
**COMPLIANCE WORLDWIDE INC.
TEST REPORT 214-18**

**In Accordance with the Requirements of
FCC PART 15.247, SUBPART C
Innovation, Science and Economic Development Canada
RSS-247, ISSUE 2**

**Low Power License-Exempt Radio Communication Devices
Intentional Radiators**

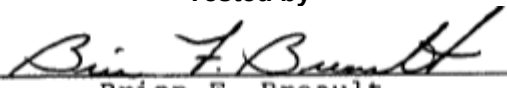
**Issued to
STATSports Group Limited
1st Floor Drumalane Mill, The Quays,
Newry, Co. Down, BT35 8QS**

**for the
Apex Pod
Model
2.4 GHz Bluetooth Low Energy Radio**

FCC ID: 2APHSAPX200

Report Issued on May 31, 2018

Tested by



Brian F. Breault

Reviewed by



Larry K. Stillings

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1. Scope

This test report certifies that the STATSports Group Apex Pod Module, as tested, meets the FCC Part 15, Subpart C and ISED Canada RSS-247, Issue 2 requirements. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

2. Product Details

- 2.1. Manufacturer:** STATSports Group Ltd
- 2.2. Model Number:** Apex Pod
- 2.3. Serial Number:** Pre-production
- 2.4. Description:** The STATSports Group Apex Pod is an athlete performance-tracking device.
- 2.5. Power Source:** DC 2.8 to 3.6 Volts
- 2.6. Hardware Revision:** Rev B
- 2.7. Software Version:** N/A
- 2.8. Modulation Type:** GFSK
- 2.9. Operating Frequency:** 2.4 GHz to 2.4835 Nominal
- 2.10. EMC Modifications:** None

3. Product Configuration

3.1. Operational Characteristics & Software

Hardware Setup:

An onboard setup file (CERT.cfg) enables the device to be configured for testing. Selection of the advertising channels is carried out by setting register bits in the data located in this file.

3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Freq (Hz)	Description/Function
STATSports Group	Apex Pod	Pre-production	3.6	DC	Sample 1 ¹ and Sample 2 ²

¹ Unit used for radiated test measurements.

² Unit used for conducted test measurements.

3.3. EUT Cables/Transducers

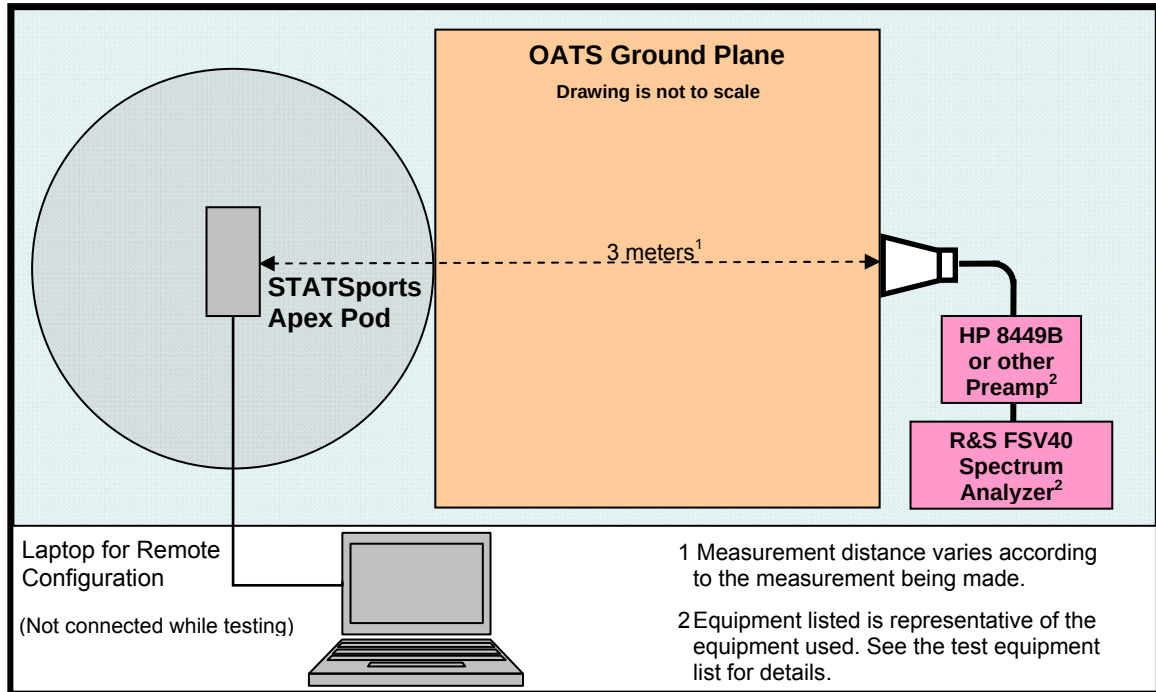
Cable Type	Length	Shield	From	To
USB	3M	Yes	EUT	Laptop for Configuration

3.4. Support Equipment

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Freq (Hz)	Description/Function
Dell	Inspiron E1505	5573349937	120	60	Laptop for Configuration
Samsung	ETA-U90JWE	SE4DC25AS/B-E	120	60	5 VDC, 2 Amp Power Adapter, USB Type A Female Connector

3. Product Configuration (continued)

3.5. Test Setup Diagram



3.6. EUT Orientation Diagram

During all radiated emissions measurement testing, the product was mounted on a polystyrene form to facilitate rotating the device through three orthogonal axes, as required by ANSI C63.10, section 5.10.1, for a hand held or body worn device. The three axes were defined as follows:

X Axis	Horizontal on left edge, USB port faces right	Button side of unit is facing the antenna at 0°
Y Axis	Upright on edge, USB port faces down	Button side of unit is facing the antenna at 0°
Z Axis	Flat on table, button facing up	USB connector of the unit is facing the antenna at 0°



4. Measurements Parameters

4.1. Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due	Interval
EMI Test Receiver, 9kHz - 7GHz ¹	Rohde & Schwarz	ESR7	101156	7/23/2018	3 Years
Spectrum Analyzer 20 Hz – 40 GHz ²	Rohde & Schwarz	FSV40	100899	7/23/2018	3 Years
Spectrum Analyzer, 9 kHz - 40 GHz ³	Rohde & Schwarz	FSVR40	100909	5/3/2019	2 Years
Spectrum Analyzer, 2 Hz - 26 GHz ⁴	Rohde & Schwarz	FSW26	102057	12/7/2018	2 Years
EMI Receiver	Hewlett Packard	8546A	3650A00360	12/6/2018	3 Years
Passive Loop Antenna, 9 kHz to 30 MHz	EMCO	6512	9309-1139	10/26/2018	2 Years
Biconilog Antenna, 30 MHz to 2 GHz	Sunol Sciences	JB1	A050913	6/3/2019	2 Years
Horn Antenna 1 to 18 GHz	ETS-Lindgren	3117	00143292	2/22/2019	3 Years
Horn Antenna, 18 GHz to 40 GHz	Com-Power	AH-840	3075	10/11/2018	2 Years
Preamplifier, 1 GHz to 26.5 GHz	Hewlett Packard	8449B	3008A00329	7/22/2018	3 Years
Preamplifier 18 to 40 GHz	Avantek	AWT-40039	FM22038832	6/2/2018	1 Year
LISN 50 ohm 50 µH, 9 kHz to 30 MHz	EMCO	3825/2	9109-1860	11/17/2018	1 Year
2.4 GHz Band Reject Filter	Micro-Tronics	BRM50702	150	1/23/2019	1 Year
EMI Receiver, 9 kHz to 6.5 GHz	Hewlett Packard	8546A	3330A00115	12/4/2018	2 Years
Digital Barometer	Control Company	4195	ID236	10/8/2018	2 Years

¹ ESR7 Firmware revision: V3.36, SP2 Date installed: 11/02/2017 Previous V3.36, installed 05/16/2017.
² FSV40 Firmware revision: V2.30 SP4, Date installed: 05/04/2016 Previous V2.30 SP1, installed 10/22/2014.
³ FSVR40 Firmware revision: V2.23 SP1, Date installed: 08/19/2016 Previous V2.23, installed 10/20/2014.
⁴ FSW26 Firmware revision: V2.80, Date installed: 10/28/2017 Previous V2.61, installed 04/04/2017.

4.2. Measurement Software

Manufacturer	Software Description	Title or Model #	Rev.	Report Sections
Compliance Worldwide	Test Report Generation Software	Test Report Generator	1.0	7.9. Conducted Emissions

4. Measurements Parameters

4.3. Measurement & Equipment Setup

Test Dates:	4/26/2018 5/14/2018 – 5/29/2018
Test Engineer:	Brian Breault
Normal Site Temperature (15 - 35°C):	21.0
Relative Humidity (20 -75%RH):	31
Frequency Range:	10 kHz to 40 GHz
Measurement Distance:	3, 1.5, 1 and 0.3 Meters
	200 Hz - 10 kHz to 150 kHz
	9 kHz - 150 kHz to 30 MHz
EMI Receiver IF Bandwidth:	120 kHz - 30 MHz to 1 GHz
	1 MHz - Above 1 GHz
	1 kHz - 10 kHz to 150 kHz
	30 kHz - 150 kHz to 30 MHz
EMI Receiver Average Bandwidth:	300 kHz - 30 MHz to 1 GHz
	3 MHz - Above 1 GHz
	Peak, QP - 10 kHz to 1 GHz
Detector Function:	Peak, Avg - Above 1 GHz
	Unless otherwise specified.

4.4. Measurement Procedures

Test measurements were made in accordance FCC Part 15.247: Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5850 MHz, and 24.0 - 24.25 GHz.

The measurement procedures in this report are in accordance with ANSI C63.10-2013: *American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices*. FCC OET Publication Number KDB 558074 D01 v04, *Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247*, dated April 5, 2017, was also referenced for the test procedures used to generate the data in this report. All references to FCC OET publication number 558074 refer to this version of the publication.

All radiated emissions measurements include correction factors for antenna, cables, preamp and attenuators, if used.

4.5. Measurement Uncertainty

The following uncertainties are expressed for an expansion/coverage factor of K=2.

RF Frequency (out of band)	$\pm 1 \times 10^{-8}$
Radiated Emission of Transmitter to 100 GHz	± 4.55 dB
Radiated Emission of Receiver	± 4.55 dB
Temperature	$\pm 0.91^{\circ}$ C
Humidity	$\pm 5\%$

5. Choice of Equipment for Test Suits

5.1 Choice of Model

This test report is based on the one test sample supplied by the manufacturer. These units are reported by the manufacturer to be equivalent to the production units.

5.2 Presentation

The test samples were tested complete with all required ancillary equipment. Refer to Section 3 of this report for product equipment configuration.

5.3 Choice of Operating Frequencies

The RTLS Module, as tested, operates on 40 channels, from channels 0 to 39 in the 2.4 GHz band.

In accordance with ANSI C63.10-2013, section 5.6, and FCC Part 15.31 (m), the choice of operating frequencies selected for the testing detailed in this report are as follows:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
37	2402	9	2422	18	2442	28	2462
0	2404	10	2424	19	2444	29	2464
1	2406	38	2426	20	2446	30	2466
2	2408	11	2428	21	2448	31	2468
3	2410	12	2430	22	2450	32	2470
4	2412	13	2432	23	2452	33	2472
5	2414	14	2434	24	2454	34	2474
6	2416	15	2436	25	2456	35	2476
7	2418	16	2438	26	2458	36	2478
8	2420	17	2440	27	2460	39	2480

5. Choice of Equipment for Test Suits (continued)

5.4 Mode of Operation

Modulation type : GFSK
 Payload Pattern : PRB29
 Payload Length : 37 bytes

For band edge measurements (section 7.6), the DTS bandwidth measurements were taken into consideration for the worst case examples.

6. Measurement Summary

Test Requirement	FCC Rule Reference	Test Report Section	Result
Antenna Requirement	15.203	7.1	Compliant
Minimum DTS Bandwidth	15.247 (a) (2)	7.2	Compliant
Maximum Peak Conducted Output Power	15.247 (b) (1)	7.3	Compliant
Operation with directional antenna gains greater than 6 dBi	15.247 (b) (4)	7.4	Compliant
Spurious Radiated Emissions	15.247 (d)	7.5	Compliant
Spurious Radiated Emissions (> GHz) - Harmonic Measurements	15.247 (d)		Compliant
Lower and Upper Band Edges	15.247 (d)	7.6	Compliant
Emissions in Non-restricted Frequency Bands	15.247(e)	7.7	Compliant
Peak Power Spectral Density	15.247(e)	7.8	Compliant
Conducted Emissions	15.207	7.9	Compliant
Duty Cycle	15.207	7.10	Compliant
Public Exposure to Radio Frequency Energy Levels	1.1307 (b) (1)	7.11	Compliant

7. Measurement Data

7.1. Antenna Requirement (15.203)

Requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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.

Results: The STATSport Apex Pod module utilizes a chip antenna which is not user replaceable.

7. Measurement Data

7.2. Minimum DTS Bandwidth

Requirement: (15.247 (a) (2))

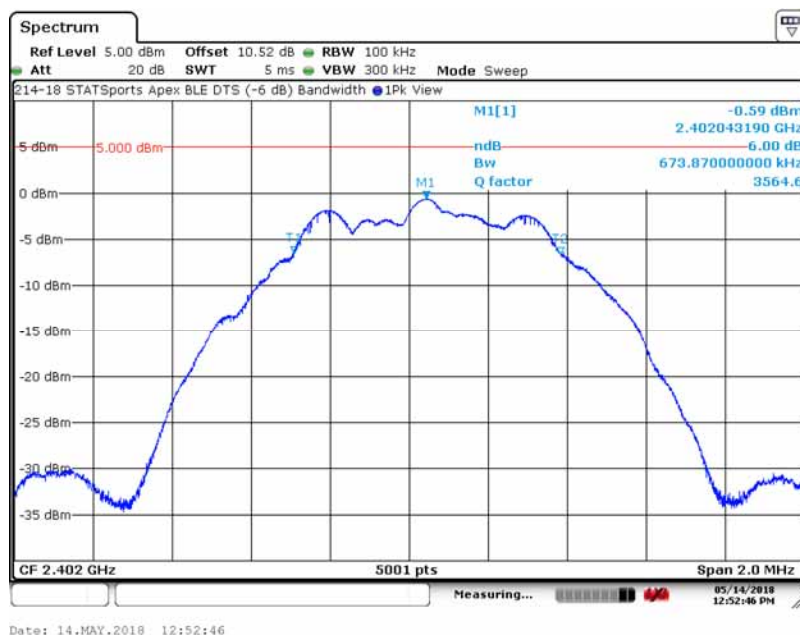
Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Procedure: This test was performed in accordance with the procedure detailed in FCC OET publication number 558074, Section 8.1 Option 1, DTS (6 dB) Channel Bandwidth.

Results: The device under test meets the minimum 500 kHz DTS (6 dB) bandwidth requirement.

Channel	Frequency (MHz)	-6 dB Bandwidth 1 Mbps (kHz)	Minimum -6 dB Bandwidth (kHz)	Result
37	2402	673.87	>500	Compliant
38	2426	667.47	>500	Compliant
39	2480	699.86	>500	Compliant

7.2.1. Low Channel – 37, 2402 MHz, 1 Mbps



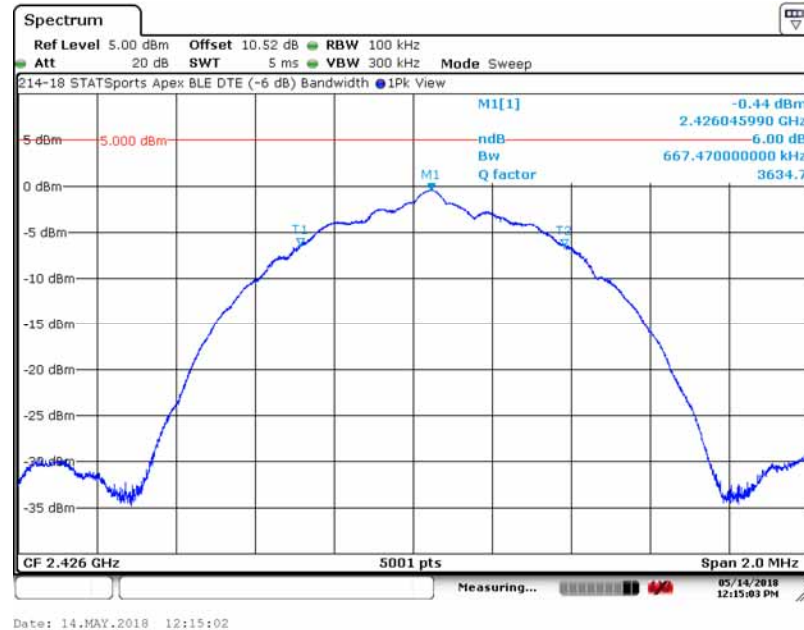
Test Number: 214-18

Issue Date: 5/31/2018

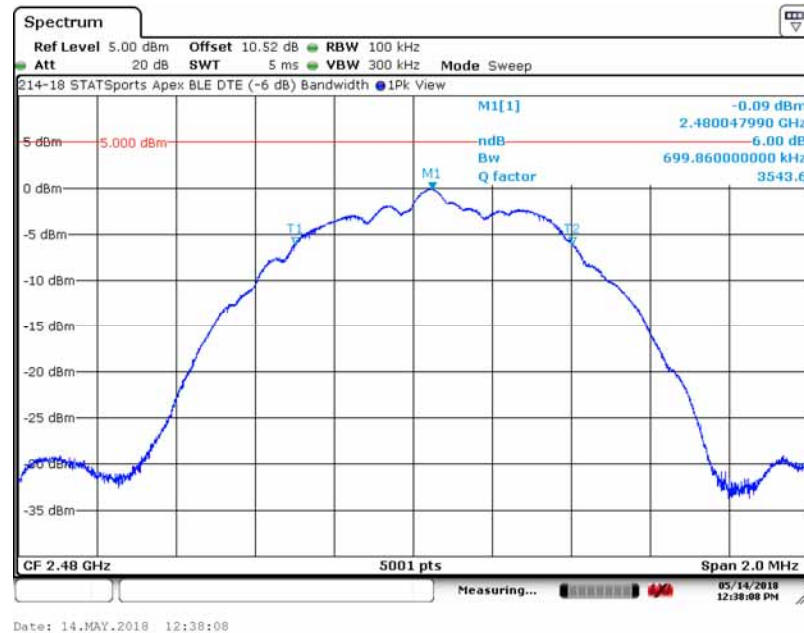
7. Measurement Data

7.2. Minimum DTS Bandwidth (15.247 (a) (2)) (continued)

7.2.2. Middle Channel – 38, 2426 MHz, 1 Mbps



7.2.3. High Channel – 39, 2480 MHz, 1 Mbps



7. Measurement Data (continued)

7.3. Maximum Peak Conducted Output Power

Requirement: (15.247 (b) (3))

The maximum peak conducted output power of the intentional radiator shall not exceed the following: For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt (+30 dBm).

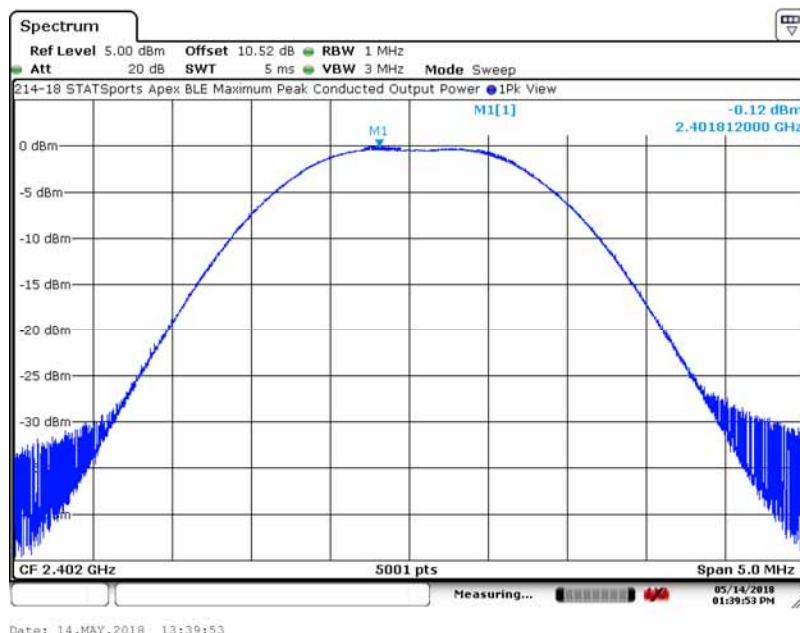
Procedure: This test was performed in accordance with the procedure detailed in FCC OET publication number KDB 558074, Section 9.1.1.

Test Note: A spectrum analyzer resolution bandwidth of 1 MHz and a video bandwidth of 3 MHz were used to meet the requirements of FCC OET publication number 558074, Section 9.1.1 and the measured product DTS bandwidth.

Results: The device under test meets the required maximum peak conducted output power level of 1 Watt (30 dBm).

Channel	Frequency	Maximum Peak Radiated Output Power	Peak Limit	Margin	Result
	(MHz)	(dBm)	(dBm)	(dB)	
37	2402	-0.12	30.00	-30.12	Compliant
38	2426	-0.36	30.00	-30.36	Compliant
39	2480	-0.04	30.00	-30.04	Compliant

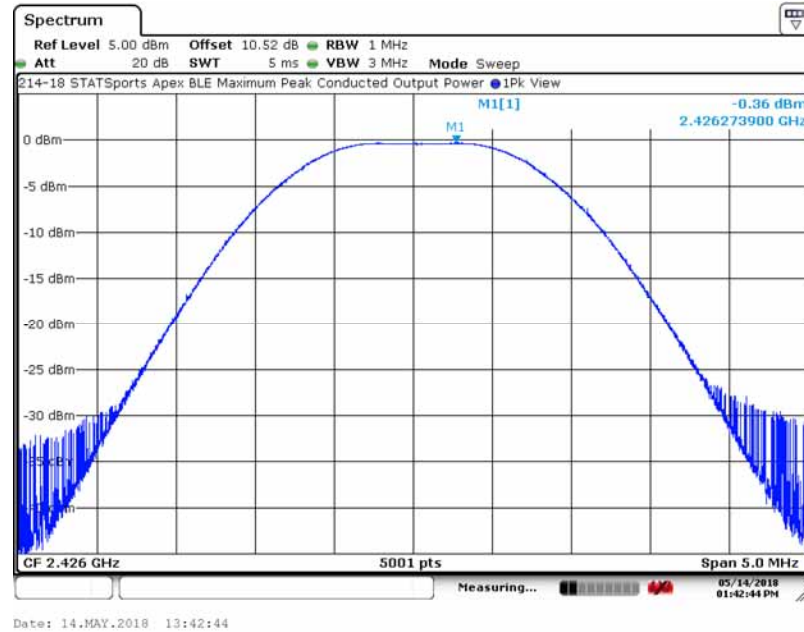
7.3.1. Low Channel – 37, 2402 MHz



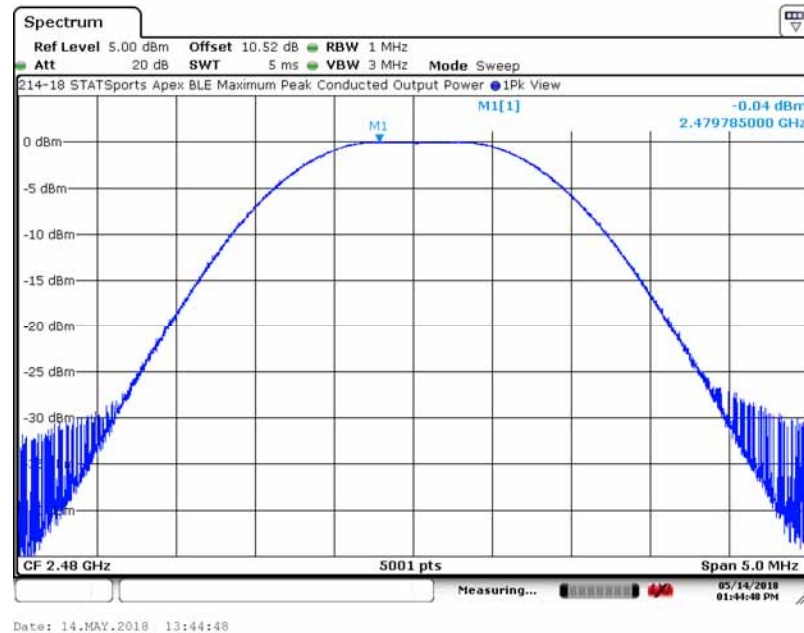
7. Measurement Data

7.3. Maximum Peak Conducted Output Power (continued)

7.3.2. Middle Channel – 38, 2426 MHz



7.3.3. High Channel – 39, 2480 MHz



7. Measurement Data**7.4. Operation with directional antenna gains greater than 6 dBi (15.247 (b)(4))**

Requirement: If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of FCC Part 15.247, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400 – 2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Procedure: Not applicable for the device under test.

DUT Status: The DUT utilizes an antenna with a 2.0 dBi gain and therefore is exempt from this requirement.

7. Measurement Data (continued)
7.5. Transmitter Spurious Radiated Emissions (30 kHz to 40 GHz)
7.5.1 Transmitter Spurious Radiated Emissions

Requirement: (15.209) The Emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency Range (MHz)	Distance (Meters)	Limit (dBμV/m) ¹
0.009 to 0.490	3	128.5 to 93.8
0.490 to 1.705	3	73.8 to 63.0
1.705 to 30	3	69.5
30 to 88	3	40.0
88 to 216	3	43.5
216 to 960	3	46.0
>960	3	54.0

¹Measurements in the 9 to 90 kHz, 110 to 490 kHz and above 1000 MHz ranges employ an average detector. Otherwise a quasi-peak detector is used.

Procedure: This test was performed in accordance with the procedure detailed in FCC OET publication number 558074, Section 12.0: Emissions in restricted frequency bands and FCC 47CFR Part 15.209: Radiated Emission Limits; General Requirements.

The test methods used to generate the data in this test report is in accordance with ANSI C63.10:2013, American National Standard for Testing Unlicensed Wireless Devices.

Test Notes: Measurements were made from the lowest oscillator frequency as stated by the manufacturer (32.768 kHz) to the 10th harmonic of the highest transmitter frequency or 40 GHz, whichever is lower.

Reference FCC Part 15.33(a) and FCC Part 15.33(a)(1).

Each of the test modes documented within the test report were evaluated and the worst case of each of the test modes is detailed in this section. A full set of measurement scans are presented in Appendix A of this test report.

Results: The Emissions from the DUT did not exceed the field strength levels specified in the above table.

Frequency Range	Worst-Case Measured Frequency	Field Strength	FCC Part 15.209 Limit	Margin	Reference	Receive Antenna Polarity
	(MHz)	(dBμV/m)	(dBμV/m)	(dB)	Appendix A	(H/V)
30 kHz - 150 kHz	0.01295	112.80	127.33	-14.53	A.1.1.2.1	Parallel
150 kHz - 30 MHz	1.07009	53.02	67.03	-14.01	A2.1.1.3	Gnd Parallel
30 MHz - 1000 MHz	744.13940	37.29	46.00	-8.71	A3.2.1	H
1000 MHz - 10000 MHz	9569.000	46.56	74.00	-27.44	A4.3.1	H
10000 MHz - 18000 MHz	17604.100	52.27	74.00	-21.73	A5.1.3	H
18000 MHz - 40000 MHz	39997.500	43.35	74.00	-30.65	A6.3.3	H

7. Measurement Data (continued)

7.5. Transmitter Spurious Radiated Emissions (30 kHz to 40 GHz)

7.5.2. Transmitter Spurious Radiated Emissions (Harmonic Meas.) Test Results

Worst case measurements of Harmonics that fall into the restricted bands.

7.5.2.1. 2.4 GHz, BLE

Freq. (MHz)	Field Strength (dB μ V/m)		Limit (dB μ V/m)		Margin (dB μ V/m)		Antenna Polarity (H/V)	Result
	Peak ¹	Average1	Peak	Average	Peak	Average		
4804	51.85	36.17	74.00	54.00	-22.15	-17.83	H	Compliant
4852	49.73	35.48	74.00	54.00	-24.27	-18.52	V	Compliant
4960	50.16	35.75	74.00	54.00	-23.84	-18.25	V	Compliant
7278	52.38	38.13	74.00	54.00	-21.62	-15.87	V	Compliant
7440	52.79	38.30	74.00	54.00	-21.21	-15.70	H	Compliant
12010	59.89	45.85	74.00	54.00	-14.11	-8.15	H	Compliant
12130	59.92	45.70	74.00	54.00	-14.08	-8.30	H	Compliant
12400	59.70	45.43	74.00	54.00	-14.30	-8.57	H	Compliant
19216	61.30	47.64	74.00	54.00	-12.70	-6.36	V	Compliant
19408	62.14	48.21	74.00	54.00	-11.86	-5.79	H	Compliant
19840	61.94	47.82	74.00	54.00	-12.06	-6.18	V	Compliant
22320	63.52	49.56	74.00	54.00	-10.48	-4.44	H	Compliant

¹ All correction factors are stored in the spectrum analyzer and applied to this column entry.

7. Measurement Data (continued)

7.6. Band Edge and Out of Band Measurements

Requirement: 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Procedure: For the lower band edge, this measurement was performed in accordance with the procedure detailed in FCC OET publication number 558074, Section 11: Emissions in non-restricted frequency bands.

For the upper band edge, this measurement was performed as a typical restricted band radiated emissions measurement above 1 GHz. Peak and CISPR average detectors and a 1 MHz resolution and 3 MHz video bandwidth were utilized.

Test Note: The radiated band edge and worst case out of band measurements in this report represent the measurements made with the worst case receive antenna polarity and product orthogonal position. In addition, the DTS bandwidth measurements were taken into consideration for the worst case examples.

Results: The DUT met the 20 dB requirement at the lower band edge and the Part 15.209 requirements at the upper band edge.

7.6.1. Lower Band Edge

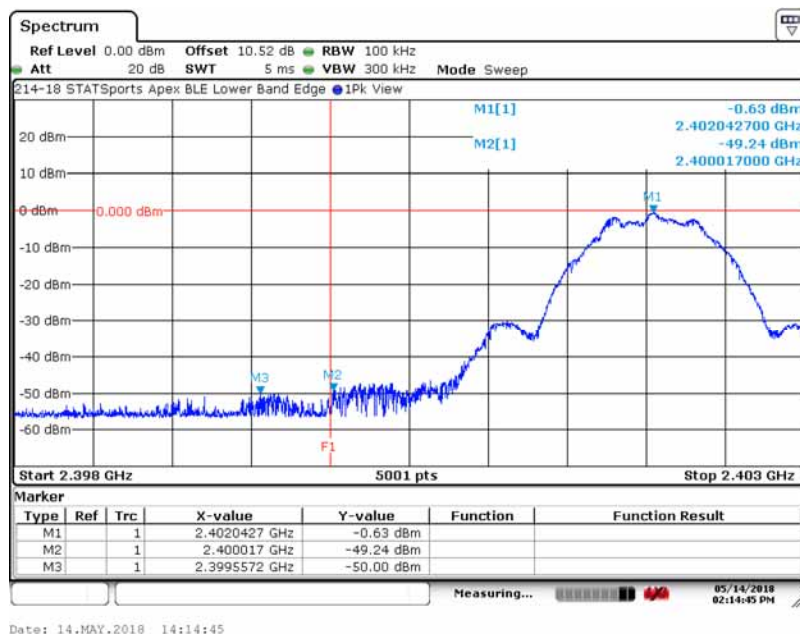
Band Edge Frequency	Lowest Transmitter Frequency	Maximum PSD (100 kHz)	Band Edge Delta to Max PSD (100 kHz)	Minimum Required Delta	Result
(MHz)	(MHz)	(dBm)	(dB)	(dB)	
2400	2402	-0.63	-48.61	-20	Compliant

Note: See plot on following page

7. Measurement Data (continued)

7.6. Band Edge and Out of Band Measurements (continued)

Lower Band Edge



7.6.2. Upper Band Edge and Worst Case Out of Band

Upper Band Edge

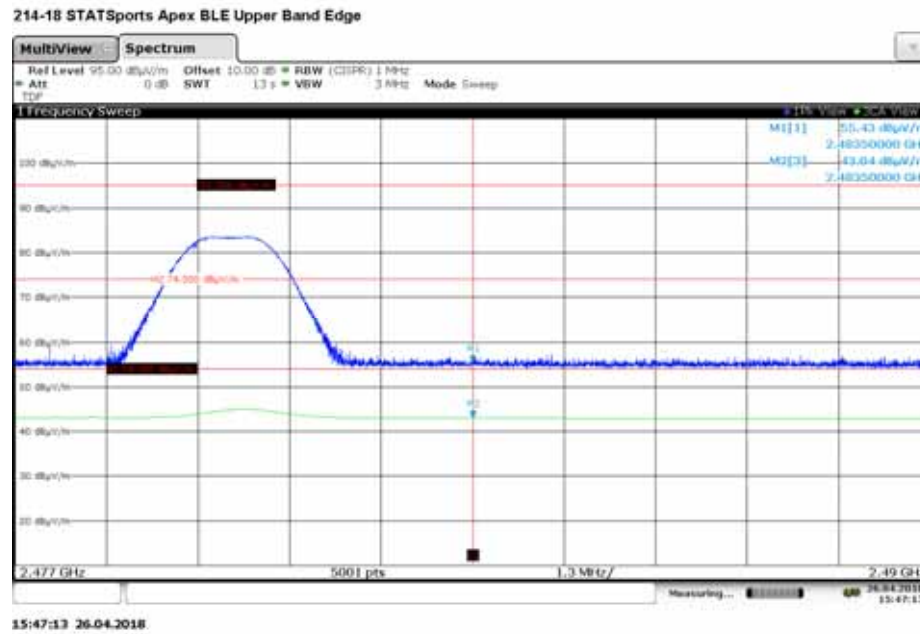
Band Edge Frequency	Field Strength (dBμV/m)		Limit (dBμV/m)		Margin (dB)		Result
	Peak	Average	Peak	Average	Peak	Average	
2483.5	55.43	43.04	74	54	-18.57	-10.96	Compliant

Notes: 1. Plot is on the following page.
2. Worst case out of band is detailed in the upper restricted band measurement.

7. Measurement Data (continued)

7.6. Band Edge and Out of Band Measurements (continued)

Upper Band Edge and Worst Case Out of Band



7.6.3. Lower Restricted Band, 2.310 MHz to 2390 MHz

Frequency (MHz)	Field Strength (dBμV/m)		Limit (dBμV/m)		Margin (dB)		Result
	Peak	Average	Peak	Average	Peak	Average	
2323.525	57.36	44.01	74	54	-16.64	-9.99	Compliant

7.6.4. Upper Restricted Band, 2483.5 MHz, to 2500 MHz

Frequency (MHz)	Field Strength (dBμV/m)		Limit (dBμV/m)		Margin (dB)		Result
2483.5100	54.93	42.66	74	54	-19.07	-11.34	Compliant

Note: Plots are on the following page.

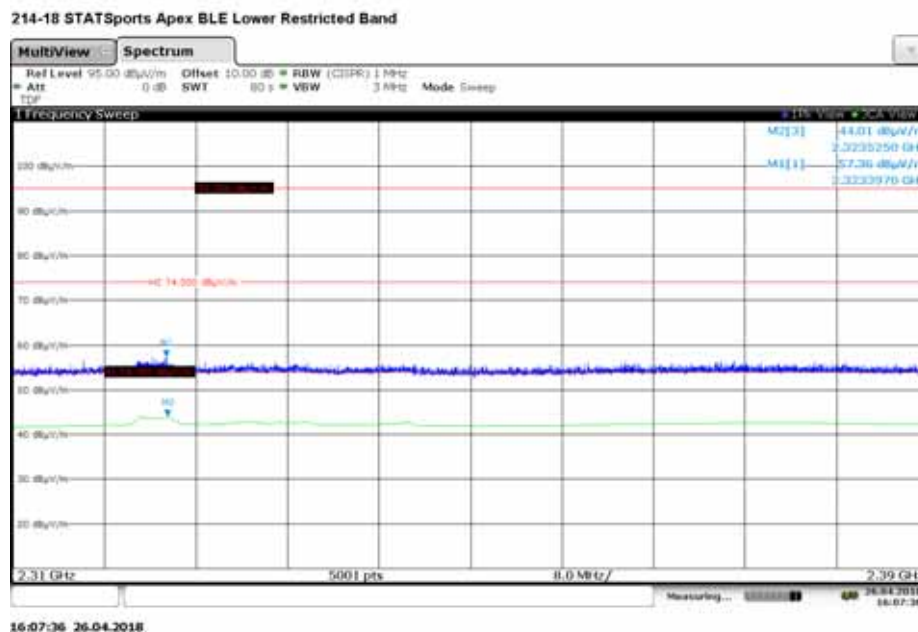
Test Number: 214-18

Issue Date: 5/31/2018

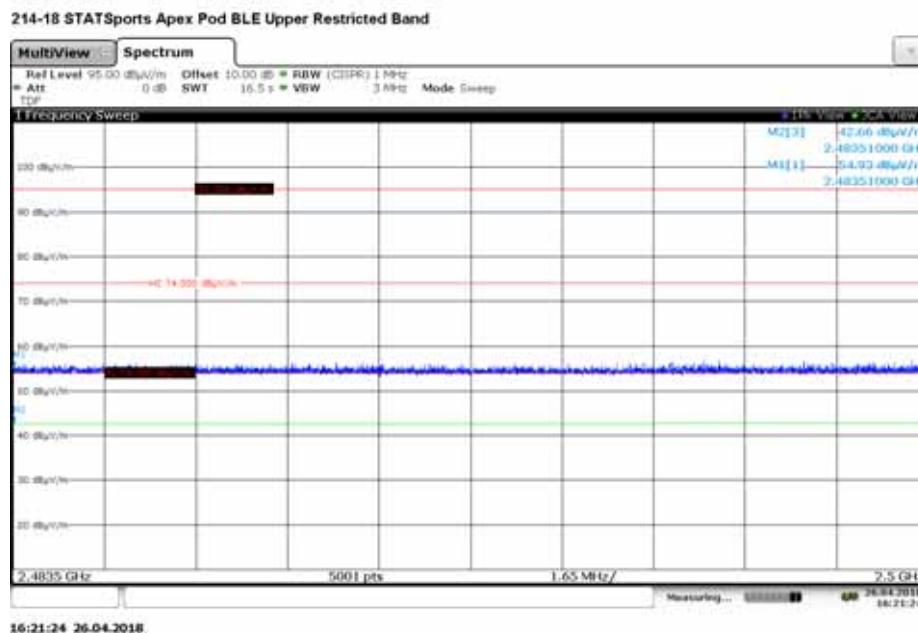
7. Measurement Data (continued)

7.6. Band Edge and Out of Band Measurements (continued)

Lower Restricted Band, 2310 MHz, to 2390 MHz



Upper Restricted Band, 2483.5 MHz, to 2500 MHz



7. Measurement Data (continued)

7.7. Emissions in Non-restricted Frequency Bands

Requirement: 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Test Notes: Peak in-band measurements were taken at the time the DTS (-6 dB) bandwidth measurements were made. These values were used as the reference levels for the following measurements. Refer to section 7.2 of this report for these values.

Results: The DUT met the 20 dB requirement emission level delta requirement in the non restricted frequency bands.

Emissions in Non-restricted Frequency Bands

Maximum PSD (100 kHz) In-Band ¹ (dBm)	Worst Case Out-of-Band Frequency (MHz)	Maximum PSD (100 kHz) Out-of-Band (dBm)	Delta to Maximum PSD (dB)	Minimum Required Delta	Result
-0.09	20016.60	-44.76	-44.67	-20 dB	Compliant

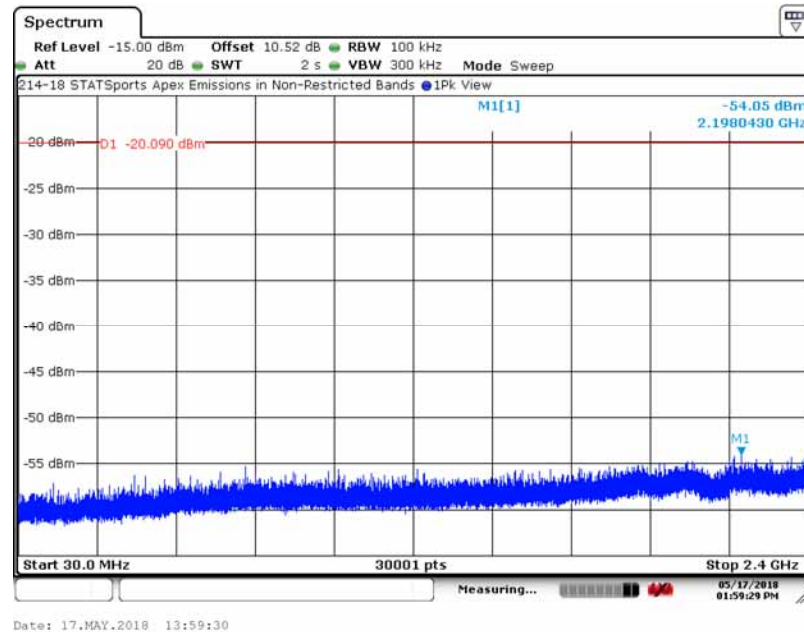
Test Number: 214-18

Issue Date: 5/31/2018

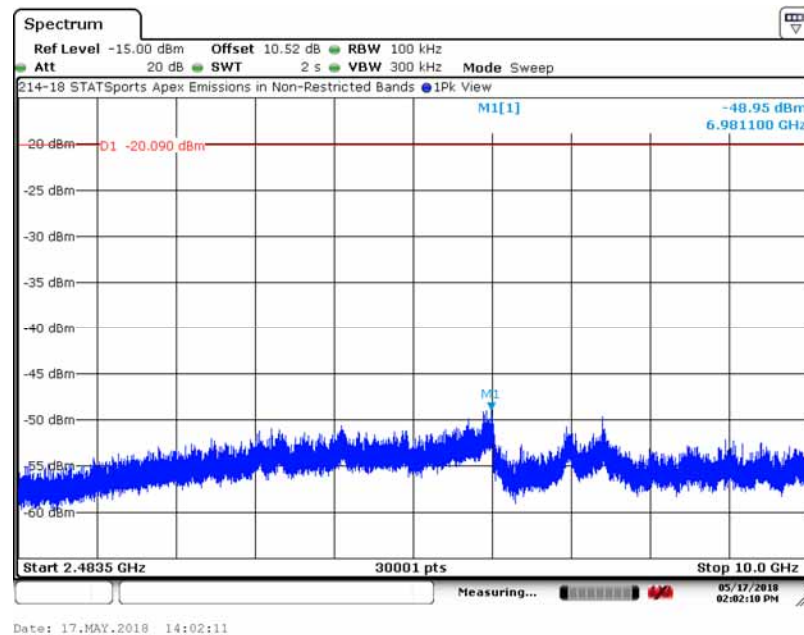
7. Measurement Data (continued)

7.7. Emissions in Non-restricted Frequency Bands (continued)

7.7.1. 30 MHz to 2.4 GHz



7.7.2. 2.4835 GHz to 10 GHz



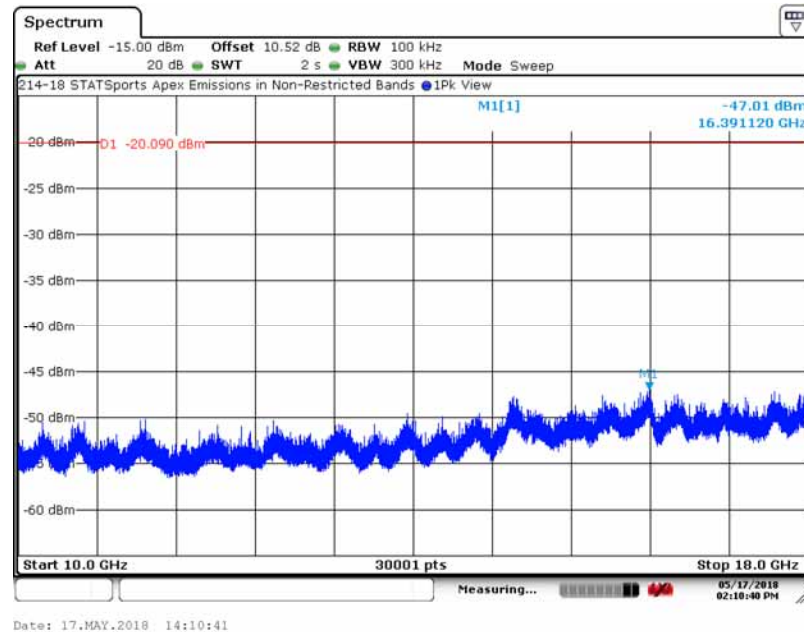
Test Number: 214-18

Issue Date: 5/31/2018

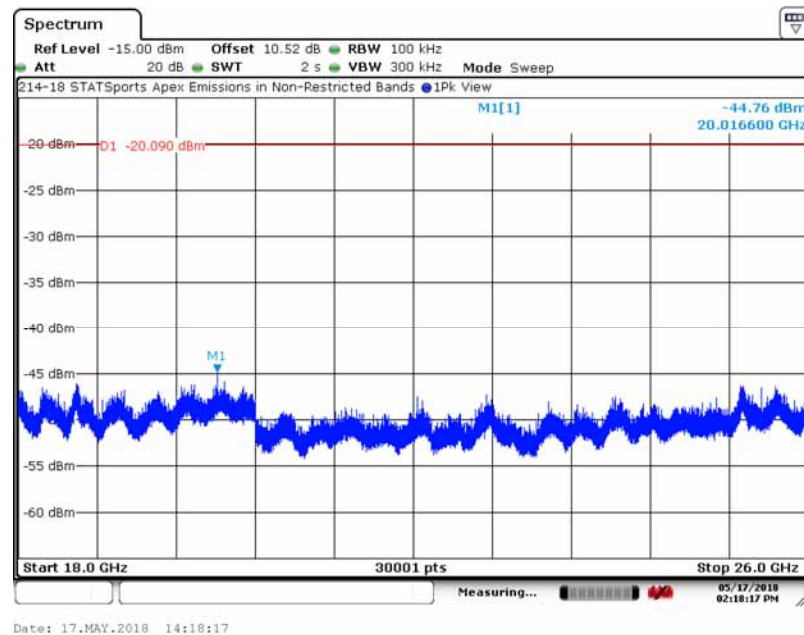
7. Measurement Data (continued)

7.7. Emissions in Non-restricted Frequency Bands (continued)

7.7.3. 10 GHz to 18 GHz



7.7.4. 18 GHz to 26 GHz



7. Measurement Data (continued)

7.8. Peak Power Spectral Density (15.247(e))

Requirement: For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of FCC Part 15.247. The same method of determining the conducted output power shall be used to determine the power spectral density.

Procedure: FCC OET publication number 558074, Section 10.2: Method PKPSD (peak PSD). FCC OET 662911 was referenced to determine the procedure for measuring in-band power spectral density of transmitters with multiple outputs in the same band.

Results: The DUT met the required power spectral density limit at the tested frequencies.

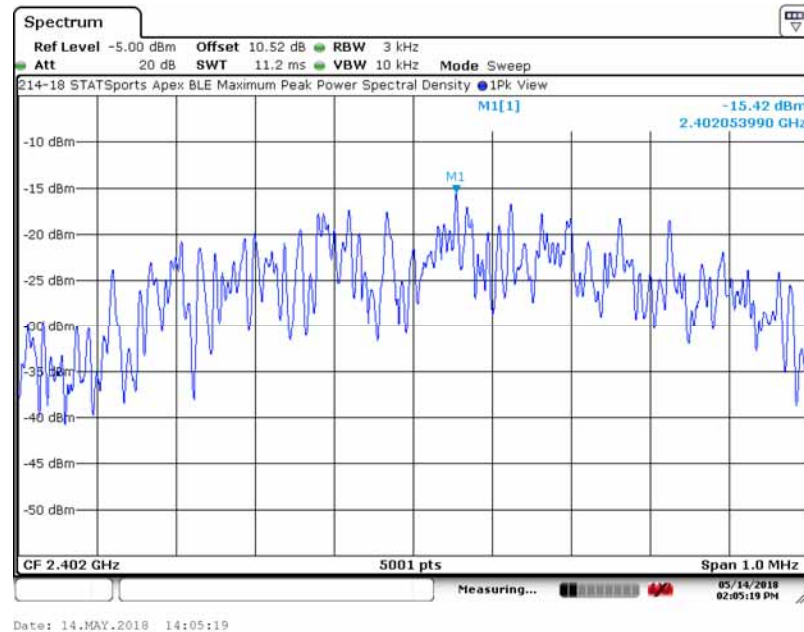
Measurement Results in 2400 MHz to 2483.5 MHz Band

Channel	Frequency	Maximum PSD Frequency	Maximum Power Spectral Density	Limit	Margin	Result
	(MHz)	(MHz)	(dBm)	(dBm)	(dB)	
37	2402	2402.0540	-15.42	8	-23.42	Compliant
38	2426	2425.9758	-13.41	8	-21.41	Compliant
39	2480	2480.0232	-16.34	8	-24.34	Compliant

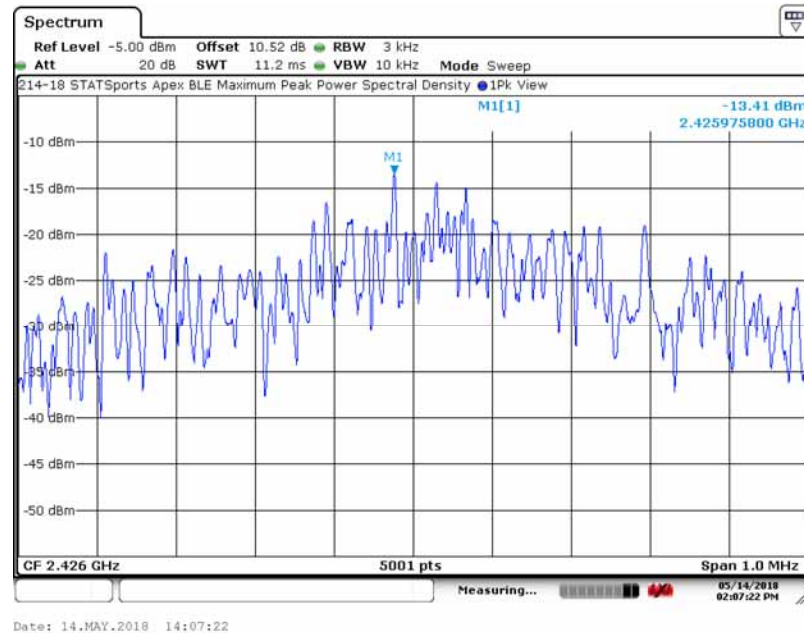
7. Measurement Data (continued)

7.8. Peak Power Spectral Density (15.247(e)) (continued)

7.8.1. Low Channel – 37, 2402 MHz



7.8.2. Middle Channel – 38, 2426 MHz



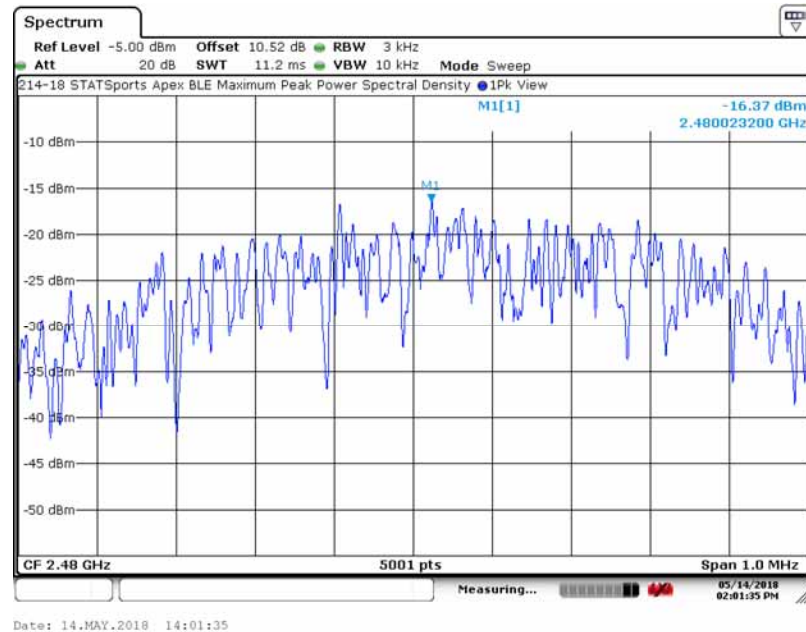
Test Number: 214-18

Issue Date: 5/31/2018

7. Measurement Data

7.8. Peak Power Spectral Density (15.247(e)) (continued)

7.8.3. High Channel – 39, 2480 MHz



7. Measurement Data (continued)
7.9. Conducted Emissions

Requirement: 15.207 With certain exceptions, an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5.0	56	46
5.0 to 30.0	60	50

* Decreases with the logarithm of the frequency.

Procedure: This test was performed in accordance with the procedure detailed in ANSI C63.10-2013, Section 6.2: Standard test method for ac power-line conducted emissions from unlicensed wireless devices.

Test Notes: The device was tested using the support equipment laptop.

Results: The device under test meets the FCC Part 15.207 test requirements.

Measurement & Equipment Setup

Test Date:	5/16/2018
Test Engineer:	Brian F Breault
Site Temperature (°C):	22.8
Relative Humidity (%RH):	48.3
Frequency Range:	0.15 MHz to 30 MHz
EMI Receiver IF Bandwidth:	9 kHz
EMI Receiver Avg Bandwidth:	30 kHz
Detector Functions:	Peak, Quasi-Peak & Average

Test Number: 214-18

Issue Date: 5/31/2018

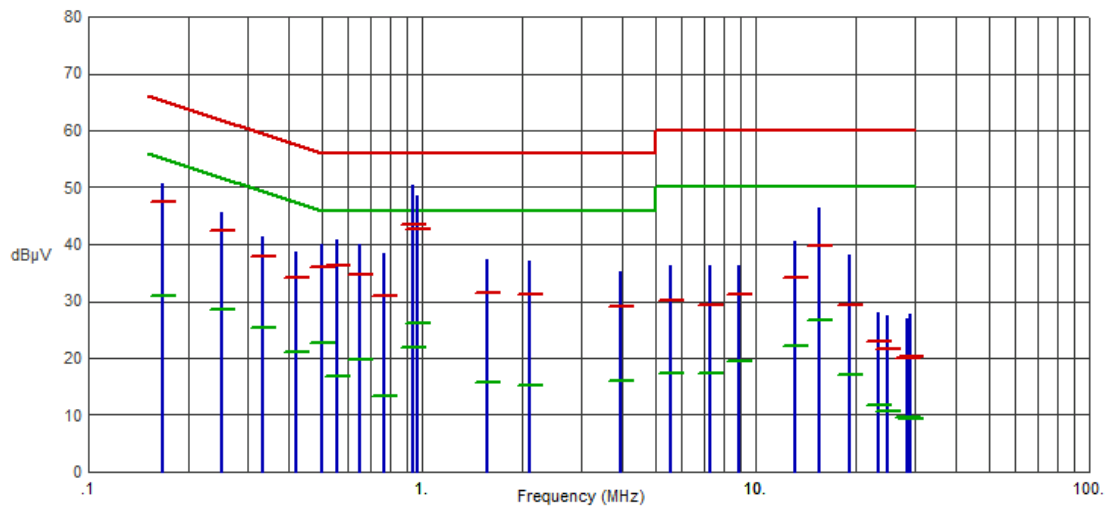
7. Measurement Data (continued)

7.9. Conducted Emissions (FCC Part 15.207)

7.9.1. 120 Volts, 60 Hz Phase

Test No.: 214-18, 120 Volts, 60 Hz Phase

FCC Part 15.207



Frequency (MHz)	Pk Amp (dBμV)	QP Amp (dBμV)	QP Limit (dBμV)	QP Margin (dB)	Avg Amp (dBμV)	Avg Limit (dBμV)	Avg Margin (dB)	Comments
.1672	50.60	47.51	65.10	-17.59	31.00	55.10	-24.10	
.2500	45.73	42.42	61.76	-19.34	28.56	51.76	-23.20	
.3336	41.21	37.97	59.36	-21.39	25.37	49.36	-23.99	
.4188	38.55	34.20	57.47	-23.27	21.12	47.47	-26.35	
.5030	39.89	35.98	56.00	-20.02	22.77	46.00	-23.23	
.5584	40.85	36.19	56.00	-19.81	16.71	46.00	-29.29	
.6494	40.02	34.70	56.00	-21.30	19.83	46.00	-26.17	
.7715	38.51	30.81	56.00	-25.19	13.41	46.00	-32.59	
.9388	50.29	43.45	56.00	-12.55	21.77	46.00	-24.23	
.9722	48.43	42.59	56.00	-13.41	26.26	46.00	-19.74	
1.5719	37.36	31.58	56.00	-24.42	15.74	46.00	-30.26	
2.1126	37.18	31.18	56.00	-24.82	15.09	46.00	-30.91	
3.9418	35.26	29.10	56.00	-26.90	16.08	46.00	-29.92	
5.5892	36.32	30.21	60.00	-29.79	17.21	50.00	-32.79	
7.3012	36.29	29.33	60.00	-30.67	17.33	50.00	-32.67	
8.9331	36.33	31.16	60.00	-28.84	19.41	50.00	-30.59	
13.0931	40.64	34.10	60.00	-25.90	22.23	50.00	-27.77	
15.5793	46.39	39.82	60.00	-20.18	26.68	50.00	-23.32	
19.0725	38.09	29.40	60.00	-30.60	16.98	50.00	-33.02	
23.3012	28.05	22.84	60.00	-37.16	11.80	50.00	-38.20	
24.9604	27.36	21.73	60.00	-38.27	10.55	50.00	-39.45	
28.4891	26.82	19.99	60.00	-40.01	9.54	50.00	-40.46	
28.9819	27.64	20.28	60.00	-39.72	9.24	50.00	-40.76	

Test Number: 214-18

Issue Date: 5/31/2018

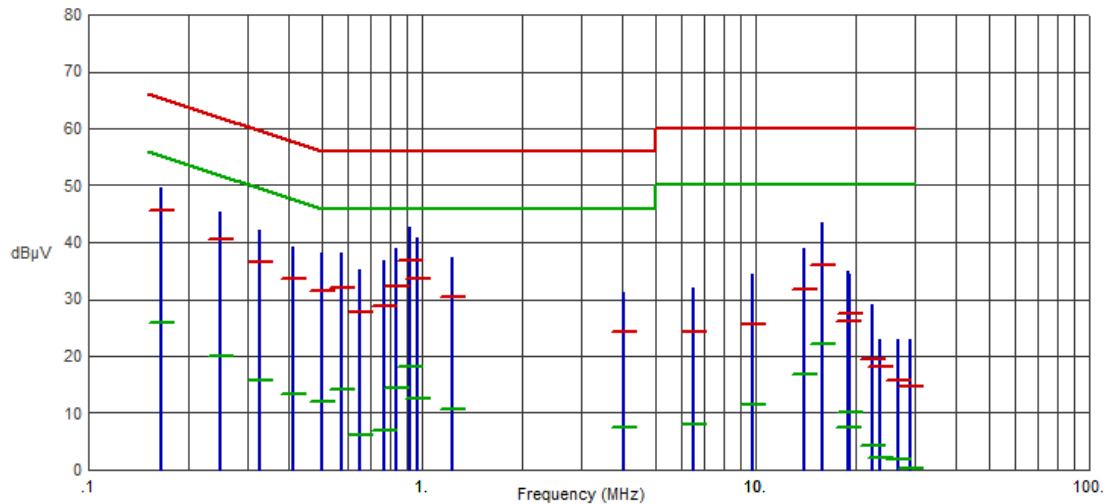
7. Measurement Data (continued)

7.9. Conducted Emissions (FCC Part 15.207) (continued)

7.9.2. 120 Volts, 60 Hz Neutral

Test No.: 214-18, 120 Volts, 60 Hz Neutral

FCC Part 15.207



Frequency (MHz)	Pk Amp (dBμV)	QP Amp (dBμV)	QP Limit (dBμV)	QP Margin (dB)	Avg Amp (dBμV)	Avg Limit (dBμV)	Avg Margin (dB)	Comments
.1646	49.62	45.63	65.23	-19.60	25.95	55.23	-29.28	
.2498	45.32	40.55	61.76	-21.21	20.09	51.76	-31.67	
.3251	42.06	36.50	59.58	-23.08	15.80	49.58	-33.78	
.4095	39.13	33.51	57.66	-24.15	13.46	47.66	-34.20	
.5029	38.13	31.58	56.00	-24.42	12.00	46.00	-34.00	
.5768	38.12	32.03	56.00	-23.97	14.17	46.00	-31.83	
.6497	35.12	27.80	56.00	-28.20	6.19	46.00	-39.81	
.7694	36.75	28.70	56.00	-27.30	6.83	46.00	-39.17	
.8362	38.89	32.37	56.00	-23.63	14.43	46.00	-31.57	
.9174	42.65	36.67	56.00	-19.33	18.14	46.00	-27.86	
.9688	40.79	33.49	56.00	-22.51	12.57	46.00	-33.43	
1.2322	37.29	30.29	56.00	-25.71	10.68	46.00	-35.32	
4.0098	31.24	24.19	56.00	-31.81	7.42	46.00	-38.58	
6.4871	31.95	24.32	60.00	-35.68	7.94	50.00	-42.06	
9.7802	34.39	25.56	60.00	-34.44	11.39	50.00	-38.61	
13.9409	39.06	31.80	60.00	-28.20	16.81	50.00	-33.19	
15.7900	43.58	36.02	60.00	-23.98	22.17	50.00	-27.83	
18.9293	34.92	26.25	60.00	-33.75	7.49	50.00	-42.51	
19.1473	34.36	27.55	60.00	-32.45	10.12	50.00	-39.88	
22.4609	29.11	19.57	60.00	-40.43	4.18	50.00	-45.82	
23.4779	22.85	18.11	60.00	-41.89	2.10	50.00	-47.90	
26.8578	23.01	15.65	60.00	-44.35	1.87	50.00	-48.13	
29.0274	22.81	14.62	60.00	-45.38	0.15	50.00	-49.85	

7. Measurement Data (continued)

7.10. Duty Cycle

Requirement: (FCC OET publication number 558074)

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%).

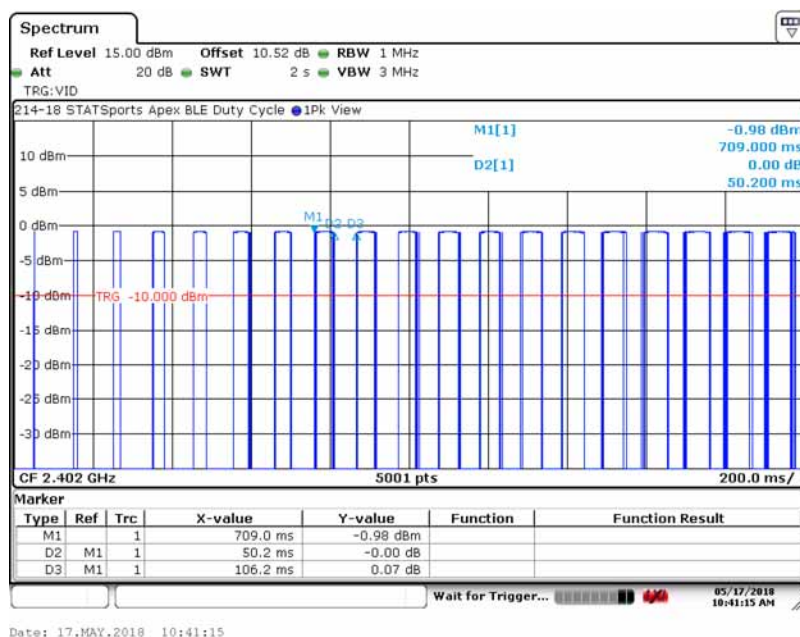
Procedure: Duty cycle measurements were made according to the procedure detailed ANSI C63.10-2013, Section 11.6(b)

Results: Duty cycle measurements are listed in the following table.

All power and power spectral density measurements for this report are peak mode measurements. Ample peak hold time was provided to ensure maximum peak measurements.

Channel	Frequency	Time High	Time per Period	Duty Cycle	
	(MHz)	(mS)	(mS)	(Numeric)	(%)
37	2402	50.200	106.200	0.47269	47.27
38	2426	46.000	100.000	0.46000	46.00
39	2480	42.800	101.200	0.42292	42.29

7.10.1. Low Channel – 37, 2402 MHz



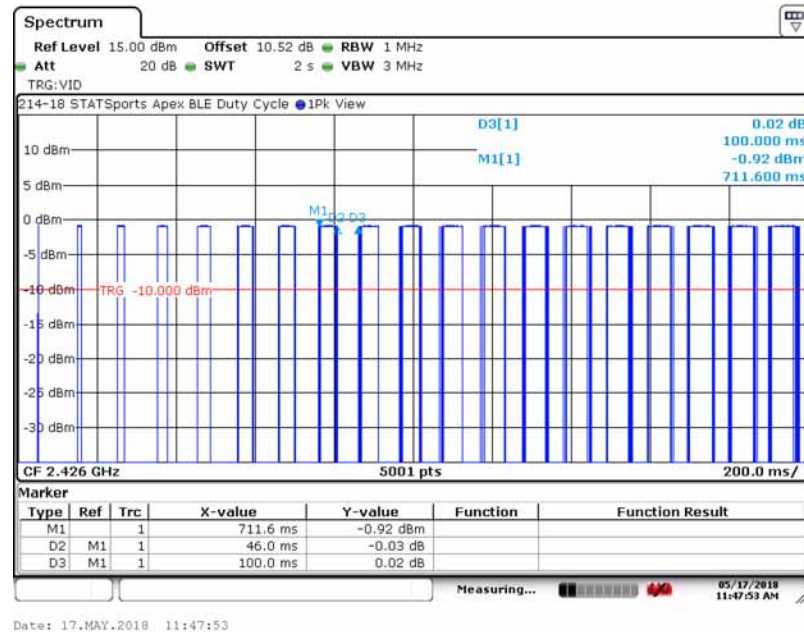
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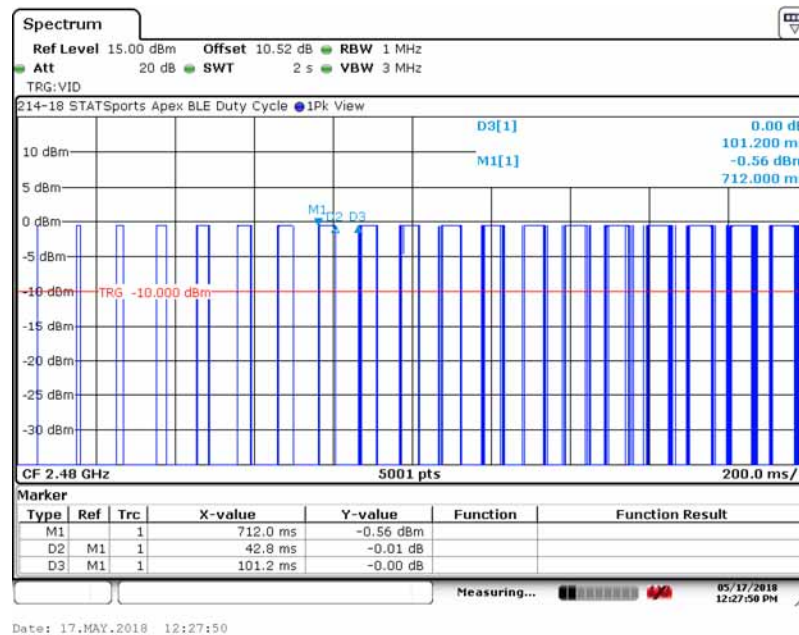
7. Measurement Data (continued)

7.10. Duty Cycle (continued)

7.10.2. Middle Channel – 38, 2426 MHz



7.10.3. High Channel – 39, 2480 MHz



7. Measurement Data (continued)

7.11. Public Exposure to Radio Frequency Energy Levels (15.247(i) (1.1307 (b)(1)) RSS-GEN, ISSUE 4 5.5, RSS 102)

7.11.1. 15.247(i) (1.1307 (b)(1)) Requirements

Requirement: Portable devices are subject to radio frequency radiation exposure requirements.

For a 1-g head or body SAR, the test exclusion result must be ≤ 3.0 .

For a 10-g extremity SAR, the test exclusion result must be ≤ 7.5 .

Test Notes: The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by the following formula:

$$\text{SAR Test Exclusion} = \frac{P_{\text{MAX}}}{d_{\text{MIN}}} \times \sqrt{f_{(\text{GHz})}} \quad (1)$$

P_{MAX} mW Maximum power of channel, including tune-up tolerance

d_{MIN} mm Minimum test separation distance, mm (≤ 50 mm)

$f_{(\text{GHz})}$ GHz $f_{(\text{GHz})}$ is the RF channel transmit frequency in GHz (>100 MHz and <6 GHz)

(1) FCC OET 447498 - Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

Results: Compliant - The device under test meets the exclusion requirement detailed in FCC OET 447498.

Channel:	37	38	39	
Input ¹ :				
P_{MAX}	0.973	0.920	0.991	mW
d_{MIN} ²	5.00	5.00	5.00	mm
$f_{(\text{GHz})}$	2.402	2.426	2.480	GHz
Test Exclusion:	0.30	0.29	0.31	
Limit Exemption:	3.0	3.0	3.0	
Measurement Result:	Compliant	Compliant	Compliant	

¹ Taken from column 3 of the table in Section 7.3 of this test report.

² When the minimum test separation distance is < 5 mm, a distance of 5 mm according to KDB 447498, 4.1 f) is applied to determine SAR test exclusion.

7. Measurement Data (continued)

7.11. Public Exposure to Radio Frequency Energy Levels (15.247(i) (1.1307 (b)(1)) RSS-GEN, ISSUE 4 5.5, RSS 102) (continued)

7.11.2. RSS-102 Issue 5 Requirements

Requirement: SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1. Portable devices are subject to radio frequency radiation exposure requirements.

Test Notes: The limit was taken from Table 1 of RSS-102 Issue 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5.

Results: Compliant

Bluetooth Radio

Frequency	Separation Distance	Maximum Power	RSS-102 Limit	Result
MHz	mm	mW	mW	
2402	≤5	0.97	10.65	Compliant
2426	≤5	0.92	10.33	Compliant
2480	≤5	0.99	9.86	Compliant

8. Test Setup Photographs

8.1. Spurious Radiated Emissions, 10 kHz to 1 GHz – Front



8. Test Setup Photographs

8.2. Spurious Radiated Emissions, 10 kHz to 30 MHz – Rear



8. Test Setup Photographs

8.3. Spurious Radiated Emissions, 30 MHz to 1 GHz – Rear



8. Test Setup Photographs

8.4. Radiated Emissions above 1 GHz – Front



8. Test Setup Photographs

8.5. Radiated Emissions 1 to 18 GHz – Rear



8. Test Setup Photographs

8.6. Radiated Emissions 18 to 40 GHz – Rear



8. Test Setup Photographs

8.7. Power Line Conducted Emissions – Front



8.8. Power Line Conducted Emissions – Front (Close-up)

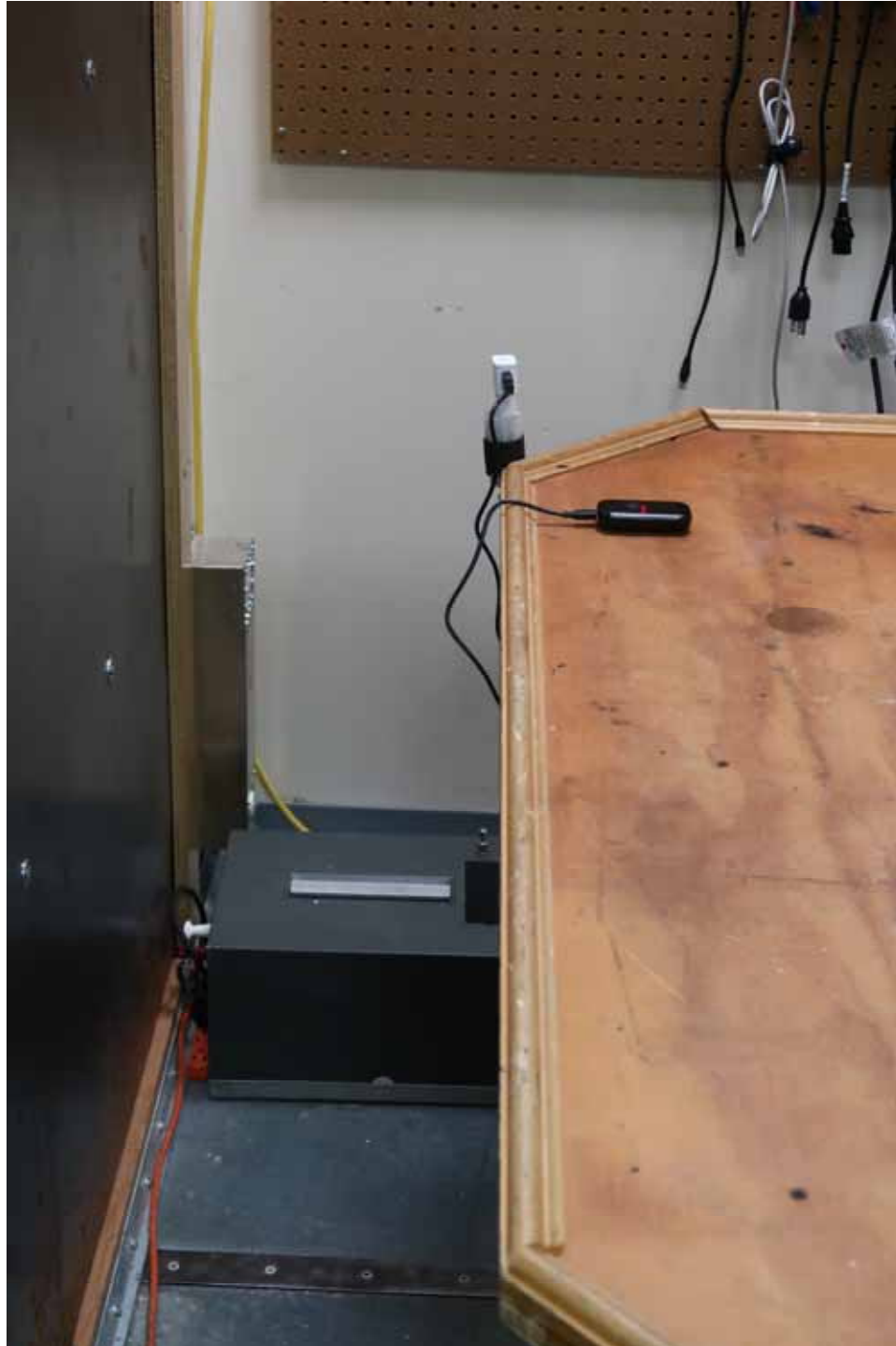


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8. Test Setup Photographs

8.9. Power Line Conducted Emissions – Rear



9. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with the Federal Communications Commission (FCC) and Industry Canada standards. Through our American Association for Laboratory Accreditation (A2LA) ISO Guide 17025:2005 Accreditation our test sites are designated with the FCC (designation number **US1091**), Industry Canada (file number **IC 3023A-1**) and VCCI (Member number 3168) under registration number A-0274.

Compliance Worldwide is also designated as a Phase 1 CAB under APEC-MRA (US0132) for Australia/New Zealand AS/NZS CISPR 22, Chinese-Taipei (Taiwan) BSMI CNS 13438 and Korea (RRA) KN 11, KN 13, KN 14-1, KN 22, KN 32, KN 61000-6-3, KN 61000-6-4.

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022. A second conducted emissions site is also located in the basement of the OATS site with a 2.3 x 2.5 meter ground plane and a 2.4 x 2.4 meter vertical wall.

Both sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.

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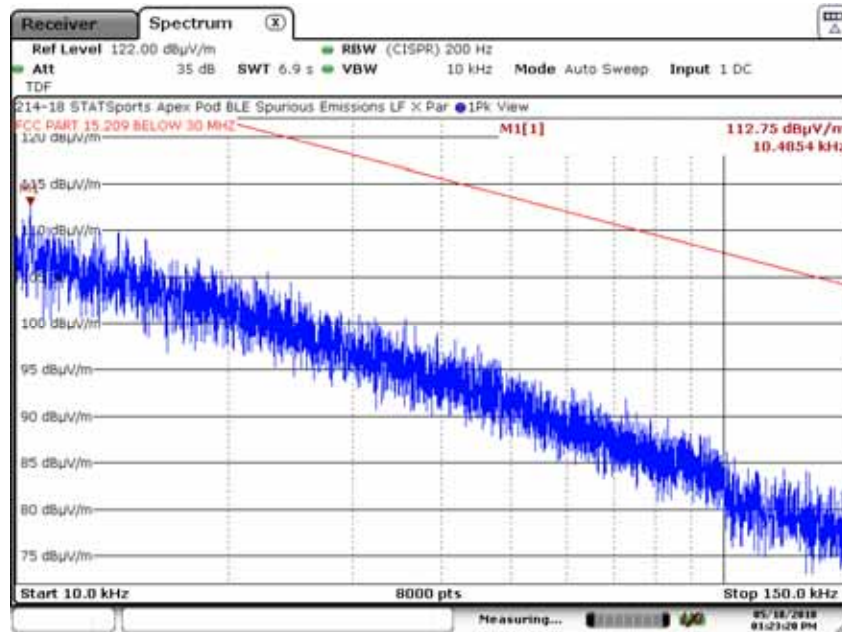
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

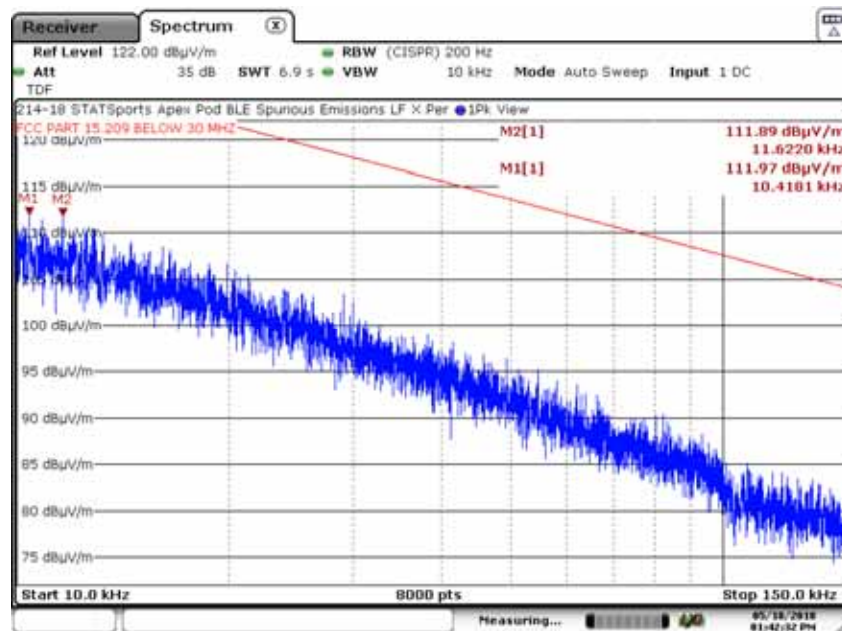
A1.1. Low Frequency: Channel 37, 2402 MHz

A1.1.1. Orthogonal Position: X-Axis

A1.1.1.1. Measurement Results: Parallel Antenna



A1.1.1.2. Measurement Results: Perpendicular Antenna



Test Number: 214-18

Issue Date: 5/31/2018

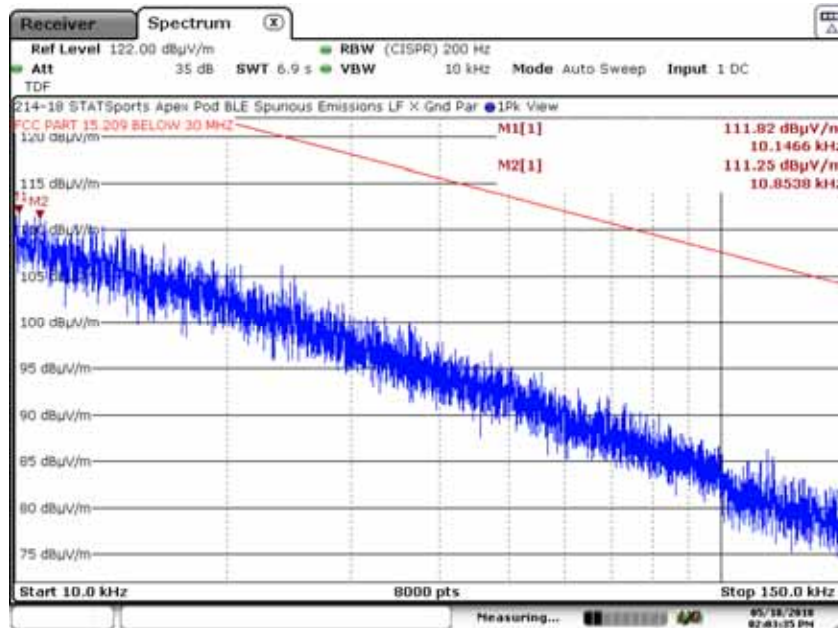
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

A1.1. Low Frequency: Channel 37, 2402 MHz

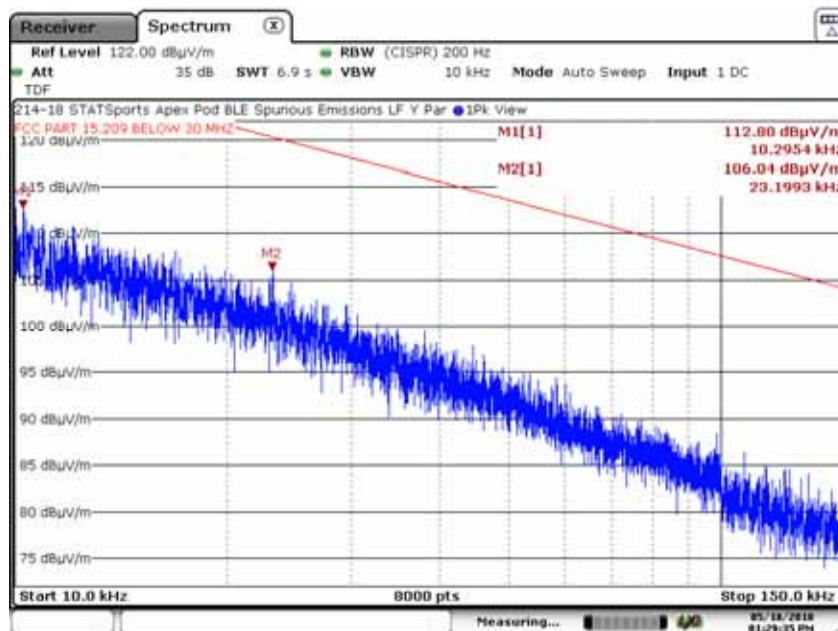
A1.1.1. Orthogonal Position: X-Axis

A1.1.1.3. Measurement Results: Ground Parallel Antenna



A1.1.2. Orthogonal Position: Y-Axis

A1.1.2.1. Measurement Results: Parallel Antenna



Test Number: 214-18

Issue Date: 5/31/2018

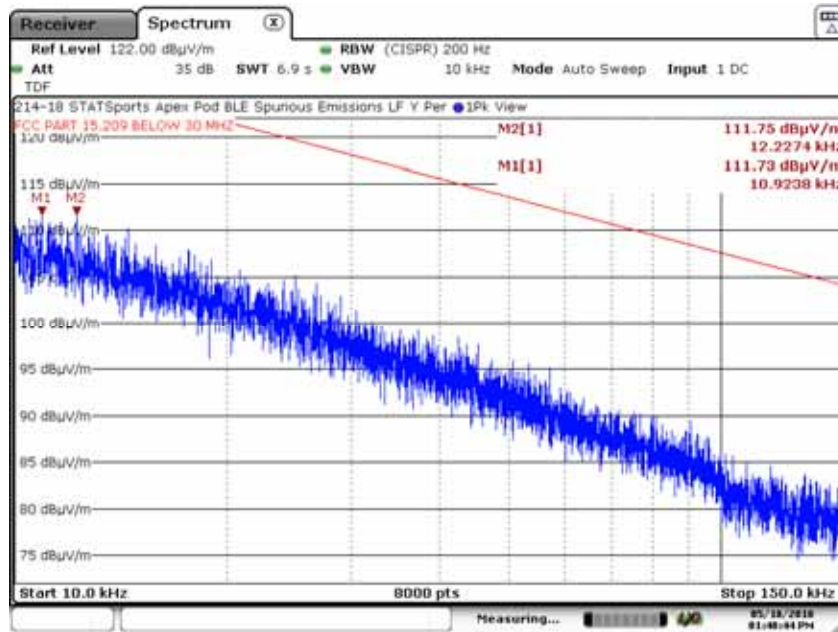
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

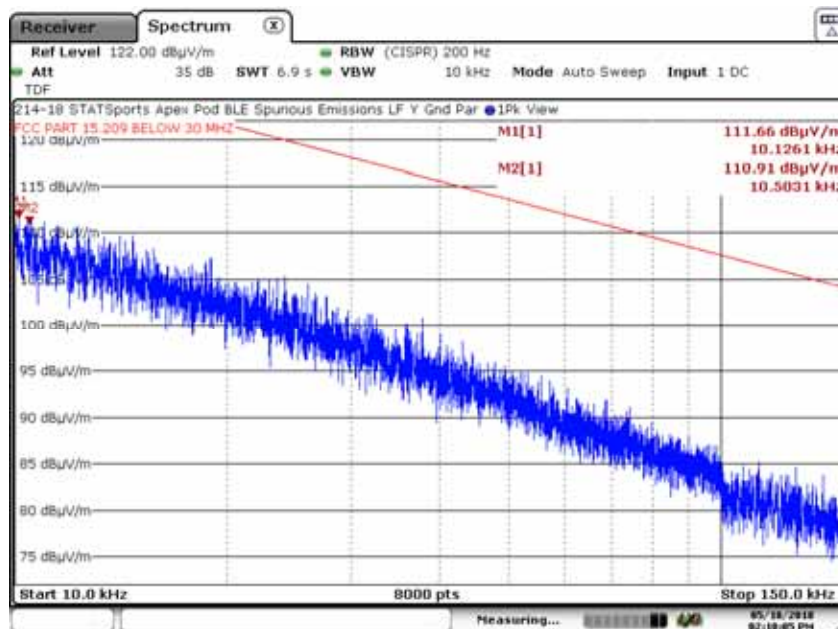
A1.1. Low Frequency: Channel 37, 2402 MHz

A1.1.2. Orthogonal Position: Y-Axis

A1.1.2.2. Measurement Results: Perpendicular Antenna



A1.1.2.3. Measurement Results: Ground Parallel Antenna



Test Number: 214-18

Issue Date: 5/31/2018

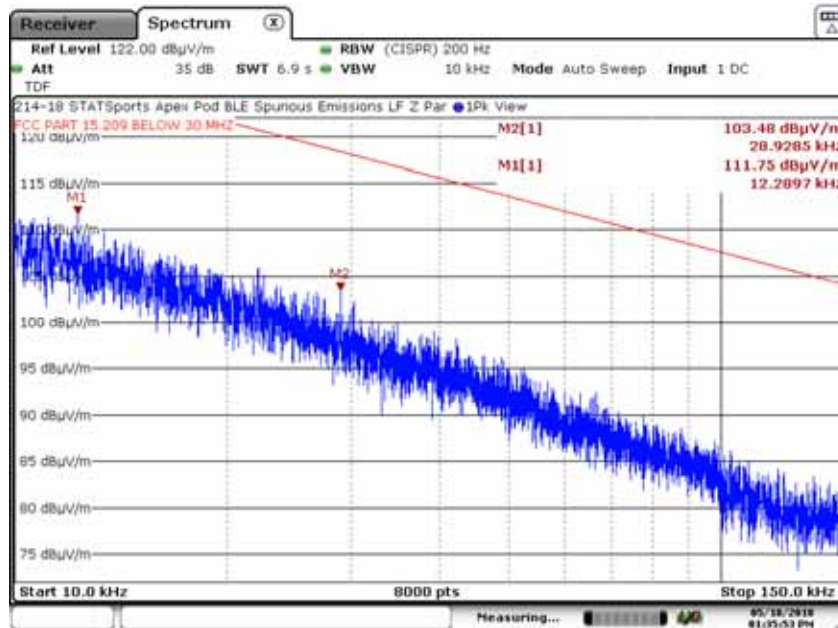
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

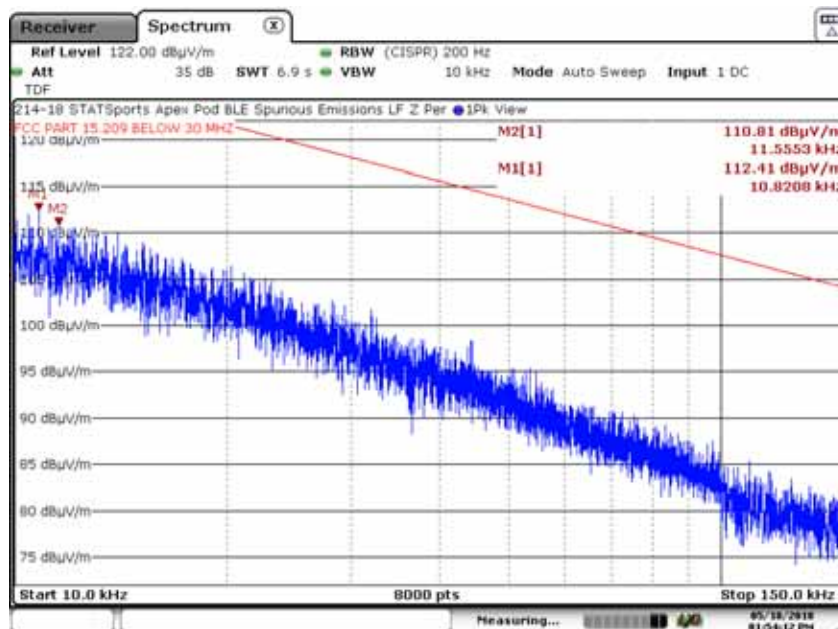
A1.1. Low Frequency: Channel 37, 2402 MHz

A1.1.3. Orthogonal Position: Z-Axis

A1.1.3.1. Measurement Results: Parallel Antenna



A1.1.3.2. Measurement Results: Perpendicular Antenna



Test Number: 214-18

Issue Date: 5/31/2018

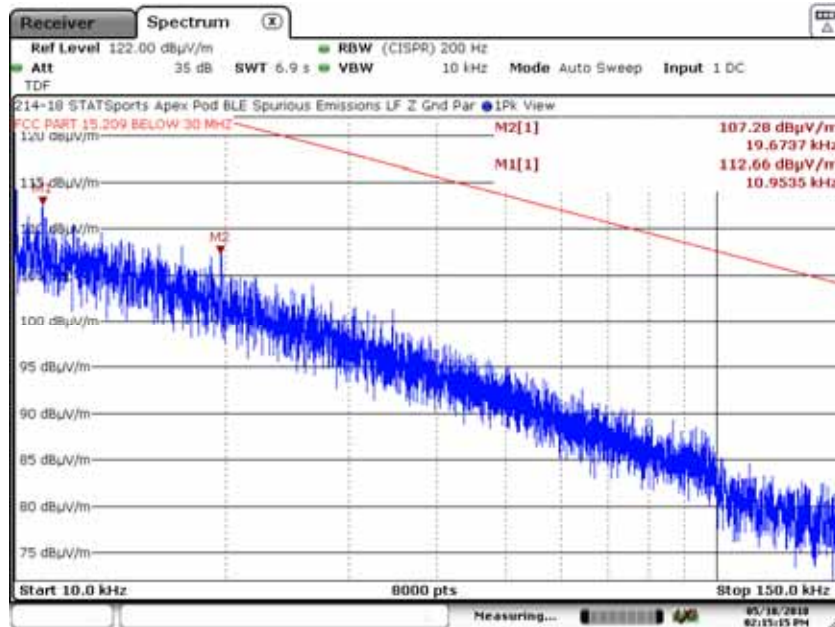
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

A1.1. Channel 37, 2402 MHz

A1.1.3. Orthogonal Position: Z-Axis

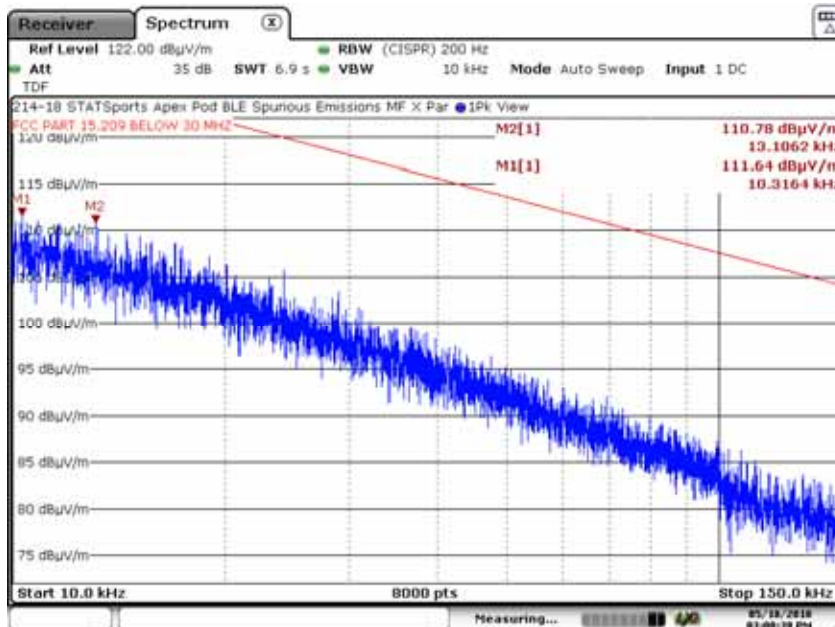
A1.1.3.3. Measurement Results: Ground Parallel Antenna



A1.2. Middle Frequency: Channel 38, 2426 MHz

A1.2.1. Orthogonal Position: X-Axis

A1.2.1.1. Measurement Results: Parallel Antenna



Test Number: 214-18

Issue Date: 5/31/2018

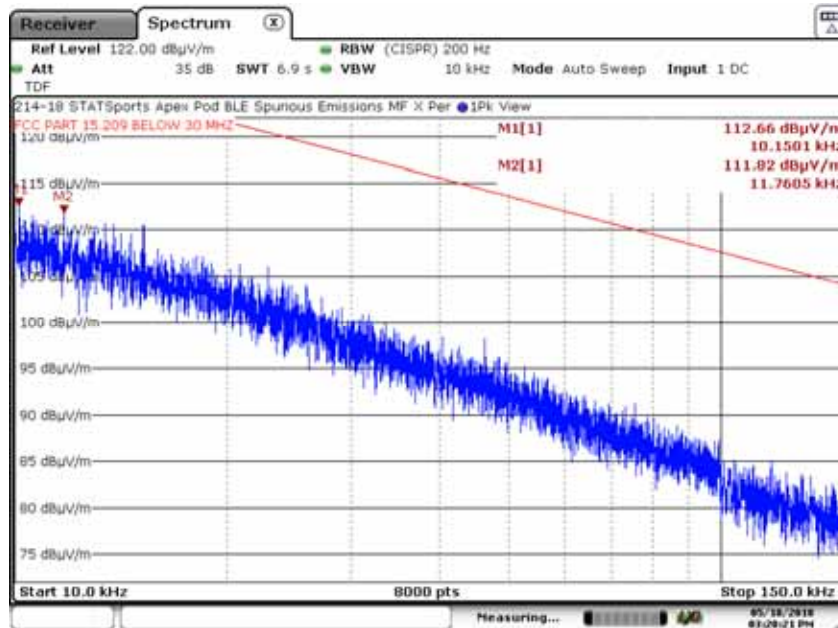
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

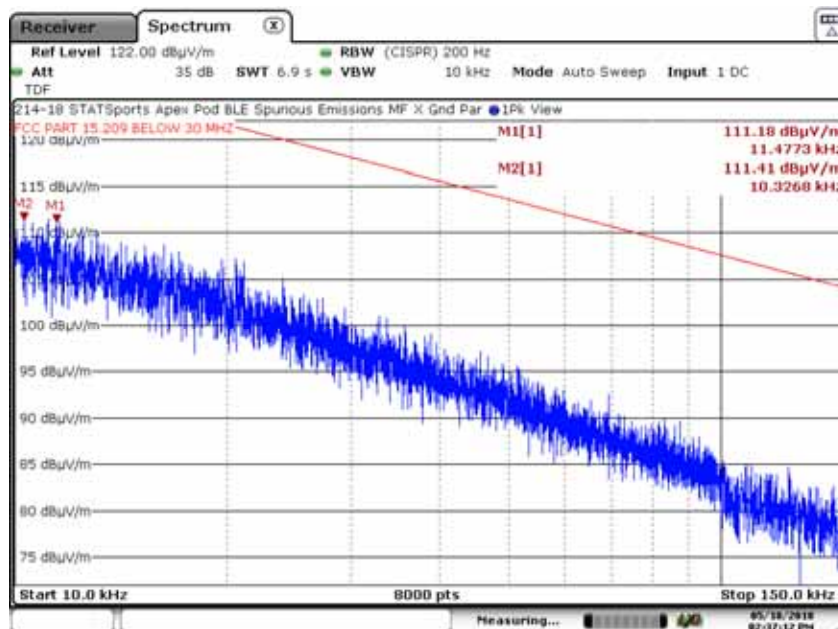
A1.2. Middle Frequency: Channel 38, 2426 MHz

A1.2.1. Orthogonal Position: X-Axis

A1.2.1.2. Measurement Results: Perpendicular Antenna



A1.2.1.3. Measurement Results: Ground Parallel Antenna



Test Number: 214-18

Issue Date: 5/31/2018

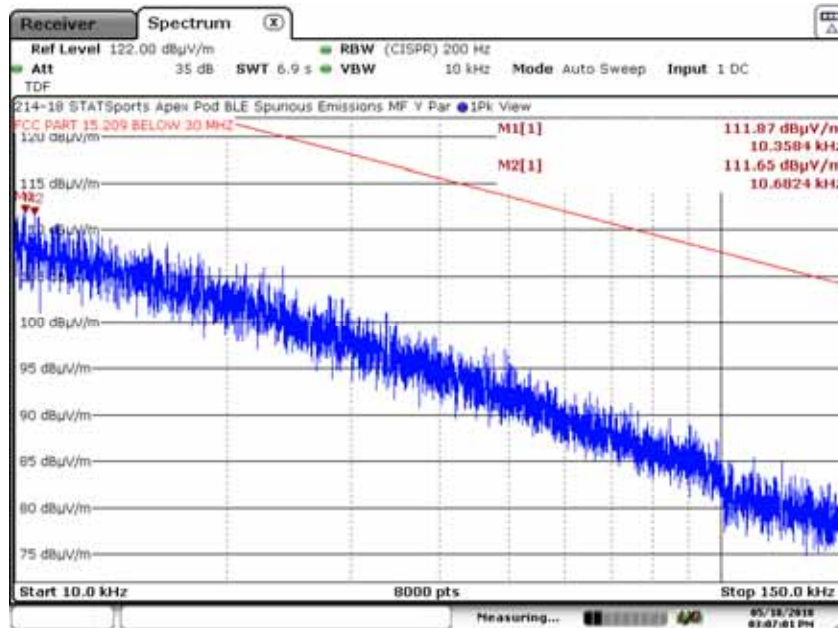
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

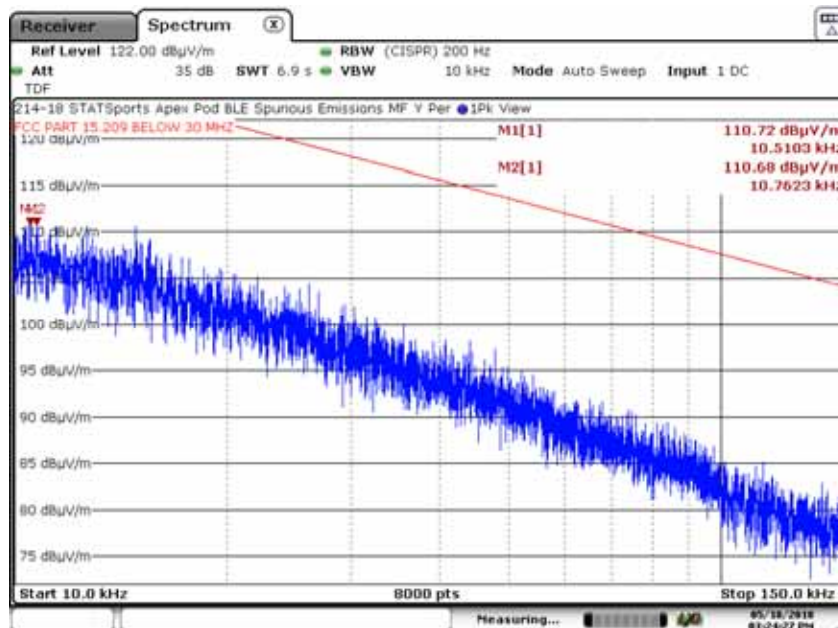
A1.2. Middle Frequency: Channel 38, 2426 MHz

A1.2.2. Orthogonal Position: Y-Axis

A1.2.2.1. Measurement Results: Parallel Antenna



A1.2.2.2. Measurement Results: Perpendicular Antenna



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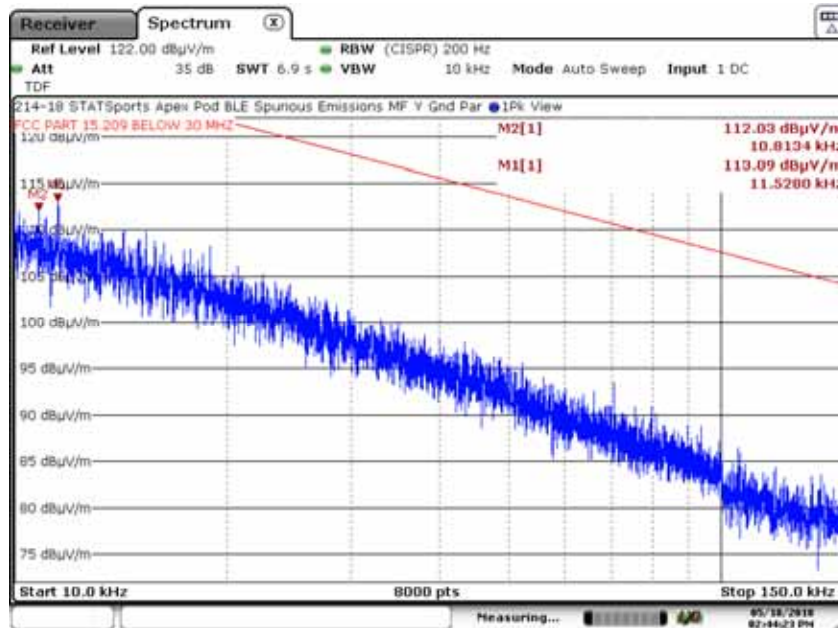
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

A1.2. Middle Frequency: Channel 38, 2426 MHz

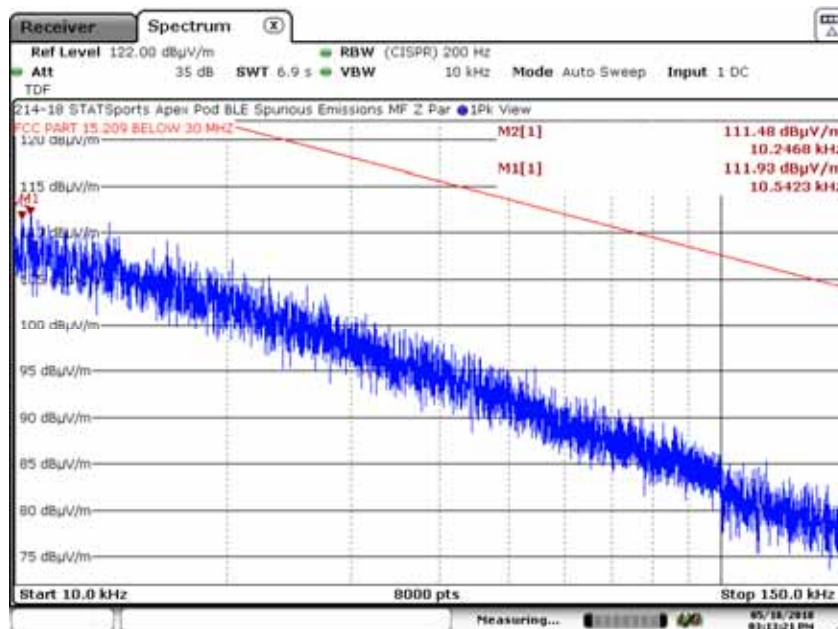
A1.2.2. Orthogonal Position: Y-Axis

A1.2.2.3. Measurement Results: Ground Parallel Antenna



A1.2.3. Orthogonal Position: Z-Axis

A1.2.3.1. Measurement Results: Parallel Antenna



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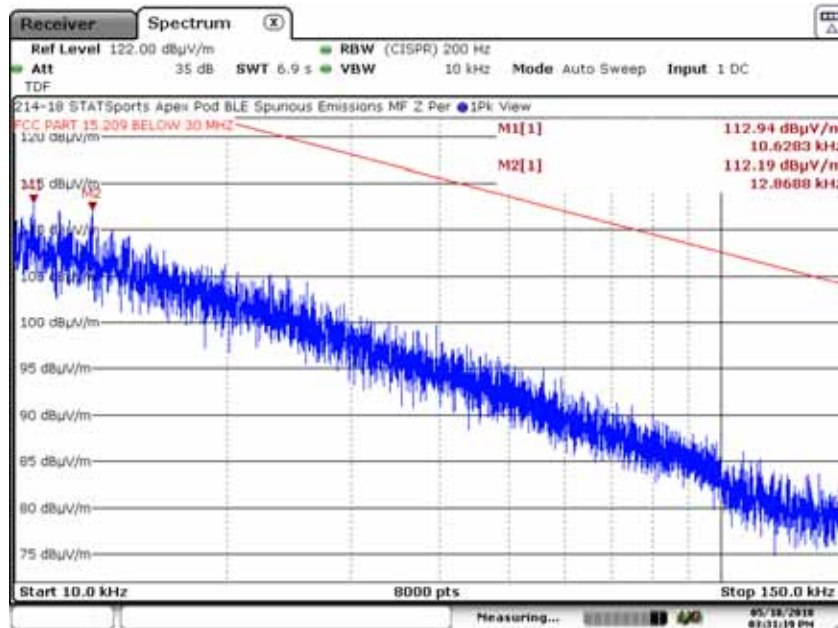
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

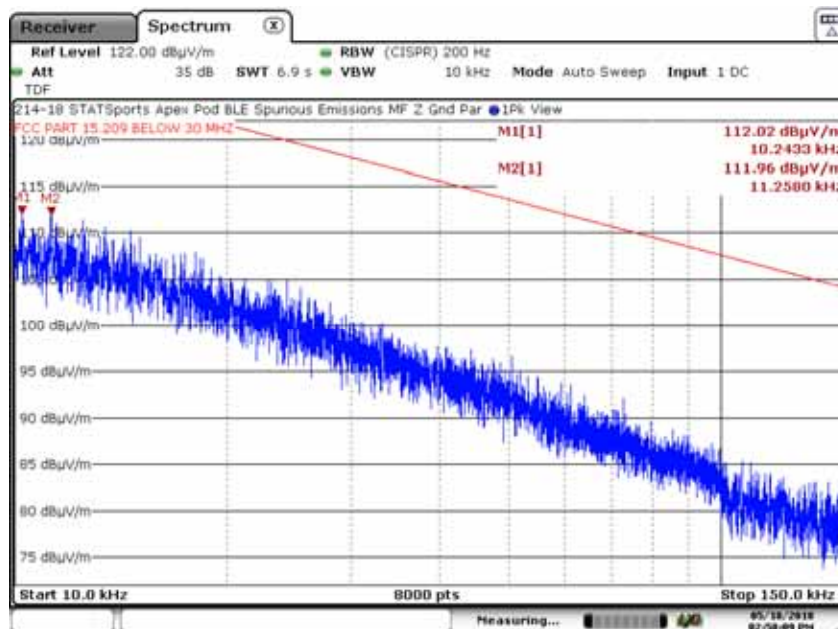
A1.2. Middle Frequency: Channel 38, 2426 MHz

A1.2.3. Orthogonal Position: Z-Axis

A1.2.3.2. Measurement Results: Perpendicular Antenna



A1.2.3.3. Measurement Results: Ground Parallel Antenna



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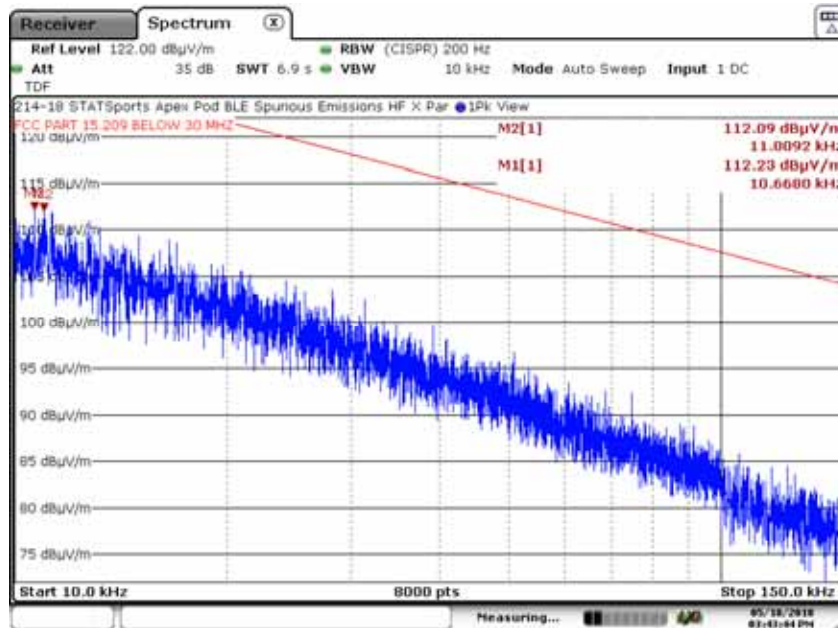
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

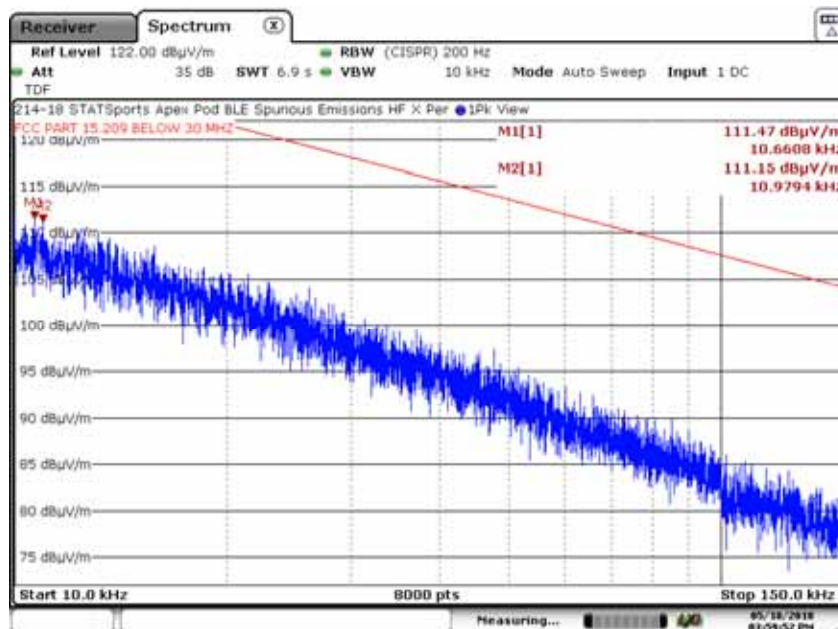
A1.3. High Frequency: Channel 39, 2480 MHz

A1.3.1. Orthogonal Position: X-Axis

A1.3.1.1. Measurement Results: Parallel Antenna



A1.3.1.2. Measurement Results: Perpendicular Antenna



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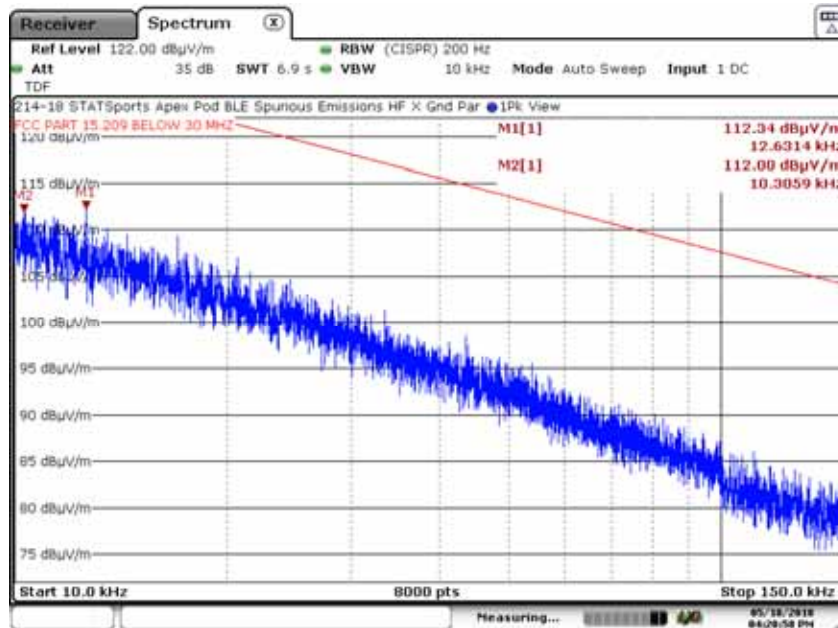
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

A1.3. High Frequency: Channel 39, 2480 MHz

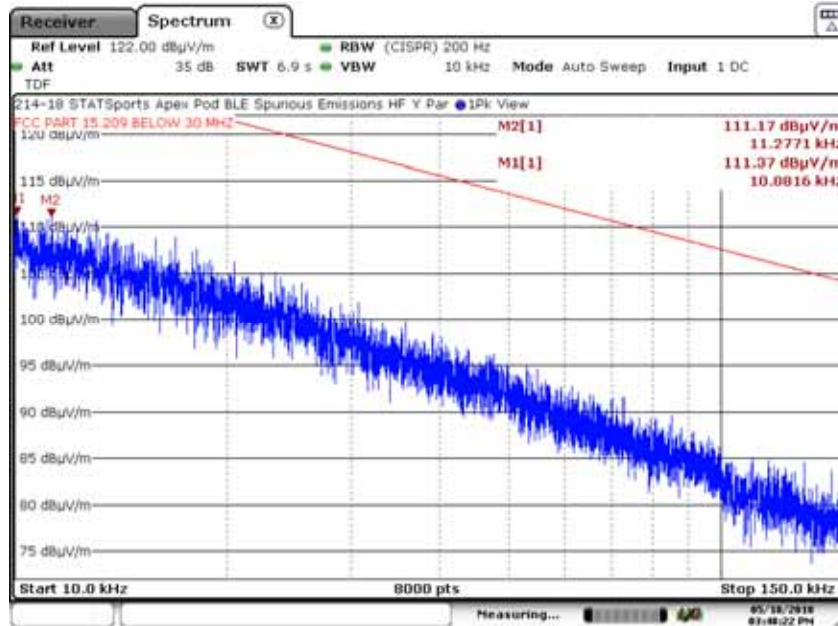
A1.3.1. Orthogonal Position: X-Axis

A1.3.1.3. Measurement Results: Ground Parallel Antenna



A1.3.2. Orthogonal Position: Y-Axis

A1.3.2.1. Measurement Results: Parallel Antenna



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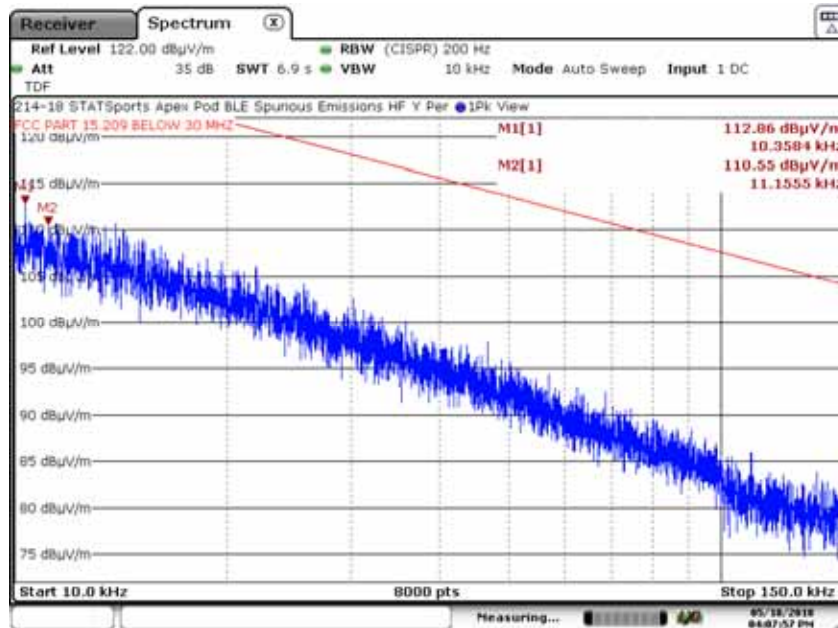
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

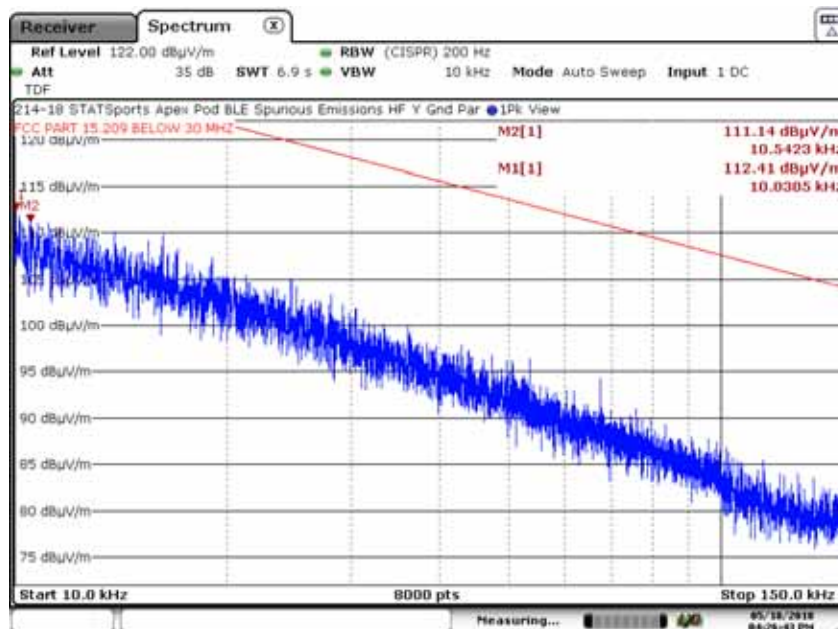
A1.3. High Frequency: Channel 39, 2480 MHz

A1.3.2. Orthogonal Position: Y-Axis

A1.3.2.2. Measurement Results: Perpendicular Antenna



A1.3.2.3. Measurement Results: Ground Parallel Antenna



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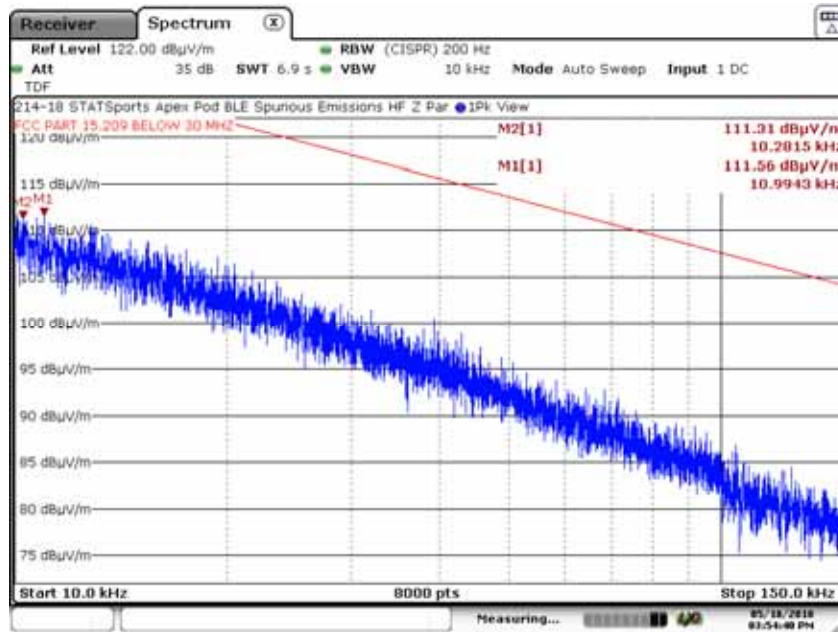
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

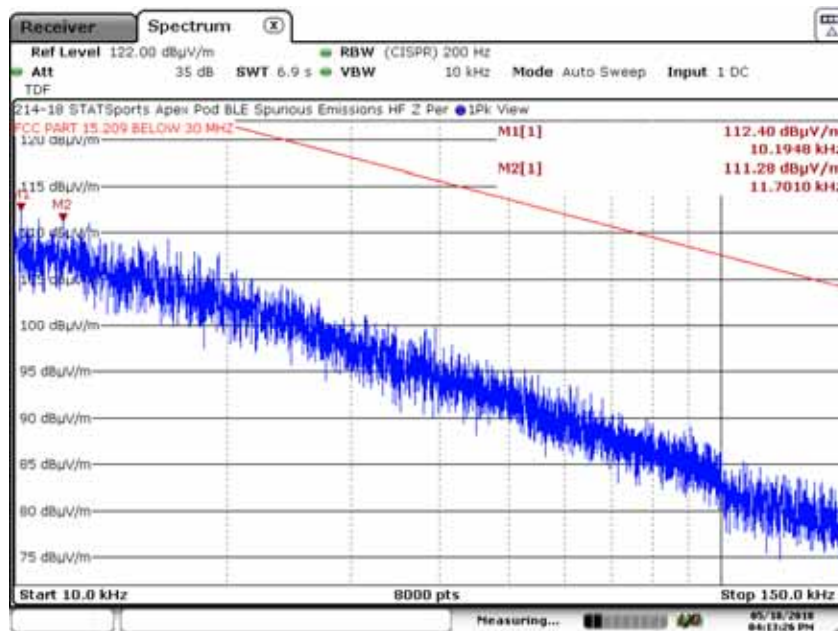
A1.3. High Frequency: Channel 39, 2480 MHz

A1.3.3. Orthogonal Position: Z-Axis

A1.3.3.1. Measurement Results: Parallel Antenna



A1.3.3.2. Measurement Results: Perpendicular Antenna



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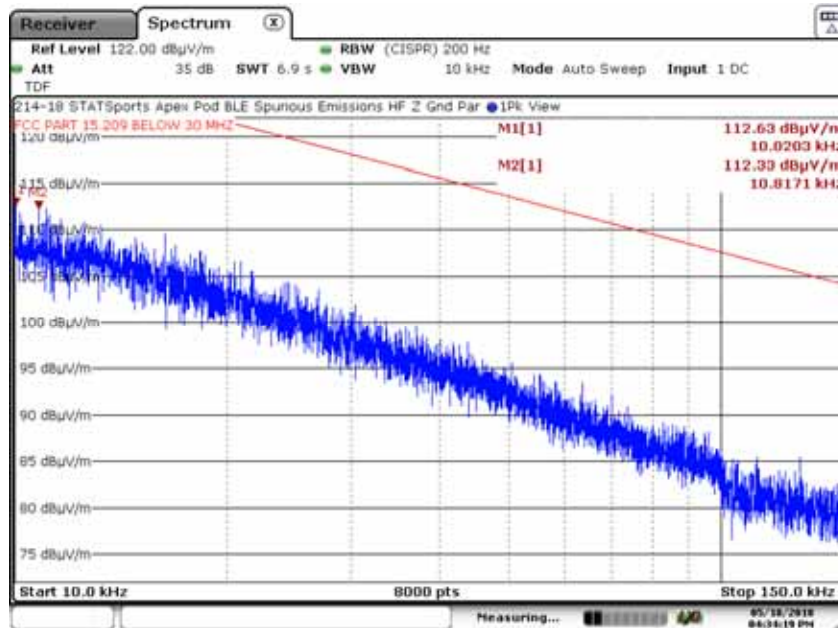
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

A1.3. High Frequency: Channel 39, 2480 MHz

A1.3.3. Orthogonal Position: Z-Axis

A1.3.3.3. Measurement Results: Ground Parallel Antenna



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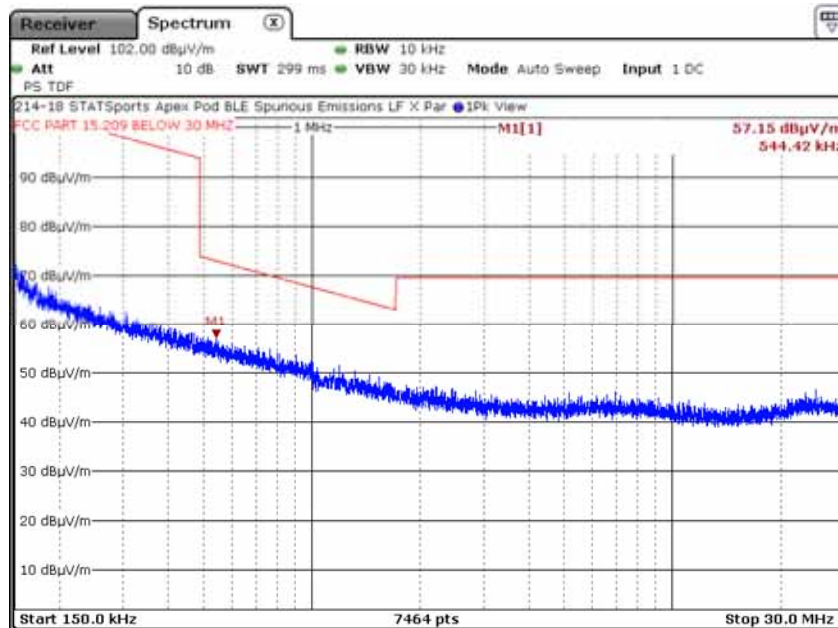
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

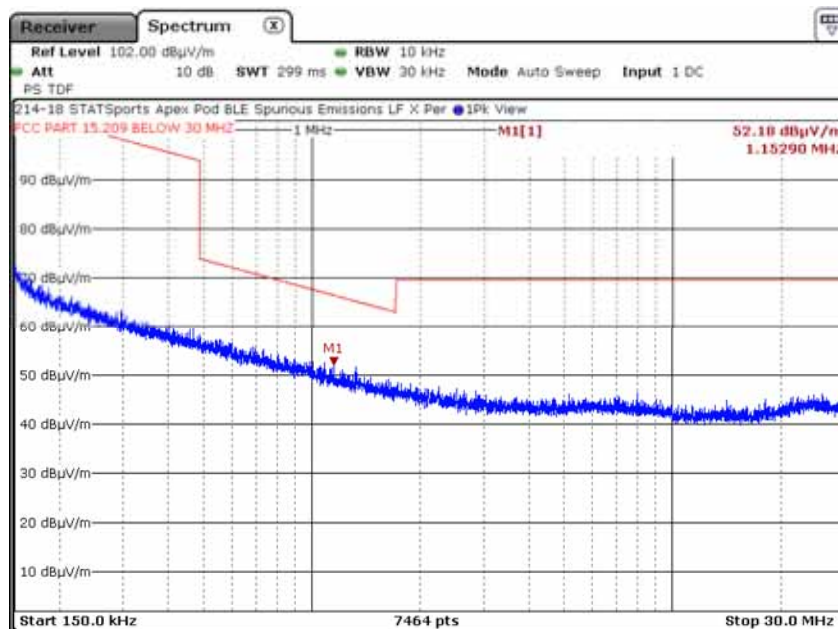
A2.1. Low Frequency: Channel 37, 2402 MHz

A2.1.1. Orthogonal Position: X-Axis

A2.1.1.1. Measurement Results: Parallel Antenna



A2.1.1.2. Measurement Results: Perpendicular Antenna



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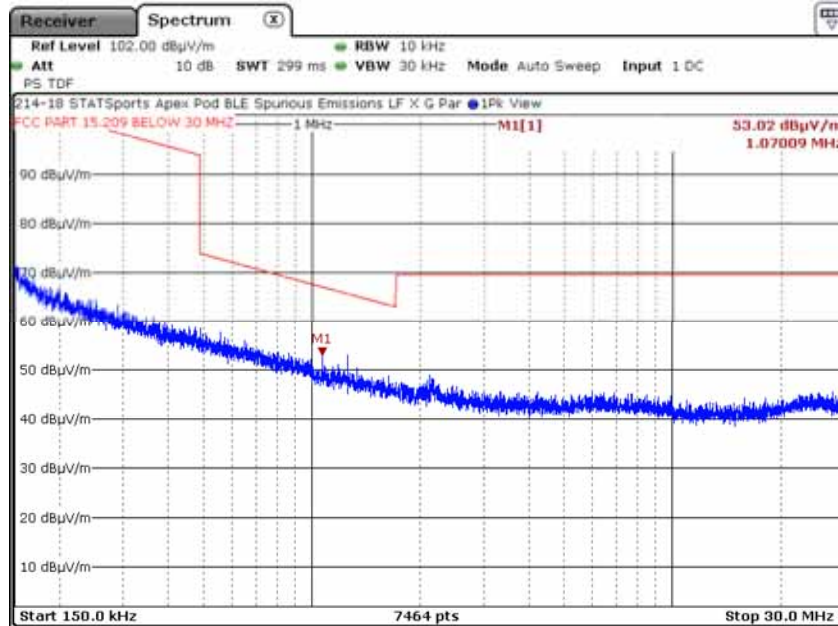
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A1. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

A2.1. Low Frequency: Channel 37, 2402 MHz

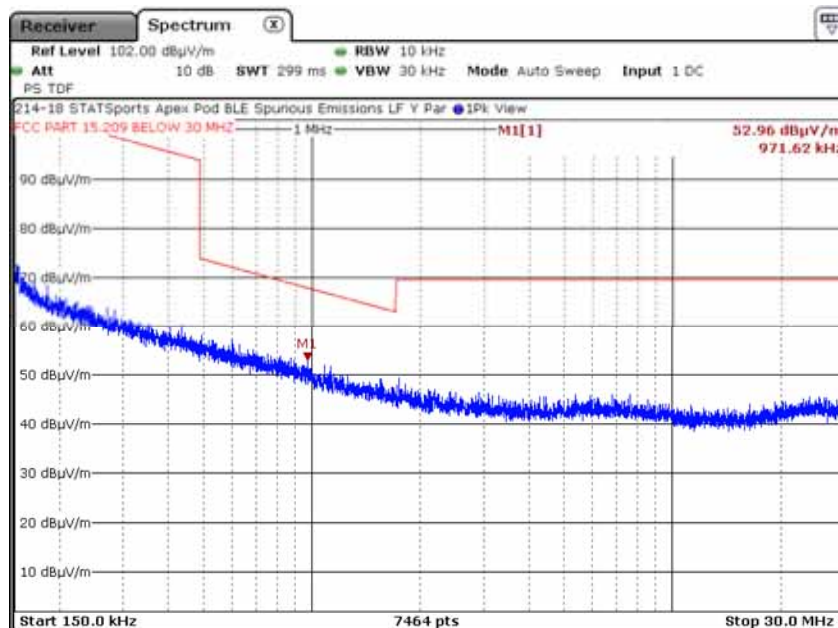
A2.1.1. Orthogonal Position: X-Axis

A2.1.1.3. Measurement Results: Ground Parallel Antenna



A2.1.2. Orthogonal Position: Y-Axis

A2.1.2.1. Measurement Results: Parallel Antenna



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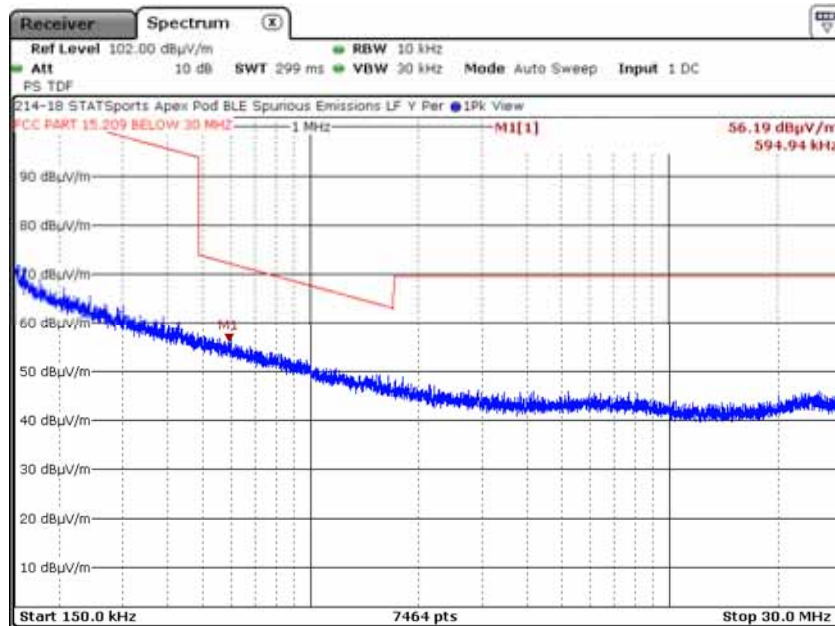
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

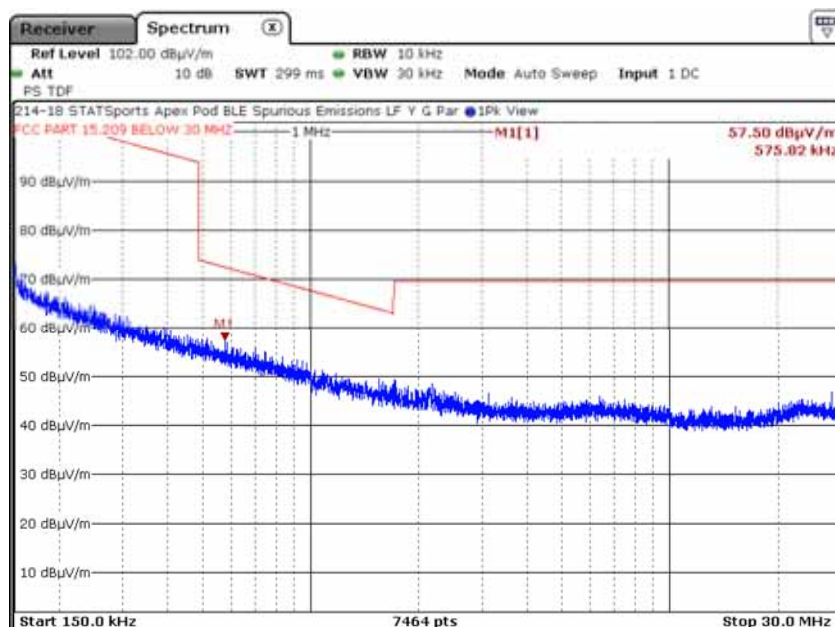
A2.1. Low Frequency: Channel 37, 2402 MHz

A2.1.2. Orthogonal Position: Y-Axis

A2.1.2.2. Measurement Results: Perpendicular Antenna



A2.1.2.3. Measurement Results: Ground Parallel Antenna



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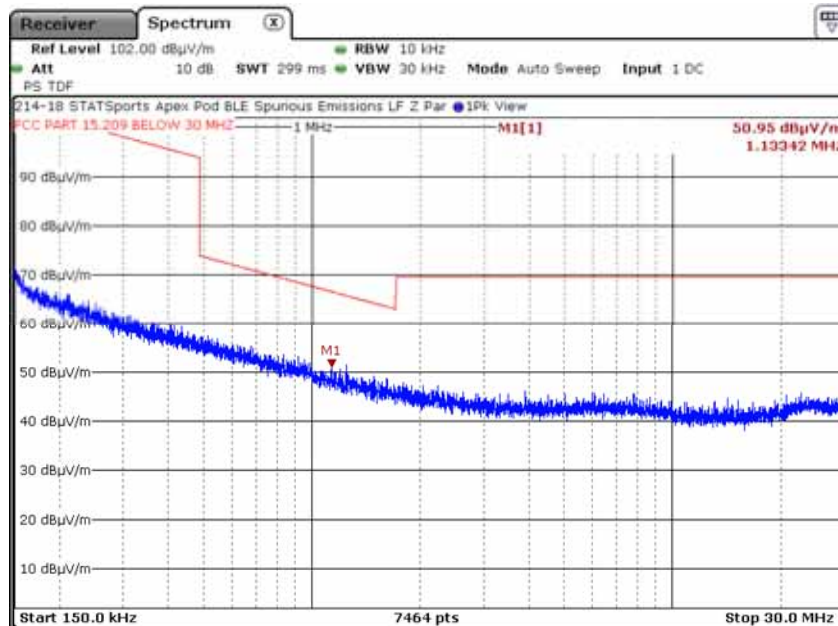
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

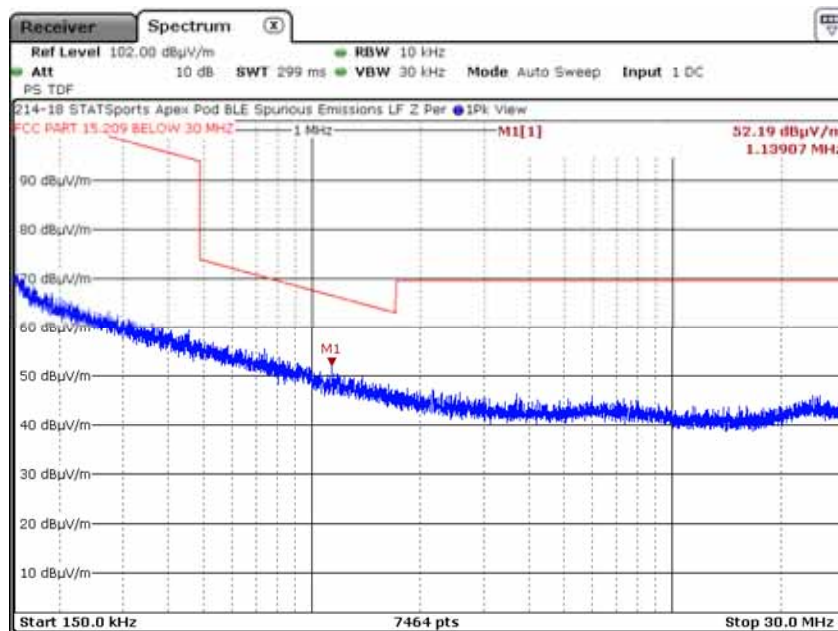
A2.1. Low Frequency: Channel 37, 2402 MHz

A2.1.3. Orthogonal Position: Z-Axis

A2.1.3.1. Measurement Results: Parallel Antenna



A2.1.3.2. Measurement Results: Perpendicular Antenna



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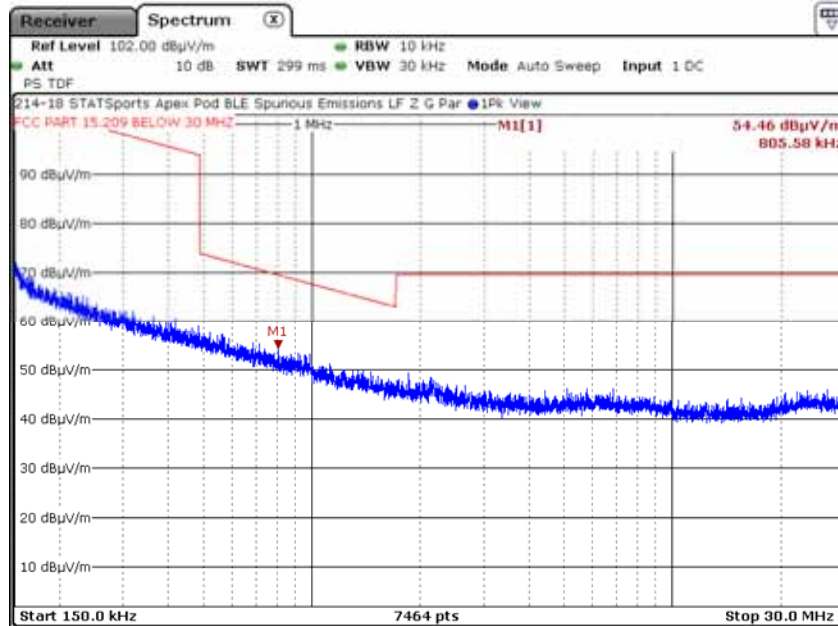
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

A2.1. Low Frequency: Channel 37, 2402 MHz

A2.1.3. Orthogonal Position: Z-Axis

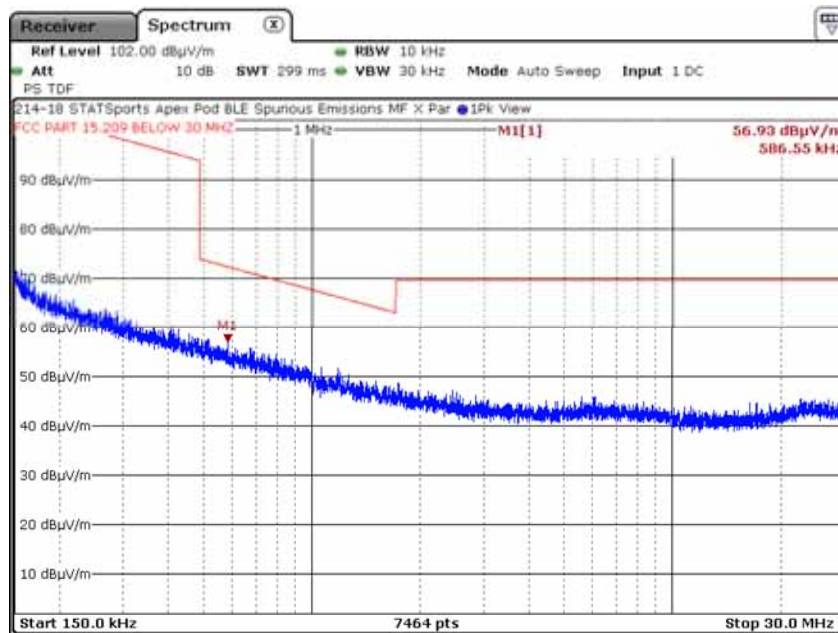
A2.1.3.3. Measurement Results: Ground Parallel Antenna



A2.2. Middle Frequency: Channel 38, 2426 MHz

A2.2.1. Orthogonal Position: X-Axis

A2.2.1.1. Measurement Results: Parallel Antenna



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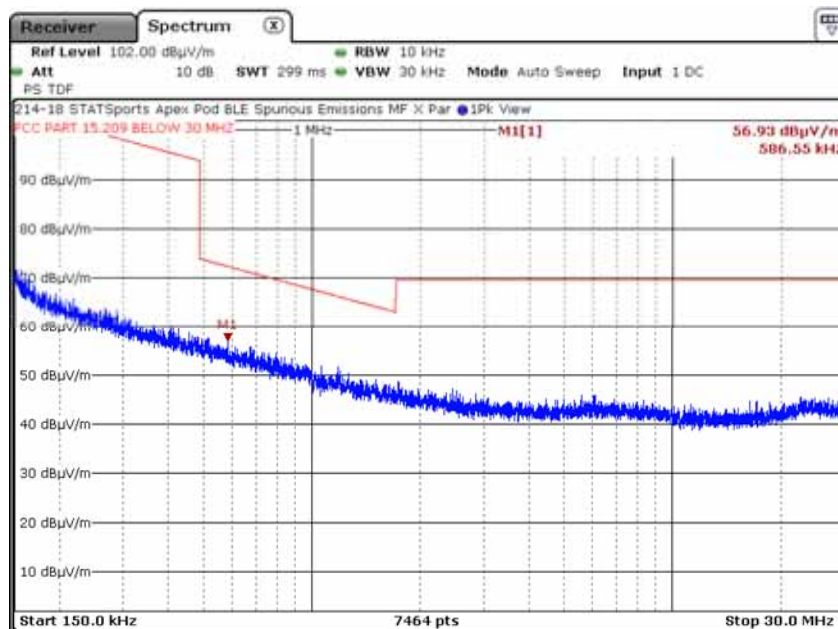
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

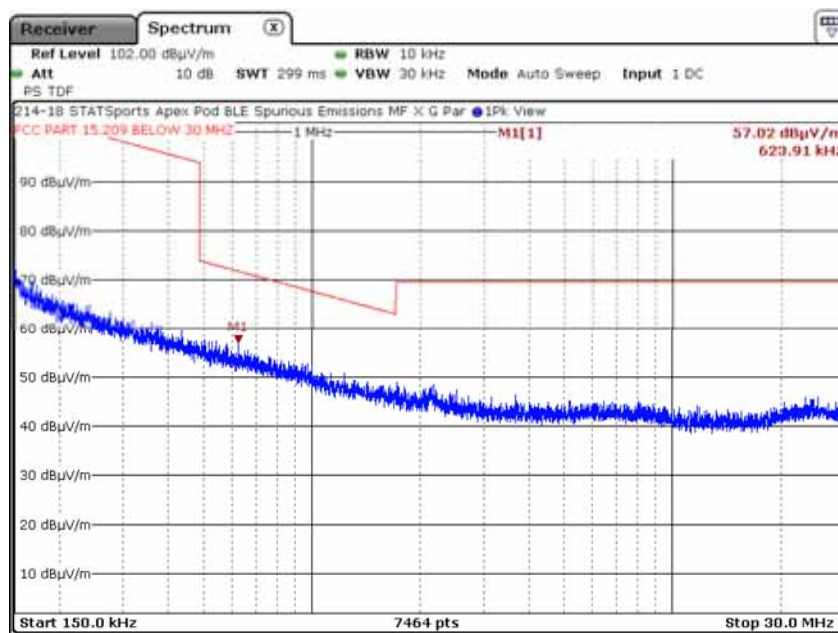
A2.2. Middle Frequency: Channel 38, 2426 MHz

A2.2.1. Orthogonal Position: X-Axis

A2.2.1.2. Measurement Results: Perpendicular Antenna



A2.2.1.3. Measurement Results: Ground Parallel Antenna



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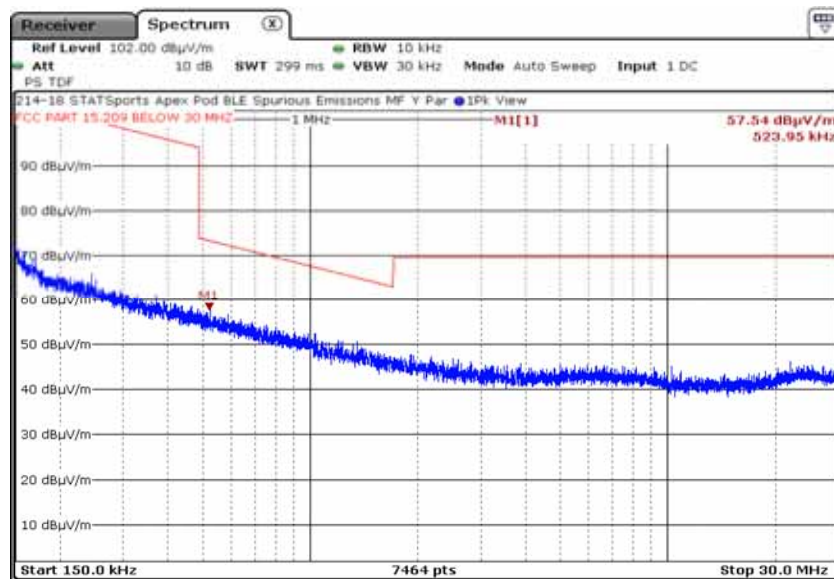
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

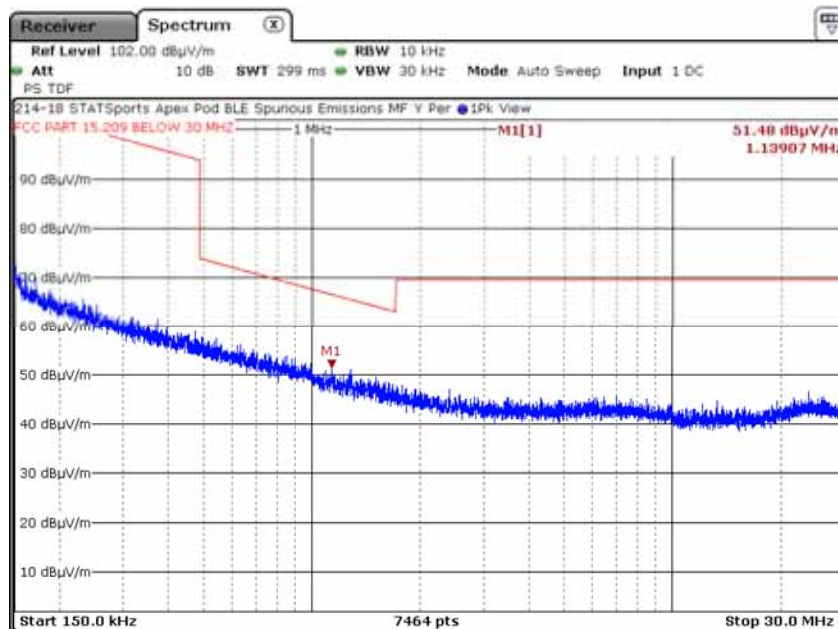
A2.2. Middle Frequency: Channel 38, 2426 MHz

A2.2.2. Orthogonal Position: Y-Axis

A2.2.2.1. Measurement Results: Parallel Antenna



A2.2.2.2. Measurement Results: Perpendicular Antenna



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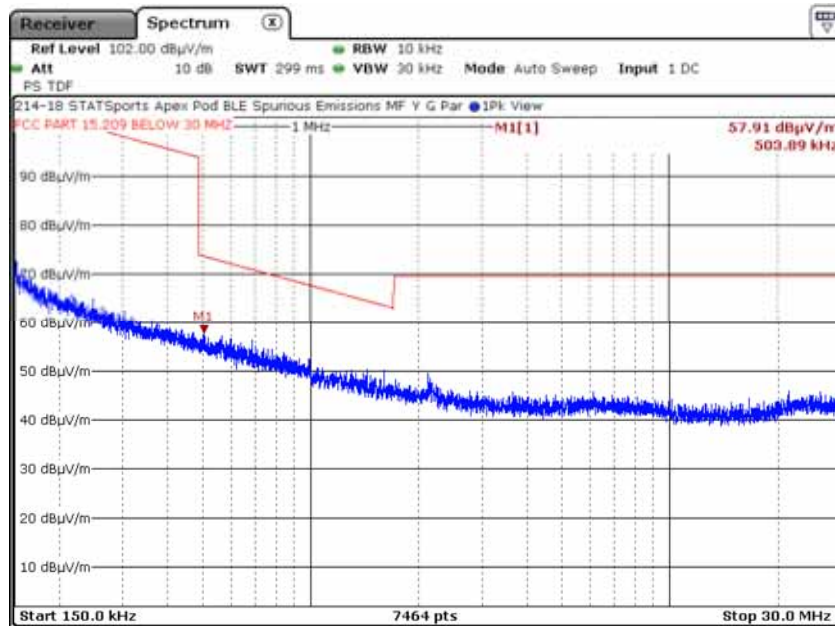
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

A2.2. Middle Frequency: Channel 38, 2426 MHz

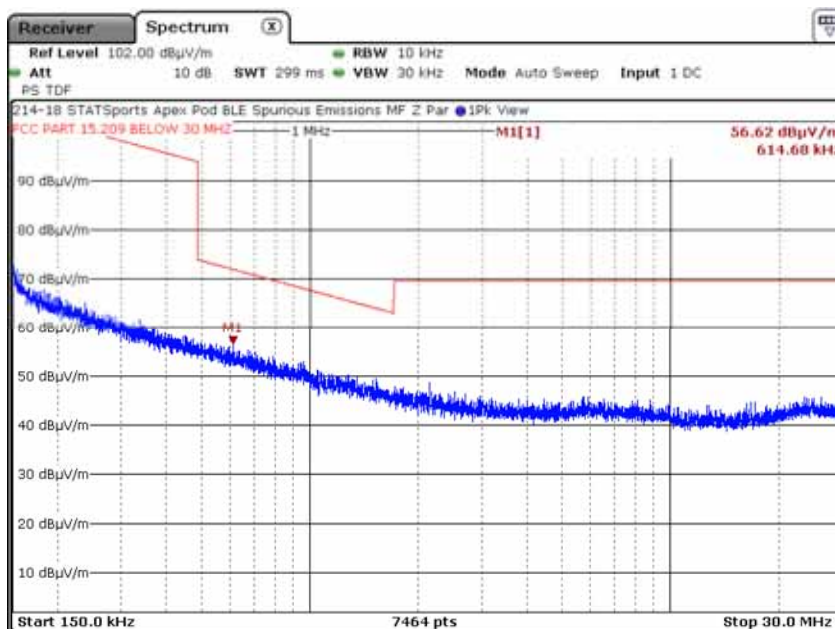
A2.2.2. Orthogonal Position: Y-Axis

A2.2.2.3. Measurement Results: Ground Parallel Antenna



A2.2.3. Orthogonal Position: Z-Axis

A2.2.3.1. Measurement Results: Parallel Antenna



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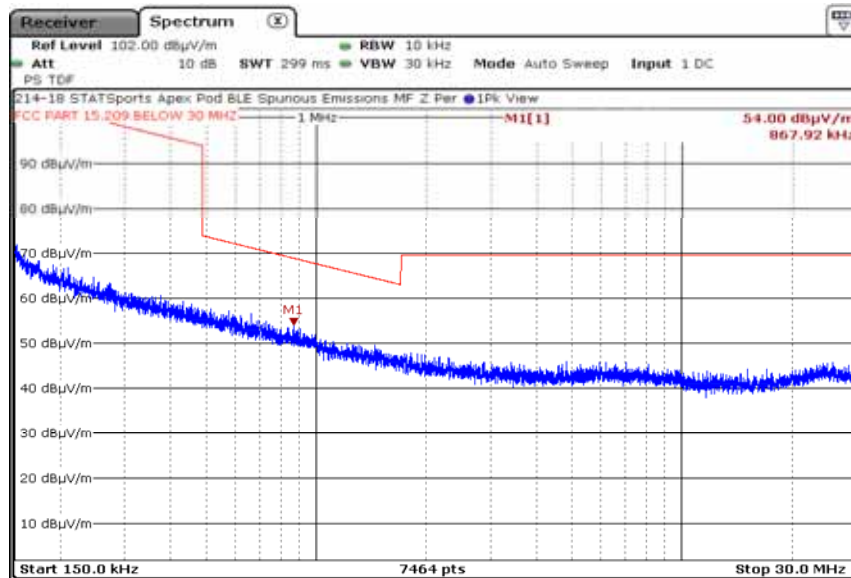
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

A2.2. Middle Frequency: Channel 38, 2426 MHz

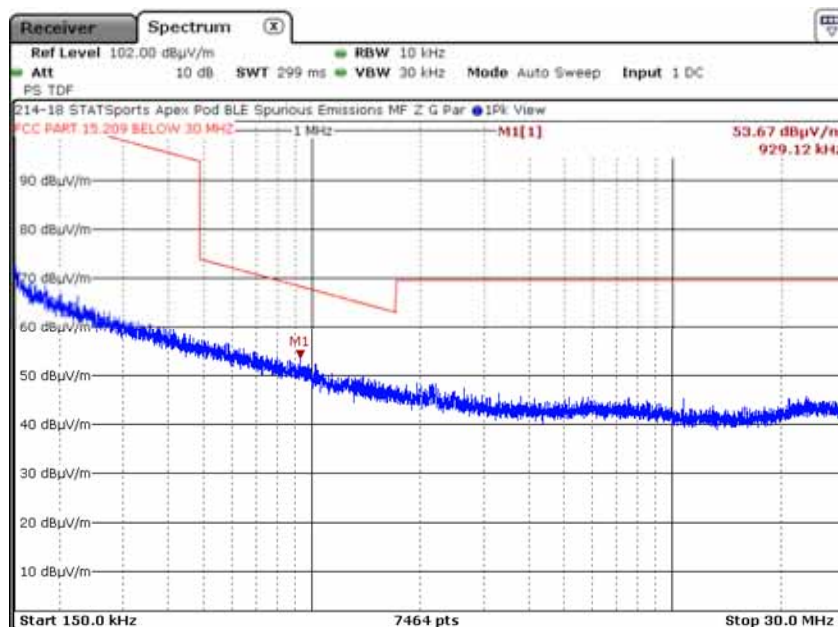
A2.2.3. Orthogonal Position: Z-Axis

A2.2.3.2. Measurement Results: Perpendicular Antenna



120VAC Phase w/ 24vdc_at065
Date: 25.MAY.2018 09:51:32

A2.2.3.3. Measurement Results: Ground Parallel Antenna



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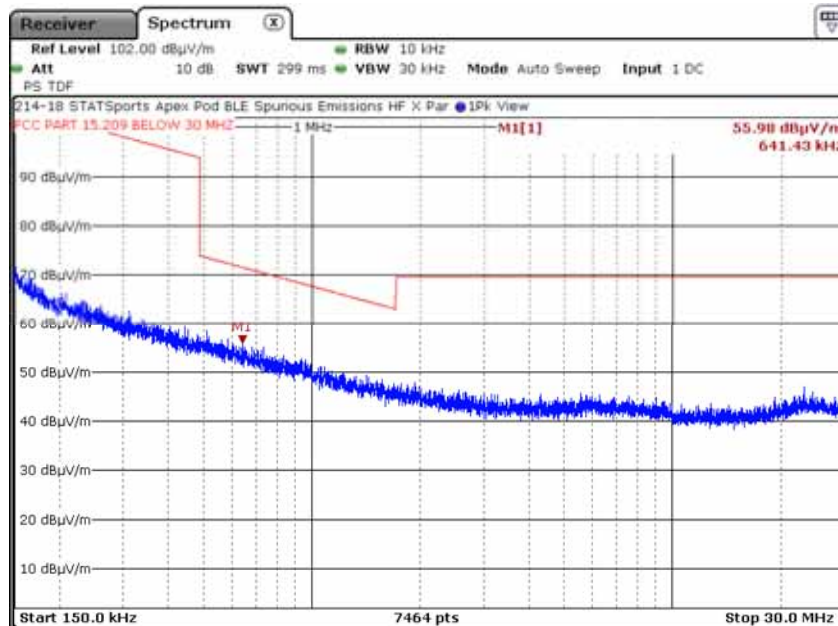
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

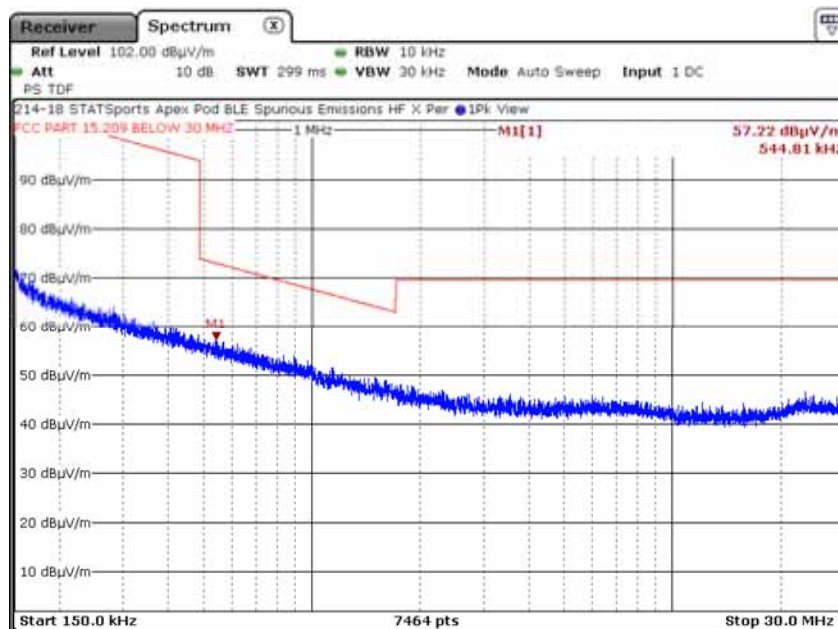
A2.3. High Frequency: Channel 39, 2480 MHz

A2.3.1. Orthogonal Position: X-Axis

A2.3.1.1. Measurement Results: Parallel Antenna



A2.3.1.2. Measurement Results: Perpendicular Antenna



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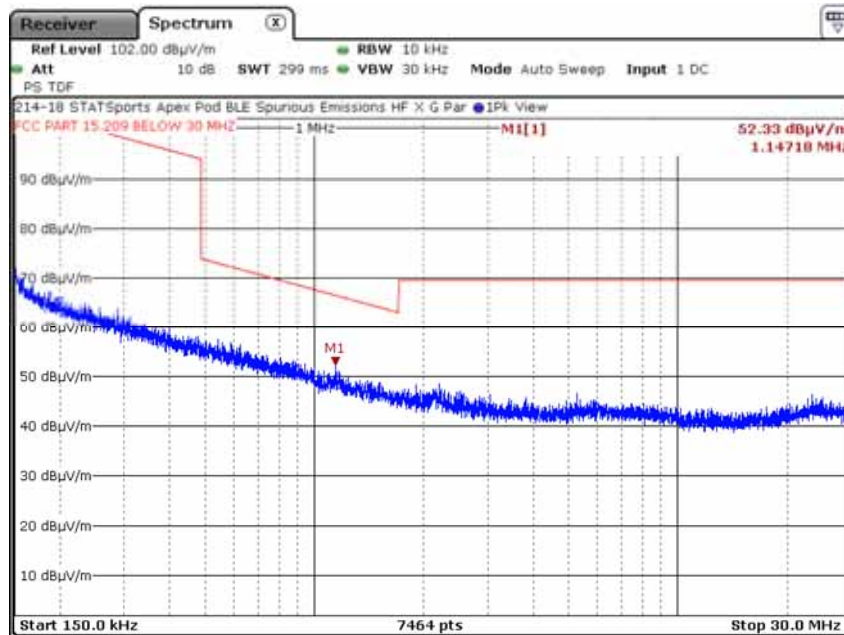
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

A2.3. High Frequency: Channel 39, 2480 MHz

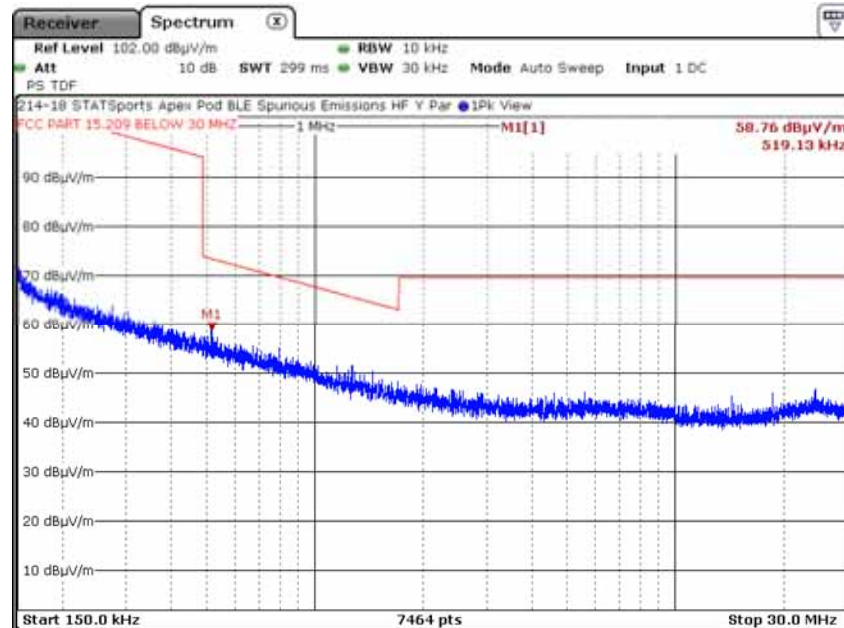
A2.3.1. Orthogonal Position: X-Axis

A2.3.1.3. Measurement Results: Ground Parallel Antenna



A2.3.2. Orthogonal Position: Y-Axis

A2.3.2.1. Measurement Results: Parallel Antenna



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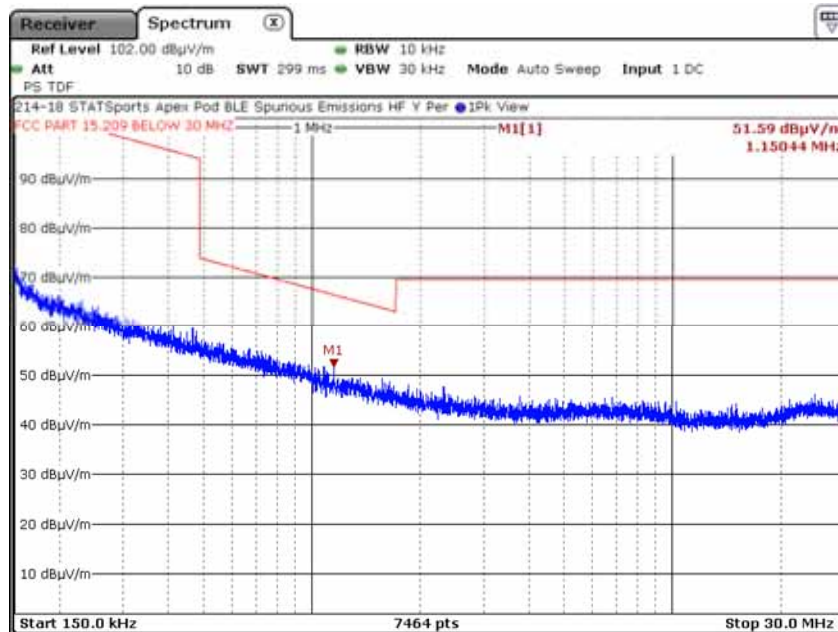
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

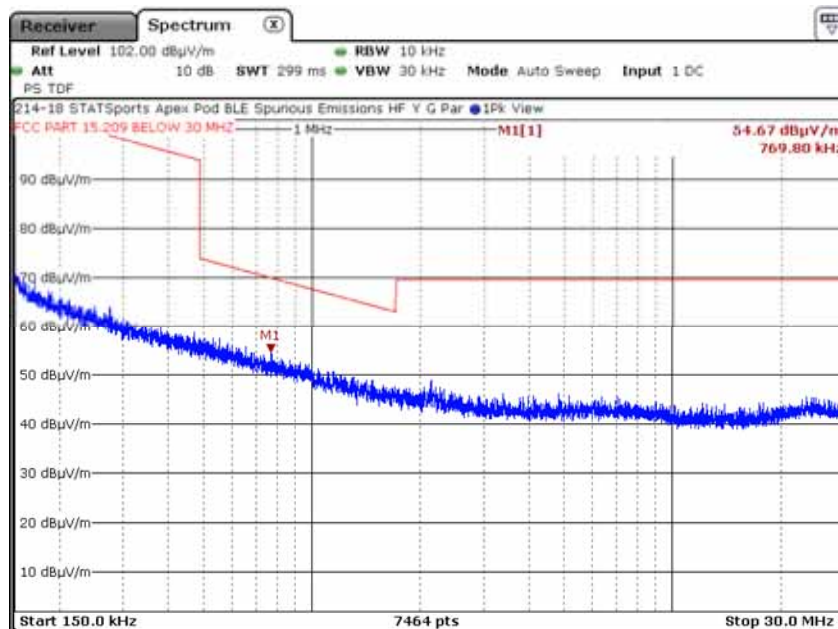
A2.3. High Frequency: Channel 39, 2480 MHz

A2.3.2. Orthogonal Position: Y-Axis

A2.3.2.2. Measurement Results: Perpendicular Antenna



A2.3.2.3. Measurement Results: Ground Parallel Antenna



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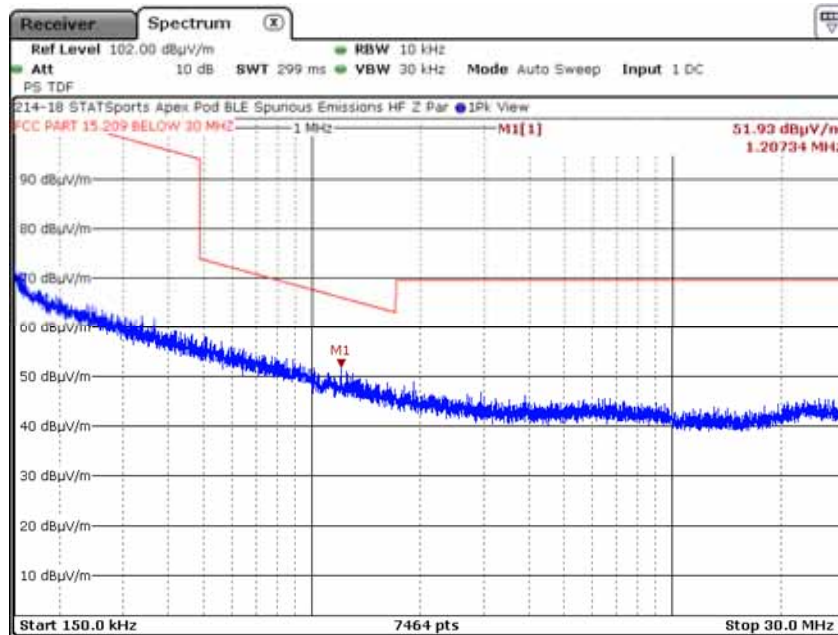
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

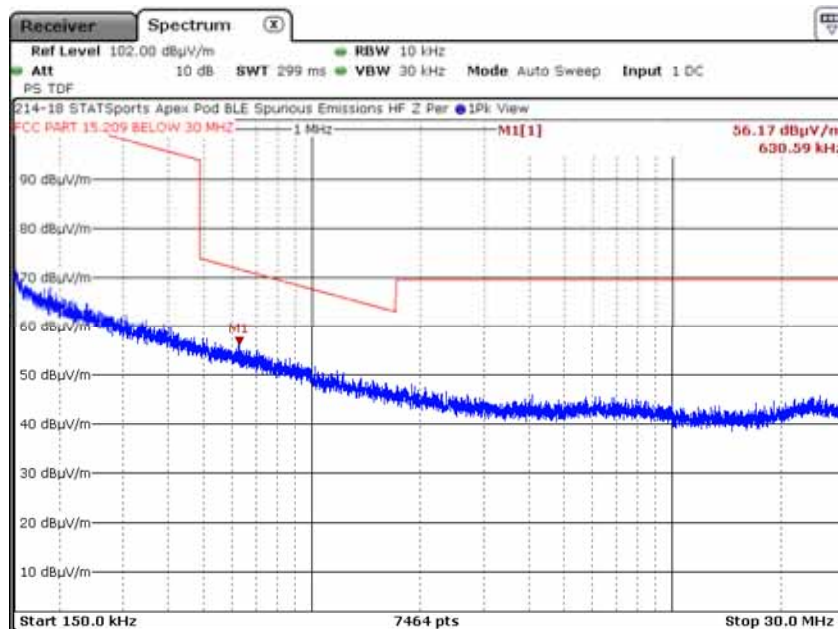
A2.3. High Frequency: Channel 39, 2480 MHz

A2.3.3. Orthogonal Position: Z-Axis

A2.3.3.1. Measurement Results: Parallel Antenna



A2.3.3.2. Measurement Results: Perpendicular Antenna



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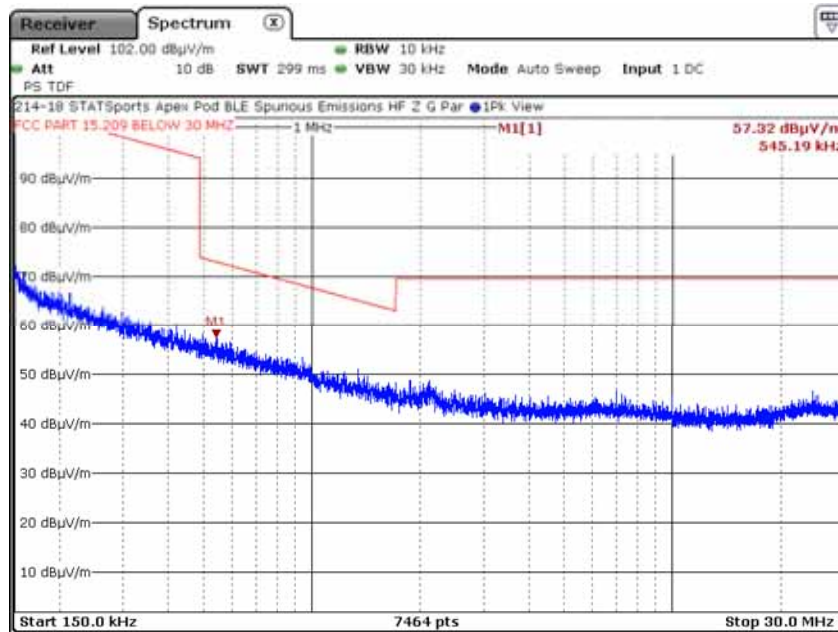
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

A2.3. High Frequency: Channel 39, 2480 MHz

A2.3.3. Orthogonal Position: Z-Axis

A2.3.3.3. Measurement Results: Ground Parallel Antenna



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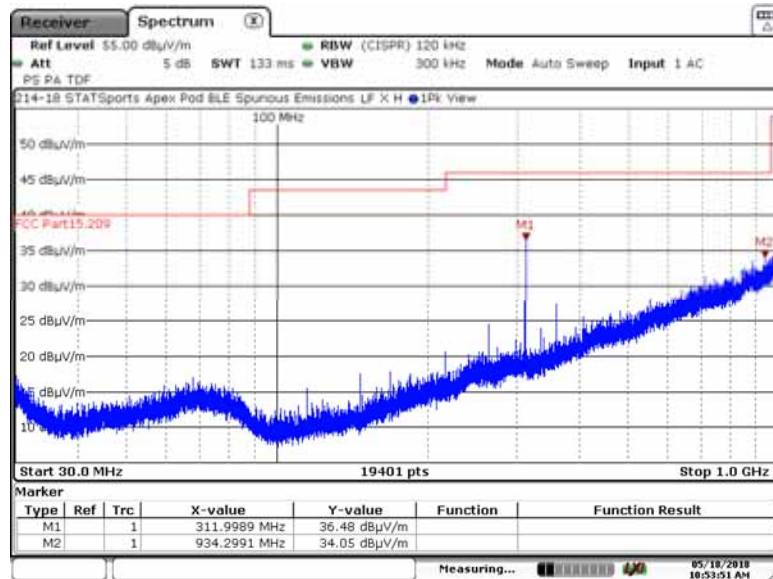
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

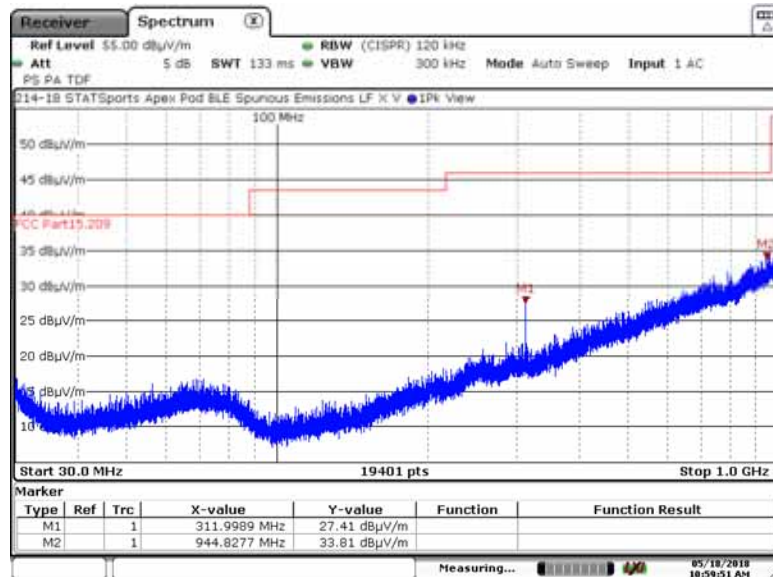
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.1. Low Frequency: Channel 37, 2402 MHz

A3.1.1. Measurement Results: X-Axis, Horizontal Antenna



A3.1.2. Measurement Results: X-Axis, Vertical Antenna



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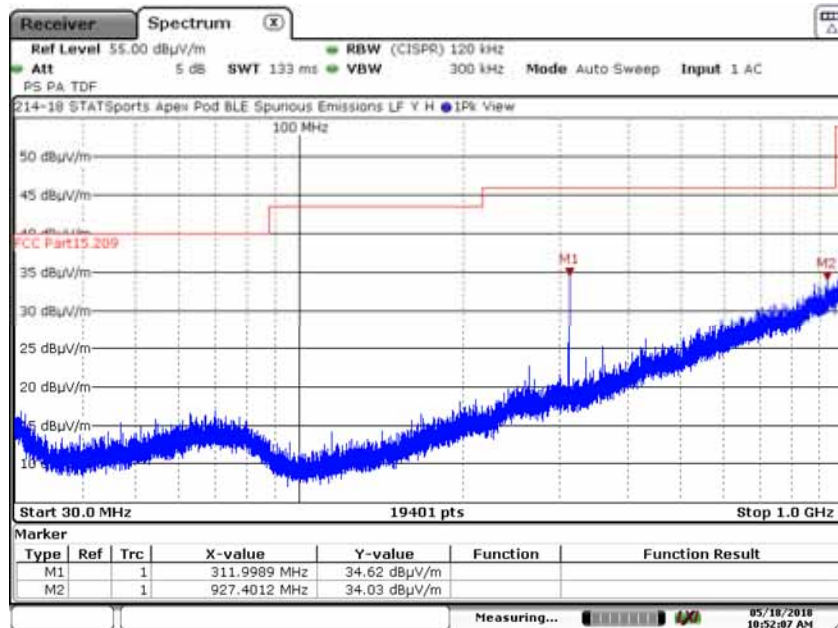
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

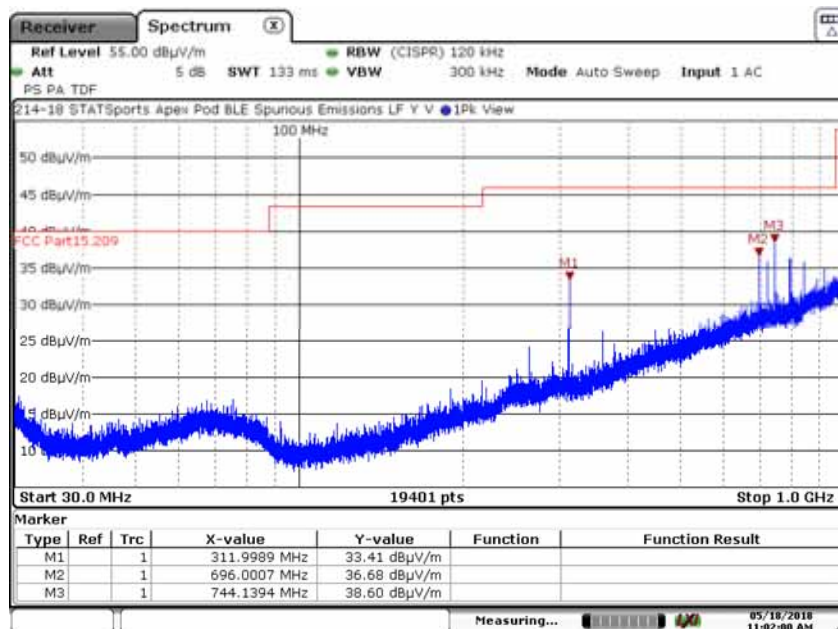
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.1. Low Frequency: Channel 37, 2402 MHz

A3.1.3. Measurement Results: Y-Axis, Horizontal Antenna



A3.1.4. Measurement Results: Y-Axis, Vertical Antenna



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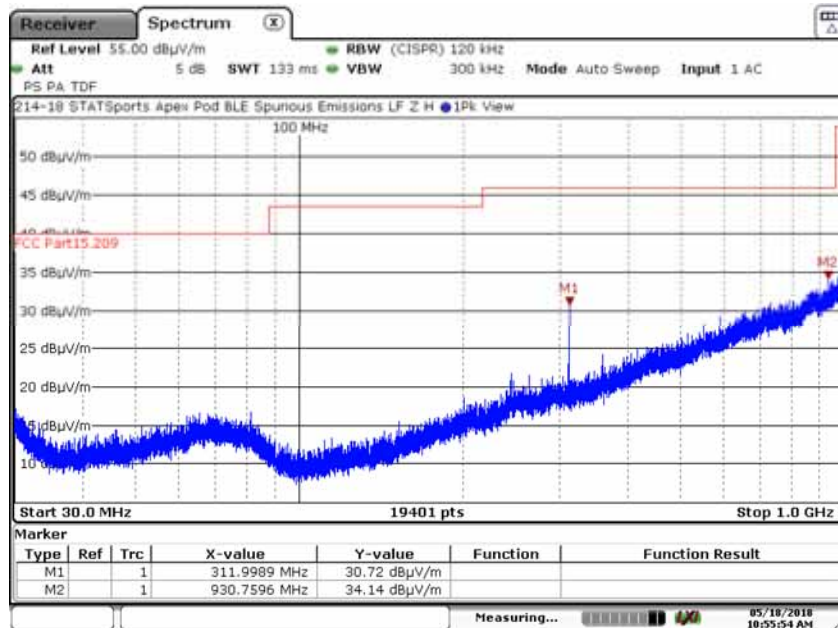
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

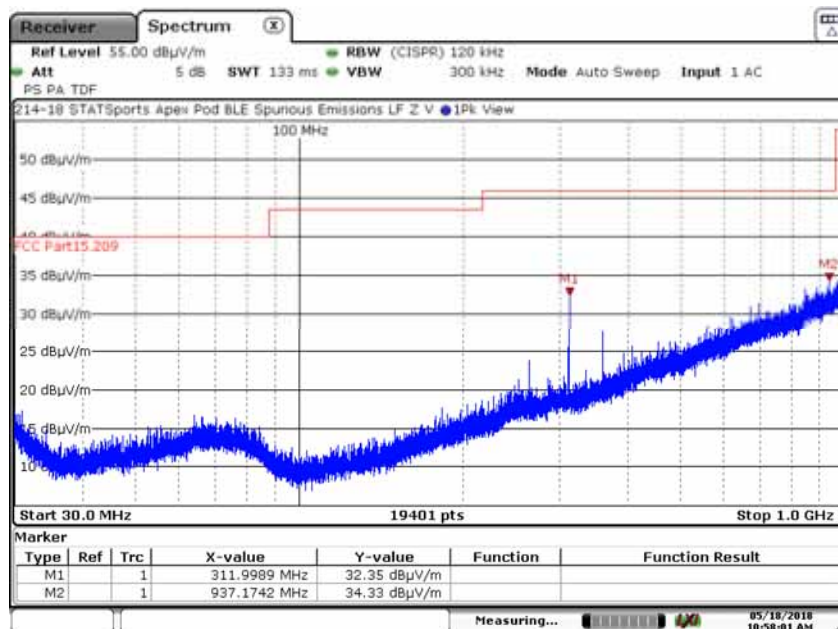
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.1. Low Frequency: Channel 37, 2402 MHz

A3.1.5. Measurement Results: Z-Axis, Horizontal Antenna



A3.1.6. Measurement Results: Z-Axis, Vertical Antenna



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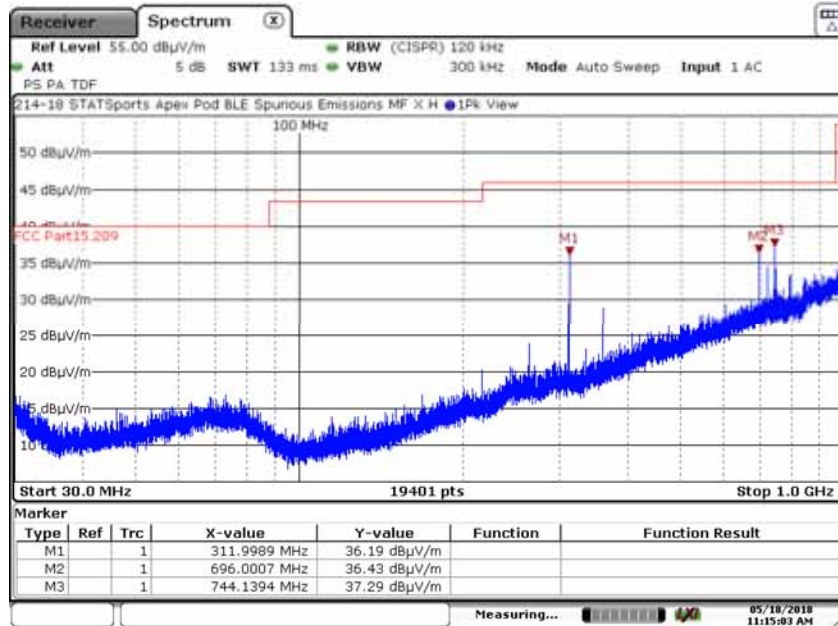
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Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

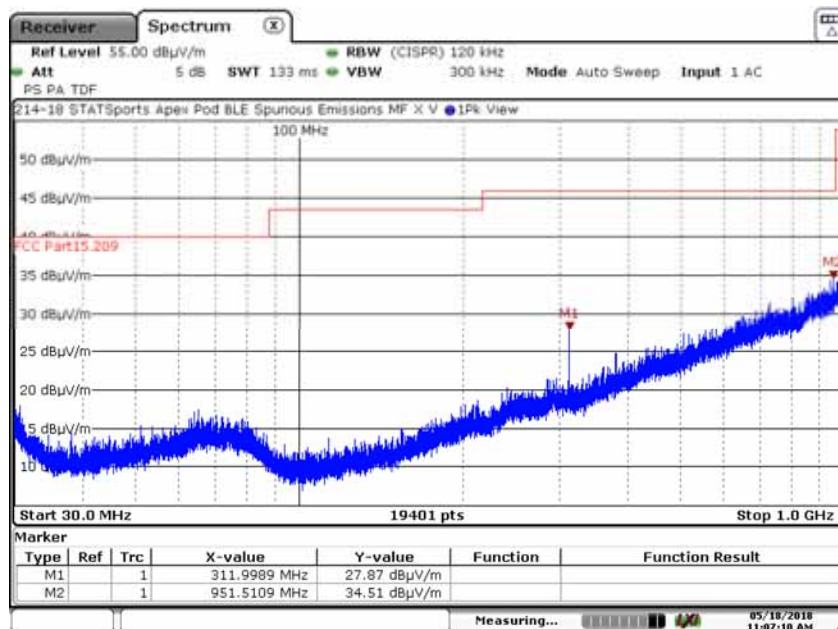
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.2. Middle Frequency: Channel 38, 2426 MHz

A3.2.1. Measurement Results: X-Axis, Horizontal Antenna



A3.2.2. Measurement Results: X-Axis, Vertical Antenna



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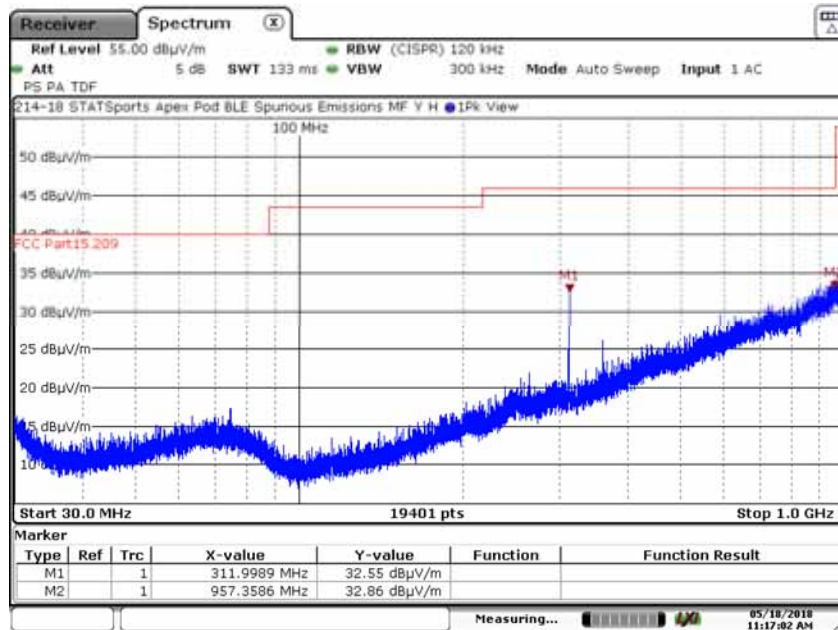
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

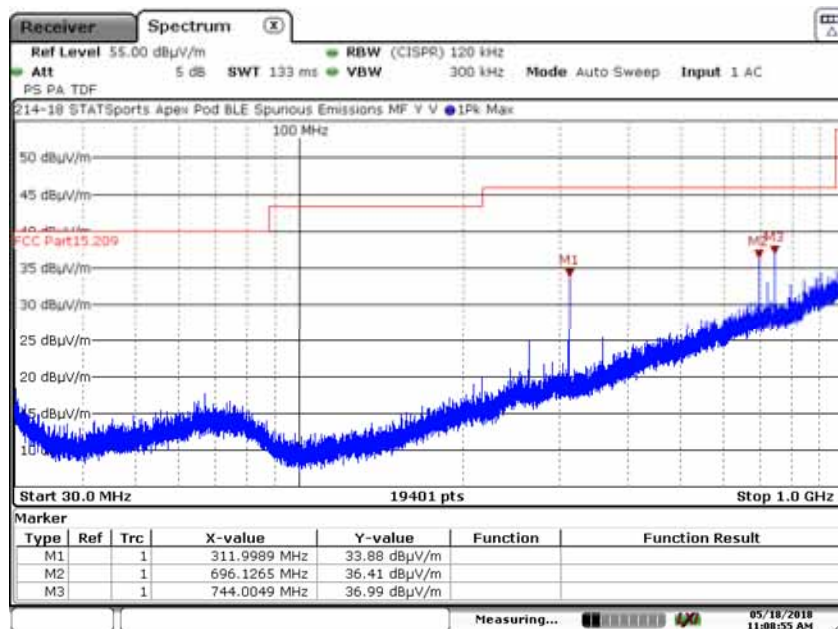
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.2. Middle Frequency: Channel 38, 2426 MHz

A3.2.3. Measurement Results: Y-Axis, Horizontal Antenna



A3.2.4. Measurement Results: Y-Axis, Vertical Antenna



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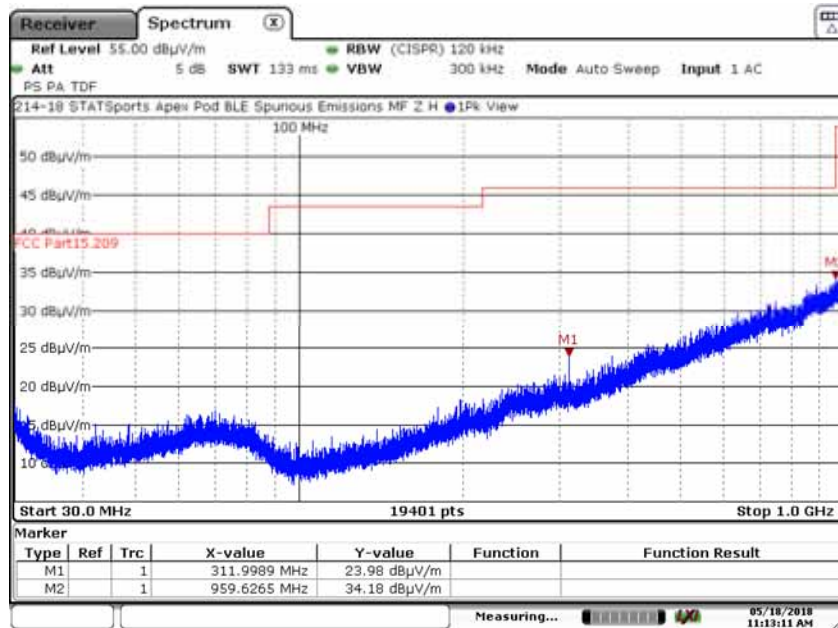
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Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

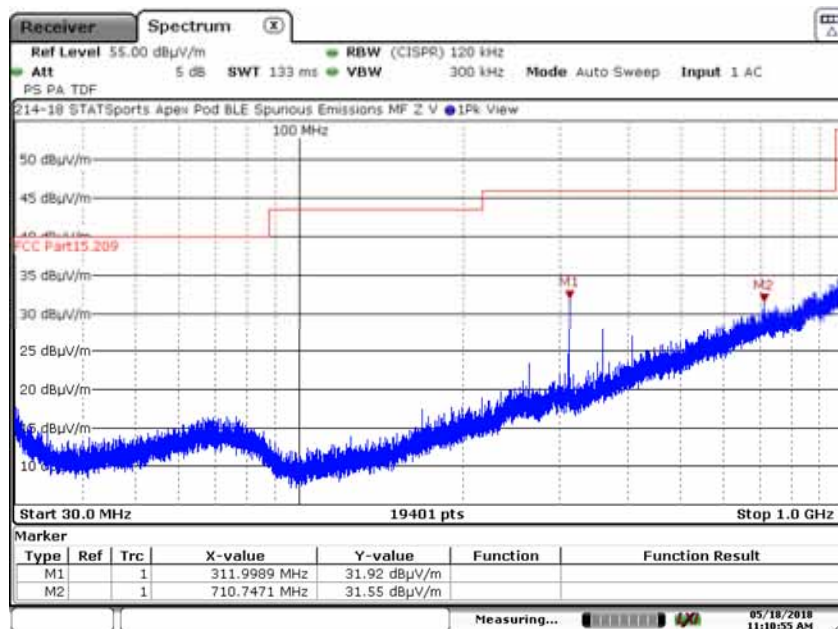
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.2 Middle Frequency: Channel 38, 2426 MHz

A3.2.5. Measurement Results: Z-Axis, Horizontal Antenna



A3.2.6. Measurement Results: Z-Axis, Vertical Antenna



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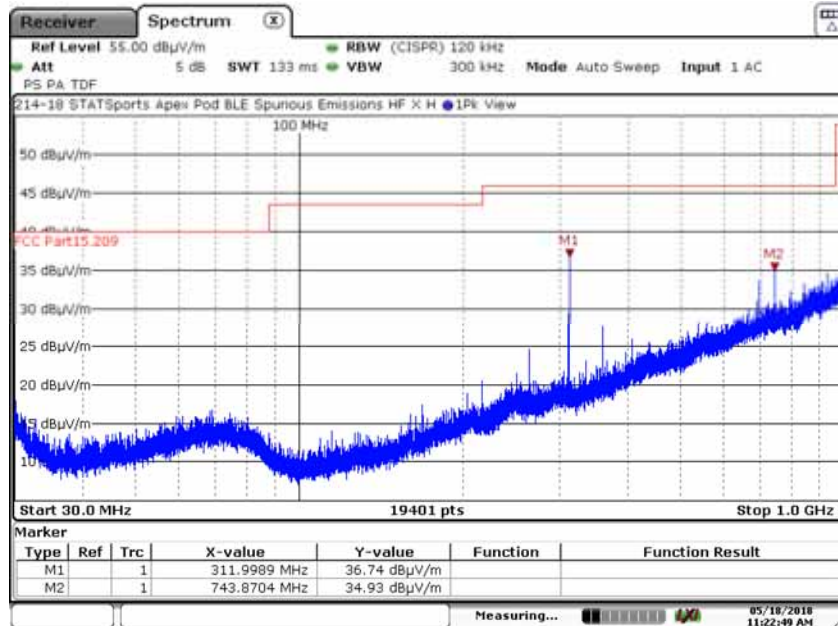
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Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

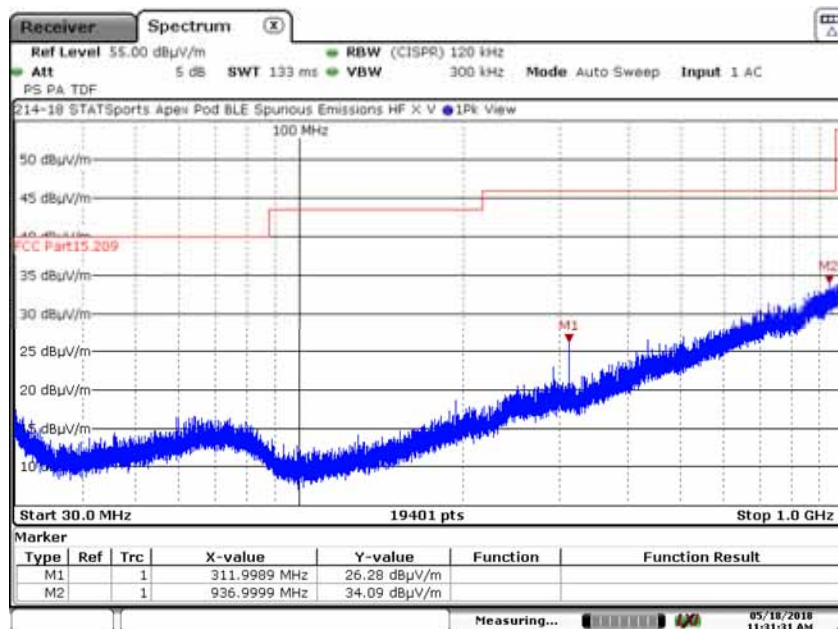
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.3. High Frequency: Channel 39, 2480 MHz

A3.3.1. Measurement Results: X-Axis, Horizontal Antenna



A3.3.2. Measurement Results: X-Axis, Vertical Antenna



Test Number: 214-18

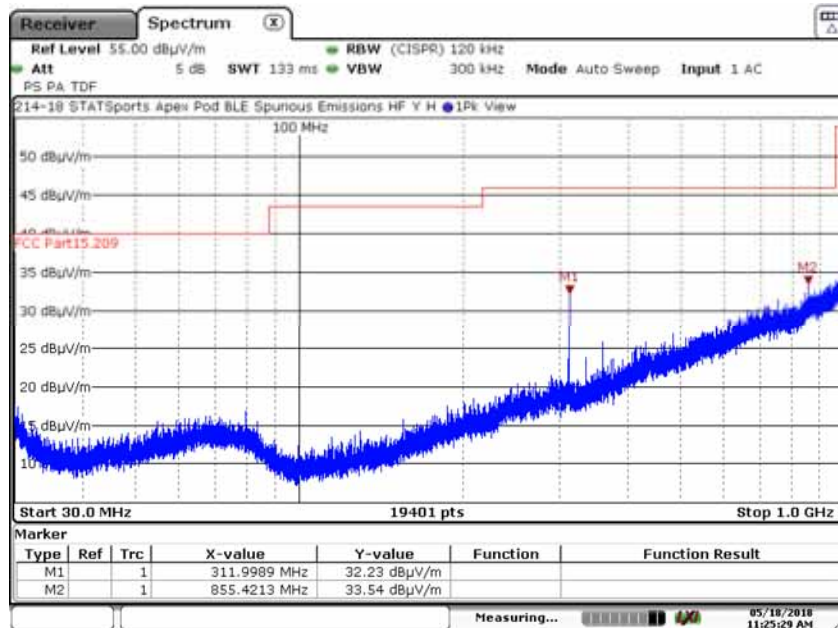
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

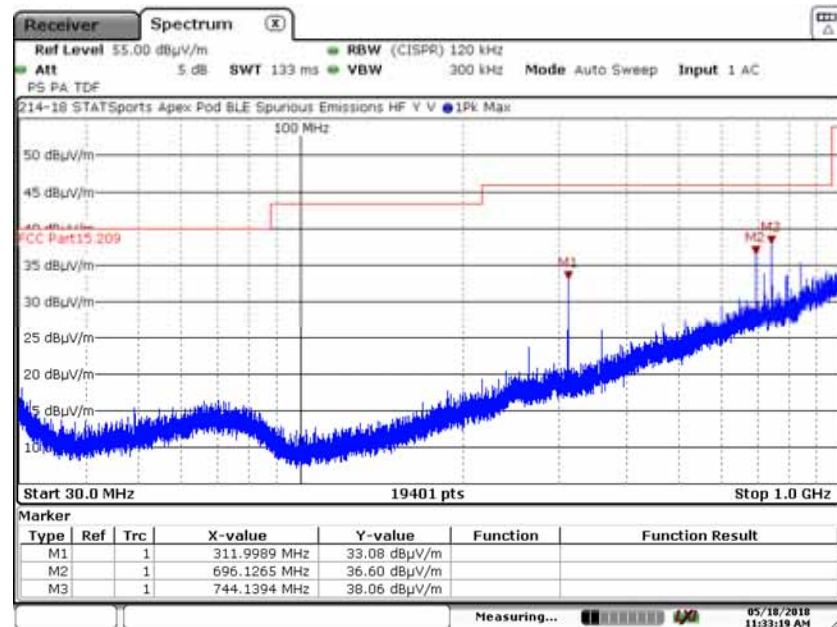
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.3. High Frequency: Channel 39, 2480 MHz

A3.3.3. Measurement Results: Y-Axis, Horizontal Antenna



A3.3.4. Measurement Results: Y-Axis, Vertical Antenna



Test Number: 214-18

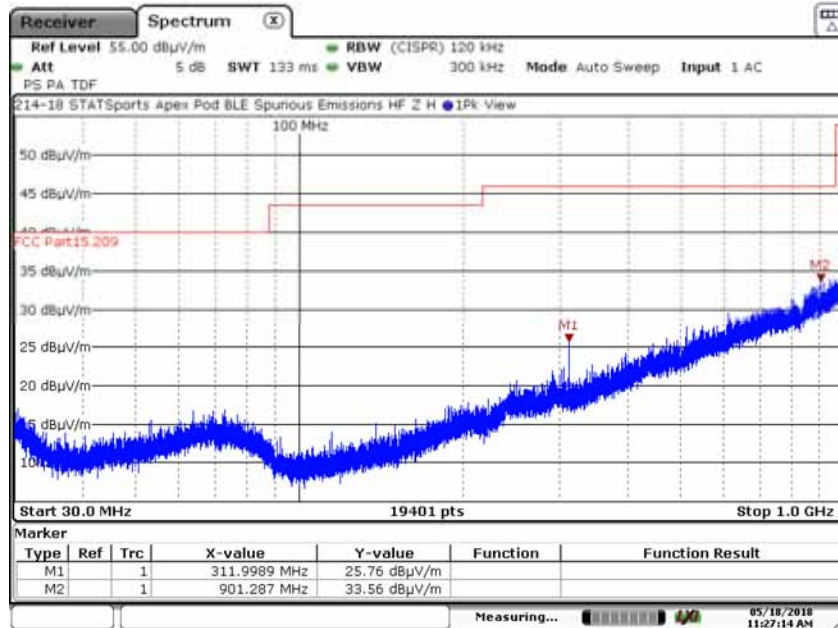
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

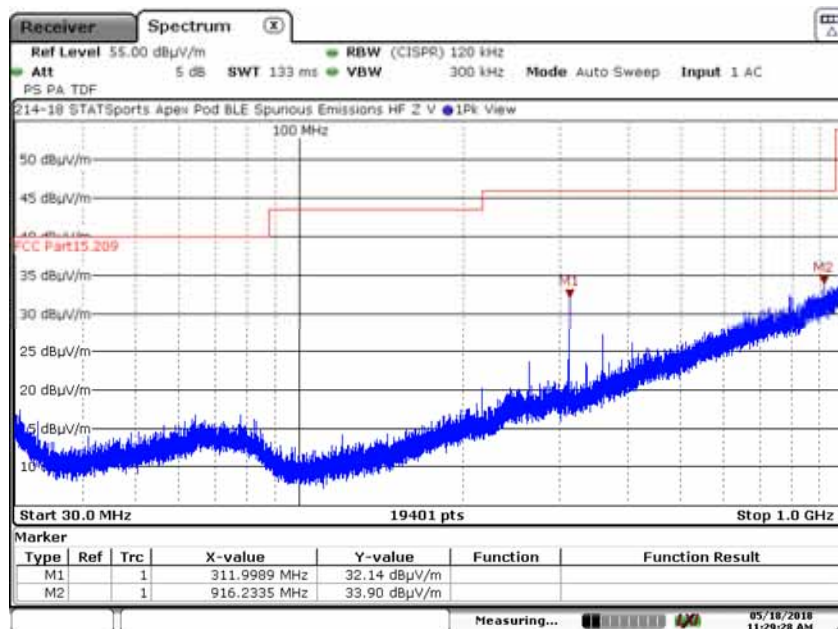
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.3. High Frequency: Channel 39, 2480 MHz

A3.3.5. Measurement Results: Z-Axis, Horizontal Antenna



A3.3.6. Measurement Results: Z-Axis, Vertical Antenna



Test Number: 214-18

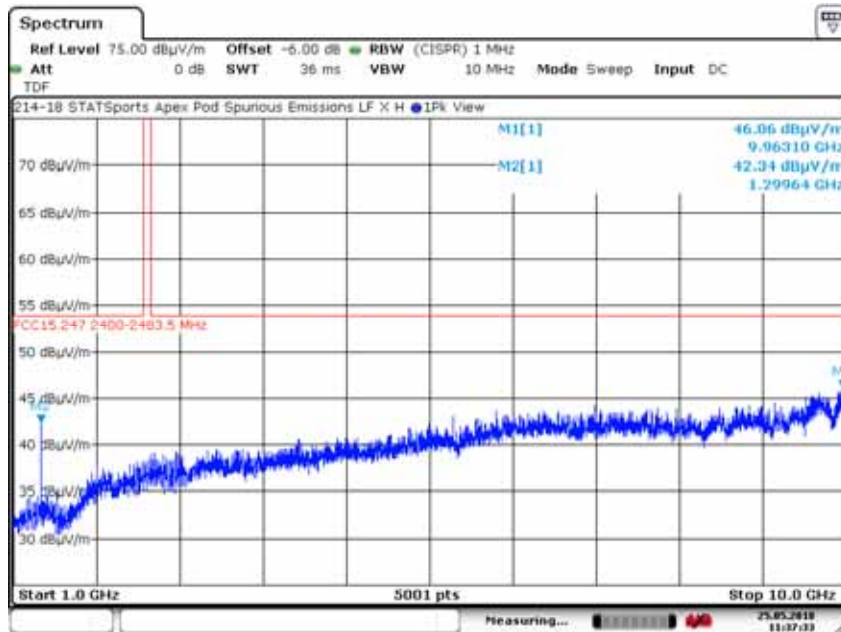
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

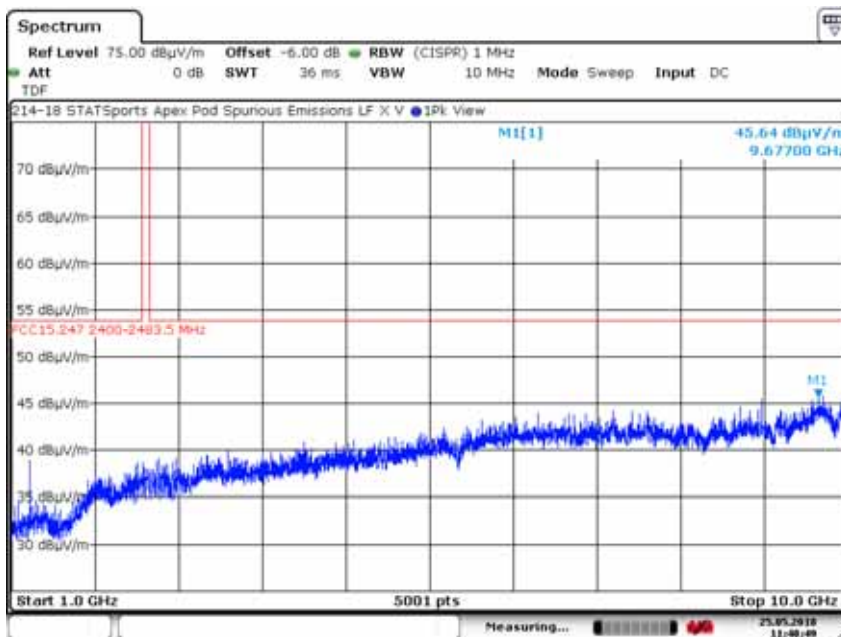
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.1. Channel 37, 2402 MHz

A4.1.1. Measurement Results: X-Axis, Horizontal Antenna



A4.1.2. Measurement Results: X-Axis, Vertical Antenna



Test Number: 214-18

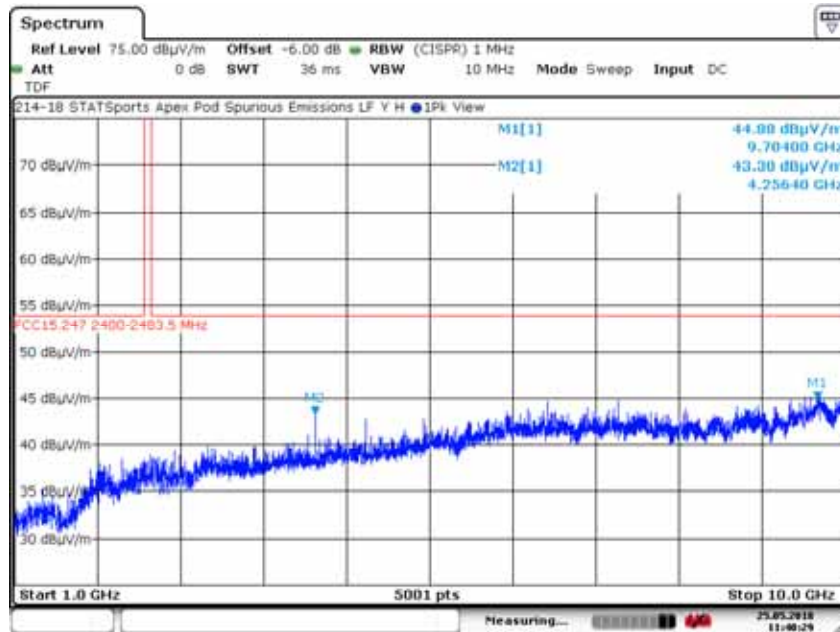
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

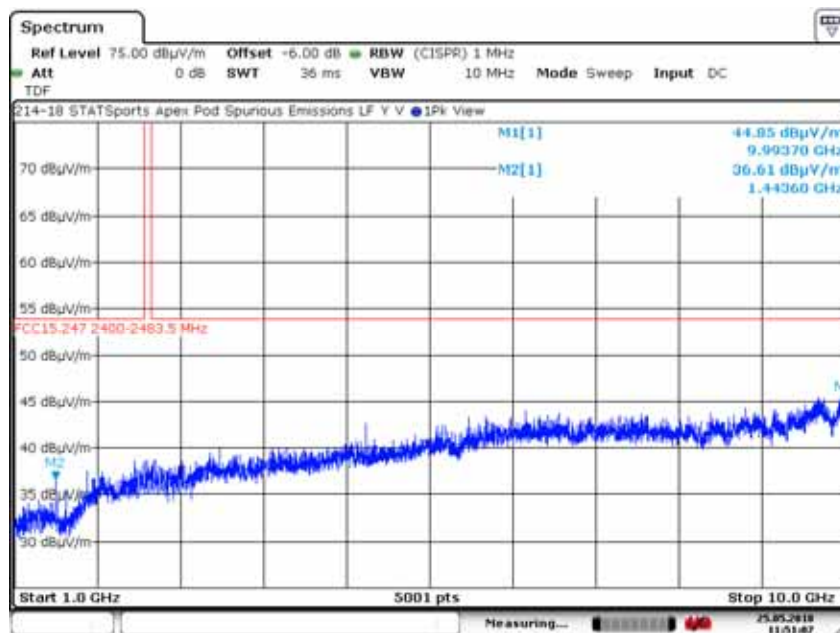
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.1. Channel 37, 2402 MHz

A4.1.3. Measurement Results: Y-Axis, Horizontal Antenna



A4.1.4. Measurement Results: Y-Axis, Vertical Antenna



Test Number: 214-18

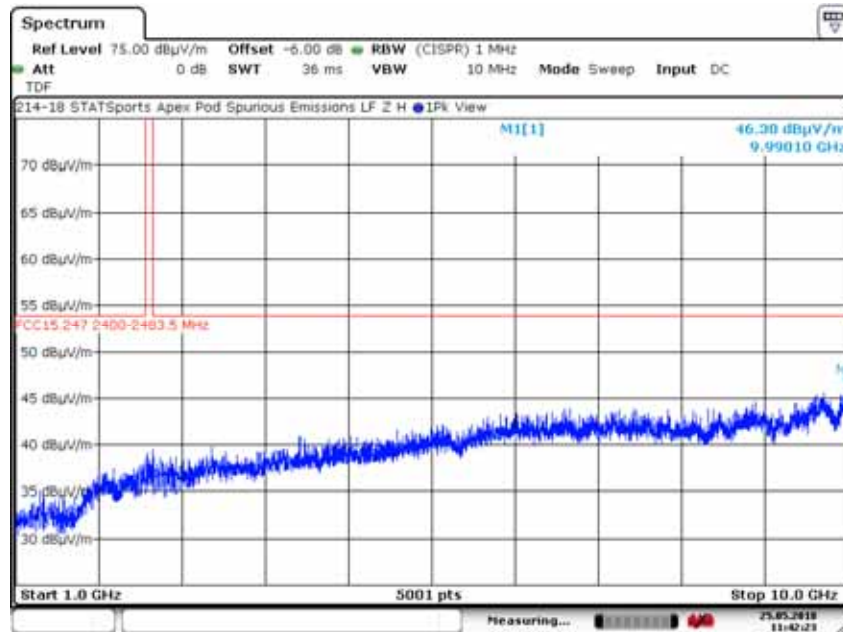
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

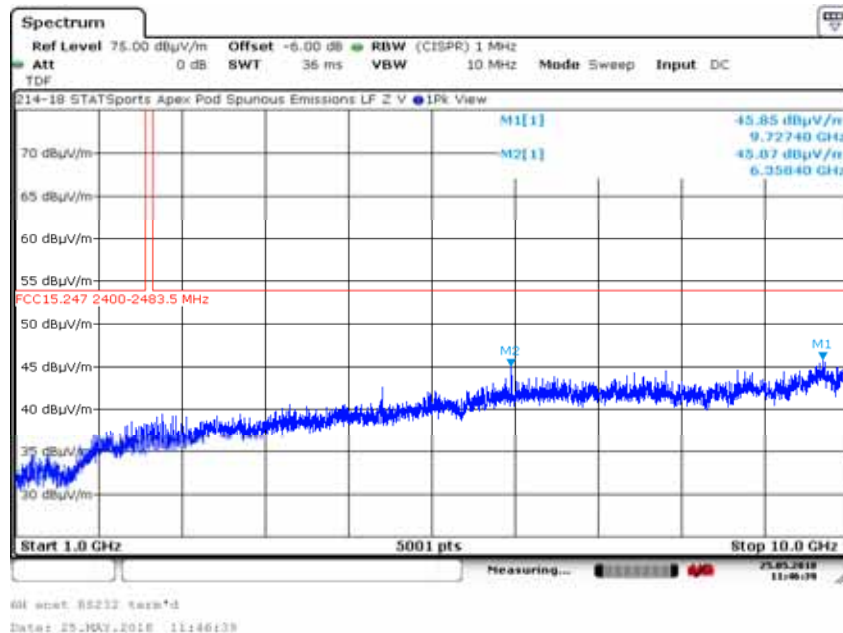
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.1. Channel 37, 2402 MHz

A4.1.5. Measurement Results: Z-Axis, Horizontal Antenna



A4.1.6. Measurement Results: Z-Axis, Vertical Antenna



Test Number: 214-18

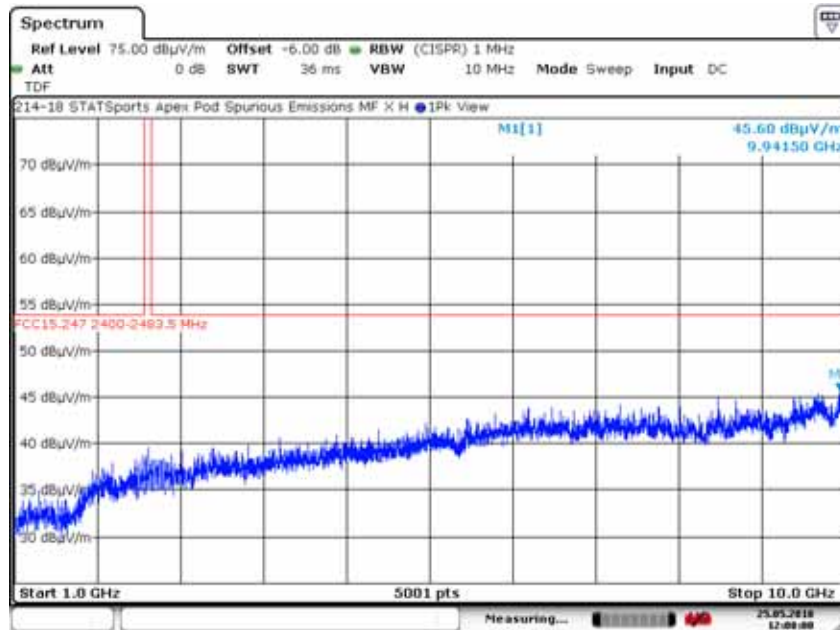
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

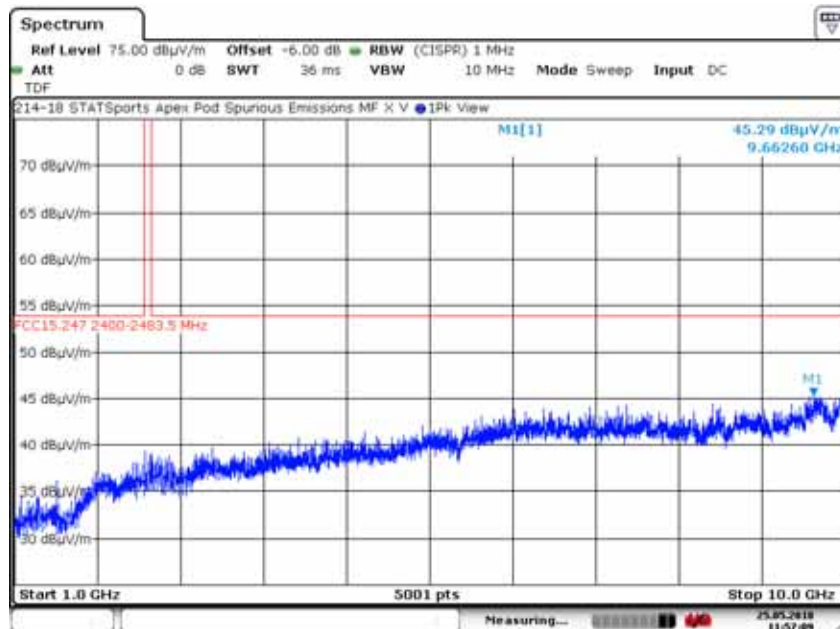
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.2. Channel 38, 2426 MHz

A4.2.1. Measurement Results: X-Axis, Horizontal Antenna



A4.2.2. Measurement Results: X-Axis, Vertical Antenna



Test Number: 214-18

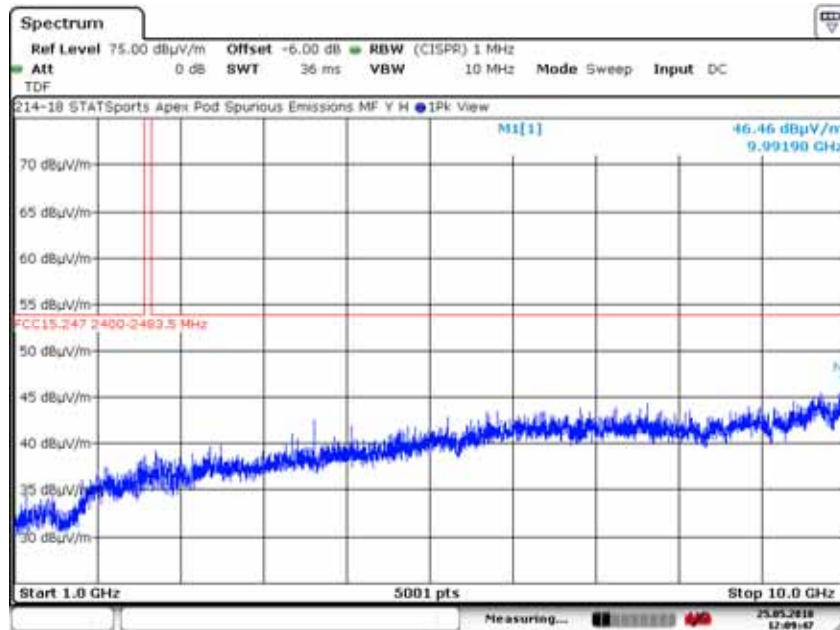
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

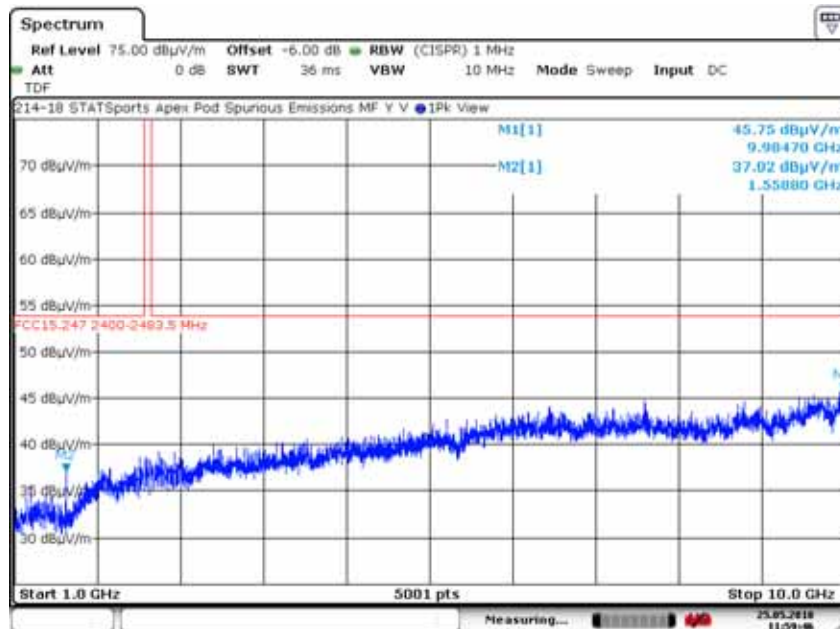
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.2. Channel 38, 2426 MHz

A4.2.3. Measurement Results: Y-Axis, Horizontal Antenna



A4.2.4. Measurement Results: Y-Axis, Vertical Antenna



Test Number: 214-18

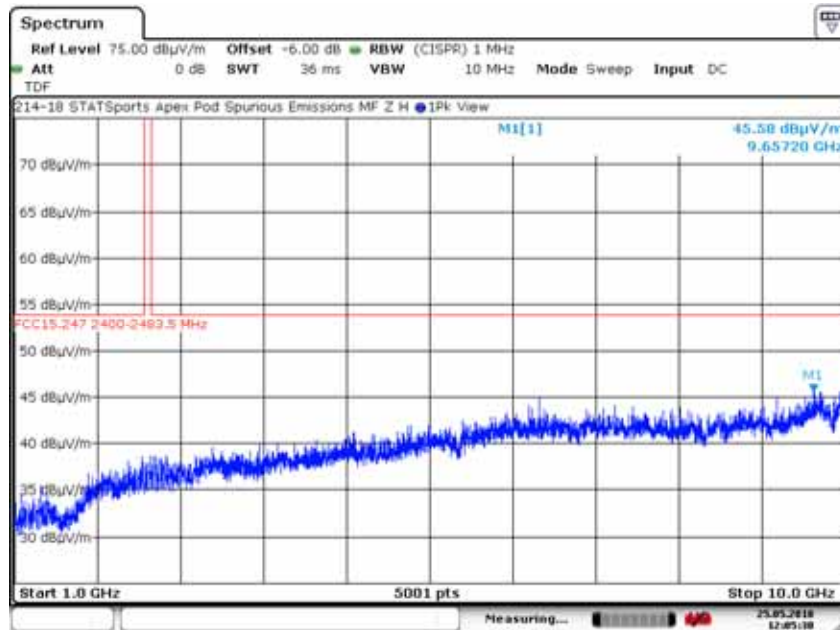
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

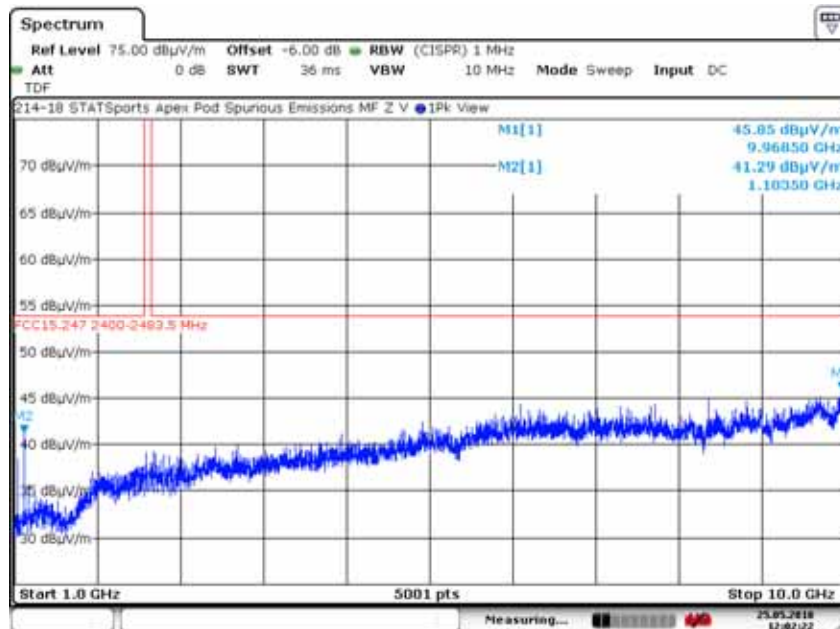
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.2. Channel 38, 2426 MHz

A4.2.5. Measurement Results: Z-Axis, Horizontal Antenna



A4.2.6. Measurement Results: Z-Axis, Vertical Antenna



Test Number: 214-18

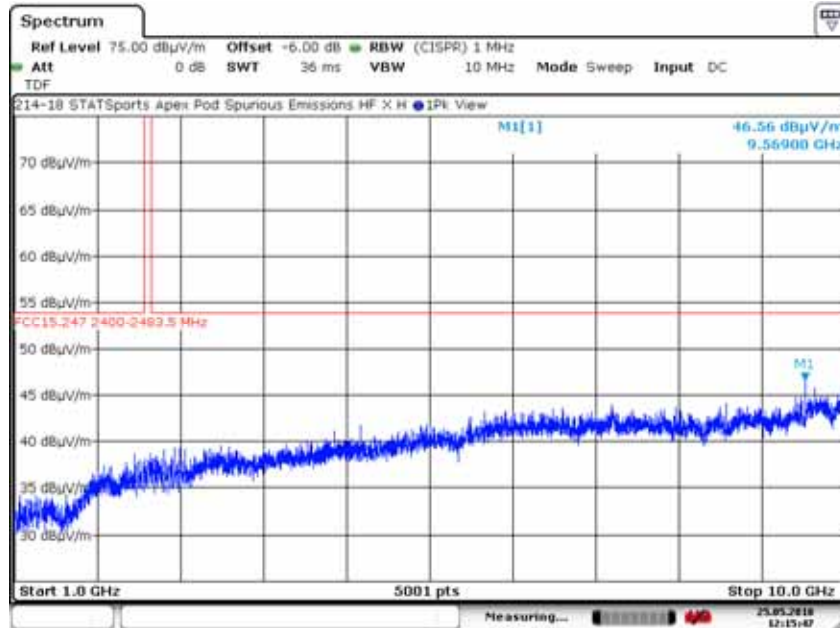
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Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

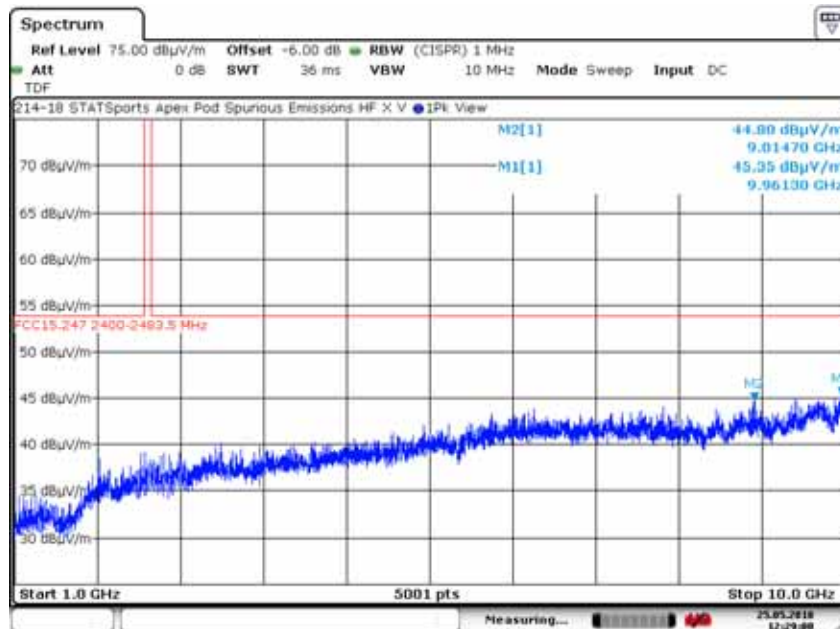
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.3. Channel 39, 2480 MHz

A4.3.1. Measurement Results: X-Axis, Horizontal Antenna



A4.3.2. Measurement Results: X-Axis, Vertical Antenna



Test Number: 214-18

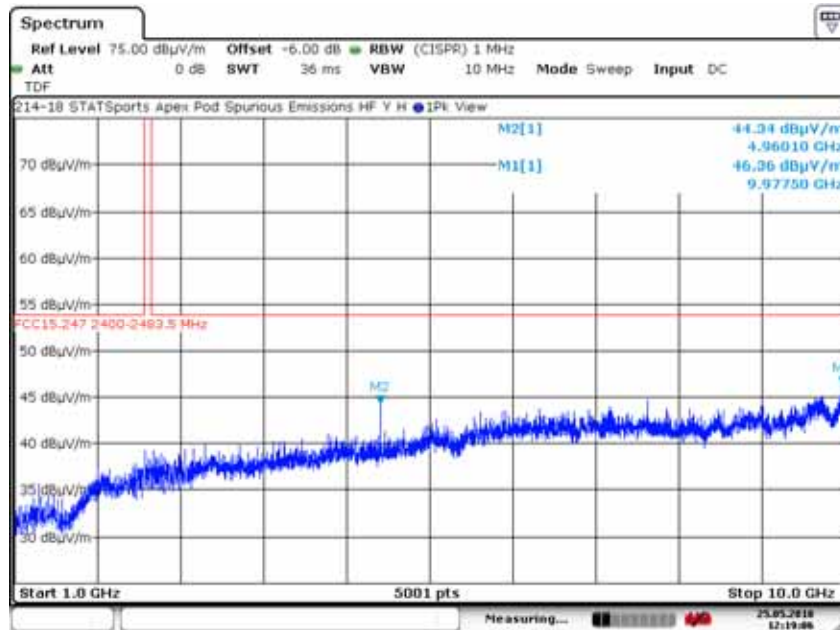
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

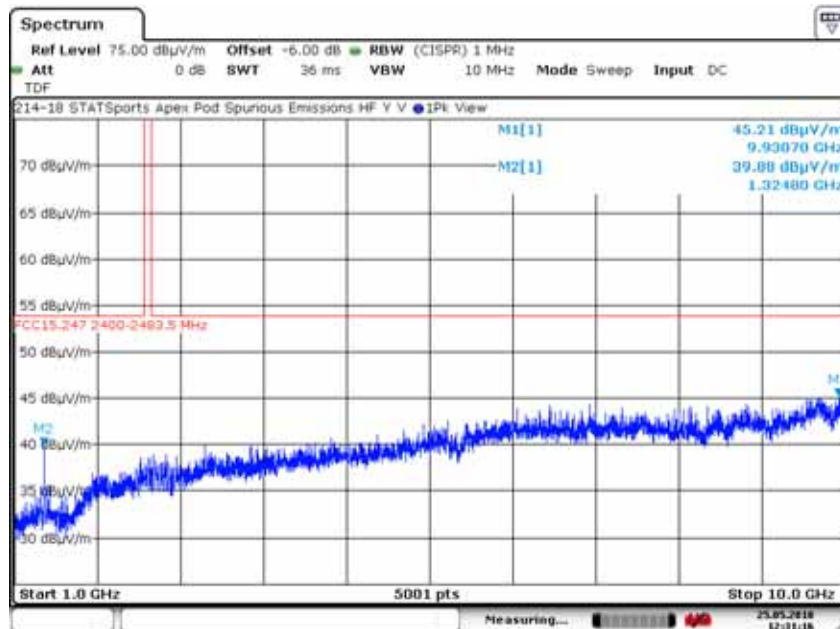
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.3. Channel 39, 2480 MHz

A4.3.3. Measurement Results: Y-Axis, Horizontal Antenna



A4.3.4. Measurement Results: Y-Axis, Vertical Antenna



Test Number: 214-18

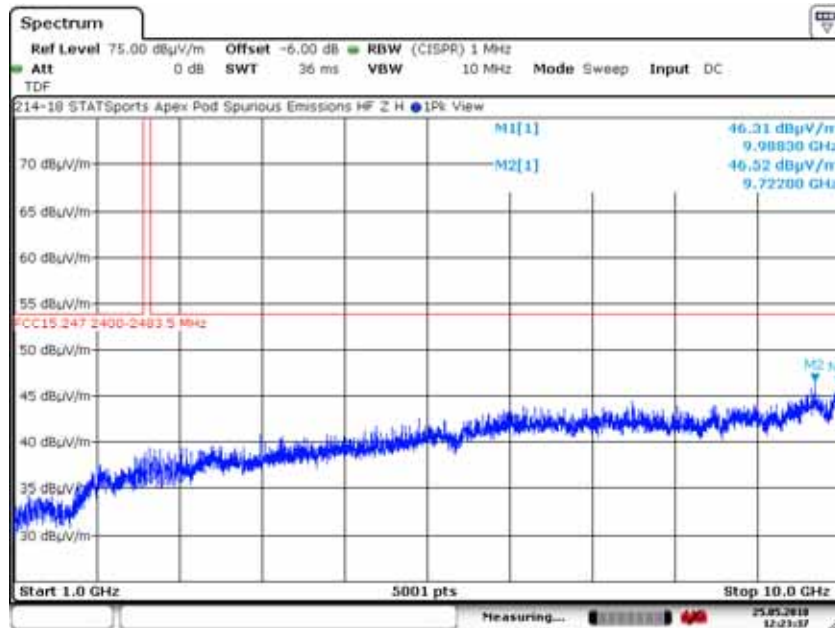
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

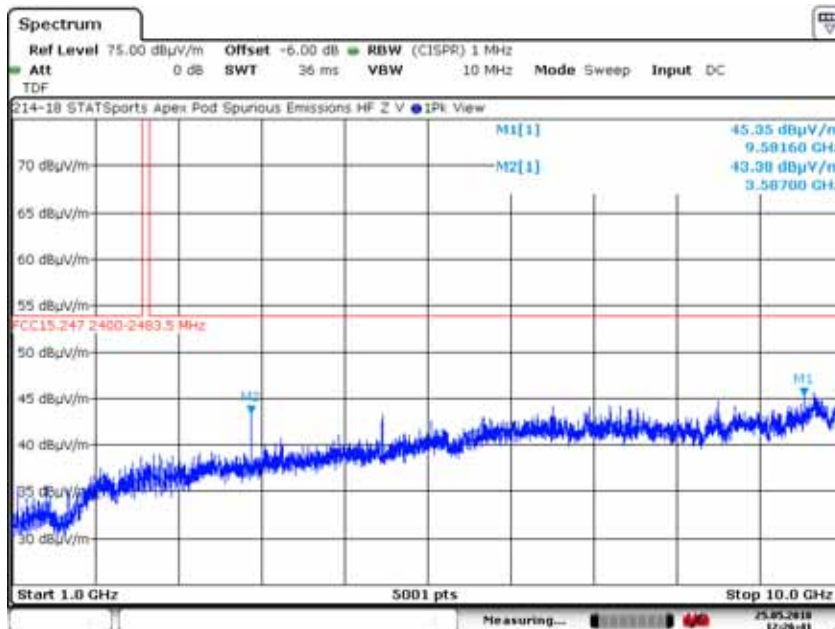
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.3. Channel 39, 2480 MHz

A4.3.5. Measurement Results: Z-Axis, Horizontal Antenna



A4.3.6. Measurement Results: Z-Axis, Vertical Antenna



Test Number: 214-18

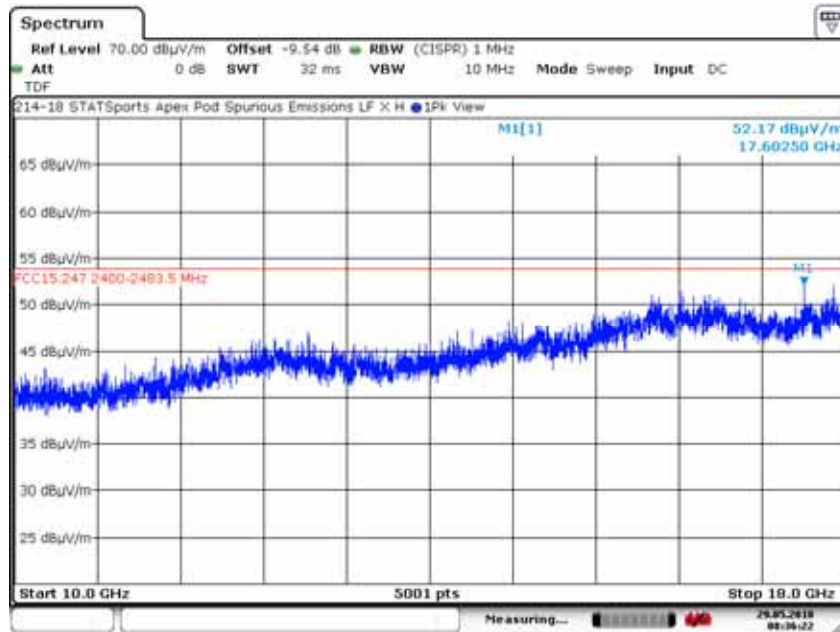
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

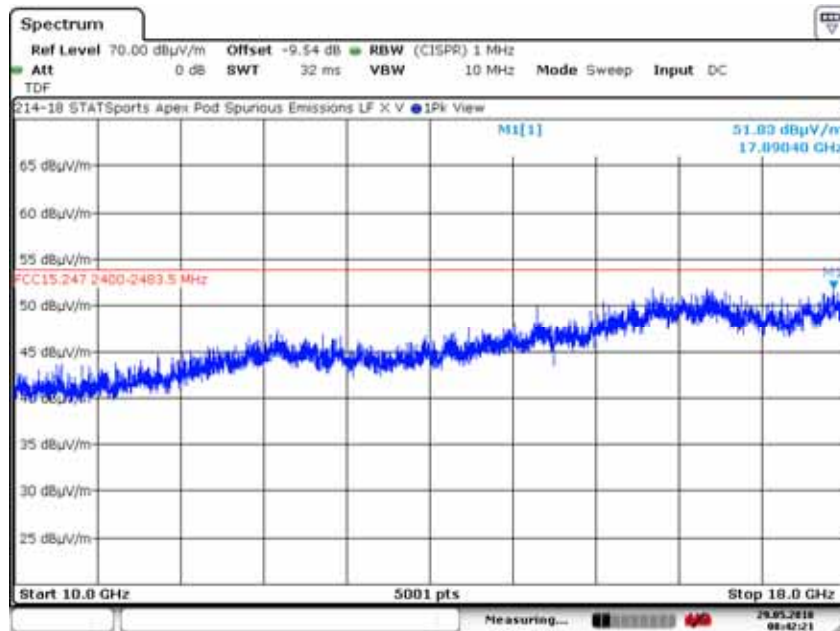
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.1. Channel 37, 2402 MHz

A5.1.1. Measurement Results: X-Axis, Horizontal Antenna



A5.1.2. Measurement Results: X-Axis, Vertical Antenna



Test Number: 214-18

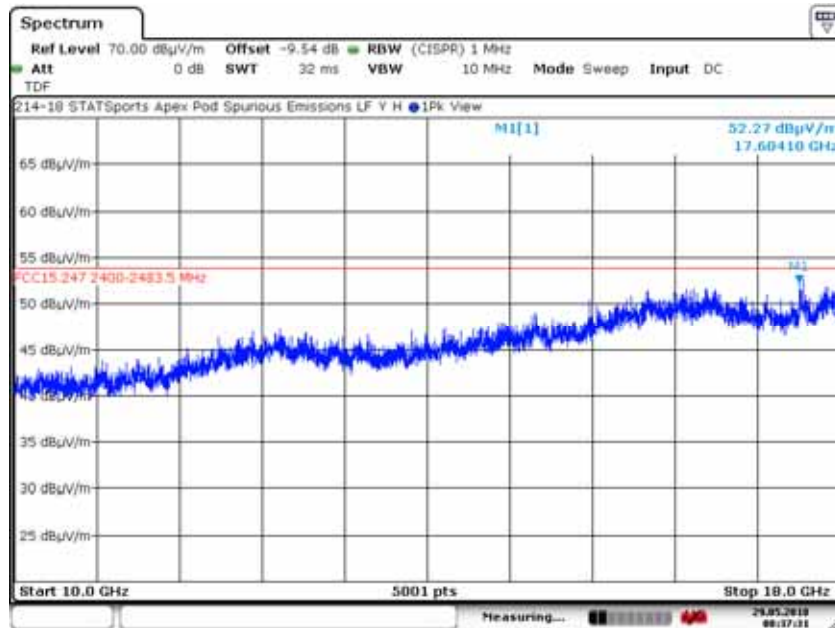
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

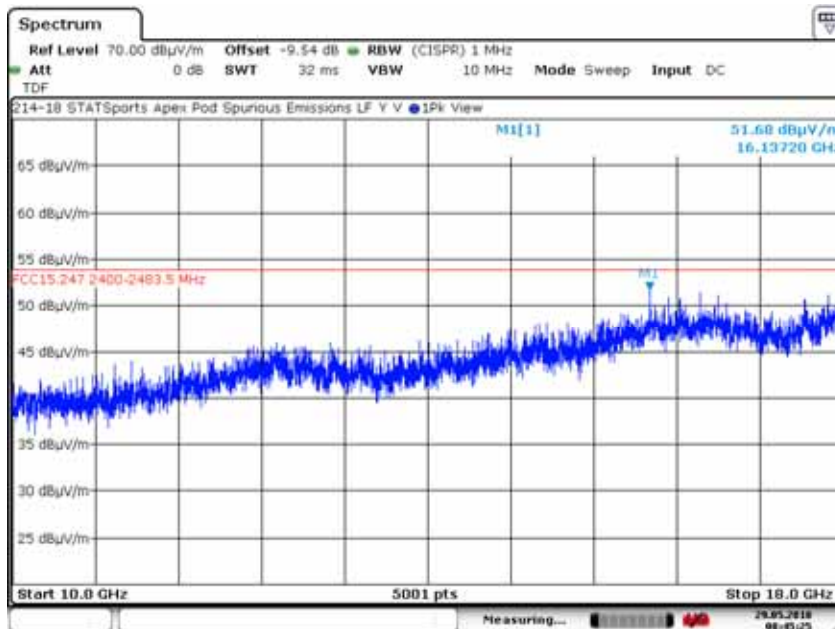
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.1. Channel 37, 2402 MHz

A5.1.3. Measurement Results: Y-Axis, Horizontal Antenna



A5.1.4. Measurement Results: Y-Axis, Vertical Antenna



Test Number: 214-18

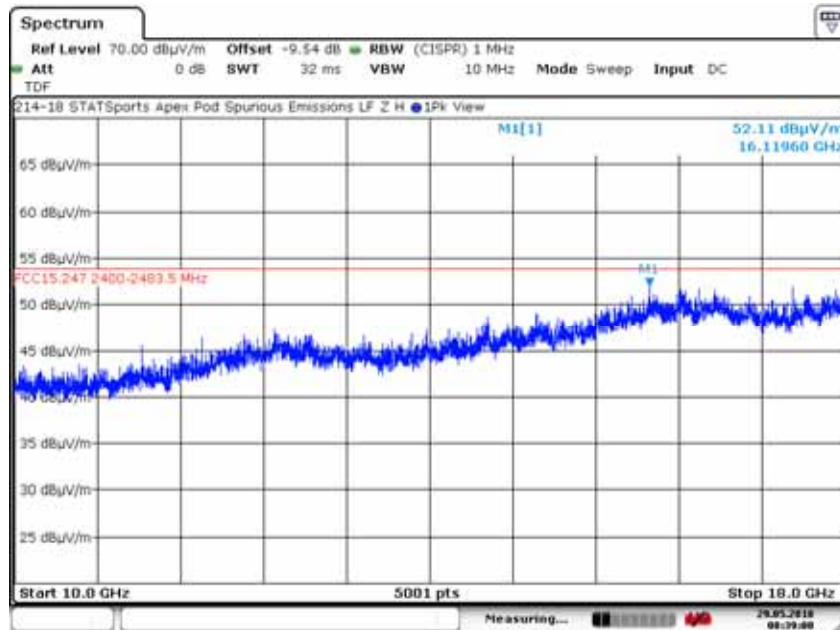
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

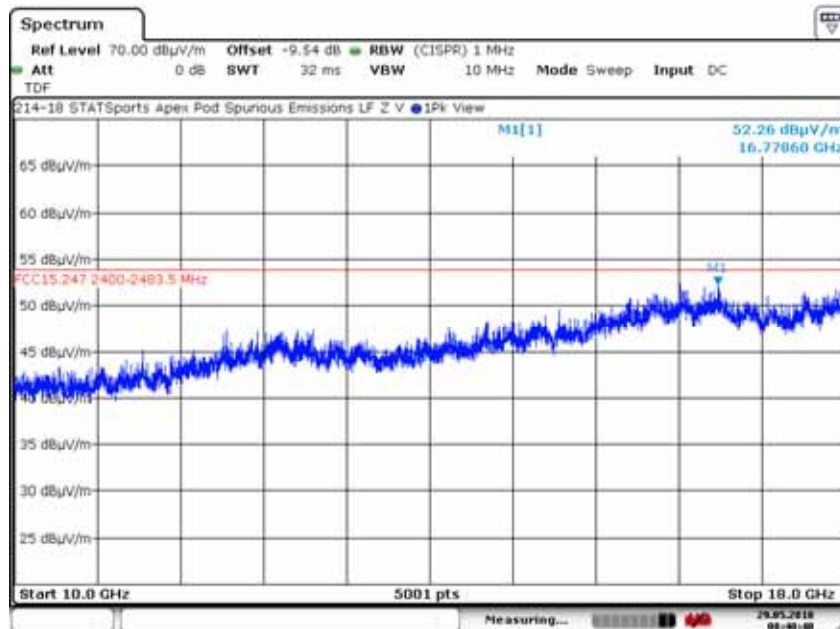
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.1. Channel 37, 2402 MHz

A5.1.5. Measurement Results: Z-Axis, Horizontal Antenna



A5.1.6. Measurement Results: Z-Axis, Vertical Antenna



Test Number: 214-18

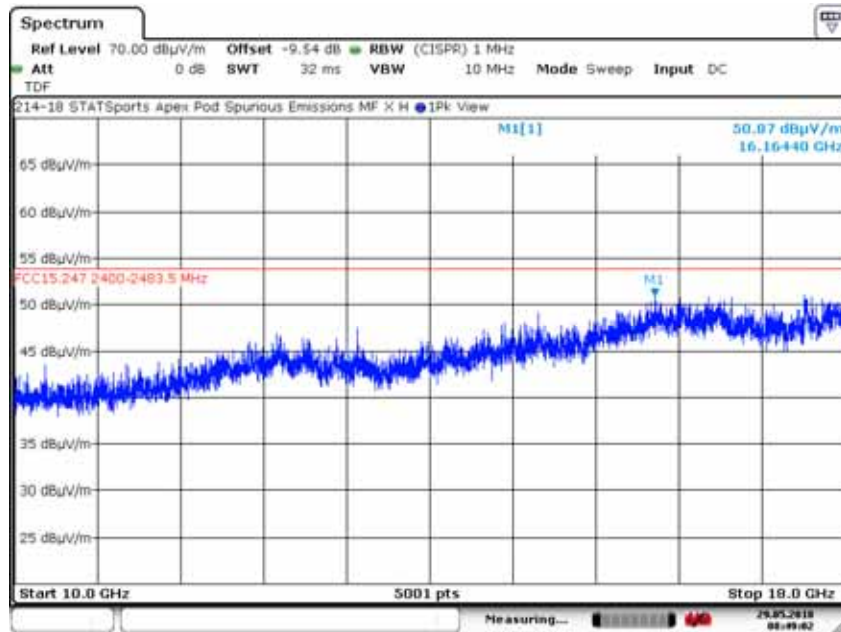
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

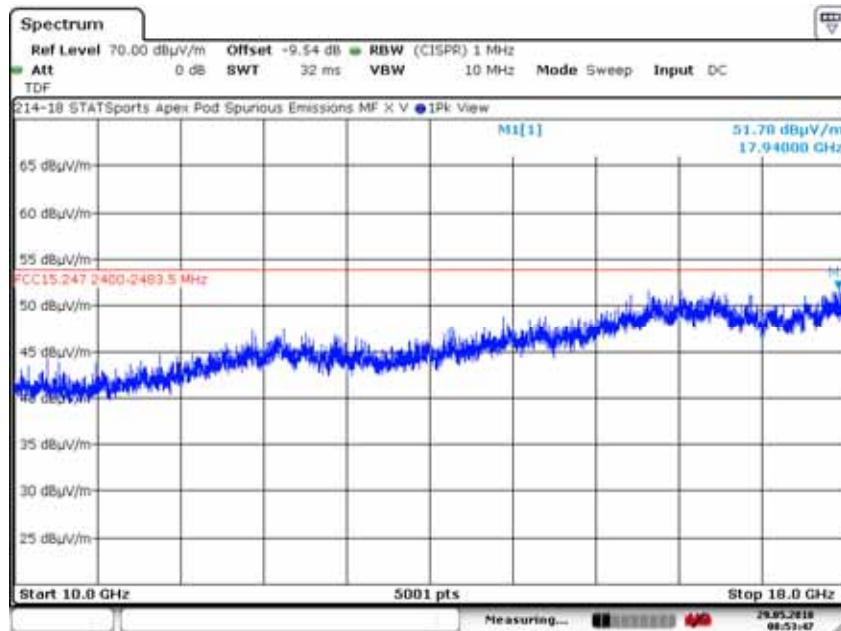
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.2. Channel 38, 2426 MHz

A5.2.1. Measurement Results: X-Axis, Horizontal Antenna



A5.2.2. Measurement Results: X-Axis, Vertical Antenna



Test Number: 214-18

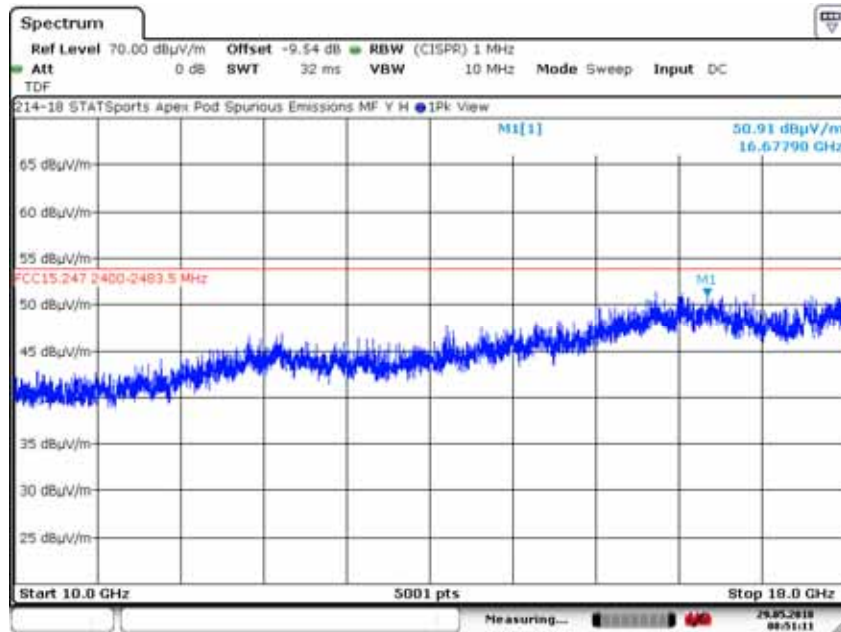
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

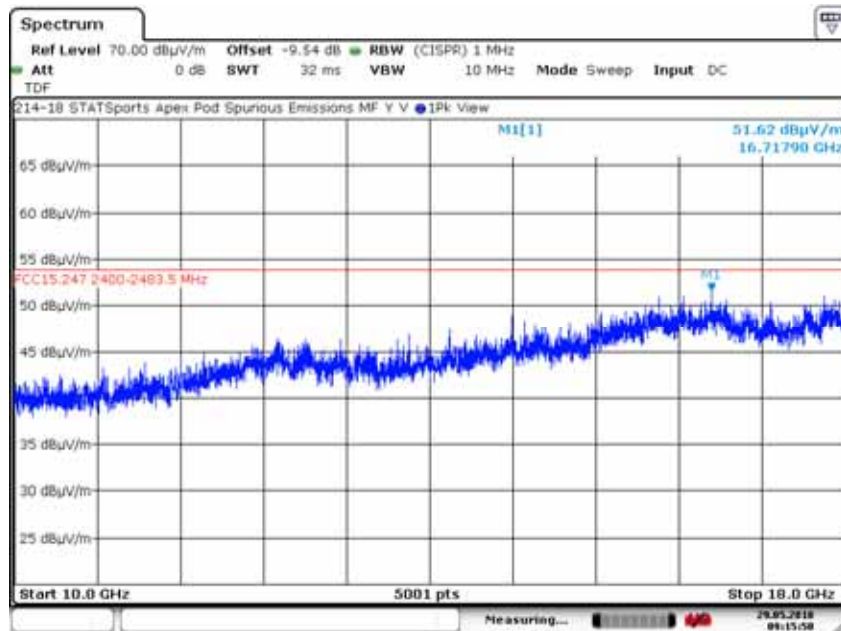
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.2. Channel 38, 2426 MHz

A5.2.3. Measurement Results: Y-Axis, Horizontal Antenna



A5.2.4. Measurement Results: Y-Axis, Vertical Antenna



Test Number: 214-18

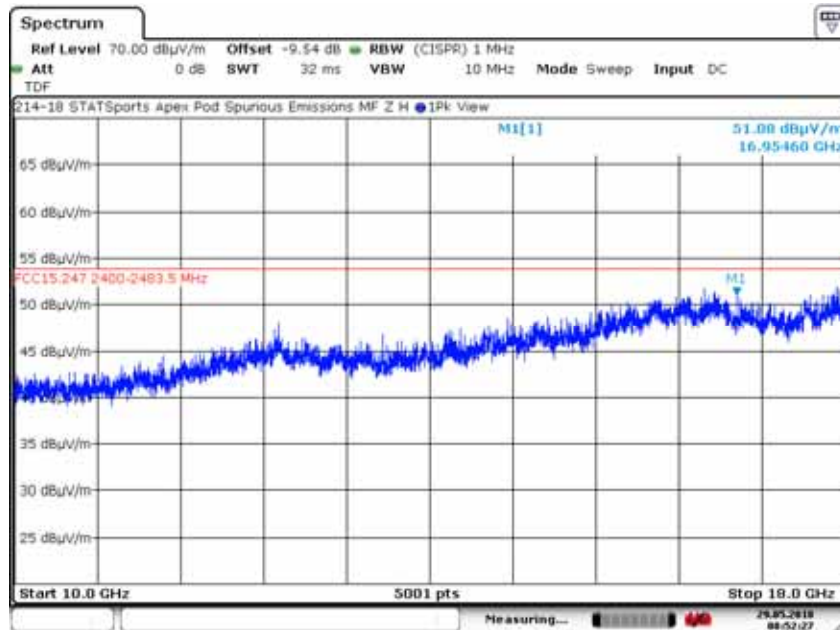
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

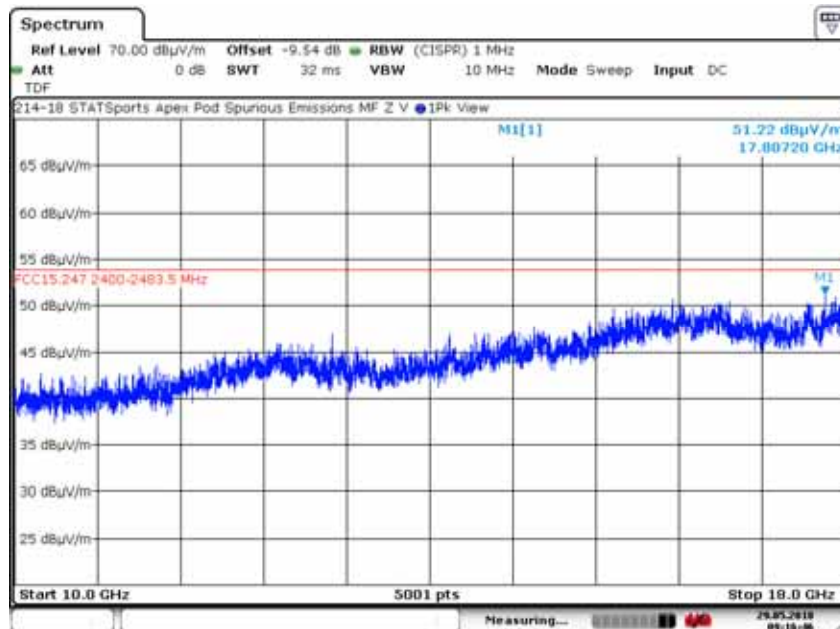
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.2. Channel 38, 2426 MHz

A5.2.5. Measurement Results: Z-Axis, Horizontal Antenna



A5.2.6. Measurement Results: Z-Axis, Vertical Antenna



Test Number: 214-18

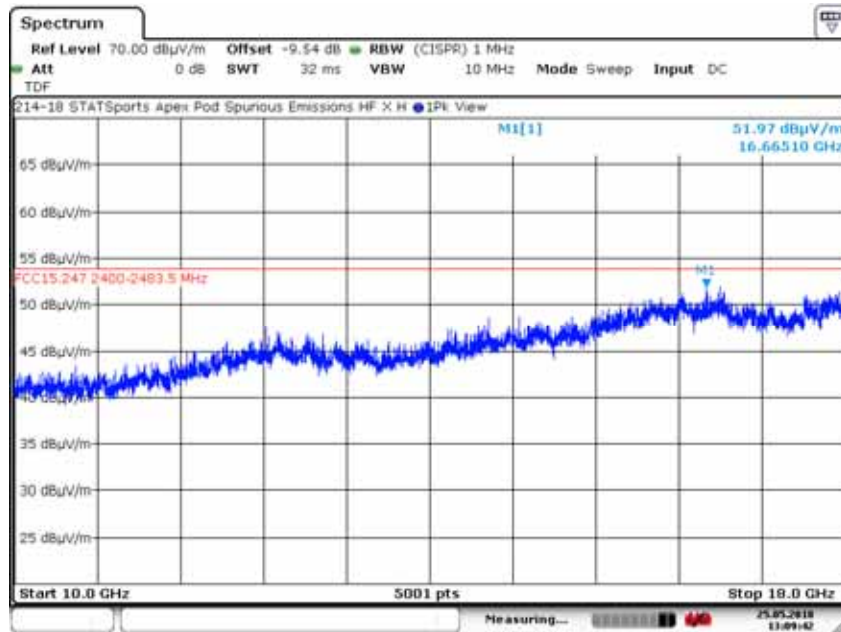
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

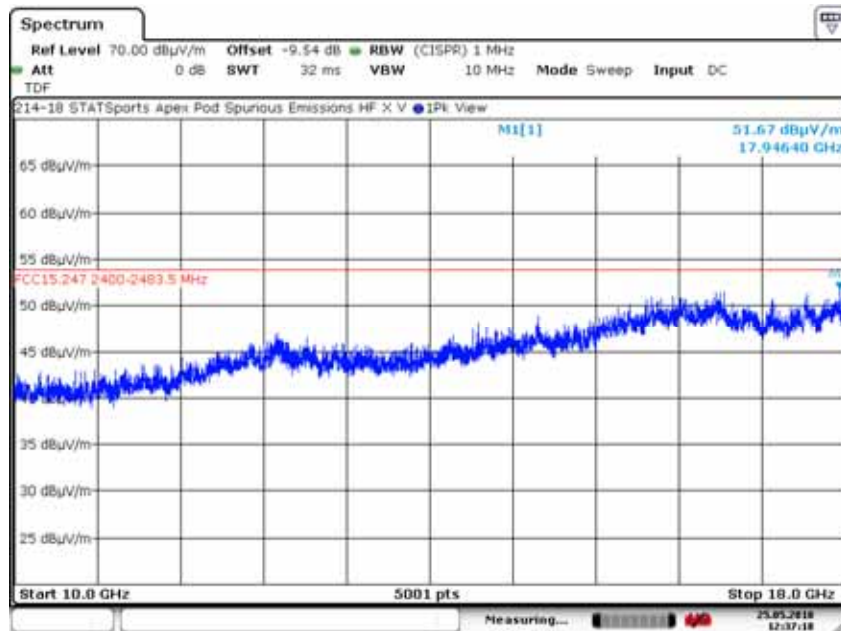
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.3. Channel 39, 2480 MHz

A5.3.1. Measurement Results: X-Axis, Horizontal Antenna



A5.3.2. Measurement Results: X-Axis, Vertical Antenna



Test Number: 214-18

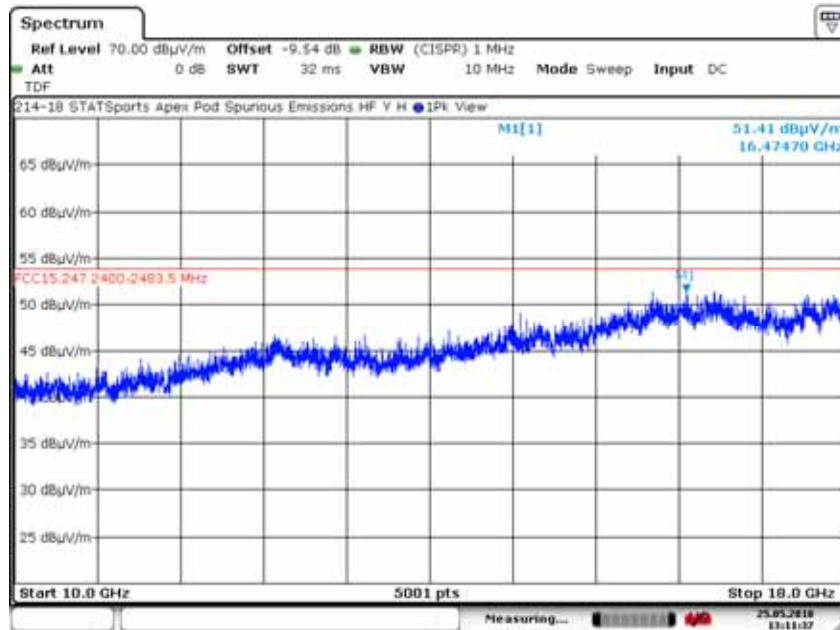
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

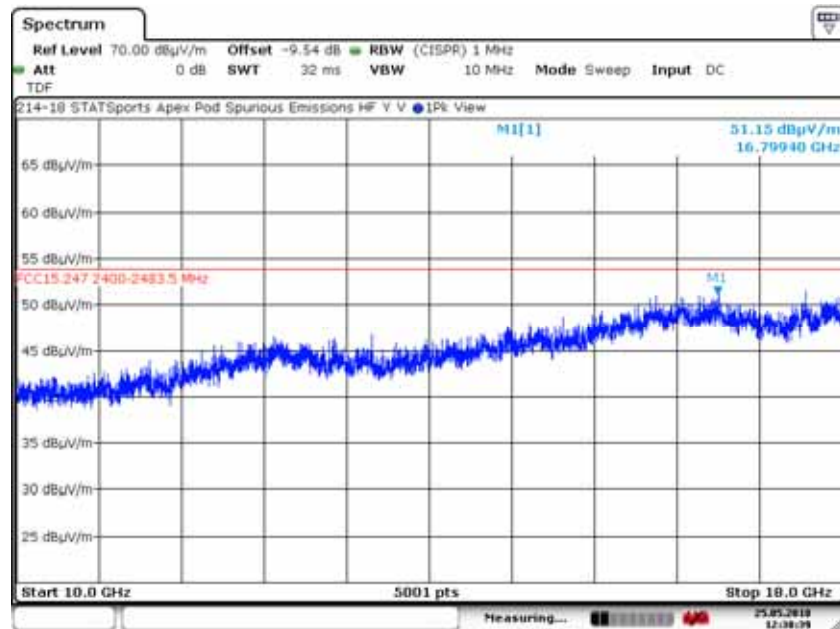
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.3. Channel 39, 2480 MHz

A5.3.3. Measurement Results: Y-Axis, Horizontal Antenna



A5.3.4. Measurement Results: Y-Axis, Vertical Antenna



Test Number: 214-18

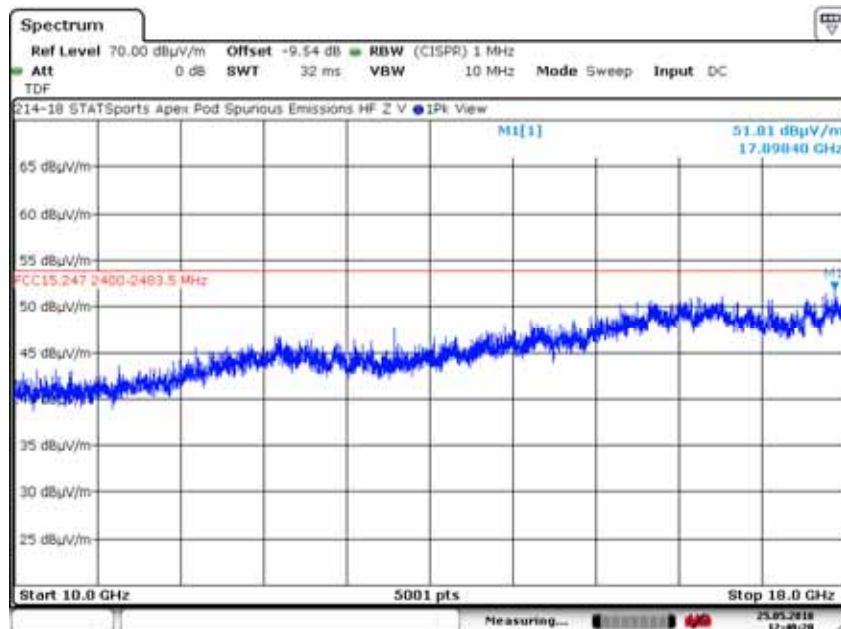
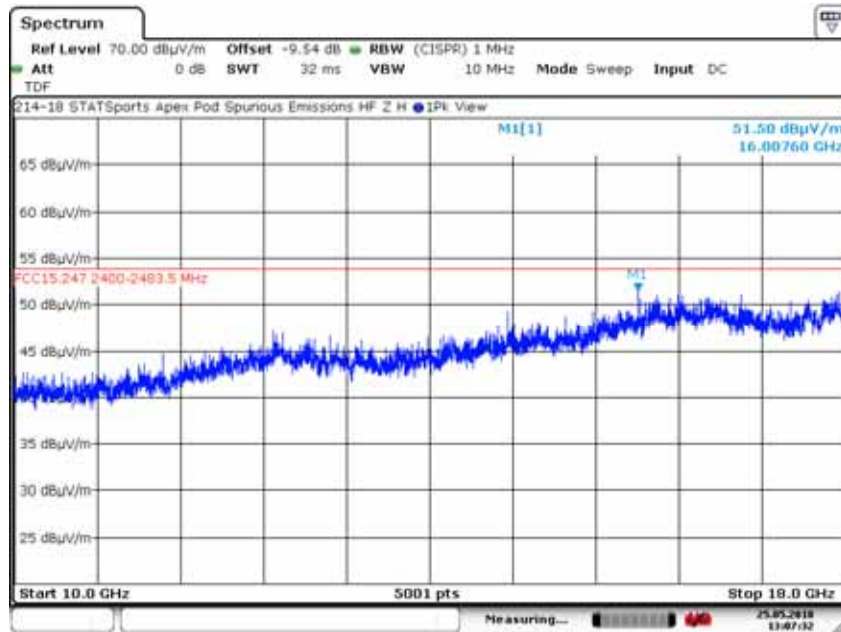
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.3. Channel 39, 2480 MHz

A5.3.5. Measurement Results: Z-Axis, Horizontal Antenna



Test Number: 214-18

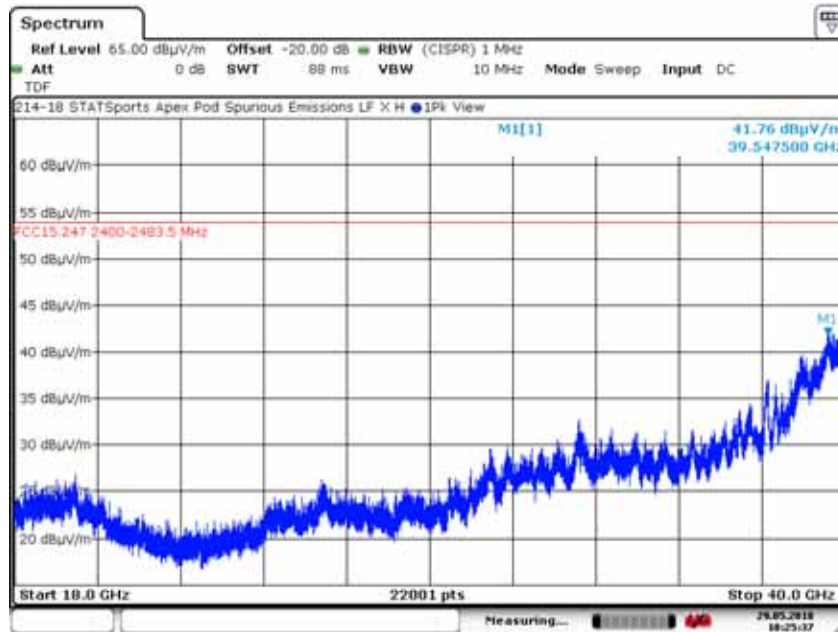
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

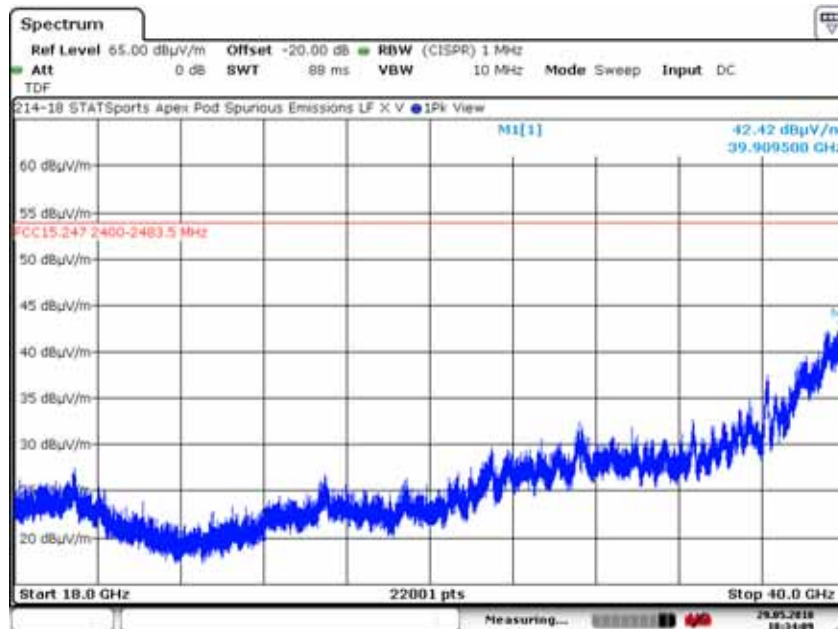
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.1. Channel 37, 2402 MHz

A6.1.1. Measurement Results: X-Axis, Horizontal Antenna



A6.1.2. Measurement Results: X-Axis, Vertical Antenna



Test Number: 214-18

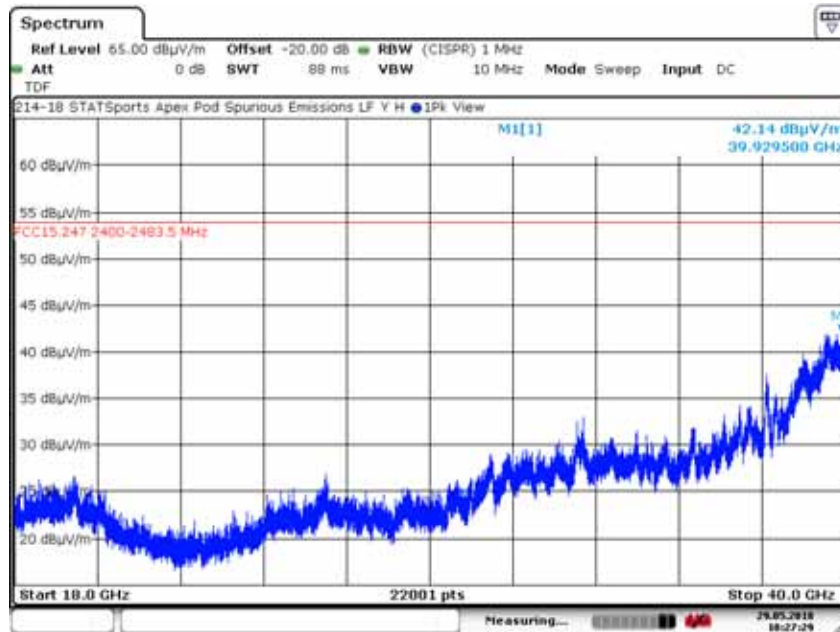
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

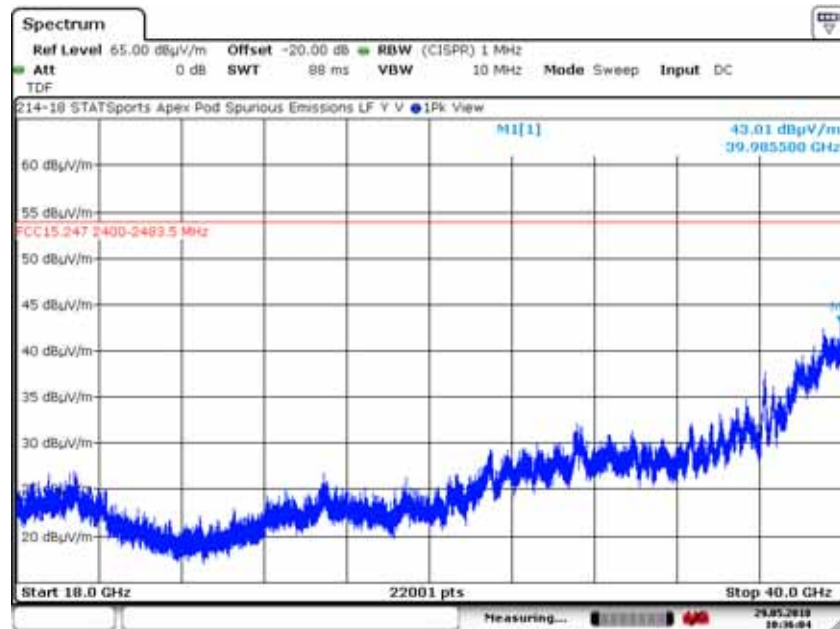
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.1. Channel 37, 2402 MHz

A6.1.3. Measurement Results: Y-Axis, Horizontal Antenna



A6.1.4. Measurement Results: Y-Axis, Vertical Antenna



Test Number: 214-18

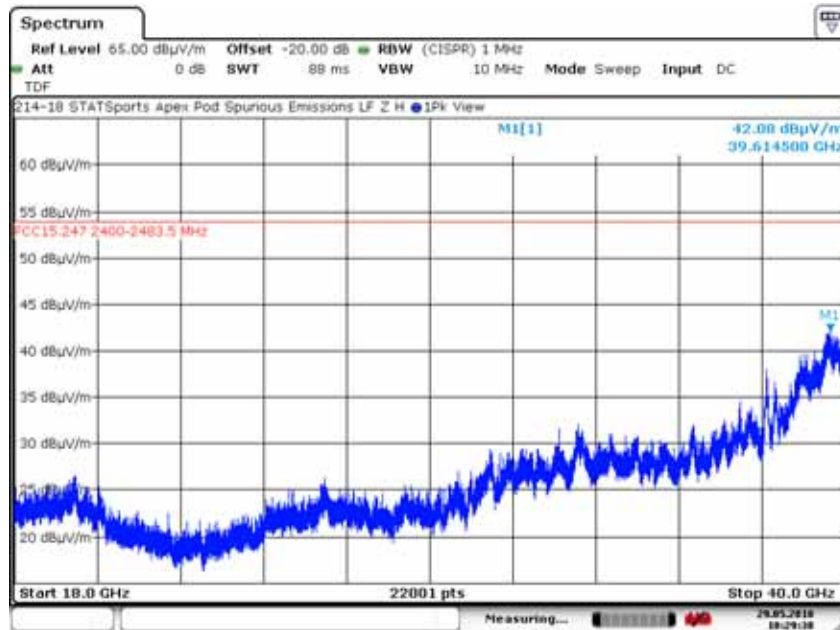
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

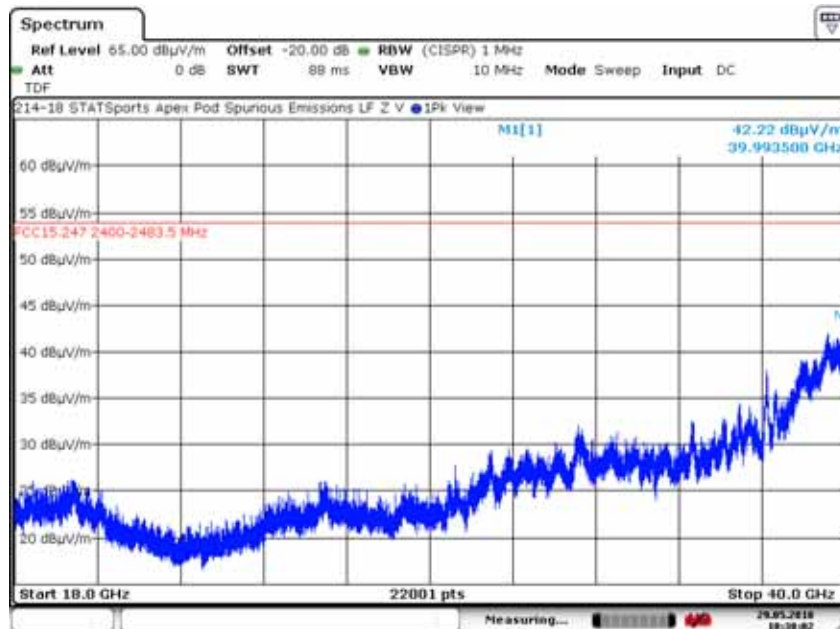
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.1. Channel 37, 2402 MHz

A6.1.5. Measurement Results: Z-Axis, Horizontal Antenna



A6.1.6. Measurement Results: Z-Axis, Vertical Antenna



Test Number: 214-18

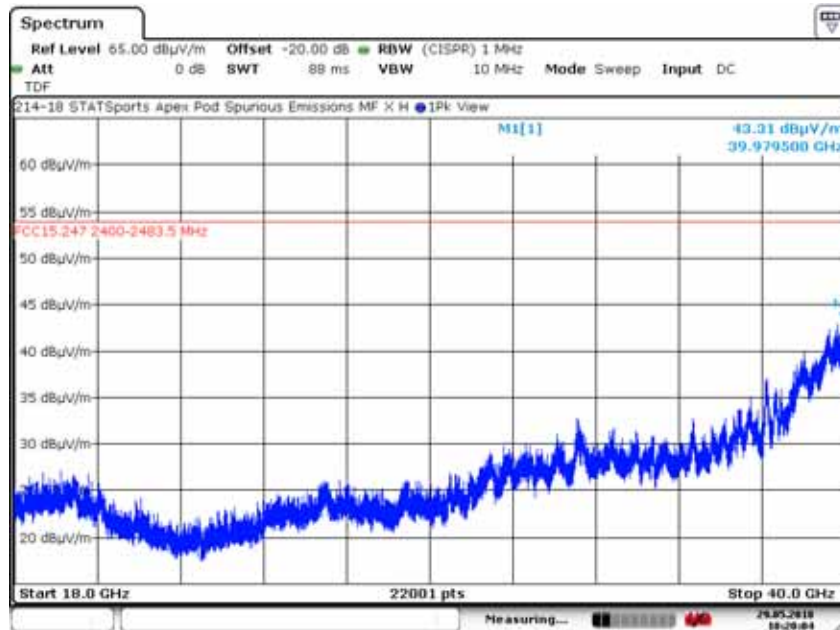
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

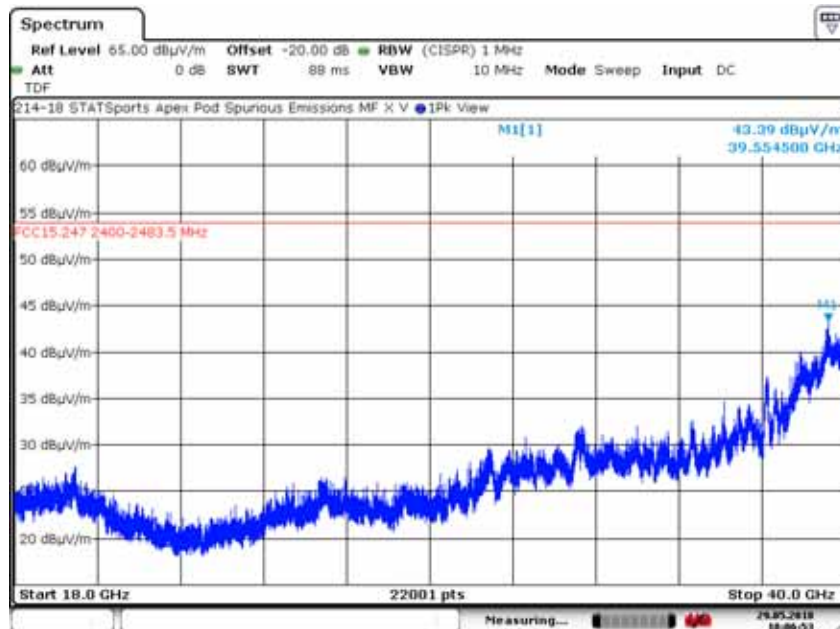
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.2. Channel 38, 2426 MHz

A6.2.1. Measurement Results: X-Axis, Horizontal Antenna



A6.2.2. Measurement Results: X-Axis, Vertical Antenna



Test Number: 214-18

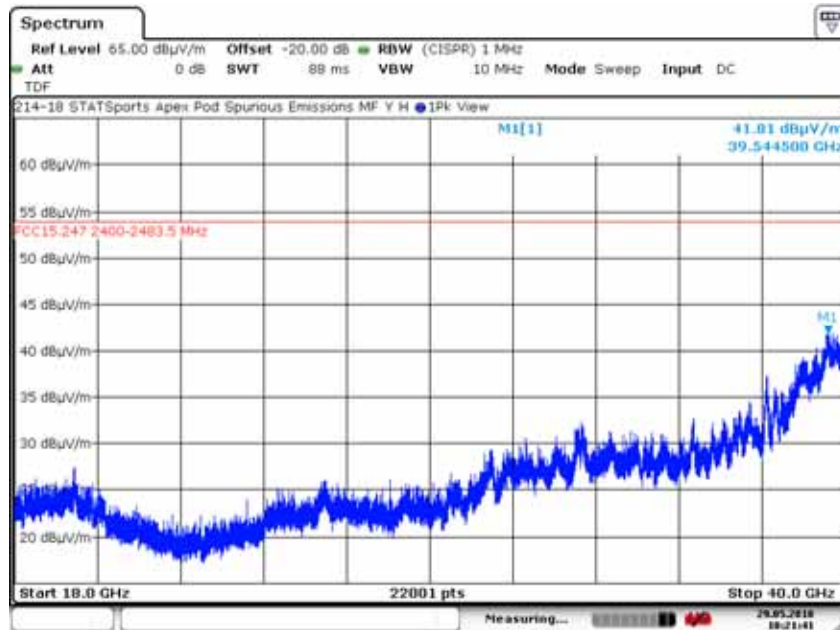
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

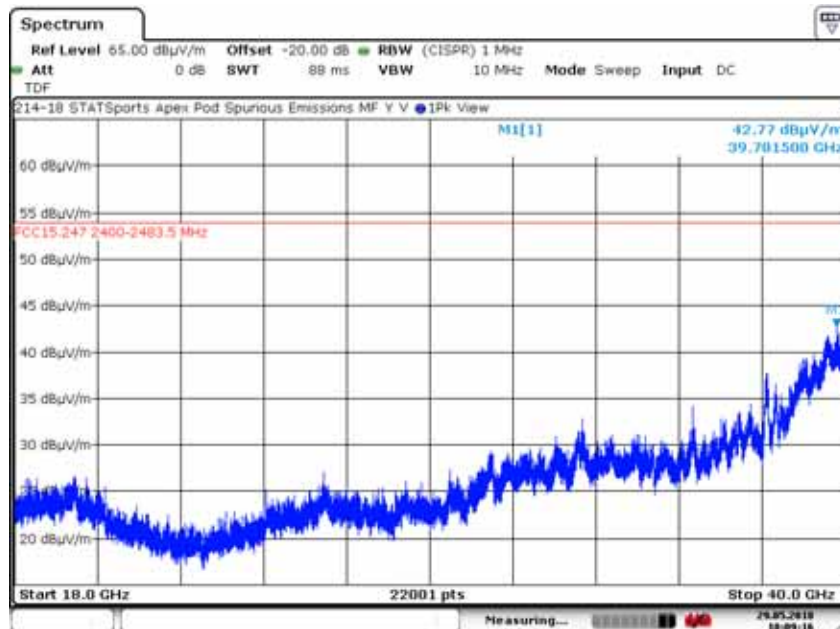
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.2. Channel 38, 2426 MHz

A6.2.3. Measurement Results: Y-Axis, Horizontal Antenna



A6.2.4. Measurement Results: Y-Axis, Vertical Antenna



Test Number: 214-18

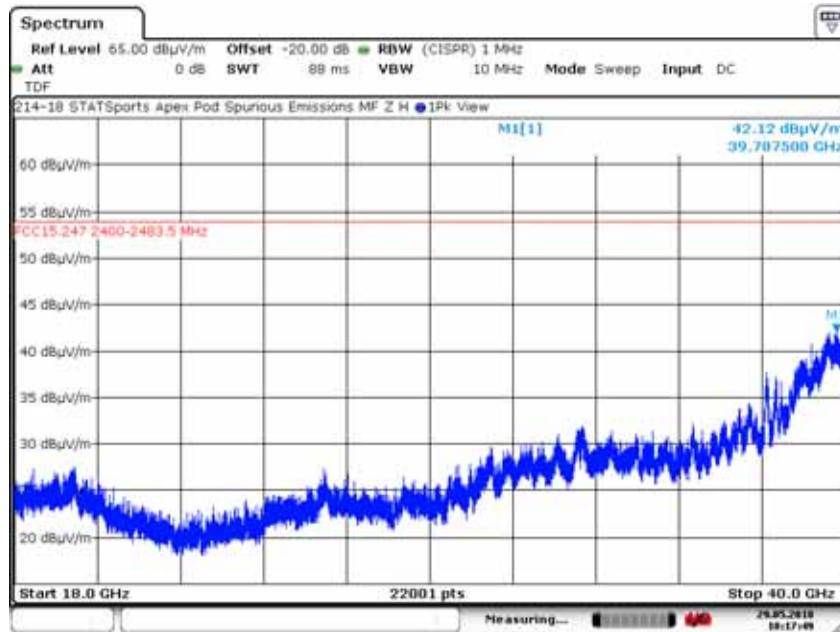
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

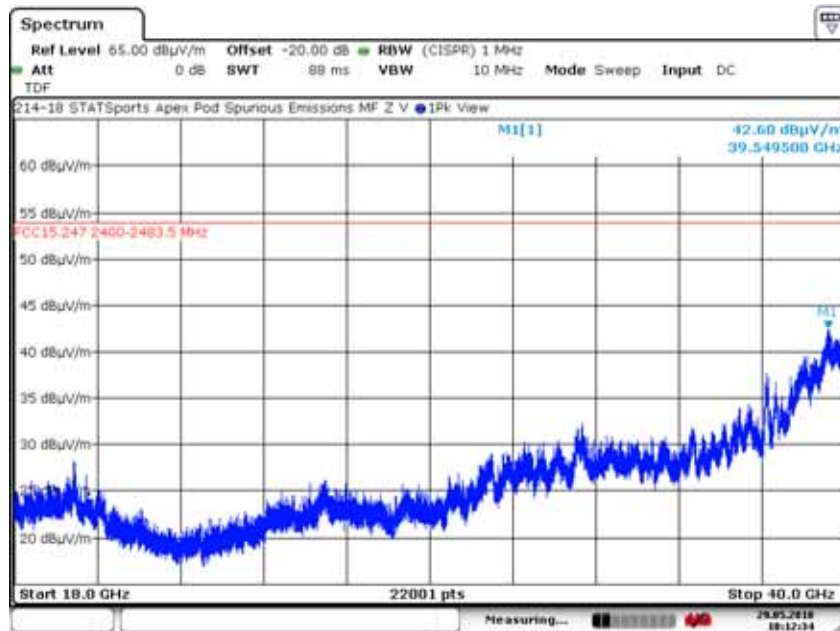
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.2. Channel 38, 2426 MHz

A6.2.5. Measurement Results: Z-Axis, Horizontal Antenna



A6.2.6. Measurement Results: Z-Axis, Vertical Antenna



Test Number: 214-18

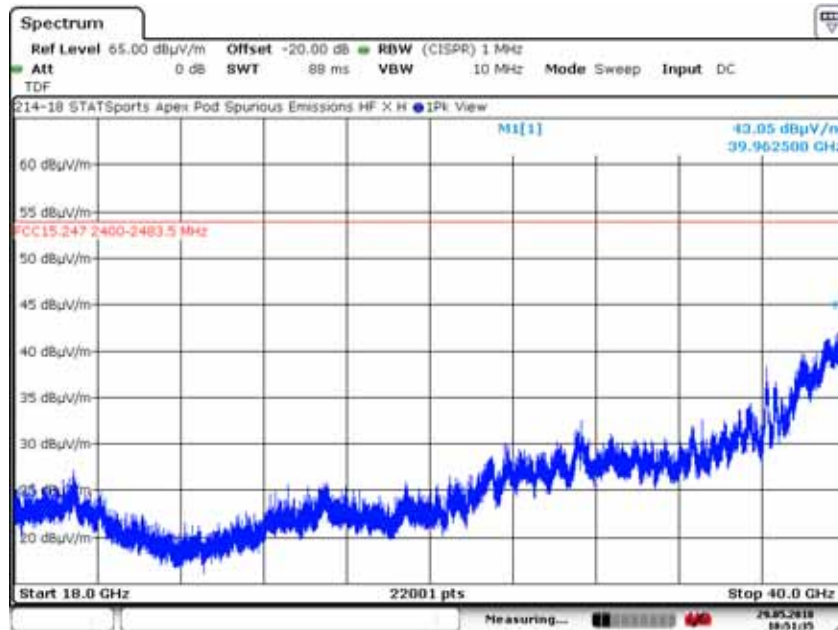
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

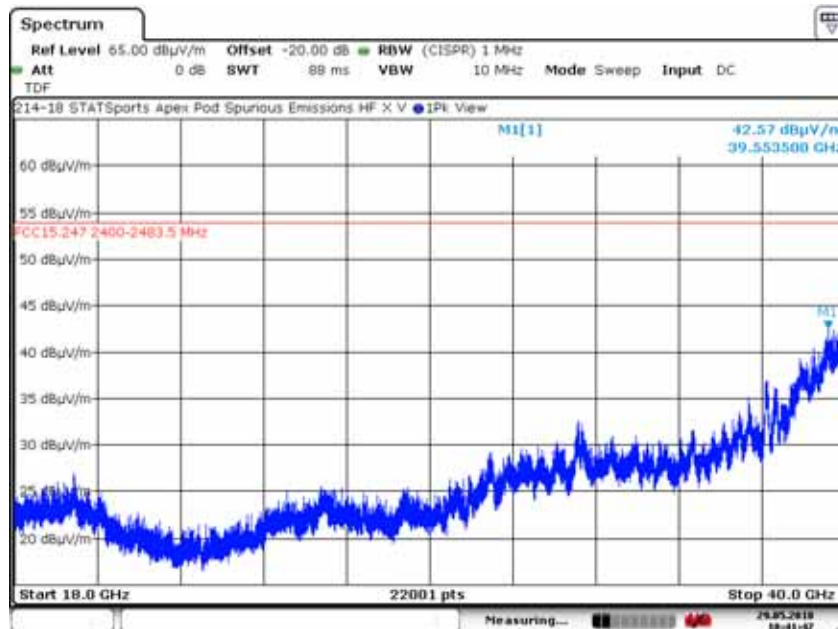
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.3. Channel 39, 2480 MHz

A6.3.1. Measurement Results: X-Axis, Horizontal Antenna



A6.3.2. Measurement Results: X-Axis, Vertical Antenna



Test Number: 214-18

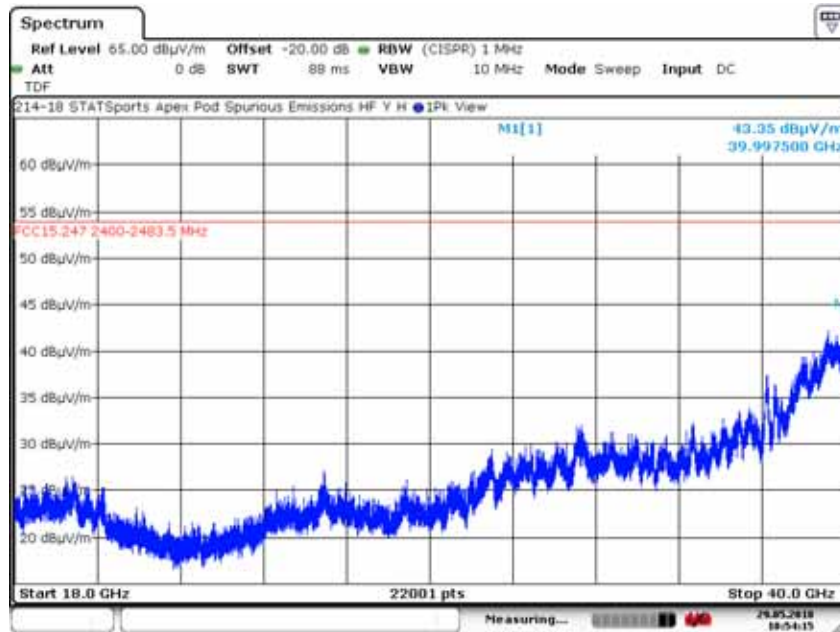
Issue Date: 5/31/2018

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

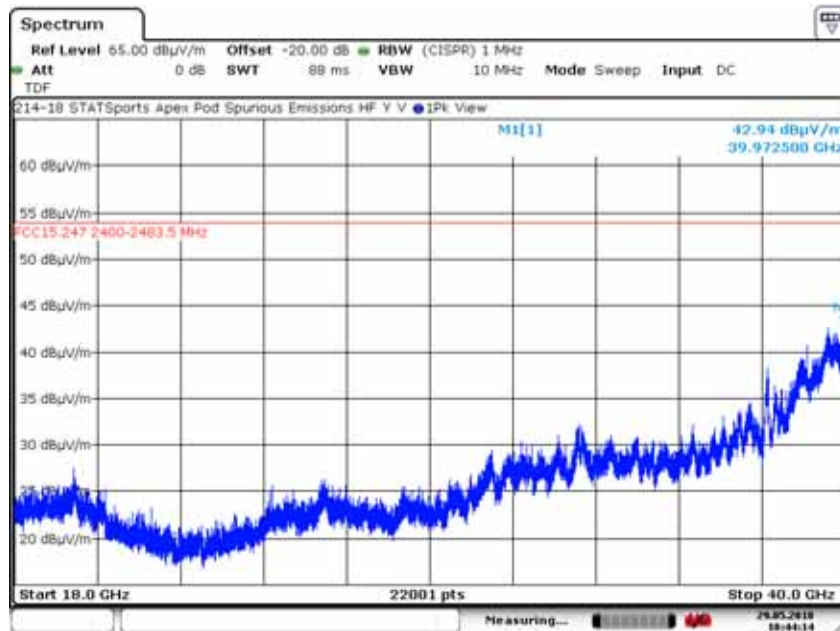
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.3. Channel 39, 2480 MHz

A6.3.3. Measurement Results: Y-Axis, Horizontal Antenna



A6.3.4. Measurement Results: Y-Axis, Vertical Antenna



Test Number: 214-18

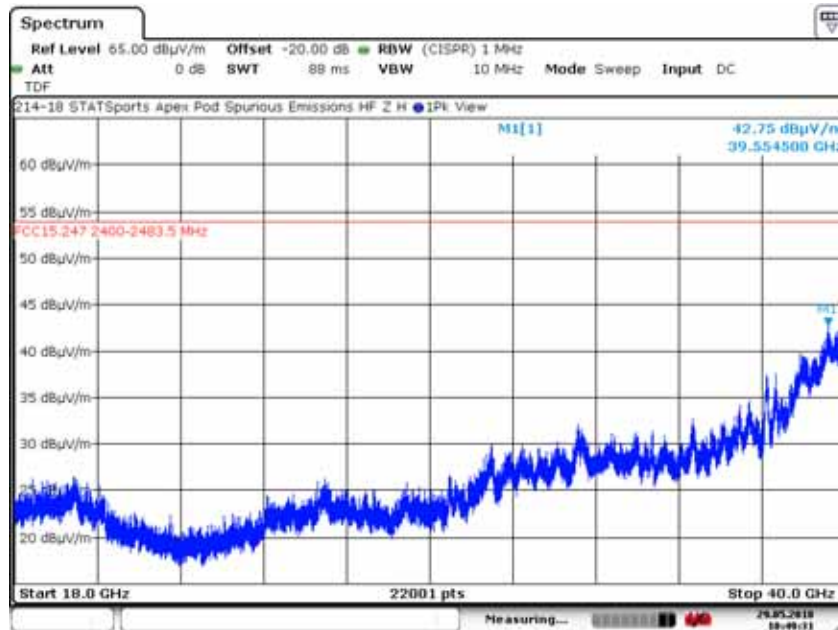
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Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.3. Channel 39, 2480 MHz

A6.3.5. Measurement Results: Z-Axis, Horizontal Antenna



A6.3.6. Measurement Results: Z-Axis, Vertical Antenna

