EMC & RF Test Report

As per

RSS-247 Issue 2:2017
&
FCC Part 15 Subpart 15.247:2018

Unlicensed Intentional Radiators

on the

FloPatch FP120

Issued by: **TÜV SÜD Canada Inc.**
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Testing produced for
FLOSONICS MEDICAL
See Appendix A for full client & EUT details.

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R-4023, G-506
C-4498, T-1246

Registration # CA6844

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Report Scope

This report addresses the EMC verification testing and test results of the **Flosonic Medical** Model: **FloPatch FP120**, and is herein referred to as EUT (Equipment Under Test). The EUT was tested for compliance against the following standards:

RSS-247 Issue 2:2017

FCC Part 15 Subpart C 15.247:2018

Test procedures, results, justifications, and engineering considerations, if any, follow later in this report.

This report does not imply product endorsement by any government, accreditation agency, or TÜV SÜD Canada Inc.

Opinions or interpretations expressed in this report, if any, are outside the scope of TÜV SÜD Canada Inc. accreditations. Any opinions expressed do not necessarily reflect the opinions of TÜV SÜD Canada Inc., unless otherwise stated.

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Summary

The results contained in this report relate only to the item(s) tested.

EUT:	FloPatch FP120
FCC Certification #, FCC ID:	2AUWSFP120
Industry Canada Certification #, IC:	25612-FP120
EUT passed all tests performed	Yes
Tests conducted by	Min Xie

For testing dates, see "Testing Environmental Conditions and Dates".

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Test Results Summary

Standard/Method	Description	Class/Limit	Result
FCC 15.203	Antenna Requirement	Unique	Pass See Justification
FCC 15.205 RSS-GEN (Table 6)	Restricted Bands for Intentional Operation	QuasiPeak Average	Pass
FCC 15.207 RSS-GEN (Table 3)	Power Line Conducted Emissions	QuasiPeak Average	Pass
FCC 15.209 RSS-GEN (Table 4)	Spurious Radiated Emissions	QuasiPeak Average	Pass
FCC 15.247(a)2 RSS-247 5.2(a)	6 dB Bandwidth	> 500 kHz	Pass
FCC 15.247(b)2 RSS-247 5.4(d)	Max Output Power	< 1 Watt	Pass
FCC 15.247(b)4 RSS-247 5.4(d)	Antenna Gain	< 6 dBi	Pass See Justifications
FCC 15.247(d) RSS-247 5.5	Antenna Conducted Spurious	< 20 dBc	Pass
FCC 15.247(e) RSS-247 5.2(b)	Spectral Density	< 8 dBm (3 kHz BW)	Pass
Overall Result			**Pass**

If the product as tested or otherwise complies with the specification, the EUT is deemed to comply with the requirement and is deemed a ‘PASS’ grade. If not ‘FAIL’ grade will be issued. Note that ‘PASS’ / ‘FAIL’ grade is independent of any measurement uncertainties. A ‘PASS’ / ‘FAIL’ grade within measurement uncertainty is marked with a ‘*’.

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Notes, Justifications, or Deviations

The following notes, justifications for tests not performed or deviations from the above listed specifications apply:

For the Antenna requirement specified in FCC 15.203 (RSS-247 section 5.4(d)), the unit uses a custom designed antenna with less than 6 dBi gain.

For the Restricted Bands of operation, the EUT is designed to only operate between 2400 – 2483.5 MHz.

The EUT is not a hybrid system and FCC 15.247 (f) does not apply to it. However the 15.247 (e) requirement of power density were met and are detailed later in this test report.

The EUT was mounted in three orthogonal axis. Worst case results were obtained with the EUT in the X-axis. Worst case results are presented. See Appendix B for axis details.

SAR assessment is applicable to the EUT. The separation distance between radiating structure of the EUT and human body is < 5 mm. According to FCC KDB 447498 Section 4.3.1 5), an assessment distance of 5 mm is applied. The maximum conducted power of the EUT is 4.8 mW which is less than the SAR Test Exclusion Power Threshold for 5 mm given in FCC KDB 447498 Appendix A. Therefore the device meets the SAR Test Exclusion criteria and no test is required.

Power line conducted emissions was not applicable since the EUT is a battery operated device. It contains a rechargeable battery but the transmitter does not operate when the battery is being charged. All tests were performed with the battery fully charged.

A SMA connector with short coaxial was soldered to the antenna connector to perform antenna port conducted emission.

Sample Calculation(s)

Radiated Emission Test

Margin = Limit – (Received Signal + Antenna Factor + Cable Loss – Pre-Amp Gain)
Margin = 50.5dBµV/m – (50dBµV + 10dB/m + 2.5dB – 20dB)
Margin = 8.0 dB (pass)

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Applicable Standards, Specifications and Methods

ANSI C63.4:2014	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10:2013	American National Standard For Testing Unlicensed Wireless Devices
CFR 47 FCC 15 Subpart C:2018	Code of Federal Regulations – Radio Frequency Devices, Intentional Radiators
FCC KDB 558074: 2017	FCC KDB 558074 Digital Transmission Systems, measurements and procedures
FCC KDB 447498: 2015	RF exposure procedures and equipment authorization policies for mobile and portable devices
RSS-GEN Issue 5 2018	General Requirements and Information for the Certification of Radio Apparatus
RSS-247 Issue 2:2017	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
ISO 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories

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Document Revision Status

Revision	Date	Description
Draft	December 2, 2019	Draft
000	December 11, 2019	Initial Release

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Definitions and Acronyms

The following definitions and acronyms are applicable in this report.
See also ANSI C63.14.

DTS – Digital Transmission System
LISN – Line Impedance Stabilization Network
NCR – No Calibration Required
NSA – Normalized Site Attenuation
N/A – Not Applicable
RF – Radio Frequency

AE – Auxiliary Equipment. A digital accessory that feeds data into or receives data from another device (host) that in turn, controls its operation.

Antenna Port – Port, other than a broadcast receiver tuner port, for connection of an antenna used for intentional transmission and/or reception of radiated RF energy.

BW – Bandwidth. Unless otherwise stated, this refers to the 6 dB bandwidth.

EMC – Electro-Magnetic Compatibility. The ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment.

EMI – Electro-Magnetic Immunity. The ability to maintain a specified performance when the equipment is subjected to disturbance (unwanted) signals of specified levels.

EUT – Equipment Under Test. A device or system being evaluated for compliance that is representative of a product to be marketed.

ITE – Information Technology Equipment. Has a primary function of entry, storage, display, retrieval, transmission, processing, switching, or control of data and/or telecommunication messages and which may be equipped with one or more ports typically for information transfer.

LISN – Line Impedance Stabilization Network

NCR – No Calibration Required

RF – Radio Frequency

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Testing Facility

Testing for EMC on the EUT was carried out at TÜV SÜD Canada testing lab near Toronto, Ontario. The testing lab has calibrated 3m semi-anechoic chambers which allow measurements on a EUT that has a maximum width or length of up to 2m and a height of up to 3m. The testing lab also has a calibrated 10m Open Area Test Site (OATS). The chambers are equipped with a turntable that is capable of testing devices up to 5000lb in weight and are equipped with a mast that controls the polarization and height of the antenna. Control of the mast occurs in the control room adjoining the shielded chamber. This facility is capable of testing products that are rated for single phase or 3-phase AC input and DC capability is also available. Radiated emission measurements are performed using a BiLog antenna and a Horn antenna where applicable. Conducted emissions, unless otherwise stated, are performed using a LISN and using the vertical ground plane if applicable.

Calibrations and Accreditations

The 3m semi-anechoic chamber is registered with Federal Communications Commission (FCC, CA6844), Innovation, Science and Economic Development Canada (ISED, 6844A-3) and Voluntary Control Council for Interference (VCCI, R-4023, G-506, C-4498, and T-1246). This chamber was calibrated for Normalized Site Attenuation (NSA) using test procedures outlined in ANSI C63.4 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The chamber is lined with ferrite tiles and absorption cones to minimize any undesired reflections. The NSA data is kept on file at TÜV SÜD Canada. For radiated susceptibility testing, a 16 point field calibration has been performed on the chamber. The field uniformity data is kept on file at TÜV SÜD Canada. TÜV SÜD Canada Inc. is accredited to ISO 17025 by A2LA with Testing Certificate #2955.02. The laboratory's current scope of accreditation listing can be found as listed on the A2LA website. All measuring equipment is calibrated on an annual or biennial basis as listed for each respective test.

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Testing Environmental Conditions and Dates

Following environmental conditions were recorded in the facility during time of testing

Date	Test	Initials	Temperature (ºC)	Humidity (%)	Pressure (kPa)
2019 Oct 30, 31	Radiated Emissions	MX	21.9 – 22.5	36.1 – 40.2	100.7 – 102.0
2019 Nov 01	Antenna Conducted Emissions	MX	22.6	23.3	101.8

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Detailed Test Results Section

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6dB Bandwidth of Digitally Modulated Systems

Purpose

The purpose of this test is to ensure that the bandwidth occupied exceeds a stated minimum. This helps ensure the utilization of the frequency allocation is sufficiently wide. This also helps prevent corruption of data by ensuring adequate data separation to distinguish the reception of the intended information.

Limits and Method

The limit is as specified in FCC Part 15.247(a)2 and RSS-247 5.2(a).

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. This should be measured with a 100 kHz RBW and a 300 kHz VBW.

The method is given in ANSI C63.10.

Results

The EUT passed. The minimum 6 dB BW measured was 702.7 kHz and the maximum 99% Occupied Bandwidth at full power setting was 1050.8 kHz.

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	694.96	1050.79
Mid	2440	702.66	1047.14
High	2480	696.50	1042.65

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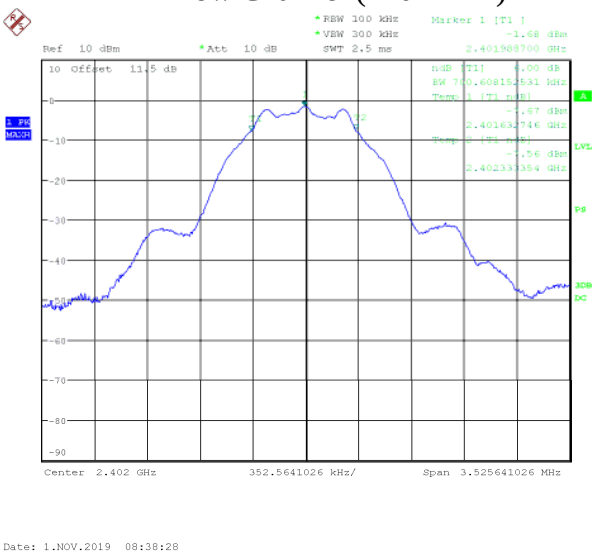
Graphs

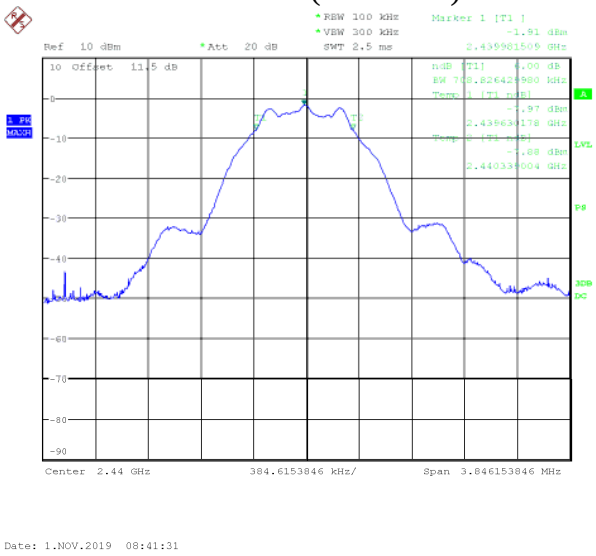
The graphs showed below show the OBW during the operation of the device. This is measured by a max hold on the spectrum analyzer and the highest resolution bandwidth that is sufficiently low to exhibit the 6 dB bandwidth of a channel during operation of the EUT. Max hold is performed for a duration of not less than 1 minute.

6dB Bandwidth

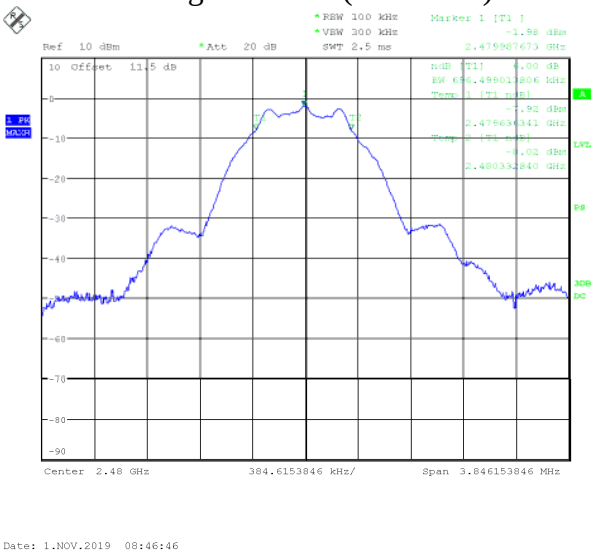
Low Channel (2402MHz)



Mid Channel (2440MHz)



High Channel (2480MHz)



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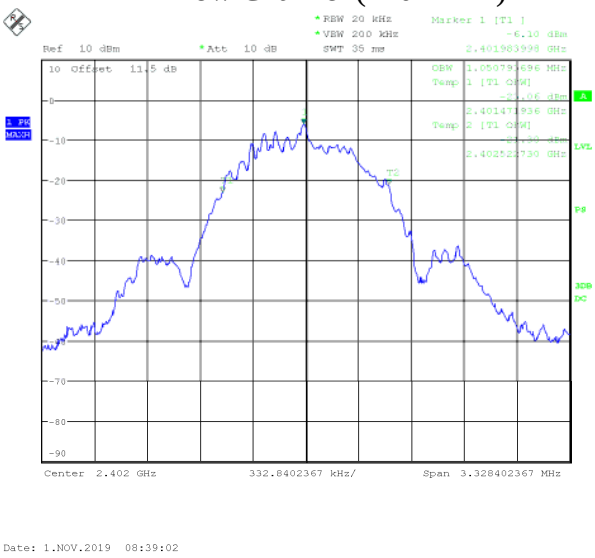
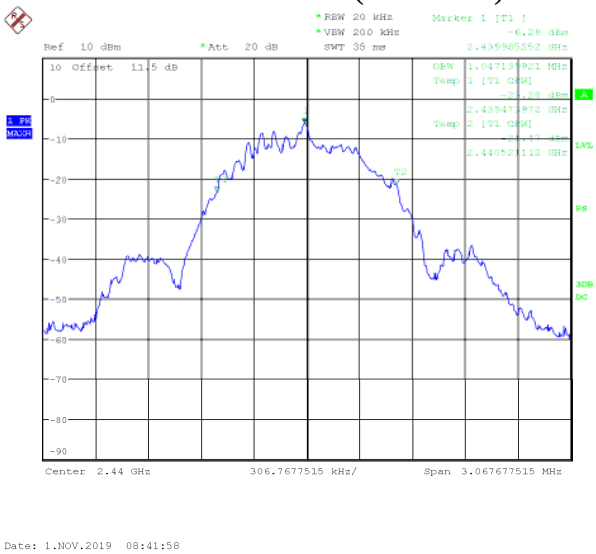
99% Bandwidth

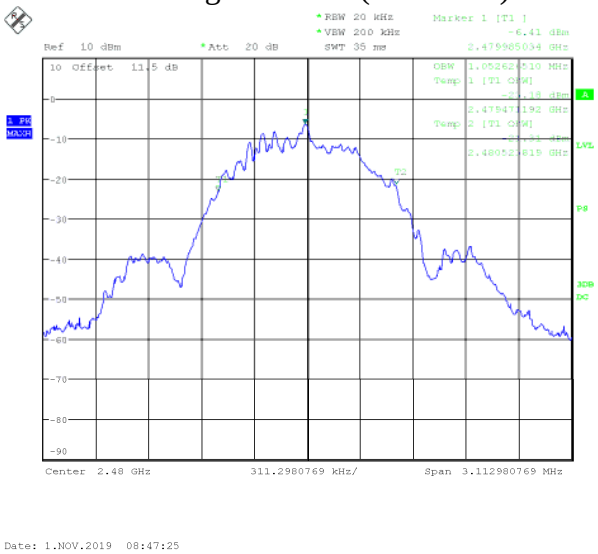
Low Channel (2402MHz)



Mid Channel (2440MHz)



High Channel (2480MHz)



Note: See 'Appendix B – EUT & Test Setup Photos' for photos showing the test set-up.

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Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date	Next Calibration Date	Asset #
Spectrum Analyzer	ESU 40	Rohde & Schwarz	Jan. 12, 2018	Jan. 12, 2020	GEMC 233
Attenuator 10 dB	3M-10	Agilent	NCR	NCR	GEMC 279

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Maximum Peak Envelope Conducted Power

Purpose

The purpose of this test is to ensure that the maximum power conducted to the radiating element does not exceed the limits specified. This ensures that if the end-user replaces the antenna, the maximum power does not exceed an amount which may create an excessive power level.

Limits and Method

The limits are defined in FCC Part 15.247(b) and RSS-247 5.4(d).
For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands, the peak limit is 1 watt (30 dBm).

The method is given in Section 9.1.2 of FCC KDB 558074 and ANSI C63.10.

Results

The EUT passed. The EUT was set to transmit at maximum power (PWR=4). Three channels were measured. The following table shows the peak power:

Channel	Frequency (MHz)	Peak Power (dBm)	Peak Power (mW)
Low	2402	-0.82	0.83
Mid	2440	-1.12	0.77
High	2480	-1.22	0.75

Note: The external attenuator and cable loss are accounted for as reference offset in the spectrum analyzer

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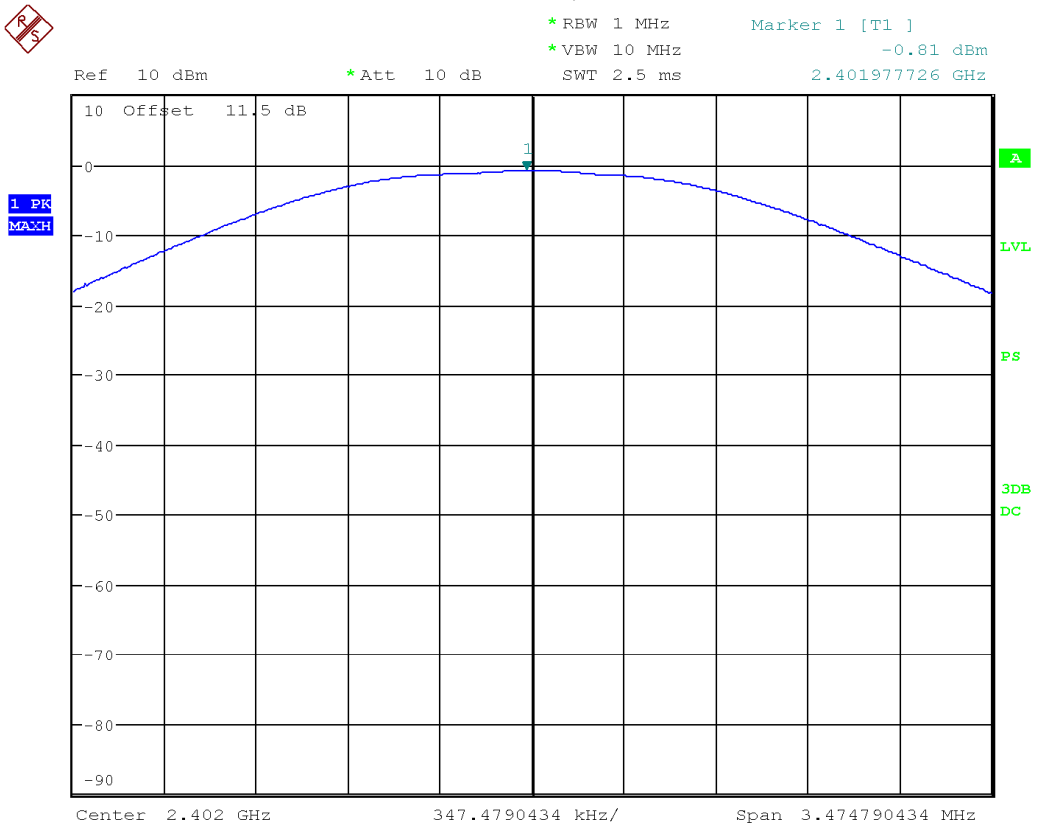
Graphs

The plots shown below show the peak power output of the device during the antenna conducted measurements during transmit operation of the EUT. The measurement RBW is ≥ than the DTS bandwidth.

Peak Power, Low Channel



Date: 1.NOV.2019 08:39:48

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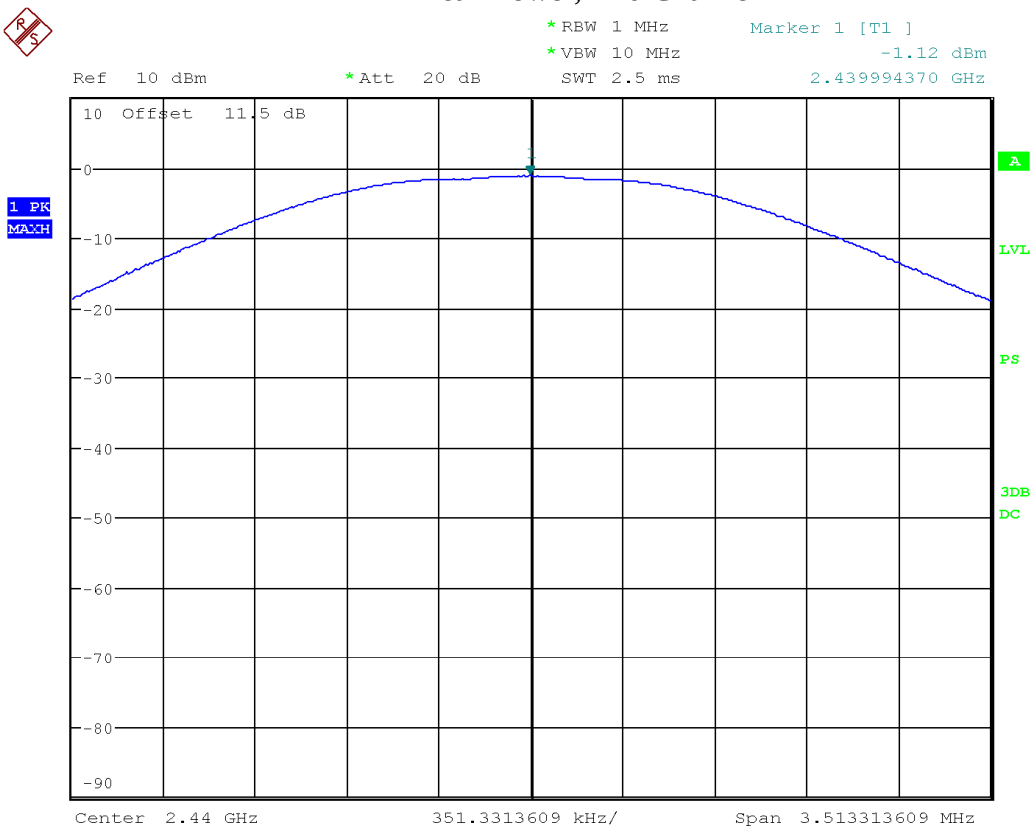
Peak Power, Mid Channel



Date: 1.NOV.2019 08:43:07

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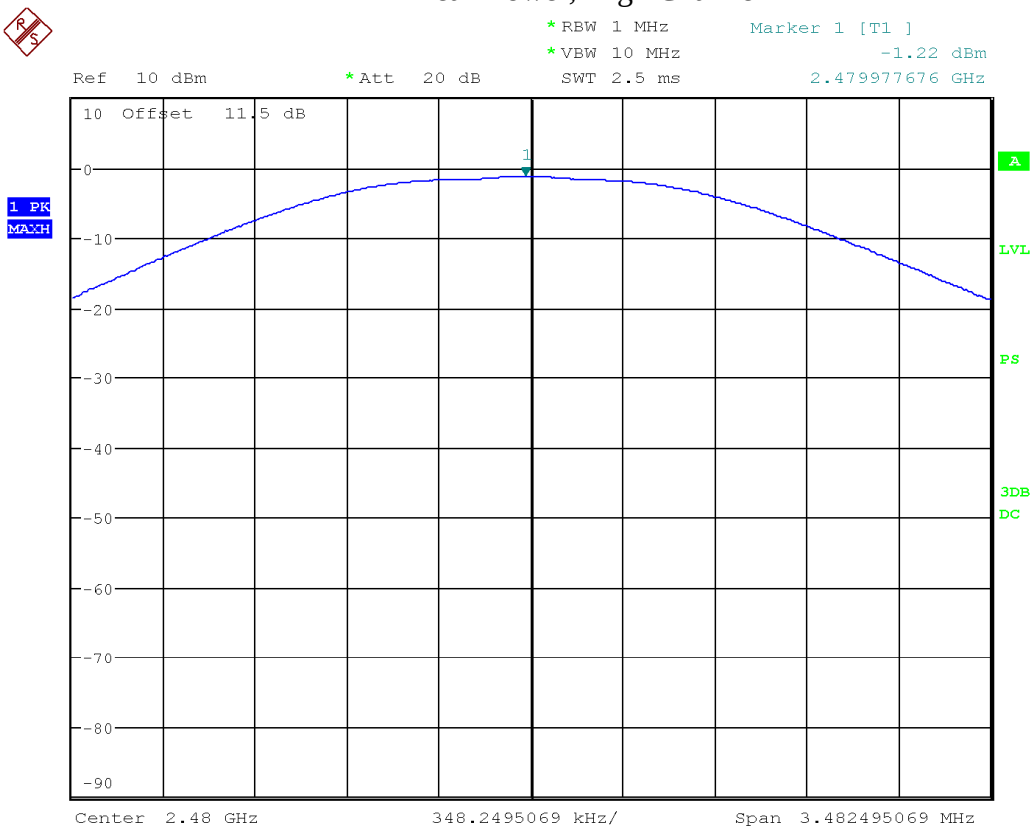
Peak Power, High Channel



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See 'Appendix B – EUT and Test Setup Photos' for photos showing the test set-up.

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Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date	Next Calibration Date	Asset #
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Attenuator 10 dB	3M-10	Agilent	NCR	NCR	GEMC 279

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Antenna Spurious Conducted Emissions (-20 dBc Requirement)

Purpose

The purpose of this test is to ensure that the maximum power conducted to the radiating element at frequencies outside of the authorized spectrum does not exceed the limits specified. This ensures that the only the intended signal is delivered to the radiating element.

Limits and Method

The limits are defined in 15.247(d) and RSS-247 5.5. In any 100 kHz band, the peak spurious harmonics emissions must be at least 20 dB below the fundamental. Spurious Conducted emissions are to be evaluated up to the 10th harmonic. This -20 dBc requirement also applies at the 'band edge' or 2.4 GHz and 2.4835 GHz.

The method is given in Section 11 of FCC KDB 558074 and ANSI C63.10

Results

The EUT passed. Low, middle and high bands were measured. The worst case is presented as a graph for the spectrum. The -20 dBc requirement is shown for the lower band edge at 2.4 GHz in the low band and also for the higher band edge at 2.4835 GHz in the high band.

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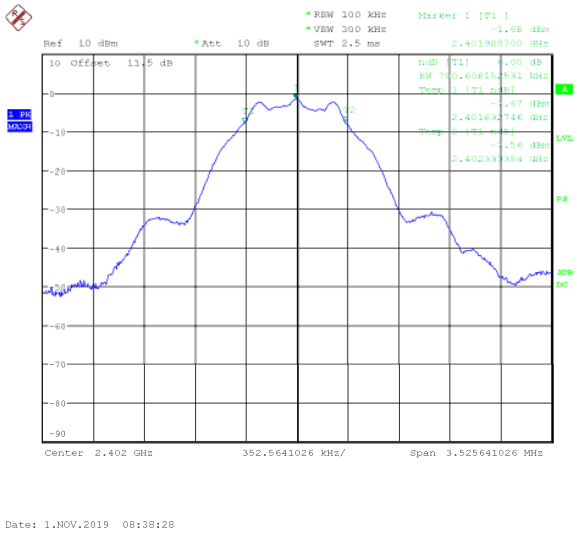
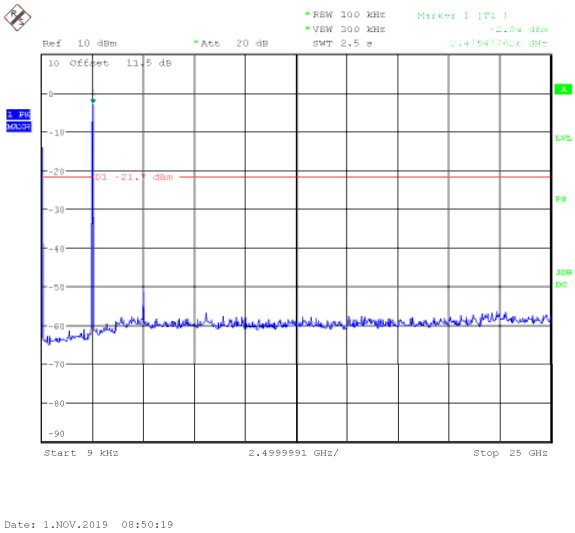
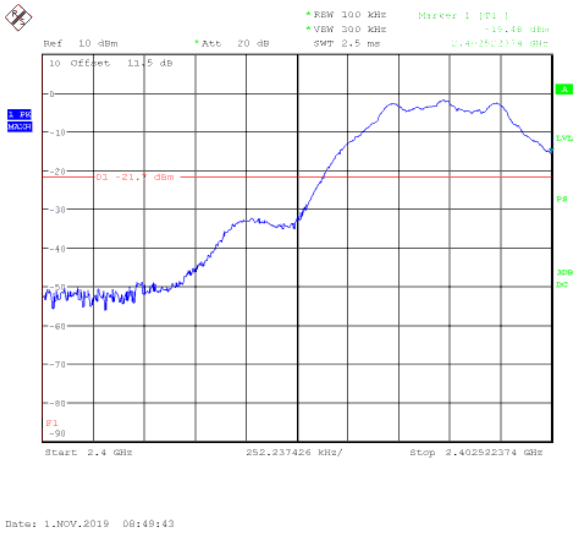
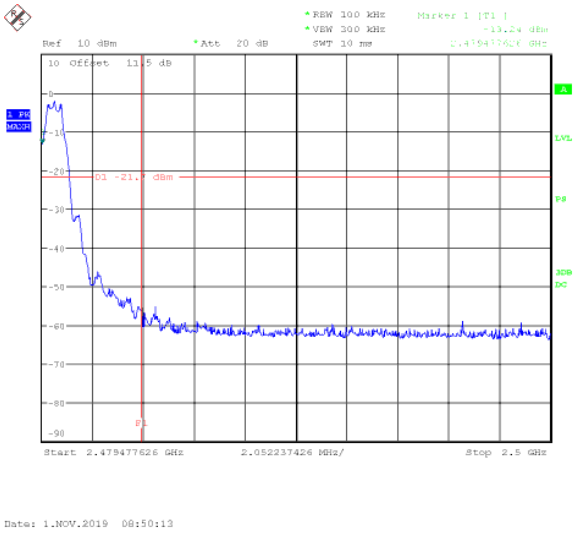
Graphs

The graphs shown below show the peak power output of the device during the antenna conducted measurement during transmit operation of the EUT.

-20dBc	
Reference Level: -1.68 dBm	9kHz –25GHz
	
2400 MHz Band Edge	2483.5 MHz Band Edge
	

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See 'Appendix B – EUT and Test Setup Photos' for photos showing the test set-up.

Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date	Next Calibration Date	Asset #
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Attenuator 10 dB	3M-10	Agilent	NCR	NCR	GEMC 279

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Transmitter Spurious Radiated Emissions

Purpose

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT does not exceed the limits listed below as defined in the applicable test standard, as measured from a receiving antenna. This helps protect broadcast radio services such as television, FM radio, pagers, cellular telephones, emergency services, and so on, from unwanted interference.

Limits and Method

The method is as defined in Section 12.2 of FCC KDB 558074 and ANSI C63.10.

The limits, as defined in 15.247(d) for unintentional radiated emissions, apply for those emissions that fall in the restricted bands, as defined in Section 15.205(a). These emissions must comply with the radiated emission limits specified in Section 15.209(a).

All unintentional emissions must also meet the 'Spurious Conducted Emissions' requirements of -20 dBc or greater. See also 'Antenna Spurious Conducted Emissions (-20dBc)' for further details.

Frequency	Limit
0.009 MHz – 0.490 MHz	2400/F(kHz) uV/m at 300m[1]
0.490 MHz – 1.705 MHz	24000/F(kHz) uV/m at 30m[1]
1.705 MHz – 30 MHz	30 uV/m at 30m[1]
30 MHz – 88 MHz	100 uV/m (40.0 dBuV/m[1]) at 3m
88 MHz – 216 MHz	150 uV/m (43.5 dBuV/m[1]) at 3m
216 MHz – 960 MHz	200 uV/m (46.0 dBuV/m[1]) at 3m
Above 960 MHz	500 uV/m (54.0 dBuV/m[1]) at 3m
Above 1000 MHz	500 uV/m (54 dBuV/m[2]) at 3m
Above 1000 MHz	500 uV/m (74 dBuV/m[3]) at 3m

[1]Limit is with Quasi Peak detector with bandwidths as defined in CISPR-16-1-1
[2]Limit is with 1 MHz measurement bandwidth and using an Average detector
[3]Limit is with 1 MHz measurement bandwidth and using a Peak detector

Based on ANSI C63.4 Section 4.2, if the Peak detector measurements do not exceed the Quasi-Peak limits, where defined, then the EUT is deemed to have passed the requirements.

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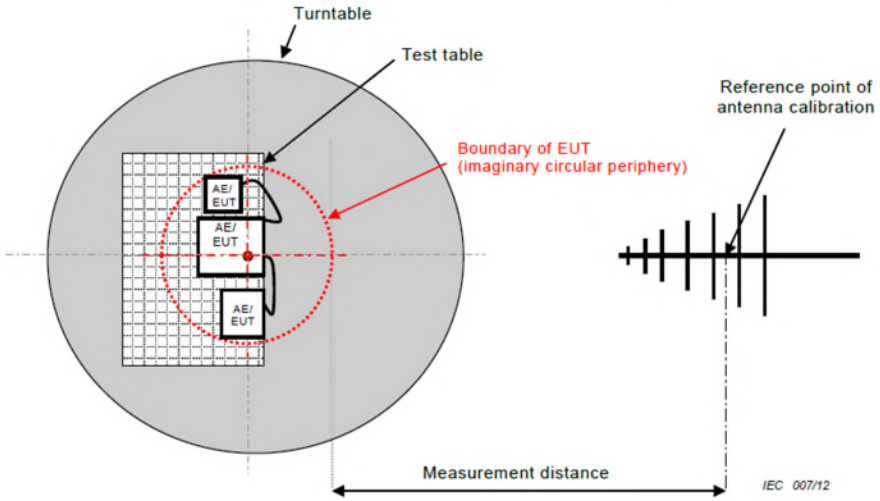
Typical Radiated Emissions Setup



Measurement Uncertainty

The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is ±4.25dB for 30MHz – 1GHz and ±4.93dB for 1GHz – 18GHz with a 'k=2' coverage factor and a 95% confidence level.

Preliminary Graphs

The graphs shown below are maximized peak measurement graphs measured with a resolution bandwidth greater than or equal to the final required detector over a full 0-360°. This peaking process is done as a worst case measurement and enables the detection of frequencies of concern for final measurement. For final measurements with the appropriate detector, where applicable, please refer to the tables under Final Measurements.

In accordance with FCC Part 15, Subpart A, Section 15.33, the device was scanned to the 10th harmonic (a minimum of 24.835 GHz).

Devices scanned may be scanned at alternate test distances and in accordance with FCC Part 15, Subpart A, Section 15.31, an extrapolation factor of 20 dB/decade was used above 30 MHz and 40 dB/decade below 30 MHz. For example for 1 meter measurements, an extrapolation factor 9.5 dB from 20 Log (1m / 3m) is applied.

Low, middle and high channels, each in three orthogonal axis were checked. However, the worst case graphs are presented which is the x-axis.

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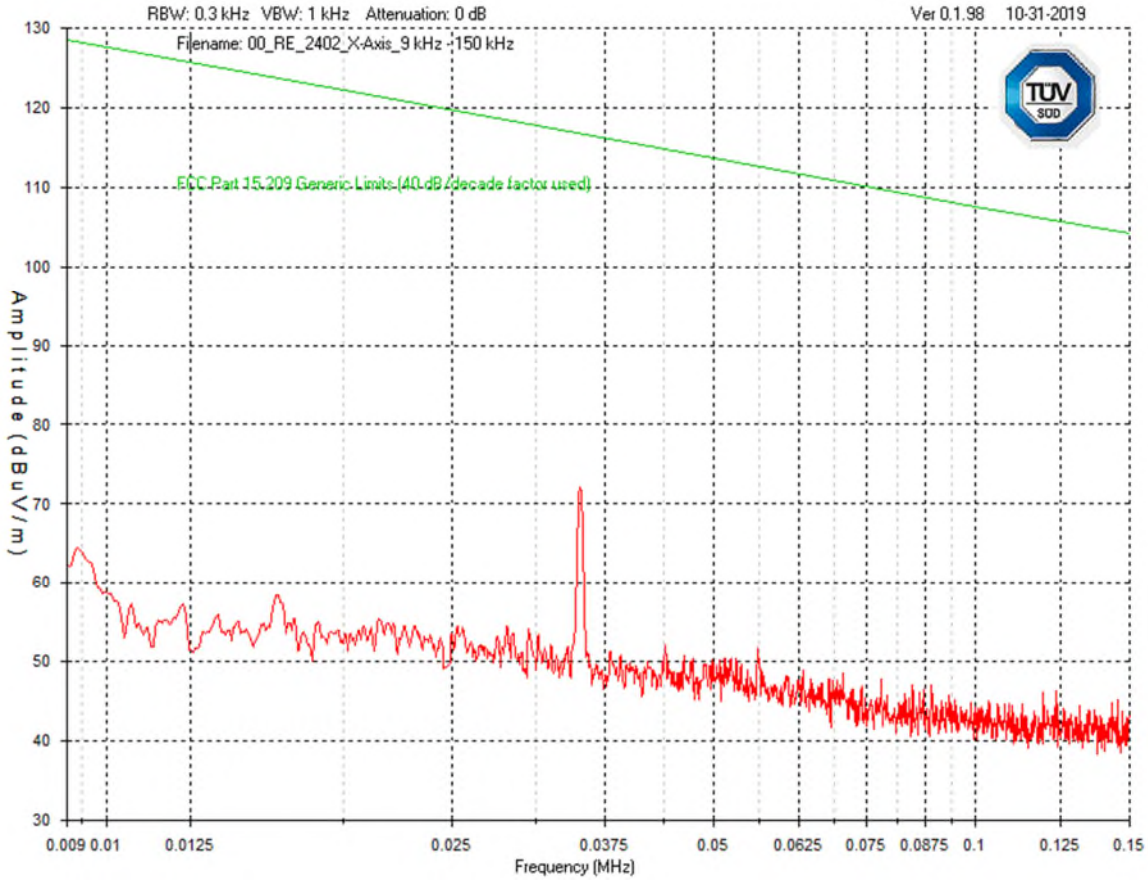
Band-edge measurement graphs are shown for illustration purposes. See final measurement section for all measurements.

Low Channel
9 kHz – 150 kHz
Peak Emission Graph



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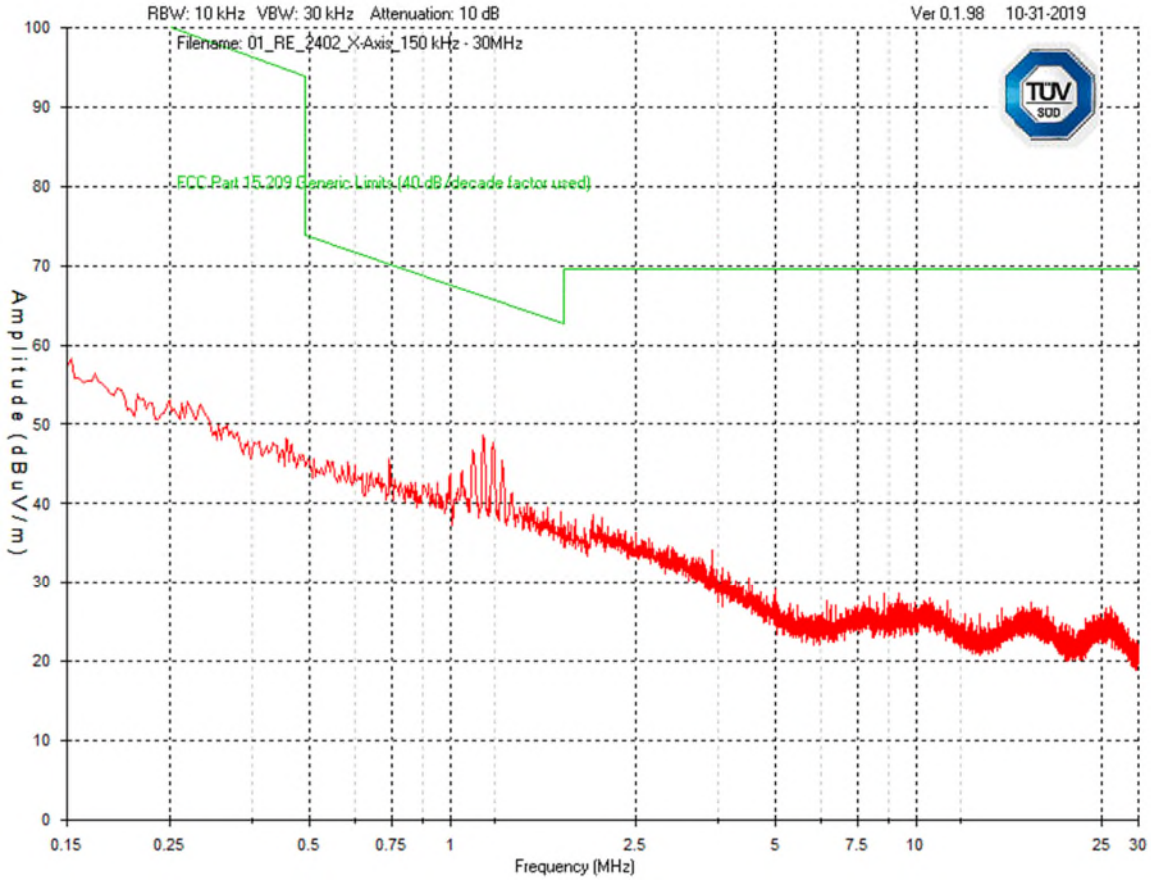
Low Channel
150 kHz – 30 MHz
Peak Emission Graph



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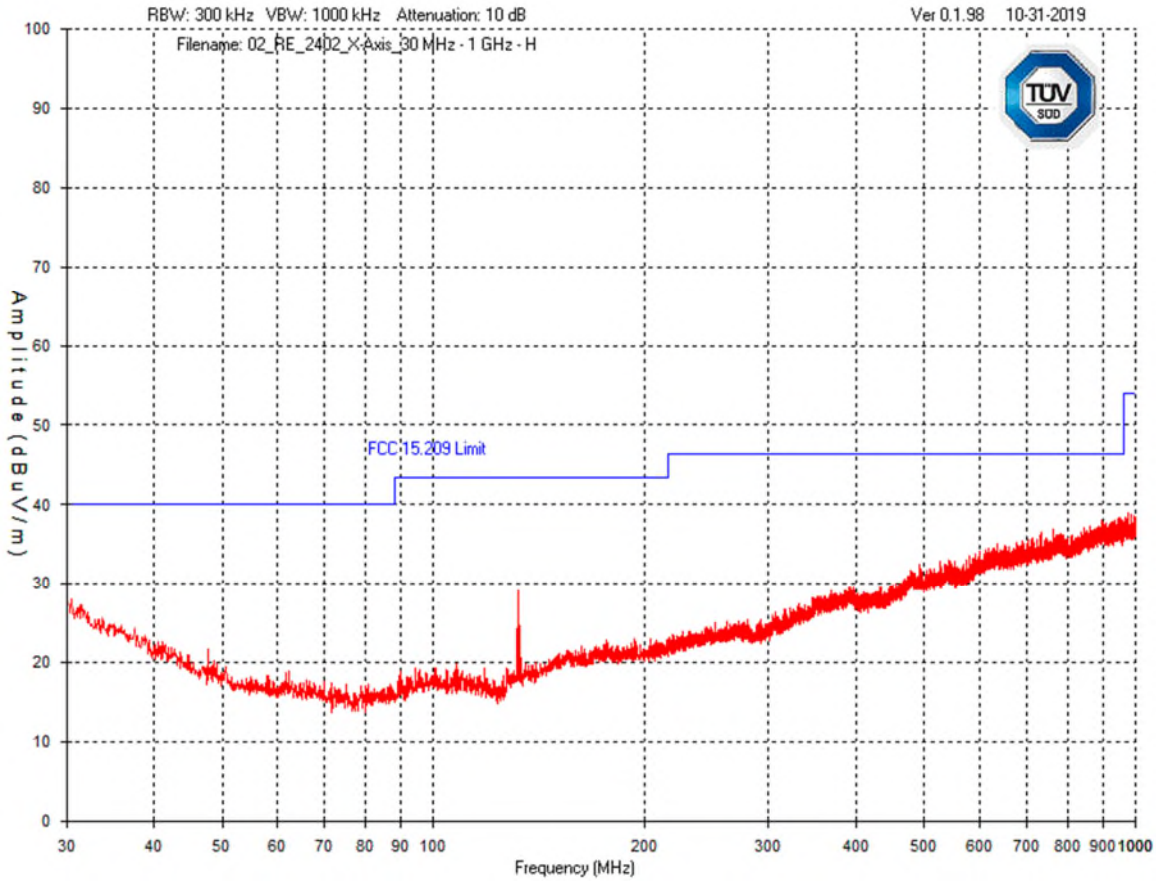
Low Channel – 30 MHz – 1 GHz
Horizontal - Peak Emission Graph



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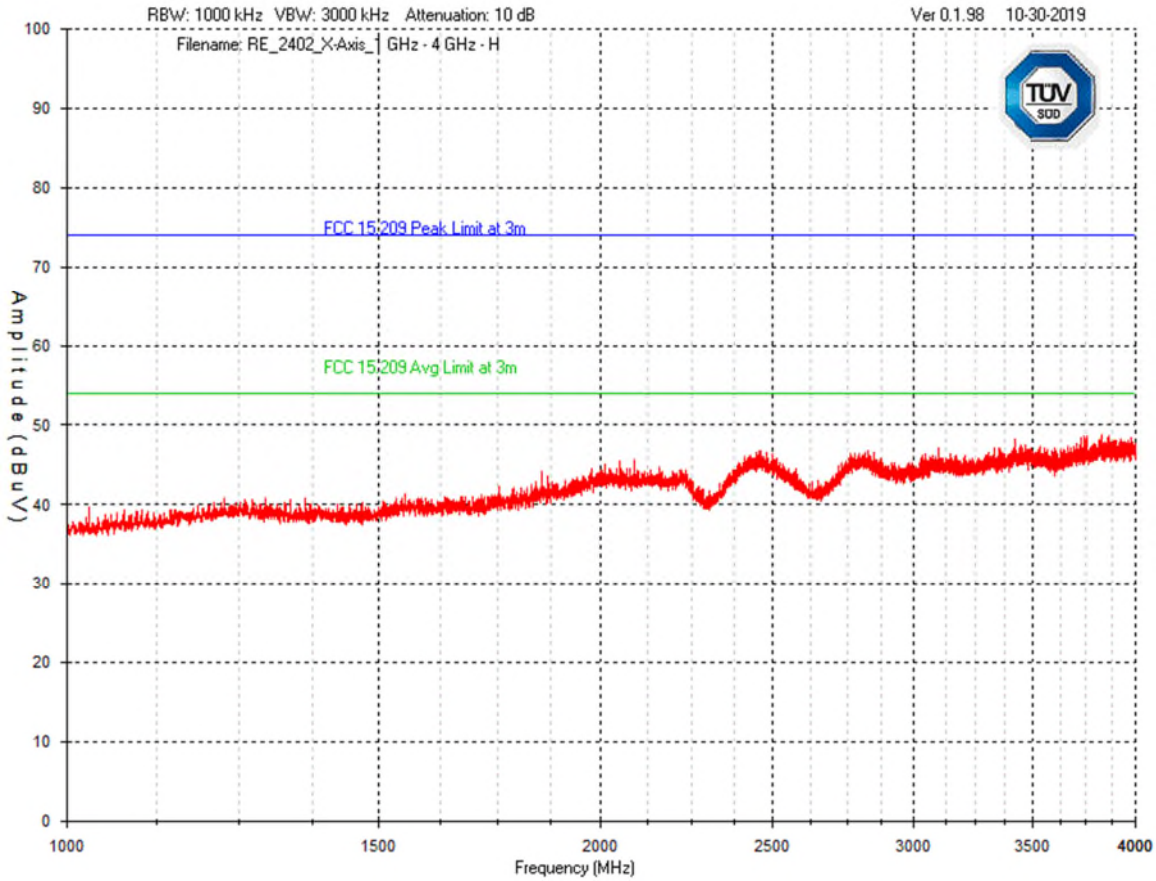
Low Channel – 1 GHz – 4 GHz
Horizontal - Peak Emission Graph



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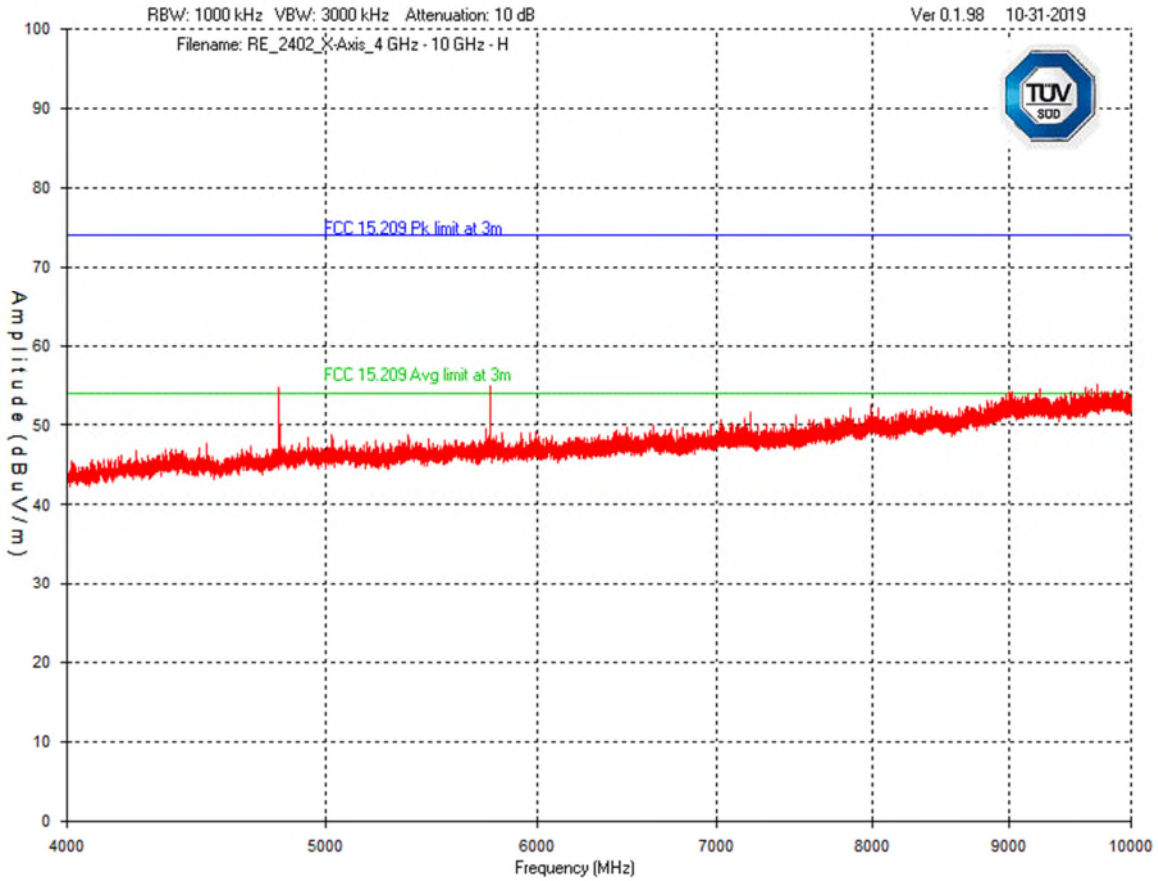
Low Channel – 4 GHz – 10 GHz
Horizontal - Peak Emission Graph



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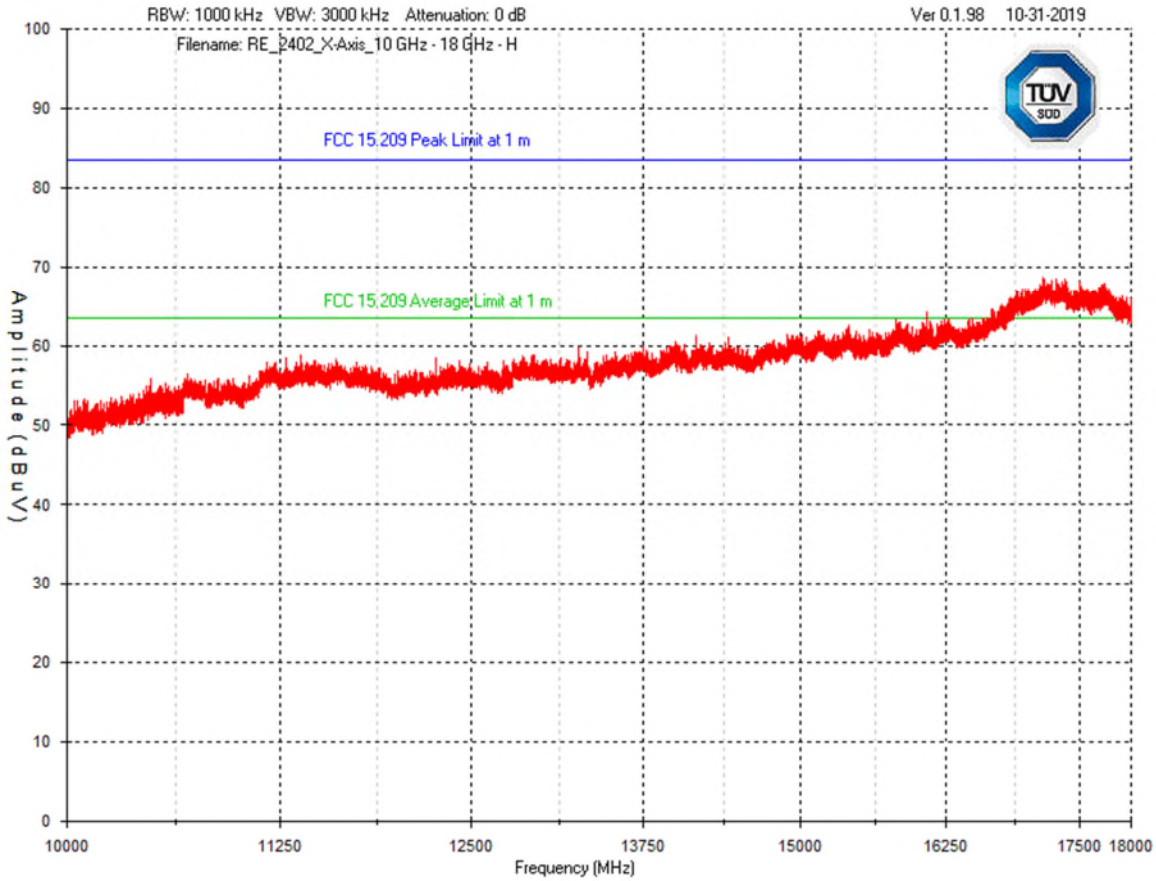
Low Channel – 10 GHz – 18 GHz
Horizontal - Peak Emission Graph



Plot was taken at a 1 meter distance. All emissions were noise floor of measurement instrument. No emissions were found in this frequency range.

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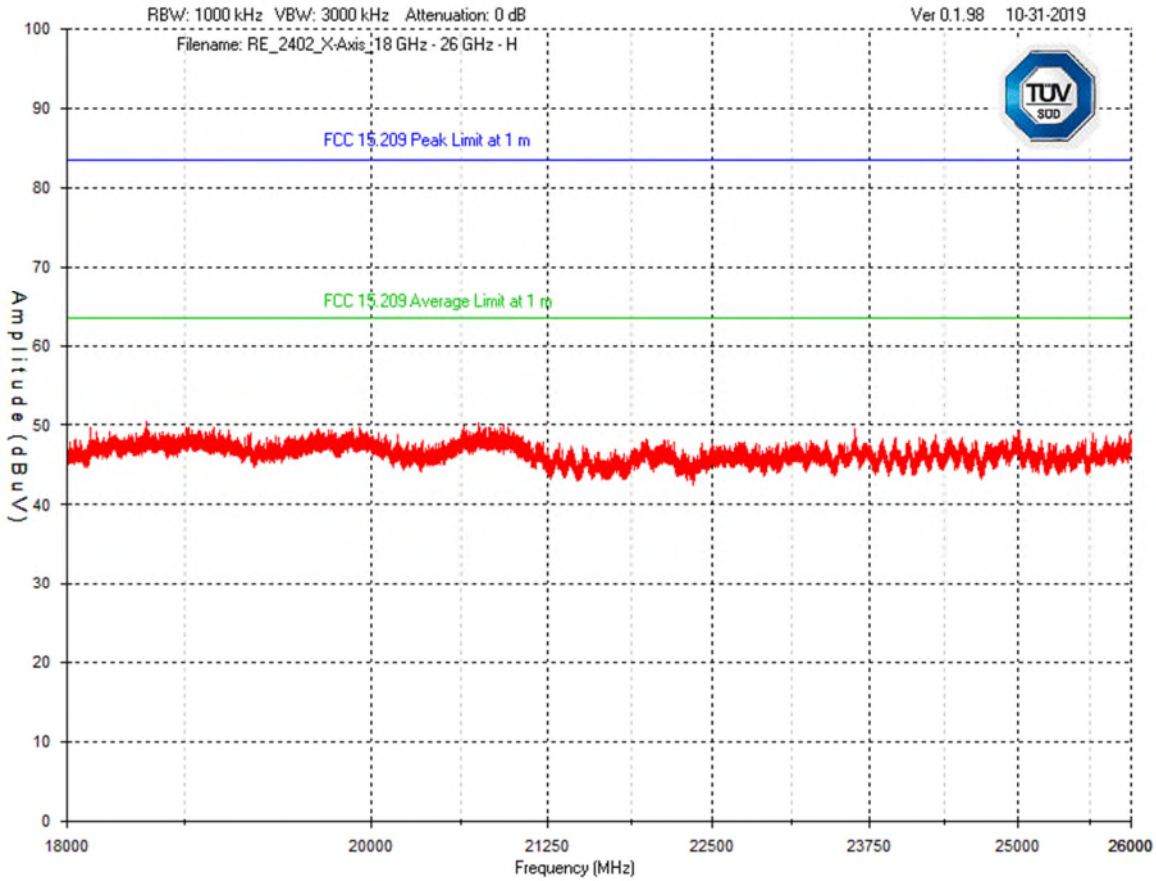
Low Channel – 18 GHz – 25 GHz
Horizontal - Peak Emission Graph



Plot was taken at a 1 meter distance. All emissions were noise floor of measurement instrument. No emissions were found in this frequency range.

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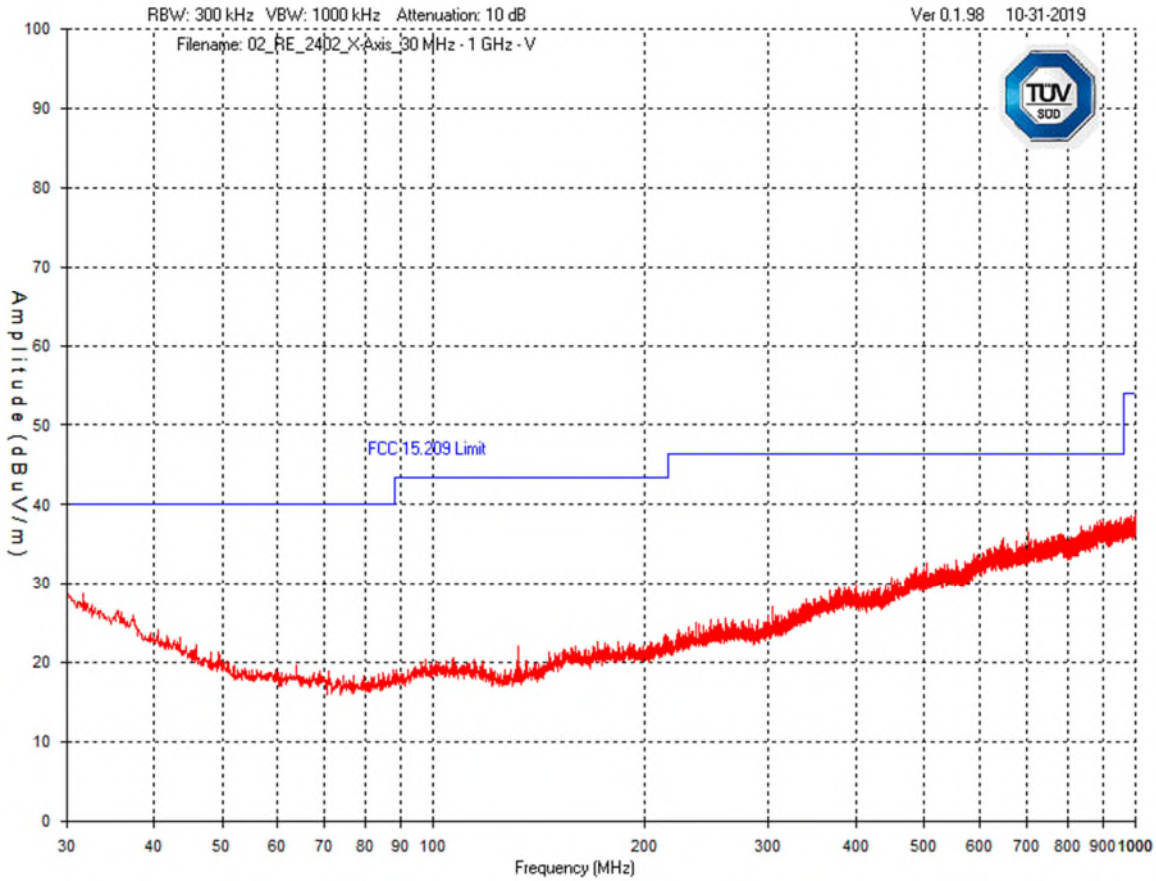
Low Channel – 30 MHz – 1 GHz
Vertical - Peak Emission Graph



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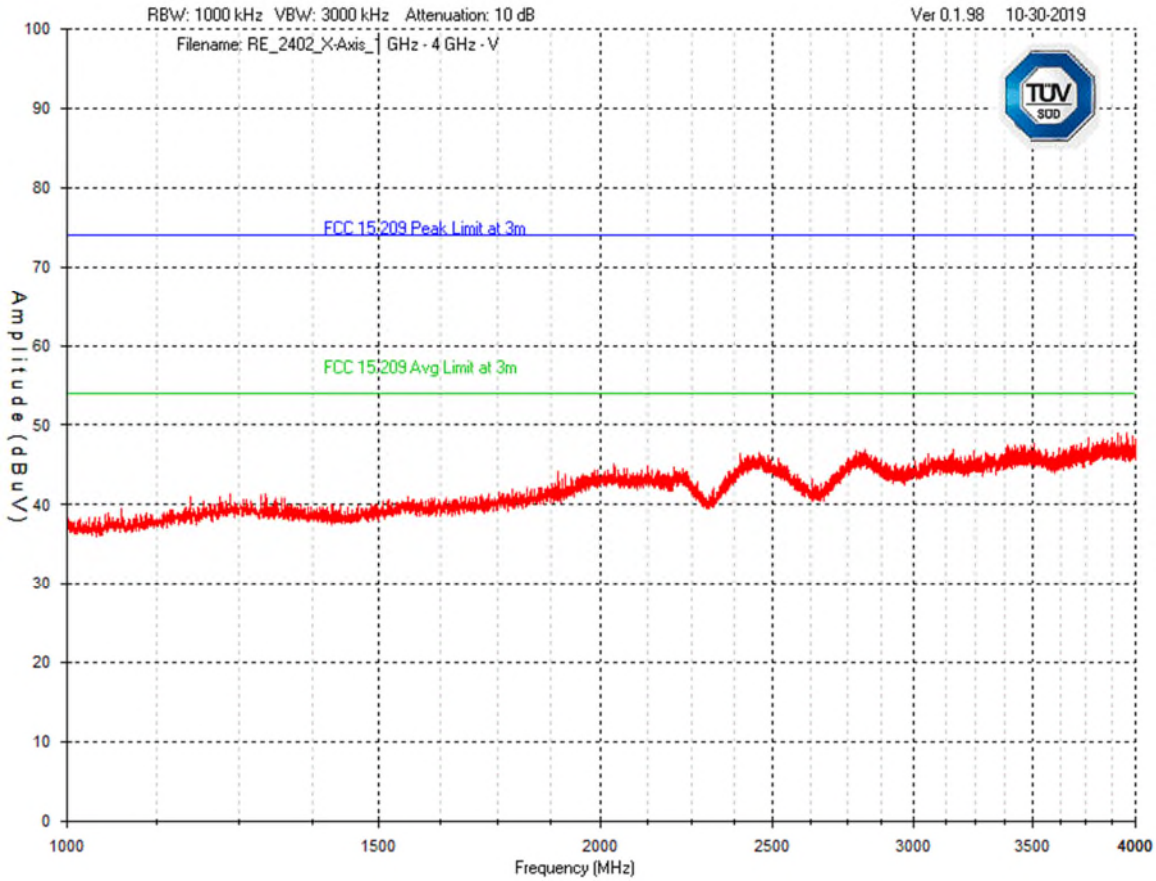
Low Channel – 1 GHz – 4 GHz
Vertical - Peak Emission Graph



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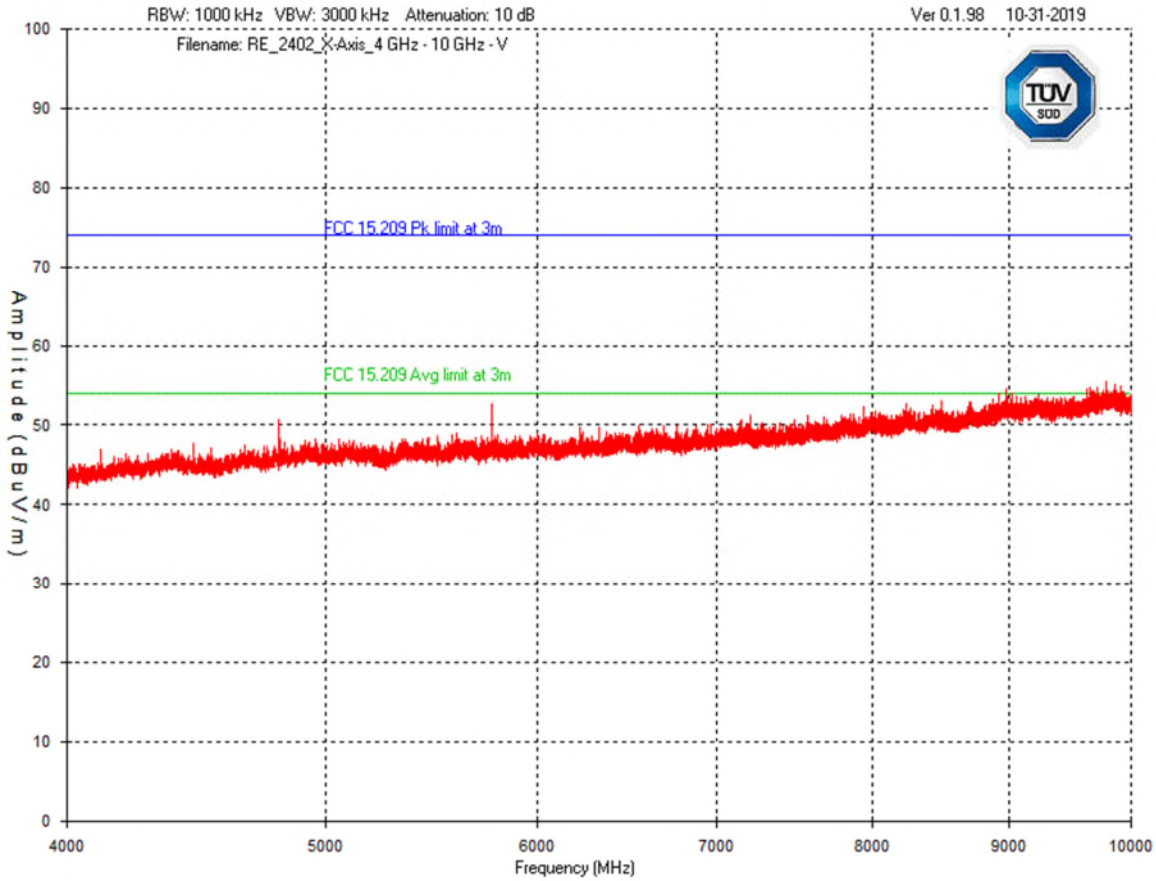
Low Channel – 4 GHz – 10 GHz
Vertical - Peak Emission Graph



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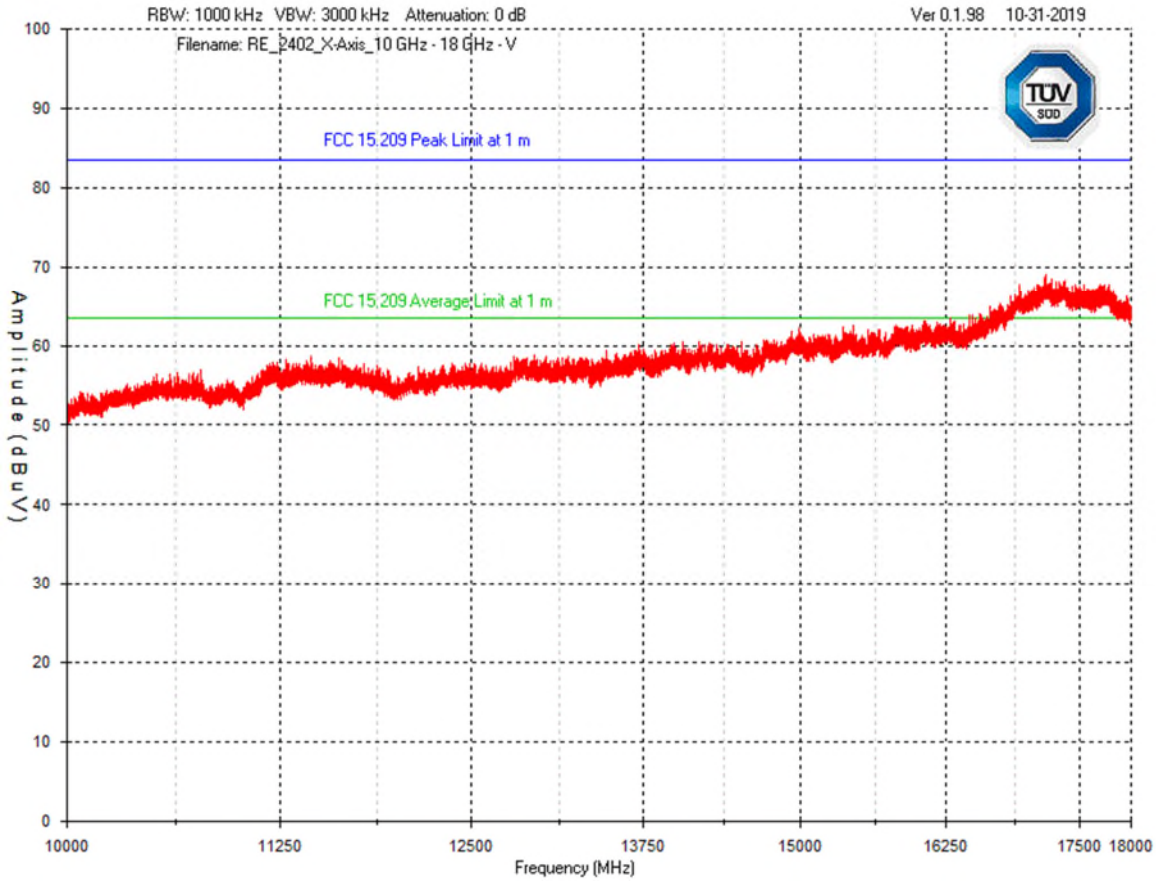
Low Channel – 10 GHz – 18 GHz
Vertical - Peak Emission Graph



Plot was taken at a 1 meter distance. All emissions were noise floor of measurement instrument. No emissions were found in this frequency range.

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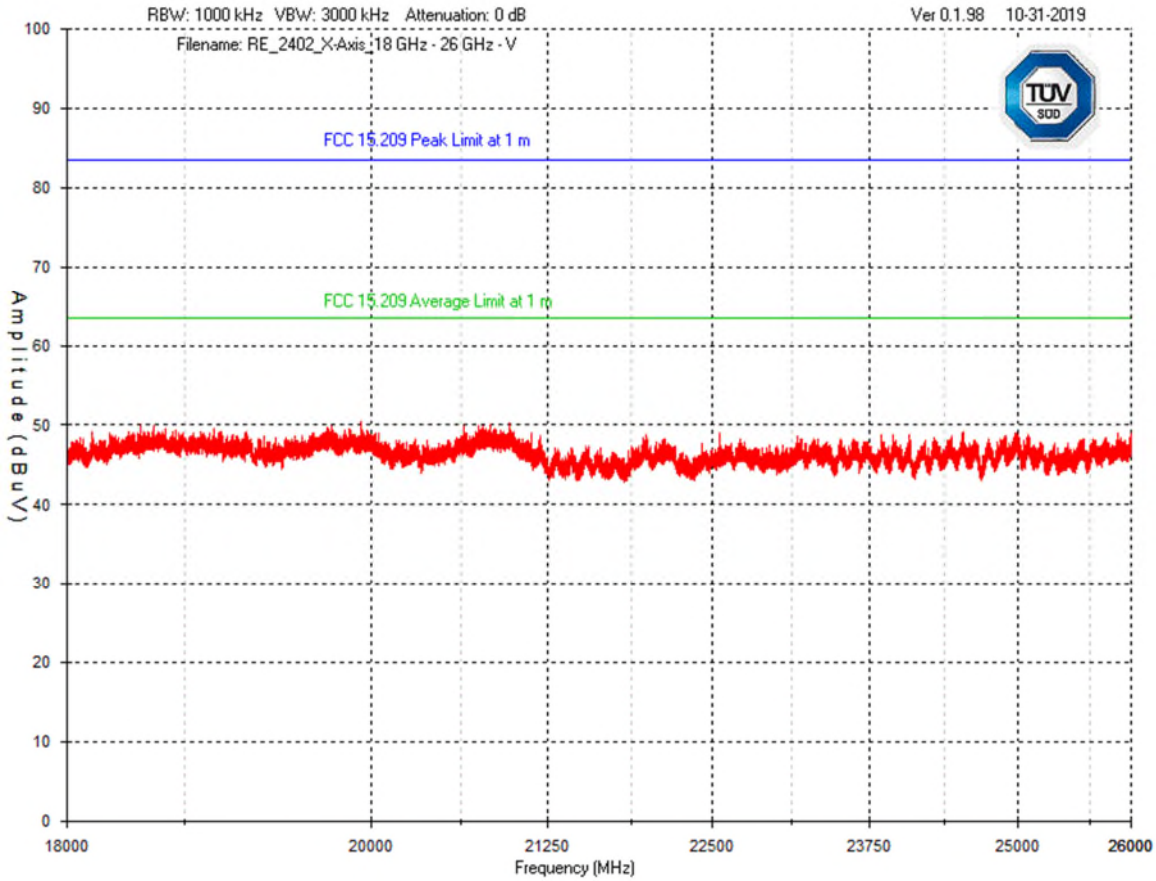
Low Channel – 18 GHz – 25 GHz
Vertical - Peak Emission Graph



Plot was taken at a 1 meter distance. All emissions were noise floor of measurement instrument. No emissions were found in this frequency range.

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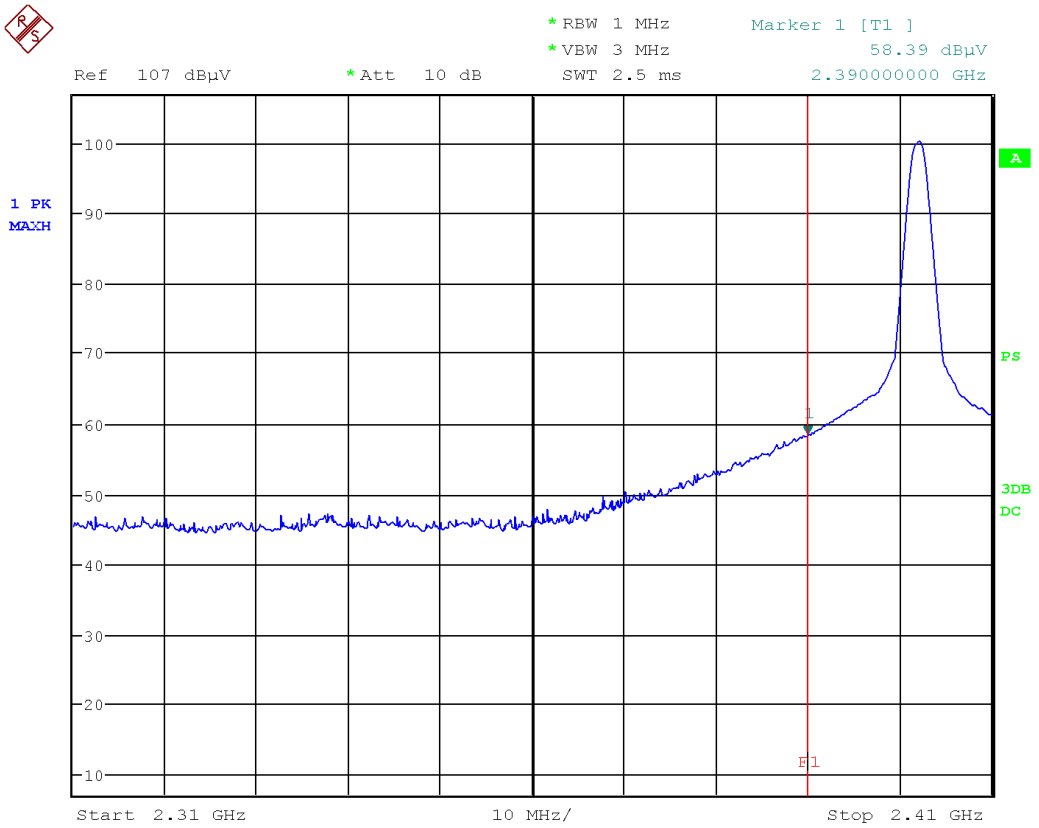
Band Edge – Low Channel
Horizontal - Peak Emission



Date: 30.OCT.2019 15:35:14

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

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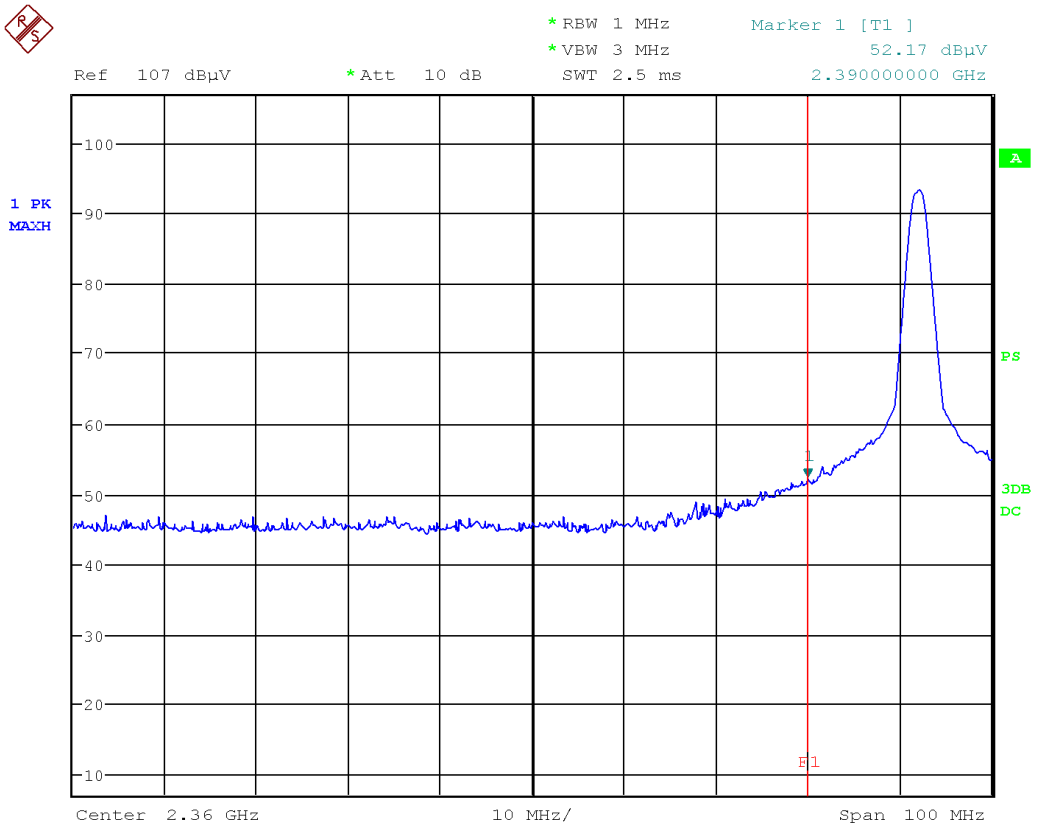
Band Edge – Low Channel
Vertical - Peak Emission



Date: 30.OCT.2019 15:46:21

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

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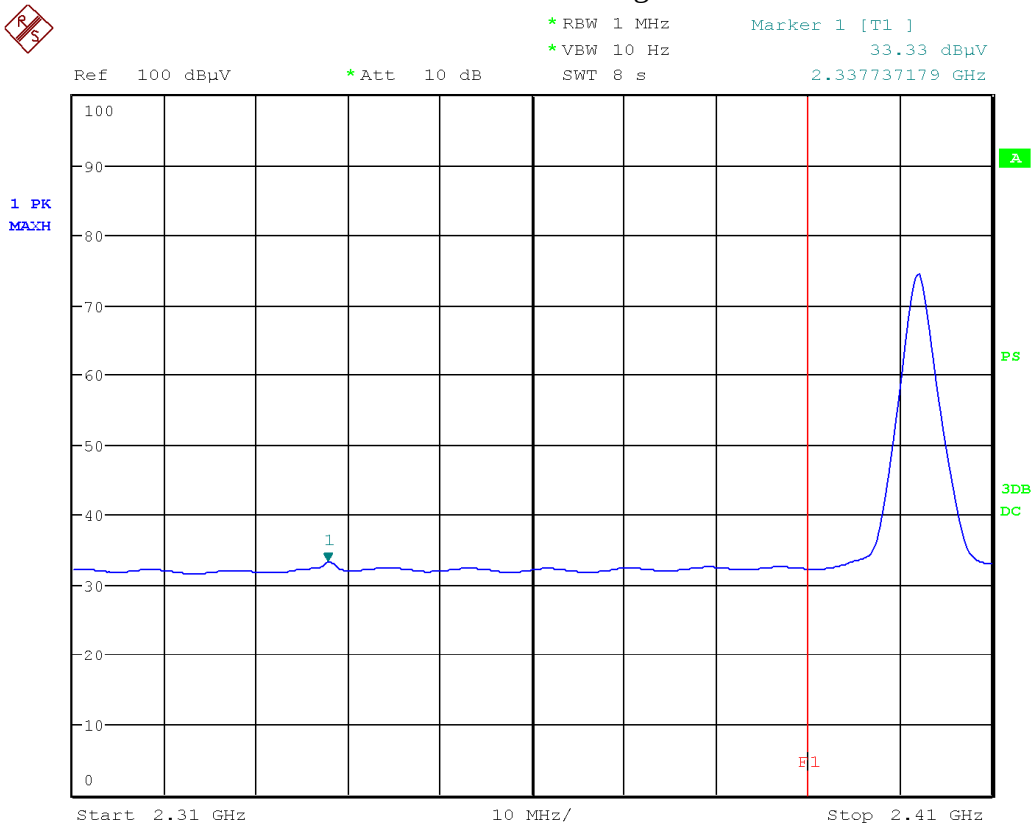
Band Edge – Low Channel
Horizontal - Average Emission



Date: 30.OCT.2019 15:33:49

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

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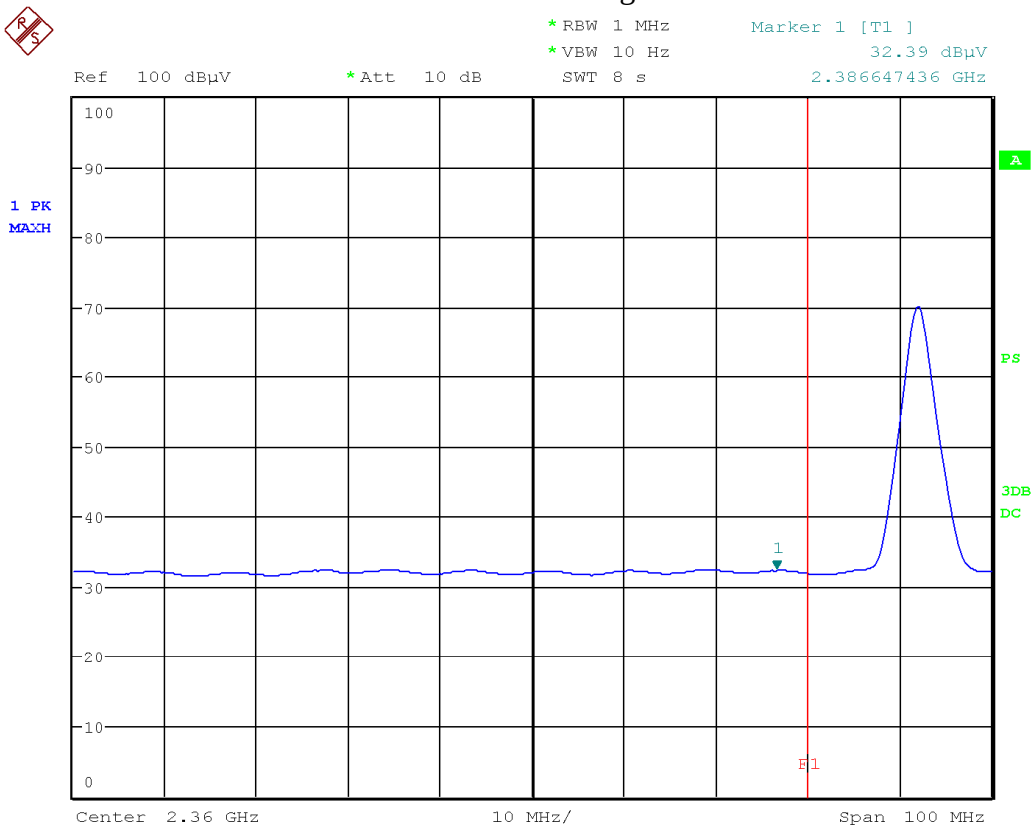
Band Edge – Low Channel
Vertical – Average Emission



Date: 30.OCT.2019 15:45:09

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

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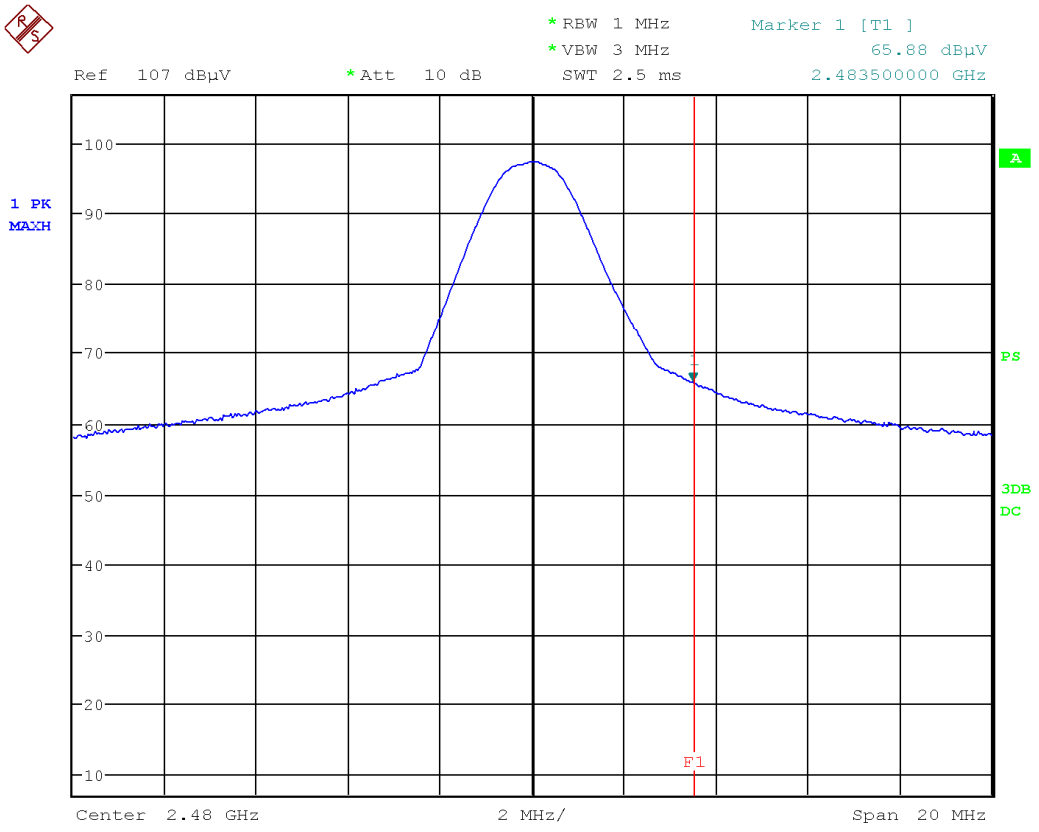
Band Edge – High Channel
Horizontal - Peak Emission



Date: 30.OCT.2019 09:34:04

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

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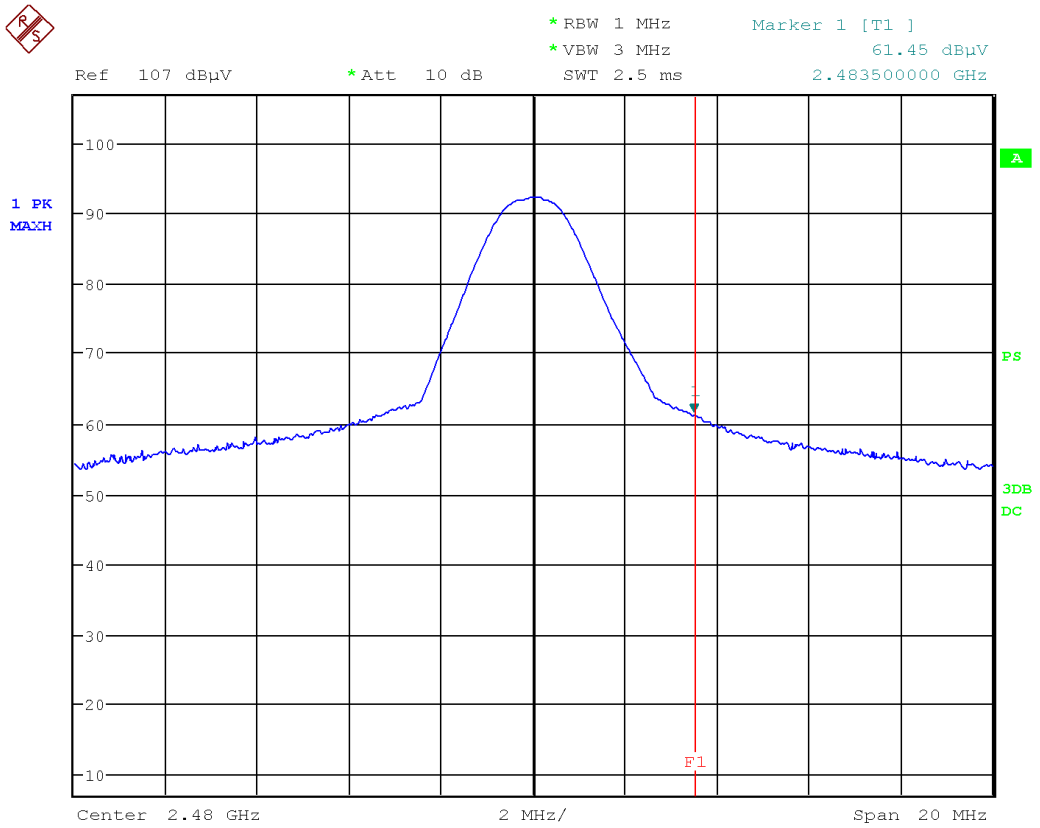
Band Edge – High Channel
Vertical - Peak Emission



Date: 30.OCT.2019 09:25:43

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

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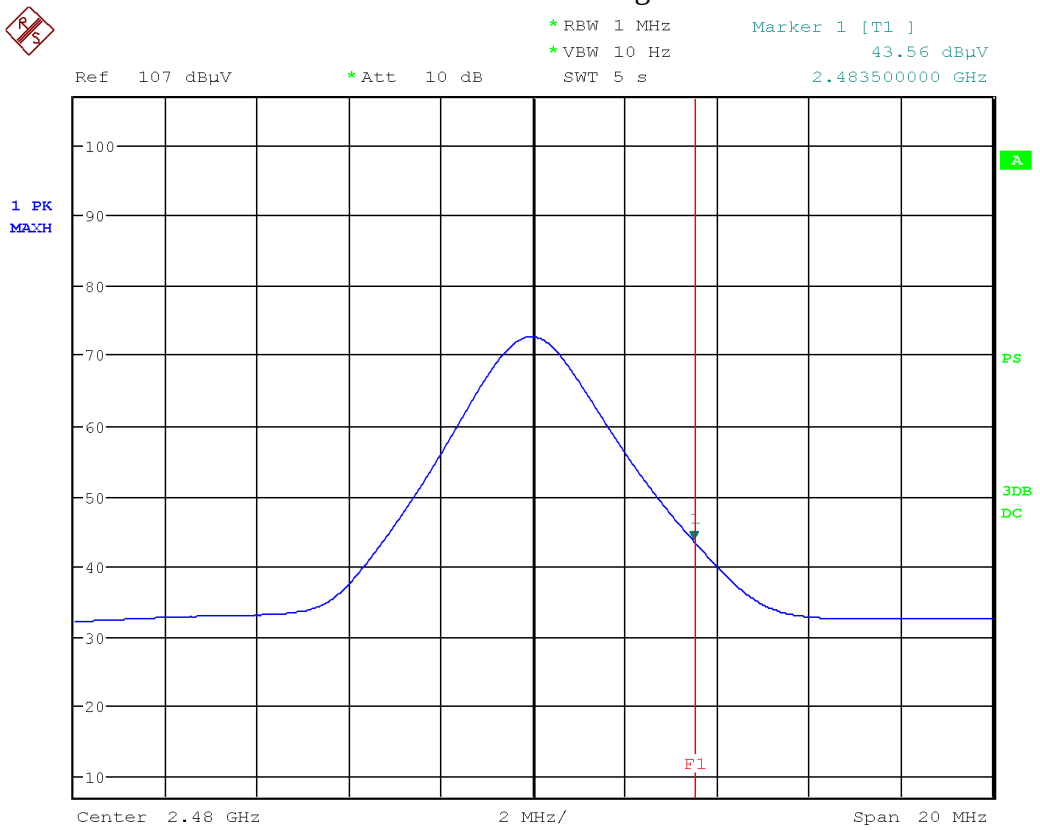
Band Edge – High Channel
Horizontal - Average Emission



Date: 30.OCT.2019 09:33:05

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

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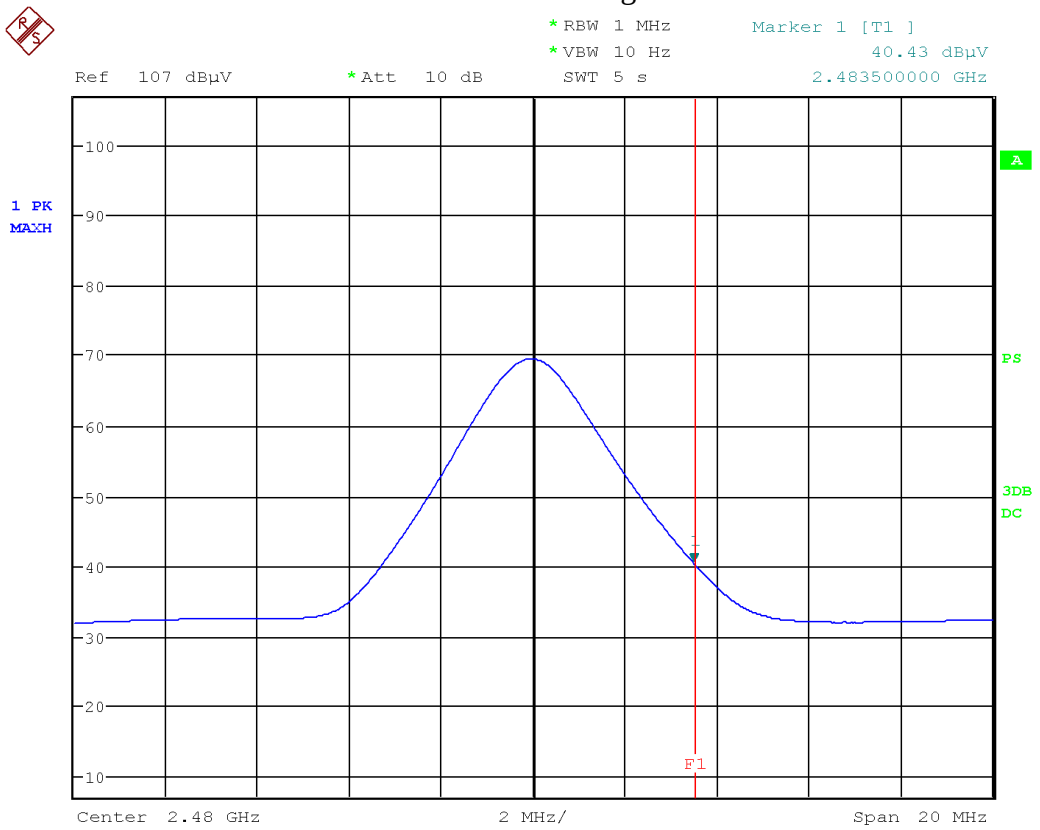
Band Edge – High Channel
Vertical – Average Emission



Date: 30.OCT.2019 09:24:59

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

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Final Measurements and Results

The EUT passed. Low, middle, and high bands were measured.

In accordance with 15.247(d), only frequencies exceeding the 15.209 limit that occur within the bands listed in 15.205 need to be verified with a final detector. Emissions outside the restricted bands were measured for informational purposes.

The measurements were maximized by rotating the turn table over a full 0-360 rotation and the antenna height was varied from 1 m to 4 m.

Frequency (MHz)	Detector	Received Signal (dBµV)	Antenna Factor (dB/m)	Atten Factor (dB)	Cable Factor (dB)	Pre-Amp (dB)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Test Result
Vertical Antenna Polarization										
9790.00	AVG	30.6	31.4	0	12.4	-33.9	40.5	54.0	13.5	Pass
8983.00	AVG	30.6	30.8	0	12.0	-33.8	39.6	54.0	14.4	Pass
5769.33	AVG	32.0	28.3	0	9.9	-33.8	36.4	54.0	17.6	Pass
Horizontal Antenna Polarization										
9714.33	AVG	30.5	31.5	0	12.2	-33.9	40.3	54.0	13.7	Pass
5761.67	AVG	35.4	28.3	0	9.9	-33.8	39.8	54.0	14.2	Pass

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Test Frequency (MHz)	Detection Mode	Antenna Polarity (Horz/Vert)	Received Signal (dBµV)	Antenna Factor (dB/m)	Cable Factor (dB)	Attenuator (dB)	Pre-Amp Gain (dB)	Level (dBµV/m)	Emission Limit (dBµV/m)	Margin (dB)	Result
Low Channel - Z axis											
2402	Peak	Horz	99.6	28.0	4.5	0.0	-35.9	96.2			PASS
2402	Avg	Horz	74.1	28.0	4.5	0.0	-35.9	70.7			PASS
2402	Peak	Vert	96.7	28.0	4.5	0.0	-35.9	93.3			PASS
2402	Avg	Vert	72.3	28.0	4.5	0.0	-35.9	68.9			PASS
2390	Peak	Horz	57.8	28.0	4.4	0.0	-35.9	54.3	74.0	19.7	PASS
2390	Avg	Horz	33.5	28.0	4.4	0.0	-35.9	30.0	54.0	24.0	PASS
2390	Peak	Vert	56.1	28.0	4.4	0.0	-35.9	52.7	74.0	21.3	PASS
2390	Avg	Vert	32.8	28.0	4.4	0.0	-35.9	29.3	54.0	24.7	PASS
Low Channel - X axis											
2402	Peak	Horz	100.2	28.0	4.5	0.0	-35.9	96.8			PASS
2402	Avg	Horz	74.5	28.0	4.5	0.0	-35.9	71.1			PASS
2402	Peak	Vert	93.3	28.0	4.5	0.0	-35.9	89.9			PASS
2402	Avg	Vert	70.1	28.0	4.5	0.0	-35.9	66.7			PASS
2390	Peak	Horz	58.4	28.0	4.4	0.0	-35.9	54.9	74.0	19.1	PASS
2390	Avg	Horz	33.3	28.0	4.4	0.0	-35.9	29.9	54.0	24.1	PASS
2390	Peak	Vert	52.2	28.0	4.4	0.0	-35.9	48.7	74.0	25.3	PASS
2390	Avg	Vert	32.4	28.0	4.4	0.0	-35.9	28.9	54.0	25.1	PASS
4804	Peak	Horz	49.1	33.0	7.2	0.0	-34.1	55.2	74.0	18.8	PASS
4804	Avg	Horz	33.5	33.0	7.2	0.0	-34.1	39.6	54.0	14.4	PASS
4804	Peak	Vert	46.2	33.0	7.2	0.0	-34.1	52.4	74.0	21.6	PASS
4804	Avg	Vert	32.6	33.0	7.2	0.0	-34.1	38.7	54.0	15.3	PASS
7206	Peak	Horz	45.7	37.0	8.0	0.0	-33.7	57.0	74.0	17.0	PASS
7206	Avg	Horz	31.2	37.0	8.0	0.0	-33.7	42.5	54.0	11.5	PASS
7206	Peak	Vert	45.9	37.0	8.0	0.0	-33.7	57.2	74.0	16.8	PASS
7206	Avg	Vert	31.4	37.0	8.0	0.0	-33.7	42.7	54.0	11.3	PASS
Low Channel - Y axis											
2402	Peak	Horz	93.2	28.0	4.5	0.0	-35.9	89.8			PASS
2402	Avg	Horz	70.1	28.0	4.5	0.0	-35.9	66.7			PASS
2402	Peak	Vert	99.9	28.0	4.5	0.0	-35.9	96.5			PASS
2402	Avg	Vert	74.3	28.0	4.5	0.0	-35.9	70.9			PASS
2390	Peak	Horz	52.8	28.0	4.4	0.0	-35.9	49.4	74.0	24.6	PASS
2390	Avg	Horz	32.4	28.0	4.4	0.0	-35.9	28.9	54.0	25.1	PASS
2390	Peak	Vert	57.9	28.0	4.4	0.0	-35.9	54.4	74.0	19.6	PASS
2390	Avg	Vert	33.8	28.0	4.4	0.0	-35.9	30.3	54.0	23.7	PASS
Mid Channel - Z axis											
2440	Peak	Horz	99.9	28.1	4.6	0.0	-35.8	96.7			PASS
2440	Avg	Horz	74.1	28.1	4.6	0.0	-35.8	70.9			PASS
2440	Peak	Vert	96.9	28.1	4.6	0.0	-35.8	93.7			PASS
2440	Avg	Vert	72.4	28.1	4.6	0.0	-35.8	69.3			PASS
4880	Peak	Horz	45.3	33.2	7.9	0.0	-34.0	52.4	74.0	21.6	PASS
4880	Avg	Horz	31.9	33.2	7.9	0.0	-34.0	39.0	54.0	15.0	PASS
4880	Peak	Vert	53.3	33.2	7.9	0.0	-34.0	60.4	74.0	13.6	PASS
4880	Avg	Vert	36.8	33.2	7.9	0.0	-34.0	43.9	54.0	10.1	PASS
7320	Peak	Horz	45.9	37.2	7.5	0.0	-33.7	56.9	74.0	17.1	PASS
7320	Avg	Horz	31.3	37.2	7.5	0.0	-33.7	42.3	54.0	11.7	PASS
7320	Peak	Vert	45.6	37.2	7.5	0.0	-33.7	56.6	74.0	17.4	PASS
7320	Avg	Vert	30.8	37.2	7.5	0.0	-33.7	41.8	54.0	12.2	PASS

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Test Frequency (MHz)	Detection Mode	Antenna Polarity (Horz/Vert)	Received Signal (dBµV)	Antenna Factor (dB/m)	Cable Factor (dB)	Attenuator (dB)	Pre-Amp Gain (dB)	Level (dBµV/m)	Emission Limit (dBµV/m)	Margin (dB)	Result
Mid Channel - X axis											
2440	Peak	Horz	98.4	28.1	4.6	0.0	-35.8	95.2			PASS
2440	Avg	Horz	73.5	28.1	4.6	0.0	-35.8	70.3			PASS
2440	Peak	Vert	94.8	28.1	4.6	0.0	-35.8	91.6			PASS
2440	Avg	Vert	71.1	28.1	4.6	0.0	-35.8	68.0			PASS
Mid Channel - Y axis											
2440	Peak	Horz	92.3	28.1	4.6	0.0	-35.8	89.2			PASS
2440	Avg	Horz	69.4	28.1	4.6	0.0	-35.8	66.3			PASS
2440	Peak	Vert	99.0	28.1	4.6	0.0	-35.8	95.9			PASS
2440	Avg	Vert	73.8	28.1	4.6	0.0	-35.8	70.7			PASS
High Channel - Z axis											
2480	Peak	Horz	97.1	28.3	4.6	0.0	-35.8	94.2			PASS
2480	Avg	Horz	72.6	28.3	4.6	0.0	-35.8	69.7			PASS
2480	Peak	Vert	94.8	28.3	4.6	0.0	-35.8	91.9			PASS
2480	Avg	Vert	71.1	28.3	4.6	0.0	-35.8	68.2			PASS
2483.5	Peak	Horz	65.5	28.3	4.6	0.0	-35.8	62.6	74.0	11.4	PASS
2483.5	Avg	Horz	43.6	28.3	4.6	0.0	-35.8	40.7	54.0	13.3	PASS
2483.5	Peak	Vert	63.9	28.3	4.6	0.0	-35.8	61.0	74.0	13.0	PASS
2483.5	Avg	Vert	42.2	28.3	4.6	0.0	-35.8	39.3	54.0	14.7	PASS
High Channel - X axis											
2480	Peak	Horz	97.6	28.3	4.6	0.0	-35.8	94.7			PASS
2480	Avg	Horz	72.7	28.3	4.6	0.0	-35.8	69.8			PASS
2480	Peak	Vert	92.5	28.3	4.6	0.0	-35.8	89.6			PASS
2480	Avg	Vert	69.5	28.3	4.6	0.0	-35.8	66.6			PASS
2483.5	Peak	Horz	66.9	28.3	4.6	0.0	-35.8	64.0	74.0	10.0	PASS
2483.5	Avg	Horz	43.6	28.3	4.6	0.0	-35.8	40.7	54.0	13.3	PASS
2483.5	Peak	Vert	61.5	28.3	4.6	0.0	-35.8	58.6	74.0	15.4	PASS
2483.5	Avg	Vert	40.4	28.3	4.6	0.0	-35.8	37.5	54.0	16.5	PASS
High Channel - Y axis											
2480	Peak	Horz	91.8	28.3	4.6	0.0	-35.8	88.9			PASS
2480	Avg	Horz	69.2	28.3	4.6	0.0	-35.8	66.3			PASS
2480	Peak	Vert	96.6	28.3	4.6	0.0	-35.8	93.7			PASS
2480	Avg	Vert	72.2	28.3	4.6	0.0	-35.8	69.3			PASS
2483.5	Peak	Horz	61.0	28.3	4.6	0.0	-35.8	58.1	74.0	15.9	PASS
2483.5	Avg	Horz	40.4	28.3	4.6	0.0	-35.8	37.6	54.0	16.4	PASS
2483.5	Peak	Vert	65.0	28.3	4.6	0.0	-35.8	62.1	74.0	11.9	PASS
2483.5	Avg	Vert	43.1	28.3	4.6	0.0	-35.8	40.2	54.0	13.8	PASS

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Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration / Verification Date	Next Calibration / Verification Date	Asset #
Spectrum Analyzer	ESU 40	Rohde & Schwarz	Jan. 12, 2018	Jan. 12, 2020	GEMC 233
Loop Antenna	EM 6871	Electro-Metrics	Feb 15, 2019	Feb 15, 2021	GEMC 70
Loop Antenna	EM 6872	Electro-Metrics	Feb 15, 2019	Feb 15, 2021	GEMC 71
BiLog Antenna	3142-C	ETS	Mar. 01, 2019	Mar. 01, 2021	GEMC 137
Attenuator 6 dB	612-6-1	Meca Electronics, Inc	NCR	NCR	GEMC 286
Horn Antenna 1 – 18 GHz	HRN-0118	TDK RF Solutions	Feb. 13, 2018	Feb. 13, 2020	GEMC 235
Horn Antenna 2 – 18 GHz	WBH218HN	Q-par	Feb. 27, 2018	Feb. 27, 2020	GEMC 6375
Horn Antenna 18 – 26.5 GHz	SAS-572	A.H. Systems	Oct. 23, 2018	Oct. 23, 2020	GEMC 6371
Pre-Amp 9 kHz – 1 GHz	LNA 6901	Teseq	Feb. 25, 2019	Feb. 25, 2021	GEMC 168
Pre-Amp 1 – 26.5 GHz	HP 8449B	HP	Jun. 12, 2018	Jun. 12, 2020	GEMC 312
Pre-Amp 18-40GHz	PAM-840A	Com-Power Corporation	Mar. 20, 2019	Mar. 20, 2011	GEMC 252
4GHz-12GHz High Pass Filter	11SH10-4000/T12000-0/0	K & L Microwave	Apr 9, 2019	Apr 9, 2020	GEMC 119
2.4GHz-2.5GHz Notch Filter	BRM50702	Micro-Tronics	July 11, 2019	July 11, 2020	GEMC 230
RF Cable 10m	LMR-400-10M-50Ω-MN-MN	LexTec	NCR	NCR	GEMC 274
RF Cable 2m	Sucoflex 104A	Huber+Suhner	NCR	NCR	GEMC 271
Emissions Software	0.1.97	Global EMC	NCR	NCR	GEMC 58

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Power Spectral Density

Purpose

The purpose of this test is to ensure that the maximum power spectral density to the radiating element does not exceed the limits specified. This ensures that the modulation is significantly wide enough, or low enough in power that it will allow for co-operation of other wireless devices operating within this frequency allocation.

Limits and Method

The limits are defined in 15.247(e) and RSS-247 5.2(b).

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.

The method is given in Section 10.2 of FCC KDB 558074.

Results

The EUT passed. Low, medium, and high bands were tested. The worst case value is -17.1 dBm as measured with a 3 kHz resolution bandwidth (peak power).

Channel	Frequency (MHz)	PSD/3kHz (dBm)	Limit (dBm/3kHz)	Pass/Fail
Low	2402	-17.05	8	Pass
Mid	2440	-17.34	8	Pass
High	2480	-17.38	8	Pass

Graphs

The graphs shown below show the power spectral density of the device during the conducted measurement operation of the EUT. Low, middle, and high channel was investigated in each mode, with the worst case being presented. The external attenuator and cable loss are accounted for as reference offset in the spectrum analyzer.

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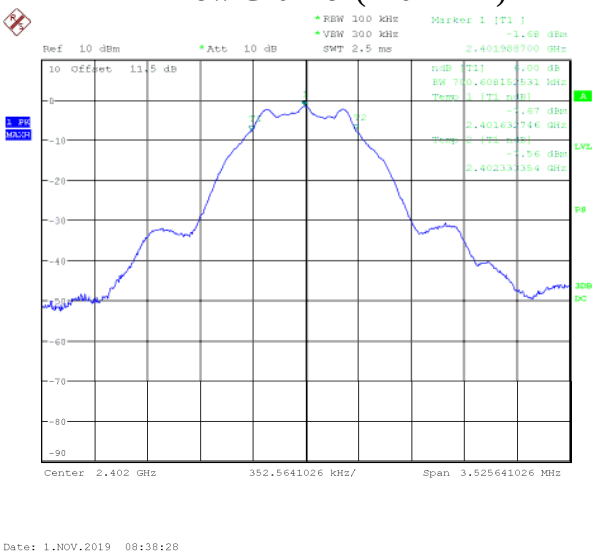
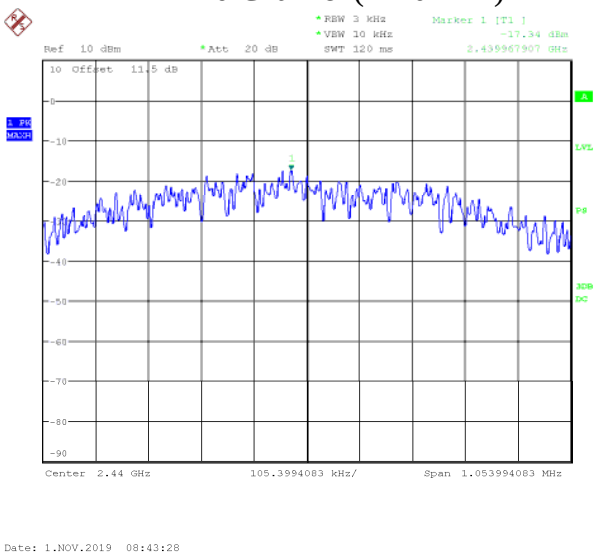
PSD

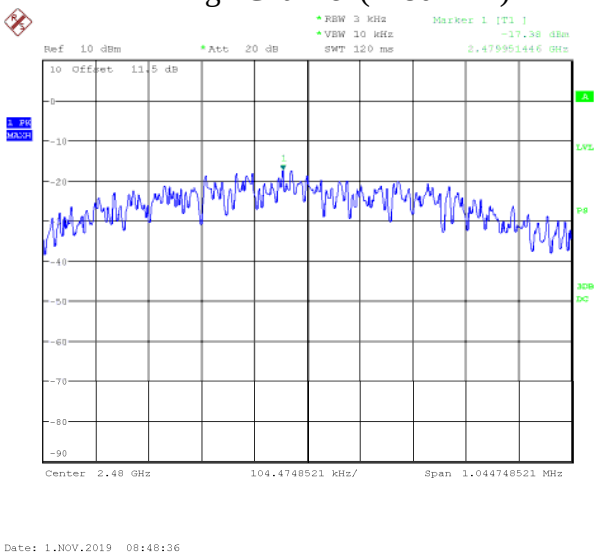
Low Channel (2402MHz)



Mid Channel (2440MHz)



High Channel (2480MHz)



See 'Appendix B – EUT and Test Setup Photos' for photos showing the test set-up.

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Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date	Next Calibration Date	Asset #
Spectrum Analyzer	ESU 40	Rohde & Schwarz	Jan. 12, 2018	Jan. 12, 2020	GEMC 233
Attenuator 10 dB	3M-10	Agilent	NCR	NCR	GEMC 279

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Appendix A – EUT Summary

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For further details for filing purposes, refer to filing package.

General EUT Description

Client	
Organization / Address	Flosonics Medical 204-73 Elm Street, Sudbury, ON, Canada P3C1R7
Contact	Aparajit Sahai
Phone	4379817762
Email	asahai@flosonicsmedical.com
EUT Details	
EUT Name	FloPatch FP120
FCC ID	2AUWSFP120
Industry Canada #	25612-FP120
Equipment Category	Medical Product
Basic EUT Functionality	The FloPatch (FP120) is a hands-free wearable ultrasound device that is portable, and non-invasive. The device is battery operated. The device is placed on the subject's neck to evaluate the blood flow velocity in the carotid artery by providing continuous Doppler shift feedback wirelessly via a medical mobile application. During the readings, the device adheres to the patient's neck for the duration of the required procedure time and is entirely hands free.
Input Voltage and Frequency	Battery Powered
Rated Input Current	N/A
Connectors available on EUT	0
Peripherals Required for Test	N/A
Release type	Final
Intentional Radiator Frequency	2400 – 2483.5 MHz for BLE applications as described above.
EUT Configuration	Wireless configured to transmit continuously at 100% duty cycle

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Note the EUT is considered to have been received the date of the commencement of the first test, unless otherwise stated. For a close-up picture of the EUT, see ‘Appendix B – EUT and Test Setup Photos’.

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Appendix B – EUT and Test Setup Photos

Refer to the files separate from this test report

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