

7.6 Contention-based Protocol

The Minimum Antenna Gain for Contention-based Protocol Testing

Band	Antenna Type	The minimum antenna gain (dBi)
U-NII-5 ~ U-NII-8	Monopole, PIFA ^{note1}	-2

Note 1: The test was evaluated by conducted method, so no physical antenna was actually used.

Note 2: Based on the current test results and appropriate calculation and evaluation, the minimum antenna gain value that can meet the regulatory threshold of -62 dBm/MHz is -2 dBi.

Environmental Conditions:	25°C, 60% RH	Tested By:	Frankie Chang
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Companion Device Information			
Product	Brand	Model No.	Software/Firmware Version
Wireless Module	Qualcomm	Fast Connect 7800	3.1.0.1370

Note: This device does not use the channel puncturing mechanism for incumbent avoidance, but instead employs the bandwidth reduction mechanism to perform its function.

For U-NII-5

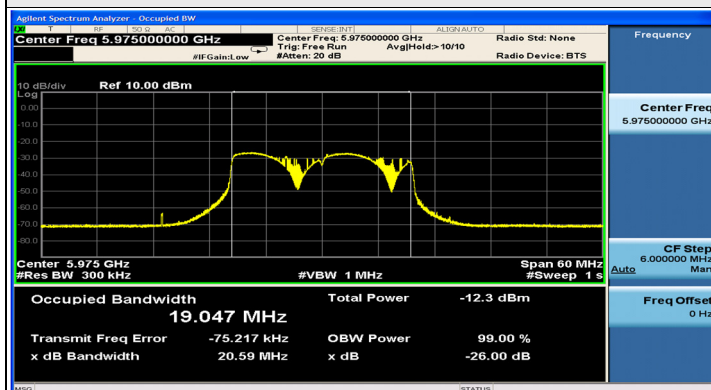
Contention Based Protocol Measurement										
Operation Mode	Channel Bandwidth (MHz)	Channel Number	Channel Freq. (MHz)	Injected Signal (AWGN)		Antenna Gain (dBi)	Path Loss (dB) (Note 3)	Adjusted Power (dBm)	Detection Limit	EUT TX Status
				Freq. (MHz)	Power (dBm)					
802.11ax	20	5	5975	5975	-65	4.75	0	-69.75	-62	OFF
					-68	4.75	0	-72.75	-62	Minimal
					-78	4.75	0	-82.75	-62	ON
	160	15	6025	5950	-71	4.75	0	-75.75	-62	OFF
					-74	4.75	0	-78.75	-62	Minimal
					-78	4.75	0	-82.75	-62	ON
				6025	-67	4.75	0	-71.75	-62	OFF
					-69	4.75	0	-73.75	-62	Minimal
					-78	4.75	0	-82.75	-62	ON
				6100	-70	4.75	0	-74.75	-62	OFF
					-72	4.75	0	-76.75	-62	Minimal
					-78	4.75	0	-82.75	-62	ON

Notes:

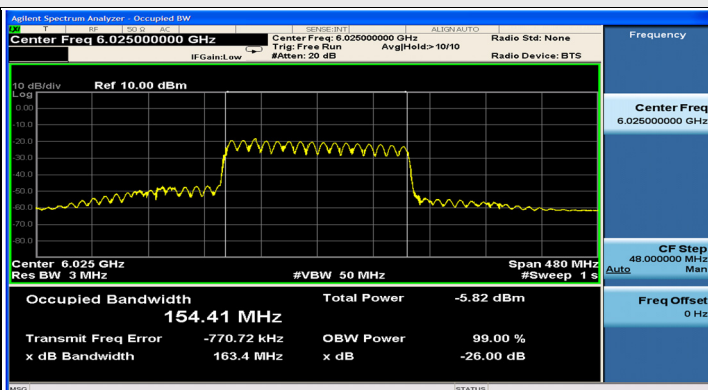
1. After investigation (consider antenna gain and path loss), the one representative port (Chain 0) was measured and presented in the report.
2. Adjusted Power (dBm) = Injected Signal (AWGN) Power (dBm) - Antenna Gain (dBi) + Path Loss (dB)
3. Antenna gain values include all the applicable path losses.

Contention Based Protocol Detection Probability															
Operation Mode	Channel Bandwidth (MHz)	AWGN Signal Freq. (MHz)	#01	#02	#03	#04	#05	#06	#07	#08	#09	#10	Detection Probability	Detection Limit	Test Result
802.11ax	20	5975	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass
	160	5950	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass
		6025	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass
		6100	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass

Plots of EUT Tx waveform

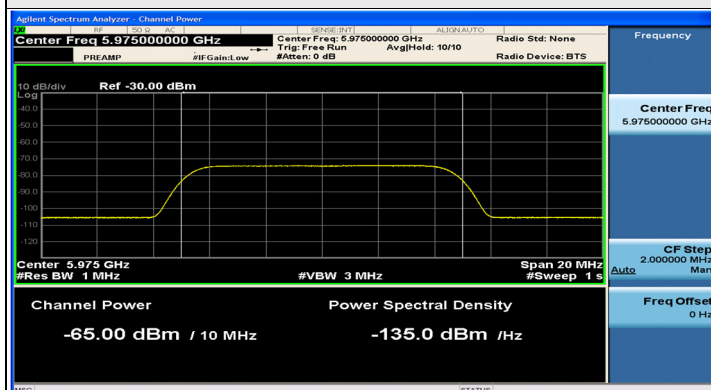


802.11ax (HE20) / CH5

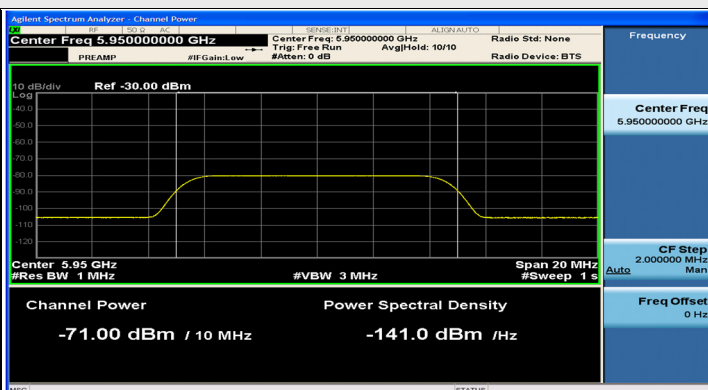


802.11ax (HE160) / CH15

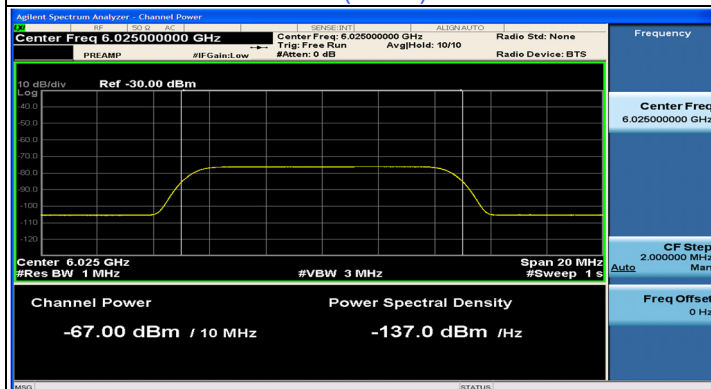
Plots of Injected signal (AWGN) level



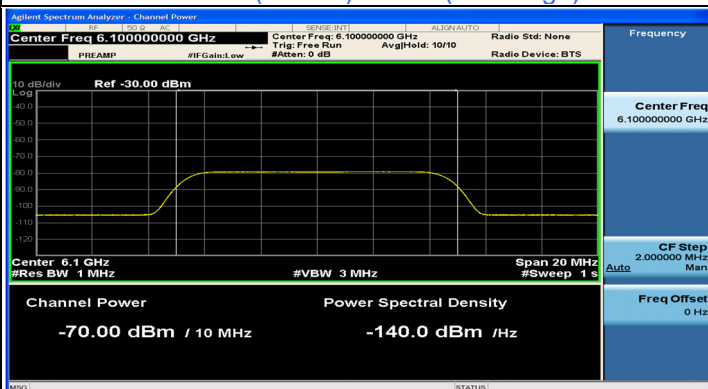
802.11ax (HE20) / CH5



802.11ax (HE160) / CH15(Low Edge)



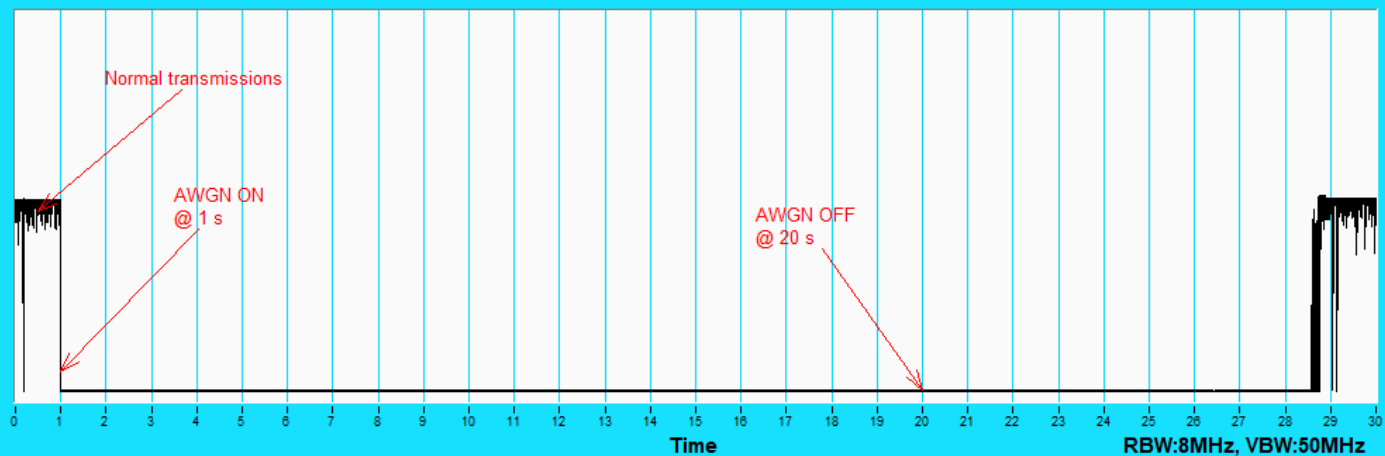
802.11ax (HE160) / CH15(Middle)



802.11ax (HE160) / CH15(High Edge)

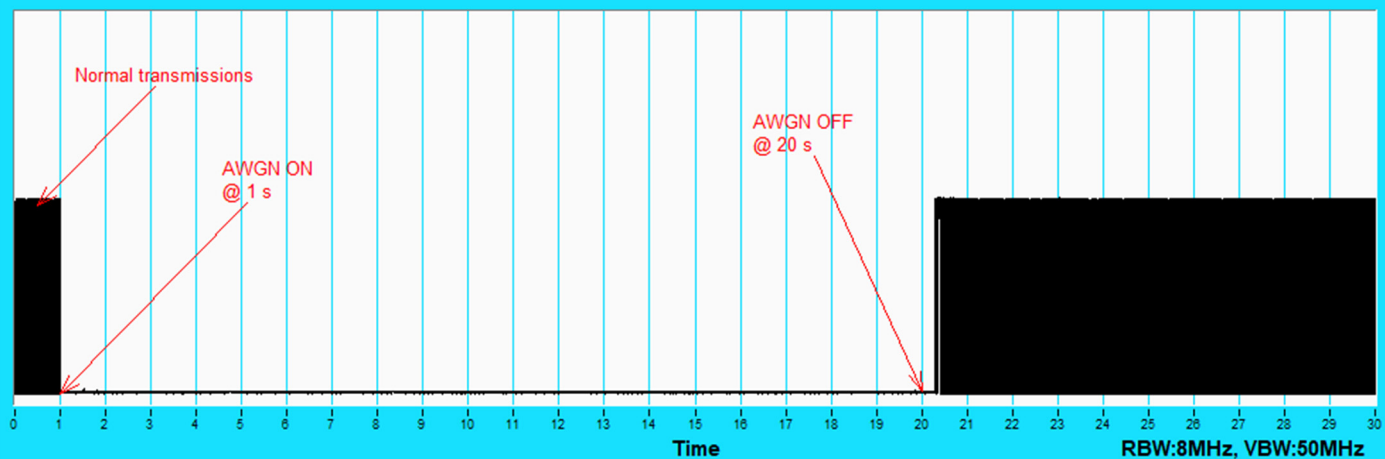
Plots of EUT ceased transmission in the time domain

CBP



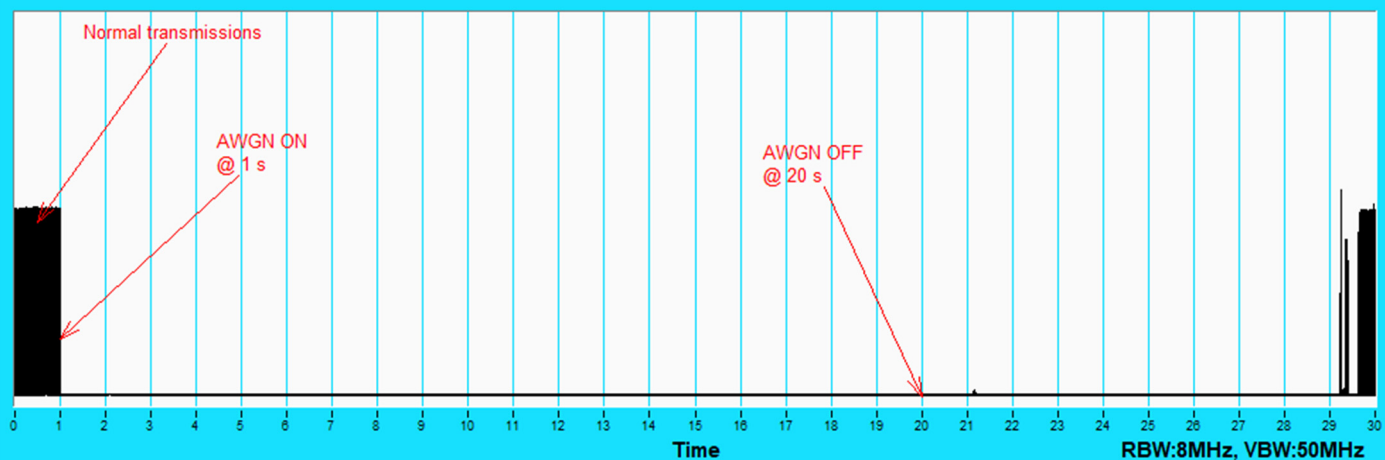
802.11ax (HE20) / CH5

CBP



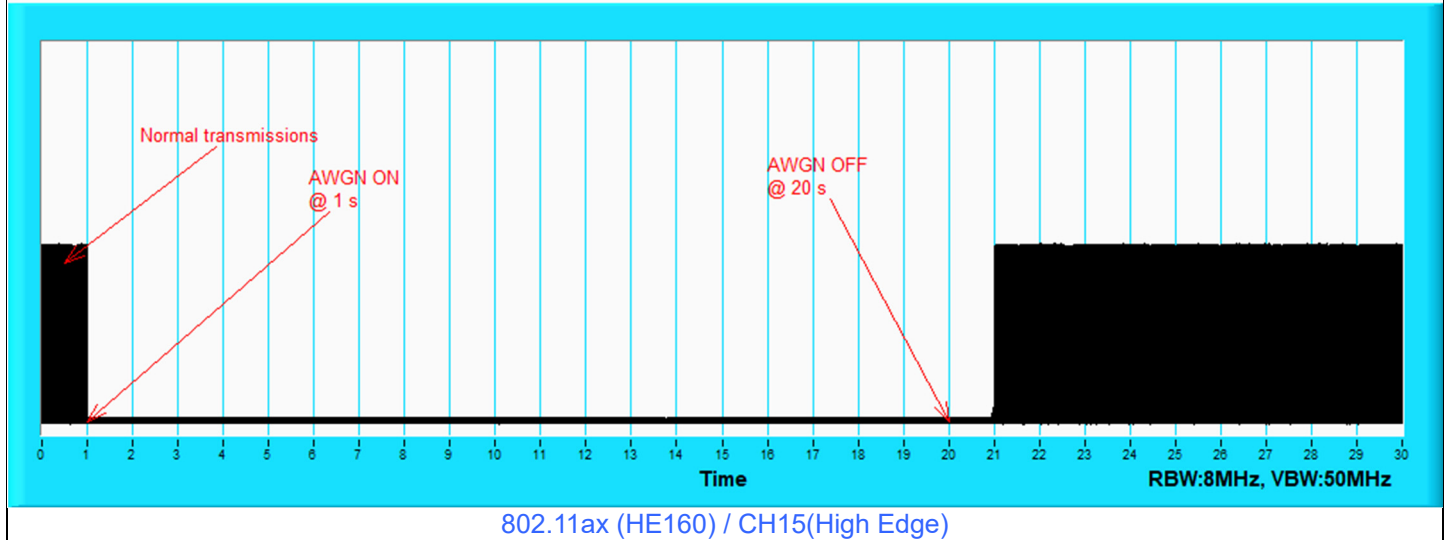
802.11ax (HE160) / CH15(Low Edge)

CBP



802.11ax (HE160) / CH15(Middle)

Plots of EUT ceased transmission in the time domain

CBP

For U-NII-7

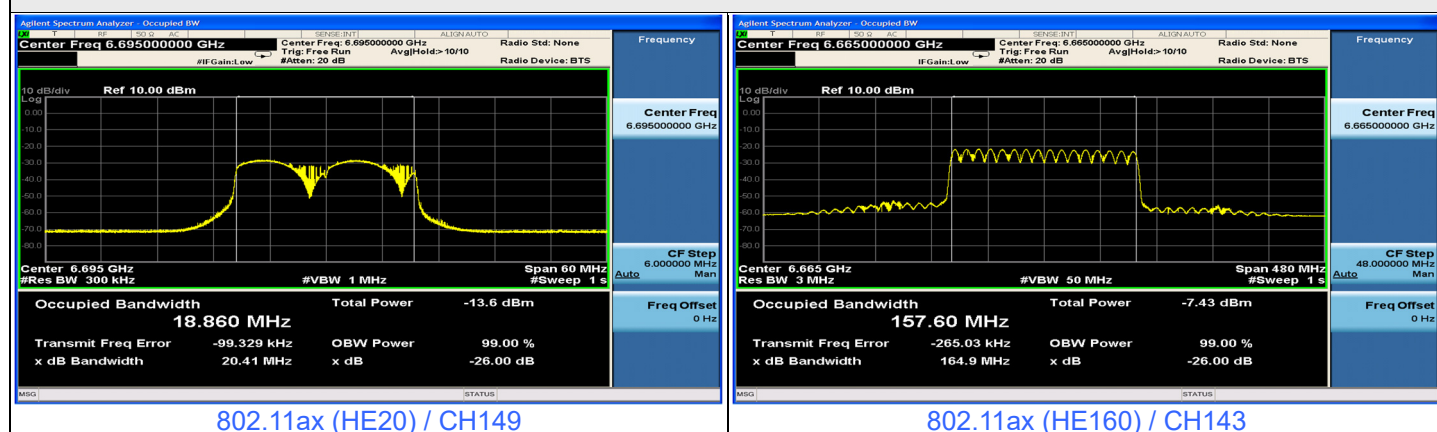
Contention Based Protocol Measurement										
Operation Mode	Channel Bandwidth (MHz)	Channel Number	Channel Freq. (MHz)	Injected Signal (AWGN)		Antenna Gain (dBi)	Path Loss (dB) (Note 3)	Adjusted Power (dBm)	Detection Limit	EUT TX Status
				Freq. (MHz)	Power (dBm)					
802.11ax	20	149	6695	6695	-65	4.81	0	-69.81	-62	OFF
					-68	4.81	0	-72.81	-62	Minimal
					-78	4.81	0	-82.81	-62	ON
	160	143	6590	6590	-71	4.81	0	-75.81	-62	OFF
					-73	4.81	0	-77.81	-62	Minimal
					-78	4.81	0	-82.81	-62	ON
			6665	6665	-65	4.81	0	-69.81	-62	OFF
					-68	4.81	0	-72.81	-62	Minimal
					-78	4.81	0	-82.81	-62	ON
			6740	6740	-70	4.81	0	-74.81	-62	OFF
					-73	4.81	0	-77.81	-62	Minimal
					-78	4.81	0	-82.81	-62	ON

Notes:

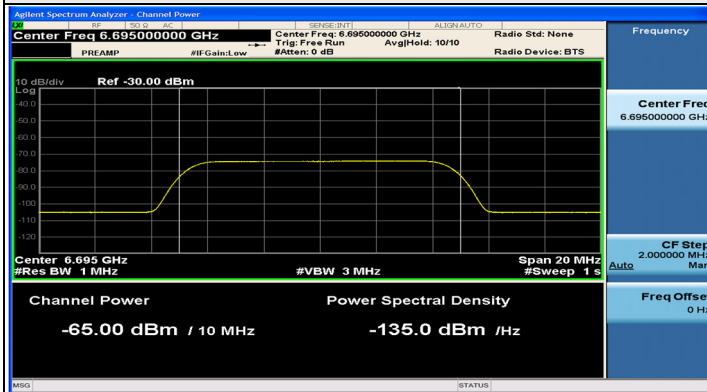
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2. Adjusted Power (dBm) = Injected Signal (AWGN) Power (dBm) - Antenna Gain (dBi) + Path Loss (dB)
3. Antenna gain values include all the applicable path losses.

Contention Based Protocol Detection Probability															
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	160	6590	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass
		6665	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass
		6740	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass

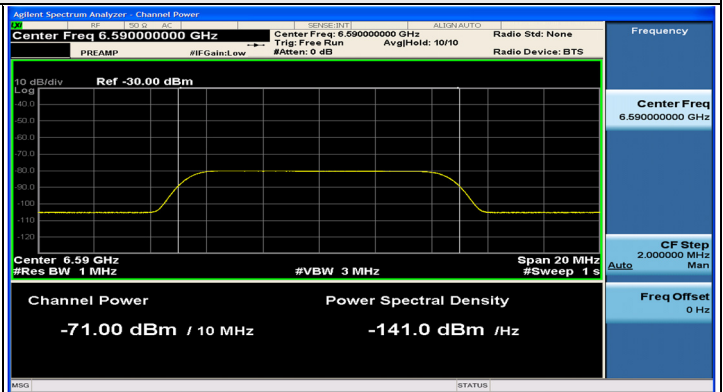
Plots of EUT Tx waveform



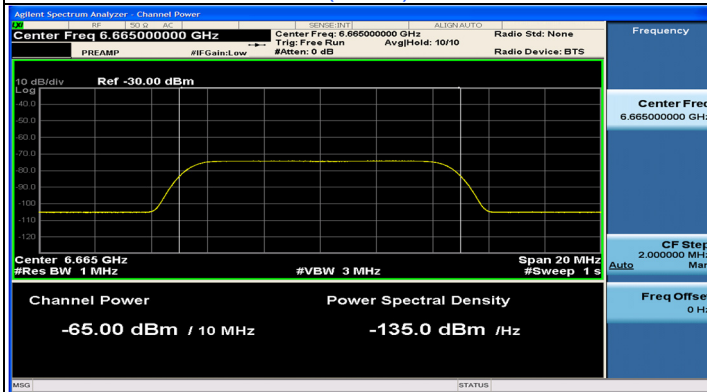
Plots of Injected signal (AWGN) level



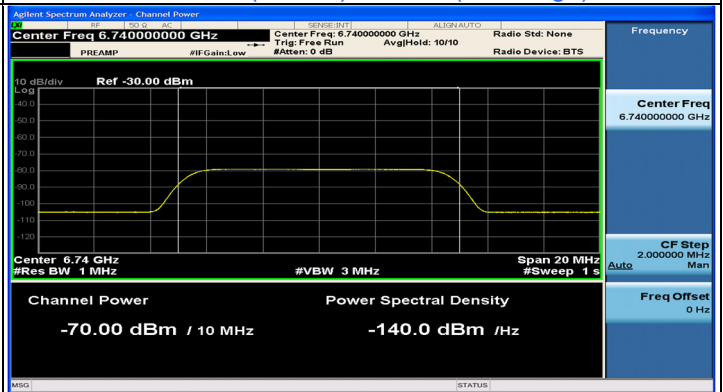
802.11ax (HE20) / CH149



802.11ax (HE160) / CH143(Low Edge)

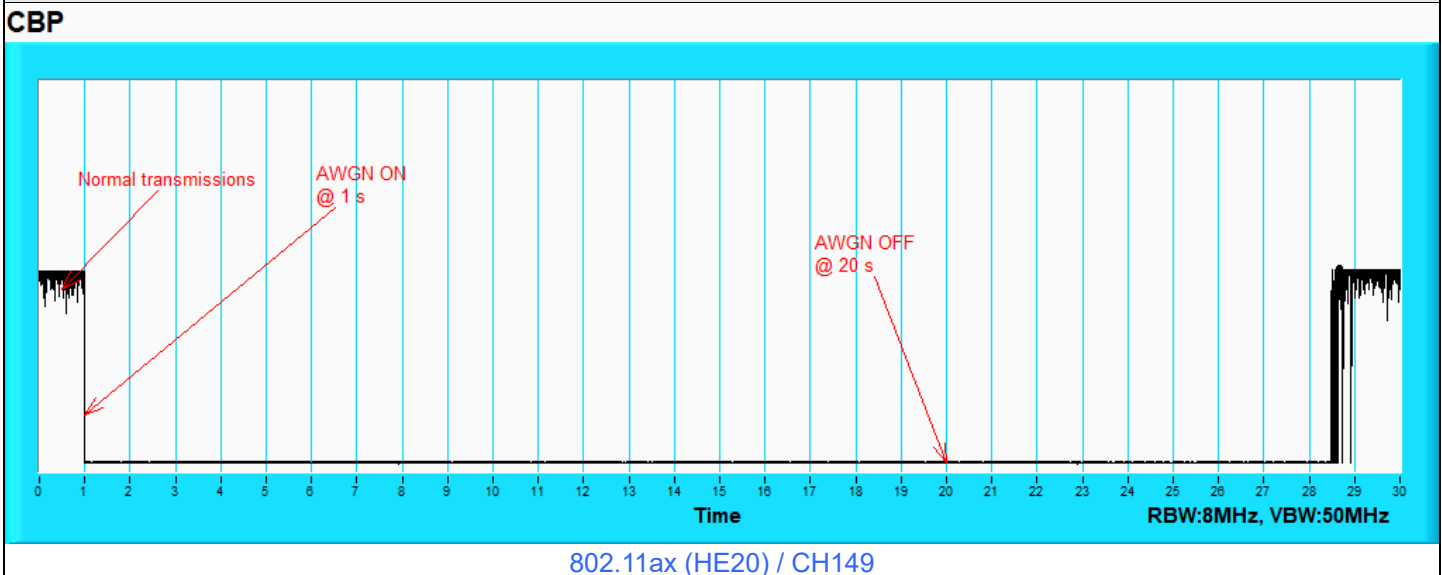


802.11ax (HE160) / CH143(Middle)



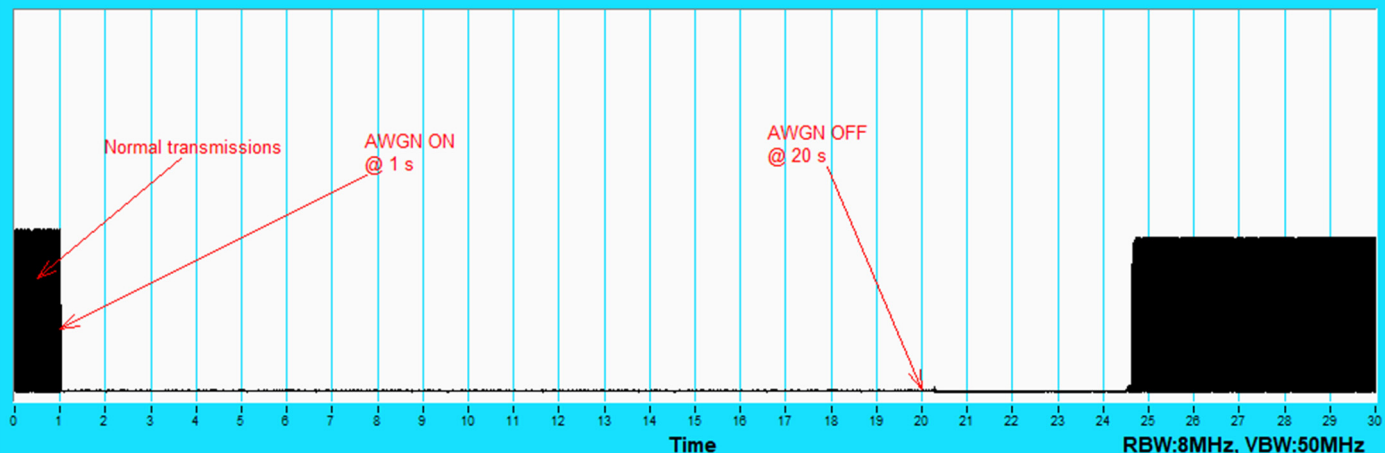
802.11ax (HE160) / CH143(High Edge)

Plots of EUT ceased transmission in the time domain



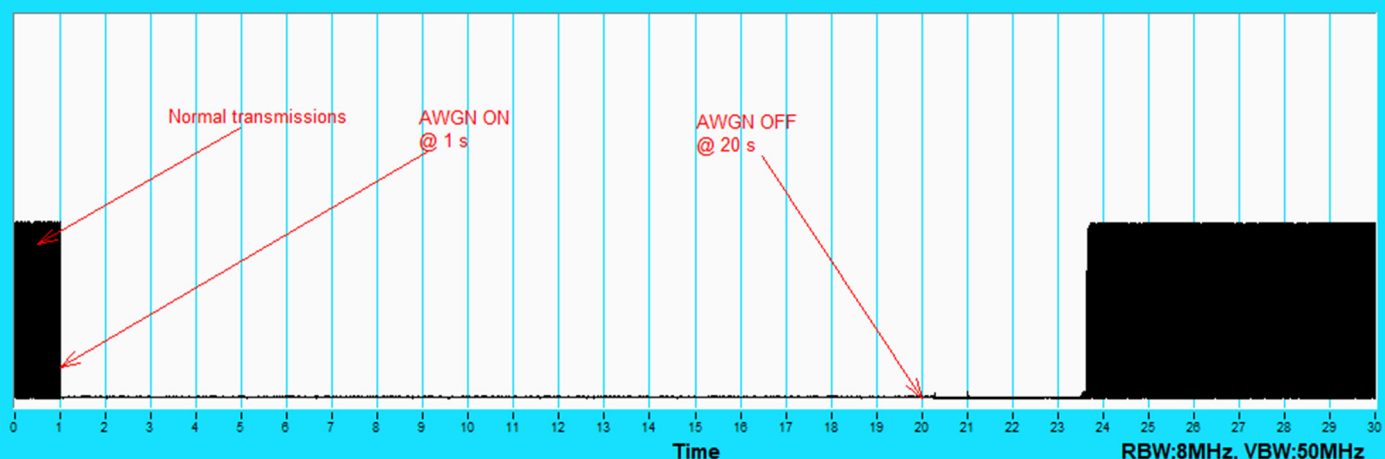
Plots of EUT ceased transmission in the time domain

CBP



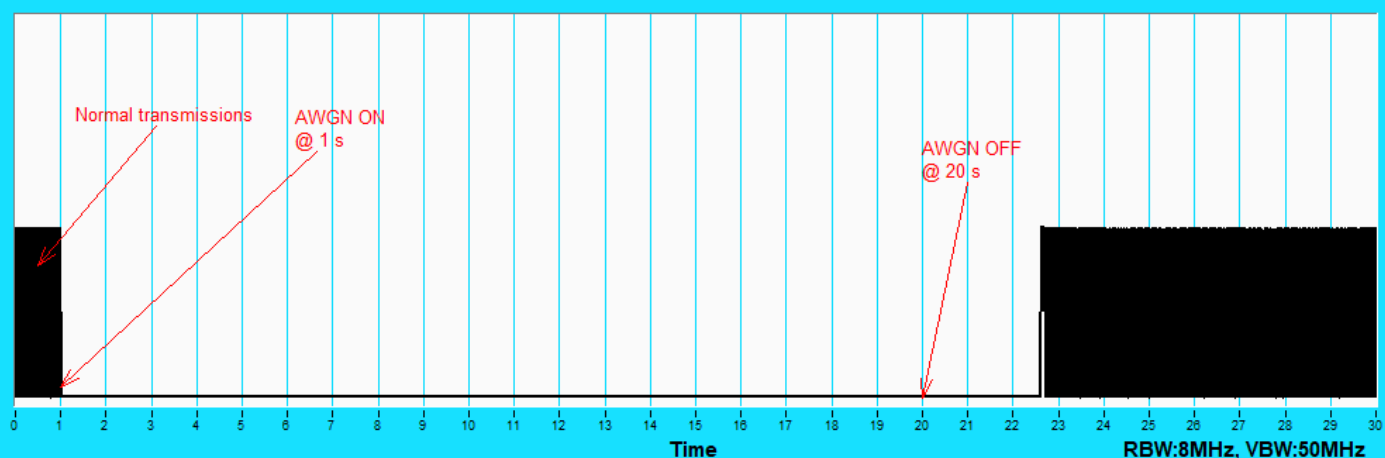
802.11ax (HE160) / CH143(Low Edge)

CBP



802.11ax (HE160) / CH143(Middle)

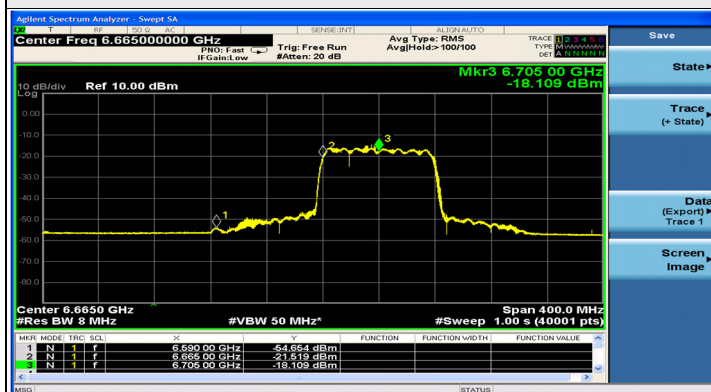
CBP



802.11ax (HE160) / CH143(High Edge)

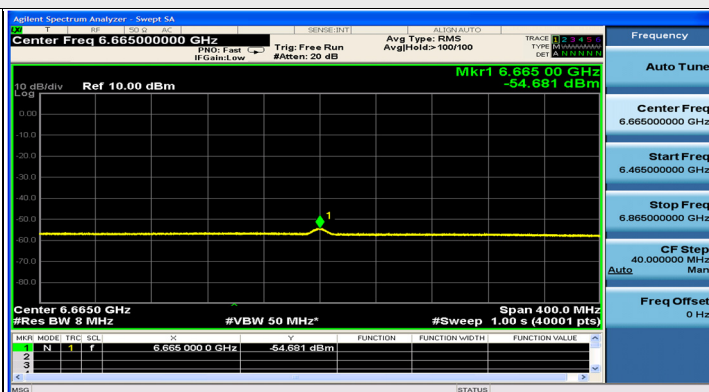
For Verify bandwidth reduction

Plots of EUT ceased transmission in the frequency domain



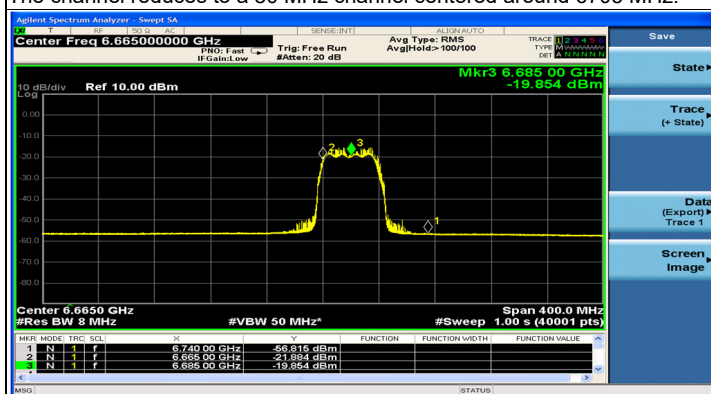
802.11ax (HE160) / CH143(Low Edge)

A 10 MHz AWGN signal (centered at 6590 MHz) is injected.
The channel reduces to a 80 MHz channel centered around 6705 MHz.



802.11ax (HE160) / CH143(Middle)

A 10 MHz AWGN signal (centered at 6665 MHz) is injected.
The channel completely ceases operation.



802.11ax (HE160) / CH143(High Edge)

A 10 MHz AWGN signal (centered at 6740 MHz) is injected.
The channel reduces to a 40 MHz channel centered around 6685 MHz.