6.4 Maximum Power Spectral Density – 802.11a/n/ac

§15.407(a.1)(2.5)

Test Overview and Limit

The spectrum analyzer was connected to the antenna terminal while the EUT was operating at its maximum duty cycle (>98%), at its maximum power control level, as defined in KDB 789033 v01r04, and at the appropriate frequencies. Method SA-1, as defined in KDB 789033 v01r04, was used to measure the power spectral density.

In the 5.15 – 5.25GHz band, the maximum permissible power spectral density is 4dBm/MHz.

In the 5.25 – 5.35GHz, 5.47 – 5.725GHz bands, the maximum permissible power spectral density is 11dBm/MHz.

Test Procedure Used

KDB 789033 v01r04 – Section F
KDB 662911 v02r01 – Section E)2) Measure-and-Sum Technique

Test Settings

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire emission bandwidth of the signal
3. RBW = 1MHz
4. VBW = 3MHz
5. Number of sweep points ≥ 2 x (span/RBW)
6. Sweep time = auto
7. Detector = power averaging (RMS)
8. Trigger was set to free run since the EUT was operating at a duty cycle ≥ 98%
9. Trace was averaged over 100 sweeps
10. The peak search function of the spectrum analyzer was used to find the peak of the spectrum.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

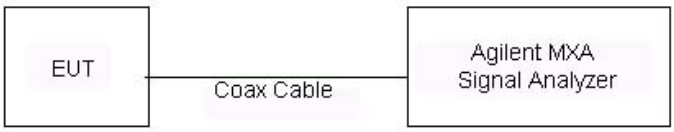

Figure 6-3. Test Instrument & Measurement Setup

Test Notes

None

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Antenna-1 Power Spectral Density Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm]	Max Permissible Power Density [dBm/MHz]	Margin [dB]	Pass / Fail
Band 1	5180	36	a	6	3.56	4.0	-0.44	Pass
	5200	40	a	6	3.47	4.0	-0.53	Pass
	5240	48	a	6	3.61	4.0	-0.39	Pass
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	2.99	4.0	-1.01	Pass
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	3.03	4.0	-0.97	Pass
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	2.86	4.0	-1.14	Pass
	5190	38	n (40MHz)	13.5/15 (MCS0)	0.21	4.0	-3.79	Pass
	5230	46	n (40MHz)	13.5/15 (MCS0)	0.13	4.0	-3.87	Pass
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-4.44	4.0	-8.44	Pass
Band 2A	5260	52	a	6	4.18	11.0	-6.82	Pass
	5280	56	a	6	4.03	11.0	-6.97	Pass
	5320	64	a	6	3.85	11.0	-7.15	Pass
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	2.74	11.0	-8.26	Pass
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	2.62	11.0	-8.38	Pass
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	2.59	11.0	-8.41	Pass
	5270	54	n (40MHz)	13.5/15 (MCS0)	-0.09	11.0	-11.09	Pass
	5310	62	n (40MHz)	13.5/15 (MCS0)	-0.39	11.0	-11.39	Pass
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	-4.99	11.0	-15.99	Pass
Band 2C	5500	100	a	6	4.52	11.0	-6.48	Pass
	5580	116	a	6	3.86	11.0	-7.14	Pass
	5700	140	a	6	4.86	11.0	-6.14	Pass
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	2.74	11.0	-8.26	Pass
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	2.46	11.0	-8.54	Pass
	5700	140	n (20MHz)	6.5/7.2 (MCS0)	3.05	11.0	-7.95	Pass
	5510	102	n (40MHz)	13.5/15 (MCS0)	0.40	11.0	-10.60	Pass
	5550	110	n (40MHz)	13.5/15 (MCS0)	-0.04	11.0	-11.04	Pass
	5670	134	n (40MHz)	13.5/15 (MCS0)	-0.71	11.0	-11.71	Pass
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	-4.29	11.0	-15.29	Pass

Table 6-18. Conducted Power Spectral Density Measurements

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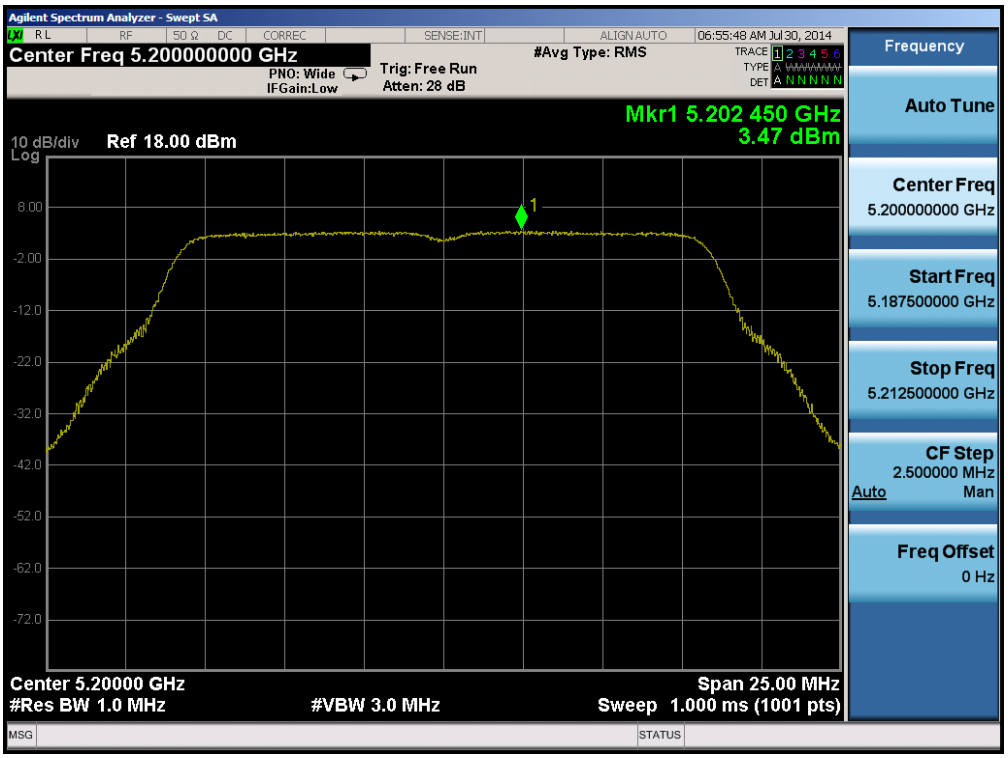
Plot 6-68. Peak Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 36)



Plot 6-69. Peak Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 40)

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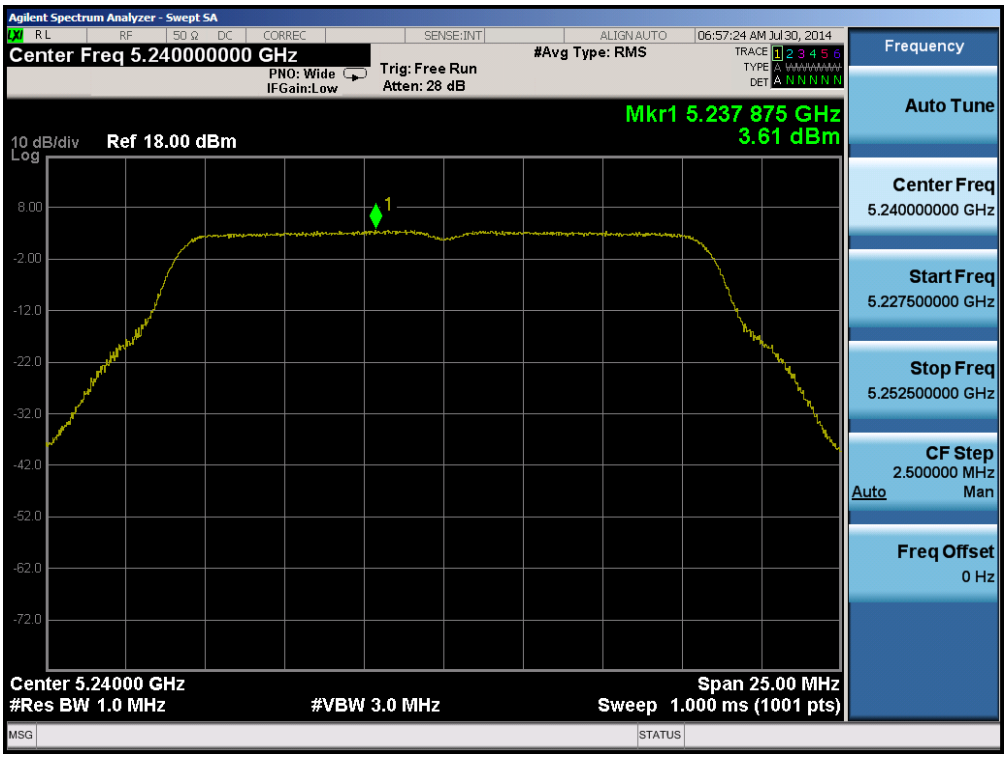
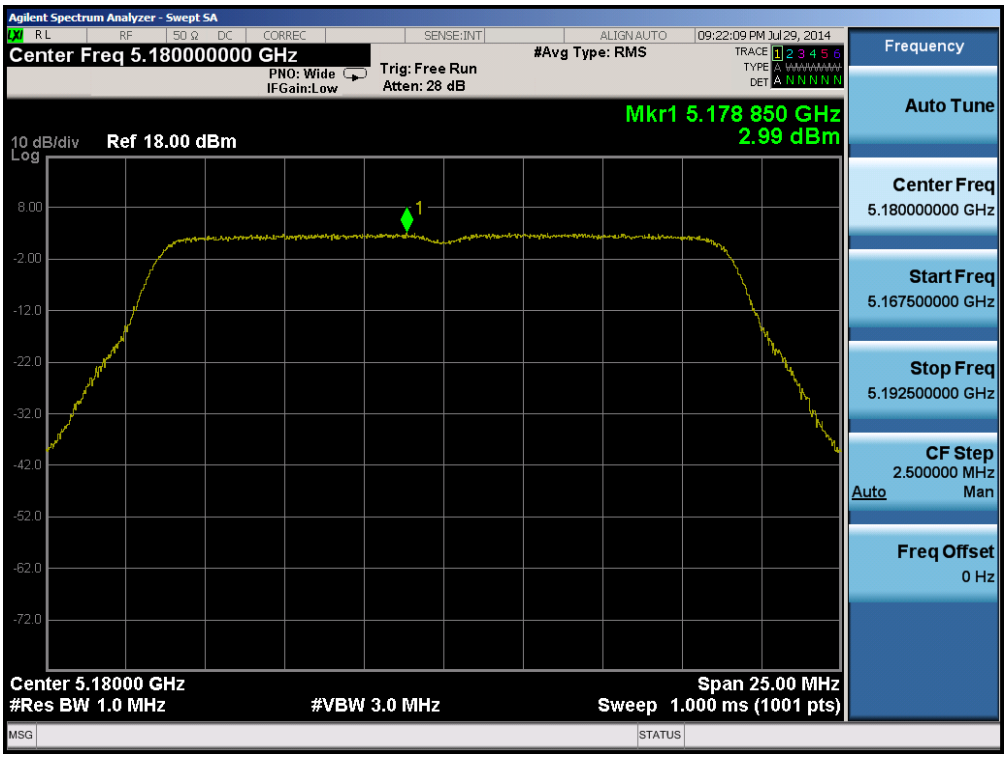


Plot 6-70. Peak Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 48)



Plot 6-71. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

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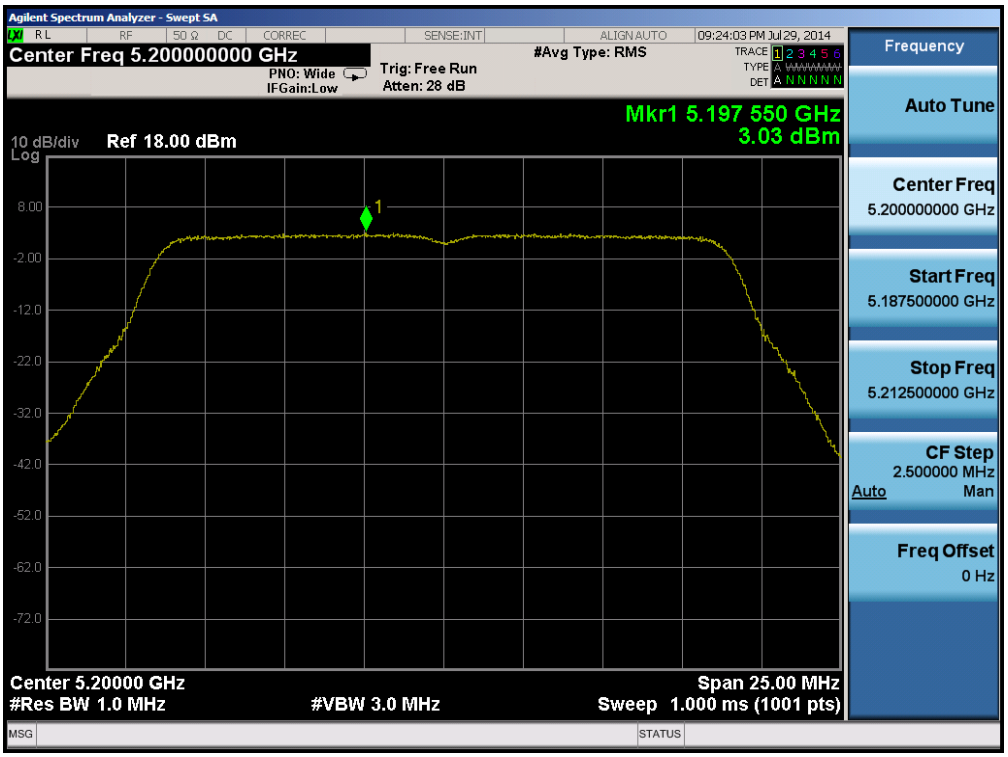
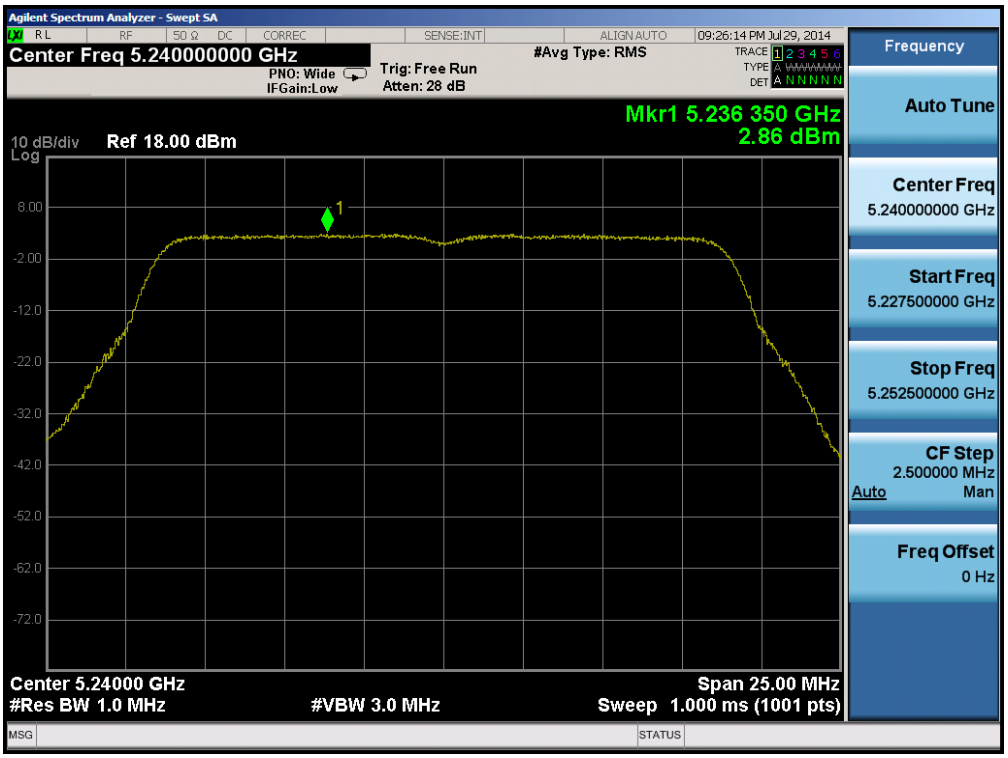


Plot 6-72. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 40)



Plot 6-73. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

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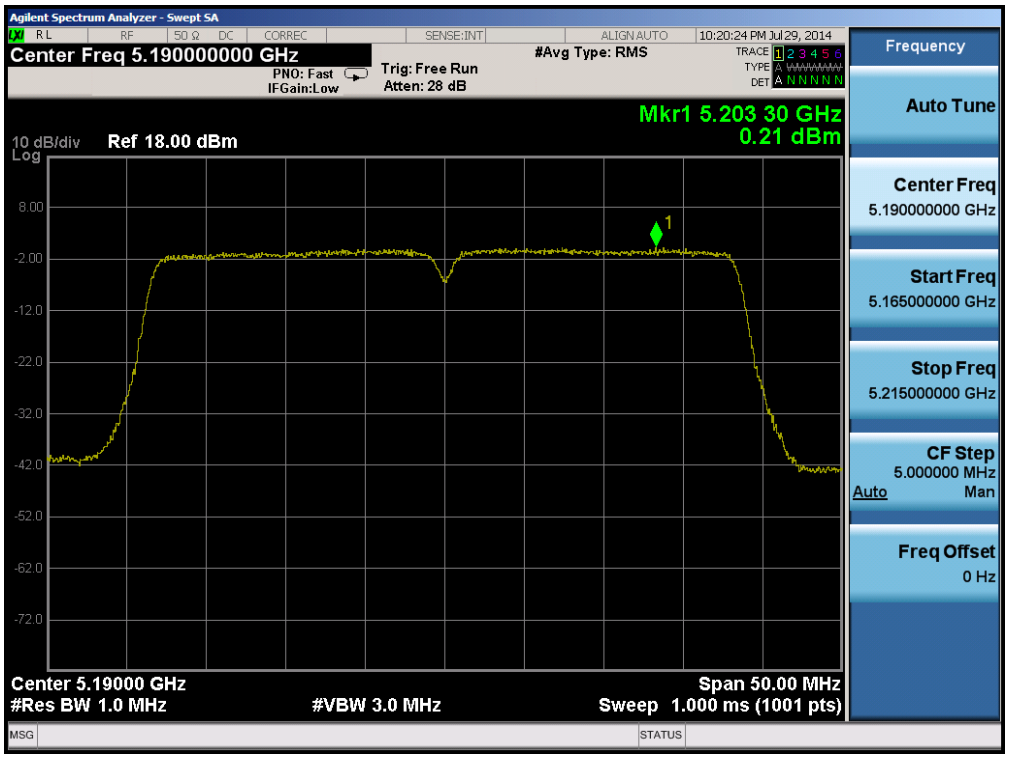
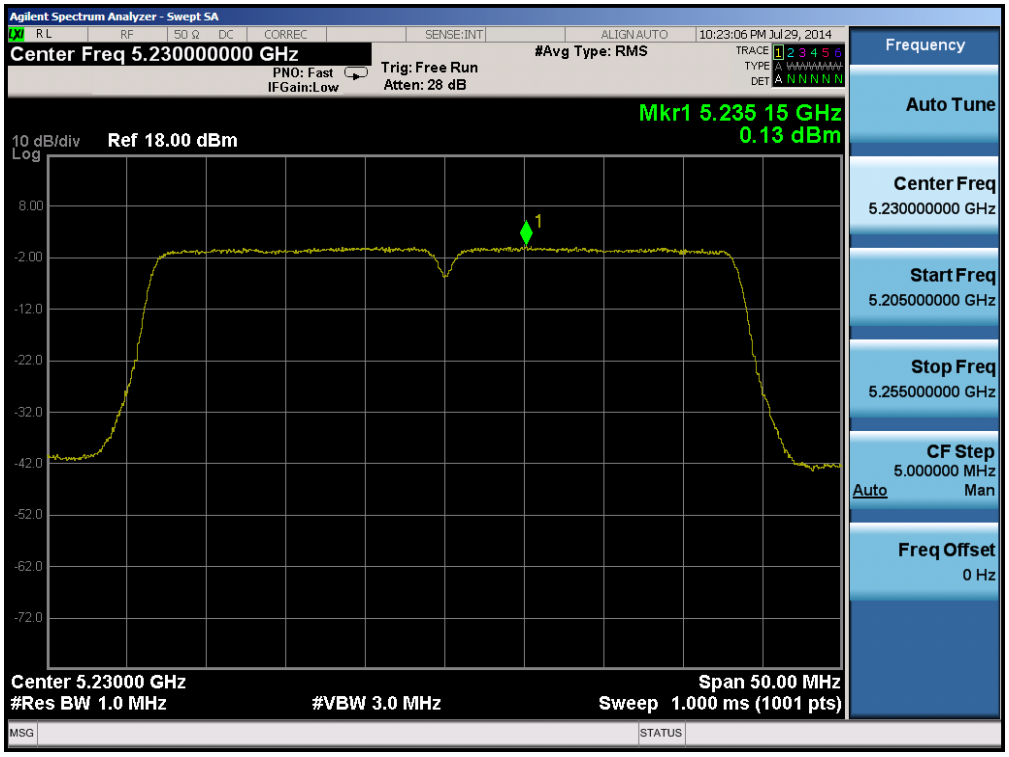


Plot 6-74. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 38)



Plot 6-75. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

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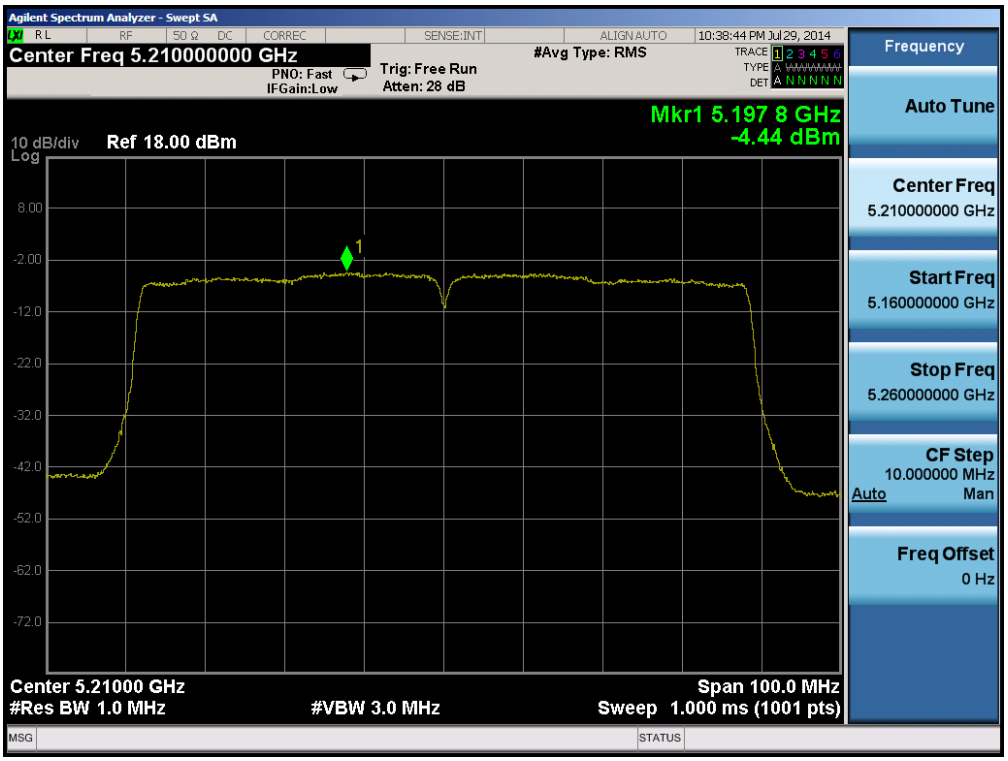
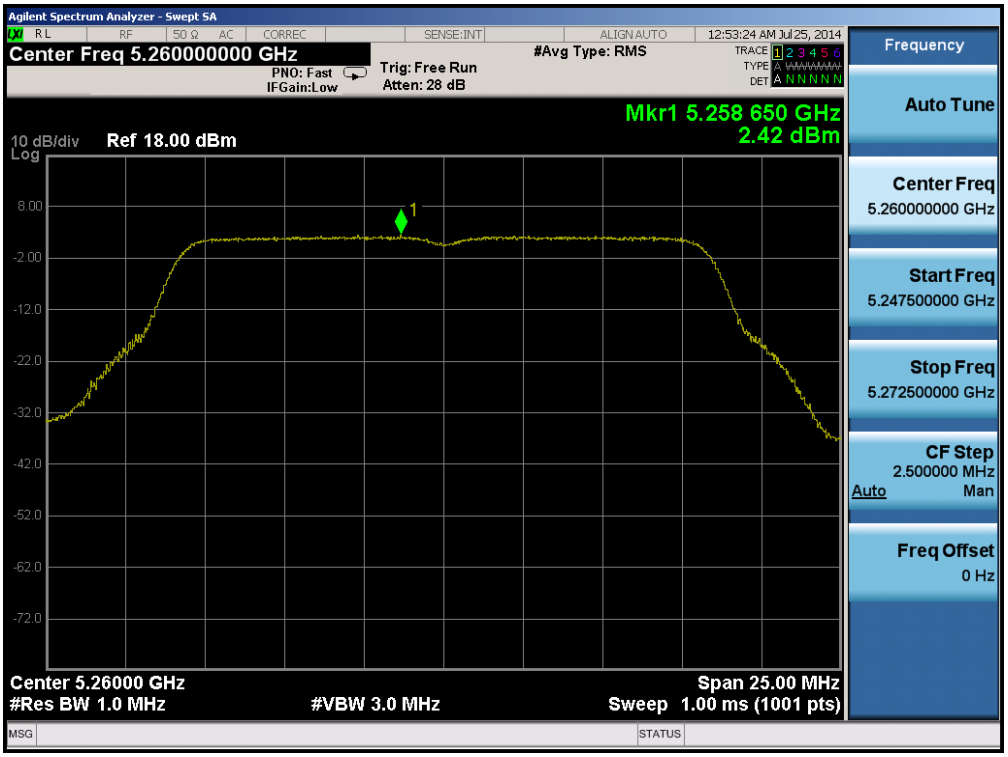


Plot 6-76. Peak Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)



Plot 6-77. Peak Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 52)

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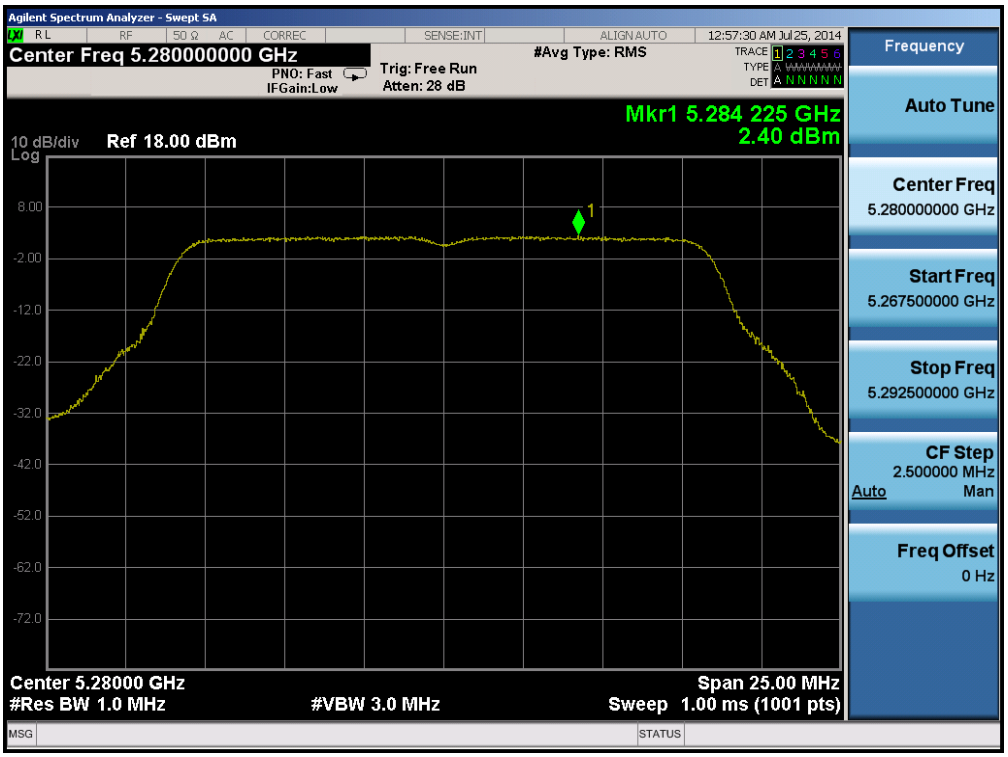
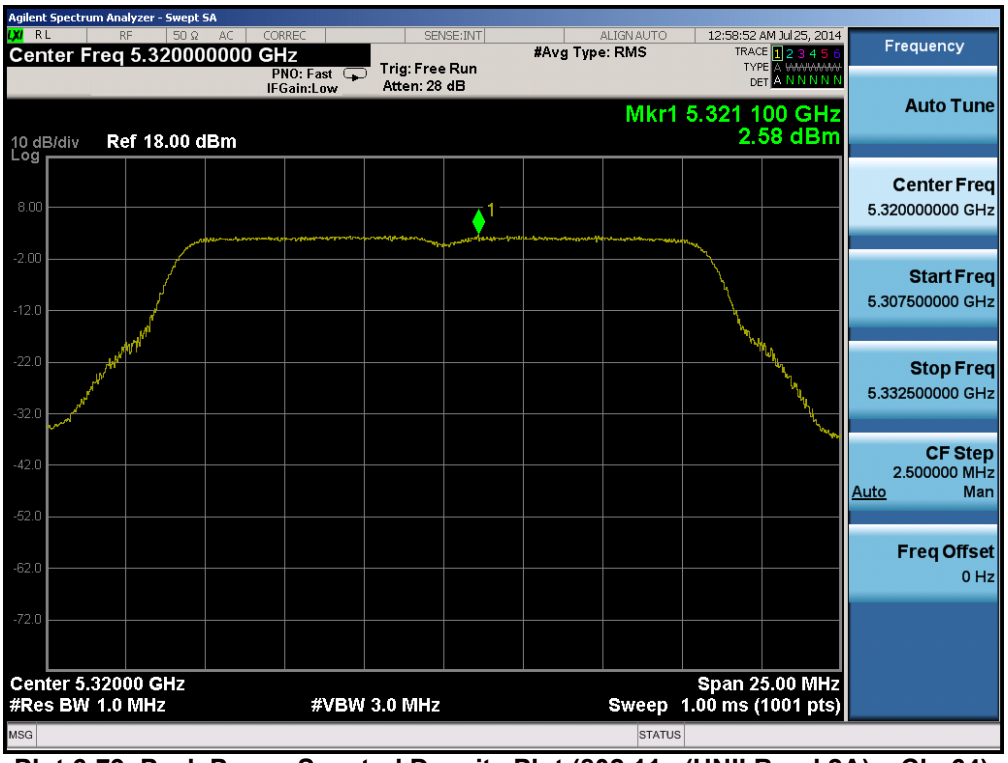


Plot 6-78. Peak Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 56)



Plot 6-79. Peak Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 64)

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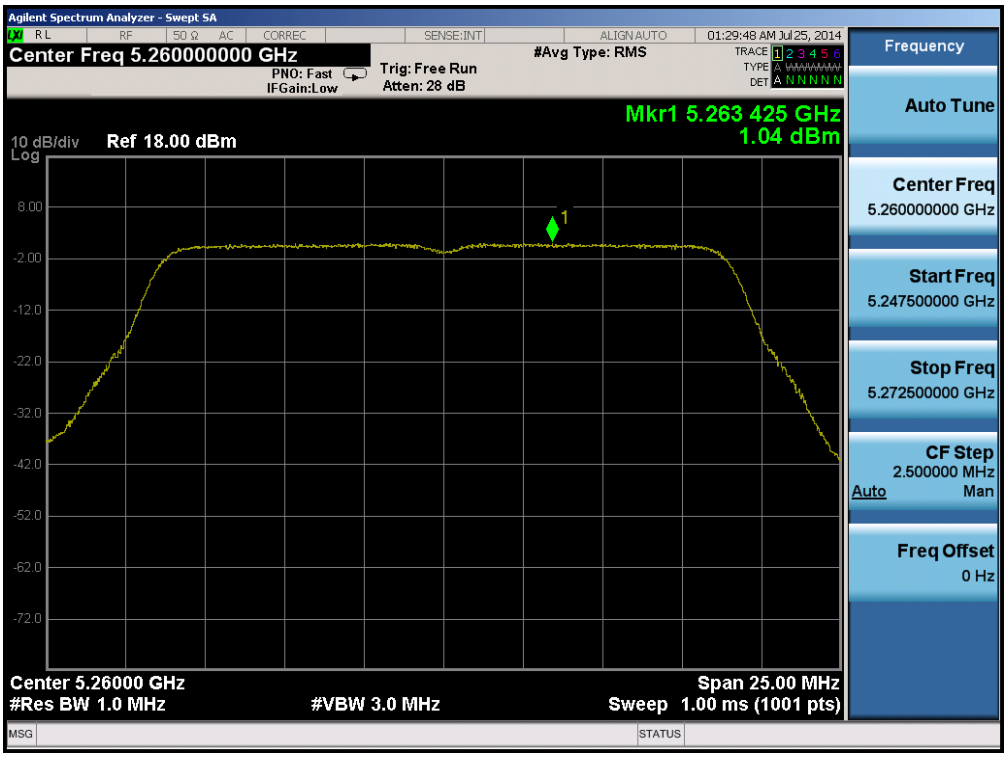
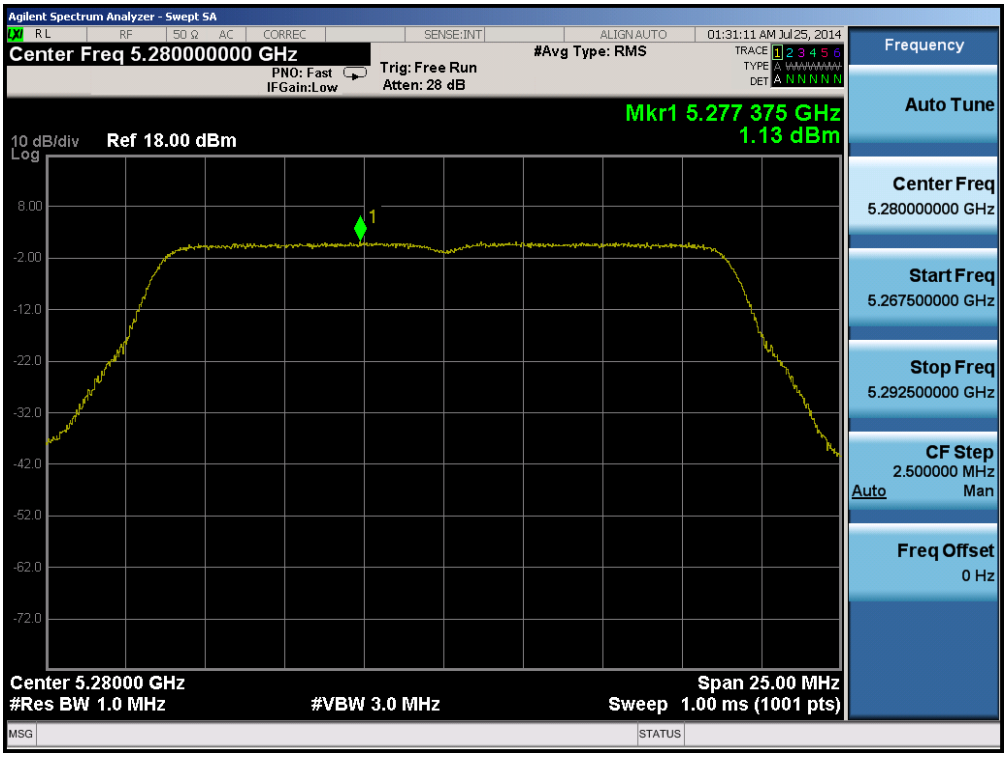


Plot 6-80. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)



Plot 6-81. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)

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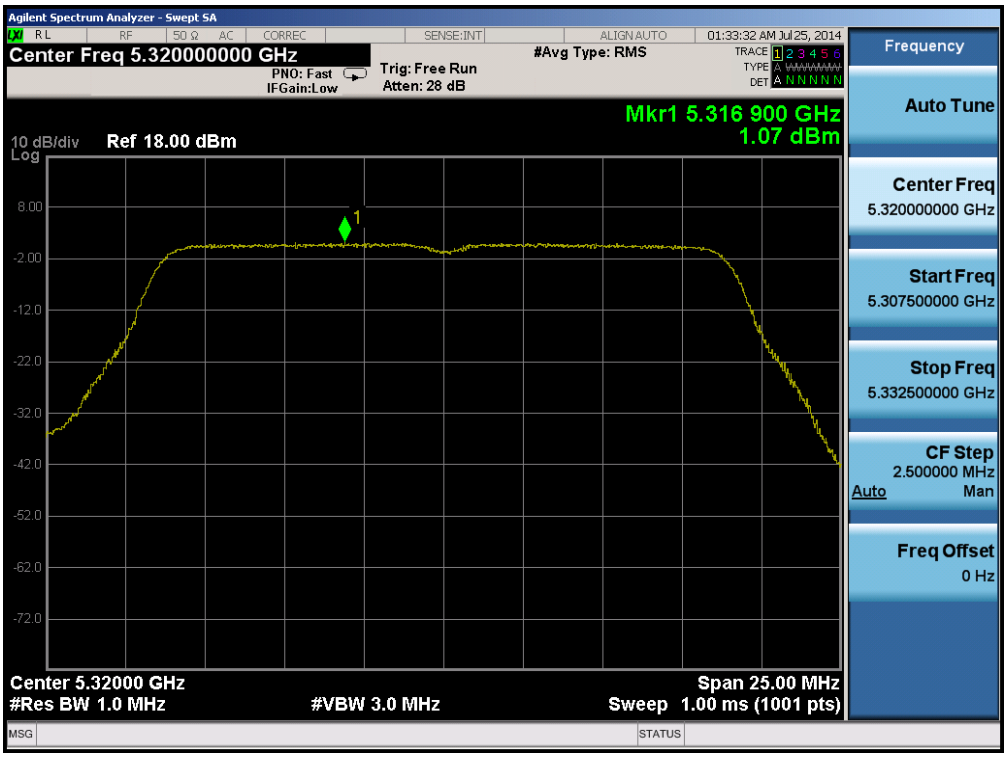
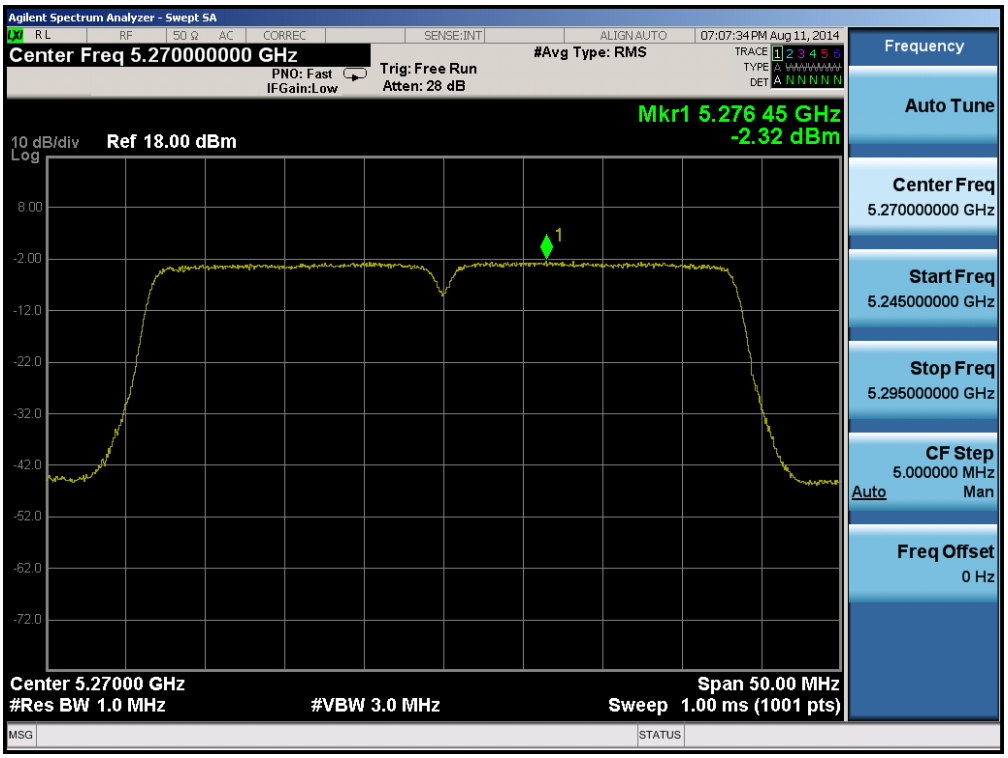


Plot 6-82. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)



Plot 6-83. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)

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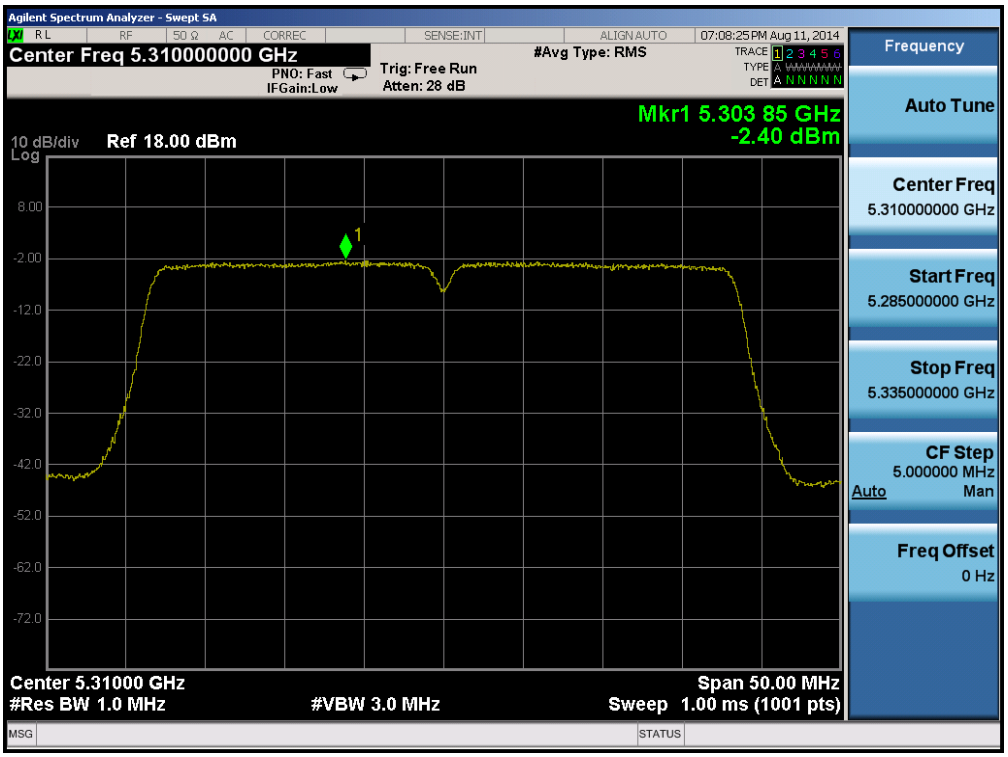

Plot 6-84. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)

Plot 6-85. Peak Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2A) – Ch. 58)

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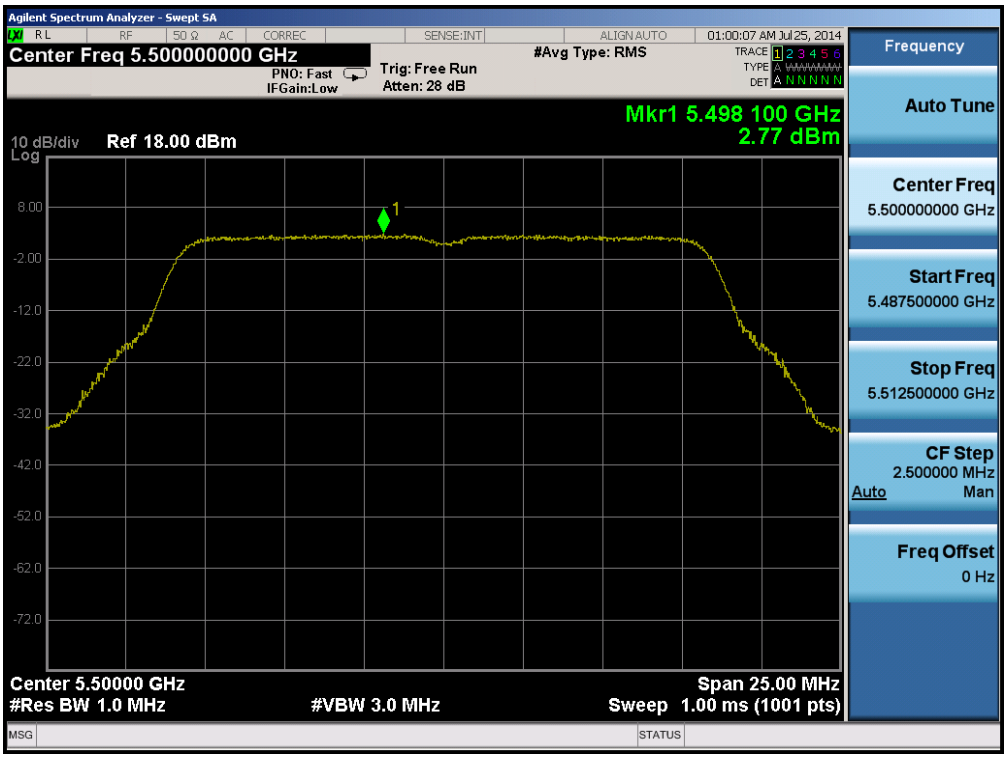
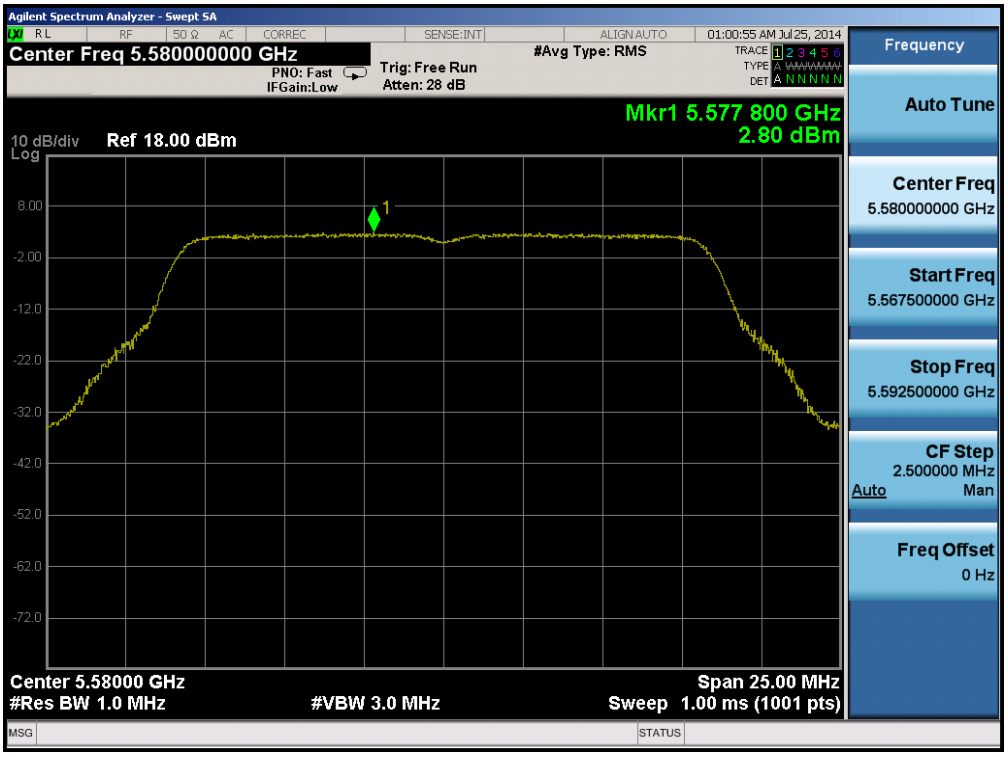


Plot 6-86. Peak Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 100)



Plot 6-87. Peak Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 116)

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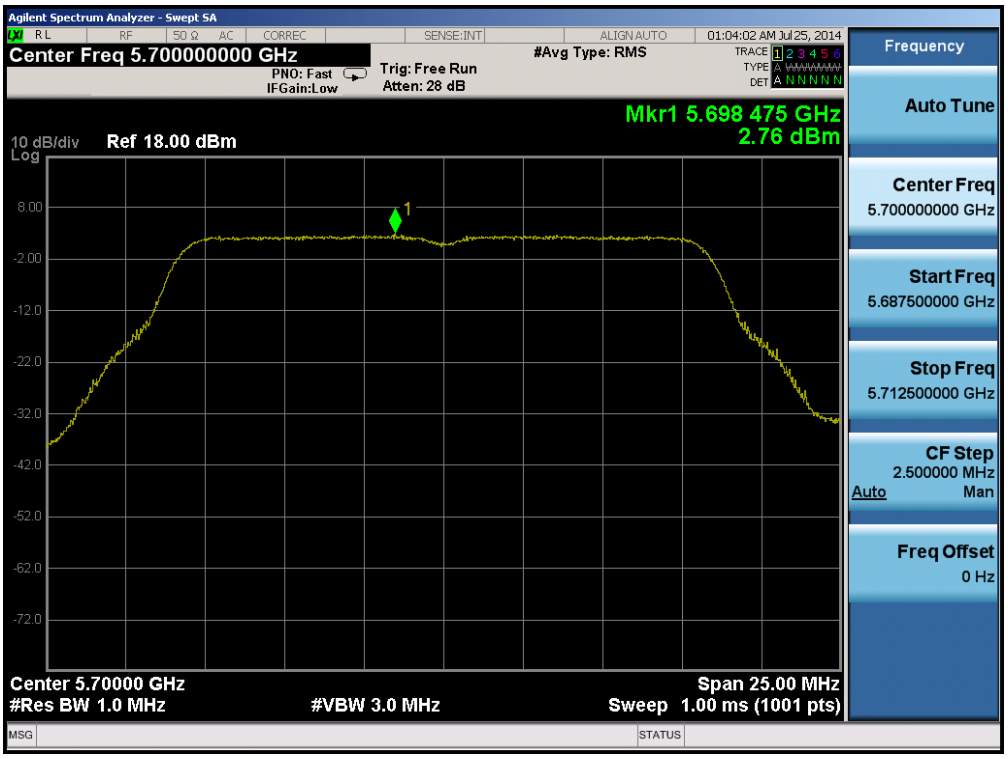
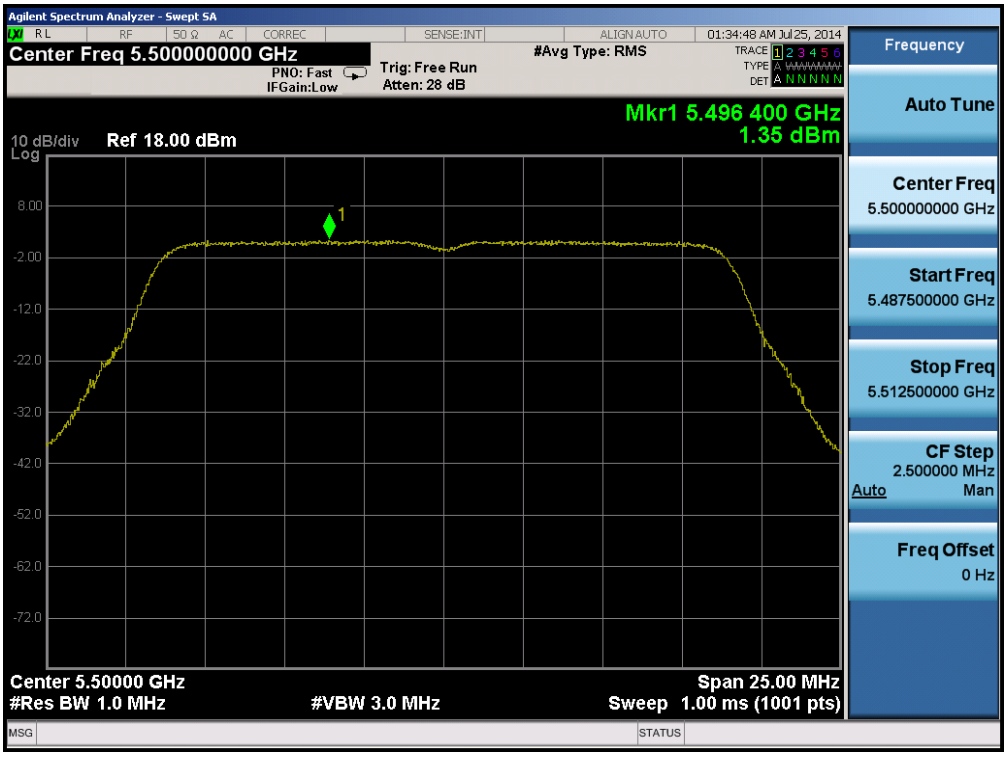


Plot 6-88. Peak Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 140)



Plot 6-89. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 100)

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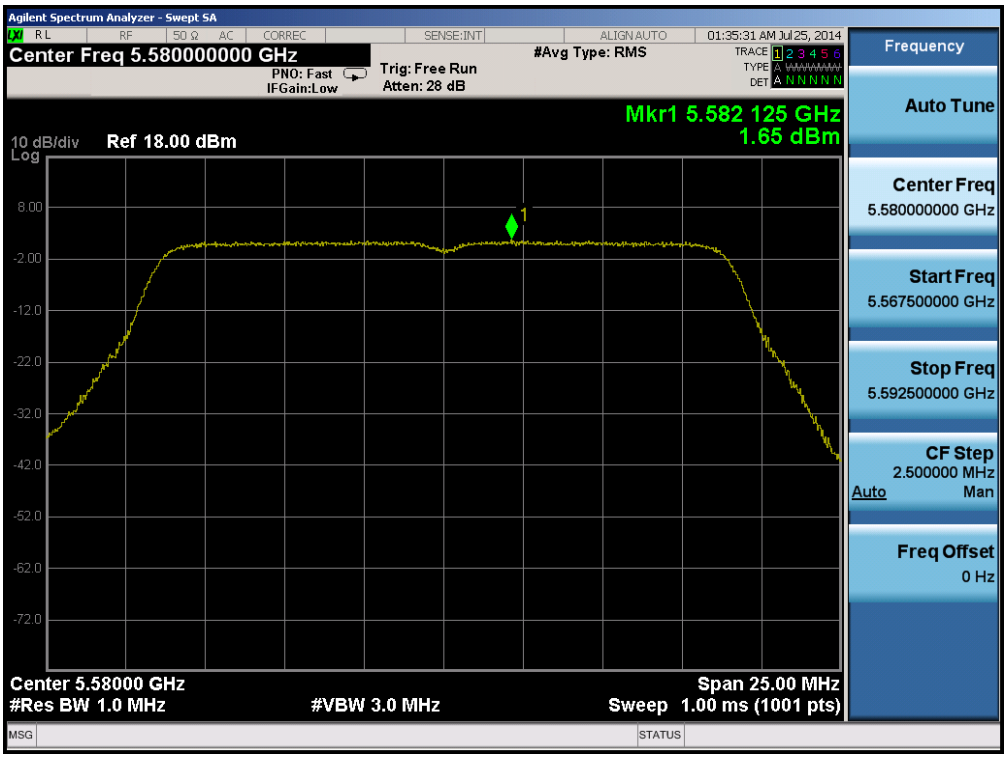
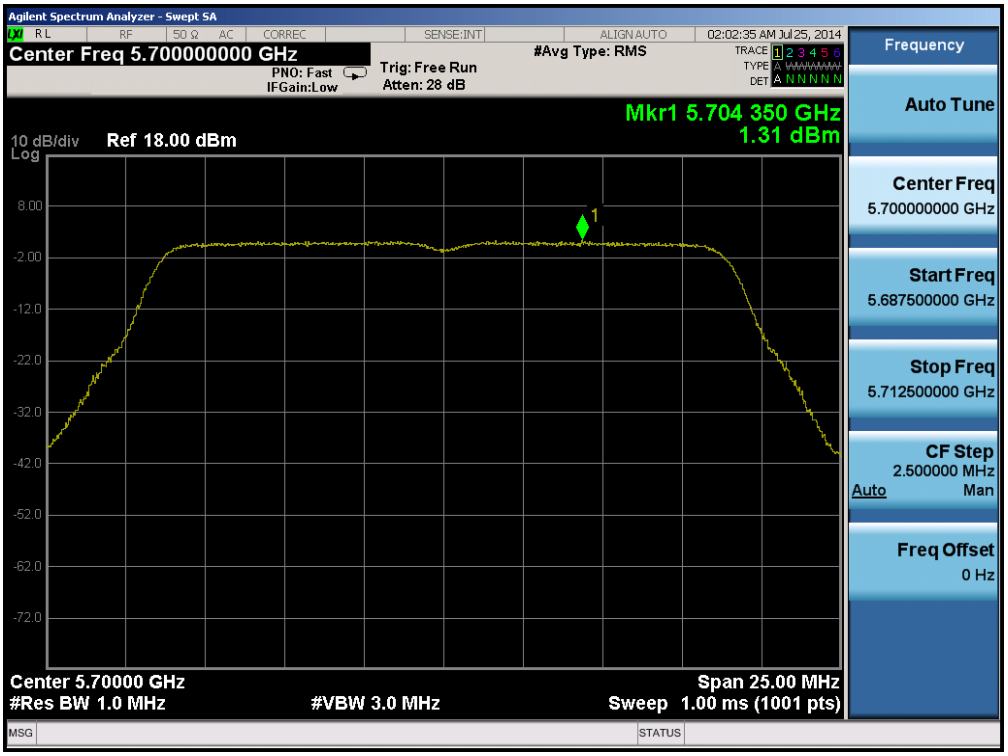


Plot 6-90. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 116)



Plot 6-91. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 140)

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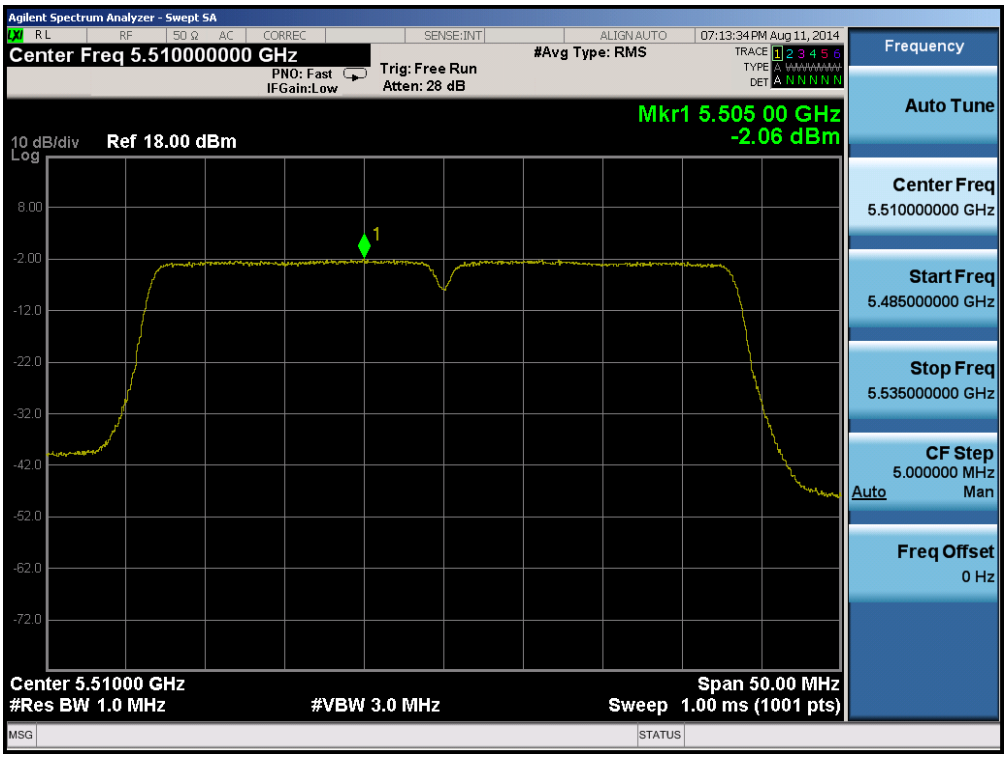
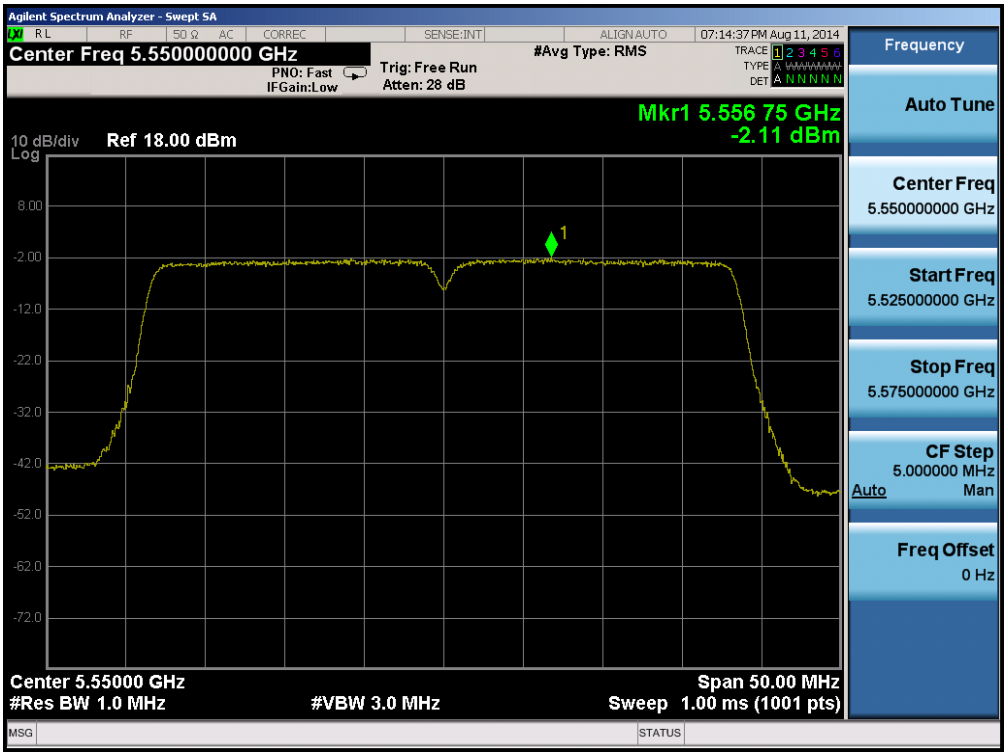


Plot 6-92. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)



Plot 6-93. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 110)

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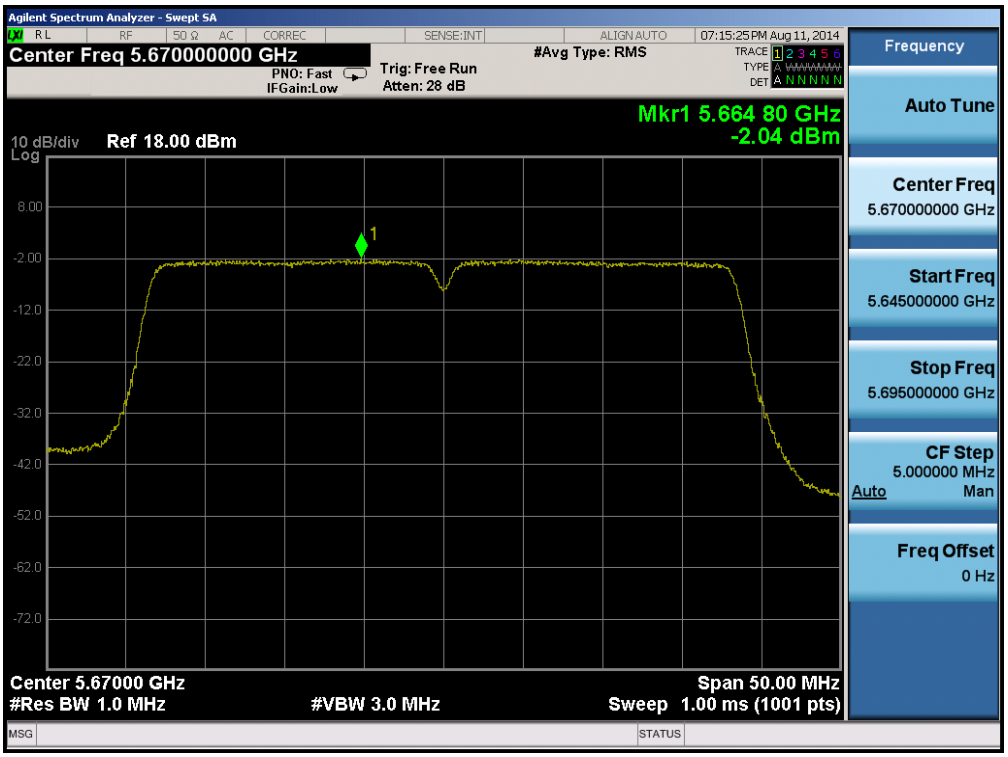
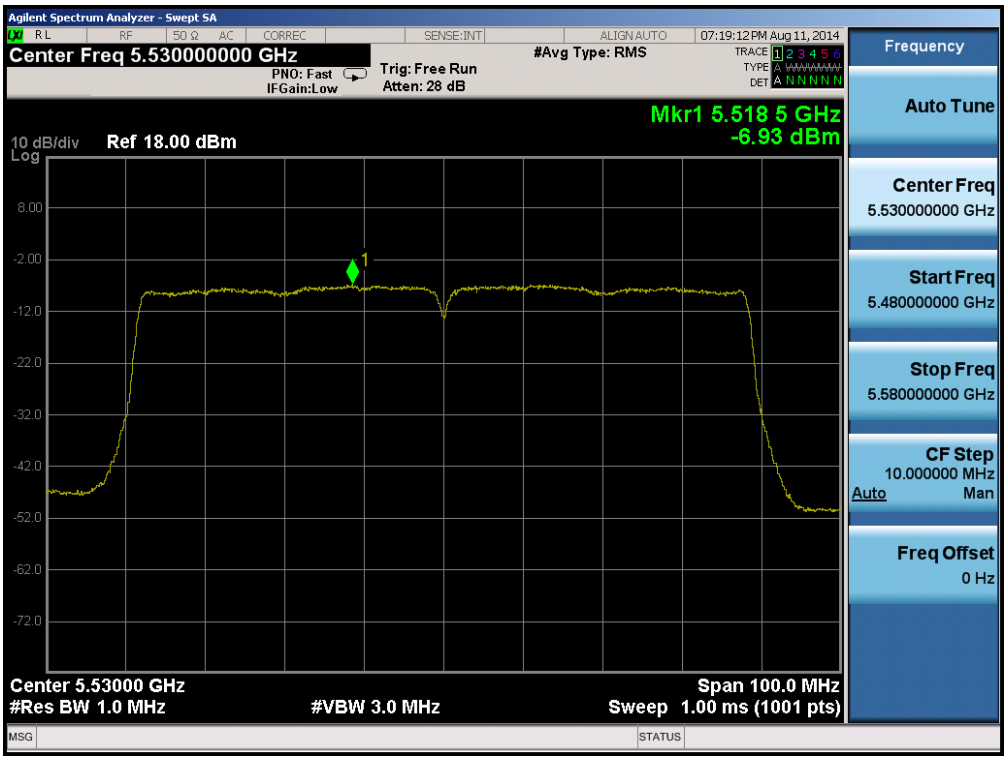


Plot 6-94. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 134)



Plot 6-95. Peak Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2C) – Ch. 106)

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Antenna-2 Power Spectral Density Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm]	Max Permissible Power Density [dBm/MHz]	Margin [dB]	Pass / Fail
Band 1	5180	36	a	6	3.06	4.0	-0.94	Pass
	5200	40	a	6	3.32	4.0	-0.68	Pass
	5240	48	a	6	2.75	4.0	-1.25	Pass
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	1.85	4.0	-2.15	Pass
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	1.87	4.0	-2.13	Pass
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	1.73	4.0	-2.27	Pass
	5190	38	n (40MHz)	13.5/15 (MCS0)	-2.75	4.0	-6.75	Pass
	5230	46	n (40MHz)	13.5/15 (MCS0)	-2.78	4.0	-6.78	Pass
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-6.27	4.0	-10.27	Pass
Band 2A	5260	52	a	6	2.42	11.0	-8.58	Pass
	5280	56	a	6	2.40	11.0	-8.60	Pass
	5320	64	a	6	2.58	11.0	-8.42	Pass
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	1.04	11.0	-9.96	Pass
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	1.14	11.0	-9.87	Pass
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	1.07	11.0	-9.93	Pass
	5270	54	n (40MHz)	13.5/15 (MCS0)	-3.21	11.0	-14.21	Pass
	5310	62	n (40MHz)	13.5/15 (MCS0)	-3.13	11.0	-14.13	Pass
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	-6.59	11.0	-17.59	Pass
Band 2C	5500	100	a	6	2.77	11.0	-8.23	Pass
	5580	116	a	6	2.80	11.0	-8.20	Pass
	5700	140	a	6	2.76	11.0	-8.25	Pass
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	1.35	11.0	-9.65	Pass
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	1.65	11.0	-9.35	Pass
	5700	140	n (20MHz)	6.5/7.2 (MCS0)	1.31	11.0	-9.69	Pass
	5510	102	n (40MHz)	13.5/15 (MCS0)	-2.83	11.0	-13.83	Pass
	5550	110	n (40MHz)	13.5/15 (MCS0)	-3.18	11.0	-14.18	Pass
	5670	134	n (40MHz)	13.5/15 (MCS0)	1.46	11.0	-9.54	Pass
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	-6.71	11.0	-17.71	Pass

Table 6-19. Conducted Power Spectral Density Measurements

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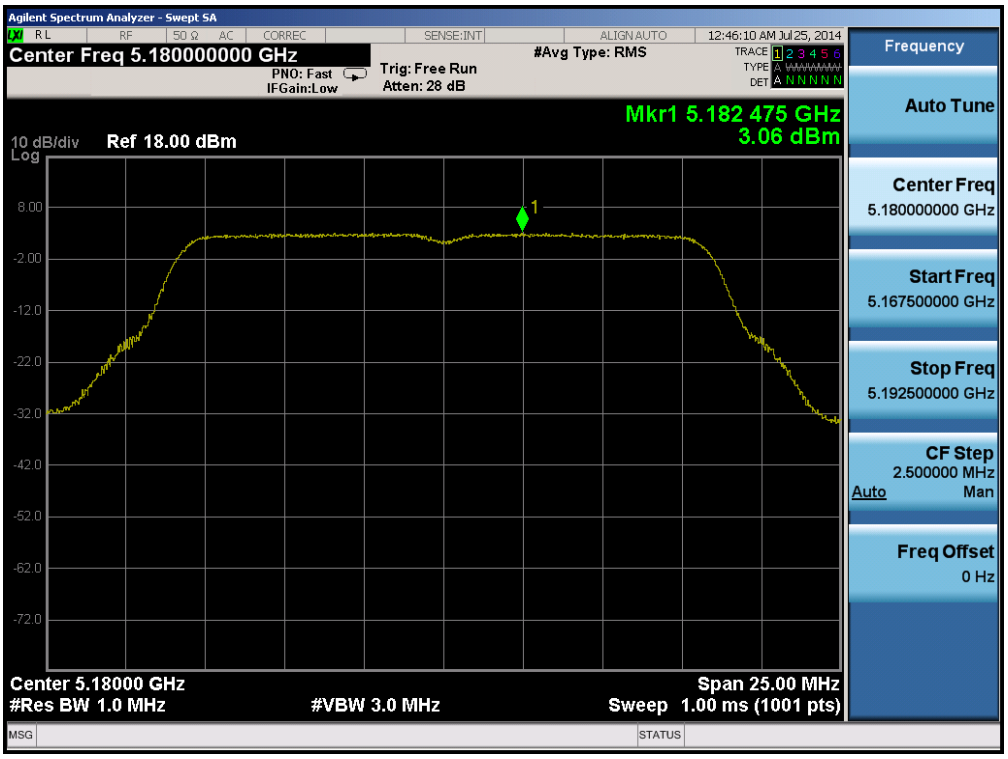
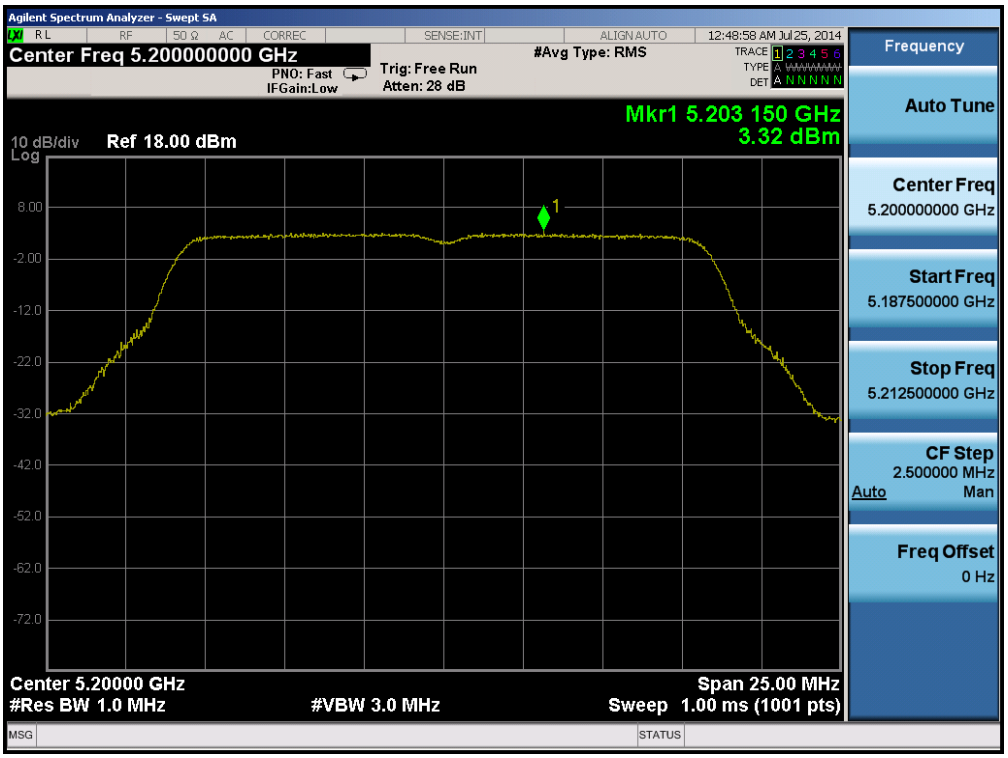


Plot 6-96. Peak Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 36)



Plot 6-97. Peak Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 40)

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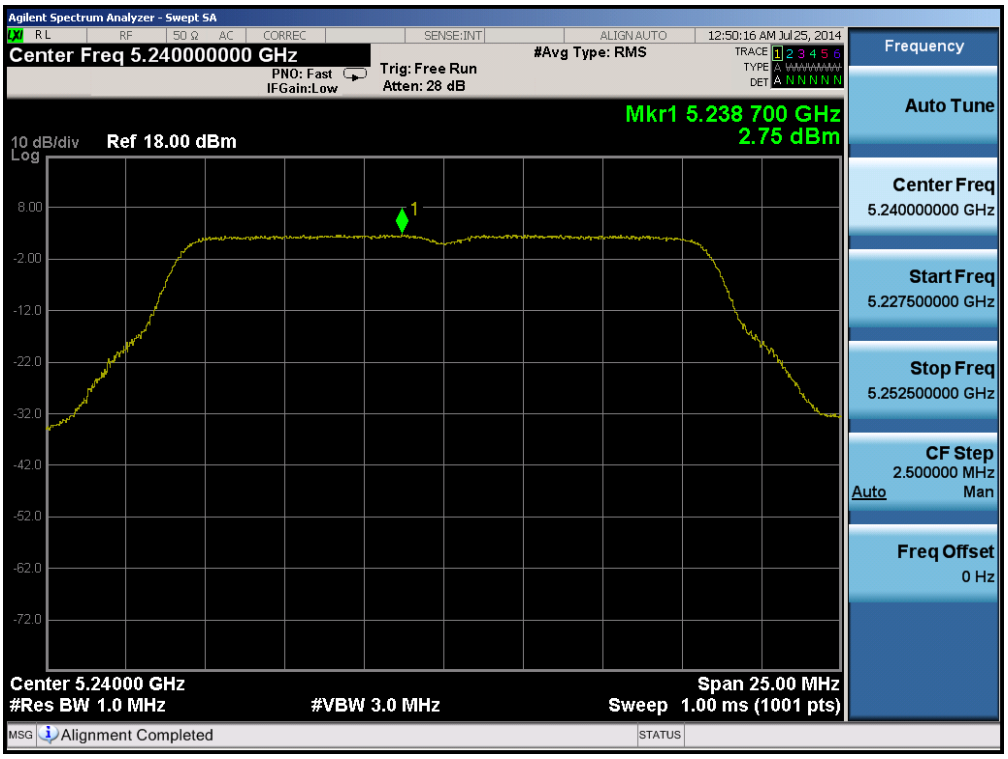
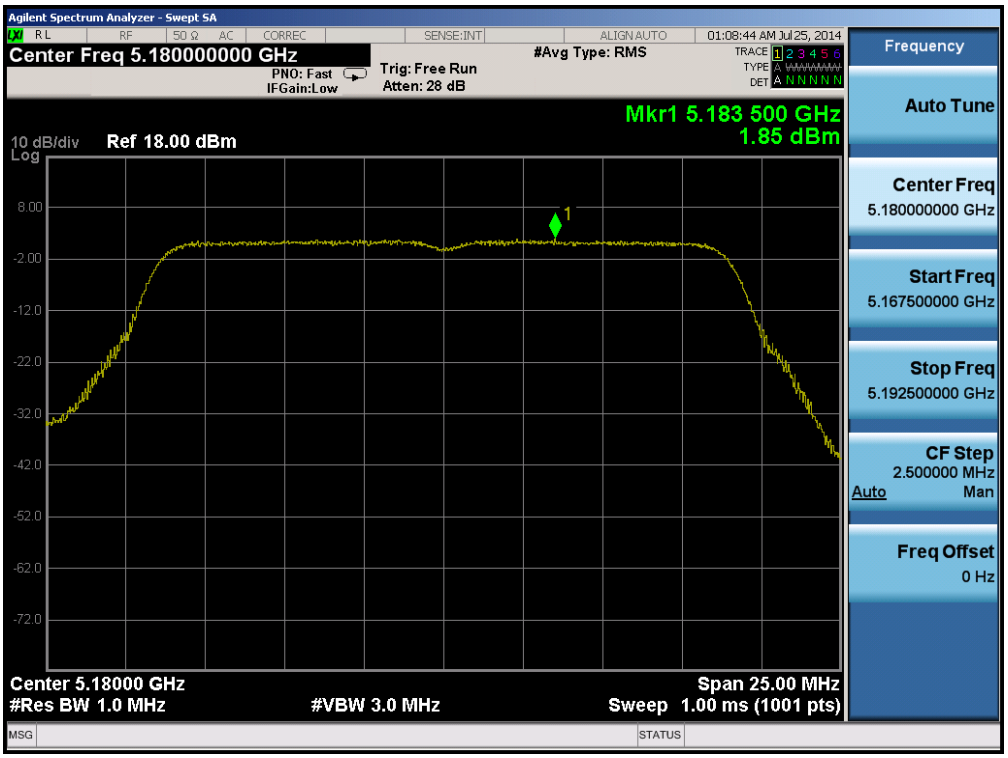


Plot 6-98. Peak Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 48)



Plot 6-99. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

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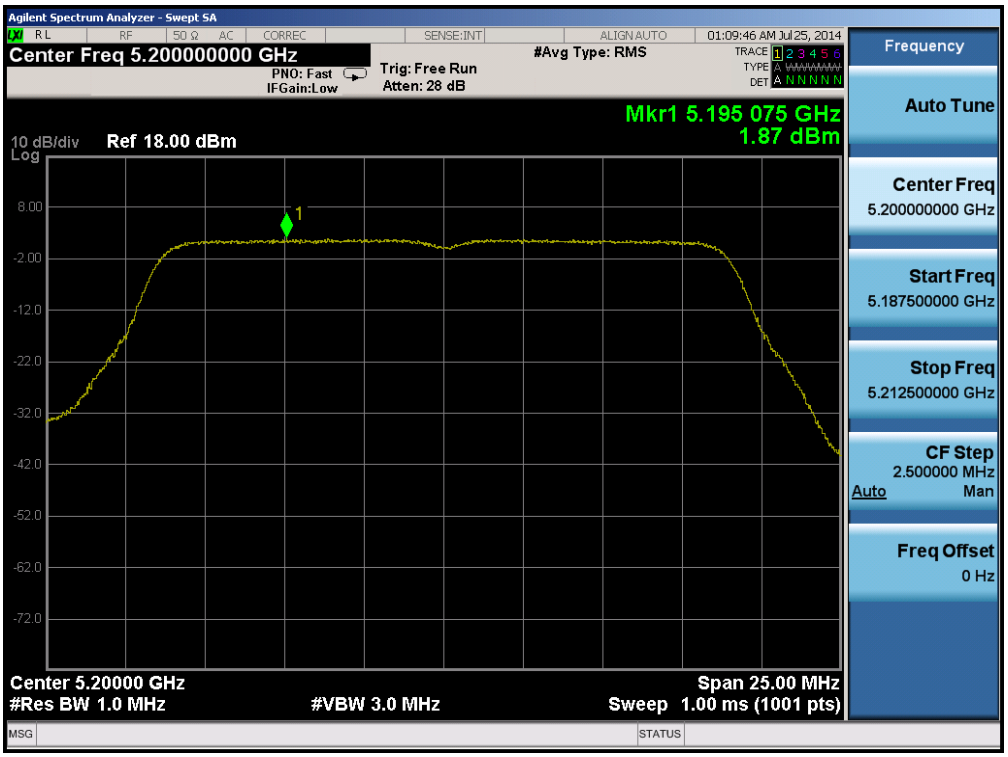
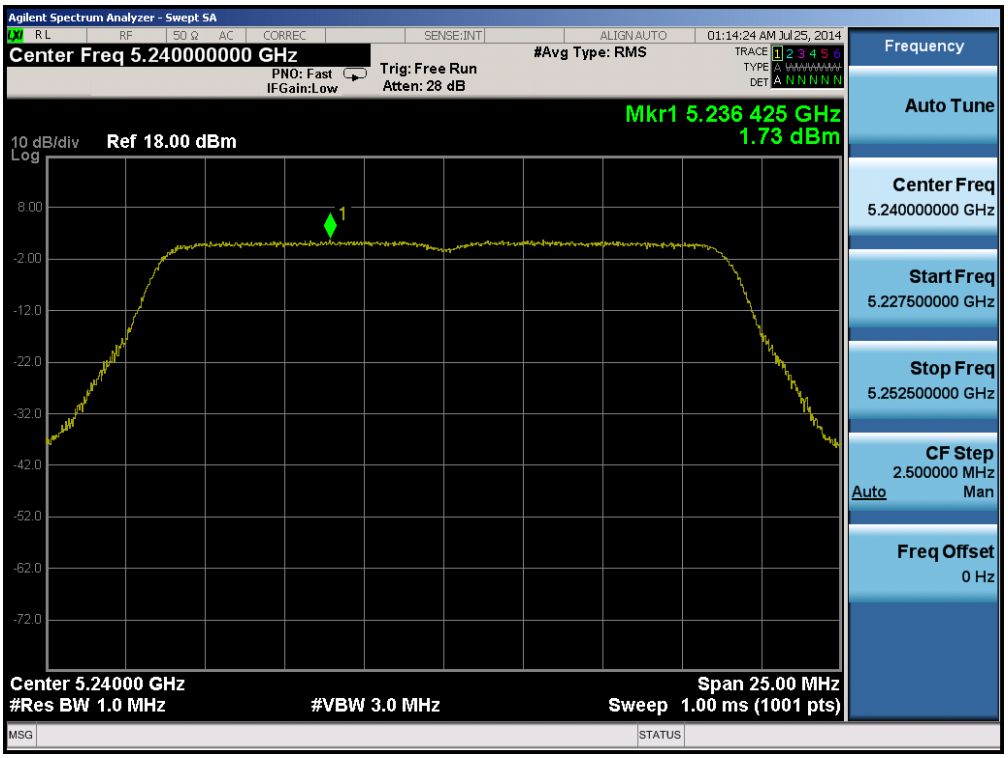


Plot 6-100. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 40)



Plot 6-101. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

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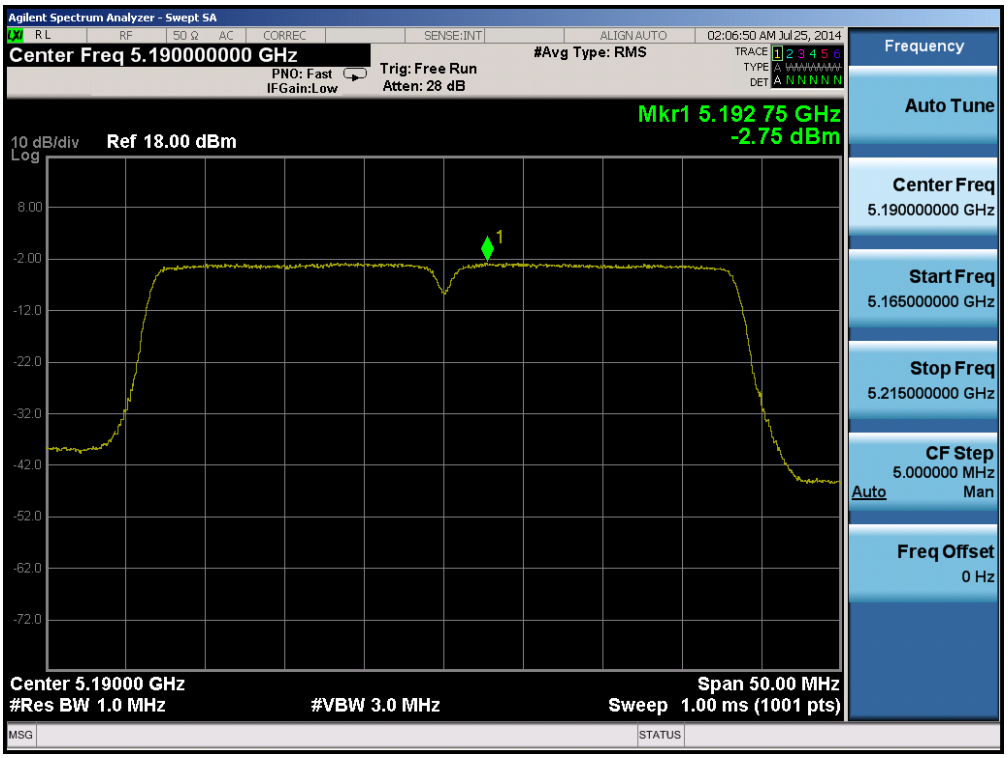
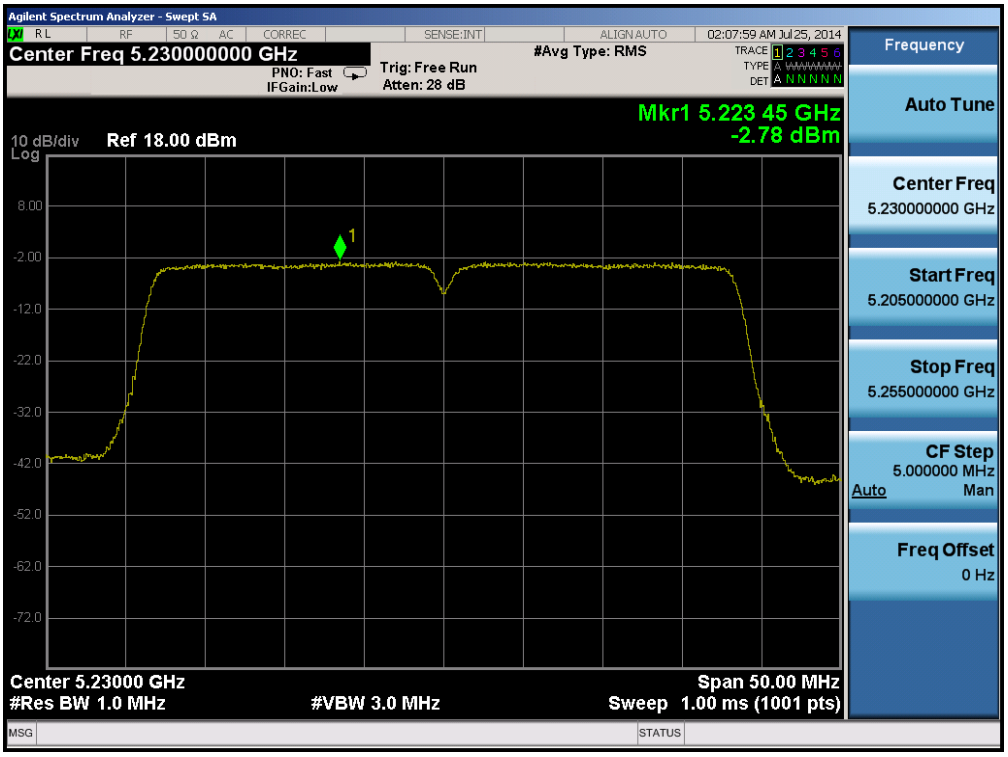


Plot 6-102. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 38)



Plot 6-103. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

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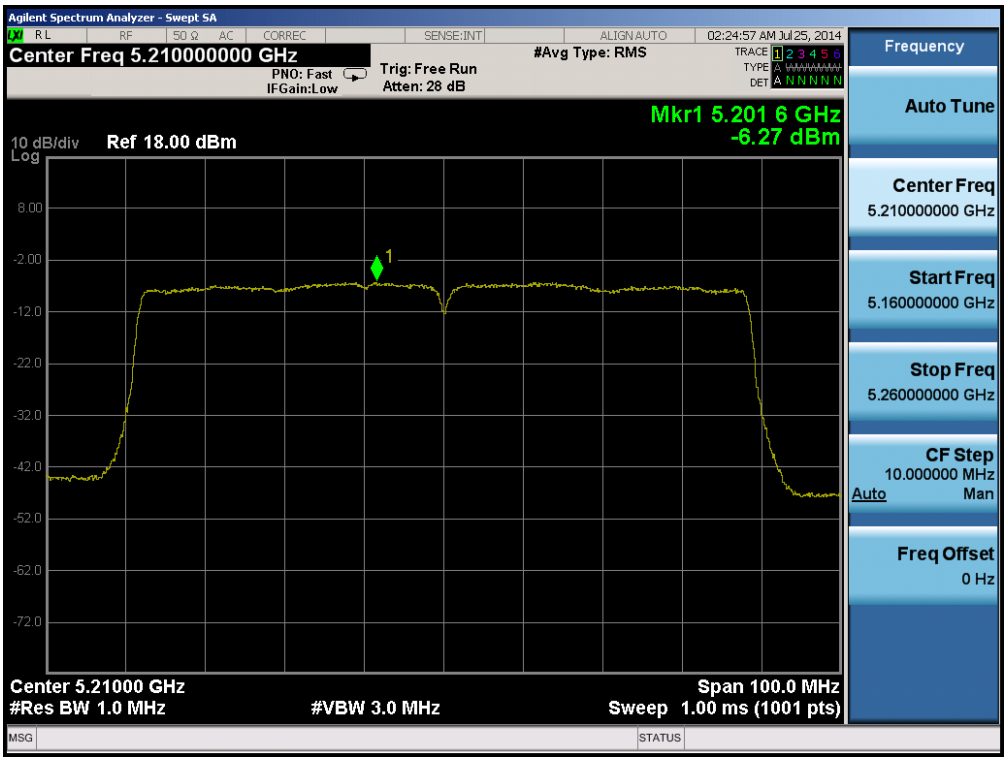
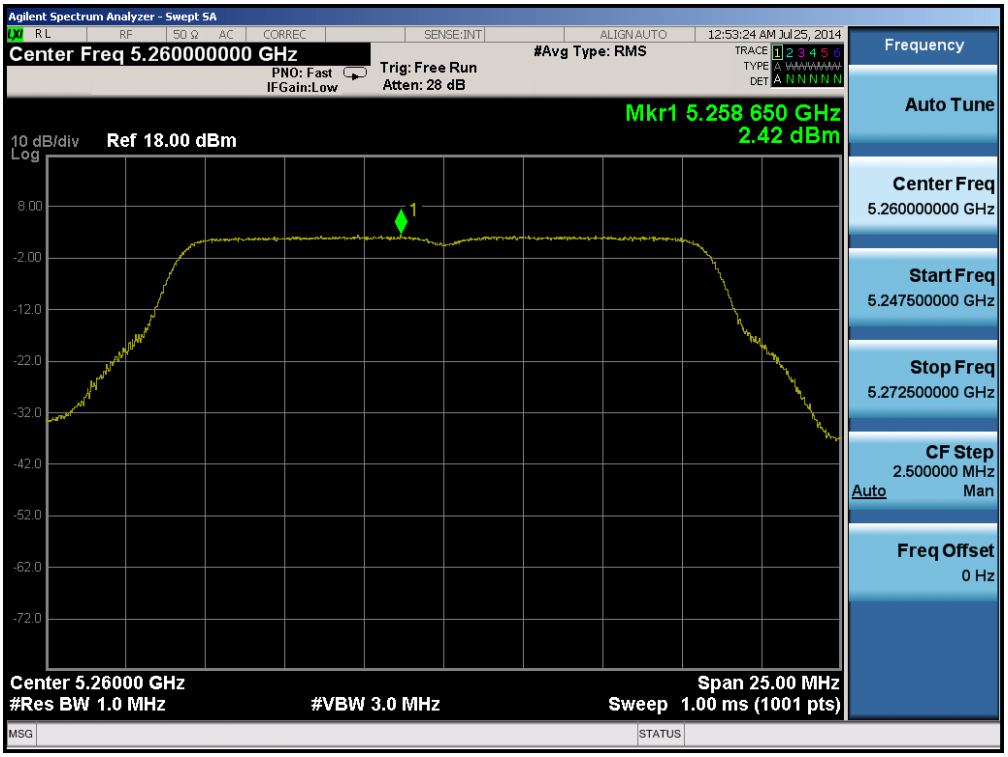


Plot 6-104. Peak Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)



Plot 6-105. Peak Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 52)

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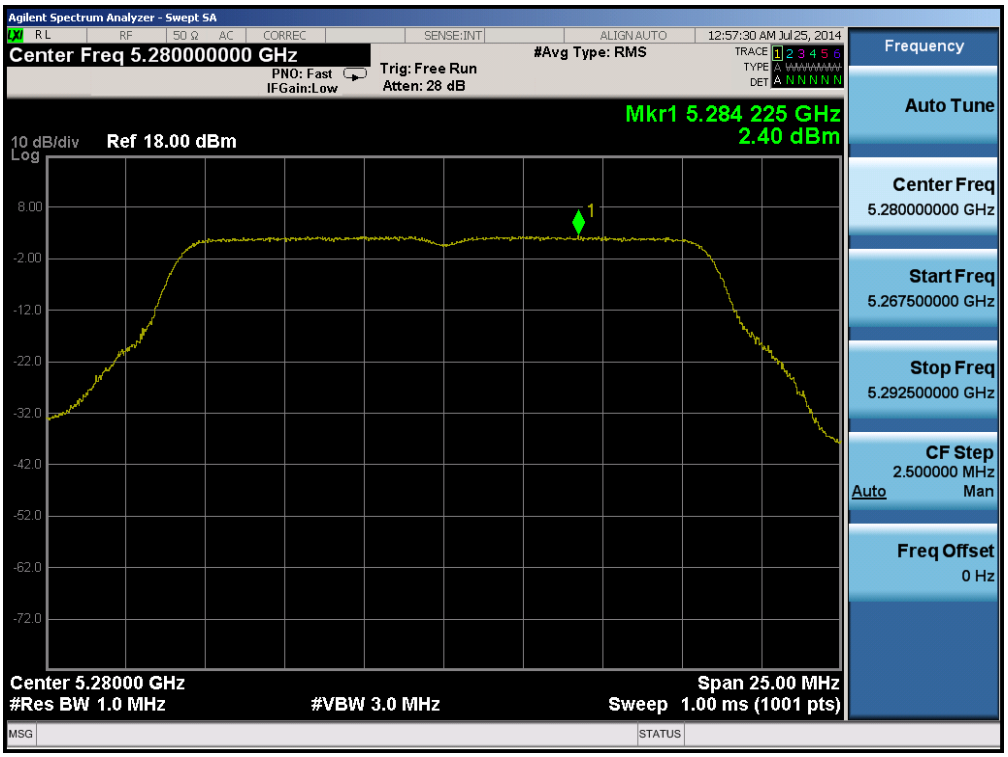
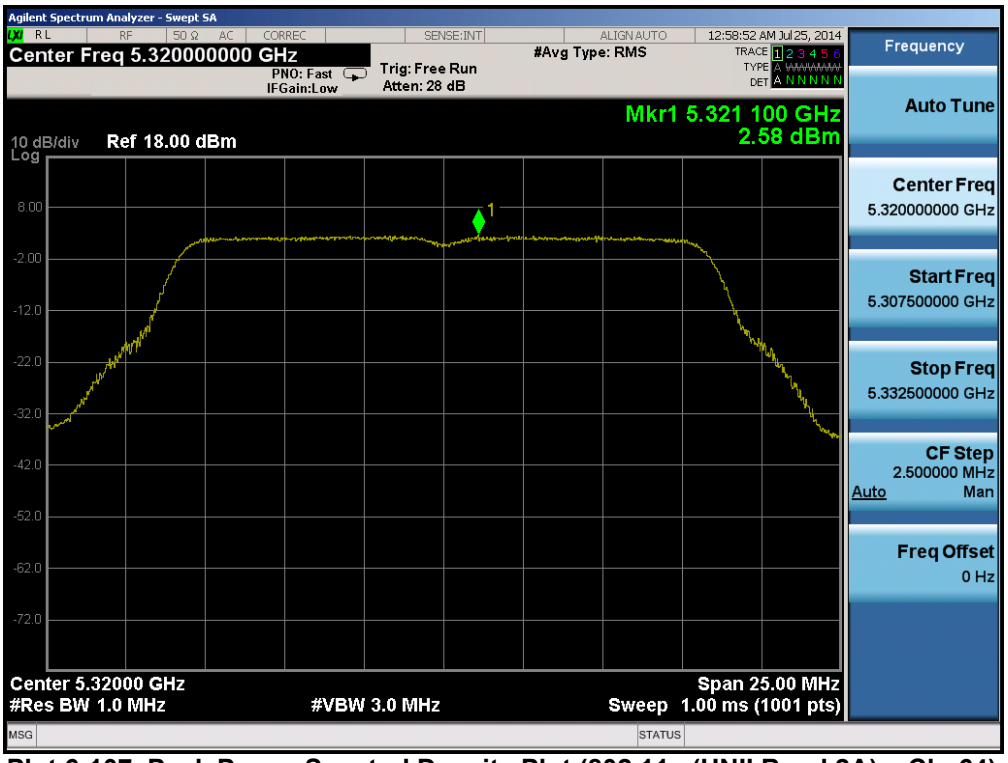


Plot 6-106. Peak Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 56)



Plot 6-107. Peak Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 64)

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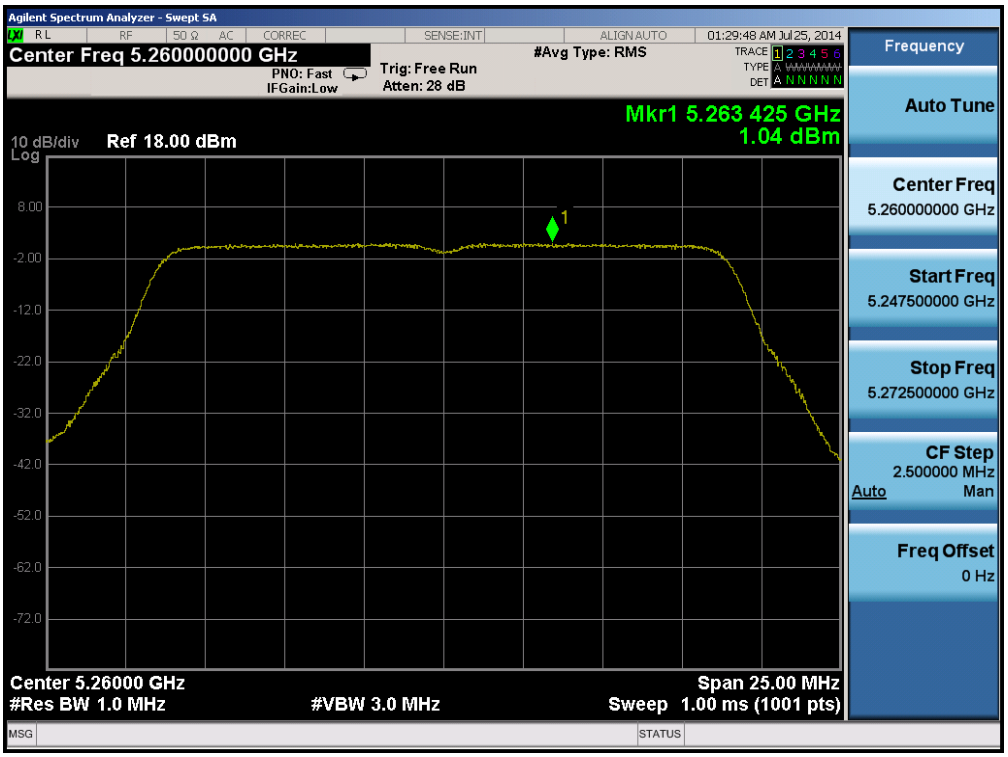
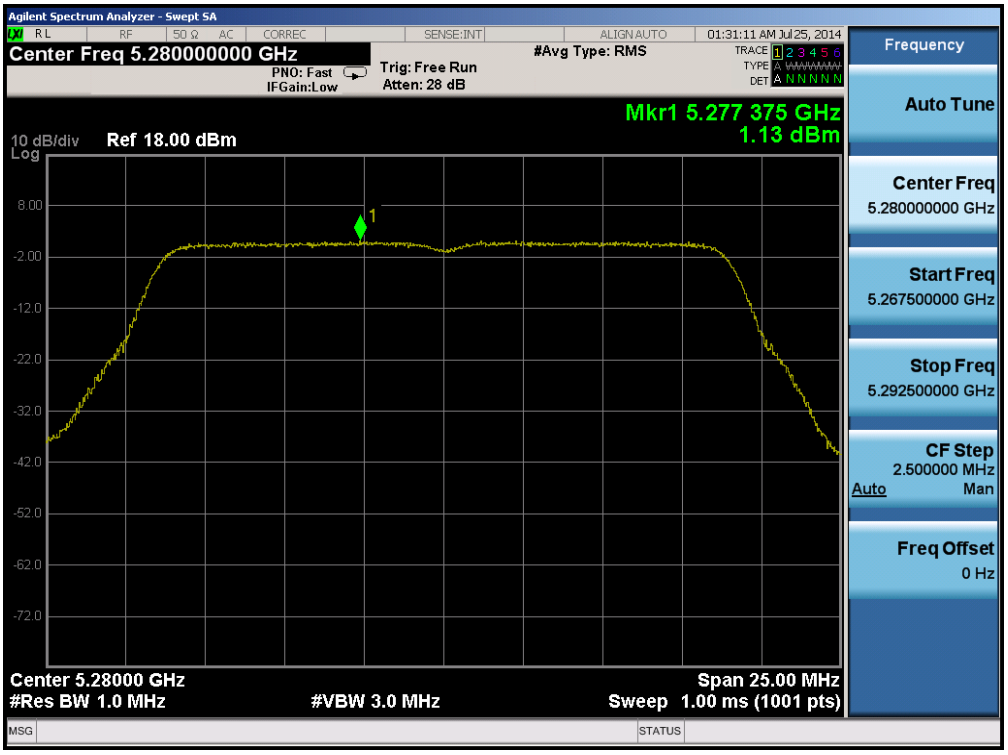


Plot 6-108. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)



Plot 6-109. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)

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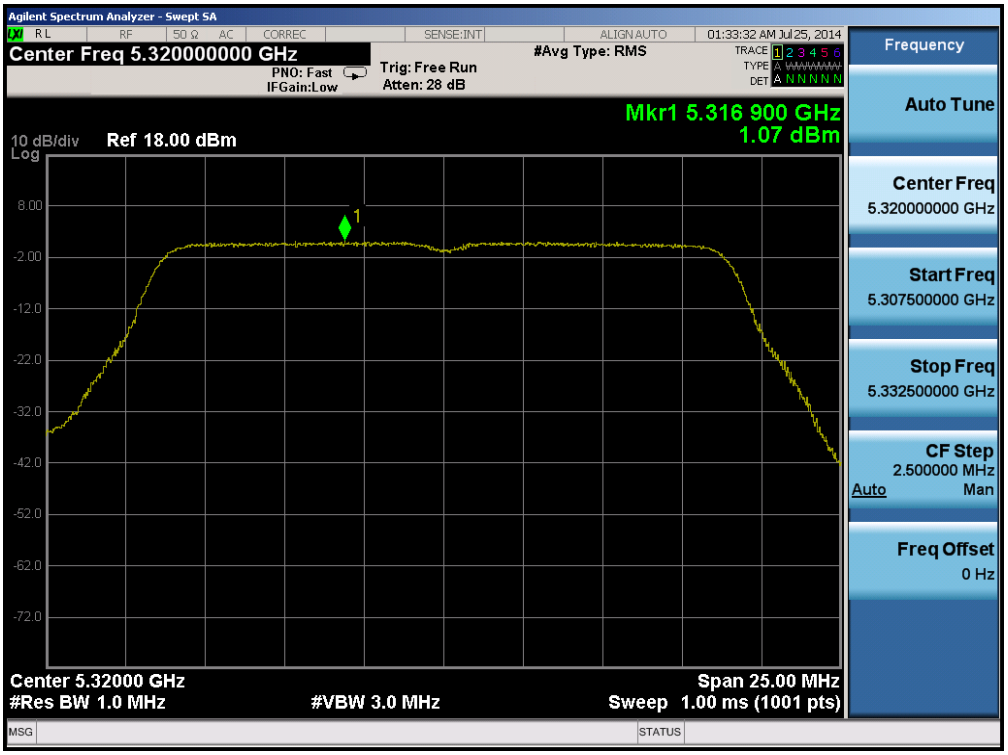
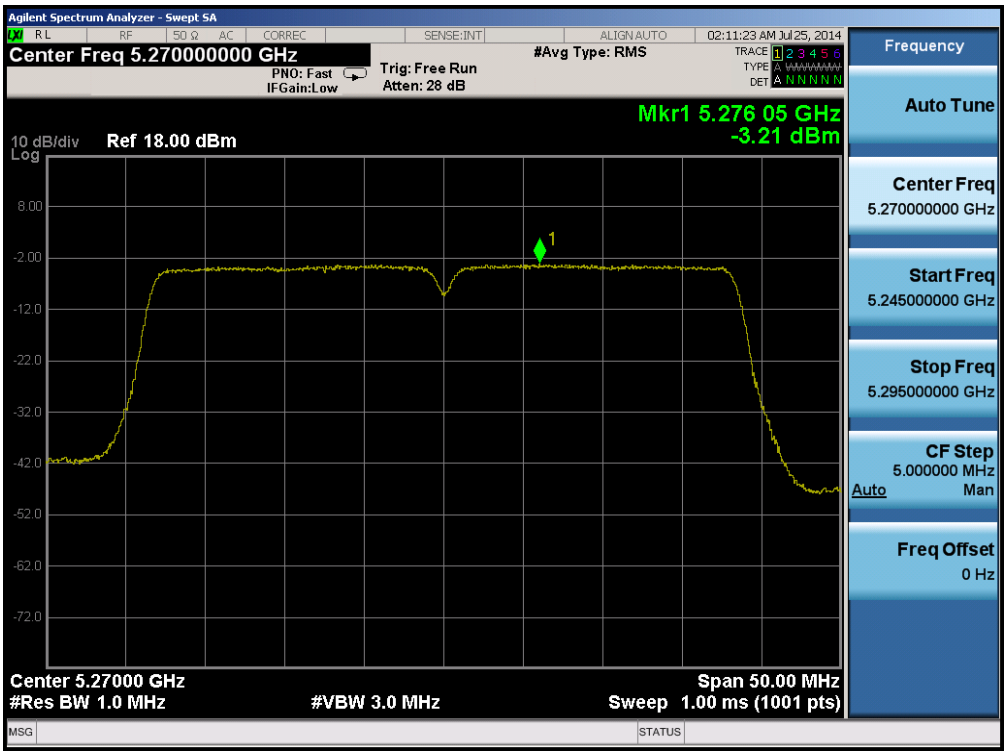


Plot 6-110. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)



Plot 6-111. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)

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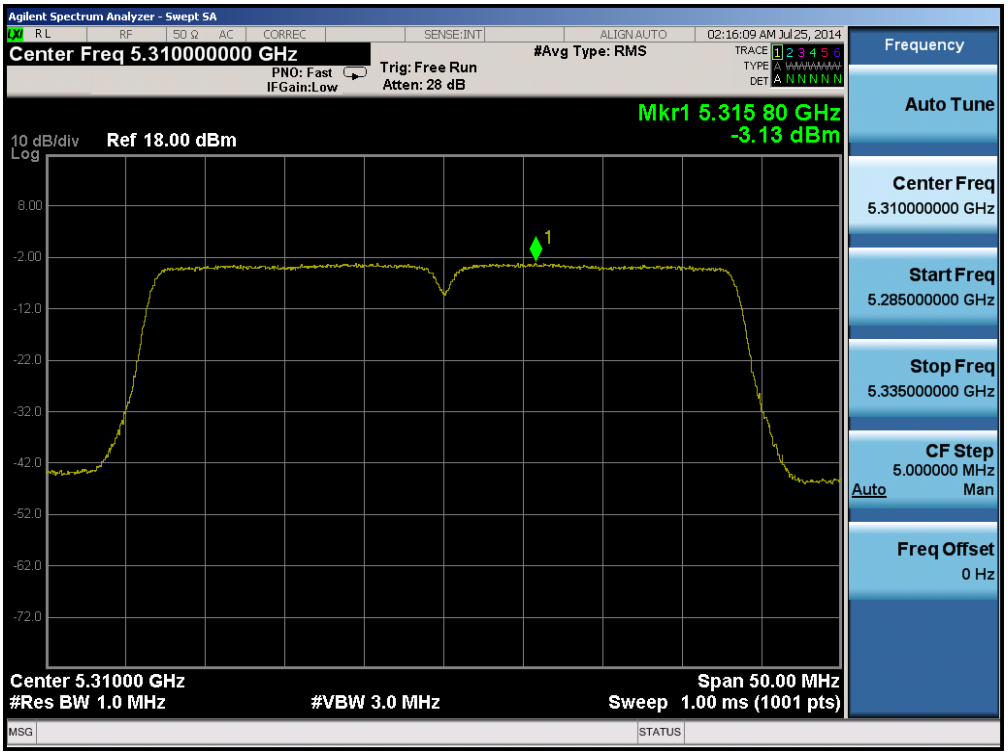
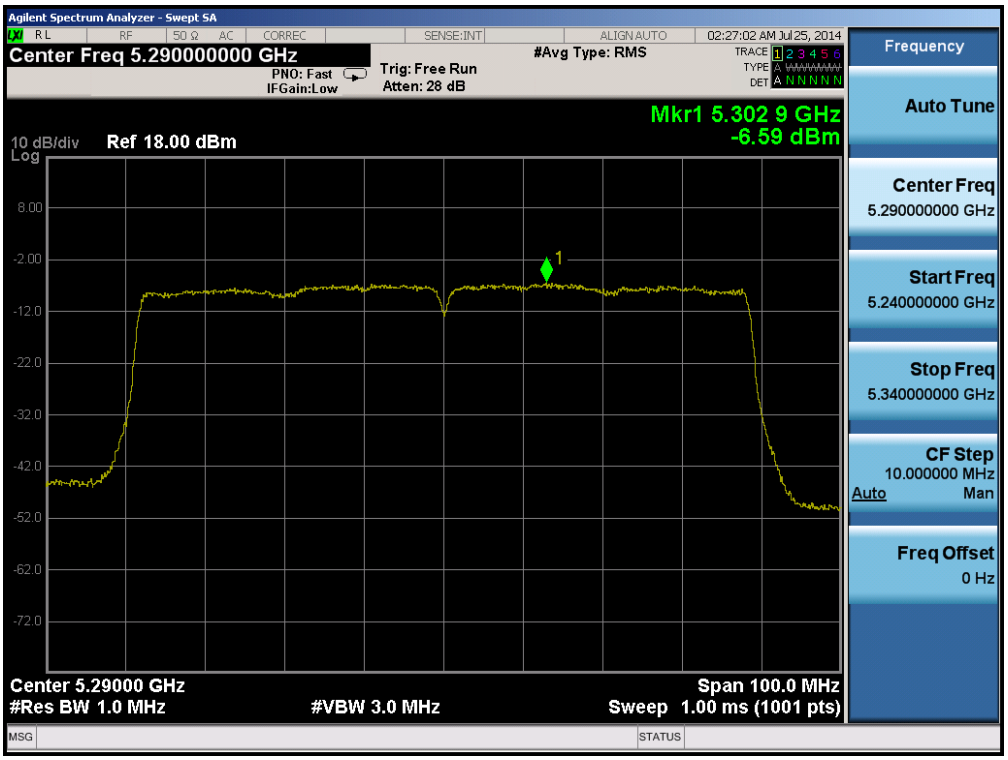


Plot 6-112. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)



Plot 6-113. Peak Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2A) – Ch. 58)

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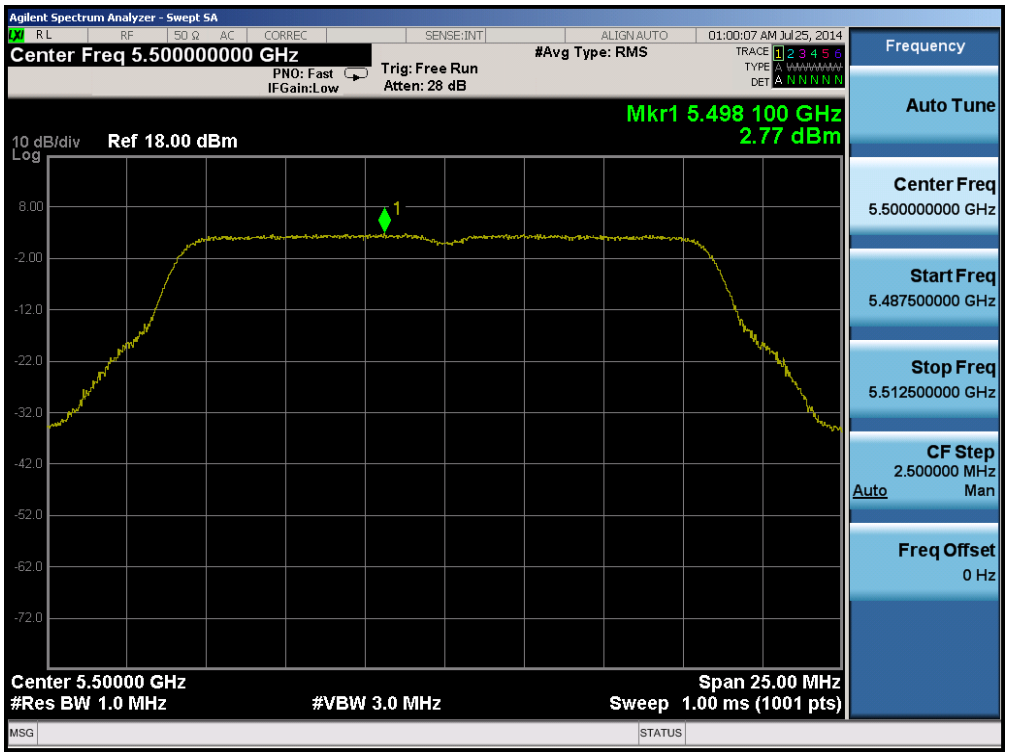
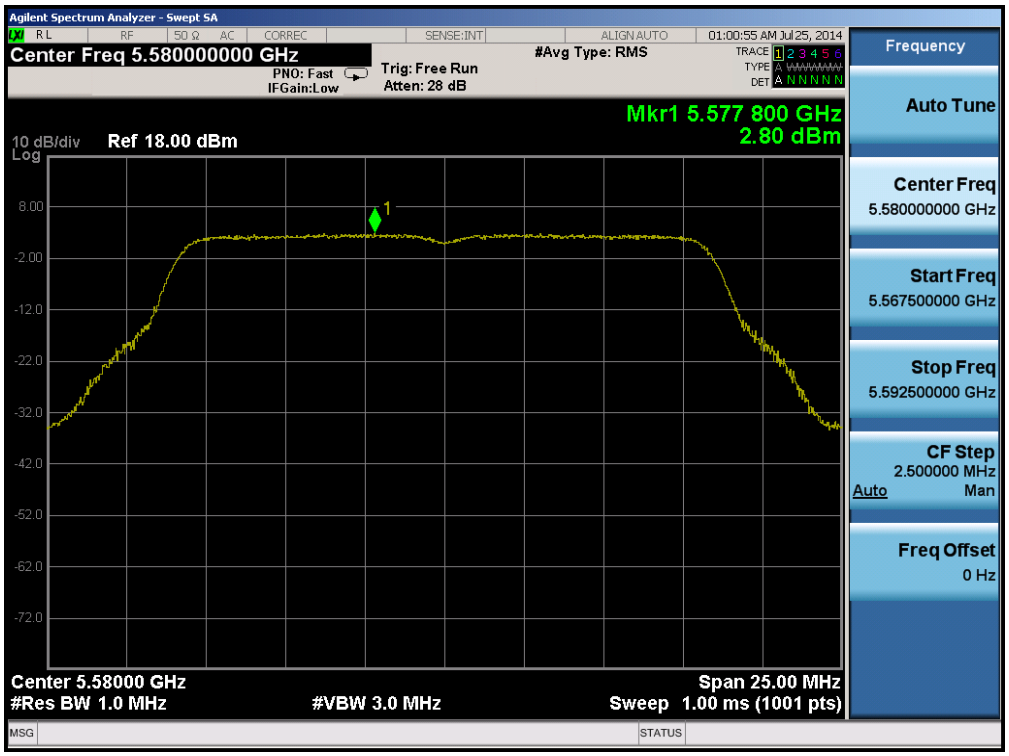


Plot 6-114. Peak Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 100)



Plot 6-115. Peak Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 116)

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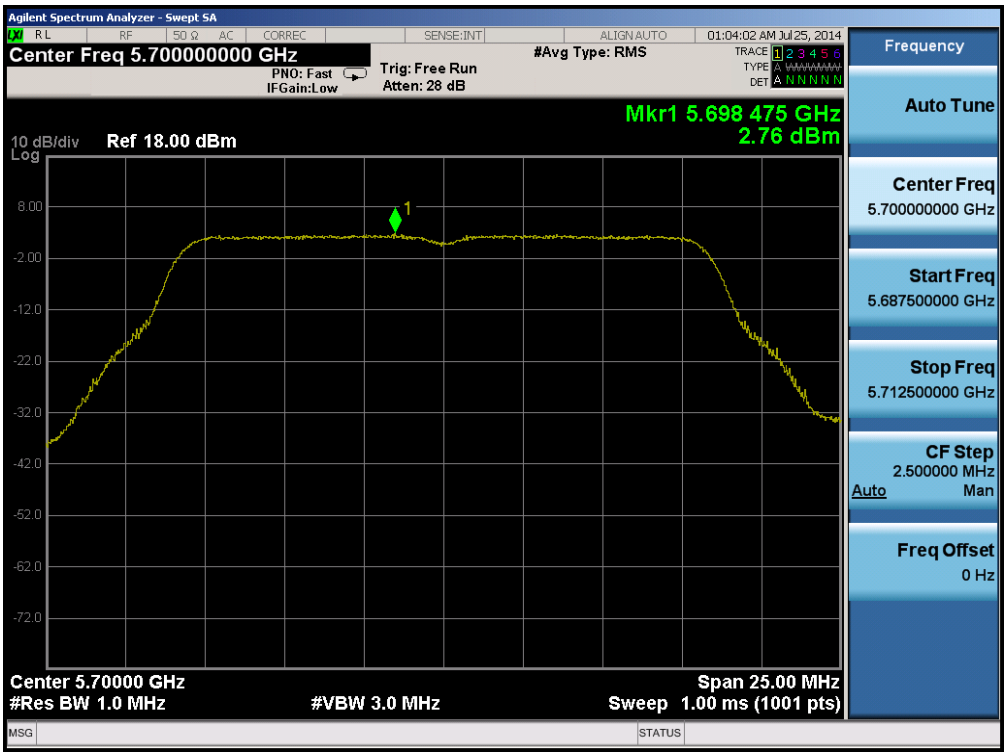
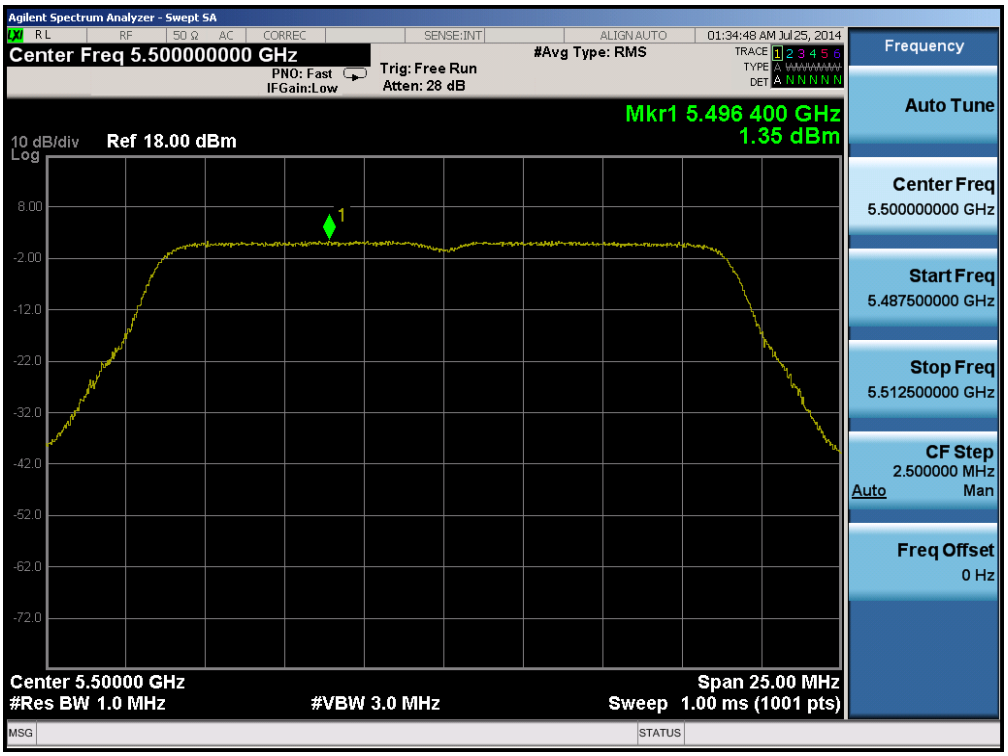


Plot 6-116. Peak Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 140)



Plot 6-117. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 100)

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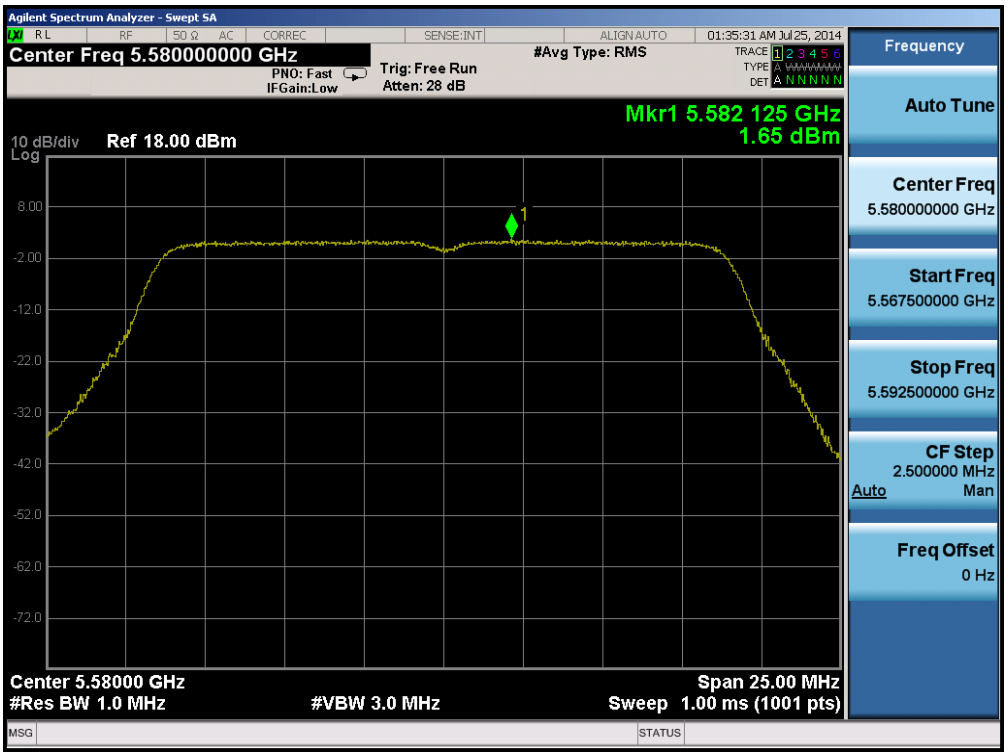
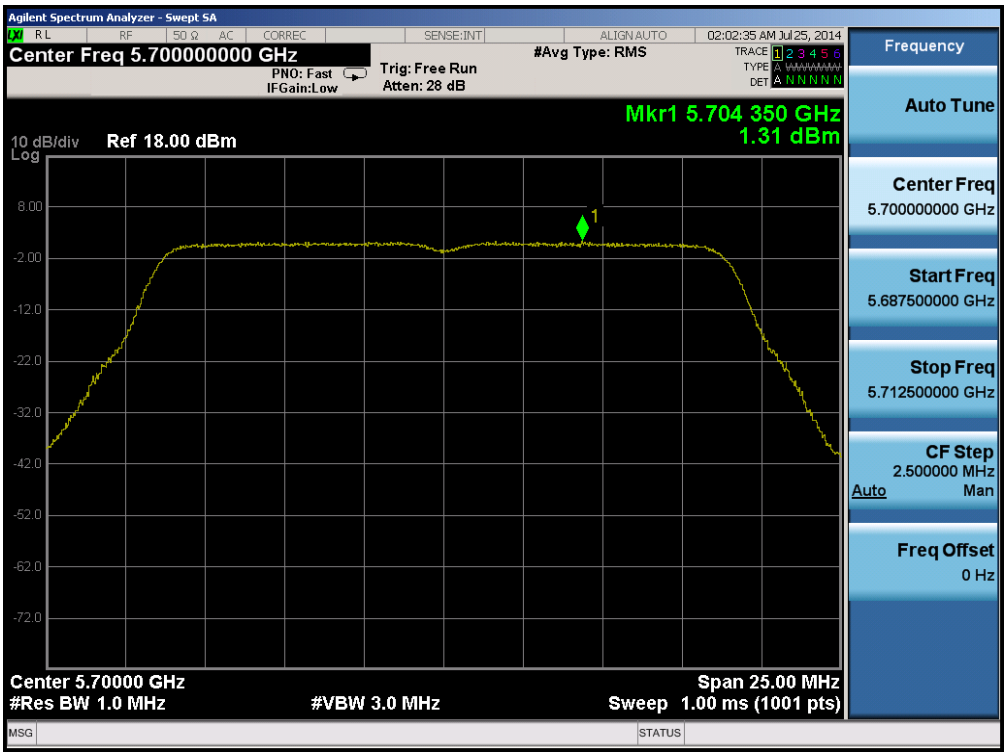


Plot 6-118. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 116)



Plot 6-119. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 140)

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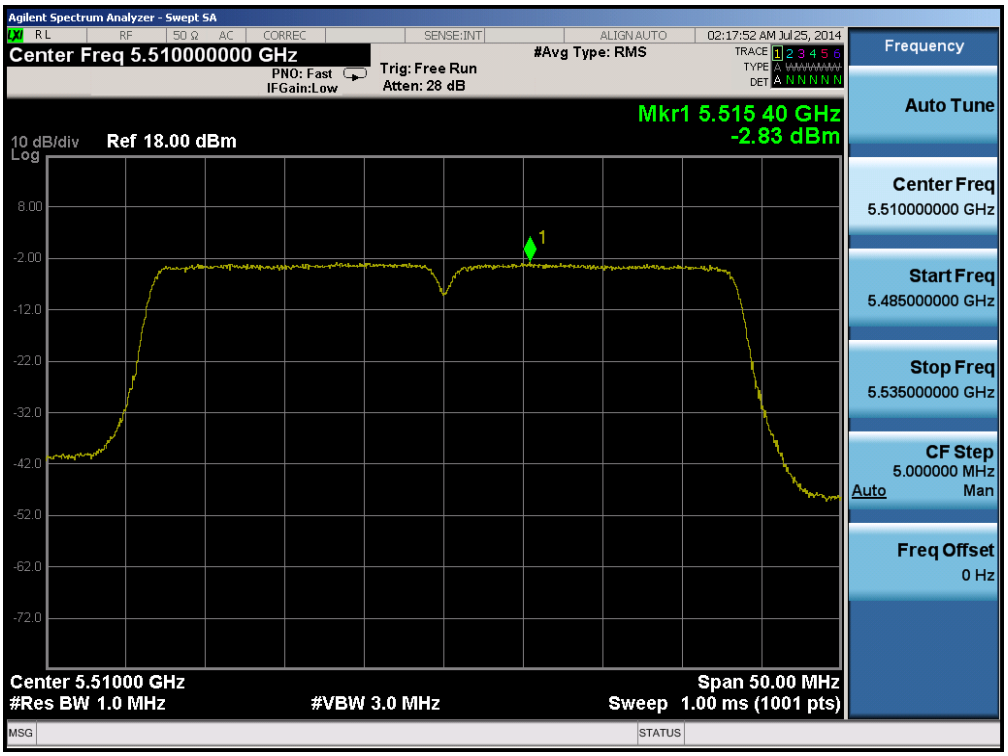
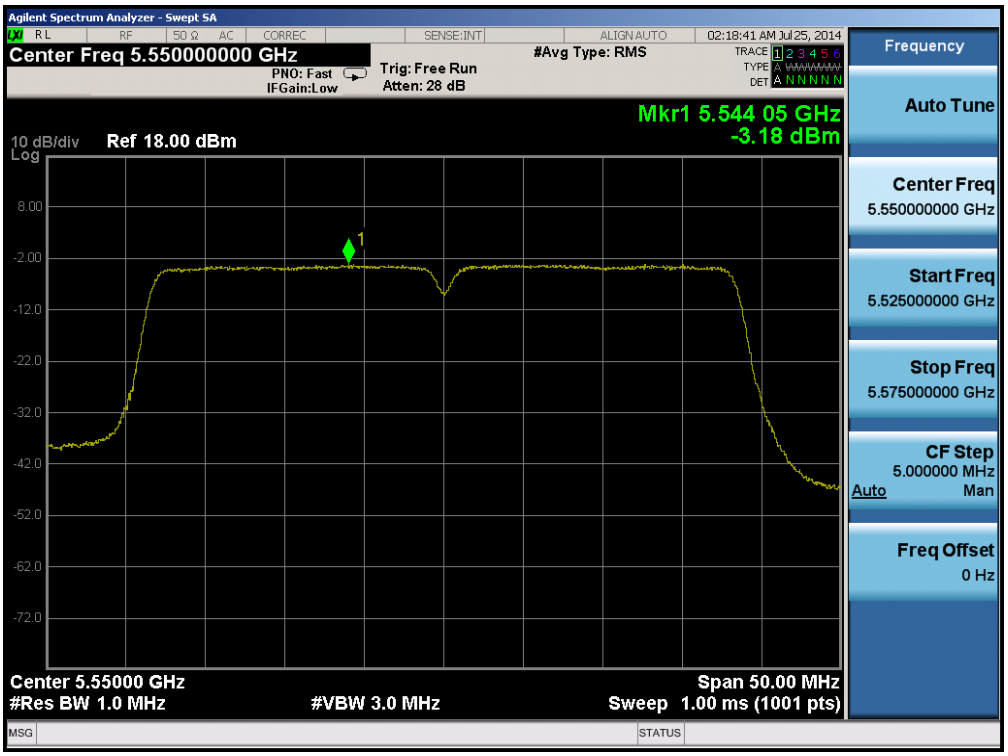


Plot 6-120. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)



Plot 6-121. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 110)

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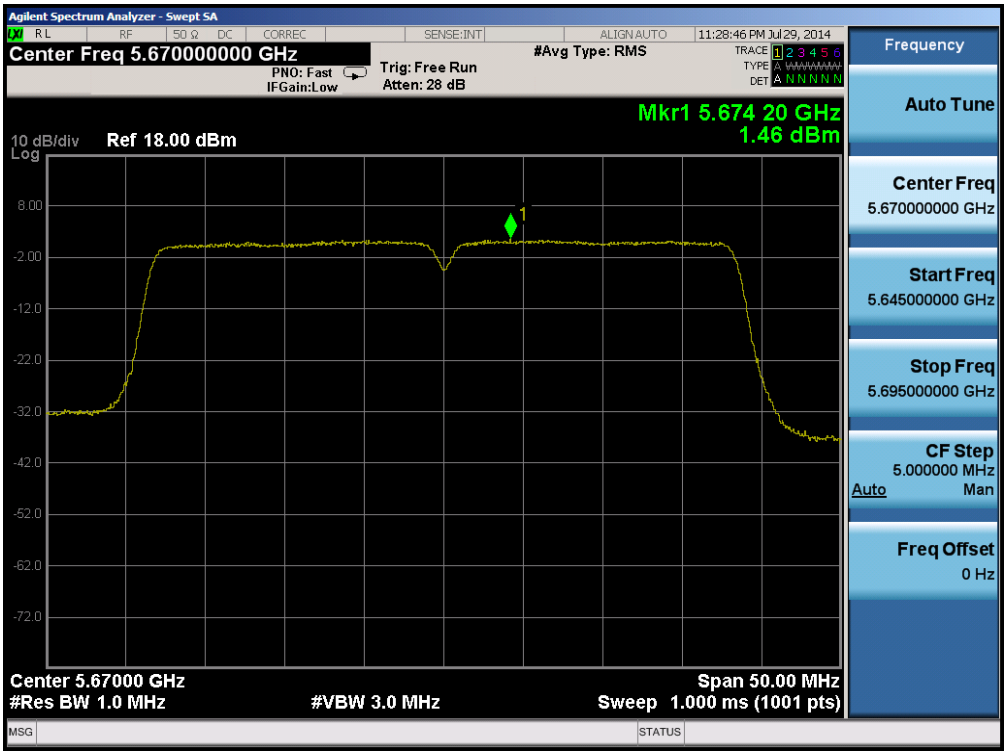
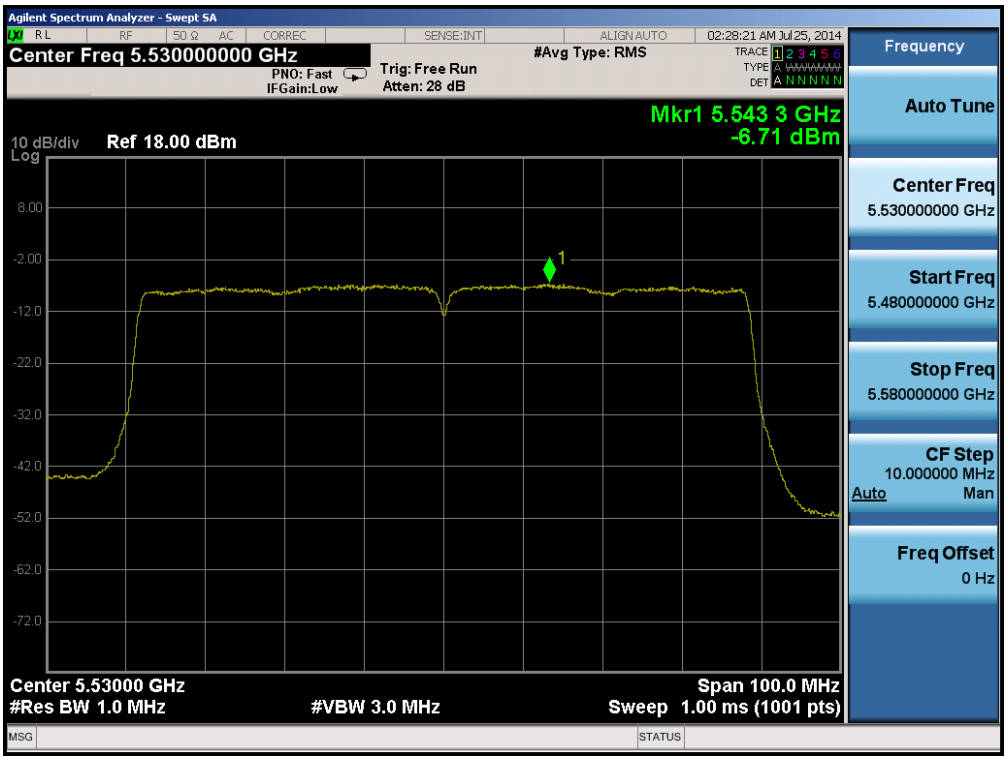


Plot 6-122. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 134)



Plot 6-123. Peak Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2C) – Ch. 106)

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Summed MIMO Power Spectral Density Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Antenn-1 Power Density [dBm]	Antenn-2 Power Density [dBm]	Summed MIMO Power Density [dBm]	Max Permissible Power Density [dBm/MHz]	Margin [dB]	Pass / Fail
Band 1	5180	36	n (20MHz)	6.5/7.2 (MCS0)	-0.24	-2.00	1.98	4.0	-2.02	Pass
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	-0.12	-2.19	1.98	4.0	-2.02	Pass
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	-0.27	-2.33	1.83	4.0	-2.17	Pass
	5190	38	n (40MHz)	13.5/15 (MCS0)	0.21	-2.75	1.99	4.0	-2.01	Pass
	5230	46	n (40MHz)	13.5/15 (MCS0)	0.13	-2.78	1.92	4.0	-2.08	Pass
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-4.44	-6.27	-2.25	4.0	-6.25	Pass
Band 2A	5260	52	n (20MHz)	6.5/7.2 (MCS0)	2.74	1.04	4.98	11.0	-6.02	Pass
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	2.62	1.14	4.95	11.0	-6.05	Pass
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	2.59	1.07	4.91	11.0	-6.09	Pass
	5270	54	n (40MHz)	13.5/15 (MCS0)	-2.33	-3.21	0.27	11.0	-10.73	Pass
	5310	62	n (40MHz)	13.5/15 (MCS0)	-2.40	-3.13	0.26	11.0	-10.74	Pass
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	-6.73	-6.59	-3.65	11.0	-14.65	Pass
Band 2C	5500	100	n (20MHz)	6.5/7.2 (MCS0)	2.74	1.35	5.11	11.0	-5.89	Pass
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	2.46	1.65	5.08	11.0	-5.92	Pass
	5700	140	n (20MHz)	6.5/7.2 (MCS0)	3.05	1.31	5.27	11.0	-5.73	Pass
	5510	102	n (40MHz)	13.5/15 (MCS0)	-2.06	-2.83	0.58	11.0	-10.42	Pass
	5550	110	n (40MHz)	13.5/15 (MCS0)	-2.11	-3.18	0.40	11.0	-10.60	Pass
	5670	134	n (40MHz)	13.5/15 (MCS0)	-2.05	1.46	3.06	11.0	-7.94	Pass

Table 6-20. MIMO Conducted Power Spectral Density Measurements

Note:

Per KDB 662911 v02r01 Section E)2), the power spectral density at Antenna 1 and Antenna 2 were first measured separately as shown in the section above. The measured values were then summed in linear power units then converted back to dBm. The plots shown below were taken transmitting from each antenna separately while transmitting in MIMO mode. These plots only apply to the 802.11n 20MHz measurements.

Sample MIMO Calculation:

At 5180MHz the average conducted power spectral density was measured to be -.24dBm for Antenna-1 and -2.00 dBm for Antenna-2.

Antenna 1 + Antenna 2 = MIMO

(-0.24 dBm + -2.00 dBm) = (0.95 mW + 0.63 mW) = 1.58 mW = 1.98 dBm

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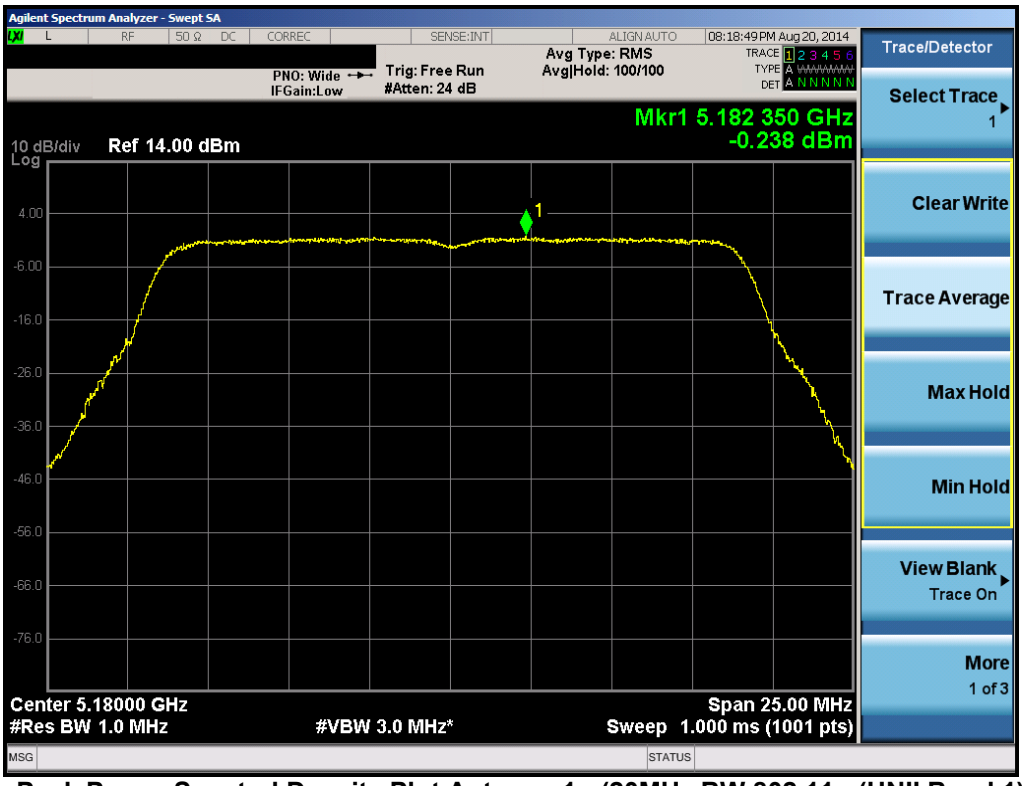
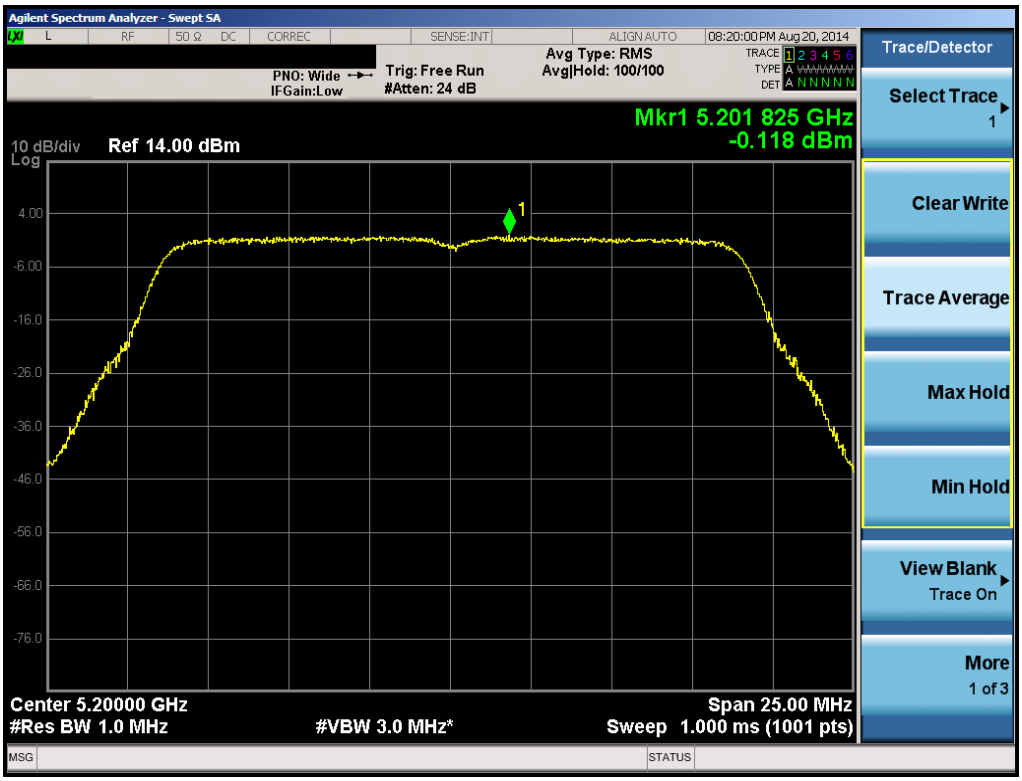


Plot 6-124. Peak Power Spectral Density Plot Antenna 1 - (20MHz BW 802.11n (UNII Band 1) – Ch. 36)



Plot 6-125. Peak Power Spectral Density Plot Antenna 1 - (20MHz BW 802.11n (UNII Band 1) – Ch. 40)

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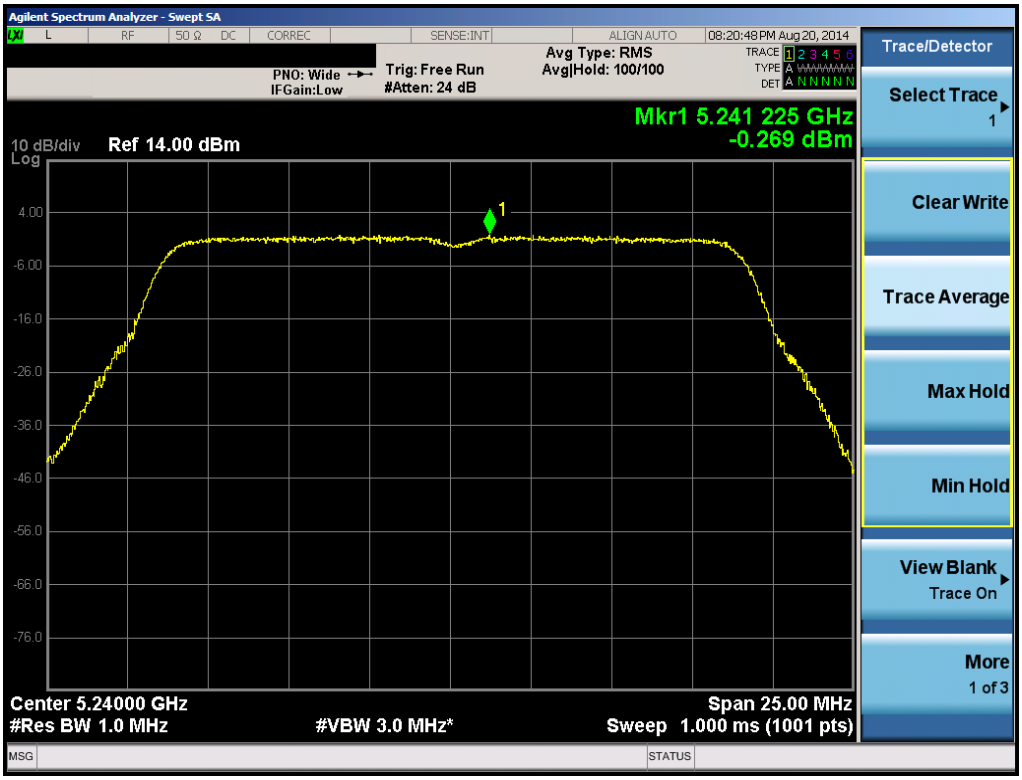
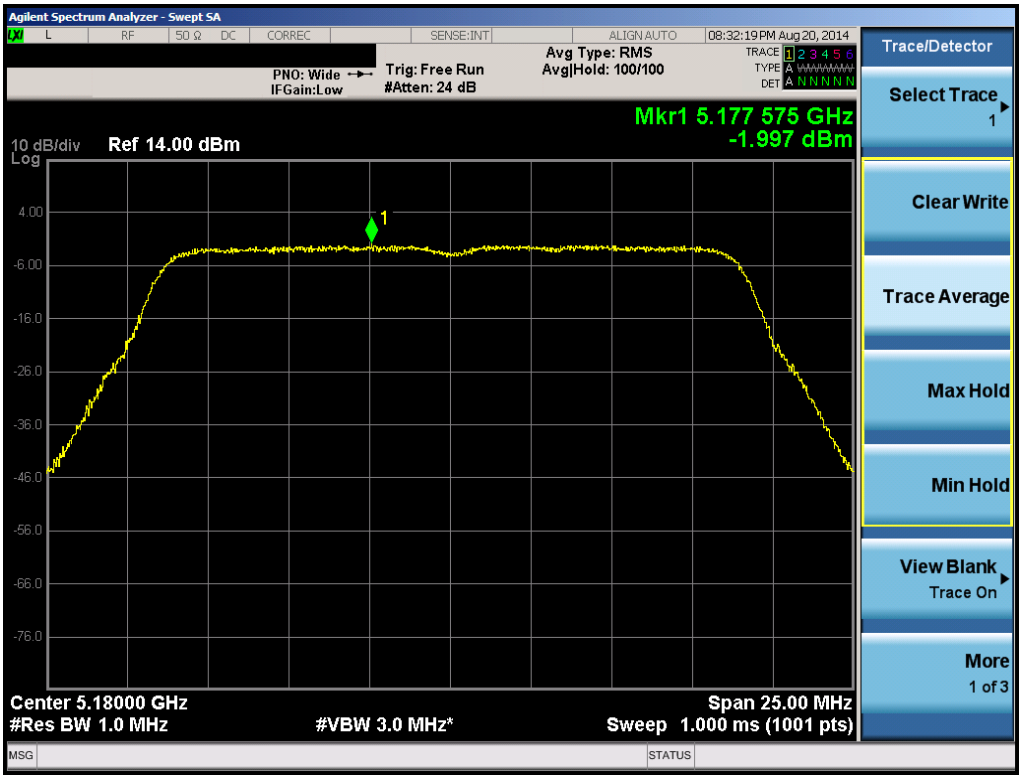


Plot 6-126. Peak Power Spectral Density Plot Antenna 1 - (20MHz BW 802.11n (UNII Band 1) – Ch. 140)



Plot 6-127. Peak Power Spectral Density Plot Antenna 2 - (20MHz BW 802.11n (UNII Band 1) – Ch. 140)

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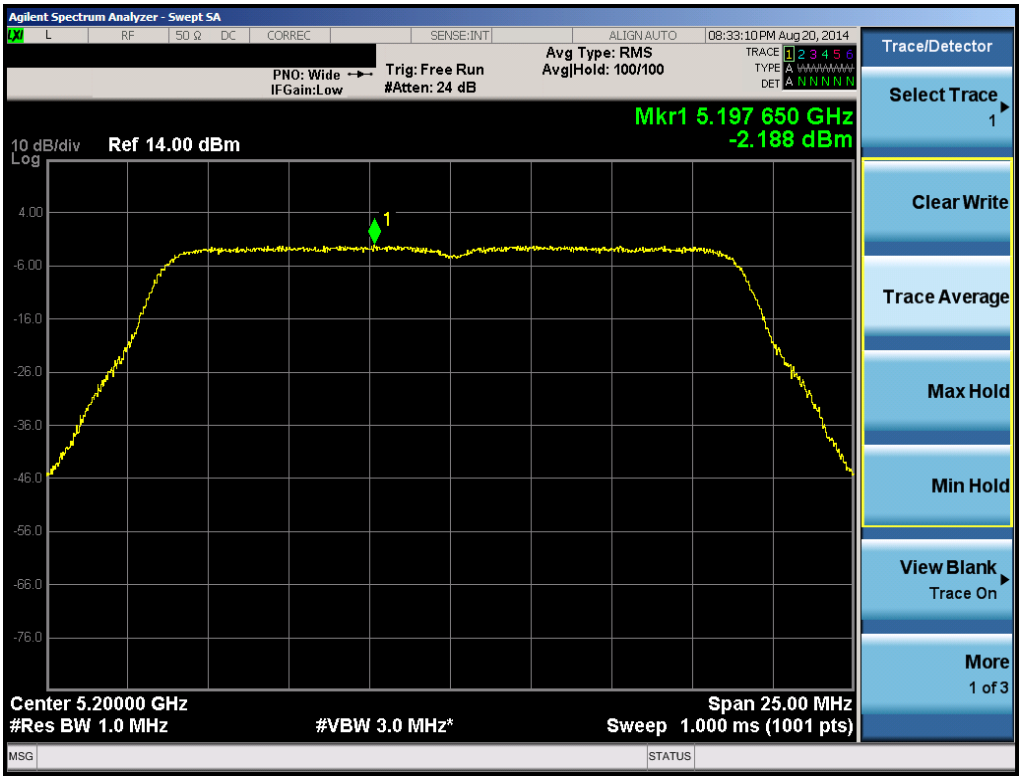

Plot 6-128. Peak Power Spectral Density Plot Antenna 2 - (20MHz BW 802.11n (UNII Band 1) – Ch. 140)

Plot 6-129. Peak Power Spectral Density Plot Antenna 2 - (20MHz BW 802.11n (UNII Band 1) – Ch. 140)

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6.5 Peak Excursion Ratio – 802.11a/n/ac

§15.407(a.6)

Test Overview and Limit

The spectrum analyzer was connected to the antenna terminal while the EUT was operating at its maximum duty cycle (>98%), at its maximum power control level, as defined in KDB 789033 v01r04, and at the appropriate frequencies. Method SA-1, as defined in KDB 789033 v01r04, was used to capture the average trace used to make the peak excursion measurement.

The largest permissible difference between the modulation envelope (measured using a peak hold function) and the maximum power spectral density is 13 dBm/MHz.

Test Procedure Used

KDB 789033 v01r04 – Section G

Test Settings

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire emission bandwidth of the signal
3. RBW = 1MHz
4. VBW = 3MHz
5. Detector = peak
6. Trace mode = max hold
7. Trace was allowed to stabilize
8. The peak search function of the spectrum analyzer was used to find the peak of the spectrum. This level was compared to the peak power density level found from the previous section to determine the peak excursion.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

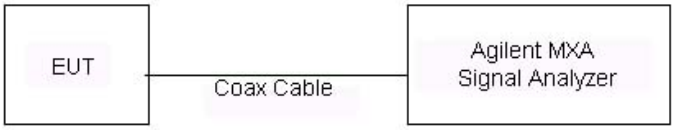

Figure 6-4. Test Instrument & Measurement Setup

Test Notes

The peak excursion was investigated for all signal types, modulation types, channel bandwidths, and variations in signal parameters and the worst case data is shown below. Only the worst case modulation mode on a single channel among all bands is reported since that is sufficient to demonstrate compliance to the peak excursion requirement per KDB 789033 v01r04.

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Antenna-1 Peak Excursion Ratio – 802.11a/n/ac

Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Peak Excursion Ratio [dBm]	Max Permissible Peak Excursion Ratio [dBm/MHz]	Margin [dB]	Pass / Fail
5180	36	a	6	8.05	13.0	-4.95	Pass
5180	36	n (20MHz)	6.5/7.2 (MCS0)	8.74	13.0	-4.26	Pass
5270	54	n (40MHz)	13.5/15 (MCS0)	8.94	13.0	-4.06	Pass
5290	58	ac (80MHz)	29.3/32.5 (MCS0)	9.15	13.0	-3.85	Pass

Table 6-21. Conducted Peak Excursion Ratio Measurements

Plot 6-130. Peak Excursion Ratio Plot (802.11a (UNII Band 1) – Ch. 36)

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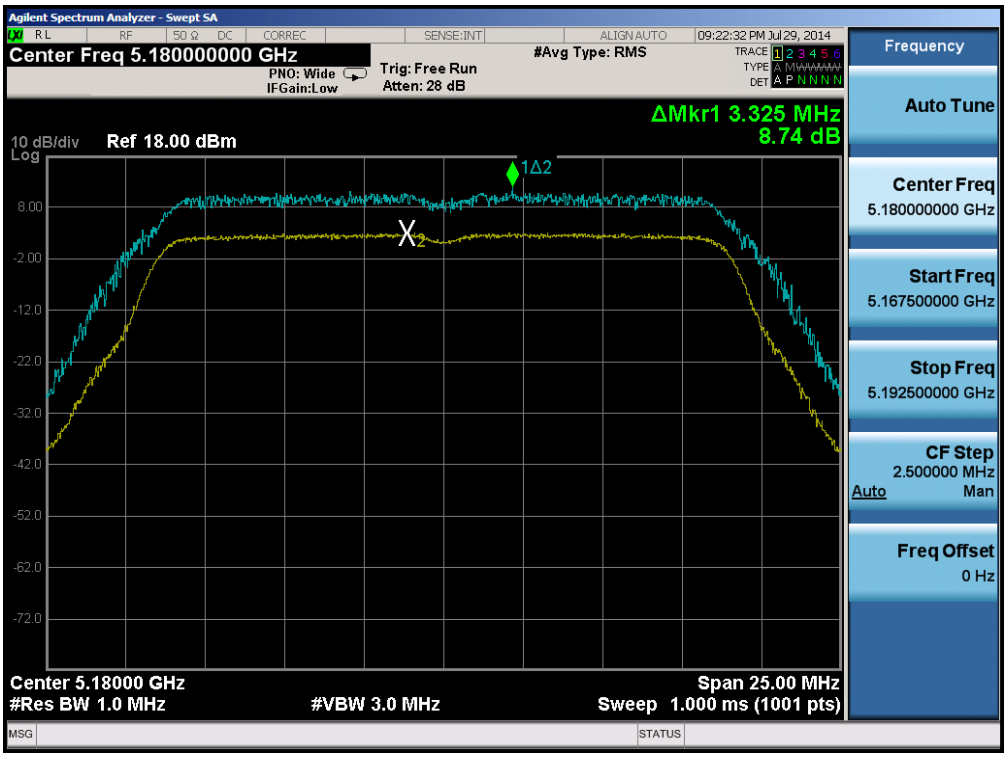
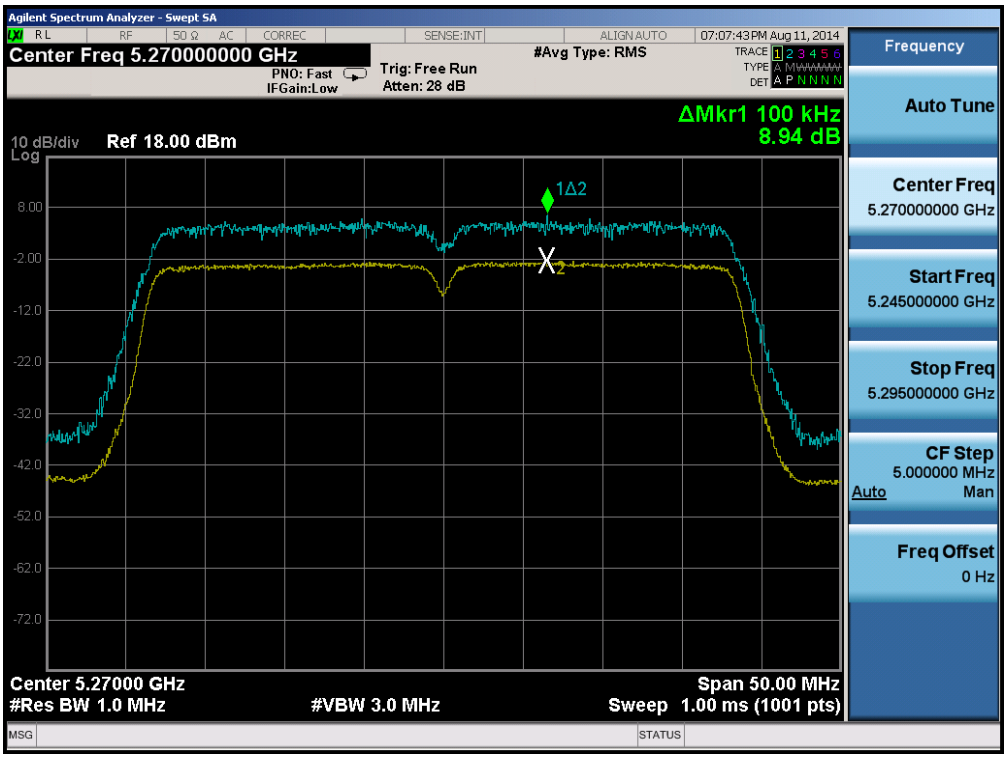


Plot 6-131. Peak Excursion Ratio Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)



Plot 6-132. Peak Excursion Ratio Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)

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Plot 6-133. Peak Excursion Ratio Plot (80MHz BW 802.11ac (UNII Band 2A) – Ch. 58)

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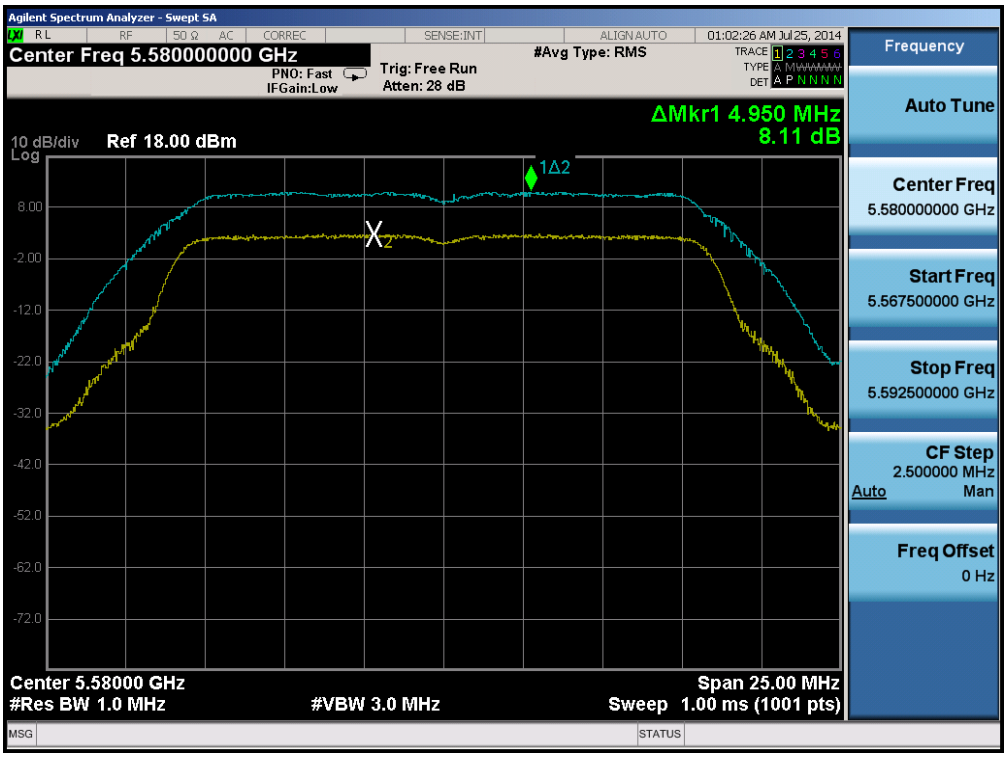
Antenna-2 Peak Excursion Ratio – 802.11a/n/ac

Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Peak Excursion Ratio [dBm]	Max Permissible Peak Excursion Ratio [dBm/MHz]	Margin [dB]	Pass / Fail
5580	116	a	6	8.11	13.0	-4.89	Pass
5260	52	n (20MHz)	6.5/7.2 (MCS0)	9.22	13.0	-3.78	Pass
5670	134	n (40MHz)	13.5/15 (MCS0)	9.54	13.0	-3.46	Pass
5210	42	ac (80MHz)	29.3/32.5 (MCS0)	8.88	13.0	-4.12	Pass

Table 6-22. Conducted Peak Excursion Ratio Measurements



Plot 6-134. Peak Excursion Ratio Plot (802.11a (UNII Band 2C) – Ch. 116)

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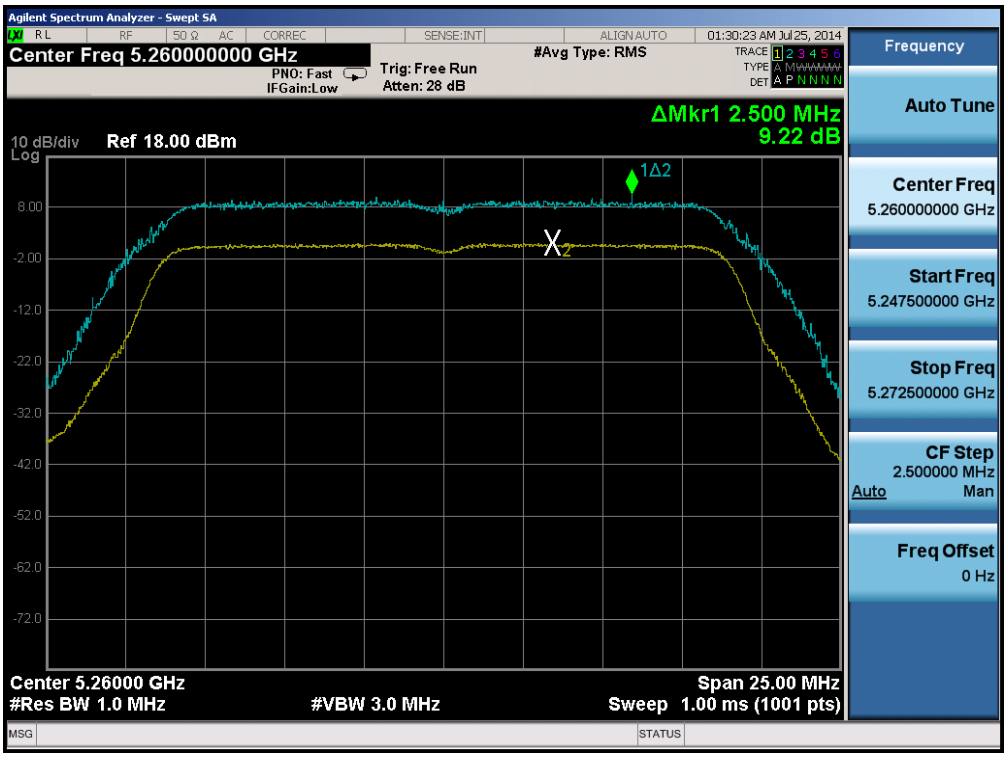
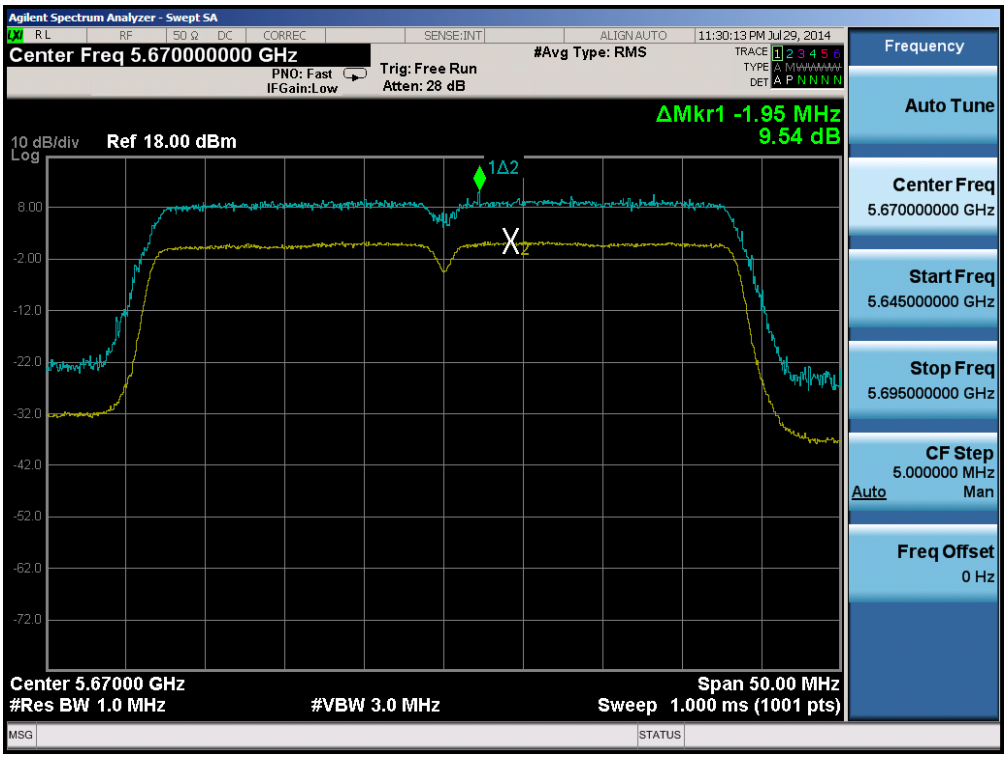


Plot 6-135. Peak Excursion Ratio Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)



Plot 6-136. Peak Excursion Ratio Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 134)

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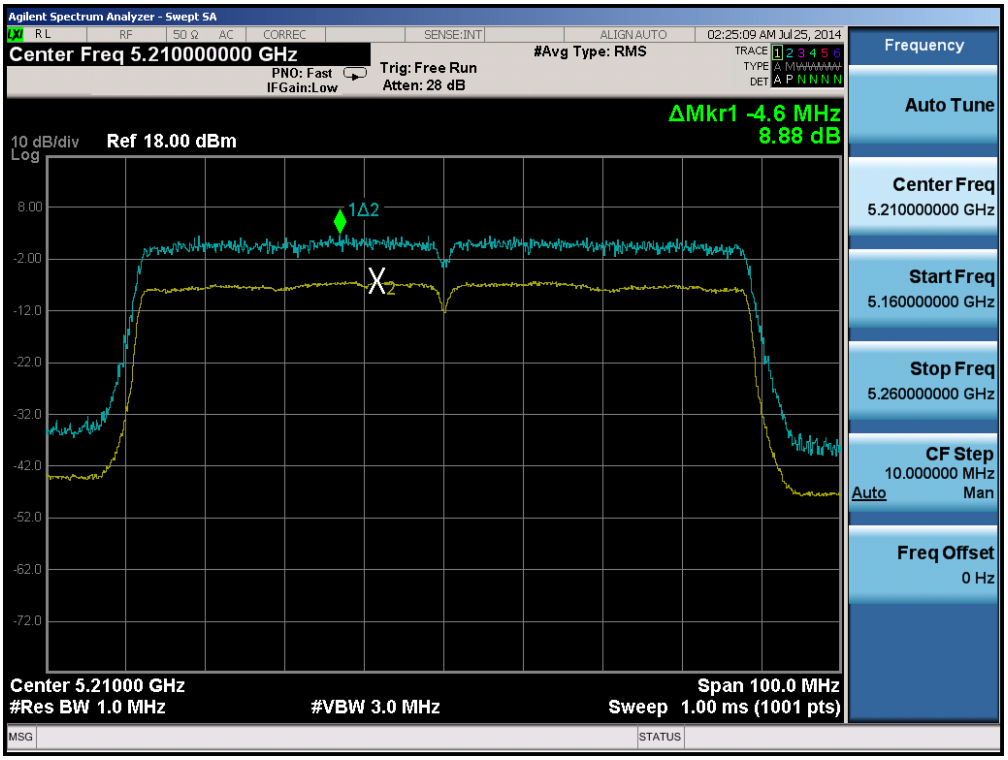

Plot 6-137. Peak Excursion Ratio Plot (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)

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6.6 Frequency Stability

§15.407(g)

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10° 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.

OPERATING FREQUENCY: 5,180,000,000 Hz

CHANNEL: 36

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	5,180,000,008	8	0.00000015
100 %		- 30	5,180,000,002	2	0.00000004
100 %		- 20	5,180,000,009	9	0.00000017
100 %		- 10	5,179,999,987	-13	-0.00000025
100 %		0	5,179,999,988	-12	-0.00000023
100 %		+ 10	5,179,999,992	-8	-0.00000015
100 %		+ 20	5,180,000,002	2	0.00000004
100 %		+ 30	5,180,000,020	20	0.00000039
100 %		+ 40	5,180,000,020	20	0.00000039
100 %		+ 50	5,180,000,007	7	0.00000014
BATT. ENDPOINT	3.45	+ 20	5,179,999,992	-8	-0.00000015

Table 6-23. Frequency Stability Measurements for UNII Band 1 (Ch. 36)

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 and voltage range as tested.

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Frequency Stability
§15.407(g)

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10° 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.

OPERATING FREQUENCY: 5,260,000,000 Hz

CHANNEL: 52

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	5,259,999,990	-10	-0.00000019
100 %		- 30	5,259,999,980	-20	-0.00000038
100 %		- 20	5,260,000,008	8	0.00000015
100 %		- 10	5,259,999,982	-18	-0.00000034
100 %		0	5,259,999,999	-1	-0.00000002
100 %		+ 10	5,259,999,983	-17	-0.00000032
100 %		+ 20	5,259,999,989	-11	-0.00000021
100 %		+ 30	5,260,000,020	20	0.00000038
100 %		+ 40	5,259,999,985	-15	-0.00000029
100 %		+ 50	5,259,999,984	-16	-0.00000030
BATT. ENDPOINT	3.45	+ 20	5,260,000,011	11	0.00000021

Table 6-24. Frequency Stability Measurements for UNII Band 2A (Ch. 52)

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 and voltage range as tested.

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Frequency Stability
§15.407(g)

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10° 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.

OPERATING FREQUENCY: 5,500,000,000 Hz

CHANNEL: 100

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	5,500,000,016	16	0.00000029
100 %		- 30	5,499,999,983	-17	-0.00000031
100 %		- 20	5,499,999,996	-4	-0.00000007
100 %		- 10	5,499,999,995	-5	-0.00000009
100 %		0	5,500,000,001	1	0.00000002
100 %		+ 10	5,499,999,995	-5	-0.00000009
100 %		+ 20	5,500,000,013	13	0.00000024
100 %		+ 30	5,500,000,017	17	0.00000031
100 %		+ 40	5,500,000,008	8	0.00000015
100 %		+ 50	5,500,000,019	19	0.00000035
BATT. ENDPOINT	3.45	+ 20	5,500,000,014	14	0.00000025

Table 6-25. Frequency Stability Measurements for UNII Band 2C (Ch. 100)

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 and voltage range as tested.

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6.7 Radiated Spurious Emission Measurements

§15.407(b.1)(b.6) §15.205 §15.209

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle (>98%), at its maximum power control level, as defined in KDB 789033 v01r04, and at the appropriate frequencies. All channels, modes (e.g. 802.11a, 802.11n (20MHz BW), 802.11n (40MHz BW), and 802.11ac (80MHz)), and modulations/data rates were investigated among all UNII bands. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 6-26 per Section 15.209.

Frequency	Field Strength [μV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 6-26. Radiated Limits

Test Procedures Used

KDB 789033 v01r04 – Section H

Test Settings

Average Measurements above 1GHz (Method AD)

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be ≥ 2 x span/RBW)
6. Averaging type = power (RMS)
7. Sweep time = auto couple
8. Trace was averaged over 100 sweeps

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Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = 120kHz
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

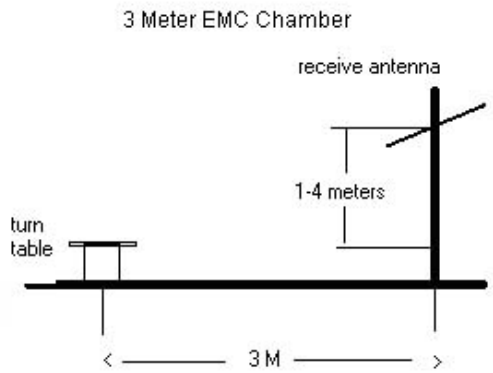

Figure 6-5. Test Instrument & Measurement Setup

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Test Notes

1. All radiated spurious emissions levels were measured in a radiated test setup per the guidance of KDB 789033 v01r04 Section H.
2. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 are below the limit shown in Table 6-26.
3. All spurious emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 6-11. All spurious emissions that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.
4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
5. The battery used with this device for testing (Model: EB-BN915BBE) contains an embedded NFC antenna.
6. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
7. Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

Sample Calculations

Determining Spurious Emissions Levels

- Field Strength Level $_{[dB\mu V/m]}$ = Analyzer Level $_{[dBm]}$ + 107 + AFCL $_{[dB/m]}$
- AFCL $_{[dB/m]}$ = Antenna Factor $_{[dB/m]}$ + Cable Loss $_{[dB]}$
- Margin $_{[dB]}$ = Field Strength Level $_{[dB\mu V/m]}$ – Limit $_{[dB\mu V/m]}$

Radiated Band Edge Measurement Offset

- The amplitude offset shown in the radiated restricted band edge plots in Section 6.8 was calculated using the formula:

  Offset (dB) = (Antenna Factor + Cable Loss + 10 dB Attenuator) – Preamplifier Gain

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Antenna-1 Radiated Spurious Emission Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5180MHz
Channel: 36

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10360.00	-98.72	Peak	V	H2	44.49	0.00	52.77	68.20	-15.43
*	15540.00	-109.83	Average	V	H2	48.82	0.00	45.99	53.98	-7.99
*	15540.00	-96.10	Peak	V	H2	48.82	0.00	59.72	73.98	-14.26
*	20720.00	-102.74	Average	H	H2	48.58	-9.54	43.29	53.98	-10.68
*	20720.00	-97.08	Peak	H	H2	48.58	-9.54	48.95	73.98	-25.02
	25900.00	-101.71	Peak	H	H2	50.95	-9.54	46.70	68.20	-21.50

Table 6-27. Radiated Measurements

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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5200MHz
Channel: 40

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10400.00	-98.56	Peak	V	H2	44.55	0.00	52.99	68.20	-15.21
*	15600.00	-111.62	Average	V	H2	48.82	0.00	44.19	53.98	-9.79
*	15600.00	-98.22	Peak	V	H2	48.82	0.00	57.59	73.98	-16.39
*	20800.00	-112.53	Average	H	H2	48.66	-9.54	33.59	53.98	-20.39
*	20800.00	-101.62	Peak	H	H2	48.66	-9.54	44.50	73.98	-29.48
	26000.00	-101.34	Peak	H	H2	51.04	-9.54	47.16	68.20	-21.04

Table 6-28. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5240MHz
Channel: 48

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10480.00	-99.62	Peak	V	H2	44.67	0.00	52.05	68.20	-16.15
*	15720.00	-112.45	Average	V	H2	48.87	0.00	43.42	53.98	-10.56
*	15720.00	-99.07	Peak	V	H2	48.87	0.00	56.80	73.98	-17.18
*	20960.00	-109.60	Average	H	H2	48.75	-9.54	36.61	53.98	-17.37
*	20960.00	-100.95	Peak	H	H2	48.75	-9.54	45.26	73.98	-28.72
	26200.00	-100.46	Peak	H	H2	51.06	-9.54	48.05	68.20	-20.15

Table 6-29. Radiated Measurements

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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5260MHz
Channel: 52

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10520.00	-99.43	Peak	V	H2	44.71	0.00	52.28	68.20	-15.92
*	15780.00	-112.18	Average	V	H2	48.90	0.00	43.72	53.98	-10.26
*	15780.00	-98.60	Peak	V	H2	48.90	0.00	57.30	73.98	-16.68
*	21040.00	-112.05	Average	V	H2	48.75	-9.54	34.16	53.98	-19.82
*	21040.00	-100.35	Peak	V	H2	48.75	-9.54	45.86	73.98	-28.12
	26300.00	-100.82	Peak	V	H2	51.09	-9.54	47.73	68.20	-20.47

Table 6-30. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5280MHz
Channel: 56

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10560.00	-100.25	Peak	V	H2	44.72	0.00	51.47	68.20	-16.73
*	15840.00	-111.93	Average	V	H2	48.97	0.00	44.04	53.98	-9.94
*	15840.00	-98.45	Peak	V	H2	48.97	0.00	57.52	73.98	-16.46
*	21120.00	-105.82	Average	V	H2	48.69	-9.54	40.33	53.98	-13.65
*	21120.00	-99.09	Peak	V	H2	48.69	-9.54	47.06	73.98	-26.92
	26400.00	-99.76	Peak	V	H2	51.16	-9.54	48.85	68.20	-19.35

Table 6-31. Radiated Measurements

Worst Case Mode: 802.11a

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Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5320MHz
Channel: 64

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	10640.00	-112.46	Average	V	H2	44.79	0.00	39.33	53.98	-14.65
*	10640.00	-99.44	Peak	V	H2	44.79	0.00	52.35	73.98	-21.63
*	15960.00	-112.74	Average	V	H2	49.13	0.00	43.38	53.98	-10.60
*	15960.00	-99.10	Peak	V	H2	49.13	0.00	57.02	73.98	-16.96
*	21280.00	-107.12	Average	V	H2	48.63	-9.54	38.97	53.98	-15.01
*	21280.00	-99.67	Peak	V	H2	48.63	-9.54	46.42	73.98	-27.56
	26600.00	-105.55	Peak	V	H2	47.32	-9.54	39.23	68.20	-28.97

Table 6-32. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5500MHz
Channel: 100

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11000.00	-113.08	Average	V	H2	44.63	0.00	38.55	53.98	-15.43
*	11000.00	-100.15	Peak	V	H2	44.63	0.00	51.48	73.98	-22.50
	16500.00	-103.34	Peak	V	H2	50.51	0.00	54.17	68.20	-14.03
	22000.00	-98.65	Peak	V	H2	48.96	-9.54	47.77	68.20	-20.43
	27500.00	-103.71	Peak	V	H2	48.36	-9.54	42.11	68.20	-26.09

Table 6-33. Radiated Measurements

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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5580MHz
Channel: 116

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11160.00	-113.72	Average	V	H2	44.72	0.00	38.00	53.98	-15.98
*	11160.00	-100.65	Peak	V	H2	44.72	0.00	51.07	73.98	-22.91
	16740.00	-99.20	Peak	V	H2	49.96	0.00	57.77	68.20	-10.43
*	22320.00	-103.65	Average	V	H2	49.73	-9.54	43.54	53.98	-10.44
*	22320.00	-98.31	Peak	V	H2	49.73	-9.54	48.88	73.98	-25.10
	27900.00	-104.44	Peak	V	H2	48.05	-9.54	41.07	68.20	-27.13

Table 6-34. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5700MHz
Channel: 140

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11400.00	-113.68	Average	V	H2	45.02	0.00	38.34	53.98	-15.64
*	11400.00	-100.50	Peak	V	H2	45.02	0.00	51.52	73.98	-22.46
	17100.00	-96.08	Peak	V	H2	50.06	0.00	60.98	68.20	-7.22
*	22800.00	-106.75	Average	V	H2	49.82	-9.54	40.52	53.98	-13.45
*	22800.00	-99.44	Peak	V	H2	49.82	-9.54	47.83	73.98	-26.14
	28500.00	-104.29	Peak	V	H2	48.01	-9.54	41.18	68.20	-27.02

Table 6-35. Radiated Measurements

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Antenna-2 Radiated Spurious Emission Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5180MHz
Channel: 36

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10360.00	-101.60	Peak	V	H2	44.49	0.00	49.89	68.20	-18.31
*	15540.00	-114.94	Average	V	H2	48.82	0.00	40.88	53.98	-13.10
*	15540.00	-101.78	Peak	V	H2	48.82	0.00	54.04	73.98	-19.94
*	20720.00	-104.52	Average	V	H2	48.58	-9.54	41.51	53.98	-12.46
*	20720.00	-98.81	Peak	V	H2	48.58	-9.54	47.22	73.98	-26.75
	25900.00	-101.95	Peak	V	H2	50.95	-9.54	46.46	68.20	-21.74

Table 6-36. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5200MHz

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10400.00	-100.20	Peak	V	H2	44.55	0.00	51.35	68.20	-16.85
*	15600.00	-115.62	Average	V	H2	48.82	0.00	40.19	53.98	-13.79
*	15600.00	-103.17	Peak	V	H2	48.82	0.00	52.64	73.98	-21.34
*	20800.00	-104.27	Average	V	H2	48.66	-9.54	41.85	53.98	-12.13
*	20800.00	-96.64	Peak	V	H2	48.66	-9.54	49.48	73.98	-24.50
	26000.00	-96.60	Peak	V	H2	51.04	-9.54	51.90	68.20	-16.30

Table 6-37. Radiated Measurements

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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5240MHz
Channel: 48

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10480.00	-99.73	Peak	V	H2	44.67	0.00	51.94	68.20	-16.26
*	15720.00	-114.78	Average	V	H2	48.87	0.00	41.09	53.98	-12.89
*	15720.00	-101.79	Peak	V	H2	48.87	0.00	54.08	73.98	-19.90
*	20960.00	-103.80	Average	V	H2	48.75	-9.54	42.41	53.98	-11.57
*	20960.00	-97.38	Peak	V	H2	48.75	-9.54	48.83	73.98	-25.15
	26200.00	-101.67	Peak	V	H2	51.06	-9.54	46.84	68.20	-21.36

Table 6-38. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5260MHz
Channel: 52

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10520.00	-99.64	Peak	V	H2	44.71	0.00	52.07	68.20	-16.13
*	15780.00	-115.12	Average	V	H2	48.90	0.00	40.78	53.98	-13.20
*	15780.00	-102.33	Peak	V	H2	48.90	0.00	53.57	73.98	-20.41
*	21040.00	-106.30	Average	V	H2	48.75	-9.54	39.91	53.98	-14.07
*	21040.00	-99.88	Peak	V	H2	48.75	-9.54	46.33	73.98	-27.65
	26300.00	-101.17	Peak	V	H2	51.09	-9.54	47.38	68.20	-20.82

Table 6-39. Radiated Measurements

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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5280MHz
Channel: 56

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10560.00	-99.90	Peak	V	H2	44.72	0.00	51.82	68.20	-16.38
*	15840.00	-114.31	Average	V	H2	48.97	0.00	41.66	53.98	-12.32
*	15840.00	-102.56	Peak	V	H2	48.97	0.00	53.41	73.98	-20.57
*	21120.00	-108.97	Average	V	H2	48.69	-9.54	37.18	53.98	-16.80
*	21120.00	-101.42	Peak	V	H2	48.69	-9.54	44.73	73.98	-29.25
	26400.00	-100.48	Peak	V	H2	51.16	-9.54	48.13	68.20	-20.07

Table 6-40. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5320MHz
Channel: 64

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	10640.00	-112.29	Average	V	H2	44.79	0.00	39.50	53.98	-14.48
*	10640.00	-99.85	Peak	V	H2	44.79	0.00	51.94	73.98	-22.04
*	15960.00	-115.44	Average	V	H2	49.13	0.00	40.68	53.98	-13.30
*	15960.00	-102.01	Peak	V	H2	49.13	0.00	54.11	73.98	-19.87
*	21280.00	-102.52	Average	V	H2	48.63	-9.54	43.57	53.98	-10.41
*	21280.00	-95.79	Peak	V	H2	48.63	-9.54	50.30	73.98	-23.68
	26600.00	-103.10	Peak	V	H2	47.32	-9.54	41.68	68.20	-26.52

Table 6-41. Radiated Measurements

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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5500MHz
Channel: 100

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11000.00	-111.67	Average	V	H2	44.63	0.00	39.96	53.98	-14.02
*	11000.00	-99.08	Peak	V	H2	44.63	0.00	52.55	73.98	-21.43
	16500.00	-102.11	Peak	V	H2	50.51	0.00	55.40	68.20	-12.80
	22000.00	-94.95	Peak	V	H2	48.96	-9.54	51.47	68.20	-16.73
	27500.00	-105.02	Peak	V	H2	48.36	-9.54	40.80	68.20	-27.40

Table 6-42. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5580MHz
Channel: 116

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11160.00	-112.25	Average	V	H2	44.72	0.00	39.47	53.98	-14.51
*	11160.00	-99.59	Peak	V	H2	44.72	0.00	52.13	73.98	-21.85
	16740.00	-101.87	Peak	V	H2	49.96	0.00	55.10	68.20	-13.10
*	22320.00	-103.67	Average	V	H2	49.73	-9.54	43.52	53.98	-10.46
*	22320.00	-97.68	Peak	V	H2	49.73	-9.54	49.50	73.98	-24.48
	27900.00	-104.05	Peak	V	H2	48.05	-9.54	41.46	68.20	-26.74

Table 6-43. Radiated Measurements

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Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5700MHz
Channel:	140

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11400.00	-112.04	Average	V	H2	45.02	0.00	39.98	53.98	-14.00
*	11400.00	-100.12	Peak	V	H2	45.02	0.00	51.90	73.98	-22.08
	17100.00	-102.26	Peak	V	H2	50.06	0.00	54.80	68.20	-13.40
*	22800.00	-105.84	Average	V	H2	49.82	-9.54	41.43	53.98	-12.54
*	22800.00	-95.50	Peak	V	H2	49.82	-9.54	51.77	73.98	-22.20
	28500.00	-104.94	Peak	V	H2	48.01	-9.54	40.53	68.20	-27.67

Table 6-44. Radiated Measurements

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MIMO Radiated Spurious Emission Measurements

Worst Case Mode: 802.11n
Worst Case Transfer Rate: MCS8
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5180MHz
Channel: 36

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10360.00	-101.22	Peak	V	H2	44.49	0.00	50.27	68.20	-17.93
*	15540.00	-110.78	Average	V	H2	48.82	0.00	45.04	53.98	-8.94
*	15540.00	-99.47	Peak	V	H2	48.82	0.00	56.35	73.98	-17.63
*	20720.00	-105.08	Average	V	H2	48.58	-9.54	40.95	53.98	-13.02
*	20720.00	-99.65	Peak	V	H2	48.58	-9.54	46.38	73.98	-27.59
	25900.00	-101.42	Peak	V	H2	50.95	-9.54	46.99	68.20	-21.21

Table 6-45. Radiated Measurements

Worst Case Mode: 802.11n
Worst Case Transfer Rate: MCS8
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5200MHz
Channel: 40

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10400.00	-100.84	Peak	V	H2	44.55	0.00	50.71	68.20	-17.49
*	15600.00	-112.66	Average	V	H2	48.82	0.00	43.15	53.98	-10.83
*	15600.00	-99.86	Peak	V	H2	48.82	0.00	55.95	73.98	-18.03
*	20800.00	-105.04	Average	V	H2	48.66	-9.54	41.08	53.98	-12.90
*	20800.00	-99.12	Peak	V	H2	48.66	-9.54	47.00	73.98	-26.98
	26000.00	-100.60	Peak	V	H2	51.04	-9.54	47.90	68.20	-20.30

Table 6-46. Radiated Measurements

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Worst Case Mode: 802.11n
Worst Case Transfer Rate: MCS8
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5240MHz
Channel: 48

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10480.00	-100.57	Peak	V	H2	44.67	0.00	51.10	68.20	-17.10
*	15720.00	-112.11	Average	V	H2	48.87	0.00	43.76	53.98	-10.22
*	15720.00	-100.89	Peak	V	H2	48.87	0.00	54.98	73.98	-19.00
*	20960.00	-105.97	Average	V	H2	48.75	-9.54	40.24	53.98	-13.74
*	20960.00	-98.62	Peak	V	H2	48.75	-9.54	47.59	73.98	-26.39
	26200.00	-102.40	Peak	V	H2	51.06	-9.54	46.11	68.20	-22.09

Table 6-47. Radiated Measurements

Worst Case Mode: 802.11n
Worst Case Transfer Rate: MCS8
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5260MHz
Channel: 52

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10520.00	-100.24	Peak	V	H2	44.71	0.00	51.47	68.20	-16.73
*	15780.00	-109.53	Average	V	H2	48.90	0.00	46.37	53.98	-7.61
*	15780.00	-99.13	Peak	V	H2	48.90	0.00	56.77	73.98	-17.21
*	21040.00	-107.60	Average	V	H2	48.75	-9.54	38.61	53.98	-15.37
*	21040.00	-99.64	Peak	V	H2	48.75	-9.54	46.57	73.98	-27.41
	26300.00	-101.34	Peak	V	H2	51.09	-9.54	47.21	68.20	-20.99

Table 6-48. Radiated Measurements

Worst Case Mode: 802.11n

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Worst Case Transfer Rate: MCS8
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5280MHz
Channel: 56

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10560.00	-101.10	Peak	V	H2	44.72	0.00	50.62	68.20	-17.58
*	15840.00	-111.46	Average	V	H2	48.97	0.00	44.51	53.98	-9.47
*	15840.00	-97.60	Peak	V	H2	48.97	0.00	58.37	73.98	-15.61
*	21120.00	-105.19	Average	V	H2	48.69	-9.54	40.96	53.98	-13.02
*	21120.00	-98.91	Peak	V	H2	48.69	-9.54	47.24	73.98	-26.74
	26400.00	-100.97	Peak	V	H2	51.16	-9.54	47.64	68.20	-20.56

Table 6-49. Radiated Measurements

Worst Case Mode: 802.11n
Worst Case Transfer Rate: MCS8
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5320MHz
Channel: 64

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	10640.00	-112.75	Average	V	H2	44.79	0.00	39.04	53.98	-14.94
*	10640.00	-100.90	Peak	V	H2	44.79	0.00	50.89	73.98	-23.09
*	15960.00	-112.74	Average	V	H2	49.13	0.00	43.38	53.98	-10.60
*	15960.00	-99.09	Peak	V	H2	49.13	0.00	57.03	73.98	-16.95
*	21280.00	-107.21	Average	V	H2	48.63	-9.54	38.88	53.98	-15.10
*	21280.00	-101.49	Peak	V	H2	48.63	-9.54	44.60	73.98	-29.38
	26600.00	-104.01	Peak	V	H2	47.32	-9.54	40.77	68.20	-27.43

Table 6-50. Radiated Measurements

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Worst Case Mode: 802.11n
Worst Case Transfer Rate: MCS8
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5500MHz
Channel: 100

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11000.00	-113.06	Average	V	H2	44.63	0.00	38.57	53.98	-15.41
*	11000.00	-99.81	Peak	V	H2	44.63	0.00	51.82	73.98	-22.16
	16500.00	-99.66	Peak	V	H2	50.51	0.00	57.85	68.20	-10.35
	22000.00	-98.45	Peak	V	H2	48.96	-9.54	47.97	68.20	-20.23
	27500.00	-112.06	Peak	V	H2	48.36	-9.54	33.76	68.20	-34.44

Table 6-51. Radiated Measurements

Worst Case Mode: 802.11n
Worst Case Transfer Rate: MCS8
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5580MHz
Channel: 116

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11160.00	-114.49	Average	V	H2	44.72	0.00	37.23	53.98	-16.75
*	11160.00	-101.37	Peak	V	H2	44.72	0.00	50.35	73.98	-23.63
	16740.00	-98.90	Peak	V	H2	49.96	0.00	58.07	68.20	-10.13
*	22320.00	-108.22	Average	V	H2	49.73	-9.54	38.97	53.98	-15.01
*	22320.00	-97.66	Peak	V	H2	49.73	-9.54	49.53	73.98	-24.45
	27900.00	-104.51	Peak	V	H2	48.05	-9.54	41.00	68.20	-27.20

Table 6-52. Radiated Measurements

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Worst Case Mode:	802.11n
Worst Case Transfer Rate:	MCS8
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5700MHz
Channel:	140

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11400.00	-112.34	Average	V	H2	45.02	0.00	39.68	53.98	-14.30
*	11400.00	-100.99	Peak	V	H2	45.02	0.00	51.03	73.98	-22.95
	17100.00	-95.11	Peak	V	H2	50.06	0.00	61.95	68.20	-6.25
*	22800.00	-102.15	Average	V	H2	49.82	-9.54	45.12	53.98	-8.85
*	22800.00	-91.78	Peak	V	H2	49.82	-9.54	55.49	73.98	-18.48
	28500.00	-104.64	Peak	V	H2	48.01	-9.54	40.83	68.20	-27.37

Table 6-53. Radiated Measurements

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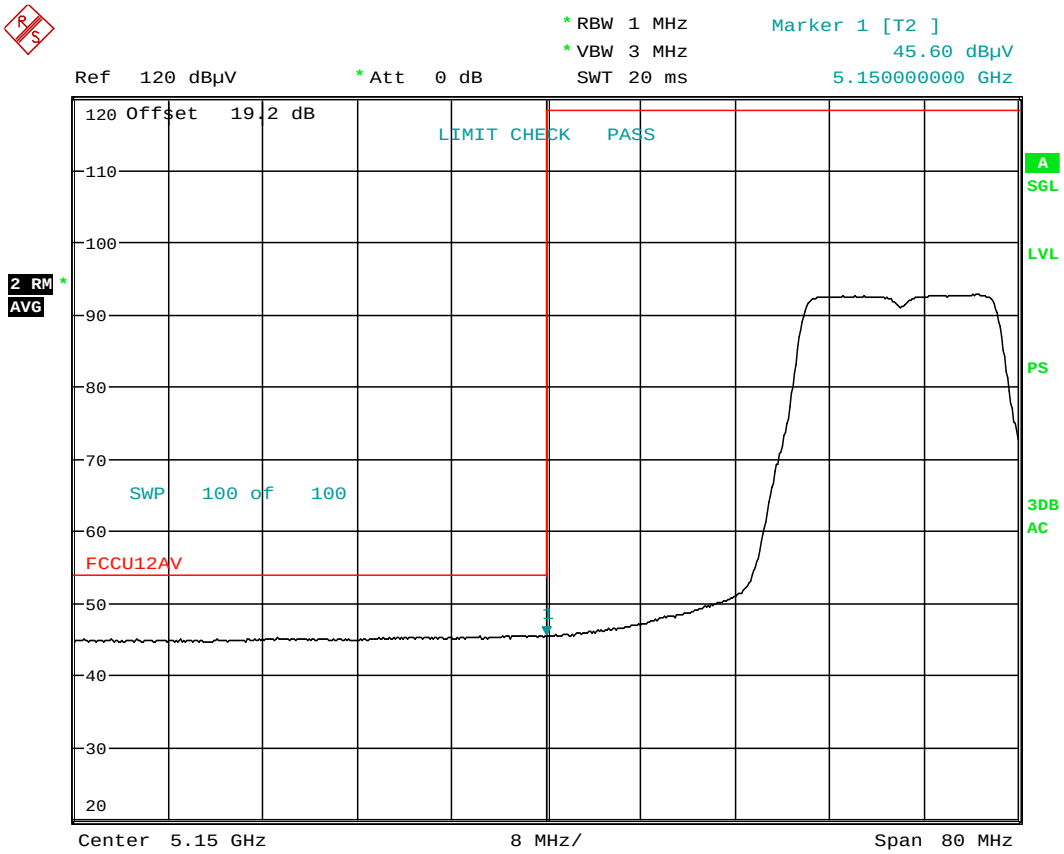
6.8 Antenna-1 Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	5180MHz
Channel:	36



Plot 6-138. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

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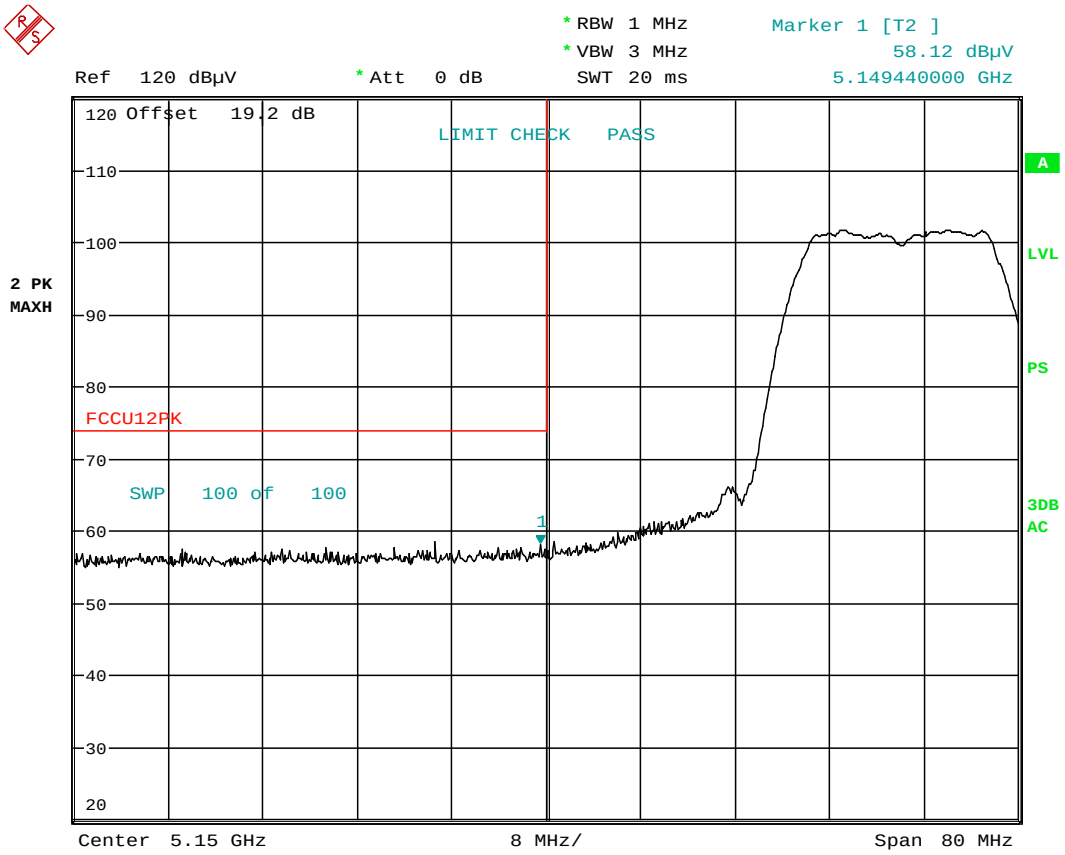
Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-139. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

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Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	5320MHz
Channel:	64

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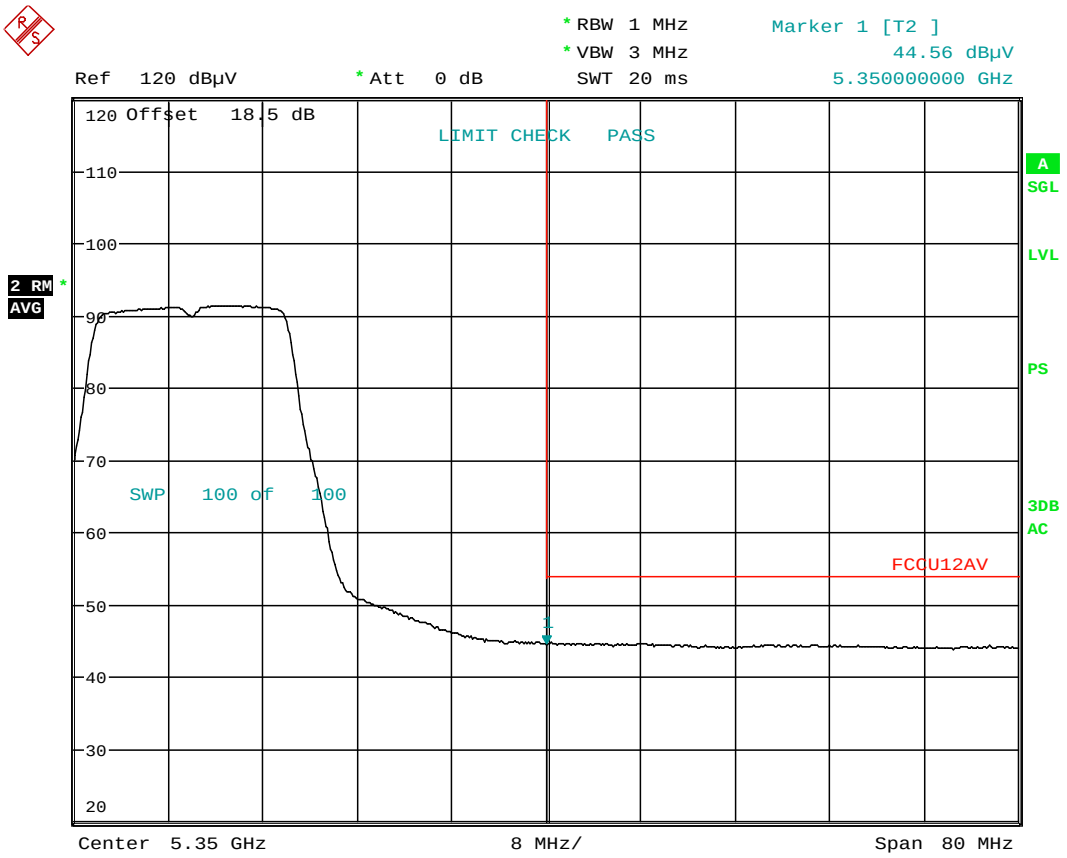

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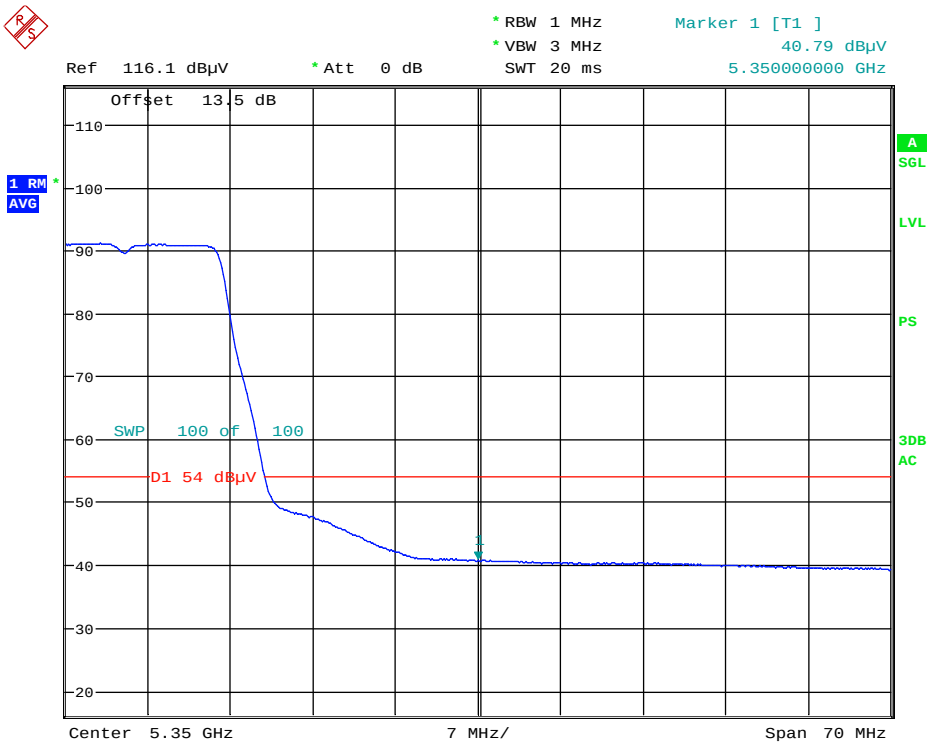

Date: 14.AUG.2014 00:46:19

Plot 6-140. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

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Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

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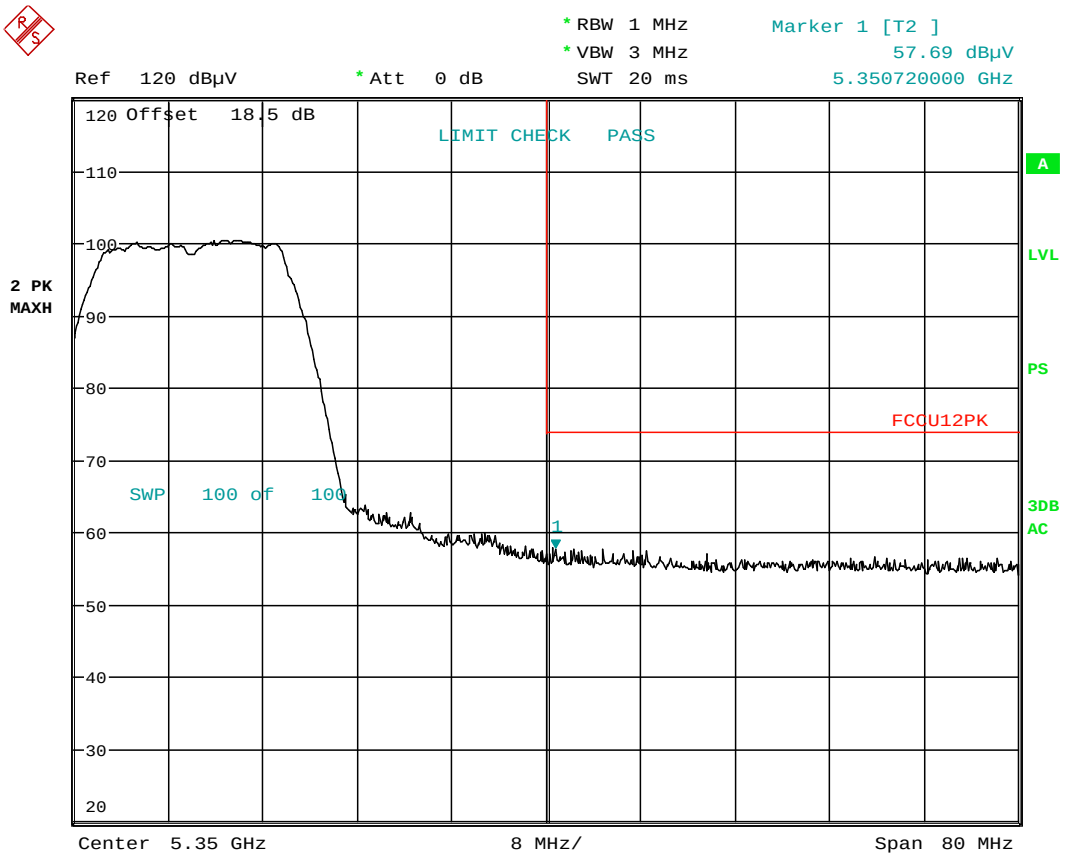

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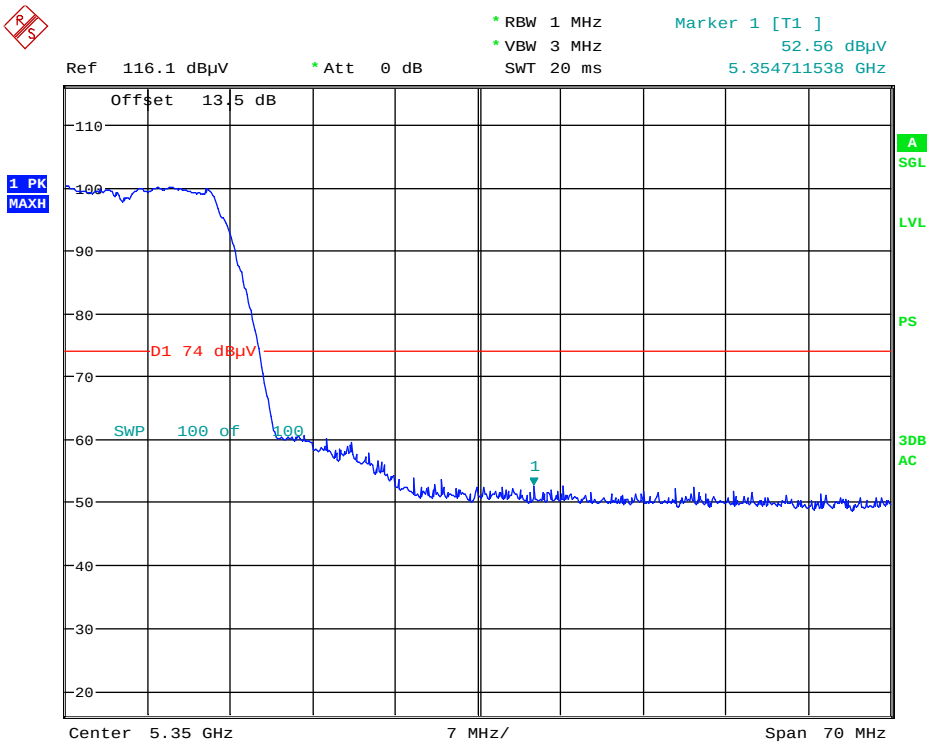

Date: 14.AUG.2014 00:53:52

Plot 6-141. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

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Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	5500MHz
Channel:	100

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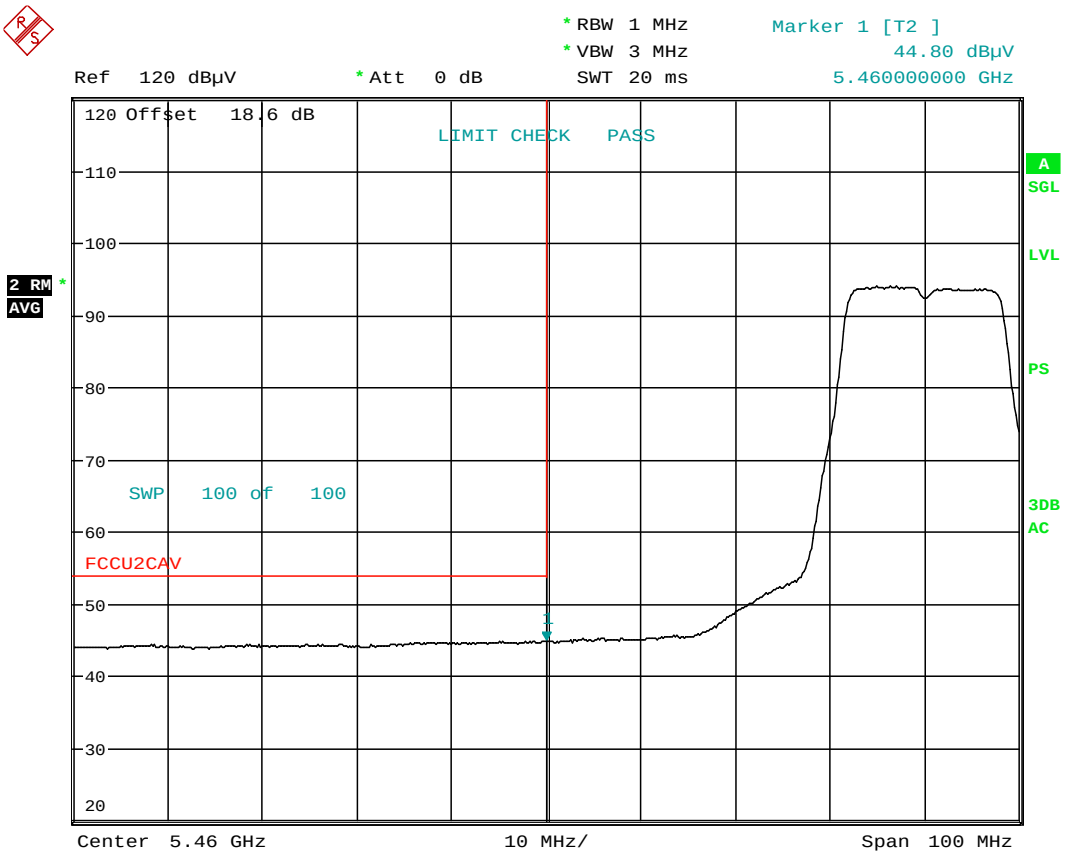
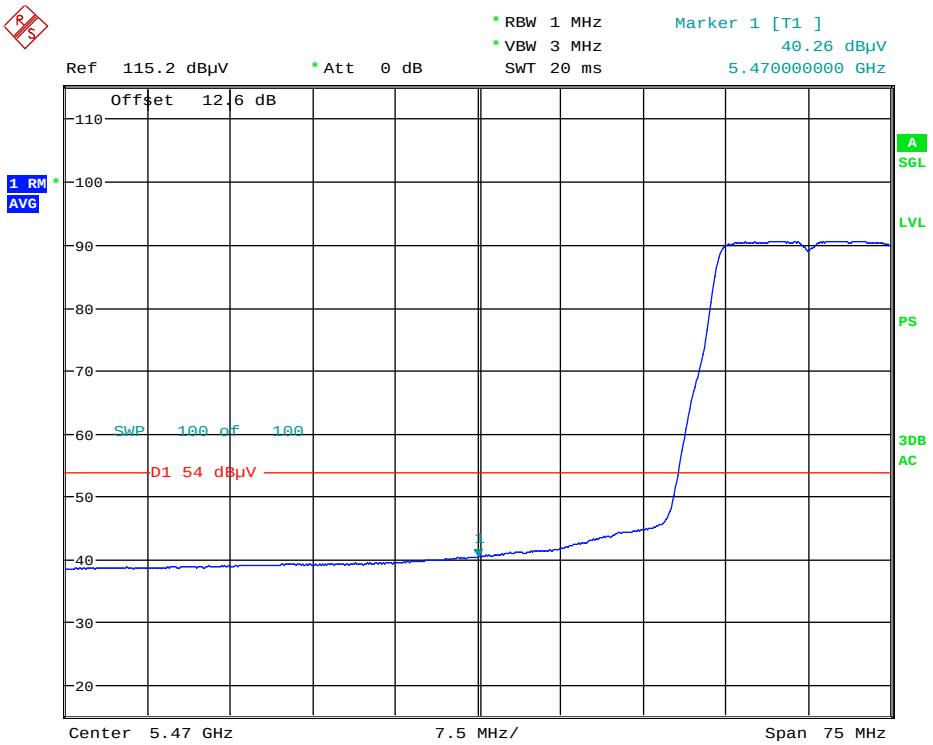


© 2014 PCTEST Engineering Laboratory, Inc.



Date: 14.AUG.2014 01:05:06

Plot 6-142. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

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Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

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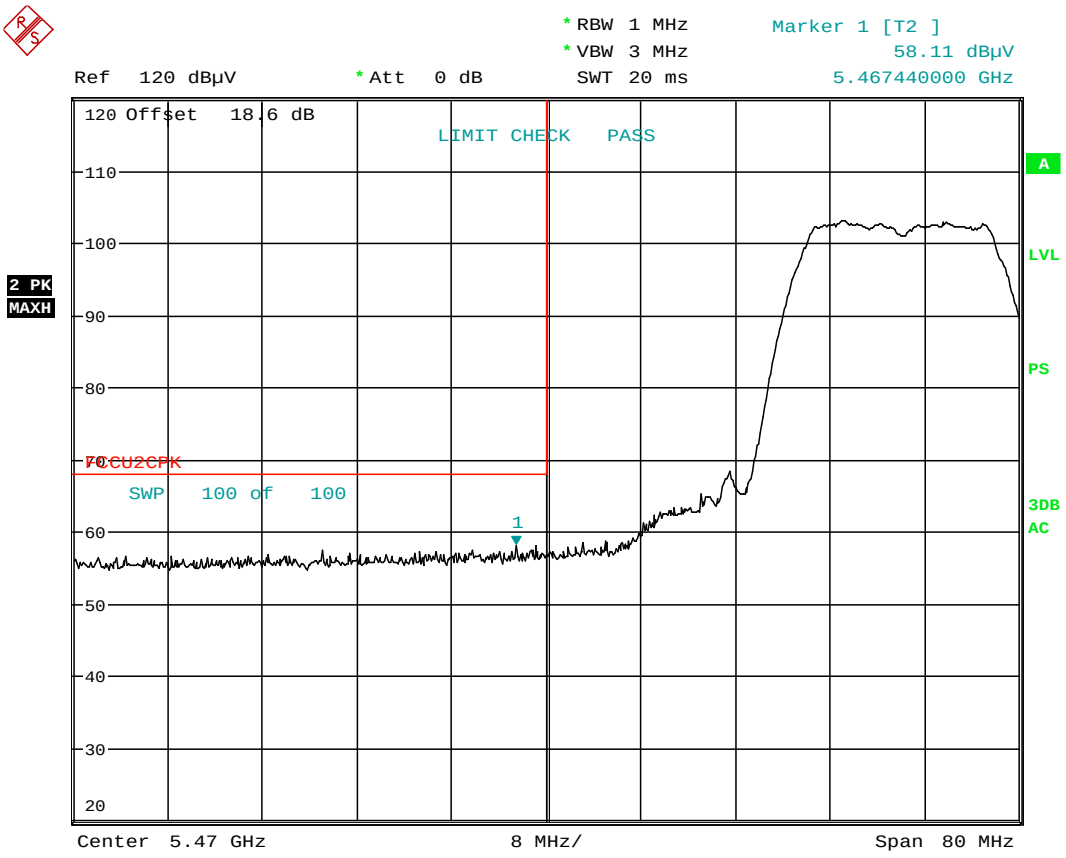
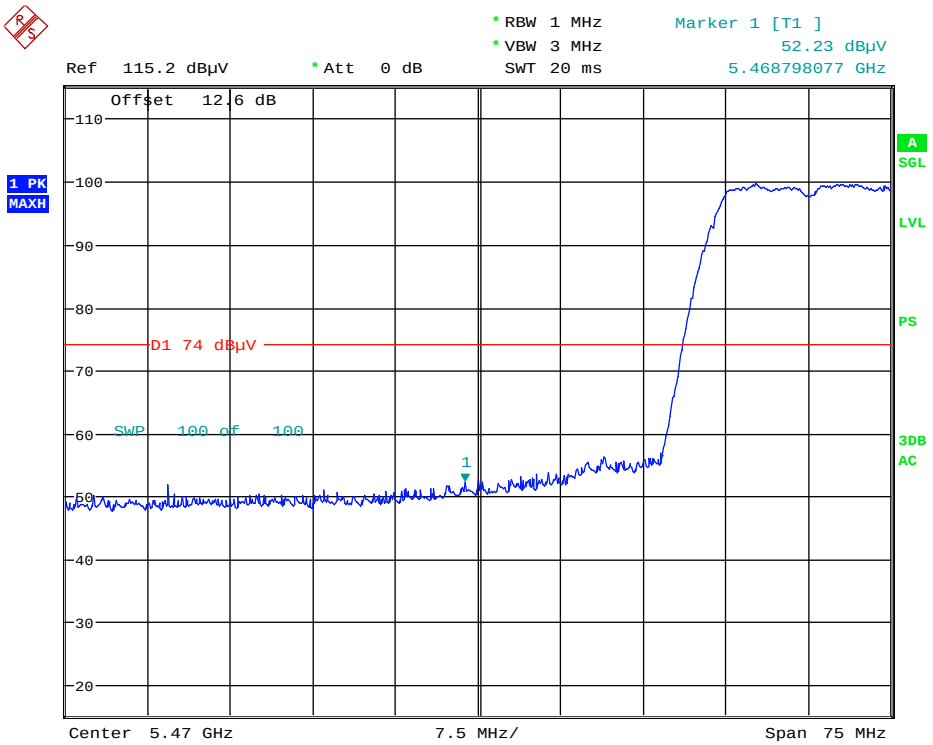


© 2014 PCTEST Engineering Laboratory, Inc.



Date: 14.AUG.2014 01:05:27

Plot 6-143. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

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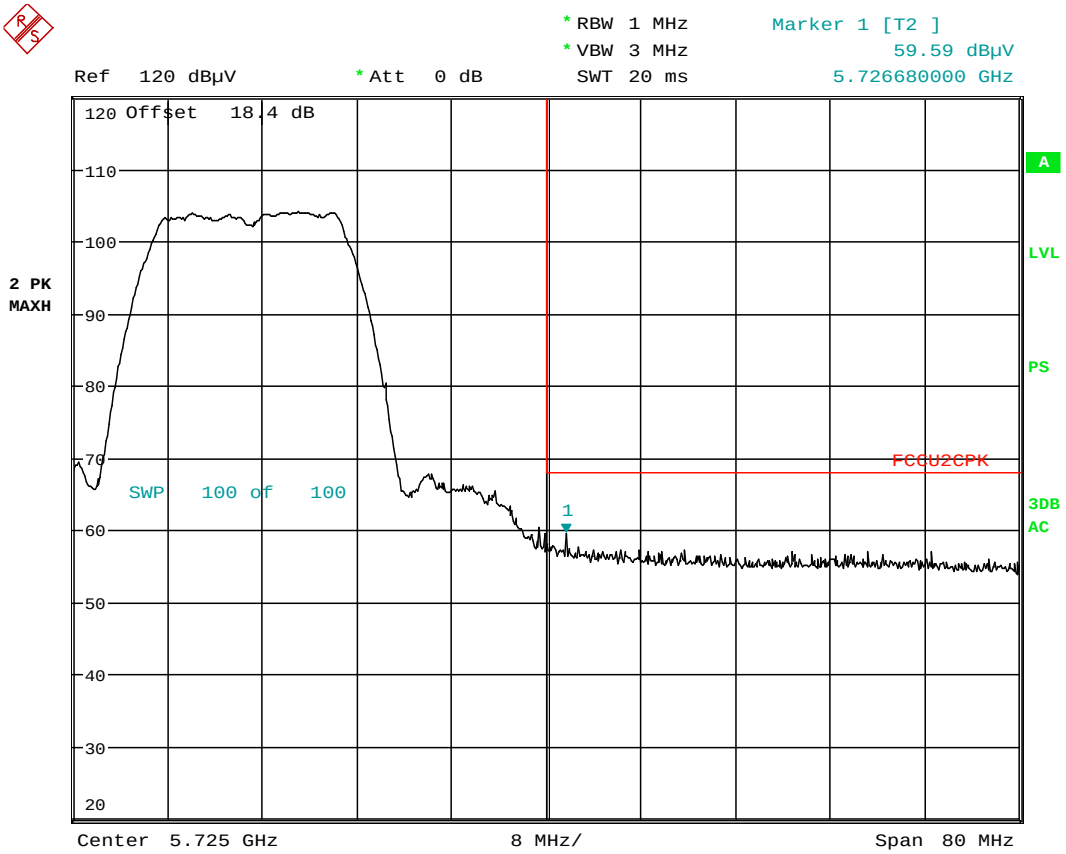
Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	5700MHz
Channel:	140



Plot 6-144. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)

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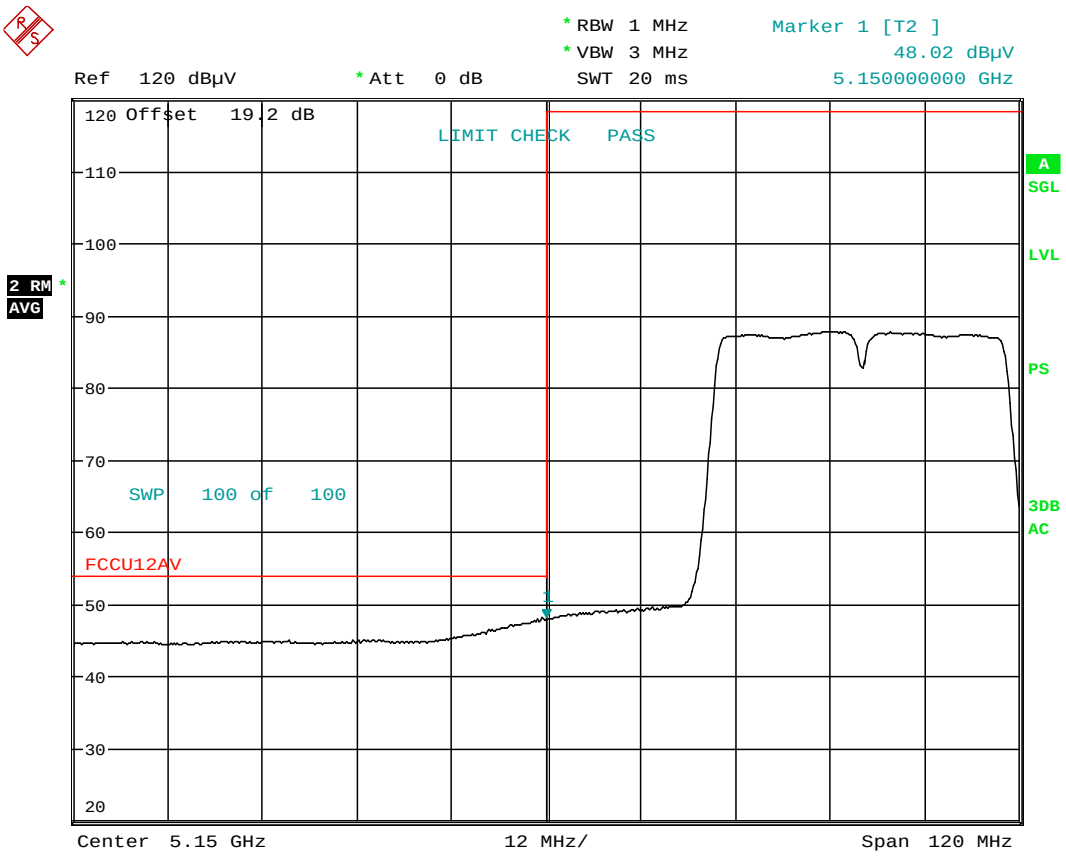
6.9 Antenna-1 Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (40MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5190MHz
Channel:	38



Plot 6-145. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

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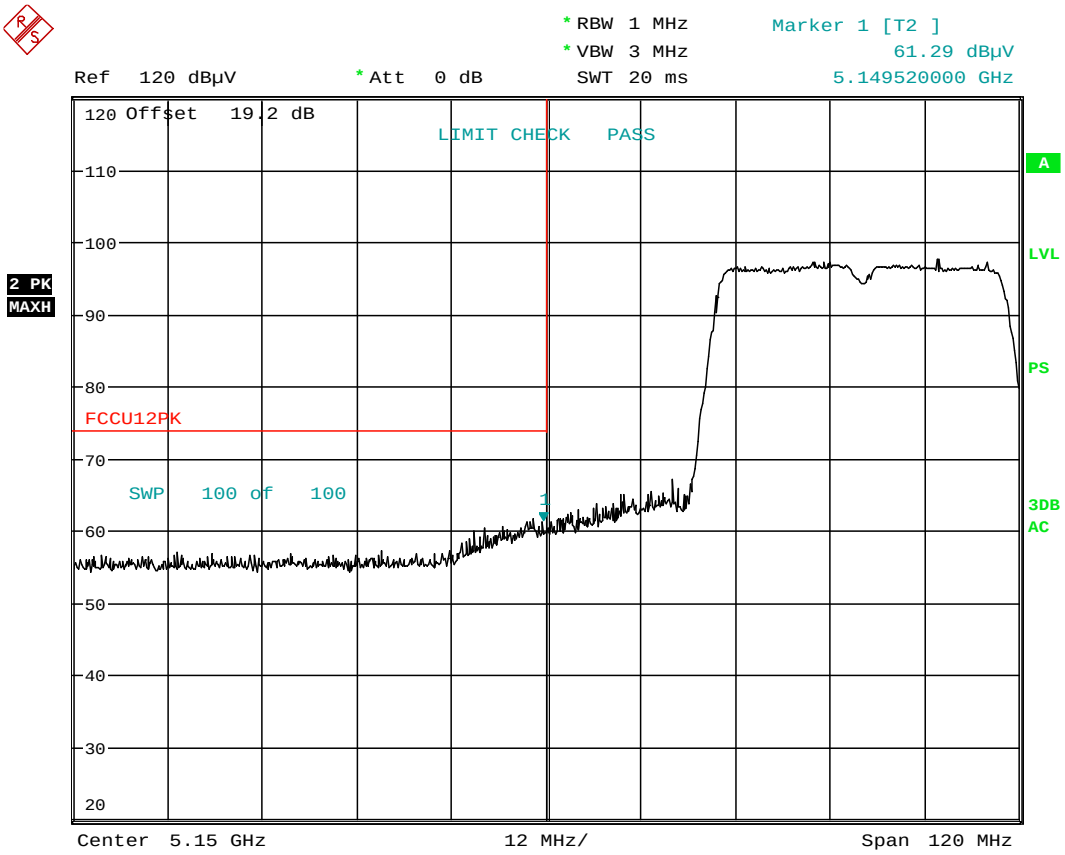
Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-146. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

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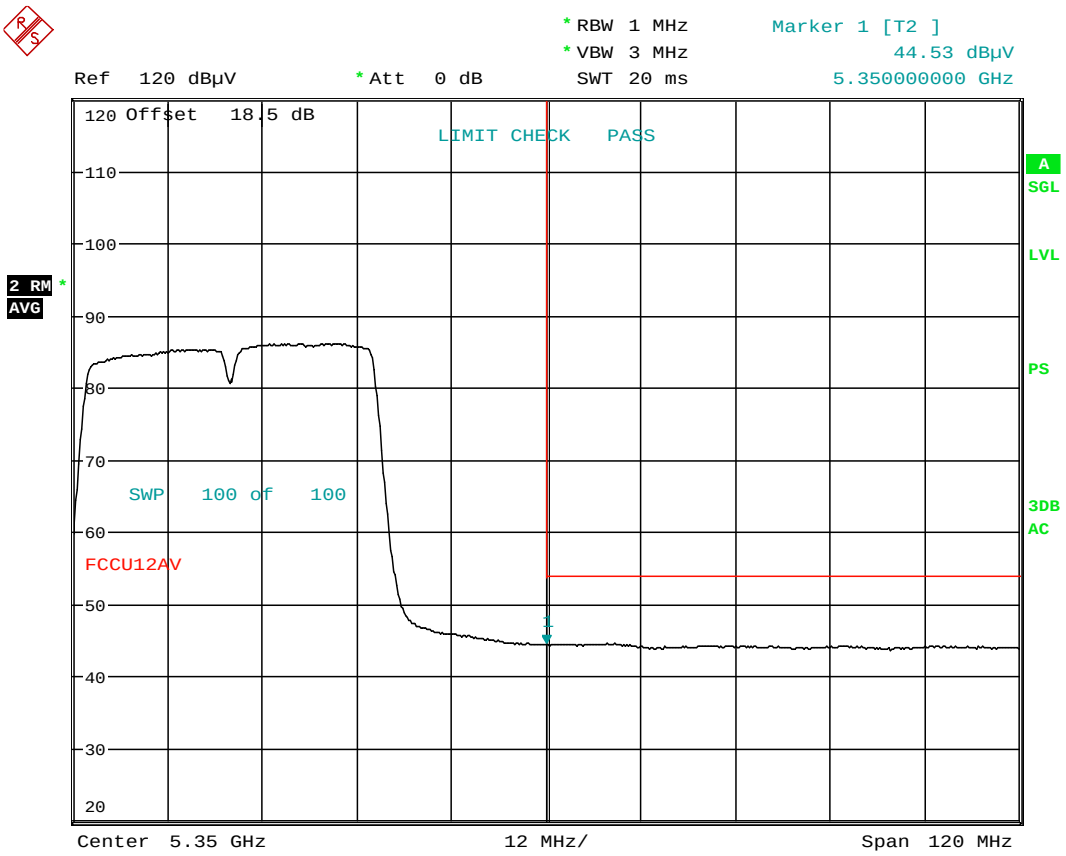
Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (40MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5310MHz
Channel:	62

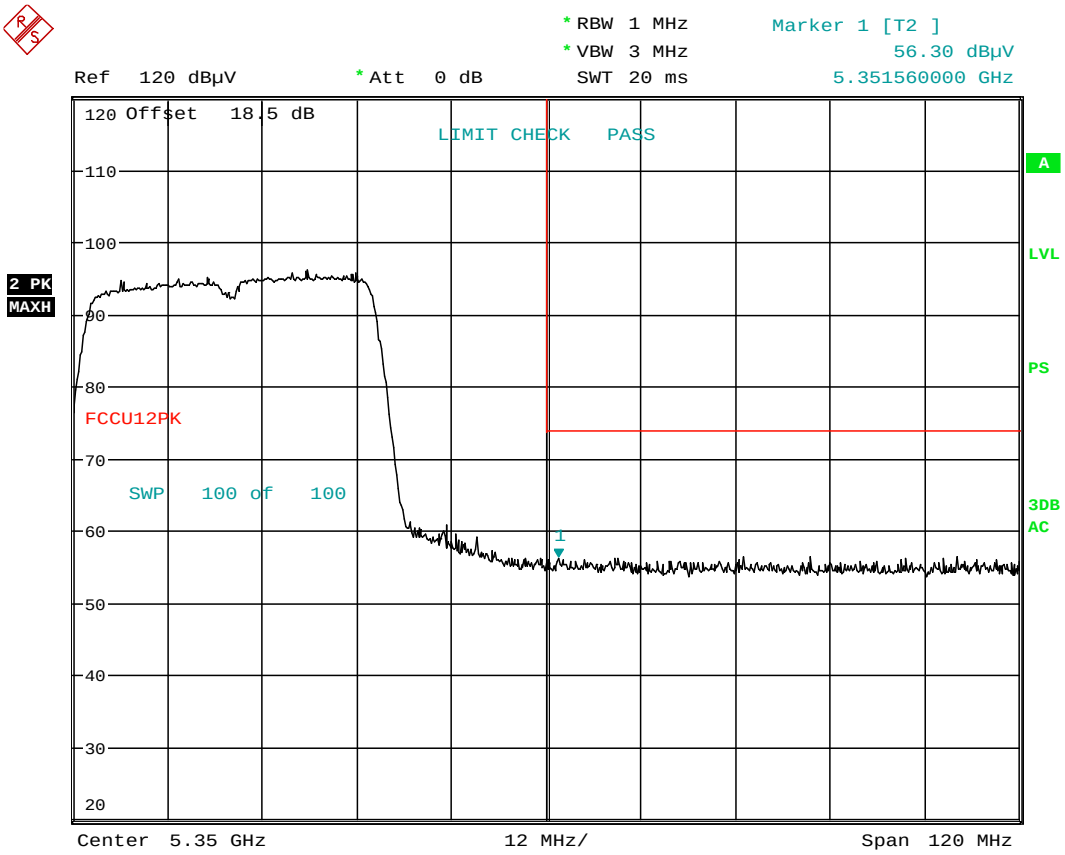


Plot 6-147. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

© 2014 PCTEST Engineering Laboratory, Inc.

Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-148. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

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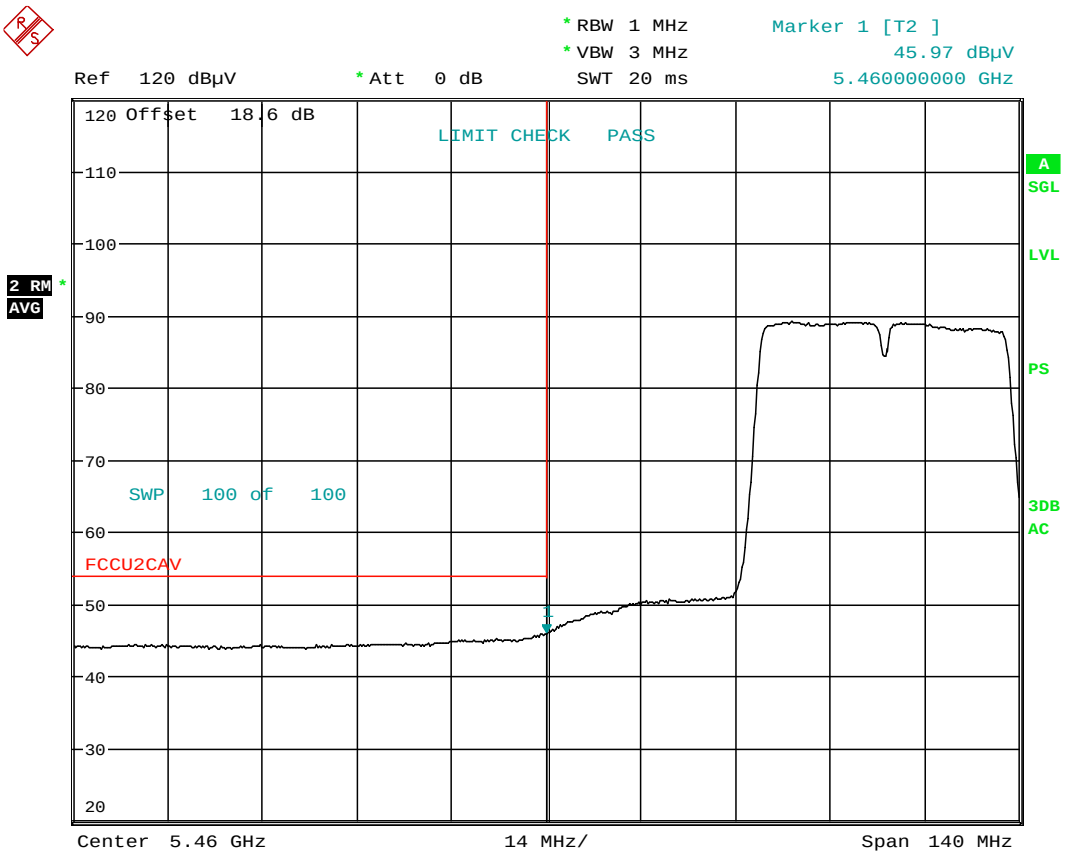
Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (40MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5510MHz
Channel:	102



Plot 6-149. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

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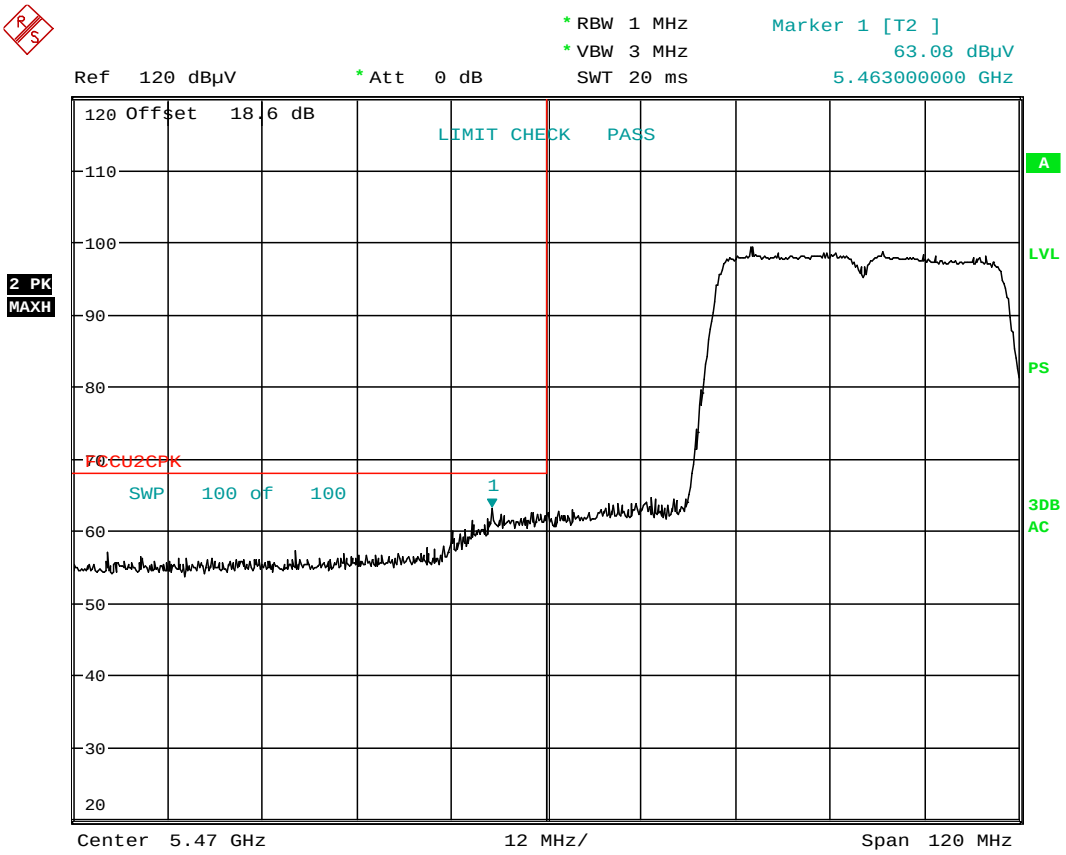
Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-150. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

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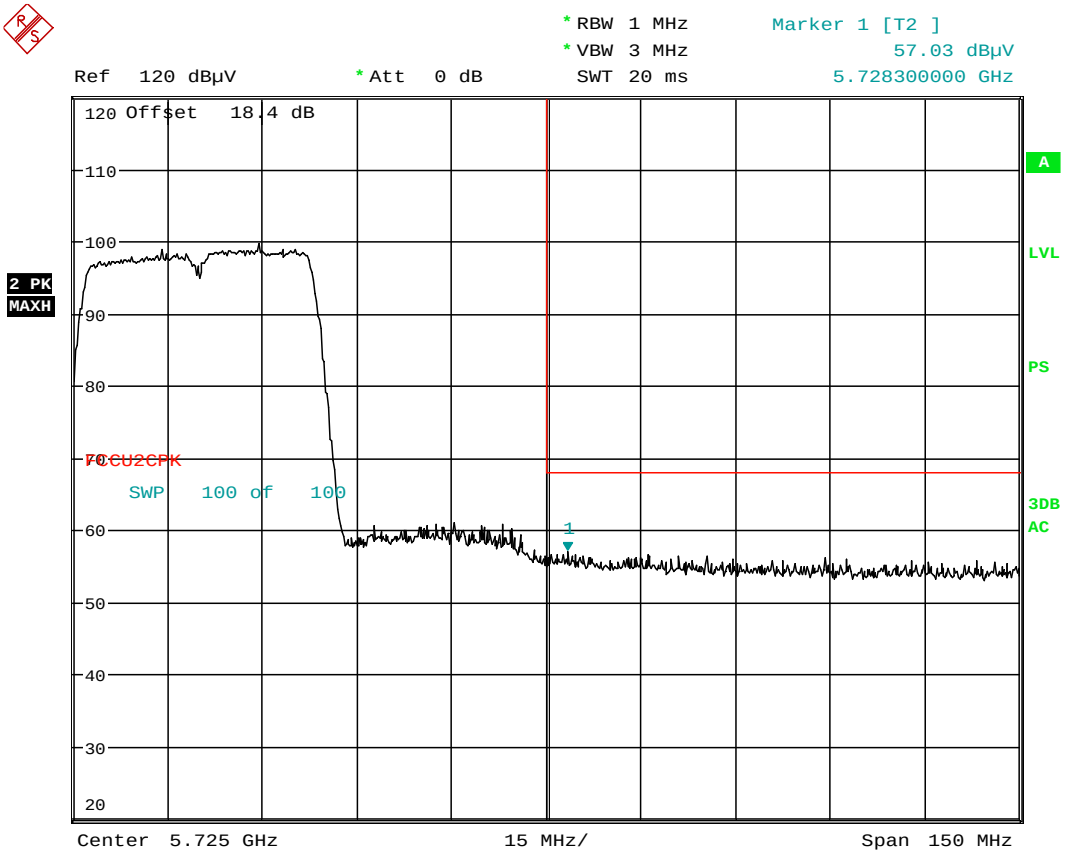
Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (40MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5670MHz
Channel:	134



Plot 6-151. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)

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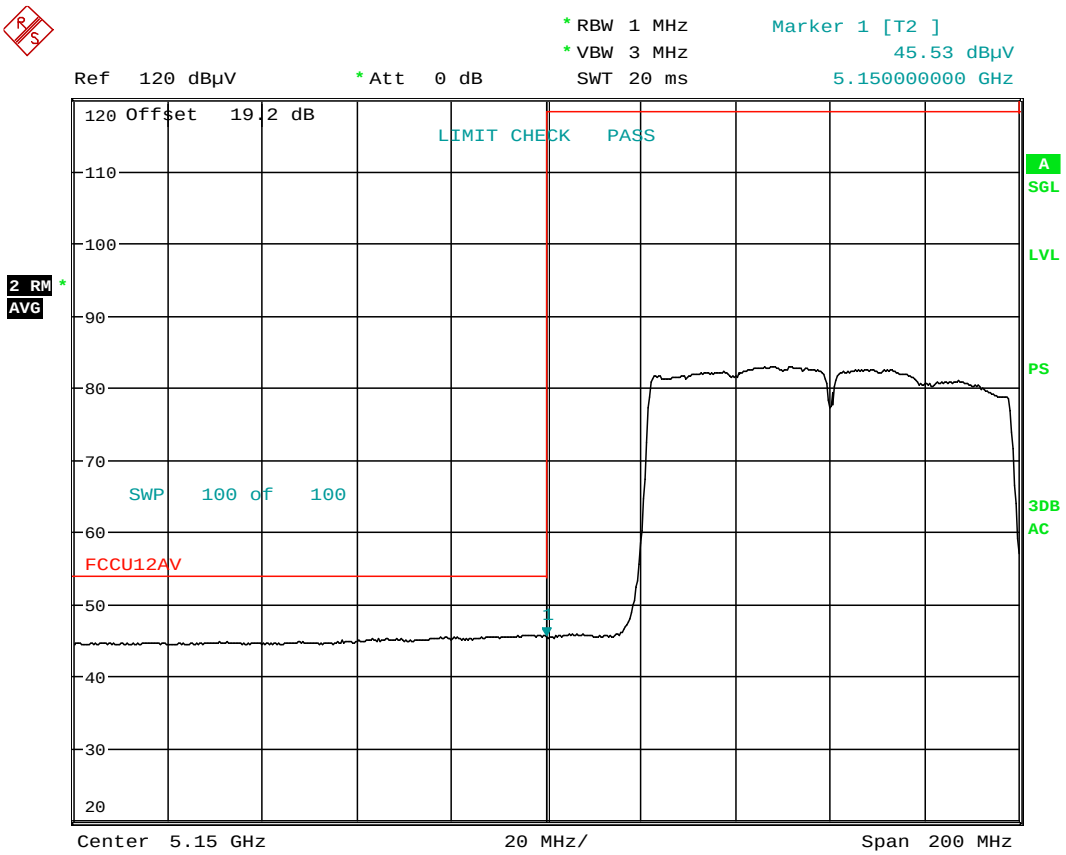
6.10 Antenna-1 Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (80MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5210MHz
Channel:	42

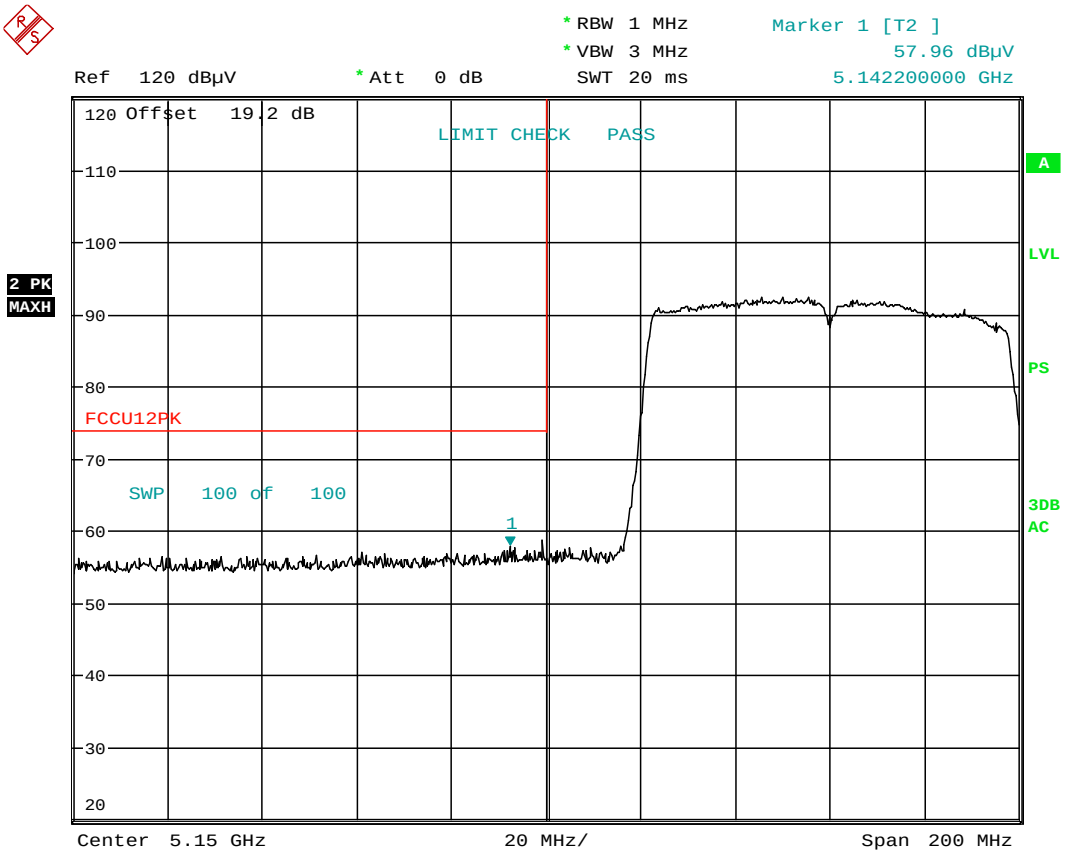


Plot 6-152. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

© 2014 PCTEST Engineering Laboratory, Inc.

Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-153. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

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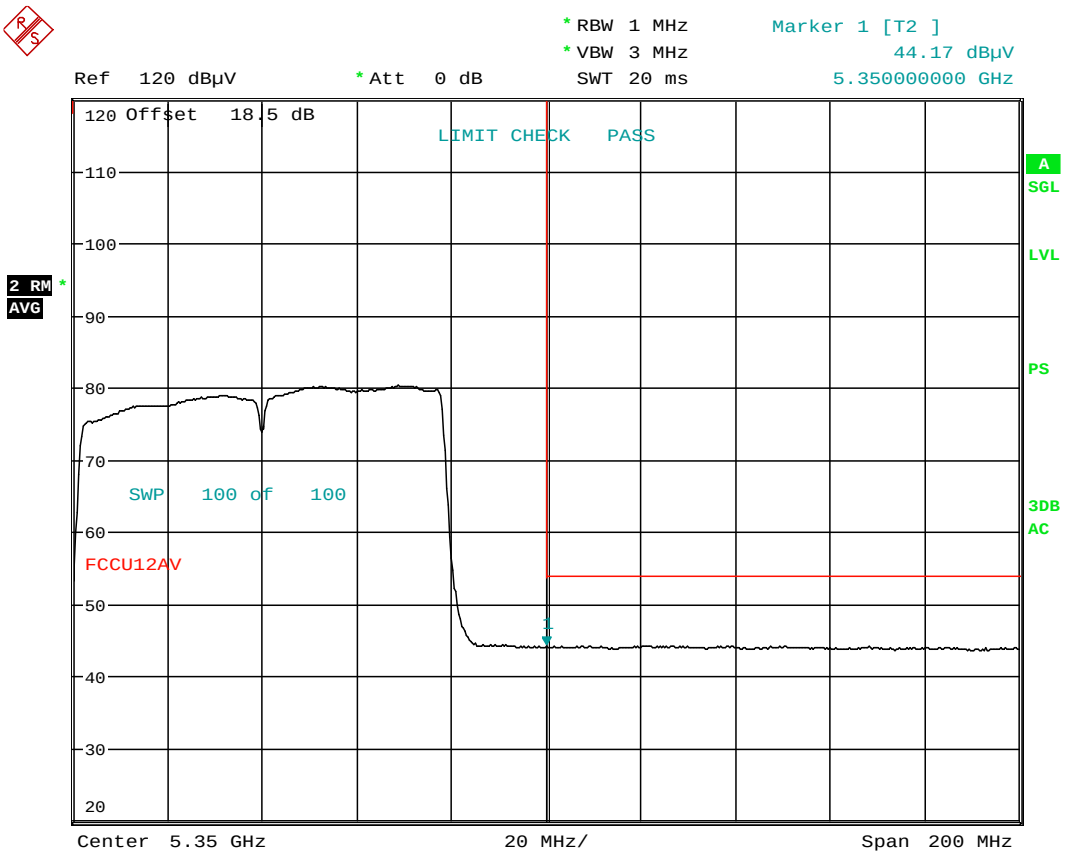
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11ac (80MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5290MHz
Channel:	58



Plot 6-154. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

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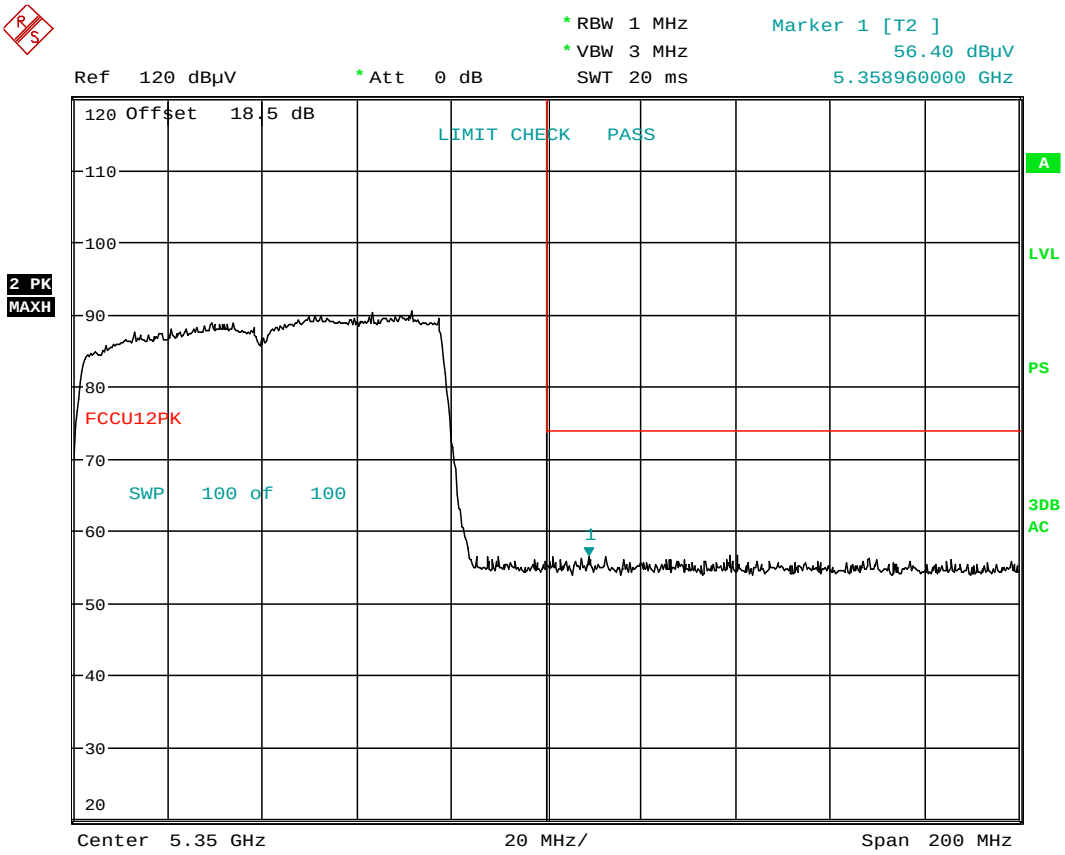
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-155. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

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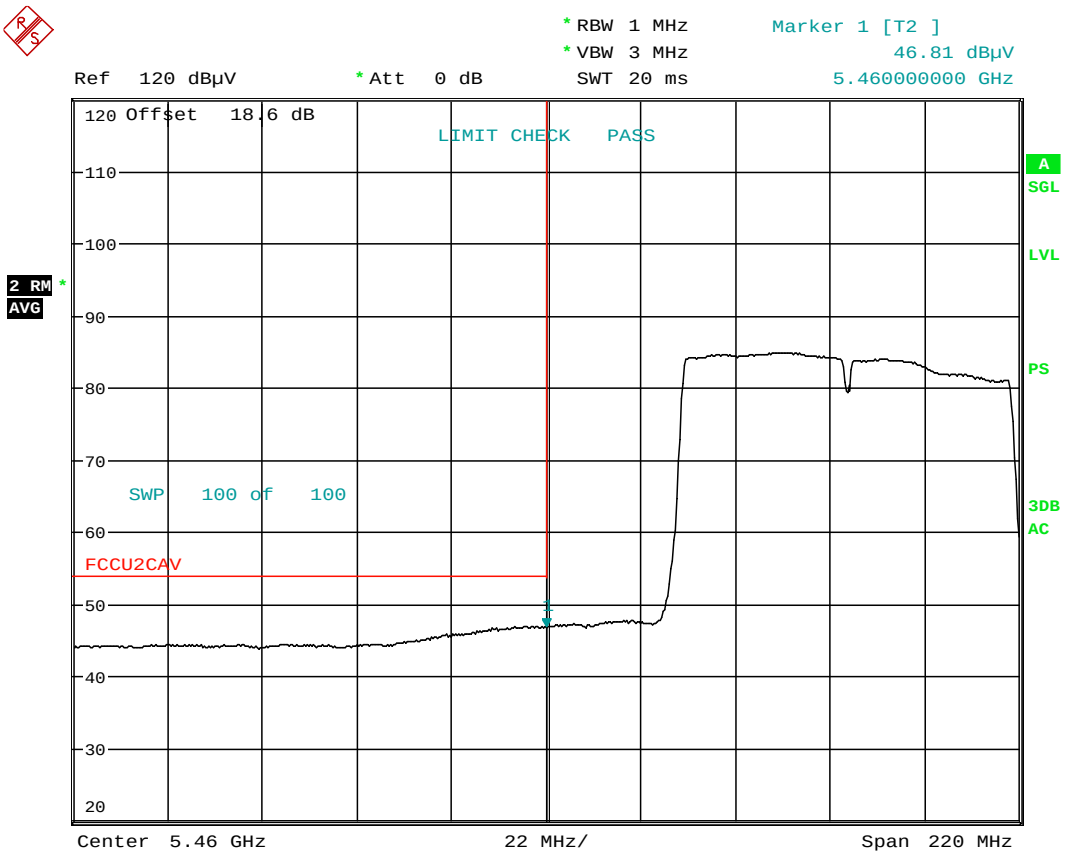
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11ac (80MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5530MHz
Channel:	106



Plot 6-156. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

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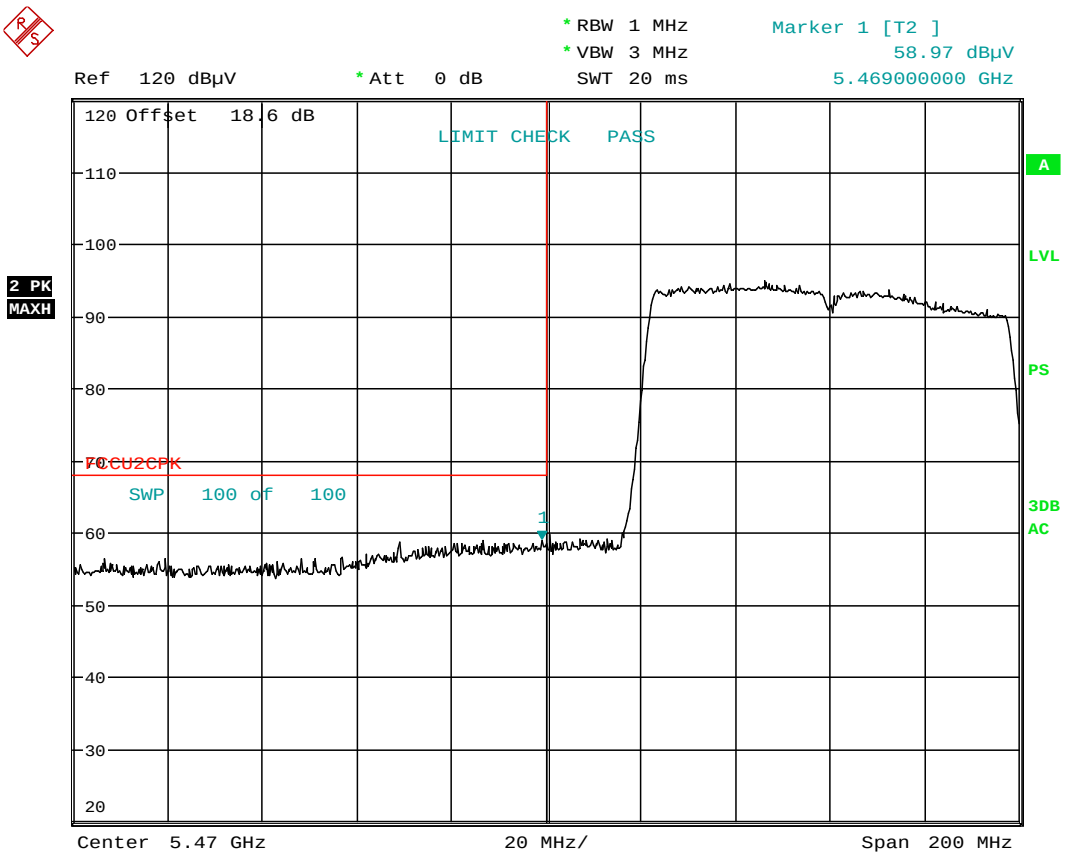
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-157. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

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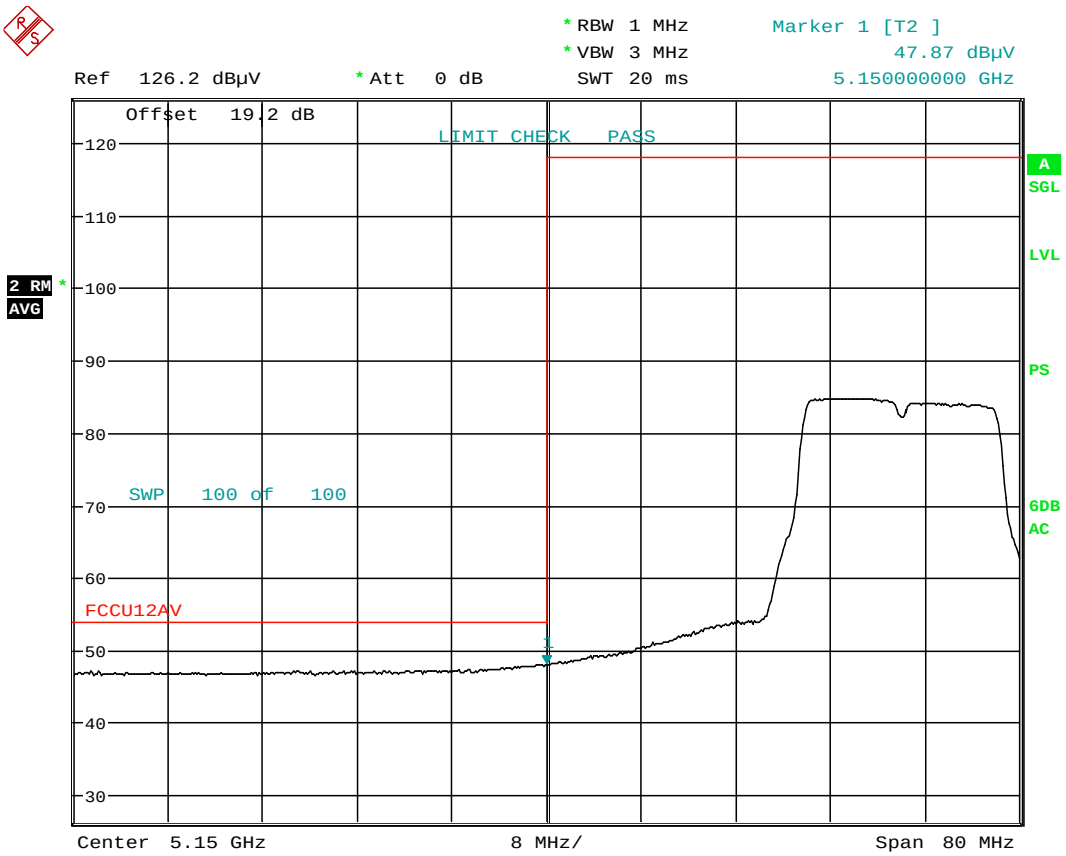
6.11 Antenna-2 Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	5180MHz
Channel:	36

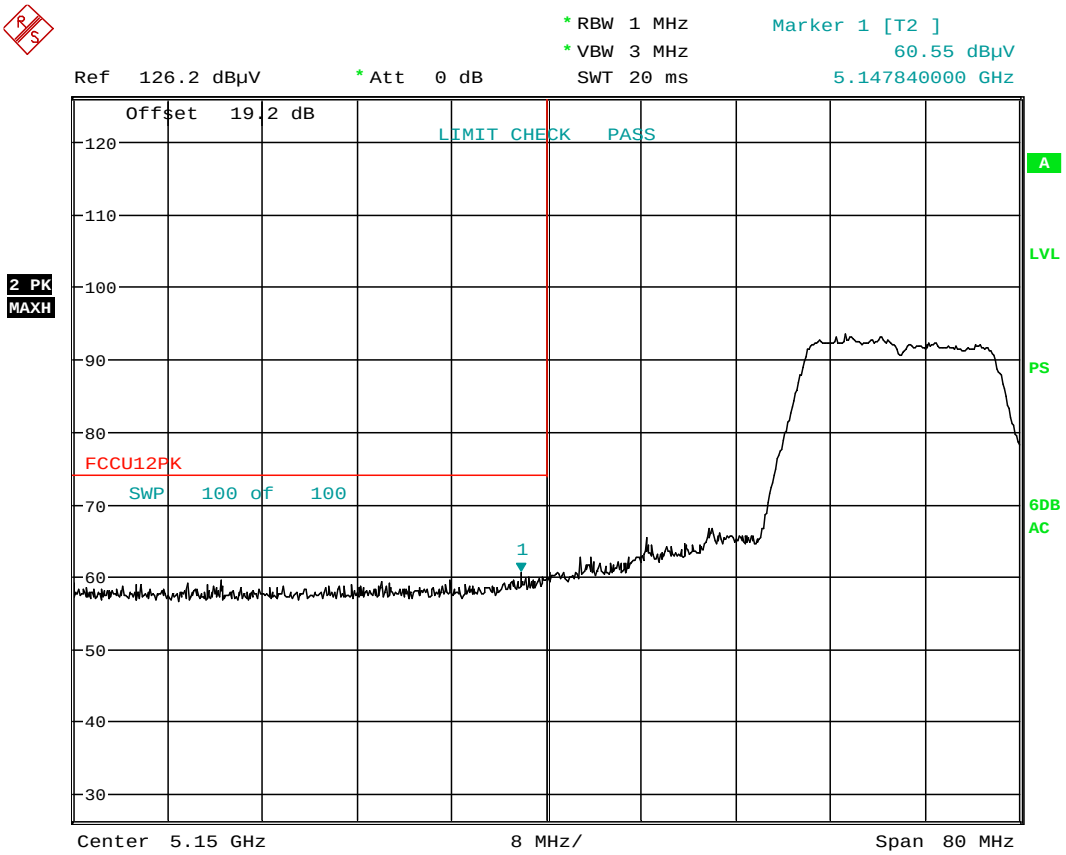


Plot 6-158. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

© 2014 PCTEST Engineering Laboratory, Inc.

Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-159. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

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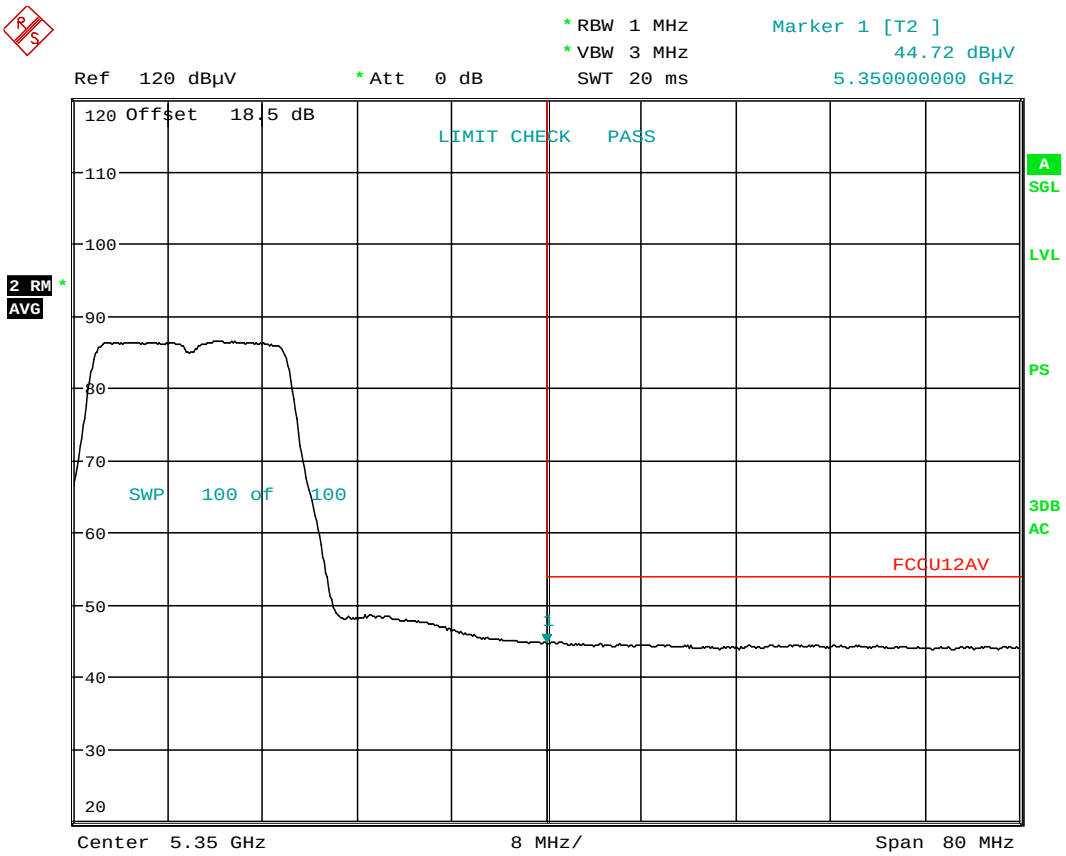
Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	5320MHz
Channel:	64

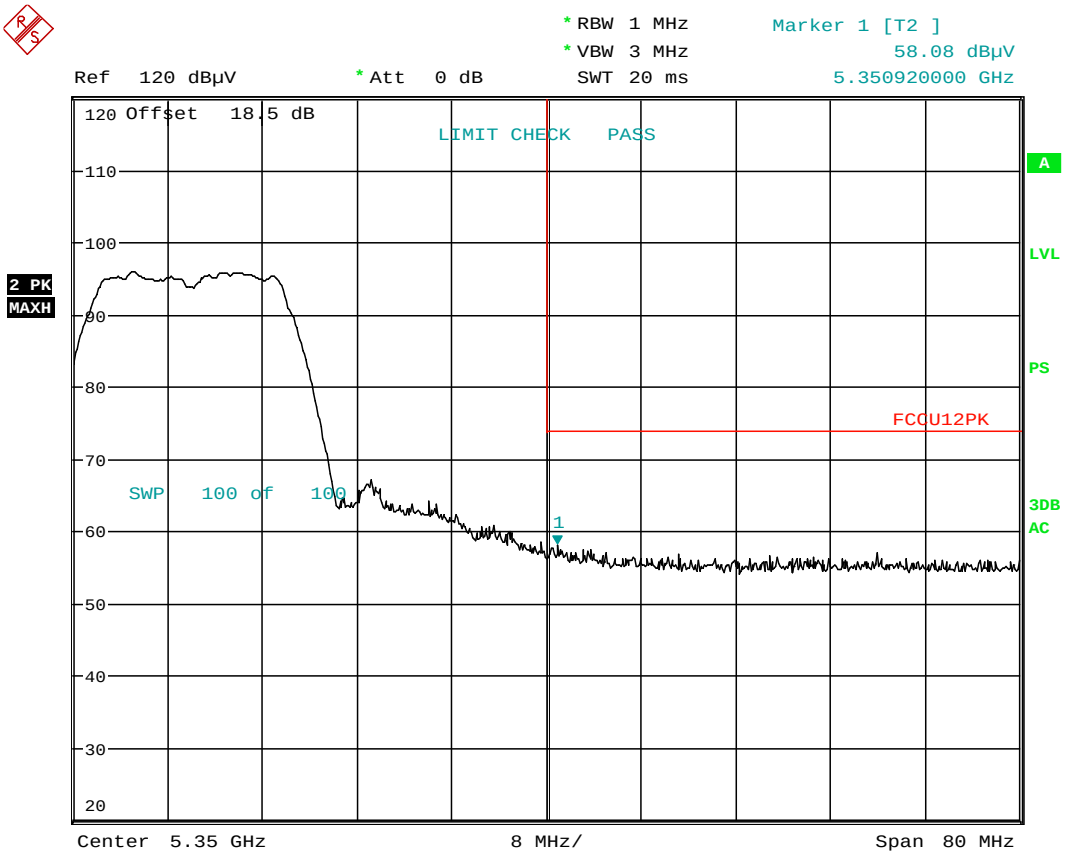


Plot 6-160. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

© 2014 PCTEST Engineering Laboratory, Inc.

Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



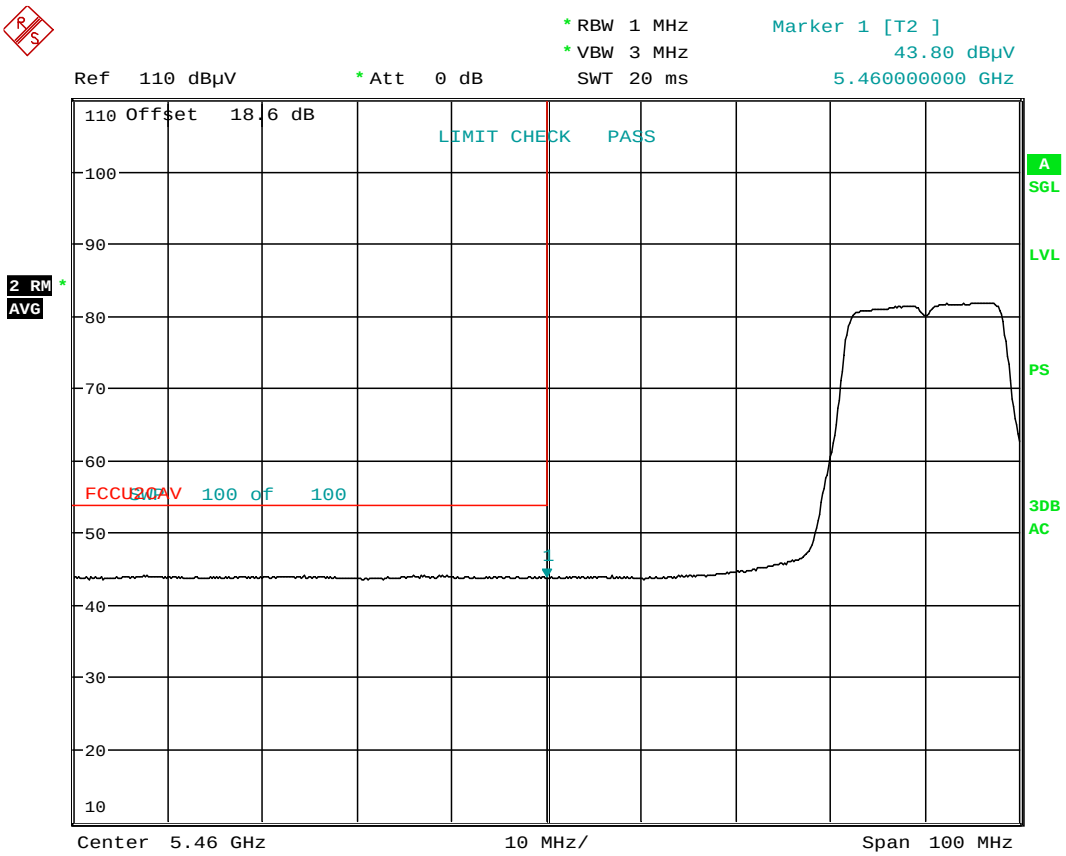
Plot 6-161. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

© 2014 PCTEST Engineering Laboratory, Inc.

Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	5500MHz
Channel:	100

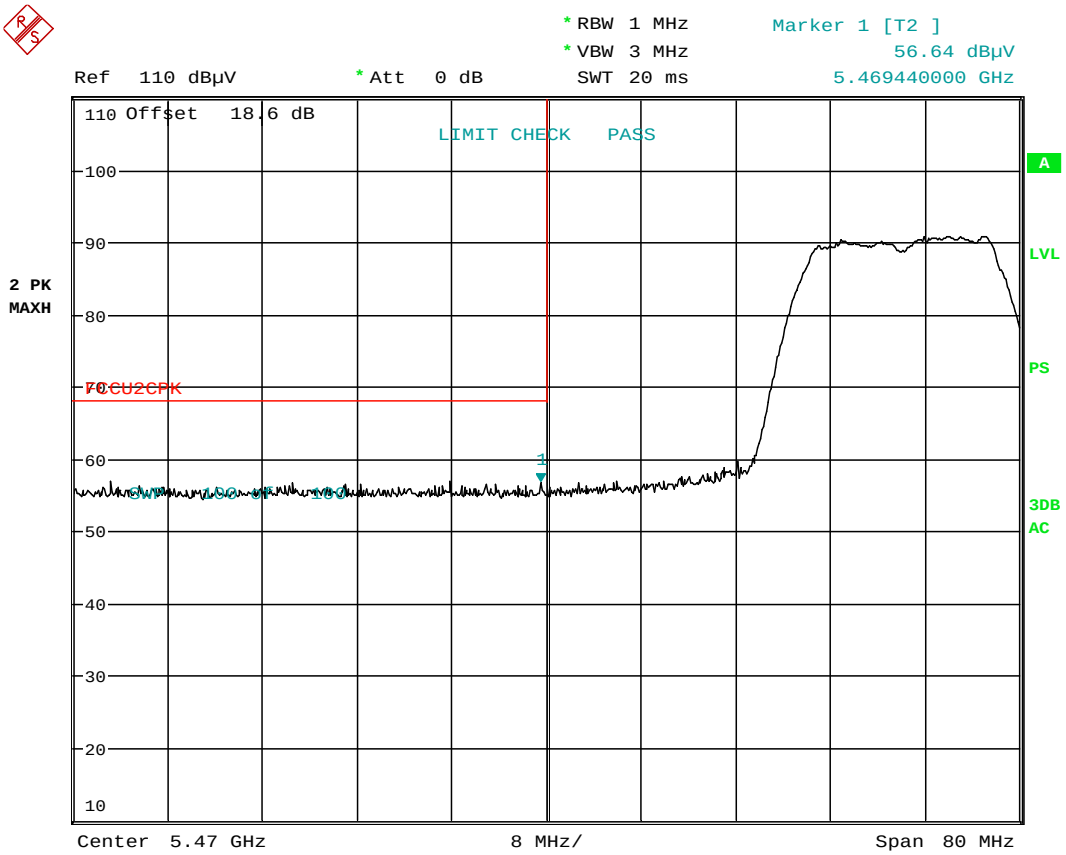


Plot 6-162. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

© 2014 PCTEST Engineering Laboratory, Inc.

Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



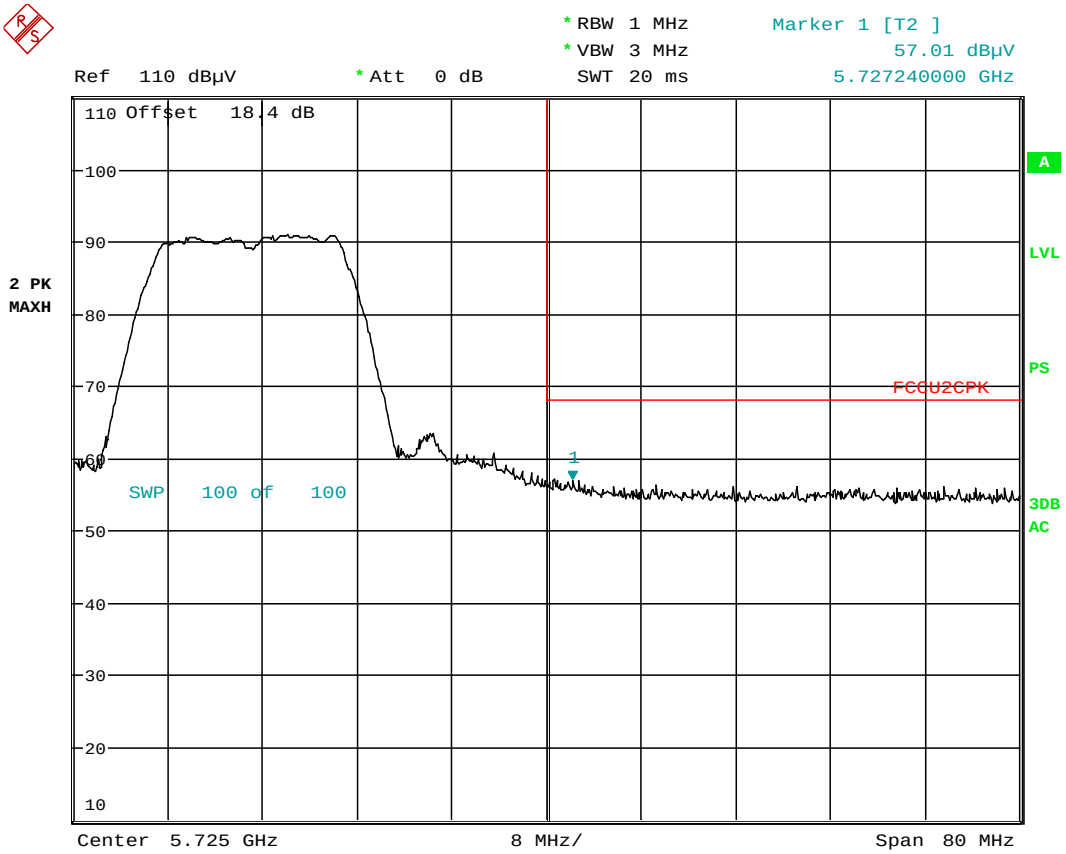
Plot 6-163. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

© 2014 PCTEST Engineering Laboratory, Inc.

Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	5700MHz
Channel:	140



Plot 6-164. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)

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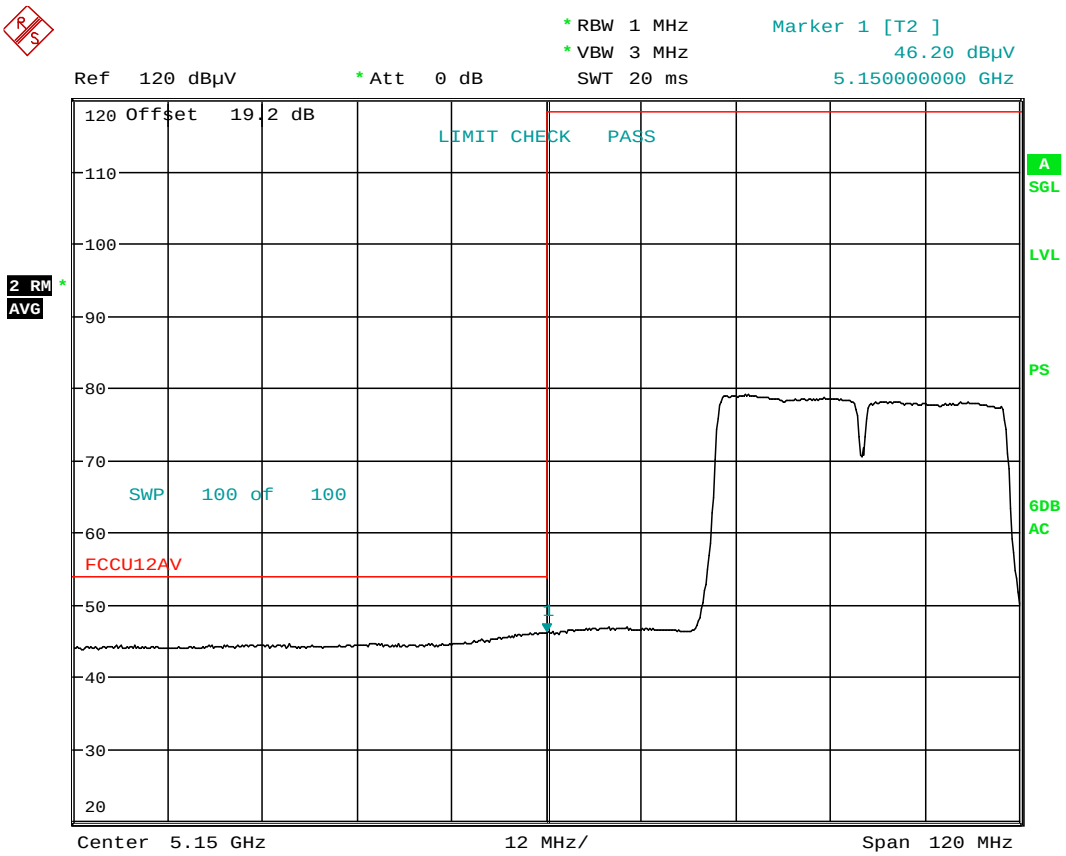
6.12 Antenna-2 Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (40MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5190MHz
Channel:	38

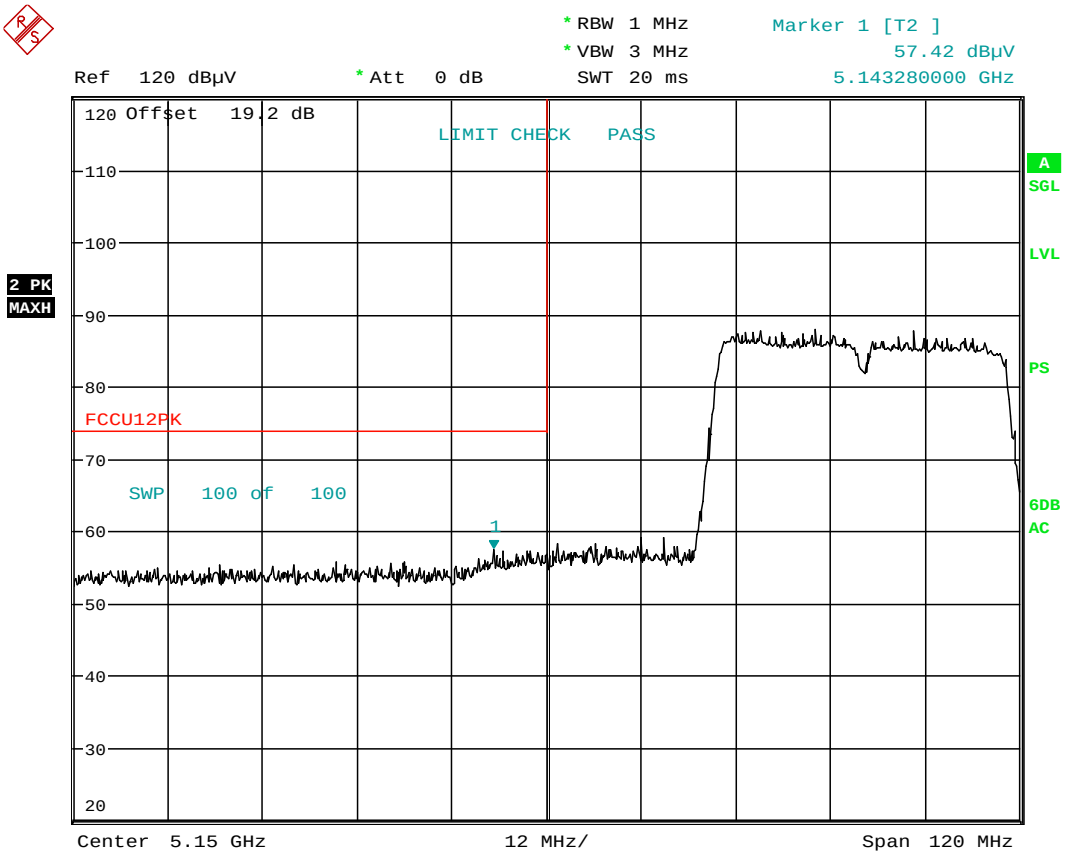


Plot 6-165. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

© 2014 PCTEST Engineering Laboratory, Inc.

Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



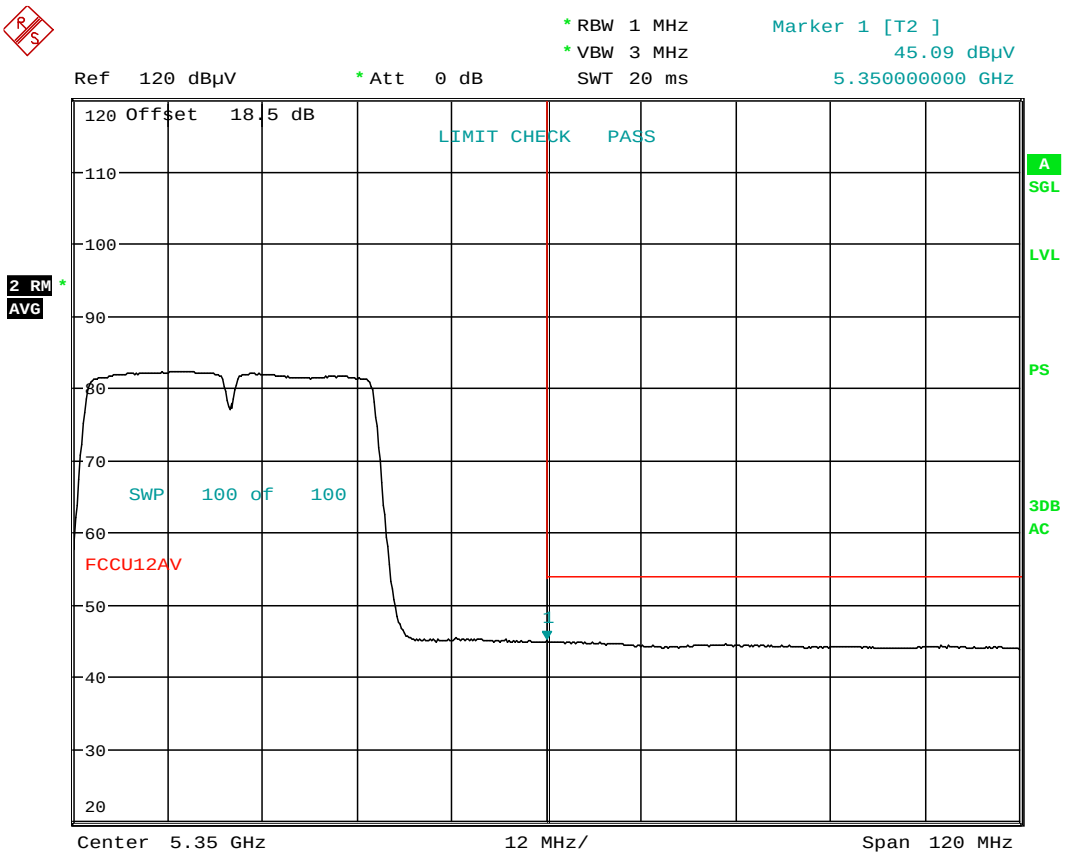
Plot 6-166. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

© 2014 PCTEST Engineering Laboratory, Inc.

Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (40MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5310MHz
Channel:	62



Plot 6-167. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

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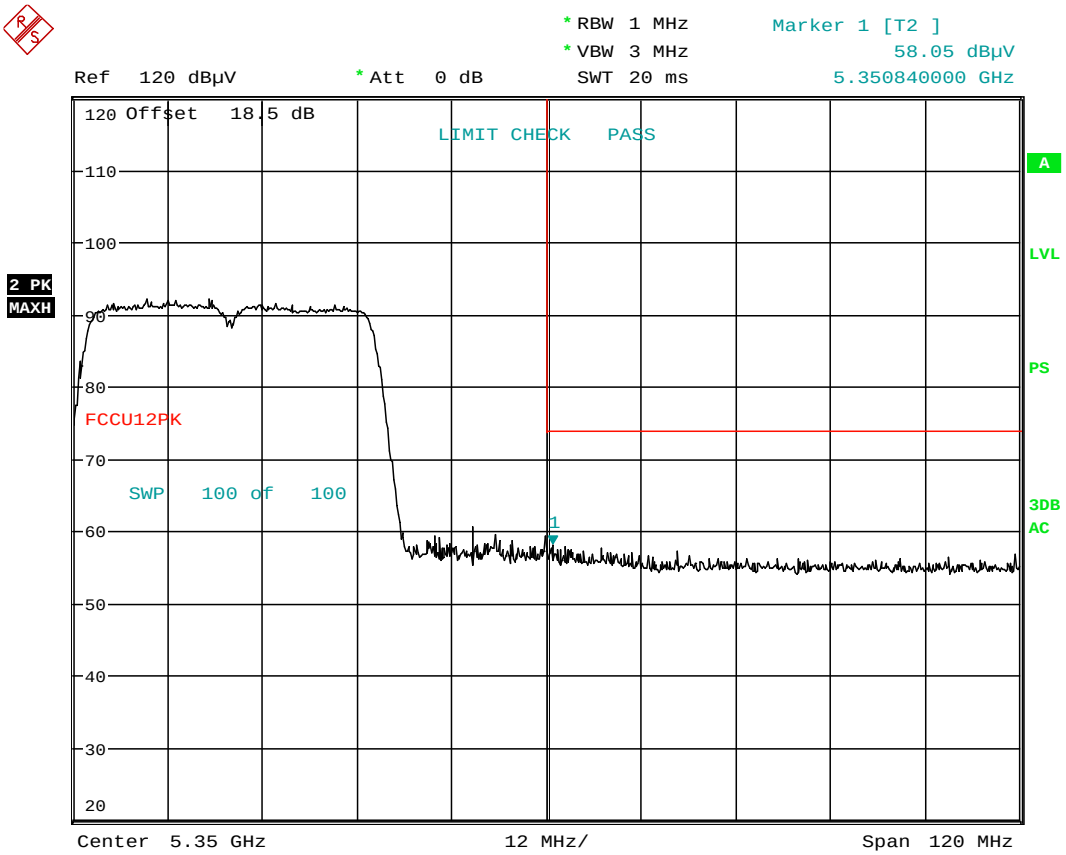
Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



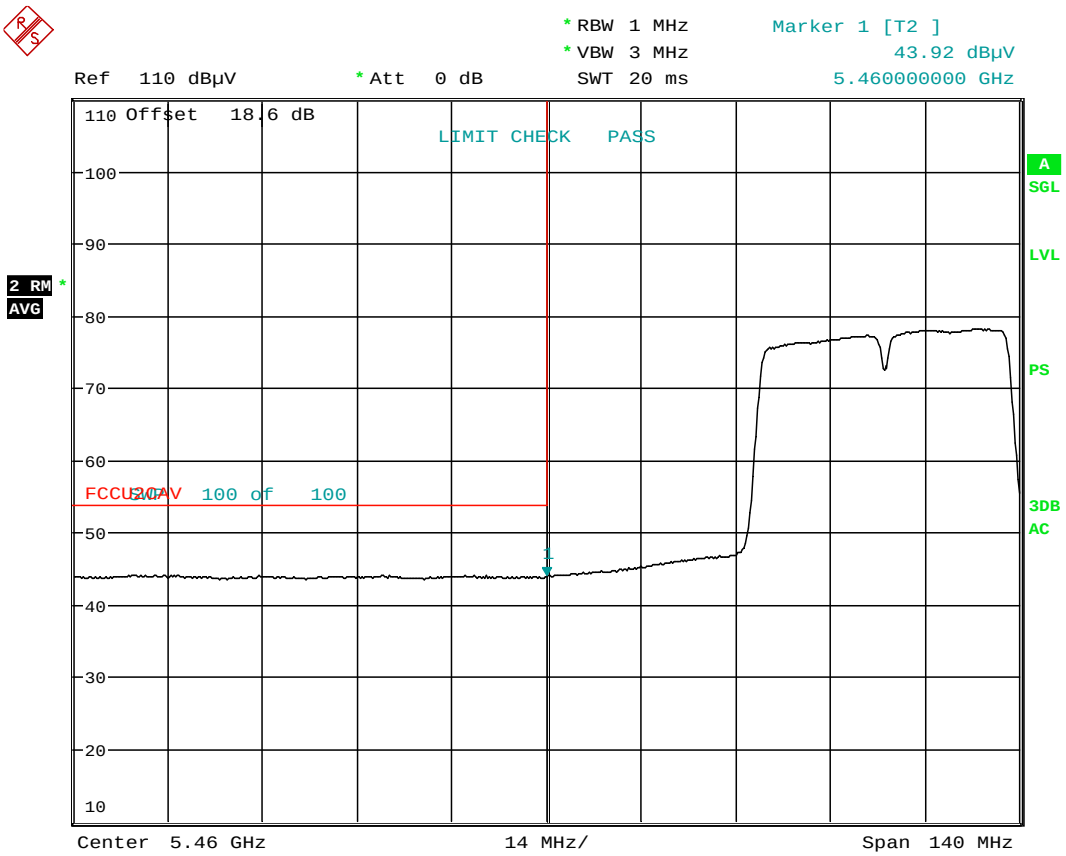
Plot 6-168. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

© 2014 PCTEST Engineering Laboratory, Inc.

Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (40MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5510MHz
Channel:	102



Plot 6-169. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

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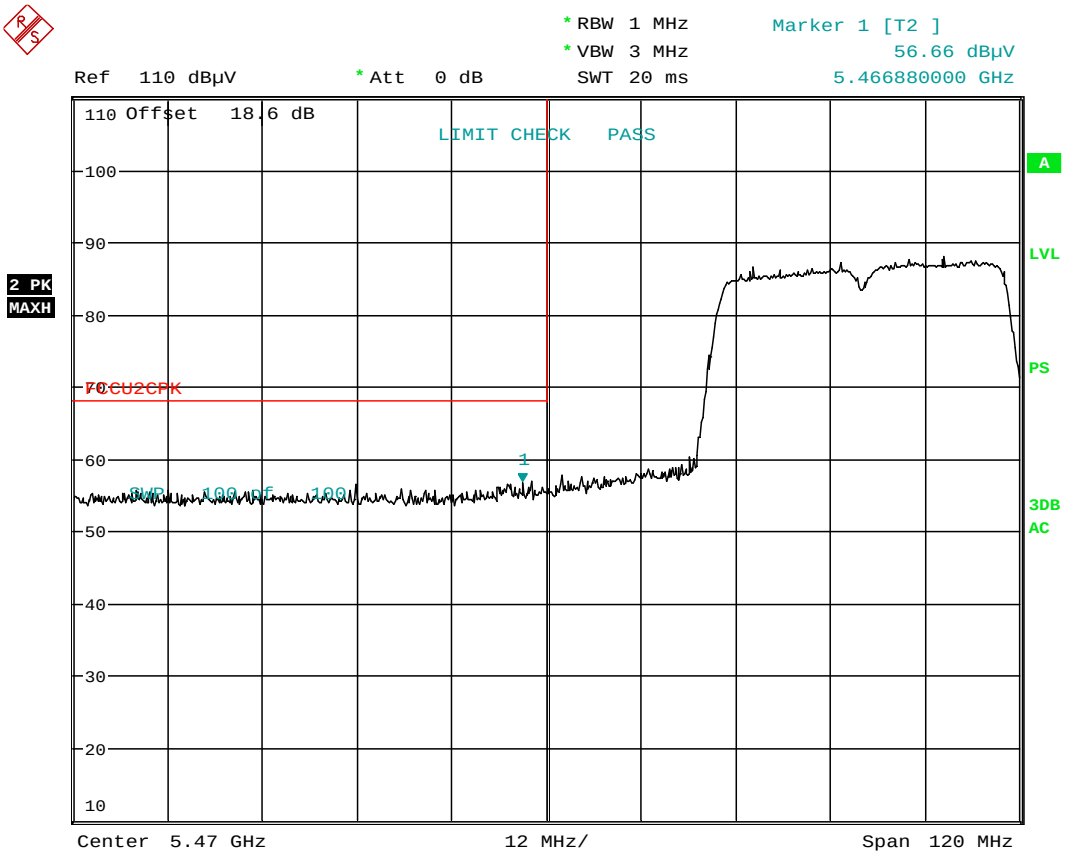
Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



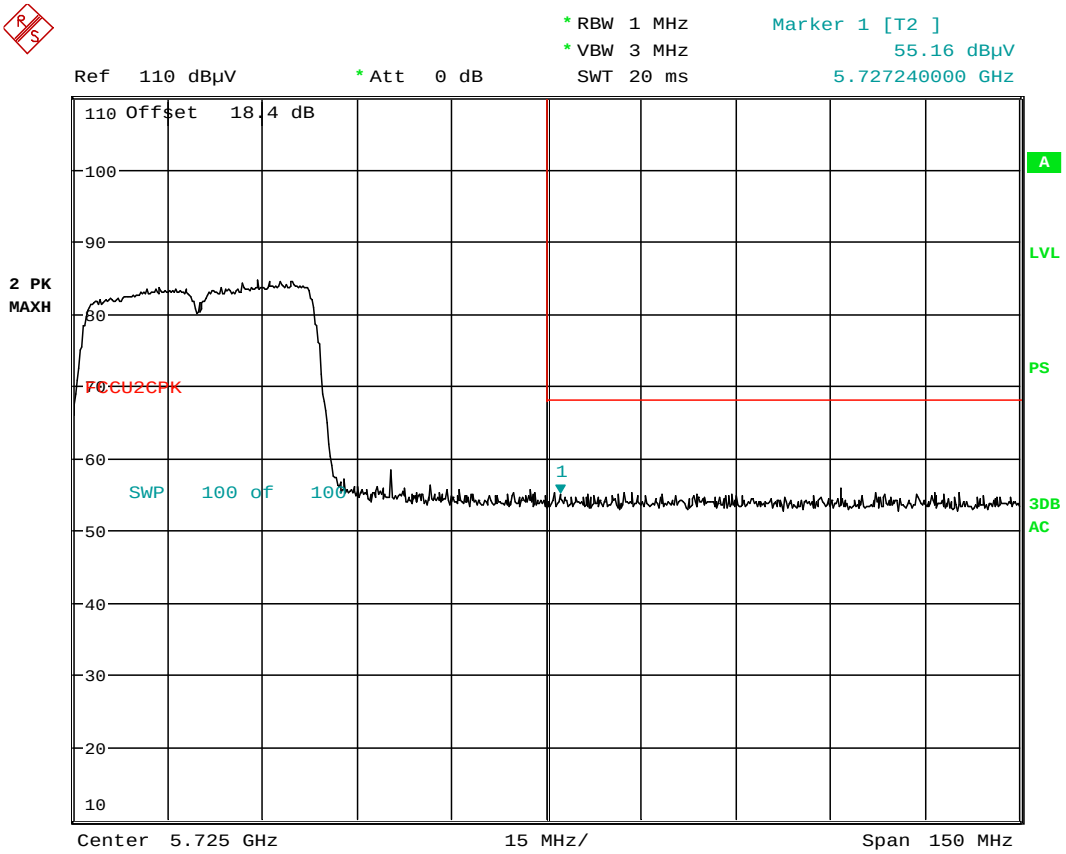
Plot 6-170. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

© 2014 PCTEST Engineering Laboratory, Inc.

Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (40MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5670MHz
Channel:	134



Plot 6-171. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)

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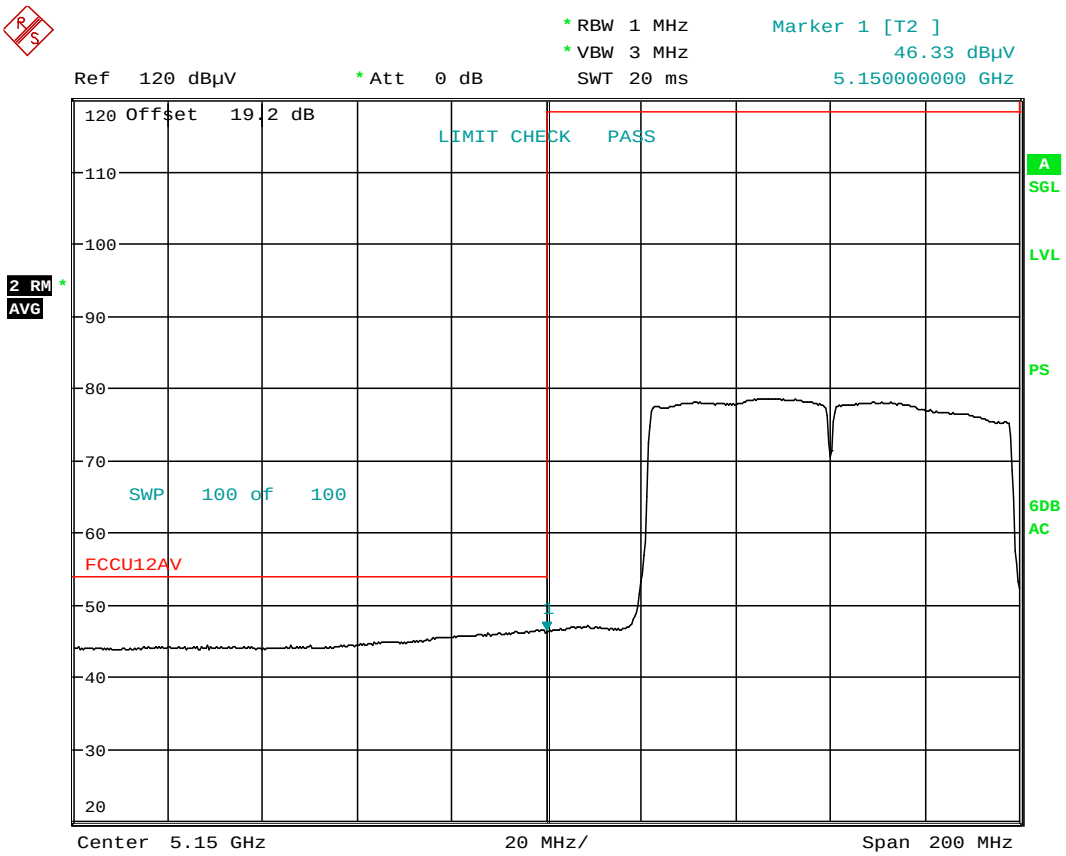
6.13 Antenna-2 Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (80MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5210MHz
Channel:	42



Plot 6-172. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

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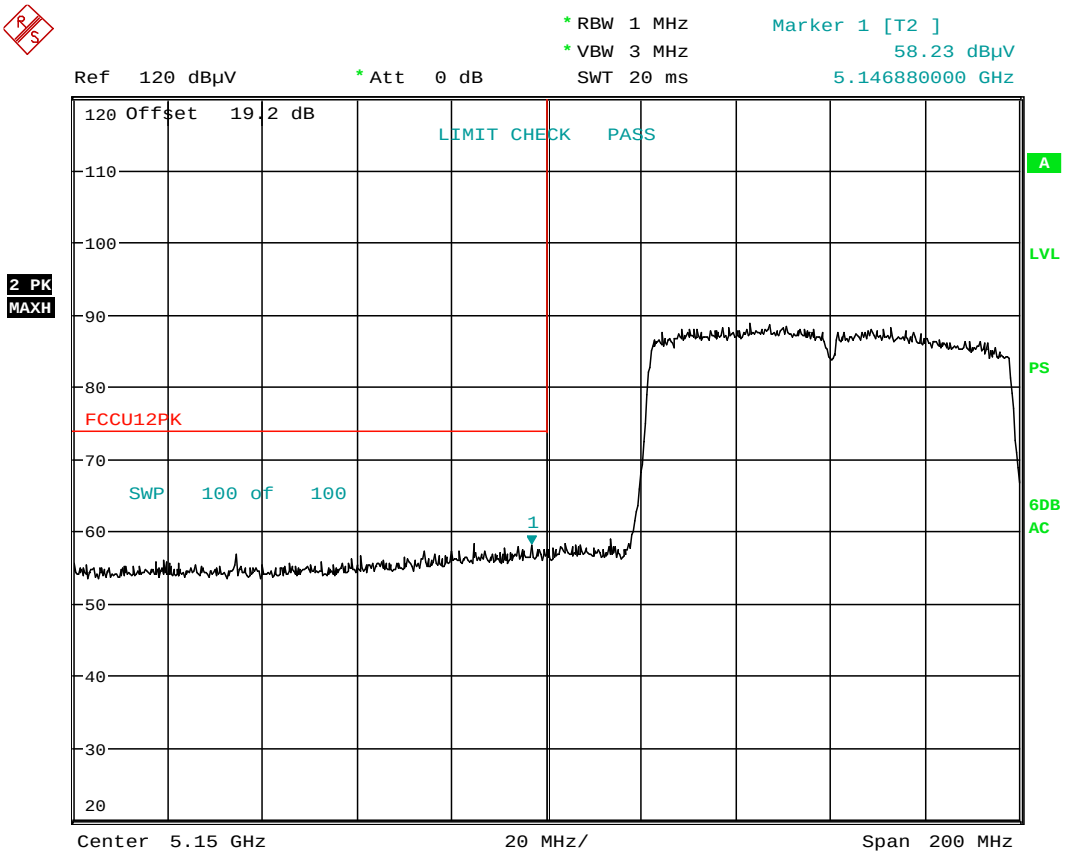
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-173. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

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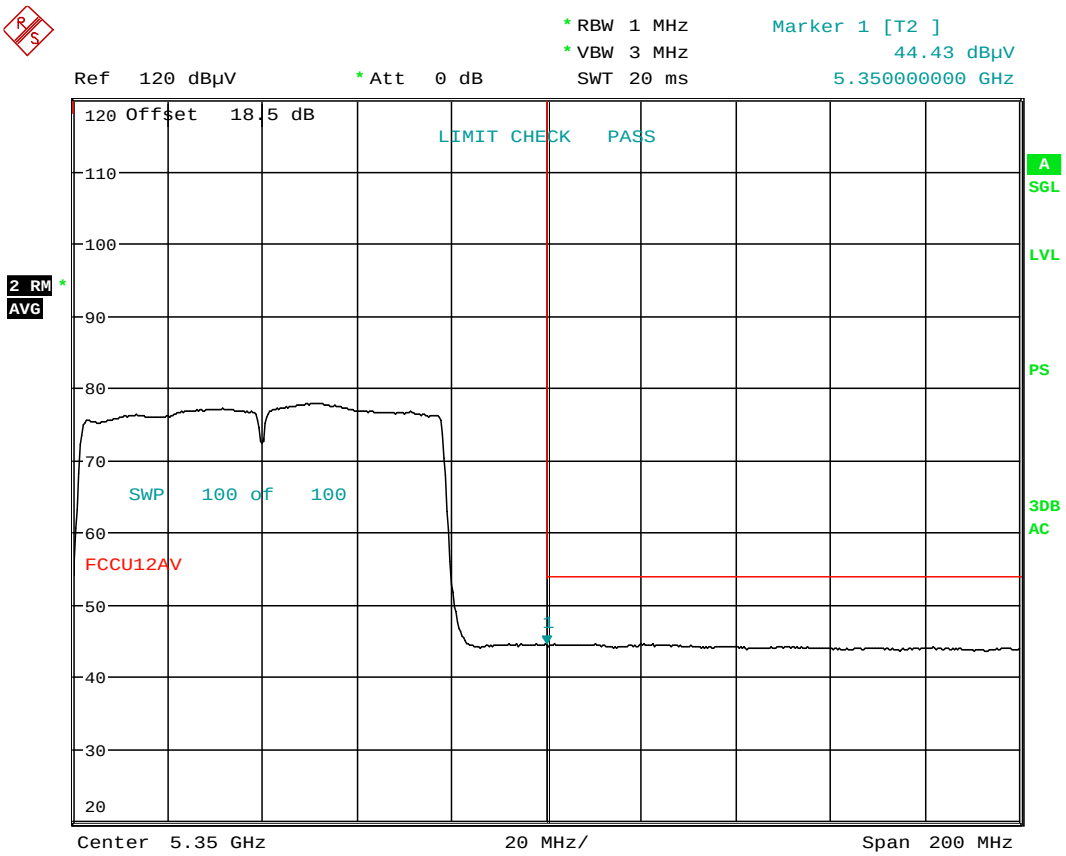
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11ac (80MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5290MHz
Channel:	58



Plot 6-174. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

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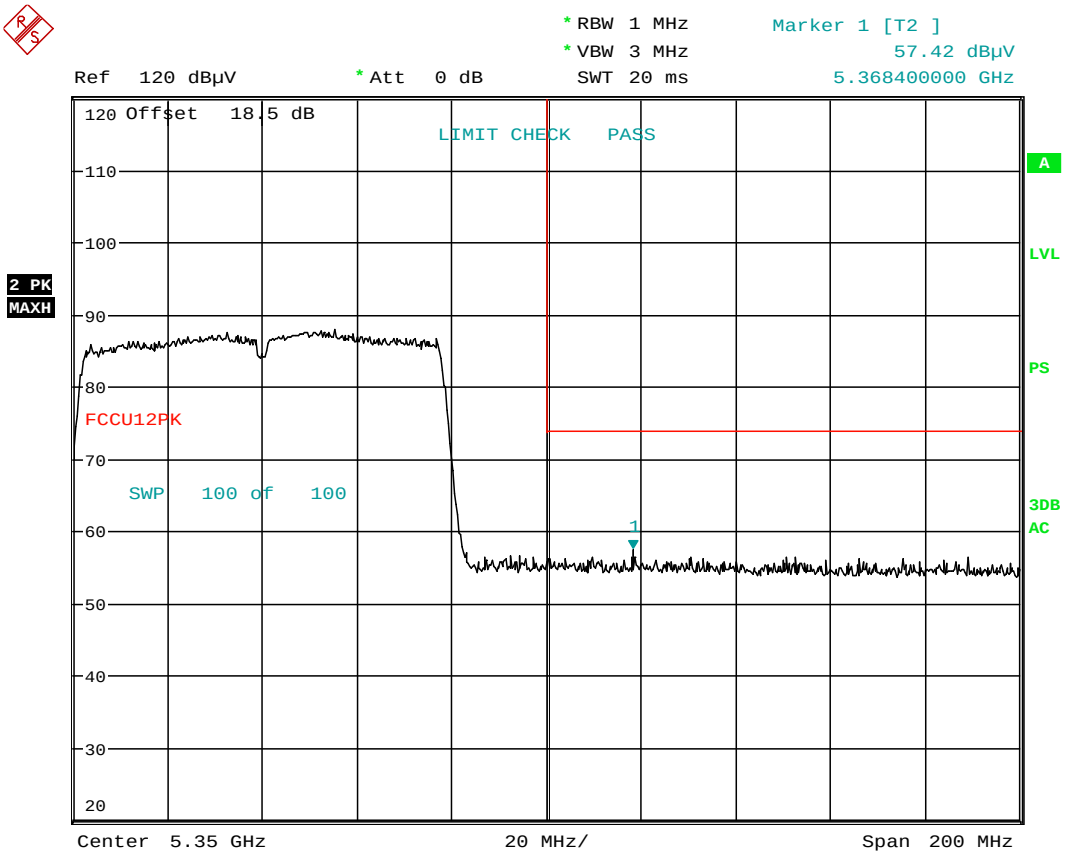
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-175. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

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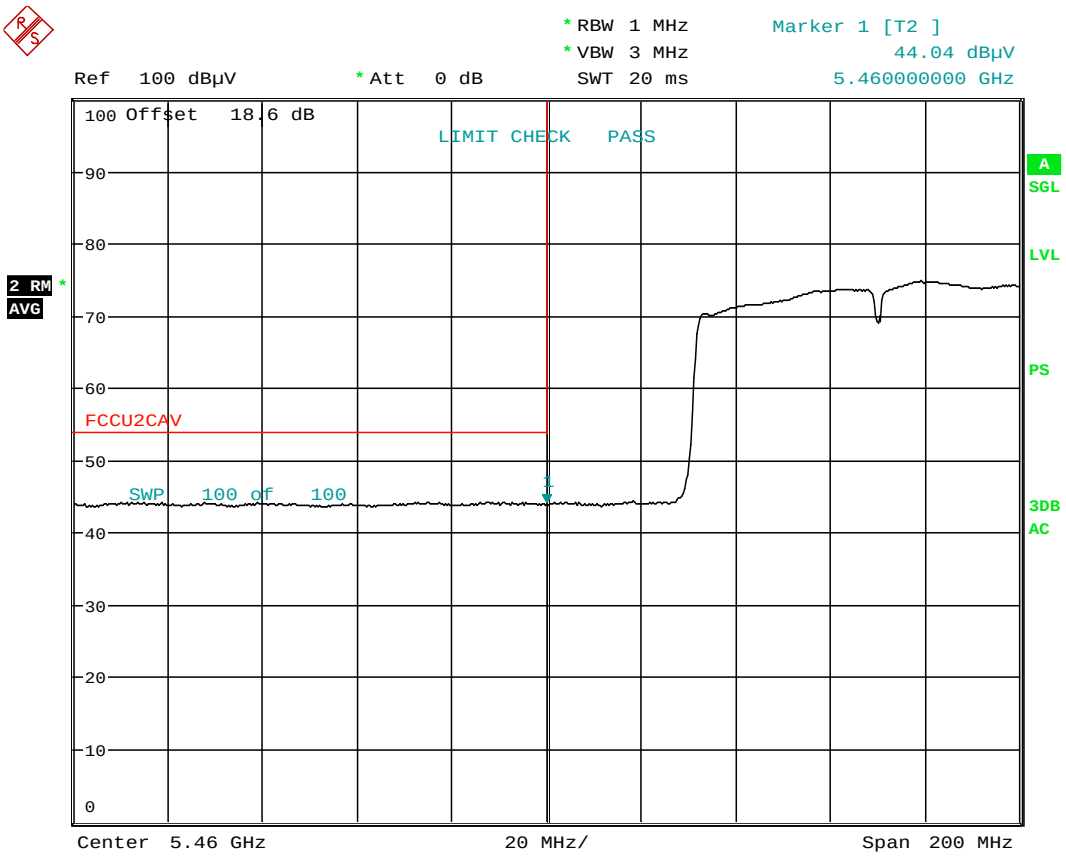
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11ac (80MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5530MHz
Channel:	106



Plot 6-176. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

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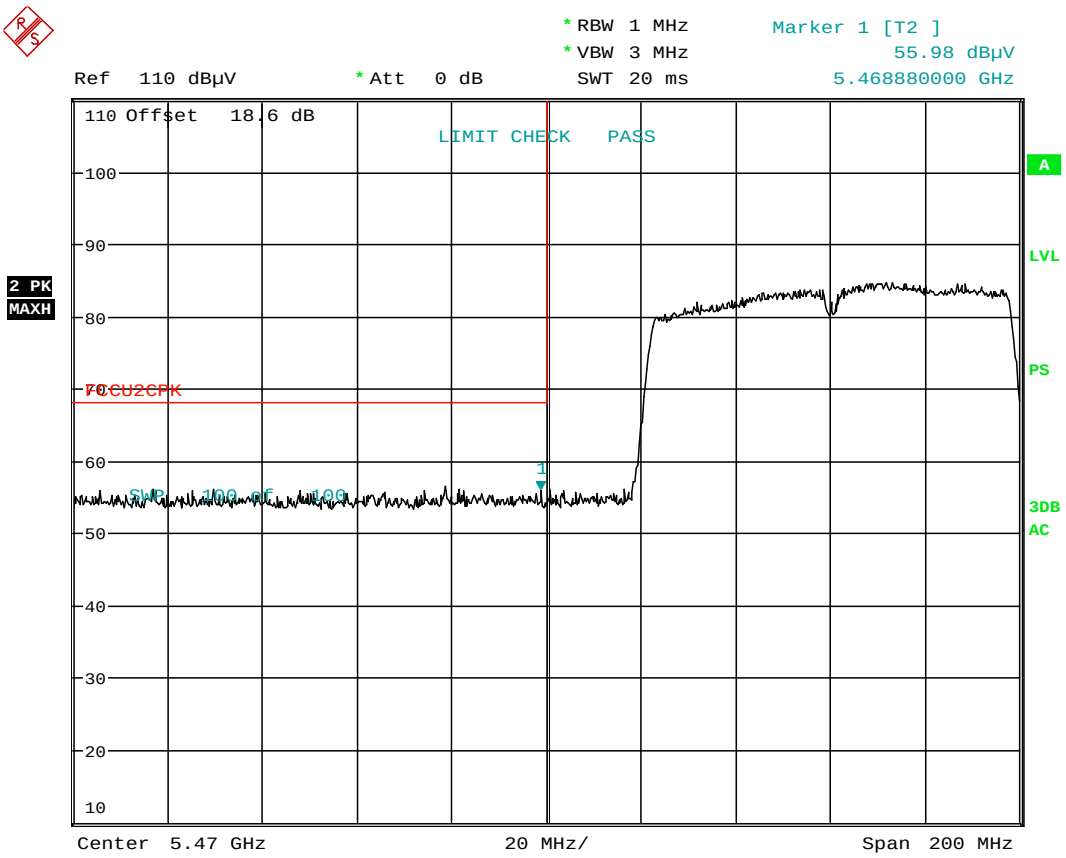
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-177. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

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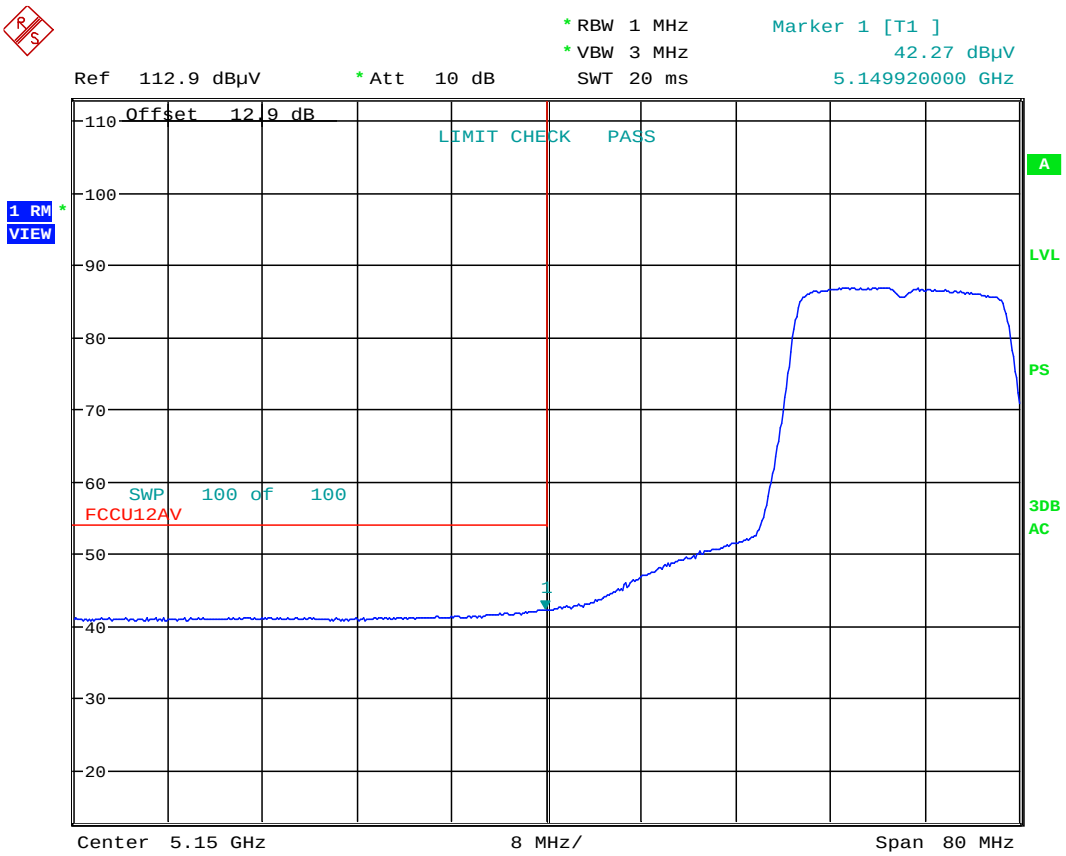
6.14 MIMO Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (20MHz)
Worst Case Transfer Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5180MHz
Channel:	36



Plot 6-178. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

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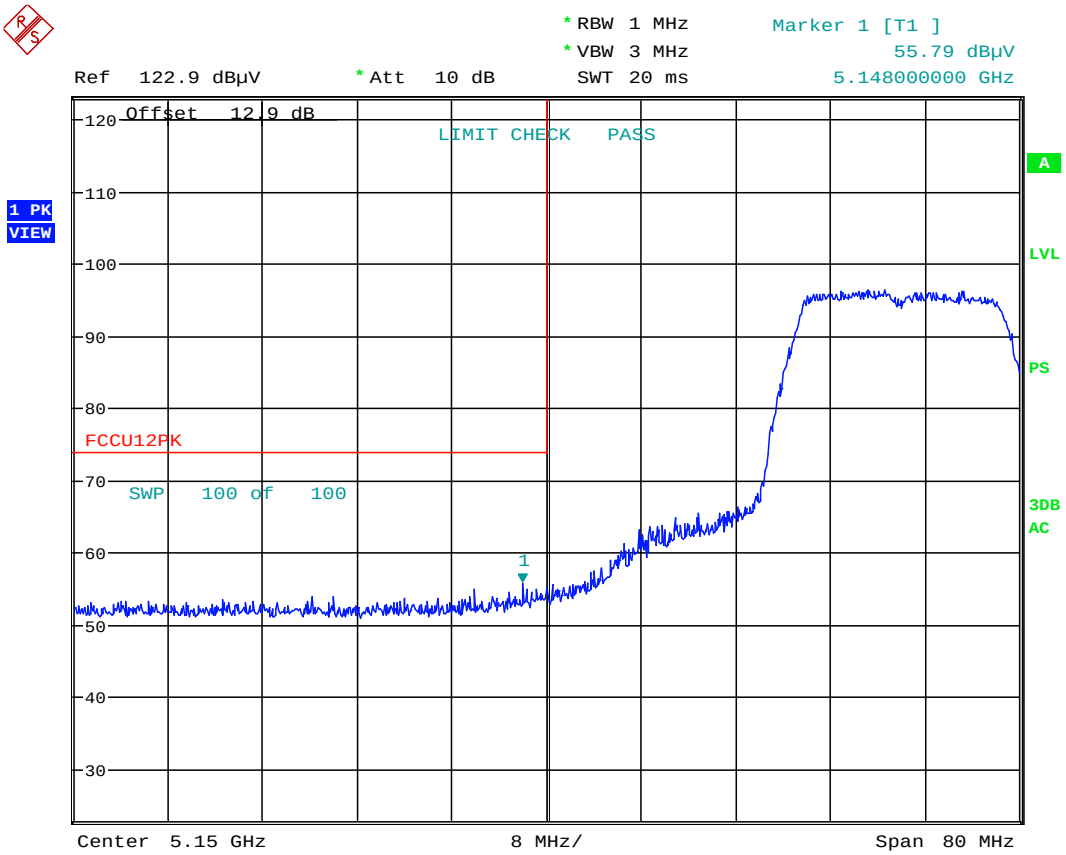
Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-179. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

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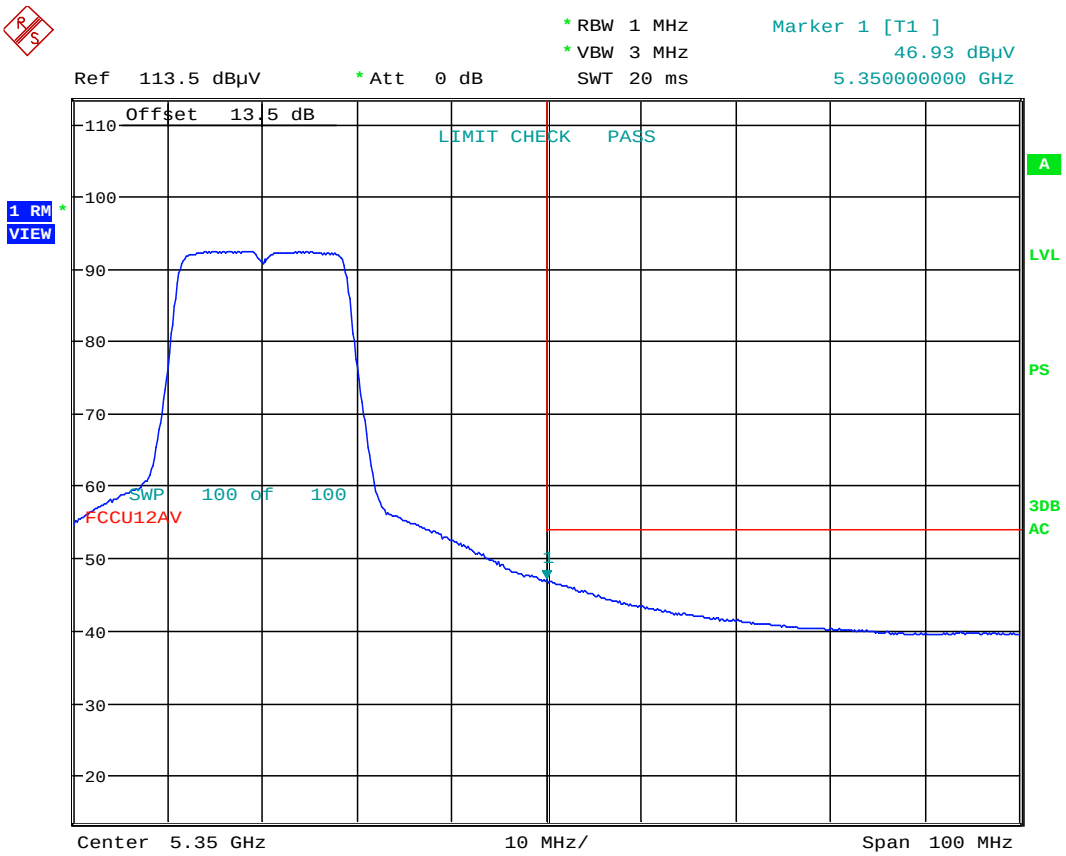
Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (20MHz)
Worst Case Transfer Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5320MHz
Channel:	64



Plot 6-180. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

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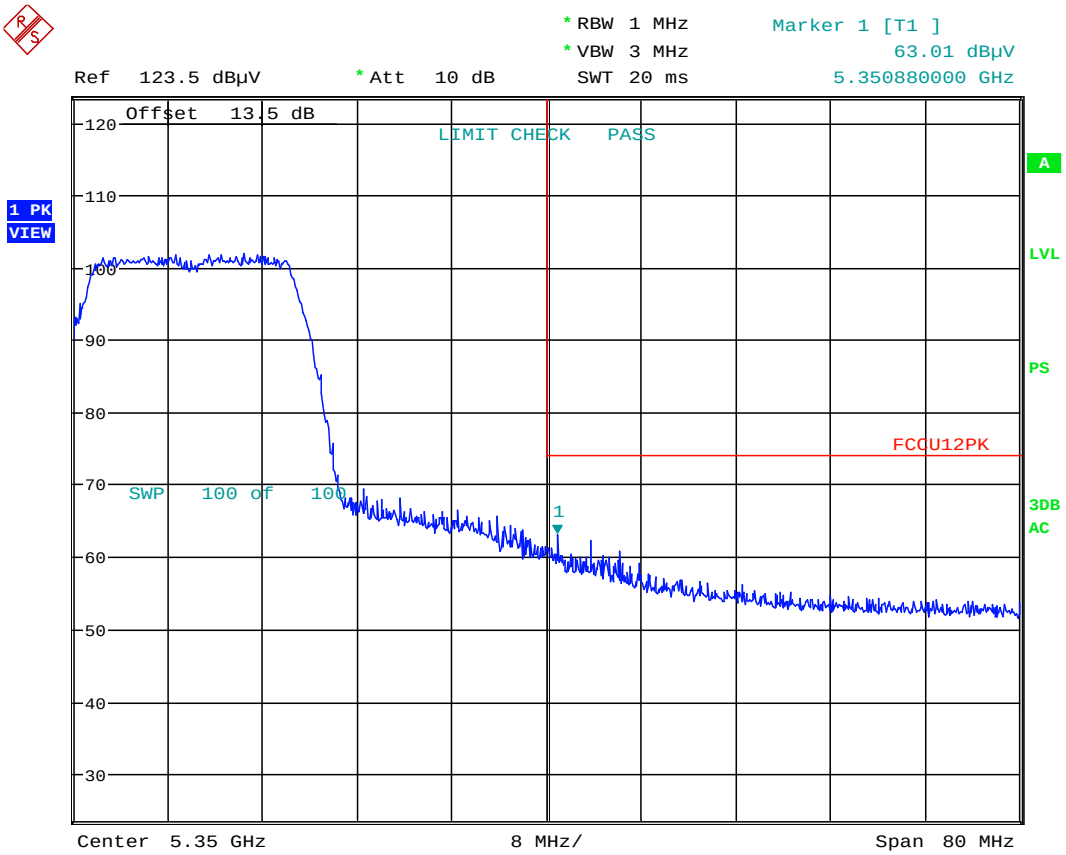
Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-181. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

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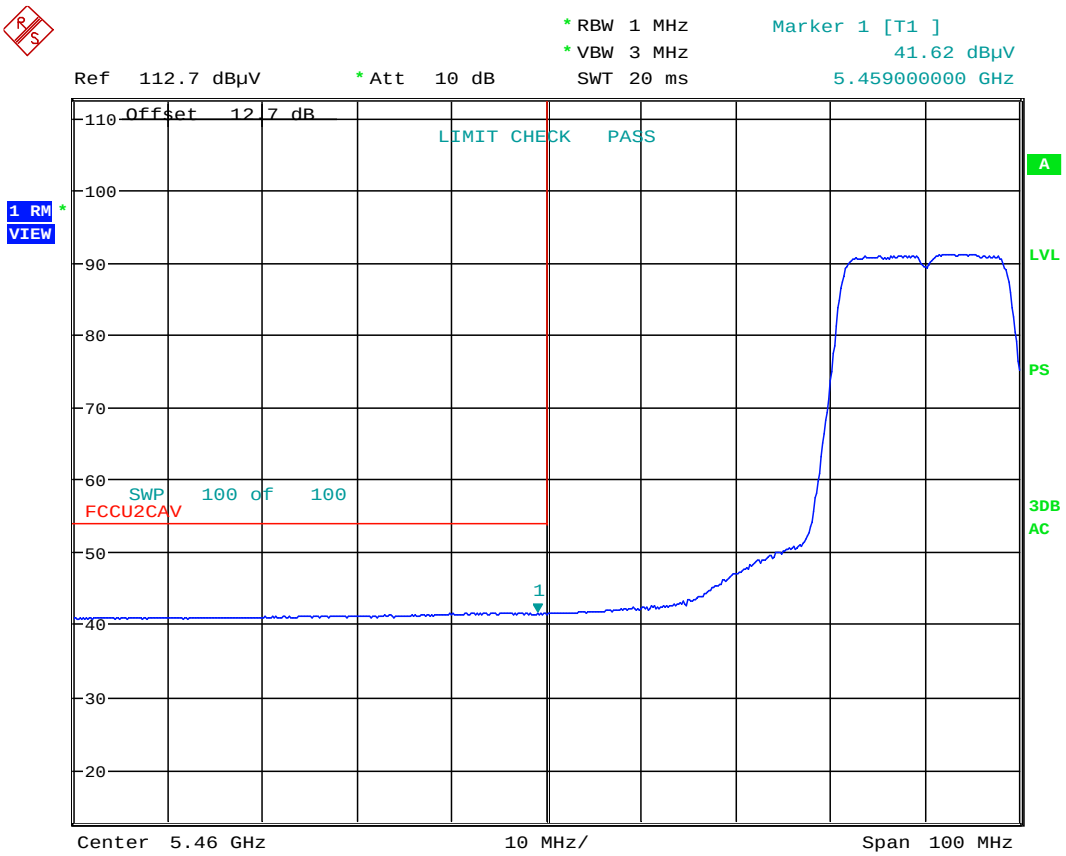
Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (20MHz)
Worst Case Transfer Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5500MHz
Channel:	100



Plot 6-182. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

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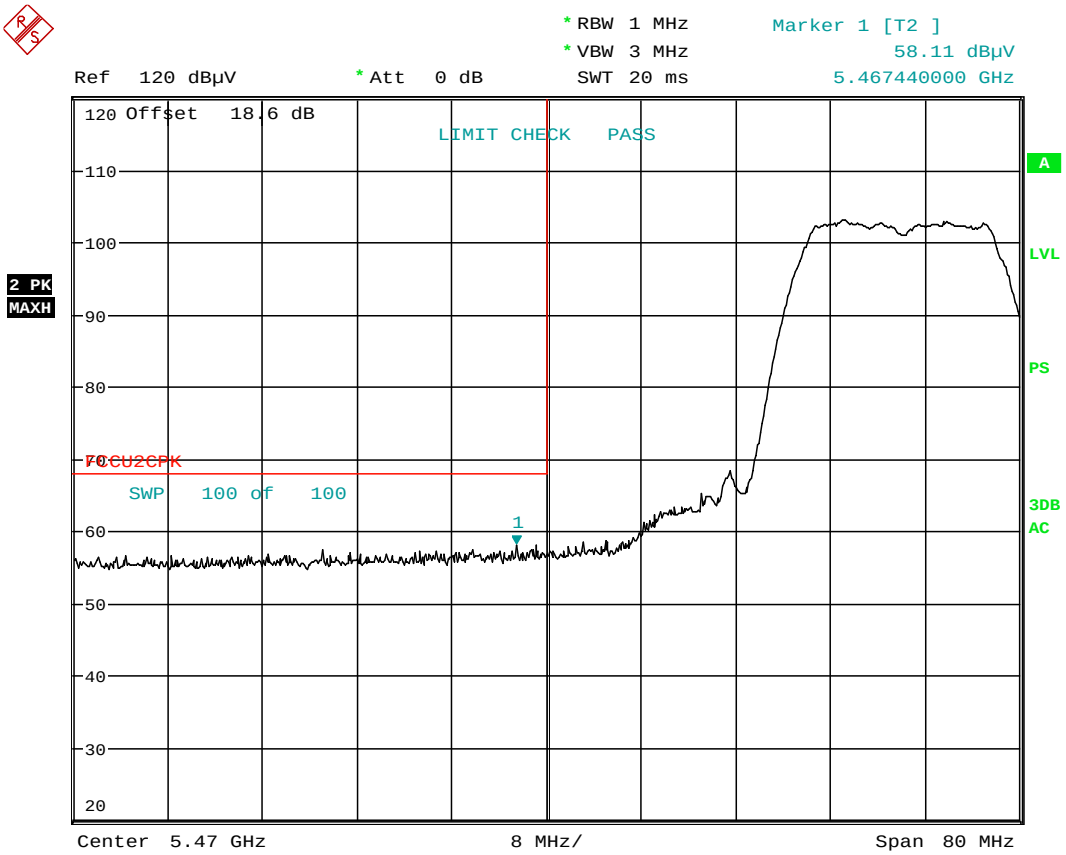
Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-183. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

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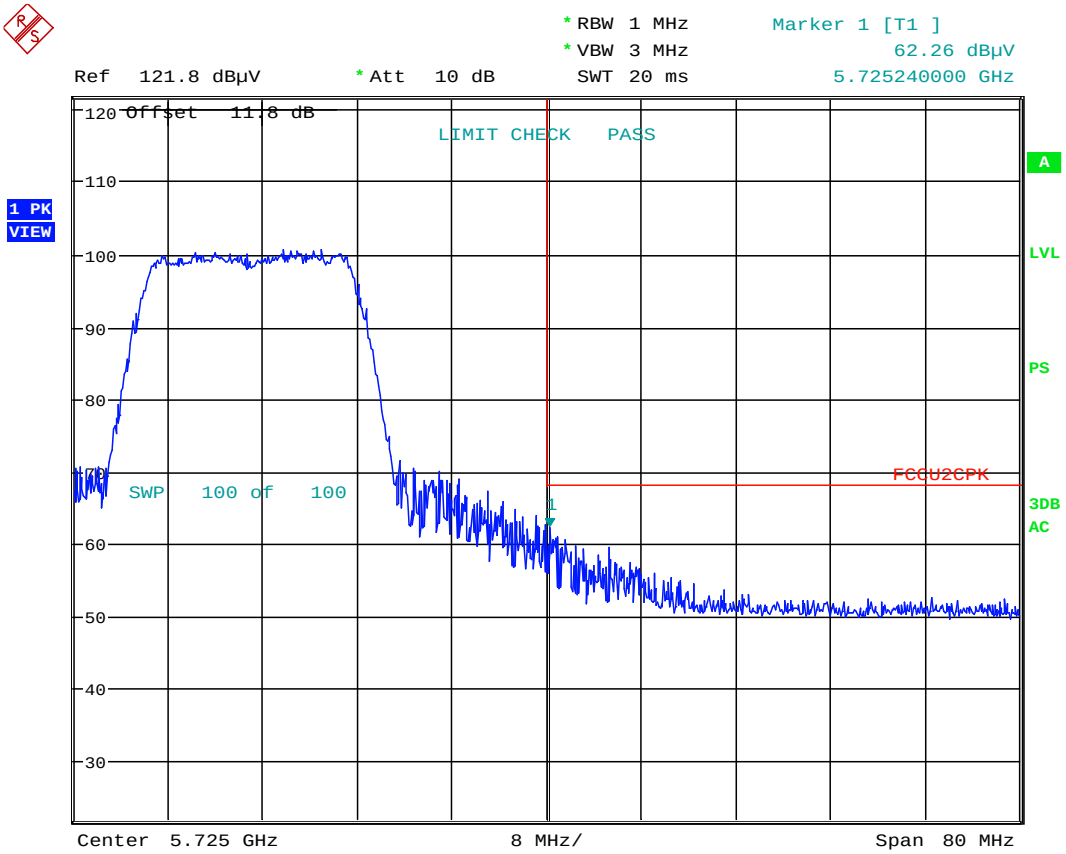
Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (20MHz)
Worst Case Transfer Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5700MHz
Channel:	140



Plot 6-184. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)

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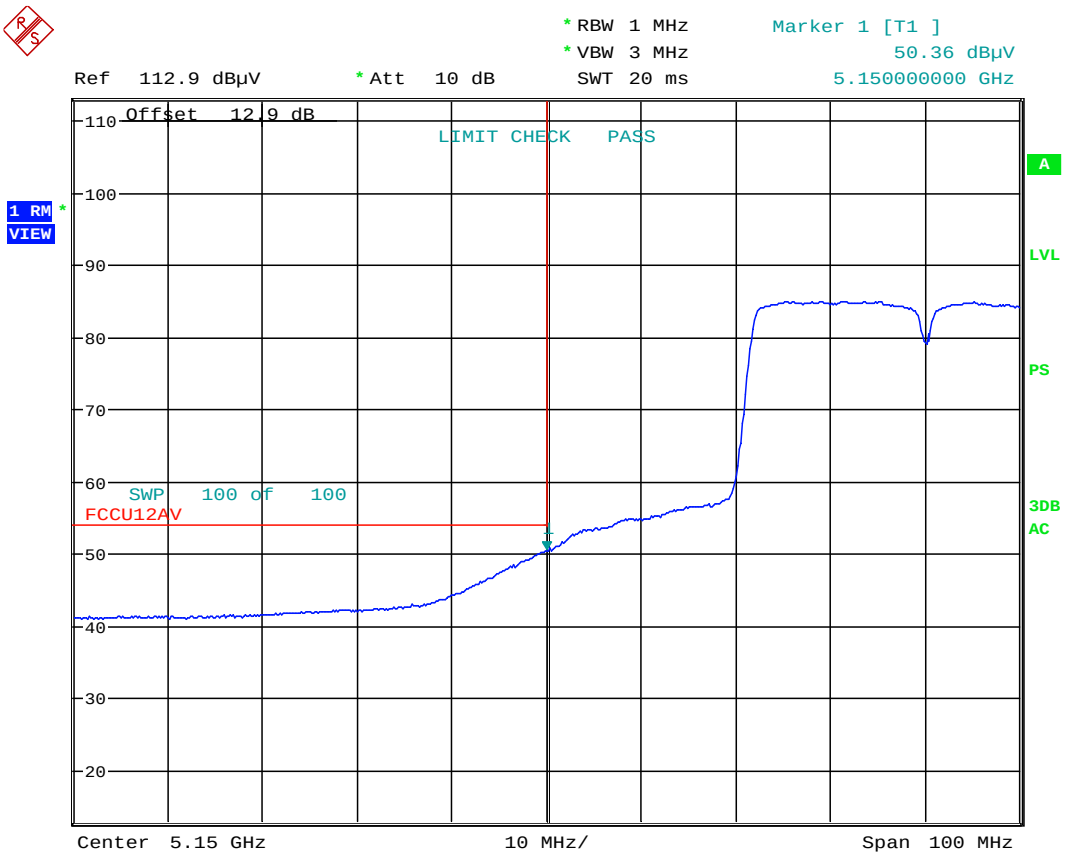
6.15 MIMO Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (40MHz)
Worst Case Transfer Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5190MHz
Channel:	38



Plot 6-185. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

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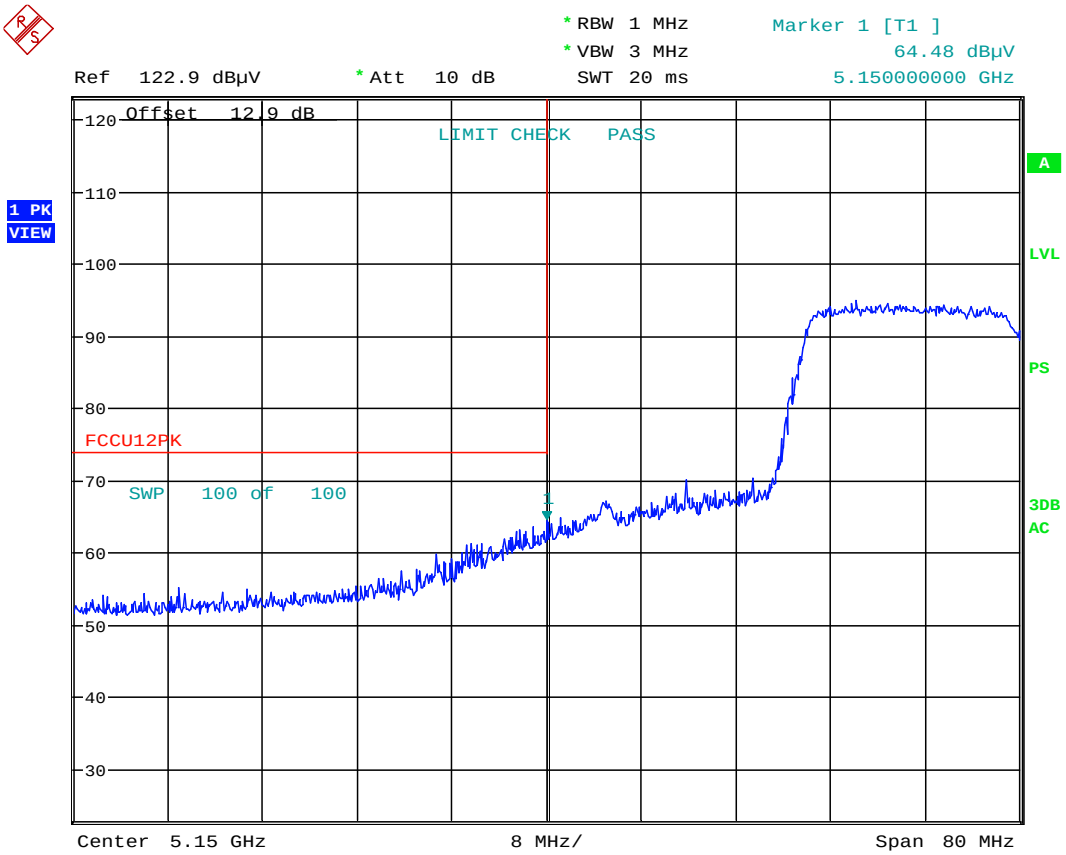
Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-186. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

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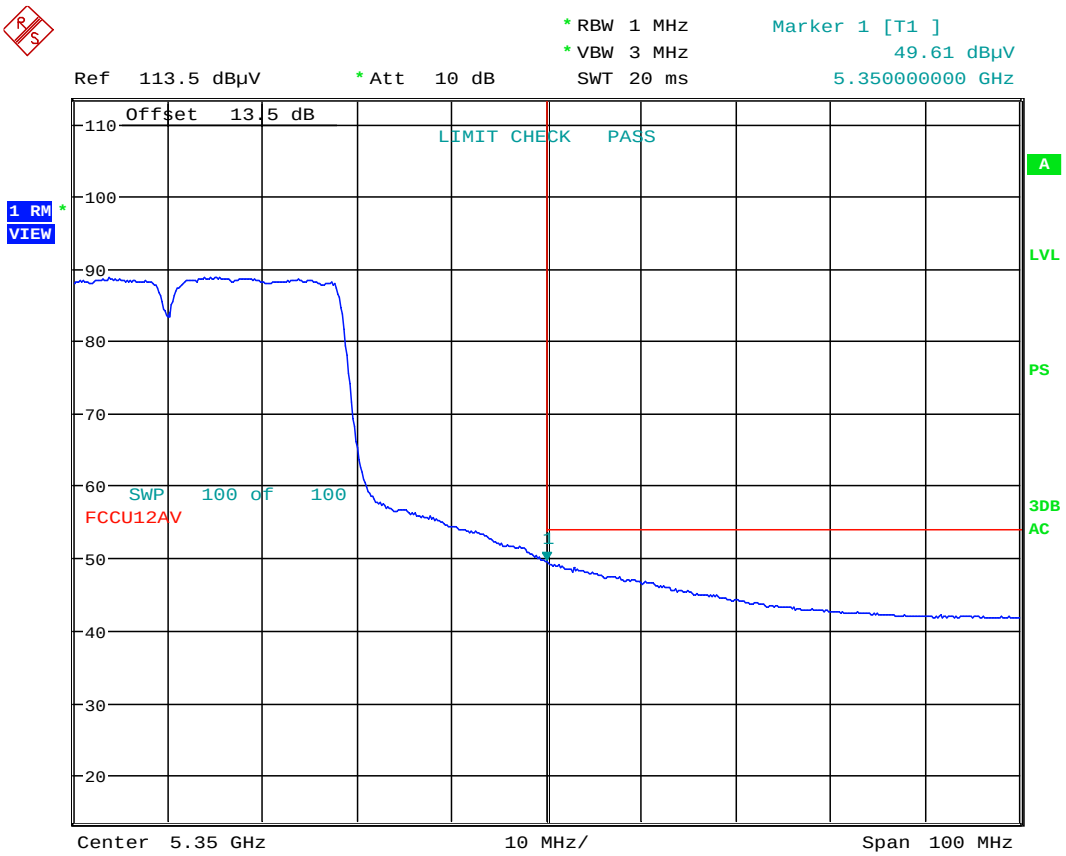
Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (40MHz)
Worst Case Transfer Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5310MHz
Channel:	62



Plot 6-187. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

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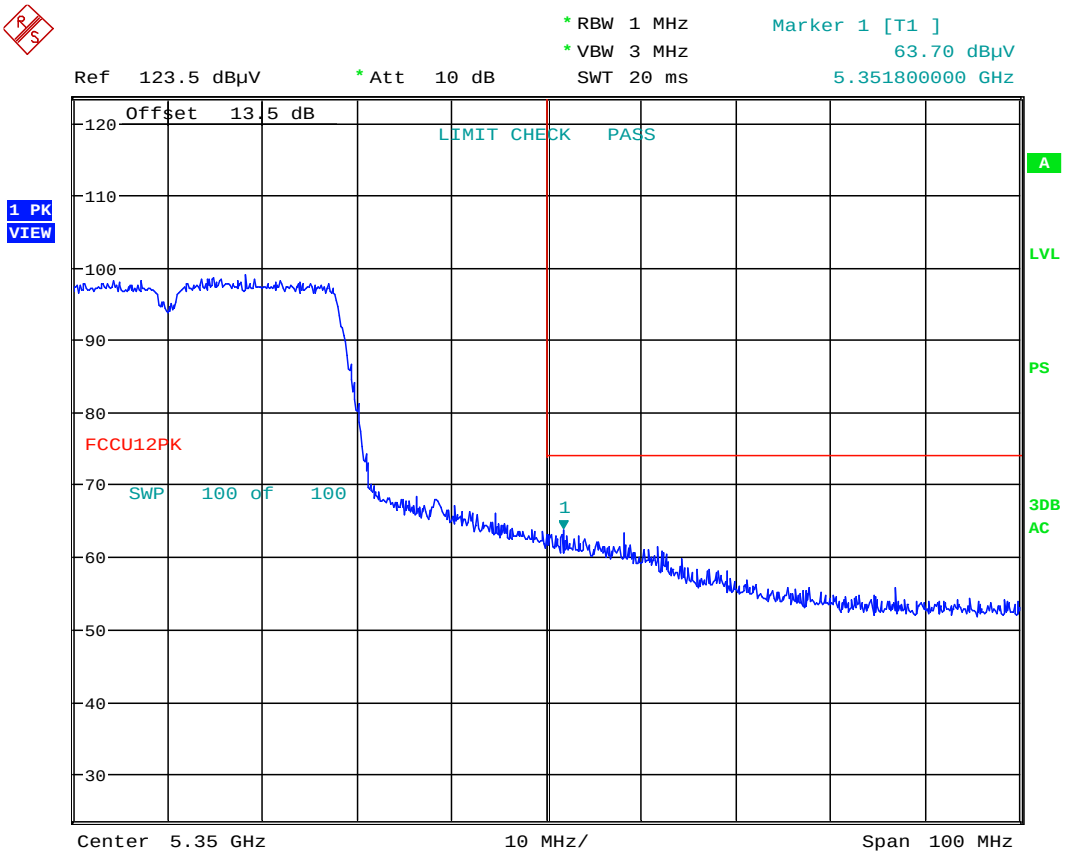
Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-188. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

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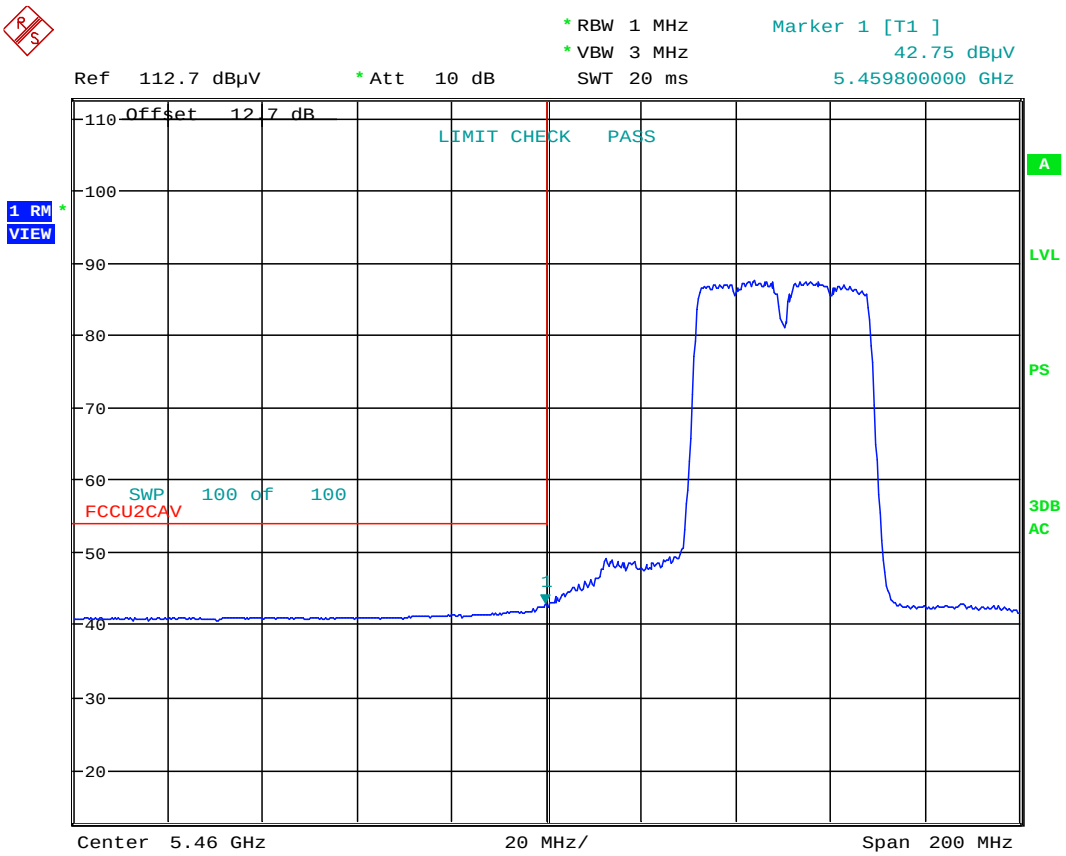
Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (40MHz)
Worst Case Transfer Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5510MHz
Channel:	102



Plot 6-189. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

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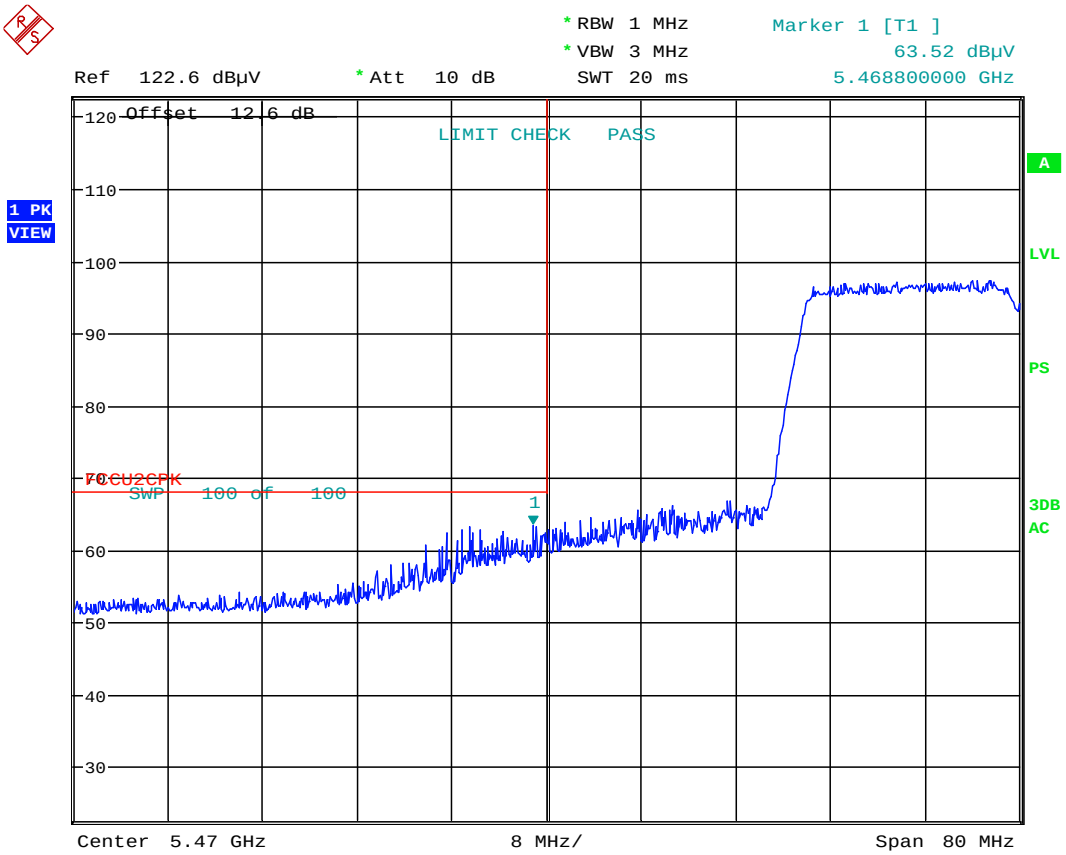
Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-190. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

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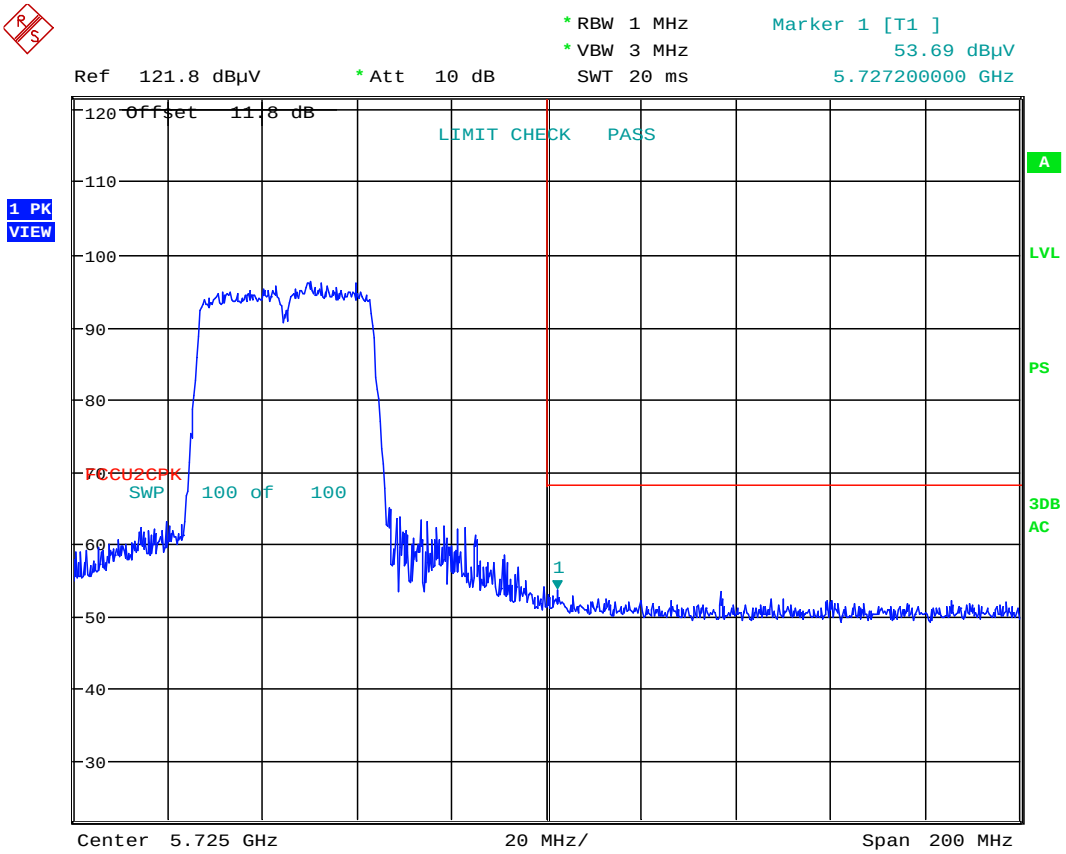
Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11n (40MHz)
Worst Case Transfer Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5670MHz
Channel:	134



Plot 6-191. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)

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6.16 MIMO Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

The table below shows additional correction factors that need to be applied to the average measurement plots in this section based on the duty cycle of the emissions.

Mode	Frequency [MHz]	Channel	Radiated Level [dBµV/m]	Duty Cycle Correction [dBm]	Limit [dBµV/m]	Corrected Radiated Level [dBµV/m]	Average Margin [dB]
802.11ac 80MHz MIMO	5150	42	42.11	0.75167	53.979	42.86	-11.12
	5350	58	42.61			43.36	-10.62
	5470	106	45.25			46.00	-7.98

Table 6-54. Radiated Band Edge Duty Cycle Corrections

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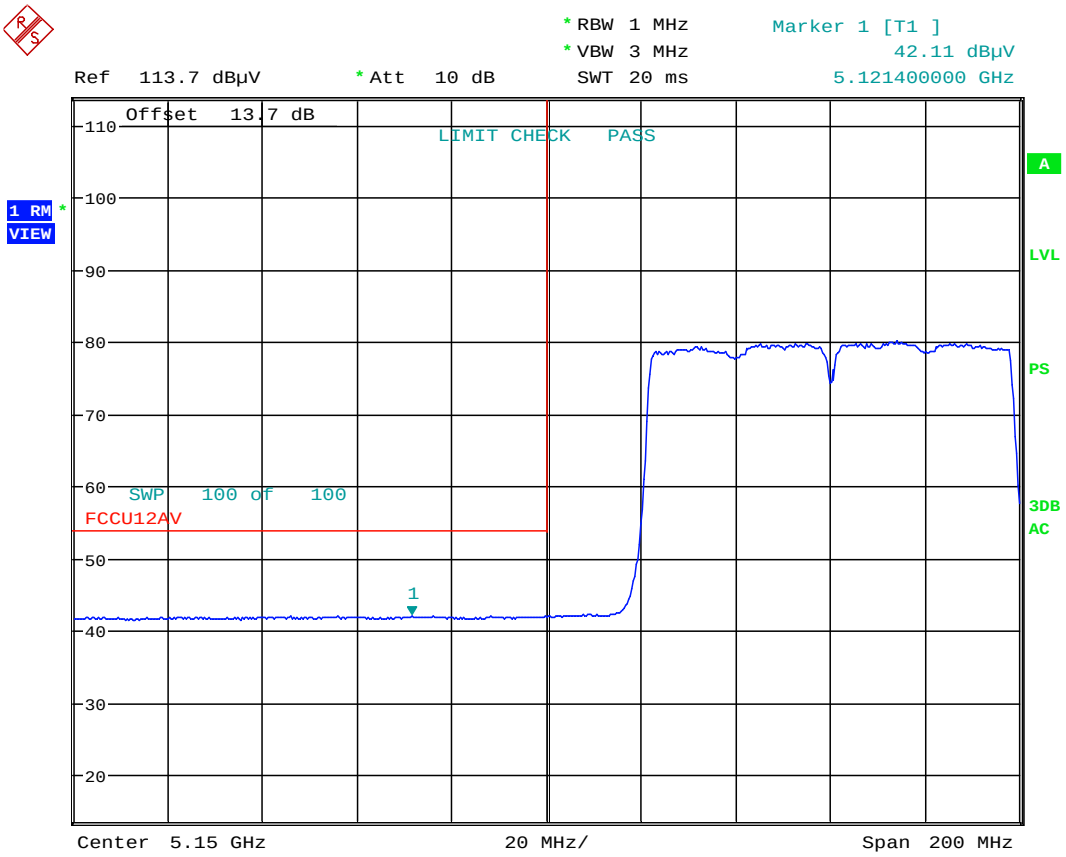
Worst Case Mode:	802.11ac (80MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5210MHz
Channel:	42



Plot 6-192. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

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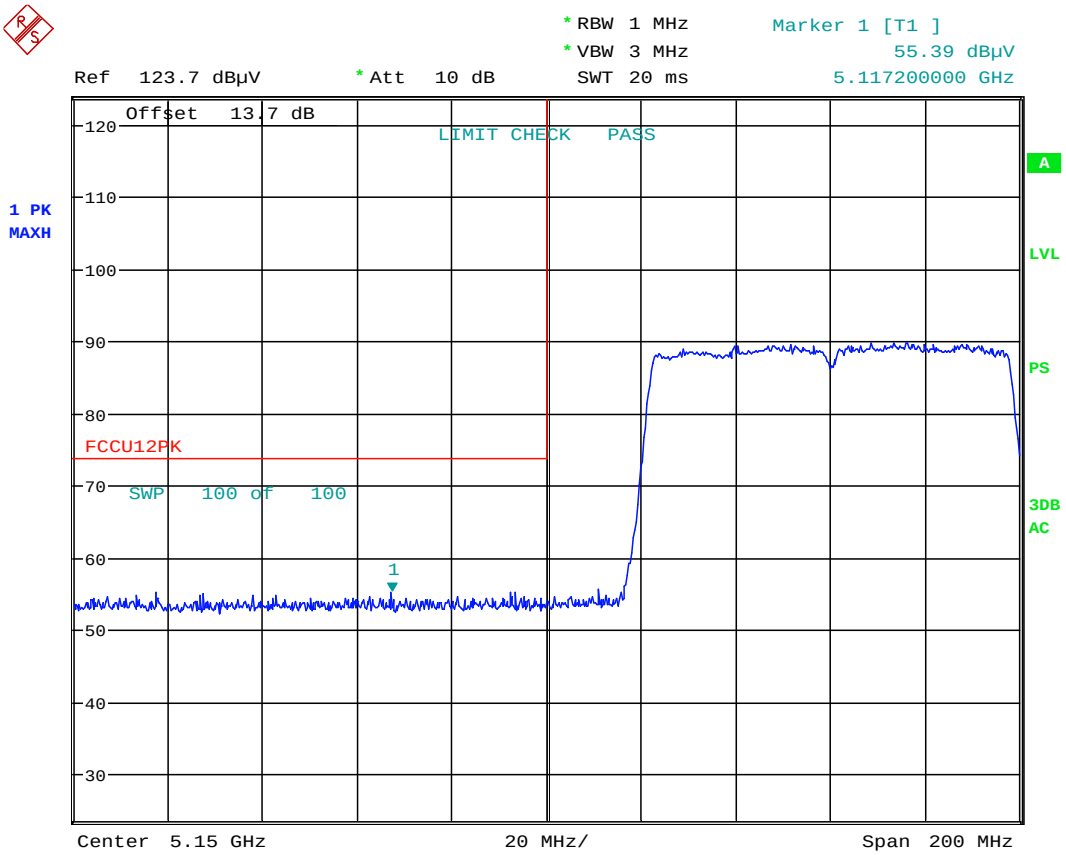
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-193. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

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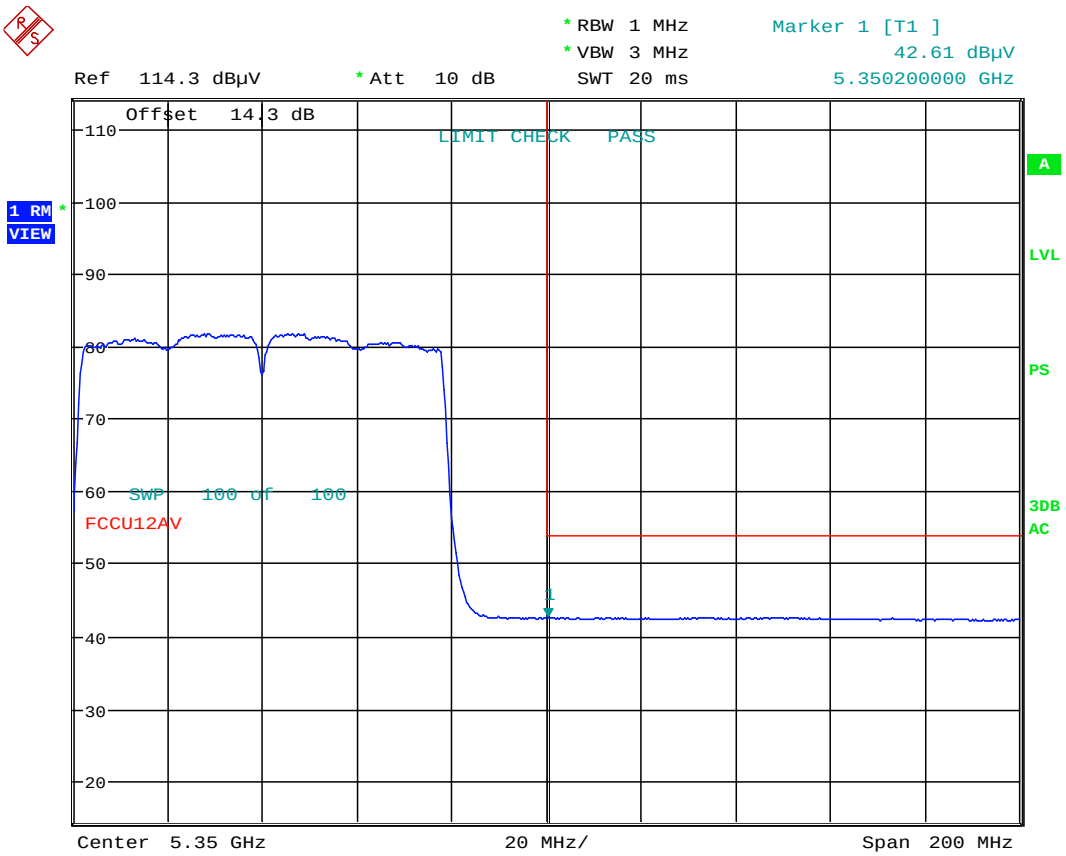
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11ac (80MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5290MHz
Channel:	58



Plot 6-194. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

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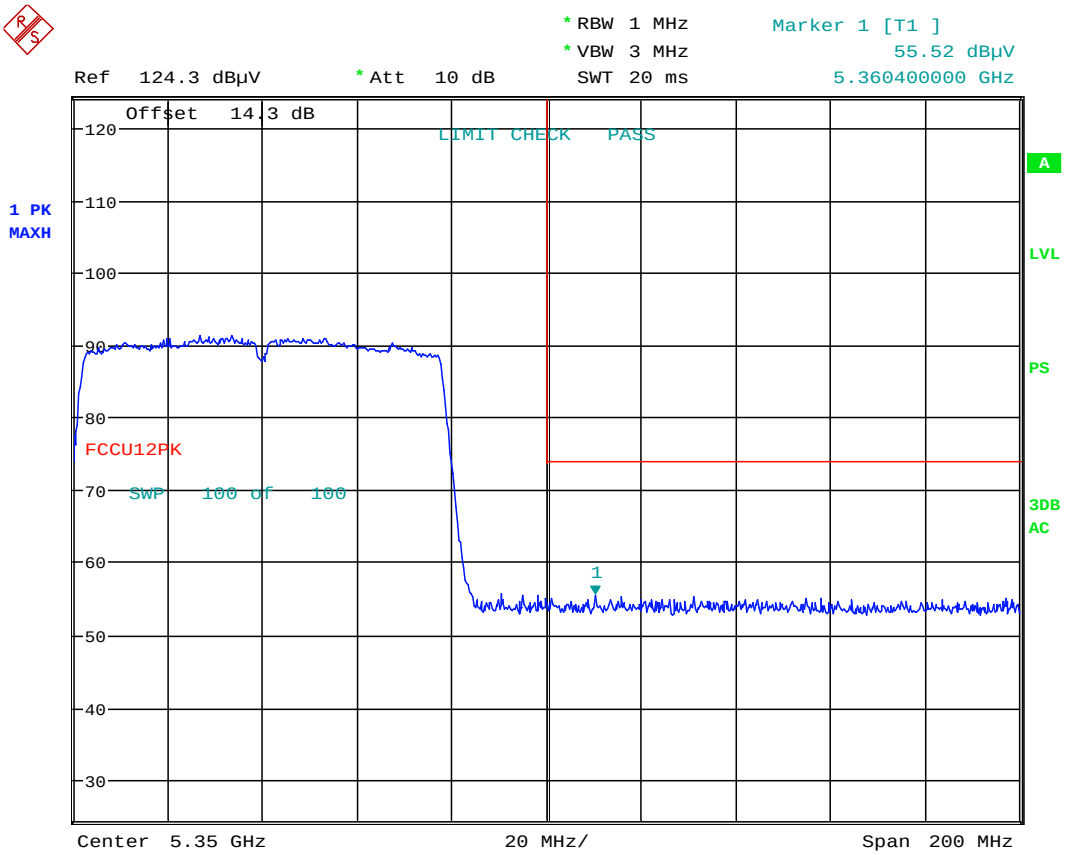
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-195. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

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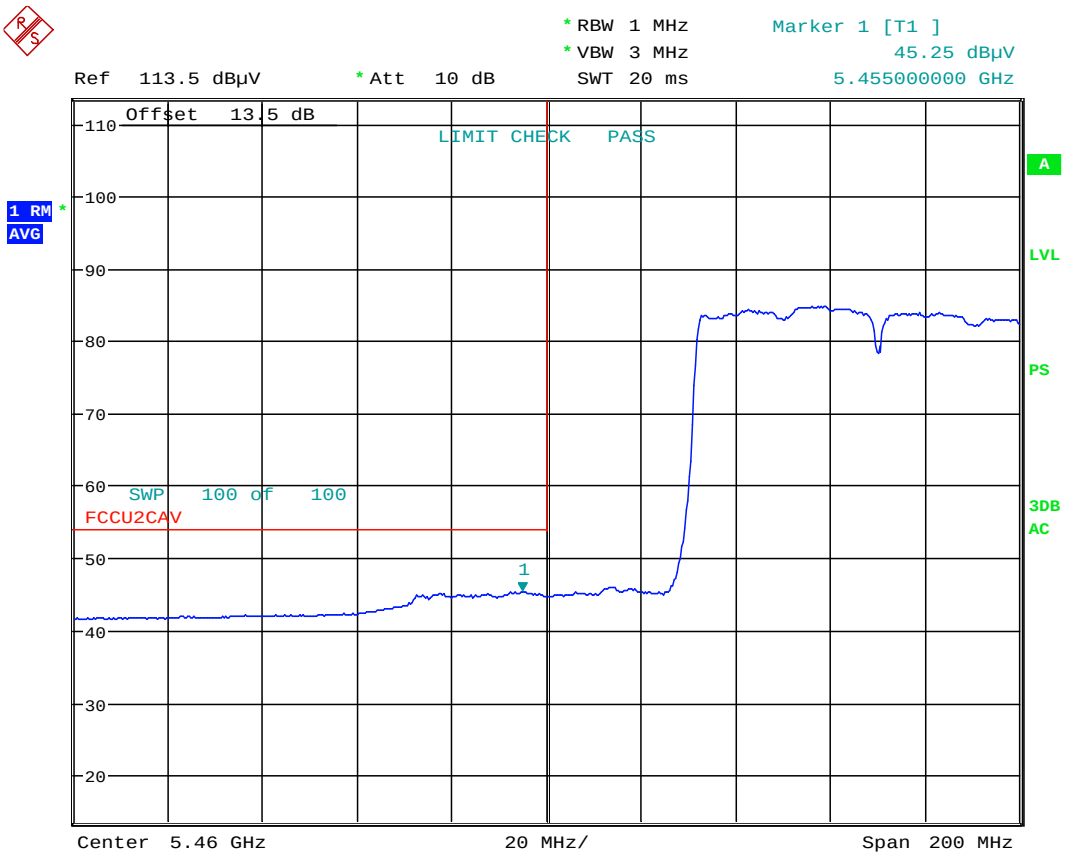
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

Worst Case Mode:	802.11ac (80MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5530MHz
Channel:	106



Plot 6-196. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

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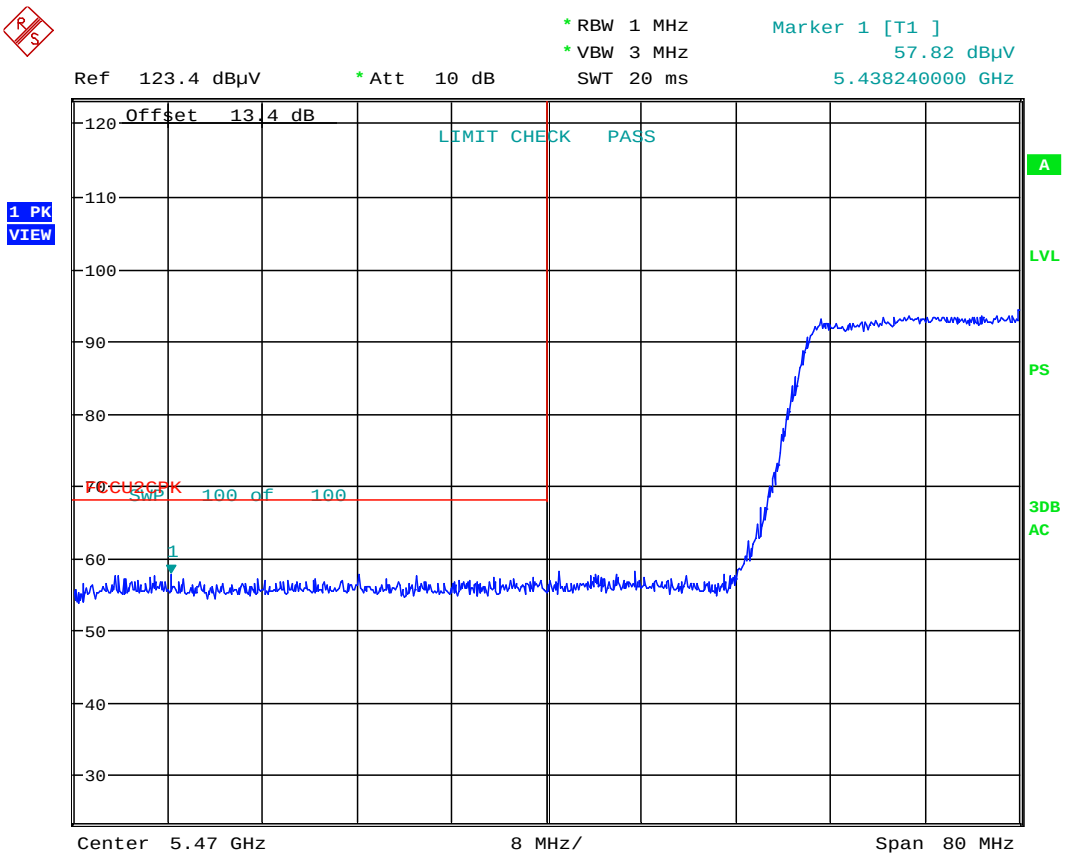
Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



Plot 6-197. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

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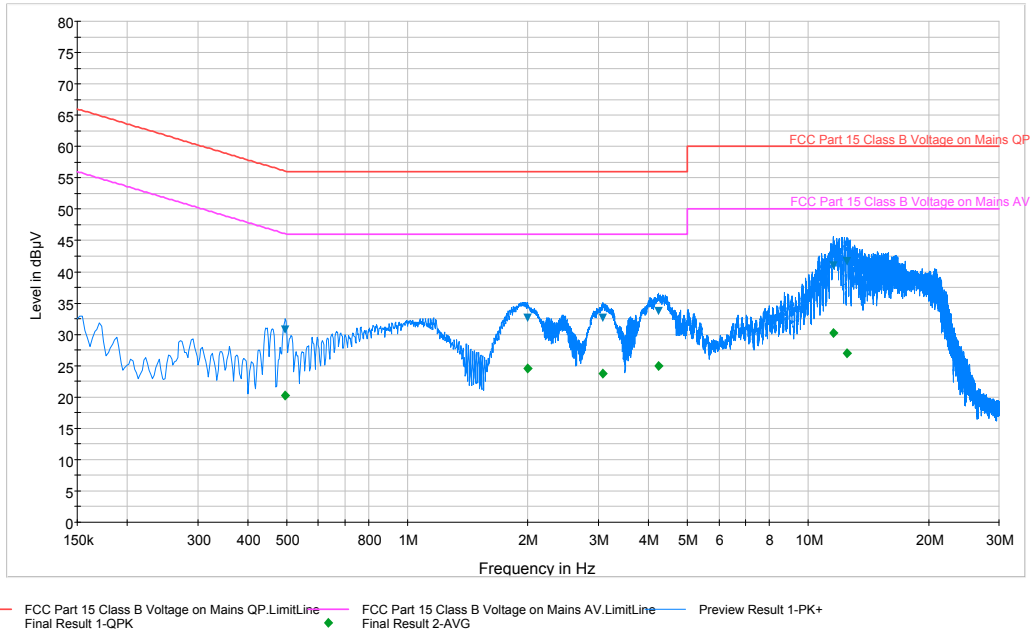
6.17 Line-Conducted Test Data

§15.407



Plot 6-198. Line Conducted Plot with 802.11a UNII Band 1 (L1)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.497	L1	0.1	30.80	56.10	25.30	20.20	46.10	25.90
1.993	L1	0.1	32.70	56.00	23.30	24.50	46.00	21.50
3.082	L1	0.2	32.60	56.00	23.40	23.80	46.00	22.20
4.243	L1	0.2	33.80	56.00	22.20	25.00	46.00	21.00
11.596	L1	0.4	41.00	60.00	19.00	30.30	50.00	19.70
12.527	L1	0.4	41.70	60.00	18.30	26.90	50.00	23.10

Table 6-55. Line Conducted Data with 802.11a UNII Band 1 (L1)

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 36. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBµV) - QP/AV Level (dBµV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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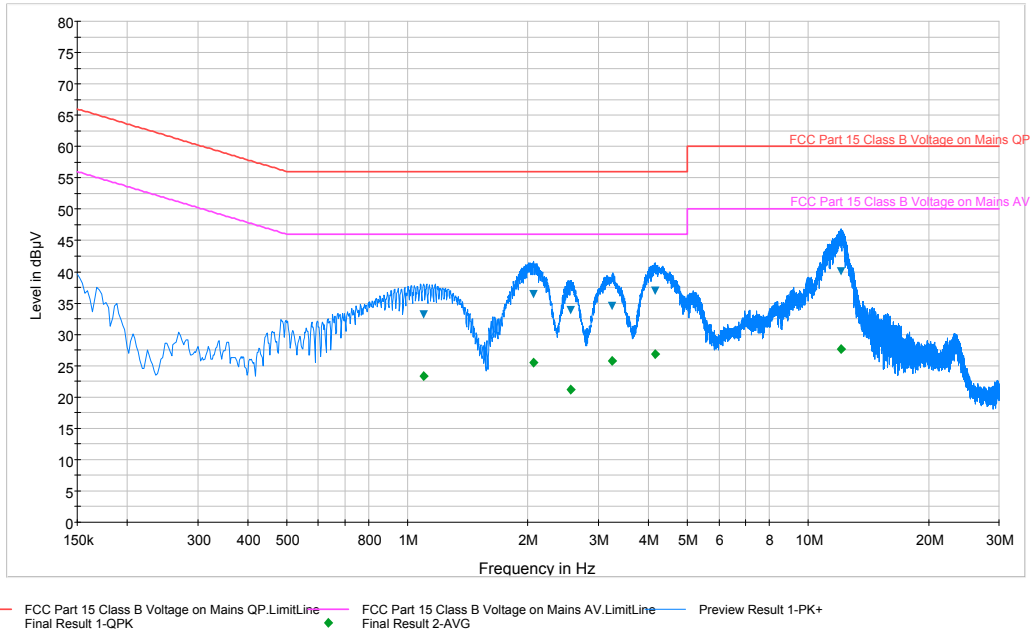
6.17 Line-Conducted Test Data
§15.407



Plot 6-199. Line Conducted Plot with 802.11a UNII Band 1 (N)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
1.097	N	0.1	33.20	56.00	22.80	23.40	46.00	22.60
2.069	N	0.2	36.40	56.00	19.60	25.60	46.00	20.40
2.562	N	0.2	33.80	56.00	22.20	21.10	46.00	24.90
3.239	N	0.2	34.50	56.00	21.50	25.70	46.00	20.30
4.160	N	0.2	37.00	56.00	19.00	26.90	46.00	19.10
12.086	N	0.4	40.10	60.00	19.90	27.60	50.00	22.40

Table 6-56. Line Conducted Data with 802.11a UNII Band 1 (N)

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 36. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBµV) - QP/AV Level (dBµV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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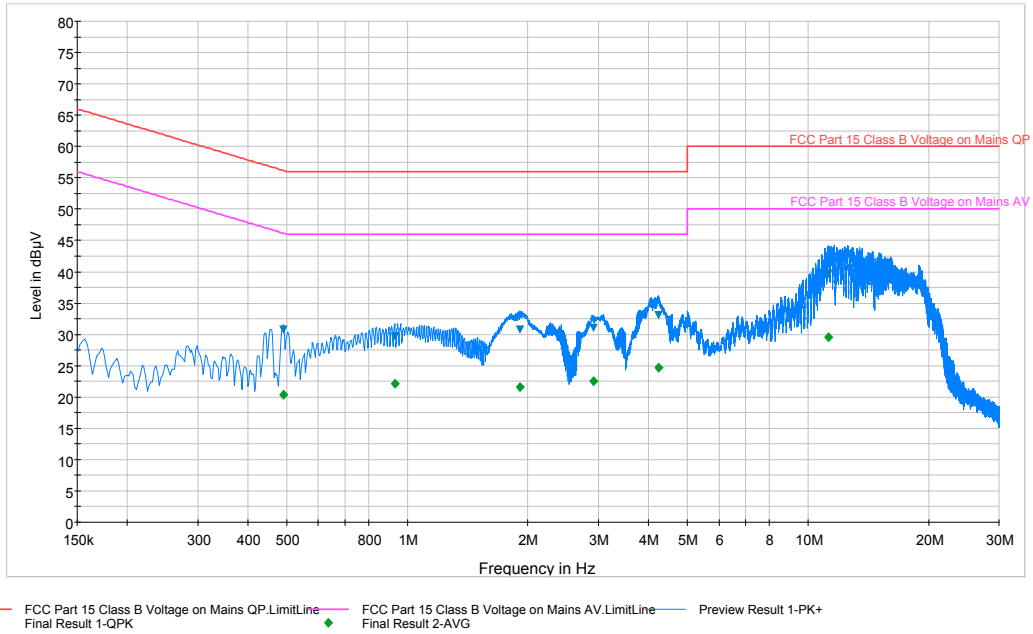
Line-Conducted Test Data

§15.407



Plot 6-200. Line Conducted Plot with 802.11a UNII Band 2A (L1)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.490	L1	0.1	30.80	56.20	25.40	20.30	46.20	25.80
0.931	L1	0.1	29.70	56.00	26.30	22.10	46.00	23.90
1.912	L1	0.1	30.70	56.00	25.30	21.60	46.00	24.40
2.911	L1	0.2	31.10	56.00	24.90	22.60	46.00	23.40
4.236	L1	0.2	33.00	56.00	23.00	24.70	46.00	21.30
11.231	L1	0.4	39.70	60.00	20.30	29.50	50.00	20.50

Table 6-57. Line Conducted Data with 802.11a UNII Band 2A (L1)

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 52. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBµV) - QP/AV Level (dBµV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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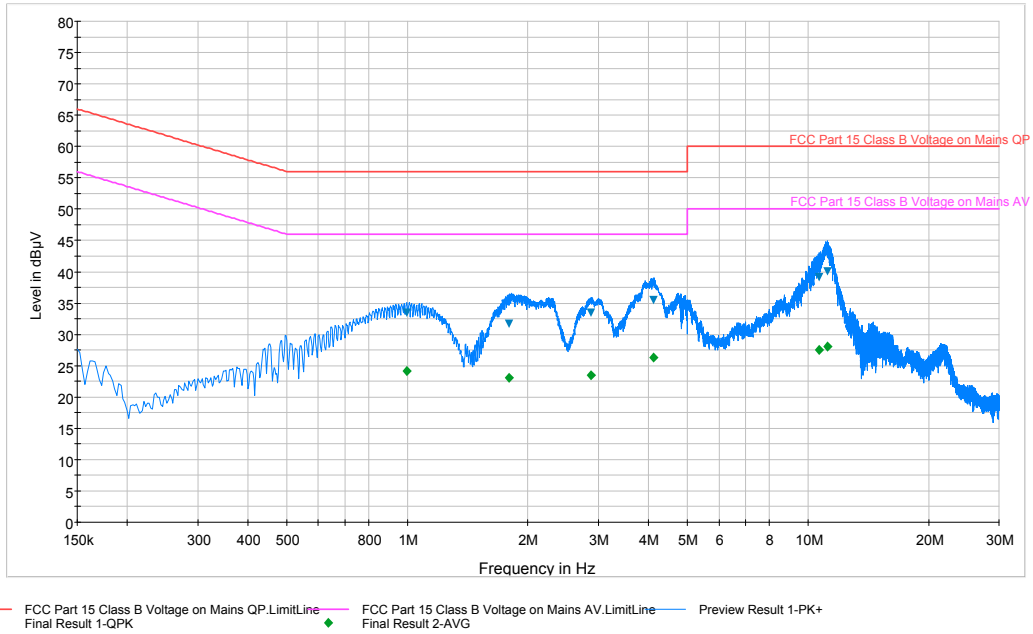
Line-Conducted Test Data

§15.407



Plot 6-201. Line Conducted Plot with 802.11a UNII Band 2A (N)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.996	N	0.1	33.50	56.00	22.50	24.10	46.00	21.90
1.793	N	0.2	31.80	56.00	24.20	23.10	46.00	22.90
2.870	N	0.2	33.40	56.00	22.60	23.40	46.00	22.60
4.121	N	0.2	35.50	56.00	20.50	26.40	46.00	19.60
10.649	N	0.4	39.10	60.00	20.90	27.60	50.00	22.40
11.202	N	0.4	40.10	60.00	20.00	28.00	50.00	22.00

Table 6-58. Line Conducted Data with 802.11a UNII Band 2A (N)

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 52. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBµV) - QP/AV Level (dBµV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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Line-Conducted Test Data

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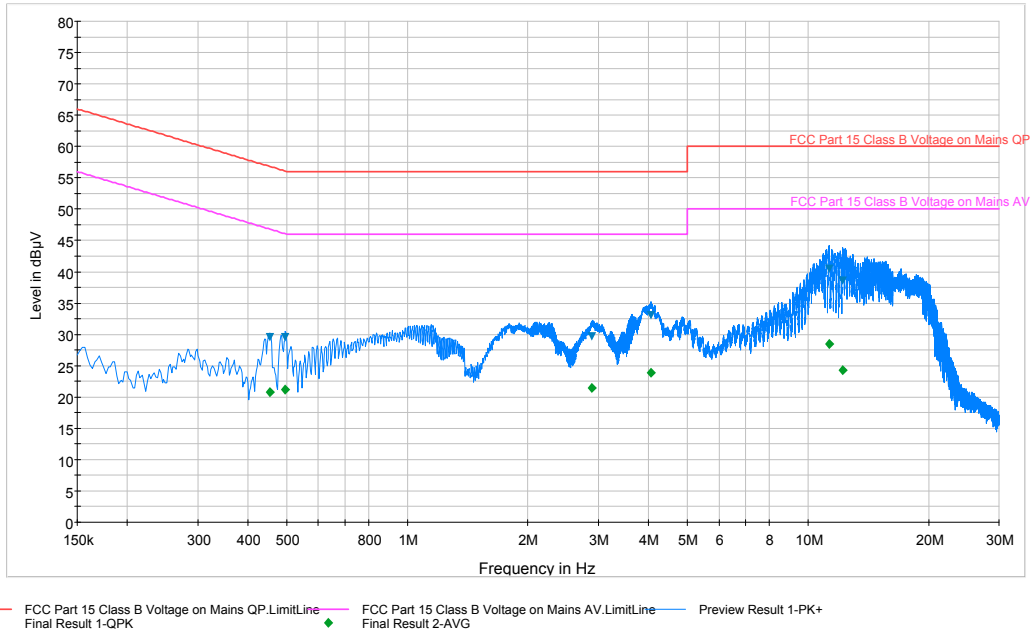

Plot 6-202. Line Conducted Plot with 802.11a UNII Band 2C (L1)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.454	L1	0.1	29.50	56.80	27.30	20.80	46.80	26.00
0.497	L1	0.1	29.60	56.10	26.50	21.20	46.10	24.90
2.893	L1	0.2	29.60	56.00	26.40	21.50	46.00	24.50
4.056	L1	0.2	33.00	56.00	23.00	23.90	46.00	22.10
11.310	L1	0.4	40.40	60.00	19.60	28.50	50.00	21.50
12.224	L1	0.4	38.50	60.00	21.50	24.20	50.00	25.80

Table 6-59. Line Conducted Plot with 802.11a UNII Band 2C (L1)

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 100. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBµV) - QP/AV Level (dBµV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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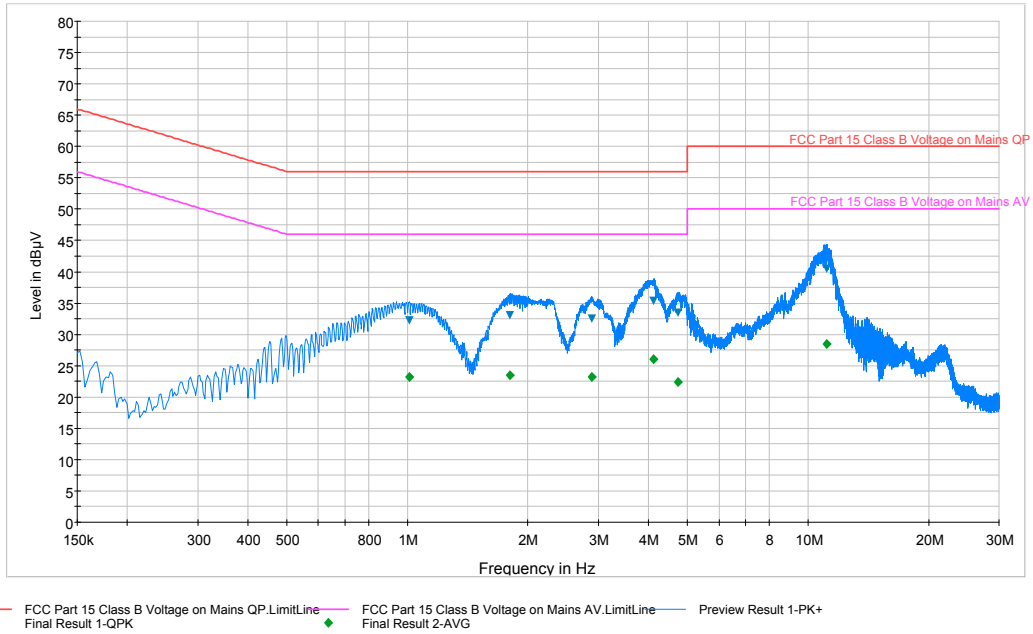
Line-Conducted Test Data

§15.407



Plot 6-203. Line Conducted Plot with 802.11a UNII Band 2C (N)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
1.010	N	0.1	32.20	56.00	23.80	23.20	46.00	22.80
1.802	N	0.2	33.10	56.00	22.90	23.50	46.00	22.60
2.886	N	0.2	32.50	56.00	23.50	23.20	46.00	22.80
4.108	N	0.2	35.40	56.00	20.60	26.10	46.00	19.90
4.733	N	0.2	33.40	56.00	22.60	22.40	46.00	23.60
11.126	N	0.4	40.40	60.00	19.60	28.40	50.00	21.60

Table 6-60. Line Conducted Data with 802.11a UNII Band 2C (N)

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 100. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBµV) - QP/AV Level (dBµV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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7.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMN915G** is in compliance with Part 15E of the FCC Rules.

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