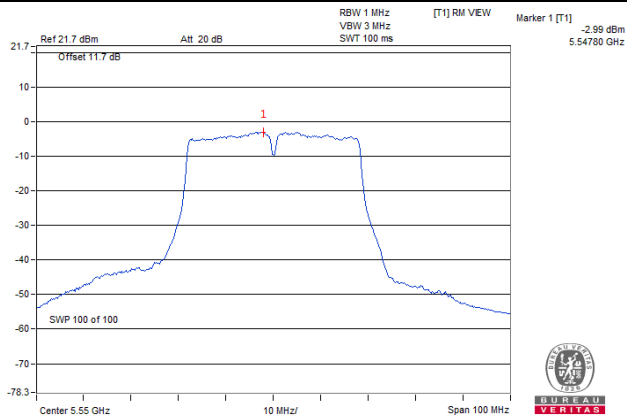
802.11a



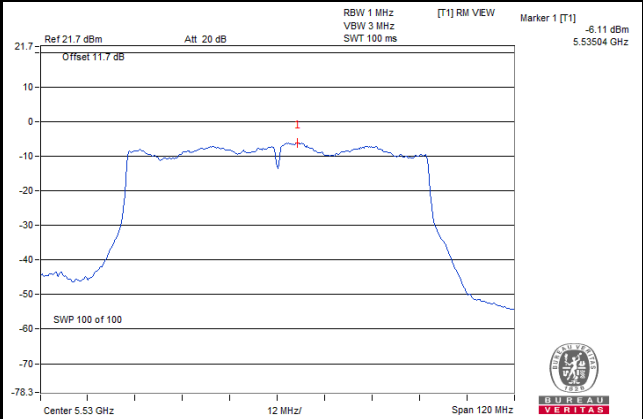
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)



For U-NII-3 Band
802.11a

TX Chain	Channel	Frequency (MHz)	PSD w/o Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
			(dBm/300 kHz)	(dBm/500 kHz)					
0	144	5720 (U-NII-3)	-8.66	-6.44	3.01	0.12	-3.31	30	Pass
	149	5745	-8.75	-6.53	3.01	0.12	-3.4	30	Pass
	157	5785	-6.38	-4.16	3.01	0.12	-1.03	30	Pass
	165	5825	-7.05	-4.83	3.01	0.12	-1.7	30	Pass
1	144	5720 (U-NII-3)	-8.28	-6.06	3.01	0.12	-2.93	30	Pass
	149	5745	-9.07	-6.85	3.01	0.12	-3.72	30	Pass
	157	5785	-7.16	-4.94	3.01	0.12	-1.81	30	Pass
	165	5825	-7.49	-5.27	3.01	0.12	-2.14	30	Pass

Note:

1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = 3.79 dBi <= 6dBi, so there is no need to reduce the power density limit.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX Chain	Channel	Frequency (MHz)	PSD		10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
			(dBm/300 kHz)	(dBm/500 kHz)					
0	144	5720 (U-NII-3)	-8.45	-6.23	3.01	0.42	-2.8	30	Pass
	149	5745	-10.36	-8.14	3.01	0.42	-4.71	30	Pass
	157	5785	-7.64	-5.42	3.01	0.42	-1.99	30	Pass
	165	5825	-7.58	-5.36	3.01	0.42	-1.93	30	Pass
1	144	5720 (U-NII-3)	-9.01	-6.79	3.01	0.42	-3.36	30	Pass
	149	5745	-10.43	-8.21	3.01	0.42	-4.78	30	Pass
	157	5785	-8.01	-5.79	3.01	0.42	-2.36	30	Pass
	165	5825	-8.18	-5.96	3.01	0.42	-2.53	30	Pass

Note:

1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = 3.79 dBi <= 6dBi, so there is no need to reduce the power density limit.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

TX Chain	Channel	Frequency (MHz)	PSD		10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
			(dBm/300 kHz)	(dBm/500 kHz)					
0	142	5710 (U-NII-3)	-13.79	-11.57	3.01	0.43	-8.13	30	Pass
	151	5755	-13.27	-11.05	3.01	0.43	-7.61	30	Pass
	159	5795	-11.53	-9.31	3.01	0.43	-5.87	30	Pass
1	142	5710 (U-NII-3)	-14.62	-12.4	3.01	0.43	-8.96	30	Pass
	151	5755	-13.59	-11.37	3.01	0.43	-7.93	30	Pass
	159	5795	-11.96	-9.74	3.01	0.43	-6.3	30	Pass

Note:

1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = 3.79 dBi <= 6dBi, so there is no need to reduce the power density limit.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

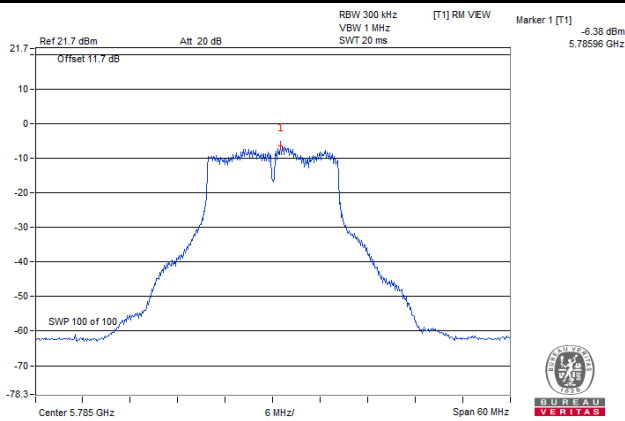
TX Chain	Channel	Frequency (MHz)	PSD		10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
			(dBm/300 kHz)	(dBm/500 kHz)					
0	138	5690 (U-NII-3)	-15.87	-13.65	3.01	0.47	-10.17	30	Pass
	155	5775	-14.85	-12.63	3.01	0.47	-9.15	30	Pass
1	138	5690 (U-NII-3)	-16.7	-14.48	3.01	0.47	-11	30	Pass
	155	5775	-15.07	-12.85	3.01	0.47	-9.37	30	Pass

Note:

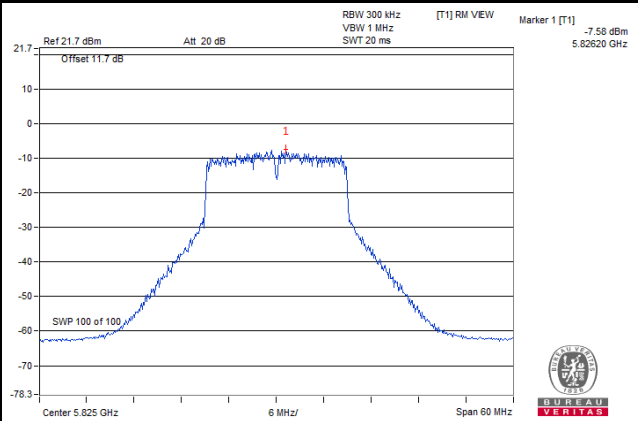
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = 3.79 dBi <= 6dBi, so there is no need to reduce the power density limit.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

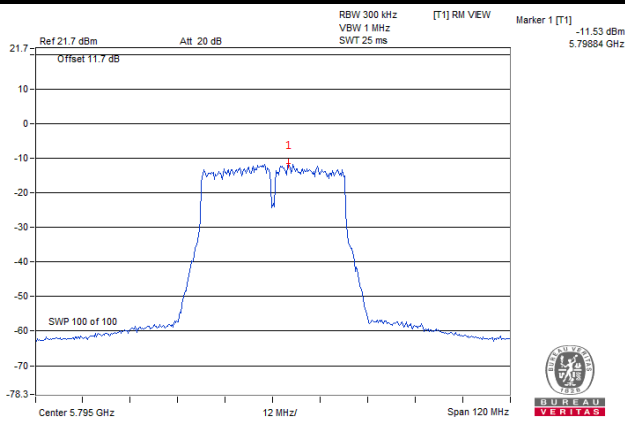
802.11a



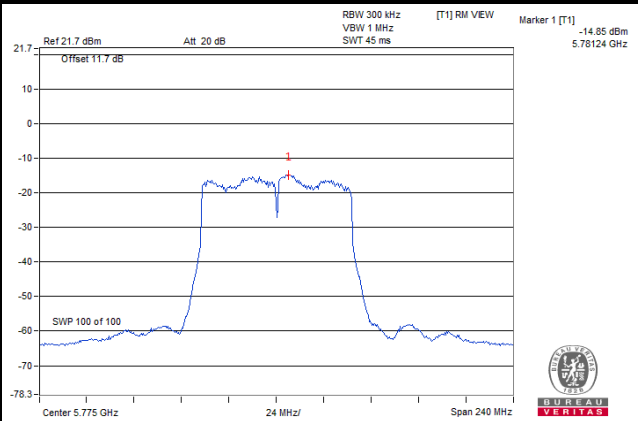
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)

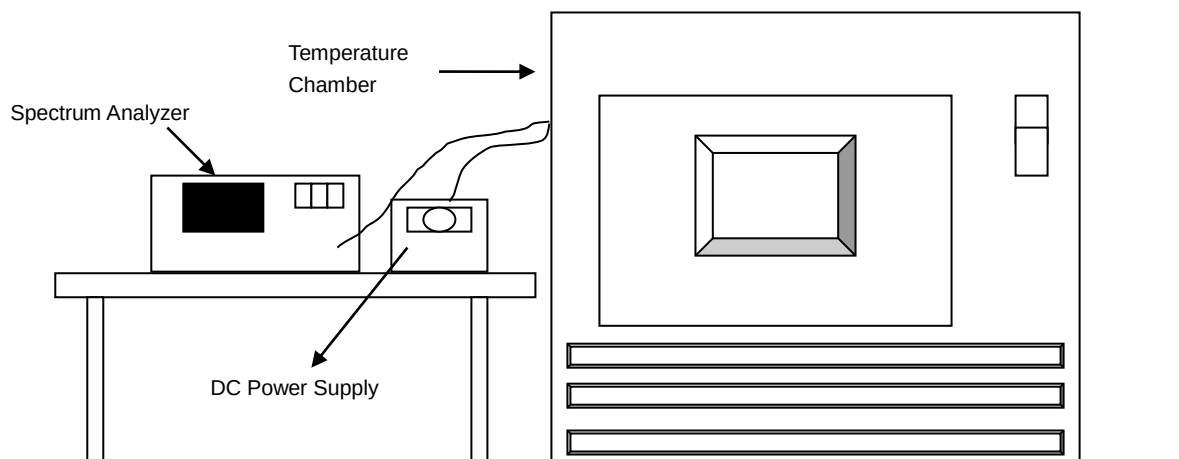


4.6 Frequency Stability

4.6.1 Limit of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation.

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

- The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
- Repeat step (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

4.6.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
Temp. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
60	3.8	5190.0164	PASS	5190.0169	PASS	5190.0169	PASS	5190.0162	PASS
50	3.8	5189.982	PASS	5189.9809	PASS	5189.9842	PASS	5189.9793	PASS
40	3.8	5189.9776	PASS	5189.9783	PASS	5189.9773	PASS	5189.9778	PASS
30	3.8	5189.988	PASS	5189.9905	PASS	5189.9915	PASS	5189.9914	PASS
20	3.8	5190.0171	PASS	5190.0175	PASS	5190.0205	PASS	5190.0178	PASS
10	3.8	5189.9903	PASS	5189.9906	PASS	5189.9918	PASS	5189.9922	PASS
0	3.8	5189.9957	PASS	5189.9933	PASS	5189.9935	PASS	5189.9945	PASS
-10	3.8	5189.9964	PASS	5189.996	PASS	5189.9934	PASS	5189.9937	PASS
-20	3.8	5189.9794	PASS	5189.976	PASS	5189.9801	PASS	5189.9795	PASS

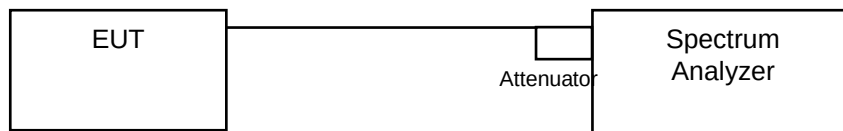
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
Temp. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
20	4.37	5190.0167	PASS	5190.018	PASS	5190.0198	PASS	5190.0187	PASS
	3.8	5190.0171	PASS	5190.0175	PASS	5190.0205	PASS	5190.0178	PASS
	3.23	5190.0174	PASS	5190.0178	PASS	5190.0203	PASS	5190.0171	PASS

4.7 6 dB Bandwidth Measurement

4.7.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

- Set resolution bandwidth (RBW) = 100 kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.7.7 Test Results

802.11a

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
144	5720 (U-NII-3)	2.58	3.15	0.5	Pass
149	5745	15.15	15.82	0.5	Pass
157	5785	15.17	16.29	0.5	Pass
165	5825	15.16	15.78	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
144	5720 (U-NII-3)	2.58	3.75	0.5	Pass
149	5745	15.16	16.34	0.5	Pass
157	5785	15.16	16.09	0.5	Pass
165	5825	15.19	16.92	0.5	Pass

802.11n (HT40)

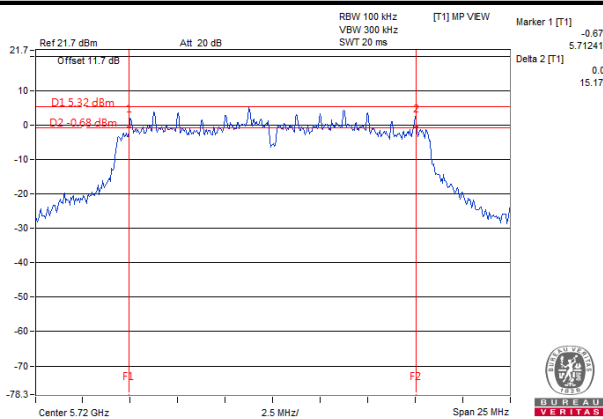
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
142	5710 (U-NII-3)	2.66	2.67	0.5	Pass
151	5755	35.28	35.48	0.5	Pass
159	5795	35.32	35.86	0.5	Pass

802.11ac (VHT80)

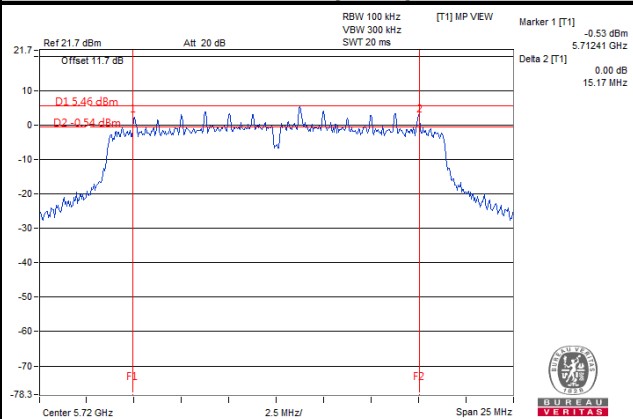
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
138	5690 (U-NII-3)	3.02	2.69	0.5	Pass
155	5775	75.49	75.36	0.5	Pass

Spectrum Plot of Worst Value

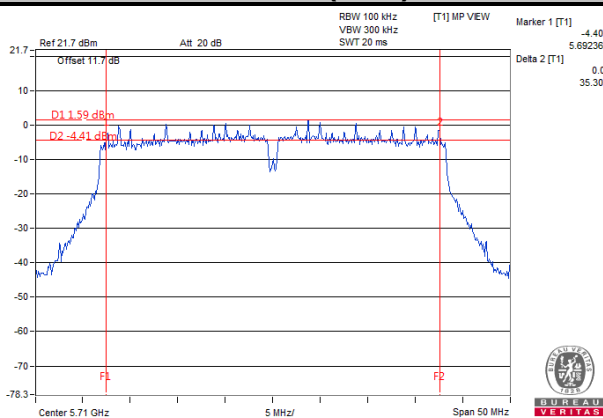
802.11a



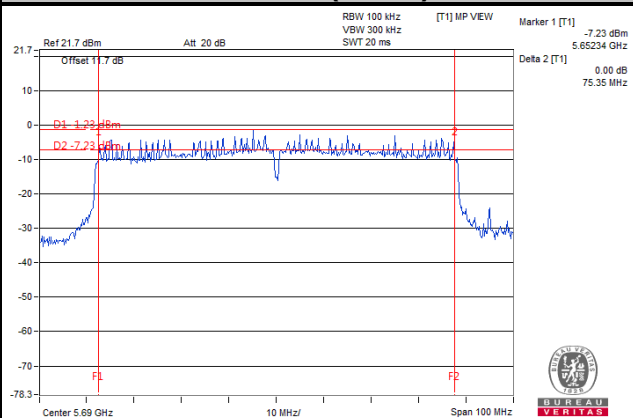
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)



Note:

For Ch138 (UNII-3 Band): The 6 dB bandwidth above 5725 MHz = Marker 1 + Delta 2 – 5725 MHz

For Ch142 (UNII-3 Band): The 6 dB bandwidth above 5725 MHz = Marker 1 + Delta 2 – 5725 MHz

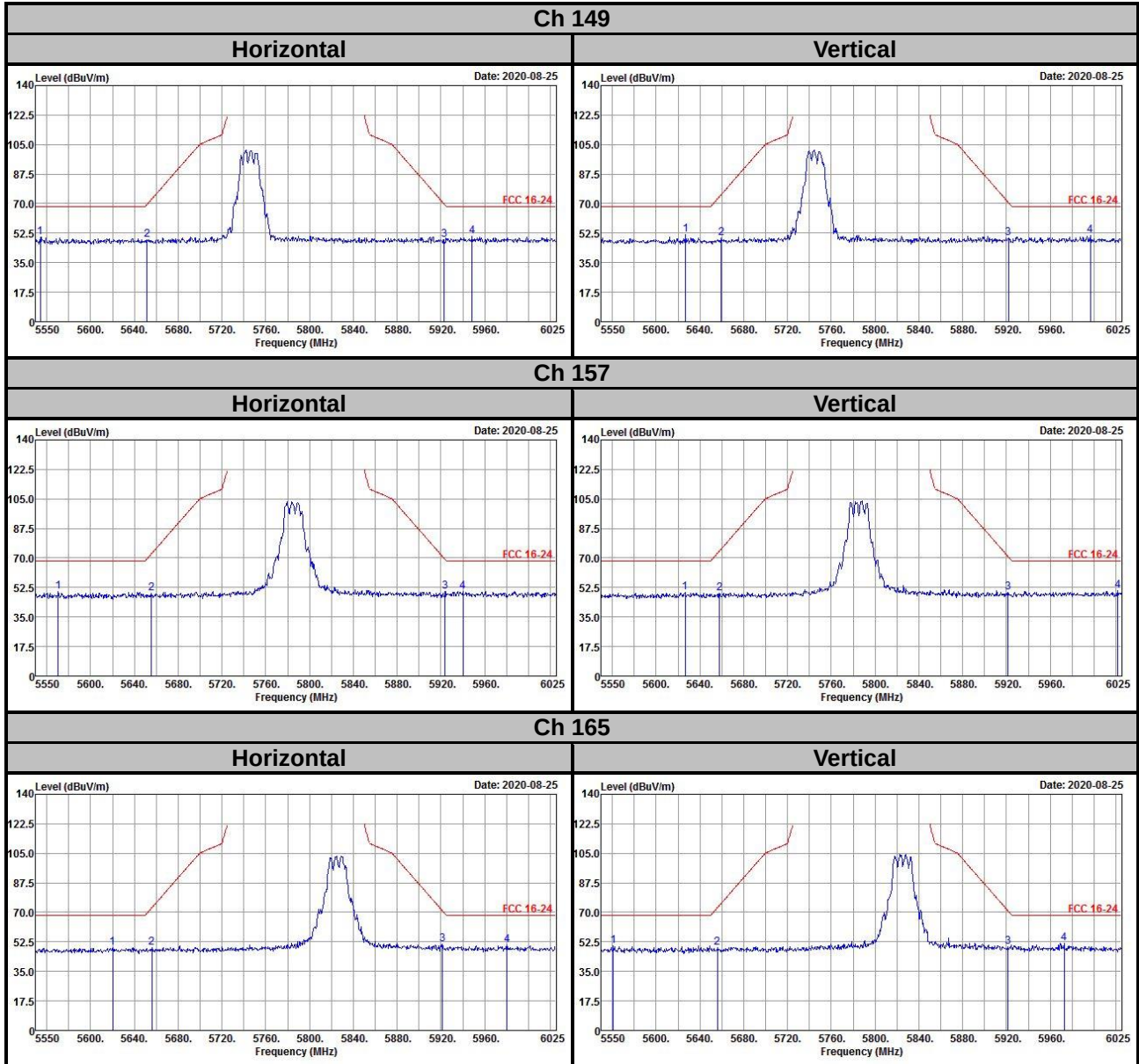
For Ch144 (UNII-3 Band): The 6 dB bandwidth above 5725 MHz = Marker 1 + Delta 2 – 5725 MHz

5 Pictures of Test Arrangements

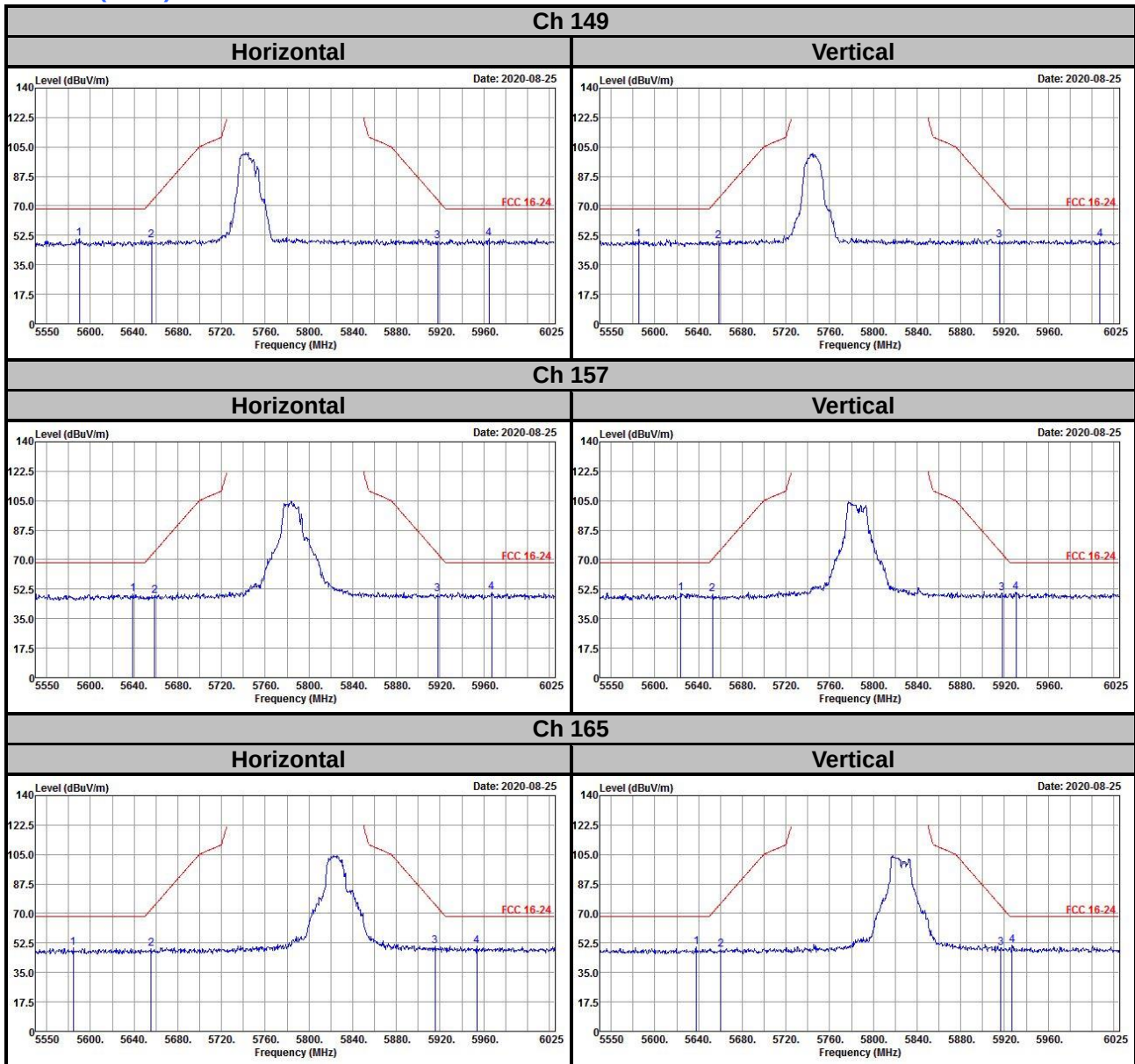
Please refer to the attached file (Test Setup Photo).

Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

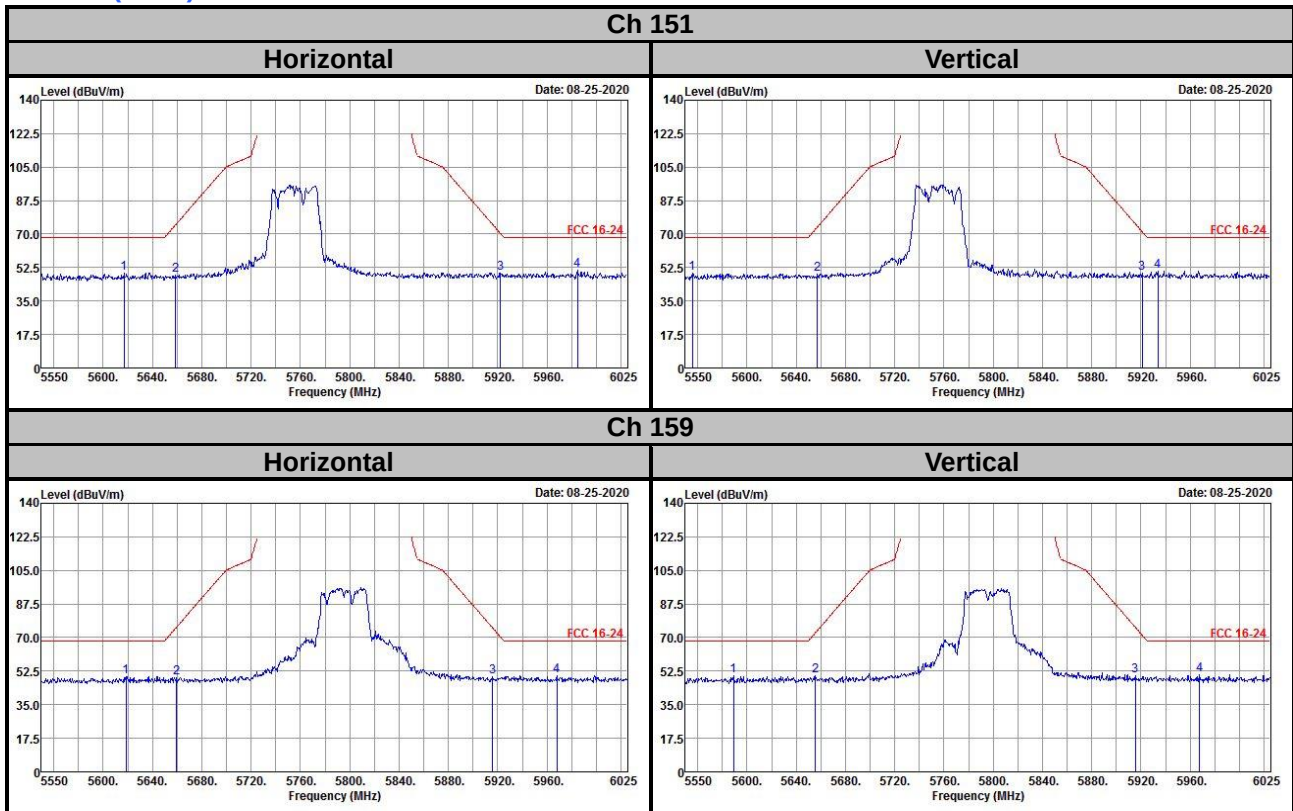
802.11a



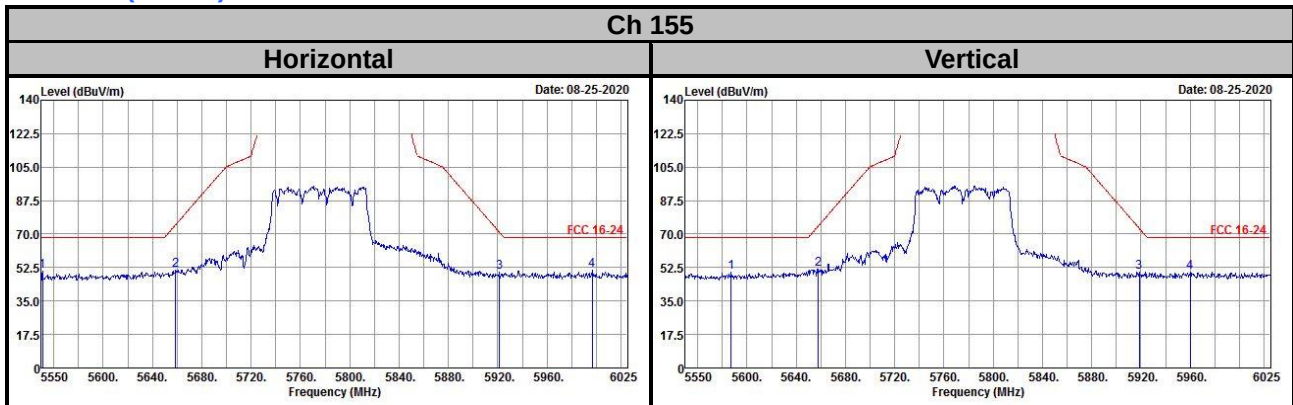
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)

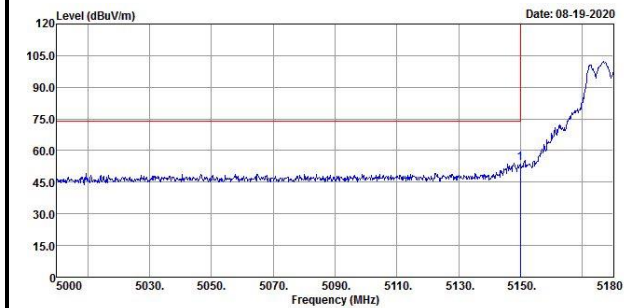


Annex B- Radiated Out of Band Emission (OOBE) Measurement

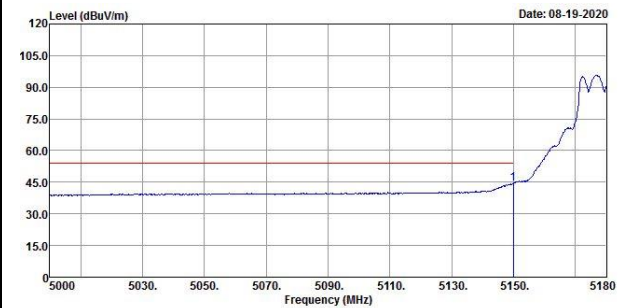
802.11a

Channel 36

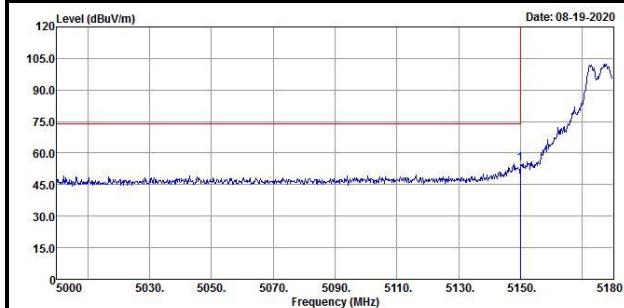
Horizontal (Peak)



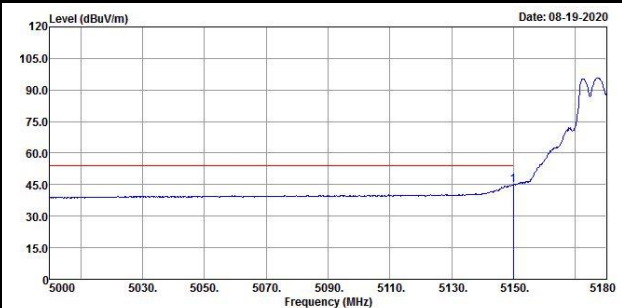
Horizontal (Average)



Vertical (Peak)

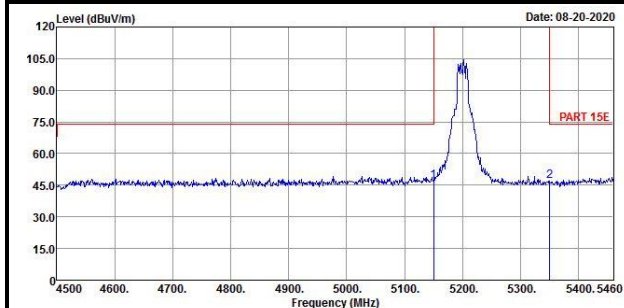


Vertical (Average)

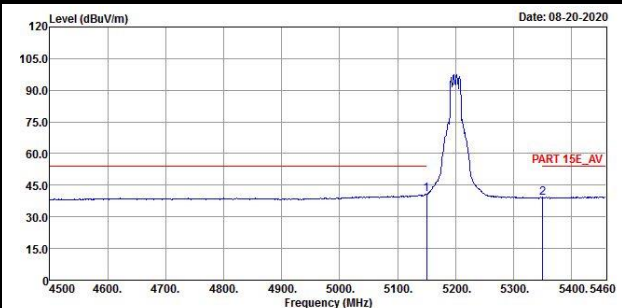


Channel 40

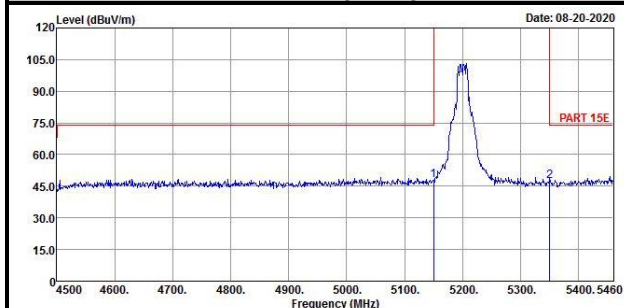
Horizontal (Peak)



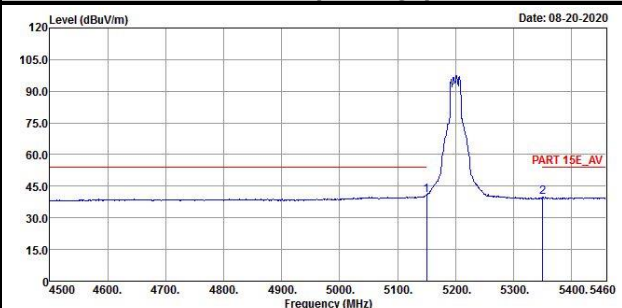
Horizontal (Average)



Vertical (Peak)

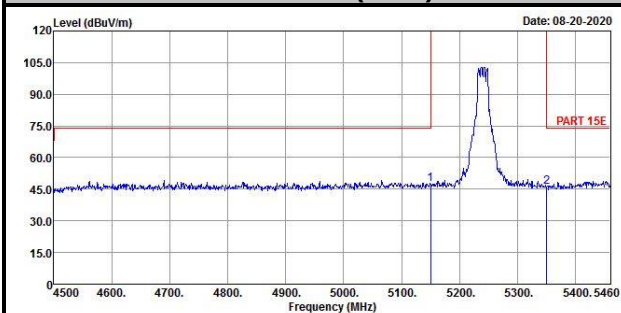


Vertical (Average)

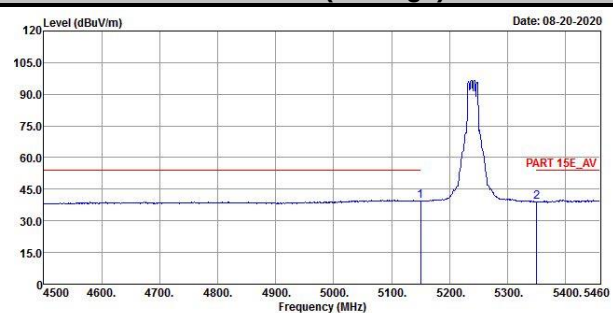


Channel 48

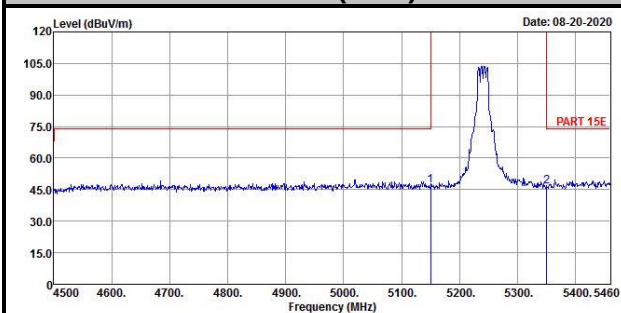
Horizontal (Peak)



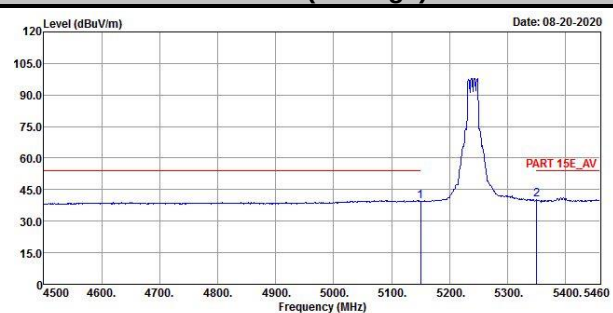
Horizontal (Average)



Vertical (Peak)

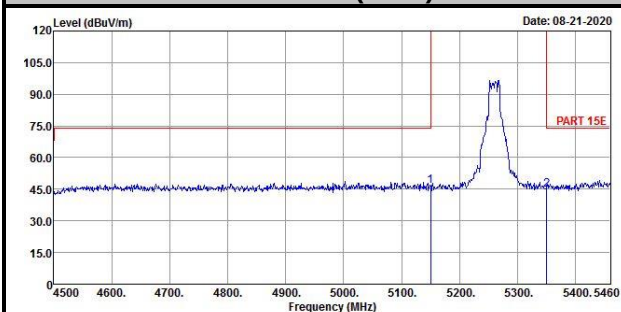


Vertical (Average)

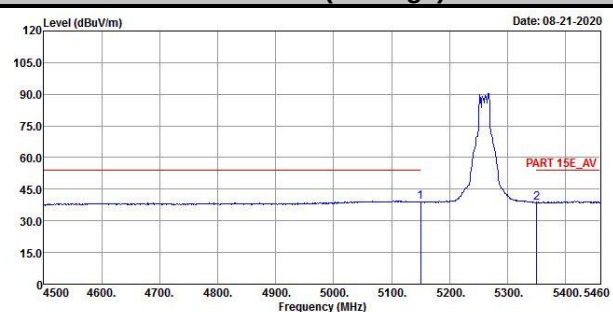


Channel 52

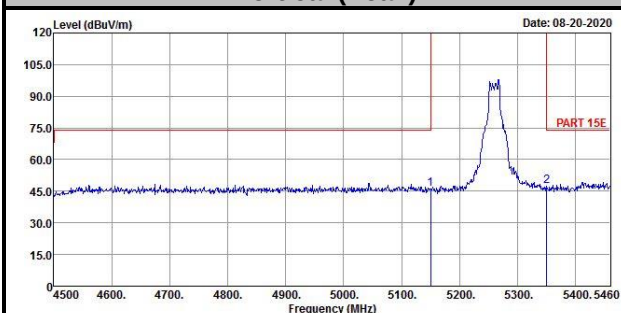
Horizontal (Peak)



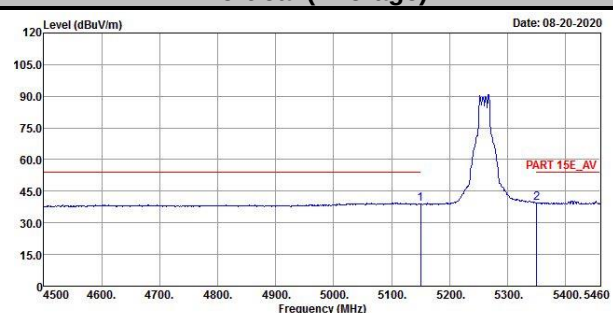
Horizontal (Average)



Vertical (Peak)

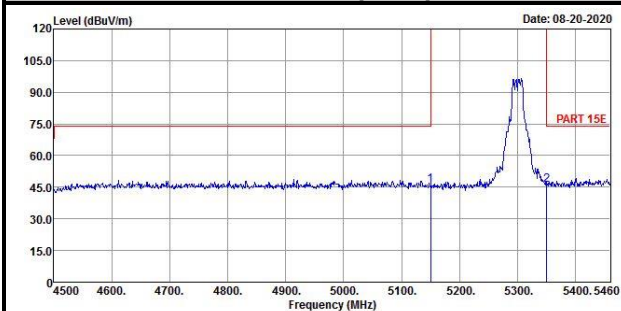


Vertical (Average)

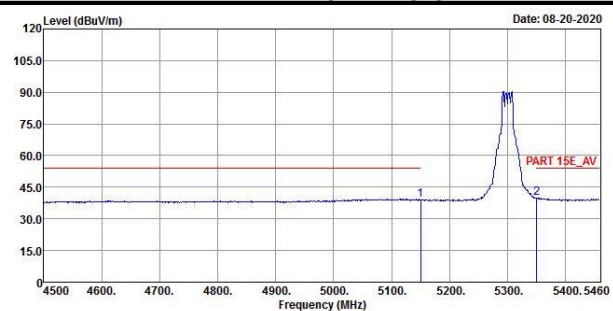


Channel 60

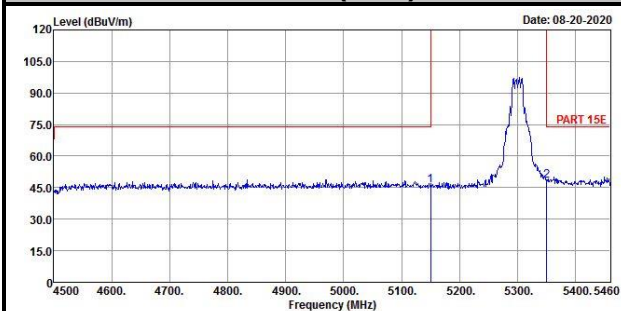
Horizontal (Peak)



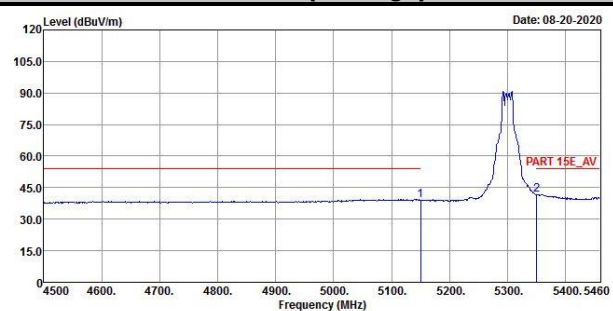
Horizontal (Average)



Vertical (Peak)

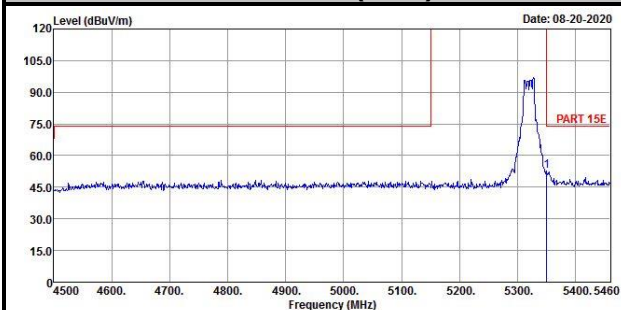


Vertical (Average)

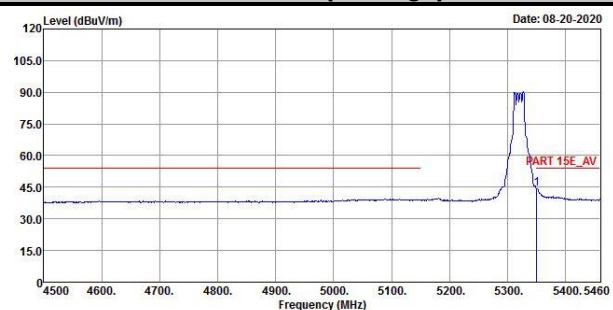


Channel 64

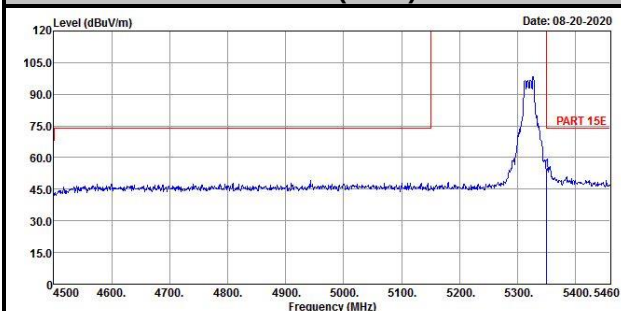
Horizontal (Peak)



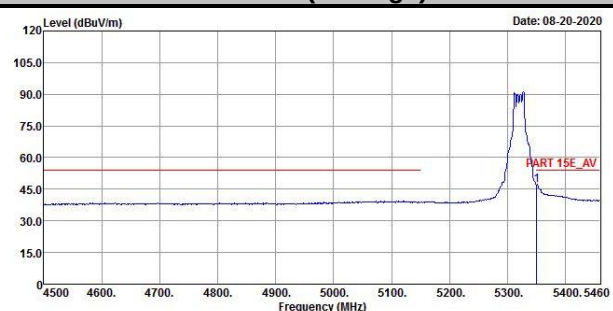
Horizontal (Average)



Vertical (Peak)

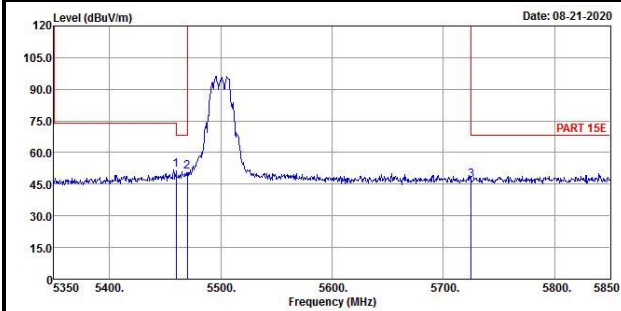


Vertical (Average)

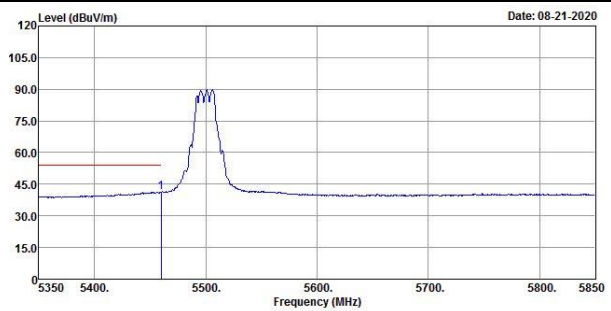


Channel 100

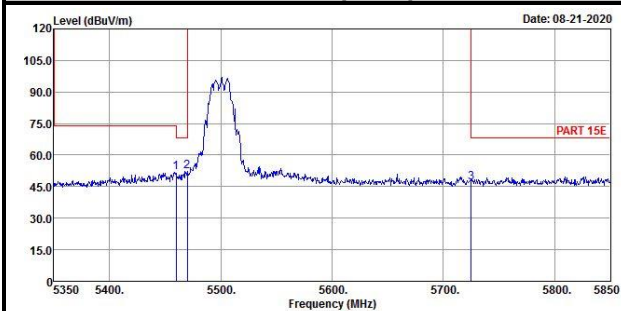
Horizontal (Peak)



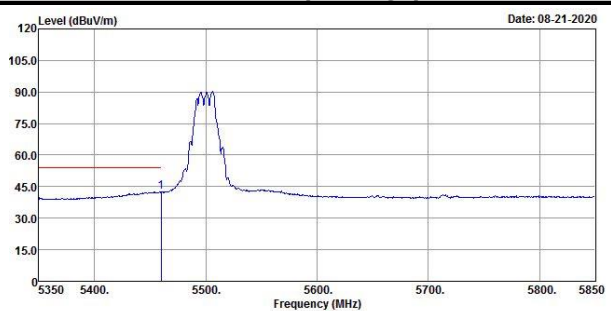
Horizontal (Average)



Vertical (Peak)

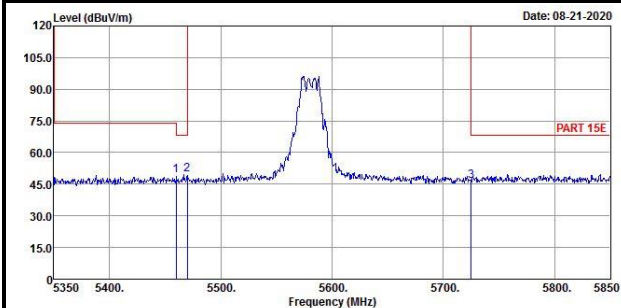


Vertical (Average)

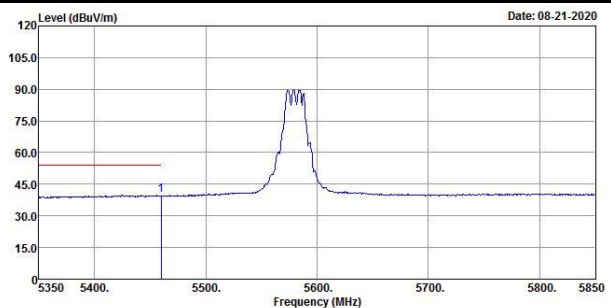


Channel 116

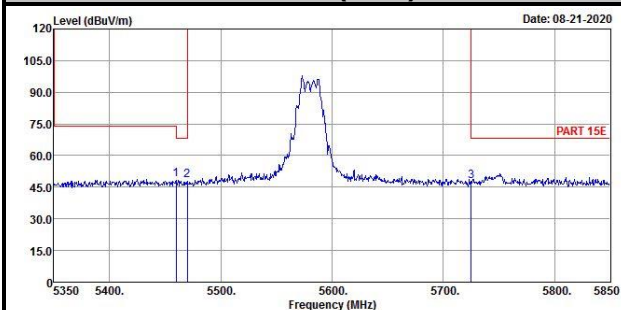
Horizontal (Peak)



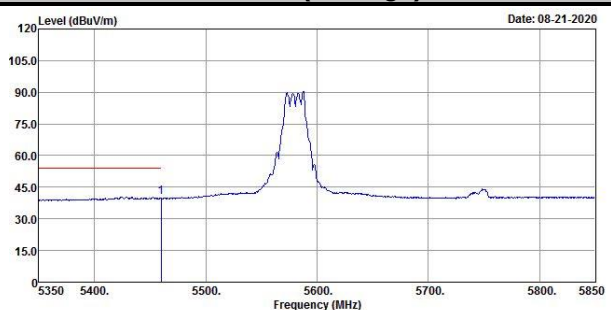
Horizontal (Average)



Vertical (Peak)

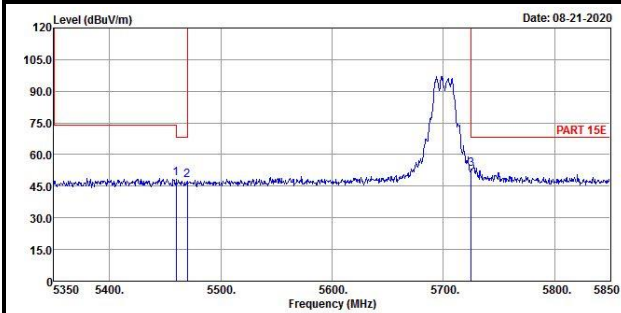


Vertical (Average)

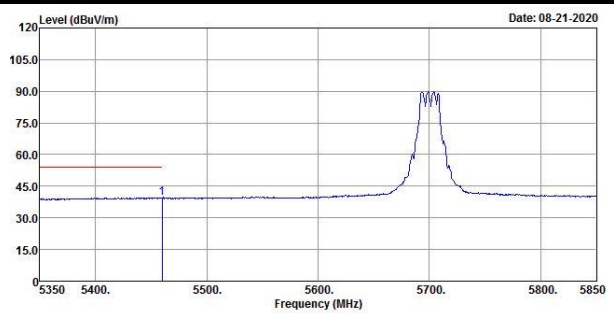


Channel 140

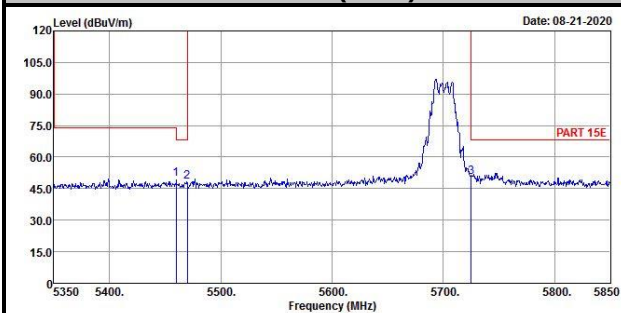
Horizontal (Peak)



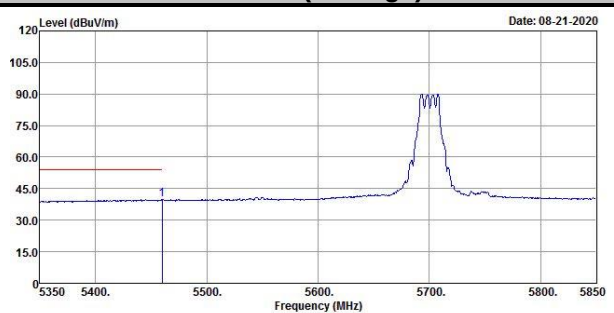
Horizontal (Average)



Vertical (Peak)

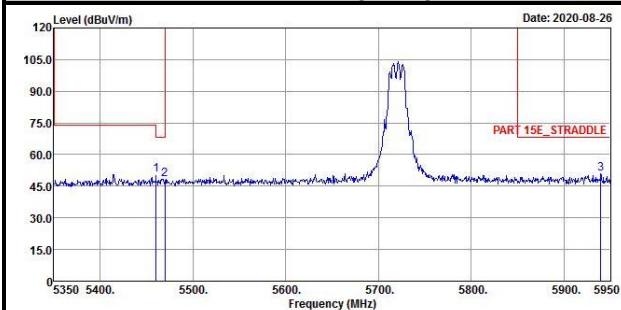


Vertical (Average)

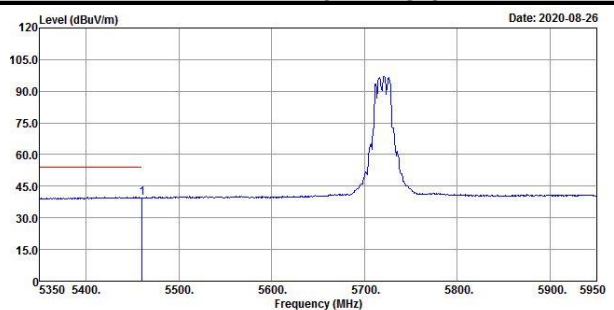


Channel 144

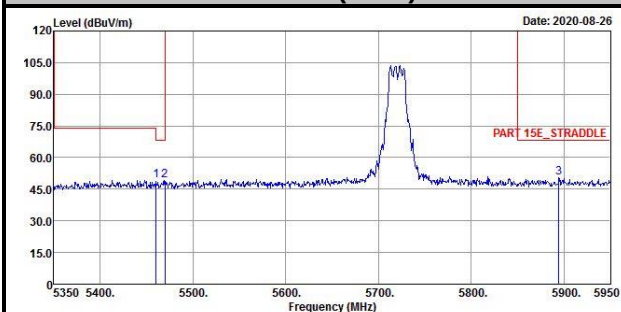
Horizontal (Peak)



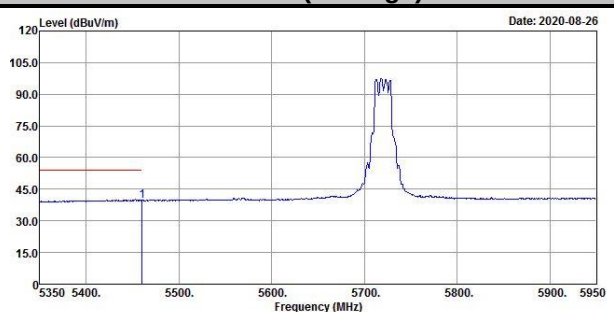
Horizontal (Average)



Vertical (Peak)



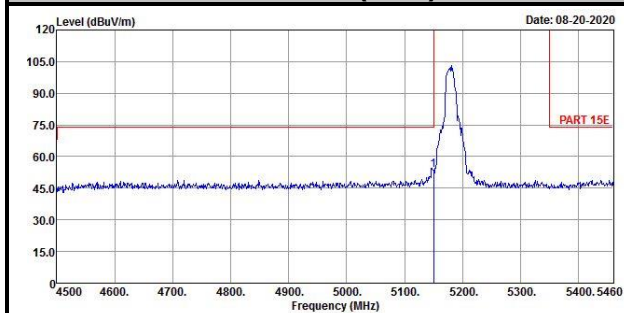
Vertical (Average)



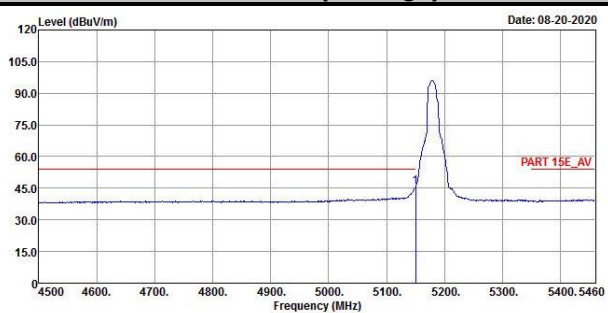
802.11n (HT20)

Channel 36

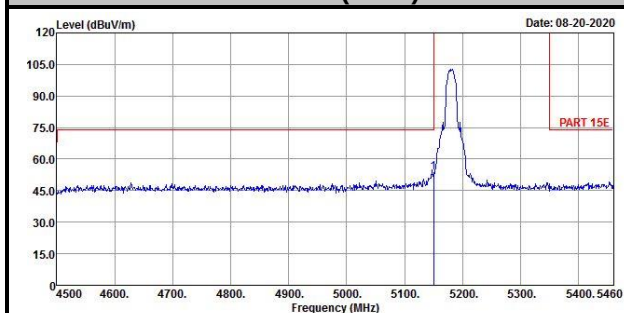
Horizontal (Peak)



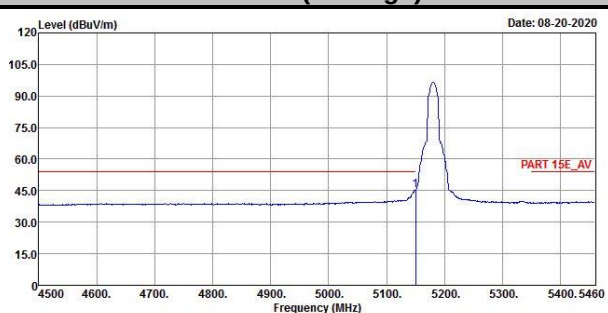
Horizontal (Average)



Vertical (Peak)

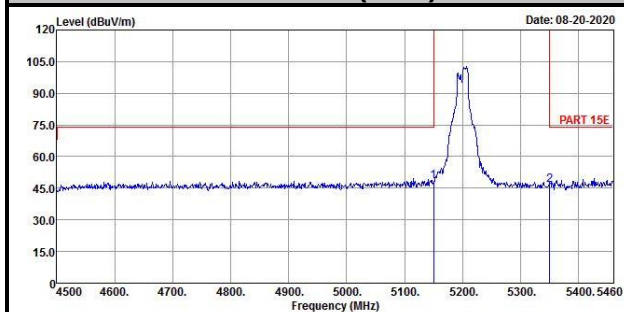


Vertical (Average)

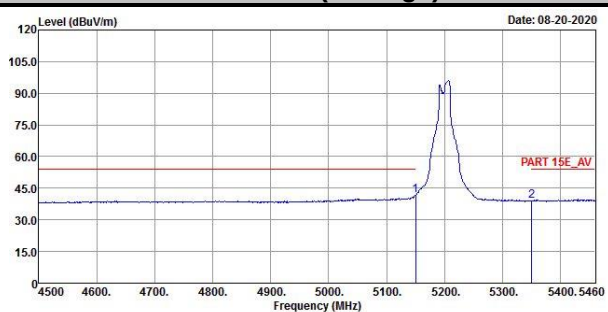


Channel 40

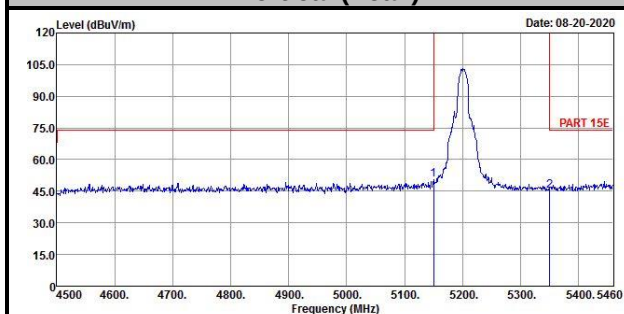
Horizontal (Peak)



Horizontal (Average)



Vertical (Peak)



Vertical (Average)

