6.4 Peak Power Spectral Density – 802.11a/n

§15.407 (a)(1),(5) / RSS-210 [A9.2]

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, and at the appropriate frequencies. Method SA-1, as defined in KDB 789033, was used to measure the power spectral density.

The maximum permissible power spectral density is 8 dBm in any 3 kHz band.

Test Procedure Used

KDB 789033 v01r02 – Section E

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.

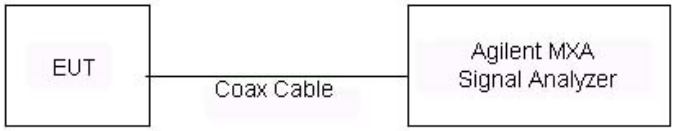

Figure 6-3. Test Instrument & Measurement Setup

Test Notes

None

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	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm]	Max Permissible Power Density [dBm/MHz]	Margin [dB]
Band I	5180	36	a	6	-0.20	4.0	-4.20
	5200	40	a	6	0.05	4.0	-3.95
	5240	48	a	6	-0.23	4.0	-4.23
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	-1.23	4.0	-5.23
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	-1.52	4.0	-5.52
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	-1.52	4.0	-5.52
	5190	38	n (40MHz)	13.5/15 (MCS0)	-6.15	4.0	-10.15
	5230	46	n (40MHz)	13.5/15 (MCS0)	-6.24	4.0	-10.24
Band II	5260	52	a	6	-0.26	11.0	-11.26
	5280	56	a	6	-0.39	11.0	-11.39
	5320	64	a	6	-0.30	11.0	-11.30
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	-1.34	11.0	-12.34
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	-1.48	11.0	-12.48
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	-1.54	11.0	-12.54
	5270	54	n (40MHz)	13.5/15 (MCS0)	-6.23	11.0	-17.23
	5310	62	n (40MHz)	13.5/15 (MCS0)	-6.25	11.0	-17.25
Band III	5500	100	a	6	-0.04	11.0	-11.04
	5580	116	a	6	0.41	11.0	-10.59
	5700	140	a	6	0.60	11.0	-10.40
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	-1.25	11.0	-12.25
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	-0.40	11.0	-11.40
	5700	140	n (20MHz)	6.5/7.2 (MCS0)	-0.63	11.0	-11.63
	5510	102	n (40MHz)	13.5/15 (MCS0)	-6.03	11.0	-17.03
	5550	110	n (40MHz)	13.5/15 (MCS0)	-5.56	11.0	-16.56
	5670	134	n (40MHz)	13.5/15 (MCS0)	-5.53	11.0	-16.53

Table 6-6. Conducted Power Spectral Density Measurements

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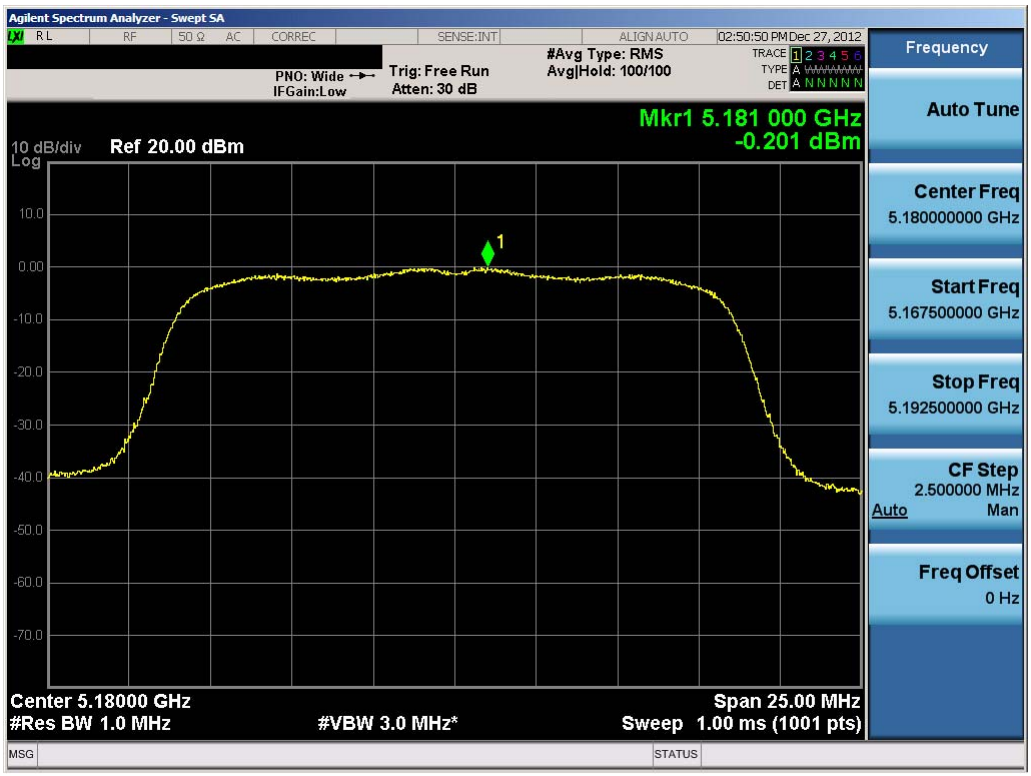
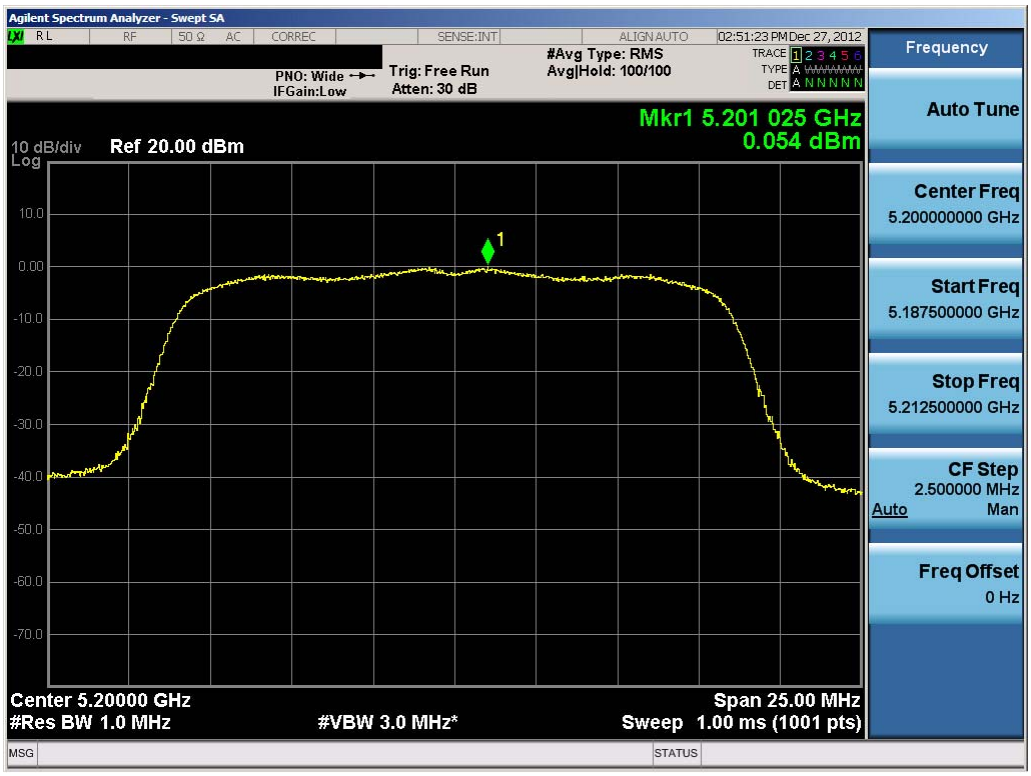


Plot 6-26. Peak Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 36)



Plot 6-27. Peak Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 40)

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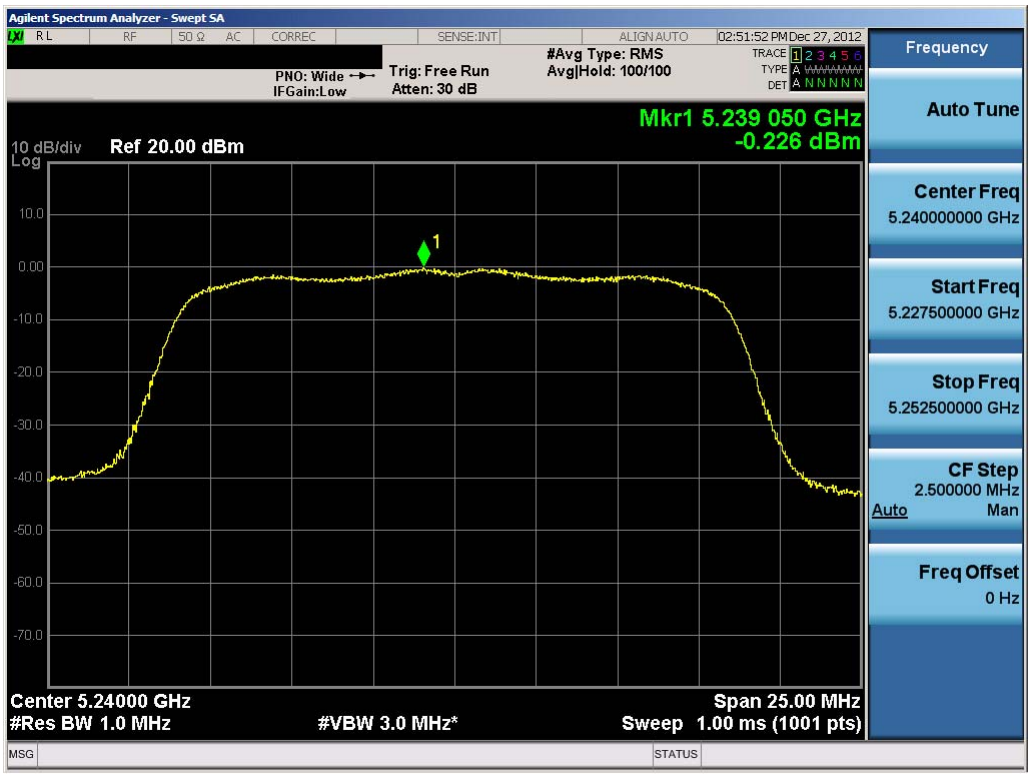
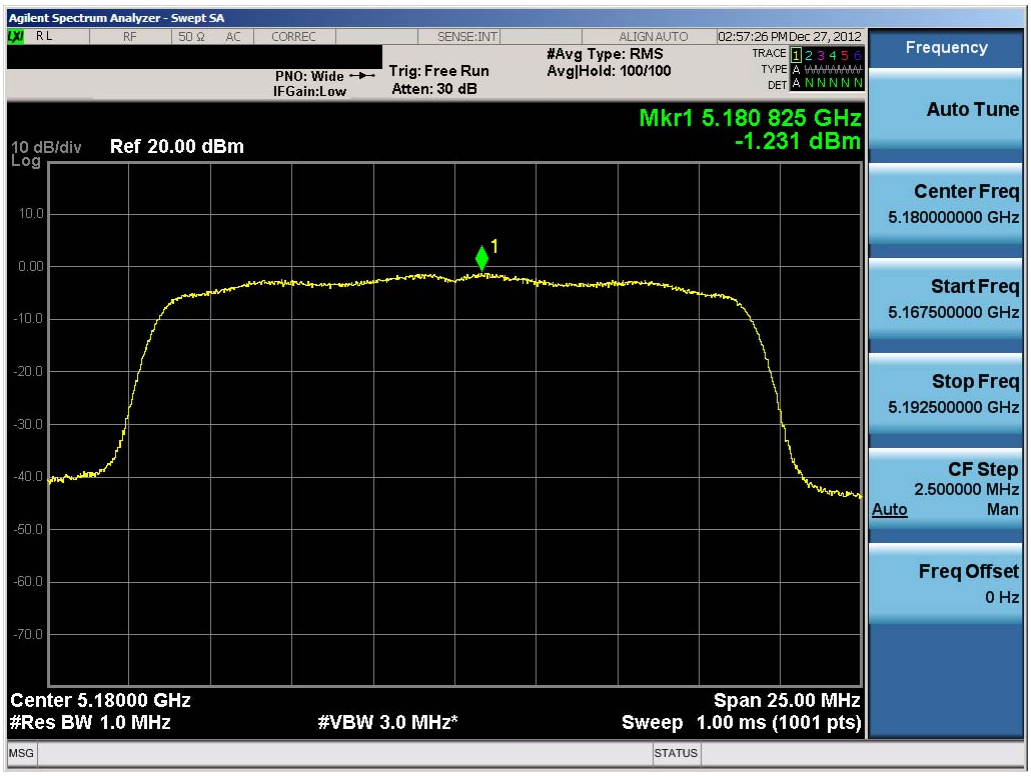


Plot 6-28. Peak Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 48)



Plot 6-29. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

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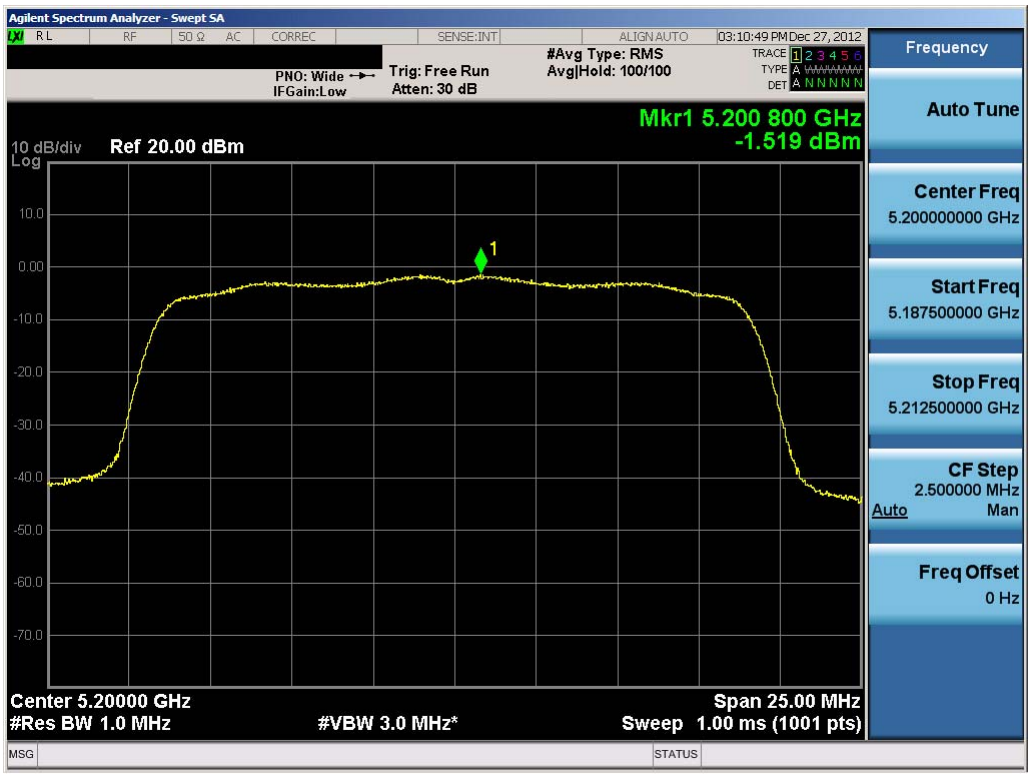
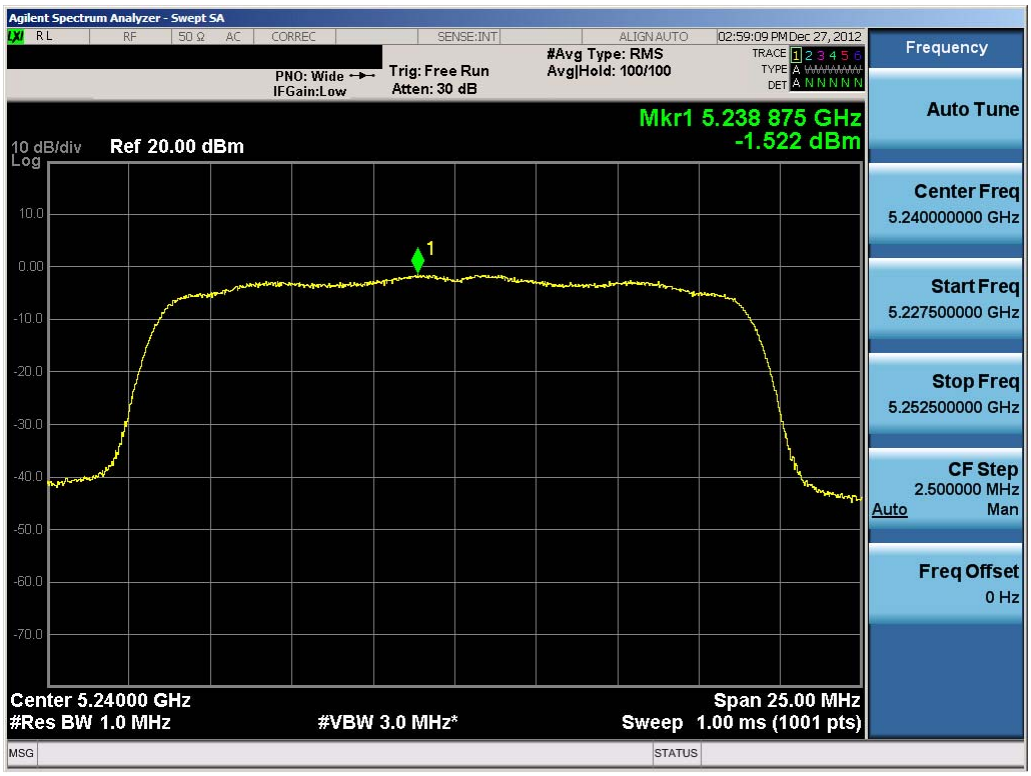


Plot 6-30. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 40)



Plot 6-31. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

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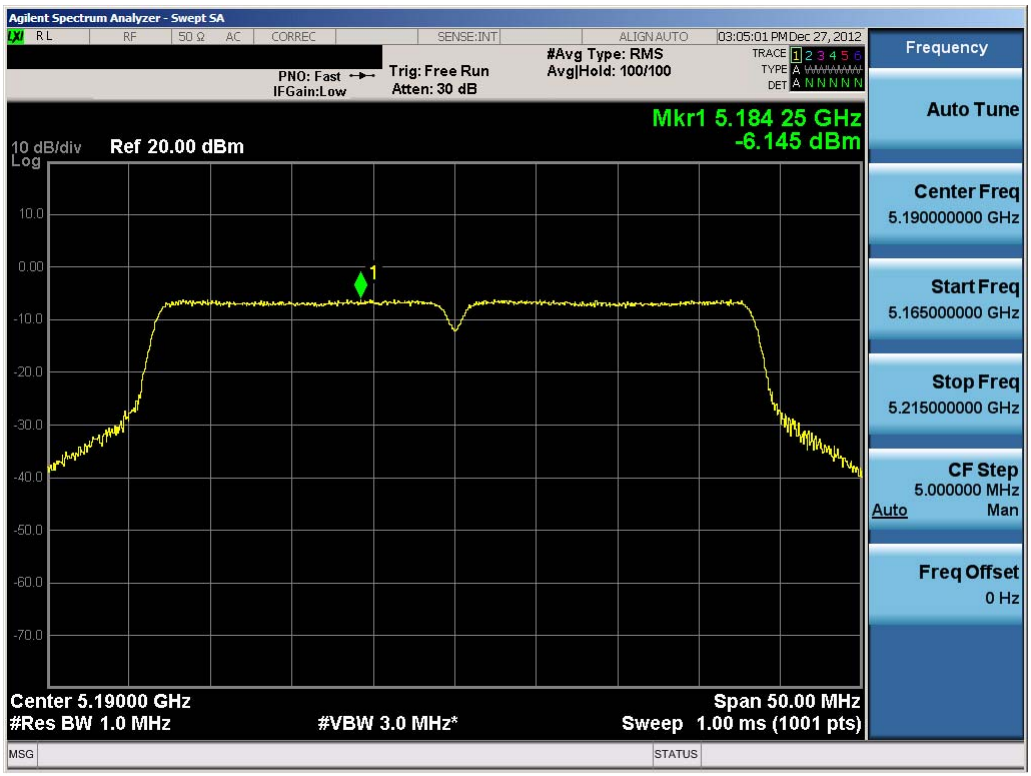

Plot 6-32. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 38)

Plot 6-33. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

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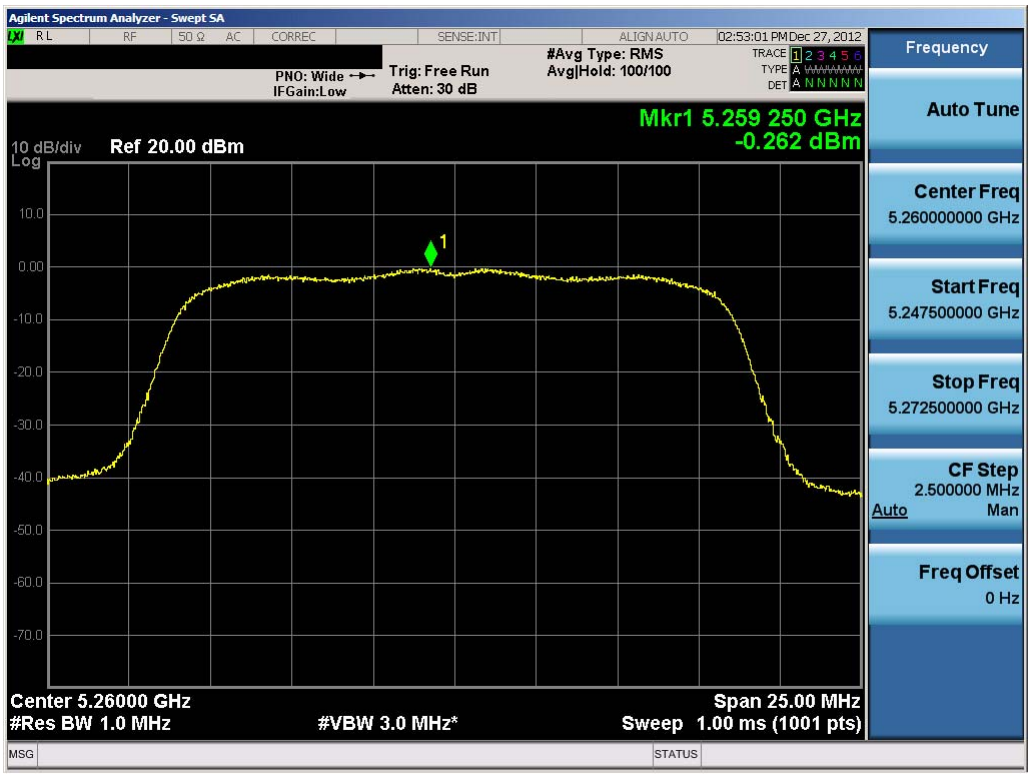
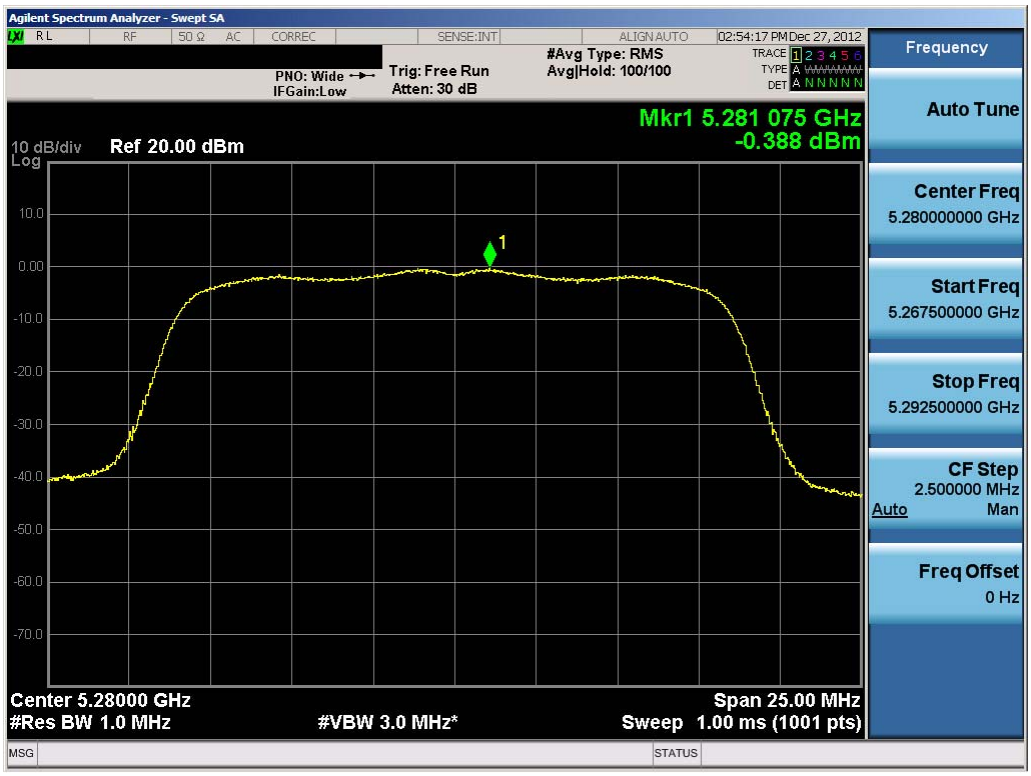


Plot 6-34. Peak Power Spectral Density Plot (802.11a (UNII Band 2) – Ch. 52)



Plot 6-35. Peak Power Spectral Density Plot (802.11a (UNII Band 2) – Ch. 56)

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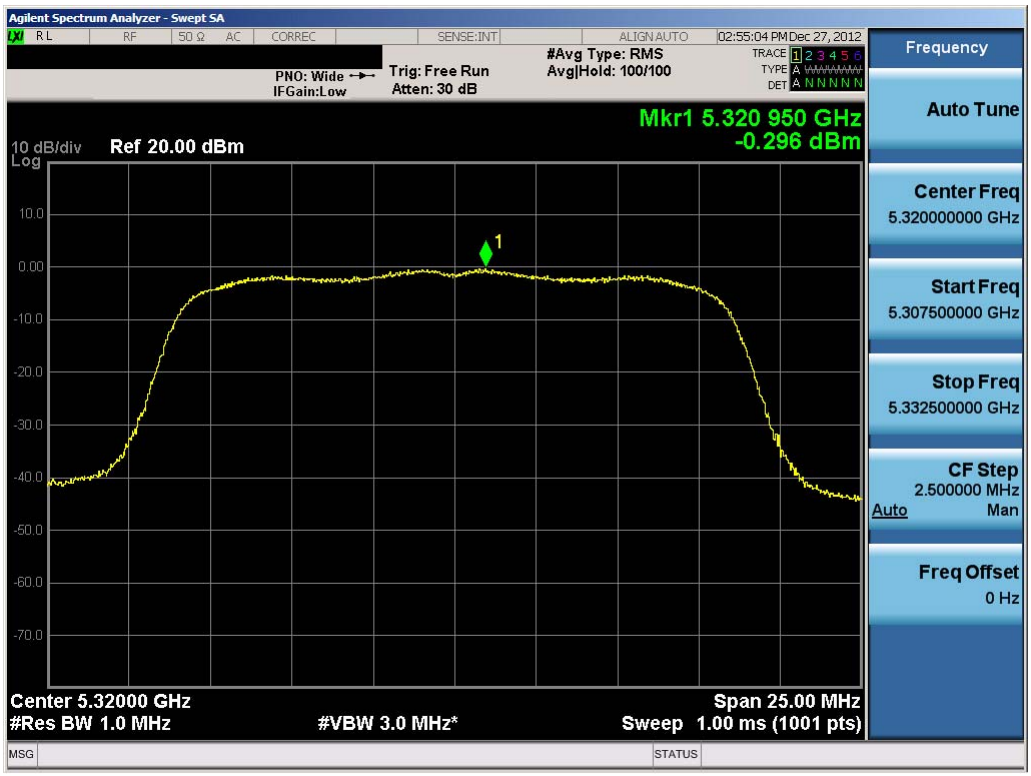
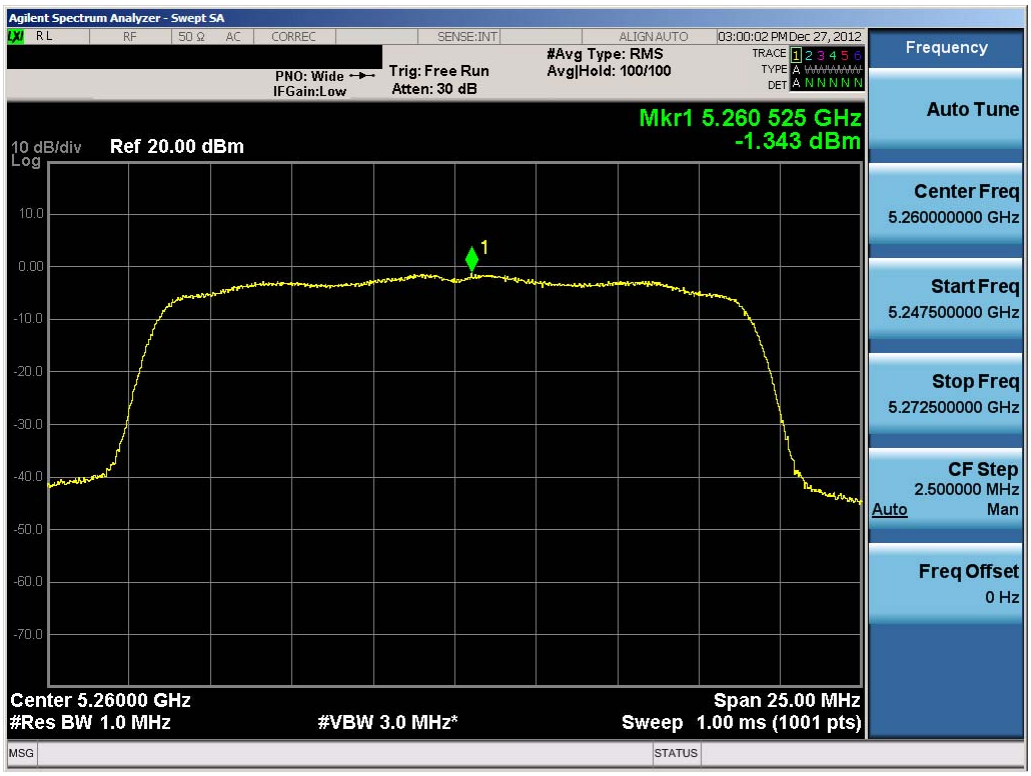


Plot 6-36. Peak Power Spectral Density Plot (802.11a (UNII Band 2) – Ch. 64)



Plot 6-37. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 52)

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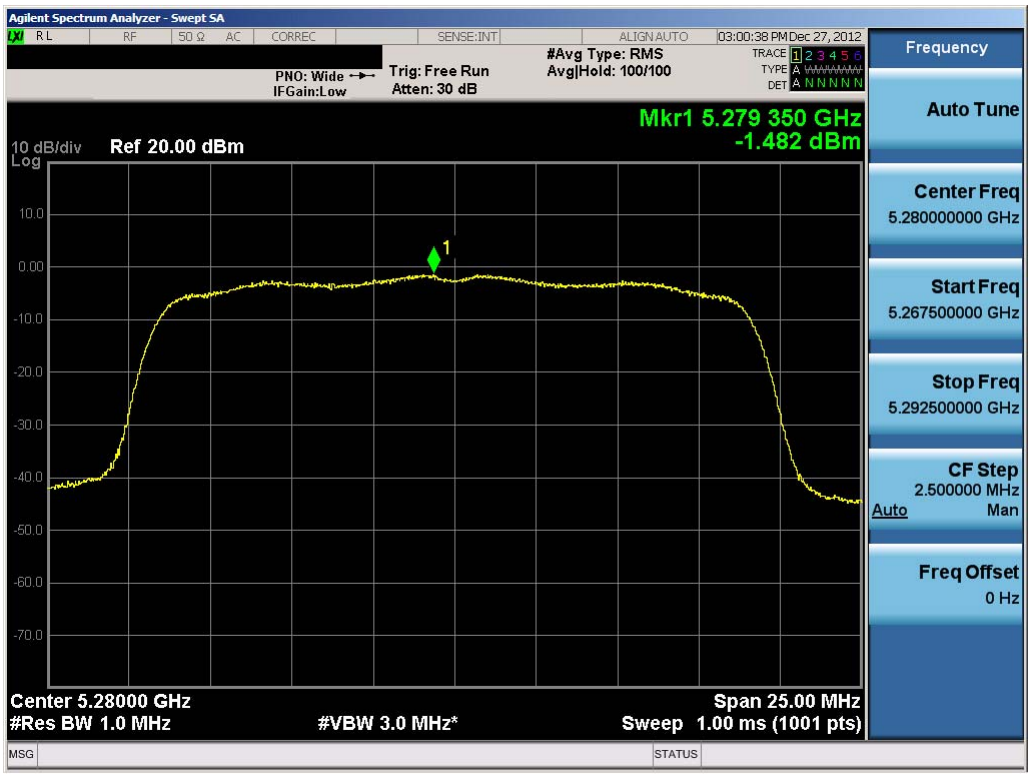
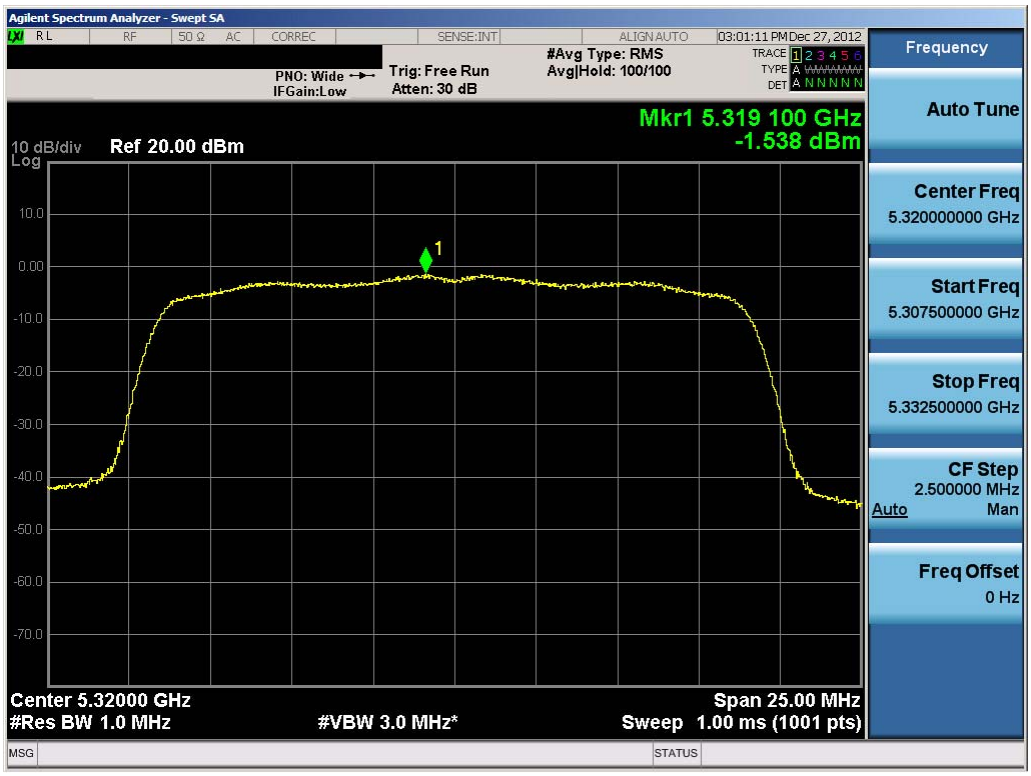


Plot 6-38. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 56)



Plot 6-39. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 64)

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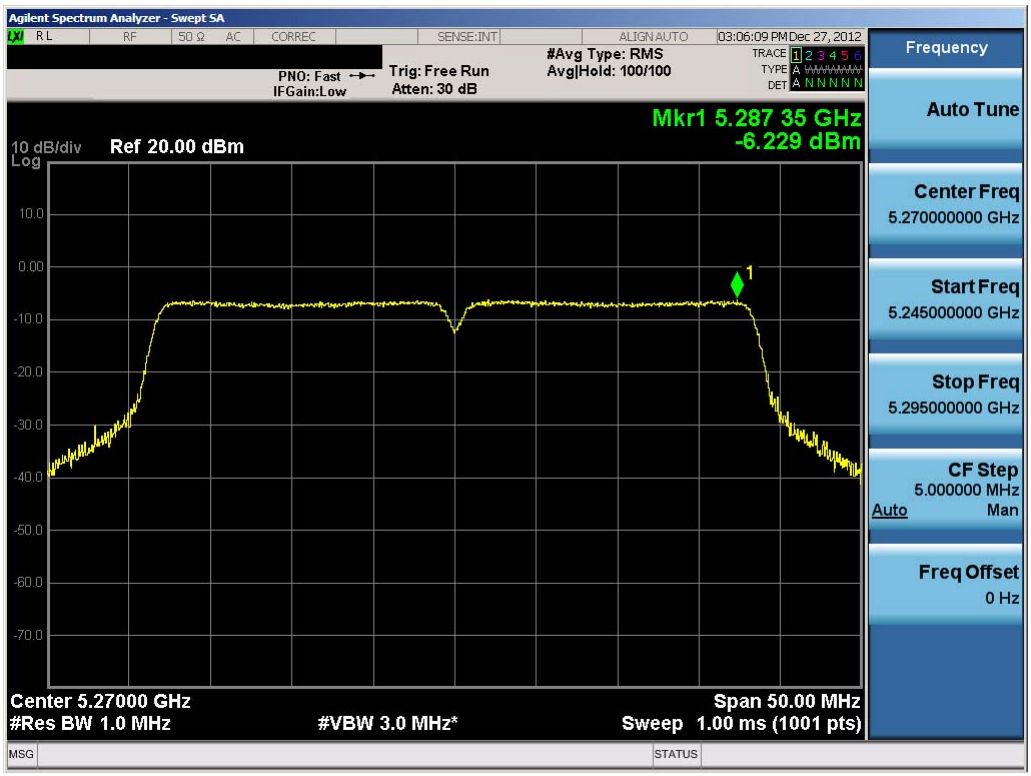

Plot 6-40. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2) – Ch. 54)

Plot 6-41. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2) – Ch. 62)

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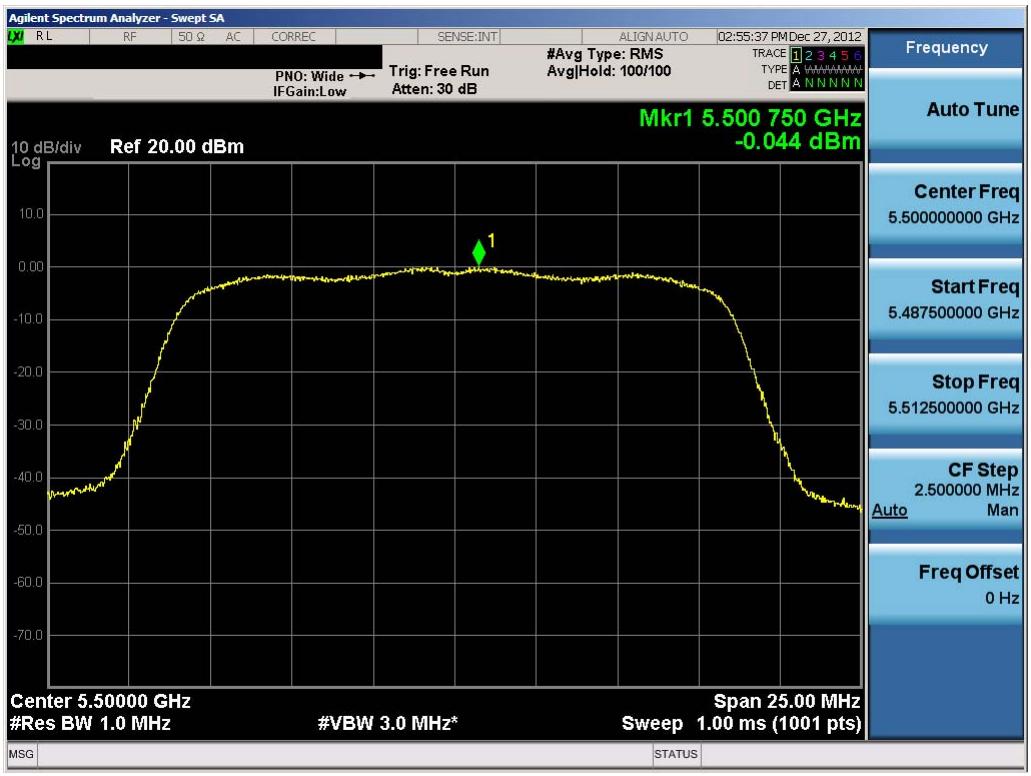
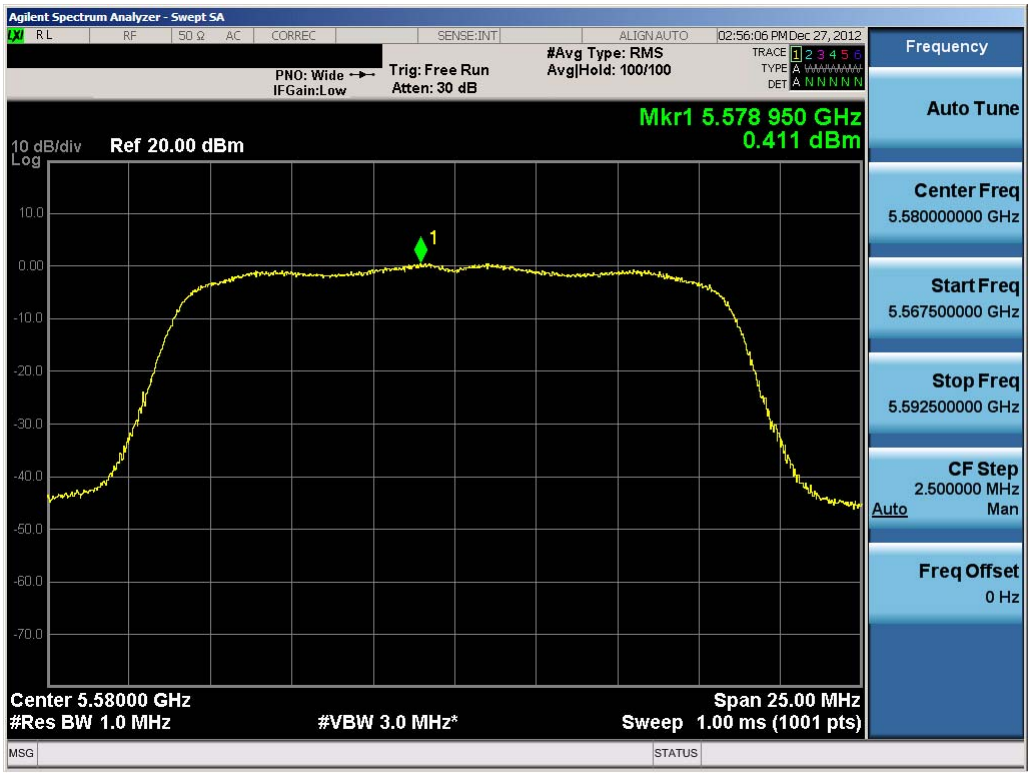


Plot 6-42. Peak Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 100)



Plot 6-43. Peak Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 116)

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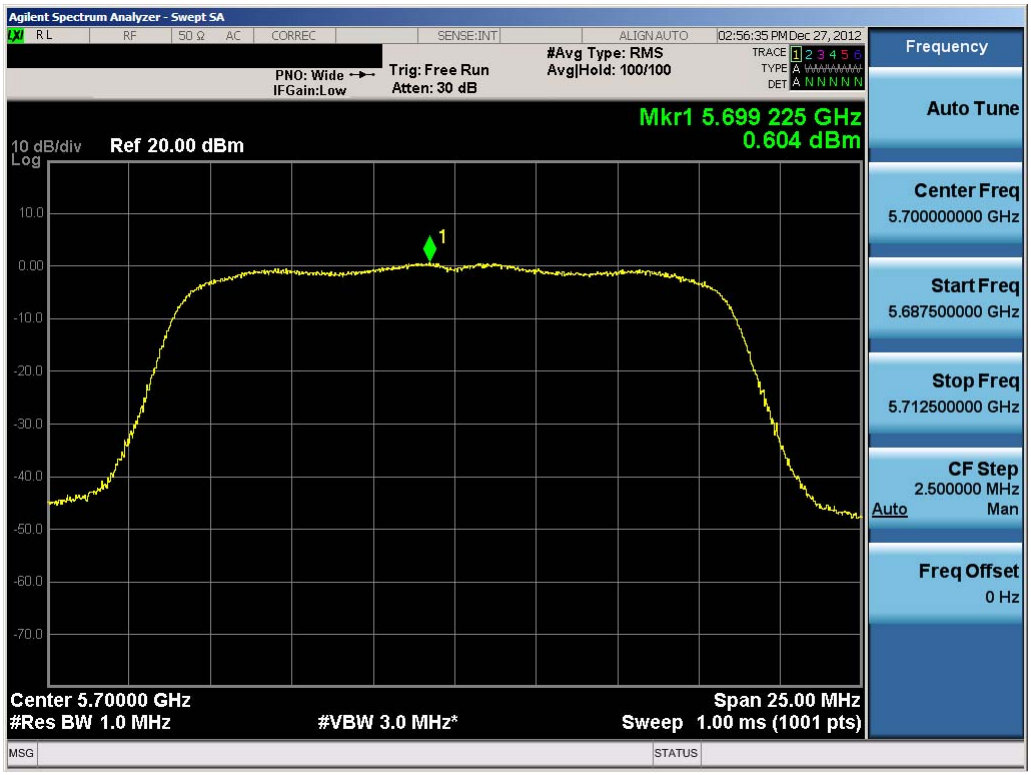
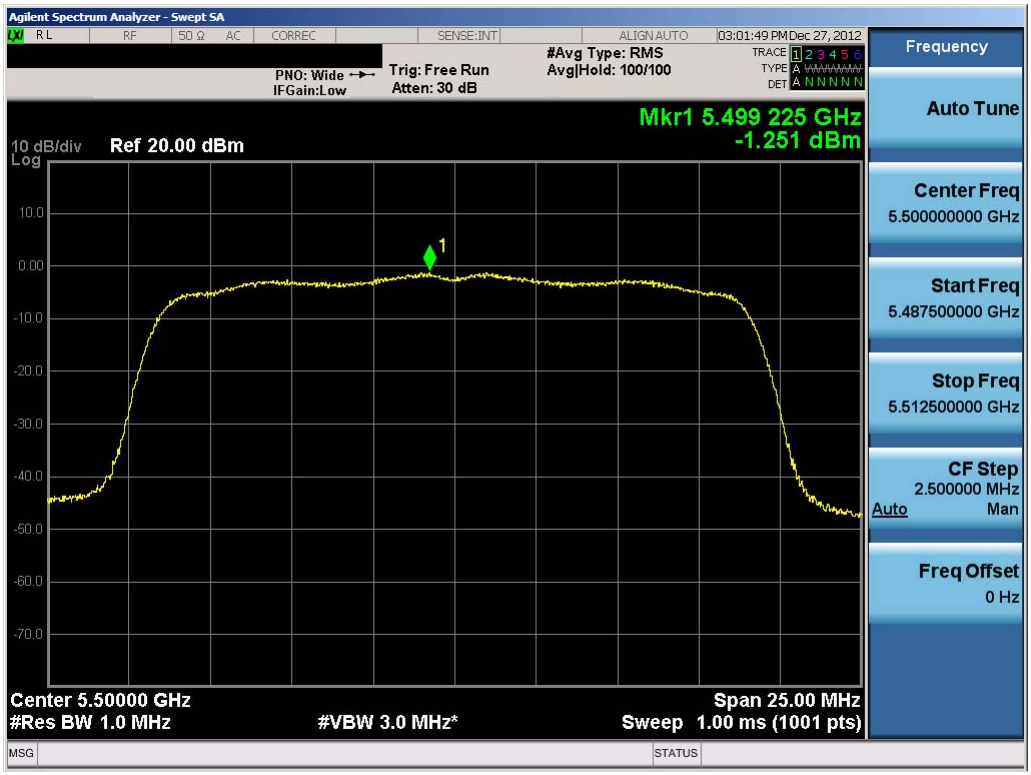


Plot 6-44. Peak Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 140)



Plot 6-45. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 100)

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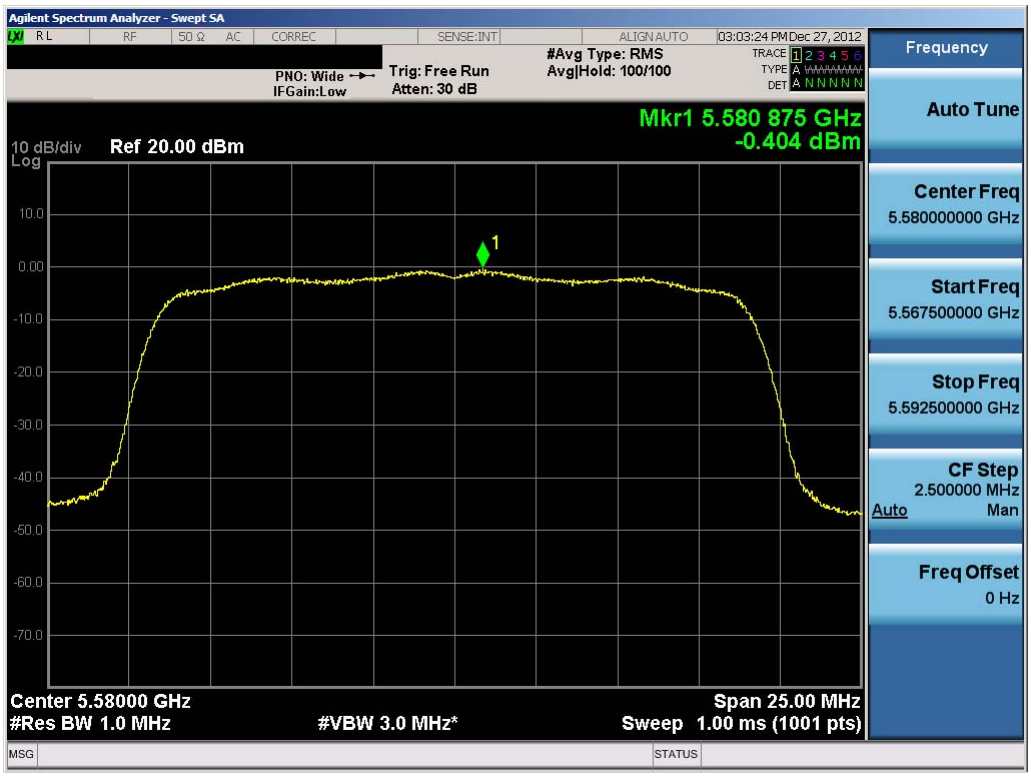
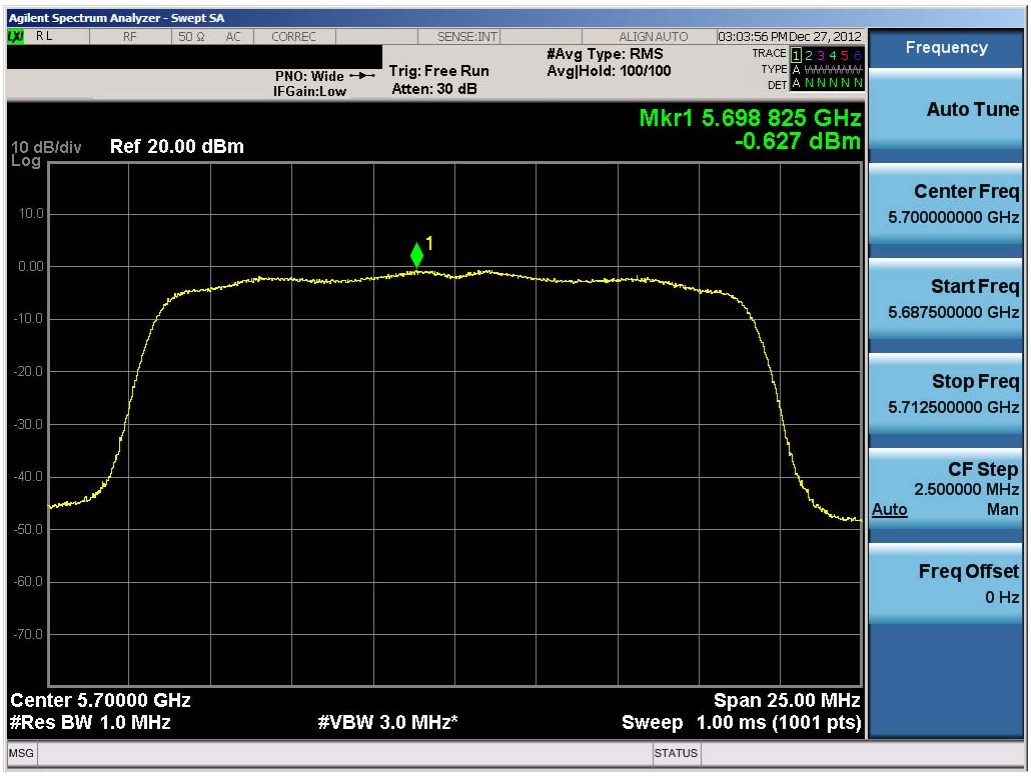


Plot 6-46. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 116)



Plot 6-47. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 140)

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Plot 6-48. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 102)

Plot 6-49. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 110)

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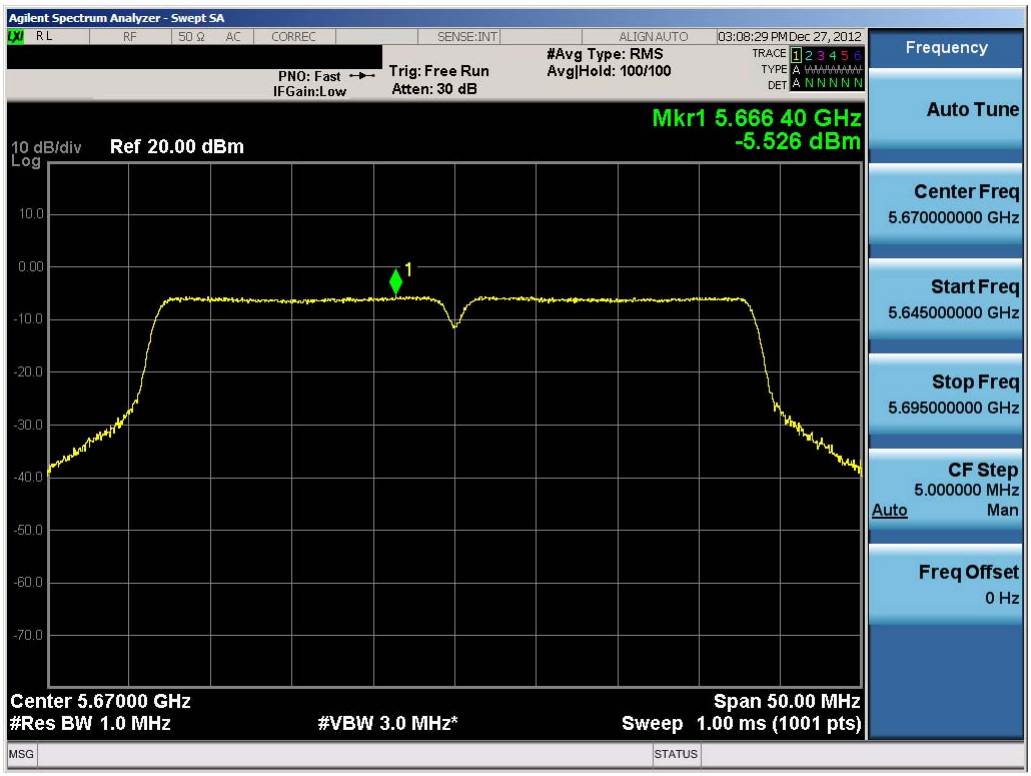

Plot 6-50. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 134)

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6.5 Peak Excursion Ratio – 802.11a/n

§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, and at the appropriate frequencies. Method SA-1, as defined in KDB 789033, 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 v01r02 – Section F

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.

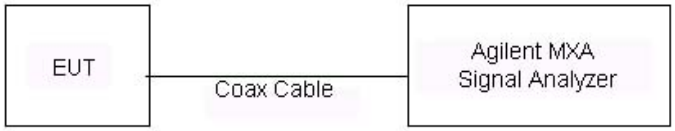

Figure 6-4. Test Instrument & Measurement Setup

Test Notes

1. 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 v01r02.

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Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Peak Excursion Ratio [dBm]	Max Permissible Peak Excursion Ratio [dBm/MHz]	Margin [dB]
5240	48	a	6	9.13	13.0	-3.87
5700	140	n (20MHz)	6.5/7.2 (MCS0)	8.34	13.0	-4.66
5510	102	n (40MHz)	13.5/15 (MCS0)	8.88	13.0	-4.12

Table 6-7. Conducted Peak Excursion Ratio Measurements

Plot 6-51. Peak Excursion Ratio Plot (802.11a)

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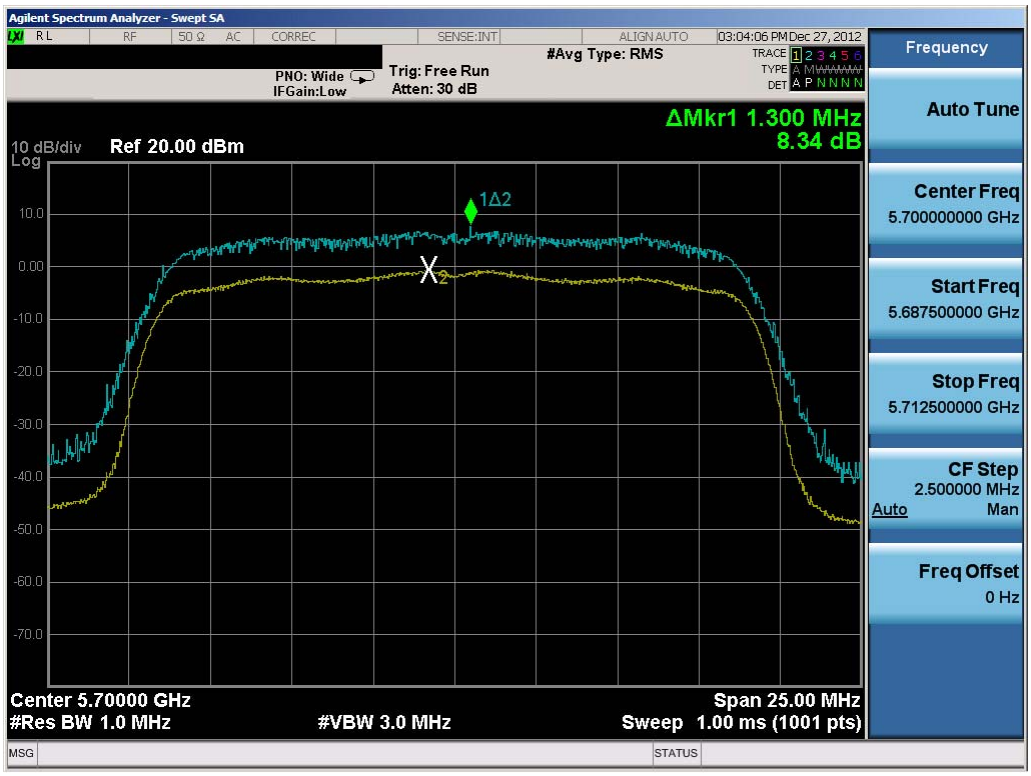

Plot 6-52. Peak Excursion Ratio Plot (20MHz BW 802.11n)

Plot 6-53. Peak Excursion Ratio Plot (40MHz BW 802.11n)

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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: 3.75 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.75	+ 20 (Ref)	5,179,999,997	-3	-0.00000006
100 %		- 30	5,179,999,985	-15	-0.00000029
100 %		- 20	5,179,999,984	-16	-0.00000031
100 %		- 10	5,179,999,989	-11	-0.00000021
100 %		0	5,180,000,013	13	0.00000025
100 %		+ 10	5,180,000,009	9	0.00000017
100 %		+ 20	5,179,999,984	-16	-0.00000031
100 %		+ 30	5,179,999,986	-14	-0.00000027
100 %		+ 40	5,179,999,985	-15	-0.00000029
100 %		+ 50	5,180,000,012	12	0.00000023
115 %	4.31	+ 20	5,180,000,003	3	0.00000006
BATT. ENDPOINT	3.45	+ 20	5,179,999,981	-19	-0.00000037

Table 6-8. Frequency Stability Measurements for UNII Band 1 (Ch. 36)

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Frequency Stability (Cont'd)
§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: 3.75 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.75	+ 20 (Ref)	5,260,000,002	2	0.00000004
100 %		- 30	5,259,999,985	-15	-0.00000029
100 %		- 20	5,259,999,983	-17	-0.00000032
100 %		- 10	5,260,000,003	3	0.00000006
100 %		0	5,259,999,992	-8	-0.00000015
100 %		+ 10	5,259,999,991	-9	-0.00000017
100 %		+ 20	5,260,000,015	15	0.00000029
100 %		+ 30	5,260,000,015	15	0.00000029
100 %		+ 40	5,259,999,981	-19	-0.00000036
100 %		+ 50	5,260,000,007	7	0.00000013
115 %	4.31	+ 20	5,259,999,992	-8	-0.00000015
BATT. ENDPOINT	3.45	+ 20	5,260,000,010	10	0.00000019

Table 6-9. Frequency Stability Measurements for UNII Band 2 (Ch. 52)

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Frequency Stability (Cont'd)
§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: 3.75 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.75	+ 20 (Ref)	5,499,999,991	-9	-0.00000016
100 %		- 30	5,500,000,008	8	0.00000015
100 %		- 20	5,500,000,003	3	0.00000005
100 %		- 10	5,500,000,016	16	0.00000029
100 %		0	5,500,000,015	15	0.00000027
100 %		+ 10	5,499,999,985	-15	-0.00000027
100 %		+ 20	5,499,999,989	-11	-0.00000020
100 %		+ 30	5,500,000,009	9	0.00000016
100 %		+ 40	5,499,999,990	-10	-0.00000018
100 %		+ 50	5,499,999,996	-4	-0.00000007
115 %	4.31	+ 20	5,499,999,986	-14	-0.00000025
BATT. ENDPOINT	3.45	+ 20	5,500,000,005	5	0.00000009

Table 6-10. Frequency Stability Measurements for UNII Band 3 (Ch. 100)

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6.7 Radiated Spurious Emission Measurements

§15.407(b)(1), (6), §15.205, §15.209; RSS-210 [A9.2]

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, and at the appropriate frequencies. All channels, modes (e.g. 802.11a, 802.11n (20MHz BW) and 802.11n (40MHz BW)), 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 6-11 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 6-11. Radiated Limits

Test Procedures Used

ANSI C63.10-2009

KDB 789033 v01r02 – Section G

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. Sweep time = auto couple
7. 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. Span was set greater than 1MHz
3. RBW = 1MHz
4. VBW = 3MHz
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. 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.

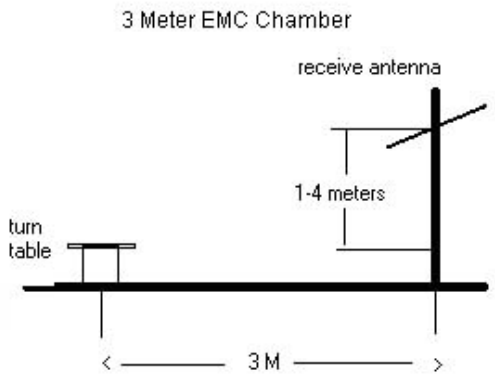

Figure 6-5. Test Instrument & Measurement Setup

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Test Notes

1. The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 789033 v01r02 were not used to evaluate this device.
2. All spurious emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 6-10. 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.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
5. 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.
6. 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.
7. Average levels at -135dBm and peak levels at -125dBm represent the analyzer noise floor and signify that no emission was detected.

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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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

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	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
	10360.00	-98.33	Peak	H	45.89	0.00	54.57	68.20	-13.63
*	15540.00	-135.00	Average	H	58.35	0.00	30.35	53.98	-23.63
*	15540.00	-125.00	Peak	H	58.35	0.00	40.35	73.98	-33.63
*	20720.00	-102.75	Average	H	44.02	-9.54	38.73	53.98	-15.25
*	20720.00	-94.90	Peak	H	44.02	-9.54	46.58	73.98	-27.40
	25900.00	-125.00	Peak	H	44.85	-9.54	26.85	68.20	-41.35

Table 6-12. Radiated Measurements

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	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
	10400.00	-98.04	Peak	H	45.98	0.00	54.94	68.20	-13.26
*	15600.00	-135.00	Average	H	58.64	0.00	30.64	53.98	-23.34
*	15600.00	-125.00	Peak	H	58.64	0.00	40.64	73.98	-33.34
*	20800.00	-103.50	Average	H	44.00	-9.54	37.95	53.98	-16.03
*	20800.00	-94.81	Peak	H	44.00	-9.54	46.64	73.98	-27.34
	26000.00	-125.00	Peak	H	44.88	-9.54	26.88	68.20	-41.32

Table 6-13. Radiated Measurements

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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

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	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	10480.00	-98.11	Peak	H	46.14	0.00	55.03	68.20	-13.17
*	15720.00	-135.00	Average	H	59.21	0.00	31.21	53.98	-22.77
*	15720.00	-125.00	Peak	H	59.21	0.00	41.21	73.98	-32.77
*	20960.00	-103.45	Average	H	43.99	-9.54	38.00	53.98	-15.98
	20960.00	-97.11	Peak	H	43.99	-9.54	44.34	73.98	-29.64
	26200.00	-125.00	Peak	H	44.82	-9.54	26.82	68.20	-41.38

Table 6-14. 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	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
	10520.00	-97.63	Peak	H	46.23	0.00	55.59	68.20	-12.61
*	15780.00	-135.00	Average	H	59.53	0.00	31.53	53.98	-22.45
*	15780.00	-125.00	Peak	H	59.53	0.00	41.53	73.98	-32.45
*	21040.00	-104.03	Average	H	44.01	-9.54	37.44	53.98	-16.54
*	21040.00	-97.13	Peak	H	44.01	-9.54	44.34	73.98	-29.64
	26300.00	-125.00	Peak	H	44.87	-9.54	26.87	68.20	-41.33

Table 6-15. Radiated Measurements

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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

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	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
	10560.00	-97.88	Peak	H	46.32	0.00	55.45	68.20	-12.75
*	15840.00	-135.00	Average	H	59.88	0.00	31.88	53.98	-22.09
*	15840.00	-125.00	Peak	H	59.88	0.00	41.88	73.98	-32.09
*	21120.00	-104.20	Average	H	44.00	-9.54	37.26	53.98	-16.72
*	21120.00	-97.11	Peak	H	44.00	-9.54	44.35	73.98	-29.63
	26400.00	-125.00	Peak	H	44.81	-9.54	26.81	68.20	-41.39

Table 6-16. 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	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	10640.00	-107.99	Average	H	46.52	0.00	45.52	53.98	-8.45
*	10640.00	-97.88	Peak	H	46.52	0.00	55.63	73.98	-18.34
*	15960.00	-135.00	Average	H	62.27	0.00	34.27	53.98	-19.71
*	15960.00	-125.00	Peak	H	62.27	0.00	44.27	73.98	-29.71
*	21280.00	-106.47	Average	H	44.02	-9.54	35.01	53.98	-18.97
*	21280.00	-96.64	Peak	H	44.02	-9.54	44.84	73.98	-29.14
	26600.00	-125.00	Peak	H	44.70	-9.54	26.70	68.20	-41.50

Table 6-17. Radiated Measurements

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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

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	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	11000.00	-107.76	Average	H	46.98	0.00	46.22	53.98	-7.76
*	11000.00	-97.70	Peak	H	46.98	0.00	56.28	73.98	-17.70
	16500.00	-125.00	Peak	H	60.10	0.00	42.10	68.20	-26.10
	22000.00	-97.67	Peak	H	44.30	-9.54	44.09	68.20	-24.11
	27500.00	-125.00	Peak	H	44.10	-9.54	26.10	68.20	-42.10

Table 6-18. 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	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	11160.00	-106.70	Average	H	49.42	0.00	49.73	53.98	-4.25
*	11160.00	-96.88	Peak	H	49.42	0.00	59.55	73.98	-14.43
	16740.00	-125.00	Peak	H	58.53	0.00	40.53	68.20	-27.67
*	22320.00	-108.48	Average	H	44.40	-9.54	33.38	53.98	-20.60
*	22320.00	-96.74	Peak	H	44.40	-9.54	45.12	73.98	-28.86
	27900.00	-125.00	Peak	H	43.94	-9.54	25.94	68.20	-42.26

Table 6-19. Radiated Measurements

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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

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	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	11400.00	-107.70	Average	H	47.61	0.00	46.91	53.98	-7.07
*	11400.00	-97.81	Peak	H	47.61	0.00	56.80	73.98	-17.18
	17100.00	-125.00	Peak	H	56.08	0.00	38.08	68.20	-30.12
*	22800.00	-109.42	Average	H	44.45	-9.54	32.49	53.98	-21.49
*	22800.00	-98.17	Peak	H	44.45	-9.54	43.74	73.98	-30.24
	28500.00	-125.00	Peak	H	43.63	-9.54	25.63	68.20	-42.57

Table 6-20. Radiated Measurements

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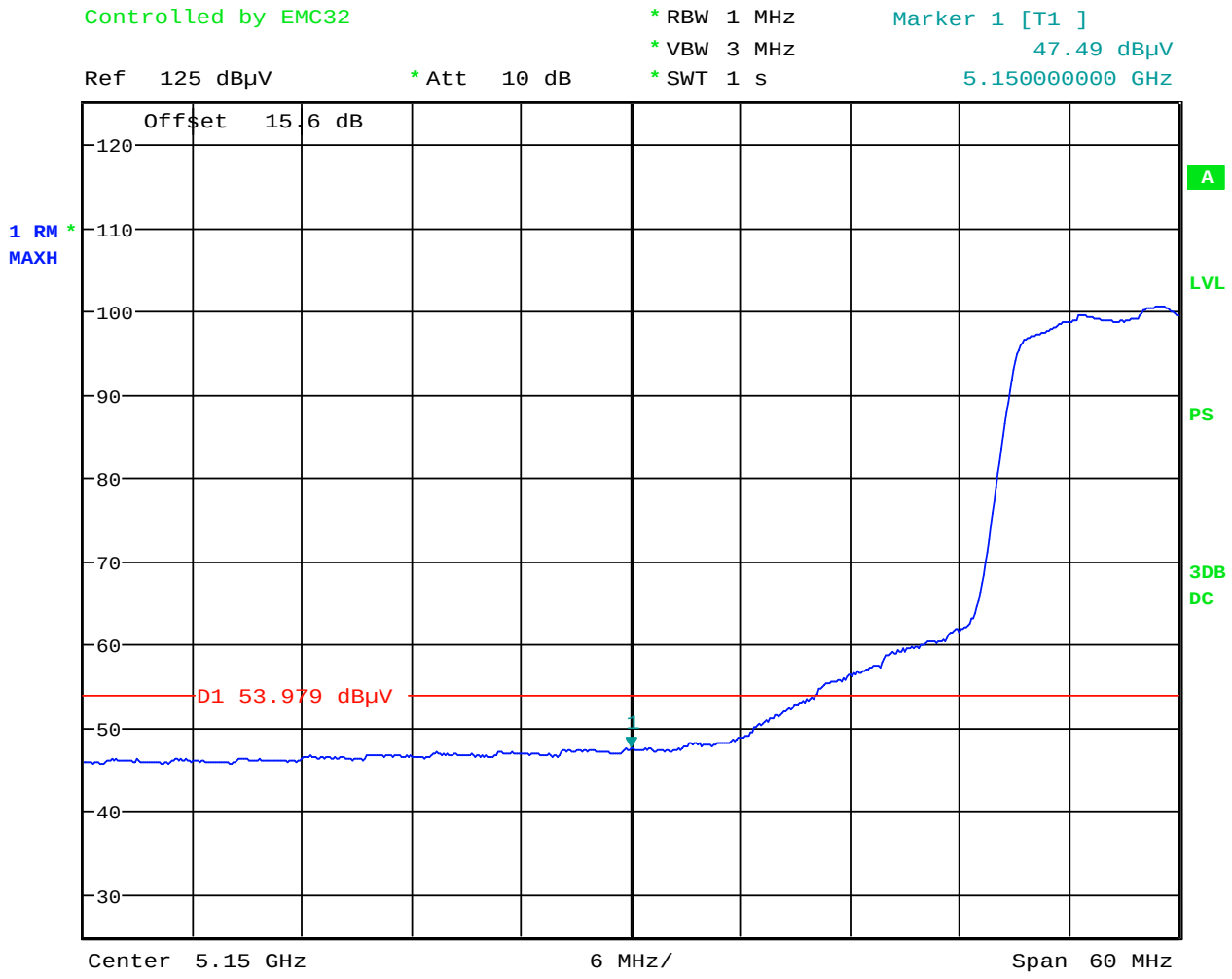
6.8 Radiated Band Edge Measurements (20MHz BW)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode:	802.11n (20MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5180MHz
Channel:	36



Date: 28.DEC.2012 09:43:21

Plot 6-54. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

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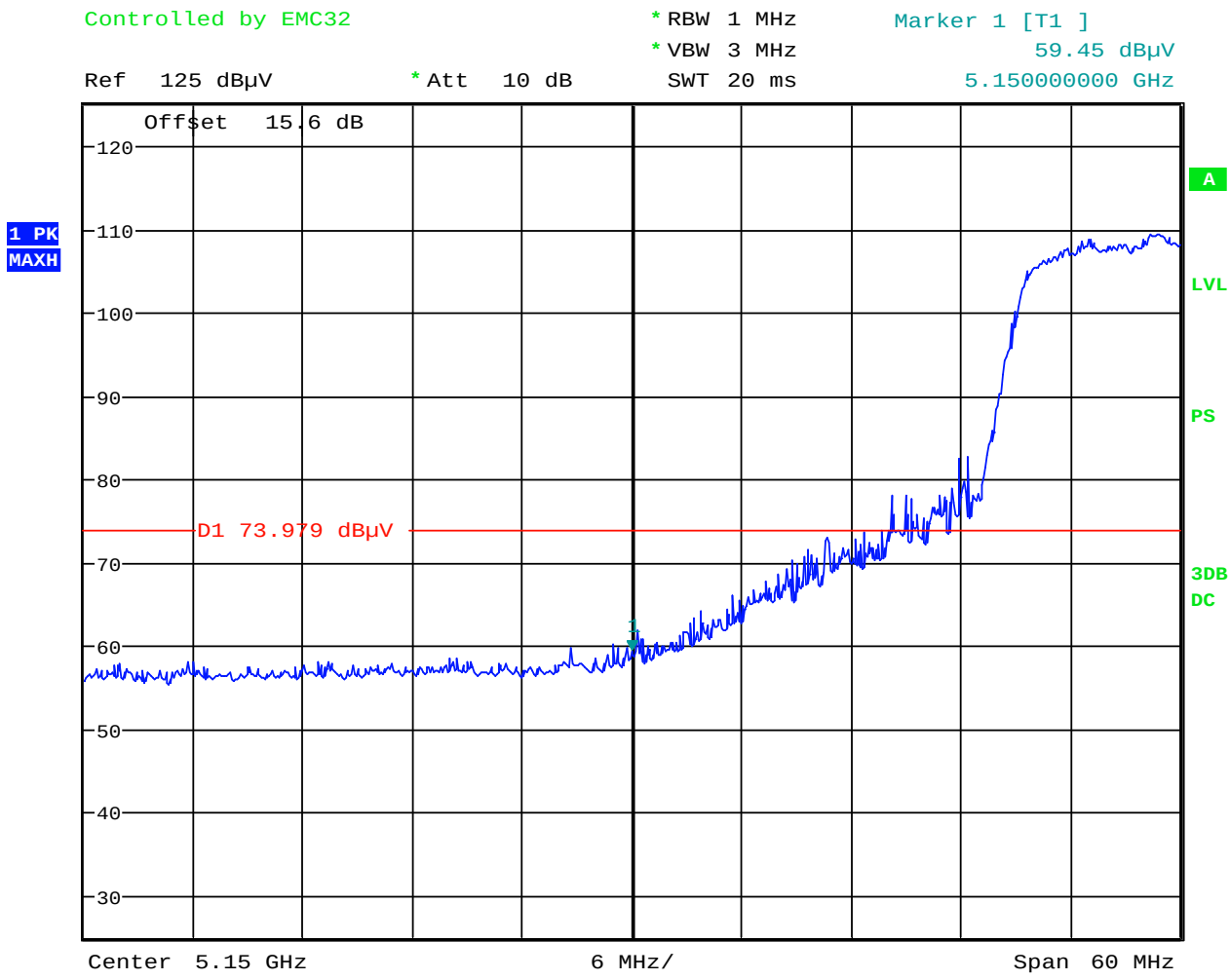
Radiated Band Edge Measurements (20MHz BW) (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]



Date: 28.DEC.2012 09:45:37

Plot 6-55. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

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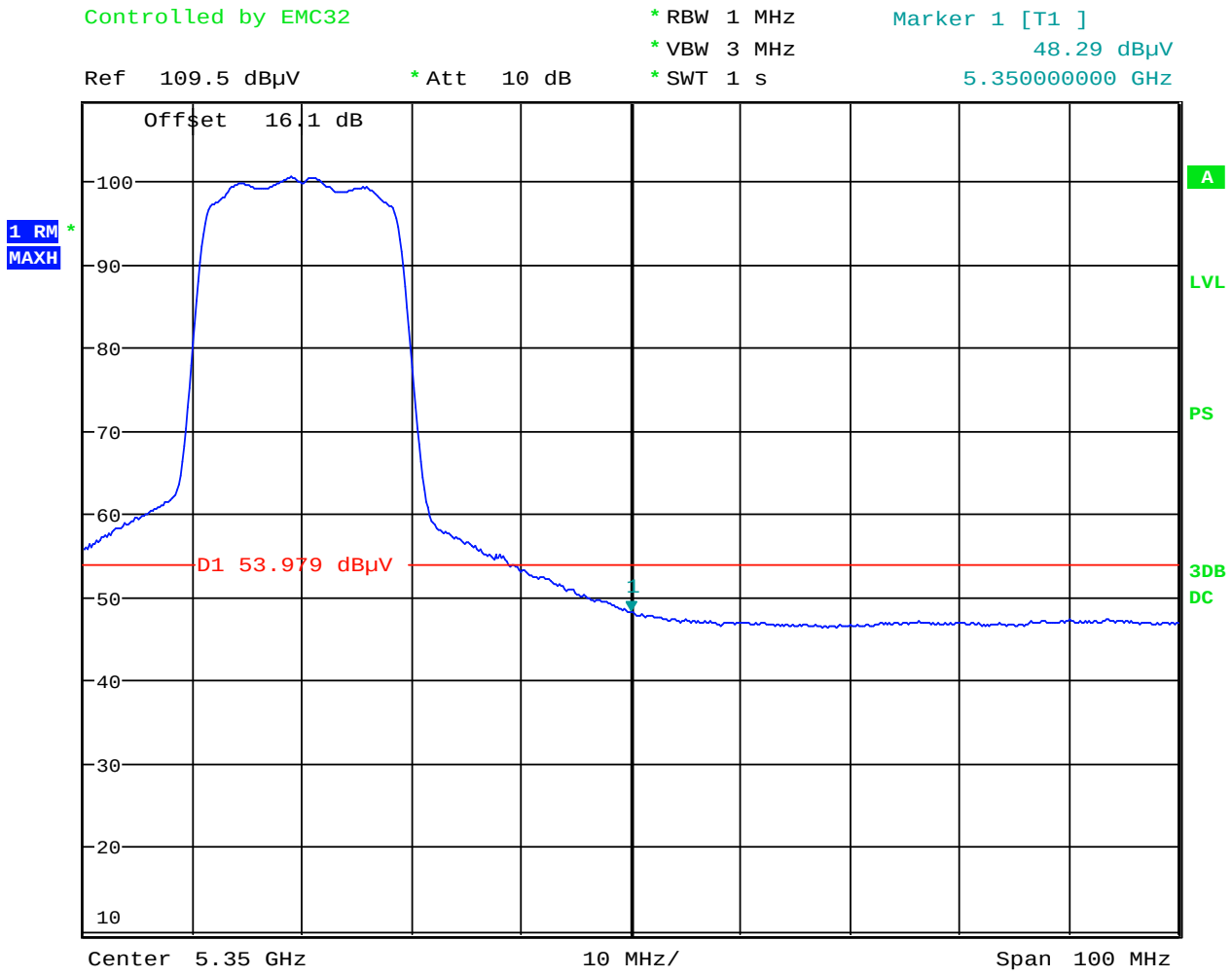
Radiated Band Edge Measurements (20MHz BW) (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode:	802.11n (20MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5320MHz
Channel:	64



Date: 28.DEC.2012 09:51:07

Plot 6-56. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2)

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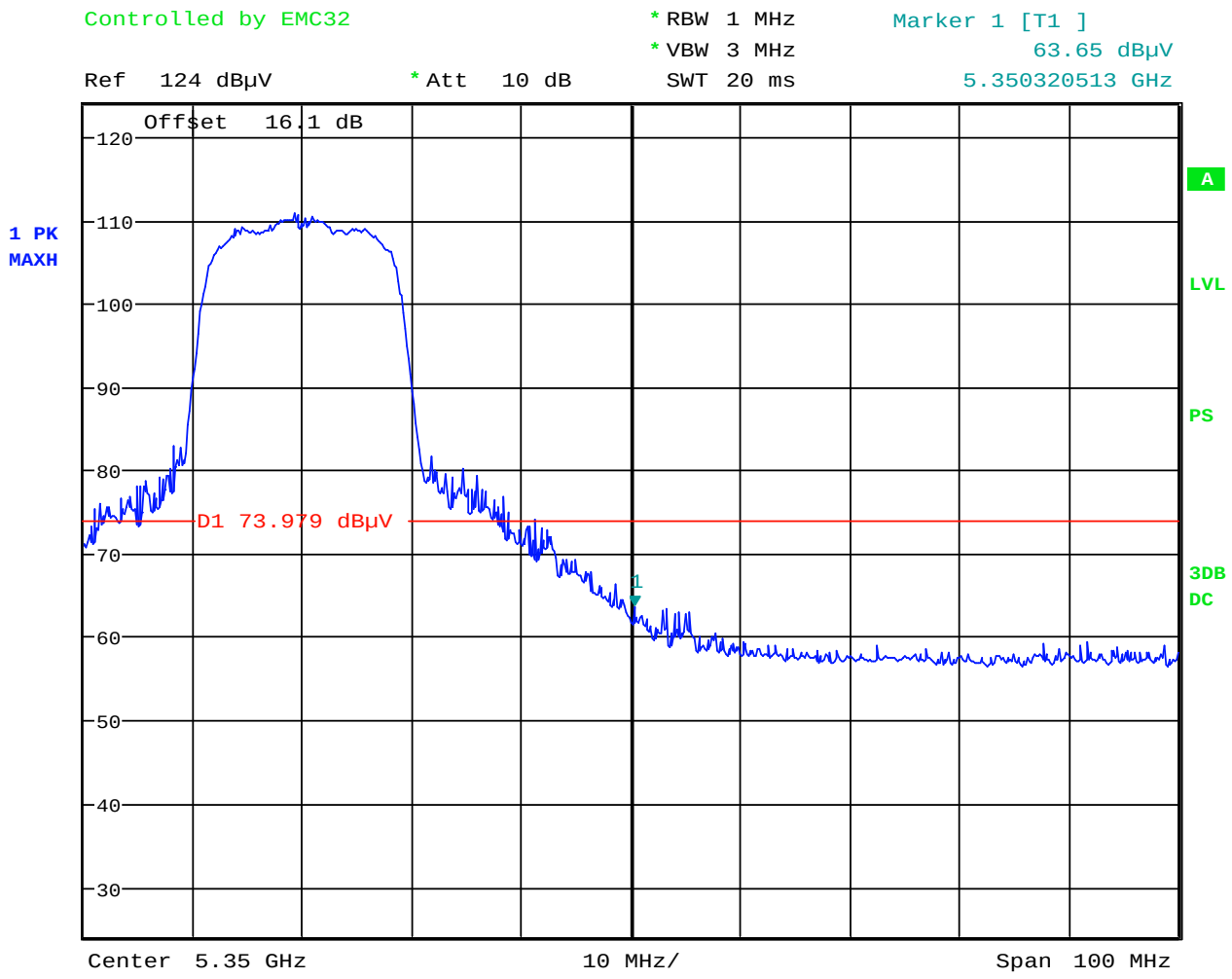
Radiated Band Edge Measurements (20MHz BW) (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]



Date: 28.DEC.2012 09:54:30

Plot 6-57. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2)

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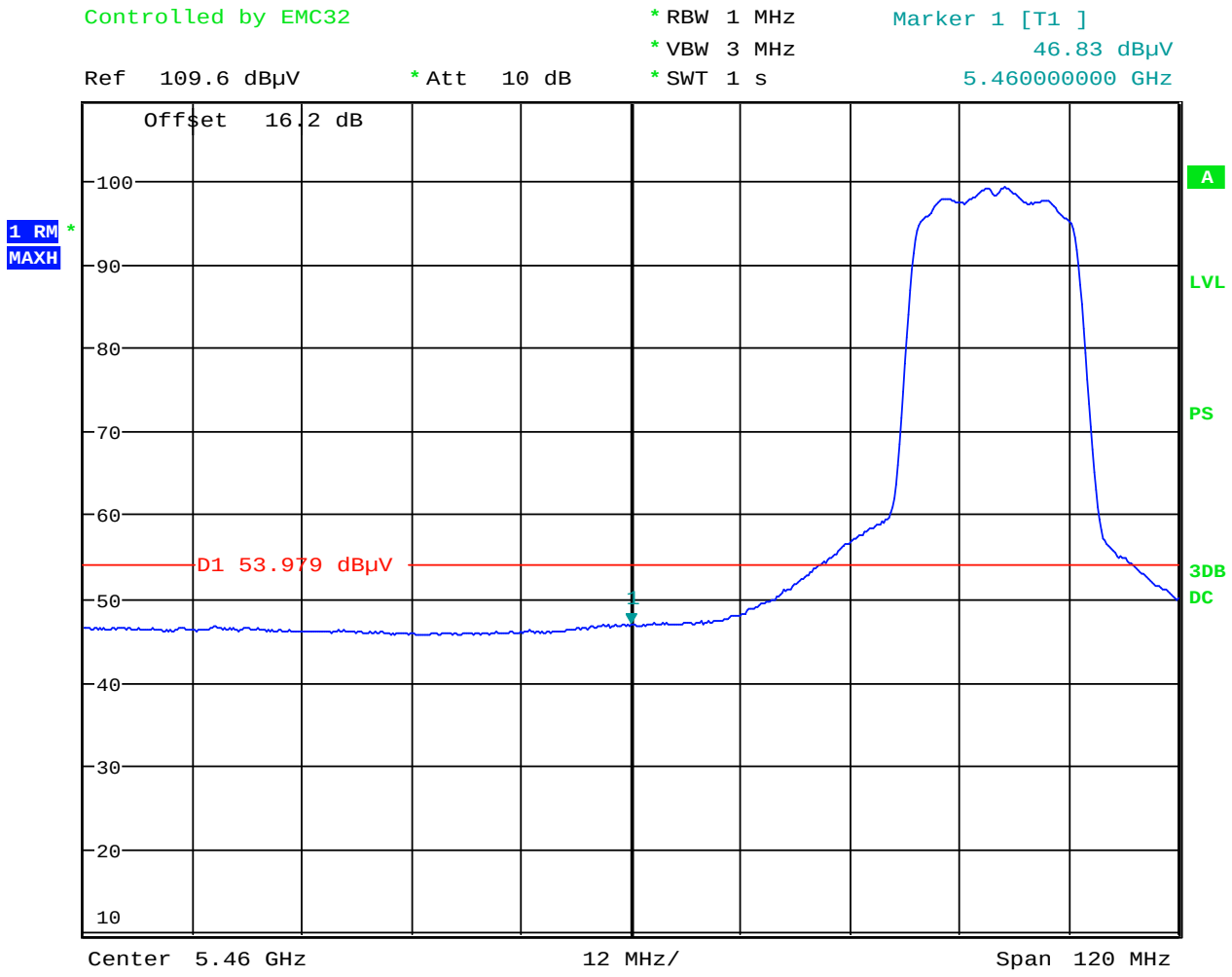
Radiated Band Edge Measurements (20MHz BW) (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode:	802.11n (20MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5500MHz
Channel:	100



Date: 28.DEC.2012 09:59:24

Plot 6-58. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 3)

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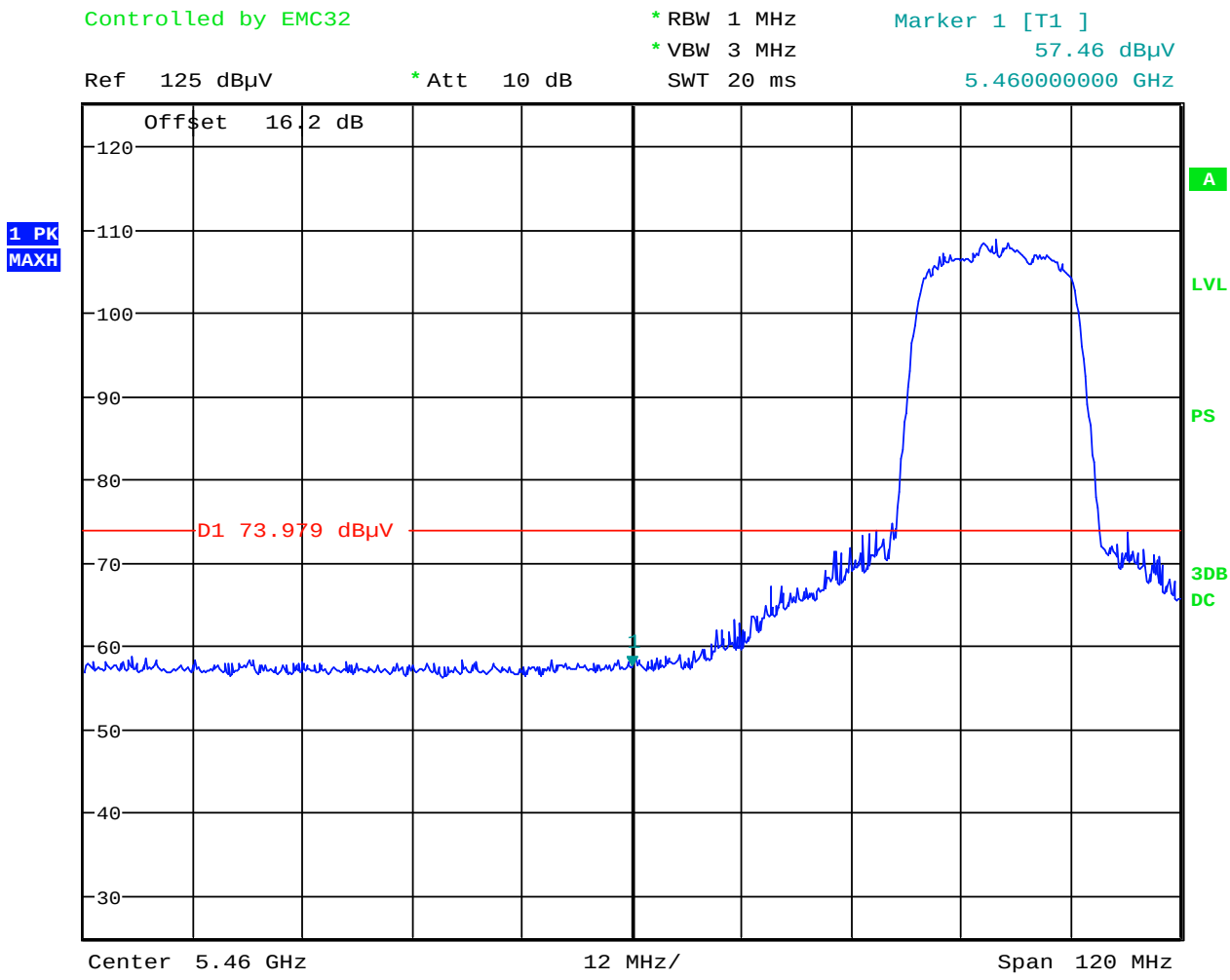
Radiated Band Edge Measurements (20MHz BW) (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]



Date: 28.DEC.2012 10:02:14

Plot 6-59. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 3)

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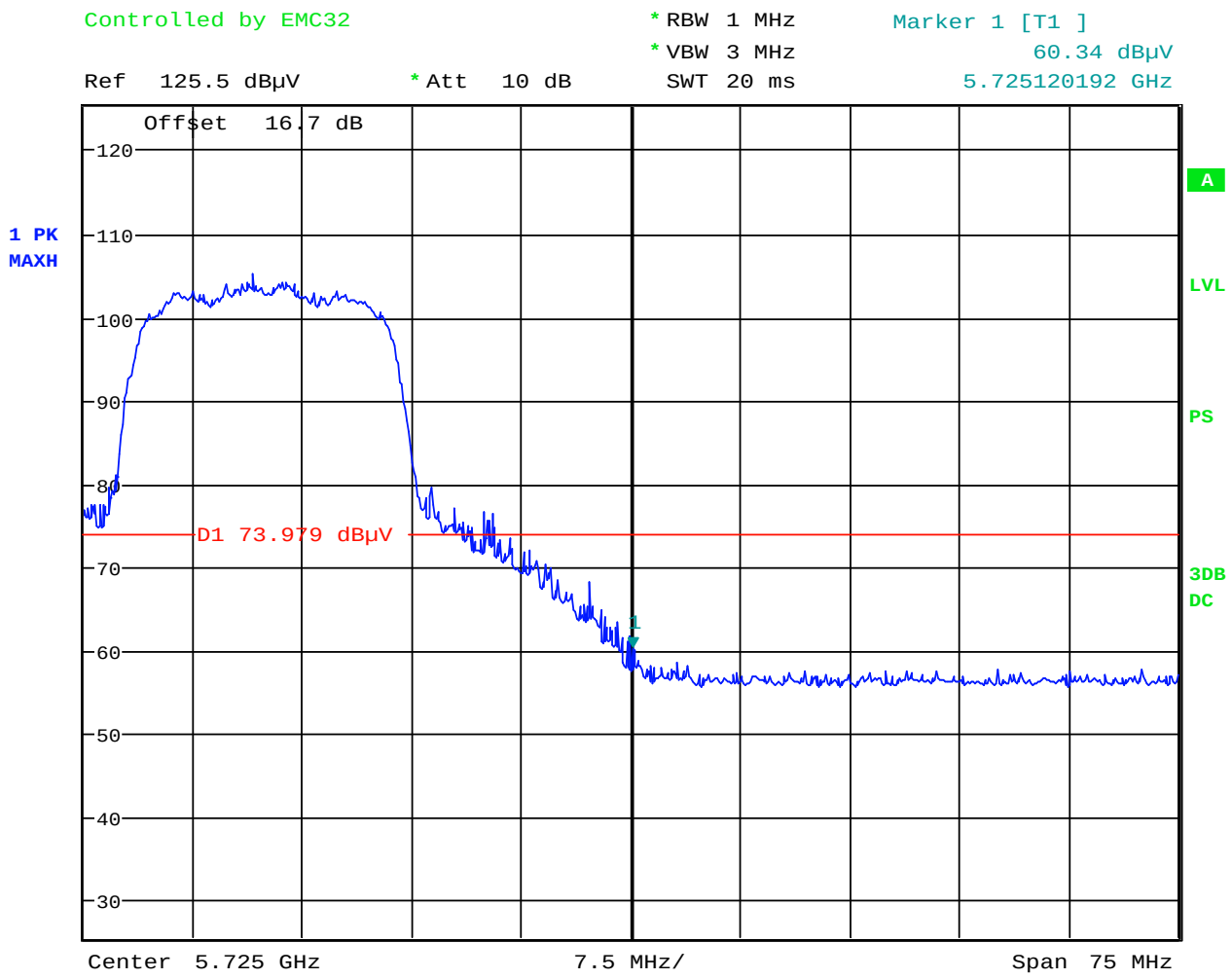
Radiated Band Edge Measurements (20MHz BW) (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode:	802.11n (20MHz)
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5700MHz
Channel:	140



Date: 28.DEC.2012 10:10:16

Plot 6-60. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

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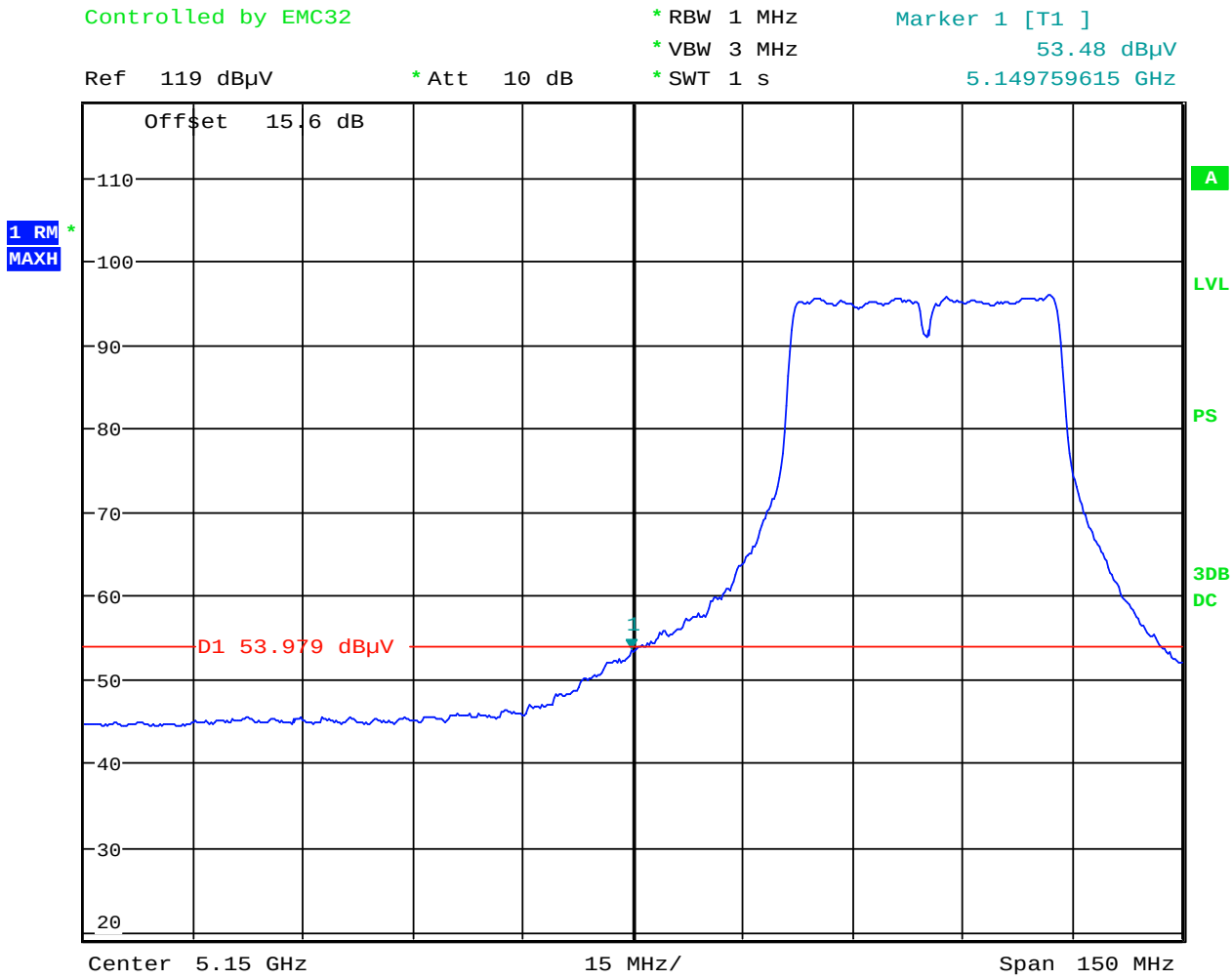
6.9 Radiated Band Edge Measurements (40MHz BW)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

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



Date: 28.DEC.2012 10:21:17

Plot 6-61. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

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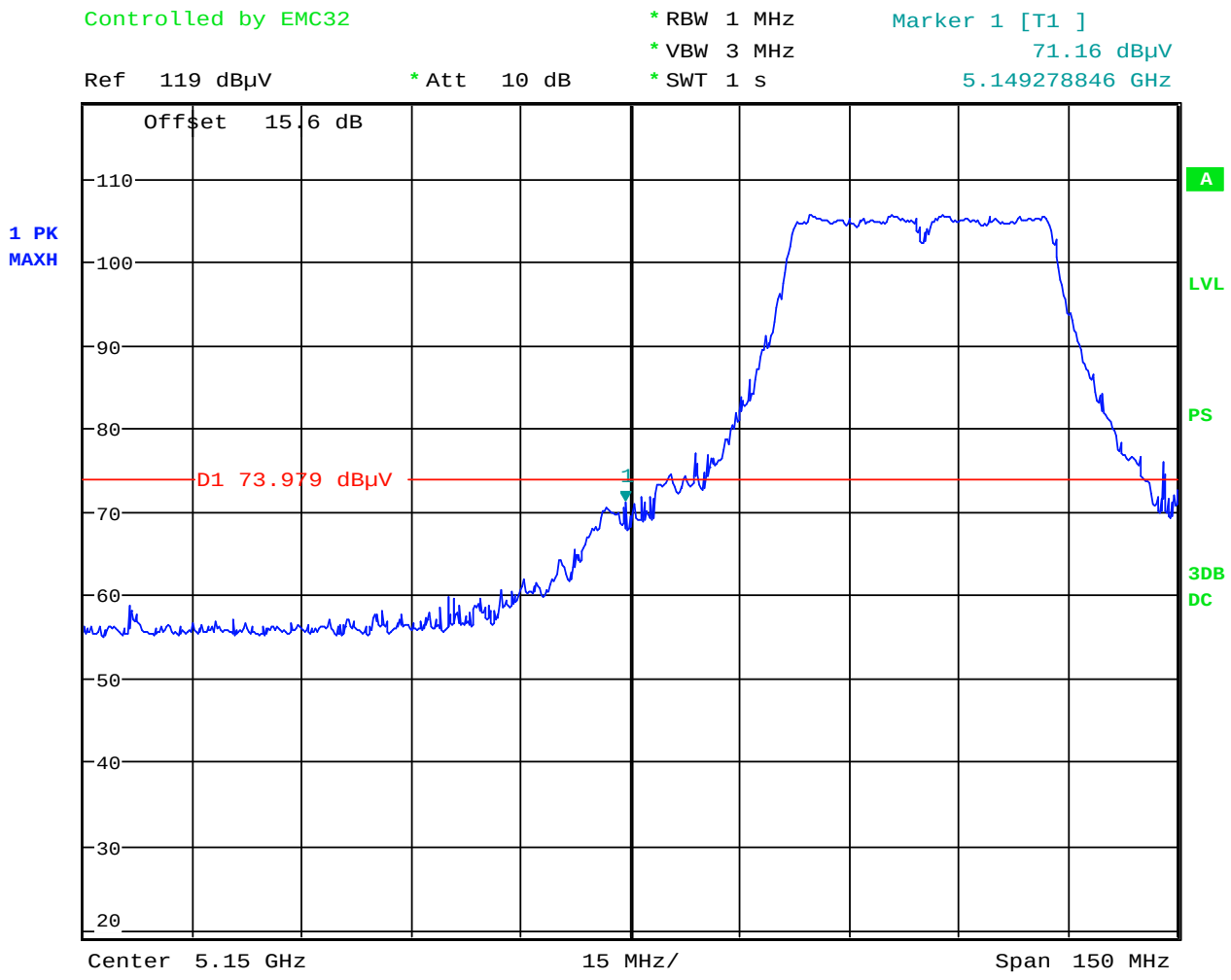
Radiated Band Edge Measurements (40MHz BW) (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]



Date: 28.DEC.2012 10:18:35

Plot 6-62. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

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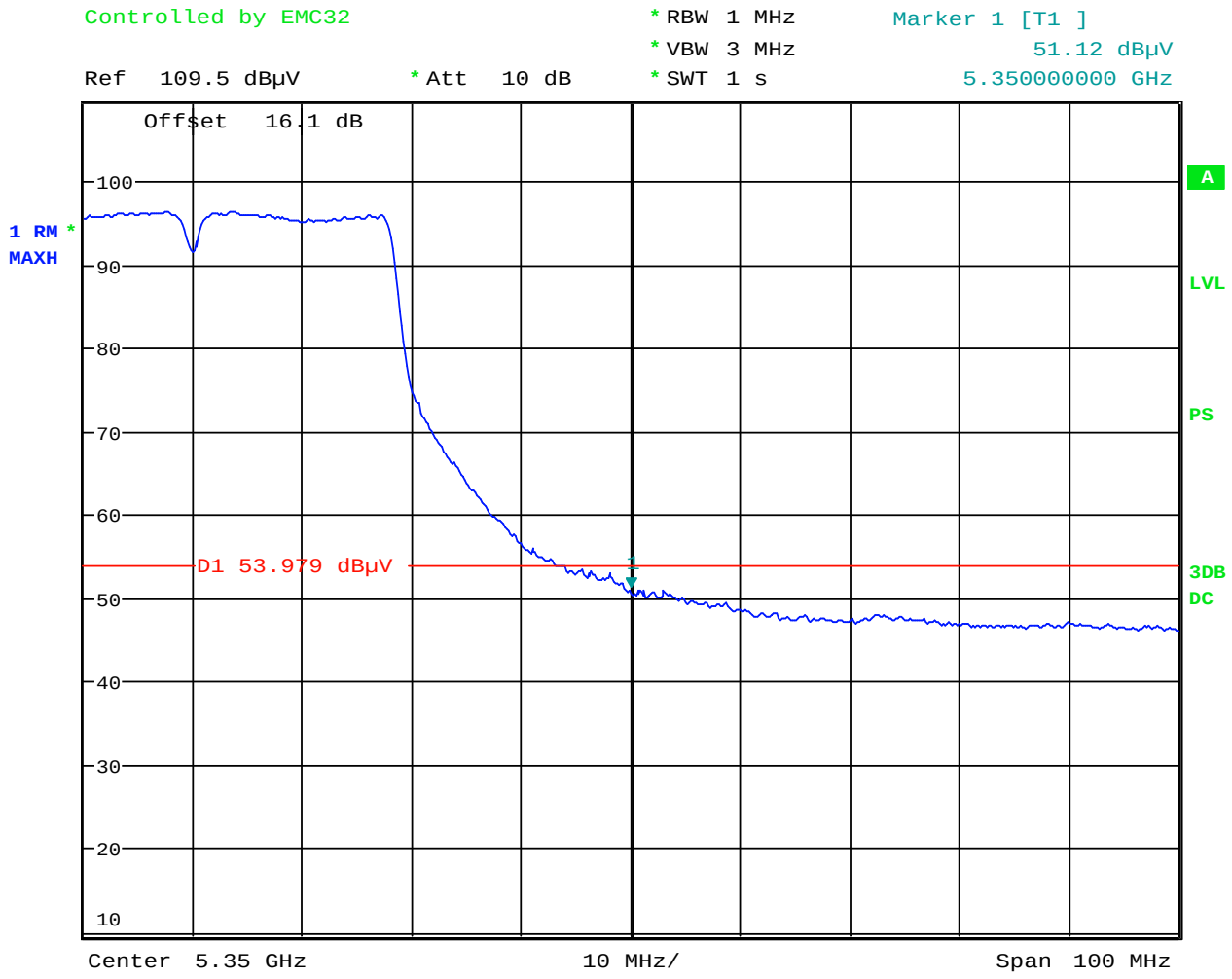
Radiated Band Edge Measurements (40MHz BW) (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

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



Date: 28.DEC.2012 10:28:04

Plot 6-63. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2)

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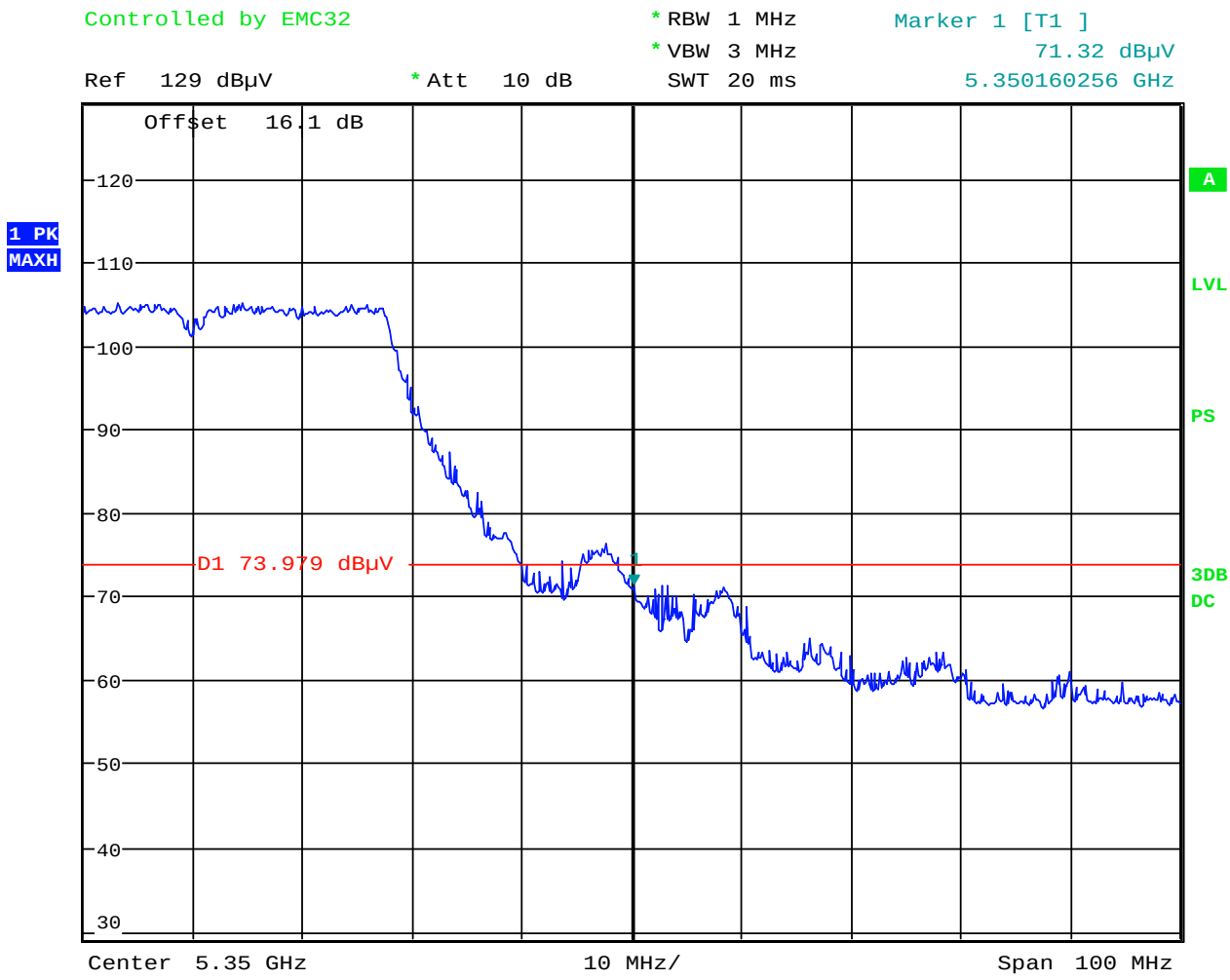
Radiated Band Edge Measurements (40MHz BW) (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]



Date: 28.DEC.2012 10:29:38

Plot 6-64. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2)

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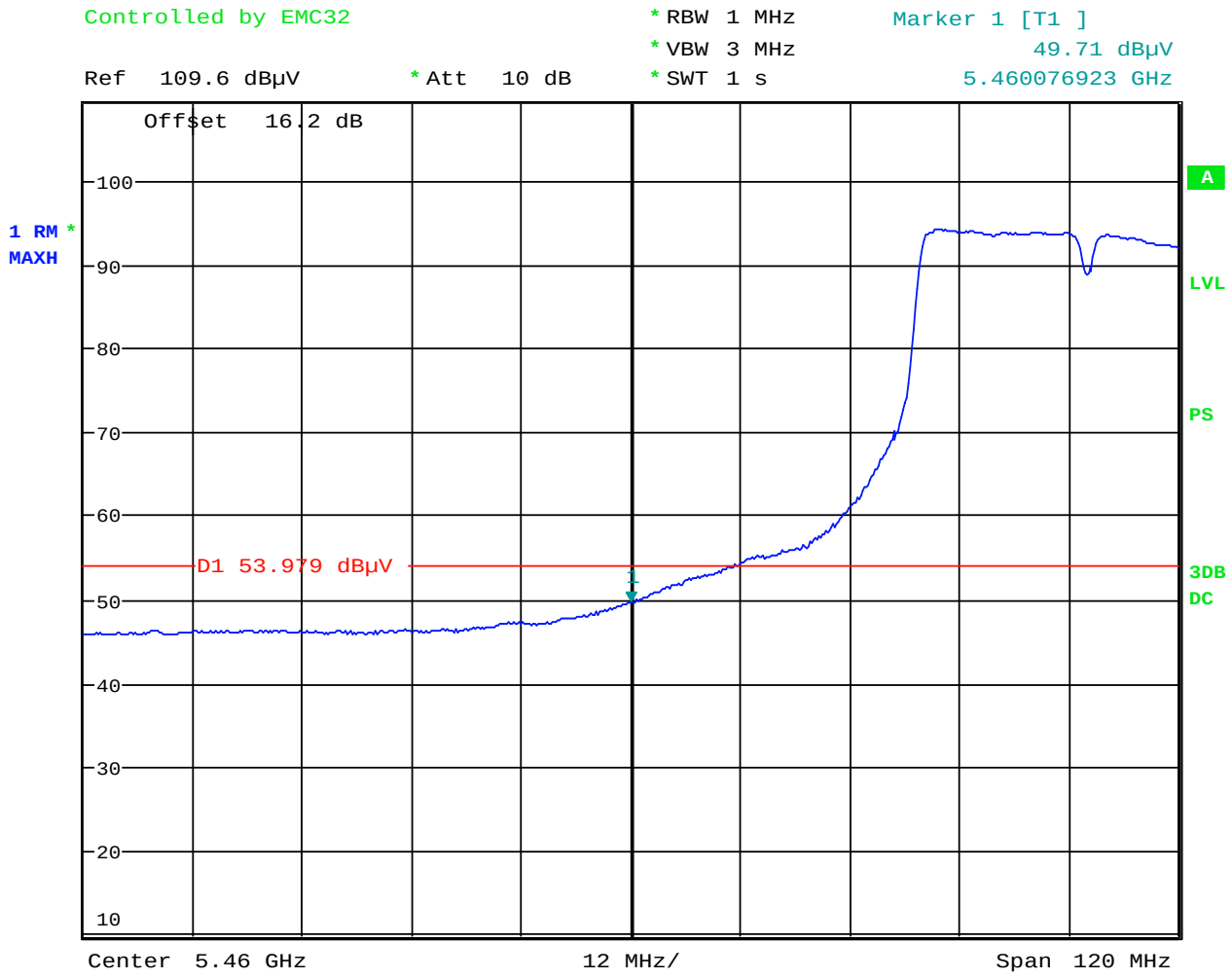
Radiated Band Edge Measurements (40MHz BW) (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

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



Date: 28.DEC.2012 10:32:54

Plot 6-65. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 3)

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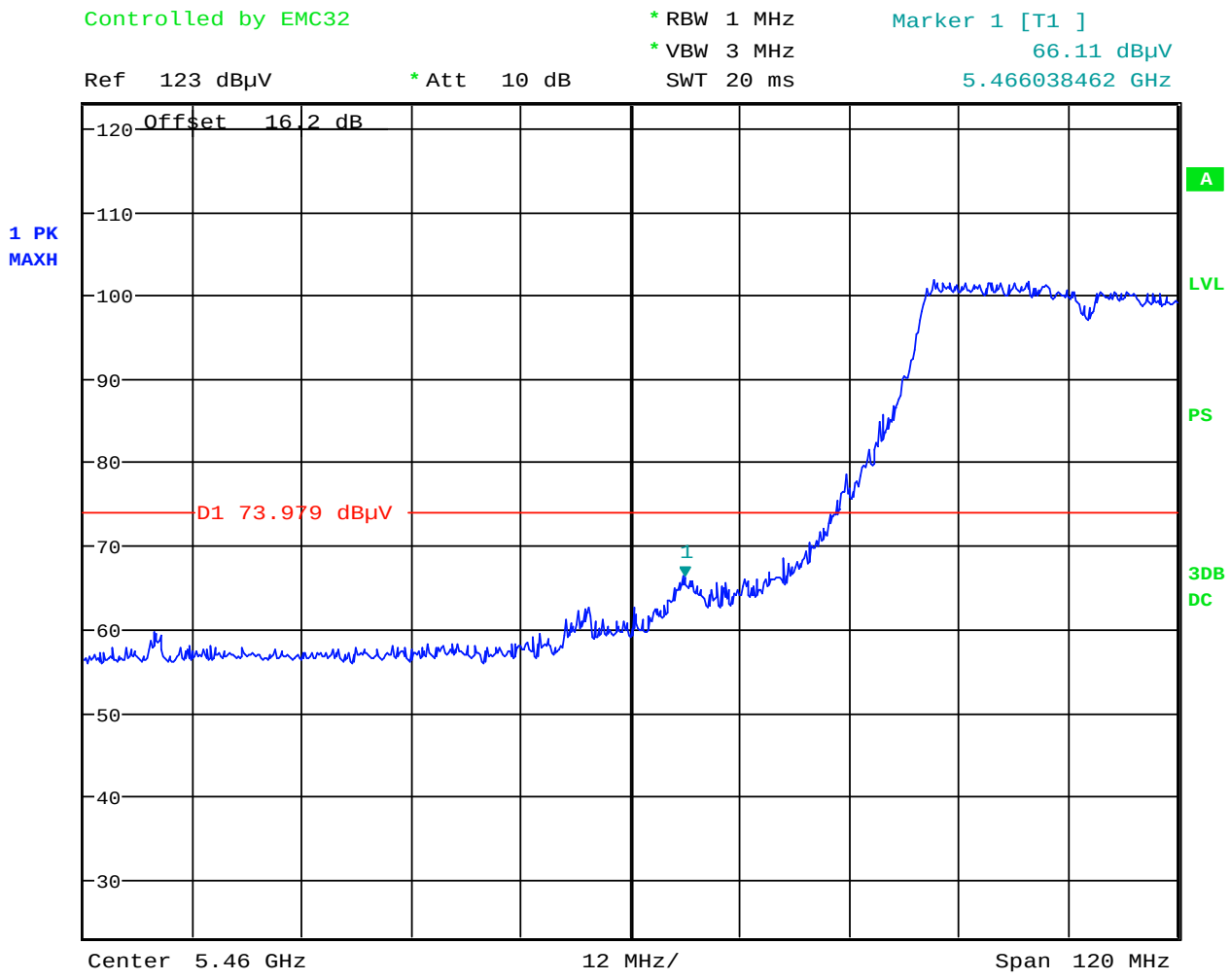
Radiated Band Edge Measurements (40MHz BW) (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]



Date: 28.DEC.2012 10:42:55

Plot 6-66. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 3)

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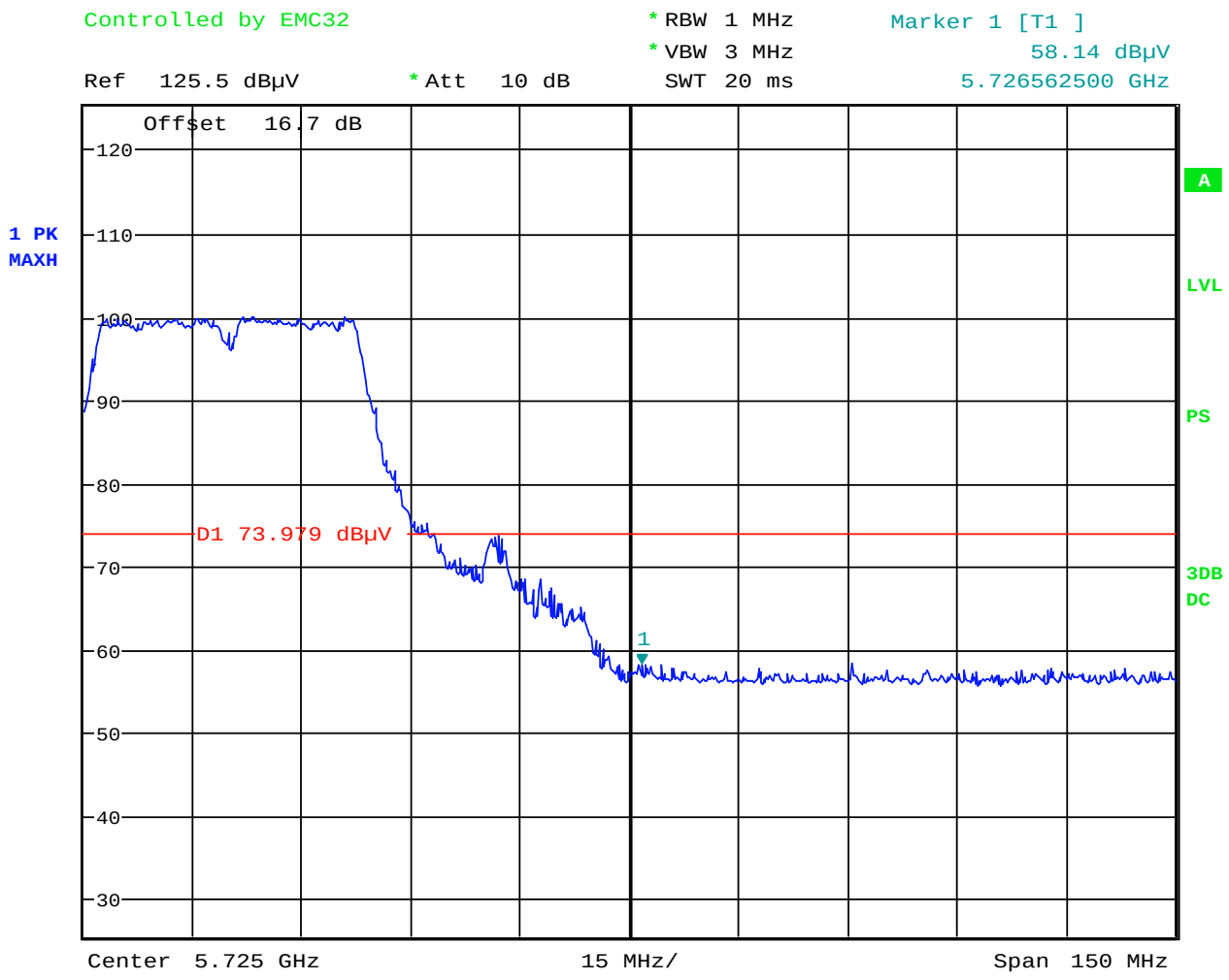
Radiated Band Edge Measurements (40MHz BW) (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

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



Date: 28.DEC.2012 10:47:23

Plot 6-67. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

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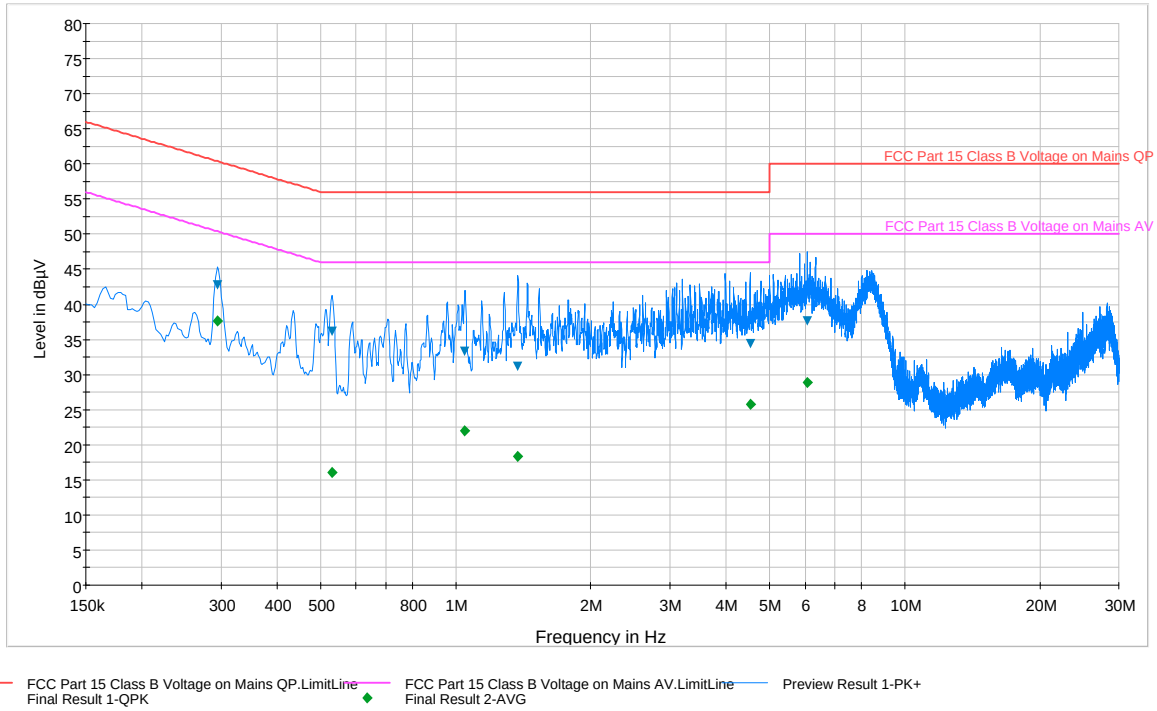
6.10 Line-Conducted Test Data

§15.207; RSS-Gen [7.2.2]



Plot 6-68. Line Conducted Plot with 802.11a UNII Band 1 (L1)

Frequency	Line	Corr.	QuasiPeak	Limit	Margin	Average	Limit	Margin
MHz		dB	dBµV	dBµV	dB	dBµV	dBµV	dB
0.294	L1	0.1	42.80	60.40	17.60	37.60	50.40	12.80
0.530	L1	0.1	36.10	56.00	19.90	16.00	46.00	30.00
1.048	L1	0.2	33.30	56.00	22.70	22.00	46.00	24.00
1.376	L1	0.2	31.10	56.00	24.90	18.30	46.00	27.70
4.526	L1	0.2	34.40	56.00	21.60	25.70	46.00	20.30
6.068	L1	0.3	37.60	60.00	22.40	28.90	50.00	21.10

Table 6-21. 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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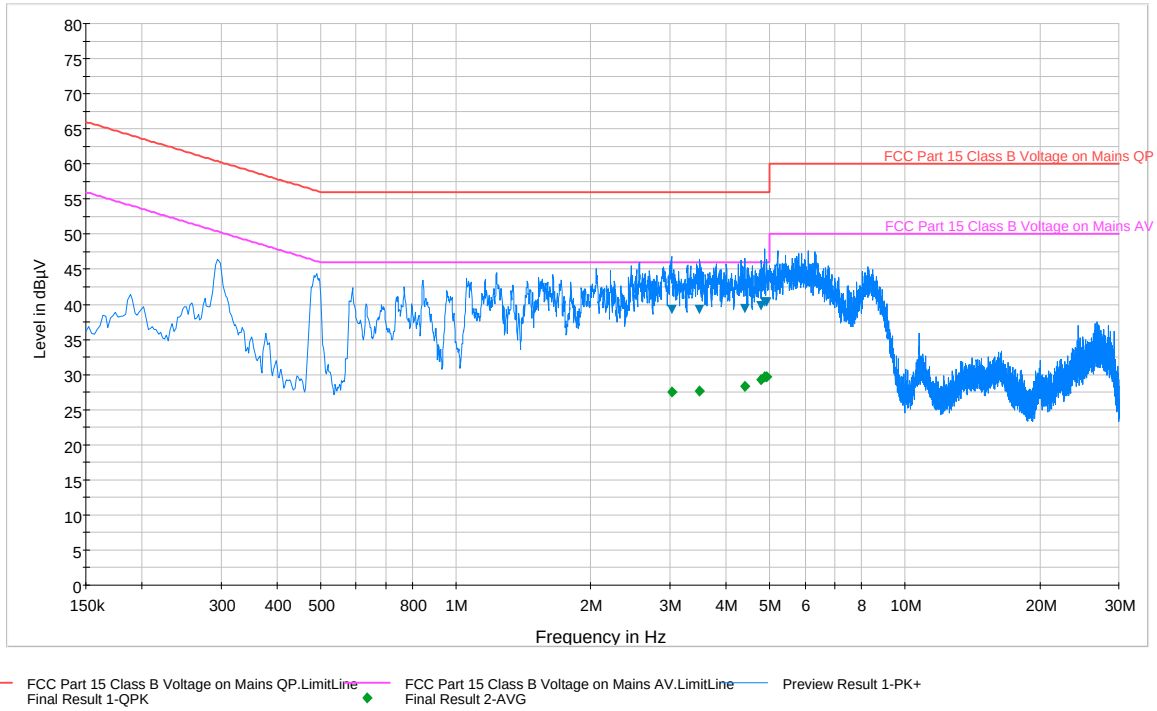
Line-Conducted Test Data (Cont'd)

§15.207; RSS-Gen [7.2.2]



Plot 6-69. 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
3.026	N	0.2	39.20	56.00	16.80	27.60	46.00	18.40
3.498	N	0.2	39.20	56.00	16.80	27.60	46.00	18.40
4.400	N	0.2	39.30	56.00	16.70	28.40	46.00	17.60
4.796	N	0.2	39.80	56.00	16.20	29.30	46.00	16.70
4.882	N	0.2	40.30	56.00	15.70	29.70	46.00	16.30
4.927	N	0.2	40.30	56.00	15.70	29.70	46.00	16.30

Table 6-22. 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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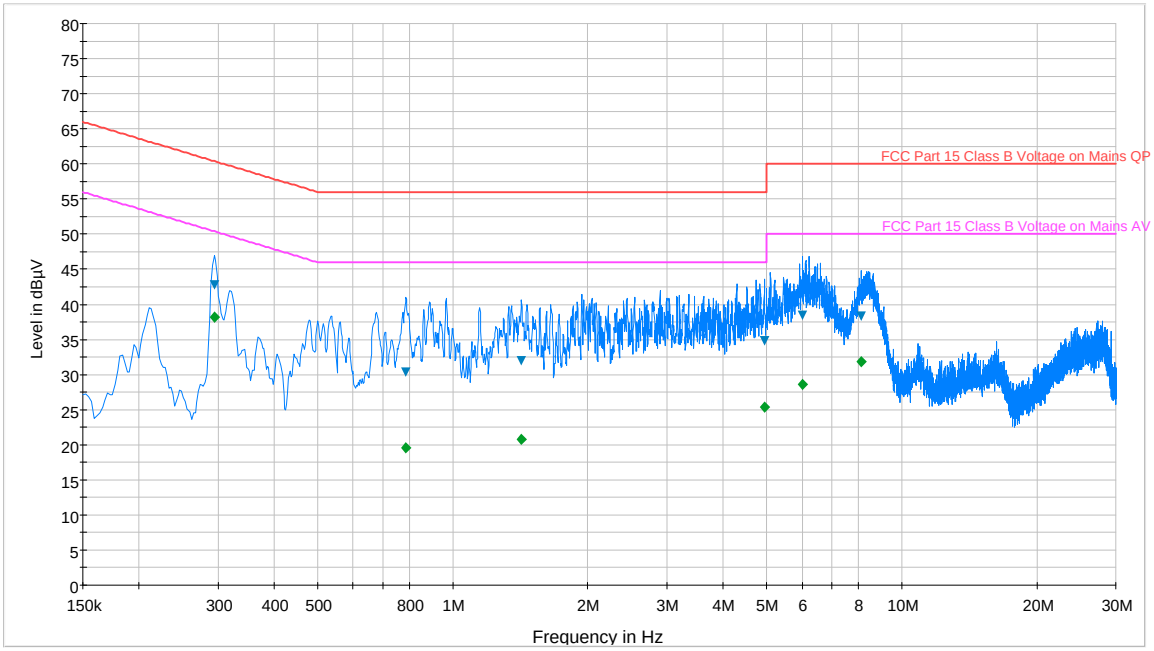
Line-Conducted Test Data (Cont'd)

§15.207; RSS-Gen [7.2.2]



Plot 6-70. Line Conducted Plot with 802.11a UNII Band 2 (L1)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.294	L1	0.1	42.70	60.40	17.70	38.20	50.40	12.20
0.787	L1	0.1	30.30	56.00	25.70	19.60	46.00	26.40
1.421	L1	0.2	32.00	56.00	24.00	20.80	46.00	25.20
4.947	L1	0.2	34.80	56.00	21.20	25.40	46.00	20.60
6.016	L1	0.3	38.40	60.00	21.60	28.60	50.00	21.40
8.138	L1	0.3	38.40	60.00	21.60	31.80	50.00	18.20

Table 6-23. Line Conducted Data with 802.11a UNII Band 2 (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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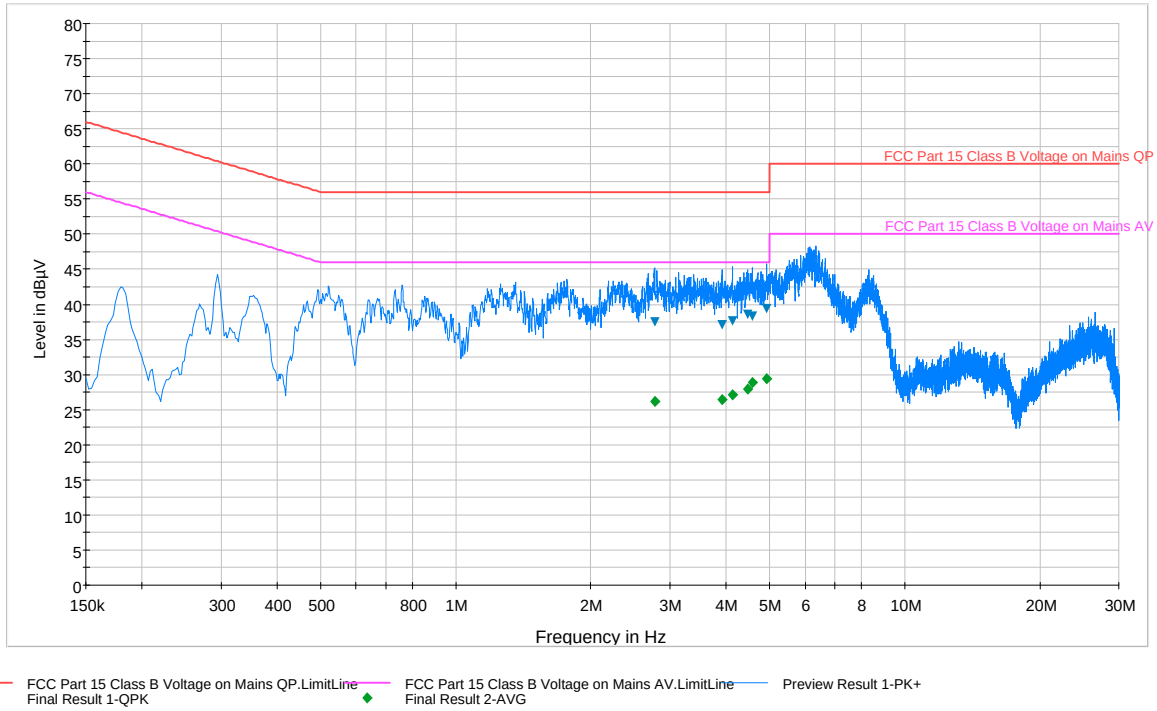
Line-Conducted Test Data (Cont'd)

§15.207; RSS-Gen [7.2.2]



Plot 6-71. Line Conducted Plot with 802.11a UNII Band 2 (N)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
2.771	N	0.2	37.50	56.00	18.50	26.20	46.00	19.80
3.928	N	0.2	37.10	56.00	18.90	26.40	46.00	19.60
4.133	N	0.2	37.70	56.00	18.30	27.10	46.00	18.90
4.461	N	0.2	38.60	56.00	17.40	28.00	46.00	18.00
4.578	N	0.2	38.40	56.00	17.60	28.90	46.00	17.10
4.931	N	0.2	39.40	56.00	16.60	29.40	46.00	16.60

Table 6-24. Line Conducted Data with 802.11a UNII Band 2 (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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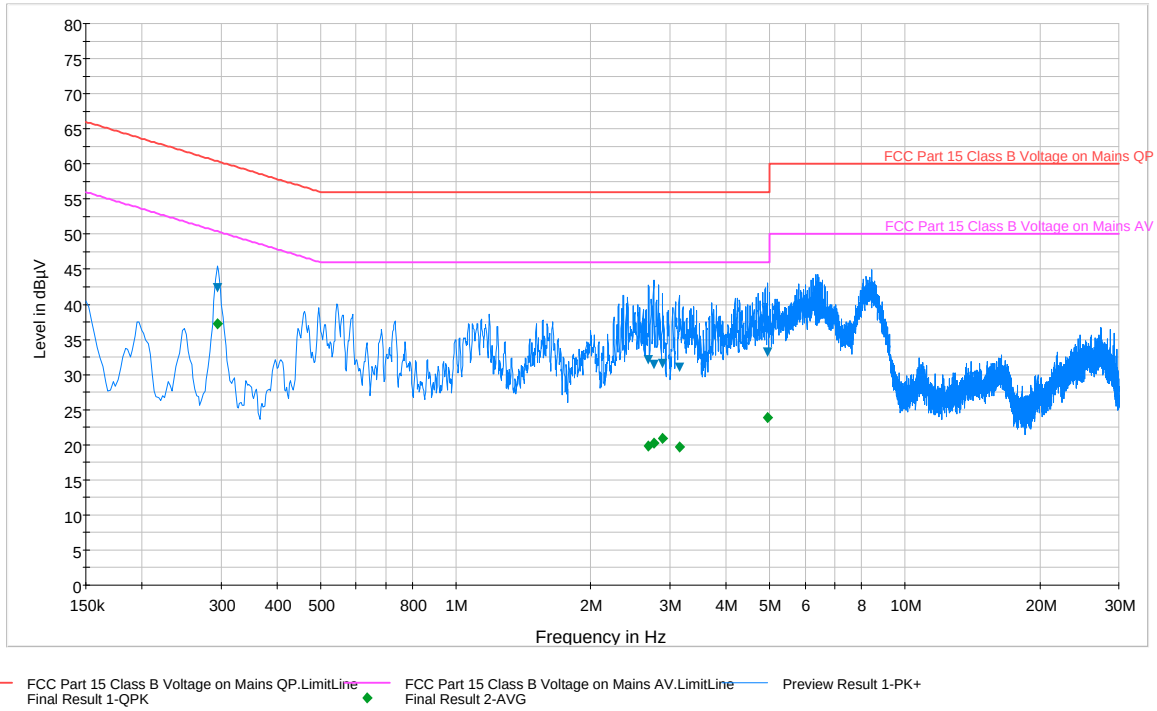
Line-Conducted Test Data (Cont'd)

§15.207; RSS-Gen [7.2.2]



Plot 6-72. Line Conducted Plot with 802.11a UNII Band 3 (L1)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.294	L1	0.1	42.30	60.40	18.10	37.20	50.40	13.20
2.690	L1	0.2	32.00	56.00	24.00	19.80	46.00	26.20
2.760	L1	0.2	31.50	56.00	24.50	20.20	46.00	25.80
2.888	L1	0.2	31.60	56.00	24.40	20.90	46.00	25.10
3.147	L1	0.2	31.10	56.00	24.90	19.70	46.00	26.30
4.945	L1	0.2	33.20	56.00	22.80	23.80	46.00	22.20

Table 6-25. Line Conducted Plot with 802.11a UNII Band 3 (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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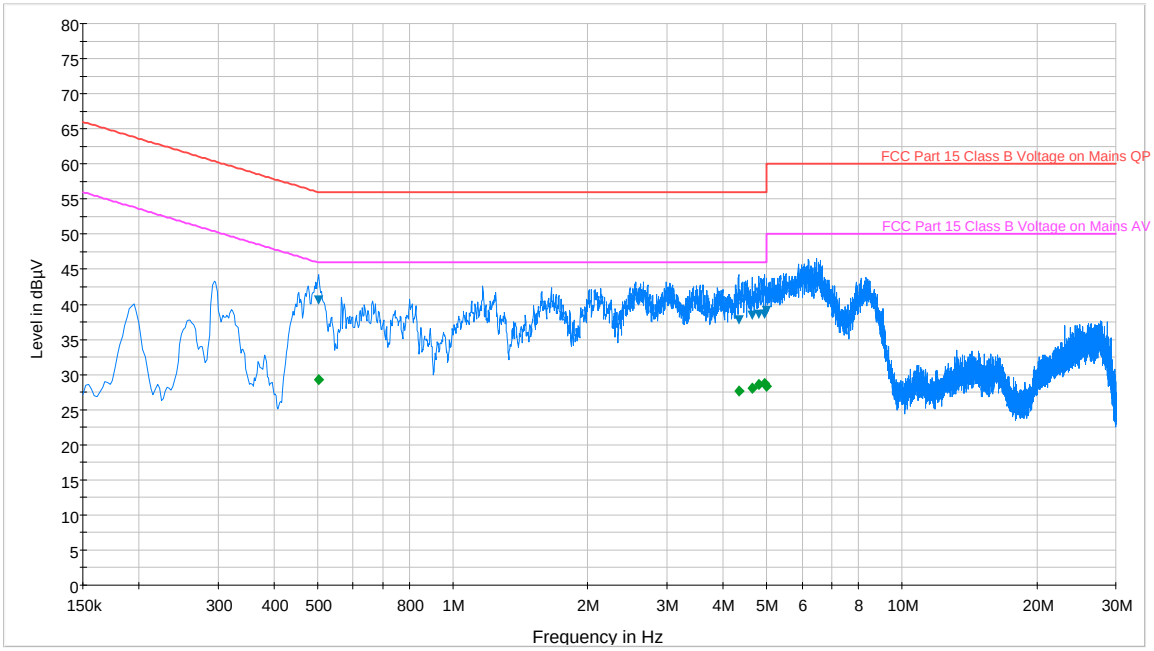
Line-Conducted Test Data (Cont'd)

§15.207; RSS-Gen [7.2.2]



Plot 6-73. Line Conducted Plot with 802.11a UNII Band 3 (N)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.503	N	0.1	40.60	56.00	15.40	29.30	46.00	16.70
4.333	N	0.2	37.80	56.00	18.20	27.60	46.00	18.40
4.652	N	0.2	38.50	56.00	17.50	28.00	46.00	18.00
4.812	N	0.2	38.60	56.00	17.40	28.60	46.00	17.40
4.949	N	0.2	38.60	56.00	17.40	28.70	46.00	17.30
4.997	N	0.2	39.10	56.00	16.90	28.40	46.00	17.60

Table 6-26. Line Conducted Data with 802.11a UNII Band 3 (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 Tablet FCC ID: A3LGTN5100** is in compliance with Part 15E of the FCC Rules.

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