COMPLIANCE WORLDWIDE INC.
TEST REPORT 393-18R1

In Accordance with the Requirements of

FCC PART 15.247, SUBPART C
&
Innovation, Science and Economic Development Canada
ISED RSS-247, ISSUE 2

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

Issued to

DecaWave Ltd.
Adelaide Chambers, Peter Street
Dublin, Ireland D08 T6YA

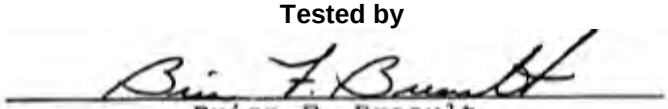
for the

DWM1001C

FCC ID: 2AQ33-DWM1001
IC: 23794-DWM1001

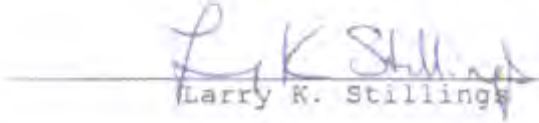
Report Issued on November 16, 2018
Revision R1 Issued on November 26, 2018

Tested by



Brian F. Breault

Reviewed by



Larry K. Stillings

Table of Contents

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1. Scope

This test report certifies that the Decawave Ltd DWM1001C, as tested, meets the FCC Part 15, Subpart C and ISED RSS-247 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. Revision R1 adds 99% Occupied BW to Section 7.2.

2. Product Details

2.1. Manufacturer:	Decawave Ltd
2.2. Model Number:	DWM1001C
2.3. Serial Number:	18230049E4
2.4. Description:	The DWM1001 RTLS Module is a full-function real-time location system (or RTLS) subsystem in a compact factor. The DWM1001C module system enables customers to quickly get a RTLS system up-and-running. The system is design to operate on 6.490 GHz (Channel 5) Centre Frequencies Nominal with a 500 MHz Bandwidth and a data rate of 6.8 Mbps only.
2.5. Power Source:	2.8 - 3.6 VDC
2.6. Hardware Revision:	N/A
2.7. Software Version:	N/A
2.8. Modulation Type:	GFSK
2.9. Operating Frequency:	2402 to 2480 MHz and 6.49 GHz Center Frequency Nominal (Channel 5 – 500 MHz BW)
2.10. EMC Modifications:	None

3. Product Configuration

3.1. Operational Characteristics & Software

Hardware Setup:

The tag was pre-configured with firmware that allowed it to transmit on the low, middle and high BLE channels using a 2 Mbps data rate modulated waveform.

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3. Product Configuration (continued)

3.1. Operational Characteristics & Software (continued)

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 edge	Arrow on the unit is facing the antenna at 0º
Y Axis	Upright on edge	Arrow on the unit is facing the antenna at 90º
Z Axis	Flat on table	Arrow on the unit is facing the antenna at 0º

X-Axis Y-Axis Z-Axis

3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Freq (Hz)	Description/Function
Decawave	DWM1001	18230049E4	3.6	DC	UWB / BLE Module

3.3. EUT Cables/Transducers

Cable Type	Length	Shield	From	To
USB	2M	Yes	EUT	USB Charger

3.4. Support Equipment

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Freq (Hz)	Description/Function
Phihong	PSA 05F-050Q	n/a	120	60	USB Charger
Dell	Inspirion E1505	5573349937	120	60	Laptop for Configuration

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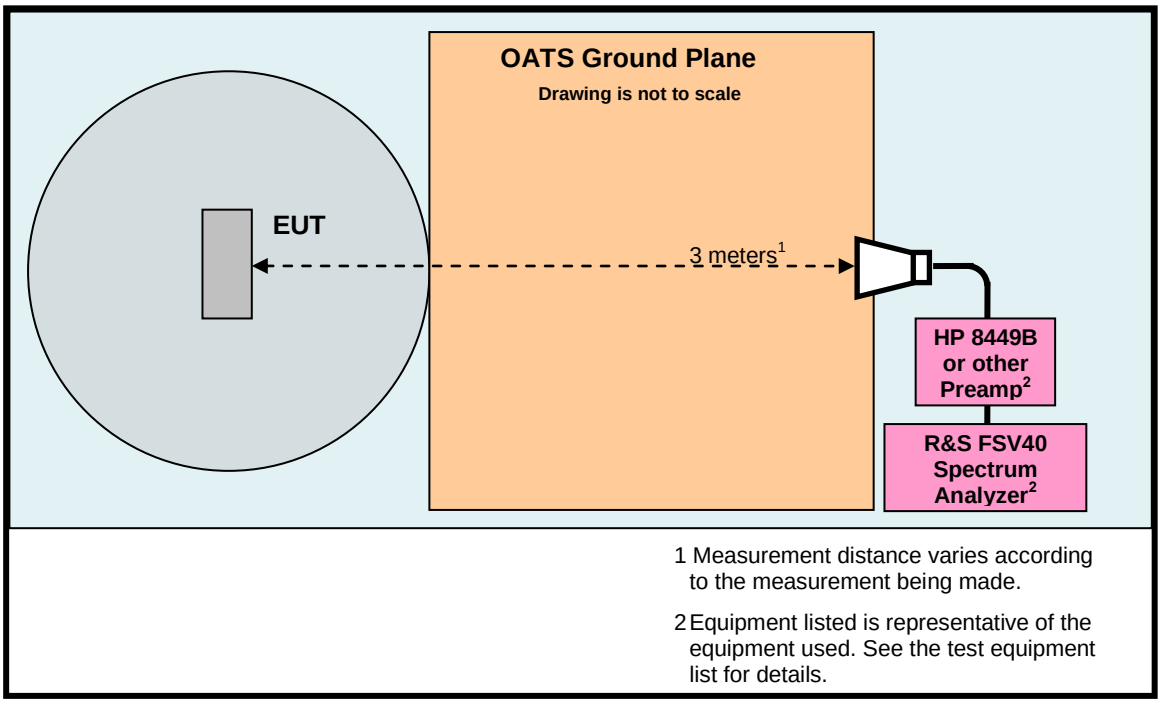
3. Product Configuration

3.5. Block Diagram



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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	9/10/2020	2 Years
Spectrum Analyzer 20 Hz – 40 GHz [2]	Rohde & Schwarz	FSV40	100899	9/10/2020	2 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	9/13/2020	2 Years
Biconilog Antenna, 30 MHz to 2 GHz	Sunol Sciences	JB1	A050913	6/3/2019	2 Years
EMI Receiver	Hewlett Packard	8546A	3650A00360	9/11/2020	2 Years
Passive Loop Antenna, 9 kHz to 30 MHz	EMCO	6512	9309-1139	10/26/2019	3 Years
Horn Antenna, 960 MHz to 18 GHz	Electro-Metrics	EM-6961	6337	10/3/2020	2 Years
Horn Antenna, 18 GHz to 40 GHz	Com-Power	AH-840	101032	10/9/2020	2 Years
Preamplifier, 1 GHz to 26.5 GHz	Hewlett Packard	8449B	3008A00329	9/11/2020	2 Years
LISN 50 ohm 50 µH, 9 kHz to 30 MHz	EMCO	3825/2	9109-1860	9/10/2019	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	9/11/2020	2 Years
Digital Barometer	Control Company	4195	ID236	4/3/2020	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

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4. Measurements Parameters

4.3. Measurement & Equipment Setup

Test Dates:	11/7/2018, 11/13/2018, 11/14/2018, 11/15/2018, 11/16/2018, 11/26/2018
Test Engineer:	Larry Stillings
Normal Site Temperature (15 - 35°C):	19.0
Relative Humidity (20 -75%RH):	31
Frequency Range:	30 kHz to 40 GHz
Measurement Distance:	3, 1.5, 1 and 0.3 Meters
EMI Receiver IF Bandwidth:	200 Hz - 10 kHz to 150 kHz 9 kHz - 150 kHz to 30 MHz 120kHz - 30 MHz to 1 GHz 1MHz - Above 1 GHz
EMI Receiver Average Bandwidth:	1 kHz - 10 kHz to 150 kHz 30 kHz - 150 kHz to 30 MHz 300kHz - 30 MHz to 1 GHz 3 MHz- Above 1 GHz
Detector Function:	Peak, QP - 10 kHz to 1 GHz Peak, C-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.

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4. Measurements Parameters

4.5. Measurement Uncertainty

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

RF Frequency	$\pm$ 1x10^{-8}
Radiated Emission of Transmitter	$\pm$ 4.55 dB
Radiated Emission of Receiver	$\pm$ 4.55 dB
Temperature	$\pm$ 0.91^{o} 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 Decawave DWM1001C, 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

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5. Choice of Equipment for Test Suits (continued)

5.4 Mode of Operation

Modulation type : GFSK
Payload pattern : PRB29
Data Rate : 2 MBPS
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	ISED Rule Reference	Test Report Section	Result
Antenna Requirement	15.203	RSS-GEN Issue 5 §6.8	7.1	Compliant
Minimum DTS Bandwidth, 99% Occupied BW	15.247 (a) (2) N/A	5.2 a RSS-GEN	7.2	Compliant
Maximum Peak Conducted Output Power	15.247 (b) (1)	5.4 d	7.3	Compliant
Operation with directional antenna gains greater than 6 dBi	15.247 (b) (4)	5.4 f	7.4	Compliant
Spurious Radiated Emissions	15.247 (d)	RSS-GEN Issue 5	7.5	Compliant
Spurious Radiated Emissions (> GHz) - Harmonic Measurements	15.247 (d)	RSS-GEN Issue 5		Compliant
Lower and Upper Band Edges	15.247 (d)	RSS-GEN Issue 5	7.6	Compliant
Emissions in Non-restricted Frequency Bands	15.247(e)	5.5	7.7	Compliant
Peak Power Spectral Density	15.247(e)	5.2 b	7.8	Compliant
Conducted Emissions	15.207	RSS-GEN Issue 5 §8.8	7.9	Compliant
Duty Cycle	15.207	RSS-GEN Issue 5 §9	7.10	Compliant
Public Exposure to Radio Frequency Energy Levels	1.1307 (b) (1)	RSS-GEN Issue 5 §5.5 RSS 102	7.11	Compliant

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7. Measurement Data

7.1. Antenna Requirement (15.203, RSS-GEN 6.8)

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 Decawave DWM1001C utilizes a pcb mount antenna which is not user replaceable.

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7. Measurement Data

7.2. Minimum DTS Bandwidth (15.247 (a) (2), RSS-247 5.2(a))

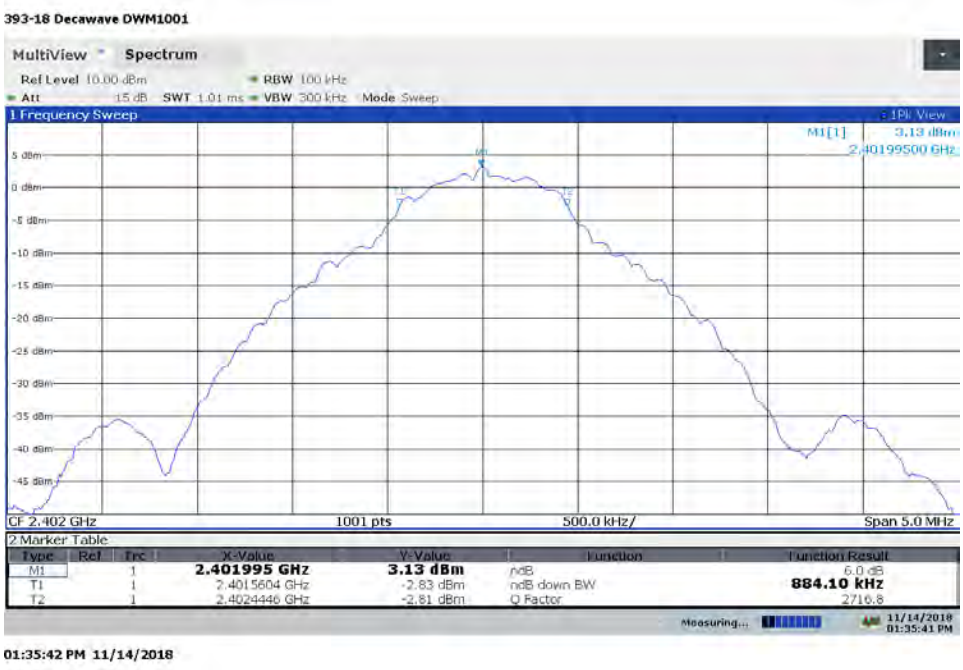
Requirement: (15.247 (a) (2)
Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

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 (kHz)	Minimum -6 dB Bandwidth (kHz)	Result
37	2402	884.10	>500	Compliant
17	2440	864.10	>500	Compliant
39	2480	884.10	>500	Compliant

7.2.1. Low Channel – 37, 2402 MHz



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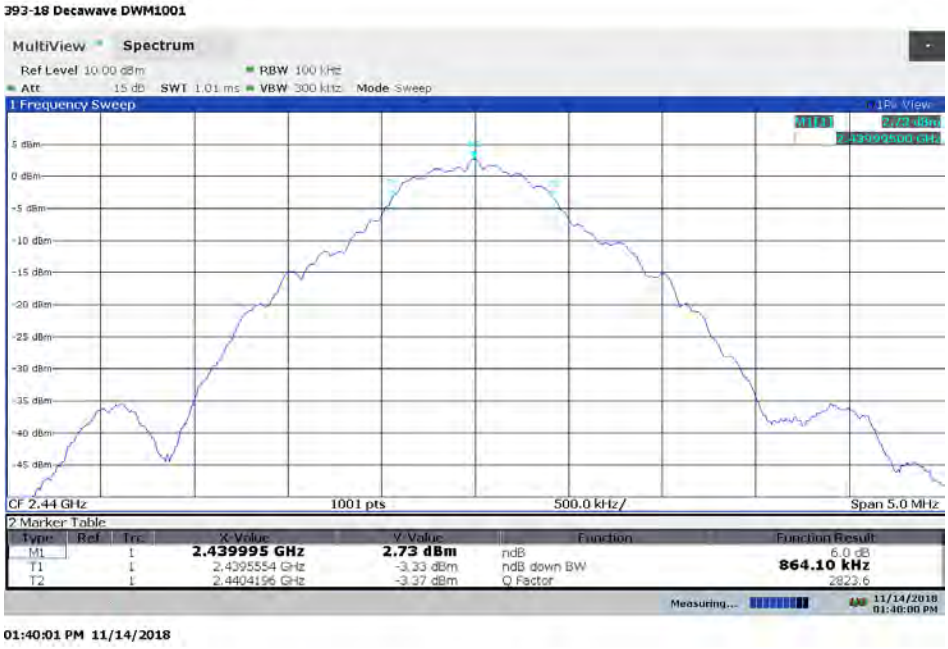
7. Measurement Data

7.2. Minimum DTS Bandwidth (continued)

7.2.2. Middle Channel – 17, 2440 MHz



7.2.3. High Channel – 39, 2480 MHz

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7. Measurement Data

7.2. Occupied Bandwidth (99% Emission Bandwidth) (ISED Canada RSS-GEN Issue 5)

Requirement: ISED Canada RSS-GEN Issue 5
The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

Procedure This test was performed in accordance with the procedure detailed in ISED Canada RSS-GEN Issue 5, section 6.7.

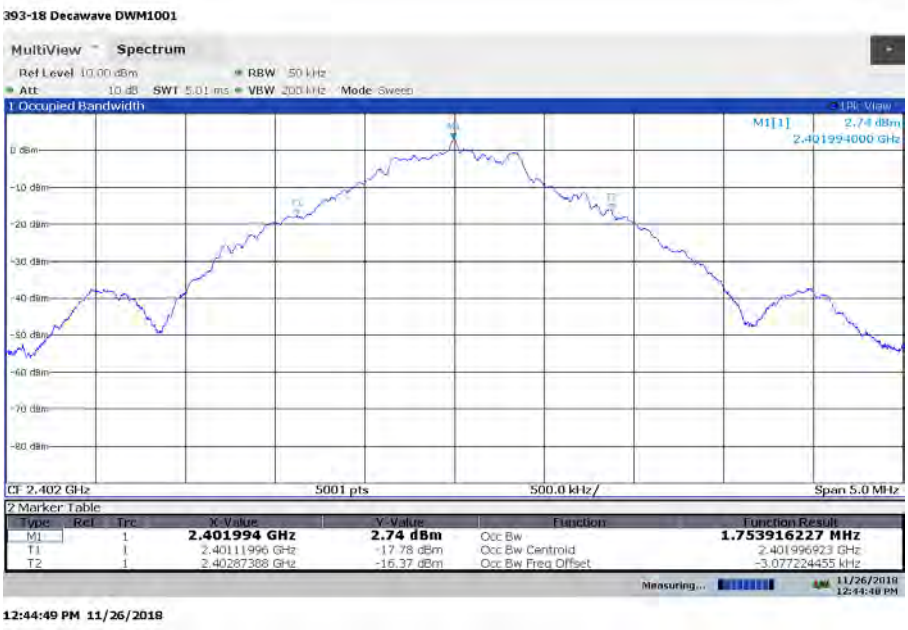
Test Note: This test was performed utilizing the automated 99% bandwidth function of the spectrum analyzer.

Conclusion: Compliant, for informational purposes.

Measurement Results - 99% Bandwidth

Channel	Channel Frequency (MHz)	99% Power Bandwidth (MHz)
Low	2402	1.759
Middle	2442	1.802
High	2480	1.824

7.2.4. 99% Bandwidth, Low Channel



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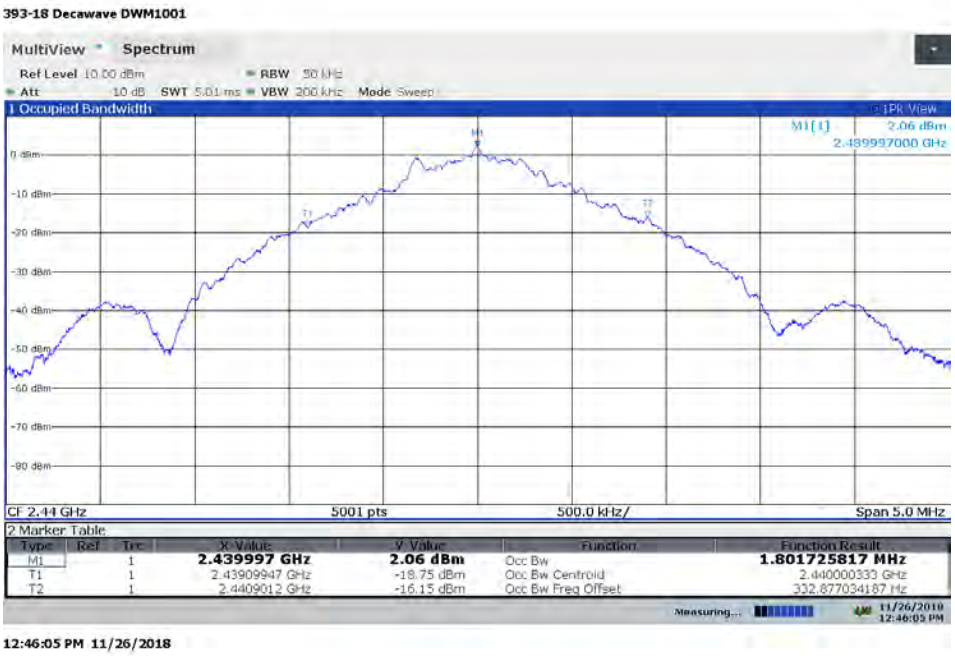
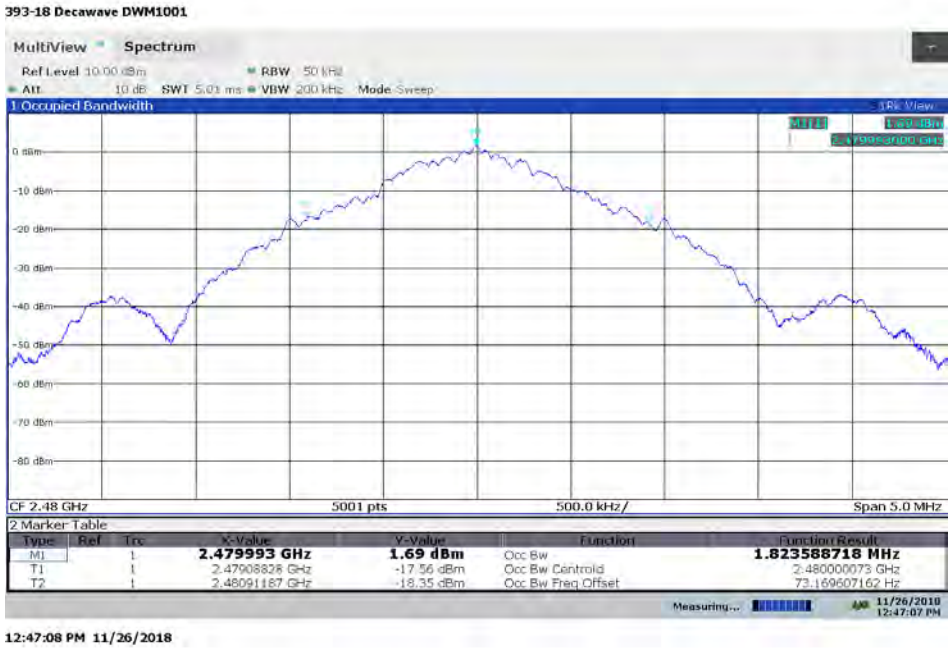
7. Measurement Data

7.2. Occupied Bandwidth (99% Emission Bandwidth) (ISED Canada RSS-GEN Issue 5)

7.2.5. 99% Bandwidth, Middle Channel



7.2.6. 99% Bandwidth, High Channel



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7. Measurement Data (continued)

7.3. Maximum Peak Conducted Output Power 15.247 (b) (3), RSS-247 5.4 (d))

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).

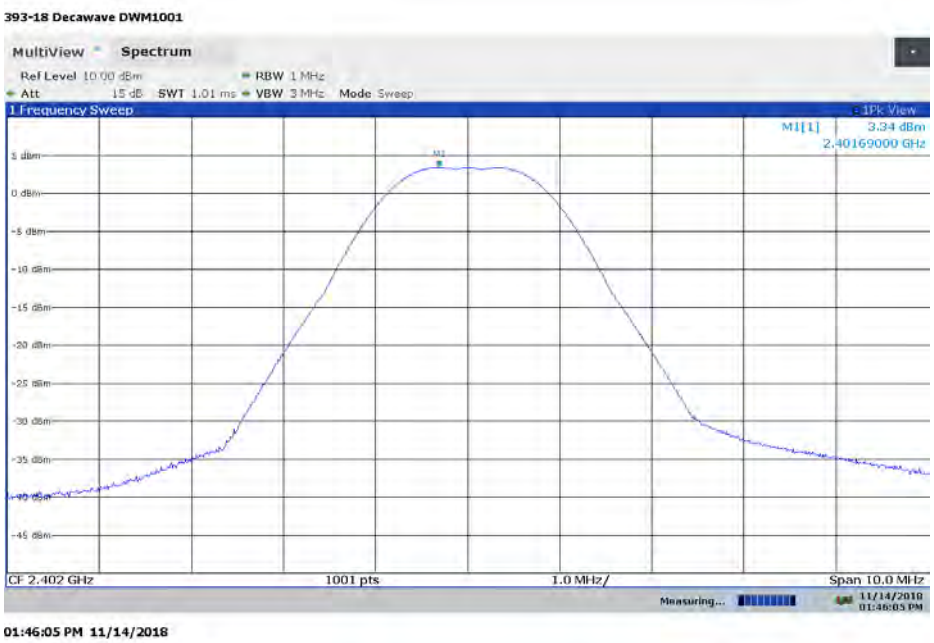
Procedure: This test was performed in accordance with the procedure detailed in FCC OET publication number KDB 558074, Section 9.1.1.

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 Conducted Output Power	Peak Limit	Margin	Result
	(MHz)	(dBm)	(dBm)	(dB)	
37	2402	3.34	30	-26.66	Compliant
17	2440	2.96	30	-27.04	Compliant
39	2480	3.07	30	-26.93	Compliant

7.3.1. Low Channel – 37, 2402 MHz



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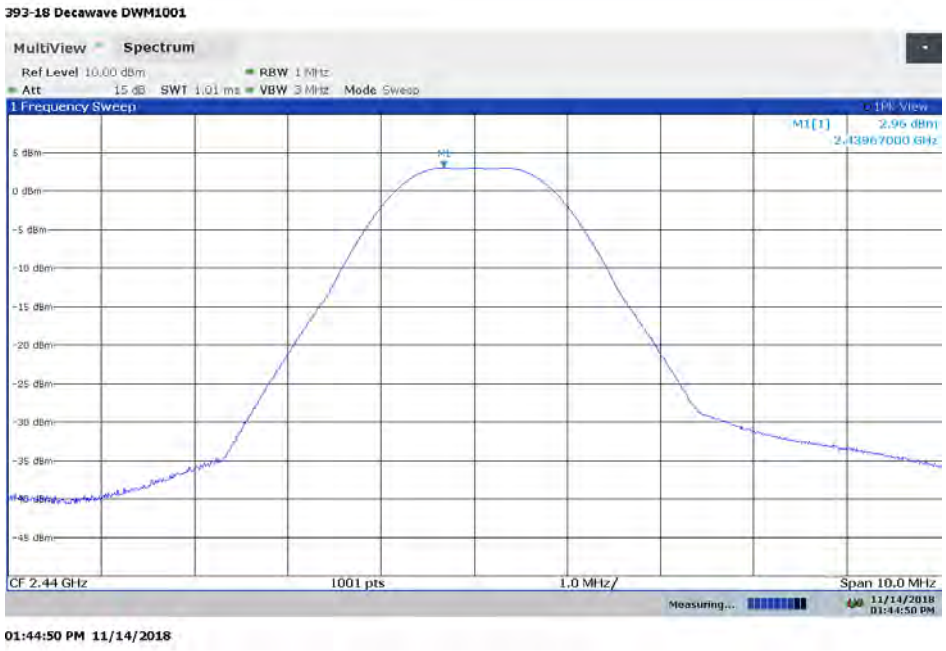
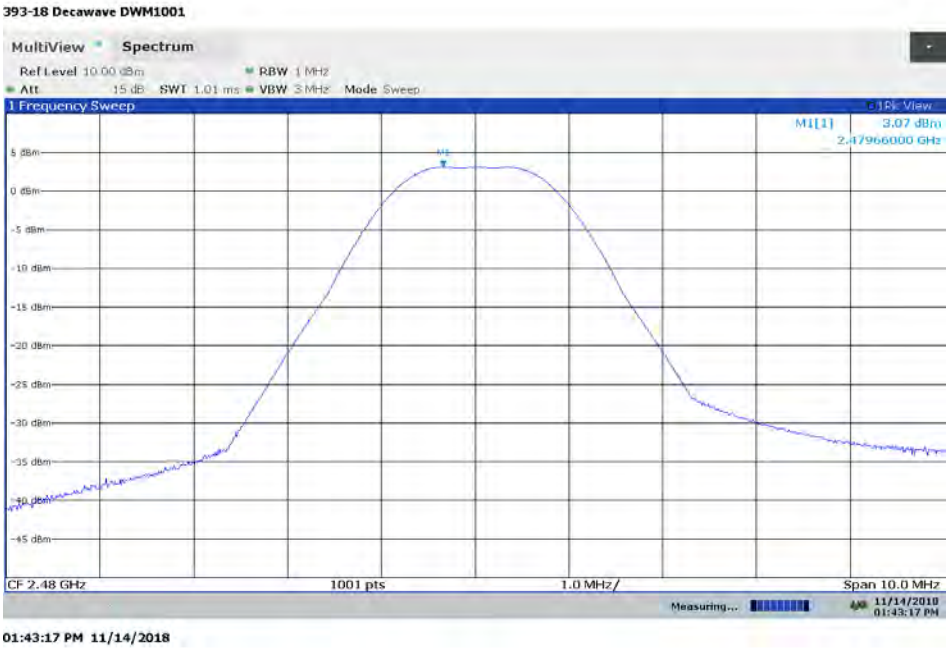
7. Measurement Data

7.3. Maximum Peak Conducted Output Power (continued)

7.3.2. Middle Channel – 17, 2440 MHz



7.3.3. High Channel – 39, 2480 MHz



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7. Measurement Data

7.4. Operation with directional antenna gains greater than 6 dBi (15.247 (b)(4), RSS-247 5.4 (f))

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 0.5 dBi Peak gain (-0.5 dBi average gain) and therefore is exempt from this requirement.

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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

[1] Measurements 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 47CFRPart 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	0.03145	72.01	117.64	-45.63	A1.3.3	Gnd Parallel
150 kHz - 30 MHz	0.15000	62.31	104.08	-41.77	A2.3.1	Parallel
30 MHz - 1000 MHz	999.60	32.11	54.00	-21.89	A3.3.2	V
1000 MHz - 10000 MHz	7207.3	53.56	74.00	-20.42	A4.1.2	V
10000 MHz - 18000 MHz	16414.7	53.23	74.00	-20.67	A5.3.3	H
18000 MHz - 40000 MHz	39517.5	45.88	74.00	-28.12	A6.1.3	H

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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 (dBµV/m)[1]		Limit (dBµV/m)		Margin (dBµV/m)		Antenna Polarity (H/V)	Result
	Peak	Average	Peak	Average	Peak	Average		
4804	51.33	38.86	74.00	54.00	-22.67	-15.14	H	Compliant
4880	51.36	38.46	74.00	54.00	-22.64	-15.54	V	Compliant
4960	51.90	39.78	74.00	54.00	-22.10	-14.22	V	Compliant
7320	57.98	47.04	74.00	54.00	-16.02	-6.96	H	Compliant
7440	56.89	45.87	74.00	54.00	-17.11	-8.13	H	Compliant
12010	60.00	46.34	74.00	54.00	-14.00	-7.66	V	Compliant
12200	59.75	45.88	74.00	54.00	-14.25	-8.12	H	Compliant
12400	59.33	45.99	74.00	54.00	-14.67	-8.01	V	Compliant
19216	47.33	47.33	74.00	54.00	-26.67	-6.67	H	Compliant
19520	61.14	47.46	74.00	54.00	-12.86	-6.54	V	Compliant
19840	61.11	47.44	74.00	54.00	-12.89	-6.56	H	Compliant
22320	62.79	49.33	74.00	54.00	-11.21	-4.67	H	Compliant

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

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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	3.19	-39.58	-20	Compliant

Note: See plot on following page

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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	Highest Transmitter Frequency	Maximum PSD (100 kHz)	Band Edge Delta to Max PSD (100 kHz)	Minimum Required Delta	Result
(MHz)	(MHz)	(dBm)	(dB)	(dB)	
2483.5	2480	3.01	-52.07	-20	Compliant

Note: See plot on following page

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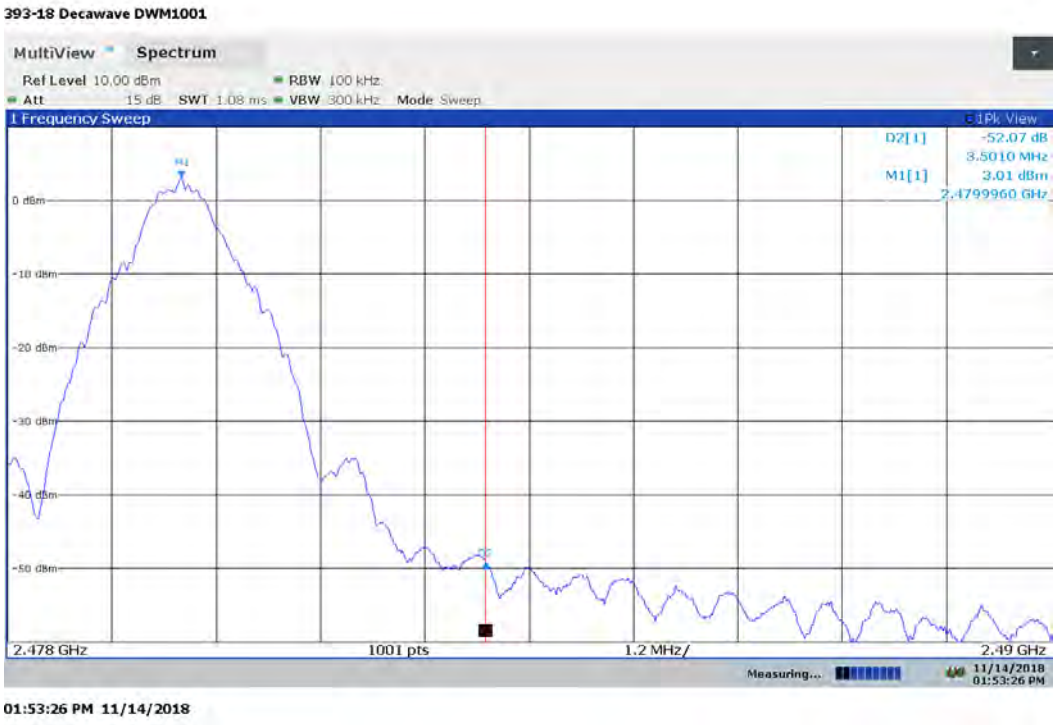
7. Measurement Data (continued)

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

Field Strength (dBµV/m)		Limit (dBµV/m)		Margin (dB)		Result
Peak	Average	Peak	Average	Peak	Average	
61.75	48.18	74	54	-12.25	-5.82	Compliant

Note: See plot on following page

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

Field Strength (dBµV/m)		Limit (dBµV/m)		Margin (dB)		Result
Peak	Average	Peak	Average	Peak	Average	
62.19	48.66	74	54	-11.81	-5.34	Compliant

Note: See plot on following page

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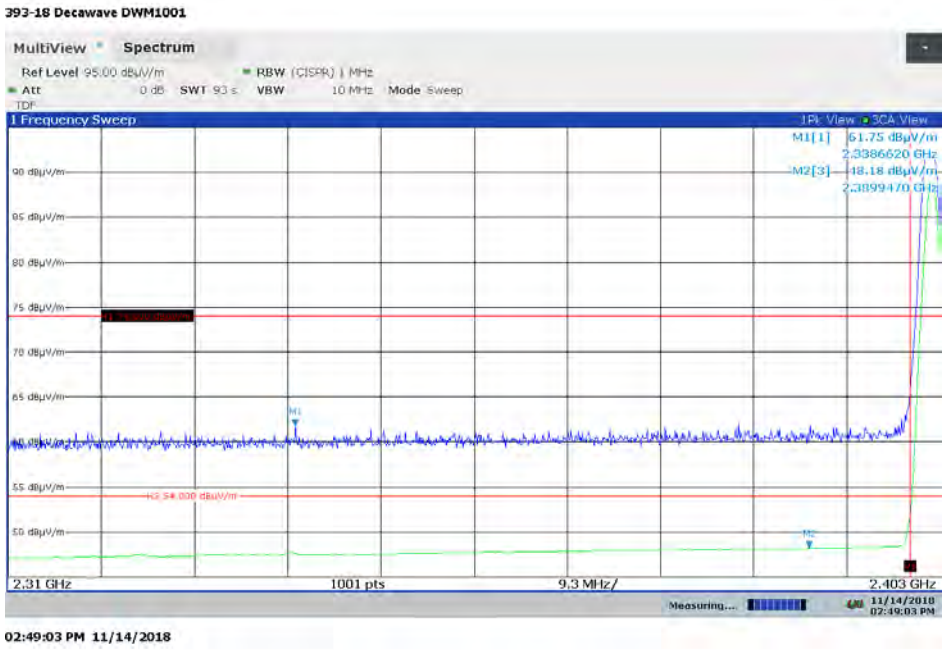
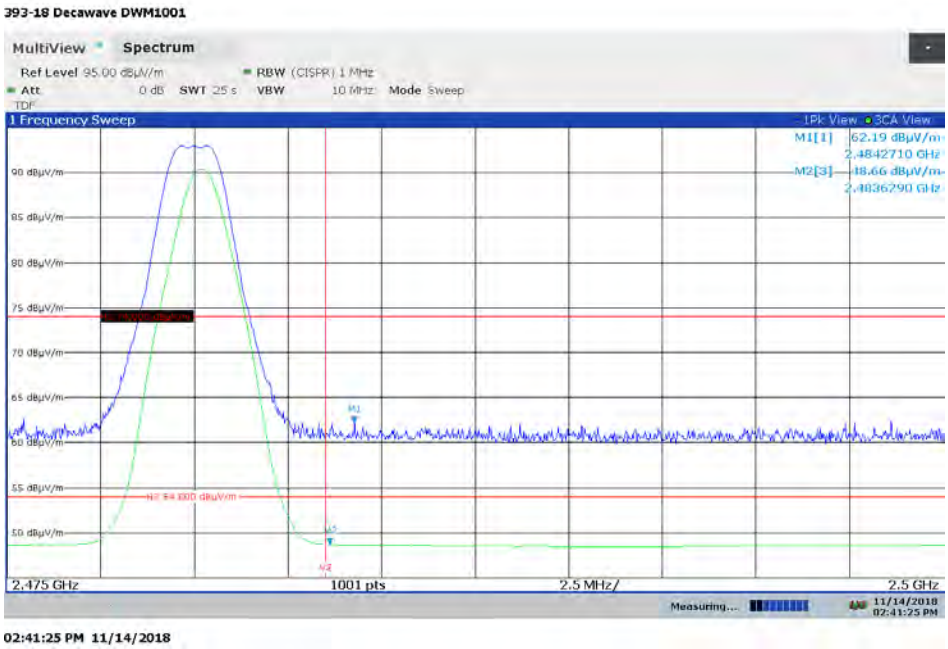
7. Measurement Data (continued)

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



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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.

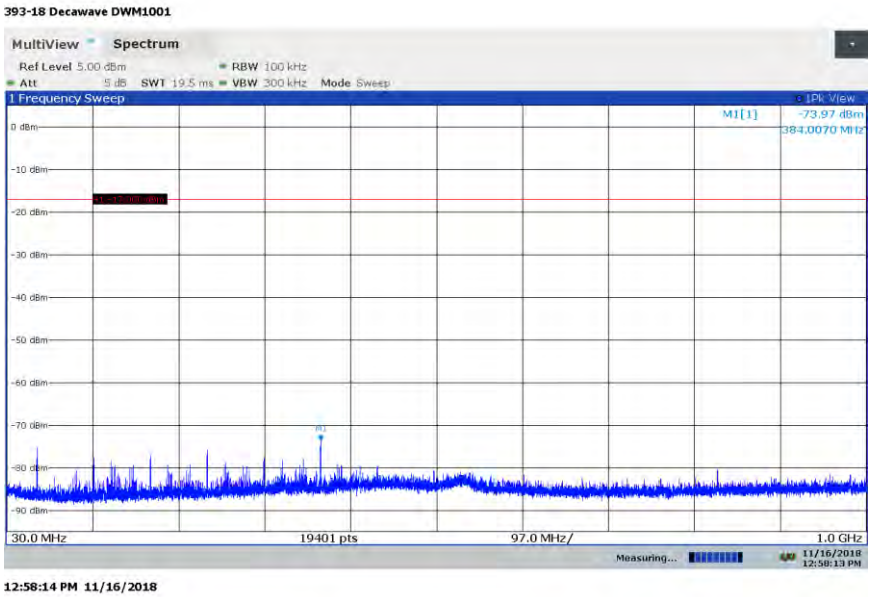
Results: The DUT met the 20 dB requirement emission level delta requirement in the non restricted frequency bands.

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[1] (dBm)	Delta to Maximum PSD (dB)	Minimum Required Delta	Result
3.12	2400.0	-41.62	-44.74	-20 dB	Compliant

[1]Taken from Section 7.6 – Lower Bandedge

7.7.1. Emissions in Non-restricted Frequency Bands, Plot 1 of 3



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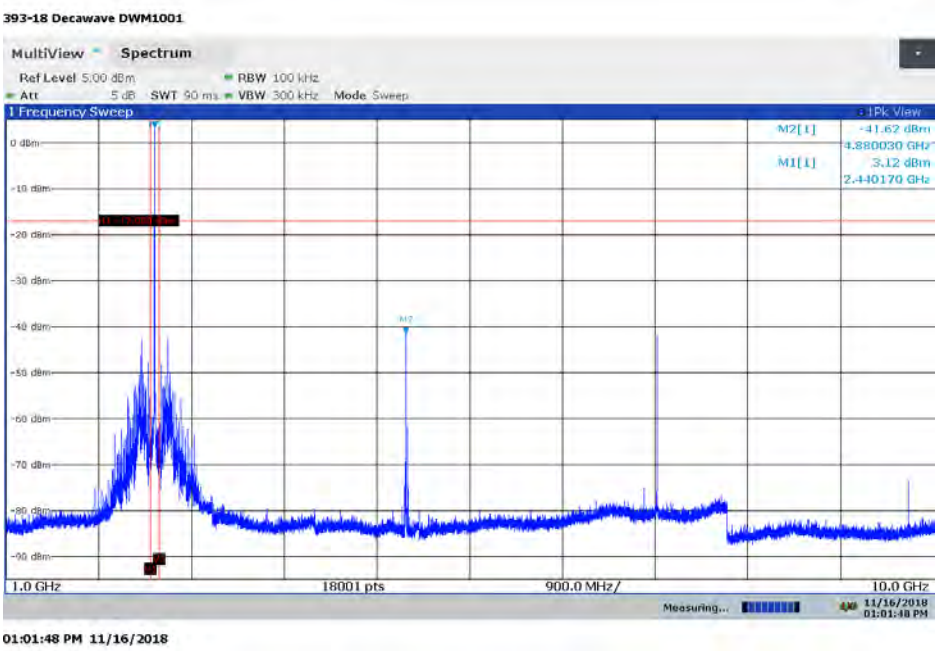
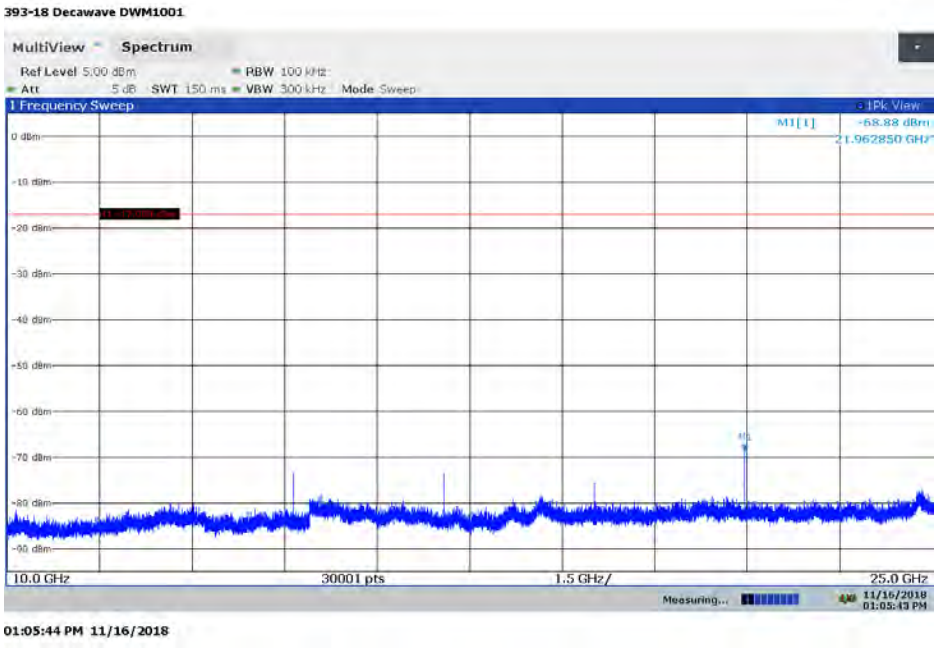
7. Measurement Data (continued)

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

7.7.2. Emissions in Non-restricted Frequency Bands, Plot 2 of 3



7.7.3. Emissions in Non-restricted Frequency Bands, Plot 3 of 3



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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).

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	2401.9175	-10.25	8	-18.25	Compliant
17	2440	2439.9580	-11.78	8	-19.78	Compliant
39	2480	2480.0014	-10.86	8	-18.86	Compliant

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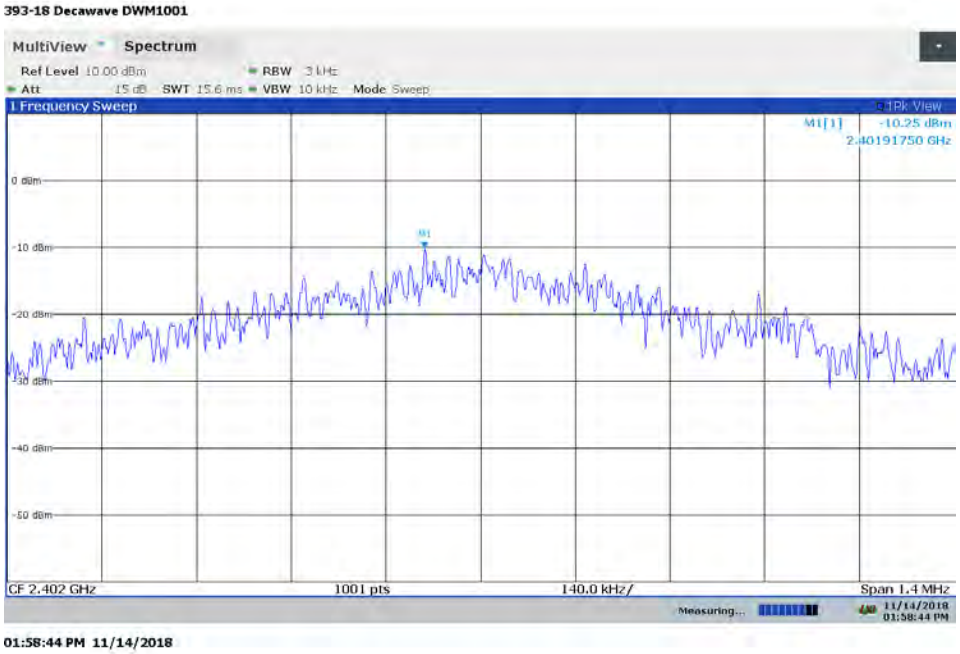
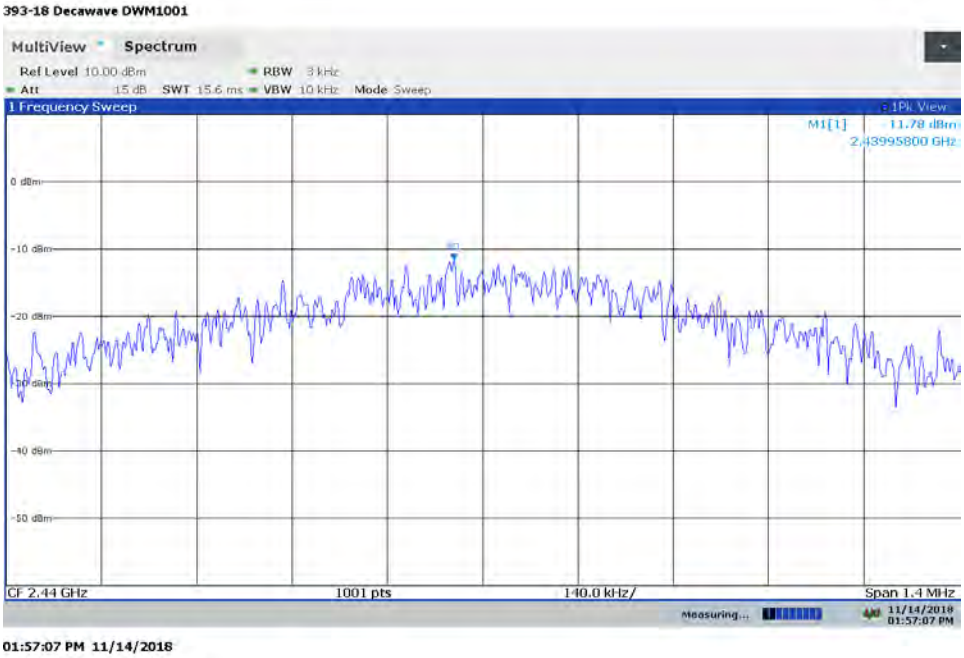
7. Measurement Data (continued)

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

7.8.1. Low Channel – 37, 2402 MHz



7.8.2. Middle Channel – 17, 2440 MHz



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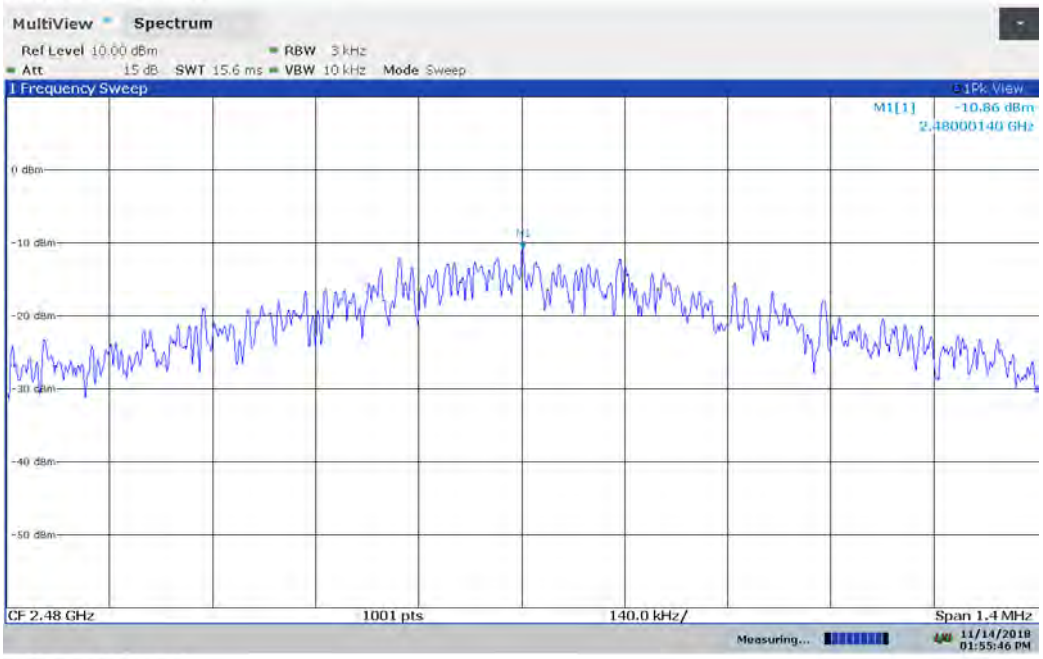
7. Measurement Data

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

7.8.3. High Channel – 39, 2480 MHz

393-18 Decawave DWM1001



01:55:46 PM 11/14/2018

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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 µH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dBµV)	
	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:	11/16/2018
Test Engineer:	Caleb Chretien
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

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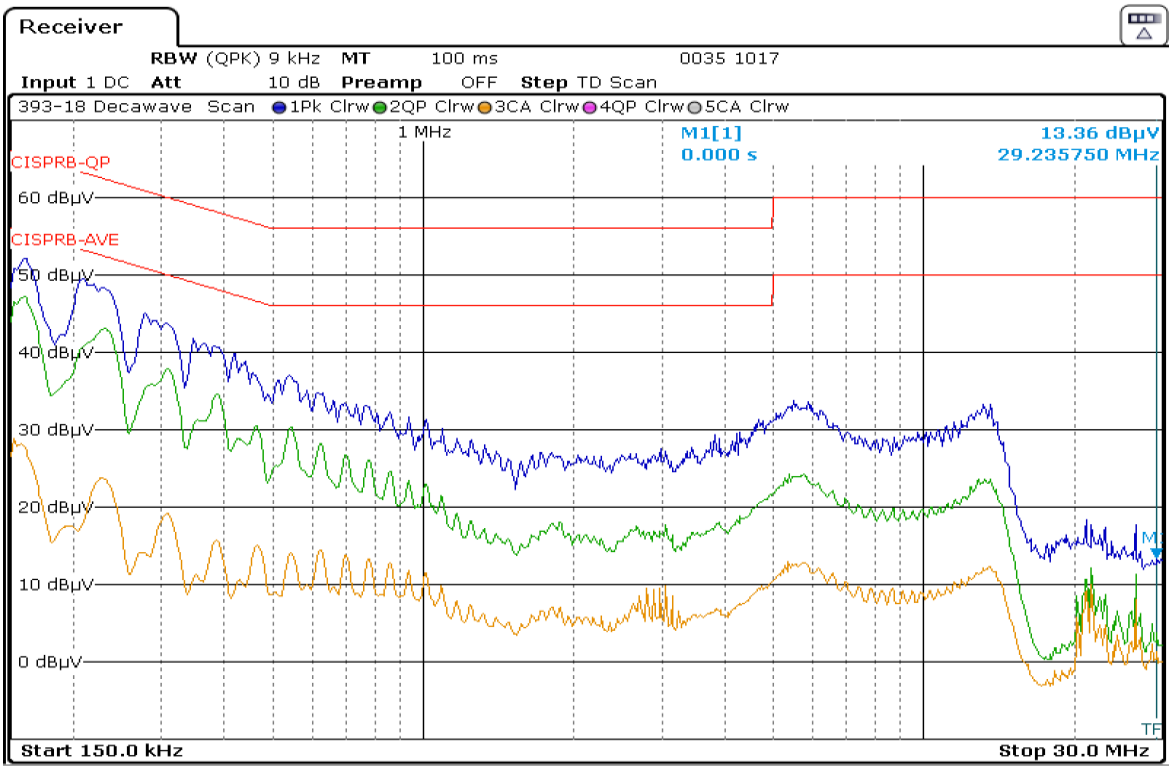
7. Measurement Data (continued)

7.9. Conducted Emissions (FCC Part 15.207)

7.9.1. 120 Volts, 60 Hz Phase



120 VAC Phase

Date: 16.NOV.2018 14:43:40

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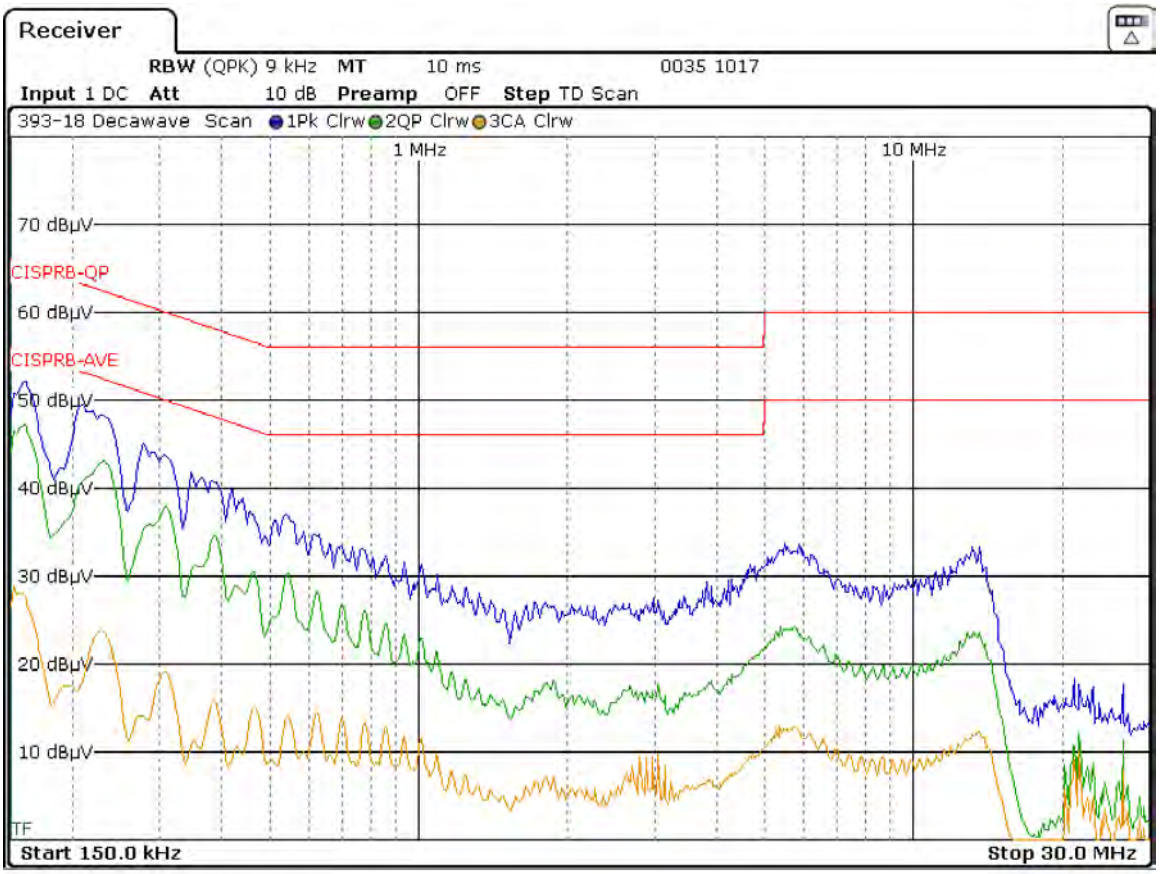
7. Measurement Data (continued)

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

7.9.2. 120 Volts, 60 Hz Neutral



120VAC Neutral

Date: 16.NOV.2018 14:07:11

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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%).

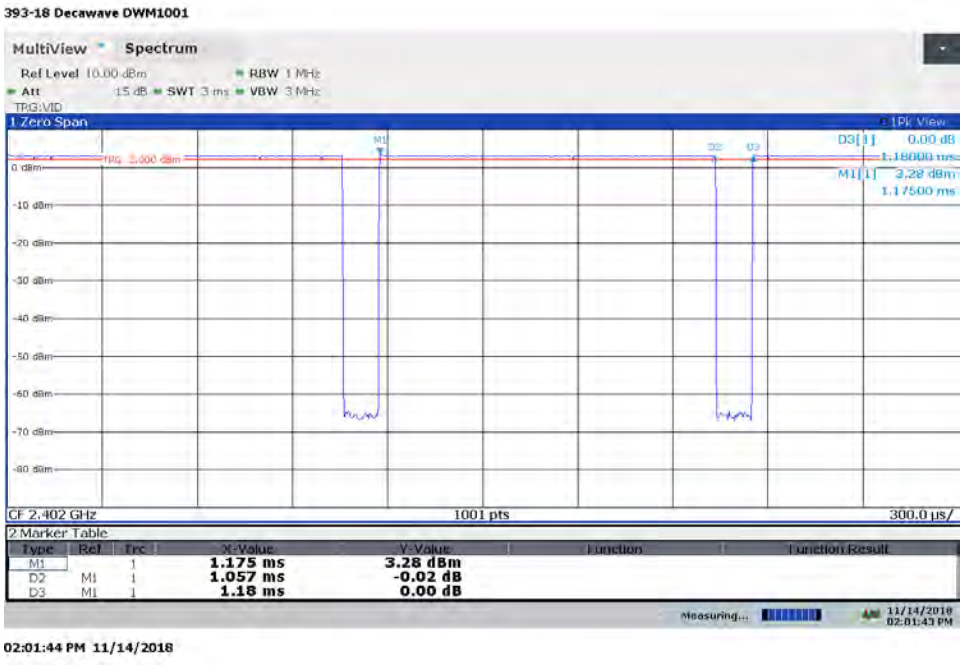
Procedure: Duty cycle measurements were made according to the procedure detailed ANSI C63.10-2013, Section 11.6(b)

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)	(µS)	(µS)	(Numeric)	(%)
37	2402	1.057	1.180	0.89576	89.58
17	2440	1.057	1.180	0.89576	89.58
39	2480	1.057	1.180	0.89576	89.58

7.10.1. Low Channel – 37, 2402 MHz



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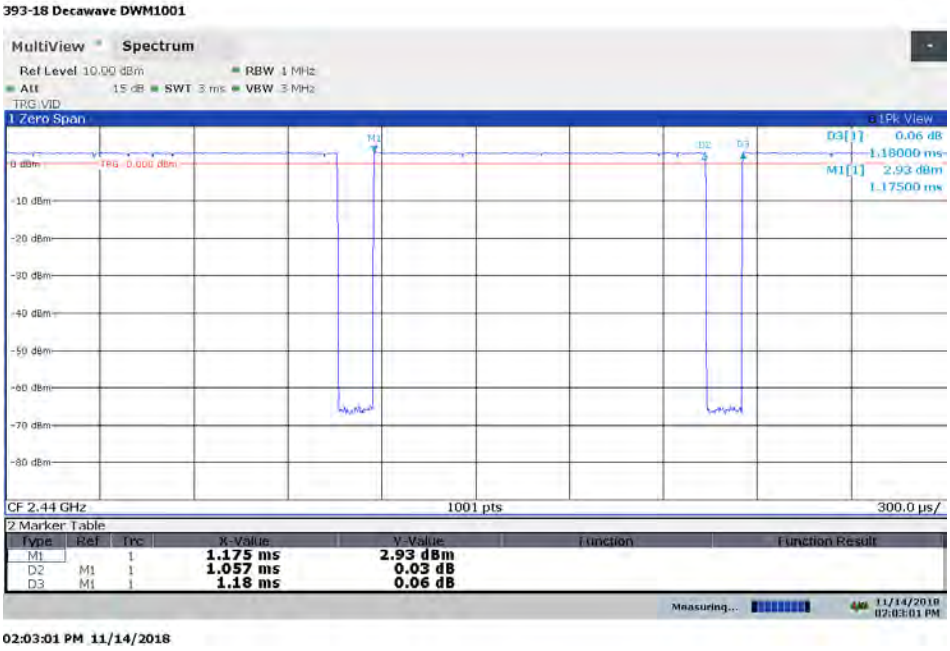
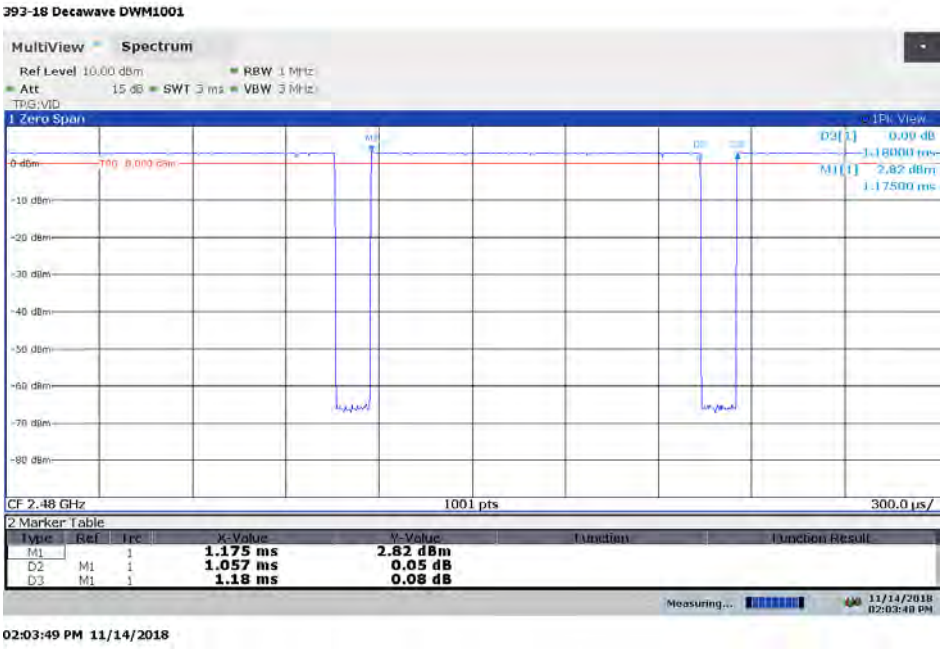
7. Measurement Data (continued)

7.10. Duty Cycle (continued)

7.10.2. Middle Channel – 17, 2440 MHz



7.10.3. High Channel – 39, 2480 MHz



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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:

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

P_{MAX}	mW	Maximum power of channel, including tune-up tolerance
d_{MIN}	mm	Minimum test separation distance, mm (≤ 50 mm)
$f_{(GHz)}$	GHz	$f_{(GHz)}$ 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: Passed - The device under test meets the exclusion requirement detailed in FCC OET 447498.

Channel:		**37**	**17**	**39**	
Input[1]:	P_{MAX}	2.158	1.977	2.028	**mW**
	d_{MIN}[2]	5.00	5.00	5.00	**mm**
	$f_{(GHz)}$	2.402	2.440	2.480	**GHz**
Test Exclusion:		**0.67**	**0.62**	**0.64**	
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.

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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)

7.12.2. 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.

Results: Compliant

Bluetooth Radio

Frequency	Separation Distance	Maximum Power	RSS-102 Limit	Result
MHz	mm	mW	mW	
2402	≤5	2.16	4.26	Compliant
2440	≤5	1.98	4.05	Compliant
2480	≤5	2.03	3.94	Compliant

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8. Test Setup Photographs

8.1. Spurious Radiated Emissions, 30 kHz to 1 GHz – Front

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8. Test Setup Photographs

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

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8. Test Setup Photographs

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

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8. Test Setup Photographs

8.4. Radiated Emissions above 1 to 18 GHz – Front

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8. Test Setup Photographs

8.5. Radiated Emissions 1 to 18 GHz – Rear

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8. Test Setup Photographs

8.6. Radiated Emissions 18 to 40 GHz– Side View

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8. Test Setup Photographs

8.7. Power Line Conducted Emissions – Front

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8. Test Setup Photographs

8.8. Power Line Conducted Emissions – Rear

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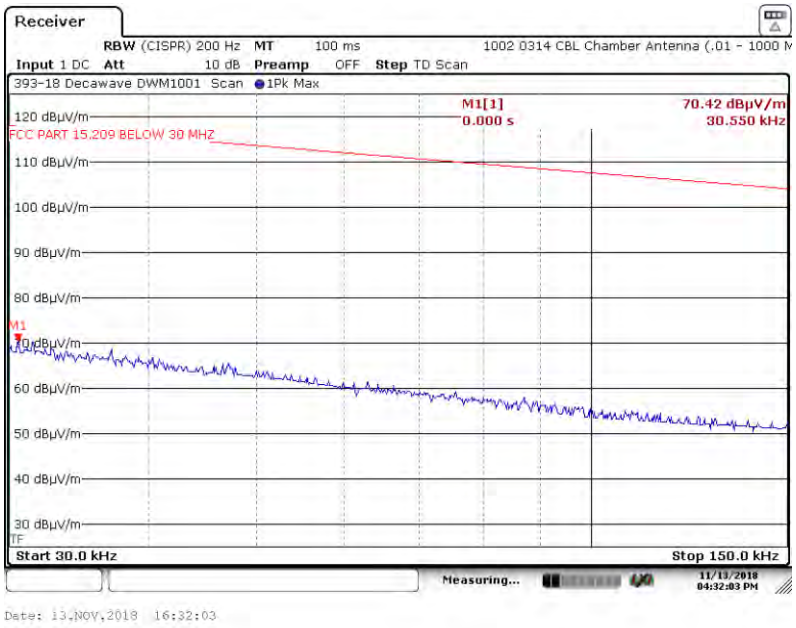
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

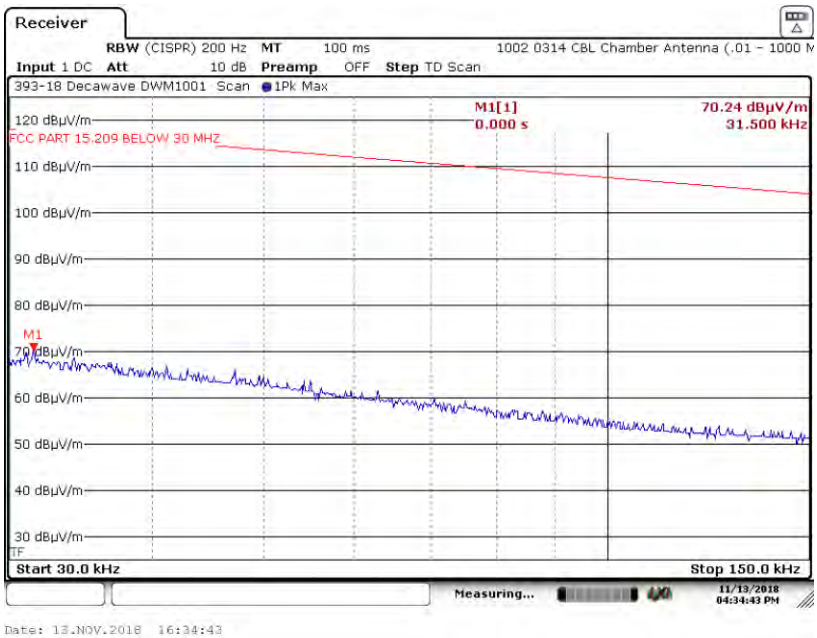
A1. Spurious Radiated Emissions (30 kHz – 150 kHz) Test Results

A1.1. Channel 37, 2402 MHz

A1.1.1. Measurement Results: X-Axis, Parallel Antenna



A1.1.2. Measurement Results: X-Axis, Perpendicular Antenna



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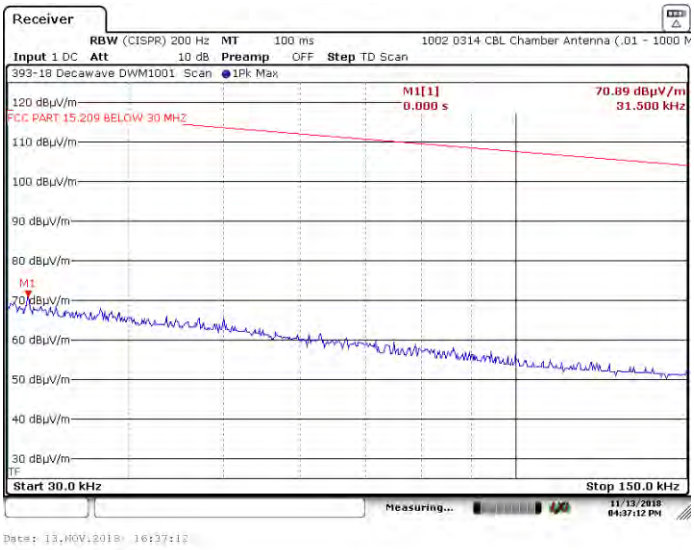
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

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

A1.1. Channel 37, 2402 MHz

A1.1.3. Measurement Results: X-Axis, Ground-Parallel Antenna



Note: Y-Axis and Z-Axis EUT Orientations was also noise floor.

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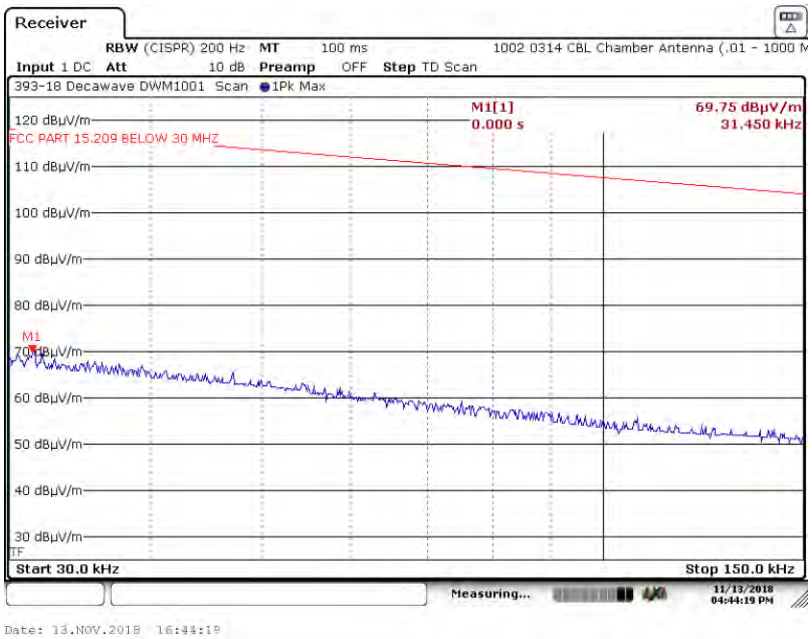
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

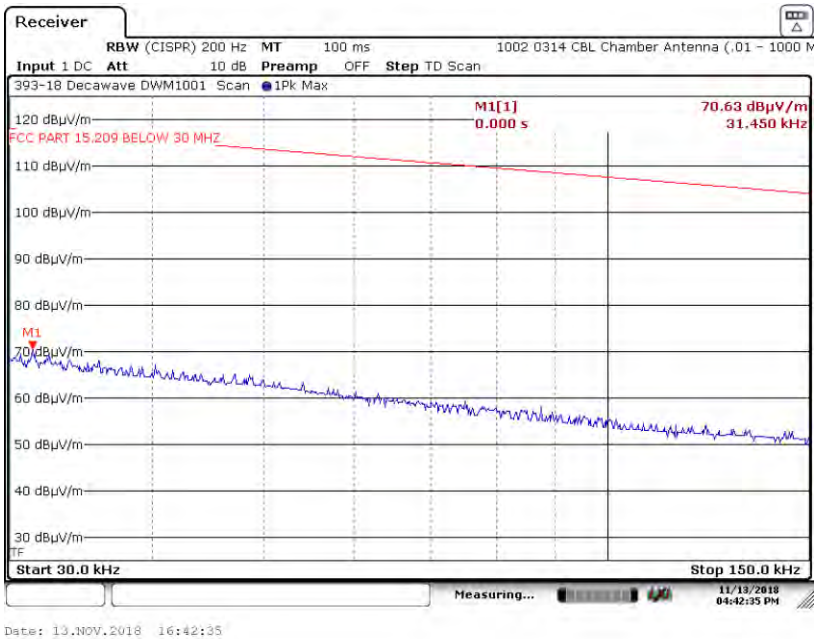
A1. Spurious Radiated Emissions (30 kHz – 150 kHz) Test Results

A1.2. Channel 17, 2440 MHz

A1.2.1. Measurement Results: X-Axis, Parallel Antenna



A1.2.2. Measurement Results: X-Axis, Perpendicular Antenna



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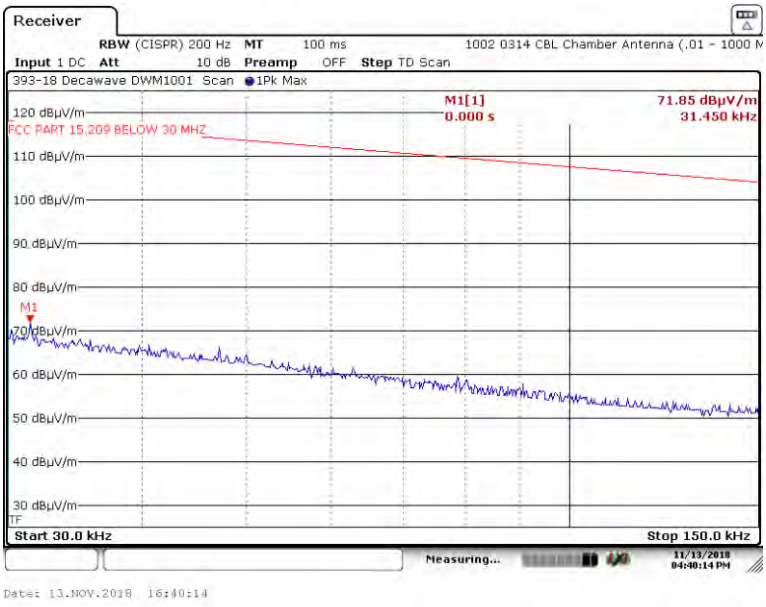
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

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

A1.2. Channel 17, 2440 MHz

A1.2.3. Measurement Results: X-Axis, Ground-Parallel Antenna



Note: Y-Axis and Z-Axis EUT Orientations was also noise floor.

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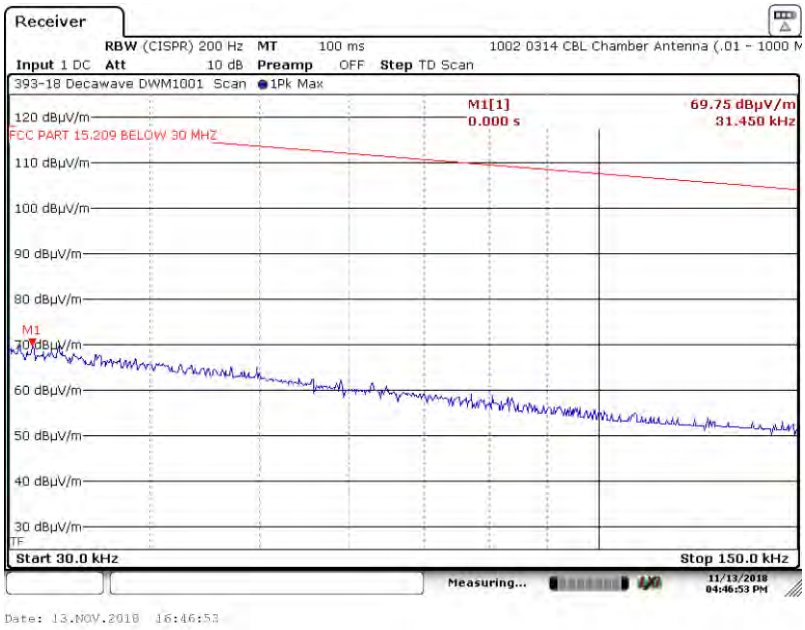
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

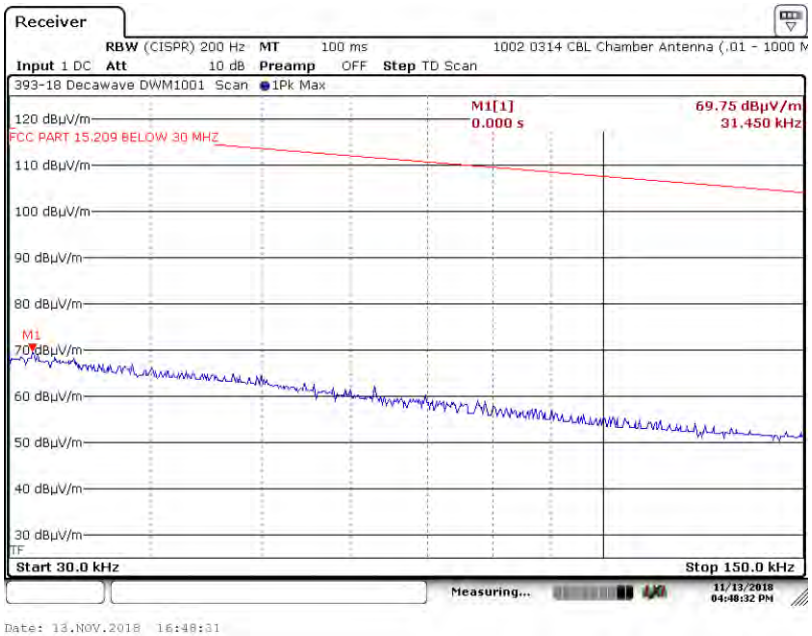
A1. Spurious Radiated Emissions (30 kHz – 150 kHz) Test Results

A1.3. Channel 39, 2480 MHz

A1.3.1. Measurement Results: X-Axis, Parallel Antenna



A1.3.2. Measurement Results: X-Axis, Perpendicular Antenna



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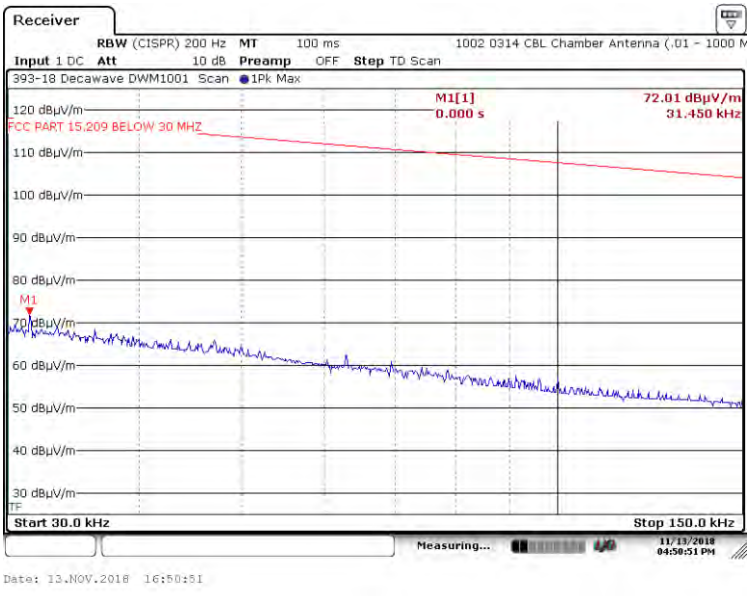
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

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

A1.3. Channel 39, 2480 MHz

A1.3.3. Measurement Results: X-Axis, Ground-Parallel Antenna



Note: Y-Axis and Z-Axis EUT Orientations was also noise floor.

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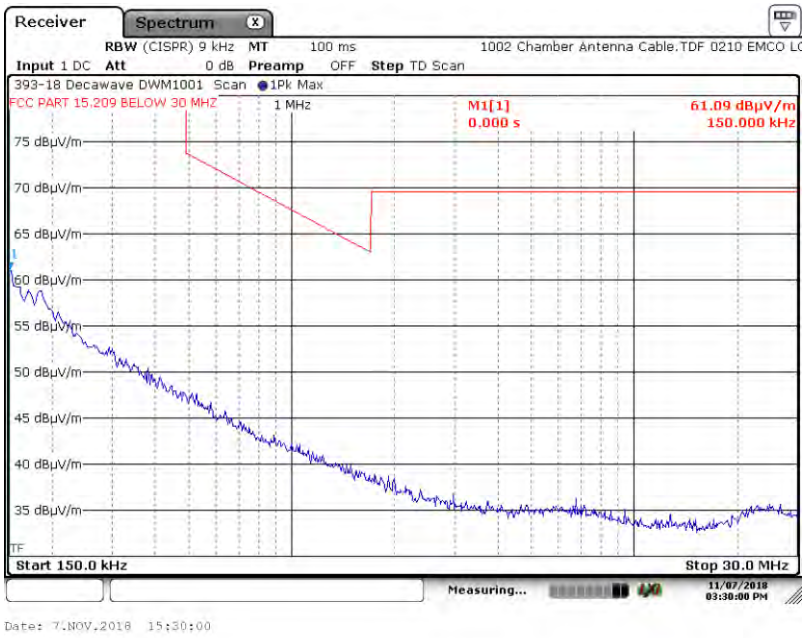
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

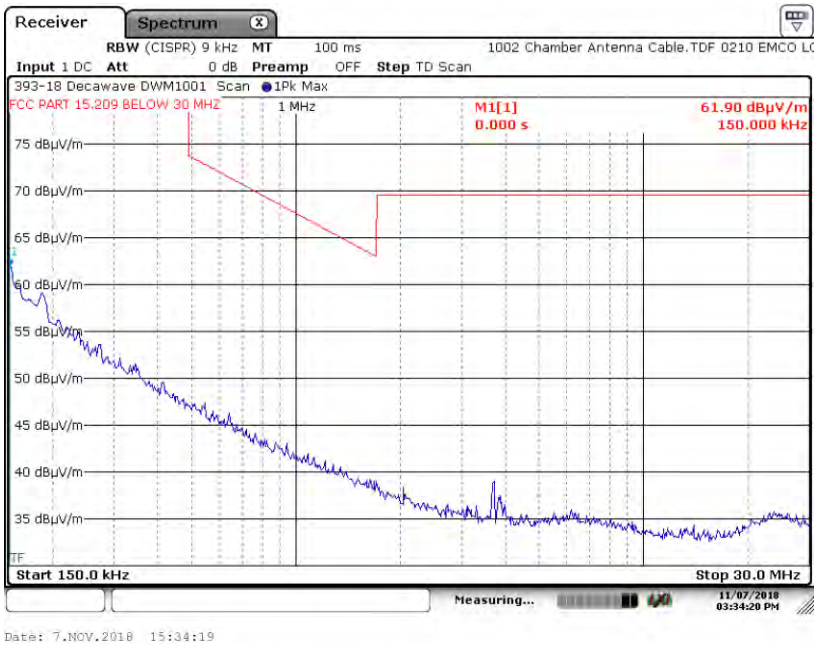
A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

A2.1. Channel 37, 2402 MHz

A2.1.1. Measurement Results: X-Axis, Parallel Antenna



A2.1.2. Measurement Results: X-Axis, Perpendicular Antenna



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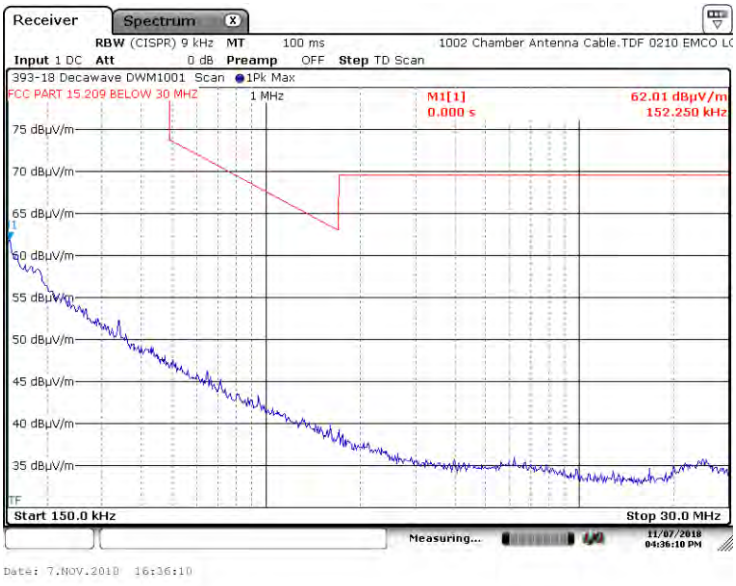
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

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

A2.1. Channel 37, 2402 MHz

A2.1.3. Measurement Results: X-Axis, Ground-Parallel Antenna



Note: Y-Axis and Z-Axis EUT Orientations was also noise floor.

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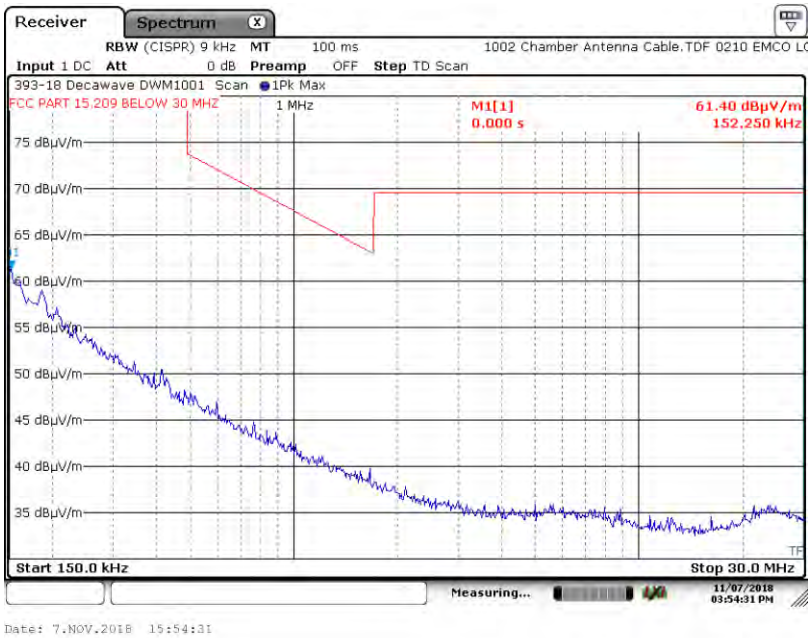
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

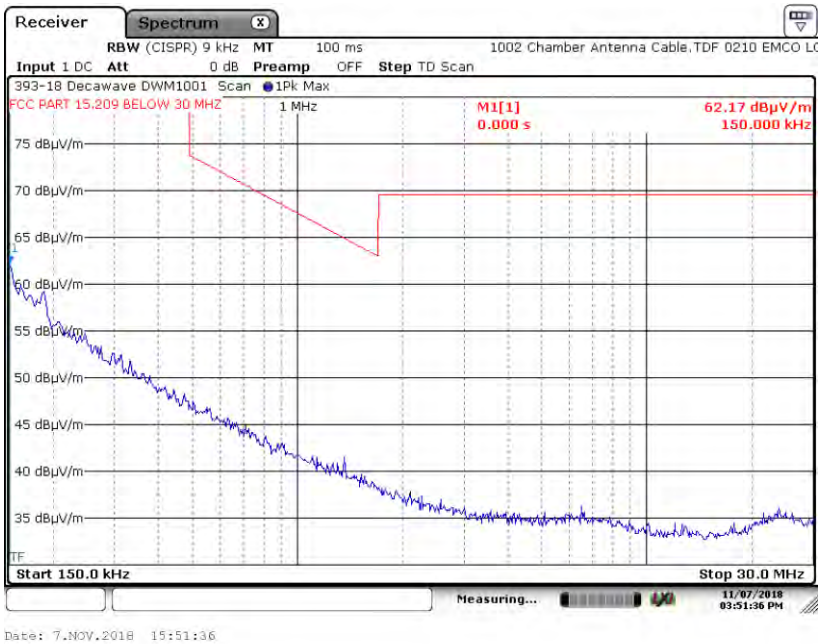
A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

A2.2. Channel 17, 2440 MHz

A2.2.1. Measurement Results: X-Axis, Parallel Antenna



A2.2.2. Measurement Results: X-Axis, Perpendicular Antenna



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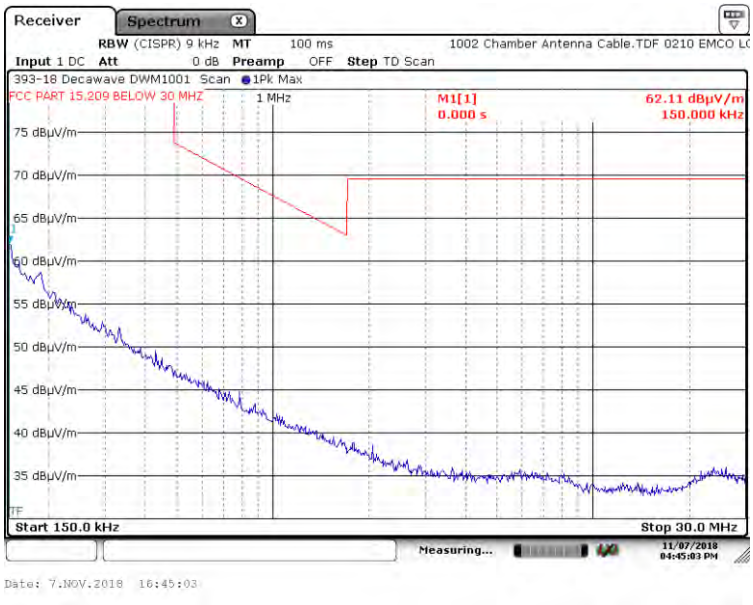
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

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

A2.2. Channel 17, 2440 MHz

A2.2.3. Measurement Results: X-Axis, Ground-Parallel Antenna



Note: Y-Axis and Z-Axis EUT Orientations was also noise floor.

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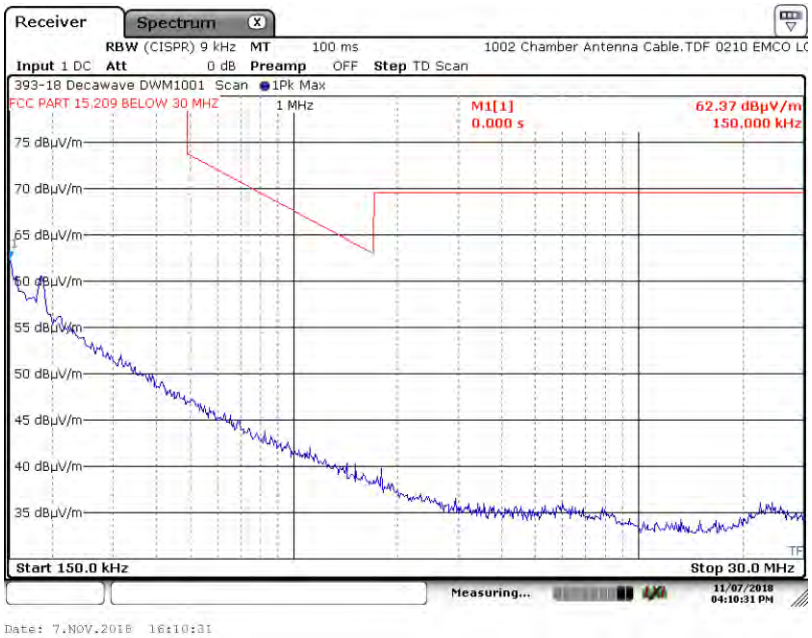
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

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

A2.3. Channel 39, 2480 MHz

A2.3.1. Measurement Results: X-Axis, Parallel Antenna



A2.3.2. Measurement Results: X-Axis, Perpendicular Antenna

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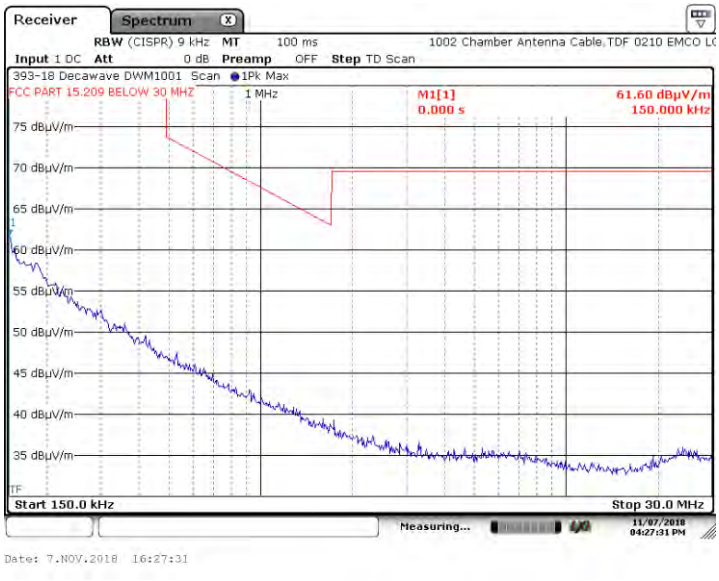
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

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

A2.3. Channel 39, 2480 MHz

A2.3.3. Measurement Results: X-Axis, Ground-Parallel Antenna



Note: Y-Axis and Z-Axis EUT Orientations was also noise floor.

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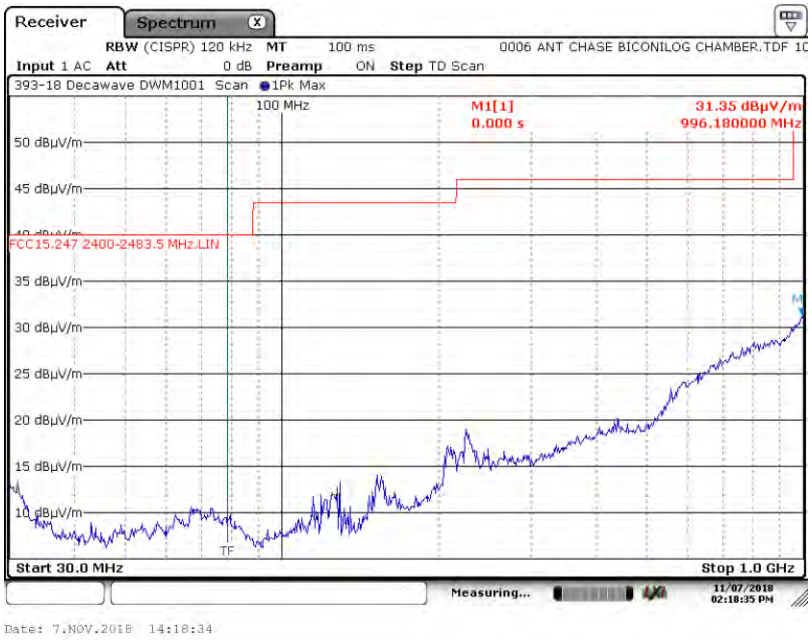
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

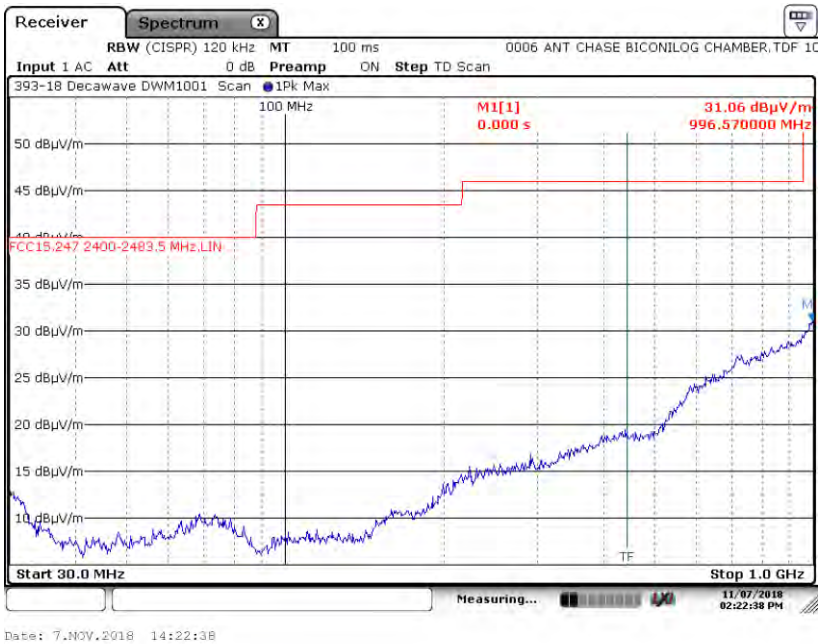
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.1. 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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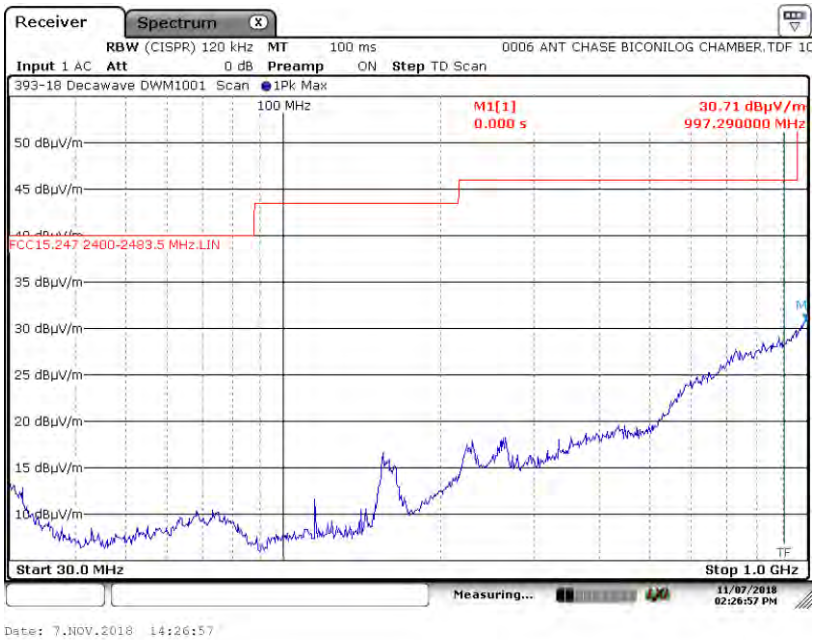
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

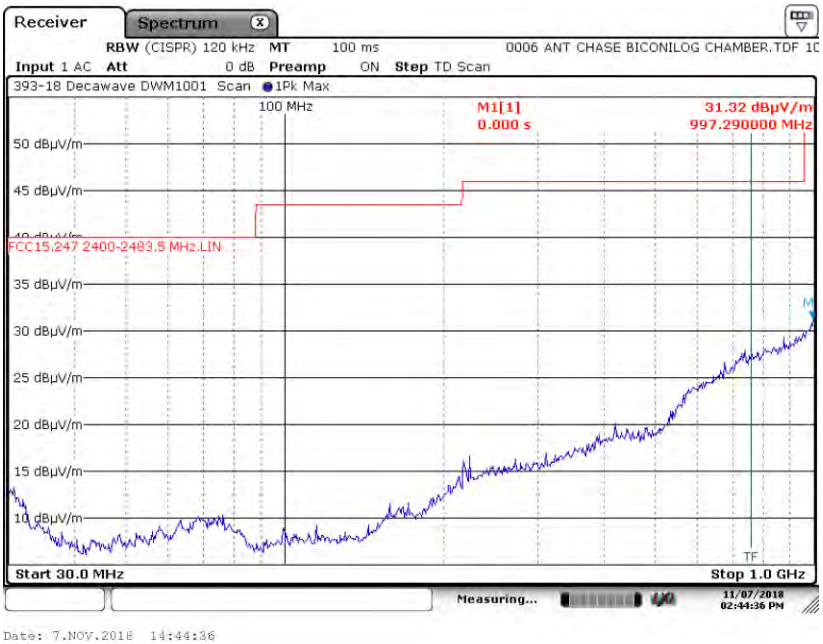
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.1. 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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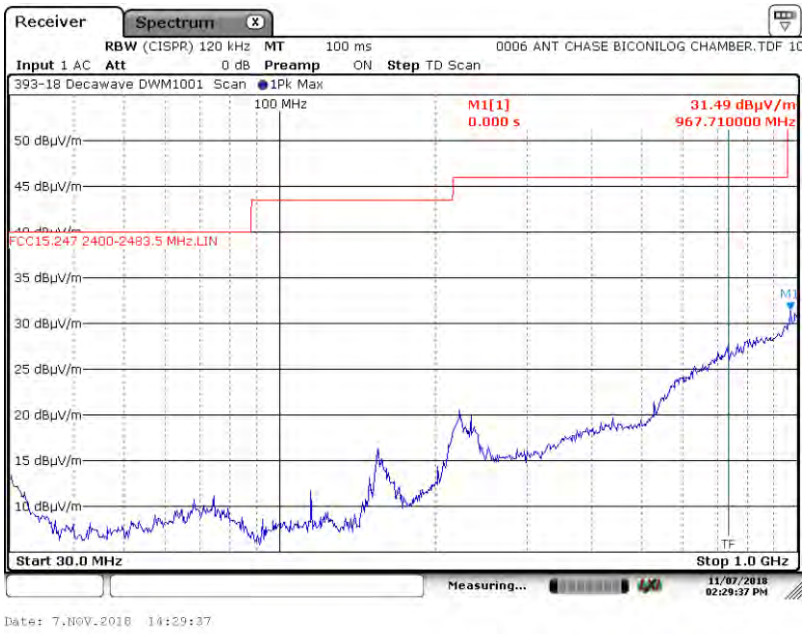
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

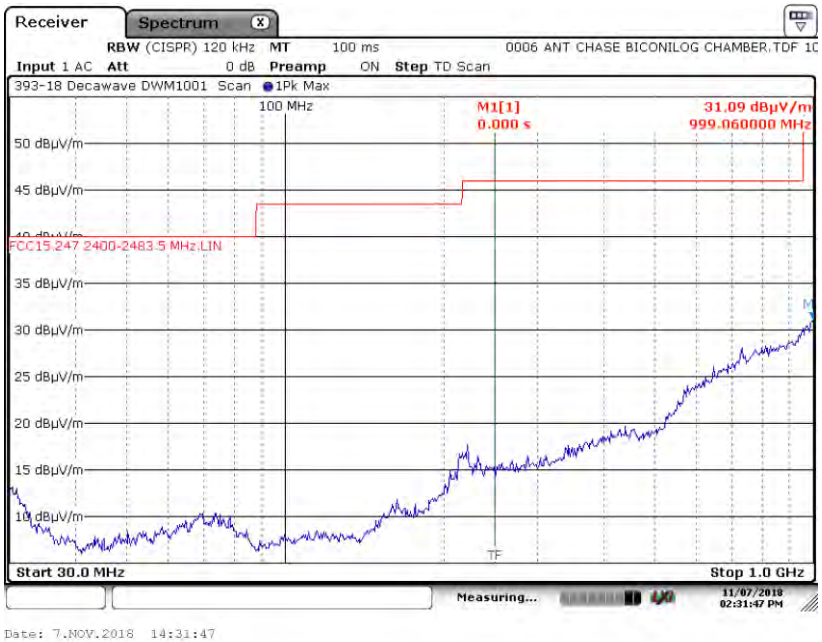
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.1. 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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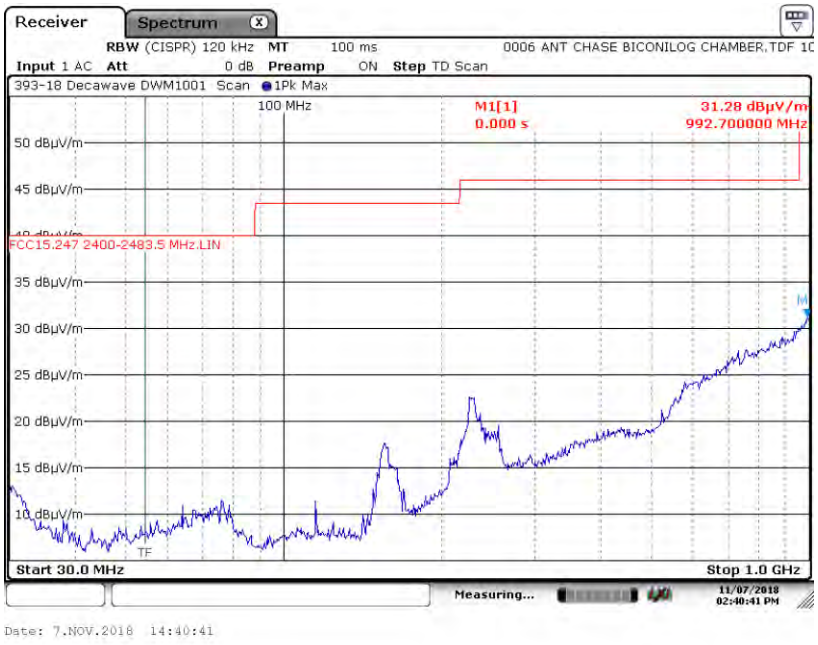
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

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

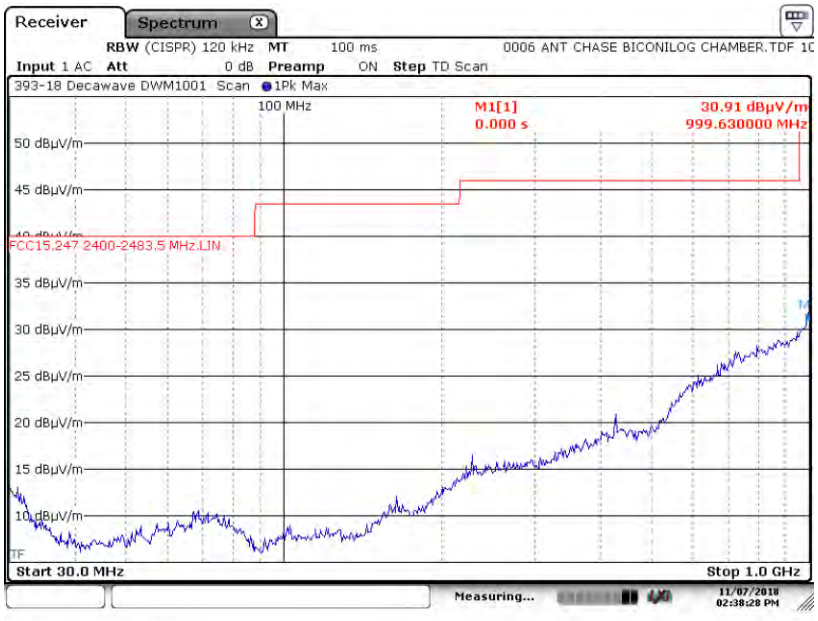
A3.2. Channel 17, 2440 MHz

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



Date: 7.NOV.2018 14:40:41

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



Date: 7.NOV.2018 14:38:28

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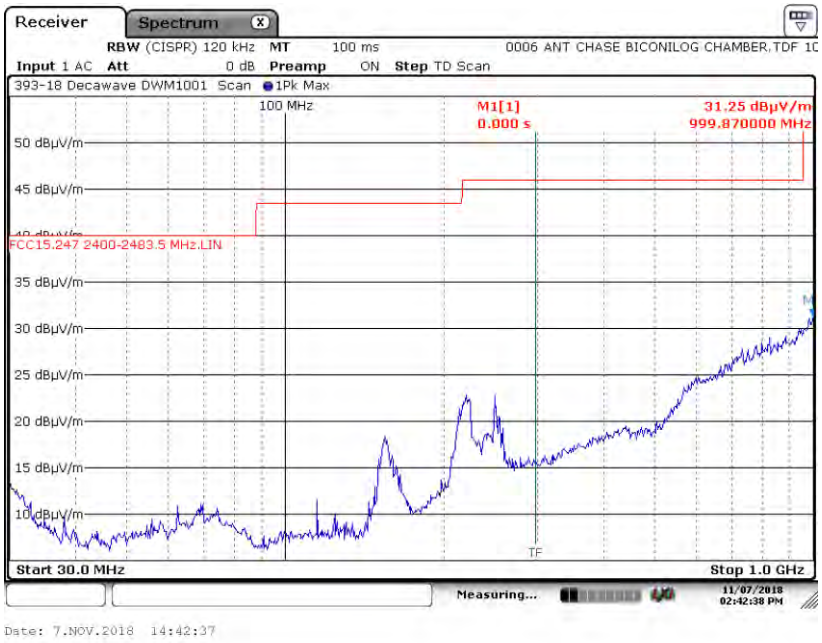
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

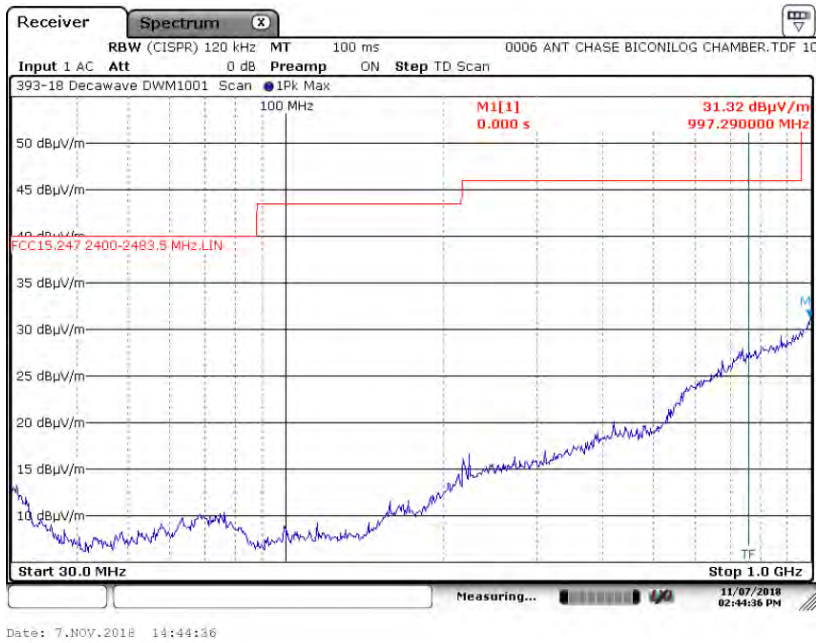
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.2. Channel 17, 2440 MHz

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



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



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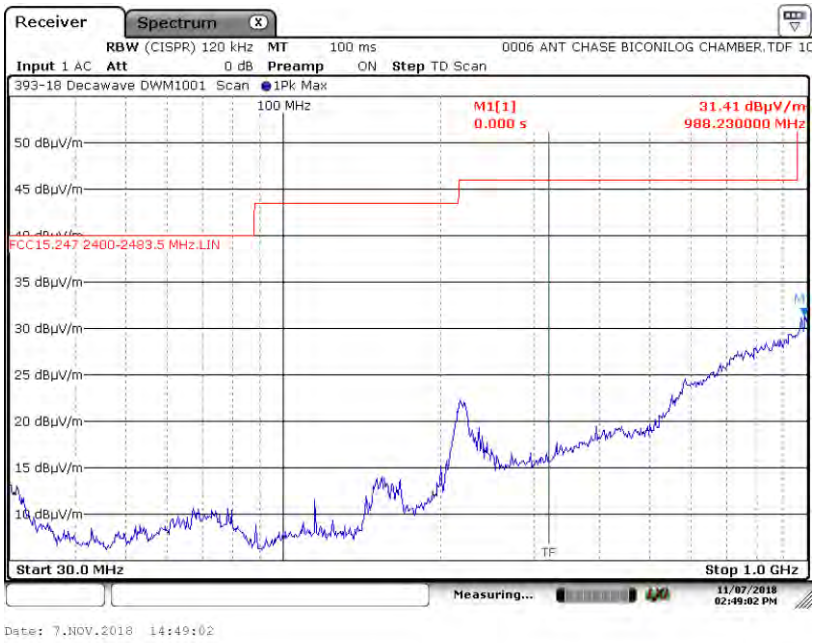
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

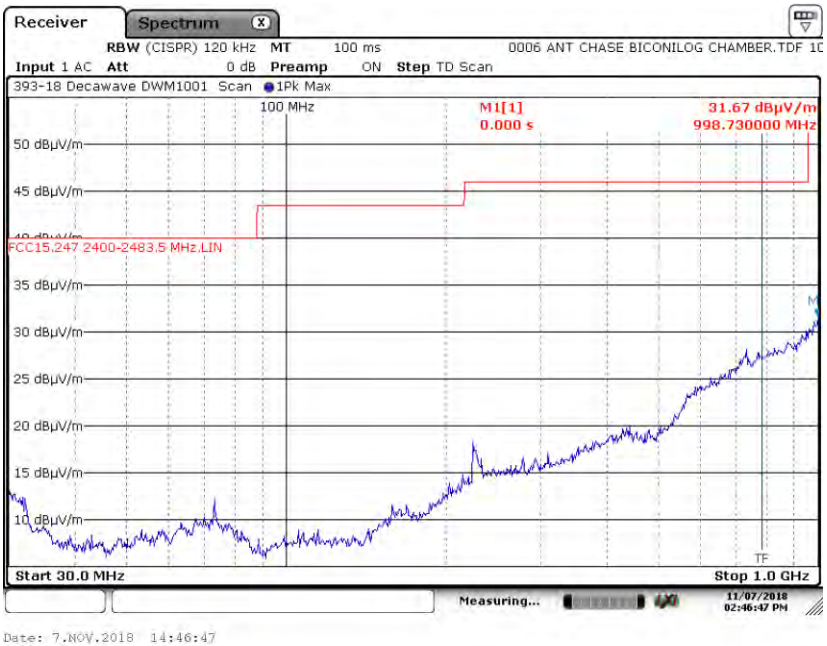
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.2. Channel 17, 2440 MHz

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



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



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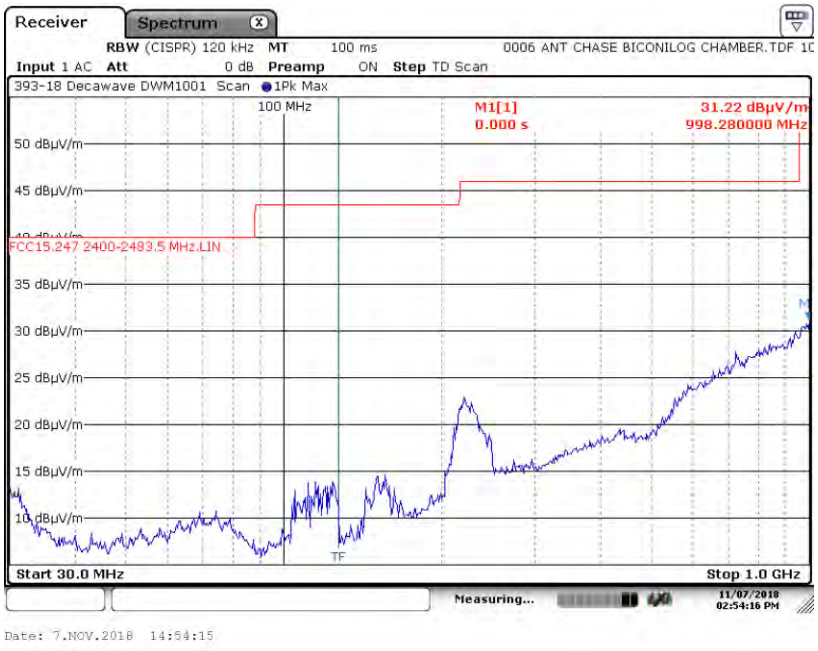
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

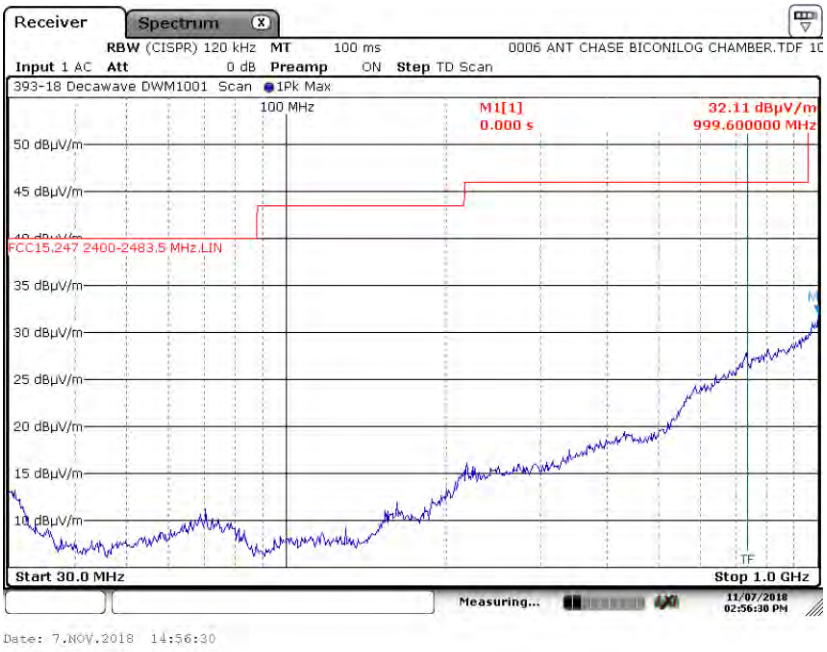
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.3. Channel 39, 2480 MHz

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



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



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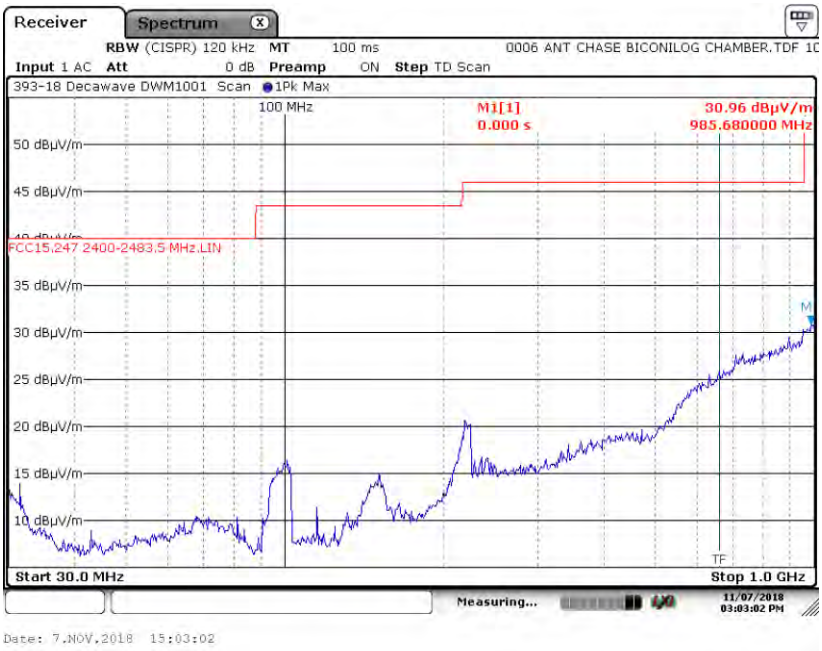
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

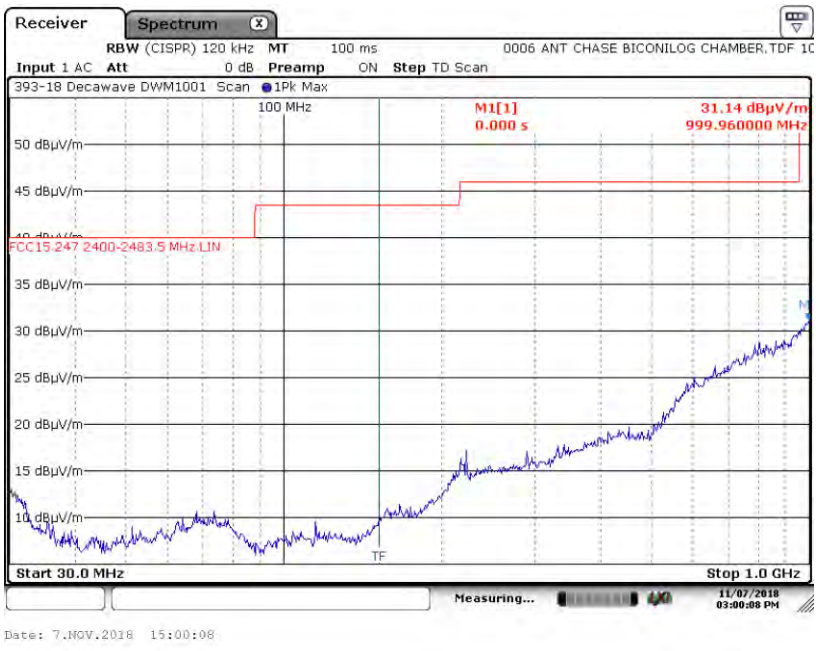
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.3. Channel 39, 2480 MHz

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



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



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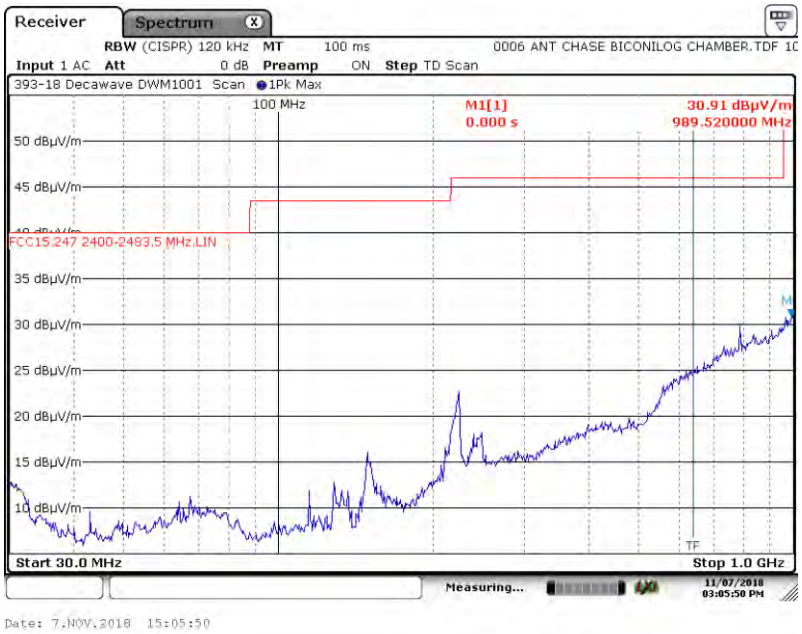
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

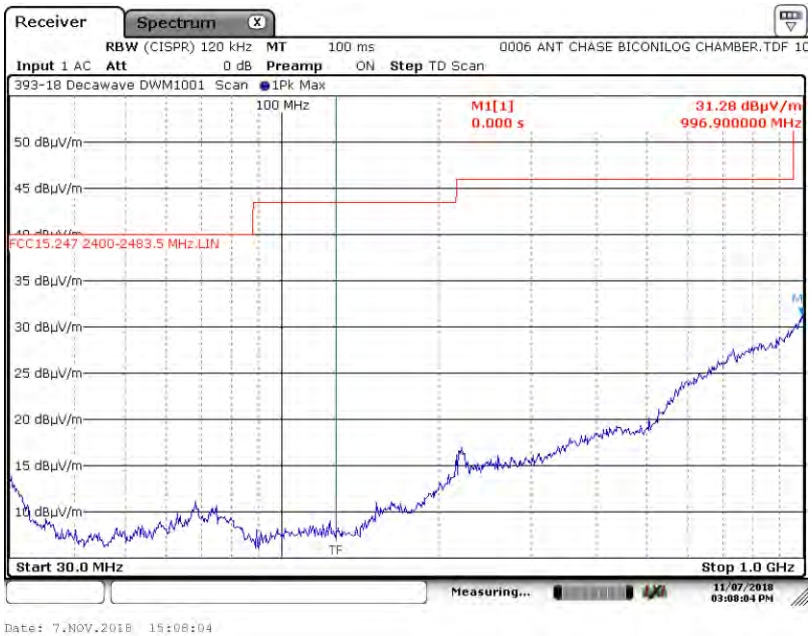
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.3. Channel 39, 2480 MHz

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



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



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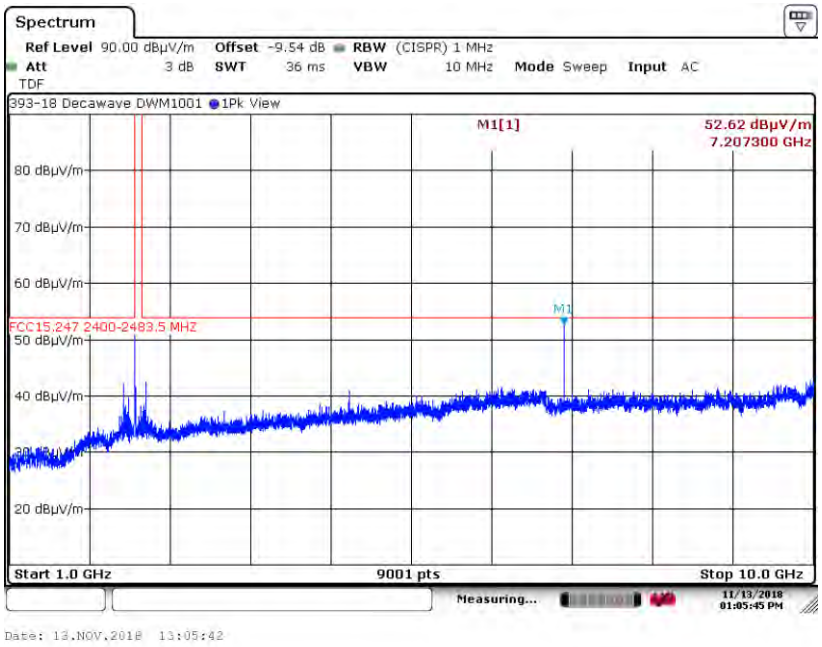
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

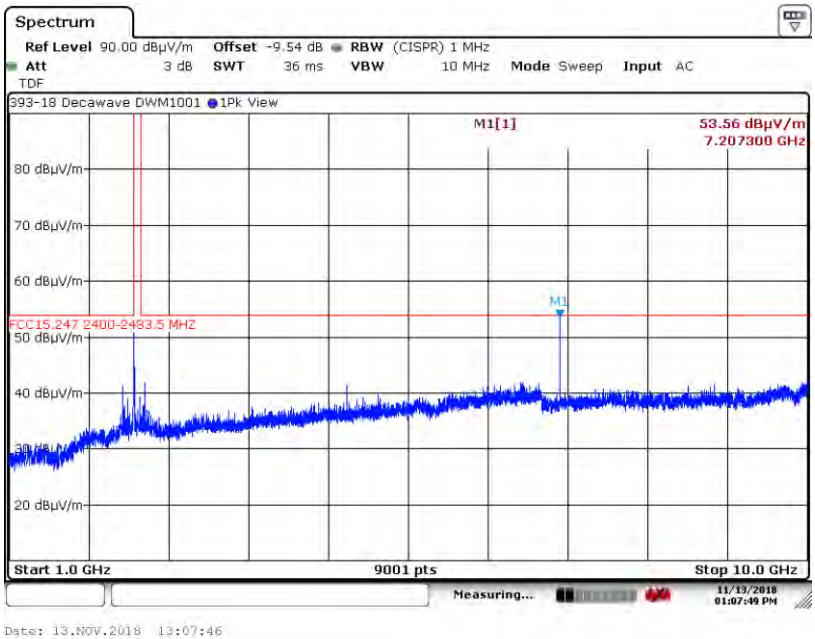
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.1. Channel 37, 2402 MHz

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



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



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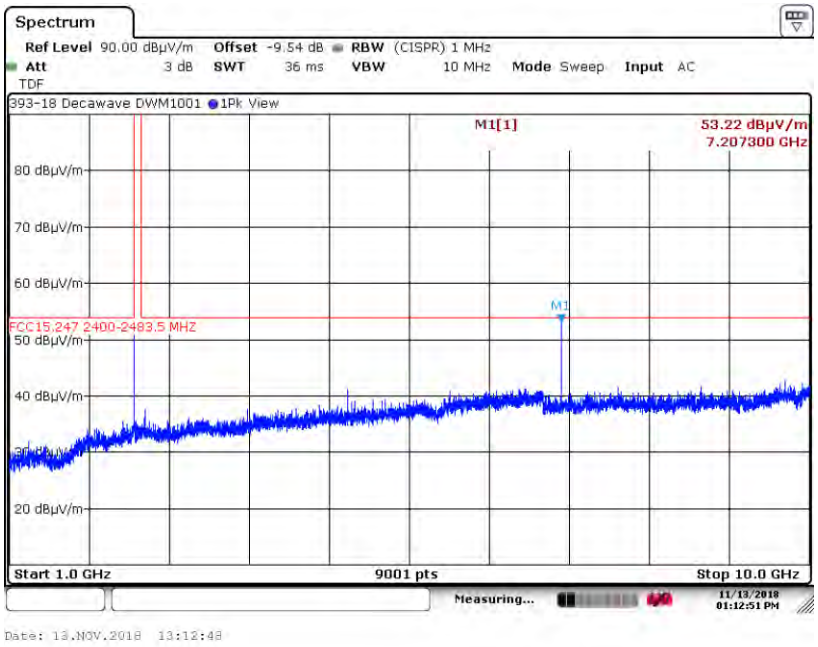
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

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

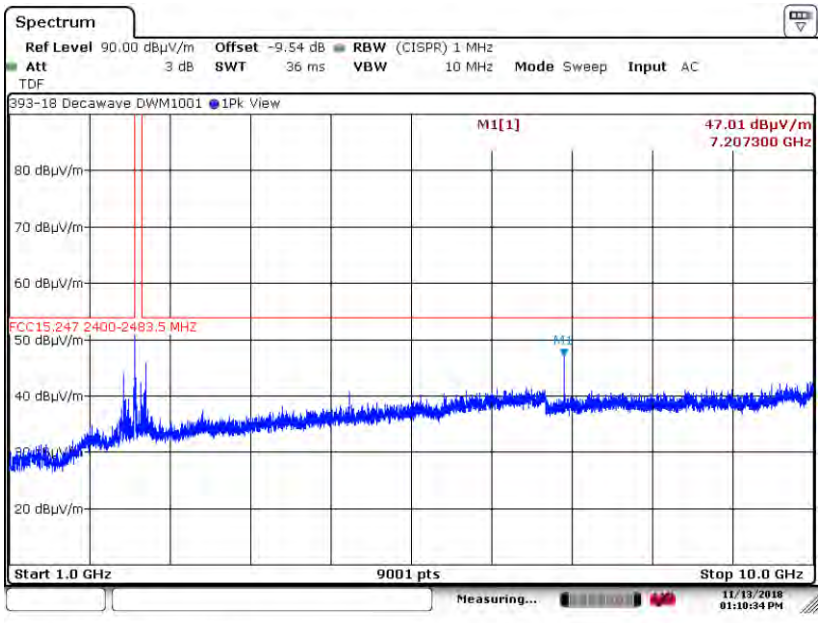
A4.1. Channel 37, 2402 MHz

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



Date: 13.NOV.2018 13:12:48

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



Date: 13.NOV.2018 13:10:31

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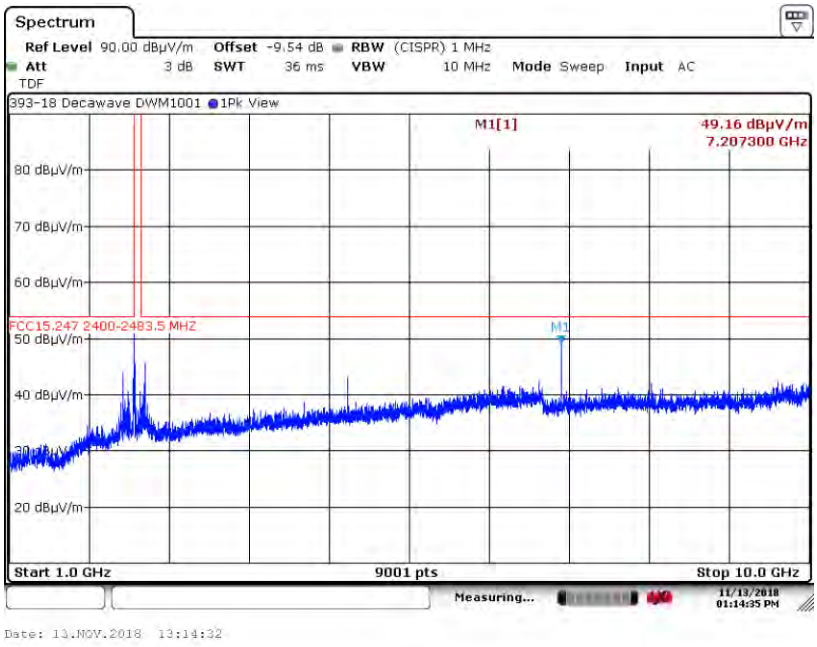
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

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

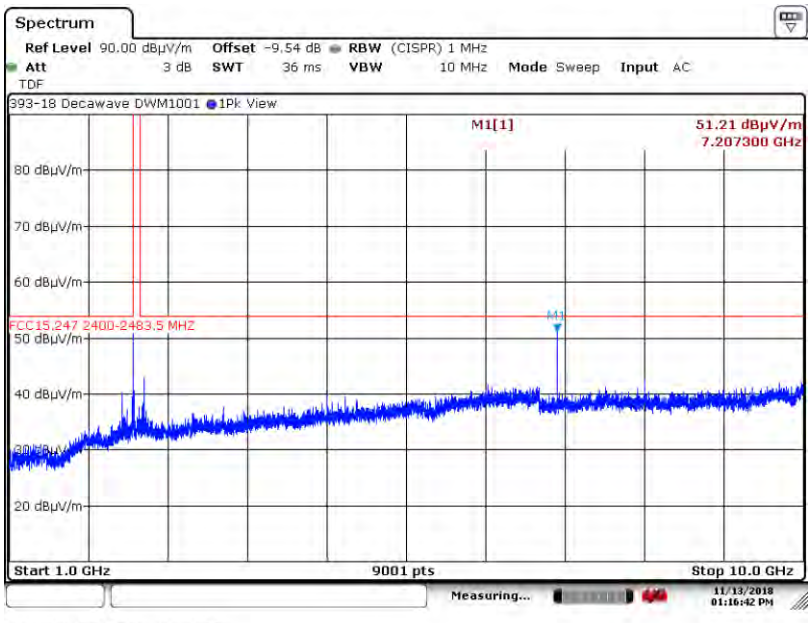
A4.1. Channel 37, 2402 MHz

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



Date: 13.NOV.2018 13:14:32

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



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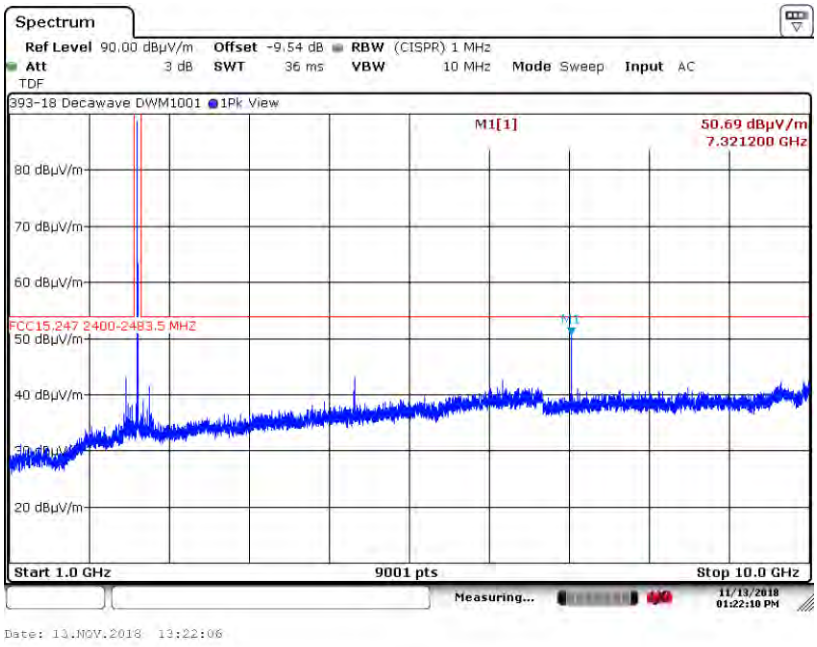
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

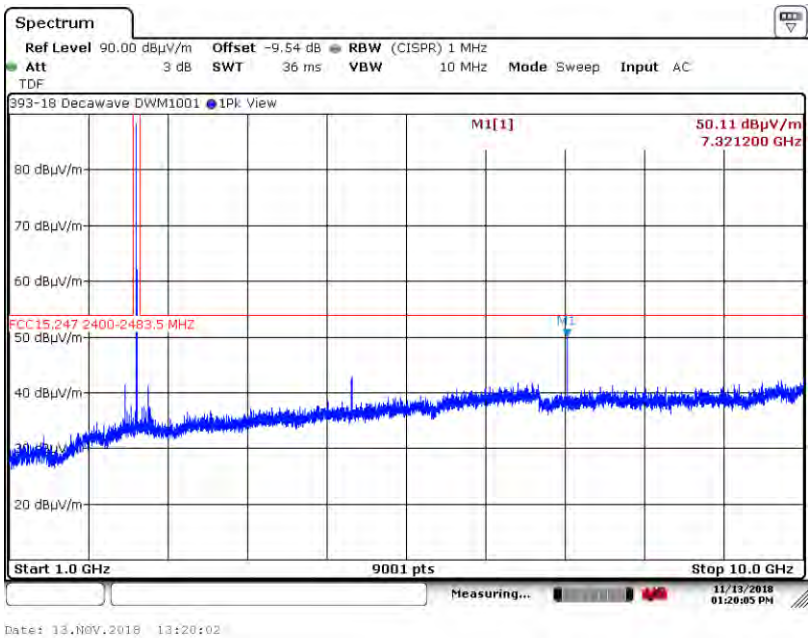
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.2. Channel 17, 2440 MHz

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



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



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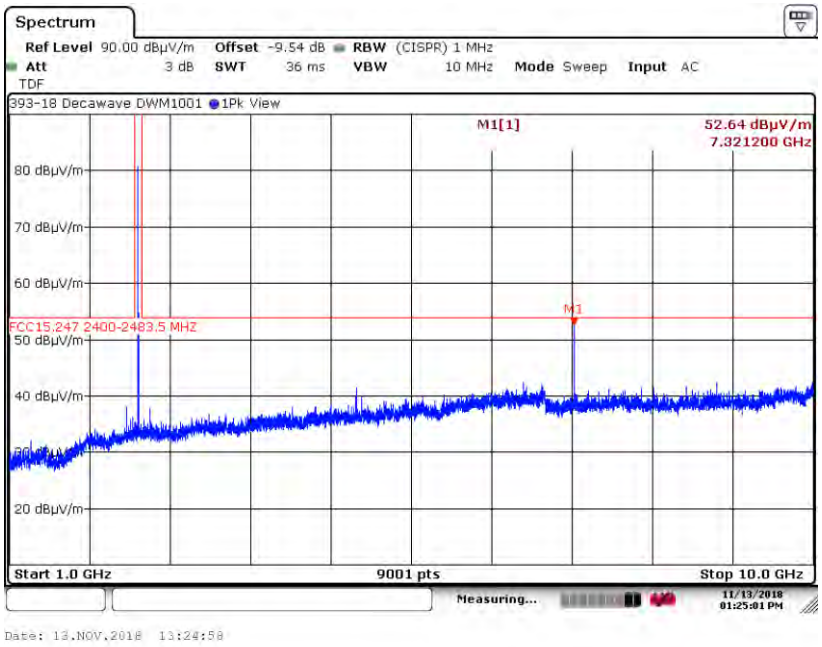
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

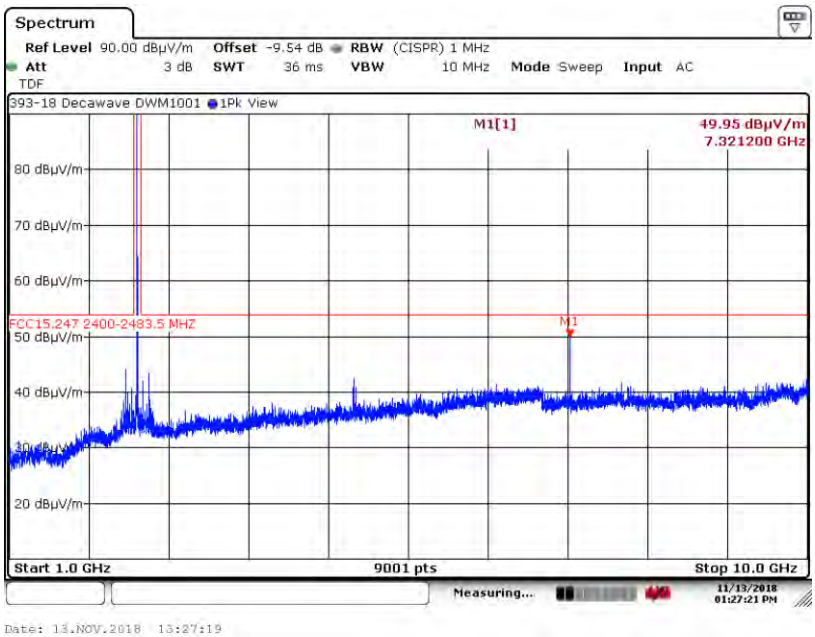
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.2. Channel 17, 2440 MHz

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



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



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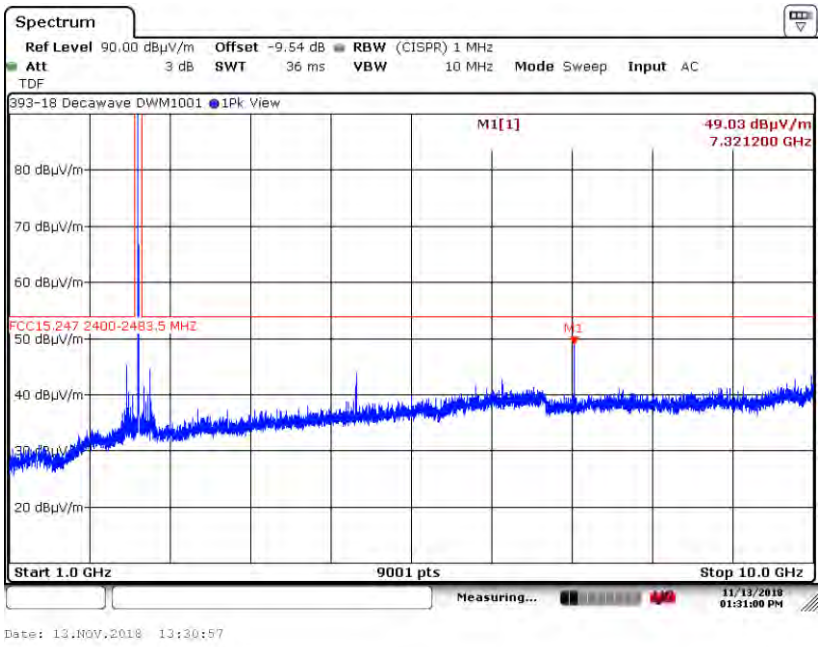
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

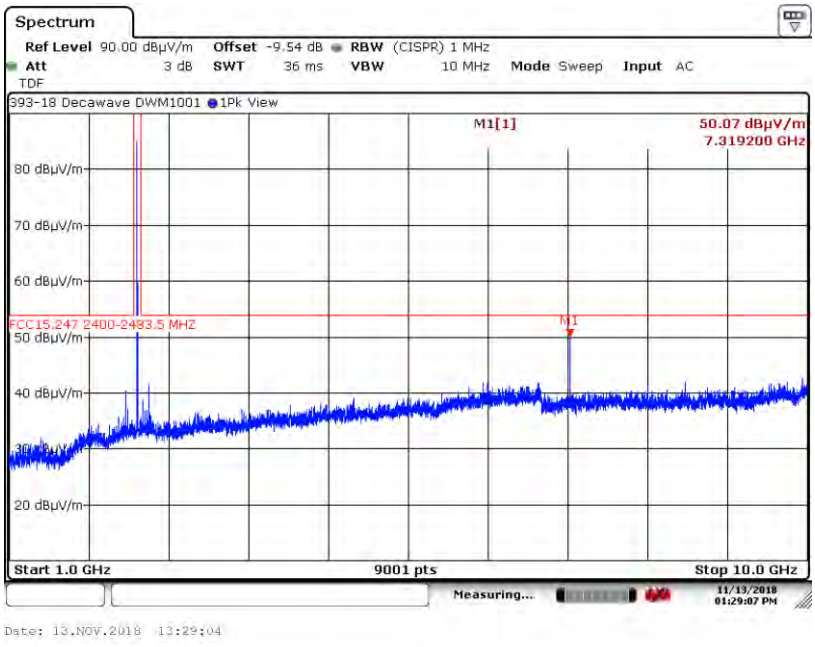
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.2. Channel 17, 2440 MHz

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



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



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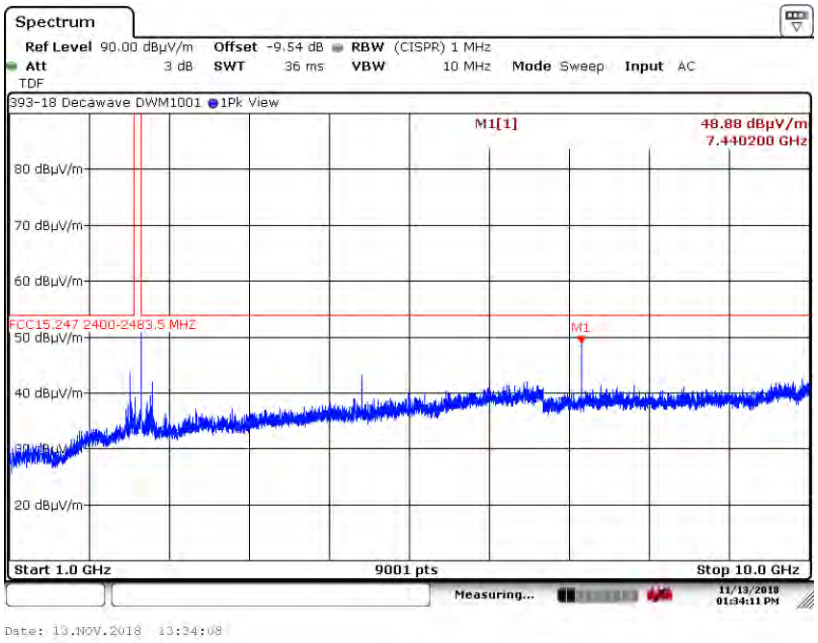
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

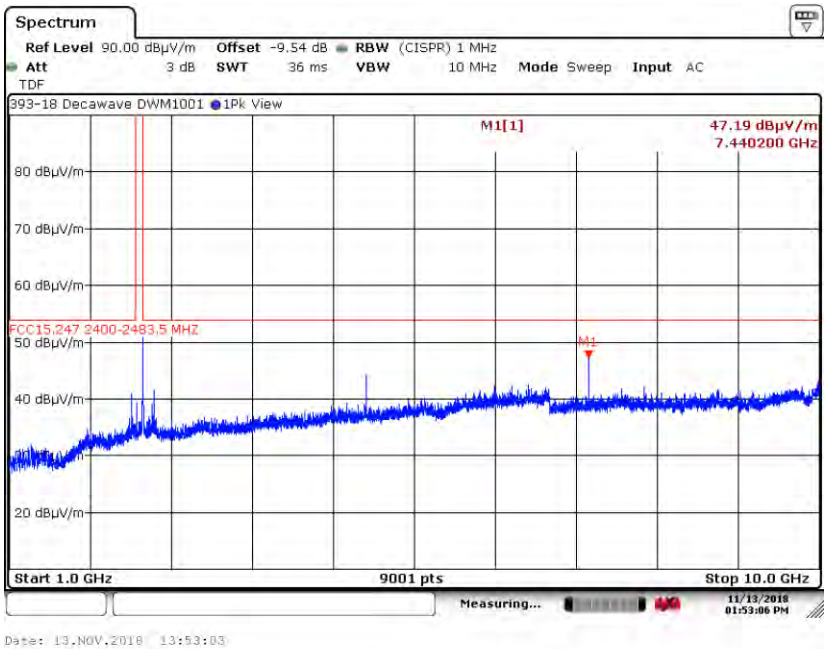
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.3. Channel 39, 2480 MHz

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



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



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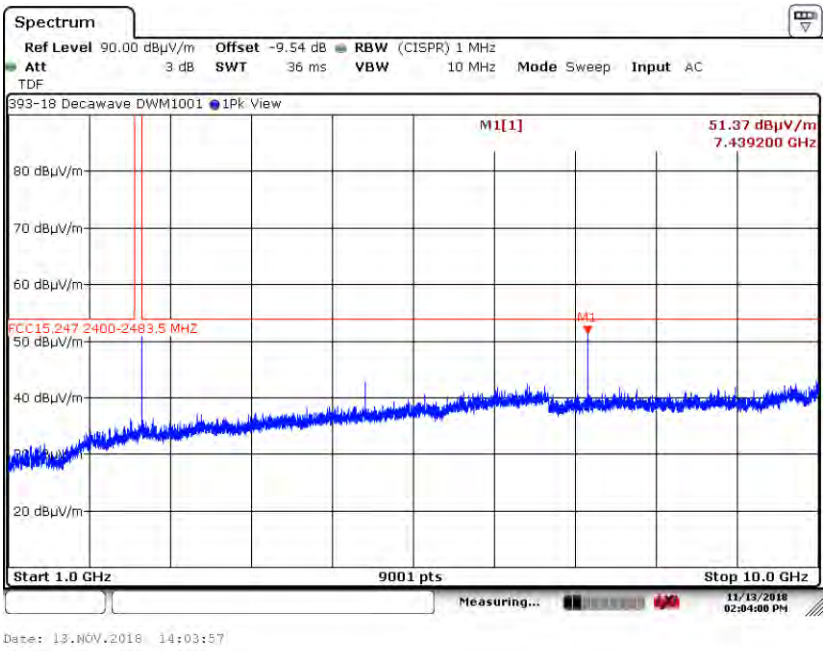
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

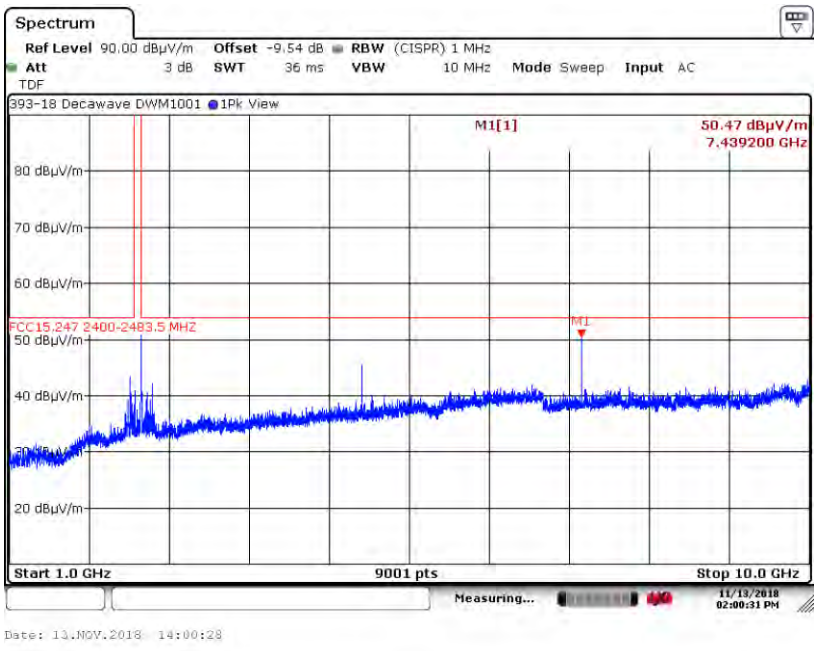
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.3. Channel 39, 2480 MHz

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



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



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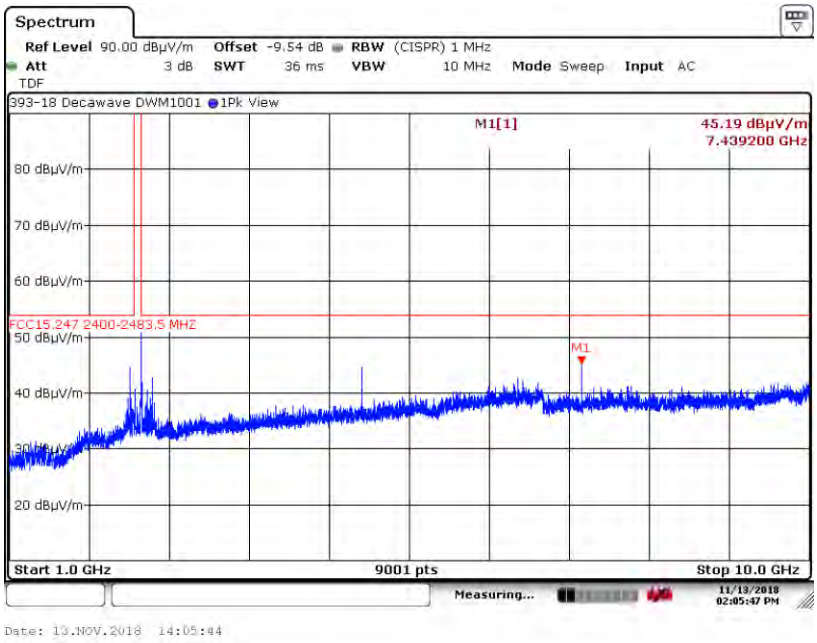
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

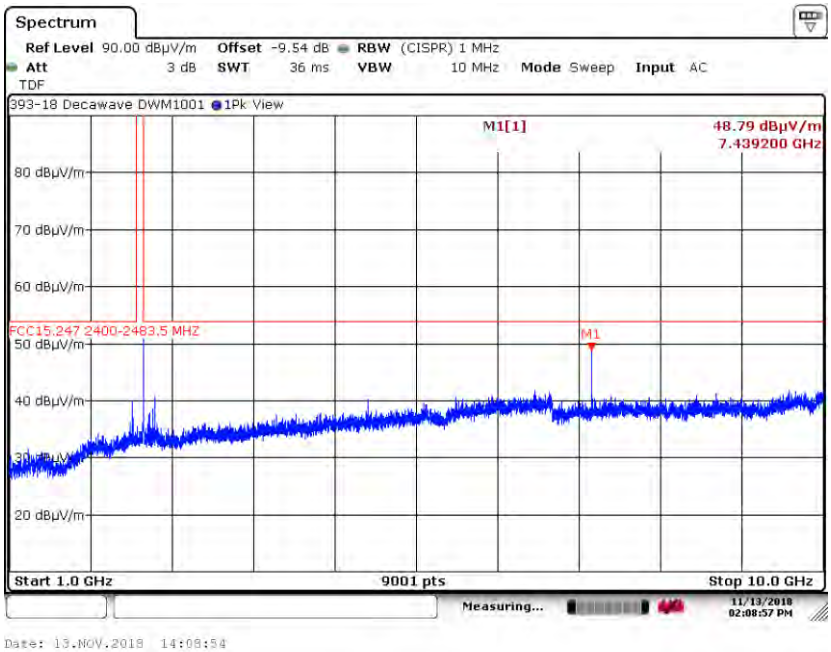
A4. Spurious Radiated Emissions (1 GHz – 10 GHz) Test Results

A4.3. Channel 39, 2480 MHz

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



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



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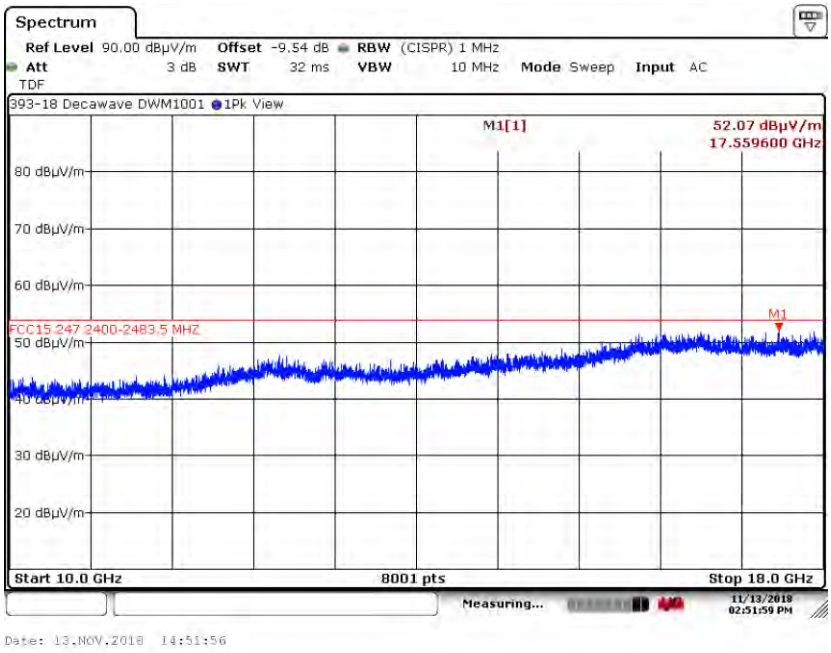
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

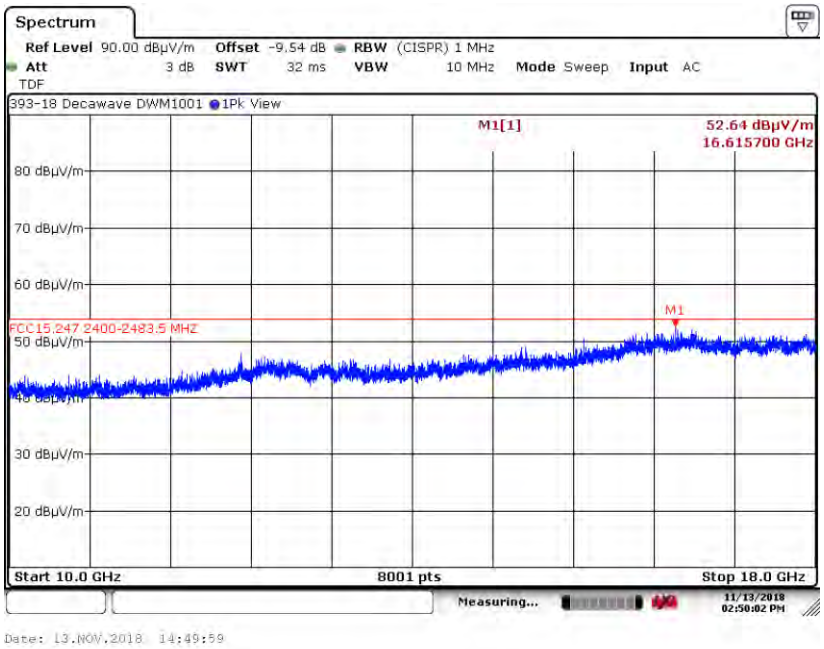
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.1. Channel 37, 2402 MHz

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



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



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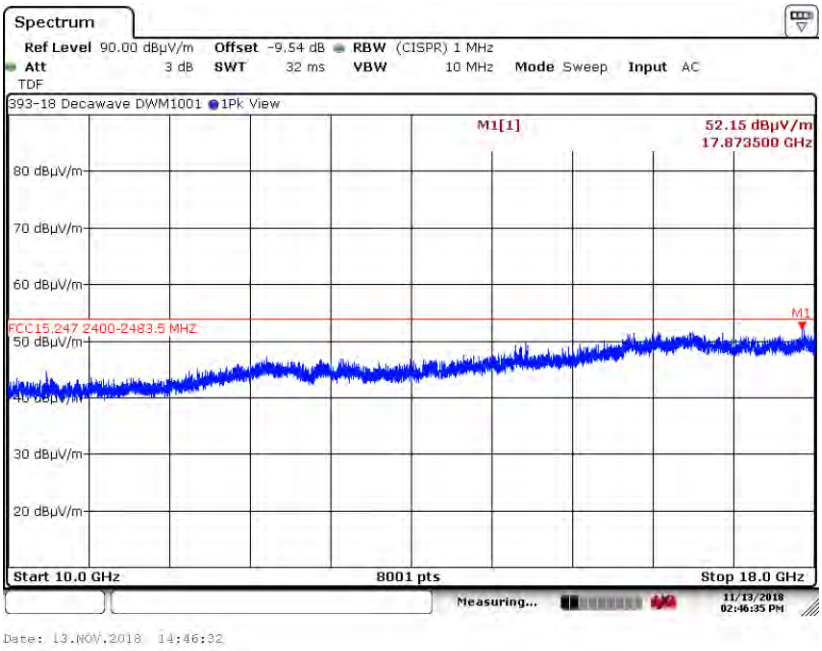
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

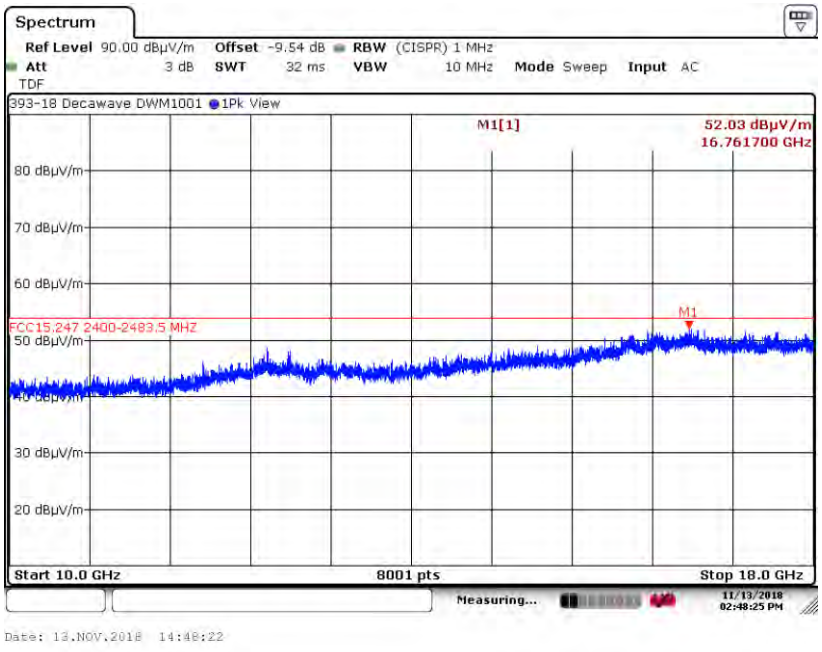
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.1. Channel 37, 2402 MHz

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



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



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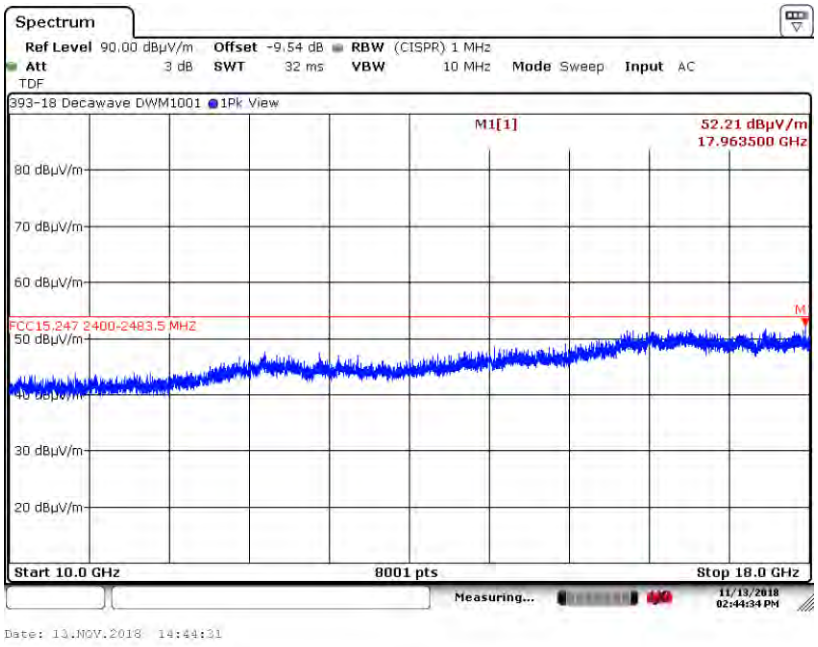
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

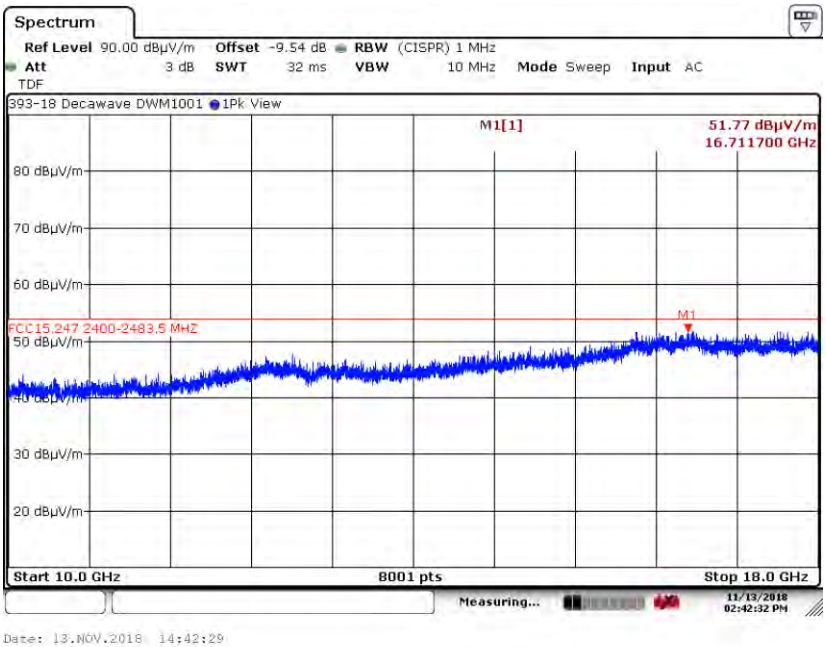
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.1. Channel 37, 2402 MHz

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



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



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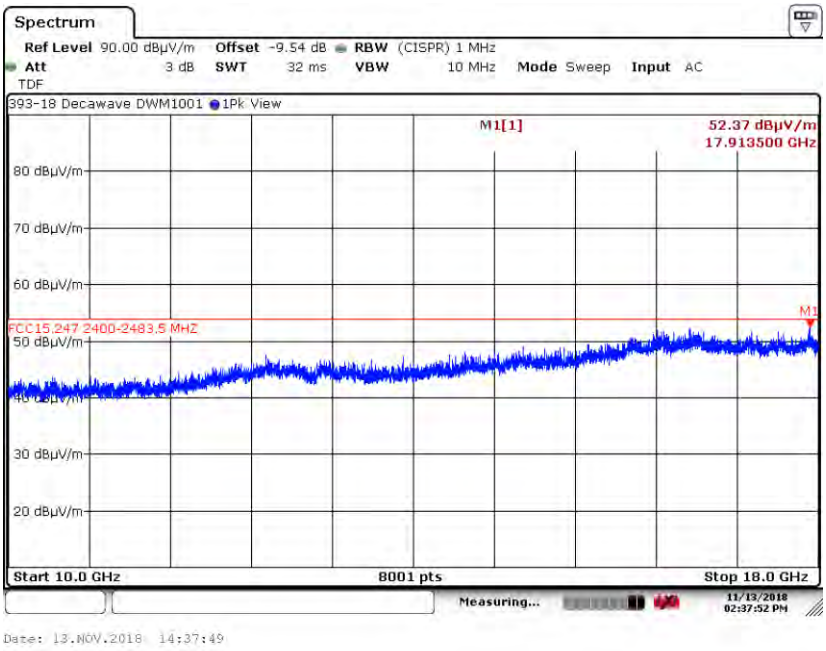
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

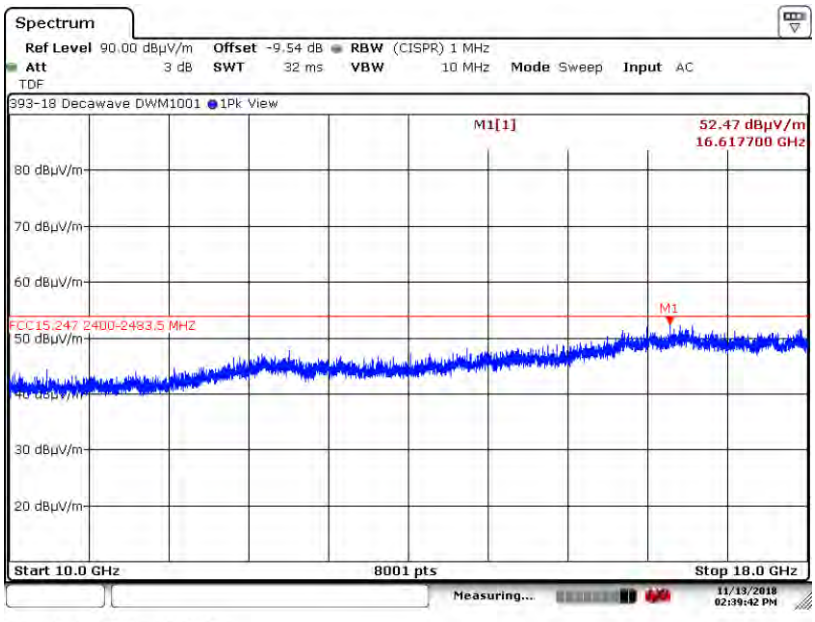
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.2. Channel 17, 2440 MHz

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



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



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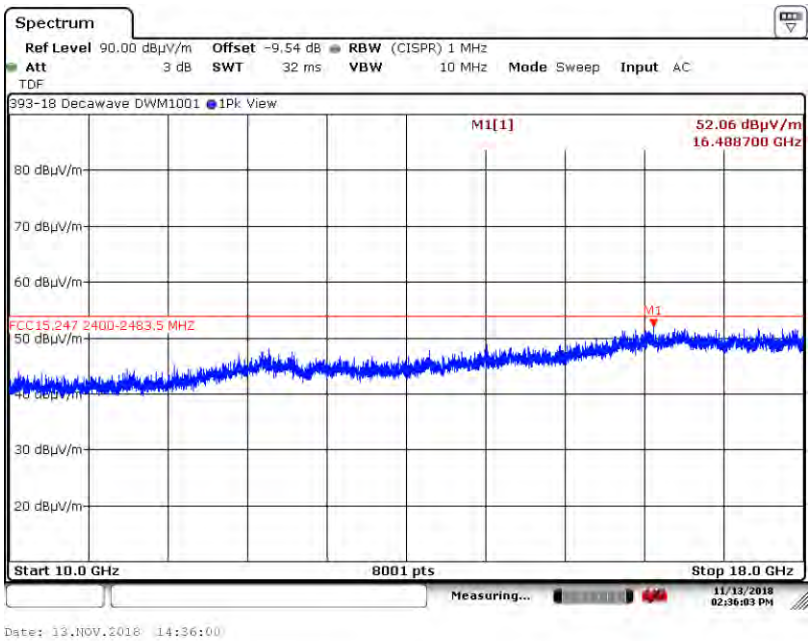
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

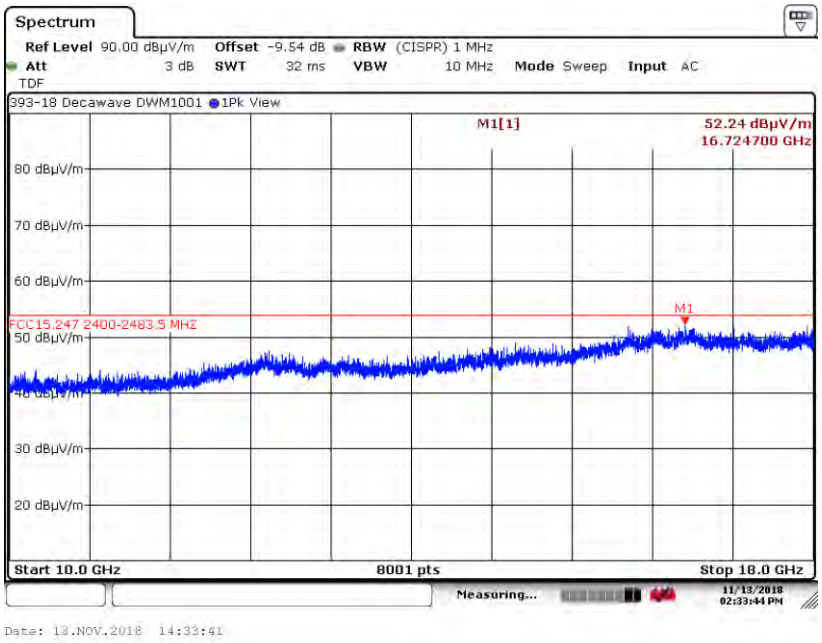
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.2. Channel 17, 2440 MHz

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



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



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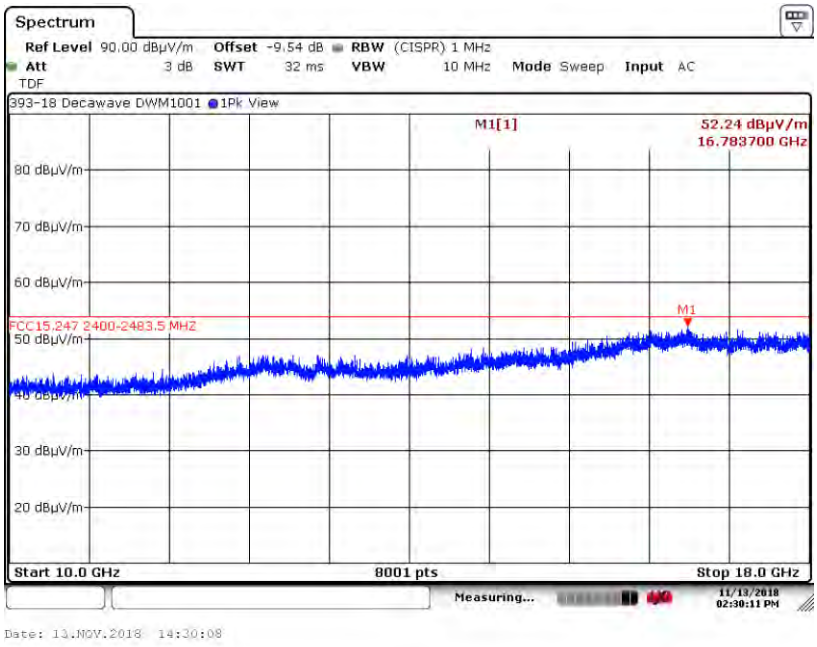
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

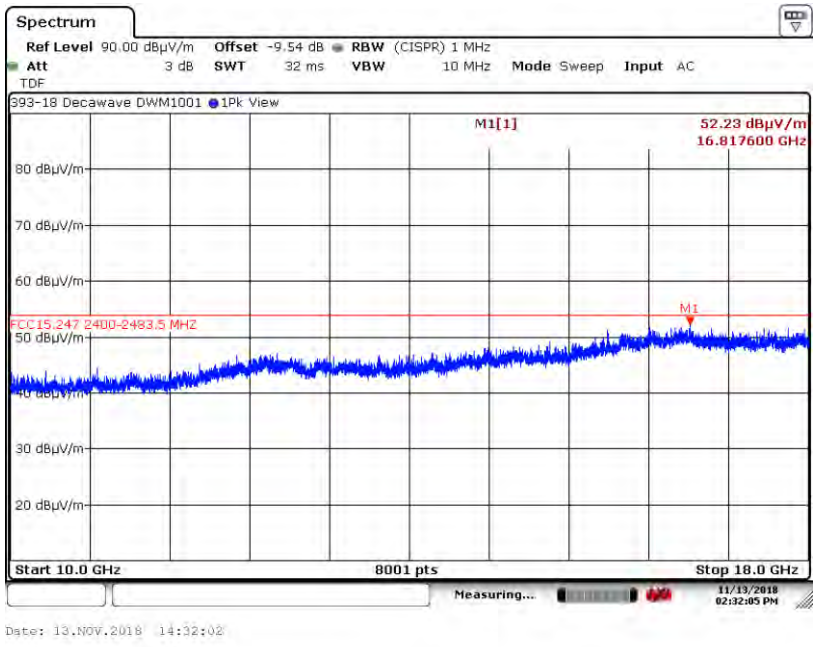
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.2. Channel 17, 2440 MHz

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



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



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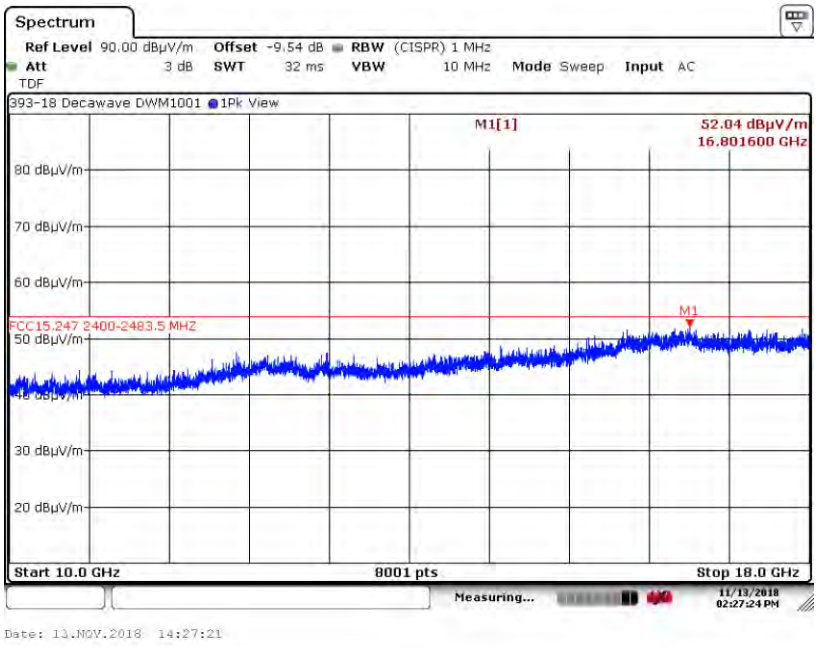
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

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

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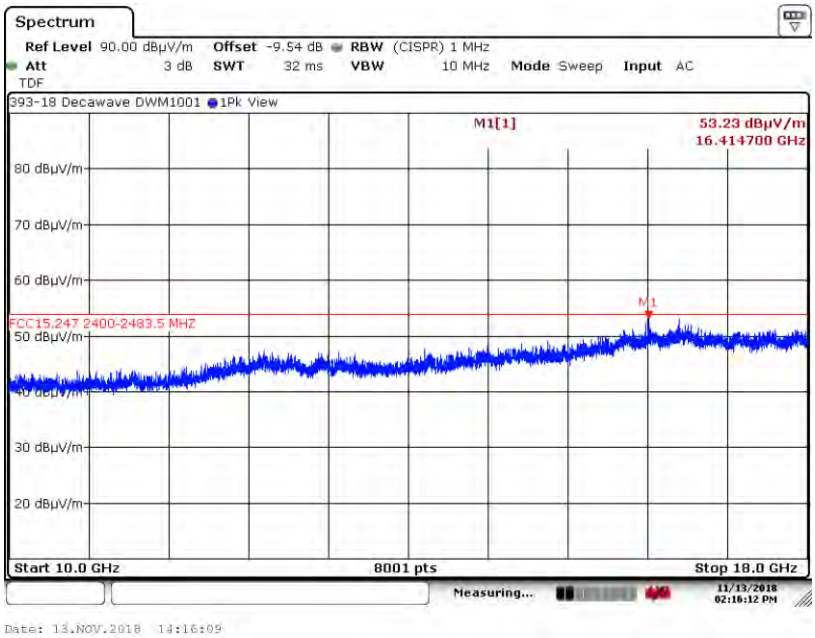
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

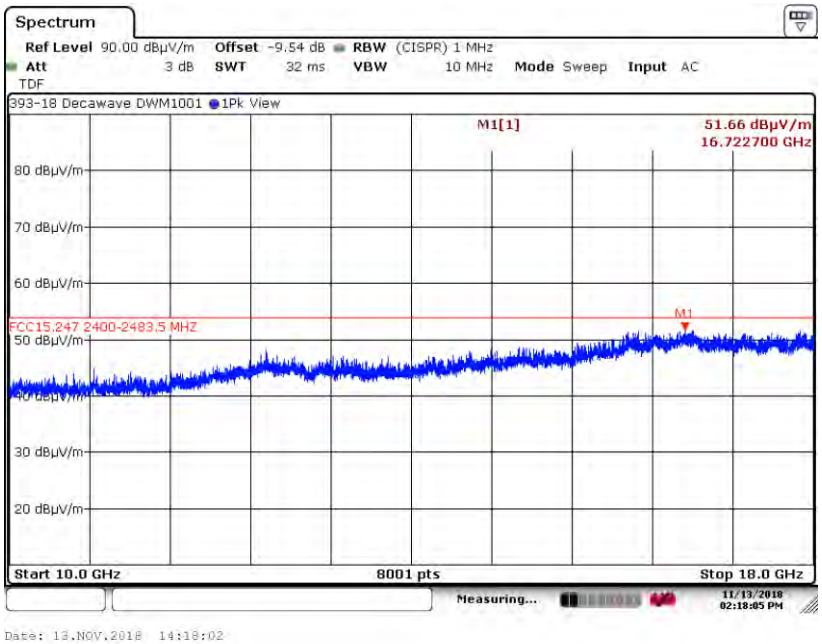
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.3. Channel 39, 2480 MHz

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



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



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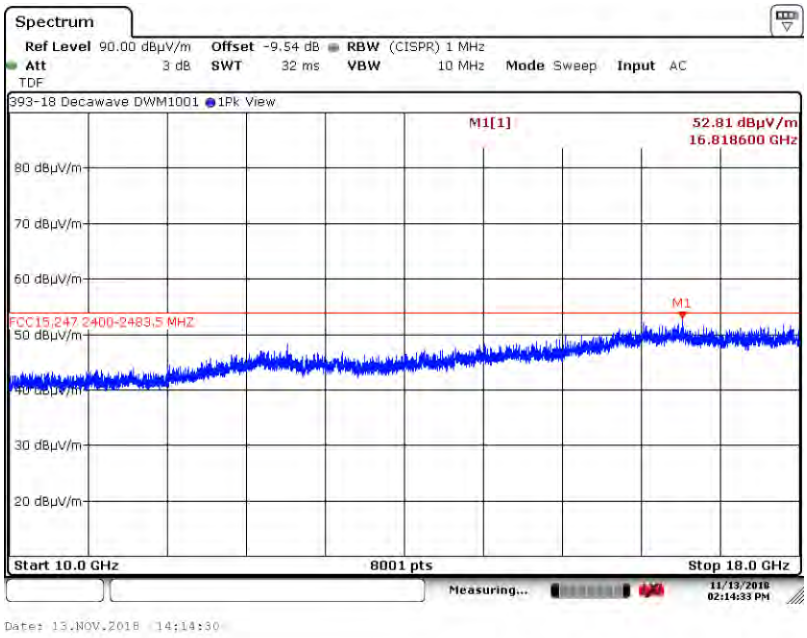
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

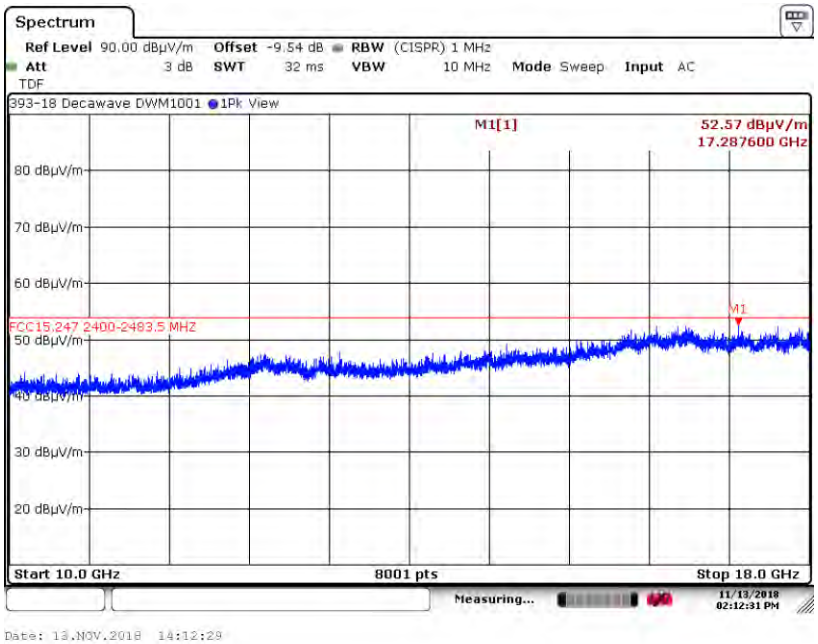
A5. Spurious Radiated Emissions (10 GHz – 18 GHz) Test Results

A5.3. Channel 39, 2480 MHz

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



A5.3.6. Measurement Results: Z-Axis, Vertical Antenna



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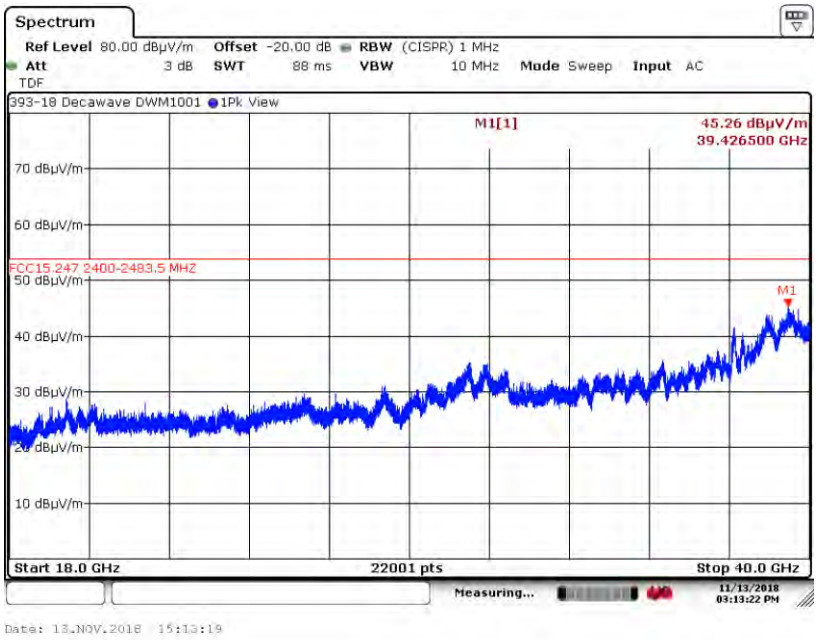
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

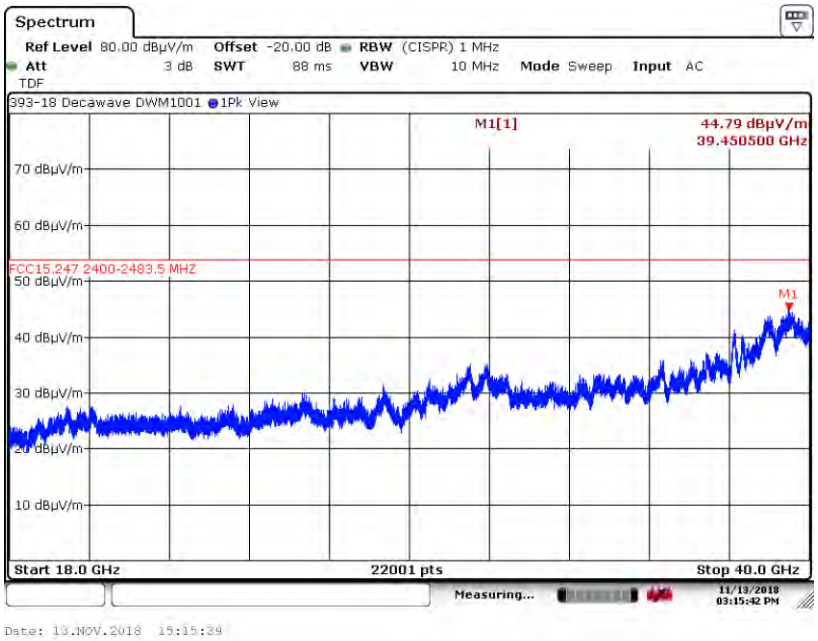
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.1. Channel 37, 2402 MHz

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



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



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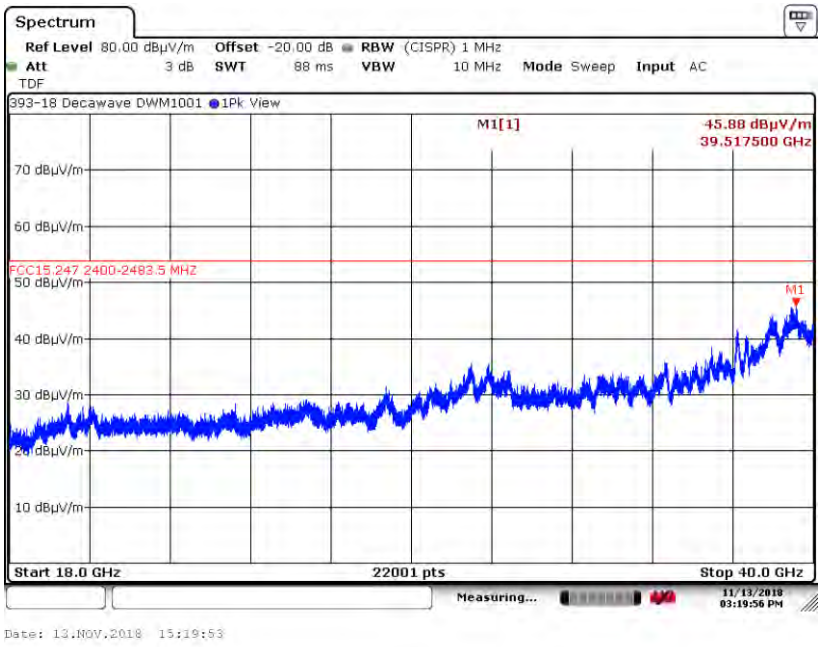
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

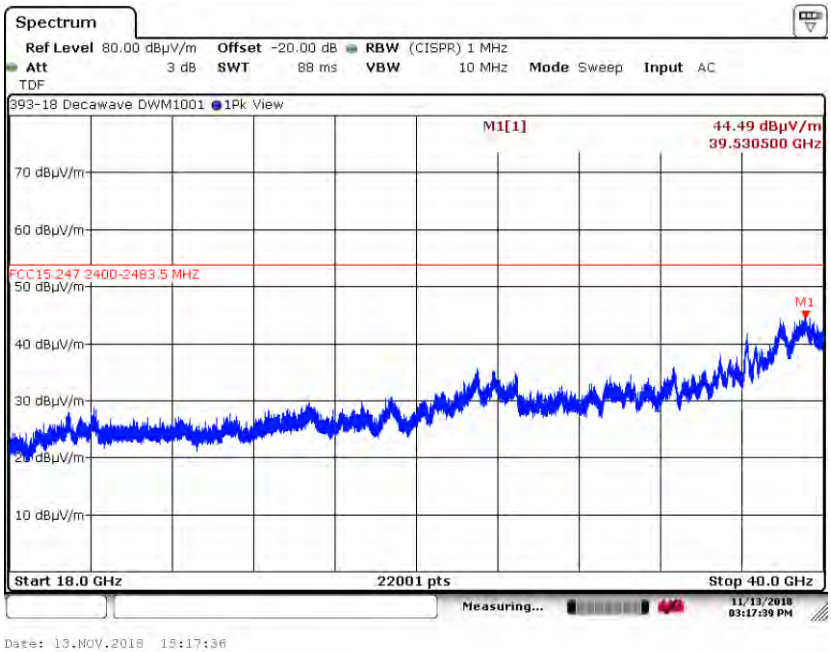
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.1. Channel 37, 2402 MHz

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



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



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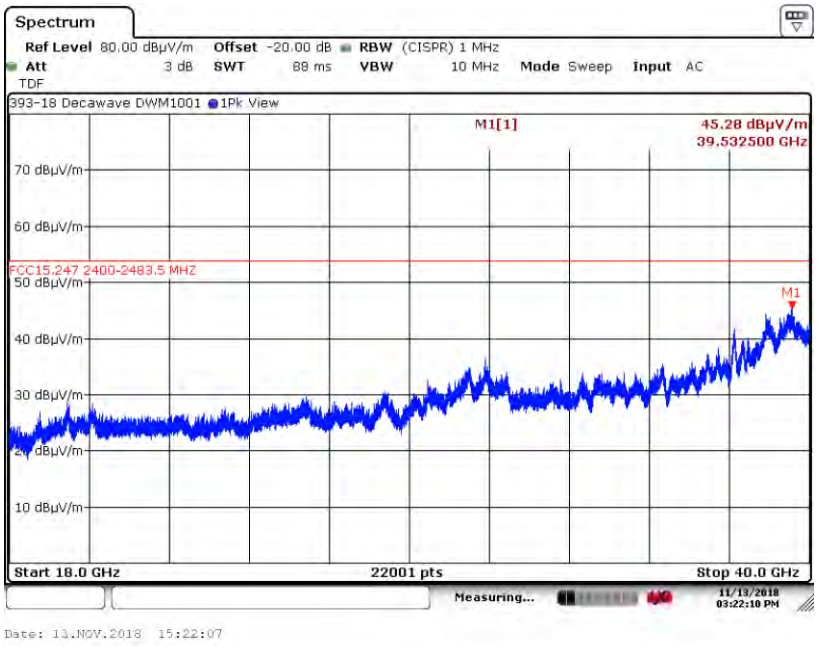
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

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

A6.1. Channel 37, 2402 MHz

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



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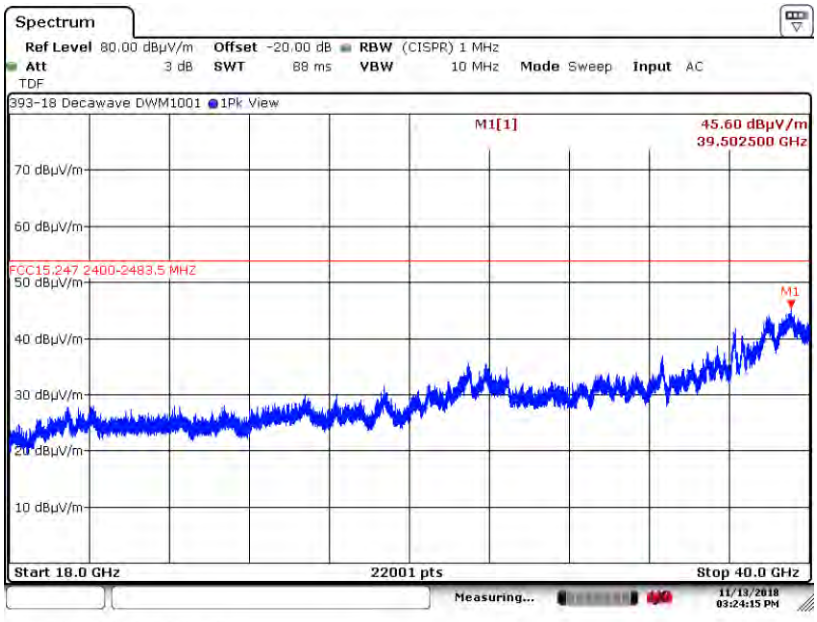
A6.1.6. Measurement Results: Z-Axis, Vertical Antenna



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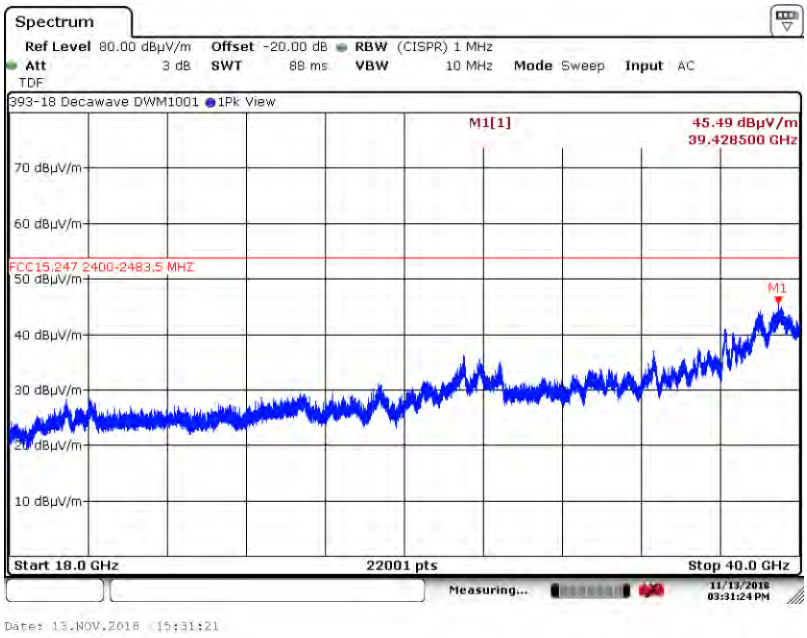
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

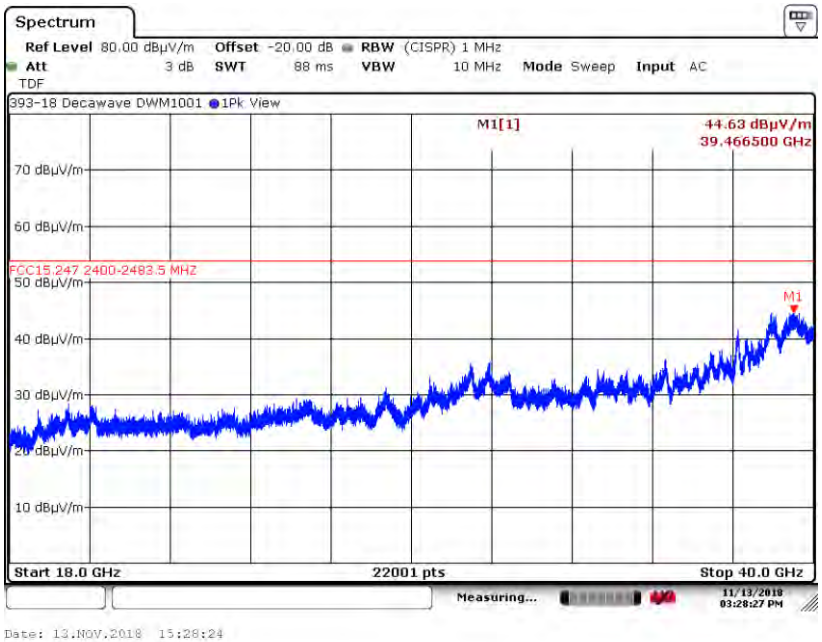
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.2. Channel 17, 2440 MHz

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



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



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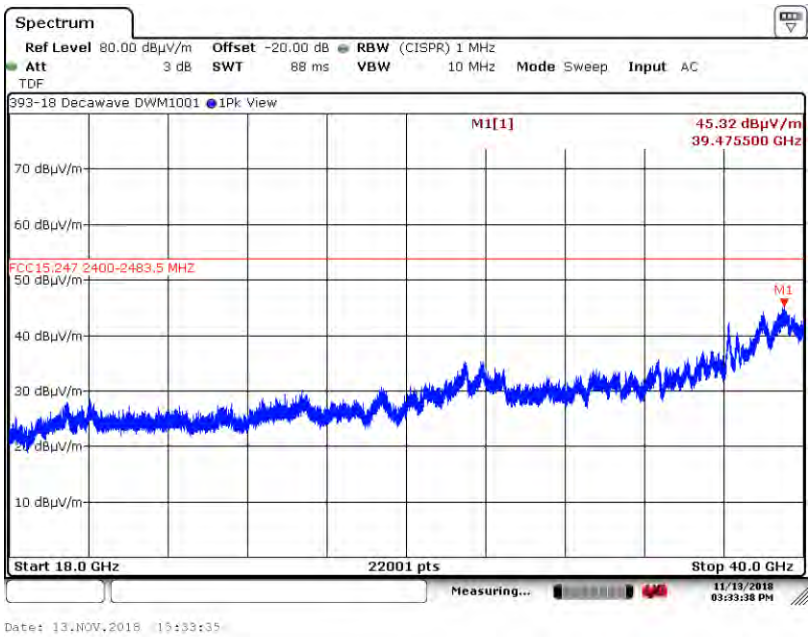
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

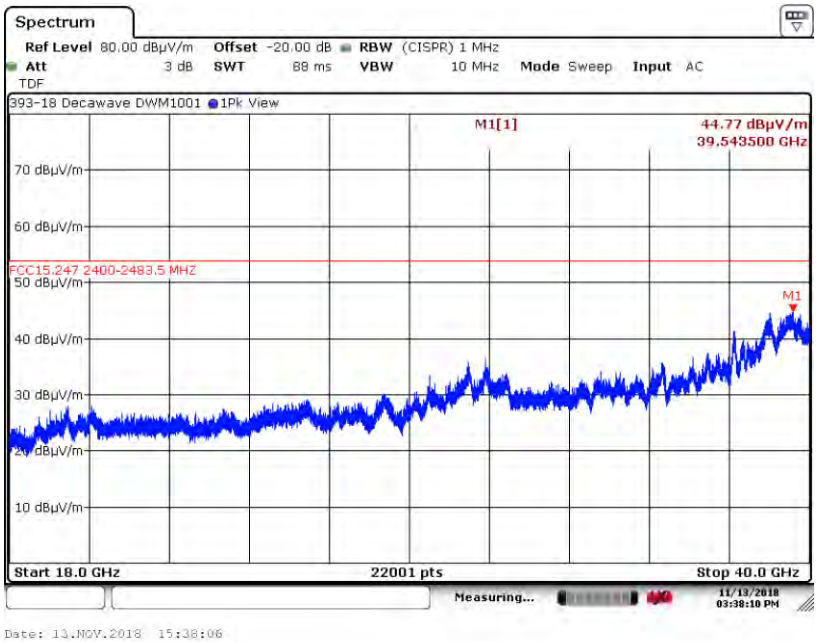
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.2. Channel 17, 2440 MHz

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



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



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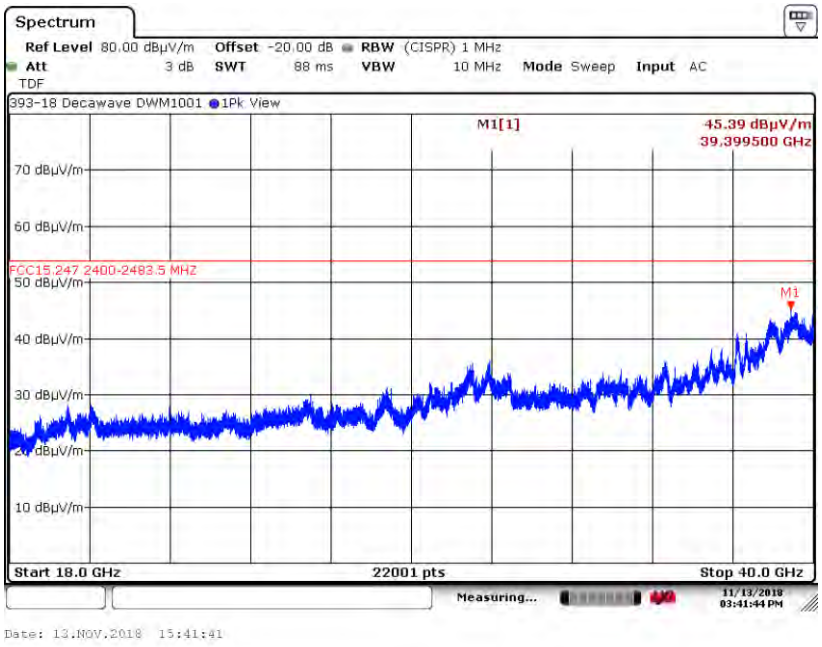
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

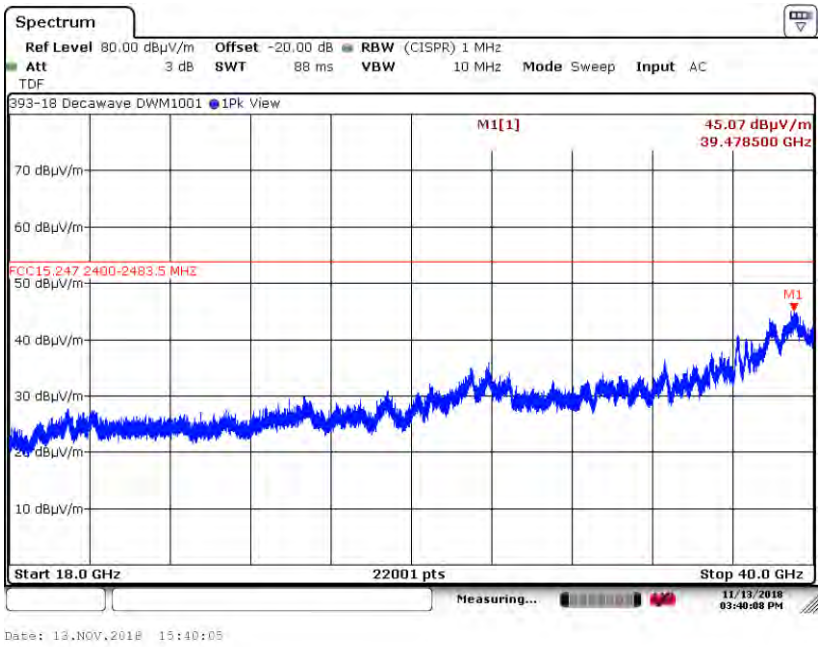
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.2. Channel 17, 2440 MHz

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



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



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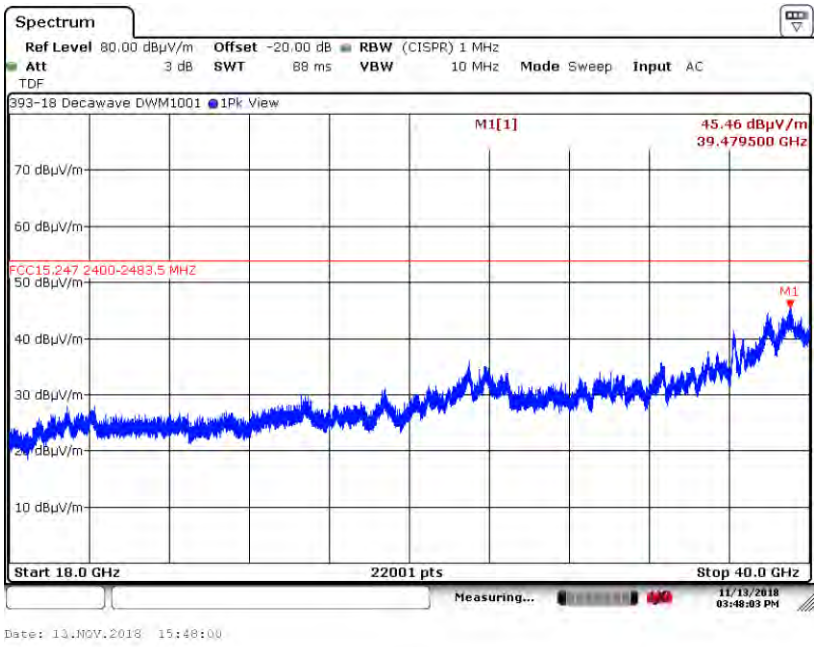
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

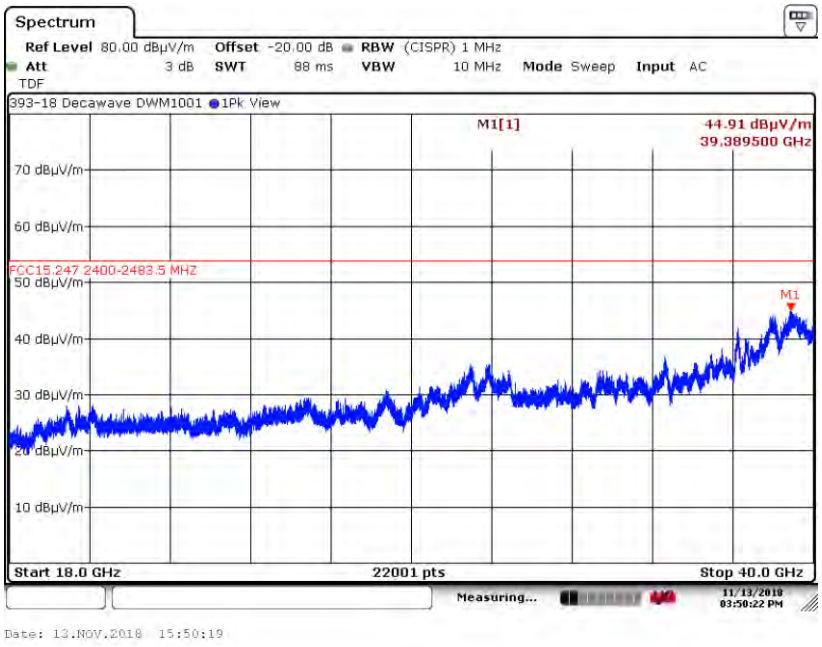
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.3. Channel 39, 2480 MHz

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



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



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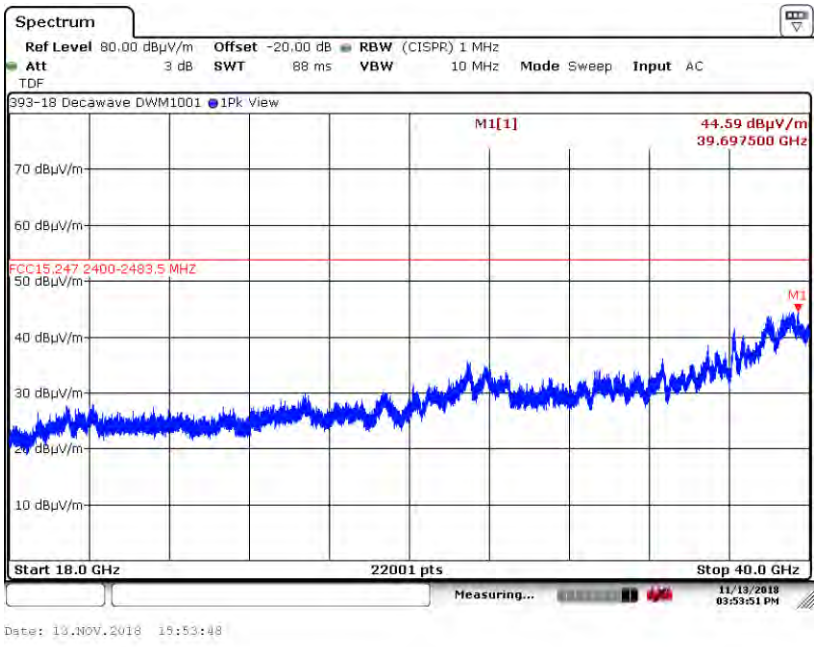
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

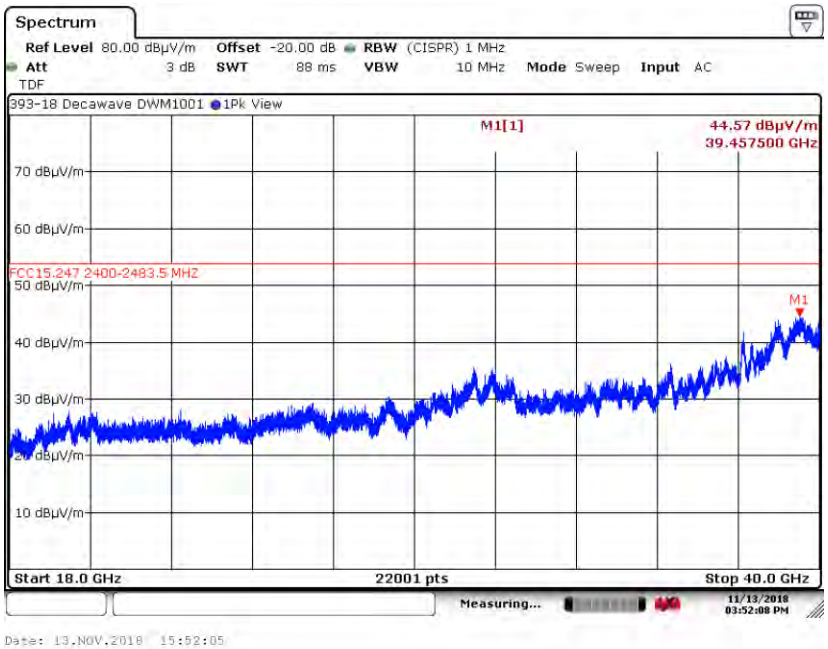
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.3. Channel 39, 2480 MHz

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



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



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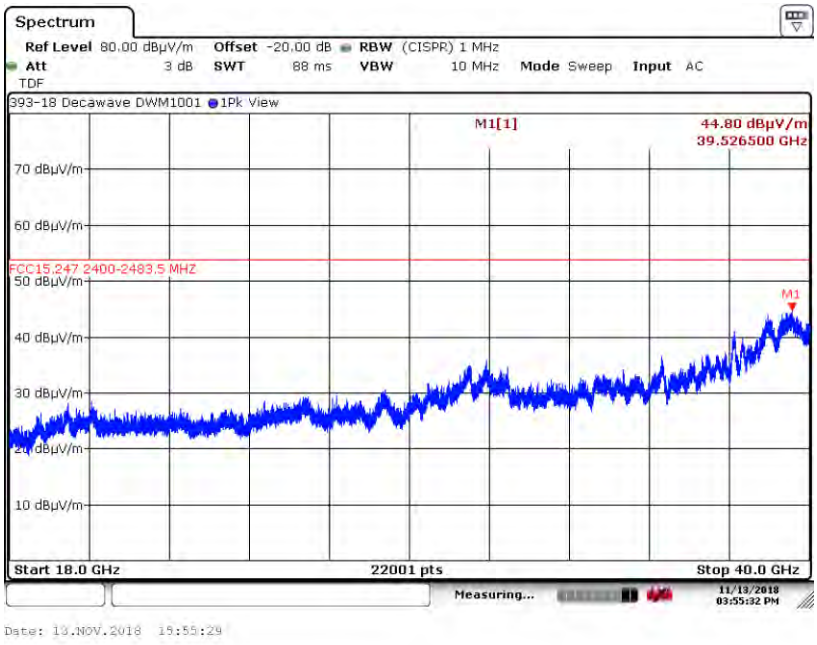
Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 40 GHz)

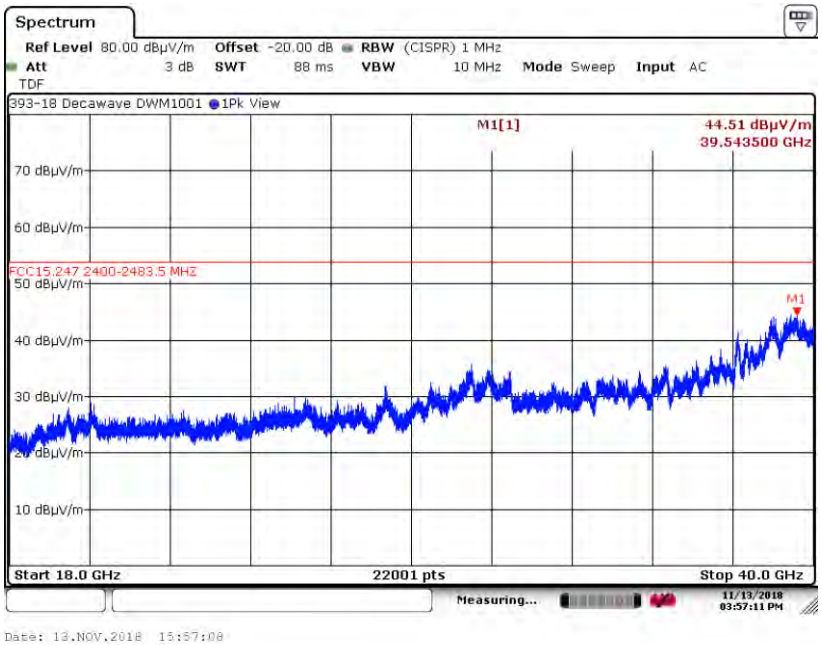
A6. Spurious Radiated Emissions (18 GHz – 40 GHz) Test Results

A6.3. Channel 39, 2480 MHz

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



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



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