

**MEASUREMENT REPORT**  
**FCC PART 15.247 / ISED RSS-247 Bluetooth**

**Applicant Name:**

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

**Date of Testing:**

12/1/2023 - 2/20/2024

**Test Report Issue Date:**

3/24/2024

**Test Site/Location:**

Element Materials Technology Morgan Hill, CA, USA

**Test Report Serial No.:**

1C2311270065-07.BCG

<b>FCC ID:</b>	<b>BCGA2898</b>
<b>IC:</b>	<b>579C-A2898</b>
<b>APPLICANT:</b>	<b>Apple Inc.</b>

**Application Type:**

Certification

**Model/HVIN:**

A2898

**EUT Type:**

Tablet Device

**Max. RF Output Power:**

105.487 mW (20.23 dBm) Peak Conducted

**Frequency Range:**

2402 – 2480MHz

**Type of Modulation:**

GFSK,  $\pi/4$ -DQPSK, 8DPSK

**FCC Classification:**

FCC Part 15 Spread Spectrum Transmitter (DSS)

**FCC Rule Part(s):**

Part 15 Subpart C (15.247)

**ISED Specification:**

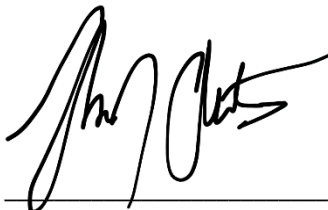
RSS-247 Issue 3

**Test Procedure(s):**

ANSI C63.10-2013

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. 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.



RJ Ortanez  
Executive Vice President

**Prepared by:** WKR0000010596

**Reviewed by:** WKR0000005805



<b>FCC ID:</b> BCGA2898 <b>IC:</b> 579C-A2898		<b>MEASUREMENT REPORT</b> <b>(CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 1 of 95

## TABLE OF CONTENTS

1.0	INTRODUCTION .....	3
1.1	Scope .....	3
1.2	Element Materials Technology Test Location .....	3
1.3	Test Facility / Accreditations .....	3
2.0	PRODUCT INFORMATION .....	4
2.1	Equipment Description .....	4
2.2	Device Capabilities .....	4
2.3	Antenna Description .....	5
2.4	Test Support Equipment .....	6
2.5	Test Configuration .....	6
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	Bandwidth Measurement .....	14
7.3	Output Power Measurement .....	24
7.3.1	Peak Output Power Measurement .....	25
7.3.2	Average Output Power Measurement .....	26
7.4	Conducted Authorized Band Edge .....	28
7.5	Carrier Frequency Separation .....	37
7.6	Time of Occupancy .....	42
7.7	Number of Hopping Channels .....	46
7.8	Conducted Spurious Emissions .....	51
7.9	Radiated Spurious Emissions – Above 1GHz .....	59
7.10	Radiated Spurious Emissions – Below 1GHz .....	86
7.11	AC Line-Conducted Emissions Measurement .....	91
8.0	CONCLUSION .....	95

<b>FCC ID:</b> BCGA2898 <b>IC:</b> 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 2 of 95

## 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 Element Materials Technology Test Location

These measurement tests were conducted at the Element Materials Technology 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 v01r01.

### 1.3 Test Facility / Accreditations

**Measurements were performed at Element Materials Technology located in Morgan Hill, CA 95037, U.S.A.**

- Element Materials Technology is an ISO 17025-2017 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.
- Element Washington DC LLC 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 ISED Standards (RSS).
- Element Materials Technology facility is a registered (22831) test laboratory with the site description on file with ISED.
- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreements (MRAs).

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 3 of 95

V 10.6 09/13/2023

## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Tablet Device FCC ID: BCGA2898 and IC: 579C-A2898**. The test data contained in this report pertains only to the emissions due to the EUT's Bluetooth transmitter.

- This Bluetooth module has been tested by manufacturer and the following were confirmed:
  - A) The hopping sequence is pseudorandom
  - B) All channels are used equally on average
  - C) The receiver input bandwidth equals the transmit bandwidth
  - D) The receiver hops in sequence with the transmit signal
- 15.247(g): In accordance with the Bluetooth Industry Standard, the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) system.
- 15.247(h): In accordance with the Bluetooth Industry Standard, the system does not coordinate its channels selection/hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.
- 15.247(h): The EUT employs Adaptive Frequency Hopping (AFH) which identifies sources of interference namely devices operating in 802.11 WLAN and excludes them from the list of available channels. The process of re-mapping reduces the number of test channels from 79 channels to a minimum number of 20 channels.

**Test Device Serial No.:** *VMC236QV6G, TDV4DV2YG0, DT77P25WCF, DLXH0H0003Z0000070N/A*

### 2.2 Device Capabilities

This device contains the following capabilities:

802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, 802.11a/ax WIFI 6E, Bluetooth (1x, EDR, LE1M, LE2M, HDR4, HDR8), NB UNII (1x, HDR4, HDR8), WPT, 802.15.4

This device supports BT Beamforming.

Ch.	Frequency (MHz)
00	2402
:	:
39	2441
:	:
78	2480

**Table 2-1. Bluetooth Frequency/ Channel Operations**

**Note:** This device is capable of operating in hopping and non-hopping mode. The EUT can hop between 79 different channels in the 2400 – 2483.5MHz band. 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 KDB 558074 D01 v05r02 and ANSI C63.10-2013. 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:

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 4 of 95

Measured Duty Cycles					
Bluetooth Mode		Frequency (MHz)	Duty Cycle [%]		
			Antenna WF7b	Antenna WF2b	TxBF
GFSK	ePA	2402-2480	100	100	100
	iPA		100	100	100
8PSK	ePA		100	100	100
	iPA		100	100	100
π/4-DPSK	ePA		100	100	100
	iPA		100	100	100

**Table 2-2. Measured Duty Cycles**

This device supports simultaneous transmission operations, which allows for multiple transmitters to transmit simultaneously on the same antenna. The table below shows all configurations possible.

Antenna	Simultaneous Tx Config	Wifi 2GHz	Bluetooth	Thread	Wifi 5GHz	Wifi 6GHz	NB UNII
		802.11 b/g/n/ax	BDR, EDR, HDR4/8, LE1/2M	802.15.4	802.11 a/n/ac/ax	802.11 a/ax	BDR, HDR4/8
WF7b	Config 1	✓	✗	✗	✗	✗	✓
WF7b	Config 2	✗	✓	✗	✓	✗	✗
WF7b	Config 3	✗	✓	✗	✗	✓	✗
WF7b	Config 4	✗	✗	✓	✓	✗	✗
WF7b	Config 5	✗	✗	✓	✗	✓	✗

**Table 2-3. Simultaneous Transmission Configurations**

✓ = Support; ✗ = Not Support

**Note:**

All the above simultaneous transmission configurations have been tested and the worst case configuration was found to be Config 2.

Specific 2.4GHz Wi-Fi antenna that can only transmit simultaneously with 2.4GHz Bluetooth antenna is listed in the SAR test report. For BT (2.4GHz) in connected mode and Wi-Fi (2.4GHz) - Wi-Fi max power will not exceed minimum of (13.5dBm, SAR max cap, Reg max cap) power. For BT (2.4GHz) in disconnected mode and Wi-Fi (2.4GHz) - BT will be using iPA only and Wi-Fi max power will not exceed minimum of (SAR max cap, Reg max cap) power. Bluetooth can simultaneously transmit with IEEE 802.11 a/n/ac/ax 5/6 GHz on separate antenna.

### 2.3 Antenna Description

Following antenna gains provided by manufacturer were used for testing.

Frequency [GHz]	Antenna Gain (dBi)	
	Antenna WF7b	Antenna WF2b
2.4	1.0	0.7

**Table 2-4. Highest Antenna Gain**

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 5 of 95

## 2.4 Test Support Equipment

1	Apple MacBook Pro	Model:	A2141	S/N:	C02H604EQ05D
	w/AC/DC Adapter	Model:	A2166	S/N:	C4H042705ZNP0WA6
2	Apple USB-C Cable	Model:	Spartan	S/N:	GXK1336018XKTR024
3	USB-C Cable	Model:	A246C	S/N:	DWH80115BK826GV19
	w/ AC Adapter	Model:	A2305	S/N:	C4H95160004PF4F4V
4	Apple Pencil	Model:	A2538	S/N:	KJ26TCFXJW
5	DC Power Supply	Model:	KPS3010D	S/N:	N/A

**Table 2-5. Test Support Equipment List**

## 2.5 Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2013. ANSI C63.10-2013 was also used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, 3.3 for radiated emissions test setups, and 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, and 7.8 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.

For emissions from 1GHz – 18GHz, low, mid, and high channels were tested with highest power and worst case configuration. The emissions below 1GHz and above 18GHz were tested with the highest transmitting power and the worst case channel.

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 the 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

$\pi/4$ -DQPSK has been investigated and confirmed as not the worst case.

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 6 of 95



All possible simultaneous transmission configurations have been investigated and the worst case config has been reported.

Description	Bluetooth	UNII
Antenna	Antenna WF7b	Antenna WF7b
Channel	79	36
Operating Frequency (MHz)	2480	5180
Mode/Modulation	GFSK ePA	802.11n

**Table 2-6. Worst Case Simultaneous Transmission Configuration**

## 2.6 Software and Firmware

The test was conducted with firmware version 21E8197 installed on the EUT.

## 2.7 EMI Suppression Device(s)/Modifications

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

<b>FCC ID:</b> BCGA2898 <b>IC:</b> 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 7 of 95

V 10.6 09/13/2023

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## 3.0 DESCRIPTION OF TESTS

### 3.1 Evaluation Procedure

The measurement procedure described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) was 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 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 the 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 7.11. Automated test software was used to perform the AC line conducted emissions testing. Automated measurement software utilized is Rohde & Schwarz EMC32, Version 10.50.40.

<b>FCC ID:</b> BCGA2898 <b>IC:</b> 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG			<b>Test Dates:</b> 12/1/2023 - 2/20/2024



### 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.

Per KDB 414788 D01 v01r01, radiated emission test sites other than open-field test sites (e.g., shielded anechoic chambers), may be employed for emission measurements below 30MHz if characterized so that the measurements correspond to those obtained at an open-field test site. To determine test site equivalency, a reference sample transmitting at 149kHz was measured on an open field test site (asphalt with no ground plane) and then measured in the 3m semi-anechoic chamber. A calibrated 60cm loop antenna was rotated about its vertical axis while the reference device was rotated through the X, Y and Z axis in order to capture the worst case level. A maximum deviation of 2.77dB at 149kHz was measured when comparing the 3 meter semi-anechoic chamber to the open field site.

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).

<b>FCC ID:</b> BCGA2898 <b>IC:</b> 579C-A2898		<b>MEASUREMENT REPORT</b> <b>(CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 9 of 95

## 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.

<b>FCC ID:</b> BCGA2898 <b>IC:</b> 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 10 of 95

V 10.6 09/13/2023

## 5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.23-2012. 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	2.07
Line Conducted Disturbance	1.91
Radiated Disturbance (<30MHz)	4.12
Radiated Disturbance (30MHz - 1GHz)	4.85
Radiated Disturbance (1 - 18GHz)	5.08
Radiated Disturbance (>18GHz)	4.59

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 11 of 95

V 10.6 09/13/2023

## 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
Agilent Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	6/21/2023	Annual	6/21/2024	MY49430244
ESPEC	SU-241	Tabletop Temperature Chamber	11/17/2023	Annual	11/17/2024	92009574
ETS-Lindgren	3117	Double Ridged Guide Antenna (1-18 GHz)	3/30/2023	Annual	3/30/2024	00218555
Keysight Technology	N9040B	UXA Signal Analyzer	3/10/2023	Annual	3/10/2024	MY57212015
Rohde & Schwarz	TS-PR18	Pre-Amplifier (1GHz - 18GHz)	8/31/2023	Annual	8/31/2024	100052
Rohde & Schwarz	FSV40	Signal Analyzer (10Hz-40GHz)	5/11/2023	Annual	5/11/2024	101619
Rohde & Schwarz	ESW44	EMI Test Receiver	6/6/2023	Annual	6/6/2024	101668
Rohde & Schwarz	TS-PR8	Pre-Amplifier (30MHz - 8GHz)	6/22/2023	Annual	6/22/2024	102356
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	11/30/2023	Annual	11/30/2024	161616
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	12/27/2023	Annual	12/27/2024	164715
Rohde & Schwarz	TS-PR1840	Pre-Amplifier (18GHz - 40GHz)	6/2/2023	Annual	6/2/2024	100050
Rohde & Schwarz	HFH2-Z2	Loop Antenna	5/1/2023	Annual	5/1/2024	100519
Rohde & Schwarz	FSW43	Signal Analyzer (2Hz-43.5GHz)	7/13/2023	Annual	7/13/2024	101261
Schwarzbeck	VULB 9162	Bilog Antenna (30MHz - 6GHz)	4/17/2023	Annual	4/17/2024	00304

**Table 6-1. Test Equipment List**

### Notes:

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: BCGA2898 IC: 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 12 of 95

## 7.0 TEST RESULTS

### 7.1 Summary

Company Name: Apple Inc.  
 FCC ID: BCGA2898  
 IC: 579C-A2898  
 Method/System: Frequency Hopping Spread Spectrum (FHSS)  
 Number of Channels: 79

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(1)	RSS-247 [5.1(a)]	20dB Bandwidth	N/A	CONDUCTED	N/A	Section 7.2
2.1049	RSS-Gen [6.7]	Occupied Bandwidth	N/A		N/A	Section 7.2
15.247(b)(1)	RSS-247 [5.4(b)]	Peak Transmitter Output Power	< 1 Watt if $\geq 75$ non-overlapping channels used		PASS	Section 7.3
15.247(a)(1)	RSS-247 [5.1(b)]	Channel Separation	> 2/3 of 20 dB BW for systems with Output Power < 125mW		PASS	Section 7.5
15.247(a)(1)(iii)	RSS-247 [5.1(d)]	Time of Occupancy	< 0.4 sec in 31.6 sec period		PASS	Section 7.6
15.247(a)(1)(iii)	RSS-247 [5.1(d)]	Number of Channels	> 15 Channels		PASS	Section 7.7
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions	> 20dBc		PASS	Section 7.4 Section 7.8
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-247 limits)	RADIATED	PASS	Section 7.9 Section 7.9.3, Section 7.10
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits (RSS-Gen [8.8] limits)	LINE CONDUCTED	PASS	Section 7.11

**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, attenuators, and couplers.
- 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 Element "BT Auto," Version 4.0.
- 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 Element "Chamber Automation," Version 3.0.

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 13 of 95

## 7.2 Bandwidth Measurement

§2.1049; §15.247 (a.1); RSS-247 [5.1(a)]; RSS-Gen [6.7]

### Test Overview and Limit

The bandwidth at 20dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

### Test Procedure Used

ANSI C63.10-2013 – Subclause 6.9.2  
RSS-Gen [6.7]

### Test Settings

1. The signal analyzers' automatic bandwidth measurement capability of the spectrum analyzer was used to perform the 99% occupied bandwidth and the 20dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 20. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% OBW
3. VBW  $\geq$  3 x RBW
4. Reference level set to keep signal from exceeding maximum input mixer level for linear operation.
5. Detector = Peak
6. Trace mode = max hold
7. Sweep = auto couple
8. The trace was allowed to stabilize
9. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 14 of 95

V 10.6 09/13/2023

**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 supported modulation, antenna (including TxBF mode) and power schemes have been tested on the unit and only worst case configuration is reported.

<b>FCC ID:</b> BCGA2898 <b>IC:</b> 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 15 of 95

## Antenna WF7b

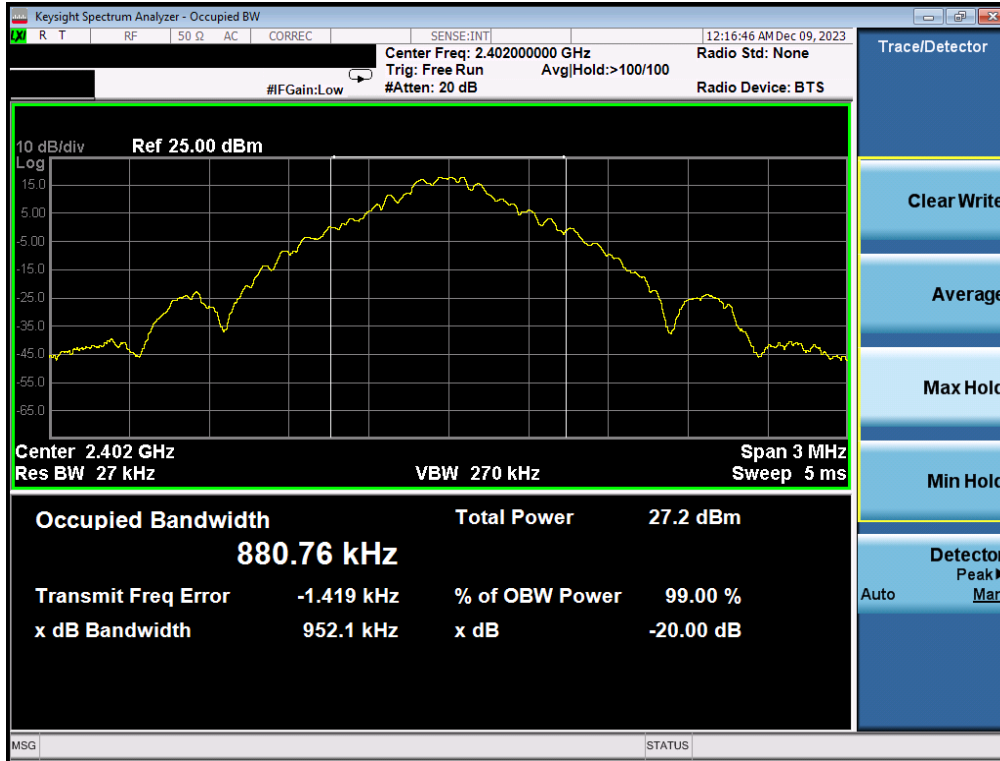
Frequency [MHz]	Data Rate [Mbps]	Mod.	Power Scheme	Channel No.	Measured 99% Occupied Bandwidth [kHz]	Measured 20dB Bandwidth [kHz]
2402	1.0	GFSK	ePA	0	880.76	952.10
2441	1.0	GFSK	ePA	39	880.86	952.90
2480	1.0	GFSK	ePA	78	880.76	953.10
2402	3.0	8DPSK	ePA	0	1211.06	1352.59
2441	3.0	8DPSK	ePA	39	1211.81	1353.35
2480	3.0	8DPSK	ePA	78	1212.80	1353.18

**Table 7-2. 20dB BW and 99% OBW Measurements Antenna WF7b**

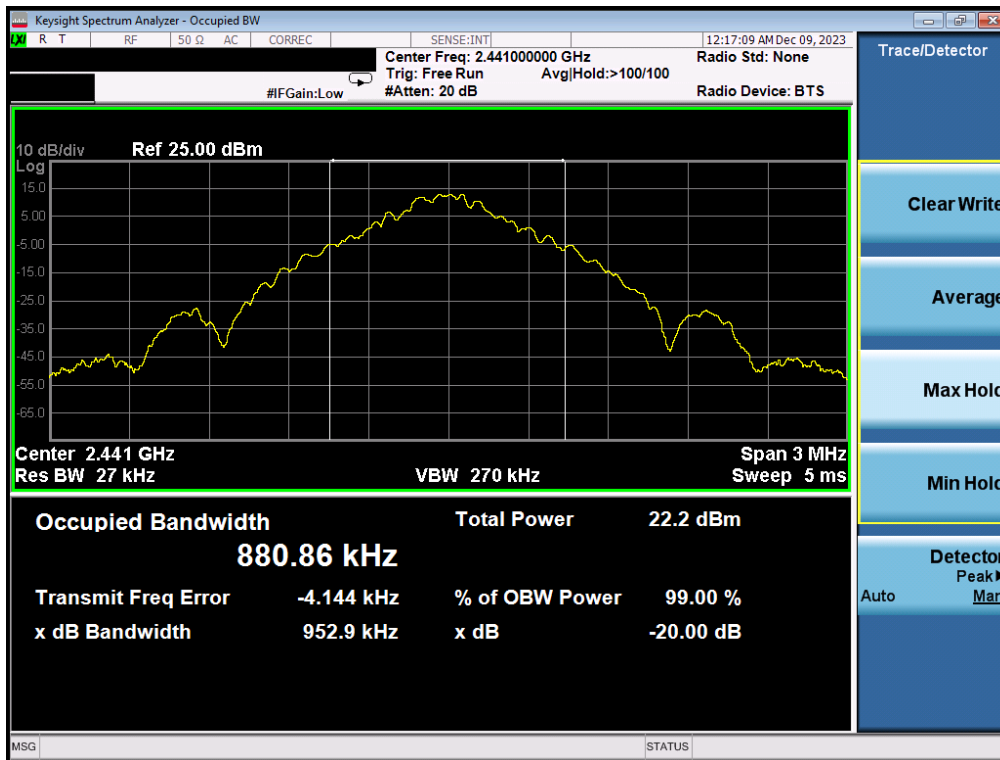
FCC ID: BCGA2898 IC: 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 16 of 95

V 10.6 09/13/2023



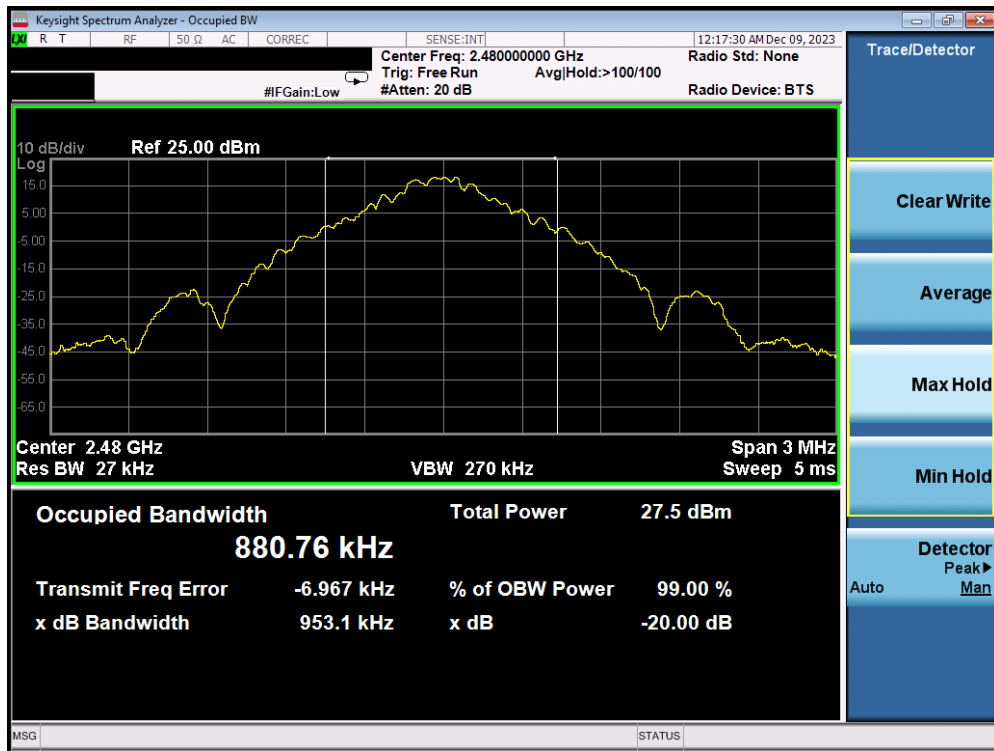


Plot 7-1. 20dB BW and 99% OBW Plot Antenna WF7b (Bluetooth, GFSK, ePA – Ch. 0)

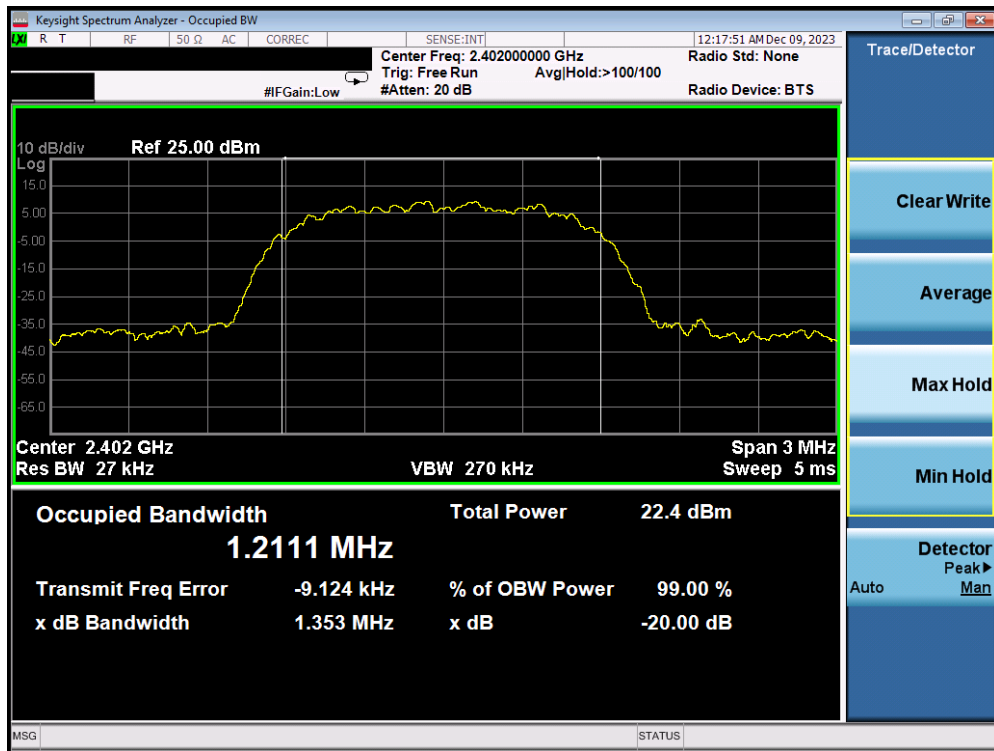


Plot 7-2. 20dB BW and 99% OBW Plot Antenna WF7b (Bluetooth, GFSK, ePA – Ch. 39)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 17 of 95

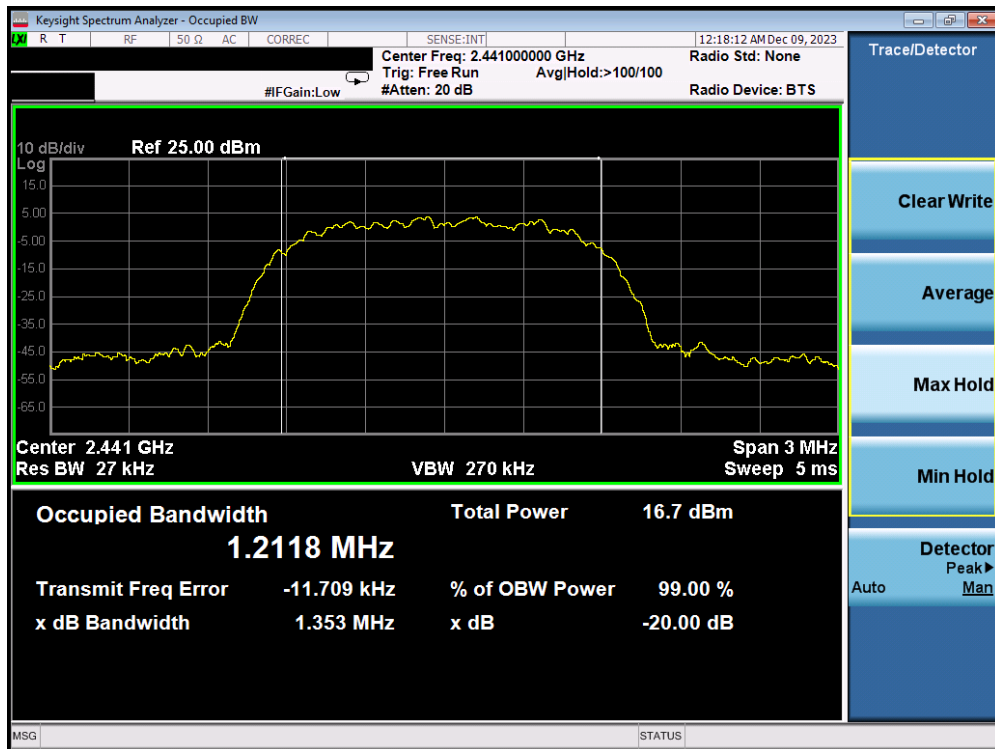


Plot 7-3. 20dB BW and 99% OBW Plot Antenna WF7b (Bluetooth, GFSK, ePA – Ch. 78)

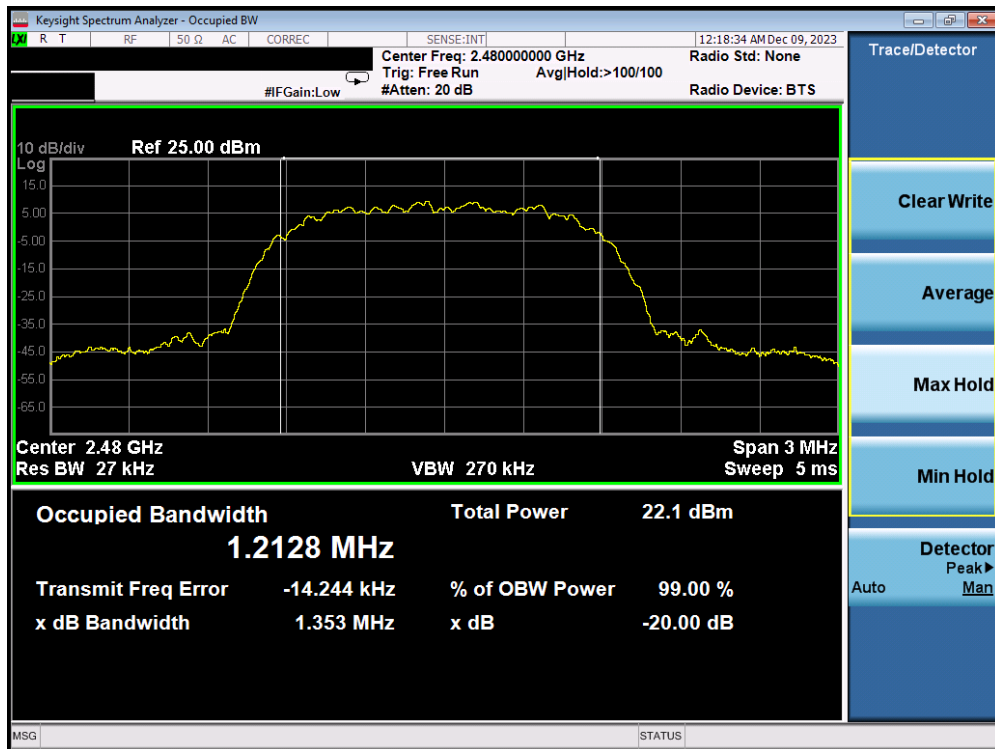


Plot 7-4. 20dB BW and 99% OBW Plot Antenna WF7b (Bluetooth, 8DPSK, ePA – Ch. 0)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 18 of 95



Plot 7-5. 20dB BW and 99% OBW Plot Antenna WF7b (Bluetooth, 8DPSK, ePA – Ch. 39)



Plot 7-6. 20dB BW and 99% OBW Plot Antenna WF7b (Bluetooth, 8DPSK, ePA – Ch. 78)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 19 of 95

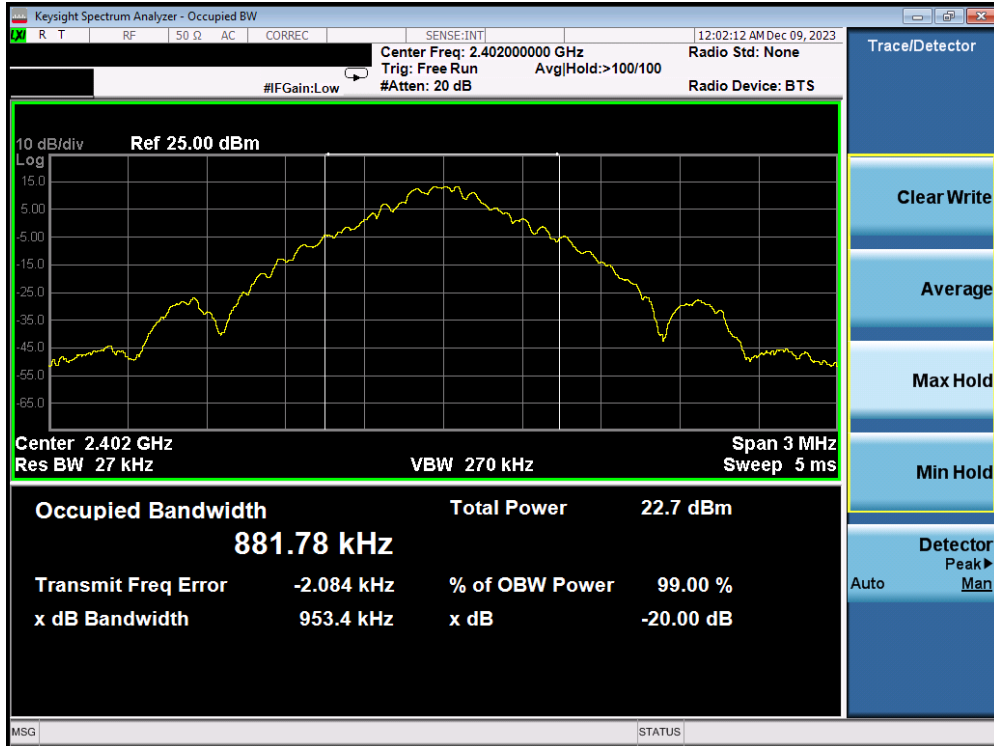
## Antenna WF2b

Frequency [MHz]	Data Rate [Mbps]	Mod.	Power Scheme	Channel No.	Measured 99% Occupied Bandwidth [kHz]	Measured 20dB Bandwidth [kHz]
2402	1.0	GFSK	ePA	0	881.78	953.43
2441	1.0	GFSK	ePA	39	881.32	953.19
2480	1.0	GFSK	ePA	78	880.76	951.30
2402	3.0	8DPSK	ePA	0	1213.00	1352.68
2441	3.0	8DPSK	ePA	39	1213.27	1353.22
2480	3.0	8DPSK	ePA	78	1213.89	1352.97

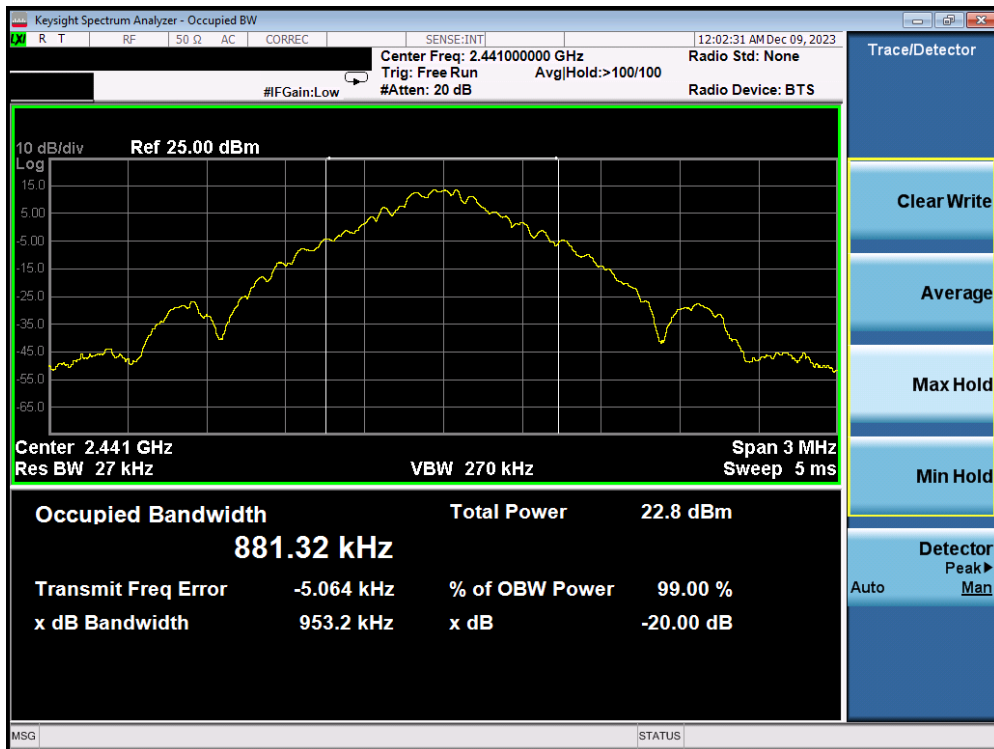
**Table 7-3. 20dB BW and 99% OBW Bandwidth Measurements Antenna WF2b**

FCC ID: BCGA2898 IC: 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 20 of 95

V 10.6 09/13/2023

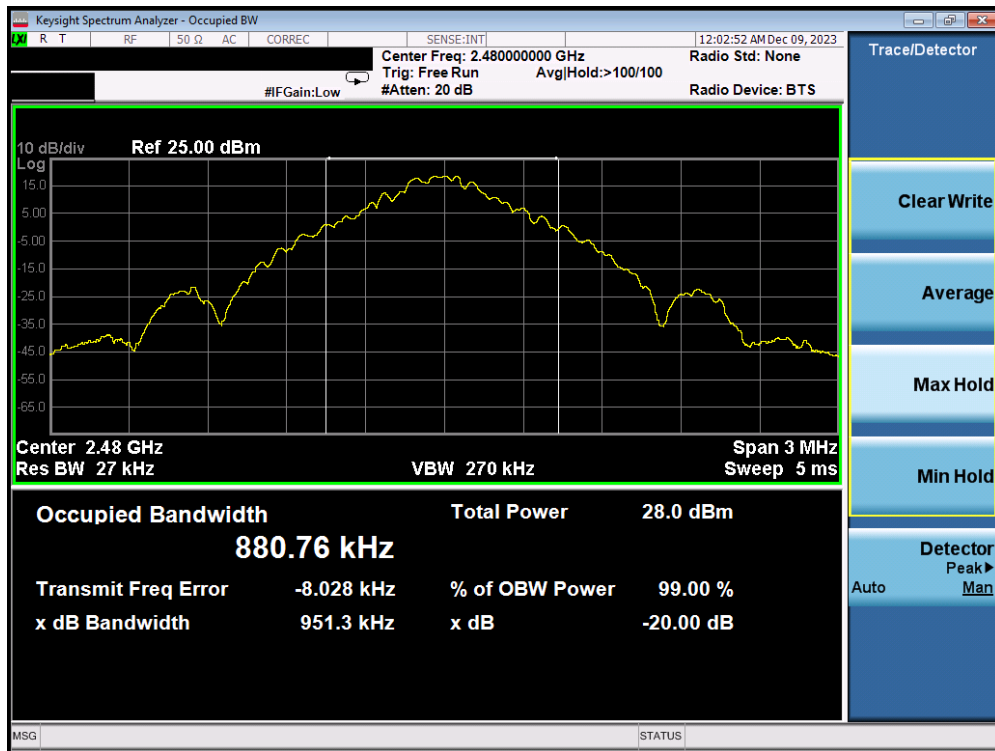


Plot 7-7. 20dB BW and 99% OBW Plot Antenna WF2b (Bluetooth, GFSK, ePA – Ch. 0)

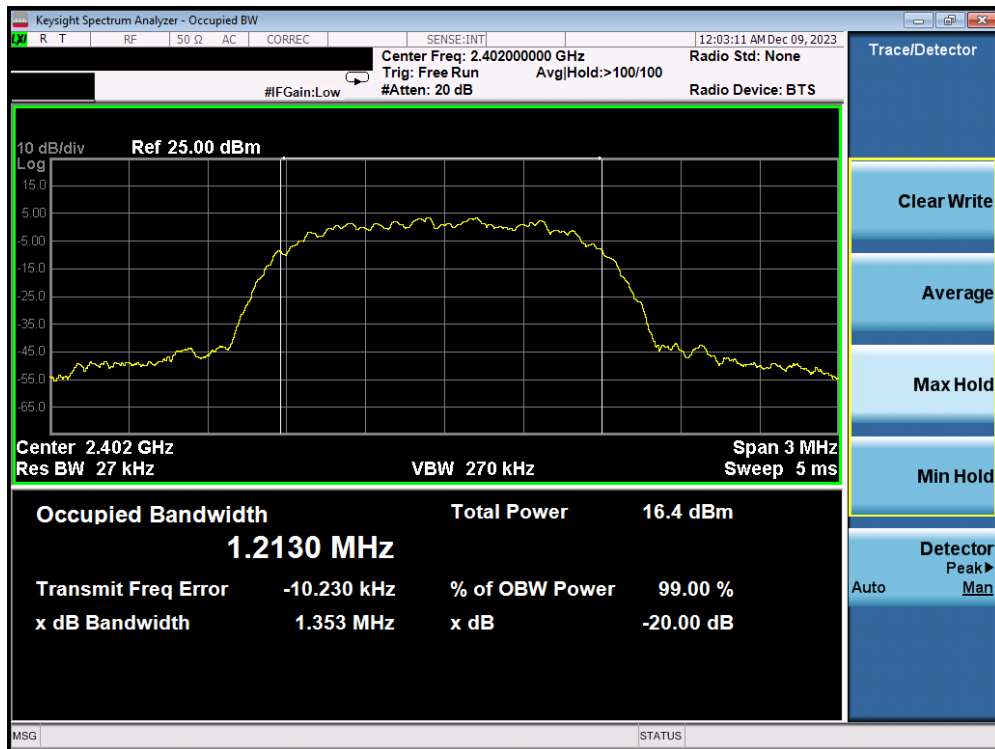


Plot 7-8. 20dB BW and 99% OBW Plot Antenna WF2b (Bluetooth, GFSK, ePA – Ch. 39)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 21 of 95

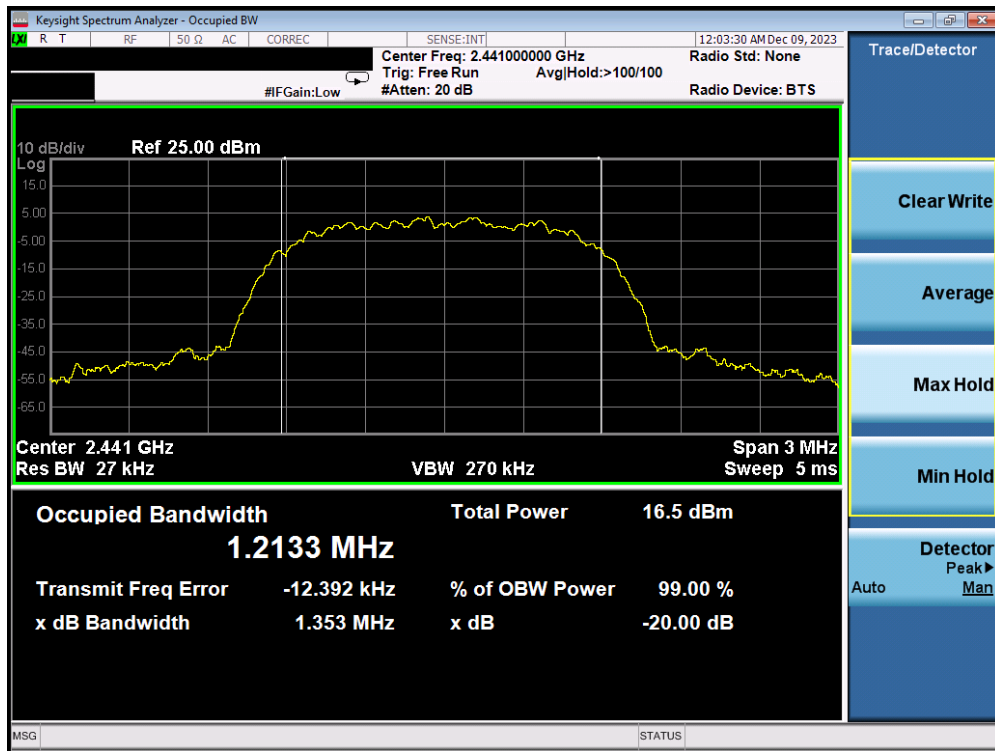


Plot 7-9. 20dB BW and 99% OBW Plot Antenna WF2b (Bluetooth, GFSK, ePA – Ch. 78)

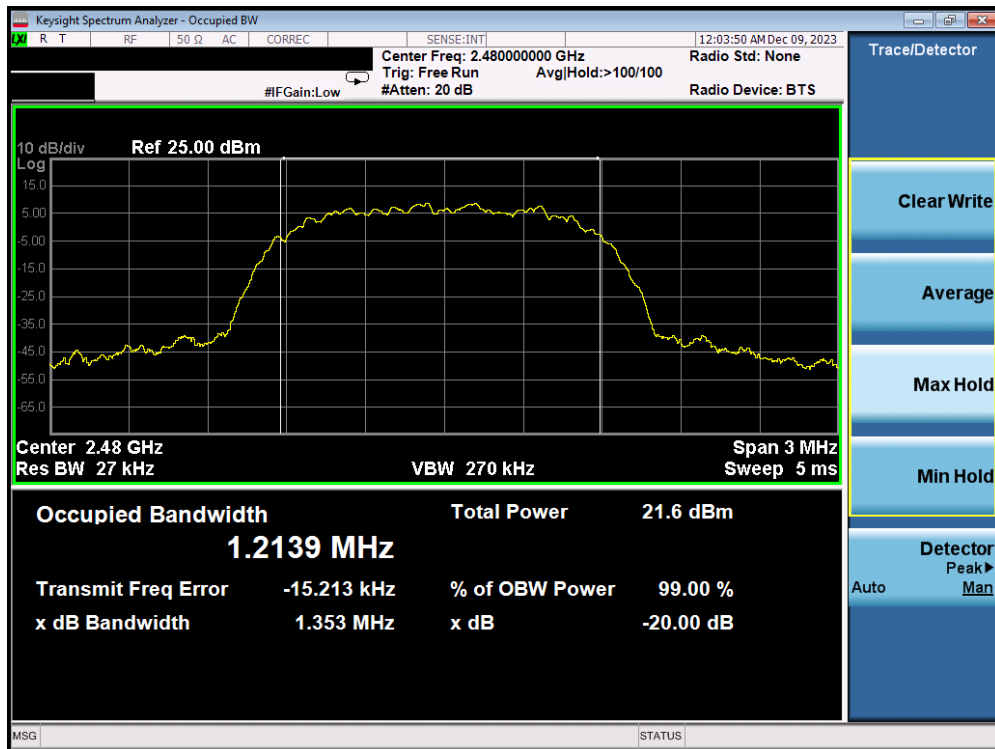


Plot 7-10. 20dB BW and 99% OBW Plot Antenna WF2b (Bluetooth, 8DPSK, ePA – Ch. 0)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 22 of 95



Plot 7-11. 20dB BW and 99% OBW Plot Antenna WF2b (Bluetooth, 8DPSK, ePA – Ch. 39)



Plot 7-12. 20dB BW and 99% OBW Plot Antenna WF2b (Bluetooth, 8DPSK, ePA – Ch. 78)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 23 of 95

### 7.3 Output Power Measurement

**§15.247 (b.1); RSS-247 [5.4(b)]**

#### Test Overview and Limits

Measurement is made while the EUT is operating in non-hopping transmission mode. Peak and Average power measurements are performed using a broadband power meter with a pulse sensor.

*The maximum peak conducted output power of frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels is 1 watt*

*The conducted output power limit on paragraph above is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.*

*For FHSS operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channels. The e.i.r.p. shall not exceed 4 W.*

#### Test Procedure Used

ANSI C63.10-2013 – Section 7.8.5  
 ANSI C63.10-2013 – Section 11.9.2.3.2 method AVGPM-G  
 ANSI C63.10-2013 – Section 14.2 Measure-and-Sum Technique

#### Test Settings

##### Peak Power Measurement

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than the occupied bandwidth.

##### 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 diagram below.



**Figure 7-2. Test Instrument & Measurement Setup for Peak and Average Power Measurement**

#### Note

All supported modulations have been tested and  $\pi/4$ -DQPSK was found not as the worst case modulation so only GFSK and 8DPSK is reported.

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 24 of 95

V 10.6 09/13/2023



### 7.3.1 Peak Output Power Measurement

Frequency [MHz]	Data Rate [Mbps]	Mod.	Power Scheme	Channel No.	Peak Conducted Power		Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	EIRP Margin [dB]
					[dBm]	[mW]						
2402	1.0	GFSK	ePA	0	20.04	100.949	30.00	-9.96	1.00	21.04	36.02	-14.98
2441	1.0	GFSK	ePA	39	19.99	99.862	30.00	-10.01	1.00	20.99	36.02	-15.03
2480	1.0	GFSK	ePA	78	20.23	105.487	30.00	-9.77	1.00	21.23	36.02	-14.79
2402	1.0	GFSK	iPA	0	11.02	12.647	30.00	-18.98	1.00	12.02	36.02	-24.00
2441	1.0	GFSK	iPA	39	11.09	12.850	30.00	-18.91	1.00	12.09	36.02	-23.93
2480	1.0	GFSK	iPA	78	11.08	12.817	30.00	-18.92	1.00	12.08	36.02	-23.94
2402	3.0	8DPSK	ePA	0	17.09	51.192	30.00	-12.91	1.00	18.09	36.02	-17.93
2441	3.0	8DPSK	ePA	39	16.64	46.132	30.00	-13.36	1.00	17.64	36.02	-18.38
2480	3.0	8DPSK	ePA	78	16.97	49.751	30.00	-13.03	1.00	17.97	36.02	-18.05
2402	3.0	8DPSK	iPA	0	10.18	10.414	30.00	-19.82	1.00	11.18	36.02	-24.84
2441	3.0	8DPSK	iPA	39	10.10	10.224	30.00	-19.90	1.00	11.10	36.02	-24.92
2480	3.0	8DPSK	iPA	78	10.05	10.111	30.00	-19.95	1.00	11.05	36.02	-24.97

Table 7-4. Peak Conducted Output Power Measurements Antenna WF7b

Frequency [MHz]	Data Rate [Mbps]	Mod.	Power Scheme	Channel No.	Peak Conducted Power		Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	EIRP Margin [dB]
					[dBm]	[mW]						
2402	1.0	GFSK	ePA	0	20.11	102.471	30.00	-9.89	0.70	20.81	36.02	-15.21
2441	1.0	GFSK	ePA	39	19.74	94.276	30.00	-10.26	0.70	20.44	36.02	-15.58
2480	1.0	GFSK	ePA	78	19.93	98.356	30.00	-10.07	0.70	20.63	36.02	-15.39
2402	1.0	GFSK	iPA	0	10.76	11.899	30.00	-19.25	0.70	11.46	36.02	-24.57
2441	1.0	GFSK	iPA	39	10.92	12.368	30.00	-19.08	0.70	11.62	36.02	-24.40
2480	1.0	GFSK	iPA	78	10.98	12.534	30.00	-19.02	0.70	11.68	36.02	-24.34
2402	3.0	8DPSK	ePA	0	16.80	47.885	30.00	-13.20	0.70	17.50	36.02	-18.52
2441	3.0	8DPSK	ePA	39	16.71	46.892	30.00	-13.29	0.70	17.41	36.02	-18.61
2480	3.0	8DPSK	ePA	78	16.75	47.304	30.00	-13.25	0.70	17.45	36.02	-18.57
2402	3.0	8DPSK	iPA	0	10.23	10.537	30.00	-19.77	0.70	10.93	36.02	-25.09
2441	3.0	8DPSK	iPA	39	10.30	10.705	30.00	-19.70	0.70	11.00	36.02	-25.02
2480	3.0	8DPSK	iPA	78	10.32	10.760	30.00	-19.68	0.70	11.02	36.02	-25.00

Table 7-5. Peak Conducted Output Power Measurements Antenna WF2b

Frequency [MHz]	Data Rate [Mbps]	Mod.	Power Scheme	Channel No.	Peak Conducted Power						Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	EIRP Margin [dB]
					Antenna WF7b		Antenna WF2b		Summed							
					[dBm]	[mW]	[dBm]	[mW]	[dBm]	[mW]						
2402	1.0	GFSK	ePA	0	17.34	54.150	16.99	49.980	20.18	104.232	30.00	-9.82	3.86	24.04	36.02	-11.98
2441	1.0	GFSK	ePA	39	16.93	49.272	16.69	46.698	19.82	95.940	30.00	-10.18	3.86	23.68	36.02	-12.34
2480	1.0	GFSK	ePA	78	16.88	48.798	16.87	48.652	19.89	97.499	30.00	-10.11	3.86	23.75	36.02	-12.27
2402	1.0	GFSK	iPA	0	10.84	12.123	11.03	12.688	13.95	24.831	30.00	-18.05	3.86	17.81	36.02	-18.21
2441	1.0	GFSK	iPA	39	10.96	12.465	10.71	11.779	13.85	24.286	30.00	-18.15	3.86	17.71	36.02	-18.31
2480	1.0	GFSK	iPA	78	10.97	12.511	10.78	11.967	13.89	24.491	30.00	-18.11	3.86	17.75	36.02	-18.27
2402	3.0	8DPSK	ePA	0	16.19	41.620	16.52	44.854	19.37	86.497	30.00	-10.63	3.86	23.23	36.02	-12.79
2441	3.0	8DPSK	ePA	39	16.48	44.422	16.45	44.127	19.47	88.512	30.00	-10.53	3.86	23.33	36.02	-12.69
2480	3.0	8DPSK	ePA	78	16.30	42.678	16.42	43.883	19.37	86.497	30.00	-10.63	3.86	23.23	36.02	-12.79
2402	3.0	8DPSK	iPA	0	10.08	10.174	10.06	10.141	13.08	20.324	30.00	-18.92	3.86	16.94	36.02	-19.08
2441	3.0	8DPSK	iPA	39	9.99	9.966	10.09	10.205	13.05	20.184	30.00	-18.95	3.86	16.91	36.02	-19.11
2480	3.0	8DPSK	iPA	78	9.96	9.897	10.09	10.209	13.03	20.091	30.00	-18.97	3.86	16.89	36.02	-19.13

Table 7-6. Peak Conducted Output Power Measurements TxBF

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 25 of 95

### 7.3.2 Average Output Power Measurement

Frequency [MHz]	Data Rate [Mbps]	Mod.	Power Scheme	Channel No.	Avg Conducted Power		Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	EIRP Margin [dB]
					[dBm]	[mW]						
2402	1.0	GFSK	ePA	0	19.82	95.962	30.00	-10.18	1.00	20.82	36.02	-15.20
2441	1.0	GFSK	ePA	39	19.77	94.820	30.00	-10.23	1.00	20.77	36.02	-15.25
2480	1.0	GFSK	ePA	78	20.00	100.000	30.00	-10.00	1.00	21.00	36.02	-15.02
2402	1.0	GFSK	iPA	0	10.83	12.109	30.00	-19.17	1.00	11.83	36.02	-24.19
2441	1.0	GFSK	iPA	39	10.92	12.345	30.00	-19.09	1.00	11.92	36.02	-24.11
2480	1.0	GFSK	iPA	78	10.91	12.331	30.00	-19.09	1.00	11.91	36.02	-24.11
2402	3.0	8DPSK	ePA	0	13.94	24.791	30.00	-16.06	1.00	14.94	36.02	-21.08
2441	3.0	8DPSK	ePA	39	13.52	22.496	30.00	-16.48	1.00	14.52	36.02	-21.50
2480	3.0	8DPSK	ePA	78	13.88	24.406	30.00	-16.13	1.00	14.88	36.02	-21.15
2402	3.0	8DPSK	iPA	0	7.32	5.389	30.00	-22.69	1.00	8.32	36.02	-27.71
2441	3.0	8DPSK	iPA	39	7.21	5.263	30.00	-22.79	1.00	8.21	36.02	-27.81
2480	3.0	8DPSK	iPA	78	7.18	5.218	30.00	-22.83	1.00	8.18	36.02	-27.85

Table 7-7. Average Conducted Output Power Measurements Antenna WF7b

Frequency [MHz]	Data Rate [Mbps]	Mod.	Power Scheme	Channel No.	Avg Conducted Power		Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	EIRP Margin [dB]
					[dBm]	[mW]						
2402	1.0	GFSK	ePA	0	19.93	98.378	30.00	-10.07	0.70	20.63	36.02	-15.39
2441	1.0	GFSK	ePA	39	19.57	90.511	30.00	-10.43	0.70	20.27	36.02	-15.75
2480	1.0	GFSK	ePA	78	19.76	94.515	30.00	-10.25	0.70	20.46	36.02	-15.57
2402	1.0	GFSK	iPA	0	10.58	11.424	30.00	-19.42	0.70	11.28	36.02	-24.74
2441	1.0	GFSK	iPA	39	10.75	11.882	30.00	-19.25	0.70	11.45	36.02	-24.57
2480	1.0	GFSK	iPA	78	10.80	12.031	30.00	-19.20	0.70	11.50	36.02	-24.52
2402	3.0	8DPSK	ePA	0	13.62	23.020	30.00	-16.38	0.70	14.32	36.02	-21.70
2441	3.0	8DPSK	ePA	39	13.56	22.678	30.00	-16.44	0.70	14.26	36.02	-21.76
2480	3.0	8DPSK	ePA	78	13.62	22.988	30.00	-16.39	0.70	14.32	36.02	-21.71
2402	3.0	8DPSK	iPA	0	7.35	5.433	30.00	-22.65	0.70	8.05	36.02	-27.97
2441	3.0	8DPSK	iPA	39	7.42	5.517	30.00	-22.58	0.70	8.12	36.02	-27.90
2480	3.0	8DPSK	iPA	78	7.46	5.568	30.00	-22.54	0.70	8.16	36.02	-27.86

Table 7-8. Average Conducted Output Power Measurements Antenna WF2b

Frequency [MHz]	Data Rate [Mbps]	Mod.	Power Scheme	Channel No.	Average Conducted Power						Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	EIRP Margin [dB]
					Antenna WF7b		Antenna WF2b		Summed							
					[dBm]	[mW]	[dBm]	[mW]	[dBm]	[mW]						
2402	1.0	GFSK	ePA	0	17.00	50.119	16.79	47.775	19.91	97.949	30.00	-10.09	3.86	23.77	36.02	-12.25
2441	1.0	GFSK	ePA	39	16.68	46.516	16.50	44.617	19.60	91.201	30.00	-10.40	3.86	23.46	36.02	-12.56
2480	1.0	GFSK	ePA	78	16.63	46.047	16.69	46.623	19.67	92.683	30.00	-10.33	3.86	23.53	36.02	-12.49
2402	1.0	GFSK	iPA	0	10.66	11.639	10.85	12.162	13.77	23.823	30.00	-16.23	3.86	17.63	36.02	-18.39
2441	1.0	GFSK	iPA	39	10.79	11.987	10.53	11.306	13.67	23.281	30.00	-16.33	3.86	17.53	36.02	-18.49
2480	1.0	GFSK	iPA	78	10.81	12.042	10.60	11.474	13.71	23.496	30.00	-16.29	3.86	17.57	36.02	-18.45
2402	3.0	8DPSK	ePA	0	13.02	20.035	13.32	21.483	16.18	41.495	30.00	-13.82	3.86	20.04	36.02	-15.98
2441	3.0	8DPSK	ePA	39	13.32	21.478	13.27	21.242	16.31	42.756	30.00	-13.69	3.86	20.17	36.02	-15.85
2480	3.0	8DPSK	ePA	78	13.17	20.768	13.27	21.218	16.23	41.976	30.00	-13.77	3.86	20.09	36.02	-15.93
2402	3.0	8DPSK	iPA	0	7.21	5.260	7.18	5.223	10.20	10.471	30.00	-19.80	3.86	14.06	36.02	-21.96
2441	3.0	8DPSK	iPA	39	7.09	5.117	7.21	5.255	10.16	10.375	30.00	-19.84	3.86	14.02	36.02	-22.00
2480	3.0	8DPSK	iPA	78	7.06	5.086	7.22	5.274	10.15	10.351	30.00	-19.85	3.86	14.01	36.02	-22.01

Table 7-9. Average Conducted Output Power Measurements TxBF

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07-BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 26 of 95

**Note:**

Per ANSI C63.10-2013 and KDB 662911 D01 v02r01 Section E)1), the conducted powers at Antenna WF7b and Antenna WF2b were first measured separately during TxBF 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 nth antenna and  $N_{ANT}$ , the total number of antennas used.

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

**Sample TxBF Calculation:**

At 2402MHz, the average conducted output power was measured to be 16.99 dBm for Antenna WF7b and 16.91 dBm for Antenna WF2b.

$$\text{Antenna WF7b} + \text{Antenna WF2b} = \text{TxBF}$$

$$(17.00\text{dBm} + 16.79 \text{ dBm}) = (50.119 \text{ mW} + 47.775 \text{ mW}) = 97.949 \text{ mW} = 19.91 \text{ dBm}$$

**Sample e.i.r.p. Calculation:**

At 2402MHz, the average conducted output power was calculated to be 19.82 dBm with antenna gain of 3.86 dBi.

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

$$19.91 \text{ dBm} + 3.86 \text{ dBi} = 23.77 \text{ dBm}$$

<b>FCC ID:</b> BCGA2898 <b>IC:</b> 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 27 of 95

## 7.4 Conducted Authorized Band Edge

§15.247 (d); RSS-247 [5.5]

### Test Overview and Limits

EUT operates in hopping and non-hopping transmission mode. Measurement is taken at the highest point located outside of the emission bandwidth. **The maximum permissible out-of-band emission level is 20 dBc.**

### Test Procedure Used

ANSI C63.10-2013 – Section 6.10.4

### 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 = 300kHz
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 7-3. Test Instrument & Measurement Setup**

### Test Notes

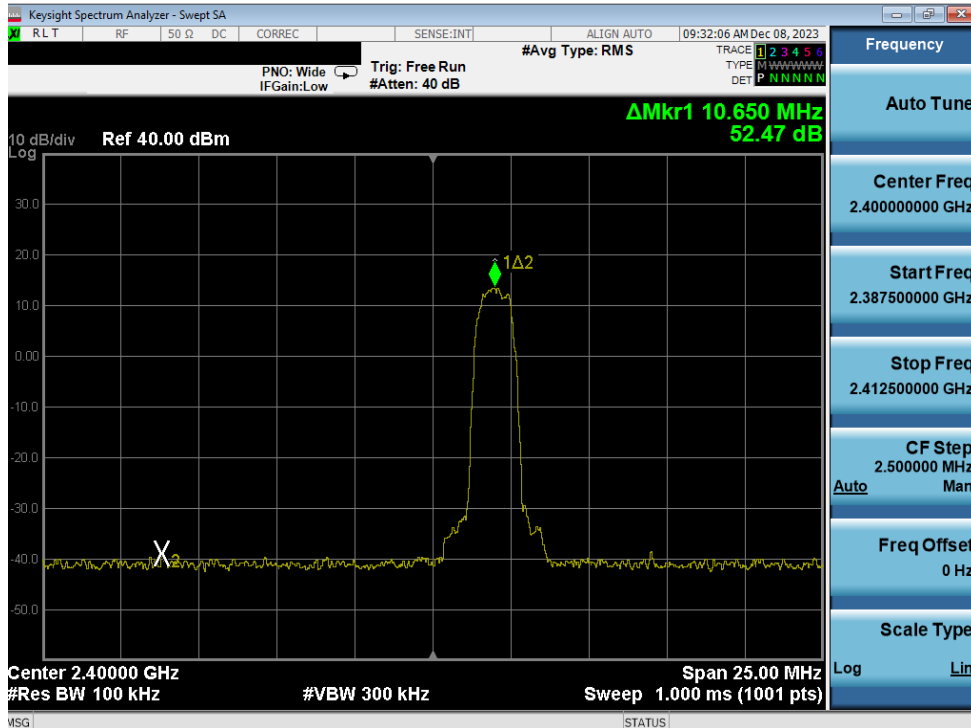
1. Out of band conducted spurious emissions at the band edge were investigated for all data rates in hopping and non-hopping modes. The worst case emissions were found with the EUT transmitting at 3 Mbps. Band edge emissions were also investigated with the EUT transmitting in all data rates. Plots of the worst case emissions are shown below.
2. All supported modulation, antenna (including TxBF mode) and power schemes have been tested on the unit and only worst case configuration is reported.

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 28 of 95

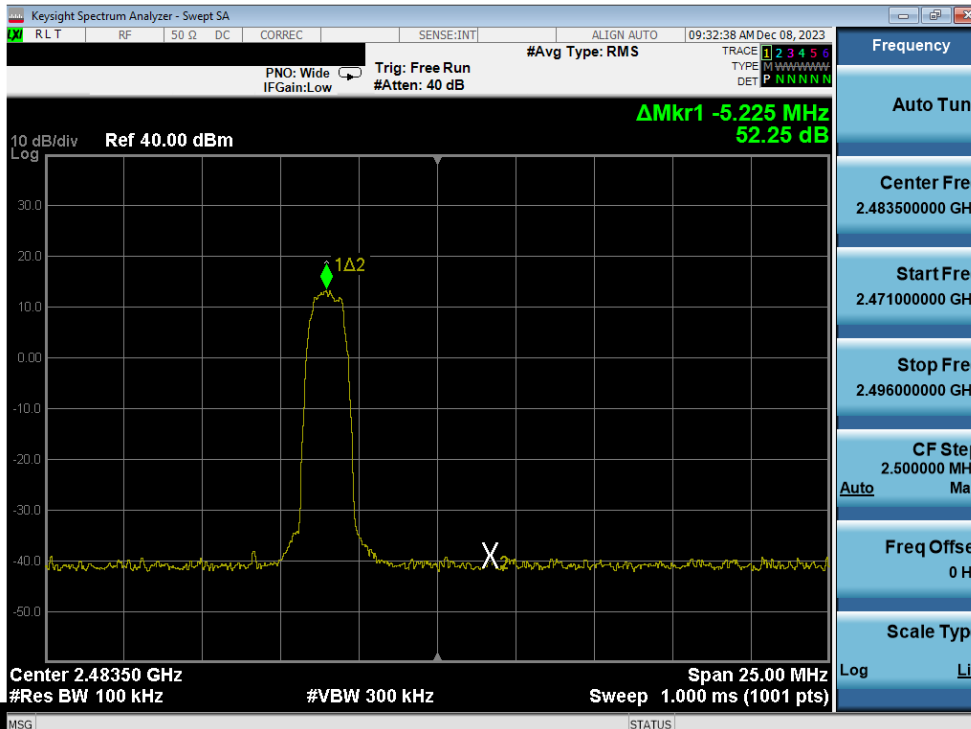
V 10.6 09/13/2023





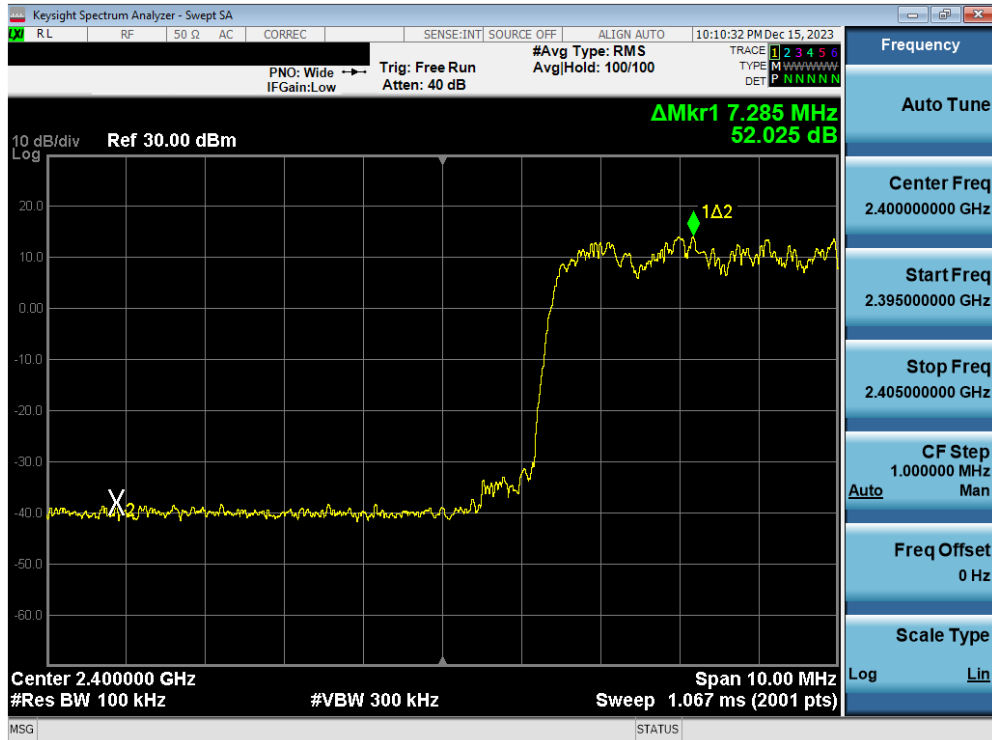


Plot 7-17. Band Edge Plot Antenna WF7b (Bluetooth with Hopping Disabled, 8DPSK, ePA – Ch. 0)

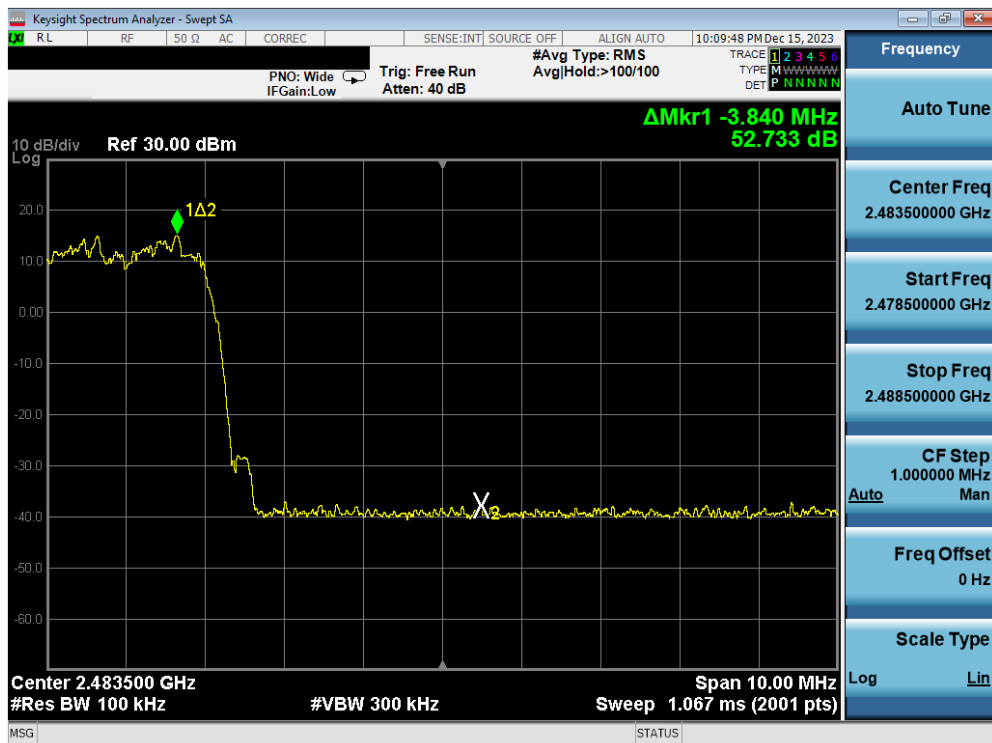


Plot 7-18. Band Edge Plot Antenna WF7b (Bluetooth with Hopping Disabled, 8DPSK, ePA – Ch. 78)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 31 of 95



Plot 7-19. Band Edge Plot Antenna WF7b (Bluetooth with Hopping Enabled, 8DPSK, ePA)

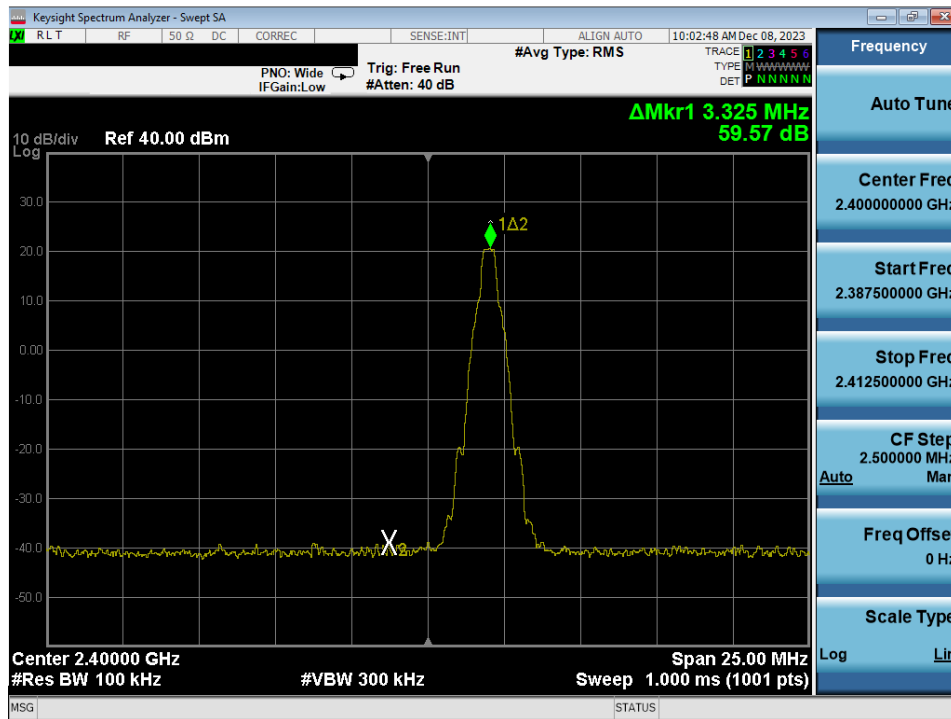


Plot 7-20. Band Edge Plot Antenna WF7b (Bluetooth with Hopping Enabled, 8DPSK, ePA)

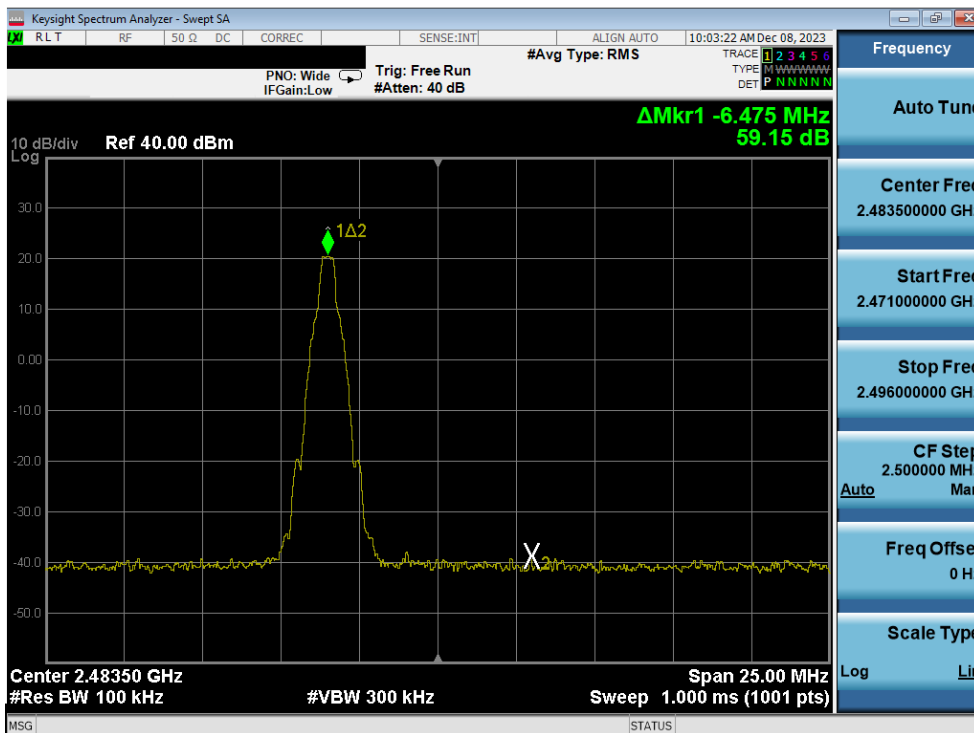
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 32 of 95



## Antenna WF2b

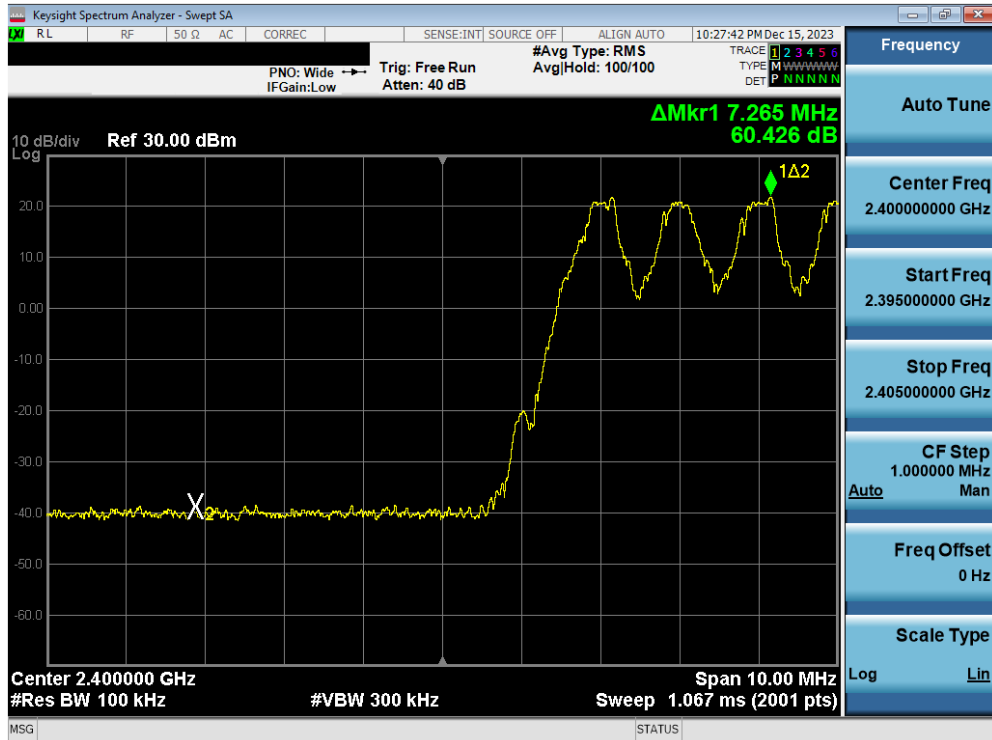


Plot 7-21. Band Edge Plot Antenna WF2b (Bluetooth with Hopping Disabled, GFSK, ePA – Ch. 0)

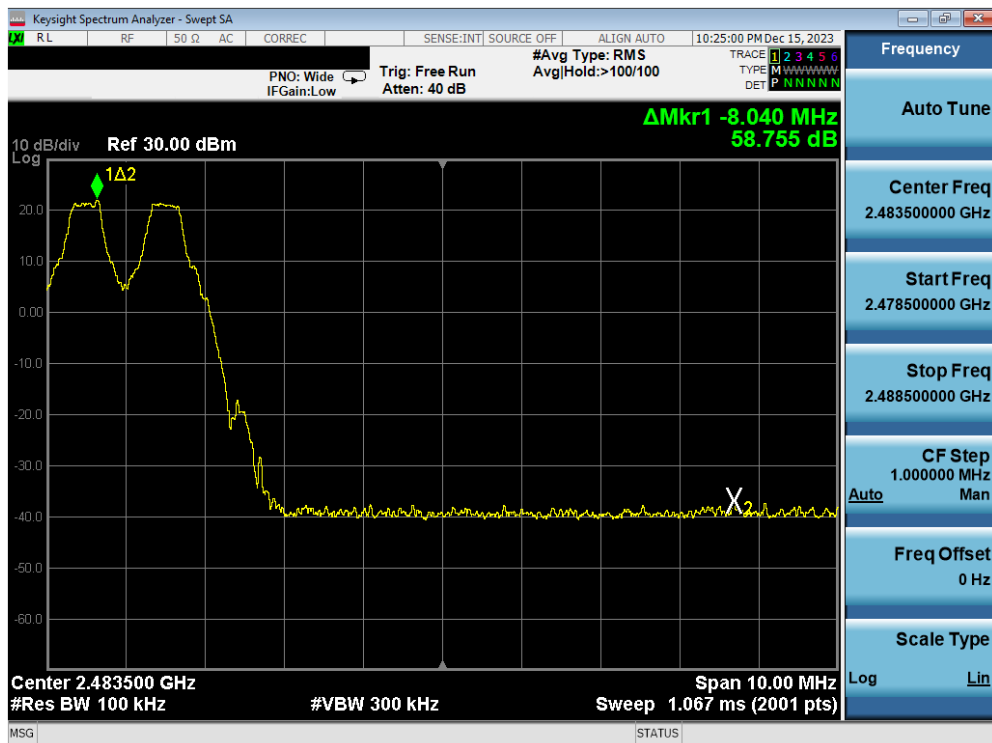


Plot 7-22. Band Edge Plot Antenna WF2b (Bluetooth with Hopping Disabled, GFSK, ePA – Ch. 78)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 33 of 95

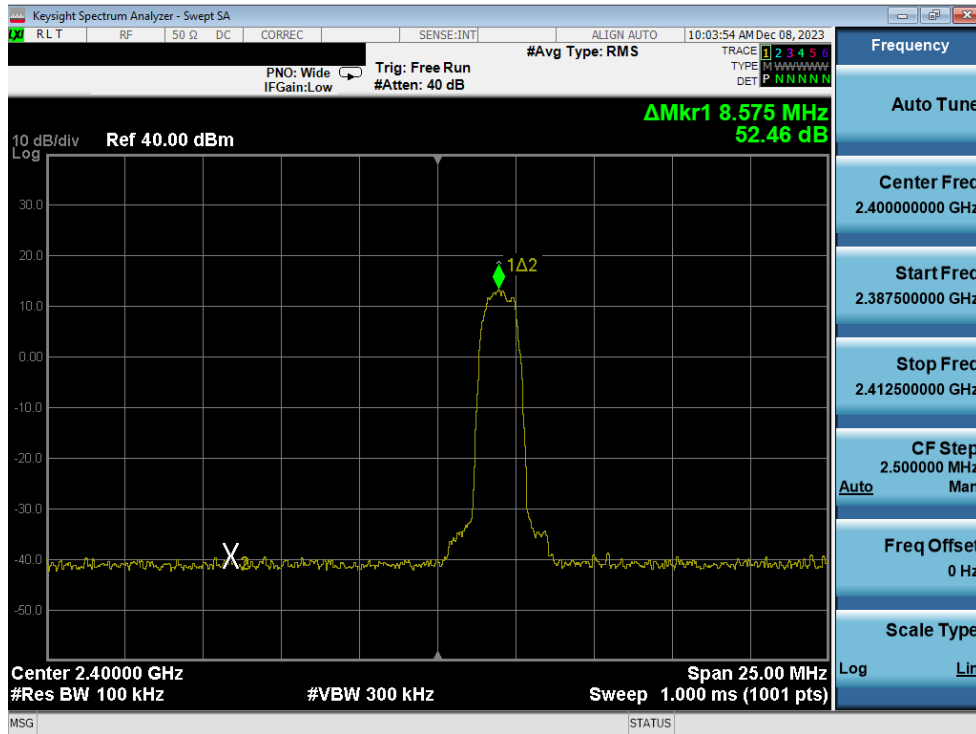


Plot 7-23. Band Edge Plot Antenna WF2b (Bluetooth with Hopping Enabled, GFSK, ePA)

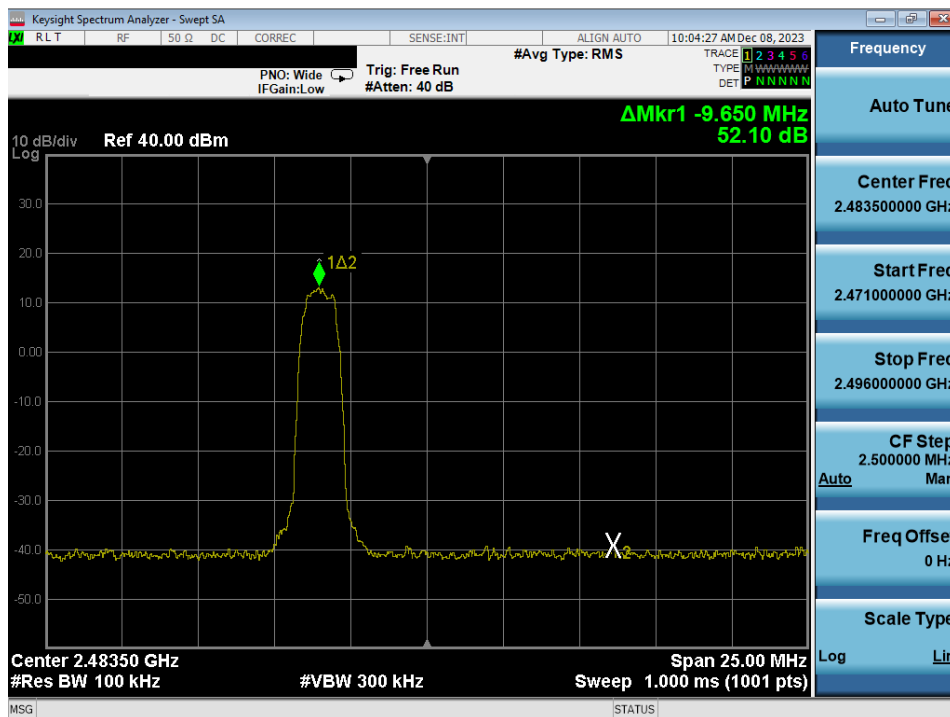


Plot 7-24. Band Edge Plot Antenna WF2b (Bluetooth with Hopping Enabled, GFSK, ePA)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 34 of 95

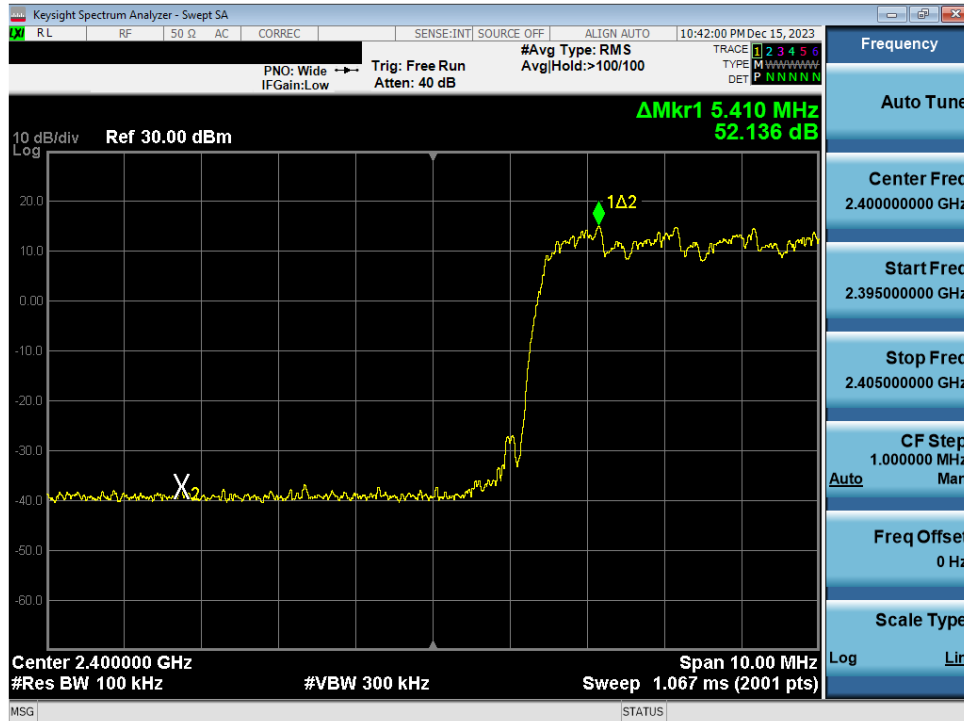


Plot 7-25. Band Edge Plot Antenna WF2b (Bluetooth with Hopping Disabled, 8DPSK, ePA – Ch. 0)

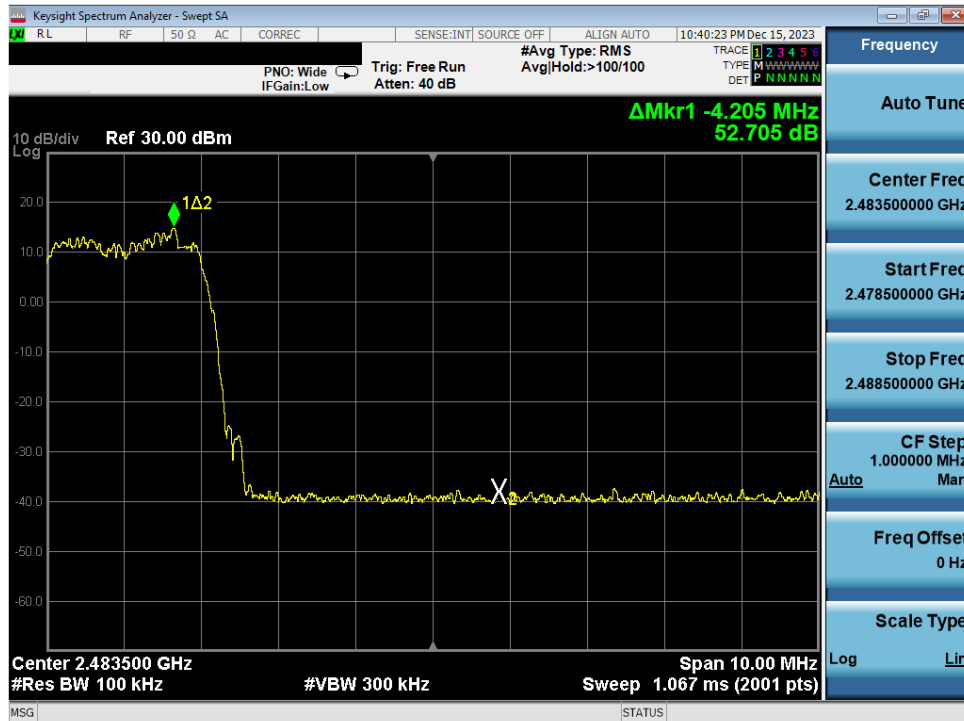


Plot 7-26. Band Edge Plot Antenna WF2b (Bluetooth with Hopping Disabled, 8DPSK, ePA – Ch. 78)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 35 of 95



Plot 7-27. Band Edge Plot Antenna WF2b (Bluetooth with Hopping Enabled, 8DPSK, ePA)



Plot 7-28. Band Edge Plot Antenna WF2b (Bluetooth with Hopping Enabled, 8DPSK, ePA)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 36 of 95

## 7.5 Carrier Frequency Separation

**§15.247 (a.1); RSS-247 [5.1(b)]**

### Test Overview and Limit

Measurement is made with EUT operating in hopping mode. ***The minimum permissible channel separation for this system is 2/3 the value of the 20dB BW.***

### Test Procedure Used

ANSI C63.10-2013 – Section 7.8.2

### Test Settings

1. Span = Wide enough to capture peaks of two adjacent channels
2. RBW = 30% of channel spacing. Adjust as necessary to best identify center of each individual channel
3. VBW  $\geq$  RBW
4. Sweep = Auto
5. Detector = Peak
6. Trace mode = max hold
7. The trace was allowed to stabilize.
8. Marker-delta function used to determine separation between peaks of the adjacent channels

### 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

1. The EUT complies with the minimum channel separation requirement when it is operating in 1x/EDR mode using 79 channels.
2. All supported modulation, antenna (including TxBF mode) and power schemes have been tested on the unit and only worst case configuration is reported.

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 37 of 95

V 10.6 09/13/2023

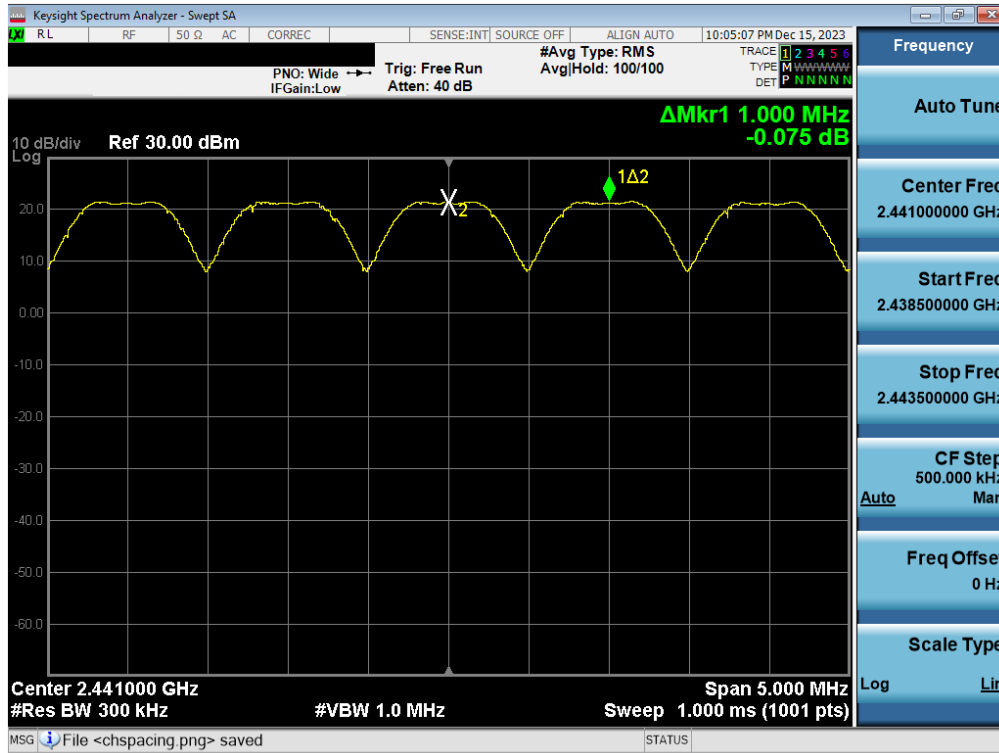
## Antenna WF7b

Frequency [MHz]	Data Rate [Mbps]	Mod.	Power Scheme	Channel No.	Measured Channel Separation [kHz]	Min. Channel Separation [kHz]	Pass/Fail
2441	1.0	GFSK	ePA	39	1.00	0.64	Pass
2441	3.0	8DPSK	ePA	39	1.00	0.90	Pass

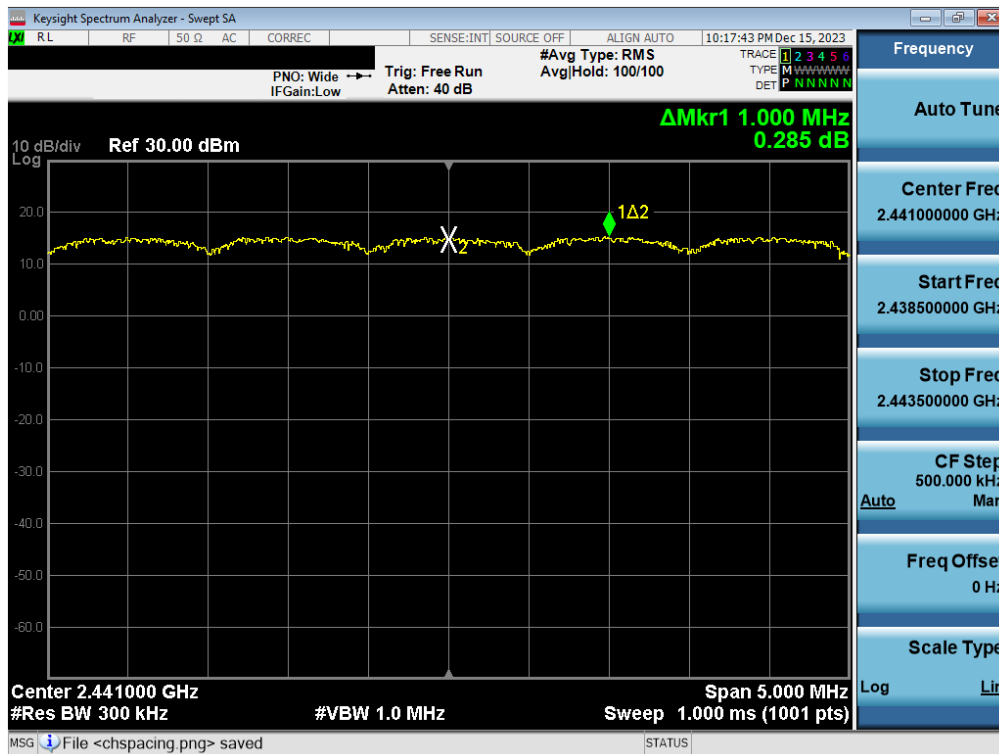
**Table 7-10. Minimum Channel Separation Antenna WF7b**

FCC ID: BCGA2898 IC: 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device		Page 38 of 95

V 10.6 09/13/2023



Plot 7-29. Channel Spacing Plot Antenna WF7b (Bluetooth, GFSK, ePA)



Plot 7-30. Channel Spacing Plot Antenna WF7b (Bluetooth, 8DPSK, ePA)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 39 of 95

## Antenna WF2b

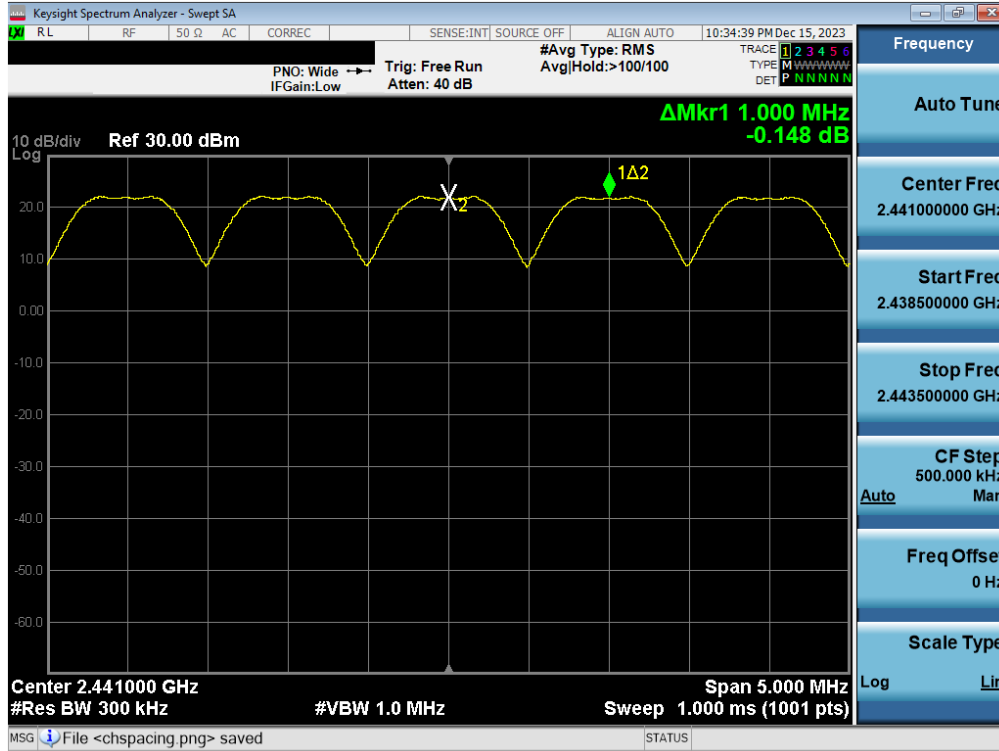
Frequency [MHz]	Data Rate [Mbps]	Mod.	Power Scheme	Channel No.	Measured Channel Separation [kHz]	Min. Channel Separation [kHz]	Pass/Fail
2441	1.0	GFSK	ePA	39	1.00	0.64	Pass
2441	3.0	8DPSK	ePA	39	1.00	0.90	Pass

**Table 7-11. Minimum Channel Separation Antenna WF2b**

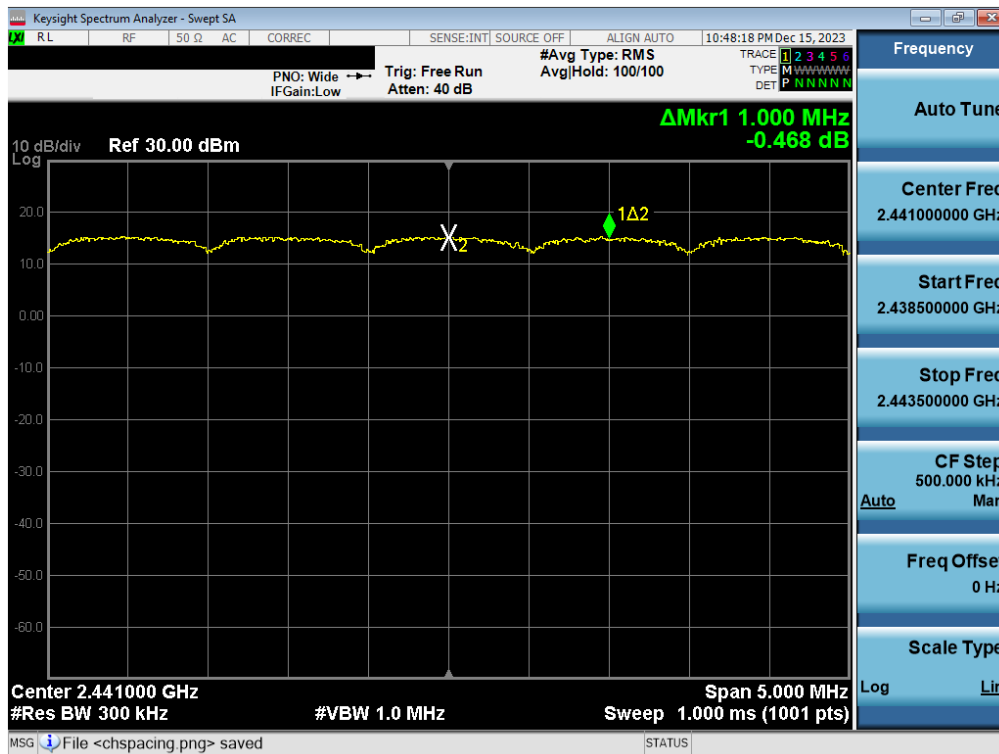
FCC ID: BCGA2898 IC: 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device		Page 40 of 95

V 10.6 09/13/2023





Plot 7-31. Channel Spacing Plot Antenna WF2b (Bluetooth, GFSK, ePA)



Plot 7-32. Channel Spacing Plot Antenna WF2b (Bluetooth, 8DPSK, ePA)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 41 of 95

## 7.6 Time of Occupancy

§15.247 (a.1.iii); RSS-247 [5.1(d)]

### Test Overview and Limit

Measurement is made while EUT is operating in hopping mode with the spectrum analyzer set to zero span. **The maximum permissible time of occupancy is 400 ms within a period of 400ms multiplied by the number of hopping channels employed.**

### Test Procedure Used

ANSI C63.10-2013 – Section 7.8.4

### Test Settings

1. Span = zero span, centered on a hopping channel
2. RBW  $\leq$  channel spacing and  $\gg 1/T$ , where T is expected dwell time per channel
3. Sweep = as necessary to capture entire dwell time. Second plot may be required to demonstrate two successive hops on a channel
4. Trigger is set with appropriate trigger delay to place pulse near the center of the plot
5. Detector = peak
6. Trace mode = max hold
7. Marker-delta function used to determine transmit time per hop

### Test Setup

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



**Figure 7-5. Test Instrument & Measurement Setup**

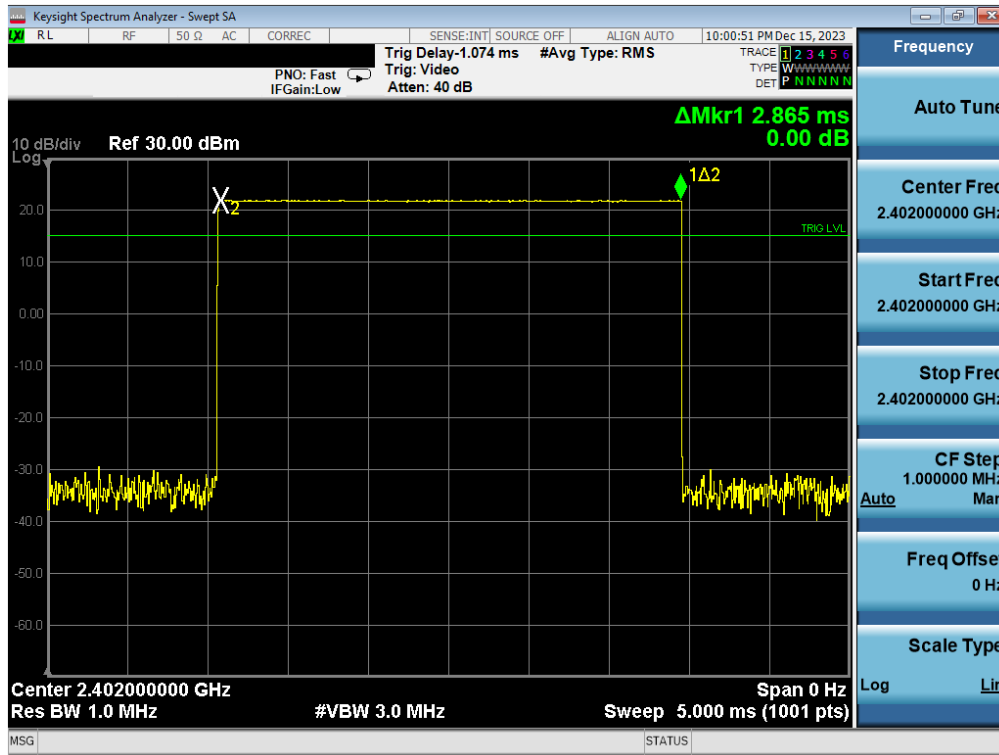
### Test Notes

All supported modulation, antenna (including TxBF mode) and power schemes have been tested on the unit and only worst case configuration is reported.

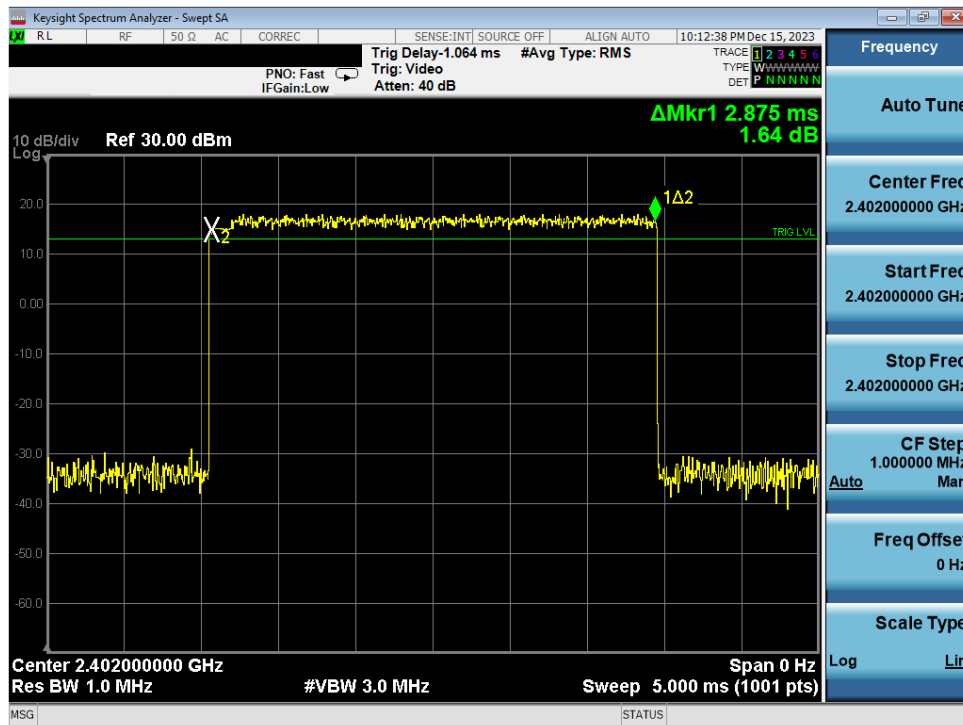
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 42 of 95

V 10.6 09/13/2023

# Antenna WF7b



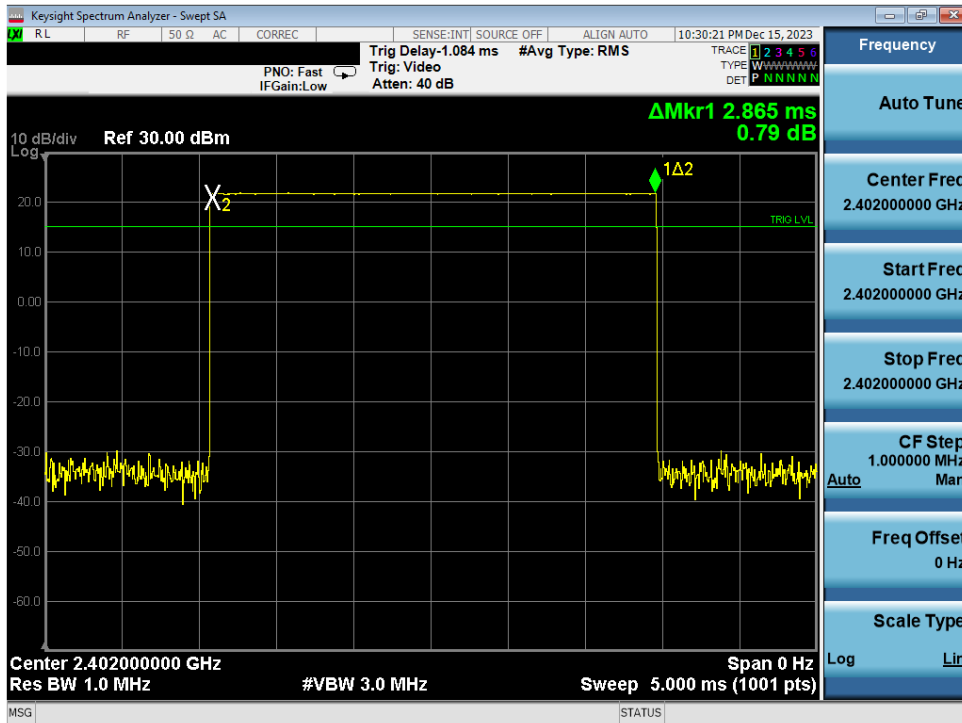
Plot 7-33. Time of Occupancy Plot Antenna WF7b (Bluetooth, GFSK, ePA)



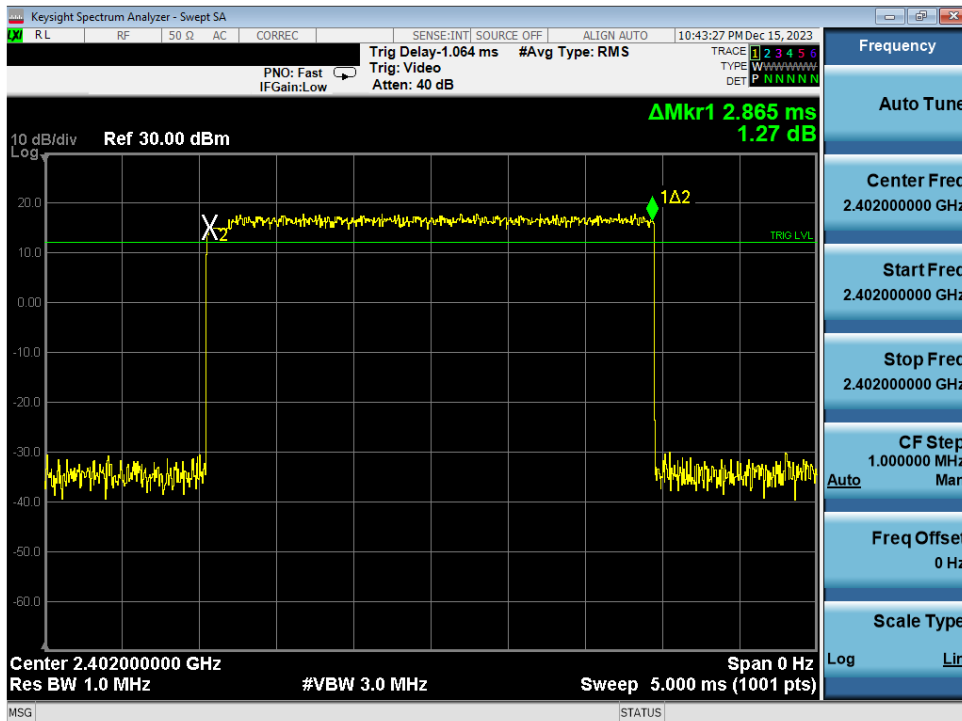
Plot 7-34. Time of Occupancy Plot Antenna WF7b (Bluetooth, 8DPSK, ePA)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 43 of 95

## Antenna WF2b



Plot 7-35. Time of Occupancy Plot Antenna WF2b (Bluetooth, GFSK, ePA)



Plot 7-36. Time of Occupancy Plot Antenna WF2b (Bluetooth, 8DPSK, ePA)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 44 of 95

**Bluetooth Time of Occupancy Calculation**

Typically, Bluetooth 1x/EDR mode has a channel hopping rate of 1600 hops/s. Since 1x/EDR modes use 5 transmit and 1 receive slot, for a total of 6 slots, the Bluetooth transmitter is actually hopping at a rate of  $1600 / 6 = 266.67$  hops/s/slot

- $400\text{ms} \times 79$  hopping channels = 31.6 sec (Time of Occupancy Limit)
- Worst case BT has 266.67 hops/second (for 1x/EDR modes with DH5 operation)
- $266.67 \text{ hops/second} / 79$  channels = 3.38 hops/second (# of hops/second on one channel)
- $3.38 \text{ hops/second/channel} \times 31.6$  seconds = 106.67 hops (# hops over a 31.6 second period)
- $106.67 \text{ hops} \times 2.88 \text{ ms/channel}$  = 307.21 ms (worst case dwell time for one channel in 1x/EDR modes)

With AFH, the number of channels is reduced to a minimum of 20 channels and the channel hopping rate is reduced by 50% to 800 hops/s. AFH mode also uses 6 total slots so the Bluetooth transmitter hops at a rate of  $800 / 6 = 133.3$  hops/s/slot

- $400\text{ms} \times 20$  hopping channels = 8 sec (Time of Occupancy Limit)
- Worst case BT has 133.3 hops/second/slot (for AFH mode with DH5 operation)
- $133.3 \text{ hops/s} / 20$  channels = 6.67 hops/second (# of hops/second on one channel)
- $6.67 \text{ hops/s} / \text{channel} \times 8$  seconds = 53.34 hops (# hops over a 8 second period)
- $53.34 \text{ hops} \times 2.88 \text{ ms/channel}$  = 153.62 ms (worst case dwell time for one channel in AFH mode)

**Test Result**

The measured worst case dwell time is below the limit of 0.4s.

<b>FCC ID:</b> BCGA2898 <b>IC:</b> 579C-A2898		<b>MEASUREMENT REPORT</b> <b>(CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 45 of 95

## 7.7 Number of Hopping Channels

**§15.247 (a.1.iii); RSS-247 [5.1(d)]**

### Test Overview and Limit

Measurement is made while EUT is operating in hopping mode. ***This frequency hopping system must employ a minimum of 15 hopping channels.***

### Test Procedure Used

ANSI C63.10-2013 – Section 7.8.3

### Test Settings

1. Span = frequency of band of operation (divided into two plots)
2. RBW < 30% of channel spacing or 20dB bandwidth, whichever is smaller.
3. VBW ≥ RBW
4. Sweep = auto
5. Detector = peak
6. Trace mode = max hold
7. Trace was allowed to stabilize

### Test Setup

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



**Figure 7-6. Test Instrument & Measurement Setup**

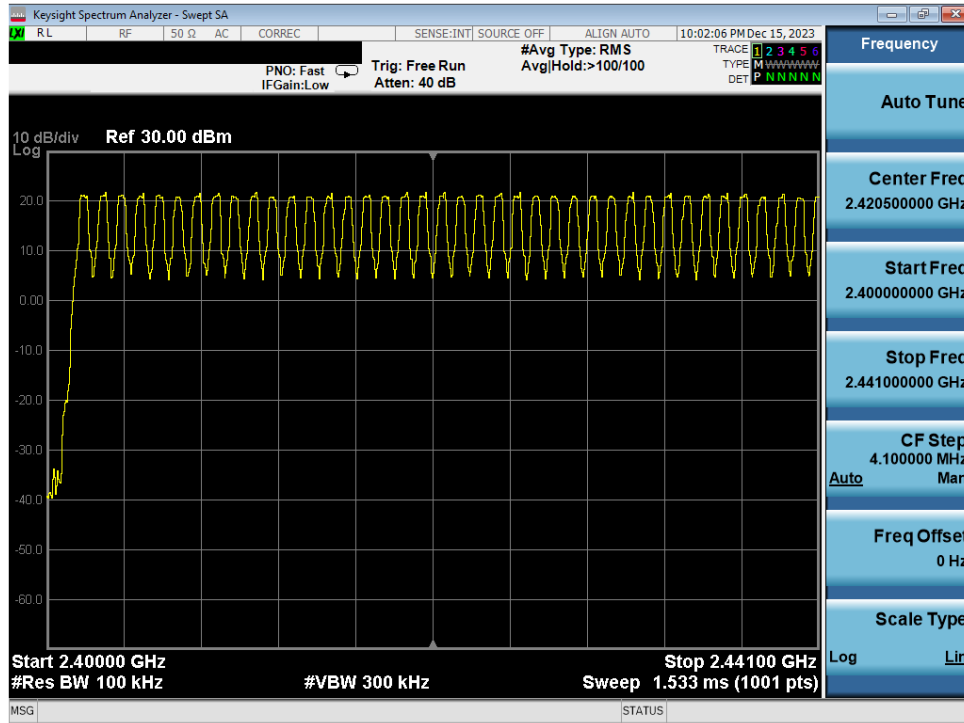
### Test Notes

1. The frequency spectrum was broken up into two sub-ranges to clearly show all of the hopping frequencies. In AFH mode, this device operates using 20 channels so the requirement for minimum number of hopping channels is satisfied.
2. All supported modulation, antenna (including TxBF mode) and power schemes have been tested on the unit and only worst case configuration is reported.

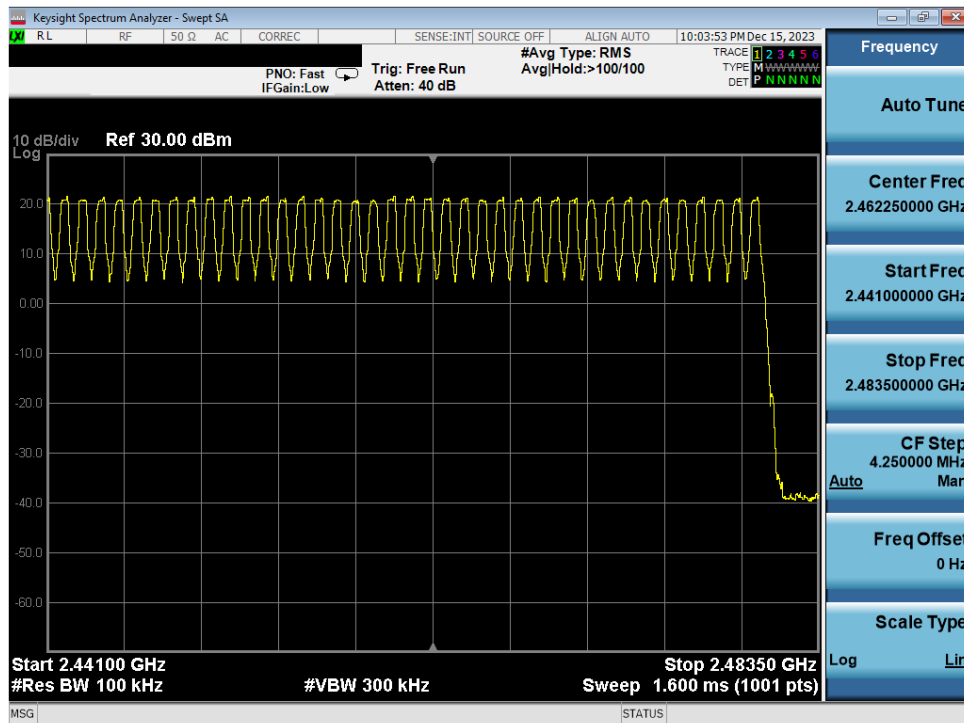
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 46 of 95

V 10.6 09/13/2023

# Antenna WF7b

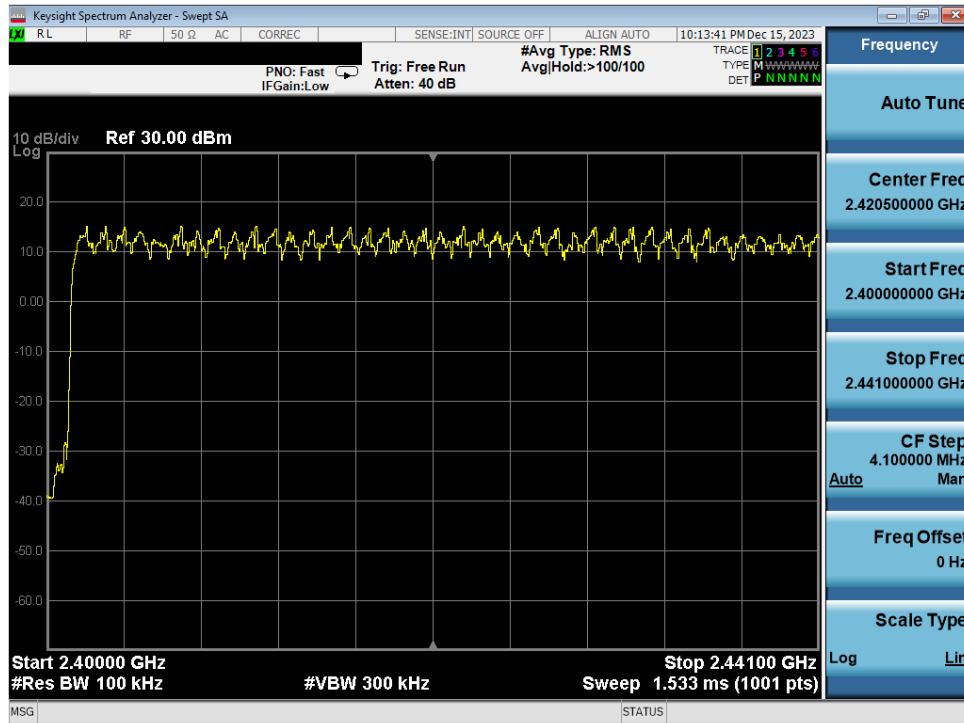


Plot 7-37. Low End Spectrum Channel Hopping Plot Antenna WF7b (Bluetooth, GFSK, ePA)

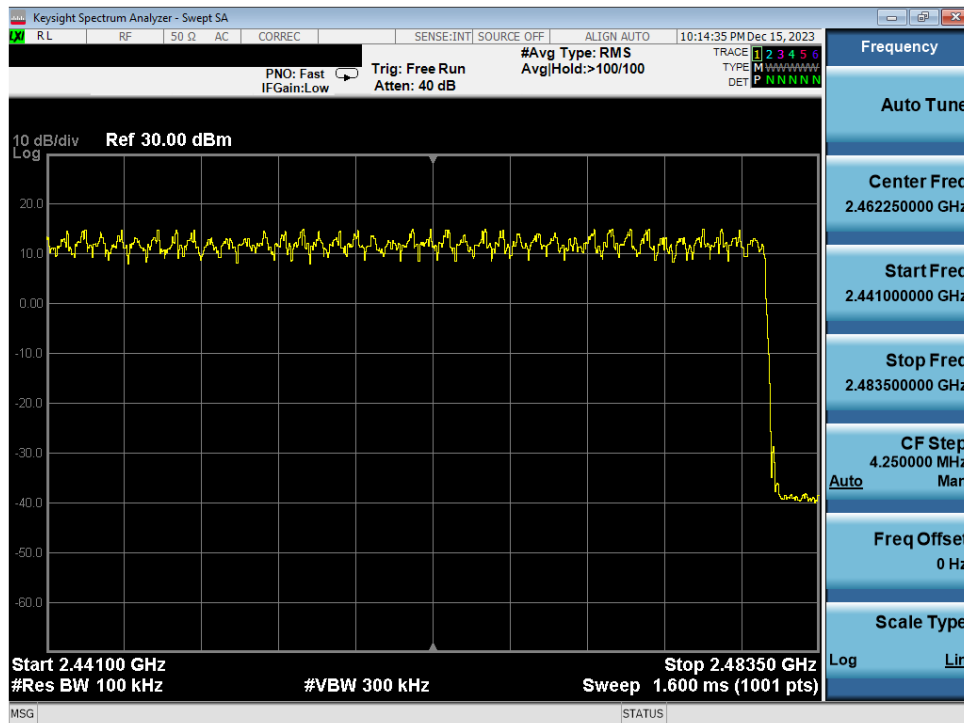


Plot 7-38. High End Spectrum Channel Hopping Plot Antenna WF7b (Bluetooth, GFSK, ePA)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 47 of 95



Plot 7-39. Low End Spectrum Channel Hopping Plot Antenna WF7b (Bluetooth, 8DPSK, ePA)

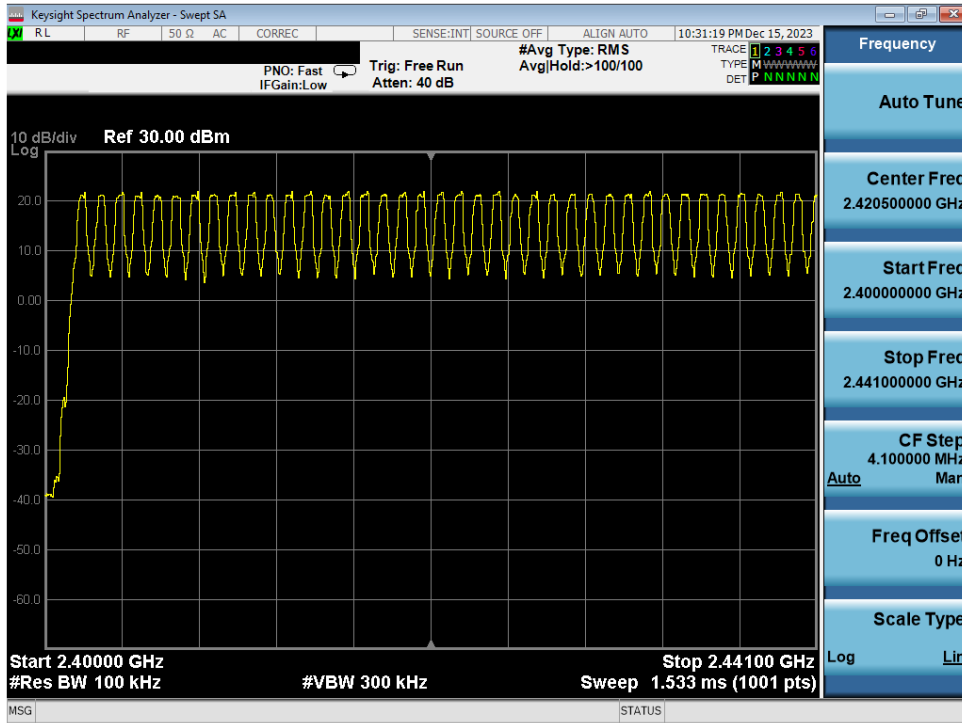


Plot 7-40. High End Spectrum Channel Hopping Plot Antenna WF7b (Bluetooth, 8DPSK, ePA)

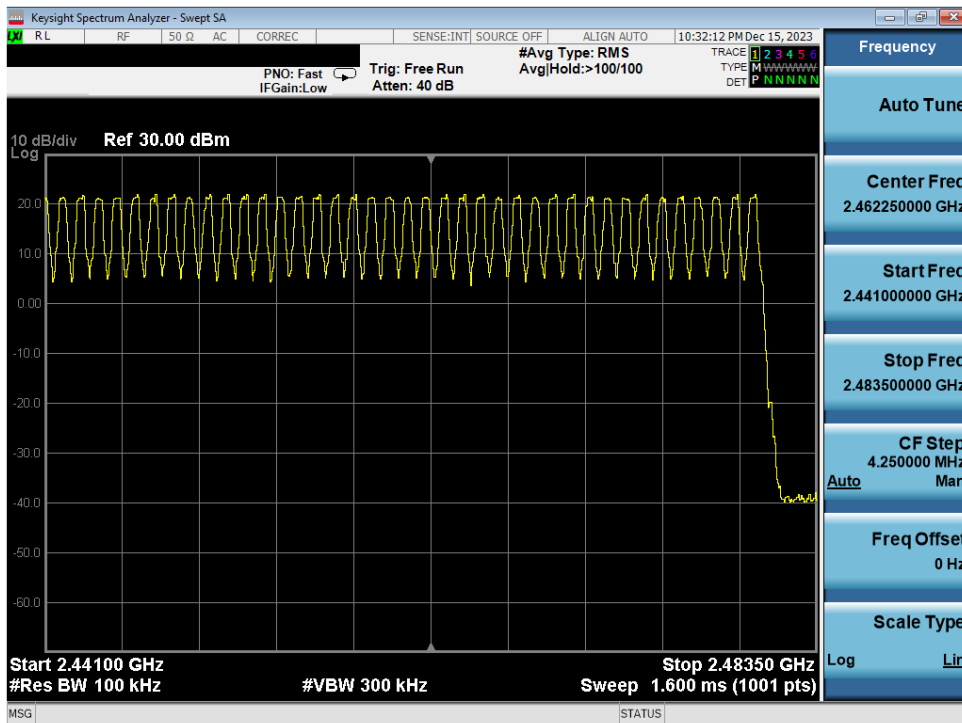
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 48 of 95



# Antenna WF2b

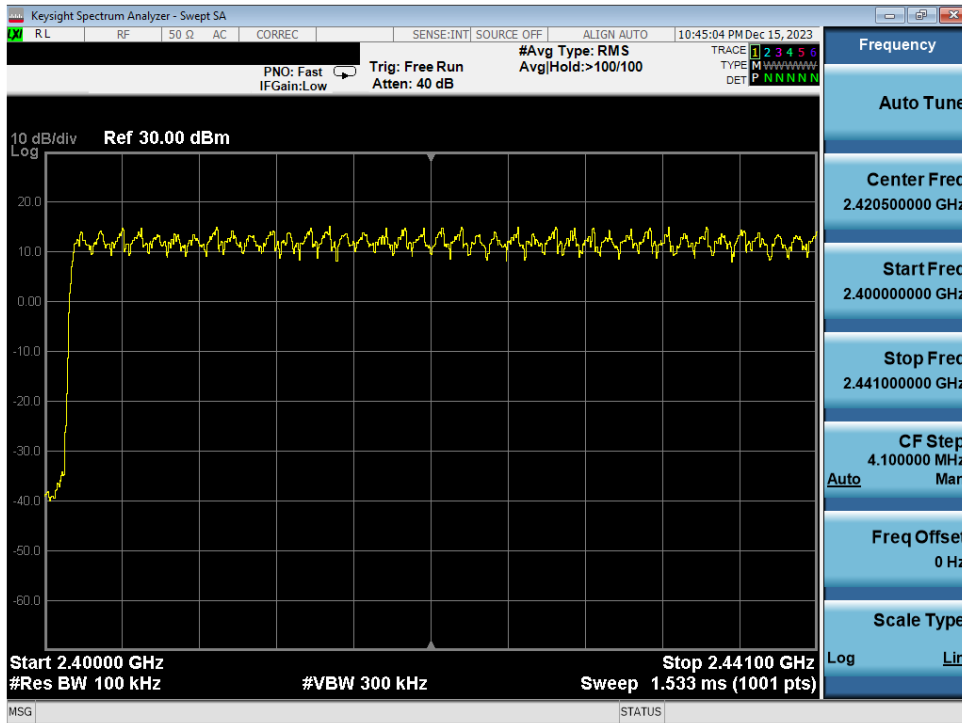


Plot 7-41. Low End Spectrum Channel Hopping Plot Antenna WF2b (Bluetooth, GFSK, ePA)

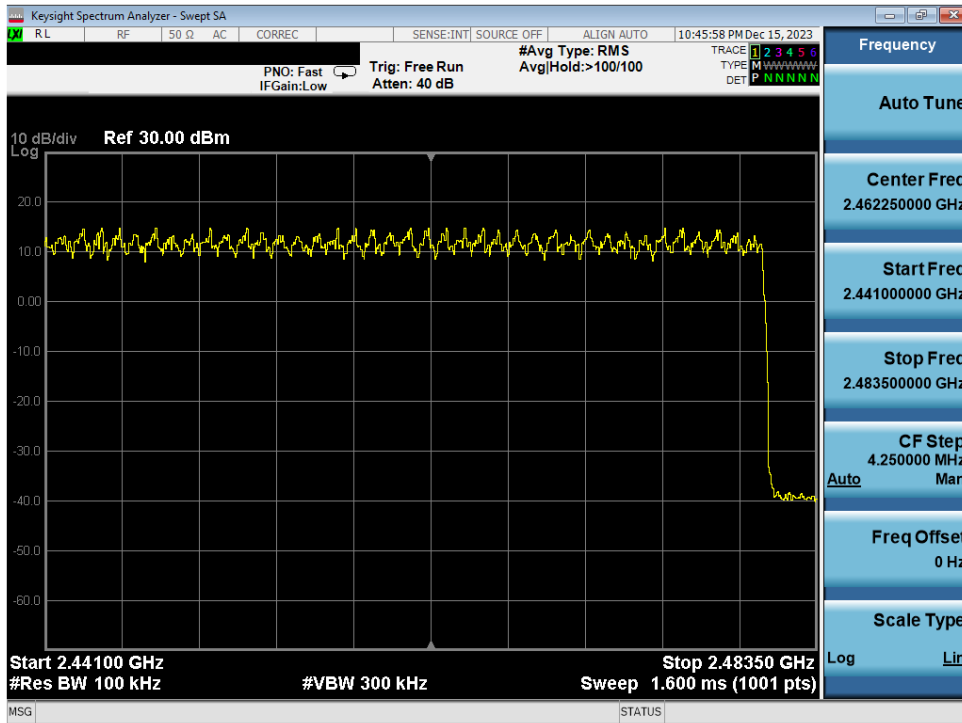


Plot 7-42. High End Spectrum Channel Hopping Plot Antenna WF2b (Bluetooth, GFSK, ePA)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 49 of 95



Plot 7-43. Low End Spectrum Channel Hopping Plot Antenna WF2b (Bluetooth, 8DPSK, ePA)



Plot 7-44. High End Spectrum Channel Hopping Plot Antenna WF2b (Bluetooth, 8DPSK, ePA)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07-BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 50 of 95

## 7.8 Conducted Spurious Emissions

§15.247 (d); RSS-247 [5.5]

### Test Overview and Limit

Conducted out-of-band spurious emissions were investigated from 30MHz up to 25GHz to include the 10<sup>th</sup> harmonic of the fundamental transmit frequency. **The maximum permissible out-of-band emission level is 20 dBc.**

### Test Procedure Used

ANSI C63.10-2013 – Section 7.8.8

### Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 25GHz (separated into two plots per channel)
2. RBW = 1MHz\* (See note below)
3. VBW = 3MHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = 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 7-7. Test Instrument & Measurement Setup

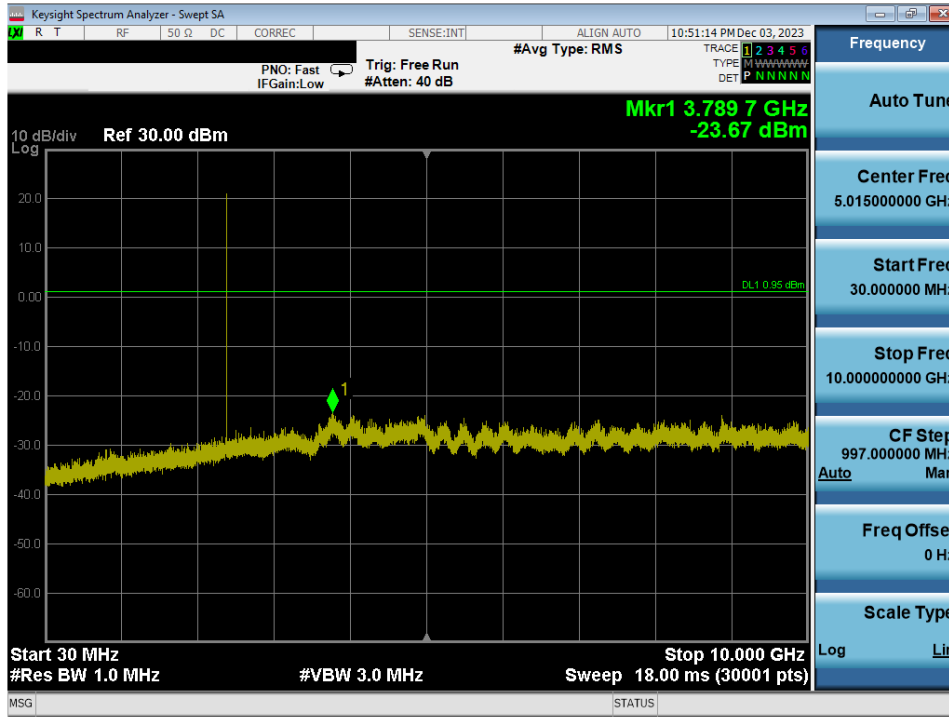
### Test Notes

1. Out-of-band conducted spurious emissions were investigated for all data rates and the worst case emissions were found with the EUT transmitting at 1Mbps. The display line shown in the following plots is the limit at 20dB below the fundamental emission level measured in a 100kHz bandwidth. However, the traces in the following plots are measured with a 1MHz RBW to reduce test time, so the display line may not necessarily appear to be 20dB below the level of the fundamental in a 1MHz bandwidth.
2. The unit was tested with all possible mode and power schemes and only the highest emission is reported.

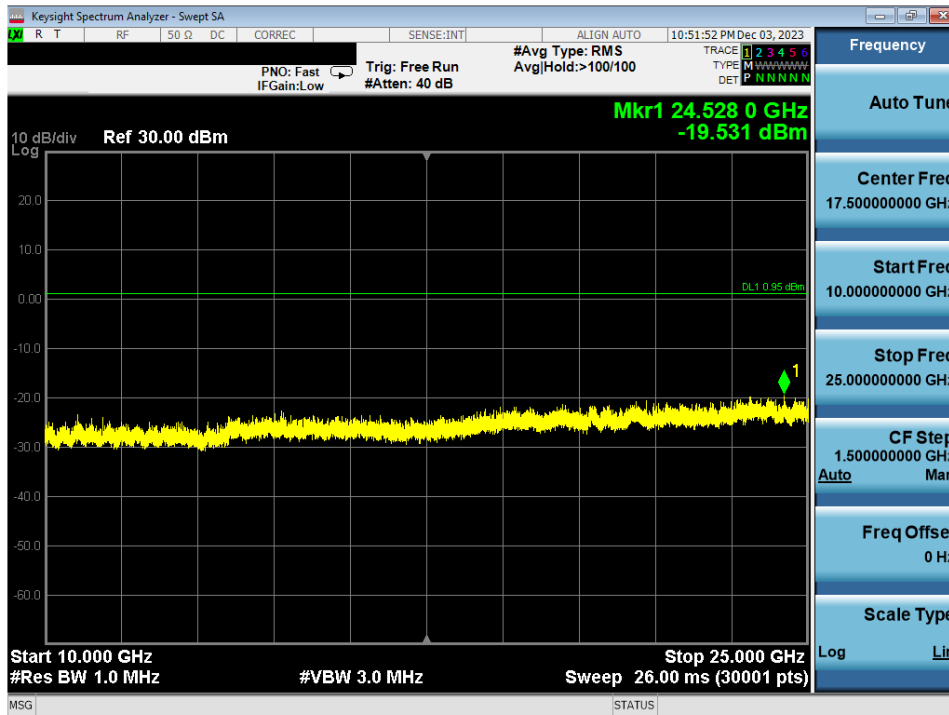
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 51 of 95

V 10.6 09/13/2023

## Antenna WF7b

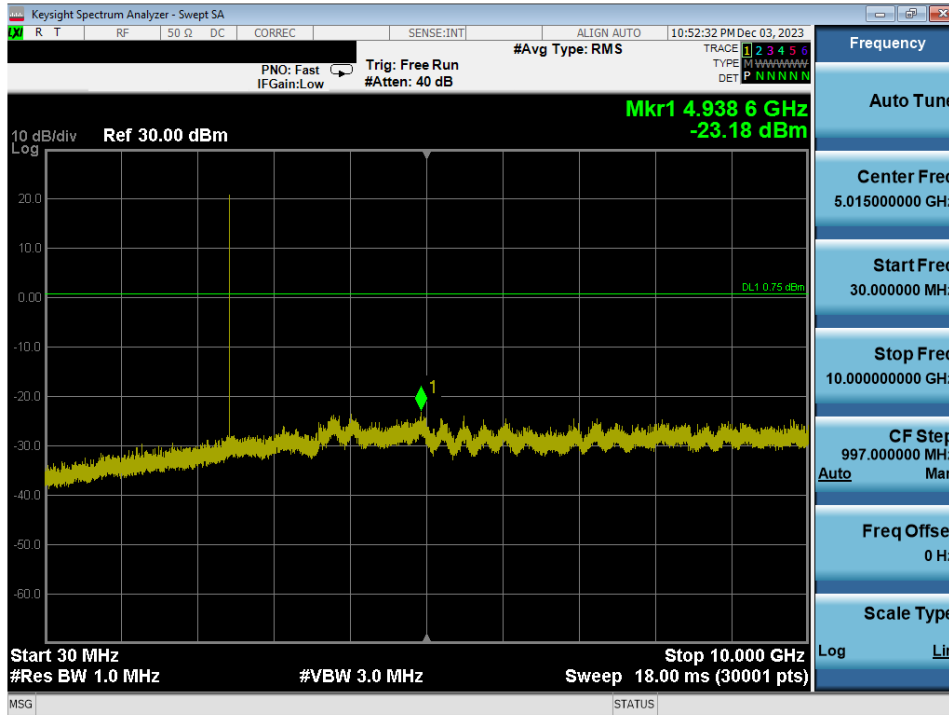


Plot 7-45. Conducted Spurious Plot Antenna WF7b (Bluetooth, GFSK, ePA – Ch. 0)

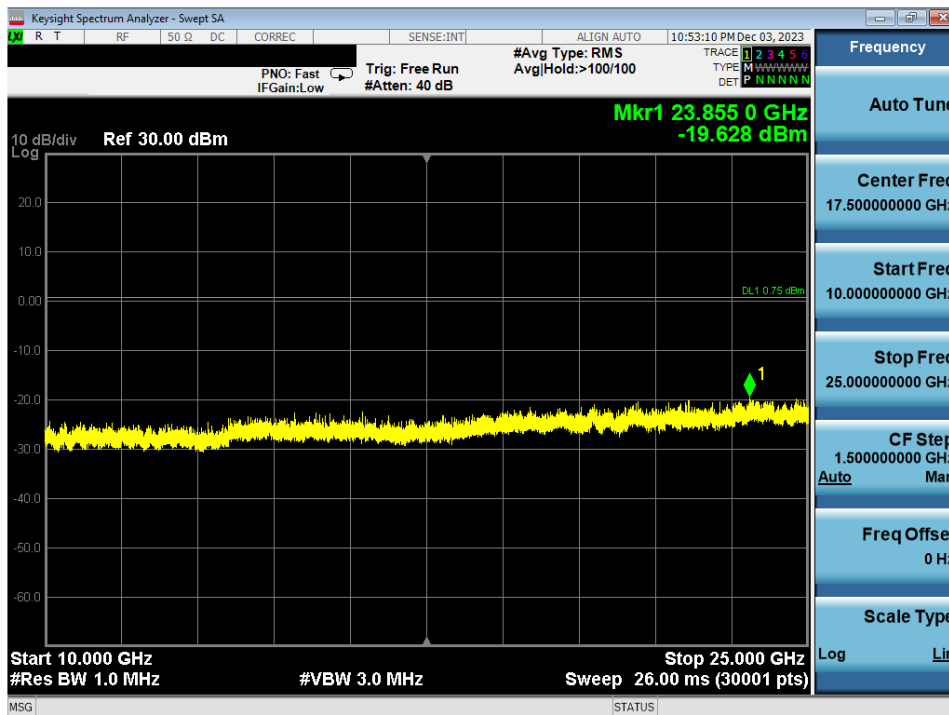


Plot 7-46. Conducted Spurious Plot Antenna WF7b (Bluetooth, GFSK, ePA – Ch. 0)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 52 of 95

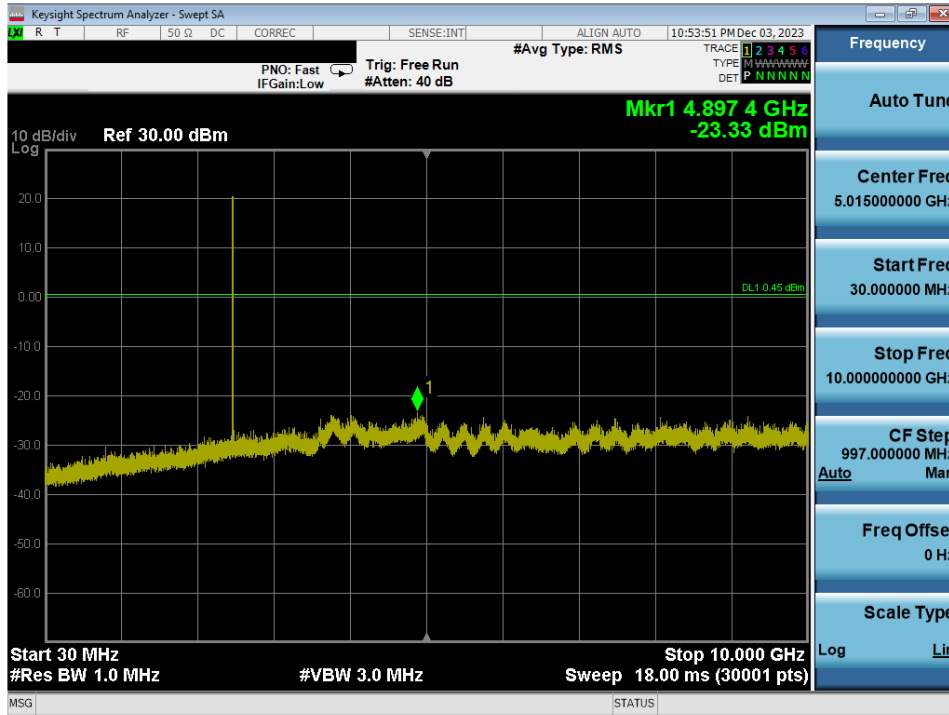


Plot 7-47. Conducted Spurious Plot Antenna WF7b (Bluetooth, GFSK, ePA – Ch. 39)

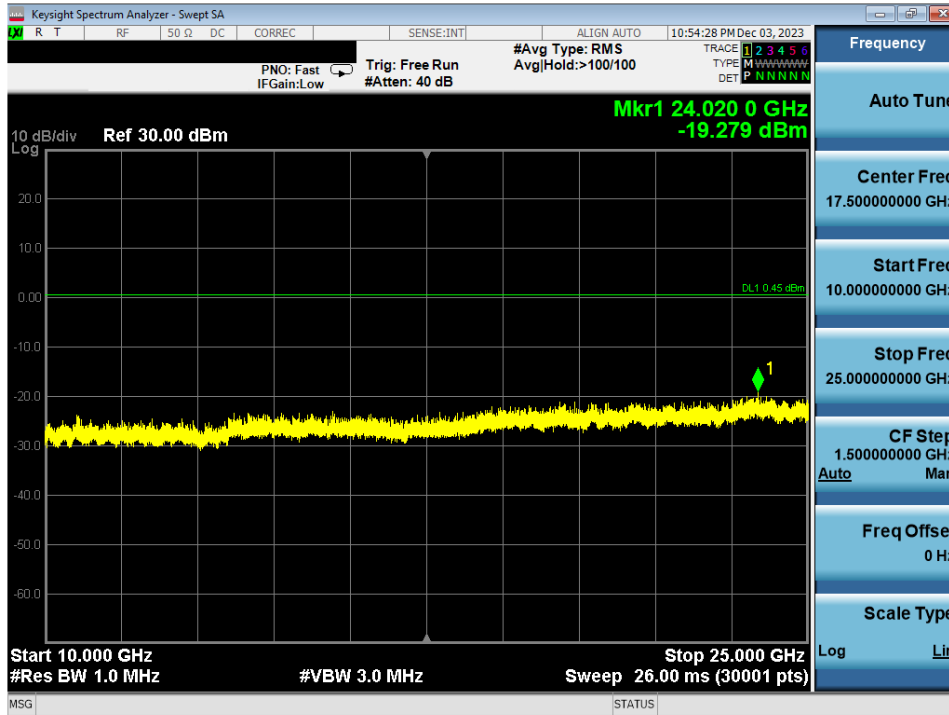


Plot 7-48. Conducted Spurious Plot Antenna WF7b (Bluetooth, GFSK, ePA Ch. 39)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 53 of 95



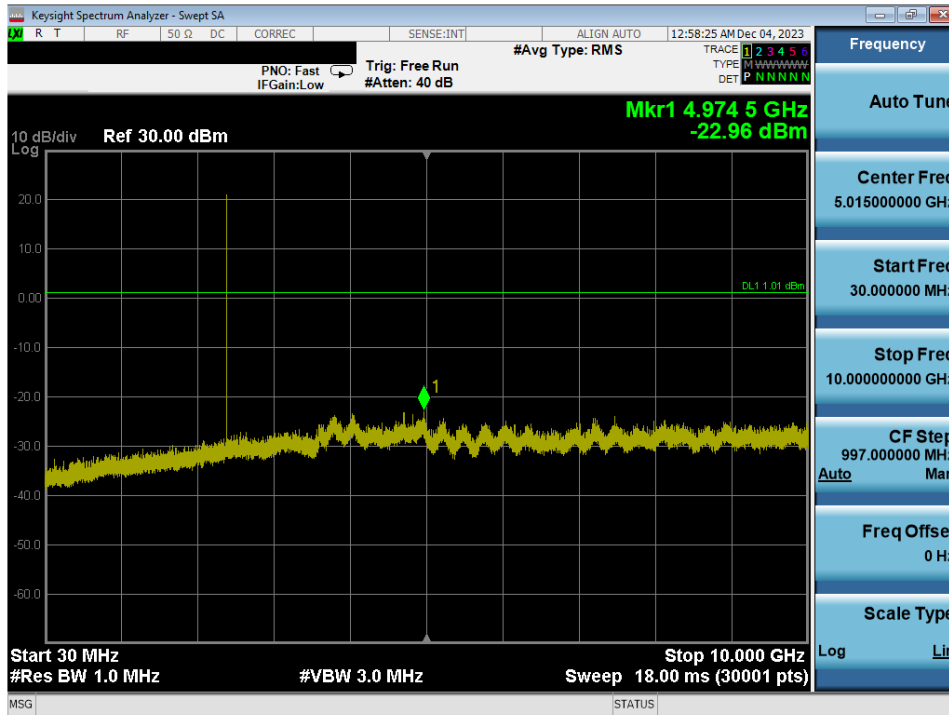
Plot 7-49. Conducted Spurious Plot Antenna WF7b (Bluetooth, GFSK, ePA – Ch. 78)



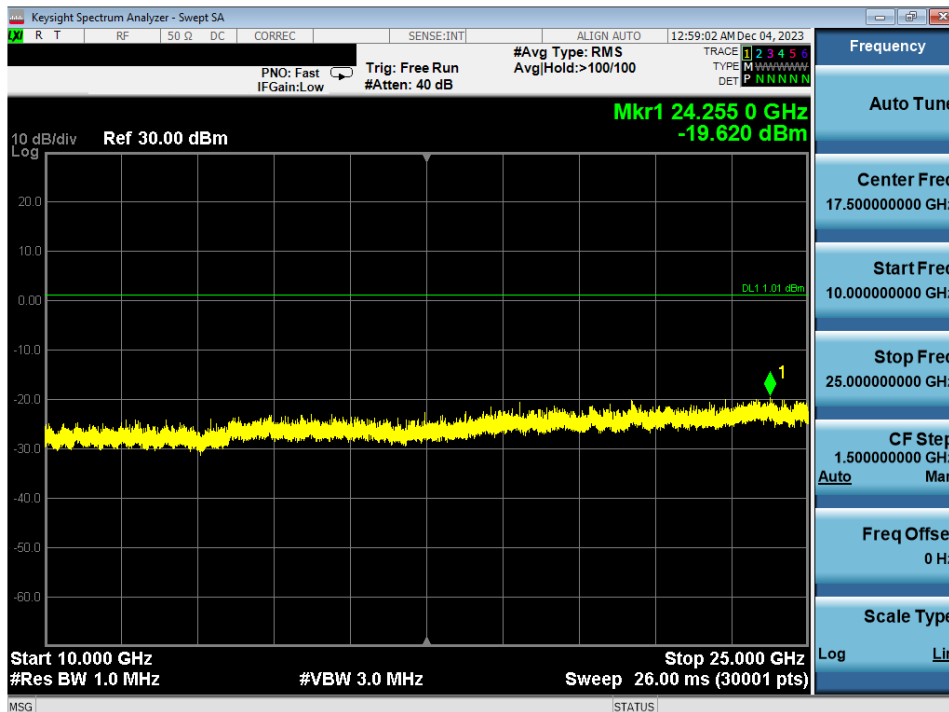
Plot 7-50. Conducted Spurious Plot Antenna WF7b (Bluetooth, GFSK, ePA – Ch. 78)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 54 of 95

## Antenna WF2b



Plot 7-51. Conducted Spurious Plot Antenna WF2b (Bluetooth, GFSK, ePA – Ch. 0)

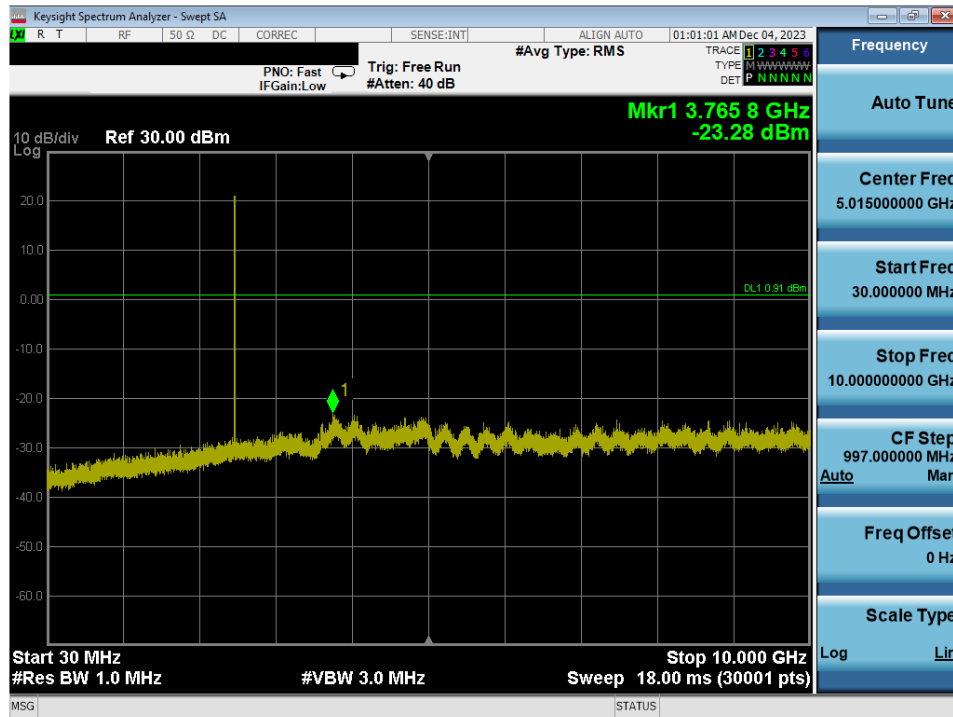


Plot 7-52. Conducted Spurious Plot Antenna WF2b (Bluetooth, GFSK, ePA – Ch. 0)

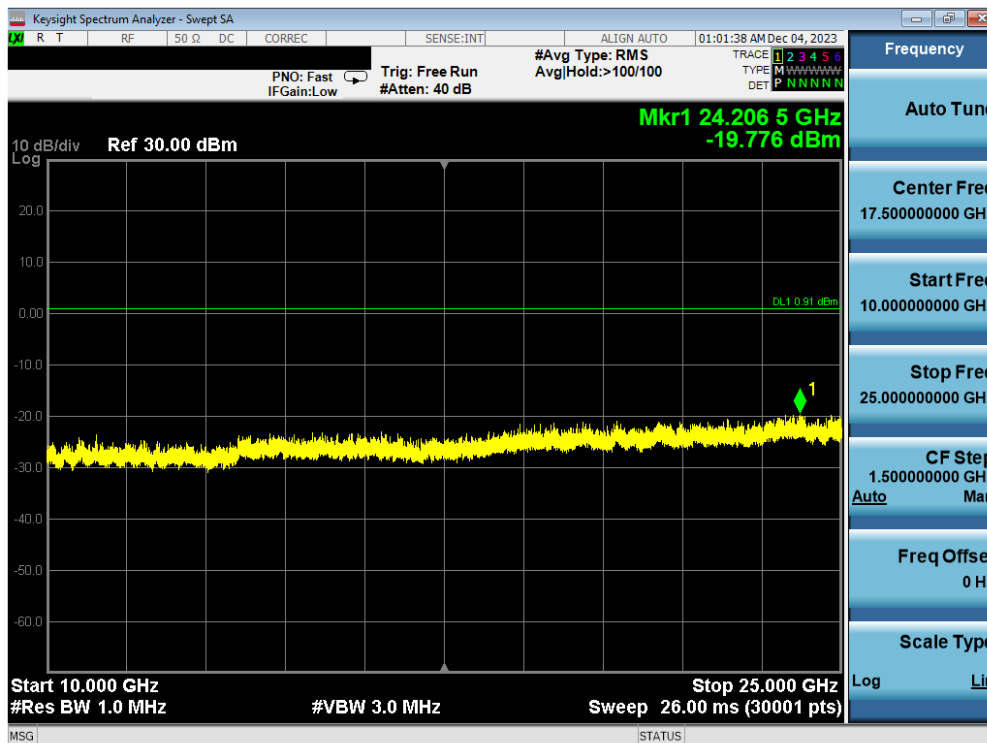
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 55 of 95







Plot 7-55. Conducted Spurious Plot Antenna WF2b (Bluetooth, GFSK, ePA – Ch. 78)



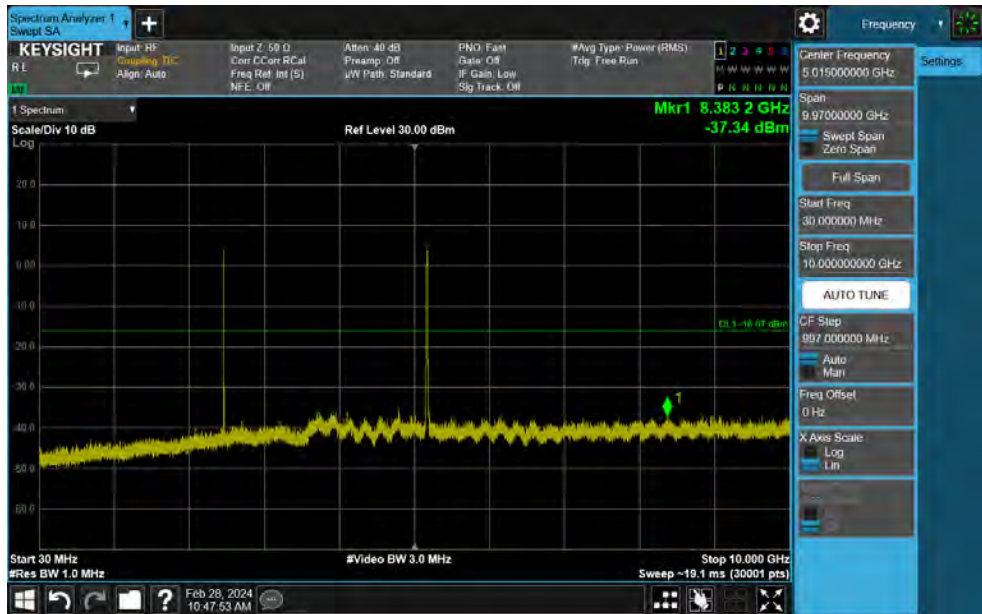
Plot 7-56. Conducted Spurious Plot Antenna WF2b (Bluetooth, GFSK, ePA – Ch. 78)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 57 of 95

Simultaneous Tx

Description	Bluetooth	UNII
Antenna	Antenna WF7b	Antenna WF7b
Channel	79	36
Operating Frequency (MHz)	2480	5180
Mode/Modulation	GFSK ePA	802.11n

Table 7-12. Worst Case Simultaneous Transmission Configuration



Plot 7-57. Conducted Simultaneous Tx Spurious Plot Antenna WF7b (Bluetooth + UNII)



Plot 7-58. Conducted Simultaneous Tx Spurious Plot Antenna WF7b (Bluetooth + UNII)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 58 of 95

## 7.9 Radiated Spurious Emissions – Above 1GHz

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

### Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at maximum power and at the appropriate frequencies. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

***All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 7 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-13 per Section 15.209 and RSS-Gen (8.9).***

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

Table 7-13. Radiated Limits

### Test Procedure Used

ANSI C63.10-2013 – Section 6.6.4.3

### Test Settings

#### Peak Field Strength Measurements

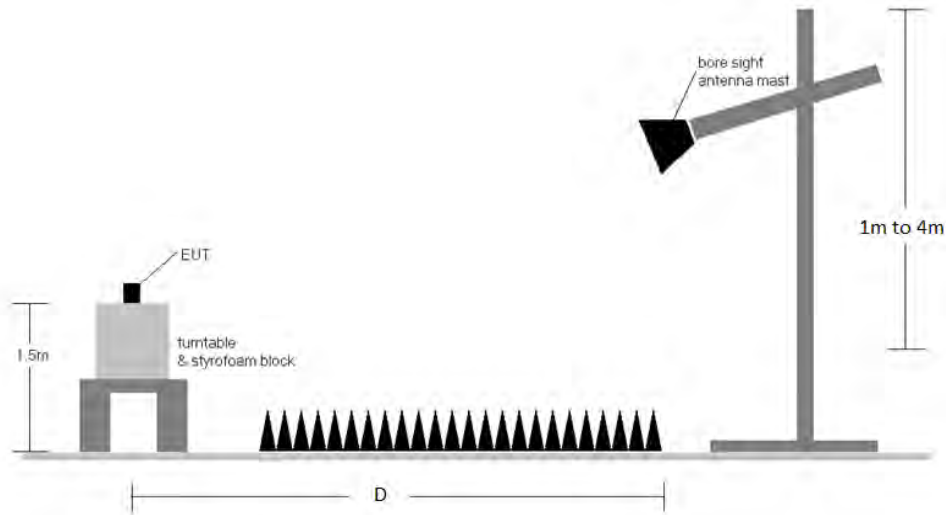
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 59 of 95

V 10.6 09/13/2023

## Test Setup

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



**Figure 7-8. Radiated Test Setup >1GHz**

## Test Notes

1. All emissions lying in restricted bands specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-13.
2. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
3. This unit was tested with its standard battery.
4. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
5. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. Any emissions found to be within 20dB of the limit are fully investigated and the results are shown in this section.
6. D is the measurement test distance and emissions 1-18GHz were measured at a 3 meters test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
7. The "-" shown in the following RSE tables are used to denote a noise floor measurement.
8. All supported modulation, antenna (including TxBF mode) and power schemes have been tested on the unit and only worst case configuration is reported.
9. Average emissions were not reported since the duty cycle correction factor was greater than 20dB.

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 60 of 95

V 10.6 09/13/2023

**Sample Calculation**

- Field Strength Level  $_{[dB\mu V/m]} = \text{Analyzer Level }_{[dBm]} + 107 + \text{AFCL }_{[dB/m]}$
- $\text{AFCL }_{[dB/m]} = \text{Antenna Factor }_{[dB/m]} + \text{Cable Loss }_{[dB]} - \text{Preamplifier Gain }_{[dB]}$
- $\text{Margin }_{[dB]} = \text{Field Strength Level }_{[dB\mu V/m]} - \text{Limit }_{[dB\mu V/m]}$

**Duty Cycle Correction Factor Calculation**

- Channel hop rate = 800 hops/second (AFH Mode)
- Adjusted channel hop rate for DH5 mode = 133.33 hops/second
- Time per channel hop =  $1 / 133.33 \text{ hops/second} = 7.50 \text{ ms}$
- Time to cycle through all channels =  $7.50 \times 20 \text{ channels} = 150 \text{ ms}$
- Number of times transmitter hits on one channel =  $100 \text{ ms} / 150 \text{ ms} = 1 \text{ time(s)}$
- Worst case dwell time = 7.5 ms

Duty cycle correction factor =  $20\log_{10}(7.5\text{ms}/100\text{ms}) = -22.5 \text{ dB}$

**Average Emission Calculation**

- Average Emission = Measured Peak Emissions  $_{[dB\mu V/m]} - \text{Duty Cycle Correction Factor }_{[dB]}$

**Radiated Band Edge Measurement Offset**

- The amplitude offset shown in the radiated restricted band edge plots in Section 7.9.3 was calculated using the formula:

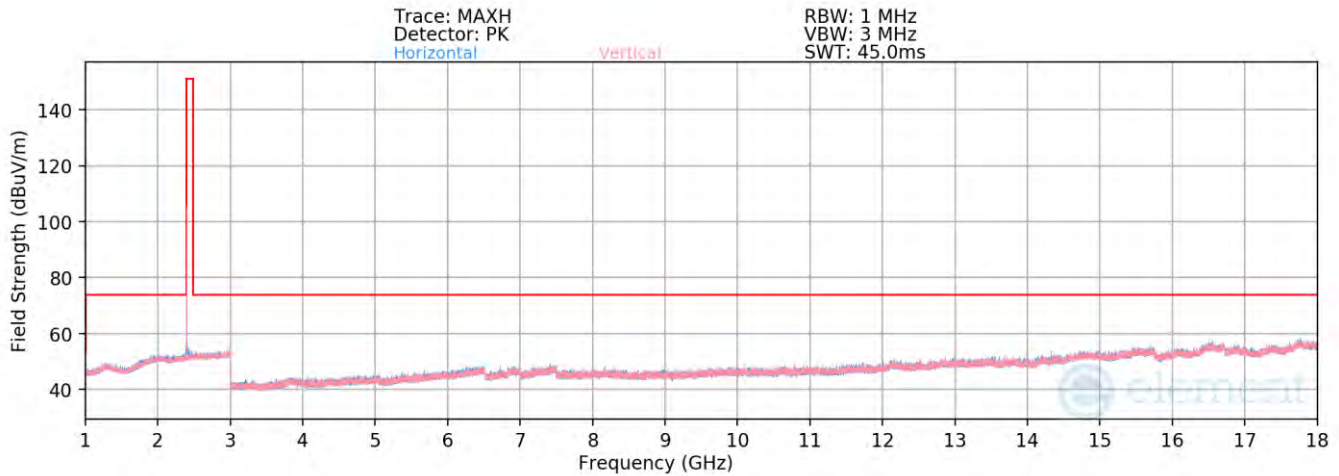
$\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss} + \text{Attenuator}) - \text{Preamplifier Gain}$

<b>FCC ID:</b> BCGA2898 <b>IC:</b> 579C-A2898		<b>MEASUREMENT REPORT</b> <b>(CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 61 of 95

### 7.9.1 Radiated Spurious Emission Measurements (1 – 18GHz)

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

#### Antenna WF7b



Plot 7-59. Radiated Spurious Emissions above 1GHz Antenna WF7b (BT GFSK ePA – Ch. 0)

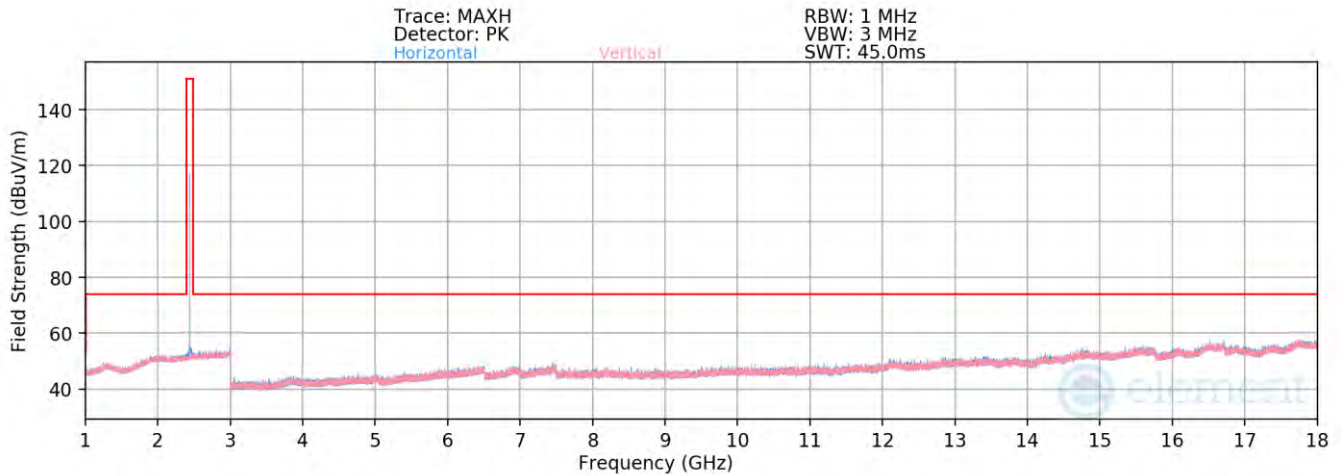
Bluetooth Mode: GFSK  
 Data Rate: 1Mbps  
 Power Scheme: ePA  
 Distance of Measurements: 3 Meters  
 Operating Frequency: 2402MHz  
 Channel: 0

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4804.00	Peak	-	-	-	-66.24	2.32	43.08	73.98	-30.90
12010.00	Peak	-	-	-	-68.56	8.74	47.18	73.98	-26.80

Table 7-14. Radiated Measurements Antenna WF7b

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 62 of 95

V 10.6 09/13/2023



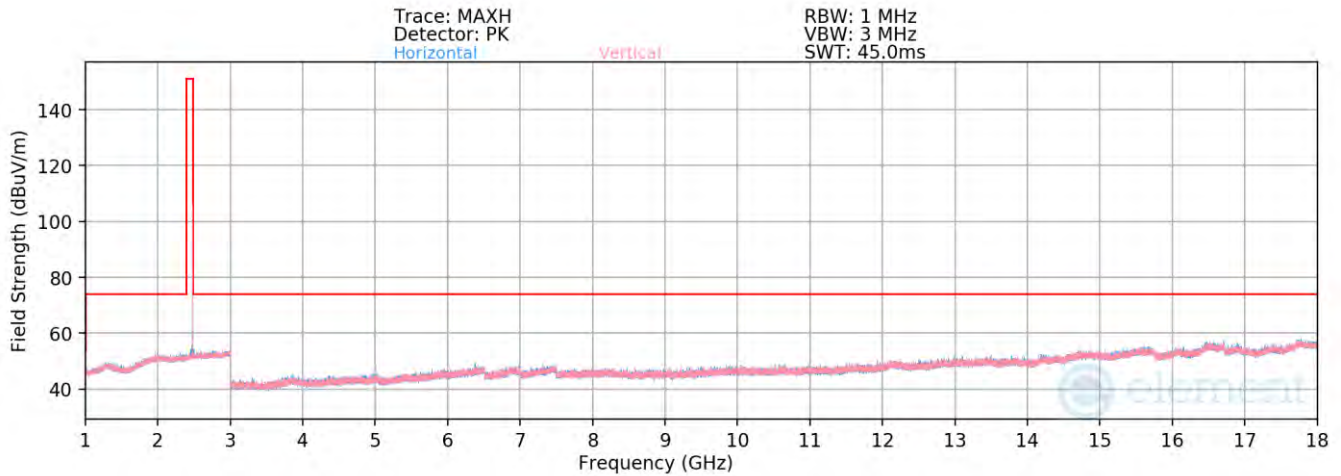
**Plot 7-60. Radiated Spurious Emissions above 1GHz Antenna WF7b (BT GFSK ePA – Ch. 39)**

Bluetooth Mode:	<u>GFSK</u>
Data Rate:	<u>1Mbps</u>
Power Scheme	<u>ePA</u>
Distance of Measurements:	<u>3 Meters</u>
Operating Frequency:	<u>2441MHz</u>
Channel:	<u>39</u>

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4882.00	Peak	-	-	-	-66.03	1.92	42.89	73.98	-31.09
7323.00	Peak	-	-	-	-66.45	4.06	44.61	73.98	-29.37
12205.00	Peak	-	-	-	-68.56	9.60	48.04	73.98	-25.94

**Table 7-15. Radiated Measurements Antenna WF7b**

FCC ID: BCGA2898 IC: 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 63 of 95



**Plot 7-61. Radiated Spurious Emissions above 1GHz Antenna WF7b (BT GFSK ePA – Ch. 78)**

Bluetooth Mode:	<u>GFSK</u>
Data Rate:	<u>1Mbps</u>
Power Scheme	<u>ePA</u>
Distance of Measurements:	<u>3 Meters</u>
Operating Frequency:	<u>2480MHz</u>
Channel:	<u>78</u>

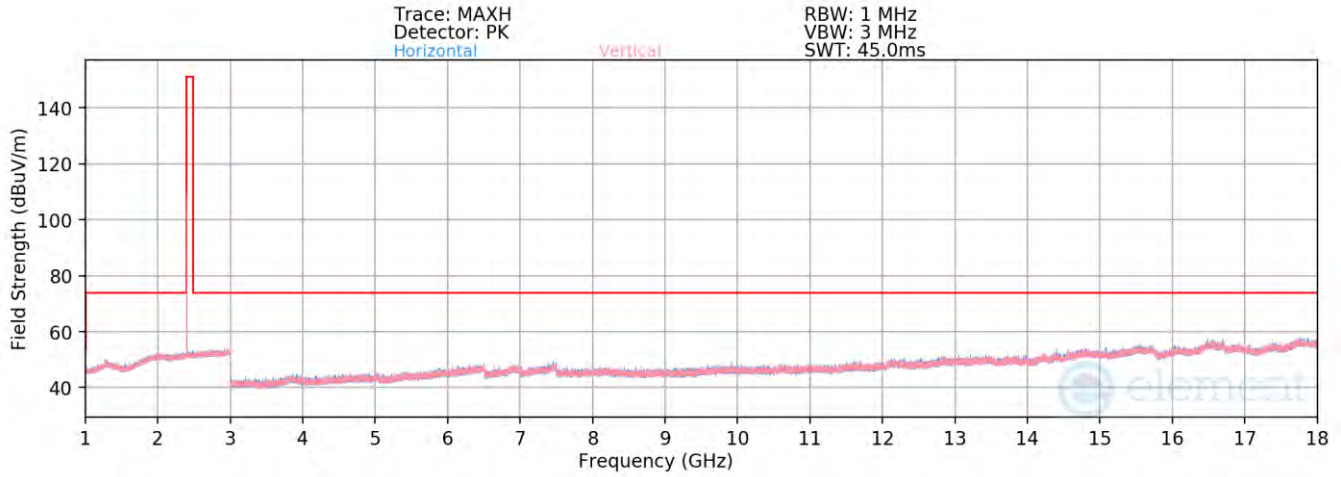
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4960.00	Peak	-	-	-	-66.21	2.14	42.93	73.98	-31.05
7440.00	Peak	-	-	-	-67.69	4.50	43.81	73.98	-30.17
12400.00	Peak	-	-	-	-68.41	9.42	48.01	73.98	-25.97

**Table 7-16. Radiated Measurements Antenna WF7b**

FCC ID: BCGA2898 IC: 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 64 of 95



### Antenna WF2b



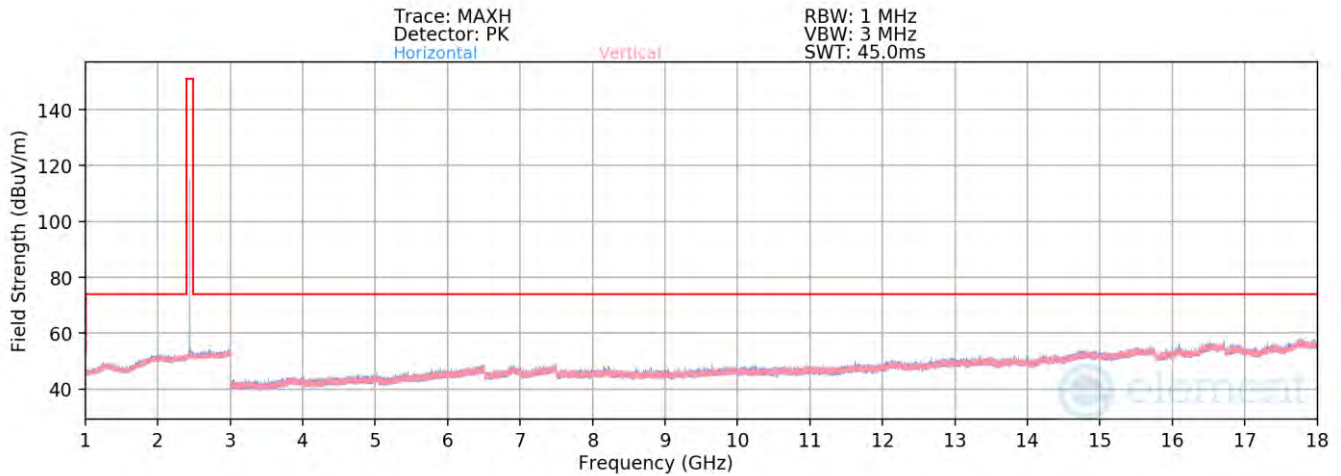
**Plot 7-62. Radiated Spurious Emissions above 1GHz Antenna WF2b (BT GFSK ePA – Ch. 0)**

Bluetooth Mode: GFSK  
 Data Rate: 1Mbps  
 Power Scheme: ePA  
 Distance of Measurements: 3 Meters  
 Operating Frequency: 2402MHz  
 Channel: 0

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4804.00	Peak	-	-	-	-65.10	2.32	44.22	73.98	-29.76
12010.00	Peak	-	-	-	-67.83	8.74	47.91	73.98	-26.07

**Table 7-17. Radiated Measurements Antenna WF2b**

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 65 of 95



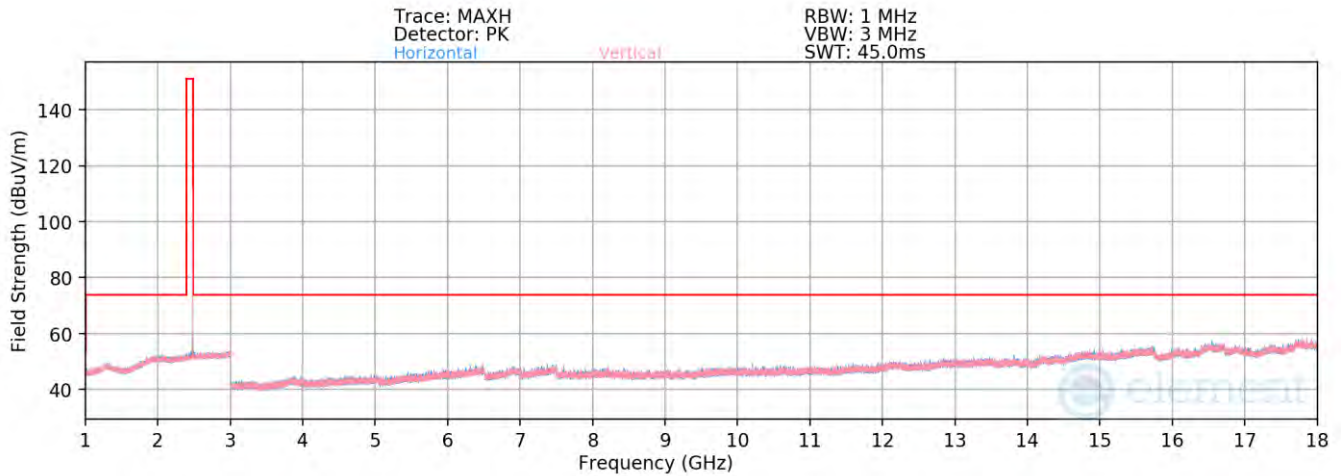
**Plot 7-63. Radiated Spurious Emissions above 1GHz Antenna WF2b (BT GFSK ePA – Ch. 39)**

Bluetooth Mode:	<u>GFSK</u>
Data Rate:	<u>1Mbps</u>
Power Scheme	<u>ePA</u>
Distance of Measurements:	<u>3 Meters</u>
Operating Frequency:	<u>2441MHz</u>
Channel:	<u>39</u>

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4882.00	Peak	V	305	75	-66.11	1.92	42.81	73.98	-31.17
7323.00	Peak	V	250	37	-66.82	4.06	44.24	73.98	-29.74
12205.00	Peak	-	-	-	-67.95	9.60	48.65	73.98	-25.33

**Table 7-18. Radiated Measurements Antenna WF2b**

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 66 of 95



**Plot 7-64. Radiated Spurious Emissions above 1GHz Antenna WF2b (BT GFSK ePA – Ch. 78)**

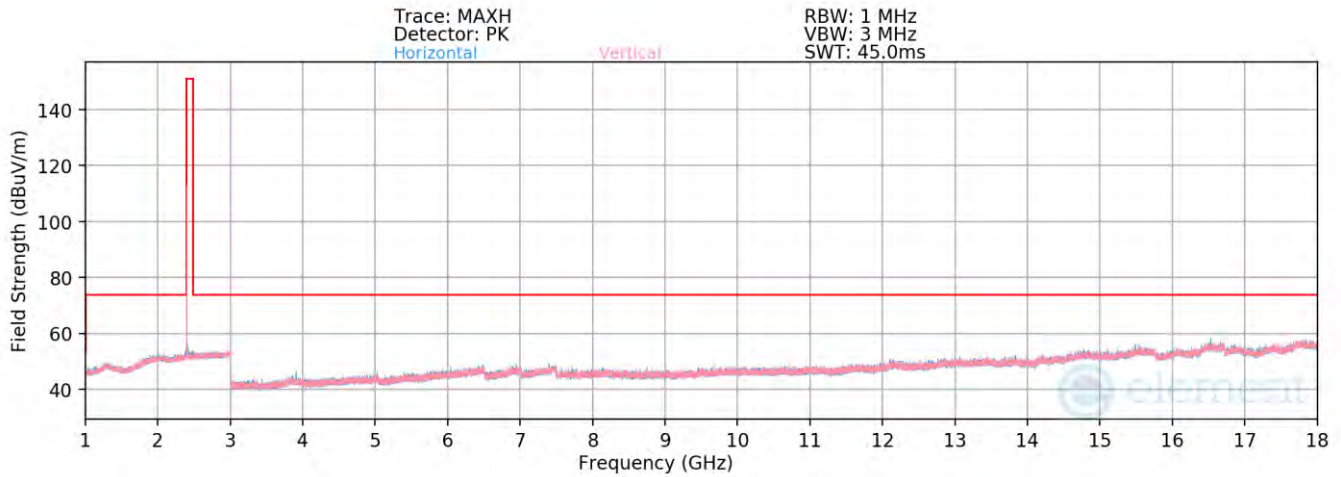
Bluetooth Mode: GFSK  
 Data Rate: 1Mbps  
 Power Scheme: ePA  
 Distance of Measurements: 3 Meters  
 Operating Frequency: 2480MHz  
 Channel: 78

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4960.00	Peak	-	-	-	-66.10	2.14	43.04	73.98	-30.94
7440.00	Peak	-	-	-	-67.13	4.50	44.37	73.98	-29.61
12400.00	Peak	-	-	-	-68.59	9.42	47.83	73.98	-26.15

**Table 7-19. Radiated Measurements Antenna WF2b**

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 67 of 95

### TxBF



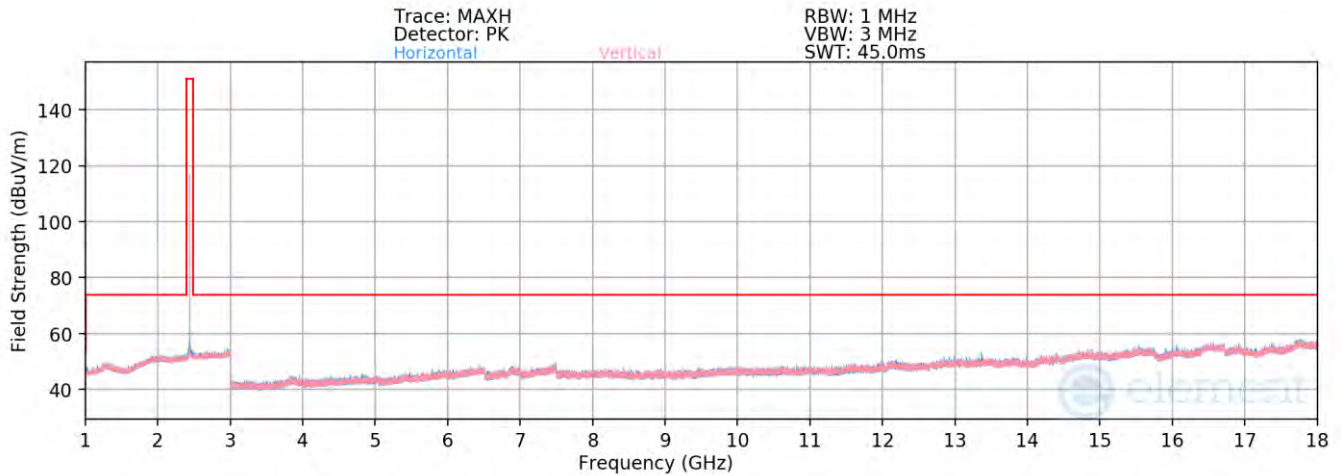
**Plot 7-65. Radiated Spurious Emissions above 1GHz TxBF (BT GFSK ePA – Ch. 0)**

Bluetooth Mode: GFSK  
 Data Rate: 1Mbps  
 Power Scheme: ePA  
 Distance of Measurements: 3 Meters  
 Operating Frequency: 2402MHz  
 Channel: 0

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4804.00	Peak	-	-	-	-66.39	2.32	42.93	73.98	-31.05
12010.00	Peak	-	-	-	-67.64	8.74	48.10	73.98	-25.88

**Table 7-20. Radiated Measurements TxBF**

FCC ID: BCGA2898 IC: 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 68 of 95



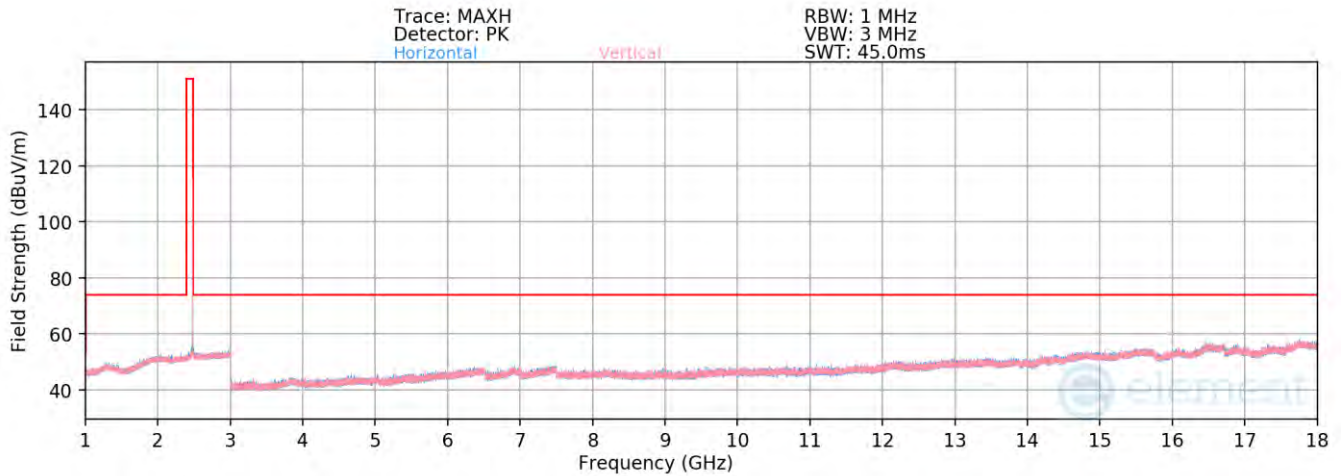
**Plot 7-66. Radiated Spurious Emissions above 1GHz TxBF (BT GFSK ePA – Ch. 39)**

Bluetooth Mode: GFSK  
 Data Rate: 1Mbps  
 Power Scheme: ePA  
 Distance of Measurements: 3 Meters  
 Operating Frequency: 2441MHz  
 Channel: 39

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4882.00	Peak	-	-	-	-66.01	1.92	42.91	73.98	-31.07
7323.00	Peak	-	-	-	-67.05	4.06	44.01	73.98	-29.97
12205.00	Peak	-	-	-	-68.80	9.60	47.80	73.98	-26.18

**Table 7-21. Radiated Measurements TxBF**

FCC ID: BCGA2898 IC: 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 69 of 95



**Plot 7-67. Radiated Spurious Emissions above 1GHz TxBF (BT GFSK ePA – Ch. 78)**

Bluetooth Mode: GFSK  
 Data Rate: 1Mbps  
 Power Scheme: ePA  
 Distance of Measurements: 3 Meters  
 Operating Frequency: 2480MHz  
 Channel: 78

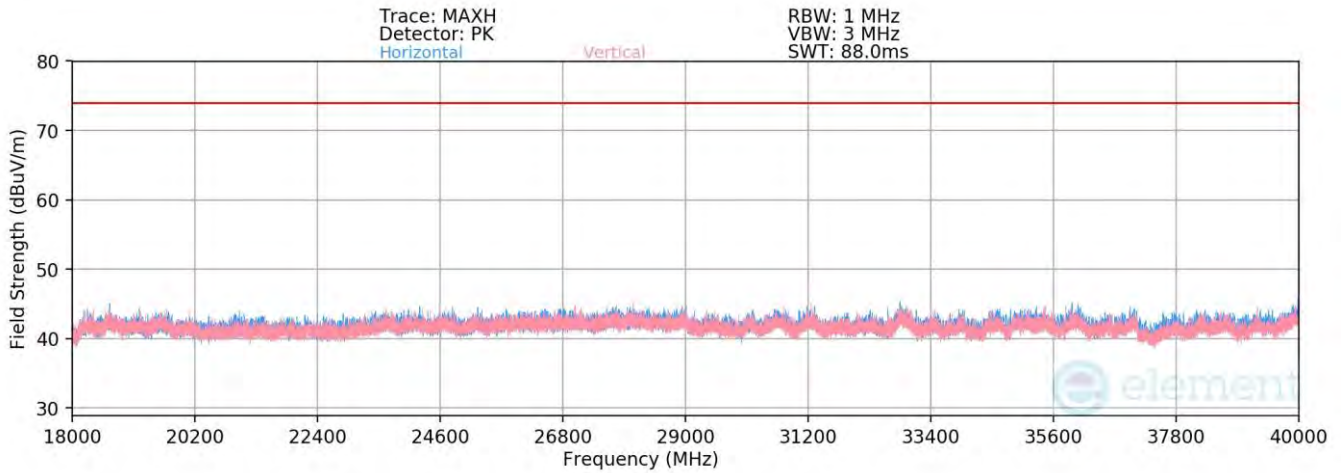
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4960.00	Peak	-	-	-	-65.50	2.14	43.64	73.98	-30.34
7440.00	Peak	V	243	185	-67.32	4.50	44.18	73.98	-29.80
12400.00	Peak	-	-	-	-68.85	9.42	47.57	73.98	-26.41

**Table 7-22. Radiated Measurements TxBF**

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 70 of 95

## Radiated Spurious Emission Measurements (Above 18GHz)

§15.205 §15.209; RSS-Gen [8.9]



Plot 7-68. Radiated Spurious Emissions above 18GHz TxBF (BT GFSK ePA – Ch. 39)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 71 of 95

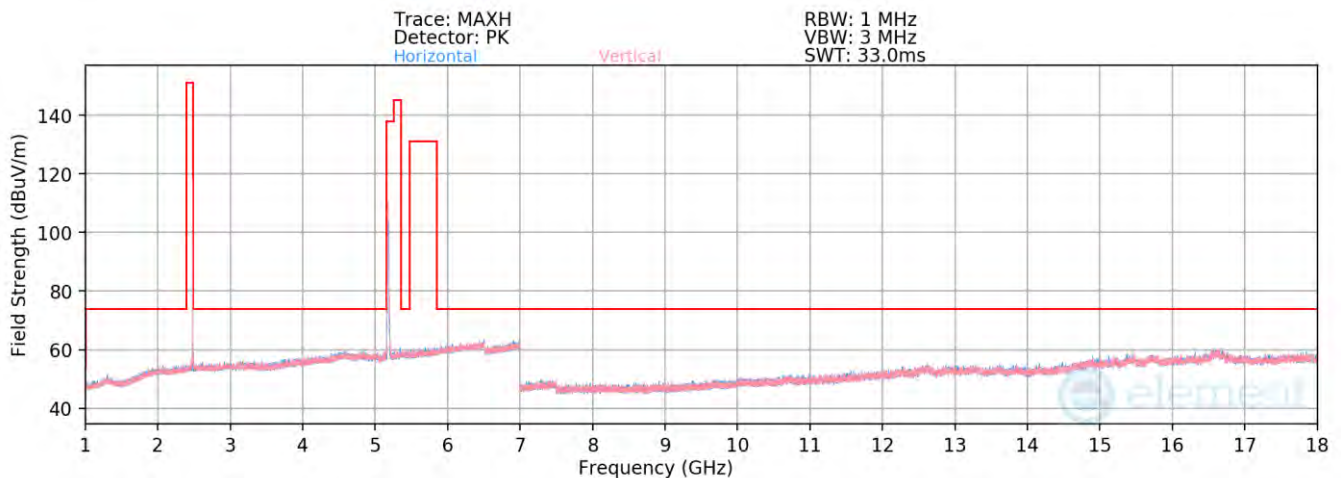
V 10.6 09/13/2023

## 7.9.2 Simultaneous Tx Radiated Spurious Emissions Measurements

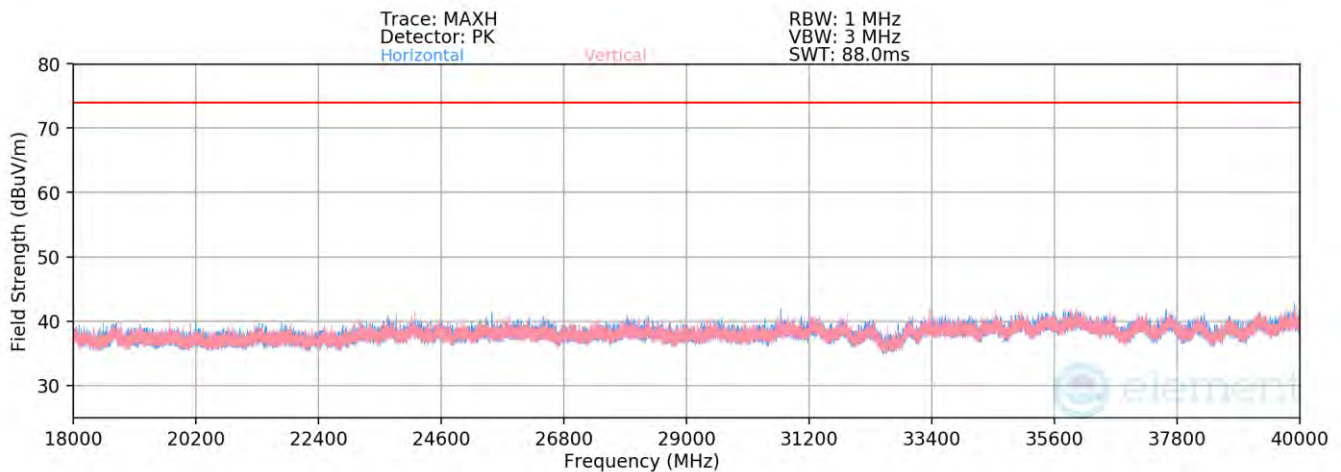
§15.209; RSS-Gen [8.9]

Description	Bluetooth	UNII
Antenna	WF7b	WF7b
Channel	79	36
Operating Frequency (MHz)	2480	5180
Mode/Modulation	GFSK ePA	802.11n

Table 7-23. Worst Case Simultaneous Transmission Configuration



Plot 7-69. Radiated Spurious Emissions 1 - 18GHz – Simultaneous Transmission



Plot 7-70. Radiated Spurious Emissions Above 18GHz – Simultaneous Transmission

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 72 of 95

V 10.6 09/13/2023



Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4960.00	Peak	V	-	-	-67.42	15.70	55.28	73.98	-18.70
7440.00	Peak	V	-	-	-67.81	9.17	48.36	73.98	-25.62
12400.00	Peak	V	-	-	-71.20	15.81	51.61	73.98	-22.36

**Table 7-24. Bluetooth Harmonics Emission Measurements – Simultaneous Transmission**

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
10360.00	Peak	V	-	-	-69.89	11.93	49.04	68.23	-19.19
15540.00	Avg	V	-	-	-82.81	19.69	43.88	53.98	-10.10
15540.00	Peak	V	-	-	-72.12	19.69	54.57	73.98	-19.41

**Table 7-25. UNII Emissions Measurements – Simultaneous Transmission**

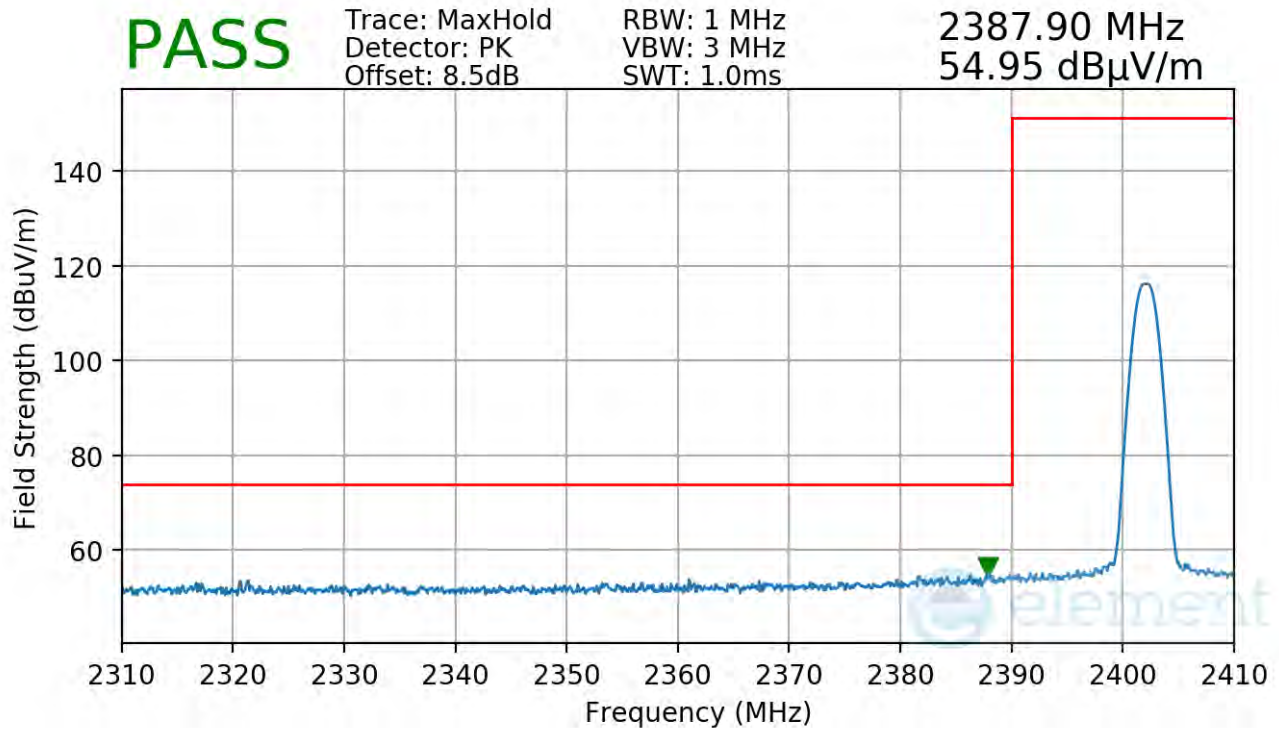
FCC ID: BCGA2898 IC: 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 73 of 95

### 7.9.3 Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

#### Antenna WF7b

Bluetooth Mode: GFSK  
 Power Scheme: ePA  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2402MHz  
 Channel: 0



Plot 7-71. Radiated Restricted Lower Band Edge Measurement Antenna WF7b

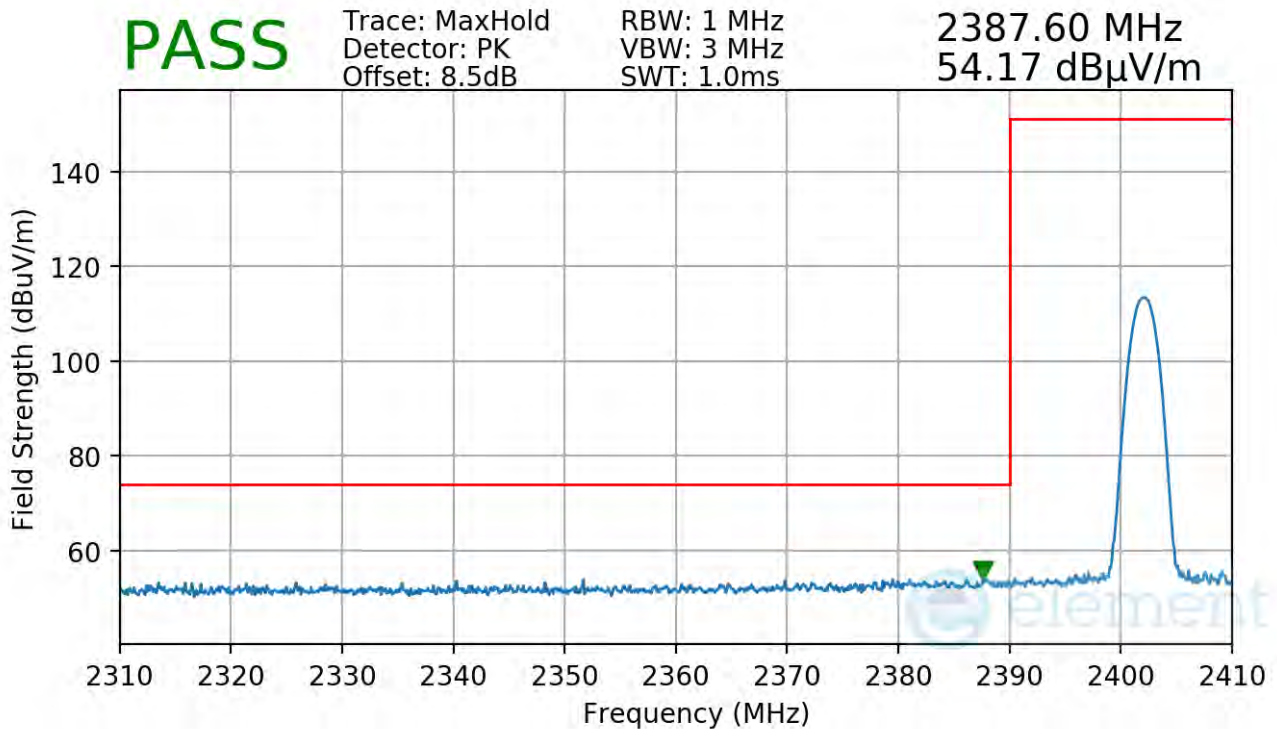
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 74 of 95

V 10.6 09/13/2023

### Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

Bluetooth Mode: 8DPSK  
 Power Scheme: ePA  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2402MHz  
 Channel: 0



Plot 7-72. Radiated Restricted Lower Band Edge Measurement Antenna WF7b

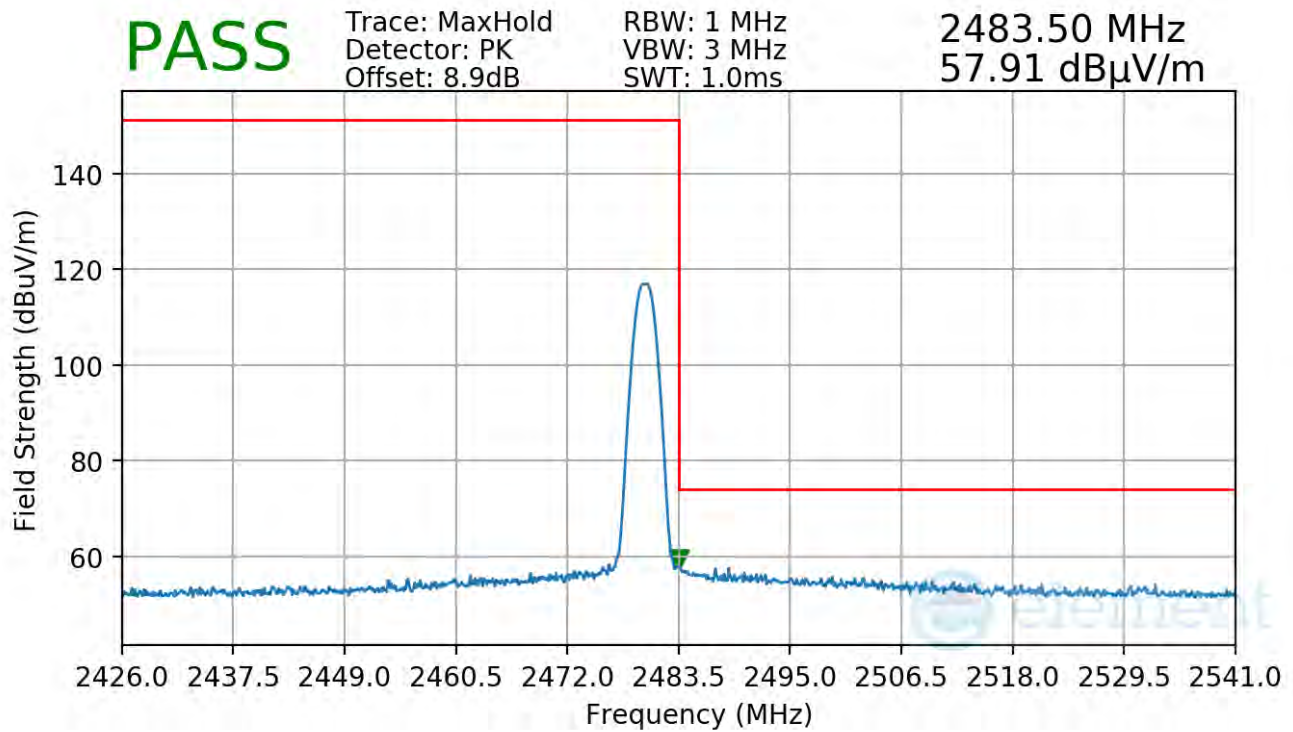
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 75 of 95

V 10.6 09/13/2023

### Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

Bluetooth Mode: GFSK  
 Power Scheme: ePA  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2480MHz  
 Channel: 78



Plot 7-73. Radiated Restricted Upper Band Edge Measurement Antenna WF7b

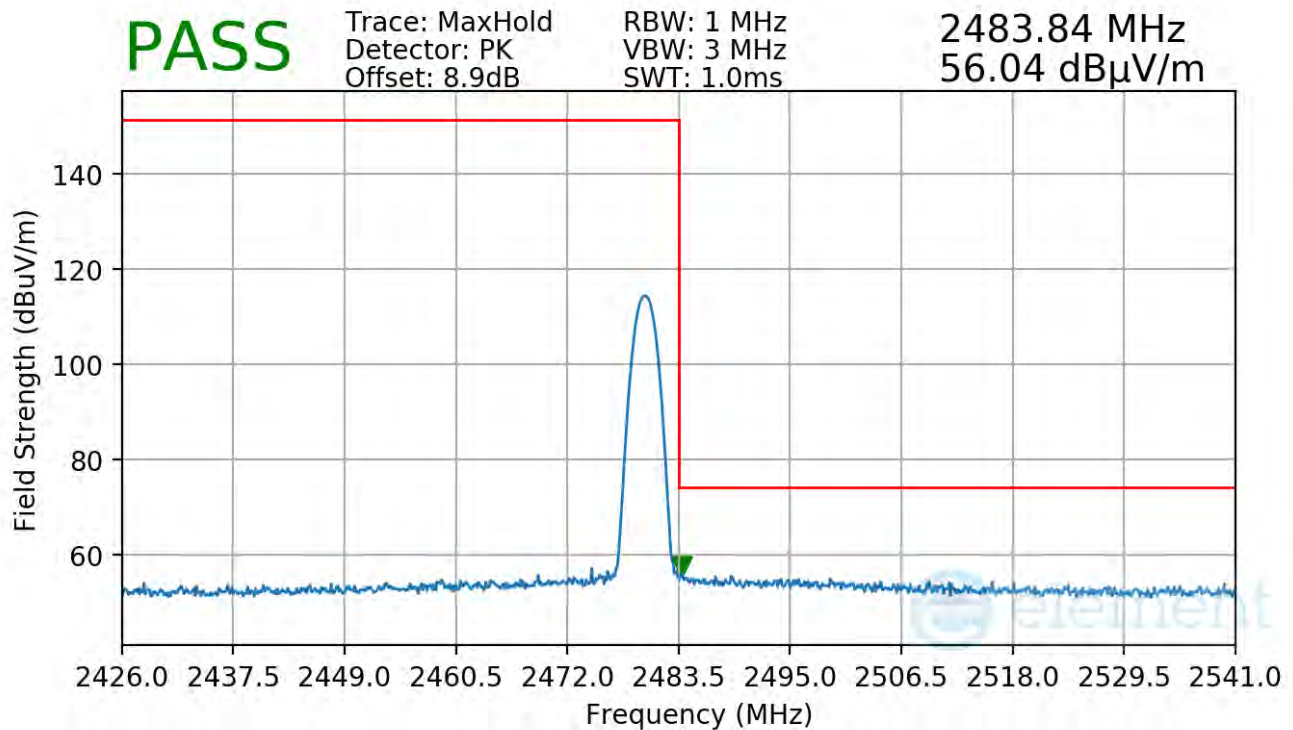
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 76 of 95

V 10.6 09/13/2023

### Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

Bluetooth Mode:	8DPSK
Power Scheme:	ePA
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	78



Plot 7-74. Radiated Restricted Upper Band Edge Measurement Antenna WF7b

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 77 of 95

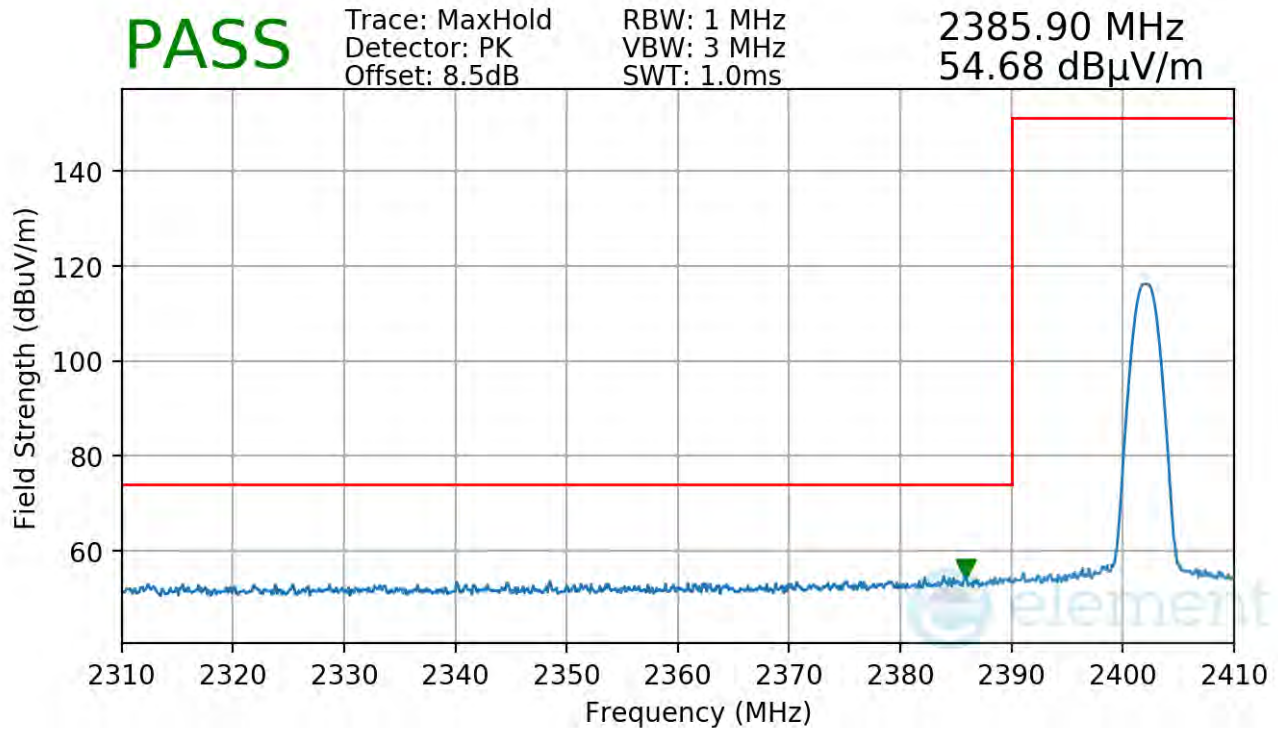
V 10.6 09/13/2023

## Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

### Antenna WF2b

Bluetooth Mode: GFSK  
 Power Scheme: ePA  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2402MHz  
 Channel: 0



Plot 7-75. Radiated Restricted Lower Band Edge Measurement Antenna WF2b

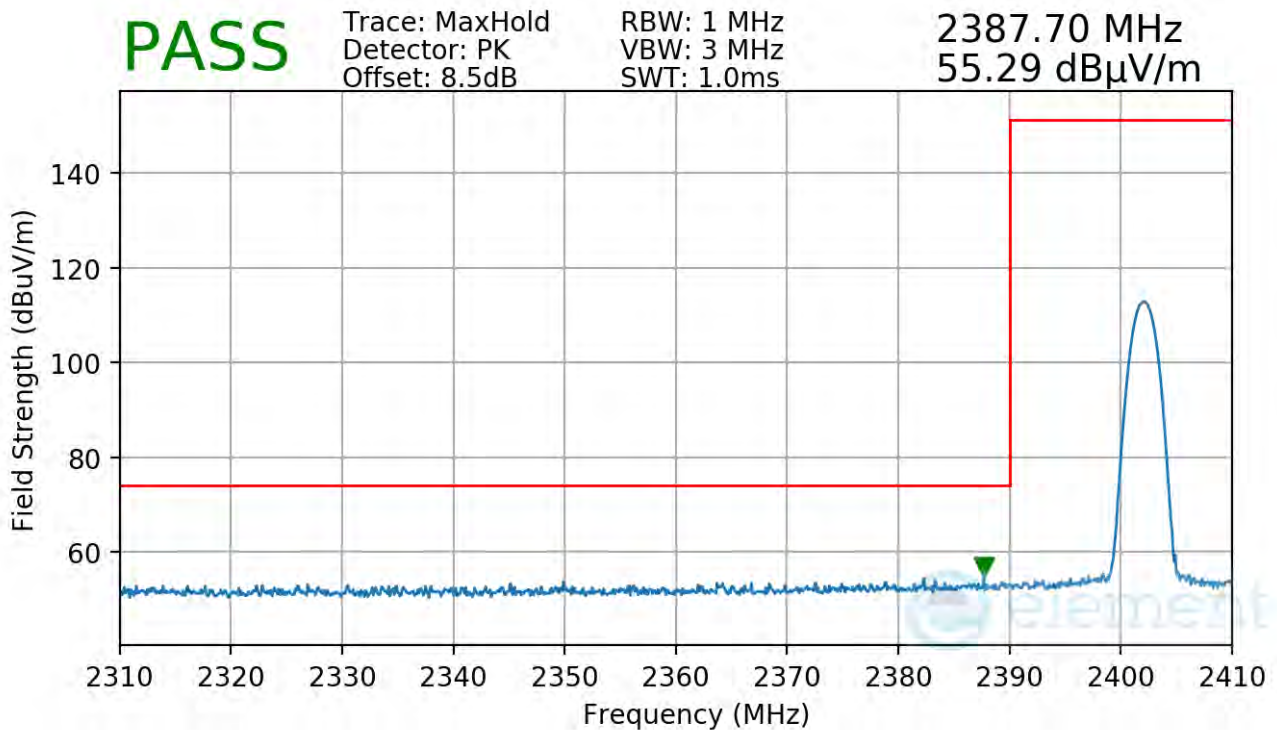
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 78 of 95

V 10.6 09/13/2023

### Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

Bluetooth Mode: 8DPSK  
 Power Scheme: ePA  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2402MHz  
 Channel: 0



Plot 7-76. Radiated Restricted Lower Band Edge Measurement Antenna WF2b

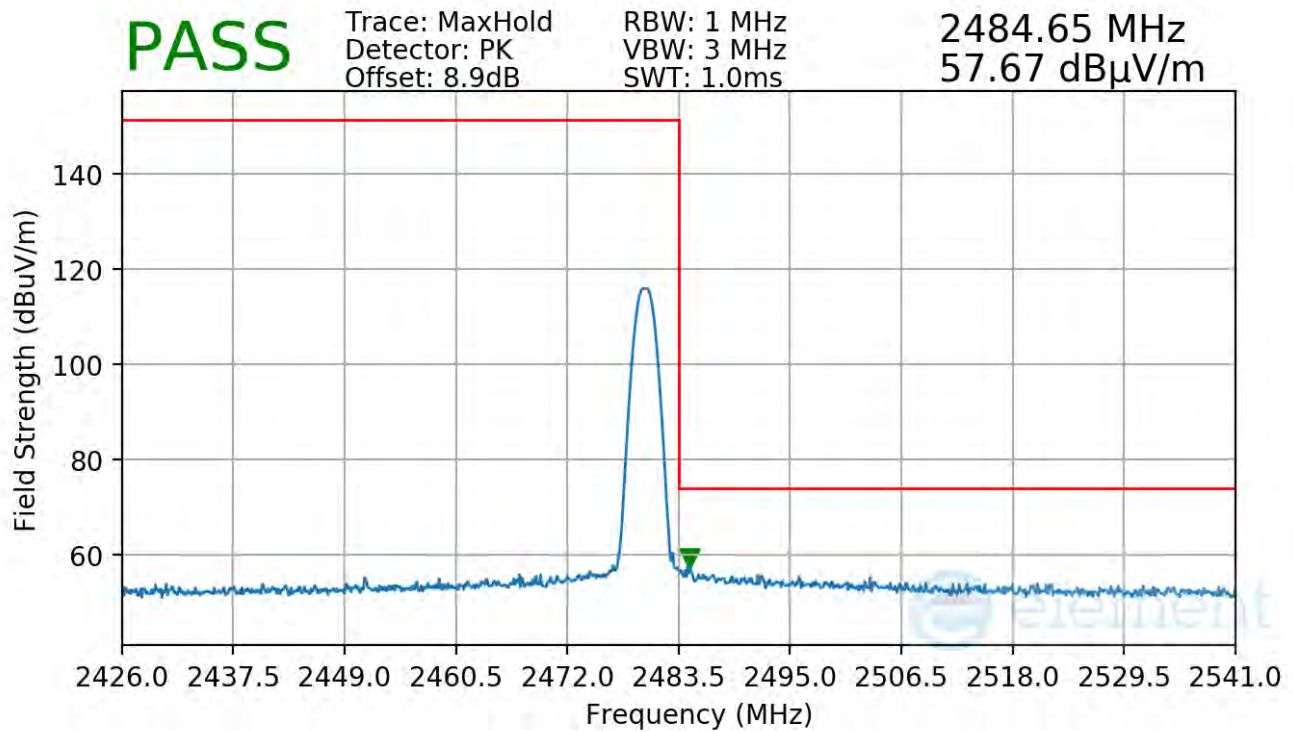
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 79 of 95

V 10.6 09/13/2023

### Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

Bluetooth Mode: GFSK  
 Power Scheme: ePA  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2480MHz  
 Channel: 78



Plot 7-77. Radiated Restricted Upper Band Edge Measurement Antenna WF2b

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 80 of 95

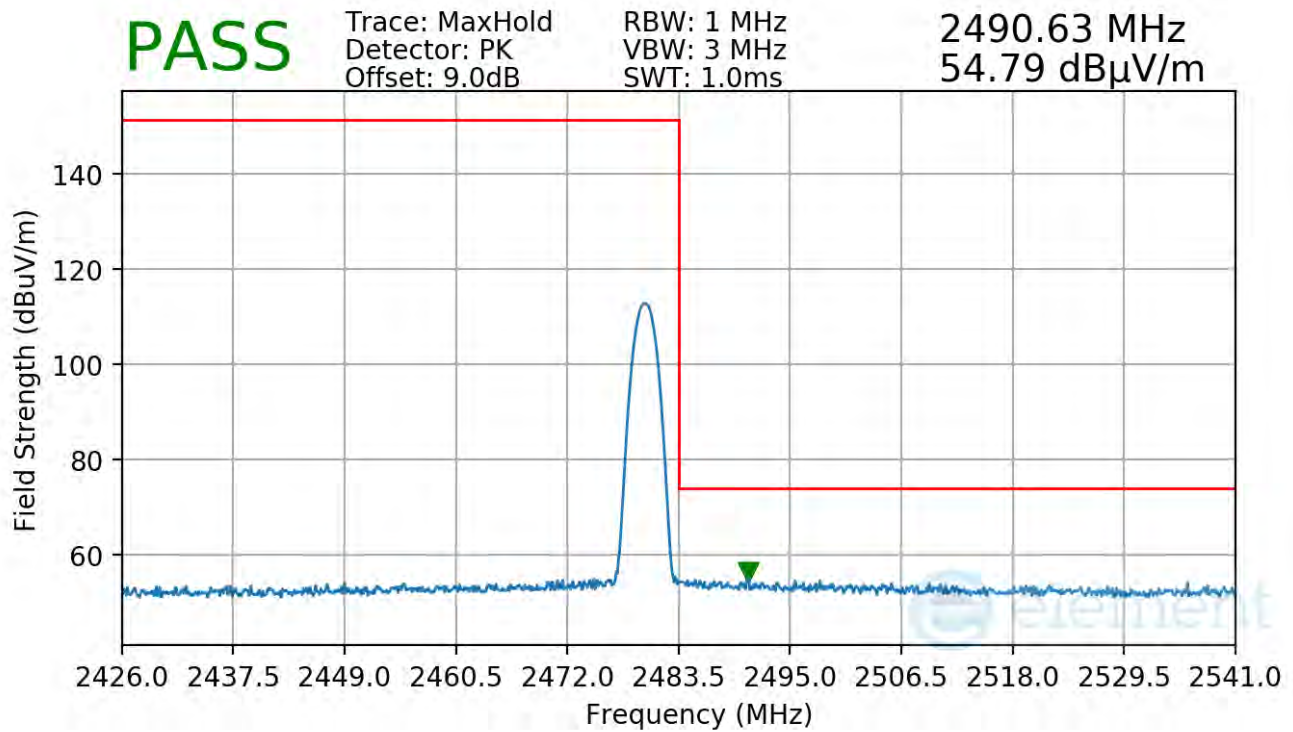
V 10.6 09/13/2023



### Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

Bluetooth Mode:	8DPSK
Power Scheme:	ePA
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	78



Plot 7-78. Radiated Restricted Upper Band Edge Measurement Antenna WF2b

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 81 of 95

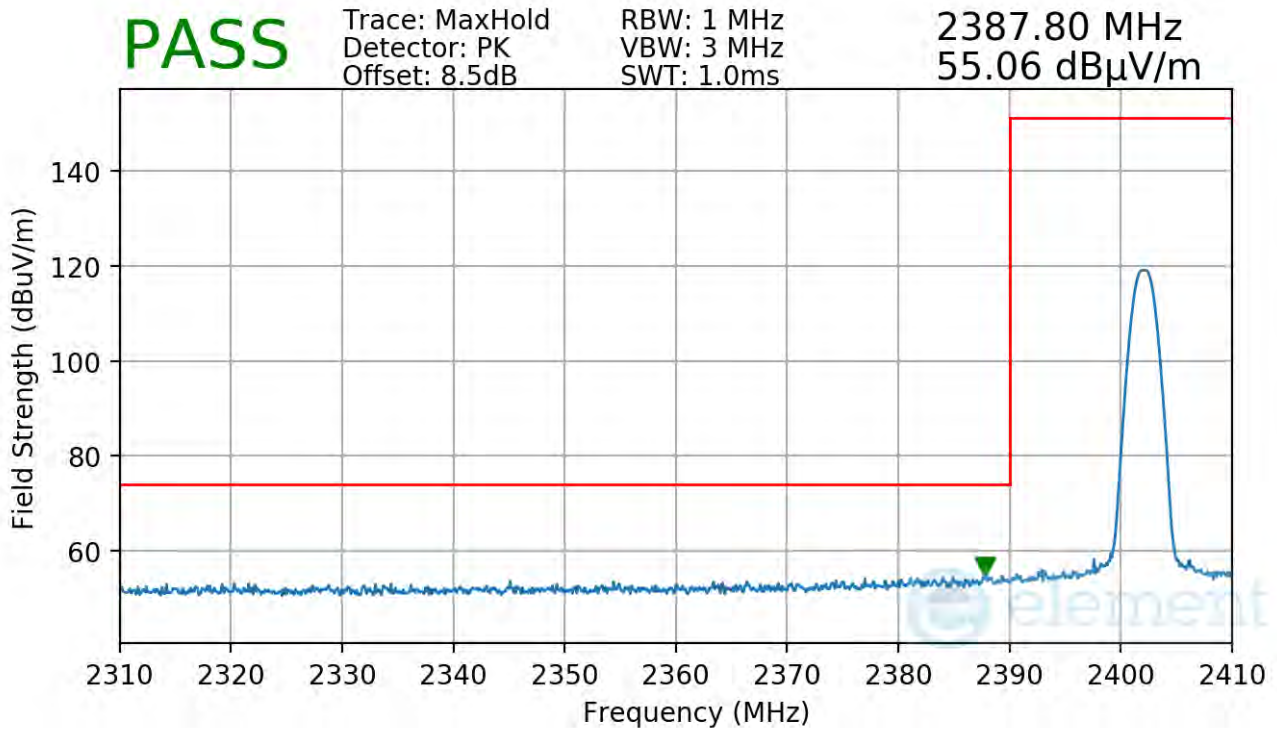
V 10.6 09/13/2023

### Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

#### TxBF

Bluetooth Mode: GFSK  
 Power Scheme: ePA  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2402MHz  
 Channel: 0



Plot 7-79. Radiated Restricted Lower Band Edge Measurement TxBF

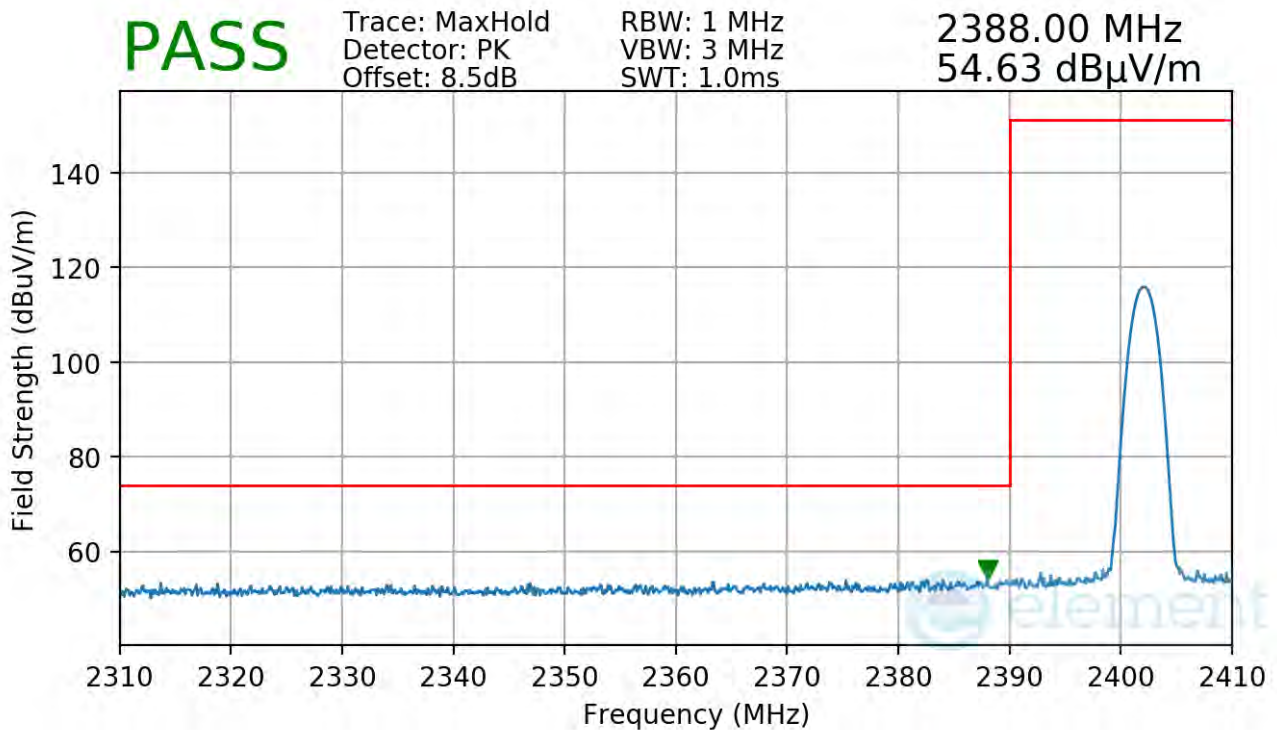
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 82 of 95

V 10.6 09/13/2023

### Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

Bluetooth Mode: 8DPSK  
 Power Scheme: ePA  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2402MHz  
 Channel: 0



**Plot 7-80. Radiated Restricted Lower Band Edge Measurement TxBF**

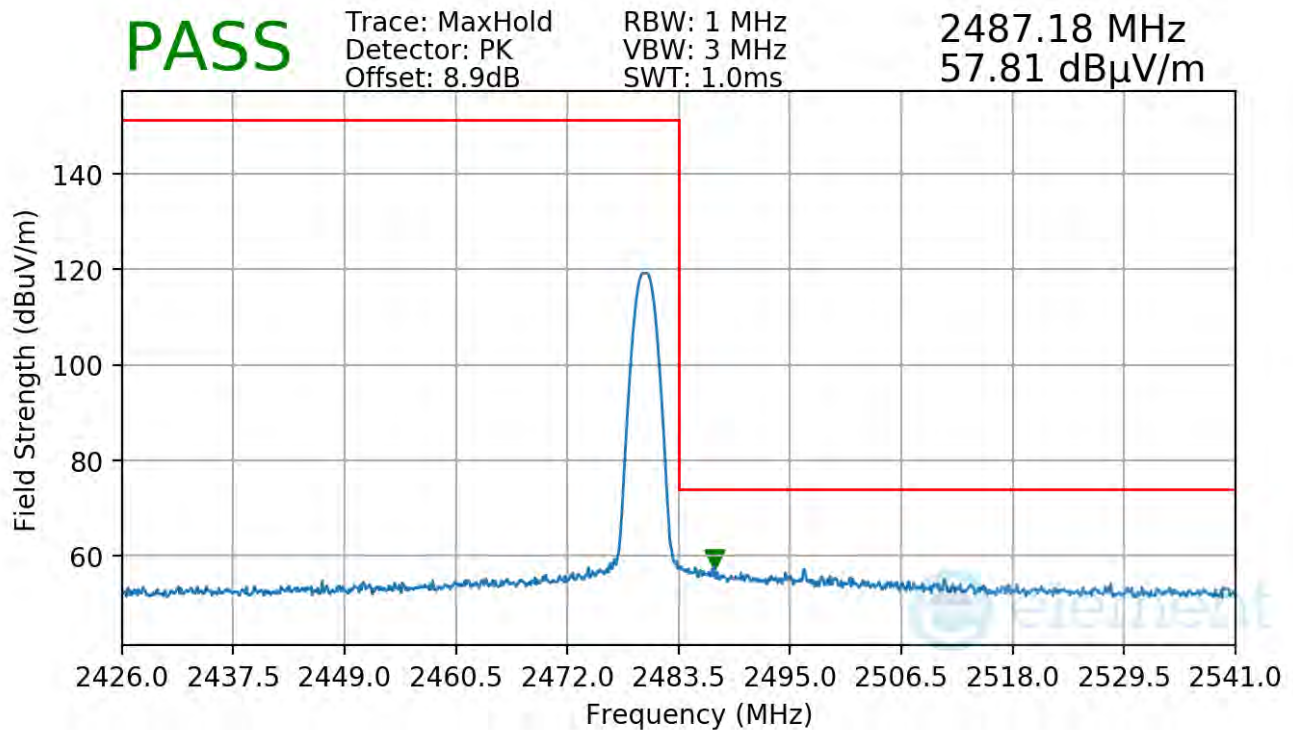
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 83 of 95

V 10.6 09/13/2023

### Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

Bluetooth Mode: GFSK  
 Power Scheme: ePA  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2480MHz  
 Channel: 78



**Plot 7-81. Radiated Restricted Upper Band Edge Measurement TxBF**

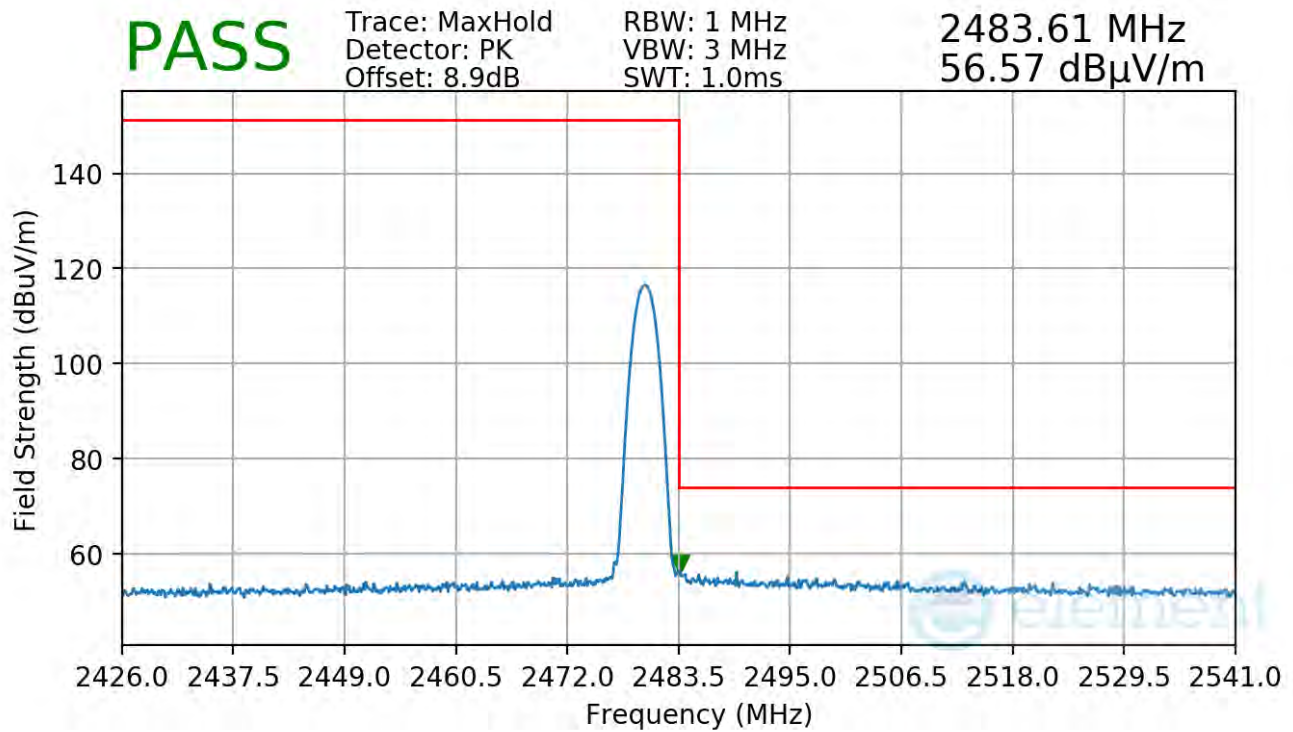
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 84 of 95

V 10.6 09/13/2023

### Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

Bluetooth Mode:	8DPSK
Power Scheme:	ePA
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	78



**Plot 7-82. Radiated Restricted Upper Band Edge Measurement TxBF**

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 85 of 95

V 10.6 09/13/2023

## 7.10 Radiated Spurious Emissions – Below 1GHz

§15.209; RSS-Gen [8.9]

### Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

**All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 7 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-26 per Section 15.209 and RSS-Gen (8.9).**

Frequency	Field Strength [ $\mu\text{V/m}$ ]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

**Table 7-26. Radiated Limits**

### Test Procedures Used

ANSI C63.10-2013

### Test Settings

#### Quasi-Peak Field Strength Measurements

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

#### Peak Field Strength Measurements

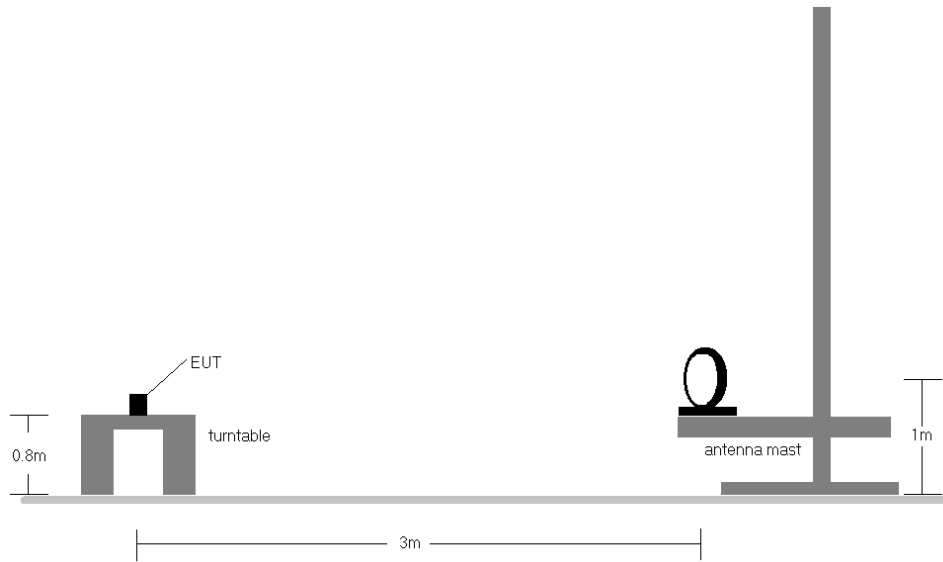
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 120kHz (for emissions from 30MHz – 1GHz)
3. VBW = 300kHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 86 of 95

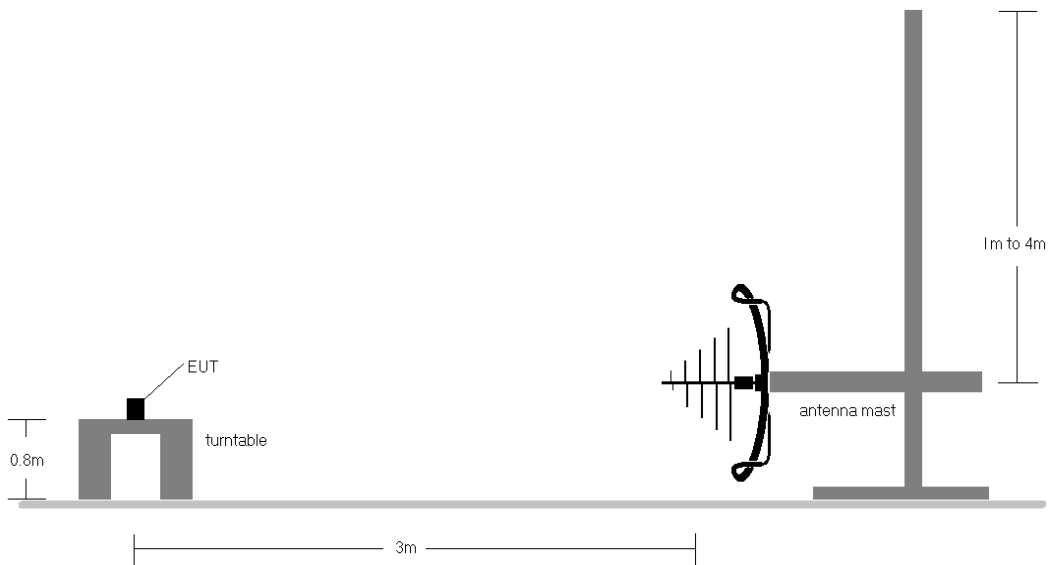
V 10.6 09/13/2023

**Test Setup**

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



**Figure 7-9. Radiated Test Setup < 30MHz**



**Figure 7-10. Radiated Test Setup < 1GHz**

<b>FCC ID:</b> BCGA2898 <b>IC:</b> 579C-A2898		<b>MEASUREMENT REPORT</b> <b>(CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 87 of 95

V 10.6 09/13/2023

**Test Notes**

1. All emissions lying in restricted bands specified in §15.205 and RSS-Gen (8.10) are below the limit shown in Table 7-26.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes. For below 30MHz the loop antenna was positioned in 3 orthogonal planes (X front, Y side, Z top) to determine the orientation resulting in the worst case emissions.
3. This unit was tested with its standard battery.
4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector on emissions that were within 6dB of the limit.
5. Emissions were measured at a 3 meter test distance.
6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
7. No spurious emissions were detected within 20dB of the limit below 30MHz.
8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
9. All supported modulation, antenna (including TxBF mode) and power schemes have been tested on the unit and only worst case configuration is reported.
10. Both configurations below were investigated, and the worst case has been reported.
  - a. EUT powered by AC/DC adaptor via USB-C cable with wire charger
  - b. EUT powered by host PC via USB-C cable with wire charger

**Sample Calculations**

**Determining Spurious Emissions Levels**

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

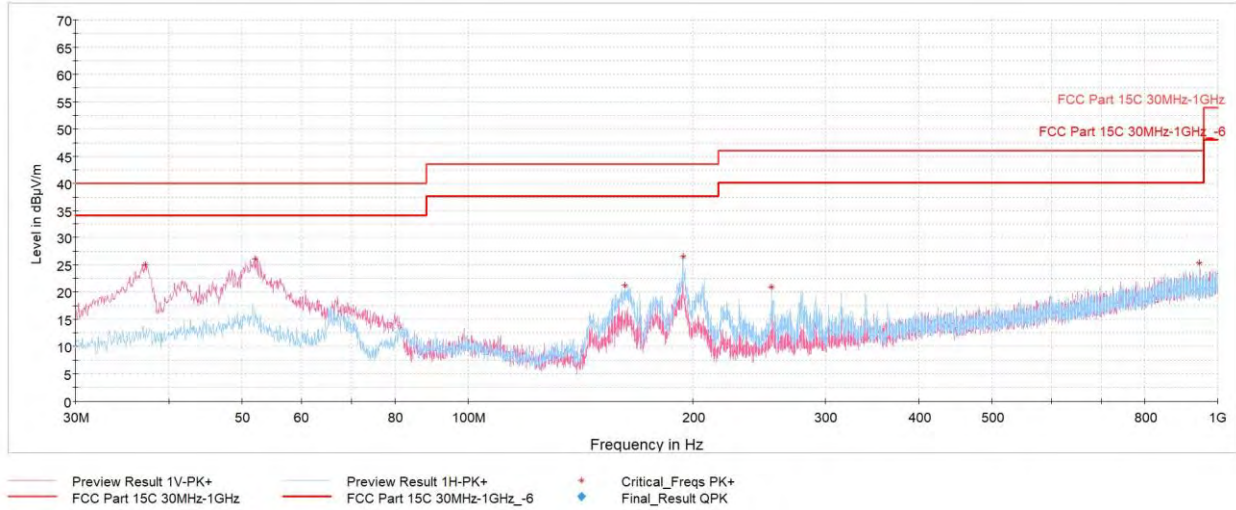
FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 88 of 95



# Radiated Spurious Emissions Measurements (Below 1GHz)

§15.209; RSS-Gen [8.9]

## TxBF



Plot 7-83. Radiated Spurious Emissions Below 1GHz TxBF (GFSK ePA – Ch.39, with AC/DC Adapter)

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
37.18	Max-Peak	V	100	30	-66.76	-15.19	25.05	40.00	-14.95
52.21	Max-Peak	V	100	323	-67.78	-13.18	26.04	40.00	-13.96
162.21	Max-Peak	H	100	229	-66.30	-19.52	21.18	43.52	-22.34
193.74	Max-Peak	H	200	249	-63.41	-17.00	26.59	43.52	-16.93
254.26	Max-Peak	H	100	31	-70.93	-15.16	20.91	46.02	-25.11
944.32	Max-Peak	H	200	80	-78.77	-2.84	25.39	46.02	-20.63

Table 7-27. Radiated Spurious Emissions Below 1GHz TxBF (GFSK ePA – Ch.39 with AC/DC Adapter)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 89 of 95

## Simultaneous TX Radiated Spurious Emissions Measurements (Below 1GHz)

§15.209; RSS-Gen [8.9]

Description	Bluetooth	UNII
Antenna	WF7b	WF7b
Channel	79	36
Operating Frequency (MHz)	2480	5180
Mode/Modulation	GFSK ePA	802.11n

Table 7-28. Worst Case Simultaneous Transmission Configuration

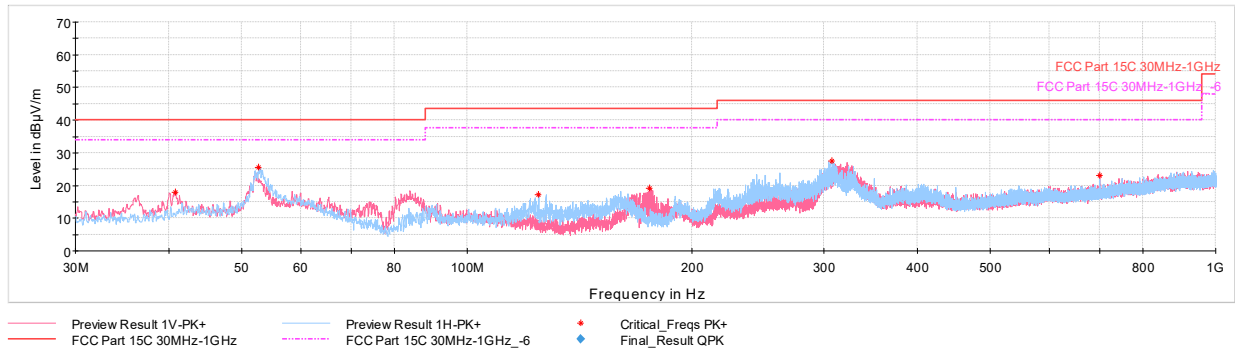


Table 7-29. Worst Case Simultaneous Transmission Configuration

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
40.82	Max-Peak	V	100	278	-75.29	-13.82	17.89	40.00	-22.11
52.70	Max-Peak	H	100	219	-68.22	-13.32	25.46	40.00	-14.54
124.72	Max-Peak	H	100	141	-70.61	-19.20	17.19	43.52	-26.33
175.50	Max-Peak	V	100	0	-68.91	-19.03	19.06	43.52	-24.46
307.52	Max-Peak	H	100	141	-65.20	-14.31	27.49	46.02	-18.53
699.88	Max-Peak	V	100	32	-77.56	-6.32	23.12	46.02	-22.90

Plot 7-84. Radiated Spurious Emissions – Simultaneous Transmission 30MHz – 1GHz, with AC/DC Adapter)

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 90 of 95

## 7.11 AC Line-Conducted Emissions Measurement

§15.207; RSS-Gen [8.8]

### Test Overview and Limit

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

**All conducted emissions must not exceed the limits shown in the table below, per Section 15.207 and RSS-Gen (8.8).**

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

**Table 7-30. Conducted Limits**

\*Decreases with the logarithm of the frequency.

### Test Procedures Used

ANSI C63.10-2013, Section 6.2

### Test Settings

#### Quasi-Peak Measurements

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

#### Average Measurements

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

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 91 of 95

V 10.6 09/13/2023

## Test Setup

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

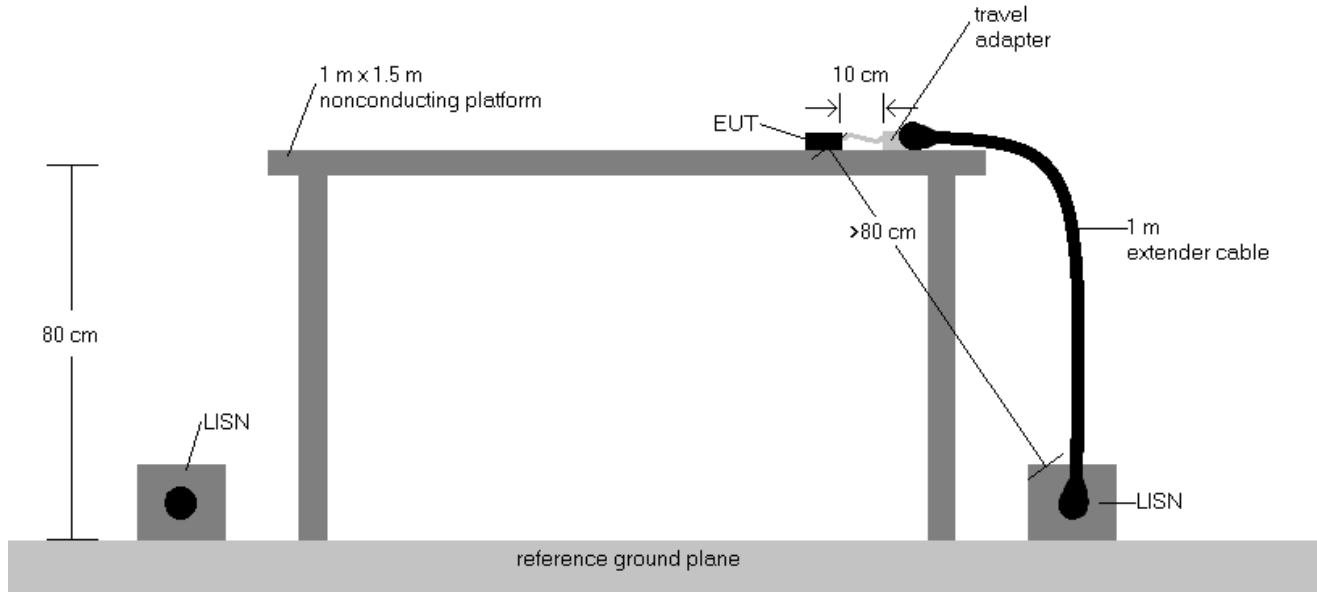


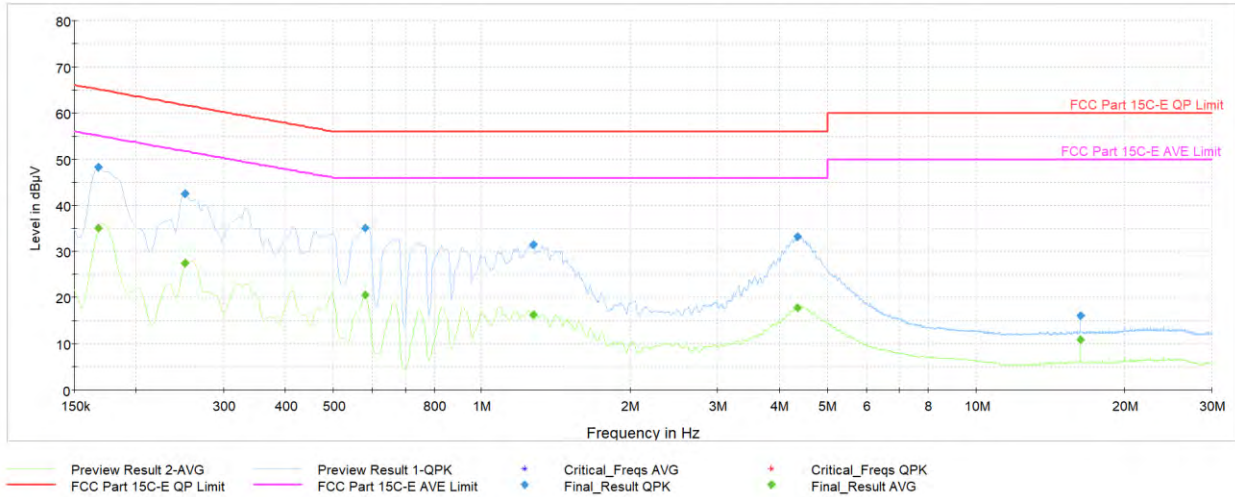
Figure 7-11. Test Instrument & Measurement Setup

## Test Notes

1. All modes of operation were investigated and the worst-case emissions are reported. The emissions found were not affected by the choice of channel used during testing.
2. Both configurations below were investigated, and the worst case has been reported.
  - a. EUT powered by AC/DC adaptor via USB-C cable with wire charger
  - b. EUT powered by host PC via USB-C cable with wire charger
3. The limit for an intentional radiator from 150kHz to 30MHz are specified in Part 15.207 and RSS-Gen (8.8).
4.  $\text{Corr. (dB)} = \text{Cable loss (dB)} + \text{LISN insertion factor (dB)}$
5.  $\text{QP/AV Level (dB}\mu\text{V)} = \text{QP/AV Analyzer/Receiver Level (dB}\mu\text{V)} + \text{Correction Factor (dB)}$
6.  $\text{Margin (dB)} = \text{QP/AV Level (dB}\mu\text{V)} - \text{QP/AV Limit (dB}\mu\text{V)}$
7. Traces shown in plot are made using a quasi peak and average detectors.
8. Deviations to the Specifications: None.

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 92 of 95

V 10.6 09/13/2023

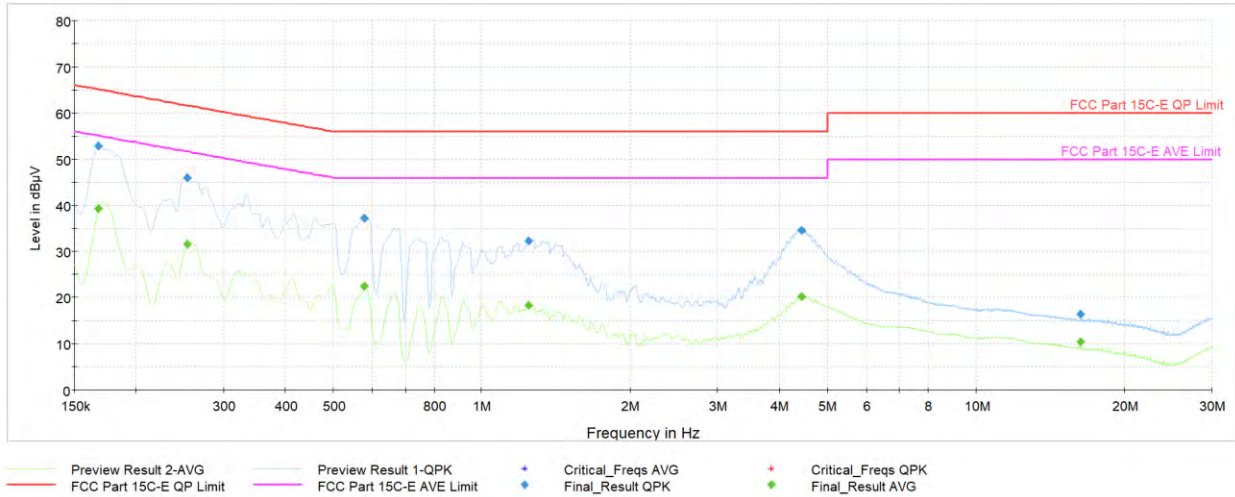


**Plot 7-85. AC Line-Conducted Test Plot TxBF (L1, GFSK ePA – Ch.0, with AC/DC Adapter)**

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.168	FINAL	—	35.13	55.06	-19.93	L1	GND
0.168	FINAL	48.3	—	65.06	-16.81	L1	GND
0.251	FINAL	—	27.52	51.72	-24.20	L1	GND
0.251	FINAL	42.5	—	61.72	-19.24	L1	GND
0.582	FINAL	—	20.53	46.00	-25.47	L1	GND
0.582	FINAL	35.2	—	56.00	-20.85	L1	GND
1.273	FINAL	31.5	—	56.00	-24.49	L1	GND
1.273	FINAL	—	16.27	46.00	-29.73	L1	GND
4.362	FINAL	33.1	—	56.00	-22.88	L1	GND
4.362	FINAL	—	17.83	46.00	-28.17	L1	GND
16.285	FINAL	—	10.90	50.00	-39.10	L1	GND
16.285	FINAL	16.1	—	60.00	-43.90	L1	GND

**Table 7-31. AC Line-Conducted Test Data TxBF (L1, GFSK ePA – Ch.0, with AC/DC Adapter)**

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 93 of 95



**Plot 7-86. AC Line-Conducted Test Plot TxBF (N, GFSK ePA – Ch.0, with AC/DC Adapter)**

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.168	FINAL	—	39.29	55.06	-15.77	N	GND
0.168	FINAL	52.9	—	65.06	-12.21	N	GND
0.254	FINAL	—	31.58	51.64	-20.06	N	GND
0.254	FINAL	45.9	—	61.64	-15.76	N	GND
0.580	FINAL	—	22.39	46.00	-23.61	N	GND
0.580	FINAL	37.1	—	56.00	-18.87	N	GND
1.246	FINAL	32.3	—	56.00	-23.67	N	GND
1.246	FINAL	—	18.27	46.00	-27.73	N	GND
4.443	FINAL	34.6	—	56.00	-21.39	N	GND
4.443	FINAL	—	20.30	46.00	-25.70	N	GND
16.294	FINAL	—	10.42	50.00	-39.58	N	GND
16.294	FINAL	16.4	—	60.00	-43.63	N	GND

**Table 7-32. AC Line-Conducted Test Data TxBF (N, GFSK ePA – Ch.0, with AC/DC Adapter)**

FCC ID: BCGA2898 IC: 579C-A2898		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2311270065-07.BCG	Test Dates: 12/1/2023 - 2/20/2024	EUT Type: Tablet Device	Page 94 of 95

## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Apple Tablet Device FCC ID: BCGA2898 and IC: 579C-A2898** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules and RSS-247 of the Innovation, Science and Economic Development Canada Rules.

<b>FCC ID:</b> BCGA2898 <b>IC:</b> 579C-A2898		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2311270065-07.BCG	<b>Test Dates:</b> 12/1/2023 - 2/20/2024	<b>EUT Type:</b> Tablet Device	Page 95 of 95