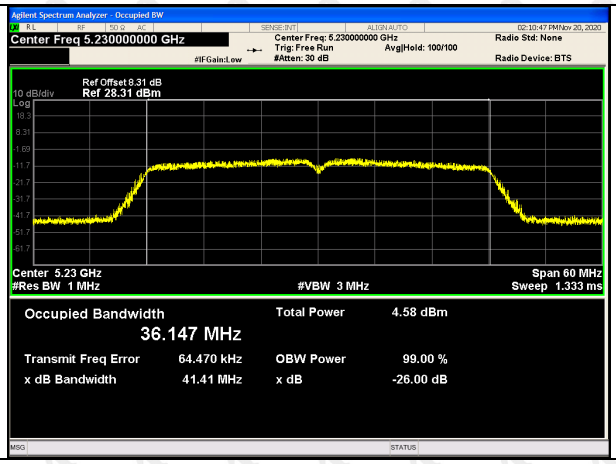
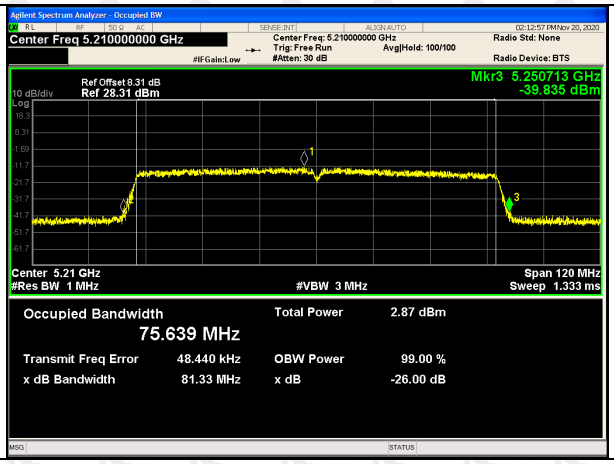
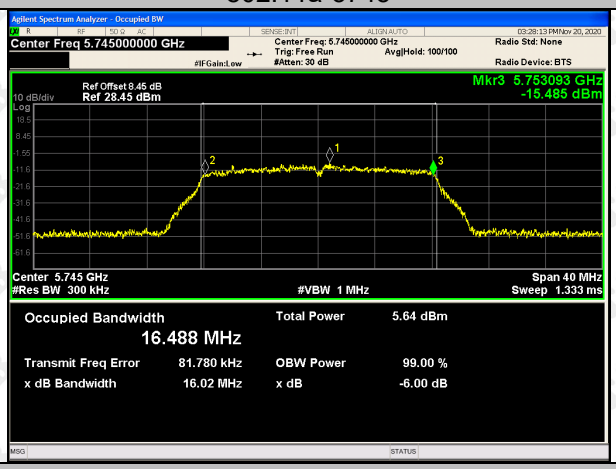


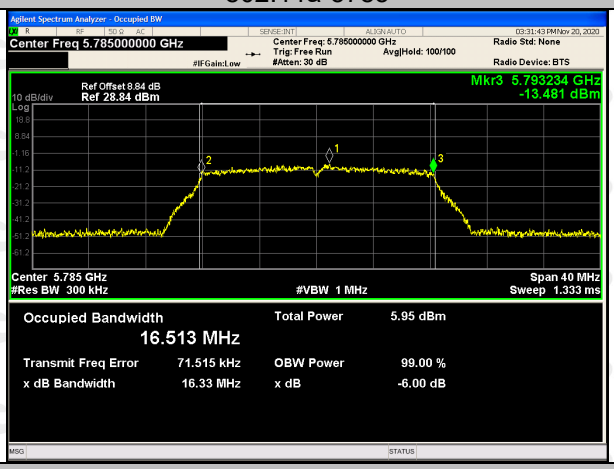
802.11a-5745



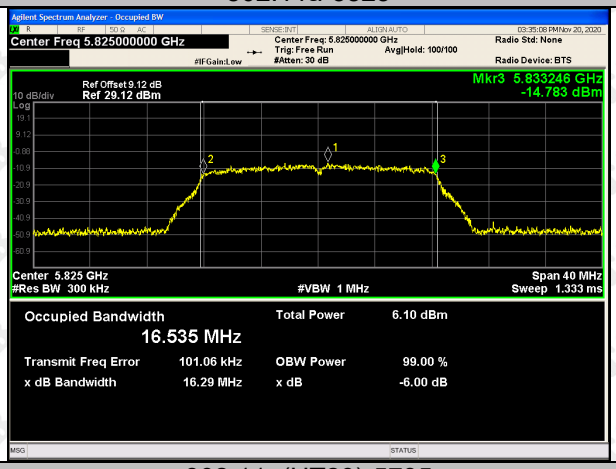
802.11a-5785



802.11a-5825



802.11n(HT20)-5745



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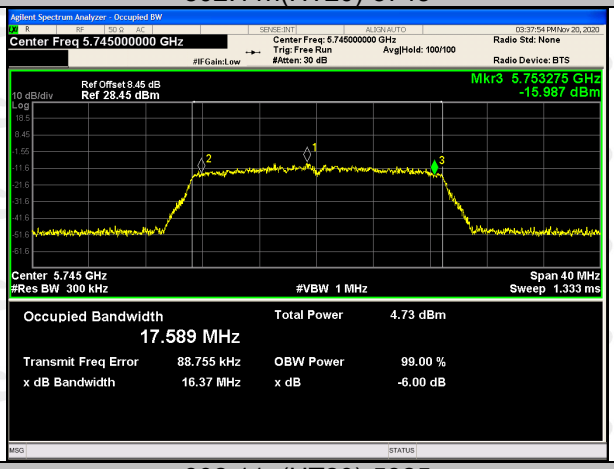

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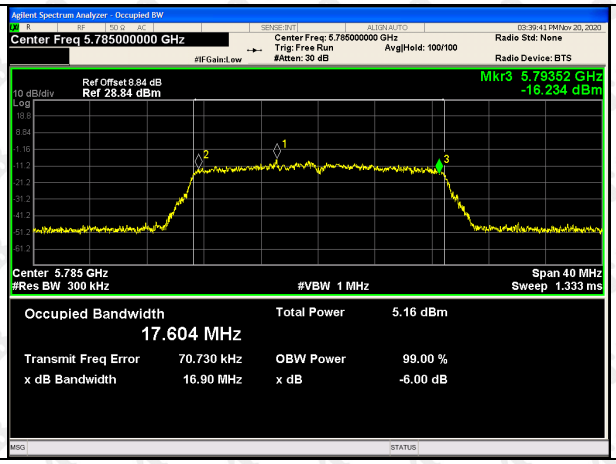

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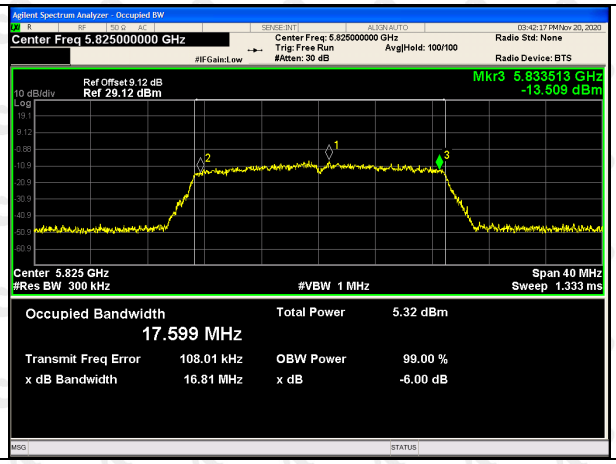

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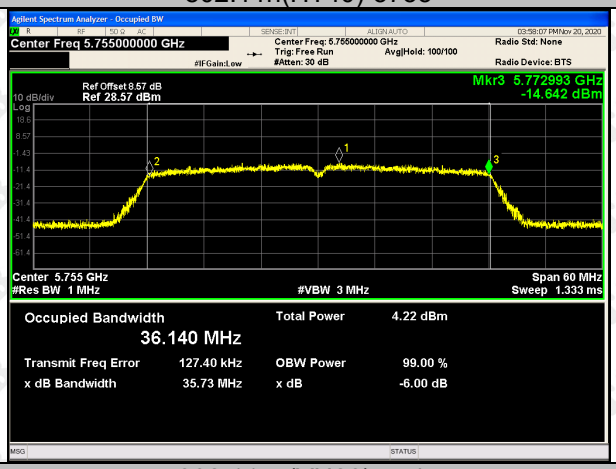

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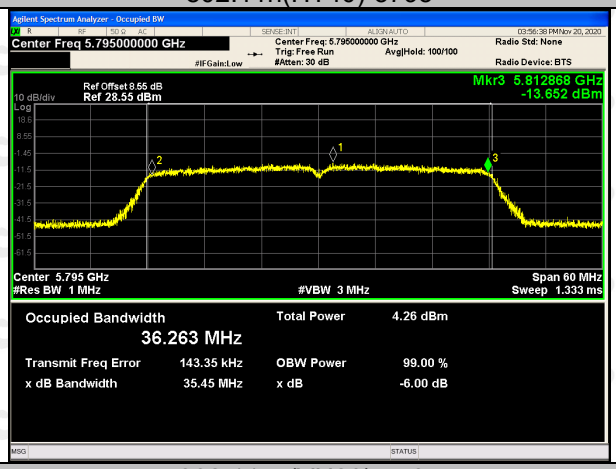

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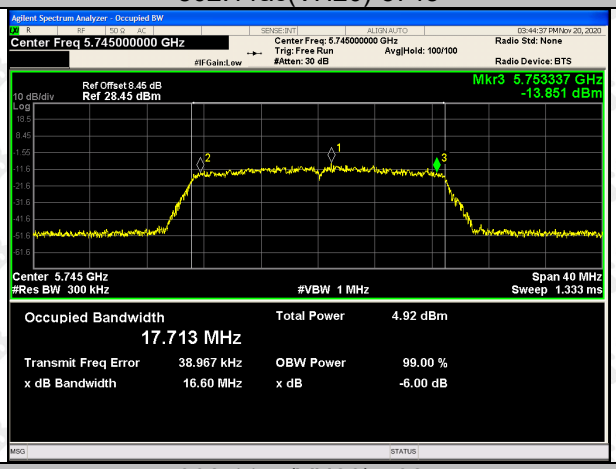

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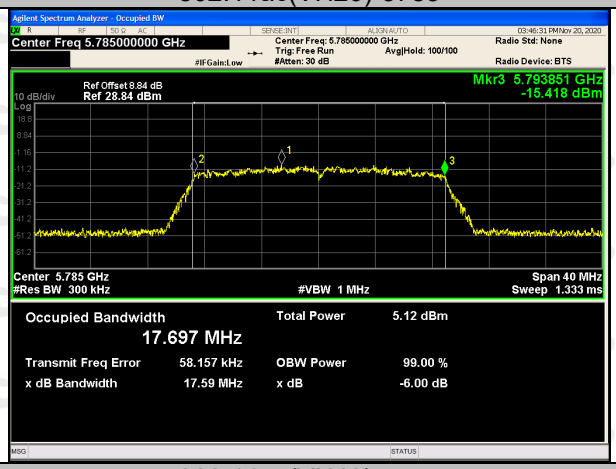

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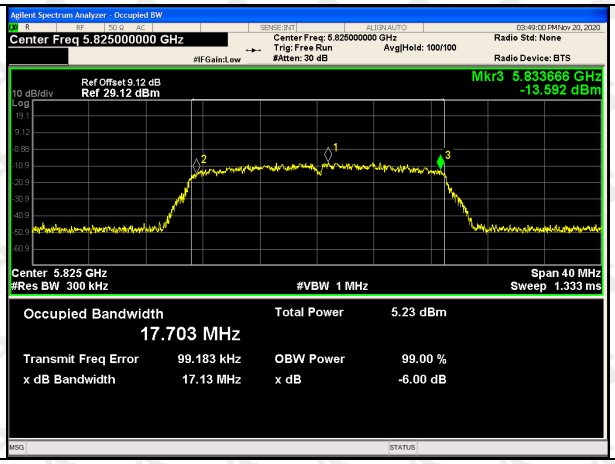

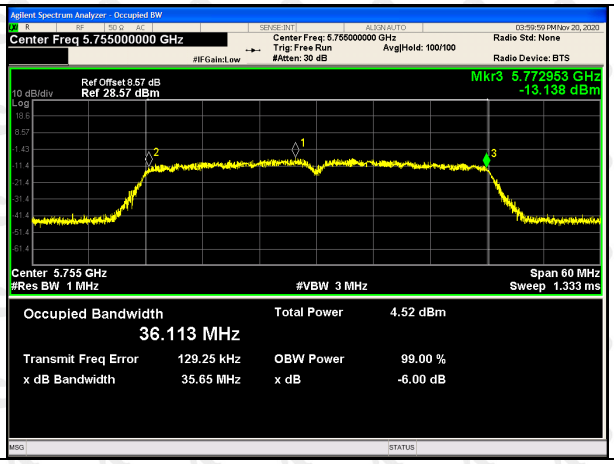

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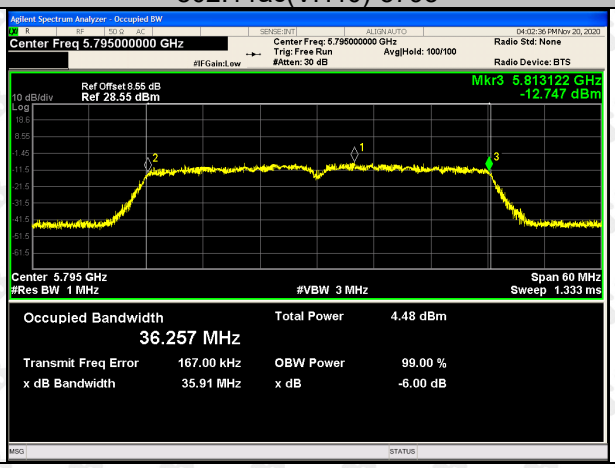
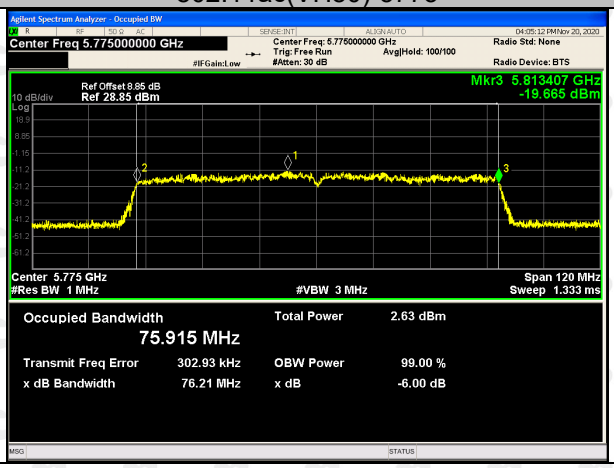


802.11ac(VH80)-5775

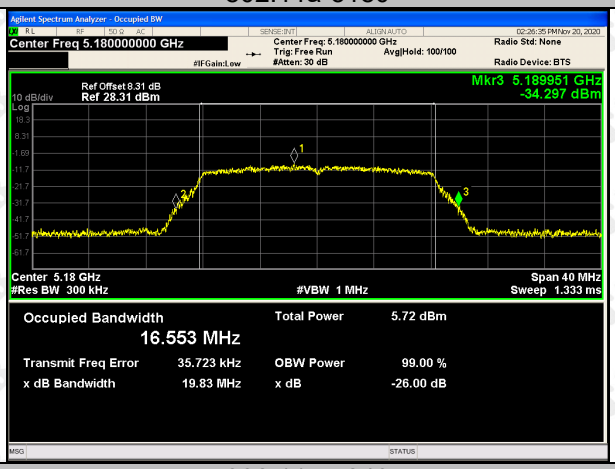


ANT 3

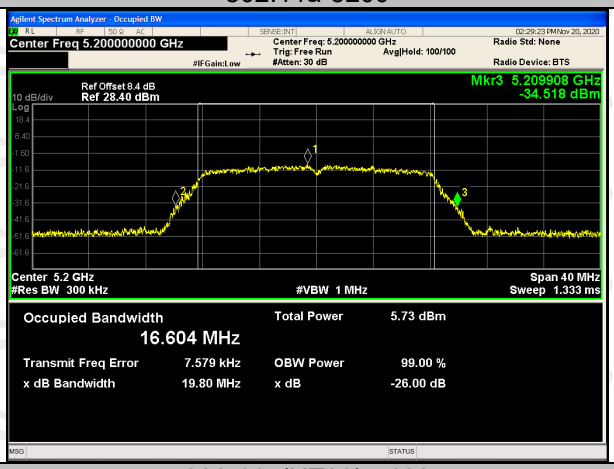
Test mode	Test Channel (MHz)	26dB Bandwidth (MHz)	Limit (MHz)
802.11a	5180	19.831	≥0.5
	5200	19.8	≥0.5
	5240	20.245	≥0.5
802.11a20	5180	20.199	≥0.5
	5200	20.35	≥0.5
	5240	20.361	≥0.5
802.11a40	5190	40.983	≥0.5
	5230	41.386	≥0.5
802.11a80	5210	81.447	≥0.5
802.11n(HT20)	5180	20.377	≥0.5
	5200	20.377	≥0.5
	5240	20.024	≥0.5
802.11n(HT40)	5190	41.173	≥0.5
	5230	41.041	≥0.5

Test mode 3	Test Channel (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
802.11a	5745	16.172	≥0.5
	5785	16.154	≥0.5
	5825	16.075	≥0.5
802.11a20	5745	17.163	≥0.5
	5785	17.317	≥0.5
	5825	17.334	≥0.5
802.11a40	5755	35.23	≥0.5
	5795	35.802	≥0.5
802.11a80	5775	75.874	≥0.5
802.11n(HT20)	5745	17.303	≥0.5
	5785	17.4	≥0.5
	5825	17.399	≥0.5
802.11n(HT40)	5755	35.556	≥0.5
	5795	35.877	≥0.5

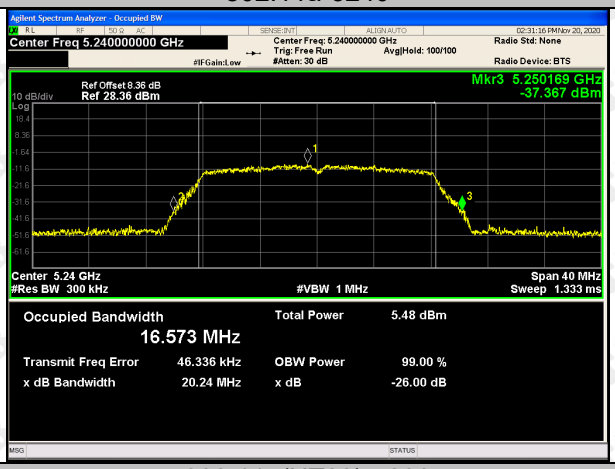
802.11a-5180



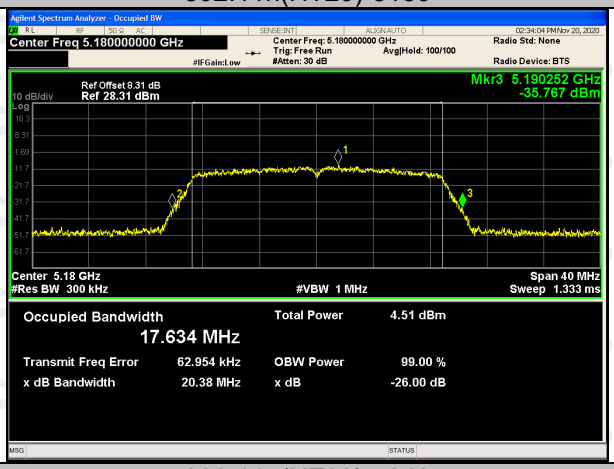
802.11a-5200



802.11a-5240



802.11n(HT20)-5180



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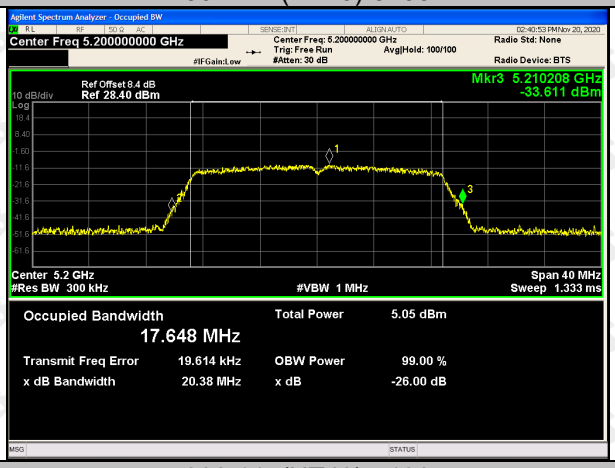

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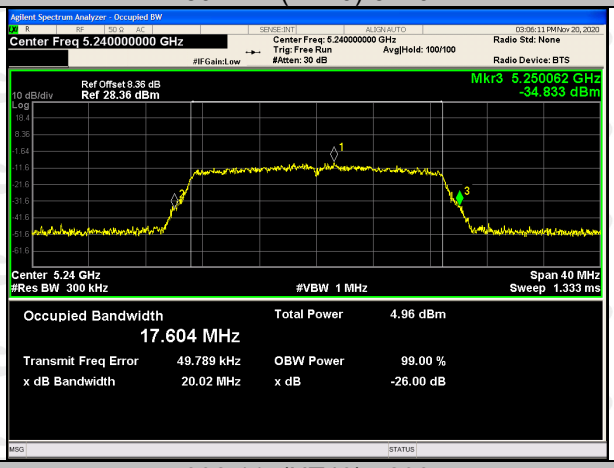
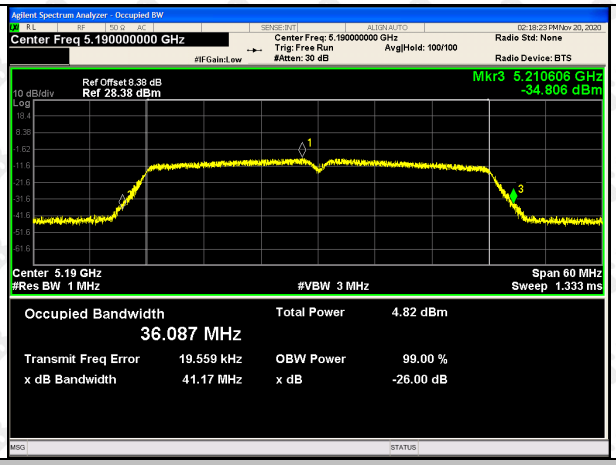
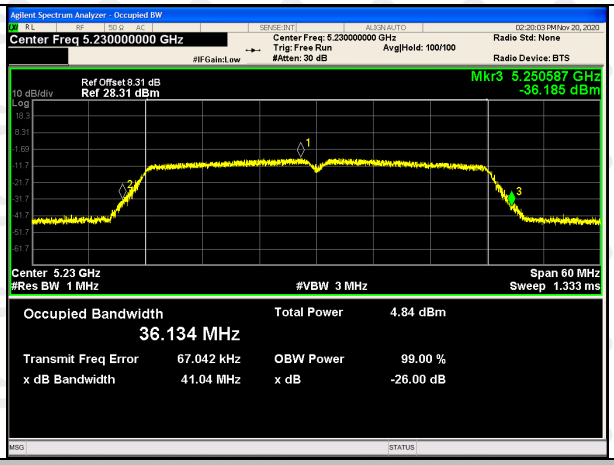


802.11n(HT40)-5190

802.11n(HT40)-5230



802.11ac(VH20)-5180



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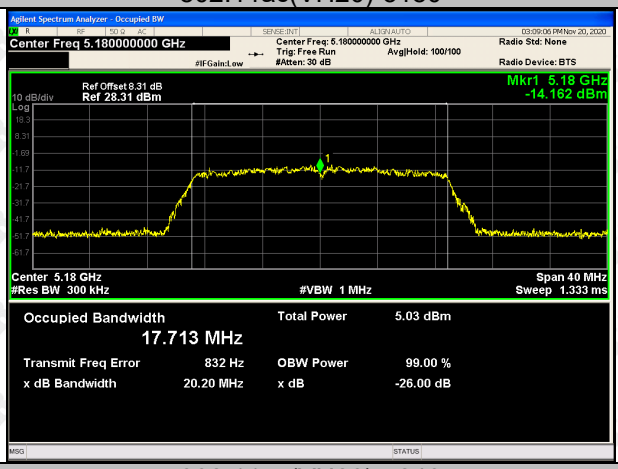

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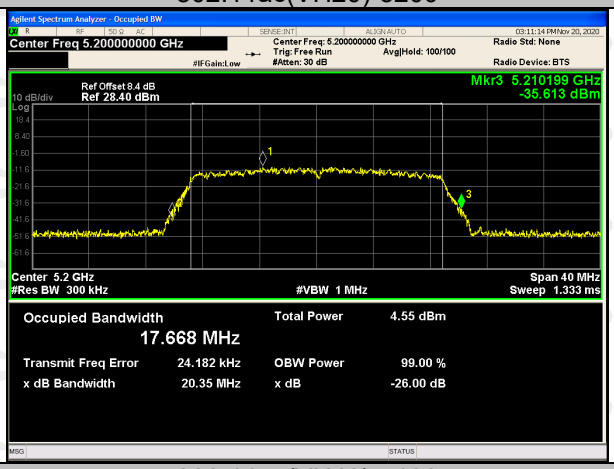

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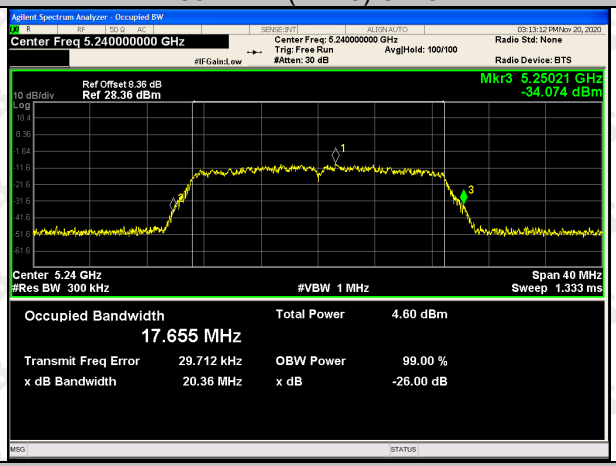

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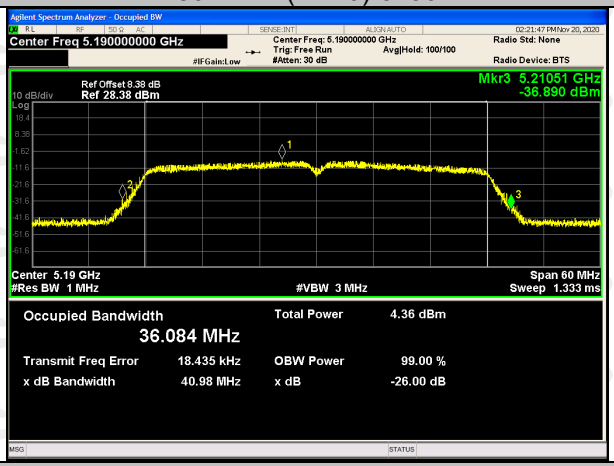

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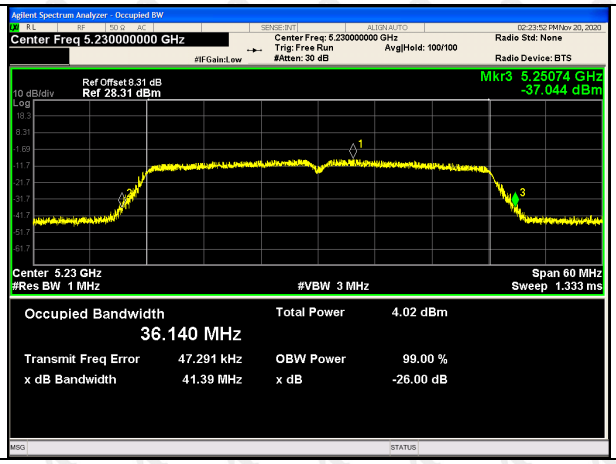
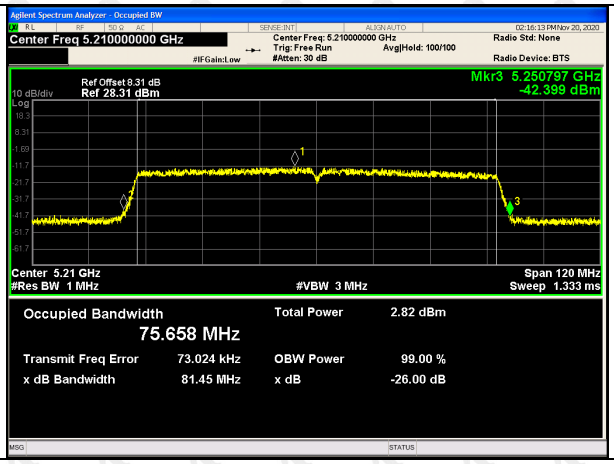
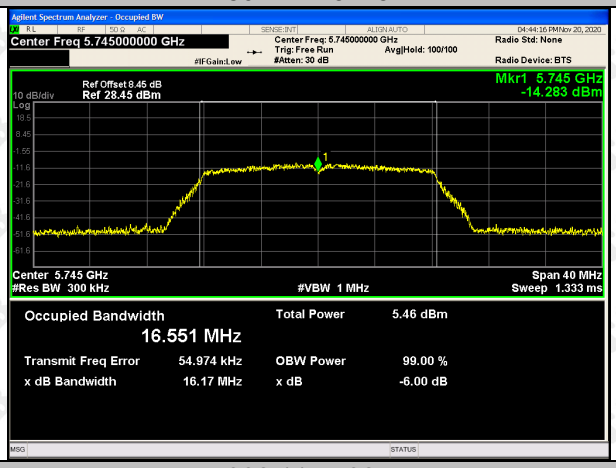


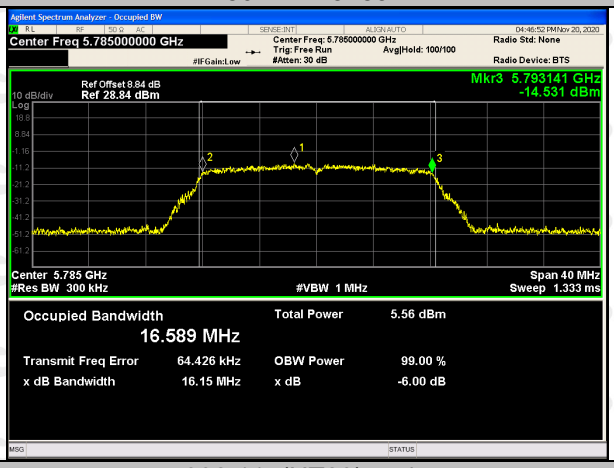
802.11a-5745



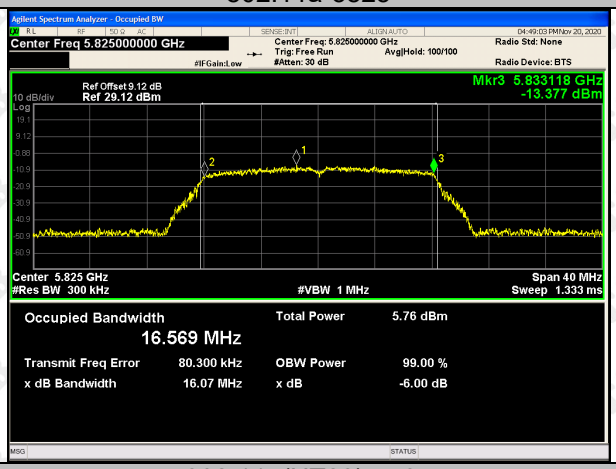
802.11a-5785



802.11a-5825



802.11n(HT20)-5745



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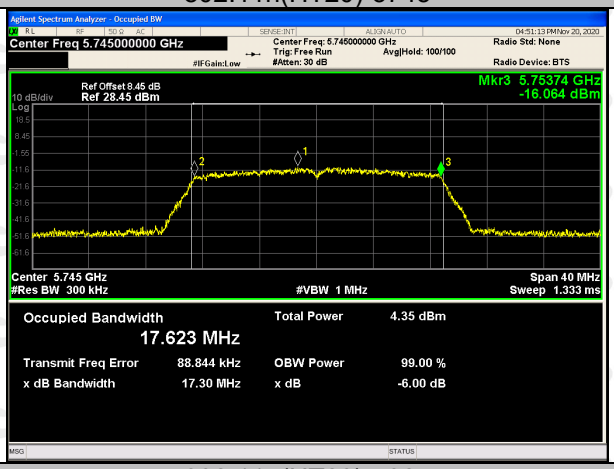

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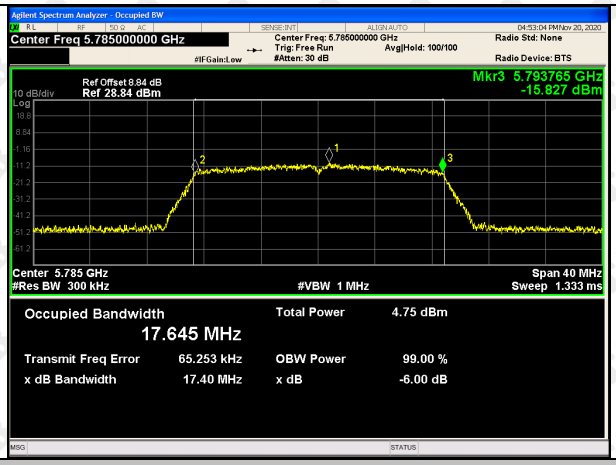

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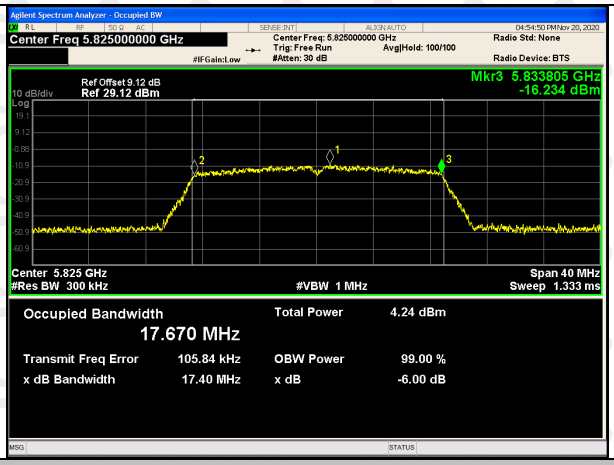

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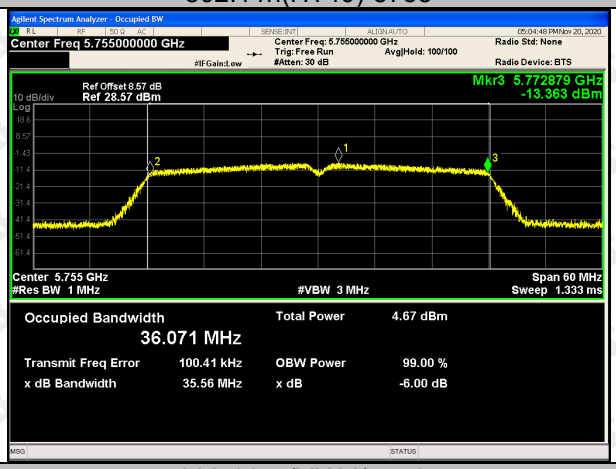

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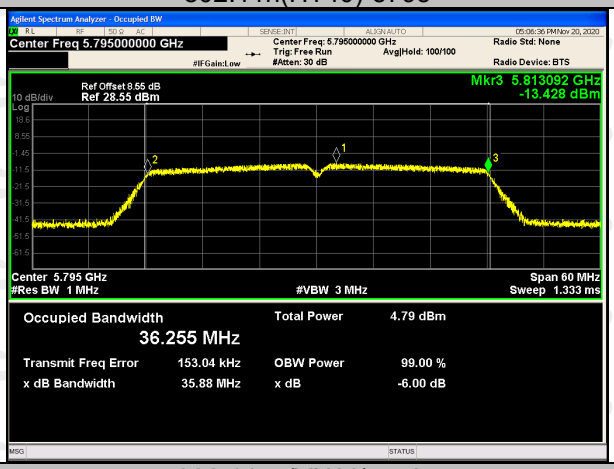

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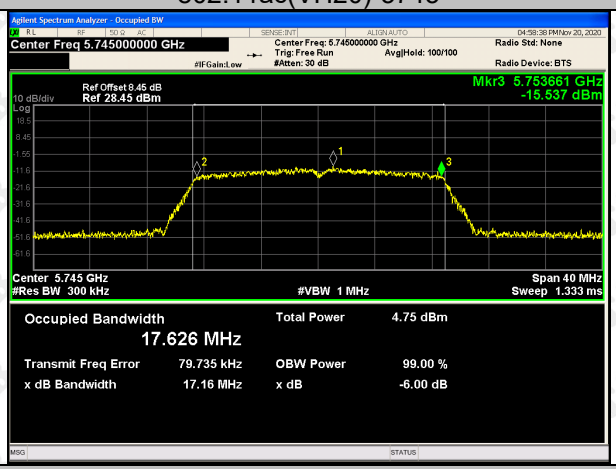

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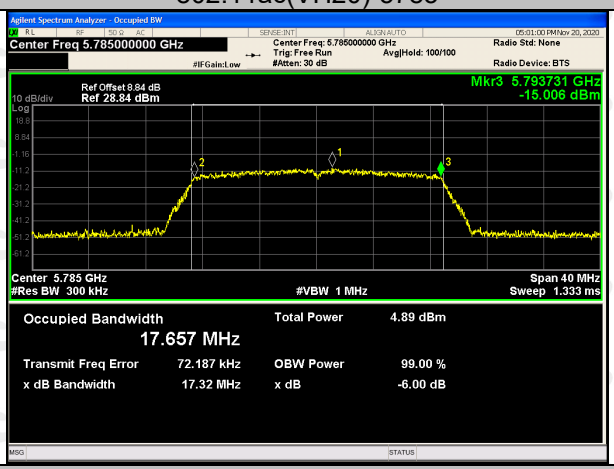

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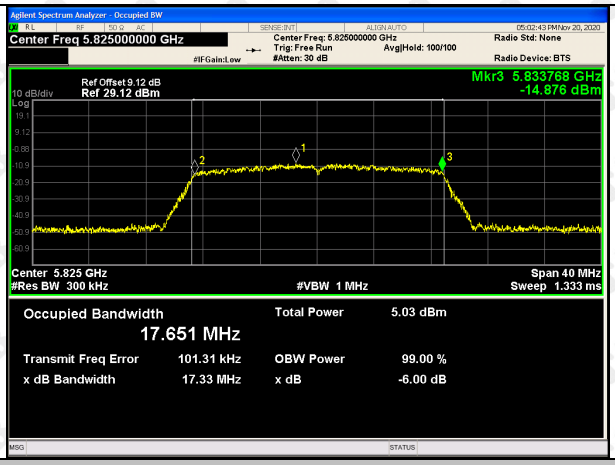

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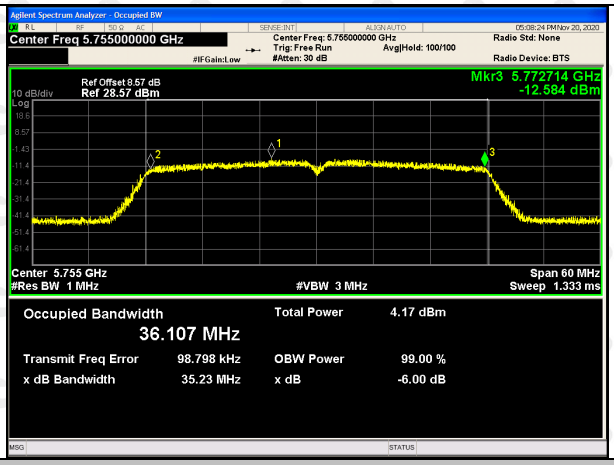
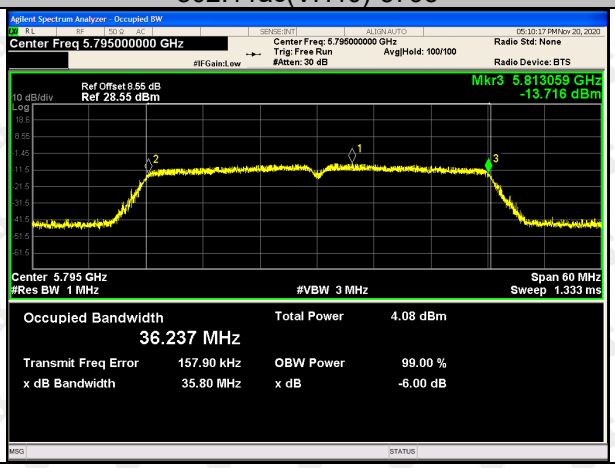
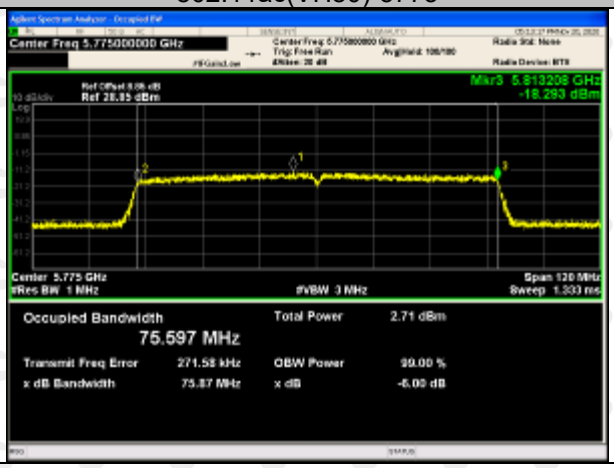


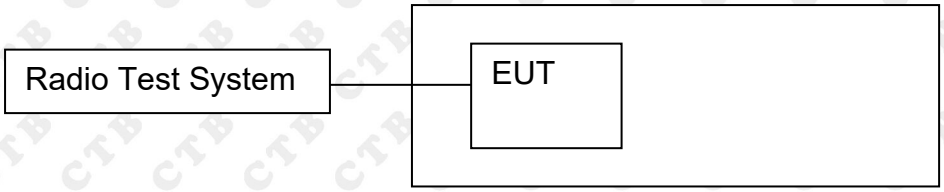
802.11ac(VH80)-5775





11. POWER SPECTRAL DENSITY

11.1 Block Diagram Of Test Setup



11.2 Limit

(1) For the band 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, 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.
(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 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. 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.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

11.3 Test procedure

According to KDB789033 D02v02r01 sectionE, the following is the measurement procedure.

For devices operating in the bands 5.15−5.25 GHz, 5.25−5.35 GHz, and 5.47−5.725 GHz, the preceding procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in Section 15.407(a)(5). For devices operating in the band 5.725−5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1/*T*, where *T* is defined in II.B.l.a).

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.
Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) and II.F.5.d), since RBW=100 kHz is available on nearly all spectrum analyzers.

11.4 Test Result

ANT 1

Test mode	Test Channel (MHz)	PSD [dBm/MHz]	Limit [dBm/MHz]	Result
802.11a	5180	-3.134	11	Pass
	5200	-2.969	11	Pass
	5240	-2.755	11	Pass
802.11ac(VH20)	5180	-3.884	11	Pass
	5200	-4.022	11	Pass
	5240	-3.92	11	Pass
802.11ac(VH40)	5190	-7.408	11	Pass
	5230	-7.157	11	Pass
802.11ac(VH80)	5210	-13.369	11	Pass
802.11n(HT20)	5180	-3.888	11	Pass
	5200	-4.208	11	Pass
	5240	-4.098	11	Pass
802.11n(HT40)	5190	-6.948	11	Pass
	5230	-7.529	11	Pass

Test mode	Test Channel (MHz)	PSD [dBm/500kHz]	Limit [dBm/500kHz]	Result
802.11a	5745	-6.693	30	Pass
	5785	-6.033	30	Pass
	5825	-6.449	30	Pass
802.11n(HT20)	5745	-6.85	30	Pass
	5785	-6.708	30	Pass
	5825	-7.667	30	Pass
802.11n(HT40)	5755	-11.152	30	Pass
	5795	-11.088	30	Pass
802.11ac(VH20)	5745	-7.768	30	Pass
	5785	-8.044	30	Pass
	5825	-8.117	30	Pass
802.11ac(VH40)	5755	-11.525	30	Pass
	5795	-11.988	30	Pass
802.11ac(VH80)	5775	-17.313	30	Pass

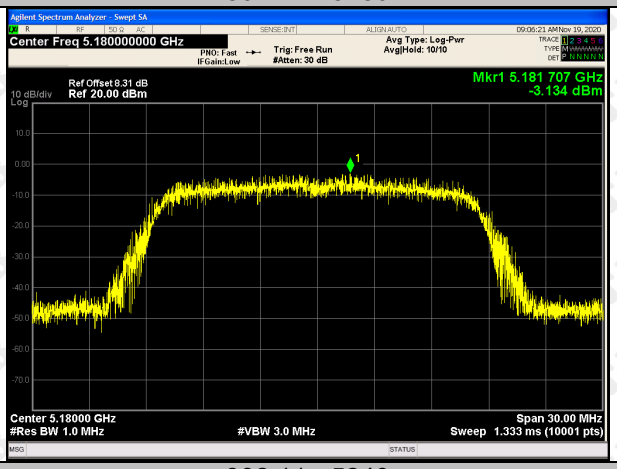
ANT 2+3

Test mode	Test Channel (MHz)	PSD [dBm/MHz] ANT 2	PSD [dBm/MHz] ANT 3	PSD [dBm/MHz] Total	Limit (dBm)	Result
802.11a	5180	-1.902	-2.322	0.903	11	Pass
	5200	-2.971	-2.294	0.391	11	Pass
	5240	-2.908	-2.732	0.191	11	Pass
802.11n(HT20)	5180	-4.039	-4.132	-1.075	11	Pass
	5200	-3.668	-3.554	-0.600	11	Pass
	5240	-3.861	-3.299	-0.561	11	Pass
802.11n(HT40)	5190	-7.501	-7.224	-4.350	11	Pass
	5230	-7.106	-7.227	-4.156	11	Pass
802.11ac(VH20)	5210	-4.384	-3.191	-0.736	11	Pass
	5180	-3.871	-3.768	-0.809	11	Pass
	5200	-3.789	-2.054	0.175	11	Pass
802.11ac(VH40)	5240	-7.65	-7.603	-4.616	11	Pass
	5190	-7.338	-7.852	-4.577	11	Pass
802.11ac(VH80)	5230	-12.623	-11.997	-9.288	11	Pass

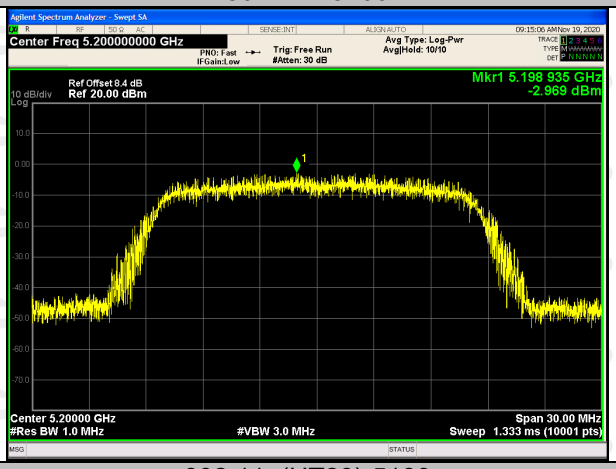
Test mode	Test Channel (MHz)	PSD [dBm/500kHz] ANT 2	PSD [dBm/500kHz] ANT 3	PSD [dBm/500kHz] Total	Limit (dBm)	Result
802.11a	5745	-5.48	-6.826	/	30	Pass
	5785	-5.732	-6.594	/	30	Pass
	5825	-5.135	-6.497	/	30	Pass
802.11n(HT20)	5745	-6.904	-7.593	-4.225	30	Pass
	5785	-6.963	-7.832	-4.366	30	Pass
	5825	-5.285	-8.481	-3.585	30	Pass
802.11n(HT40)	5755	-11.13	-12.095	-8.575	30	Pass
	5795	-11.886	-11.632	-8.747	30	Pass
802.11ac(VH20)	5745	-7.483	-7.976	-4.712	30	Pass
	5785	-6.349	-7.587	-3.914	30	Pass
	5825	-6.737	-6.945	-3.829	30	Pass
802.11ac(VH40)	5755	-11.059	-11.767	-8.388	30	Pass
	5795	-10.066	-11.899	-7.876	30	Pass
802.11ac(VH80)	5775	-16.527	-16.976	-13.735	30	Pass

ANT 1

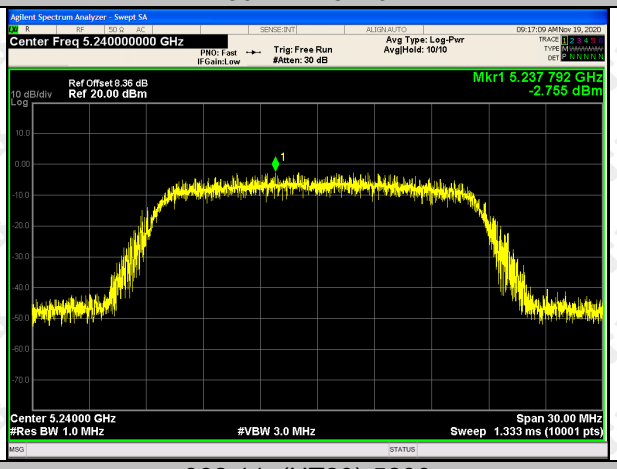
802.11a-5180



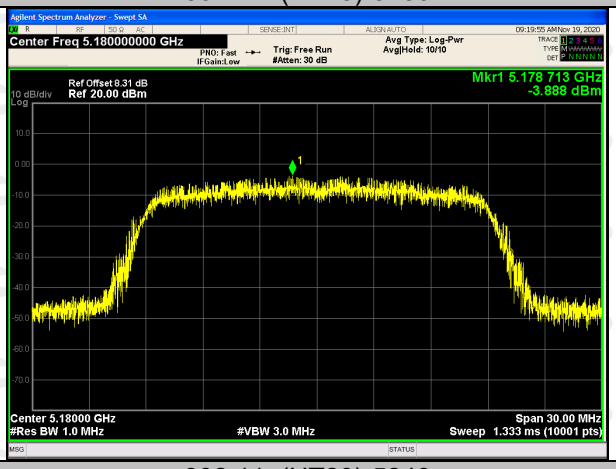
802.11a-5200



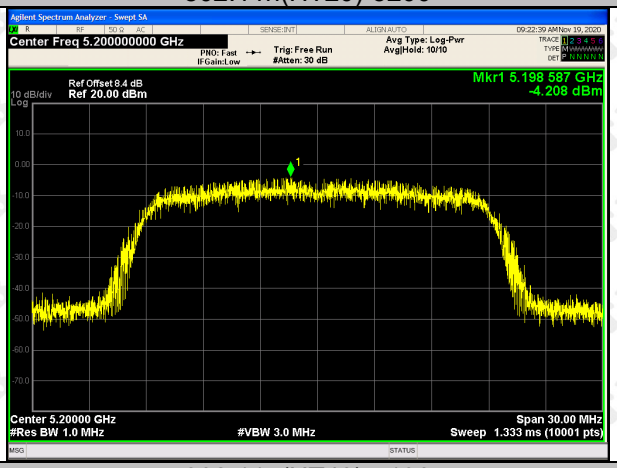
802.11a-5240



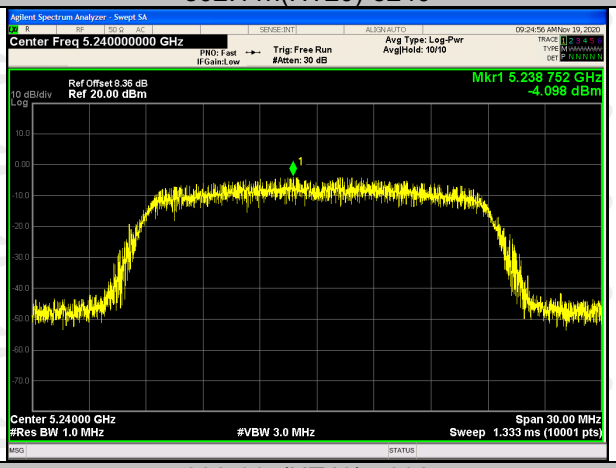
802.11n(HT20)-5180



802.11n(HT20)-5200

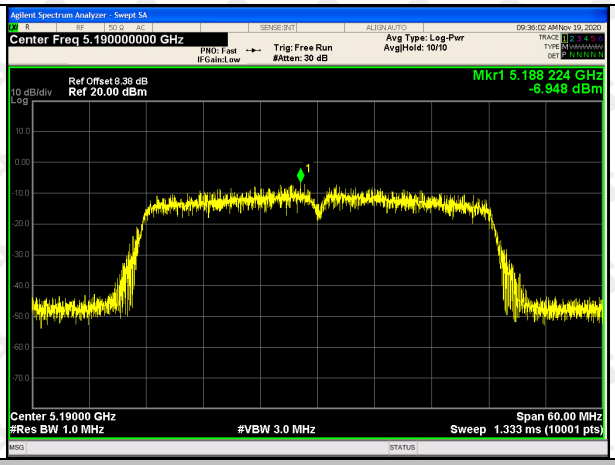


802.11n(HT20)-5240

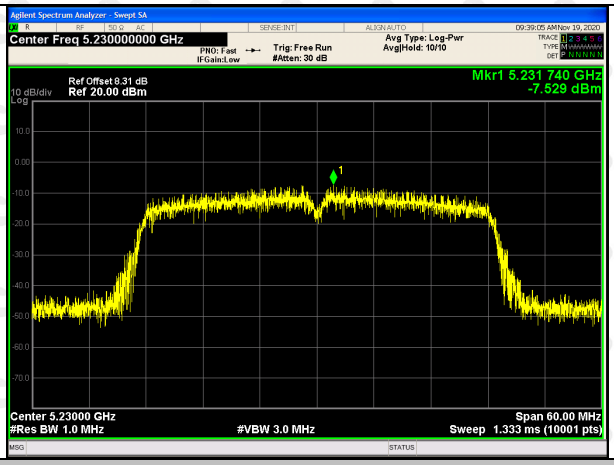


802.11n(HT40)-5190

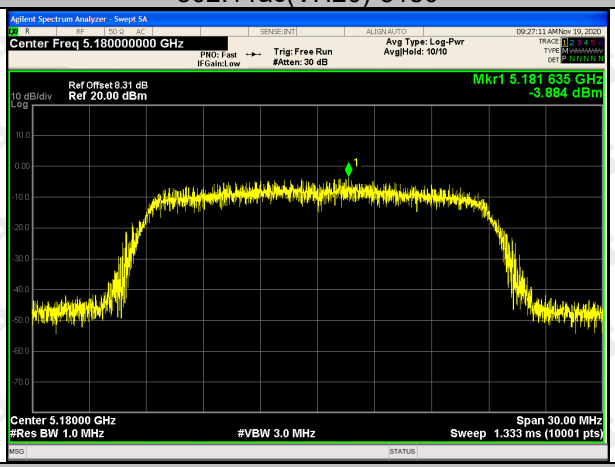
802.11n(HT40)-5230



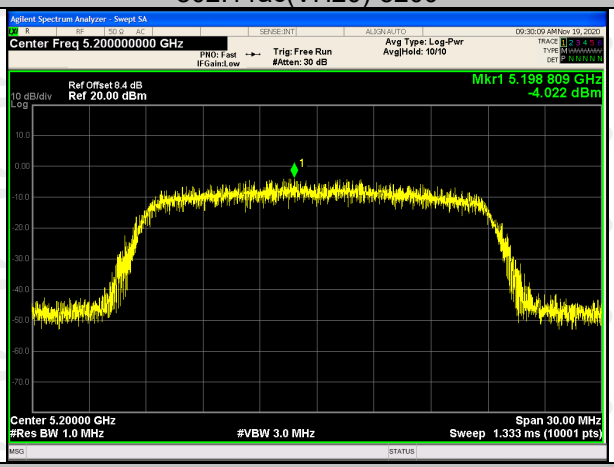
802.11ac(VH20)-5180



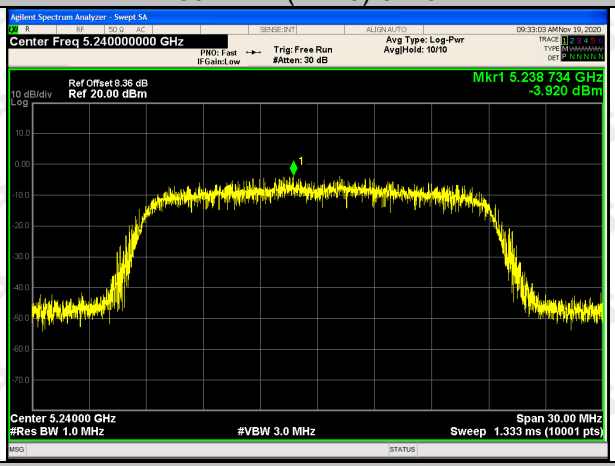
802.11ac(VH20)-5200



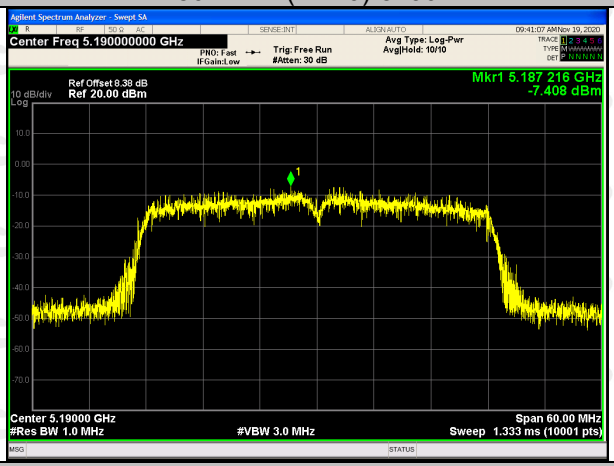
802.11ac(VH20)-5240



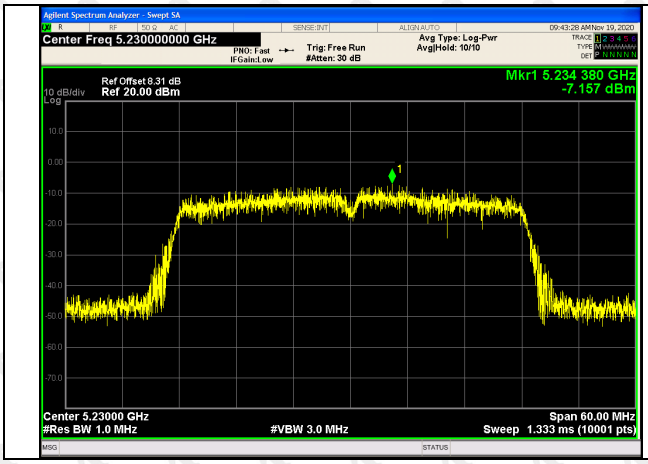
802.11ac(VH40)-5190



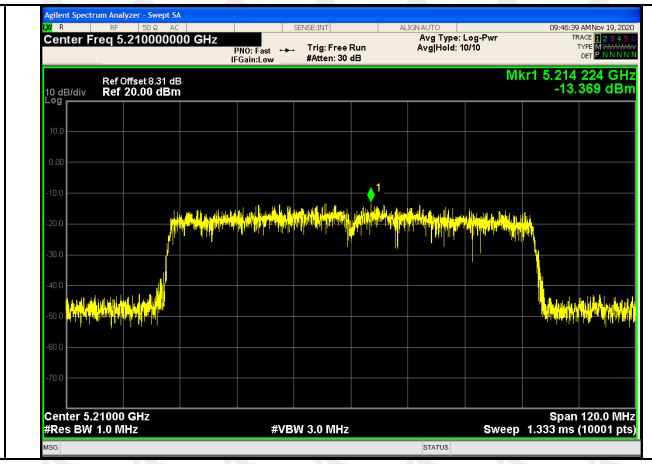
802.11ac(VH40)-5230



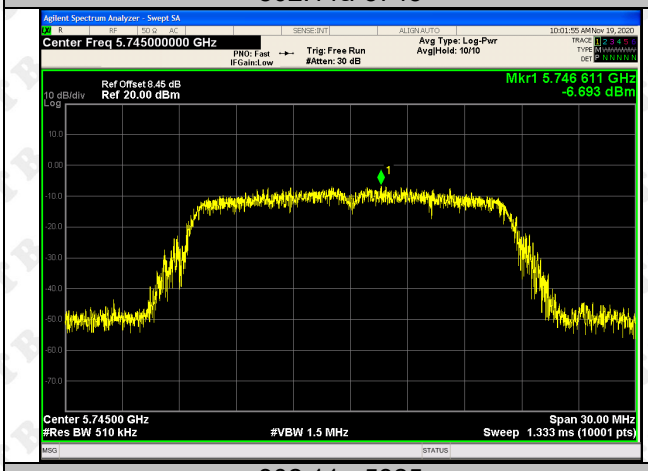
802.11ac(VH80)-5210



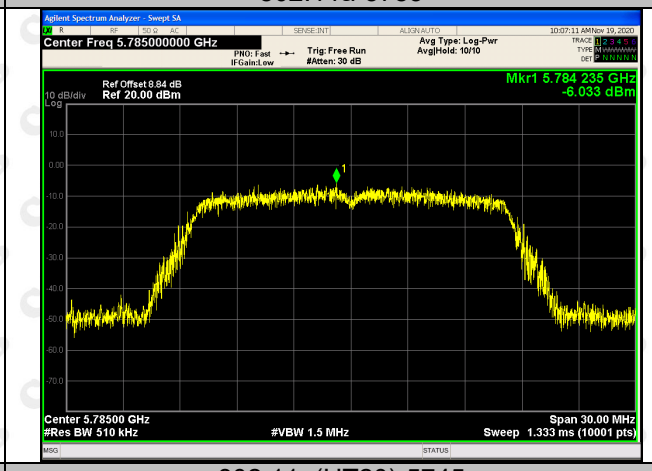
802.11a-5745



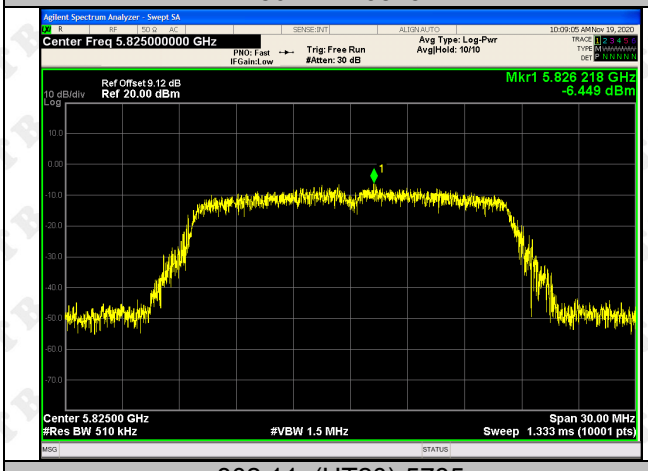
802.11a-5785



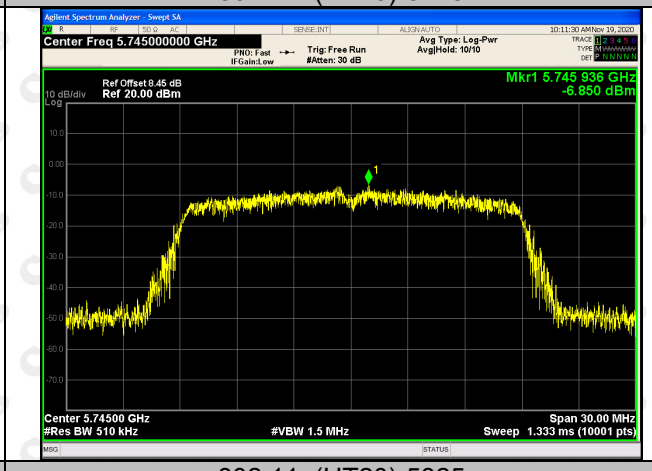
802.11a-5825



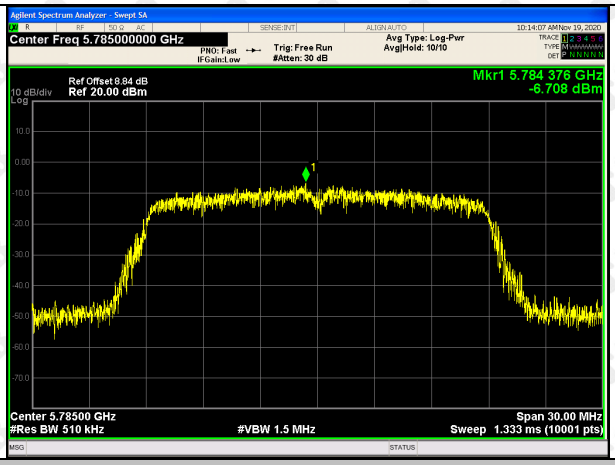
802.11n(HT20)-5745



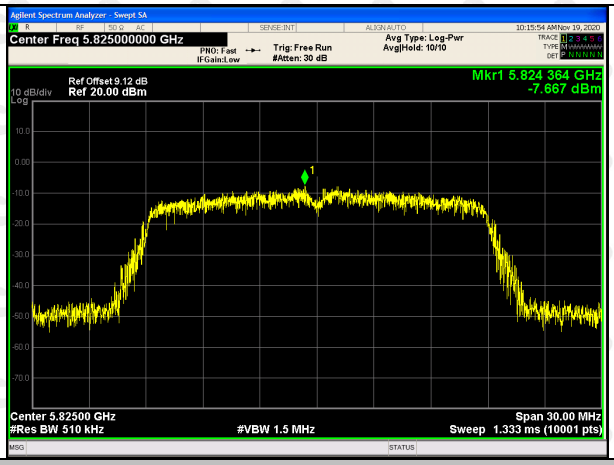
802.11n(HT20)-5785



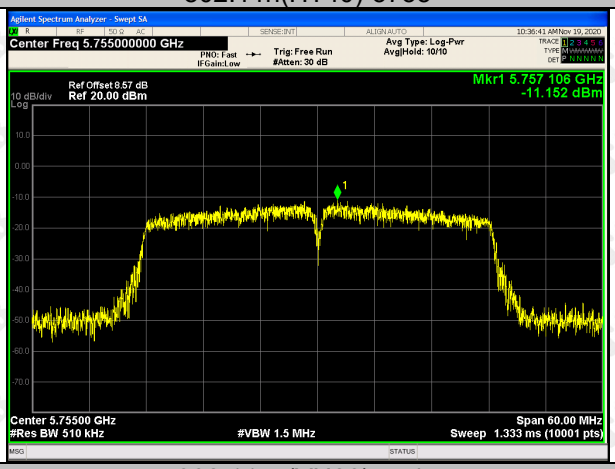
802.11n(HT20)-5825



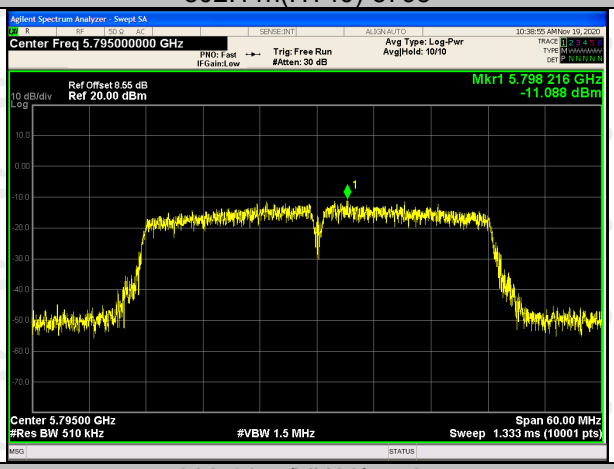
802.11n(HT40)-5755



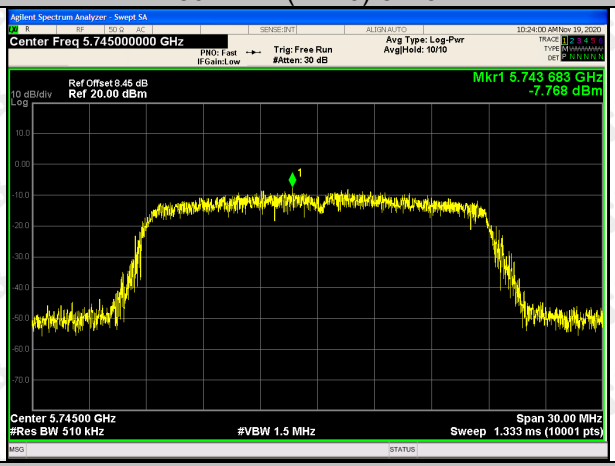
802.11n(HT40)-5795



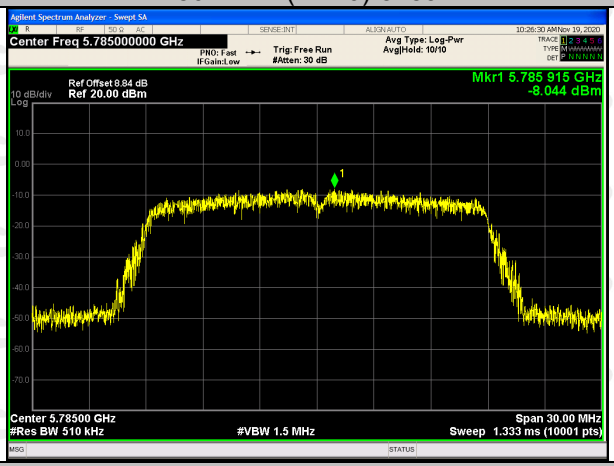
802.11ac(VH20)-5745



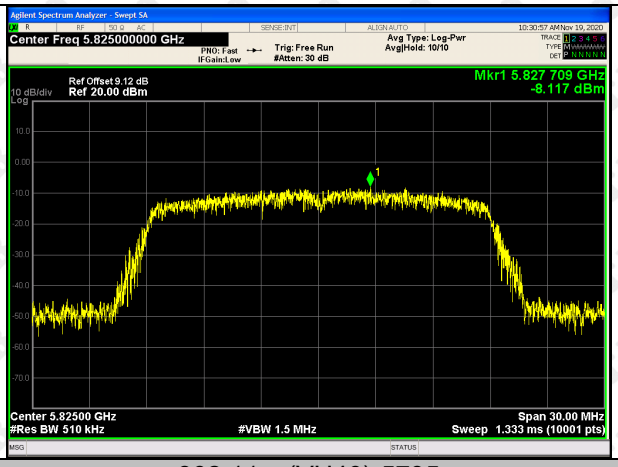
802.11ac(VH20)-5785



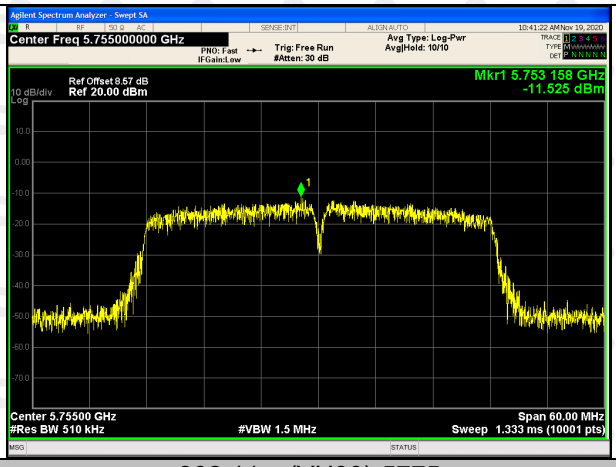
802.11ac(VH20)-5825



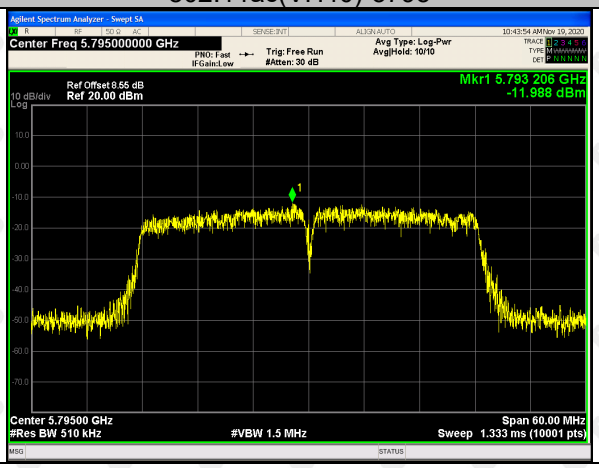
802.11ac(VH40)-5755

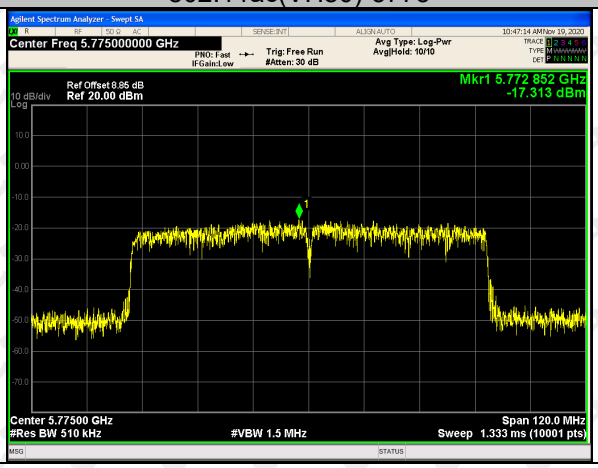


802.11ac(VH40)-5795



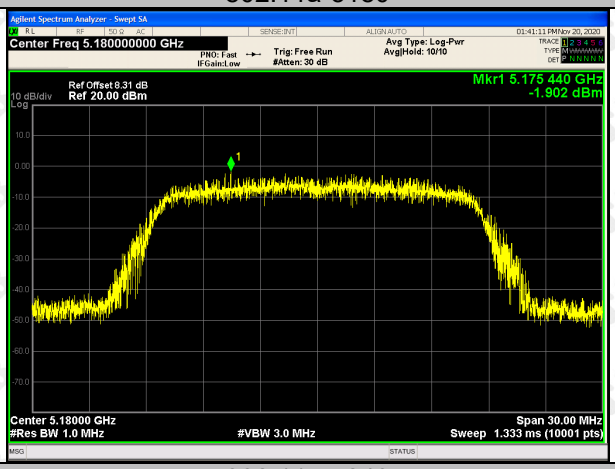
802.11ac(VH80)-5775



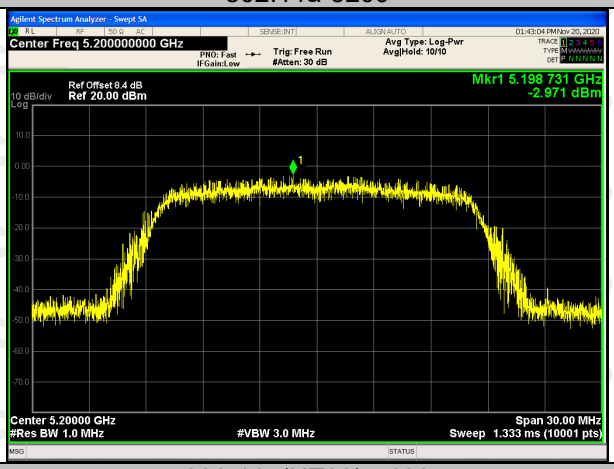


ANT 2

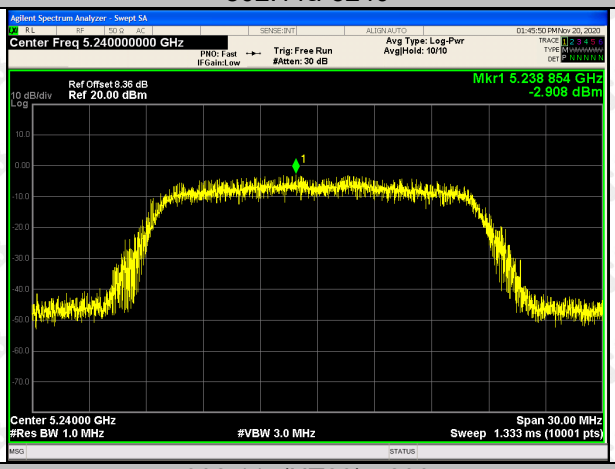
802.11a-5180



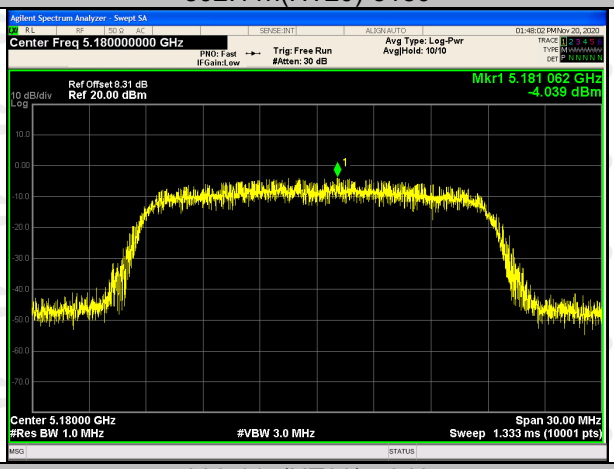
802.11a-5200



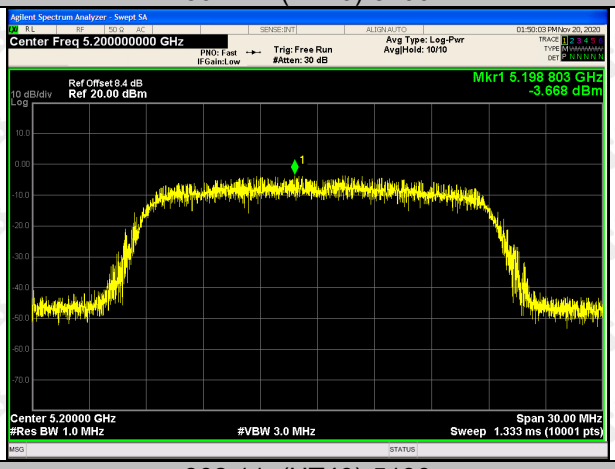
802.11a-5240



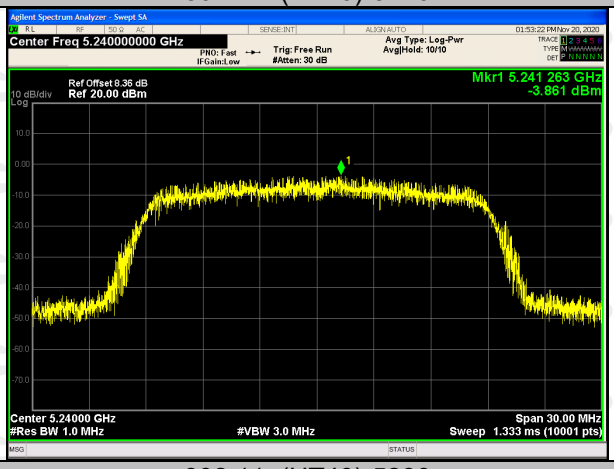
802.11n(HT20)-5180



802.11n(HT20)-5200

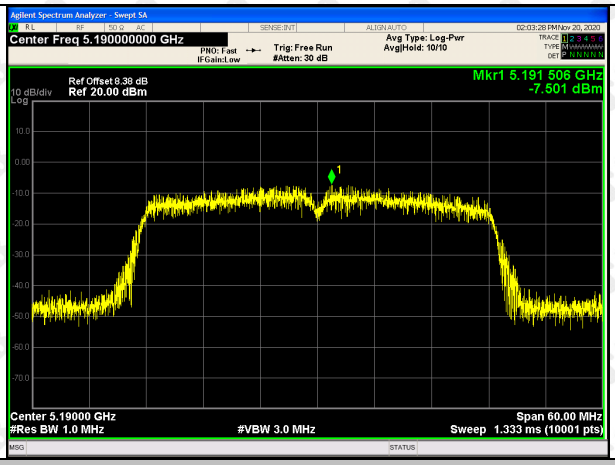


802.11n(HT20)-5240

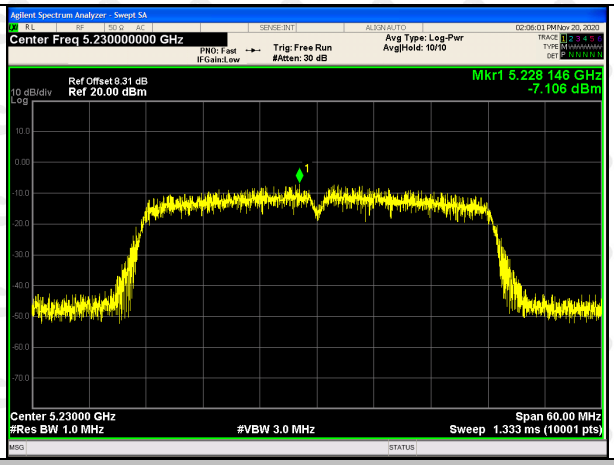


802.11n(HT40)-5190

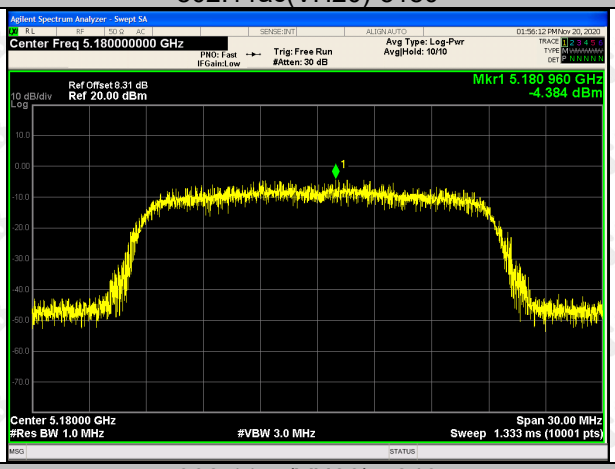
802.11n(HT40)-5230



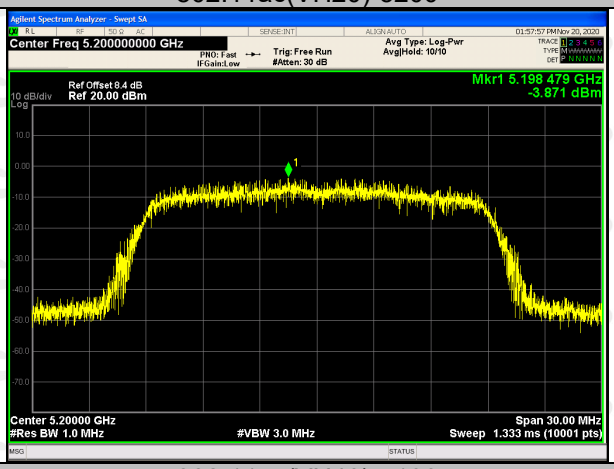
802.11ac(VH20)-5180



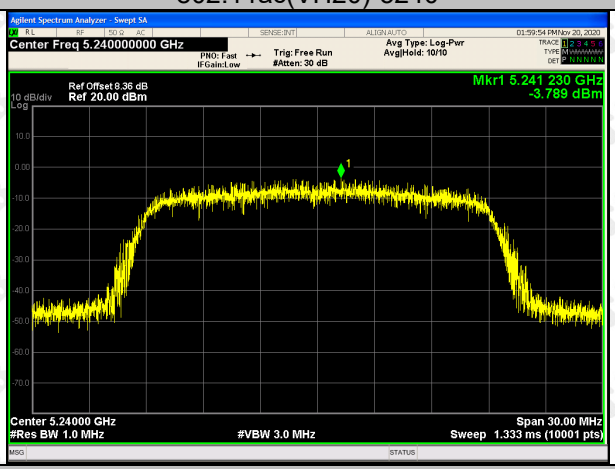
802.11ac(VH20)-5200



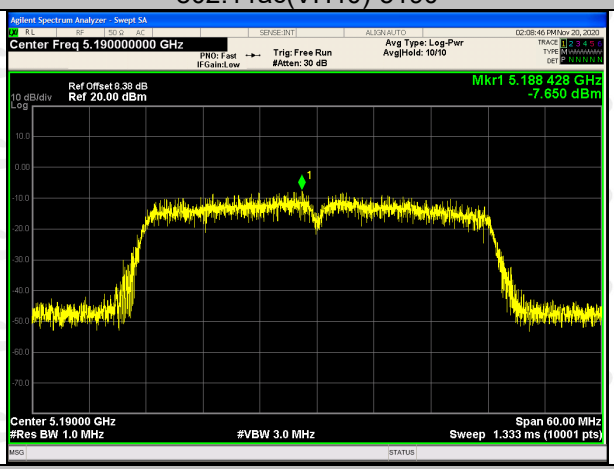
802.11ac(VH20)-5240



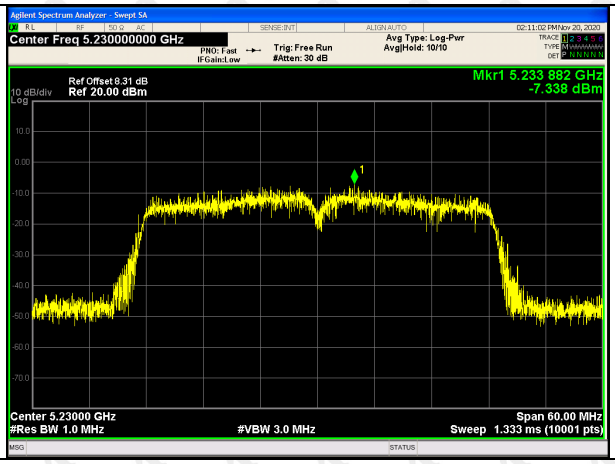
802.11ac(VH40)-5190

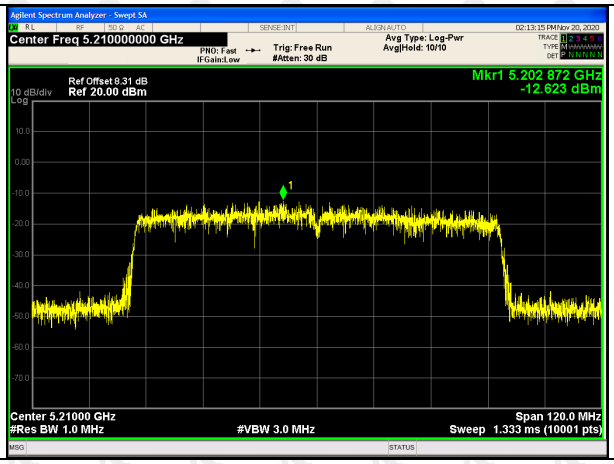


802.11ac(VH40)-5230

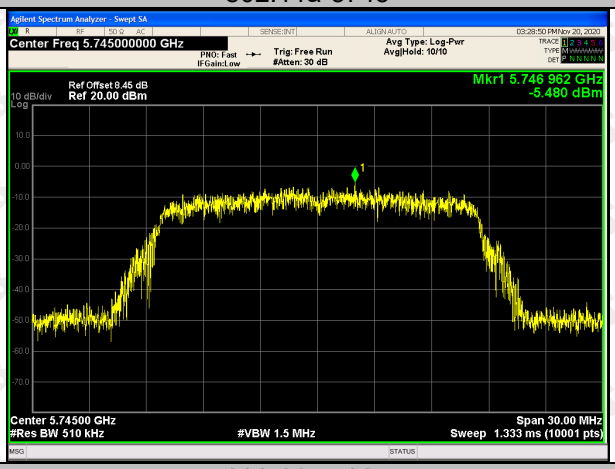


802.11ac(VH80)-5210

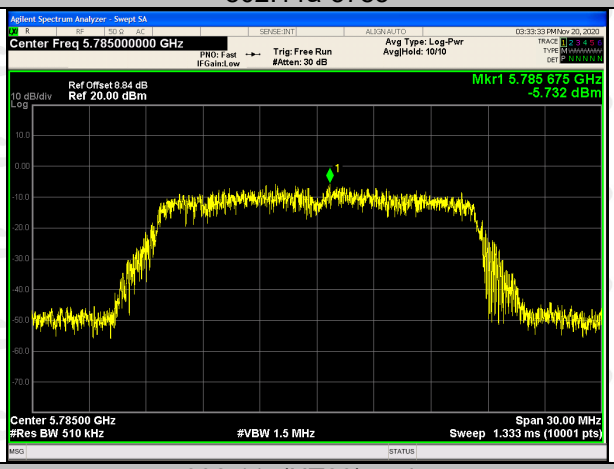

Agilent Spectrum Analyzer - Swept SA
Center Freq 5.230000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
02:11:02 PM Nov 20, 2020
Ref Offset 8.31 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 5.233 882 GHz
-7.338 dBm
Center 5.23000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 60.00 MHz
Sweep 1.333 ms (10001 pts)


Agilent Spectrum Analyzer - Swept SA
Center Freq 5.210000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
02:13:15 PM Nov 20, 2020
Ref Offset 8.31 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 5.202 872 GHz
-12.623 dBm
Center 5.21000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 120.0 MHz
Sweep 1.333 ms (10001 pts)

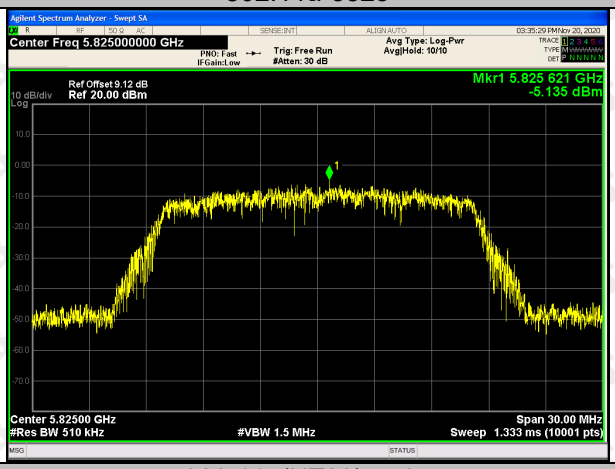
802.11a-5745



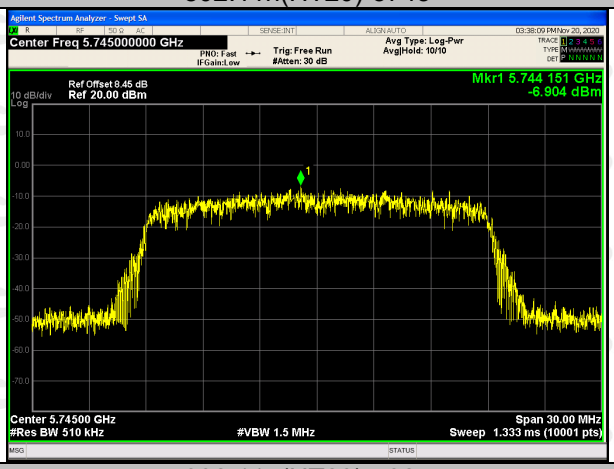
802.11a-5785



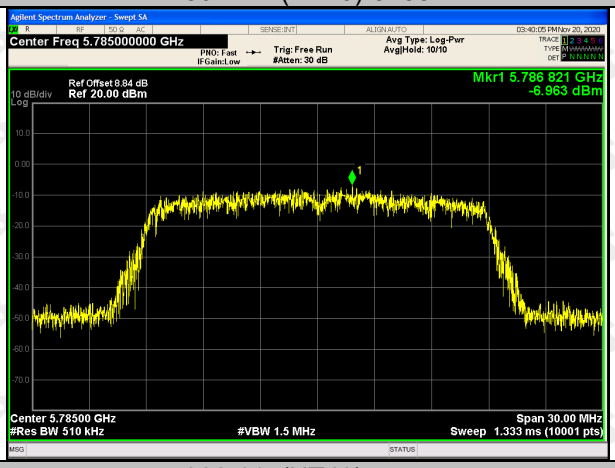
802.11a-5825



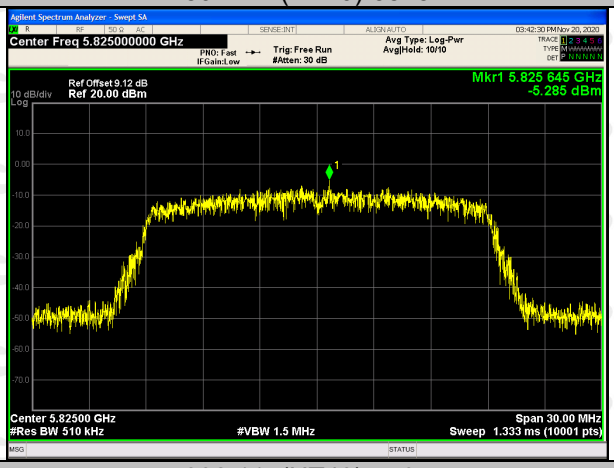
802.11n(HT20)-5745



802.11n(HT20)-5785



802.11n(HT20)-5825



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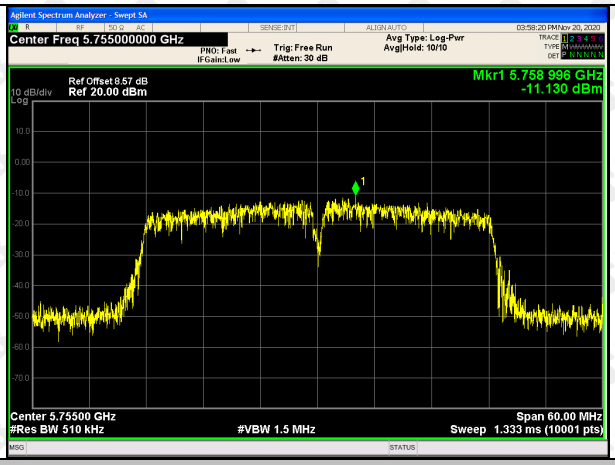
802.11n(HT40)-5795



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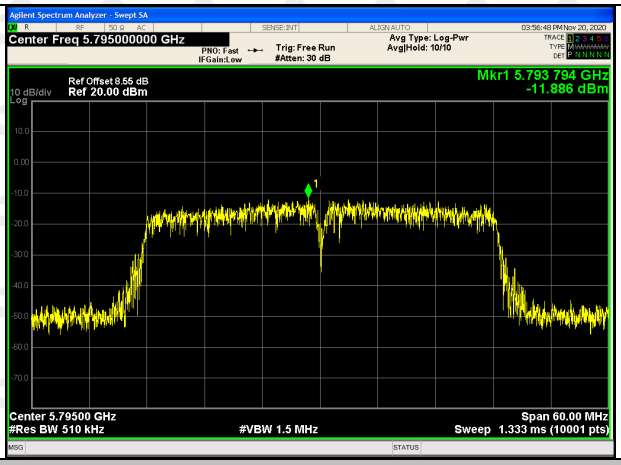

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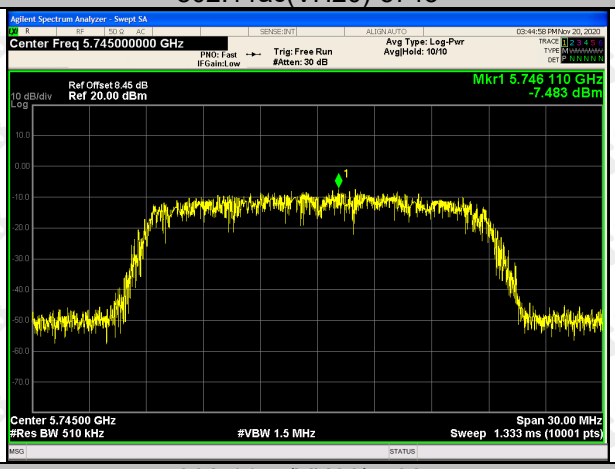

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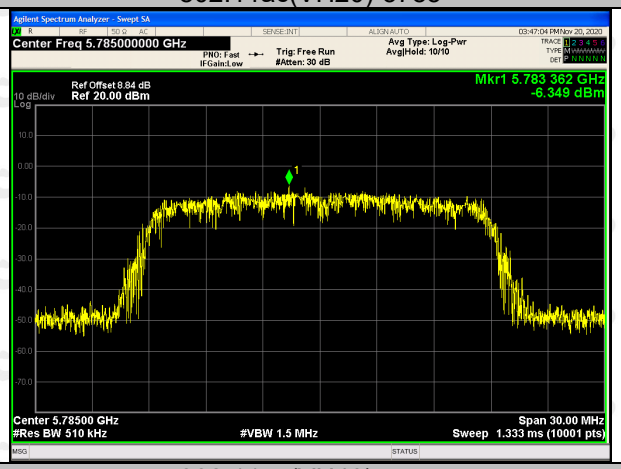

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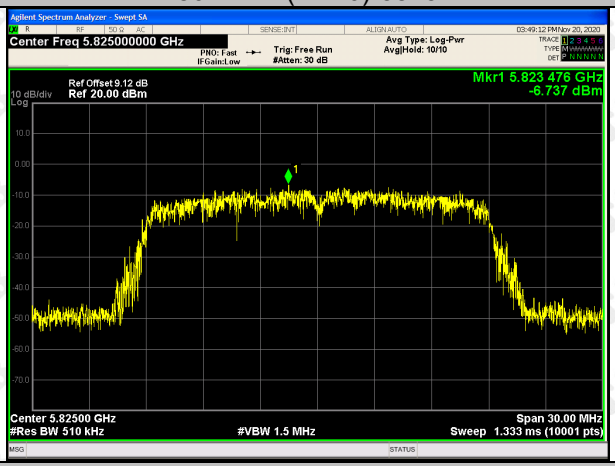

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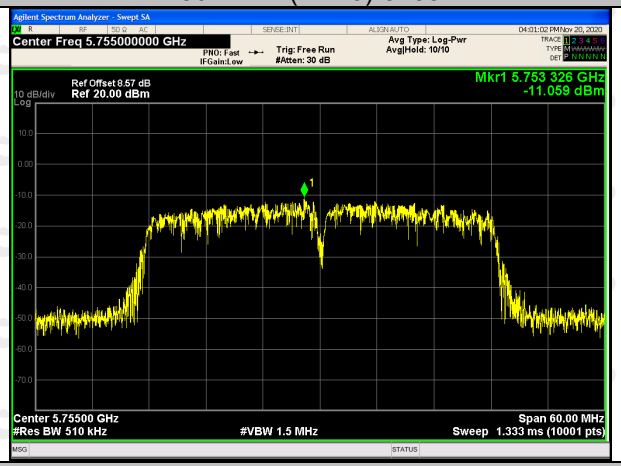
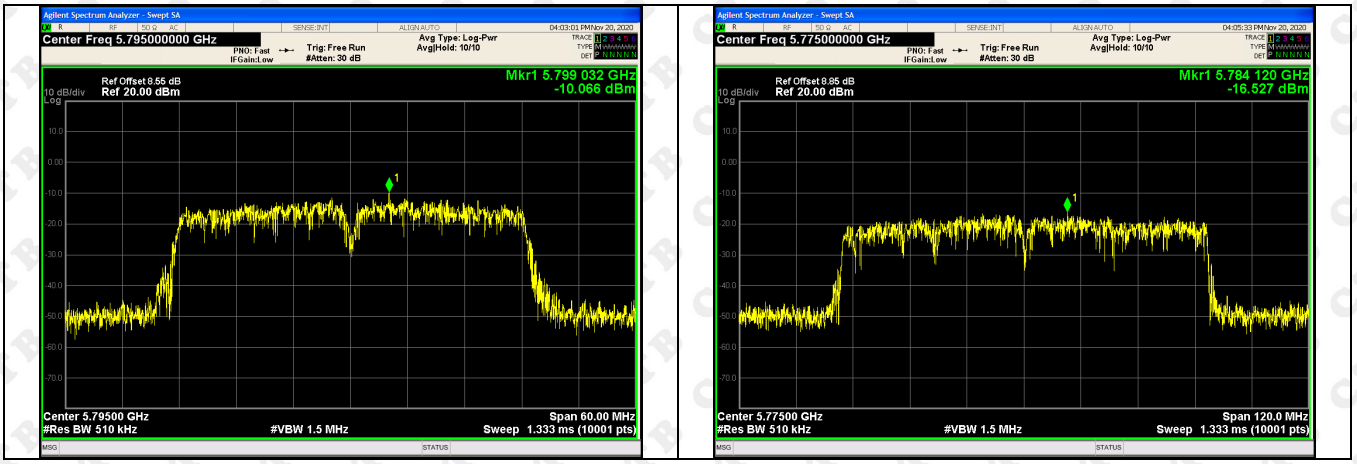


802.11ac(VH80)-5775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Center Freq 5.795000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
Ref Offset 8.55 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.799 032 GHz
-10.066 dBm
Center 5.79500 GHz
#Res BW 510 kHz
#VBW 1.5 MHz
Span 60.00 MHz
Sweep 1.333 ms (10001 pts)
Agilent Spectrum Analyzer - Swept SA
Center Freq 5.775000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
Ref Offset 8.85 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.784 120 GHz
-16.527 dBm
Center 5.77500 GHz
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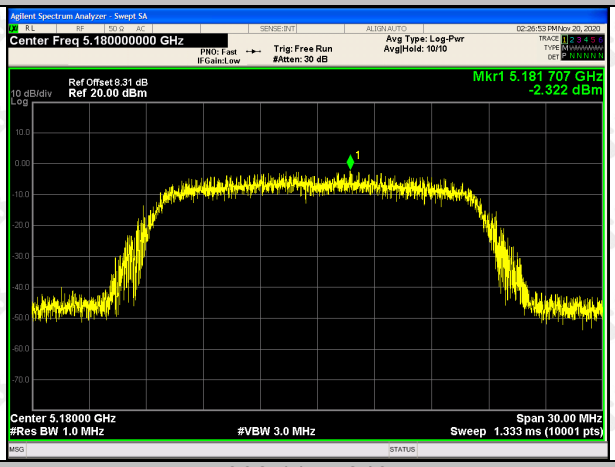
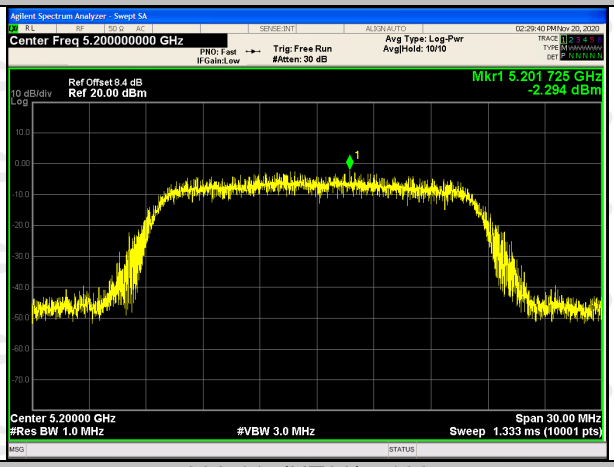
#VBW 1.5 MHz
Span 120.0 MHz
Sweep 1.333 ms (10001 pts)

ANT 3

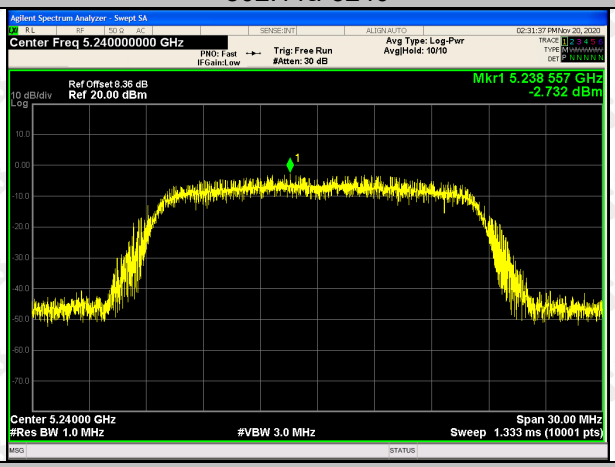
802.11a-5180



802.11a-5200



802.11a-5240



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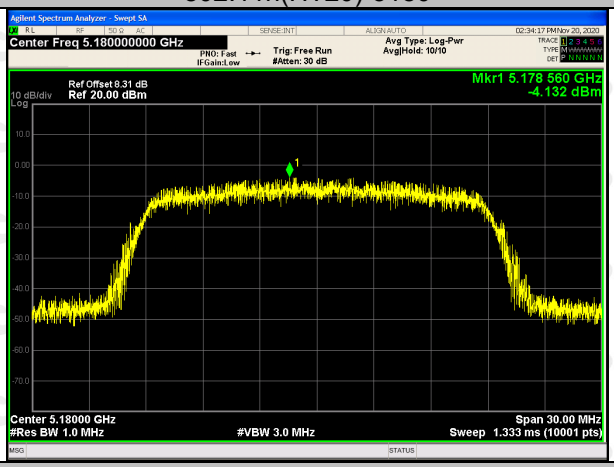

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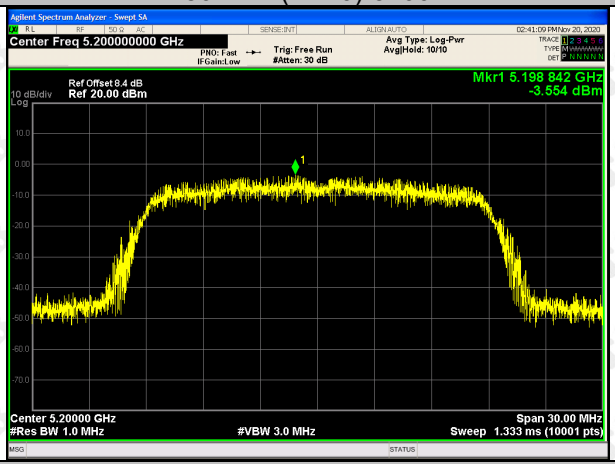

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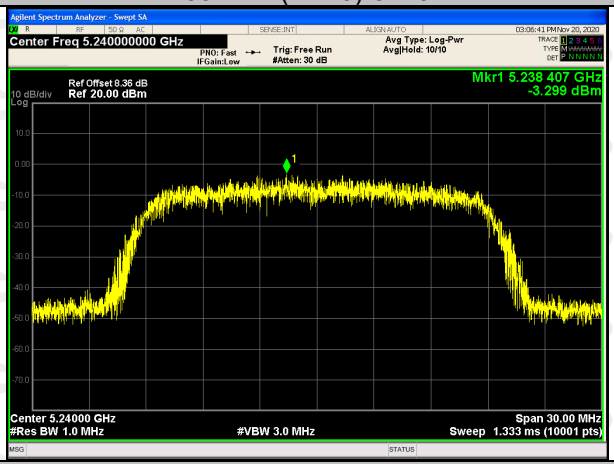

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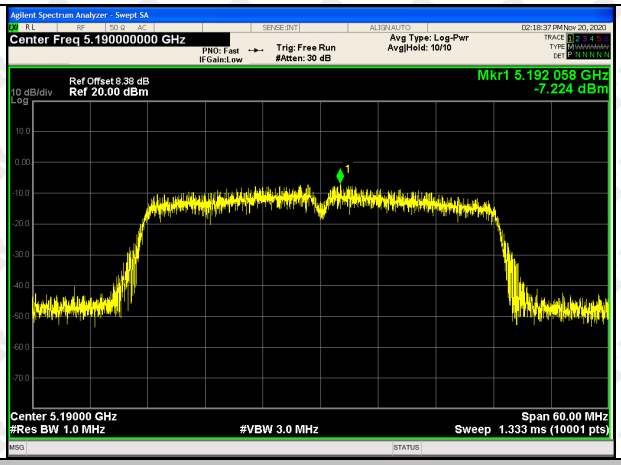
802.11n(HT40)-5230



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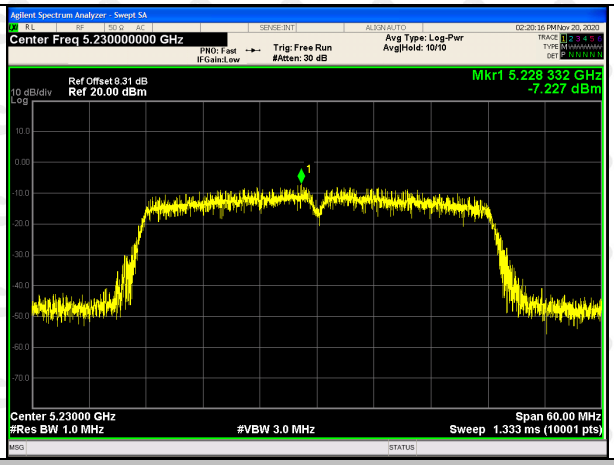

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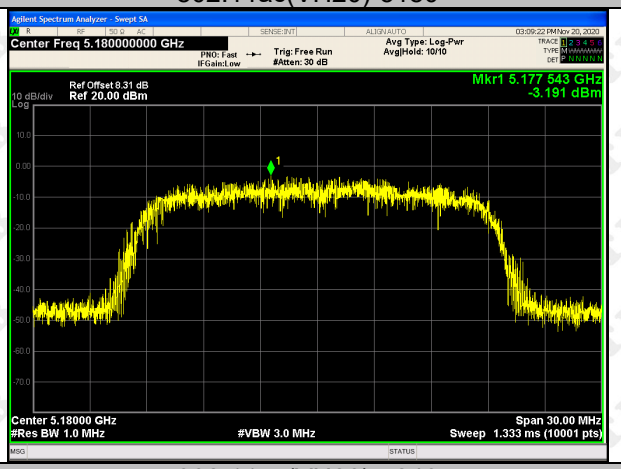

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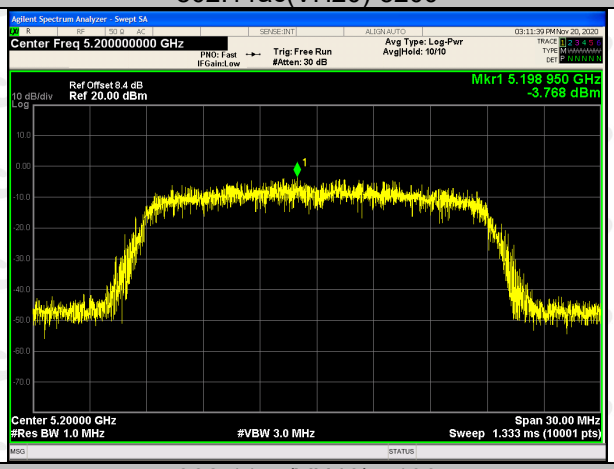

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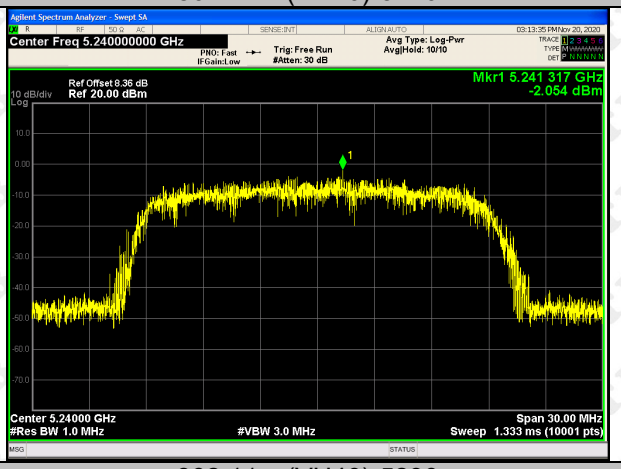

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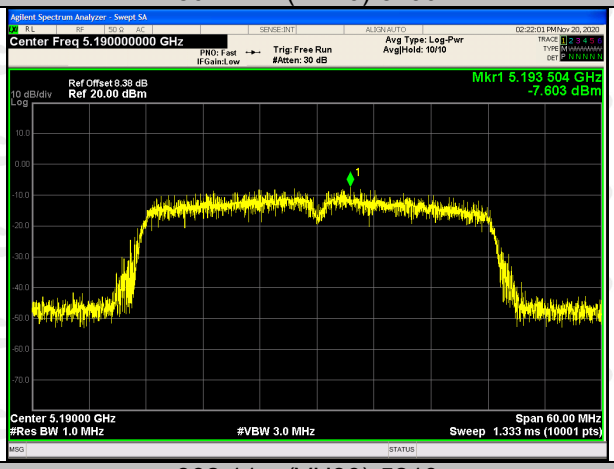

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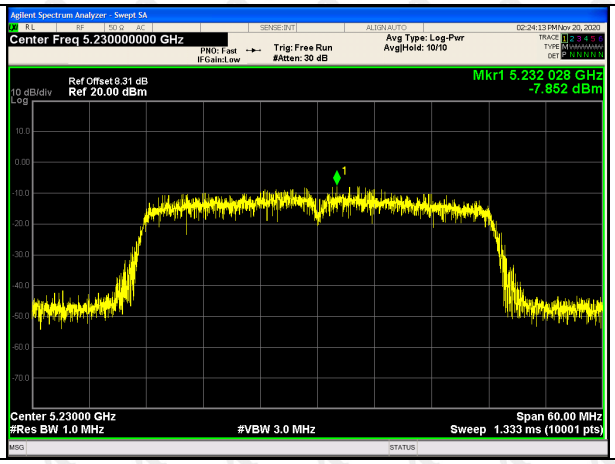

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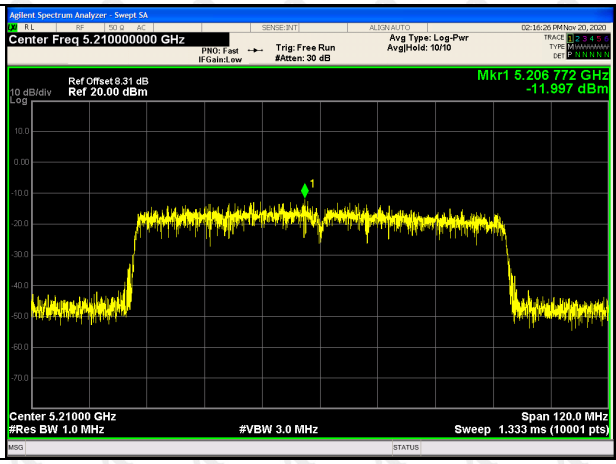

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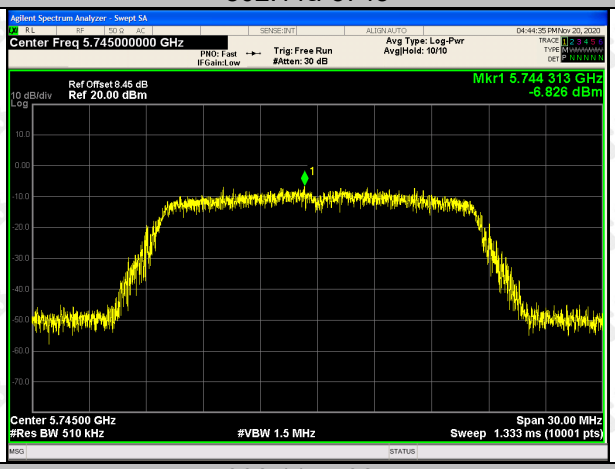

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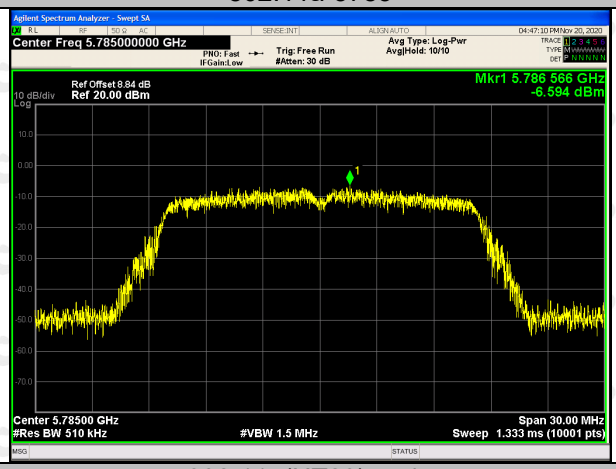

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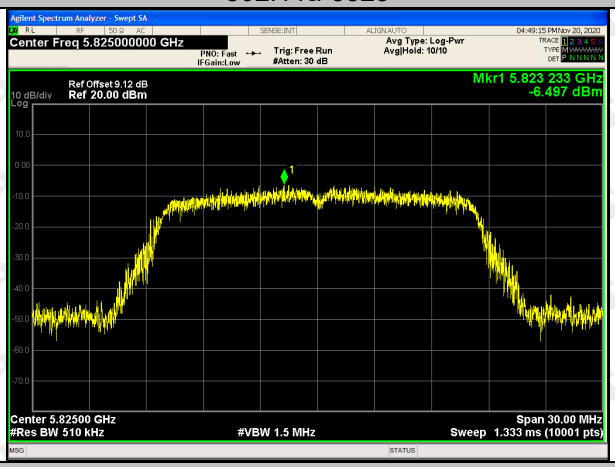

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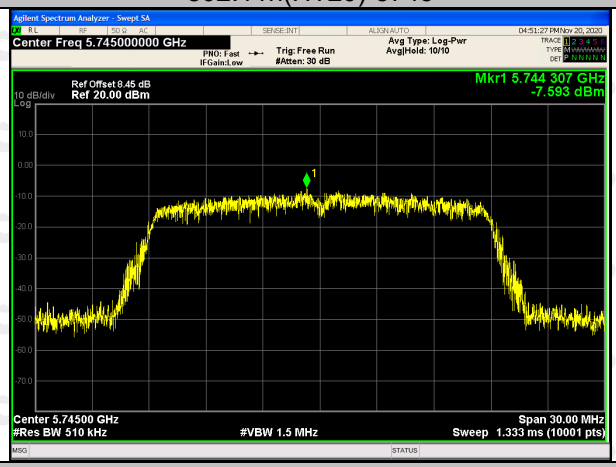

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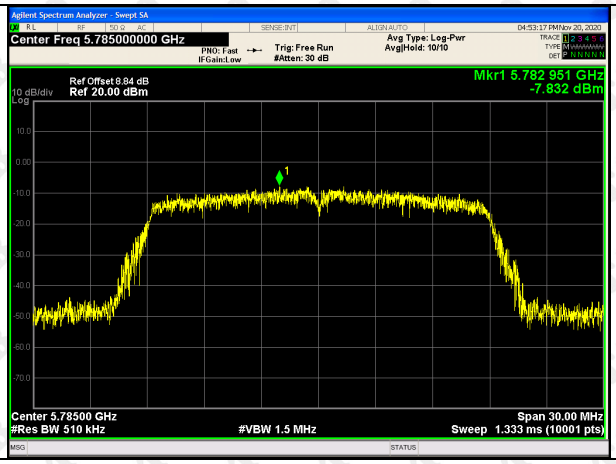

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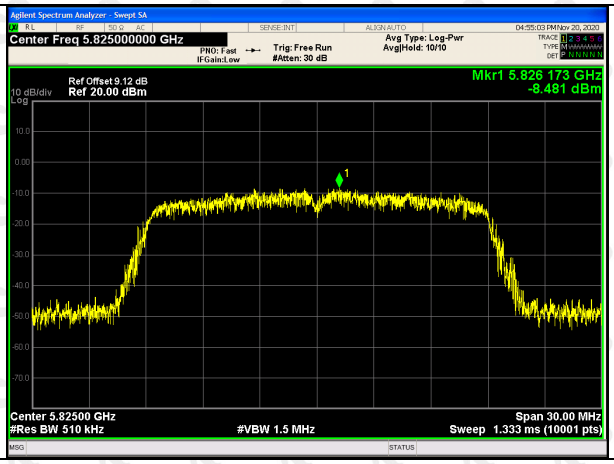

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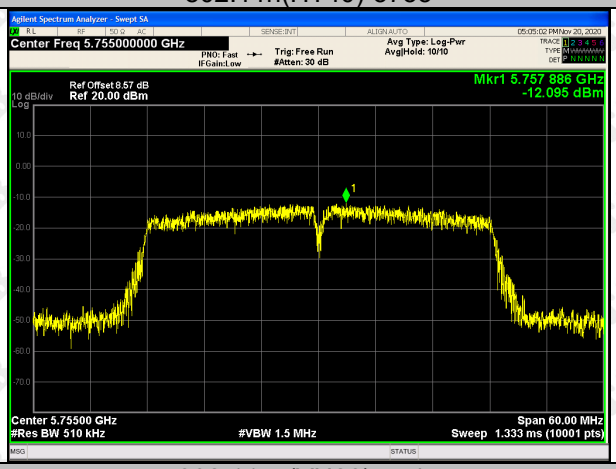

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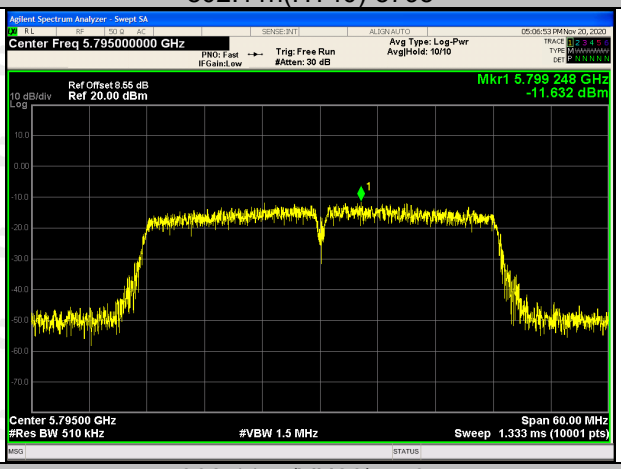

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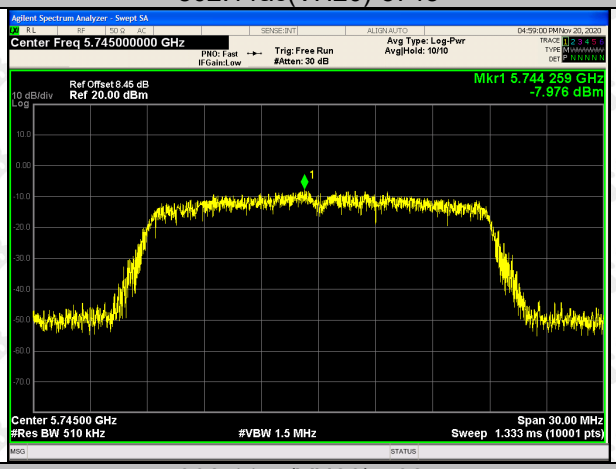

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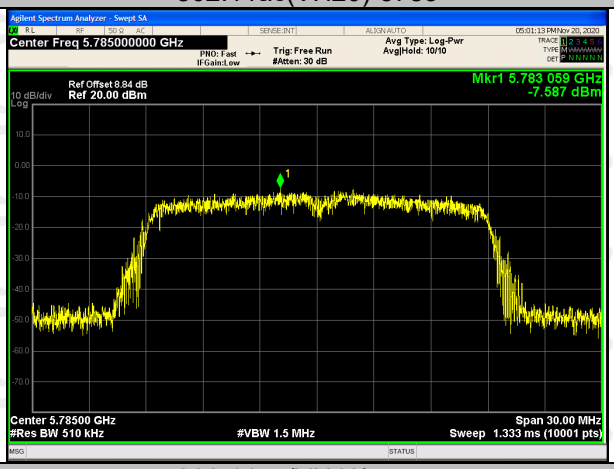

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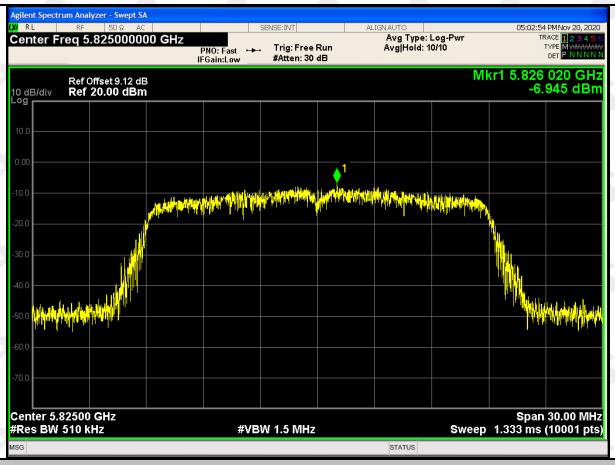

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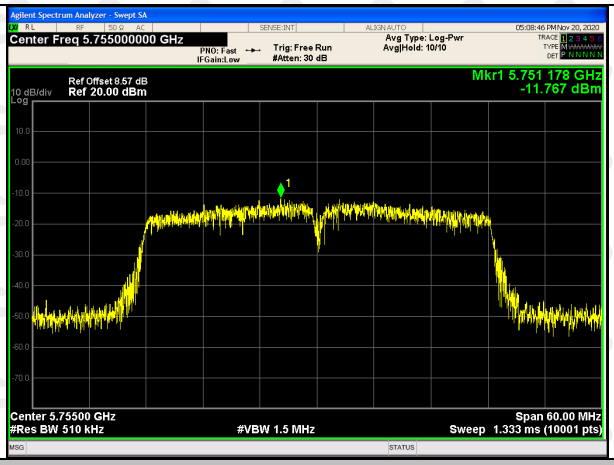

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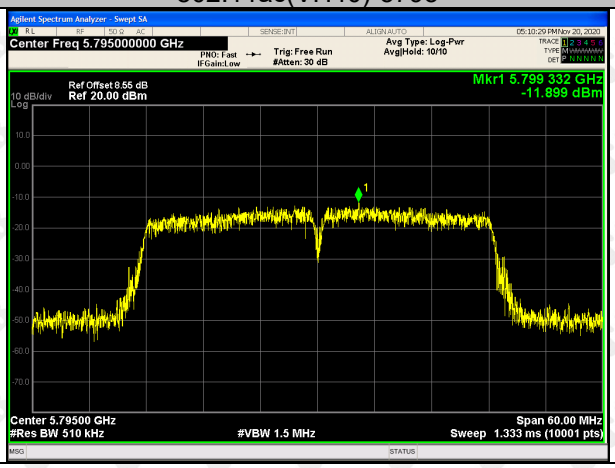
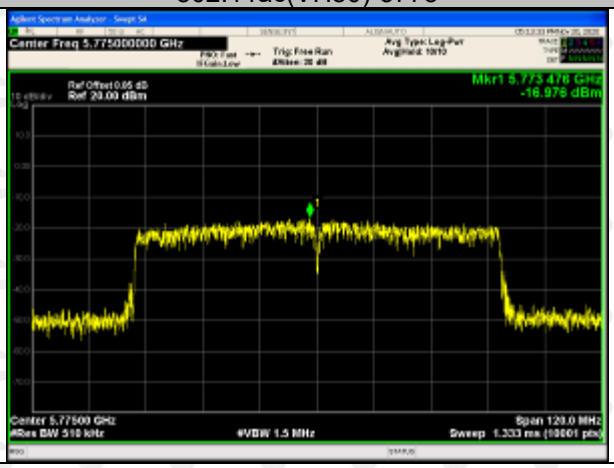
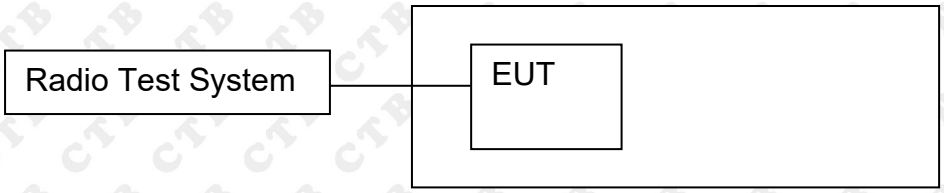




12. FREQUENCY STABILITY

12.1 Block Diagram Of Test Setup



12.2 Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

12.3 Test procedure

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.

2. Set EUT as normal operation.

3. Turn the EUT on and couple its output to spectrum.

4. Turn the EUT off and set the chamber to the highest temperature specified.

5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.

6. Repeat step with the temperature chamber set to the lowest temperature.

12.4 Test Result

Pass

13. OPERATION IN THE ABSENCE OF INFORMATION TO THE TRANSMIT

13.1 Requirement

15.407(c) requirement:
The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signal ling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

13.2 Test Results

Operation in the absence of information to the transmit:

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling
signal of ASK message transmitting from remote device and verify whether it shall resend or
discontinue transmission. (manufacturer declare)

14. ANTENNA REQUIREMENT

15.203 requirement:

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.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is External Antenna and no consideration of replacement. The best case gain of the antenna is 2dBi.

15. EUT PHOTOGRAPHS

EUT Photo 1

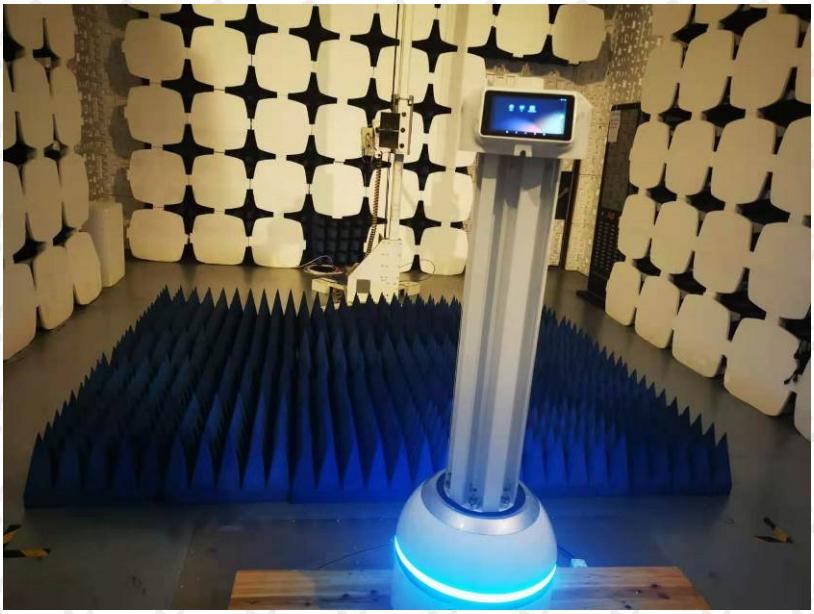
EUT Photo 2

16. EUT TEST SETUP PHOTOGRAPHS

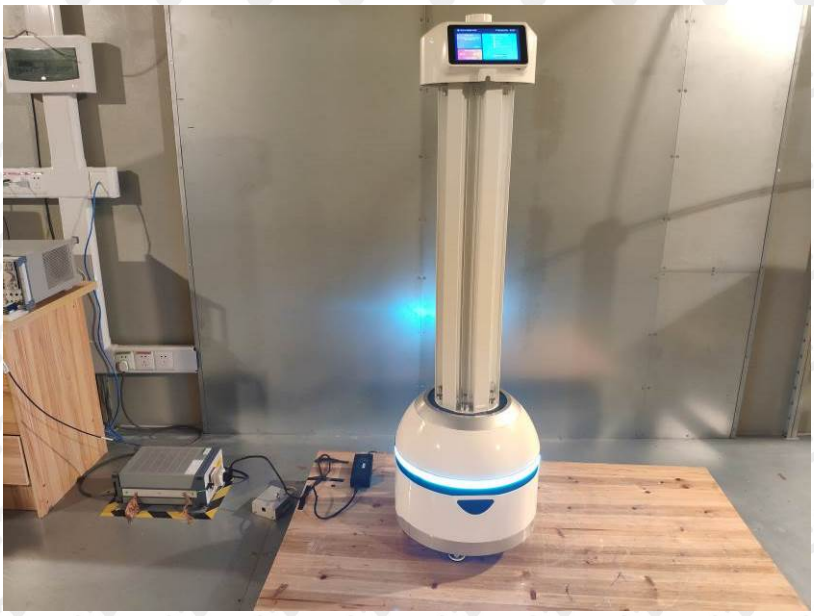
Spurious emissions

Below 1GHz

Above 1GHz



Conducted Emission



※※※※※ END OF REPORT ※※※※※