

**MEASUREMENT REPORT****FCC PART 15.407 / ISSED RSS-247 UNII 802.11a/n/ac****Applicant Name:**Apple Inc.
One Apple Park Way
Cupertino, CA 95014
United States**Date of Testing:**

11/09/2018-02/02/2019

Test Site/Location:

PCTEST Lab. Morgan Hill, CA, USA

Test Report Serial No.:

1C1811080028-10.BCG

FCC ID:**BCGA2153****IC:****579C-A2153****APPLICANT:****Apple Inc.****Application Type:**

Certification

Model/HVIN:

A2153

EUT Type:

Tablet Device

Frequency Range:

5180 – 5825MHz

FCC Classification:

Unlicensed National Information Infrastructure (UNII)

FCC Rule Part(s):

Part 15 Subpart E (15.407)


ISED Specification:

RSS-247 Issue 2

Test Procedure(s):ANSI C63.10-2013, KDB 789033 D02 v02r01,
KDB 662911 D01 v02r01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013 and KDB 789033 D02 v02r01. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

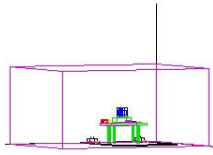

Randy Ortanez
President

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 1 of 205

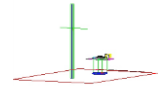
TABLE OF CONTENTS

1.0	INTRODUCTION.....	4
1.1	Scope.....	4
1.2	PCTEST Test Location	4
1.3	Test Facility / Accreditations	4
2.0	PRODUCT INFORMATION	5
2.1	Equipment Description.....	5
2.2	Device Capabilities.....	5
2.3	Antenna Description.....	7
2.4	Test Support Equipment	7
2.5	Test Configuration.....	8
2.6	Software and Firmware.....	8
2.7	EMI Suppression Device(s)/Modifications	8
3.0	DESCRIPTION OF TESTS	9
3.1	Evaluation Procedure.....	9
3.2	AC Line Conducted Emissions	9
3.3	Radiated Emissions	10
3.4	Environmental Conditions	10
4.0	ANTENNA REQUIREMENTS	11
5.0	MEASUREMENT UNCERTAINTY.....	12
6.0	TEST EQUIPMENT CALIBRATION DATA.....	13
7.0	TEST RESULTS	14
7.1	Summary.....	14
7.2	26dB Bandwidth Measurement – 802.11a/n/ac.....	15
7.3	6dB Bandwidth Measurement – 802.11a/n/ac.....	38
7.4	UNII Output Power Measurement – 802.11a/n/ac.....	47
7.5	Maximum Power Spectral Density – 802.11a/n/ac.....	55
7.6	Radiated Spurious Emission Measurements – Above 1GHz.....	122
7.6.1	SISO CORE 0 Radiated Spurious Emission Measurements	125
7.6.2	SISO CORE 1 Radiated Spurious Emission Measurements	135
7.6.3	MIMO/CDD Radiated Spurious Emission Measurements.....	145
7.6.4	Simultaneous Tx Radiated Spurious Emissions Measurements.....	156
7.6.5	SISO CORE 0 Radiated Band Edge Measurements (20MHz BW).....	159
7.6.6	SISO CORE 0 Radiated Band Edge Measurements (40MHz BW).....	163
7.6.7	SISO CORE 0 Radiated Band Edge Measurements (80MHz BW).....	168
7.6.8	SISO CORE 1 Radiated Band Edge Measurements (20MHz BW).....	171
7.6.9	SISO CORE 1 Radiated Band Edge Measurements (40MHz BW).....	175
7.6.10	SISO CORE 1 Radiated Band Edge Measurements (80MHz BW).....	180
7.6.11	MIMO/CDD Radiated Band Edge Measurements (20MHz BW)	183
7.6.12	MIMO/CDD Radiated Band Edge Measurements (40MHz BW)	188
7.6.13	MIMO/CDD Radiated Band Edge Measurements (80MHz BW)	193
7.7	Radiated Spurious Emissions Measurements – Below 1GHz	196
7.8	AC Line Conducted Test Data	201
8.0	CONCLUSION	205

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 2 of 205



MEASUREMENT REPORT



UNII Band	Channel Bandwidth (MHz)	Tx Frequency (MHz)	SISO				MIMO/CDD					
			Core 0		Core 1		Core 0		Core 1		Combined	
			Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
1	20	5180 - 5240	37.584	15.75	53.088	17.25	37.584	15.75	50.119	17.00	87.700	19.43
2A		5260 - 5320	44.668	16.50	39.811	16.00	44.668	16.50	39.811	16.00	84.528	19.27
2C		5500 - 5720	33.497	15.25	35.481	15.50	33.497	15.25	35.481	15.50	69.024	18.39
3		5745 - 5825	29.854	14.75	37.584	15.75	29.854	14.75	37.584	15.75	67.453	18.29
1	40	5190 - 5230	37.411	15.73	52.845	17.23	37.411	15.73	52.966	17.24	90.365	19.56
2A		5270 - 5310	44.055	16.44	39.446	15.96	44.668	16.50	39.264	15.94	83.946	19.24
2C		5510 - 5710	33.497	15.25	35.481	15.50	33.497	15.25	35.481	15.50	69.024	18.39
3		5755 - 5795	29.854	14.75	37.239	15.71	29.854	14.75	37.584	15.75	67.453	18.29
1	80	5210	24.889	13.96	24.889	13.96	15.488	11.90	15.849	12.00	31.333	14.96
2A		5290	19.861	12.98	19.953	13.00	13.335	11.25	13.335	11.25	26.669	14.26
2C		5530 - 5690	33.497	15.25	34.914	15.43	33.497	15.25	35.400	15.49	68.865	18.38
3		5775	29.717	14.73	36.644	15.64	29.854	14.75	37.239	15.71	67.143	18.27

FCC EUT Overview

UNII Band	Channel Bandwidth (MHz)	Tx Frequency (MHz)	SISO				MIMO/CDD					
			Core 0		Core 1		Core 0		Core 1		Combined	
			Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
1	20	5180 - 5240	35.481	15.50	35.481	15.50	15.849	12.00	15.849	12.00	31.696	15.01
2A		5260 - 5320	44.668	16.50	39.811	16.00	44.668	16.50	39.811	16.00	84.528	19.27
2C		5500 - 5720	33.497	15.25	35.481	15.50	33.497	15.25	35.481	15.50	69.024	18.39
3		5745 - 5825	29.854	14.75	37.584	15.75	29.854	14.75	37.584	15.75	67.453	18.29
1	40	5190 - 5230	37.411	15.73	52.845	17.23	27.479	14.39	28.184	14.50	55.719	17.46
2A		5270 - 5310	44.055	16.44	39.446	15.96	44.668	16.50	39.264	15.94	83.946	19.24
2C		5510 - 5710	33.497	15.25	35.481	15.50	33.497	15.25	35.481	15.50	69.024	18.39
3		5755 - 5795	29.854	14.75	37.239	15.71	29.854	14.75	37.584	15.75	67.453	18.29
1	80	5210	24.889	13.96	24.889	13.96	15.488	11.90	15.849	12.00	31.333	14.96
2A		5290	19.861	12.98	19.953	13.00	13.335	11.25	13.335	11.25	26.669	14.26
2C		5530 - 5690	33.497	15.25	34.914	15.43	33.497	15.25	35.400	15.49	68.865	18.38
3		5775	29.717	14.73	36.644	15.64	29.854	14.75	37.239	15.71	67.143	18.27

ISED EUT Overview

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 3 of 205

1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 18855 Adams Court, Morgan Hill, CA 95037. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014 and KDB 414788 D01 v01.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Morgan Hill, CA 95037, U.S.A.

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.02 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISSED Standards (RSS).
- PCTEST facility is a registered (22831) test laboratory with the site description on file with ISSED.

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 4 of 205

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Tablet Device FCC ID: BCGA2153**. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter.

Test Device Serial No.: DLXXT033LT65, DLXXT00SLT65

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSDPA, Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n/ac UNII, Bluetooth (HDR4, HDR8, 1x, EDR, LE)

Band 1		Band 2A		Band 2C		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
36	5180	52	5260	100	5500	149	5745
:	:	:	:	:	:	:	:
42	5210	56	5280	116	5580	157	5785
:	:	:	:	:	:	:	:
48	5240	64	5320	144	5720	165	5825

Table 2-1. 802.11a / 802.11n / 802.11ac (20MHz) Frequency / Channel Operations

Band 1		Band 2A		Band 2C		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
38	5190	54	5270	102	5510	151	5755
:	:	:	:	:	:	:	:
46	5230	62	5310	110	5550	159	5795
				:	:		
				142	5710		

Table 2-2. 802.11n / 802.11ac (40MHz BW) Frequency / Channel Operations

Band 1		Band 2A		Band 2C		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
42	5210	58	5290	106	5530	155	5775
				:	:		
				138	5690		

Table 2-3. 802.11ac (80MHz BW) Frequency / Channel Operations

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 5 of 205

Notes:

- 5GHz NII operation is possible in 20MHz, and 40MHz, and 80MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section B)2)b) of ANSI C63.10-2013 and KDB 789033 D02 v02r01. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Maximum Achievable Duty Cycles				
802.11 Mode/Band		Duty Cycle [%]		
		CORE0	CORE1	MIMO/CDD
5GHz	a	99.0	99.0	98.9
	n (HT20)	99.0	98.9	98.9
	n (HT40)	97.8	97.6	97.7
	ac (HT80)	95.6	94.9	95.4

Table 2-4. Measured Duty Cycles

- Antenna 1 (ANT1) is correlating to Core 0 and antenna 2 (ANT2) is correlating to Core 1.
- The device employs MIMO technology. Below are the possible configurations.

WiFi Configurations		SISO		CDD		SDM		STBC	
		CORE 0	CORE 1	CORE 0	CORE 1	CORE 0	CORE 1	CORE 0	CORE 1
5GHz	11a	✓	✓	✓	✓	✗	✗	✗	✗
	11n (20MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11n (40MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11ac (80MHz)	✓	✓	✓	✓	✓	✓	✓	✓

Table 2-5. Frequency / Channel Operations

✓ = Support ; ✗ = NOT Support

SISO = Single Input Single Output

MIMO = Multiple Input Multiple Output

SDM = Spatial Diversity Multiplexing – MIMO function

CDD = Cyclic Delay Diversity - 2Tx Function

Data Rate(s) Tested: 6, 9, 12, 18, 24, 36, 48, 54Mbps (802.11a)

6.5/7.2, 13/14.4, 19.5/21.7, 26/28.9, 39/43.3, 52/57.8, 58.5/65, 65/72.2 (n – 20MHz)

13.5/15, 27/30, 40.5/45, 54/60, 81/90, 108/120, 121.5/135, 135/150 (n – 40MHz BW)

29.3/32.5, 58.5/65, 87.8/97.5, 117/130, 175.5/195, 234/260, 263.3/292.5, 292.5/325, 351/390, 390/433.3 (ac – 80MHz BW)

13/14.4, 26.28.9, 39/43.3, 52/57.8, 78/86.7, 104/115.6, 117/130, 130/144.4Mbps (MIMO n/ac – 20MHz)

156/173Mbps (MIMO ac – 20MHz)

27/30, 54/60, 81/90, 108/120, 162/180, 216/240, 243/270, 270/300Mbps (MIMO n/ac – 40MHz) 324/360, 360/400Mbps (MIMO ac – 40MHz)

58.5/65, 117/130, 175.5/195, 234/260, 351/390, 468/520, 526.5/585, 585/650, 702/780, 780/866.7Mbps (MIMO ac – 80MHz)

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 6 of 205

4. This device supports simultaneous transmission operation, which allows for two SISO channels to operate independent of one another in the 2.4GHz and 5GHz bands simultaneously on each antenna. The following tables show the worst case configurations determined during testing. The data for these configurations is contained in this test report.

Worst Case Configuration: CORE 0 is transmitting both 2.4GHz and 5GHz mode

Description	2.4 GHz Emission	5 GHz Emission
Antenna	0	0
Channel	78	36
Operating Frequency (MHz)	2480	5180
Data Rate (Mbps)	GFSK/1Mbps	MCS0
Mode	Bluetooth	UNII

Table 2-6. Worst Case Simultaneous Transmission Config

2.3 Antenna Description

Following antenna was used for the testing.

Frequency [GHz]	Antenna Gain (dBi)	
	Core 0	Core 1
5.150 - 5.250	1.66	2.65
5.260 - 5.350	2.28	2.81
5.470 - 5.725	3.77	3.10
5.745 - 5.850	3.40	3.18

Table 2-7. Highest Antenna Gain

2.4 Test Support Equipment

1	Apple MacBook	Model:	A1398	S/N:	C2QKP008F6F3
	w/AC/DC Adapter	Model:	A1435	S/N:	C04325505K1F288BG
2	Apple Lightning Cable	Model:	Kanzi	S/N:	3252E9
3	USB Lightning Cable	Model:	N/A	S/N:	N/A
	w/ AC Adapter	Model:	A1385	S/N:	D292066H2NLDHLHAE
4	Apple Pencil	Model:	A1603	S/N:	G64TG0FEGWTJ
5	DC Power Supply	Model:	KPS3010D	S/N:	N/A

Table 2-8. Test Support Equipment Used

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 7 of 205	

2.5 Test Configuration

The EUT was tested per the guidance of KDB 789033 D02 v02r01. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections for AC Line Conducted Emissions for AC line conducted emissions test setups. See Sections 7.8 for AC line conducted emissions test setups, 7.6 for radiated emissions test setups, and 7.2, 7.3, 7.4, and 7.5 for antenna port conducted emissions test setups.

There are two vendors of the WiFi/Bluetooth radio modules, variant 1 and variant 2. Both radio modules have the same mechanical outline, same on-board antenna matching circuit, identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances. The worst case configuration was found between the two variants. The EUT was also investigated with and without charger.

The emissions below 1GHz and above 18GHz were tested with the highest transmitting power channel and the worst case configuration.

The EUT was manipulated through three orthogonal planes of X-orientation (flatbed), Y-orientation (landscape), and Z-orientation (portrait) during the testing. Only the worst case emissions were reported in this test report.

For AC line conducted and radiated test below 1GHz, following configuration were investigated and worst case was reported.

- EUT powered by AC/DC adaptor via USB cable with wire charger
- EUT powered by host PC via USB cable with wire charger

802.11n HT20/40 and acVHT80 2TX SDM mode test data provided in this report covers 802.11n HT20/40 and 802.11acVHT80 2TX STBC mode

802.11ac VHT20 and VHT40 mode are different from 802.11n HT20 and HT40 only in control messages and have the same power settings.

Throughout the report, Core 0 is correlating to Antenna WF1 and Core 1 is correlating to Antenna WF2.

2.6 Software and Firmware

The test was conducted with firmware version 16E31520i installed on the EUT.

2.7 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 8 of 205

3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 789033 D02 v02r01 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 7m x 3.66m x 2.7m shielded enclosure. The shielded enclosure is manufactured by AP Americas. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-6. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is EPCOS 2X60A Power Line Filter (100dB Attenuation, 14kHz-18GHz) and the two EPCOs 2X48A filters (100dB Minimum Insertion Loss, 14kHz - 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.8. Automated test software was used to perform the AC line conducted emissions testing. Automated measurement software utilized is Rohde & Schwarz EMC32, Version 10.20.01.

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 9 of 205

3.3 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. An 80cm tall test table made of Styrodur is placed on top of the turn table. For measurements above 1GHz, an additional Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33 depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 474788 D01.

3.4 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 10 of 205

4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- The antennas of the EUT are **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The EUT complies with the requirement of §15.203.

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 11 of 205

5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (\pm dB)
Conducted Bench Top Measurements	1.29
Line Conducted Disturbance	2.48
Radiated Disturbance (<1GHz)	4.15
Radiated Disturbance (>1GHz)	4.70
Radiated Disturbance (>18GHz)	5.01

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 12 of 205

6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Anritsu	ML2496A	Power Meter	10/22/2018	Annual	10/22/2019	184005
Anritsu	MA2411B	Pulse Power Meter	10/22/2018	Annual	10/22/2019	1726261
Anritsu	MA2411B	Pulse Power Meter	10/22/2018	Annual	10/22/2019	1726262
ATM	180-442A-KF	20dB Nominal Gain Horn Antenna	3/13/2018	Annual	3/13/2019	T058601-02
COM-POWER	LIN-120A	LISN	3/7/2018	Annual	3/7/2019	241296
Keysight Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	2/27/2018	Annual	2/27/2019	MY49430244
Rohde & Schwarz	ESW26	EMI Test Receiver	7/19/2018	Annual	7/19/2019	101299
Rohde & Schwarz	ESW44	EMI Test Receiver	11/20/2018	Annual	11/20/2019	101570
Rohde & Schwarz	TS-PR1840	Pre-Amplifier (18GHz - 40GHz)	6/11/2018	Annual	6/11/2019	100051
Rohde & Schwarz	TS-PR8	Pre-Amplifier (30MHz - 8GHz)	1/25/2018	Annual	1/25/2019	102333
Rohde & Schwarz	HL562E	Ultra Broadband Antenna (30MHz - 6GHz)	6/8/2018	Annual	6/8/2019	100810
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Antenna (400MHz-18GHz)	11/21/2018	Annual	11/21/2019	101057
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Antenna (400MHz-18GHz)	12/7/2018	Annual	12/7/2019	101063
Rohde & Schwarz	HFH2-Z2	Loop Antenna	3/13/2018	Annual	3/13/2019	100519

Table 6-1. Annual Test Equipment Calibration Schedule

Note:

For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 13 of 205

7.0 TEST RESULTS

7.1 Summary

Company Name: Apple Inc.
 FCC ID: BCGA2153
 FCC Classification: Unlicensed National Information Infrastructure (UNII)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
N/A	RSS-Gen [6.6]	26dB Bandwidth	N/A	CONDUCTED	PASS	Section 7.2
15.407(e)	RSS-Gen [6.6]	6dB Bandwidth	>500kHz(5725-5850MHz)		PASS	Section 7.3
15.407 (a.1.iv), (a.2), (a.3)	RSS-247 [6.2]	Maximum Conducted Output Power	Maximum conducted powers must meet the limits detailed in 15.407 (a) (RSS-247 [6.2])		PASS	Section 7.4
15.407 (a.1.iv), (a.2), (a.3)	RSS-247 [6.2]	Maximum Power Spectral Density	Maximum power spectral density must meet the limits detailed in 15.407 (a) (RSS-247 [6.2])		PASS	Section 7.5
15.407(h)	RSS-247 [6.3]	Dynamic Frequency Selection	See DFS Test Report	RADIATED	PASS	See DFS Test Report
15.407(b.1), (2), (3), (4)	RSS-247 [6.2]	Undesirable Emissions	Undesirable emissions must meet the limits detailed in 15.407(b) (RSS-247 [6.2])		PASS	Section 7.6
15.205, 15.407(b.1), (4), (5), (6)	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-Gen [8.9])		PASS	Section 7.6, 7.7
15.407	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 (RSS-Gen [8.8]) limits	LINE CONDUCTED	PASS	Section 7.8

Table 7-1. Summary of Test Results

Notes:

- 1) All channels, modes, and modulations/data rates were investigated among all UNII bands. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST “UNII Automation,” Version 4.6.
- 5) For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST “Chamber Automation,” Version 1.3.0.

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 14 of 205

7.2 26dB Bandwidth Measurement – 802.11a/n/ac

RSS-Gen [6.2]

Test Overview and Limit

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

The 26dB bandwidth is used to determine the conducted power limits.

Test Procedure Used

ANSI C63.10-2013 – Section 12.4

KDB 789033 D02 v02r01 – Section C

Test Settings

1. The signal analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to $X = 26$. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth
3. $VBW \geq 3 \times RBW$
4. Detector = Peak
5. Trace mode = max hold

Test Setup

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



Figure 7-1. Test Instrument & Measurement Setup

Test Notes

All antenna configs were investigated and only the worst case is reported.

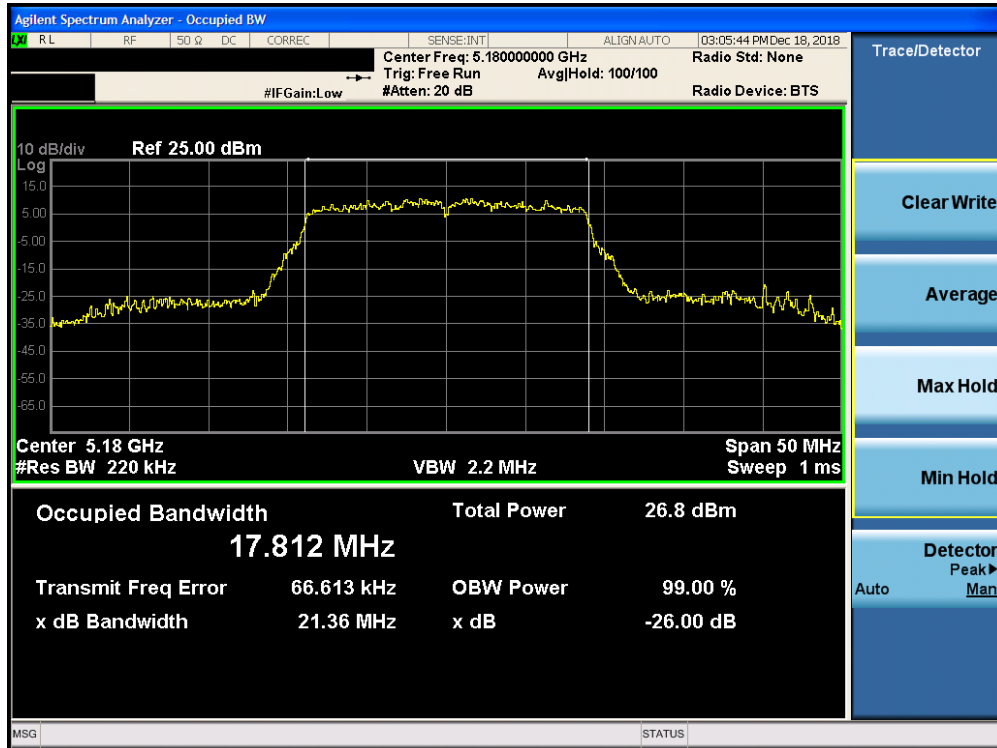
FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 15 of 205

SISO CORE 0 - 26 dB Bandwidth Measurements

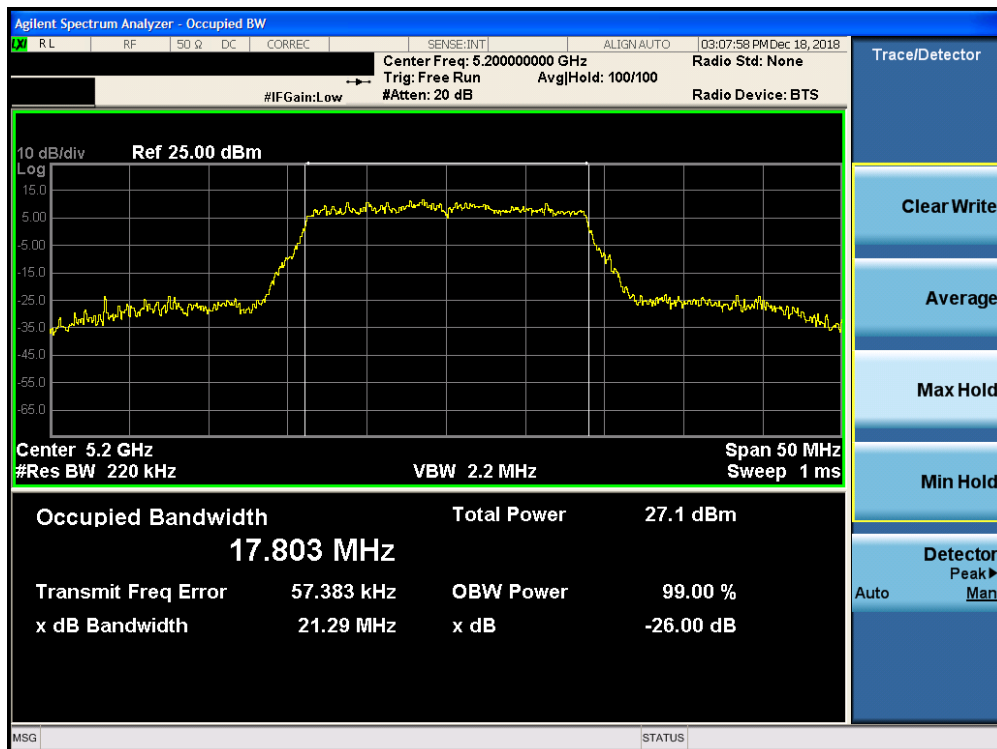
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
Band 1	5180	36	n (20MHz)	6.5/7.2 (MCS0)	21.36
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	21.29
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	21.40
	5190	38	n (40MHz)	13.5/15 (MCS0)	39.55
	5230	46	n (40MHz)	13.5/15 (MCS0)	39.50
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	81.07
Band 2A	5260	52	n (20MHz)	6.5/7.2 (MCS0)	21.23
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	21.34
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	21.53
	5270	54	n (40MHz)	13.5/15 (MCS0)	39.72
	5310	62	n (40MHz)	13.5/15 (MCS0)	39.67
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	81.12
Band 2C	5500	100	n (20MHz)	6.5/7.2 (MCS0)	21.32
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	21.56
	5720	144	n (20MHz)	6.5/7.2 (MCS0)	21.57
	5510	102	n (40MHz)	13.5/15 (MCS0)	39.81
	5550	110	n (40MHz)	13.5/15 (MCS0)	39.51
	5710	142	n (40MHz)	13.5/15 (MCS0)	39.69
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	81.18
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	80.49

Table 7-2. Conducted Bandwidth Measurements SISO CORE0

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 16 of 205

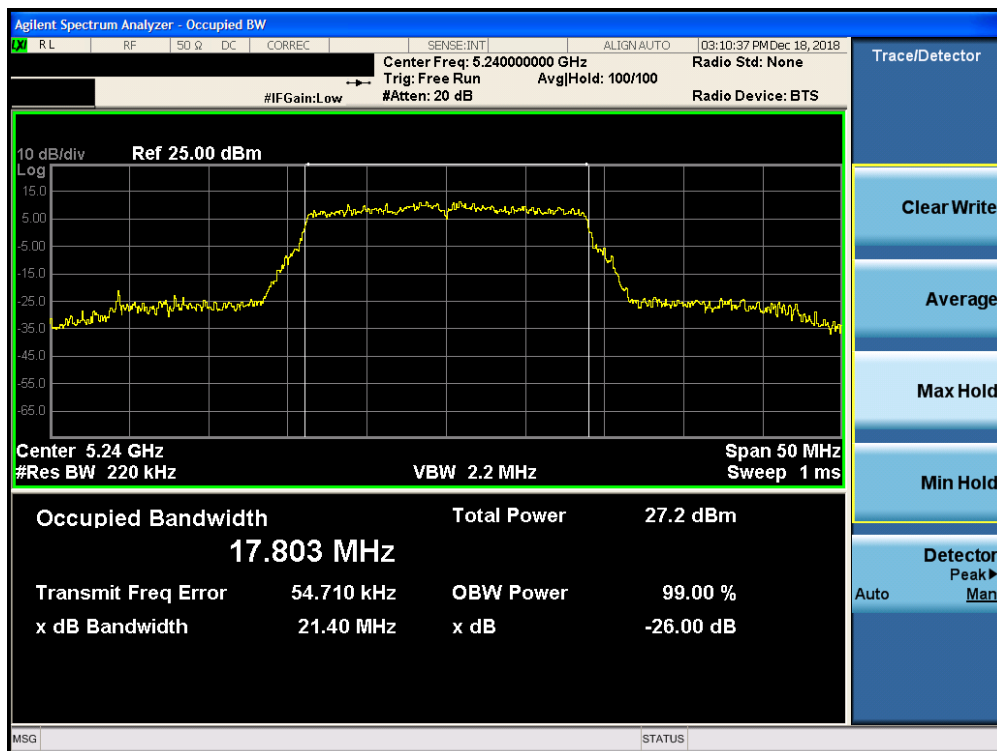


Plot 7-1. 26dB Bandwidth Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

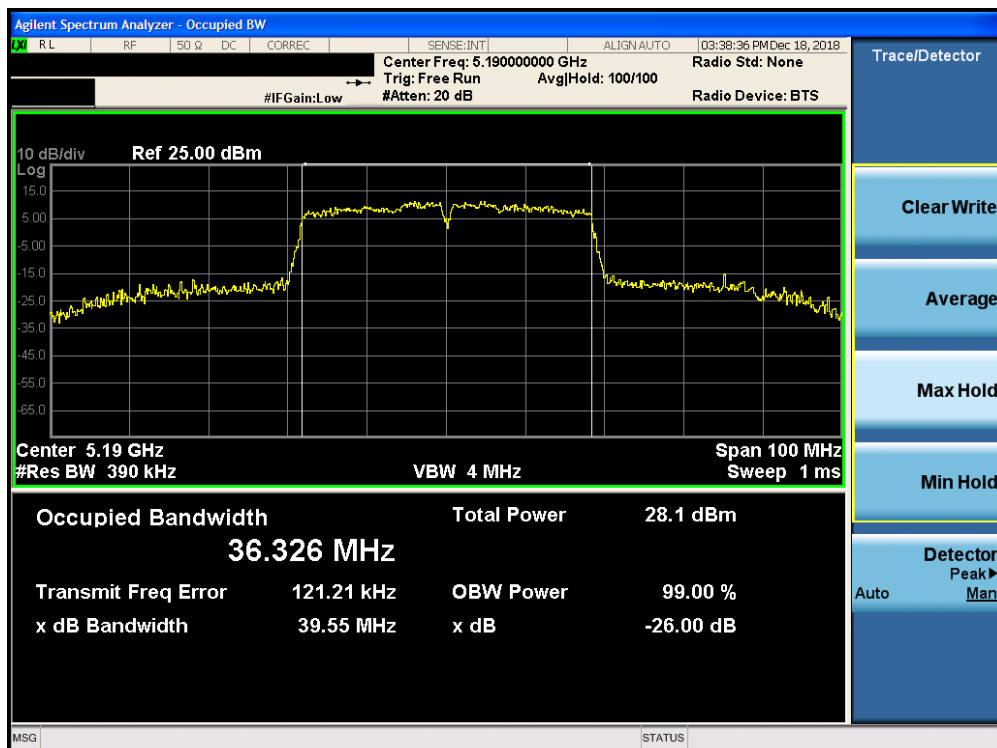


Plot 7-2. 26dB Bandwidth Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 1) – Ch. 40)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 17 of 205

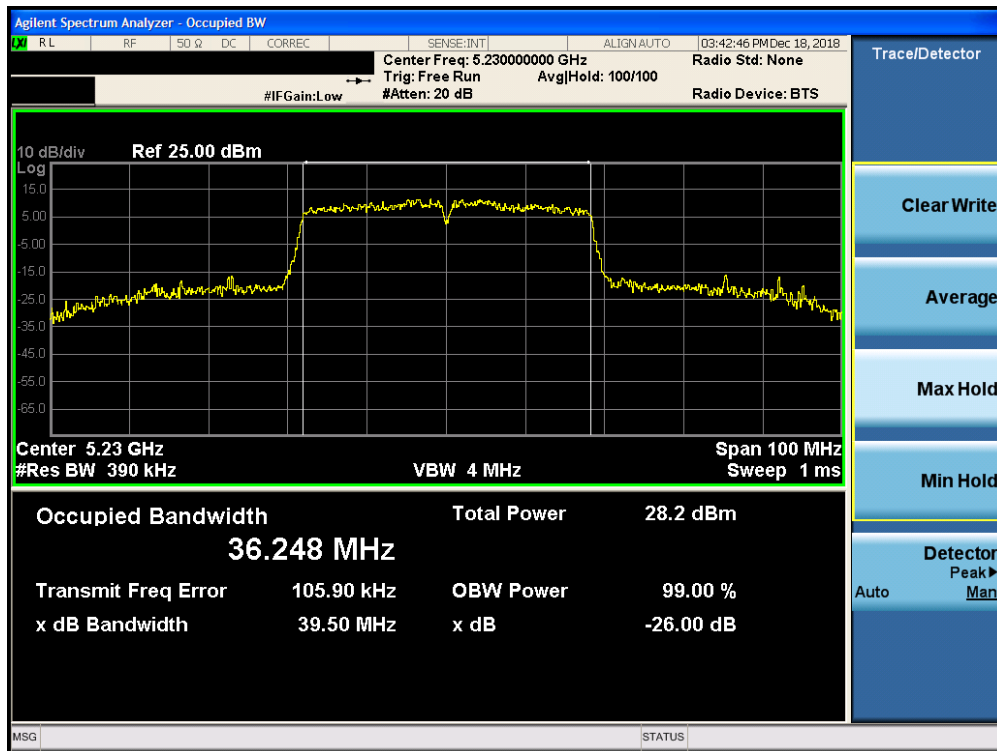


Plot 7-3. 26dB Bandwidth Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

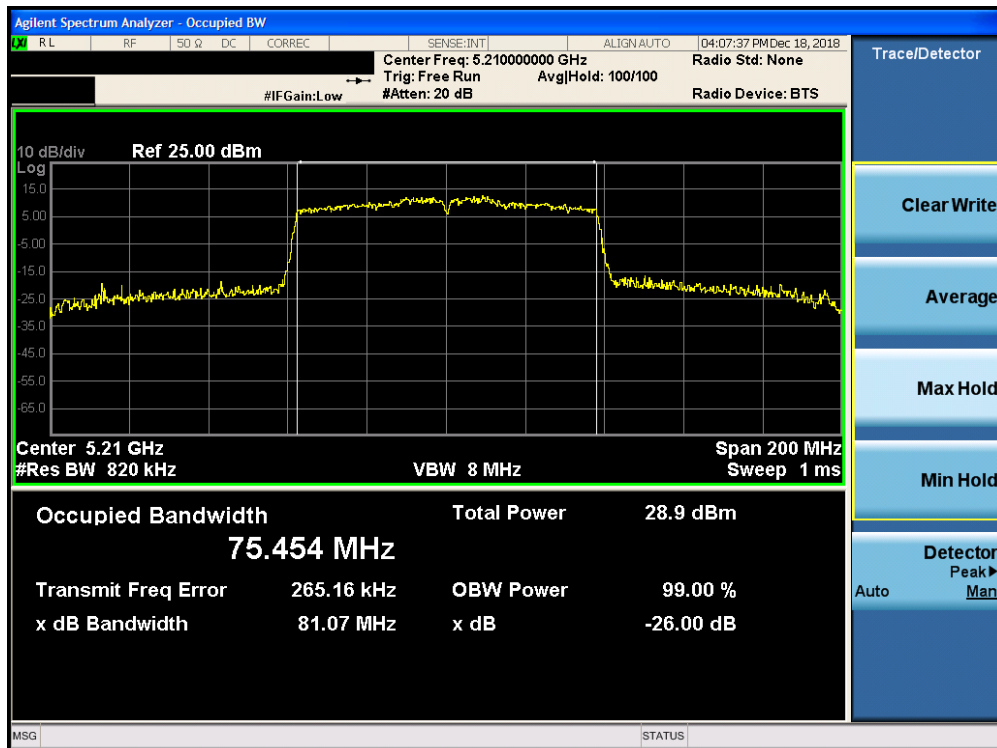


Plot 7-4. 26dB Bandwidth Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 1) – Ch. 38)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 18 of 205

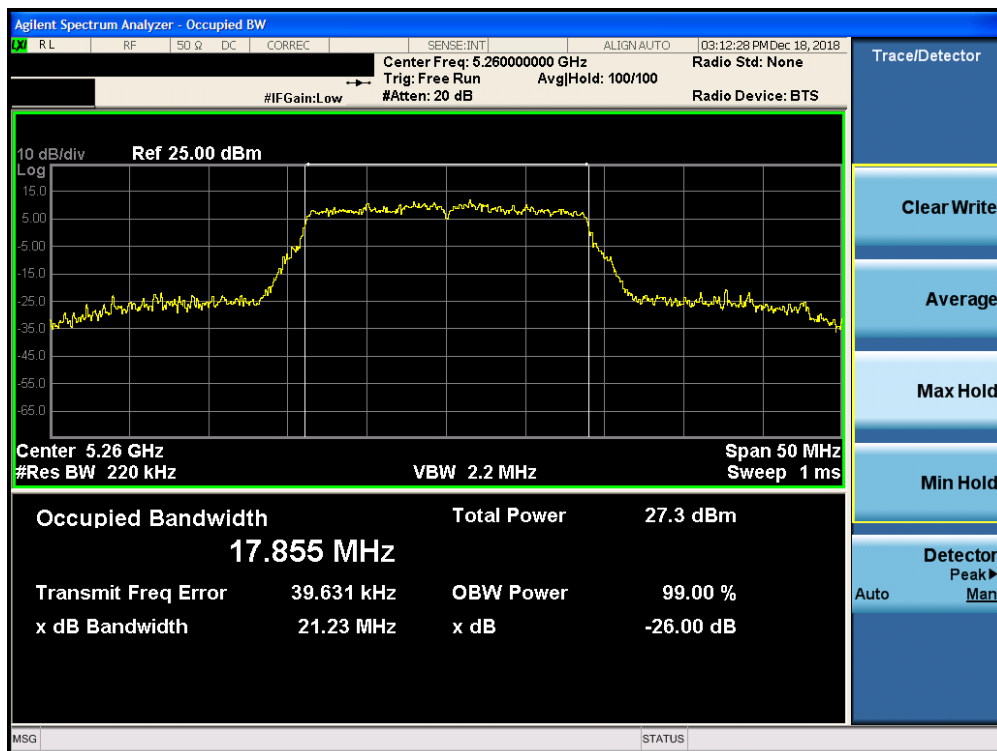


Plot 7-5. 26dB Bandwidth Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

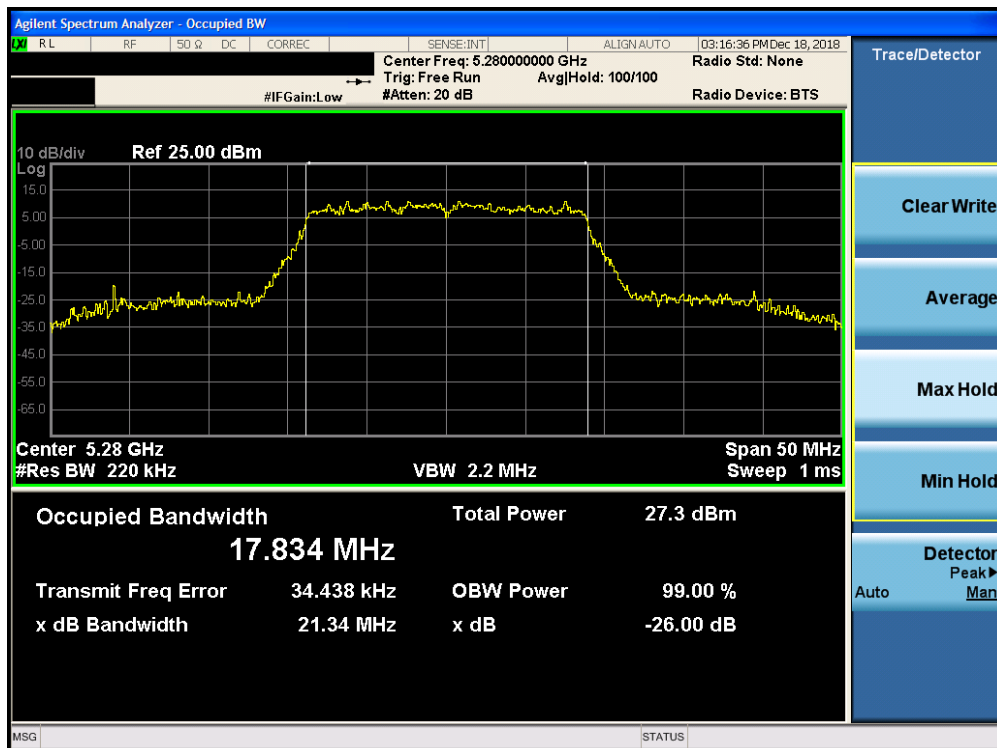


Plot 7-6. 26dB Bandwidth Plot SISO CORE0 (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 19 of 205

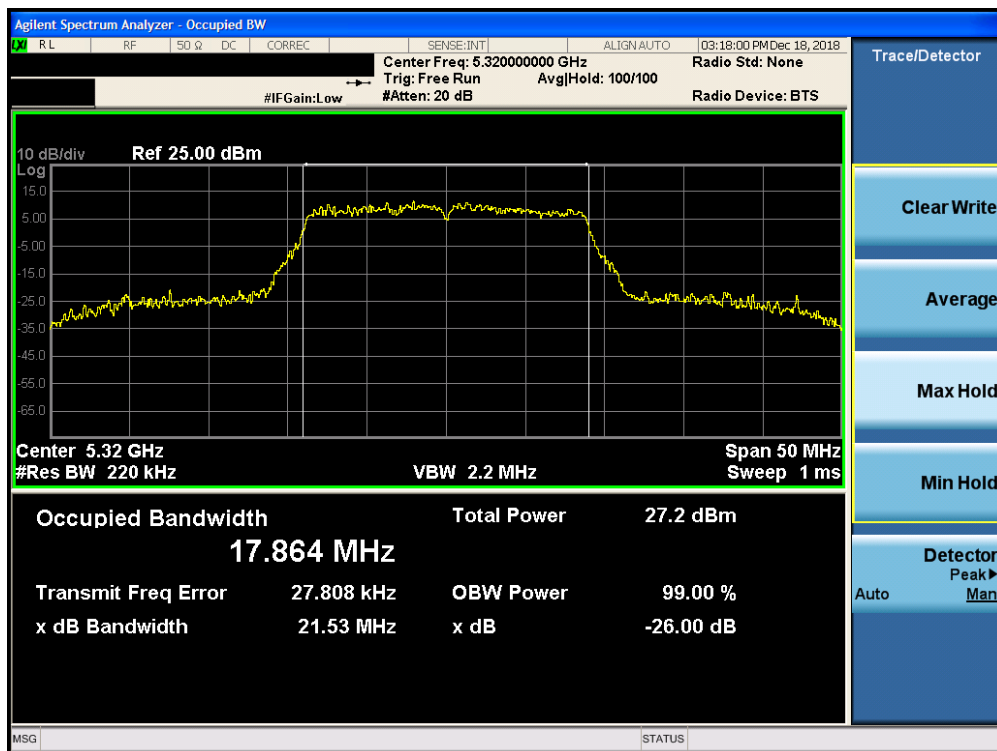


Plot 7-7. 26dB Bandwidth Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)

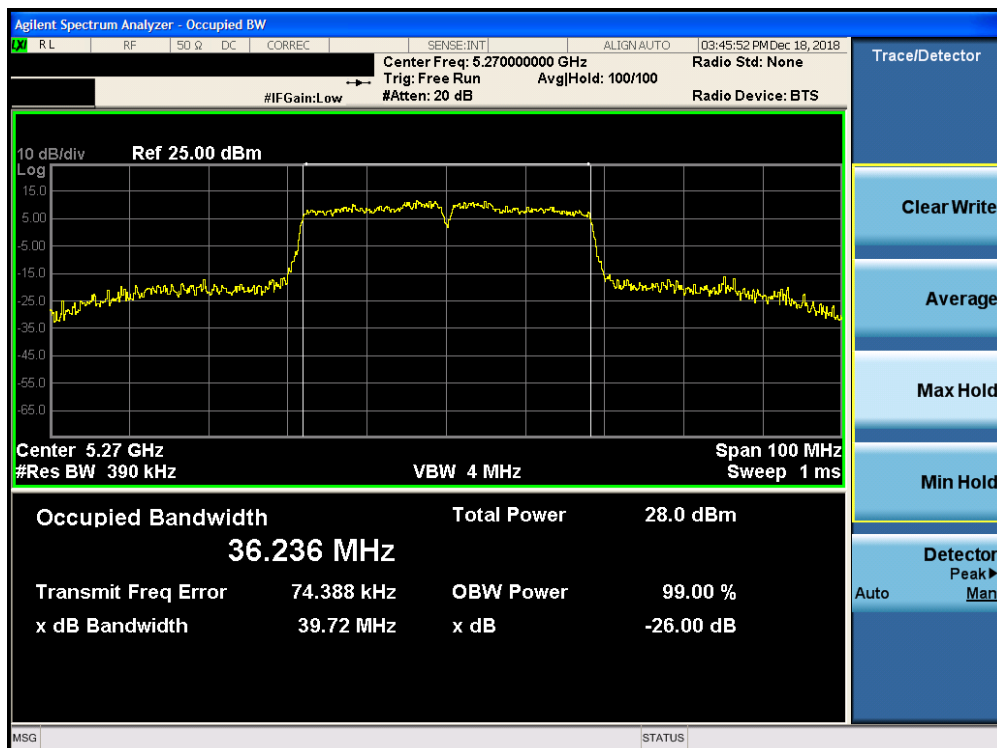


Plot 7-8. 26dB Bandwidth Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 20 of 205

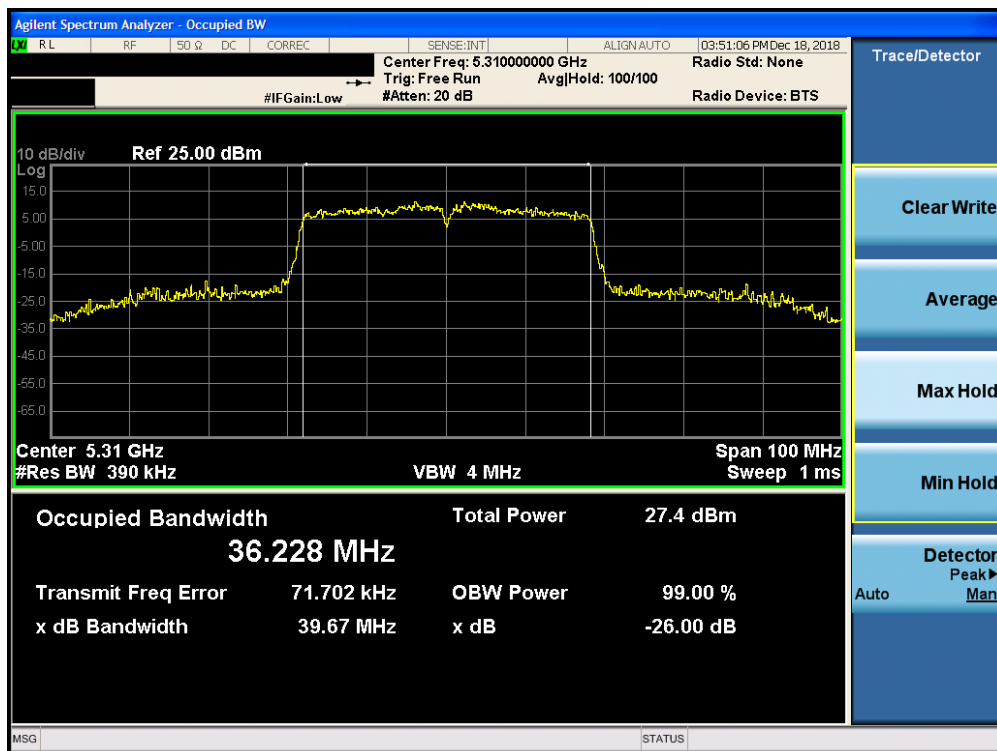


Plot 7-9. 26dB Bandwidth Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)

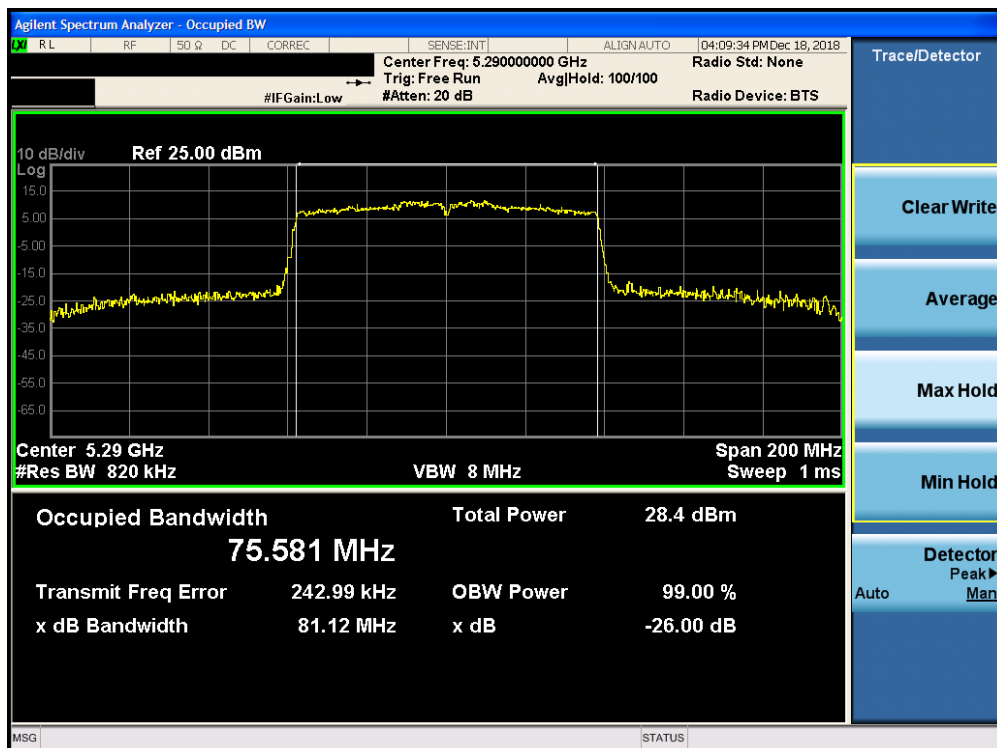


Plot 7-10. 26dB Bandwidth Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 21 of 205

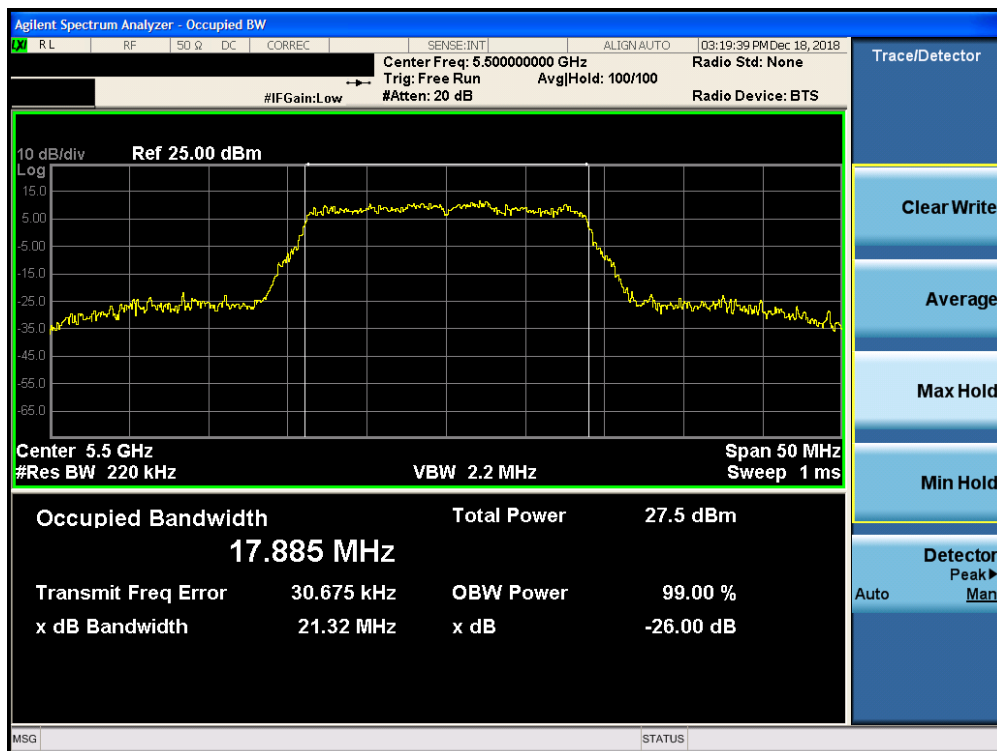


Plot 7-11. 26dB Bandwidth Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)

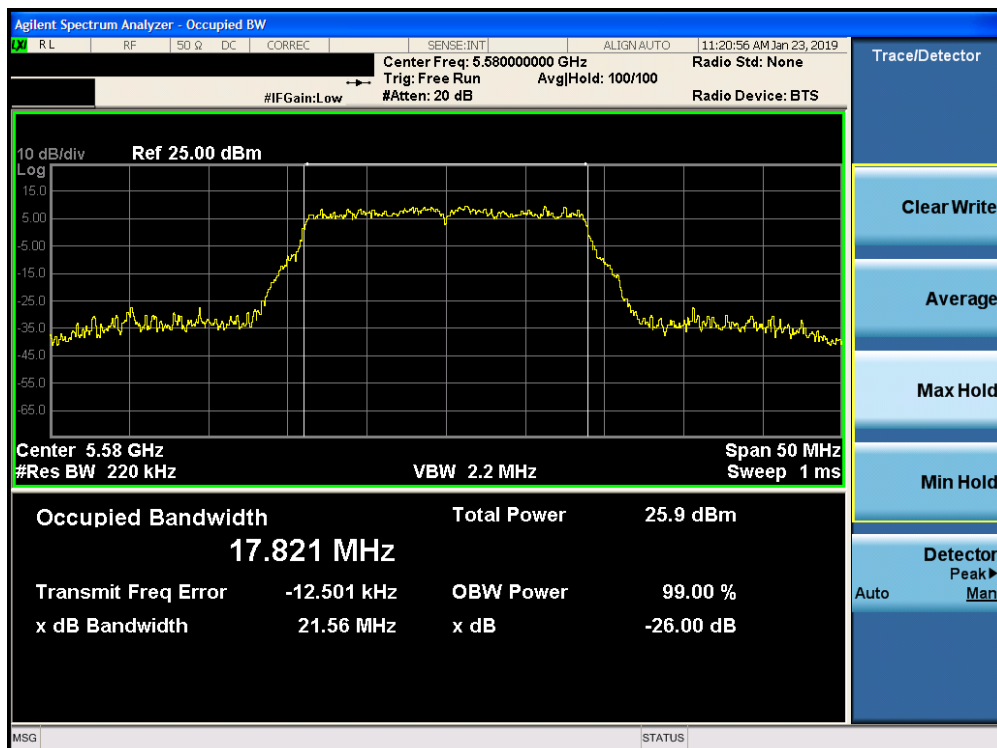


Plot 7-12. 26dB Bandwidth Plot SISO CORE0 (80MHz BW 802.11ac (UNII Band 2A) – Ch. 58)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 22 of 205

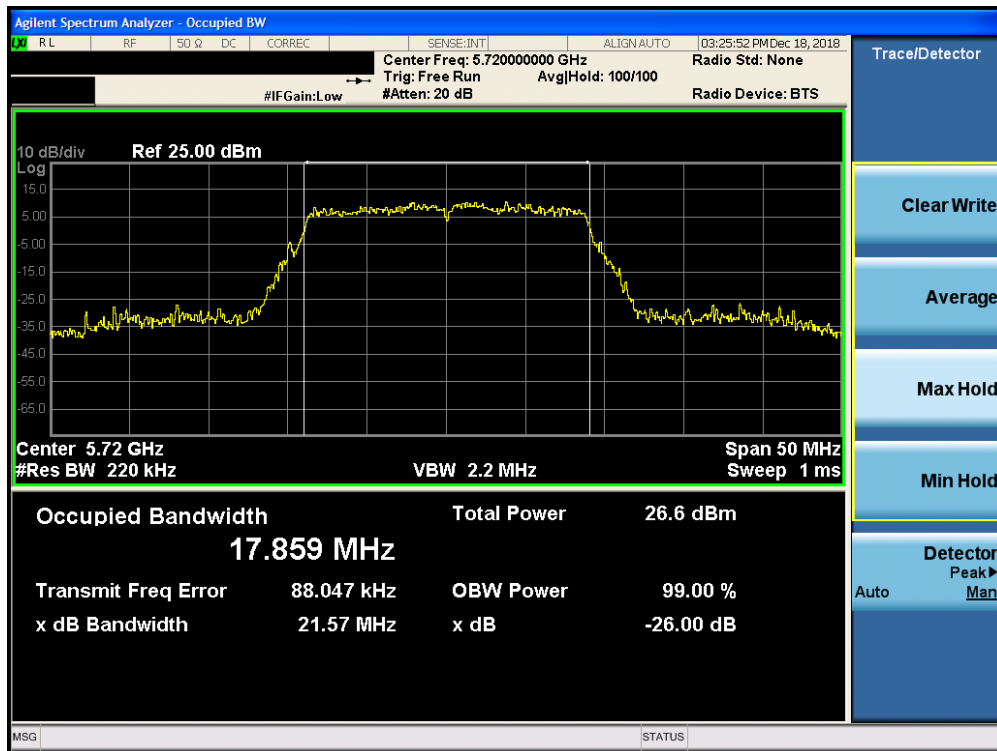


Plot 7-13. 26dB Bandwidth Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 2C) – Ch. 100)

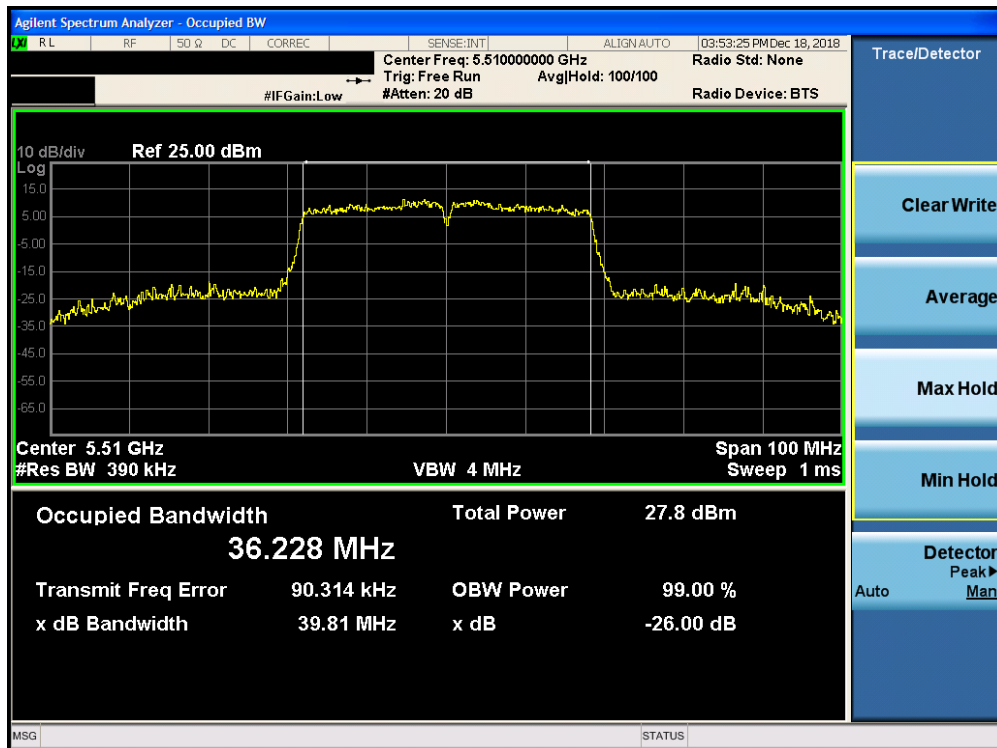


Plot 7-14. 26dB Bandwidth Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 2C) – Ch. 116)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 23 of 205

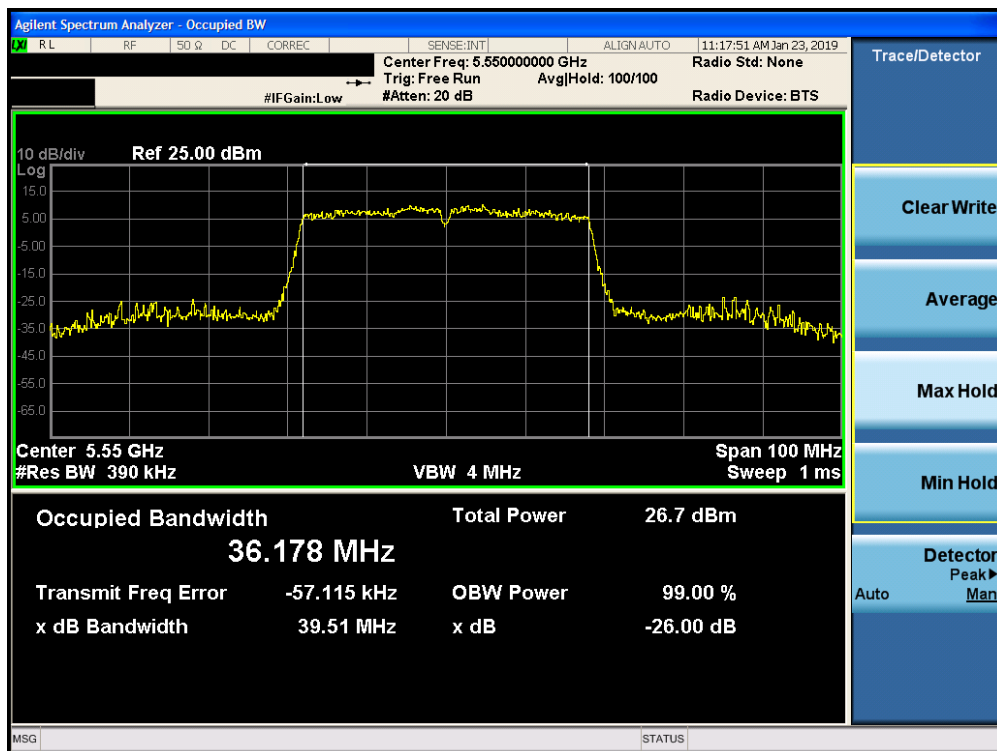


Plot 7-15. 26dB Bandwidth Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 2C) – Ch. 144)

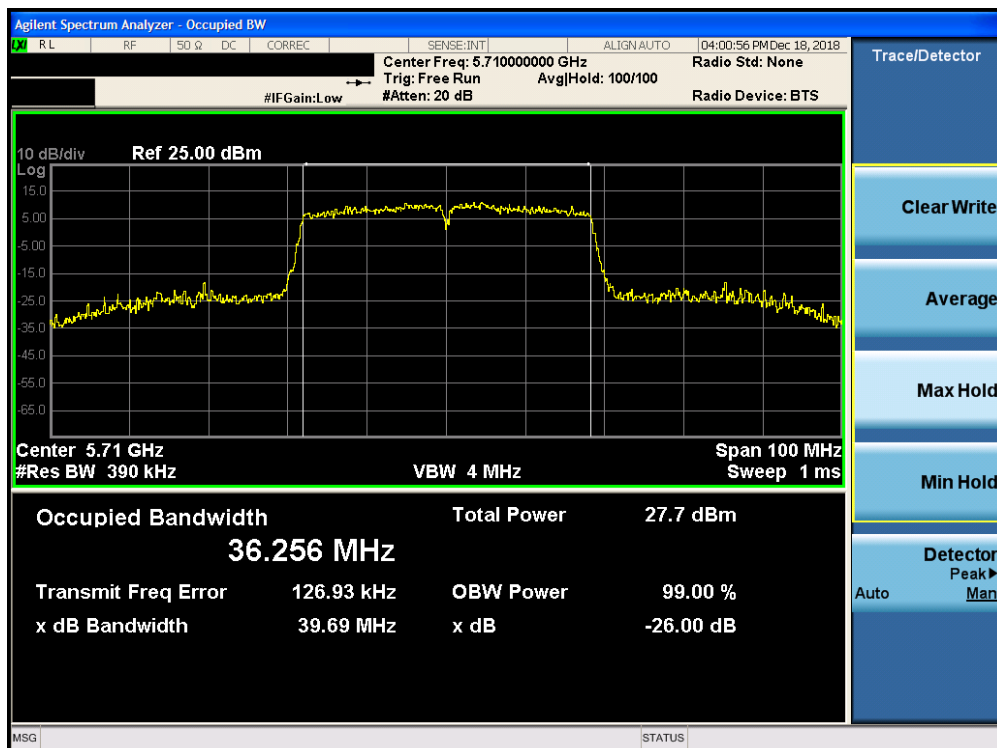


Plot 7-16. 26dB Bandwidth Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 24 of 205

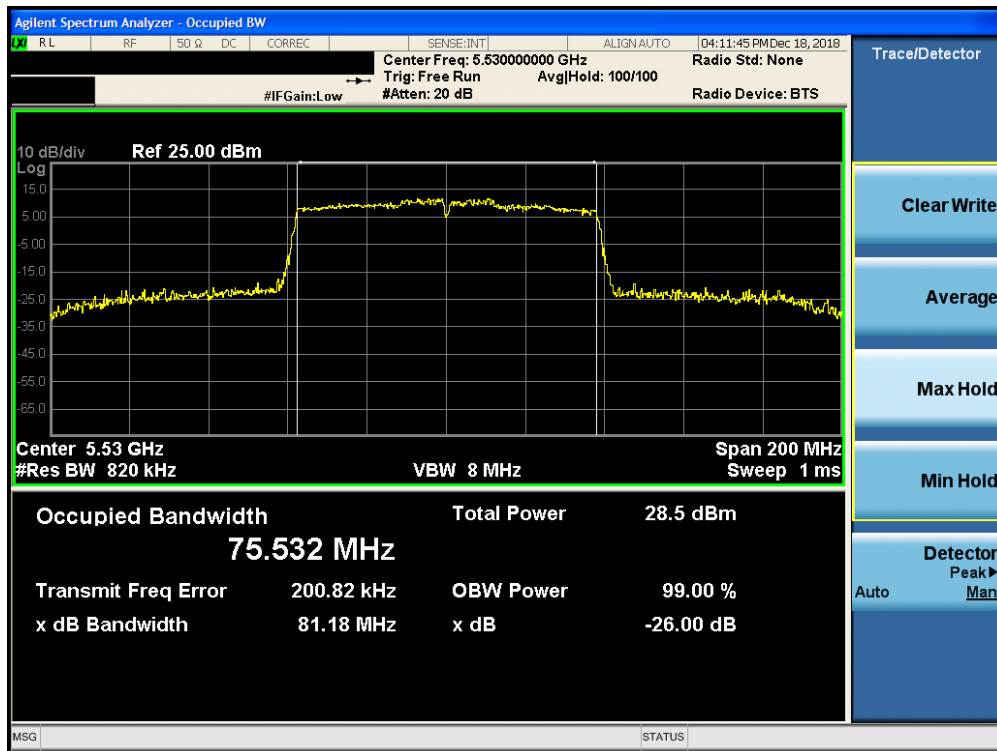


Plot 7-17. 26dB Bandwidth Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 2C) – Ch. 110)

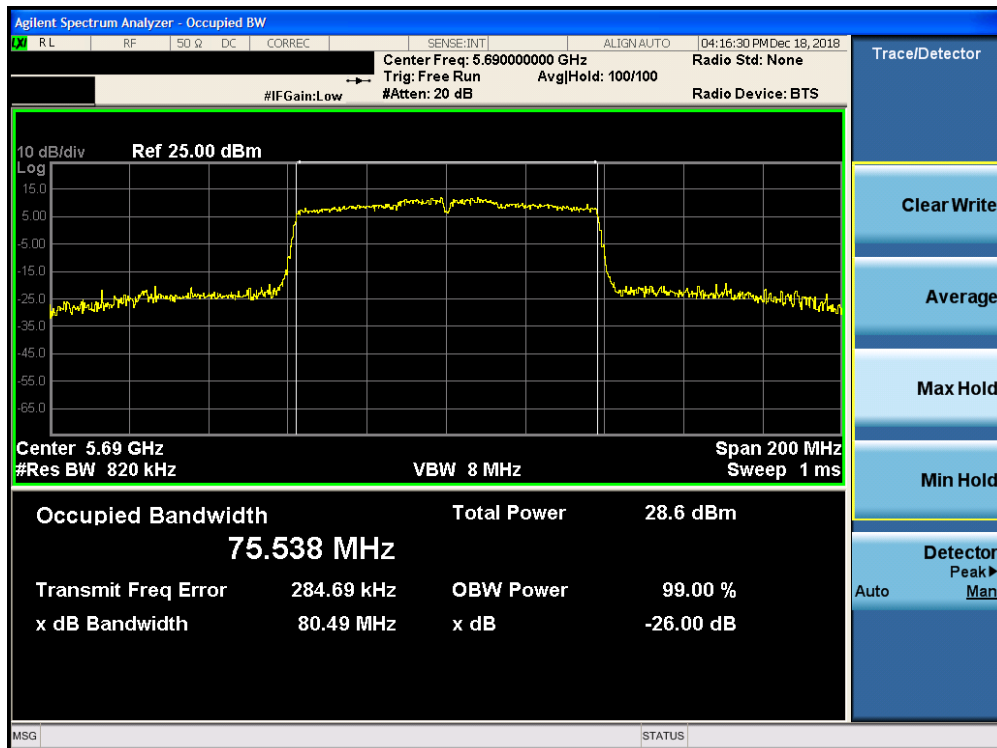


Plot 7-18. 26dB Bandwidth Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 2C) – Ch. 142)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 25 of 205



Plot 7-19. 26dB Bandwidth Plot SISO CORE0 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 106)



Plot 7-20. 26dB Bandwidth Plot SISO CORE0 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 138)

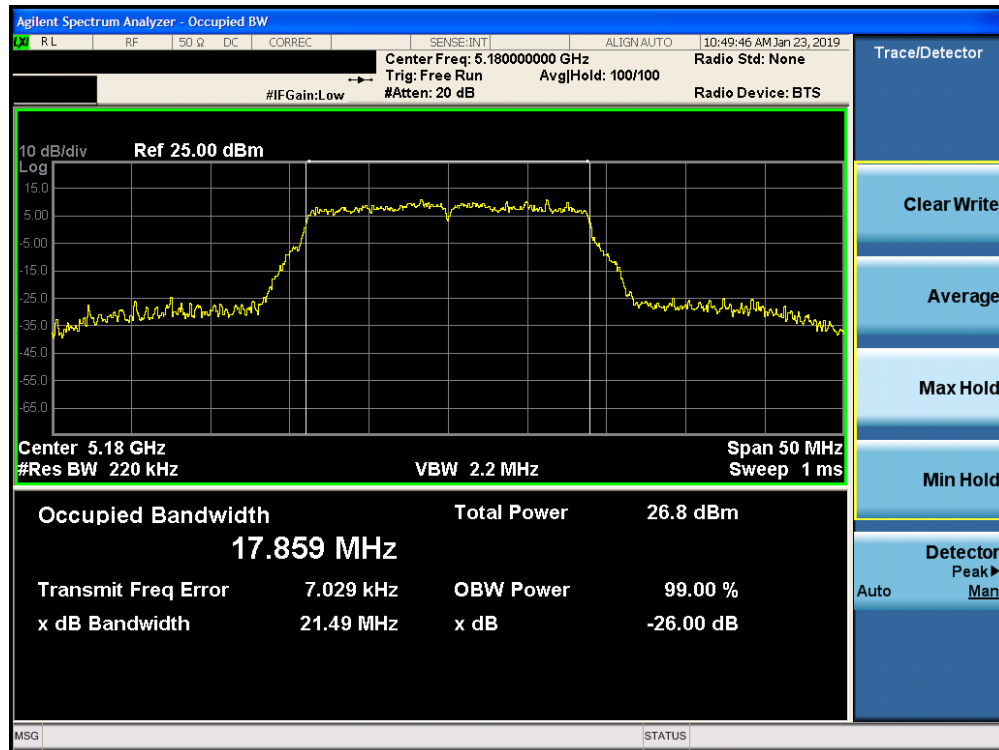
FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 26 of 205

SISO CORE 1 - 26dB Bandwidth Measurements

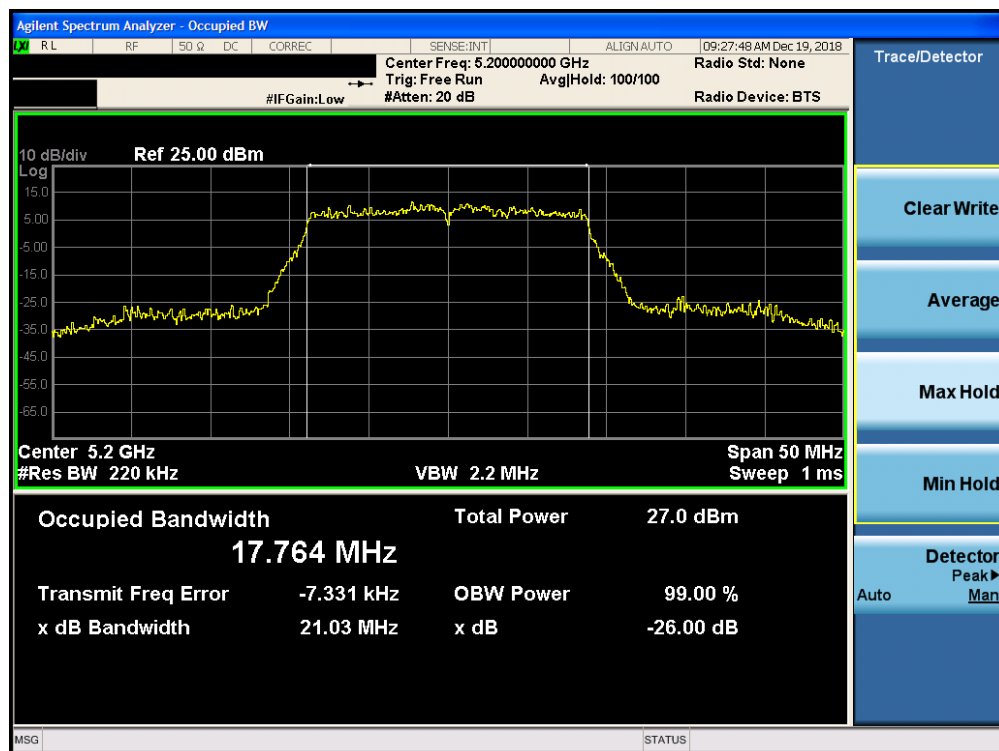
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
Band 1	5180	36	n (20MHz)	6.5/7.2 (MCS0)	21.49
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	21.03
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	21.31
	5190	38	n (40MHz)	13.5/15 (MCS0)	39.48
	5230	46	n (40MHz)	13.5/15 (MCS0)	39.56
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	81.25
Band 2A	5260	52	n (20MHz)	6.5/7.2 (MCS0)	21.43
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	21.42
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	21.61
	5270	54	n (40MHz)	13.5/15 (MCS0)	39.76
	5310	62	n (40MHz)	13.5/15 (MCS0)	39.41
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	80.57
Band 2C	5500	100	n (20MHz)	6.5/7.2 (MCS0)	21.35
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	21.14
	5720	144	n (20MHz)	6.5/7.2 (MCS0)	21.45
	5510	102	n (40MHz)	13.5/15 (MCS0)	39.54
	5550	110	n (40MHz)	13.5/15 (MCS0)	39.35
	5710	142	n (40MHz)	13.5/15 (MCS0)	39.49
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	80.99
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	80.55

Table 7-3. Conducted Bandwidth Measurements SISO CORE1

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 27 of 205

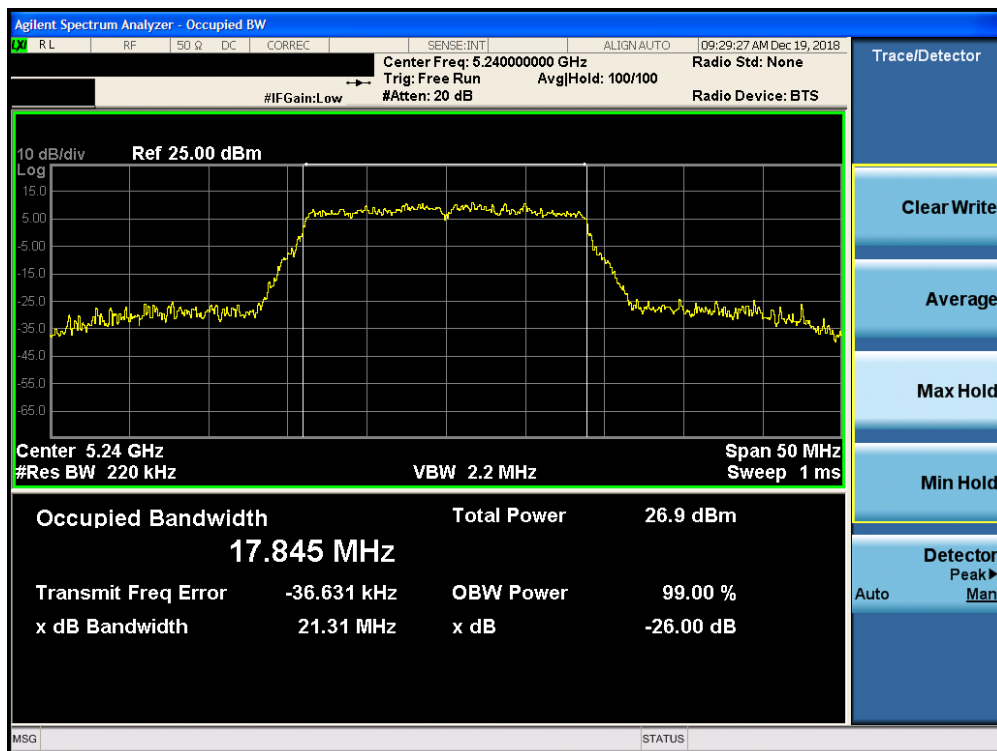


Plot 7-21. 26dB Bandwidth Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

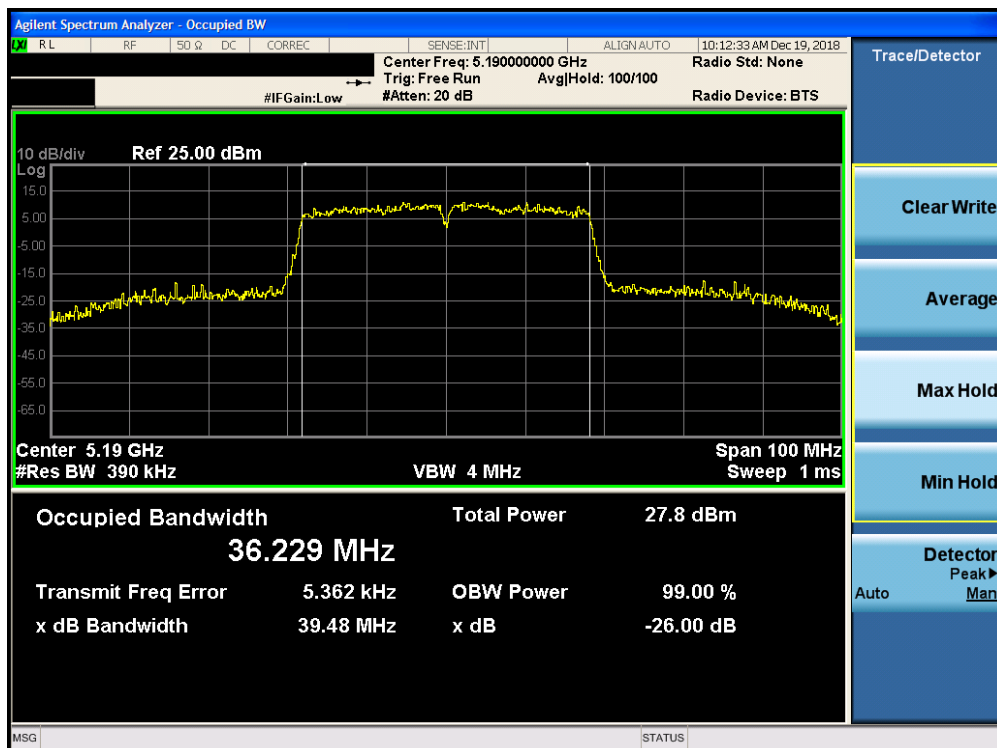


Plot 7-22. 26dB Bandwidth Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 1) – Ch. 40)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 28 of 205

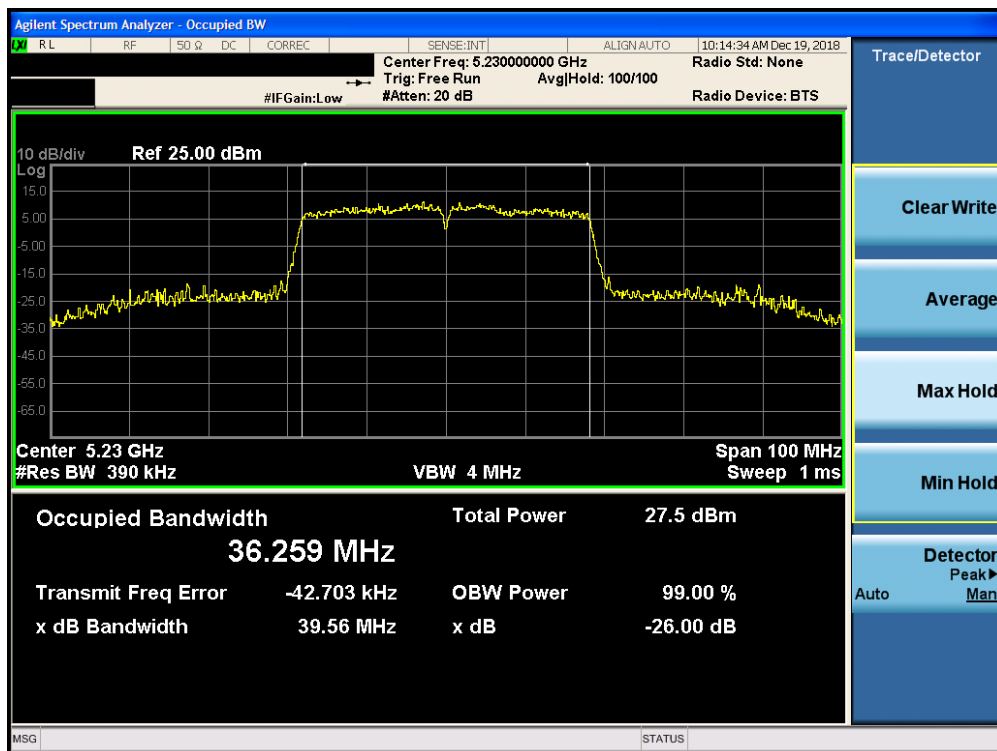


Plot 7-23. 26dB Bandwidth Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

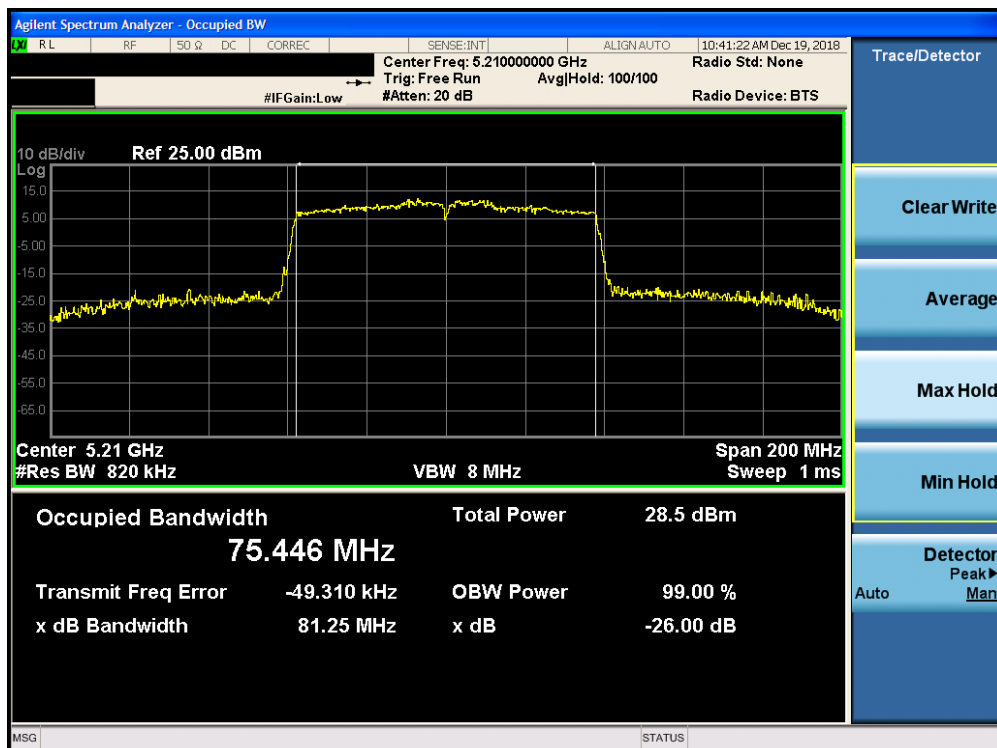


Plot 7-24. 26dB Bandwidth Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 1) – Ch. 38)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 29 of 205

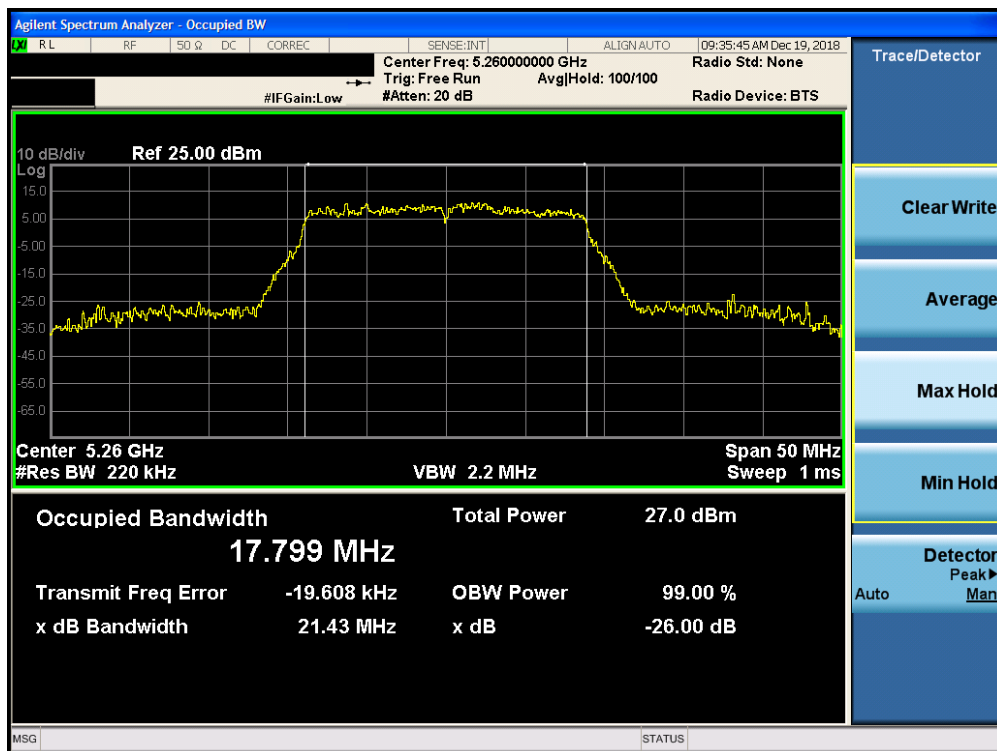


Plot 7-25. 26dB Bandwidth Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

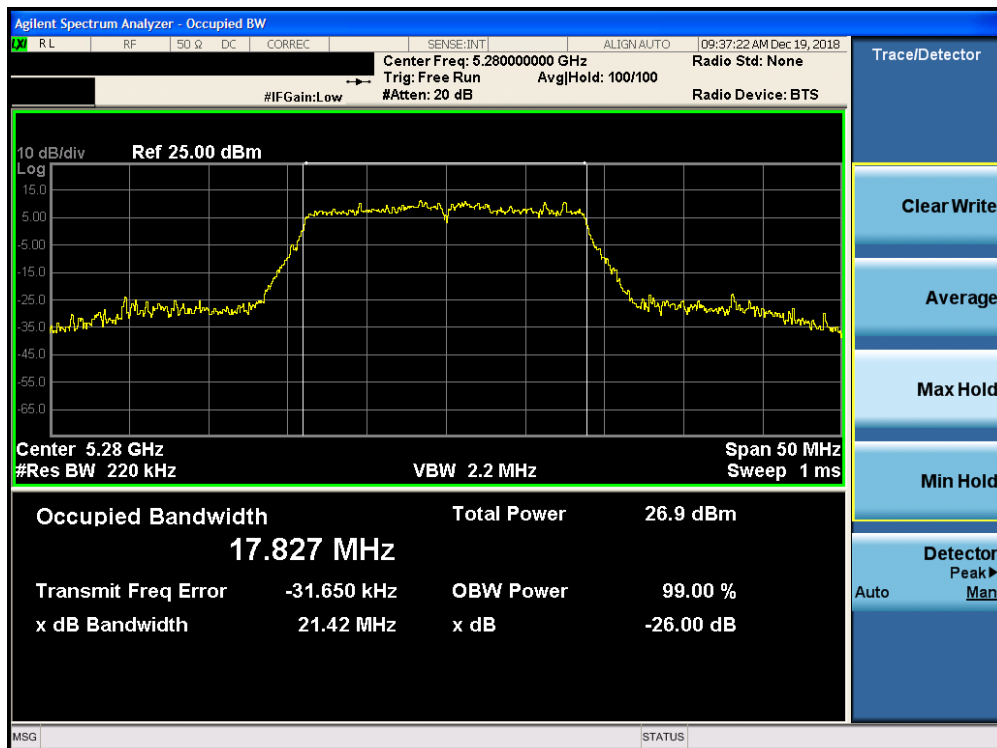


Plot 7-26. 26dB Bandwidth Plot SISO CORE1 (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 30 of 205

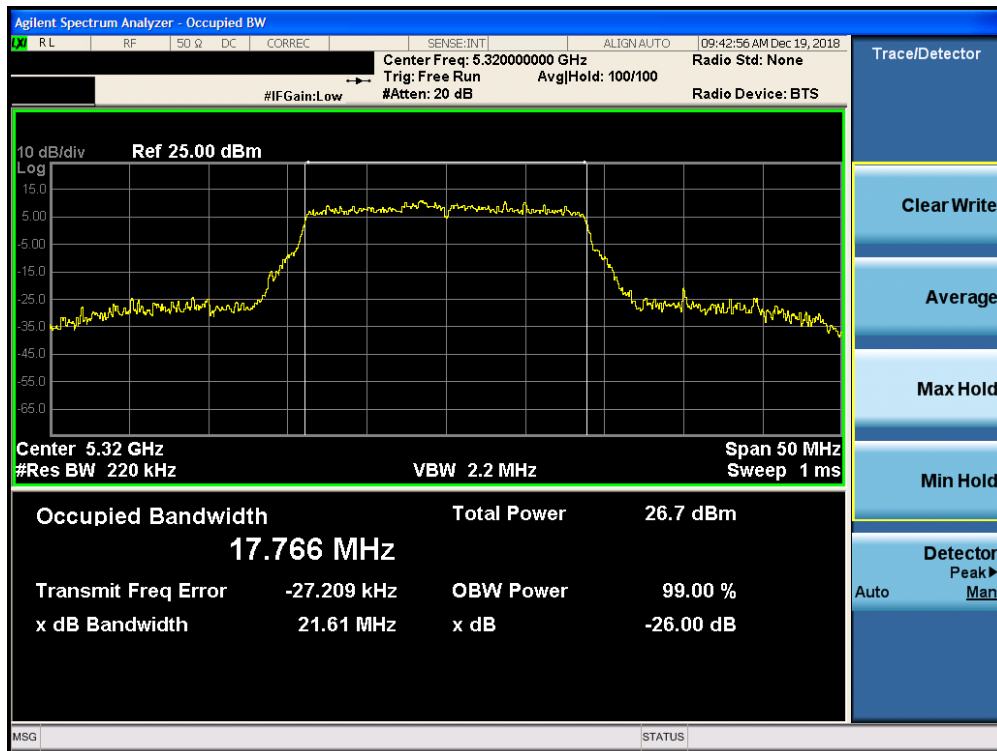


Plot 7-27. 26dB Bandwidth Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)

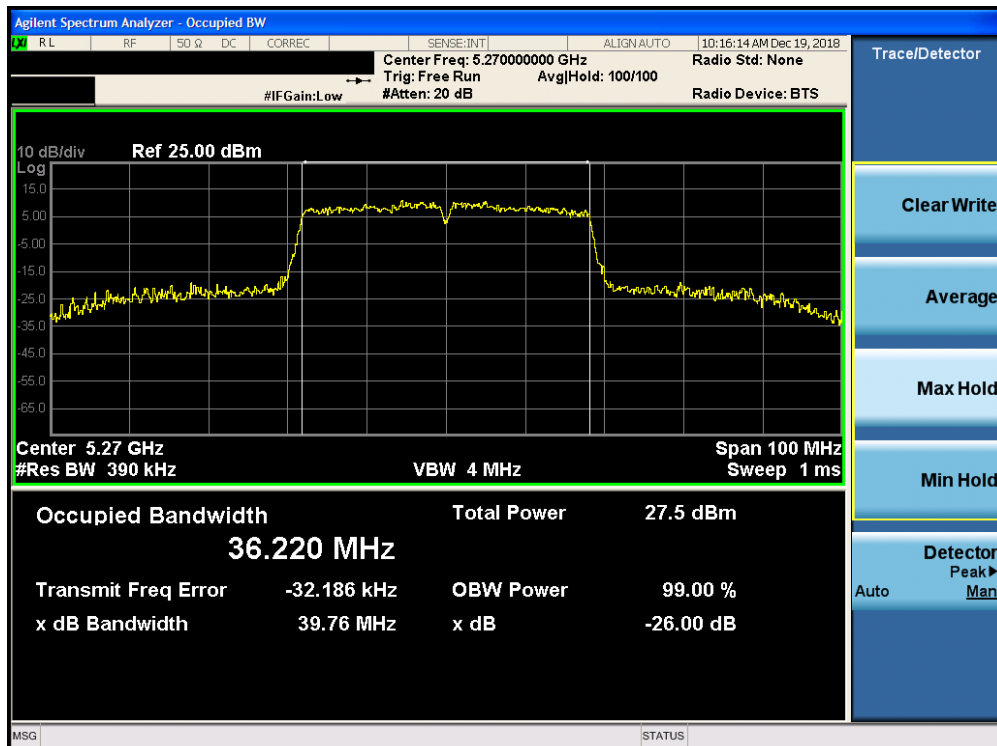


Plot 7-28. 26dB Bandwidth Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 31 of 205

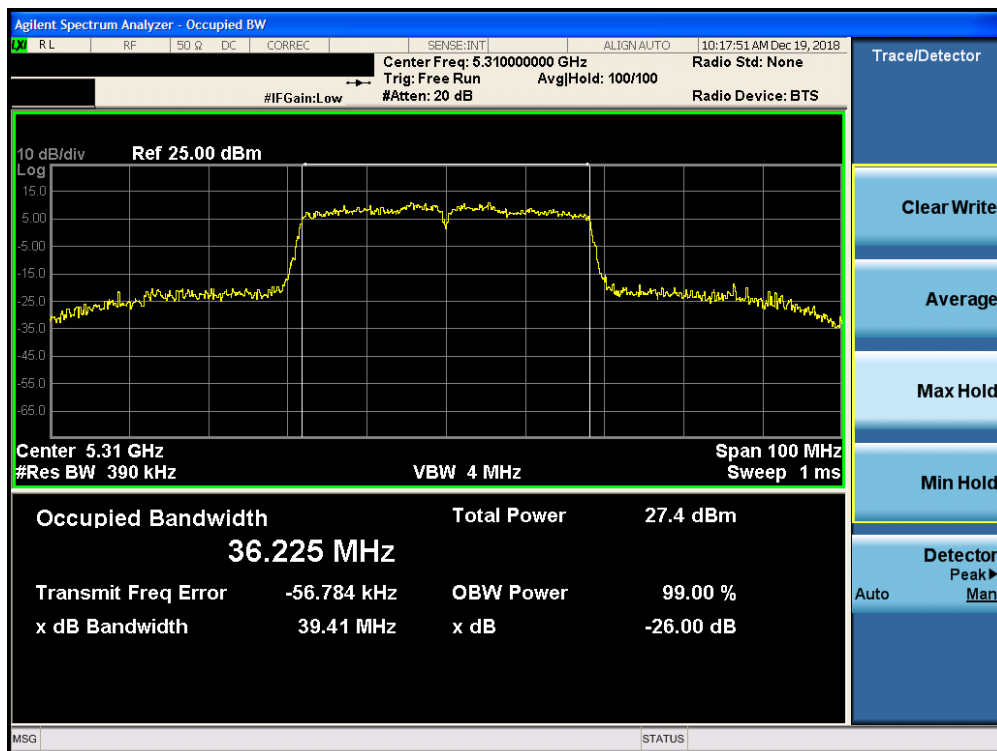


Plot 7-29. 26dB Bandwidth Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)

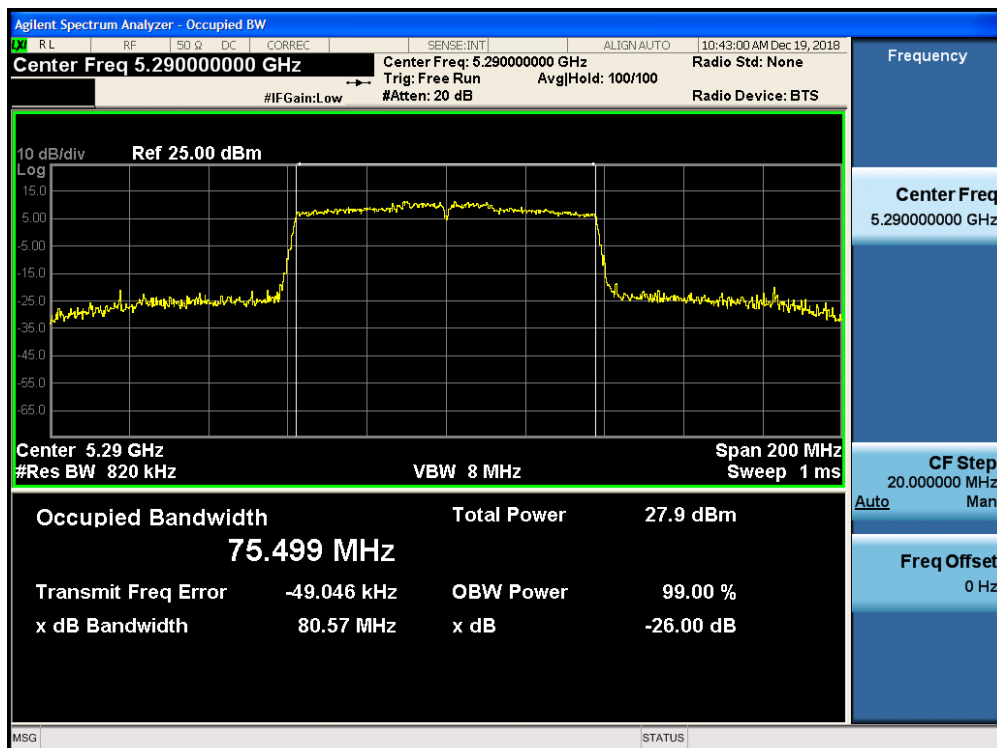


Plot 7-30. 26dB Bandwidth Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 32 of 205

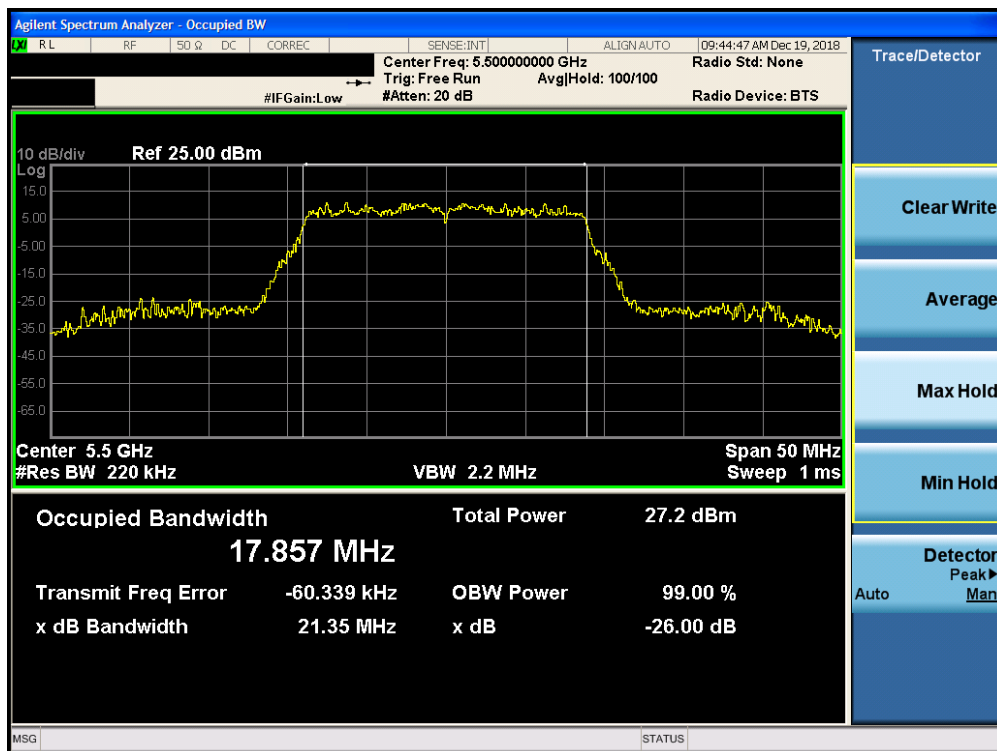


Plot 7-31. 26dB Bandwidth Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)

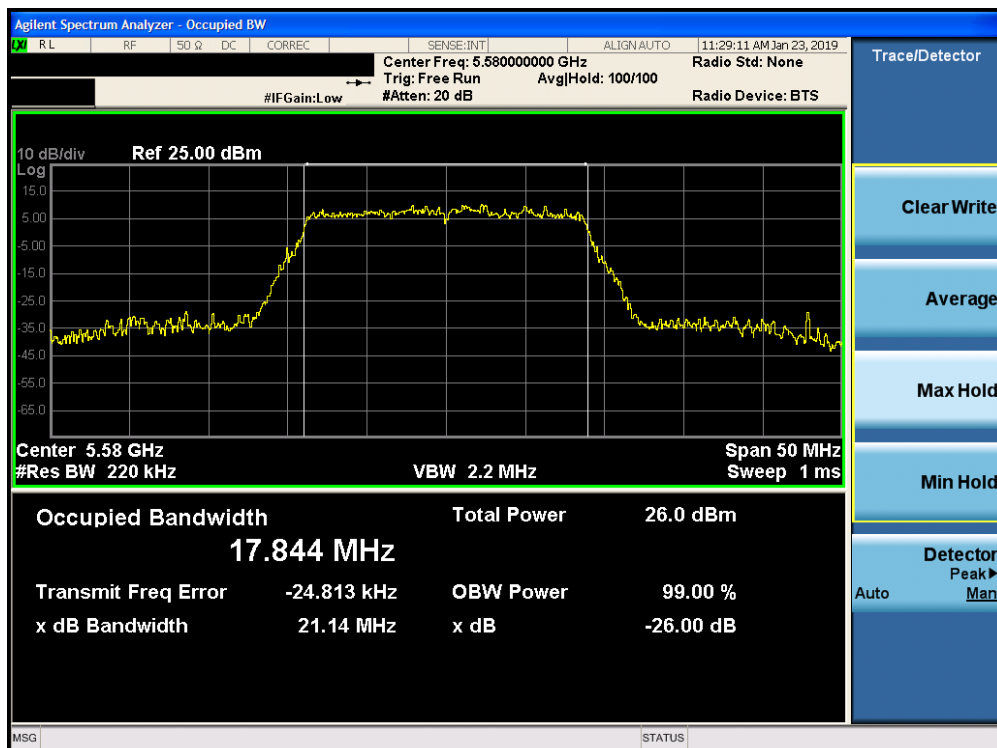


Plot 7-32. 26dB Bandwidth Plot SISO CORE1 (80MHz BW 802.11ac (UNII Band 2A) – Ch. 58)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 33 of 205

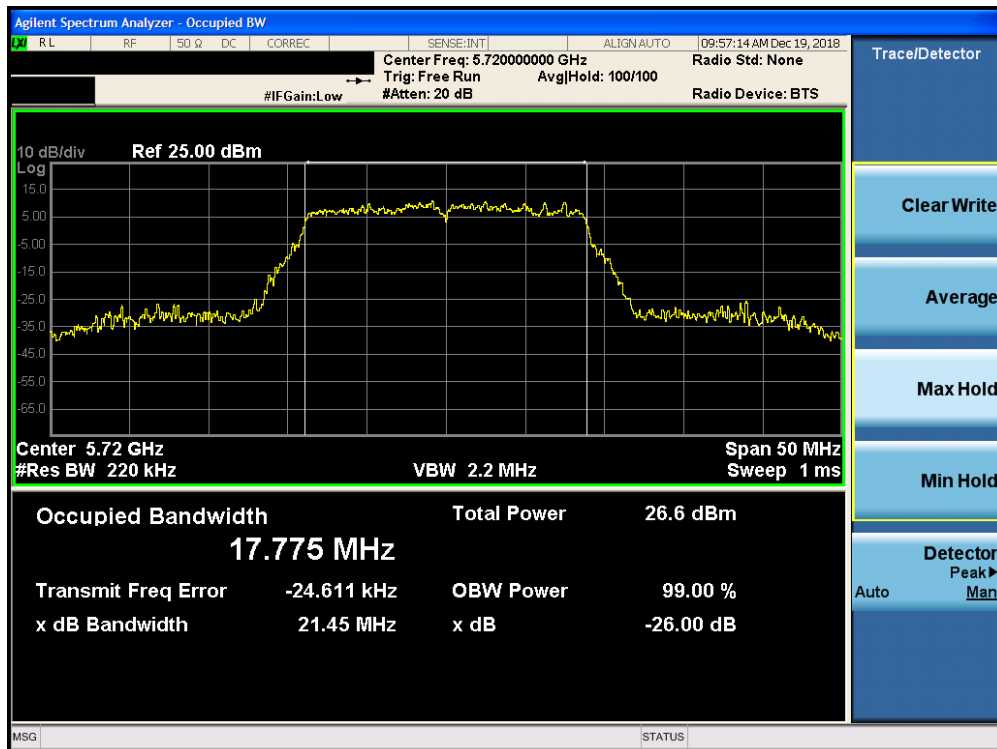


Plot 7-33. 26dB Bandwidth Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 2C) – Ch. 100)

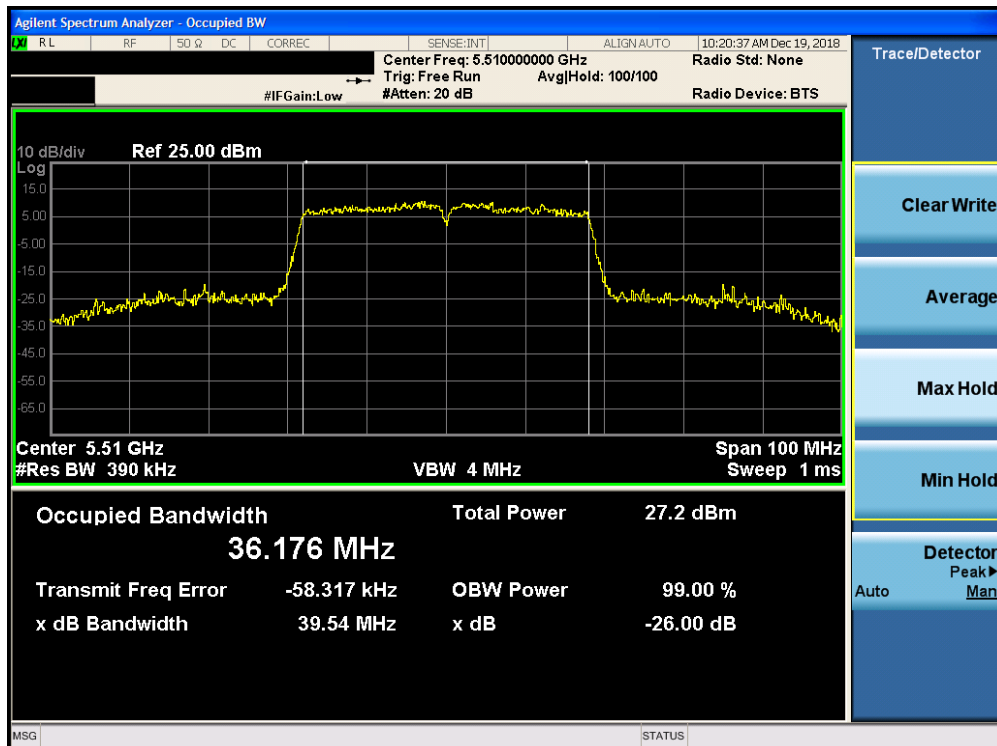


Plot 7-34. 26dB Bandwidth Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 2C) – Ch. 116)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 34 of 205

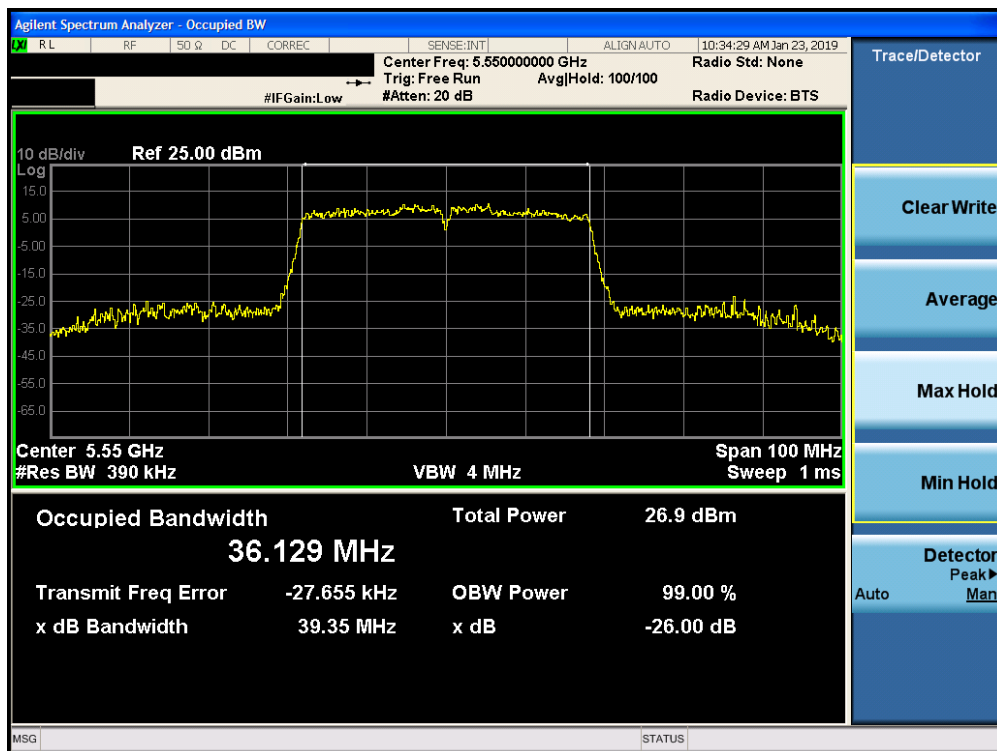


Plot 7-35. 26dB Bandwidth Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 2C) – Ch. 144)

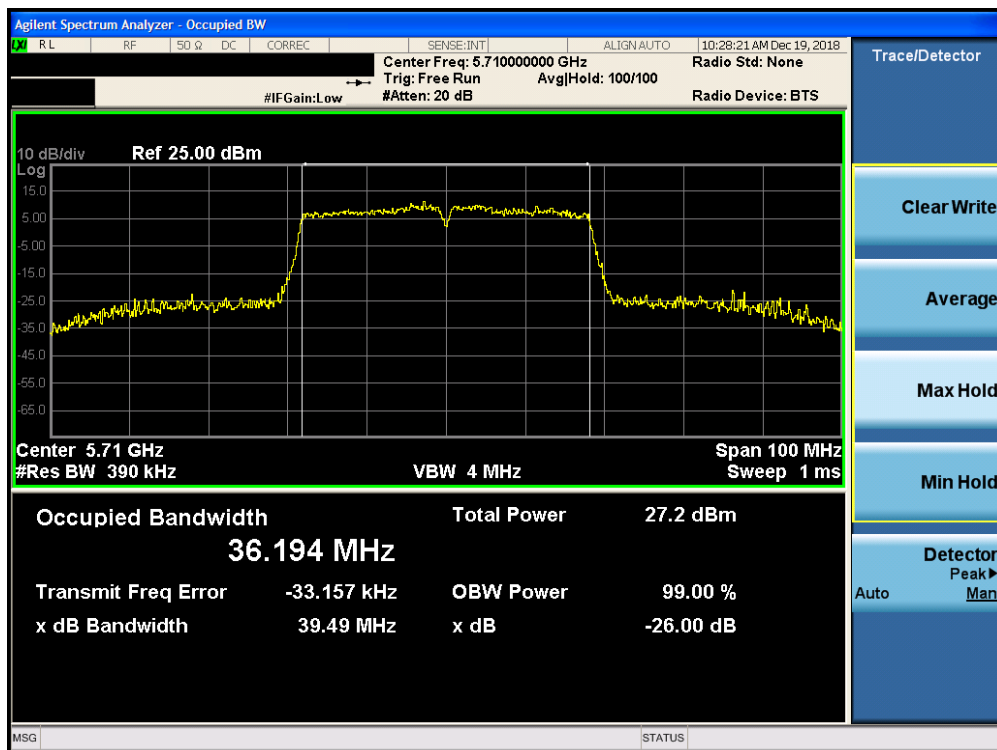


Plot 7-36. 26dB Bandwidth Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 35 of 205

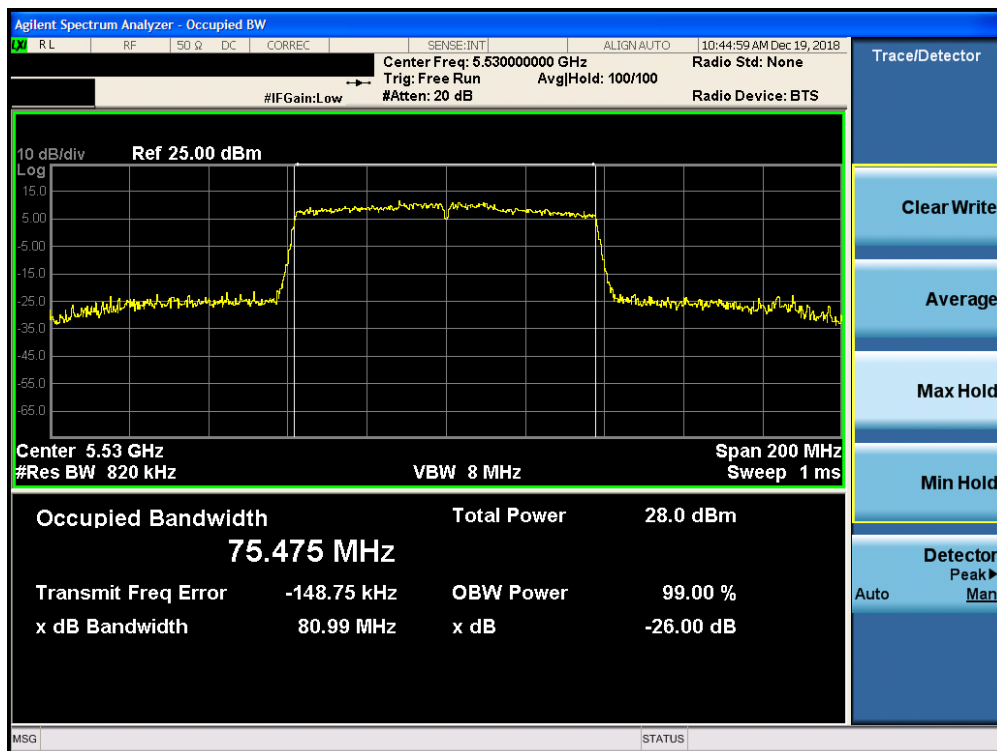


Plot 7-37. 26dB Bandwidth Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 2C) – Ch. 110)

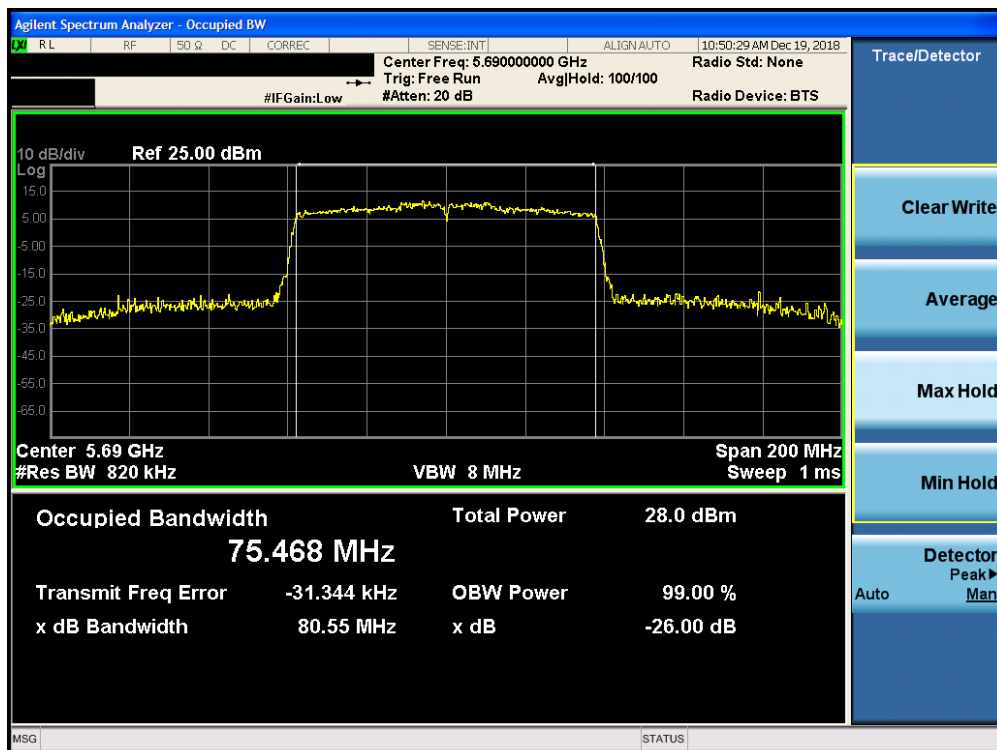


Plot 7-38. 26dB Bandwidth Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 2C) – Ch. 142)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 36 of 205



Plot 7-39. 26dB Bandwidth Plot SISO CORE1 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 106)



Plot 7-40. 26dB Bandwidth Plot SISO CORE1 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 138)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 37 of 205

7.3 6dB Bandwidth Measurement – 802.11a/n/ac §15.407 (e); RSS-Gen [6.2]

Test Overview and Limit

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 6dB bandwidth.

In the 5.725 – 5.850GHz band, the 6dB bandwidth must be ≥ 500 kHz.

Test Procedure Used

ANSI C63.10-2013 – Section 6.9.2
KDB 789033 D02 v02r01 – Section C

Test Settings

1. The signal analyzers' automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to $X = 6$. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 100 kHz
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple

Test Setup

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



Figure 7-2. Test Instrument & Measurement Setup

Test Notes

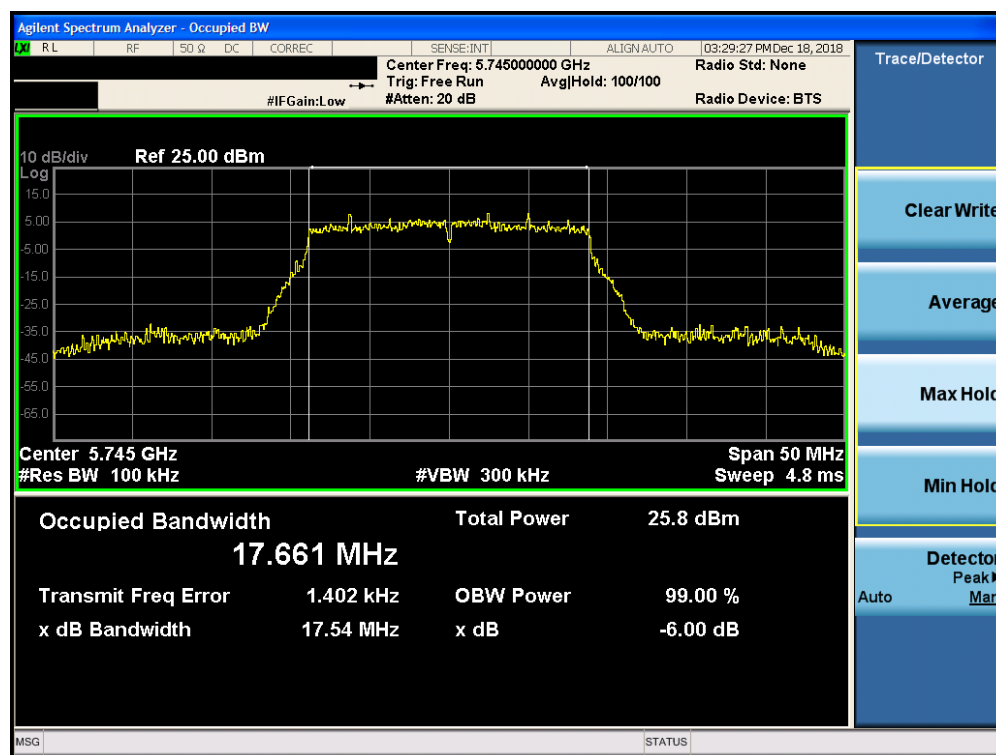
All antenna configs were investigated and only the worst case is reported.

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 38 of 205

SISO CORE 0 - 6 dB Bandwidth Measurements

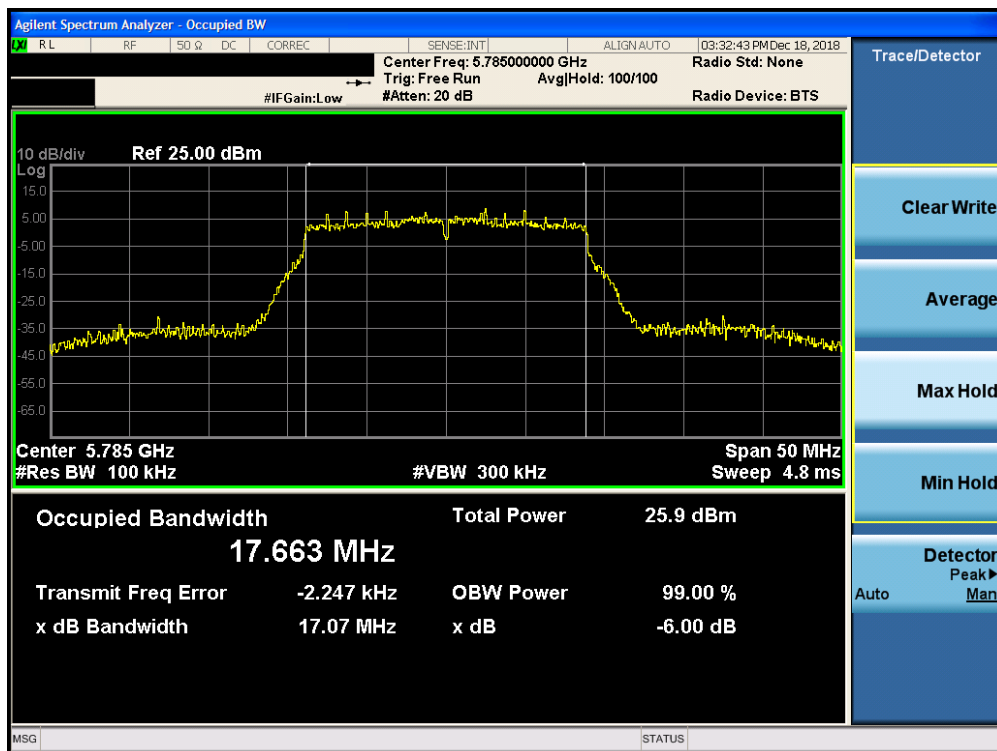
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
Band 3	5745	149	n (20MHz)	6.5/7.2 (MCS0)	17.54
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	17.07
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	16.92
	5755	151	n (40MHz)	13.5/15 (MCS0)	35.48
	5795	159	n (40MHz)	13.5/15 (MCS0)	35.52
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	75.49

Table 7-4. Conducted Bandwidth Measurements SISO CORE0

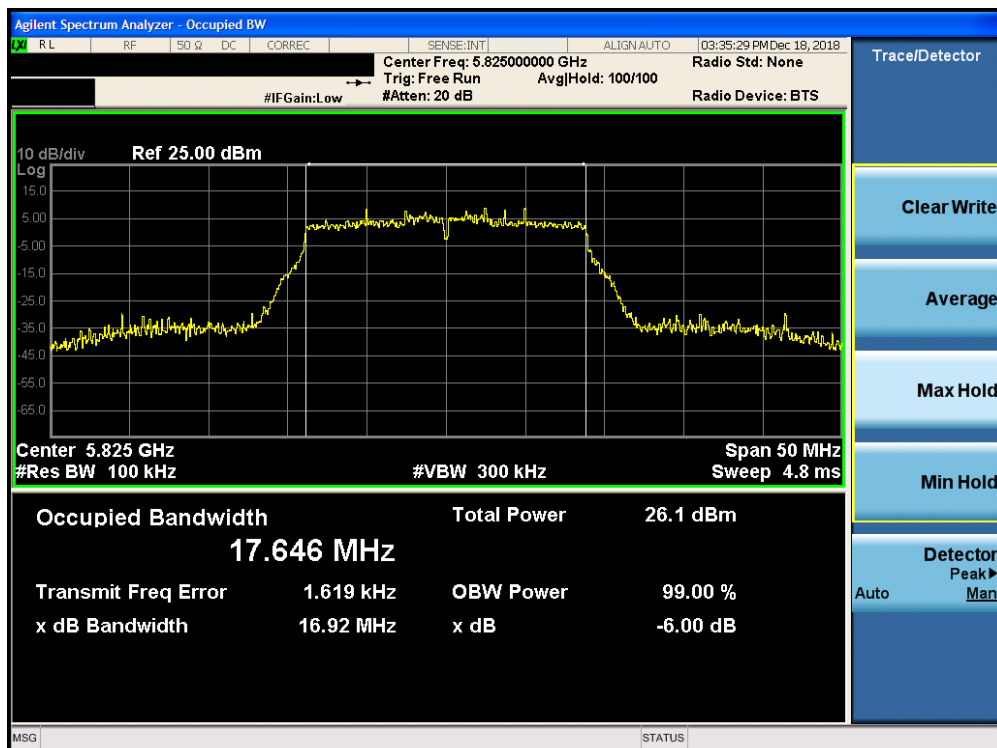


Plot 7-41. 6dB Bandwidth Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 3) – Ch. 149)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 39 of 205

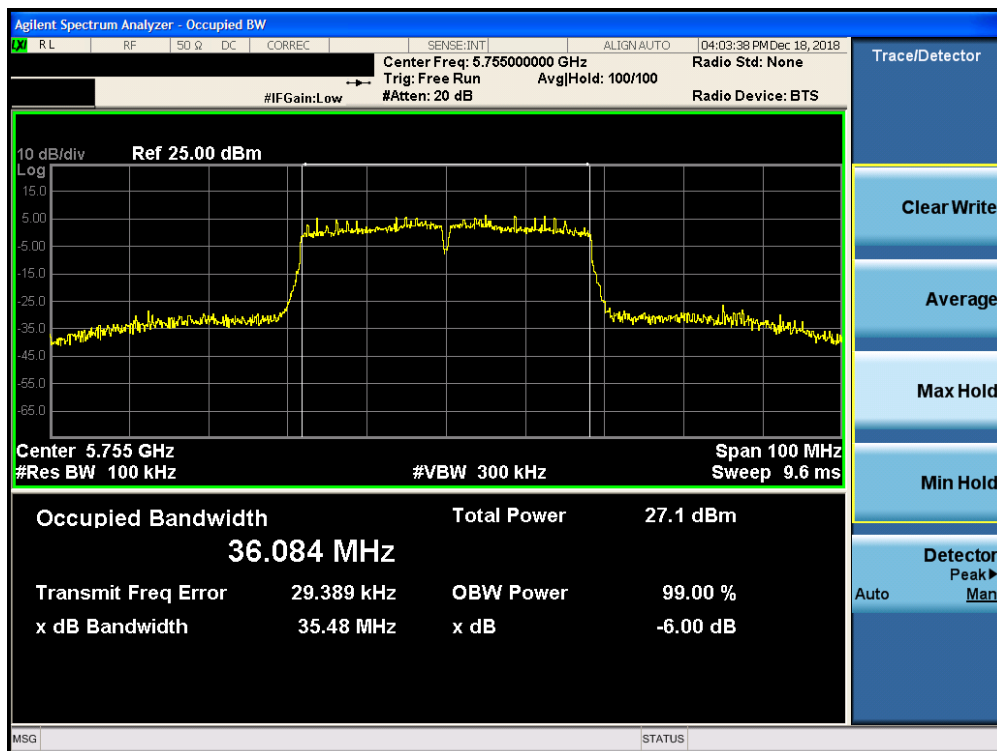


Plot 7-42. 6dB Bandwidth Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 3) – Ch. 157)



Plot 7-43. 6dB Bandwidth Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 3) – Ch. 165)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 40 of 205

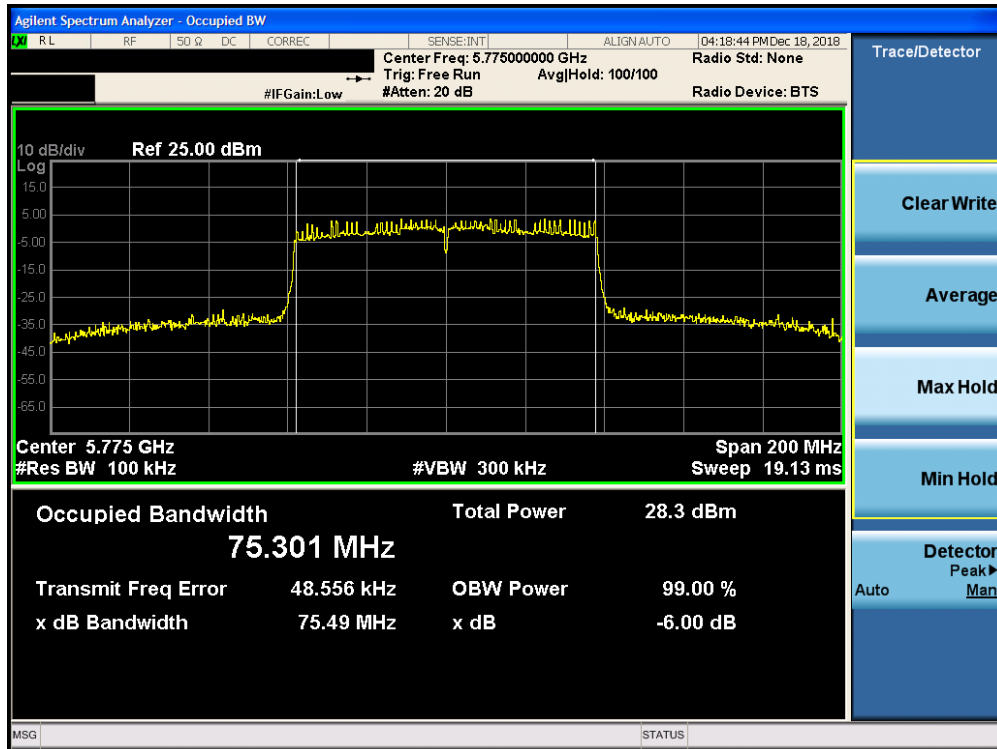


Plot 7-44. 6dB Bandwidth Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 3) – Ch. 151)



Plot 7-45. 6dB Bandwidth Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 3) – Ch. 159)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 41 of 205



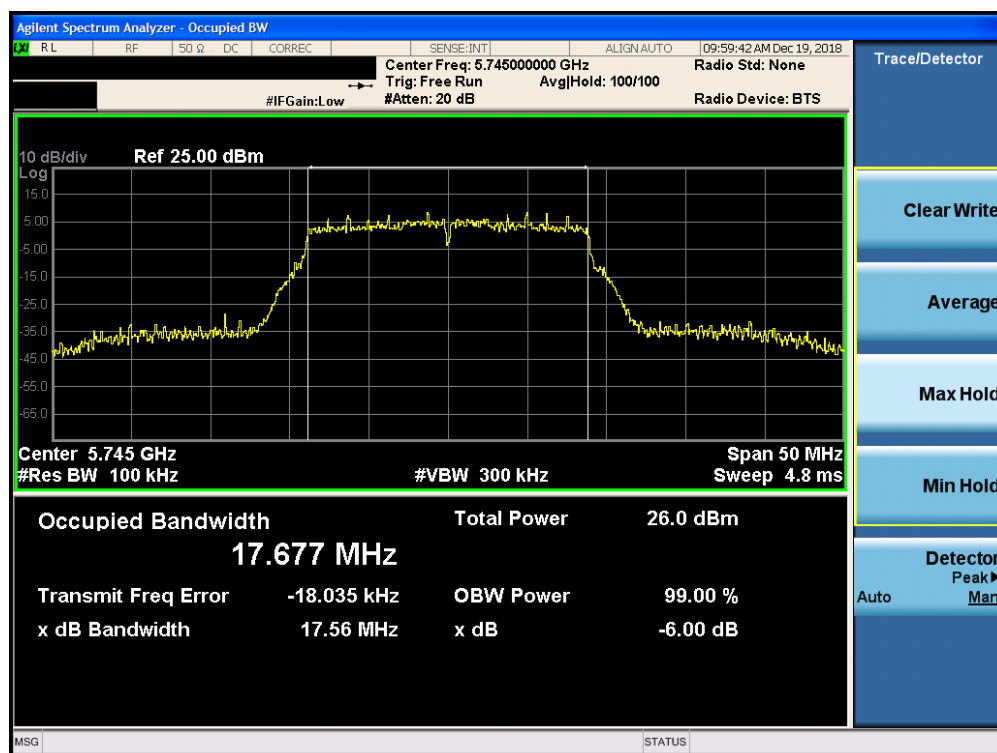
Plot 7-46. 6dB Bandwidth Plot SISO CORE0 (80MHz BW 802.11ac (UNII Band 3) – Ch. 155)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 42 of 205

SISO CORE 1 - 6dB Bandwidth Measurements

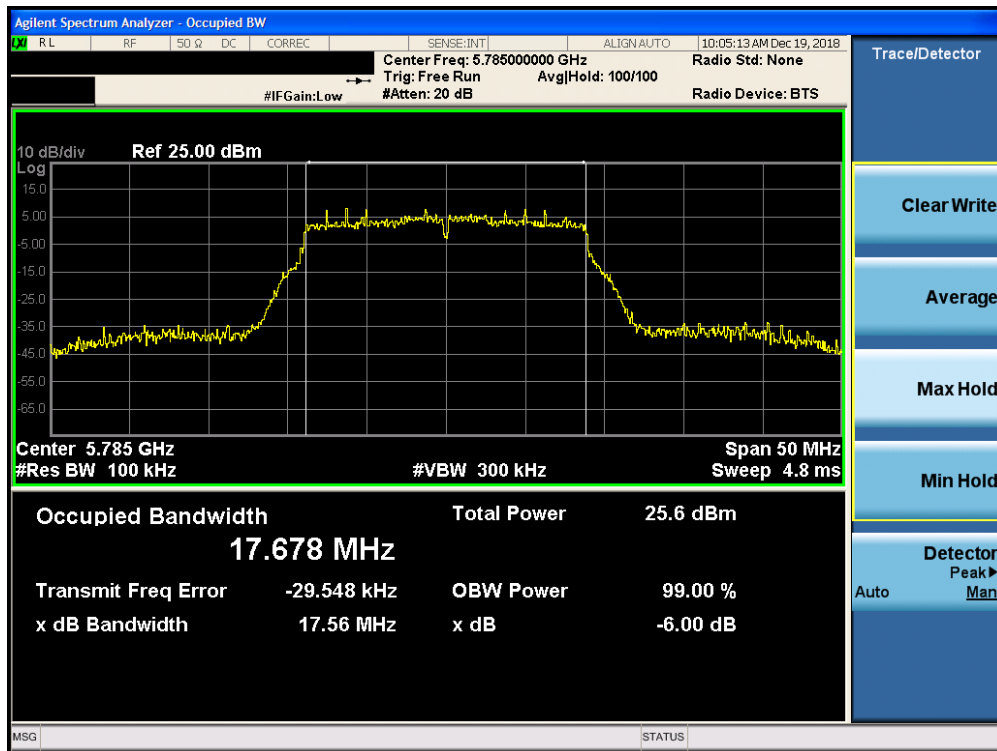
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
Band 3	5745	149	n (20MHz)	6.5/7.2 (MCS0)	17.56
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	17.56
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	17.51
	5755	151	n (40MHz)	13.5/15 (MCS0)	35.30
	5795	159	n (40MHz)	13.5/15 (MCS0)	35.49
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	75.53

Table 7-5. Conducted Bandwidth Measurements SISO CORE1

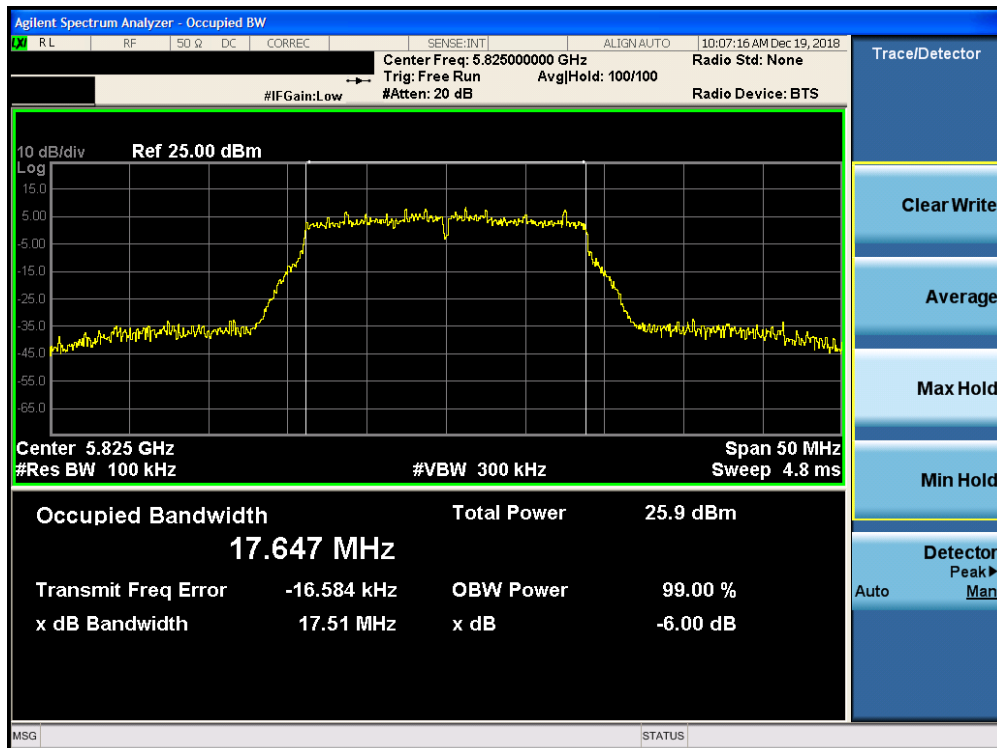


Plot 7-47. 6dB Bandwidth Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 3) – Ch. 149)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 43 of 205

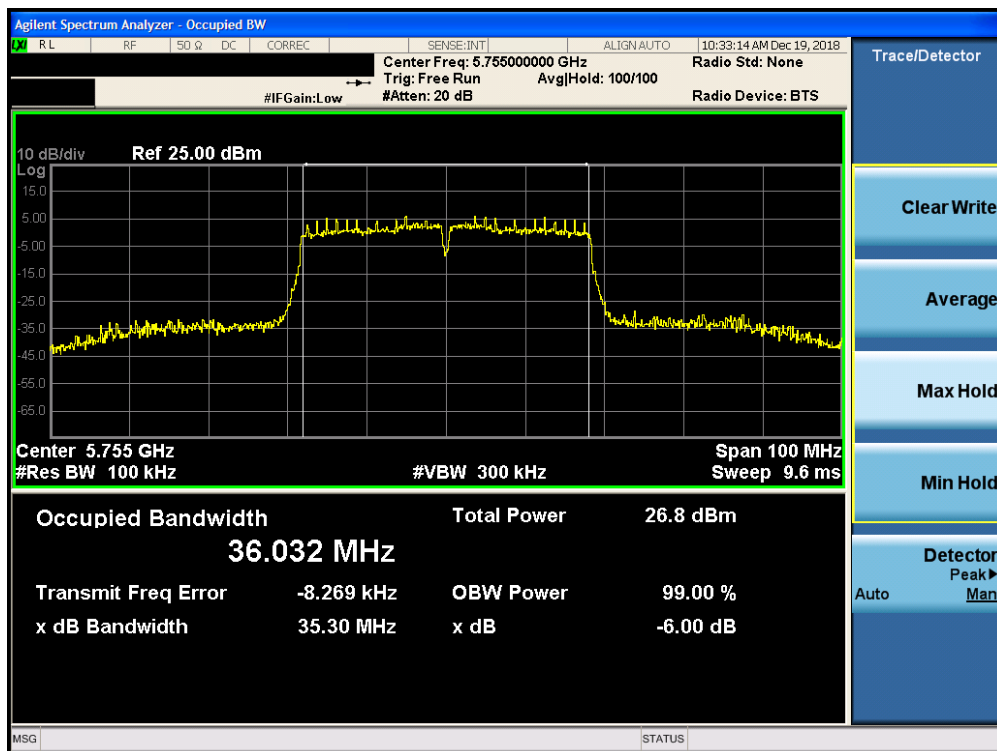


Plot 7-48. 6dB Bandwidth Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 3) – Ch. 157)

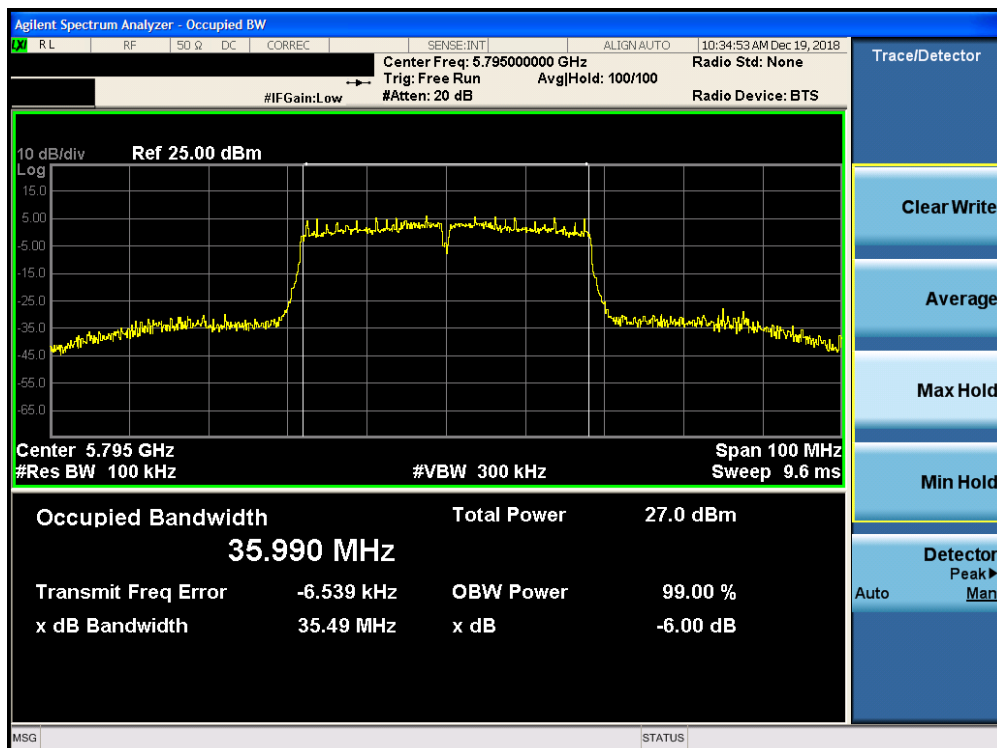


Plot 7-49. 6dB Bandwidth Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 3) – Ch. 165)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 44 of 205

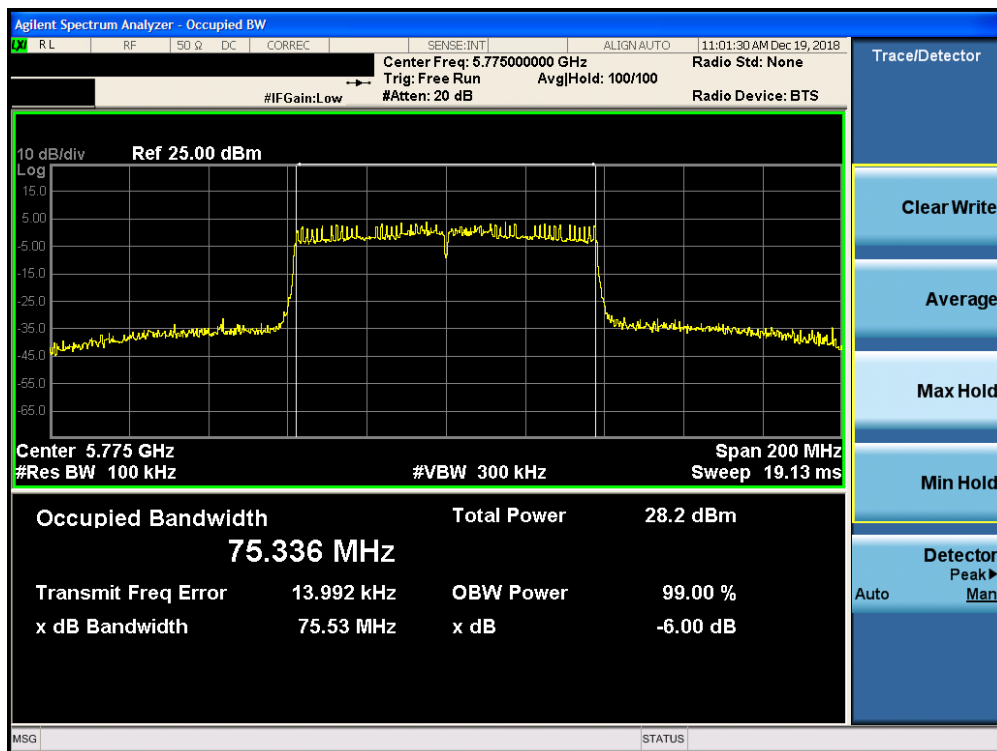


Plot 7-50. 6dB Bandwidth Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 3) – Ch. 151)



Plot 7-51. 6dB Bandwidth Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 3) – Ch. 159)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 45 of 205



Plot 7-52. 6dB Bandwidth Plot SISO CORE1 (80MHz BW 802.11ac (UNII Band 3) – Ch. 155)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 46 of 205

7.4 UNII Output Power Measurement – 802.11a/n/ac

§15.407(a.1.iv) §15.407(a.2) §15.407(a.3); RSS-247 [6.2]

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 ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies.

In the 5.15 – 5.25GHz band, the maximum permissible conducted output power is 250mW (23.98dBm). The maximum e.i.r.p. shall not exceed the lesser of 200 mW or $10 + 10 \log_{10}B$, dBm.

In the 5.25 – 5.35GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and $11 \text{ dBm} + 10 \log_{10}(26 \text{ dB BW}) = 11 \text{ dBm} + 10 \log_{10}(21.34) = 24.29 \text{ dBm}$. The maximum e.i.r.p. shall not exceed the lesser of 1.0 W or $17 + 10 \log_{10}B$, dBm.

In the 5.47 – 5.725GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and $11 \text{ dBm} + 10 \log_{10}(26 \text{ dB BW}) = 11 \text{ dBm} + 10 \log_{10}(21.56) = 24.34 \text{ dBm}$. The maximum e.i.r.p. shall not exceed the lesser of 1.0 W or $17 + 10 \log_{10}B$, dBm.

In the 5.725 – 5.850GHz band, the maximum permissible conducted output power is 1W (30dBm). The maximum e.i.r.p. is 36 dBm.

Test Procedure Used

ANSI C63.10-2013 – Section 12.3.3.2 Method PM-G
KDB 789033 D02 v02r01 – Section E)3)b) Method PM-G
ANSI C63.10-2013 – Section 14.2 Measure-and-Sum Technique
KDB 662911 v02r01 – Section E)1) Measure-and-Sum Technique

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

Per RSS-247 Section 6.2.3, transmission on channels which overlap the 5600-5650 MHz is prohibited. This device operates under these frequencies only under the control of a certified master device and does not support active scanning on these channels. This device does not transmit any beacons or initiate any transmissions in UNII Bands 2A or 2C.

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 47 of 205

FCC SISO CORE 0 Conducted Output Power Measurements

Freq [MHz]	Channel	Detector	IEEE Transmission Mode		Conducted Power Limit [dBm]	Conducted Power Margin [dB]
			802.11a	802.11n		
5180	36	AVG	15.73	15.75	23.98	-8.23
5200	40	AVG	15.72	15.75	23.98	-8.23
5220	44	AVG	15.75	15.73	23.98	-8.23
5240	48	AVG	15.73	15.75	23.98	-8.23
5260	52	AVG	16.50	16.50	23.98	-7.48
5280	56	AVG	16.50	16.50	23.98	-7.48
5300	60	AVG	16.40	16.50	23.98	-7.48
5320	64	AVG	15.99	16.00	23.98	-7.98
5500	100	AVG	15.25	15.25	23.98	-8.73
5520	104	AVG	15.25	15.25	23.98	-8.73
5580	116	AVG	15.17	15.25	23.98	-8.73
5680	136	AVG	15.25	15.24	23.98	-8.73
5700	140	AVG	14.90	15.00	23.98	-8.98
5720	144	AVG	15.25	15.25	23.98	-8.73
5745	149	AVG	14.60	14.70	30.00	-15.30
5785	157	AVG	14.75	14.70	30.00	-15.25
5825	165	AVG	14.70	14.75	30.00	-15.25

Table 7-6. FCC SISO CORE 0 20MHz BW (UNII) Maximum Conducted Output Power

Freq [MHz]	Channel	Detector	IEEE Transmission Mode	Conducted Power Limit [dBm]	Conducted Power Margin [dB]
			802.11n		
5190	38	AVG	14.50	23.98	-9.48
5230	46	AVG	15.73	23.98	-8.25
5270	54	AVG	16.44	23.98	-7.54
5310	62	AVG	14.42	23.98	-9.56
5510	102	AVG	14.49	23.98	-9.49
5550	110	AVG	15.23	23.98	-8.75
5630	126	AVG	15.15	23.98	-8.83
5670	134	AVG	15.25	23.98	-8.73
5710	142	AVG	15.25	23.98	-8.73
5755	151	AVG	14.75	30.00	-15.25
5795	159	AVG	14.75	30.00	-15.25

Table 7-7. FCC SISO CORE 0 40MHz BW (UNII) Maximum Conducted Output Power

Freq [MHz]	Channel	Detector	IEEE Transmission Mode	Conducted Power Limit [dBm]	Conducted Power Margin [dB]
			802.11ac		
5210	42	AVG	13.96	23.98	-10.02
5290	58	AVG	12.98	23.98	-11.00
5530	106	AVG	13.50	23.98	-10.48
5610	122	AVG	15.24	23.98	-8.74
5690	138	AVG	15.25	23.98	-8.73
5775	155	AVG	14.73	30.00	-15.27

Table 7-8. FCC SISO CORE 0 80MHz BW (UNII) Maximum Conducted Output Power

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 48 of 205

ISED SISO CORE 0 Conducted Output Power Measurements

Freq [MHz]	Channel	Detector	IEEE Transmission Mode		Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
			802.11a	802.11n						
5180	36	AVG	15.46	15.50	23.98	-8.48	1.66	17.16	23.01	-5.85
5200	40	AVG	15.48	15.50	23.98	-8.48	1.66	17.16	23.01	-5.85
5220	44	AVG	15.50	15.47	23.98	-8.48	1.66	17.16	23.01	-5.85
5240	48	AVG	15.50	15.50	23.98	-8.48	1.66	17.16	23.01	-5.85
5260	52	AVG	16.50	16.50	23.98	-7.48	2.28	18.78	30.00	-11.22
5280	56	AVG	16.50	16.50	23.98	-7.48	2.28	18.78	30.00	-11.22
5300	60	AVG	16.40	16.50	23.98	-7.48	2.28	18.78	30.00	-11.22
5320	64	AVG	15.99	16.00	23.98	-7.98	2.28	18.28	30.00	-11.72
5500	100	AVG	15.25	15.25	23.98	-8.73	3.77	19.02	30.00	-10.98
5520	104	AVG	15.25	15.25	23.98	-8.73	3.77	19.02	30.00	-10.98
5580	116	AVG	15.17	15.25	23.98	-8.73	3.77	19.02	30.00	-10.98
5680	136	AVG	15.25	15.24	23.98	-8.73	3.77	19.02	30.00	-10.98
5700	140	AVG	14.90	15.00	23.98	-8.98	3.77	18.77	30.00	-11.23
5720	144	AVG	15.25	15.25	23.98	-8.73	3.77	19.02	30.00	-10.98
5745	149	AVG	14.60	14.70	30.00	-15.30	3.40	18.10	30.00	-11.90
5785	157	AVG	14.75	14.70	30.00	-15.25	3.40	18.15	30.00	-11.85
5825	165	AVG	14.70	14.75	30.00	-15.25	3.40	18.15	30.00	-11.85

Table 7-9. ISED SISO CORE 0 20MHz BW (UNII) Maximum Conducted Output Power

Freq [MHz]	Channel	Detector	IEEE Transmission Mode	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
			802.11n						
5190	38	AVG	14.50	23.98	-9.48	1.66	16.16	23.01	-6.85
5230	46	AVG	15.73	23.98	-8.25	1.66	17.39	23.01	-5.62
5270	54	AVG	16.44	23.98	-7.54	2.28	18.72	30.00	-11.28
5310	62	AVG	14.42	23.98	-9.56	2.28	16.70	30.00	-13.30
5510	102	AVG	14.49	23.98	-9.49	3.77	18.26	30.00	-11.74
5550	110	AVG	15.23	23.98	-8.75	3.77	19.00	30.00	-11.00
5630	126	AVG	15.15	23.98	-8.83	3.77	18.92	30.00	-11.08
5670	134	AVG	15.25	23.98	-8.73	3.77	19.02	30.00	-10.98
5710	142	AVG	15.25	23.98	-8.73	3.77	19.02	30.00	-10.98
5755	151	AVG	14.75	30.00	-15.25	3.40	18.15	30.00	-11.85
5795	159	AVG	14.75	30.00	-15.25	3.40	18.15	30.00	-11.85

Table 7-10. ISED SISO CORE 0 40MHz BW (UNII) Maximum Conducted Output Power

Freq [MHz]	Channel	Detector	IEEE Transmission Mode	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
			802.11ac						
5210	42	AVG	13.96	23.98	-10.02	1.66	15.62	23.01	-7.39
5290	58	AVG	12.98	23.98	-11.00	2.28	15.26	30.00	-14.74
5530	106	AVG	13.50	23.98	-10.48	3.77	17.27	30.00	-12.73
5610	122	AVG	15.24	23.98	-8.74	3.77	19.01	30.00	-10.99
5690	138	AVG	15.25	23.98	-8.73	3.77	19.02	30.00	-10.98
5775	155	AVG	14.73	30.00	-15.27	3.40	18.13	30.00	-11.87

Table 7-11. ISED SISO CORE 0 80MHz BW (UNII) Maximum Conducted Output Power

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 49 of 205

FCC SISO CORE 1 Conducted Output Power Measurements

Freq [MHz]	Channel	Detector	IEEE Transmission Mode		Conducted Power Limit [dBm]	Conducted Power Margin [dB]
			802.11a	802.11n		
5180	36	AVG	16.00	16.00	23.98	-7.98
5200	40	AVG	17.23	17.23	23.98	-6.75
5220	44	AVG	17.21	17.25	23.98	-6.73
5240	48	AVG	17.19	17.24	23.98	-6.74
5260	52	AVG	15.96	16.00	23.98	-7.98
5280	56	AVG	15.93	15.97	23.98	-8.01
5300	60	AVG	16.00	16.00	23.98	-7.98
5320	64	AVG	15.95	15.97	23.98	-8.01
5500	100	AVG	15.50	15.50	23.98	-8.48
5520	104	AVG	15.50	15.47	23.98	-8.48
5580	116	AVG	15.48	15.50	23.98	-8.48
5680	136	AVG	15.47	15.45	23.98	-8.51
5700	140	AVG	15.00	15.00	23.98	-8.98
5720	144	AVG	15.49	15.50	23.98	-8.48
5745	149	AVG	15.72	15.73	30.00	-14.27
5785	157	AVG	15.73	15.72	30.00	-14.27
5825	165	AVG	15.74	15.75	30.00	-14.25

Table 7-12. FCC SISO CORE 1 20MHz BW (UNII) Maximum Conducted Output Power

Freq [MHz]	Channel	Detector	IEEE Transmission Mode	Conducted Power Limit [dBm]	Conducted Power Margin [dB]
			802.11n		
5190	38	AVG	14.50	23.98	-9.48
5230	46	AVG	17.23	23.98	-6.75
5270	54	AVG	15.96	23.98	-8.02
5310	62	AVG	14.50	23.98	-9.48
5510	102	AVG	14.50	23.98	-9.48
5550	110	AVG	15.50	23.98	-8.48
5630	126	AVG	15.48	23.98	-8.50
5670	134	AVG	15.42	23.98	-8.56
5710	142	AVG	15.50	23.98	-8.48
5755	151	AVG	15.68	30.00	-14.32
5795	159	AVG	15.71	30.00	-14.29

Table 7-13. FCC SISO CORE 1 40MHz BW (UNII) Maximum Conducted Output Power

Freq [MHz]	Channel	Detector	IEEE Transmission Mode	Conducted Power Limit [dBm]	Conducted Power Margin [dB]
			802.11ac		
5210	42	AVG	13.96	23.98	-10.02
5290	58	AVG	13.00	23.98	-10.98
5530	106	AVG	13.50	23.98	-10.48
5610	122	AVG	15.41	23.98	-8.57
5690	138	AVG	15.43	23.98	-8.55
5775	155	AVG	15.64	30.00	-14.36

Table 7-14. FCC SISO CORE 1 80MHz BW (UNII) Maximum Conducted Output Power

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 50 of 205

ISED SISO CORE 1 Conducted Output Power Measurements

Freq [MHz]	Channel	Detector	IEEE Transmission Mode		Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
			802.11a	802.11n						
5180	36	AVG	15.50	15.40	23.98	-8.48	2.65	18.15	23.01	-4.86
5200	40	AVG	15.41	15.50	23.98	-8.48	2.65	18.15	23.01	-4.86
5220	44	AVG	15.50	15.47	23.98	-8.48	2.65	18.15	23.01	-4.86
5240	48	AVG	15.46	15.50	23.98	-8.48	2.65	18.15	23.01	-4.86
5260	52	AVG	15.96	16.00	23.98	-7.98	2.81	18.81	30.00	-11.19
5280	56	AVG	15.93	15.97	23.98	-8.01	2.81	18.78	30.00	-11.22
5300	60	AVG	16.00	16.00	23.98	-7.98	2.81	18.81	30.00	-11.19
5320	64	AVG	15.95	15.97	23.98	-8.01	2.81	18.78	30.00	-11.22
5500	100	AVG	15.50	15.50	23.98	-8.48	3.10	18.60	30.00	-11.40
5520	104	AVG	15.50	15.47	23.98	-8.48	3.10	18.60	30.00	-11.40
5580	116	AVG	15.48	15.50	23.98	-8.48	3.10	18.60	30.00	-11.40
5680	136	AVG	15.47	15.45	23.98	-8.51	3.10	18.57	30.00	-11.43
5700	140	AVG	15.00	15.00	23.98	-8.98	3.10	18.10	30.00	-11.90
5720	144	AVG	15.49	15.50	23.98	-8.48	3.10	18.60	30.00	-11.40
5745	149	AVG	15.72	15.73	30.00	-14.27	3.18	18.91	30.00	-11.09
5785	157	AVG	15.73	15.72	30.00	-14.27	3.18	18.91	30.00	-11.09
5825	165	AVG	15.74	15.75	30.00	-14.25	3.18	18.93	30.00	-11.07

Table 7-15. ISED SISO CORE 1 20MHz BW (UNII) Maximum Conducted Output Power

Freq [MHz]	Channel	Detector	IEEE Transmission Mode	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
			802.11n						
5190	38	AVG	14.50	23.98	-9.48	2.65	17.15	23.01	-5.86
5230	46	AVG	17.23	23.98	-6.75	2.65	19.88	23.01	-3.13
5270	54	AVG	15.96	23.98	-8.02	2.81	18.77	30.00	-11.23
5310	62	AVG	14.50	23.98	-9.48	2.81	17.31	30.00	-12.69
5510	102	AVG	14.50	23.98	-9.48	3.10	17.60	30.00	-12.40
5550	110	AVG	15.50	23.98	-8.48	3.10	18.60	30.00	-11.40
5630	126	AVG	15.48	23.98	-8.50	3.10	18.58	30.00	-11.42
5670	134	AVG	15.42	23.98	-8.56	3.10	18.52	30.00	-11.48
5710	142	AVG	15.50	23.98	-8.48	3.10	18.60	30.00	-11.40
5755	151	AVG	15.68	30.00	-14.32	3.18	18.86	30.00	-11.14
5795	159	AVG	15.71	30.00	-14.29	3.18	18.89	30.00	-11.11

Table 7-16. ISED SISO CORE 1 40MHz BW (UNII) Maximum Conducted Output Power

Freq [MHz]	Channel	Detector	IEEE Transmission Mode	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
			802.11ac						
5210	42	AVG	13.96	23.98	-10.02	2.65	16.61	23.01	-6.40
5290	58	AVG	13.00	23.98	-10.98	2.81	15.81	30.00	-14.19
5530	106	AVG	13.50	23.98	-10.48	3.10	16.60	30.00	-13.40
5610	122	AVG	15.41	23.98	-8.57	3.10	18.51	30.00	-11.49
5690	138	AVG	15.43	23.98	-8.55	3.10	18.53	30.00	-11.47
5775	155	AVG	15.64	30.00	-14.36	3.18	18.82	30.00	-11.18

Table 7-17. ISED SISO CORE 1 80MHz BW (UNII) Maximum Conducted Output Power

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 51 of 205

FCC MIMO/CDD Maximum Conducted Output Power Measurements

Freq [MHz]	Channel	Detector	Mode	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]
				Core 0	Core 1	MIMO/CDD		
5180	36	AVG	CDD	14.45	14.50	17.49	23.98	-6.49
5200	40	AVG	SDM	15.73	16.97	19.40	23.98	-4.58
5220	44	AVG	SDM	15.75	17.00	19.43	23.98	-4.55
5240	48	AVG	SDM	15.68	16.94	19.37	23.98	-4.61
5260	52	AVG	CDD	16.50	15.92	19.23	23.98	-4.75
5280	56	AVG	CDD	16.47	16.00	19.25	23.98	-4.73
5300	60	AVG	CDD	16.50	16.00	19.27	23.98	-4.71
5320	64	AVG	CDD	14.50	14.50	17.51	23.98	-6.47
5500	100	AVG	CDD	15.00	15.00	18.01	23.98	-5.97
5520	104	AVG	SDM	15.25	15.50	18.39	23.98	-5.59
5580	116	AVG	SDM	15.25	15.49	18.38	23.98	-5.60
5680	136	AVG	SDM	15.25	15.50	18.39	23.98	-5.59
5700	140	AVG	CDD	13.50	13.50	16.51	23.98	-7.47
5720	144	AVG	SDM	15.25	15.50	18.39	23.98	-5.59
5745	149	AVG	CDD	14.70	15.72	18.25	30.00	-11.75
5785	157	AVG	CDD	14.75	15.75	18.29	30.00	-11.71
5825	165	AVG	CDD	14.75	15.61	18.21	30.00	-11.79

Table 7-18. FCC MIMO/CDD 20MHz BW 802.11n (UNII) Maximum Conducted Output Power

Freq [MHz]	Channel	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]
			Core 0	Core 1	CDD		
5190	38	AVG	13.40	13.40	16.41	23.98	-7.57
5230	46	AVG	15.73	17.24	19.56	23.98	-4.42
5270	54	AVG	16.50	15.94	19.24	23.98	-4.74
5310	62	AVG	12.50	12.40	15.46	23.98	-8.52
5510	102	AVG	12.96	12.91	15.95	23.98	-8.03
5550	110	AVG	15.25	15.40	18.34	23.98	-5.64
5630	126	AVG	15.22	15.49	18.37	23.98	-5.61
5670	134	AVG	14.48	14.50	17.50	23.98	-6.48
5710	142	AVG	15.25	15.50	18.39	23.98	-5.59
5755	151	AVG	14.75	15.74	18.28	30.00	-11.72
5795	159	AVG	14.75	15.75	18.29	30.00	-11.71

Table 7-19. FCC CDD 40MHz BW 802.11n (UNII) Maximum Conducted Output Power

Freq [MHz]	Channel	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]
			Core 0	Core 1	CDD		
5210	42	AVG	11.90	12.00	14.96	23.98	-9.02
5290	58	AVG	11.25	11.25	14.26	23.98	-9.72
5530	106	AVG	11.92	12.00	14.97	23.98	-9.01
5610	122	AVG	15.25	15.47	18.37	23.98	-5.61
5690	138	AVG	15.24	15.49	18.38	23.98	-5.60
5775	155	AVG	14.75	15.71	18.27	30.00	-11.73

Table 7-20. FCC CDD 80MHz BW 802.11ac (UNII) Maximum Conducted Output Power

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device		Page 52 of 205

ISED MIMO/CDD Maximum Conducted Output Power Measurements

Freq [MHz]	Channel	Detector	Mode	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
				Core 0	Core 1	MIMO/CDD						
5180	36	AVG	SDM	12.00	12.00	15.01	23.98	-8.97	2.18	17.19	23.01	-5.82
5200	40	AVG	SDM	12.00	11.98	15.00	23.98	-8.98	2.18	17.18	23.01	-5.83
5220	44	AVG	SDM	12.00	11.95	14.99	23.98	-8.99	2.18	17.17	23.01	-5.84
5240	48	AVG	SDM	12.00	11.83	14.93	23.98	-9.05	2.18	17.11	23.01	-5.90
5260	52	AVG	CDD	16.50	15.92	19.23	23.98	-4.75	5.56	24.79	30.00	-5.21
5280	56	AVG	CDD	16.47	16.00	19.25	23.98	-4.73	5.56	24.81	30.00	-5.19
5300	60	AVG	CDD	16.50	16.00	19.27	23.98	-4.71	5.56	24.83	30.00	-5.17
5320	64	AVG	CDD	14.50	14.50	17.51	23.98	-6.47	5.56	23.07	30.00	-6.93
5500	100	AVG	CDD	15.00	15.00	18.01	23.98	-5.97	6.45	24.46	30.00	-5.54
5520	104	AVG	CDD	15.25	15.50	18.39	23.98	-5.59	6.45	24.84	30.00	-5.16
5580	116	AVG	CDD	15.25	15.49	18.38	23.98	-5.60	6.45	24.83	30.00	-5.17
5680	136	AVG	CDD	15.25	15.50	18.39	23.98	-5.59	6.45	24.84	30.00	-5.16
5700	140	AVG	CDD	13.50	13.50	16.51	23.98	-7.47	6.45	22.96	30.00	-7.04
5720	144	AVG	CDD	15.25	15.50	18.39	23.98	-5.59	6.45	24.84	30.00	-5.16
5745	149	AVG	CDD	14.70	15.72	18.25	30.00	-11.75	6.30	24.55	30.00	-5.45
5785	157	AVG	CDD	14.75	15.75	18.29	30.00	-11.71	6.30	24.59	30.00	-5.41
5825	165	AVG	CDD	14.75	15.61	18.21	30.00	-11.79	6.30	24.51	30.00	-5.49

Table 7-21. ISED MIMO/CDD 20MHz BW 802.11n (UNII) Maximum Conducted Output Power

Freq [MHz]	Channel	Detector	Mode	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
				Core 0	Core 1	MIMO/CDD						
5190	38	AVG	SDM	13.00	12.98	16.00	23.98	-7.98	2.18	18.18	23.01	-4.83
5230	46	AVG	SDM	14.39	14.50	17.46	23.98	-6.52	2.18	19.64	23.01	-3.37
5270	54	AVG	CDD	16.50	15.94	19.24	23.98	-4.74	5.56	24.80	30.00	-5.20
5310	62	AVG	CDD	12.50	12.40	15.46	23.98	-8.52	5.56	21.02	30.00	-8.98
5510	102	AVG	CDD	12.96	12.91	15.95	23.98	-8.03	6.45	22.40	30.00	-7.60
5550	110	AVG	CDD	15.25	15.40	18.34	23.98	-5.64	6.45	24.79	30.00	-5.21
5630	126	AVG	CDD	15.22	15.49	18.37	23.98	-5.61	6.45	24.82	30.00	-5.18
5670	134	AVG	CDD	14.48	14.50	17.50	23.98	-6.48	6.45	23.95	30.00	-6.05
5710	142	AVG	CDD	15.25	15.50	18.39	23.98	-5.59	6.45	24.84	30.00	-5.16
5755	151	AVG	CDD	14.75	15.74	18.28	30.00	-11.72	6.30	24.58	30.00	-5.42
5795	159	AVG	CDD	14.75	15.75	18.29	30.00	-11.71	6.30	24.59	30.00	-5.41

Table 7-22. ISED MIMO/CDD 40MHz BW 802.11n (UNII) Maximum Conducted Output Power

Freq [MHz]	Channel	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
			Core 0	Core 1	CDD						
5210	42	AVG	11.90	12.00	14.96	23.98	-9.02	5.18	20.14	23.01	-2.87
5290	58	AVG	11.25	11.25	14.26	23.98	-9.72	5.56	19.82	30.00	-10.18
5530	106	AVG	11.92	12.00	14.97	23.98	-9.01	6.45	21.42	30.00	-8.58
5610	122	AVG	15.25	15.47	18.37	23.98	-5.61	6.45	24.82	30.00	-5.18
5690	138	AVG	15.24	15.49	18.38	23.98	-5.60	6.45	24.83	30.00	-5.17
5775	155	AVG	14.75	15.71	18.27	30.00	-11.73	6.30	24.57	30.00	-5.43

Table 7-23. ISED CDD 80MHz BW 802.11ac (UNII) Maximum Conducted Output Power

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 53 of 205

Note:

Per ANSI C63.10-2013 and KDB 662911 v02r01 Section E1), the conducted powers at Core 0 and Core 1 were first measured separately during MIMO/CDD transmission as shown in the section above. The measured values were then summed in linear power units then converted back to dBm.

Per ANSI C63.10-2013 Section 14.4.3, the directional gain is calculated using the following formula, where G_N is the gain of the n th antenna and N_{ANT} , the total number of antennas used.

For *correlated* unequal antenna gain

$$\text{Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N_{ANT}] \text{ dBi}$$

For *completely uncorrelated* unequal antenna gain

$$\text{Directional gain} = 10 \log[(10^{G_1/10} + 10^{G_2/10} + \dots + 10^{G_N/10}) / N_{ANT}] \text{ dBi}$$

Sample MIMO/CDD Calculation:

At 5180MHz in 802.11n (20MHz BW) mode, the average conducted output power was measured to be 14.45 dBm for Core 0 and 14.50 dBm for Core 1.

Core 0 + Core 1 = MIMO/CDD

$$(14.45 \text{ dBm} + 14.50 \text{ dBm}) = (27.86 \text{ mW} + 28.18 \text{ mW}) = 56.05 \text{ mW} = 17.49 \text{ dBm}$$

Sample e.i.r.p. Calculation:

At 5180MHz in 802.11n (20MHz BW) mode, the average MIMO/CDD conducted power was calculated to be 17.49 dBm with directional gain of 5.18 dBi.

$$\text{e.i.r.p. (dBm)} = \text{Conducted Power (dBm)} + \text{Ant gain (dBi)}$$

$$17.49 \text{ dBm} + 5.18 \text{ dBi} = 22.67 \text{ dBm}$$

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 54 of 205

7.5 Maximum Power Spectral Density – 802.11a/n/ac §15.407(a.1.iv) §15.407(a.2) §15.407(a.3); RSS-247 [6.2]

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 ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies. Method SA-1, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, 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

ANSI C63.10-2013 – Section 12.3.2.2

KDB 789033 D02 v02r01 – Section F

ANSI C63.10-2013 – Section 14.3.2.2 Measure-and-Sum Technique

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

Test Settings

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire emission bandwidth of the signal
3. RBW = 1MHz
4. VBW = 3MHz
5. Number of sweep points $\geq 2 \times (\text{span/RBW})$
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: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 55 of 205

SISO CORE 0 Power Spectral Density Measurements

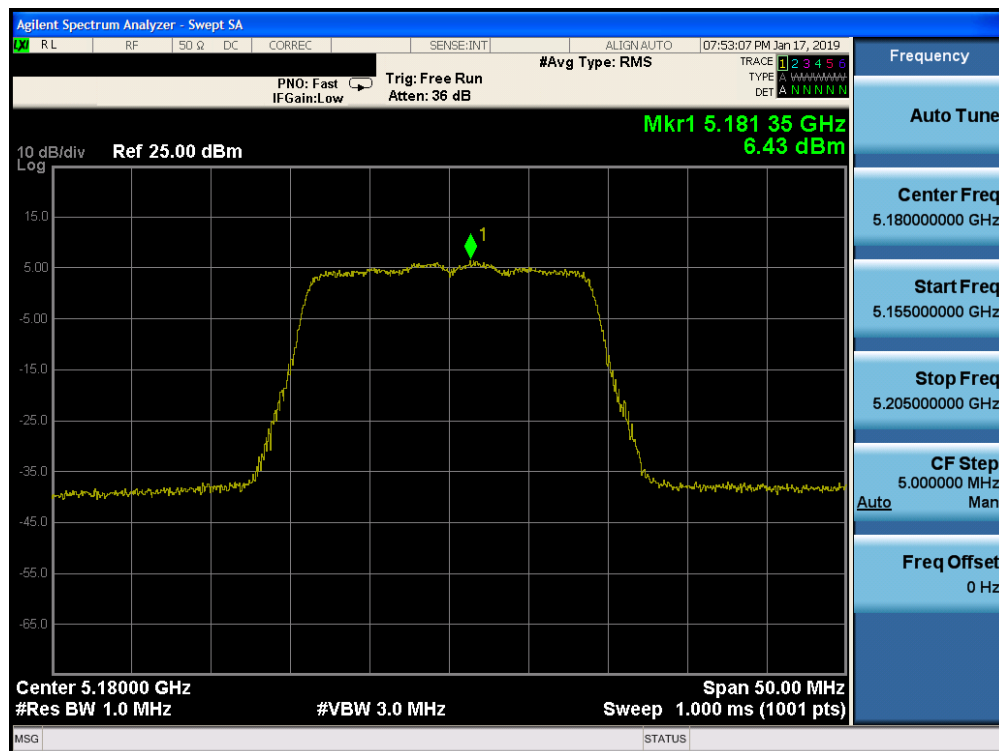
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm/MHz]	Max Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	n (20MHz)	6.5/7.2 (MCS0)	6.43	11.0	-4.57
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	6.20	11.0	-4.80
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	6.67	11.0	-4.33
	5190	38	n (40MHz)	13.5/15 (MCS0)	0.69	11.0	-10.31
	5230	46	n (40MHz)	13.5/15 (MCS0)	2.29	11.0	-8.71
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-0.57	11.0	-11.57
Band 2A	5260	52	n (20MHz)	6.5/7.2 (MCS0)	7.73	11.0	-3.27
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	7.35	11.0	-3.65
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	6.88	11.0	-4.12
	5270	54	n (40MHz)	13.5/15 (MCS0)	4.49	11.0	-6.51
	5310	62	n (40MHz)	13.5/15 (MCS0)	1.90	11.0	-9.10
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	-1.14	11.0	-12.14
Band 2C	5500	100	n (20MHz)	6.5/7.2 (MCS0)	6.12	11.0	-4.88
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	4.83	11.0	-6.17
	5720	144	n (20MHz)	6.5/7.2 (MCS0)	5.68	11.0	-5.32
	5510	102	n (40MHz)	13.5/15 (MCS0)	2.55	11.0	-8.45
	5550	110	n (40MHz)	13.5/15 (MCS0)	3.04	11.0	-7.96
	5710	142	n (40MHz)	13.5/15 (MCS0)	3.25	11.0	-7.75
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	-0.92	11.0	-11.92
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	0.50	11.0	-10.50

Table 7-24. Bands 1, 2A, 2C Conducted Power Spectral Density Measurements SISO CORE0

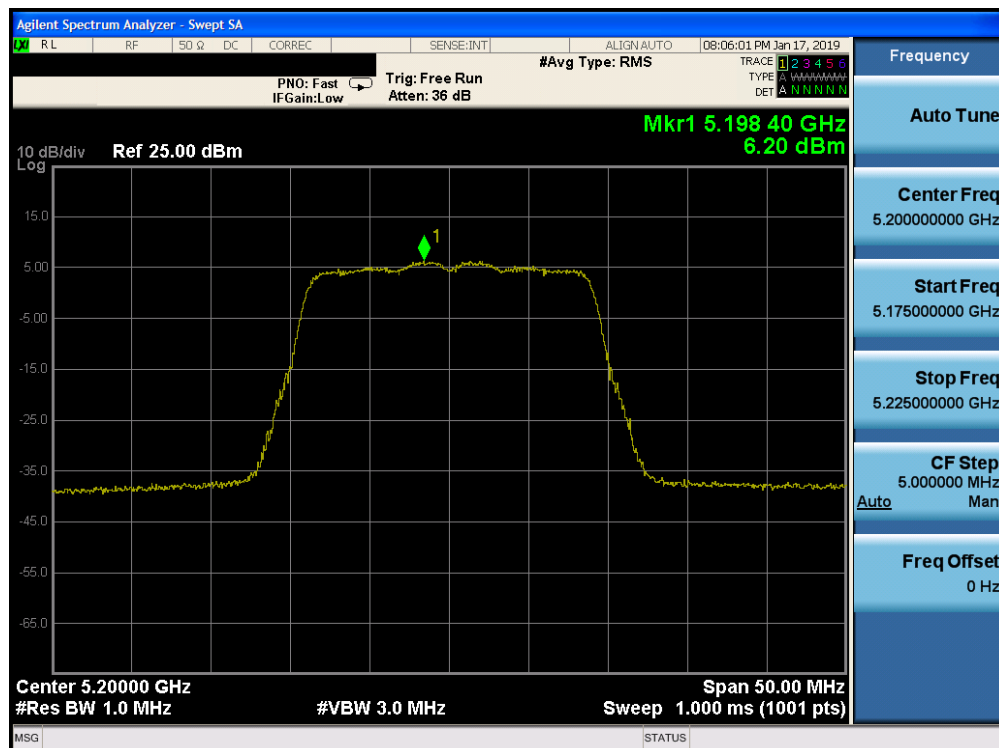
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm/MHz]	Antenna Gain [dBi]	e.i.r.p. Power Density [dBm/MHz]	ISED Max e.i.r.p. Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	n (20MHz)	6.5/7.2 (MCS0)	6.43	1.66	8.09	10.0	-1.91
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	6.20	1.66	7.86	10.0	-2.14
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	6.67	1.66	8.33	10.0	-1.67
	5190	38	n (40MHz)	13.5/15 (MCS0)	0.69	1.66	2.35	10.0	-7.65
	5230	46	n (40MHz)	13.5/15 (MCS0)	2.29	1.66	3.95	10.0	-6.05
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-0.57	1.66	1.09	10.0	-8.91

Table 7-25. Band 1 e.i.r.p. Conducted Power Spectral Density Measurements (ISED) SISO CORE0

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 56 of 205

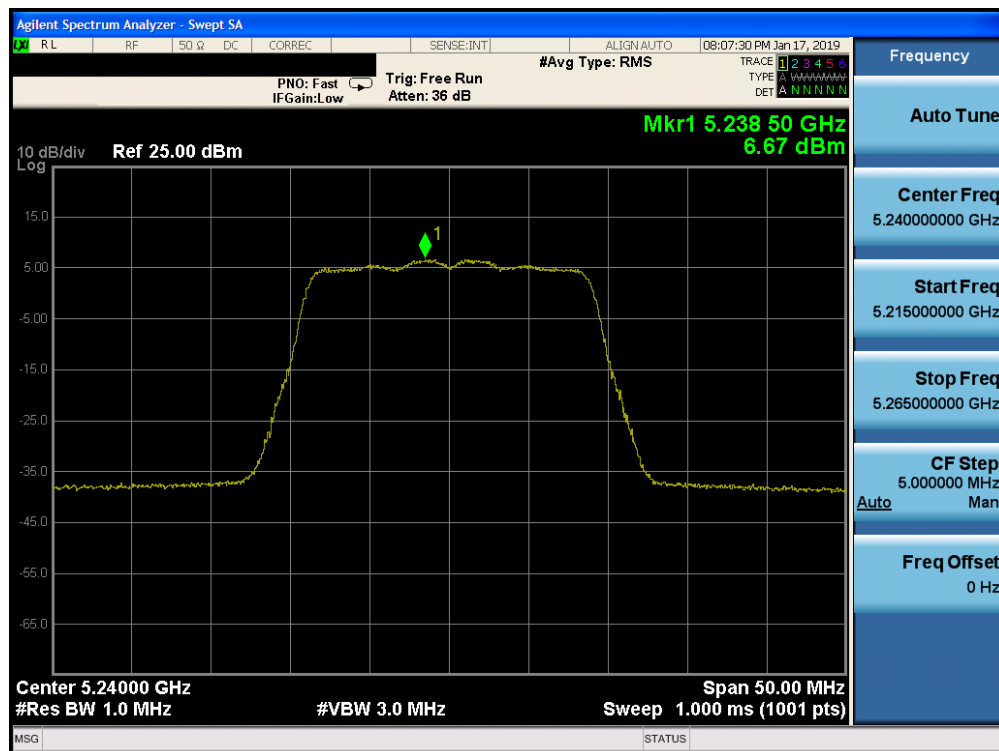


Plot 7-53. Power Spectral Density Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

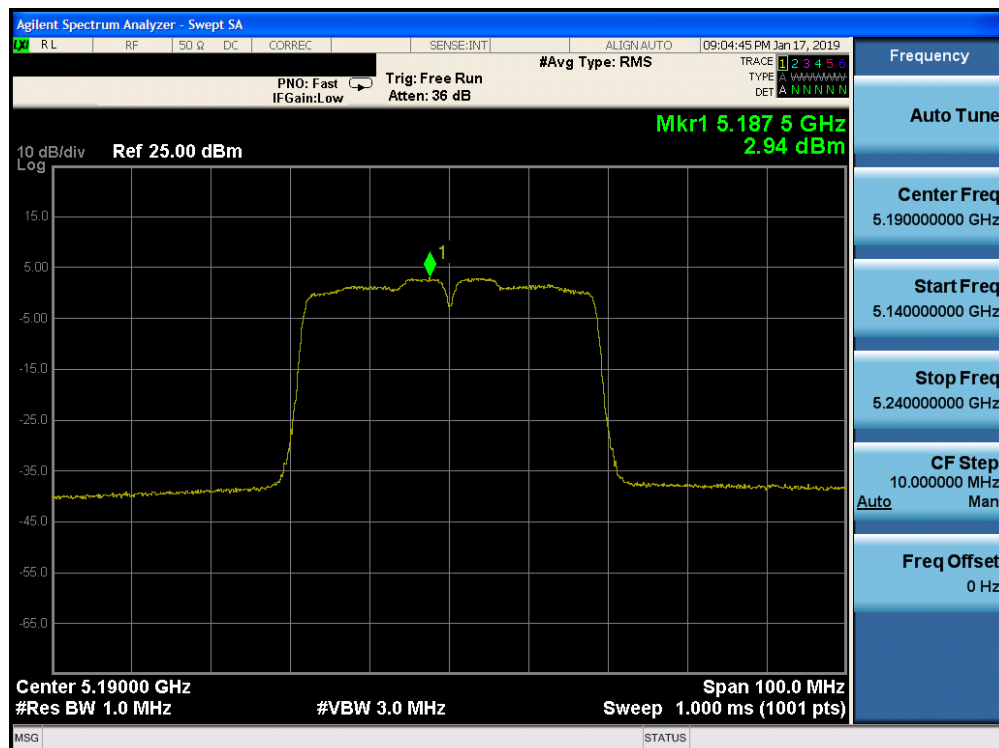


Plot 7-54. Power Spectral Density Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 1) – Ch. 40)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 57 of 205

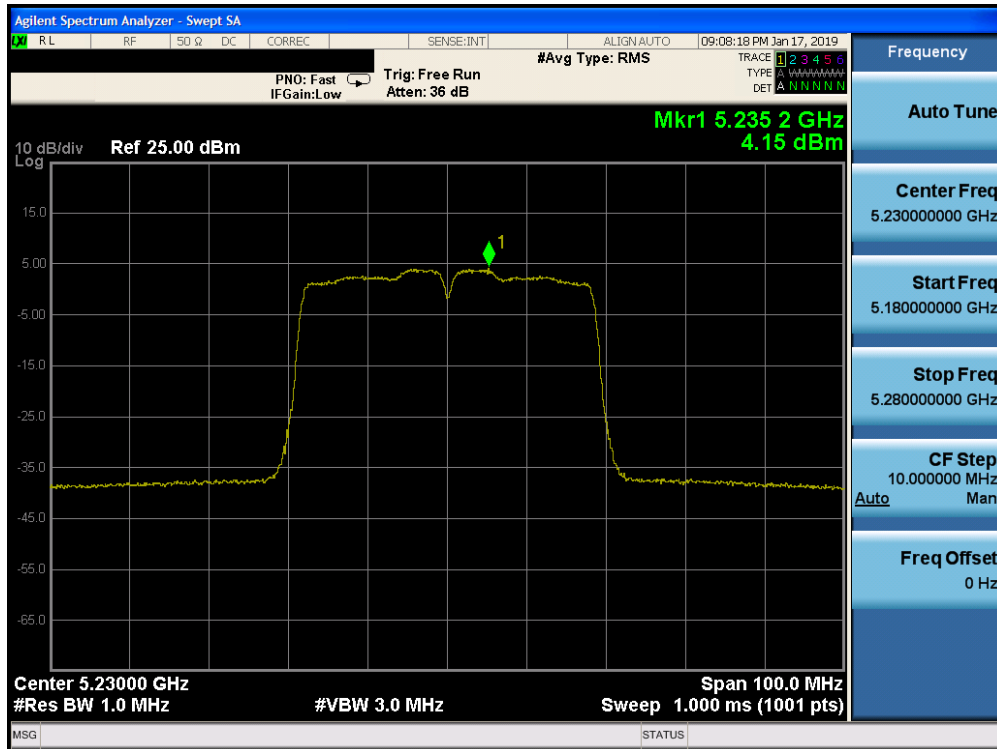


Plot 7-55. Power Spectral Density Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

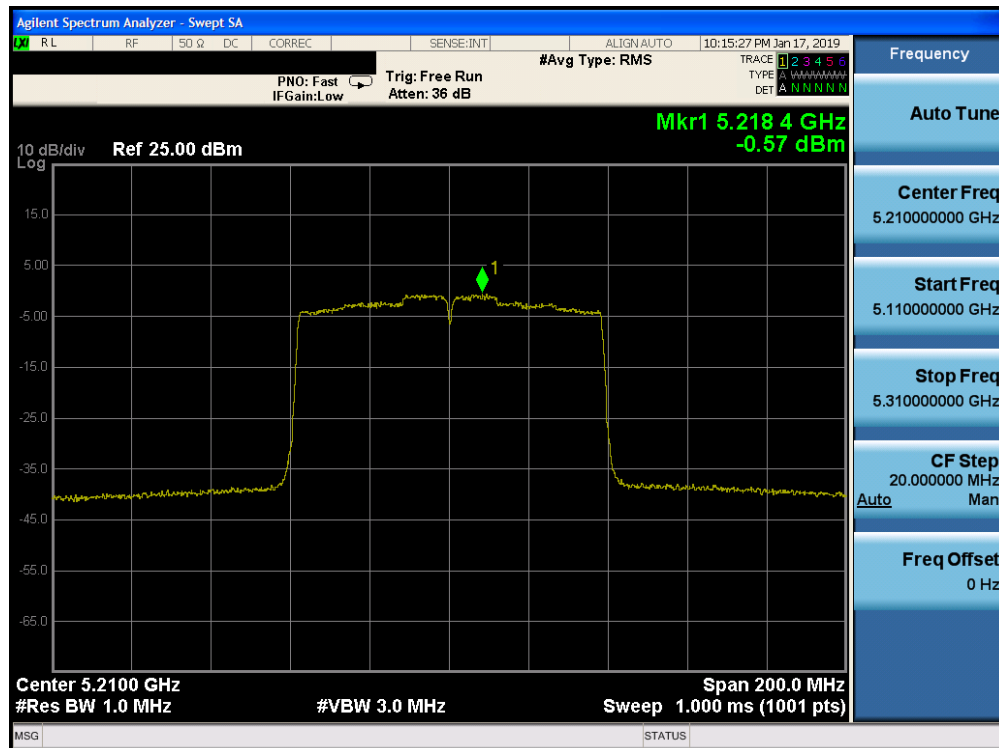


Plot 7-56. Power Spectral Density Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 1) – Ch. 38)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 58 of 205

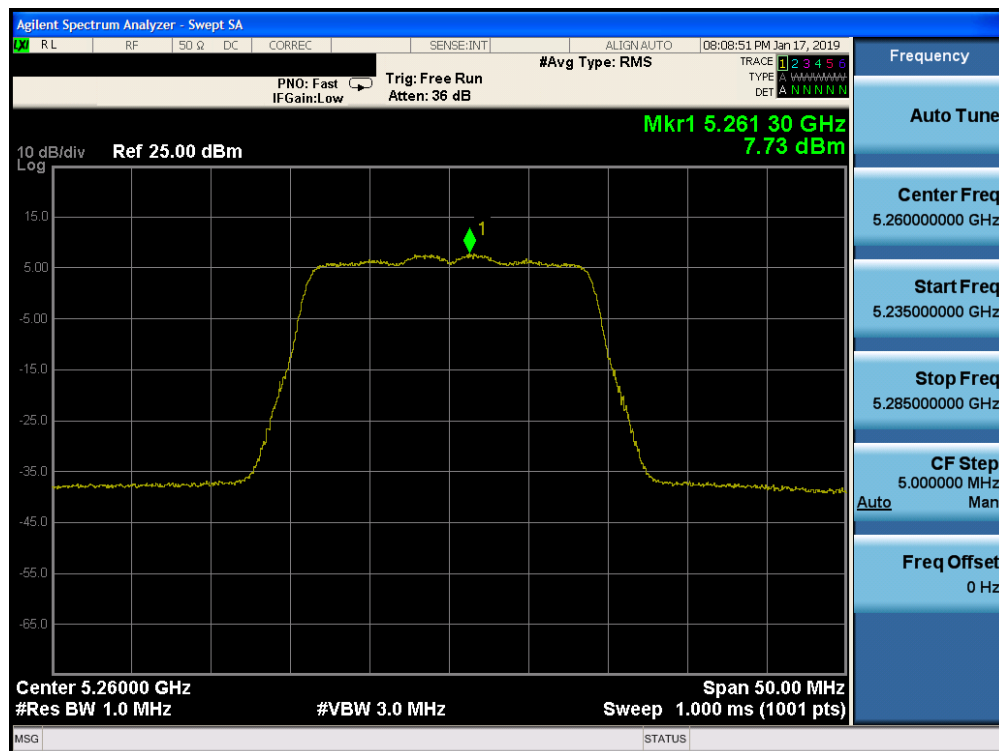


Plot 7-57. Power Spectral Density Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

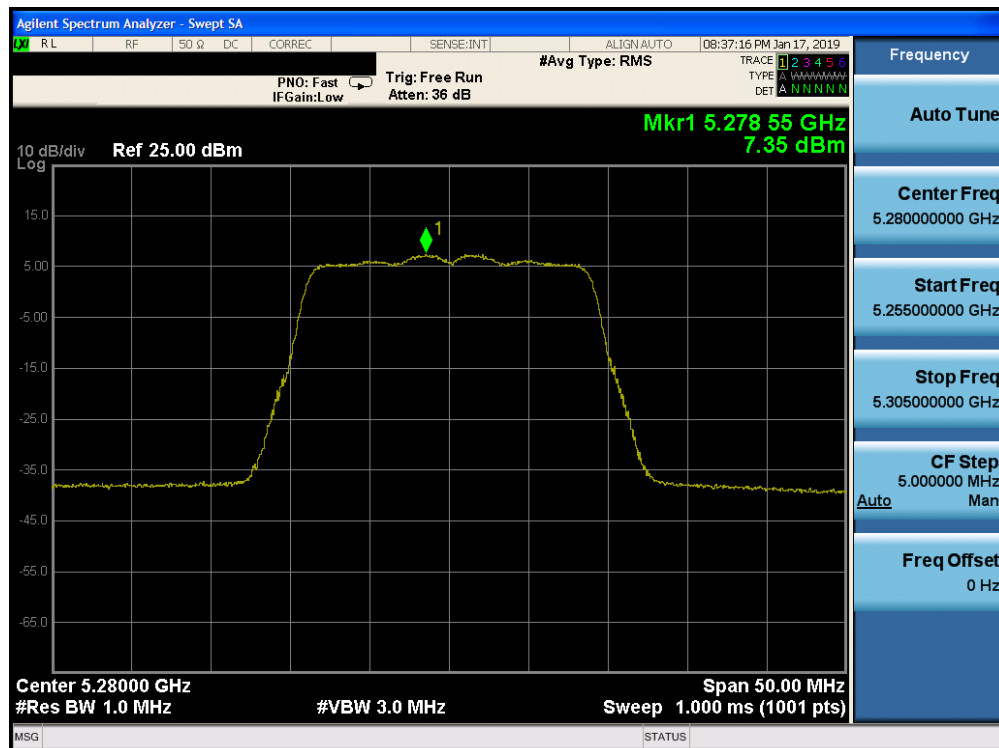


Plot 7-58. Power Spectral Density Plot SISO CORE0 (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 59 of 205

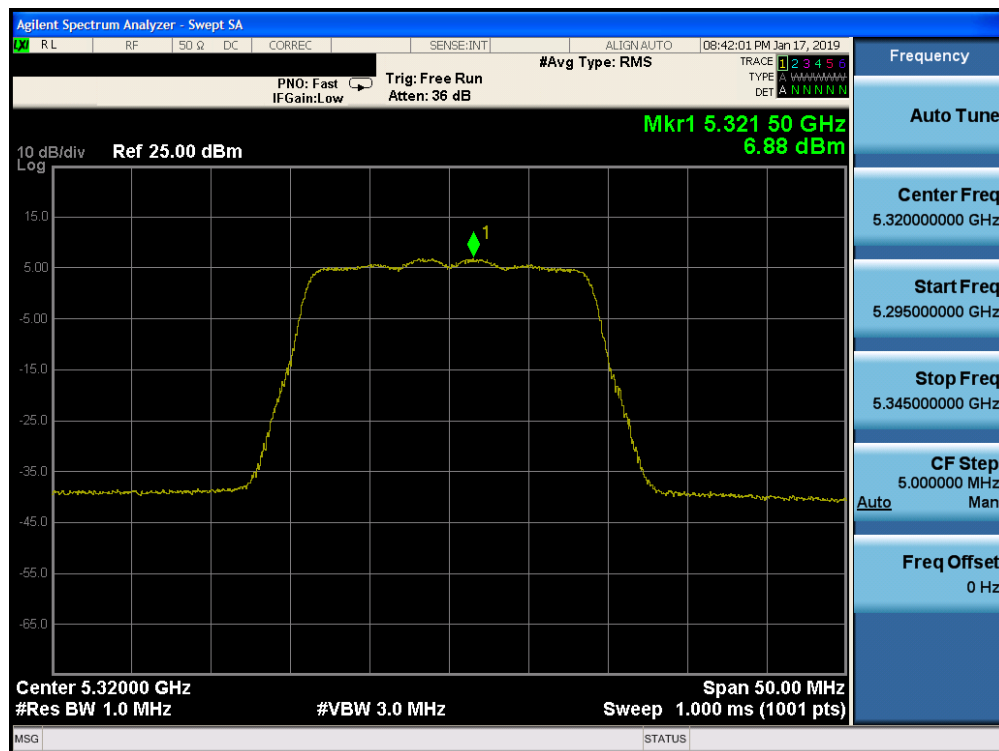


Plot 7-59. Power Spectral Density Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)

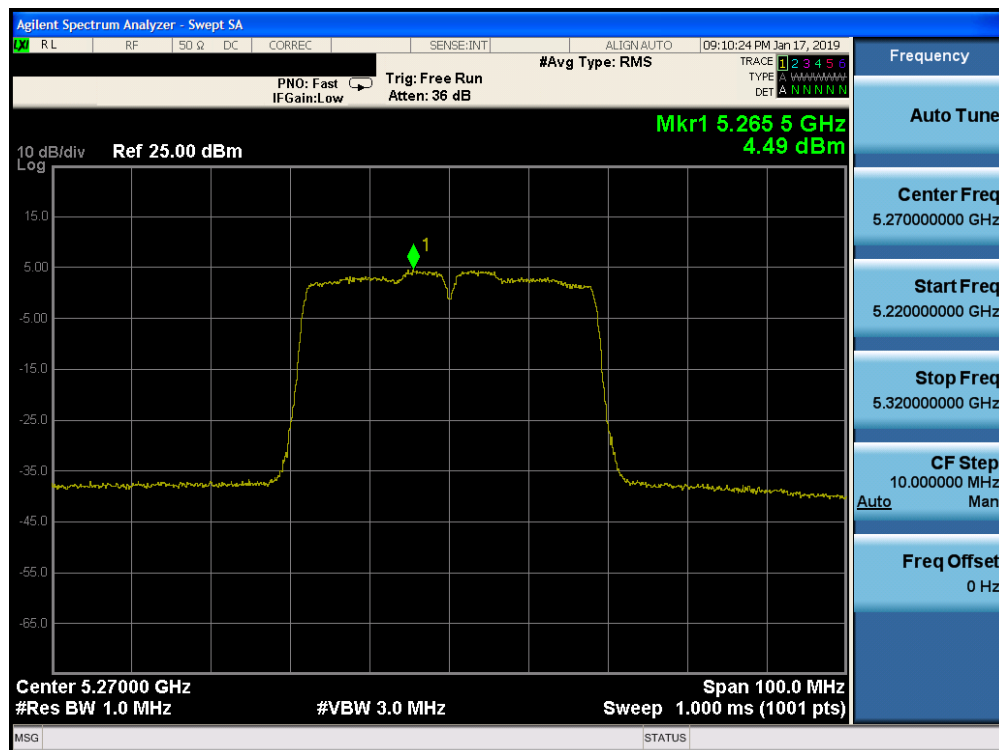


Plot 7-60. Power Spectral Density Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 60 of 205

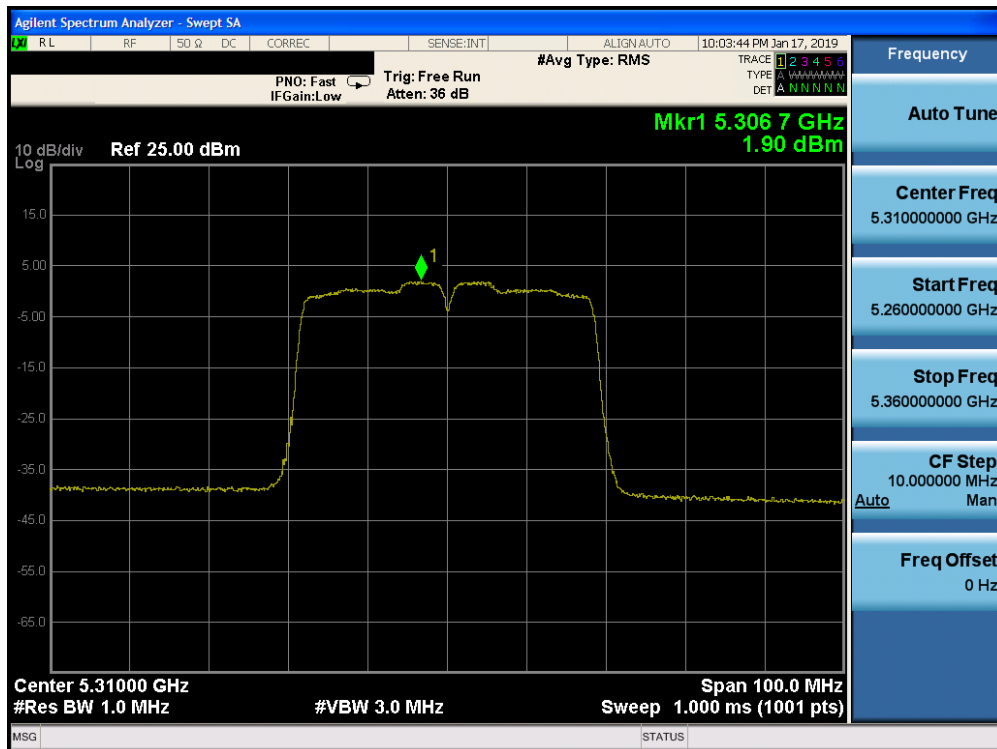


Plot 7-61. Power Spectral Density Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)

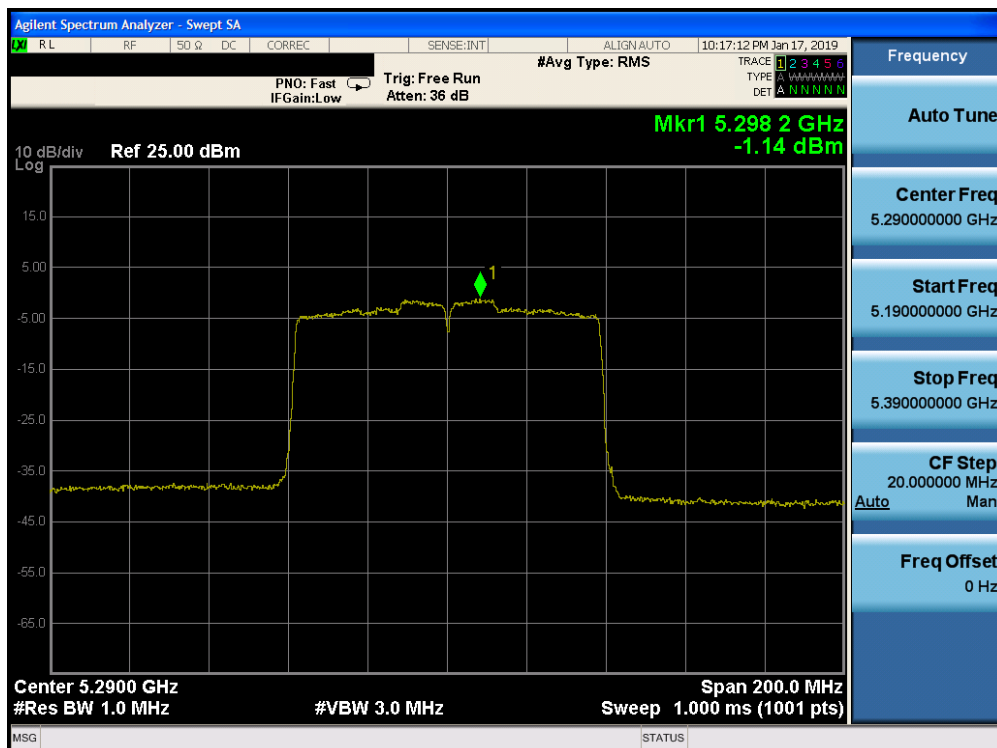


Plot 7-62. Power Spectral Density Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 61 of 205

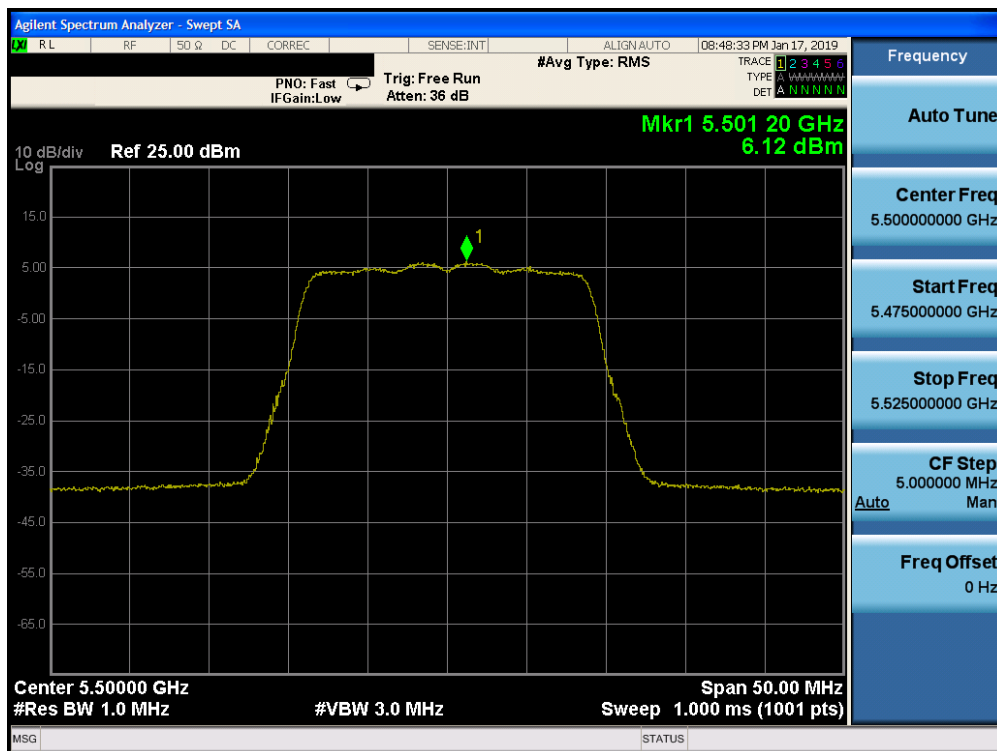


Plot 7-63. Power Spectral Density Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)

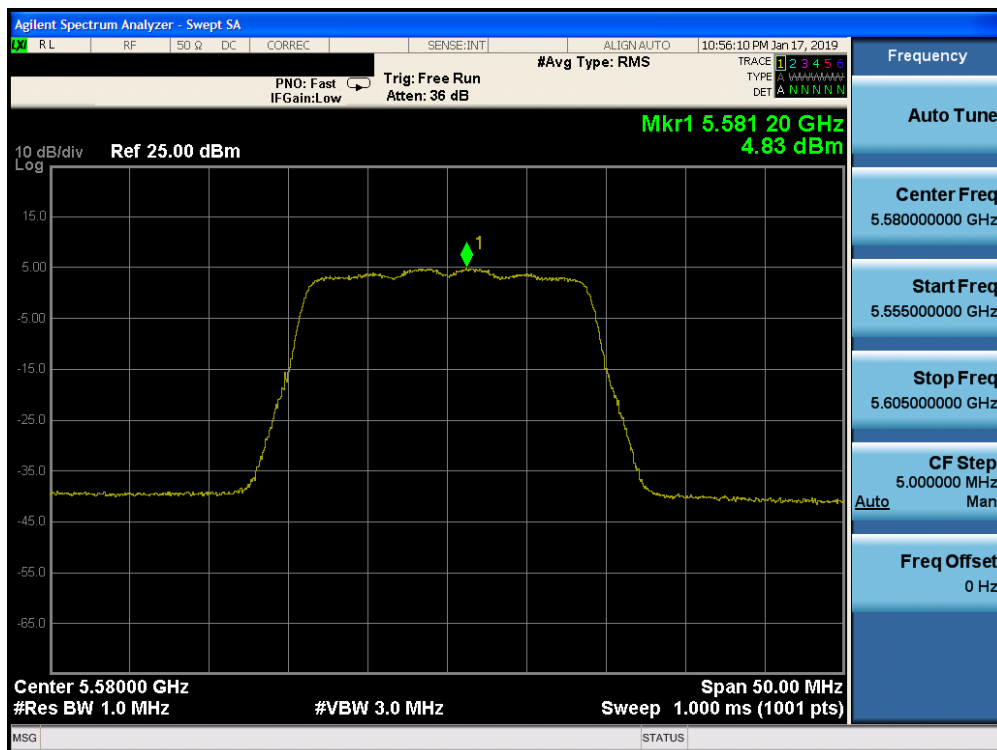


Plot 7-64. Power Spectral Density Plot SISO CORE0 (80MHz BW 802.11ac (UNII Band 2A) – Ch. 58)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 62 of 205

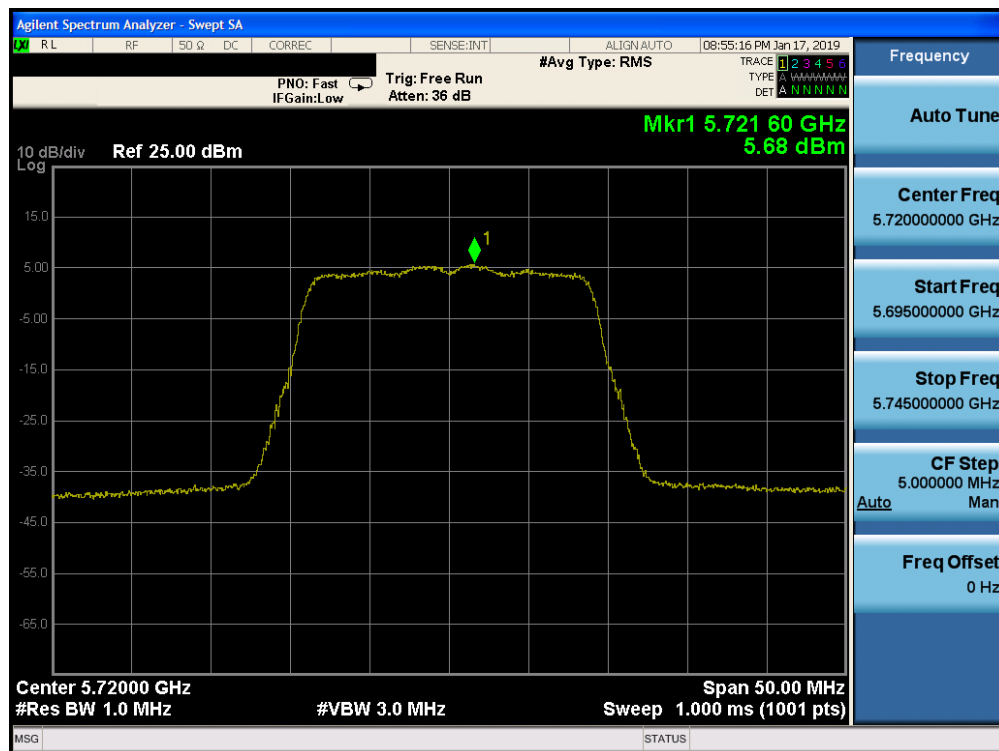


Plot 7-65. Power Spectral Density Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 2C) – Ch. 100)

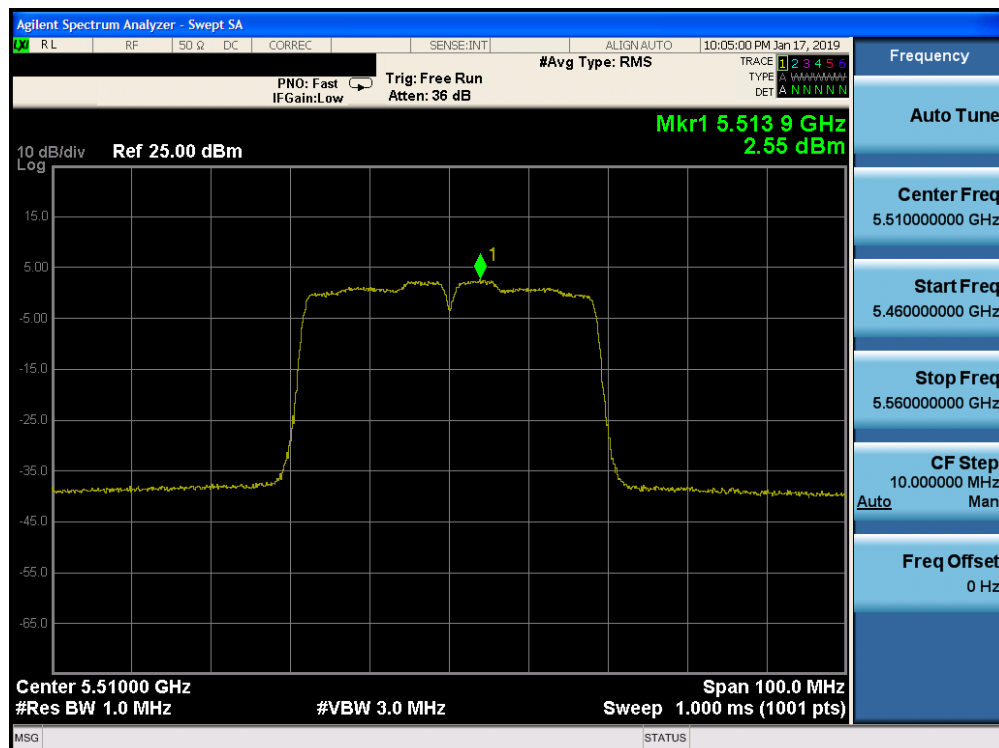


Plot 7-66. Power Spectral Density Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 2C) – Ch. 116)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 63 of 205

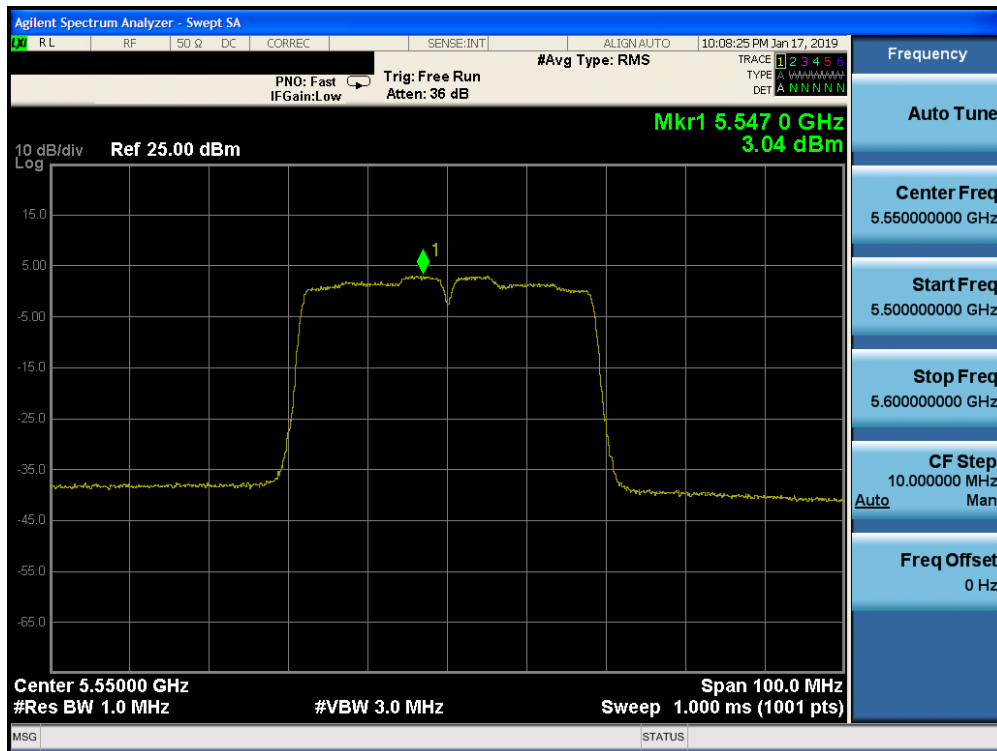


Plot 7-67. Power Spectral Density Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 2C) – Ch. 144)

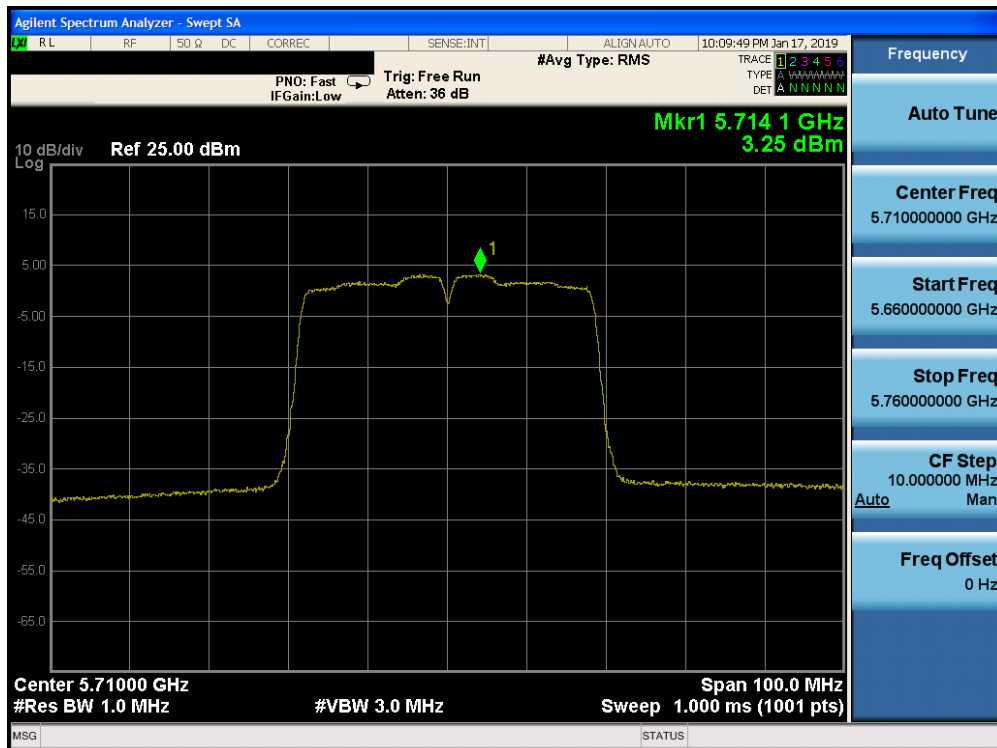


Plot 7-68. Power Spectral Density Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 64 of 205

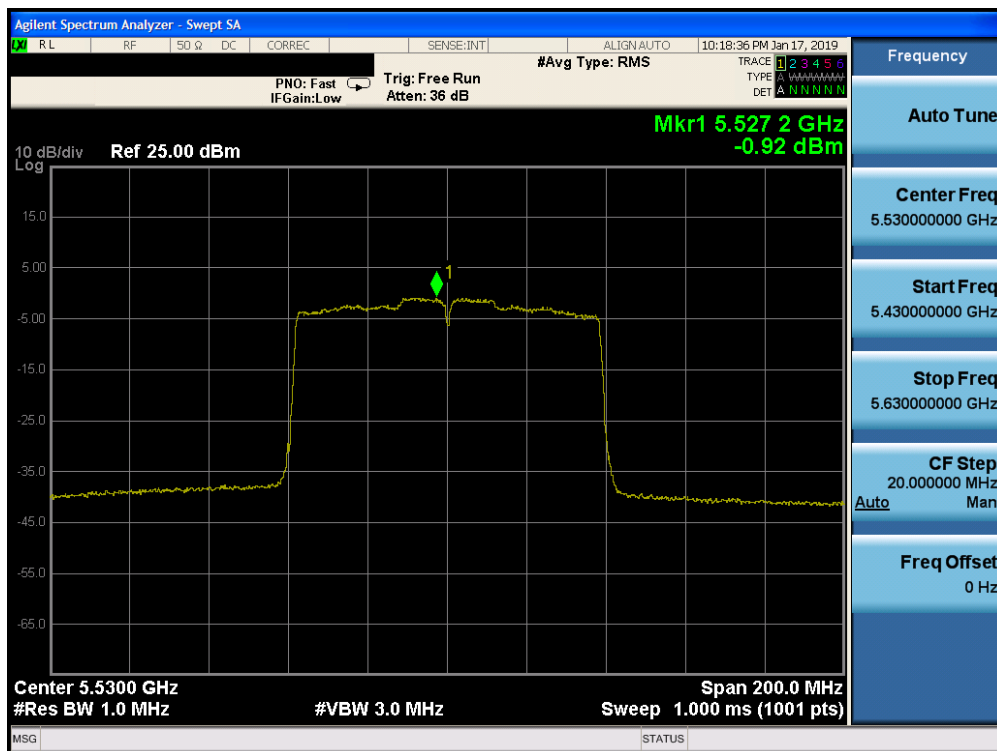


Plot 7-69. Power Spectral Density Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 2C) – Ch. 110)

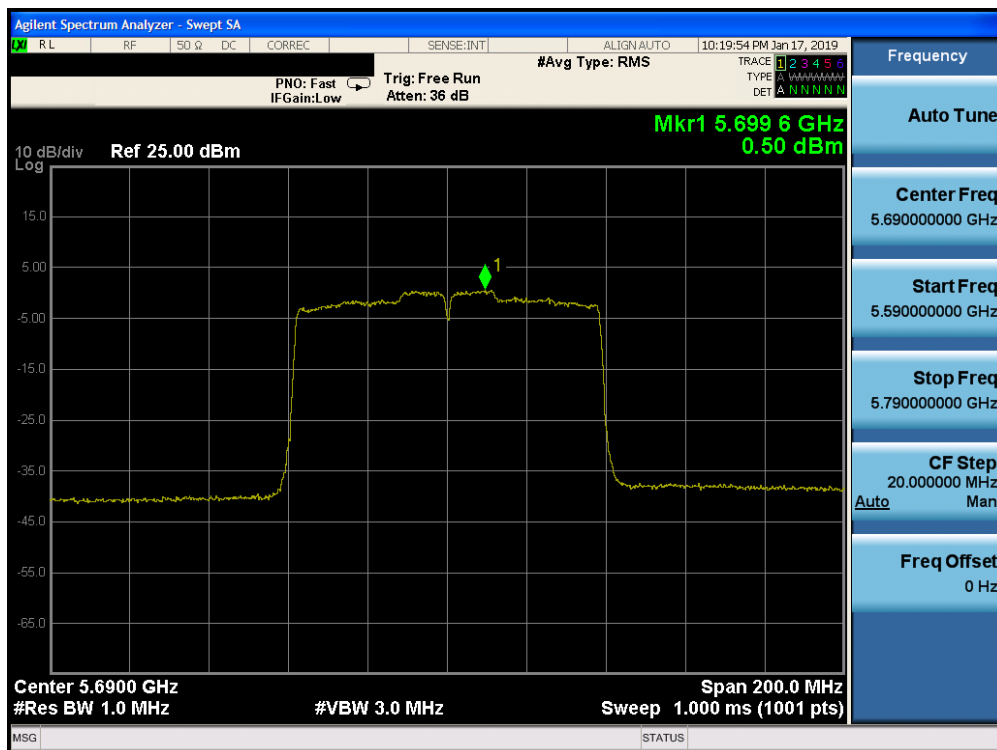


Plot 7-70. Power Spectral Density Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 2C) – Ch. 142)

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 65 of 205



Plot 7-71. Power Spectral Density Plot SISO CORE0 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 106)

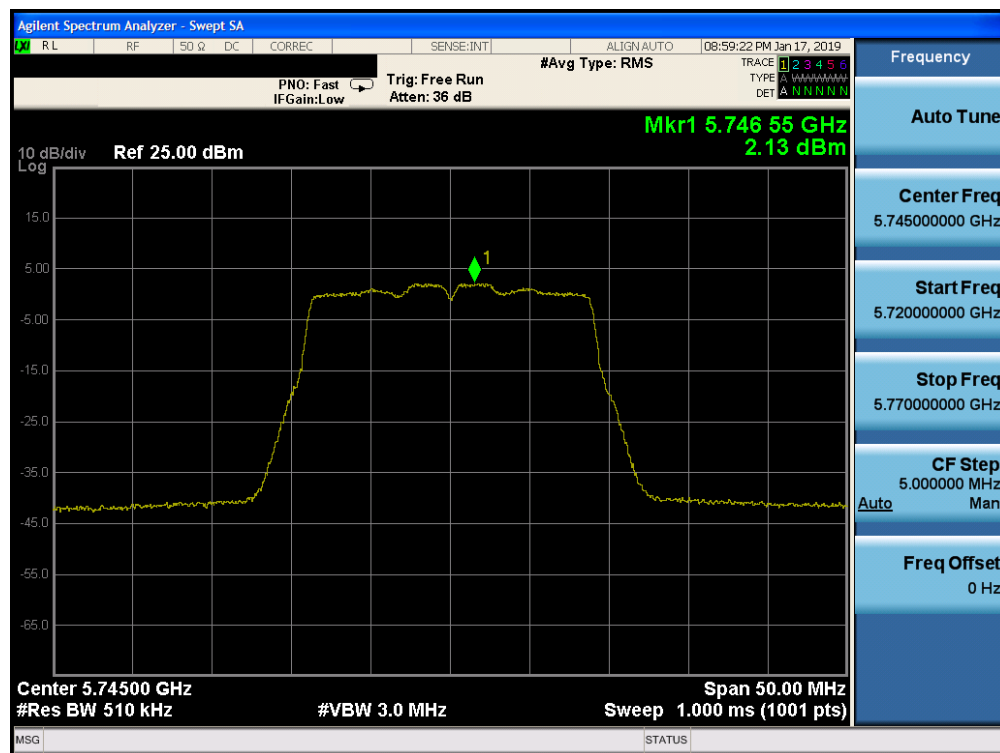


Plot 7-72. Power Spectral Density Plot SISO CORE0 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 138)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 66 of 205

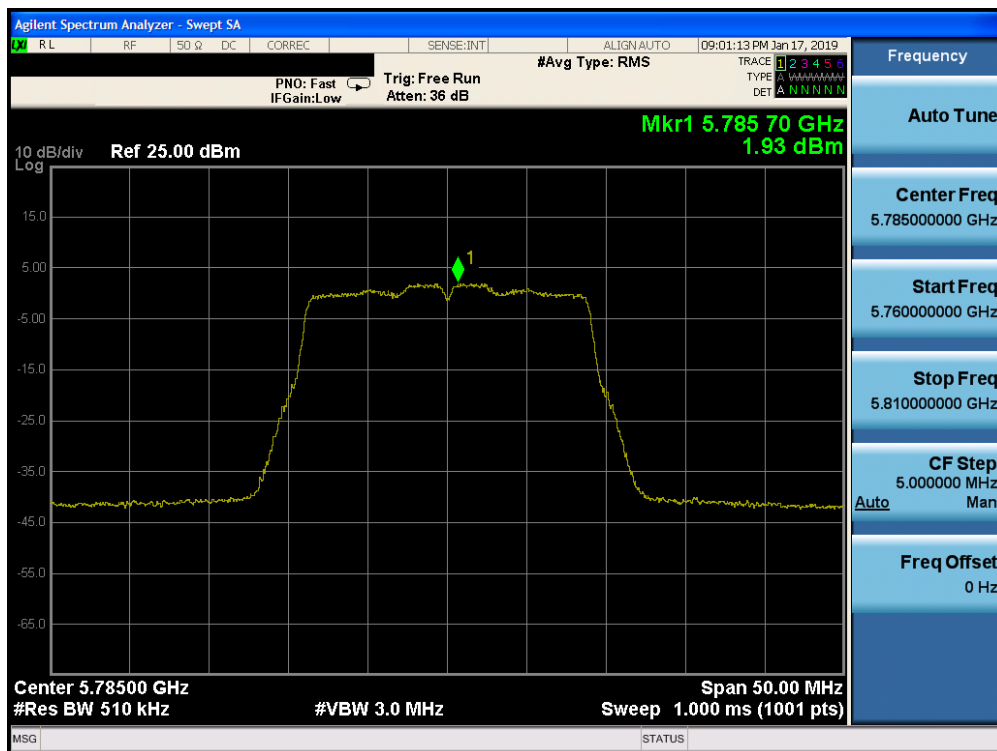
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm/500kHz]	Max Permissible Power Density [dBm/500kHz]	Margin [dB]
Band 3	5745	149	n (20MHz)	6.5/7.2 (MCS0)	2.13	30.0	-27.87
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	1.93	30.0	-28.07
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	1.88	30.0	-28.12
	5755	151	n (40MHz)	13.5/15 (MCS0)	-0.06	30.0	-30.06
	5795	159	n (40MHz)	13.5/15 (MCS0)	-0.35	30.0	-30.35
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	-2.90	30.0	-32.90

Table 7-26. Band 3 Conducted Power Spectral Density Measurements SISO CORE0

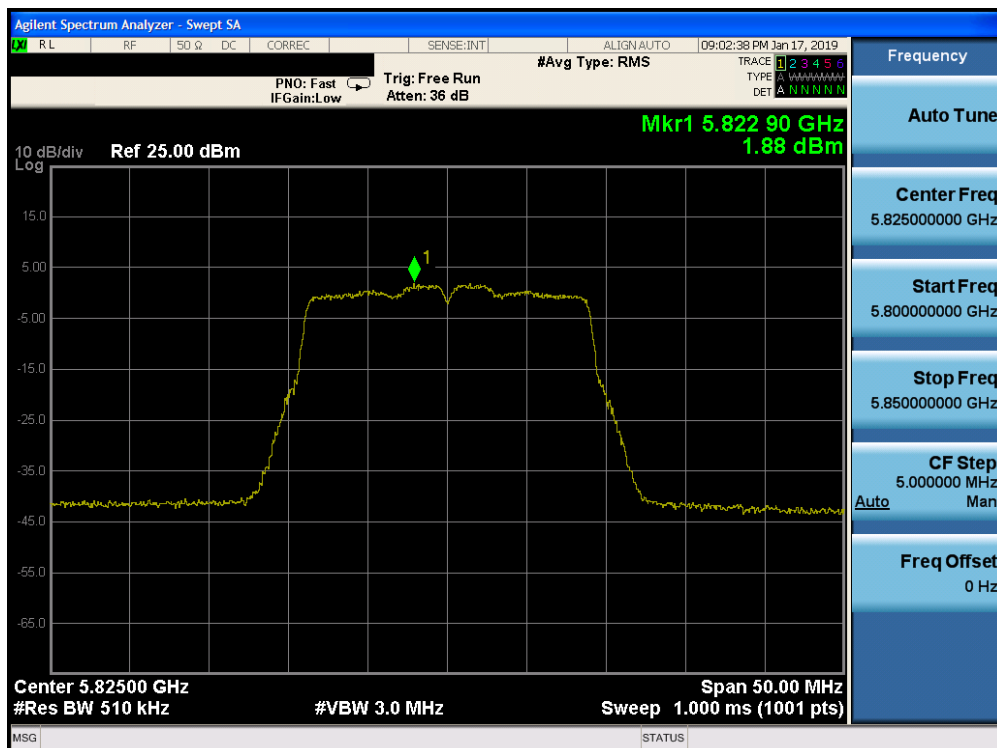


Plot 7-73. Power Spectral Density Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 3) – Ch. 149)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 67 of 205

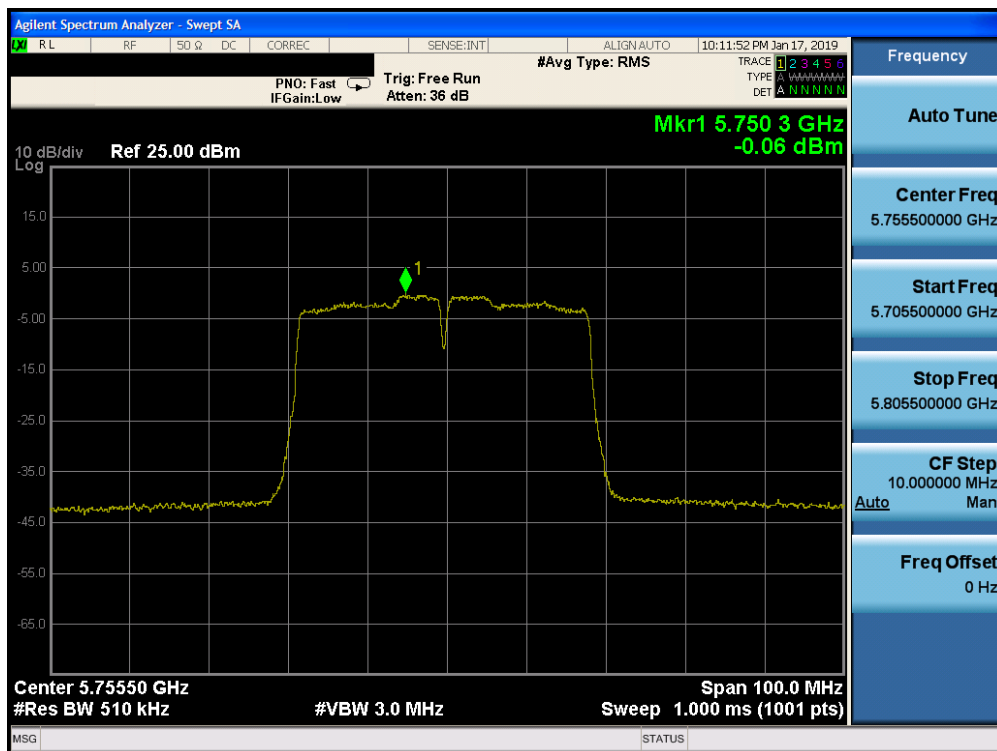


Plot 7-74. Power Spectral Density Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 3) – Ch. 157)

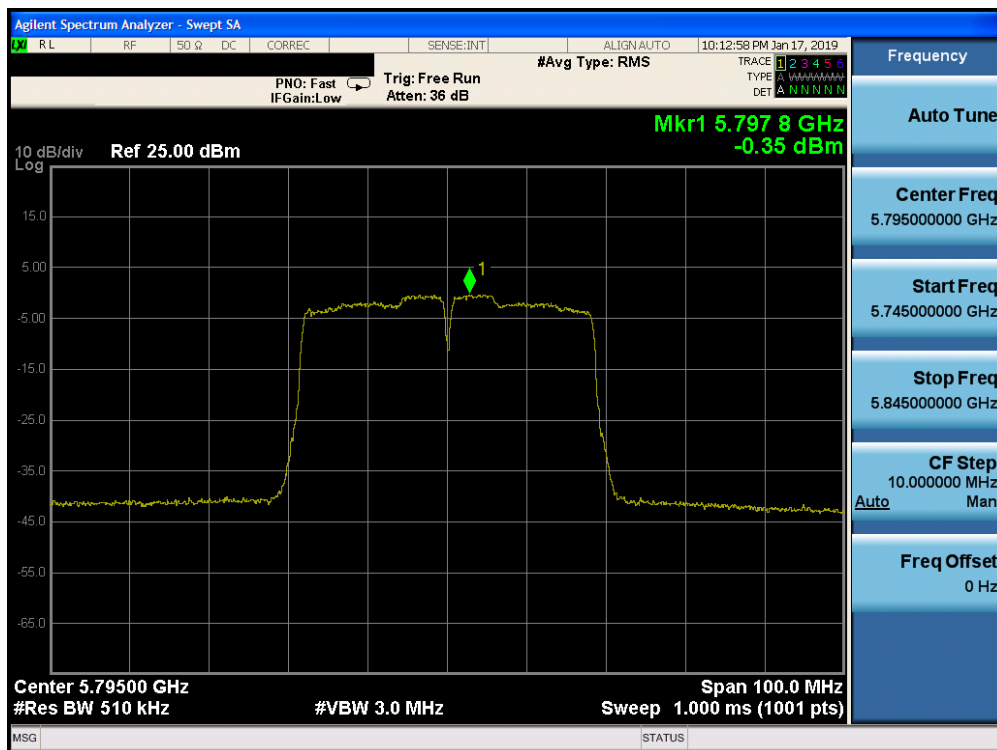


Plot 7-75. Power Spectral Density Plot SISO CORE0 (20MHz BW 802.11n (UNII Band 3) – Ch. 165)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 68 of 205

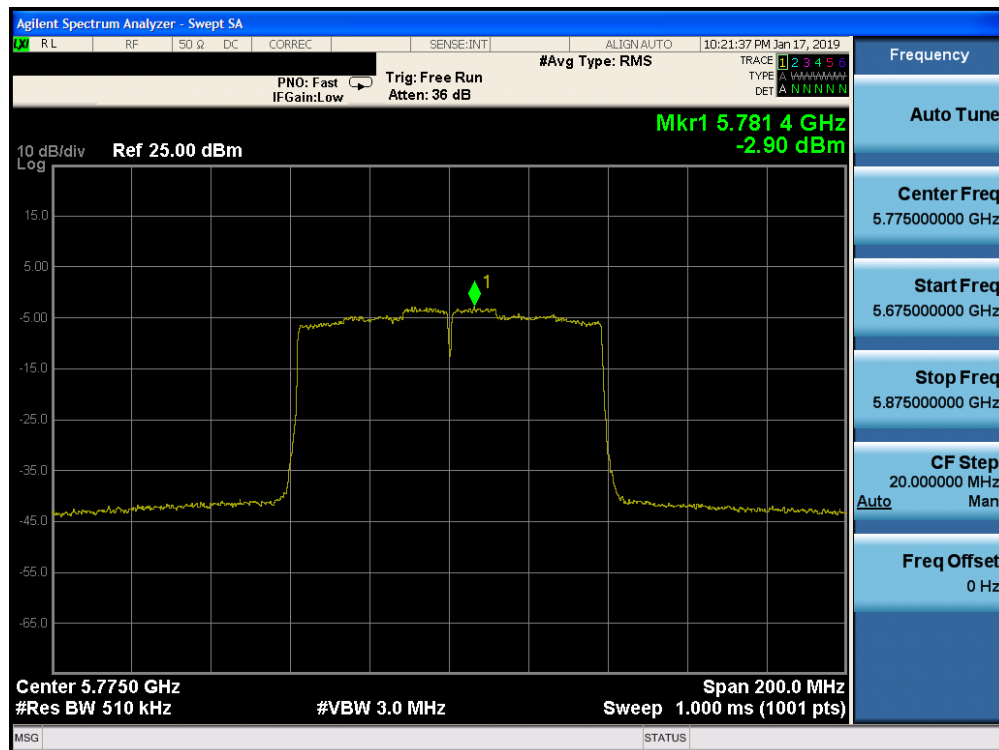


Plot 7-76. Power Spectral Density Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 3) – Ch. 151)



Plot 7-77. Power Spectral Density Plot SISO CORE0 (40MHz BW 802.11n (UNII Band 3) – Ch. 159)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 69 of 205



Plot 7-78. Power Spectral Density Plot SISO CORE0 (80MHz BW 802.11ac (UNII Band 3) – Ch. 155)

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 70 of 205

SISO CORE 1 Power Spectral Density Measurements

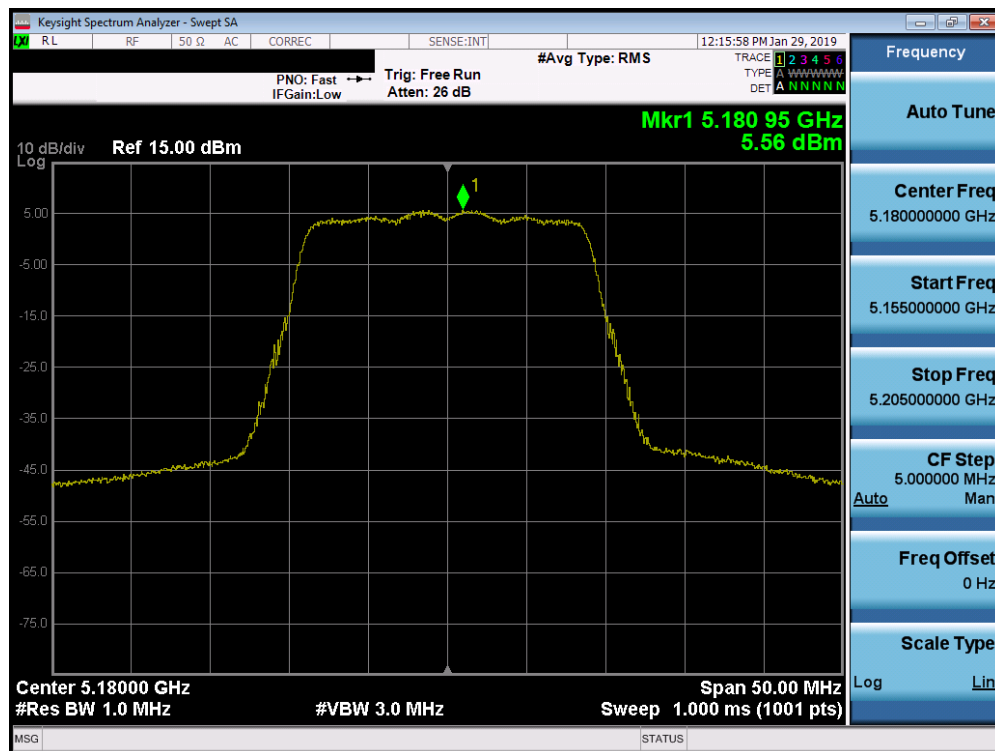
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm/MHz]	Max Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	n (20MHz)	6.5/7.2 (MCS0)	6.46	11.0	-4.54
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	7.79	11.0	-3.21
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	7.91	11.0	-3.09
	5190	38	n (40MHz)	13.5/15 (MCS0)	3.20	11.0	-7.80
	5230	46	n (40MHz)	13.5/15 (MCS0)	6.11	11.0	-4.89
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-0.36	11.0	-11.36
Band 2A	5260	52	n (20MHz)	6.5/7.2 (MCS0)	6.71	11.0	-4.29
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	6.55	11.0	-4.45
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	6.57	11.0	-4.43
	5270	54	n (40MHz)	13.5/15 (MCS0)	4.66	11.0	-6.34
	5310	62	n (40MHz)	13.5/15 (MCS0)	2.48	11.0	-8.52
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	-1.06	11.0	-12.06
Band 2C	5500	100	n (20MHz)	6.5/7.2 (MCS0)	4.83	11.0	-6.17
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	5.00	11.0	-6.00
	5720	144	n (20MHz)	6.5/7.2 (MCS0)	5.62	11.0	-5.38
	5510	102	n (40MHz)	13.5/15 (MCS0)	2.62	11.0	-8.38
	5550	110	n (40MHz)	13.5/15 (MCS0)	3.62	11.0	-7.38
	5710	142	n (40MHz)	13.5/15 (MCS0)	3.87	11.0	-7.13
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	-0.91	11.0	-11.91
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	0.79	11.0	-10.21

Table 7-27. Conducted Power Spectral Density Measurements SISO CORE1

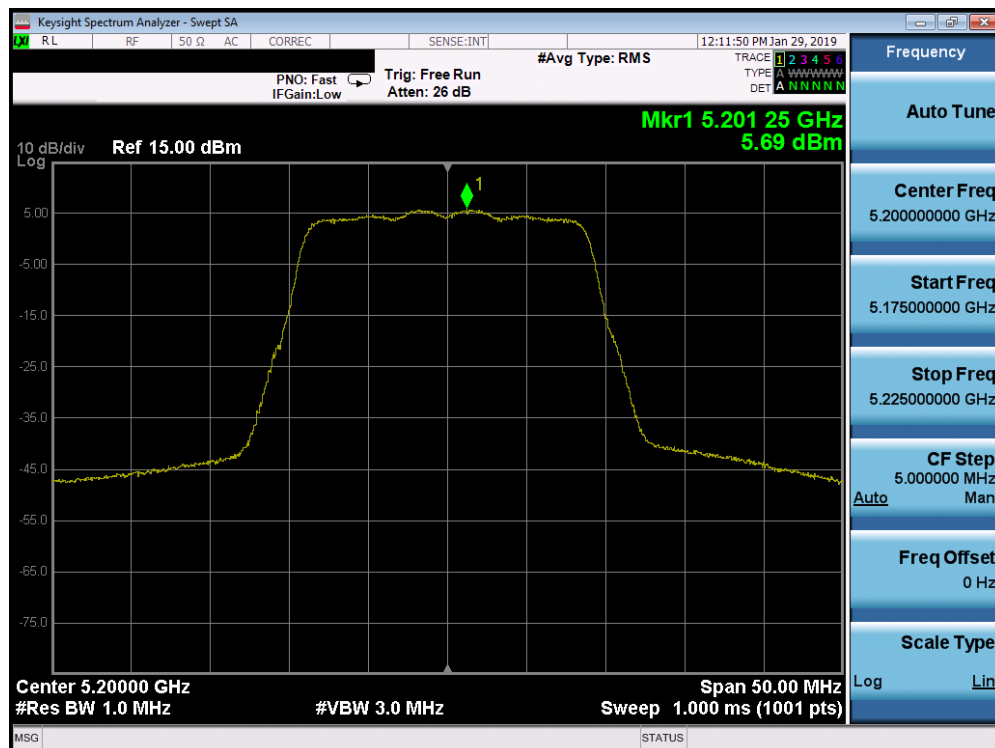
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm/MHz]	Antenna Gain [dBi]	e.i.r.p. Power Density [dBm/MHz]	ISED Max e.i.r.p. Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	n (20MHz)	6.5/7.2 (MCS0)	5.56	2.65	8.21	10.0	-1.79
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	5.69	2.65	8.34	10.0	-1.66
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	5.51	2.65	8.16	10.0	-1.84
	5190	38	n (40MHz)	13.5/15 (MCS0)	3.20	2.65	5.85	10.0	-4.15
	5230	46	n (40MHz)	13.5/15 (MCS0)	6.11	2.65	8.76	10.0	-1.24
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-0.36	2.65	2.29	10.0	-7.71

Table 7-28. Band 1 e.i.r.p. Conducted Power Spectral Density Measurements (ISED) SISO CORE1

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 71 of 205

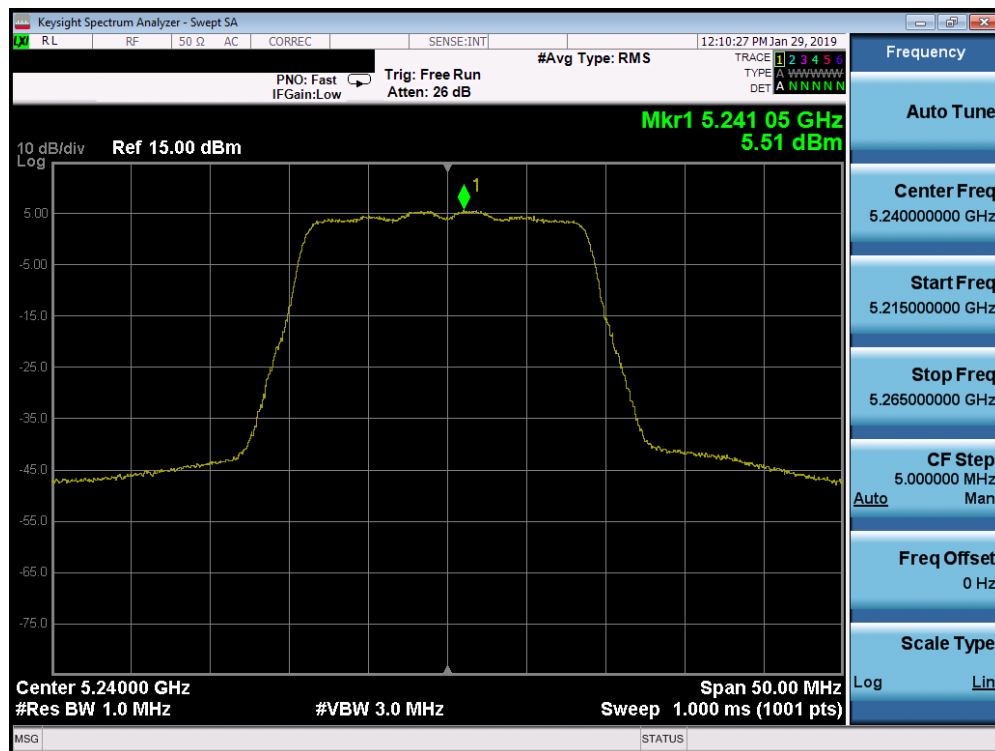


Plot 7-79. Power Spectral Density Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 1) – Ch. 36) - ISED

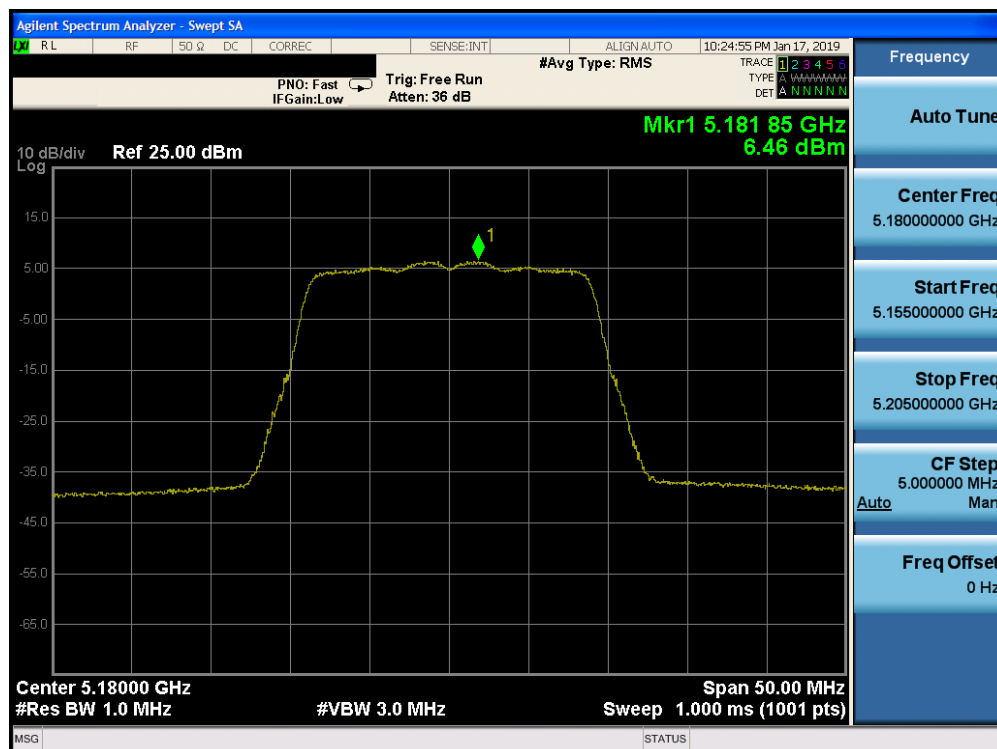


Plot 7-80. Power Spectral Density Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 1) – Ch. 40) - ISED

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 72 of 205

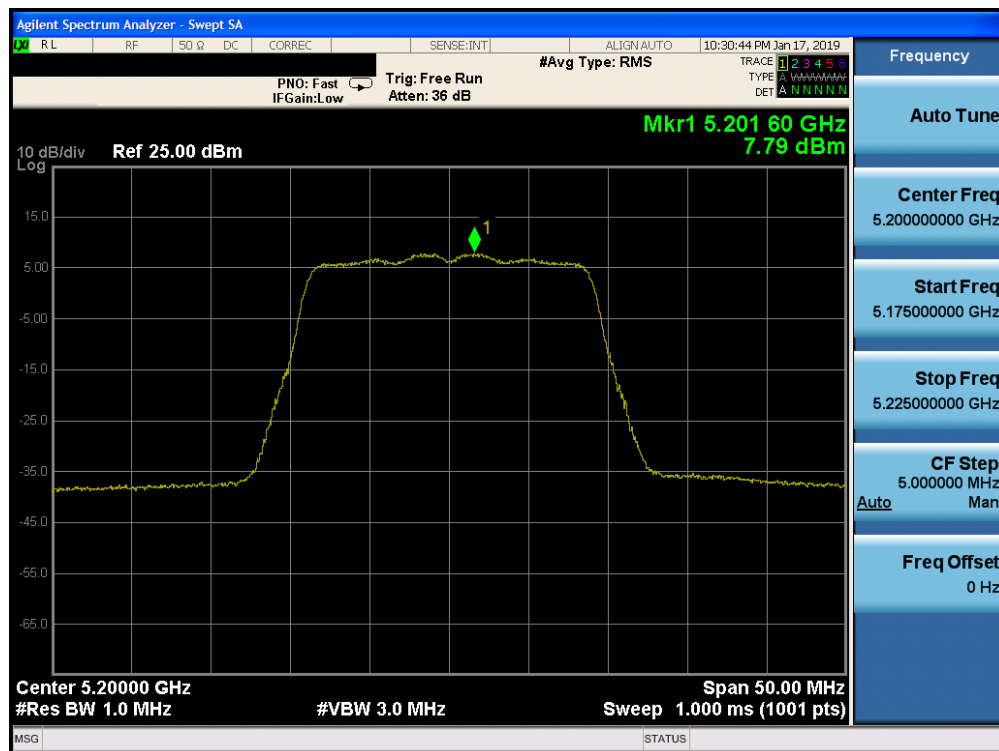


Plot 7-81. Power Spectral Density Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 1) – Ch. 48) - ISED

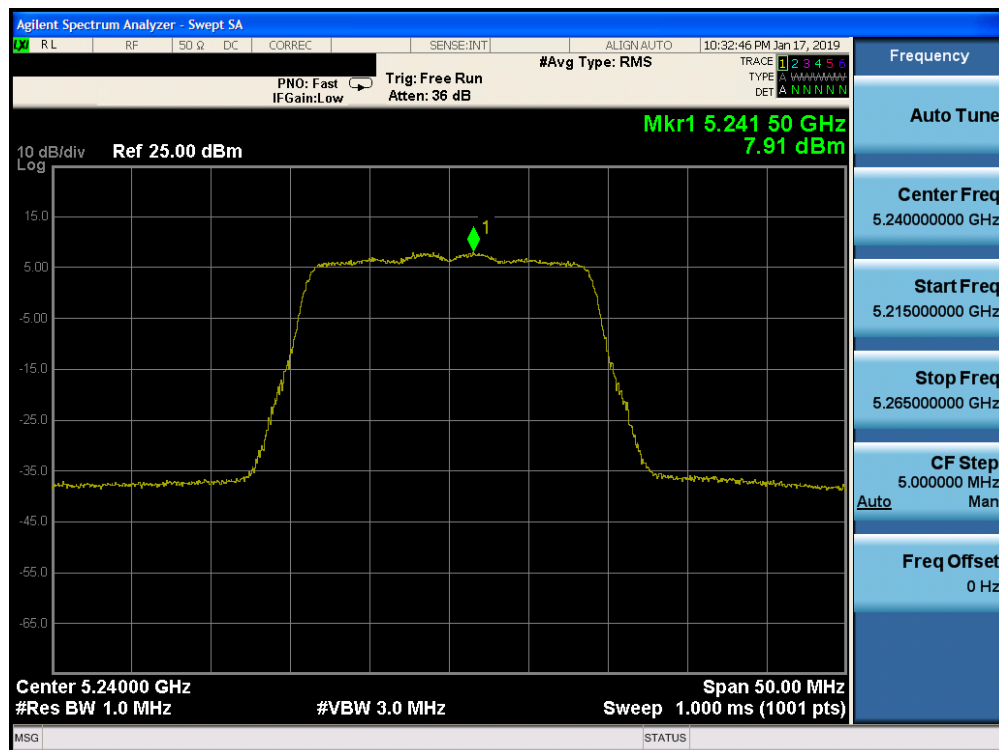


Plot 7-82. Power Spectral Density Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 73 of 205

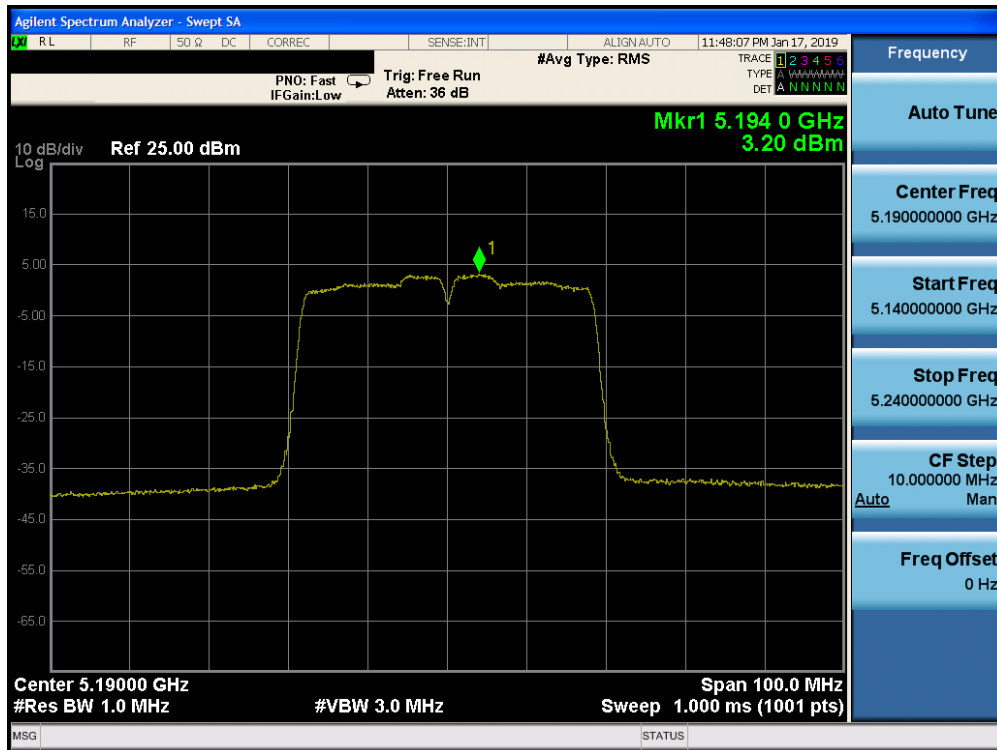


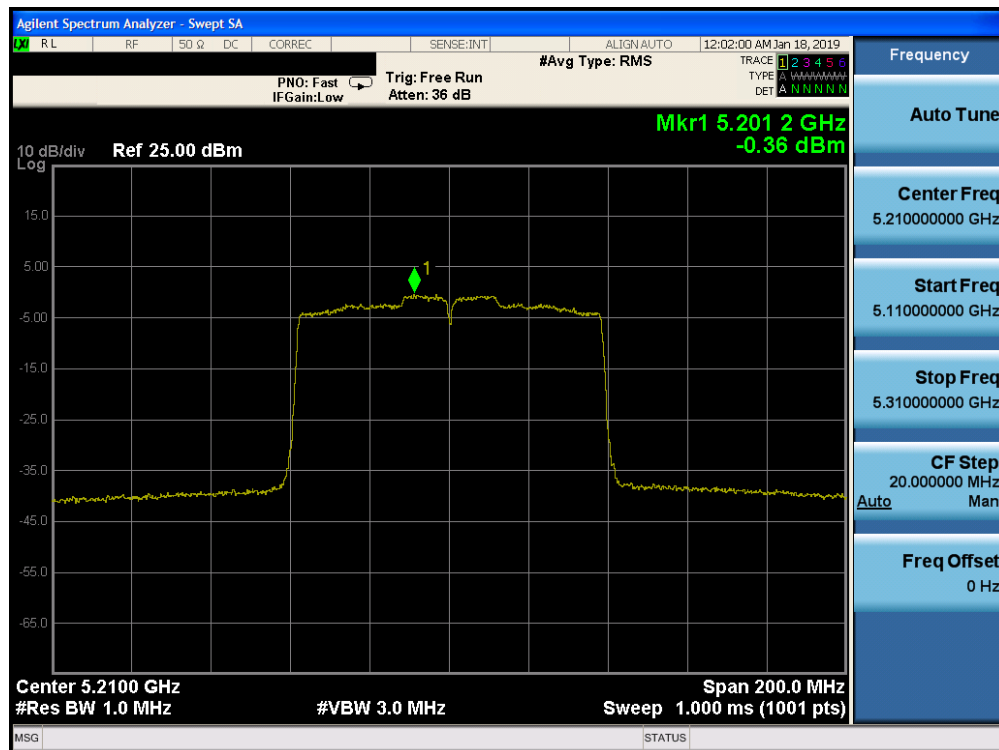
Plot 7-83. Power Spectral Density Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 1) – Ch. 40)



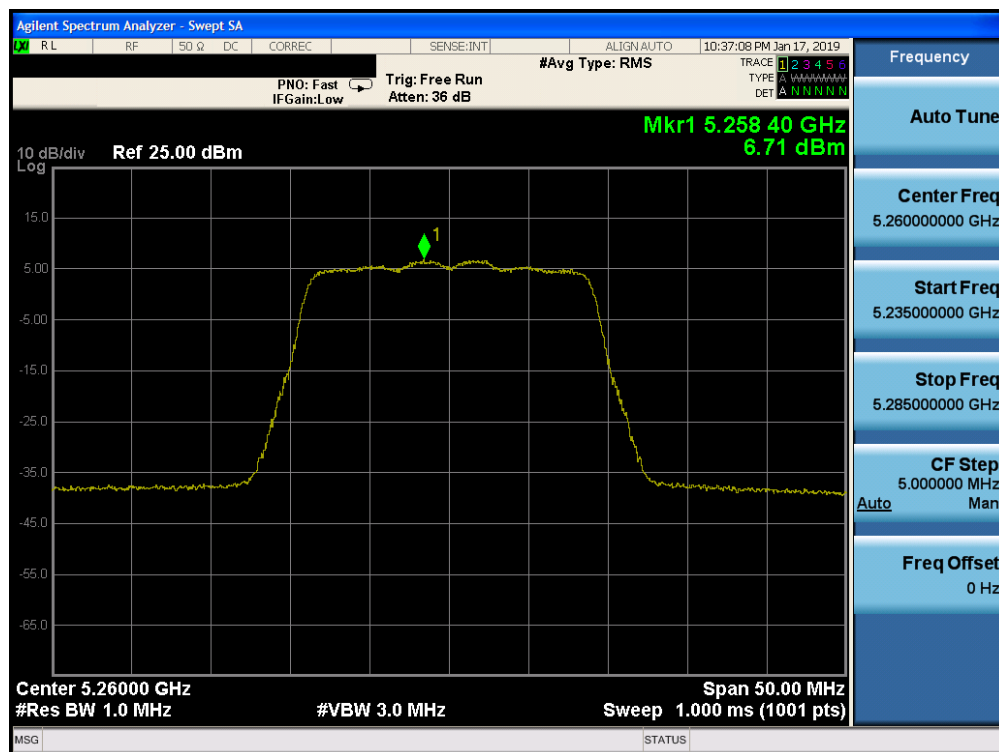
Plot 7-84. Power Spectral Density Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 74 of 205



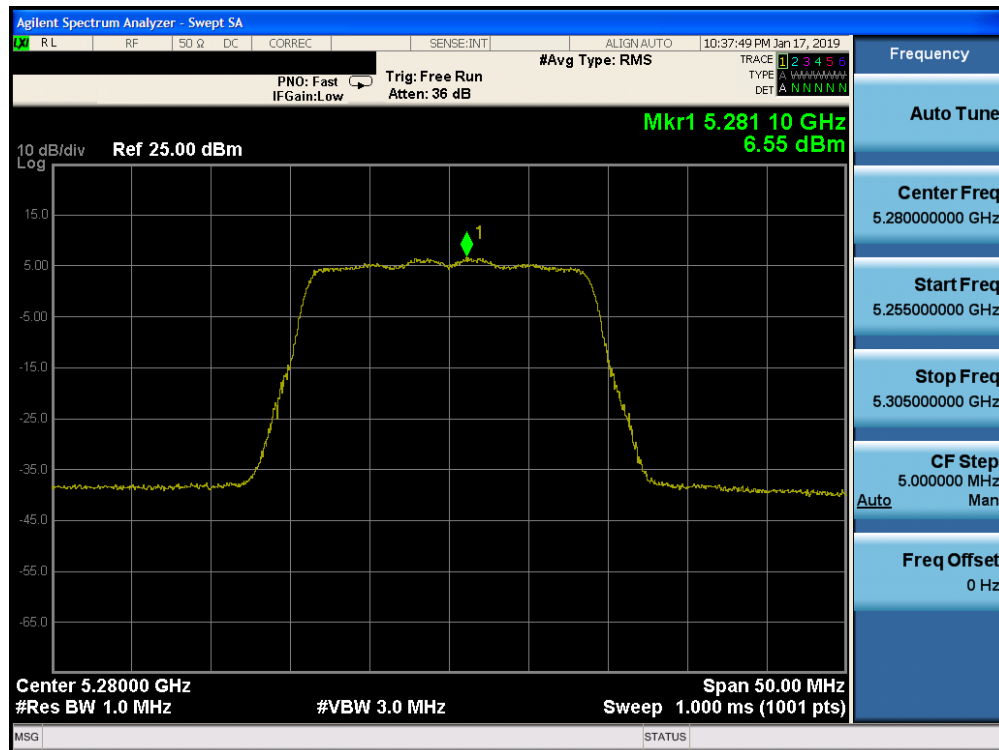


Plot 7-87. Power Spectral Density Plot SISO CORE1 (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)

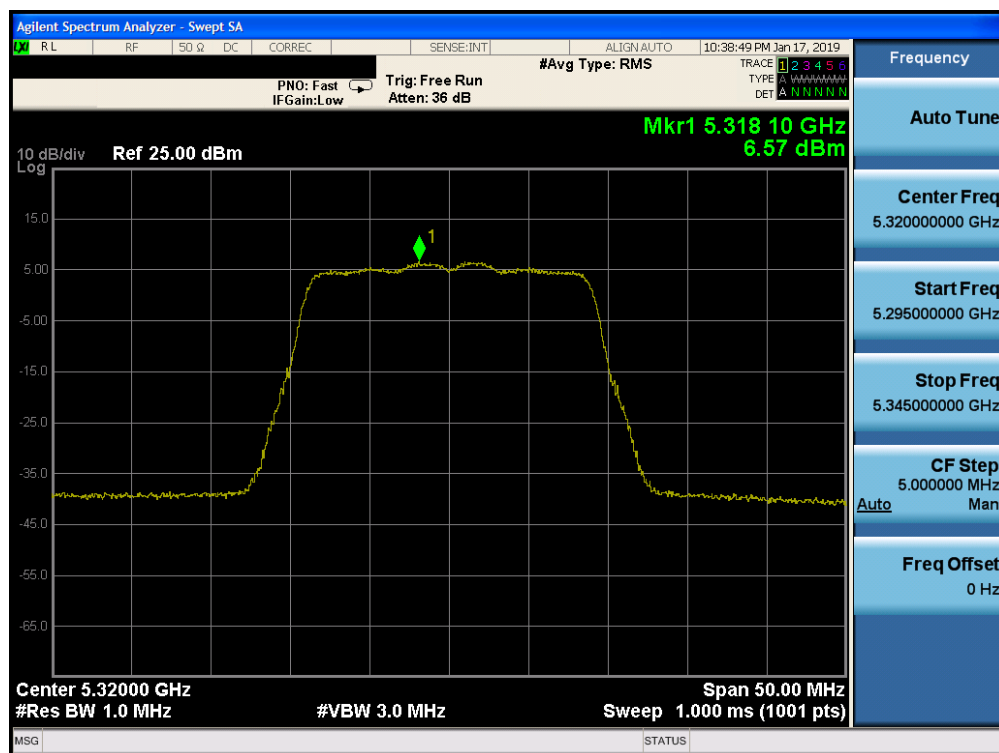


Plot 7-88. Power Spectral Density Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 76 of 205

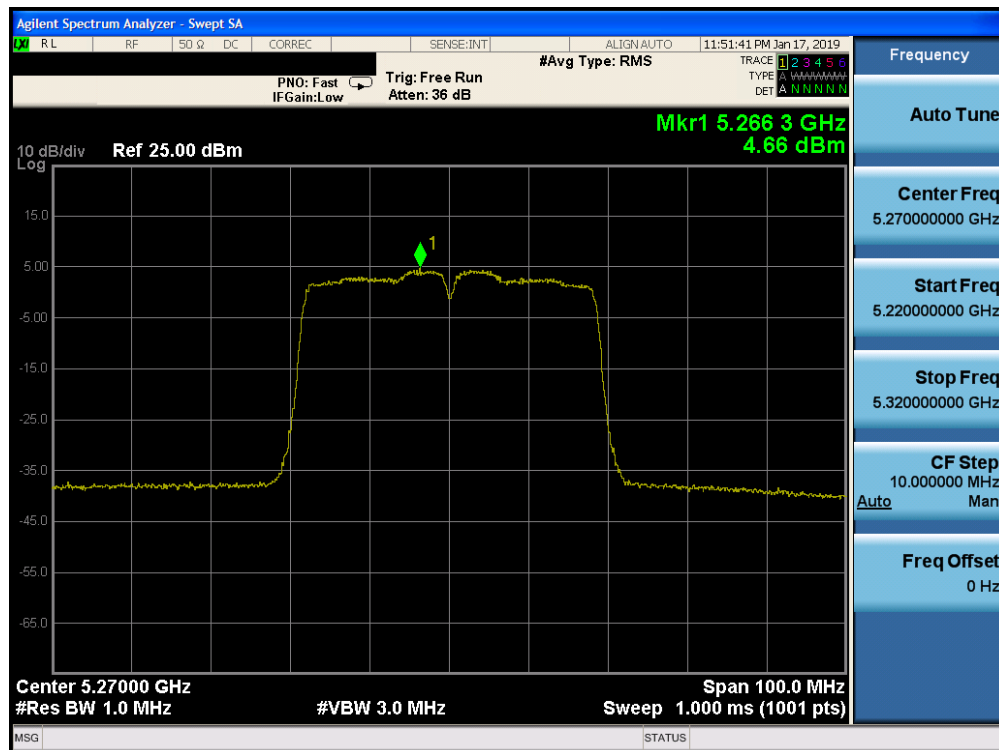


Plot 7-89. Power Spectral Density Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)

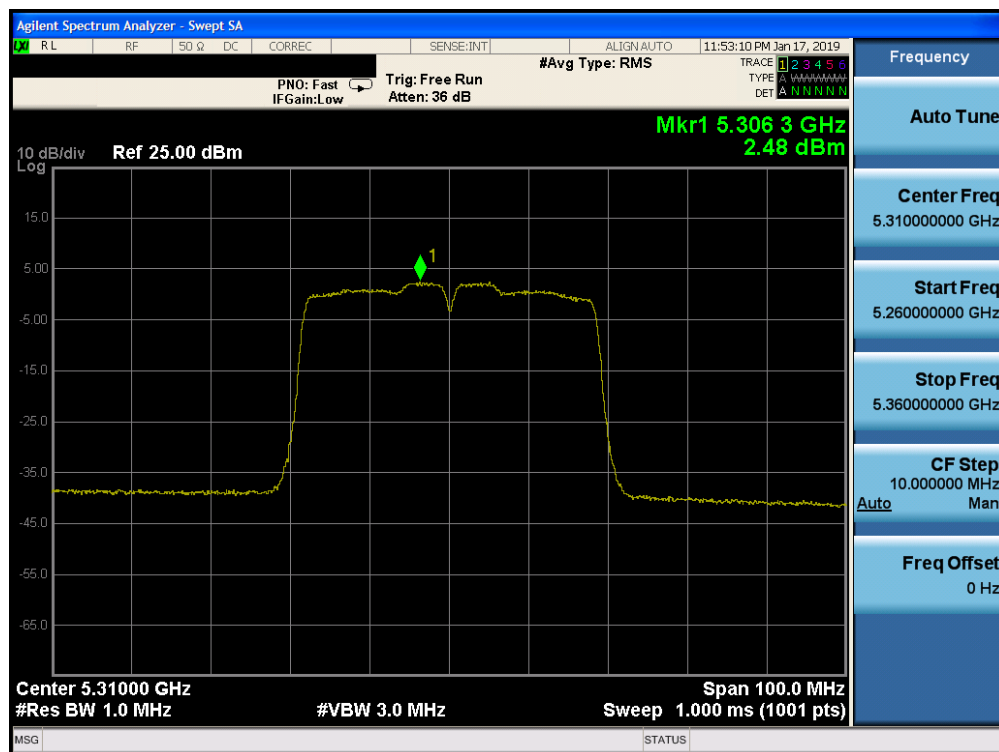


Plot 7-90. Power Spectral Density Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 77 of 205

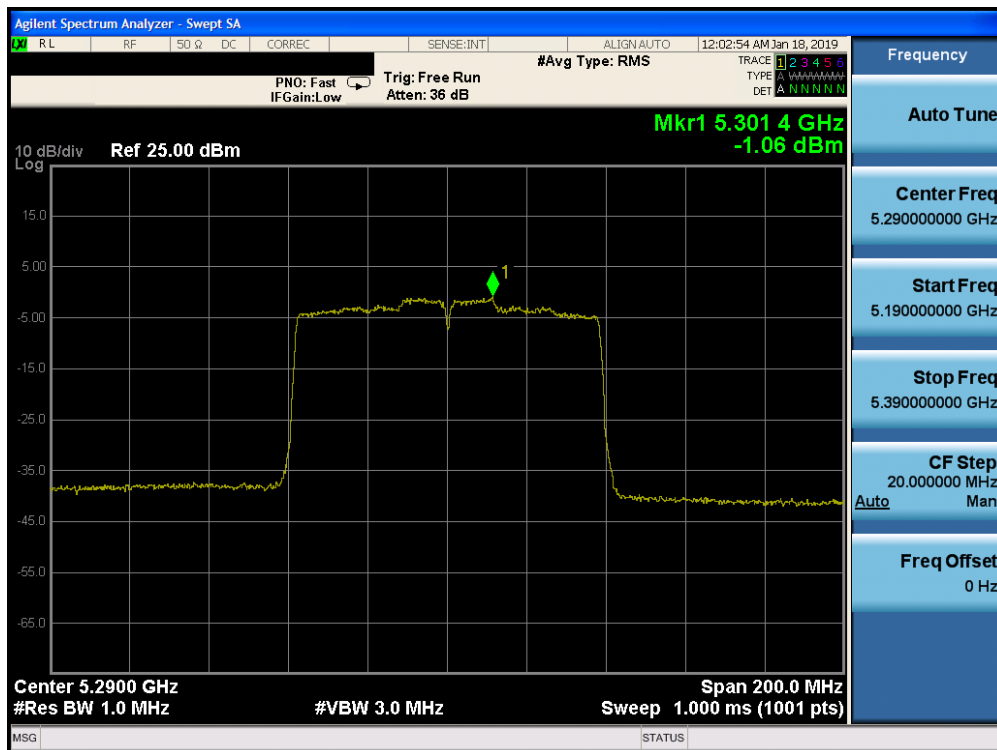


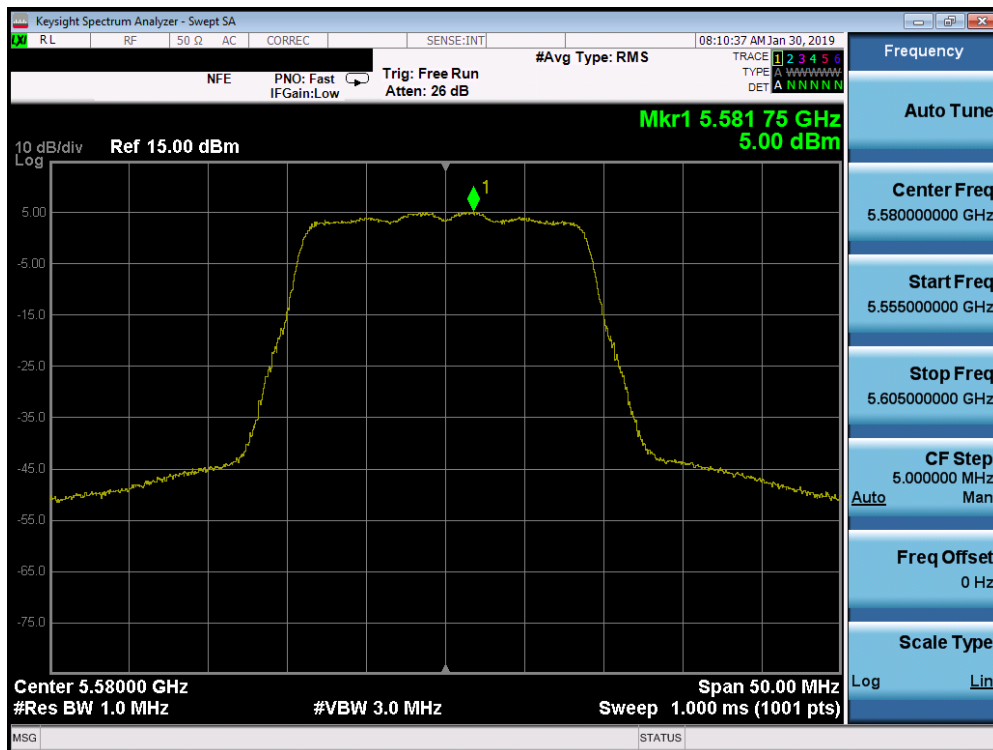
Plot 7-91. Power Spectral Density Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)



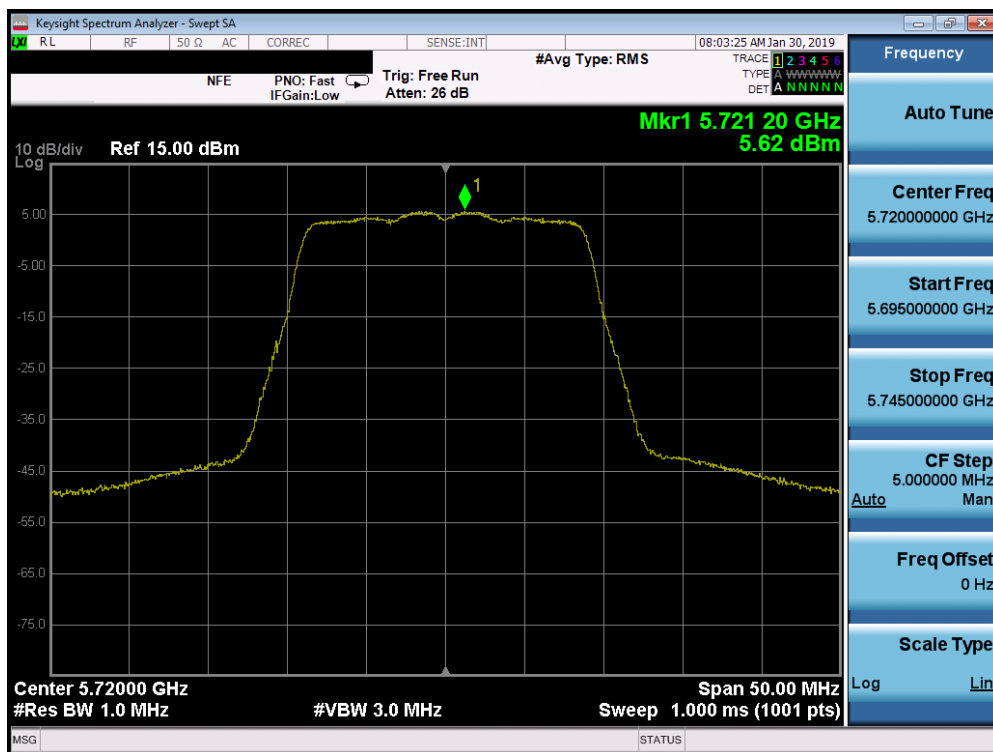
Plot 7-92. Power Spectral Density Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 78 of 205



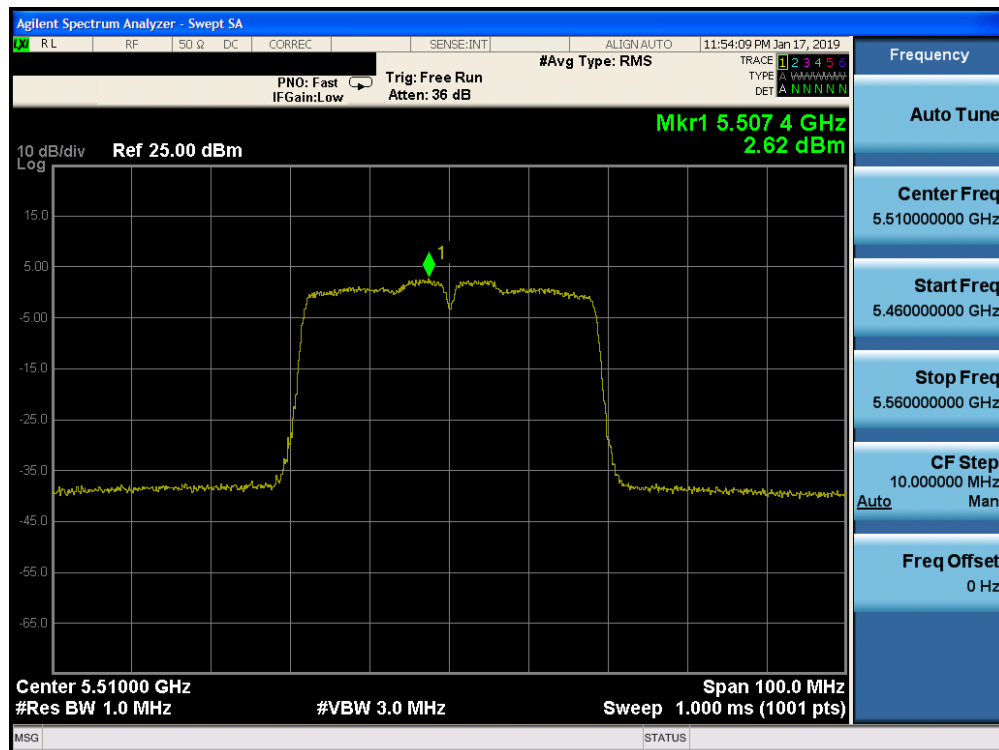


Plot 7-95. Power Spectral Density Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 2C) – Ch. 116)

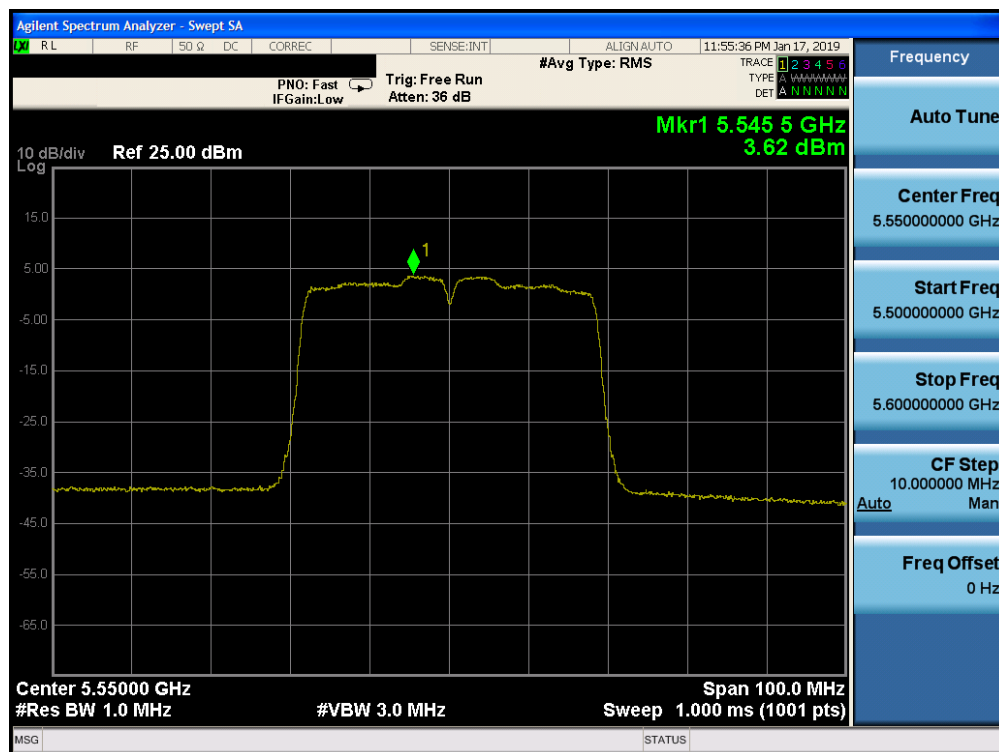


Plot 7-96. Power Spectral Density Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 2C) – Ch. 144)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 80 of 205

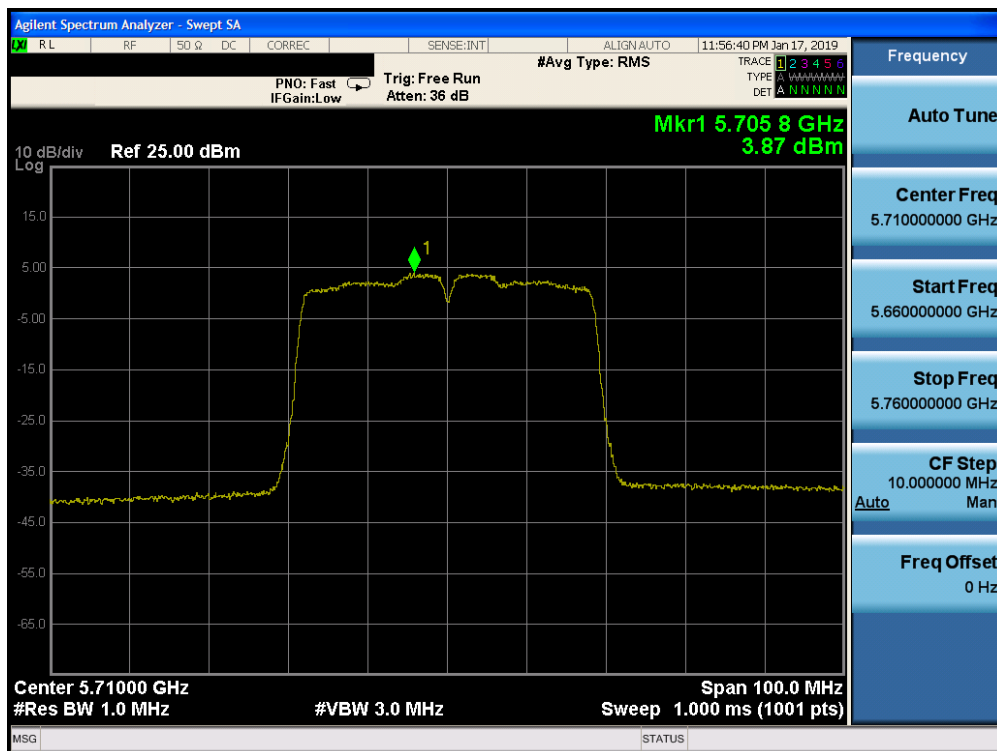


Plot 7-97. Power Spectral Density Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)

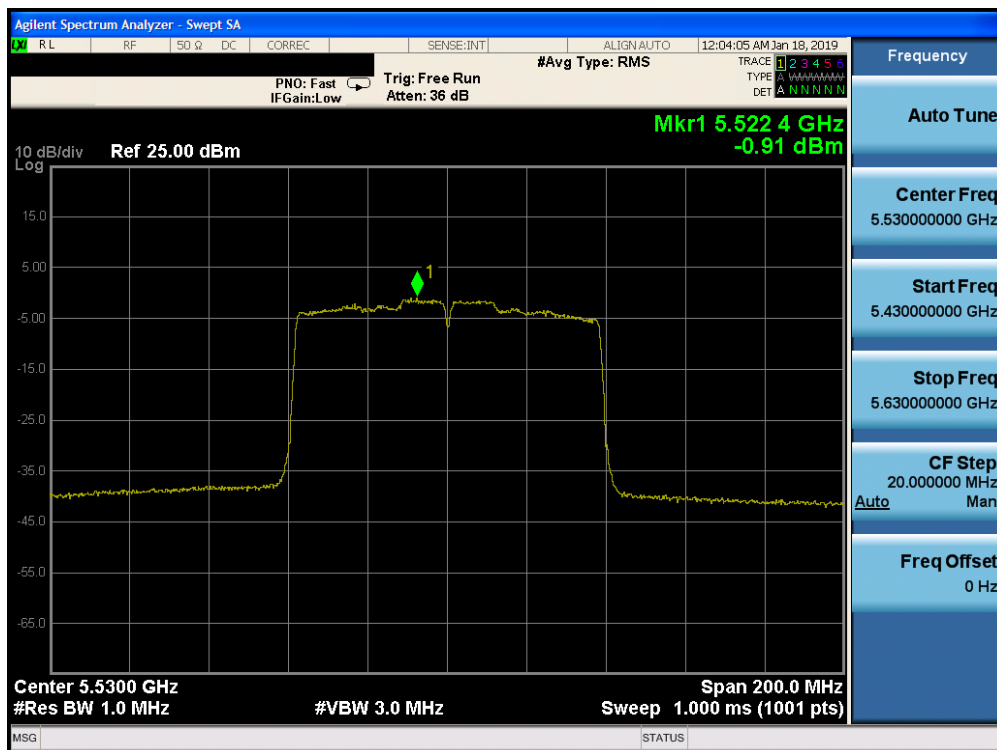


Plot 7-98. Power Spectral Density Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 2C) – Ch. 110)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 81 of 205

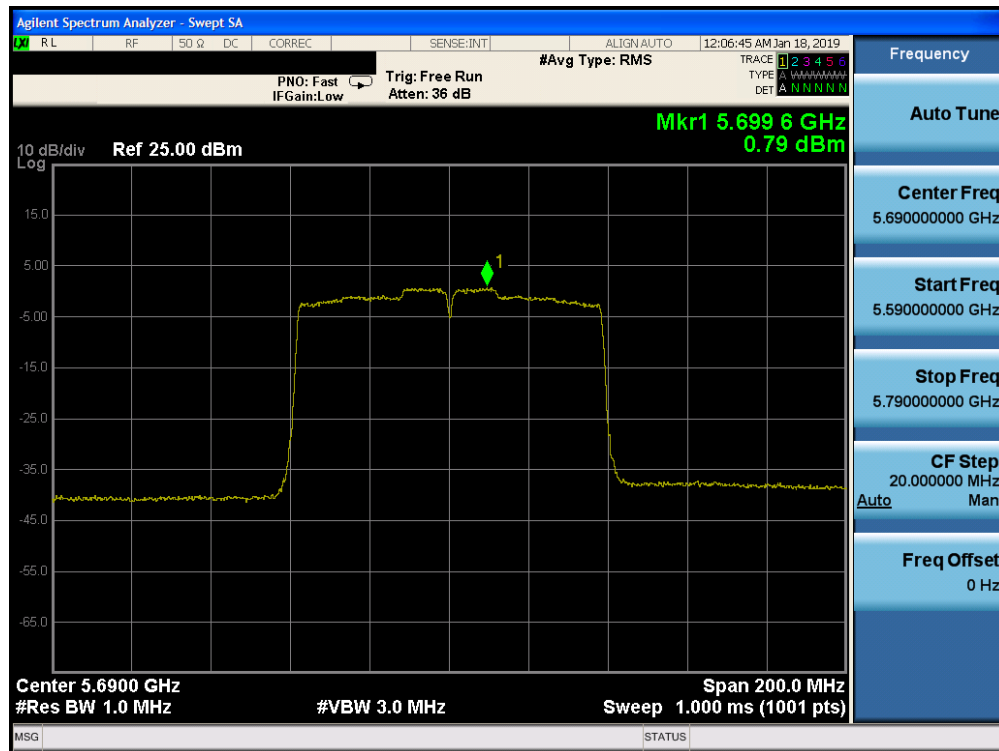


Plot 7-99. Power Spectral Density Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 2C) – Ch. 142)



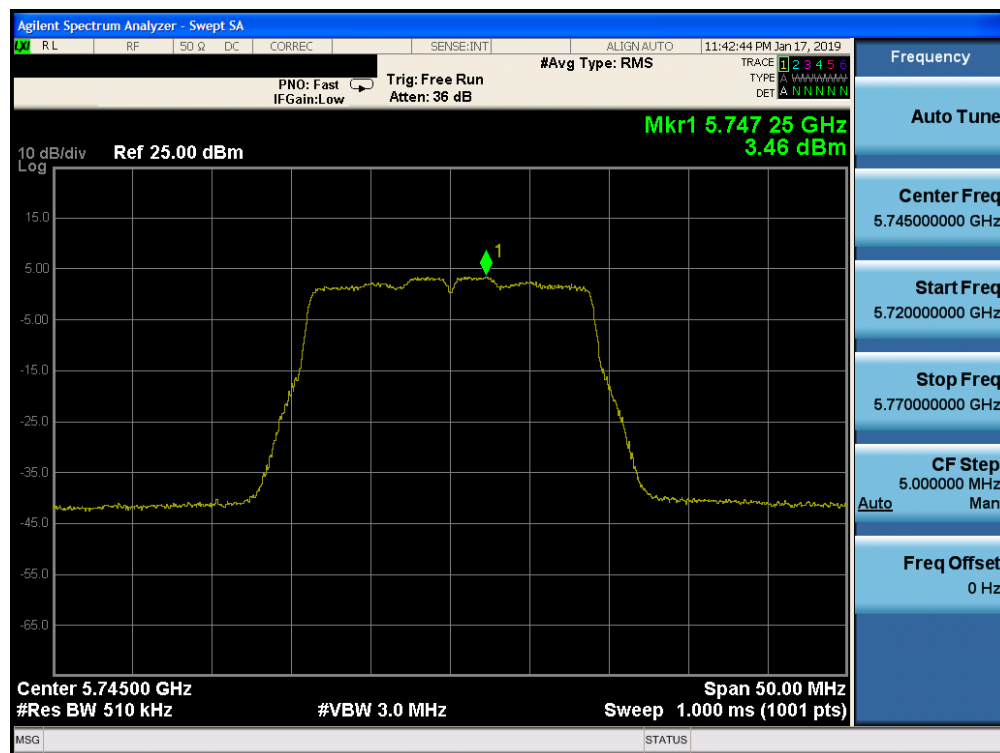
Plot 7-100. Power Spectral Density Plot SISO CORE1 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 106)

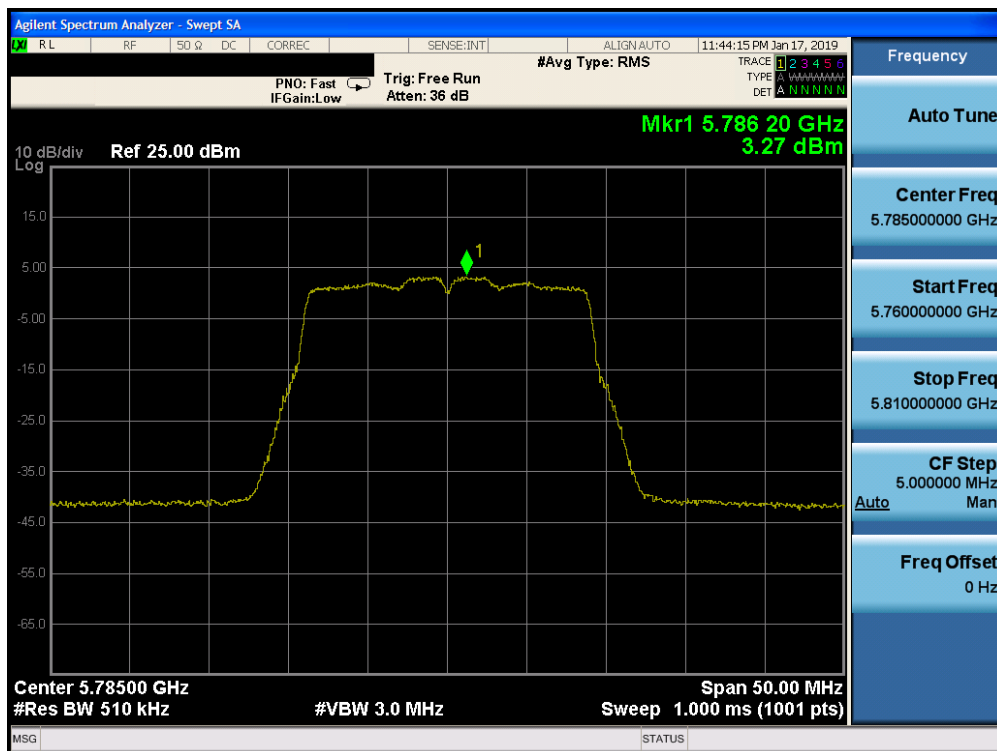
FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 82 of 205



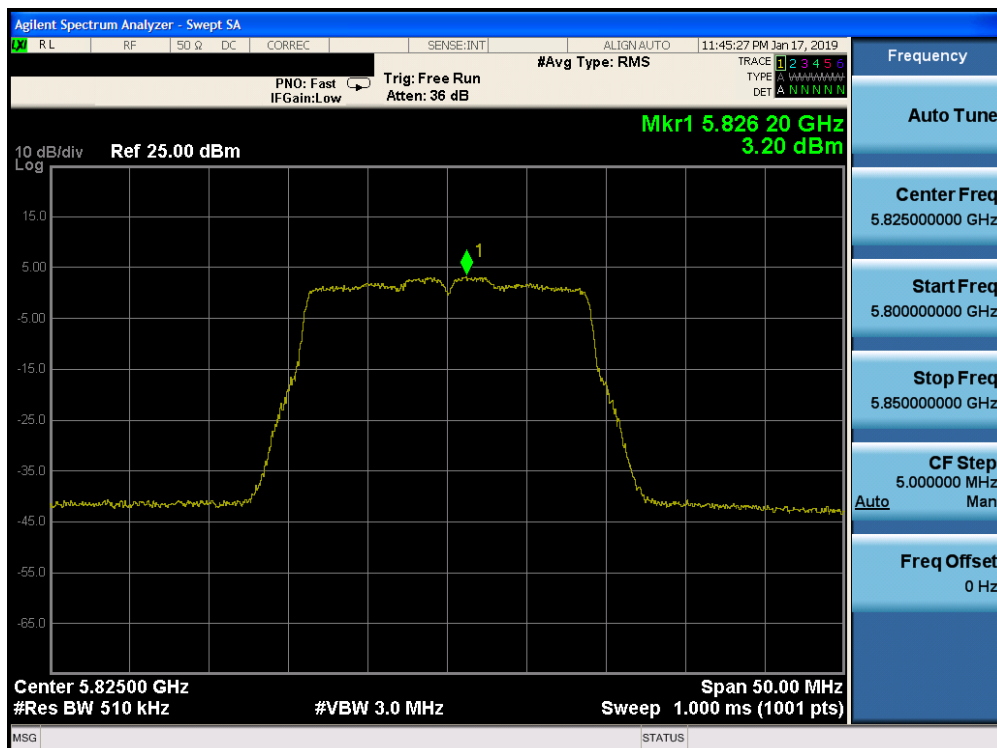
Plot 7-101. Power Spectral Density Plot SISO CORE1 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 138)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 83 of 205



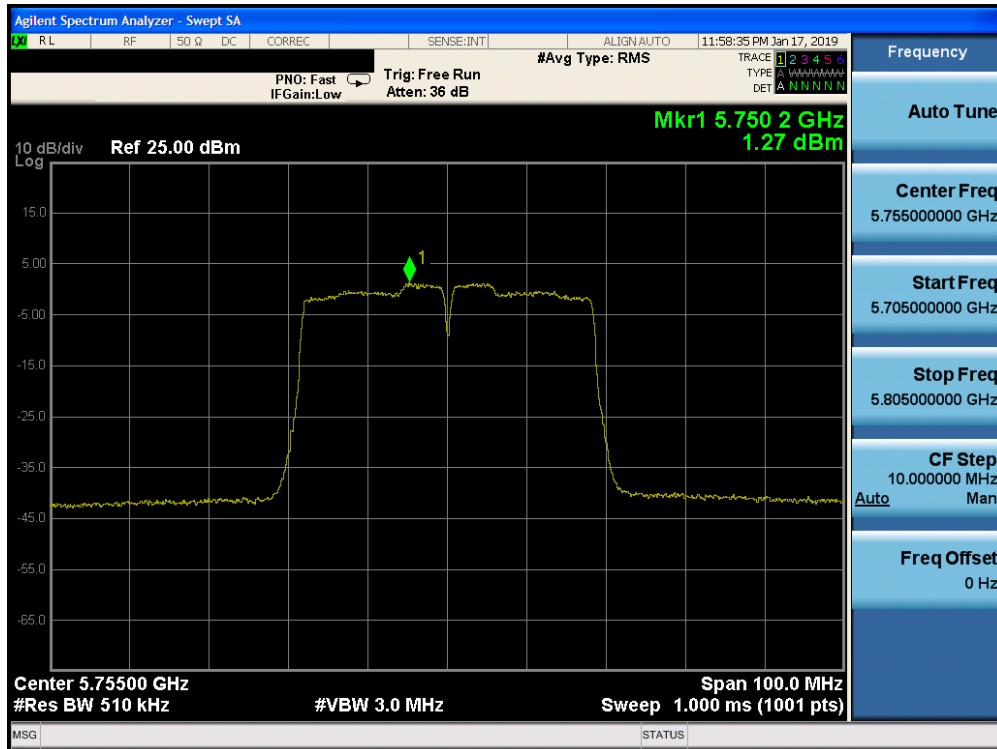


Plot 7-103. Power Spectral Density Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 3) – Ch. 157)

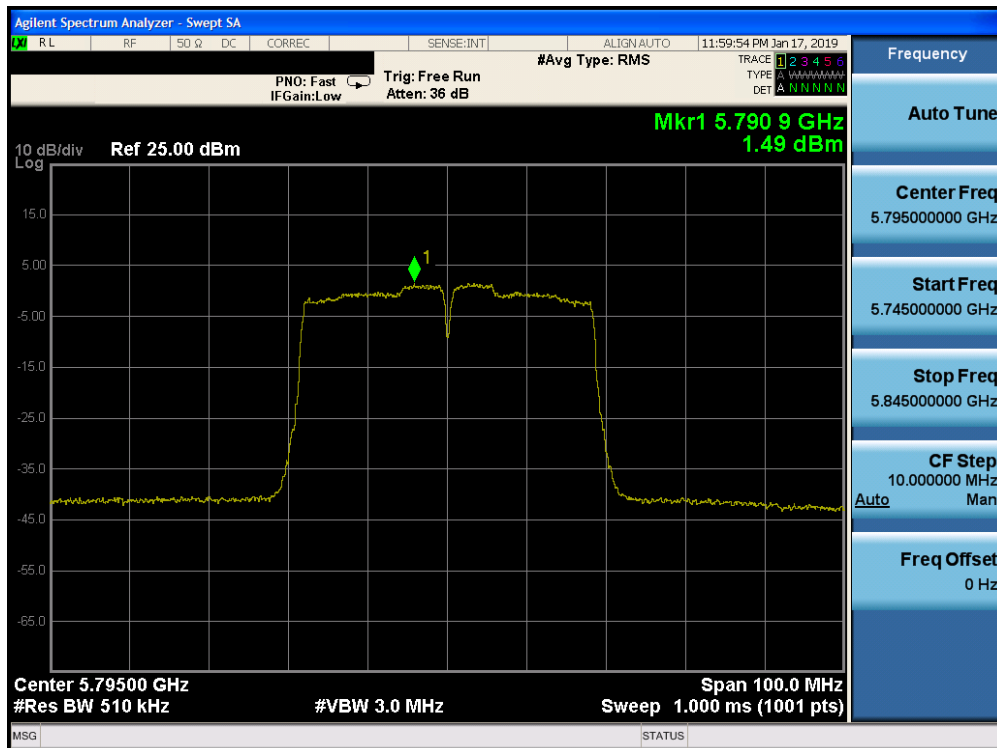


Plot 7-104. Power Spectral Density Plot SISO CORE1 (20MHz BW 802.11n (UNII Band 3) – Ch. 165)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 85 of 205

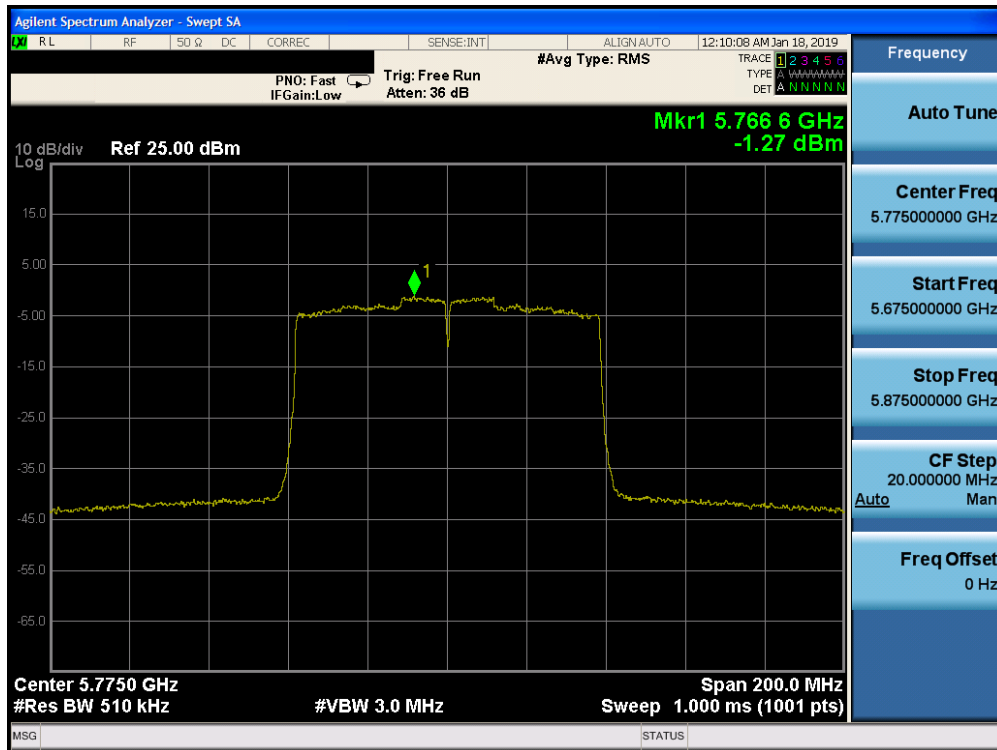


Plot 7-105. Power Spectral Density Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 3) – Ch. 151)



Plot 7-106. Power Spectral Density Plot SISO CORE1 (40MHz BW 802.11n (UNII Band 3) – Ch. 159)

FCC ID: BCGA2153	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 86 of 205



Summed MIMO/CDD Power Spectral Density Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Core 0 Power Density [dBm/MHz]	Core 1 Power Density [dBm/MHz]	Summed MIMO/CDD Power Density [dBm/MHz]	Max Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	n (20MHz)	6.5/7.2 (MCS0)	5.10	5.77	8.46	11.0	-2.54
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	6.15	7.53	9.90	11.0	-1.10
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	6.24	7.48	9.91	11.0	-1.09
	5190	38	n (40MHz)	13.5/15 (MCS0)	1.66	1.49	4.59	11.0	-6.41
	5230	46	n (40MHz)	13.5/15 (MCS0)	4.27	5.83	8.13	11.0	-2.87
Band 2A	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-2.01	-1.92	1.05	11.0	-9.95
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	7.34	6.50	9.95	11.0	-1.05
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	7.08	6.79	9.95	11.0	-1.05
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	4.57	5.20	7.91	11.0	-3.09
	5270	54	n (40MHz)	13.5/15 (MCS0)	4.84	4.42	7.65	11.0	-3.35
Band 2C	5310	62	n (40MHz)	13.5/15 (MCS0)	0.75	0.69	3.73	11.0	-7.27
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	-2.64	-2.49	0.45	11.0	-10.55
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	5.69	6.29	9.01	11.0	-1.99
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	4.98	5.22	8.11	11.0	-2.89
	5720	144	n (20MHz)	6.5/7.2 (MCS0)	5.50	5.99	8.76	11.0	-2.24
	5510	102	n (40MHz)	13.5/15 (MCS0)	1.76	1.59	4.69	11.0	-6.31
	5550	110	n (40MHz)	13.5/15 (MCS0)	3.65	3.65	6.66	11.0	-4.34
	5710	142	n (40MHz)	13.5/15 (MCS0)	3.14	3.08	6.12	11.0	-4.88
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	-2.16	-2.36	0.75	11.0	-10.25
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	0.62	1.00	3.82	11.0	-7.18

Table 7-30. Bands 1, 2A, 2C MIMO/CDD Conducted Power Spectral Density Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Mode	Core 0 Power Density [dBm/MHz]	Core 1 Power Density [dBm/MHz]	Summed MIMO/CDD Power Density [dBm/MHz]	Directional Antenna Gain [dBi]	e.i.r.p. Power Density [dBm/MHz]	ISED Max e.i.r.p. Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	n (20MHz)	6.5/7.2 (MCS0)	SDM	1.79	1.93	4.87	2.18	7.05	10.0	-2.95
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	SDM	1.70	2.14	4.94	2.18	7.12	10.0	-2.88
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	SDM	1.84	1.64	4.75	2.18	6.93	10.0	-3.07
	5190	38	n (40MHz)	13.5/15 (MCS0)	SDM	0.69	0.74	3.73	2.18	5.91	10.0	-4.09
	5230	46	n (40MHz)	13.5/15 (MCS0)	SDM	2.29	2.93	5.63	2.18	7.82	10.0	-2.18
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	CDD	-2.01	-1.92	1.05	5.18	6.22	10.0	-3.78

Table 7-31. Band 1 MIMO/CDD e.i.r.p. Conducted Power Spectral Density Measurements (ISED)

FCC ID: BCGA2153	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1811080028-10.BCG	Test Dates: 11/09/2018-02/02/2019	EUT Type: Tablet Device	Page 88 of 205