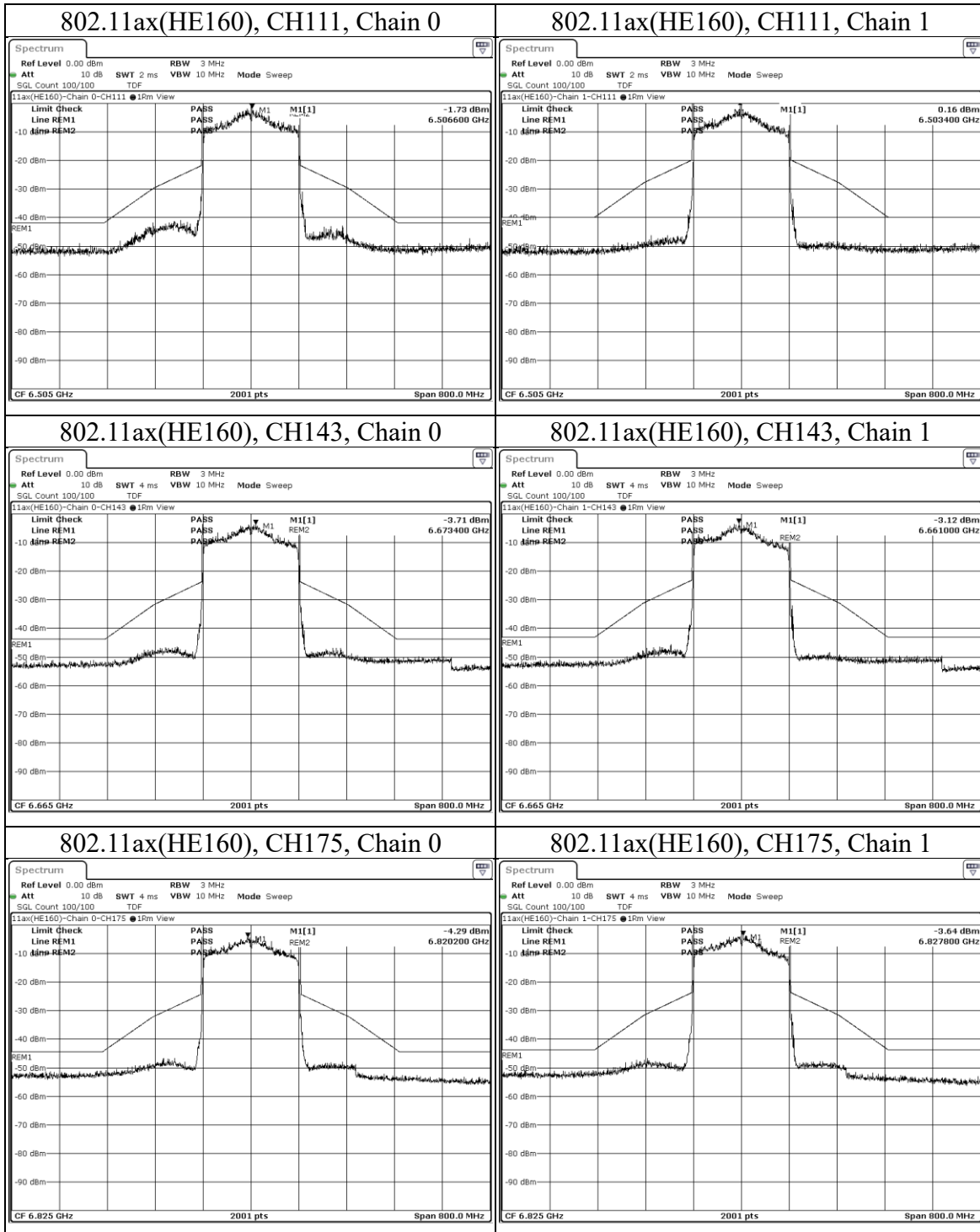


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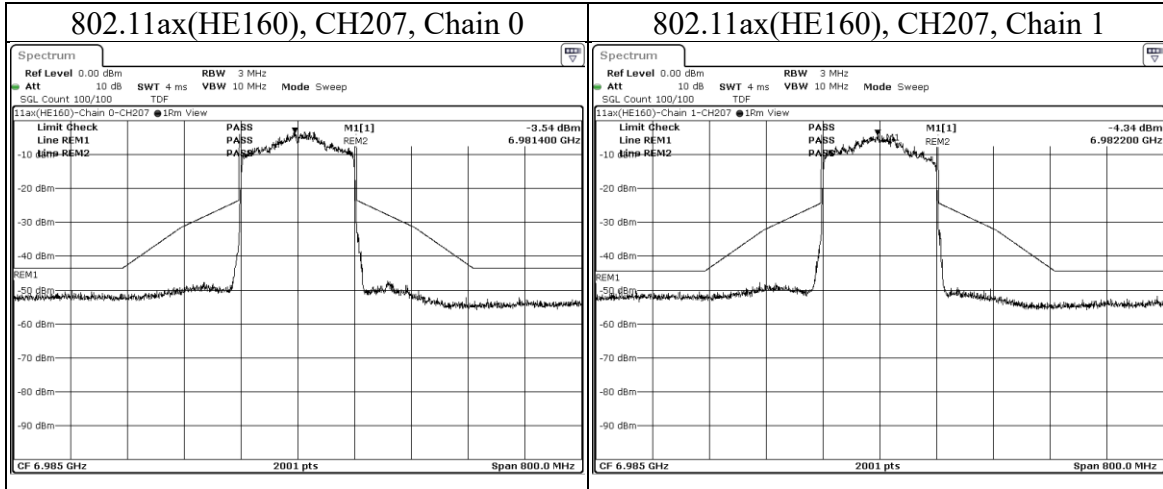
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9.9. Contention Based Protocol Measurement

Requirements

Unlicensed indoor low-power devices must detect co-channel radio frequency power that is at least -62 dBm (The threshold is referenced to a 0 dBi antenna gain.) or lower. Additionally, indoor low-power devices must detect co-channel energy with 90% or greater certainty.

Test procedure

- a. Set the EUT to transmit with a constant duty cycle and relative operating parameters which including power level, operating frequency, modulation and bandwidth.
- b. 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. Trigger out connect the output port of the EUT to signal analyzer 2. Ensure that the attenuator 2 provides enough attenuation to not overload the signal analyzer 2 receiver.
- c. Monitoring the signal analyzer 2, verify the EUT is operating and transmitting with the parameters.
- d. Determine number of times detection threshold test as following table:

If	Number of Tests	Placement of Incumbent Transmission
$BW_{EUT} \leq BW_{Inc}$	Once	Same as EUT transmission
$BW_{Inc} < BW_{EUT} \leq 2 * BW_{Inc}$	Once	Contained within BW_{EUT}
$2 * BW_{Inc} < BW_{EUT} \leq 4 * BW_{Inc}$	Twice (Incumbent transmission is contained within BW_{EUT})	Closely to the lower edge and upper edge of the EUT Channel
$BW_{EUT} > 4 * BW_{Inc}$	Three times	Closely to the lower edge, in the middle and upper edge of the EUT Channel

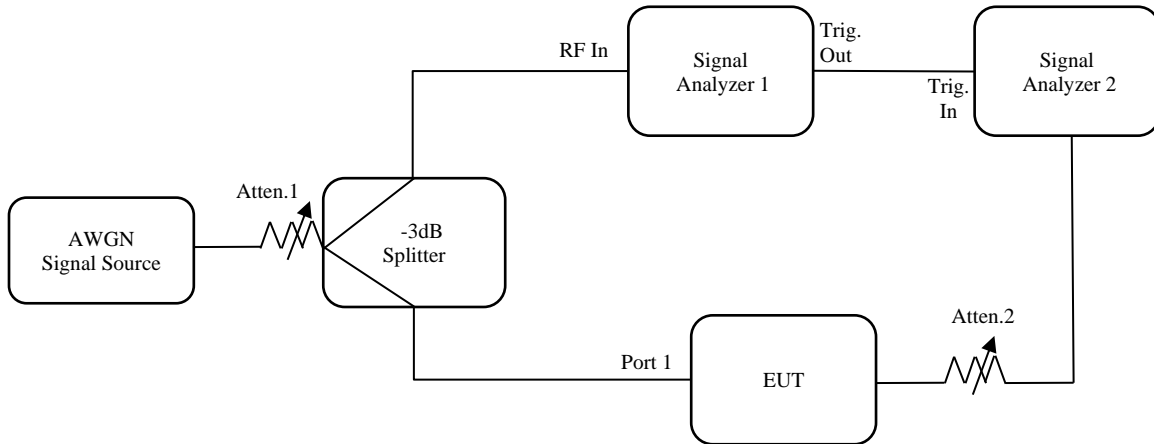
- e. Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use step c table to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.
- f. Set the AWGN signal power to an extremely low level (more than 20 dB below the -62 dBm threshold). Connect the AWGN signal source, via a 3-dB splitter, to the signal analyzer 1 and the EUT.
- g. Transmit the AWGN signal (RF ON) and verify its characteristics on the signal analyzer 1.
- h. 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.
- i. (Including all losses in the RF paths) 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.
- j. Refer to step c table 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 d, choose a different center frequency for the AWGN signal and repeat the process.

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Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.



Test Data

Measurement Mode	Conducted measurement	Device Type	Indoor Client
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802.11ax (HE20)

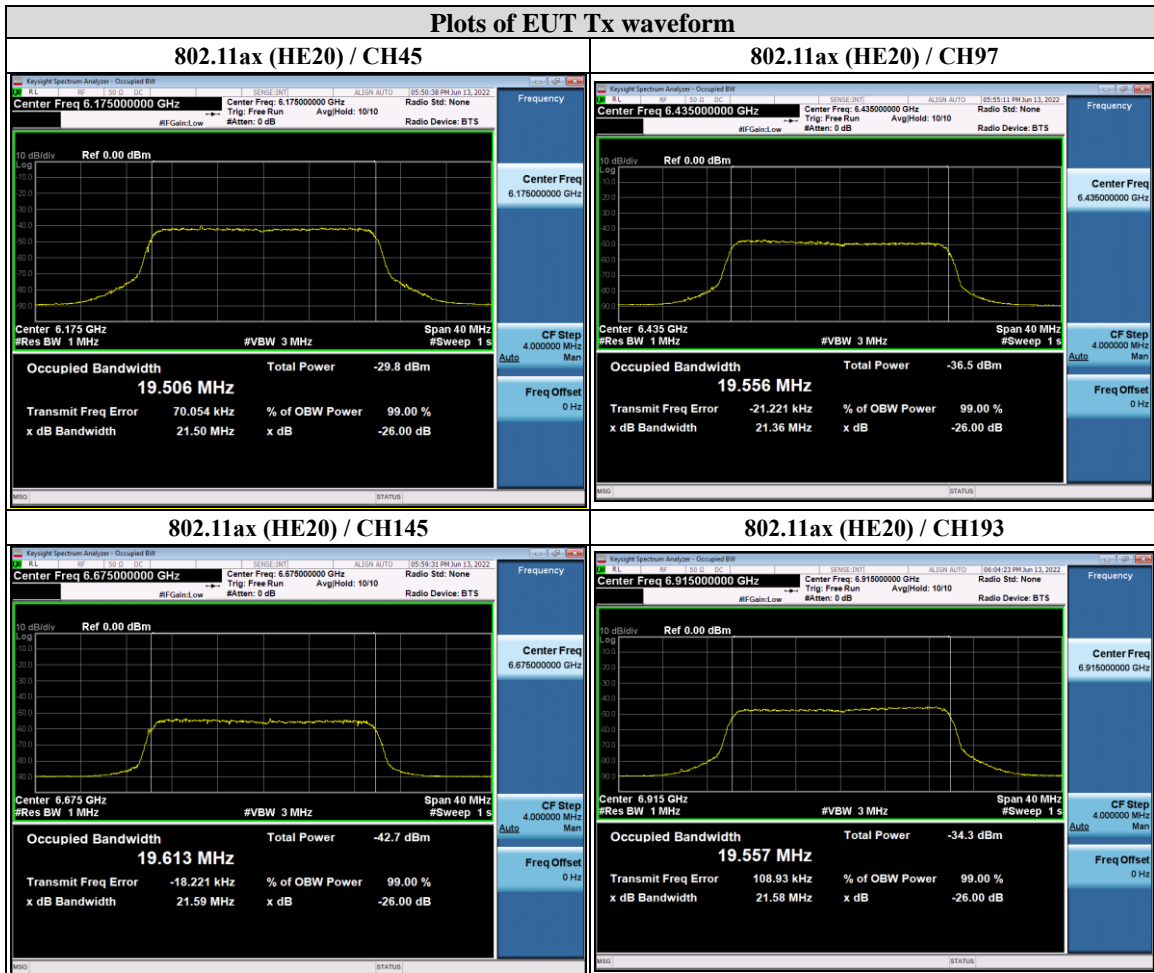
Operation Band	Ch.	EUT Freq. (MHz)	Minimum Antenna Gain (dBi)	Test Result							
				Test Signals Freq. (MHz)	The Incumbent (AWGN) Signal Level (dBm)	Number of Times	Number of Detected	Detection Rate (%)	Limit	PASS /FAIL	Status of EUT transmission
UNII-5	45	6175	0	6175	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
UNII-6	97	6435	0	6435	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
UNII-7	145	6675	0	6675	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
UNII-8	193	6915	0	6915	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting

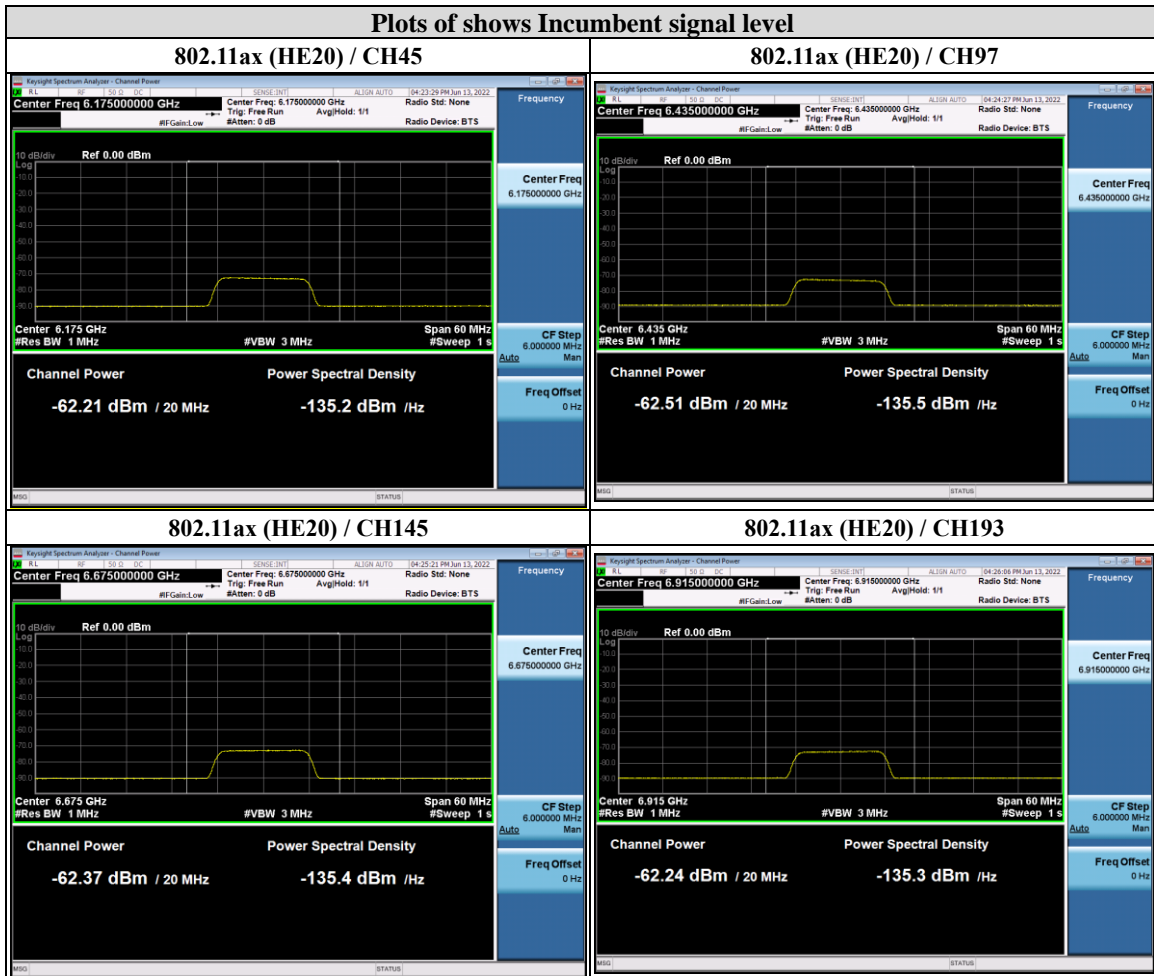
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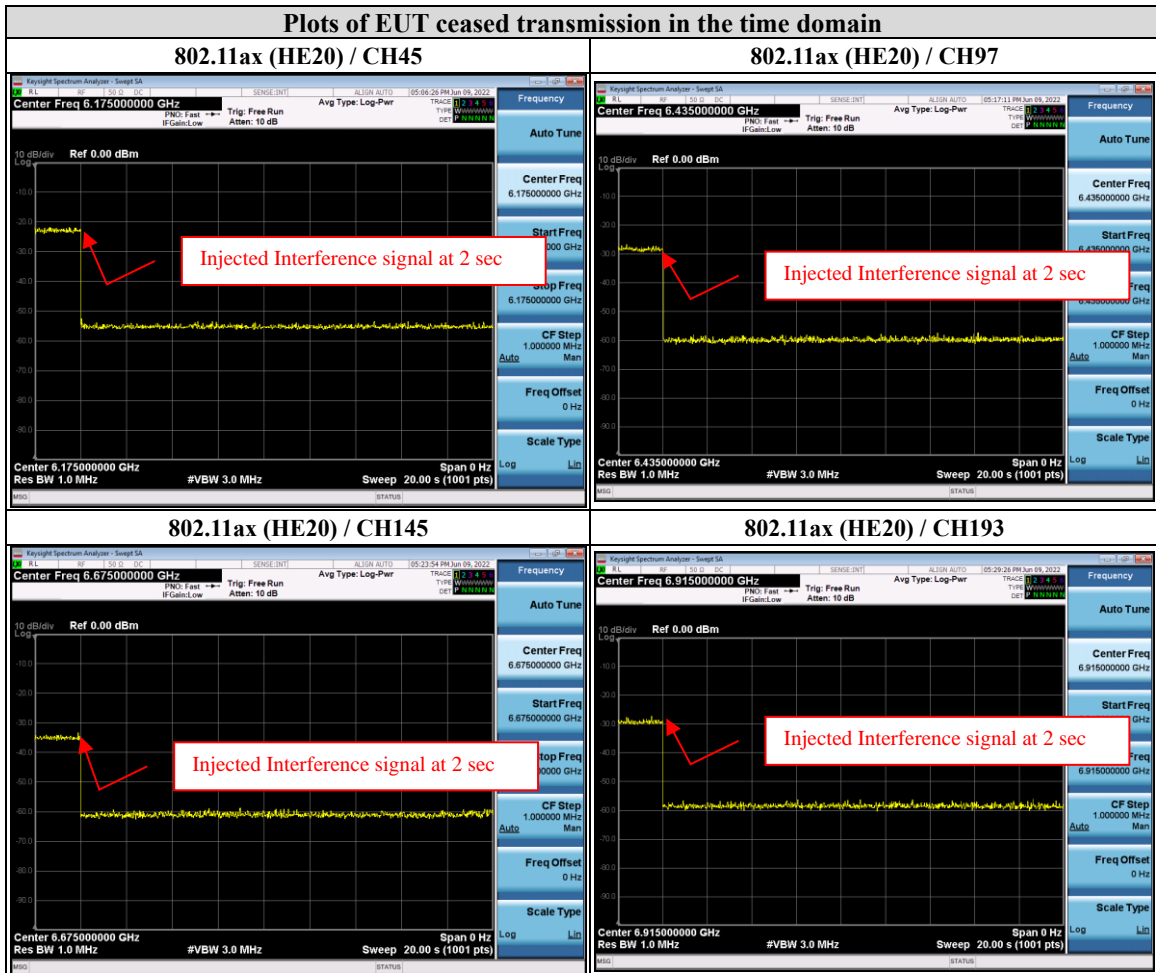
- For UNII-5, The Incumbent (AWGN) Signal Level is considered 0 dBi (-62dBm) gain for path loss, it will be more strict than EUT gain.
- For UNII-6, The Incumbent (AWGN) Signal Level is considered 0 dBi (-62dBm) gain for path loss, it will be more strict than EUT gain.
- For UNII-7, The Incumbent (AWGN) Signal Level is considered 0 dBi (-62dBm) gain for path loss, it will be more strict than EUT gain.
- For UNII-8, The Incumbent (AWGN) Signal Level is considered 0 dBi (-62dBm) gain for path loss, it will be more strict than EUT gain.
- For status "Ceased" is mean this threshold where the device detects interference will stops transmitting level.
- For status "Minimal" is mean this threshold where the device detects interference will stops transmitting minimum level.
- For status "Transmitting" is mean this threshold where the detects interference will device re-starts transmitting level.

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802.11ax (HE160)

Operation Band	Ch.	EUT Freq. (MHz)	Minimum Antenna Gain (dBi)	Test Result							
				Test Signals Freq. (MHz)	The Incumbent (AWGN) Signal Level (dBm)	Number of Times	Number of Detected	Detection Rate (%)	Limit	PASS /FAIL	Status of EUT transmission
UNII-5	47	6185	0	6110	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
				6185	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
				6260	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
UNII-6	111	6505	0	6430	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
				6505	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
				6580	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
UNII-7	143	6665	0	6590	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
				6665	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
				6740	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
UNII-8	207	6985	0	6910	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
				6985	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting
				7060	-62	10	10	100%	90%	PASS	Ceased
					-68	10	9	90%	90%	PASS	Minimal
					-69	10	0	0%	90%	FAIL	Transmitting

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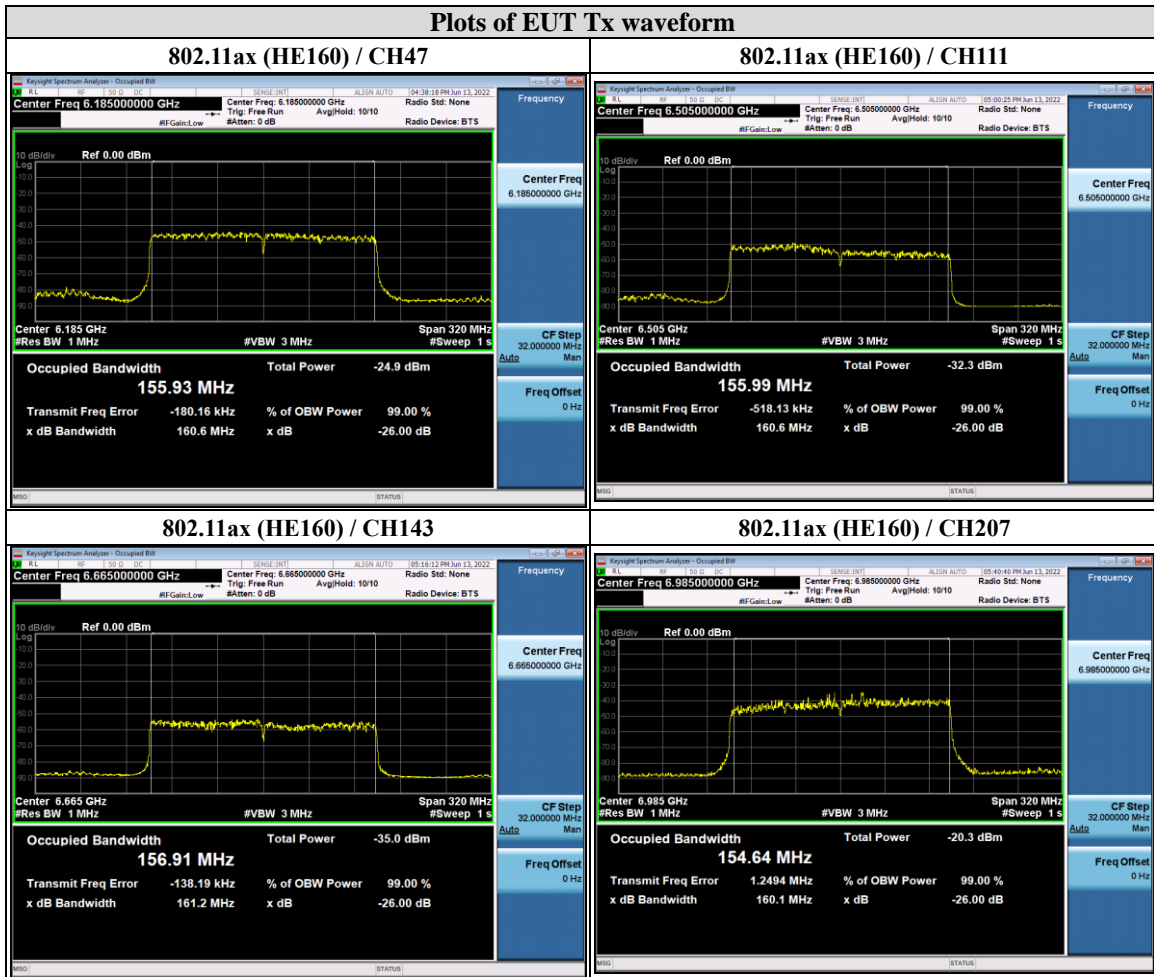
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Note :

1. For UNII-5, The Incumbent (AWGN) Signal Level is considered 0 dBi (-62dBm) gain for path loss, it will be more strict than EUT gain.
2. For UNII-6, The Incumbent (AWGN) Signal Level is considered 0 dBi (-62dBm) gain for path loss, it will be more strict than EUT gain.
3. For UNII-7, The Incumbent (AWGN) Signal Level is considered 0 dBi (-62dBm) gain for path loss, it will be more strict than EUT gain.
4. For UNII-8, The Incumbent (AWGN) Signal Level is considered 0 dBi (-62dBm) gain for path loss, it will be more strict than EUT gain.
5. For status "Ceased" is mean this threshold where the device detects interference will stops transmitting level.
6. For status "Minimal" is mean this threshold where the device detects interference will stops transmitting minimum level.
7. For status "Transmitting" is mean this threshold where the detects interference will device re-starts transmitting level.



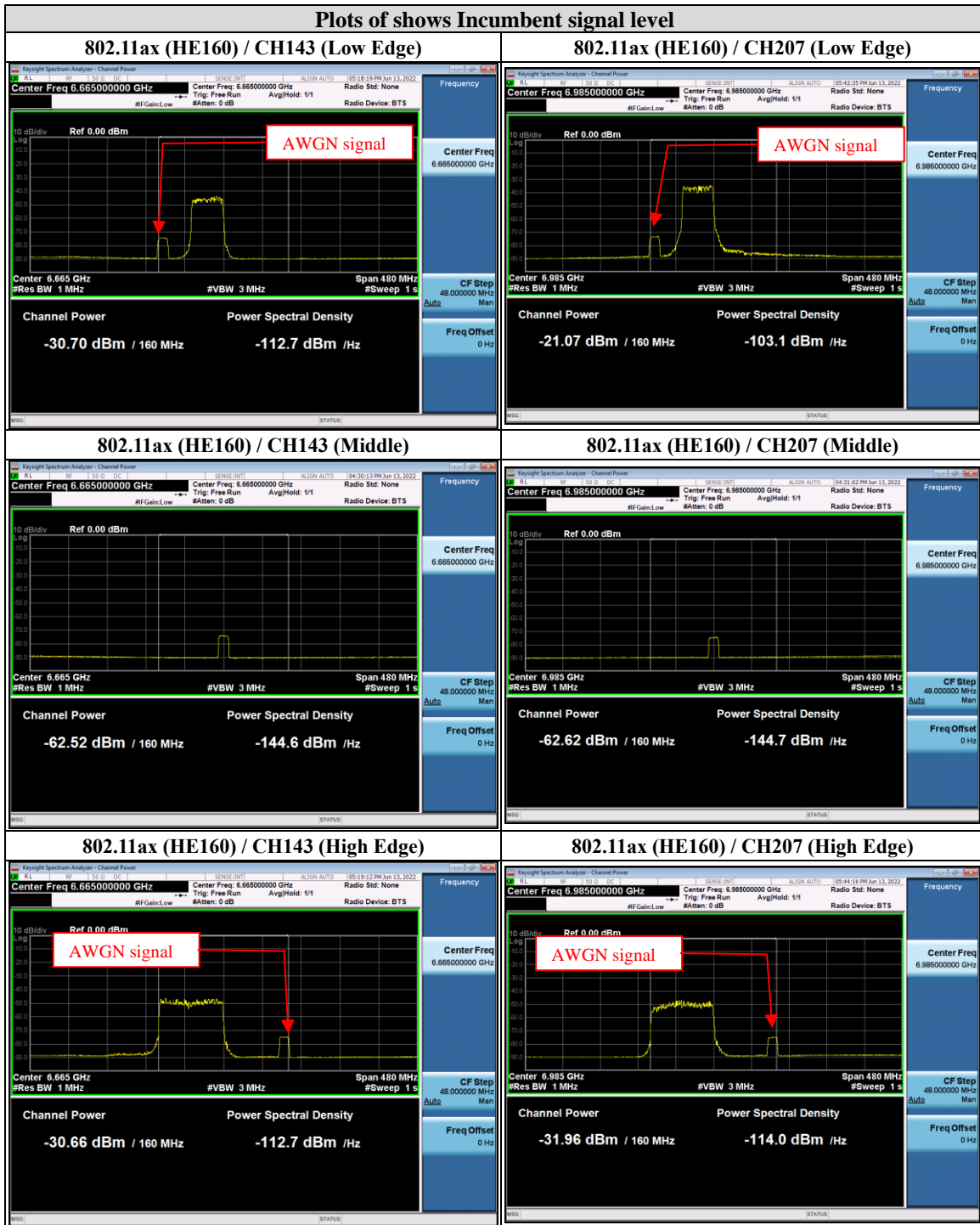
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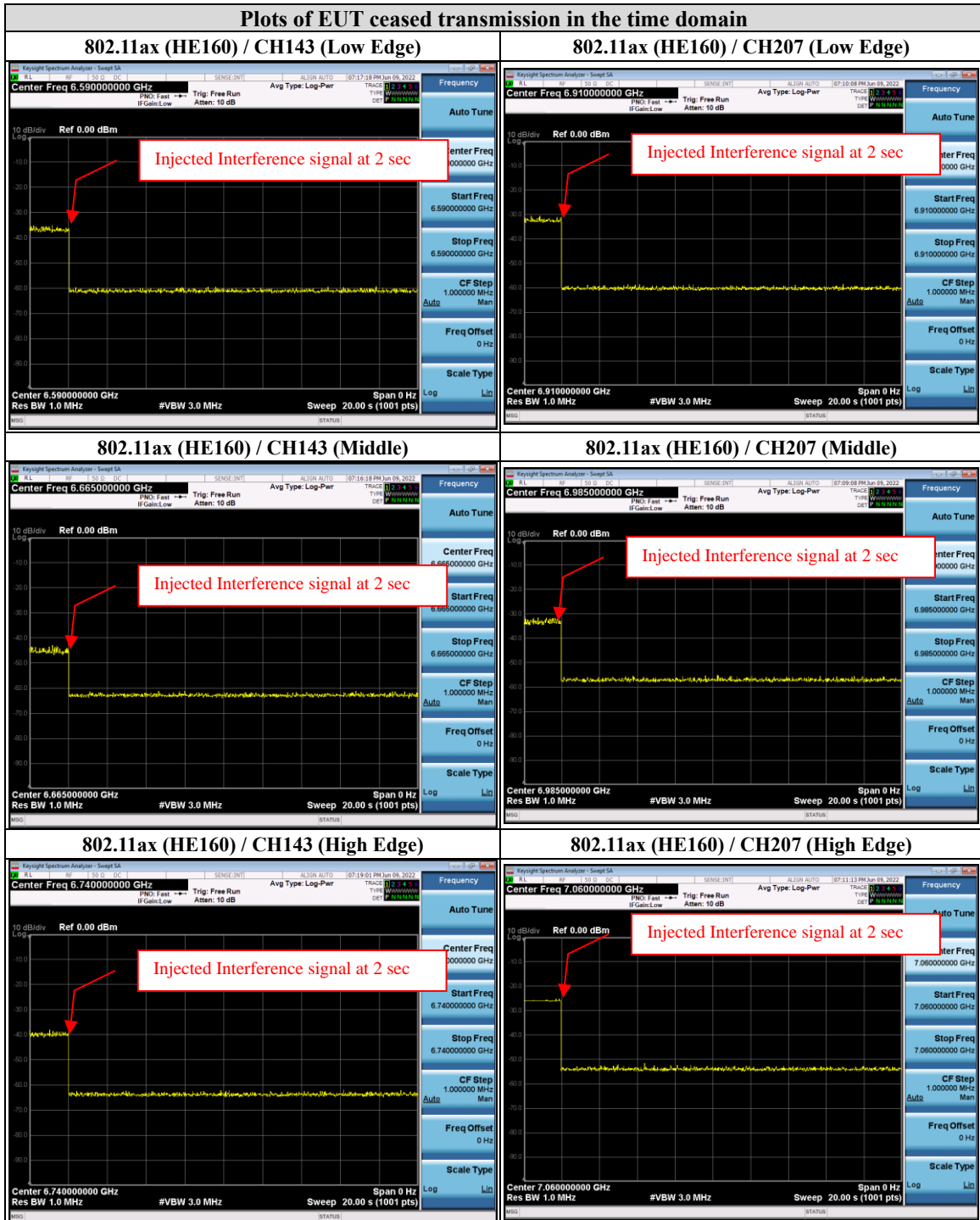
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