

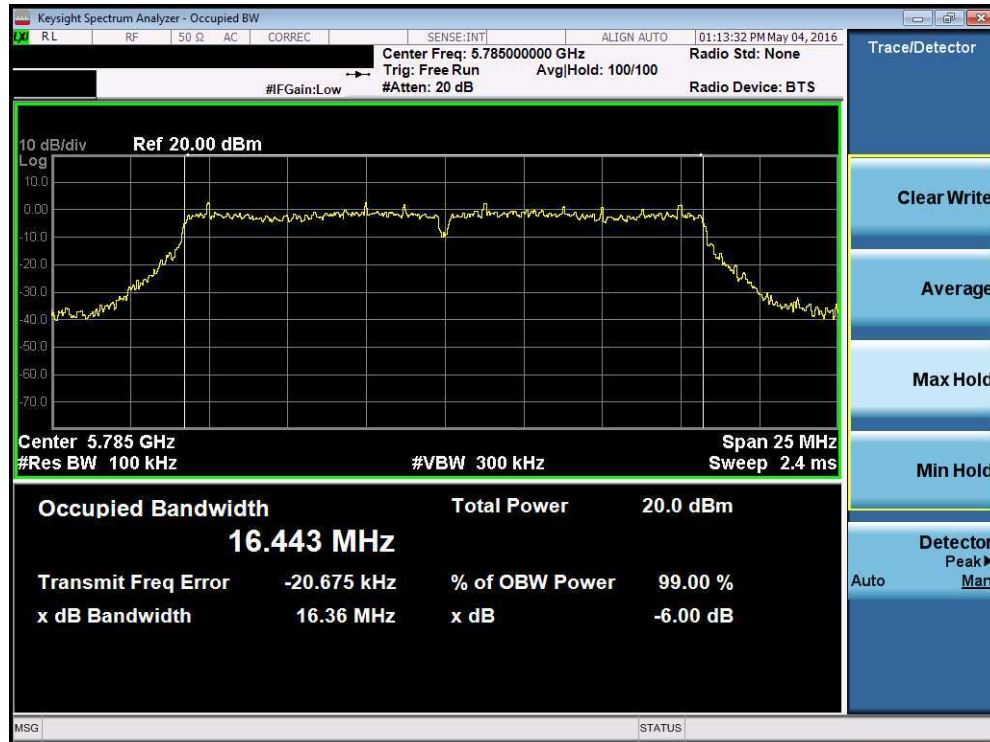
Antenna-1 6 dB Bandwidth Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
Band 3	5745	149	a	6	16.35
	5785	157	a	6	16.36
	5825	165	a	6	16.34
	5745	149	n (20MHz)	6.5/7.2 (MCS0)	17.56
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	17.56
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	17.33
	5755	151	n (40MHz)	13.5/15 (MCS0)	35.39
	5795	159	n (40MHz)	13.5/15 (MCS0)	35.31
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	76.52

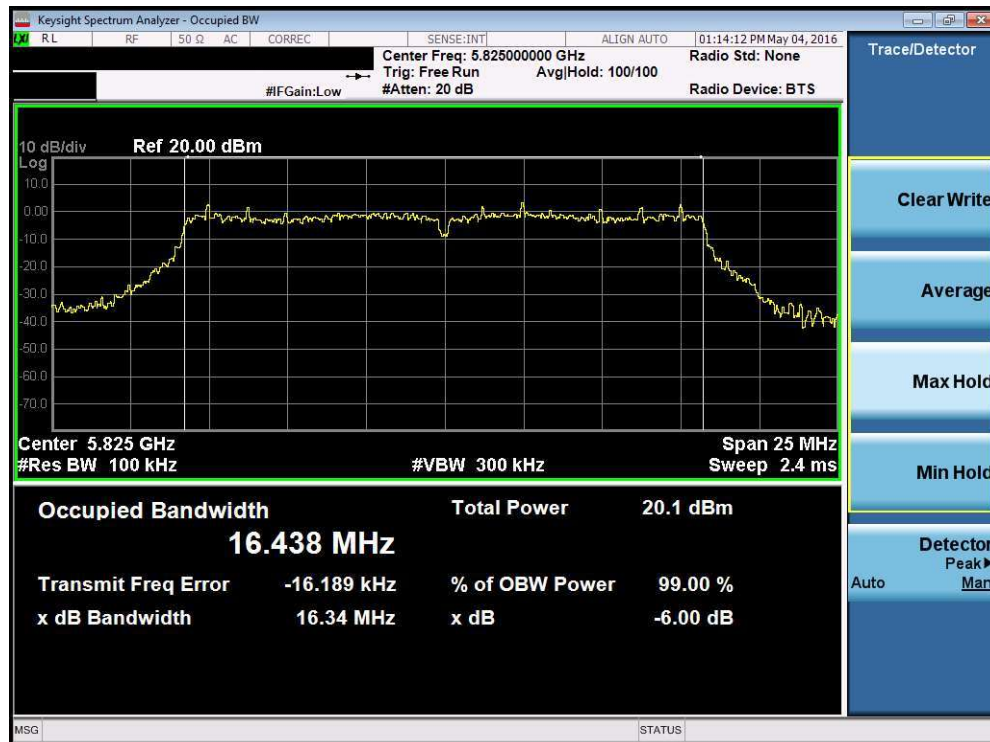
Table 7-3. Conducted Bandwidth Measurements



Plot 7-30. 6dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 149)

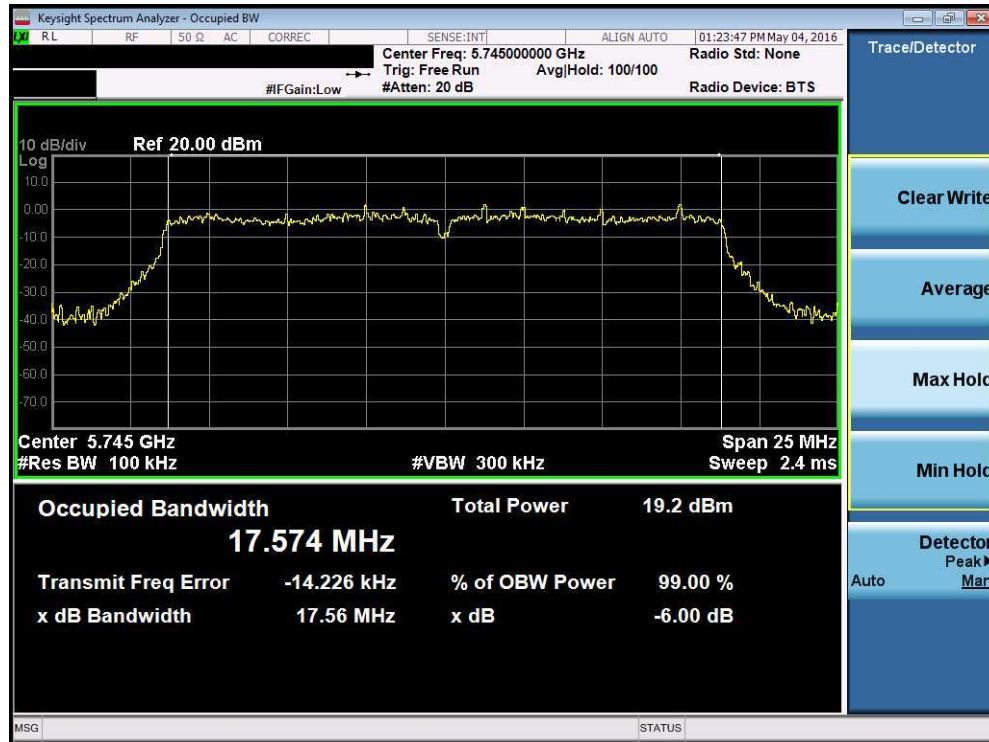


Plot 7-31. 6dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 157)

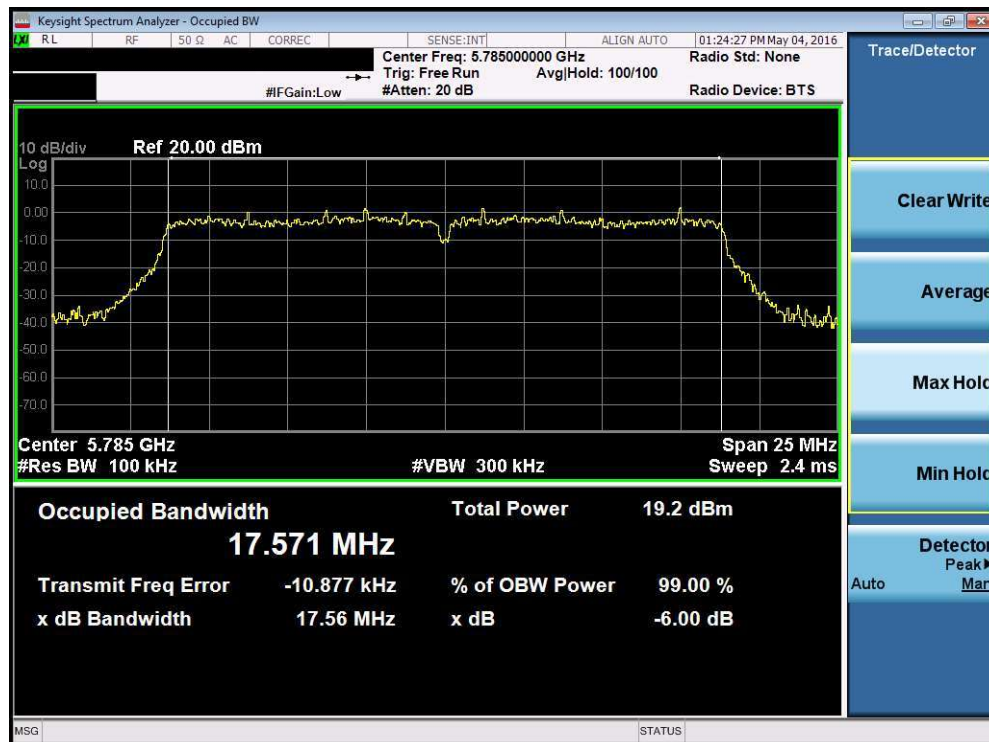


Plot 7-32. 6dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 165)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 31 of 106



Plot 7-33. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 149)

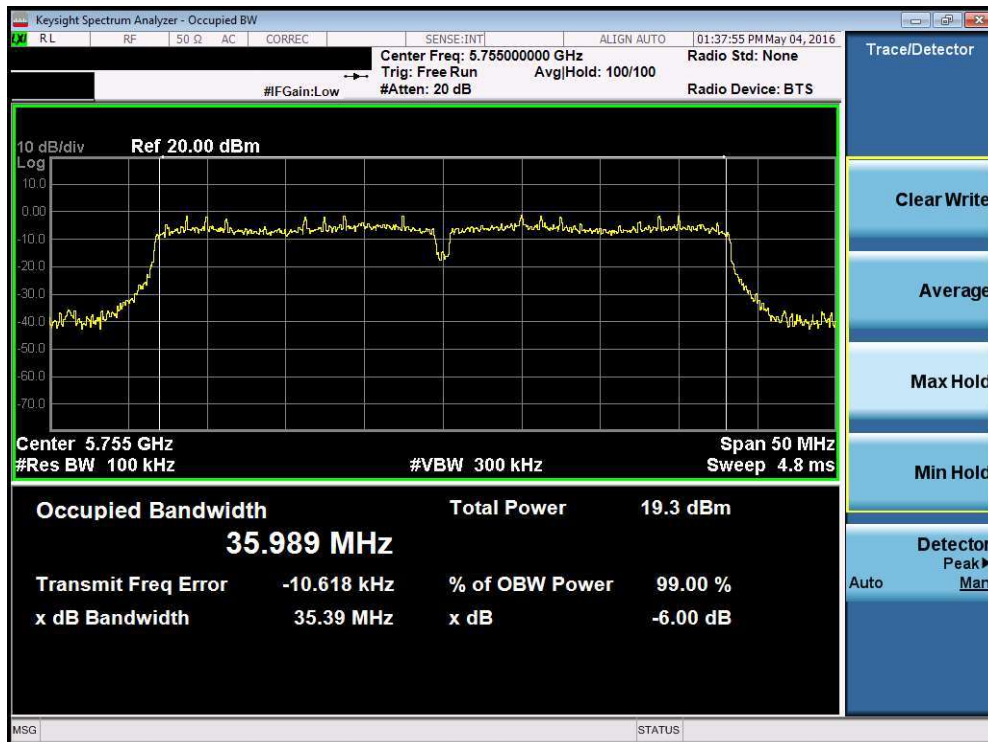


Plot 7-34. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 157)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 32 of 106

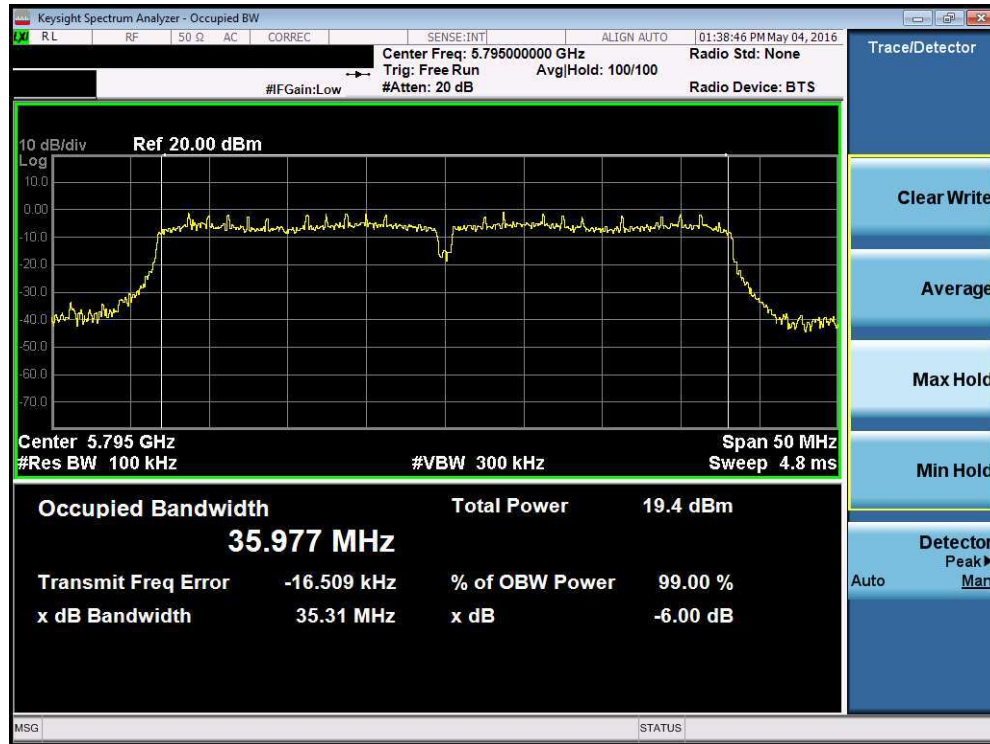


Plot 7-35. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 165)

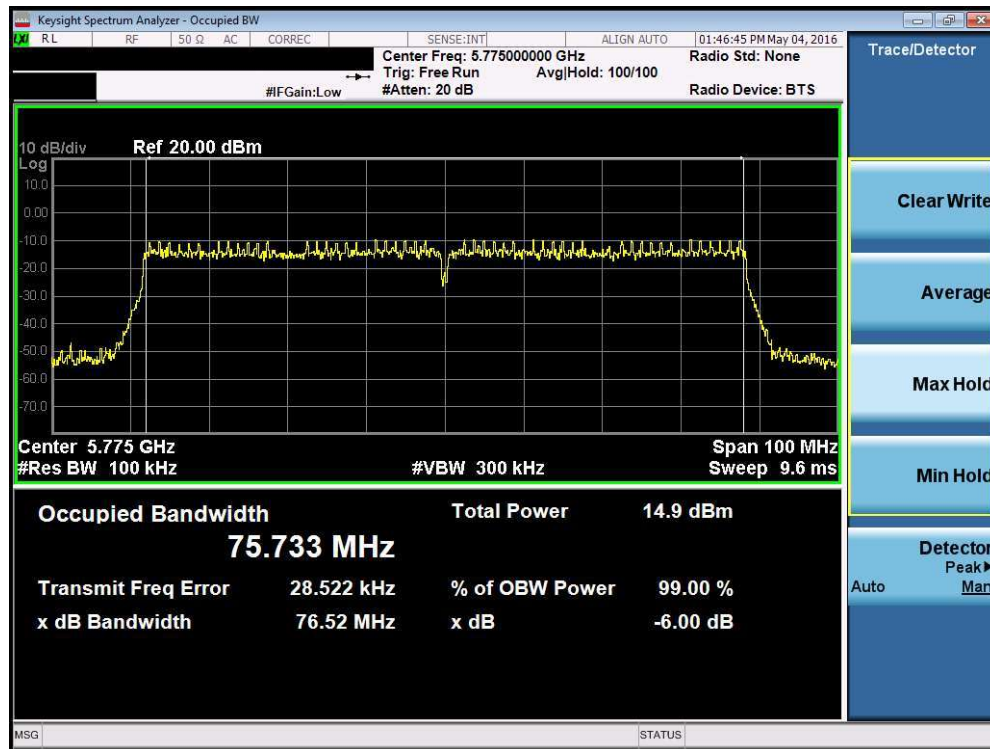


Plot 7-36. 6dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 151)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 33 of 106



Plot 7-37. 6dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 159)



Plot 7-38. 6dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 3) – Ch. 155)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 34 of 106

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 v01r02, 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 $11 \text{ dBm} + 10\log_{10}(26\text{dB BW}) = 11 \text{ dBm} + 10\log_{10}(19.18) = 23.83\text{dBm}$.

In the 5.47 – 5.725GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and $11 \text{ dBm} + 10\log_{10}(26\text{dB BW}) = 11 \text{ dBm} + 10\log_{10}(19.27) = 23.85\text{dBm}$.

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

Test Procedure Used

KDB 789033 D02 v01r02 – 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.

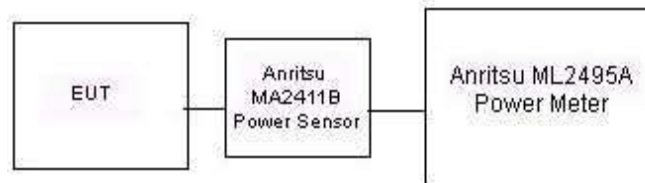


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

None

FCC ID: XO2SPB209A		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 35 of 106

Freq [MHz]	Channel	Detector	5GHz (20MHz) Conducted Power [dBm]		
			IEEE Transmission Mode		
			802.11a	802.11n	802.11ac
5180	36	AVG	14.58	13.55	9.31
5200	40	AVG	14.51	13.48	9.36
5240	48	AVG	14.50	13.51	9.43
5260	52	AVG	14.45	13.40	9.57
5280	56	AVG	14.32	13.42	9.55
5320	64	AVG	14.37	13.37	9.61
5500	100	AVG	14.26	13.20	9.23
5580	116	AVG	13.93	13.27	9.20
5600	120	AVG	13.90	13.22	9.15
5620	124	AVG	13.87	13.25	9.18
5640	128	AVG	13.88	13.25	9.17
5700	140	AVG	13.86	13.21	9.16
5720	144	AVG	14.01	13.22	9.09
5745	149	AVG	14.02	13.03	8.96
5785	157	AVG	13.99	13.17	9.11
5825	165	AVG	13.86	13.48	9.12

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

Freq [MHz]	Channel	Detector	5GHz (40MHz) Conducted Power [dBm]	
			IEEE Transmission Mode	
			802.11n	802.11ac
5190	38	AVG	13.32	8.04
5230	46	AVG	13.37	8.11
5270	54	AVG	13.36	8.15
5310	62	AVG	13.49	8.28
5510	102	AVG	13.68	8.08
5550	110	AVG	13.64	8.09
5590	118	AVG	13.33	7.93
5630	126	AVG	13.28	7.96
5670	134	AVG	13.23	7.96
5710	142	AVG	13.25	7.94
5755	151	AVG	13.31	7.80
5795	159	AVG	13.31	7.65

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

5GHz (80MHz) Conducted Power [dBm]			
Freq [MHz]	Channel	Detector	IEEE Transmission Mode
			802.11ac
5210	42	AVG	8.39
5290	58	AVG	8.29
5530	106	AVG	8.47
5610	122	AVG	8.44
5690	138	AVG	7.93
5775	155	AVG	8.09

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

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 v01r02, and at the appropriate frequencies. Method SA-1, as defined in KDB 789033 D02 v01r02, 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 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. Number of sweep points $\geq 2 \times (\text{span}/\text{RBW})$
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.

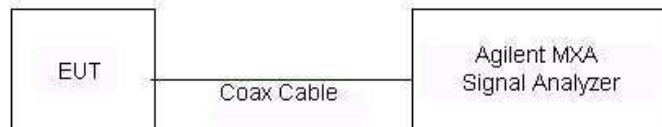


Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None

FCC ID: XO2SPB209A		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 37 of 106

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm]	Max Permissible Power Density [dBm/MHz]	Margin [dB]	Pass / Fail
Band 1	5180	36	a	6	3.55	11.0	-7.45	Pass
	5200	40	a	6	3.24	11.0	-7.76	Pass
	5240	48	a	6	3.48	11.0	-7.52	Pass
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	2.29	11.0	-8.71	Pass
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	2.26	11.0	-8.74	Pass
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	2.26	11.0	-8.74	Pass
	5190	38	n (40MHz)	13.5/15 (MCS0)	-0.48	11.0	-11.48	Pass
	5230	46	n (40MHz)	13.5/15 (MCS0)	-0.91	11.0	-11.91	Pass
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-9.22	11.0	-20.22	Pass
Band 2A	5260	52	a	6	3.45	11.0	-7.55	Pass
	5280	56	a	6	3.45	11.0	-7.55	Pass
	5320	64	a	6	3.53	11.0	-7.47	Pass
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	2.29	11.0	-8.71	Pass
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	2.00	11.0	-9.00	Pass
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	2.46	11.0	-8.54	Pass
	5270	54	n (40MHz)	13.5/15 (MCS0)	-0.86	11.0	-11.86	Pass
	5310	62	n (40MHz)	13.5/15 (MCS0)	-0.94	11.0	-11.94	Pass
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	-9.19	11.0	-20.19	Pass
Band 2C	5500	100	a	6	3.44	11.0	-7.57	Pass
	5580	116	a	6	3.35	11.0	-7.65	Pass
	5720	144	a	6	3.21	11.0	-7.79	Pass
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	1.88	11.0	-9.12	Pass
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	2.45	11.0	-8.55	Pass
	5720	144	n (20MHz)	6.5/7.2 (MCS0)	1.72	11.0	-9.28	Pass
	5510	102	n (40MHz)	13.5/15 (MCS0)	-0.93	11.0	-11.93	Pass
	5550	110	n (40MHz)	13.5/15 (MCS0)	-0.81	11.0	-11.81	Pass
	5710	142	n (40MHz)	13.5/15 (MCS0)	-0.78	11.0	-11.78	Pass
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	-8.78	11.0	-19.78	Pass

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



Plot 7-39. Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 36)

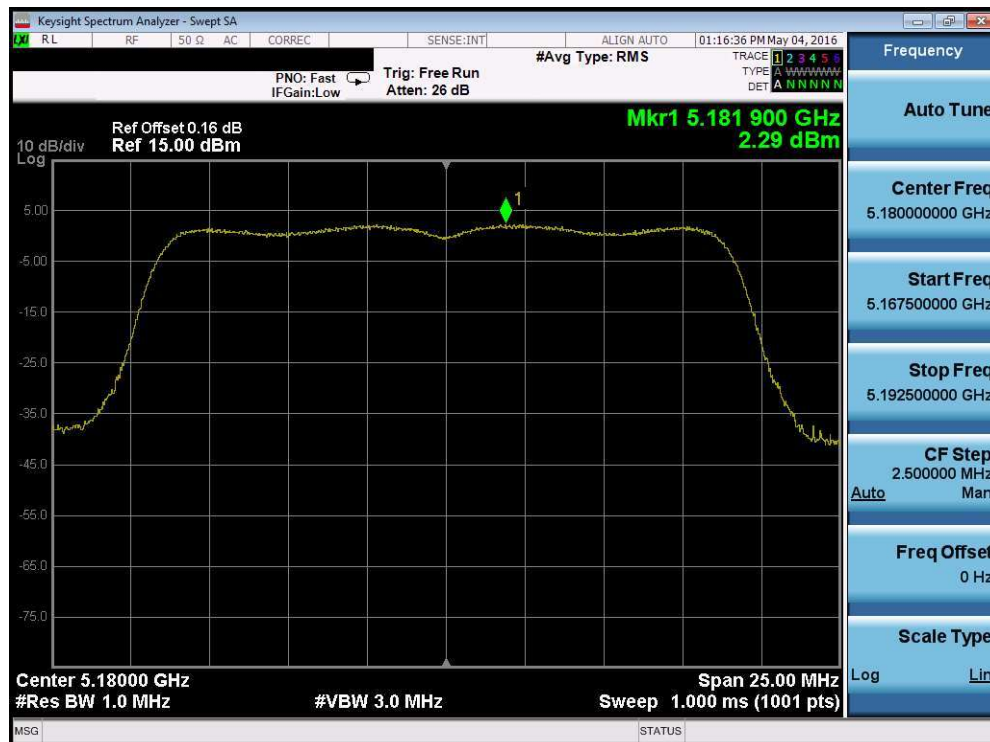


Plot 7-40. Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 40)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 39 of 106

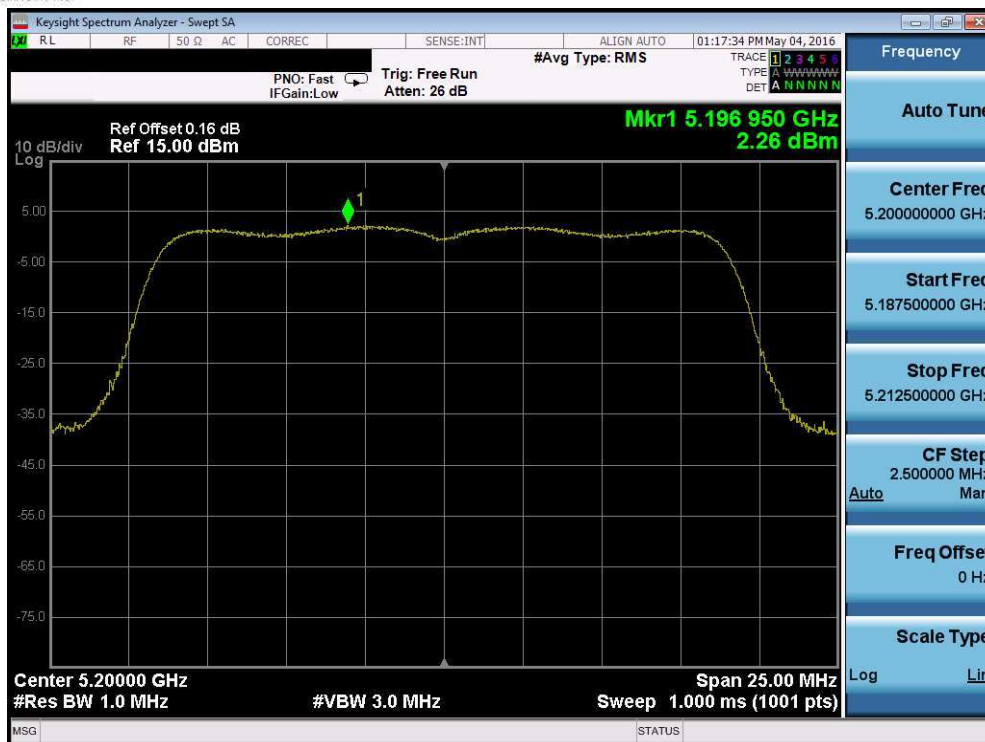


Plot 7-41. Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 48)

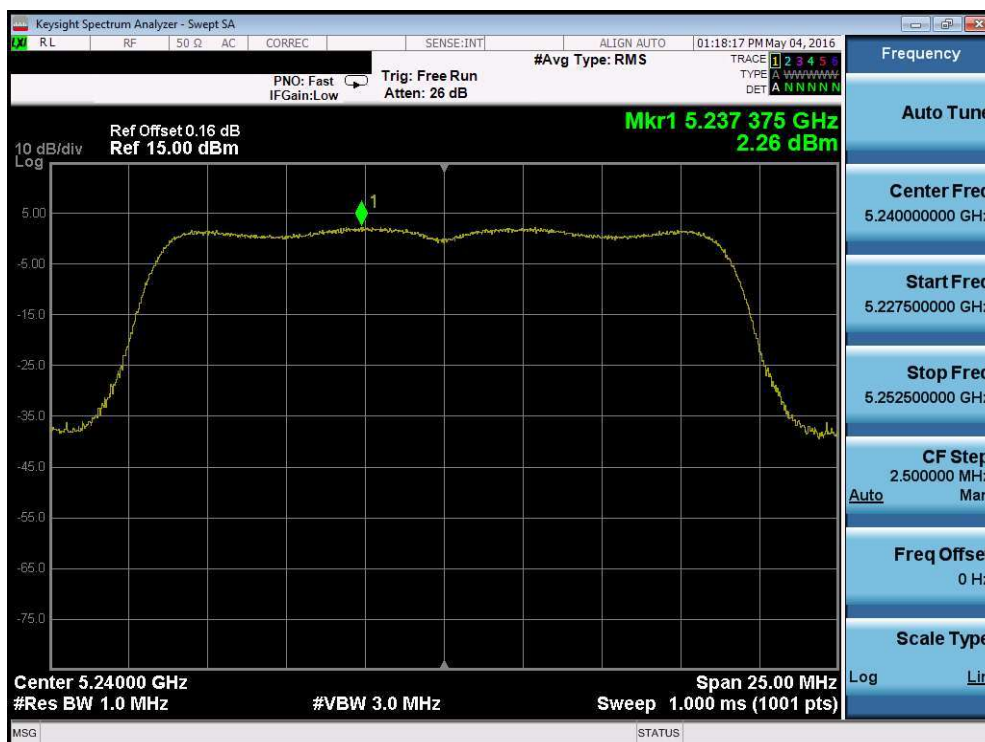


Plot 7-42. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 40 of 106



Plot 7-43. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 40)

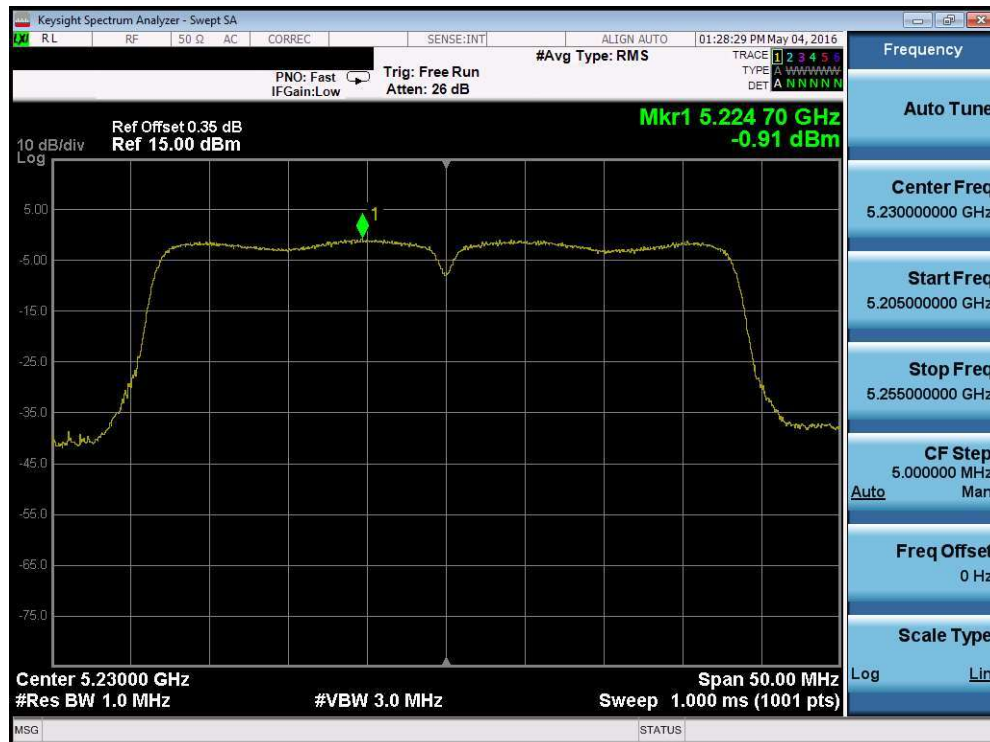


Plot 7-44. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 41 of 106

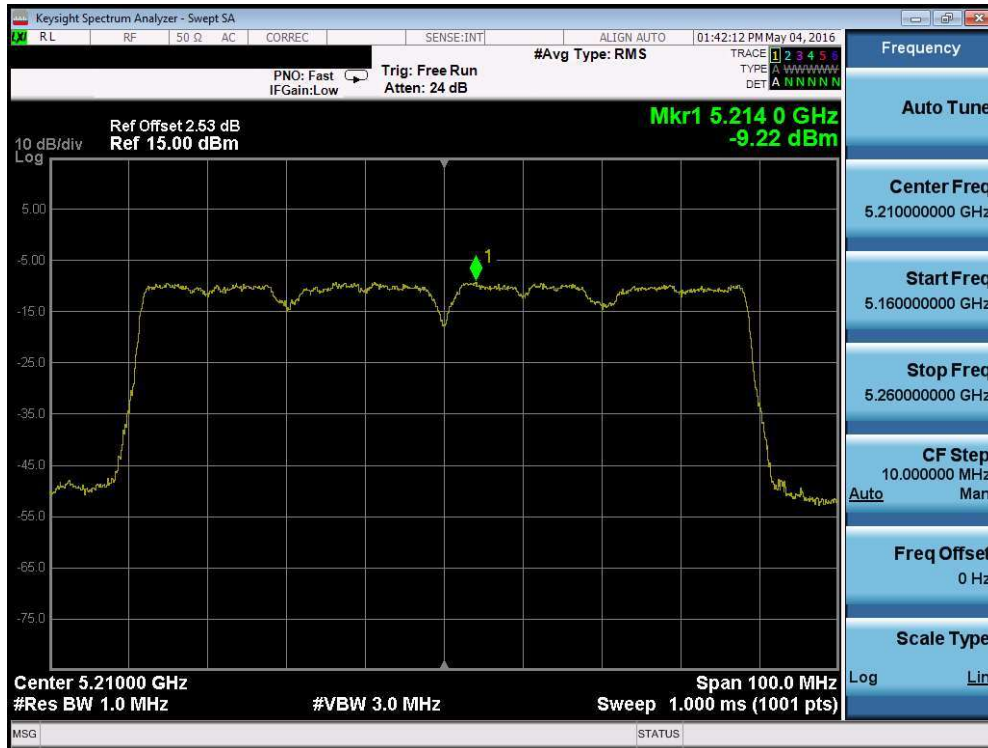


Plot 7-45. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 38)



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

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 42 of 106

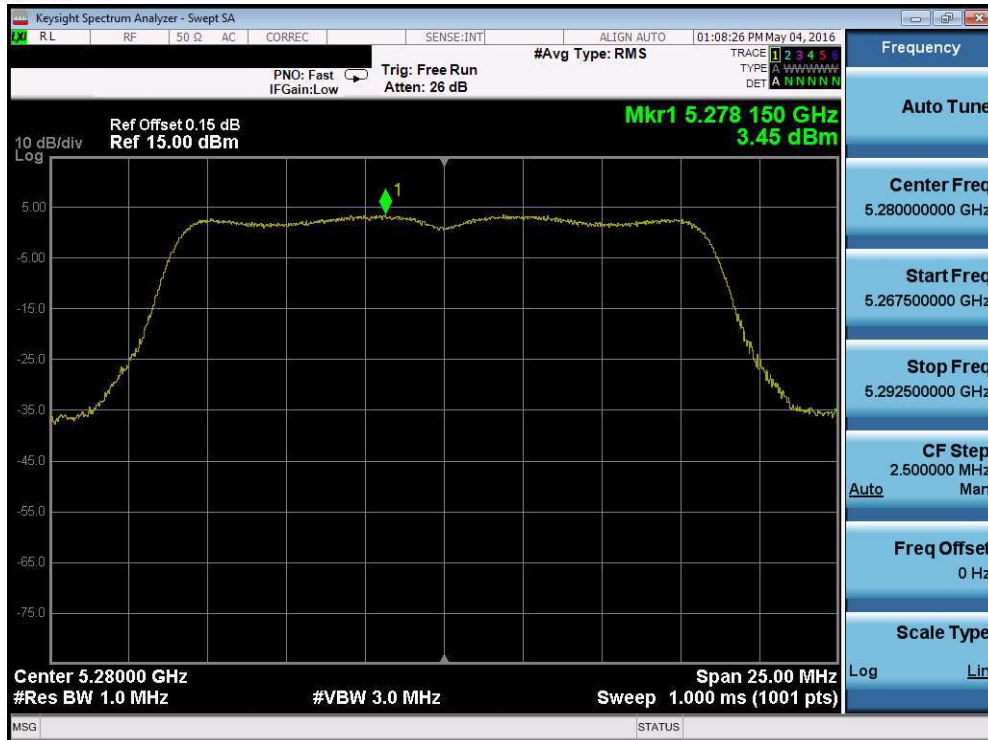


Plot 7-47. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)

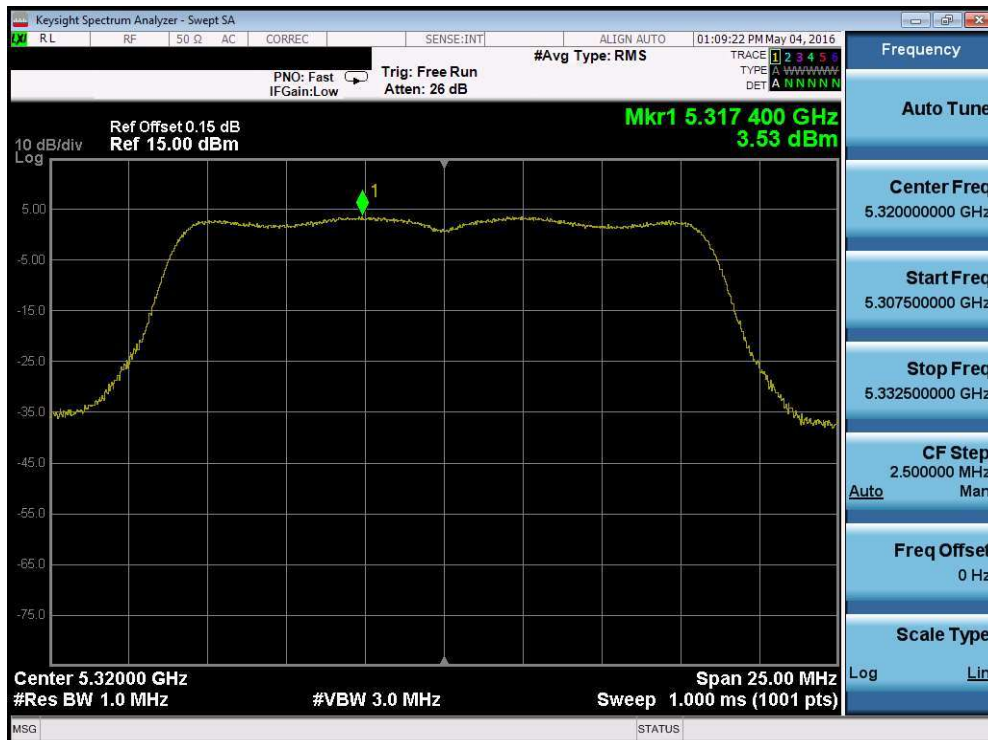


Plot 7-48. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 52)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 43 of 106

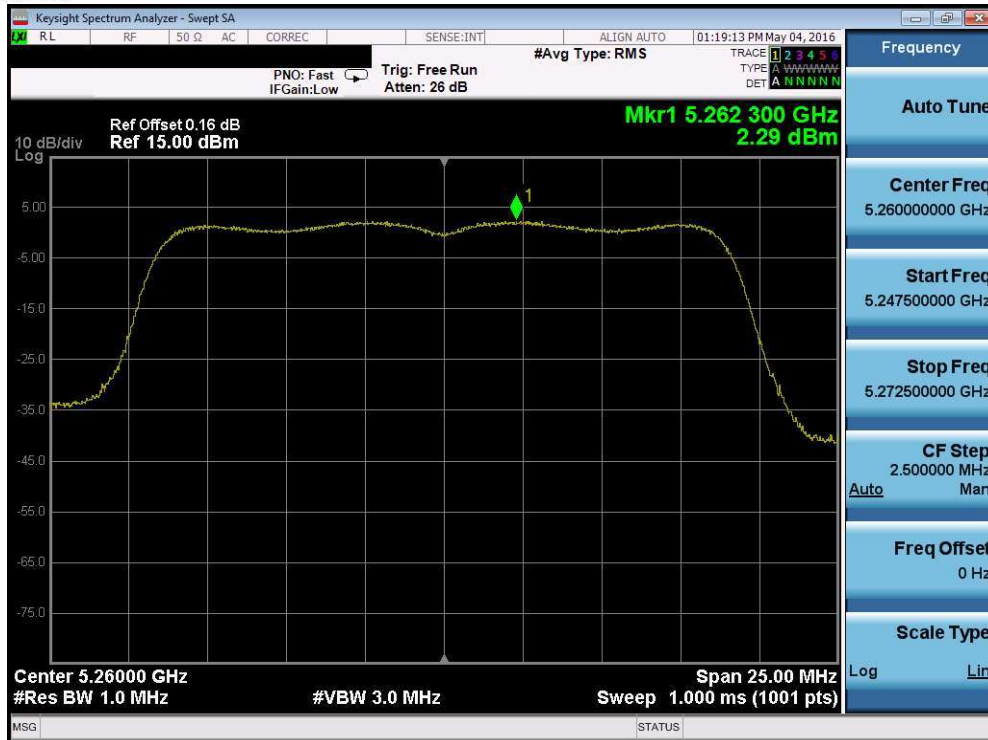


Plot 7-49. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 56)

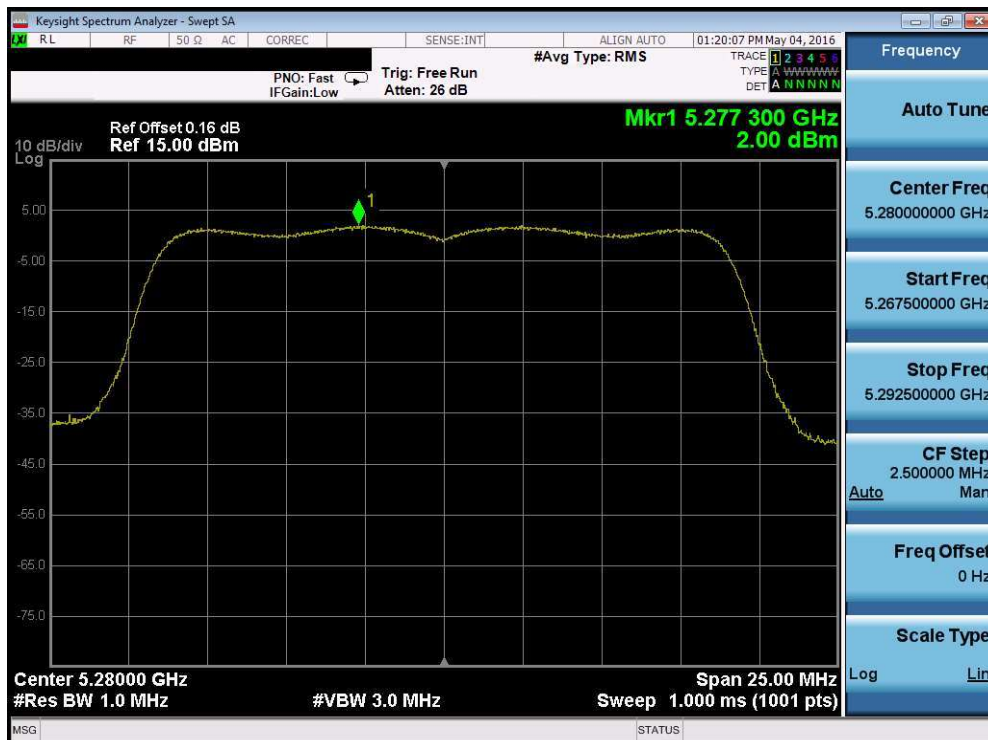


Plot 7-50. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 64)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 44 of 106

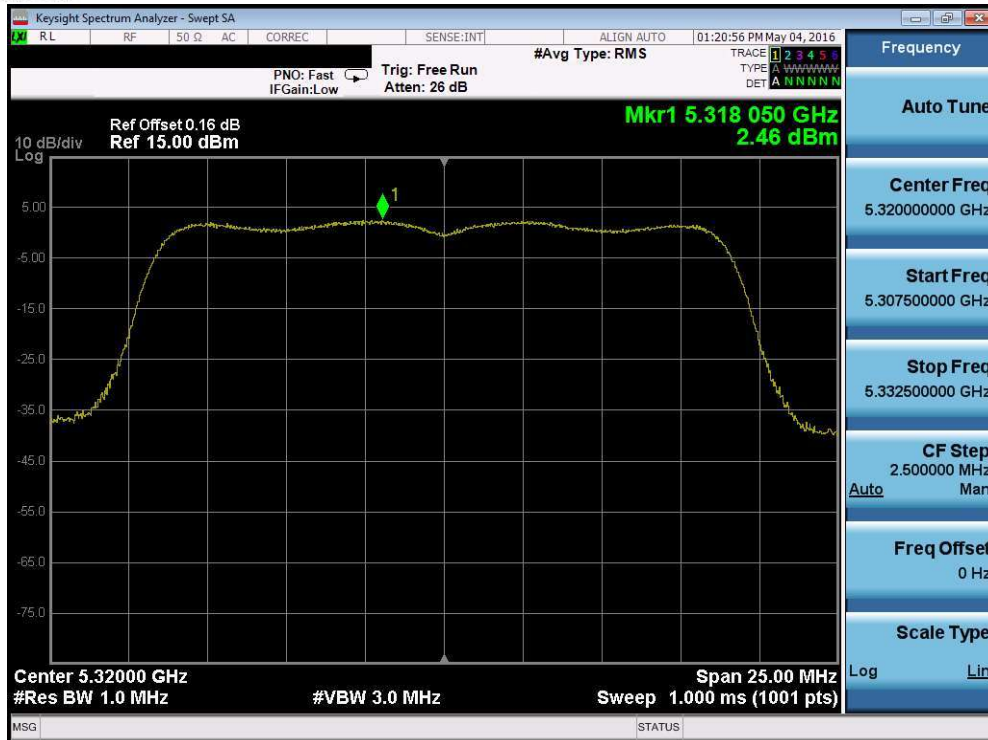


Plot 7-51. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)

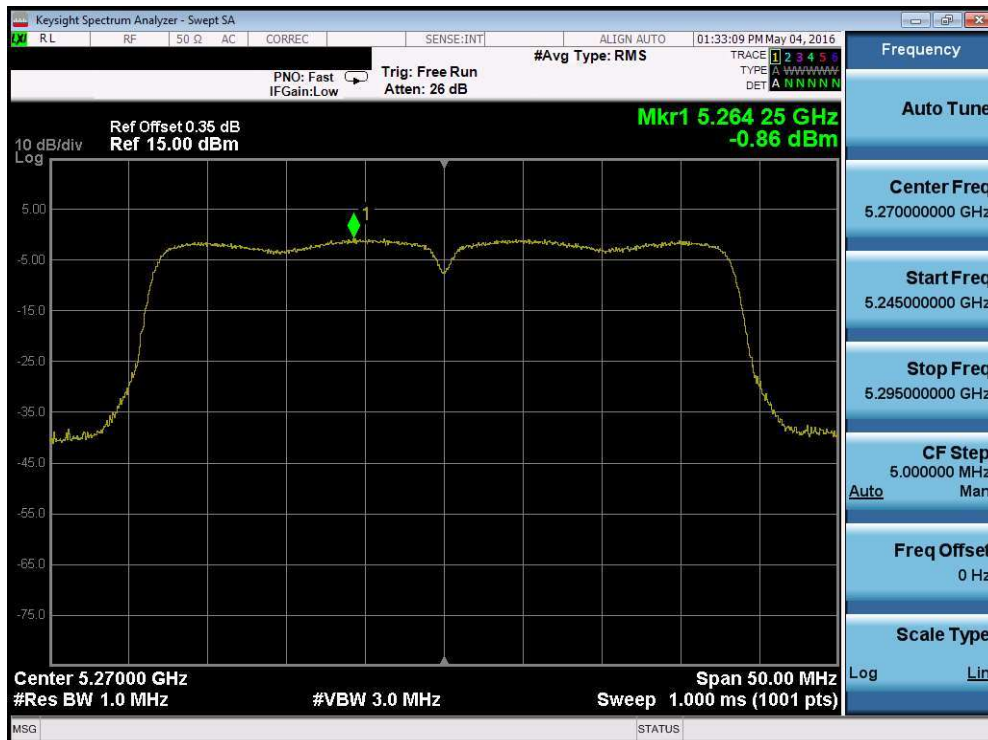


Plot 7-52. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 45 of 106



Plot 7-53. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)

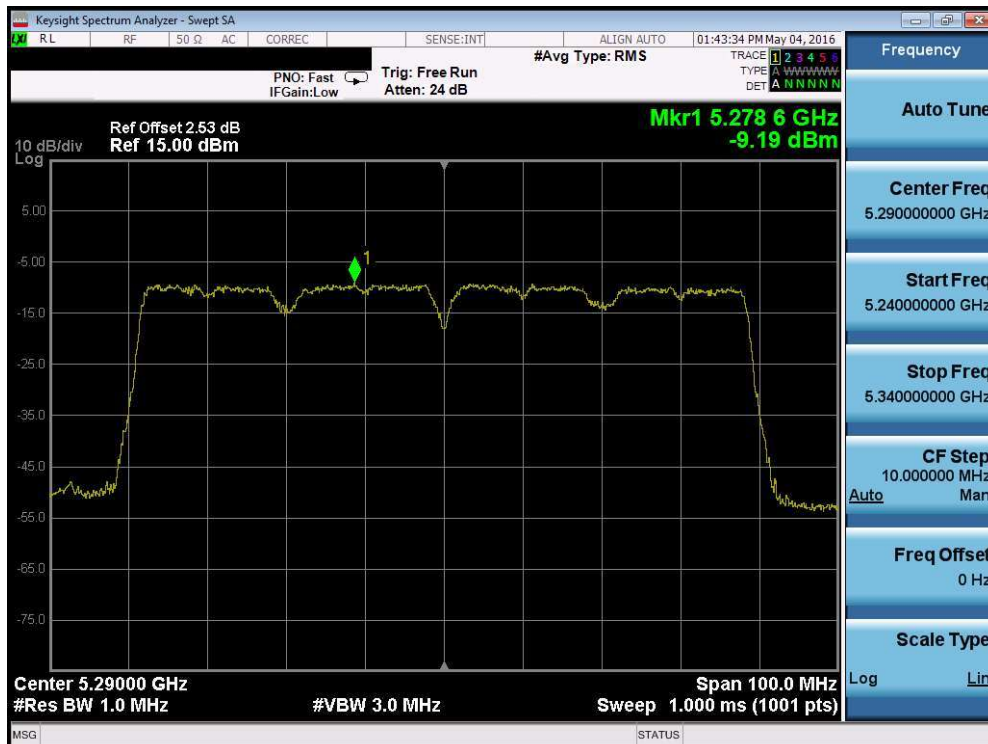


Plot 7-54. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 46 of 106



Plot 7-55. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)



Plot 7-56. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2A) – Ch. 58)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 47 of 106



Plot 7-57. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 100)

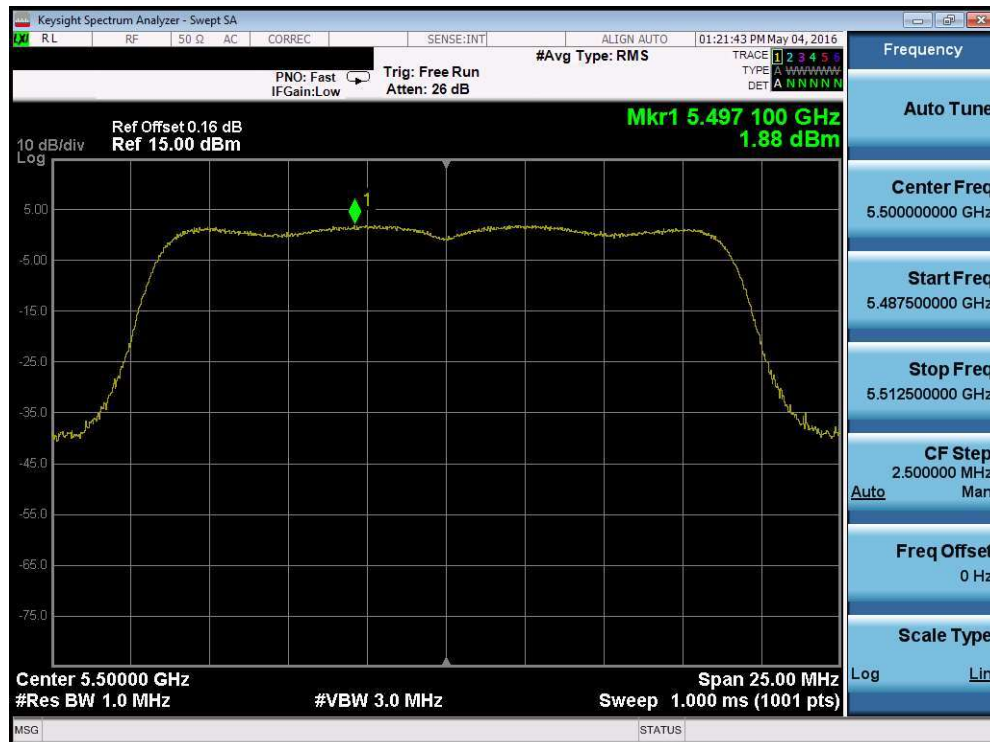


Plot 7-58. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 116)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 48 of 106

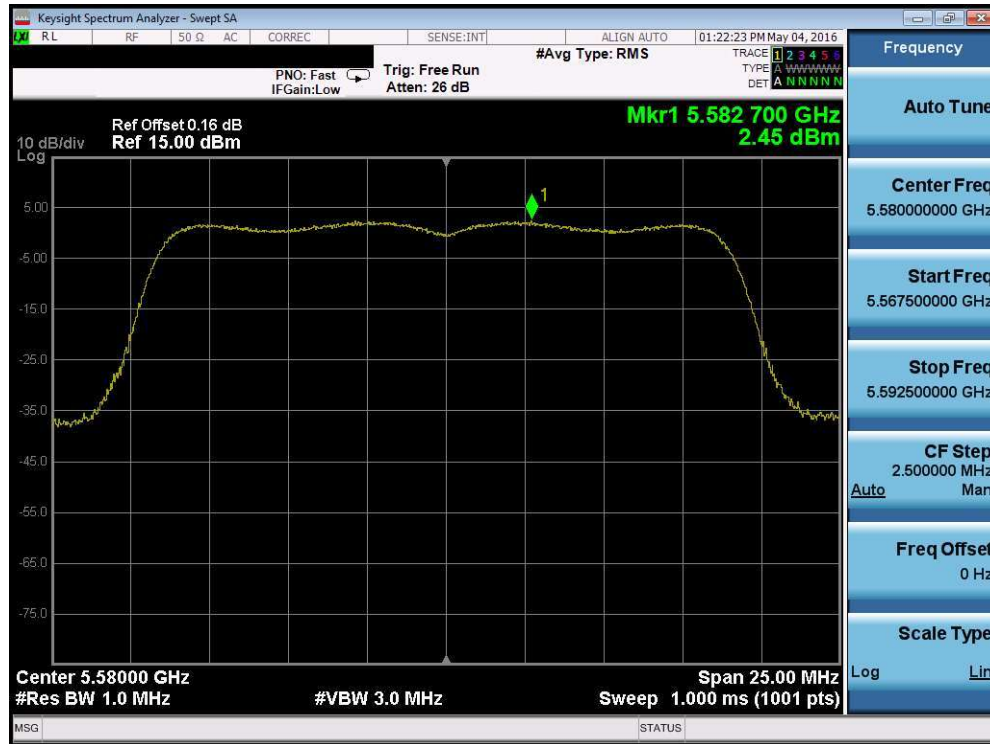


Plot 7-59. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 144)

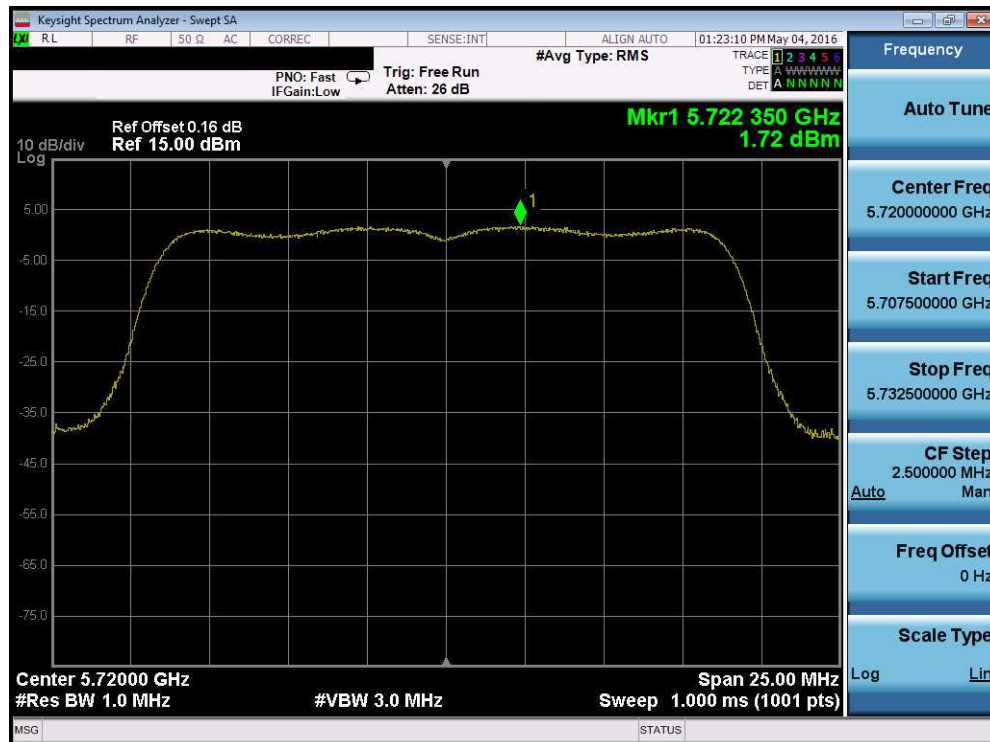


Plot 7-60. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 100)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 49 of 106



Plot 7-61. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 116)



Plot 7-62. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 144)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 50 of 106

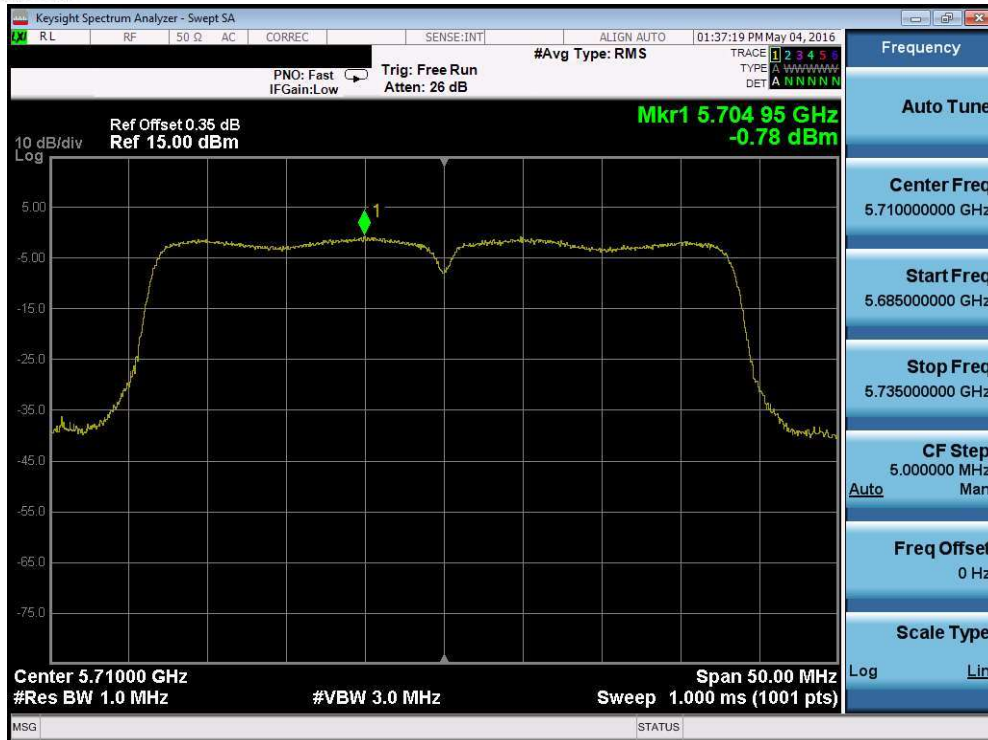


Plot 7-63. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)

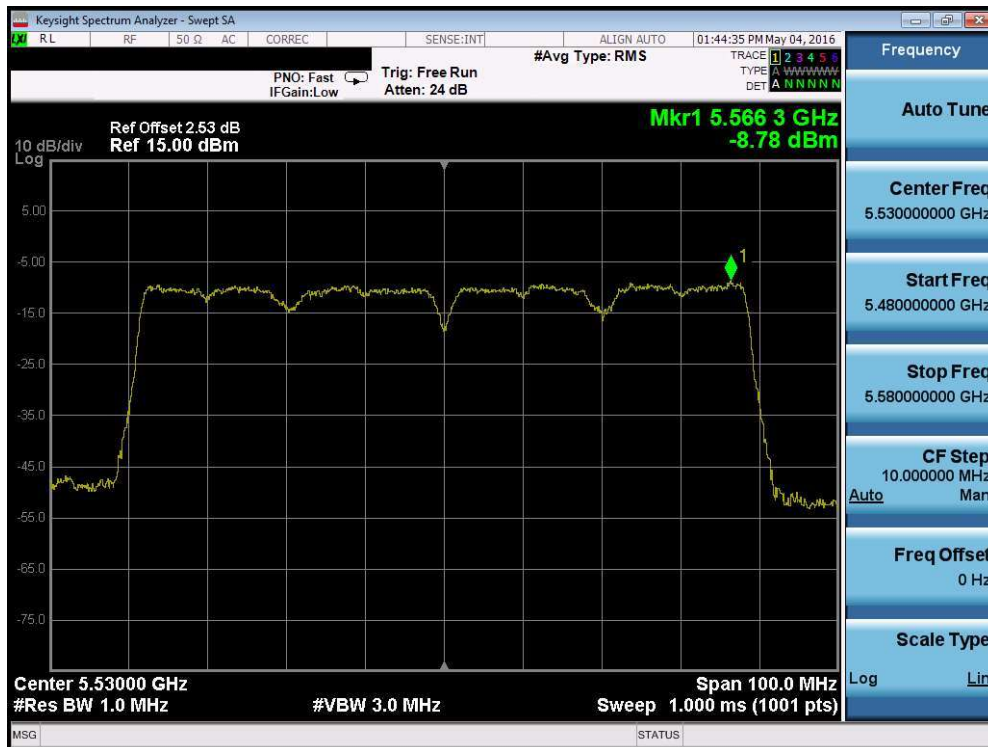


Plot 7-64. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 110)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 51 of 106

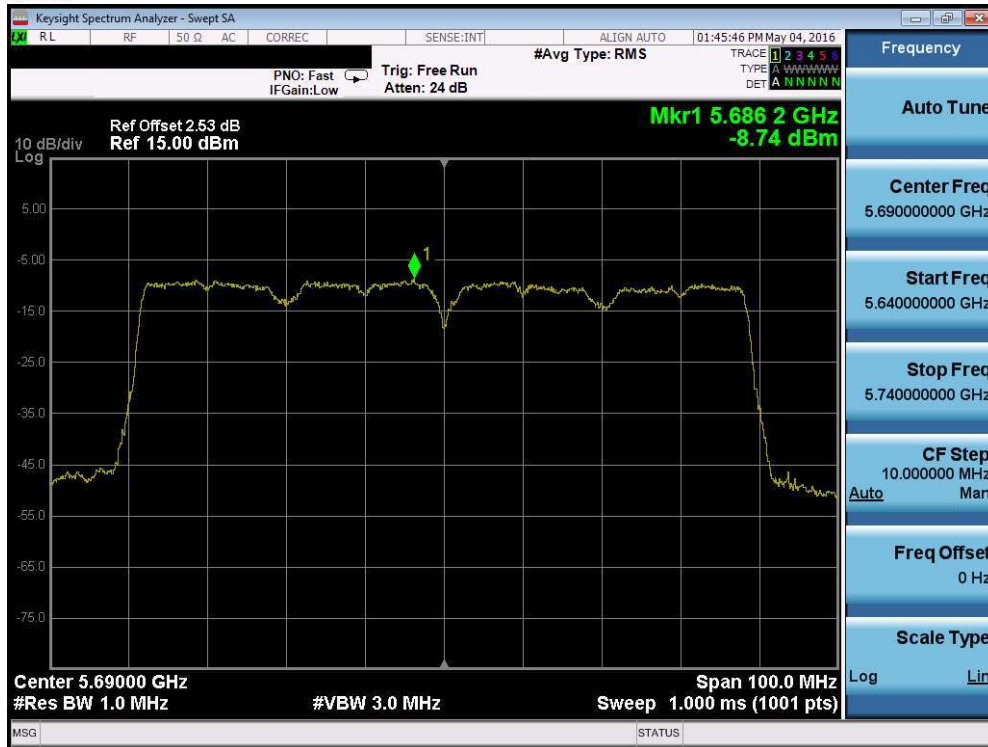


Plot 7-65. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 142)



Plot 7-66. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2C) – Ch. 106)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 52 of 106



Plot 7-67. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2C) – Ch. 138)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 53 of 106

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm]	Max Permissible Power Density [dBm/500kHz]	Margin [dB]	Pass / Fail
Band 3	5745	149	a	6	0.41	30.0	-29.59	Pass
	5785	157	a	6	0.40	30.0	-29.60	Pass
	5825	165	a	6	0.98	30.0	-29.03	Pass
	5745	149	n (20MHz)	6.5/7.2 (MCS0)	-0.63	30.0	-30.63	Pass
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	-0.72	30.0	-30.72	Pass
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	-0.87	30.0	-30.87	Pass
	5755	151	n (40MHz)	13.5/15 (MCS0)	-4.10	30.0	-34.10	Pass
	5795	159	n (40MHz)	13.5/15 (MCS0)	-3.89	30.0	-33.89	Pass
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	-11.77	30.0	-41.77	Pass

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



Plot 7-68. Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 149)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: OY1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 54 of 106



Plot 7-69. Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 157)

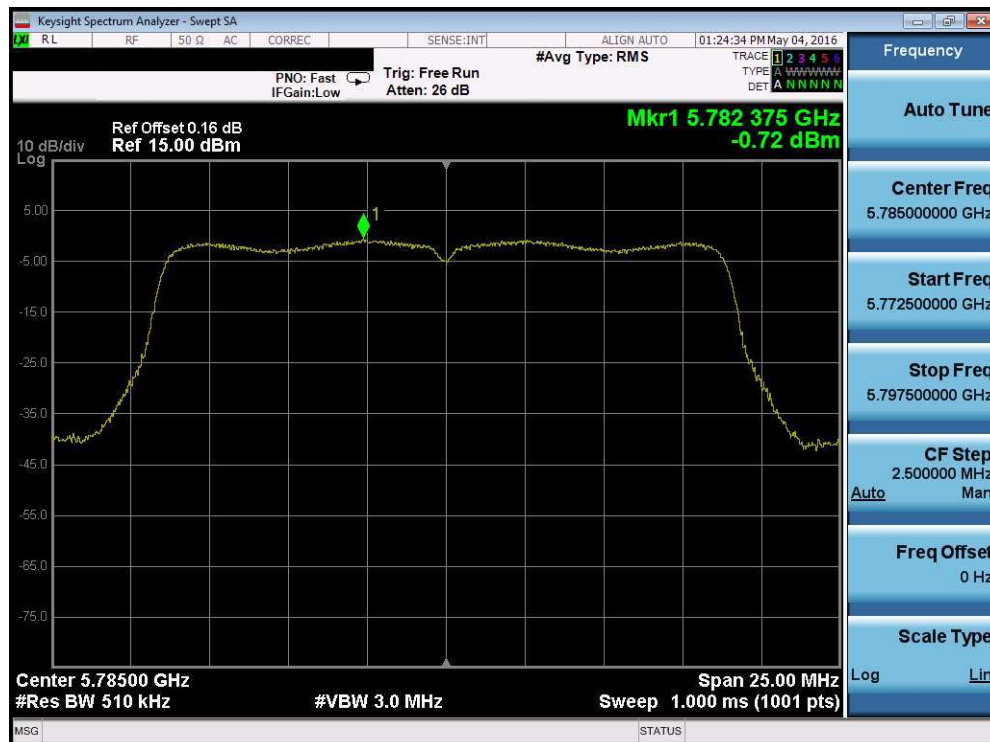


Plot 7-70. Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 165)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 55 of 106



Plot 7-71. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 149)



Plot 7-72. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 157)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 56 of 106



Plot 7-73. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 165)

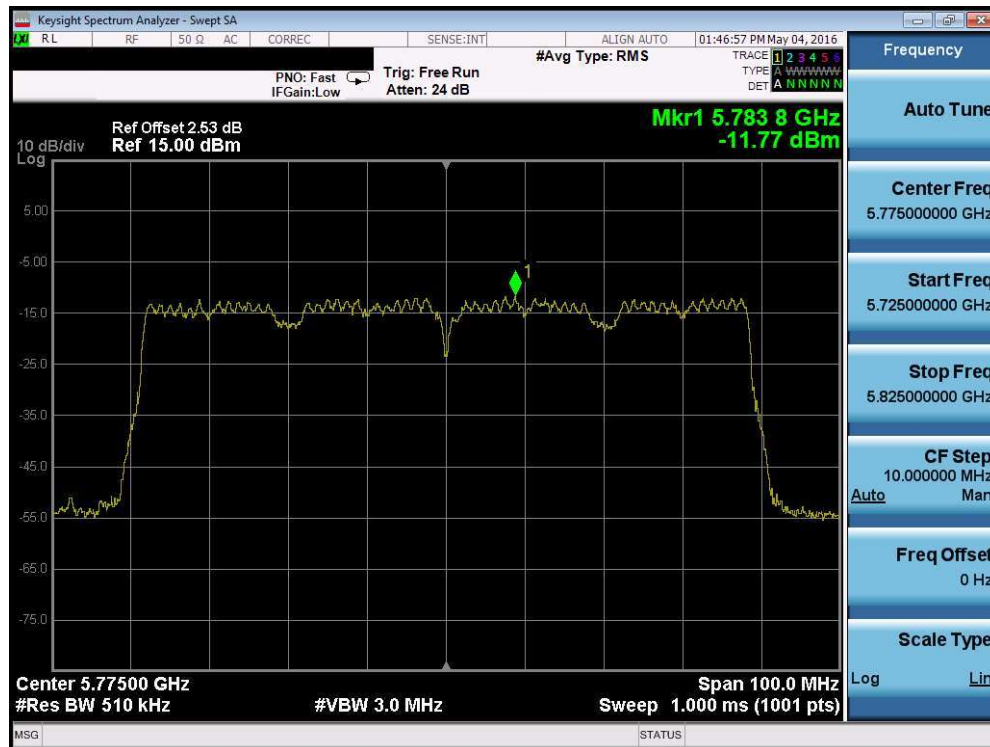


Plot 7-74. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 151)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 57 of 106



Plot 7-75. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 159)



Plot 7-76. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 3) – Ch. 155)

FCC ID: XO2SPB209A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	H&D Wireless	Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 58 of 106

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: 3.30 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.30	+ 20 (Ref)	5,179,999,901	-99	-0.00000191
100 %		-40	5,180,000,185	185	0.00000357
100 %		-30	5,180,000,043	43	0.00000083
100 %		- 20	5,180,000,032	32	0.00000062
100 %		- 10	5,179,999,814	-186	-0.00000359
100 %		0	5,180,000,280	280	0.00000541
100 %		+ 10	5,179,999,938	-62	-0.00000120
100 %		+ 20	5,179,999,919	-81	-0.00000156
100 %		+ 30	5,179,999,920	-80	-0.00000154
100 %		+ 40	5,180,000,065	65	0.00000125
100 %		+ 50	5,179,999,968	-32	-0.00000062
100 %		+ 60	5,180,000,038	38	0.00000073
100 %		+ 70	5,180,000,092	92	0.00000178
100 %		+ 85	5,180,000,053	53	0.00000102
BATT. ENDPOINT	2.90	+ 20	5,180,000,023	23	0.00000044

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: XO2SPB209A		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 59 of 106

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: 3.30 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.30	+ 20 (Ref)	5,259,999,800	-200	-0.00000380
100 %		- 40	5,259,999,934	-66	-0.00000125
100 %		- 30	5,259,999,972	-28	-0.00000053
100 %		- 20	5,260,000,032	32	0.00000061
100 %		- 10	5,260,000,041	41	0.00000078
100 %		0	5,260,000,042	42	0.00000080
100 %		+ 10	5,260,000,203	203	0.00000386
100 %		+ 20	5,259,999,974	-26	-0.00000049
100 %		+ 30	5,260,000,271	271	0.00000515
100 %		+ 40	5,259,999,982	-18	-0.00000034
100 %		+ 50	5,260,000,049	49	0.00000093
100 %		+ 60	5,260,000,030	30	0.00000057
100 %		+ 70	5,259,999,850	-150	-0.00000285
100 %		+ 85	5,259,999,688	-312	-0.00000593
BATT. ENDPOINT	2.90	+ 20	5,259,999,999	-1	-0.00000002

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: XO2SPB209A		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604070737.XO2	Test Dates: 4/7 - 6/17/2016	EUT Type: Wifi/BT/NFC Module		Page 60 of 106