



4.3 Power Spectral Density

Test Procedures

Maximum Power Spectral Density (KDB 789033, Method SA-2)
Multiple Transmitter Output (KDB 662911 D01, D02)

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

Test Settings :

Center frequency = the highest, middle and the lowest channels

- a) RBW = 1 MHz
- b) VBW = 3 MHz
- c) Sweep time = auto
- d) Detector = power averaging (rms)
- e) Trace mode = Average at least 100
- f) Duty cycle factor = $10\log(1/x)$

Test mode	Duty Cycle Factor (dB)
802.11a	0.11
802.11n_HT20	0.00
802.11n_HT40	0.10
802.11ac_VHT20	0.00
802.11ac_VHT40	0.09
802.11ac_VHT80	0.24
802.11ac_VHT160	0.11



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Limit

Operating Mode	Band	Mode	ANT Configuration	ANT Gain (dBi)	Limit (dBm)
SISO	UNII 2A	802.11a/n/ac	ANT0	3.49	11.00
			ANT1	4.53	
			ANT2	3.90	
			ANT3	3.78	
	UNII 2C		ANT0	3.49	
			ANT1	4.53	
			ANT2	3.90	
			ANT3	3.78	
MIMO (2Tx)	UNII 2A	802.11a/n/ac	ANT0 + ANT1	7.04	9.96
	UNII 2C				
MIMO (3Tx)	UNII 2A	802.11a/n/ac	ANT0 + ANT1 + ANT2	8.76	8.24
	UNII 2C				
MIMO (4Tx)	UNII 2A	802.11a/n/ac	ANT0 + ANT1 + ANT2 + ANT3	9.95	7.05
	UNII 2C				



Test Data

ANTO

Test Mode	Frequency (MHz)	Measured Power Density (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 260	-0.74	0.11	-0.63	11.00	11.63
	5 300	-0.97	0.11	-0.86	11.00	11.86
	5 320	-1.68	0.11	-1.57	11.00	12.57
	5 500	-3.22	0.11	-3.11	11.00	14.11
	5 600	-0.74	0.11	-0.63	11.00	11.63
	5 720	-1.13	0.11	-1.02	11.00	12.02
802.11n _HT20	5 260	-0.60	0.00	-0.60	11.00	11.60
	5 300	-0.92	0.00	-0.92	11.00	11.92
	5 320	-1.82	0.00	-1.82	11.00	12.82
	5 500	-3.90	0.00	-3.90	11.00	14.90
	5 600	-1.22	0.00	-1.22	11.00	12.22
	5 720	-1.57	0.00	-1.57	11.00	12.57
802.11ac _VHT20	5 260	-0.50	0.00	-0.50	11.00	11.50
	5 300	-0.88	0.00	-0.88	11.00	11.88
	5 320	-1.72	0.00	-1.72	11.00	12.72
	5 500	-3.94	0.00	-3.94	11.00	14.94
	5 600	-1.24	0.00	-1.24	11.00	12.24
	5 720	-1.44	0.00	-1.44	11.00	12.44
802.11n _HT40	5 270	-1.50	0.10	-1.40	11.00	12.40
	5 310	-2.24	0.10	-2.14	11.00	13.14
	5 510	-3.78	0.10	-3.68	11.00	14.68
	5 590	-1.26	0.10	-1.16	11.00	12.16
	5 710	-1.59	0.10	-1.49	11.00	12.49
802.11ac _VHT40	5 270	-1.36	0.09	-1.27	11.00	12.27
	5 310	-2.17	0.09	-2.08	11.00	13.08
	5 510	-3.88	0.09	-3.79	11.00	14.79
	5 590	-1.37	0.09	-1.28	11.00	12.28
	5 710	-1.56	0.09	-1.47	11.00	12.47
802.11ac _VHT80	5 290	-4.70	0.24	-4.46	11.00	15.46
	5 530	-6.39	0.24	-6.15	11.00	17.15
	5 690	-5.31	0.24	-5.07	11.00	16.07
Measurement uncertainty		± 1.5 dB				



ANT1

Test Mode	Frequency (MHz)	Measured Power Density (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 260	-1.60	0.11	-1.49	11.00	12.49
	5 300	-1.25	0.11	-1.14	11.00	12.14
	5 320	-0.99	0.11	-0.88	11.00	11.88
	5 500	-3.82	0.11	-3.71	11.00	14.71
	5 600	-1.84	0.11	-1.73	11.00	12.73
	5 720	-1.27	0.11	-1.16	11.00	12.16
802.11n _HT20	5 260	-0.78	0.00	-0.78	11.00	11.78
	5 300	-0.52	0.00	-0.52	11.00	11.52
	5 320	-0.52	0.00	-0.52	11.00	11.52
	5 500	-3.97	0.00	-3.97	11.00	14.97
	5 600	-2.01	0.00	-2.01	11.00	13.01
	5 720	-1.09	0.00	-1.09	11.00	12.09
802.11ac _VHT20	5 260	-0.80	0.00	-0.80	11.00	11.80
	5 300	-0.39	0.00	-0.39	11.00	11.39
	5 320	-0.70	0.00	-0.70	11.00	11.70
	5 500	-4.02	0.00	-4.02	11.00	15.02
	5 600	-2.17	0.00	-2.17	11.00	13.17
	5 720	-1.24	0.00	-1.24	11.00	12.24
802.11n _HT40	5 270	-2.13	0.10	-2.03	11.00	13.03
	5 310	-2.01	0.10	-1.91	11.00	12.91
	5 510	-4.47	0.10	-4.37	11.00	15.37
	5 590	-2.84	0.10	-2.74	11.00	13.74
	5 710	-1.88	0.10	-1.78	11.00	12.78
802.11ac _VHT40	5 270	-1.90	0.09	-1.81	11.00	12.81
	5 310	-2.01	0.09	-1.92	11.00	12.92
	5 510	-4.37	0.09	-4.28	11.00	15.28
	5 590	-2.90	0.09	-2.81	11.00	13.81
	5 710	-1.71	0.09	-1.62	11.00	12.62
802.11ac _VHT80	5 290	-4.98	0.24	-4.74	11.00	15.74
	5 530	-8.64	0.24	-8.40	11.00	19.40
	5 690	-6.45	0.24	-6.21	11.00	17.21
Measurement uncertainty		± 1.5 dB				



ANT2

Test Mode	Frequency (MHz)	Measured Power Density (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 260	-0.73	0.11	-0.62	11.00	11.62
	5 300	-0.17	0.11	-0.06	11.00	11.06
	5 320	-0.49	0.11	-0.38	11.00	11.38
	5 500	-3.49	0.11	-3.38	11.00	14.38
	5 600	-1.36	0.11	-1.25	11.00	12.25
	5 720	-0.63	0.11	-0.52	11.00	11.52
802.11n _HT20	5 260	-0.60	0.00	-0.60	11.00	11.60
	5 300	-0.09	0.00	-0.09	11.00	11.09
	5 320	-0.47	0.00	-0.47	11.00	11.47
	5 500	-3.49	0.00	-3.49	11.00	14.49
	5 600	-1.42	0.00	-1.42	11.00	12.42
	5 720	-0.47	0.00	-0.47	11.00	11.47
802.11ac _VHT20	5 260	-0.65	0.00	-0.65	11.00	11.65
	5 300	-0.10	0.00	-0.10	11.00	11.10
	5 320	-0.39	0.00	-0.39	11.00	11.39
	5 500	-3.46	0.00	-3.46	11.00	14.46
	5 600	-1.14	0.00	-1.14	11.00	12.14
	5 720	-0.54	0.00	-0.54	11.00	11.54
802.11n _HT40	5 270	-2.00	0.10	-1.90	11.00	12.90
	5 310	-1.53	0.10	-1.43	11.00	12.43
	5 510	-4.36	0.10	-4.26	11.00	15.26
	5 590	-2.69	0.10	-2.59	11.00	13.59
	5 710	-1.65	0.10	-1.55	11.00	12.55
802.11ac _VHT40	5 270	-1.87	0.09	-1.78	11.00	12.78
	5 310	-1.49	0.09	-1.40	11.00	12.40
	5 510	-4.30	0.09	-4.21	11.00	15.21
	5 590	-2.73	0.09	-2.64	11.00	13.64
	5 710	-1.51	0.09	-1.42	11.00	12.42
802.11ac _VHT80	5 290	-4.78	0.24	-4.54	11.00	15.54
	5 530	-6.56	0.24	-6.32	11.00	17.32
	5 690	-4.63	0.24	-4.39	11.00	15.39
Measurement uncertainty		± 1.5 dB				



ANT3

Test Mode	Frequency (MHz)	Measured Power Density (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 260	-0.77	0.11	-0.66	11.00	11.66
	5 300	-1.18	0.11	-1.07	11.00	12.07
	5 320	-1.87	0.11	-1.76	11.00	12.76
	5 500	-2.94	0.11	-2.83	11.00	13.83
	5 600	-0.38	0.11	-0.27	11.00	11.27
	5 720	-0.53	0.11	-0.42	11.00	11.42
802.11n _HT20	5 260	-0.08	0.00	-0.08	11.00	11.08
	5 300	-0.51	0.00	-0.51	11.00	11.51
	5 320	-1.44	0.00	-1.44	11.00	12.44
	5 500	-2.92	0.00	-2.92	11.00	13.92
	5 600	-0.31	0.00	-0.31	11.00	11.31
	5 720	-0.80	0.00	-0.80	11.00	11.80
802.11ac _VHT20	5 260	-0.10	0.00	-0.10	11.00	11.10
	5 300	-0.36	0.00	-0.36	11.00	11.36
	5 320	-1.47	0.00	-1.47	11.00	12.47
	5 500	-2.98	0.00	-2.98	11.00	13.98
	5 600	-0.20	0.00	-0.20	11.00	11.20
	5 720	-0.84	0.00	-0.84	11.00	11.84
802.11n _HT40	5 270	-1.60	0.10	-1.50	11.00	12.50
	5 310	-2.37	0.10	-2.27	11.00	13.27
	5 510	-3.17	0.10	-3.07	11.00	14.07
	5 590	-0.90	0.10	-0.80	11.00	11.80
	5 710	-1.55	0.10	-1.45	11.00	12.45
802.11ac _VHT40	5 270	-1.58	0.09	-1.49	11.00	12.49
	5 310	-2.19	0.09	-2.10	11.00	13.10
	5 510	-3.11	0.09	-3.02	11.00	14.02
	5 590	-1.10	0.09	-1.01	11.00	12.01
	5 710	-1.64	0.09	-1.55	11.00	12.55
802.11ac _VHT80	5 290	-5.03	0.24	-4.79	11.00	15.79
	5 530	-5.51	0.24	-5.27	11.00	16.27
	5 690	-4.56	0.24	-4.32	11.00	15.32
Measurement uncertainty		± 1.5 dB				



ANTO+ANT1

Test Mode	Frequency (MHz)	Measured Power Density (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 260	1.86	0.11	1.97	9.96	7.99
	5 300	1.90	0.11	2.01	9.96	7.95
	5 320	1.69	0.11	1.80	9.96	8.16
	5 500	-0.50	0.11	-0.39	9.96	10.35
	5 600	1.76	0.11	1.87	9.96	8.09
	5 720	1.81	0.11	1.92	9.96	8.04
802.11n _HT20	5 260	2.32	0.00	2.32	9.96	7.64
	5 300	2.29	0.00	2.29	9.96	7.67
	5 320	1.89	0.00	1.89	9.96	8.07
	5 500	-0.92	0.00	-0.92	9.96	10.88
	5 600	1.41	0.00	1.41	9.96	8.55
	5 720	1.69	0.00	1.69	9.96	8.27
802.11ac _VHT20	5 260	2.36	0.00	2.36	9.96	7.60
	5 300	2.38	0.00	2.38	9.96	7.58
	5 320	1.83	0.00	1.83	9.96	8.13
	5 500	-0.97	0.00	-0.97	9.96	10.93
	5 600	1.33	0.00	1.33	9.96	8.63
	5 720	1.67	0.00	1.67	9.96	8.29
802.11n _HT40	5 270	1.21	0.10	1.31	9.96	8.65
	5 310	0.89	0.10	0.99	9.96	8.97
	5 510	-1.10	0.10	-1.00	9.96	10.96
	5 590	1.03	0.10	1.13	9.96	8.83
	5 710	1.28	0.10	1.38	9.96	8.58
802.11ac _VHT40	5 270	1.39	0.09	1.48	9.96	8.48
	5 310	0.92	0.09	1.01	9.96	8.95
	5 510	-1.11	0.09	-1.02	9.96	10.98
	5 590	0.94	0.09	1.03	9.96	8.93
	5 710	1.38	0.09	1.47	9.96	8.49
802.11ac _VHT80	5 290	-1.83	0.24	-1.59	9.96	11.55
	5 530	-4.36	0.24	-4.12	9.96	14.08
	5 690	-2.83	0.24	-2.59	9.96	12.55
Measurement uncertainty		± 1.5 dB				



ANTO+ANT1+ANT2

Test Mode	Frequency (MHz)	Measured Power Density (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 260	3.77	0.11	3.88	8.24	4.36
	5 300	4.00	0.11	4.11	8.24	4.13
	5 320	3.75	0.11	3.86	8.24	4.38
	5 500	1.27	0.11	1.38	8.24	6.86
	5 600	3.48	0.11	3.59	8.24	4.65
	5 720	3.77	0.11	3.88	8.24	4.36
802.11n _HT20	5 260	4.11	0.00	4.11	8.24	4.13
	5 300	4.27	0.00	4.27	8.24	3.97
	5 320	3.88	0.00	3.88	8.24	4.36
	5 500	0.99	0.00	0.99	8.24	7.25
	5 600	3.23	0.00	3.23	8.24	5.01
	5 720	3.75	0.00	3.75	8.24	4.49
802.11ac _VHT20	5 260	4.12	0.00	4.12	8.24	4.12
	5 300	4.33	0.00	4.33	8.24	3.91
	5 320	3.87	0.00	3.87	8.24	4.37
	5 500	0.97	0.00	0.97	8.24	7.27
	5 600	3.28	0.00	3.28	8.24	4.96
	5 720	3.72	0.00	3.72	8.24	4.52
802.11n _HT40	5 270	2.90	0.10	3.00	8.24	5.24
	5 310	2.85	0.10	2.95	8.24	5.29
	5 510	0.58	0.10	0.68	8.24	7.56
	5 590	2.57	0.10	2.67	8.24	5.57
	5 710	3.07	0.10	3.17	8.24	5.07
802.11ac _VHT40	5 270	3.07	0.09	3.16	8.24	5.08
	5 310	2.89	0.09	2.98	8.24	5.26
	5 510	0.59	0.09	0.68	8.24	7.56
	5 590	2.49	0.09	2.58	8.24	5.66
	5 710	3.18	0.09	3.27	8.24	4.97
802.11ac _VHT80	5 290	-0.05	0.24	0.19	8.24	8.05
	5 530	-2.31	0.24	-2.07	8.24	10.31
	5 690	-0.63	0.24	-0.39	8.24	8.63
Measurement uncertainty		± 1.5 dB				



ANTO+ANT1+ANT2+ANT3

Test Mode	Frequency (MHz)	Measured Power Density (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 260	5.08	0.11	5.19	7.05	1.86
	5 300	5.15	0.11	5.26	7.05	1.79
	5 320	4.80	0.11	4.91	7.05	2.14
	5 500	2.67	0.11	2.78	7.05	4.27
	5 600	4.98	0.11	5.09	7.05	1.96
	5 720	5.14	0.11	5.25	7.05	1.80
802.11n _HT20	5 260	5.51	0.00	5.51	7.05	1.54
	5 300	5.52	0.00	5.52	7.05	1.53
	5 320	5.00	0.00	5.00	7.05	2.05
	5 500	2.47	0.00	2.47	7.05	4.58
	5 600	4.82	0.00	4.82	7.05	2.23
	5 720	5.06	0.00	5.06	7.05	1.99
802.11ac _VHT20	5 260	5.52	0.00	5.52	7.05	1.53
	5 300	5.60	0.00	5.60	7.05	1.45
	5 320	4.98	0.00	4.98	7.05	2.07
	5 500	2.44	0.00	2.44	7.05	4.61
	5 600	4.89	0.00	4.89	7.05	2.16
	5 720	5.02	0.00	5.02	7.05	2.03
802.11n _HT40	5 270	4.22	0.10	4.32	7.05	2.73
	5 310	4.00	0.10	4.10	7.05	2.95
	5 510	2.11	0.10	2.21	7.05	4.84
	5 590	4.18	0.10	4.28	7.05	2.77
	5 710	4.35	0.10	4.45	7.05	2.60
802.11ac _VHT40	5 270	4.35	0.09	4.44	7.05	2.61
	5 310	4.07	0.09	4.16	7.05	2.89
	5 510	2.14	0.09	2.23	7.05	4.82
	5 590	4.07	0.09	4.16	7.05	2.89
	5 710	4.42	0.09	4.51	7.05	2.54
802.11ac _VHT80	5 290	1.15	0.24	1.39	7.05	5.66
	5 530	-0.61	0.24	-0.37	7.05	7.42
	5 690	0.85	0.24	1.09	7.05	5.96
Measurement uncertainty		± 1.5 dB				



Ant0 + Ant2_1TX

Test Mode	Frequency (MHz)	Measured Power Density (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11ac_VHT160	5 250	-4.48	0.11	-4.37	7.05	11.42
	5 570	-4.72	0.11	-4.61	7.05	11.66
Measurement uncertainty		± 1.5 dB				

Ant1 + Ant3_1TX

Test Mode	Frequency (MHz)	Measured Power Density (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11ac_VHT160	5 250	-4.41	0.11	-4.30	7.05	11.35
	5 570	-4.43	0.11	-4.32	7.05	11.37
Measurement uncertainty		± 1.5 dB				

Ant0 + Ant1 + Ant2 + ANT3_2TX

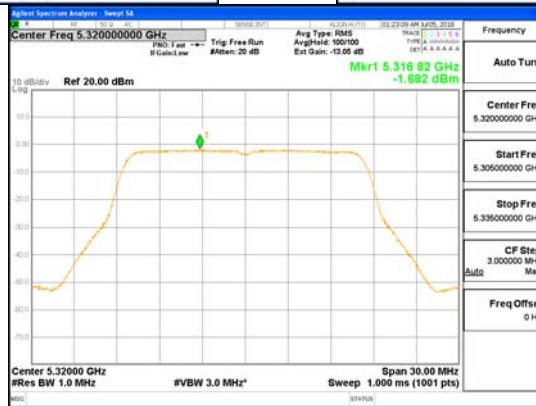
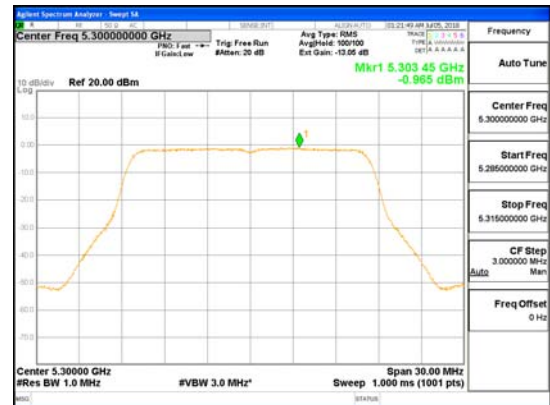
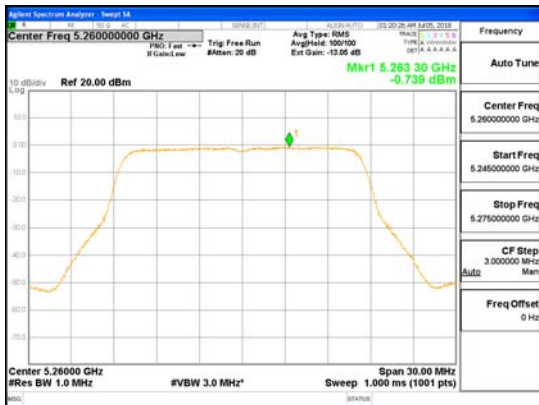
Test Mode	Frequency (MHz)	Measured Power Density (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11ac_VHT160	5 250	-1.43	0.11	-1.32	7.05	8.37
	5 570	-1.56	0.11	-1.45	7.05	8.50
Measurement uncertainty		± 1.5 dB				

See next pages for actual measured spectrum plots.

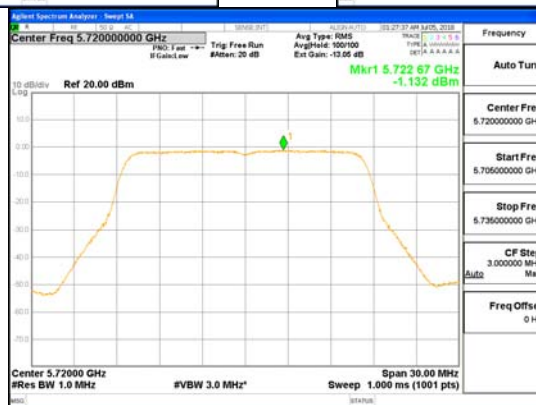
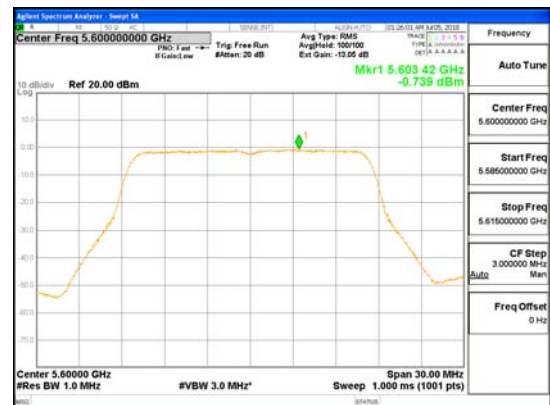
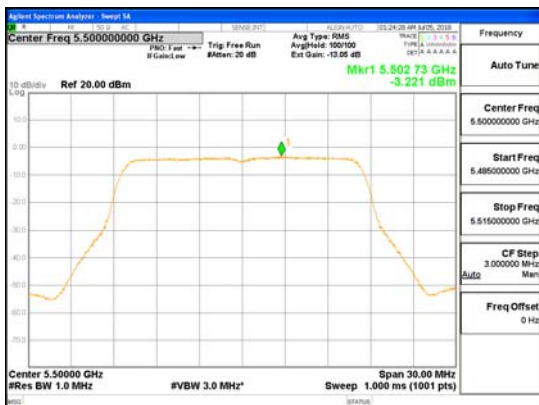


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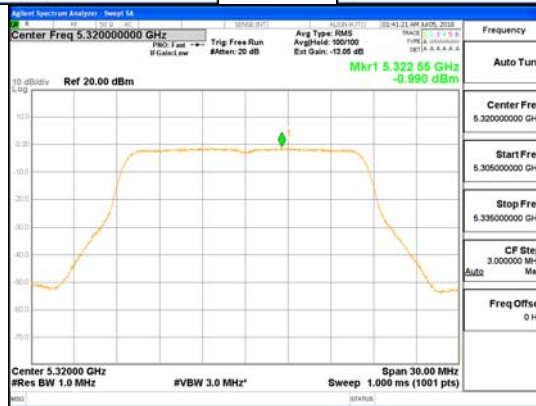
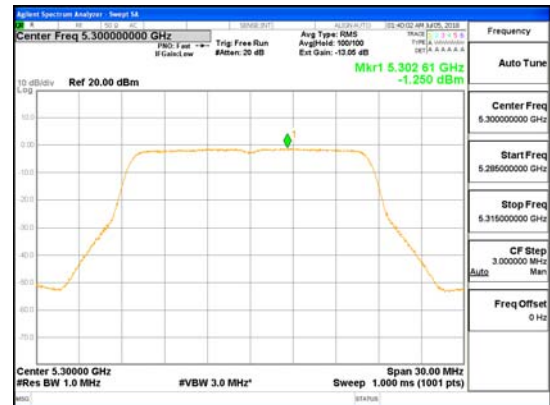
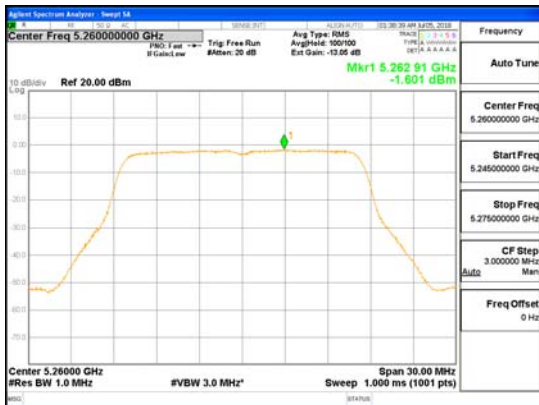
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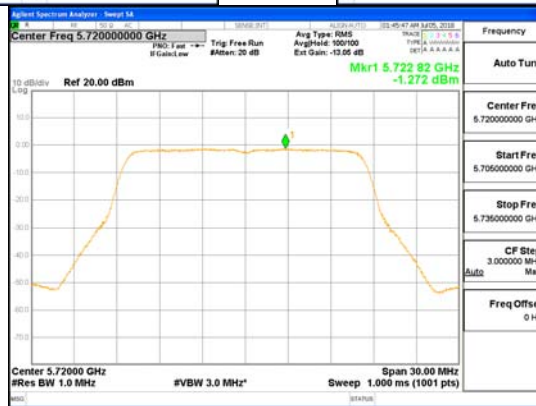
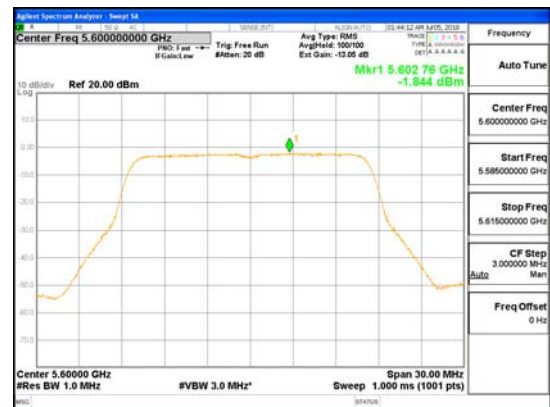
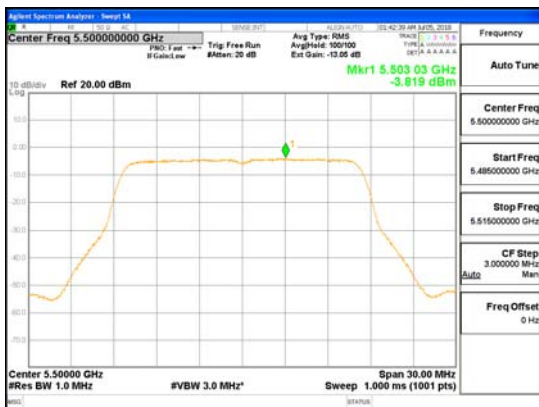
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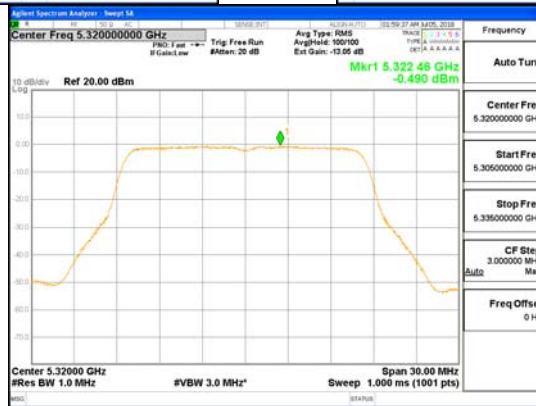
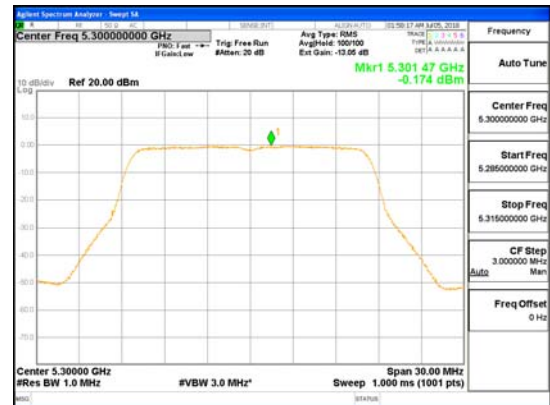
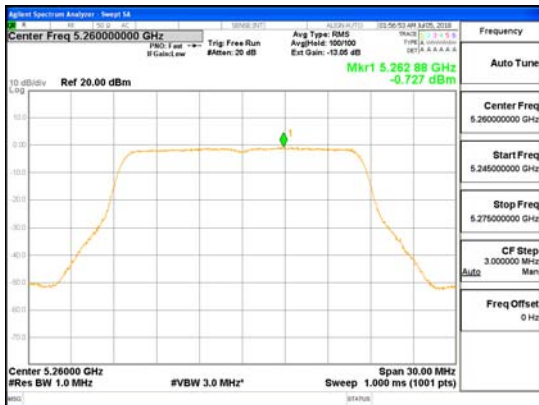
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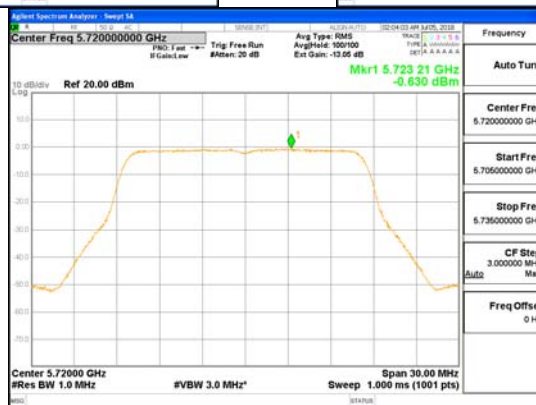
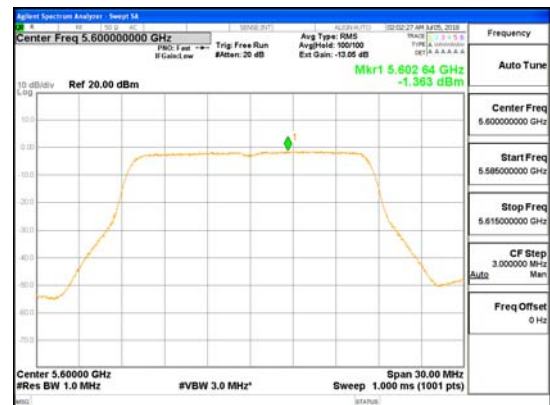
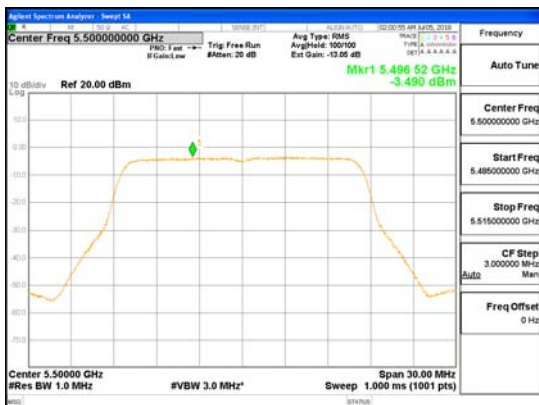
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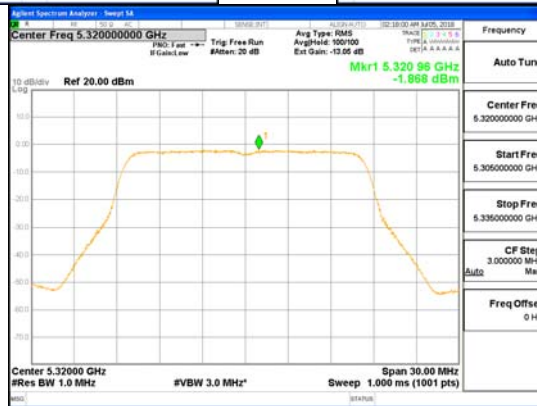
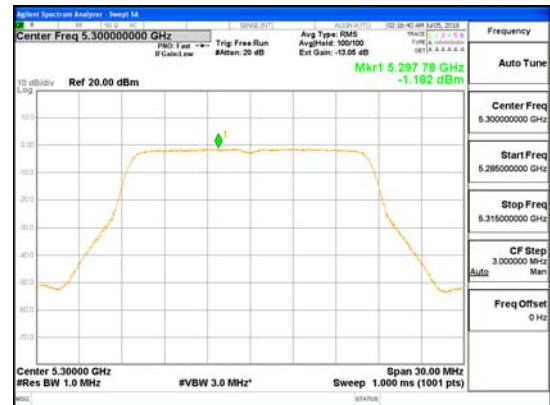
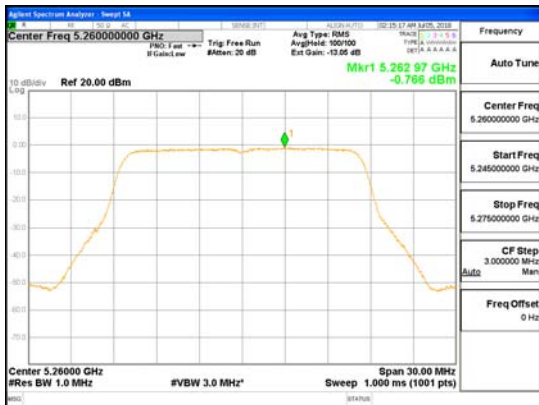


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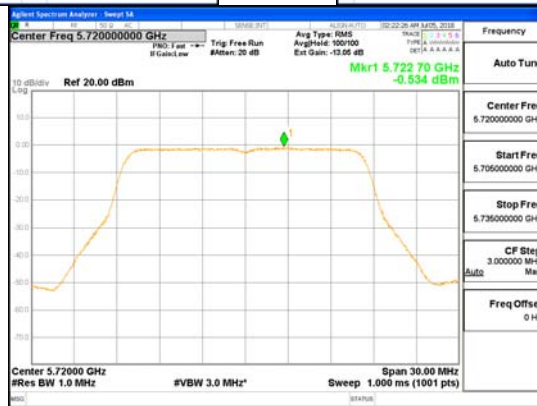
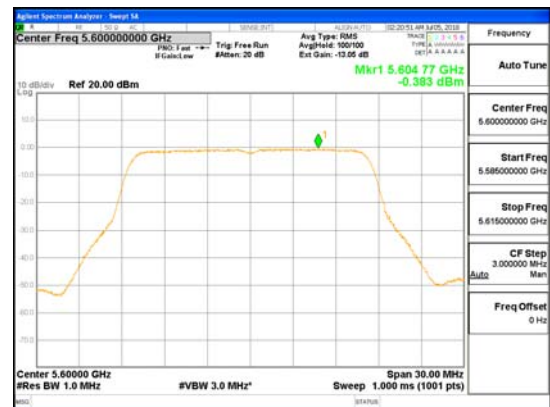
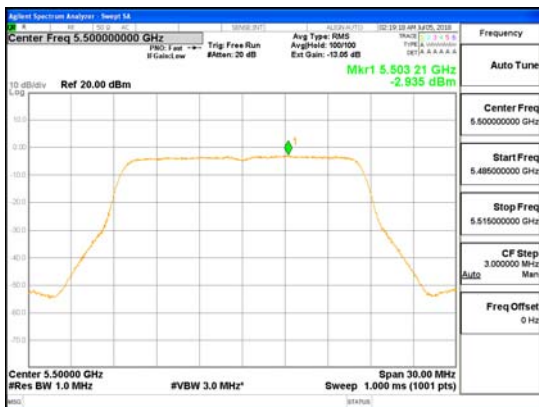


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ANT3_802.11a_UNII 2A

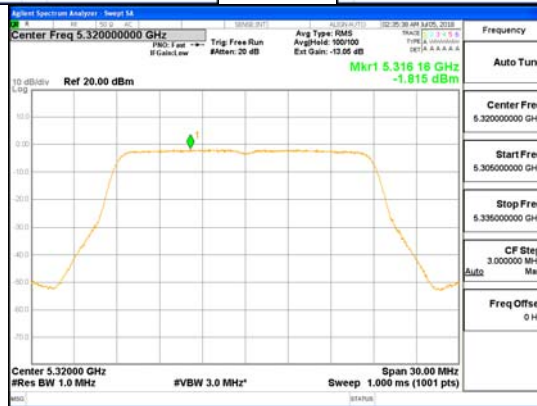
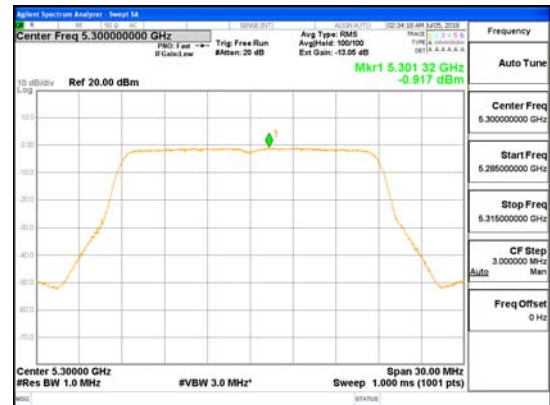
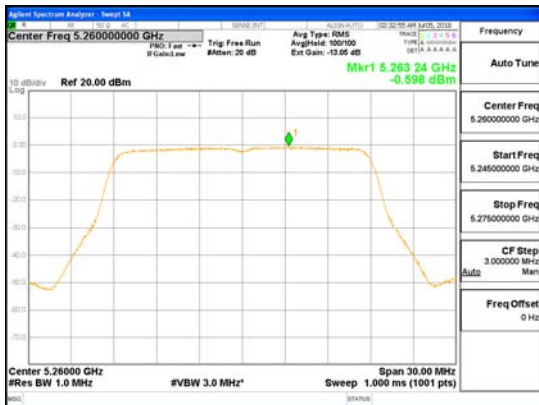


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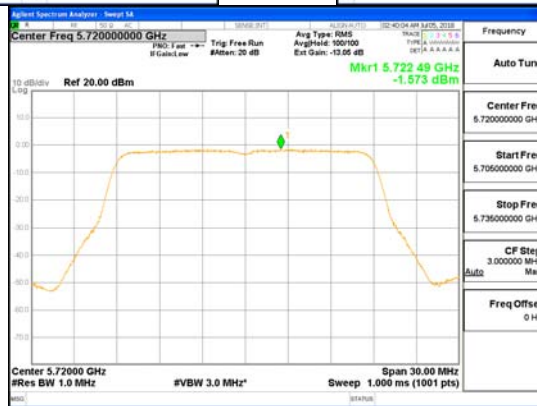
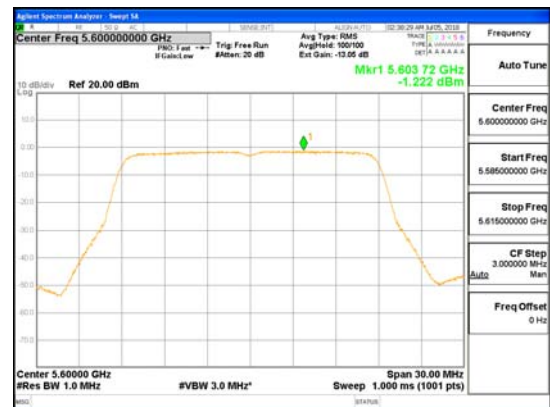
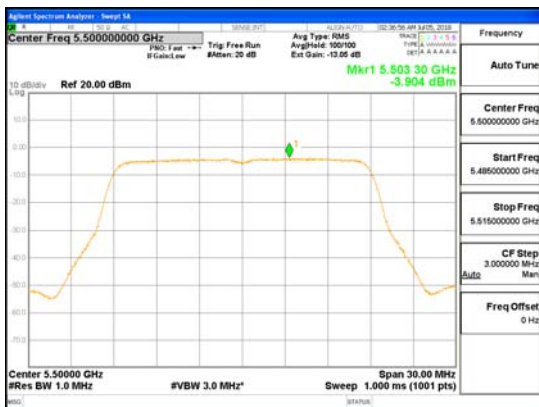


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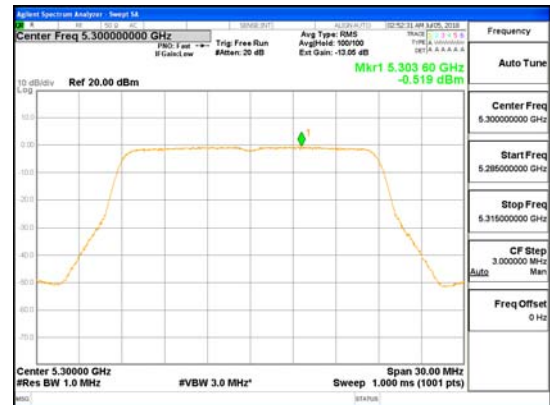
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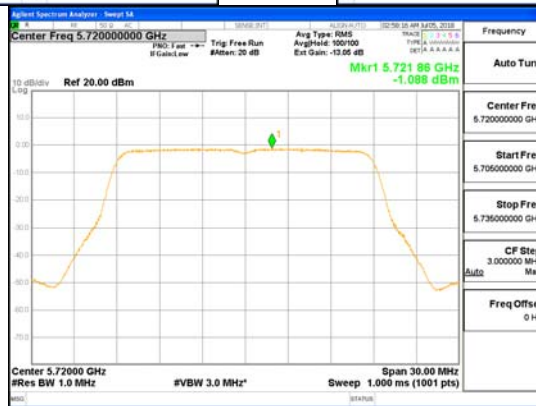
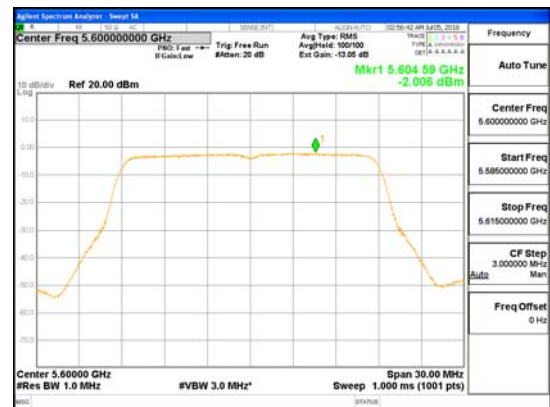
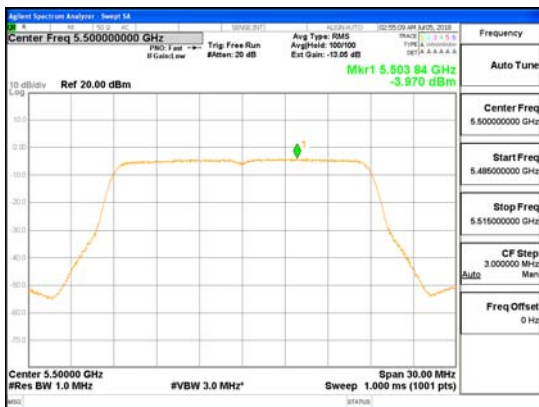
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ANTO_802.11n_HT20_UNII_2C



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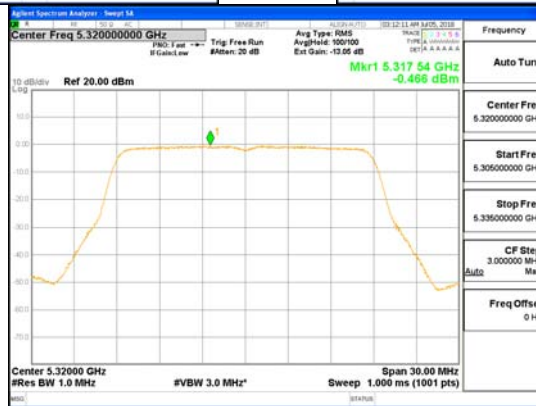
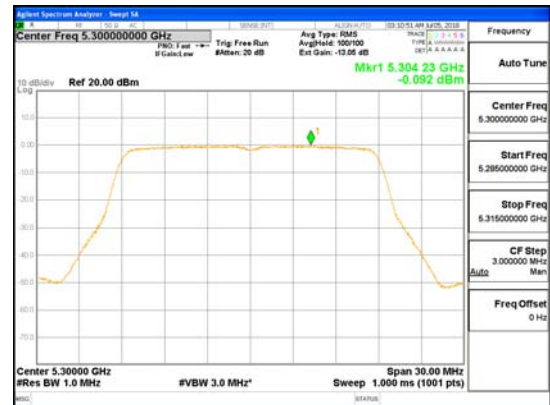
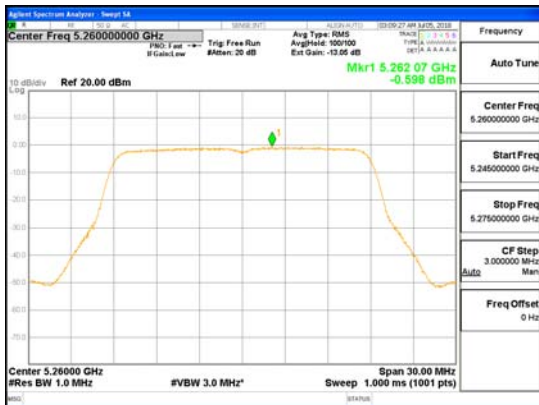


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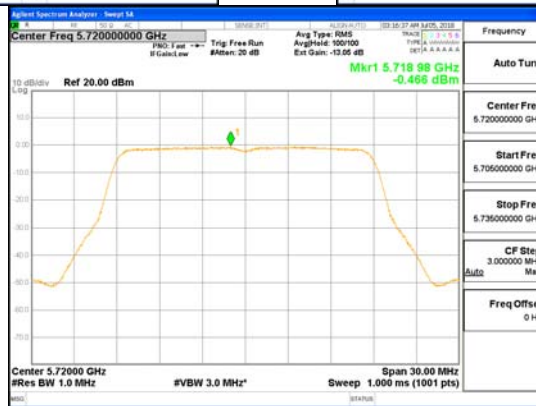
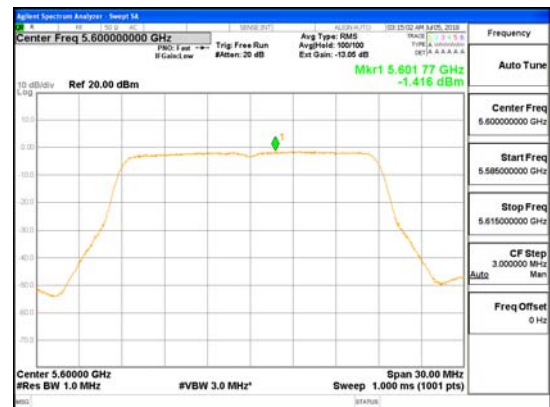
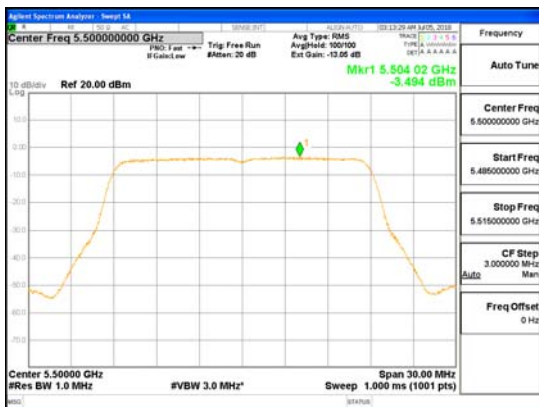


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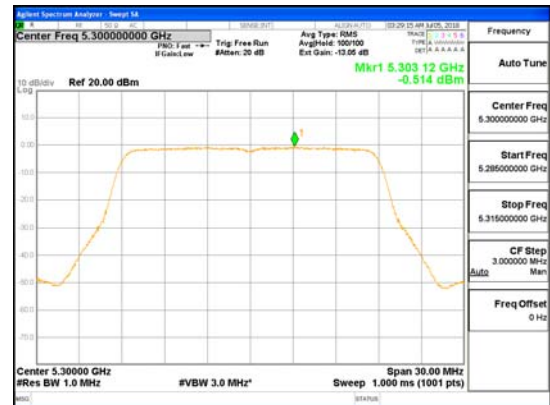
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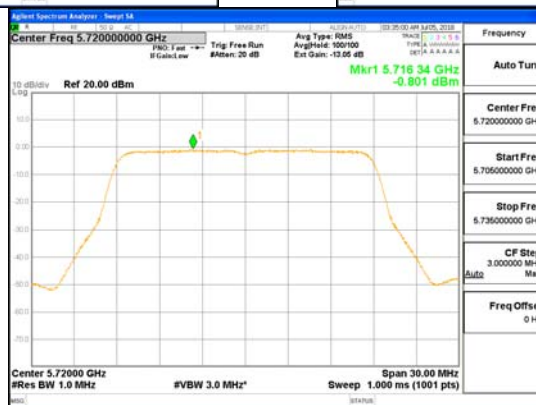
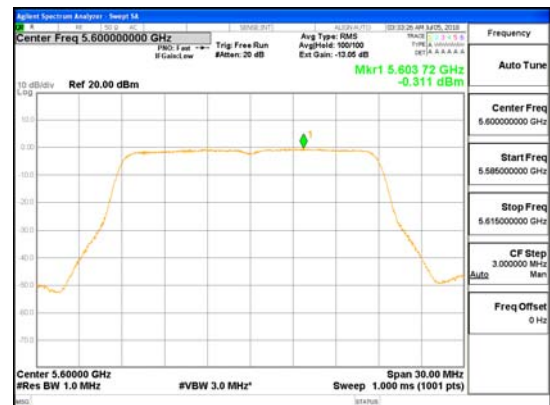
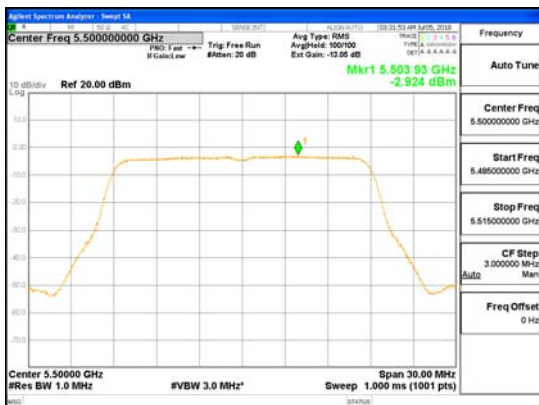
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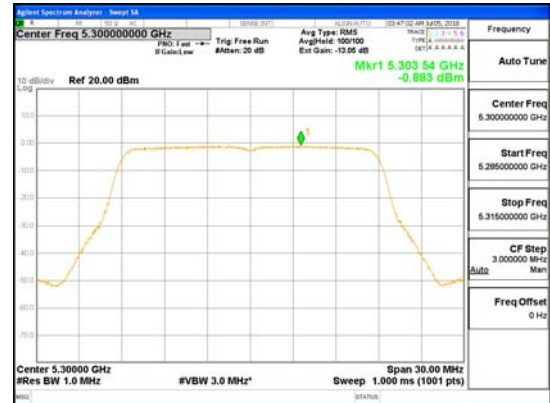
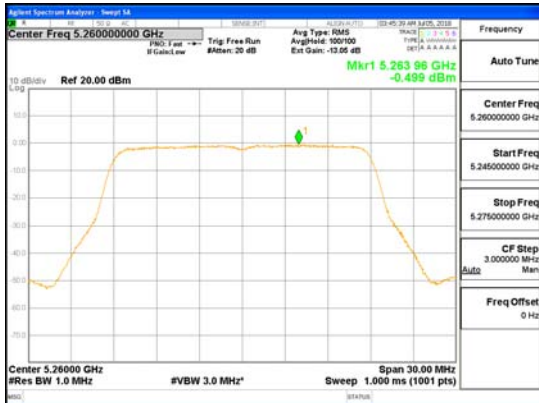
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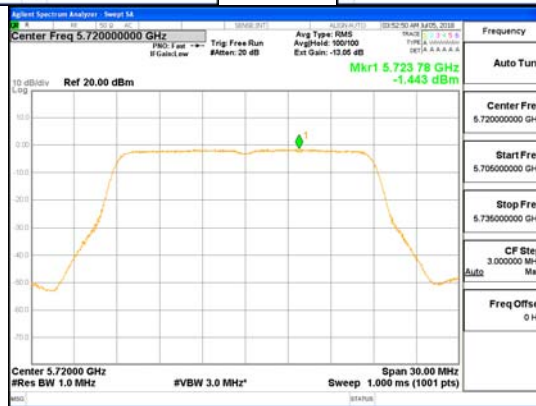
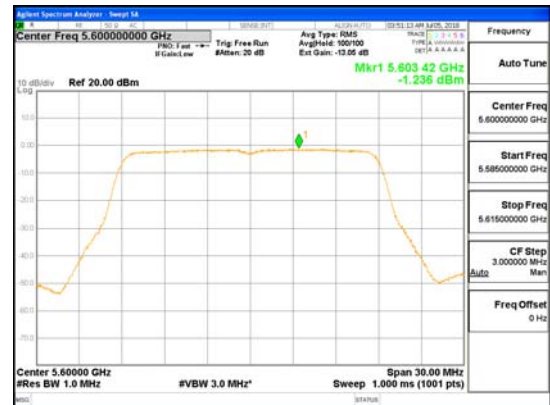
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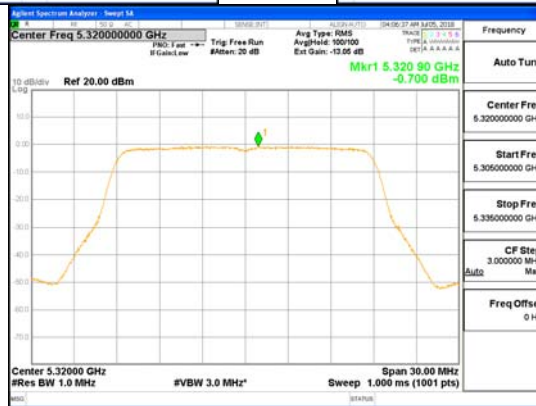
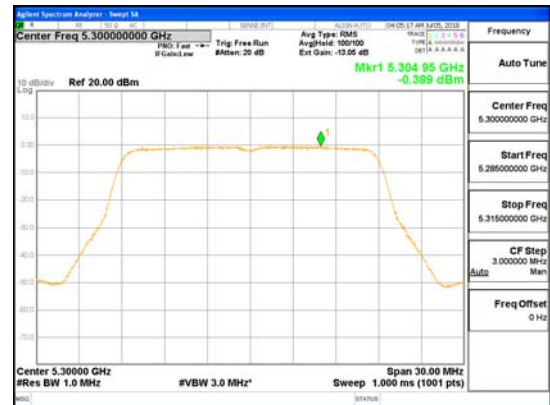
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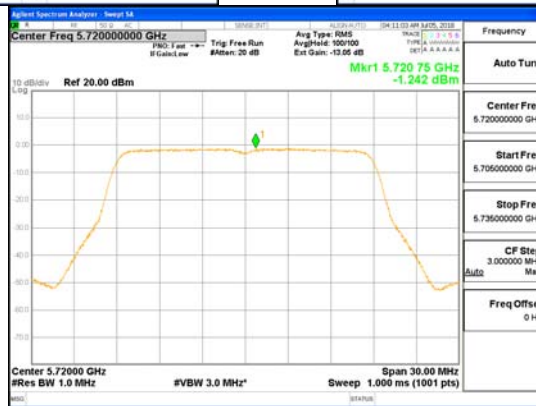
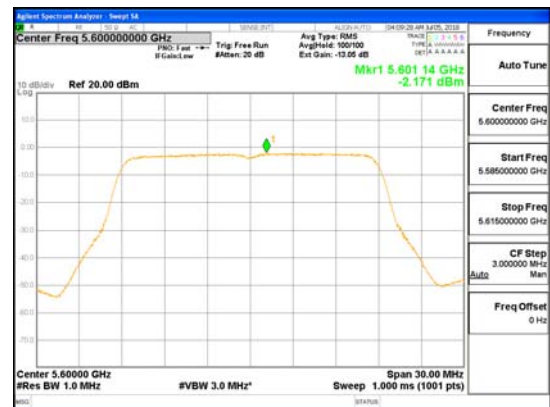
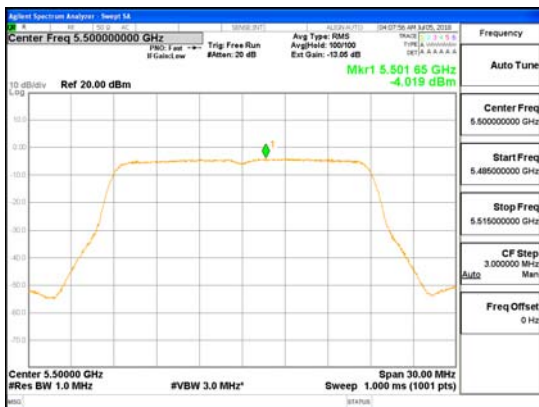
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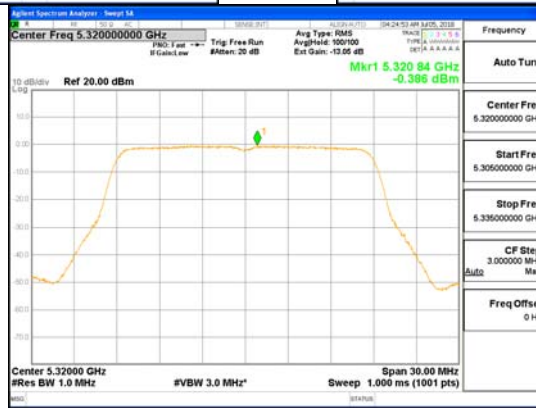
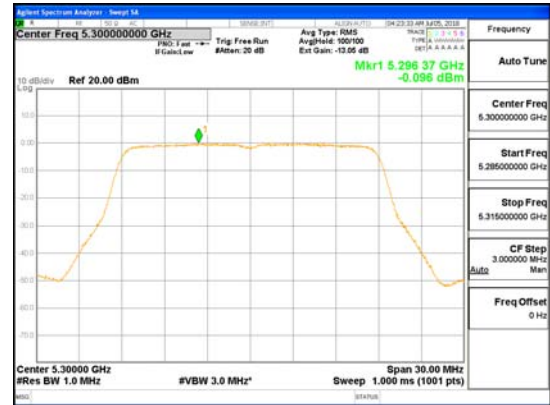
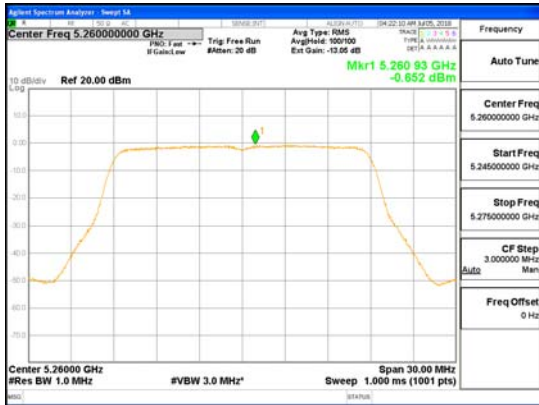
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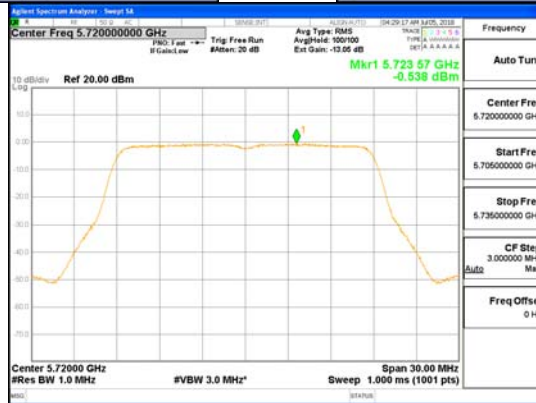
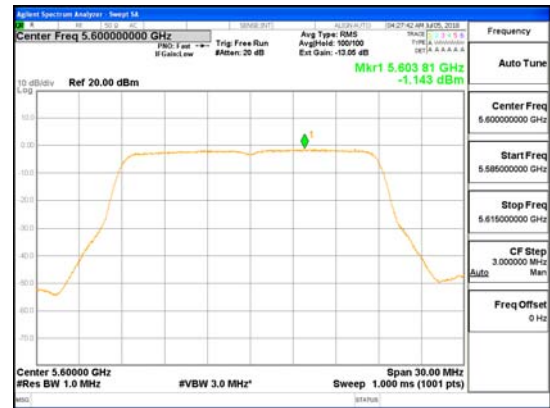
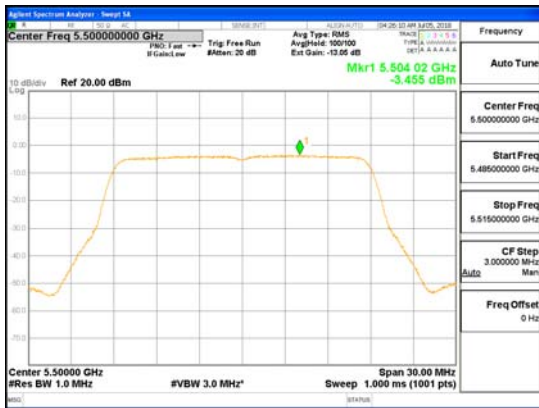
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ANT1_802.11ac_VHT20_UNII 2C



ANT2_802.11ac_VHT20_UNII 2A

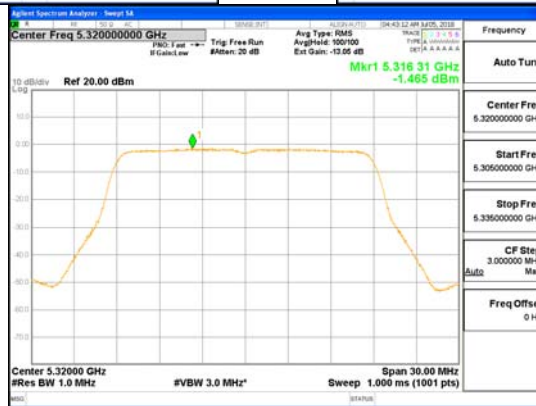
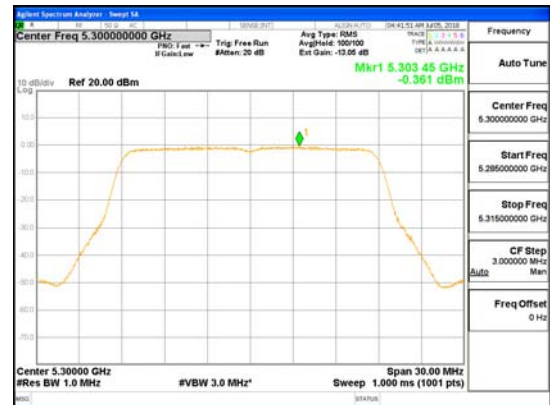
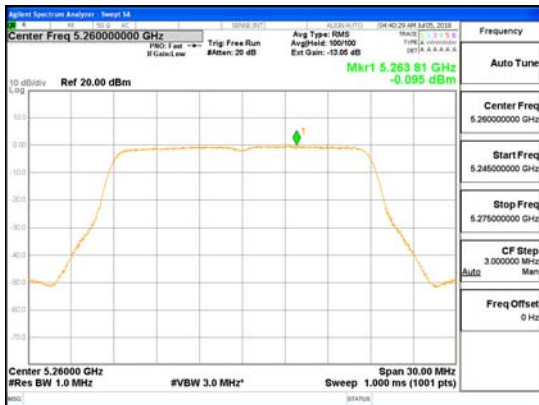


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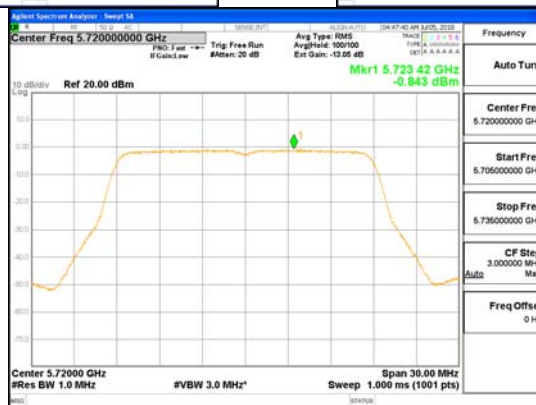
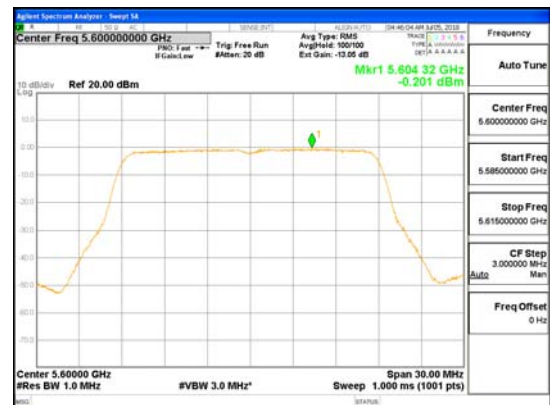
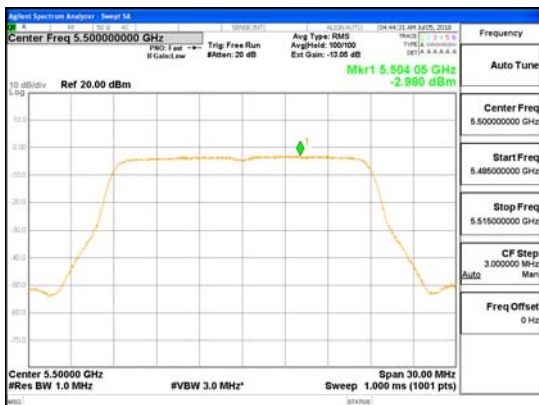


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ANT3_802.11ac_VHT20_UNII 2A

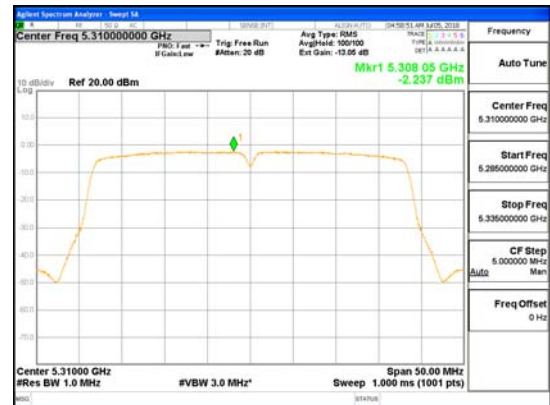


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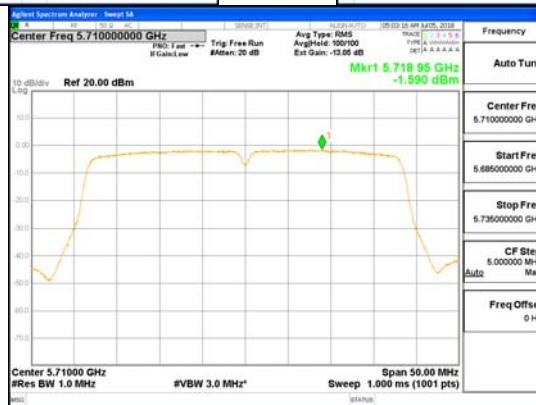


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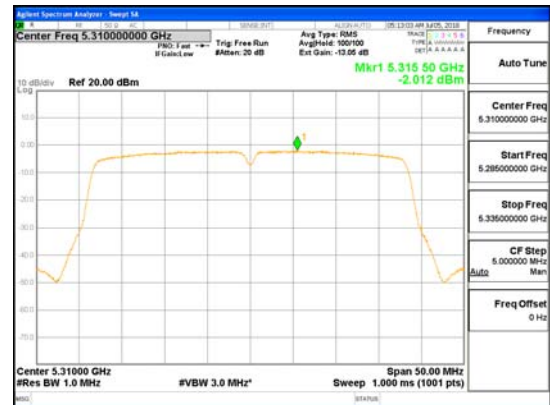
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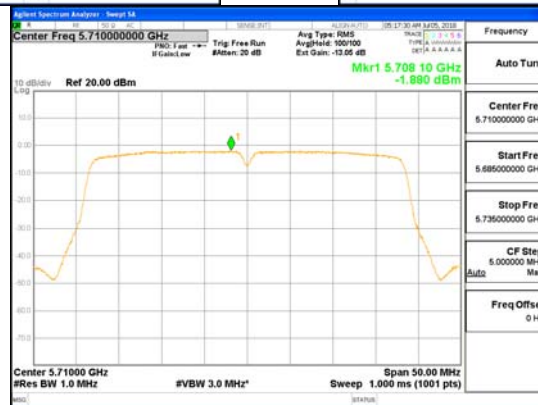
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ANTO_802.11n_HT40_UNII 2C



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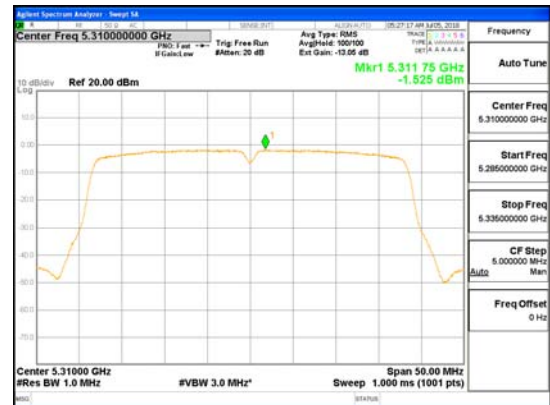


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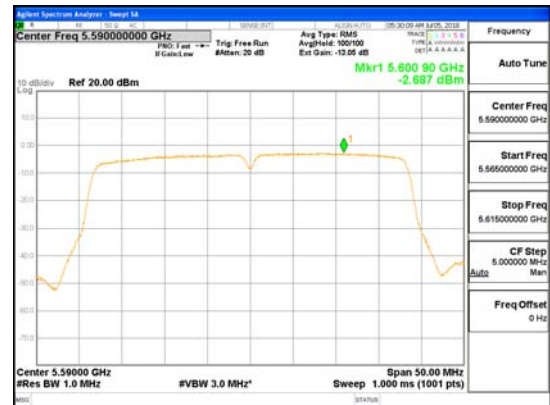


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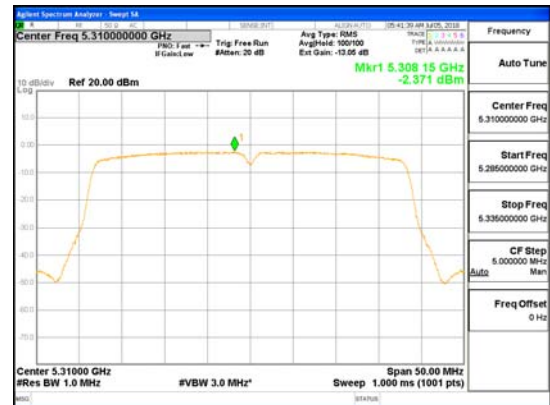


ANT2_802.11n_HT40_UNII_2C



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ANT3_802.11n_HT40_UNII 2A

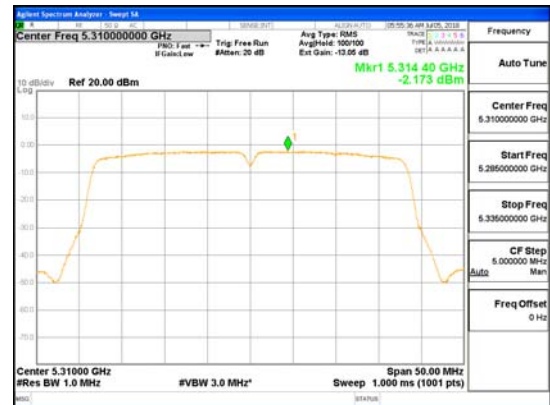
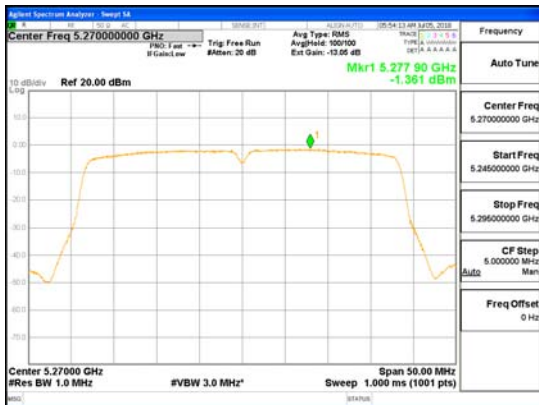


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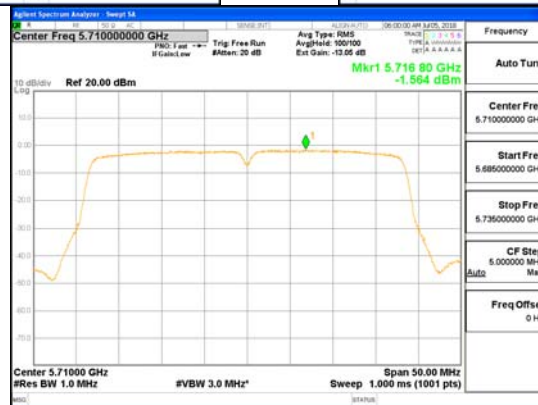
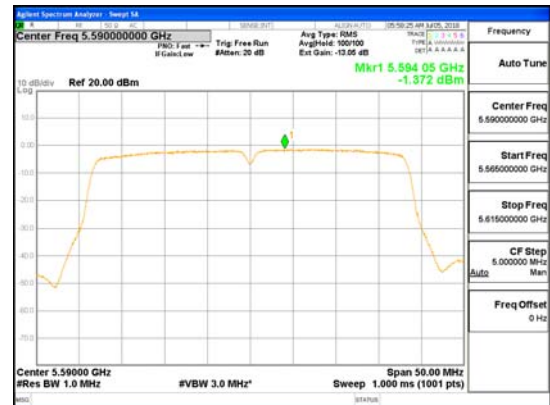


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ANTO_802.11ac_VHT40_UNII 2A

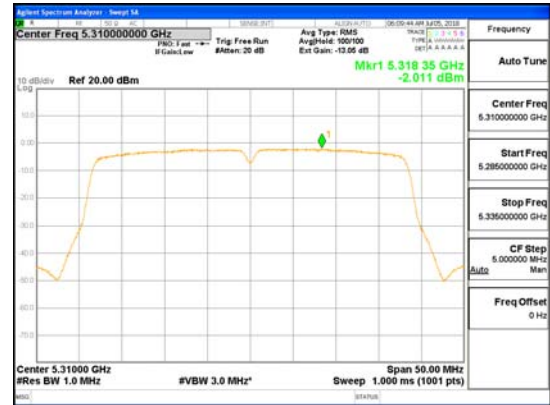


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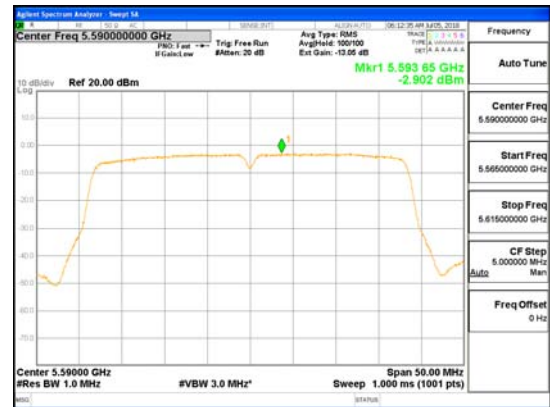
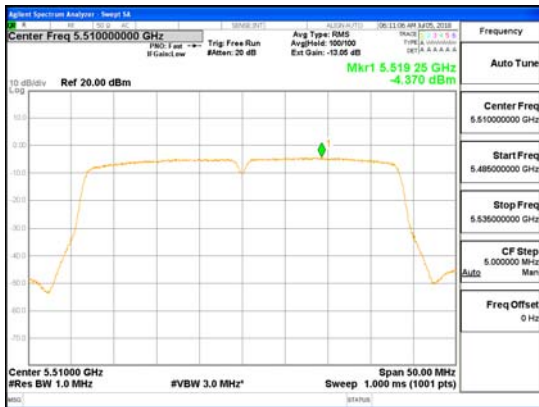


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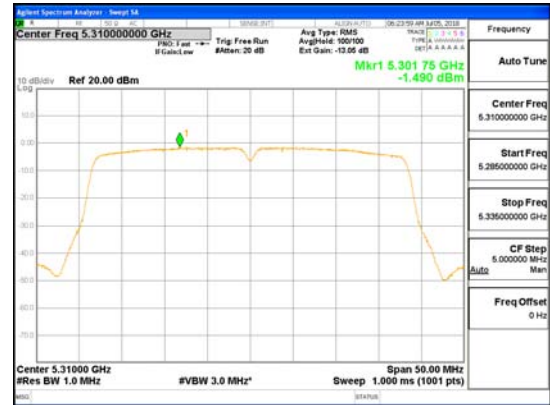


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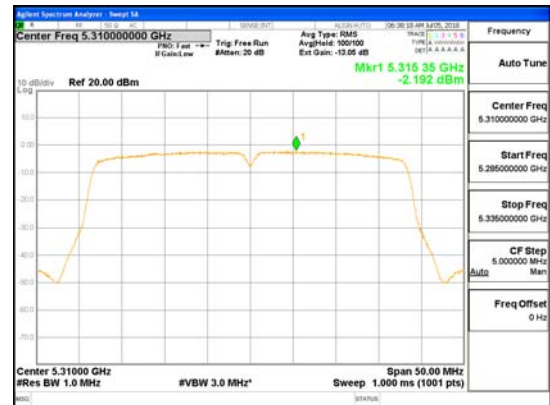


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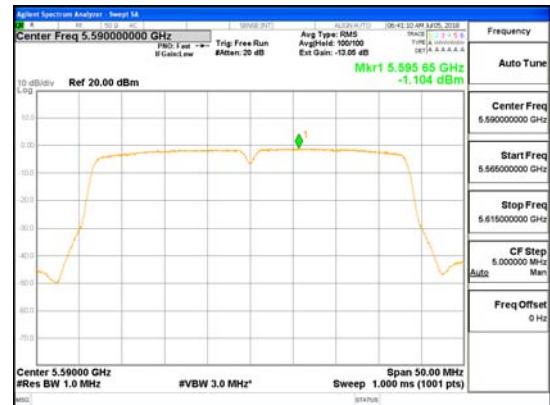


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ANT3_802.11ac_VHT40_UNII 2A



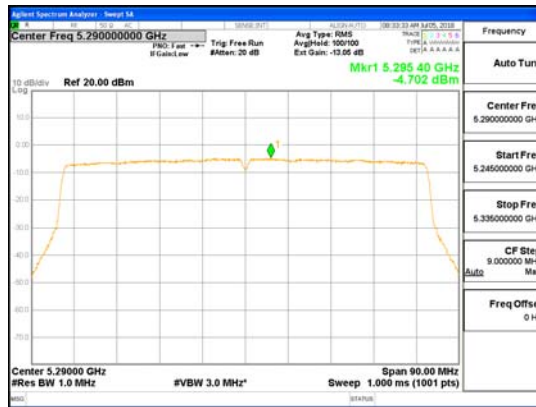
ANT3_802.11ac_VHT40_UNII 2C



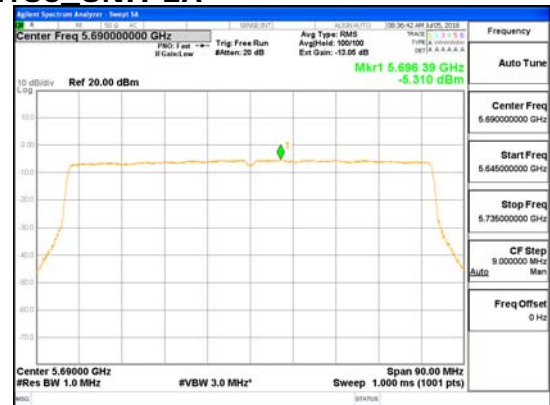


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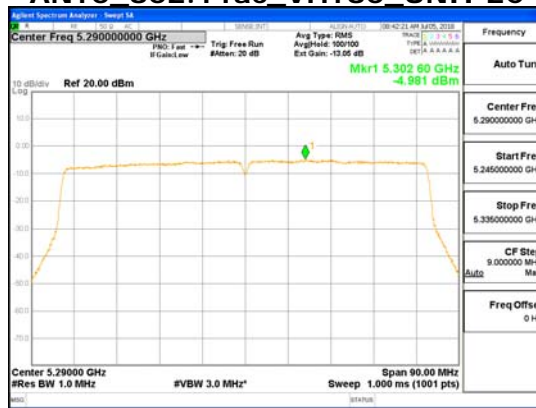
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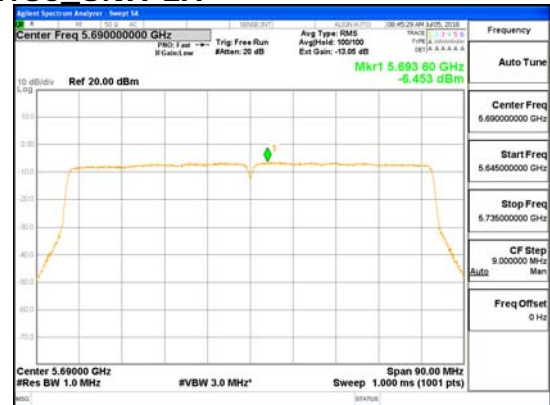
ANTO_802.11ac_VHT80_UNII_2A



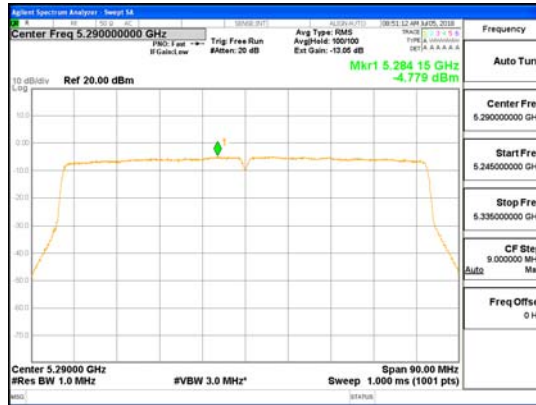
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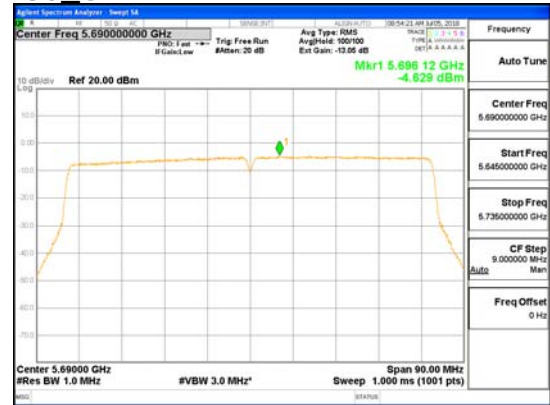
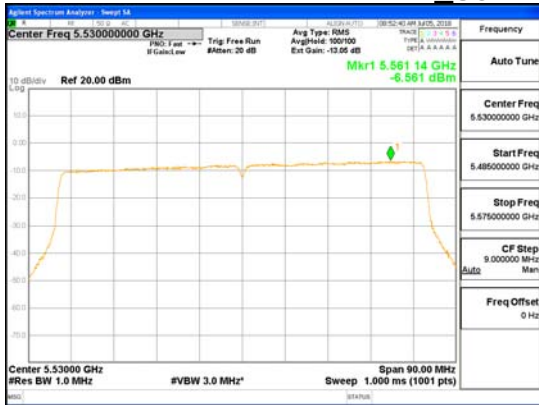
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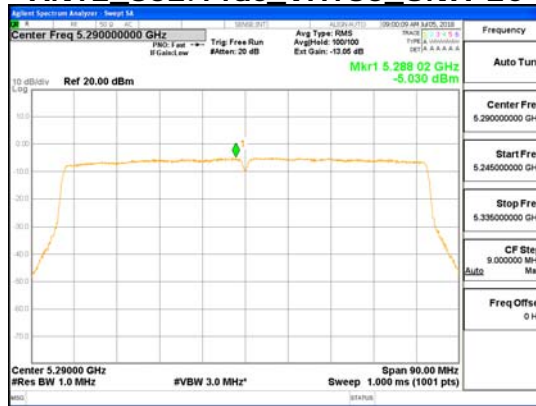
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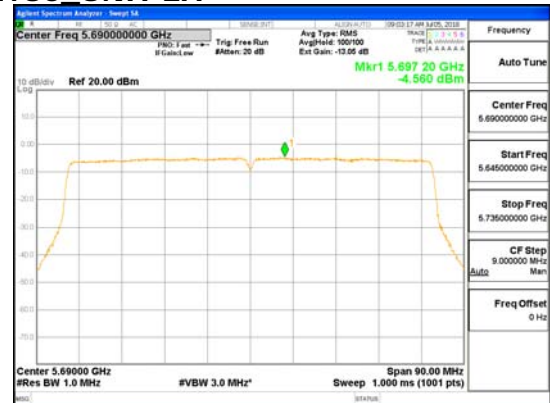
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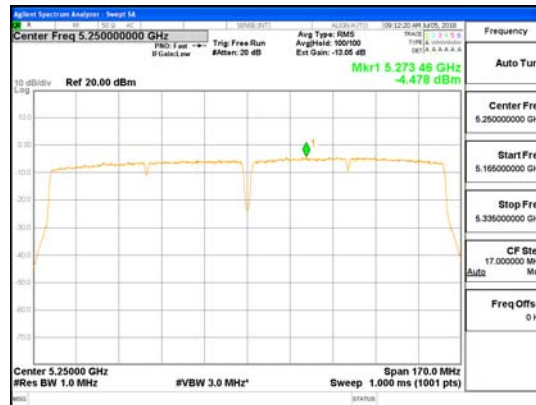
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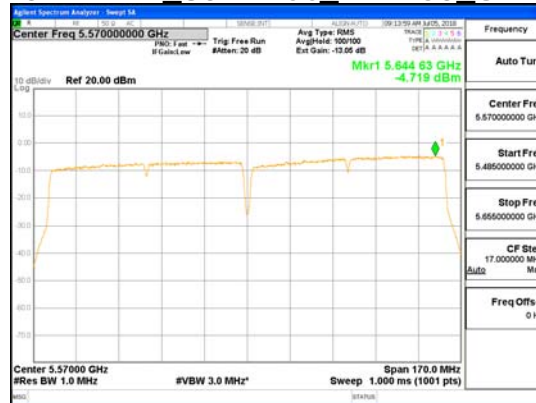
ANT3_802.11ac_VHT80_UNII_2A



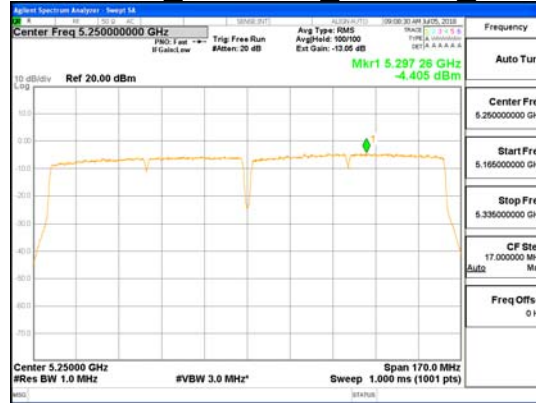
ANT3_802.11ac_VHT80_UNII_2C



ANTO + ANT2_802.11ac_VHT160_UNII 2A



ANTO + ANT2_802.11ac_VHT160_UNII 2C



ANT1 + ANT3_802.11ac_VHT160_UNII 2A



ANT1 + ANT3_802.11ac_VHT160_UNII 2C

4.4 Frequency Stability

Test Procedures

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -40°C and +65°C (Declaration by the Manufacturer). The temperature was incremented by 10°C (5°C) intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

Data for the worst case channel is shown below.

Temperature (°C)	-40	-30	-20	-10	0	10
Frequency	Measured Frequency Error (kHz)					
5 260 MHz	-21.011	13.462	33.949	40.787	36.655	43.152
5 300 MHz	-21.213	14.221	34.250	41.206	37.064	43.334
5 320 MHz	-21.270	14.354	34.415	41.227	37.203	43.493
5 500 MHz	-22.093	14.897	35.452	42.784	38.464	45.028
5 600 MHz	-22.246	15.232	16.262	43.524	39.164	45.637
5 720 MHz	-22.589	15.696	36.971	44.418	39.994	46.576

Temperature (°C)	20	30	40	50	60	65
Frequency	Measured Frequency Error (kHz)					
5 260 MHz	14.992	-7.630	-25.263	-39.808	-46.166	-45.263
5 300 MHz	15.092	-7.699	-25.475	-40.095	-46.485	-45.619
5 320 MHz	15.069	-7.806	-25.588	-40.264	-46.696	-45.788
5 500 MHz	15.599	-8.041	-26.517	-41.638	-48.297	-47.291
5 600 MHz	15.802	-8.215	-27.004	-42.405	-49.172	-48.176
5 720 MHz	16.168	-8.461	-27.599	-43.346	-50.235	-49.154

Note :

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature range as tested.

4.5 Unwanted Emissions

Test Location

- 10 m SAC (test distance : 10 m, 3 m)
 3 m SAC (test distance : 3 m)

Test Procedures

- 1) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- 2) In the frequency range above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

Test Settings:

Frequency Range = 9 kHz ~ 1 GHz

- a) RBW = 100 kHz for $f < 1$ GHz, 9 kHz for $f < 30$ MHz
b) VBW \geq RBW
c) Detector = CISPR Quasi-peak
d) Sweep time = auto couple

- Peak

Frequency Range = 1 GHz ~ 40 GHz

- a) RBW = 1 MHz
b) VBW $\geq 3 \times$ RBW
c) Detector = Peak
d) Sweep time = auto
e) Trace mode = max hold

- Average (duty cycle $\geq 98\%$)

Frequency Range = 1 GHz ~ 40 GHz

- a) RBW = 1 MHz
b) VBW $\geq 3 \times$ RBW
c) Detector = RMS
d) Sweep time = auto
e) Averaging type = power (i.e., RMS)
f) Trace mode = average (at least 100 traces)



- Average (duty cycle < 98%)

Frequency Range = 1 GHz ~ 40 GHz

a) RBW = 1 MHz

b) VBW ≥ 3 x RBW

c) Detector = RMS

d) Sweep time = auto

e) Averaging type = power (i.e., RMS)

f) Trace mode = average (at least 100 traces)

If power averaging (RMS) mode, then the applicable correction factor is $10 \log(1/x)$, where x is the duty cycle.

Test mode	Duty Cycle Factor (dB)
802.11a	0.11
802.11n_HT20	0.00
802.11n_HT40	0.10
802.11ac_VHT20	0.00
802.11ac_VHT40	0.09
802.11ac_VHT80	0.24
802.11ac_VHT160	0.11

Limit

- 15.209(a)

Frequency(MHz)	Field Strength uV/m@3m	Field Strength dBuV/m@3m	Deasurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705-30	30	-	30
30-88	100**	40	3
88-216	150**	43.5	3
216-960	200**	46	3
Above 960	500	54	3

** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

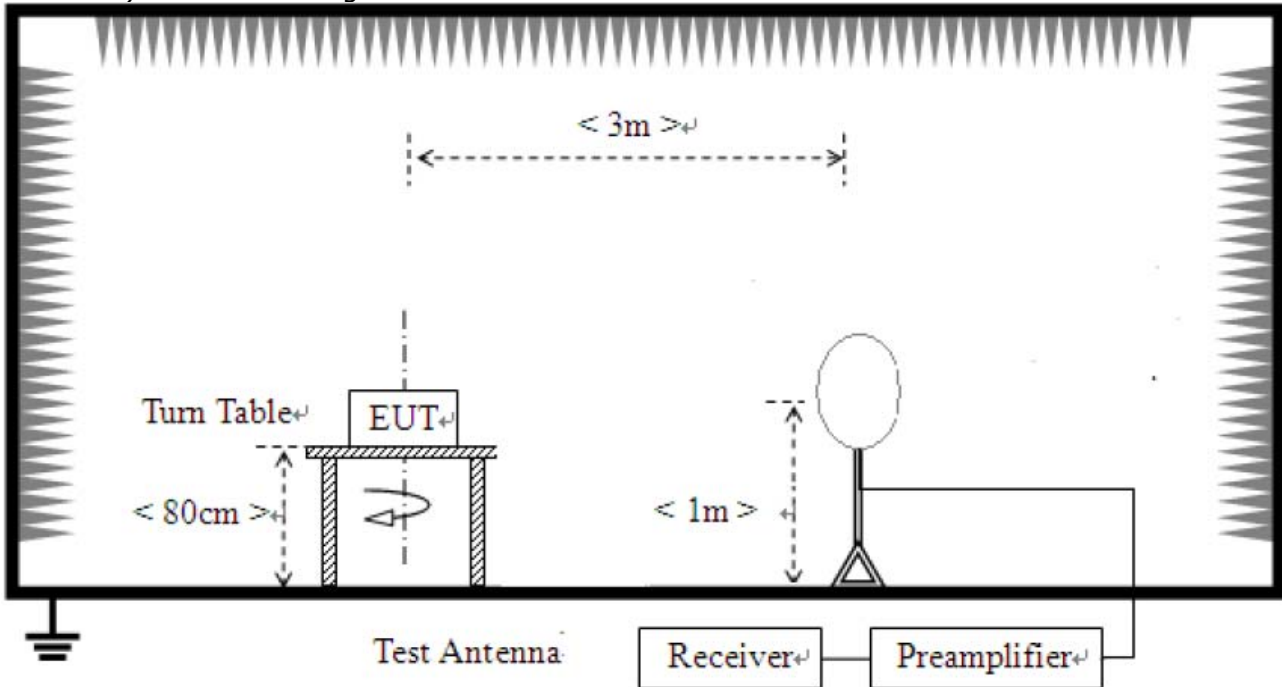
- 15.407, KDB 789033

E.I.R.P -27 dBm/MHz

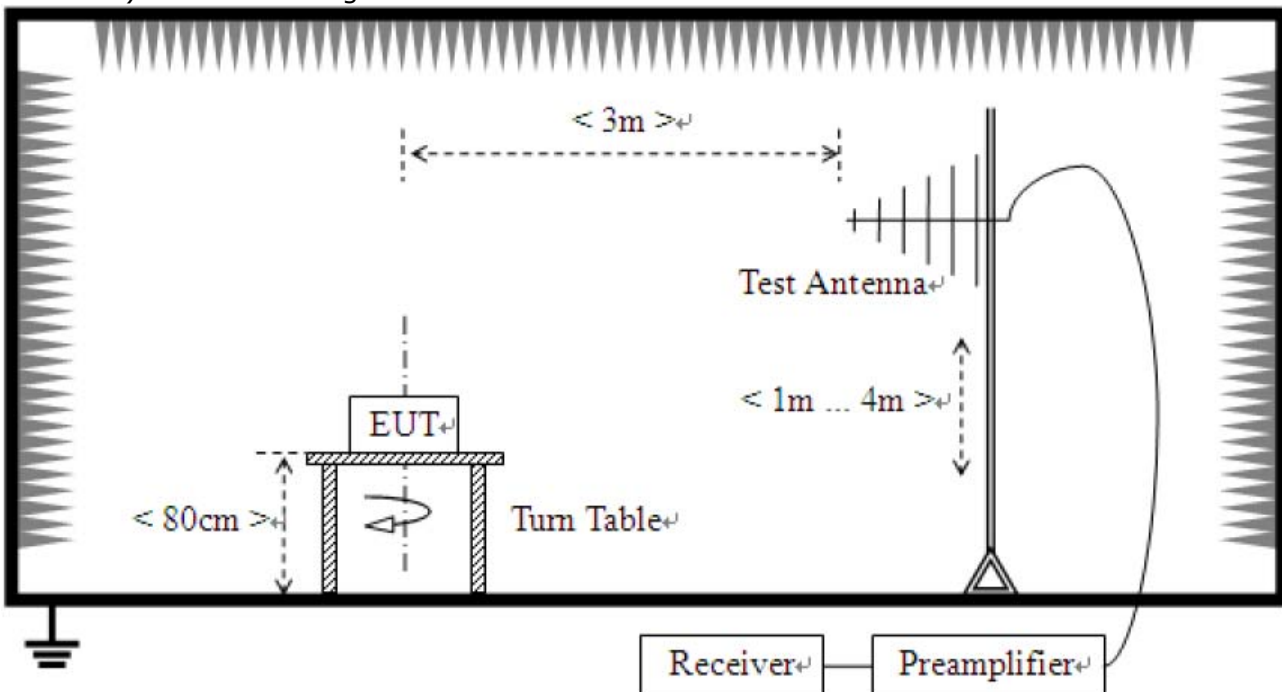
$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2$, for $d = 3\text{m}$

Test Setup:

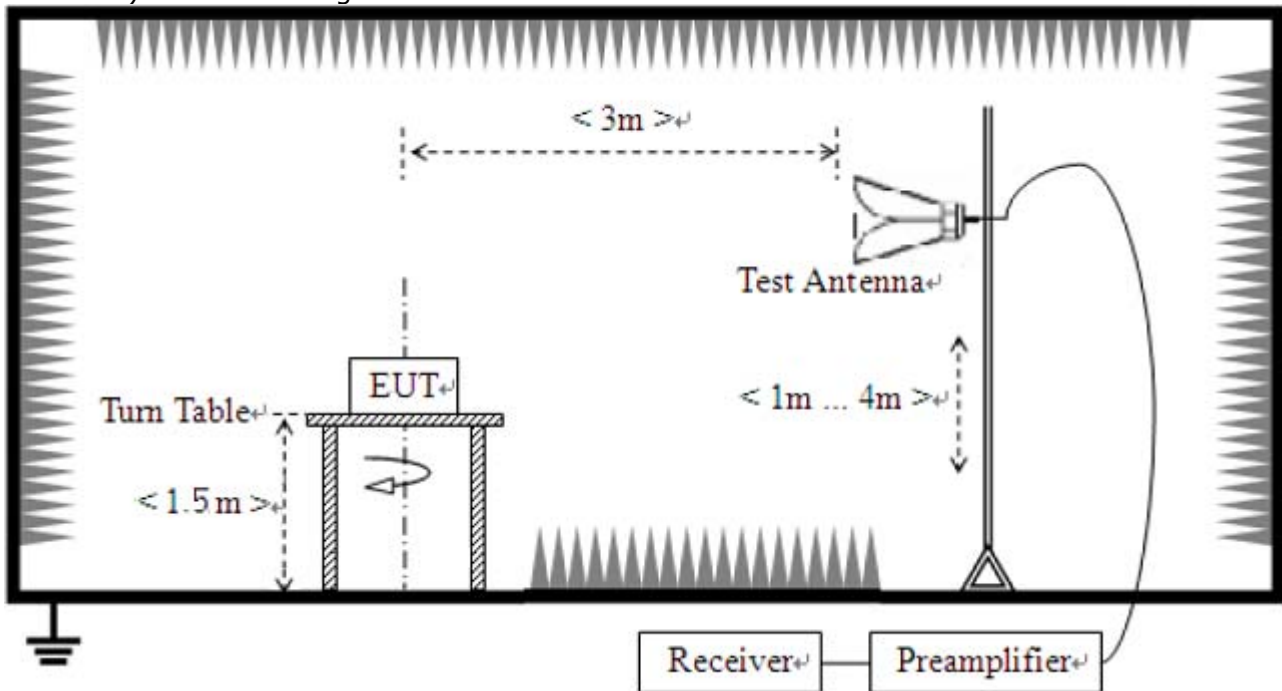
- 1) For field strength of emissions from 9 kHz to 30 MHz



- 2) For field strength of emissions from 30 MHz to 1 GHz



3) For field strength of emissions above 1 GHz



Test Mode

We have done all test mode.

The worst-case antenna configuration are determined to be as follows for each mode.

- 802.11a : ANT0 + ANT1 + ANT2 + ANT3 (MIMO)
- 802.11n : ANT0 + ANT1 + ANT2 + ANT3 (MIMO)
- 802.11ac : ANT0 + ANT1 + ANT2 + ANT3 (MIMO)

So the results are only attached worst cases.



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Test Results

1) 9 kHz to 30 MHz

Test mode : Transmitter, Receiver, 802.11a, 802.11n, 802.11ac (Worst case)

The requirements are:

Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	See note

Note :

The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB)

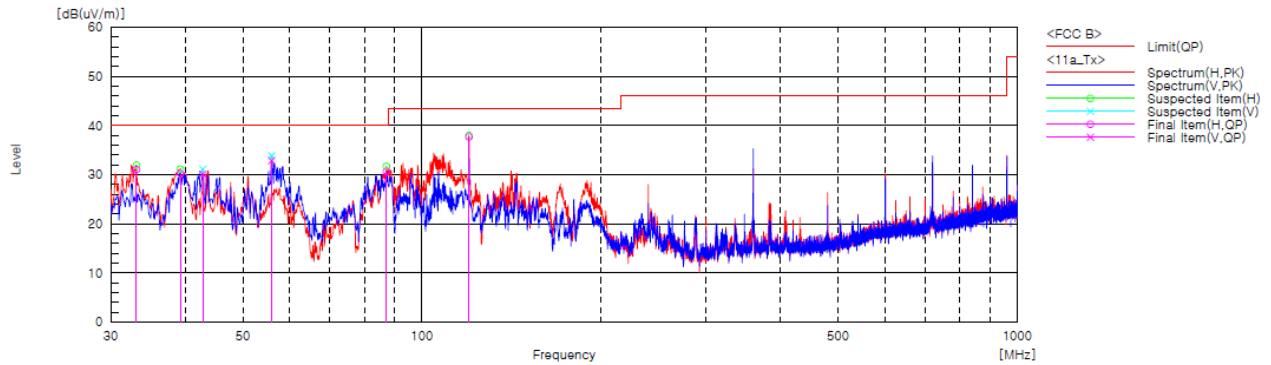
2) 30 MHz to 1 GHz

Test mode : Transmitter, 802.11a(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	33.157	H	46.1	-15.1	31.0	40.0	9.0	99.8	141.8	
2	39.254	H	43.9	-13.7	30.2	40.0	9.8	99.8	1.9	
3	42.846	V	42.7	-12.6	30.1	40.0	9.9	99.8	306.3	
4	55.911	V	45.9	-13.0	32.9	40.0	7.1	99.8	258.2	
5	87.156	H	47.5	-16.8	30.7	40.0	9.3	99.8	294.2	
6	119.925	H	53.5	-15.8	37.7	43.5	5.8	99.8	303.4	

Remark :

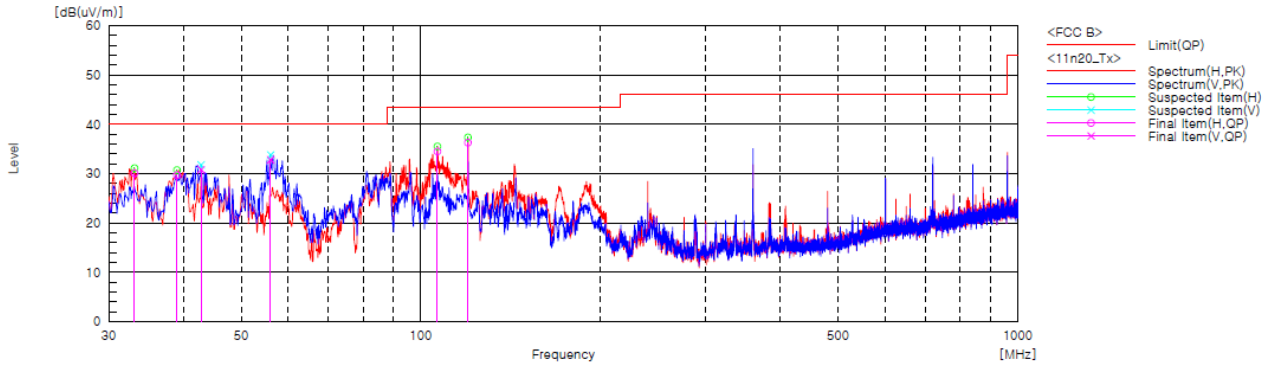
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Transmitter, 802.11n_HT20(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Height [cm]	Angle [deg]	Remark
1	33.157	H	45.2	-15.1	30.1	40.0	9.9	99.8	101.7	
2	39.036	H	43.5	-13.8	29.7	40.0	10.3	99.8	349.7	
3	42.846	V	43.4	-12.6	30.8	40.0	9.2	99.8	341.0	
4	56.019	V	45.8	-13.0	32.8	40.0	7.2	99.8	341.0	
5	106.643	H	48.9	-14.4	34.5	43.5	9.0	99.8	304.1	
6	119.925	H	52.1	-15.8	36.3	43.5	7.2	99.8	280.4	

Remark :

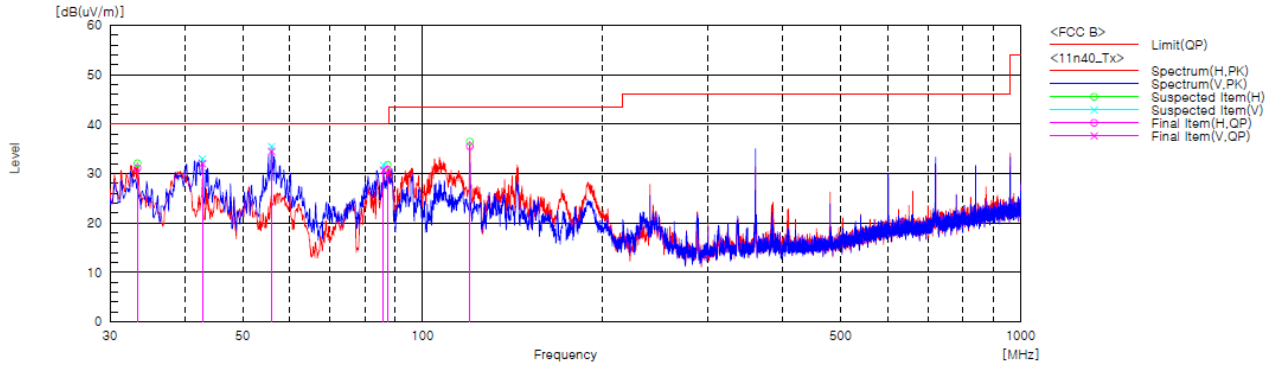
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Transmitter, 802.11n_HT40(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	33.375	H	46.2	-15.1	31.1	40.0	8.9	99.8	145.5	
2	42.846	V	44.6	-12.6	32.0	40.0	8.0	99.8	331.9	
3	55.911	V	47.5	-13.0	34.5	40.0	5.5	99.8	251.0	
4	86.067	V	47.8	-17.1	30.7	40.0	9.3	99.8	218.2	
5	87.373	H	47.5	-16.7	30.8	40.0	9.2	99.8	255.8	
6	119.925	H	51.3	-15.8	35.5	43.5	8.0	99.8	292.1	

Remark :

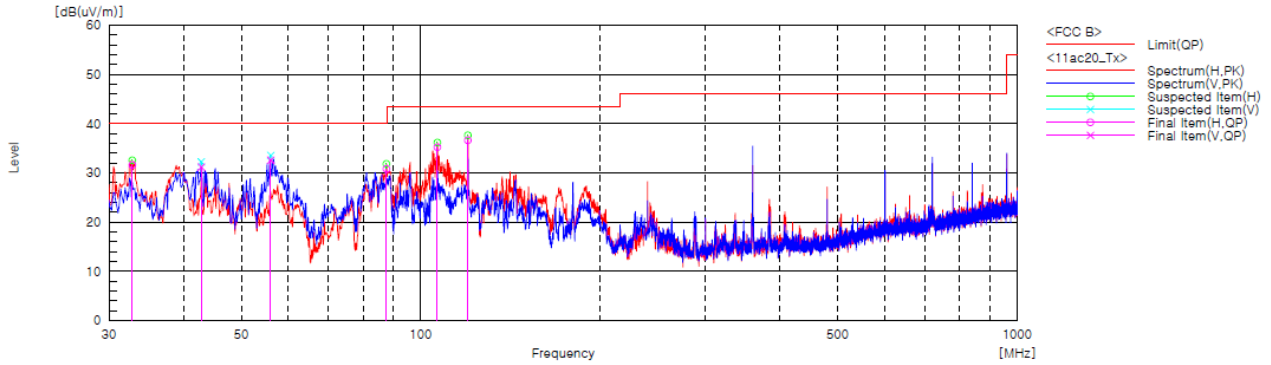
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Transmitter, 802.11ac_VHT20(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	32.831	H	46.7	-15.1	31.6	40.0	8.4	99.8	125.3	
2	42.846	V	43.8	-12.6	31.2	40.0	8.8	99.8	225.0	
3	56.019	V	45.6	-13.0	32.6	40.0	7.4	99.8	238.4	
4	87.591	H	47.4	-16.6	30.8	40.0	9.2	99.8	283.1	
5	106.643	H	49.6	-14.4	35.2	43.5	8.3	99.8	283.1	
6	119.925	H	52.4	-15.8	36.6	43.5	6.9	99.8	305.3	

Remark :

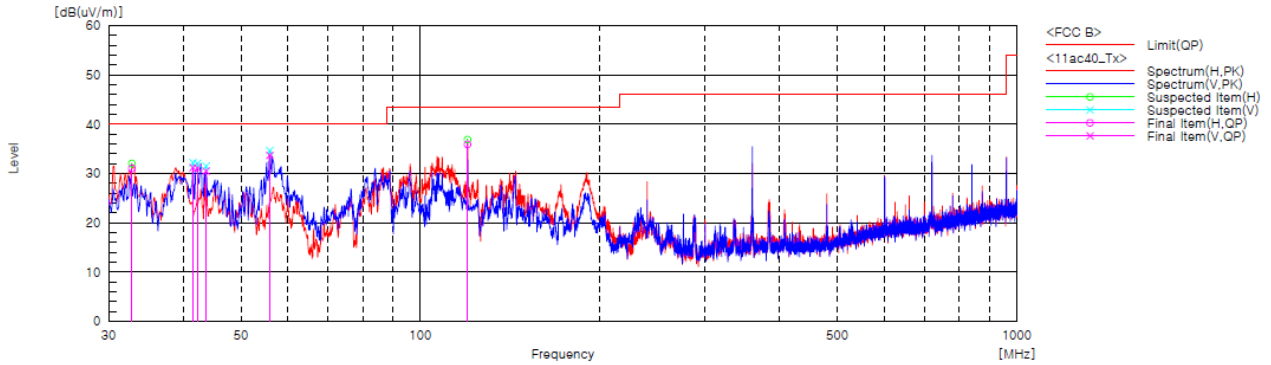
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Transmitter, 802.11ac_VHT40(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Height [cm]	Angle [deg]	Remark
1	32.831	H	46.1	-15.1	31.0	40.0	9.0	99.8	314.0	
2	41.540	V	44.1	-12.9	31.2	40.0	8.8	99.8	2.7	
3	42.302	V	43.8	-12.7	31.1	40.0	8.9	99.8	312.5	
4	43.717	V	43.0	-12.5	30.5	40.0	9.5	99.8	78.0	
5	55.911	V	46.7	-13.0	33.7	40.0	6.3	99.8	246.8	
6	119.925	H	51.7	-15.8	35.9	43.5	7.6	99.8	265.8	

Remark :

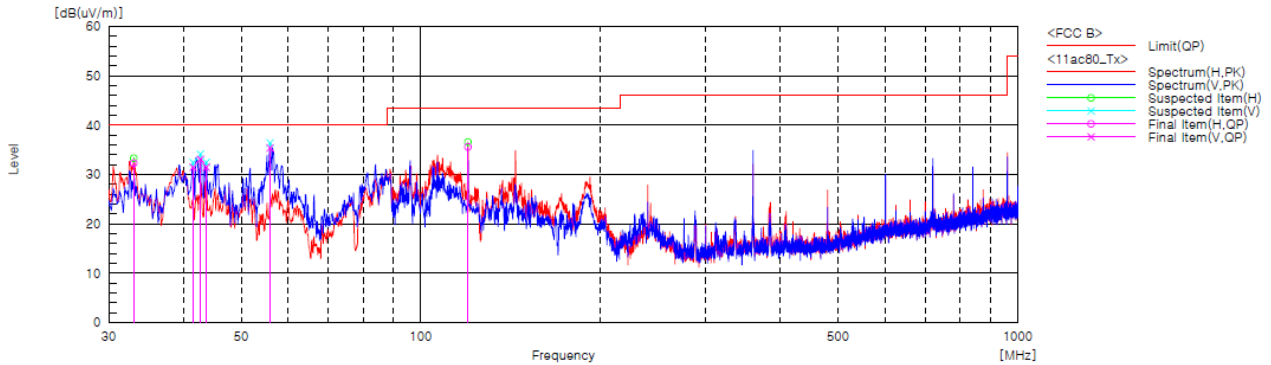
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Transmitter, 802.11ac_VHT80(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading OP [dB(uV)]	c.f [dB(1/m)]	Result OP [dB(uV/m)]	Limit OP [dB(uV/m)]	Margin OP [dB]	Height [cm]	Angle [deg]	Remark
1	33.048	H	47.4	-15.1	32.3	40.0	7.7	99.8	133.7	
2	41.540	V	44.4	-12.9	31.5	40.0	8.5	99.8	328.5	
3	42.738	V	45.7	-12.6	33.1	40.0	6.9	99.8	280.5	
4	43.717	V	44.0	-12.5	31.5	40.0	8.5	99.8	67.1	
5	55.911	V	48.4	-13.0	35.4	40.0	4.6	99.8	292.7	
6	119.925	H	51.4	-15.8	35.6	43.5	7.9	99.8	304.7	

Remark :

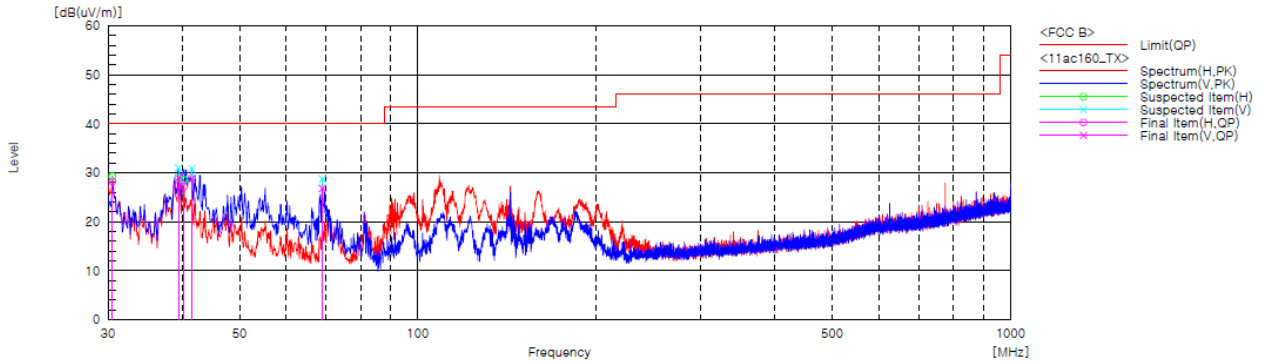
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Transmitter, 802.11ac_VHT160(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	30,544	H	43.4	-15.2	28.2	40.0	11.8	99.8	345.0	
2	39,471	V	42.6	-13.6	29.0	40.0	11.0	99.8	328.2	
3	39,471	H	41.0	-13.6	27.4	40.0	12.6	99.8	54.2	
4	40,342	H	40.4	-13.2	27.2	40.0	12.8	99.8	42.8	
5	41,540	V	41.7	-12.9	28.8	40.0	11.2	99.8	292.6	
6	68,975	V	43.0	-16.2	26.8	40.0	13.2	99.8	259.7	

Remark :

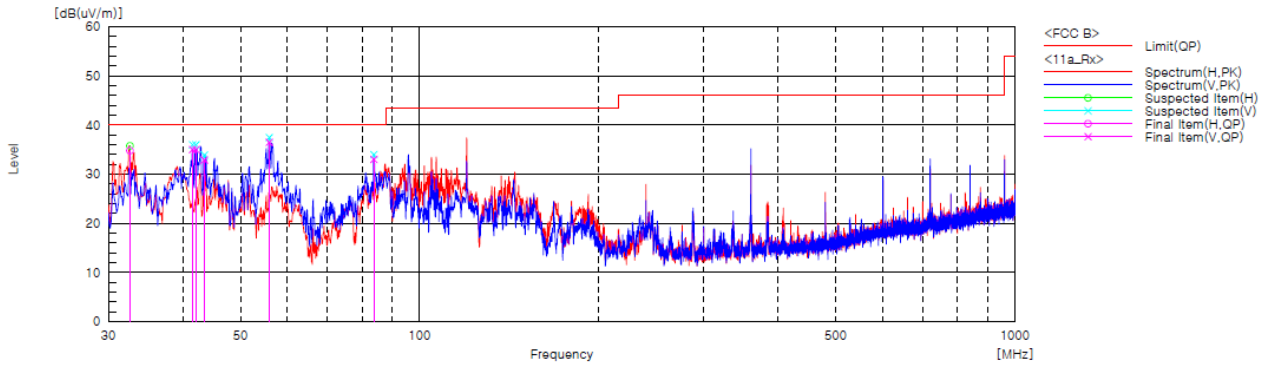
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Receiver, 802.11a(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Height [cm]	Angle [deg]	Remark
1	32.613	H	49.9	-15.1	34.8	40.0	5.2	99.8	117.1	
2	41.540	V	47.9	-12.9	35.0	40.0	5.0	99.8	358.6	
3	42.084	V	47.7	-12.7	35.0	40.0	5.0	99.8	334.2	
4	43.500	V	45.4	-12.5	32.9	40.0	7.1	99.8	358.6	
5	55.911	V	49.5	-13.0	36.5	40.0	3.5	99.8	284.1	
6	83.781	V	50.7	-17.7	33.0	40.0	7.0	99.8	271.8	

Remark :

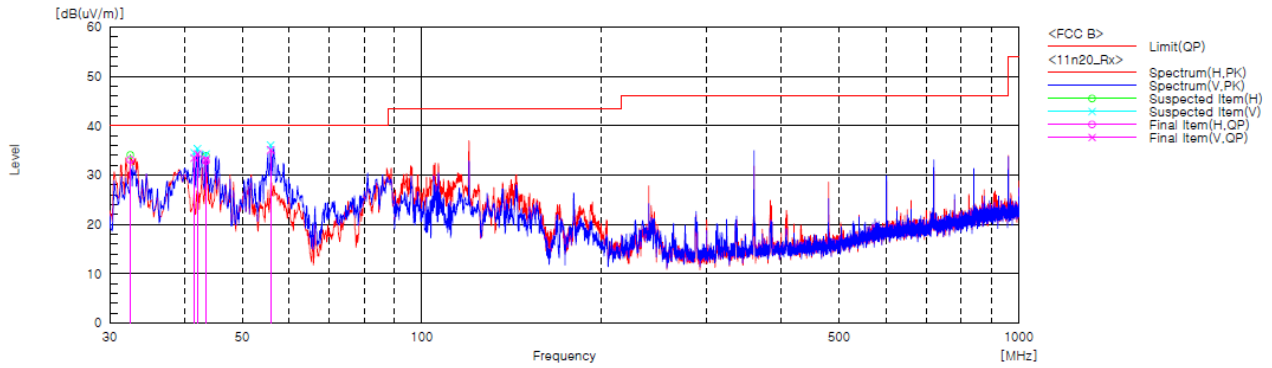
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Receiver, 802.11n_HT20(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	32.504	H	48.2	-15.1	33.1	40.0	6.9	99.8	109.9	
2	41.540	V	46.4	-12.9	33.5	40.0	6.5	99.8	316.9	
3	42.084	V	47.0	-12.7	34.3	40.0	5.7	99.8	304.7	
4	43.500	V	45.7	-12.5	33.2	40.0	6.8	99.8	98.1	
5	43.500	H	45.4	-12.5	32.9	40.0	7.1	99.8	122.1	
6	55.802	V	48.0	-12.9	35.1	40.0	4.9	99.8	249.4	

Remark :

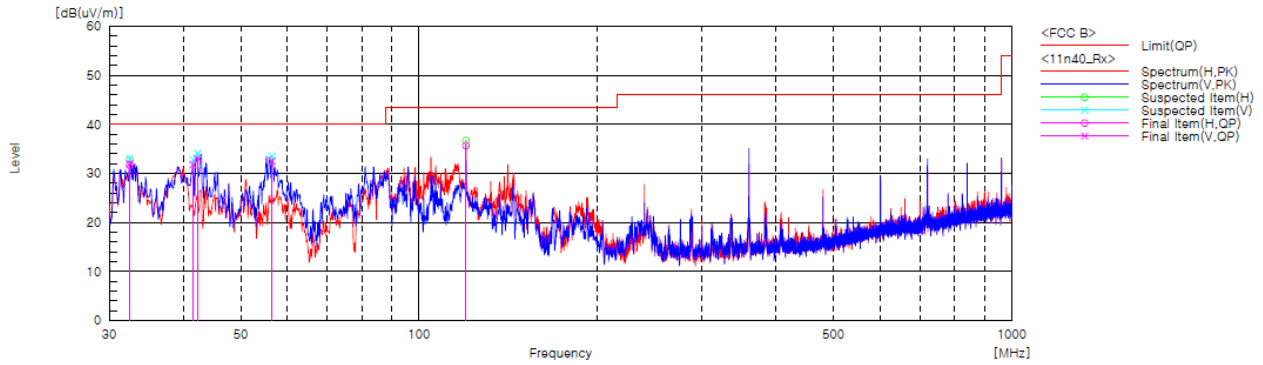
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Receiver, 802.11n_HT40(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	32.504	V	47.1	-15.1	32.0	40.0	8.0	99.8	299.7	
2	32.504	H	46.8	-15.1	31.7	40.0	8.3	99.8	113.7	
3	41.540	V	44.7	-12.9	31.8	40.0	8.2	99.8	275.9	
4	42.302	V	45.8	-12.7	33.1	40.0	6.9	99.8	275.9	
5	56.455	V	45.6	-13.1	32.5	40.0	7.5	99.8	31.4	
6	119.925	H	51.5	-15.8	35.7	43.5	7.8	99.8	291.1	

Remark :

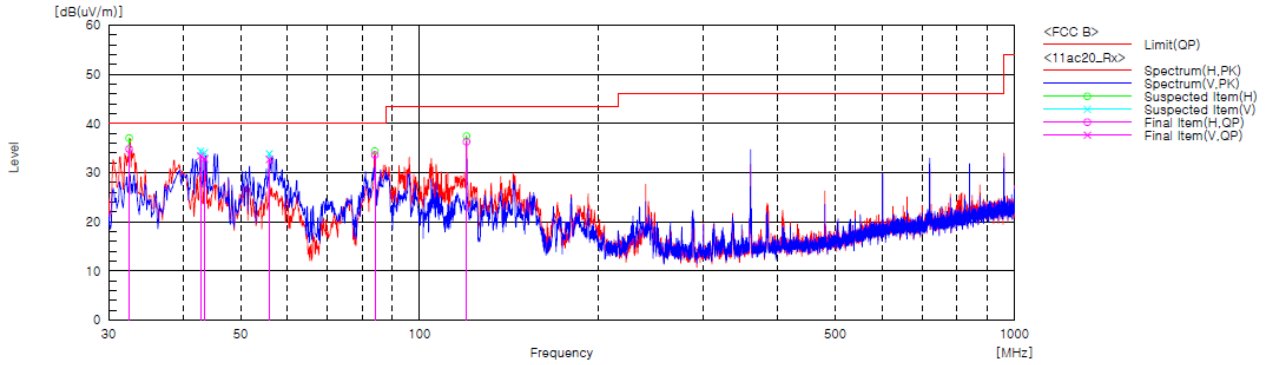
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Receiver, 802.11ac_VHT20(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	32.504	H	49.9	-15.1	34.8	40.0	5.2	99.8	127.0	
2	42.846	V	46.0	-12.6	33.4	40.0	6.6	99.8	31.4	
3	43.500	V	45.3	-12.5	32.8	40.0	7.2	99.8	55.9	
4	55.911	V	45.7	-13.0	32.7	40.0	7.3	99.8	8.9	
5	84.107	H	51.3	-17.7	33.6	40.0	6.4	99.8	257.5	
6	119.925	H	52.1	-15.8	36.3	43.5	7.2	99.8	269.3	

Remark :

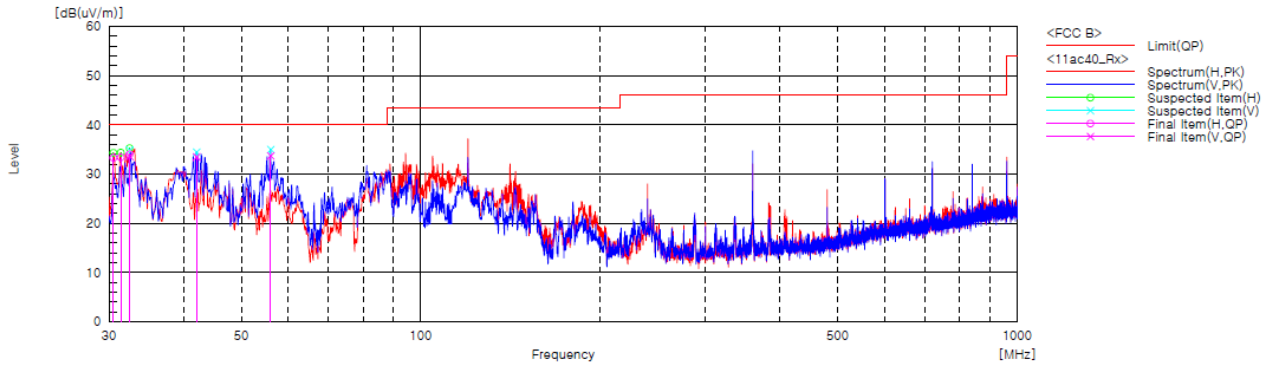
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Receiver, 802.11ac_VHT40(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	30.544	H	48.5	-15.2	33.3	40.0	6.7	99.8	128.7	
2	31.415	H	48.6	-15.2	33.4	40.0	6.6	99.8	138.6	
3	32.504	H	49.1	-15.1	34.0	40.0	6.0	99.8	128.7	
4	32.504	V	48.7	-15.1	33.6	40.0	6.4	99.8	270.7	
5	42.084	V	46.2	-12.7	33.5	40.0	6.5	99.8	333.4	
6	56.019	V	46.7	-13.0	33.7	40.0	6.3	99.8	214.0	

Remark :

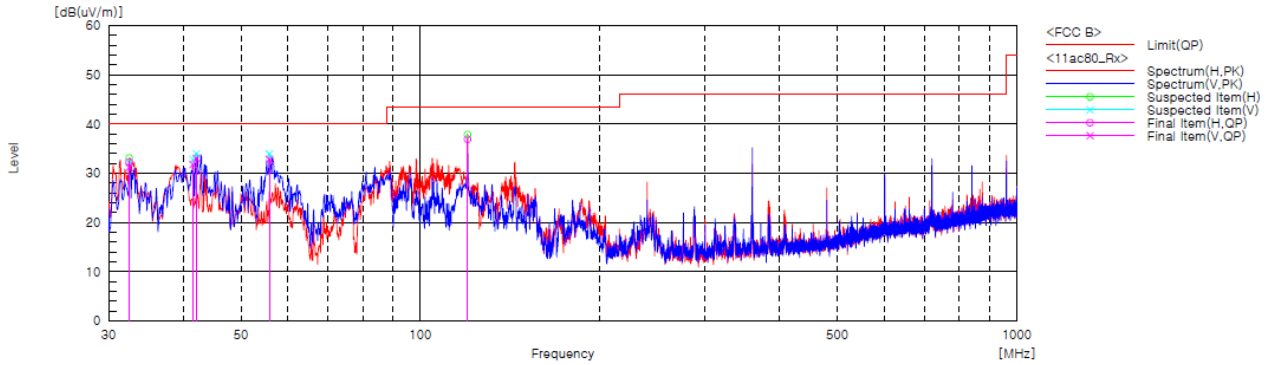
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Receiver, 802.11ac_VHT80(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	32,504	H	47.4	-15.1	32.3	40.0	7.7	99.8	101.8	
2	32,504	V	46.3	-15.1	31.2	40.0	8.8	99.8	31.4	
3	41,540	V	44.7	-12.9	31.8	40.0	8.2	99.8	315.3	
4	42,084	V	45.7	-12.7	33.0	40.0	7.0	99.8	339.1	
5	55,802	V	45.7	-12.9	32.8	40.0	7.2	99.8	246.5	
6	119,925	H	52.7	-15.8	36.9	43.5	6.6	99.8	292.3	

Remark :

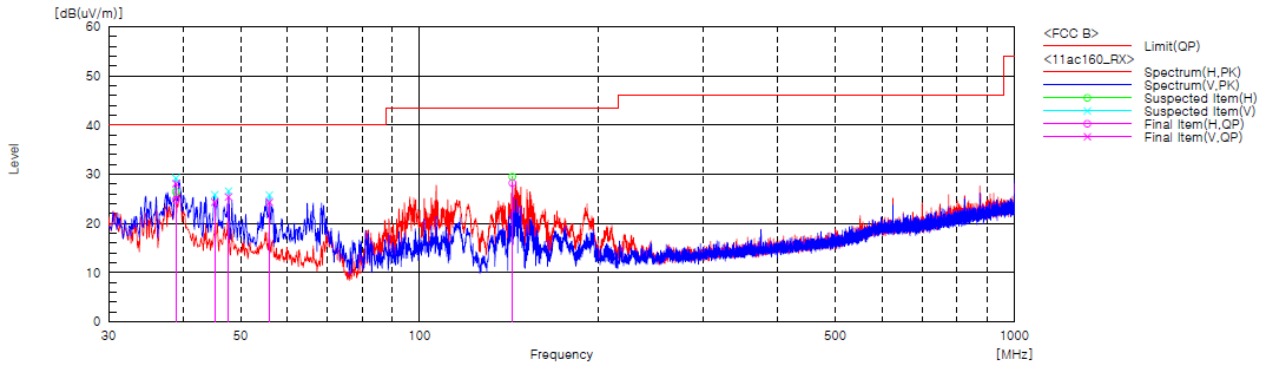
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Receiver, 802.11ac_VHT160(Worst Case)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	38.927	V	41.9	-13.8	28.1	40.0	11.9	99.8	270.3	
2	38.927	H	38.6	-13.8	24.8	40.0	15.2	99.8	66.9	
3	45.241	V	36.7	-12.4	24.3	40.0	15.7	99.8	21.1	
4	47.745	V	37.8	-12.4	25.4	40.0	14.6	99.8	69.6	
5	55.911	V	37.3	-13.0	24.3	40.0	15.7	99.8	349.5	
6	143.222	H	45.8	-17.6	28.2	43.5	15.3	99.8	103.3	

Remark :

1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain



3) above 1 GHz

Test mode : Transmitter, 802.11a

The requirements are:

Complies

Ch.52(5 260 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Ch.60(5 300 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Ch.64(5 320 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5372.07	H	54.0	74.0	50.4	61.0	3.6	13.0
5357.64	V	54.0	74.0	50.4	61.7	3.6	12.3

Ch.100(5 500 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5440.85	H	54.0	74.0	51.0	62.7	3.0	11.3
5424.04	V	54.0	74.0	50.7	61.6	3.3	12.4

Ch.120(5 600 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Ch.144(5 720 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Remarks

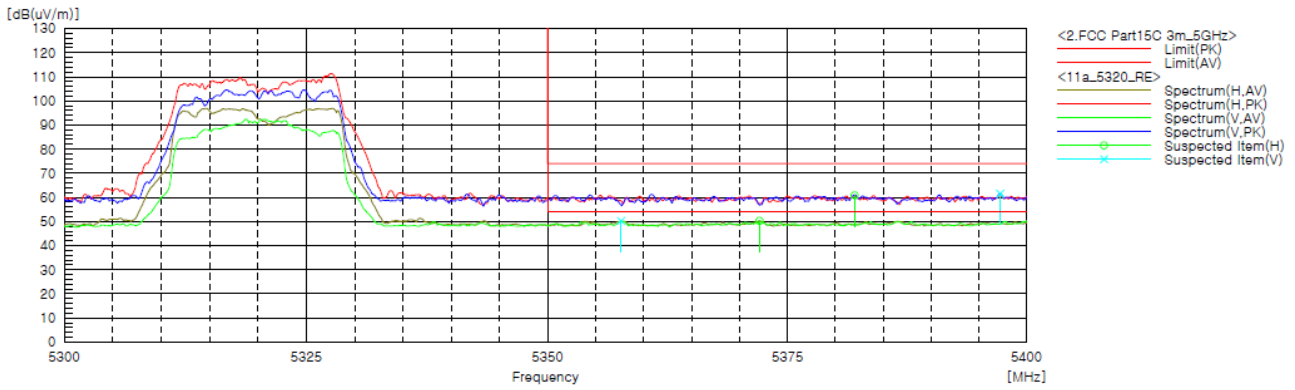
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.



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Worst Case Mode :	802.11a
Worst Case Transfer Rate :	6 Mbps
Distance of Measurements :	3 Meters
Operating Frequency :	5 320 MHz
Channel :	64



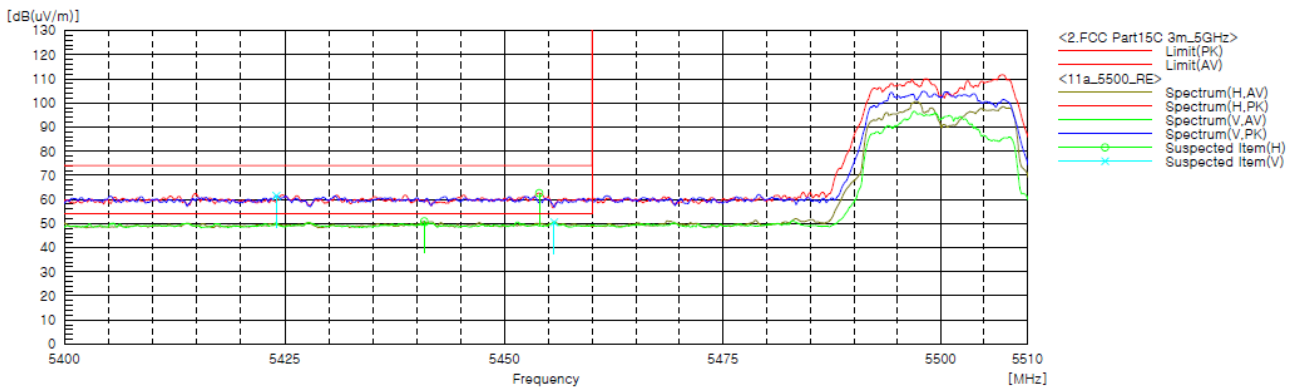
Radiated Restricted Lower Band Edge Plot



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Report No. :
CTK-2018-02344
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Worst Case Mode :	802.11a
Worst Case Transfer Rate :	6 Mbps
Distance of Measurements :	3 Meters
Operating Frequency :	5 500 MHz
Channel :	100



Radiated Restricted Lower Band Edge Plot



Test mode : Transmitter, 802.11n_HT20

The requirements are:

Complies

Ch.52(5 260 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Ch.60(5 300 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Ch.64(5 320 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5 356.05	H	54.0	74.0	51.3	62.2	2.7	11.8
5 356.82	V	54.0	74.0	50.7	62.0	3.3	12.0

Ch.100(5 500 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5 441.01	H	54.0	74.0	50.5	62.4	3.5	11.6
5 445.50	V	54.0	74.0	51.2	62.3	2.8	11.7

Ch.120(5 600 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Ch.144(5 720 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Remarks

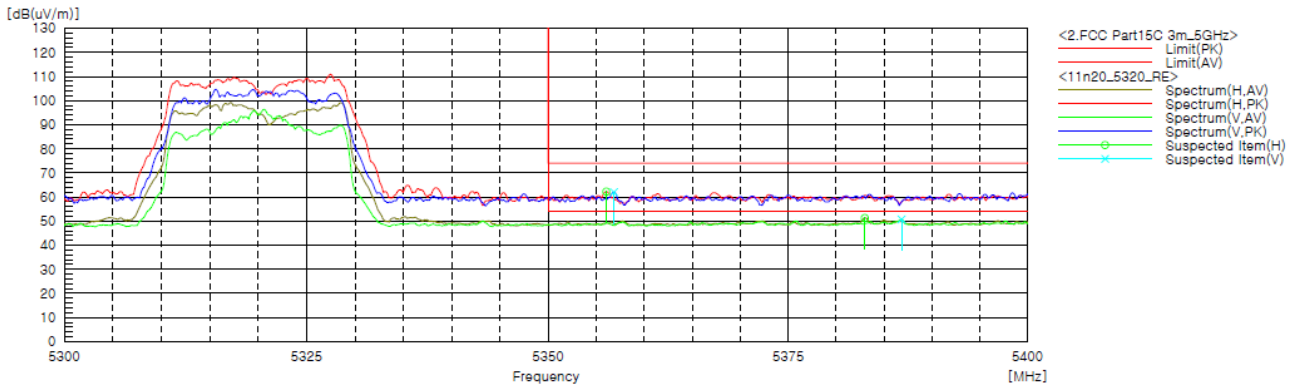
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.



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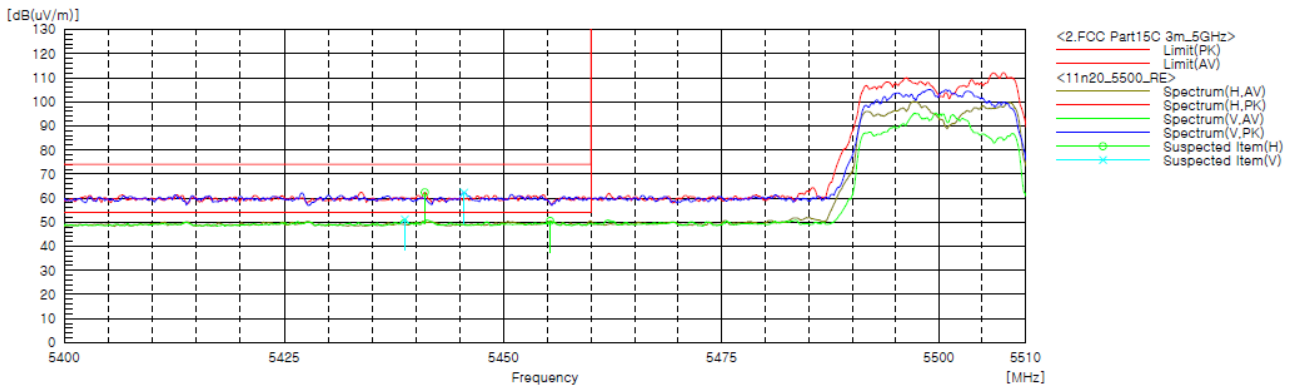
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Worst Case Mode :	802.11n_HT20
Worst Case Transfer Rate :	MCS 24
Distance of Measurements :	3 Meters
Operating Frequency :	5 320 MHz
Channel :	64



Radiated Restricted Lower Band Edge Plot

Worst Case Mode :	802.11n_HT20
Worst Case Transfer Rate :	MCS 24
Distance of Measurements :	3 Meters
Operating Frequency :	5 500 MHz
Channel :	100



Radiated Restricted Lower Band Edge Plot



Test mode : Transmitter, 802.11ac_VHT20

The requirements are:

Complies

Ch.52(5 260 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
-----------------	-----	-------------------	-------------------	--------------------	--------------------	----------------	----------------

No emissions were detected at a level greater than 20dB below limit.

Ch.60(5 300 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
-----------------	-----	-------------------	-------------------	--------------------	--------------------	----------------	----------------

No emissions were detected at a level greater than 20dB below limit.

Ch.64(5 320 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5 380.15	H	54.0	74.0	50.3	61.1	3.7	12.9
5 385.79	V	54.0	74.0	50.3	61.8	3.7	12.2

Ch.100(5 500 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5 426.27	H	54.0	74.0	50.7	62.3	3.3	11.7
5 416.56	V	54.0	74.0	50.6	62.2	3.4	11.8

Ch.120(5 600 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Ch.144(5 720 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Remarks

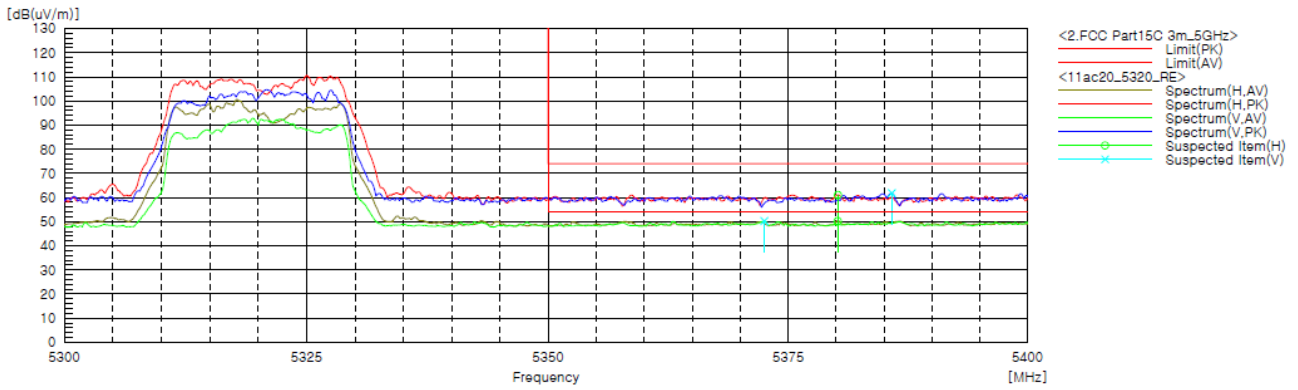
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.



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Worst Case Mode :	802.11ac_VHT20
Worst Case Transfer Rate :	MNSS 0
Distance of Measurements :	3 Meters
Operating Frequency :	5 320 MHz
Channel :	64



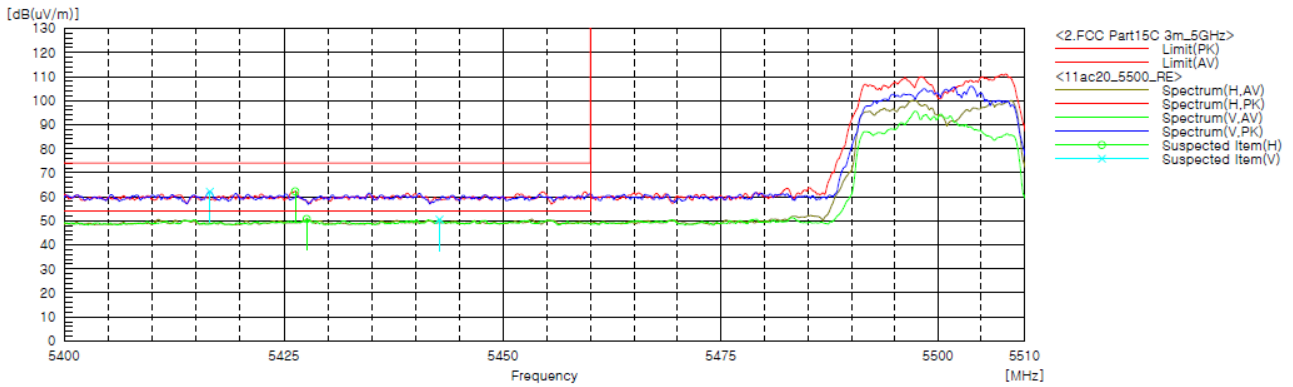
Radiated Restricted Lower Band Edge Plot



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Worst Case Mode :	802.11ac_VHT20
Worst Case Transfer Rate :	MNSS 0
Distance of Measurements :	3 Meters
Operating Frequency :	5 500 MHz
Channel :	100



Radiated Restricted Lower Band Edge Plot



Test mode : Transmitter, 802.11n_HT40

The requirements are:

Complies

Ch.54(5 270 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Ch.62(5 310 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5 350.17	H	54.0	74.0	48.9	61.9	5.1	12.1
5 378.31	V	54.0	74.0	43.7	55.1	10.3	18.9

Ch.102(5 510 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5 455.46	H	54.0	74.0	42.7	55.9	11.3	18.1
5 427.70	V	54.0	74.0	41.3	52.3	12.7	21.7

Ch.118(5 590 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Ch.142(5 710 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Remarks

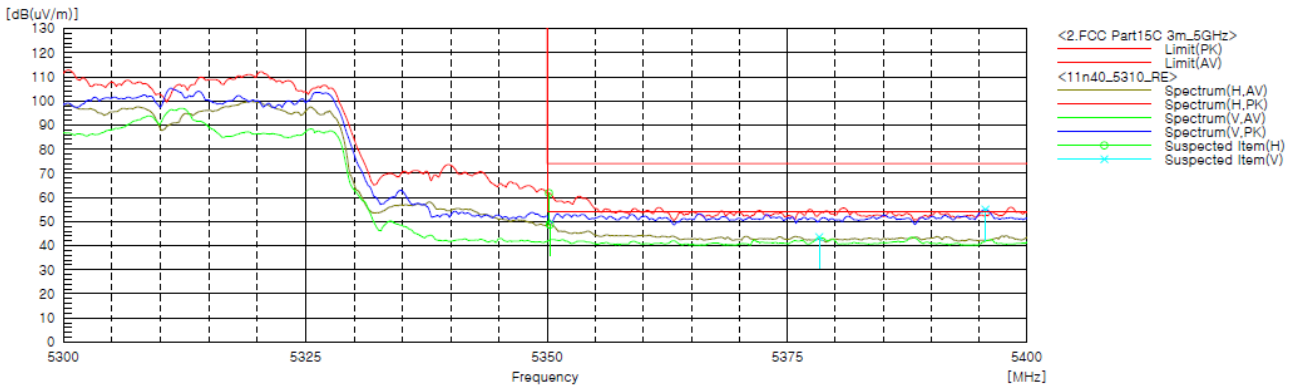
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.



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Worst Case Mode :	802.11n_HT40
Worst Case Transfer Rate :	MCS 24
Distance of Measurements :	3 Meters
Operating Frequency :	5 310 MHz
Channel :	62



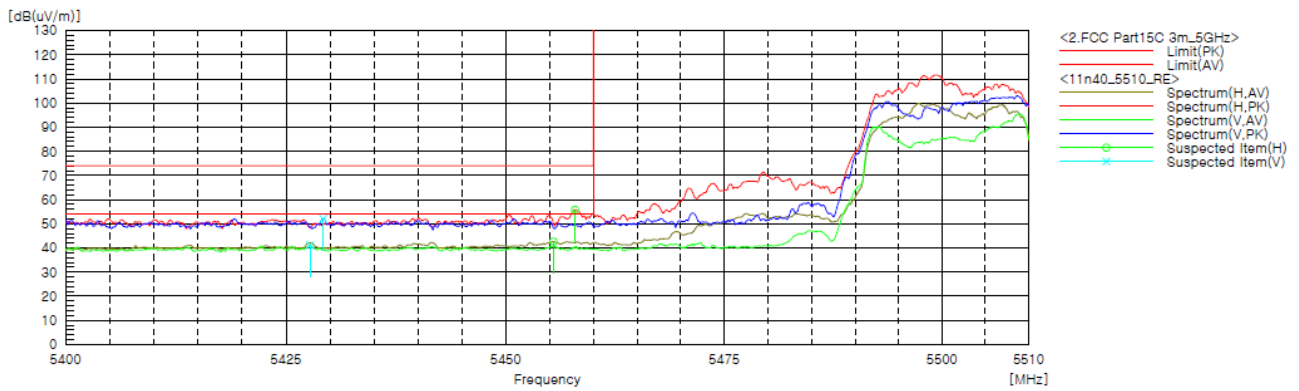
Radiated Restricted Lower Band Edge Plot



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CTK-2018-02344
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Worst Case Mode :	802.11n_HT40
Worst Case Transfer Rate :	MCS 24
Distance of Measurements :	3 Meters
Operating Frequency :	5 510 MHz
Channel :	102



Radiated Restricted Lower Band Edge Plot



Test mode : Transmitter, 802.11ac_VHT40

The requirements are:

Complies

Ch.54(5 270 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
-----------------	-----	-------------------	-------------------	--------------------	--------------------	----------------	----------------

No emissions were detected at a level greater than 20dB below limit.

Ch.62(5 310 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5 350.00	H	54.0	74.0	46.2	59.9	7.8	14.1
5 367.46	V	54.0	74.0	42.2	52.3	11.8	21.7

Ch.102(5 510 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5 458.03	H	54.0	74.0	43.3	54.4	10.7	19.6
5 436.11	V	54.0	74.0	41.8	52.2	12.2	21.8

Ch.118(5 590 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
-----------------	-----	-------------------	-------------------	--------------------	--------------------	----------------	----------------

No emissions were detected at a level greater than 20dB below limit.

Ch.142(5 710 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
-----------------	-----	-------------------	-------------------	--------------------	--------------------	----------------	----------------

No emissions were detected at a level greater than 20dB below limit.

Remarks

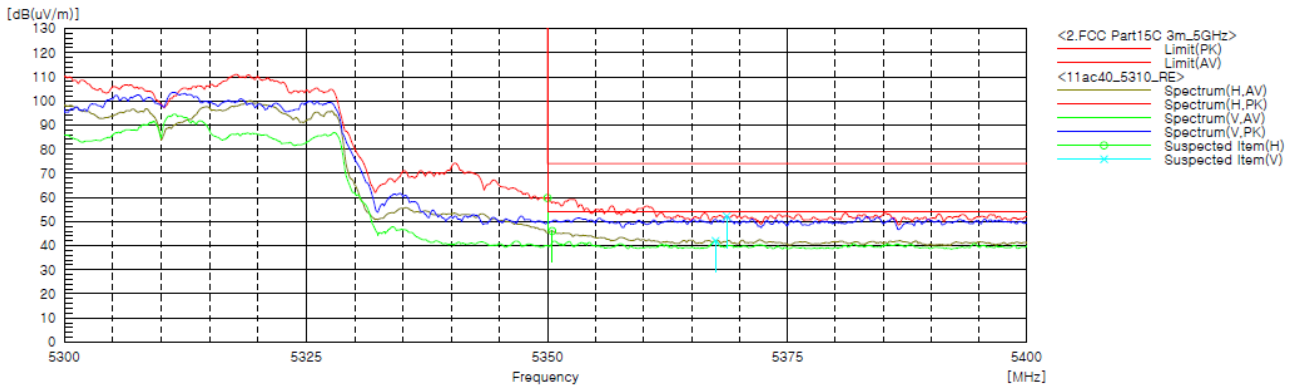
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.



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Report No. :
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Worst Case Mode :	802.11ac_VHT40
Worst Case Transfer Rate :	MNSS 0
Distance of Measurements :	3 Meters
Operating Frequency :	5 310 MHz
Channel :	62



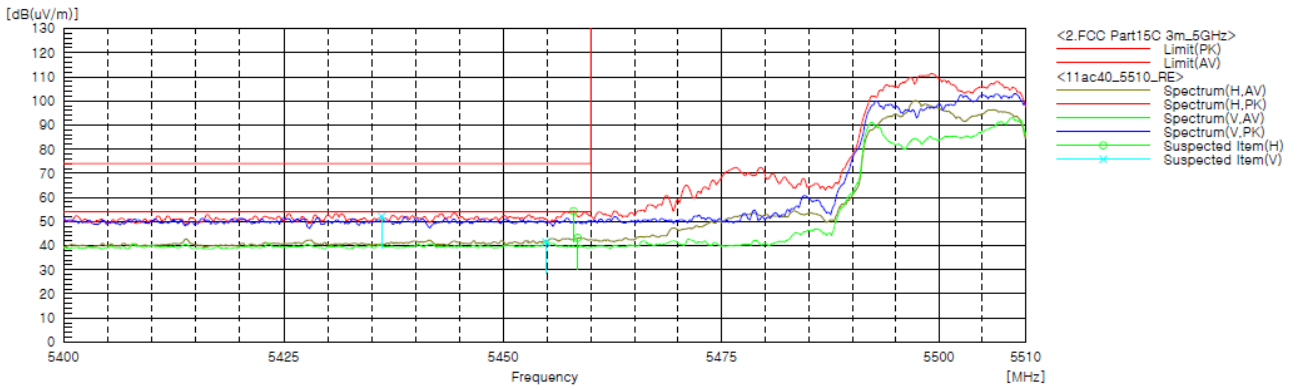
Radiated Restricted Lower Band Edge Plot



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Worst Case Mode :	802.11ac_VHT40
Worst Case Transfer Rate :	MNSS 0
Distance of Measurements :	3 Meters
Operating Frequency :	5 510 MHz
Channel :	102



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Test mode : Transmitter, 802.11ac_VHT80

The requirements are:

Complies

Ch.58(5 290 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5 357.78	H	54.0	74.0	52.0	70.0	2.0	4.0
5 357.24	V	54.0	74.0	43.3	54.6	10.7	19.4

Ch.106(5 530 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5 457.78	H	54.0	74.0	49.1	65.2	4.9	8.8
5 441.83	V	54.0	74.0	42.2	54.1	11.8	19.9

Ch.138(5 690 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Remarks

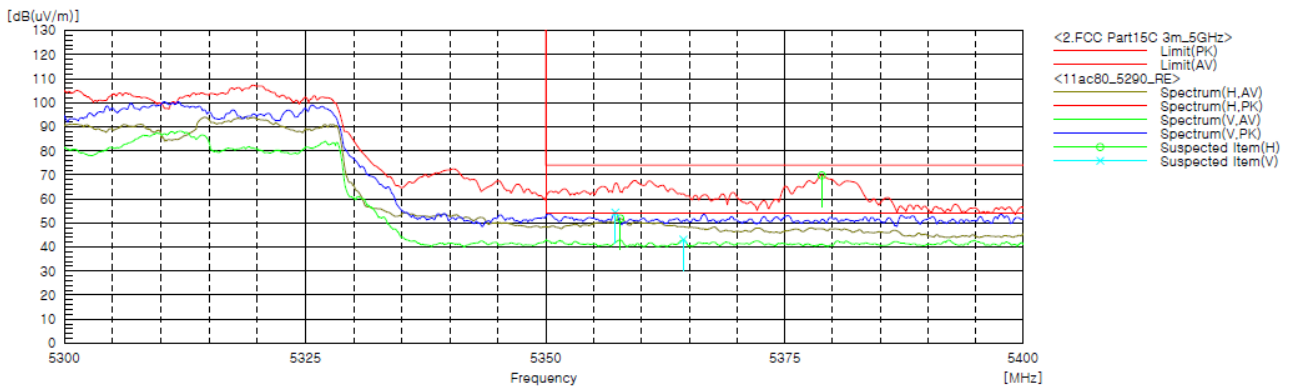
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.



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Worst Case Mode :	802.11ac_VHT80
Worst Case Transfer Rate :	MNSS 0
Distance of Measurements :	3 Meters
Operating Frequency :	5 290 MHz
Channel :	58



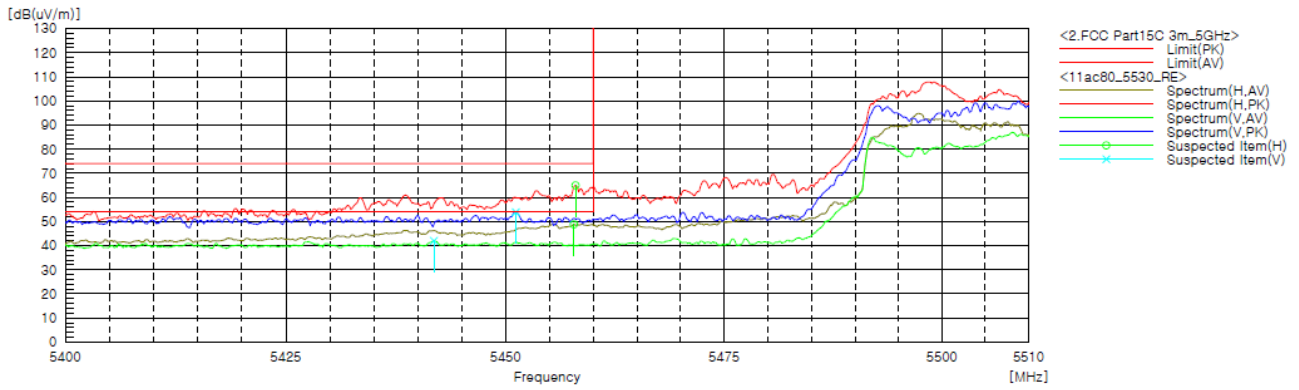
Radiated Restricted Lower Band Edge Plot



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Worst Case Mode :	802.11ac_VHT80
Worst Case Transfer Rate :	MNSS 0
Distance of Measurements :	3 Meters
Operating Frequency :	5 530 MHz
Channel :	106



Radiated Restricted Lower Band Edge Plot



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Test mode : Transmitter, 802.11ac_VH160

The requirements are:

Complies

Ch.50(5 250 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5 139.56	H	54.0	74.0	50.3	65.3	3.7	8.7
5 115.63	V	54.0	74.0	40.3	52.3	13.7	21.7
5 357.58	H	54.0	74.0	48.0	69.4	6.0	4.6
5 350.44	V	54.0	74.0	41.6	52.8	12.4	21.2

Ch.114(5 570 MHz)

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
5 452.77	H	54.0	74.0	50.3	64.7	3.7	9.3
5 454.33	V	54.0	74.0	42.1	53.2	11.9	20.8

Remarks

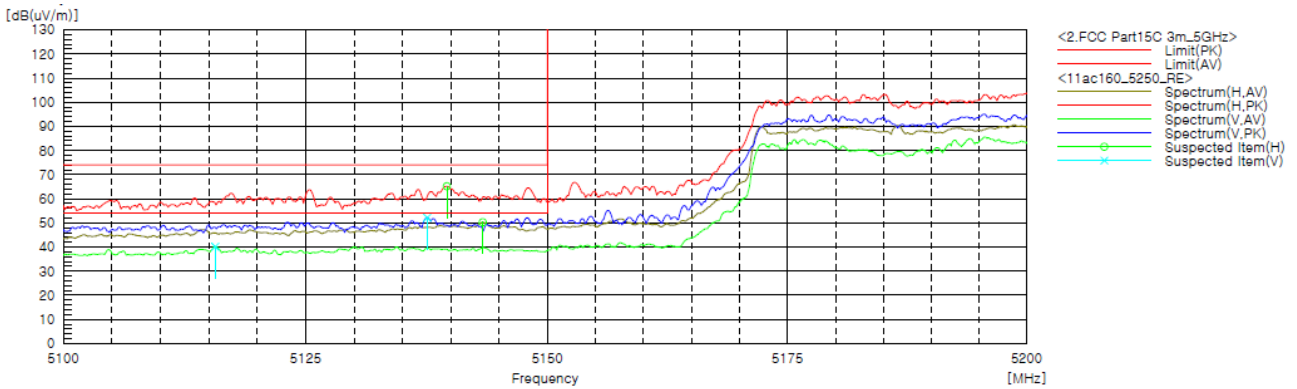
1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.



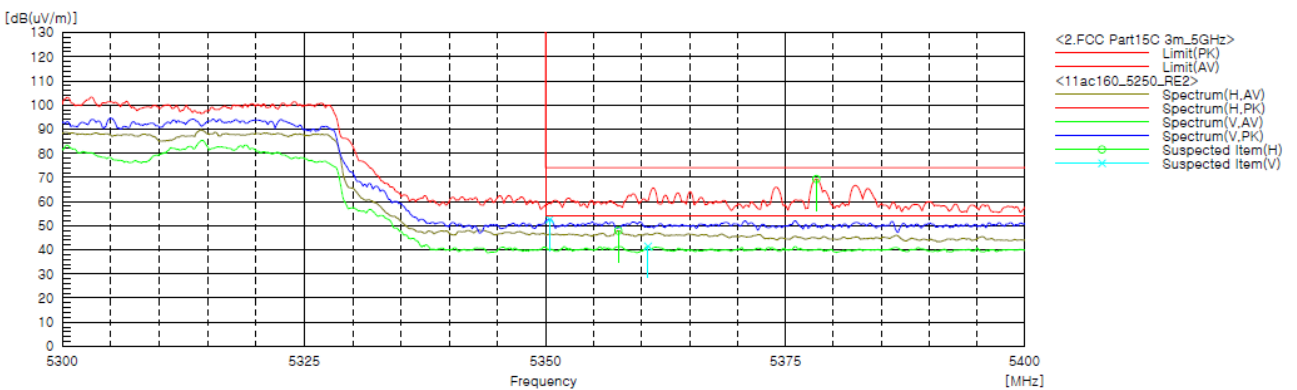
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Worst Case Mode :	802.11ac_VHT160
Worst Case Transfer Rate :	MNSS 0
Distance of Measurements :	3 Meters
Operating Frequency :	5 250 MHz
Channel :	50



Radiated Restricted Lower Band Edge Plot



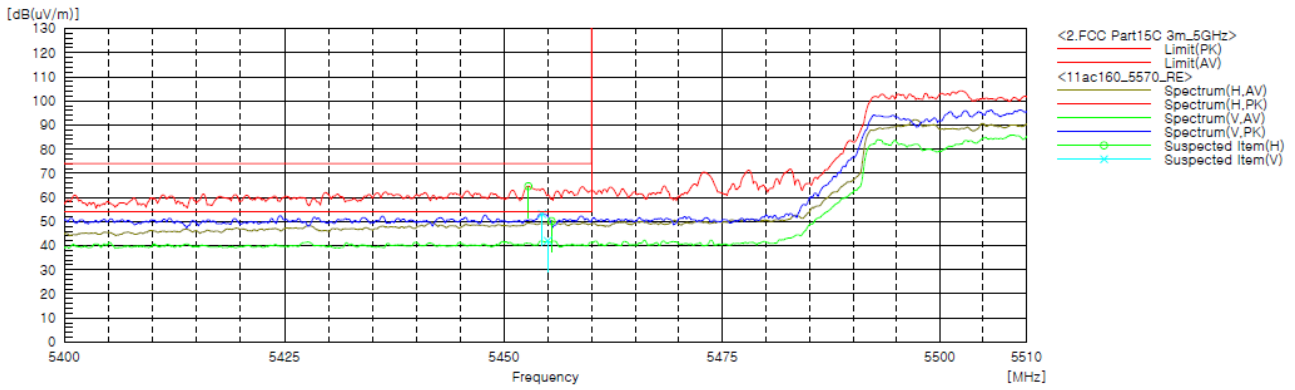
Radiated Restricted Lower Band Edge Plot 2



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Worst Case Mode :	802.11ac_VHT160
Worst Case Transfer Rate :	MNSS 0
Distance of Measurements :	3 Meters
Operating Frequency :	5 570 MHz
Channel :	114



Radiated Restricted Lower Band Edge Plot



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Test mode : Receiver

The requirements are:

Complies

Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
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No emissions were detected at a level greater than 20dB below limit.

Remarks

1. The EUT was tested in three orientations in order to determine that "Z axis" was the worst case.



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4.6 AC Conducted Emissions

Test Location

Shielded Room

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

- 15.207(a)

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency.

Test Results

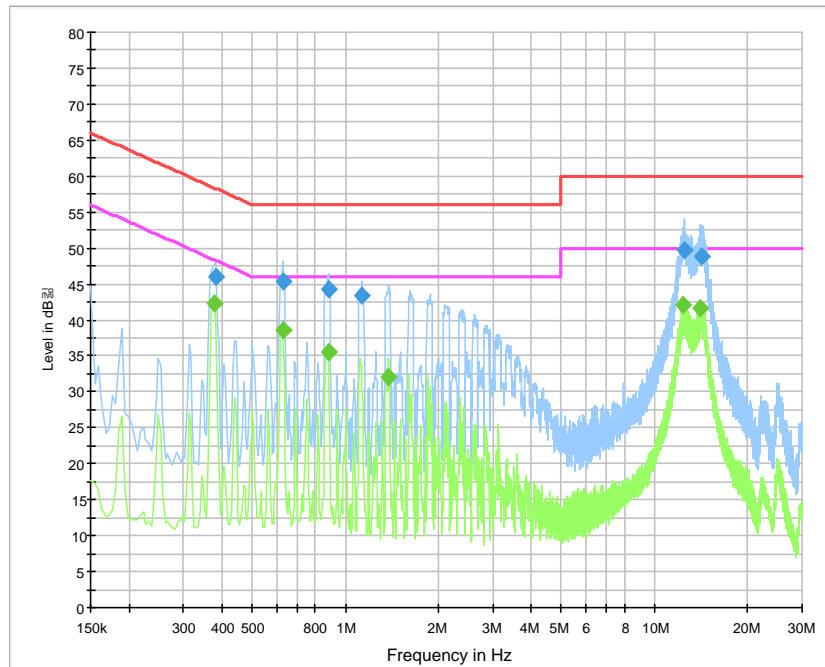
The requirements are:

Complies

Test Data

[LINE]

Class B_L1



Final Result 1

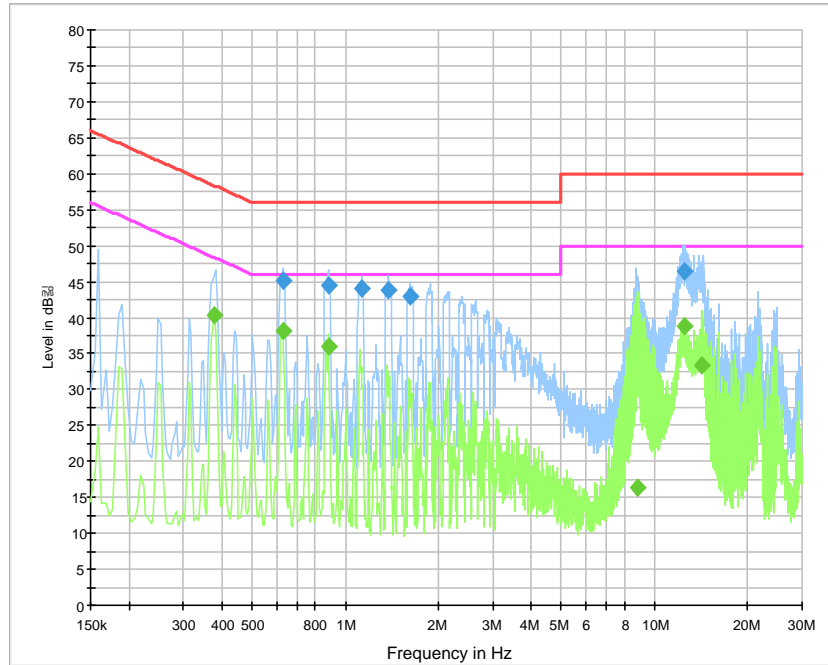
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.379500	46.1	1000.0	9.000	On	L1	9.9	12.2	58.3
0.627000	45.4	1000.0	9.000	On	L1	9.9	10.6	56.0
0.879000	44.3	1000.0	9.000	On	L1	9.8	11.7	56.0
1.131000	43.5	1000.0	9.000	On	L1	9.8	12.5	56.0
12.543000	49.6	1000.0	9.000	On	L1	9.9	10.4	60.0
14.298000	48.9	1000.0	9.000	On	L1	10.0	11.1	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.375000	42.2	1000.0	9.000	On	L1	9.9	6.2	48.4
0.627000	38.5	1000.0	9.000	On	L1	9.9	7.5	46.0
0.879000	35.5	1000.0	9.000	On	L1	9.8	10.5	46.0
1.383000	32.0	1000.0	9.000	On	L1	9.7	14.0	46.0
12.421500	42.1	1000.0	9.000	On	L1	9.9	7.9	50.0
14.109000	41.7	1000.0	9.000	On	L1	10.0	8.3	50.0

[NEUTRAL]

Class B_N



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.627000	45.1	1000.0	9.000	On	N	9.9	10.9	56.0
0.879000	44.5	1000.0	9.000	On	N	9.8	11.5	56.0
1.131000	44.1	1000.0	9.000	On	N	9.8	11.9	56.0
1.378500	43.7	1000.0	9.000	On	N	9.7	12.3	56.0
1.626000	42.9	1000.0	9.000	On	N	9.7	13.1	56.0
12.543000	46.4	1000.0	9.000	On	N	9.9	13.6	60.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.375000	40.3	1000.0	9.000	On	N	9.9	8.1	48.4
0.627000	38.2	1000.0	9.000	On	N	9.9	7.8	46.0
0.879000	36.0	1000.0	9.000	On	N	9.8	10.0	46.0
8.839500	16.3	1000.0	9.000	On	N	9.9	33.7	50.0
12.543000	38.9	1000.0	9.000	On	N	9.9	11.1	50.0
14.275500	33.4	1000.0	9.000	On	N	10.0	16.6	50.0



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APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Signal Analyzer	Agilent	N9020A	MY48011598	2017-11-01	2018-11-01
2	Signal Generator	Rohde & Schwarz	SMB100A	175528	2017-11-01	2018-11-01
3	EMI Test Receiver	Rohde & Schwarz	ESCI7	100814	2017-10-25	2018-10-25
4	Bilog Antenna	Schaffner	CBL6111C	2551	2018-05-10	2020-05-10
5	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-125	2018-05-02	2020-05-02
6	6dB Attenuator	R&S	DNF	272.4110.50-2	2017-10-25	2018-10-25
7	AMPLIFIER	SONOMA	310	291721	2018-02-02	2019-02-02
8	EMI Test Receiver	Rohde & Schwarz	ESU40	100336	2018-02-01	2019-02-01
9	LISN	Rohde & Schwarz	ENV216	101235	2018-01-31	2019-01-31
10	Preamplifier	Agilent	8449B	3008A02011	2017-11-30	2018-11-30
11	Horn Antenna	ETS-Lindgren	3116	00062504	2017-12-04	2019-12-04
12	Horn Antenna	ETS-Lindgren	3117	00154525	2017-02-17	2019-02-17
13	Singnal Canditioning Unit	R&S	SCU-40	10023	2017-11-01	2018-11-01
14	Band Reject Filter	Micro Tronics	BRM50716	G184	2018-01-26	2019-01-26
15	Temp&Humi Chamber	ESPEC CORP.	SH-242	93012243	2018-03-09	2019-03-09
16	Combiner/Divider	Weinschel	1580	SQ369	2018-11-01	2019-11-01
17	RF Cable	Canare Corporation	L-5D2W	N/A	-	-
18	RF Cable	Junkosha Inc.	MWX221	1510S085	-	-
19	RF Cable	HUBER+SUHNER	SUCOFLEX 102	MY073/2	-	-
20	RF Cable	HUBER+SUHNER	SUCOFLEX 102	MY4728/2	-	-
21	RF Cable	HUBER+SUHNER	SUCOFLEX 104	MY27558/4	-	-
22	RF Cable	HUBER+SUHNER	SUCOFLEX 104	N/A	-	-
23	RF Cable	HUBER+SUHNER	SUCOFLEX 104	MY27573/4	-	-
24	RF Cable	HUBER+SUHNER	SUCOFLEX 106	N/A	-	-