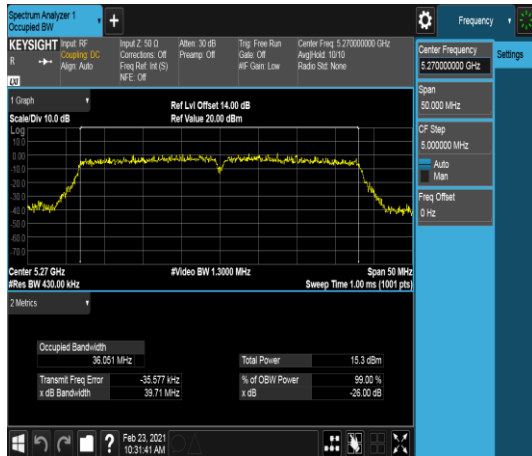


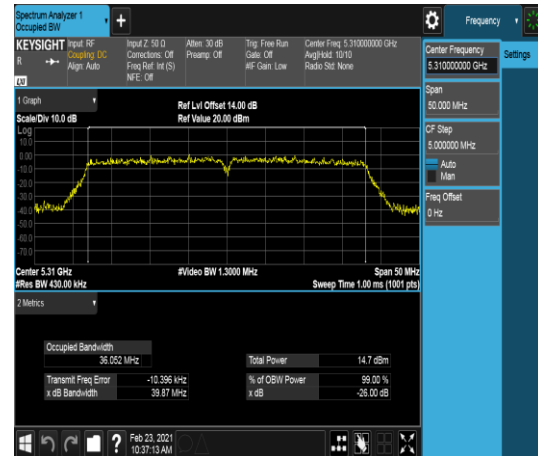
Report No.: T201222W02-RP5

UNII-2a IEEE 802.11n HT40 mode- chain 1

Low CH

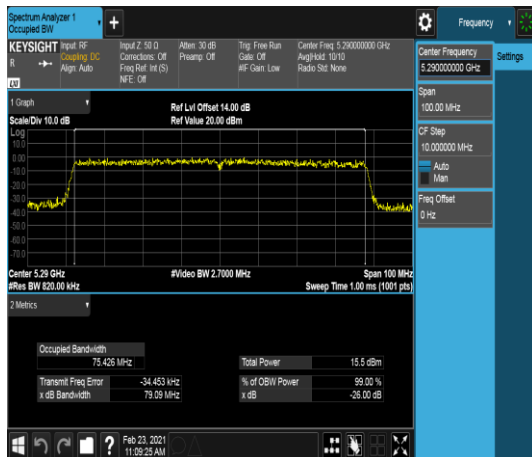


High CH



UNII-2a IEEE 802.11ac VHT80 mode- chain 1

Low CH

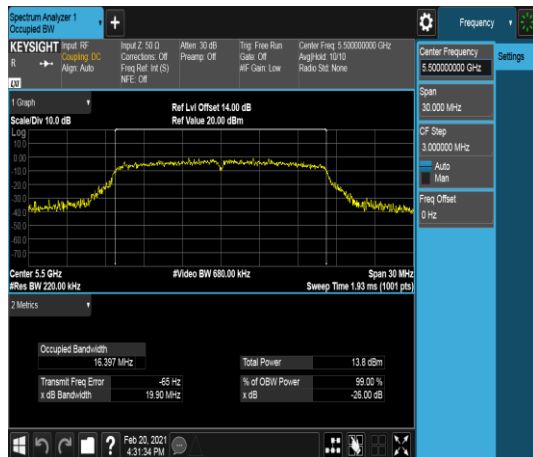


Report No.: T201222W02-RP5

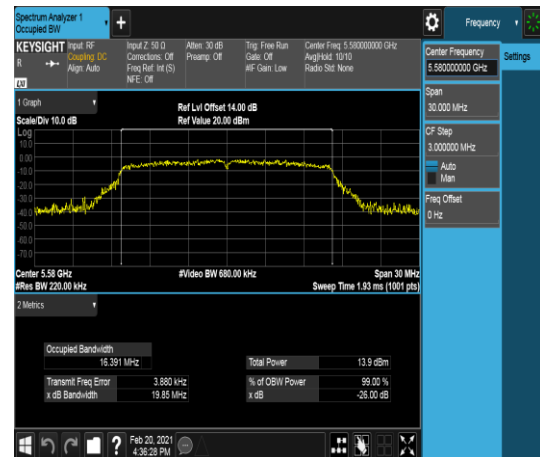
BANDWIDTH 99%

UNII-2c IEEE 802.11a mode- chain 0

Low CH



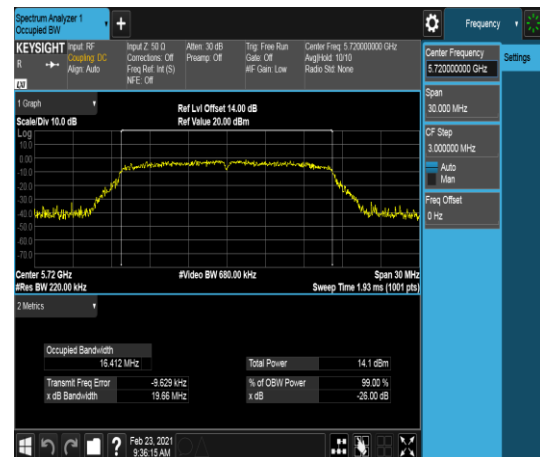
Mid CH



High CH



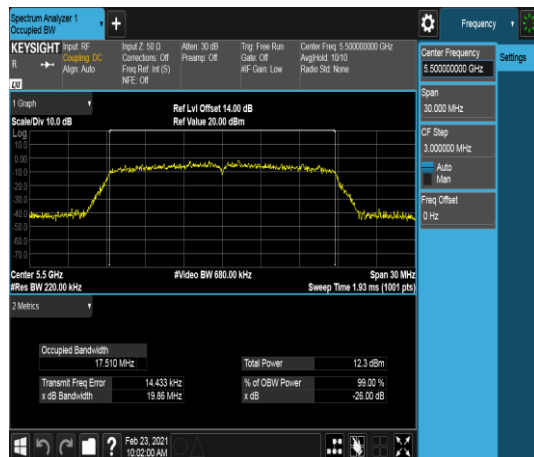
Cross CH



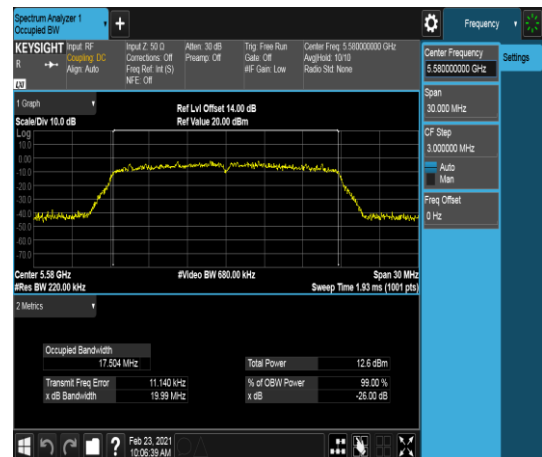
Report No.: T201222W02-RP5

UNII-2c IEEE 802.11n HT20 mode- chain 0

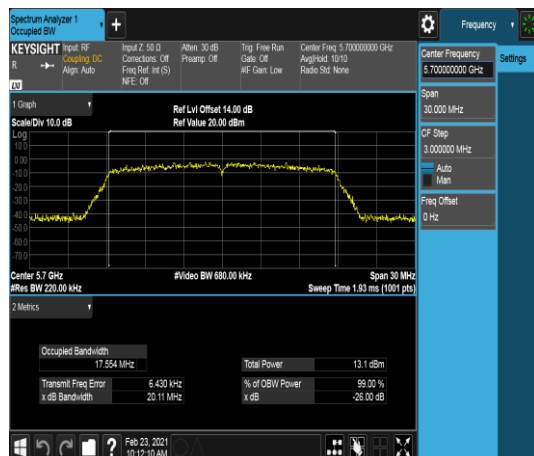
Low CH



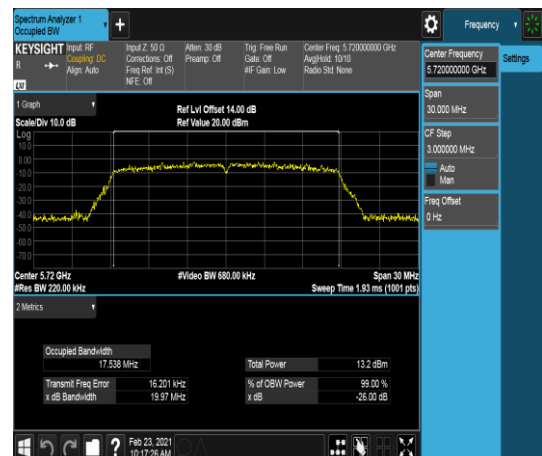
Mid CH



High CH



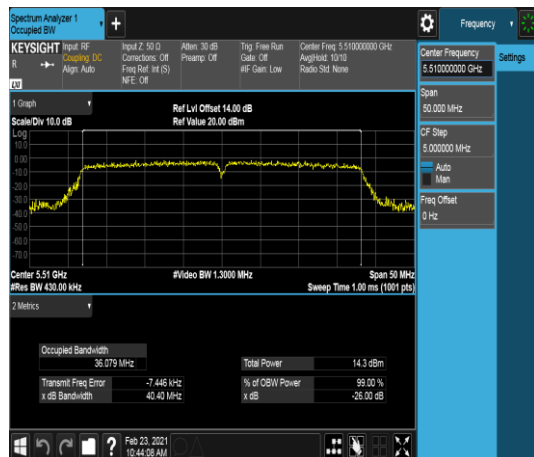
Cross CH



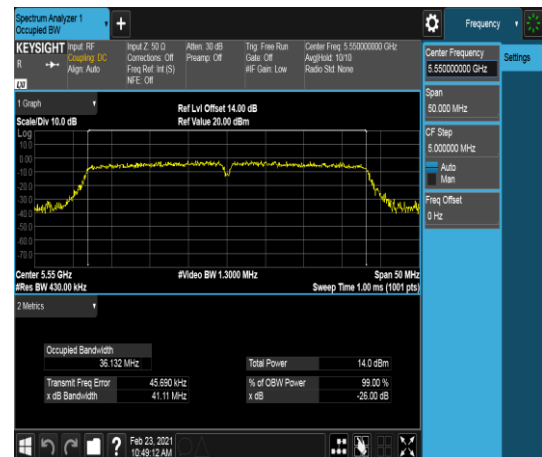
Report No.: T201222W02-RP5

UNII-2c IEEE 802.11n HT40 mode- chain 0

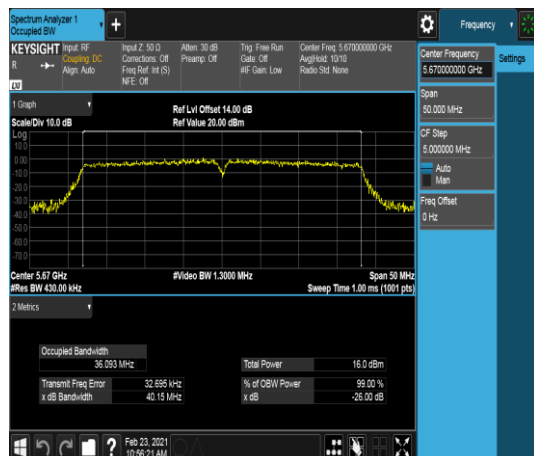
Low CH



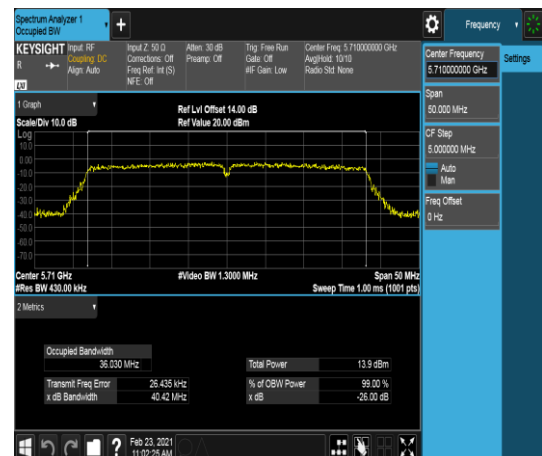
Mid CH



High CH



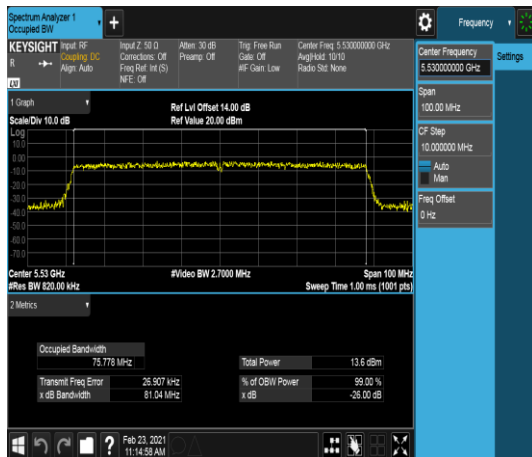
Cross CH



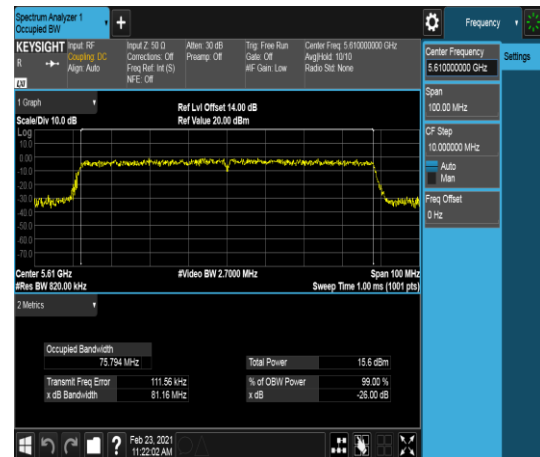
Report No.: T201222W02-RP5

UNII-2c IEEE 802.11ac VHT80 mode- chain 0

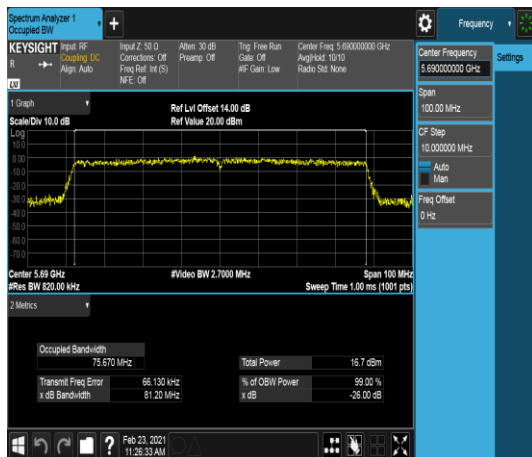
Low CH



High CH



Cross CH

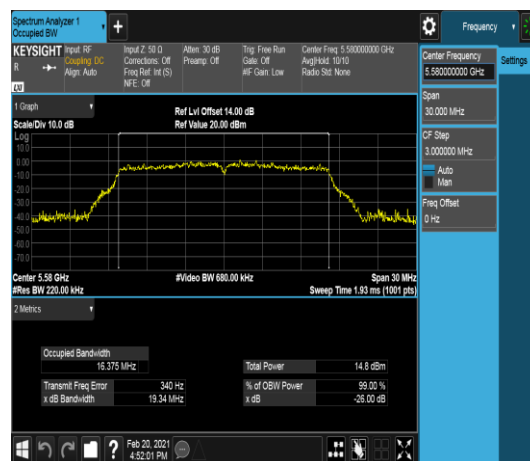


UNII-2c IEEE 802.11a mode- chain 1

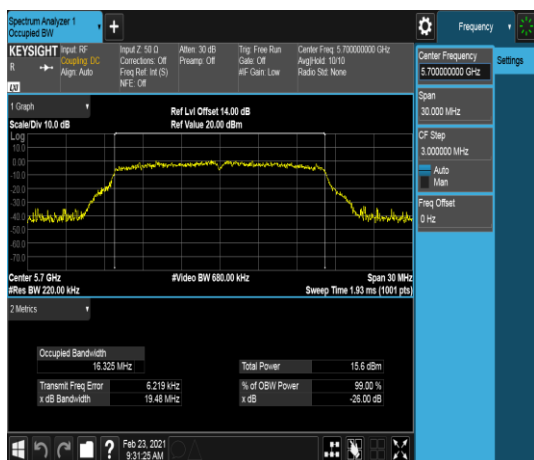
Low CH



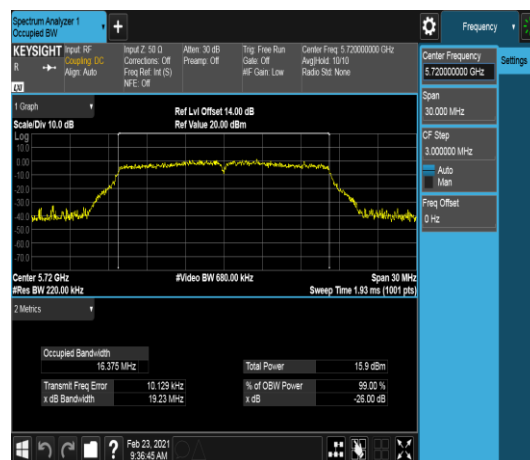
Mid CH



High CH



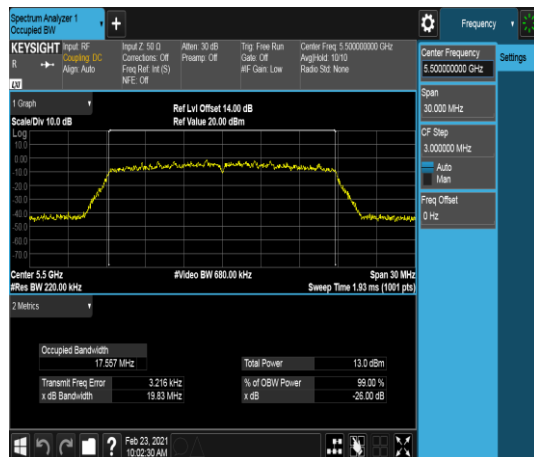
Cross CH



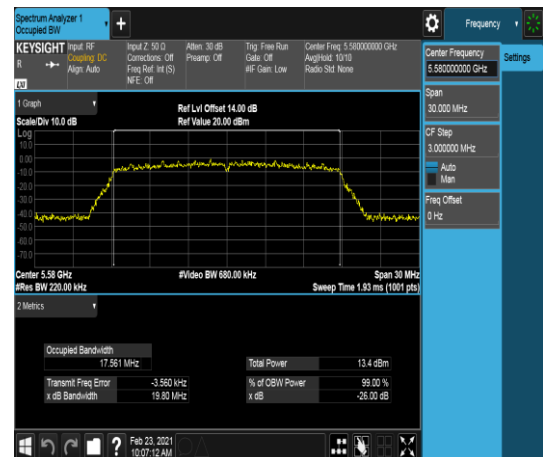
Report No.: T201222W02-RP5

UNII-2c IEEE 802.11n HT20 mode- chain 1

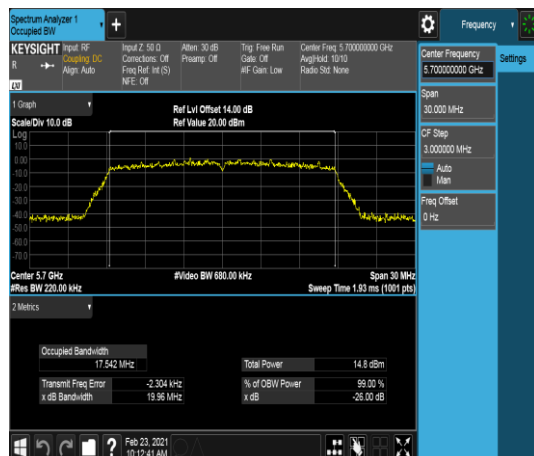
Low CH



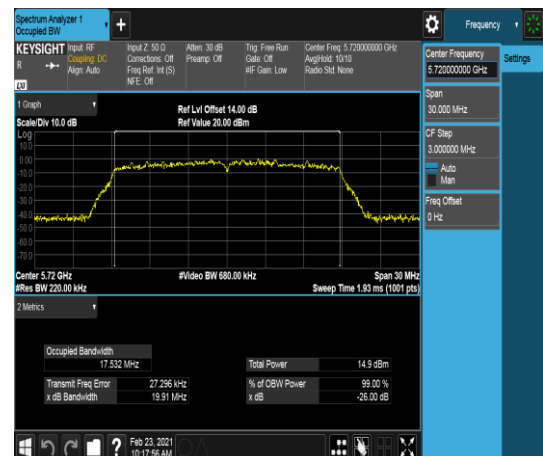
Mid CH



High CH



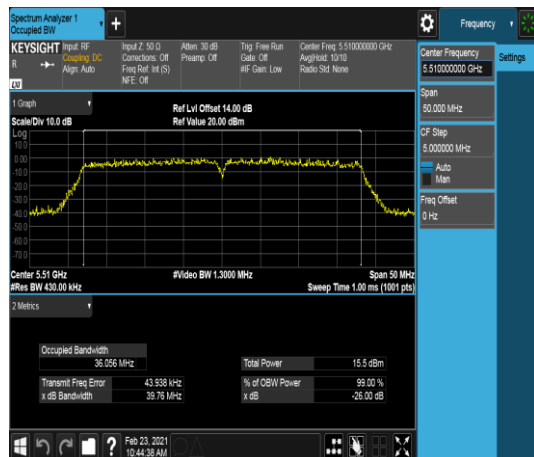
Cross CH



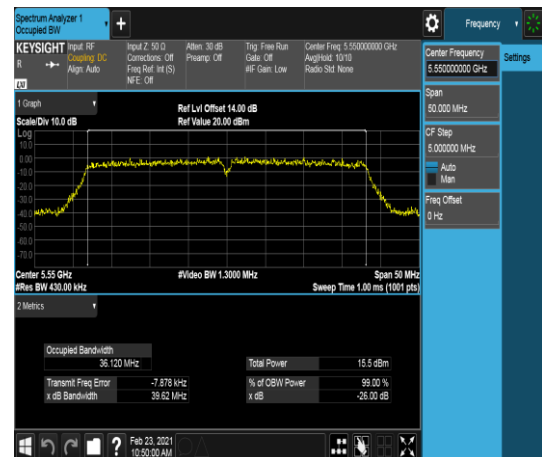
Report No.: T201222W02-RP5

UNII-2c IEEE 802.11n HT40 mode- chain 1

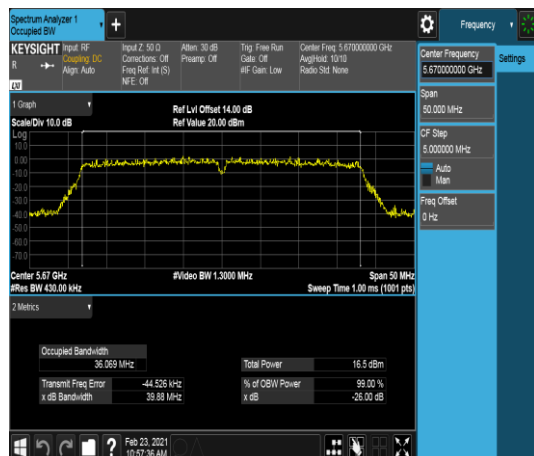
Low CH



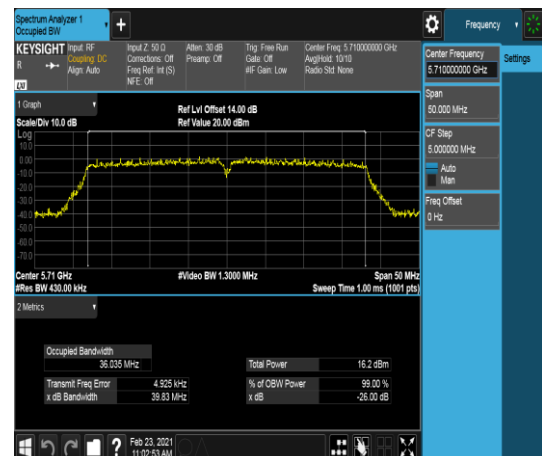
Mid CH



High CH



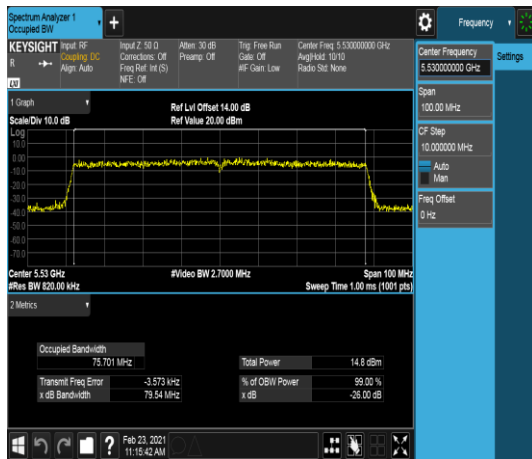
Cross CH



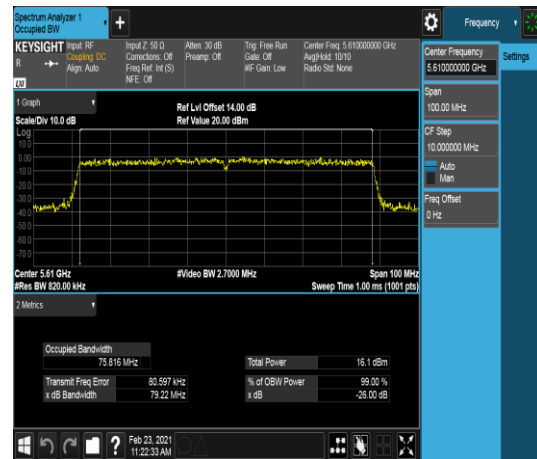
Report No.: T201222W02-RP5

UNII-2c IEEE 802.11ac VHT80 mode- chain 1

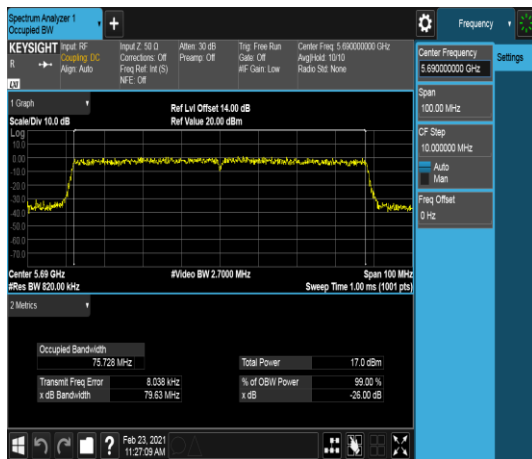
Low CH



High CH



Cross CH



4.3 OUTPUT POWER MEASUREMENT

4.3.1 Test Limit

According to §15.407 (a)(1), 15.407(a)(2) and 15.407(a)(3), and RSS-247 section 6.2.1.1, section 6.2.2.1, section 6.2.3.1 and section 6.2.4.1

FCC:

UNII-2a and 2c:

the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. and The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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IC:

UNII-2a and 2c:

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or $1.76 + 10 \log_{10} B$, dBm, whichever is less. Devices shall implement TPC in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.

Devices, other than devices installed in vehicles, shall comply with the following:

The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band;

The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

UNII-2c (5470-5600 MHz and 5650-5725 MHz)

The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

UNII-2a/2c Limit	☒ Antenna not exceed 6 dBi : 24dBm ☐ Antenna with DG greater than 6 dBi : [Limit = 24 – (DG – 6)]
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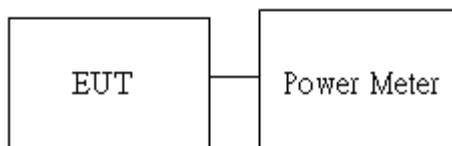
4.3.2 Test Procedure

Test method Refer as KDB 789033 D02, Section E.3.b for BW 20MHz and 40MHz, E.2.b for BW 80MHz.

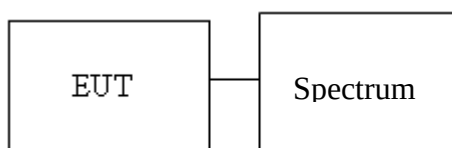
1. The EUT RF output connected to the power meter or spectrum by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Average output power. in the test report.

4.3.3 Test Setup

For BW 20MHz and 40MHz



For BW 80MHz



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4.3.4 Test Result

Conducted output power :

Temperature: 22.6°C

Humidity: 52% RH

Tested by: Lance Chen

Test date: February 20, 2021

802.11a_2TX

CH	Frequency (MHz)	Data Rate	Power set	Avg. Power (dBm)		Total Power (dBm)	Total power (mW)	Required Limit (dBm)		IC Required Limit (dBm)		
				CH 0	CH 1							
52	5260	6	8	6.87	7.95	10.77	11.937	23.98	or 11+10log(B) = 23.88	23.98	or 11+10log(B) = 23.14	
60	5300	6	8	6.88	8.02	10.81	12.058	23.98	or 11+10log(B) = 23.92	23.98	or 11+10log(B) = 23.14	
64	5320	6	8	6.75	7.92	10.70	11.748	23.98	or 11+10log(B) = 23.90	23.98	or 11+10log(B) = 23.15	
100	5500	6	8	6.3	6.75	9.86	9.675	23.98	or 11+10log(B) = 23.87	23.98	or 11+10log(B) = 23.14	
116	5580	6	8	6.38	7.06	10.06	10.136	23.98	or 11+10log(B) = 23.85	23.98	or 11+10log(B) = 23.14	
140	5700	6	8	6.48	8.73	11.07	12.807	23.98	or 11+10log(B) = 23.84	23.98	or 11+10log(B) = 23.13	
144	5720(U-NII 2C)	6	8	5.46	7.60	9.99	9.984	23.98	or 11+10log(B) = 22.69	23.98	or 11+10log(B) = 22.2	
144	5720 (U-NII 3)	6	8	0.53	2.70	5.08	3.220	30.00				

802.11n_HT20_MIMO

CH	Frequency (MHz)	Data Rate	Power set	Avg. Power (dBm)		Total Power (dBm)	Total power (mW)	Required Limit (dBm)		IC Required Limit (dBm)		
				CH 0	CH 1							
52	5260	MCS8	8	5.48	6.71	9.75	9.448	23.98	or 11+10log(B) = 23.96	23.98	or 11+10log(B) = 23.44	
60	5300	MCS8	8	5.43	6.47	9.60	9.112	23.98	or 11+10log(B) = 23.98	23.98	or 11+10log(B) = 23.45	
64	5320	MCS8	8	5.39	6.51	9.60	9.122	23.98	or 11+10log(B) = 23.99	23.98	or 11+10log(B) = 23.44	
100	5500	MCS8	8	4.82	5.27	8.67	7.355	23.98	or 11+10log(B) = 23.97	23.98	or 11+10log(B) = 23.43	
116	5580	MCS8	8	4.91	5.59	8.88	7.724	23.98	or 11+10log(B) = 23.92	23.98	or 11+10log(B) = 23.43	
140	5700	MCS8	8	5.27	7.32	10.03	10.069	23.98	or 11+10log(B) = 23.97	23.98	or 11+10log(B) = 23.44	
144	5720(U-NII 2C)	MCS8	8	4.00	6.01	8.73	7.458	23.98	or 11+10log(B) = 22.73	23.98	or 11+10log(B) = 22.39	
144	5720 (U-NII 3)	MCS8	8	-0.83	1.21	3.92	2.465	30.00				

802.11n_HT40_MIMO

CH	Frequency (MHz)	Data Rate	Power set	Avg. Power (dBm)		Total Power (dBm)	Total power (mW)	Required Limit (dBm)			IC Required Limit (dBm)		
				CH 0	CH 1								
54	5270	MCS8	9	5.47	6.5	10.10	10.244	23.98	or 11+10log(B) =	27.00	23.98	or 11+10log(B) =	26.57
62	5310	MCS8	9	5.32	6.2	9.87	9.709	23.98	or 11+10log(B) =	27.01	23.98	or 11+10log(B) =	26.57
102	5510	MCS8	10	5.71	6.13	10.01	10.033	23.98	or 11+10log(B) =	27.06	23.98	or 11+10log(B) =	26.57
110	5550	MCS8	10	5.49	6.25	9.98	9.945	23.98	or 11+10log(B) =	27.00	23.98	or 11+10log(B) =	26.58
134	5670	MCS8	9	5.54	6.09	9.91	9.802	23.98	or 11+10log(B) =	27.02	23.98	or 11+10log(B) =	26.57
142	5710(U-NII 2C)	MCS8	9	4.52	6.11	9.48	8.862	23.98	or 11+10log(B) =	26.44	23.98	or 11+10log(B) =	26.19
142	5710 (U-NII 3)	MCS8	9	-3.93	-2.31	1.04	1.272	30.00					

802.11ac_VHT80_MIMO

CH	Frequency (MHz)	Data Rate	Power set	Avg. Power (dBm)		Total Power (dBm)	Total power (mW)	Required Limit (dBm)			IC Required Limit (dBm)		
				CH 0	CH 1								
58	5290	MCS0	9	5.12	6.23	9.86	9.673	23.98	or 11+10log(B) =	30.03	23.98	or 11+10log(B) =	29.78
106	5530	MCS0	9	4.55	5.32	9.10	8.124	23.98	or 11+10log(B) =	30.01	23.98	or 11+10log(B) =	29.79
122	5610	MCS0	9	5.94	6.29	10.26	10.627	23.98	or 11+10log(B) =	30.02	23.98	or 11+10log(B) =	29.8
138	5690(U-NII 2C)	MCS0	9	6.12	6.83	10.64	11.580	23.98	or 11+10log(B) =	29.74	23.98	or 11+10log(B) =	29.62
138	5690 (U-NII 3)	MCS0	9	-5.18	-5.02	-0.95	0.803	30.00					

4.4 POWER SPECTRAL DENSITY

4.4.1 Test Limit

According to §15.407 (a)(1), 15.407(a)(2) and 15.407(a)(3)

According to RSS-247 section 6.2.1.1, section 6.2.2.1, section 6.2.3.1 and section 6.2.4.1

UNII-2a and 2c:

The maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

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

UNII-2a Limit	☒ Antenna not exceed 6 dBi : 11 dBm ☐ Antenna with DG greater than 6 dBi : [Limit = 11 – (DG – 6)]
UNII-2c Limit	☒ Antenna not exceed 6 dBi : 11 dBm ☐ Antenna with DG greater than 6 dBi : [Limit = 11 – (DG – 6)]

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4.4.2 Test Procedure

Test method Refer as KDB 789033 D02

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. UNII-1, UNII-2a and UNII-2c, SA set RBW = 1MHz, VBW = 3MHz and Detector = RMS, to measurement Power Density.
4. UNII-3, SA set RBW = 500kHz, VBW = 2MHz and Detector = RMS, to measurement Power Density
5. The path loss and Duty Factor were compensated to the results for each measurement by SA.
6. Mark the maximum level.
7. Measure and record the result of power spectral density. in the test report.

4.4.3 Test Setup



Report No.: T201222W02-RP5

4.4.4 Test Result

Temperature: 22.6°C**Tested by:** Lance Chen**Humidity:** 52% RH**Test date:** February 20, 2021**Temperature:** 22.4°C**Tested by:** Lance Chen**Humidity:** 53% RH**Test date:** February 23, 2021

UNII-2a 5250-5350 MHz					
Test mode: IEEE 802.11a mode					
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)
Low	5260	-0.69	0.93	3.53	11
Mid	5300	-0.94	0.51	3.18	
High	5320	-0.99	0.34	3.06	
Test mode: IEEE 802.11n HT20 mode					
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)
Low	5260	-3.05	-1.06	1.67	11
Mid	5300	-2.85	-1.80	1.32	
High	5320	-2.99	-1.81	1.25	
Test mode: IEEE 802.11n HT40 mode					
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)
Low	5270	-5.56	-4.86	-1.11	11
High	5310	-6.48	-4.81	-1.47	
Test mode: IEEE 802.11ac VHT80 mode					
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)
Mid	5290	-9.35	-7.99	-4.47	11

Remark:

Total PPSD = Chain0 PPSD + Chain1 PPSD + Duty factor

UNII-2c 5470-5725 MHz					
Test mode: IEEE 802.11a mode					
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)
Low	5500	-1.17	0.12	2.85	11
Mid	5580	-0.50	0.15	3.17	
High	5700	-0.92	0.63	3.25	
144	5720 (U-NII 2C)	-0.36	1.36	3.91	

Test mode: IEEE 802.11a mode						
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	10log (500kHz/RBW) Factor(dB)	Total Corr'd PSD (dBm/500kHz)	Limit (dBm)
	5720 (U-NII 3)	-7.14	-6.32	2.22	-1.16	30

Test mode: IEEE 802.11n HT20 mode					
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)
Low	5500	-3.24	-2.09	0.98	11
Mid	5580	-2.40	-2.15	1.34	
High	5700	-2.74	-0.39	2.20	
144	5720 (U-NII 2C)	-1.72	-0.06	2.80	

Test mode: IEEE 802.11n HT20 mode						
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	10log (500kHz/RBW) Factor(dB)	Total Corr'd PSD (dBm/500kHz)	Limit (dBm)
	5720 (U-NII 3)	-8.88	-6.50	2.22	-1.70	30

Remark:

Total PPSD = Chain0 PPSD + Chain1 PPSD + Duty factor

Test mode: IEEE 802.11n HT40 mode					
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)
Low	5510	-5.26	-3.69	-0.31	11
Mid	5550	-5.35	-4.45	-0.79	
High	5670	-3.42	-3.39	0.69	
142	5710 (U-NII 2C)	-6.14	-4.13	-0.93	

Test mode: IEEE 802.11n HT40 mode						
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	10log (500kHz/RBW) Factor(dB)	Total Corr'd PSD (dBm/500kHz)	Limit (dBm)
	5710 (U-NII 3)	-12.63	-11.41	2.22	-5.67	30

Test mode: IEEE 802.11ac VHT80 mode					
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)
Low	5530	-9.86	-9.14	-5.33	11
High	5610	-7.70	-7.94	-3.67	
138	5690 (U-NII 2C)	-7.16	-7.34	-3.10	

Test mode: IEEE 802.11ac VHT80 mode						
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	10log (500kHz/RBW) Factor(dB)	Total Corr'd PSD (dBm/500kHz)	Limit (dBm)
	5690 (U-NII 3)	-13.42	-13.37	2.22	-7.02	30

Remark:

Total PPSD = Chain0 PPSD + Chain1 PPSD + Duty factor

Report No.: T201222W02-RP5

Test Data

UNII-2a IEEE 802.11a mode- chain 0

Low CH



Mid CH



High CH



Report No.: T201222W02-RP5

UNII-2a IEEE 802.11n HT20 mode- chain 0

Low CH



Mid CH



High CH



Report No.: T201222W02-RP5

UNII-2a IEEE 802.11n HT40 mode- chain 0

Low CH



High CH



UNII-2a IEEE 802.11ac VHT80 mode- chain 0

Low CH



Report No.: T201222W02-RP5

UNII-2a IEEE 802.11a mode- chain 1

Low CH



Mid CH



High CH



Report No.: T201222W02-RP5

UNII-2a IEEE 802.11n HT20 mode- chain 1

Low CH



Mid CH



High CH



Report No.: T201222W02-RP5

UNII-2a IEEE 802.11n HT40 mode- chain 1

Low CH



High CH



UNII-2a IEEE 802.11ac VHT80 mode- chain 1

Low CH



Report No.: T201222W02-RP5

Test Data

UNII-2c IEEE 802.11a mode- chain 0

Low CH



Mid CH



High CH



144 CH (U-NII 2C)



144 CH (U-NII 3)



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UNII-2c IEEE 802.11n HT20 mode- chain 0

Low CH



Mid CH



High CH



144 CH (U-NII 2C)



144 CH (U-NII 3)



UNII-2c IEEE 802.11n HT40 mode- chain 0

Low CH



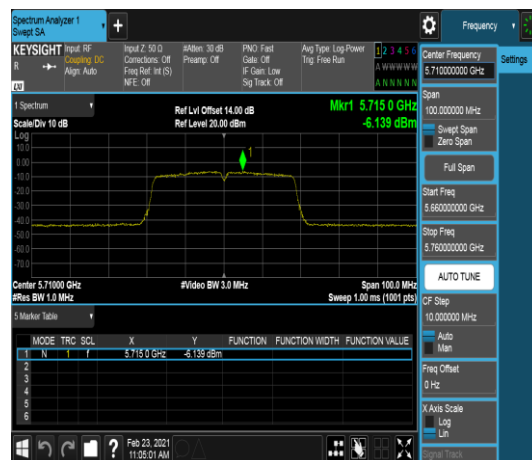
Mid CH



High CH



142 CH (U-NII 2C)



142 CH (U-NII 3)

