

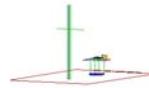


# PCTEST ENGINEERING LABORATORY, INC.

7185 Oakland Mills Road, Columbia, MD 21046 USA

Tel. 410.290.6652 / Fax 410.290.6654

<http://www.pctest.com>



## MEASUREMENT REPORT FCC PART 15.247

**Applicant Name:**

SMC Corporation  
4-2-2, Kinunodai, Tsukubamirai-shi  
Ibaraki-ken, 300-2493  
Japan

**Date of Testing:**

7/11-9/22/2017

**Test Site/Location:**

PCTEST Lab. Columbia, MD, USA

**Test Report Serial No.:**

1M1707310232-01.2AJE7

**FCC ID:** 2AJE7SMC-WEX01

**APPLICANT:** SMC Corporation

**Application Type:** Certification

**Model:** EX600-WEN1

**Additional Model(s):** EX600-WEN2, EX600-WSV1, EX600-WSV2

**EUT Type:** Wireless I/O Device

**Max. RF Output Power:** 6.546 mW (8.16 dBm) Peak Conducted

**Frequency Range:** 2403 – 2481MHz

**FCC Classification:** FCC Part 15 Spread Spectrum Transmitter (DSS)

**FCC Rule Part(s):** Part 15 Subpart C (15.247)

**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.

\_\_\_\_\_  
Randy Ortanez  
President



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## 1.0 INTRODUCTION

### 1.1 Scope

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

### 1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

### 1.3 Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- PCTEST facility is a registered (22831) test laboratory with the site description on file with ISED.

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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **SMC Wireless Systems Wireless I/O Device FCC ID: 2AJE7SMC-WEX01**. The test data contained in this report pertains only to the emissions due to the EUT's 2.4GHz transmitter.

### 2.2 Device Capabilities

This device contains the following capabilities:

2.4GHz Frequency Hopper

Ch.	Frequency (MHz)
00	2403
:	:
39	2442
:	:
78	2481

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

### 2.3 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 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.

### 2.4 EMI Suppression Device(s)/Modifications

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

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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 Radiated Emissions

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

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) 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.

### 3.3 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).

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## 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.

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## 5.0 MEASUREMENT UNCERTAINTY

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

Contribution	Expanded Uncertainty ( $\pm$ dB)
Conducted Bench Top Measurements	1.13
Conducted Disturbance	3.09
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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## 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
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	6/21/2017	Annual	6/21/2018	RE1
-	WL25-1	Conducted Cable Set (25GHz)	6/14/2017	Annual	6/14/2018	WL25-1
Agilent	N9020A	MXA Signal Analyzer	10/28/2016	Annual	10/28/2017	US46470561
COM-Power	AL-130R	Active Loop Antenna	6/5/2017	Annual	6/5/2018	121085
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	6/21/2017	Annual	6/21/2018	441119
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/23/2016	Biennial	8/23/2018	135427
Huber+Suhner	Sucoflex 102A	40GHz Radiated Cable	5/19/2017	Annual	5/19/2018	251425001
PCTEST	-	EMC Switch System	6/21/2017	Annual	6/21/2018	NM1
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	4/19/2017	Annual	4/19/2018	100342
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	7/11/2017	Annual	7/11/2018	103200
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100040
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/2/2016	Biennial	3/2/2018	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	3/14/2016	Biennial	3/14/2018	A051107

Table 6-1. Annual Test Equipment Calibration Schedule

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## 7.0 TEST RESULTS

### 7.1 Summary

Company Name: SMC Corporation  
 FCC ID: 2AJE7SMC-WEX01  
 Method/System: Frequency Hopping Spread Spectrum (FHSS)  
 Number of Channels: 79

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(1)(iii)	20dB Bandwidth	N/A	CONDUCTED	PASS	Section 7.2
15.247(b)(1)	Peak Transmitter Output Power	< 1 Watt if $\geq$ 75 non-overlapping channels used		PASS	Section 7.3
15.247(a)(1)	Channel Separation	> 2/3 of 20 dB BW for systems with Output Power < 125mW		PASS	Section 7.5
15.247(a)(1)(iii)	Number of Channels	> 15 Channels		PASS	Section 7.7
15.247(a)(1)(iii)	Time of Occupancy	< 0.4 sec in 31.6 sec period		PASS	Section 7.6
15.247(d)	Band Edge / Out-of-Band Emissions	Conducted > 20dBc		PASS	Section 7.4, Section 7.8
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	RADIATED	PASS	Section 7.9, Section 7.10, 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, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT 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 radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "Chamber Automation," Version 1.1.5.
- 5) This report includes data from 4 models (EX600-WEN1, EX600-WEN2, EX600-WSV1, EX600-WSV2) that will use the same FCC ID: 2AJE7SMC-WEN1

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## 7.2 20dB Bandwidth Measurement

§15.247 (a.1.iii)

### 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.

### Test Procedure Used

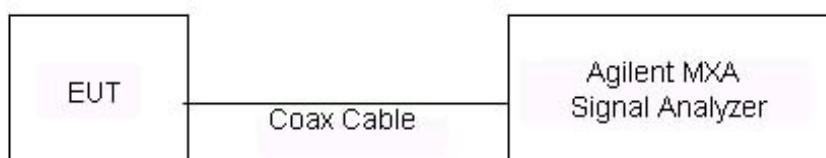
ANSI C63.10-2013 – Section 6.9.2

### Test Settings

1. The signal analyzers' automatic bandwidth measurement capability of the spectrum analyzer was used to perform 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

### Test Setup

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



**Figure 7-1. Test Instrument & Measurement Setup**

### Test Notes

None

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Frequency [MHz]	Channel No.	20dB Bandwidth Test Results	
		Measured Bandwidth [kHz]	Pass/Fail
2403	0	796.80	Pass
2442	39	801.30	Pass
2481	78	905.50	Pass

Table 7-2. Conducted 20dB Bandwidth Measurements(EX600-WEN1)

Frequency [MHz]	Channel No.	20dB Bandwidth Test Results	
		Measured Bandwidth [kHz]	Pass/Fail
2403	0	794.00	Pass
2442	39	790.60	Pass
2481	78	796.80	Pass

Table 7-3. Conducted 20dB Bandwidth Measurements(EX600-WEN2)

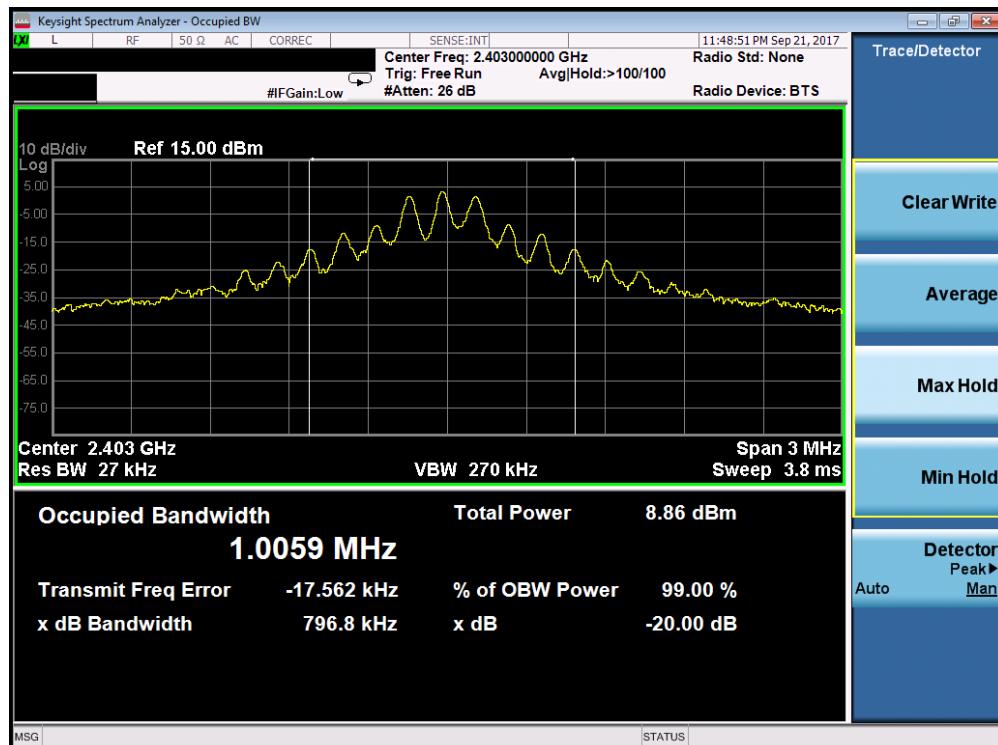
Frequency [MHz]	Channel No.	20dB Bandwidth Test Results	
		Measured Bandwidth [kHz]	Pass/Fail
2403	0	774.20	Pass
2442	39	785.70	Pass
2481	78	779.00	Pass

Table 7-4. Conducted 20dB Bandwidth Measurements(EX600-WSV1)

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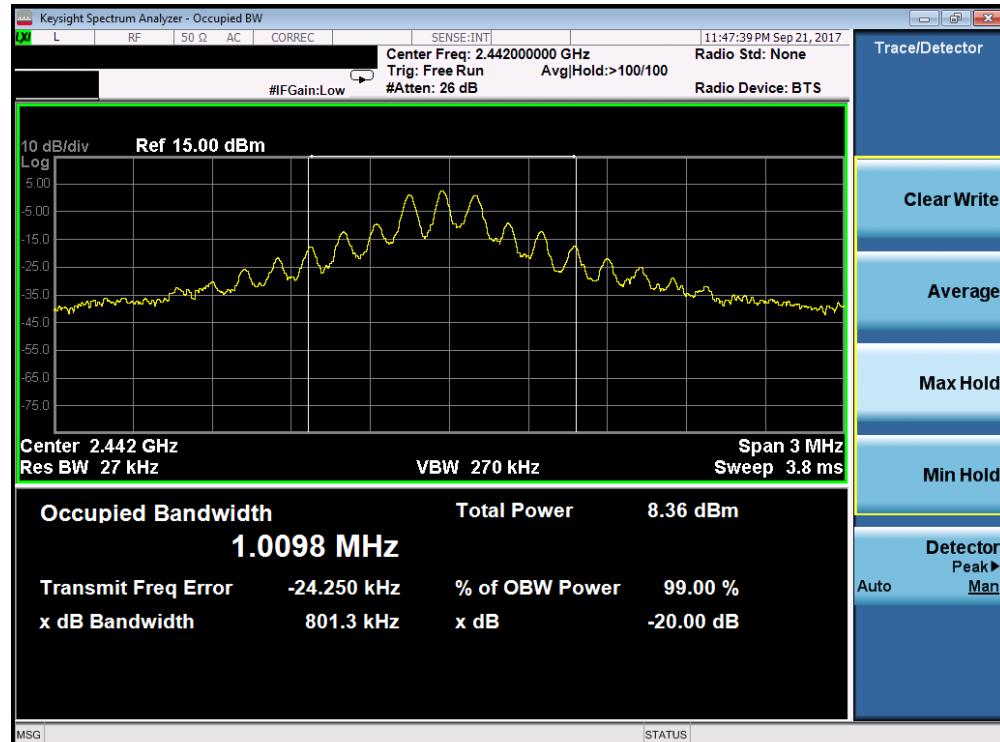
Frequency [MHz]	Channel No.	20dB Bandwidth Test Results	
		Measured Bandwidth [kHz]	Pass/Fail
2403	0	768.00	Pass
2442	39	767.30	Pass
2481	78	772.20	Pass

Table 7-5. Conducted 20dB Bandwidth Measurements(EX600-WSV2)

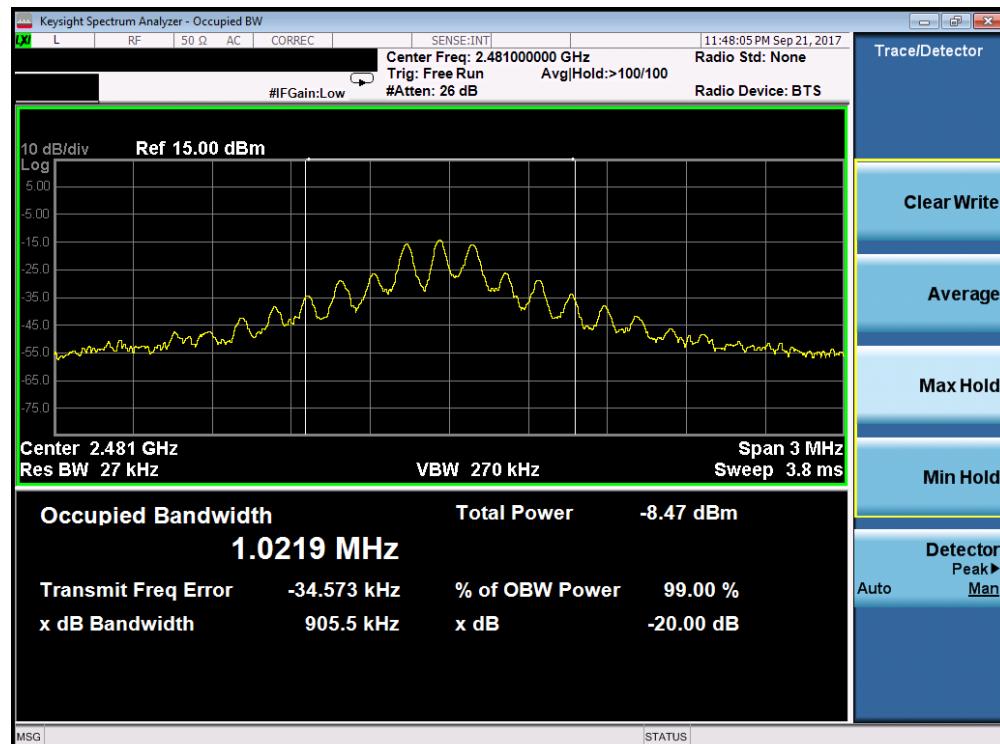


Plot 7-1. 20dB Bandwidth Plot (EX600-WEN1, Ch. 0)

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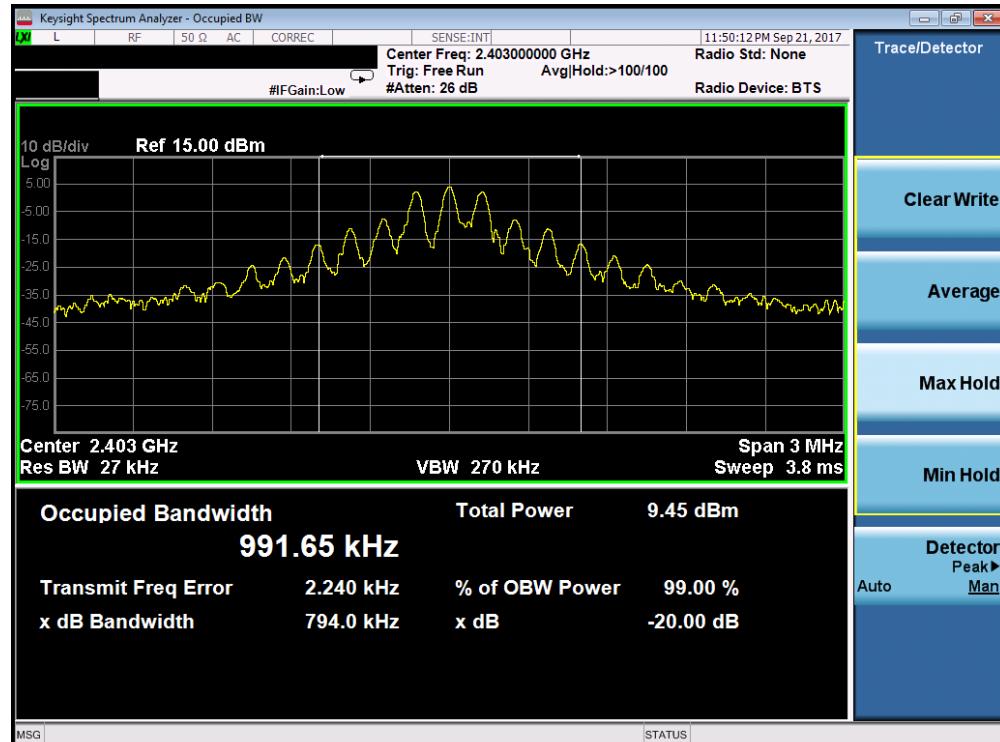


Plot 7-2. 20dB Bandwidth Plot (EX600-WEN1, Ch. 39)

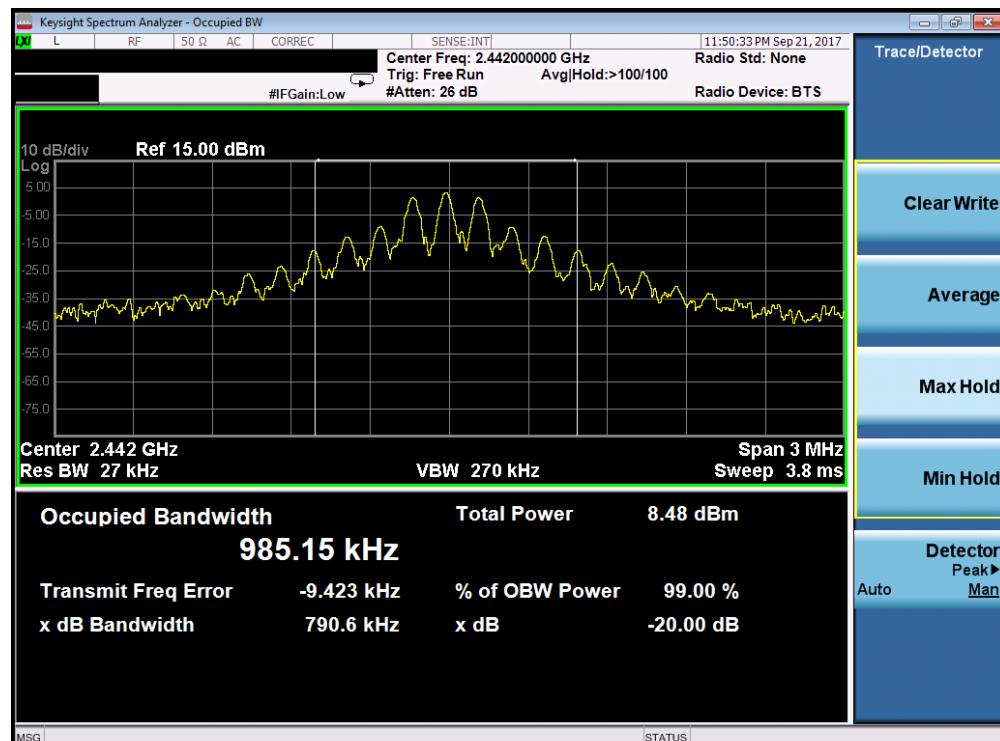


Plot 7-3. 20dB Bandwidth Plot (EX600-WEN1, Ch. 78)

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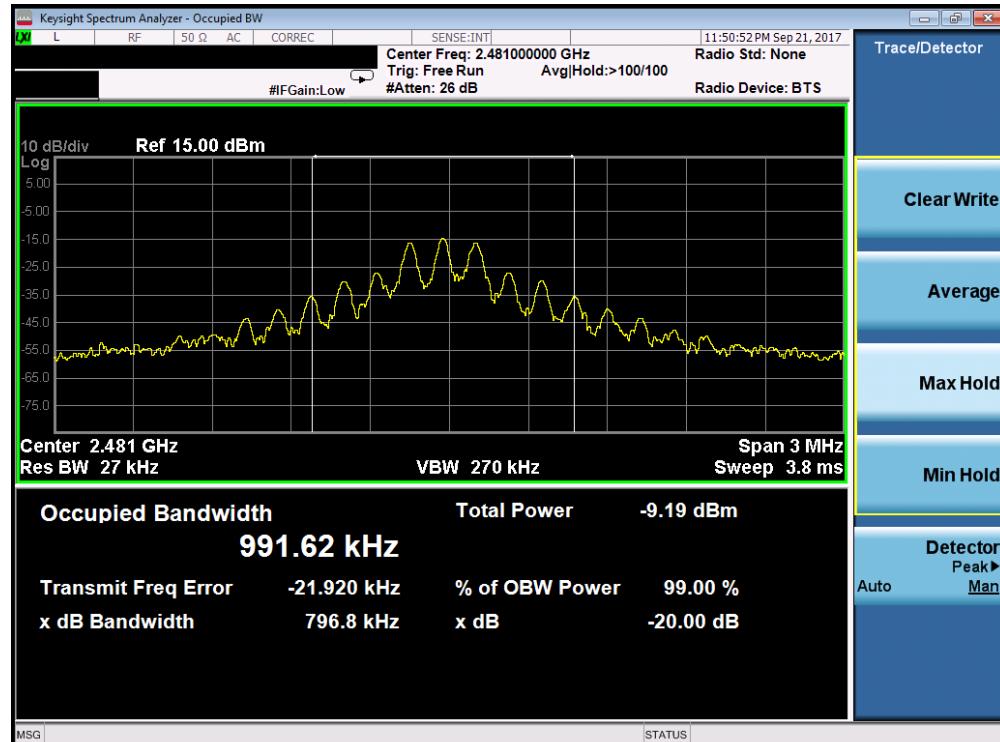


Plot 7-4. 20dB Bandwidth Plot (EX600-WEN2, Ch. 0)



Plot 7-5. 20dB Bandwidth Plot (EX600-WEN2, Ch. 39)

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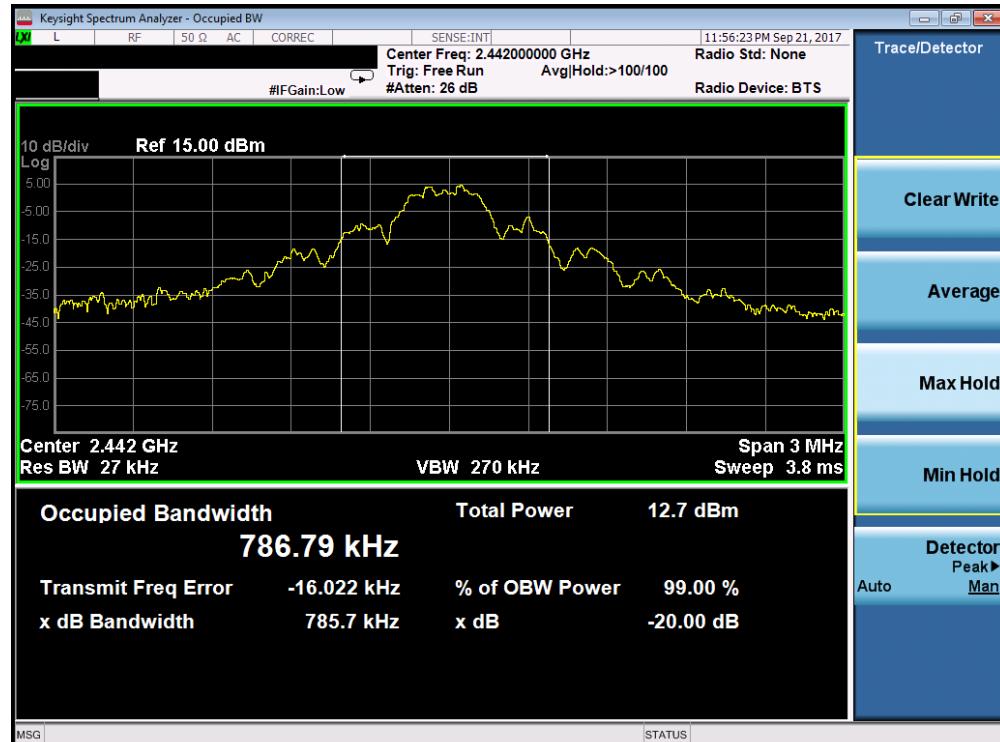


Plot 7-6. 20dB Bandwidth Plot (EX600-WEN2, Ch. 78)



Plot 7-7. 20dB Bandwidth Plot (EX600-WSV1, Ch. 0)

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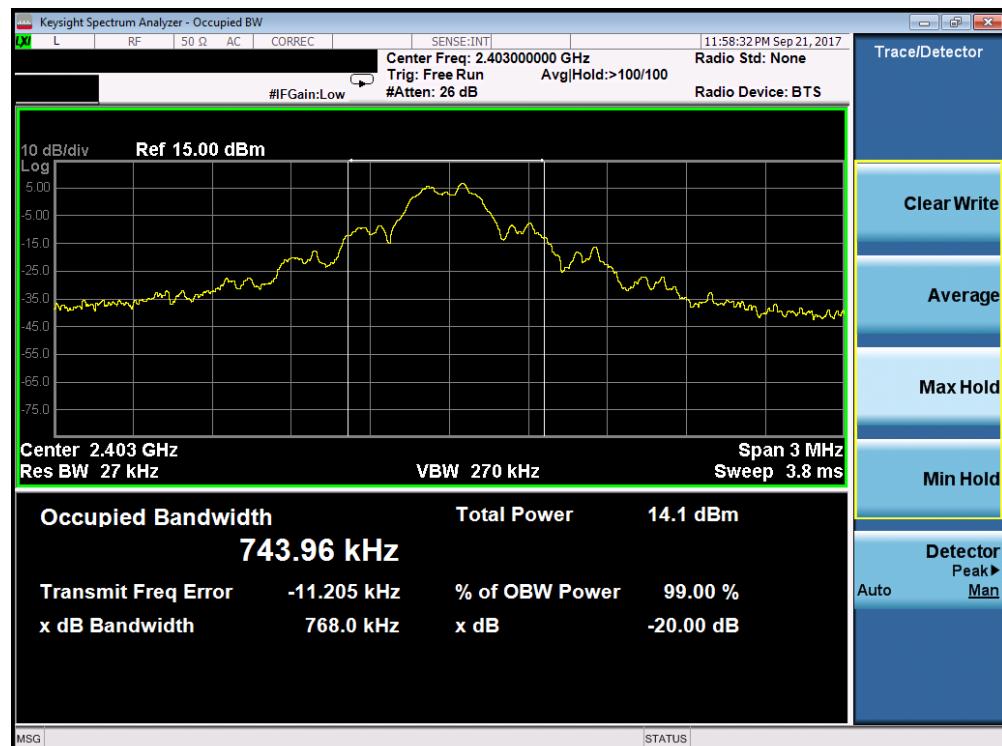


Plot 7-8. 20dB Bandwidth Plot (EX600-WSV1, Ch. 39)



Plot 7-9. 20dB Bandwidth Plot (EX600-WSV1, Ch. 78)

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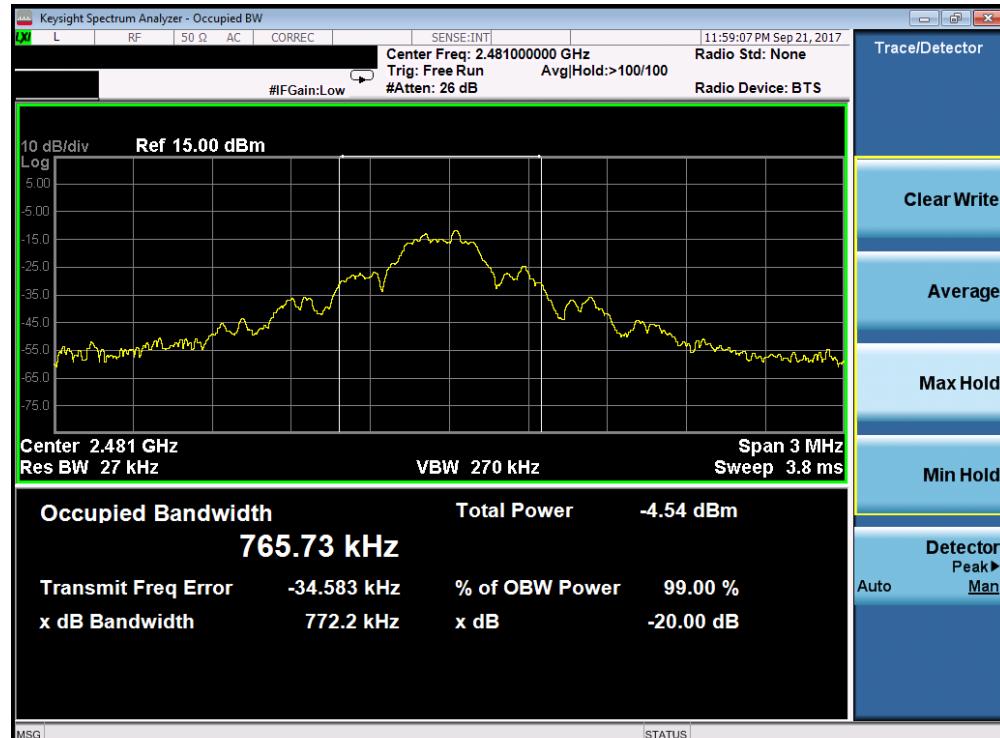


Plot 7-10. 20dB Bandwidth Plot (EX600-WSV2, Ch. 0)



Plot 7-11. 20dB Bandwidth Plot (EX600-WSV2, Ch. 39)

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Plot 7-12. 20dB Bandwidth Plot (EX600-WSV2, Ch. 78)

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## 7.3 Output Power Measurement

§15.247 (b.1)

### Test Overview and Limits

Measurement is made while the EUT is operating in non-hopping transmission mode. The powers shown below were measured using a spectrum analyzer.

***The maximum permissible output power is 1 Watt.***

### Test Procedure Used

ANSI C63.10-2013 – Section 7.8.5

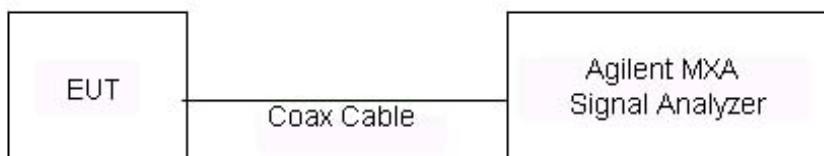
### Test Settings

#### Peak Power Measurement

1. Span = approximately 5x 20dB bandwidth, centered on hopping channel
2. RBW > 20dB bandwidth of emission being measured
3. VBW  $\geq$  RBW
4. Sweep = auto
5. Detector = peak
6. Trace mode = max hold
7. The trace was allowed to stabilize

### Test Setup

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



**Figure 7-2. Test Instrument & Measurement Setup**

### Note

None.

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Final results were obtained using calibrated couplers, attenuators and cables. The following formula was used:

$$\text{Output Power (dBm)} = \text{Raw Analyzer Level (dBm)} + \text{Cable Loss (dB)}$$

Frequency [MHz]	Channel No.	Peak Conducted Power	
		[dBm]	[mW]
2403	0	7.61	5.770
2442	39	6.99	5.000
2481	78	-9.37	0.116

Table 7-6. Conducted Output Power Measurements(EX600-WEN1)

Frequency [MHz]	Channel No.	Peak Conducted Power	
		[dBm]	[mW]
2403	0	8.16	6.545
2442	39	7.39	5.478
2481	78	-10.03	0.099

Table 7-7. Conducted Output Power Measurements(EX600-WEN2)

Frequency [MHz]	Channel No.	Peak Conducted Power	
		[dBm]	[mW]
2403	0	8.01	6.324
2442	39	7.41	5.502
2481	78	-8.85	0.130

Table 7-8. Conducted Output Power Measurements(EX600-WSV1)

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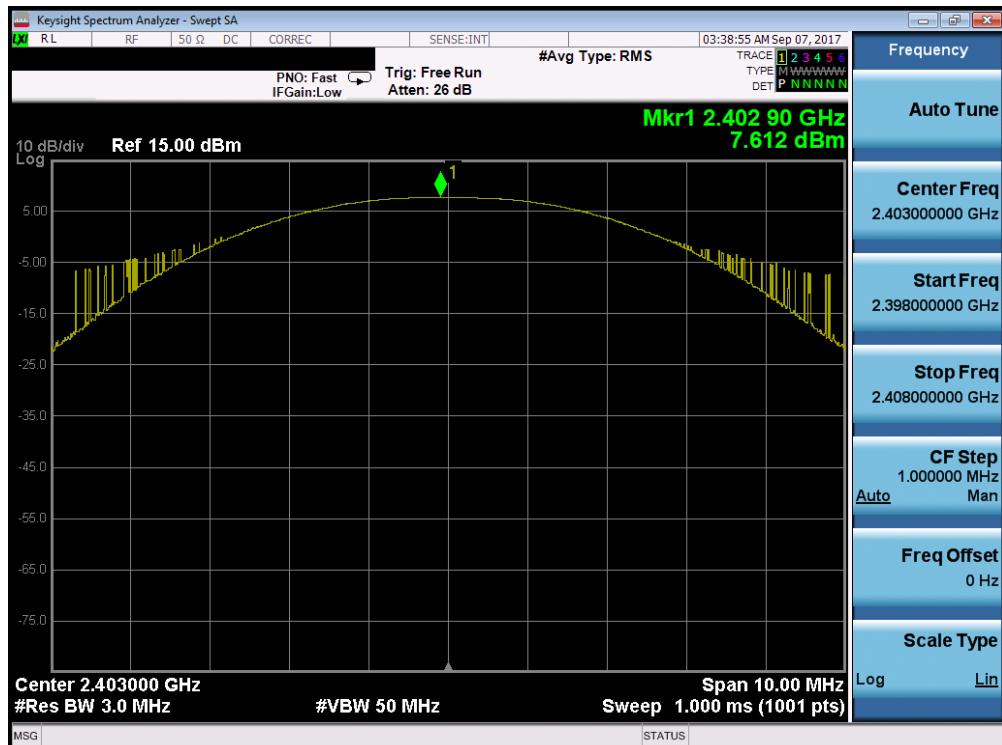
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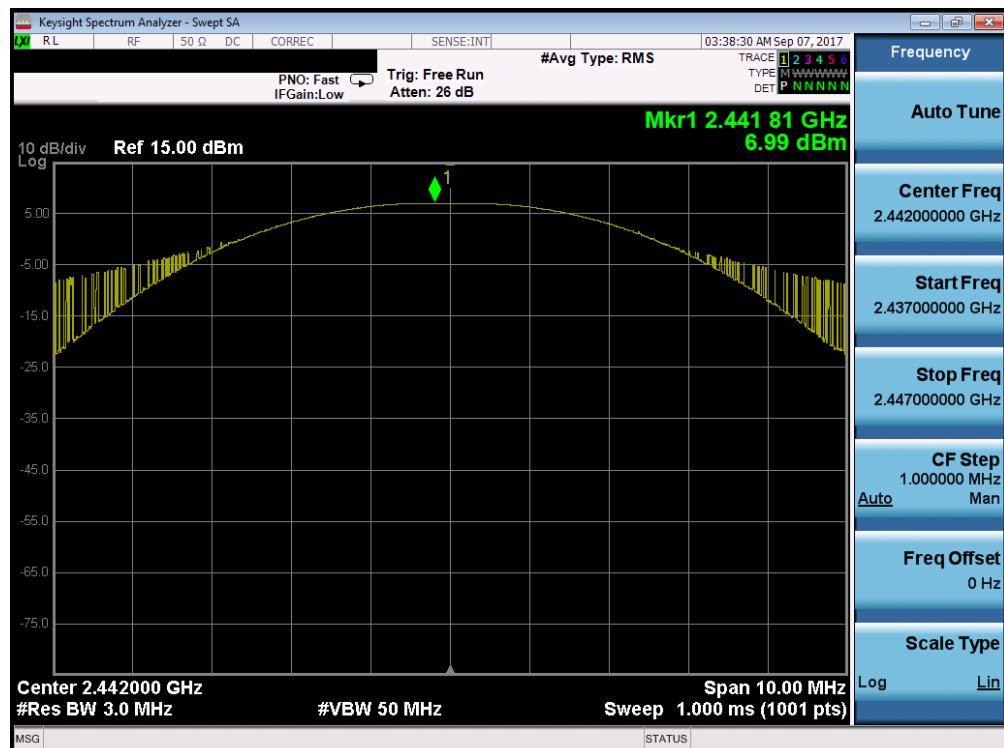
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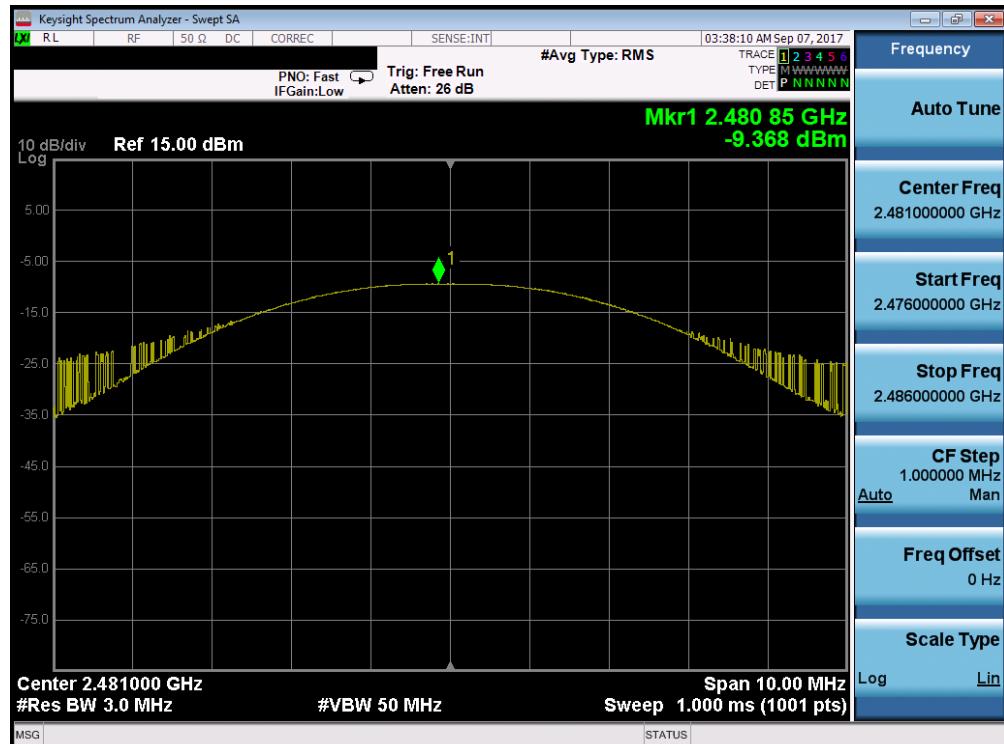
Frequency [MHz]	Channel No.	Peak Conducted Power	
		[dBm]	[mW]
2403	0	7.89	6.152
2442	39	7.06	5.082
2481	78	-9.96	0.101

**Table 7-9. Conducted Output Power Measurements(EX600-WSV2)**

**Plot 7-13. Peak Conducted Power (EX-WEN1, Ch. 0)**

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Plot 7-14. Peak Conducted Power (EX-WEN1, Ch. 39)

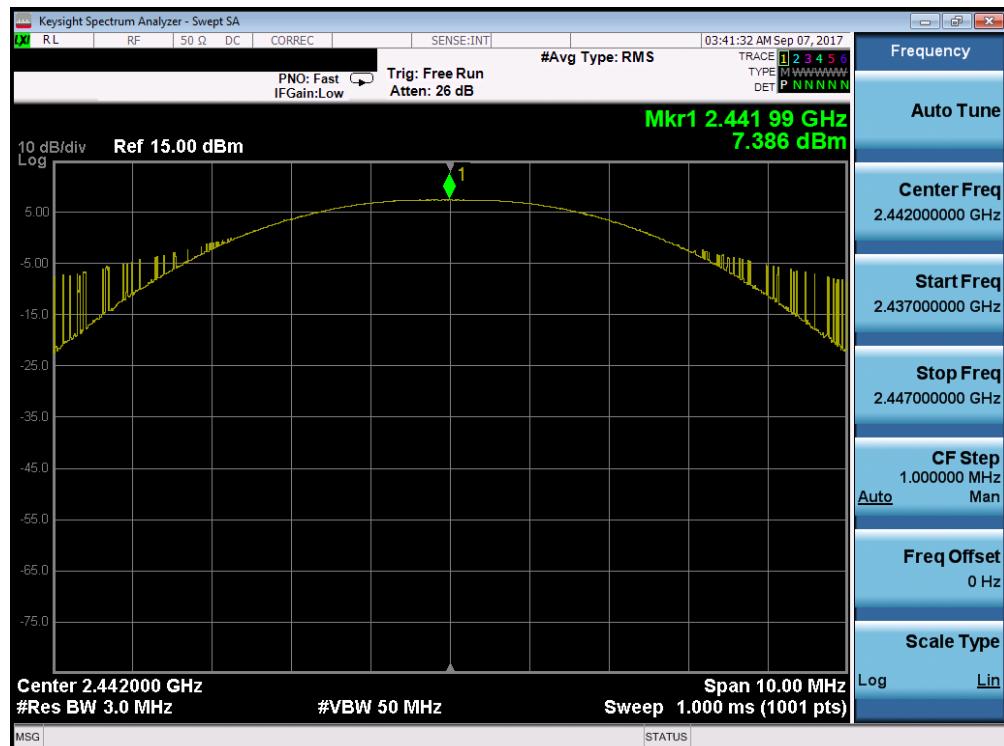


Plot 7-15. Peak Conducted Power (EX-WEN1, Ch. 78)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
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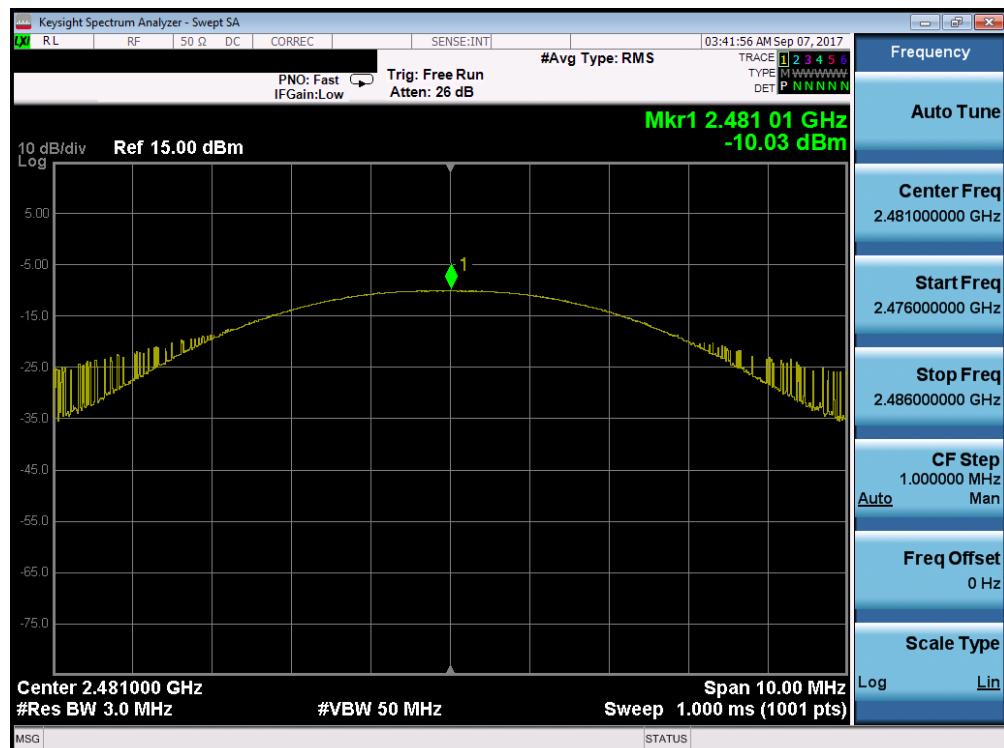


Plot 7-16. Peak Conducted Power (EX-WEN2, Ch. 0)

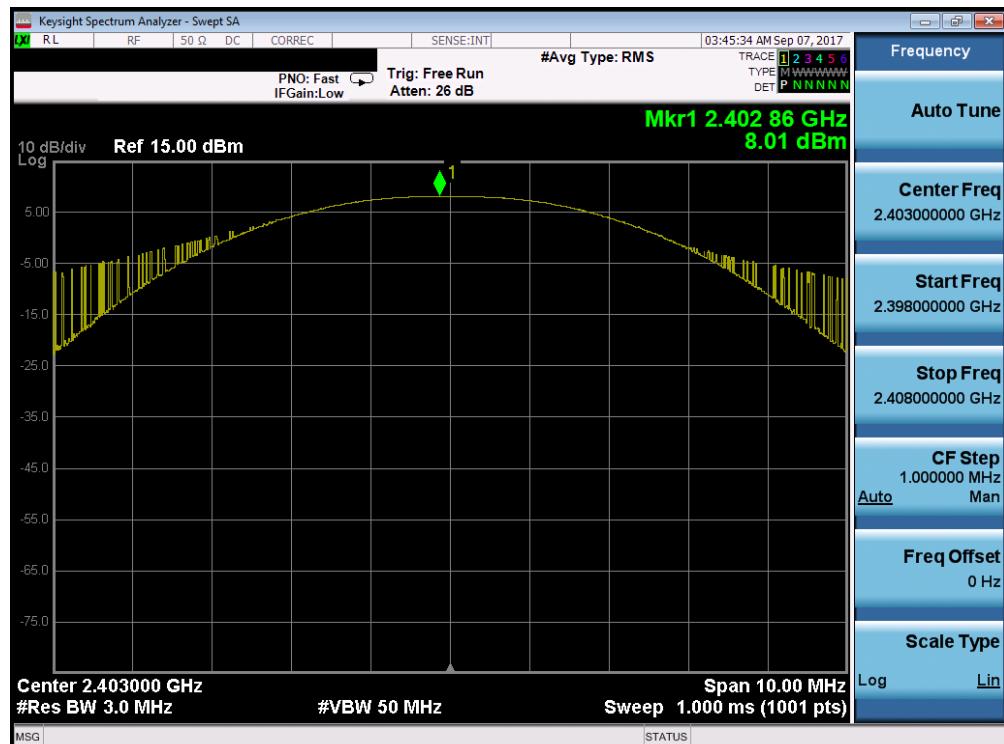


Plot 7-17. Peak Conducted Power (EX-WEN2, Ch. 39)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 23 of 108

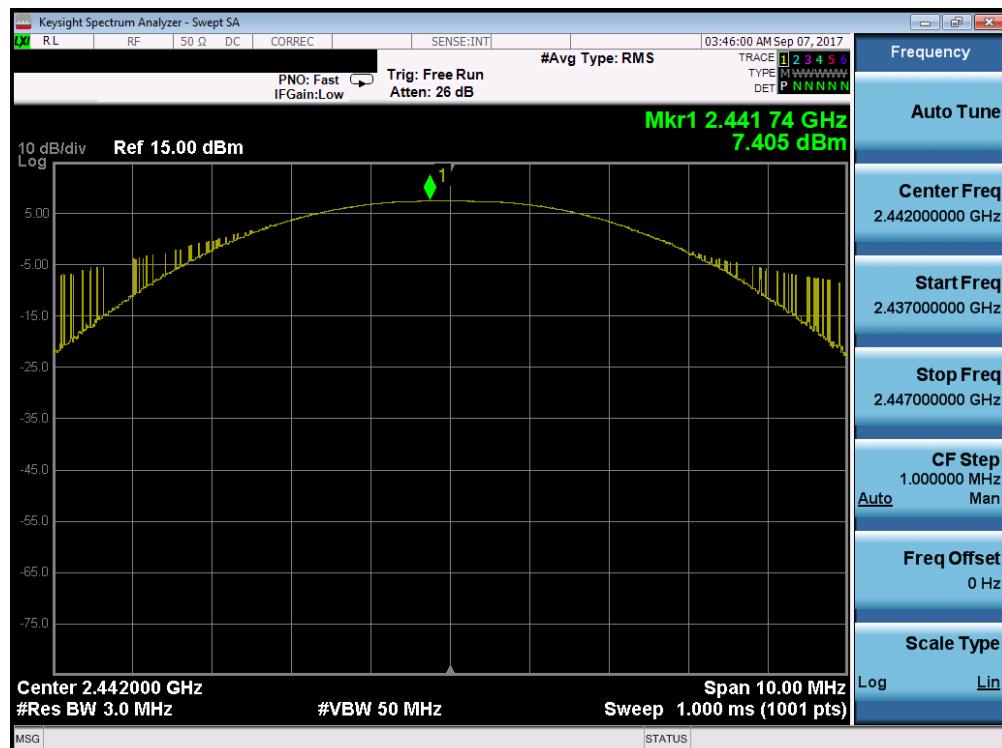


Plot 7-18. Peak Conducted Power (EX-WEN2, Ch. 78)

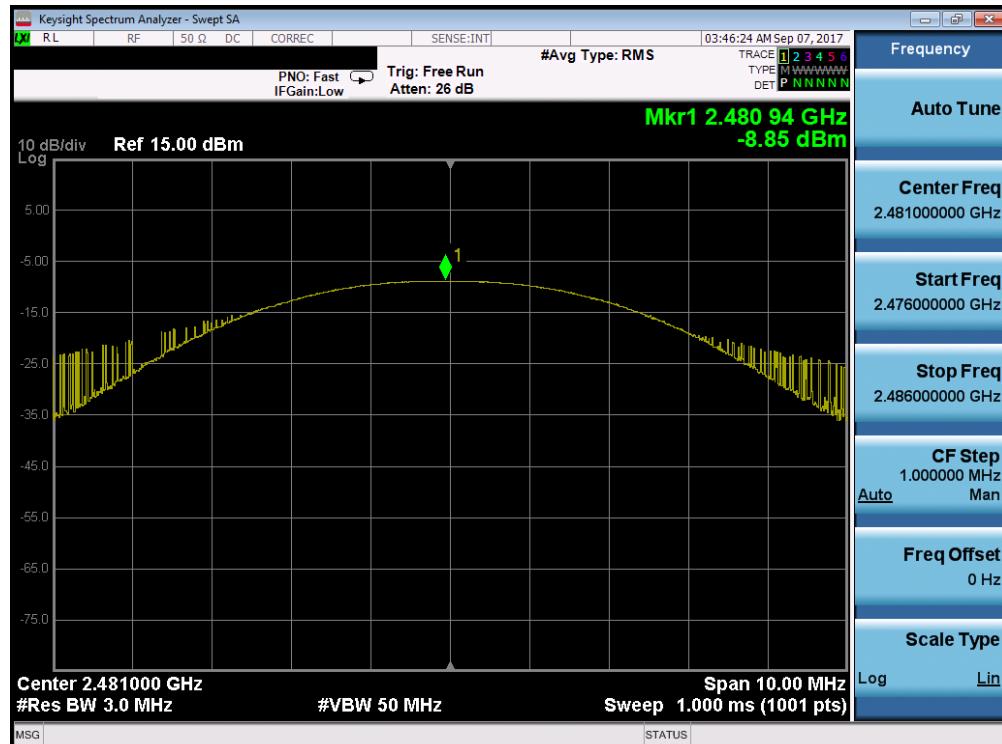


Plot 7-19. Peak Conducted Power (EX-WSV1, Ch. 0)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-20. Peak Conducted Power (EX-WSV1, Ch. 39)

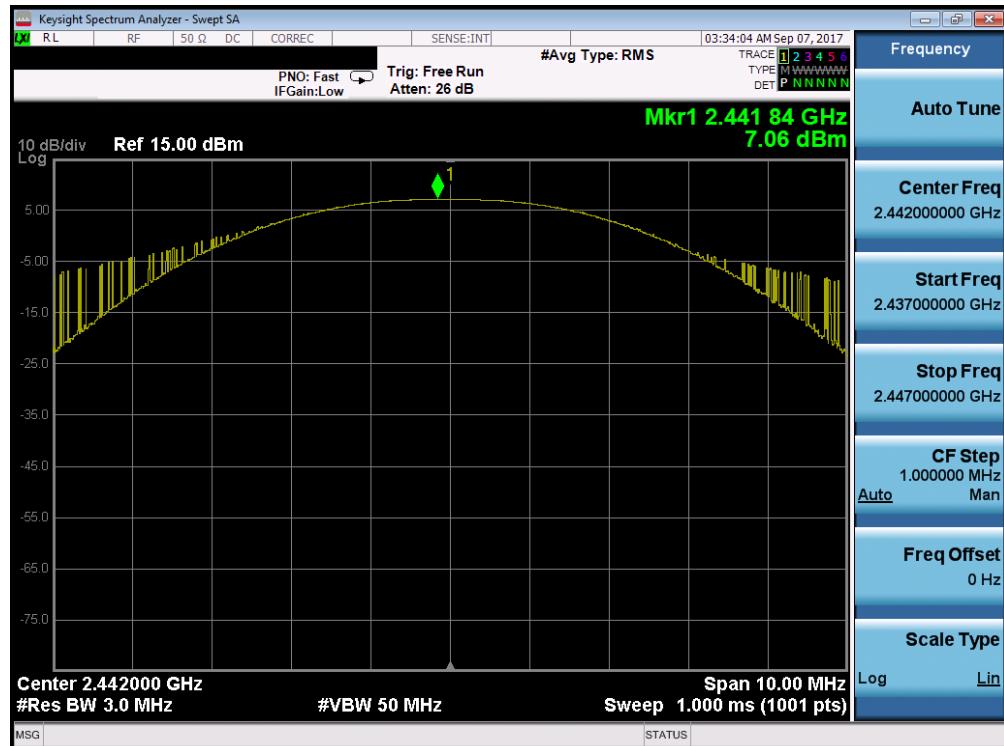


Plot 7-21. Peak Conducted Power (EX-WSV1, Ch. 78)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
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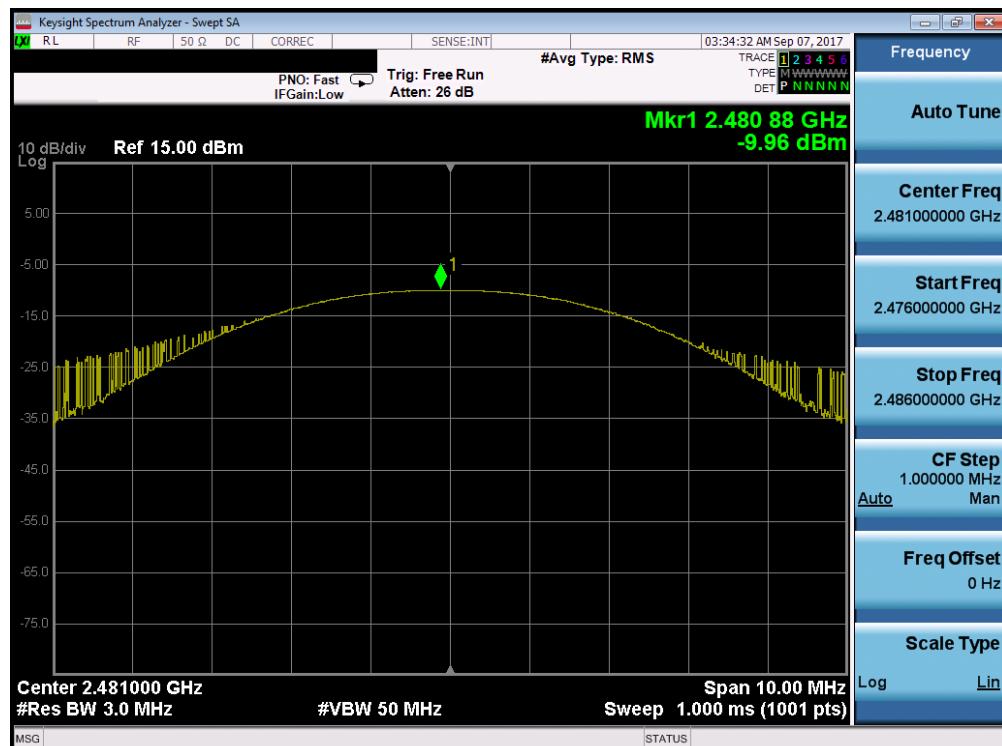


Plot 7-22. Peak Conducted Power (EX-WSV2, Ch. 0)



Plot 7-23. Peak Conducted Power (EX-WSV2, Ch. 39)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-24. Peak Conducted Power (EX-WSV2, Ch. 78)

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## 7.4 Band Edge Compliance

§15.247 (d)

### 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

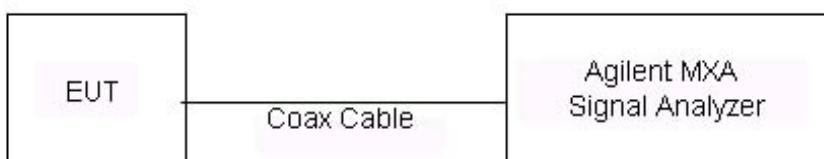
ANSI C63.10-2013 – Section 6.10.4

### 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  $\geq 2 \times \text{Span}/\text{RBW}$
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.

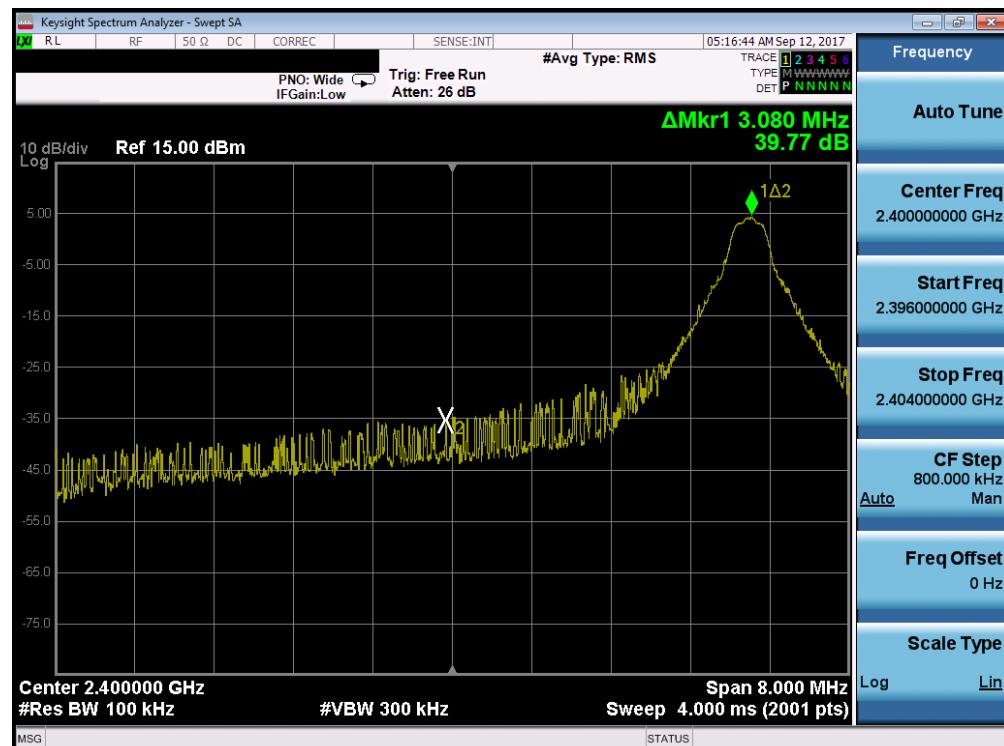


**Figure 7-3. Test Instrument & Measurement Setup**

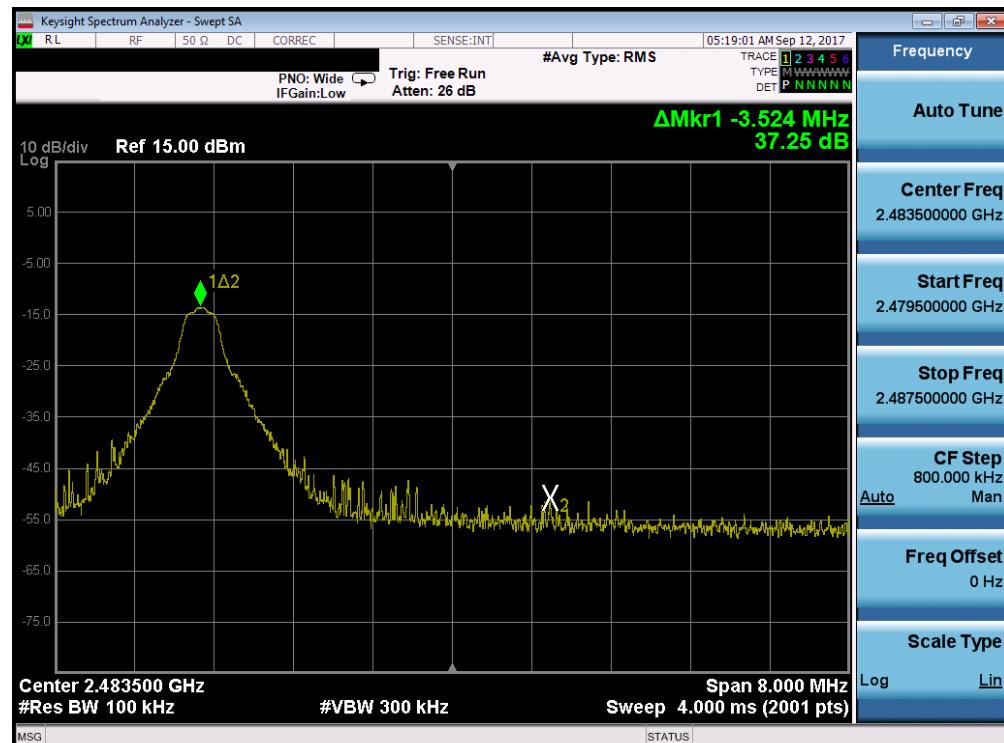
### Test Notes

Out of band conducted spurious emissions at the band edge were investigated in hopping and non-hopping modes.

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
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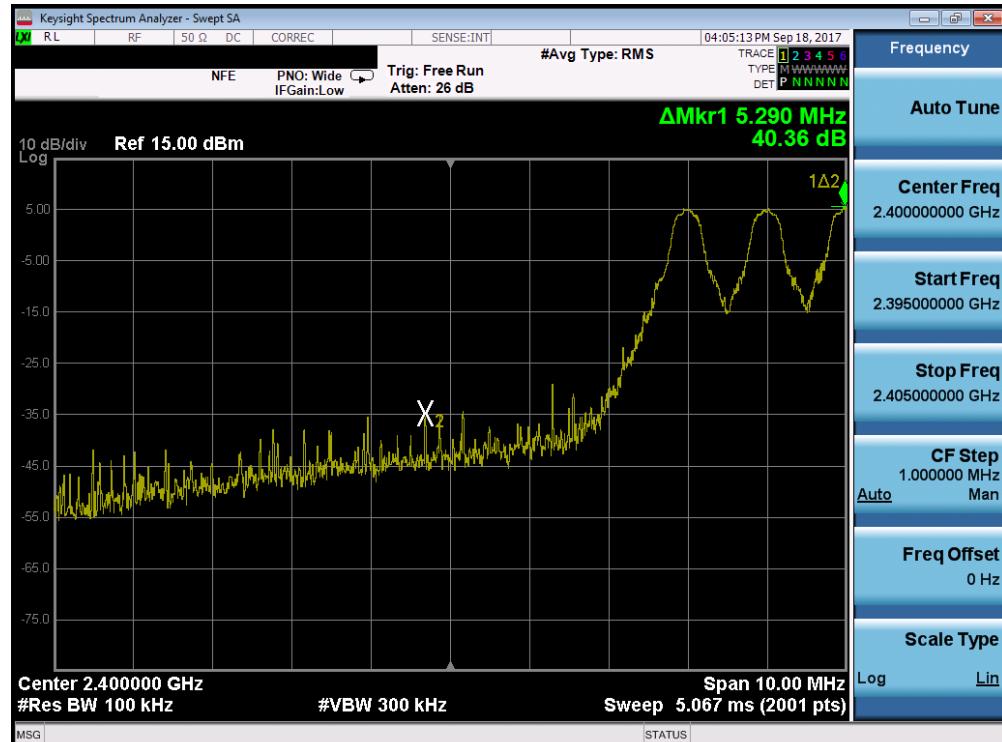


Plot 7-25. Band Edge Plot (EX600-WEN1, Ch. 0)

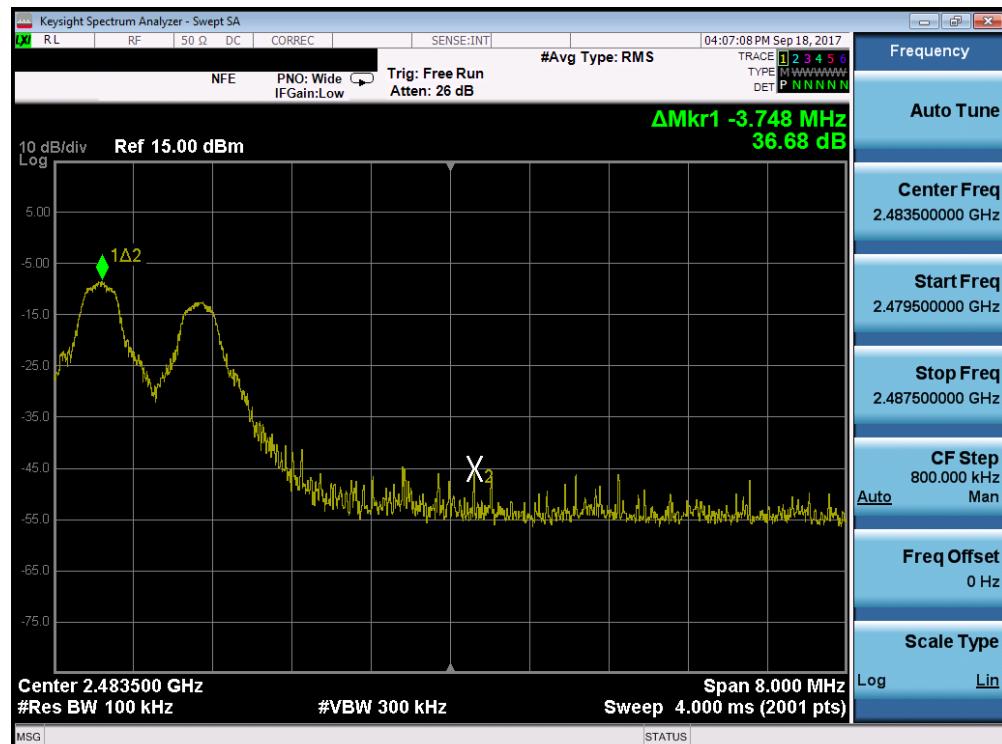


Plot 7-26. Band Edge Plot (EX600-WEN1, Ch. 78)

FCC ID: 2AJE7SMC-WEX01	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: SMC Quality Manager
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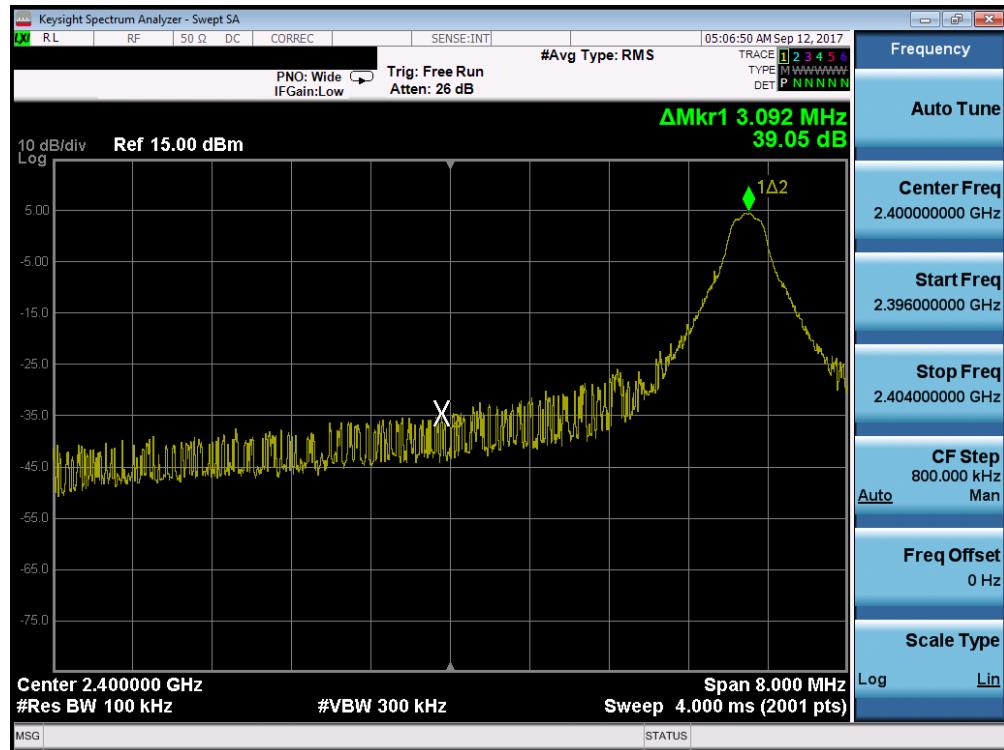


Plot 7-27. Band Edge Plot (EX600-WEN1 with Hopping Enabled)

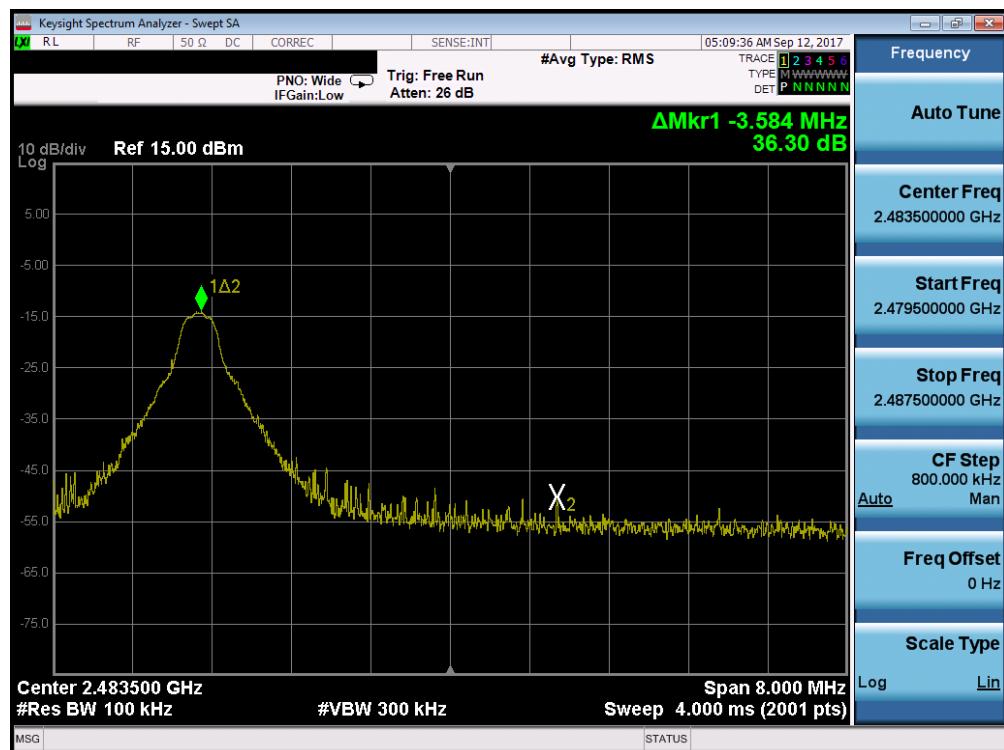


Plot 7-28. Band Edge Plot (EX600-WEN1 with Hopping Enabled)

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: Quality Manager
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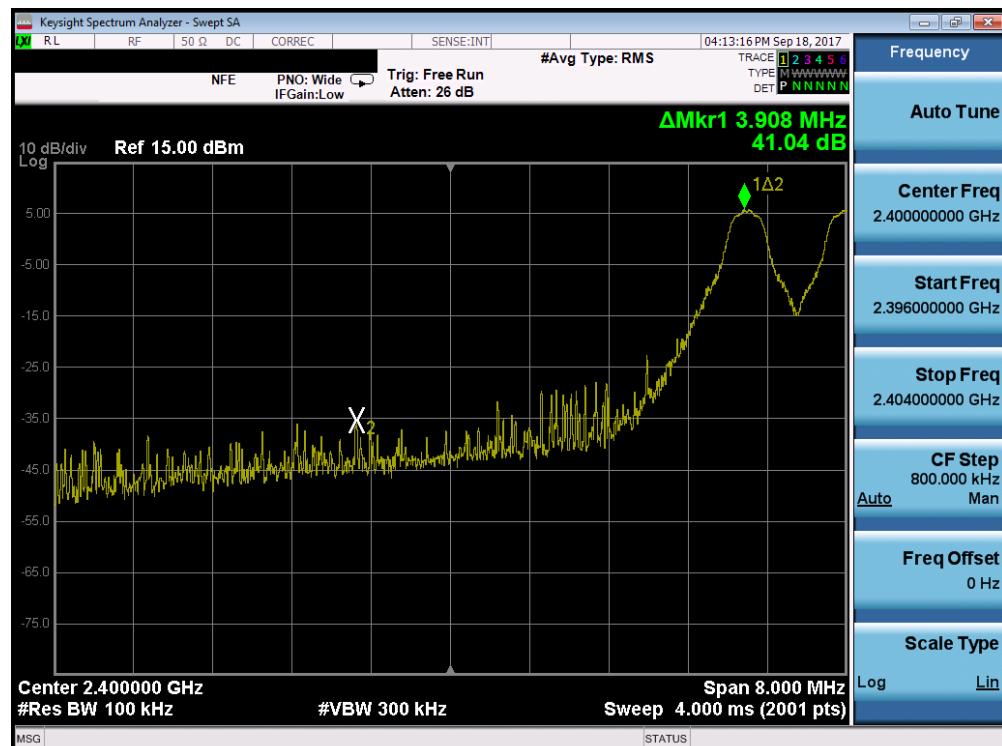


Plot 7-29. Band Edge Plot (EX600-WEN2, Ch. 0)

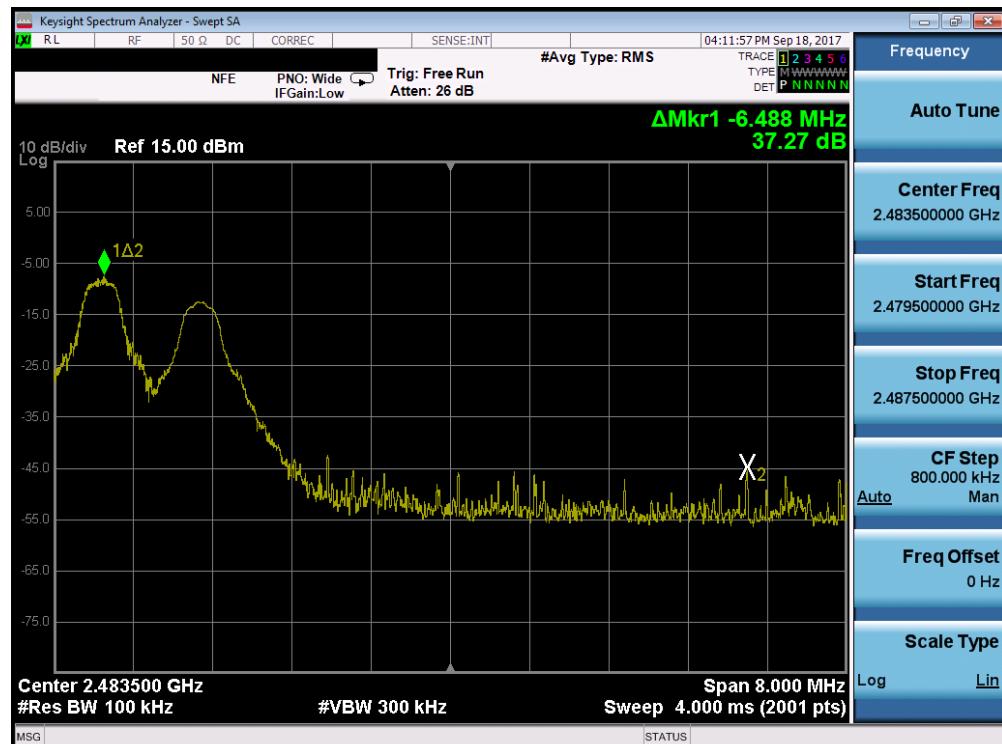


Plot 7-30. Band Edge Plot (EX600-WEN2, Ch. 78)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
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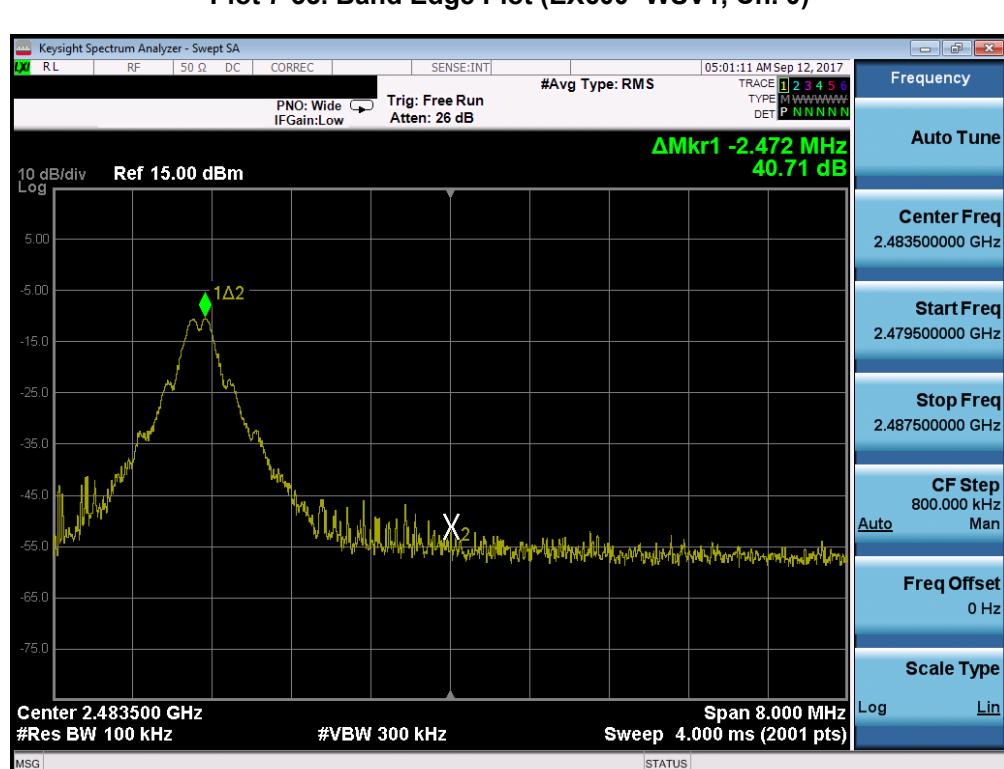
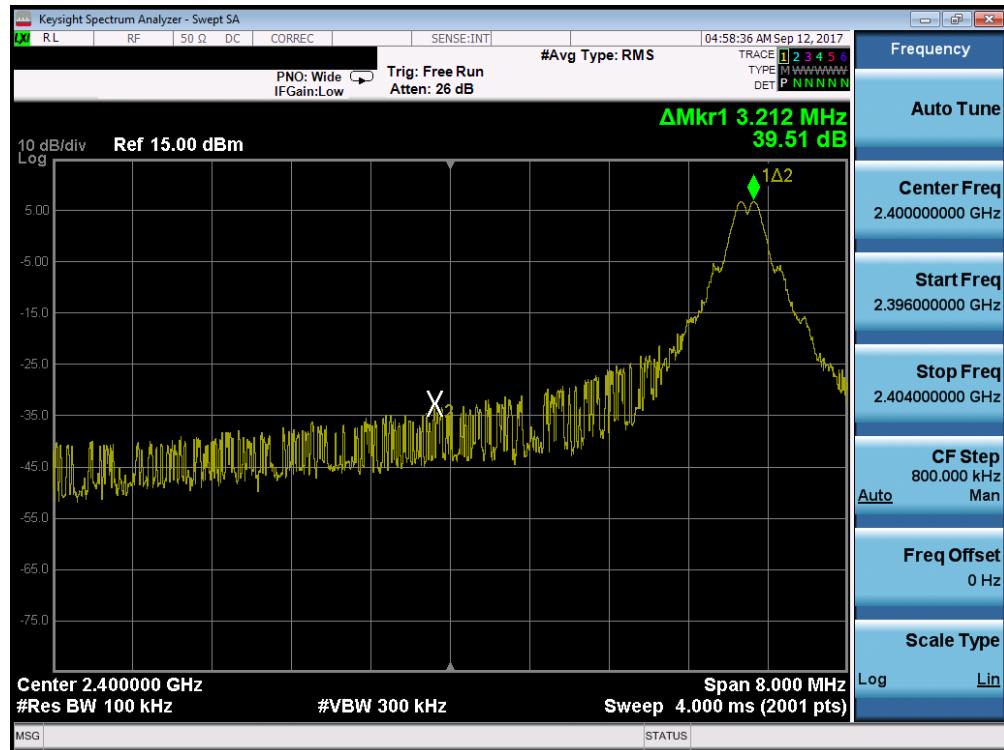


Plot 7-31. Band Edge Plot (EX600-WEN2 with Hopping Enabled)

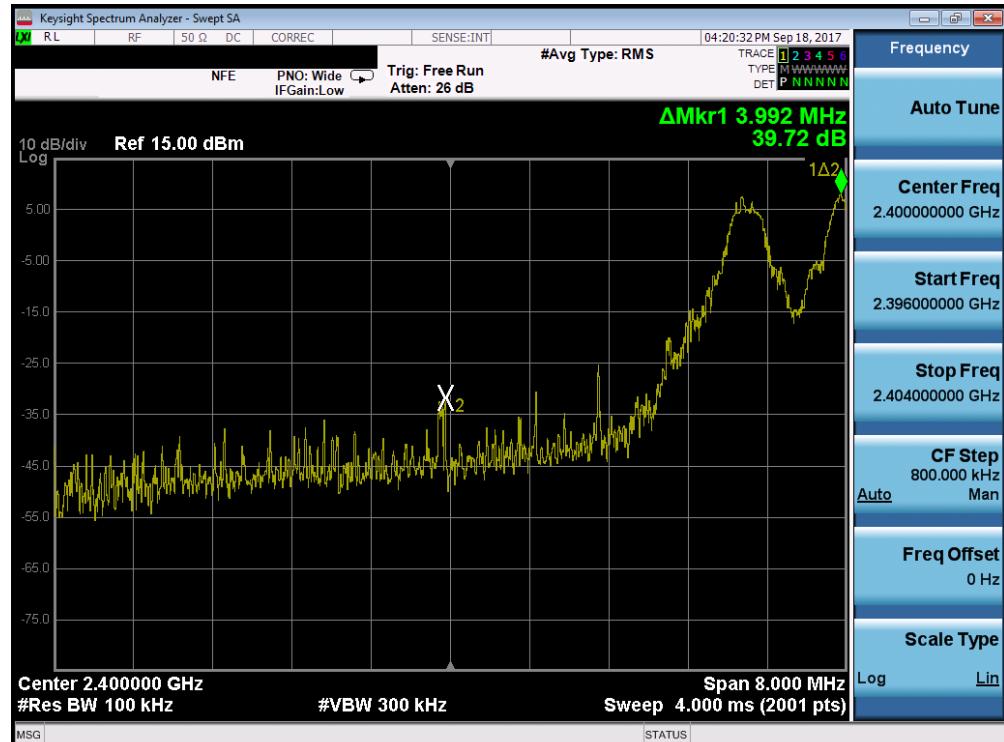


Plot 7-32. Band Edge Plot (EX600-WEN2 with Hopping Enabled)

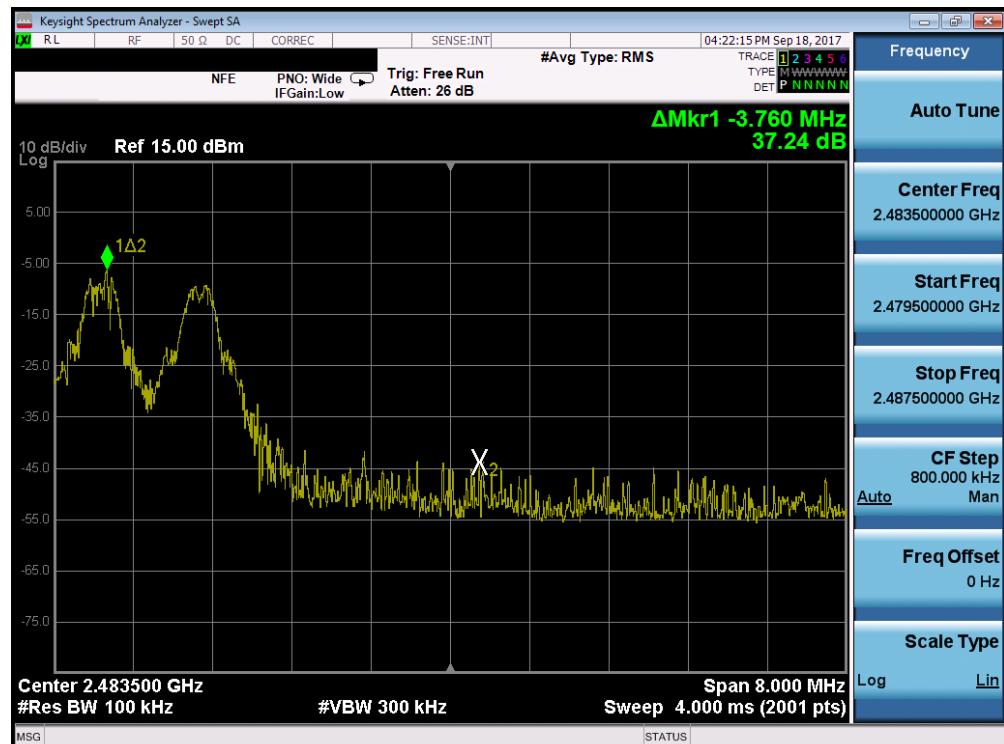
FCC ID: 2AJE7SMC-WEX01	PCTEST Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 32 of 108



FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	 Approved by: Quality Manager
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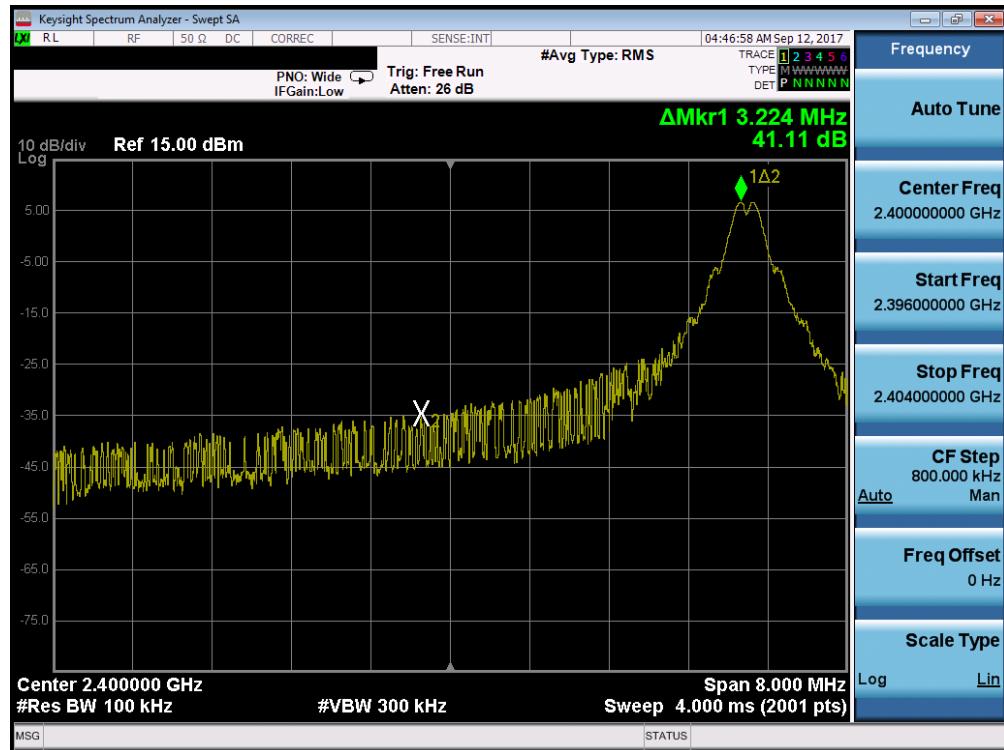


Plot 7-35. Band Edge Plot (EX600- WSV1 with Hopping Enabled)

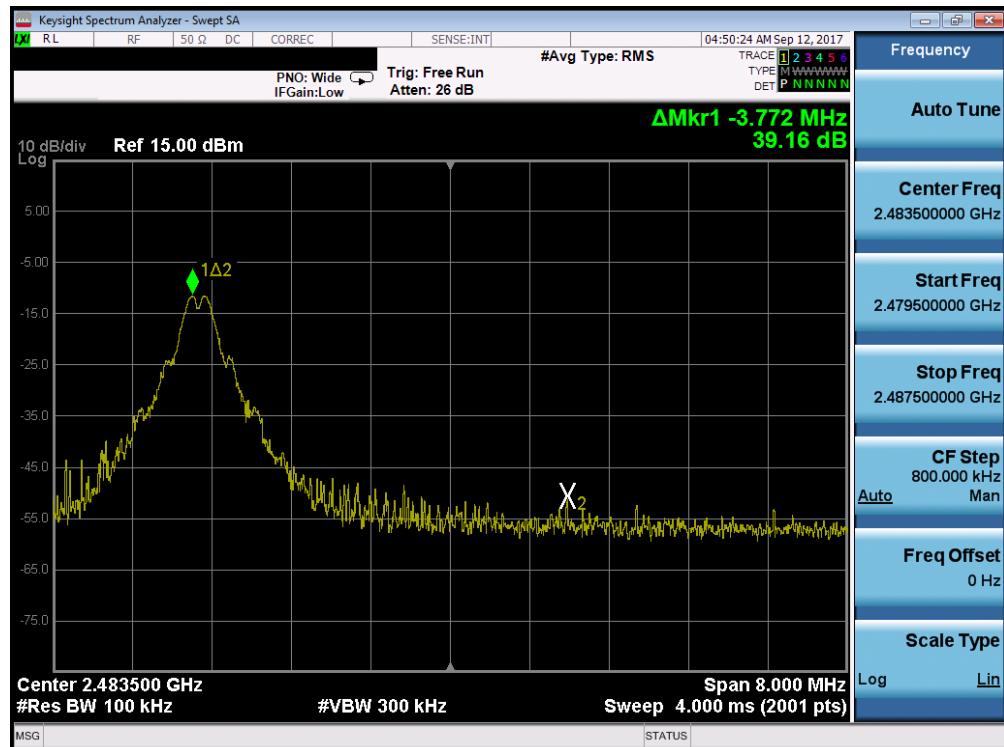


Plot 7-36. Band Edge Plot (EX600- WSV1 with Hopping Enabled)

FCC ID: 2AJE7SMC-WEX01	PCTEST Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
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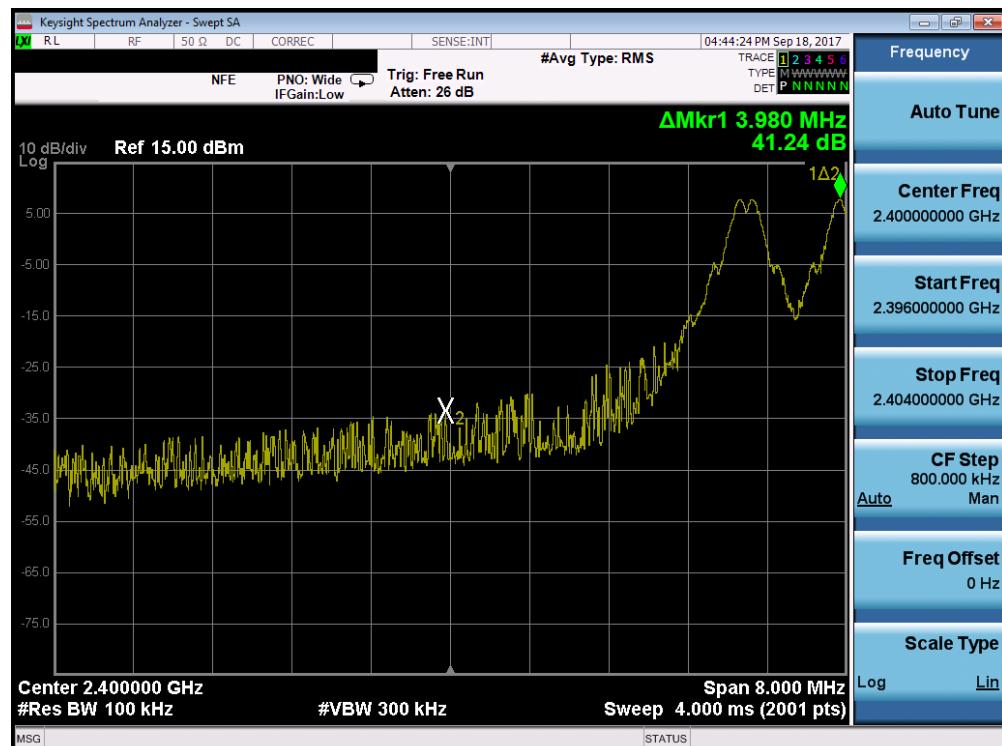


Plot 7-37. Band Edge Plot (EX600- WSV2, Ch. 0)

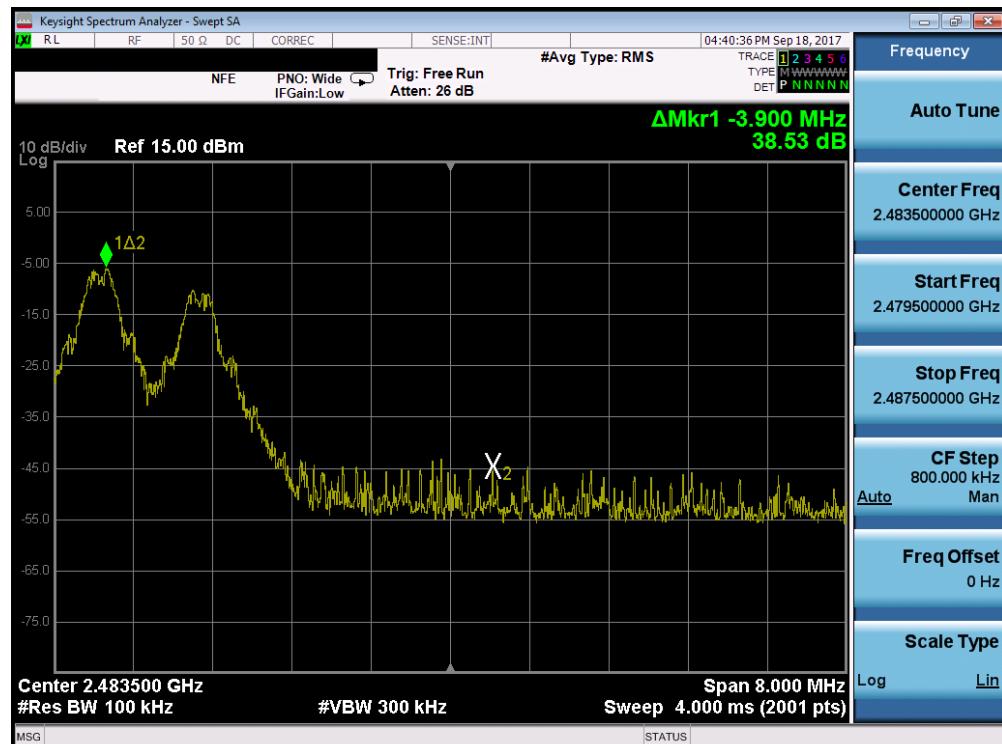


Plot 7-38. Band Edge Plot (EX600- WSV2, Ch. 78)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-39. Band Edge Plot (EX600-WSV2 with Hopping Enabled)



Plot 7-40. Band Edge Plot (EX600- WSV2 with Hopping Enabled)

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## 7.5 Carrier Frequency Separation

§15.247 (a.1)

### 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

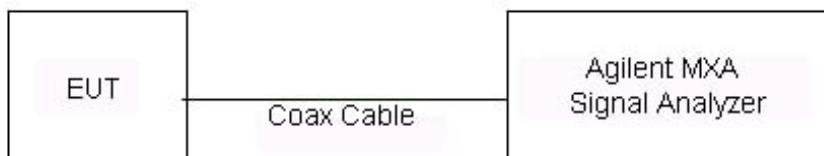
ANSI C63.10-2013 – Section 7.8.2

### 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

None.

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
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Frequency [MHz]	Channel No.	Min. Channel Separation [MHz]
2403	0	0.531
2442	39	0.534
2481	78	0.604

Table 7-10. Minimum Channel Separation(EX600-WEN1)

Frequency [MHz]	Channel No.	Min. Channel Separation [MHz]
2403	0	0.529
2442	39	0.527
2481	78	0.531

Table 7-11. Minimum Channel Separation(EX600-WEN2)

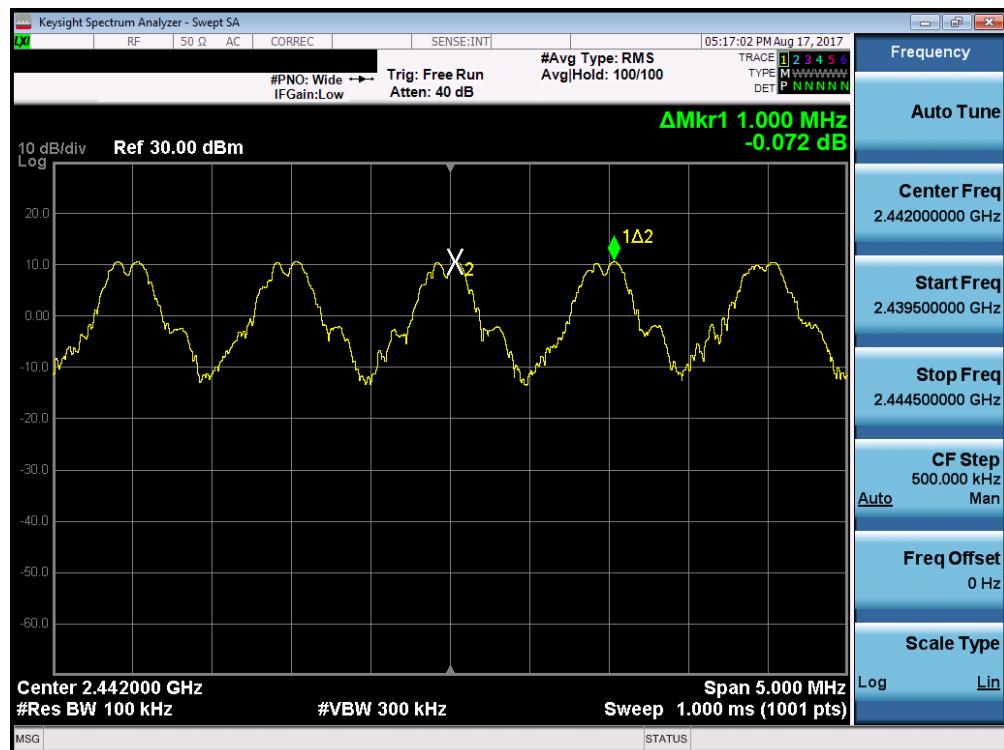
Frequency [MHz]	Channel No.	Min. Channel Separation [MHz]
2403	0	0.516
2442	39	0.524
2481	78	0.519

Table 7-12. Minimum Channel Separation(EX600-WSV1)

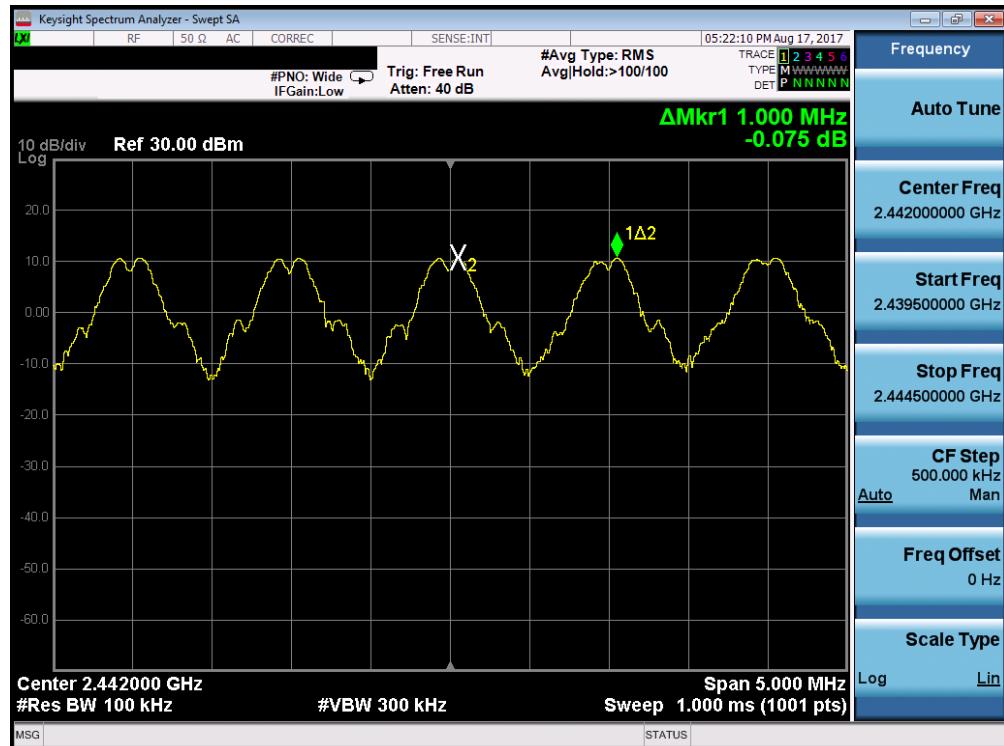
Frequency [MHz]	Channel No.	Min. Channel Separation [MHz]
2403	0	0.512
2442	39	0.512
2481	78	0.515

Table 7-13. Minimum Channel Separation(EX600-WSV2)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 38 of 108

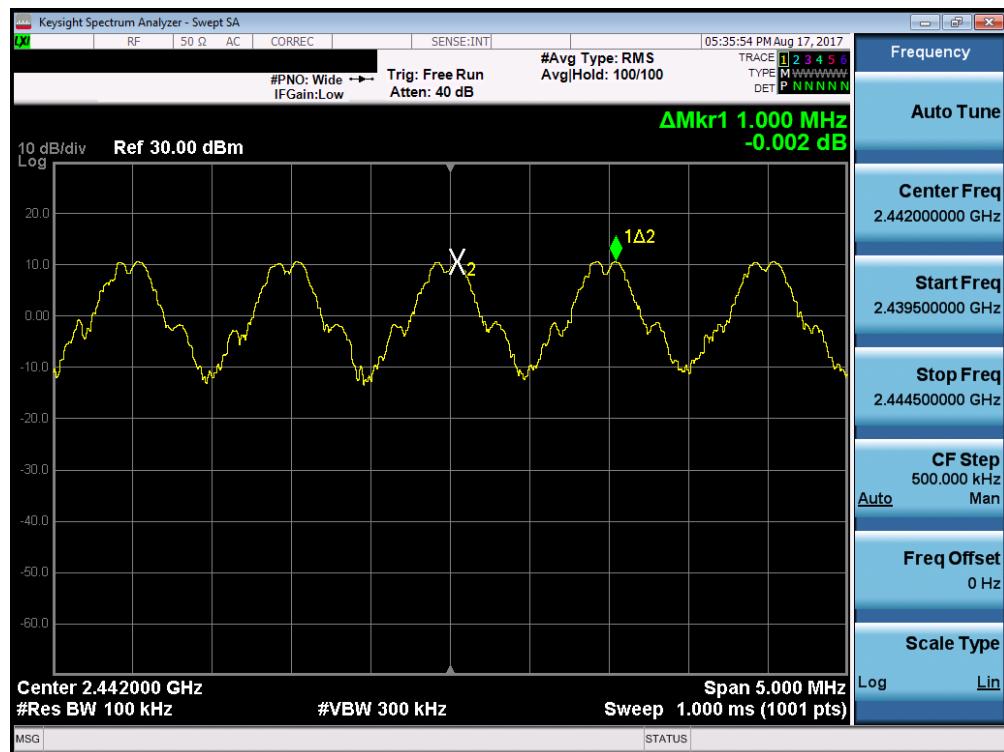


Plot 7-41. Channel Spacing Plot (EX600-WEN1)

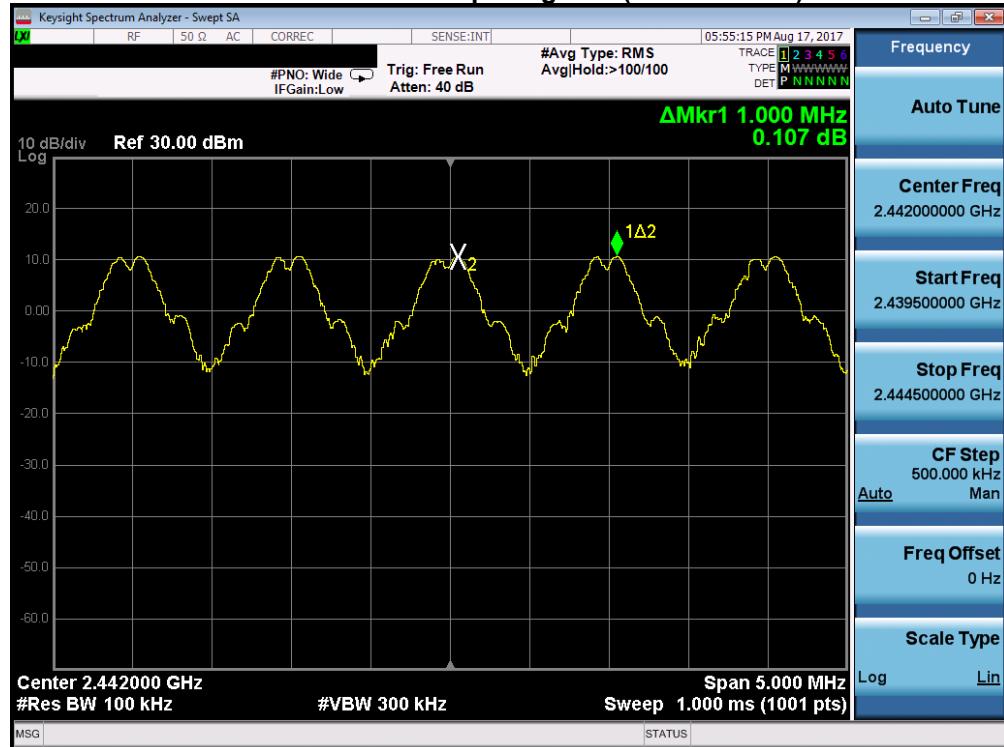


Plot 7-42. Channel Spacing Plot (EX600-WEN2)

FCC ID: 2AJE7SMC-WEX01	PCTEST Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
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Plot 7-43. Channel Spacing Plot (EX600-WSV1)



Plot 7-44. Channel Spacing Plot (EX600-WSV2)

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## 7.6 Time of Occupancy

§15.247 (a.1.iii)

### 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

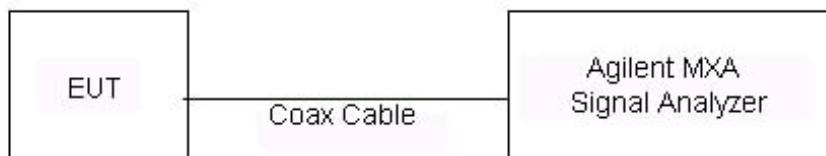
ANSI C63.10-2013 – Section 7.8.4

### 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.
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**

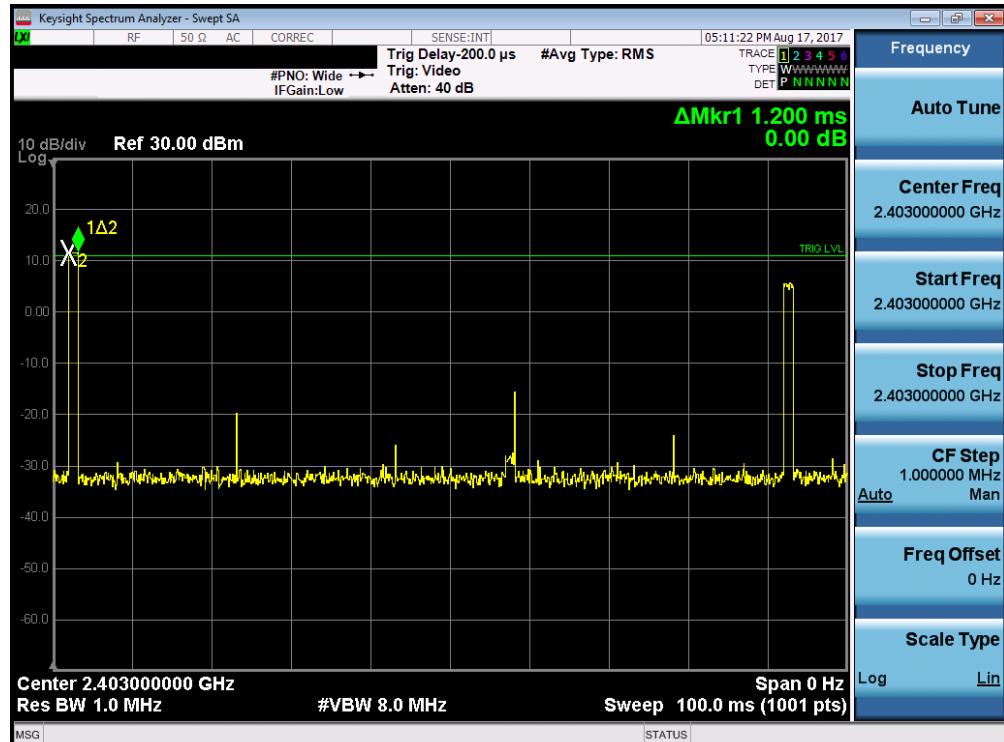
### Test Notes

None

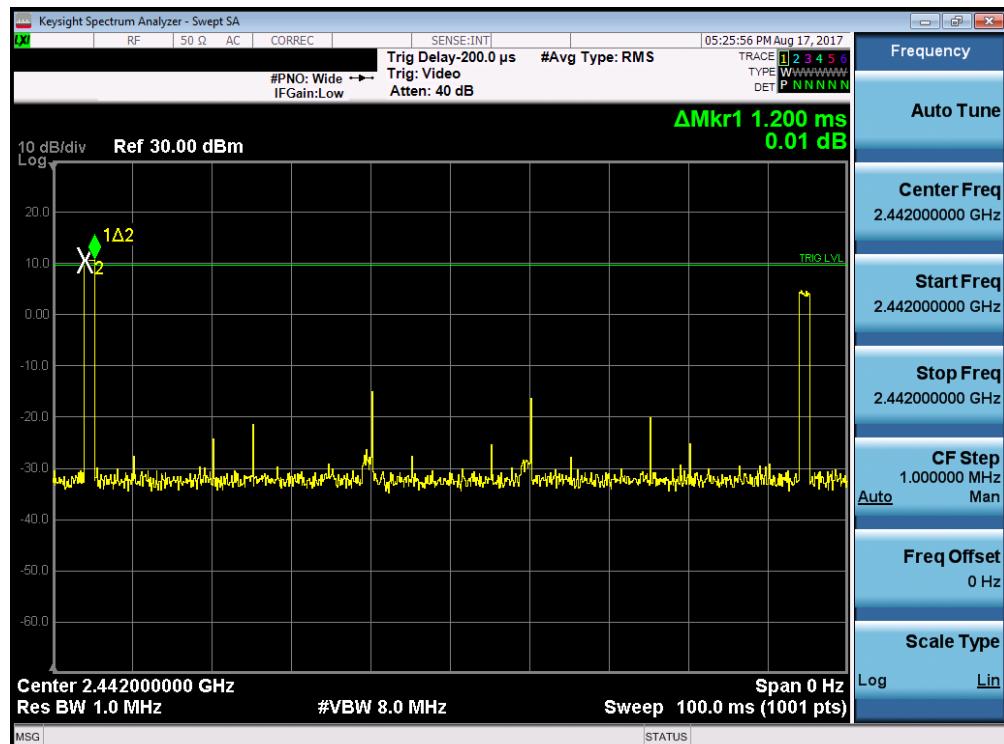
FCC ID: 2AJE7SMC-WEX01	PCTEST Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 41 of 108

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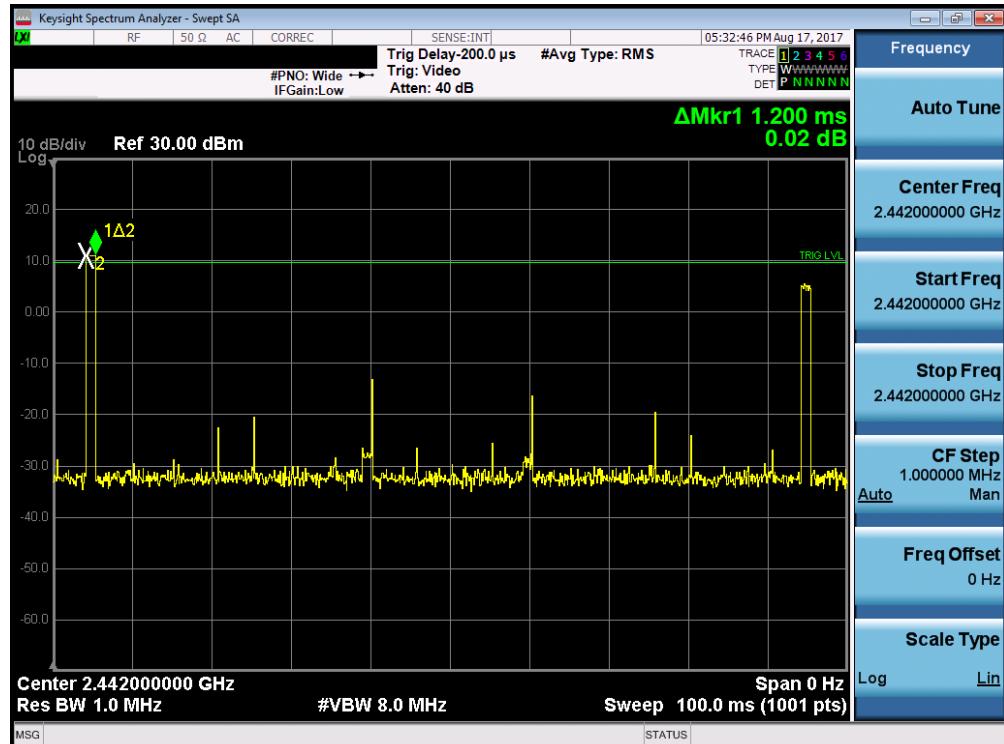


Plot 7-45. Time of Occupancy Plot (EX600-WEN1)

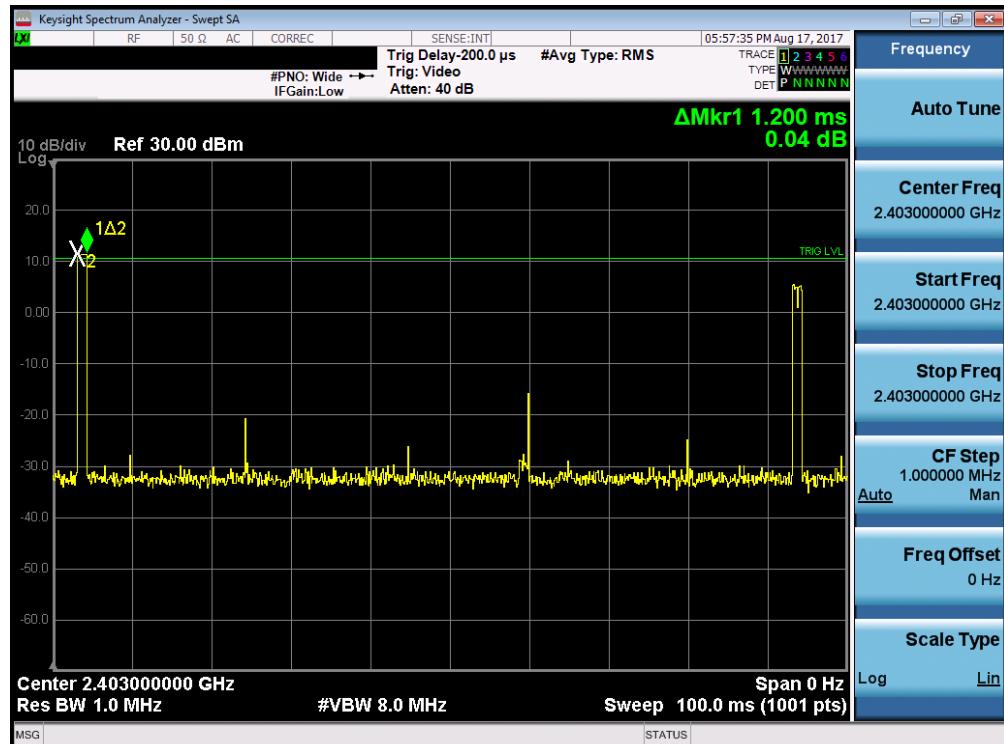


Plot 7-46. Time of Occupancy Plot (EX600-WEN2)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 42 of 108

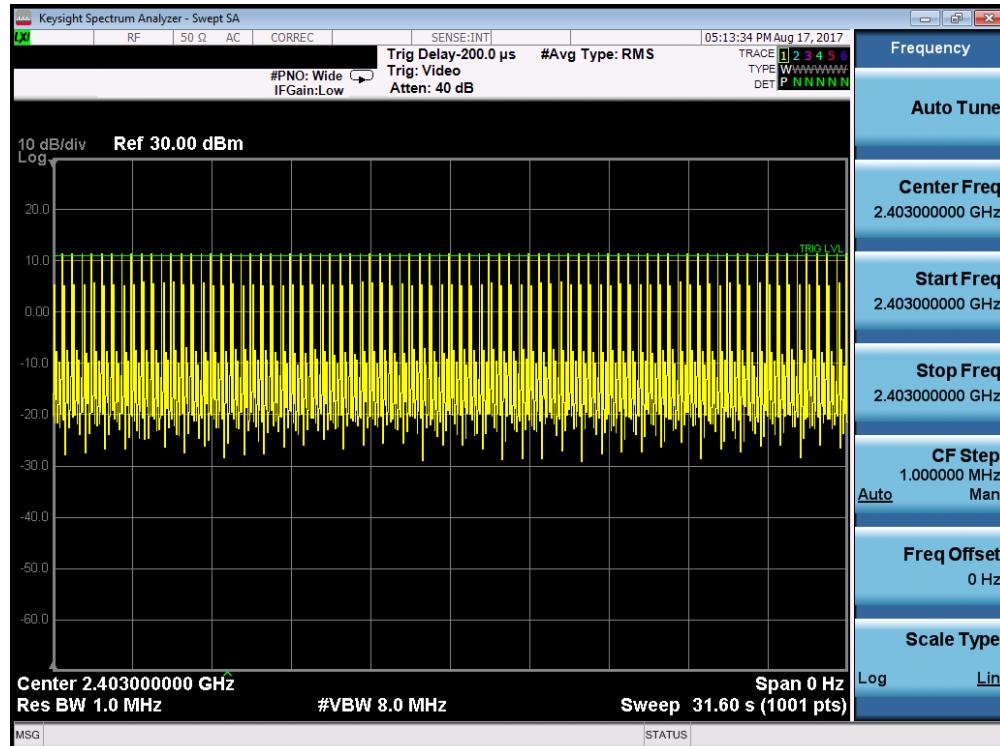


Plot 7-47. Time of Occupancy Plot (EX600-WSV1)

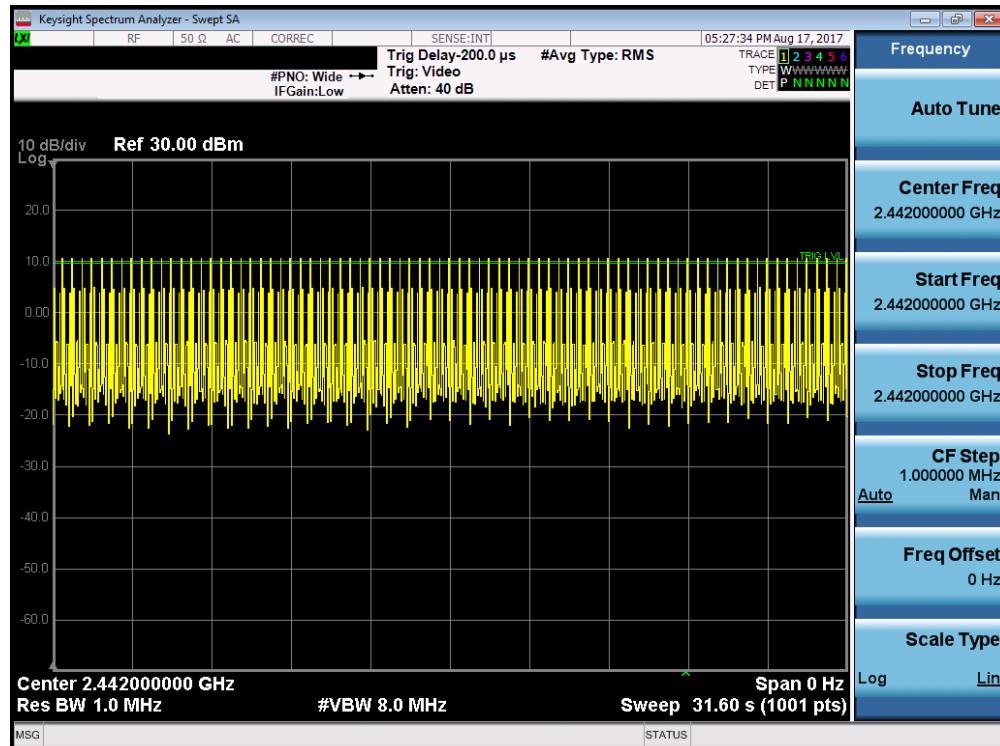


Plot 7-48. Time of Occupancy Plot (EX600-WSV2)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 43 of 108

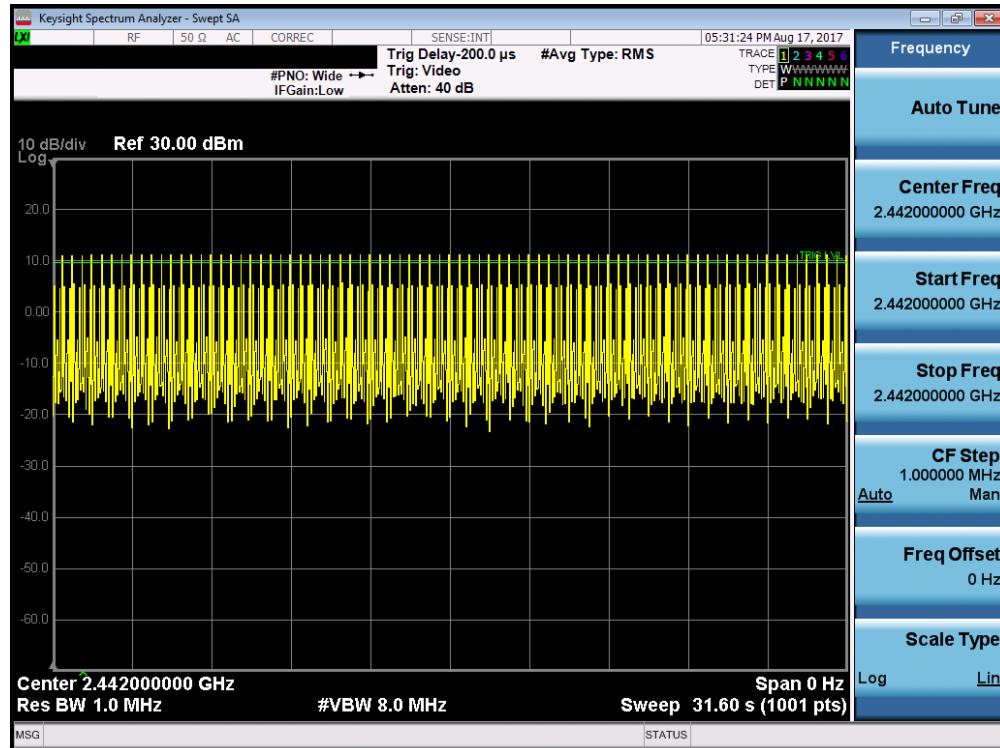


Plot 7-49. Dwell Time Plot (EX600-WEN1)

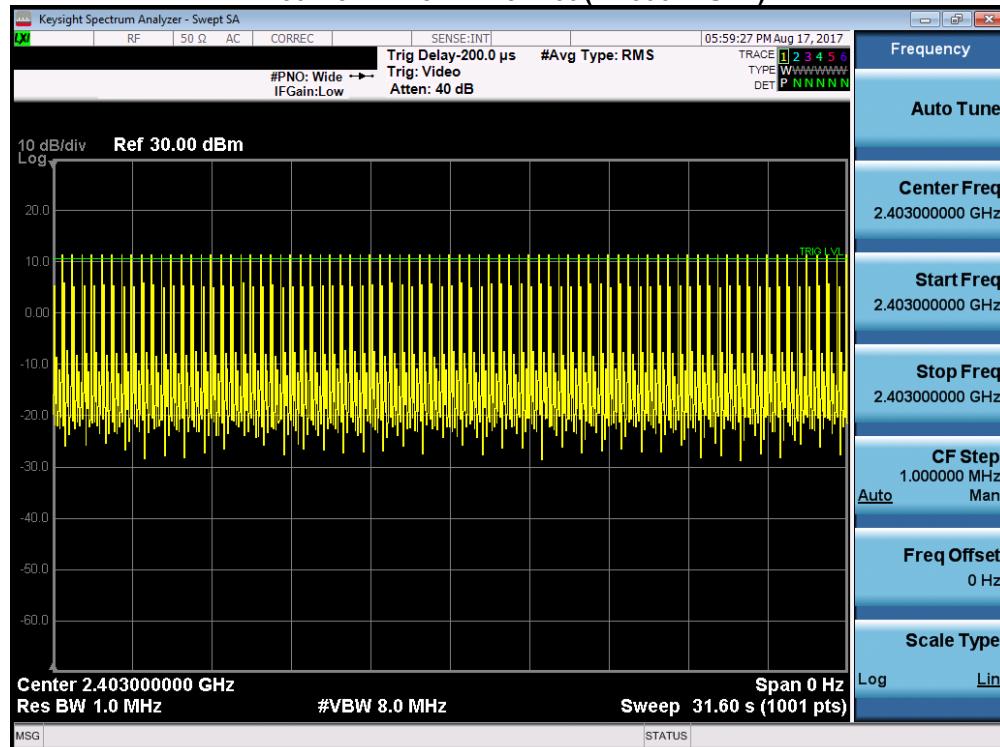


Plot 7-50. Dwell Time Plot (EX600-WEN2)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 44 of 108



Plot 7-51. Dwell Time Plot (EX600-WSV1)



Plot 7-52. Dwell Time Plot (EX600-WSV2)

FCC ID: 2AJE7SMC-WEX01	PCTEST Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 45 of 108



## Time of Occupancy Calculation

Base on the previous plots, the time of occupancy can be determined as follows:

- Pulse Width = 1.2 ms (See Plot 7-45)
- 400ms x 79 hopping channels = 31.6 sec (Time of Occupancy Limit)
- Number of times that one particular channel appears in a 31.6 second period = 81 (see Plot 7-49)
- Time of Occupancy = 1.2 ms/pulse x 81 pulses/31.6 sec = 97.2 ms/31.6 sec = 3.07 ms/sec
- Above calculations show the devices are compliant with the Time of Occupancy requirement

FCC ID: 2AJE7SMC-WEX01	PCTEST Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	SMC	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 46 of 108

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## 7.7 Number of Hopping Channels

§15.247 (a.1.iii)

### 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

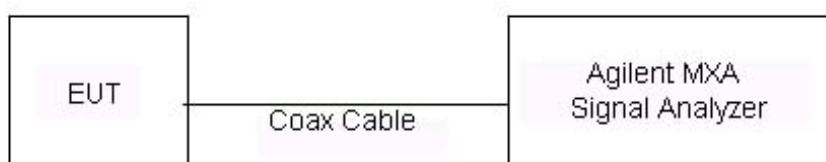
ANSI C63.10-2013 – Section 7.8.3

### 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**

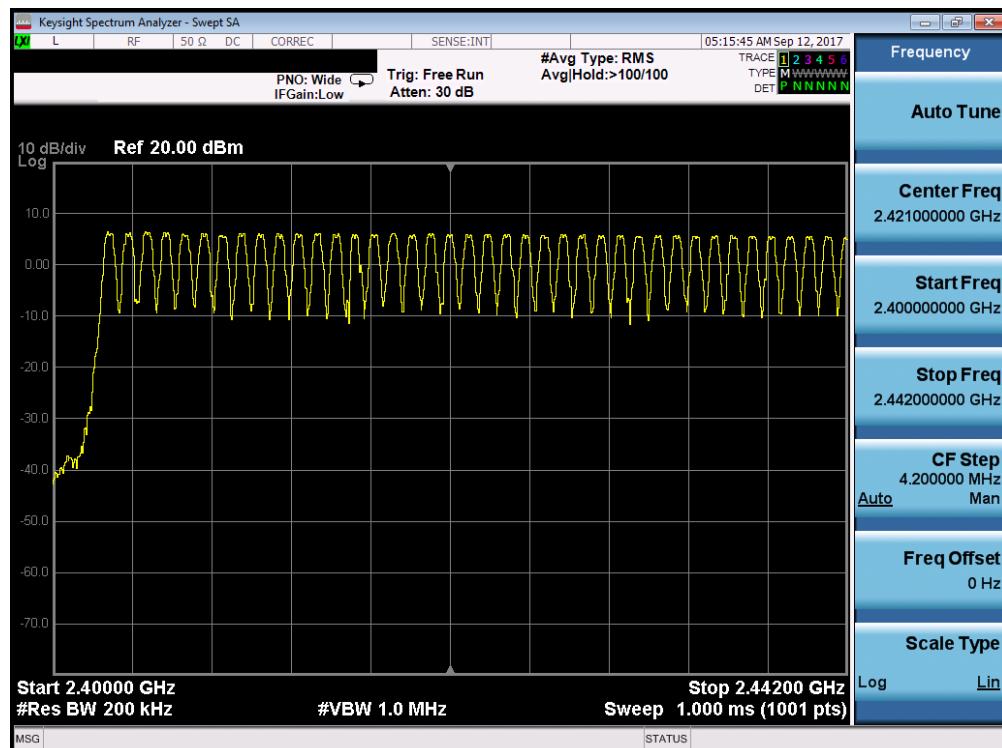
### Test Notes

None.

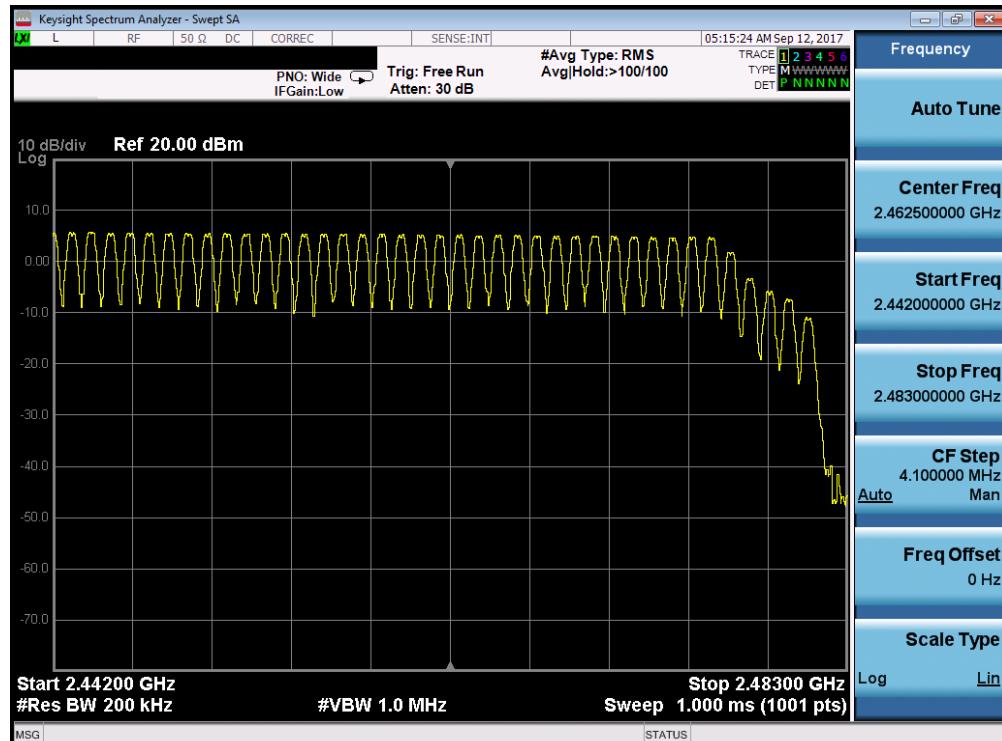
FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 47 of 108

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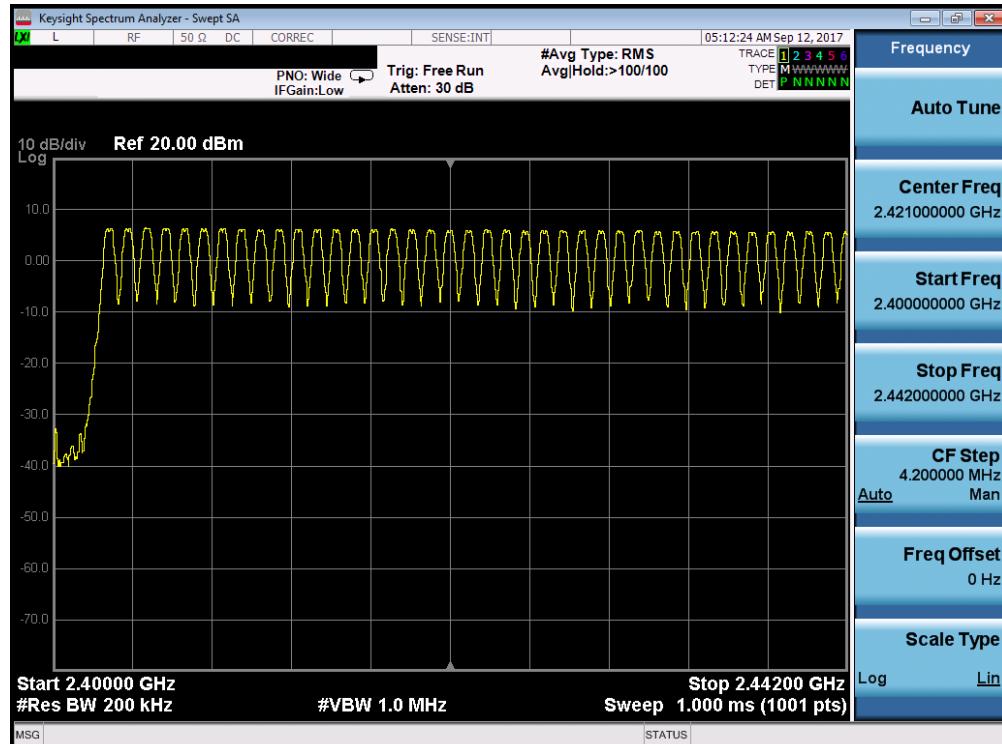


Plot 7-53. Low End Spectrum Channel Hopping Plot (EX600-WEN1)

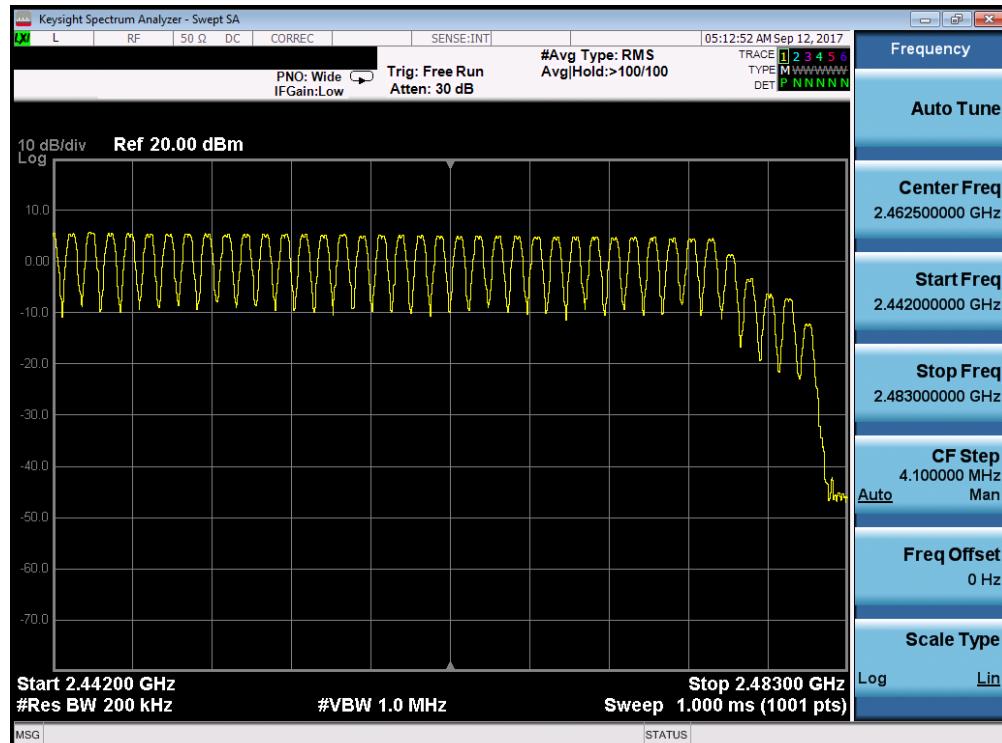


Plot 7-54. High End Spectrum Channel Hopping Plot (EX600-WEN1)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 48 of 108

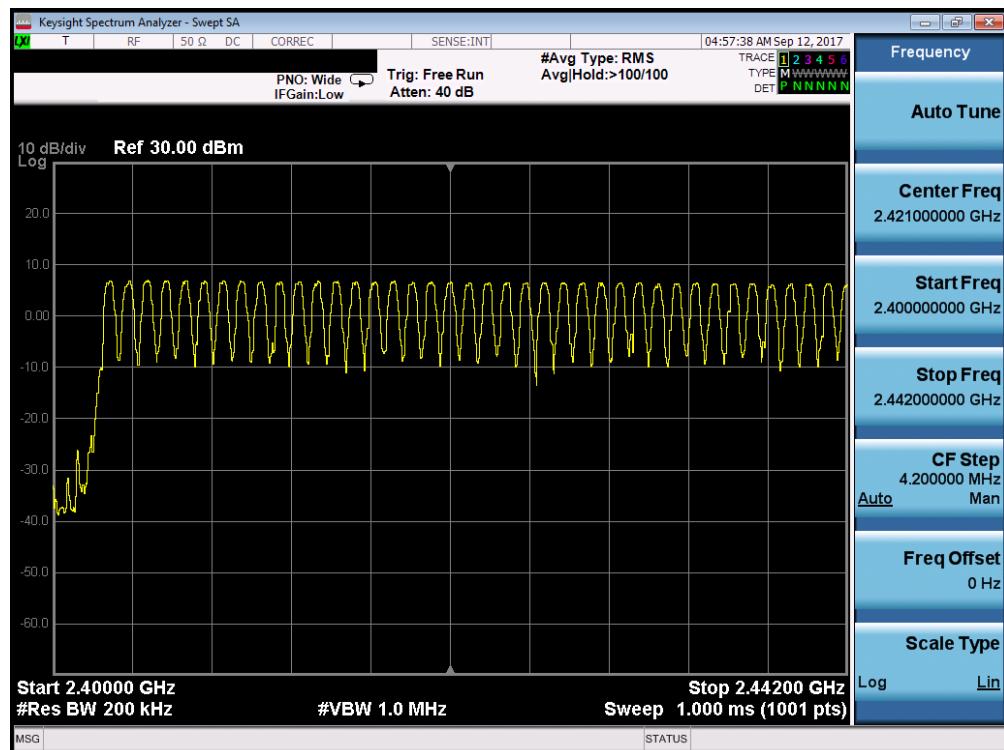


Plot 7-55. Low End Spectrum Channel Hopping Plot (EX600-WEN2)

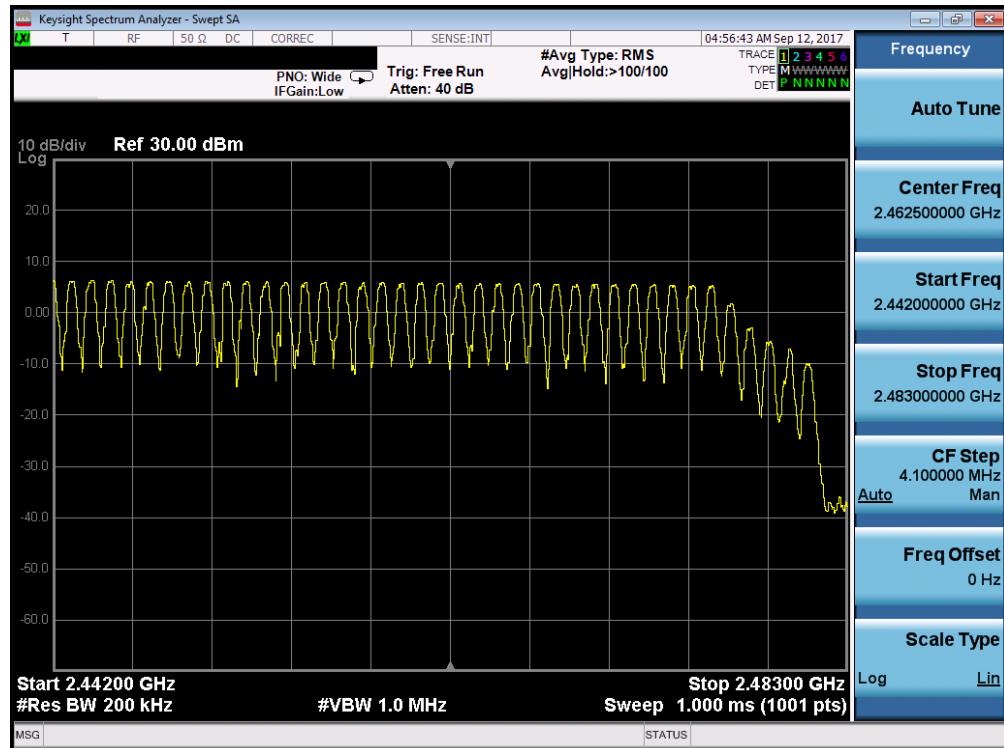


Plot 7-56. High End Spectrum Channel Hopping Plot (EX600-WEN2)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 49 of 108

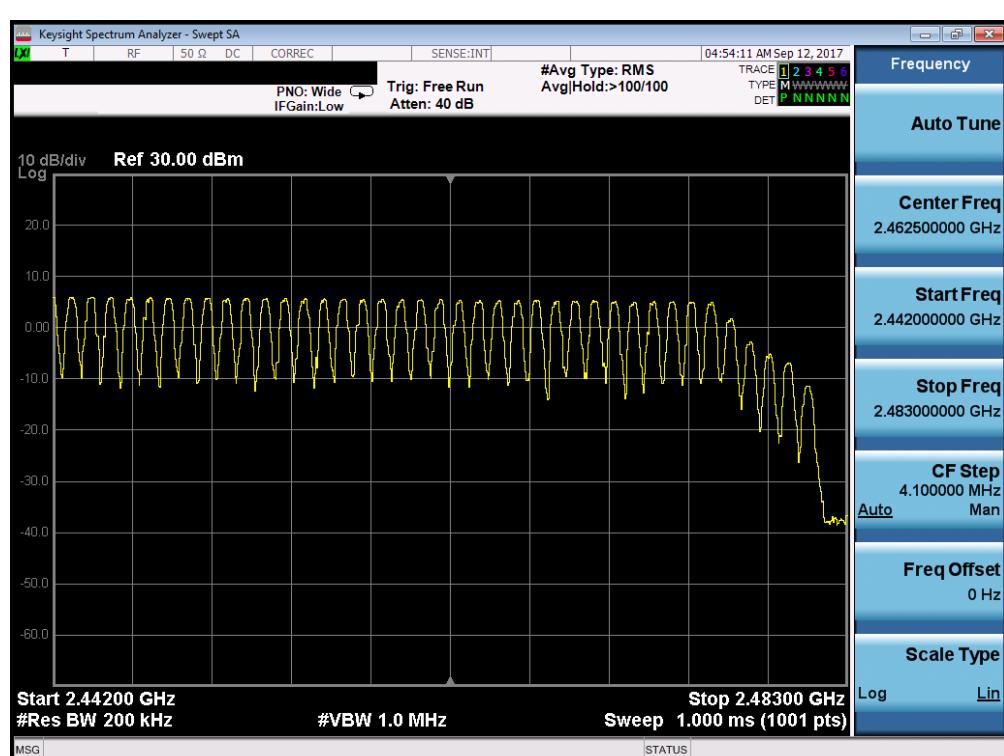
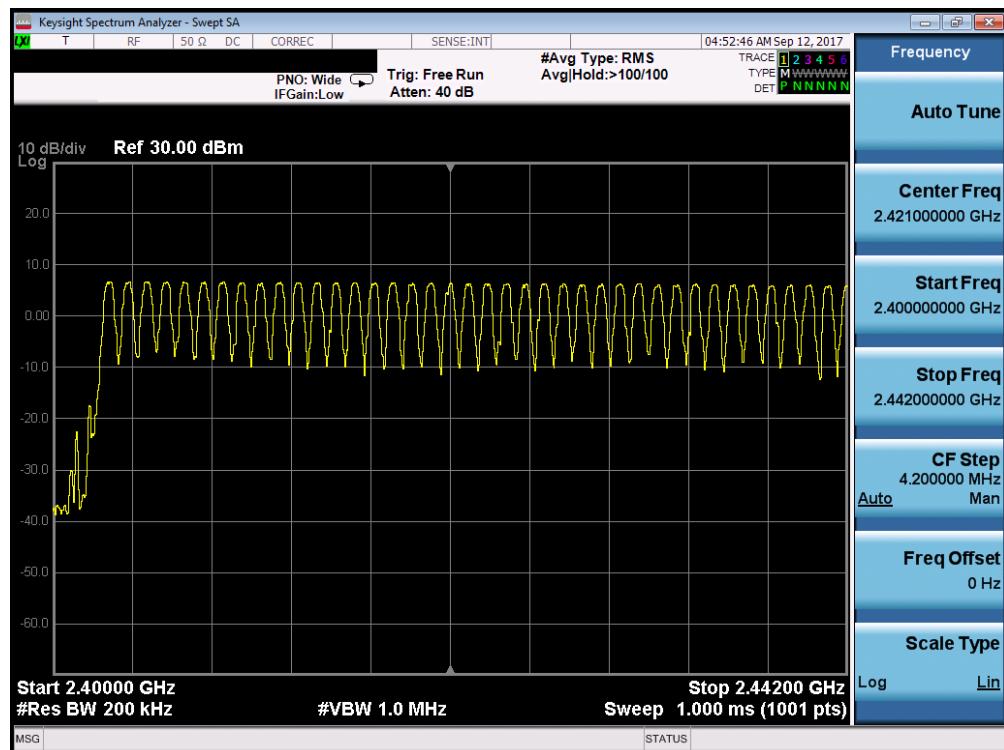


Plot 7-57. Low End Spectrum Channel Hopping Plot (EX600- WSV1)



Plot 7-58. High End Spectrum Channel Hopping Plot (EX600- WSV1)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 50 of 108



FCC ID: 2AJE7SMC-WEX01	PCTEST Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 51 of 108

## 7.8 Conducted Spurious Emissions

§15.247 (d)

### 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

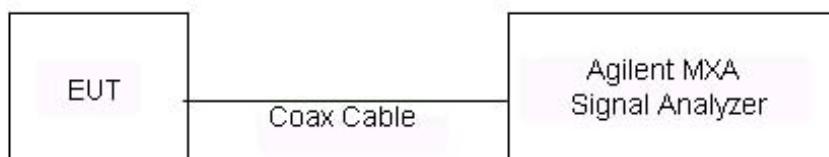
ANSI C63.10-2013 – Section 7.8.8

### 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.

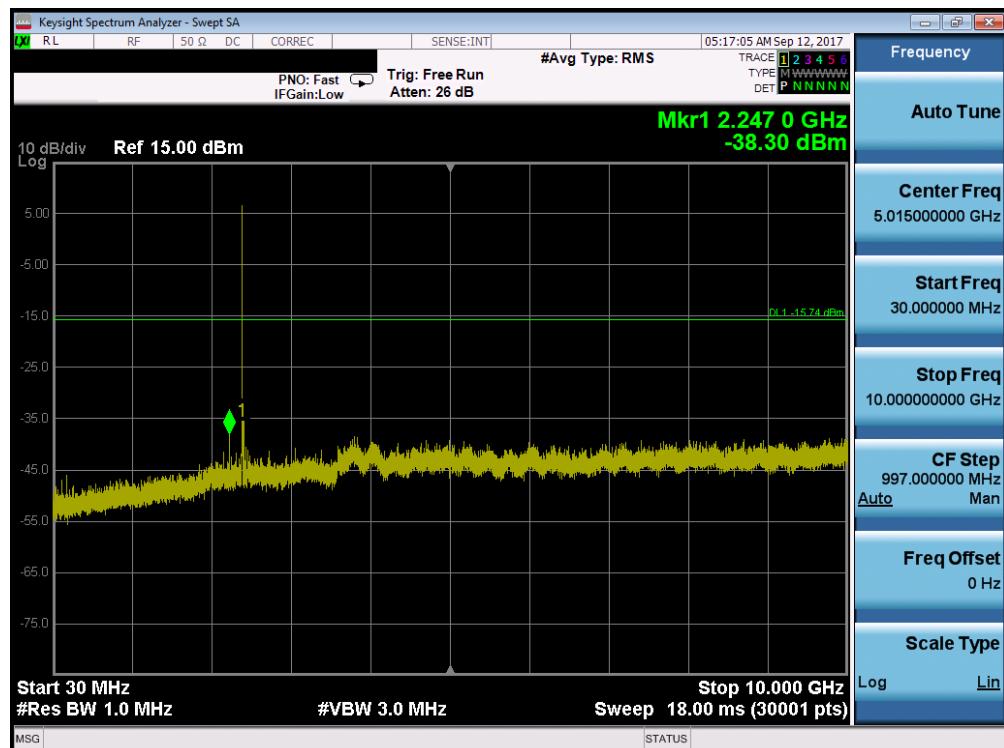


**Figure 7-7. Test Instrument & Measurement Setup**

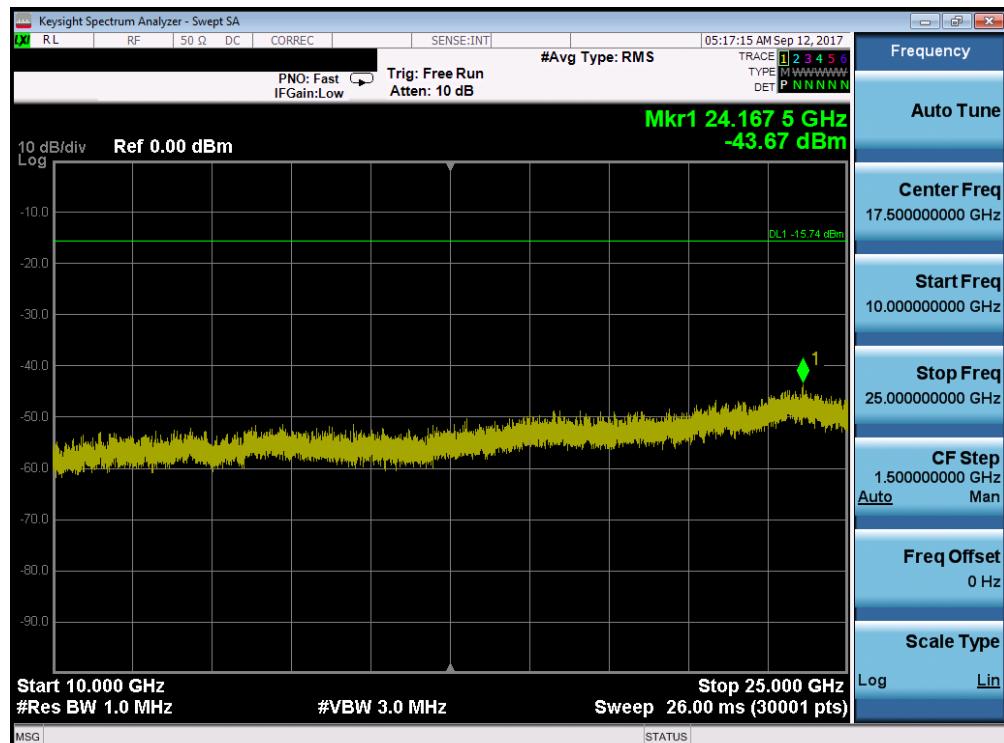
### Test Notes

Out-of-band conducted spurious emissions were investigated for all data rates and the worst case emissions were found with the EUT transmitting in non-hopping. 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.

FCC ID: 2AJE7SMC-WEX01	PCTEST Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 52 of 108

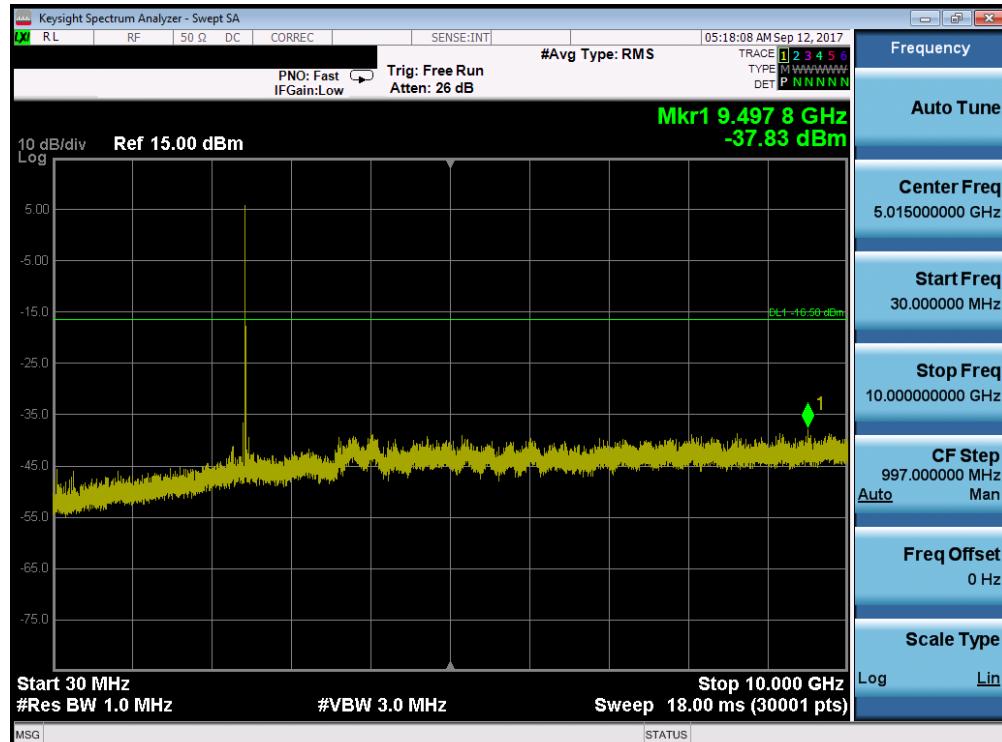


Plot 7-61. Conducted Spurious Plot (EX600-WEN1, Ch. 0)

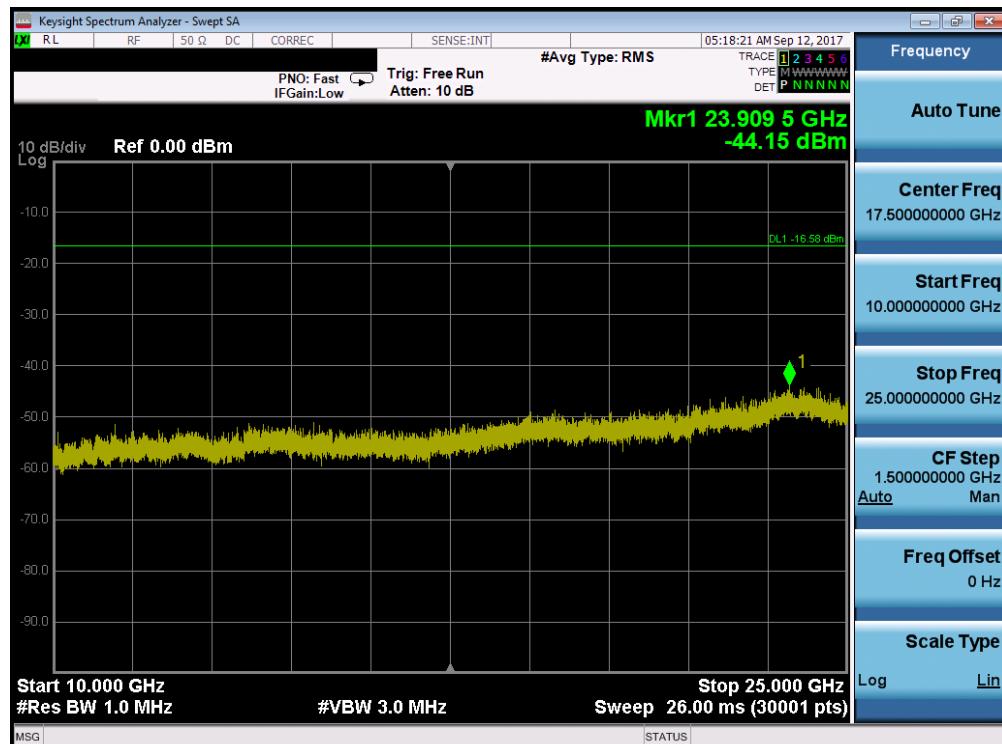


Plot 7-62. Conducted Spurious Plot (EX600-WEN1, Ch. 0)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 53 of 108

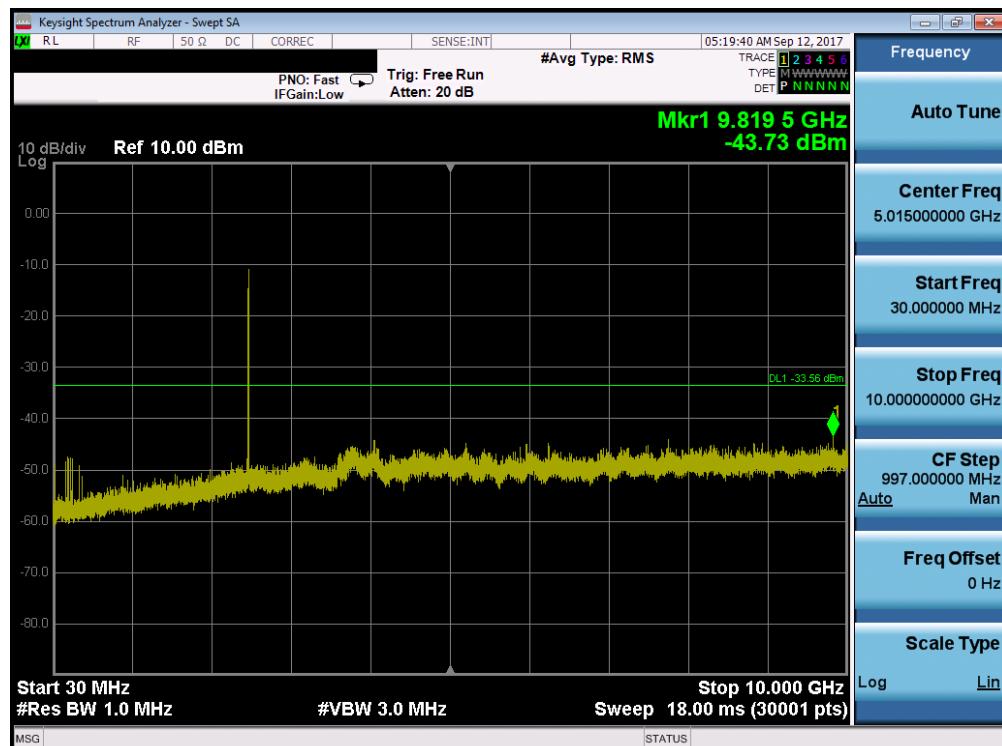


Plot 7-63. Conducted Spurious Plot (EX600-WEN1, Ch. 39)

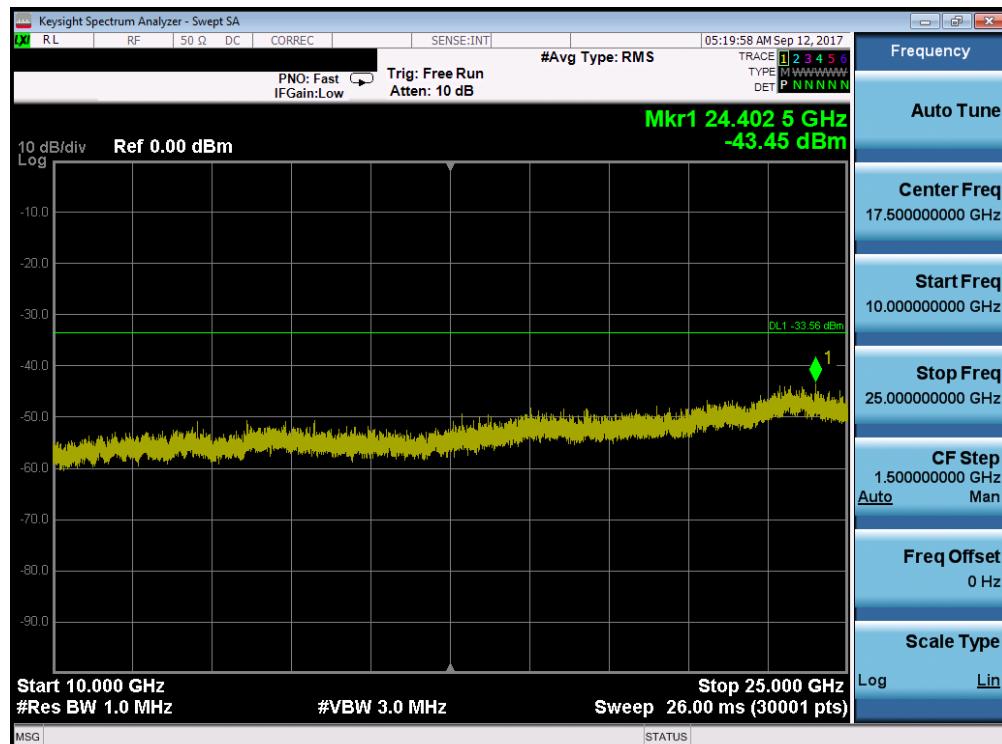


Plot 7-64. Conducted Spurious Plot (EX600-WEN1, Ch. 39)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 54 of 108

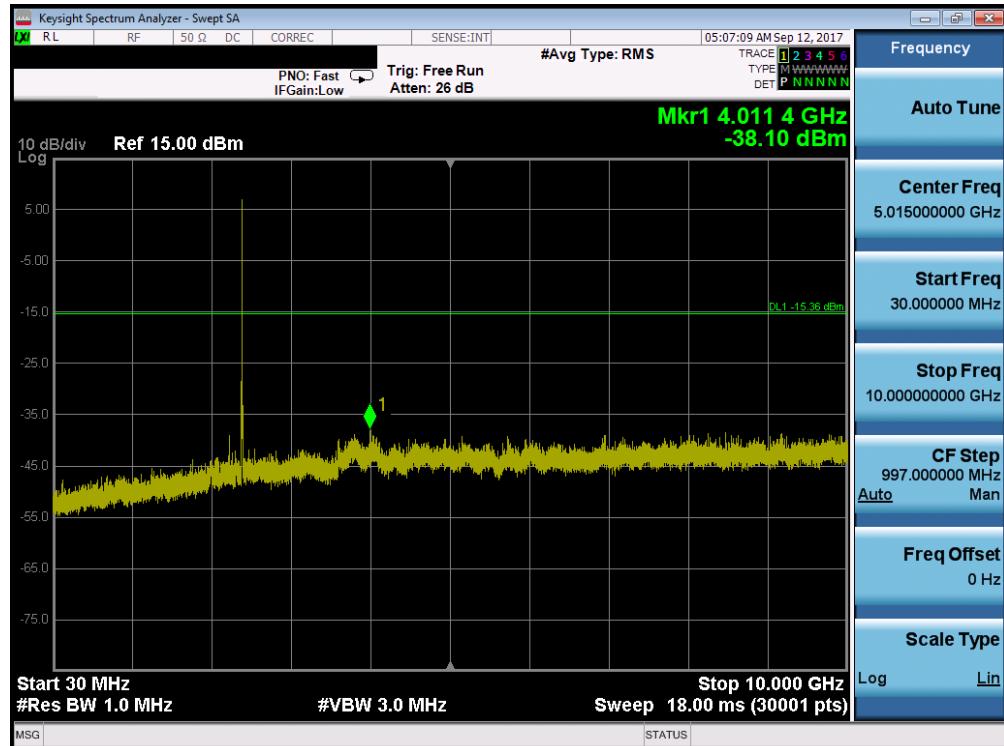


Plot 7-65. Conducted Spurious Plot (EX600-WEN1, Ch. 78)

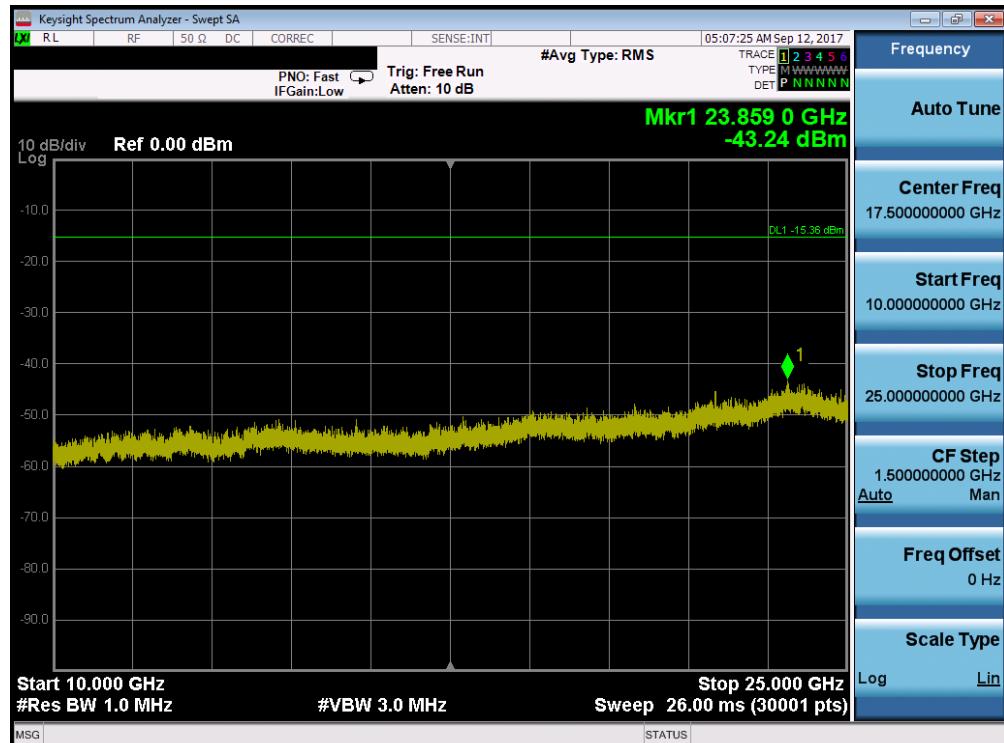


Plot 7-66. Conducted Spurious Plot (EX600-WEN1, Ch. 78)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 55 of 108

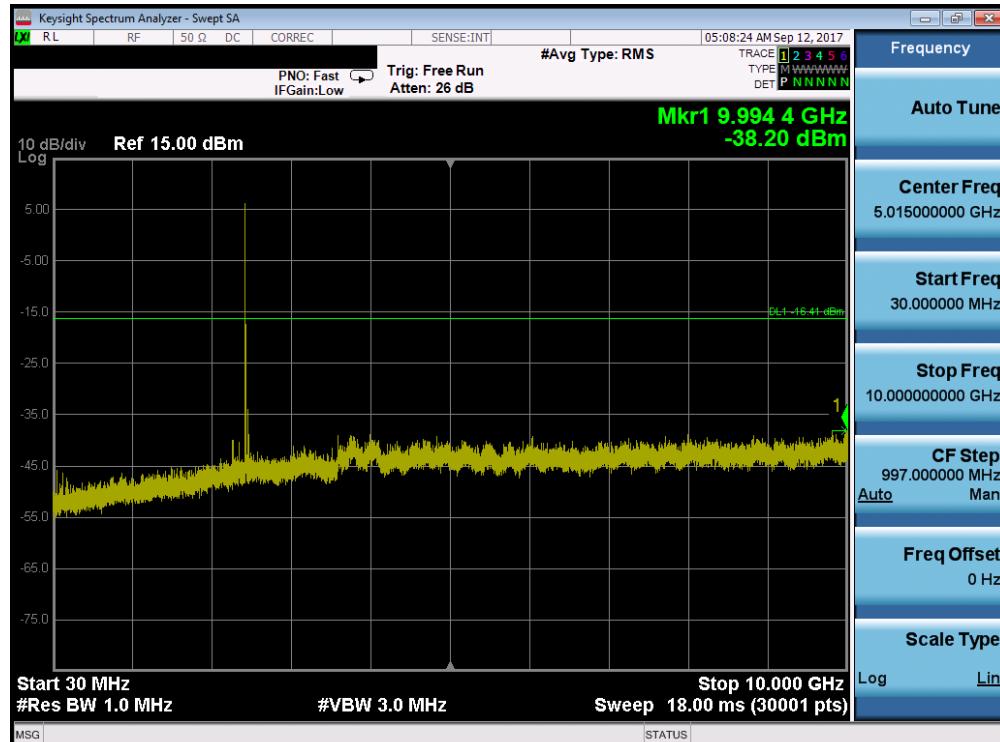


Plot 7-67. Conducted Spurious Plot (EX600-WEN2, Ch. 0)

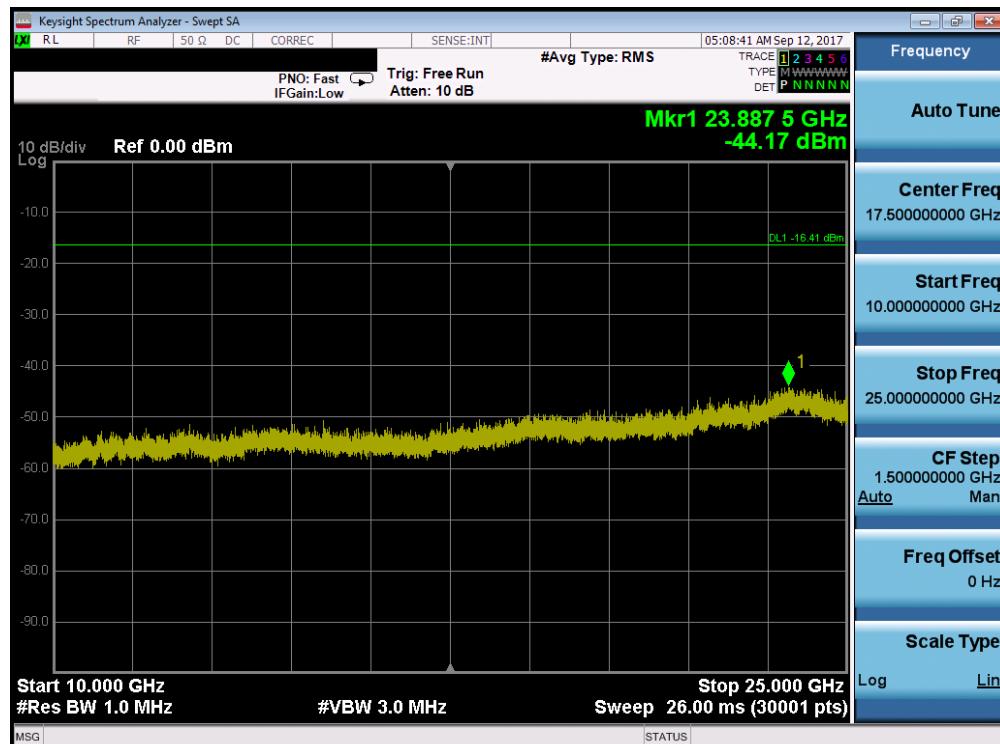


Plot 7-68. Conducted Spurious Plot (EX600-WEN2, Ch. 0)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 56 of 108

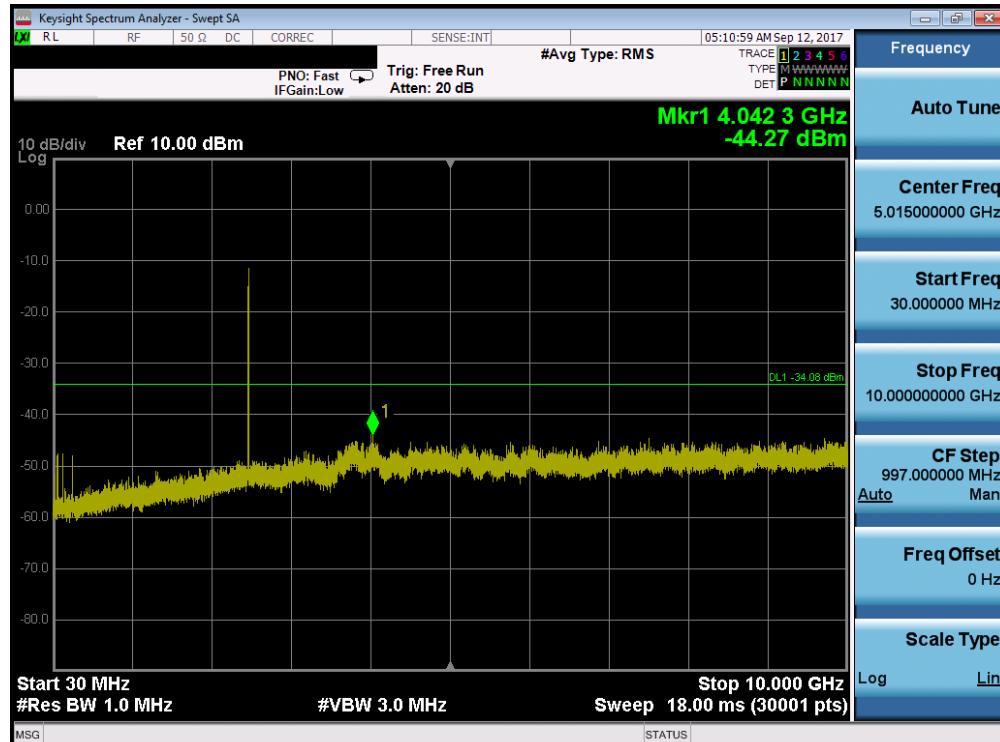


Plot 7-69. Conducted Spurious Plot (EX600-WEN2, Ch. 39)

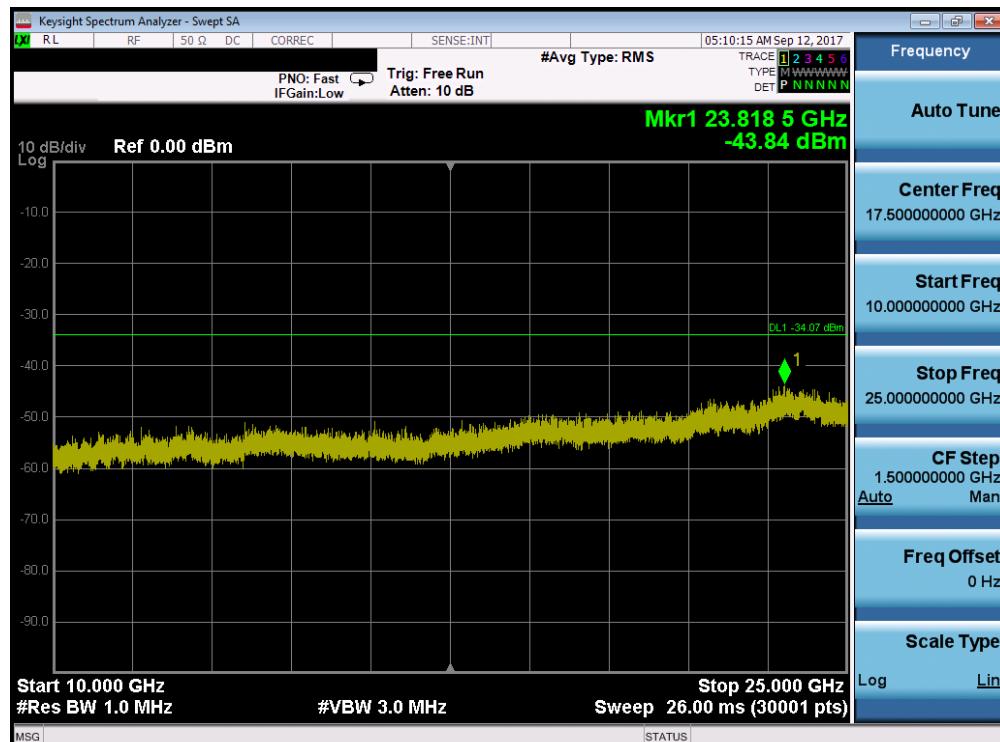


Plot 7-70. Conducted Spurious Plot (EX600-WEN2, Ch. 39)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 57 of 108

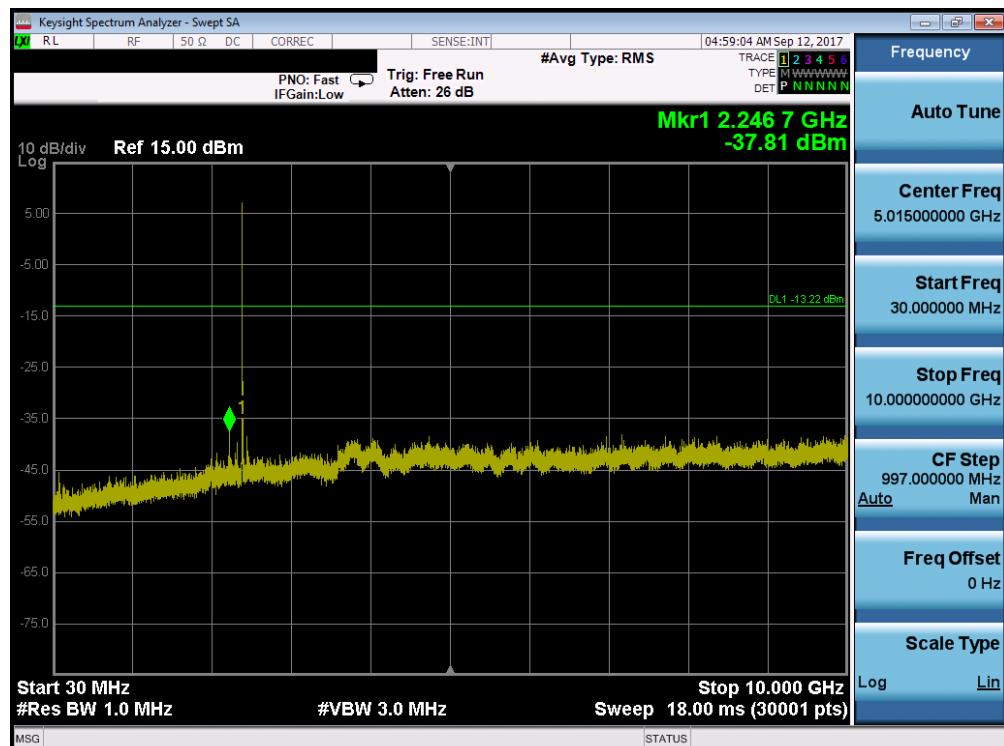


Plot 7-71. Conducted Spurious Plot (EX600-WEN2, Ch. 78)

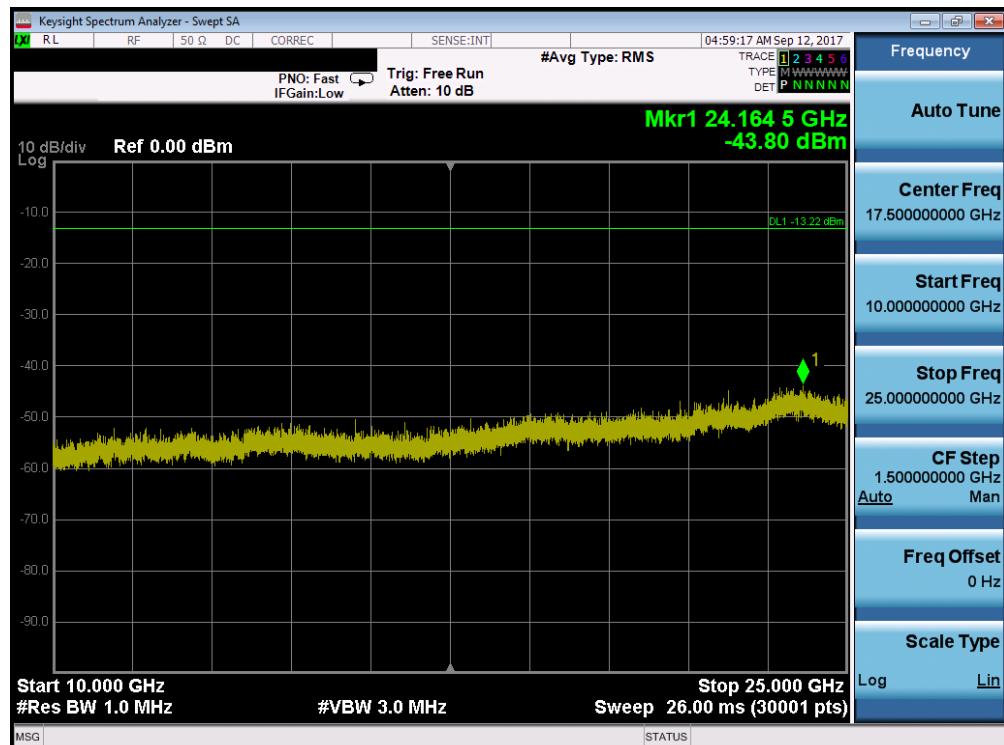


Plot 7-72. Conducted Spurious Plot (EX600-WEN2, Ch. 78)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 58 of 108

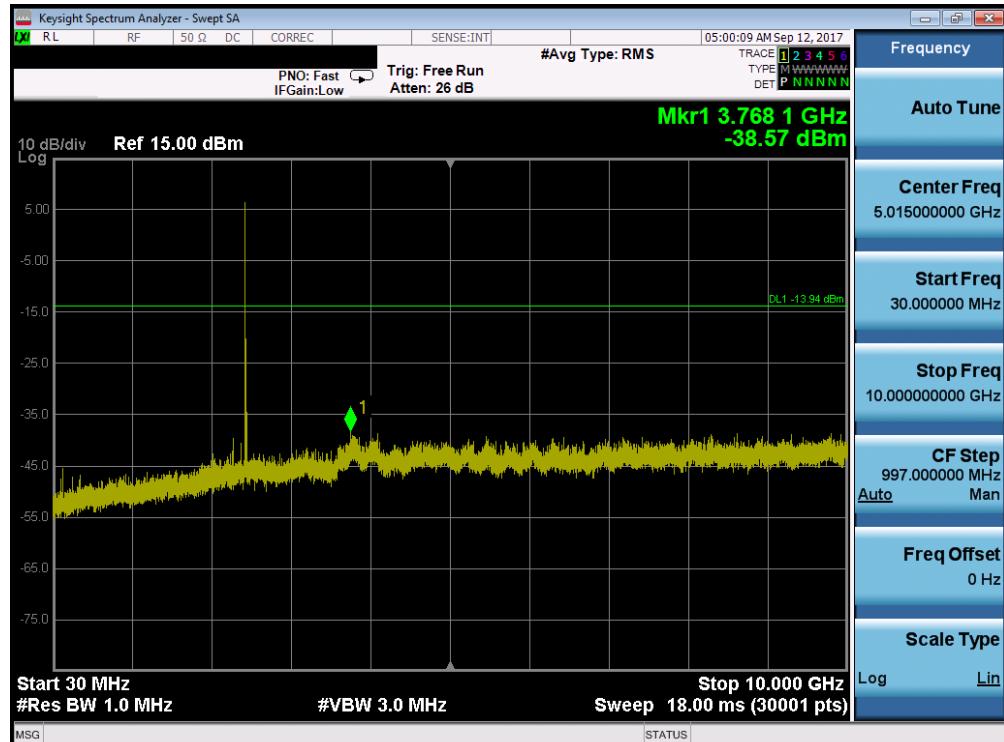


Plot 7-73. Conducted Spurious Plot (EX600-WSV1, Ch. 0)

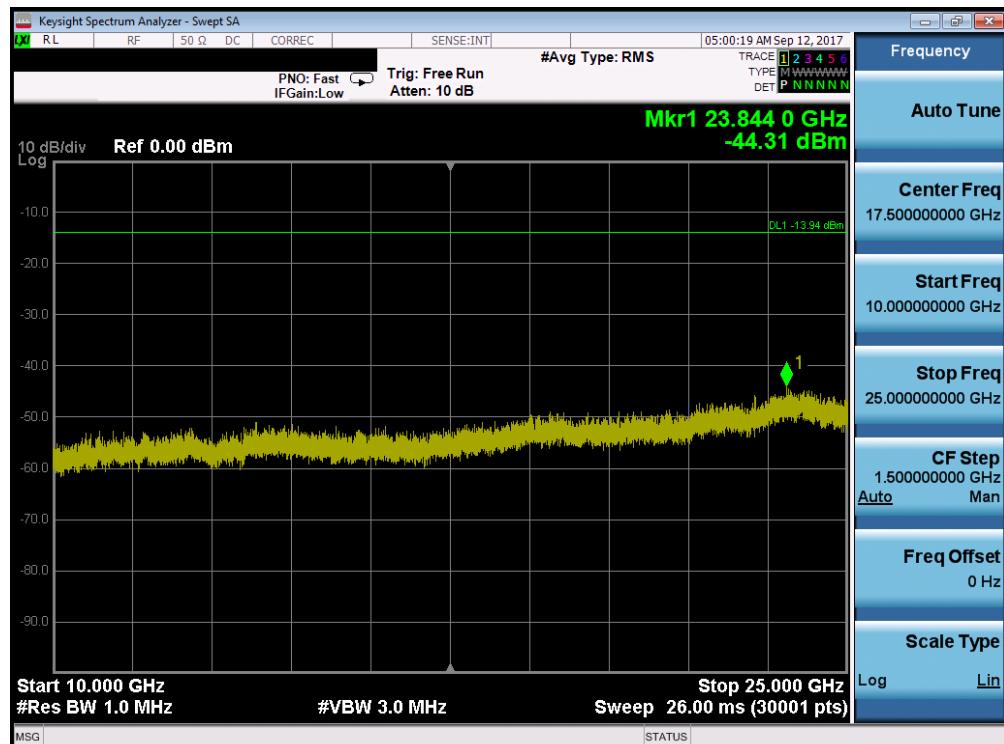


Plot 7-74. Conducted Spurious Plot (EX600- WSV1, Ch. 0)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 59 of 108

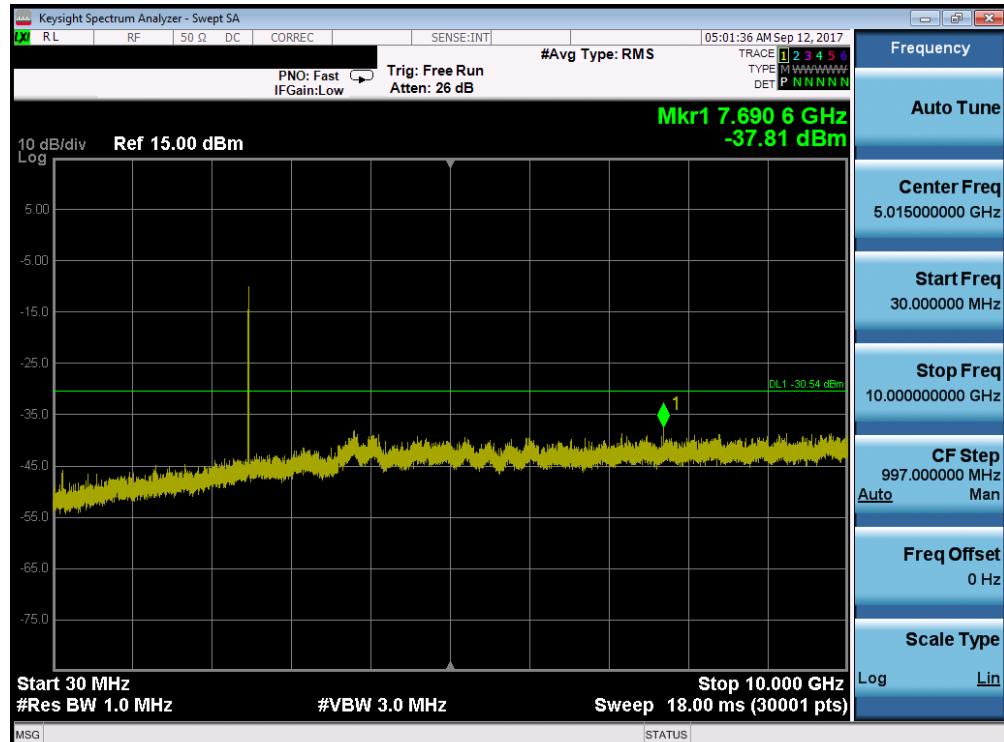


Plot 7-75. Conducted Spurious Plot (EX600- WSV1, Ch. 39)

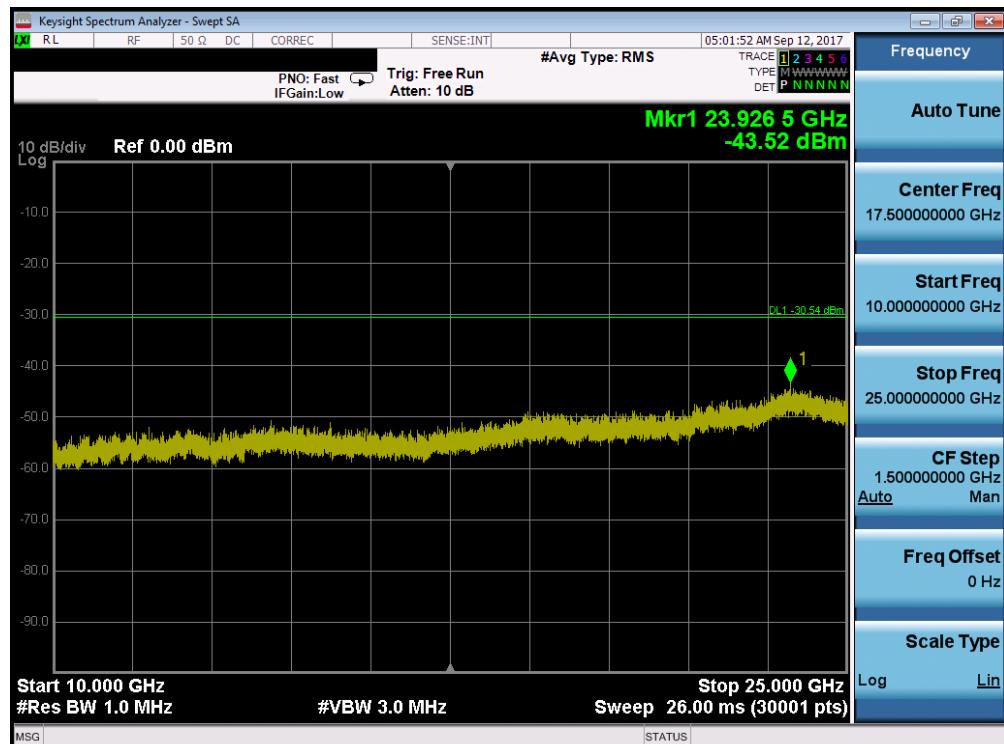


Plot 7-76. Conducted Spurious Plot (EX600- WSV1, Ch. 39)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 60 of 108

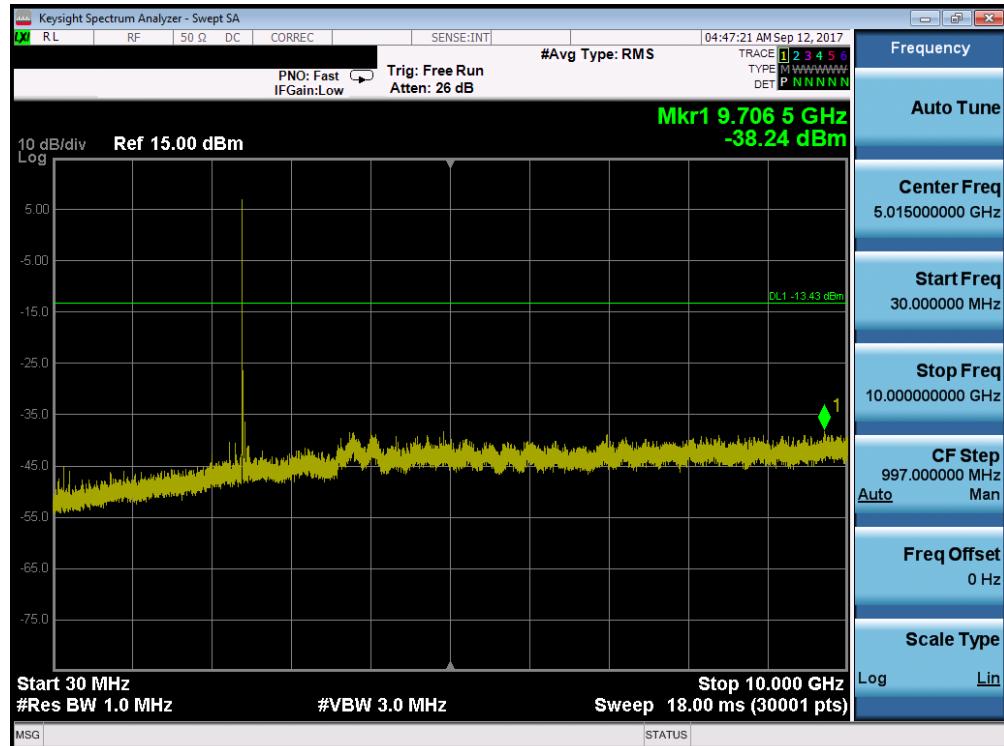


Plot 7-77. Conducted Spurious Plot (EX600- WSV1, Ch. 78)

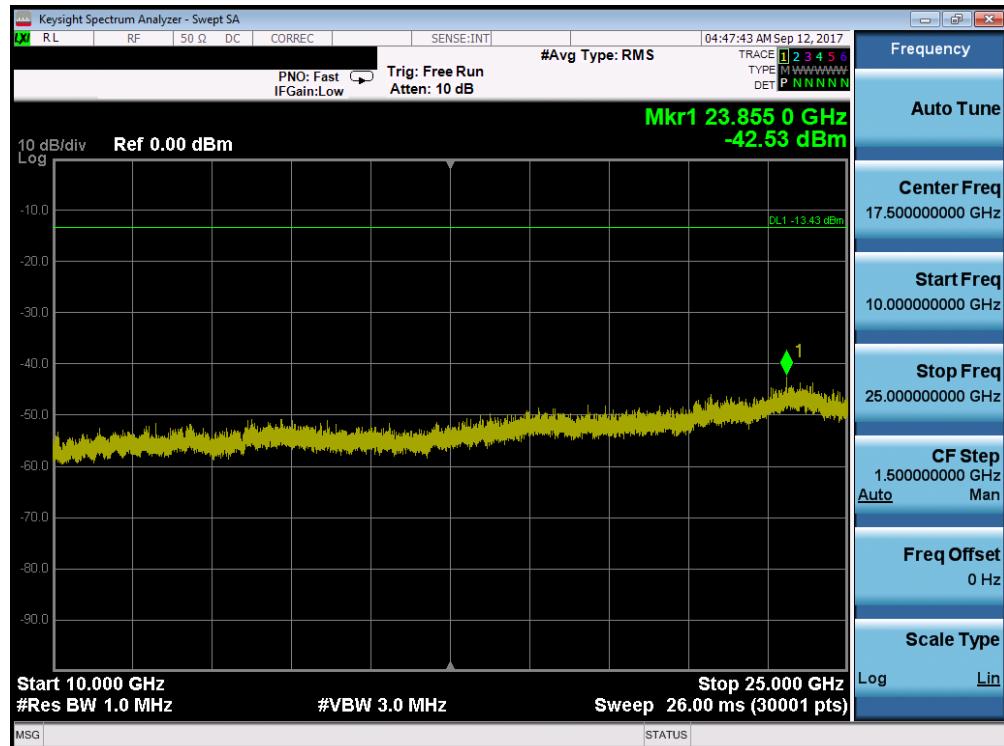


Plot 7-78. Conducted Spurious Plot (EX600- WSV1, Ch. 78)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 61 of 108

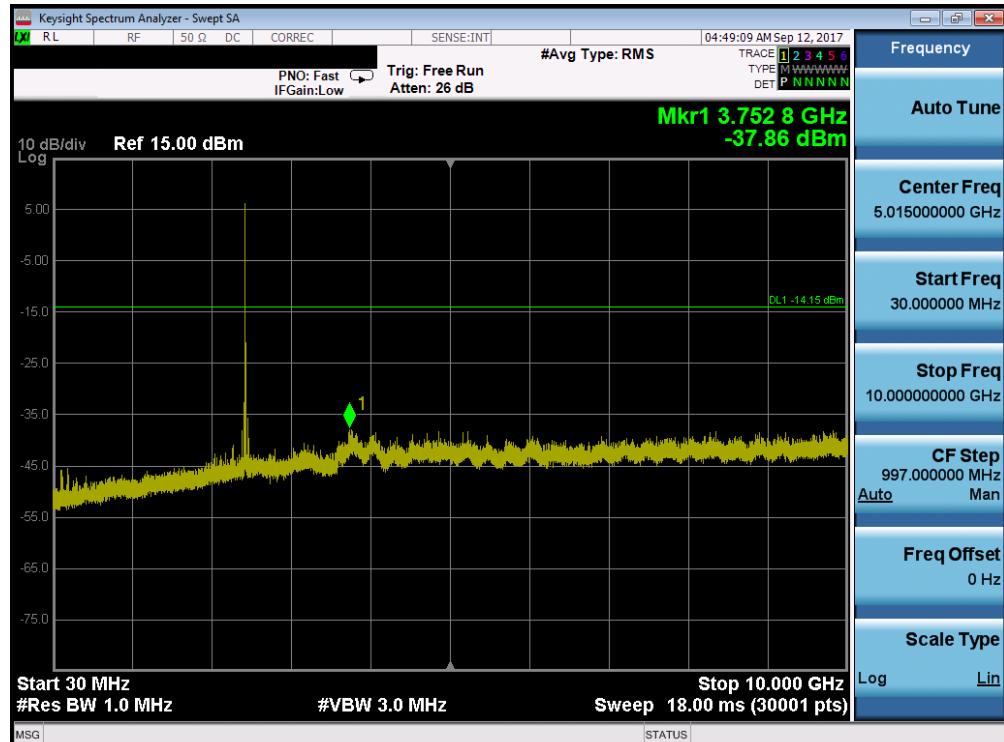


Plot 7-79. Conducted Spurious Plot (EX600-WSV2, Ch. 0)

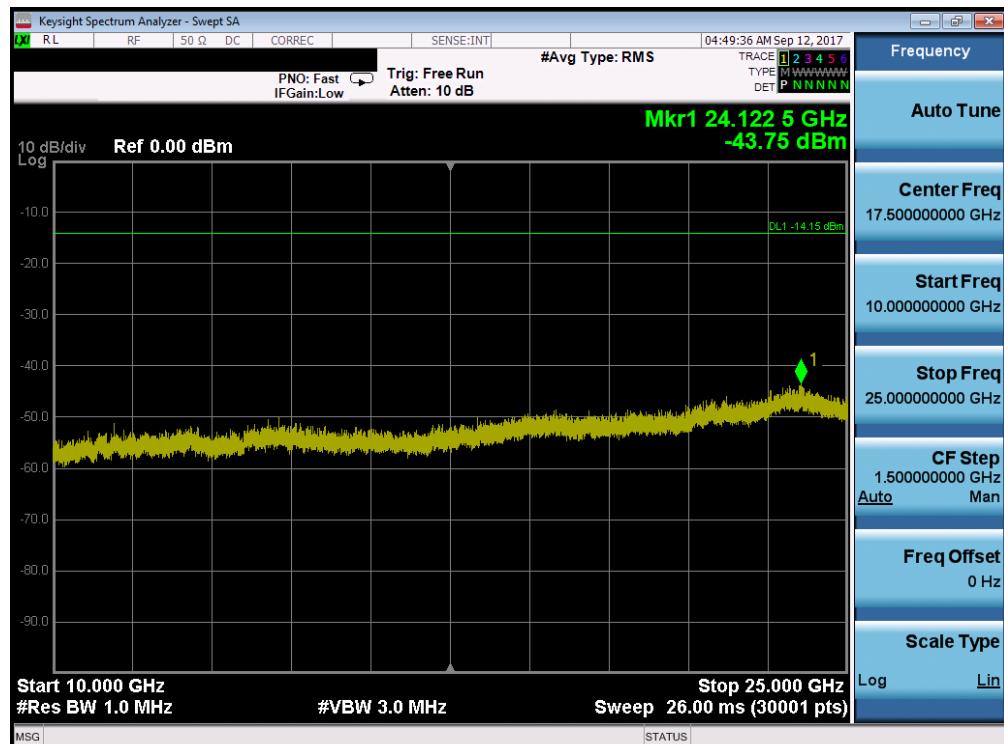


Plot 7-80. Conducted Spurious Plot (EX600- WSV2, Ch. 0)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 62 of 108

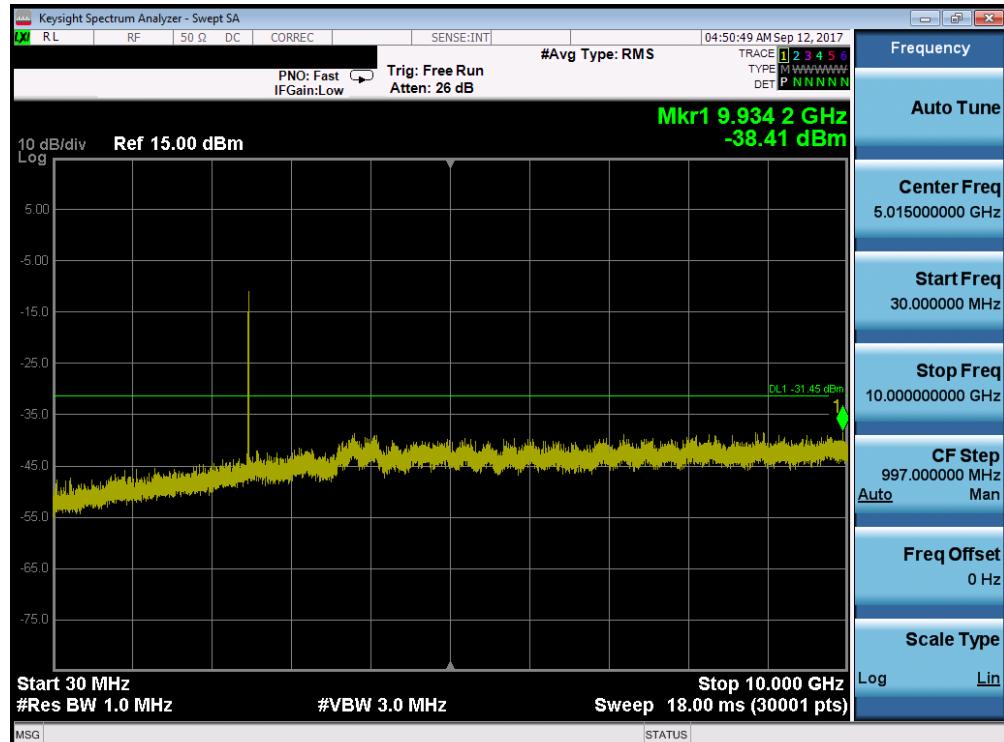


Plot 7-81. Conducted Spurious Plot (EX600- WSV2, Ch. 39)

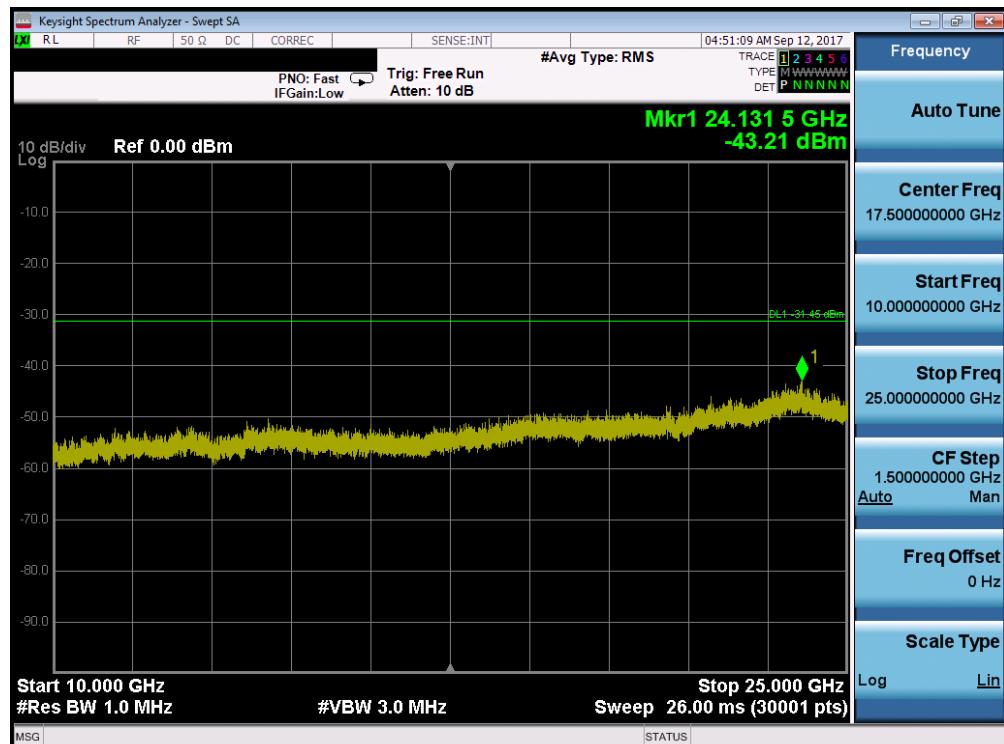


Plot 7-82. Conducted Spurious Plot (EX600- WSV2, Ch. 39)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-83. Conducted Spurious Plot (EX600- WSV2, Ch. 78)



Plot 7-84. Conducted Spurious Plot (EX600- WSV2, Ch. 78)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 64 of 108



## 7.9 Radiated Spurious Emission Measurements – Above 1GHz

§15.205 §15.209 §15.247 (d)

### 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 must not exceed the limits shown in Table 7-14 per Section 15.209.***

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

**Table 7-14. Radiated Limits**

### Test Procedure Used

ANSI C63.10-2013 – Section 6.6.4.3

### Test Settings

#### Average Field Strength Measurements per Section 4.1.4.2.3 of ANSI C63.10-2013

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 1kHz  $\geq 1/\tau$  Hz, where  $\tau$  = pulse width in seconds
4. Averaging type was set to RMS to ensure that video filtering was applied in the power domain
5. Detector = peak
6. Sweep time = auto
7. Trace mode = max hold
8. Trace was allowed to stabilize

#### Peak Field Strength Measurements per Section 4.1.4.2.2 of ANSI C63.10-2013

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW is set depending on measurement frequency, as specified in Table 7-15 below
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
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Frequency	RBW
9 – 150kHz	200 – 300Hz
0.15 – 30MHz	9 – 10kHz
30 – 1000MHz	100 – 120kHz
> 1000MHz	1MHz

Table 7-15. RBW as a Function of Frequency

### Test Setup

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

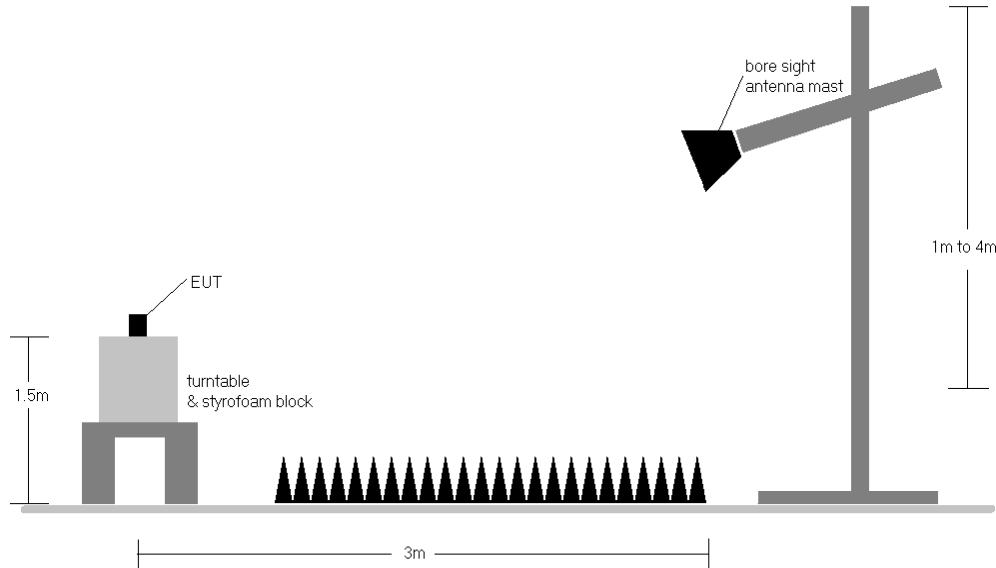


Figure 7-8. Radiated Test Setup >1GHz

### Test Notes

1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-14.
2. No significant radiated emissions were found in the 2310 - 2390MHz restricted band.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. This unit was tested while powered by an DC power source.
5. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
6. The duty cycle correction factor was not applied to noise floor measurements.
7. 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.
8. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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## Sample Calculation

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

## Duty Cycle Correction Factor Calculation

- Number of times transmitter hits on one channel = 1 time(s) / 100ms
- Worst case dwell time = 1.2 ms
- Duty cycle correction factor =  $20\log_{10}(1.2\text{ms}/100\text{ms}) = -38.42 \text{ dB}$

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Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 67 of 108

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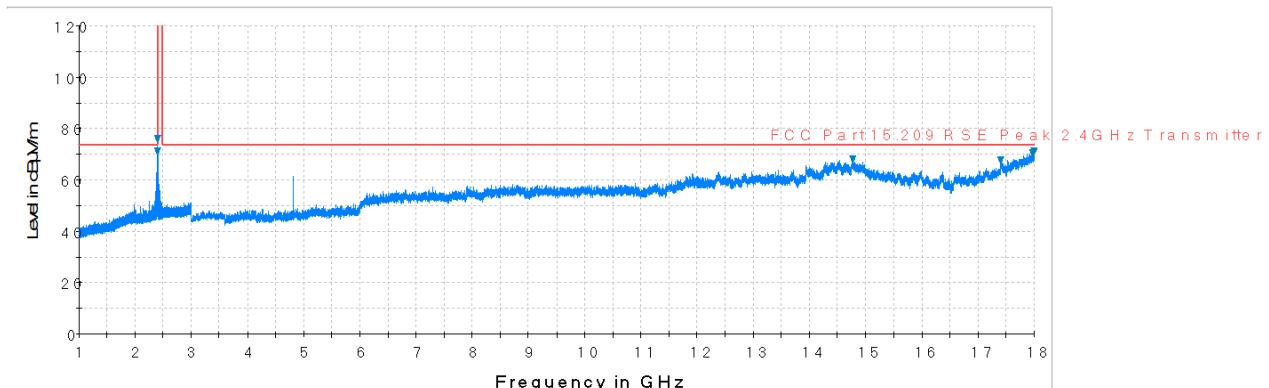
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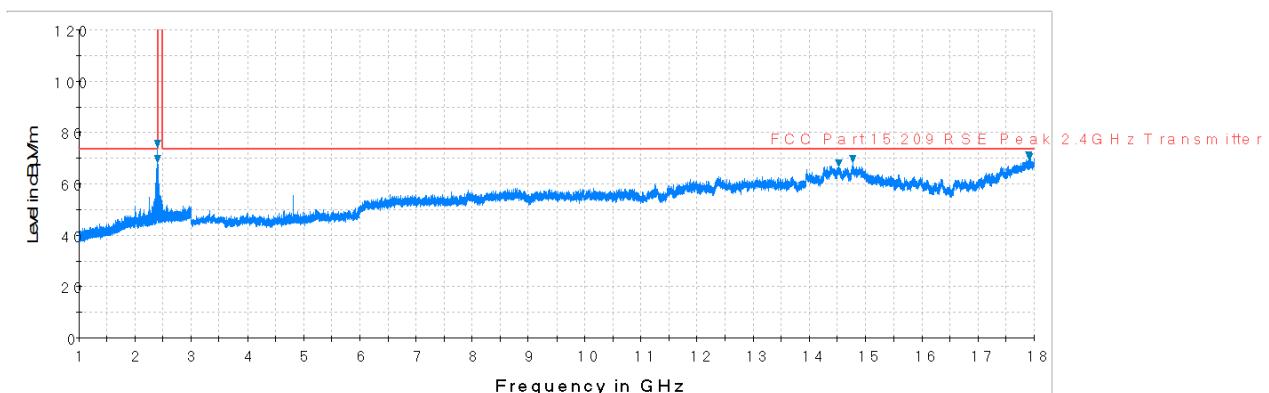
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## Radiated Spurious Emission Measurements

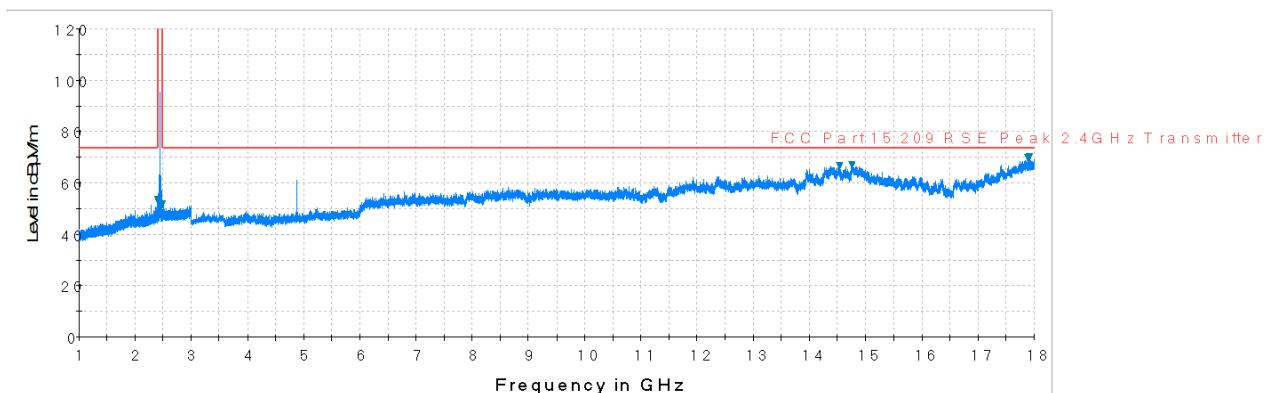
§15.205 §15.209 §15.247 (d)



Plot 7-85. Radiated Spurious Plot above 1GHz (EX600-WEN1, Ch. 0, Ant. Pol. H)

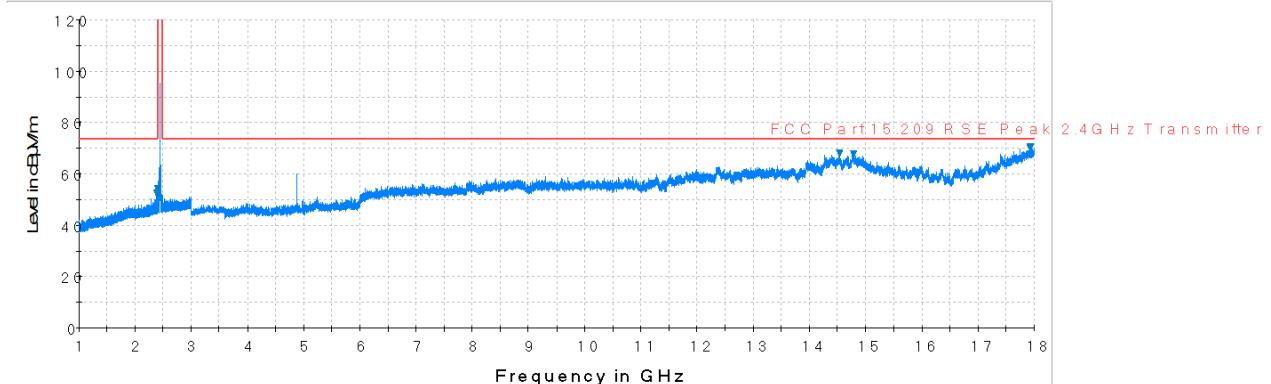


Plot 7-86. Radiated Spurious Plot above 1GHz (EX600-WEN1, Ch. 0, Ant. Pol. V)

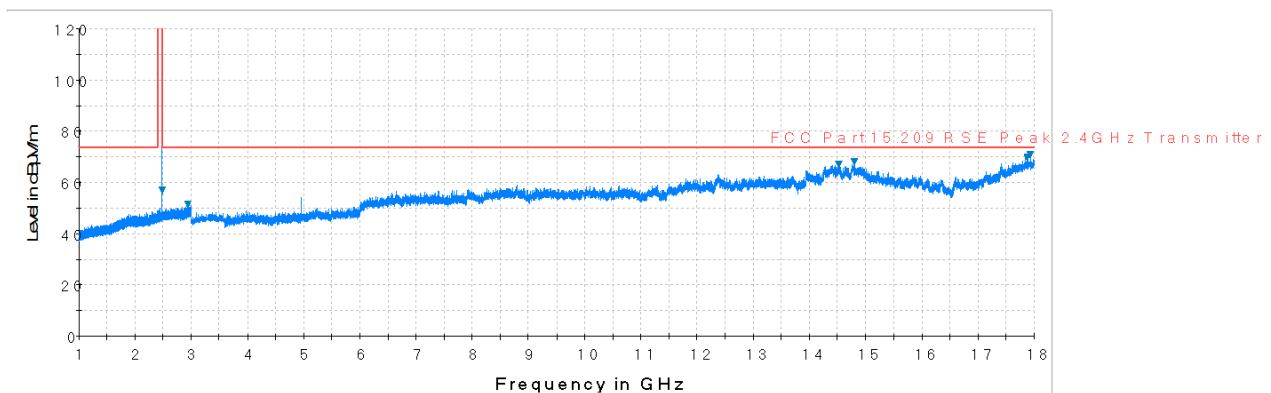


Plot 7-87. Radiated Spurious Plot above 1GHz (EX600-WEN1, Ch. 39, Ant. Pol. H)

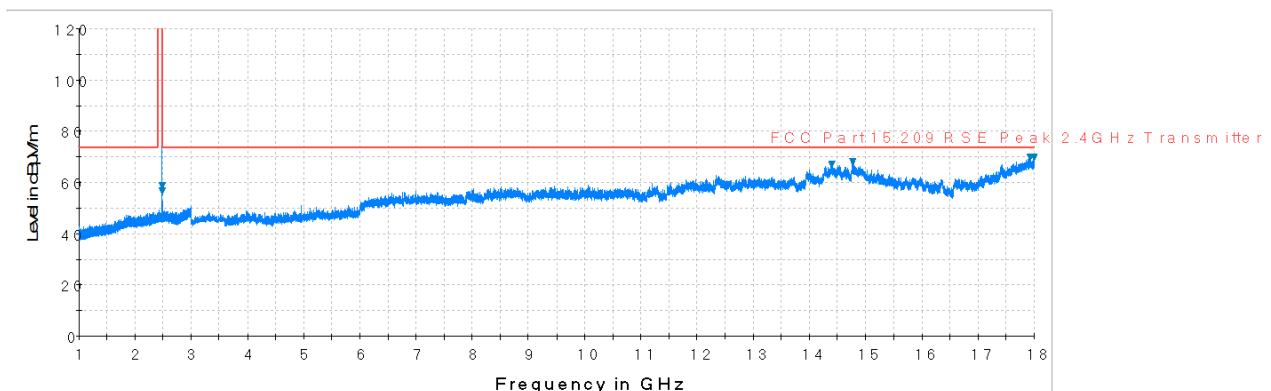
FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 68 of 108



**Plot 7-88. Radiated Spurious Plot above 1GHz (EX600-WEN1, Ch. 39, Ant. Pol. V)**

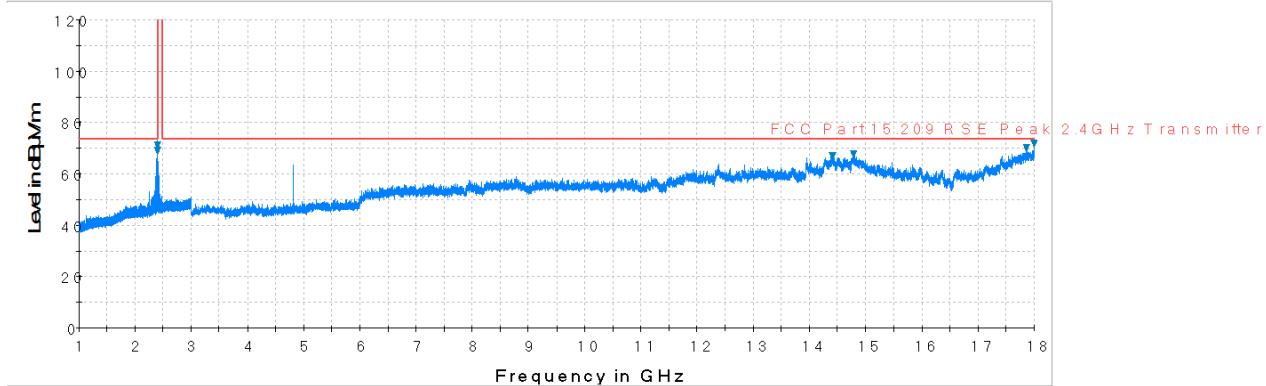


**Plot 7-89. Radiated Spurious Plot above 1GHz (EX600-WEN1, Ch. 78, Ant. Pol. H)**

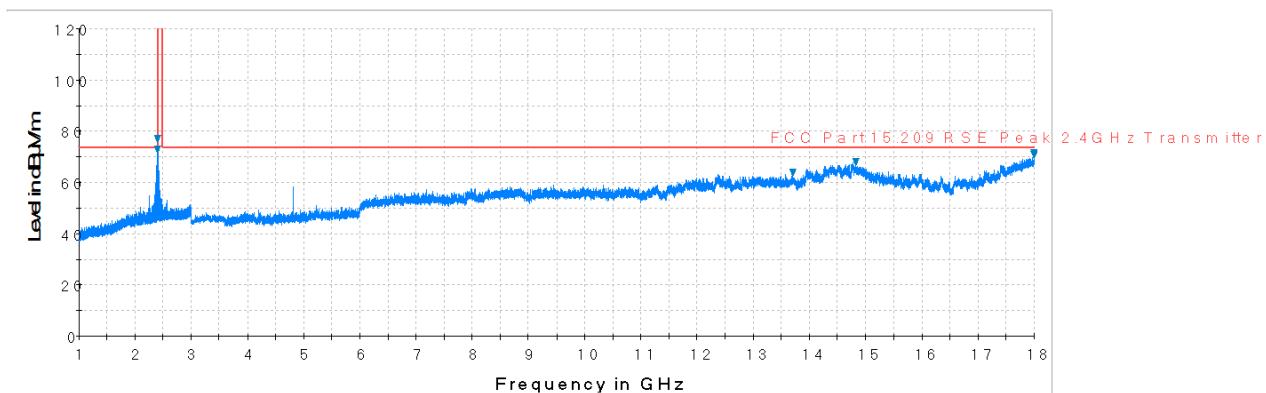


**Plot 7-90. Radiated Spurious Plot above 1GHz (EX600-WEN1, Ch. 78, Ant. Pol. V)**

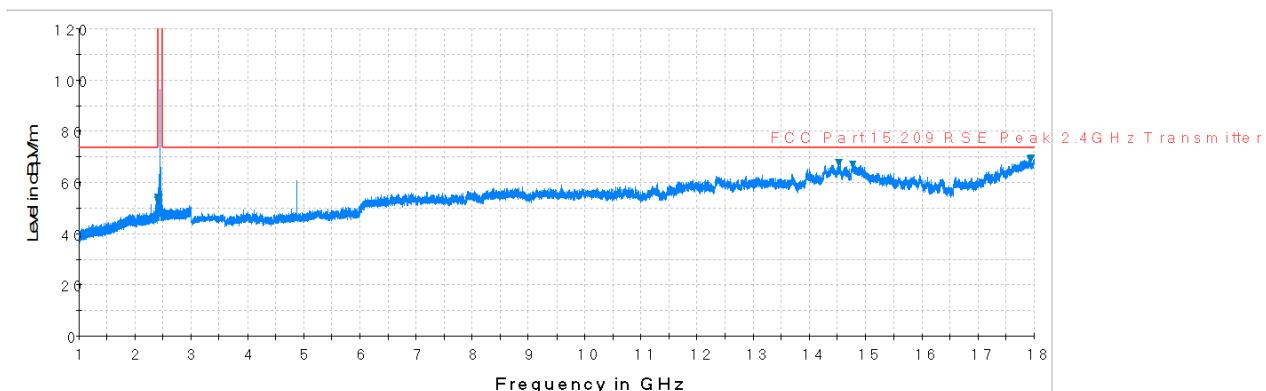
FCC ID: 2AJE7SMC-WEX01	<b>PCTEST</b> Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 69 of 108



**Plot 7-91. Radiated Spurious Plot above 1GHz (EX600-WEN2, Ch. 0, Ant. Pol. H)**

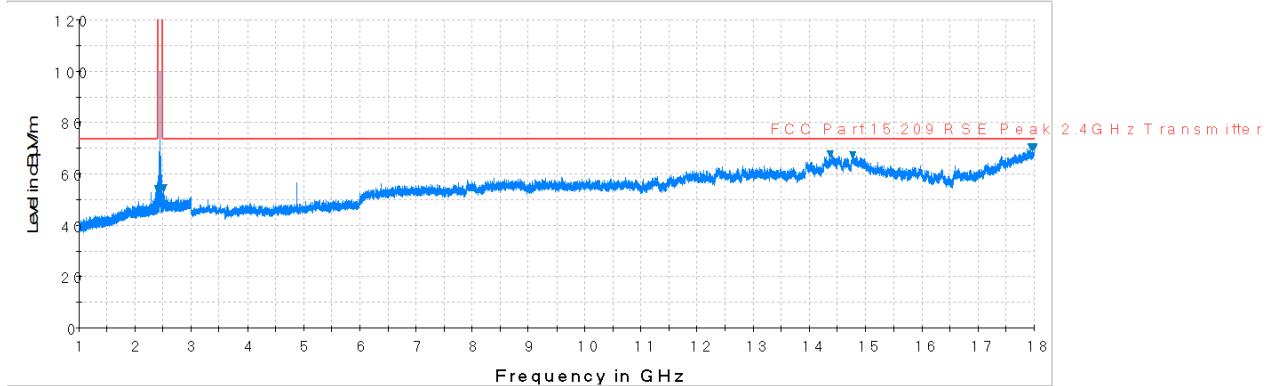


**Plot 7-92. Radiated Spurious Plot above 1GHz (EX600-WEN2, Ch. 0, Ant. Pol. V)**

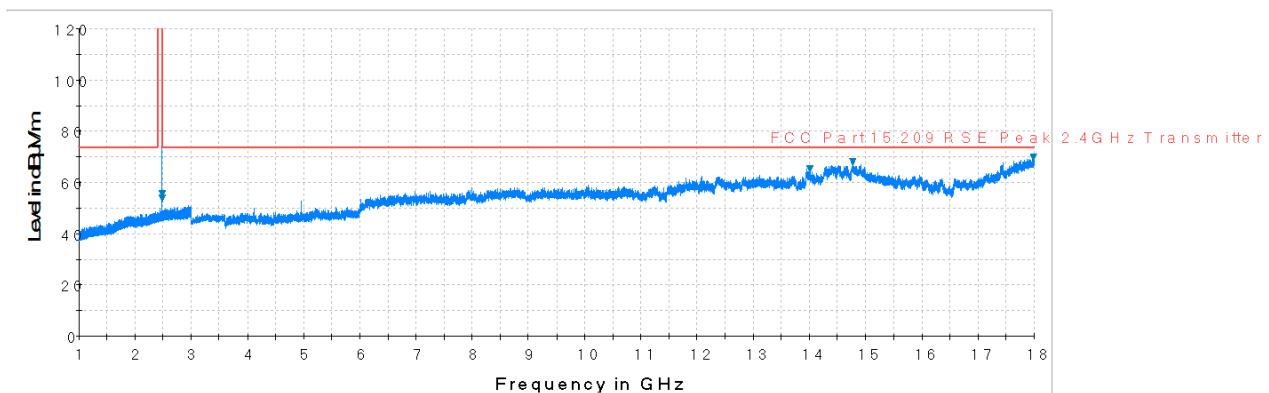


**Plot 7-93. Radiated Spurious Plot above 1GHz (EX600-WEN2, Ch. 39, Ant. Pol. H)**

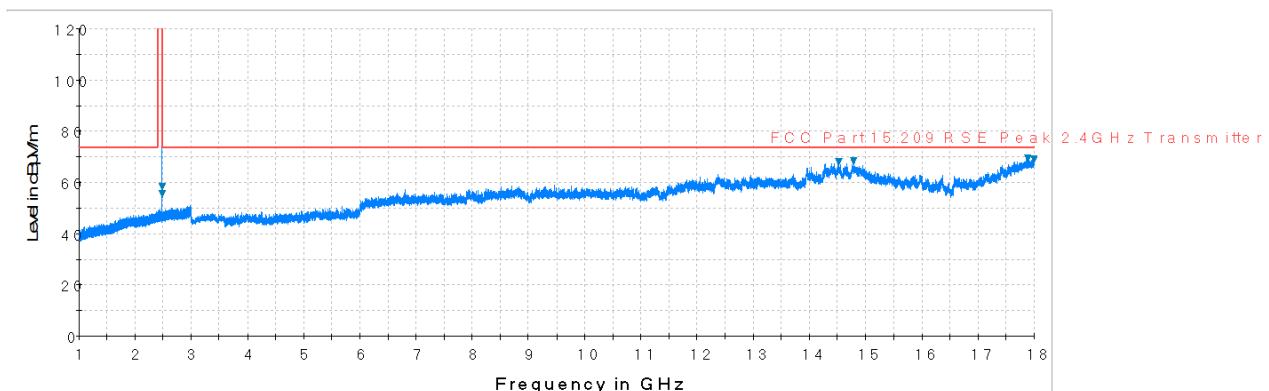
FCC ID: 2AJE7SMC-WEX01	<b>PCTEST</b> Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: Quality Manager
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**Plot 7-94. Radiated Spurious Plot above 1GHz (EX600-WEN2, Ch. 39, Ant. Pol. V)**

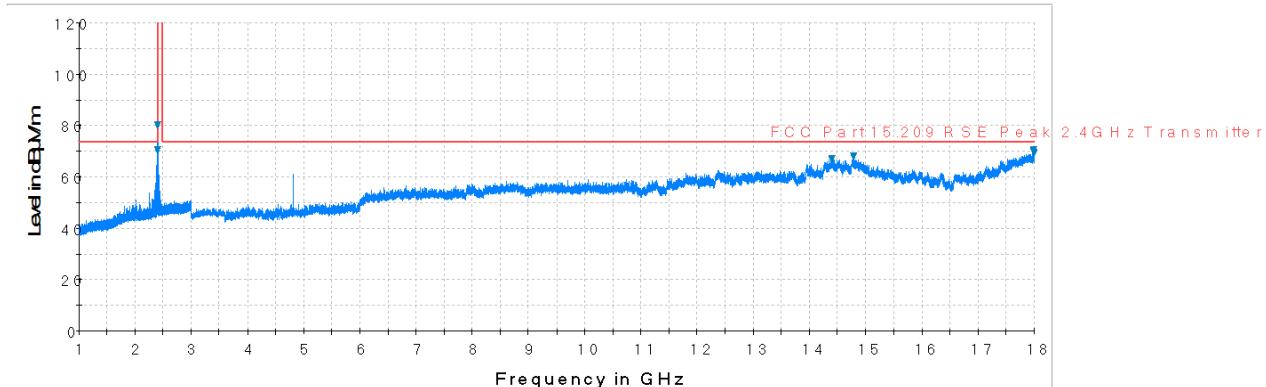


**Plot 7-95. Radiated Spurious Plot above 1GHz (EX600-WEN2, Ch. 78, Ant. Pol. H)**

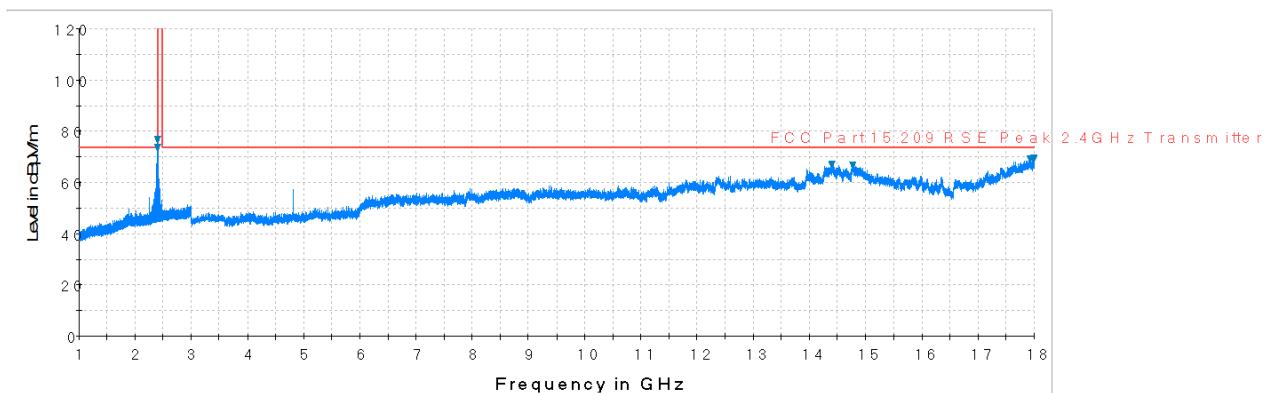


**Plot 7-96. Radiated Spurious Plot above 1GHz (EX600-WEN2, Ch. 78, Ant. Pol. V)**

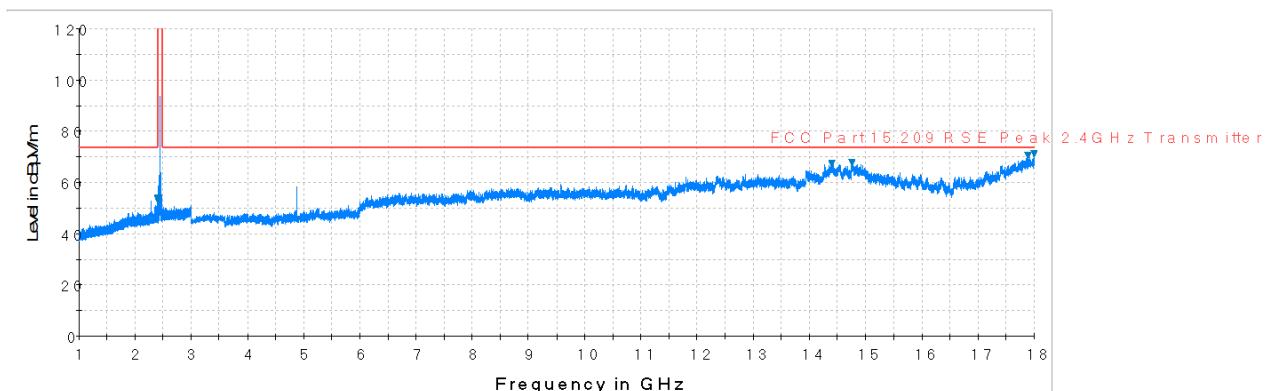
FCC ID: 2AJE7SMC-WEX01	<b>PCTEST</b> Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
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**Plot 7-97. Radiated Spurious Plot above 1GHz (EX600-WSV1, Ch. 0, Ant. Pol. H)**

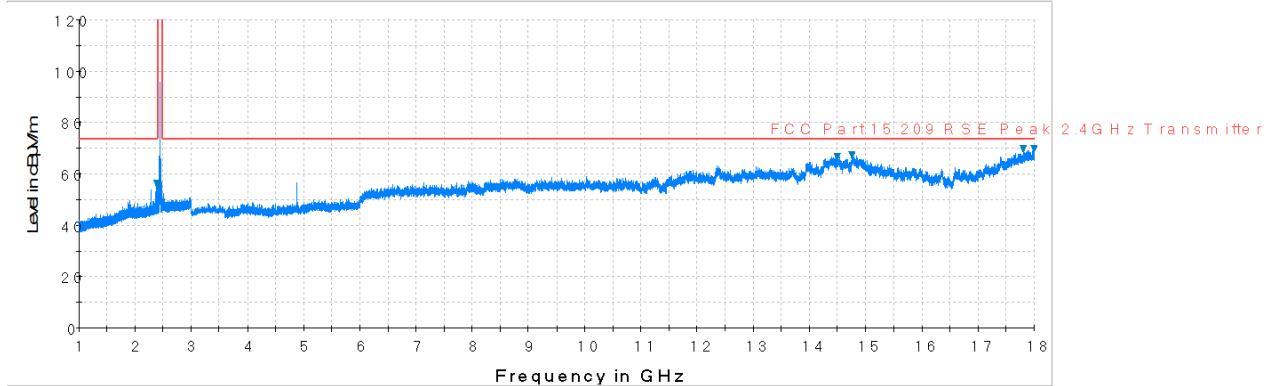


**Plot 7-98. Radiated Spurious Plot above 1GHz (EX600- WSV1, Ch. 0, Ant. Pol. V)**

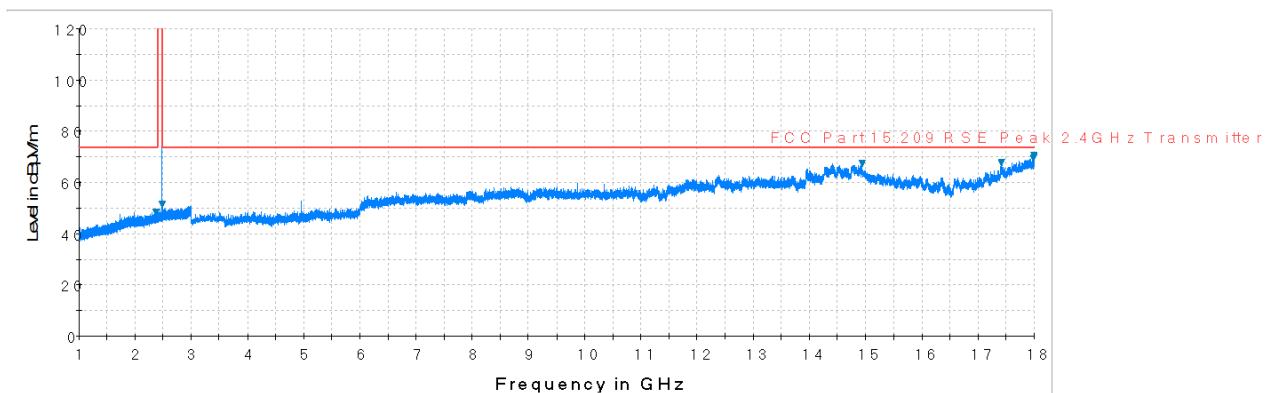


**Plot 7-99. Radiated Spurious Plot above 1GHz (EX600- WSV1, Ch. 39, Ant. Pol. H)**

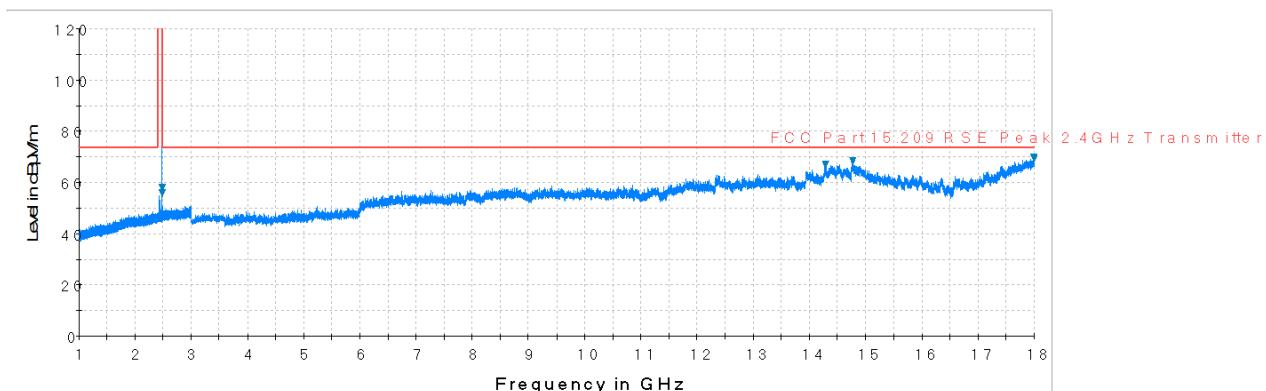
FCC ID: 2AJE7SMC-WEX01	PCTEST Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 72 of 108



**Plot 7-100. Radiated Spurious Plot above 1GHz (EX600- WSV1, Ch. 39, Ant. Pol. V)**

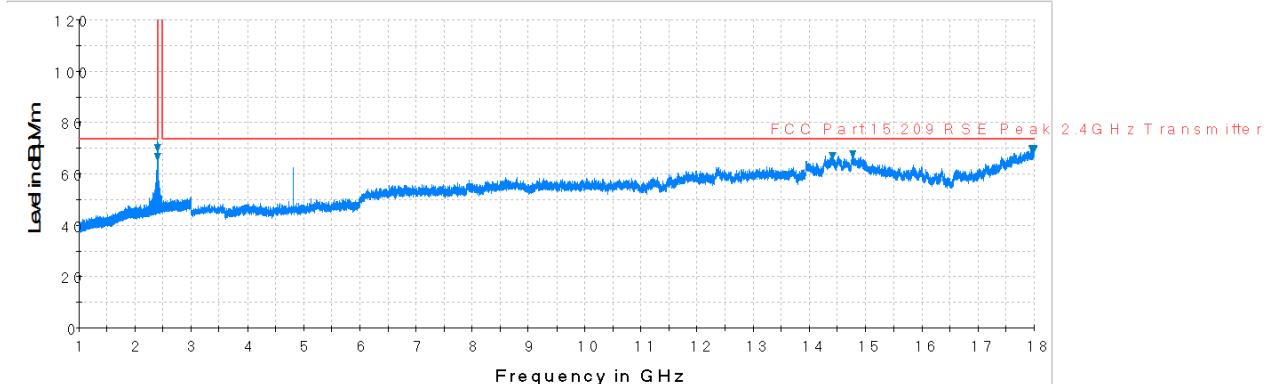


**Plot 7-101. Radiated Spurious Plot above 1GHz (EX600- WSV1, Ch. 78, Ant. Pol. H)**

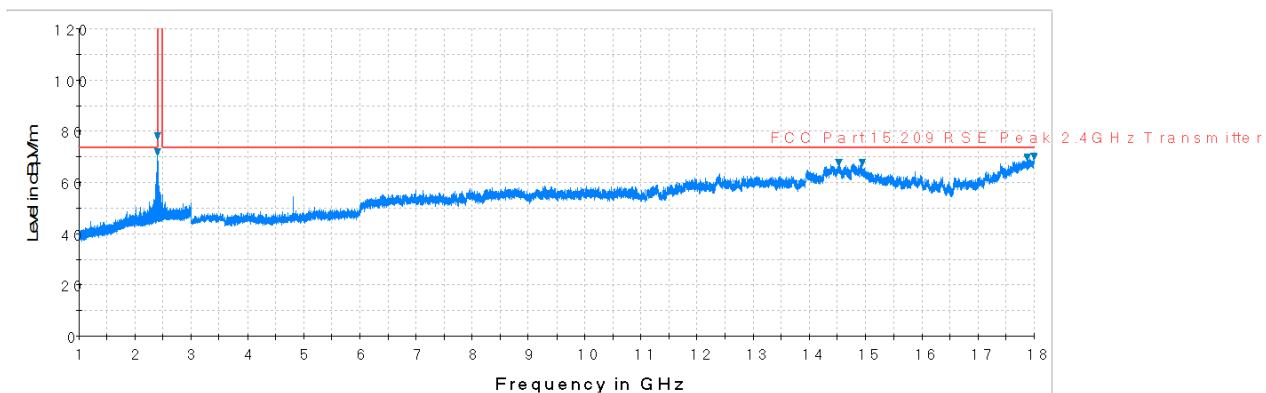


**Plot 7-102. Radiated Spurious Plot above 1GHz (EX600- WSV1, Ch. 78, Ant. Pol. V)**

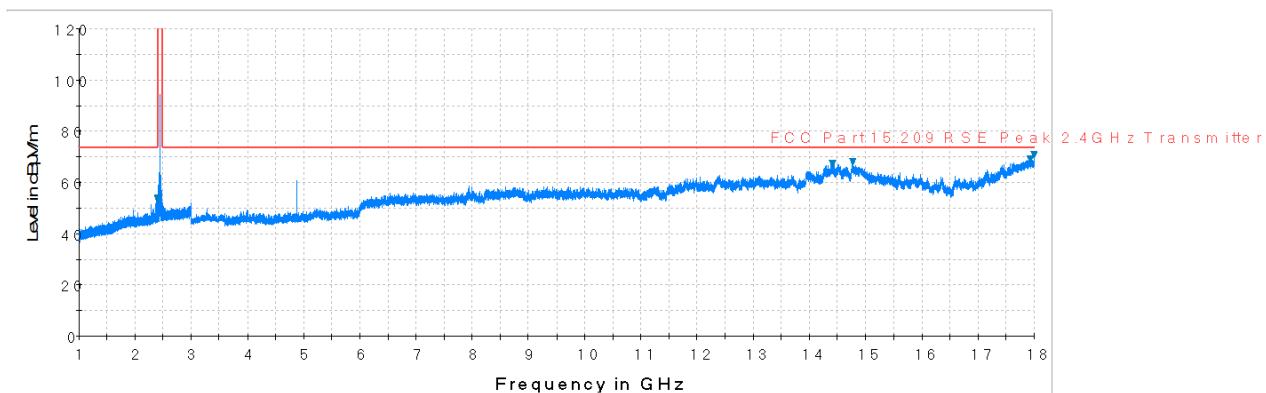
FCC ID: 2AJE7SMC-WEX01	<b>PCTEST</b> Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	<b>SMC</b>	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 73 of 108



**Plot 7-103. Radiated Spurious Plot above 1GHz (EX600-WSV2, Ch. 0, Ant. Pol. H)**

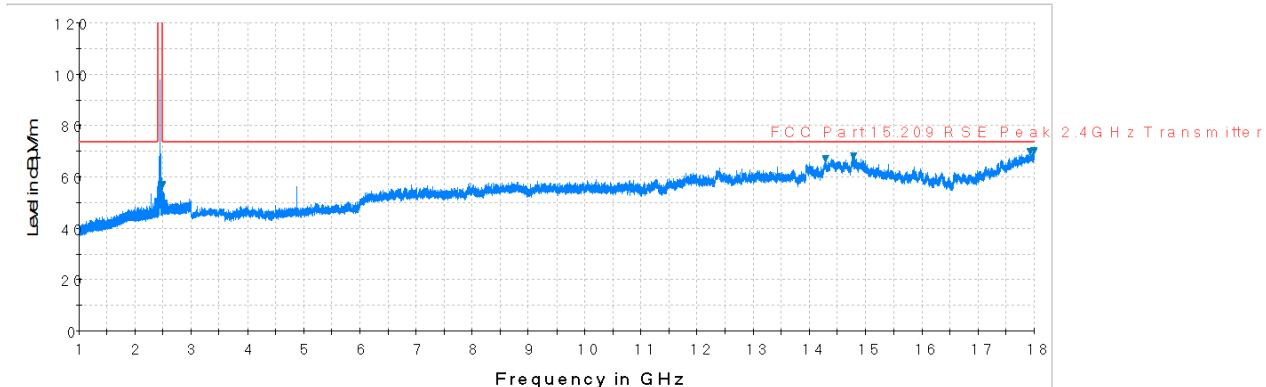


**Plot 7-104. Radiated Spurious Plot above 1GHz (EX600- WSV2, Ch. 0, Ant. Pol. V)**

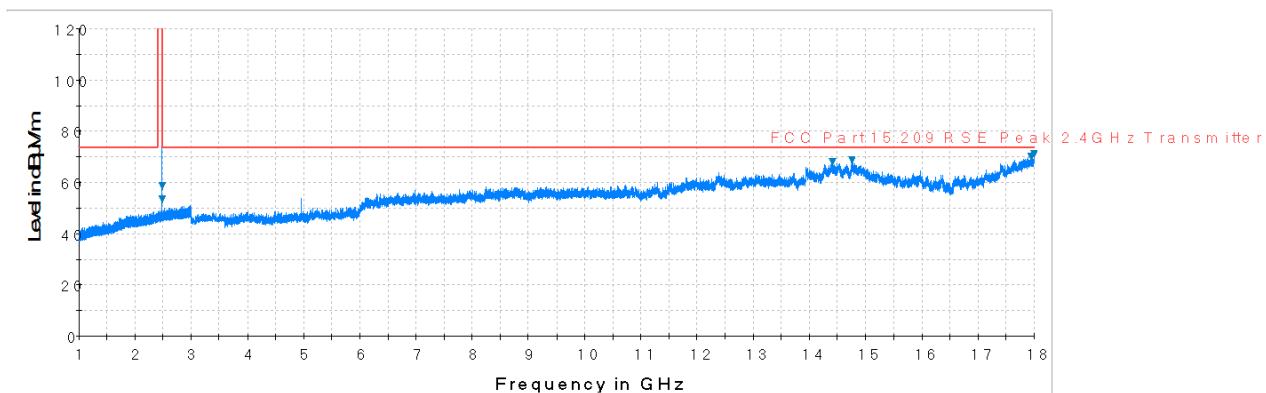


**Plot 7-105. Radiated Spurious Plot above 1GHz (EX600- WSV2, Ch. 39, Ant. Pol. H)**

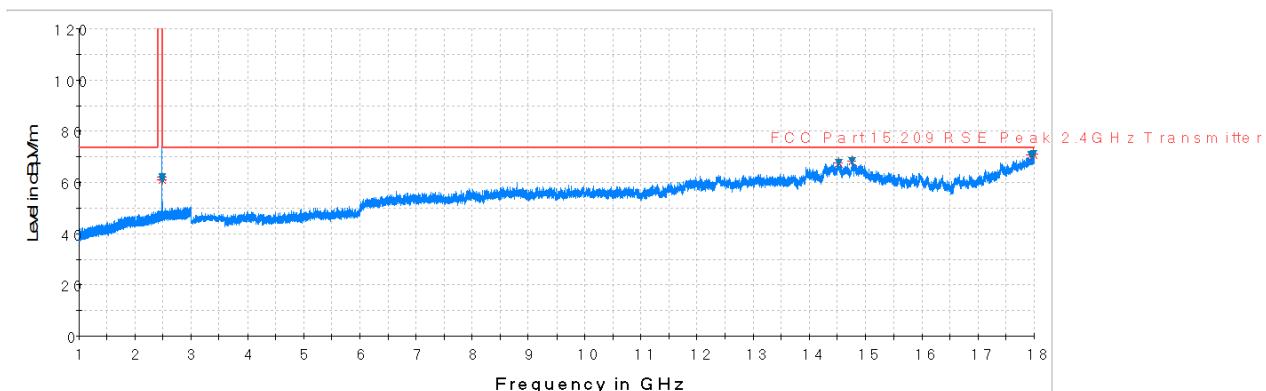
FCC ID: 2AJE7SMC-WEX01	<b>PCTEST</b> Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	<b>SMC</b>	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 74 of 108



**Plot 7-106. Radiated Spurious Plot above 1GHz (EX600- WSV2, Ch. 39, Ant. Pol. V)**



**Plot 7-107. Radiated Spurious Plot above 1GHz (EX600- WSV2, Ch. 78, Ant. Pol. H)**



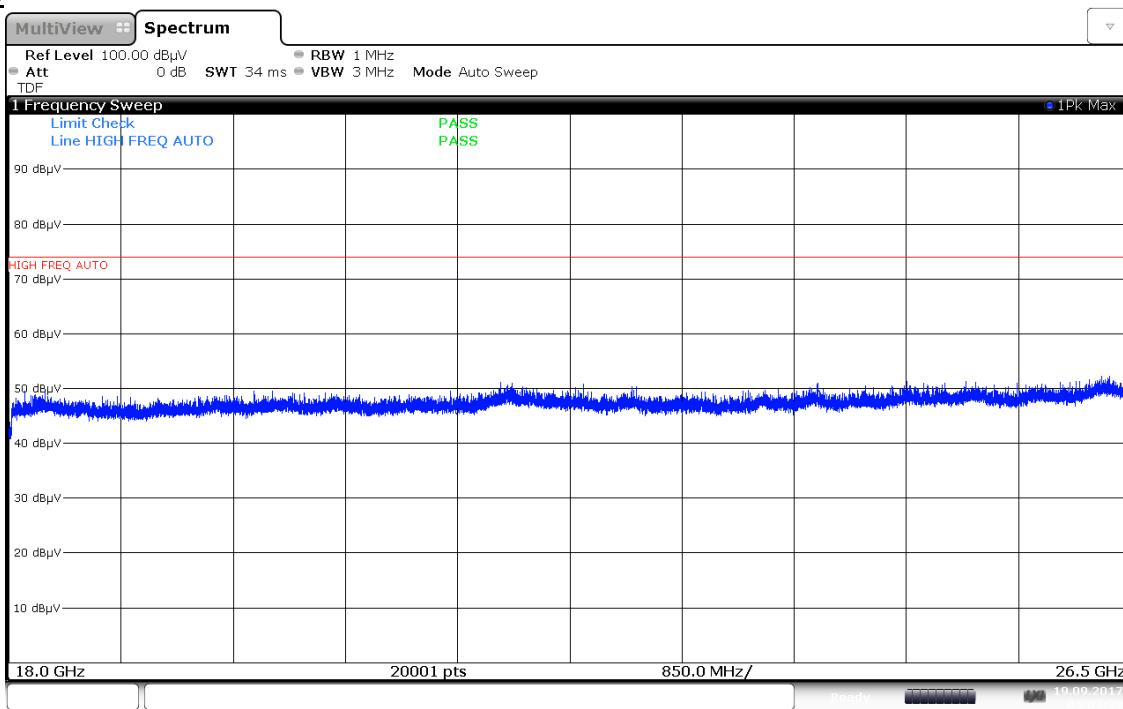
**Plot 7-108. Radiated Spurious Plot above 1GHz (EX600- WSV2, Ch. 78, Ant. Pol. V)**

FCC ID: 2AJE7SMC-WEX01	<b>PCTEST</b> Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	<b>SMC</b>	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 75 of 108

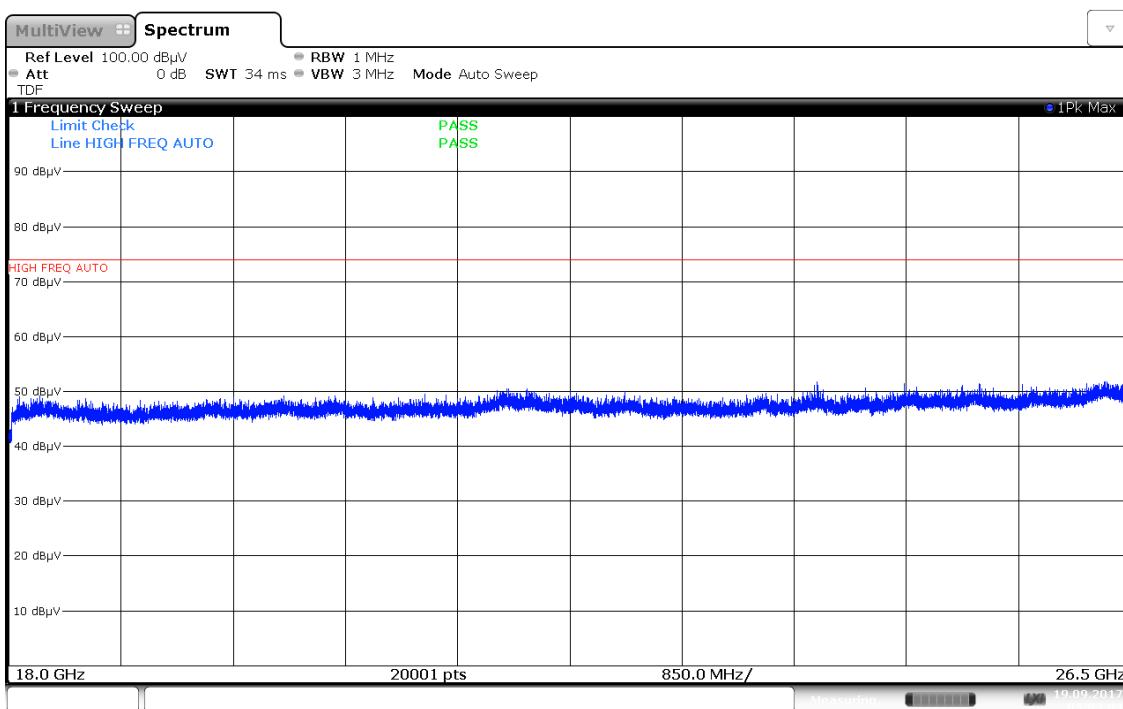


## Radiated Spurious Emissions Measurements (Above 18GHz)

§15.209



Plot 7-109. Radiated Spurious Plot above 18GHz (EX600-WEN1, Pol. H)



Plot 7-110. Radiated Spurious Plot above 18GHz (EX600-WEN1, Pol. V)

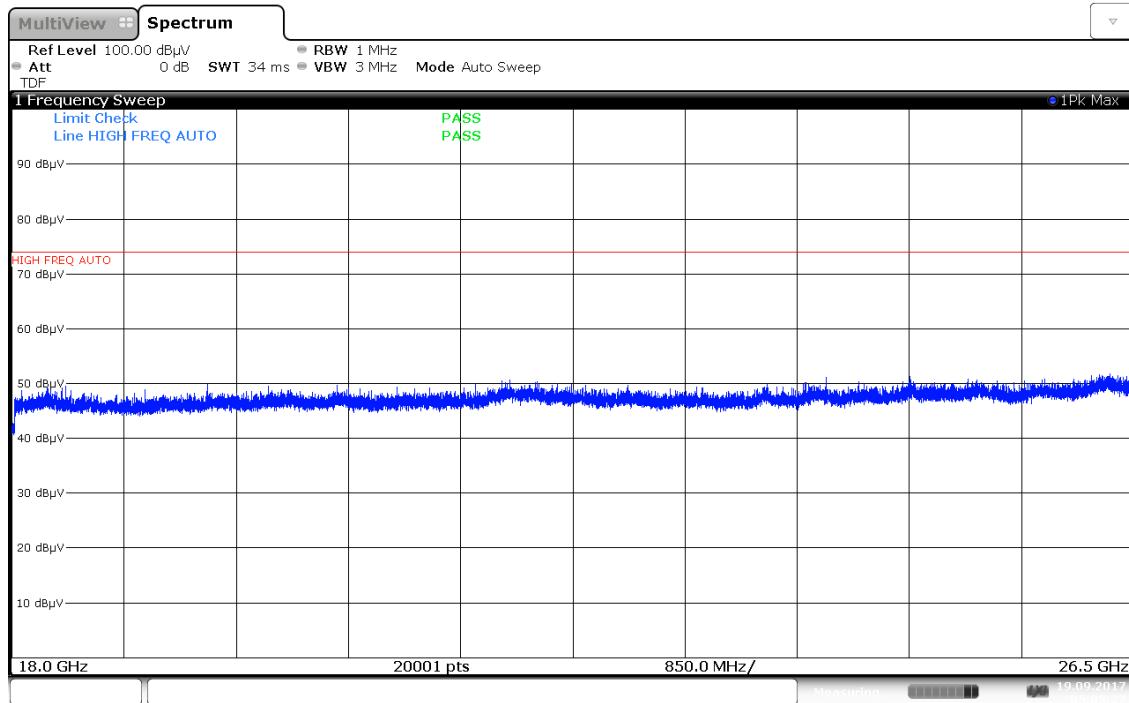
FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 76 of 108

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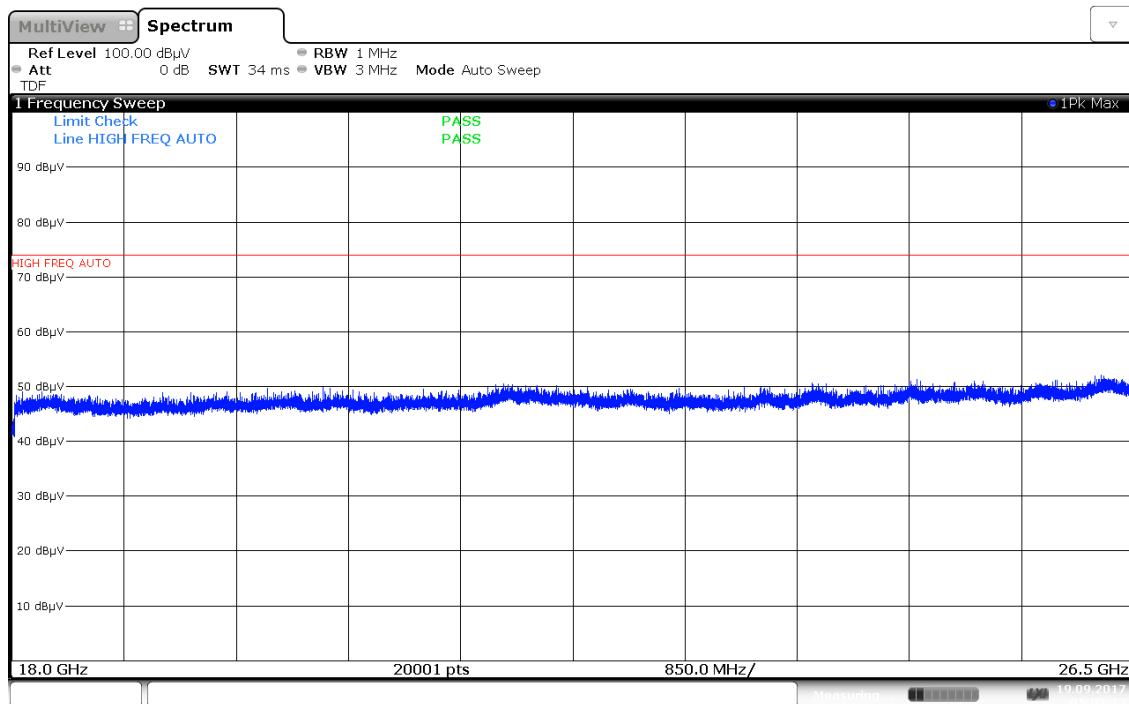
07/14/2017

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05:05:28 19.09.2017

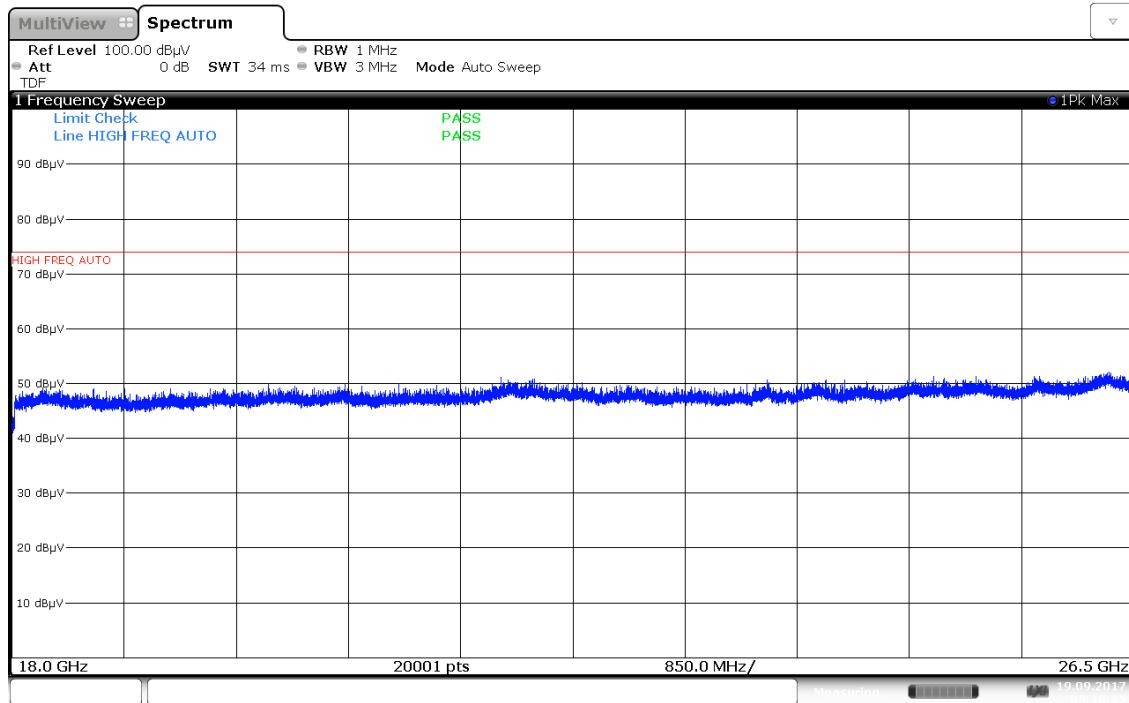
**Plot 7-111. Radiated Spurious Plot above 18GHz (EX600-WEN2, Pol. H)**



05:07:14 19.09.2017

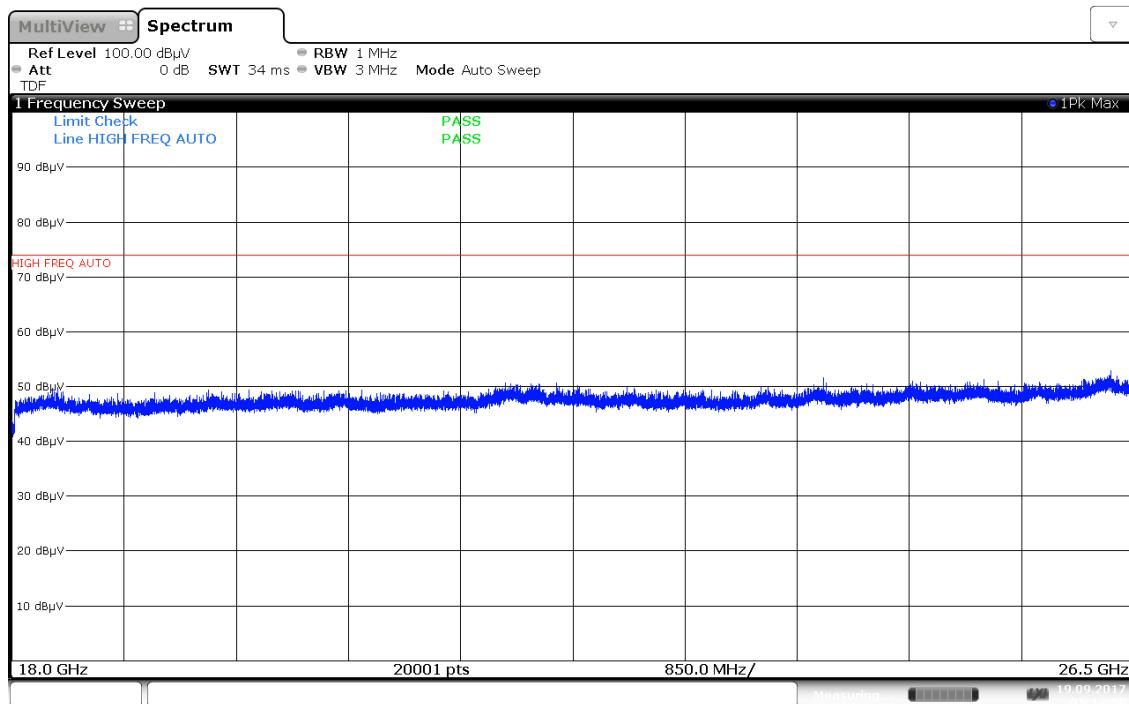
**Plot 7-112. Radiated Spurious Plot above 18GHz (EX600-WEN2, Pol. V)**

FCC ID: 2AJE7SMC-WEX01	PCTEST Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
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05:10:36 19.09.2017

**Plot 7-113. Radiated Spurious Plot above 18GHz (EX600-WSV1, Pol. H)**



05:12:59 19.09.2017

**Plot 7-114. Radiated Spurious Plot above 18GHz (EX600-WSV1, Pol. V)**

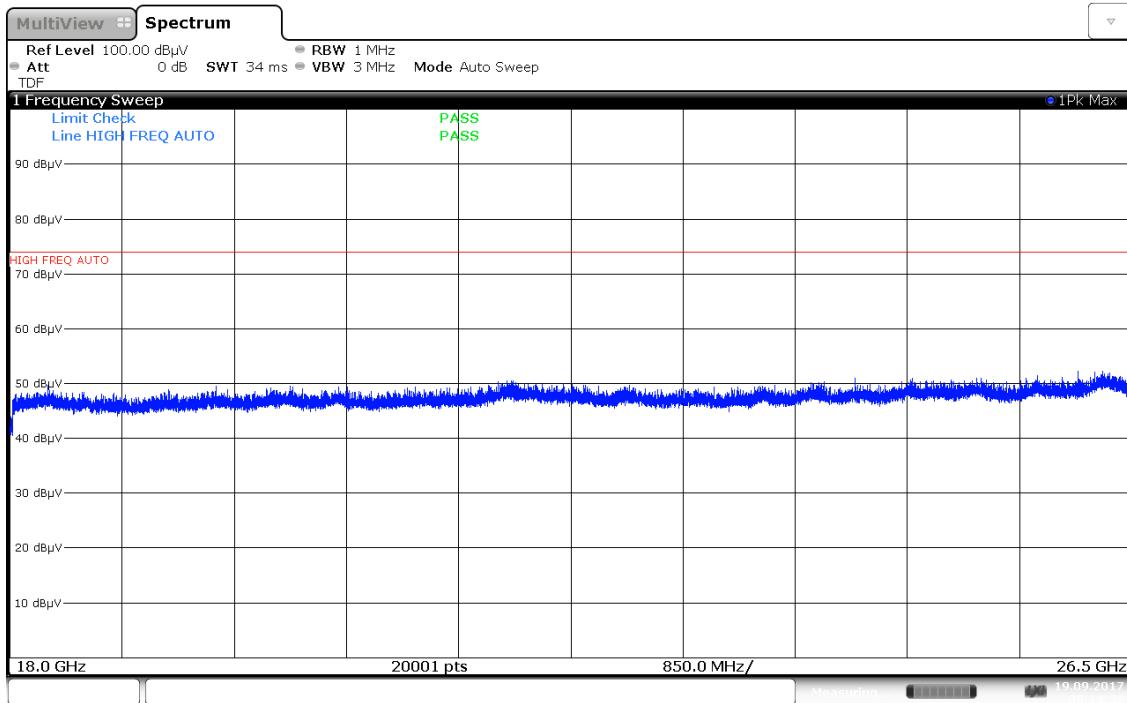
FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 78 of 108

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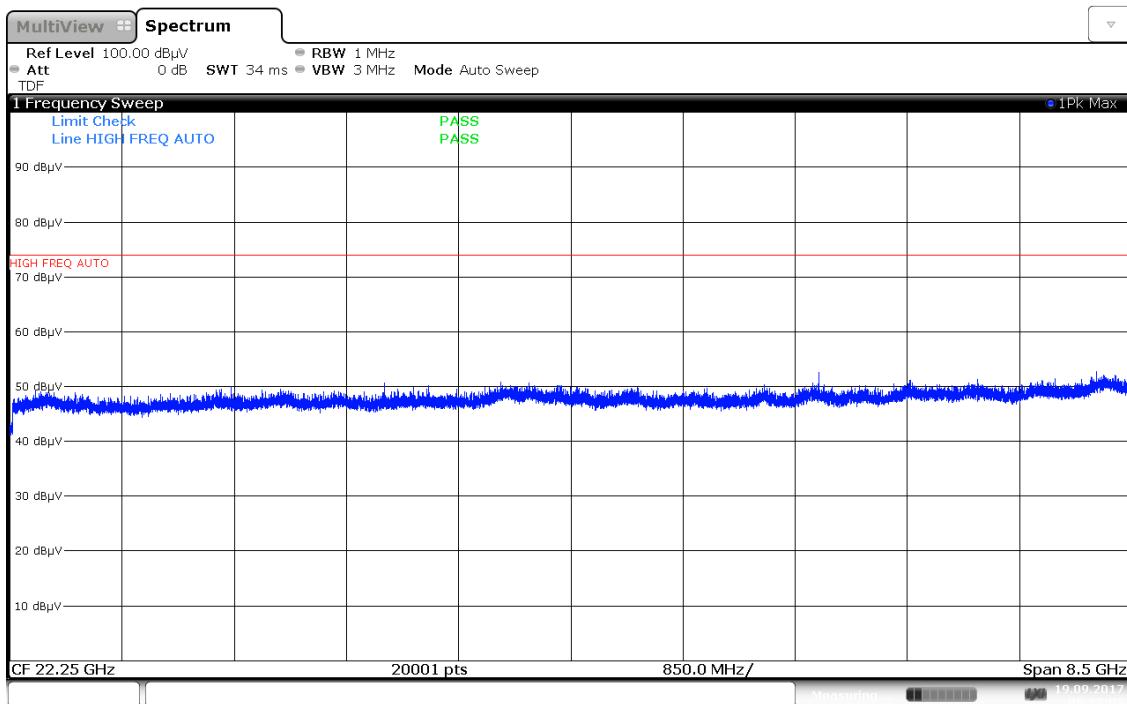
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05:14:32 19.09.2017

**Plot 7-115. Radiated Spurious Plot above 18GHz (EX600-WSV2, Pol. H)**



05:17:03 19.09.2017

**Plot 7-116. Radiated Spurious Plot above 18GHz (EX600-WSV2, Pol. V)**

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 79 of 108

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## Radiated Spurious Emission Measurements

§15.205 §15.209 §15.247 (d)

Measurement Distance: 3 Meters  
 Operating Frequency: 2403MHz  
 Channel: 0

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4806.00	Avg	H	270	167	-49.18	0.46	-38.42	19.87	53.98	-34.11
4806.00	Peak	H	270	167	-46.80	0.46	0.00	60.66	73.98	-13.32
12015.00	Avg	H	-	-	-73.00	15.27	0.00	49.27	53.98	-4.71
12015.00	Peak	H	-	-	-61.42	15.27	0.00	60.85	73.98	-13.13

Table 7-16. Radiated Measurements(EX600-WEN1)

Measurement Distance: 3 Meters  
 Operating Frequency: 2442MHz  
 Channel: 39

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4884.00	Avg	H	228	190	-50.38	0.87	-38.42	19.07	53.98	-34.91
4884.00	Peak	H	228	190	-47.71	0.87	0.00	60.16	73.98	-13.82
7326.00	Avg	H	-	-	-72.91	9.53	0.00	43.62	53.98	-10.36
7326.00	Peak	H	-	-	-60.53	9.53	0.00	56.00	73.98	-17.98
12210.00	Avg	H	-	-	-73.48	16.19	0.00	49.71	53.98	-4.27
12210.00	Peak	H	-	-	-61.09	16.19	0.00	62.10	73.98	-11.88

Table 7-17. Radiated Measurements(EX600-WEN1)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
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## Radiated Spurious Emission Measurements

§15.205 §15.209 §15.247 (d)

Measurement Distance: 3 Meters  
 Operating Frequency: 2481MHz  
 Channel: 78

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4962.00	Avg	H	133	193	-56.29	1.08	-38.42	13.38	53.98	-40.60
4962.00	Peak	H	133	193	-51.81	1.08	0.00	56.27	73.98	-17.71
7443.00	Avg	H	-	-	-72.84	10.13	0.00	44.29	53.98	-9.69
7443.00	Peak	H	-	-	-59.86	10.13	0.00	57.27	73.98	-16.71
12405.00	Avg	H	-	-	-73.39	15.37	0.00	48.98	53.98	-5.00
12405.00	Peak	H	-	-	-60.75	15.37	0.00	61.62	73.98	-12.36

Table 7-18. Radiated Measurements(EX600-WEN1)

Measurement Distance: 3 Meters  
 Operating Frequency: 2403MHz  
 Channel: 0

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4806.00	Avg	V	100	264	-45.83	0.46	-38.42	23.22	53.98	-30.76
4806.00	Peak	V	100	264	-43.58	0.46	0.00	63.88	73.98	-10.10
12015.00	Avg	V	-	-	-72.77	15.27	0.00	49.50	53.98	-4.48
12015.00	Peak	V	-	-	-60.49	15.27	0.00	61.78	73.98	-12.20

Table 7-19. Radiated Measurements(EX600-WEN2)

FCC ID: 2AJE7SMC-WEX01	PCTEST Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
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## Radiated Spurious Emission Measurements

§15.205 §15.209 §15.247 (d)

Measurement Distance: 3 Meters  
 Operating Frequency: 2442MHz  
 Channel: 39

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4884.00	Avg	V	100	262	-48.40	0.87	-38.42	21.05	53.98	-32.93
4884.00	Peak	V	100	262	-45.77	0.87	0.00	62.10	73.98	-11.88
7326.00	Avg	V	-	-	-72.75	9.53	0.00	43.78	53.98	-10.20
7326.00	Peak	V	-	-	-68.80	9.53	0.00	47.73	73.98	-26.25
12210.00	Avg	V	-	-	-73.30	16.19	0.00	49.89	53.98	-4.09
12210.00	Peak	V	-	-	-60.94	16.19	0.00	62.25	73.98	-11.73

**Table 7-20. Radiated Measurements(EX600-WEN2)**

Measurement Distance: 3 Meters  
 Operating Frequency: 2481MHz  
 Channel: 78

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4962.00	Avg	V	104	299	-57.97	1.08	-38.42	11.70	53.98	-42.28
4962.00	Peak	V	104	299	-53.21	1.08	0.00	54.87	73.98	-19.11
7443.00	Avg	V	-	-	-72.91	10.13	0.00	44.22	53.98	-9.76
7443.00	Peak	V	-	-	-60.14	10.13	0.00	56.99	73.98	-16.99
12405.00	Avg	V	-	-	-73.18	15.37	0.00	49.19	53.98	-4.79
12405.00	Peak	V	-	-	-61.61	15.37	0.00	60.76	73.98	-13.22

**Table 7-21. Radiated Measurements(EX600-WEN2)**

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 82 of 108



## Radiated Spurious Emission Measurements

§15.205 §15.209 §15.247 (d)

Measurement Distance: 3 Meters  
 Operating Frequency: 2403MHz  
 Channel: 0

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4806.00	Avg	H	290	333	-47.93	0.46	-38.42	21.12	53.98	-32.86
4806.00	Peak	H	290	333	-43.93	0.46	0.00	63.53	73.98	-10.45
12015.00	Avg	H	-	-	-73.15	15.27	0.00	49.12	53.98	-4.86
12015.00	Peak	H	-	-	-60.26	15.27	0.00	62.01	73.98	-11.97

Table 7-22. Radiated Measurements(EX600-WSV1)

Measurement Distance: 3 Meters  
 Operating Frequency: 2442MHz  
 Channel: 39

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4884.00	Avg	H	341	331	-49.89	0.87	-38.42	19.56	53.98	-34.42
4884.00	Peak	H	341	331	-45.43	0.87	0.00	62.44	73.98	-11.54
7326.00	Avg	H	-	-	-72.88	9.53	0.00	43.65	53.98	-10.33
7326.00	Peak	H	-	-	-60.49	9.53	0.00	56.04	73.98	-17.94
12210.00	Avg	H	-	-	-73.39	16.19	0.00	49.80	53.98	-4.18
12210.00	Peak	H	-	-	-61.14	16.19	0.00	62.05	73.98	-11.93

Table 7-23. Radiated Measurements(EX600-WSV1)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 83 of 108

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## Radiated Spurious Emission Measurements

§15.205 §15.209 §15.247 (d)

Measurement Distance: 3 Meters  
 Operating Frequency: 2481MHz  
 Channel: 78

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4962.00	Avg	H	270	340	-58.38	1.08	-38.42	11.29	53.98	-42.69
4962.00	Peak	H	270	340	-52.29	1.08	0.00	55.79	73.98	-18.19
7443.00	Avg	H	-	-	-73.00	10.13	0.00	44.13	53.98	-9.85
7443.00	Peak	H	-	-	-59.99	10.13	0.00	57.14	73.98	-16.84
12405.00	Avg	H	-	-	-73.24	15.37	0.00	49.13	53.98	-4.85
12405.00	Peak	H	-	-	-60.73	15.37	0.00	61.64	73.98	-12.34

Table 7-24. Radiated Measurements(EX600-WSV1)

Measurement Distance: 3 Meters  
 Operating Frequency: 2403MHz  
 Channel: 0

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4806.00	Avg	H	321	350	-47.29	0.46	-38.42	21.76	53.98	-32.22
4806.00	Peak	H	321	350	-44.86	0.46	0.00	62.60	73.98	-11.38
12015.00	Avg	H	-	-	-73.12	15.27	0.00	49.15	53.98	-4.83
12015.00	Peak	H	-	-	-61.53	15.27	0.00	60.74	73.98	-13.24

Table 7-25. Radiated Measurements(EX600-WSV2)

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 84 of 108



## Radiated Spurious Emission Measurements

§15.205 §15.209 §15.247 (d)

Measurement Distance: 3 Meters  
 Operating Frequency: 2442MHz  
 Channel: 39

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4884.00	Avg	H	326	3	-49.96	0.87	-38.42	19.49	53.98	-34.49
4884.00	Peak	H	326	3	-47.41	0.87	0.00	60.46	73.98	-13.52
7326.00	Avg	H	-	-	-72.86	9.53	0.00	43.67	53.98	-10.31
7326.00	Peak	H	-	-	-60.55	9.53	0.00	55.98	73.98	-18.00
12210.00	Avg	H	-	-	-73.76	16.19	0.00	49.43	53.98	-4.55
12210.00	Peak	H	-	-	-61.82	16.19	0.00	61.37	73.98	-12.61

**Table 7-26. Radiated Measurements(EX600-WSV2)**

Measurement Distance: 3 Meters  
 Operating Frequency: 2481MHz  
 Channel: 78

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4962.00	Avg	H	242	203	-58.48	1.08	-38.42	11.19	53.98	-42.79
4962.00	Peak	H	242	203	-57.48	1.08	0.00	50.60	73.98	-23.38
7443.00	Avg	H	-	-	-72.35	10.13	0.00	44.78	53.98	-9.20
7443.00	Peak	H	-	-	-71.56	10.13	0.00	45.57	73.98	-28.41
12405.00	Avg	H	-	-	-72.51	15.37	0.00	49.86	53.98	-4.12
12405.00	Peak	H	-	-	-72.03	15.37	0.00	50.34	73.98	-23.64

**Table 7-27. Radiated Measurements(EX600-WSV2)**

FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 85 of 108

## 7.10 Radiated Restricted Band Edge Measurements

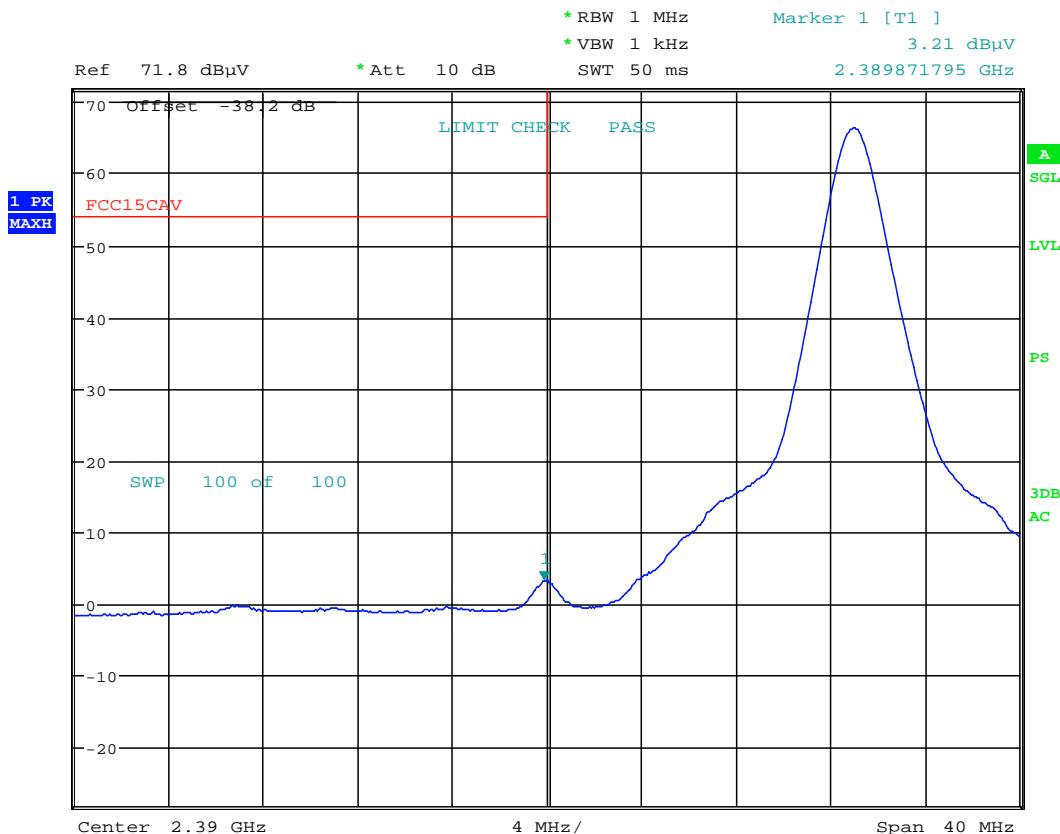
§15.205 §15.209 §15.247 (d)

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting. Two different amplitude offsets were used depending on whether peak or average measurements were measured. The average measurements use a duty cycle correction factor (DCCF).

The amplitude offset shown in the following plots for average measurements was calculated using the formula:

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

Model:	EX600-WEN1
Measurement Distance:	3 Meters
Operating Frequency:	2403MHz
Channel:	0



Date: 13.SEP.2017 00:37:28

**Plot 7-117. Radiated Restricted Upper Band Edge Measurement (Average)**

FCC ID: 2AJE7SMC-WEX01	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 86 of 108

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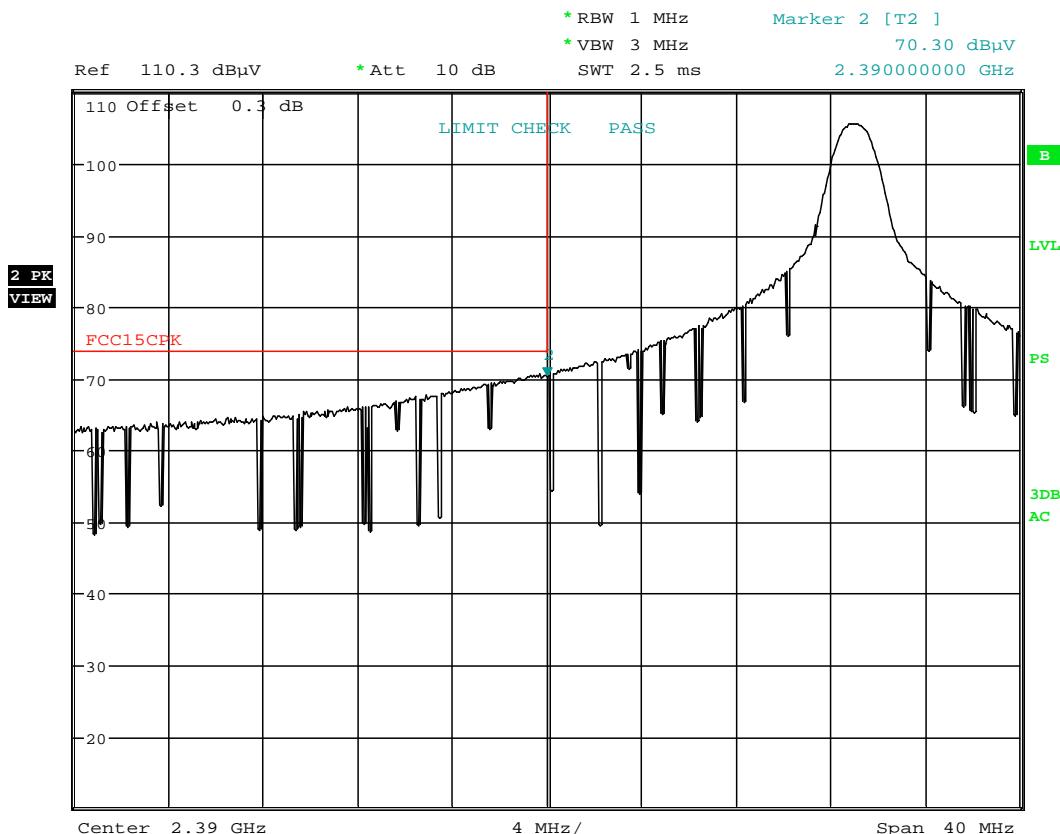
V 6.8  
07/14/2017

## Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d)

The amplitude offset shown in the following plots for peak measurements was calculated using the formula:

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



Date: 13.SEP.2017 00:39:46

**Plot 7-118. Radiated Restricted Upper Band Edge Measurement (Peak)**

FCC ID: 2AJE7SMC-WEX01	PCTEST Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 87 of 108

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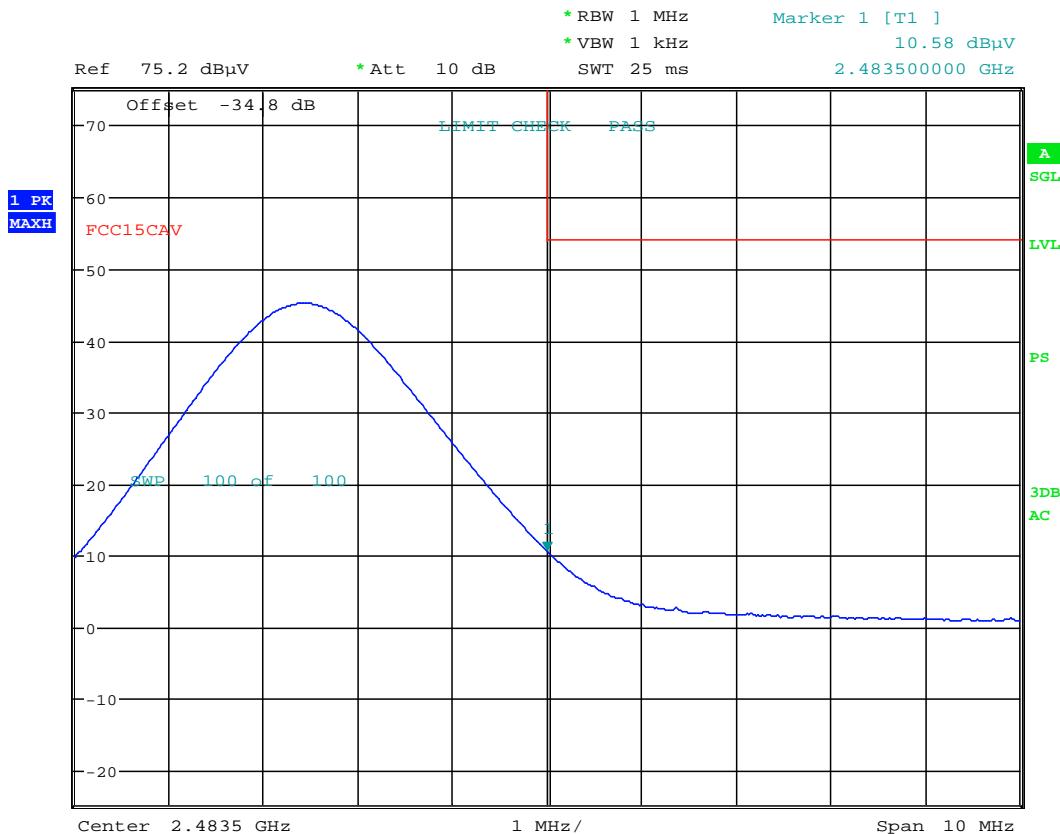
V 6.8  
07/14/2017

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## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)

Model: EX600-WEN1  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2481MHz  
 Channel: 78



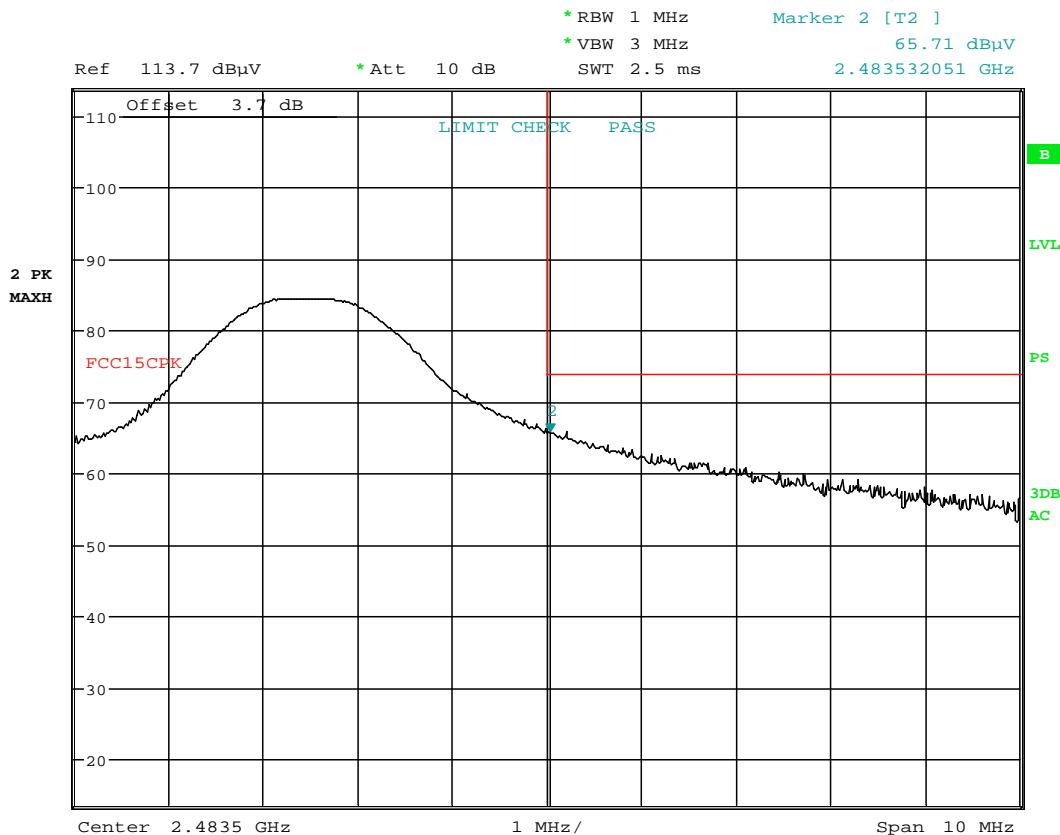
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**Plot 7-119. Radiated Restricted Upper Band Edge Measurement (Average)**

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 88 of 108

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)



Date: 1.SEP.2017 19:42:54

**Plot 7-120. Radiated Restricted Upper Band Edge Measurement (Peak)**

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 89 of 108

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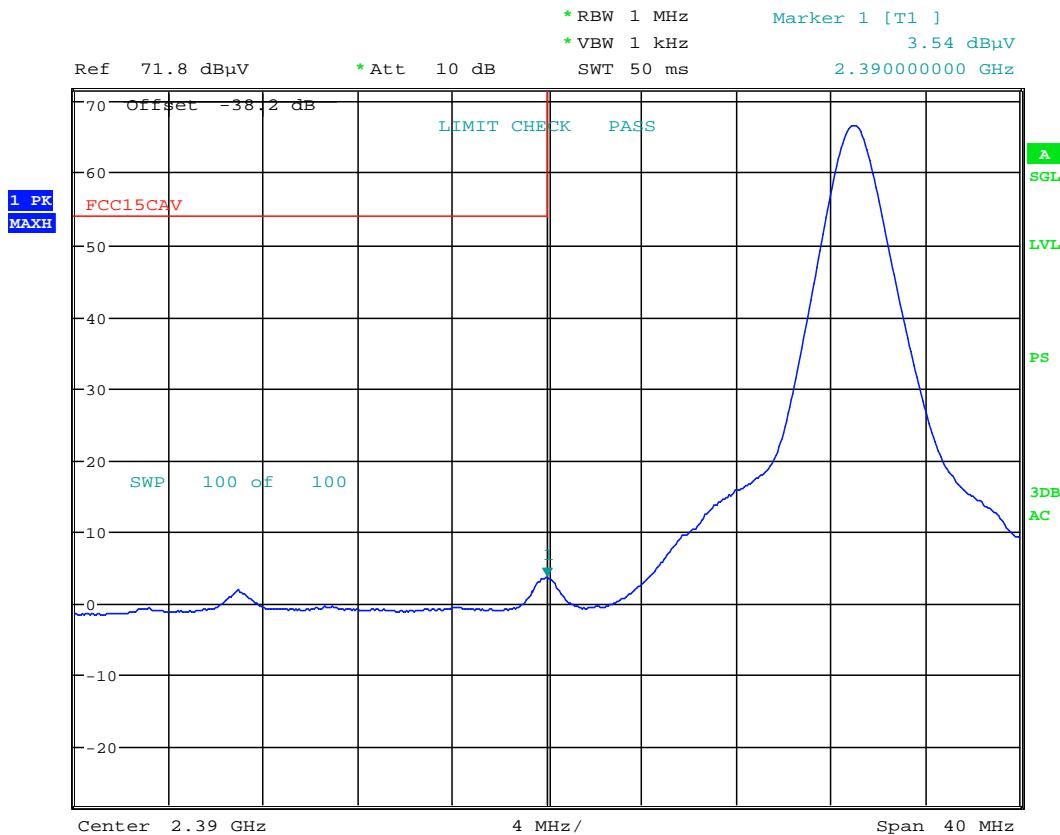
V 6.8  
07/14/2017

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## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)

Model: EX600-WEN2  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2403MHz  
 Channel: 00



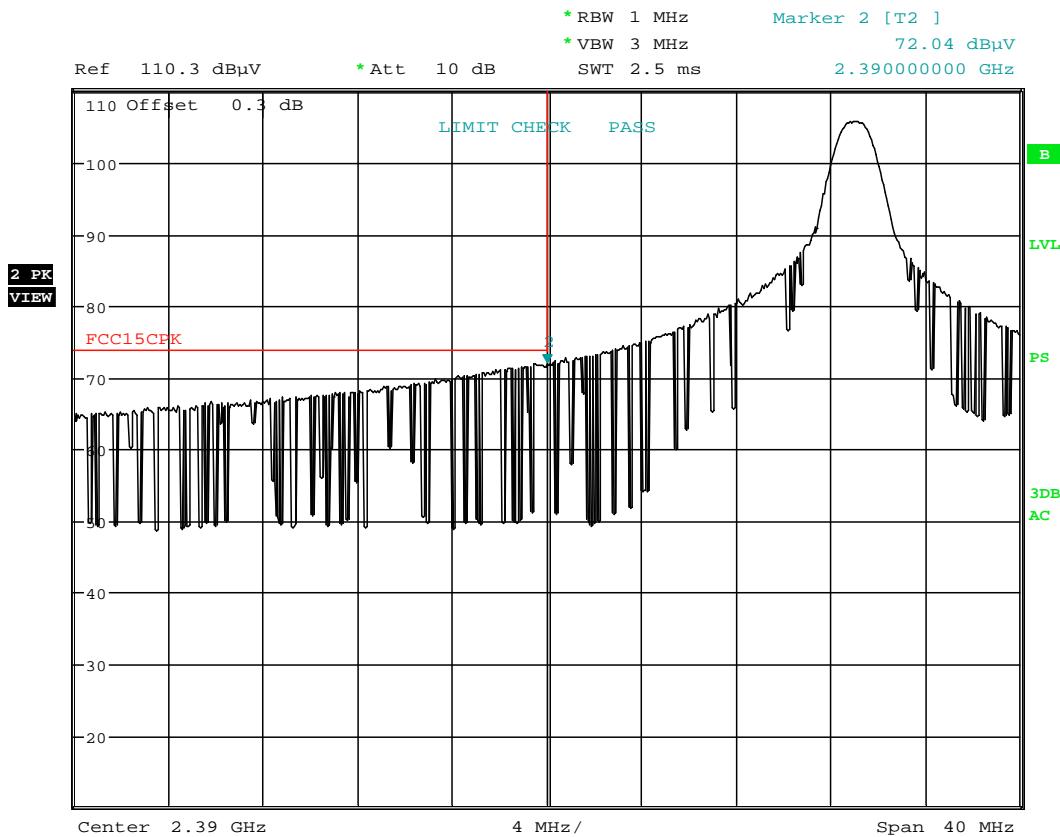
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**Plot 7-121. Radiated Restricted Lower Band Edge Measurement (Average)**

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Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 90 of 108

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)



Date: 13.SEP.2017 00:53:38

**Plot 7-122. Radiated Restricted Lower Band Edge Measurement (Peak)**

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 91 of 108

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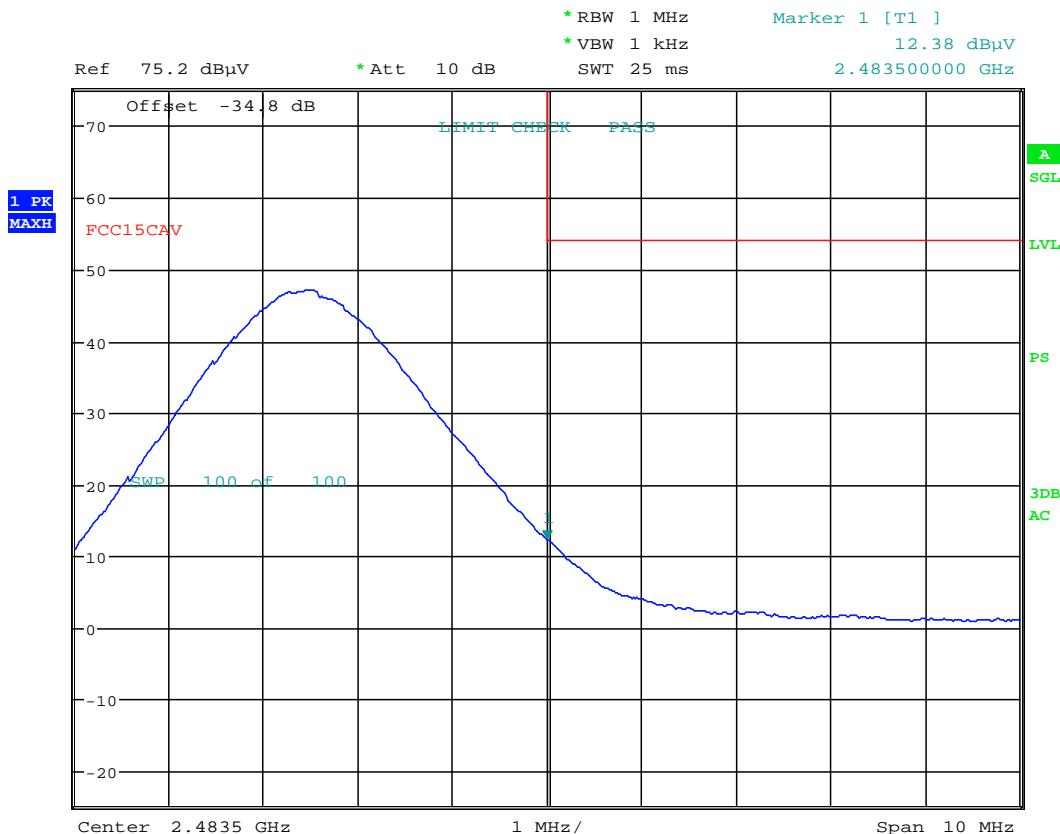
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## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)

Model: EX600-WEN2  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2481MHz  
 Channel: 78



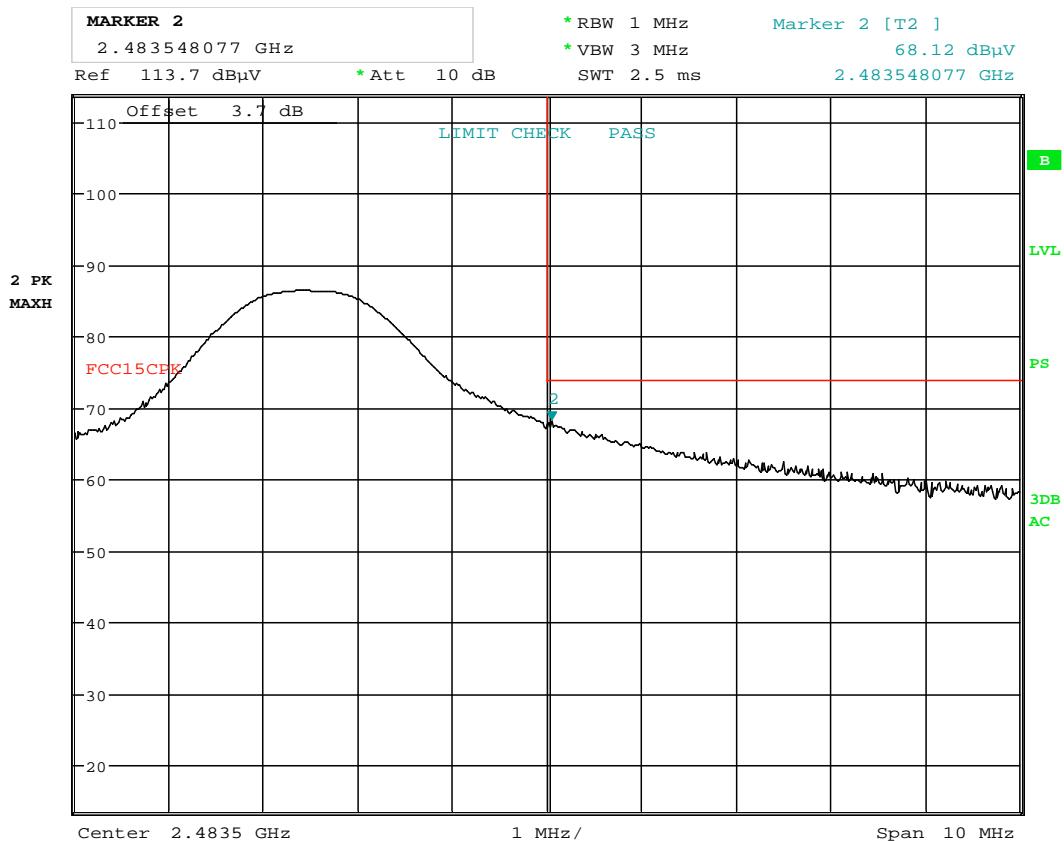
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**Plot 7-123. Radiated Restricted Upper Band Edge Measurement (Average)**

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 92 of 108

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)



Date: 1.SEP.2017 20:49:39

**Plot 7-124. Radiated Restricted Upper Band Edge Measurement (Peak)**

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 93 of 108

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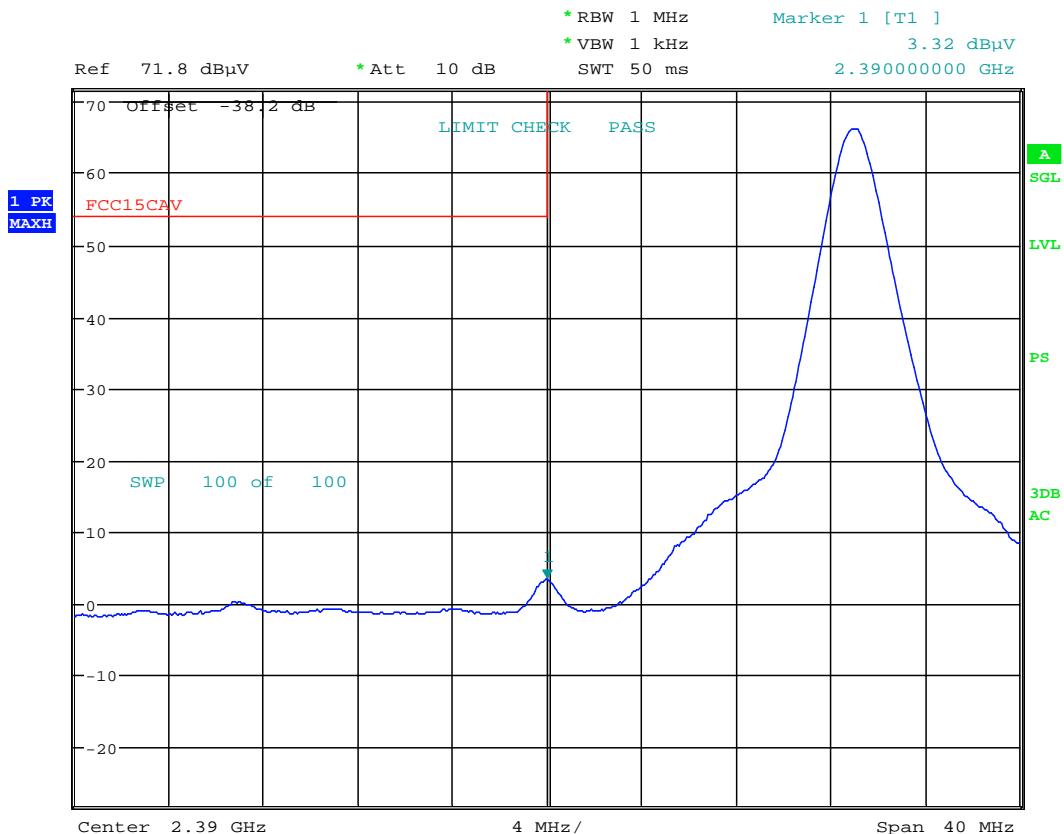
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## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)

Model: EX600-WSV1  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2403MHz  
 Channel: 00



Date: 13.SEP.2017 01:28:10

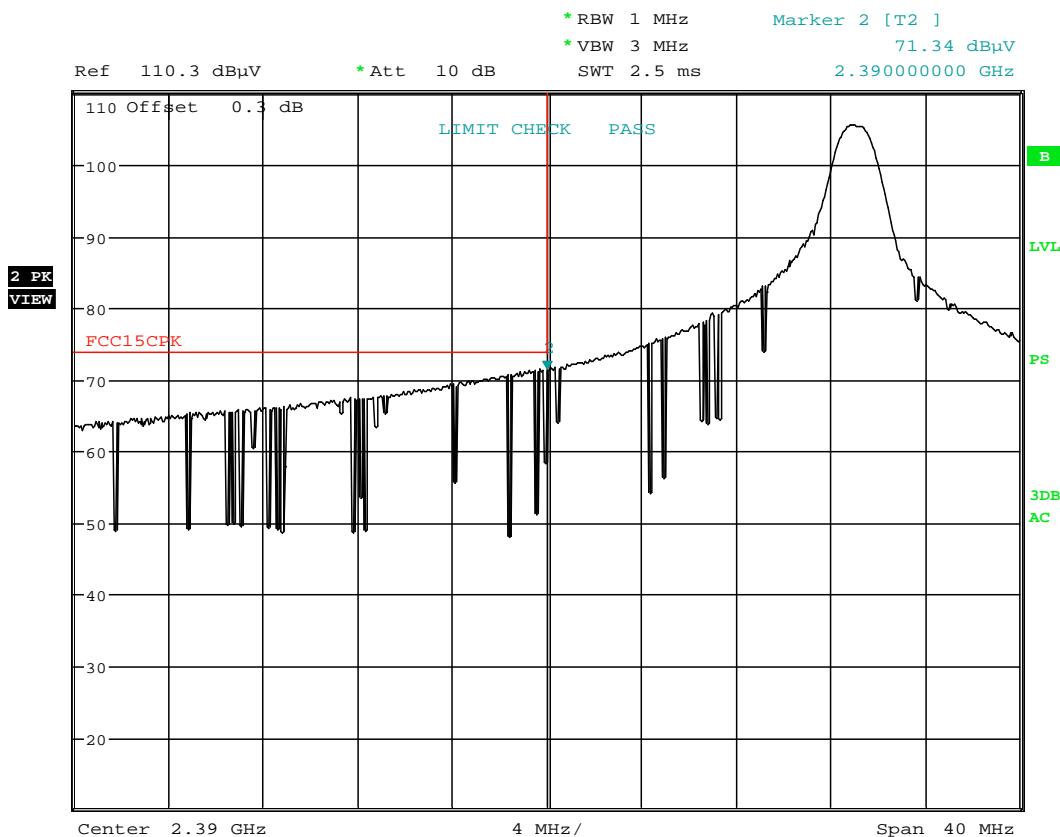
**Plot 7-125. Radiated Restricted Lower Band Edge Measurement (Average)**

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 94 of 108



## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)



Date: 13.SEP.2017 01:29:31

**Plot 7-126. Radiated Restricted Lower Band Edge Measurement (Peak)**

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 95 of 108

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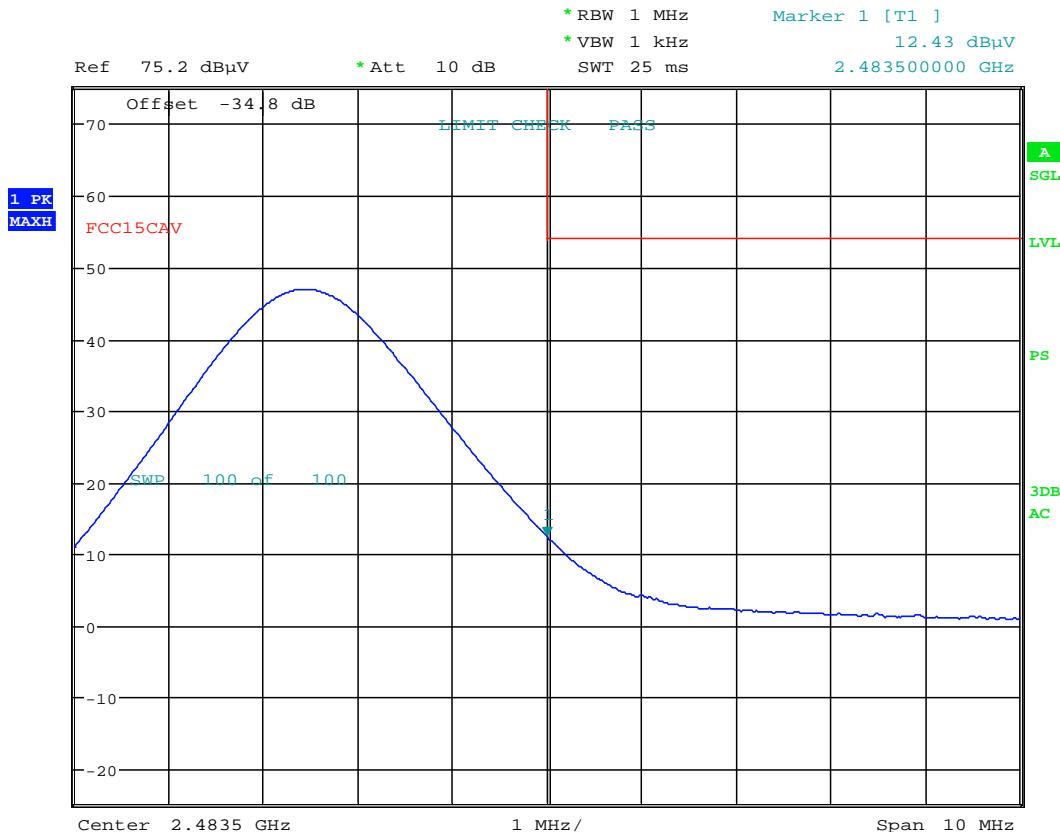
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## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)

Model: EX600-WSV1  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2481MHz  
 Channel: 78



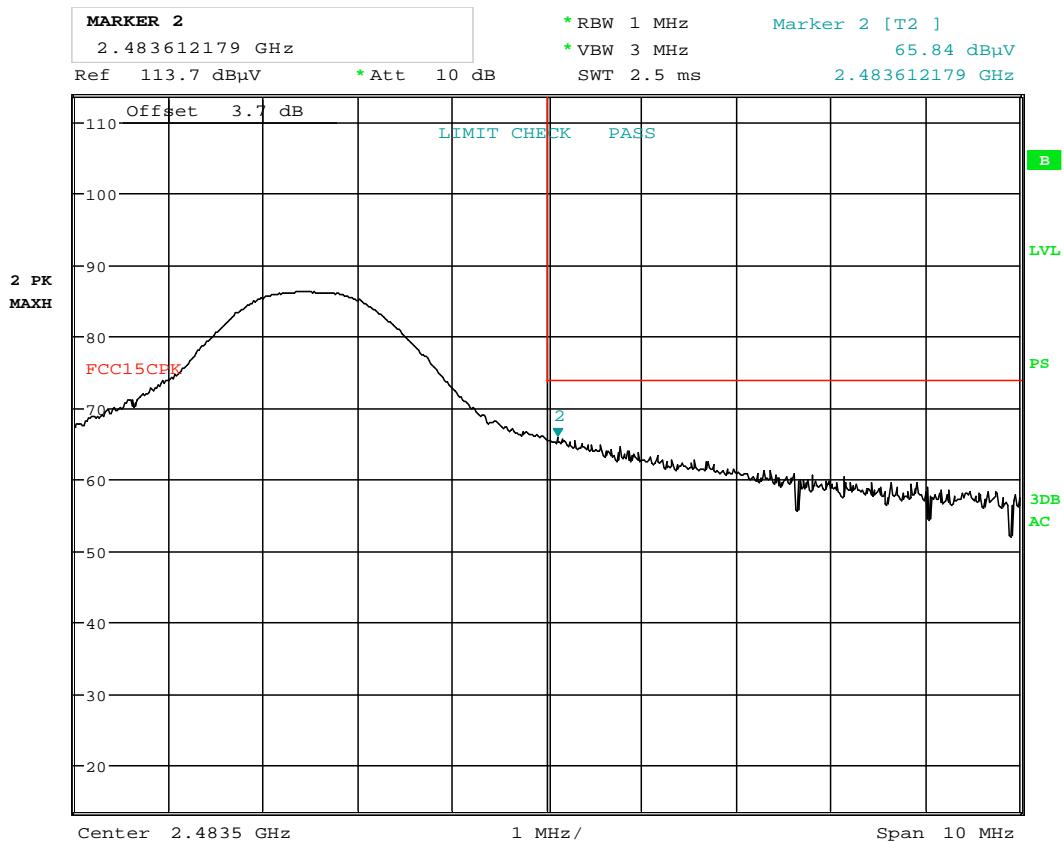
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**Plot 7-127. Radiated Restricted Upper Band Edge Measurement (Average)**

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 96 of 108

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)



Date: 1.SEP.2017 20:14:48

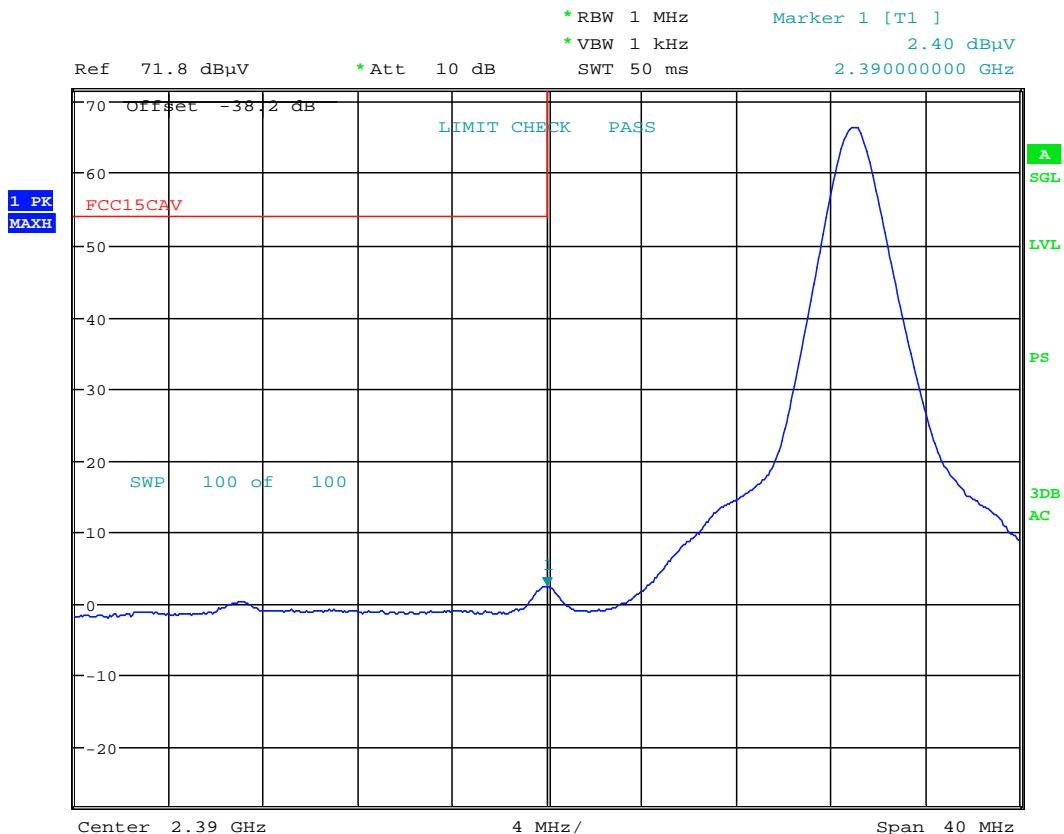
**Plot 7-128. Radiated Restricted Upper Band Edge Measurement (Peak)**

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 97 of 108

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)

Model: EX600-WSV2  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2403MHz  
 Channel: 00



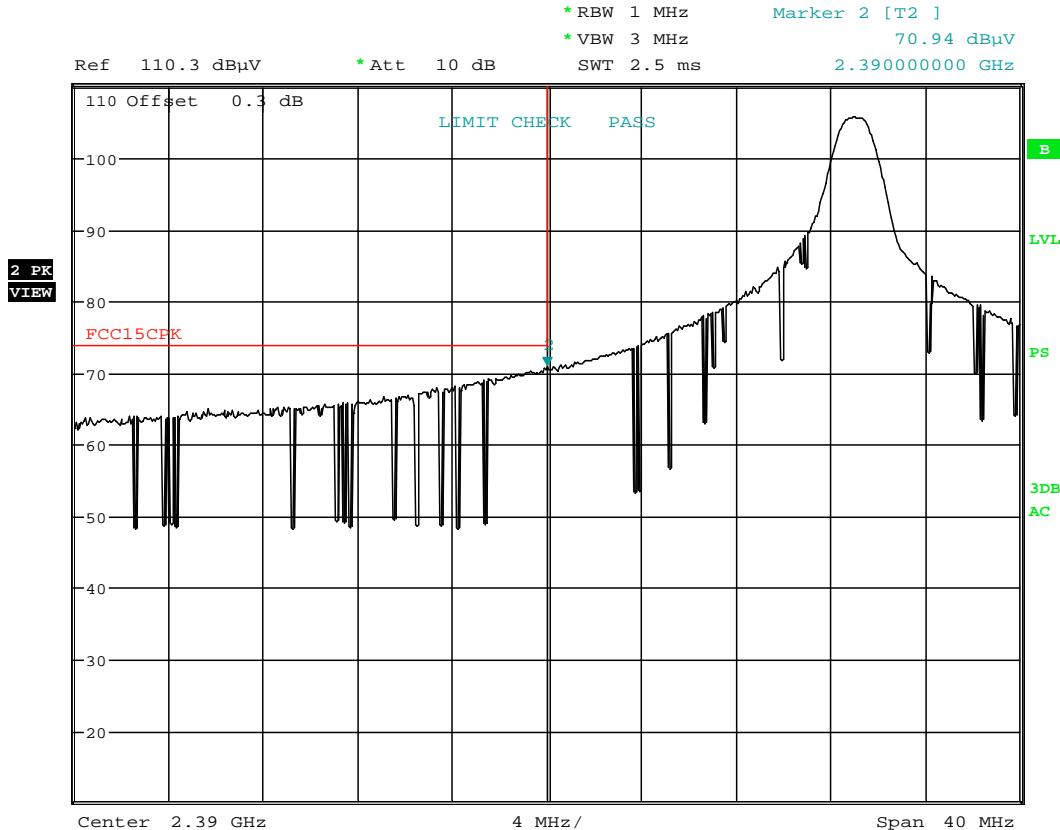
Date: 13.SEP.2017 01:48:16

**Plot 7-129. Radiated Restricted Lower Band Edge Measurement (Average)**

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Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 98 of 108

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)



Date: 13.SEP.2017 01:49:30

**Plot 7-130. Radiated Restricted Lower Band Edge Measurement (Peak)**

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 99 of 108

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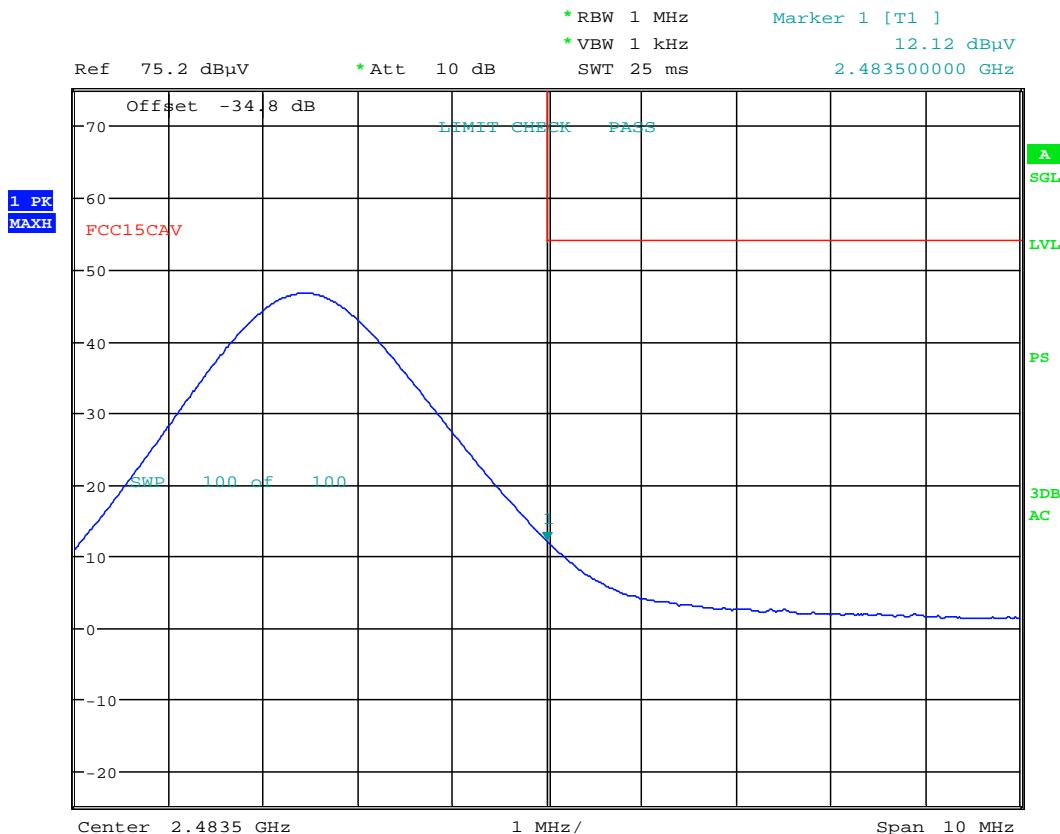
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## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)

Model: EX600-WSV2  
 Measurement Distance: 3 Meters  
 Operating Frequency: 2481MHz  
 Channel: 78



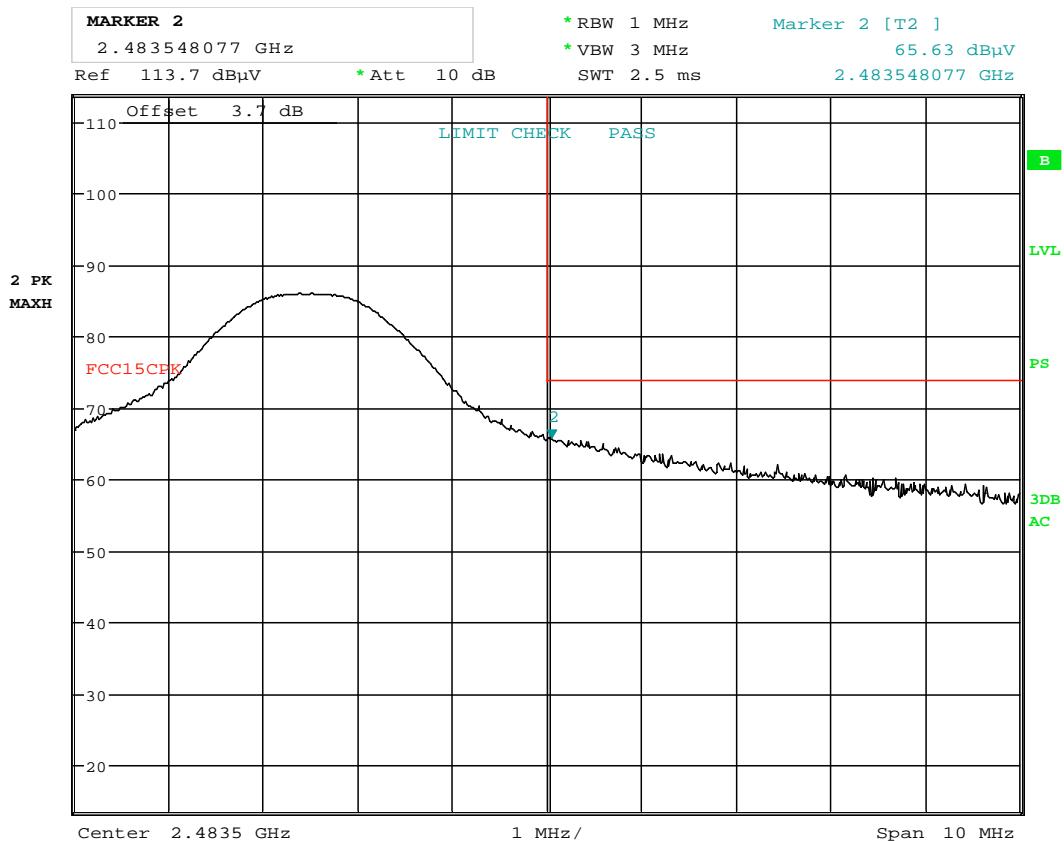
Date: 1.SEP.2017 21:06:41

**Plot 7-131. Radiated Restricted Upper Band Edge Measurement (Average)**

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device	Page 100 of 108

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.247 (d)



Date: 1.SEP.2017 21:09:53

**Plot 7-132. Radiated Restricted Upper Band Edge Measurement (Peak)**

FCC ID: 2AJE7SMC-WEX01	PCTEST® Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	Approved by: SMC Quality Manager
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## 7.11 Radiated Spurious Emissions Measurements – Below 1GHz

§15.209

### Test Overview and Limit

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

***All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 7-28 per Section 15.209.***

Frequency	Field Strength [ $\mu$ 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 7-28. Radiated Limits**

### Test Procedures Used

ANSI C63.10-2013

### Test Settings

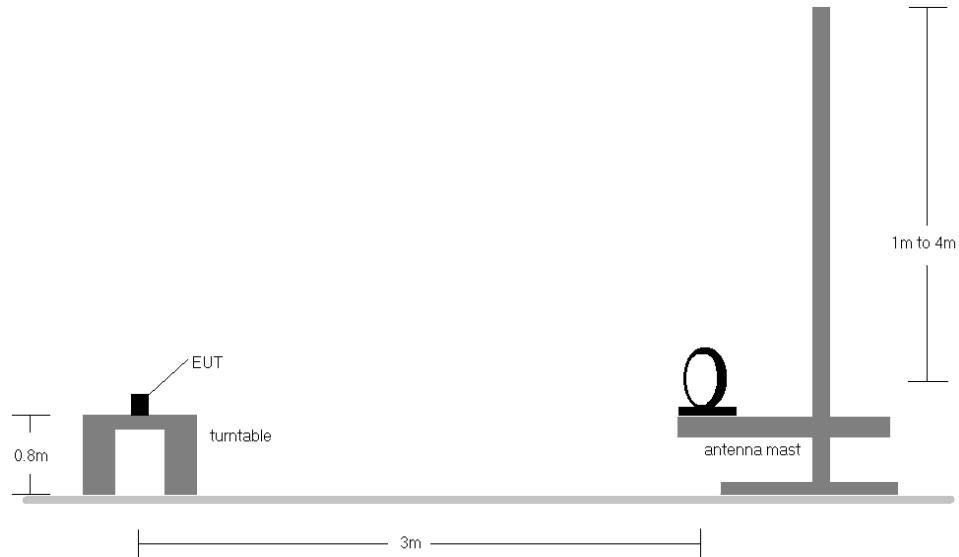
#### Quasi-Peak Field Strength Measurements

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

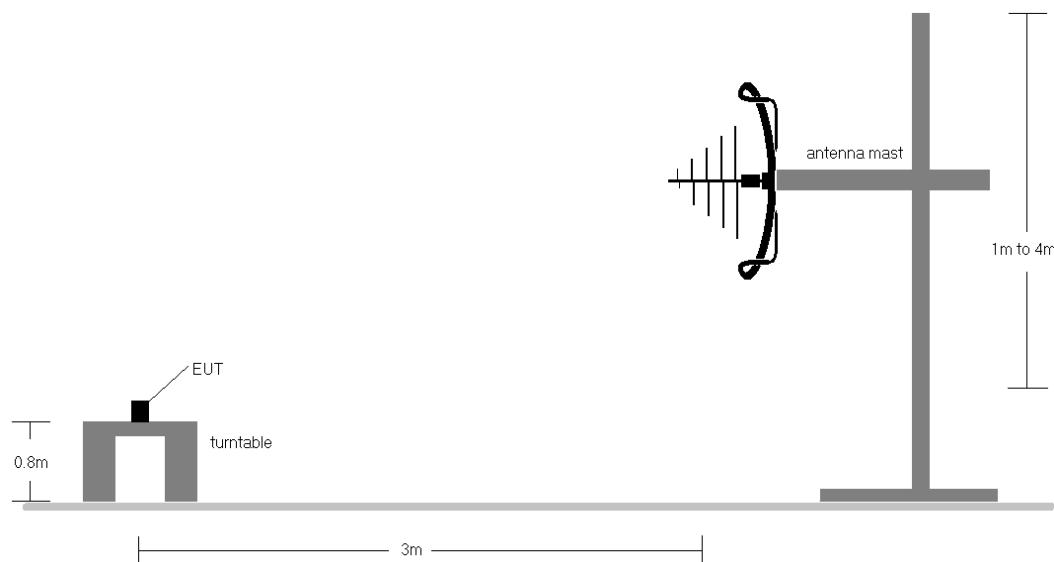
FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 102 of 108

## 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**

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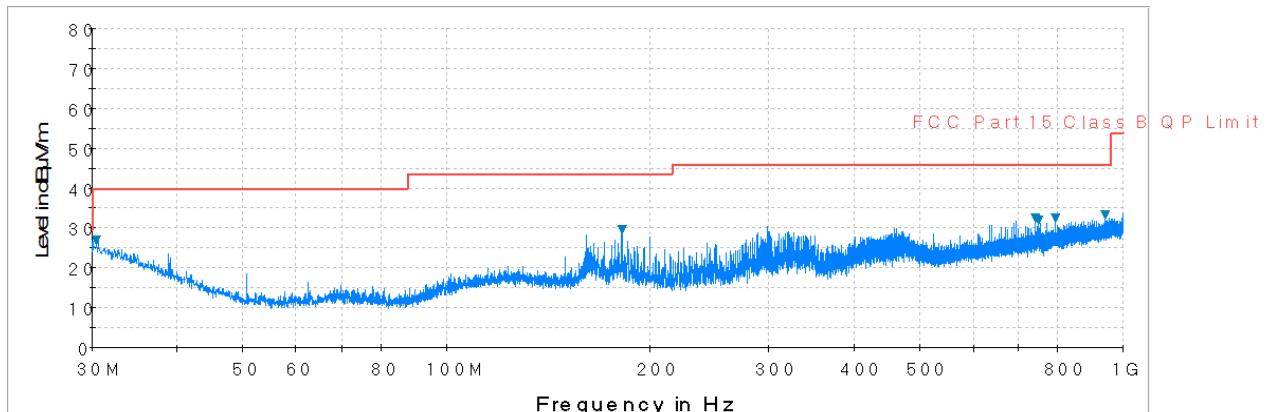
## Test Notes

1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-28.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
3. This unit was tested while powered by an DC power source.
4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
5. Emissions were measured at a 3 meter test distance.
6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
7. No spurious emissions were detected within 20dB of the limit below 30MHz.
8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
9. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. There were no emissions detected in the 30MHz – 1GHz frequency range, as shown in the subsequent plots.

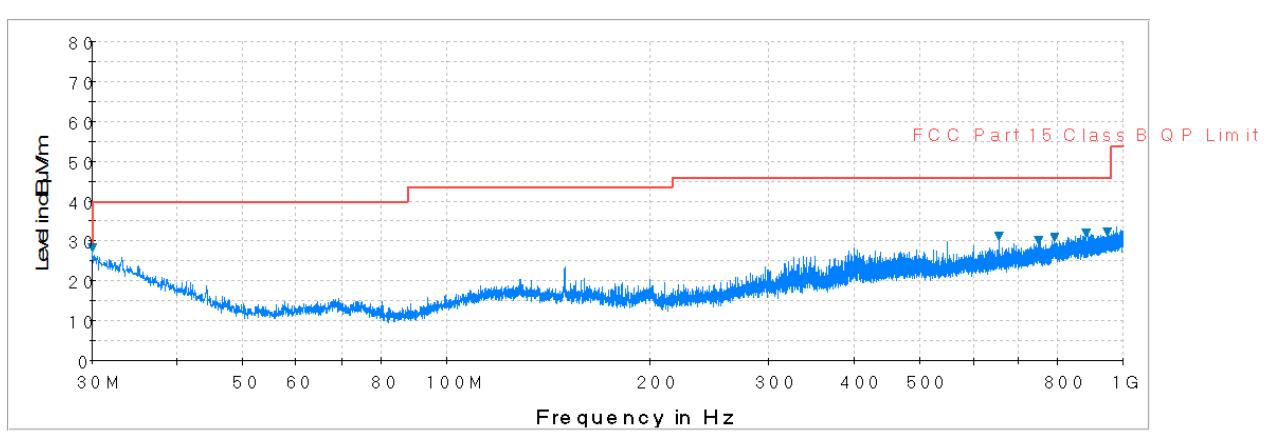
FCC ID: 2AJE7SMC-WEX01	 <b>PCTEST</b> Engineering Laboratory, Inc.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	 <b>SMC</b>	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 104 of 108

## Radiated Spurious Emissions Measurements (Below 1GHz)

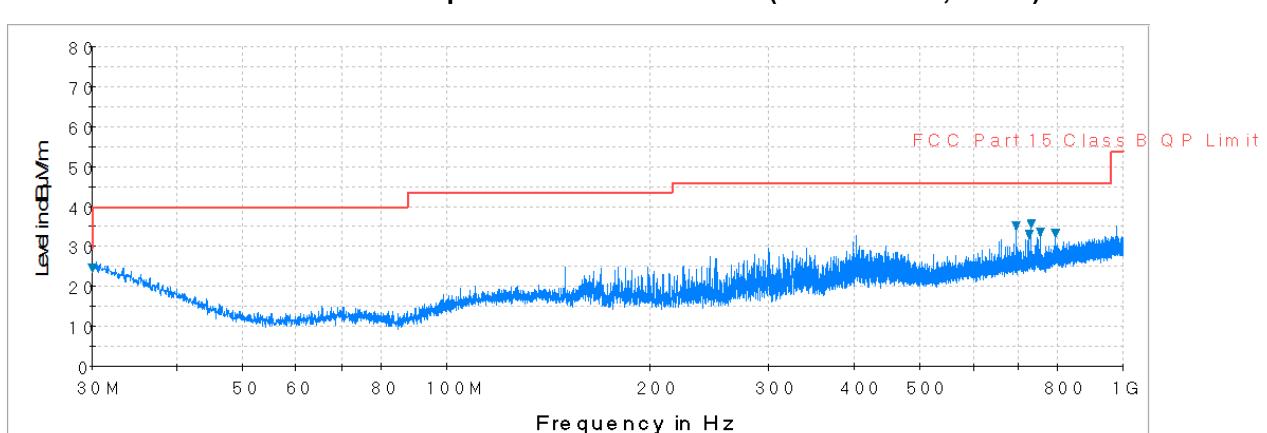
§15.209



**Plot 7-133. Radiated Spurious Plot below 1GHz (EX600-WEN1, Pol. H)**

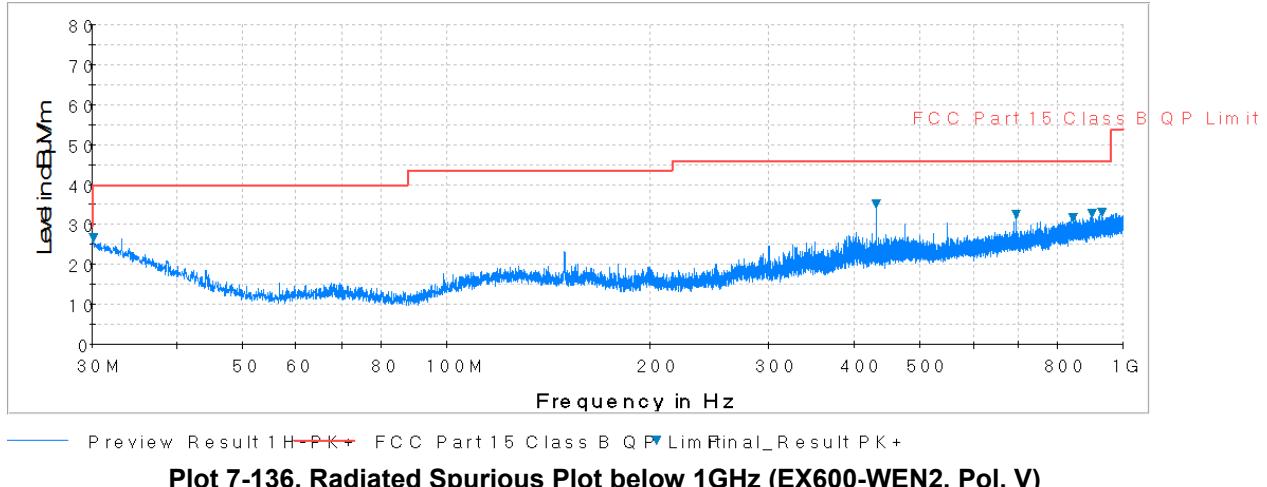


**Plot 7-134. Radiated Spurious Plot below 1GHz (EX600-WEN1, Pol. V)**

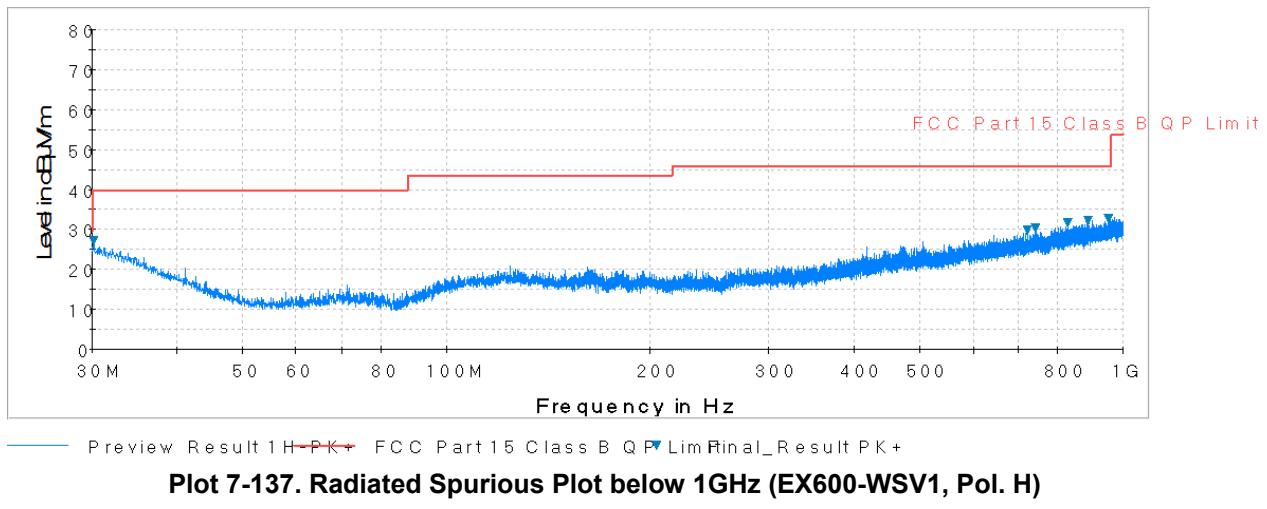


**Plot 7-135. Radiated Spurious Plot below 1GHz (EX600-WEN2, Pol. H)**

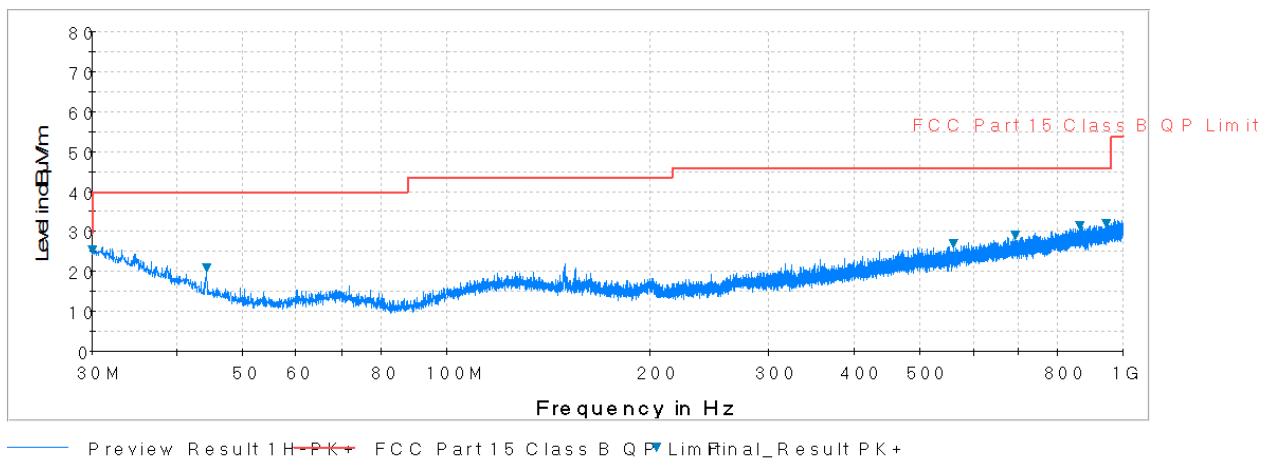
FCC ID: 2AJE7SMC-WEX01		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 105 of 108



**Plot 7-136. Radiated Spurious Plot below 1GHz (EX600-WEN2, Pol. V)**

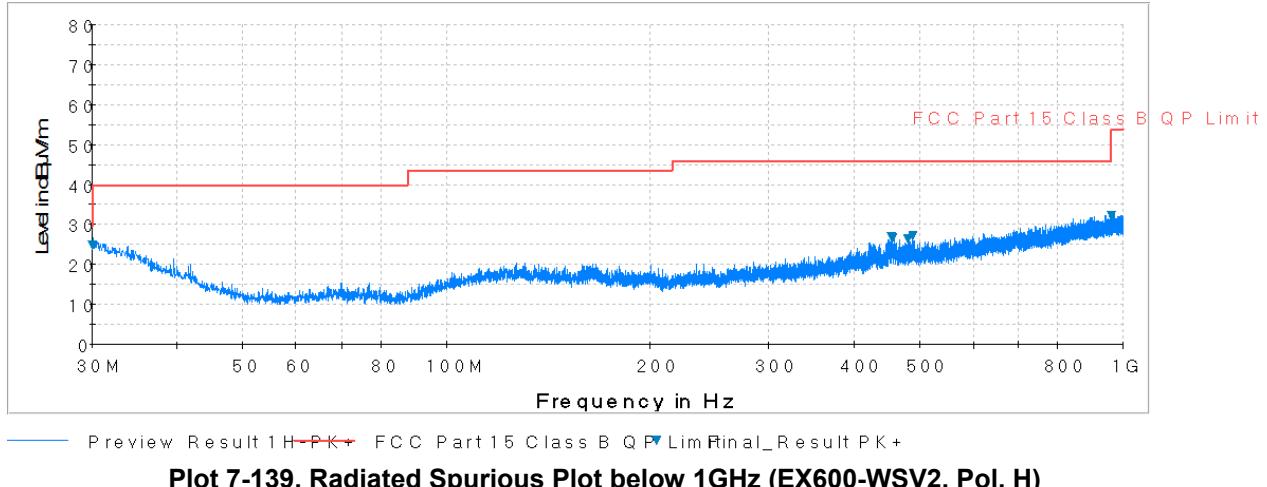


**Plot 7-137. Radiated Spurious Plot below 1GHz (EX600-WSV1, Pol. H)**

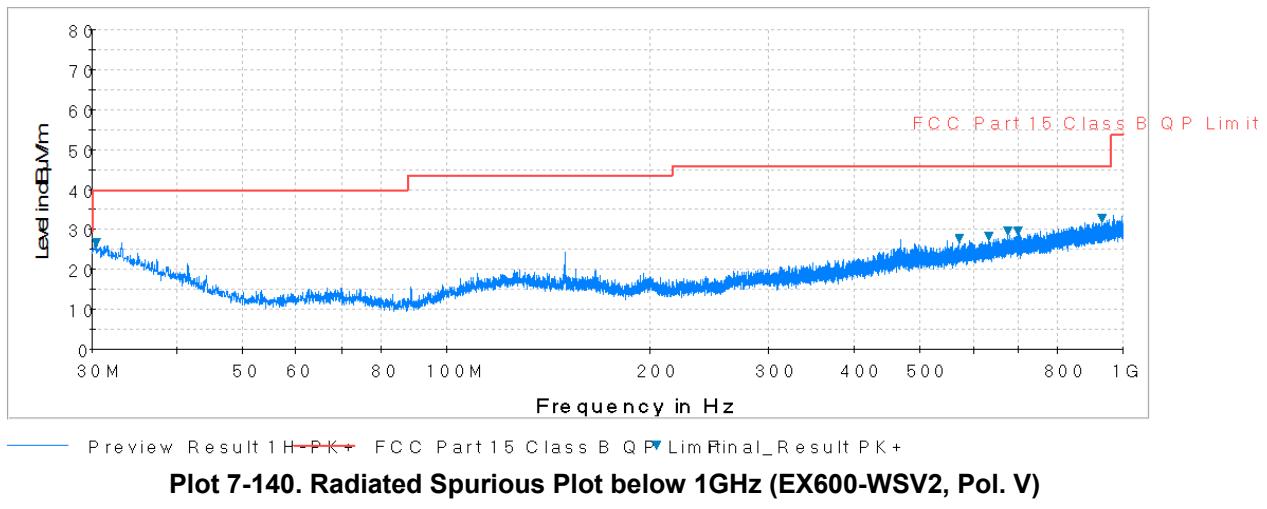


**Plot 7-138. Radiated Spurious Plot below 1GHz (EX600-WSV1, Pol. V)**

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**Plot 7-139. Radiated Spurious Plot below 1GHz (EX600-WSV2, Pol. H)**



**Plot 7-140. Radiated Spurious Plot below 1GHz (EX600-WSV2, Pol. V)**

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Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 107 of 108

## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **SMC Wireless Systems Wireless I/O Device FCC ID: 2AJE7SMC-WEX01** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules.

FCC ID: 2AJE7SMC-WEX01	 <b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 TEST REPORT (CERTIFICATION)	 <b>SMC</b>	Approved by: Quality Manager
Test Report S/N: 1M1707310232-01.2AJE7	Test Dates: 7/11-9/22/2017	EUT Type: Wireless I/O Device		Page 108 of 108

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