**MEASUREMENT REPORT****FCC PART 15.247 / ISSED RSS-247 WLAN 802.11b/g/n****Applicant Name:**

Apple Inc.
One Apple Park Way
Cupertino, CA 95014
United States

Date of Testing:

07/27/2018-09/21/2018

Test Site/Location:

PCTEST Lab. Morgan Hill, CA, USA

Test Report Serial No.:

1C1806220013-02.BCG

FCC ID:

BCGA1980

IC:

579C-A1980

APPLICANT:

Apple Inc.

Application Type:

Certification

Model/HVIN:

A1980

EUT Type:

Tablet Device

Frequency Range:

2412 – 2472MHz

FCC Classification:

Digital Transmission System (DTS)

FCC Rule Part(s):

Part 15 Subpart C (15.247)

ISED Specification:

RSS-247 Issue 2

Test Procedure(s):

ANSI C63.10-2013, KDB 558074 D01 v05,
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 558074 D01 v05. 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.

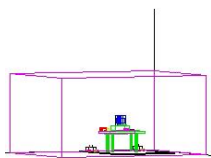

Randy Ortanez
President

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 1 of 145

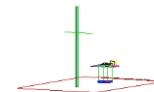
TABLE OF CONTENTS

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	6
2.4	Test Support Equipment	6
2.5	Test Configuration	7
2.6	Software and Firmware	7
2.7	EMI Suppression Device(s)/Modifications	7
3.0	DESCRIPTION OF TESTS	8
3.1	Evaluation Procedure	8
3.2	AC Line Conducted Emissions	8
3.3	Radiated Emissions	9
3.4	Environmental Conditions	9
4.0	ANTENNA REQUIREMENTS	10
5.0	MEASUREMENT UNCERTAINTY	11
6.0	TEST EQUIPMENT CALIBRATION DATA	12
7.0	TEST RESULTS	13
7.1	Summary	13
7.2	6dB Bandwidth Measurement	14
7.3	Output Power Measurement	30
7.3.1	Average Output Power Measurement	31
7.3.2	Peak Output Power Measurement	33
7.4	Power Spectral Density	36
7.5	Conducted Emissions at the Band Edge	66
7.6	Conducted Spurious Emissions	85
7.7	Radiated Spurious Emission Measurements – Above 1 GHz	96
7.7.1	SISO Core 0 Radiated Spurious Emission Measurements	99
7.7.2	SISO Core 1 Primary Radiated Spurious Emission Measurements	102
7.7.3	SISO Core 1 Diversity Radiated Spurious Emission Measurements	105
7.7.4	CDD Primary Radiated Spurious Emission Measurements	108
7.7.5	CDD Diversity Radiated Spurious Emission Measurements	112
7.7.6	SISO Core 0 Radiated Restricted Band Edge Measurements	115
7.7.7	SISO Core 1 Primary Radiated Restricted Band Edge Measurements	120
7.7.8	SISO Core 1 Diversity Radiated Restricted Band Edge Measurements	125
7.7.9	CDD Primary Radiated Restricted Band Edge Measurements	129
7.7.10	CDD Diversity Radiated Restricted Band Edge Measurements	133
7.8	Radiated Spurious Emissions Measurements – Below 1GHz	137
7.9	Line-Conducted Test Data	141
8.0	CONCLUSION	145

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 2 of 145



MEASUREMENT REPORT



Mode	Tx Frequency (MHz)	Core 0				Core 1 Primary				Core 1 Diversity				MIMO Primary				MIMO Diversity			
		Avg Conducted		Peak Conducted		Avg Conducted		Peak Conducted		Avg Conducted		Peak Conducted		Avg Conducted		Peak Conducted		Avg Conducted		Peak Conducted	
		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)	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)
802.11b	2412 - 2472	56.234	17.50	105.439	20.23	56.234	17.50	98.175	19.92	125.893	21.00	228.560	23.59	N/A				N/A			
802.11g	2412 - 2472	56.234	17.50	246.604	23.92	56.234	17.50	238.781	23.78	125.893	21.00	382.825	25.83	112.460	20.51	477.051	26.79	145.211	21.62	551.608	27.42
802.11n	2412 - 2472	56.234	17.50	259.418	24.14	56.234	17.50	246.037	23.91	125.893	21.00	387.258	25.88	112.460	20.51	510.132	27.08	145.211	21.62	571.785	27.57

EUT Overview

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	
			Page 3 of 145

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: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 4 of 145

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Tablet Device FCC ID: BCGA1980**. The test data contained in this report pertains only to the emissions due to the EUT's WLAN (DTS) transmitter.

Test Device Serial No.: DLXX300JKR4G, DLXX2029KR4G

2.2 Device Capabilities

This device contains the following capabilities:

802.11b/g/n WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE, HDR4, HDR8)

Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	13	2472
7	2442		

Table 2-1. Frequency/ Channel Operations

Note: 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 6.0 b) of ANSI C63.10-2013 and KDB 558074 D01 v05. 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 [%]				
		SISO Core 0	SISO Core 1 Primary	SISO Core 1 Diversity	CDD Primary	CDD Diversity
2.4GHz	b	100.0	100.0	100.0	N/A	N/A
	g	99.0	98.6	98.7	98.9	98.8
	n	99.0	98.8	99.1	98.5	98.8

Table 2-2. Measured Duty Cycles

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device		Page 5 of 145

The device employs MIMO technology. Below are the possible configurations.

WiFi Configurations		SISO			Primary				Diversity			
					CDD		SDM		CDD		SDM	
		CORE0	CORE1 Primary	CORE1 Diversity	CORE0	CORE1 Primary	CORE0	CORE1 Primary	CORE0	CORE1 Primary	CORE0	CORE1 Primary
2.4GHz	11b	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗
	11g	✓	✓	✓	✓	✓	✗	✗	✓	✓	✗	✗
	11n	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 2-3. 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 Rates Supported: 1Mbps, 2Mbps, 5.5Mbps, 11Mbps (b)
 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps (g)
 6.5/7.2Mbps, 13/14.4Mbps, 19.5/21.7Mbps, 26/28.9Mbps, 39/43.3Mbps,
 52/57.8Mbps, 58.5/65Mbps, 65/72.2Mbps (n)
 13/14.4Mbps, 26/28.9Mbps, 39/43.3Mbps, 52/57.8Mbps, 78/86.7Mbps,
 104/115.6Mbps, 117/130Mbps, 130/144.4Mbps (MIMO n)

2.3 Antenna Description

Following antenna was used for the testing.

Frequency [GHz]	Antenna Gain (dBi)		
	Core 0	Core 1 Primary	Core 1 Diversity
2.4	1.8	-1.4	-14.0

Table 2-4. Antenna Peak Gain

2.4 Test Support Equipment

1	Apple MacBook w/AC/DC Adapter	Model: A1398 Model: A1435	S/N: C2QKP008F6F3 S/N: C04325505K1F288BG
2	Apple USB-C Cable	Model: Chimp	S/N: 300C44
3	USB-C Cable w/ AC Adapter	Model: A146 Model: A1720	S/N: N/A S/N: C3D8257A2EPGKVP2C
4	USB-C to 3.5mm Aux Adapter	Model: A2049	S/N: DWH413100GJJLT12
5	DC Power Supply	Model: KPS3010D	S/N: N/A

Table 2-5. Test Support Equipment Used

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 6 of 145

2.5 Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2013 and KDB 558074 D01 v05. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 7.9 for AC line conducted emissions test setups, 7.7 for radiated emissions test setups, and, 7.2, 7.3, 7.4, 7.5 and 7.6 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-C cable with wire charger
- EUT powered by host PC via USB-C cable with wire charger

Throughout the report, Core0 is correlating to WF8, Core1 Primary is correlating to WF7, and Core1 Diversity is correlating to ANT5B.

2.6 Software and Firmware

The test was conducted with firmware version 16B64 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: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 7 of 145

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 558074 D01 v05 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 65-5. 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 an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (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 7.9. 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: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 8 of 145

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.

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: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 9 of 145

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 connections to an external antenna.

Conclusion:

The EUT unit complies with the requirement of §15.203.

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 10 of 145

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	1.13
Line Conducted Disturbance	3.09
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 11 of 145

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	ML2495A	Power Meter	11/28/2017	Annual	11/28/2018	1039008
Anritsu	MA2411B	Power Sensor 10MHz-40GHz	11/28/2017	Annual	11/28/2018	1027293
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
Maturo	NCD/264/205616	Mast/TT controller	N/A	N/A	N/A	NCD_264
Rohde & Schwarz	ESW44	EMI Test Receiver	12/20/2017	Annual	12/20/2018	101668
Rohde & Schwarz	ESW44	EMI Test Receiver	11/16/2017	Annual	11/16/2018	101570
Rohde & Schwarz	FSV40	Signal Analyzer (10Hz-40GHz)	2/6/2018	Annual	2/6/2019	101619
Rohde & Schwarz	SFUNIT-RX	Shielded Filter Unit	7/5/2018	Annual	7/5/2019	102137
Rohde & Schwarz	SFUNIT-RX	Shielded Filter Unit	12/11/2017	Annual	12/11/2018	102136
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
ATM	180-442A-KF	20dB Nominal Gain Horn Antenna	3/13/2018	Annual	3/13/2019	T058601-02
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)	11/13/2017	Annual	11/13/2018	101057
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Antenna (400MHz-18GHz)	11/29/2017	Annual	11/29/2018	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: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 12 of 145

7.0 TEST RESULTS

7.1 Summary

Company Name: Apple Inc.

FCC ID: BCGA1980

FCC Classification: Digital Transmission System (DTS)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	RSS-247 [5.2]	6dB Bandwidth	> 500kHz	CONDUCTED	PASS	Section 7.2
15.247(b)(3)	RSS-247 [5.4]	Transmitter Output Power	< 1 Watt		PASS	Sections 7.3
15.247(e)	RSS-247 [5.2]	Transmitter Power Spectral Density	< 8dBm / 3kHz Band		PASS	Section 7.4
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions	≥ 20dBc		PASS	Sections 7.5, 7.6
15.205 15.209	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])	RADIATED	PASS	Sections 7.7, 7.8
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits (RSS-Gen[8.8])	LINE CONDUCTED	PASS	Section 7.9

Table 7-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. 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 "WLAN Automation," Version 3.5.
- 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 0.2.8.

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 13 of 145

7.2 6dB Bandwidth Measurement

§15.247(a.2); RSS-247 [5.2]

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 transmitter antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated and the worst case configuration results are reported in this section.

The minimum permissible 6dB bandwidth is 500 kHz.

Test Procedure Used

ANSI C63.10-2013 – Section 11.8.2 Option 2
KDB 558074 D01 v05 – Section 8.2

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to $X = 6$. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 100kHz
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize

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

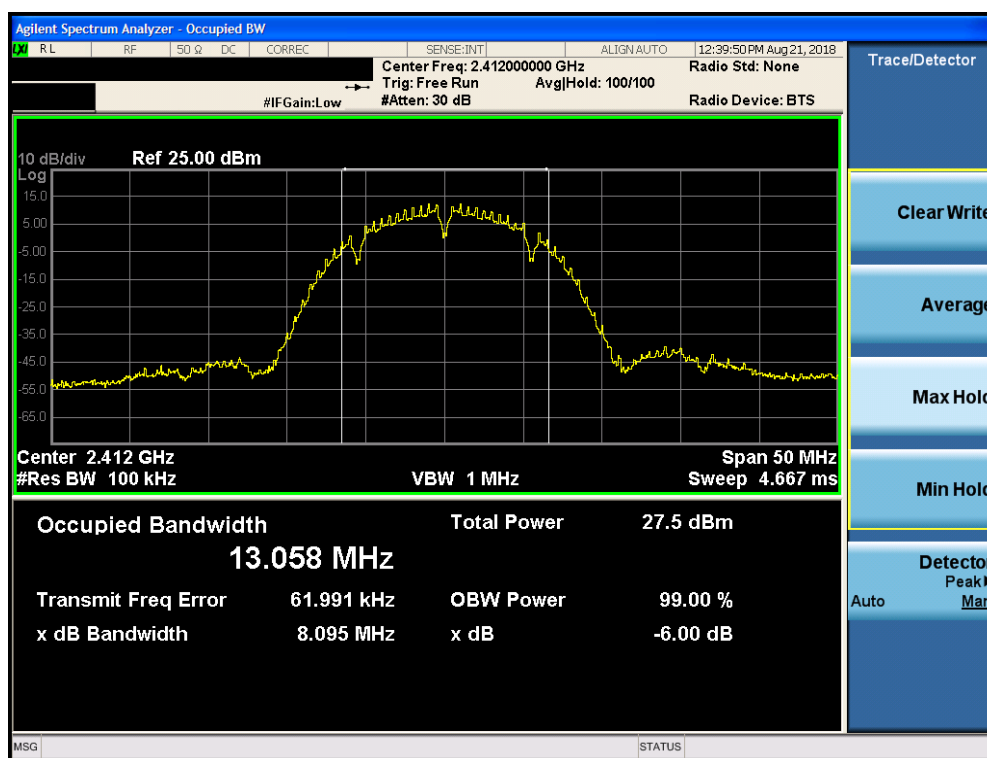
None

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 14 of 145

SISO Core 0 6 dB Bandwidth Measurements

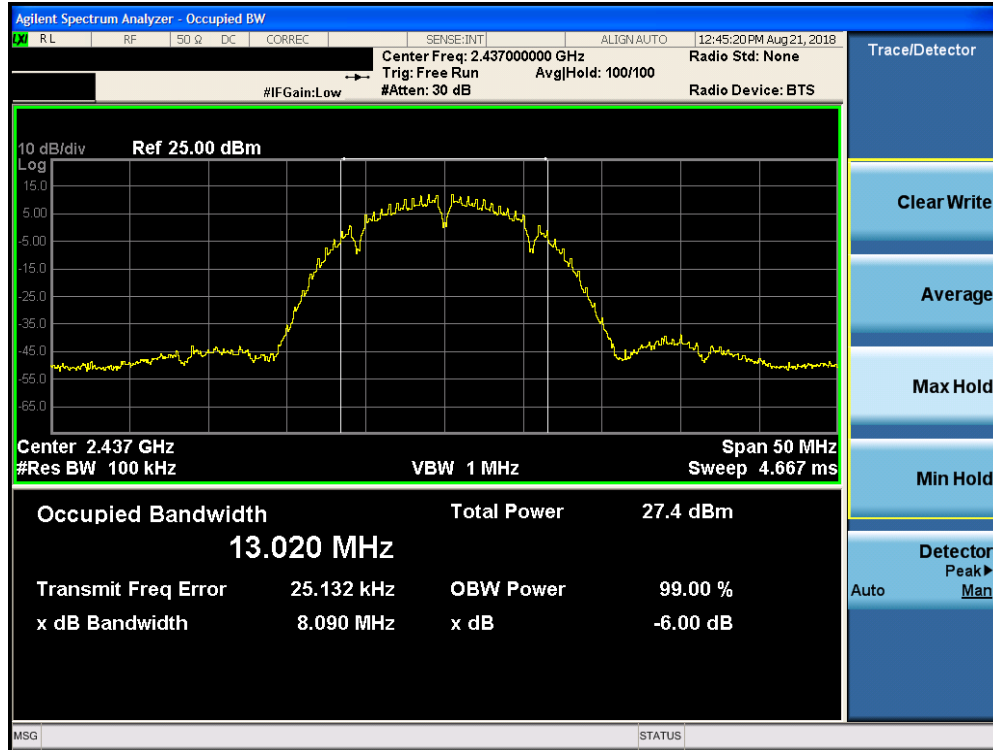
Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
2412	1	b	1	8.095	0.500
2437	6	b	1	8.090	0.500
2462	11	b	1	8.523	0.500
2412	1	g	6	15.74	0.500
2437	6	g	6	15.83	0.500
2462	11	g	6	15.83	0.500
2412	1	n	6.5/7.2 (MCS0)	16.14	0.500
2437	6	n	6.5/7.2 (MCS0)	16.93	0.500
2462	11	n	6.5/7.2 (MCS0)	16.27	0.500

Table 7-2. Conducted Bandwidth Measurements SISO Core 0

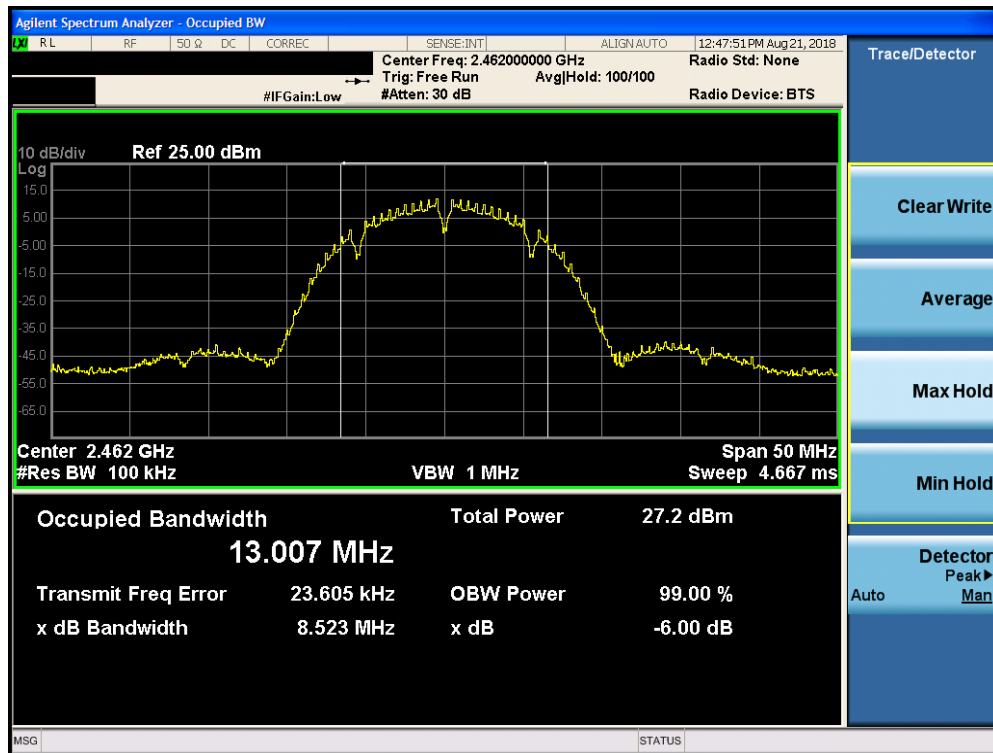


Plot 7-1. 6dB Bandwidth Plot SISO Core 0 (802.11b – Ch. 1)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 15 of 145

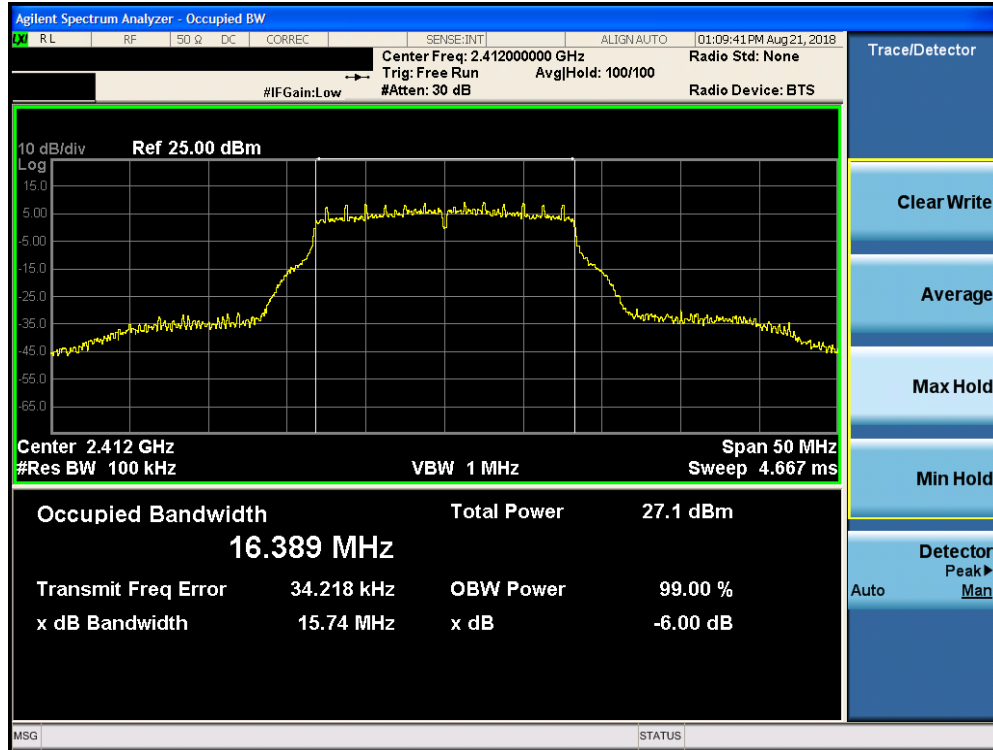


Plot 7-2. 6dB Bandwidth Plot SISO Core 0 (802.11b – Ch. 6)

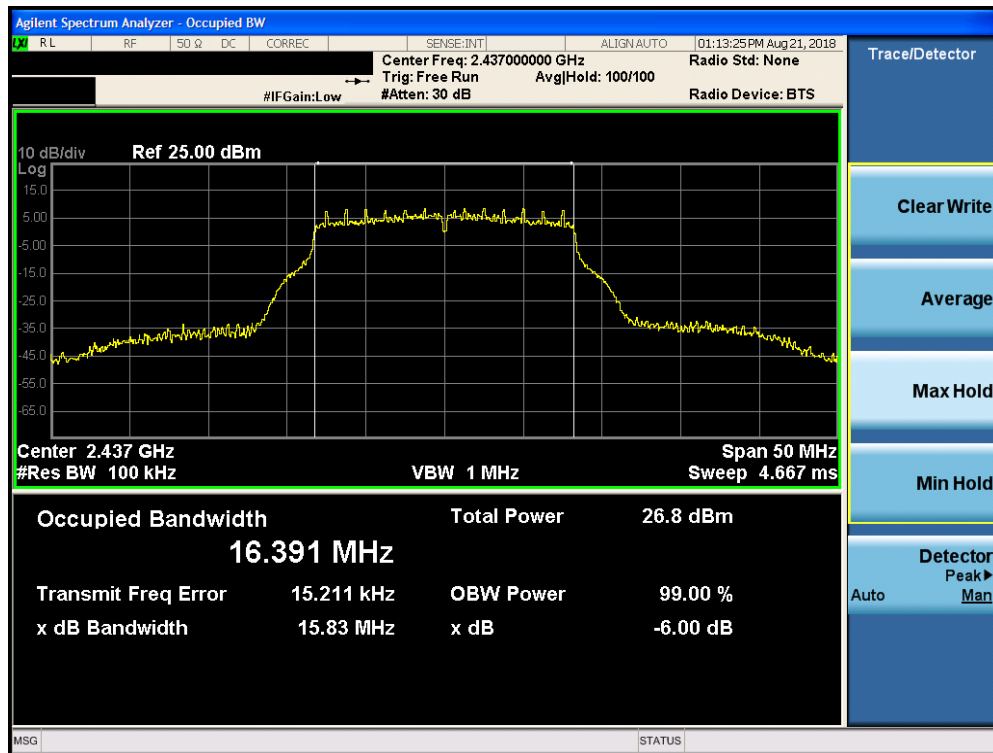


Plot 7-3. 6dB Bandwidth Plot SISO Core 0 (802.11b – Ch. 11)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 16 of 145

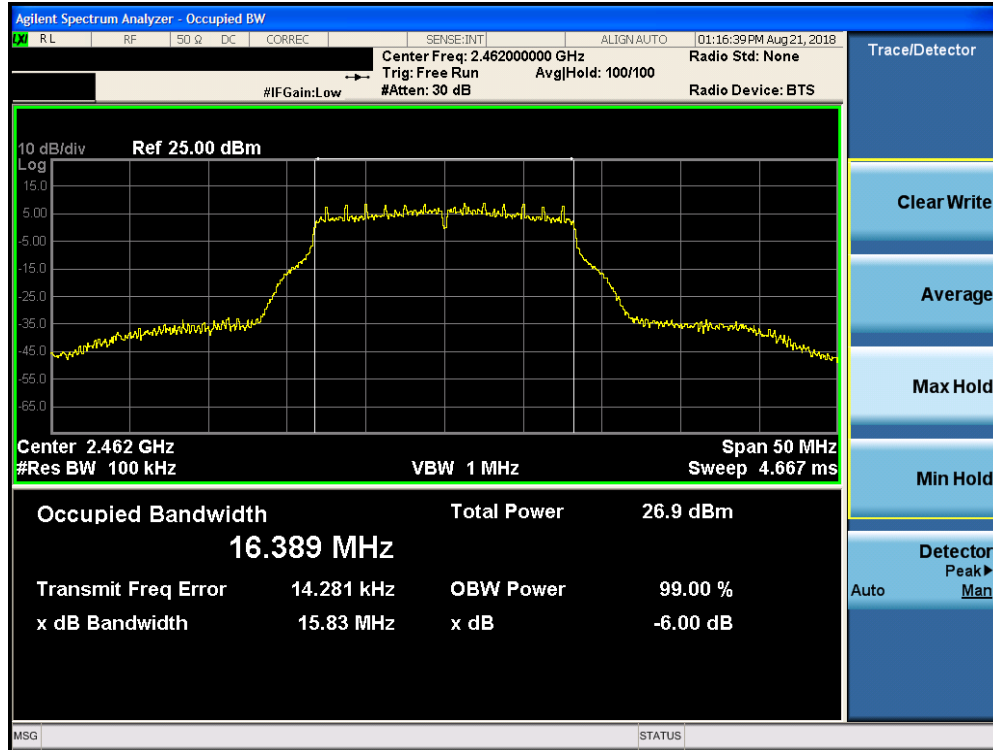


Plot 7-4. 6dB Bandwidth Plot SISO Core 0 (802.11g – Ch. 1)

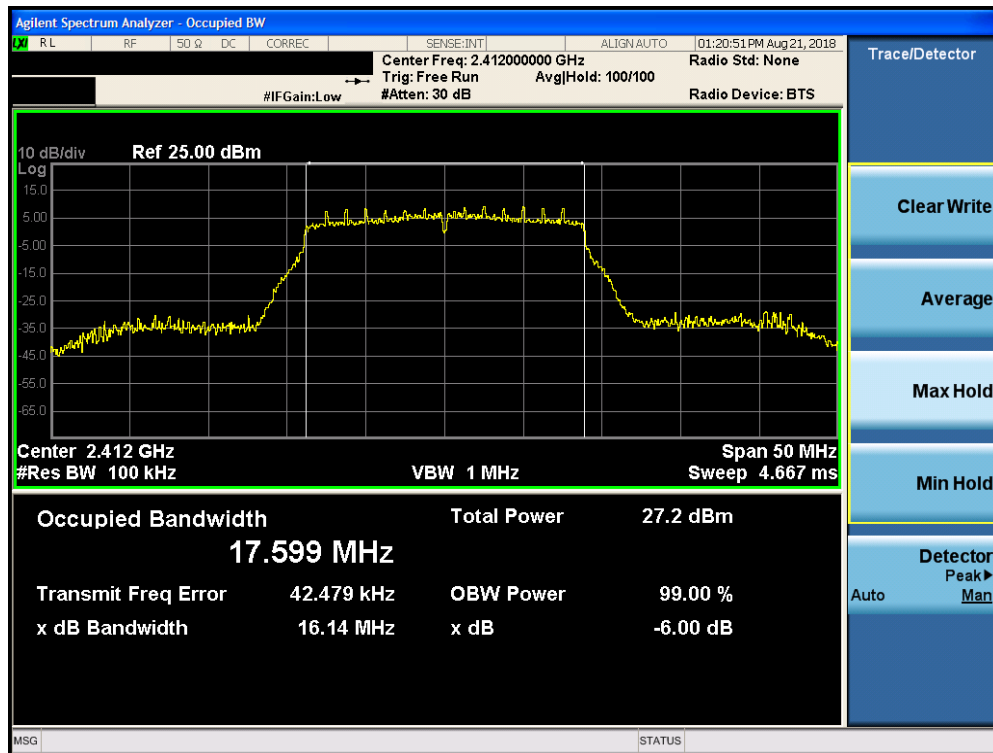


Plot 7-5. 6dB Bandwidth Plot SISO Core 0 (802.11g – Ch. 6)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 17 of 145

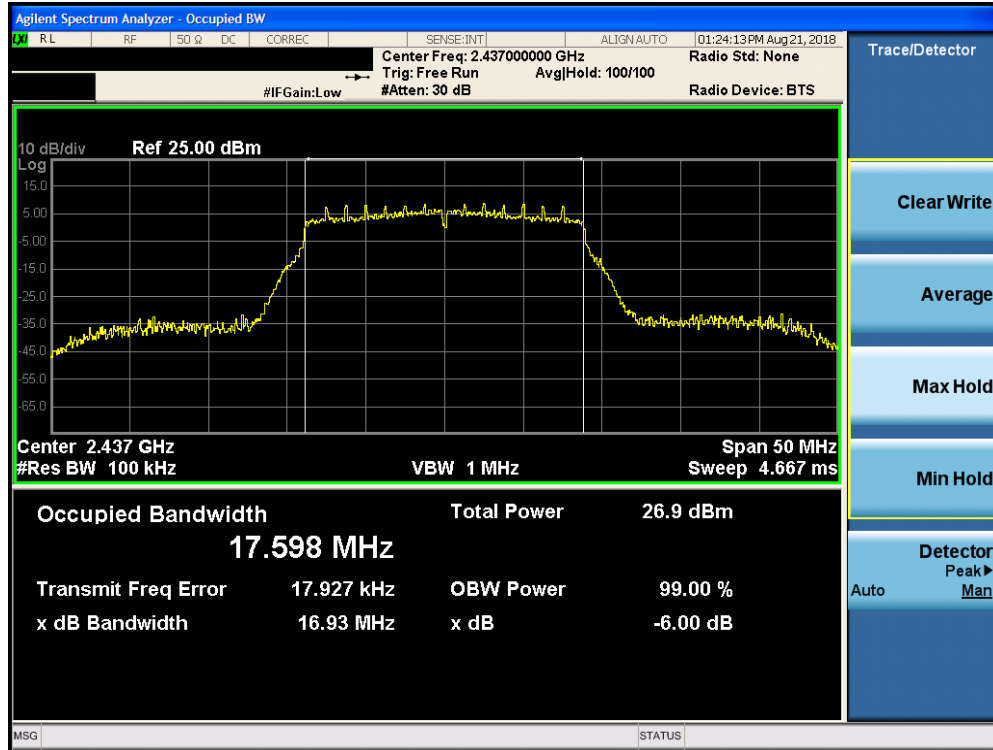


Plot 7-6. 6dB Bandwidth Plot SISO Core 0 (802.11g – Ch. 11)

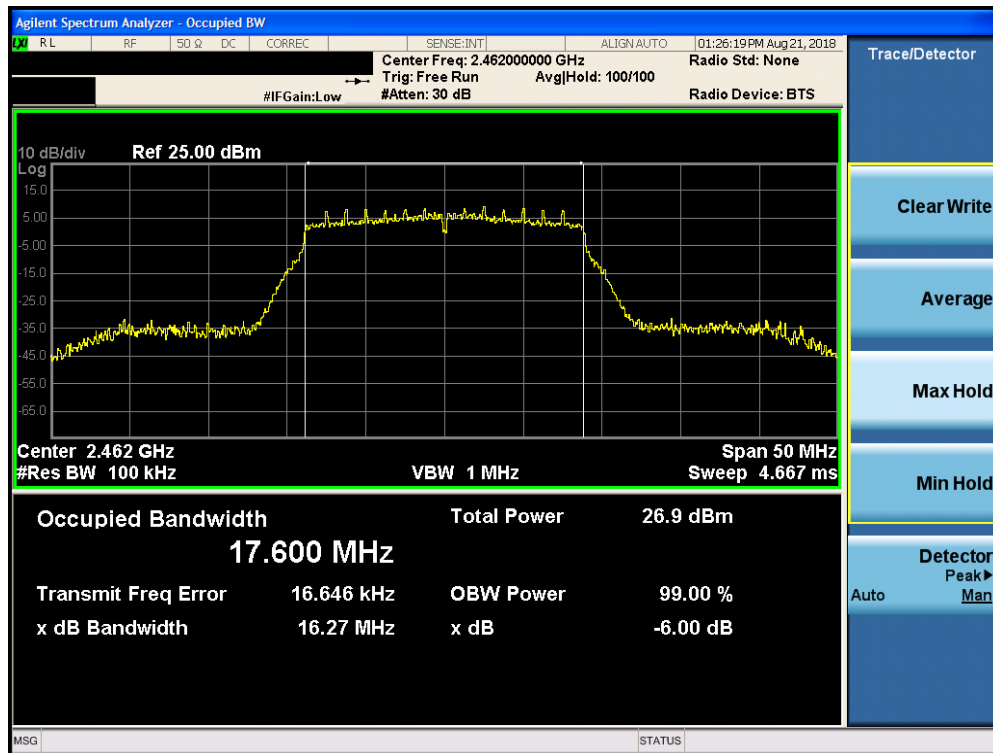


Plot 7-7. 6dB Bandwidth Plot SISO Core 0 (802.11n (2.4GHz) – Ch. 1)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 18 of 145



Plot 7-8. 6dB Bandwidth Plot SISO Core 0 (802.11n (2.4GHz) – Ch. 6)



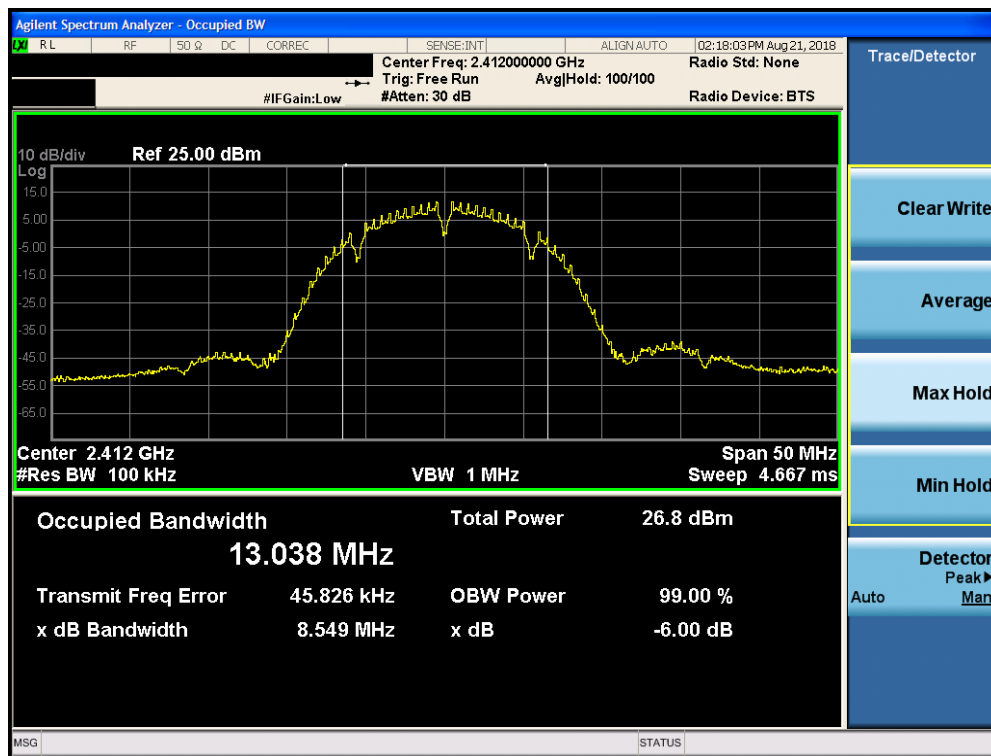
Plot 7-9. 6dB Bandwidth Plot SISO Core 0 (802.11n (2.4GHz) – Ch. 11)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 19 of 145

SISO Core 1 Primary 6 dB Bandwidth Measurements

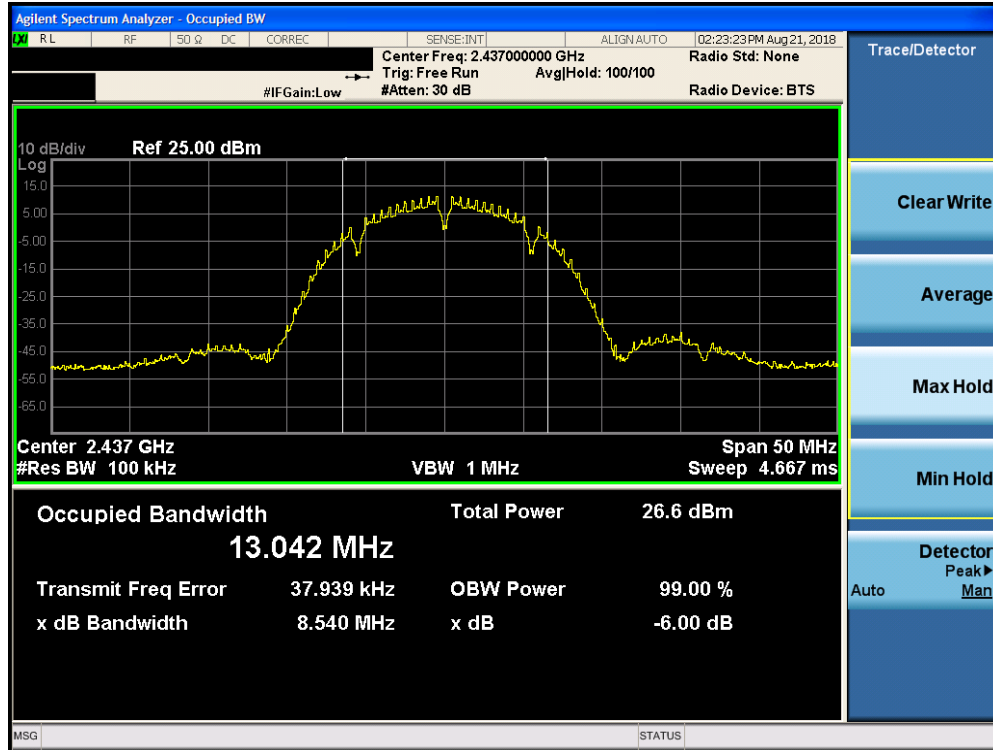
Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
2412	1	b	1	8.549	0.500
2437	6	b	1	8.540	0.500
2462	11	b	1	8.098	0.500
2412	1	g	6	15.86	0.500
2437	6	g	6	16.08	0.500
2462	11	g	6	15.85	0.500
2412	1	n	6.5/7.2 (MCS0)	16.90	0.500
2437	6	n	6.5/7.2 (MCS0)	16.29	0.500
2462	11	n	6.5/7.2 (MCS0)	16.28	0.500

Table 7-3. Conducted Bandwidth Measurements SISO Core 1 Primary

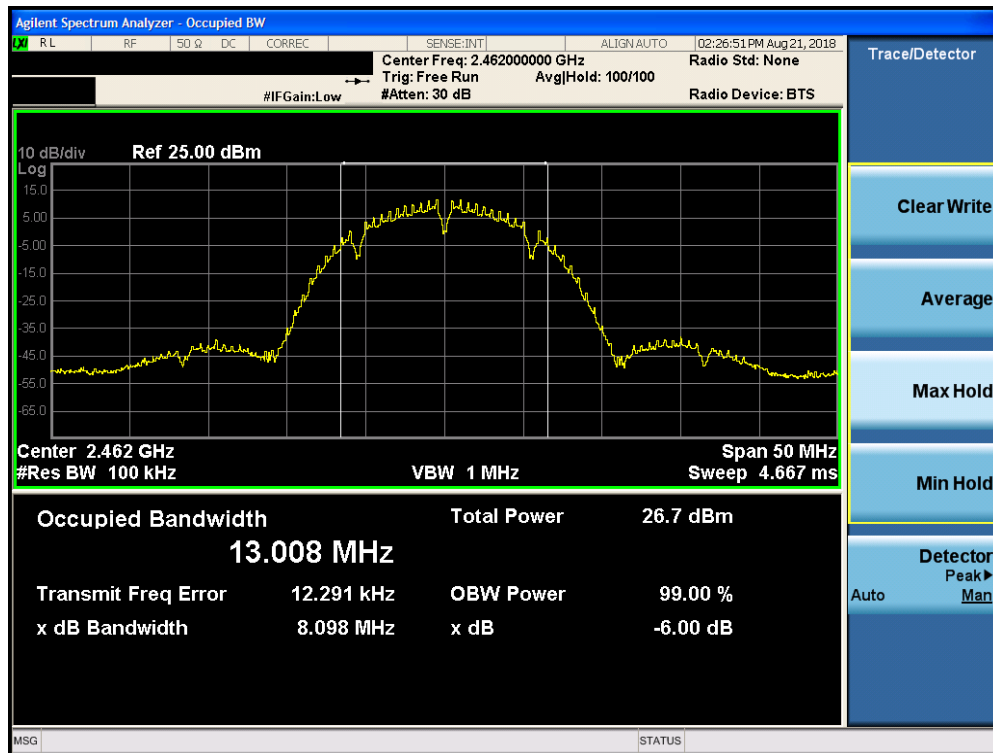


Plot 7-10. 6dB Bandwidth Plot SISO Core 1 Primary (802.11b – Ch. 1)

FCC ID: BCGA1980	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 20 of 145

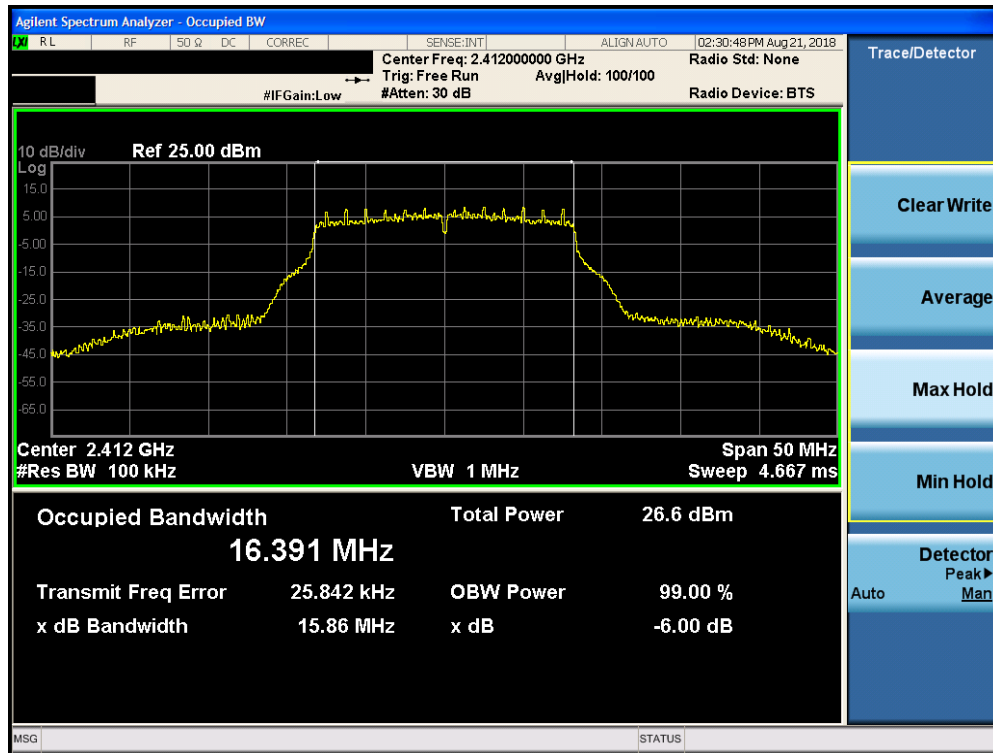


Plot 7-11. 6dB Bandwidth Plot SISO Core 1 Primary (802.11b – Ch. 6)

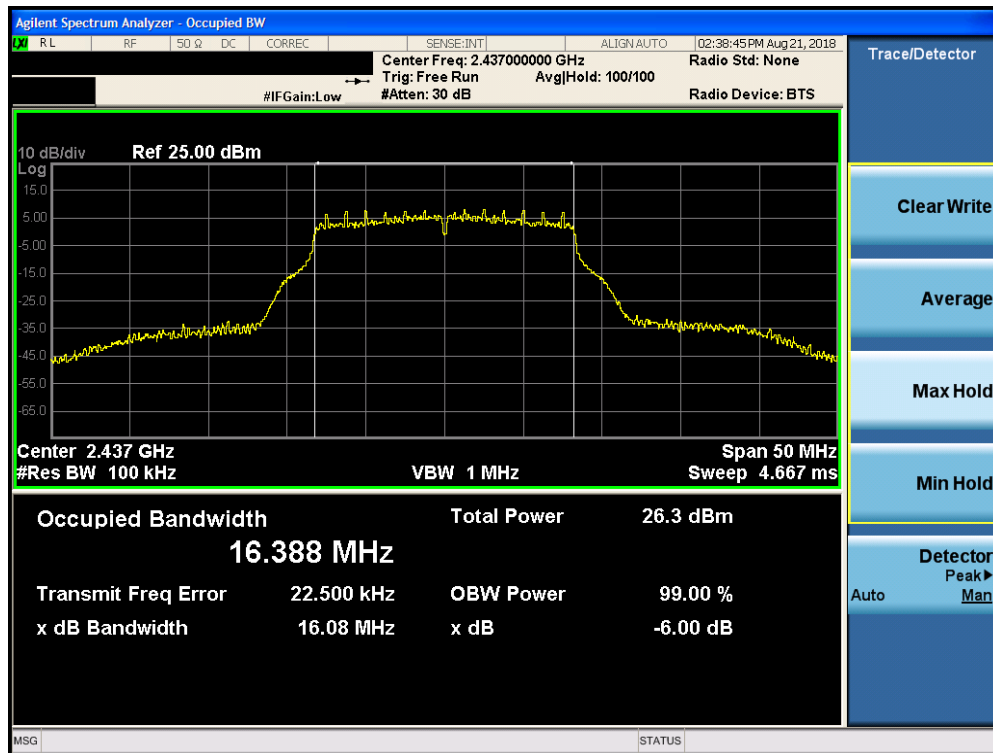


Plot 7-12. 6dB Bandwidth Plot SISO Core 1 Primary (802.11b – Ch. 11)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 21 of 145

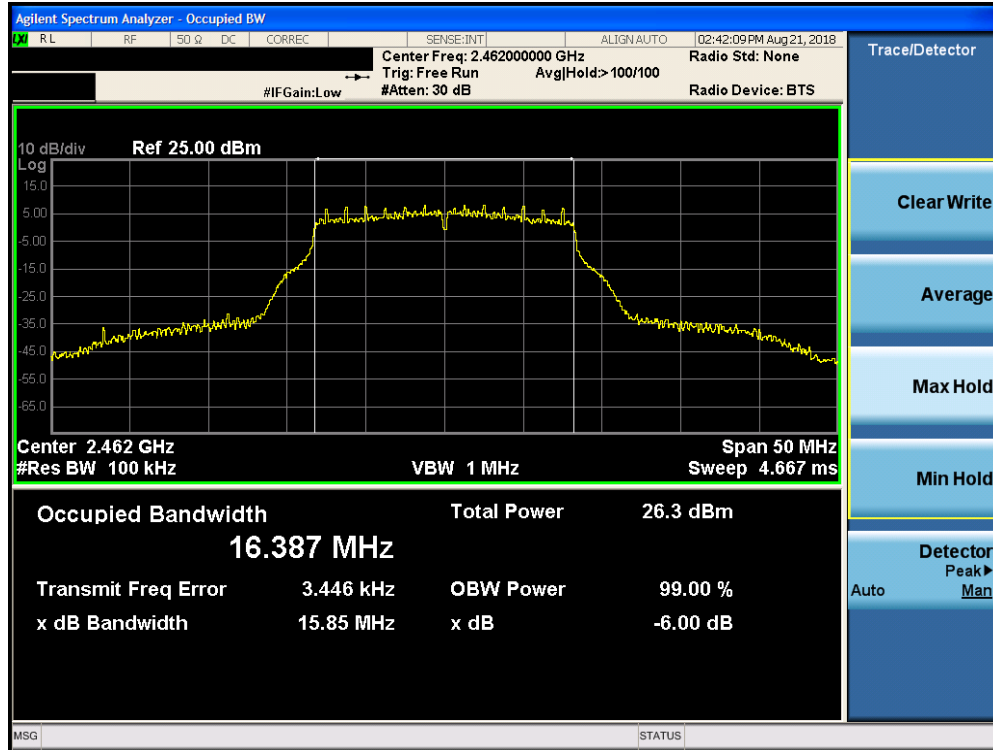


Plot 7-13. 6dB Bandwidth Plot Core 1 Primary (802.11g – Ch. 1)

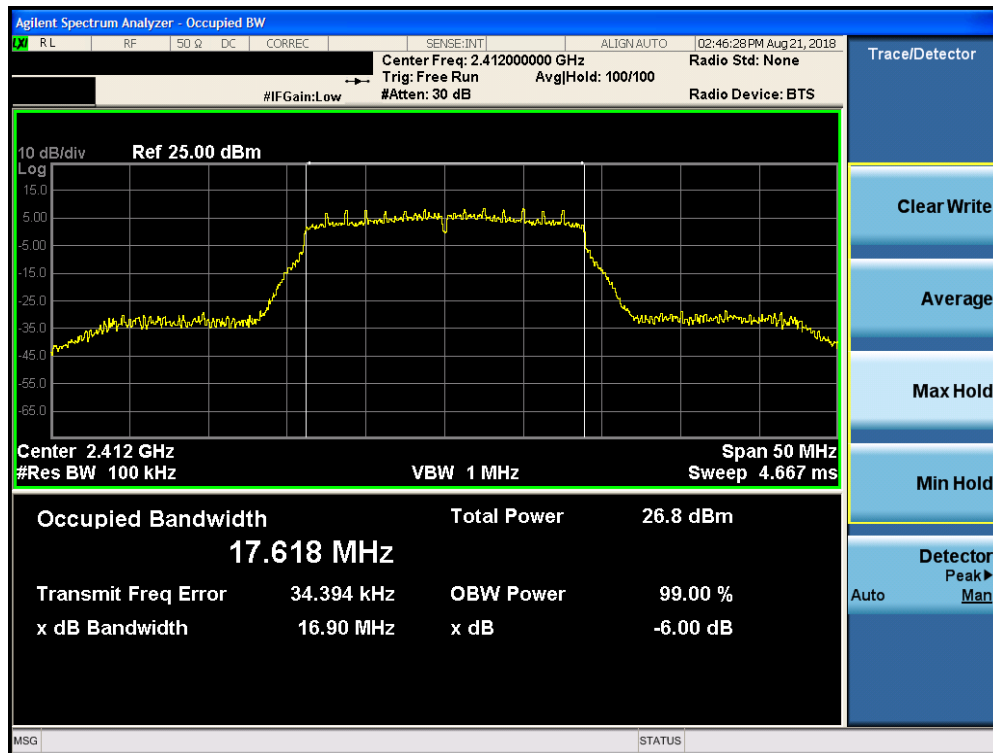


Plot 7-14. 6dB Bandwidth Plot SISO Core 1 Primary (802.11g – Ch. 6)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 22 of 145

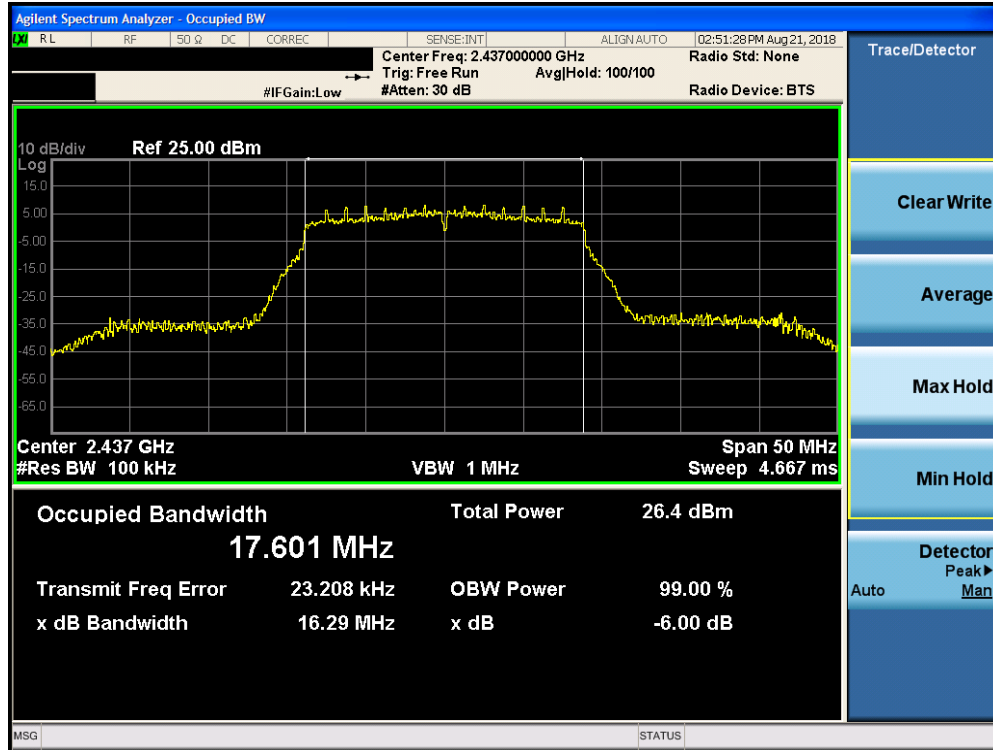


Plot 7-15. 6dB Bandwidth Plot SISO Core 1 Primary (802.11g – Ch. 11)

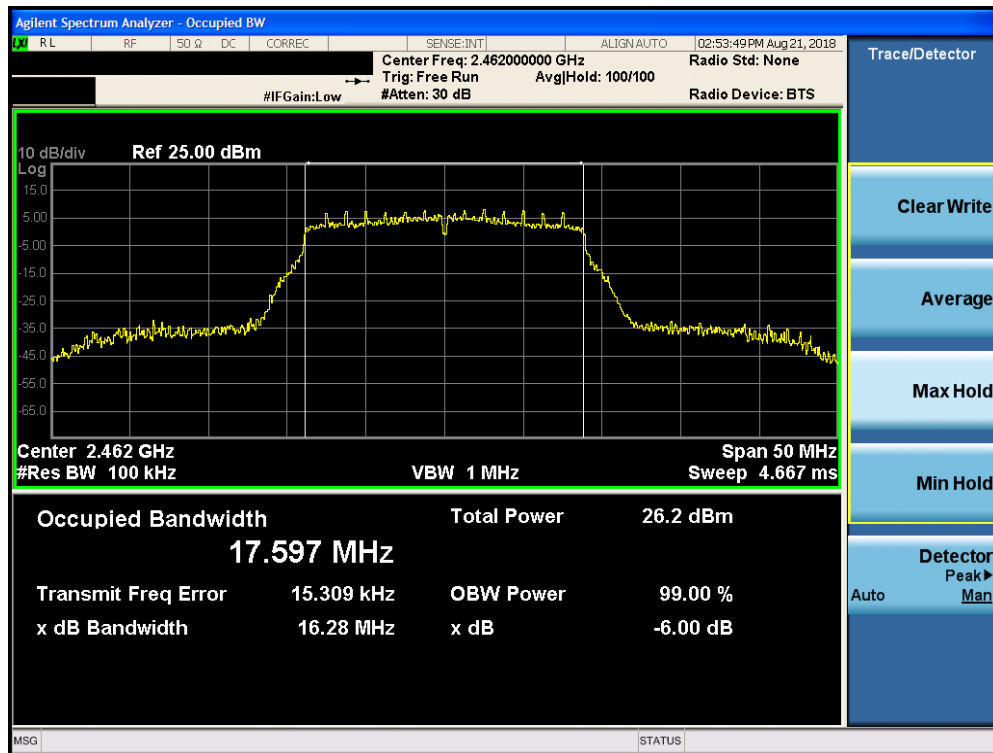


Plot 7-16. 6dB Bandwidth Plot SISO Core 1 Primary (802.11n (2.4GHz) – Ch. 1)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 23 of 145



Plot 7-17. 6dB Bandwidth Plot SISO Core 1 Primary (802.11n (2.4GHz) – Ch. 6)



Plot 7-18. 6dB Bandwidth Plot SISO Core 1 Primary (802.11n (2.4GHz) – Ch. 11)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 24 of 145

SISO Core 1 Diversity 6 dB Bandwidth Measurements

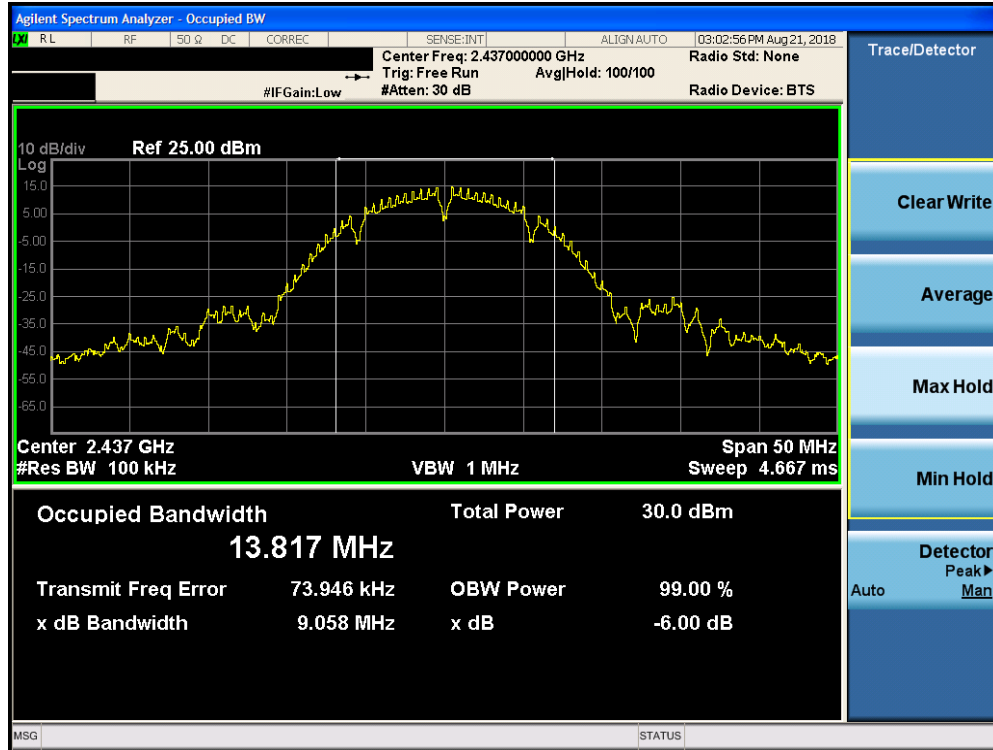
Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
2412	1	b	1	8.566	0.500
2437	6	b	1	9.058	0.500
2462	11	b	1	9.062	0.500
2412	1	g	6	15.74	0.500
2437	6	g	6	15.81	0.500
2462	11	g	6	16.06	0.500
2412	1	n	6.5/7.2 (MCS0)	15.99	0.500
2437	6	n	6.5/7.2 (MCS0)	16.56	0.500
2462	11	n	6.5/7.2 (MCS0)	16.28	0.500

Table 7-4. Conducted Bandwidth Measurements SISO Core 1 Diversity

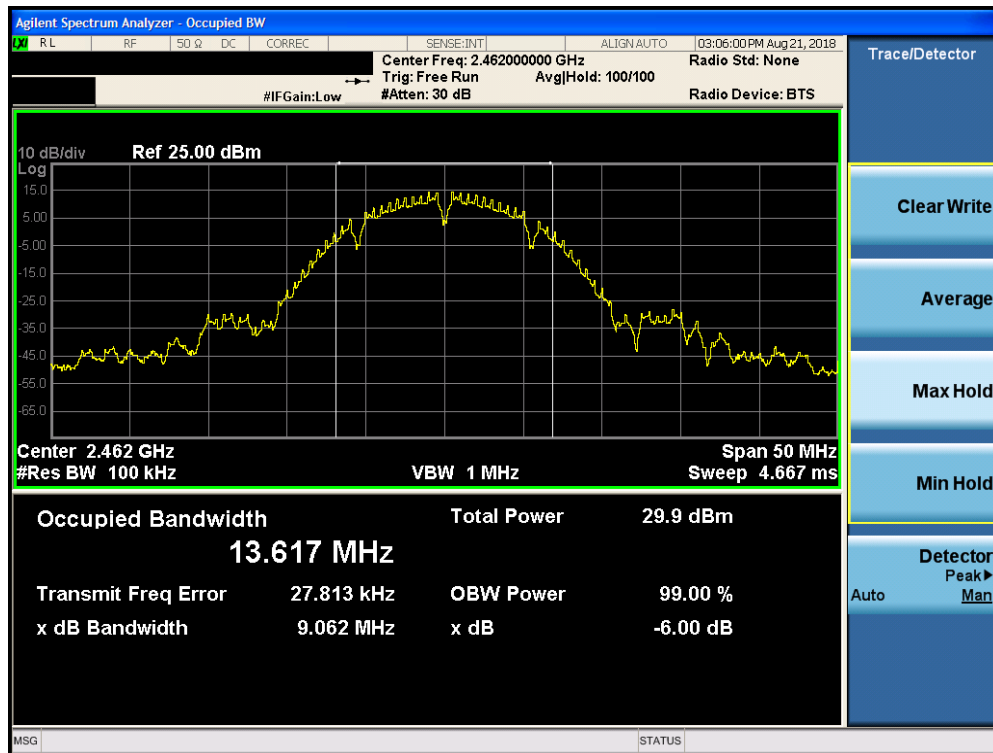


Plot 7-19. 6dB Bandwidth Plot SISO Core 1 Diversity (802.11b – Ch. 1)

FCC ID: BCGA1980	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 25 of 145

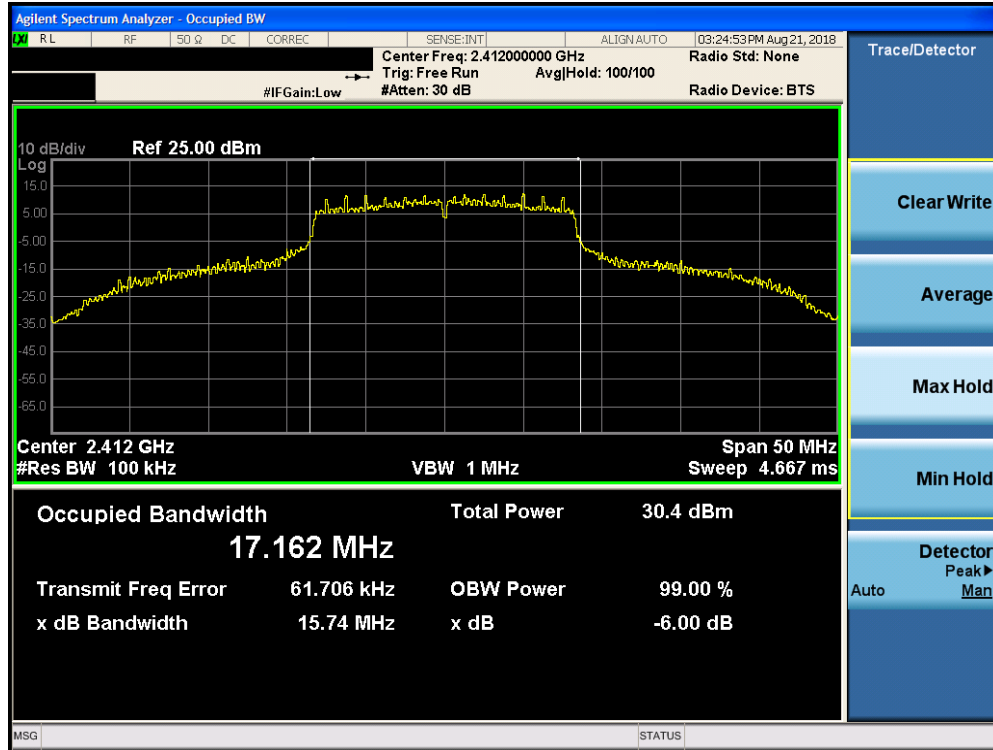


Plot 7-20. 6dB Bandwidth Plot SISO Core 1 Diversity (802.11b – Ch. 6)

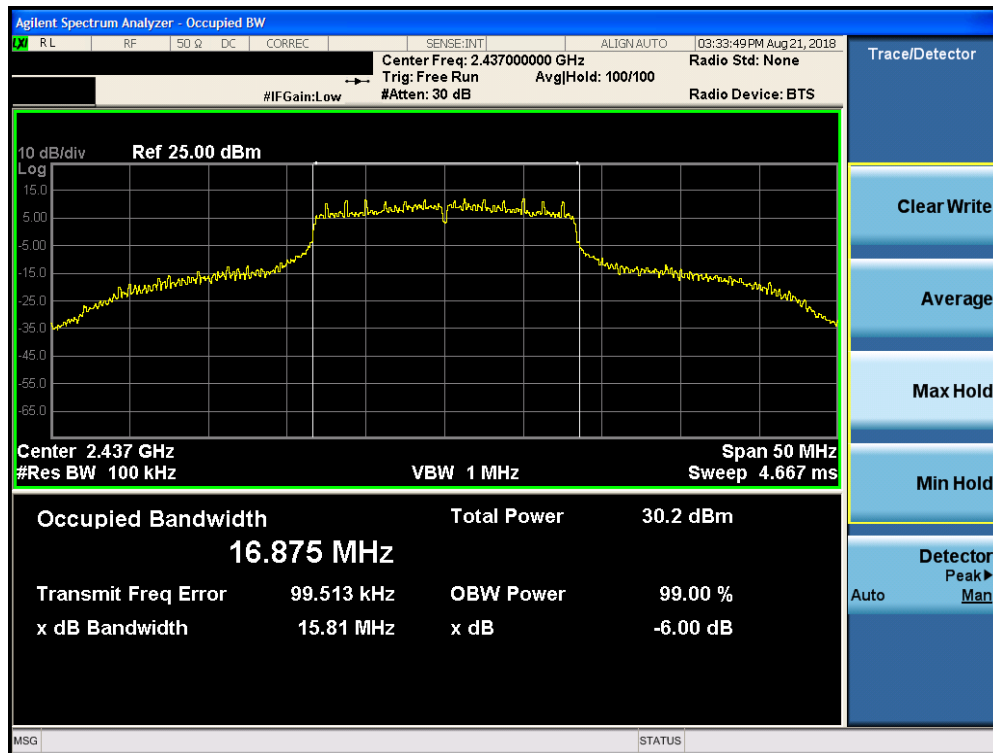


Plot 7-21. 6dB Bandwidth Plot SISO Core 1 Diversity (802.11b – Ch. 11)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 26 of 145

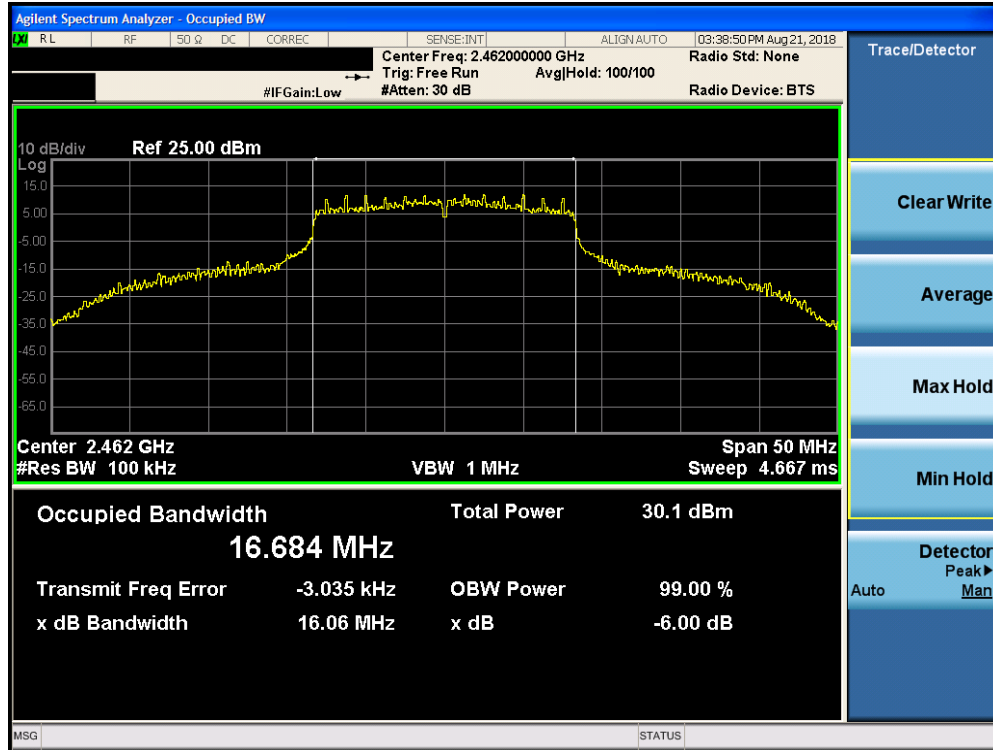


Plot 7-22. 6dB Bandwidth Plot Core 1 Diversity (802.11g – Ch. 1)

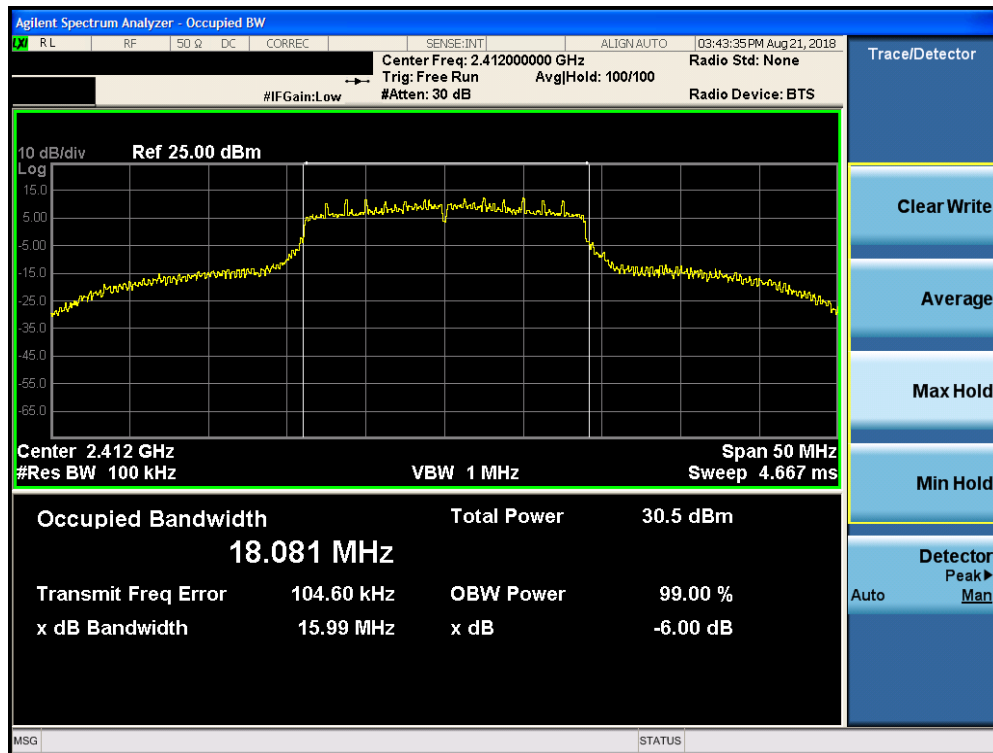


Plot 7-23. 6dB Bandwidth Plot SISO Core 1 Diversity (802.11g – Ch. 6)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 27 of 145

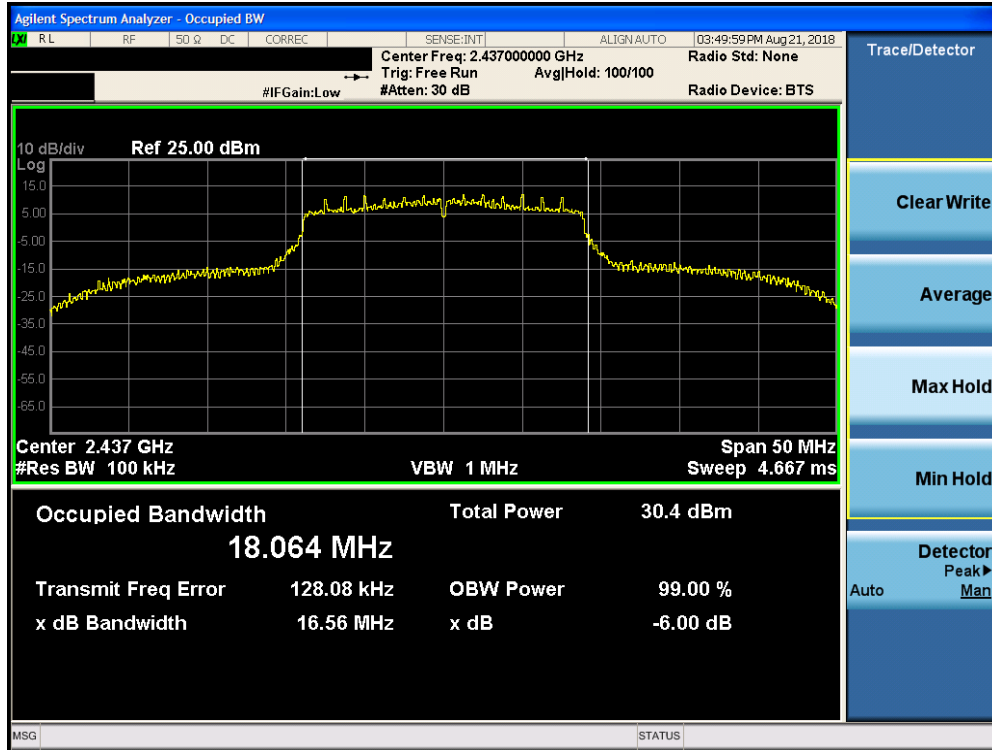


Plot 7-24. 6dB Bandwidth Plot SISO Core 1 Diversity (802.11g – Ch. 11)

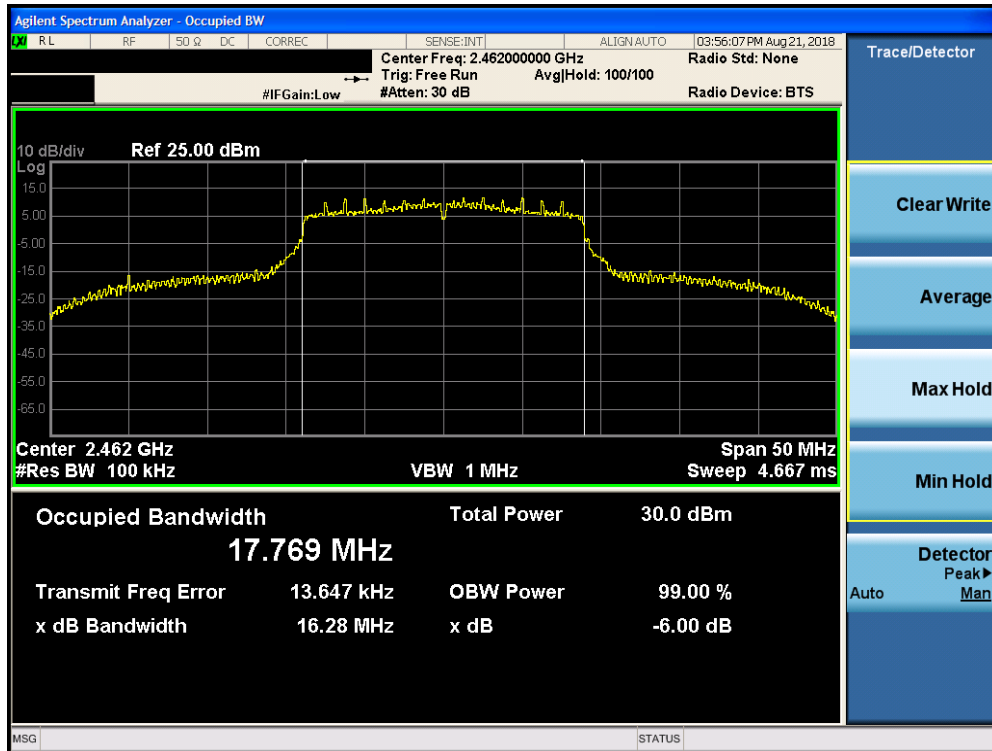


Plot 7-25. 6dB Bandwidth Plot SISO Core 1 Diversity (802.11n (2.4GHz) – Ch. 1)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 28 of 145



Plot 7-26. 6dB Bandwidth Plot SISO Core 1 Diversity (802.11n (2.4GHz) – Ch. 6)



Plot 7-27. 6dB Bandwidth Plot SISO Core 1 Diversity (802.11n (2.4GHz) – Ch. 11)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 29 of 145

7.3 Output Power Measurement

§15.247(b.3); RSS-247 [5.4]

Test Overview and Limits

A transmitter antenna terminal of EUT is connected to the input of an RF power sensor. Measurement is made using a broadband power meter capable of making peak and average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

Test Procedure Used

ANSI C63.10-2013 – Section 11.9.1.3 PKPM1 Peak Power Method
KDB 558074 D01 v05 – Section 8.3.1.3 PKPM1 Peak-reading Power Meter Method
ANSI C63.10-2013 – Section 11.9.2.3.2 Method AVGPM-G
KDB 558074 D01 v05 – Section 8.3.2.3 Measurement using a Power Meter (PM)
ANSI C63.10-2013 – Section 14.2 Measure-and-Sum Technique
KDB 662911 D01 v02r01 – Section E)1) Measure-and-Sum Technique

Test Settings

Method PKPM1 (Peak Power Measurement)

Peak 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 pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

Method AVGPM-G (Average Power Measurement)

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 diagrams below.



Figure 7-2. Test Instrument & Measurement Setup for Power Meter Measurements

Test Notes

None

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 30 of 145

7.3.1 Average Output Power Measurement

§15.247(b.3); RSS-247 [5.4]

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]
			802.11b	802.11g	802.11n						
2412	1	AVG	17.50	16.00	16.00	30.00	-12.50	1.30	18.80	36.02	-17.22
2417	2	AVG	17.50	17.50	17.37	30.00	-12.50	1.30	18.80	36.02	-17.22
2437	6	AVG	17.43	17.50	17.50	30.00	-12.50	1.80	19.30	36.02	-16.72
2457	10	AVG	17.50	17.36	17.50	30.00	-12.50	1.50	19.00	36.02	-17.02
2462	11	AVG	17.50	13.50	13.50	30.00	-12.50	1.50	19.00	36.02	-17.02
2467	12	AVG	15.91	10.00	9.84	30.00	-14.09	1.20	17.11	36.02	-18.91
2472	13	AVG	13.00	1.46	1.37	30.00	-17.00	1.00	14.00	36.02	-22.02

Table 7-5. Average Conducted Output Power Measurements SISO Core 0

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]
			802.11b	802.11g	802.11n						
2412	1	AVG	17.50	15.98	16.00	30.00	-12.50	-2.80	14.70	36.02	-21.32
2417	2	AVG	17.49	17.50	17.47	30.00	-12.50	-2.60	14.90	36.02	-21.12
2437	6	AVG	17.43	17.50	17.50	30.00	-12.50	-1.90	15.60	36.02	-20.42
2457	10	AVG	17.41	17.48	17.45	30.00	-12.52	-1.40	16.08	36.02	-19.94
2462	11	AVG	17.43	16.00	16.00	30.00	-12.57	-1.50	15.93	36.02	-20.09
2467	12	AVG	17.00	12.00	12.00	30.00	-13.00	-1.40	15.60	36.02	-20.42
2472	13	AVG	15.50	3.00	2.93	30.00	-14.50	-1.40	14.10	36.02	-21.92

Table 7-6. Average Conducted Output Power Measurements SISO Core 1 Primary

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]
			802.11b	802.11g	802.11n						
2412	1	AVG	20.90	20.00	19.94	30.00	-9.10	-14.30	6.60	36.02	-29.42
2417	2	AVG	21.00	21.00	21.00	30.00	-9.00	-14.20	6.80	36.02	-29.22
2437	6	AVG	21.00	21.00	20.99	30.00	-9.00	-14.50	6.50	36.02	-29.52
2462	11	AVG	21.00	21.00	20.99	30.00	-9.00	-14.90	6.10	36.02	-29.92
2467	12	AVG	20.98	19.00	18.94	30.00	-9.02	-14.80	6.18	36.02	-29.84
2472	13	AVG	20.90	17.00	16.96	30.00	-9.10	-15.70	5.20	36.02	-30.82

Table 7-7. Average Conducted Output Power Measurements SISO Core 1 Diversity

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 31 of 145

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 Primary	CDD						
2412	1	AVG	15.00	15.00	18.01	30.00	-11.99	2.50	20.51	36.02	-15.51
2417	2	AVG	17.50	17.49	20.51	30.00	-9.49	2.58	23.08	36.02	-12.94
2437	6	AVG	17.50	17.50	20.51	30.00	-9.49	3.16	23.67	36.02	-12.35
2452	9	AVG	17.50	17.50	20.51	30.00	-9.49	3.16	23.67	36.02	-12.35
2457	10	AVG	16.00	16.00	19.01	30.00	-10.99	3.18	22.19	36.02	-13.83
2462	11	AVG	12.50	12.50	15.51	30.00	-14.49	3.14	18.65	36.02	-17.37
2467	12	AVG	8.75	8.67	11.72	30.00	-18.28	3.01	14.73	36.02	-21.29
2472	13	AVG	-1.00	-1.00	2.01	30.00	-27.99	2.89	4.90	36.02	-31.12

Table 7-8. Average Conducted Output Power Measurements CDD Primary(802.11g)

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 Diversity	CDD						
2412	1	AVG	15.00	19.50	20.82	30.00	-9.18	-0.38	20.44	36.02	-15.58
2417	2	AVG	17.50	19.50	21.62	30.00	-8.38	-0.36	21.26	36.02	-14.76
2437	6	AVG	17.50	19.49	21.62	30.00	-8.38	0.03	21.65	36.02	-14.38
2452	9	AVG	17.50	19.46	21.60	30.00	-8.40	0.03	21.63	36.02	-14.39
2457	10	AVG	16.00	16.00	19.01	30.00	-10.99	-0.23	18.78	36.02	-17.24
2462	11	AVG	12.50	17.50	18.69	30.00	-11.31	-0.29	18.41	36.02	-17.61
2467	12	AVG	8.75	9.47	12.14	30.00	-17.86	-0.53	11.60	36.02	-24.42
2472	13	AVG	-1.00	-1.00	2.01	30.00	-27.99	-0.82	1.19	36.02	-34.84

Table 7-9. Average Conducted Output Power Measurements CDD Diversity(802.11g)

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 Primary	CDD						
2412	1	AVG	15.00	14.95	17.99	30.00	-12.01	2.50	20.49	36.02	-15.54
2417	2	AVG	17.50	17.50	20.51	30.00	-9.49	2.58	23.09	36.02	-12.93
2437	6	AVG	17.50	17.41	20.47	30.00	-9.53	3.16	23.62	36.02	-12.40
2452	9	AVG	17.48	17.48	20.49	30.00	-9.51	3.16	23.65	36.02	-12.37
2457	10	AVG	15.99	16.00	19.01	30.00	-10.99	3.18	22.19	36.02	-13.83
2462	11	AVG	12.48	12.50	15.50	30.00	-14.50	3.14	18.64	36.02	-17.38
2467	12	AVG	8.75	8.75	11.76	30.00	-18.24	3.01	14.77	36.02	-21.25
2472	13	AVG	-1.00	-1.05	1.99	30.00	-28.01	2.89	4.88	36.02	-31.14

Table 7-10. Average Conducted Output Power Measurements CDD Primary(802.11n)

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 Diversity	CDD						
2412	1	AVG	15.00	19.48	20.80	30.00	-9.20	-0.38	20.43	36.02	-15.59
2417	2	AVG	17.50	19.50	21.62	30.00	-8.38	-0.36	21.26	36.02	-14.76
2437	6	AVG	17.48	19.50	21.62	30.00	-8.38	0.03	21.64	36.02	-14.38
2452	9	AVG	17.50	19.44	21.59	30.00	-8.41	0.03	21.61	36.02	-14.41
2457	10	AVG	15.91	16.00	18.97	30.00	-11.03	-0.23	18.73	36.02	-17.29
2462	11	AVG	12.50	17.50	18.69	30.00	-11.31	-0.29	18.41	36.02	-17.61
2467	12	AVG	8.75	9.50	12.15	30.00	-17.85	-0.53	11.62	36.02	-24.40
2472	13	AVG	-1.00	-1.05	1.99	30.00	-28.01	-0.82	1.16	36.02	-34.86

Table 7-11. Average Conducted Output Power Measurements CDD Diversity(802.11n)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 32 of 145

7.3.2 Peak Output Power Measurement

§15.247(b.3); RSS-247 [5.4]

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]
			802.11b	802.11g	802.11n						
2412	1	PEAK	19.90	22.45	23.49	30.00	-6.51	1.30	24.79	36.02	-11.23
2417	2	PEAK	20.00	23.92	23.98	30.00	-6.02	1.30	25.28	36.02	-10.74
2437	6	PEAK	19.81	23.65	24.03	30.00	-5.97	1.80	25.83	36.02	-10.19
2457	10	PEAK	20.23	23.75	24.14	30.00	-5.86	1.50	25.64	36.02	-10.38
2462	11	PEAK	19.85	20.20	21.15	30.00	-8.85	1.50	22.65	36.02	-13.37
2467	12	PEAK	18.31	16.37	16.61	30.00	-11.69	1.20	19.51	36.02	-16.51
2472	13	PEAK	15.41	7.83	8.08	30.00	-14.59	1.00	16.41	36.02	-19.61

Table 7-12. Peak Conducted Output Power Measurements SISO Core 0

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]
			802.11b	802.11g	802.11n						
2412	1	PEAK	19.88	22.58	23.59	30.00	-6.41	-2.80	20.79	36.02	-15.23
2417	2	PEAK	19.88	23.78	23.85	30.00	-6.15	-2.60	21.25	36.02	-14.77
2437	6	PEAK	19.83	22.63	22.85	30.00	-7.15	-1.90	20.95	36.02	-15.07
2457	10	PEAK	19.72	23.68	23.91	30.00	-6.09	-1.40	22.51	36.02	-13.51
2462	11	PEAK	19.92	22.35	23.41	30.00	-6.59	-1.50	21.91	36.02	-14.11
2467	12	PEAK	19.51	18.46	18.73	30.00	-10.49	-1.40	18.11	36.02	-17.91
2472	13	PEAK	18.06	9.37	9.63	30.00	-11.94	-1.40	16.66	36.02	-19.36

Table 7-13. Peak Conducted Output Power Measurements SISO Core 1 Primary

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]
			802.11b	802.11g	802.11n						
2412	1	PEAK	23.27	25.35	25.45	30.00	-4.55	-14.30	11.15	36.02	-24.87
2417	2	PEAK	23.35	25.74	25.87	30.00	-4.13	-14.20	11.67	36.02	-24.35
2437	6	PEAK	23.38	25.83	25.88	30.00	-4.12	-14.50	11.38	36.02	-24.64
2462	11	PEAK	23.59	25.78	25.88	30.00	-4.12	-14.90	10.98	36.02	-25.04
2467	12	PEAK	23.38	24.80	24.95	30.00	-5.05	-14.80	10.15	36.02	-25.87
2472	13	PEAK	23.40	23.40	23.51	30.00	-6.49	-15.70	7.81	36.02	-28.21

Table 7-14. Peak Conducted Output Power Measurements SISO Core 1 Diversity

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 33 of 145

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 Primary	CDD						
2412	1	PEAK	21.45	21.58	24.53	30.00	-5.47	2.50	27.03	36.02	-8.99
2417	2	PEAK	23.84	23.68	26.77	30.00	-3.23	2.58	29.35	36.02	-6.67
2437	6	PEAK	23.64	22.71	26.21	30.00	-3.79	3.16	29.37	36.02	-6.65
2452	9	PEAK	23.83	23.72	26.79	30.00	-3.21	3.16	29.94	36.02	-6.08
2457	10	PEAK	22.95	22.46	25.72	30.00	-4.28	3.18	28.90	36.02	-7.12
2462	11	PEAK	18.85	19.00	21.94	30.00	-8.06	3.14	25.08	36.02	-10.95
2467	12	PEAK	15.00	14.98	18.00	30.00	-12.00	3.01	21.01	36.02	-15.01
2472	13	PEAK	5.75	4.34	8.11	30.00	-21.89	2.89	11.01	36.02	-25.02

Table 7-15. Peak Conducted Output Power Measurements CDD Primary(802.11g)

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 Diversity	CDD						
2412	1	PEAK	21.50	25.21	26.75	30.00	-3.25	-0.38	26.37	36.02	-9.65
2417	2	PEAK	23.70	24.70	27.24	30.00	-2.76	-0.36	26.88	36.02	-9.14
2437	6	PEAK	23.77	24.68	27.26	30.00	-2.74	0.03	27.29	36.02	-8.73
2452	9	PEAK	23.81	24.93	27.42	30.00	-2.58	0.03	27.44	36.02	-8.58
2457	10	PEAK	22.24	22.28	25.27	30.00	-4.73	-0.23	25.04	36.02	-10.98
2462	11	PEAK	18.83	23.86	25.05	30.00	-4.95	-0.29	24.76	36.02	-11.26
2467	12	PEAK	15.20	15.76	18.50	30.00	-11.50	-0.53	17.97	36.02	-18.05
2472	13	PEAK	5.78	6.21	9.01	30.00	-20.99	-0.82	8.19	36.02	-27.83

Table 7-16. Peak Conducted Output Power Measurements CDD Diversity(802.11g)

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 Primary	CDD						
2412	1	PEAK	21.00	22.02	24.55	30.00	-5.45	2.50	27.05	36.02	-8.97
2417	2	PEAK	24.18	23.95	27.08	30.00	-2.92	2.58	29.65	36.02	-6.37
2437	6	PEAK	23.89	22.64	26.32	30.00	-3.68	3.16	29.48	36.02	-6.54
2452	9	PEAK	24.05	23.94	27.01	30.00	-2.99	3.16	30.16	36.02	-5.86
2457	10	PEAK	22.71	22.76	25.75	30.00	-4.25	3.18	28.93	36.02	-7.09
2462	11	PEAK	19.05	19.30	22.19	30.00	-7.81	3.14	25.33	36.02	-10.69
2467	12	PEAK	15.49	15.65	18.58	30.00	-11.42	3.01	21.59	36.02	-14.43
2472	13	PEAK	5.96	5.85	8.91	30.00	-21.09	2.89	11.81	36.02	-24.21

Table 7-17. Peak Conducted Output Power Measurements CDD Primary(802.11n)

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 Diversity	CDD						
2412	1	PEAK	21.60	24.83	26.52	30.00	-3.48	-0.38	26.14	36.02	-9.88
2417	2	PEAK	24.02	24.86	27.47	30.00	-2.53	-0.36	27.11	36.02	-8.91
2437	6	PEAK	24.06	24.84	27.48	30.00	-2.52	0.03	27.50	36.02	-8.52
2452	9	PEAK	24.05	25.02	27.57	30.00	-2.43	0.03	27.60	36.02	-8.42
2457	10	PEAK	22.67	22.61	25.65	30.00	-4.35	-0.23	25.42	36.02	-10.60
2462	11	PEAK	16.30	24.30	24.94	30.00	-5.06	-0.29	24.65	36.02	-11.37
2467	12	PEAK	15.30	16.14	18.75	30.00	-11.25	-0.53	18.22	36.02	-17.80
2472	13	PEAK	6.04	6.87	9.49	30.00	-20.51	-0.82	8.66	36.02	-27.36

Table 7-18. Peak Conducted Output Power Measurements CDD Diversity(802.11n)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 34 of 145

Note:

Per ANSI C63.10-2013 and KDB 662911 D01 v02r01 Section E)1), the conducted powers at Core 0 and Core 1 were first measured separately during MIMO transmission as shown in the section above. The measured values were then summed in linear power units then converted back to dBm.

Sample MIMO Calculation:

At 2412MHz for 11n MIMO Primary, the average conducted output power was measured to be 15.00 dBm for Core 0 and 14.95 dBm for Core 1 Primary.

Core 0 + Core 1 Primary = MIMO Primary

$$(15.00 \text{ dBm} + 14.95 \text{ dBm}) = (31.62 \text{ mW} + 31.26 \text{ mW}) = 62.88 \text{ mW} = 17.99 \text{ dBm}$$

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 35 of 145

7.4 Power Spectral Density

§15.247(e); RSS-247 [5.2]

Test Overview and Limit

The peak power density is measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated and the worst case configuration results are reported in this section.

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

Test Procedure Used

ANSI C63.10-2013 – Section 11.10.2 Method PKPSD

KDB 558074 D01 v05 – Section 8.4 DTS Maximum Power Spectral Density level in the fundamental emission

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

KDB 662911 D01 v02r01 – Section E)2) Measure-and-Sum Technique

Test Settings

1. Analyzer was set to the center frequency of the DTS channel under investigation
2. Span = 1.5 times the DTS channel bandwidth
3. RBW = 3kHz
4. VBW = 1MHz
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Trace was allowed to stabilize

Test Setup

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



Figure 7-3. Test Instrument & Measurement Setup

Test Notes

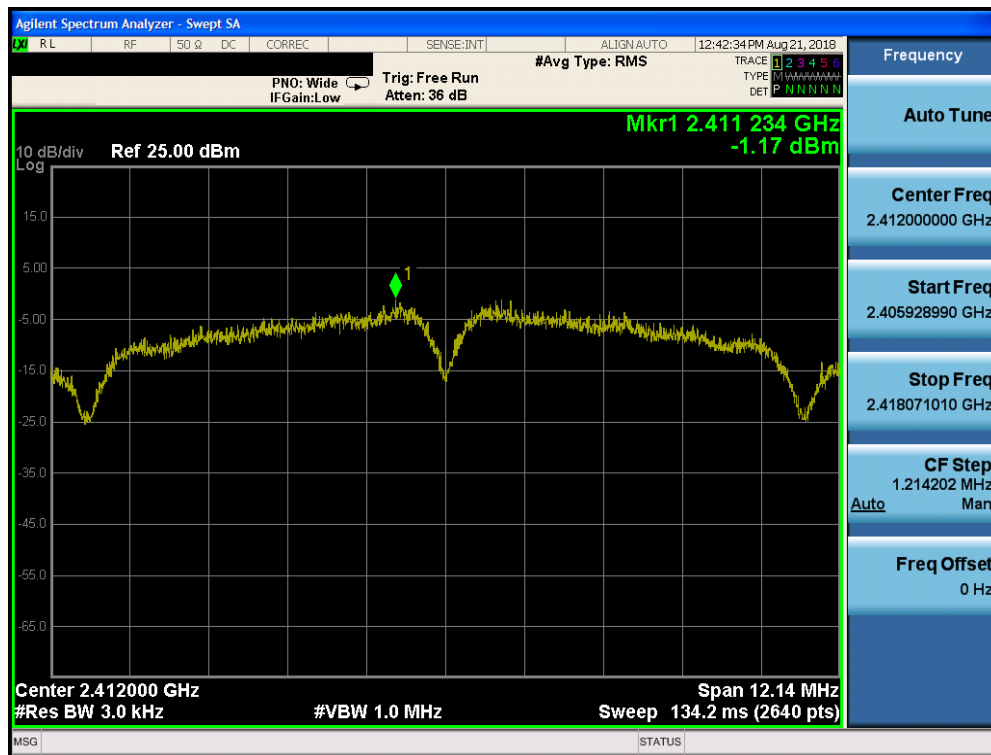
None

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 36 of 145

SISO Core 0 Power Spectral Density Measurements

Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]	Pass / Fail
2412	1	b	1	-1.17	8.00	-9.17	Pass
2437	6	b	1	-2.02	8.00	-10.02	Pass
2462	11	b	1	-0.42	8.00	-8.42	Pass
2412	1	g	6	-4.43	8.00	-12.43	Pass
2437	6	g	6	-4.43	8.00	-12.43	Pass
2462	11	g	6	-4.66	8.00	-12.66	Pass
2412	1	n	6.5/7.2 (MCS0)	-4.74	8.00	-12.74	Pass
2437	6	n	6.5/7.2 (MCS0)	-4.78	8.00	-12.78	Pass
2462	11	n	6.5/7.2 (MCS0)	-5.27	8.00	-13.27	Pass

Table 7-19. Conducted Power Density Measurements SISO Core 0



Plot 7-28. Power Spectral Density Plot SISO Core 0 (802.11b – Ch. 1)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 37 of 145

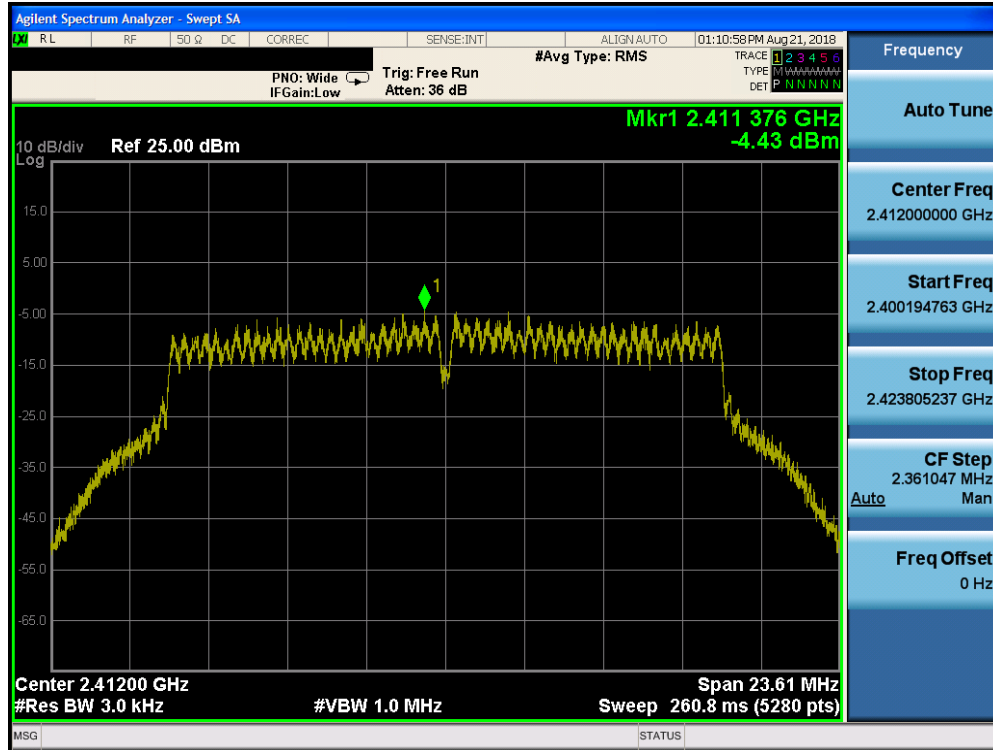


Plot 7-29. Power Spectral Density Plot SISO Core 0 (802.11b – Ch. 6)

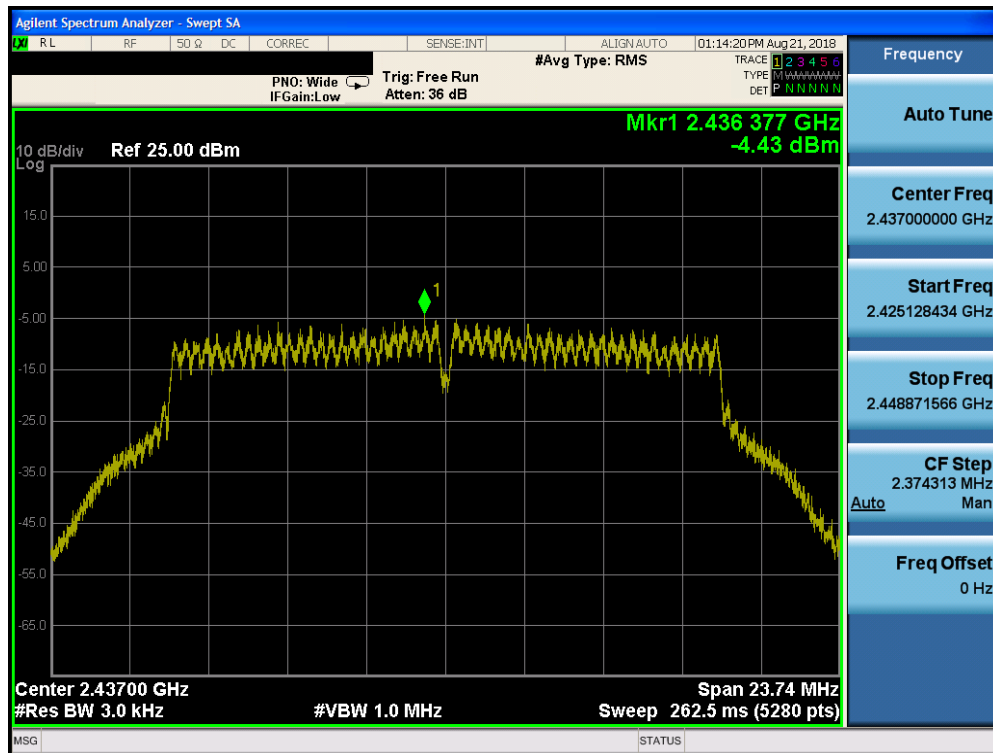


Plot 7-30. Power Spectral Density Plot SISO Core 0 (802.11b – Ch. 11)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 38 of 145

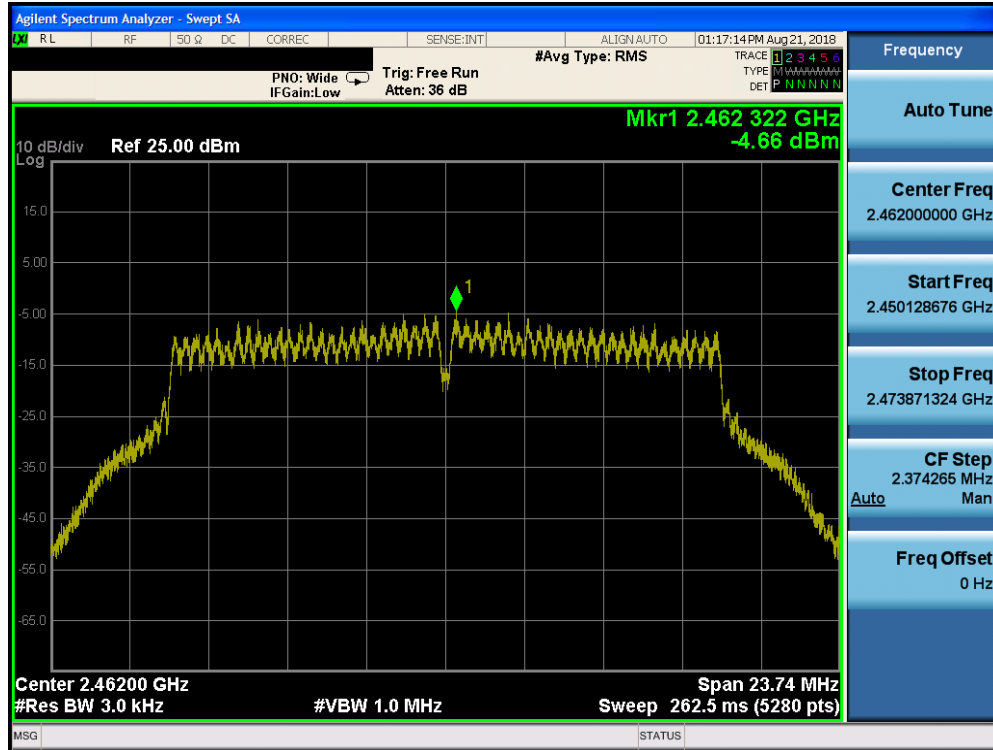


Plot 7-31. Power Spectral Density Plot SISO Core 0 (802.11g – Ch. 1)

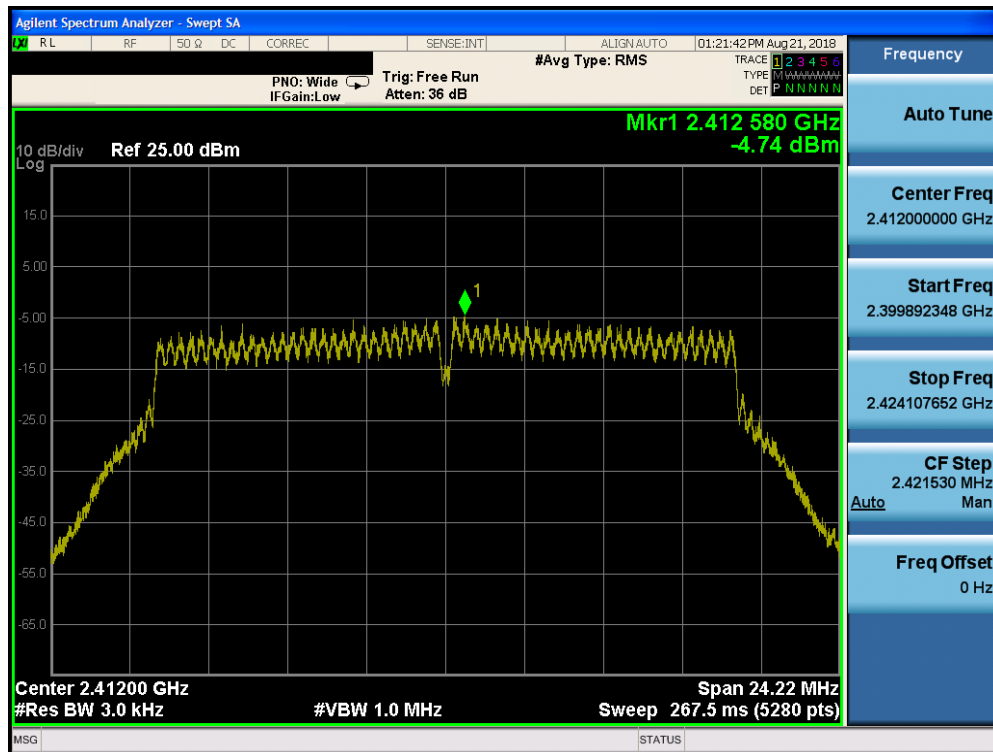


Plot 7-32. Power Spectral Density Plot SISO Core 0 (802.11g – Ch. 6)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 39 of 145

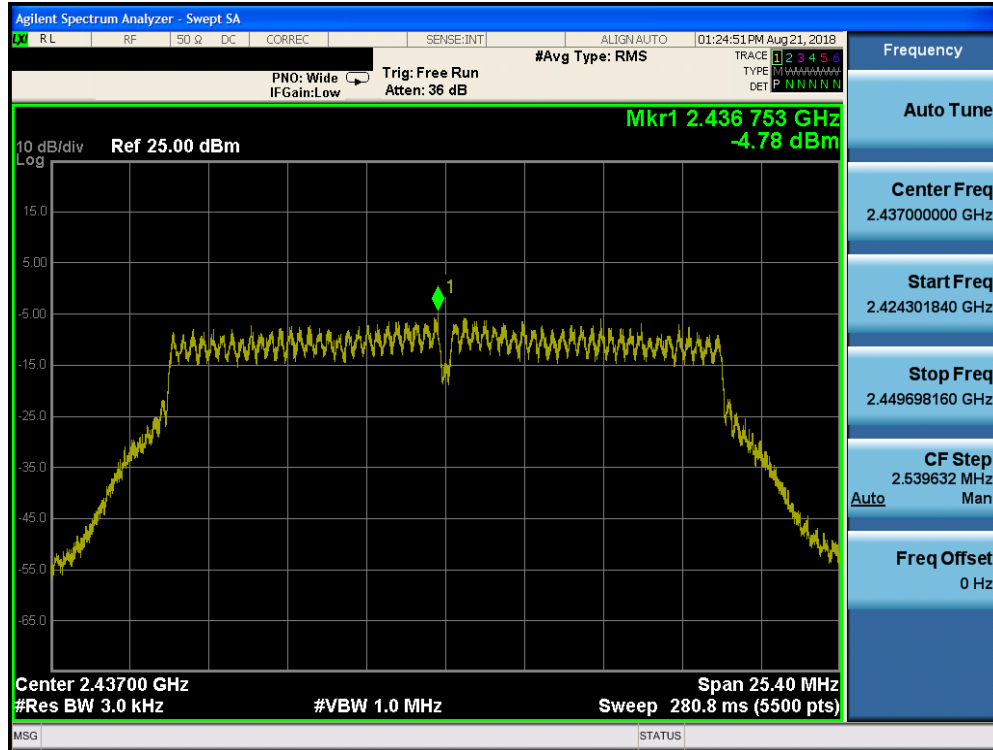


Plot 7-33. Power Spectral Density Plot SISO Core 0 (802.11g – Ch. 11)

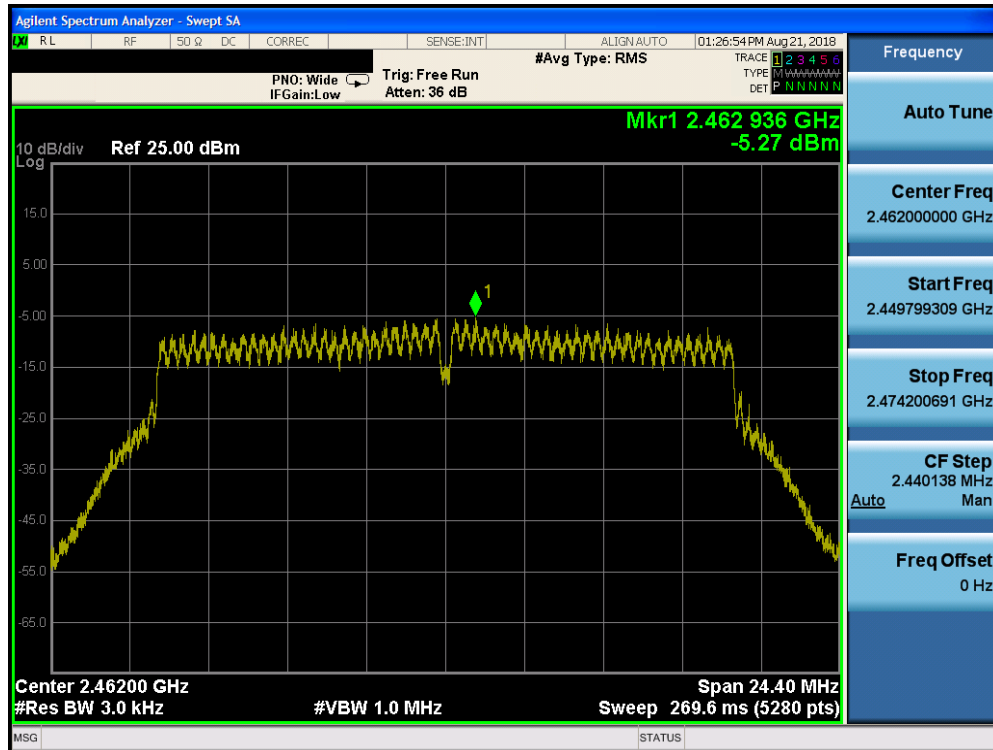


Plot 7-34. Power Spectral Density Plot SISO Core 0 (802.11n (2.4GHz) – Ch. 1)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 40 of 145



Plot 7-35. Power Spectral Density Plot SISO Core 0 (802.11n (2.4GHz) – Ch. 6)



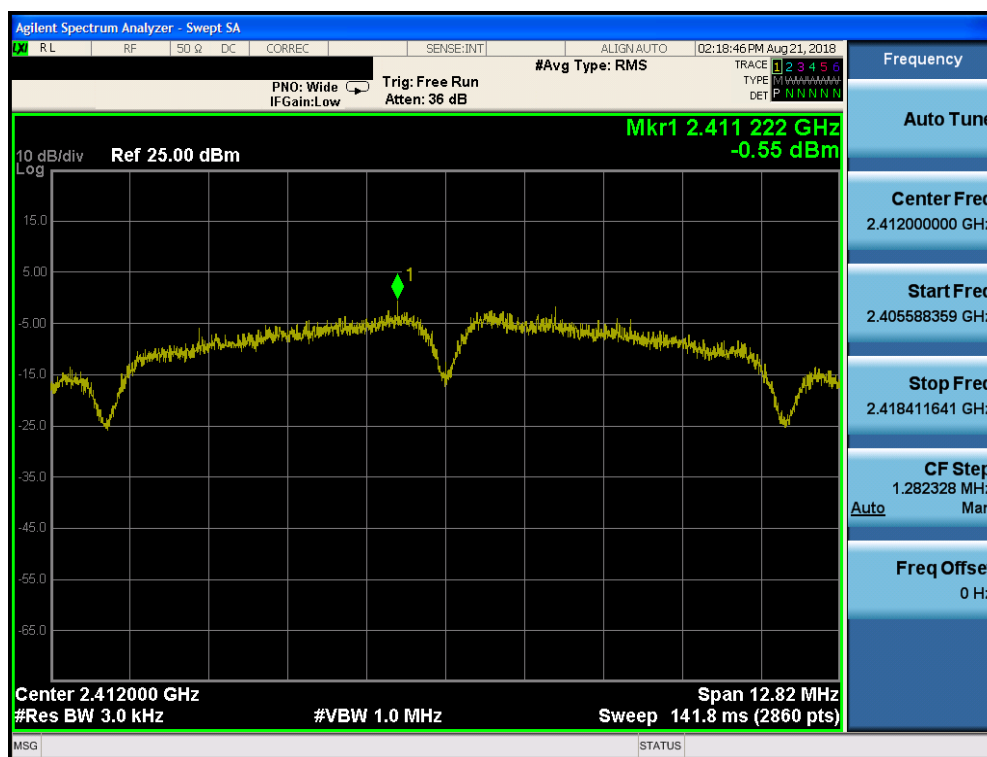
Plot 7-36. Power Spectral Density Plot SISO Core 0 (802.11n (2.4GHz) – Ch. 11)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 41 of 145

SISO Core 1 Primary Power Spectral Density Measurements

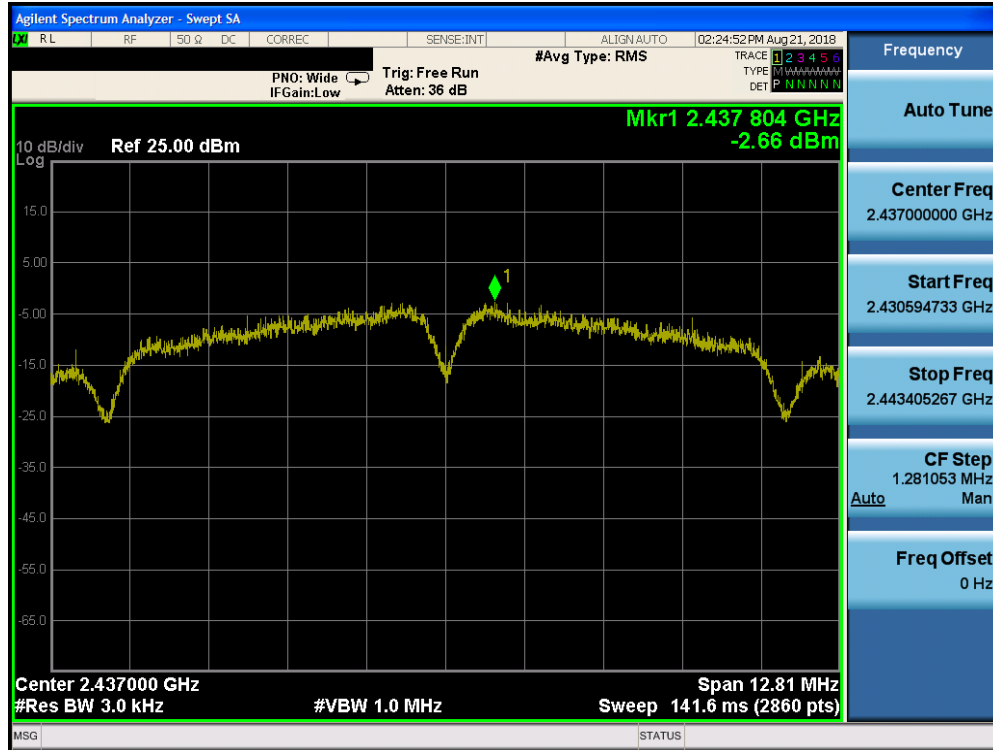
Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]	Pass / Fail
2412	1	b	1	-0.55	8.00	-8.55	Pass
2437	6	b	1	-2.66	8.00	-10.66	Pass
2462	11	b	1	-2.27	8.00	-10.27	Pass
2412	1	g	6	-5.05	8.00	-13.05	Pass
2437	6	g	6	-5.76	8.00	-13.76	Pass
2462	11	g	6	-5.36	8.00	-13.36	Pass
2412	1	n	6.5/7.2 (MCS0)	-5.64	8.00	-13.64	Pass
2437	6	n	6.5/7.2 (MCS0)	-6.39	8.00	-14.39	Pass
2462	11	n	6.5/7.2 (MCS0)	-6.18	8.00	-14.18	Pass

Table 7-20. Conducted Power Density Measurements SISO Core 1 Primary

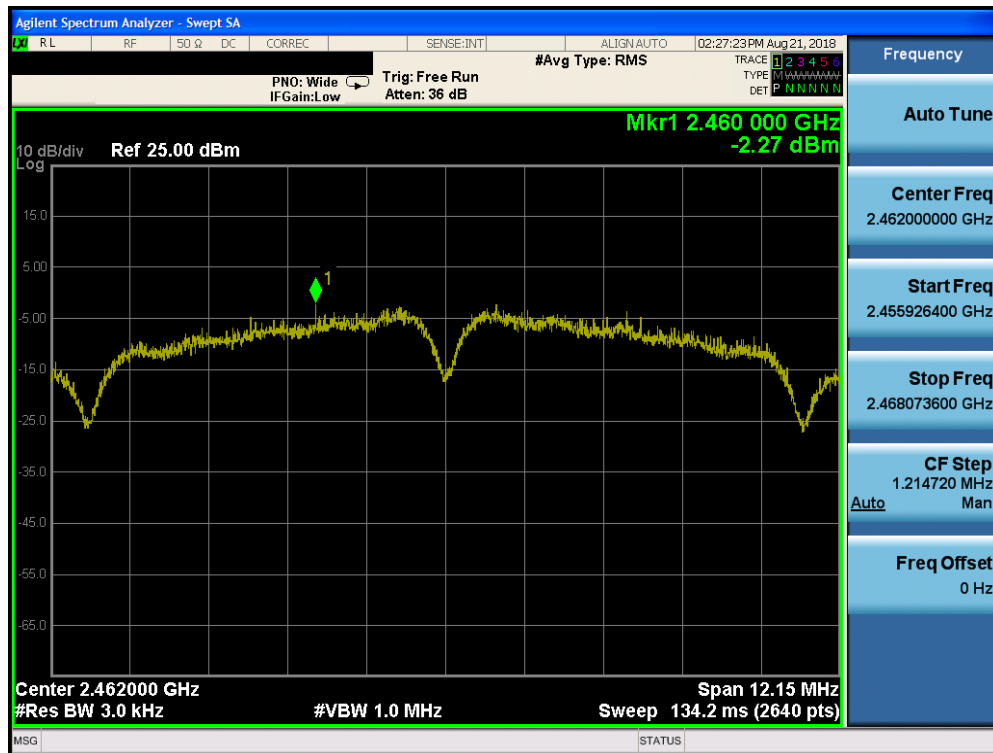


Plot 7-37. Power Spectral Density Plot SISO Core 1 Primary (802.11b – Ch. 1)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 42 of 145

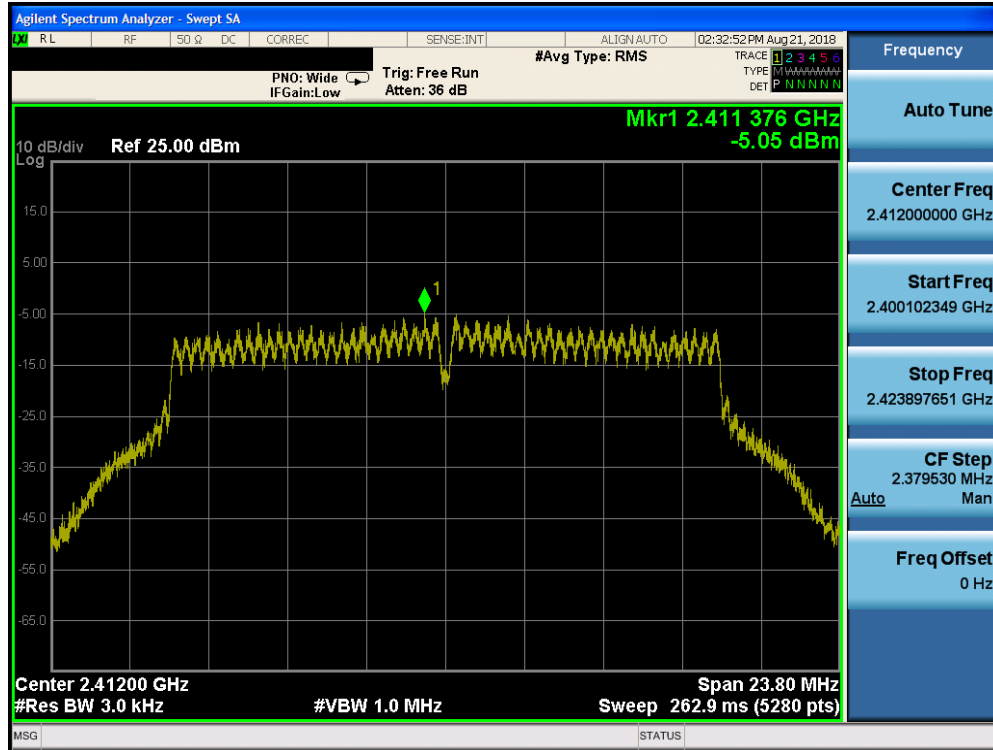


Plot 7-38. Power Spectral Density Plot SISO Core 1 Primary (802.11b – Ch. 6)

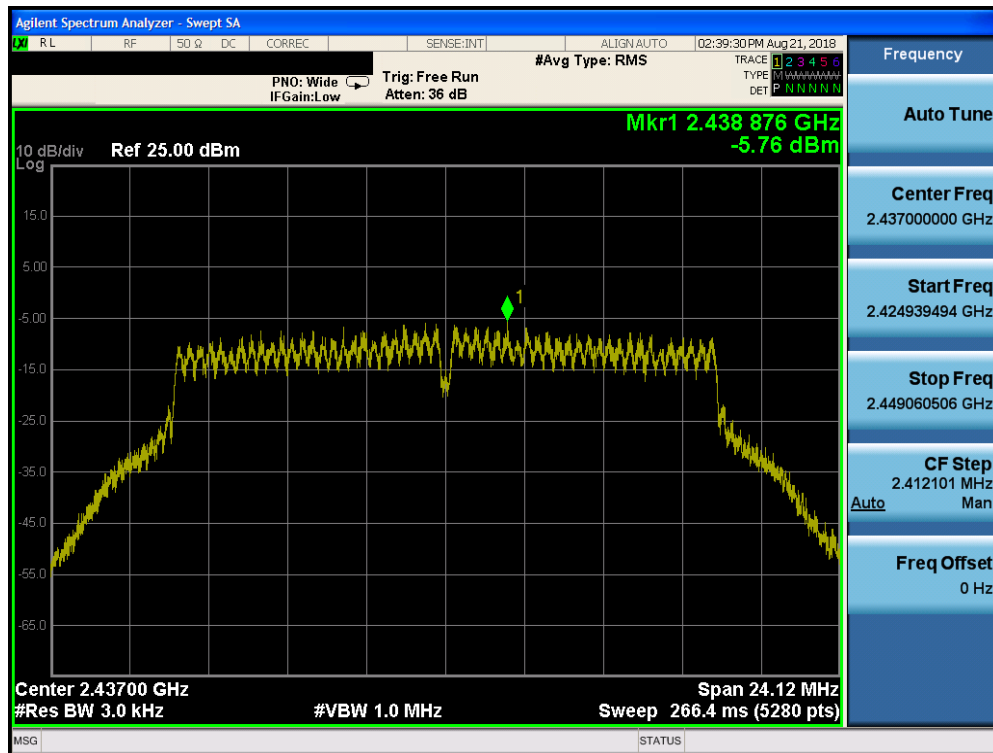


Plot 7-39. Power Spectral Density Plot SISO Core 1 Primary (802.11b – Ch. 11)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 43 of 145

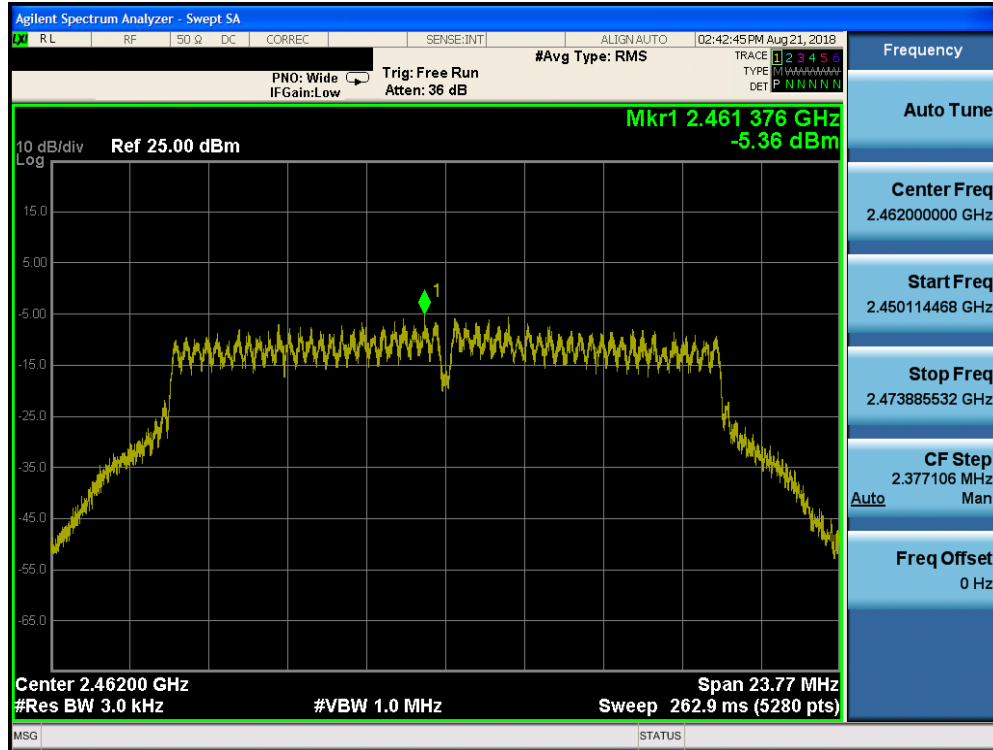


Plot 7-40. Power Spectral Density Plot SISO Core 1 Primary (802.11g – Ch. 1)

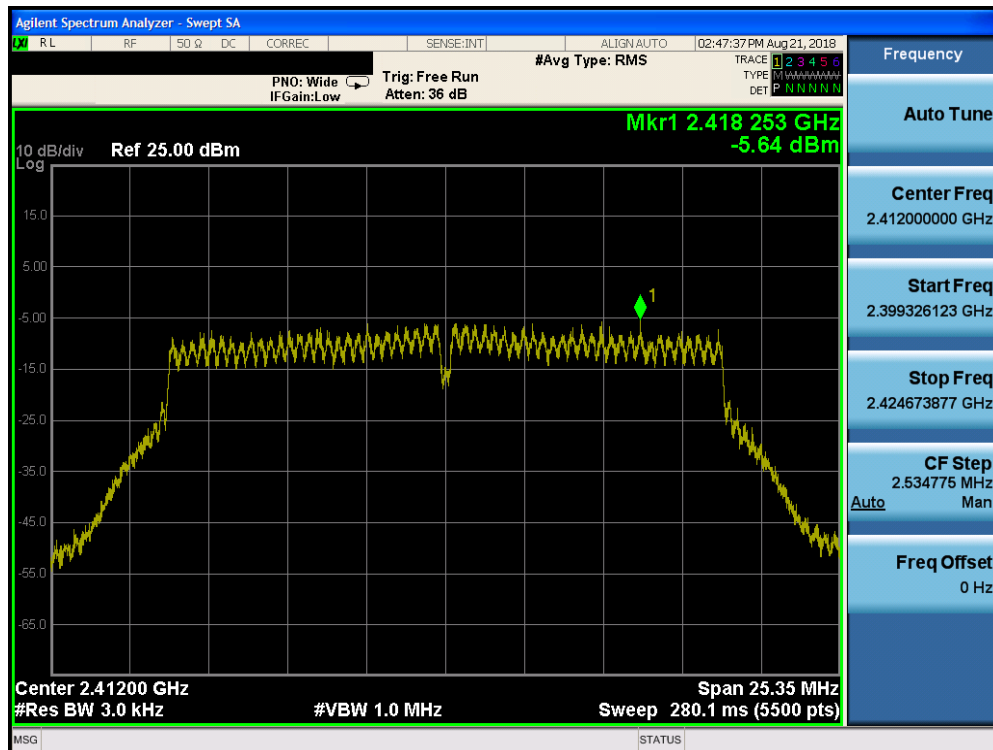


Plot 7-41. Power Spectral Density Plot SISO Core 1 Primary (802.11g – Ch. 6)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 44 of 145

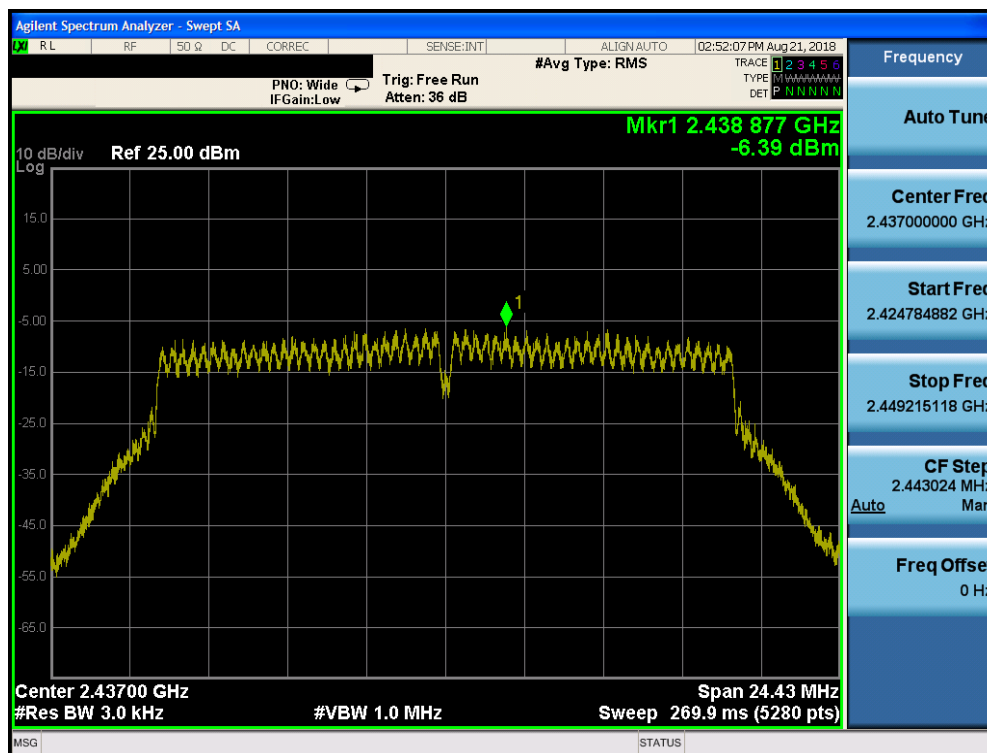


Plot 7-42. Power Spectral Density Plot SISO Core 1 Primary (802.11g – Ch. 11)

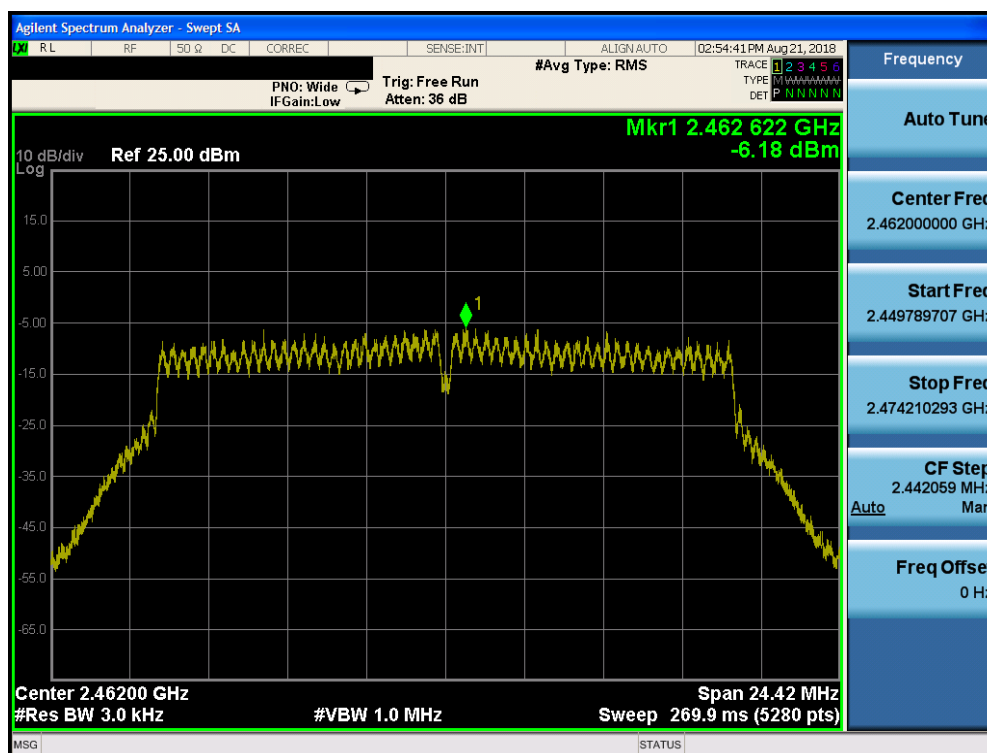


Plot 7-43. Power Spectral Density Plot SISO Core 1 Primary (802.11n (2.4GHz) – Ch. 1)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 45 of 145



Plot 7-44. Power Spectral Density Plot SISO Core 1 Primary (802.11n (2.4GHz) – Ch. 6)



Plot 7-45. Power Spectral Density Plot SISO Core 1 Primary (802.11n (2.4GHz) – Ch. 11)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 46 of 145

SISO Core 1 Diversity Power Spectral Density Measurements

Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]	Pass / Fail
2412	1	b	1	2.48	8.00	-5.52	Pass
2437	6	b	1	1.22	8.00	-6.78	Pass
2462	11	b	1	1.15	8.00	-6.85	Pass
2412	1	g	6	-1.68	8.00	-9.68	Pass
2437	6	g	6	-1.00	8.00	-9.00	Pass
2462	11	g	6	-1.55	8.00	-9.55	Pass
2412	1	n	6.5/7.2 (MCS0)	-0.94	8.00	-8.94	Pass
2437	6	n	6.5/7.2 (MCS0)	-1.06	8.00	-9.06	Pass
2462	11	n	6.5/7.2 (MCS0)	-2.01	8.00	-10.01	Pass

Table 7-21. Conducted Power Density Measurements SISO Core 1 Diversity



Plot 7-46. Power Spectral Density Plot SISO Core 1 Diversity (802.11b – Ch. 1)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 47 of 145

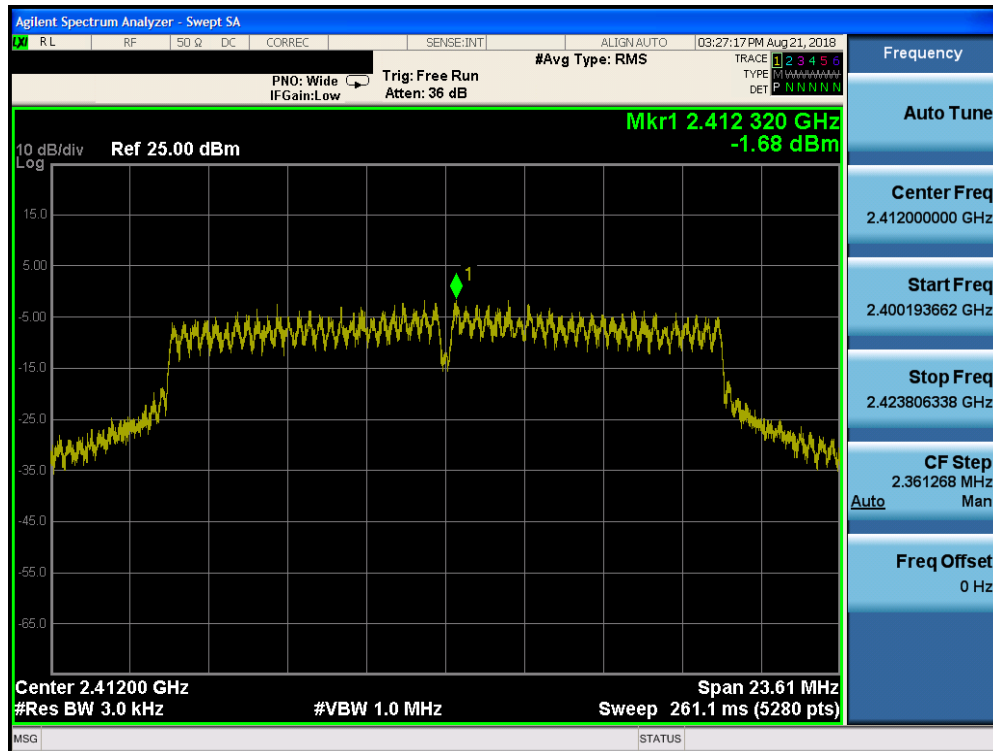


Plot 7-47. Power Spectral Density Plot SISO Core 1 Diversity (802.11b – Ch. 6)

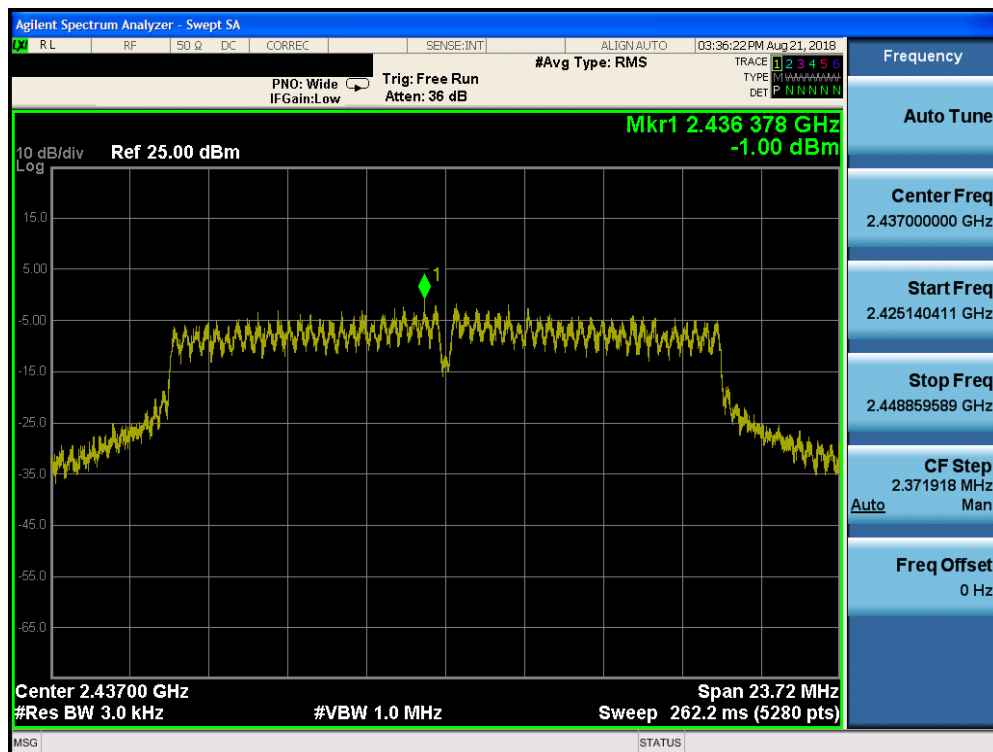


Plot 7-48. Power Spectral Density Plot SISO Core 1 Diversity (802.11b – Ch. 11)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 48 of 145

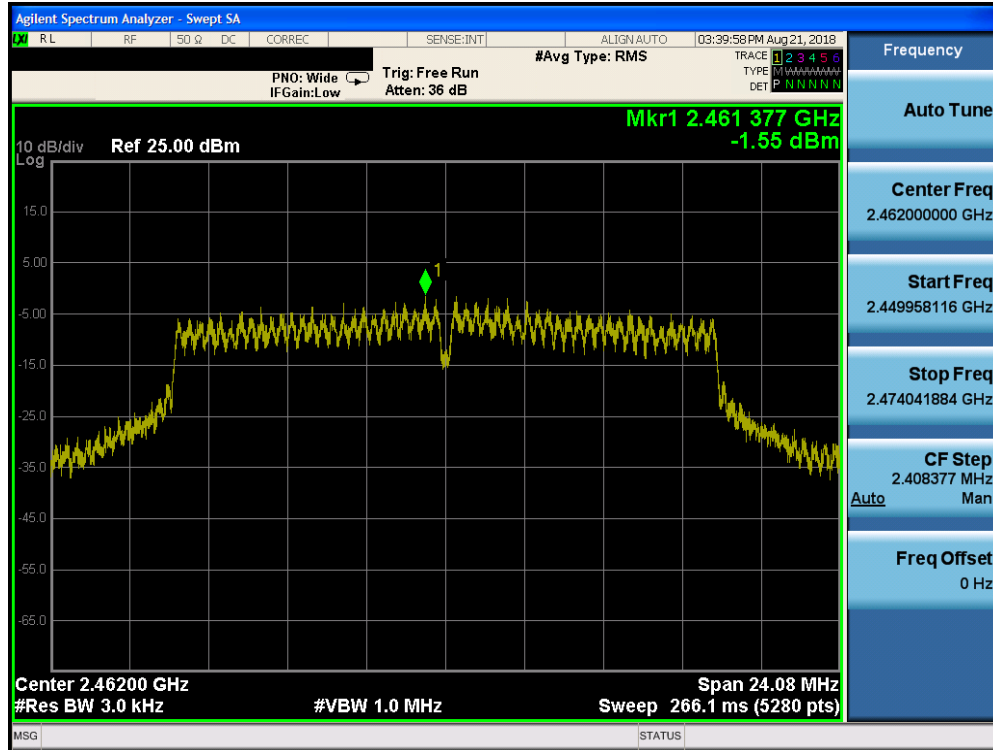


Plot 7-49. Power Spectral Density Plot SISO Core 1 Diversity (802.11g – Ch. 1)

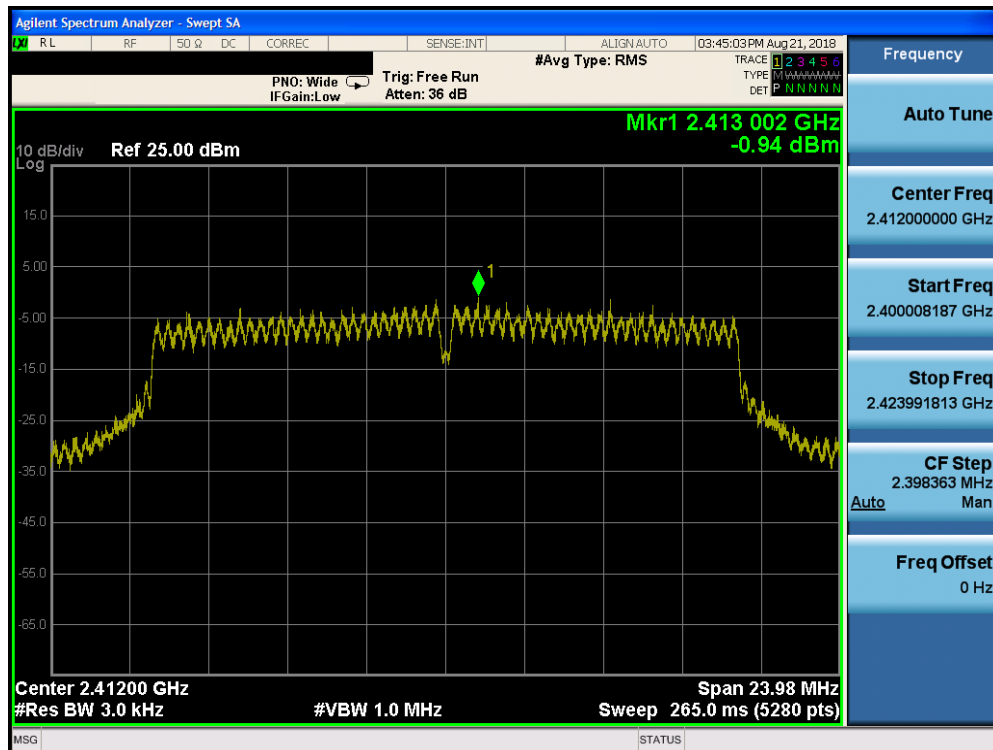


Plot 7-50. Power Spectral Density Plot SISO Core 1 Diversity (802.11g – Ch. 6)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 49 of 145

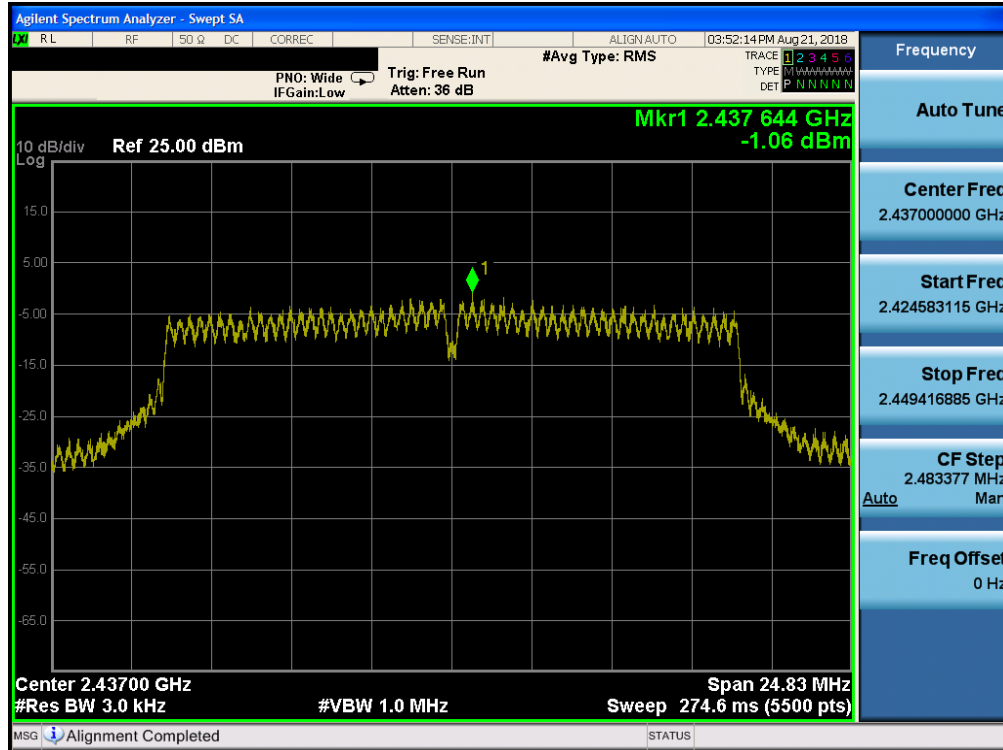


Plot 7-51. Power Spectral Density Plot SISO Core 1 Diversity (802.11g – Ch. 11)

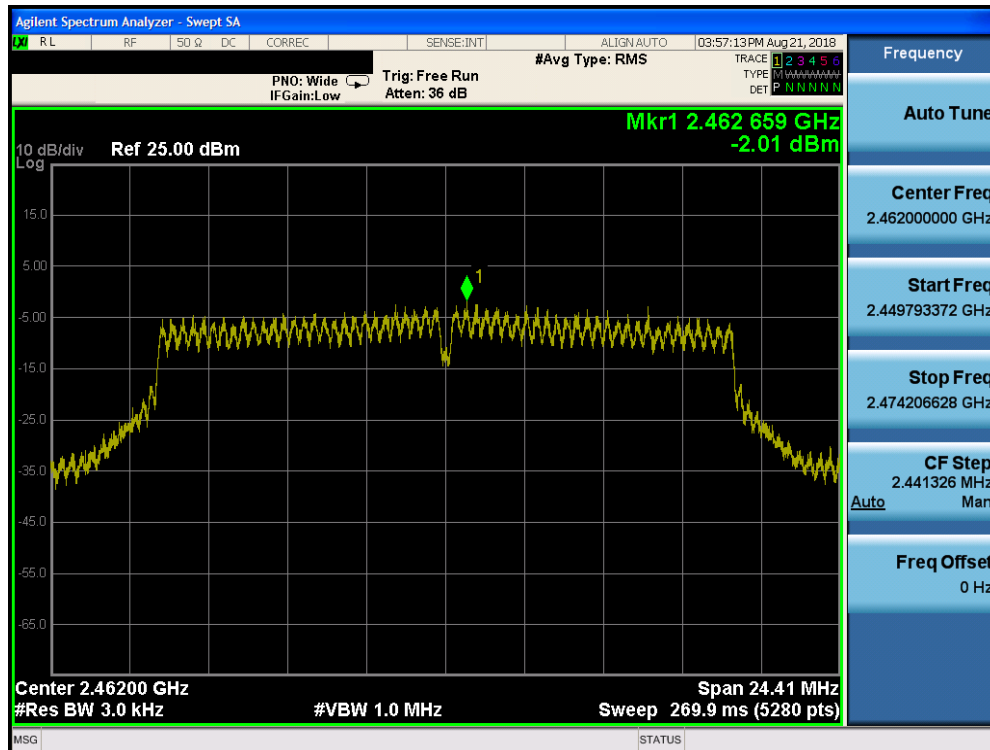


Plot 7-52. Power Spectral Density Plot SISO Core 1 Diversity (802.11n (2.4GHz) – Ch. 1)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 50 of 145



Plot 7-53. Power Spectral Density Plot SISO Core 1 Diversity (802.11n (2.4GHz) – Ch. 6)



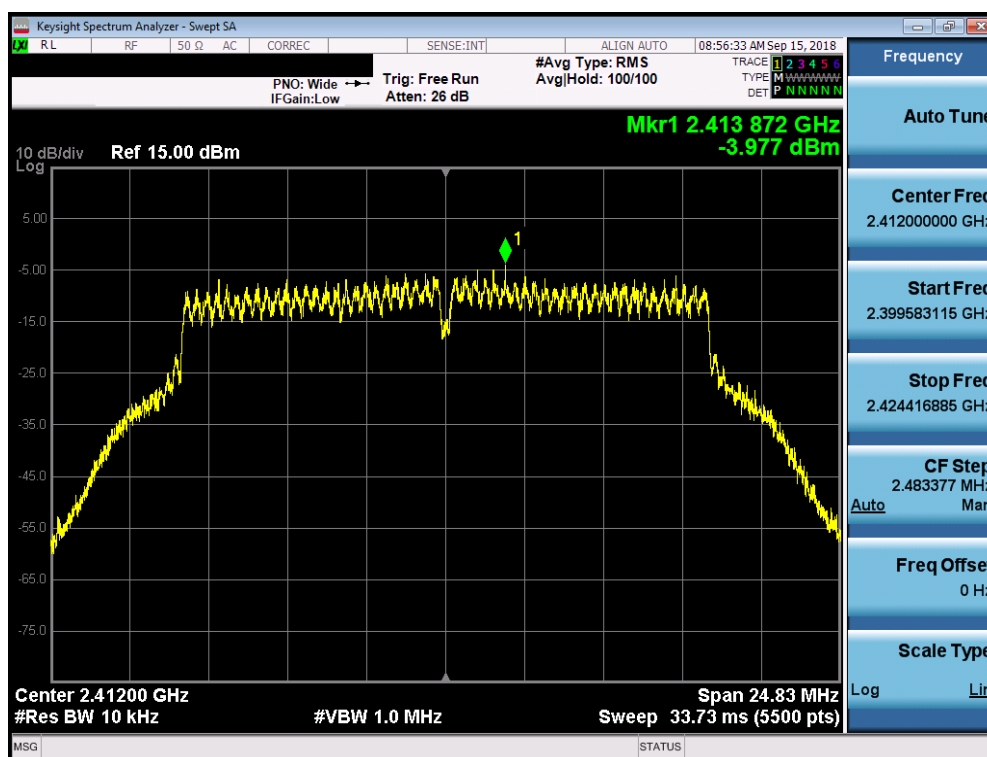
Plot 7-54. Power Spectral Density Plot SISO Core 1 Diversity (802.11n (2.4GHz) – Ch. 11)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 51 of 145

CDD Primary Power Spectral Density Measurements

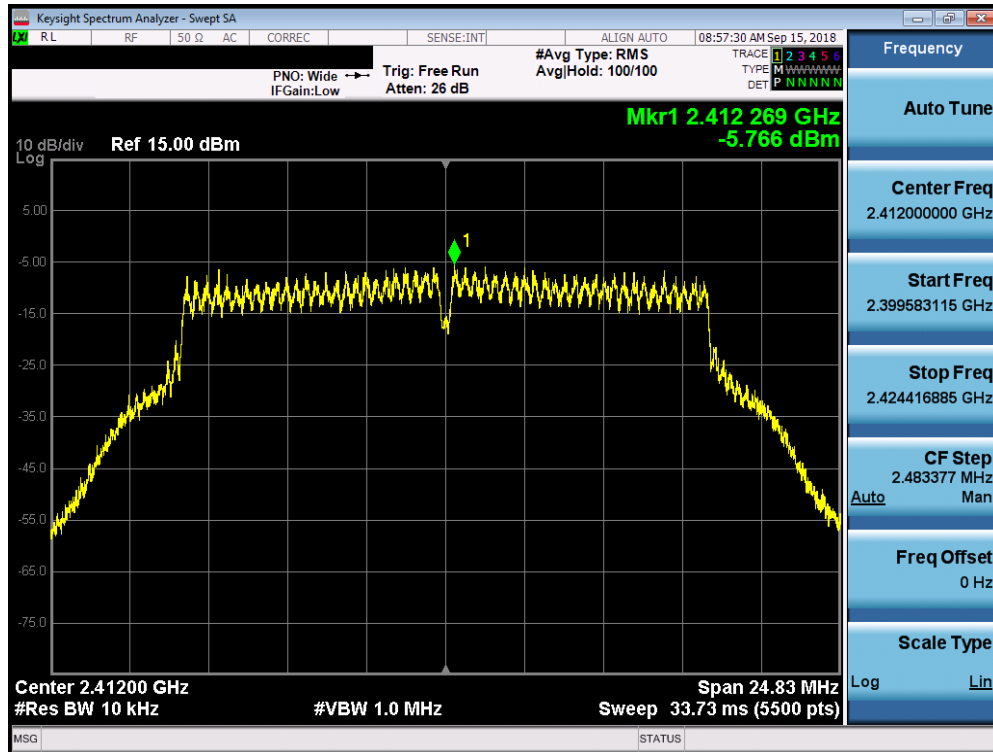
Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Core 0 Power Spectral Density [dBm]	Core 1 Primary Power Spectral Density [dBm]	Summed MIMO Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]	Pass / Fail
2412	1	g	6	-3.98	-5.77	-1.77	8.00	-9.77	Pass
2437	6	g	6	-1.07	-1.70	1.64	8.00	-6.36	Pass
2462	11	g	6	-7.72	-8.10	-4.90	8.00	-12.90	Pass
2412	1	n	6.5/7.2 (MCS0)	-5.55	-5.33	-2.43	8.00	-10.43	Pass
2437	6	n	6.5/7.2 (MCS0)	-0.82	-1.95	1.66	8.00	-6.34	Pass
2462	11	n	6.5/7.2 (MCS0)	-6.51	-7.90	-4.14	8.00	-12.14	Pass

Table 7-22.CDD Primary Conducted Power Density Measurements

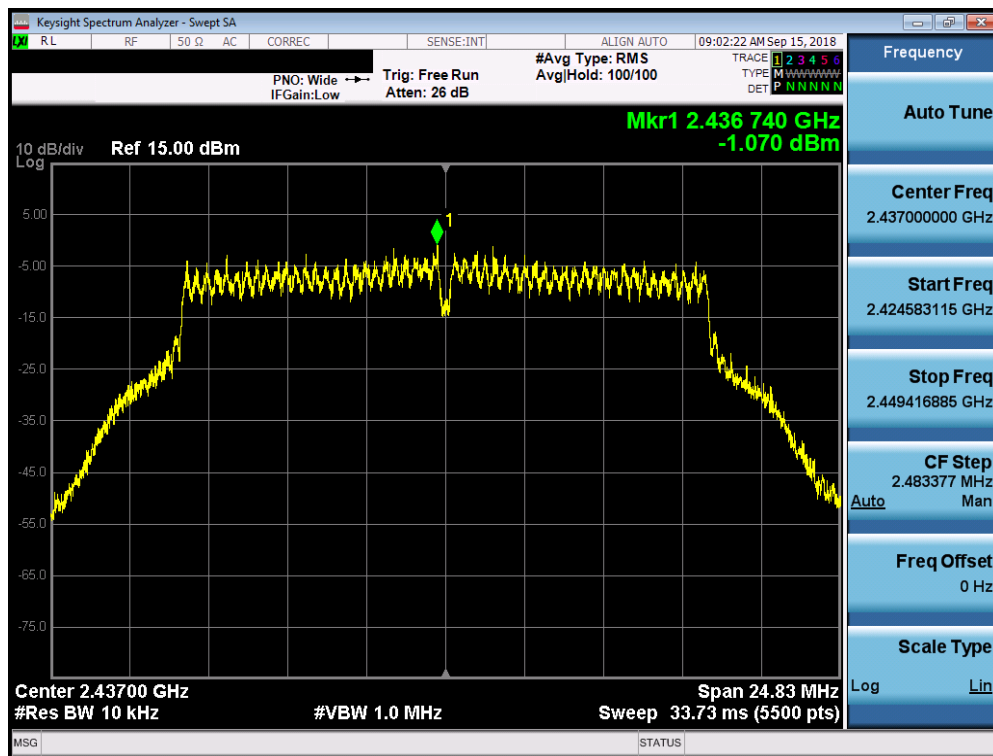


Plot 7-55. Power Spectral Density Plot CDD Core 0 (802.11g – Ch. 1)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 52 of 145

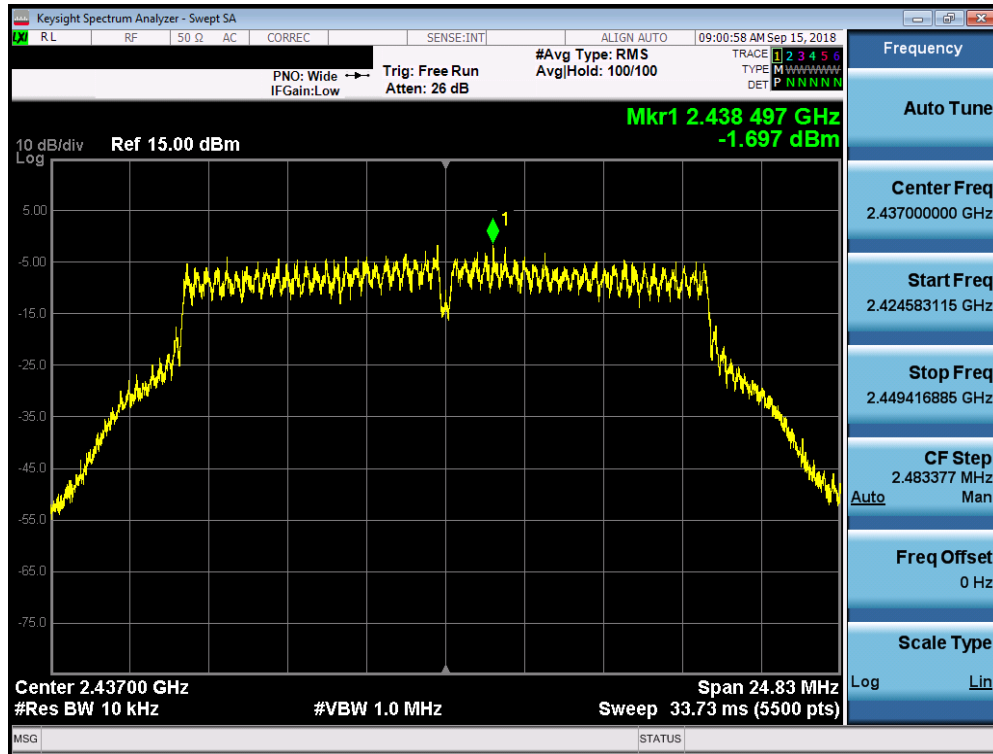


Plot 7-56. Power Spectral Density Plot CDD Core 1 Primary (802.11g – Ch. 1)

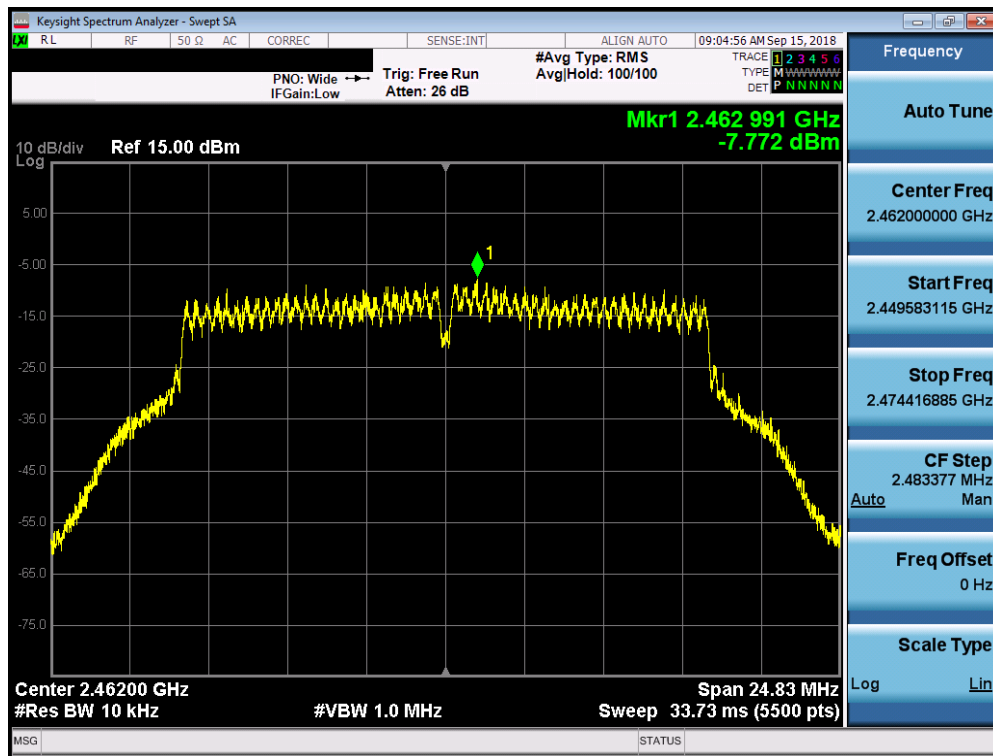


Plot 7-57. Power Spectral Density Plot CDD Core 0 (802.11g – Ch. 6)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 53 of 145

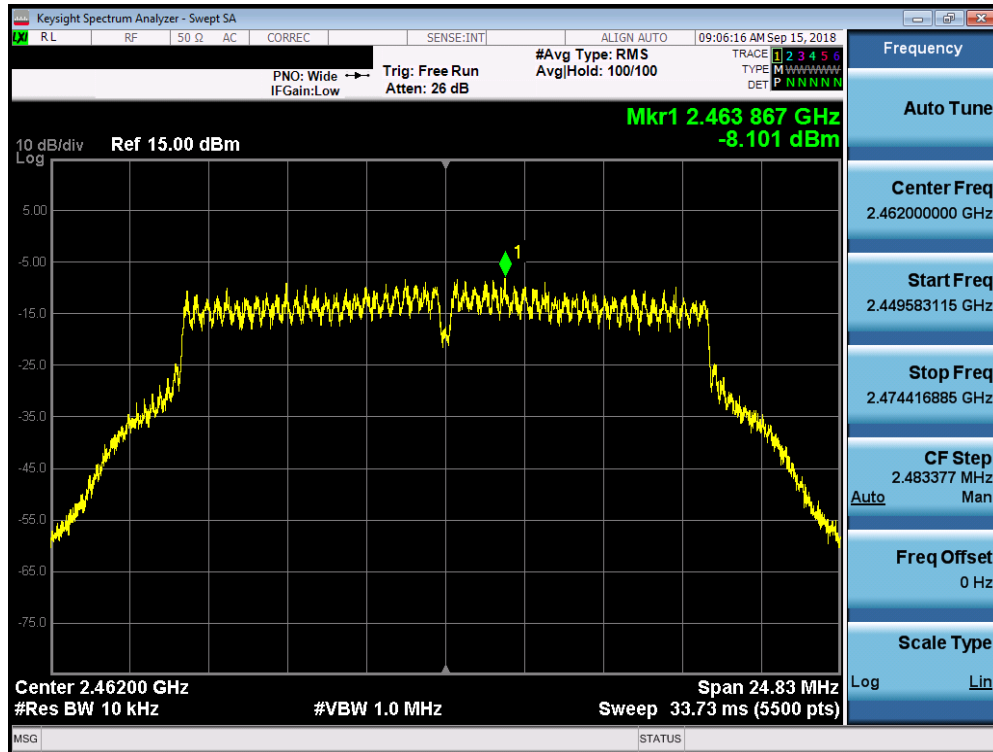


Plot 7-58. Power Spectral Density Plot CDD Core 1 Primary (802.11g – Ch. 6)

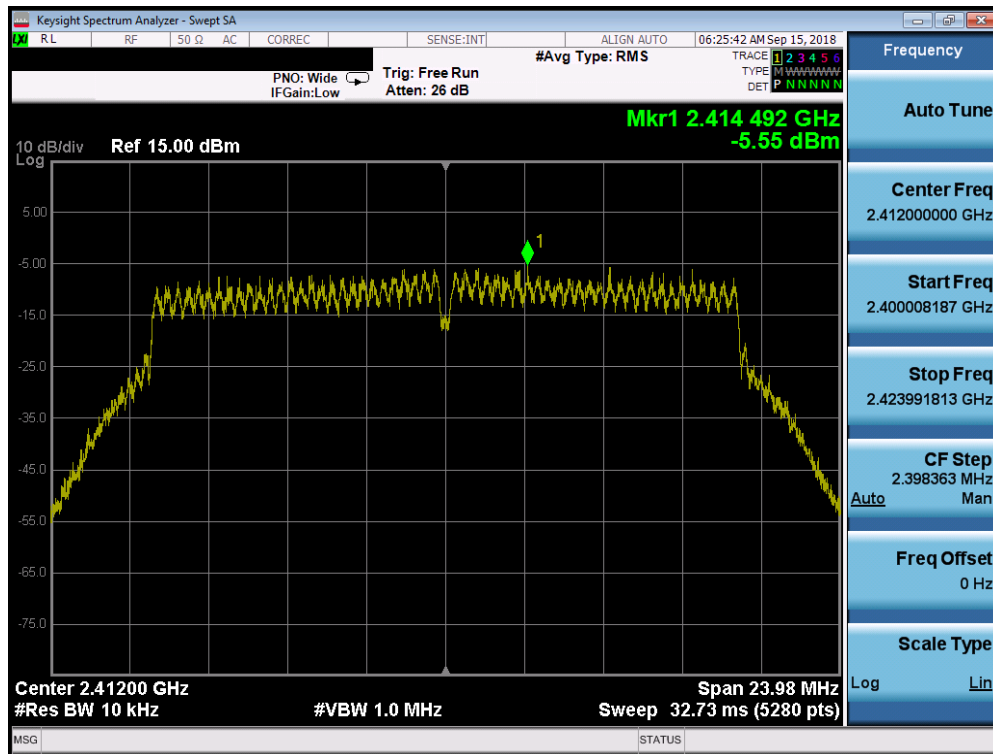


Plot 7-59. Power Spectral Density Plot CDD Core 0 (802.11g – Ch. 11)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 54 of 145

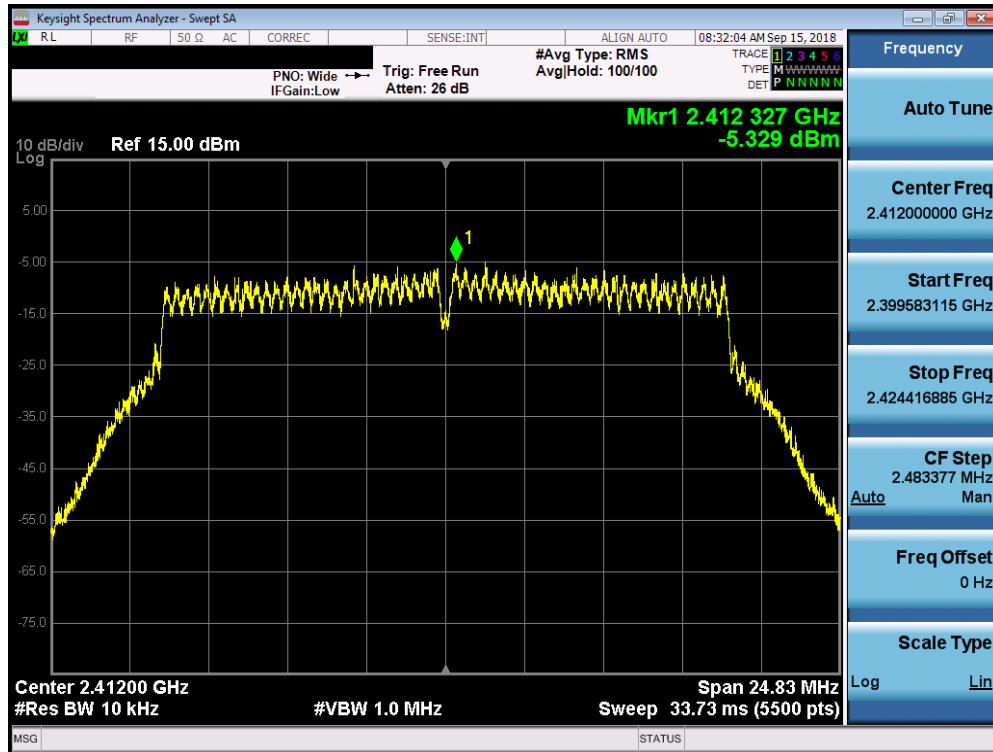


Plot 7-60. Power Spectral Density Plot CDD Core 1 Primary (802.11g – Ch. 11)

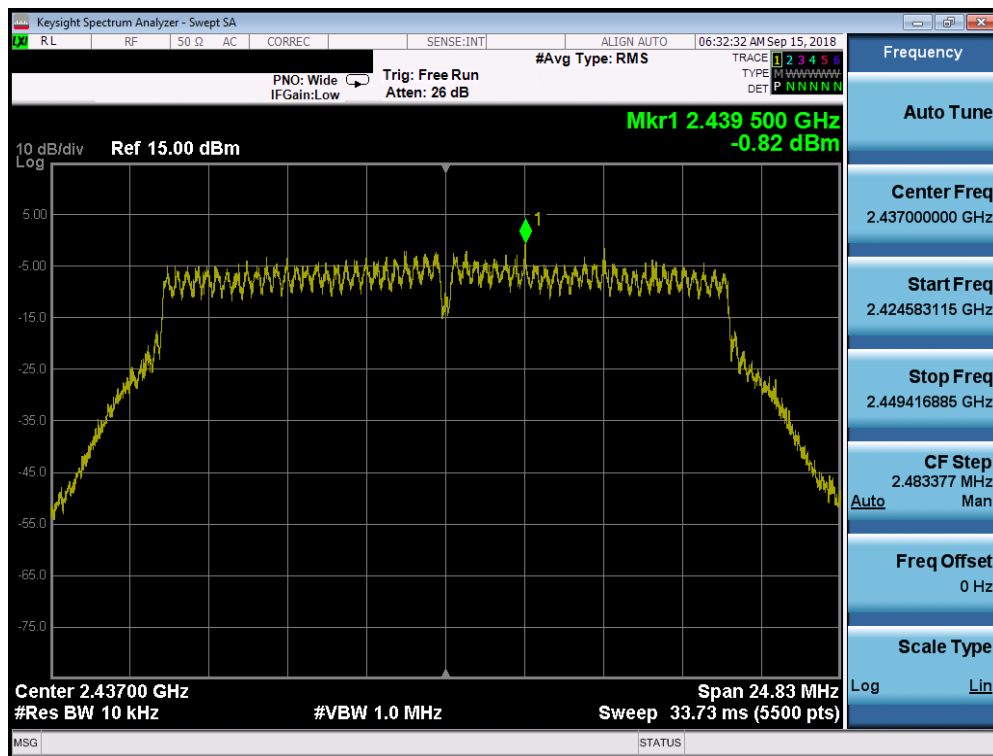


Plot 7-61. Power Spectral Density Plot CDD Core 0 (802.11n – Ch. 1)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 55 of 145

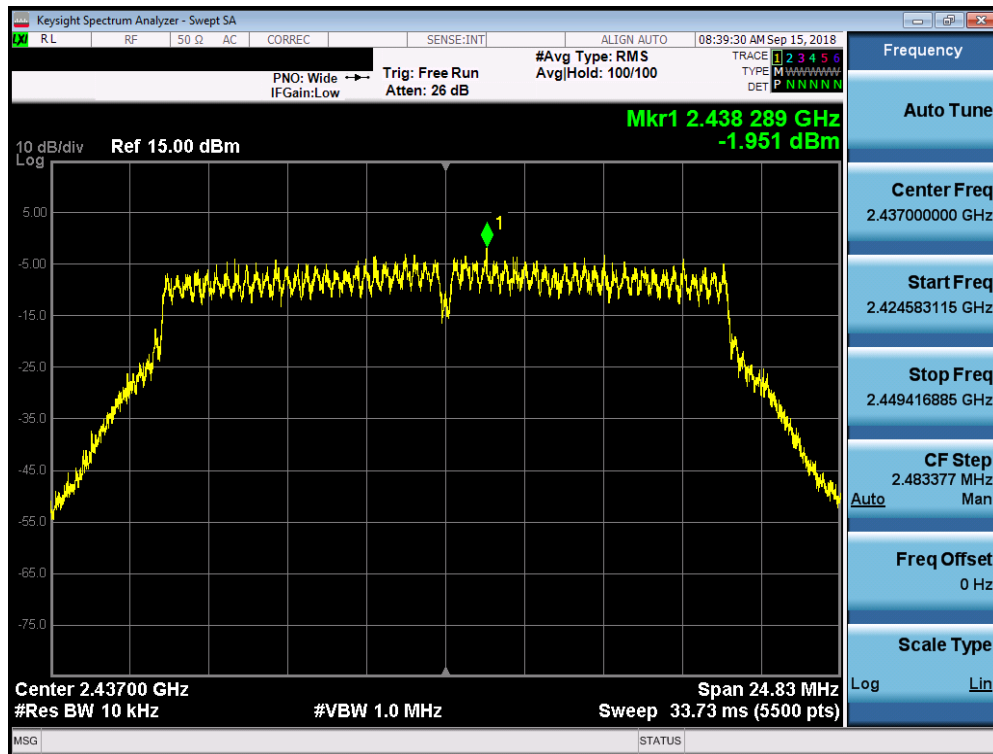


Plot 7-62. Power Spectral Density Plot CDD Core 1 Primary (802.11n – Ch. 1)

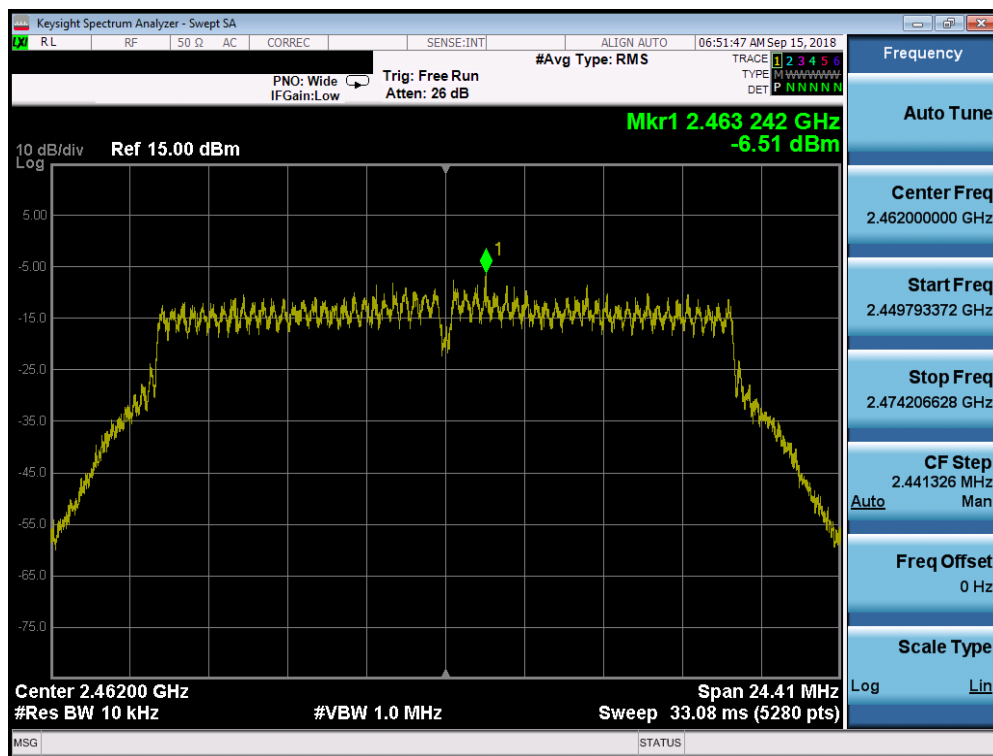


Plot 7-63. Power Spectral Density Plot CDD Core 0 (802.11n – Ch. 6)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 56 of 145

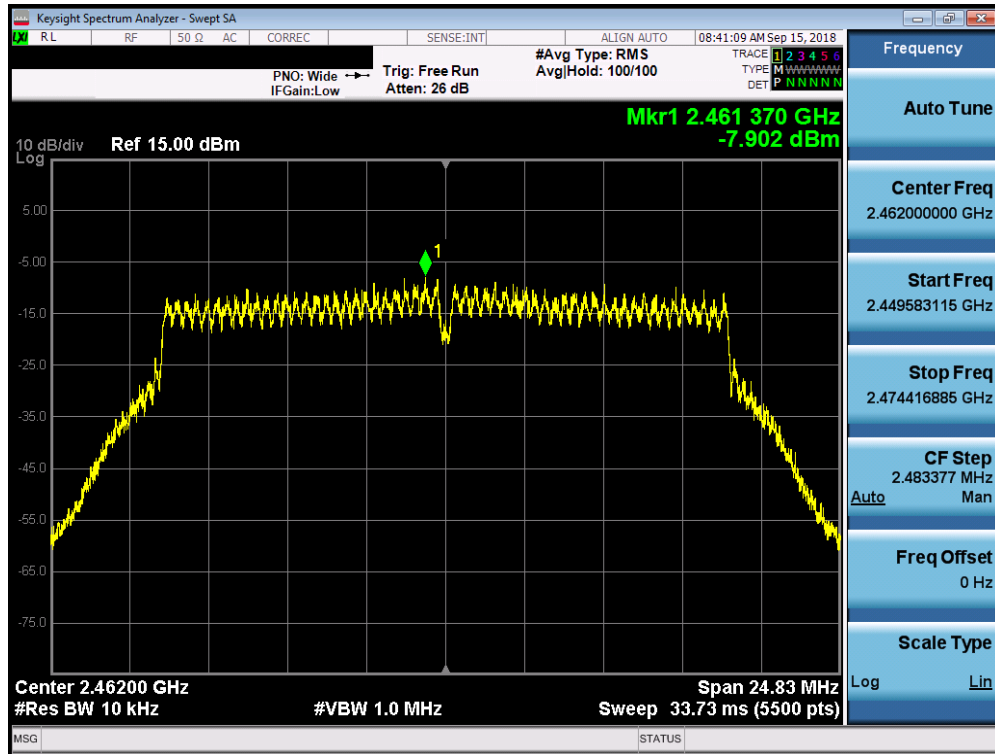


Plot 7-64. Power Spectral Density Plot CDD Core 1 Primary (802.11n – Ch. 6)



Plot 7-65. Power Spectral Density Plot CDD Core 0 (802.11n – Ch. 11)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 57 of 145



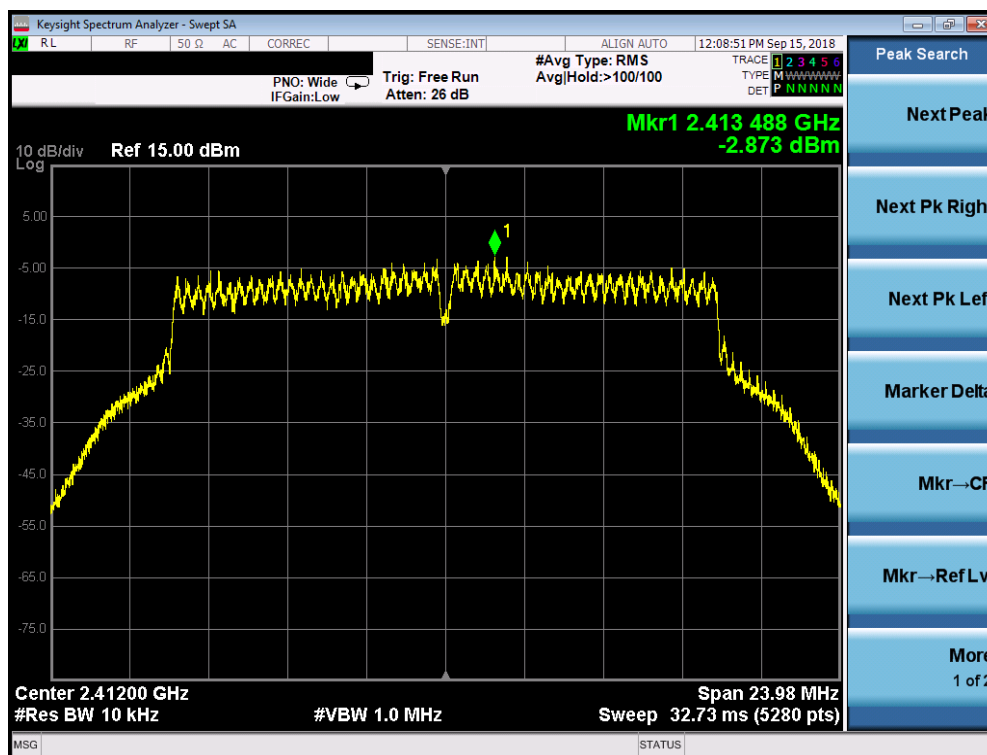
Plot 7-66. Power Spectral Density Plot CDD Core 1 Primary (802.11n – Ch. 11)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 58 of 145

CDD Diversity Power Spectral Density Measurements

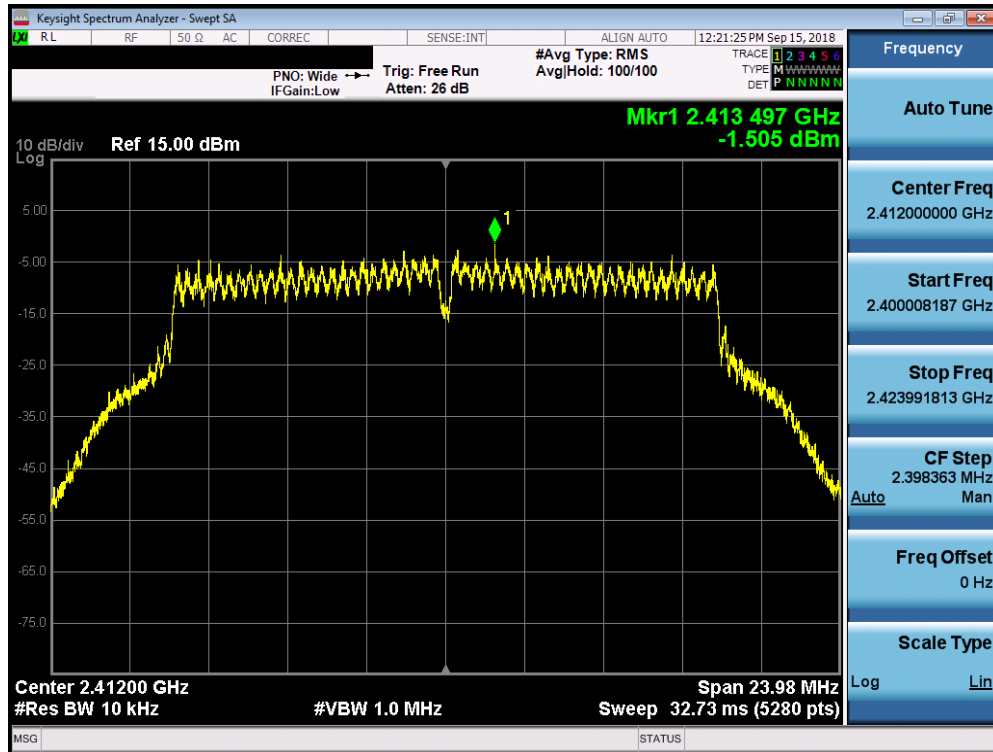
Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Core 0 Power Spectral Density [dBm]	Core 1 Diversity Power Spectral Density [dBm]	Summed MIMO Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]	Pass / Fail
2412	1	g	6	-2.87	-1.51	0.87	8.00	-7.13	Pass
2437	6	g	6	0.49	3.01	4.94	8.00	-3.06	Pass
2462	11	g	6	-6.20	-4.45	-2.23	8.00	-10.23	Pass
2412	1	n	6.5/7.2 (MCS0)	-4.71	-3.92	-1.29	8.00	-9.29	Pass
2437	6	n	6.5/7.2 (MCS0)	-1.57	1.45	3.21	8.00	-4.79	Pass
2462	11	n	6.5/7.2 (MCS0)	-7.90	-6.34	-4.04	8.00	-12.04	Pass

Table 7-23.CDD Diversity Conducted Power Density Measurements

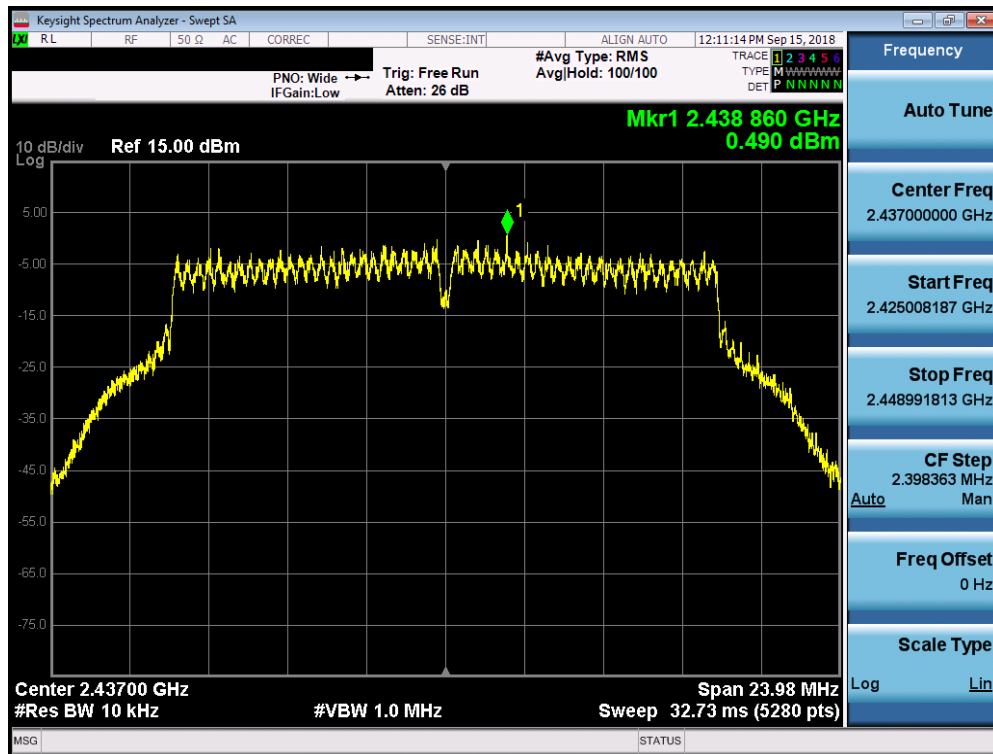


Plot 7-67. Power Spectral Density Plot CDD Core 0 (802.11g – Ch. 1)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 59 of 145

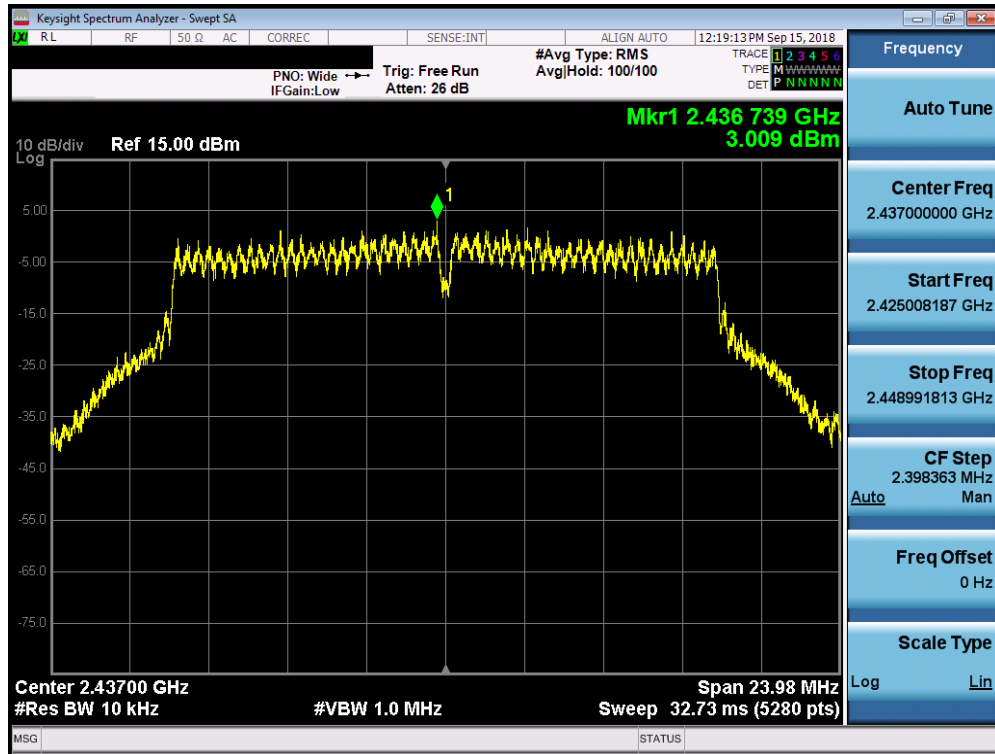


Plot 7-68. Power Spectral Density Plot CDD Core 1 Diversity (802.11g – Ch. 1)

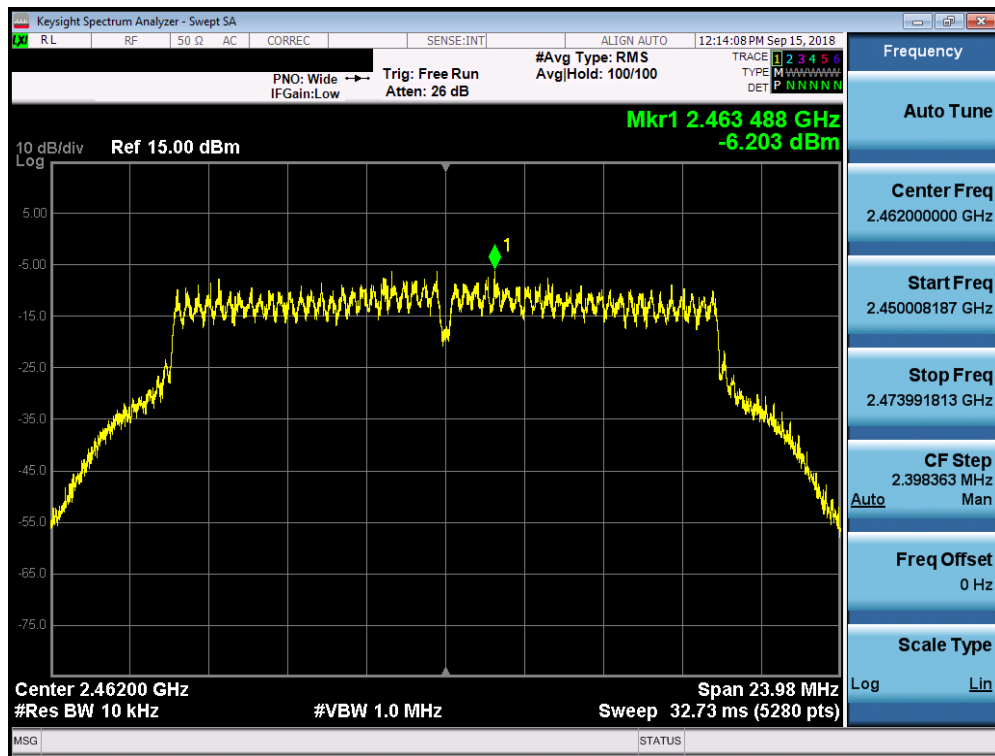


Plot 7-69. Power Spectral Density Plot CDD Core 0 (802.11g – Ch. 6)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 60 of 145

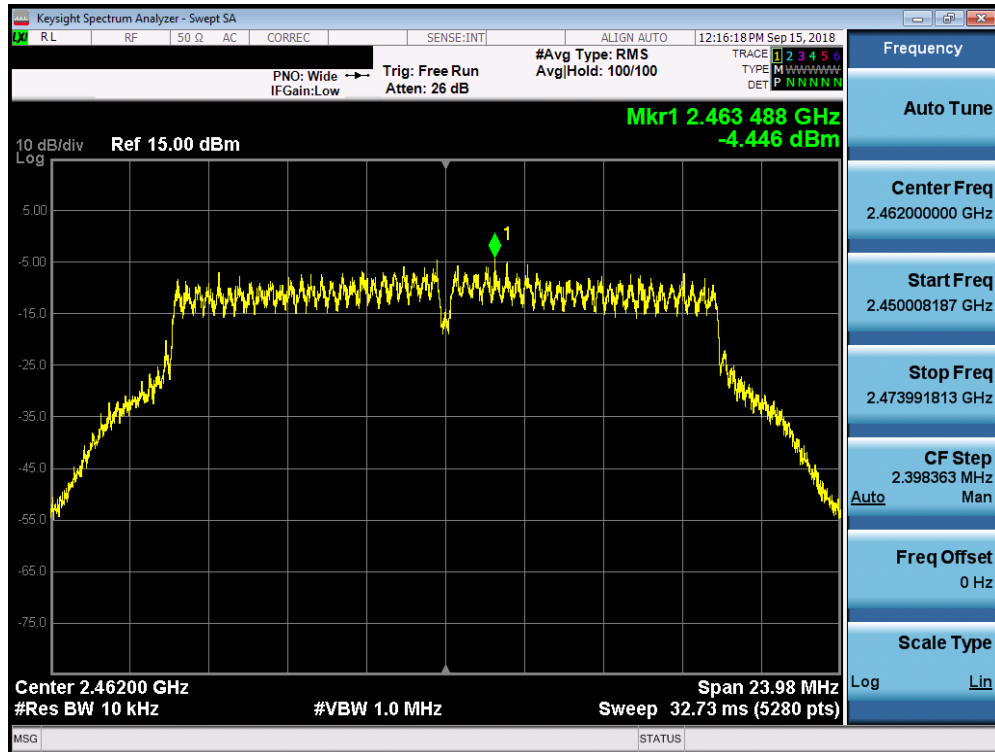


Plot 7-70. Power Spectral Density Plot CDD Core 1 Diversity (802.11g – Ch. 6)

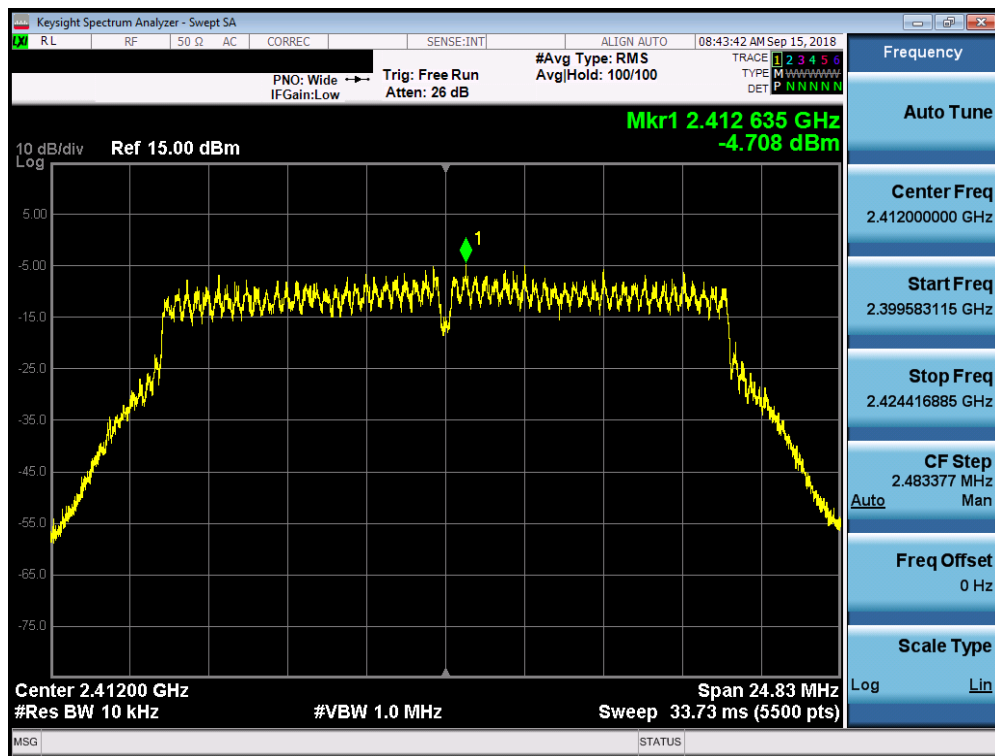


Plot 7-71. Power Spectral Density Plot CDD Core 0 (802.11g – Ch. 11)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 61 of 145

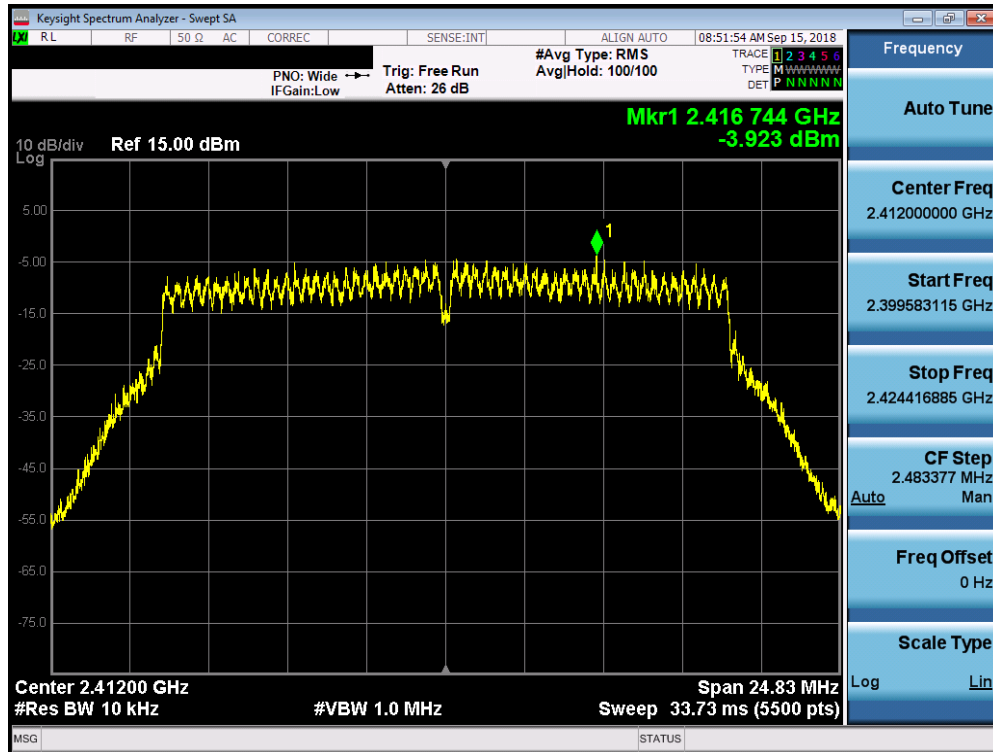


Plot 7-72. Power Spectral Density Plot CDD Core 1 Diversity (802.11g – Ch. 11)

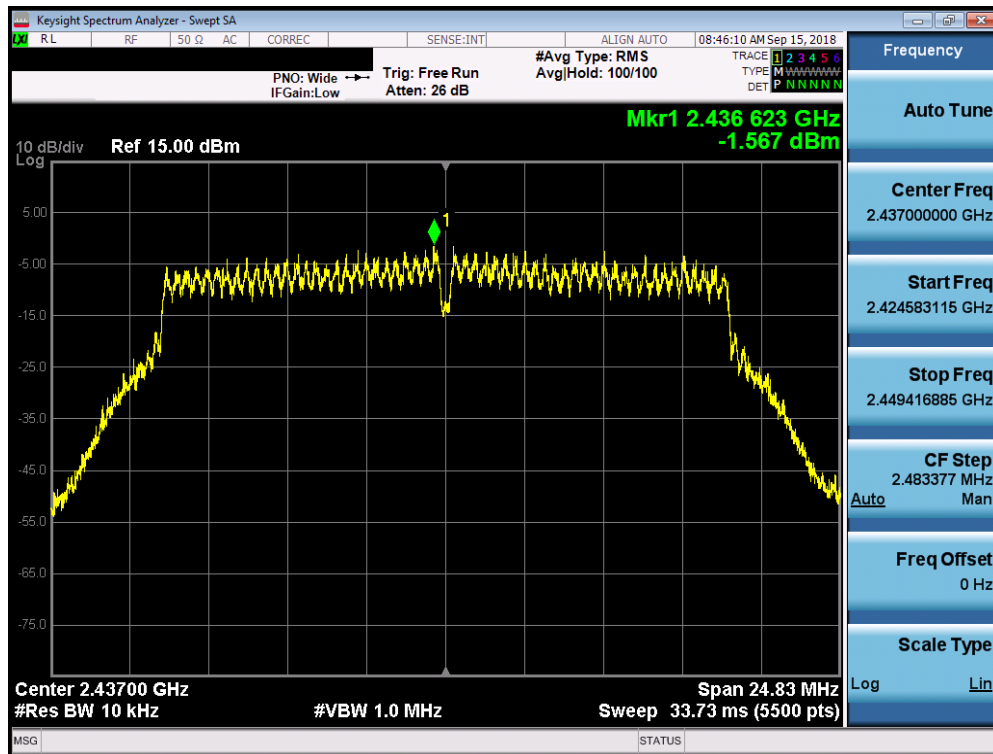


Plot 7-73. Power Spectral Density Plot CDD Core 0 (802.11n – Ch. 1)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 62 of 145

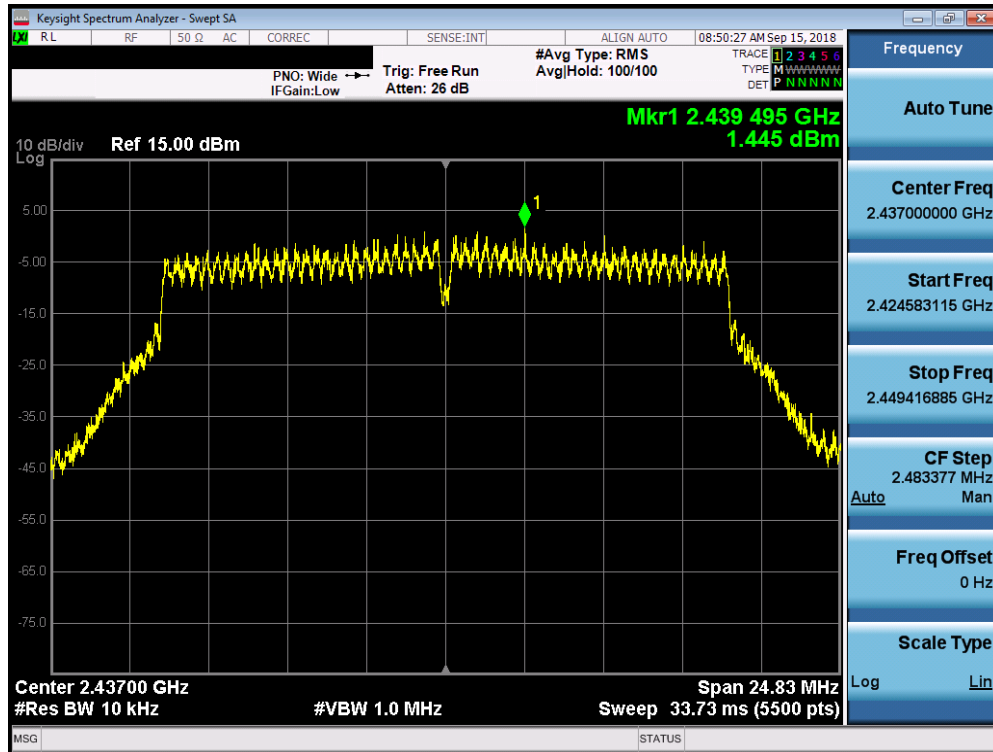


Plot 7-74. Power Spectral Density Plot CDD Core 1 Diversity (802.11n – Ch. 1)

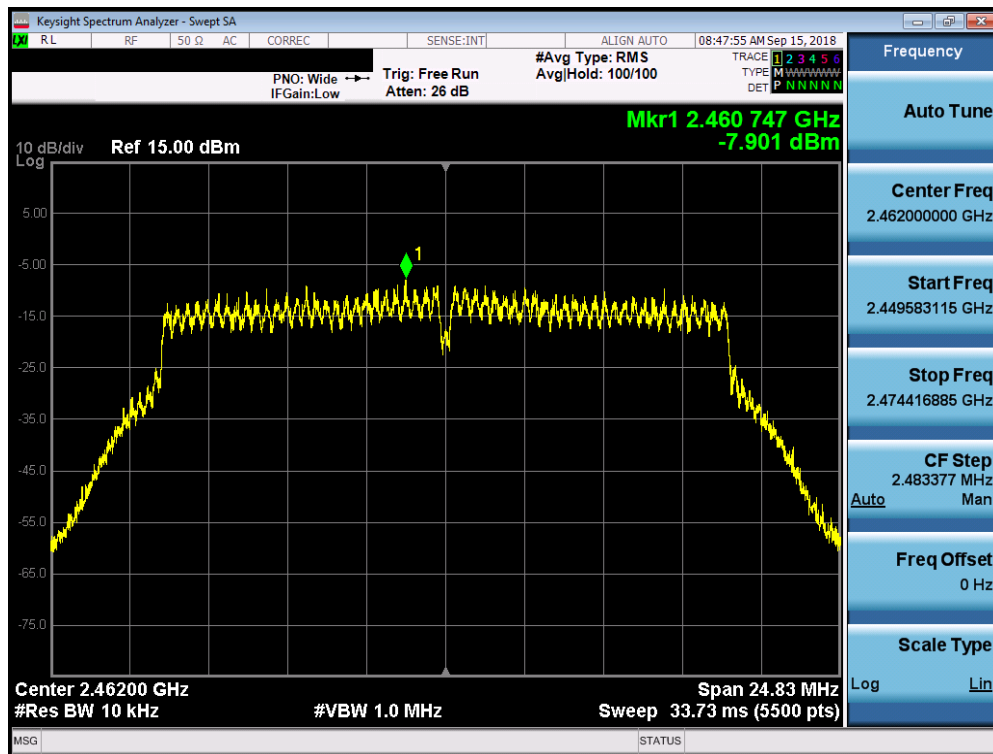


Plot 7-75. Power Spectral Density Plot CDD Core 0 (802.11n – Ch. 6)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 63 of 145

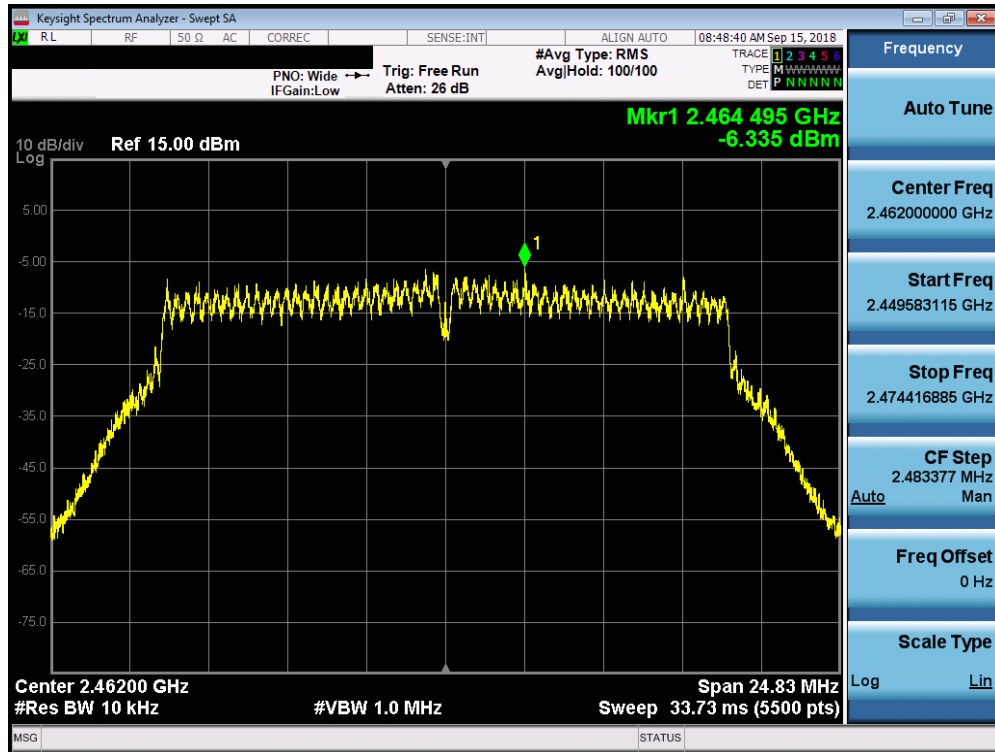


Plot 7-76. Power Spectral Density Plot CDD Core 1 Diversity (802.11n – Ch. 6)



Plot 7-77. Power Spectral Density Plot CDD Core 0 (802.11n – Ch. 11)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 64 of 145



Plot 7-78. Power Spectral Density Plot CDD Core 1 Diversity (802.11n – Ch. 11)

Note:

Per ANSI C63.10-2013 Section 14.3.2.2 and KDB 662911 D01 v02r01 Section E2), the power spectral density at Core 0 and Core 1 were first measured separately as shown in the section above. The measured values were then summed in linear power units then converted back to dBm.

Sample MIMO Calculation:

At 2412MHz for 11n MIMO Primary, the average conducted power spectral density was measured to be -5.55 dBm for Core 0 and -5.33 dBm for Core 1 Primary.

$$\text{Core 0} + \text{Core 1 Primary} = \text{MIMO Primary}$$

$$(-5.55 \text{ dBm} + -5.33 \text{ dBm}) = (0.28 \text{ mW} + 0.29 \text{ mW}) = 0.57 \text{ mW} = -2.43 \text{ dBm}$$

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 65 of 145

7.5 Conducted Emissions at the Band Edge

§15.247(d); RSS-247 [5.5]

Test Overview and Limit

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. For the following out of band conducted spurious emissions plots at the band edge, the EUT was set at a data rate of 1Mbps for “b” mode, 6 Mbps for “g” mode, and 6.5/7.2Mbps for “n” mode as these settings produced the worst-case emissions.

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the PSD procedure (Section 7.4).

Test Procedure Used

ANSI C63.10-2013 – Section 11.11.3
KDB 558074 D01 v05 – Section 8.7.2

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW = 100kHz
4. VBW = 1MHz
5. Detector = Peak
6. Number of sweep points $\geq 2 \times \text{Span/RBW}$
7. Trace mode = max hold
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

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



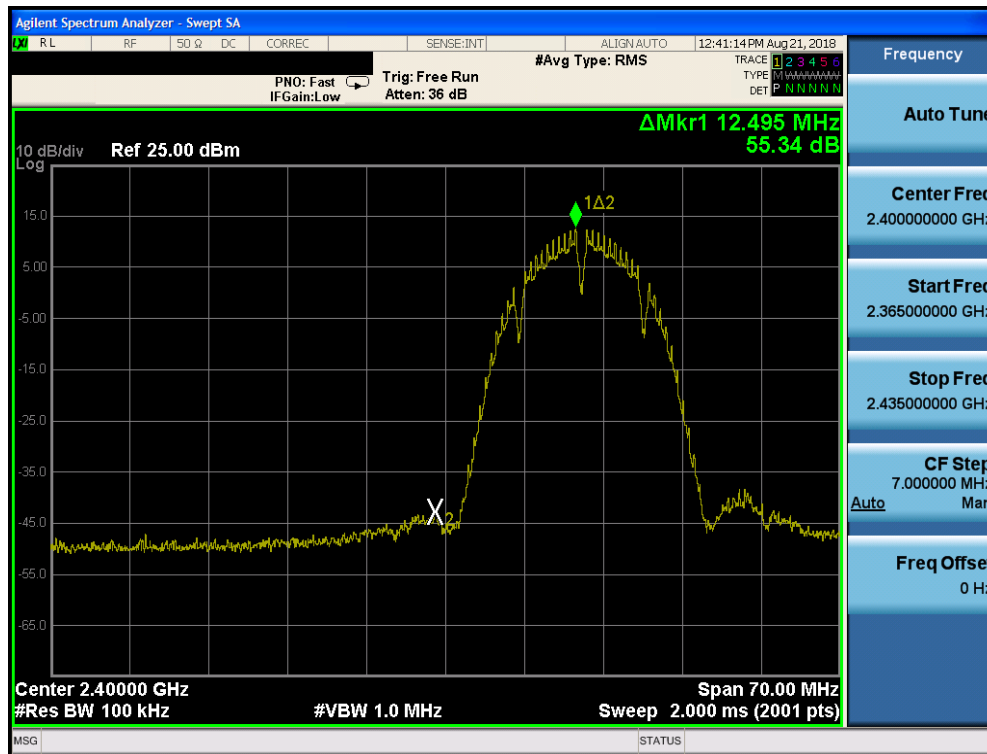
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

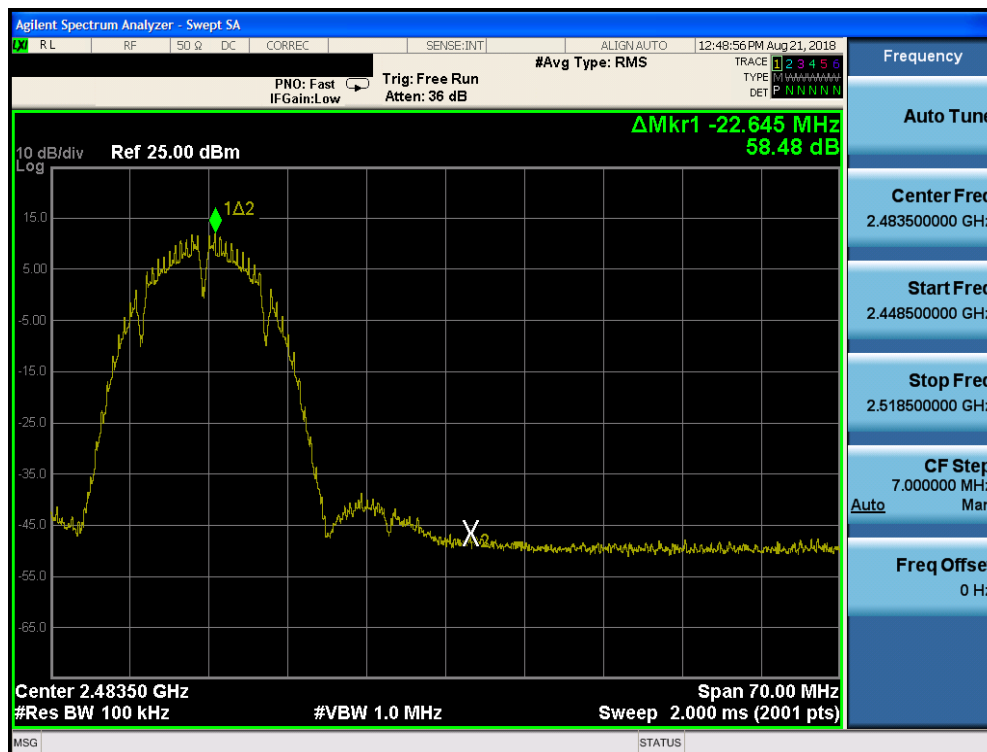
None

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 66 of 145

SISO Core 0 Conducted Emissions at the Band Edge

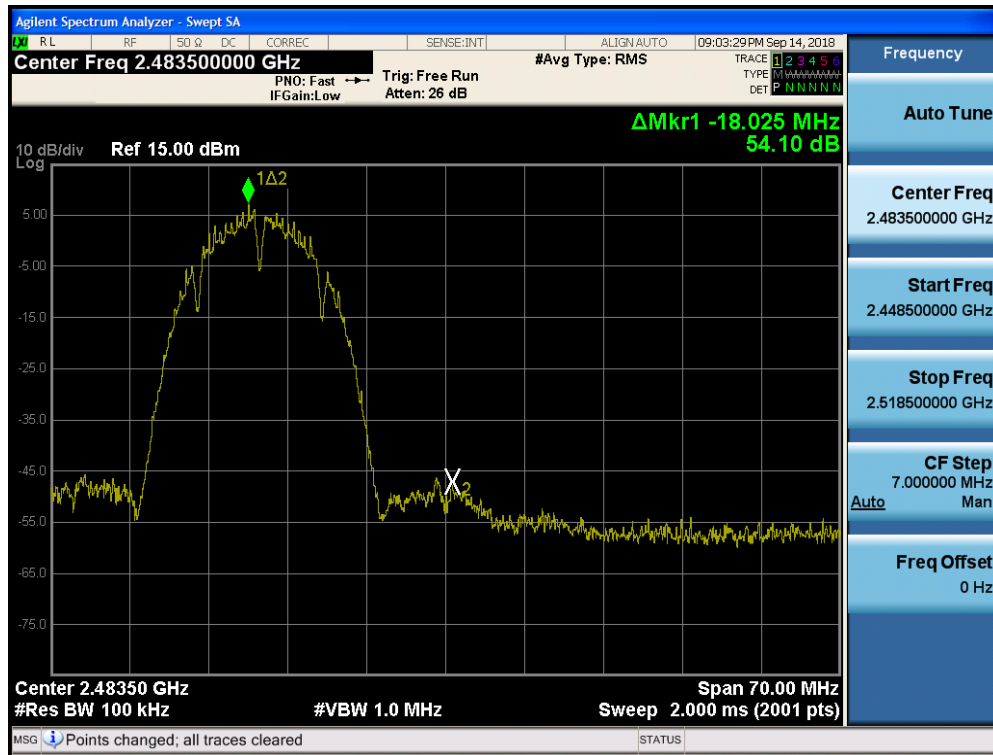


Plot 7-79. Band Edge Plot SISO Core 0 (802.11b – Ch. 1)

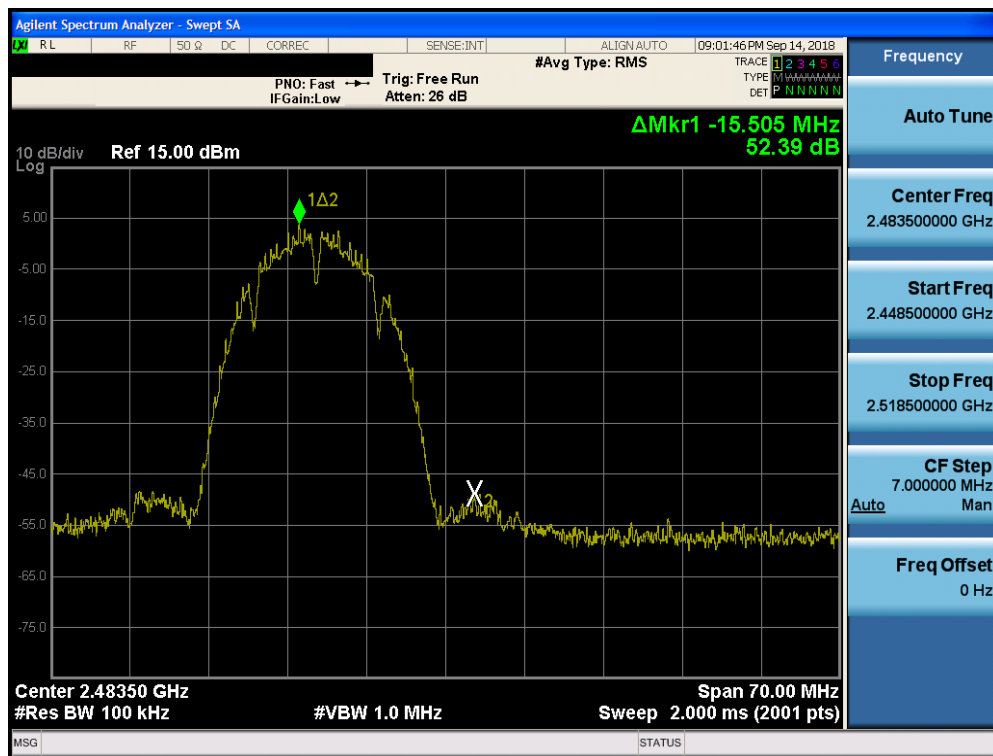


Plot 7-80. Band Edge Plot SISO Core 0 (802.11b – Ch. 11)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 67 of 145

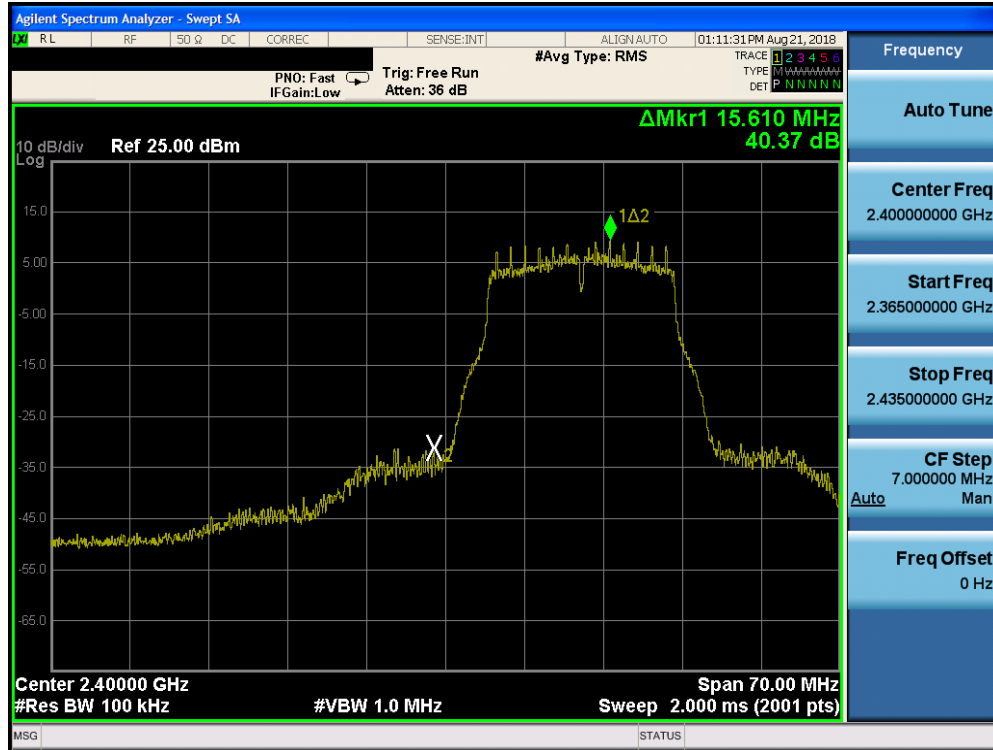


Plot 7-81. Band Edge Plot SISO Core 0 (802.11b – Ch. 12)

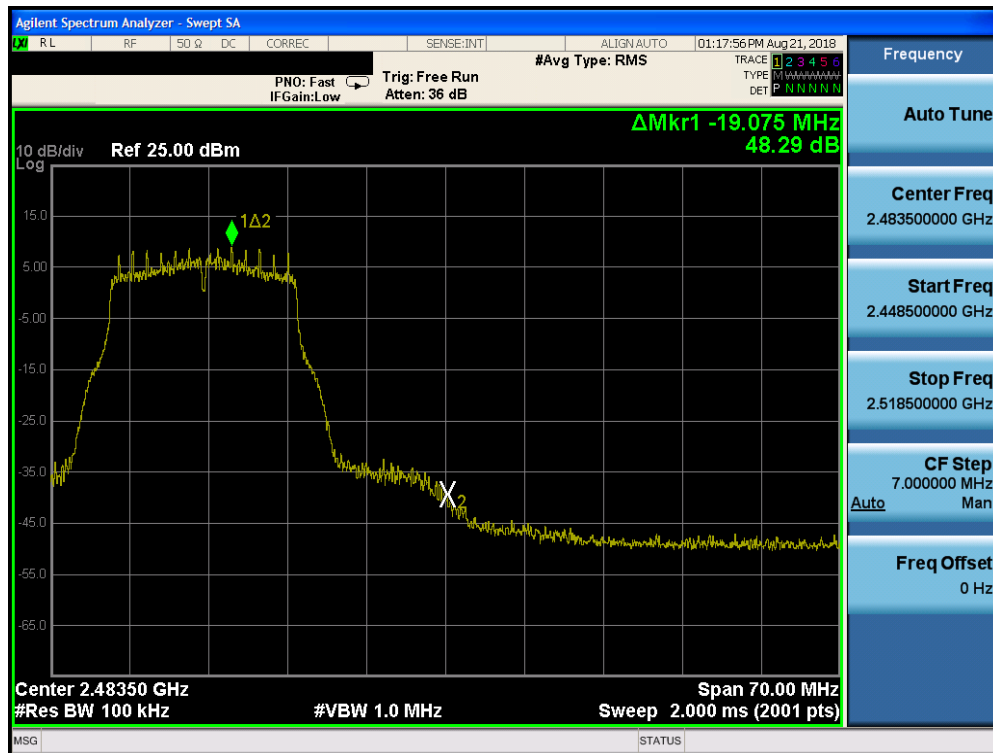


Plot 7-82. Band Edge Plot SISO Core 0 (802.11b – Ch. 13)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 68 of 145

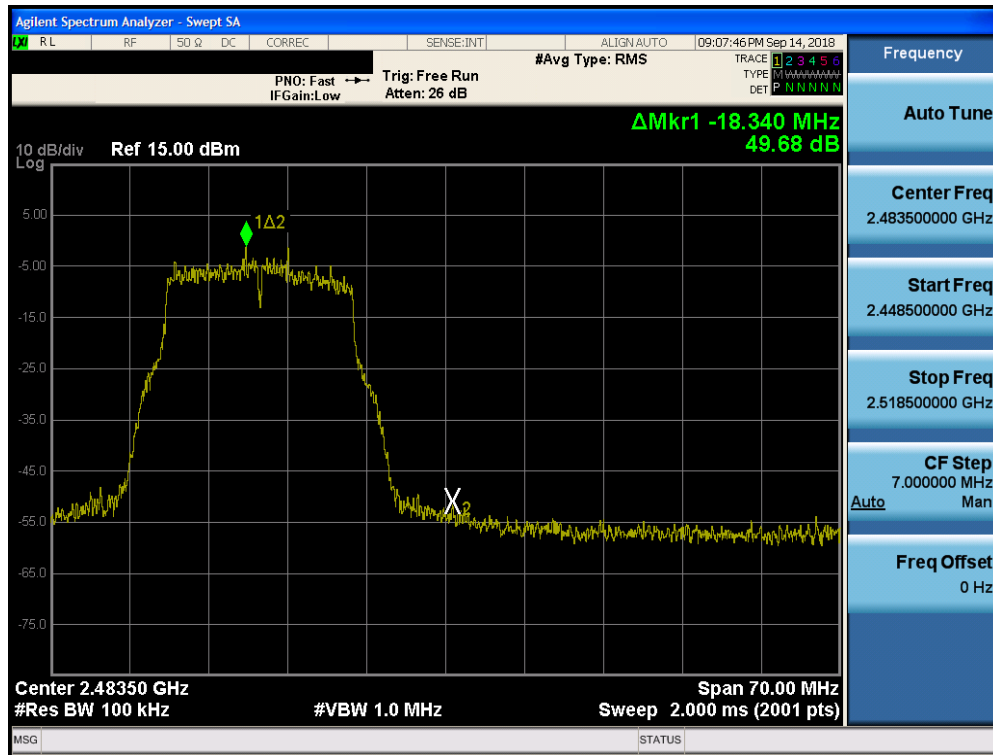


Plot 7-83. Band Edge Plot SISO Core 0 (802.11g- Ch. 1)



Plot 7-84. Band Edge Plot SISO Core 0 (802.11g - Ch. 11)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 69 of 145

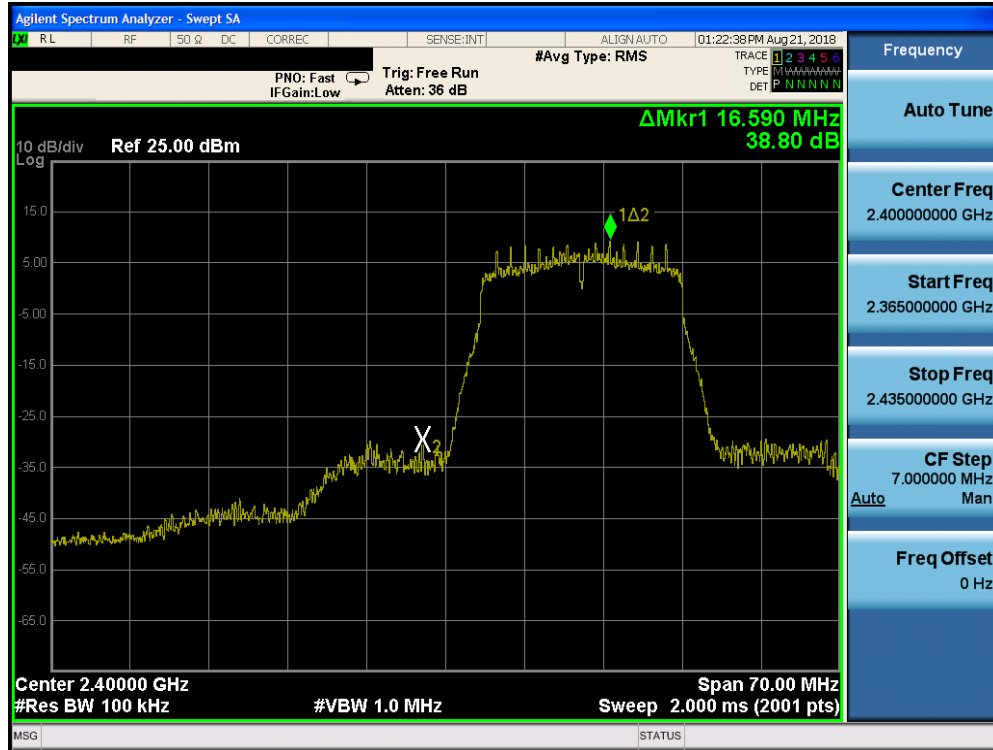


Plot 7-85. Band Edge Plot SISO Core 0 (802.11g – Ch. 12)



Plot 7-86. Band Edge Plot SISO Core 0 (802.11g – Ch. 13)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 70 of 145

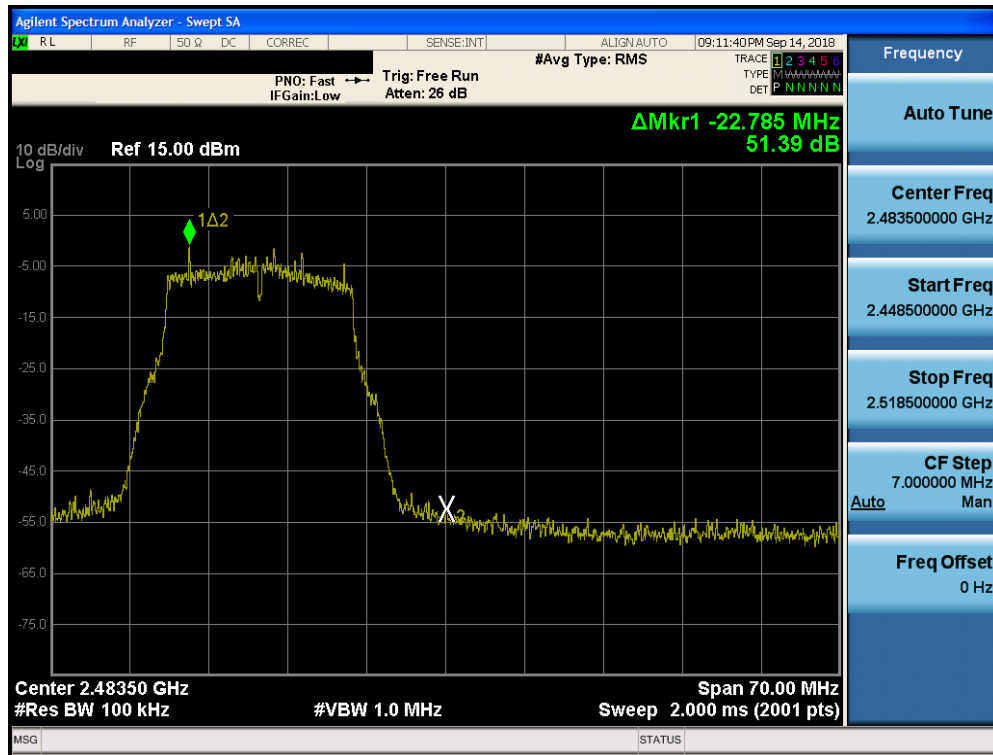


Plot 7-87. Band Edge Plot SISO Core 0 (802.11n (2.4GHz) – Ch. 1)

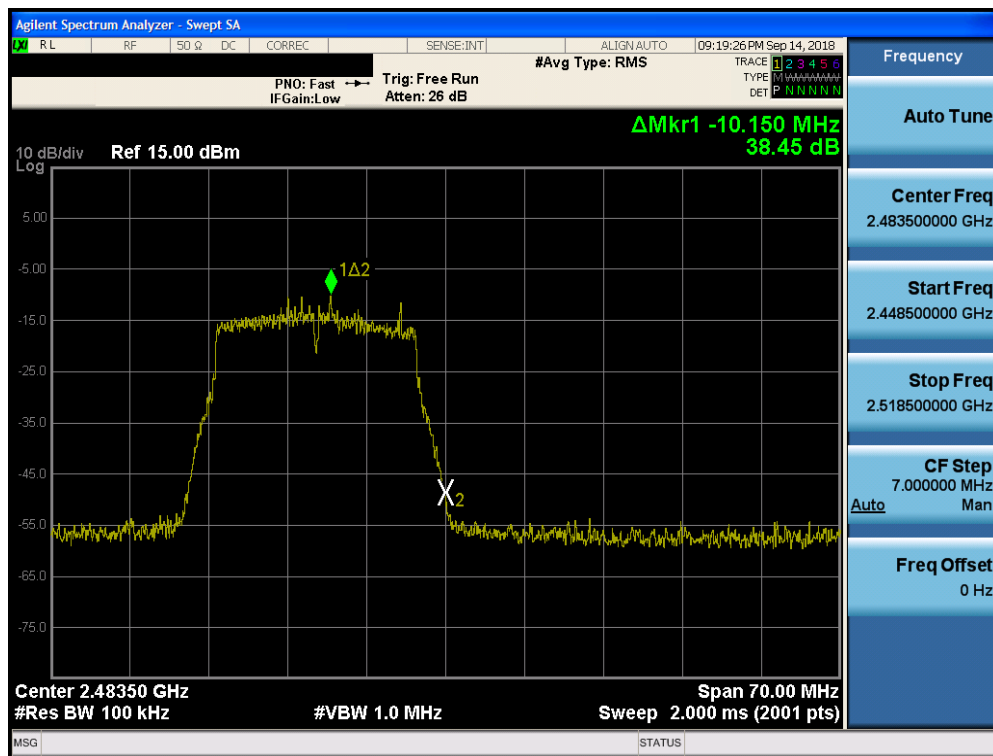


Plot 7-88. Band Edge Plot SISO Core 0 (802.11n (2.4GHz) – Ch. 11)

FCC ID: BCGA1980	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 71 of 145



Plot 7-89. Band Edge Plot SISO Core 0 (11n (2.4GHz) – Ch. 12)



Plot 7-90. Band Edge Plot SISO Core 0 (11n (2.4GHz) – Ch. 13)

FCC ID: BCGA1980	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1806220013-02.BCG	Test Dates: 07/27/2018-09/21/2018	EUT Type: Tablet Device	Page 72 of 145