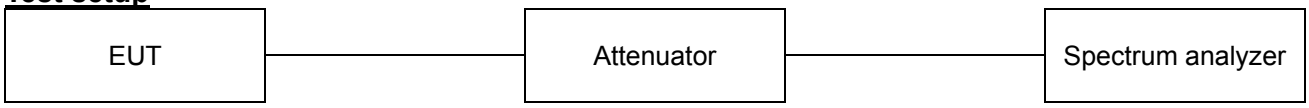
7.3. 26 dB Bandwidth & 99% Bandwidth

Test setup



Limit

N/A

Test procedure

ANSI C63.10-2013 Section 12.4
KDB 789033 D02 v02r01 - Section C.1 (26dBbandwidth)
KDB 789033 D02 v02r01 - Section D (99% bandwidth)

Test settings

1. 26 dB Bandwidth

a. Set RBW = approximately 1% of the emission bandwidth.
b. Set the VBW > RBW.
c. Detector = Peak.
d. Trace mode = max hold.
e. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

2. 99% Occupied Bandwidth

a. Set center frequency to the nominal EUT channel center frequency.
b. Set span = 1.5 times to 5.0 times the OBW.
c. Set RBW = 1% to 5% of the OBW
d. Set VBW ≥ 3 x RBW
e. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f. Use the 99% power bandwidth function of the instrument (if available).
g. If the instrument does not have a 99% power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

Notes:

1. [1)] means Band-crossing channels.

Test results

26 dB bandwidth

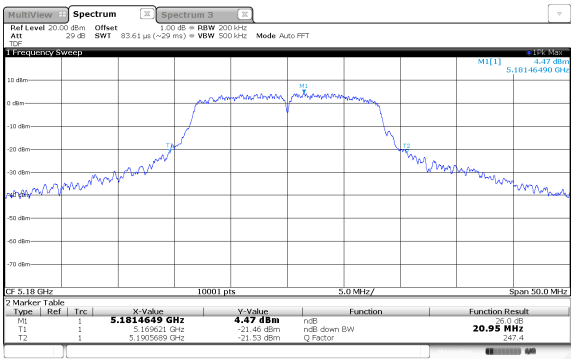
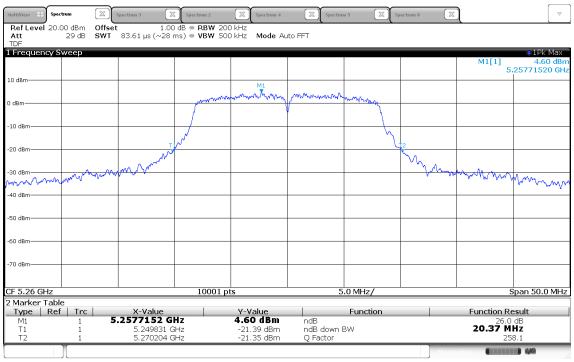
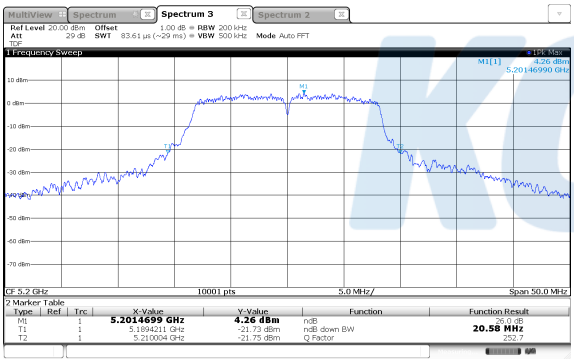
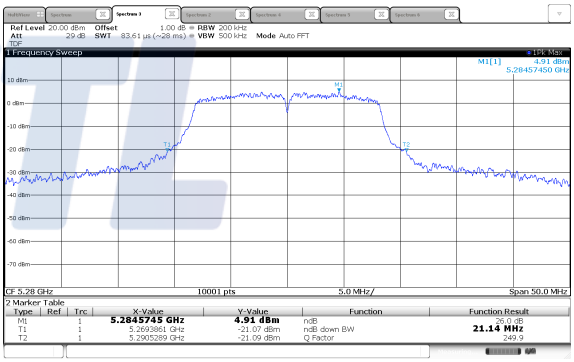
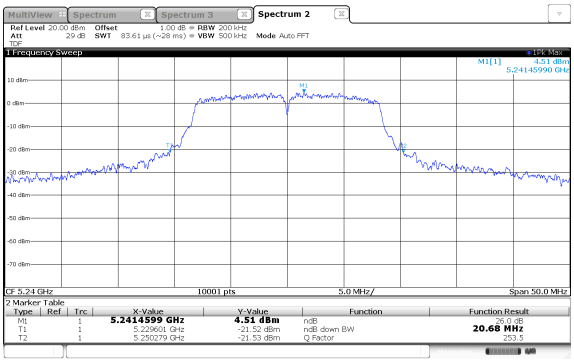
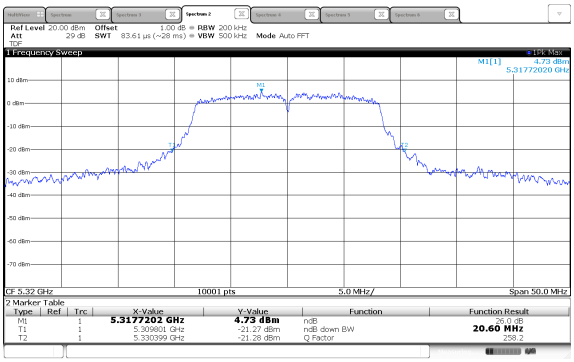
Test mode	Band	Frequency(㎒)	Measured Bandwidth (㎒)
802.11a	UNII-1	5 180	20.95
		5 200	20.58
		5 240	20.68
	UNII-2A	5 260	20.37
		5 280	21.14
		5 320	20.60
	UNII-2C	5 500	20.72
		5 600	21.19
		5 700	20.61
		5 720[1)]	15.51
802.11n HT20	UNII-1	5 180	21.47
		5 200	21.57
		5 240	21.45
	UNII-2A	5 260	21.41
		5 280	21.60
		5 320	21.38
	UNII-2C	5 500	21.60
		5 600	21.46
		5 700	21.30
		5 720[1)]	15.89
802.11n HT40	UNII-1	5 190	41.71
		5 230	41.42
	UNII-2A	5 270	41.46
		5 310	41.27
	UNII-2C	5 510	41.34
		5 590	42.45
		5 670	40.78
		5 710[1)]	35.41

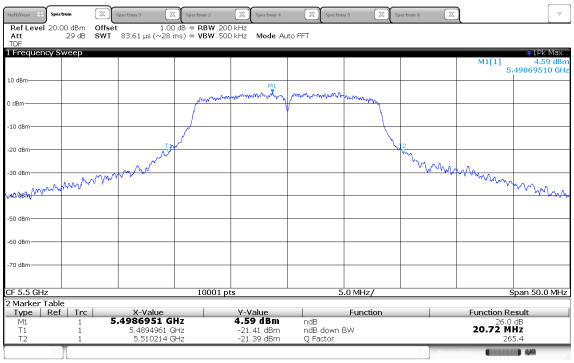
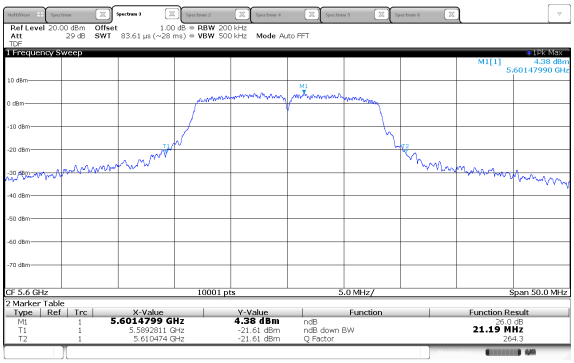
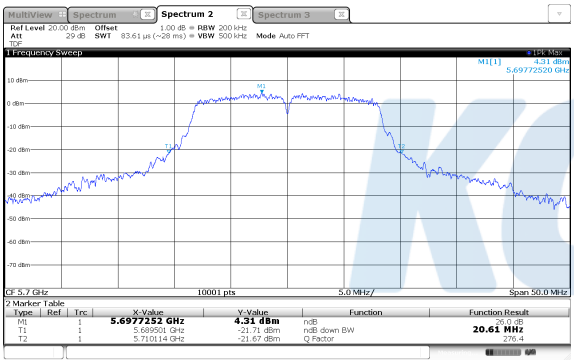
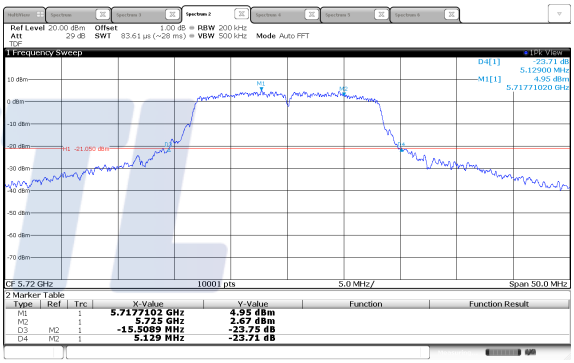
Test mode	Band	Frequency(㎒)	Measured Bandwidth (㎒)
802.11ac VHT20	UNII-1	5 180	20.92
		5 200	20.76
		5 240	21.28
	UNII-2A	5 260	21.42
		5 280	21.49
		5 320	21.30
	UNII-2C	5 500	21.46
		5 600	21.48
		5 700	21.34
		5 720[1)]	15.67
802.11ac VHT40	UNII-1	5 190	41.57
		5 230	41.10
	UNII-2A	5 270	41.32
		5 310	41.06
	UNII-2C	5 510	41.24
		5 590	41.88
		5 670	40.88
		5 710[1)]	35.39
802.11ac VHT80	UNII-1	5 210	81.26
	UNII-2A	5 290	80.98
	UNII-2C	5 530	80.79
		5 610	81.00
		5 690[1)]	76.36

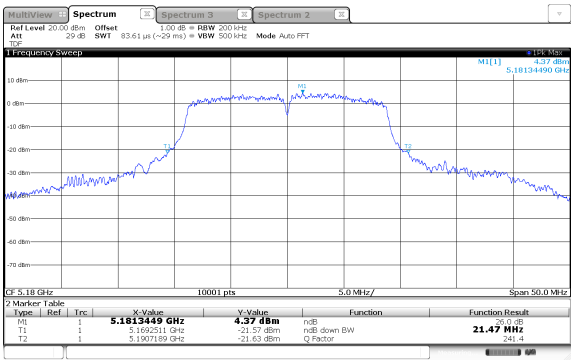
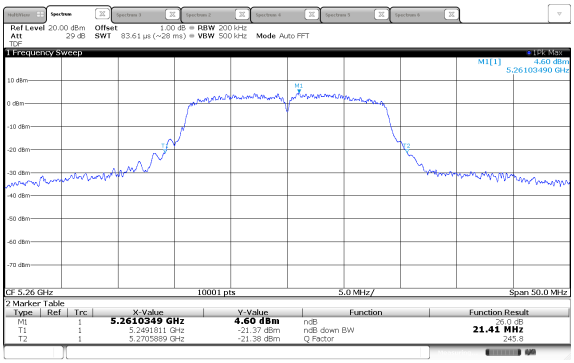
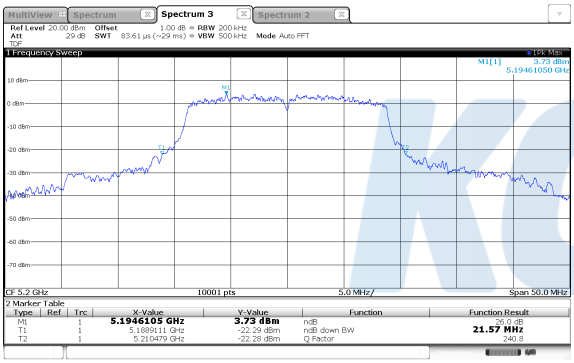
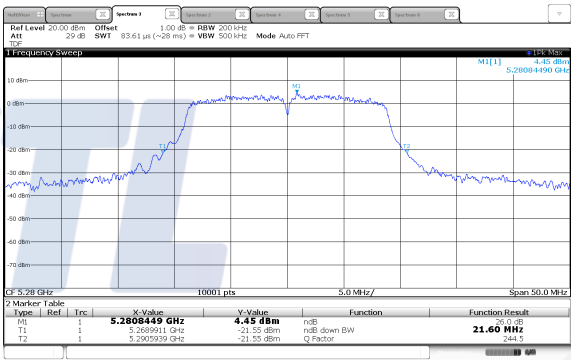
99% bandwidth

Test mode	Band	Frequency(㎒)	Measured Bandwidth (㎒)
802.11a	UNII-1	5 240	16.58
	UNII-2A	5 260	16.42
802.11n HT20	UNII-1	5 240	17.66
	UNII-2A	5 260	17.61
802.11n HT40	UNII-1	5 230	36.71
	UNII-2A	5 270	36.48
802.11ac VHT20	UNII-1	5 240	17.60
	UNII-2A	5 260	17.62
802.11ac VHT40	UNII-1	5 230	36.17
	UNII-2A	5 270	36.05
802.11ac VHT80	UNII-1	5 210	75.45
	UNII-2A	5 290	75.33

26 dB bandwidth

UNII-1 / 802.11a / Low ch.	UNII-2A / 802.11a / Low ch.
	
UNII-1 / 802.11a / Mid ch.	**UNII-2A / 802.11a / Mid ch.**
	
UNII-1 / 802.11a / High ch.	**UNII-2A / 802.11a / High ch.**
	

UNII-2C / 802.11a / Low ch.	UNII-2C / 802.11a / Mid ch.
	
UNII-2C / 802.11a / High ch.	**UNII-2C / 802.11a / Straddle ch.**
	

UNII-1 / 802.11n HT20 / Low ch.	UNII-2A / 802.11n HT20 / Low ch.
	
UNII-1 / 802.11n HT20 / Mid ch.	**UNII-2A / 802.11n HT20 / Mid ch.**
	
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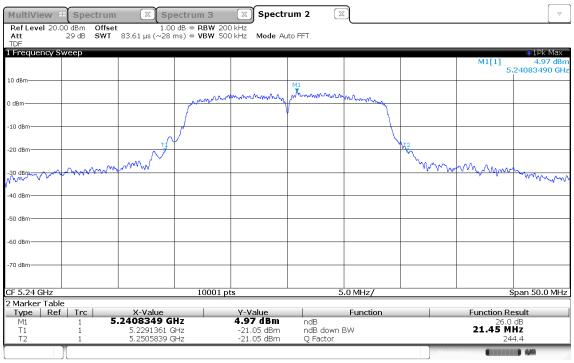
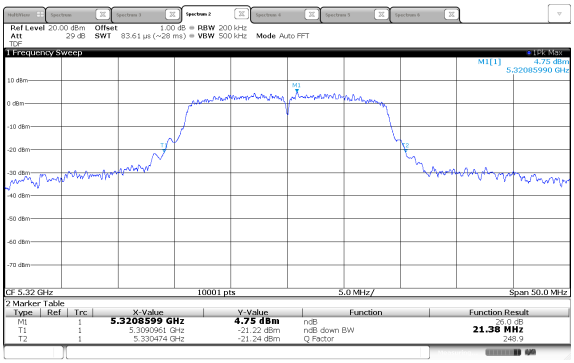
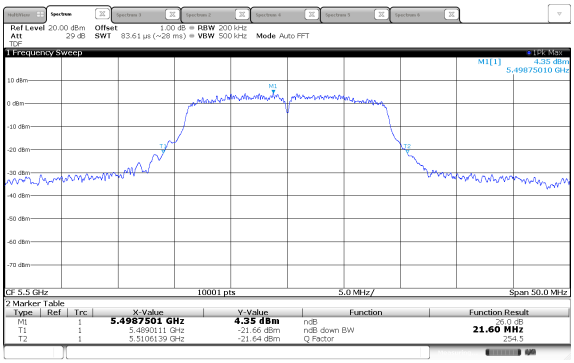
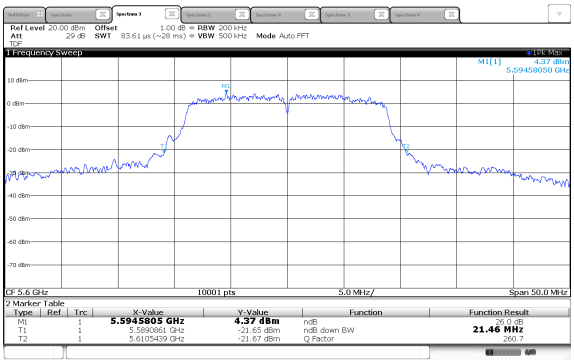
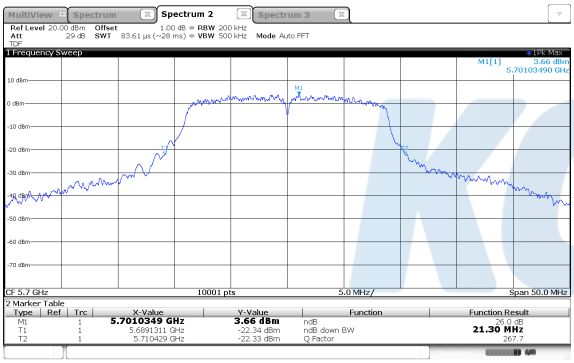
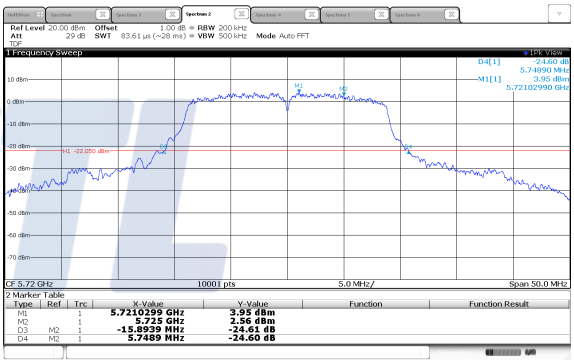
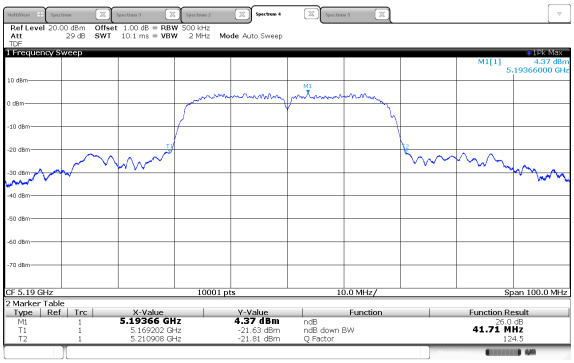
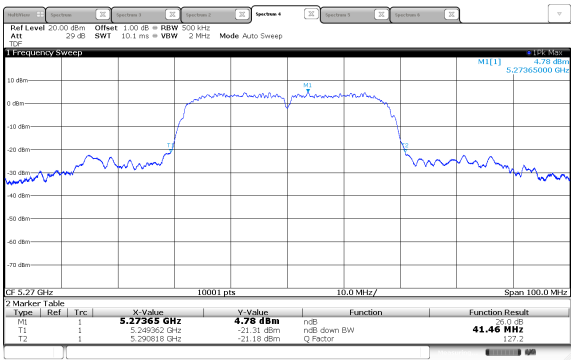
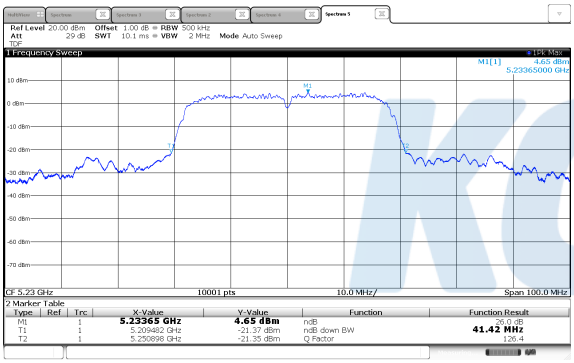
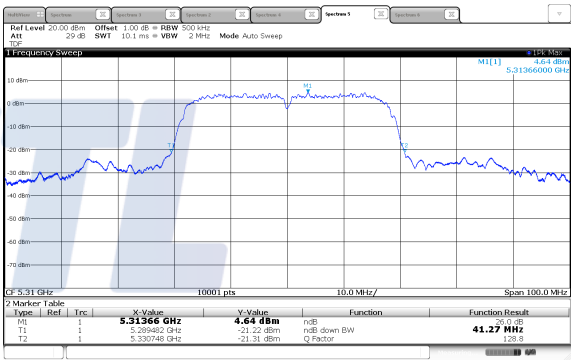
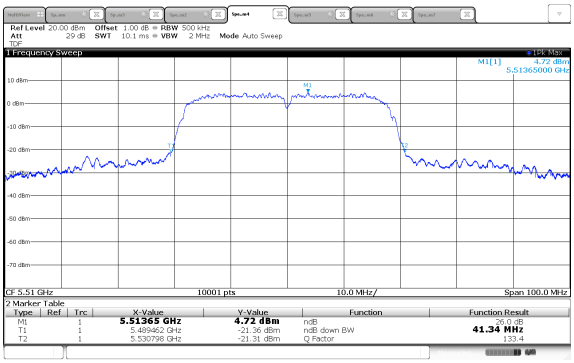
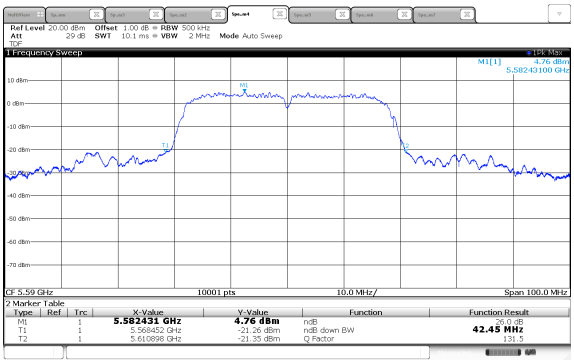
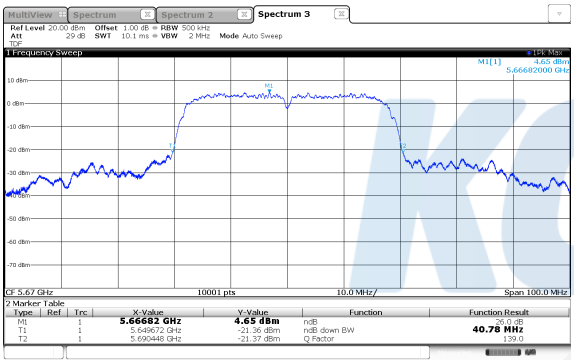
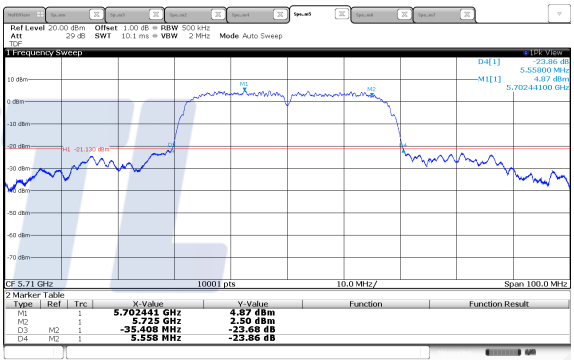
	

UNII-2C / 802.11n HT20 / Low ch.	UNII-2C / 802.11n HT20 / Mid ch.
	
UNII-2C / 802.11n HT20 / High ch.	**UNII-2C / 802.11n HT20 / Straddle ch.**
	

UNII-1 / 802.11n HT40 / Low ch.	UNII-2A / 802.11n HT40 / Low ch.
	
UNII-1 / 802.11n HT40 / High ch.	**UNII-2A / 802.11n HT40 / High ch.**
	

UNII-2C / 802.11n HT40 / Low ch.	UNII-2C / 802.11n HT40 / Mid ch.
	
UNII-2C / 802.11n HT40 / High ch.	**UNII-2C / 802.11n HT40 / Straddle ch.**
	

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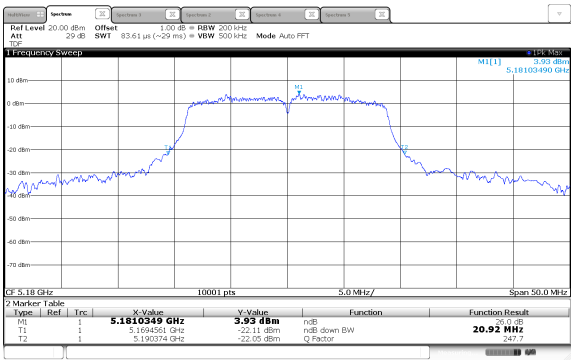	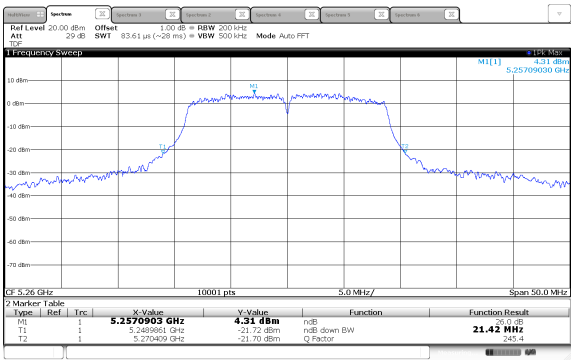
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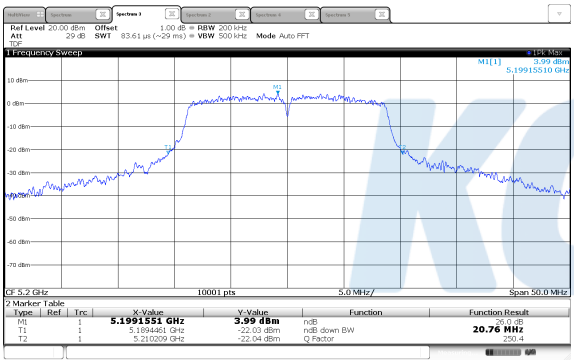	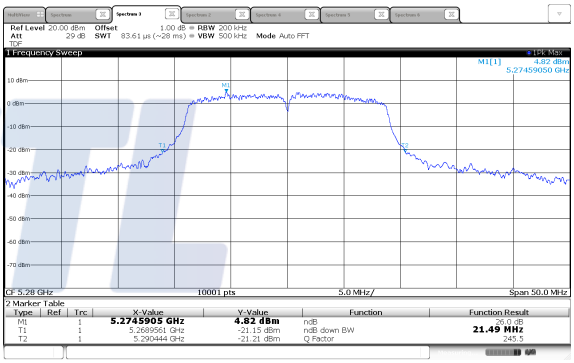
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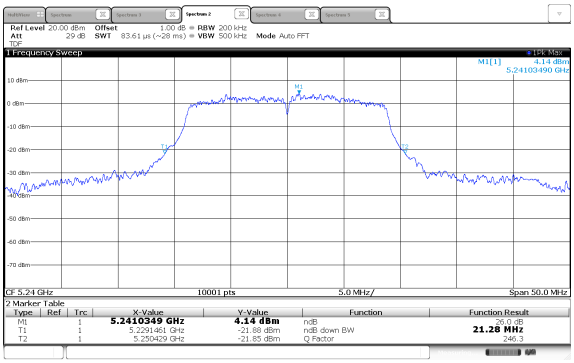	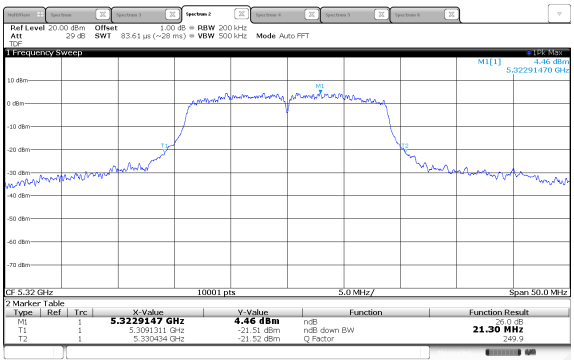

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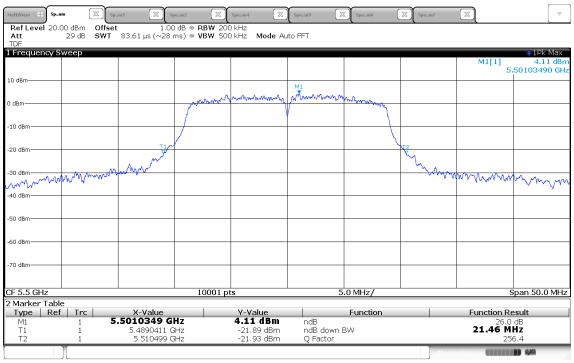
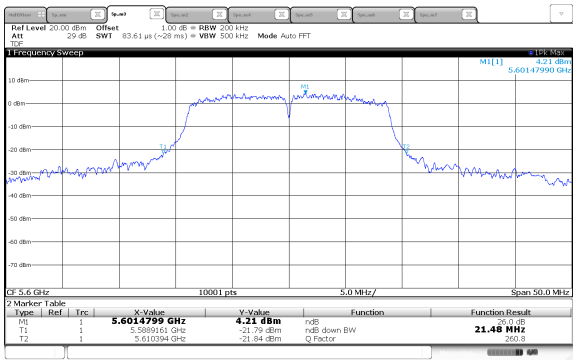
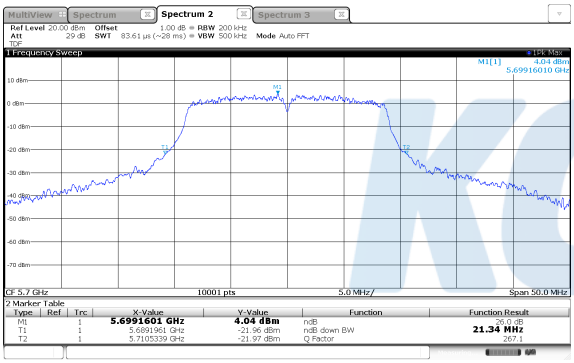
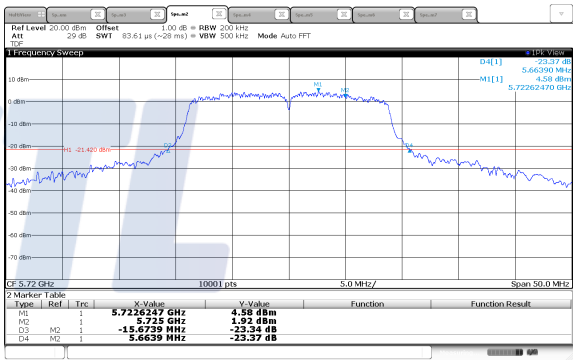
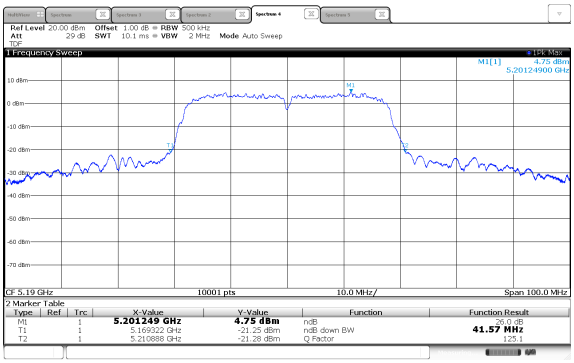
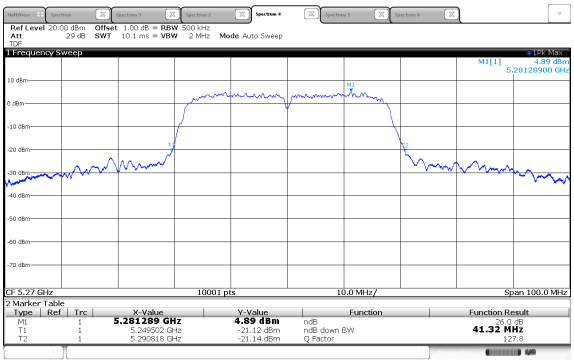
	
UNII-2C / 802.11ac VHT20 / High ch.	**UNII-2C / 802.11ac VHT20 / Straddle ch.**
	

UNII-1 / 802.11ac VHT40 / Low ch.	UNII-2A / 802.11ac VHT40 / Low ch.
	
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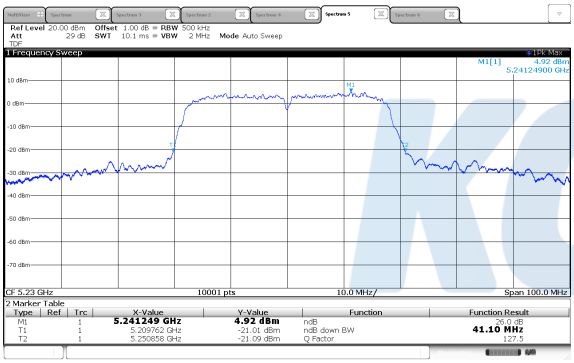
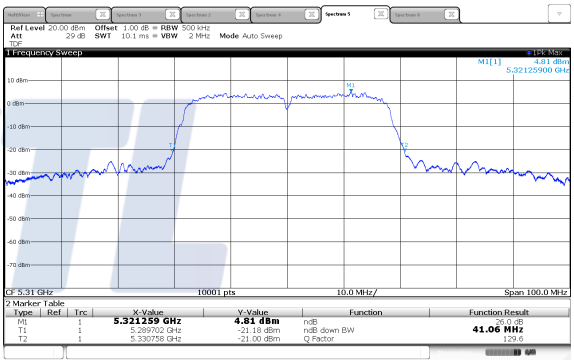
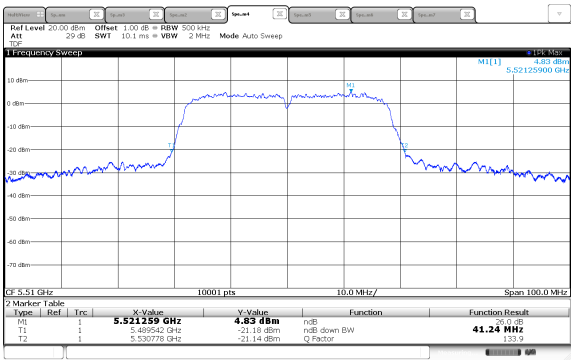
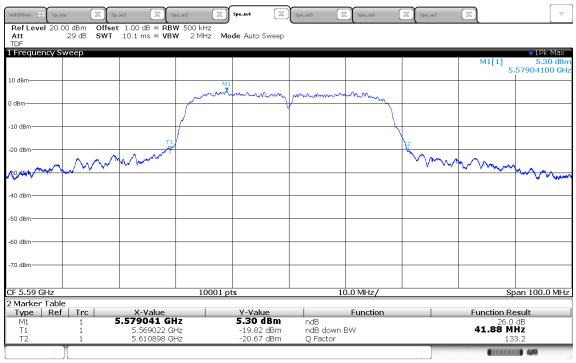
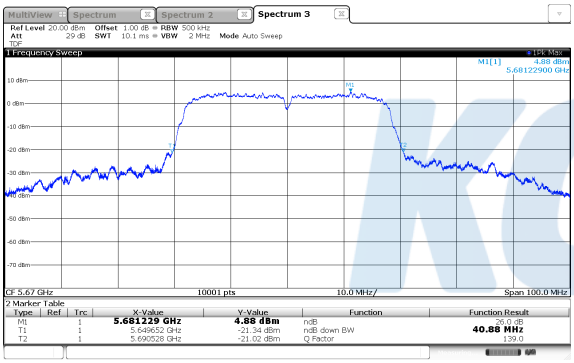
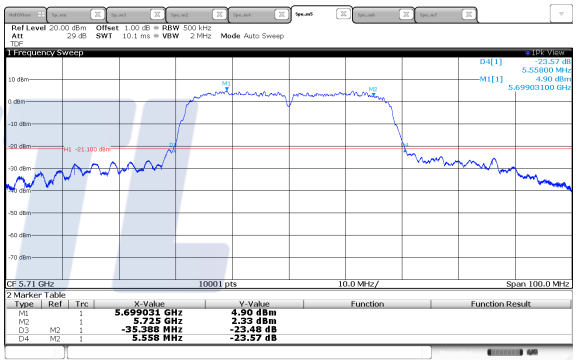
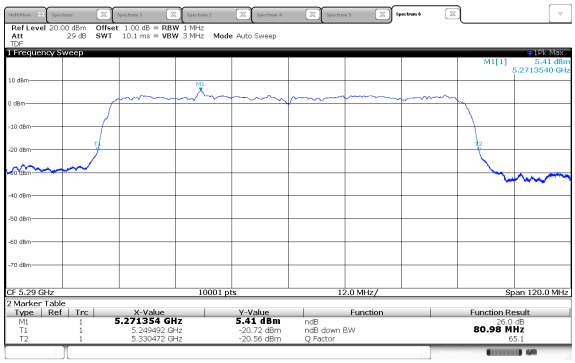
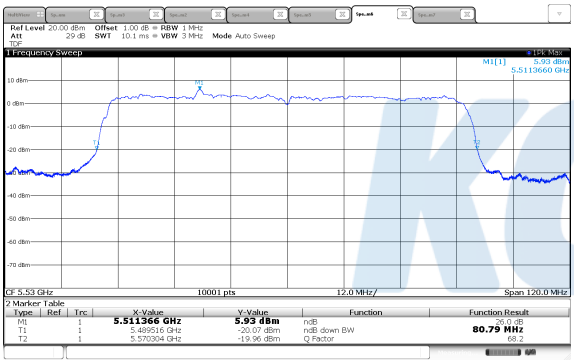
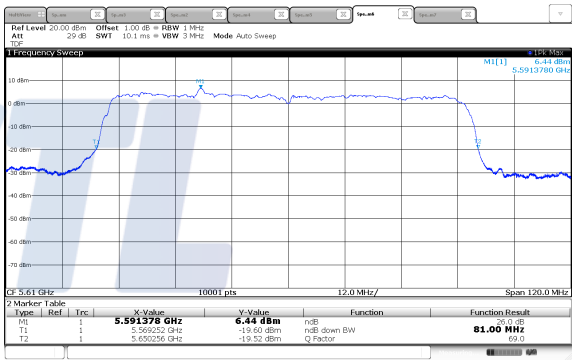
	

UNII-2C / 802.11ac VHT40 / Low ch.	UNII-2C / 802.11ac VHT40 / Mid ch.
	
UNII-2C / 802.11ac VHT40 / High ch.	**UNII-2C / 802.11ac VHT40 / Straddle ch.**
	

UNII-1 / 802.11ac VHT80 / Low ch.	UNII-2A / 802.11ac VHT80 / Low ch.
	
UNII-2C / 802.11ac VHT80 / Low ch.	**UNII-2C / 802.11ac VHT80 / High ch.**
	
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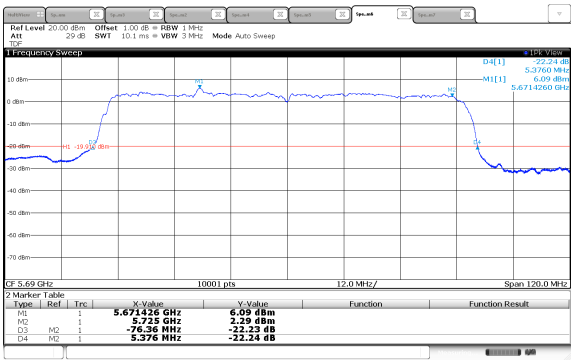
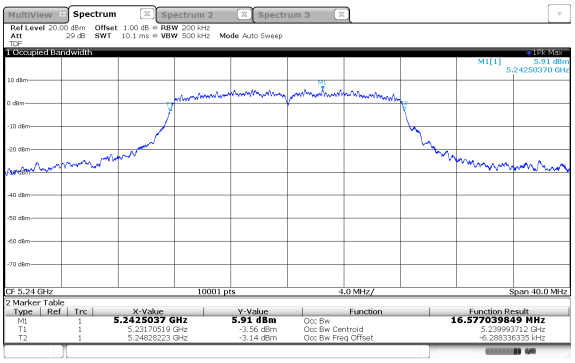
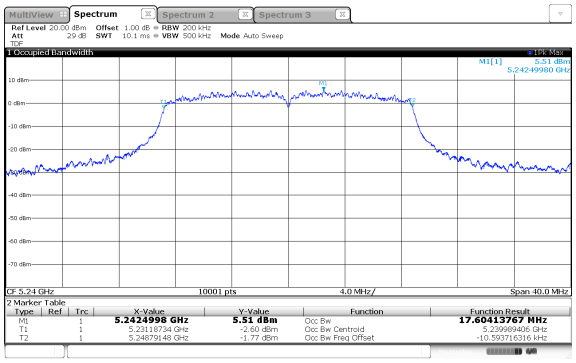
	Blank

99% bandwidth

UNII-1 / 802.11a / 5 240 ㎒	UNII-1 / 802.11ac VHT20 / 5 240 ㎒
	
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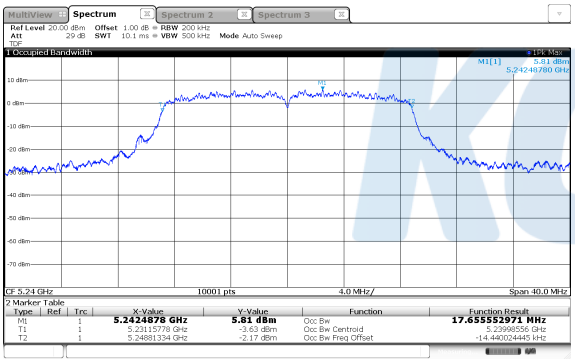
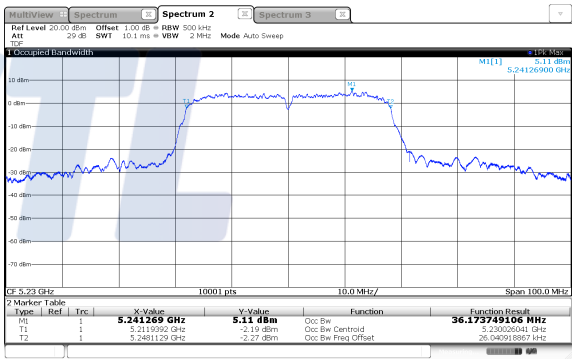
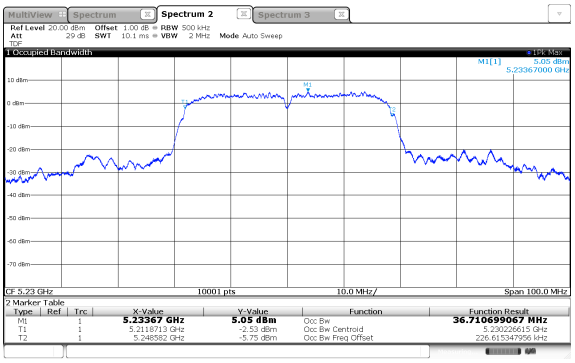
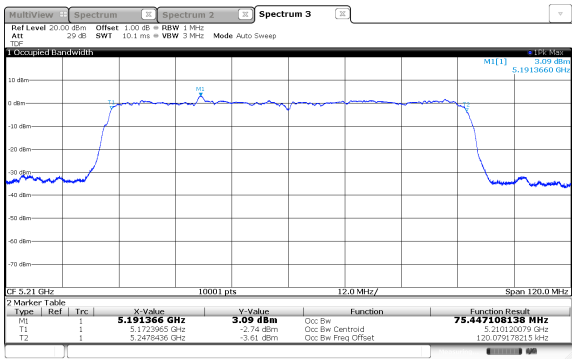
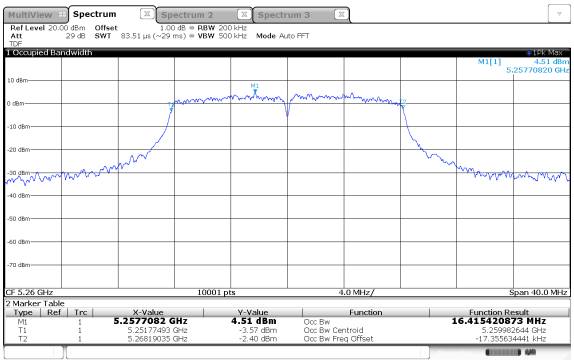
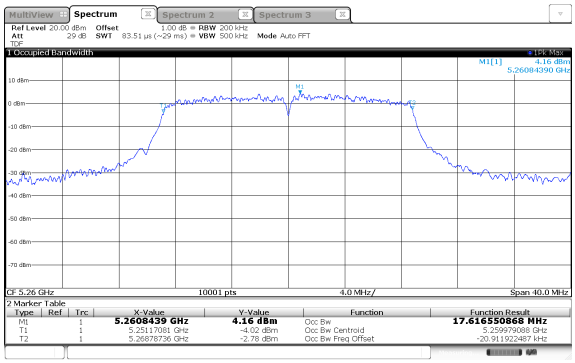
	
UNII-1 / 802.11n HT40 / 5 230 ㎒	**UNII-1 / 802.11ac VHT 80 / 5 210 ㎒**
	

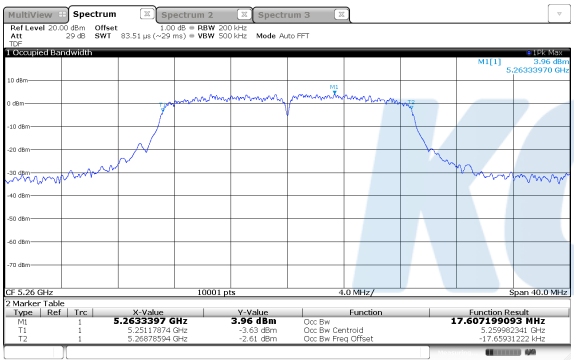
UNII-2A / 802.11a / 5 260 ㎒



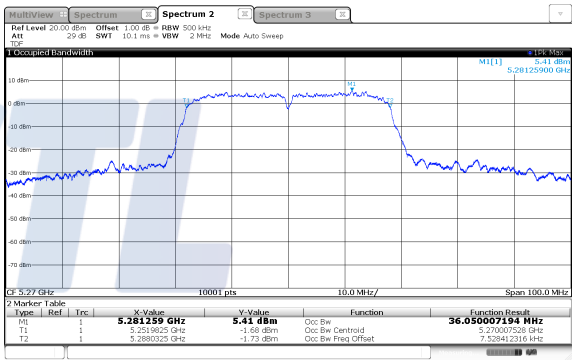
UNII-2A / 802.11ac VHT20 / 5 260 ㎒



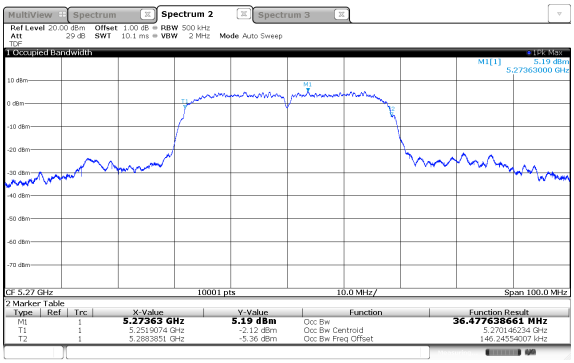
UNII-2A / 802.11n HT20 / 5 260 ㎒



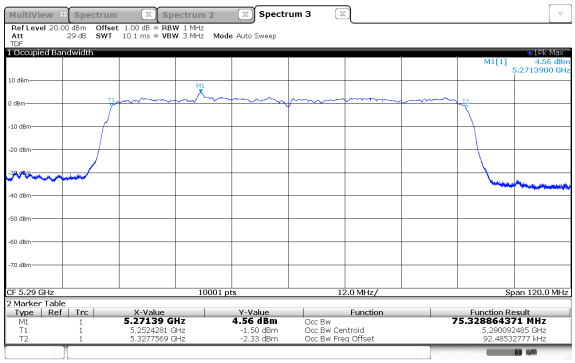
UNII-2A / 802.11ac VHT40 / 5 270 ㎒



UNII-2A / 802.11n HT40 / 5 270 ㎒

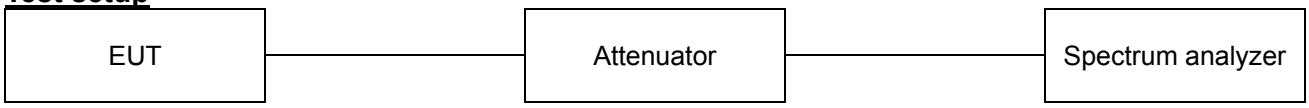


UNII-2A / 802.11ac VHT 80 / 5 290 ㎒



7.4. 6 dB Bandwidth

Test setup



Limit

According to §15.407(e), RSS-247(6.2.4)
Within the 5.725-5.85 ㎓ band, the minimum 6 dB bandwidth if U-NII devices shall be at least 500㎑

Test procedure

ANSI C63.10-2013 Section 6.9.2
KDB 789033 D02 v02r01 - Section C.2

Test settings

Minimum Emission Bandwidth for the band 5.725−5.85 ㎓

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 ㎑ for the band 5.725−5.85 ㎓. The following procedure shall be used for measuring this bandwidth:

1. Set RBW = 100 ㎑.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

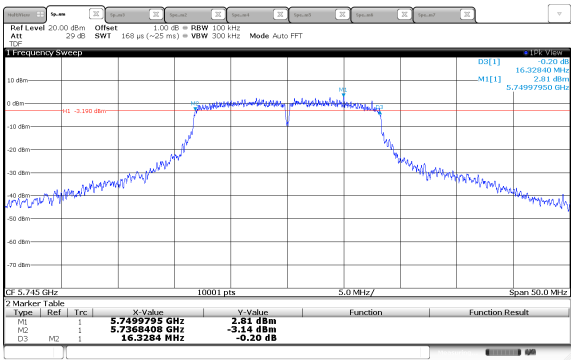
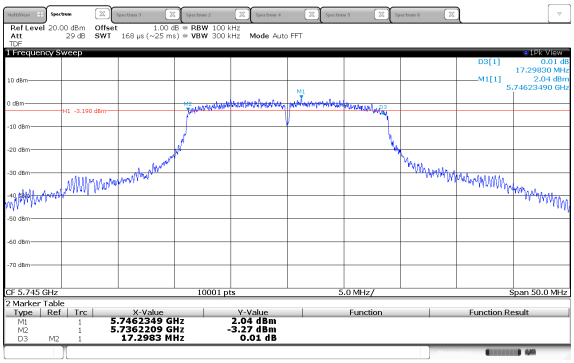
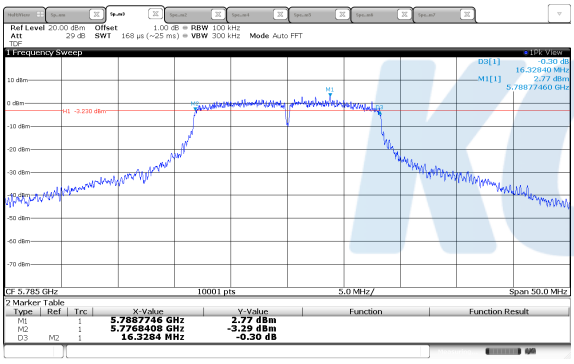
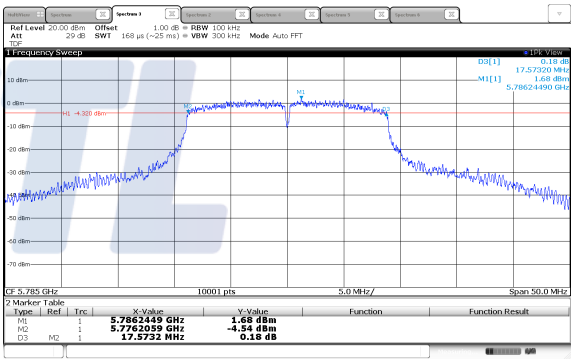
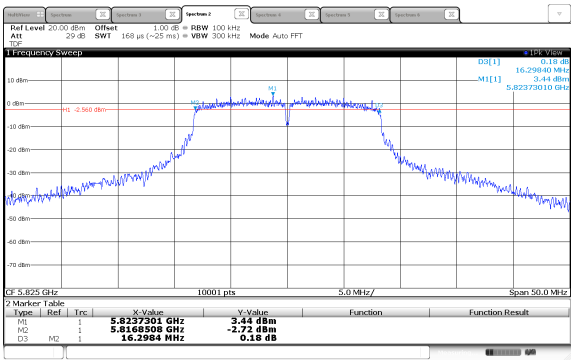
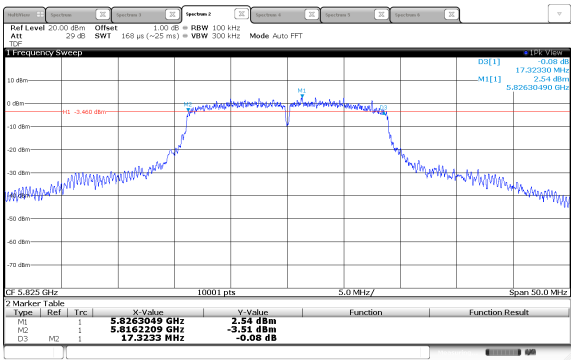
Notes:

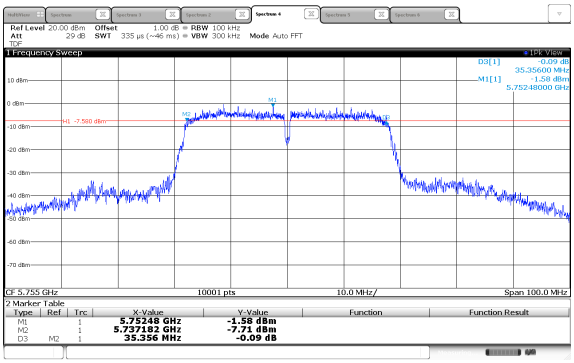
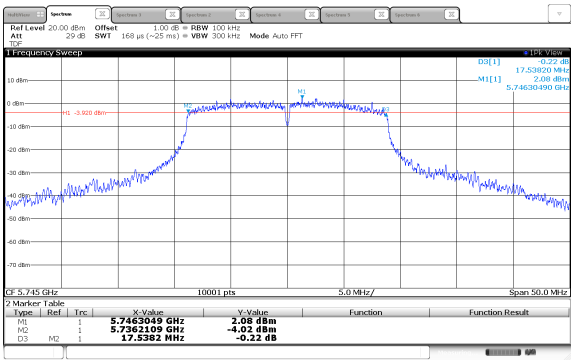
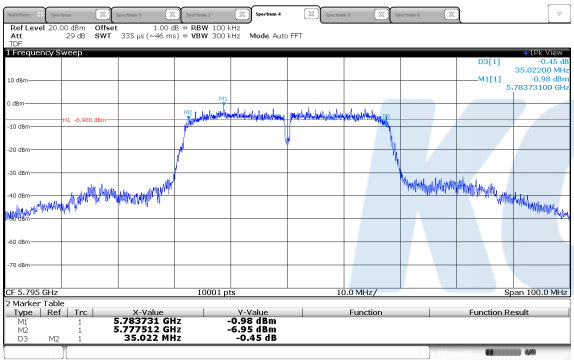
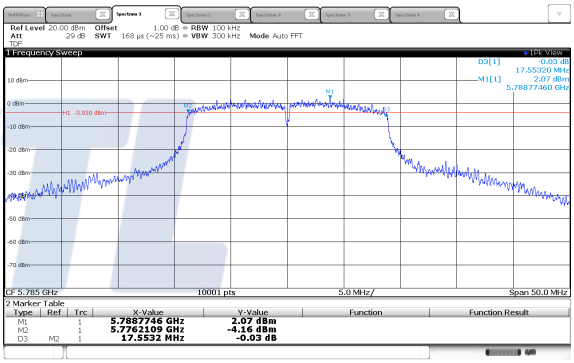
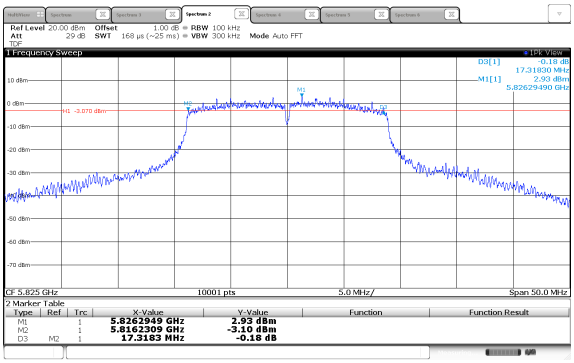
1. [1)] means Band-crossing channels.

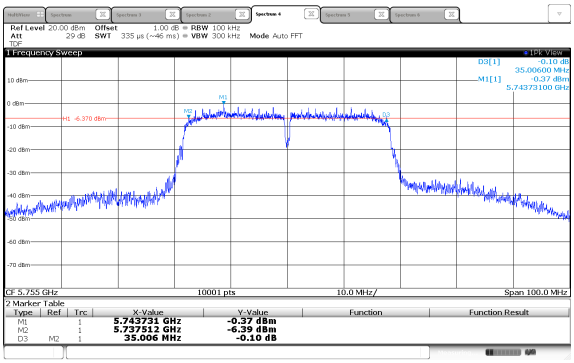
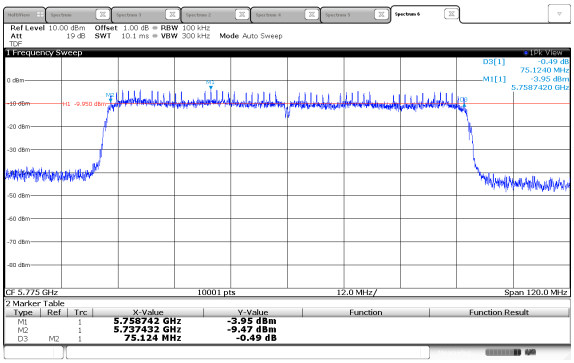
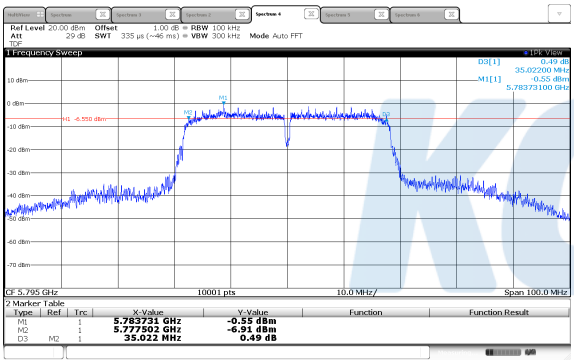
Test results

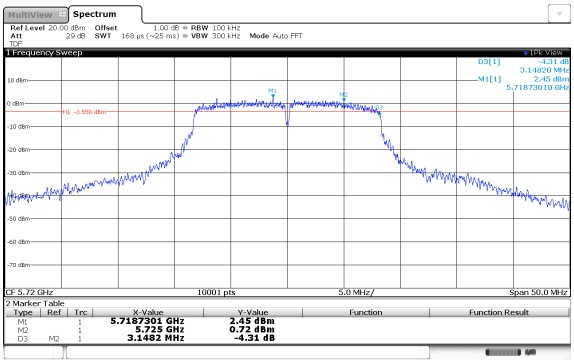
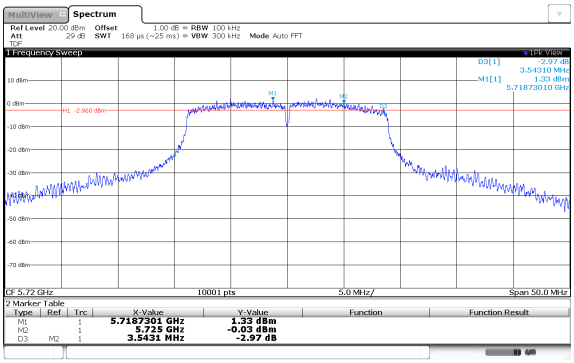
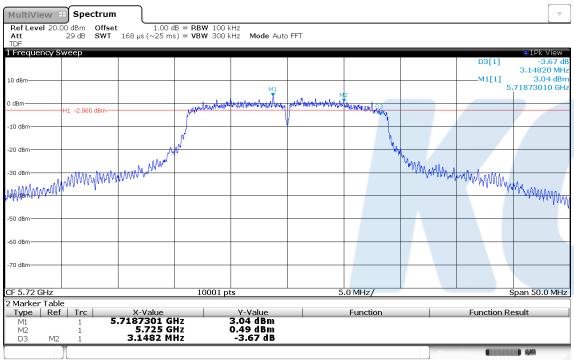
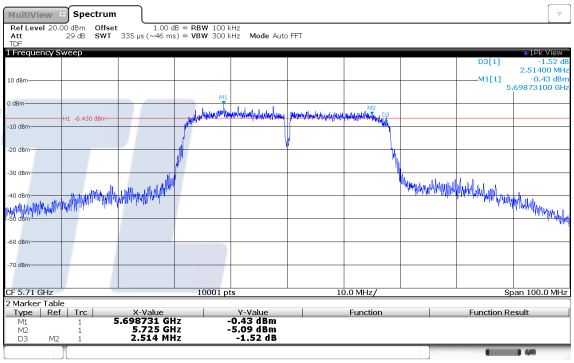
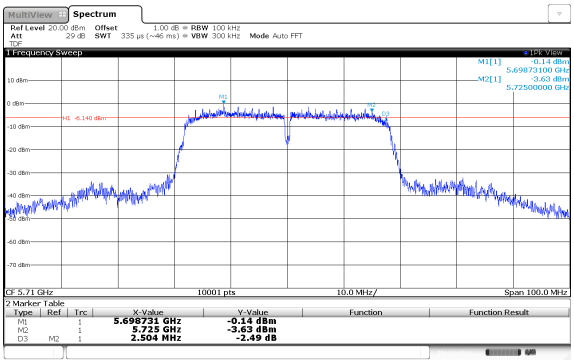
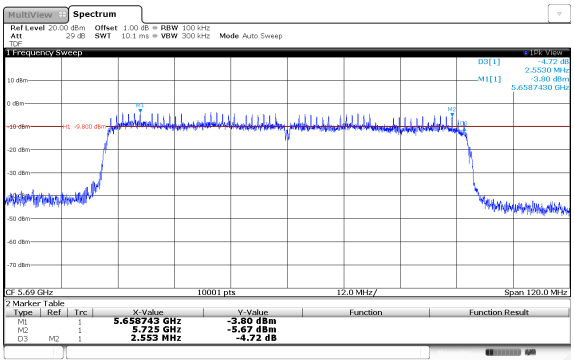
Test mode	Band	Frequency (㎒)	Measured Bandwidth (㎒)	Limit (㎒)
802.11a	UNII-3	5 720[1)]	3.15	0.50
		5 745	16.33	0.50
		5 785	16.33	0.50
		5 825	16.30	0.50
802.11n HT20	UNII-3	5 720[1)]	3.15	0.50
		5 745	17.30	0.50
		5 785	17.57	0.50
		5 825	17.32	0.50
802.11n HT40	UNII-3	5 710[1)]	2.50	0.50
		5 755	35.36	0.50
		5 795	35.02	0.50
802.11ac VHT20	UNII-3	5 720[1)]	3.54	0.50
		5 745	17.54	0.50
		5 785	17.55	0.50
		5 825	17.32	0.50
802.11ac VHT40	UNII-3	5 710[1)]	2.51	0.50
		5 755	35.01	0.50
		5 795	35.02	0.50
802.11ac VHT80	UNII-3	5 690[1)]	2.55	0.50
		5 775	75.12	0.50

6 dB bandwidth

UNII-3 / 802.11a / Low ch.	UNII-3 / 802.11n HT20 / Low ch.
	
UNII-3 / 802.11a / Mid ch.	**UNII-3 / 802.11n HT20 / Mid ch.**
	
UNII-3 / 802.11a / High ch.	**UNII-3 / 802.11n HT20 / High ch.**
	

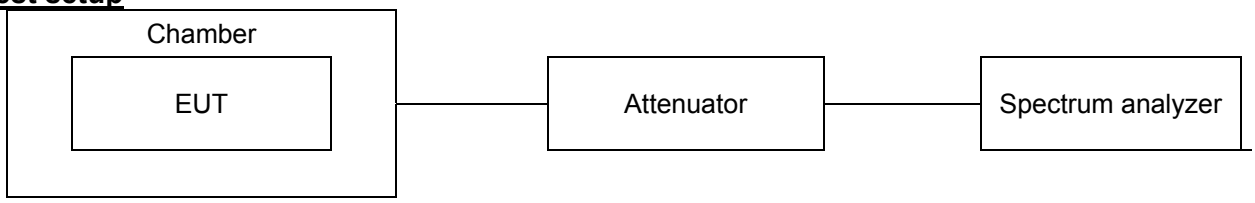
UNII-3 / 802.11n HT40 / Low ch.	UNII-3 / 802.11ac VHT20 / Low ch.
	
UNII-3 / 802. 11n HT40 / High ch.	**UNII-3 / 802.11ac VHT20 / Mid ch.**
	
	UNII-3 / 802.11ac VHT20 / High ch.
Blank	

UNII-3 / 802.11ac VHT40 / Low ch.	UNII-3 / 802.11ac VHT80 / Low ch.
	
UNII-3 / 802. 11ac VHT40 / High ch.	
	Blank

UNII-3 / 802.11a / 5 720 ㎒	UNII-3 / 802.11ac VHT20 / 5 720 ㎒
	
UNII-3 / 802. 11n HT20 / 5 720 ㎒	**UNII-3 / 802.11ac VHT40 / 5 710 ㎒**
	
UNII-3 / 802. 11n HT40 / 5 710 ㎒	**UNII-3 / 802.11ac VHT80 / 5 690 ㎒**
	

7.5. Frequency Stability

Test setup



Limit

N/A

Test procedure

ANSI C63.10-2013, clause 6.8.1

Test settings

The frequency stability of the carrier frequency of the intentional radiator shall be maintained all conditions of normal operation as specified in the user manual. The frequency stability shall be maintained over a temperature variation of specified in the user manual at normal supply voltage, and over a variation in the primary supply voltage of specified in the user manual of the rated supply voltage at a temperature of 20 °C. For equipment that is capable only of operating from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.

1. The EUT was placed inside the environmental test chamber.
2. The temperature was incremented by 10 °C intervals from lowest temperature.
3. Each increase step of temperature measured the frequency.
4. The test temperature was set 20°C and the supply voltage was then adjusted on the EUT from 85 % to 115% and the frequency record.
5. While maintaining a constant temperature inside the environmental chamber, turn the EUT on and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

Test results

Test mode : UNII-1

Frequency(㎐) : 5 180 000 000

Voltage	Voltage	TEMP	Maintaining time	Measure frequency	Frequency deviation	Deviation
[%]	[V]	[℃]		[㎐]	[㎐]	[%]
100	3.85	+22(Ref)	Startup	5 180 000 999	999	0.000 02
			2 minutes	5 180 001 036	1 036	0.000 02
			5 minutes	5 180 001 043	1 043	0.000 02
			10 minutes	5 180 001 055	1 055	0.000 02
		-30	Startup	5 180 001 521	1 521	0.000 03
			2 minutes	5 180 001 578	1 578	0.000 03
			5 minutes	5 180 001 582	1 582	0.000 03
			10 minutes	5 180 001 575	1 575	0.000 03
		-20	Startup	5 180 001 344	1 344	0.000 03
			2 minutes	5 180 001 345	1 345	0.000 03
			5 minutes	5 180 001 351	1 351	0.000 03
			10 minutes	5 180 001 353	1 353	0.000 03
		-10	Startup	5 180 001 162	1 162	0.000 02
			2 minutes	5 180 001 140	1 140	0.000 02
			5 minutes	5 180 001 130	1 130	0.000 02
			10 minutes	5 180 001 135	1 135	0.000 02
		0	Startup	5 180 000 959	959	0.000 02
			2 minutes	5 180 000 960	960	0.000 02
			5 minutes	5 180 000 959	959	0.000 02
			10 minutes	5 180 000 962	962	0.000 02
		10	Startup	5 180 000 795	795	0.000 02
			2 minutes	5 180 000 790	790	0.000 02
			5 minutes	5 180 000 787	787	0.000 02
			10 minutes	5 180 000 778	778	0.000 02
		20	Startup	5 180 000 643	643	0.000 01
			2 minutes	5 180 000 641	641	0.000 01
			5 minutes	5 180 000 438	438	0.000 01
			10 minutes	5 180 000 427	427	0.000 01
		30	Startup	5 180 000 863	863	0.000 02
			2 minutes	5 180 000 867	867	0.000 02
			5 minutes	5 180 000 875	875	0.000 02
			10 minutes	5 180 000 880	880	0.000 02
		40	Startup	5 180 000 977	977	0.000 02
			2 minutes	5 180 000 979	979	0.000 02
			5 minutes	5 180 000 983	983	0.000 02
			10 minutes	5 180 000 987	987	0.000 02
		50	Startup	5 180 000 779	779	0.000 02
			2 minutes	5 180 000 777	777	0.000 01
			5 minutes	5 180 000 773	773	0.000 01
			10 minutes	5 180 000 770	770	0.000 01
85	3.27	+22(Ref)	Startup	5 180 001 035	1 035	0.000 02
			2 minutes	5 180 001 025	1 025	0.000 02
			5 minutes	5 180 001 019	1 019	0.000 02
			10 minutes	5 180 001 018	1 018	0.000 02
115	4.43	+22(Ref)	Startup	5 180 001 036	1 036	0.000 02
			2 minutes	5 180 001 038	1 038	0.000 02
			5 minutes	5 180 001 042	1 042	0.000 02
			10 minutes	5 180 001 039	1 039	0.000 02

Test mode : UNII-2A

Frequency(㎐) : 5 260 000 000

Voltage	Voltage	TEMP	Maintaining time	Measure frequency	Frequency deviation	Deviation
[%]	[V]	[℃]		[㎐]	[㎐]	[%]
100	3.85	+22(Ref)	Startup	5 260 001 023	1 023	0.000 02
			2 minutes	5 260 001 030	1 030	0.000 02
			5 minutes	5 260 001 069	1 069	0.000 02
			10 minutes	5 260 001 075	1 075	0.000 02
		-30	Startup	5 260 001 479	1 479	0.000 03
			2 minutes	5 260 001 482	1 482	0.000 03
			5 minutes	5 260 001 480	1 480	0.000 03
			10 minutes	5 260 001 477	1 477	0.000 03
		-20	Startup	5 260 001 279	1 279	0.000 02
			2 minutes	5 260 001 280	1 280	0.000 02
			5 minutes	5 260 001 278	1 278	0.000 02
			10 minutes	5 260 001 277	1 277	0.000 02
		-10	Startup	5 260 001 143	1 143	0.000 02
			2 minutes	5 260 001 147	1 147	0.000 02
			5 minutes	5 260 001 151	1 151	0.000 02
			10 minutes	5 260 001 154	1 154	0.000 02
		0	Startup	5 260 000 976	976	0.000 02
			2 minutes	5 260 000 979	979	0.000 02
			5 minutes	5 260 000 988	988	0.000 02
			10 minutes	5 260 001 000	1 000	0.000 02
		10	Startup	5 260 000 794	794	0.000 02
			2 minutes	5 260 000 785	785	0.000 01
			5 minutes	5 260 000 780	780	0.000 01
			10 minutes	5 260 000 729	729	0.000 01
		20	Startup	5 260 000 698	698	0.000 01
			2 minutes	5 260 000 700	700	0.000 01
			5 minutes	5 260 000 704	704	0.000 01
			10 minutes	5 260 000 710	710	0.000 01
		30	Startup	5 260 000 888	888	0.000 02
			2 minutes	5 260 000 890	890	0.000 02
			5 minutes	5 260 000 985	985	0.000 02
			10 minutes	5 260 000 988	988	0.000 02
		40	Startup	5 260 000 992	992	0.000 02
			2 minutes	5 260 000 996	996	0.000 02
			5 minutes	5 260 000 998	998	0.000 02
			10 minutes	5 260 001 002	1 002	0.000 02
		50	Startup	5 260 000 622	622	0.000 01
			2 minutes	5 260 000 621	621	0.000 01
			5 minutes	5 260 000 518	518	0.000 01
			10 minutes	5 260 000 515	515	0.000 01
85	3.27	+22(Ref)	Startup	5 260 001 092	1 092	0.000 02
			2 minutes	5 260 001 090	1 090	0.000 02
			5 minutes	5 260 001 093	1 093	0.000 02
			10 minutes	5 260 001 089	1 089	0.000 02
115	4.43	+22(Ref)	Startup	5 260 001 060	1 060	0.000 02
			2 minutes	5 260 001 057	1 057	0.000 02
			5 minutes	5 260 001 055	1 055	0.000 02
			10 minutes	5 260 001 056	1 056	0.000 02

Test mode : UNII-2C

Frequency(㎐) : 5 500 000 000

Voltage	Voltage	TEMP	Maintaining time	Measure frequency	Frequency deviation	Deviation
[%]	[V]	[℃]		[㎐]	[㎐]	[%]
100	3.85	+22(Ref)	Startup	5 500 001 122	1 122	0.000 02
			2 minutes	5 500 001 116	1 116	0.000 02
			5 minutes	5 500 001 113	1 113	0.000 02
			10 minutes	5 500 001 111	1 111	0.000 02
		-30	Startup	5 500 001 630	1 630	0.000 03
			2 minutes	5 500 001 591	1 591	0.000 03
			5 minutes	5 500 001 600	1 600	0.000 03
			10 minutes	5 500 001 581	1 581	0.000 03
		-20	Startup	5 500 001 242	1 242	0.000 02
			2 minutes	5 500 001 249	1 249	0.000 02
			5 minutes	5 500 001 247	1 247	0.000 02
			10 minutes	5 500 001 242	1 242	0.000 02
		-10	Startup	5 500 001 180	1 180	0.000 02
			2 minutes	5 500 001 183	1 183	0.000 02
			5 minutes	5 500 001 190	1 190	0.000 02
			10 minutes	5 500 001 192	1 192	0.000 02
		0	Startup	5 500 001 031	1 031	0.000 02
			2 minutes	5 500 001 035	1 035	0.000 02
			5 minutes	5 500 001 038	1 038	0.000 02
			10 minutes	5 500 001 045	1 045	0.000 02
		10	Startup	5 500 000 843	843	0.000 02
			2 minutes	5 500 000 857	857	0.000 02
			5 minutes	5 500 000 865	865	0.000 02
			10 minutes	5 500 000 884	884	0.000 02
		20	Startup	5 500 000 738	738	0.000 01
			2 minutes	5 500 000 735	735	0.000 01
			5 minutes	5 500 000 724	724	0.000 01
			10 minutes	5 500 000 721	721	0.000 01
		30	Startup	5 500 000 935	935	0.000 02
			2 minutes	5 500 000 936	936	0.000 02
			5 minutes	5 500 000 941	941	0.000 02
			10 minutes	5 500 000 948	948	0.000 02
		40	Startup	5 500 001 038	1 038	0.000 02
			2 minutes	5 500 001 041	1 041	0.000 02
			5 minutes	5 500 001 048	1 048	0.000 02
			10 minutes	5 500 001 052	1 052	0.000 02
		50	Startup	5 500 000 666	666	0.000 01
			2 minutes	5 500 000 667	667	0.000 01
			5 minutes	5 500 000 662	662	0.000 01
			10 minutes	5 500 000 660	660	0.000 01
85	3.27	+22(Ref)	Startup	5 500 001 110	1 110	0.000 02
			2 minutes	5 500 001 104	1 104	0.000 02
			5 minutes	5 500 001 102	1 102	0.000 02
			10 minutes	5 500 001 100	1 100	0.000 02
115	4.43	+22(Ref)	Startup	5 500 001 094	1 094	0.000 02
			2 minutes	5 500 001 089	1 089	0.000 02
			5 minutes	5 500 001 090	1 090	0.000 02
			10 minutes	5 500 001 092	1 092	0.000 02

Test mode : UNII-3

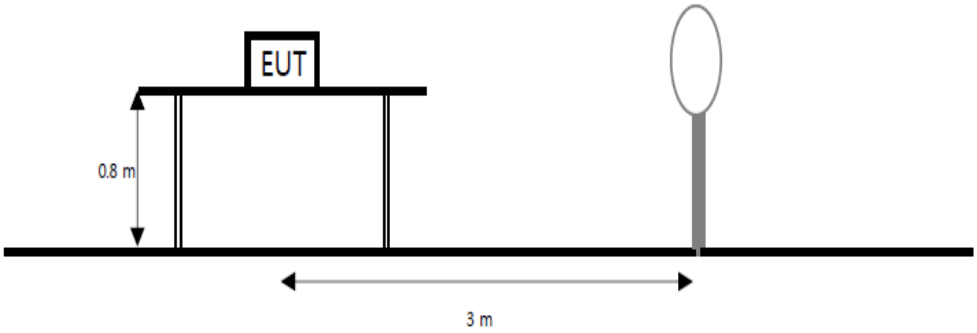
Frequency(㎐) : 5 745 000 000

Voltage	Voltage	TEMP	Maintaining time	Measure frequency	Frequency deviation	Deviation
[%]	[V]	[℃]		[㎐]	[㎐]	[%]
100	3.85	+22(Ref)	Startup	5 745 001 159	1 159	0.000 02
			2 minutes	5 745 001 156	1 156	0.000 02
			5 minutes	5 745 001 153	1 153	0.000 02
			10 minutes	5 745 001 157	1 157	0.000 02
		-30	Startup	5 745 001 872	1 872	0.000 03
			2 minutes	5 745 001 857	1 857	0.000 03
			5 minutes	5 745 001 840	1 840	0.000 03
			10 minutes	5 745 001 889	1 889	0.000 03
		-20	Startup	5 745 001 565	1 565	0.000 03
			2 minutes	5 745 001 531	1 531	0.000 03
			5 minutes	5 745 001 548	1 548	0.000 03
			10 minutes	5 745 001 557	1 557	0.000 03
		-10	Startup	5 745 001 319	1 319	0.000 02
			2 minutes	5 745 001 310	1 310	0.000 02
			5 minutes	5 745 001 313	1 313	0.000 02
			10 minutes	5 745 001 312	1 312	0.000 02
		0	Startup	5 745 001 064	1 064	0.000 02
			2 minutes	5 745 001 066	1 066	0.000 02
			5 minutes	5 745 001 067	1 067	0.000 02
			10 minutes	5 745 001 070	1 070	0.000 02
		10	Startup	5 745 000 846	846	0.000 01
			2 minutes	5 745 000 859	859	0.000 01
			5 minutes	5 745 000 863	863	0.000 02
			10 minutes	5 745 000 877	877	0.000 02
		20	Startup	5 745 000 765	765	0.000 01
			2 minutes	5 745 000 763	763	0.000 01
			5 minutes	5 745 000 755	755	0.000 01
			10 minutes	5 745 000 751	751	0.000 01
		30	Startup	5 745 000 948	948	0.000 02
			2 minutes	5 745 000 949	949	0.000 02
			5 minutes	5 745 000 953	953	0.000 02
			10 minutes	5 745 000 956	956	0.000 02
		40	Startup	5 745 001 086	1 086	0.000 02
			2 minutes	5 745 001 089	1 089	0.000 02
			5 minutes	5 745 001 092	1 092	0.000 02
			10 minutes	5 745 001 095	1 095	0.000 02
		50	Startup	5 745 000 928	928	0.000 02
			2 minutes	5 745 000 913	913	0.000 02
			5 minutes	5 745 000 905	905	0.000 02
			10 minutes	5 745 000 891	891	0.000 02
85	3.27	+22(Ref)	Startup	5 745 001 168	1 168	0.000 02
			2 minutes	5 745 001 158	1 158	0.000 02
			5 minutes	5 745 001 158	1 158	0.000 02
			10 minutes	5 745 001 159	1 159	0.000 02
115	4.43	+22(Ref)	Startup	5 745 001 153	1 153	0.000 02
			2 minutes	5 745 001 155	1 155	0.000 02
			5 minutes	5 745 001 153	1 153	0.000 02
			10 minutes	5 745 001 156	1 156	0.000 02

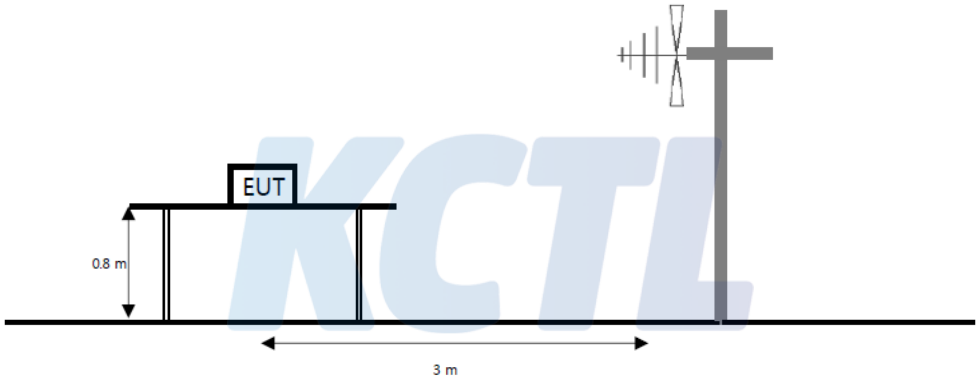
7.6. Spurious Emission, Band Edge and Restricted bands

Test setup

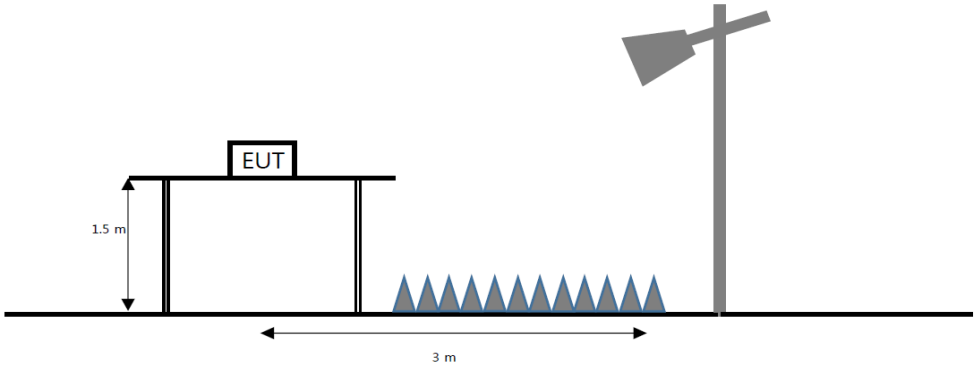
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to the tenth harmonic of the highest fundamental frequency or to 40 ㎓ emissions, whichever is lower.



Limit

According to section 15.209(a) except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (㎒)	Field strength (㎶/m)	Measurement distance (m)
0.009 - 0.490	2 400/F(㎑)	300
0.490 - 1.705	24 000/F(㎑)	30
1.705 - 30	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 ㎒, 76–88 ㎒, 174–216 ㎒ or 470–806 ㎒. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section15.231 and 15.241.

According to section 15.205(a) and (b) only spurious emissions are permitted in any of the frequency bands listed below:

㎒	㎒	㎒	㎓
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 – 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 – 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 – 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 – 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 – 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 – 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 – 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 – 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 – 2 500	17.7 - 21.4
8.376 25 - 8.386 75	156.7 - 156.9	2 690 – 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 – 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 – 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 – 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 – 4 400	Above 38.6
13.36 - 13.41			

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in section 15.209. At frequencies equal to or less than 1 000 ㎒, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 ㎒, compliance with the emission limits in section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in section 15.35 apply to these measurements.

According to section 15.407(b), undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

For transmitters operating in the 5.15-5.25 ㎓ band: All emissions outside of the 5.15-5.35 ㎓ band shall not exceed an e.i.r.p. of −27 ㏈m/㎒
For transmitters operating in the 5.25-5.35 ㎓ band: All emissions outside of the 5.15-5.35 ㎓ band shall not exceed an e.i.r.p. of −27 ㏈m/㎒.

For transmitters operating in the 5.725-5.85 ㎓ band: All emissions shall be limited to a level of -27 ㏈m/㎒ at 75 ㎒ or more above or below the band edge increasing linearly to 10 ㏈m/㎒ at 25 ㎒ above or below the band edge, and form 25 ㎒ above or below the band edge increasing linearly to a level of 15.6 ㏈m/㎒ at 5 ㎒ above or below the band edge, and from 5 ㎒ above or below the band edge increasing linearly to a level of 27 ㏈m/㎒ at the band edge.

Test procedure

ANSI C63.10-2013 Section 12.7.7.2, 12.7.5, 12.7.6
KDB 789033 D02 v02r01 – Section G

Test settings

Peak field strength measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in table
3. VBW ≥ (3×RBW)
4. Detector = peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow sweeps to continue until the trace stabilizes

Table. RBW as a function of frequency

Frequency	RBW
9 ㎑ to 150 ㎑	200 ㎐ to 300 ㎐
0.15 ㎒ to 30 ㎒	9 ㎑ to 10 ㎑
30 ㎒ to 1 000 ㎒	100 ㎑ to 120 ㎑
> 1 000 ㎒	1 ㎒

Average field strength measurements

Trace averaging with continuous EUT transmission at full power

If the EUT can be configured or modified to transmit continuously (D ≥ 98%), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):

1. RBW = 1 ㎒ (unless otherwise specified).
2. VBW ≥ (3×RBW).
3. Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
4. Averaging type = power (i.e., rms):
   1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
   2) Some instruments require linear display mode to use linear voltage averaging. Log or ㏈ averaging shall not be used.
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.

Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT (D ≥ 98%) cannot be achieved and the duty cycle is constant (duty cycle variations are less than ±2%), then the following procedure shall be used:

1. The EUT shall be configured to operate at the maximum achievable duty cycle.
2. Measure the duty cycle D of the transmitter output signal as described in 11.6.
3. RBW = 1 ㎒ (unless otherwise specified).
4. VBW ≥ [3 × RBW].
5. Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this

condition cannot be satisfied, then the detector mode shall be set to peak.

6. Averaging type = power (i.e., rms):
   1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
   2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
7. Sweep time = auto.
8. Perform a trace average of at least 100 traces.
9. A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
   1) If power averaging (rms) mode was used in step f), then the applicable correction factor is [10 log (1 / D)], where D is the duty cycle.
   2) If linear voltage averaging mode was used in step f), then the applicable correction factor is [20 log (1 / D)], where D is the duty cycle.
   3) If a specific emission is demonstrated to be continuous (D ≥ 98%) rather than turning ON and OFF with with the transmit cycle, then no duty cycle correction is required for that emission.

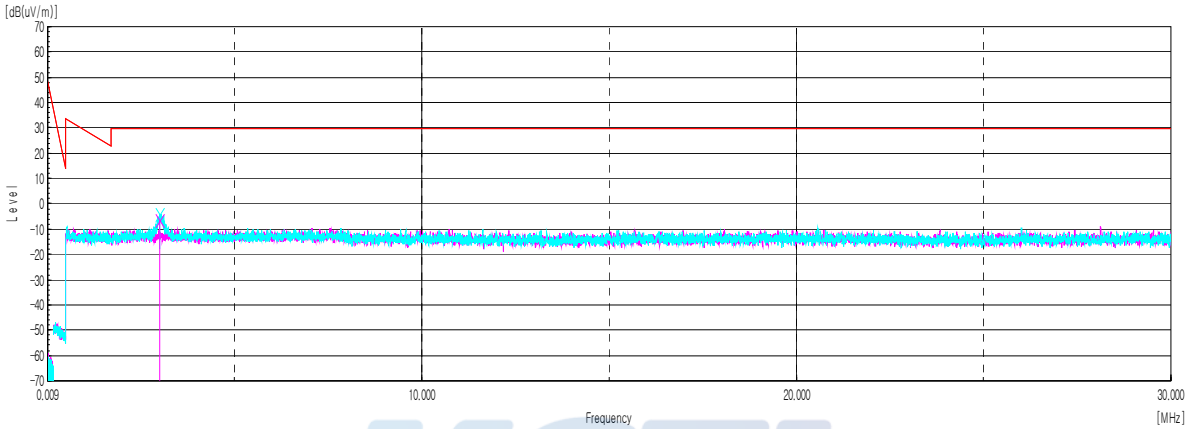
Notes:

2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 ㎒ for Peak detection and frequency above 1 ㎓. The resolution bandwidth of test receiver/spectrum analyzer is 1 ㎒ and the video bandwidth is 1 ㎑(≥1/T) for Average detection (AV) at frequency above 1 ㎓. (where T = pulse width)
3. *f* <30 ㎒, extrapolation factor of 40 dB/decade of distance. F_d = 40log(D_m/Ds)
   f ≥30 ㎒, extrapolation factor of 20 dB/decade of distance. F_d = 20log(D_m/Ds)
   Where:
   F_d= Distance factor in dB
   D_m= Measurement distance in meters
   D_s= Specification distance in meters
4. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d(dB)
5. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
6. Average test would be performed if the peak result were greater than the average limit.
7. 1) means restricted band.
8. According to part 15.31(f)(2), an extrapolation factor of 40 dB/decade is applied because measured distance of radiated emission is 3 m.
9. Below 30 ㎒ frequency range, In order to search for the worst result, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported. when the emission level was higher than 20 dB of the limit, then the following statement shall be made: “No spurious emissions were detected within 20 dB of the limit.”

Test results (Below 30 ㎒) – Worst case: 802.11a / UNII-1 Highest frequency

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
No spurious emissions were detected within 20 ㏈ of the limit.								

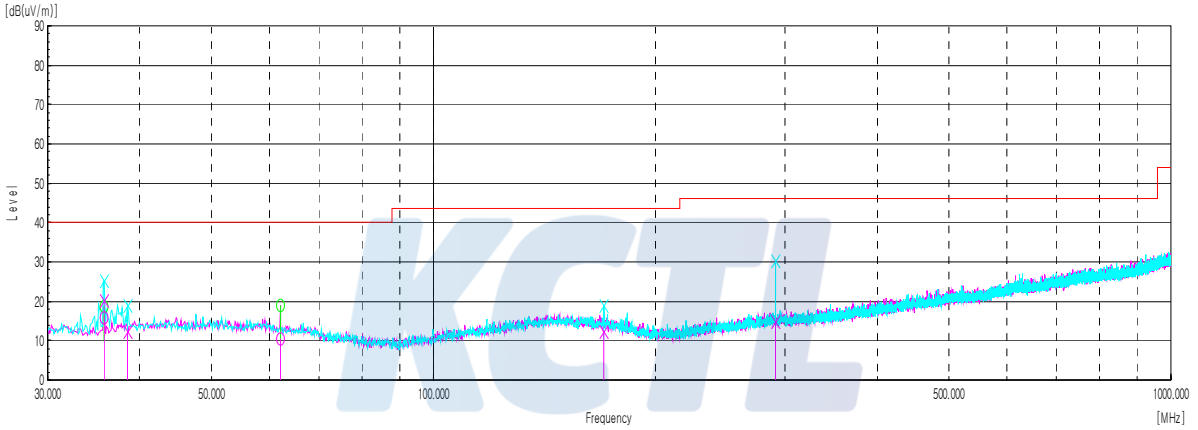
Horizontal/Vertical



Test results (Below 1 000 ㎒) – Worst case: 802.11a / UNII-1 Highest frequency

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data								
35.82	V	33.20	17.56	-30.53	-	20.23	40.00	19.77
38.49	V	24.50	18.10	-30.48	-	12.12	40.00	27.88
62.01	H	22.90	17.58	-30.08	-	10.40	40.00	29.60
170.41	V	22.40	18.37	-28.57	-	12.20	43.50	31.30
291.29	V	23.70	19.13	-27.87	-	14.96	46.00	31.04

Horizontal/Vertical



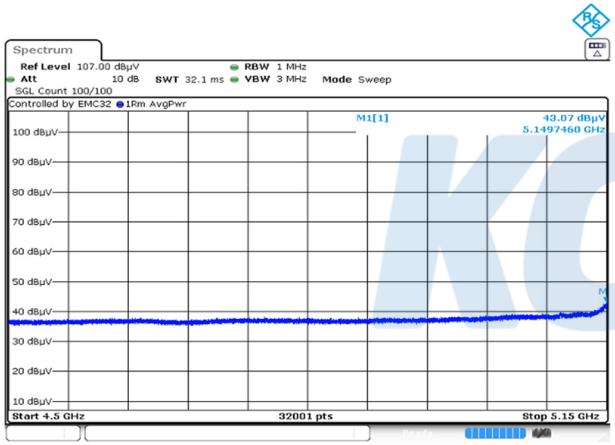
Test results (Above 1 000 ㎒)

802.11a_UNII-1

Lowest Channel (5 180 ㎒)

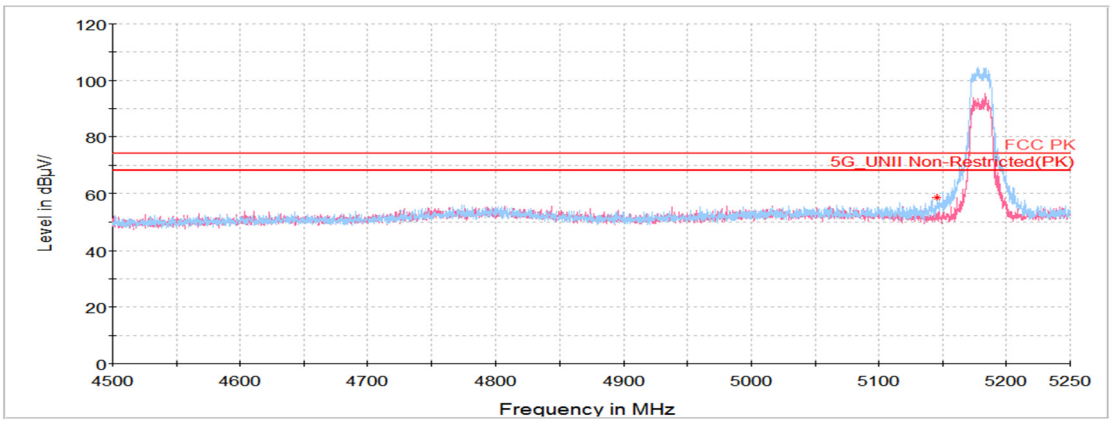
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 149.75[1)]	H	51.55	34.15	-27.12	-	58.58	74.00	15.42
10 360.77	V	58.03	37.49	-48.87	-	46.65	68.20	21.55
15 540.80[1)]	V	56.06	39.70	-48.02	-	47.74	74.00	26.26
Average Data								
5 149.75[1)]	H	43.07	34.15	-27.12	0.30	50.40	54.00	3.60

Average data

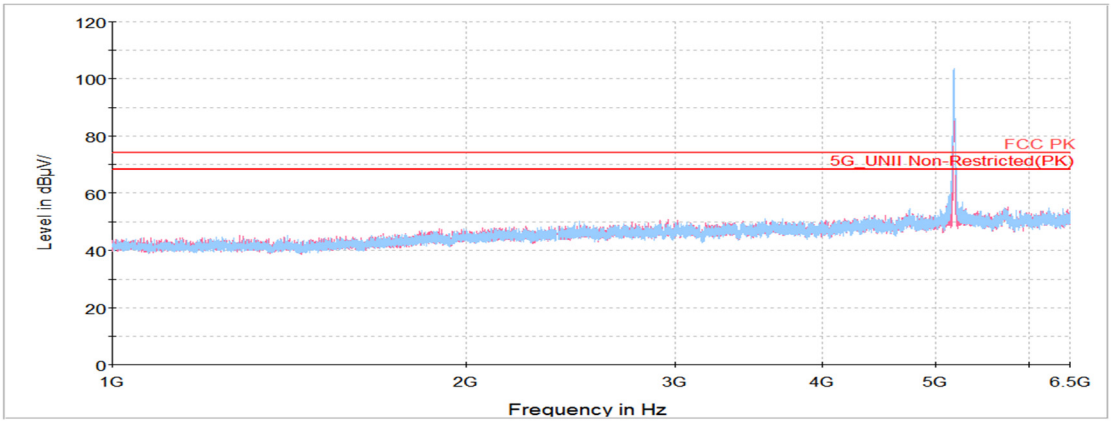


Blank

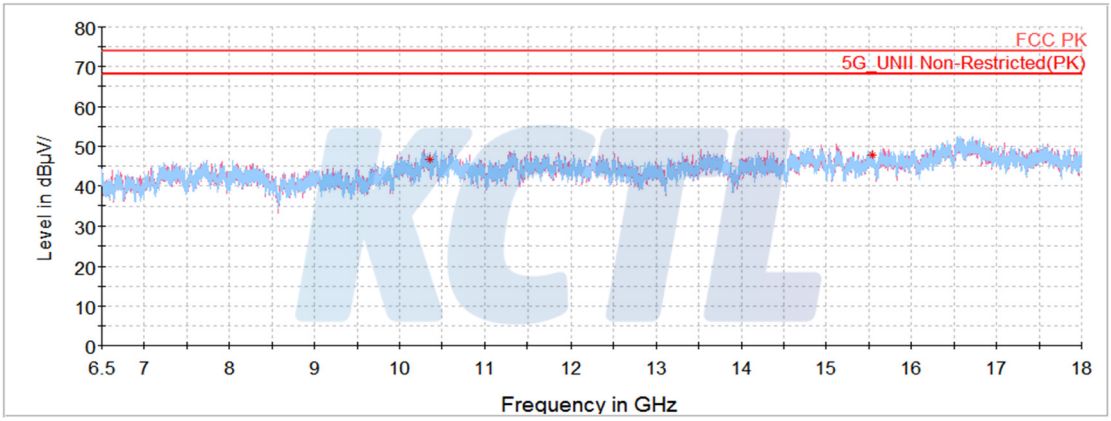
Horizontal/Vertical for Band-edge



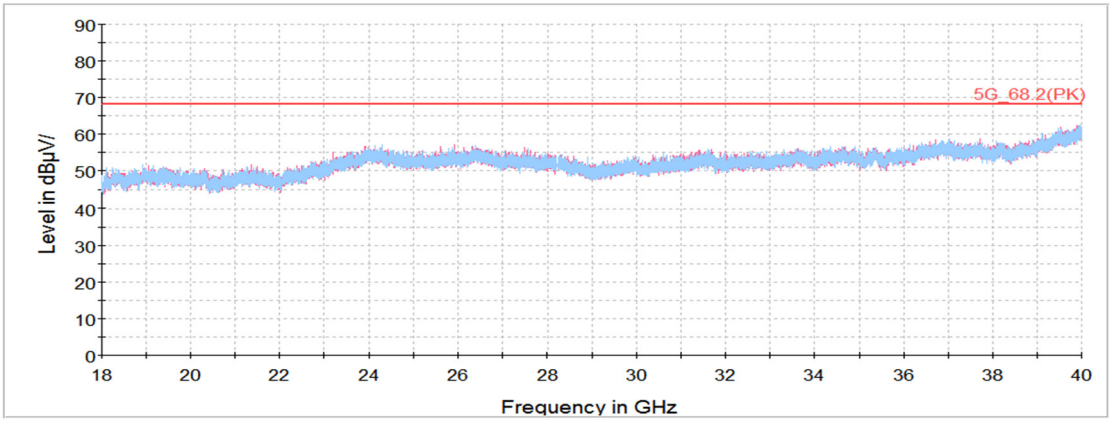
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



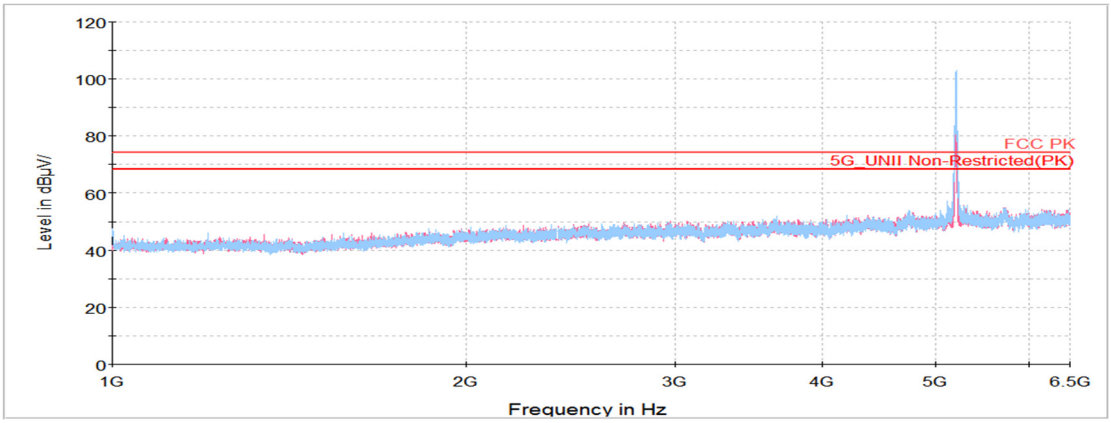
Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



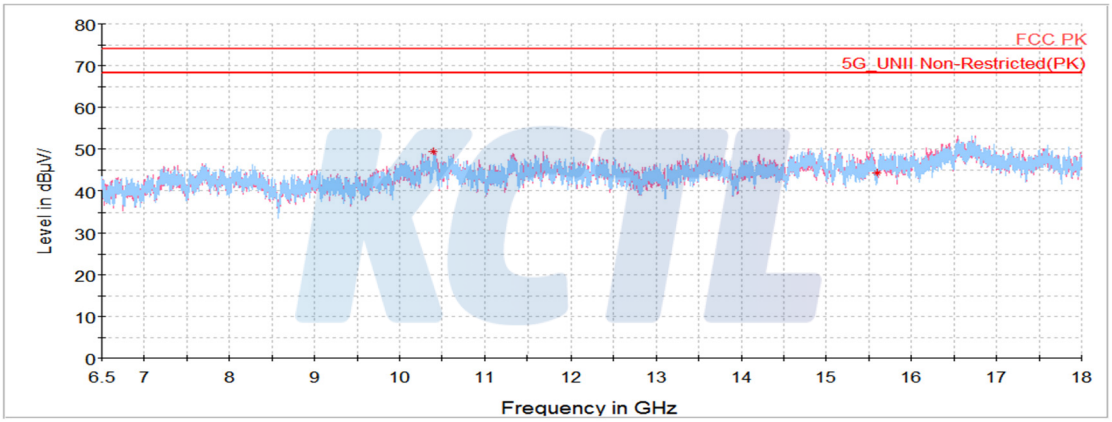
Middle Channel (5 200 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 403.53	V	60.44	37.52	-48.63	-	49.33	68.20	18.87
15 601.17[1)]	V	52.64	39.70	-48.03	-	44.31	74.00	29.69
Average Data								
No spurious emissions were detected within 20 dB of the limit								

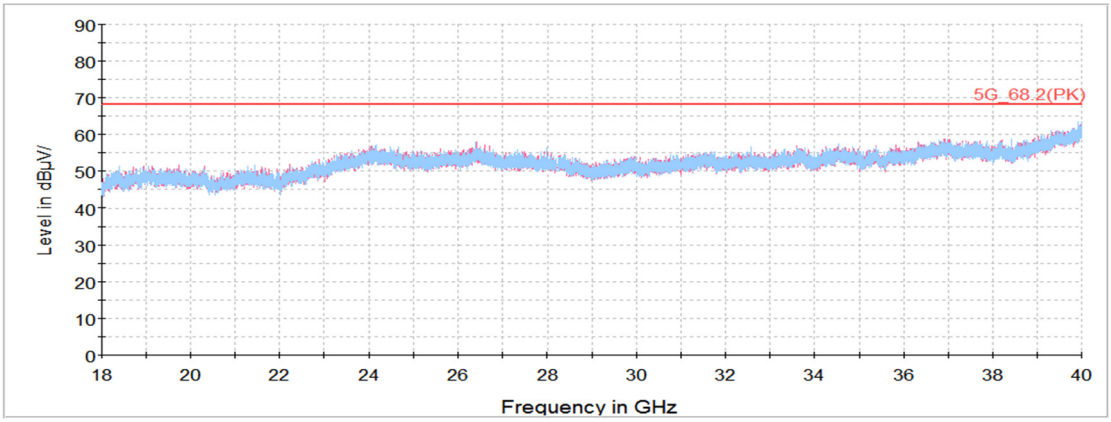
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



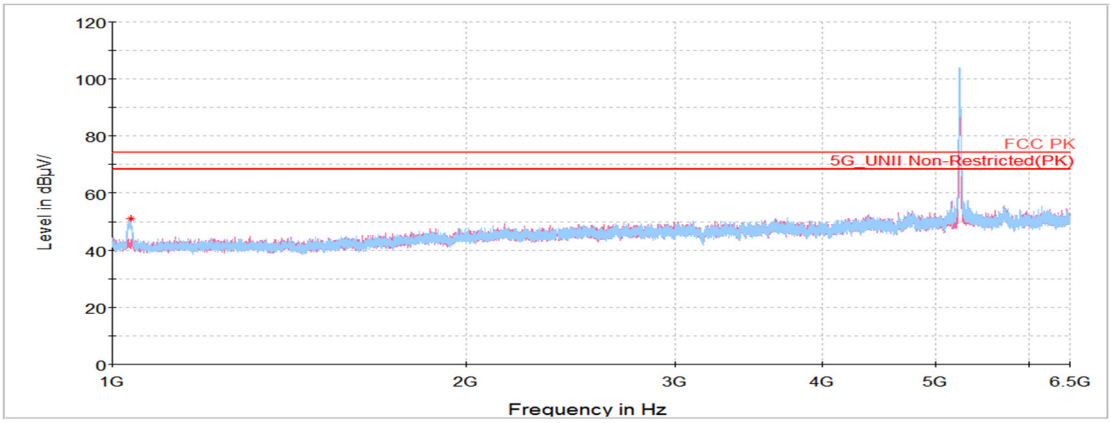
Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



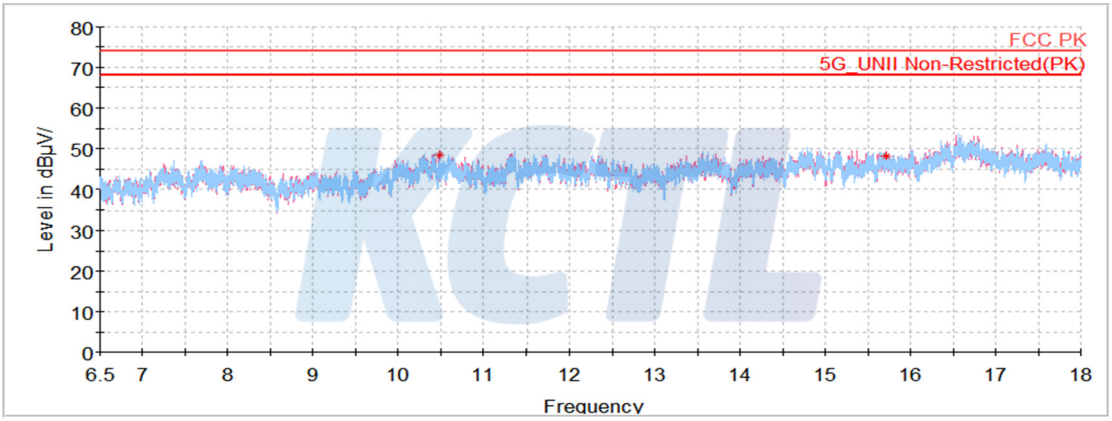
Highest Channel (5 240 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 035.68[1)]	H	74.95	26.92	-50.68	-	51.19	74.00	22.81
10 480.44	V	59.06	37.58	-48.19	-	48.45	68.20	19.75
15 719.05[1)]	H	56.33	39.70	-48.04	-	47.99	74.00	26.01
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓