

## 7.4 UNII Output Power Measurement – 802.11a/n/ac §15.407 (a.1)

### Test Overview and Limits

A transmitter antenna terminal of the EUT is connected to the input of an RF pulse power sensor. Measurement is made using a broadband average power meter while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02 v01, and at the appropriate frequencies.

*In the 5.15 – 5.25GHz band, the maximum permissible conducted output power is 250mW (23.98dBm).*

*In the 5.25 – 5.35GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and  $11 \text{ dBm} + 10\log_{10}(26\text{dB BW}) = 11 \text{ dBm} + 10\log_{10}(21.49) = 24.32\text{dBm}$ .*

*In the 5.47 – 5.725GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and  $11 \text{ dBm} + 10\log_{10}(26\text{dB BW}) = 11 \text{ dBm} + 10\log_{10}(21.50) = 24.32\text{dBm}$ .*

*In the 5.725 – 5.850GHz band, the maximum permissible conducted output power is 1W (30dBm).*

### Test Procedure Used

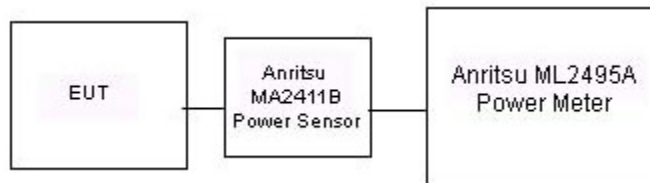
KDB 789033 D02 v01 – Section E)3)b) Method PM-G

### Test Settings

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

### Test Setup



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



**Figure 7-3. Test Instrument & Measurement Setup**

### Test Notes

None



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Freq [MHz]	Channel	Detector	5GHz (20MHz) Conducted Power [dBm]		
			IEEE Transmission Mode		
			802.11a	802.11n	802.11ac
5180	36	AVG	10.23	9.99	8.65
5200	40	AVG	10.70	10.40	9.41
5220	44	AVG	10.69	10.39	9.59
5240	48	AVG	10.87	10.59	9.82
5260	52	AVG	10.90	10.77	9.90
5280	56	AVG	10.40	10.30	9.39
5300	60	AVG	10.45	10.19	9.41
5320	64	AVG	10.37	10.33	9.60
5500	100	AVG	10.93	10.84	9.62
5520	104	AVG	11.06	10.93	10.31
5540	108	AVG	11.14	10.80	10.16
5560	112	AVG	10.95	10.94	10.23
5580	116	AVG	10.64	10.46	9.25
5745	149	AVG	10.33	10.51	9.27
5765	153	AVG	10.27	10.37	9.26
5785	157	AVG	10.00	10.18	9.05
5805	161	AVG	10.42	10.50	9.60
5825	165	AVG	10.23	10.59	9.44

**Table 7-4. 20MHz BW (UNII) Maximum Conducted Output Power**



Freq [MHz]	Channel	Detector	5GHz (40MHz) Conducted	
			IEEE Transmission Mode	
			802.11n	802.11ac
5190	38	AVG	10.41	9.99
5230	46	AVG	10.56	10.08
5270	54	AVG	10.87	10.23
5310	62	AVG	10.87	10.31
5510	102	AVG	10.49	9.91
5550	110	AVG	10.55	9.89
5670	134	AVG	10.51	9.95
5755	151	AVG	10.32	9.77
5795	159	AVG	10.18	9.82

**Table 7-5. 40MHz BW (UNII) Maximum Conducted Output Power**

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5GHz (80MHz) Conducted Power [dBm]			
Freq [MHz]	Channel	Detector	IEEE Transmission Mode
			802.11ac
5210	42	AVG	10.27
5290	58	AVG	10.43
5530	106	AVG	10.18
5775	155	AVG	9.80

**Table 7-6. 80MHz BW (UNII) Maximum Conducted Output Power**

<b>FCC ID:</b> ZNFK557		<b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset		Page 36 of 116

## 7.5 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, at its maximum power control level, as defined in KDB 789033 D02 v01, and at the appropriate frequencies. Method SA-1, as defined in KDB 789033 D02 v01, was used to measure the power spectral density.

***In the 5.15 – 5.25GHz, 5.25 – 5.35GHz, 5.47 – 5.725GHz bands, the maximum permissible power spectral density is 11dBm/MHz.***

***In the 5.725 – 5.850GHz band, the maximum permissible power spectral density is 30dBm/500kHz.***

### Test Procedure Used

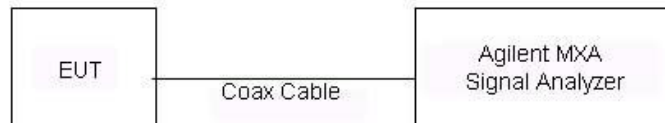
KDB 789033 D02 v01 – Section F

### 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. Number of sweep points  $\geq 2 \times$  (span/RBW)
6. Sweep time = auto
7. Detector = power averaging (RMS)
8. Trigger was set to free run for all modes
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 7-4. Test Instrument & Measurement Setup**

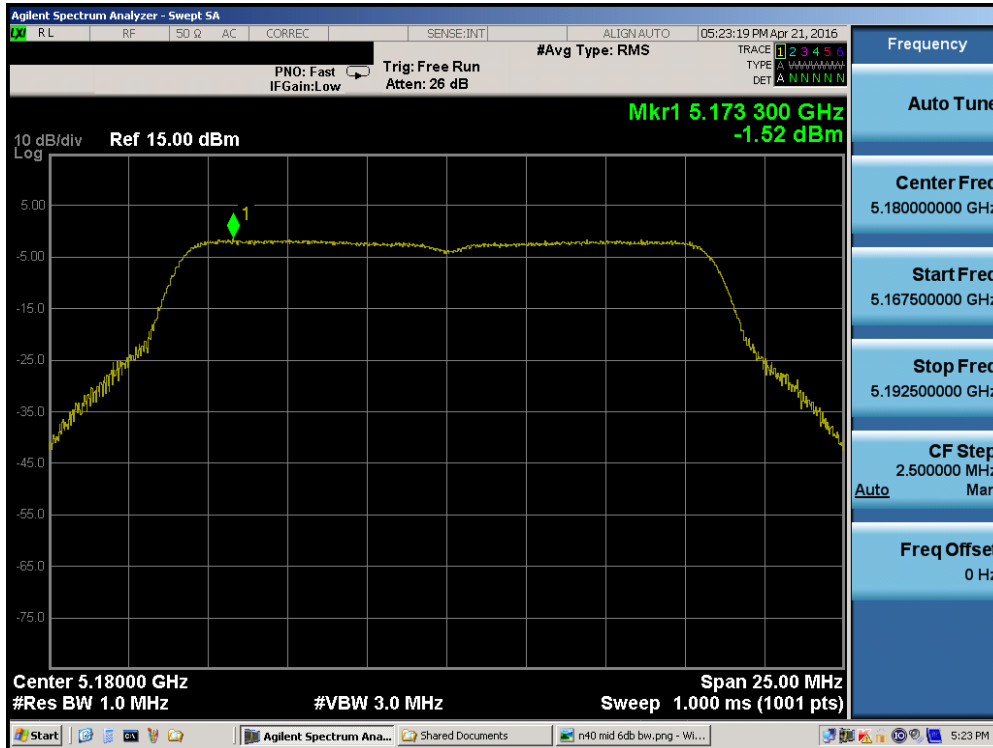
### Test Notes

None

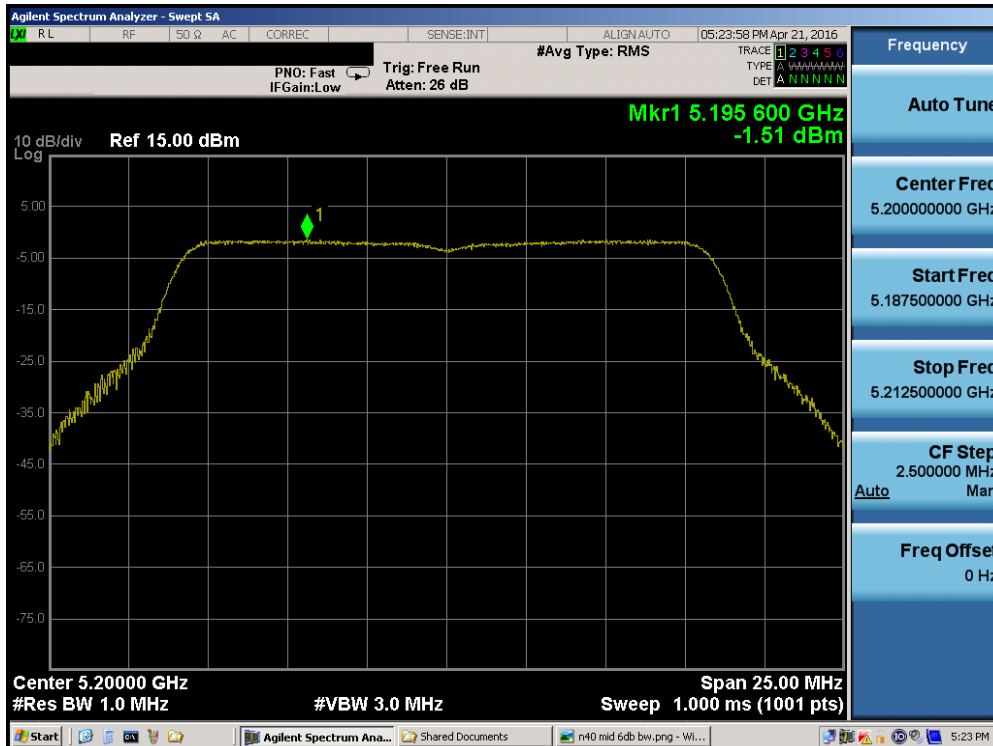
FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset	Page 37 of 116	

	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	-1.52	11.0	-12.52	Pass
	5200	40	a	6	-1.51	11.0	-12.51	Pass
	5240	48	a	6	-1.19	11.0	-12.19	Pass
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	-1.81	11.0	-12.81	Pass
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	-1.66	11.0	-12.66	Pass
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	-1.50	11.0	-12.50	Pass
	5190	38	n (40MHz)	13.5/15 (MCS0)	-4.51	11.0	-15.51	Pass
	5230	46	n (40MHz)	13.5/15 (MCS0)	-4.35	11.0	-15.35	Pass
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-7.74	11.0	-18.74	Pass
Band 2A	5260	52	a	6	-0.86	11.0	-11.86	Pass
	5280	56	a	6	-1.16	11.0	-12.16	Pass
	5320	64	a	6	-1.42	11.0	-12.42	Pass
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	-1.00	11.0	-12.00	Pass
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	-1.44	11.0	-12.44	Pass
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	-1.94	11.0	-12.94	Pass
	5270	54	n (40MHz)	13.5/15 (MCS0)	-3.88	11.0	-14.88	Pass
	5310	62	n (40MHz)	13.5/15 (MCS0)	-3.97	11.0	-14.97	Pass
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	-7.17	11.0	-18.17	Pass
Band 2C	5500	100	a	6	-1.29	11.0	-12.29	Pass
	5580	116	a	6	-1.47	11.0	-12.47	Pass
	5700	140	a	6	-2.25	11.0	-13.25	Pass
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	-1.44	11.0	-12.44	Pass
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	-1.60	11.0	-12.60	Pass
	5700	140	n (20MHz)	6.5/7.2 (MCS0)	-2.23	11.0	-13.23	Pass
	5510	102	n (40MHz)	13.5/15 (MCS0)	-4.42	11.0	-15.42	Pass
	5550	110	n (40MHz)	13.5/15 (MCS0)	-4.41	11.0	-15.41	Pass
	5670	134	n (40MHz)	13.5/15 (MCS0)	-4.88	11.0	-15.88	Pass
5530	106	ac (80MHz)	29.3/32.5 (MCS0)	-8.08	11.0	-19.08	Pass	

**Table 7-7. Bands 1, 2A, 2C Conducted Power Spectral Density Measurements**

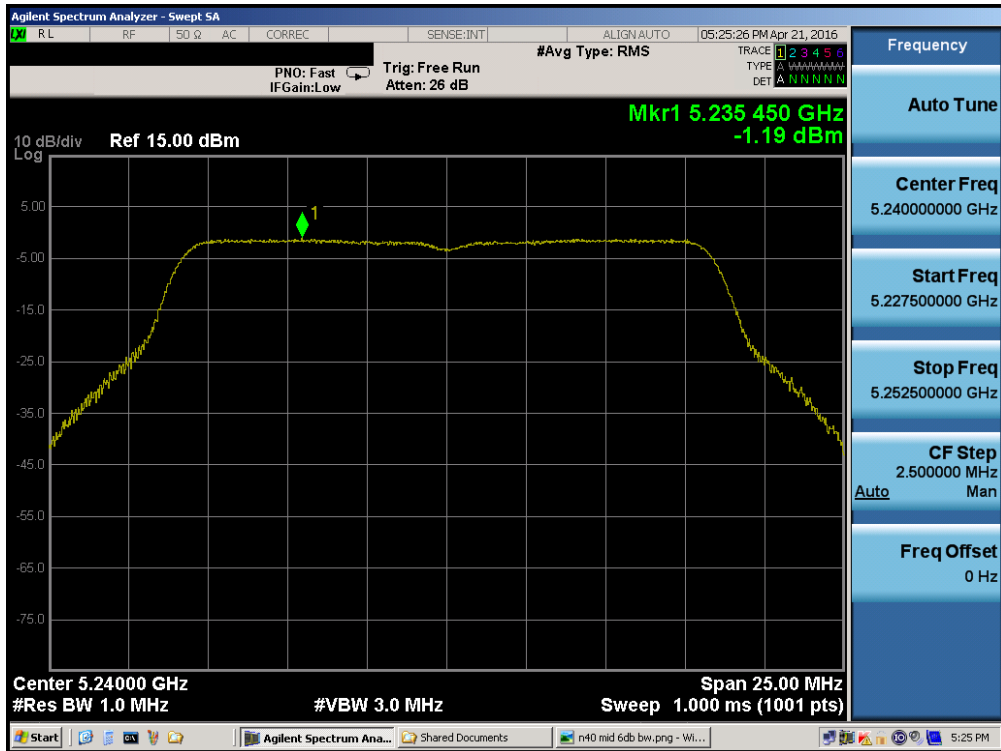


Plot 7-38. Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 36)

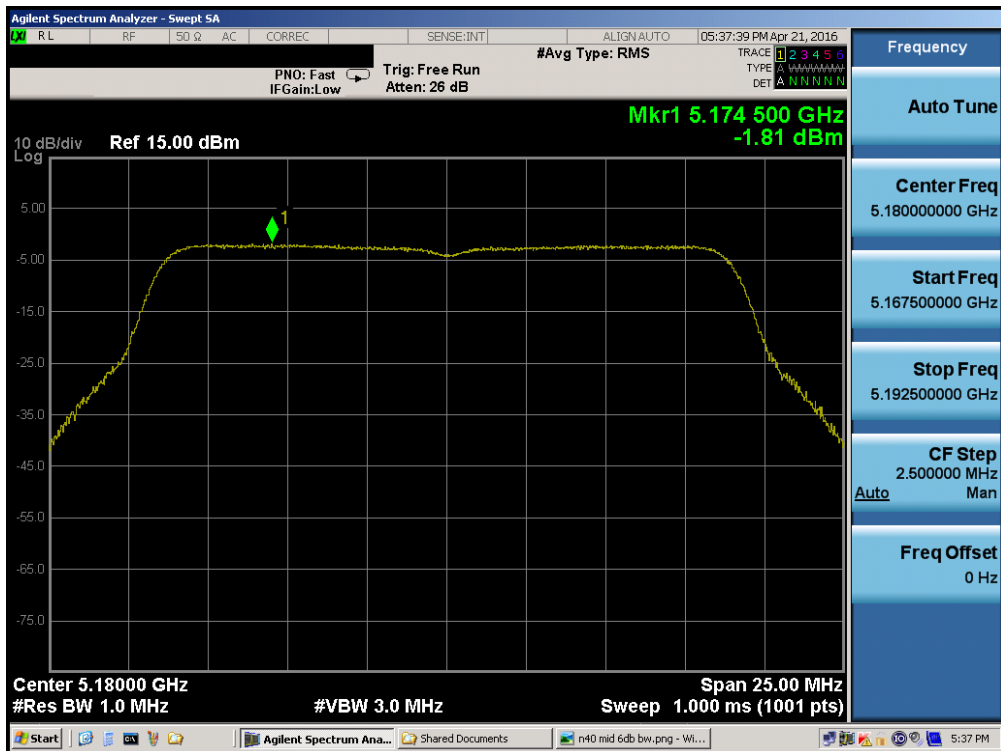


Plot 7-39. Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 40)

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 39 of 116



Plot 7-40. Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 48)

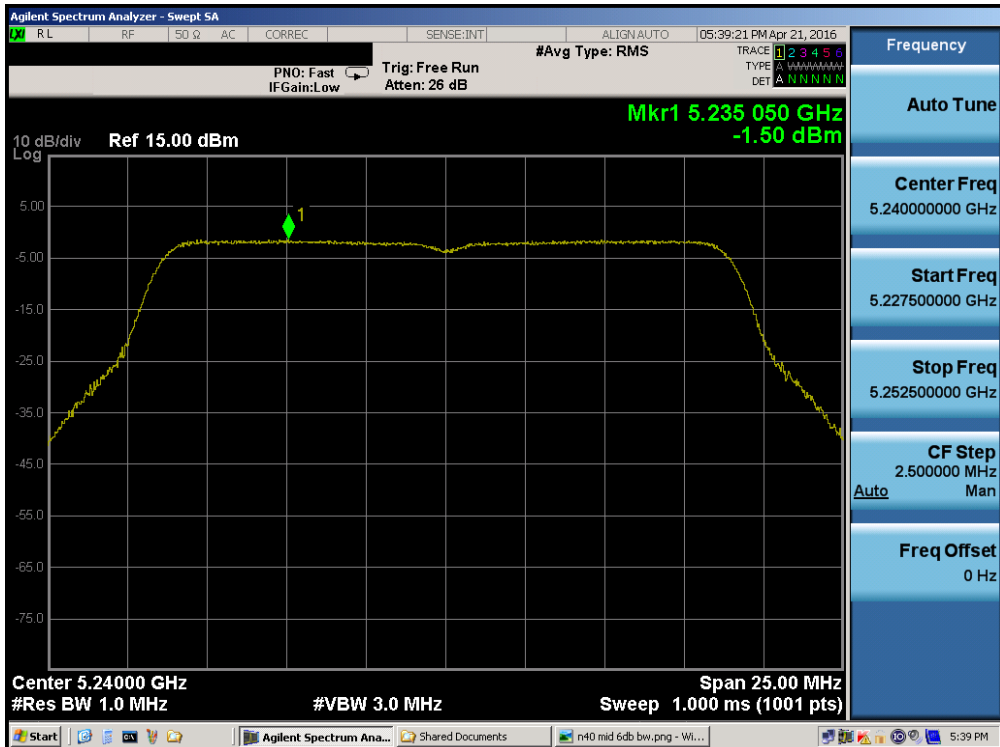


Plot 7-41. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

<p>FCC ID: ZNFK557</p>		<p>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)</p>		<p>Reviewed by: Quality Manager</p>
<p>Test Report S/N: 0Y1604110747.ZNF</p>	<p>Test Dates: 4/12 - 5/2/2016</p>	<p>EUT Type: Portable Handset</p>	<p>Page 40 of 116</p>	



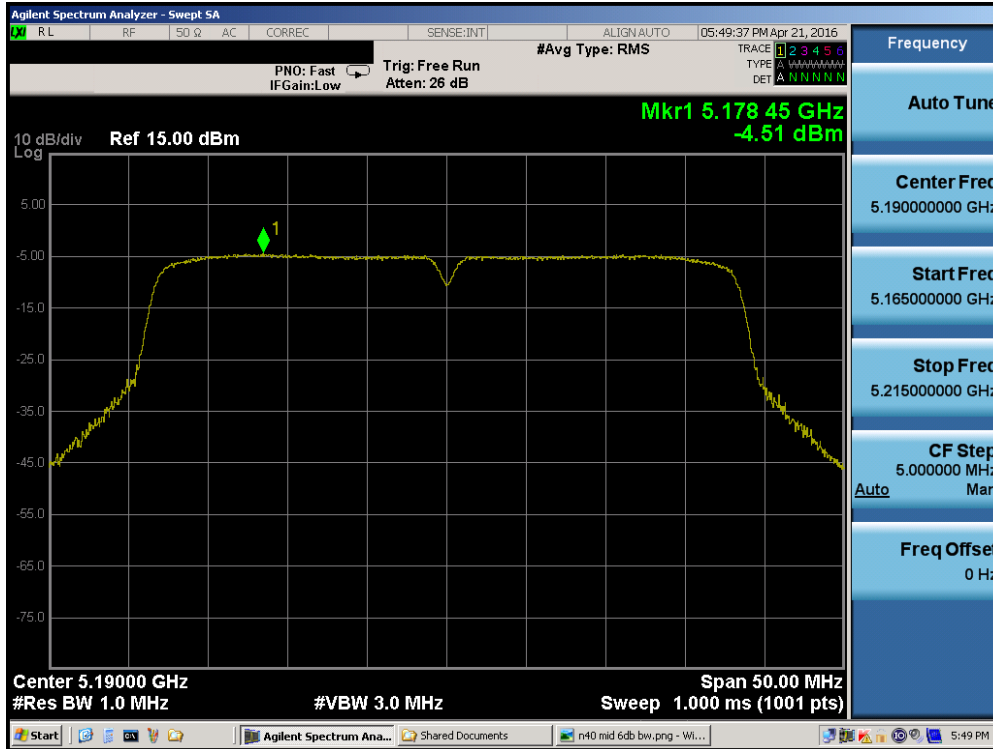
Plot 7-42. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 40)



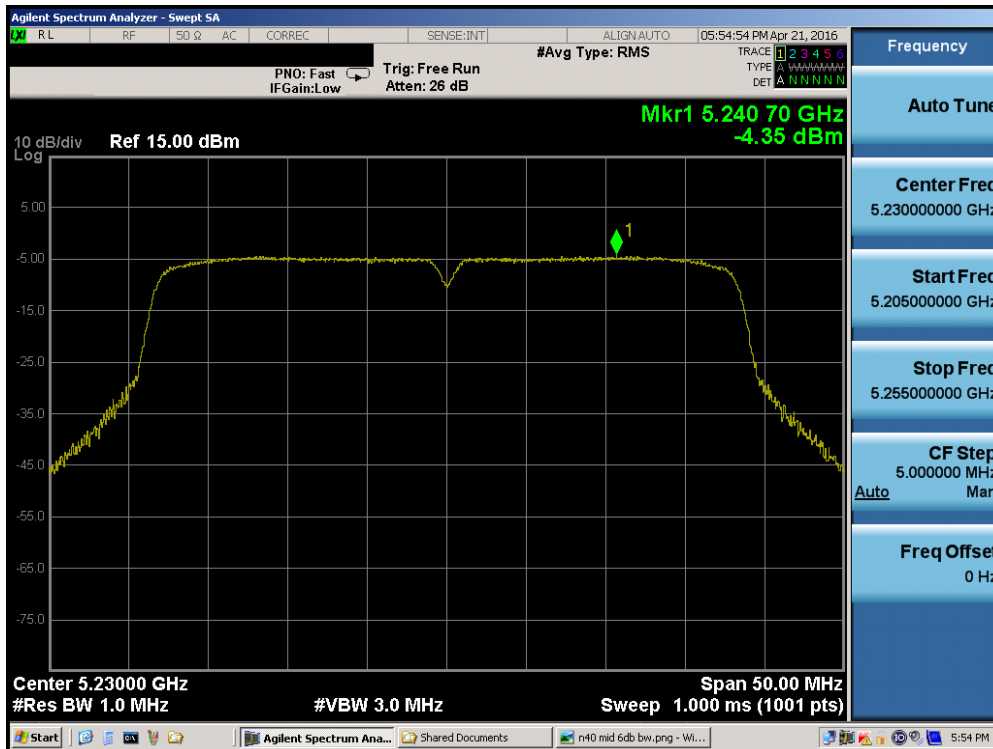
Plot 7-43. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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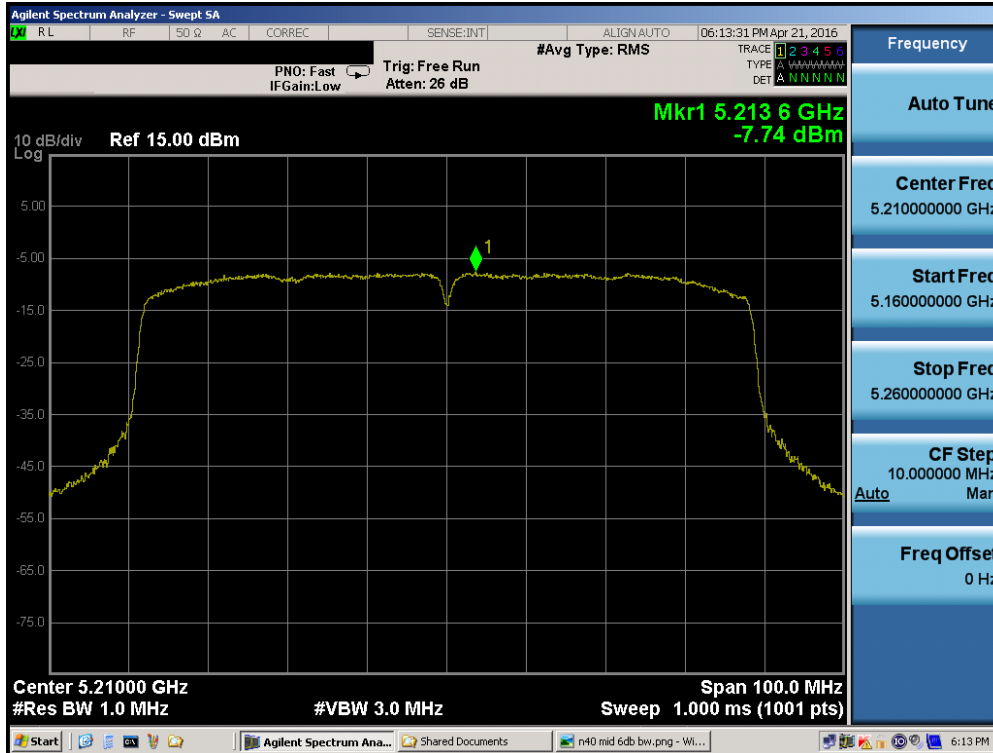


Plot 7-44. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 38)

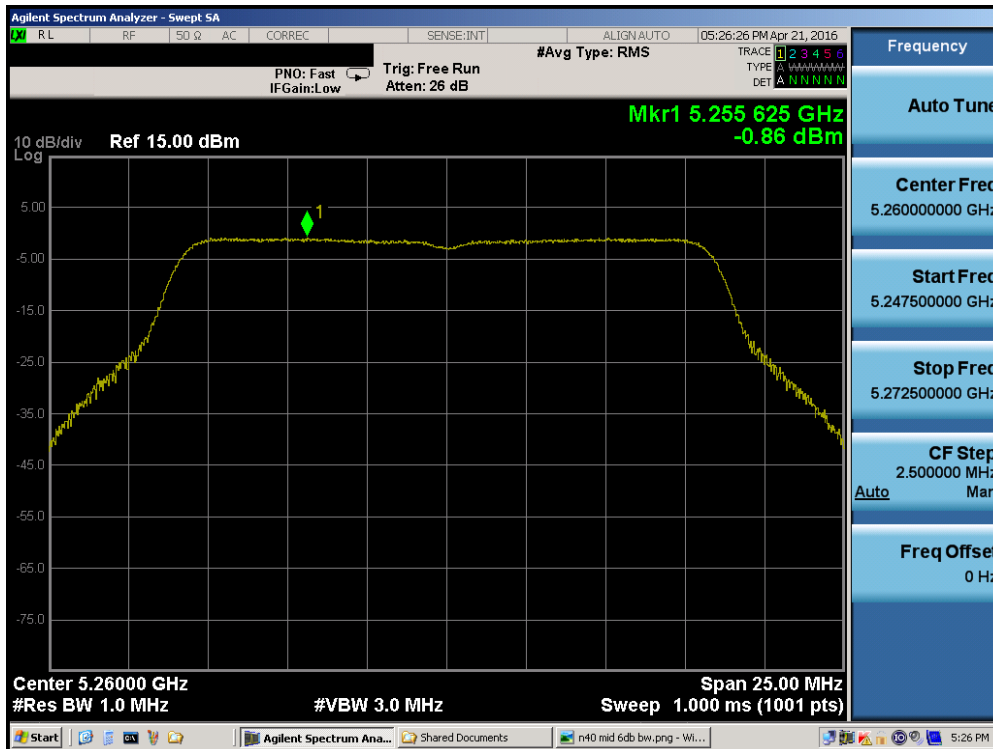


Plot 7-45. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

FCC ID: ZNFK557	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 42 of 116

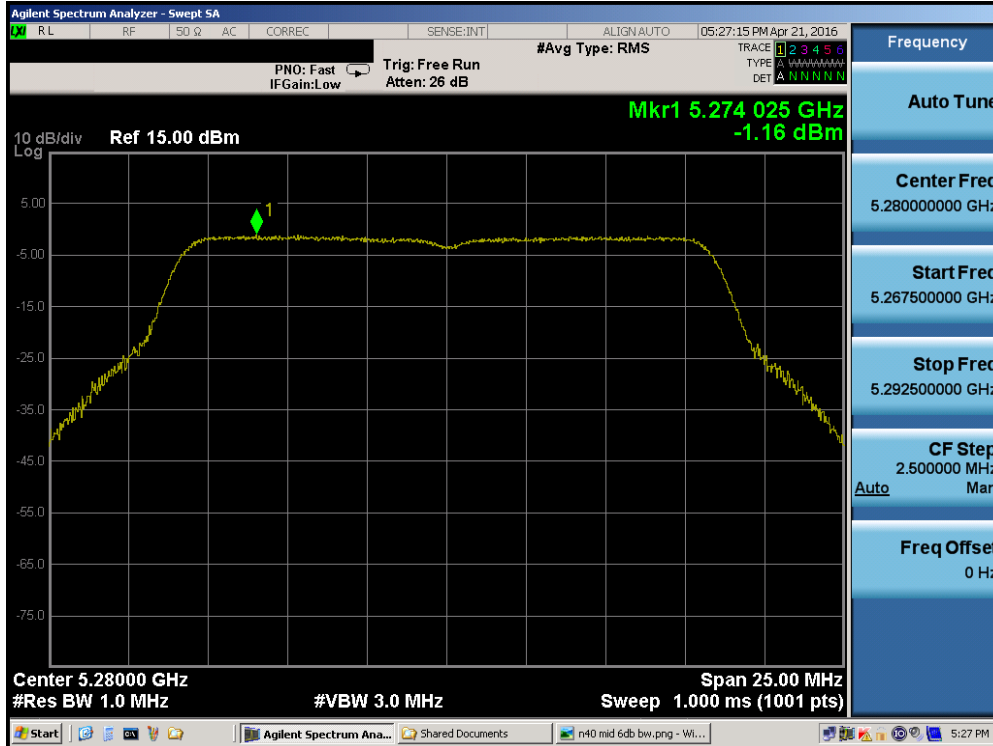


Plot 7-46. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)

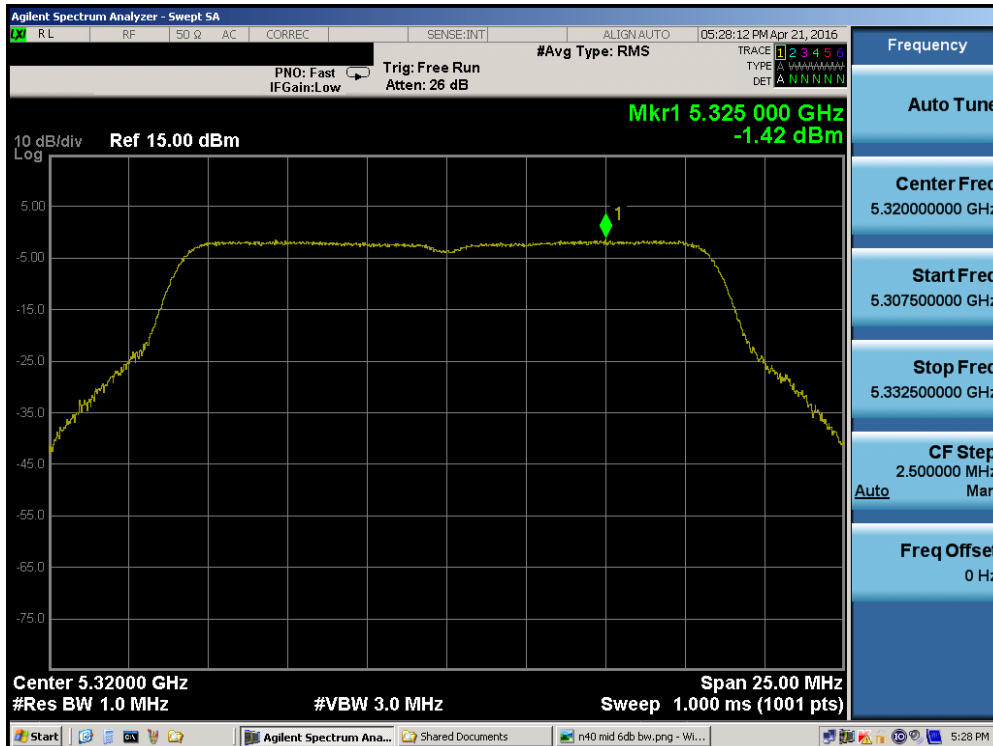


Plot 7-47. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 52)



FCC ID: ZNFK557	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 43 of 116



**Plot 7-48. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 56)**

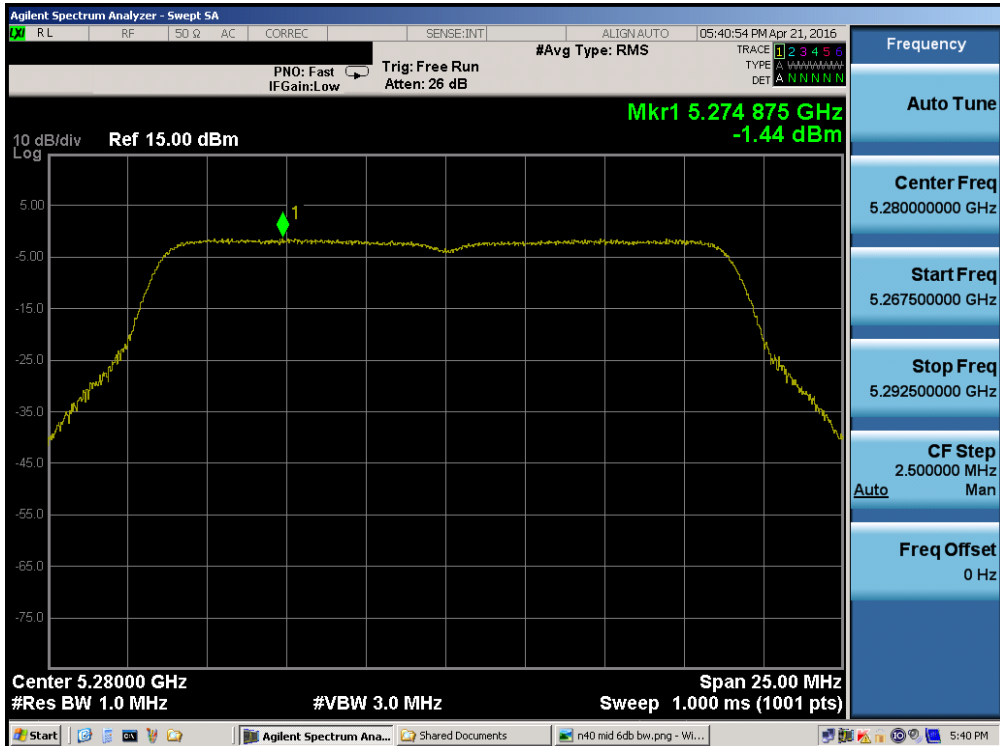


**Plot 7-49. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 64)**

FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 44 of 116

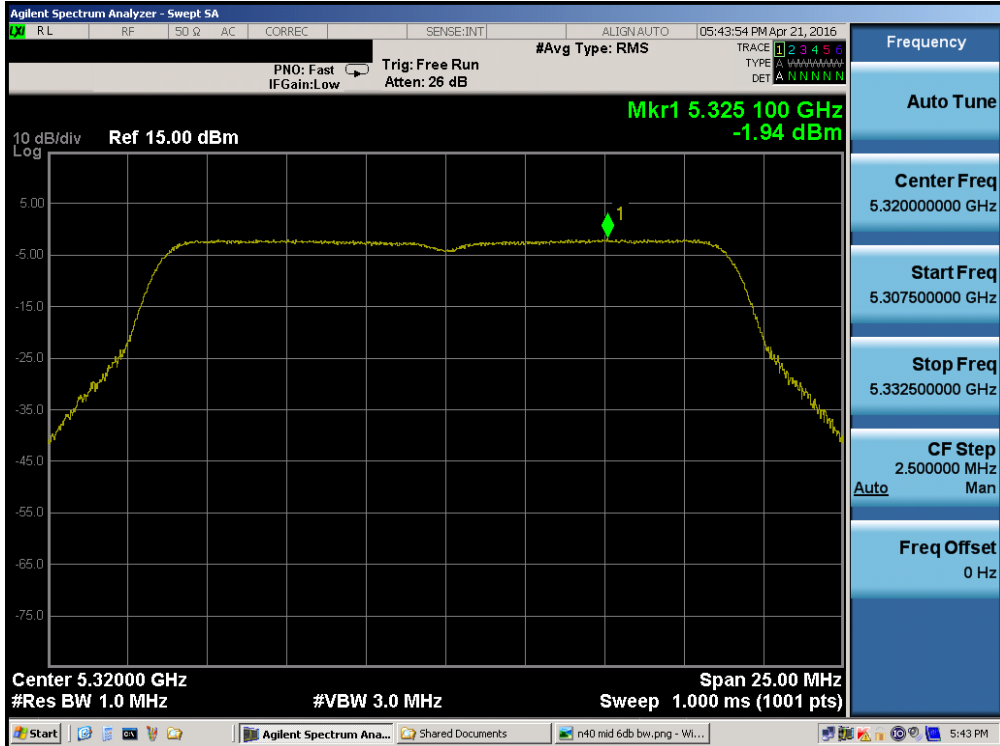


Plot 7-50. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)

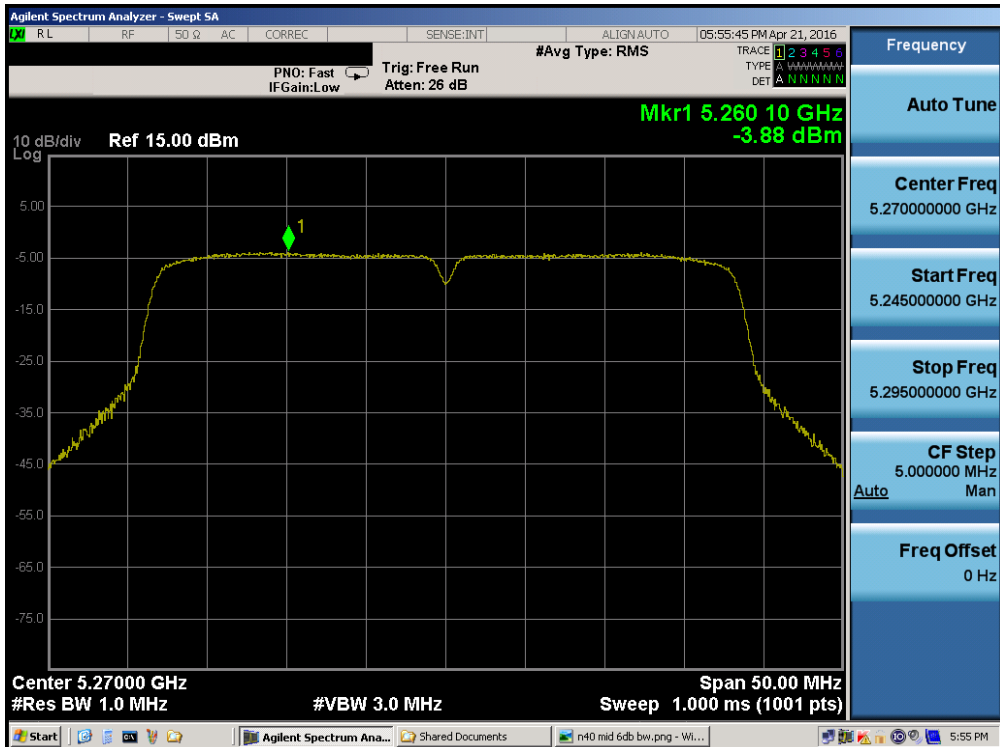


Plot 7-51. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)



FCC ID: ZNFK557	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 45 of 116

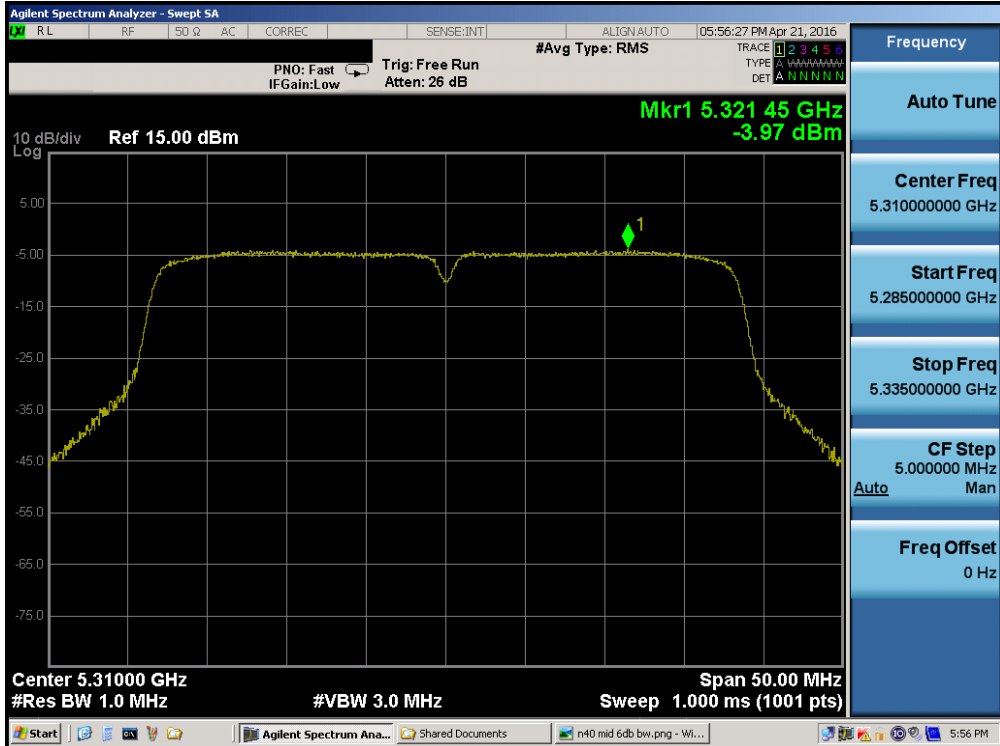


**Plot 7-52. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)**

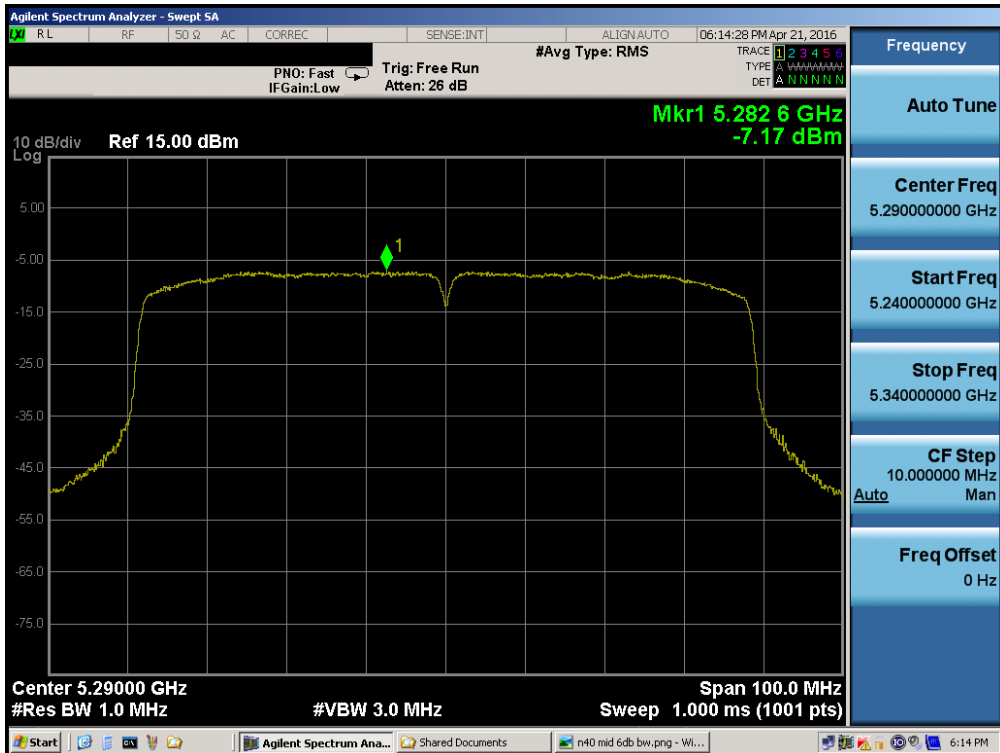


**Plot 7-53. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)**

FCC ID: ZNFK557	 <b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 46 of 116

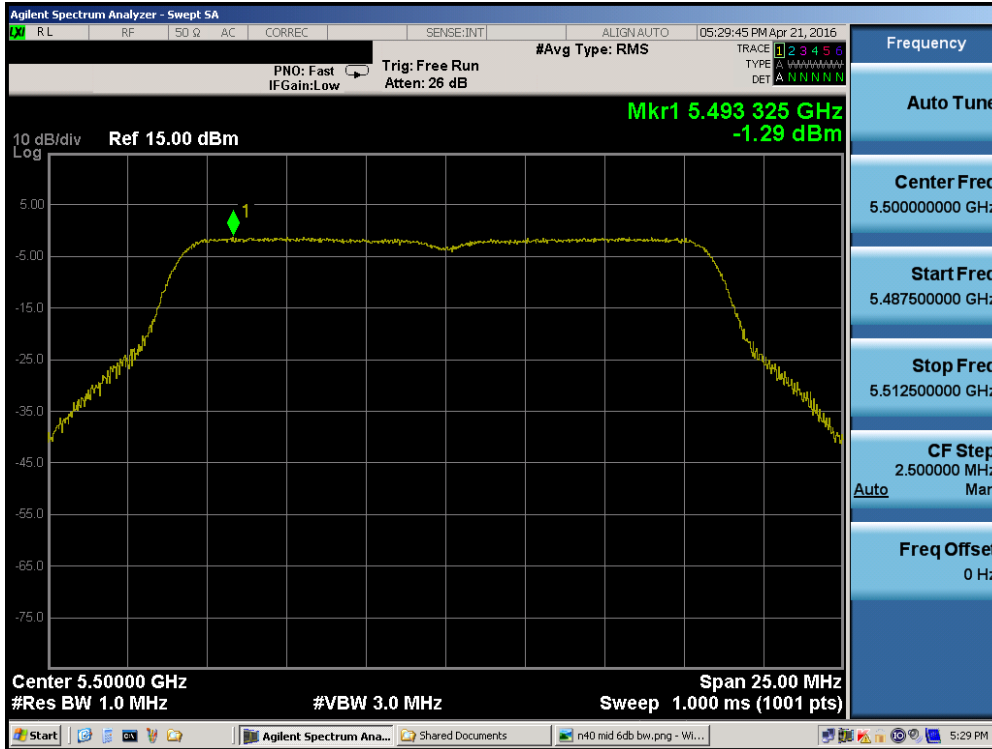


Plot 7-54. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)

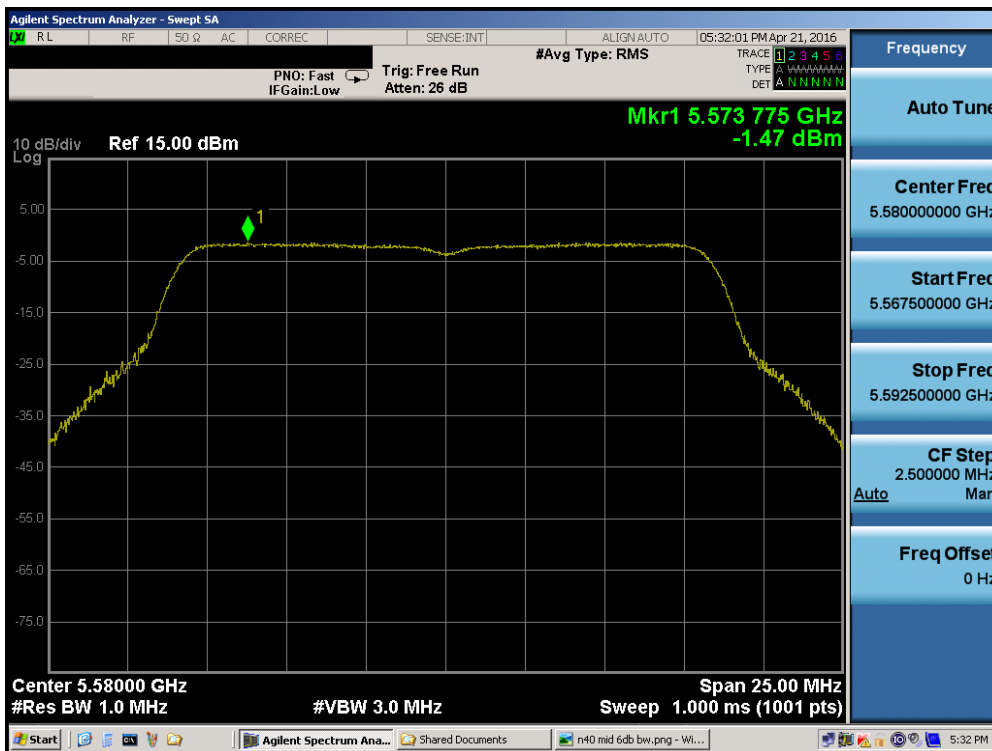


Plot 7-55. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2A) – Ch. 58)

FCC ID: ZNFK557	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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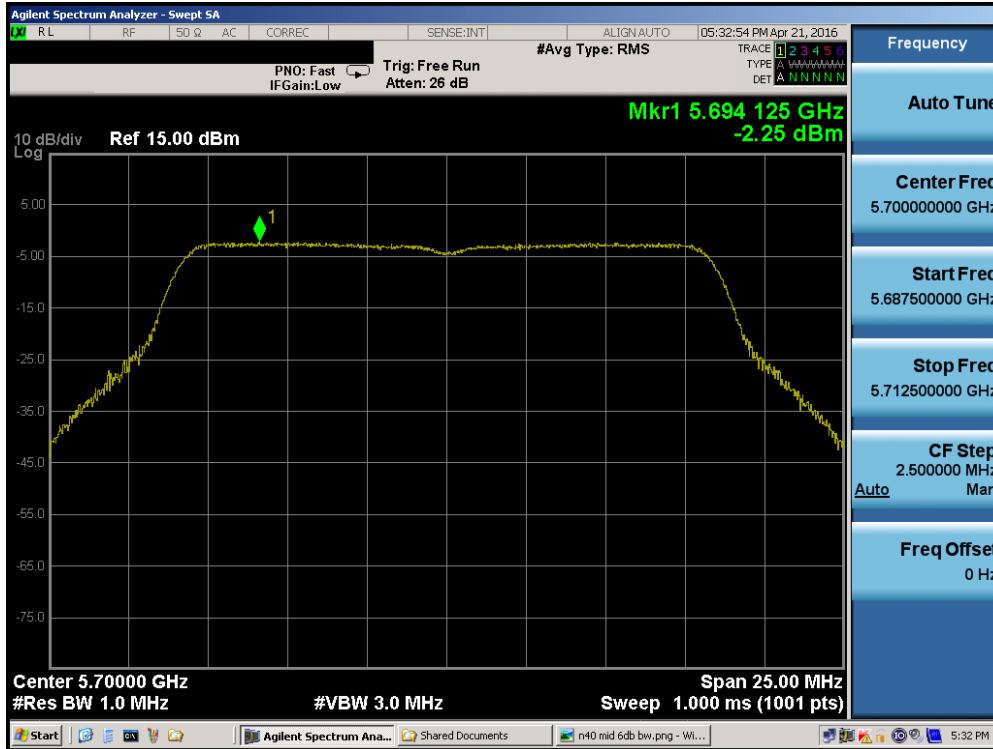


Plot 7-56. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 100)

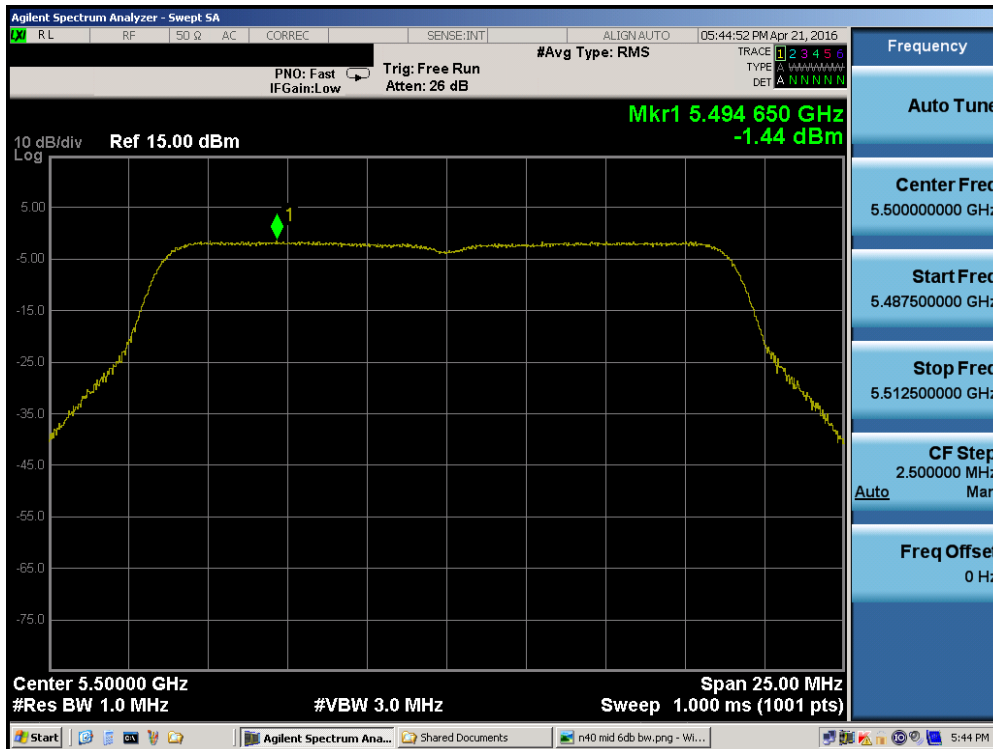


Plot 7-57. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 116)

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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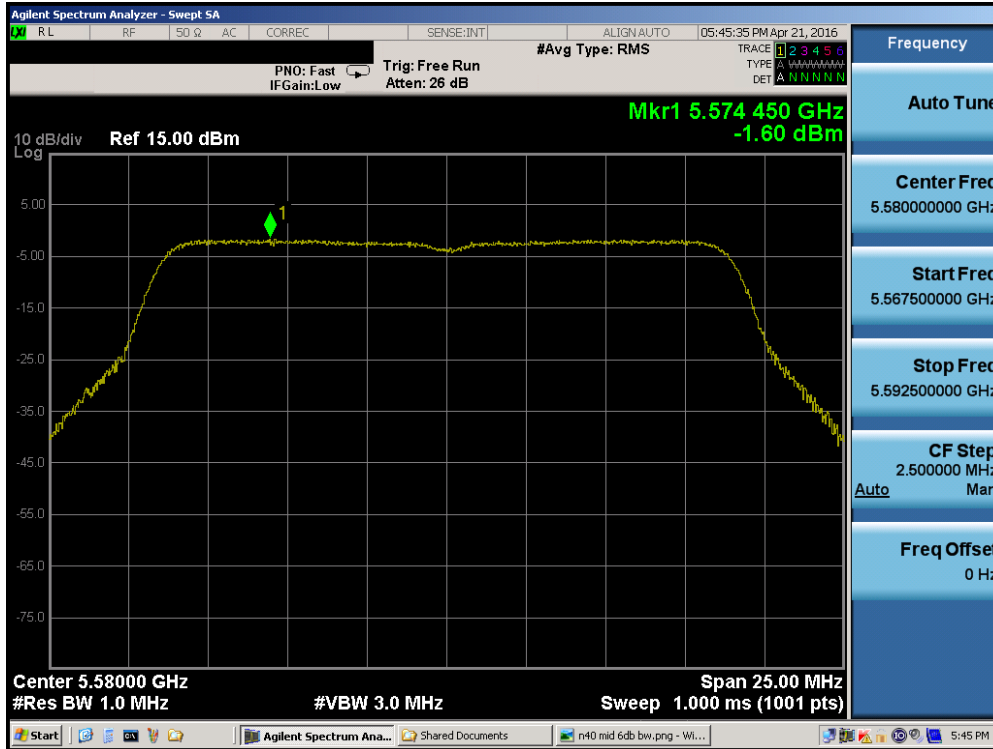
Plot 7-58. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 140)



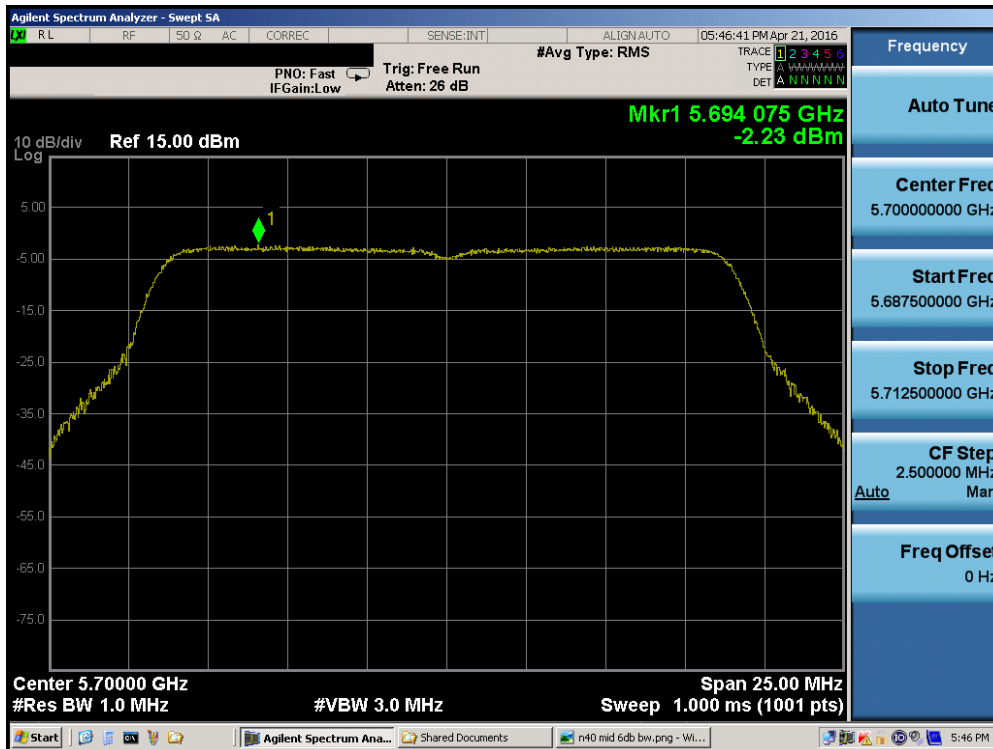
Plot 7-59. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 100)

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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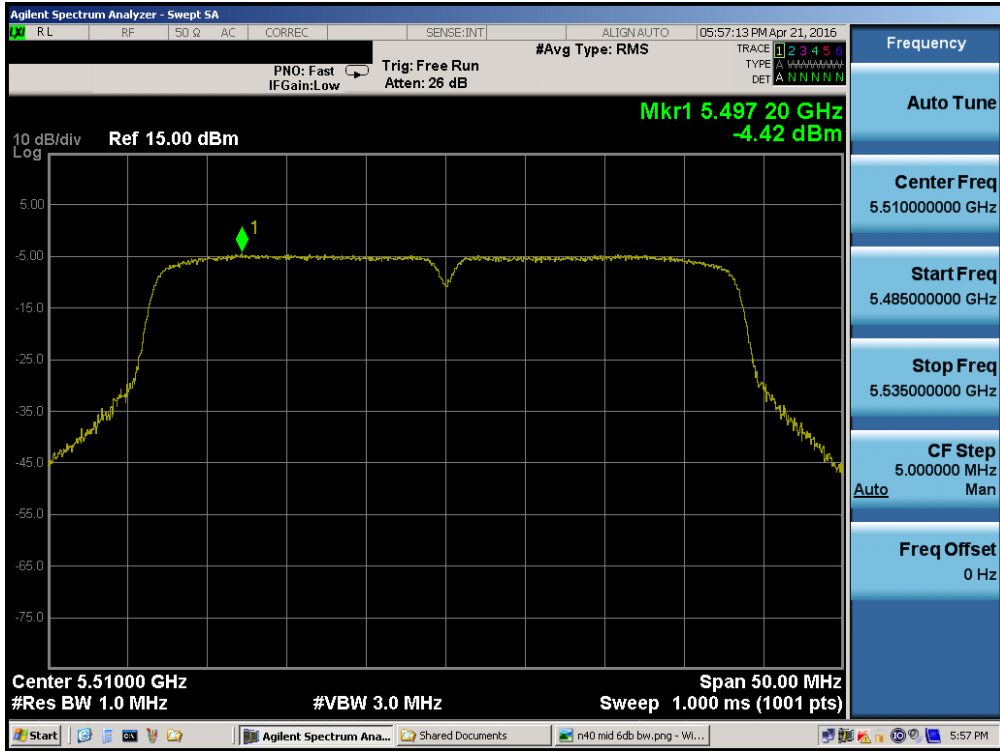


Plot 7-60. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 116)

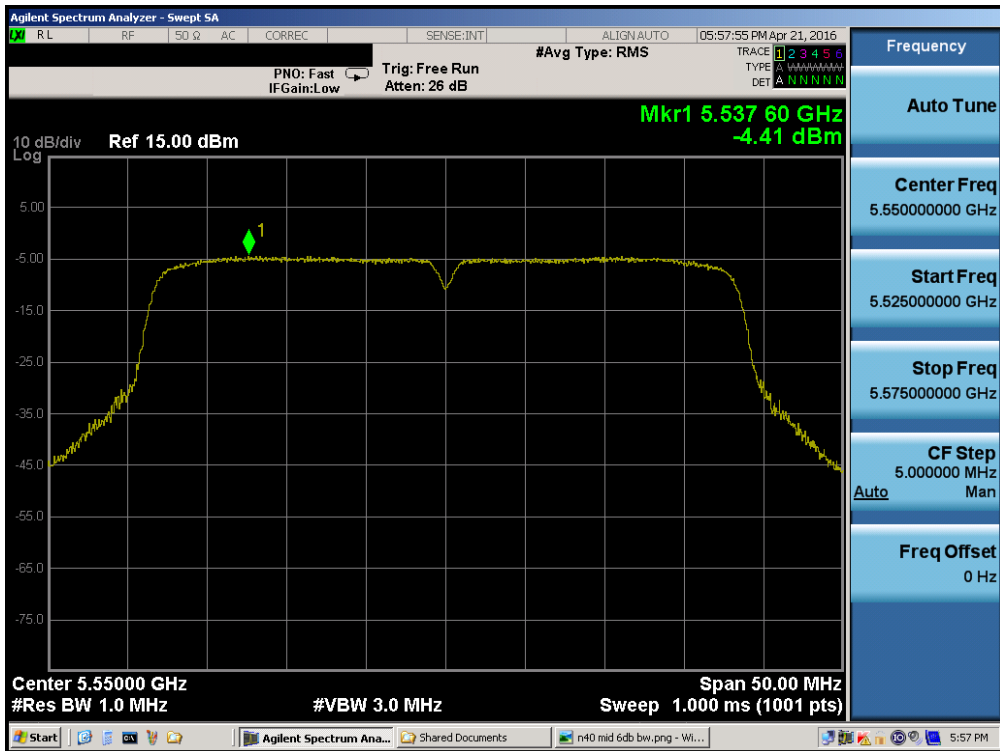


Plot 7-61. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 140)

FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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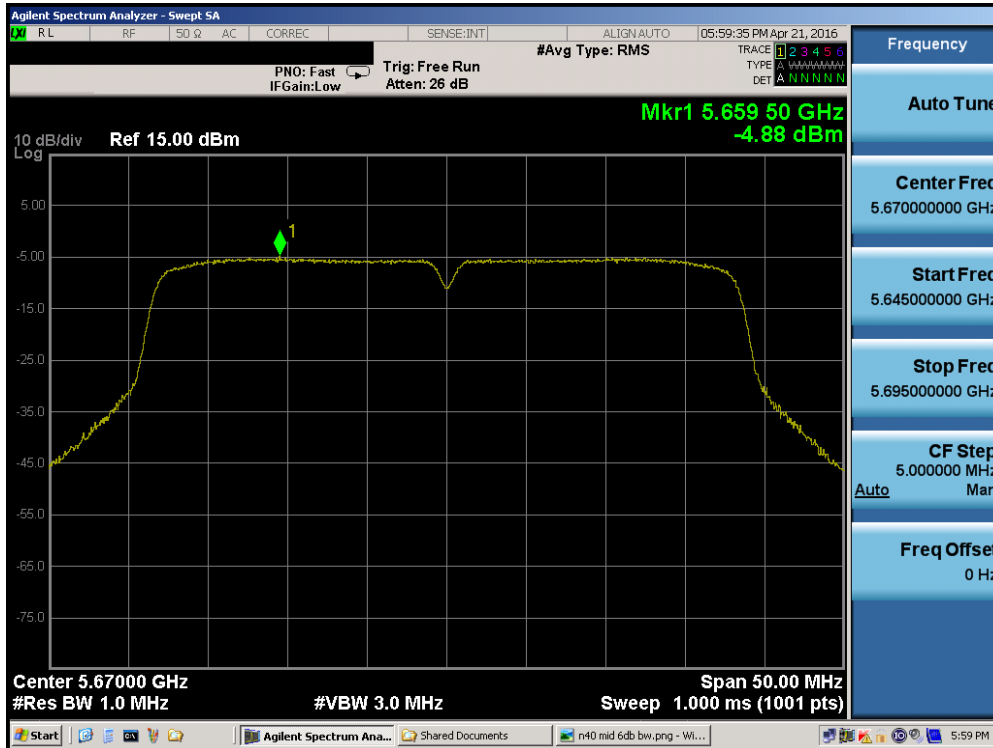


Plot 7-62. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)

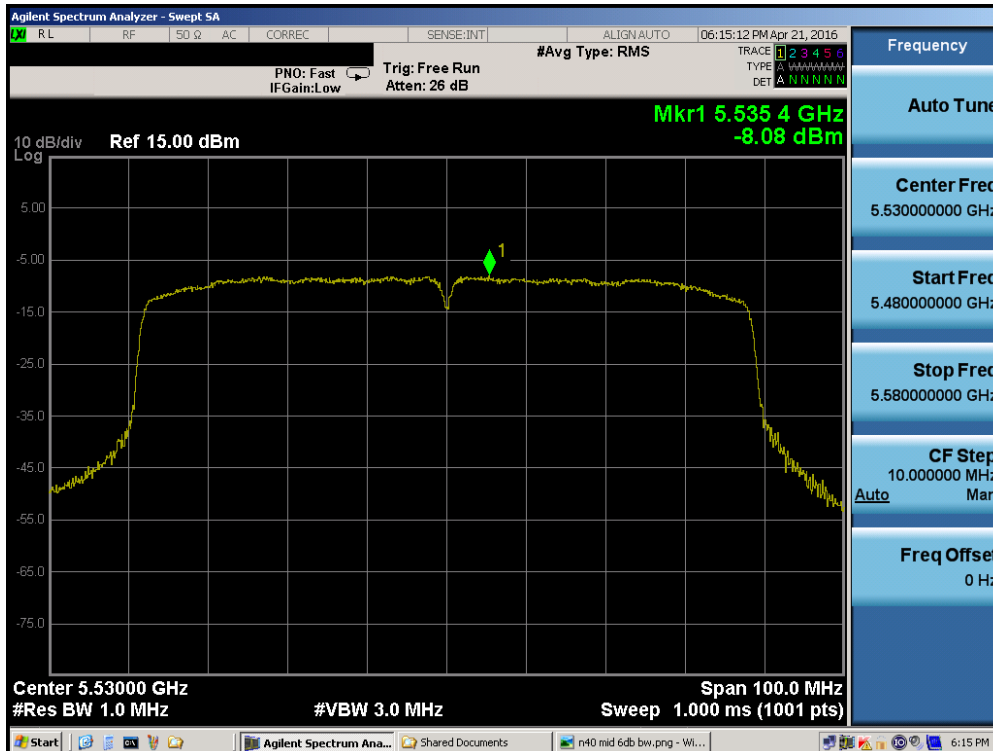


Plot 7-63. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 110)

FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-64. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 134)

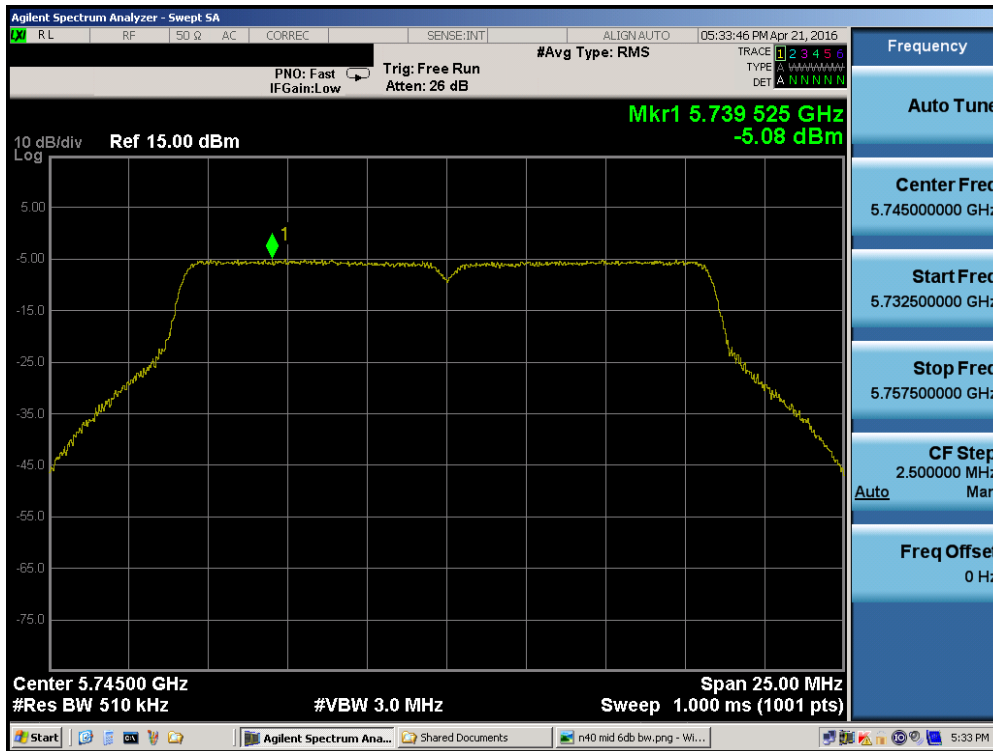


Plot 7-65. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2C) – Ch. 106)

FCC ID: ZNFK557	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 52 of 116

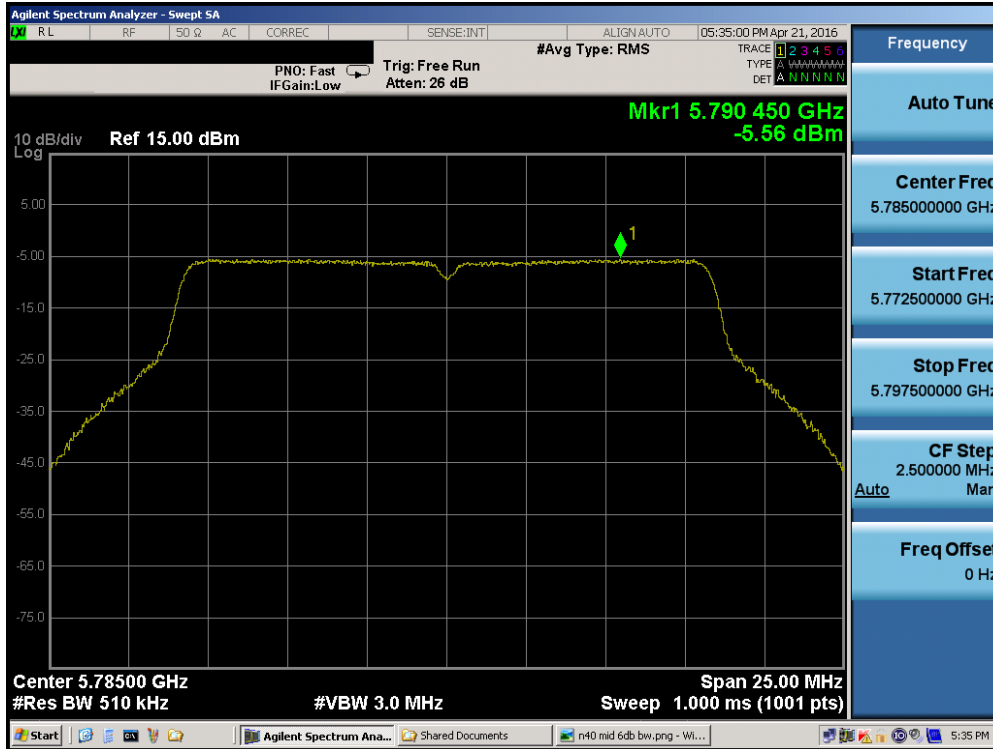
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm]	Max Permissible Power Density [dBm/500kHz]	Margin [dB]	Pass / Fail
<b>Band 3</b>	5745	149	a	6	-5.08	30.0	-35.08	Pass
	5785	157	a	6	-5.56	30.0	-35.56	Pass
	5825	165	a	6	-5.17	30.0	-35.17	Pass
	5745	149	n (20MHz)	6.5/7.2 (MCS0)	-5.11	30.0	-35.11	Pass
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	-5.71	30.0	-35.71	Pass
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	-5.65	30.0	-35.65	Pass
	5755	151	n (40MHz)	13.5/15 (MCS0)	-8.08	30.0	-38.08	Pass
	5795	159	n (40MHz)	13.5/15 (MCS0)	-7.56	30.0	-37.56	Pass
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	-8.90	30.0	-38.90	Pass

**Table 7-8. Band 3 Conducted Power Spectral Density Measurements**

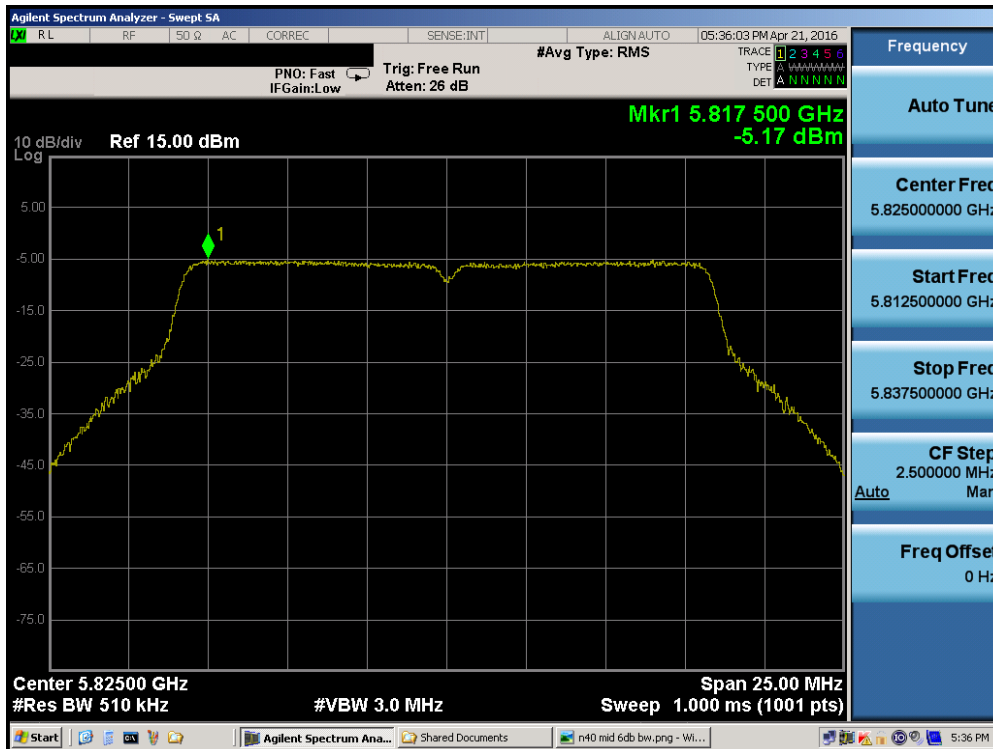


**Plot 7-66. Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 149)**

FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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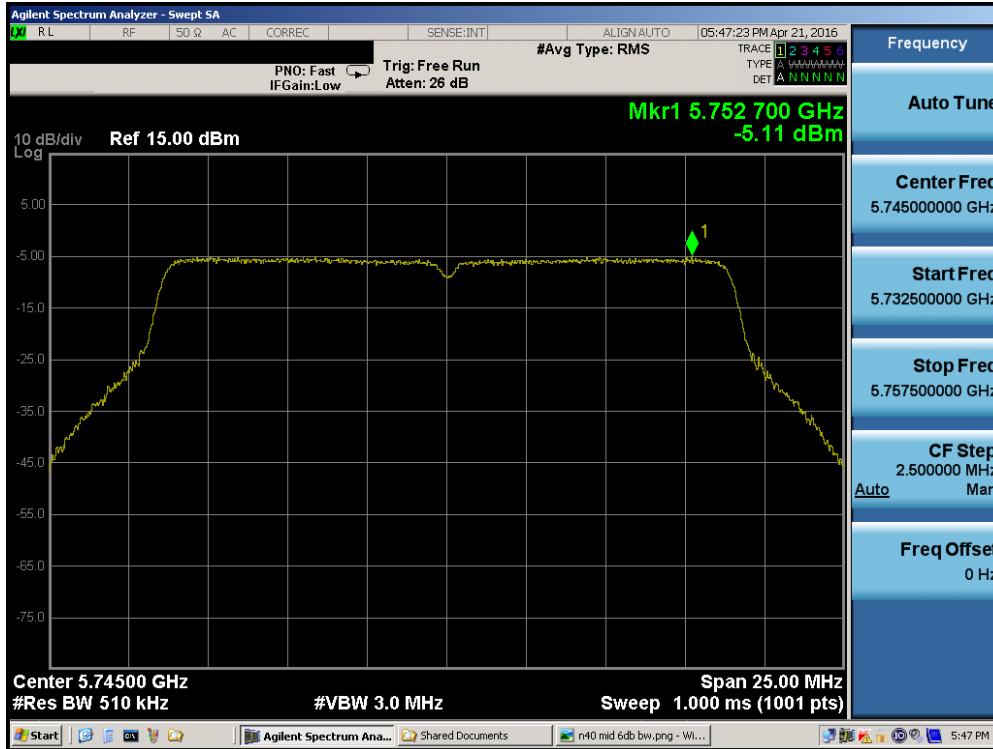


Plot 7-67. Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 157)

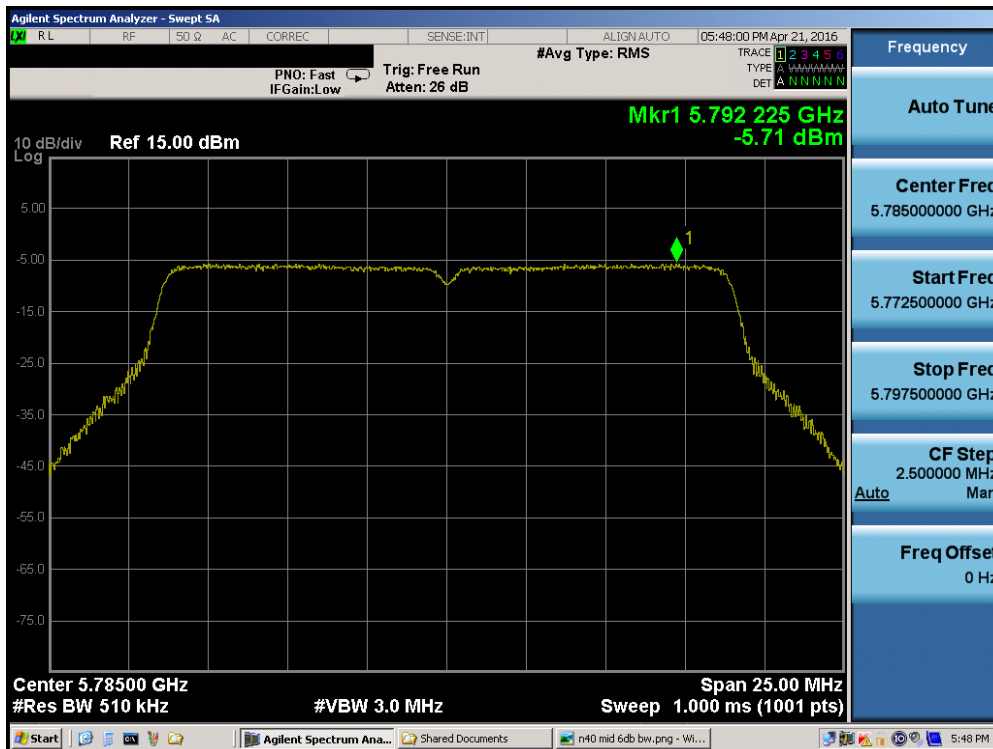


Plot 7-68. Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 165)

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 54 of 116

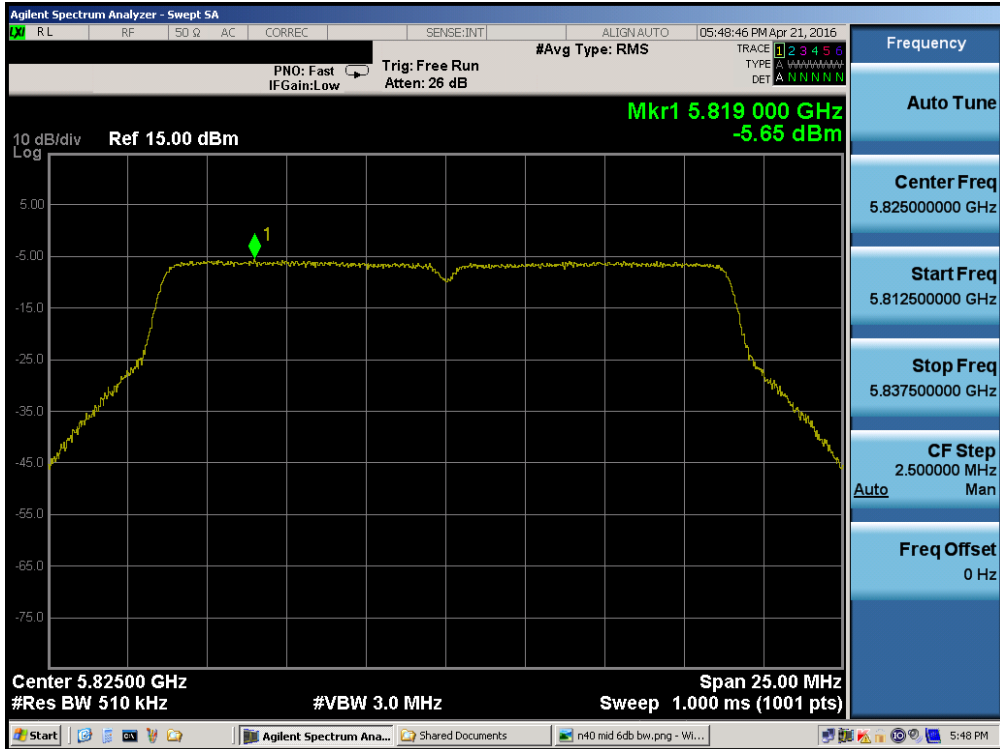


Plot 7-69. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 149)

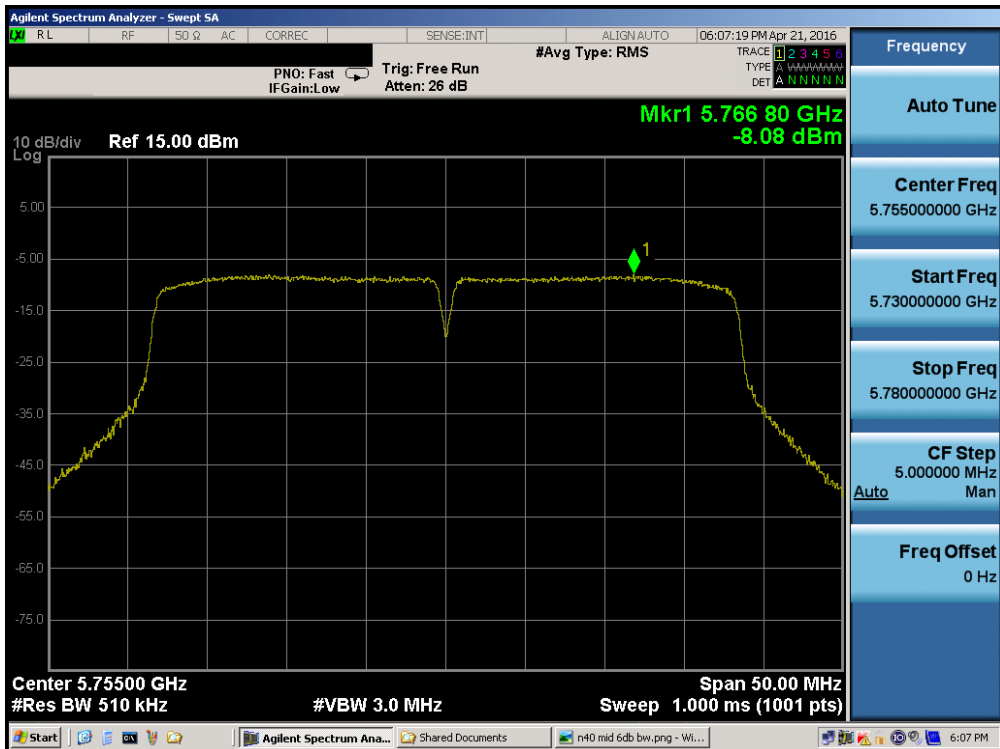


Plot 7-70. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 157)

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 55 of 116

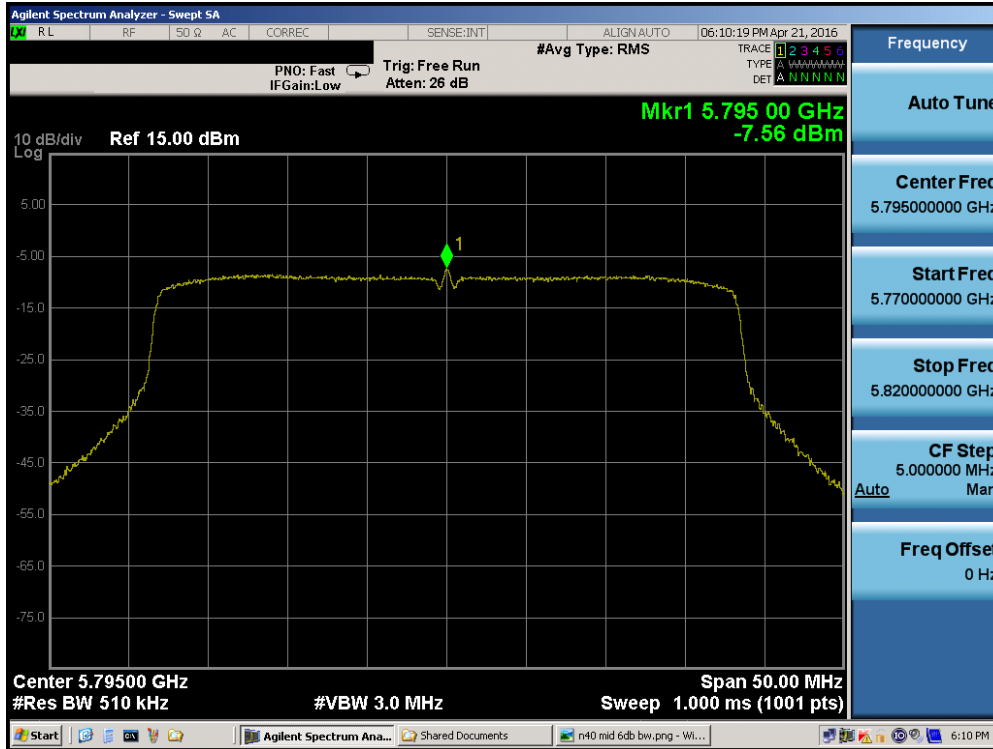


Plot 7-71. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 165)

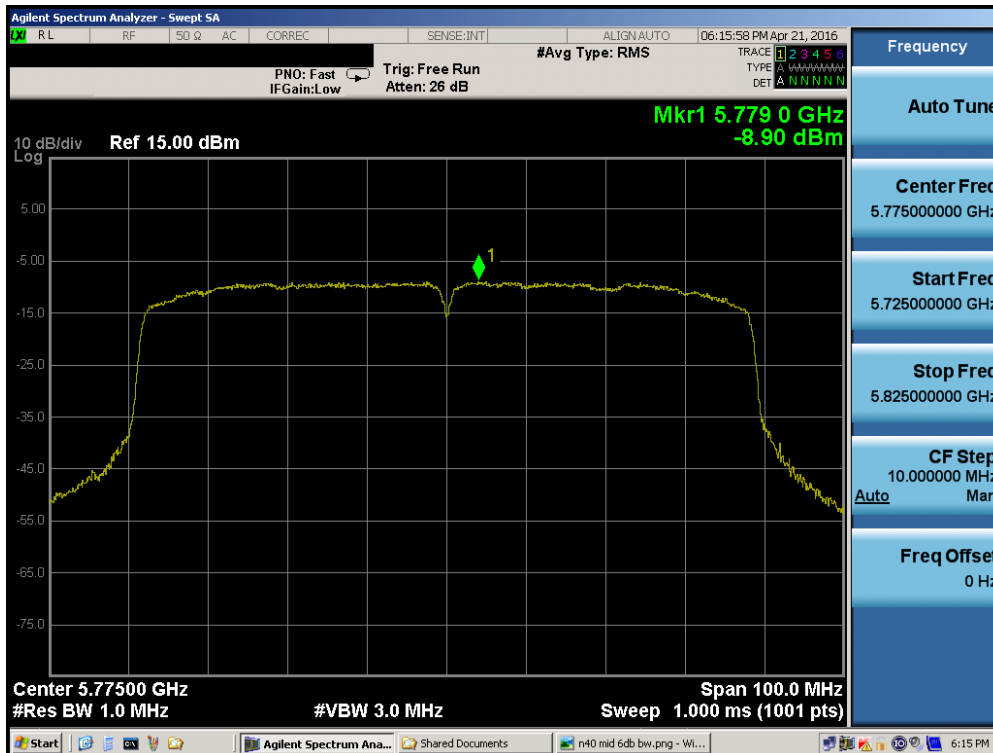


Plot 7-72. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 151)

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 56 of 116



Plot 7-73. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 159)



Plot 7-74. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 3) – Ch. 155)

FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 57 of 116



## 7.6 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)	5,180,000,015	15	0.0000029
100 %		- 30	5,180,000,091	91	0.00000176
100 %		- 20	5,180,000,012	12	0.00000023
100 %		- 10	5,179,999,824	-176	-0.00000340
100 %		0	5,179,999,848	-152	-0.00000293
100 %		+ 10	5,180,000,218	218	0.00000421
100 %		+ 20	5,180,000,111	111	0.00000214
100 %		+ 30	5,179,999,888	-112	-0.00000216
100 %		+ 40	5,179,999,895	-105	-0.00000203
100 %		+ 50	5,180,000,151	151	0.00000292
BATT. ENDPOINT		3.45	+ 20	5,179,999,897	-103

**Table 7-9. 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.

FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset	Page 58 of 116	

## 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)	5,260,000,228	228	0.00000433
100 %		- 30	5,260,000,220	220	0.00000418
100 %		- 20	5,259,999,539	-461	-0.00000876
100 %		- 10	5,260,000,154	154	0.00000293
100 %		0	5,260,000,037	37	0.00000070
100 %		+ 10	5,260,000,391	391	0.00000743
100 %		+ 20	5,259,999,918	-82	-0.00000156
100 %		+ 30	5,259,999,710	-290	-0.00000551
100 %		+ 40	5,260,000,179	179	0.00000340
100 %		+ 50	5,260,000,043	43	0.00000082
BATT. ENDPOINT		3.45	+ 20	5,260,000,025	25

**Table 7-10. 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.

FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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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)	5,500,000,119	119	0.00000216
100 %		- 30	5,500,000,329	329	0.00000598
100 %		- 20	5,499,999,818	-182	-0.00000331
100 %		- 10	5,500,000,237	237	0.00000431
100 %		0	5,500,000,131	131	0.00000238
100 %		+ 10	5,500,000,030	30	0.00000055
100 %		+ 20	5,500,000,472	472	0.00000858
100 %		+ 30	5,500,000,265	265	0.00000482
100 %		+ 40	5,499,999,814	-186	-0.00000338
100 %		+ 50	5,499,999,683	-317	-0.00000576
BATT. ENDPOINT		3.45	+ 20	5,500,000,133	133

**Table 7-11. 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.

## 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: 5,745,000,000 Hz  
 CHANNEL: 149  
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	5,745,000,002	2	0.00000003
100 %		- 30	5,744,999,928	-72	-0.00000125
100 %		- 20	5,744,999,827	-173	-0.00000301
100 %		- 10	5,744,999,923	-77	-0.00000134
100 %		0	5,744,999,794	-206	-0.00000359
100 %		+ 10	5,745,000,343	343	0.00000597
100 %		+ 20	5,744,999,956	-44	-0.00000077
100 %		+ 30	5,745,000,122	122	0.00000212
100 %		+ 40	5,744,999,835	-165	-0.00000287
100 %		+ 50	5,745,000,198	198	0.00000345
BATT. ENDPOINT		3.45	+ 20	5,744,999,824	-176

**Table 7-12. Frequency Stability Measurements for UNII Band 3 (Ch. 149)**

#### 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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## 7.7 Radiated Spurious Emission Measurements – Above 1GHz

§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, at its maximum power control level, as defined in KDB 789033 D02 v01, 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 7-13 per Section 15.209.**

Frequency	Field Strength [ $\mu\text{V}/\text{m}$ ]	Measured Distance [Meters]
Above 960.0 MHz	500	3

**Table 7-13. Radiated Limits**

### Test Procedures Used

KDB 789033 D02 v01 – 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  $\geq 2 \times \text{span}/\text{RBW}$ )
6. Averaging type = power (RMS)
7. Sweep time = auto couple
8. Trace was averaged over 100 sweeps

#### 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

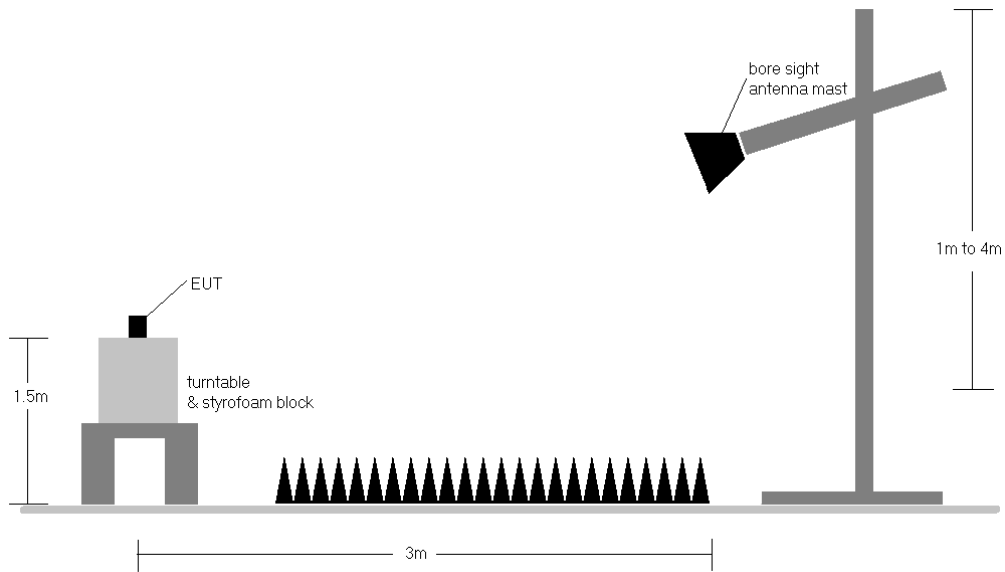
FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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### Peak Measurements below 1GHz

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 7-5. Test Instrument & Measurement Setup**

### Test Notes

1. All radiated spurious emissions levels were measured in a radiated test setup per the guidance of KDB 789033 D02 v01 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 7-13.
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 dB $\mu$ V/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 68.2dB $\mu$ V/m.

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4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
5. This unit was tested with its standard battery.
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.
8. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. Any emissions found to be within 20dB of the limit are fully investigated and the results are shown in this section. Rohde & Schwarz EMC32, Version 9.15.00 automated test software was used to perform the Radiated Spurious Emissions Pre-Scan testing.
9. The “-” shown in the following RSE tables are used to denote a noise floor measurement.



## Sample Calculations

### Determining Spurious Emissions Levels

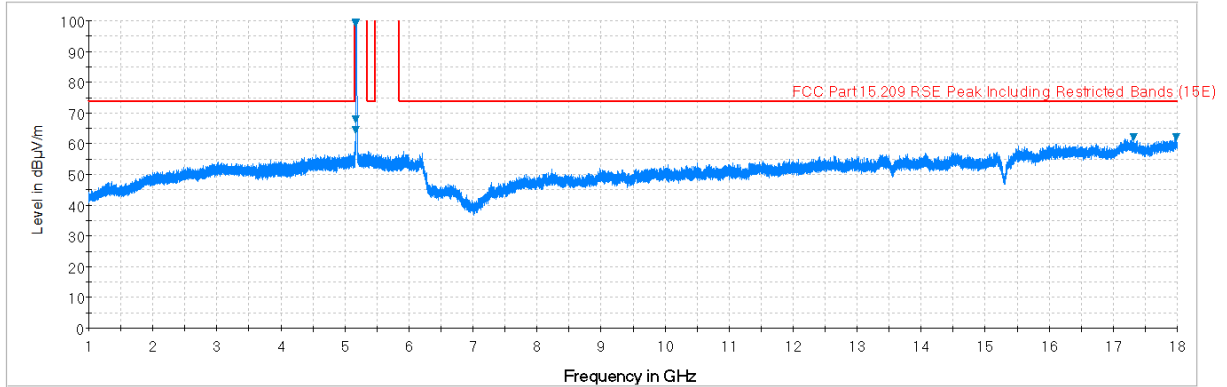
- Field Strength Level [dB $\mu$ V/m] = Analyzer Level [dBm] + 107 + AFCL [dB/m]
- AFCL [dB/m] = Antenna Factor [dB/m] + Cable Loss [dB]
- Margin [dB] = Field Strength Level [dB $\mu$ V/m] – Limit [dB $\mu$ V/m]

### Radiated Band Edge Measurement Offset

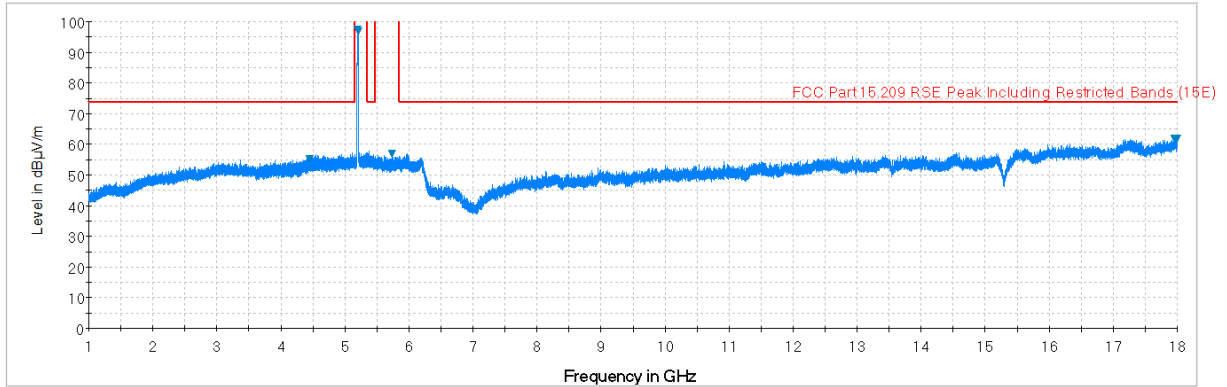
- The amplitude offset shown in the radiated restricted band edge plots in Section 6.8 was calculated using the formula:  
Offset (dB) = (Antenna Factor + Cable Loss + 10 dB Attenuator) – Pre-amplifier Gain

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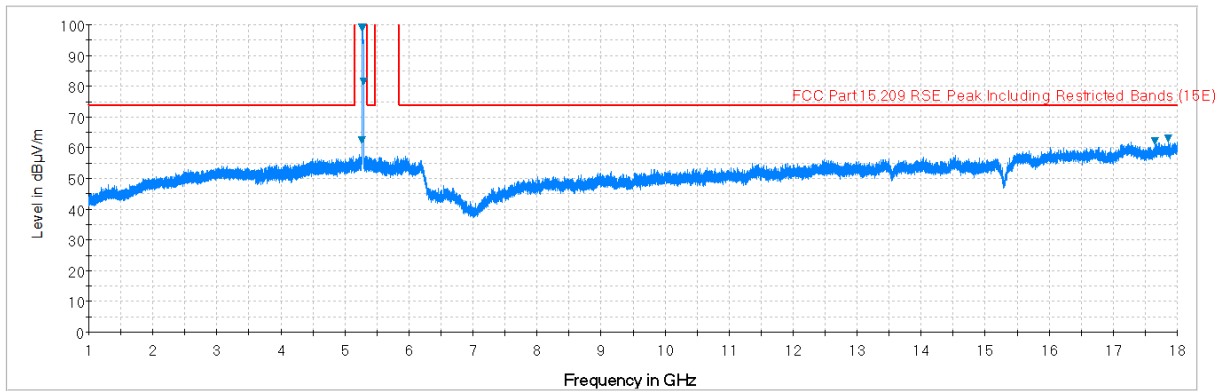
## 7.7.1 Radiated Spurious Emission Measurements





**Plot 7-75. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. H)**



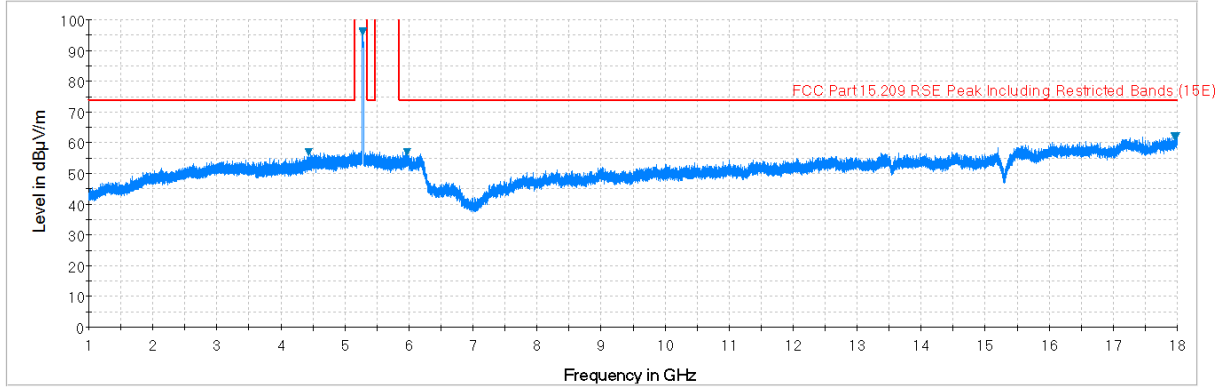
**Plot 7-76. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. V)**



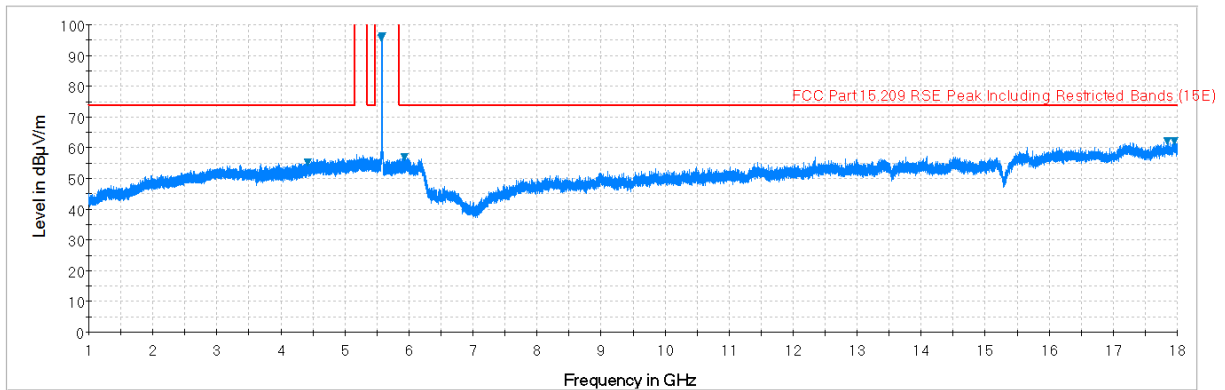
**Plot 7-77. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. H)**

FCC ID: ZNFK557	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	 LG	Reviewed by: Quality Manager
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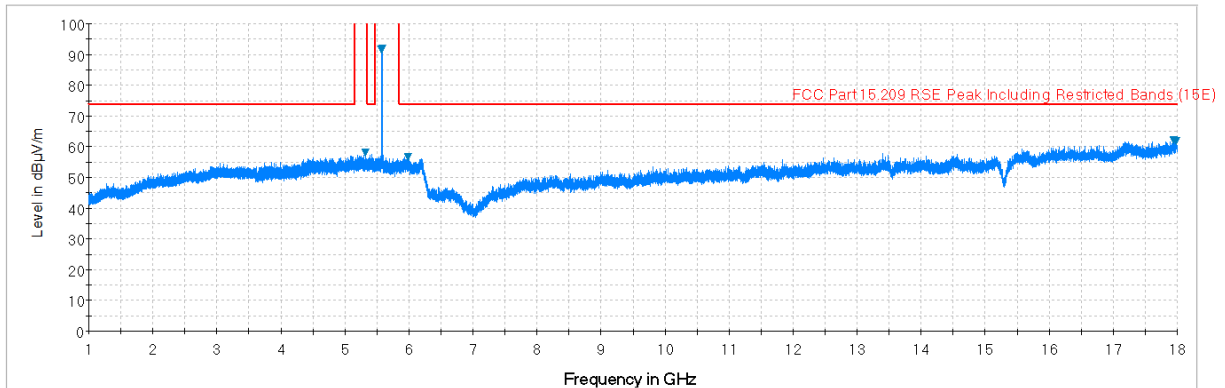






**Plot 7-78. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. V)**

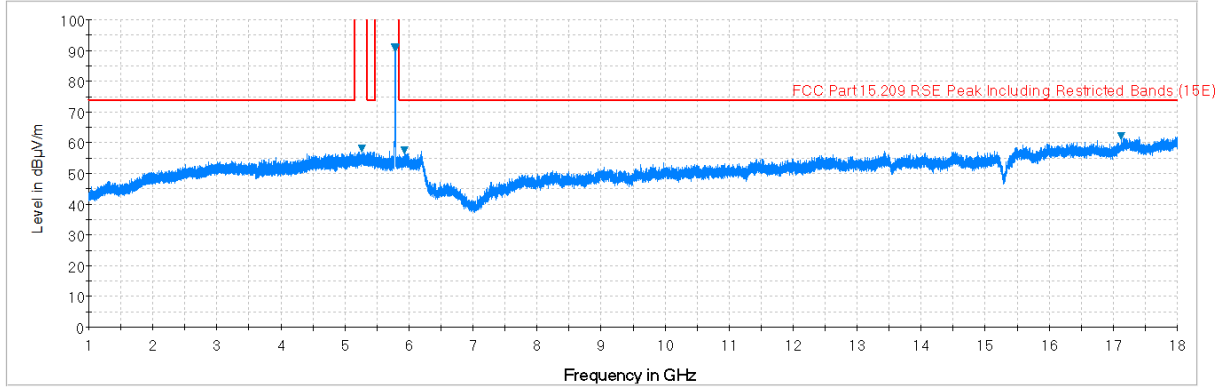


**Plot 7-79. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. H)**

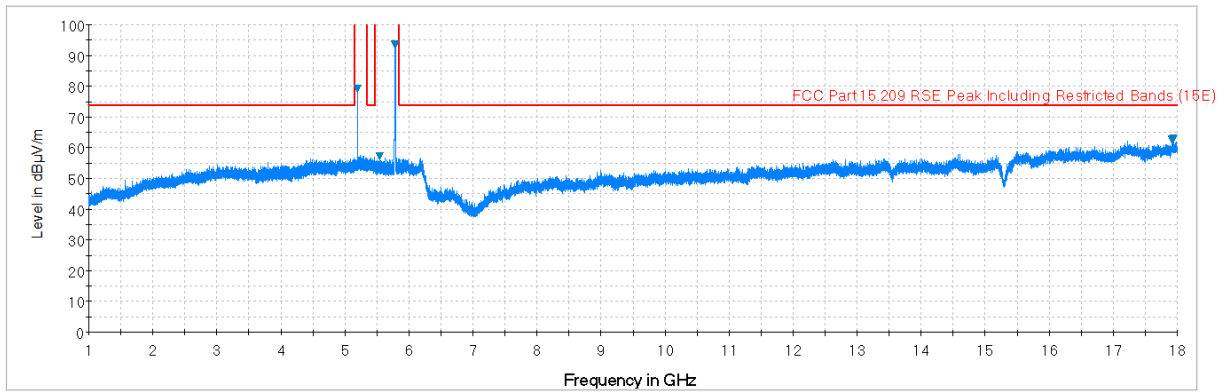


**Plot 7-80. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. V)**

<b>FCC ID:</b> ZNFK557		<b>FCC Pt. 15.407 802.11a/n/ac UNI MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset	Page 66 of 116	



**Plot 7-81. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)**

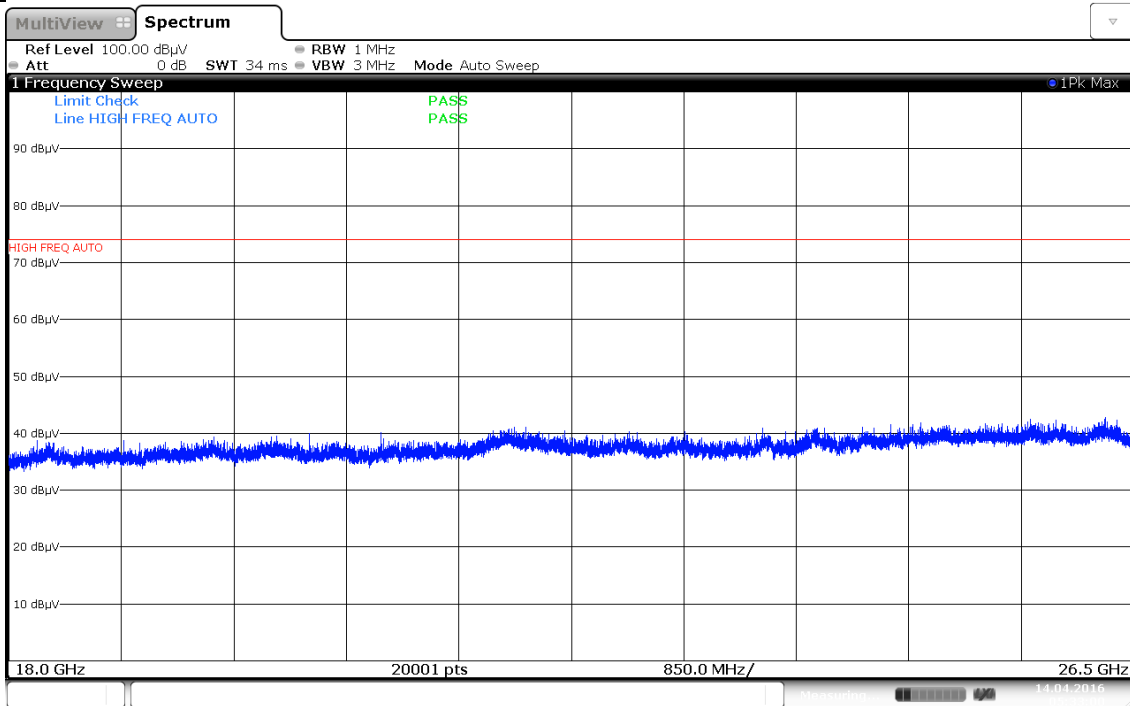


**Plot 7-82. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)**

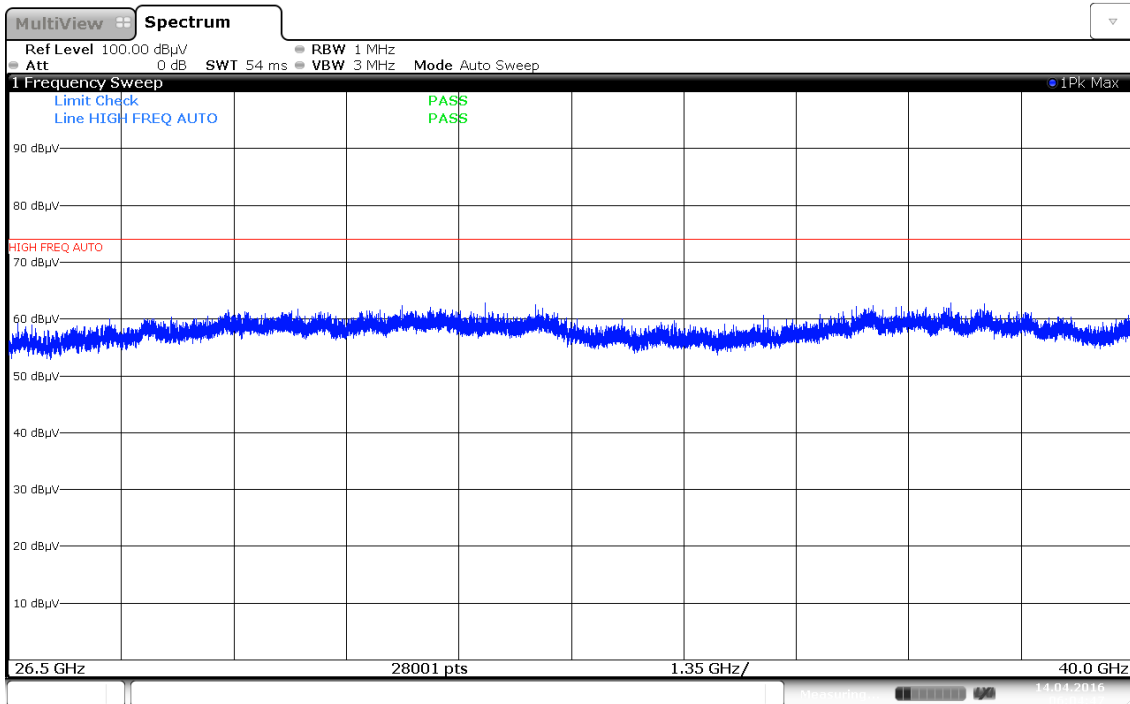
FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNI MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset	Page 67 of 116	

# Radiated Spurious Emissions Measurements (Above 18GHz)

§15.209

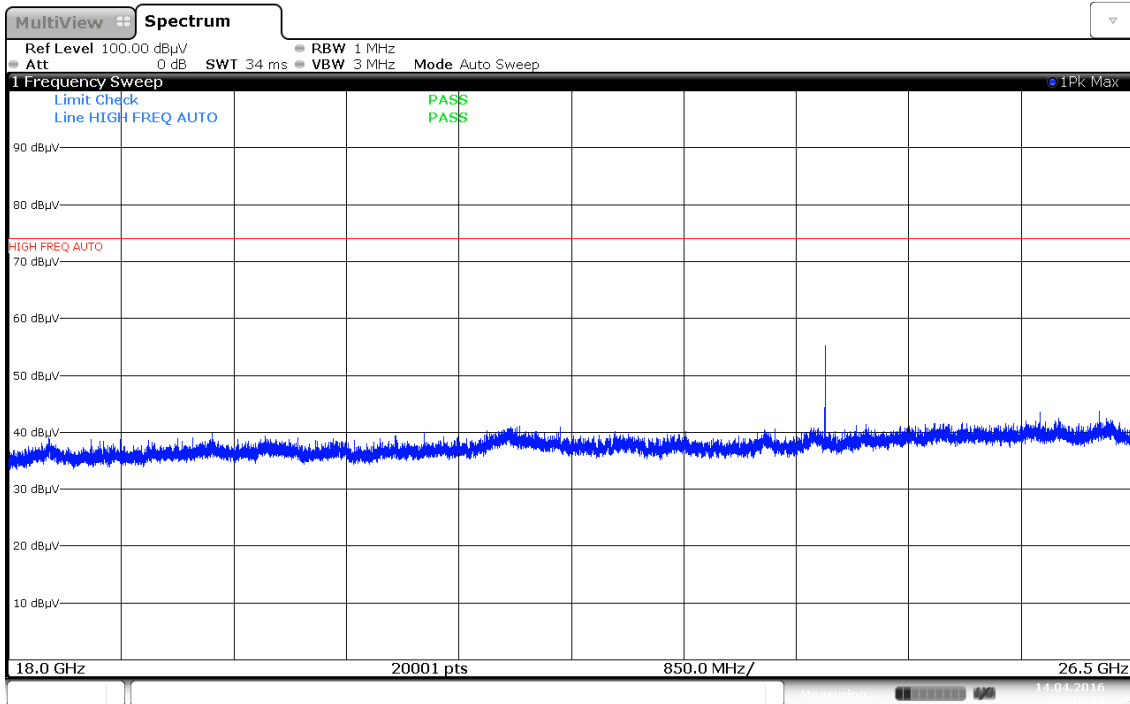


Plot 7-83. Radiated Spurious Plot above 18GHz (802.11a – Ant. Pol. H)

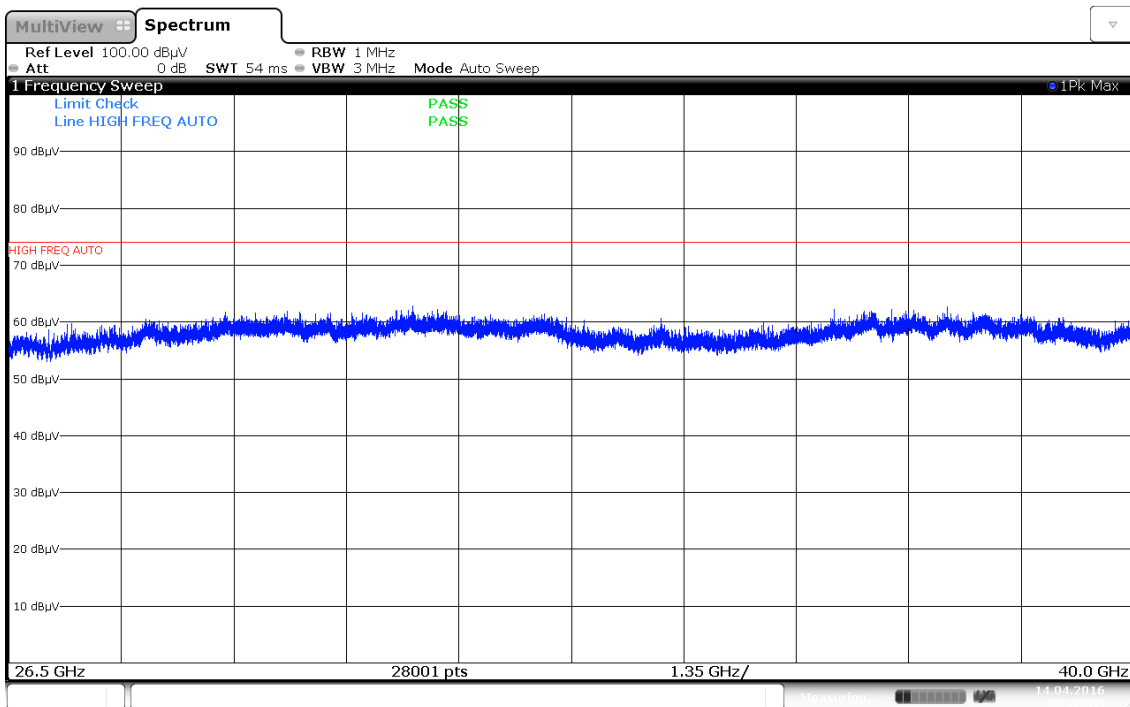


Plot 7-84. Radiated Spurious Plot above 18GHz (802.11a – Ant. Pol. H)

FCC ID: ZNFK557	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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Plot 7-85. Radiated Spurious Plot above 18GHz (802.11a – Ant. Pol. V)



Plot 7-86. Radiated Spurious Plot above 18GHz (802.11a – Ant. Pol. V)

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 69 of 116

## Radiated Spurious Emission Measurements

§15.247(d) §15.205 & §15.209

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



Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
10360.00	Peak	H	-	-	-103.31	48.08	0.00	51.77	68.20	-16.43
* 15540.00	Average	H	-	-	-113.50	53.35	0.00	46.85	53.98	-7.13
* 15540.00	Peak	H	-	-	-102.38	53.35	0.00	57.97	73.98	-16.01
* 20720.00	Average	H	-	-	-108.03	44.39	-9.54	33.81	53.98	-20.17
* 20720.00	Peak	H	-	-	-96.12	44.39	-9.54	45.72	73.98	-28.26
25900.00	Peak	H	-	-	-93.91	45.11	-9.54	48.66	68.20	-19.54

**Table 7-14. 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]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
10400.00	Peak	H	-	-	-103.46	48.05	0.00	51.59	68.20	-16.61
* 15600.00	Average	H	-	-	-112.91	53.44	0.00	47.52	53.98	-6.46
* 15600.00	Peak	H	-	-	-101.53	53.44	0.00	58.90	73.98	-15.08
* 20800.00	Average	H	-	-	-108.03	44.39	-9.54	33.82	53.98	-20.16
* 20800.00	Peak	H	-	-	-96.69	44.39	-9.54	45.16	73.98	-28.82
26000.00	Peak	H	-	-	-94.71	45.12	-9.54	47.86	68.20	-20.34

**Table 7-15. Radiated Measurements**

FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset	Page 70 of 116	

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

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10480.00	Peak	H	-	-	-103.49	48.21	0.00	51.72	68.20	-16.48
* 15720.00	Average	H	-	-	-115.47	53.84	0.00	45.37	53.98	-8.61
* 15720.00	Peak	H	-	-	-104.68	53.84	0.00	56.16	73.98	-17.82
* 20960.00	Average	H	-	-	-108.04	44.31	-9.54	33.73	53.98	-20.25
* 20960.00	Peak	H	-	-	-96.53	44.31	-9.54	45.24	73.98	-28.74
26200.00	Peak	H	-	-	-93.07	45.01	-9.54	49.40	68.20	-18.80

**Table 7-16. 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]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10520.00	Peak	H	-	-	-102.98	48.22	0.00	52.24	68.20	-15.96
* 15780.00	Average	H	-	-	-113.53	53.85	0.00	47.32	53.98	-6.66
* 15780.00	Peak	H	-	-	-102.53	53.85	0.00	58.32	73.98	-15.66
* 21040.00	Average	H	-	-	-107.76	44.29	-9.54	33.99	53.98	-19.99
* 21040.00	Peak	H	-	-	-96.88	44.29	-9.54	44.87	73.98	-29.11
26300.00	Peak	H	-	-	-96.49	45.00	-9.54	45.96	68.20	-22.24

**Table 7-17. 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]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10560.00	Peak	H	-	-	-102.48	48.18	0.00	52.70	68.20	-15.50
* 15840.00	Average	H	-	-	-112.97	53.94	0.00	47.96	53.98	-6.02
* 15840.00	Peak	H	-	-	-101.87	53.94	0.00	59.06	73.98	-14.92
* 21120.00	Average	H	-	-	-107.54	44.28	-9.54	34.19	53.98	-19.79
* 21120.00	Peak	H	-	-	-96.02	44.28	-9.54	45.71	73.98	-28.27
26400.00	Peak	H	-	-	-93.23	45.02	-9.54	49.25	68.20	-18.95

**Table 7-18. 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]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 10640.00	Average	H	-	-	-113.06	48.11	0.00	42.04	53.98	-11.94
* 10640.00	Peak	H	-	-	-102.07	48.11	0.00	53.03	73.98	-20.95
* 15960.00	Average	H	-	-	-113.47	54.57	0.00	48.10	53.98	-5.88
* 15960.00	Peak	H	-	-	-101.20	54.57	0.00	60.37	73.98	-13.61
* 21280.00	Average	H	-	-	-107.27	44.26	-9.54	34.45	53.98	-19.52
* 21280.00	Peak	H	-	-	-94.96	44.26	-9.54	46.76	73.98	-27.21
26600.00	Peak	H	-	-	-103.21	47.61	-9.54	41.85	68.20	-26.35

**Table 7-19. 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]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11000.00	Average	H	-	-	-112.22	49.03	0.00	43.81	53.98	-10.17
* 11000.00	Peak	H	-	-	-100.86	49.03	0.00	55.17	73.98	-18.81
16500.00	Peak	H	-	-	-101.12	55.10	0.00	60.97	68.20	-7.23
22000.00	Peak	H	-	-	-94.57	44.50	-9.54	47.39	68.20	-20.81
27500.00	Peak	H	-	-	-103.68	47.97	-9.54	41.75	68.20	-26.45

**Table 7-20. 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]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11160.00	Average	H	-	-	-112.78	49.29	0.00	43.51	53.98	-10.47
* 11160.00	Peak	H	-	-	-101.35	49.29	0.00	54.94	73.98	-19.04
16740.00	Peak	H	-	-	-101.71	57.02	0.00	62.31	68.20	-5.89
* 22320.00	Average	H	-	-	-106.63	44.56	-9.54	35.39	53.98	-18.59
* 22320.00	Peak	H	-	-	-95.51	44.56	-9.54	46.51	73.98	-27.47
27900.00	Peak	H	-	-	-103.18	48.08	-9.54	42.36	68.20	-25.84

**Table 7-21. 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]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11400.00	Average	H	100	49	-113.05	49.74	0.00	43.69	53.98	-10.29
* 11400.00	Peak	H	100	49	-102.71	49.74	0.00	54.03	73.98	-19.95
17100.00	Peak	H	-	-	-100.69	57.13	0.00	63.45	68.20	-4.75
* 22800.00	Average	H	-	-	-107.40	44.56	-9.54	34.62	53.98	-19.36
* 22800.00	Peak	H	-	-	-95.97	44.56	-9.54	46.05	73.98	-27.93
28500.00	Peak	H	-	-	-102.82	48.32	-9.54	42.96	68.20	-25.24

**Table 7-22. Radiated Measurements**

Worst Case Mode: 802.11a  
 Worst Case Transfer Rate: 6 Mbps  
 Distance of Measurements: 1 & 3 Meters  
 Operating Frequency: 5745MHz  
 Channel: 149

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11490.00	Average	H	100	9	-112.97	50.05	0.00	44.09	53.98	-9.89
* 11490.00	Peak	H	100	9	-103.54	50.05	0.00	53.52	73.98	-20.46
17235.00	Peak	H	-	-	-101.34	57.47	0.00	63.12	68.20	-5.08
* 22980.00	Average	H	-	-	-108.35	44.68	-9.54	33.79	53.98	-20.19
* 22980.00	Peak	H	-	-	-96.68	44.68	-9.54	45.46	73.98	-28.52
28725.00	Peak	H	-	-	-102.60	48.26	-9.54	43.12	68.20	-25.08

**Table 7-23. Radiated Measurements**

Worst Case Mode: 802.11a  
 Worst Case Transfer Rate: 6 Mbps  
 Distance of Measurements: 1 & 3 Meters  
 Operating Frequency: 5785MHz  
 Channel: 157



Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11570.00	Average	H	100	14	-111.92	50.28	0.00	45.35	53.98	-8.63
* 11570.00	Peak	H	100	14	-102.29	50.28	0.00	54.98	73.98	-19.00
17355.00	Peak	H	-	-	-101.12	58.13	0.00	64.01	68.20	-4.19
23140.00	Peak	H	-	-	-95.48	44.75	-9.54	46.73	68.20	-21.47
28925.00	Peak	H	-	-	-103.16	48.29	-9.54	42.59	68.20	-25.61

**Table 7-24. Radiated Measurements**

Worst Case Mode: 802.11a  
 Worst Case Transfer Rate: 6 Mbps  
 Distance of Measurements: 1 & 3 Meters  
 Operating Frequency: 5825MHz  
 Channel: 165

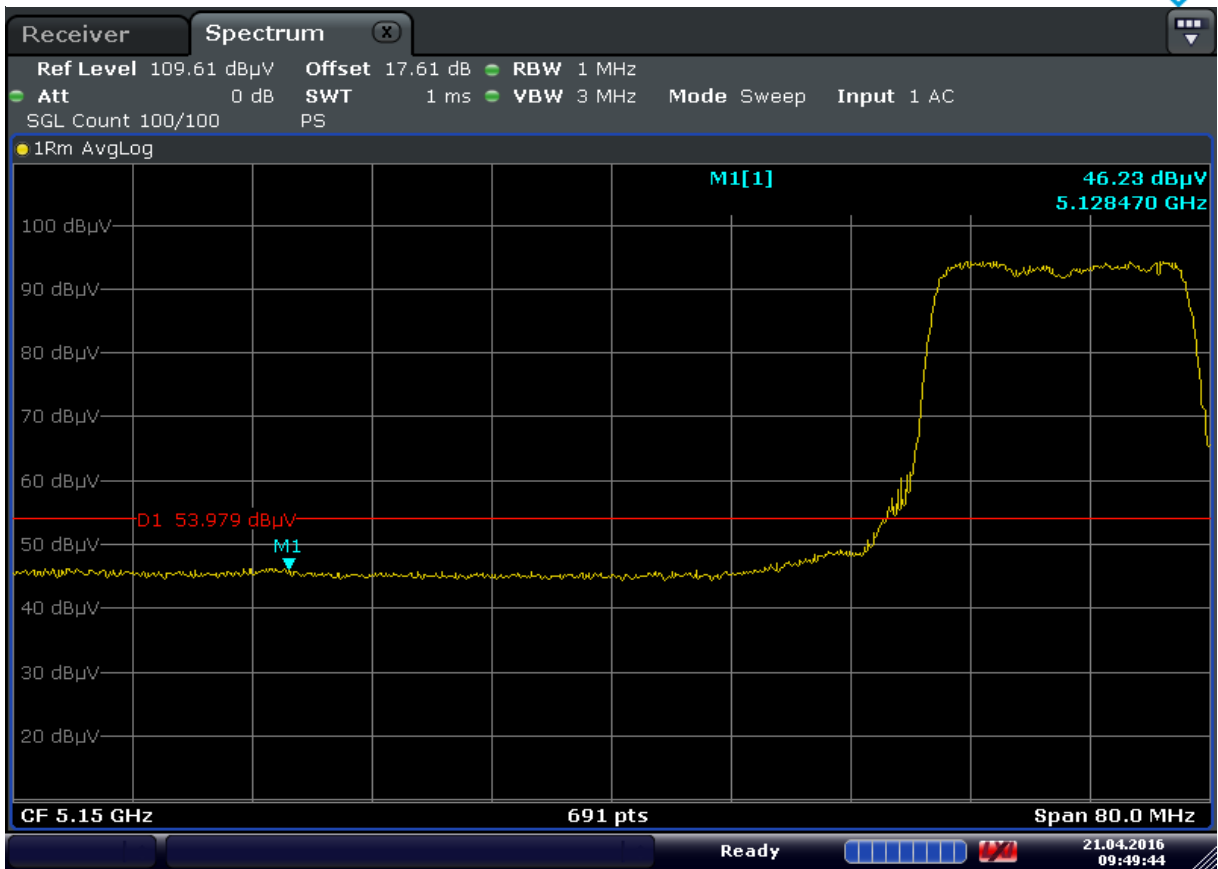
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11650.00	Average	H	100	17	-98.42	50.40	0.00	58.98	53.98	-79.29
* 11650.00	Peak	H	100	17	-88.77	50.40	0.00	68.63	73.98	-70.66
17475.00	Peak	H	-	-	-86.81	59.19	0.00	79.38	68.20	-68.97
23300.00	Peak	H	-	-	-95.89	44.75	-9.54	46.32	68.20	-21.88
29125.00	Peak	H	-	-	-102.32	48.28	-9.54	43.42	68.20	-24.78

**Table 7-25. Radiated Measurements**

FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset	Page 75 of 116	

**7.7.2 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

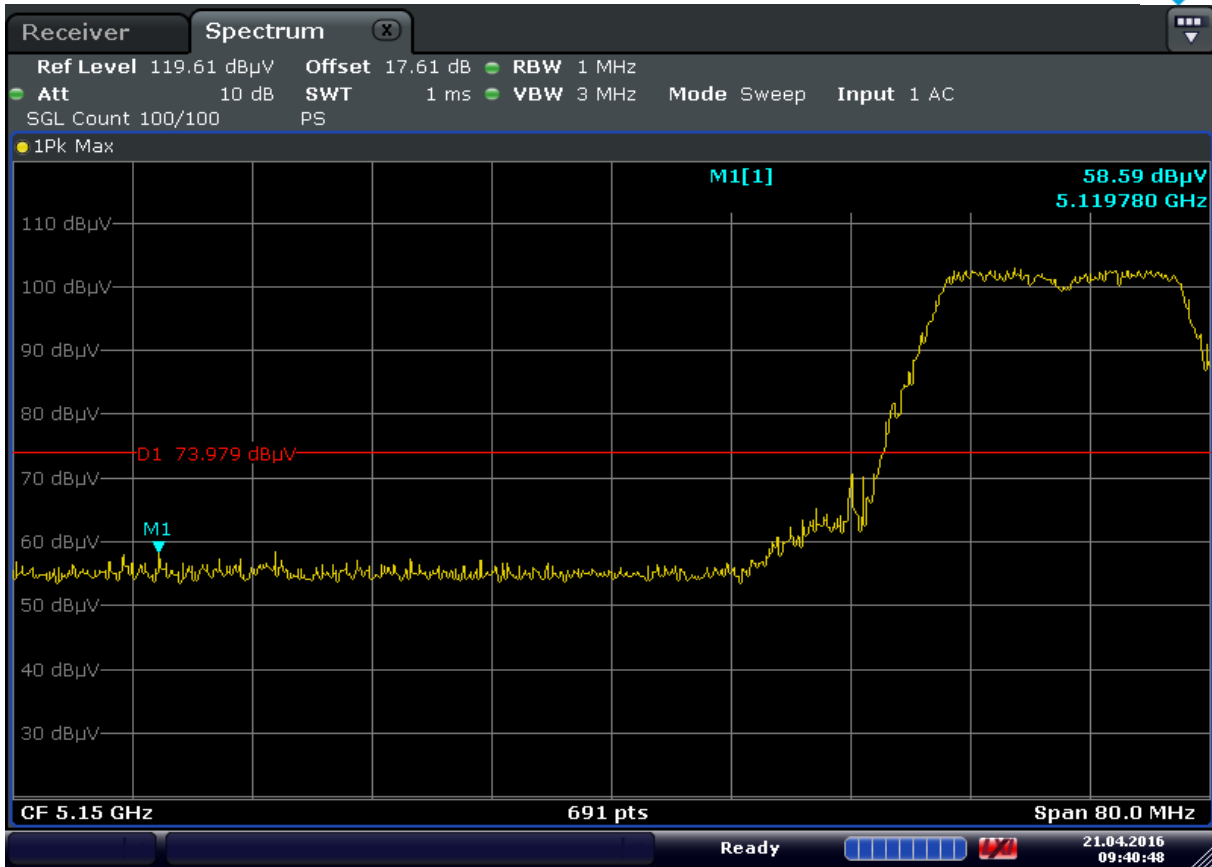


Date: 21.APR.2016 09:49:44

**Plot 7-87. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 76 of 116

**Radiated Band Edge Measurements (20MHz BW)**  
§15.407(b.1)(b.2) §15.205 §15.209



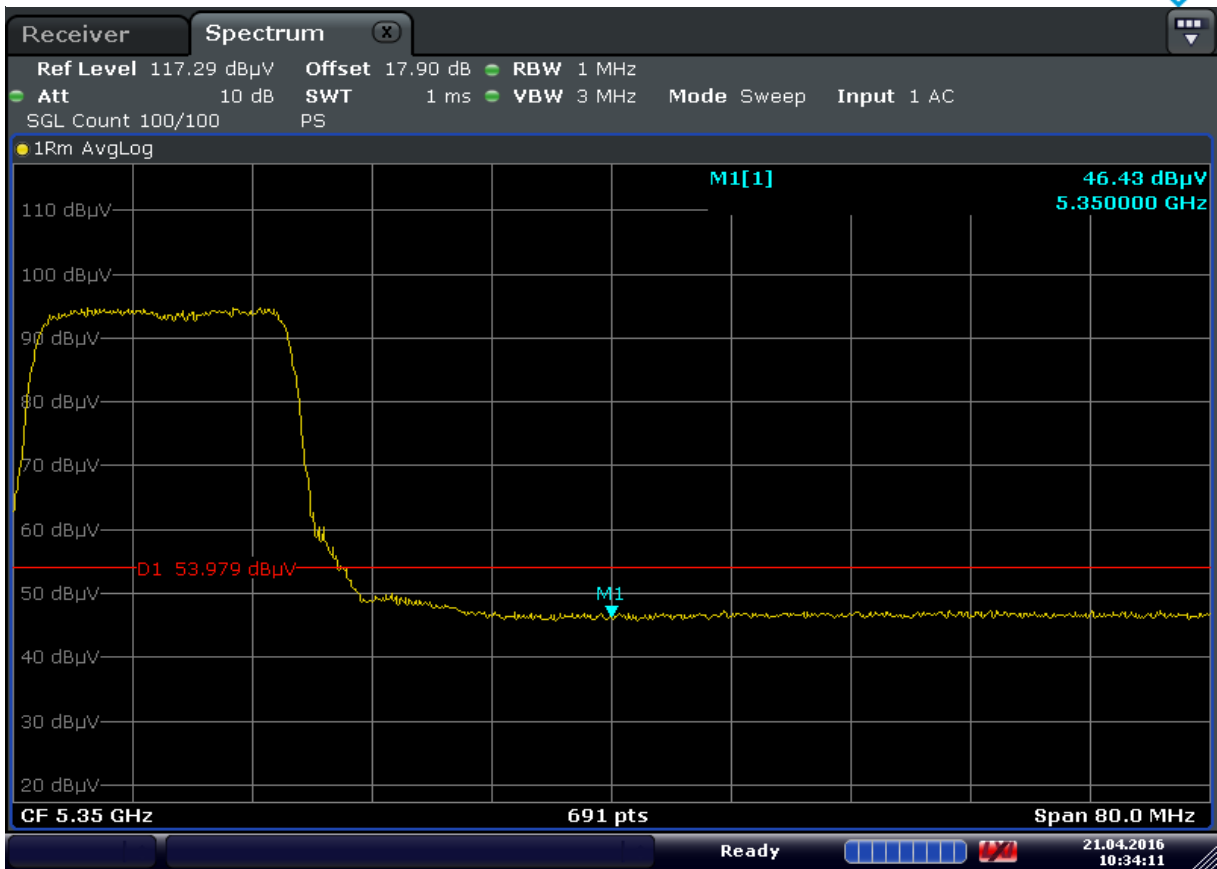
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**Plot 7-88. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)**

<b>FCC ID:</b> ZNFK557	ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset		Page 77 of 116

**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

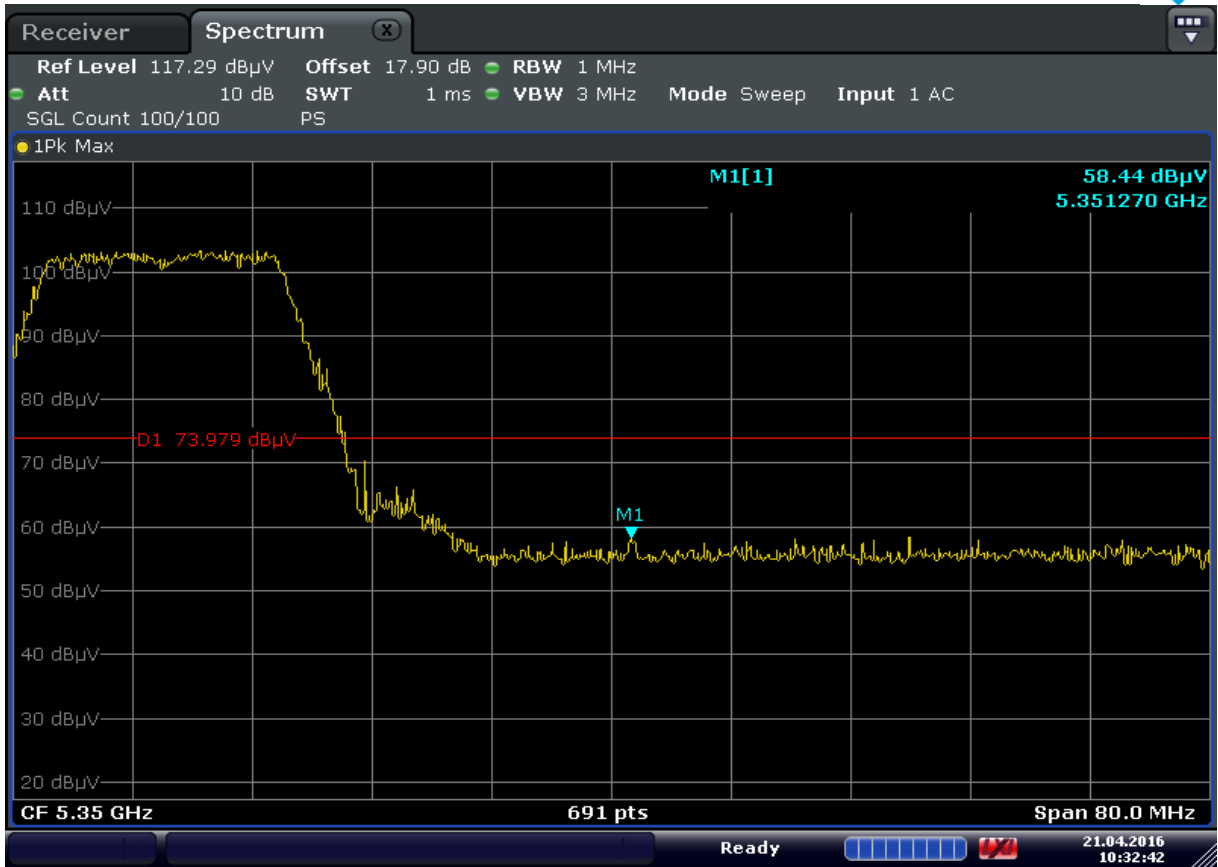


Date: 21.APR.2016 10:34:11

**Plot 7-89. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset	Page 78 of 116	

**Radiated Band Edge Measurements (20MHz BW)**  
§15.407(b.1)(b.2) §15.205 §15.209



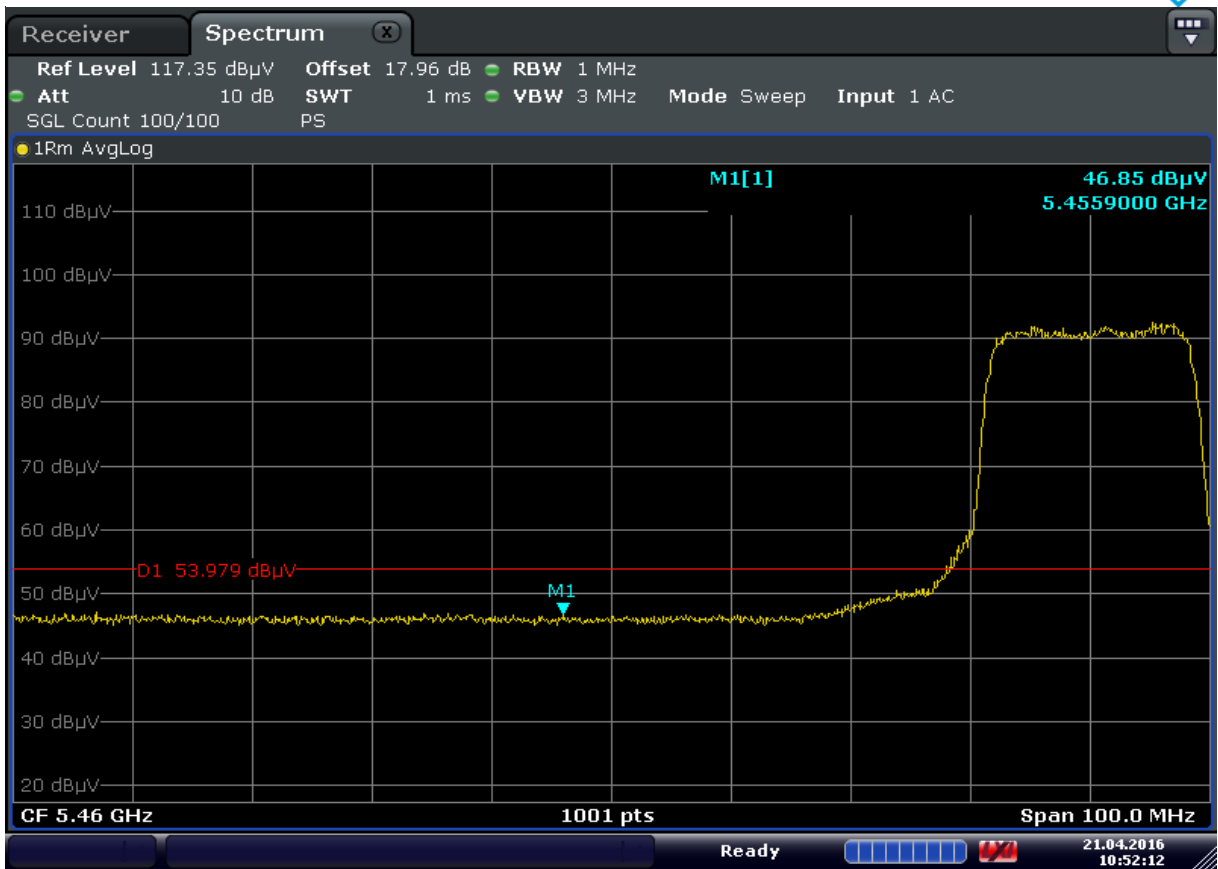
Date: 21.APR.2016 10:32:42

**Plot 7-90. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)**

<b>FCC ID:</b> ZNFK557	ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset		Page 79 of 116

**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

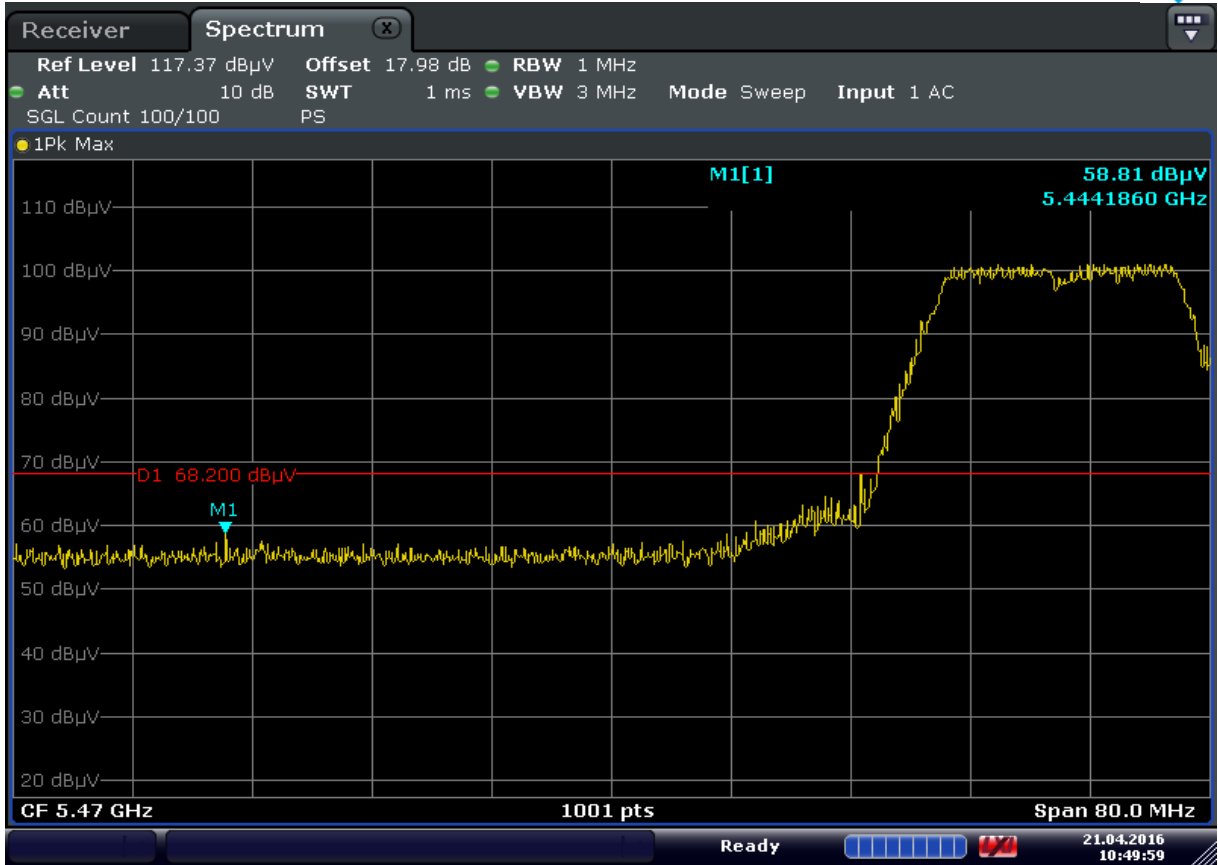


Date: 21.APR.2016 10:52:12

**Plot 7-91. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset	Page 80 of 116	

**Radiated Band Edge Measurements (20MHz BW)**  
§15.407(b.1)(b.2) §15.205 §15.209



Date: 21.APR.2016 10:49:59

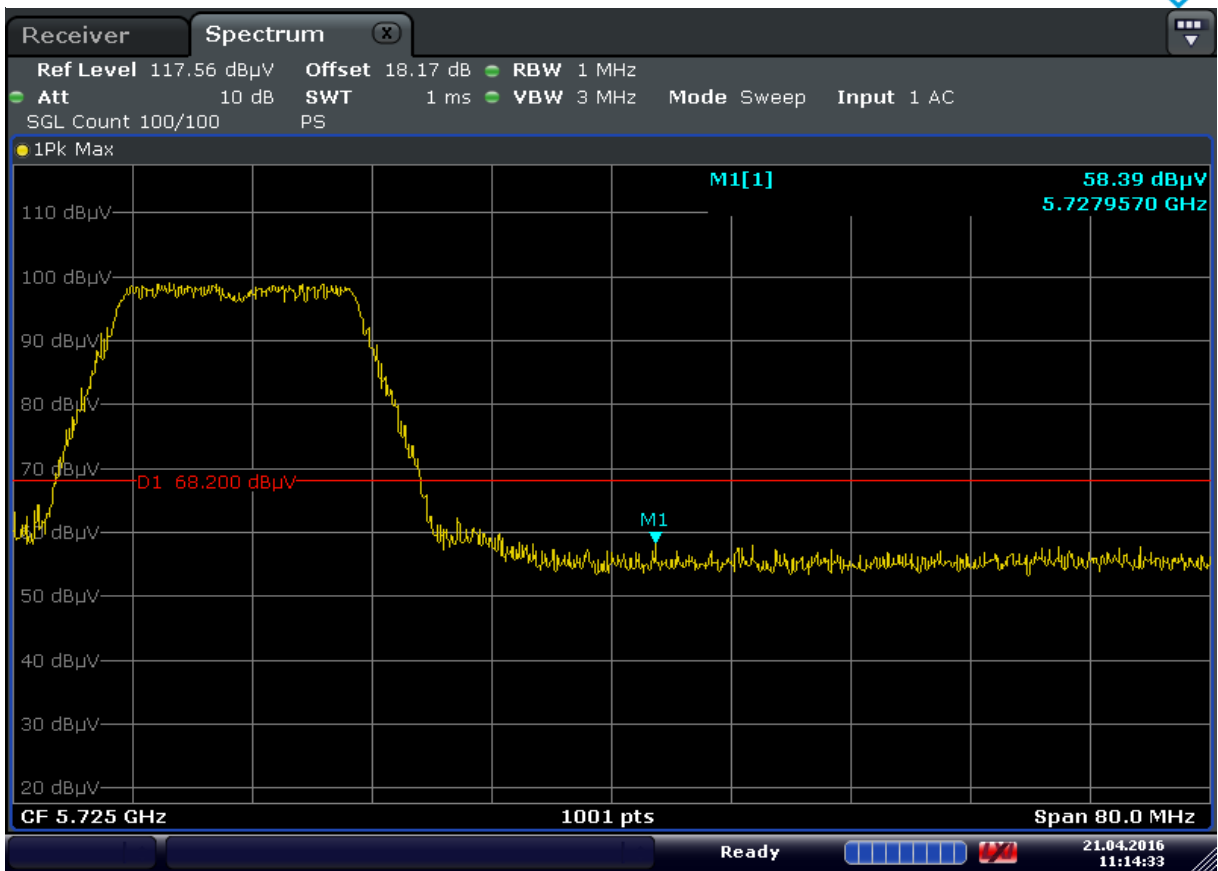
**Plot 7-92. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 81 of 116



**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



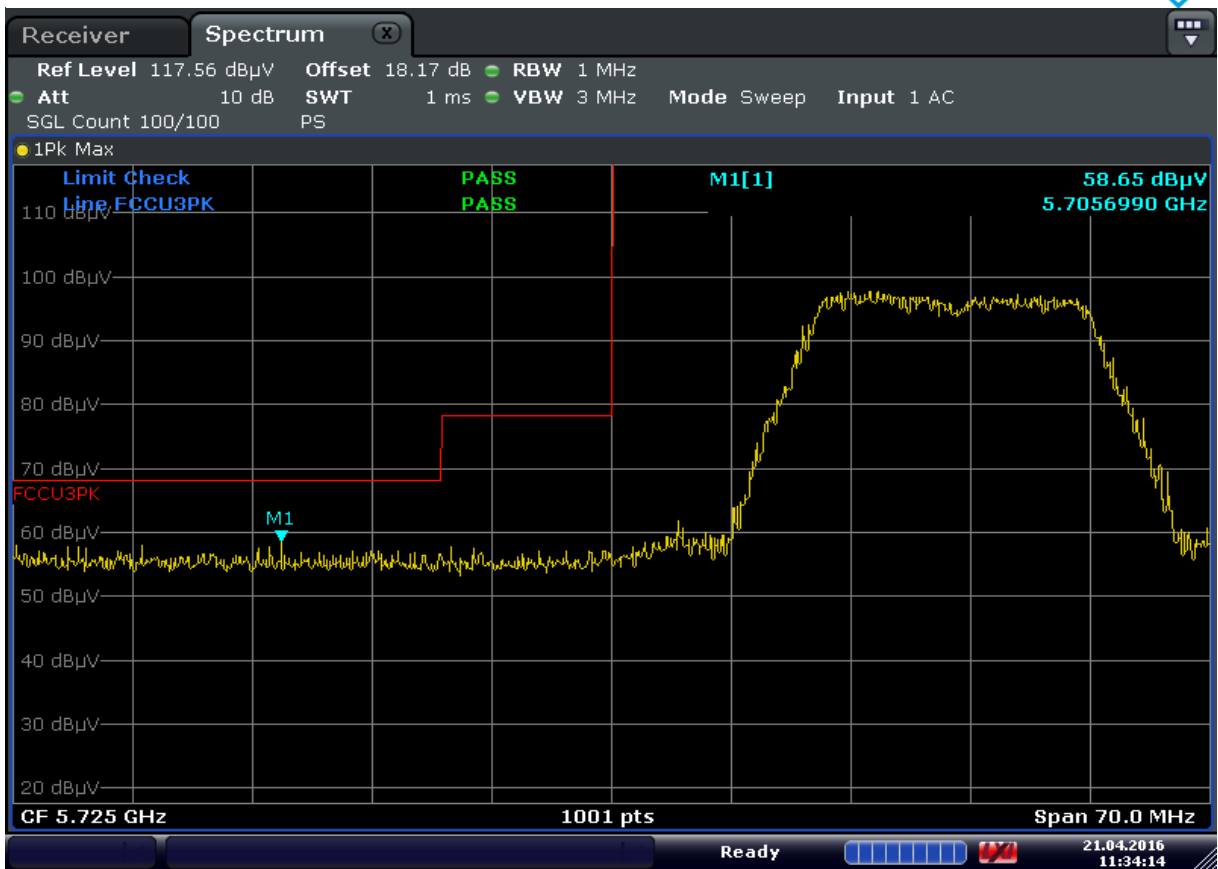
Date: 21.APR.2016 11:14:33

**Plot 7-93. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 82 of 116

**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: 5745MHz  
 Channel: 149



Date: 21.APR.2016 11:34:14

**Plot 7-94. Radiated Lower Band Edge Plot (Peak – UNII Band 3)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 83 of 116

**Radiated Band Edge Measurements (20MHz BW)**  
§15.407(b.1)(b.2) §15.205 §15.209

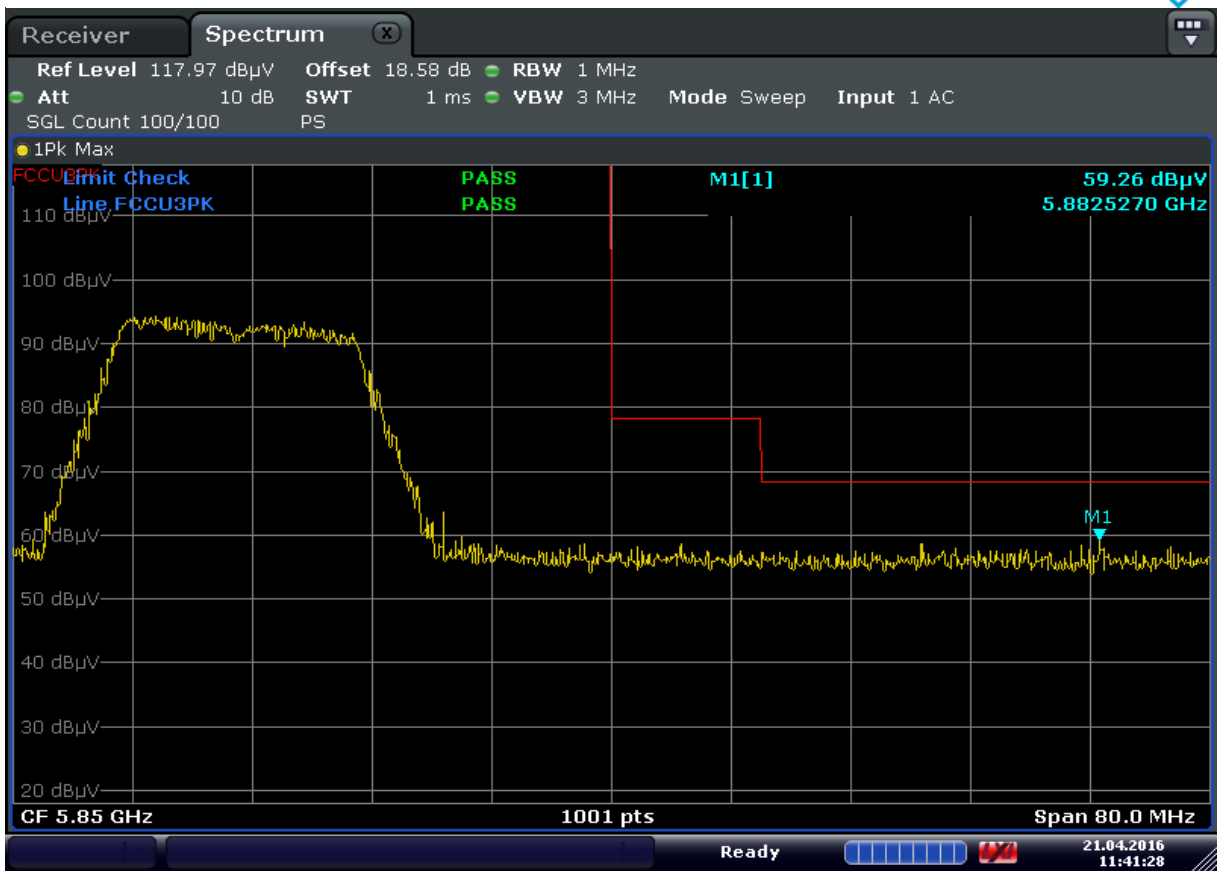
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5825MHz

Channel: 165



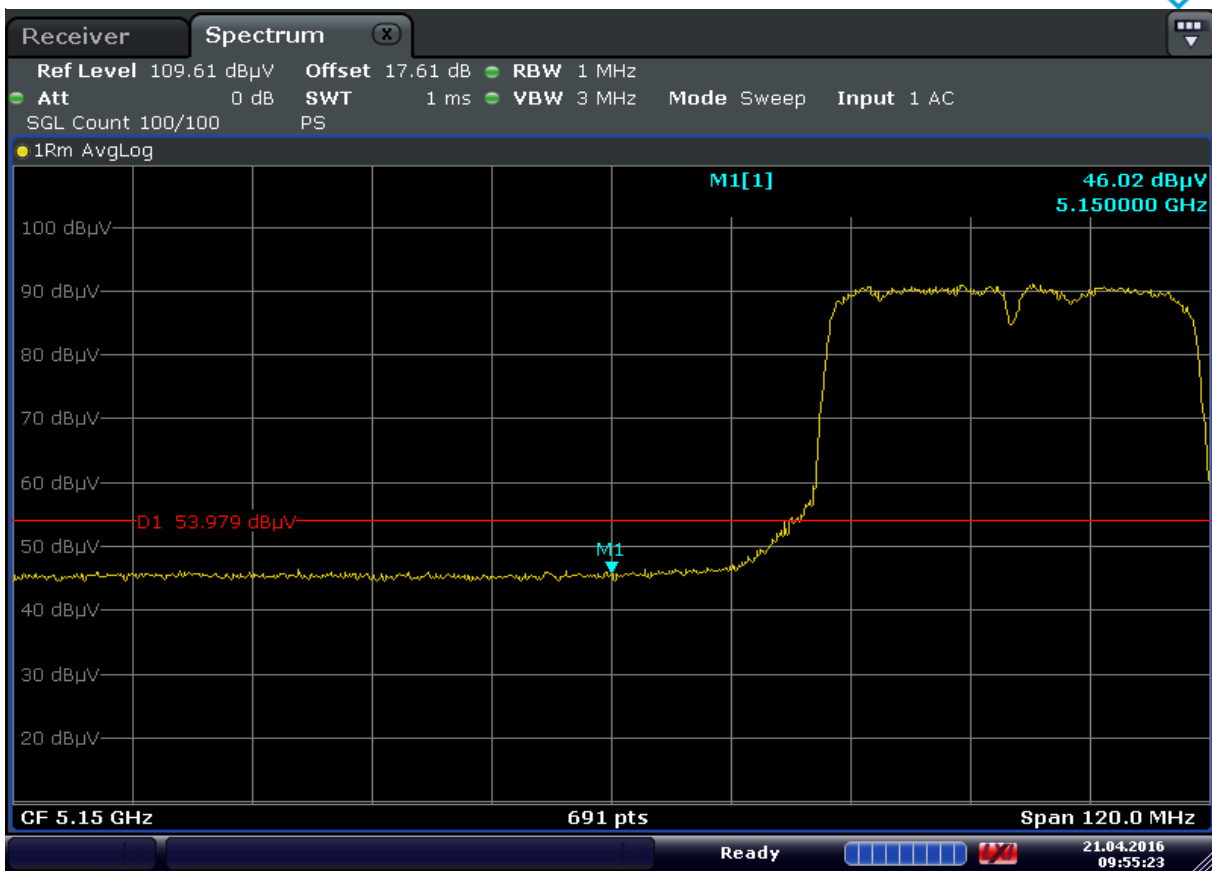
Date: 21.APR.2016 11:41:28

**Plot 7-95. Radiated Upper Band Edge Plot (Peak – UNII Band 3)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 84 of 116

**7.7.3 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

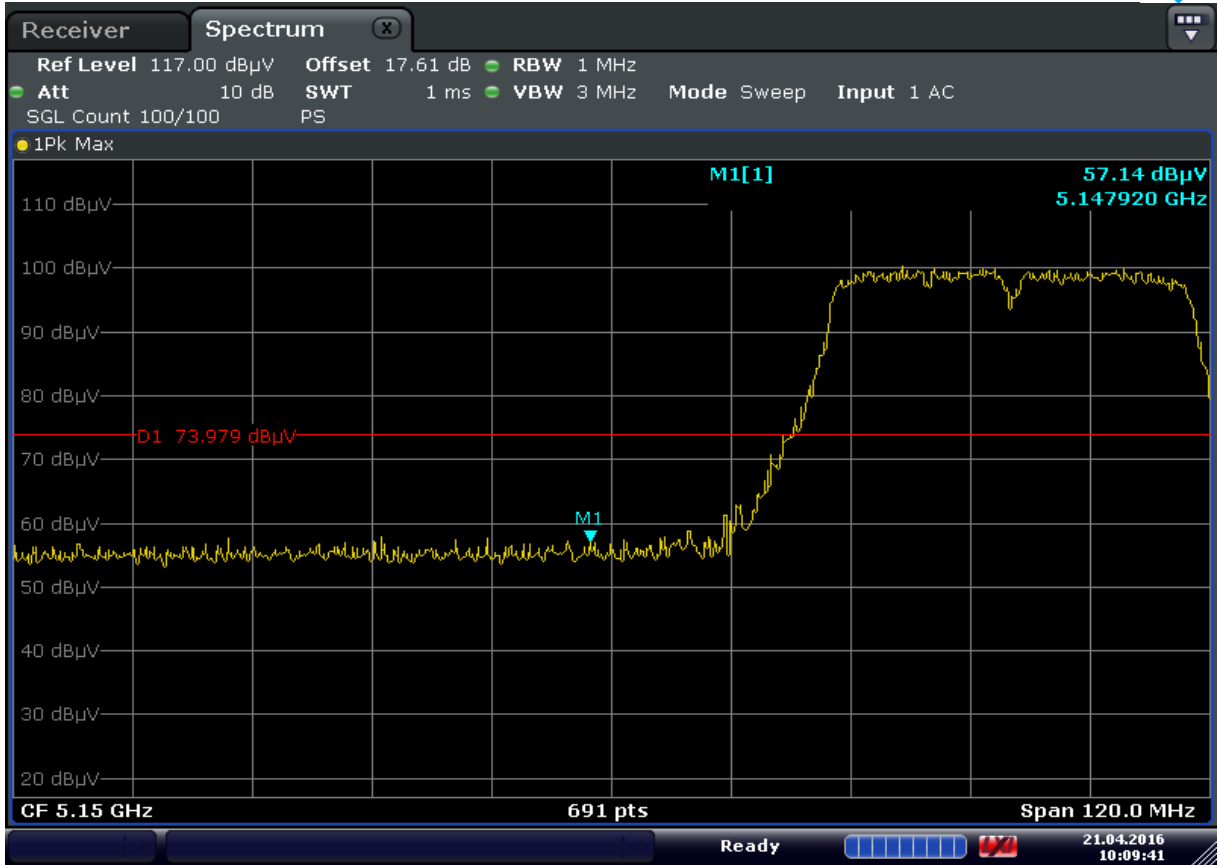


Date: 21.APR.2016 09:55:23

**Plot 7-96. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset	Page 85 of 116	

**Radiated Band Edge Measurements (40MHz BW)**  
§15.407(b.1)(b.2) §15.205 §15.209



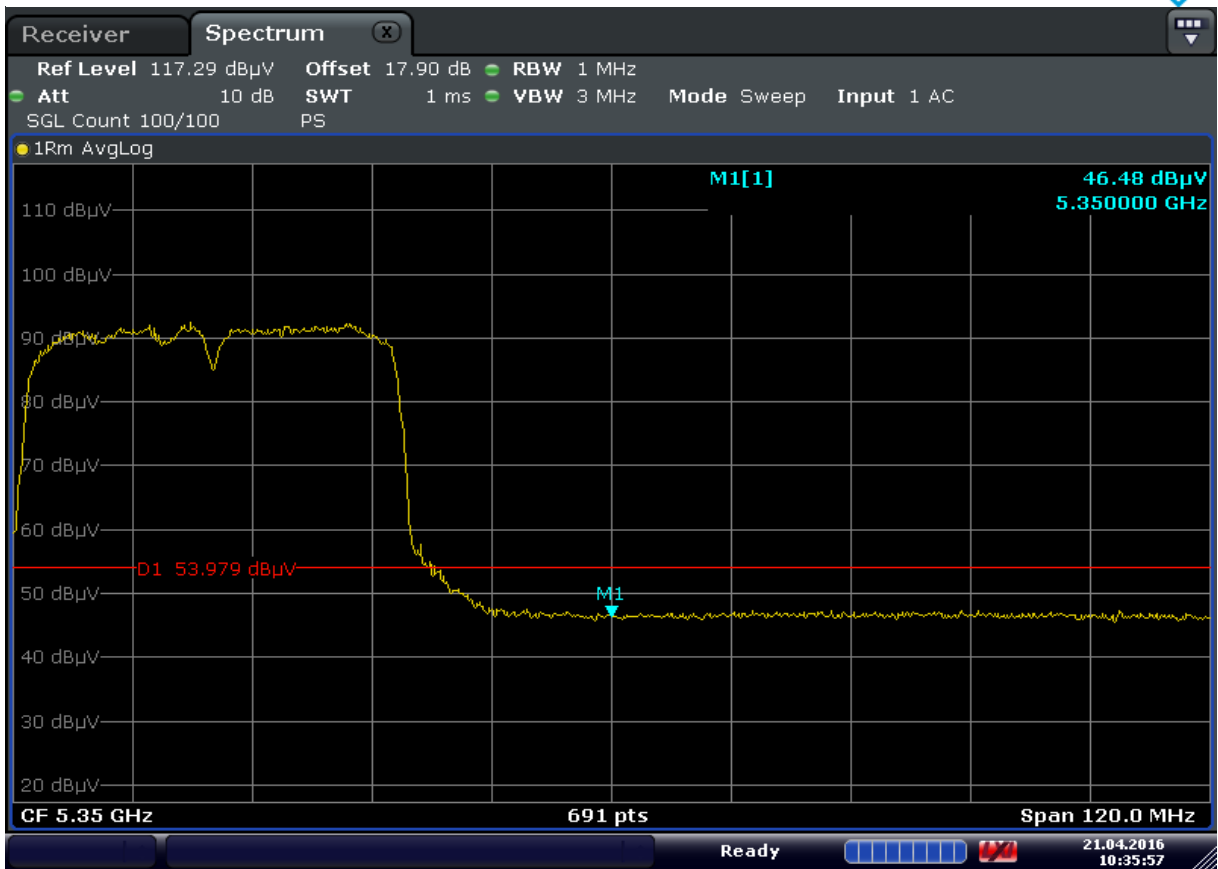
Date: 21.APR.2016 10:09:41

**Plot 7-97. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 86 of 116

**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

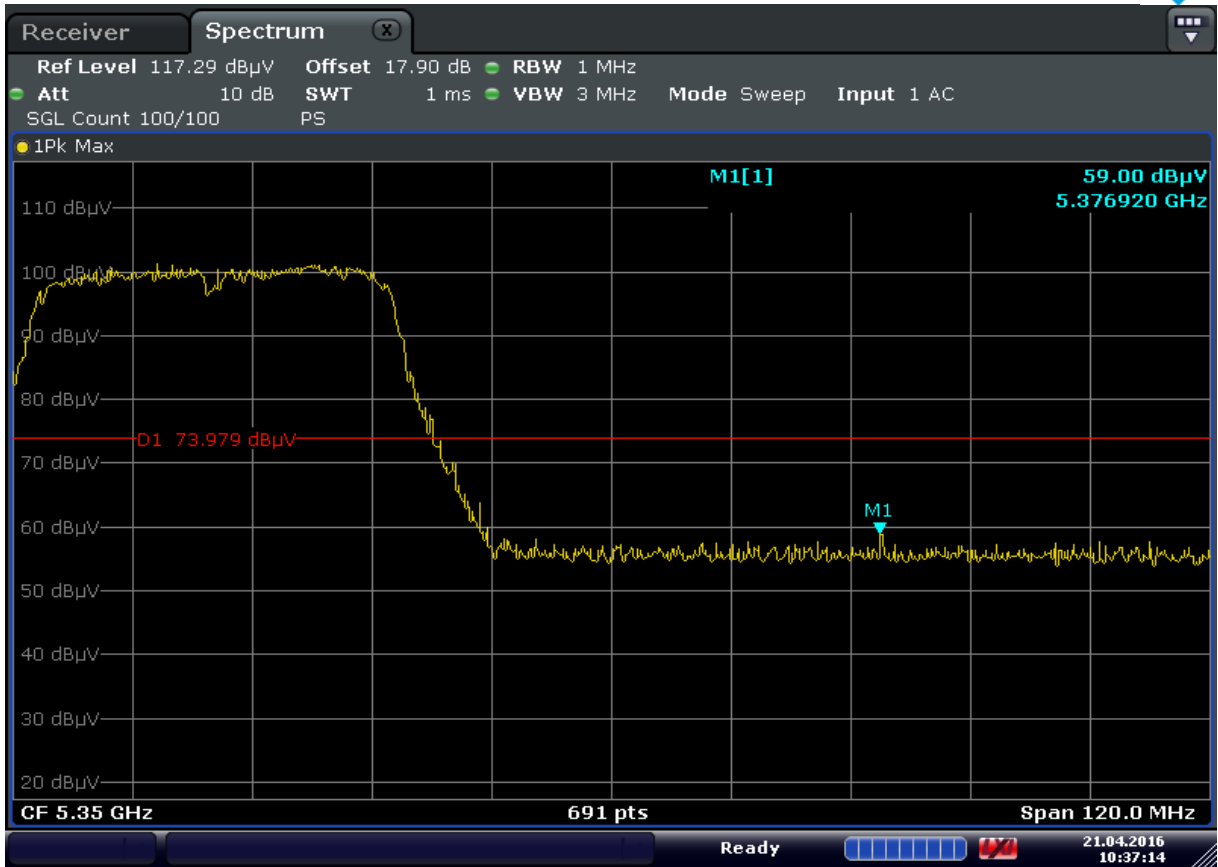


Date: 21.APR.2016 10:35:57

**Plot 7-98. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 87 of 116

**Radiated Band Edge Measurements (40MHz BW)**  
§15.407(b.1)(b.2) §15.205 §15.209



Date: 21.APR.2016 10:37:14

**Plot 7-99. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 88 of 116

# Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

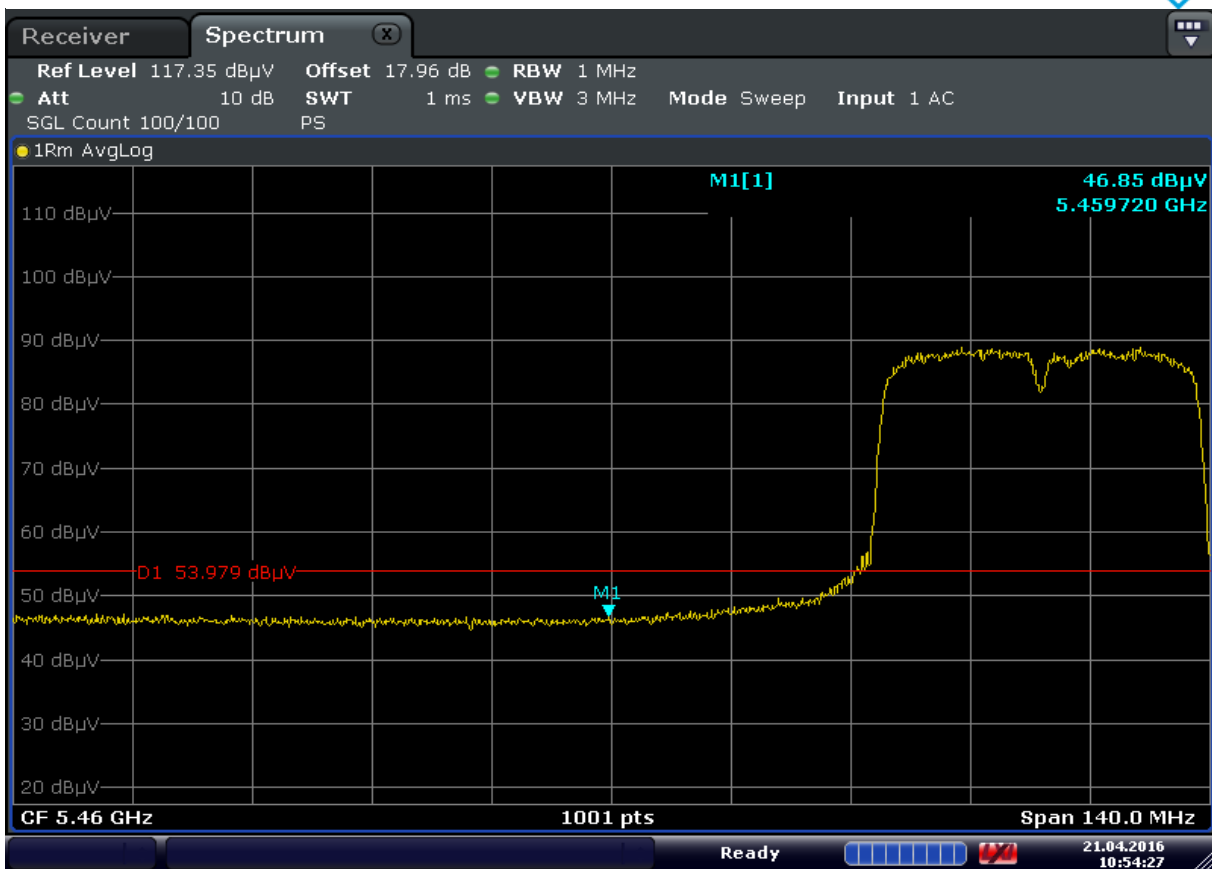
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5510MHz

Channel: 102



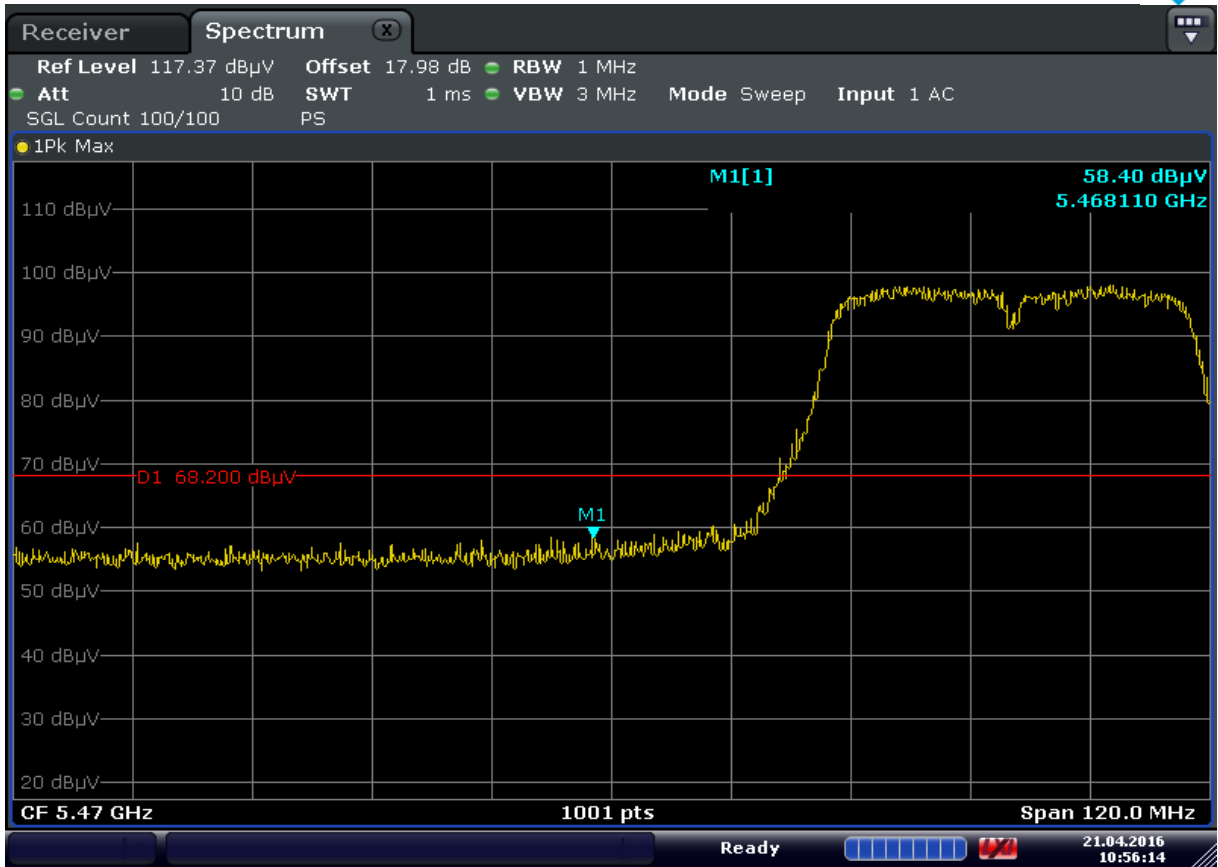
Date: 21.APR.2016 10:54:27

**Plot 7-100. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 89 of 116



**Radiated Band Edge Measurements (40MHz BW)**  
§15.407(b.1)(b.2) §15.205 §15.209



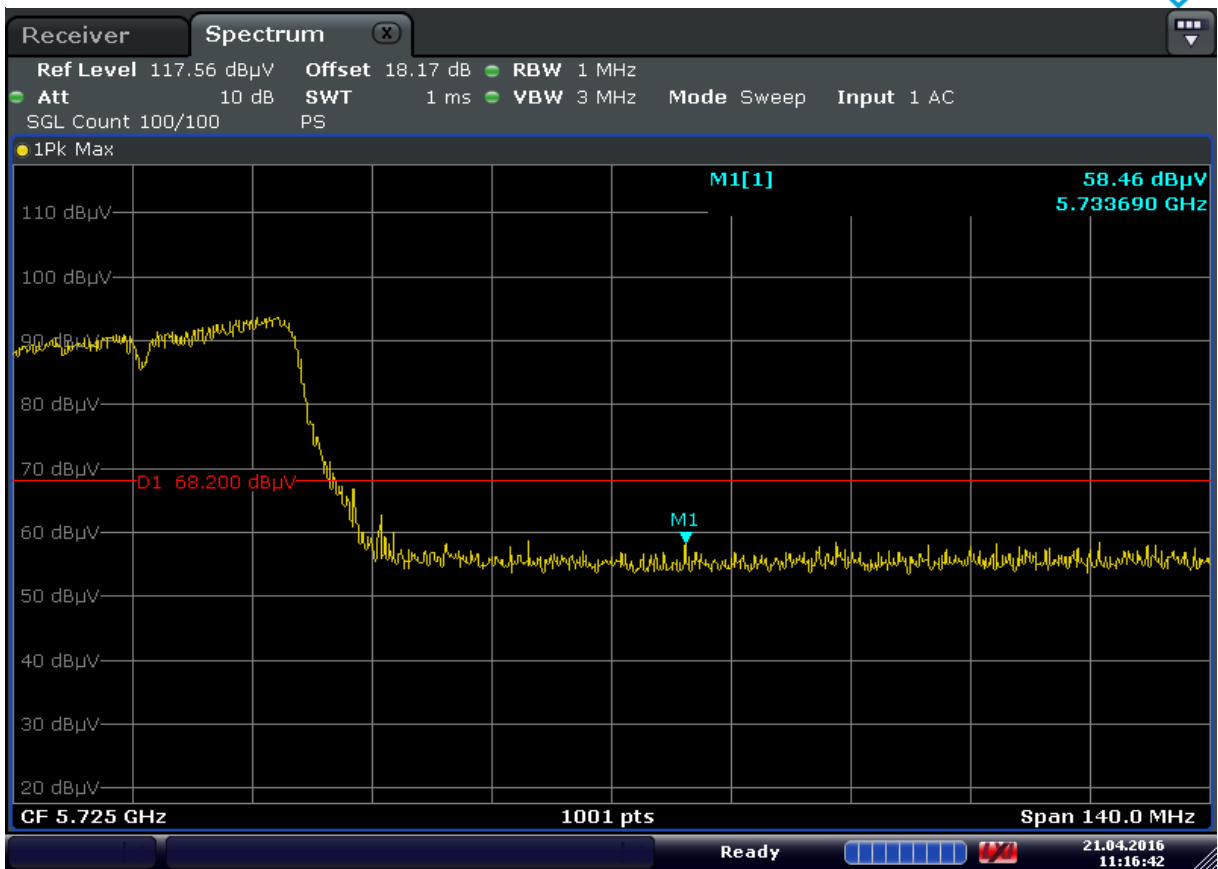
Date: 21.APR.2016 10:56:14

**Plot 7-101. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 90 of 116

**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



Date: 21.APR.2016 11:16:42

**Plot 7-102. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 91 of 116

**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: 5755MHz  
 Channel: 151



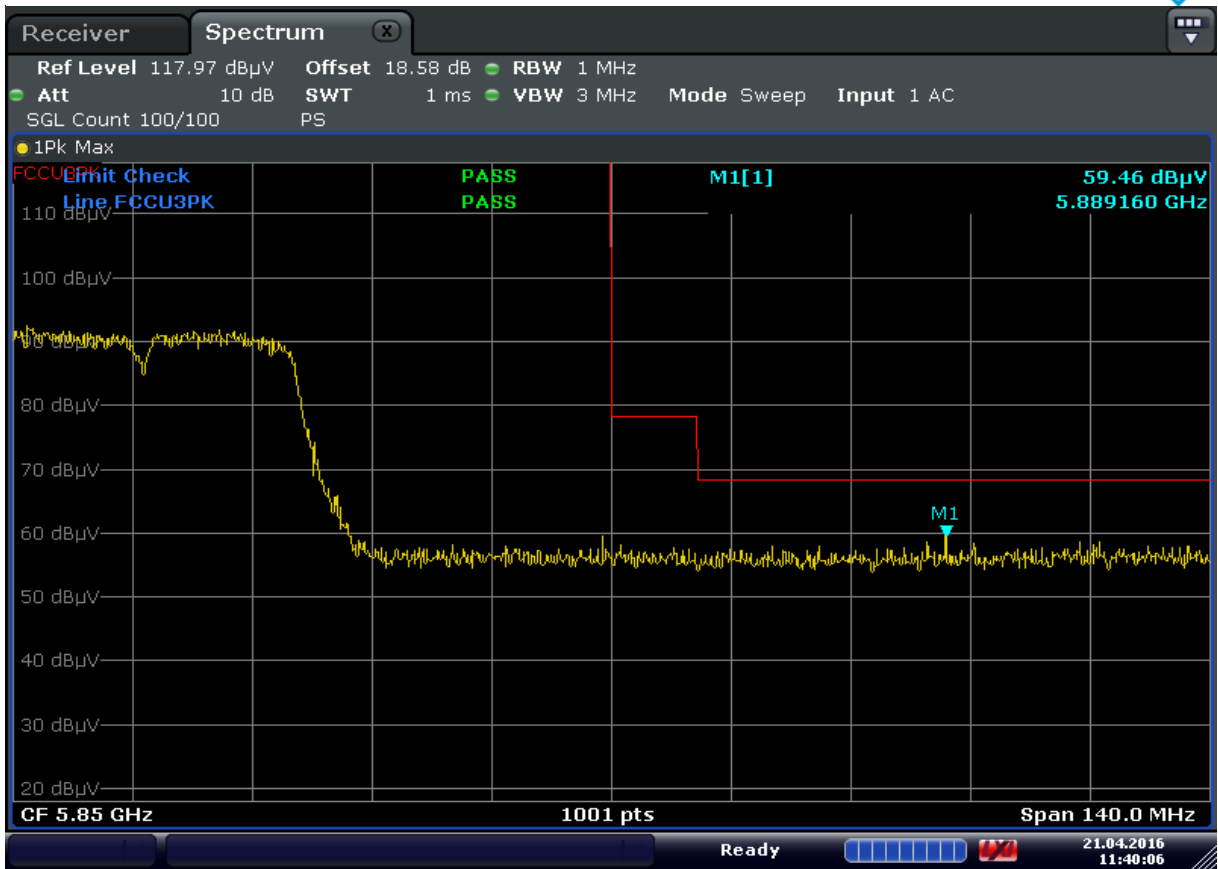
Date: 21.APR.2016 11:35:48

**Plot 7-103. Radiated Lower Band Edge Plot (Peak – UNII Band 3)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 92 of 116

**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: 5795MHz  
 Channel: 159



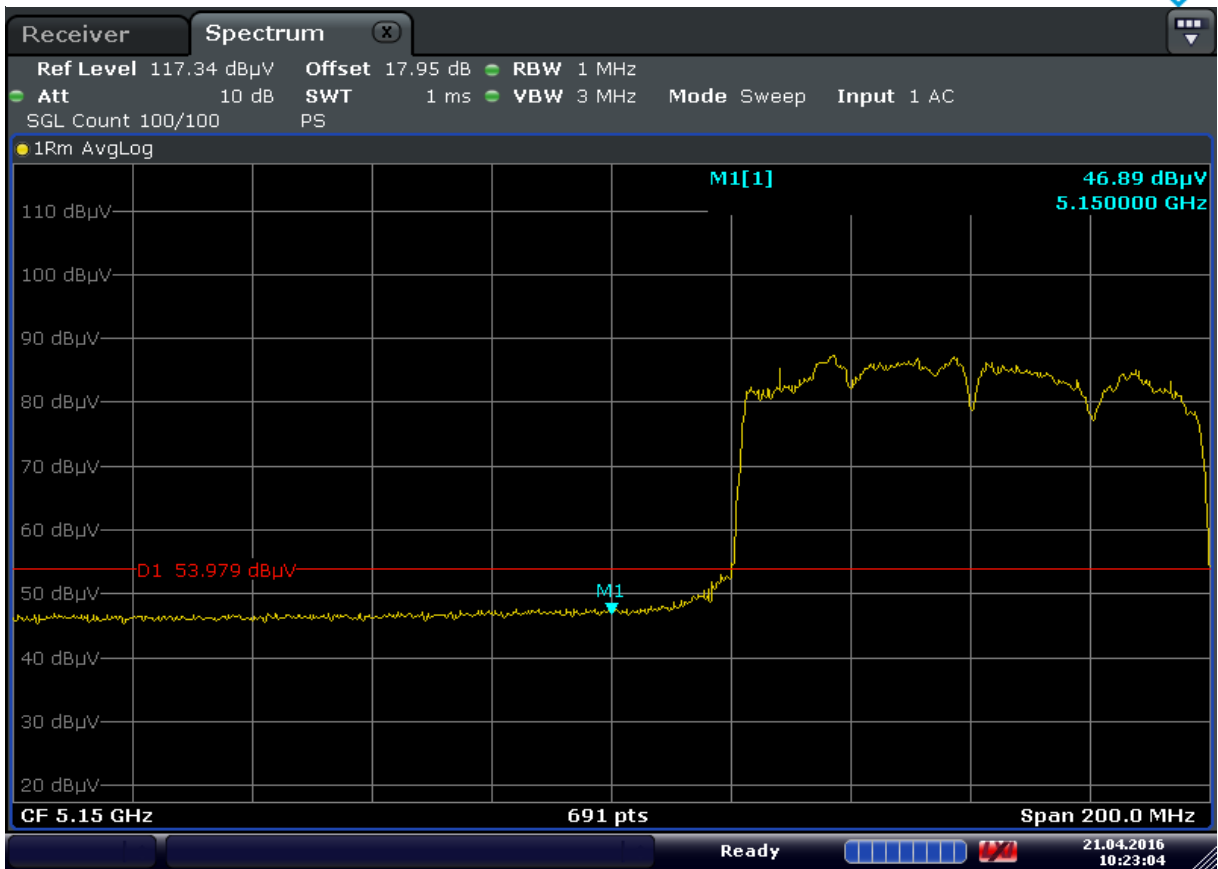
Date: 21.APR.2016 11:40:06

**Plot 7-104. Radiated Upper Band Edge Plot (Peak – UNII Band 3)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 93 of 116

**7.7.4 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

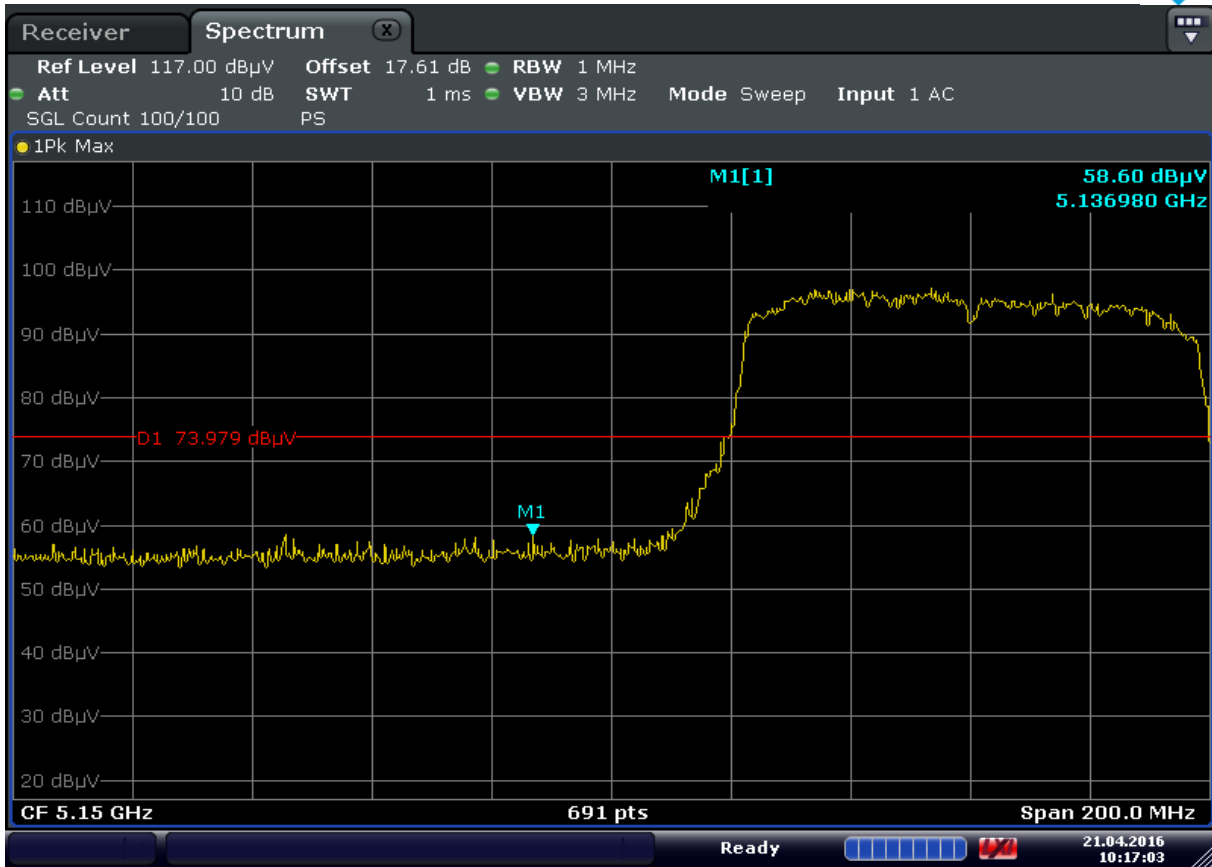


Date: 21.APR.2016 10:23:04

**Plot 7-105. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 94 of 116

**Radiated Band Edge Measurements (80MHz BW)**  
§15.407(b.1)(b.2) §15.205 §15.209



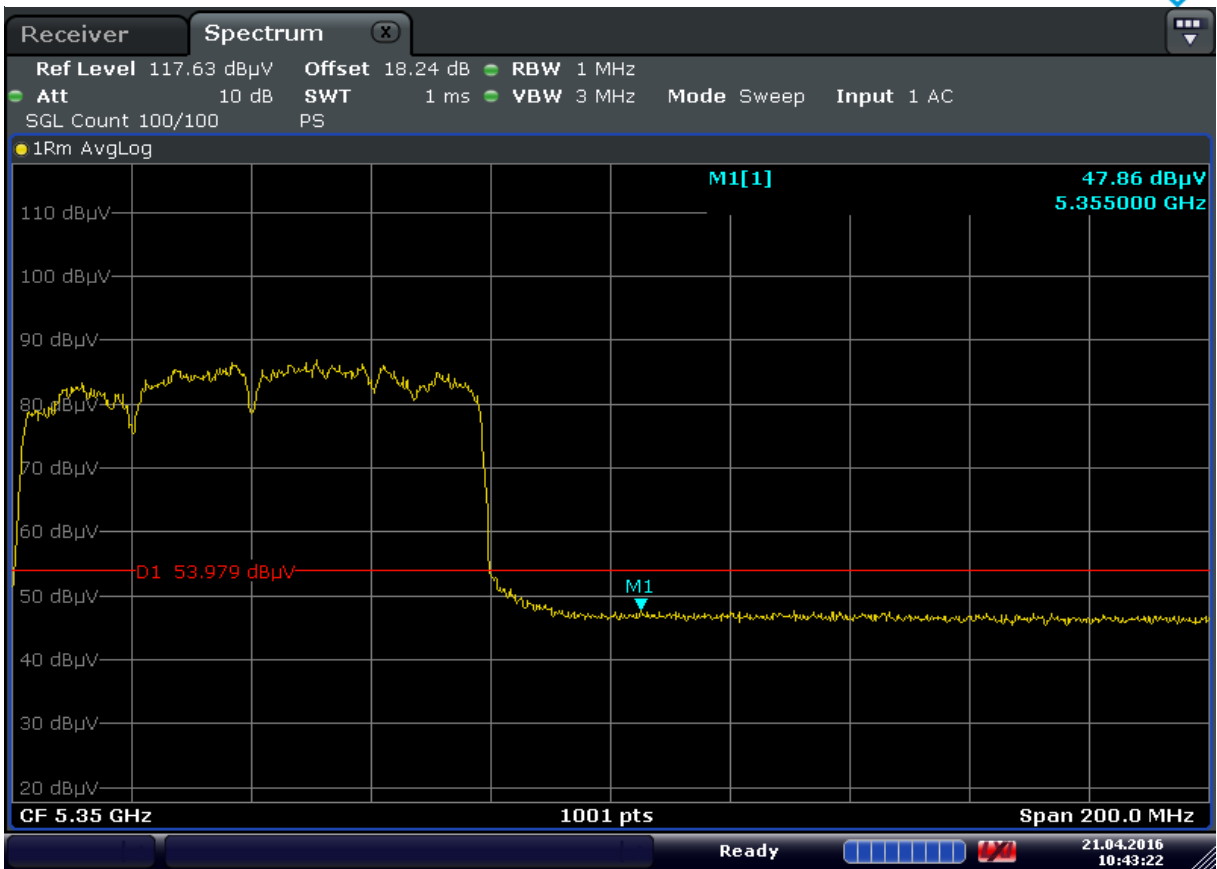
Date: 21.APR.2016 10:17:03

**Plot 7-106. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)**

<b>FCC ID:</b> ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset	Page 95 of 116	

**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

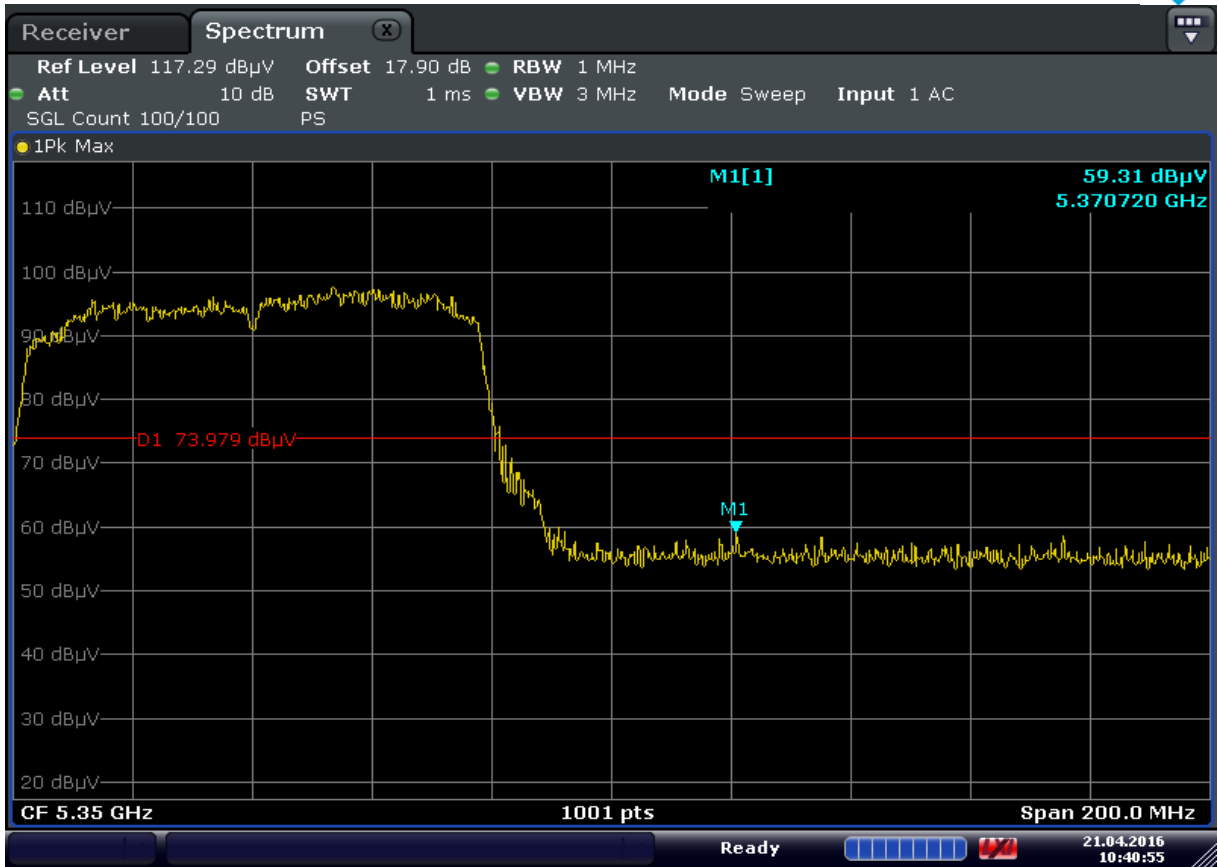


Date: 21.APR.2016 10:43:22

**Plot 7-107. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 96 of 116

**Radiated Band Edge Measurements (80MHz BW)**  
§15.407(b.1)(b.2) §15.205 §15.209



Date: 21.APR.2016 10:40:55

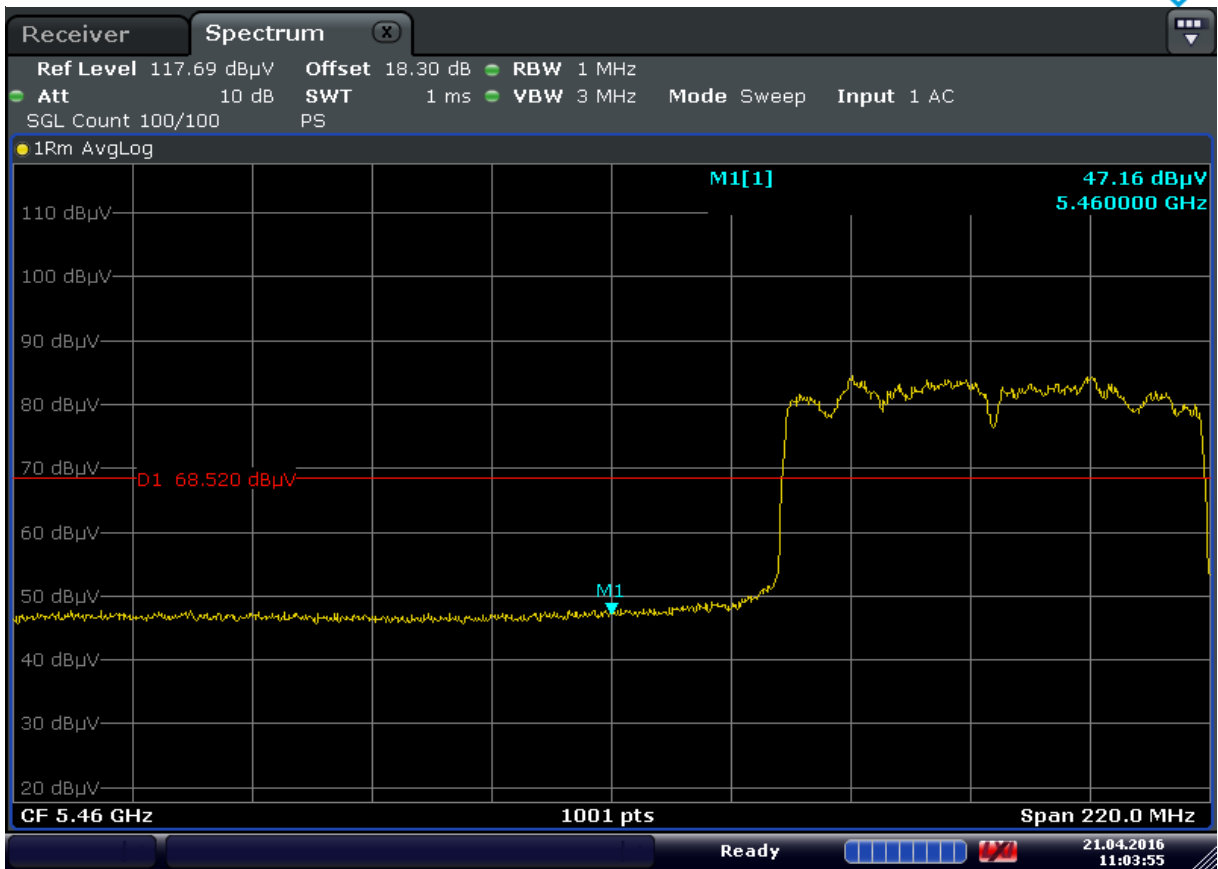
**Plot 7-108. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 97 of 116



**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

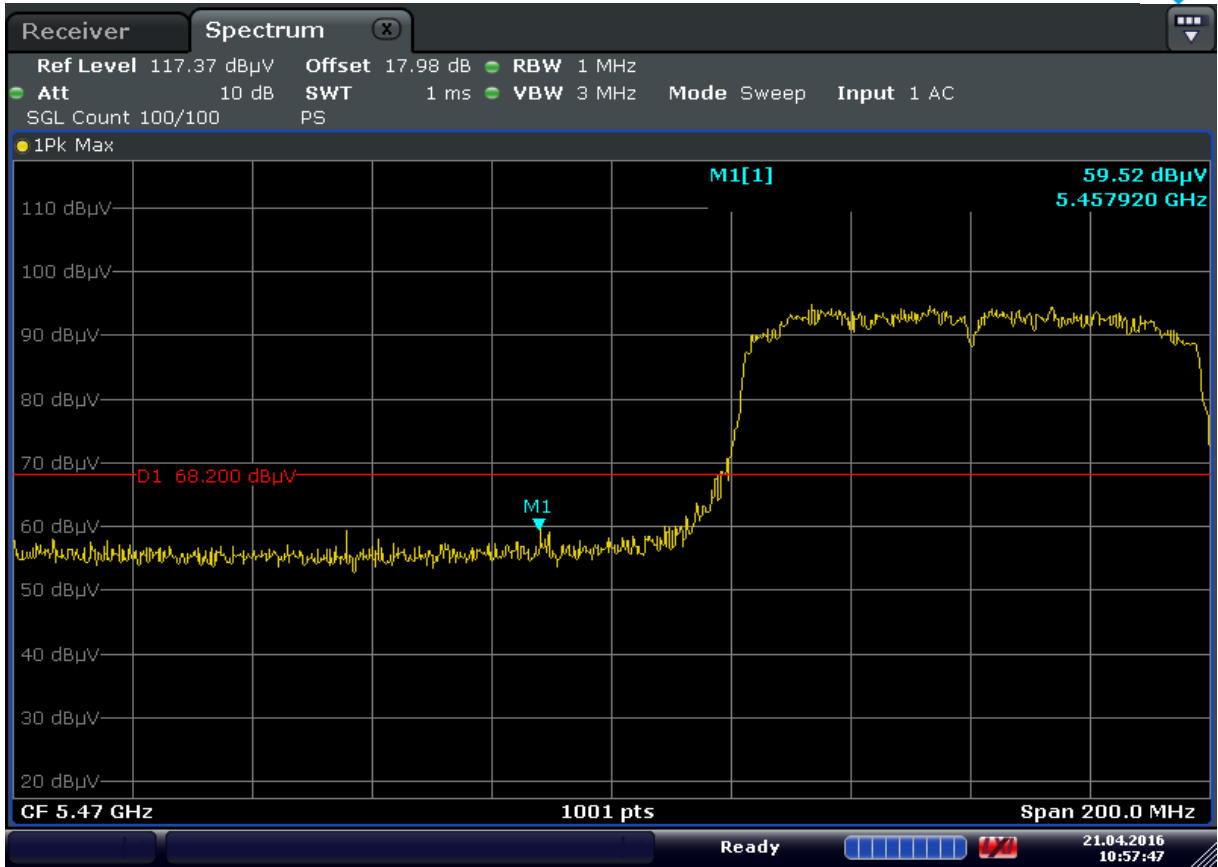


Date: 21.APR.2016 11:03:55

**Plot 7-109. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 98 of 116

**Radiated Band Edge Measurements (80MHz BW)**  
§15.407(b.1)(b.2) §15.205 §15.209



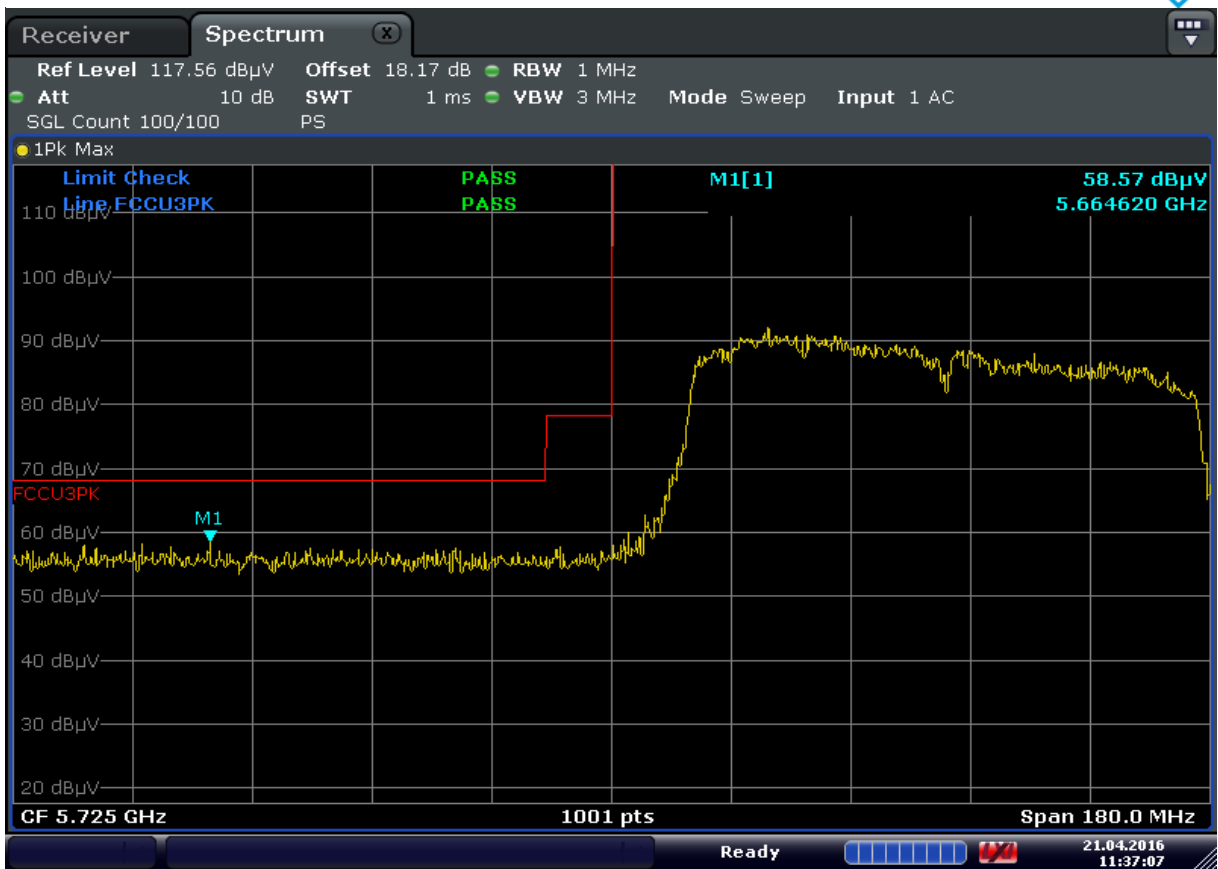
Date: 21.APR.2016 10:57:47

**Plot 7-110. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 99 of 116

**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: 5775MHz  
 Channel: 155



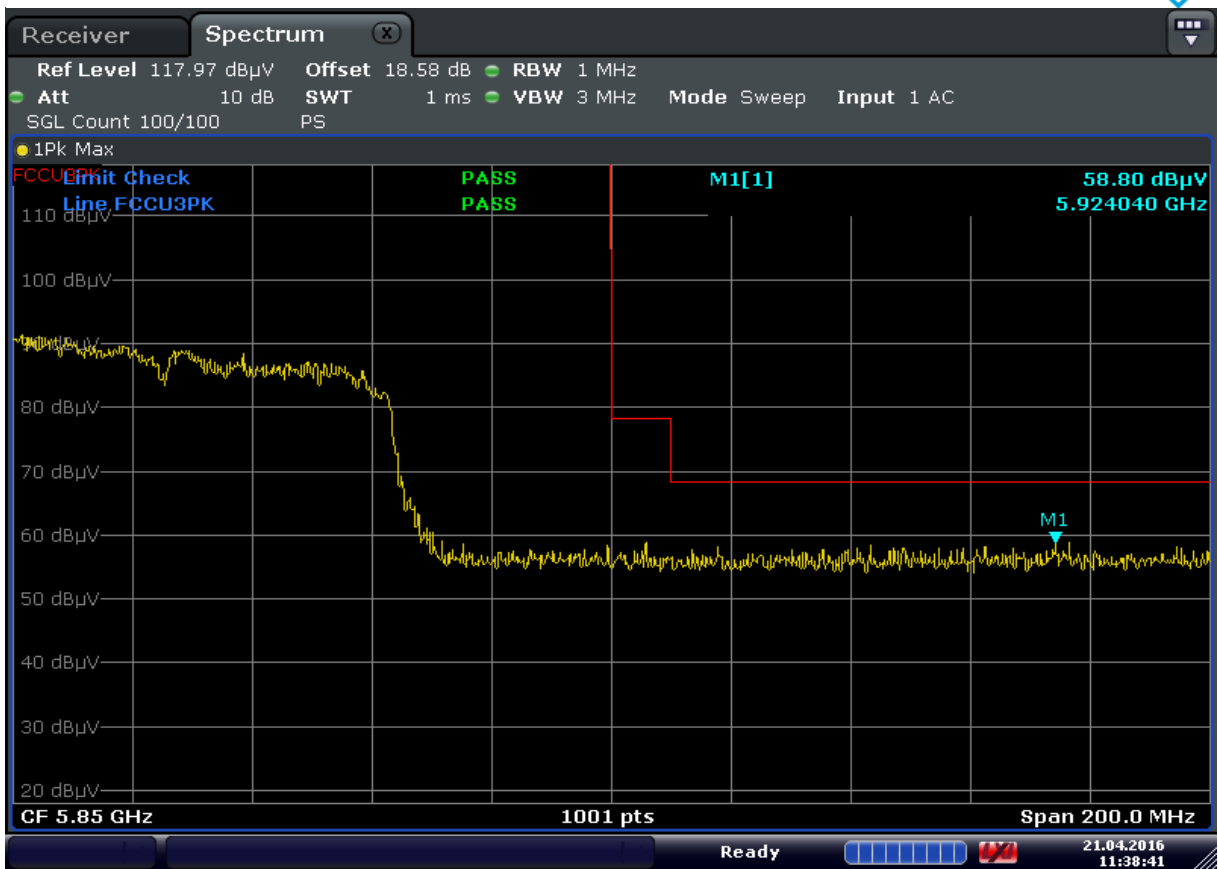
Date: 21.APR.2016 11:37:07

**Plot 7-111. Radiated Lower Band Edge Plot (Peak – UNII Band 3)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 100 of 116

**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: 5775MHz  
 Channel: 155



Date: 21.APR.2016 11:38:41

**Plot 7-112. Radiated Upper Band Edge Plot (Peak – UNII Band 3)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 101 of 116

## 7.8 Radiated Spurious Emissions Measurements – Below 1GHz

### §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, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for radiated spurious emissions. 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 7-26 per Section 15.209.***

Frequency	Field Strength [ $\mu\text{V}/\text{m}$ ]	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 7-26. Radiated Limits**



#### Test Procedures Used

ANSI C63.4-2014

#### Test Settings

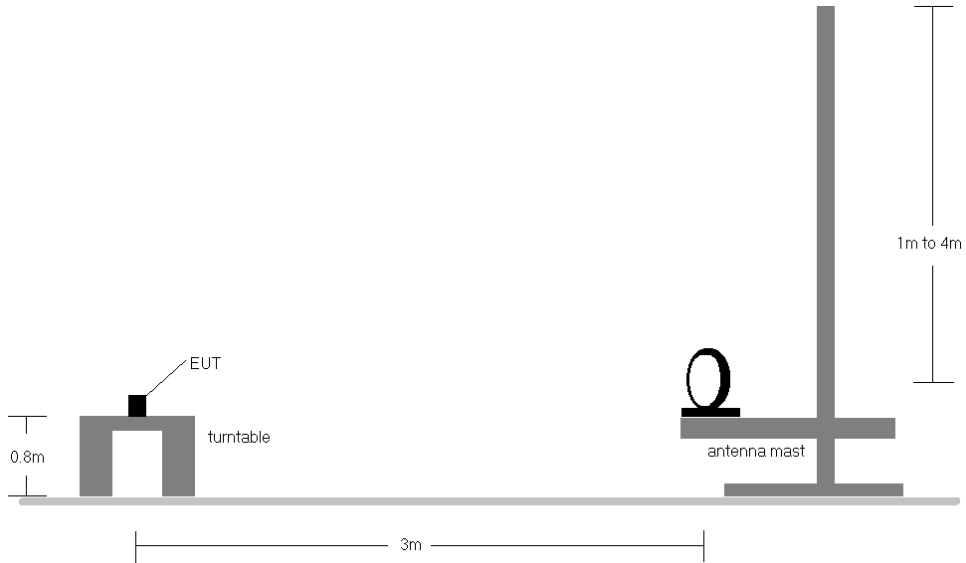
##### Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 120kHz (for emissions from 30MHz – 1GHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

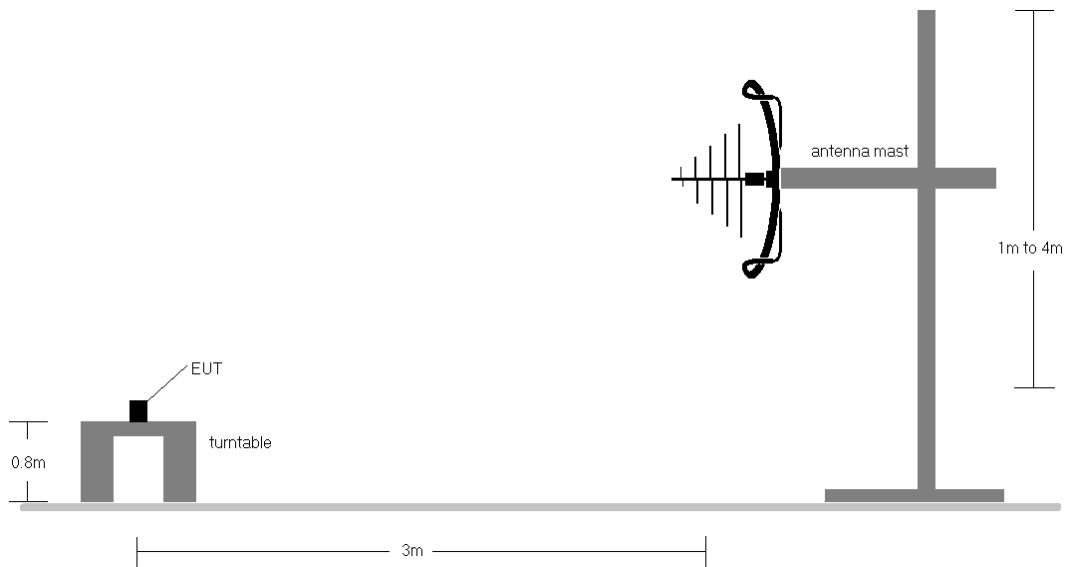
FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset	Page 102 of 116	

**Test Setup**

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





**Figure 7-6. Radiated Test Setup < 30MHz**





**Figure 7-7. Radiated Test Setup < 1GHz**

**Test Notes**

1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-13.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
3. This unit was tested with its standard battery.

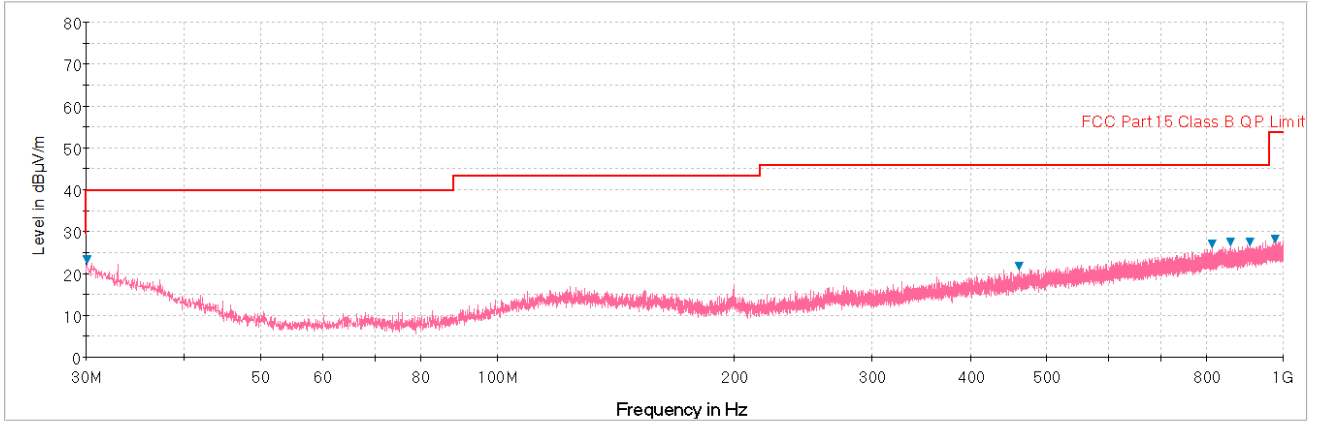
<b>FCC ID:</b> ZNFK557		<b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset		Page 103 of 116

4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
5. Emissions were measured at a 3 meter test distance.
6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
7. No spurious emissions were detected within 20dB of the limit below 30MHz.
8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
9. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. There were no emissions detected in the 30MHz – 1GHz frequency range, as shown in the subsequent plots.

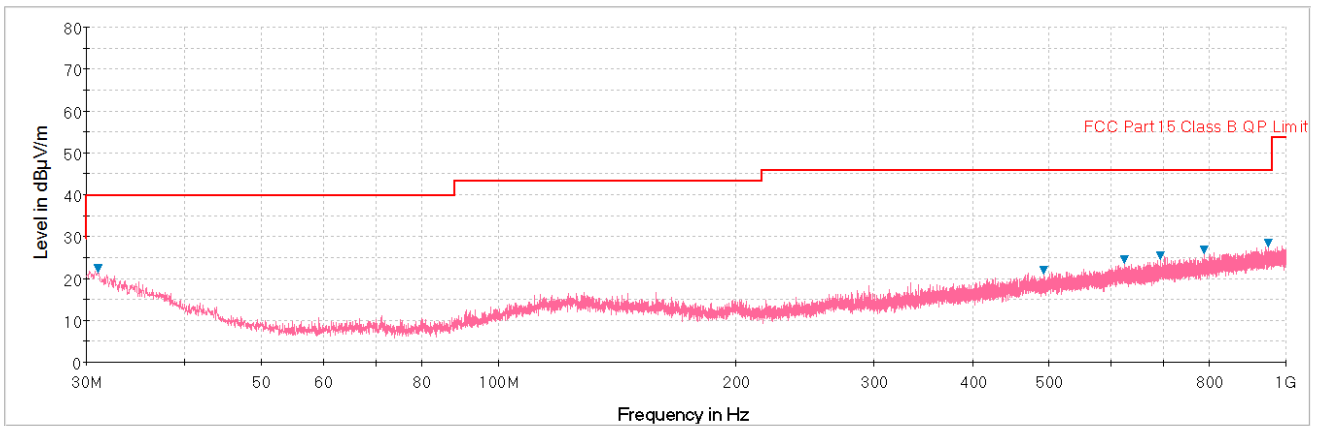
FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset	Page 104 of 116	

## Radiated Spurious Emissions Measurements (Below 1GHz)



§15.209



**Plot 7-113. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)**



**Plot 7-114. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)**

<b>FCC ID:</b> ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset	Page 105 of 116	



## 7.9 Line-Conducted Test Data

### §15.407

#### Test Overview and Limit

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.

**All conducted emissions must not exceed the limits shown in the table below, per Section 15.207.**

Frequency of emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

**Table 7-27. Conducted Limits**

\*Decreases with the logarithm of the frequency.

#### Test Procedures Used

ANSI C63.10-2013, Section 6.2



#### Test Settings

##### Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

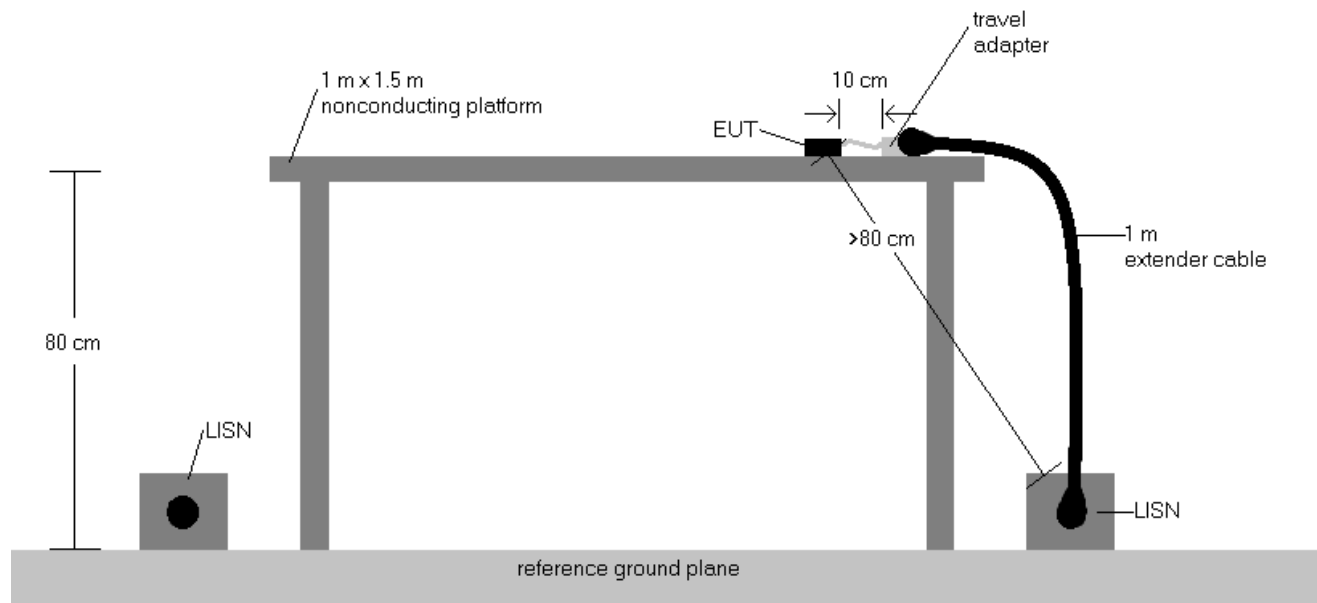
##### Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = RMS
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset	Page 106 of 116	

## Test Setup



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



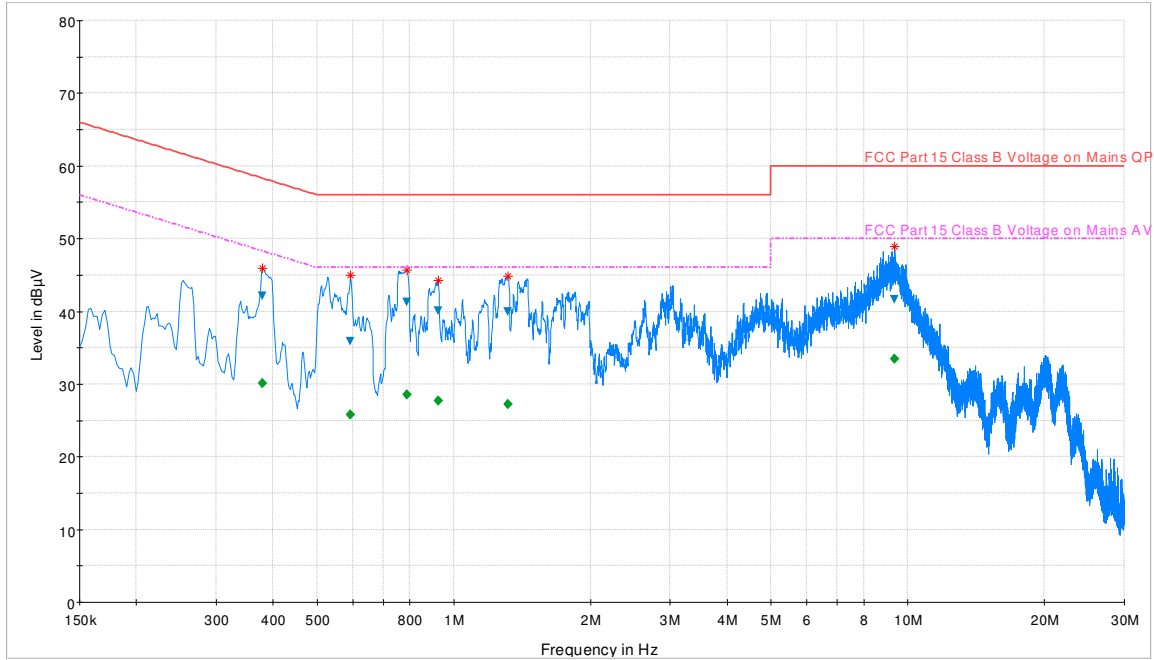
**Figure 7-8. Test Instrument & Measurement Setup**

## Test Notes

1. All modes of operation were investigated and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
2. The limit for an intentional radiator from 150kHz to 30MHz are specified in 15.207.
3.  $\text{Corr. (dB)} = \text{Cable loss (dB)} + \text{LISN insertion factor (dB)}$
4.  $\text{QP/AV Level (dB}\mu\text{V)} = \text{QP/AV Analyzer/Receiver Level (dB}\mu\text{V)} + \text{Corr. (dB)}$
5.  $\text{Margin (dB)} = \text{QP/AV Limit (dB}\mu\text{V)} - \text{QP/AV Level (dB}\mu\text{V)}$
6. Traces shown in plot are made using a peak detector.
7. Deviations to the Specifications: None.

FCC ID: ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 107 of 116

**Line-Conducted Test Data**  
**§15.407**



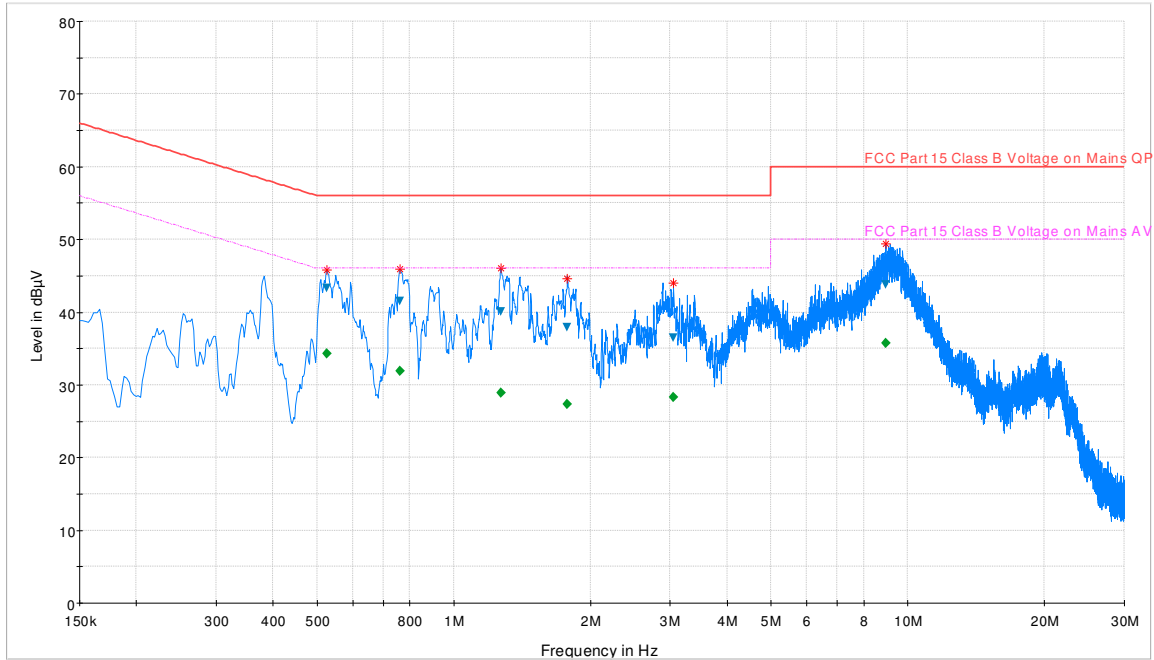
— Preview Result 1-PK+  
- - - FCC Part 15 Class B Voltage on Mains AV
 \* Critical\_Freqs PK+  
▼ Final\_Result QPK
 — FCC Part 15 Class B Voltage on Mains QP  
◆ Final\_Result AVG

Frequency MHz	Process State	QuasiPeak dBµV	Average dBµV	Limit dBµV	Margin dB	Corr. dB
0.379500	FINAL	—	30.13	48.29	18.16	0.0
0.379500	FINAL	42.06	—	58.29	16.23	0.0
0.593250	FINAL	—	25.73	46.00	20.27	0.0
0.593250	FINAL	35.82	—	56.00	20.18	0.0
0.789000	FINAL	—	28.58	46.00	17.42	0.0
0.789000	FINAL	41.22	—	56.00	14.78	0.0
0.924000	FINAL	—	27.69	46.00	18.31	0.0
0.924000	FINAL	40.02	—	56.00	15.98	0.0
1.315500	FINAL	—	27.22	46.00	18.78	0.0
1.315500	FINAL	39.97	—	56.00	16.03	0.0
9.370500	FINAL	—	33.51	50.00	16.49	0.2
9.370500	FINAL	41.66	—	60.00	18.34	0.2

**Plot 7-115. Line Conducted Plot with 802.11a UNII Band 1 (L1)**

<b>FCC ID:</b> ZNFK557		<b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset	Page 108 of 116	

**Line-Conducted Test Data**  
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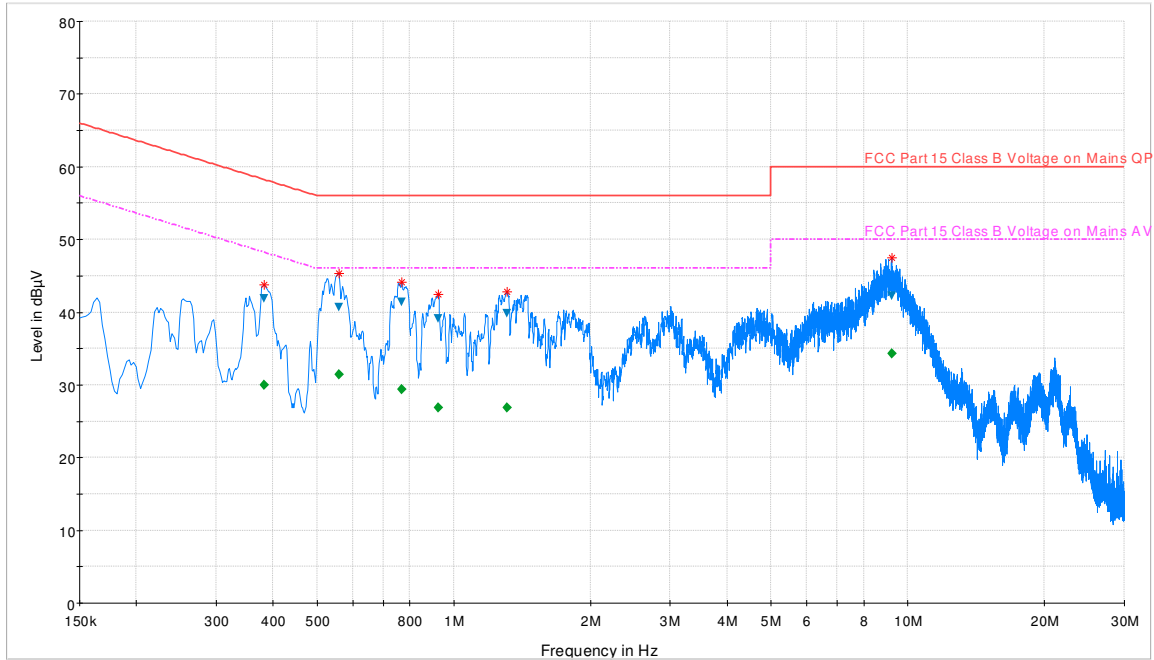
— Preview Result 1-PK+  
— FCC Part 15 Class B Voltage on Mains AV
 \* Critical\_Freqs PK+  
▼ Final\_Result QPK
 — FCC Part 15 Class B Voltage on Mains QP  
◆ Final\_Result AVG

Frequency MHz	Process State	QuasiPeak dBµV	Average dBµV	Limit dBµV	Margin dB	Corr. dB
0.525750	FINAL	—	34.31	46.00	11.69	-0.1
0.525750	FINAL	43.33	—	56.00	12.67	-0.1
0.762000	FINAL	—	31.95	46.00	14.05	-0.1
0.762000	FINAL	41.52	—	56.00	14.48	-0.1
1.270500	FINAL	—	28.96	46.00	17.04	-0.1
1.270500	FINAL	40.08	—	56.00	15.92	-0.1
1.781250	FINAL	—	27.35	46.00	18.65	0.0
1.781250	FINAL	37.94	—	56.00	18.06	0.0
3.050250	FINAL	—	28.32	46.00	17.68	0.0
3.050250	FINAL	36.42	—	56.00	19.58	0.0
8.952000	FINAL	—	35.69	50.00	14.31	0.1
8.952000	FINAL	43.74	—	60.00	16.26	0.1

**Plot 7-116. Line Conducted Plot with 802.11a UNII Band 1 (N)**

<b>FCC ID:</b> ZNFK557		<b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT</b> (CERTIFICATION)		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset	Page 109 of 116	

**Line-Conducted Test Data**  
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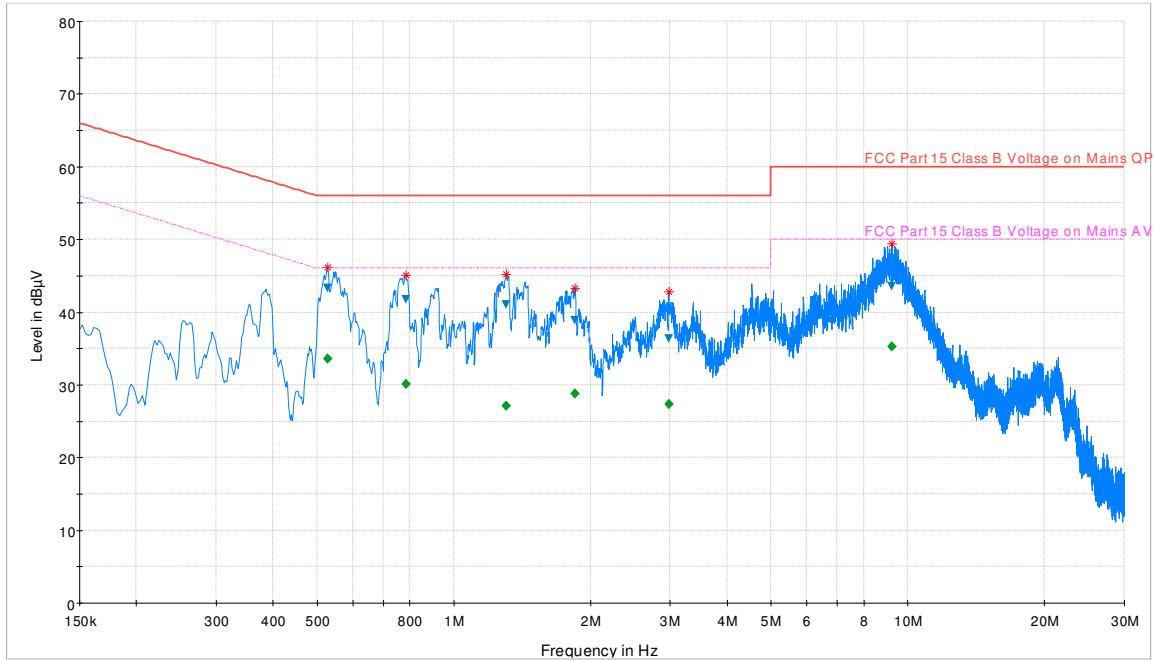
— Preview Result 1-PK+  
- - - - FCC Part 15 Class B Voltage on Mains AV
 \* Critical\_Freqs PK+  
▼ Final\_Result QPK
 — FCC Part 15 Class B Voltage on Mains QP  
◆ Final\_Result AVG

Frequency MHz	Process State	QuasiPeak dBµV	Average dBµV	Limit dBµV	Margin dB	Corr. dB
0.381750	FINAL	—	30.03	48.24	18.21	0.0
0.381750	FINAL	41.86	—	58.24	16.38	0.0
0.559500	FINAL	—	31.42	46.00	14.58	0.0
0.559500	FINAL	40.63	—	56.00	15.37	0.0
0.768750	FINAL	—	29.34	46.00	16.66	0.0
0.768750	FINAL	41.35	—	56.00	14.65	0.0
0.926250	FINAL	—	26.87	46.00	19.13	0.0
0.926250	FINAL	39.16	—	56.00	16.84	0.0
1.308750	FINAL	—	26.85	46.00	19.15	0.0
1.308750	FINAL	39.86	—	56.00	16.14	0.0
9.208500	FINAL	—	34.26	50.00	15.74	0.2
9.208500	FINAL	42.21	—	60.00	17.79	0.2

**Plot 7-117. Line Conducted Plot with 802.11a UNII Band 2A (L1)**

<b>FCC ID:</b> ZNFK557		<b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset		Page 110 of 116

**Line-Conducted Test Data**  
**§15.407**



— Preview Result 1-PK+  
— FCC Part 15 Class B Voltage on Mains AV
 \* Critical\_Freqs PK+  
▼ Final\_Result QPK
 — FCC Part 15 Class B Voltage on Mains QP  
◆ Final\_Result AVG

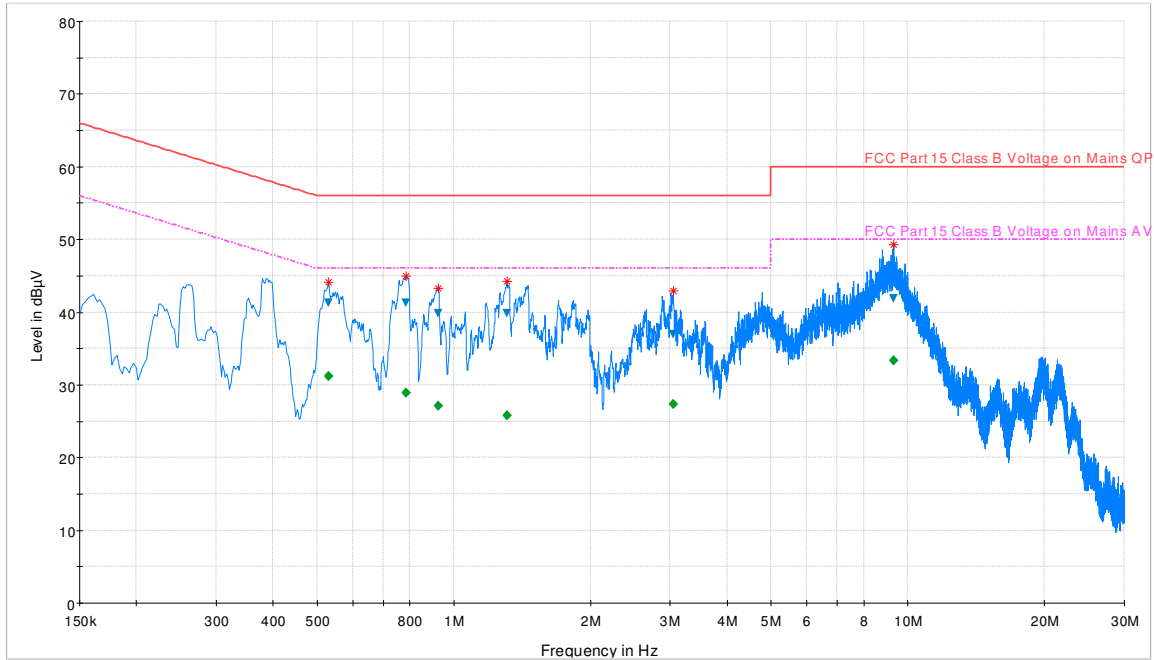
Frequency MHz	Process State	QuasiPeak dBµV	Average dBµV	Limit dBµV	Margin dB	Corr. dB
0.528000	FINAL	—	33.56	46.00	12.44	-0.1
0.528000	FINAL	43.34	—	56.00	12.66	-0.1
0.784500	FINAL	—	30.09	46.00	15.91	-0.1
0.784500	FINAL	41.69	—	56.00	14.31	-0.1
1.306500	FINAL	—	27.11	46.00	18.89	-0.1
1.306500	FINAL	41.03	—	56.00	14.97	-0.1
1.851000	FINAL	—	28.79	46.00	17.21	0.0
1.851000	FINAL	38.90	—	56.00	17.10	0.0
2.973750	FINAL	—	27.32	46.00	18.68	0.0
2.973750	FINAL	36.39	—	56.00	19.61	0.0
9.242250	FINAL	—	35.32	50.00	14.68	0.1
9.242250	FINAL	43.52	—	60.00	16.48	0.1

**Plot 7-118. Line Conducted Plot with 802.11a UNII Band 2A (N)**

<b>FCC ID:</b> ZNFK557		<b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset		Page 111 of 116

# Line-Conducted Test Data

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— Preview Result 1-PK+  
— FCC Part 15 Class B Voltage on Mains AV
 \* Critical\_Freqs PK+  
▼ Final\_Result QPK
 — FCC Part 15 Class B Voltage on Mains QP  
◆ Final\_Result AVG

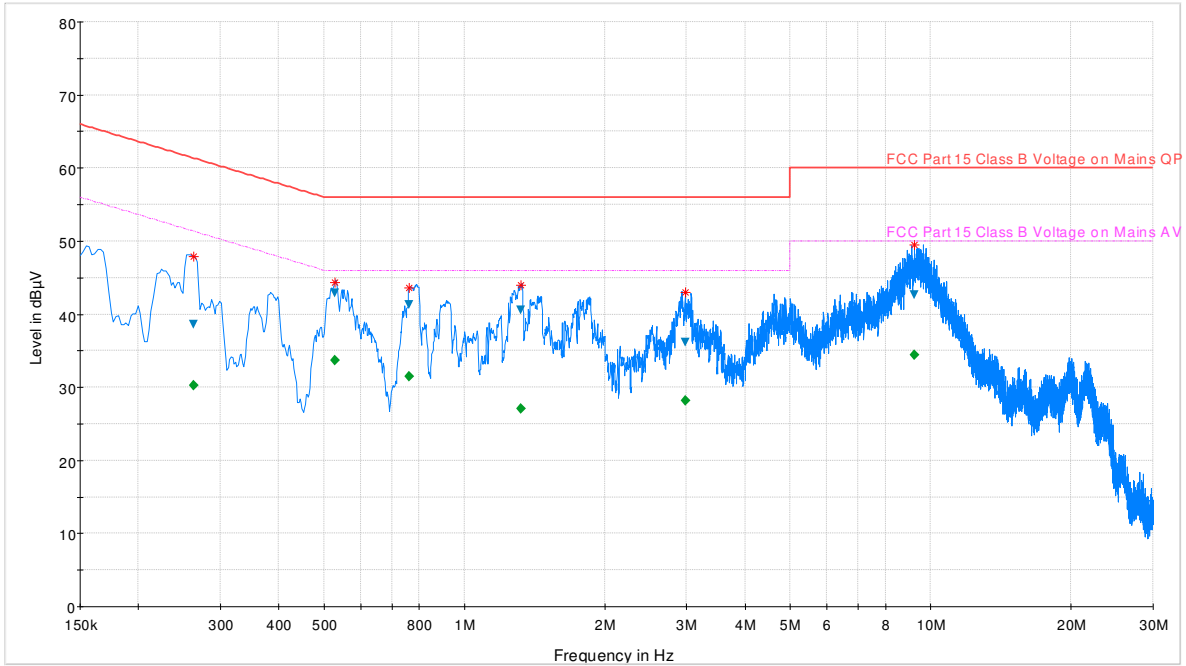
Frequency MHz	Process State	QuasiPeak dBµV	Average dBµV	Limit dBµV	Margin dB	Corr. dB
0.530250	FINAL	—	31.13	46.00	14.87	0.0
0.530250	FINAL	41.28	—	56.00	14.72	0.0
0.784500	FINAL	—	28.95	46.00	17.05	0.0
0.784500	FINAL	41.31	—	56.00	14.69	0.0
0.924000	FINAL	—	27.06	46.00	18.94	0.0
0.924000	FINAL	39.83	—	56.00	16.17	0.0
1.308750	FINAL	—	25.82	46.00	20.18	0.0
1.308750	FINAL	39.83	—	56.00	16.17	0.0
3.048000	FINAL	—	27.32	46.00	18.68	0.1
3.048000	FINAL	36.96	—	56.00	19.04	0.1
9.323250	FINAL	—	33.40	50.00	16.60	0.2
9.323250	FINAL	41.83	—	60.00	18.17	0.2

**Plot 7-119. Line Conducted Plot with 802.11a UNII Band 2C (L1)**

FCC ID: ZNFK557	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604110747.ZNF	Test Dates: 4/12 - 5/2/2016	EUT Type: Portable Handset		Page 112 of 116

# Line-Conducted Test Data

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— Preview Result 1-PK+     
 \* Critical\_Freqs PK+     
 — FCC Part 15 Class B Voltage on Mains QP  
— FCC Part 15 Class B Voltage on Mains AV     
 ▼ Final\_Result QPK     
 ◆ Final\_Result AVG

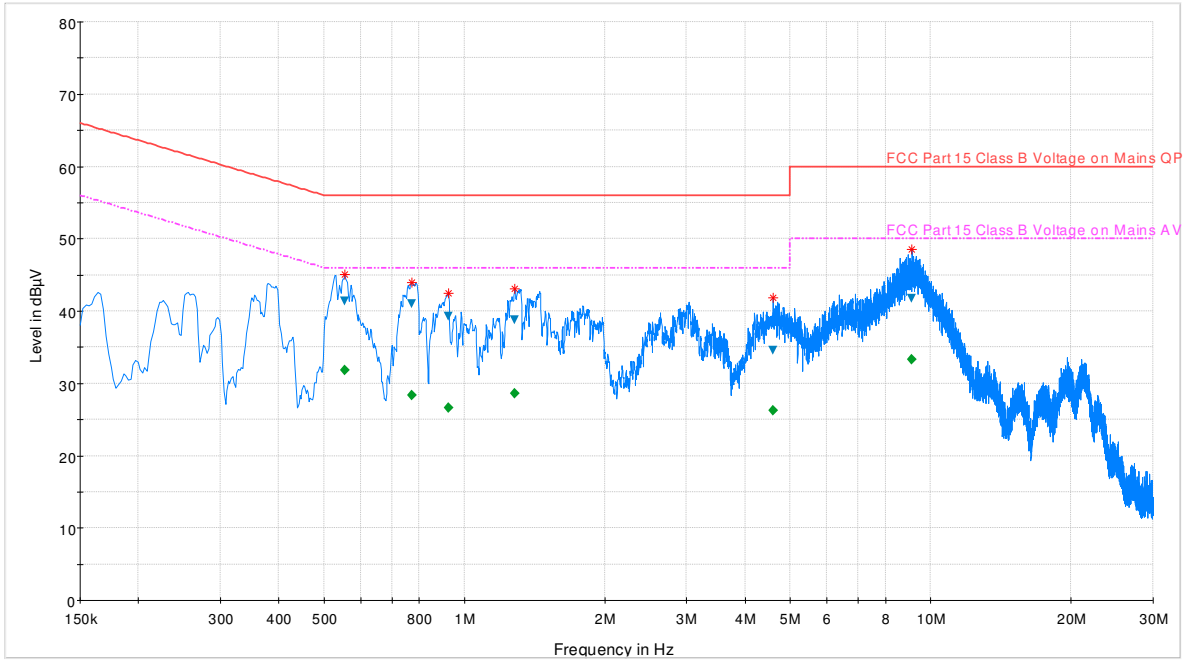
Frequency MHz	Process State	QuasiPeak dBµV	Average dBµV	Limit dBµV	Margin dB	Corr. dB
0.262500	FINAL	—	30.23	51.35	21.12	-0.2
0.262500	FINAL	38.55	—	61.35	22.80	-0.2
0.528000	FINAL	—	33.63	46.00	12.37	-0.1
0.528000	FINAL	42.85	—	56.00	13.15	-0.1
0.762000	FINAL	—	31.52	46.00	14.48	-0.1
0.762000	FINAL	41.31	—	56.00	14.69	-0.1
1.324500	FINAL	—	27.11	46.00	18.89	-0.1
1.324500	FINAL	40.59	—	56.00	15.41	-0.1
2.976000	FINAL	—	28.20	46.00	17.80	0.0
2.976000	FINAL	36.15	—	56.00	19.85	0.0
9.244500	FINAL	—	34.43	50.00	15.57	0.1
9.244500	FINAL	42.60	—	60.00	17.40	0.1

**Plot 7-120. Line Conducted Plot with 802.11a UNII Band 2C (N)**

<b>FCC ID:</b> ZNFK557		<b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset		Page 113 of 116



**Line-Conducted Test Data**  
**§15.407**



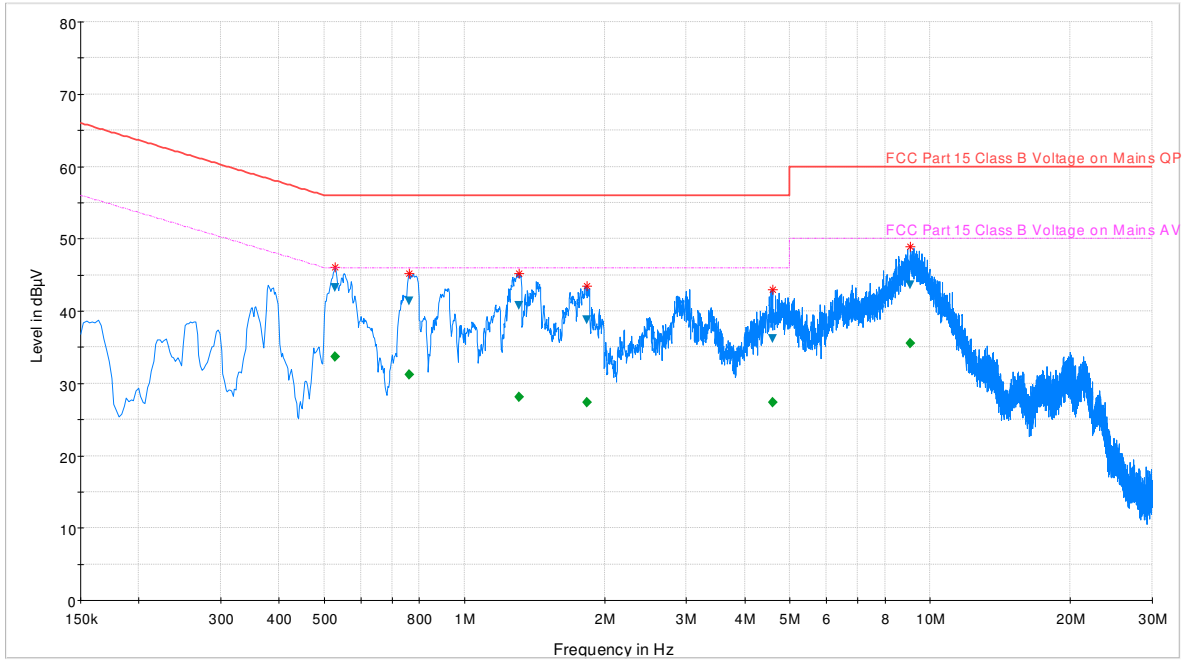
— Preview Result 1-PK+     
 \* Critical\_Freqs PK+     
 — FCC Part 15 Class B Voltage on Mains QP  
- - - FCC Part 15 Class B Voltage on Mains AV     
 ▼ Final\_Result QPK     
 ◆ Final\_Result AVG

Frequency MHz	Process State	QuasiPeak dBµV	Average dBµV	Limit dBµV	Margin dB	Corr. dB
0.555000	FINAL	—	31.81	46.00	14.19	0.0
0.555000	FINAL	41.36	—	56.00	14.64	0.0
0.771000	FINAL	—	28.39	46.00	17.61	0.0
0.771000	FINAL	41.00	—	56.00	15.00	0.0
0.926250	FINAL	—	26.62	46.00	19.38	0.0
0.926250	FINAL	39.26	—	56.00	16.74	0.0
1.284000	FINAL	—	28.62	46.00	17.38	0.0
1.284000	FINAL	38.79	—	56.00	17.21	0.0
4.589250	FINAL	—	26.22	46.00	19.78	0.1
4.589250	FINAL	34.54	—	56.00	21.46	0.1
9.125250	FINAL	—	33.28	50.00	16.72	0.2
9.125250	FINAL	41.78	—	60.00	18.22	0.2

**Plot 7-121. Line Conducted Plot with 802.11a UNII Band 3 (L1)**

<b>FCC ID:</b> ZNFK557		<b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset	Page 114 of 116	

**Line-Conducted Test Data**  
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— Preview Result 1-PK+     
 \* Critical\_Freqs PK+     
 — FCC Part 15 Class B Voltage on Mains QP  
— FCC Part 15 Class B Voltage on Mains AV     
 ▼ Final\_Result QPK     
 ◆ Final\_Result AVG



Frequency MHz	Process State	QuasiPeak dBµV	Average dBµV	Limit dBµV	Margin dB	Corr. dB
0.528000	FINAL	—	33.74	46.00	12.26	-0.1
0.528000	FINAL	43.18	—	56.00	12.82	-0.1
0.762000	FINAL	—	31.15	46.00	14.85	-0.1
0.762000	FINAL	41.32	—	56.00	14.68	-0.1
1.308750	FINAL	—	28.11	46.00	17.89	-0.1
1.308750	FINAL	40.71	—	56.00	15.29	-0.1
1.830750	FINAL	—	27.41	46.00	18.59	0.0
1.830750	FINAL	38.76	—	56.00	17.24	0.0
4.587000	FINAL	—	27.32	46.00	18.68	0.0
4.587000	FINAL	36.12	—	56.00	19.88	0.0
9.084750	FINAL	—	35.60	50.00	14.40	0.1
9.084750	FINAL	43.65	—	60.00	16.35	0.1

**Plot 7-122. Line Conducted Plot with 802.11a UNII Band 3 (N)**

<b>FCC ID:</b> ZNFK557		<b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset	Page 115 of 116	

## 8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFK557** is in compliance with Part 15E of the FCC Rules.

<b>FCC ID:</b> ZNFK557		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1604110747.ZNF	<b>Test Dates:</b> 4/12 - 5/2/2016	<b>EUT Type:</b> Portable Handset	Page 116 of 116	