



COMPLIANCE WORLDWIDE INC. TEST REPORT 431-19

In Accordance with the Requirements of
FCC PART 15.247, SUBPART C
Class II Permissive Change
Innovation, Science and Economic Development Canada
RSS-247, Issue 2

Low Power License-Exempt Radio Communication Devices
Intentional Radiators

Issued to
iZotope, Inc.
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Cambridge, MA 02139
617- 577-7799

for the
iZotope Spire Studio (Tonos Product)
Model: SP121
Bluetooth Low Energy (BLE) Transmitter

FCC ID: 2AKPU1DX
IC: 23446-PU1DX

Report Issued on December 10, 2019

Tested by

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Reviewed by

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1. Scope

This test report certifies that the iZotope Spire Studio (Tonos Product) Bluetooth Low Energy (BLE) Transmitter, 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:	iZotope, Inc.
2.2. Model Number:	Spire Studio
2.3. Serial Number:	HA-389 (including HA-414 CPU, HA-426 UI, and HA-401 Audio)
2.4. Description:	"Spire Capture Pro": wireless internet enabled audio recording device.
2.5. Power Source:	DC 5 Volts @ 2 Amps. (Wall adapter)
2.6. Hardware Revision:	Tonos_Rev2
2.7. Software Revision:	Bare Modus 2.2.0.15384
2.8. Modulation Type:	OFDM
2.9. Operating Frequency:	2.4 GHz Nominal
2.10. EMC Modifications:	.None

3. Product Configuration

3.1. Operational Characteristics & Software

First, make sure to plug the device in and let it charge for at least two hours. Turn the device on by pressing and holding the power button on the rear for at least two seconds. The LED panel will display a boot-up animation with white LEDs. After a few seconds, the device will enter testing mode and the LED panel will display one yellow and nine purple segments. The device will initially be in an idle, non-transmitting state.

For Bluetooth Low Energy testing, the device has four test modes:

Test Mode	Tx Mode	Channel	Data Rate
1	Idle	-	-
6	BLE	37	1 Mbps
7	BLE	17	1 Mbps
8	BLE	39	1 Mbps

3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Freq (Hz)	Description/Function
iZotope, Inc.	Spire Studio	None	5	DC	

3.3. EUT Cables/Transducers

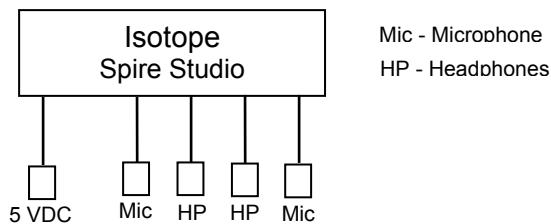
Cable Type	Length	Shield	From	To
Power	1 Meter	No	Power Adapter	Equipment under test
Mic/Line In 1	1 Meter	Yes	Unterminated	Equipment under test
Mic/Line In 2	1 Meter	Yes	Unterminated	Equipment under test
Headphones	1 Meter	Yes	Headphones	Equipment under test

3. Product Configuration (continued)

3.4. Support Equipment

Device	Manufacturer	Model	Serial No.	Comment
None				

3.5. Block Diagram Cables



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
EMI Test Receiver, 10 Hz - 7GHz ¹	Rohde & Schwarz	ESR7	101770	10/3/2020	2 Years
Spectrum Analyzer, 2 Hz to 26.5 GHz ²	Rohde & Schwarz	FSW26	102057	9/13/2020	2 Years
Spectrum Analyzer, 9 kHz to 40 GHz ³	Rohde & Schwarz	FSV40	100899	9/10/2020	2 Years
EMI Receiver 9 kHz - 1 GHz	Hewlett Packard	8546A	3650A00360	9/11/2020	2 Years
Loop Antenna 9 kHz - 30 MHz	EMCO	6512	9309-1139	1/28/2022	3 Years
Biconilog Antenna, 30 MHz to 2 GHz	Sunol Sciences Corp	JB1	A050913	6/5/2022	2 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	03075	1/7/2021	2 Years
Preamplifier, 1 GHz to 26.5 GHz	Hewlett Packard	8449B	3008A01323	9/11/2020	2 Years
Digital Barometer	Control Company	4195	ID236	4/3/2020	2 Years
Temperature Chamber	Associated Environmental	SD-308	10782	CNR	

¹ ESR7 Firmware revision: V3.46 SP1, Date installed: 12/22/2018

Previous V3.36 SP2, installed 12/5/2018.

² FSW26 Firmware revision: V4.30 SP1, Date installed: 02/22/2019

Previous V3.36 SP2, installed 10/26/2018.

³ FSV40 Firmware revision: V2.30 SP4, Date installed: 05/04/2016

Previous V2.30 SP1, installed 10/22/2014.

4.2. Measurement Software

Manufacturer	Software Description	Title or Model #	Rev.	Report Sections
Compliance Worldwide	Test Report Generation Software	Test Report Generator	1.0	7.10. Conducted Emissions



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4. Measurements Parameters

4.3. Measurement & Equipment Setup

Test Dates:	Nov. 6 th to Dec. 6 th 2019
Test Engineers:	Sean Defelice, Brian Breault
Normal Site Temperature (15 - 35°C):	21.7
Relative Humidity (20 -75%RH):	32%
Frequency Range:	30 kHz to 25 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	9 kHz – 150 kHz to 30 MHz 120 kHz – 30 MHz to 1 GHz 1 MHz – Above 1 GHz
EMI Receiver Avg Bandwidth:	30 kHz – 150 kHz to 30 MHz 300 kHz – 30 MHz to 1 GHz 3 MHz – Above 1 GHz
Detector Function:	Peak, QP - 150 kHz to 1 GHz 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 v05r02, *Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS), Frequency Hopping Spread Spectrum Systems, and Hybrid System Devices Operating Under §15.247*, dated April 2, 2019, was also referenced for the test procedures used to generate the data in this report. All references to these publications refer to this versions and dates detailed in this paragraph.

4. Measurements Parameters

4.5. Measurement Uncertainty

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

RF Frequency	$\pm 1 \times 10^{-8}$
Radiated Emission of Transmitter	± 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 test samples supplied by the manufacturer and are reported by the manufacturer to be equivalent to the production units.

5.2 Presentation

This test sample was 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 Izotope Spire Studio, 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 outlined in the following table:

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

5.4 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.



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6. Measurement Summary

Test Requirement	FCC Rule Requirement	ISED Rule Requirement	Test Report Section	Result
Antenna Requirement	15.203	---	7.1	Compliant
Minimum DTS Bandwidth	15.247 (a) (2)	RSS-247 5.2 a)	7.2	Compliant
Maximum Peak Conducted Output Power	15.247 (b) (1)	RSS-247 5.4 d)	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)	RSS-GEN 6.13	7.5	Compliant
Spurious Radiated Emissions (> GHz) - Harmonic Measurements	15.247 (d)	RSS-GEN 6.13		Compliant
Band Edge and Out of Band Measurements	15.247 (d)	RSS-GEN 6.13	7.6	Compliant
Emissions in Non-restricted Frequency Bands	15.247(e)	RSS-GEN 6.13	7.7	Compliant
Peak Power Spectral Density	15.247(e)	RSS-247 5.2 b)	7.8	Compliant
AC Power Line Conducted Emissions	15.207	RSS-GEN 7.2	7.9	
Duty Cycle	15.247	N/A	7.10	Compliant
99% (Occupied) Bandwidth	---	RSS-GEN 6.7	7.11	Compliant
Public Exposure to Radio Frequency Energy Levels	1.1307 (b) (1)	RSS-GEN, Issue 5, Section 3.4, RSS 102	7.12	Compliant



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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 Izotope Spire Studio utilizes a chip etch antenna that is not user replaceable.

7. Measurement Data

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

Requirement: (15.247 (a) (2)

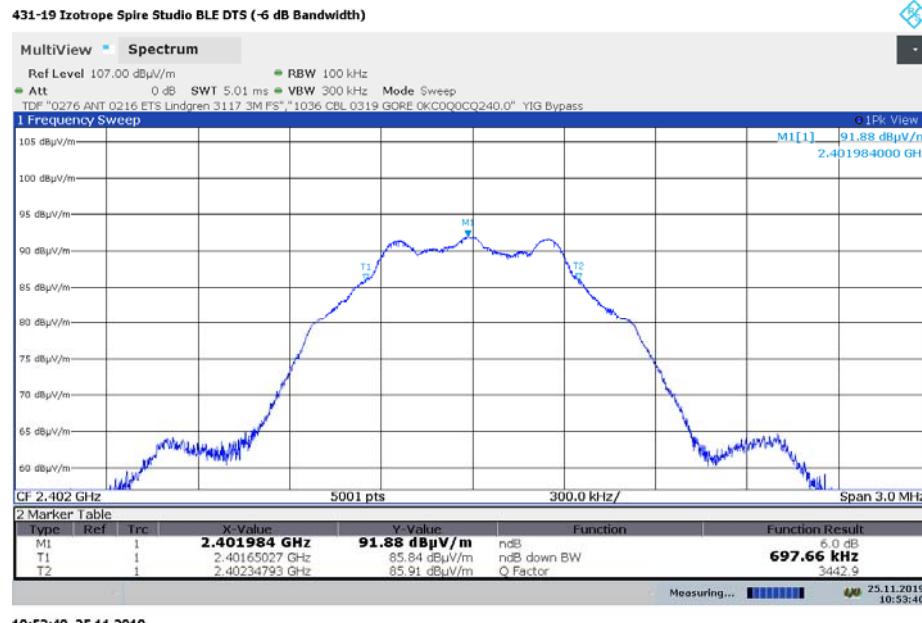
Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

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	697.66	>500	Compliant
17	2442	685.06	>500	Compliant
39	2480	683.70	>500	Compliant

7.2.1. Low Channel – 37, 2402 MHz

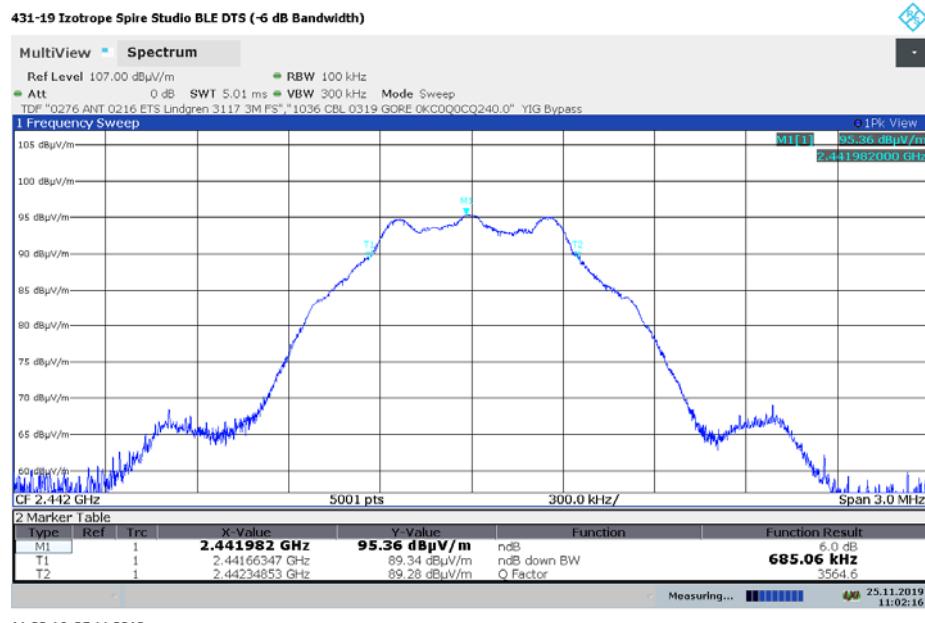


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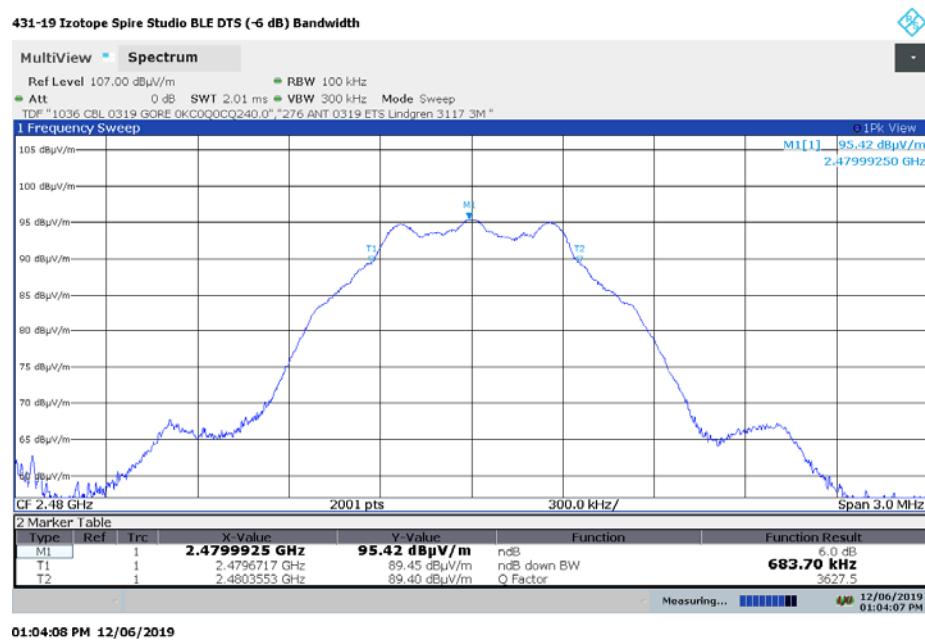
7. Measurement Data

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

7.2.2. Middle Channel – 17, 2440 MHz



7.2.3. High Channel – 39, 2480 MHz



7. Measurement Data (continued)

7.3. Maximum Peak Conducted Output Power (FCC 15.247 (b)(3), ISED 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.

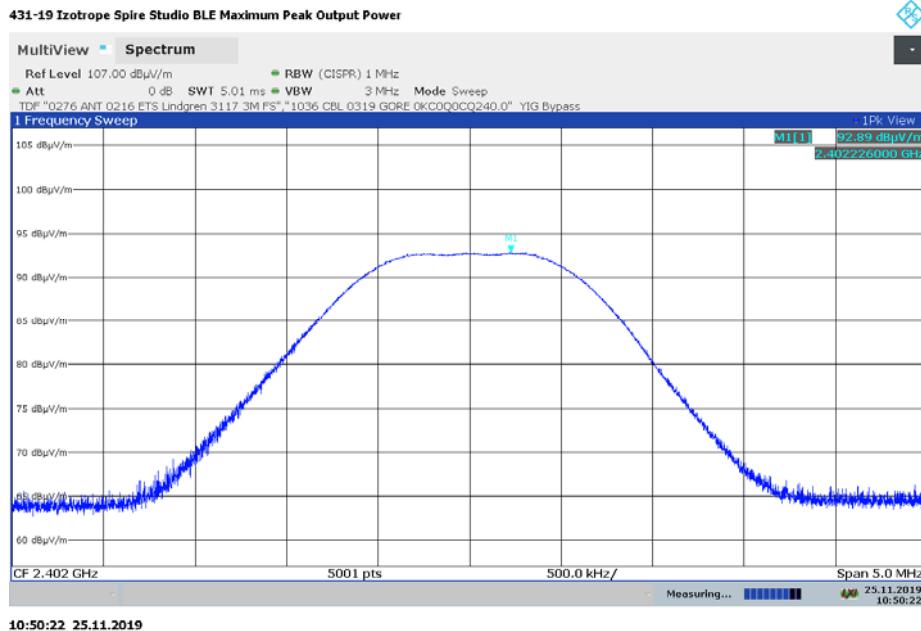
Test Note: A spectrum analyzer resolution bandwidth of 1 MHz and a video bandwidth of 3 MHz were used to meet the requirements of FCC OET publication number 558074, Section 9.1.1 and the measured product DTS bandwidth.

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

BLE Channel	Frequency (MHz)	Maximum Peak Radiated Output Power		Peak Limit (dBm)	Margin (dB)	Result
		(dB μ V/m)	(dBm) ¹			
37	2402	92.89	-2.34	30	-32.34	Compliant
17	2442	96.33	1.10	30	-28.90	Compliant
39	2480	98.36	3.13	30	-26.87	Compliant

¹Converted from field strength. Reference ANSI C63.10-2013, Annex G, section G2

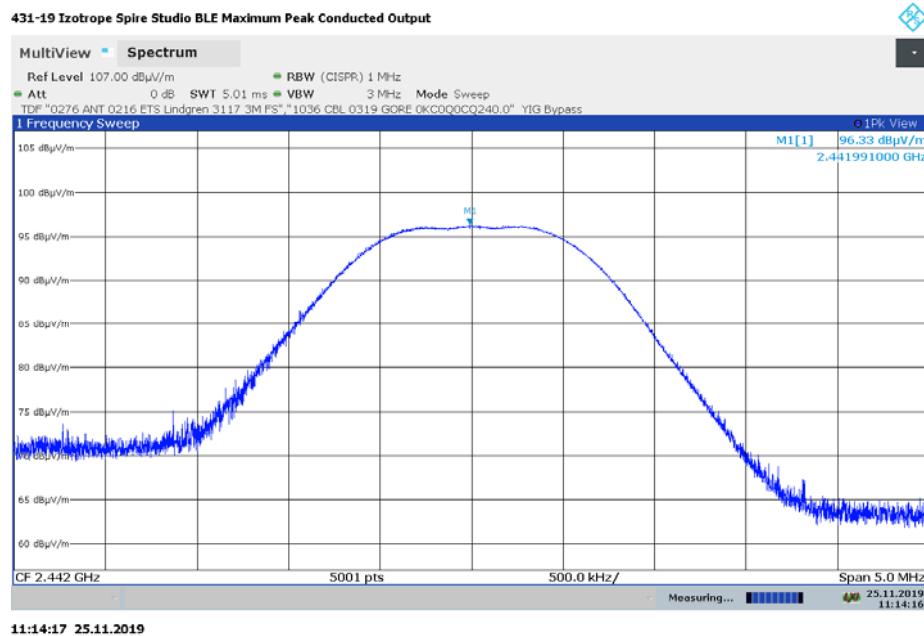
7.3.1. Low Channel – 37, 2402 MHz



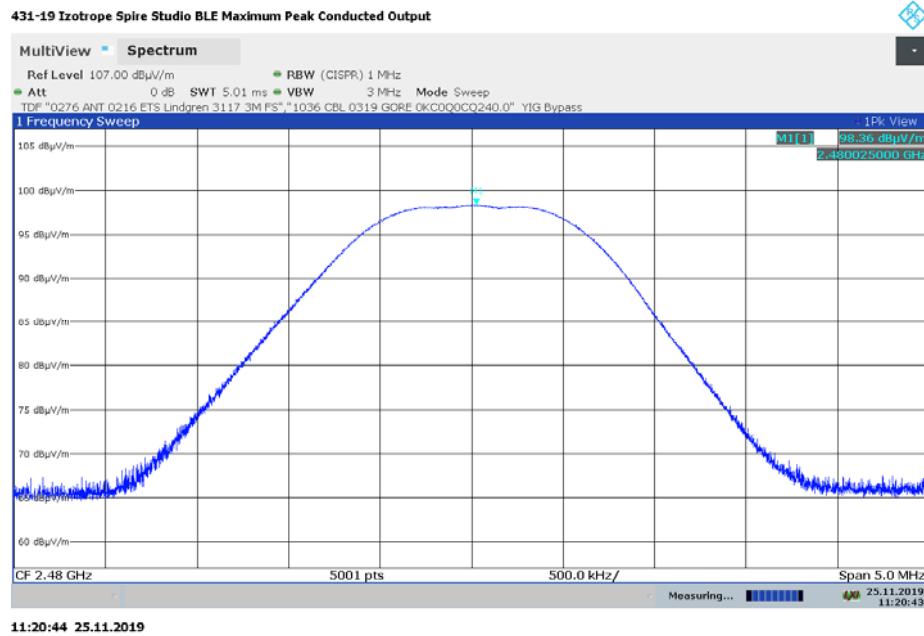
7. Measurement Data

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))

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 gain of 1.5 dBi 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) (FCC 15.209, ISED RSS-GEN 6.13)

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 (dB μ V/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)	(dB μ V/m)	(dB μ V/m)	(dB)	Appendix A	(H/V)
10 kHz - 150 kHz	0.01575	78.33	123.64	-45.31	A1.1.3	Gnd Parallel
150 kHz - 30 MHz	0.91050	53.21	68.43	-15.22	A2.2.3	Parallel
30 MHz - 1000 MHz	958.74000	38.10	46.00	-7.90	A3.1.1	H
1000 MHz - 10000 MHz	6847.130	43.56	74.00	-30.44	A4.1.1	H
10000 MHz - 18000 MHz	17985.200	48.28	74.00	-25.72	A5.1.1	H
18000 MHz - 25000 MHz	23755.170	44.50	74.00	-29.50	A6.2.1	H

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7. Measurement Data (continued)

7.5. Transmitter Spurious Radiated Emissions (30 kHz to 40 GHz) (FCC 15.209, ISED RSS-GEN 6.13)

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

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

Freq. (MHz)	Field Strength (dB μ V/m) ¹		Limit (dB μ V/m)		Margin (dB μ V/m)		Antenna Polarity (H/V)	Result
	Peak	Average	Peak	Average	Peak	Average		
4804	48.32	35.52	74.00	54.00	-25.68	-18.48	H	Compliant
4884	47.04	35.34	74.00	54.00	-26.96	-18.66	V	Compliant
4960	47.57	36.44	74.00	54.00	-26.43	-17.56	V	Compliant
7326	49.90	37.85	74.00	54.00	-24.10	-16.15	H	Compliant
7440	50.27	39.02	74.00	54.00	-23.73	-14.98	V	Compliant
12010	60.01	47.09	74.00	54.00	-13.99	-6.91	H	Compliant
12210	57.94	47.38	74.00	54.00	-16.06	-6.62	V	Compliant
12400	59.81	47.81	74.00	54.00	-14.19	-6.19	H	Compliant
19216	64.29	51.56	74.00	54.00	-9.71	-2.44	H	Compliant
19536	64.37	52.25	74.00	54.00	-9.63	-1.75	H	Compliant
19840	62.77	51.22	74.00	54.00	-11.23	-2.78	H	Compliant
22320	63.98	52.20	74.00	54.00	-10.02	-1.80	H	Compliant

¹ All correction factors are stored in the spectrum analyzer and applied to these column entries.

7. Measurement Data (continued)

7.6. Band Edge and Out of Band Measurements (FCC 15.209, ISED RSS-GEN 6.13)

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. 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)	(dB μ V/m)	(dB)	(dB)	
2400	2402	91.46	-39.52	-20	Compliant

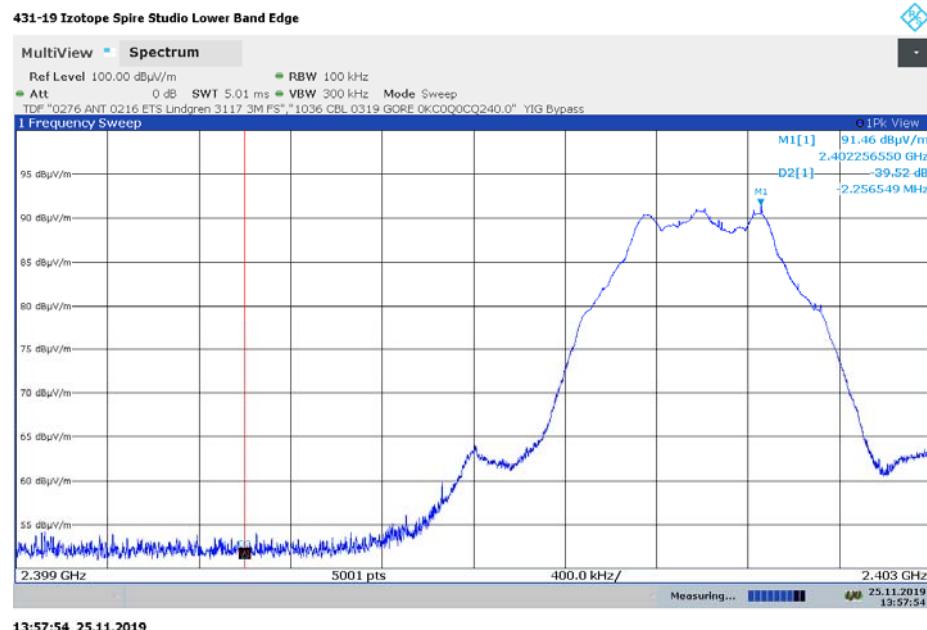
Note: Reference the plot on the following page.

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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	Field Strength (dB μ V/m)		Limit (dB μ V/m)		Margin (dB)		Result
	(MHz)	Peak	Average	Peak	Average	Peak	Average
2483.5	46.71	34.99	74	54	-27.29	-19.01	Compliant

Worst Case Out of Band

Band Edge Frequency	Out of Band Frequency	Field Strength (dB μ V/m)		Limit (dB μ V/m)		Margin (dB μ V/m)		Result
		Peak	Average	Peak	Average	Peak	Average	
2483.5	2484.1344	47.82	34.65	74	54	-26.18	-19.35	Compliant

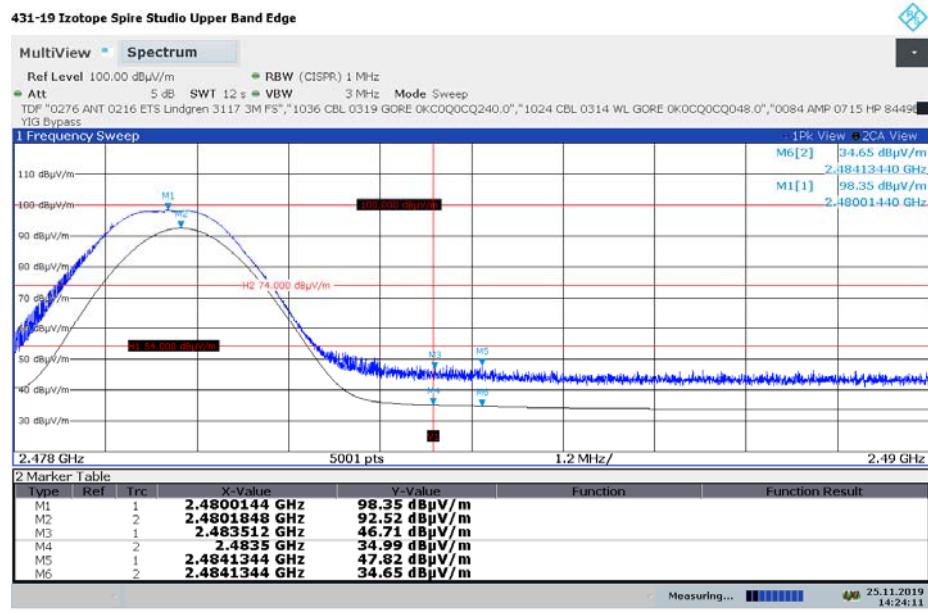
Note: Reference the plot on the following page.

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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

Frequency (MHz)	Field Strength (dB μ V/m)		Limit (dB μ V/m)		Margin (dB)		Result
	Peak	Average	Peak	Average	Peak	Average	
2375.1950	46.69	33.23	74	54	-27.31	-20.77	Compliant

Reference the plot on the following page.

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

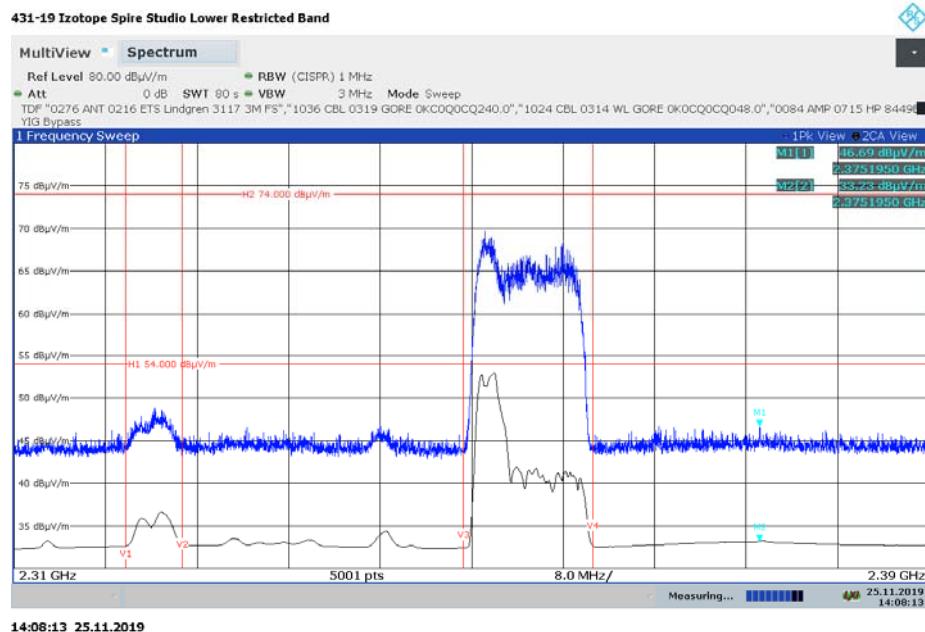
Frequency (MHz)	Field Strength (dB μ V/m)		Limit (dB μ V/m)		Margin (dB)		Result
	Peak	Average	Peak	Average	Peak	Average	
2484.0526	47.83	33.29	74	54	-26.17	-20.71	Compliant

Reference the plot on the following page.

7. Measurement Data (continued)

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

Lower Restricted Band, 2310 MHz, to 2390 MHz



Note about the non-EUT transmissions in this band:

The emissions enclosed in vertical markers were due to transmissions in the Wireless Communications Service (WCS) B Block (2310 MHz to 2315 MHz). The emission near the center of the Lower Restricted Band was due to a transmission in the WCS A and B Blocks (2350 MHz to 2360 MHz). A real-time observation of the Lower Restricted Band confirmed that there were no emissions contributed by the EUT in either of these WCS Blocks during the absence of the ambient signals. However, due to the time requirements of the CISPR average detector, this could not be realized on the spectrum analyzer display. Markers 1 and 2 represent the peak and CISPR average values of the worst case emission contributed by the EUT.

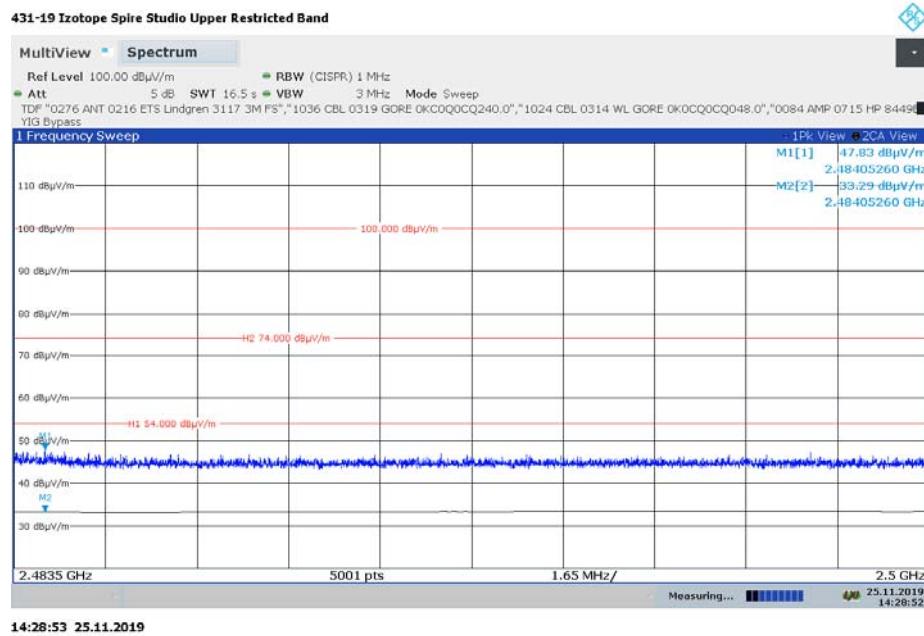
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7. Measurement Data (continued)

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

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.

Reference Appendix B for the measurement data used for this test section.

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 (dB μ V/m)	Worst Case Out-of-Band Frequency (MHz)	Maximum PSD (100 kHz) Out-of-Band (dB μ V/m)	Delta to Maximum PSD (dB)	Minimum Required Delta (dB)	Result
95.42	0.6135	55.66	-39.76	75.42	Compliant

¹Taken from Section 7.2 - DTS Bandwidth

7. Measurement Data (continued)

7.8. Peak Power Spectral Density (FCC 15.247(e), ISED RSS-247, 5.2 b))

Requirement: For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm (103.2 dB μ V/m) 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 (MHz)	Maximum PSD Frequency (MHz)	Maximum Power Spectral Density		Limit (dBm)	Margin (dB)	Result
			(dB μ V/m)	(dBm) ¹			
37	2402	2401.9790	77.59	-17.64	8	-25.64	Compliant
17	2442	2441.9831	77.77	-17.46	8	-25.46	Compliant
39	2480	2479.9874	89.26	-5.97	8	-13.97	Compliant

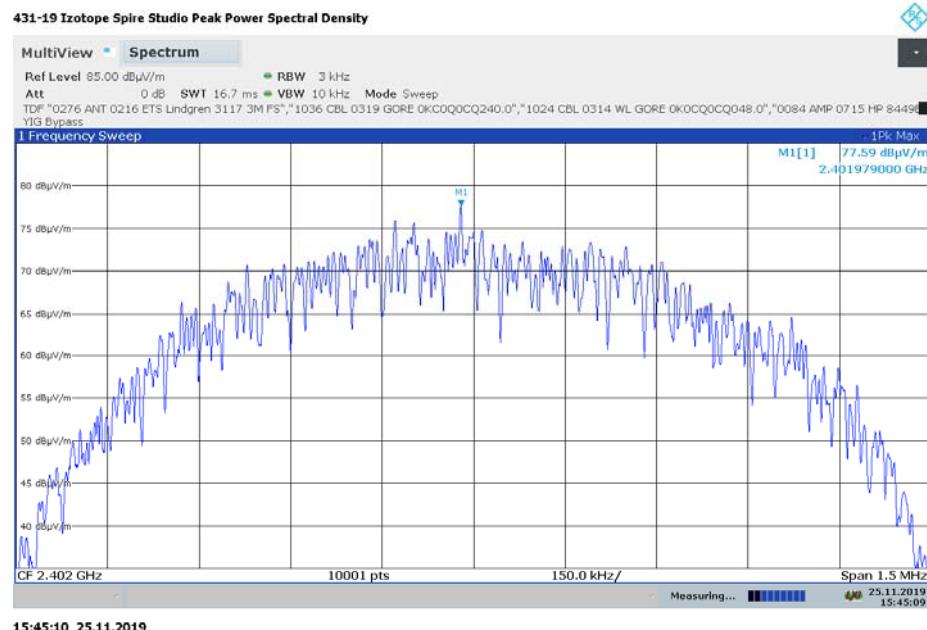
¹Converted from field strength. Reference ANSI C63.10-2013, Annex G, section G2

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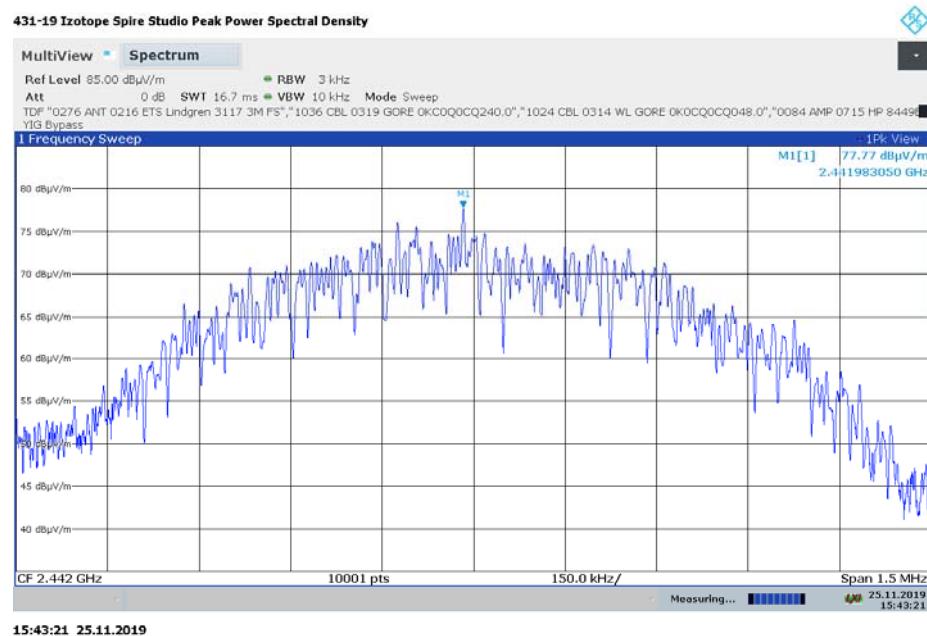
7. Measurement Data (continued)

7.8. Peak Power Spectral Density (15.247(e)), ISED RSS-247, 5.2 b)) (continued)

7.8.1. Low Channel – 37, 2402 MHz



7.8.2. Middle Channel – 17, 2442 MHz



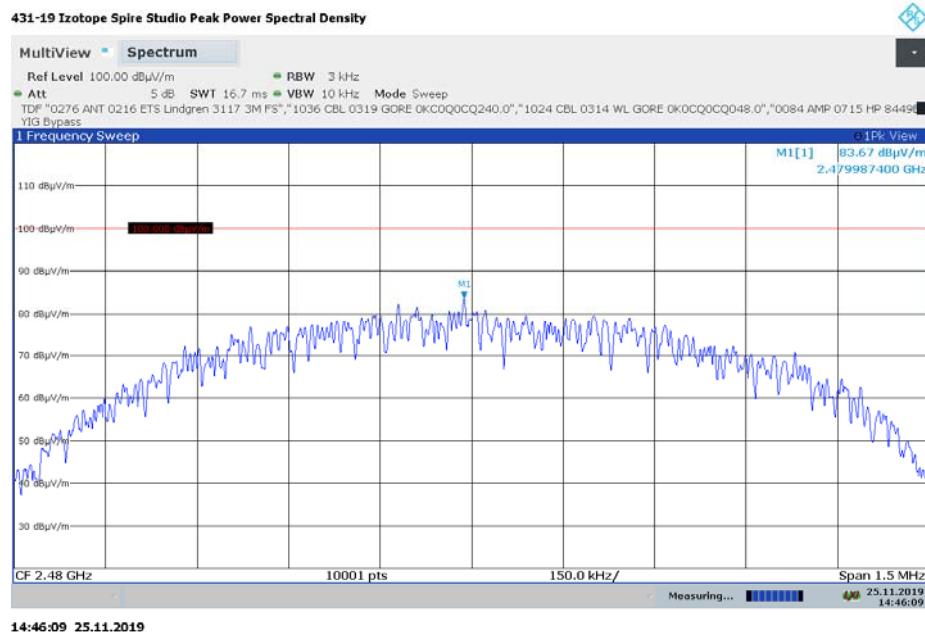
Test Number: 431-19

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7. Measurement Data

7.8. Peak Power Spectral Density (15.247(e)), ISED RSS-247, 5.2 b)) (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:	07/03/2018
Test Engineer:	Sean Defelice
Site Temperature (°C):	23.3
Relative Humidity (%RH):	40.9
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

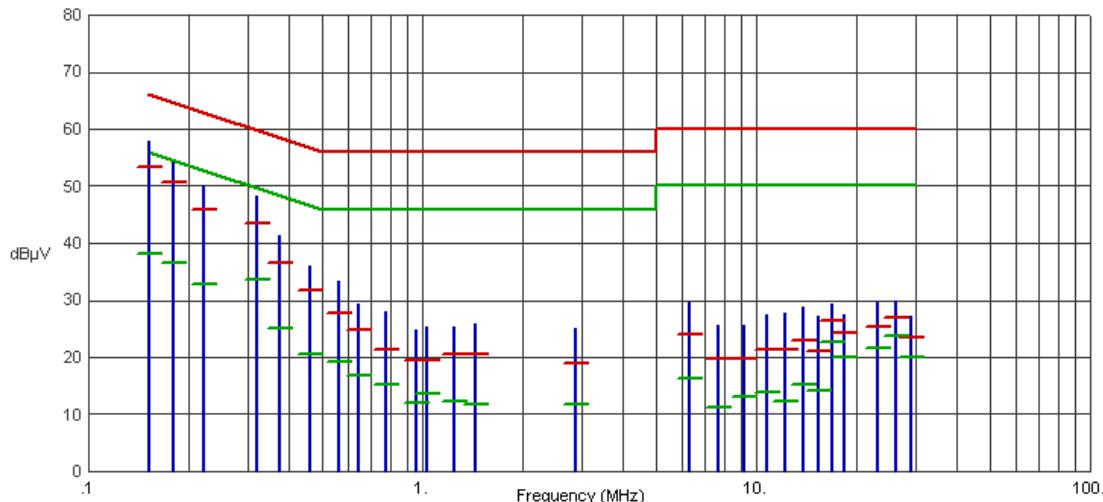
Test Number: 431-19
Issue Date: 12/10/2019

8. Conducted Emissions Test Results

7.9. Conducted Emissions (FCC Part 15.207)

7.9.1. 120 Volts, 60 Hz Phase

Test No.: 431-19, 120 Volts, 60 Hz Phase FCC Part 15.207

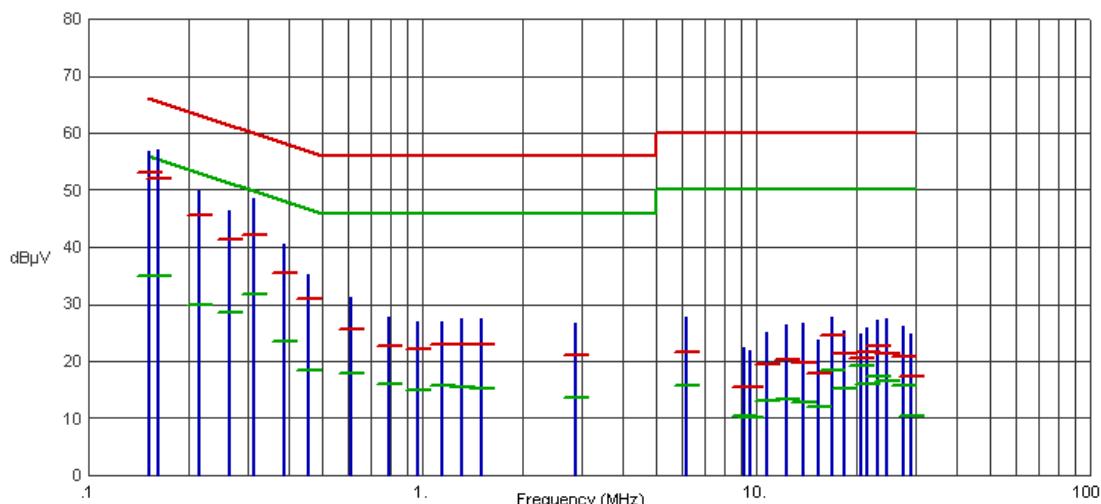


Frequency (MHz)	Pk Amp (dB μ V)	QP Amp (dB μ V)	QP Limit (dB μ V)	QP Margin (dB)	Avg Amp (dB μ V)	Avg Limit (dB μ V)	Avg Margin (dB)	Comments
.1523	57.95	53.29	65.87	-12.58	38.08	55.87	-17.79	
.1793	54.13	50.68	64.52	-13.84	36.61	54.52	-17.91	
.2220	50.04	45.93	62.74	-16.81	32.86	52.74	-19.88	
.3210	48.24	43.37	59.68	-16.31	33.71	49.68	-15.97	
.3750	41.42	36.49	58.39	-21.90	25.02	48.39	-23.37	
.4628	35.92	31.67	56.64	-24.97	20.56	46.64	-26.08	
.5595	33.32	27.65	56.00	-28.35	19.31	46.00	-26.69	
.6450	29.45	24.79	56.00	-31.21	16.78	46.00	-29.22	
.7800	27.96	21.42	56.00	-34.58	15.15	46.00	-30.85	
.9623	24.78	19.38	56.00	-36.62	11.94	46.00	-34.06	
1.0298	25.21	19.55	56.00	-36.45	13.49	46.00	-32.51	
1.2458	25.41	20.48	56.00	-35.52	12.36	46.00	-33.64	
1.4370	25.91	20.63	56.00	-35.37	11.65	46.00	-34.35	
2.8703	25.16	19.01	56.00	-36.99	11.64	46.00	-34.36	
6.2948	29.47	24.09	60.00	-35.91	16.32	50.00	-33.68	
7.6808	25.54	19.66	60.00	-40.34	11.07	50.00	-38.93	
9.2153	25.71	19.86	60.00	-40.14	13.03	50.00	-36.97	
10.7475	27.47	21.40	60.00	-38.60	13.76	50.00	-36.24	
12.2573	27.76	21.25	60.00	-38.75	12.40	50.00	-37.60	
13.8255	28.91	22.97	60.00	-37.03	15.26	50.00	-34.74	
15.3578	27.10	21.07	60.00	-38.93	14.09	50.00	-35.91	
16.8945	29.26	26.51	60.00	-33.49	22.67	50.00	-27.33	
18.4313	27.47	24.18	60.00	-35.82	20.09	50.00	-29.91	
23.0393	29.59	25.23	60.00	-34.77	21.49	50.00	-28.51	
26.1105	29.77	26.87	60.00	-33.13	23.74	50.00	-26.26	
29.0850	27.09	23.53	60.00	-36.47	20.12	50.00	-29.88	

8. Conducted Emissions Test Results (continued)

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

7.9.2. 120 Volts, 60 Hz Neutral

Test No.: 431-19, 120 Volts, 60 Hz Neutral
FCC Part 15.207


Frequency (MHz)	Pk Amp (dB μ V)	QP Amp (dB μ V)	QP Limit (dB μ V)	QP Margin (dB)	Avg Amp (dB μ V)	Avg Limit (dB μ V)	Avg Margin (dB)	Comments
.1523	56.76	52.98	65.87	-12.89	34.94	55.87	-20.93	
.1613	57.11	52.07	65.40	-13.33	34.84	55.40	-20.56	
.2153	49.82	45.61	63.00	-17.39	30.00	53.00	-23.00	
.2648	46.51	41.37	61.28	-19.91	28.43	51.28	-22.85	
.3120	48.60	42.22	59.92	-17.70	31.78	49.92	-18.14	
.3840	40.40	35.55	58.19	-22.64	23.51	48.19	-24.68	
.4538	35.20	30.89	56.81	-25.92	18.44	46.81	-28.37	
.6090	31.22	25.69	56.00	-30.31	17.90	46.00	-28.10	
.7913	27.70	22.64	56.00	-33.36	15.97	46.00	-30.03	
.9645	26.95	22.11	56.00	-33.89	14.88	46.00	-31.12	
1.1423	26.94	22.98	56.00	-33.02	15.80	46.00	-30.20	
1.3178	27.41	22.91	56.00	-33.09	15.56	46.00	-30.44	
1.5023	27.58	22.87	56.00	-33.13	15.16	46.00	-30.84	
2.8815	26.75	21.16	56.00	-34.84	13.72	46.00	-32.28	
6.1958	27.60	21.55	60.00	-38.45	15.62	50.00	-34.38	
9.2198	22.36	15.52	60.00	-44.48	10.47	50.00	-39.53	
9.5820	21.97	15.37	60.00	-44.63	10.16	50.00	-39.84	
10.7520	24.97	19.44	60.00	-40.56	13.16	50.00	-36.84	
12.2888	26.32	20.30	60.00	-39.70	13.38	50.00	-36.62	
13.8233	26.79	19.62	60.00	-40.38	12.75	50.00	-37.25	
15.3578	23.65	17.86	60.00	-42.14	11.99	50.00	-38.01	
16.8945	27.71	24.45	60.00	-35.55	18.35	50.00	-31.65	
18.4290	25.45	21.26	60.00	-38.74	15.16	50.00	-34.84	
20.6858	24.72	20.59	60.00	-39.41	19.30	50.00	-30.70	
21.5025	25.92	21.72	60.00	-38.28	16.12	50.00	-33.88	
23.0393	27.17	22.73	60.00	-37.27	17.27	50.00	-32.73	
24.5738	27.43	21.36	60.00	-38.64	16.64	50.00	-33.36	
27.6450	26.22	20.75	60.00	-39.25	15.64	50.00	-34.36	
29.1818	24.80	17.33	60.00	-42.67	10.48	50.00	-39.52	

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%).

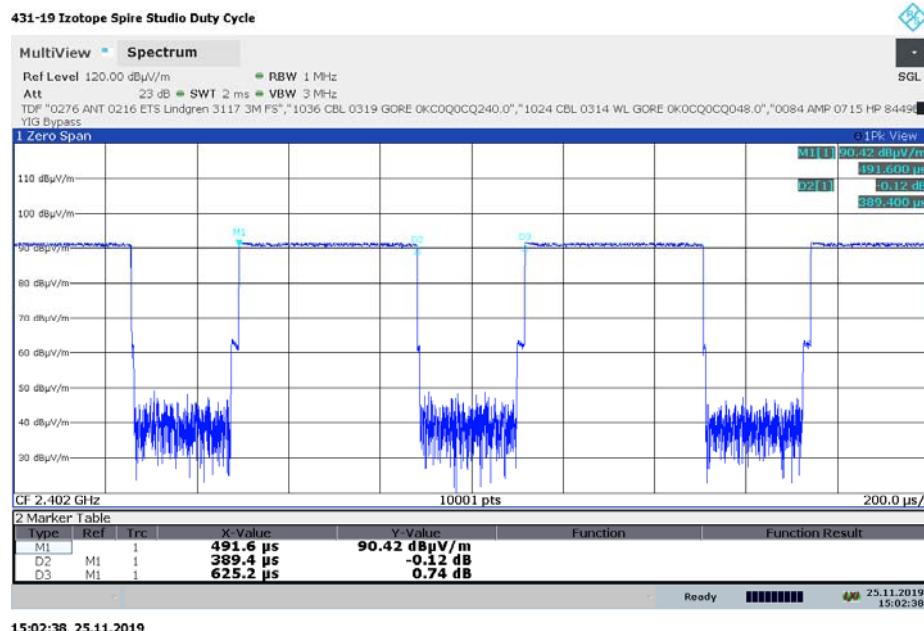
Procedure: Duty cycle measurements were made according to the procedure detailed ANSI C63.10-2013, Section 11.6(b)

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	0.389	0.625	0.6	62.28
17	2442	0.390	0.625	0.6	62.30
39	2480	0.390	0.625	0.6	62.30

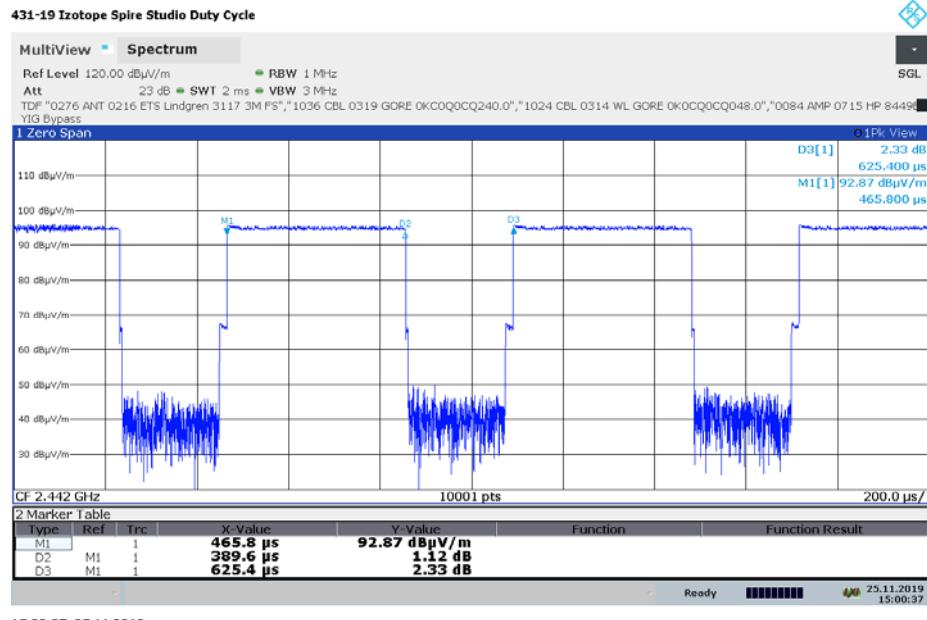
7.10.1. Low Channel – 37, 2402 MHz



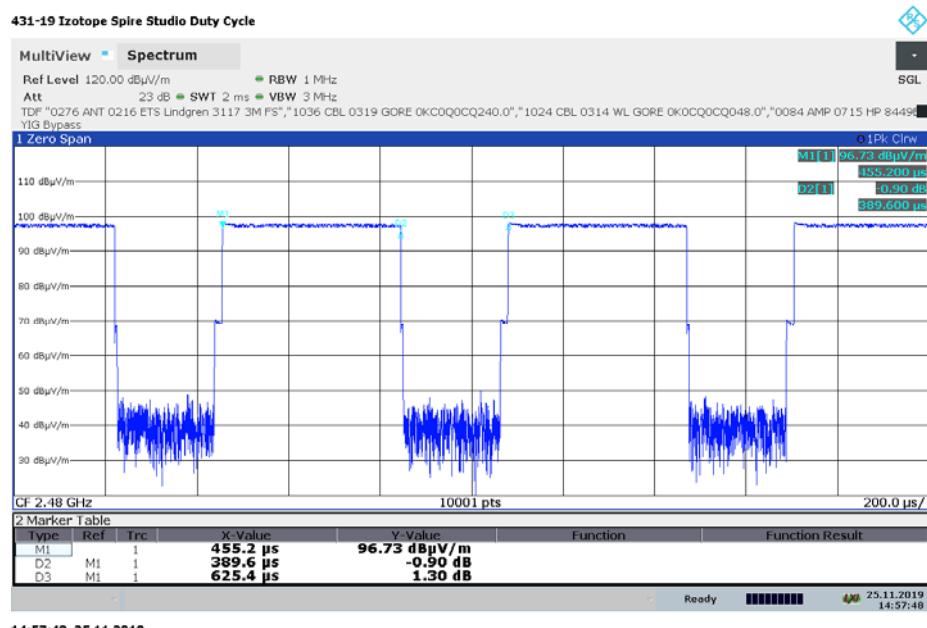
7. Measurement Data (continued)

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. 99% (Occupied) Bandwidth (RSS-GEN 6.7)

Requirement: The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

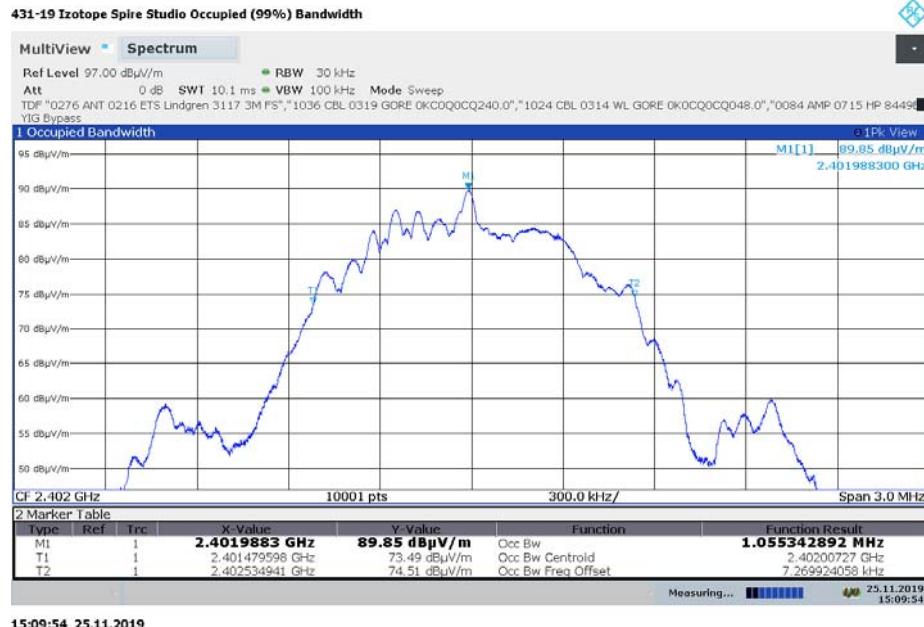
The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value.

The sample detector of the spectrum analyzer shall be used to make the measurement.

7.11.1. Measurement Results

Channel	Channel Frequency (MHz)	99% Power Bandwidth (MHz)
Low	2402	1.0553
Middle	2442	1.0550
High	2480	1.0538

7.11.1.1. 99% Power Bandwidth – Low Frequency (2402 MHz)



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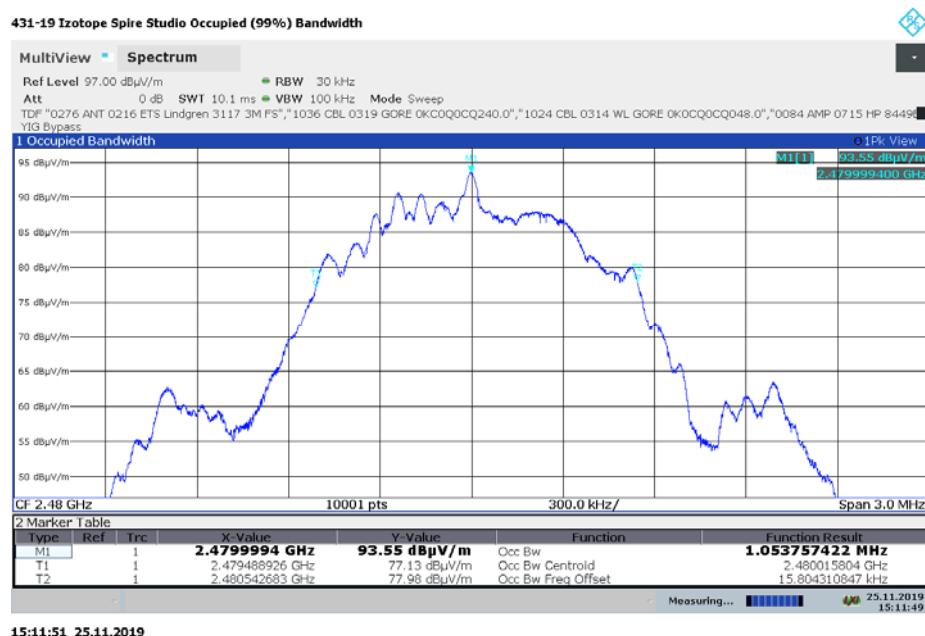
7. Measurement Data (continued)

7.11. 99% (Occupied) Bandwidth (RSS-GEN 6.7)

7.11.1.2. 99% Power Bandwidth – Middle Frequency (2441 MHz)



7.11.1.3. 99% Power Bandwidth – High Frequency (2480 MHz)





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7. Measurement Data (continued)

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

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

Channel:	37	17	39	
Input¹:	P_{MAX}	0.584	1.289	2.056
	d_{MIN}^2	5.00	5.00	5.00
	$f_{(\text{GHz})}$	2.402	2.442	2.480
Test Exclusion:	0.18	0.40	0.65	
Limit Exemption:	7.5	7.5	7.5	
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.

Note: BLE and UWB Radios do not transmit simultaneously.

7.12.2. IC RSS-102 Issue 5 SAR Evaluation (Reference RSS-102, Table 1)

Frequency	Separation Distance	Maximum Power	RSS-102 Limit	Result
MHz	mm	mW	mW	
2402	≤ 20	0.58	10.65	Compliant
2440	≤ 20	1.29	10.11	Compliant
2480	≤ 20	2.06	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 Above 18 GHz – Rear



8. Test Setup Photographs

8.7. Conducted Emissions Measurements - Front



8. Test Setup Photographs

8.8. Conducted Emissions Measurements - 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.

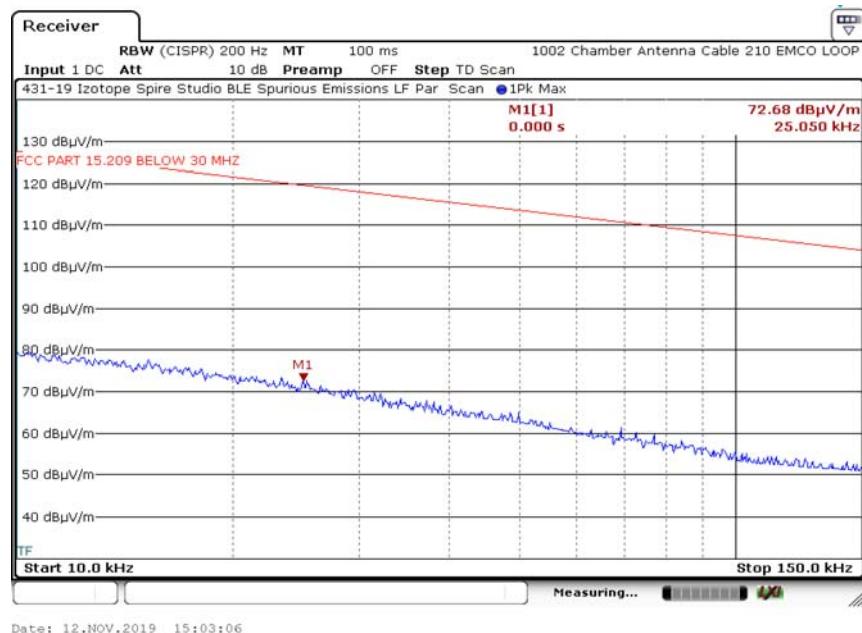
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Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

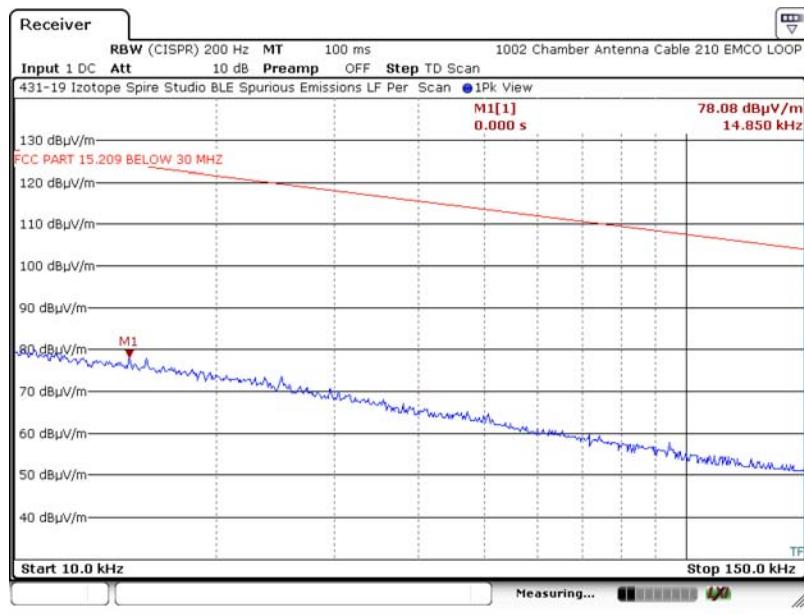
A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

A1.1. Channel 37, 2402 MHz

A1.1.1. Measurement Results: Parallel Antenna



A1.1.2. Measurement Results: Perpendicular Antenna



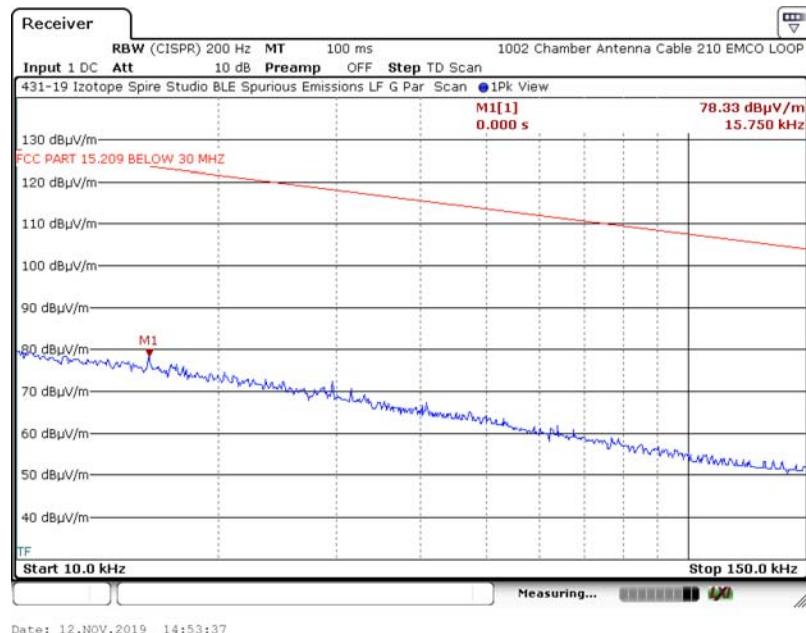
Test Number: 431-19
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Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

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

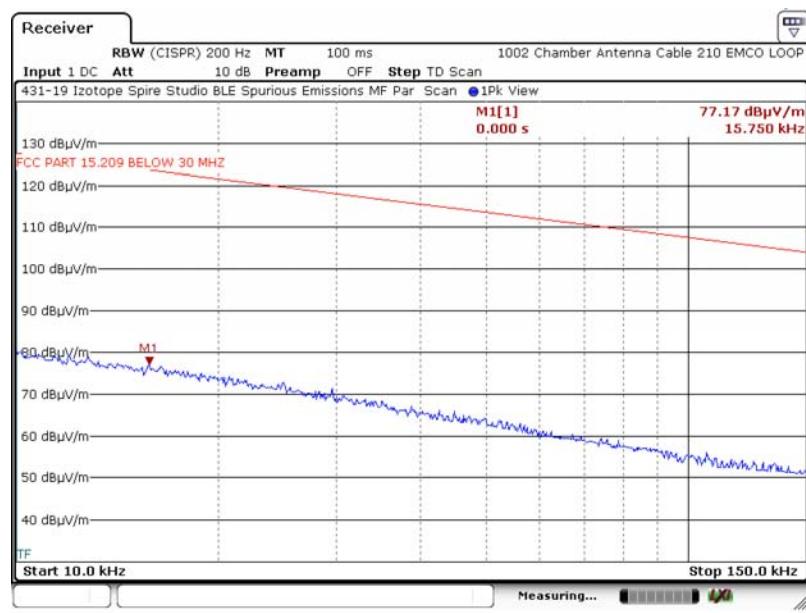
A1.1. Channel 37, 2402 MHz

A1.1.3. Measurement Results: Ground-Parallel Antenna



A1.2. Channel 17, 2442 MHz

A1.2.1. Measurement Results: Parallel Antenna

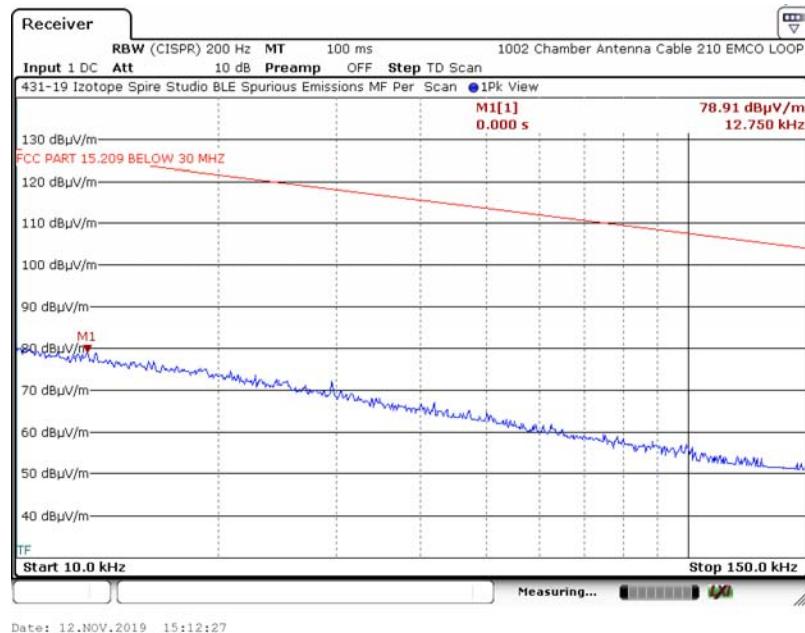


Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

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

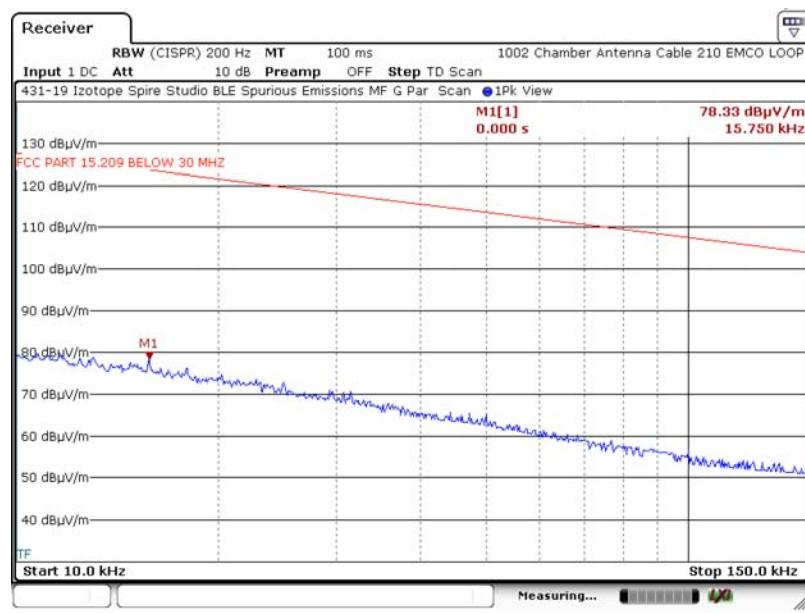
A1.2. Channel 17, 2440 MHz

A1.2.2. Measurement Results: Perpendicular Antenna



A1.2. Channel 17, 2442 MHz

A1.2.3. Measurement Results: Ground-Parallel Antenna



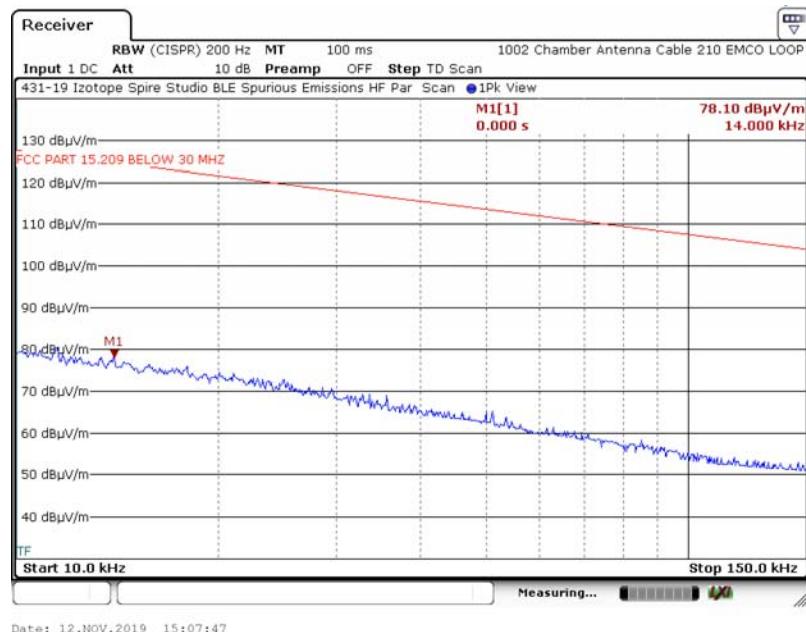
Test Number: 431-19
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Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

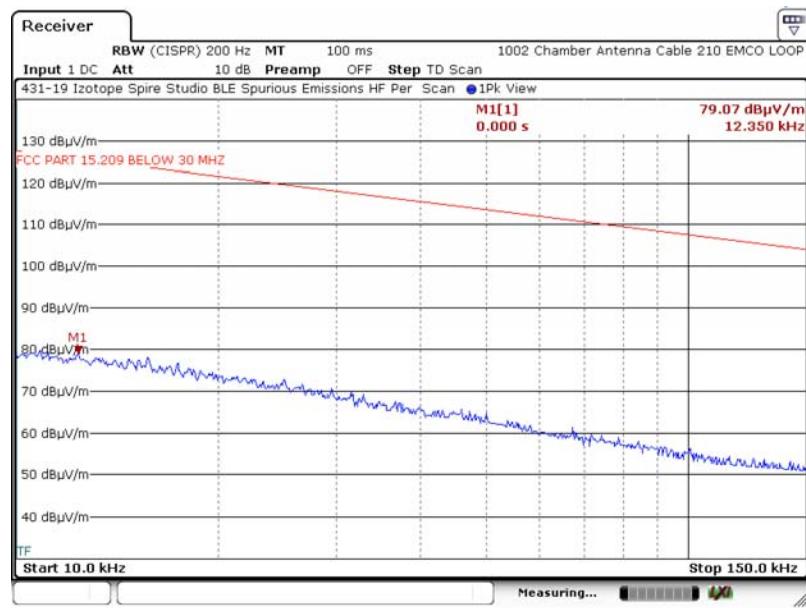
A1. Spurious Radiated Emissions (10 kHz – 150 kHz) Test Results

A1.3. Channel 39, 2480 MHz

A1.3.1. Measurement Results: Parallel Antenna



A1.3.2. Measurement Results: Perpendicular Antenna



Test Number: 431-19

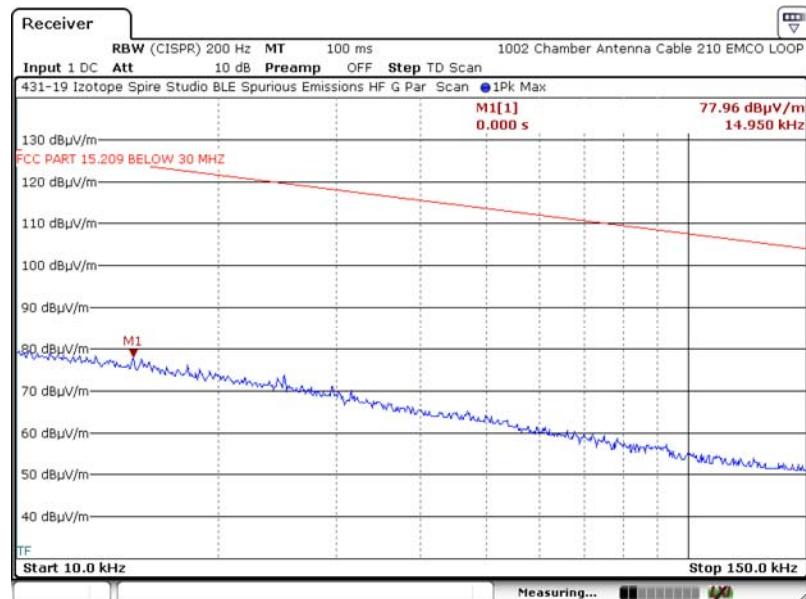
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

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

A1.3. Channel 39, 2480 MHz

A1.3.3. Measurement Results: Ground-Parallel Antenna



Test Number: 431-19
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

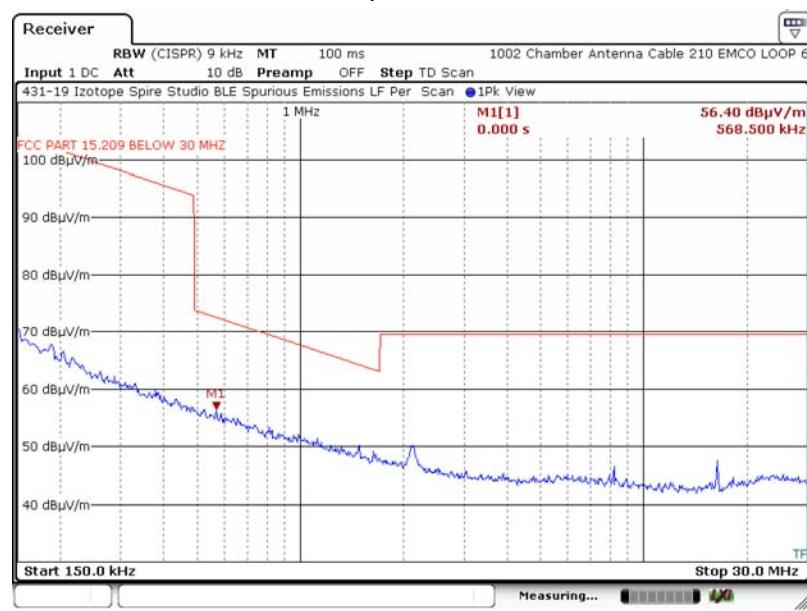
A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

A2.1. Channel 37, 2402 MHz

A2.1.1. Measurement Results: Parallel Antenna



A2.1.2. Measurement Results: Perpendicular Antenna



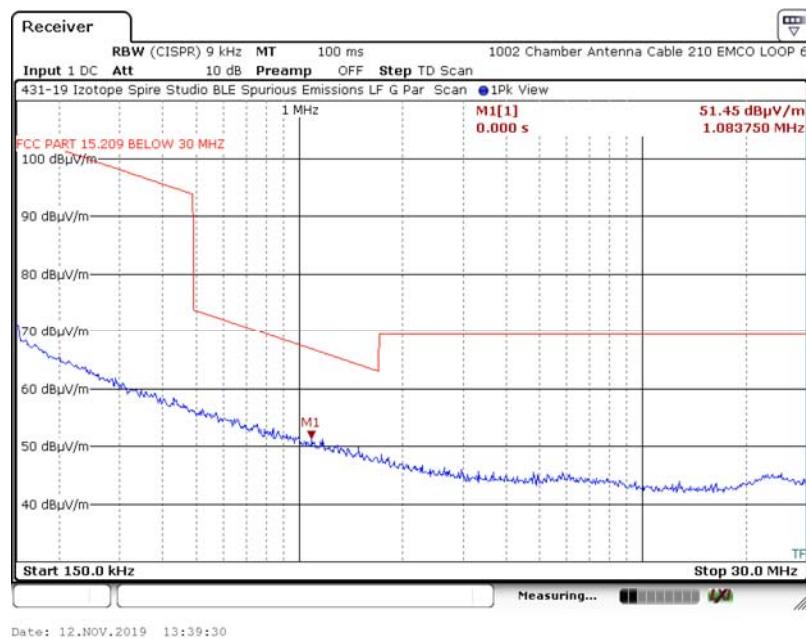
Test Number: 431-19
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

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

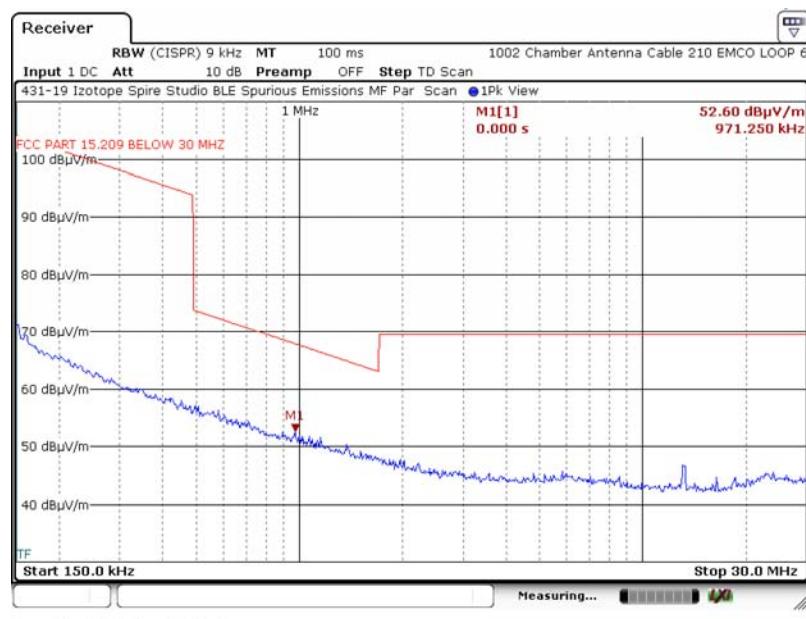
A2.1. Channel 37, 2402 MHz

A2.1.3. Measurement Results: Ground-Parallel Antenna



A2.2. Channel 17, 2442 MHz

A2.2.1. Measurement Results: Parallel Antenna

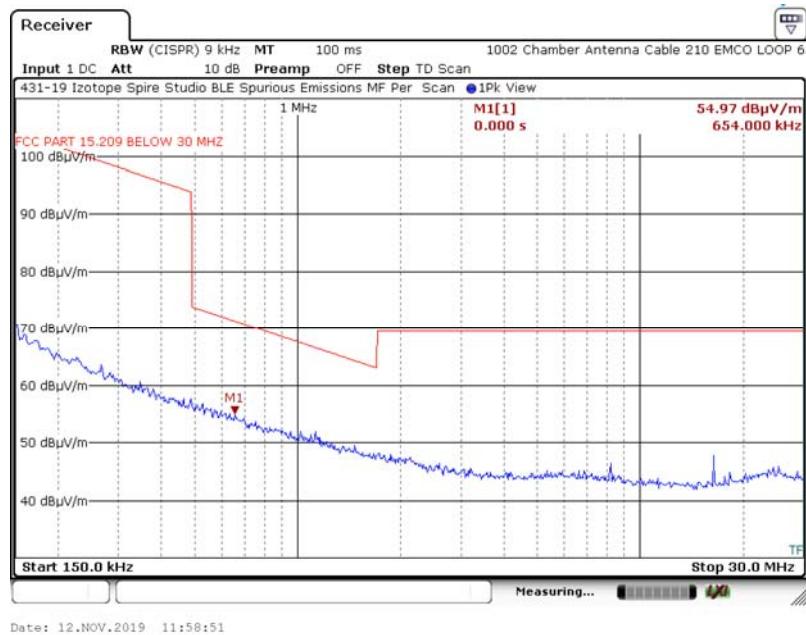


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Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

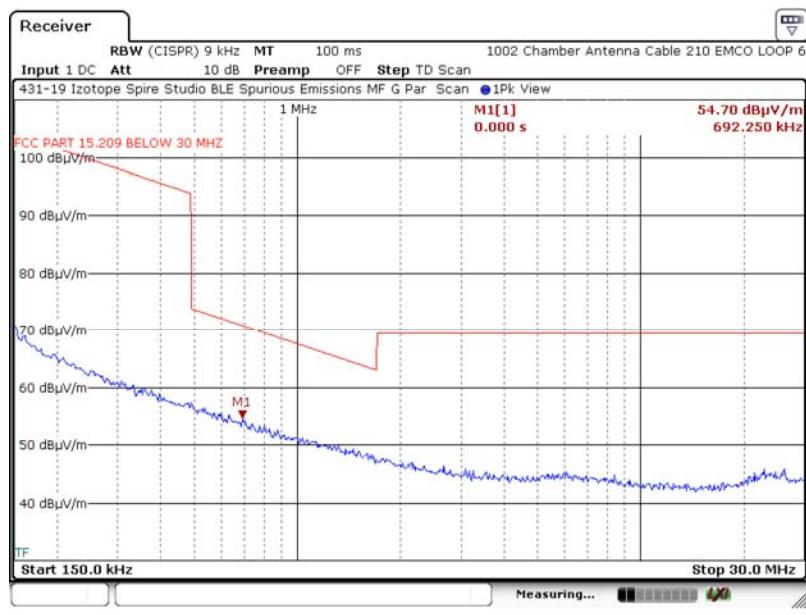
A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

A2.2. Measurement Results: Perpendicular Antenna



A2.2. Channel 17, 2442 MHz

A2.2.3. Measurement Results: Ground-Parallel Antenna

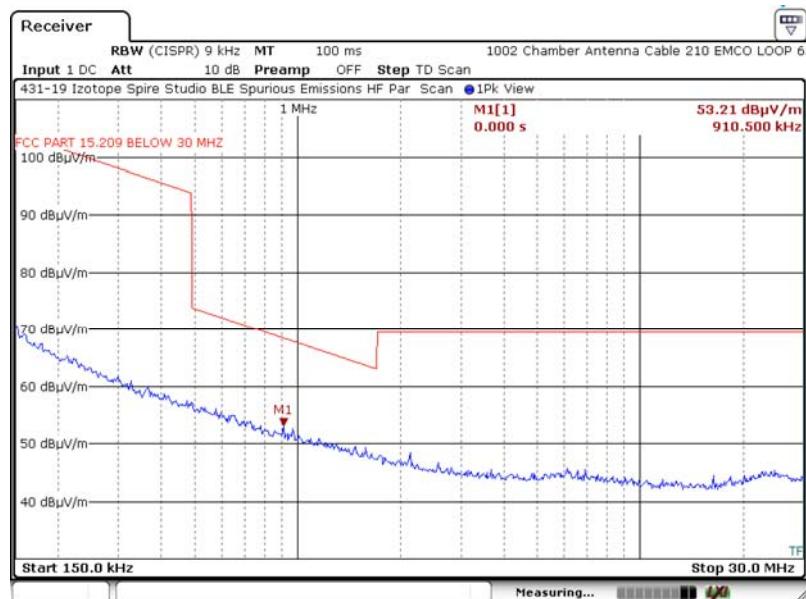


Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

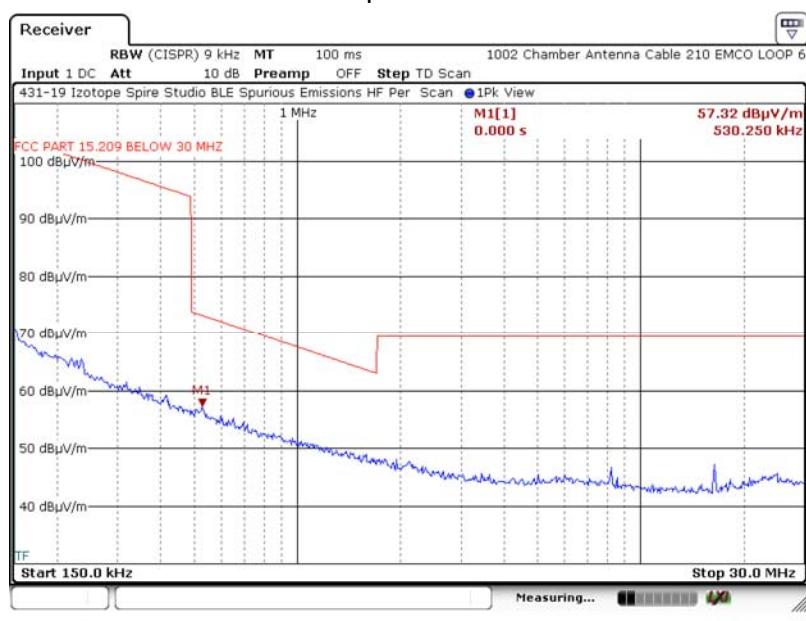
A2. Spurious Radiated Emissions (150 kHz – 30 MHz) Test Results

A2.3. Channel 39, 2480 MHz

A2.3.1. Measurement Results: Parallel Antenna



A2.3.2. Measurement Results: Perpendicular Antenna



Test Number: 431-19

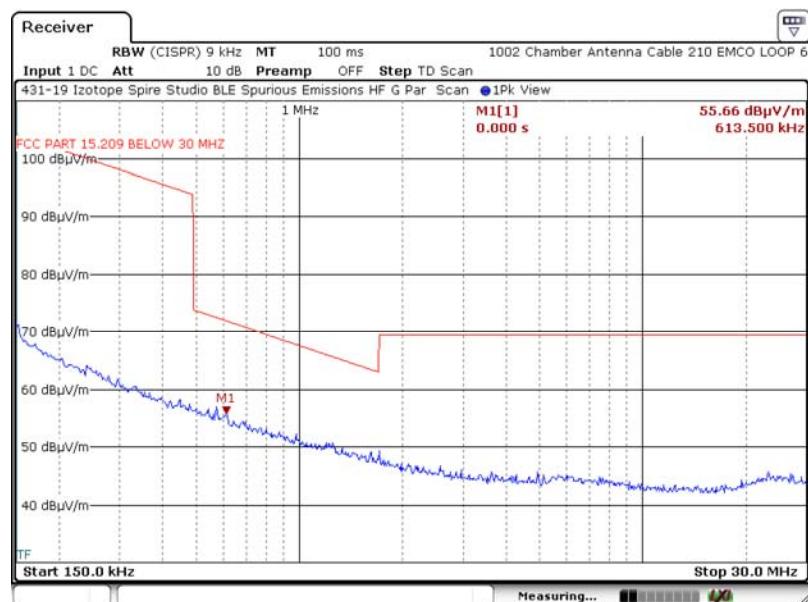
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

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

A2.3. Channel 39, 2480 MHz

A2.3.3. Measurement Results: Ground-Parallel Antenna



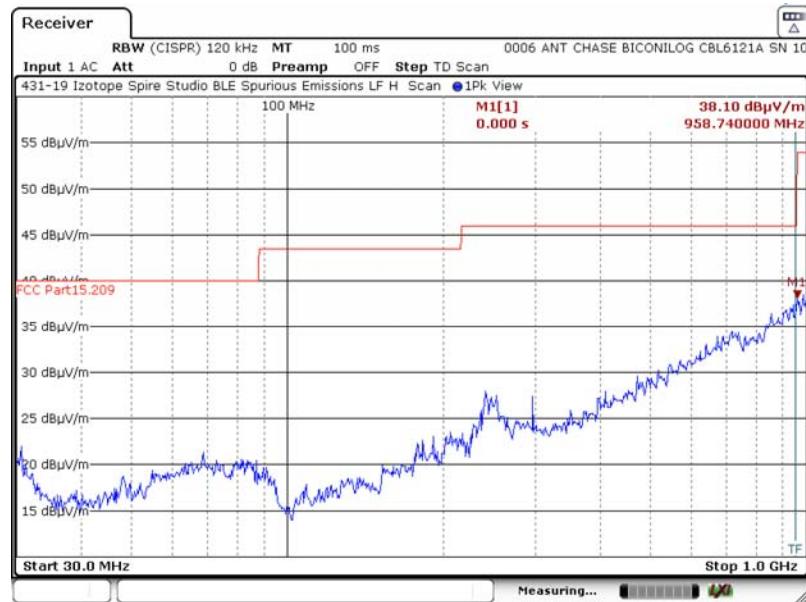
Test Number: 431-19
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

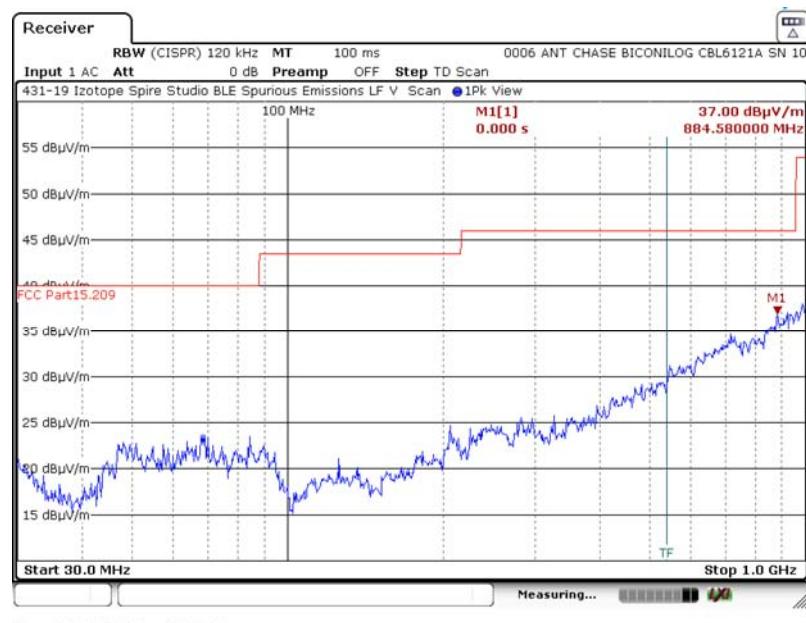
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.1. Channel 37, 2402 MHz

A3.1.1. Measurement Results: Horizontal Antenna



A3.1.2. Measurement Results: Vertical Antenna

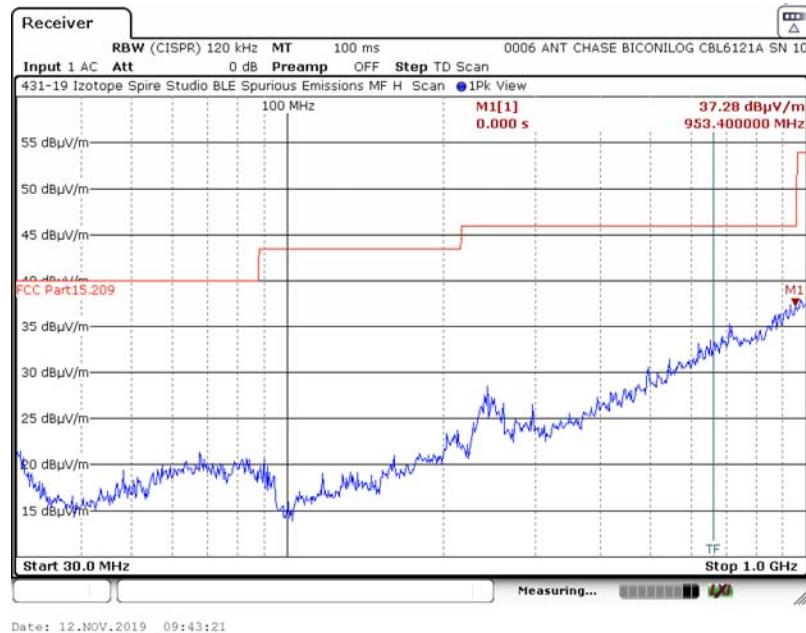


Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

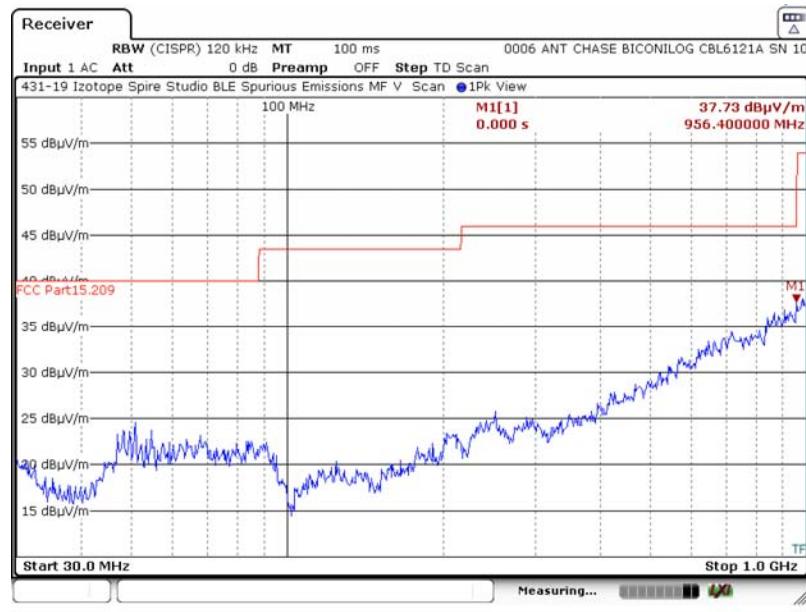
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.2. Channel 17, 2442 MHz

A3.2.1. Measurement Results: Horizontal Antenna



A3.2.2. Measurement Results: Vertical Antenna

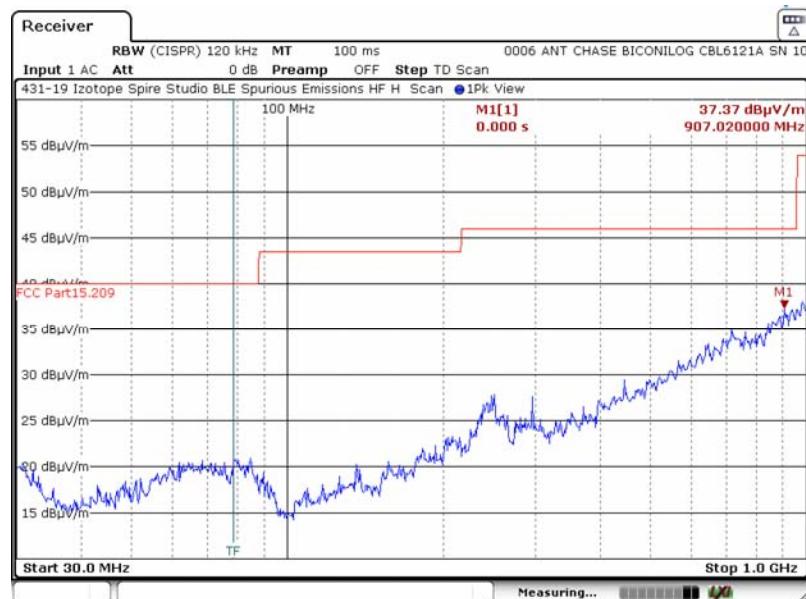


Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

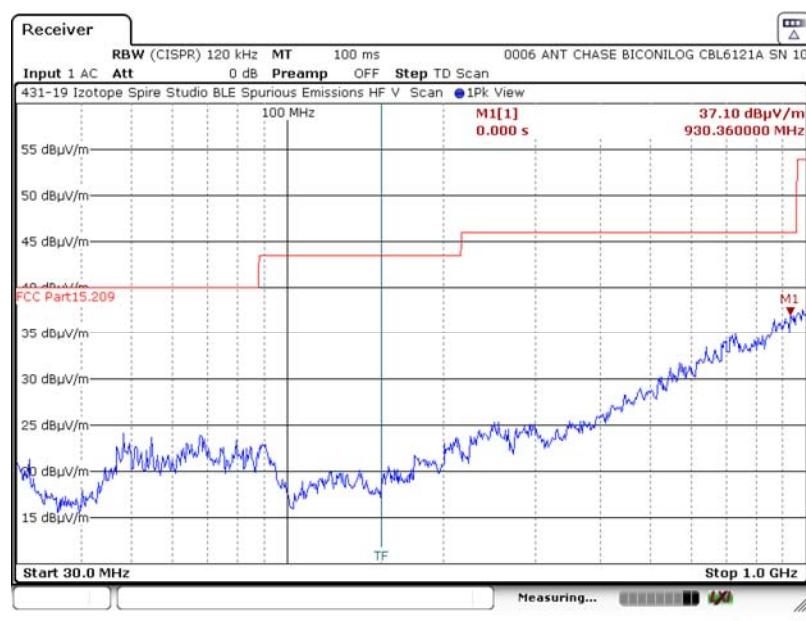
A3. Spurious Radiated Emissions (30 MHz – 1 GHz) Test Results

A3.3. Channel 39, 2480 MHz

A3.3.1. Measurement Results: Horizontal Antenna



A3.3.2. Measurement Results: Vertical Antenna



Test Number: 431-19

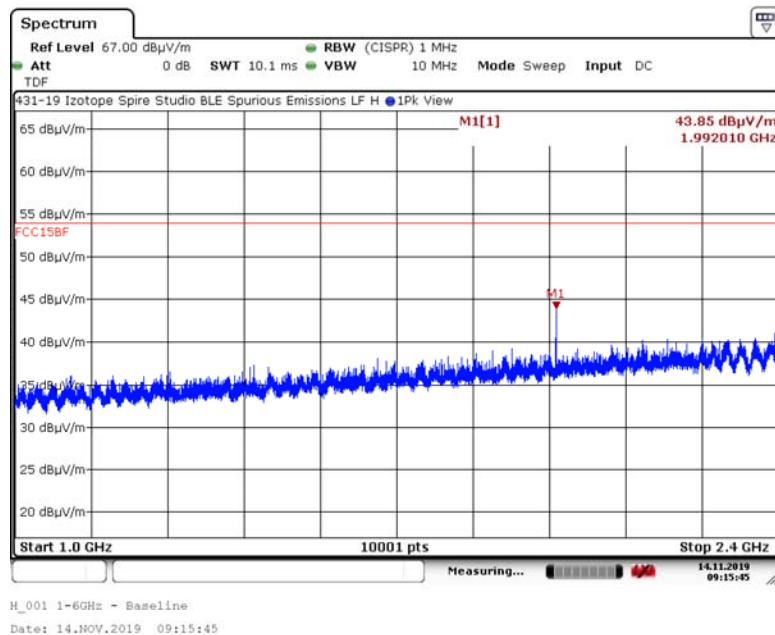
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

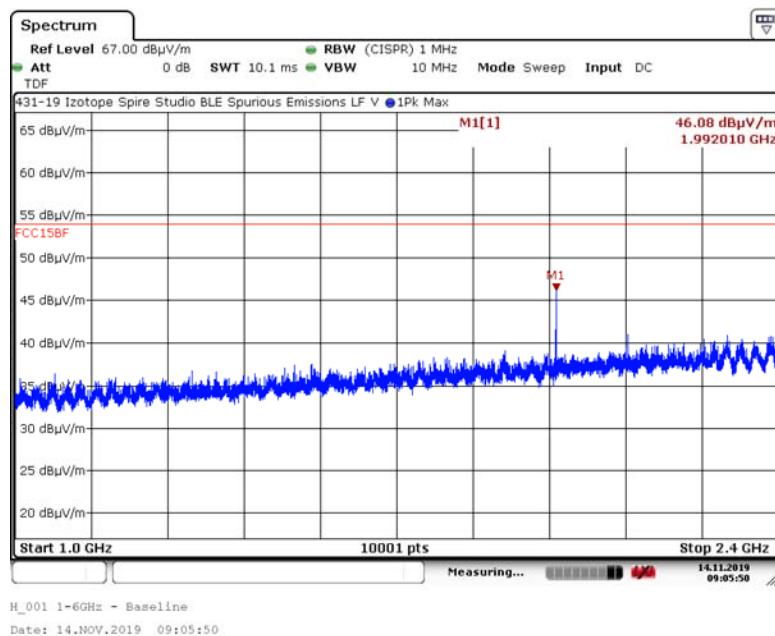
A4. Spurious Radiated Emissions (1 GHz – 2.4 GHz) Test Results

A4.1. Channel 37, 2402 MHz

A4.1.1. Measurement Results: Horizontal Antenna



A4.1.2. Measurement Results: Vertical Antenna



Test Number: 431-19

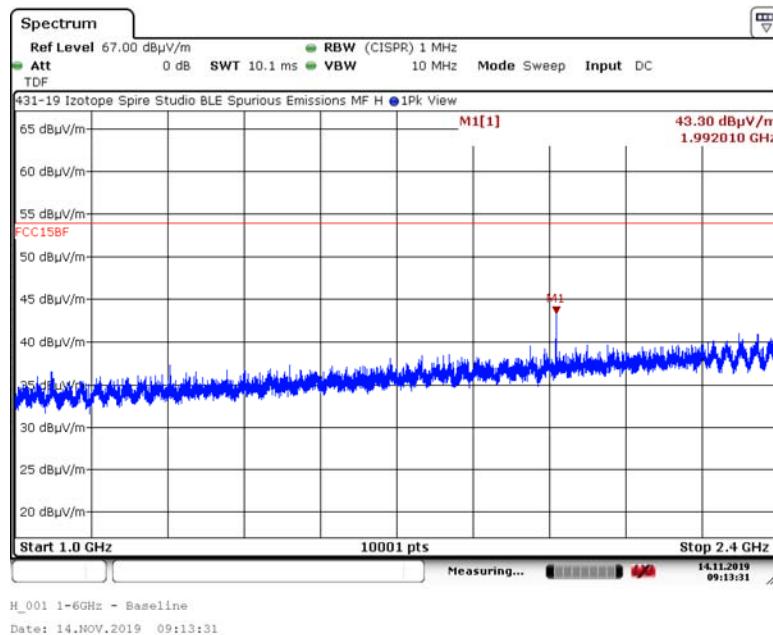
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

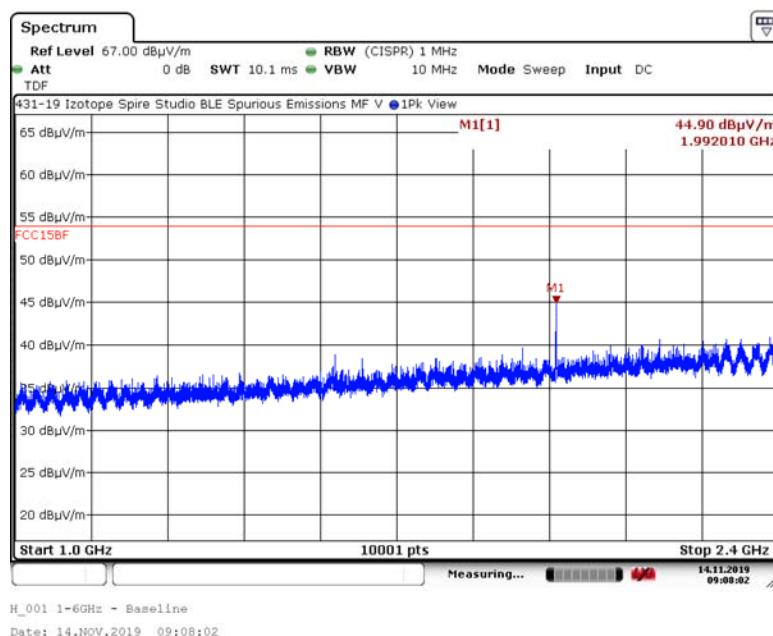
A4. Spurious Radiated Emissions 1 GHz – 2.4 GHz Test Results

A4.2. Channel 17, 2442 MHz

A4.2.1. Measurement Results: Horizontal Antenna



A4.2.2. Measurement Results: Vertical Antenna



Test Number: 431-19

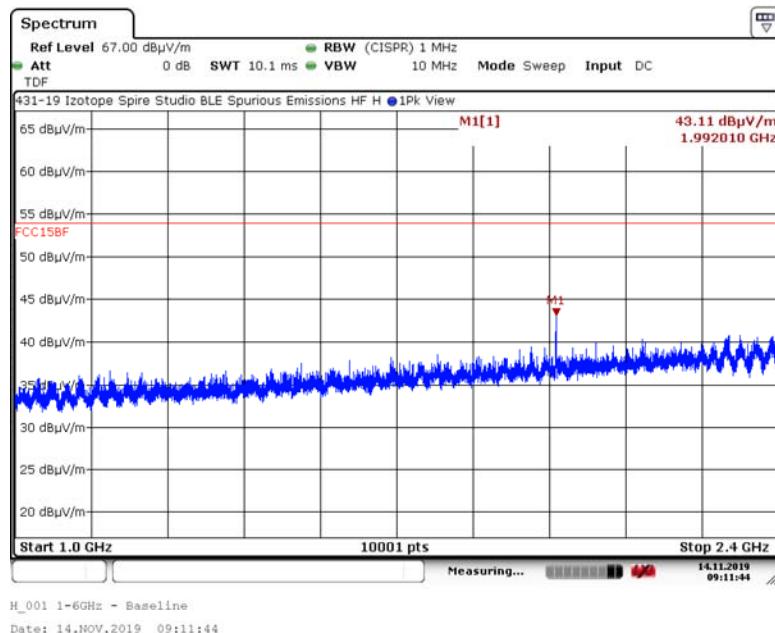
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

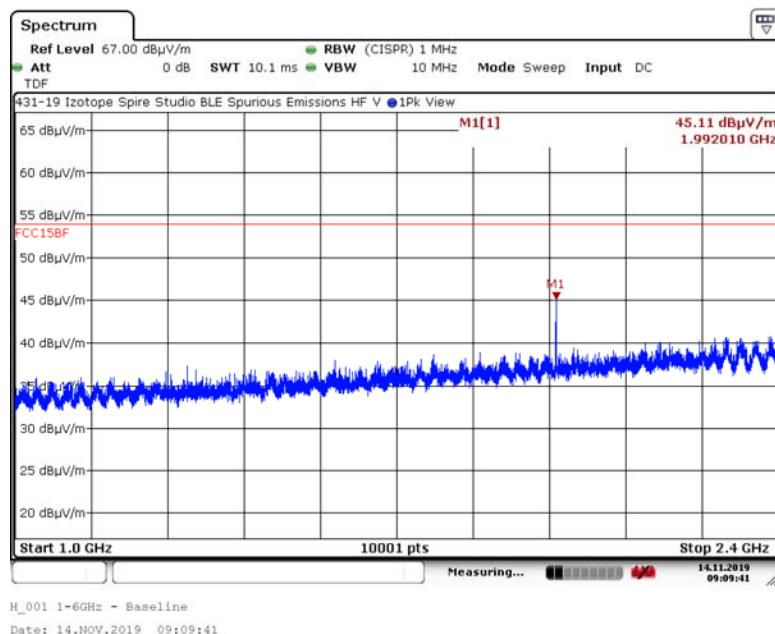
A4. Spurious Radiated Emissions (1 GHz – 2.4 GHz) Test Results

A4.3. Channel 39, 2480 MHz

A4.3.1. Measurement Results: Horizontal Antenna



A4.3.2. Measurement Results: Vertical Antenna



Test Number: 431-19

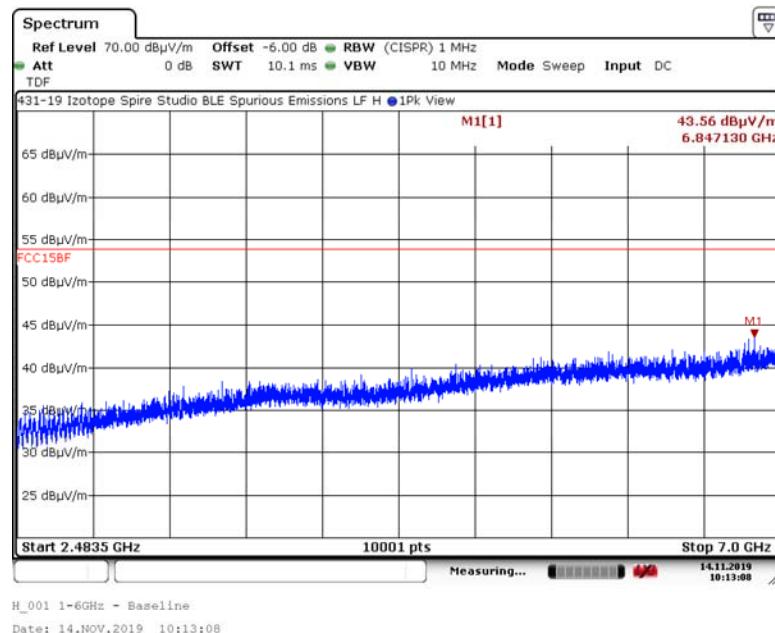
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

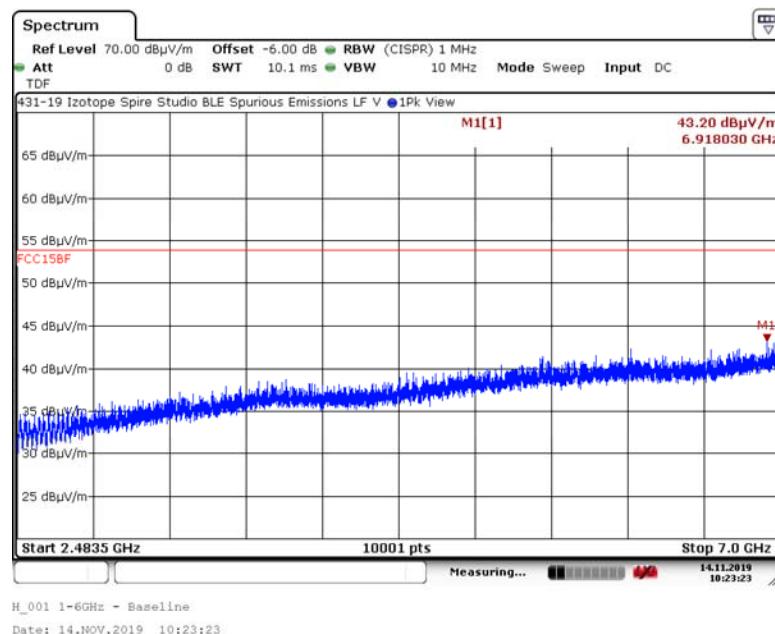
A5. Spurious Radiated Emissions (2.4835 GHz – 7 GHz) Test Results

A5.1. Channel 37, 2402 MHz

A5.1.1. Measurement Results: Horizontal Antenna



A5.1.2. Measurement Results: Vertical Antenna



Test Number: 431-19

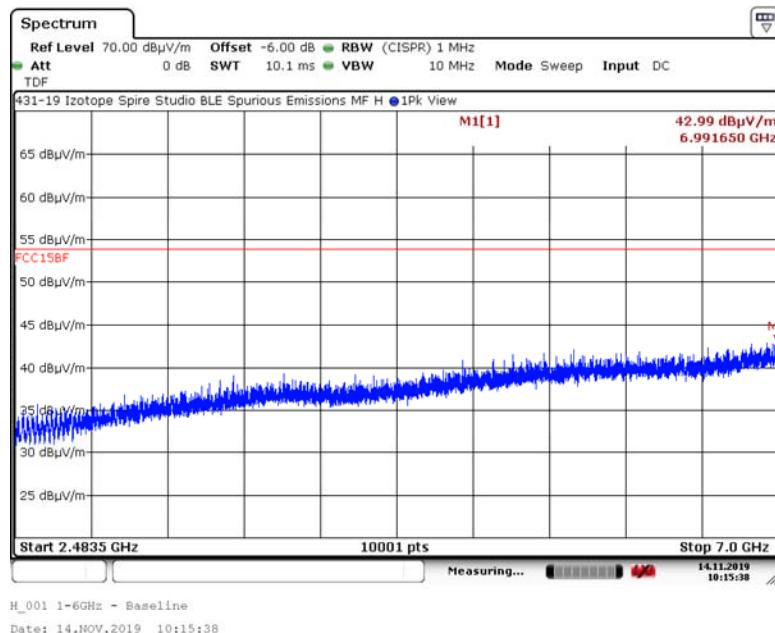
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

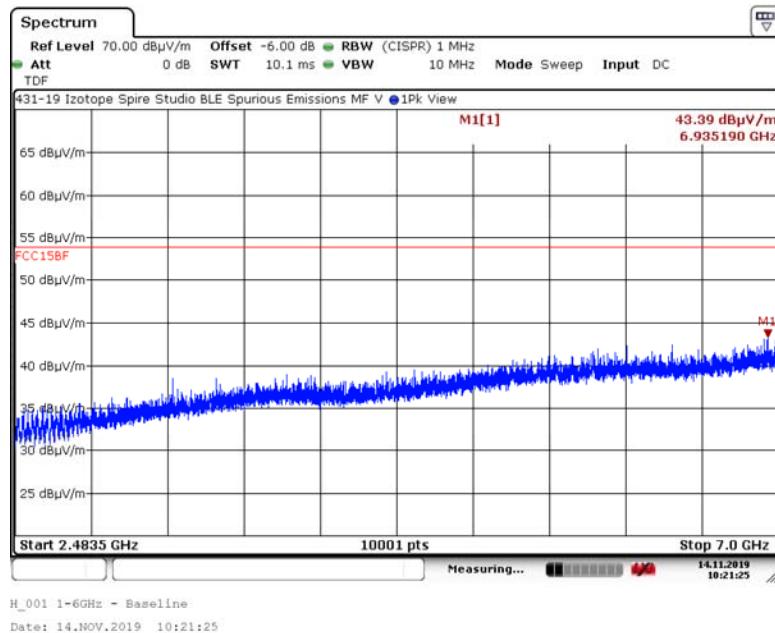
A5. Spurious Radiated Emissions (2.4835 GHz – 7 GHz) Test Results

A5.2. Channel 17, 2442 MHz

A5.2.1. Measurement Results: Horizontal Antenna



A5.2.2. Measurement Results: Vertical Antenna



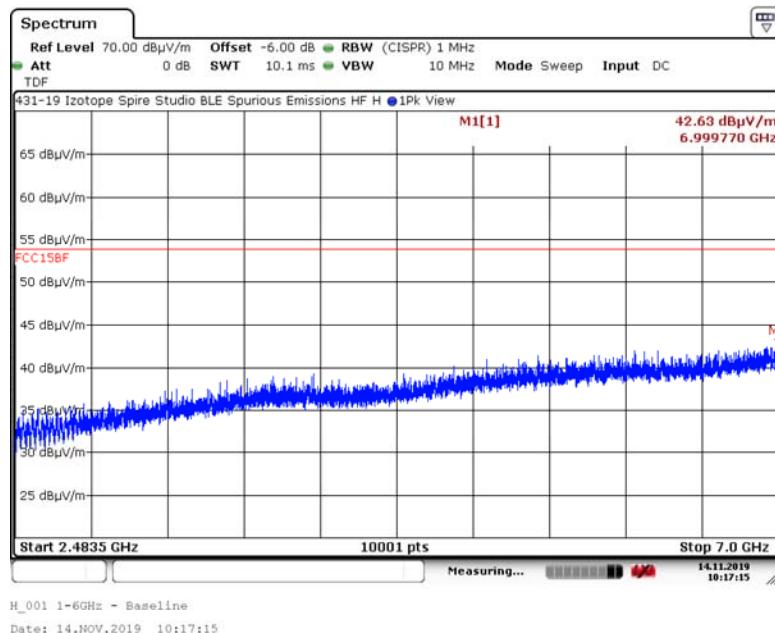
Test Number: 431-19
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

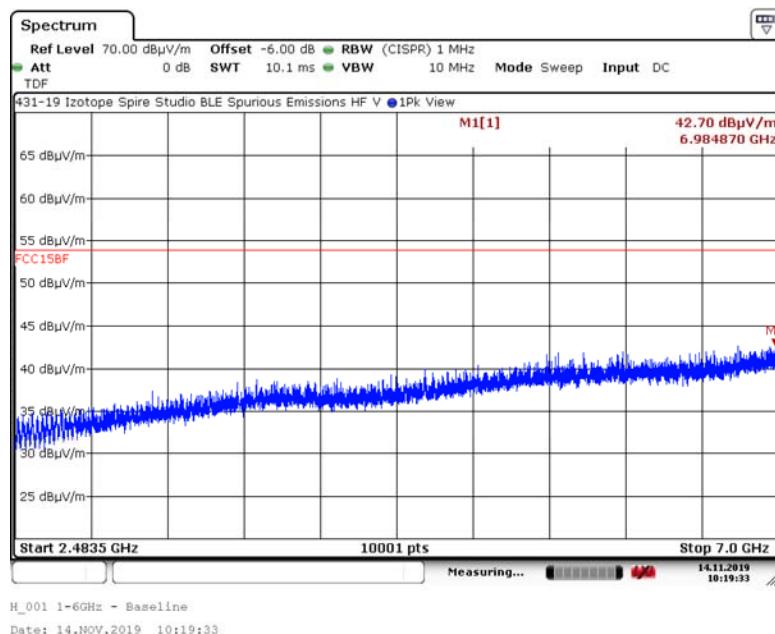
A5. Spurious Radiated Emissions (2.4835 GHz – 7 GHz) Test Results

A5.3. Channel 39, 2480 MHz

A5.3.1. Measurement Results: Horizontal Antenna



A5.3.2. Measurement Results: Vertical Antenna



Test Number: 431-19

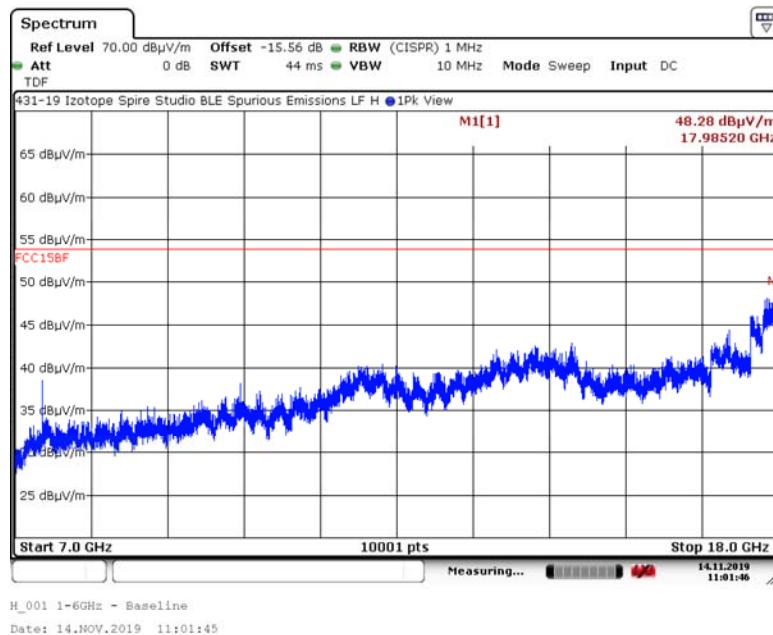
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

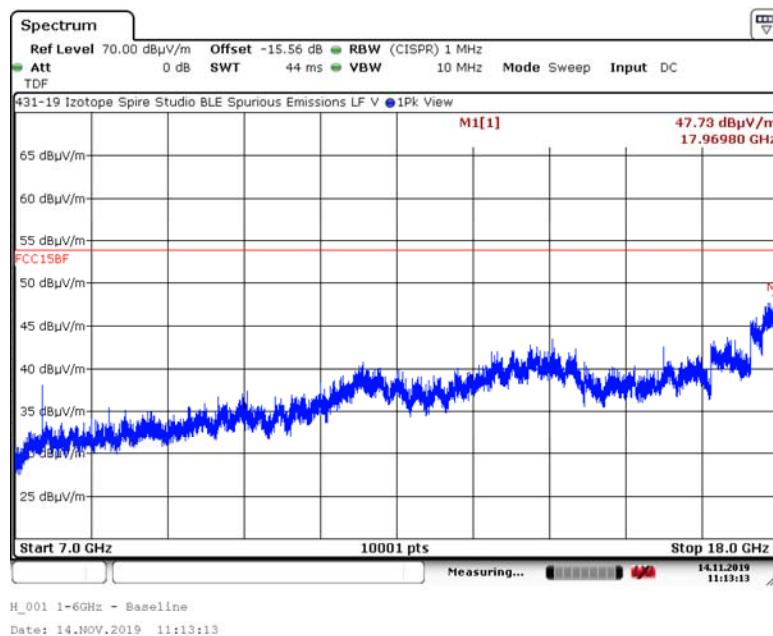
A6. Spurious Radiated Emissions (7 GHz – 18 GHz) Test Results

A6.1. Channel 37, 2402 MHz

A6.1.1. Measurement Results: Horizontal Antenna



A6.1.2. Measurement Results: Vertical Antenna



Test Number: 431-19

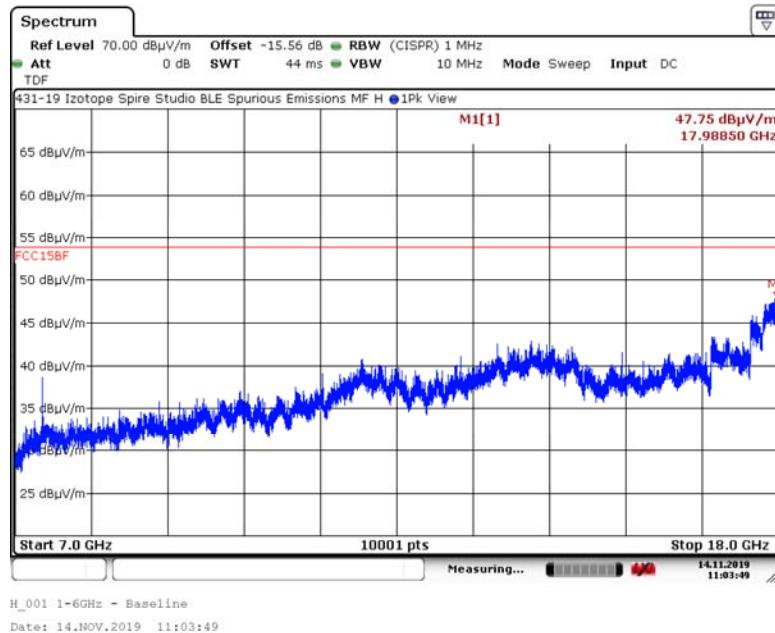
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

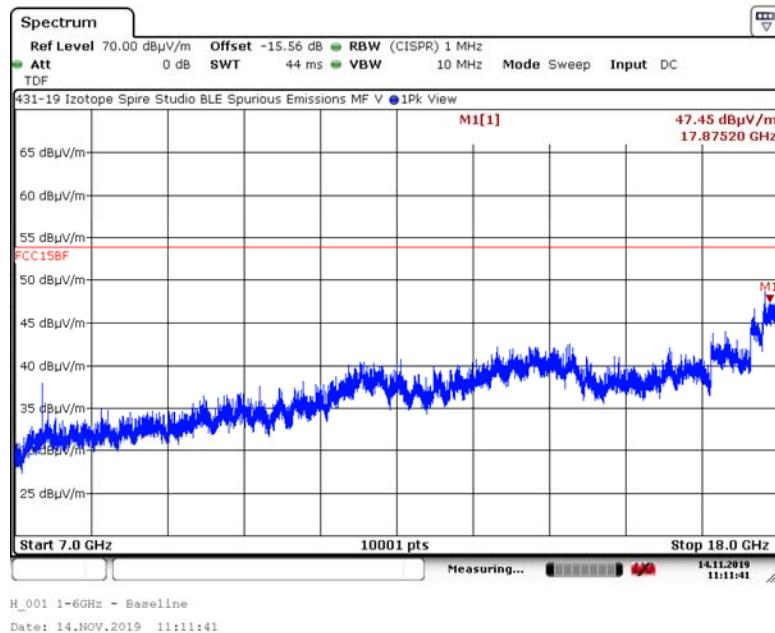
A6. Spurious Radiated Emissions (7 GHz – 18 GHz) Test Results

A6.2. Channel 17, 2442 MHz

A6.2.1. Measurement Results: Horizontal Antenna



A6.2.2. Measurement Results: Vertical Antenna



Test Number: 431-19

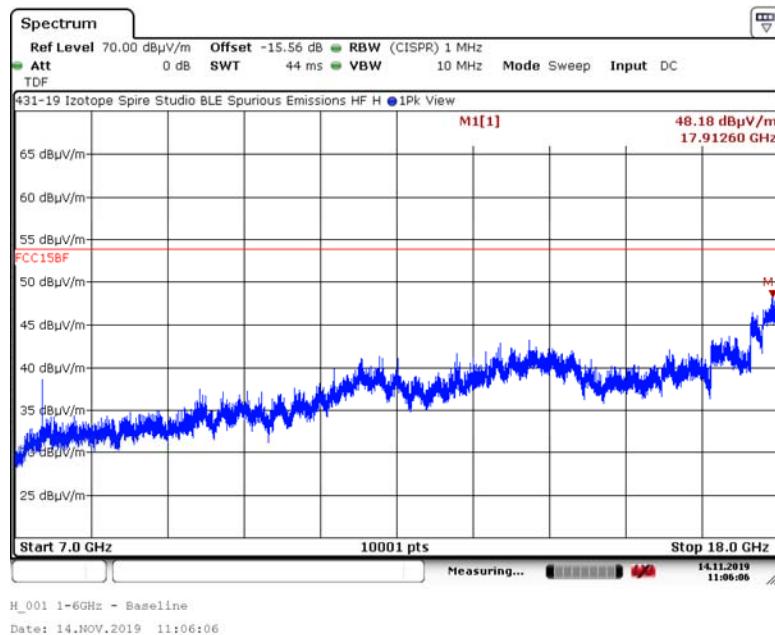
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

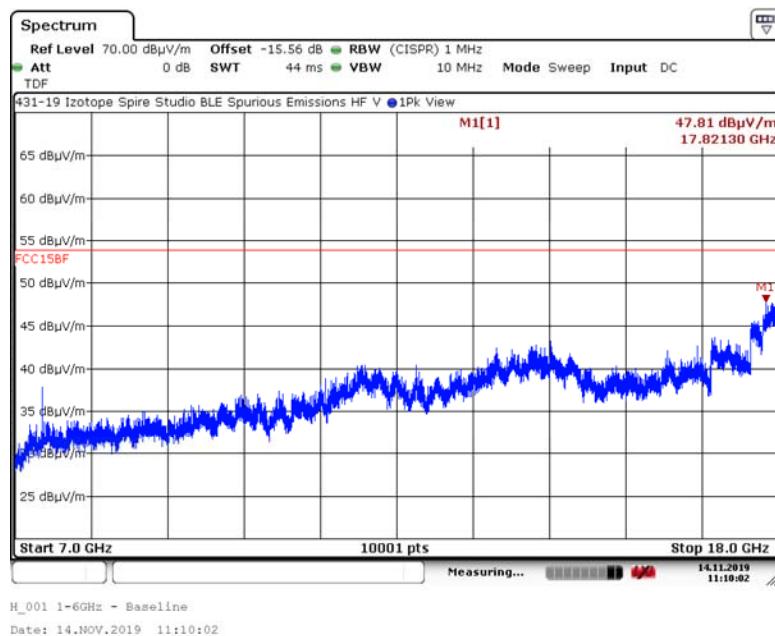
A6. Spurious Radiated Emissions (7 GHz – 18 GHz) Test Results

A6.3. Channel 39, 2480 MHz

A6.3.1. Measurement Results: Horizontal Antenna



A6.3.2. Measurement Results: Vertical Antenna



Test Number: 431-19

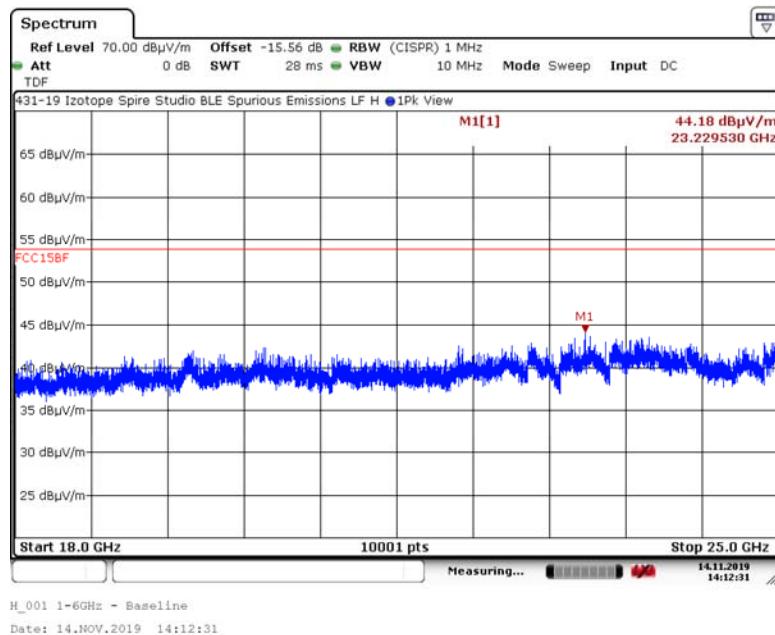
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

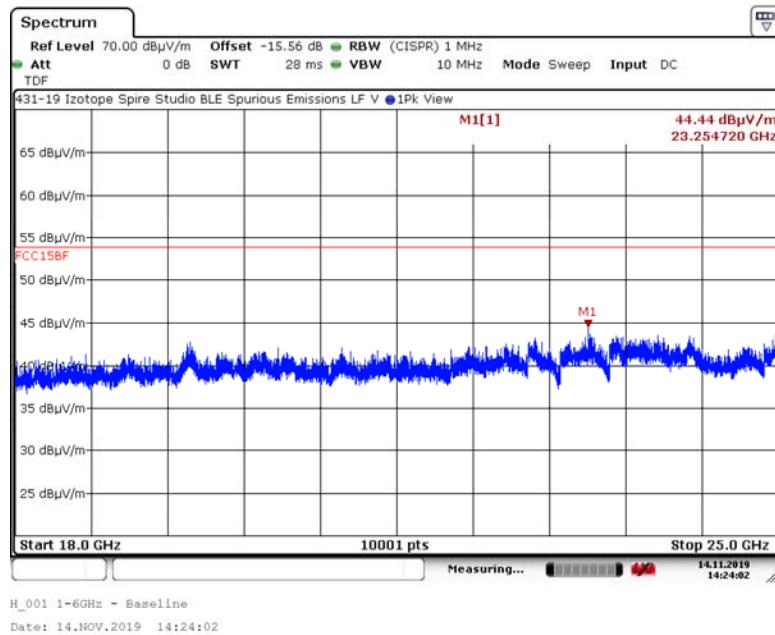
A7. Spurious Radiated Emissions (18 GHz – 25 GHz) Test Results

A7.1. Channel 37, 2402 MHz

A7.1.1. Measurement Results: Horizontal Antenna



A7.1.2. Measurement Results: Vertical Antenna



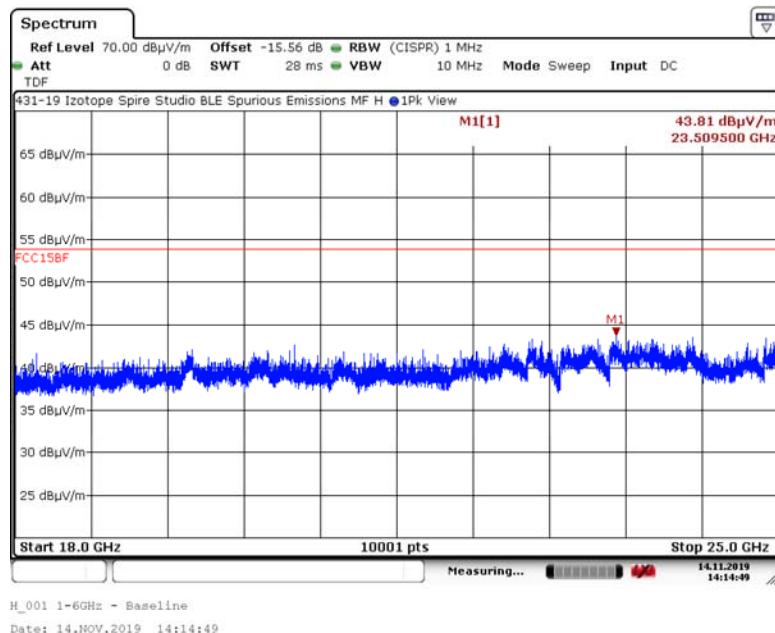
Test Number: 431-19
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

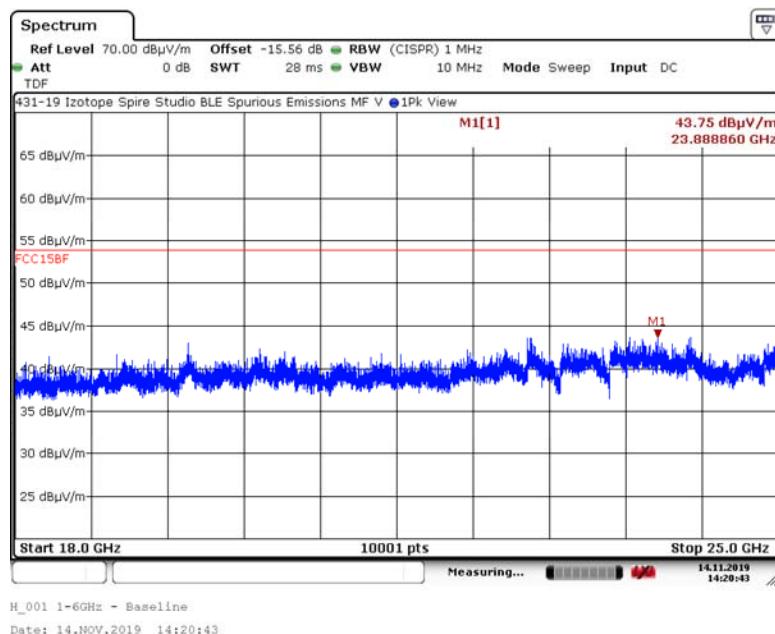
A7. Spurious Radiated Emissions (18 GHz – 25 GHz) Test Results

A7.2. Channel 17, 2442 MHz

A7.2.3. Measurement Results: Horizontal Antenna



A7.2.4. Measurement Results: Vertical Antenna



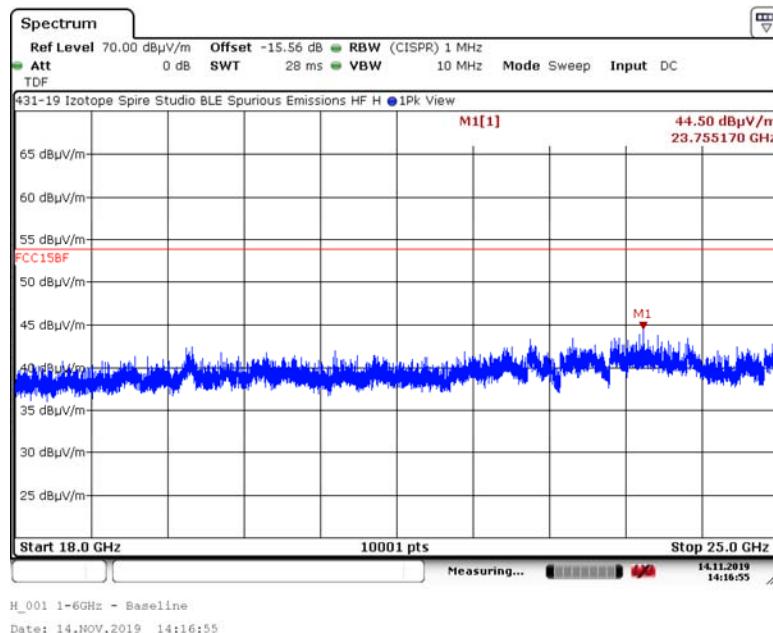
Test Number: 431-19
Issue Date: 12/10/2019

Appendix A - Transmitter Spurious Radiated Emissions (10 kHz to 25 GHz)

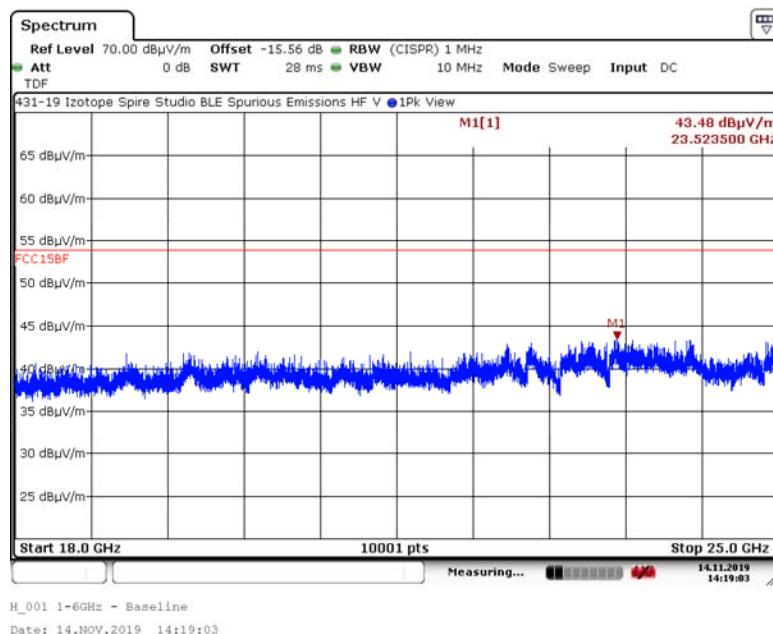
A7. Spurious Radiated Emissions (18 GHz – 25 GHz) Test Results

A7.2. Channel 39, 2480 MHz

A7.2.1. Measurement Results: Horizontal Antenna



A7.2.2. Measurement Results: Vertical Antenna

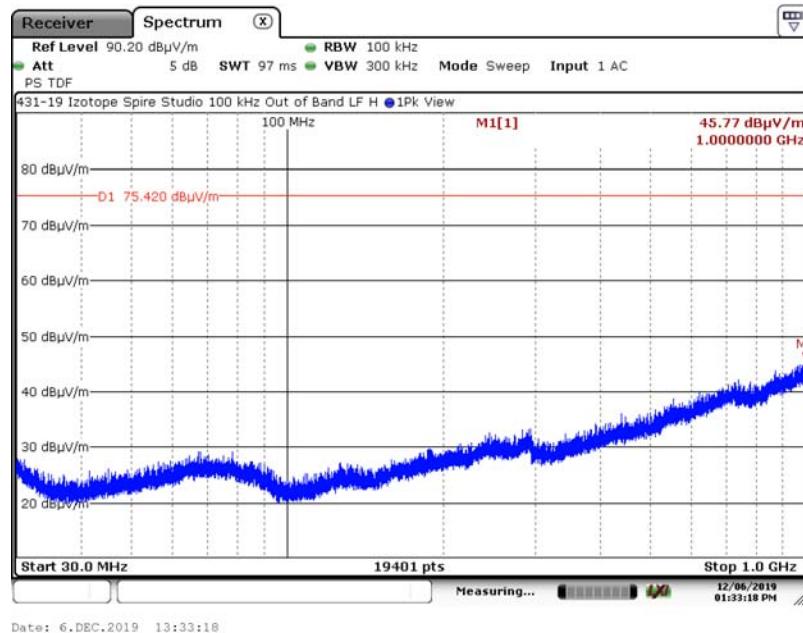


Appendix B

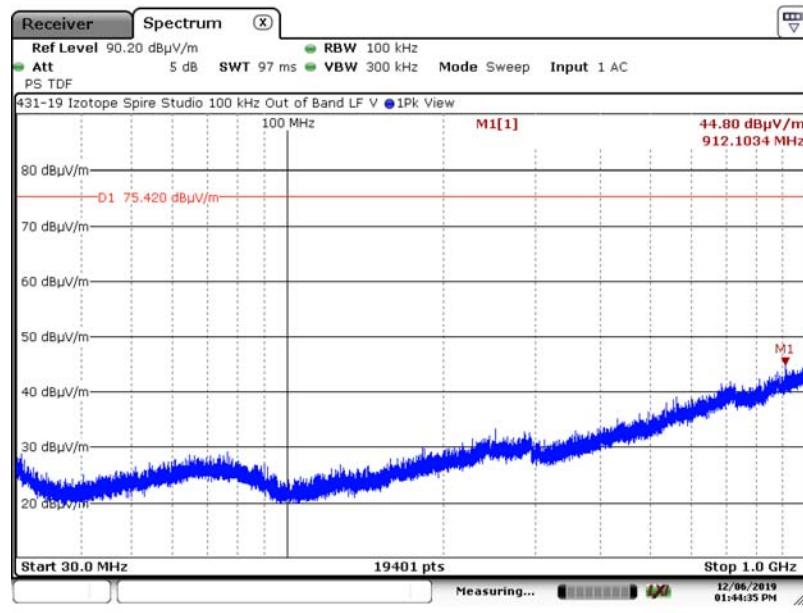
B1. Emissions in Non-restricted Frequency Bands (30 MHz to 25 GHz)

B1.1. Emissions in Non-restricted Frequency Bands (30 MHz – 1 GHz) Test Results

B1.1.1. Measurement Results, LF: Horizontal Receive Antenna



B1.1.2. Measurement Results, LF: Vertical Receive Antenna

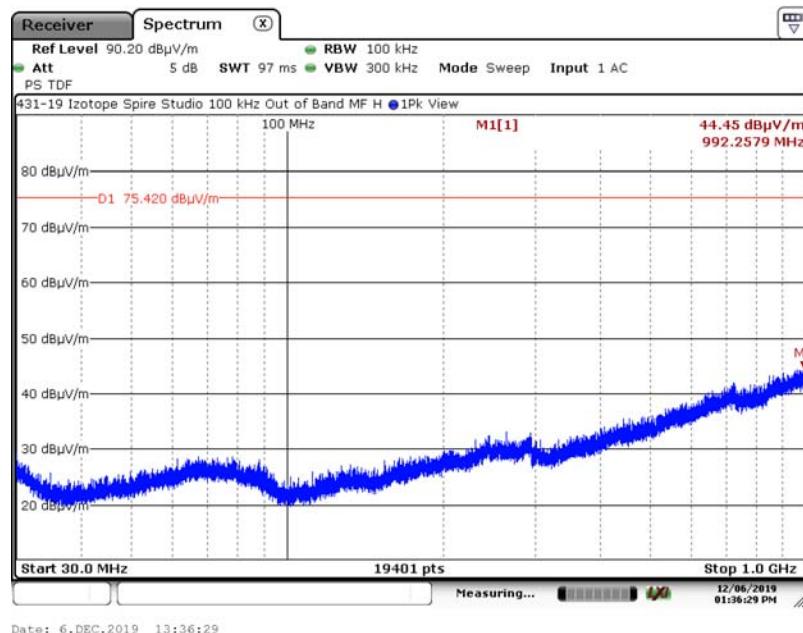


Appendix B

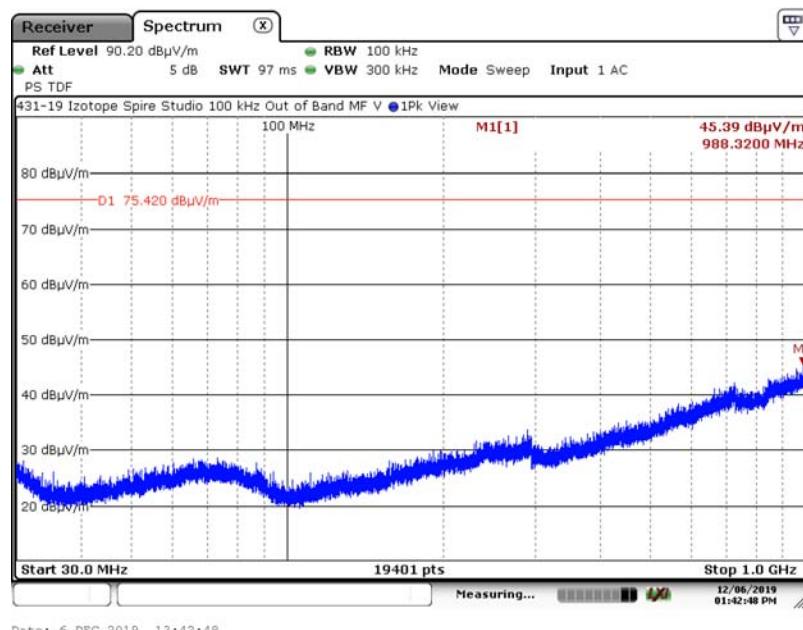
B1. Emissions in Non-restricted Frequency Bands (30 MHz to 25 GHz) (continued)

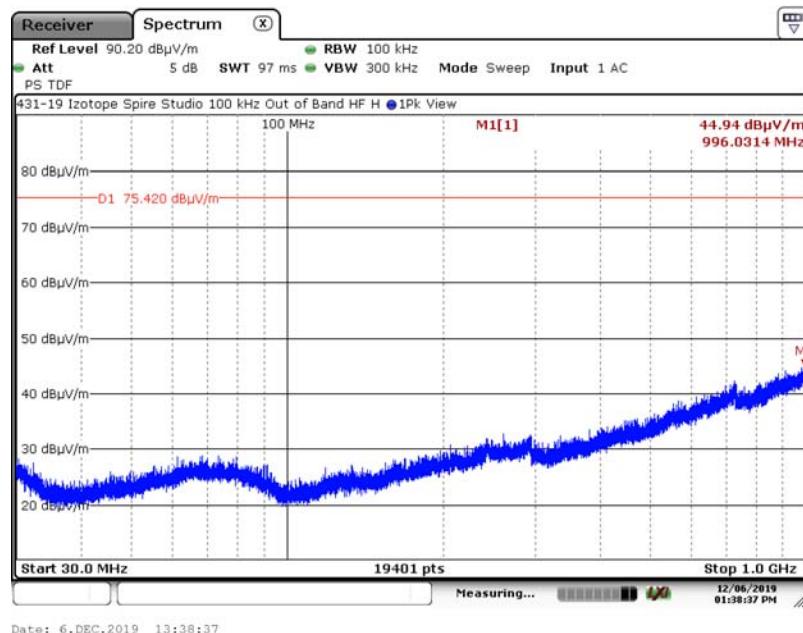
B1.1. Emissions in Non-restricted Frequency Bands (30 MHz – 1 GHz) Test Results

B1.1.3. Measurement Results, MF: Horizontal Receive Antenna

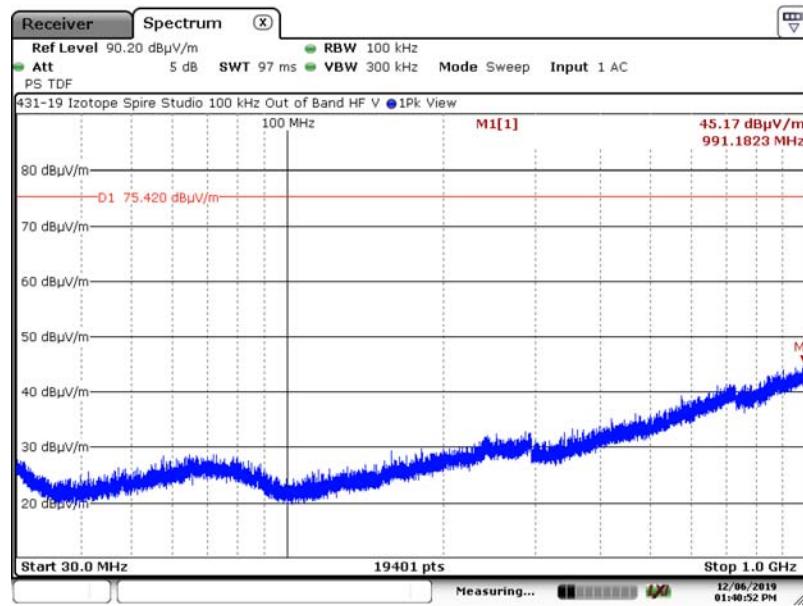


B1.1.4. Measurement Results, MF: Vertical Receive Antenna



Appendix B
B1. Emissions in Non-restricted Frequency Bands (30 MHz to 25 GHz) (continued)
B1.1. Emissions in Non-restricted Frequency Bands (30 MHz – 1 GHz) Test Results
B1.1.5. Measurement Results, HF: Horizontal Receive Antenna


Date: 6.DEC.2019 13:38:37

B1.1.6. Measurement Results, HF: Vertical Receive Antenna


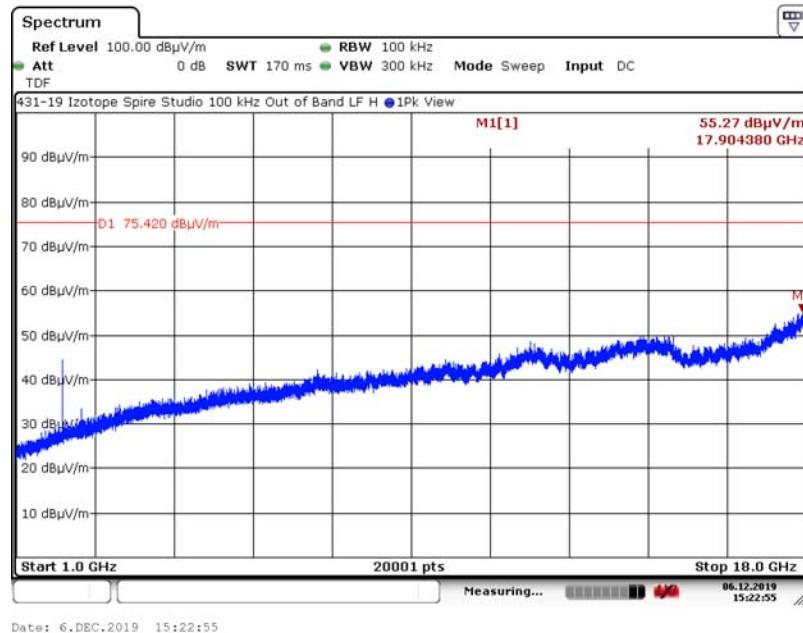
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Appendix B

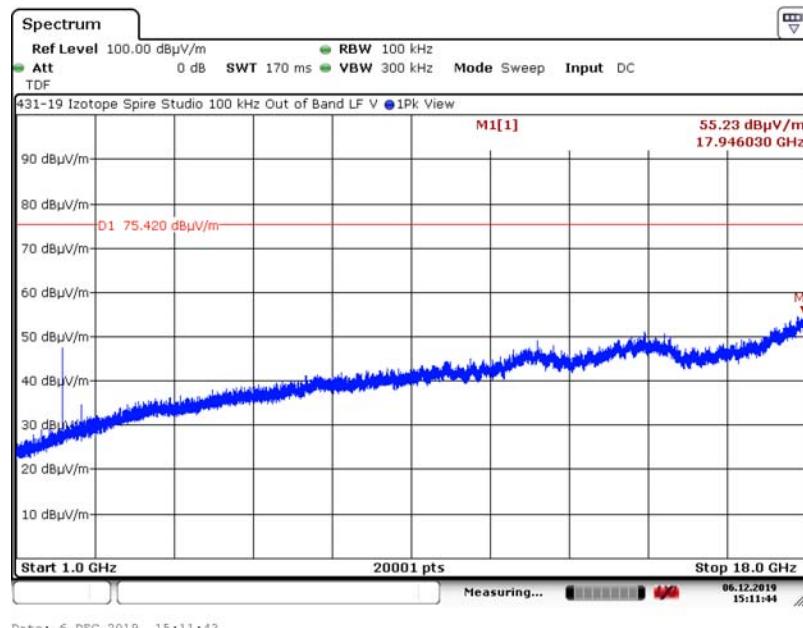
B1. Emissions in Non-restricted Frequency Bands (30 MHz to 25 GHz) (continued)

B1.2. Emissions in Non-restricted Frequency Bands (1 GHz – 18 GHz) Test Results

B1.2.1. Measurement Results, LF: Horizontal Receive Antenna



B1.2.2. Measurement Results, LF: Vertical Receive Antenna

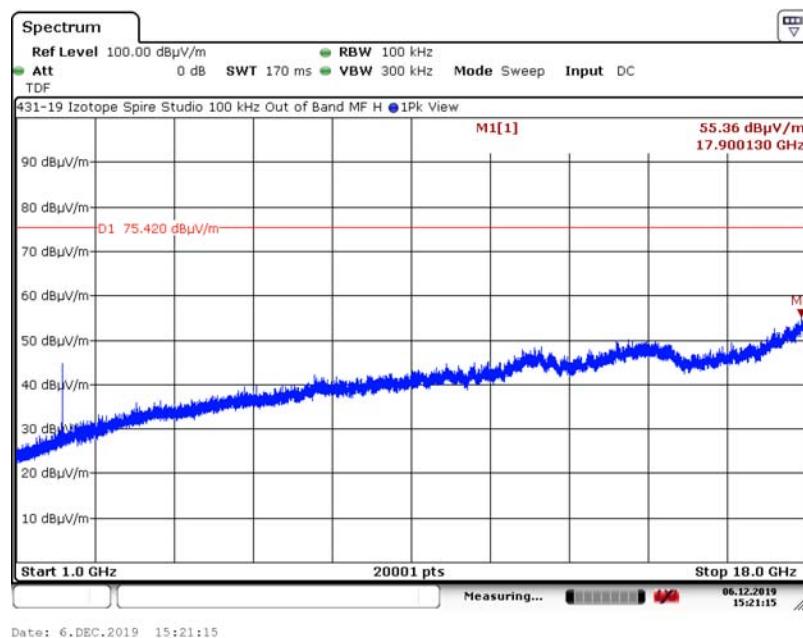


Appendix B

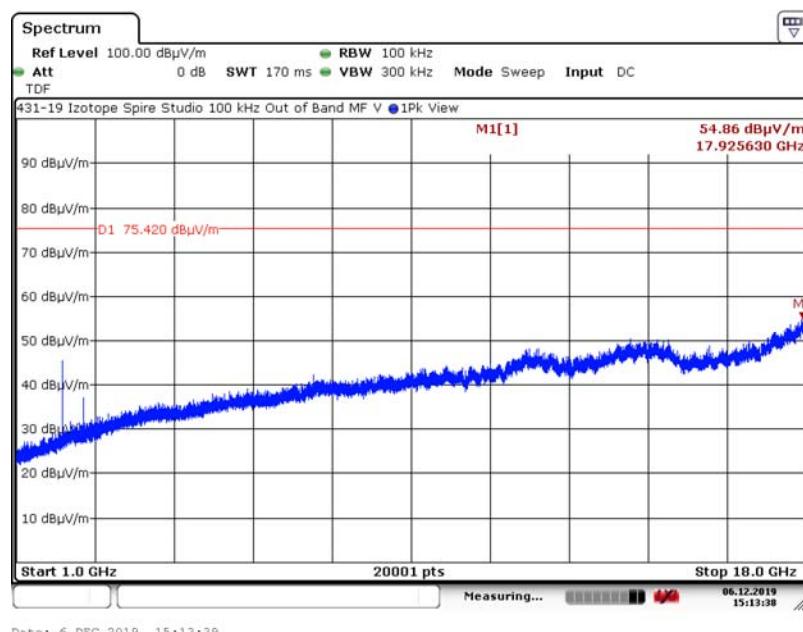
B1. Emissions in Non-restricted Frequency Bands (30 MHz to 25 GHz) (continued)

B1.2. Emissions in Non-restricted Frequency Bands (1 GHz – 18 GHz) Test Results

B1.2.3. Measurement Results, MF: Horizontal Receive Antenna



B1.2.4. Measurement Results, MF: Vertical Receive Antenna

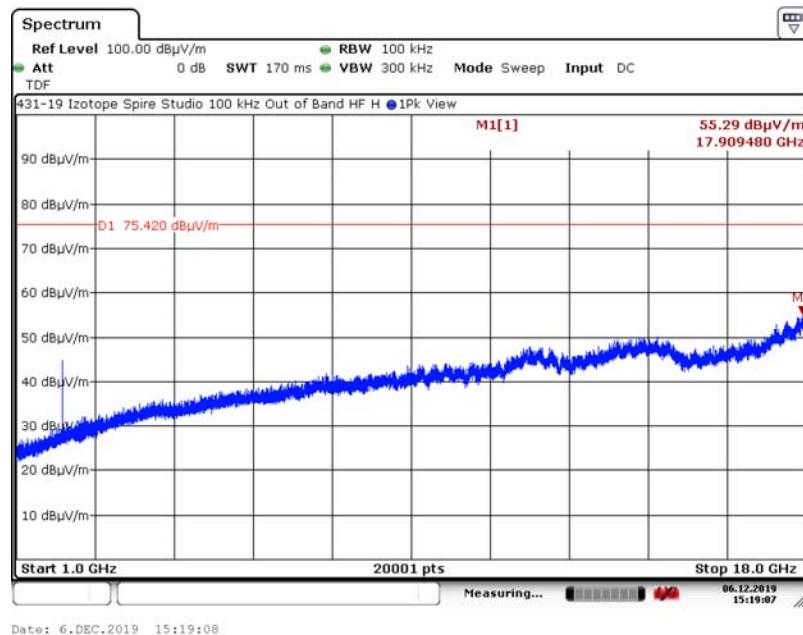


Appendix B

B1. Emissions in Non-restricted Frequency Bands (30 MHz to 25 GHz) (continued)

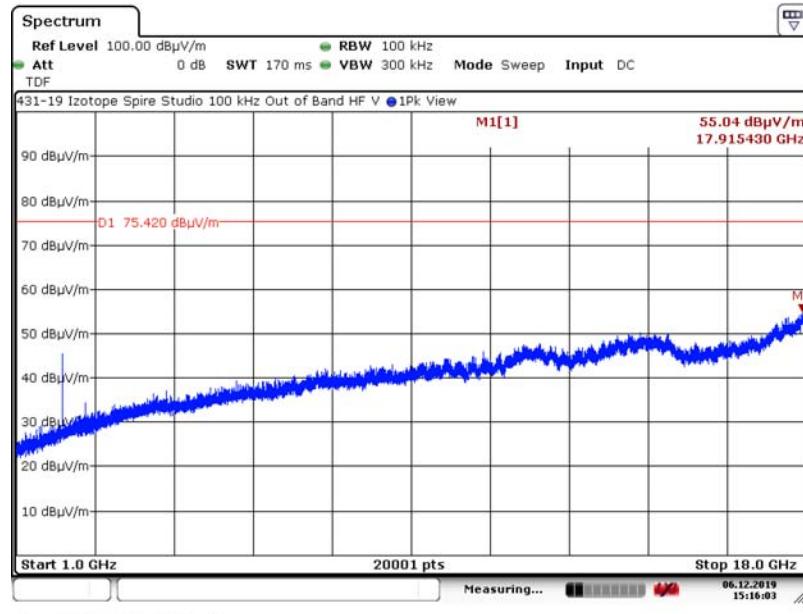
B1.2. Emissions in Non-restricted Frequency Bands (1 GHz – 18 GHz) Test Results

B1.2.5. Measurement Results, HF: Horizontal Receive Antenna

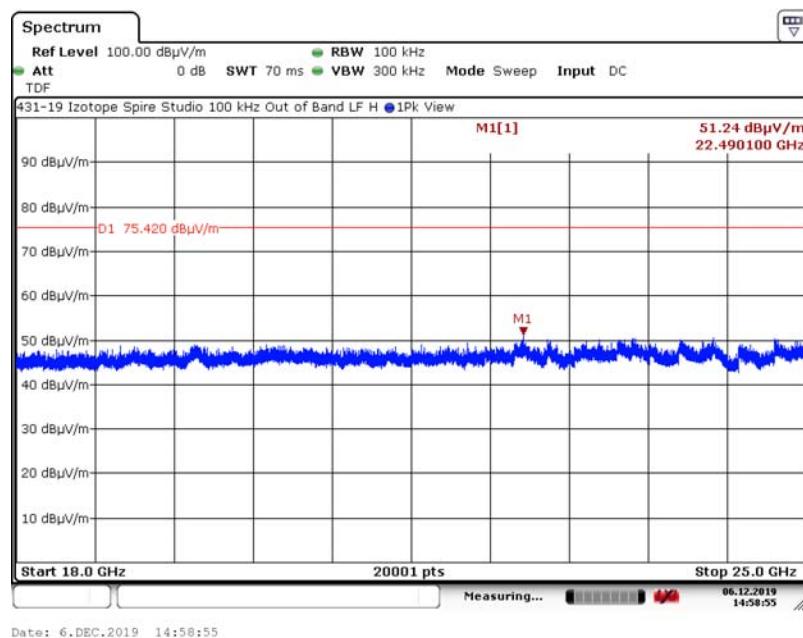
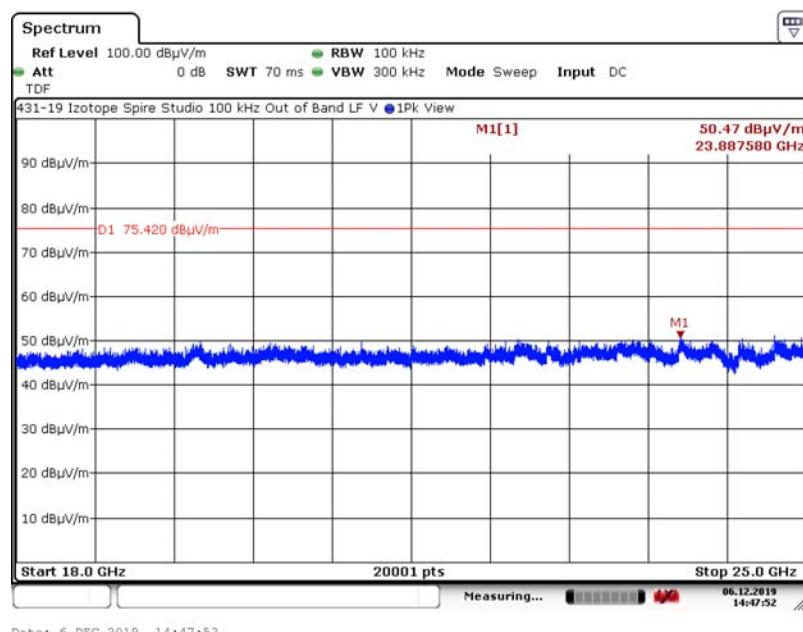


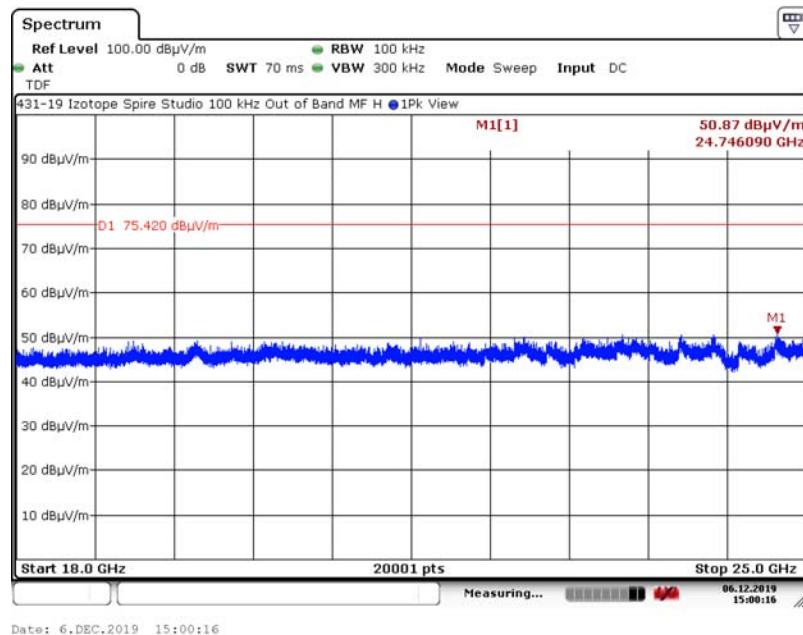
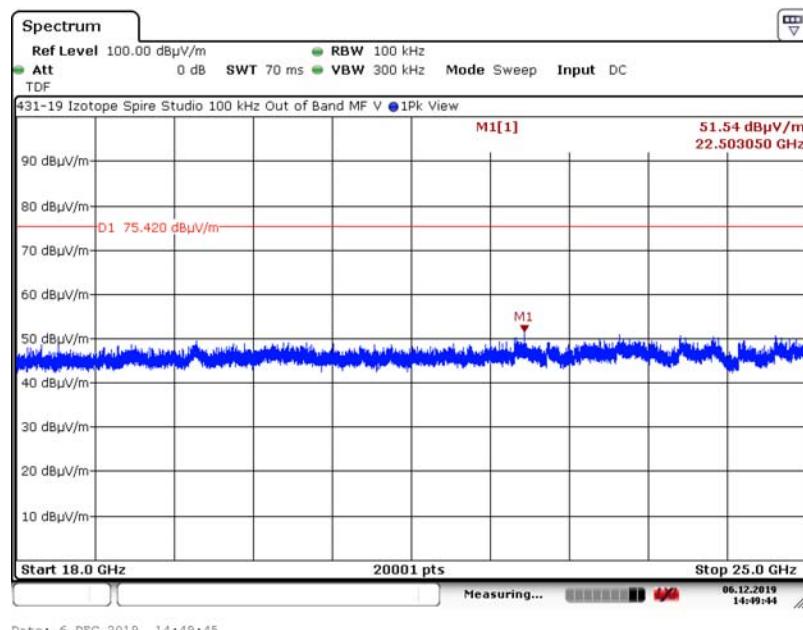
Date: 6.DEC.2019 15:19:08

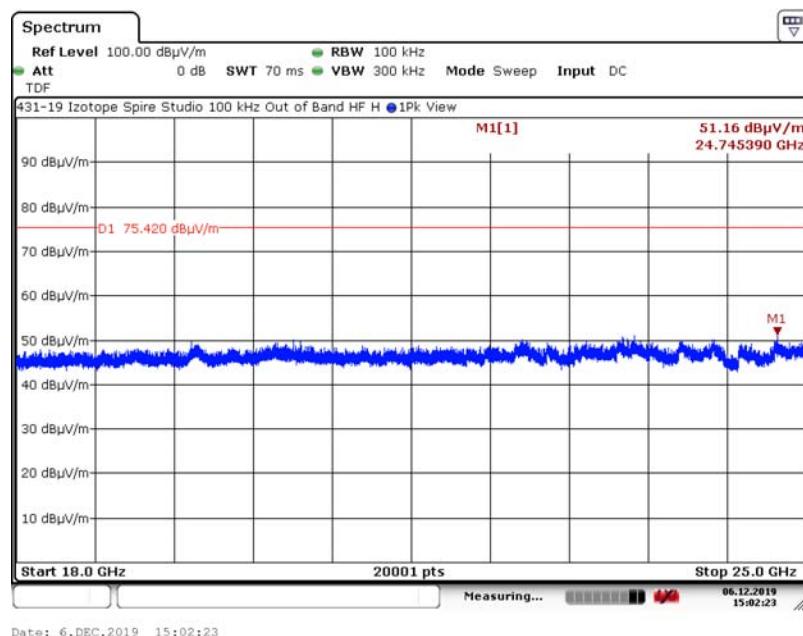
B1.2.6. Measurement Results, HF: Vertical Receive Antenna



Date: 6.DEC.2019 15:16:03

Appendix B
B1. Emissions in Non-restricted Frequency Bands (30 MHz to 25 GHz) (continued)
B1.3. Emissions in Non-restricted Frequency Bands (18 GHz – 25 GHz) Test Results
B1.3.1. Measurement Results, LF: Horizontal Receive Antenna

B1.3.2 Measurement Results, LF: Vertical Receive Antenna


Appendix B
B1. Emissions in Non-restricted Frequency Bands (30 MHz to 25 GHz) (continued)
B1.3. Emissions in Non-restricted Frequency Bands (18 GHz – 25 GHz) Test Results
B1.3.3. Measurement Results, MF: Horizontal Receive Antenna

B1.3.4 Measurement Results, MF: Vertical Receive Antenna


Appendix B
B1. Emissions in Non-restricted Frequency Bands (30 MHz to 25 GHz) (continued)
B1.3. Emissions in Non-restricted Frequency Bands (18 GHz – 25 GHz) Test Results
B1.3.5. Measurement Results, HF: Horizontal Receive Antenna

B1.3.6 Measurement Results, HF: Vertical Receive Antenna
