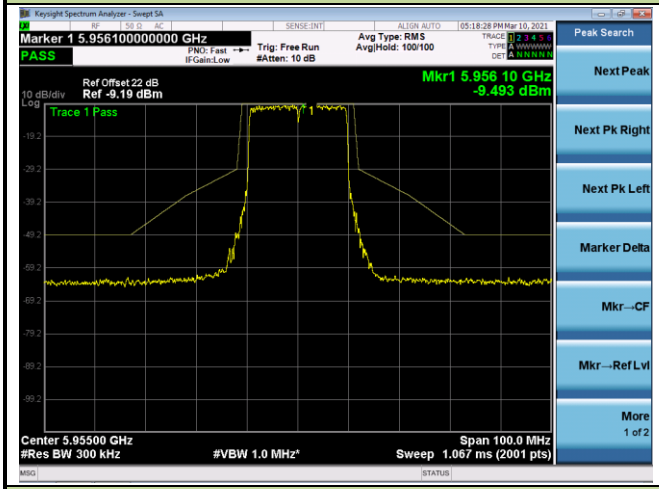
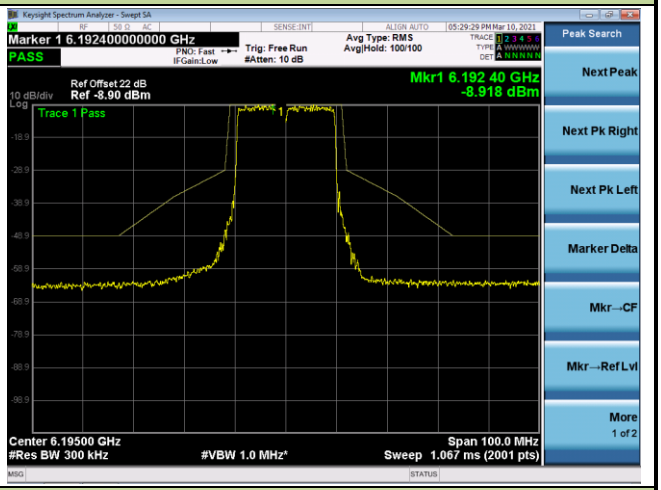
802.11ax-HE20 - Ant 1

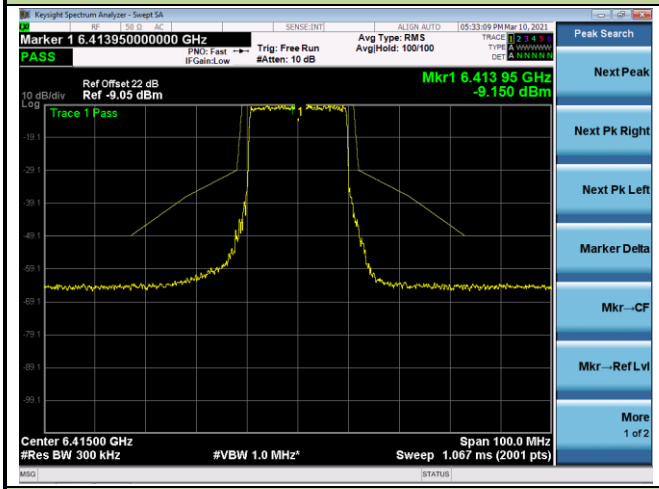
Channel 1 (5955MHz)



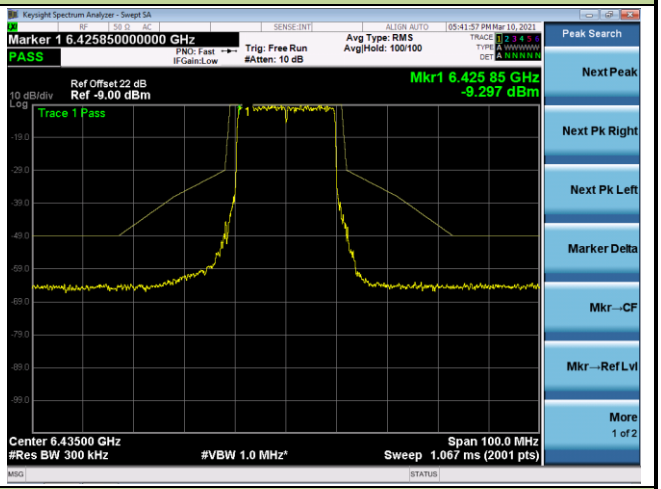
Channel 49 (6195MHz)



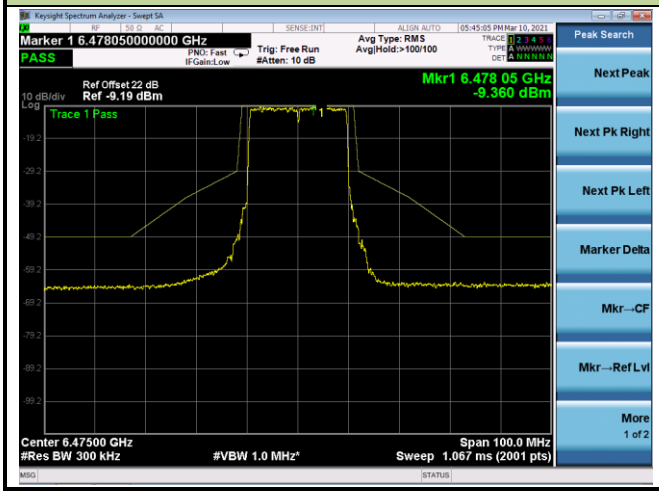
Channel 93 (6415MHz)



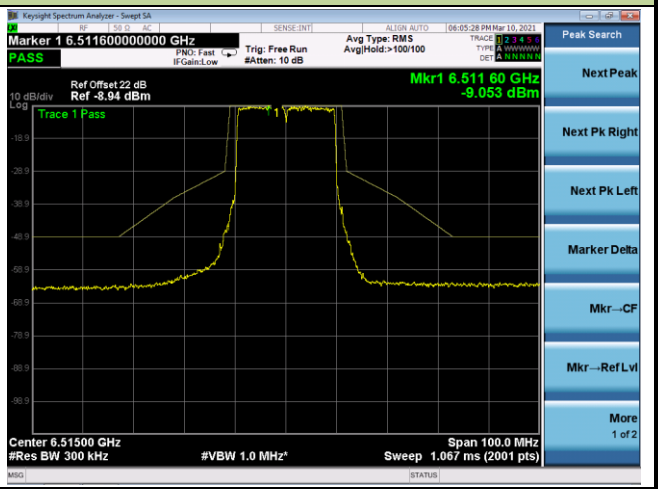
Channel 97 (6435MHz)



Channel 105 (6475MHz)

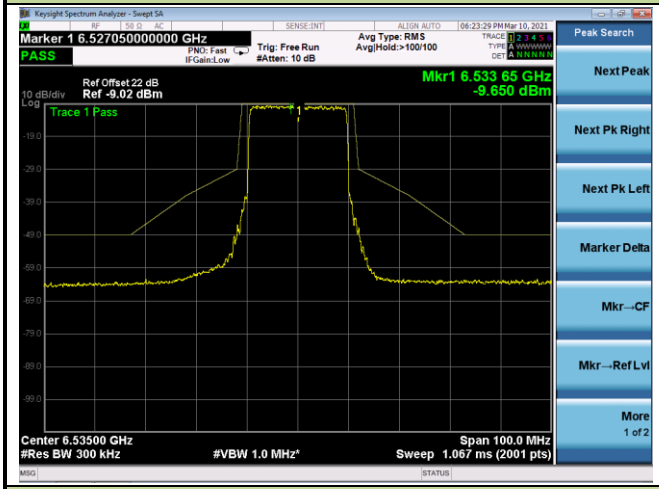


Channel 113 (6515MHz)



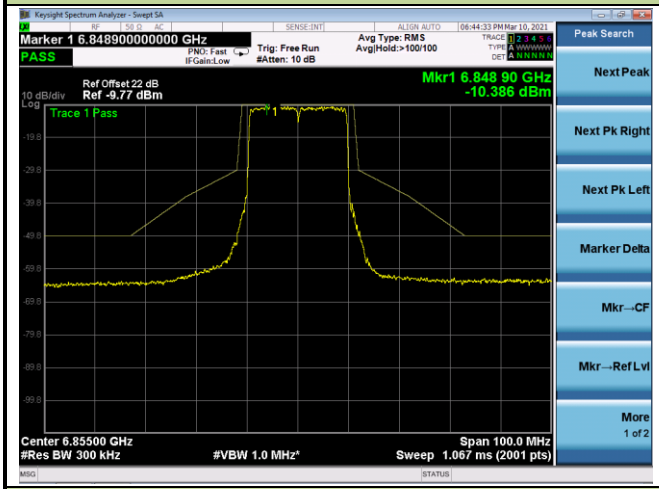
802.11ax-HE20 - Ant 1

Channel 117 (6535MHz)

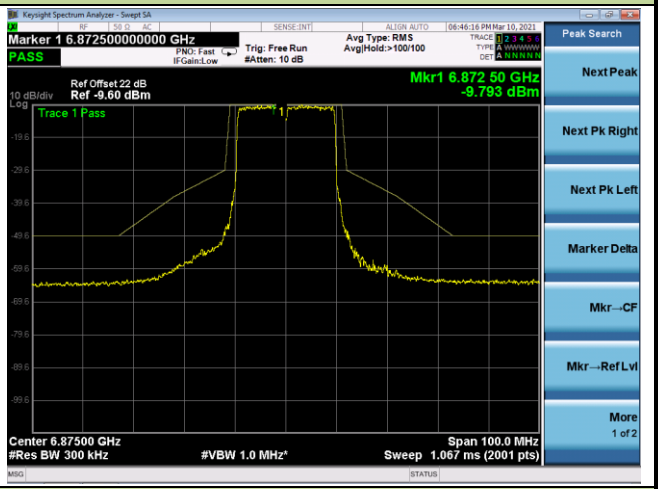


Channel 153 (6715MHz)

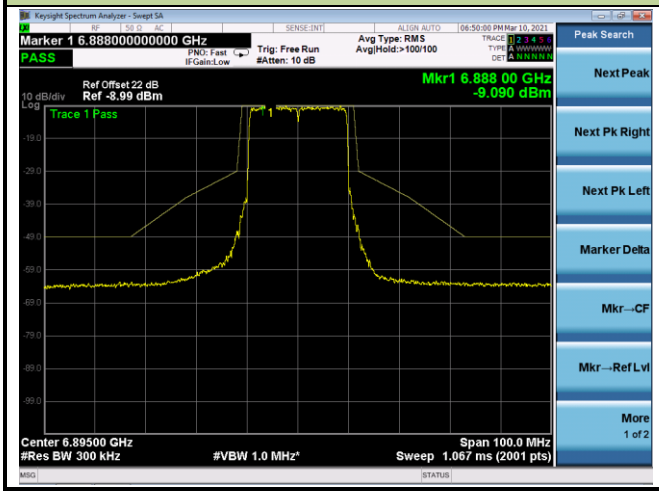
Channel 181 (6855MHz)



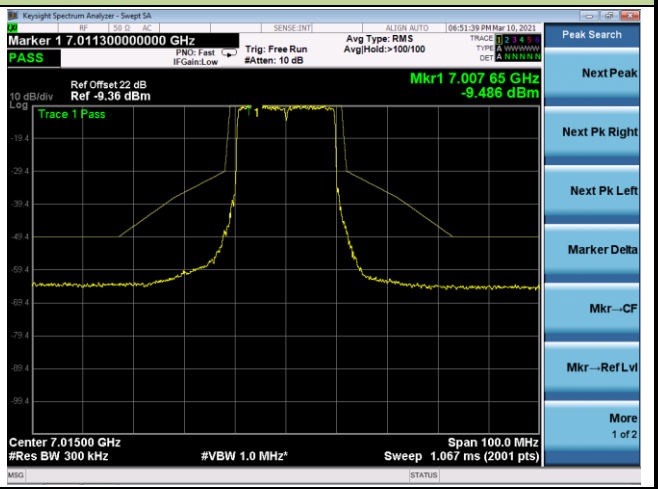
Channel 185 (6875MHz)

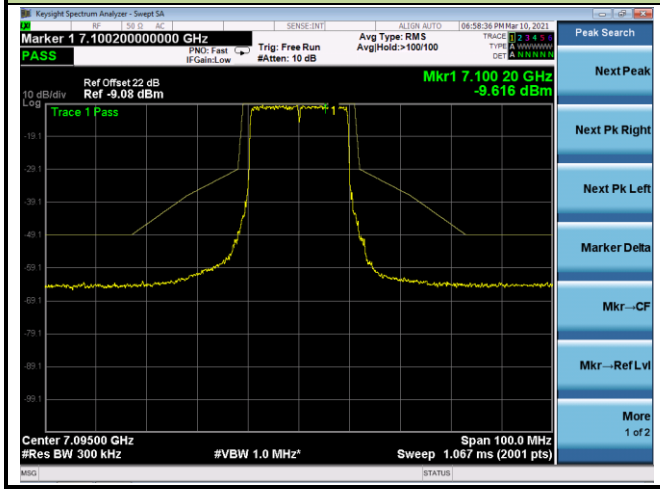


Channel 189 (6895MHz)



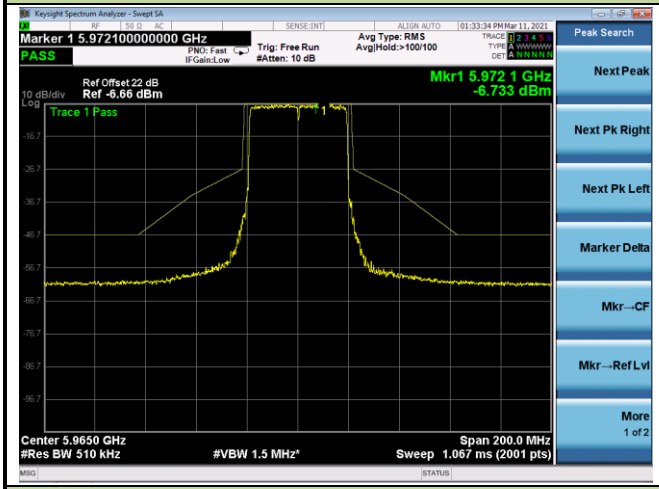
Channel 213 (7015MHz)



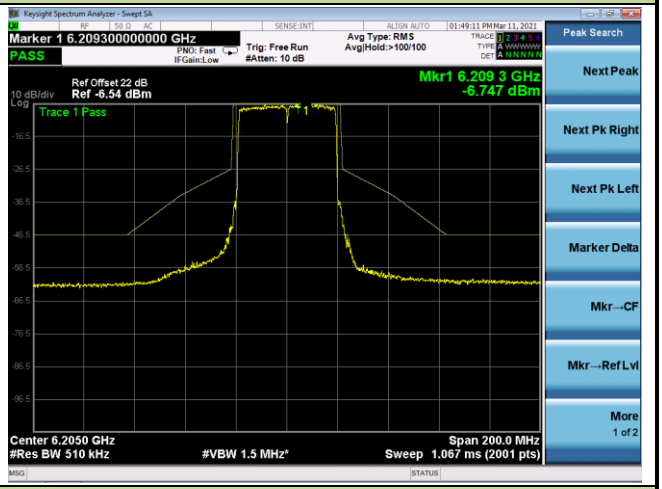
802.11ax-HE20 - Ant 1	
Channel 229 (7095MHz)	
	

802.11ax-HE40 - Ant 1

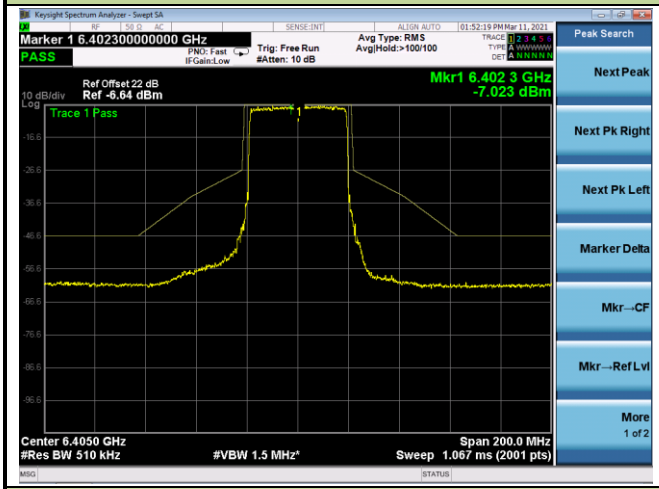
Channel 3 (5965MHz)



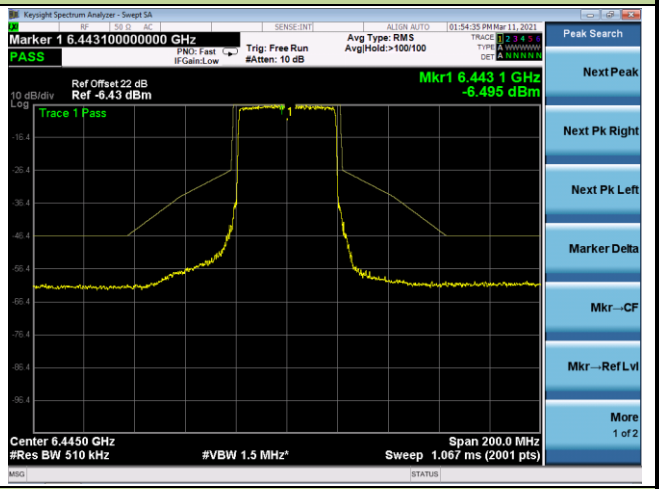
Channel 51 (6205MHz)



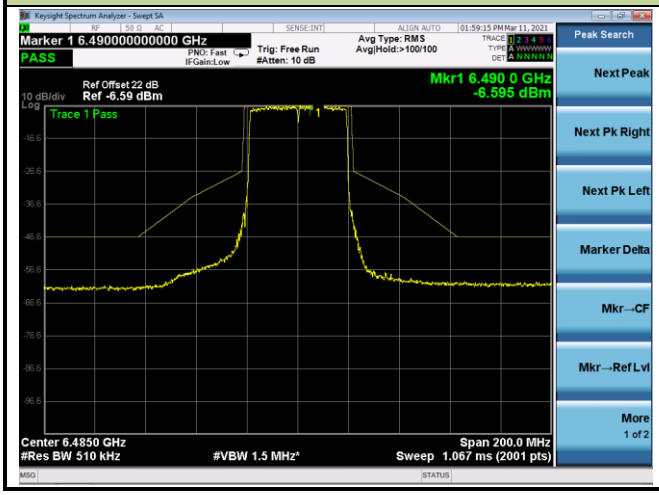
Channel 91 (6405MHz)



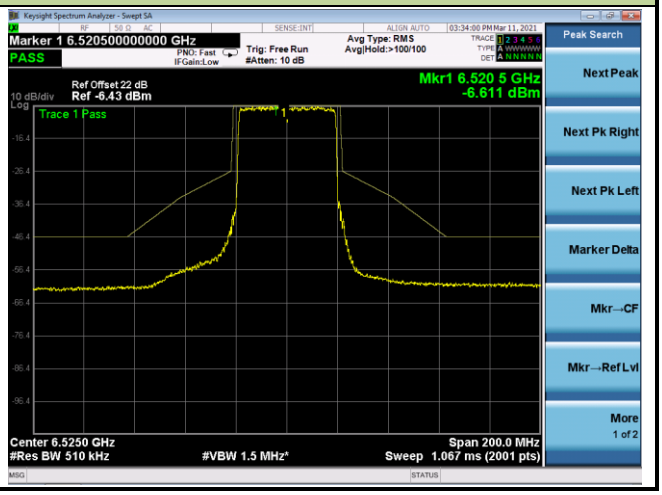
Channel 99 (6445MHz)



Channel 107 (6485MHz)

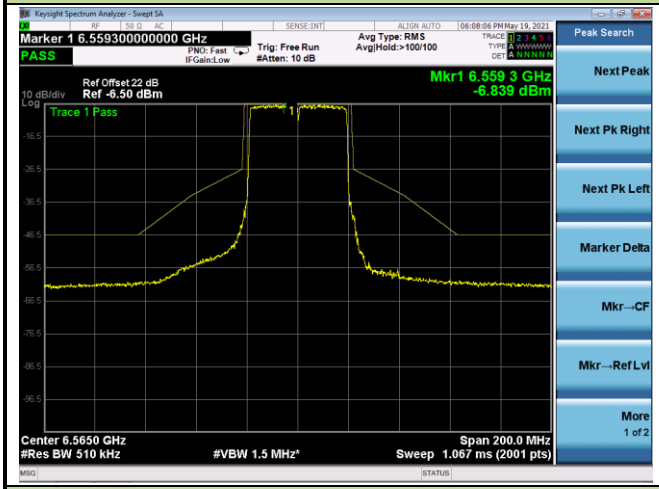


Channel 115 (6525MHz)

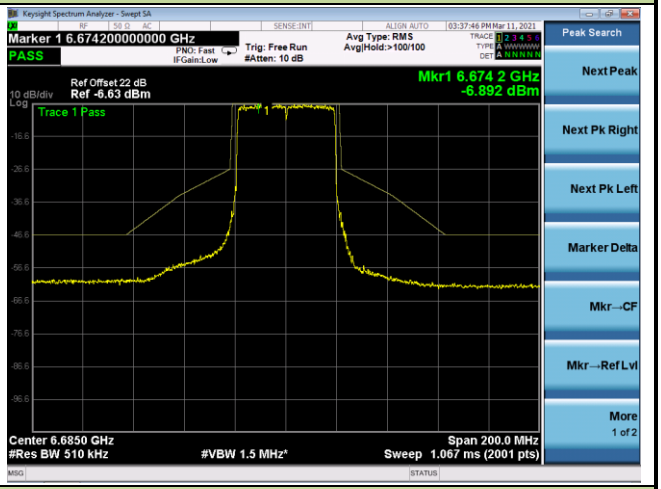


802.11ax-HE40 - Ant 1

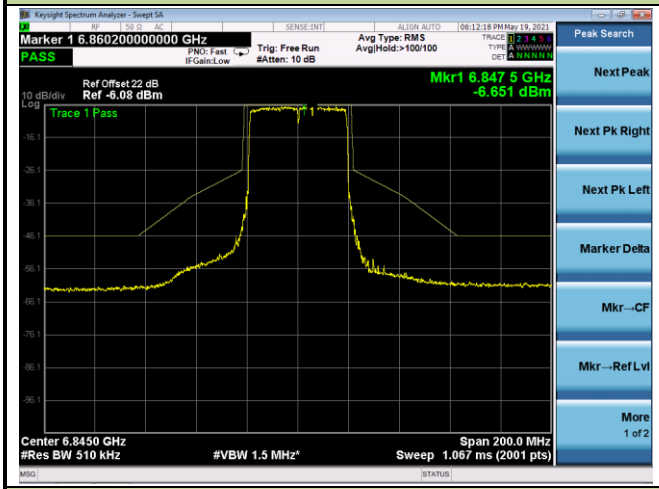
Channel 123 (6565MHz)



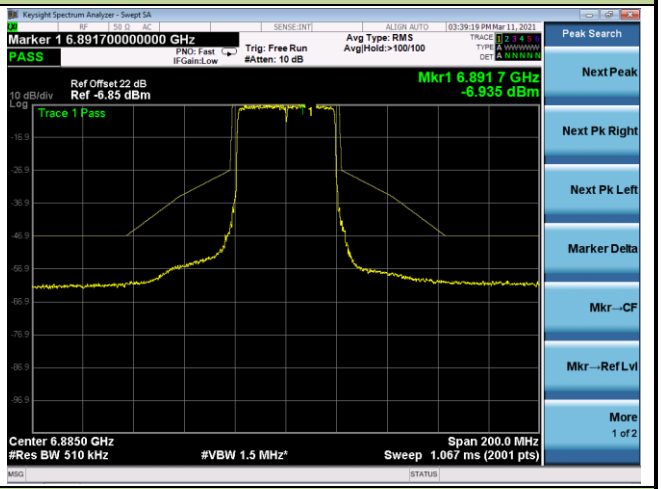
Channel 147 (6685MHz)



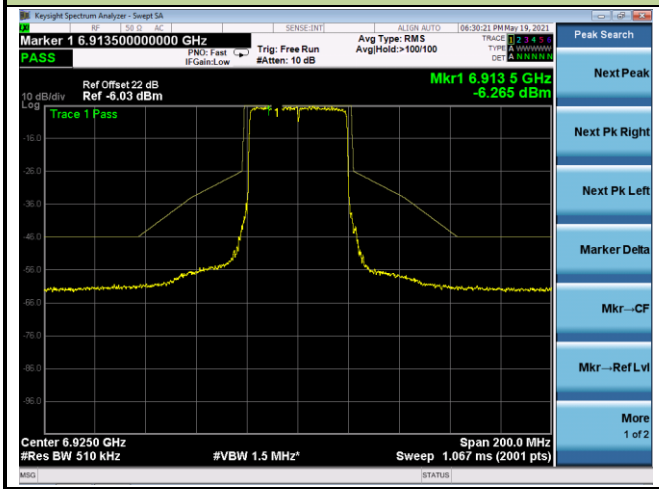
Channel 179 (6845MHz)



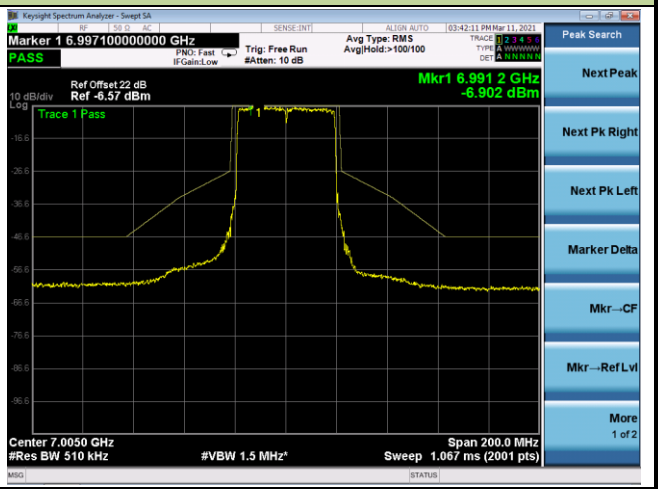
Channel 187 (6885MHz)

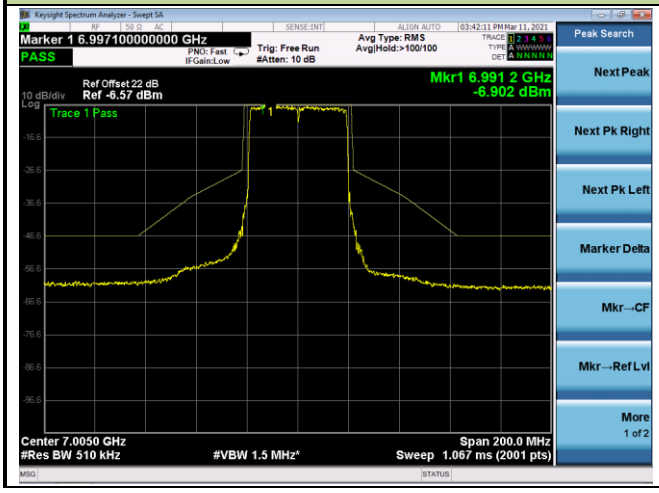
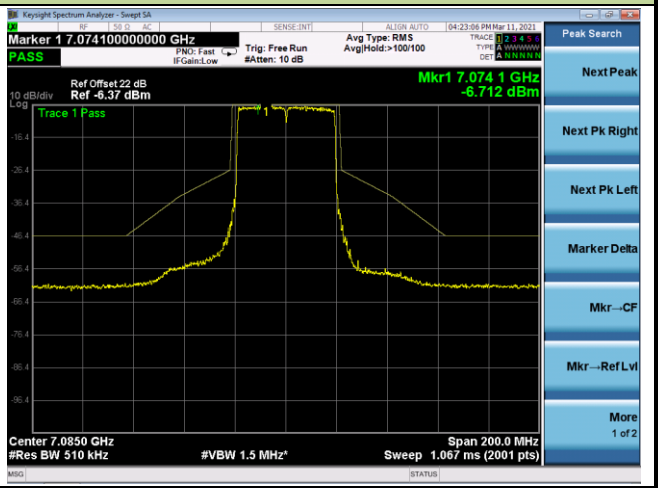


Channel 195 (6925MHz)



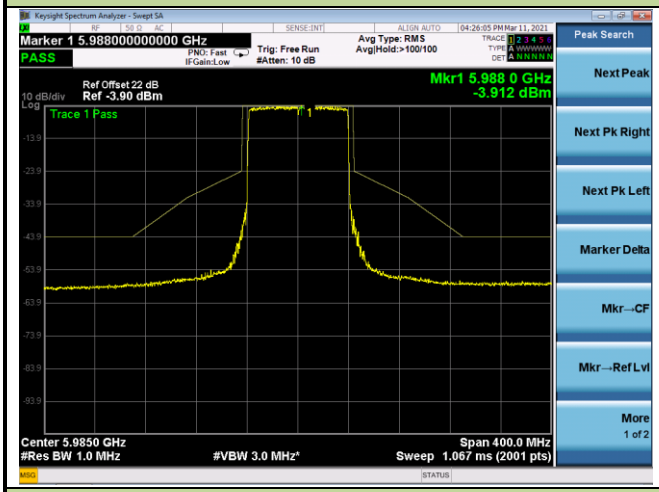
Channel 211 (7005MHz)



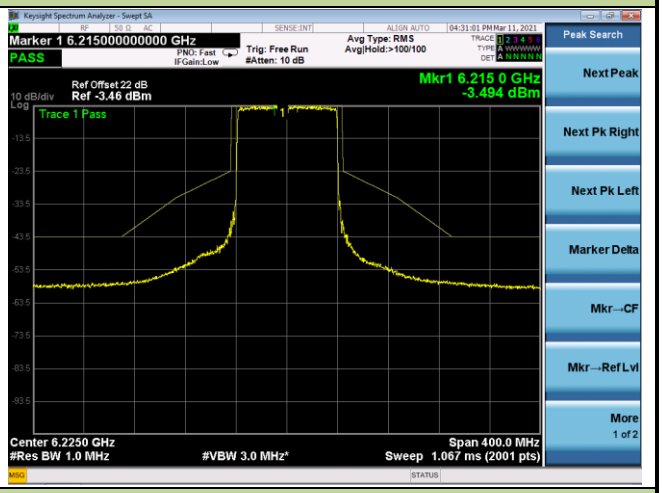
802.11ax-HE40 - Ant 1	
Channel 211 (7005MHz)	Channel 227 (7085MHz)
	

802.11ax-HE80 - Ant 1

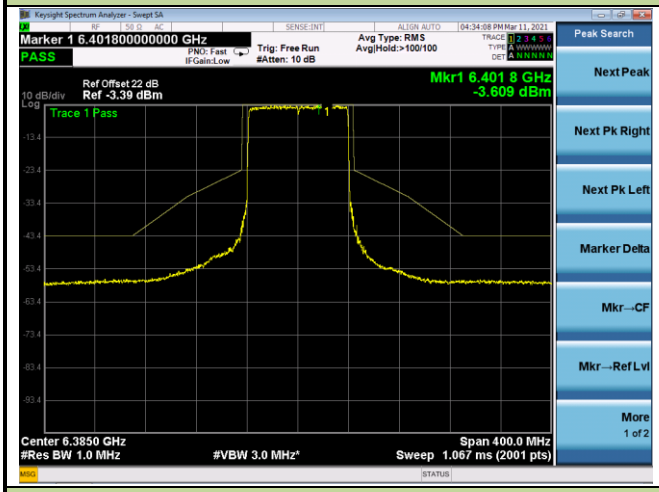
Channel 7 (5985MHz)



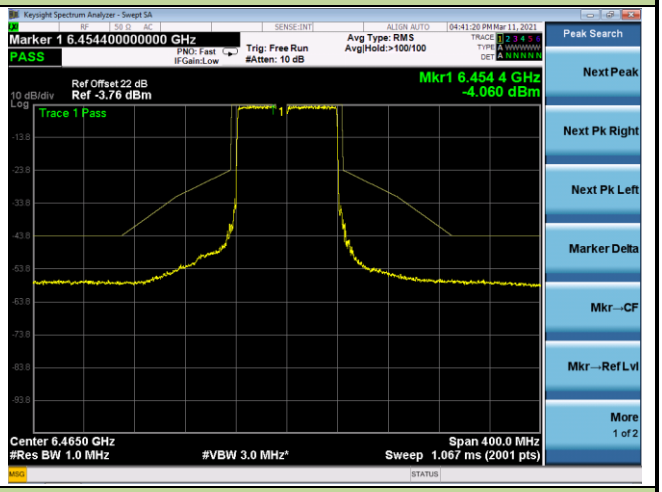
Channel 55 (6225MHz)



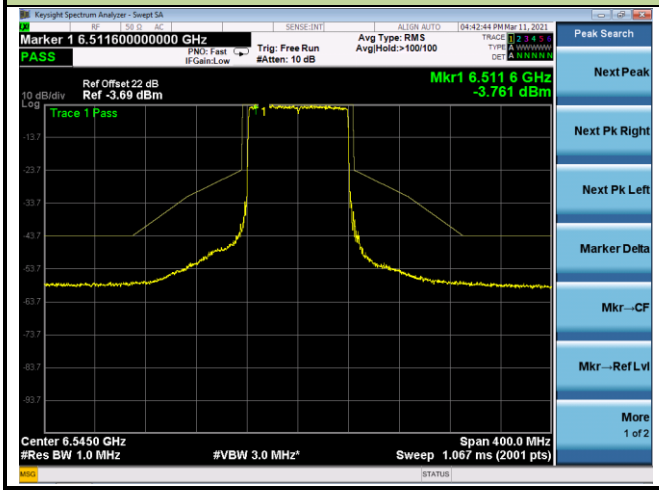
Channel 87 (6385MHz)



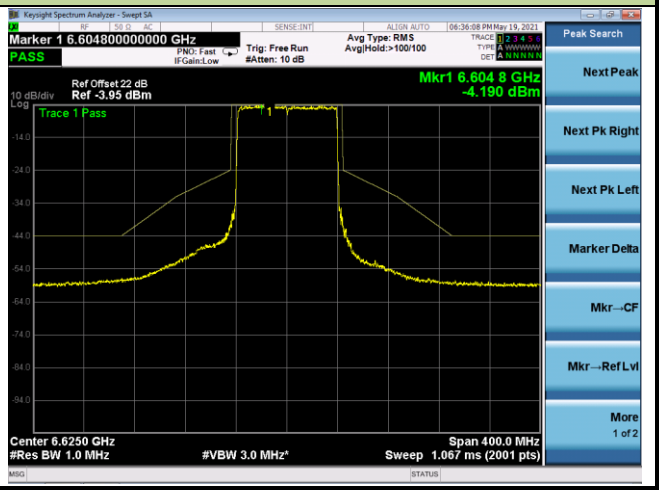
Channel 103 (6465MHz)

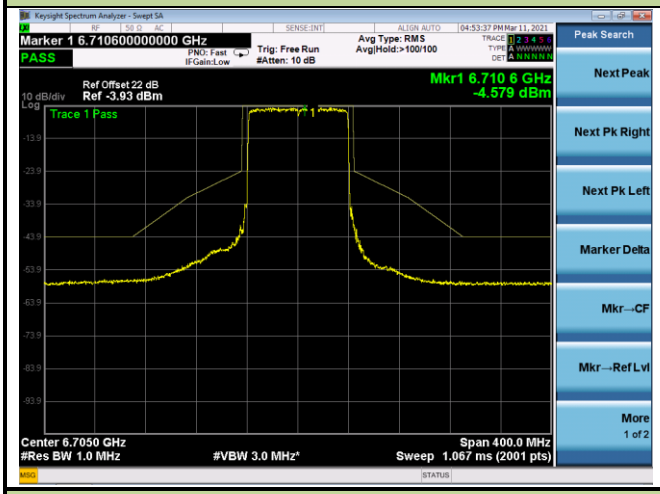
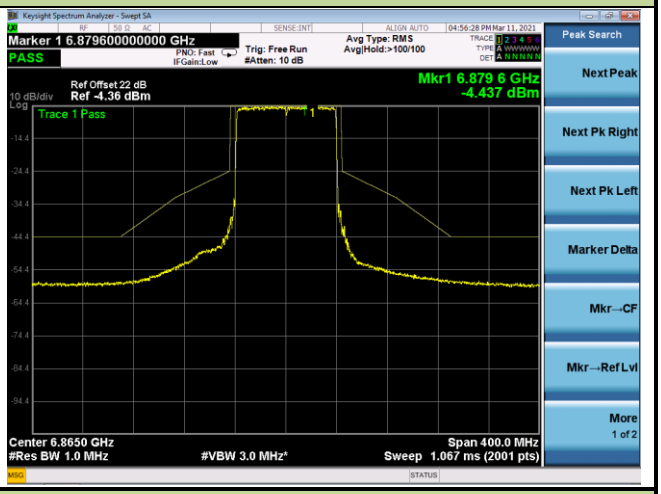
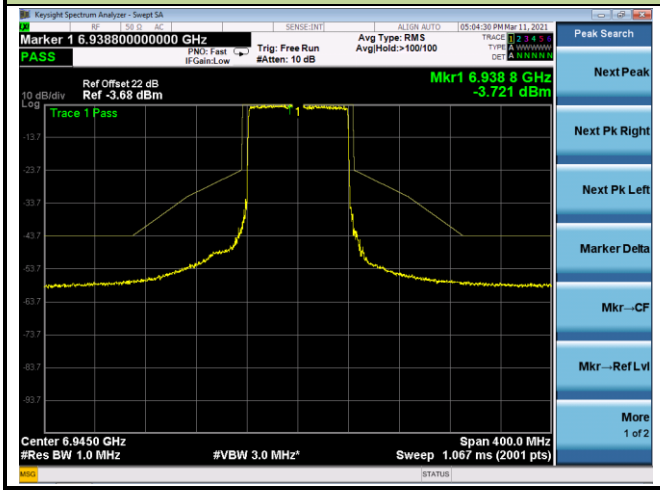
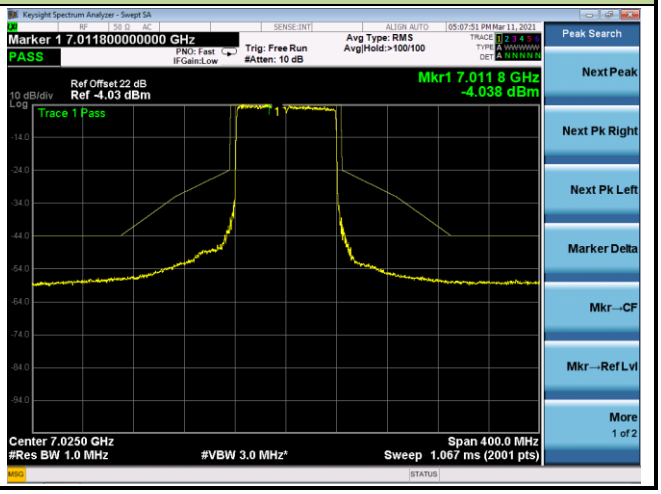


Channel 119 (6545MHz)



Channel 135 (6625MHz)



802.11ax-HE80 - Ant 1	
Channel 151 (6705MHz)	Channel 183 (6865MHz)
	
Channel 199 (6945MHz)	Channel 215 (7025MHz)
	

802.11ax-HE160 - Ant 1

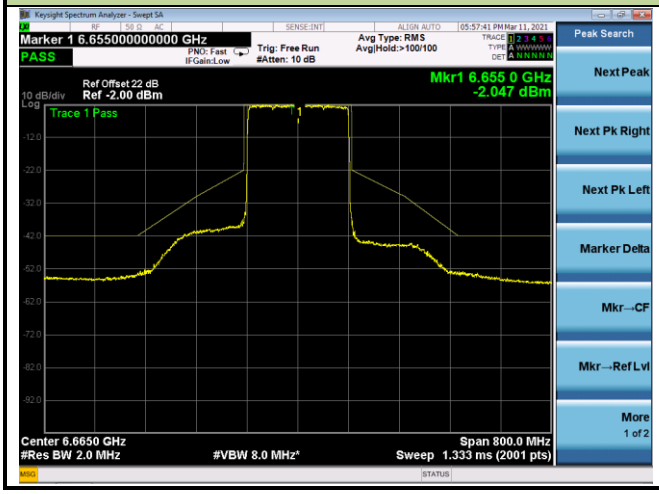
Channel 15 (6025MHz)

Channel 47 (6185MHz)

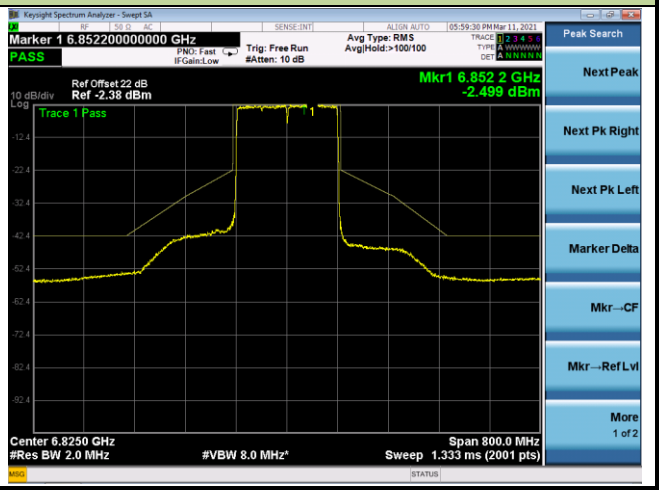
Channel 79 (6345MHz)

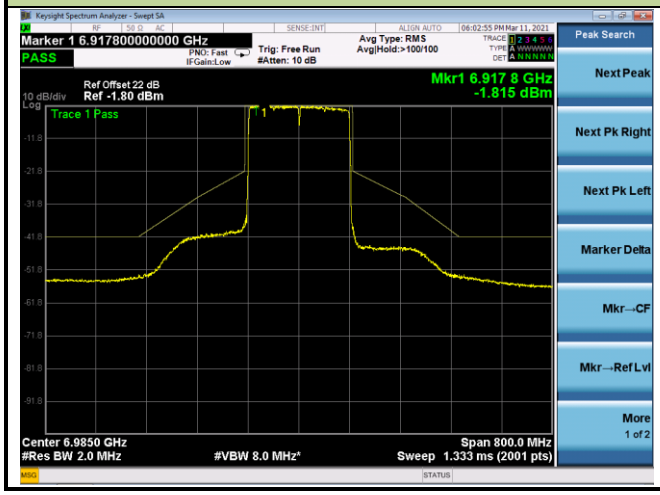
Channel 111 (6505MHz)

Channel 143 (6665MHz)



Channel 175 (6825MHz)



802.11ax-HE160 - Ant 1	
Channel 207 (6985MHz)	
	

6.6. Frequency Stability Measurement

6.6.1.Test Limit

Manufactures 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.

6.6.2.Test Procedure Used

Frequency Stability Under Temperature Variations:

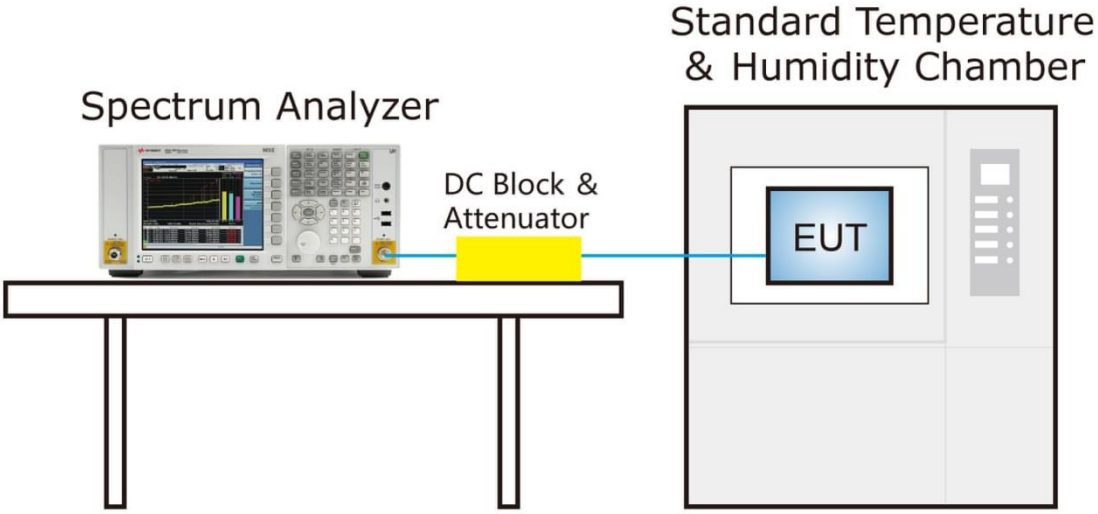
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, recordthe maximum frequency change.

6.6.3.Test Setup



6.6.4.Test Result

Test Site	WZ-TR3	Test Engineer	Dandy Li
Test Date	2021/04/20		
Test Mode	5955MHz (Carrier Mode)		

Voltage (%)	Power (VAC)	Temp (°C)	Frequency Tolerance (ppm)			
			0 minutes	2 minutes	5 minutes	10 minutes
100	120	0	-1.69	-2.56	-2.58	-2.23
		+ 10	-2.08	-2.60	-2.57	-2.35
		+ 20	-2.19	-2.59	-2.55	-2.44
		+ 30	-2.34	-2.61	-2.52	-2.50
		+ 40	-2.40	-2.61	-2.52	-2.54
		+ 50	-2.44	-2.61	-1.77	-2.59
115	138	+ 20	-2.50	-2.60	-1.97	-2.58
85	102	+ 20	-2.53	-2.59	-2.12	-2.58

Note: Frequency Tolerance (ppm) = {[Measured Frequency (Hz) - Declared Frequency (Hz)] / Declared Frequency (Hz)} $*10^6$.

6.7. Contention Based Protocol

6.7.1.Test Limit

Unlicensed indoor low power device must detect co-channel radio frequency power that is at least -62dBm (The threshold is referenced to a 0dBi antenna gain.) or low.

Indoor low power device must detect an AWGN signal with 90% (or better) level of certainty.

6.7.2.Test Procedure Used

KDB 987594 D02v01- Section I

6.7.3.Test Setting

1. Configure the EUT to transmit with a constant duty cycle.

2. Set the operating parameters of the EUT including power level, operating frequency, modulation and bandwidth.

3. Set the signal analyzer center frequency to the nominal EUT channel center frequency. The span range of the signal analyzer shall be between two times and five times the OBW of the EUT. Connect the output port of the EUT to the signal analyzer 2. Ensure that the attenuator 2 provides enough attenuation to not overload the signal analyzer 2 receiver.

4. Monitoring the signal analyzer 2, verify the EUT is operating and transmitting with the parameters set at step two.

5. Using an AWGN signal source, generate a 10 MHz-wide AWGN signal. Use Table 1 of KDB 987594 to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.

6. Set the AWGN signal power to an extremely low level. Connect the AWGN signal source, via a 3-dB splitter, to the signal analyzer 1 and the EUT as shown in below figure.

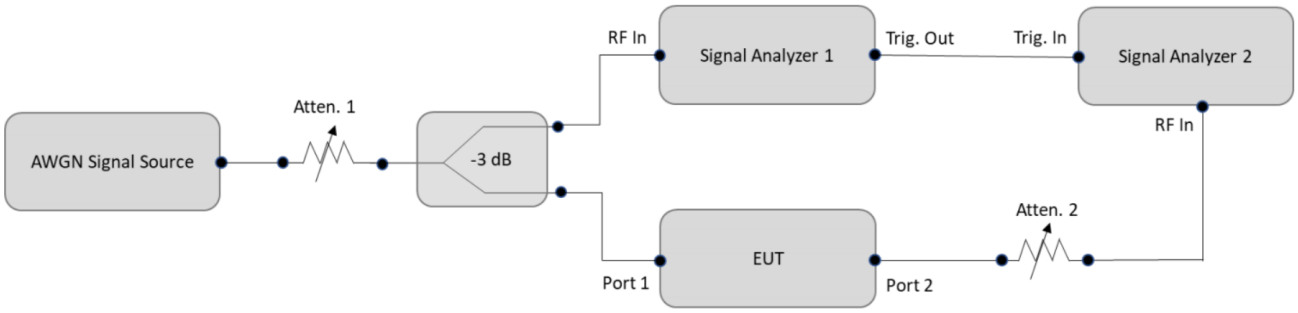
7. Transmit the AWGN signal (RF ON) and verify its characteristics on the signal analyzer 1.

8. Monitor the signal analyzer 2 to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.

9. Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.

10. Refer to Table 1 to determine number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step 5, choose a different center frequency for the AWGN signal and repeat the process.

6.7.4.Test Setup



6.7.5.Test Result

Test Site	WZ-SR4	Test Engineer	Dandy Li
Test Date	2021/05/25 - 2021/05/28		
Test Port	Ant 0 + 1		

Test Channel	Bandwidth (MHz)	Freq. (MHz)	Interference Freq. (MHz)	AWGN Level (dBm)	Detected Number	Detection Probability (%)	Limit (%)	Test Result
Operation Band: U-NII 5								
33	20	6115	6115	-62	10	100	90	Pass
47	160	6185	6110	-62	10	100	90	Pass
47	160	6185	6185	-58	10	100	90	Pass
47	160	6185	6260	-62	10	100	90	Pass
Operation Band: U-NII 6								
97	20	6435	6435	-62	10	100	90	Pass
103	80	6465	6430	-62	10	100	90	Pass
103	80	6465	6465	-62	10	100	90	Pass
103	80	6465	6500	-62	10	100	90	Pass
Operation Band: U-NII 7								
153	20	6715	6715	-62	10	100	90	Pass
143	160	6665	6590	-62	10	100	90	Pass
143	160	6665	6665	-61	10	100	90	Pass
143	160	6665	6740	-62	10	100	90	Pass
Operation Band: U-NII 8								
213	20	7015	7015	-62	10	100	90	Pass
207	160	6985	6910	-62	10	100	90	Pass
207	160	6985	6985	-62	10	100	90	Pass
207	160	6985	7060	-62	10	100	90	Pass

Note: Refer to KDB 987594 D02 U-NII 6GHz EMC Measurement v01r01 Clause I), the -62dBm threshold is referenced to 0dBi antenna gain. Wi-Fi 6E antenna gain = 4.3dBi, the threshold level = -62 dBm + 4.3dBi = -57.7 dBm, so we use AWGN signal level -58 dBm or less (Lower than -57.7 dBm) to perform detection probability and lowest interference level check testing.

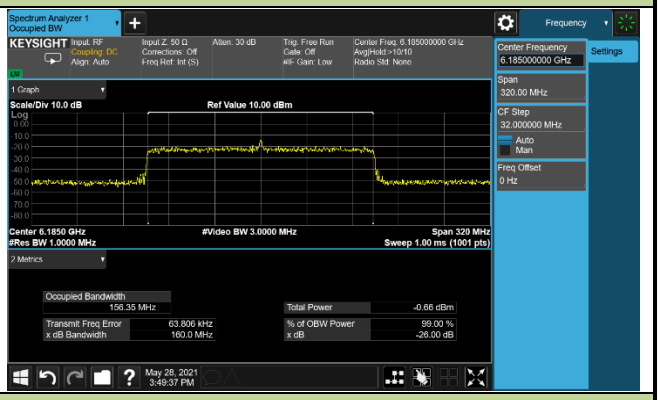
Test Site	WZ-SR4	Test Engineer	Dandy Li
Test Date	2021/05/28		
Test Port	Ant 0 + 1		
Remark	Lowest Interference (AWGN) Level Check		

Test Channel	Bandwidth (MHz)	Freq. (MHz)	Interference Freq. (MHz)	AWGN Level (dBm)	EUT Status
Operation Band: U-NII 5					
33	20	6115	6115	-68	Start transmission
47	160	6185	6110	-66	Start transmission
47	160	6185	6185	-59	Start transmission
47	160	6185	6260	-66	Start transmission
Operation Band: U-NII 6					
97	20	6435	6435	-68	Start transmission
103	80	6465	6430	-69	Start transmission
103	80	6465	6465	-66	Start transmission
103	80	6465	6500	-71	Start transmission
Operation Band: U-NII 7					
153	20	6715	6715	-70	Start transmission
143	160	6665	6590	-65	Start transmission
143	160	6665	6665	-62	Start transmission
143	160	6665	6740	-70	Start transmission
Operation Band: U-NII 8					
213	20	7015	7015	-70	Start transmission
207	160	6985	6910	-67	Start transmission
207	160	6985	6985	-67	Start transmission
207	160	6985	7060	-67	Start transmission

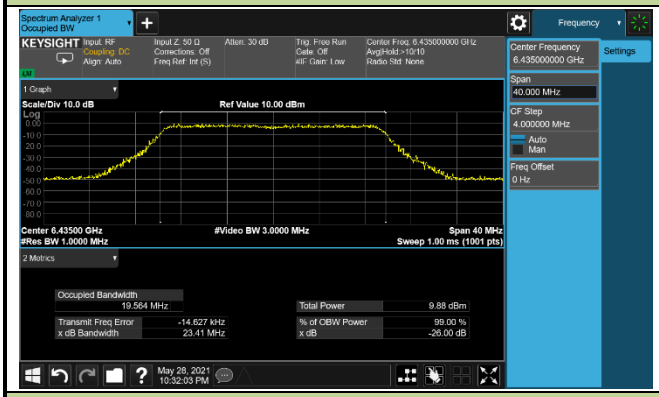
EUT Tx Waveform

802.11ax-HE20 / CH33

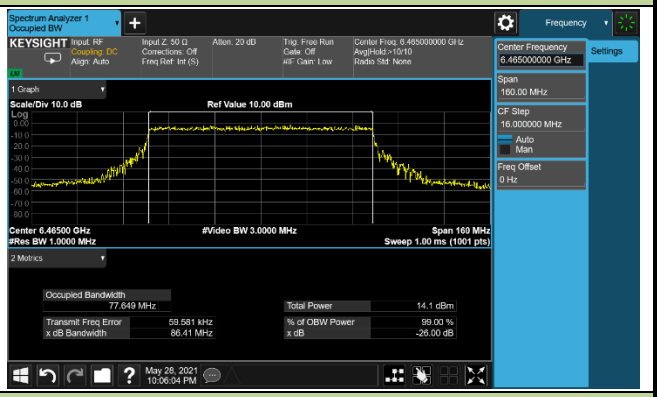
802.11ax-HE160 / CH47



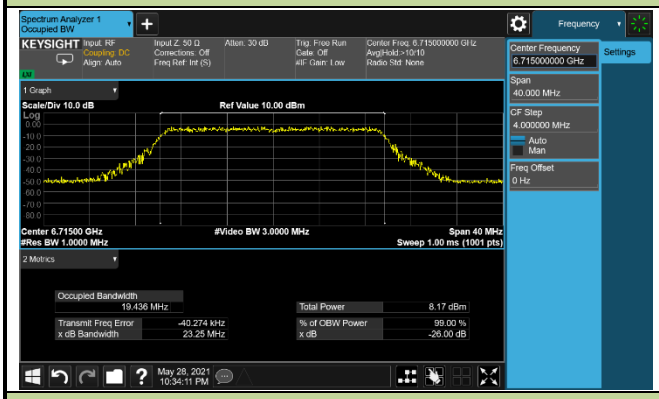
802.11ax-HE20 / CH97



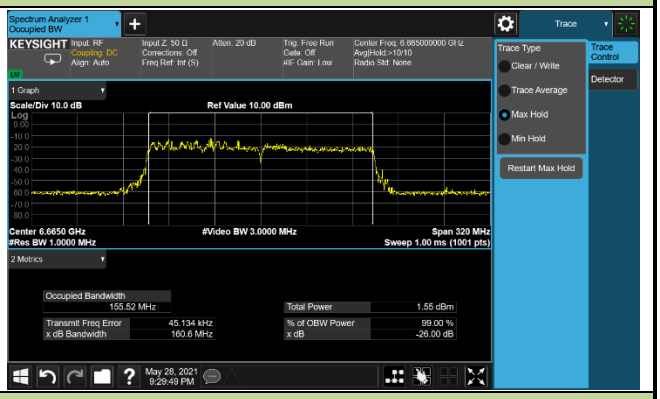
802.11ax-HE80 / CH103



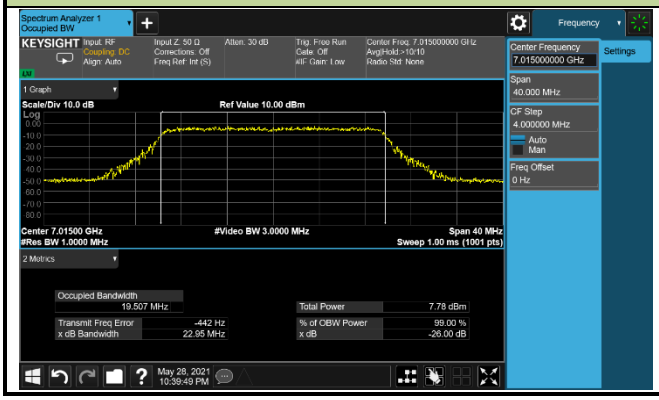
802.11ax-HE20 / CH153



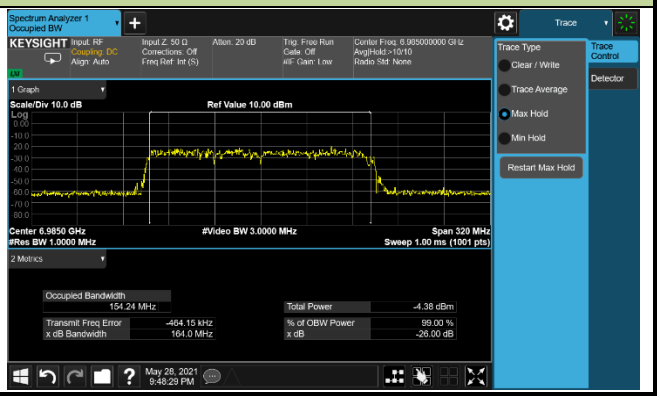
802.11ax-HE160 / CH143

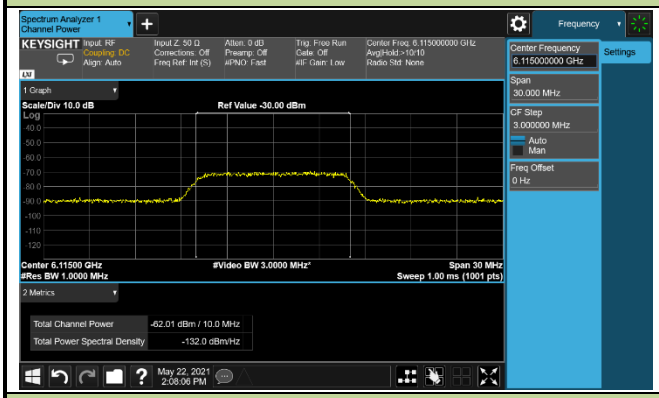
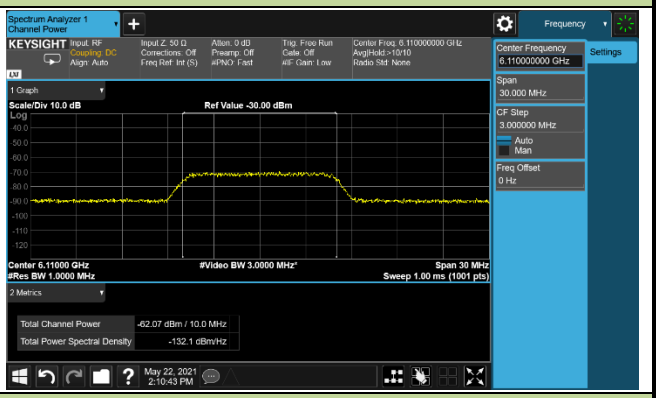
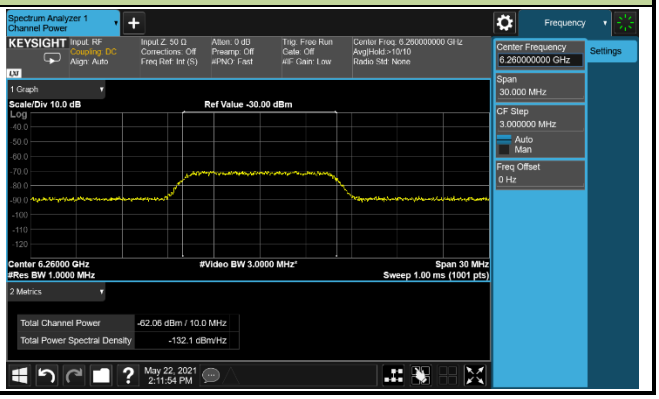


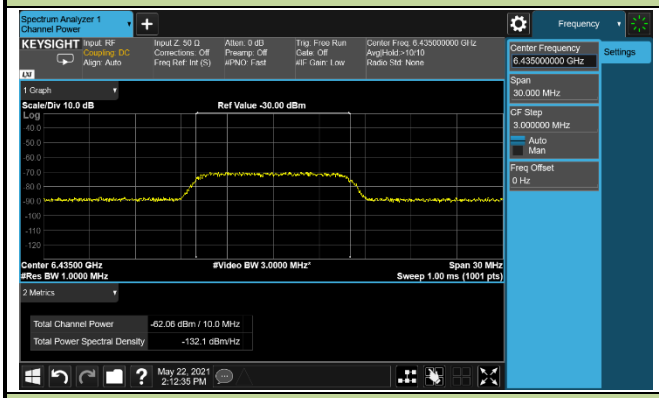
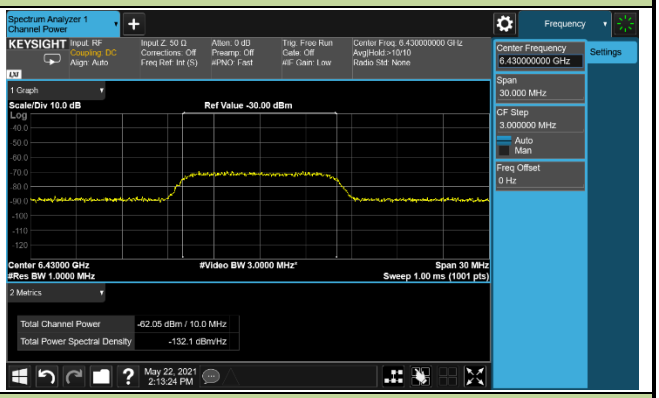
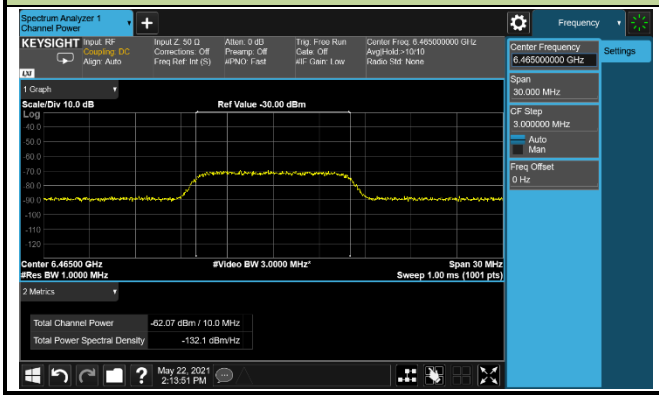
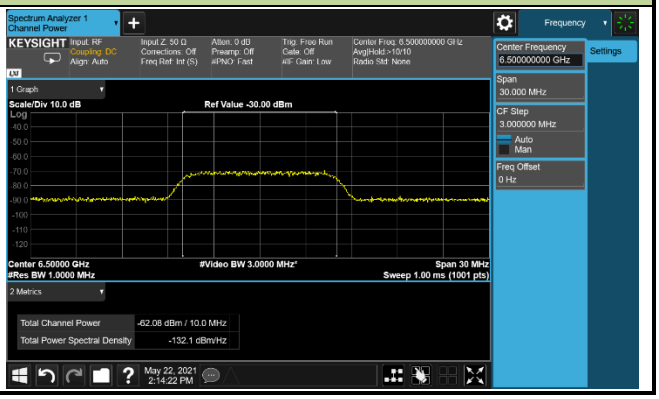
802.11ax-HE20 / CH213



802.11ax-HE160 / CH207



Incumbent Signal Calibration Plots (NII-5 Band)	
802.11ax-HE20 / CH33	802.11ax-HE160 / CH47 (Low Edge)
	
802.11ax-HE160 / CH47 (Middle)	802.11ax-HE160 / CH47 (High Edge)
	

Incumbent Signal Calibration Plots (NII-6 Band)	
802.11ax-HE20 / CH97	802.11ax-HE80 / CH103 (Low Edge)
	
802.11ax-HE80 / CH103 (Middle)	802.11ax-HE80 / CH103 (High Edge)