



# PCTEST ENGINEERING LABORATORY, INC.

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## MEASUREMENT REPORT FCC PART 15.247

**Applicant Name:**

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

**Date of Testing:**

2/21-3/9/2018

**Test Site/Location:**

PCTEST Lab. Columbia, MD, USA

**Test Report Serial No.:**

1M1802120022-01.2AJE7

<b>FCC ID:</b>	<b>2AJE7SMC-WEX01</b>
<b>APPLICANT:</b>	<b>SMC Corporation</b>

**Application Type:**

Class II Permissive Change

**Model:**

EX600-WPN1

**Additional Model(s):**

EX600-WPN2

**EUT Type:**

Wireless I/O Device

**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

**Class II Permissive Change:**

Please see FCC change document

**Original Grant Date:**

09/26/2017

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 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.

**Test Device Serial No.:** 0WPN1, 0WPN2

### 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. See Section 3.2 for radiated 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
Agilent	N9030A	PXA Signal Analyzer (26.5GHz)	8/28/2017	Annual	8/28/2018	MY49432391
COM-Power	AL-130R	Active Loop Antenna	6/5/2017	Annual	6/5/2018	121085
Emco	3115	Horn Antenna (1-18GHz)	3/10/2016	Biennial	3/10/2018	9704-5182
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/23/2016	Biennial	8/23/2018	135427
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	12/1/2016	Biennial	12/1/2018	125518
Huber+Suhner	Sucoflex 102A	40GHz Radiated Cable	5/19/2017	Annual	5/19/2018	251425001
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	4/19/2017	Annual	4/19/2018	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/31/2017	Annual	7/31/2018	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/11/2017	Annual	8/11/2018	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102133
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	4/2/2016	Biennial	4/2/2018	N/A
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Sunol Sciences	JB6	JB6 Antenna	9/27/2016	Biennial	9/27/2018	A082816

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)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.205 15.209	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-247 limits)	RADIATED	PASS	Section 7.2, Section 7.3, Section 7.4

**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.

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## 7.2 Radiated Spurious Emission Measurements – Above 1GHz

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

### Test Overview and Limit

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

***All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 6 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-2 per Section 15.209 and RSS-Gen (8.9).***

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

**Table 7-2. 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 7-3 below
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

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Frequency	RBW
9 – 150kHz	200 – 300Hz
0.15 – 30MHz	9 – 10kHz
30 – 1000MHz	100 – 120kHz
> 1000MHz	1MHz

Table 7-3. RBW as a Function of Frequency

### Test Setup

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

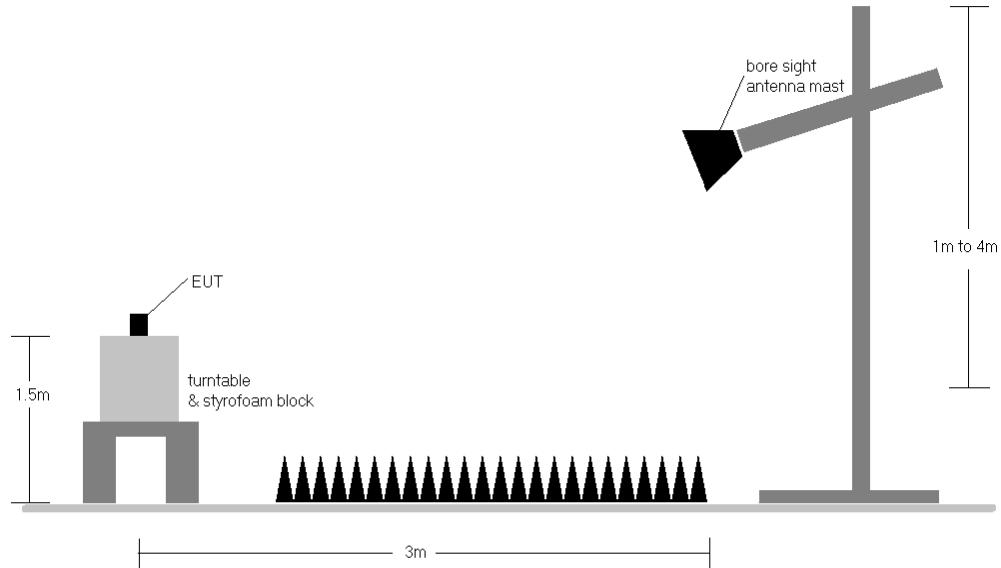


Figure 7-1. Radiated Test Setup >1GHz

### Test Notes

1. All emissions lying in restricted bands specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-2.
2. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
3. This unit was tested while powered by an DC power source.
4. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
5. The duty cycle correction factor was not applied to noise floor measurements.
6. 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.
7. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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## Sample Calculation

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

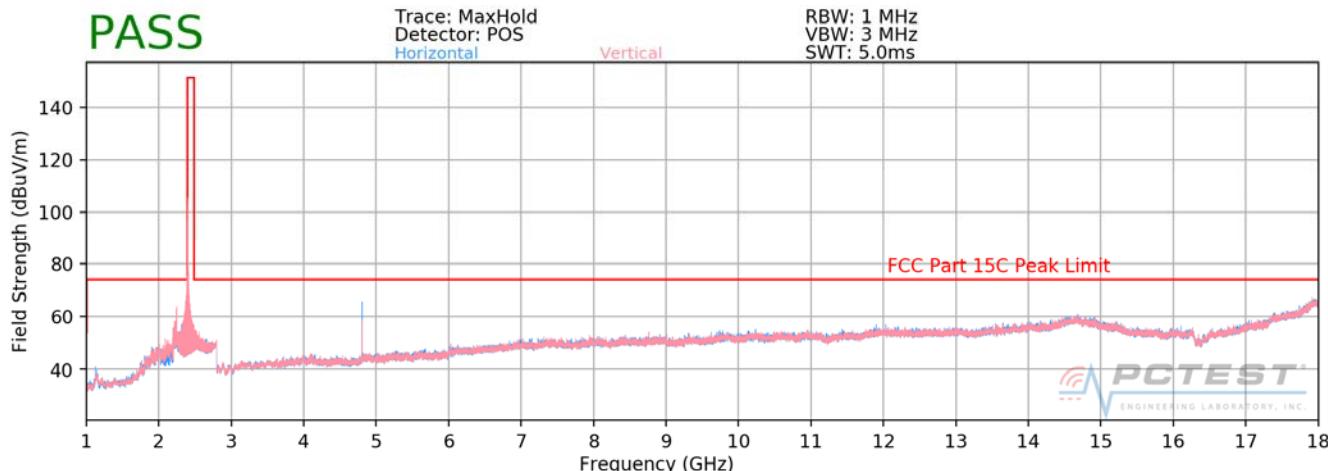
## Duty Cycle Correction Factor Calculation

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

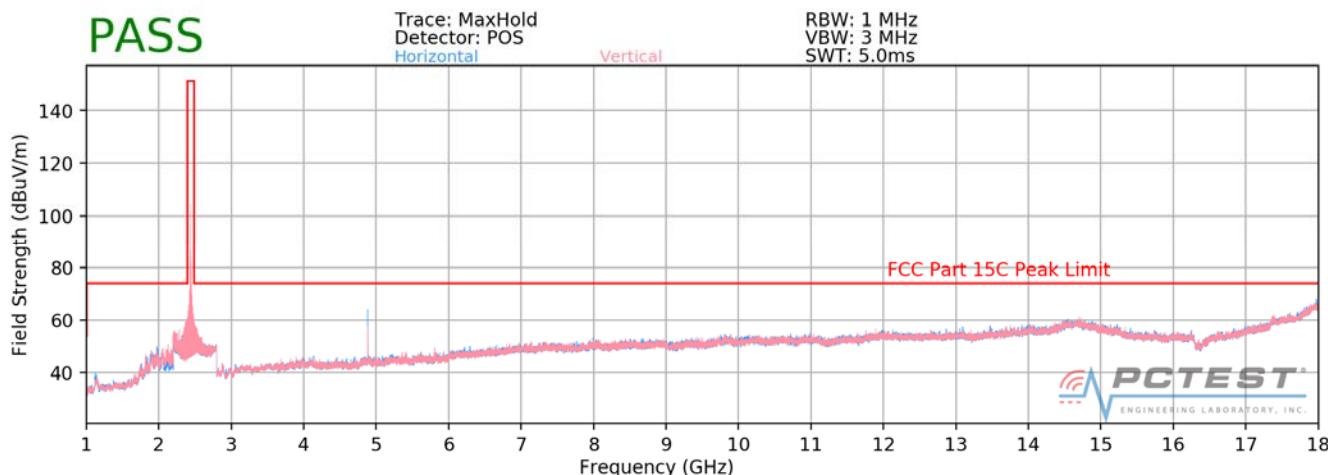
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## Radiated Spurious Emission Measurements

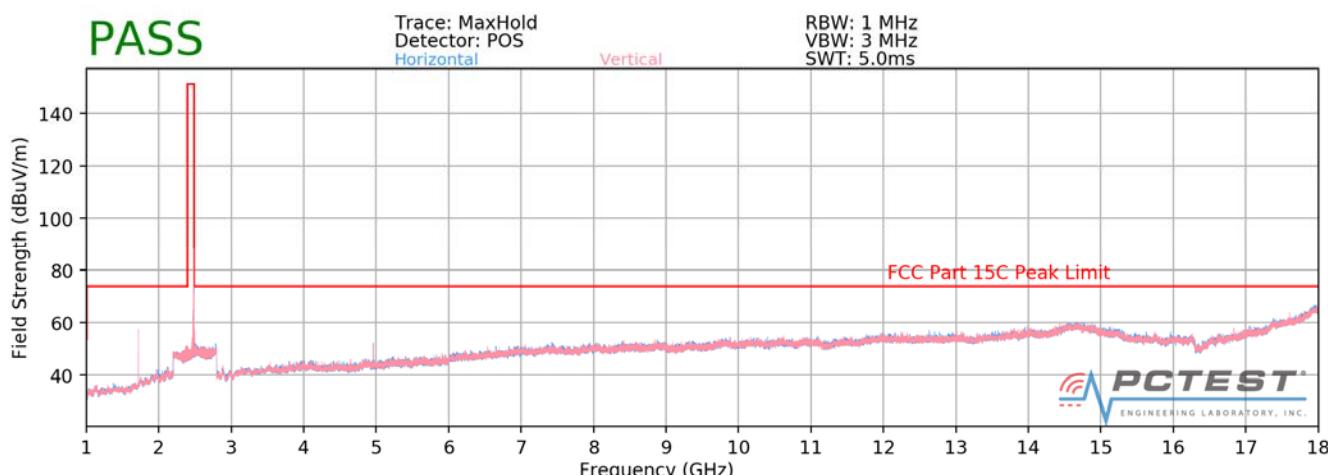
§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]



Plot 7-1. Radiated Spurious Plot above 1GHz (Ch. 0) – EX600-WPN1

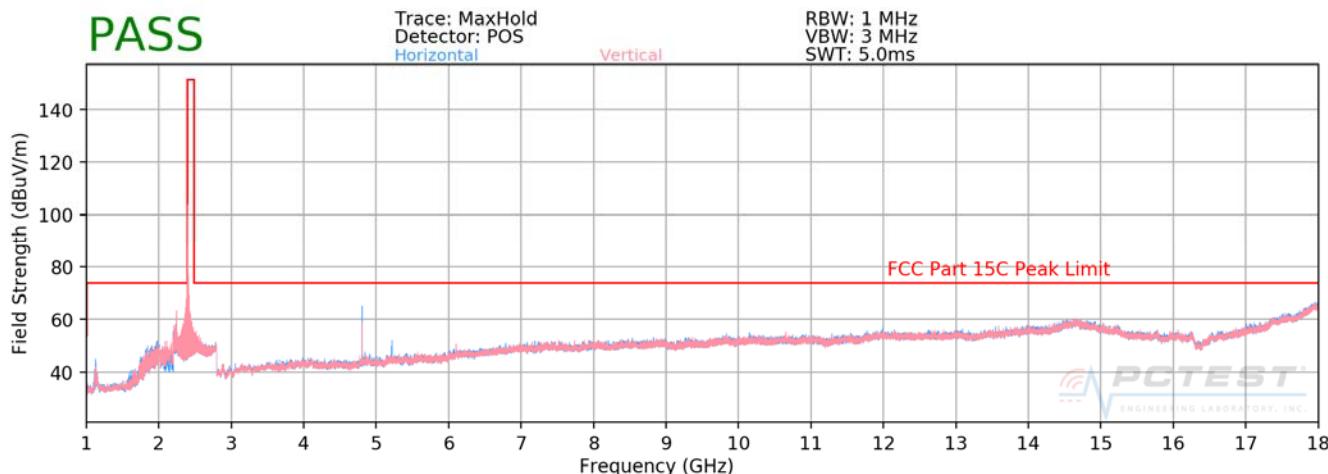


Plot 7-2. Radiated Spurious Plot above 1GHz (Ch. 39) – EX600-WPN1

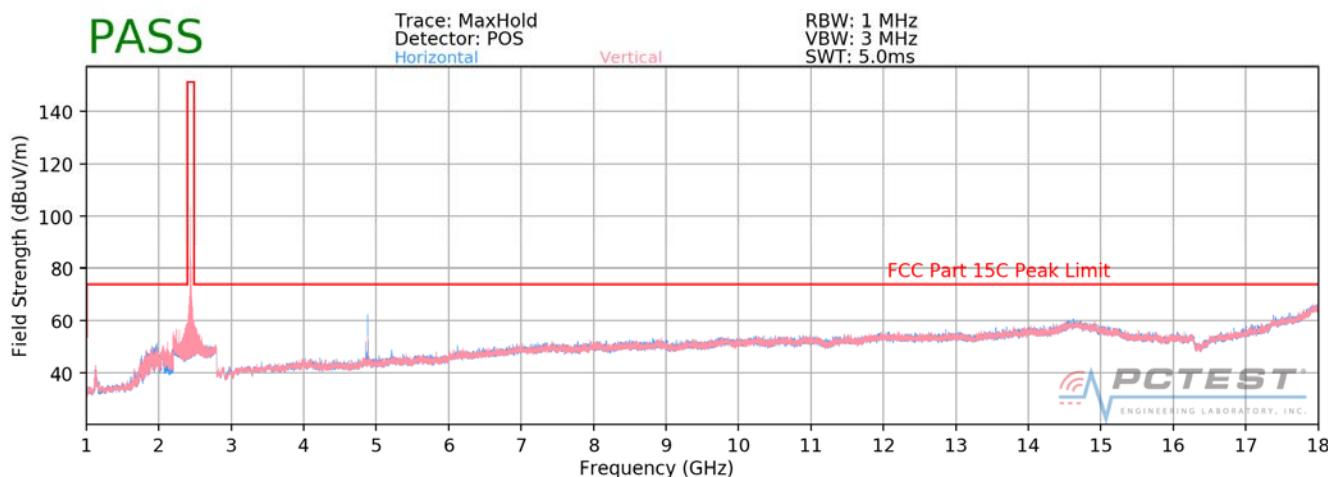


Plot 7-3. Radiated Spurious Plot above 1GHz (Ch. 78) – EX600-WPN1

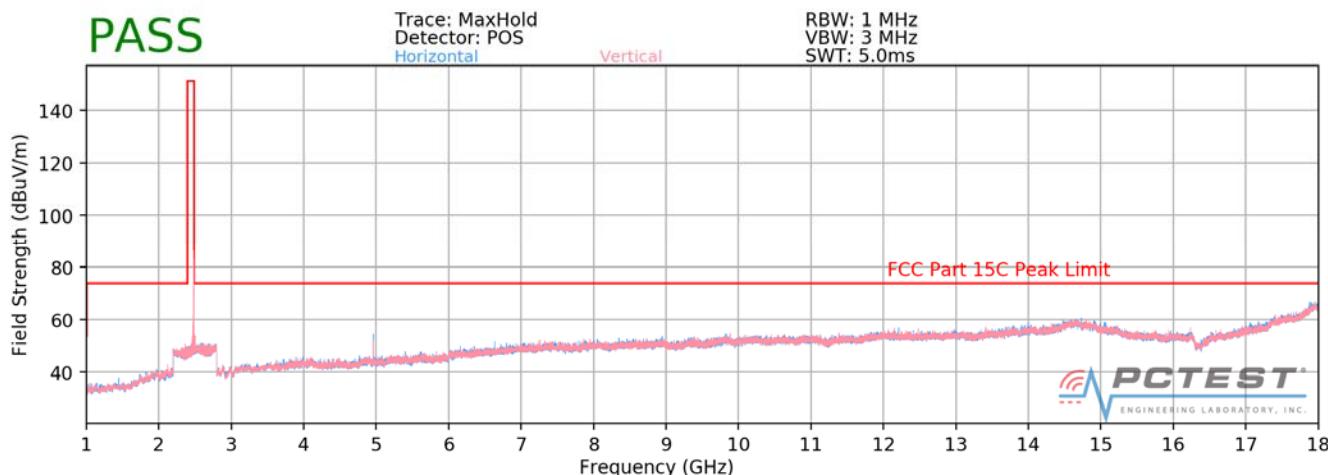
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**Plot 7-4. Radiated Spurious Plot above 1GHz (Ch. 0) – EX600-WPN2**



**Plot 7-5. Radiated Spurious Plot above 1GHz (Ch. 39) – EX600-WPN2**

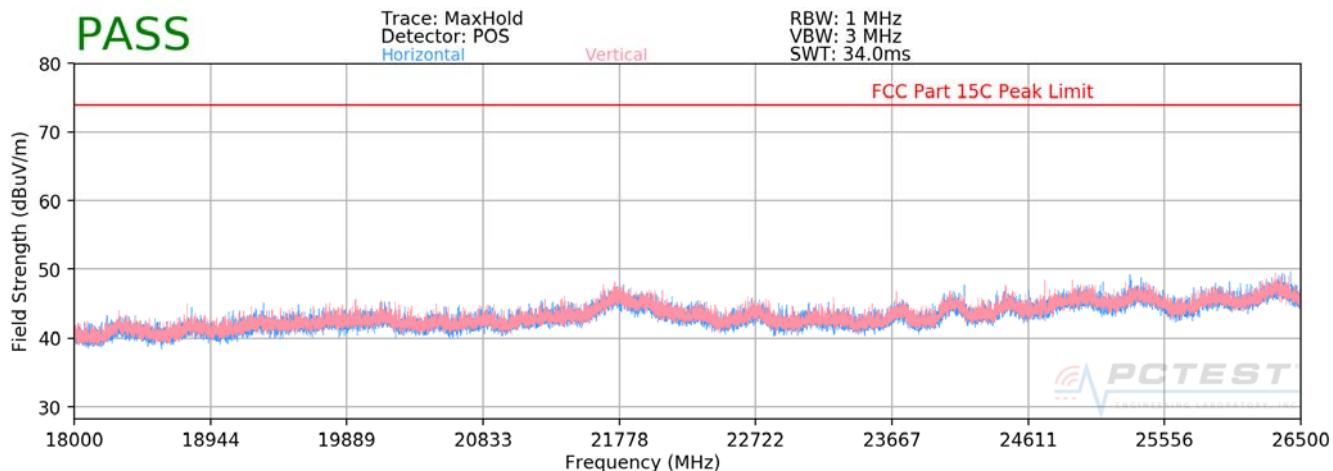


**Plot 7-6. Radiated Spurious Plot above 1GHz (Ch. 78) – EX600-WPN2**

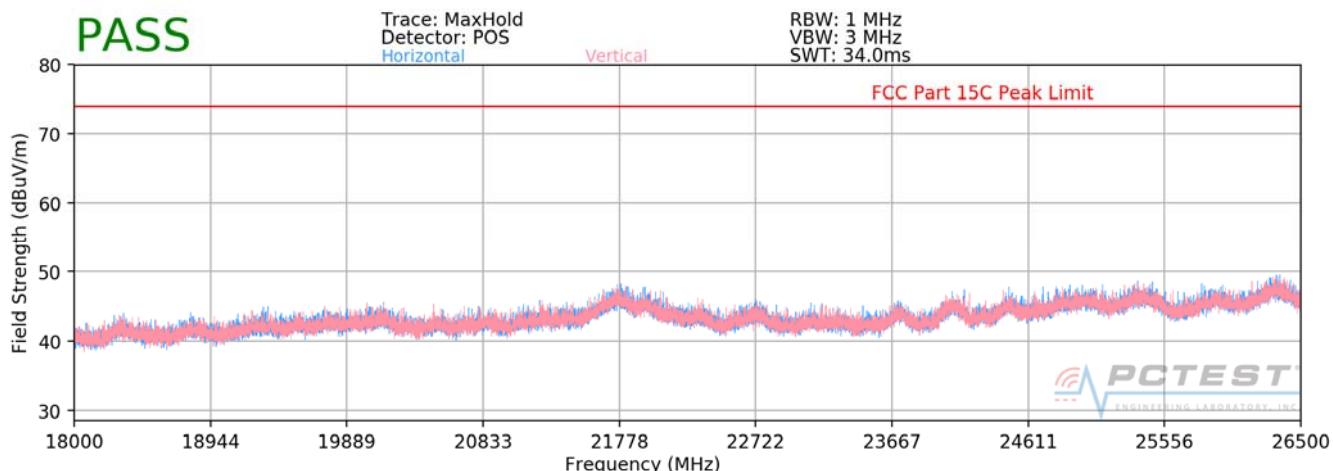
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## Radiated Spurious Emissions Measurements (Above 18GHz)

§15.209; RSS-Gen [8.9]



**Plot 7-7. Radiated Spurious Plot above 18GHz – EX600-WPN1**



**Plot 7-8. Radiated Spurious Plot above 18GHz – EX600-WPN2**

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## Radiated Spurious Emission Measurements

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

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	145	189	-46.00	2.00	-38.42	24.58	53.98	-29.39
4806.00	Peak	H	145	189	-44.64	2.00	0.00	64.36	73.98	-9.61
12015.00	Avg	H	-	-	-80.19	13.25	0.00	40.06	53.98	-13.92
12015.00	Peak	H	-	-	-67.43	13.25	0.00	52.82	73.98	-21.16

Table 7-4. Radiated Measurements – EX600-WPN1

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	215	361	-47.36	2.84	-38.42	24.06	53.98	-29.92
4884.00	Peak	H	215	361	-45.67	2.84	0.00	64.17	73.98	-9.81
7326.00	Avg	H	-	-	-79.24	9.19	0.00	36.95	53.98	-17.03
7326.00	Peak	H	-	-	-65.87	9.19	0.00	50.32	73.98	-23.66
12210.00	Avg	H	-	-	-79.77	13.58	0.00	40.81	53.98	-13.17
12210.00	Peak	H	-	-	-64.25	13.58	0.00	56.33	73.98	-17.65

Table 7-5. Radiated Measurements – EX600-WPN1

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## Radiated Spurious Emission Measurements

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

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	158	331	-56.58	2.39	-38.42	14.39	53.98	-39.59
4962.00	Peak	H	158	331	-53.36	2.39	0.00	56.03	73.98	-17.95
7443.00	Avg	H	-	-	-76.73	9.25	0.00	39.52	53.98	-14.46
7443.00	Peak	H	-	-	-62.23	9.25	0.00	54.02	73.98	-19.96
12405.00	Avg	H	-	-	-76.74	13.21	0.00	43.47	53.98	-10.51
12405.00	Peak	H	-	-	-64.27	13.21	0.00	55.94	73.98	-18.04

Table 7-6. Radiated Measurements – EX600-WPN1

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	215	178	-46.05	2.00	-38.42	24.53	53.98	-29.44
4806.00	Peak	H	215	178	-44.84	2.00	0.00	64.16	73.98	-9.81
12015.00	Avg	H	-	-	-80.10	13.25	0.00	40.15	53.98	-13.83
12015.00	Peak	H	-	-	-67.37	13.25	0.00	52.88	73.98	-21.10

Table 7-7. Radiated Measurements – EX600-WPN2

FCC ID: 2AJE7SMC-WEX01	 PCTEST Engineering Laboratory, Inc.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	 SMC	Approved by: Quality Manager
Test Report S/N: 1M1802120022-01.2AJE7	Test Dates: 2/21-3/9/2018	EUT Type: Wireless I/O Device		Page 17 of 27

## Radiated Spurious Emission Measurements

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

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	301	333	-47.42	2.84	-38.42	24.00	53.98	-29.98
4884.00	Peak	H	301	333	-45.87	2.84	0.00	63.97	73.98	-10.01
7326.00	Avg	H	-	-	-76.71	9.19	0.00	39.48	53.98	-14.50
7326.00	Peak	H	-	-	-64.40	9.19	0.00	51.79	73.98	-22.19
12210.00	Avg	H	-	-	-79.33	13.58	0.00	41.25	53.98	-12.73
12210.00	Peak	H	-	-	-65.41	13.58	0.00	55.17	73.98	-18.81

Table 7-8. Radiated Measurements – EX600-WPN2

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	116	331	-56.40	2.39	-38.42	14.57	53.98	-39.41
4962.00	Peak	H	116	331	-54.03	2.39	0.00	55.36	73.98	-18.62
7443.00	Avg	H	-	-	-80.25	9.25	0.00	36.00	53.98	-17.98
7443.00	Peak	H	-	-	-66.29	9.25	0.00	49.96	73.98	-24.02
12405.00	Avg	H	-	-	-80.61	13.21	0.00	39.60	53.98	-14.38
12405.00	Peak	H	-	-	-68.53	13.21	0.00	51.68	73.98	-22.30

Table 7-9. Radiated Measurements – EX600-WPN2

FCC ID: 2AJE7SMC-WEX01		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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### 7.3 Radiated Restricted Band Edge Measurements

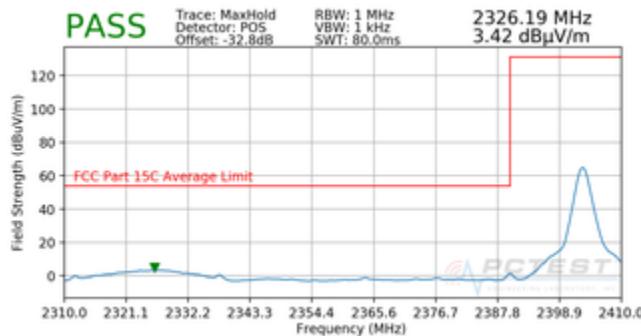
§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

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).

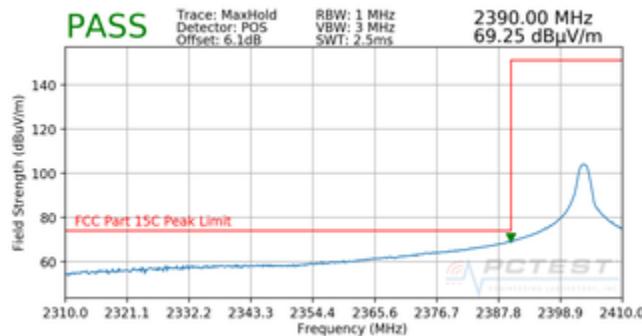
The amplitude offset shown in the following plots for average measurements was calculated using the formula:

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

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



Plot 7-9. Radiated Restricted Lower Band Edge Measurement (Average) – EX600-WPN1



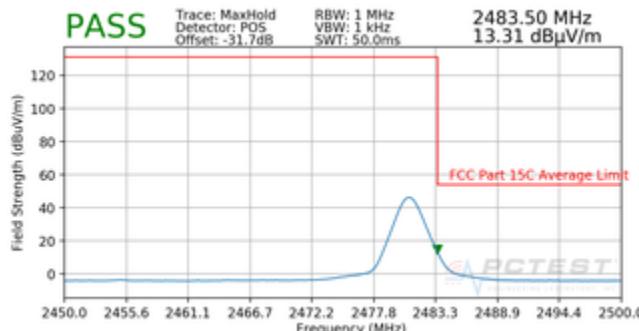
Plot 7-10. Radiated Restricted Lower Band Edge Measurement (Peak) – EX600-WPN1

FCC ID: 2AJE7SMC-WEX01	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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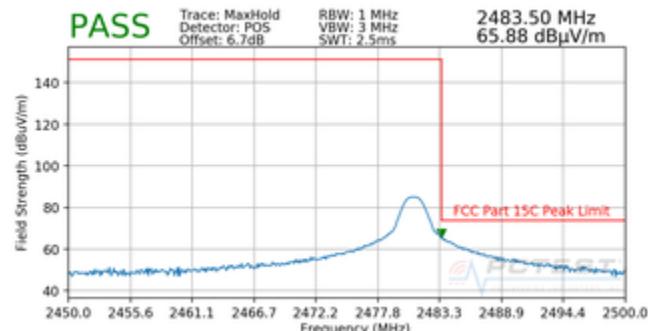
## Radiated Restricted Band Edge Measurements

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

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



Plot 7-11. Radiated Restricted Upper Band Edge Measurement (Average) – EX600-WPN1



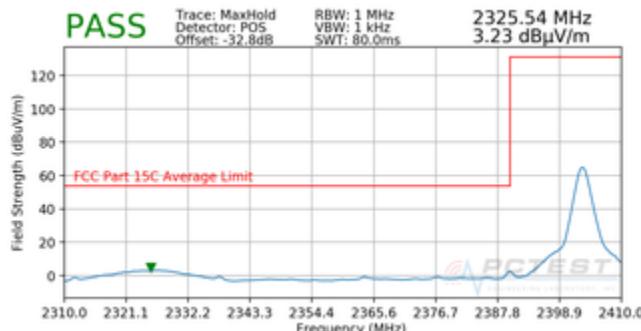
Plot 7-12. Radiated Restricted Upper Band Edge Measurement (Peak) – EX600-WPN1

FCC ID: 2AJE7SMC-WEX01	 <b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>			Approved by: Quality Manager
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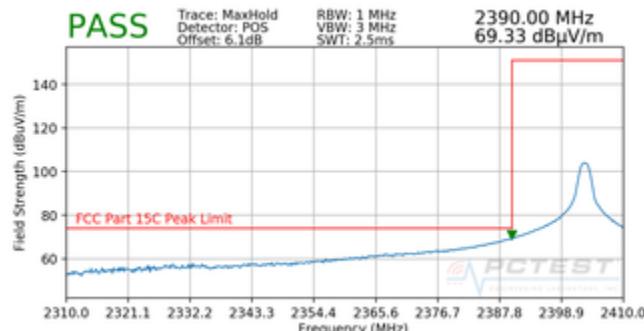
## Radiated Restricted Band Edge Measurements

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

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



Plot 7-13. Radiated Restricted Lower Band Edge Measurement (Average) – EX600-WPN2



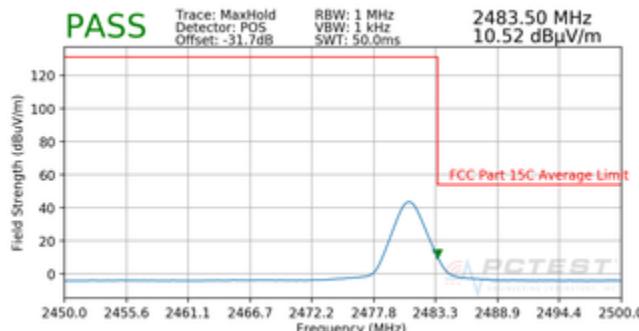
Plot 7-14. Radiated Restricted Lower Band Edge Measurement (Peak) – EX600-WPN2

FCC ID: 2AJE7SMC-WEX01	 PCTEST Engineering Laboratory, Inc.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	 SMC	Approved by: Quality Manager
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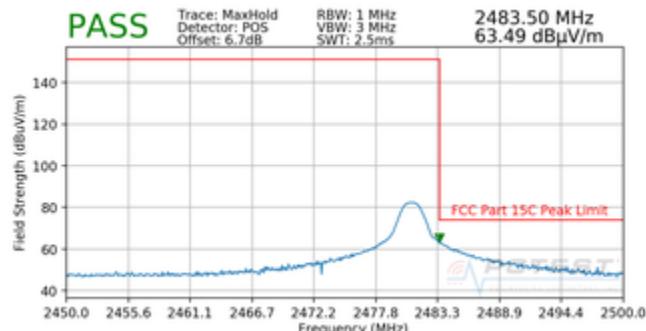
## Radiated Restricted Band Edge Measurements

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

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



**Plot 7-15. Radiated Restricted Upper Band Edge Measurement (Average) – EX600-WPN2**



**Plot 7-16. Radiated Restricted Upper Band Edge Measurement (Peak) – EX600-WPN2**

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## 7.4 Radiated Spurious Emissions Measurements – Below 1GHz

§15.209; RSS-Gen [8.9]

### Test Overview and Limit

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

***All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 6 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-10 per Section 15.209 and RSS-Gen (8.9).***

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 7-10. Radiated Limits**

### Test Procedures Used

ANSI C63.10-2013

### Test Settings

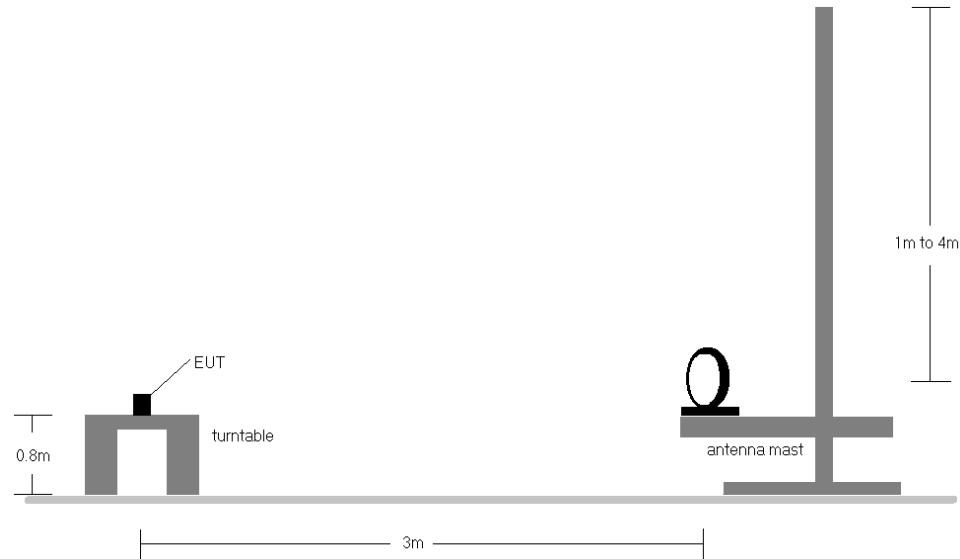
#### Quasi-Peak Field Strength Measurements

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

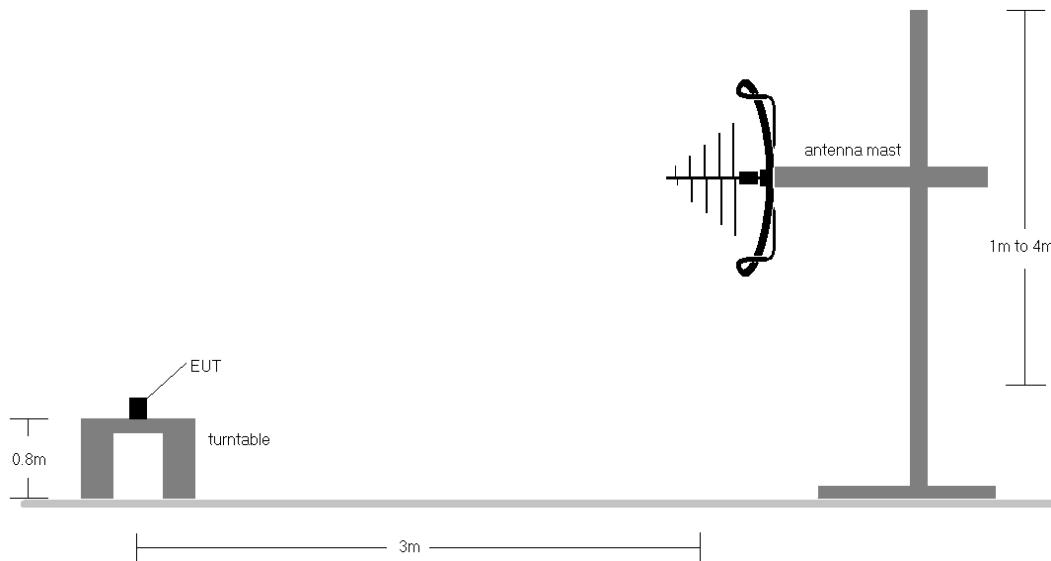
FCC ID: 2AJE7SMC-WEX01	 <b>PCTEST</b> Engineering Laboratory, Inc.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	 <b>SMC</b>	Approved by: Quality Manager
Test Report S/N: 1M1802120022-01.2AJE7	Test Dates: 2/21-3/9/2018	EUT Type: Wireless I/O Device		Page 23 of 27

## Test Setup

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



**Figure 7-2. Radiated Test Setup < 30Mhz**



**Figure 7-3. Radiated Test Setup < 1GHz**

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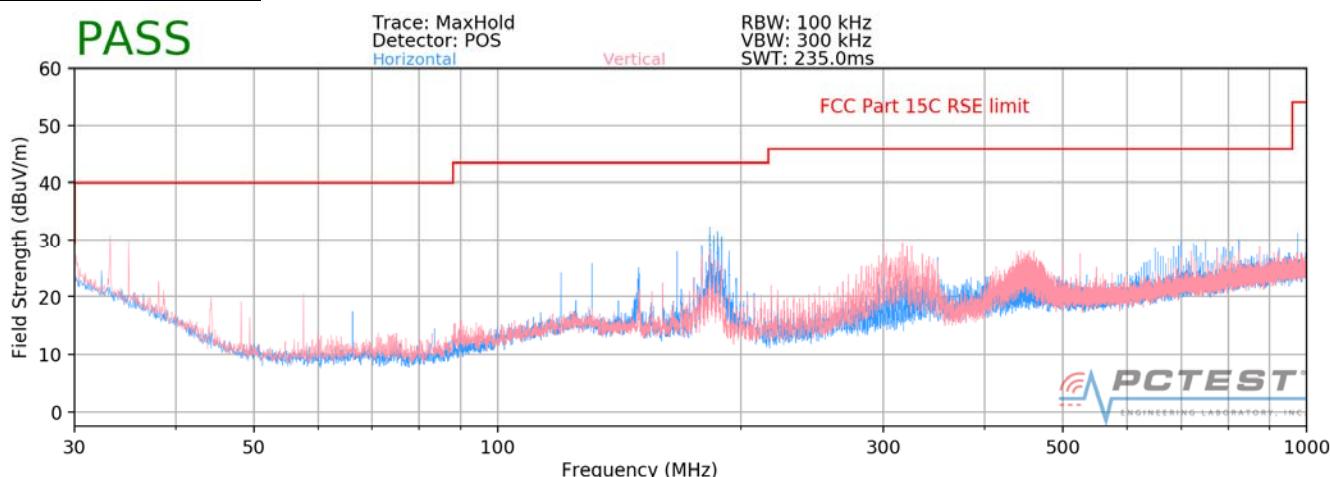
## Test Notes

1. All emissions lying in restricted bands specified in §15.205 and RSS-Gen (8.10) are below the limit shown in Table 7-10.
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.

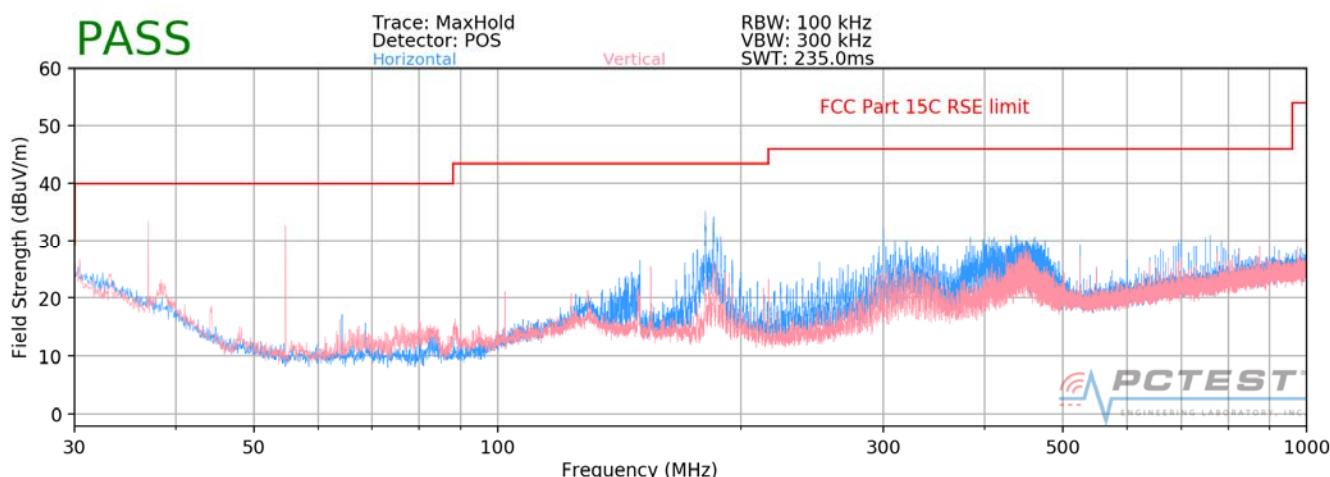
FCC ID: 2AJE7SMC-WEX01	 <b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>		Approved by: Quality Manager
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## Radiated Spurious Emissions Measurements (Below 1GHz)

§15.209; RSS-Gen [8.9]



Plot 7-17. Radiated Spurious Plot below 1GHz (Pol. H) – EX600-WPN1



Plot 7-18. Radiated Spurious Plot below 1GHz (Pol. H) – EX600-WPN2

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## 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>MEASUREMENT REPORT</b> (CLASS II PERMISSIVE CHANGE)			 <b>Approved by:</b> Quality Manager
Test Report S/N: 1M1802120022-01.2AJE7	Test Dates: 2/21-3/9/2018	EUT Type: Wireless I/O Device		Page 27 of 27