HEADQUARTERS: 914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230 • PHONE (410) 354-3300 • FAX (410) 354-3313

March 19, 2021

InfiNet Malta LTD
Level 1, Britannia House, 9 Old Bakery Street
Valletta VLT 1450, Malta

Dear Vsevolod Doronin,

Enclosed is the EMC Wireless test report for compliance testing of the InfiNet Malta LTD, Q5-E/04701 as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Title 47 of the CFR, Part 15.407, Subpart E (UNII 3).

Thank you for using the services of Eurofins Electrical and Electronic Testing NA, Inc. If you have any questions regarding these results or if Eurofins Electrical and Electronic Testing NA, Inc. can be of further service to you, please feel free to contact me.

Sincerely yours,
EUROFINS ELECTRICAL AND ELECTRONIC TESTING NA, INC.

Michelle Tawmging

Michelle Tawmging
Documentation Department

Reference: (\InfiNet Malta LTD\ WIR110274-FCC407 UNII 3 Rev. 1)

ACCREDITED
TESTING CERT #0591.01

HEADQUARTERS: 914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230 • PHONE (410) 354-3300 • FAX (410) 354-3313

Electromagnetic Compatibility Criteria
Test Report

for the

InfiNet Malta LTD
Model Q5-E/04701

Tested under
The FCC Certification Rules
contained in
Title 47 of the CFR
15.407 Subpart E

Report: WIR110274-FCC407 UNII 3 Rev. 1

March 19, 2021

Prepared For:

InfiNet Malta LTD
Level 1, Britannia House, 9 Old Bakery Street
Valletta VLT 1450, Malta

Prepared By:
Eurofins Electrical and Electronic Testing NA, Inc.
914 West Patapsco Ave.,
Baltimore MD 21230

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Donald Salguero, Project Engineer
Electromagnetic Compatibility Lab

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of 15.407 of the FCC Rules under normal use and maintenance.

Steve Pitta
Director, Operations Strategy

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	March 11, 2021	Initial Issue.
1	March 19, 2021	Implemented Customer-Requested Revisions.

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List of Figures

Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the InfiNet Malta LTD Q5-E/04701, with the requirements of Part 15, §15.407. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the Q5-E/04701. InfiNet Malta LTD should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Q5-E/04701, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.407, in accordance with InfiNet Malta LTD, purchase order number IM00-000331. All tests were conducted using measurement procedure ANSI C63.10-2013.

FCC Reference	Description	Results
§15.203	Antenna Requirement	Compliant
§15.403(i)	26 dB Bandwidth	Not Tested/Evaluated at MET.
§15.407 (a)(3)	Maximum Conducted Output Power	Not Tested/Evaluated at MET.
§15.407 (a)(3)	Maximum Power Spectral Density	Not Tested/Evaluated at MET.
§15.407 (b)(4)& (8 - 9)	Undesirable Emissions	Compliant
§15.407(b)(6)	Conducted Emission Limits	Not Tested/Evaluated at MET.
§15.407(c)	Automatic Discontinue of Transmitter	Not Tested/Evaluated at MET.
§15.407(e)	6 dB Bandwidth	Not Tested/Evaluated at MET.
§15.407(f)	RF Exposure	Not Tested/Evaluated at MET.
§15.407(g)	Frequency Stability	Not Tested/Evaluated at MET.

Figure 1: Executive Summary of EMC Part 15.407 ComplianceTesting

Equipment Configuration

A. Overview

Eurofins Electrical and Electronic Testing NA, Inc. was contracted by InfiNet Malta LTD to perform testing on the Q5-E/04701, under InfiNet Malta LTD's purchase order number IM00-000331.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the InfiNet Malta LTD Q5-E/04701.

The results obtained relate only to the item(s) tested.

Model(s) Tested:	Q5-E/04701	
Model(s) Covered:	Q5-E/04701	
EUT Specifications:	Primary Power: 100-240 VAC	
	FCC ID: X8Q-Q5-23	
	Type of Modulations:	QPSK, QAM16, QAM64, QAM256
	Equipment Code:	NII
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35° C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Donald Salguero	
Report Date(s):	March 19, 2021	

Figure 2: EUT Summary

B. References

CFR 47, Part 15, Subpart E	Unlicensed National Information Infrastructure Devices (UNII)
KDB 789033 D02 v02r01	General UNII Test Procedures New Rules.
ANSI C63.4:2014	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ISO/IEC 17025:2017	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Figure 3: References

C. Test Site

All testing was performed at Eurofins Electrical and Electronic Testing NA, Inc., 914 West Patapsco Ave., Baltimore MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at Eurofins Electrical and Electronic Testing NA, Inc.

D. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty	K	Confidence Level
Radiated Emissions, (30 MHz – 1 GHz)	±3.20	2	95%
Radiated Emissions, (1 GHz – 6 GHz)	±2.52	2	95%
Conducted Emission Voltage	±2.03	2	95%
RF Frequencies	±4.52 Hz	2	95%
RF Power Conducted Emissions	±2.32 dB	2	95%
RF Power Conducted Spurious Emissions	±2.25 dB	2	95%
RF Power Radiated Emissions	±3.01 dB	2	95%

Figure 4: Uncertainty Calculations Summary

E. Description of Test Sample

The InfiNet Malta LTD Q5-E/04701, Equipment Under Test (EUT), is a 5GHz fixed wireless service point-to-point RF-transceiver for various purposes, with wired Ethernet network connection, PoE powered, intended to be mounted on towers/masts.

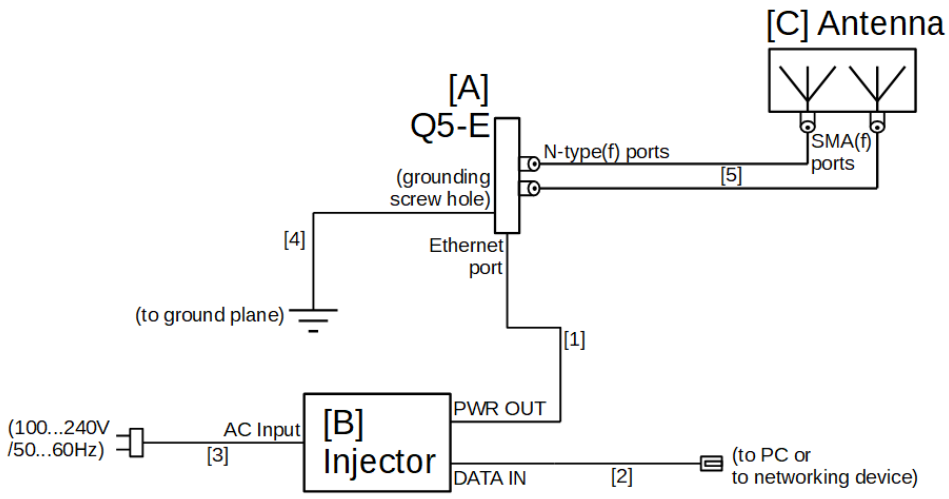


Figure 5: Block Diagram of Test Configuration

F. Equipment Configuration

The EUT was set up as outlined in Figure 5, Block Diagram of Test Setup. All cards, racks, etc., incorporated as part of the EUT is included in the following list.

Ref. ID	Slot #	Name/Description	Model Number	Part Number	Serial Number	Rev. #
A		RF-transceiver	Q5-E/04701		700113, 700115, 700119, 700567	
		Bracket for mounting on a pipe rack	MOUNT-KIT-85			

Figure 6: Equipment Configuration

G. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Ref. ID	Name/Description	Manufacturer	Model Number	Customer Supplied Calibration Data
B	PoE Injector, AC/DC converter	Microsemi	PD-ACDC48GR/AC (PD-6641G300)	
C	External antenna	MARS antennas	MA-WA56-DP23	
	Enclosure for mounting			
	Bracket for mounting on a pipe rack	Infinet LLC	MOUNT-KIT-85	

Figure 7: Support Equipment

H. Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Description or reason for no cable	Qty	Length as tested (m)	Max Length (m)	Shielded? (Y/N)	Termination Box ID & Port Name
1	A. Ethernet port	Cat5e UTP, 4 pairs	1	3	90	No	B. PWR OUT
2	B. DATA IN	Cat5e UTP, 4 pairs	1	2	-	No	(to PC or to networking device)
3	B. AC Input	3 conductor cord	1	2	-	No	(100...240V/50...60Hz)
4	A. (grounding screw hole)	Grounding wire crimped with grounding ring, wire gauge not less than 10awg	1	2	-	No	(to ground plane)
5	N-type(f) ports	50 Ohm coaxial cables, SMA(m)/3.5(m) to N-type(m) connectors o	2	0.5	2.5	Yes	C. SMA(f) ports
5	N-type(f) ports	50 Ohm coaxial cables with N-type(m) connectors on one end	2	0.5	2.5	Yes	(to 50Ω loads/measuring equipment/distribution)

Figure 8: Ports and Cabling Information

I. Mode of Operation

For the purpose of testing, there are several operational modes offered: 1) Master mode - for the purpose of testing of transmitter qualities (i.e. spurious emissions, power and power density, etc.) it is enough to manage device to work in a Master mode on a desired channel. In that mode, radio of device periodically transmits beacon packets, representative of actual traffic; 2) Slave mode - for the purpose of testing of receiver qualities (i.e. spurious emissions) it is enough to manage device to work in a Slave mode on a desired channel. In that mode and in the absence of master, radio of device is in constant receiving state; 3) Radio switched off - for the purpose of testing qualities of unintentional radiator it is enough to switch off the radio off. CPU, RAM, Ethernet and other on-board devices that may be incidental radiators continue to operate as usual.

J. Method of Monitoring EUT Operation

LEDs on the rear side of the enclosure are indicating powering and Received Signal Strength (RSSI). Not glowing LEDs indicate that EUT is not powered. LED on the bottom of the scale, the closest one to 'PWR' designator, when glowing, indicates that the board is powered. Next on top LED signalizes Ethernet connectivity: red means the EUT is not connected to another networking device, green means the EUT's Ethernet is operating at speed 1000Mbps, amber means the EUT's Ethernet is operating at speed 100Mbps. Monitoring transmitter/receiver parameters may be done via HTTP (user web-interface) or Telnet protocol. State of the radio of a normally operating device in Master mode (i.e. transceiver) is "started". In that state, device already transmits beacon packets. State of the radio of a normally operating Slave device is "connecting" or "base_detection". In that state, device is already constantly receiving.

K. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

L. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to InfiNet Malta LTD upon completion of testing.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

Test Requirement: **§ 15.203:** 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

a.) Antenna must be permanently attached to the unit.

b.) Antenna must use a unique type of connector to attach to the EUT.

c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Results: The EUT as tested is **compliant** the criteria of §15.203.

EUT model: Q5-E/04701

Antenna Type: External – Dual polarized flat-panel
Antenna Gain: 23dBi
Manufacturer: MARS antennas
Model Number: MRF-WA56DP23IF-1710-31208

Test Engineer(s): Donald Salguero

Test Date(s): March 3, 2021

Electromagnetic Compatibility Criteria for Intentional Radiators
§ 15. 403(i) 26 dB Bandwidth

Test Requirements: **§ 15.403(i):** For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

Test Procedure: The transmitter was set to low, mid, and high operating frequencies at the highest output power and connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% of the total emission bandwidth, VBW > RBW. The 26 dB Bandwidth was measured and recorded.

Test Results: The EUT was **Not Tested/Evaluated at MET**

Electromagnetic Compatibility Criteria for Intentional Radiators
§15. 407(a)(3) Maximum Conducted Output Power

Test Requirements: **§15.407(a)(3):** For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

Test Procedure: The EUT was connected to a spectrum analyzer through a cable and attenuator. Measurements were taken with the EUT set to transmit continuously on its low, mid, and high channels. Its power was measured according to measurement method SA-1, as described in 789033 D02 General UNII Test Procedures v01.

Test Results: The EUT was **Not Tested/Evaluated at MET**

Electromagnetic Compatibility Criteria for Intentional Radiators
§15.407(a)(3) Maximum Power Spectral Density

Test Requirements: **§15.407(a)(3):** In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

Test Procedure: The EUT was connected to a spectrum analyzer through a cable and attenuator. Measurements were taken with the EUT set to transmit continuously on its low, mid, and high channels. Its power was measured according KDB 789033 D02 General UNII Test Procedures v01. A 1 MHz RBW was used during testing, as this provides a worst-case scenario.

Test Results: The EUT was **Not Tested/Evaluated at MET**

Electromagnetic Compatibility Criteria for Intentional Radiators §15.407(b)(4) & (6–7)

Undesirable Emissions

Test Requirements:

§ 15.407(b)(4): For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
§ 15.407(b)(8): Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.

§ 15.407(b)(9): The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

Test Procedure:

The EUT was placed on a non-conducting stand on a turntable in a chamber. To find the maximum emission the EUT was set to transmit on low, mid, and high channels. Additionally, the turntable was rotated 360 degrees, the EUT was oriented through its three orthogonal axes, and the receive antenna height was varied in order to maximize emissions.

For frequencies from 30 MHz to 1 GHz, measurements were first made using a peak detector with a 100 kHz resolution bandwidth. Emissions which exceeded the limits were re-measured using a quasi-peak detector with a 120 kHz resolution bandwidth.

Above 1 GHz, measurements were made pursuant the method described in FCC KDB 789033 D02 General UNII Test Procedure New Rules v02r01. The equation, **EIRP= E + 20 log D – 104.8** was used to convert field strength to EIRP (**E** = field strength (dBµV/m) and **D** = Reference measurement distance**).**

For emissions above 1 GHz and in restricted bands, measurements of the field strength were made with a peak detector and an average detector and compared with the limits of 15.209.

As an alternative, according to FCC KDB 789033 D02 General UNII Test Procedure New Rules v02r01, all emissions above 1 GHz that comply with the peak and average limits of 15.209 satisfy the requirements of unwanted emissions in 15.407.

Test Results:

For below 1 GHz, the EUT was **compliant** with the requirements of this section.

For above 1 GHz, the EUT was **compliant** with the requirements of this section.

Test Engineer(s): Donald Salguero

Test Date(s): March 3, 2021

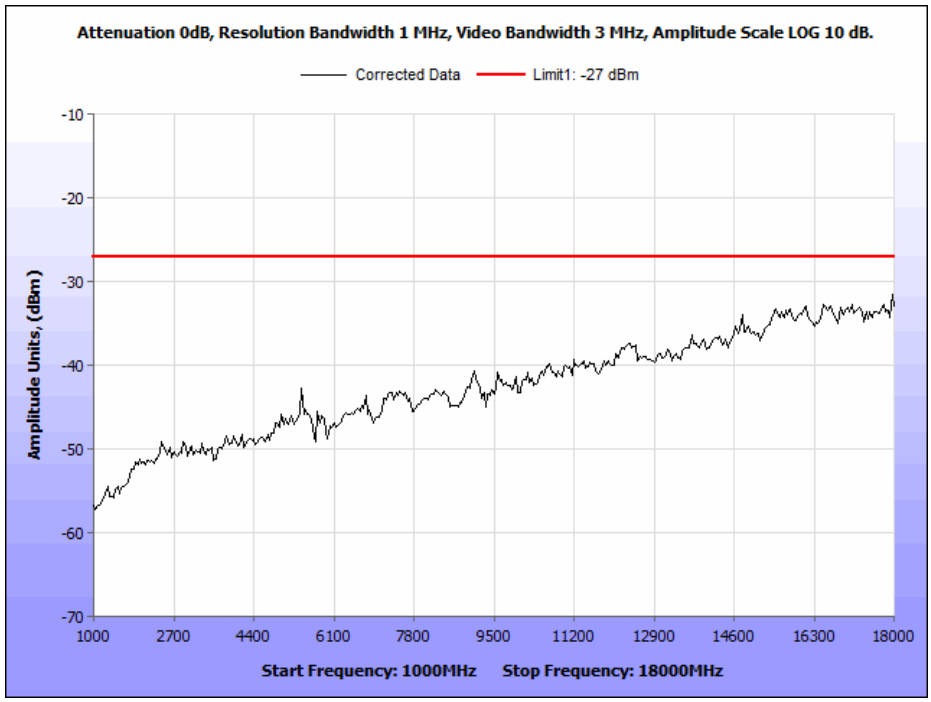


Figure 9: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 10MHz - 5735MHz - 1-18GHz

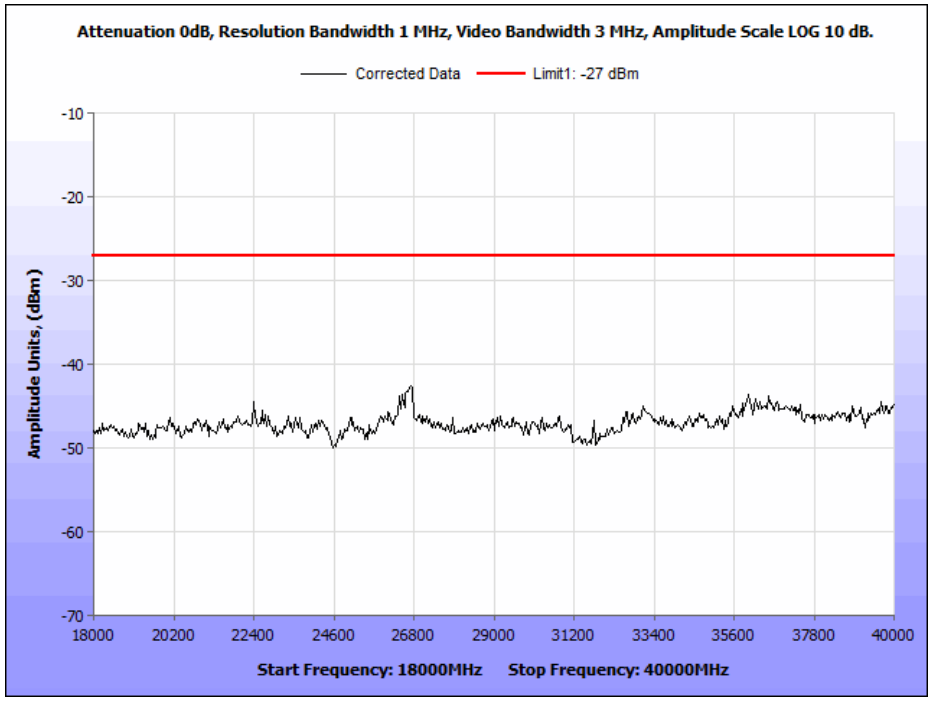


Figure 10: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 10MHz - 5735MHz - 18-40GHz

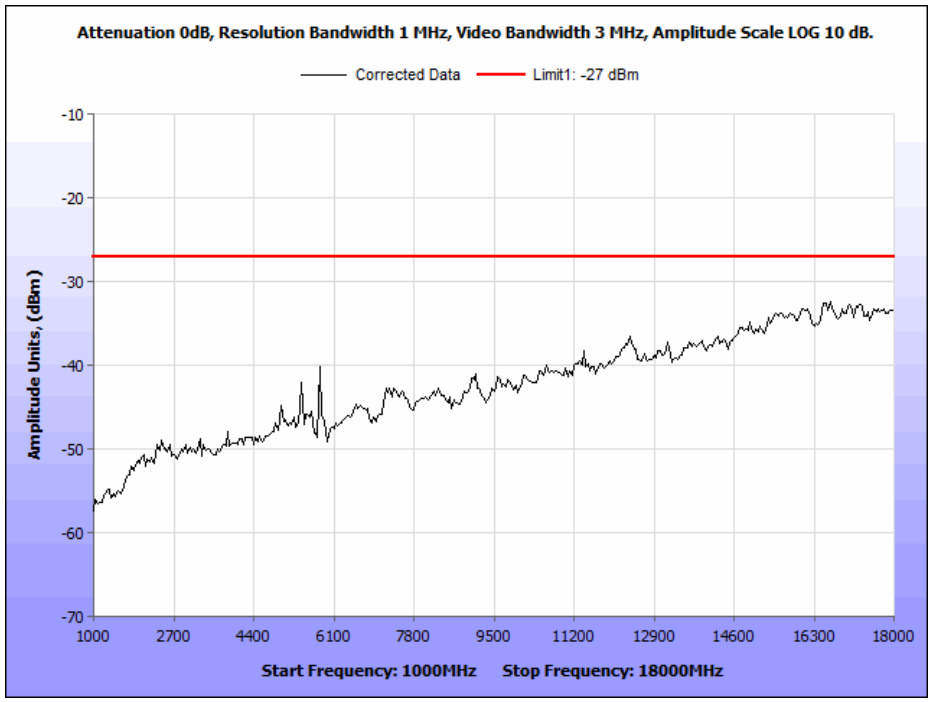


Figure 11: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 10MHz - 5785MHz - 1-18GHz

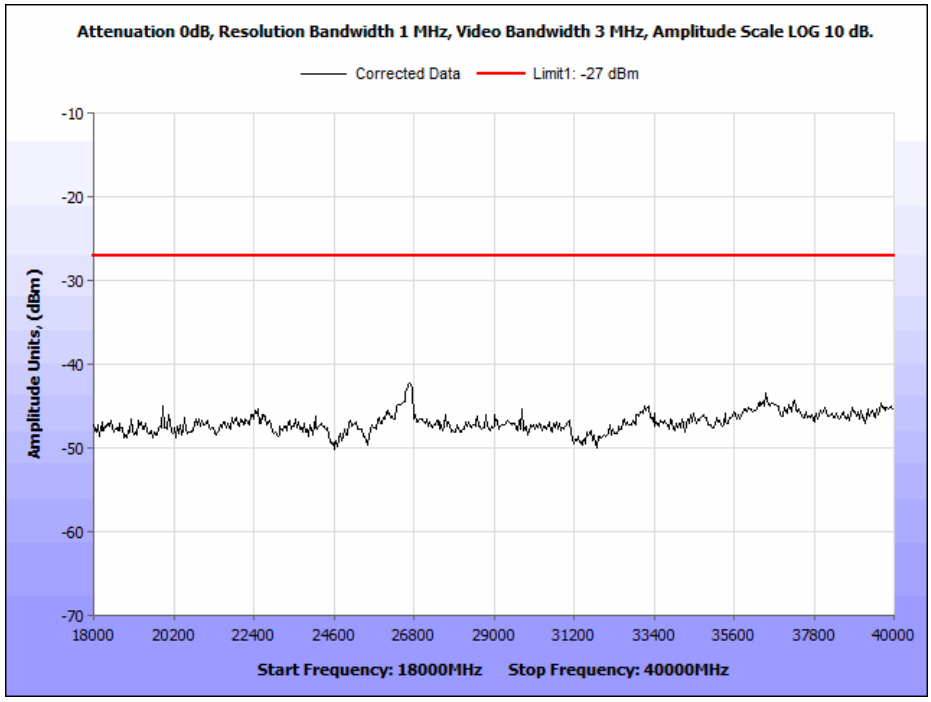


Figure 12: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 10MHz - 5785MHz - 18-40GHz

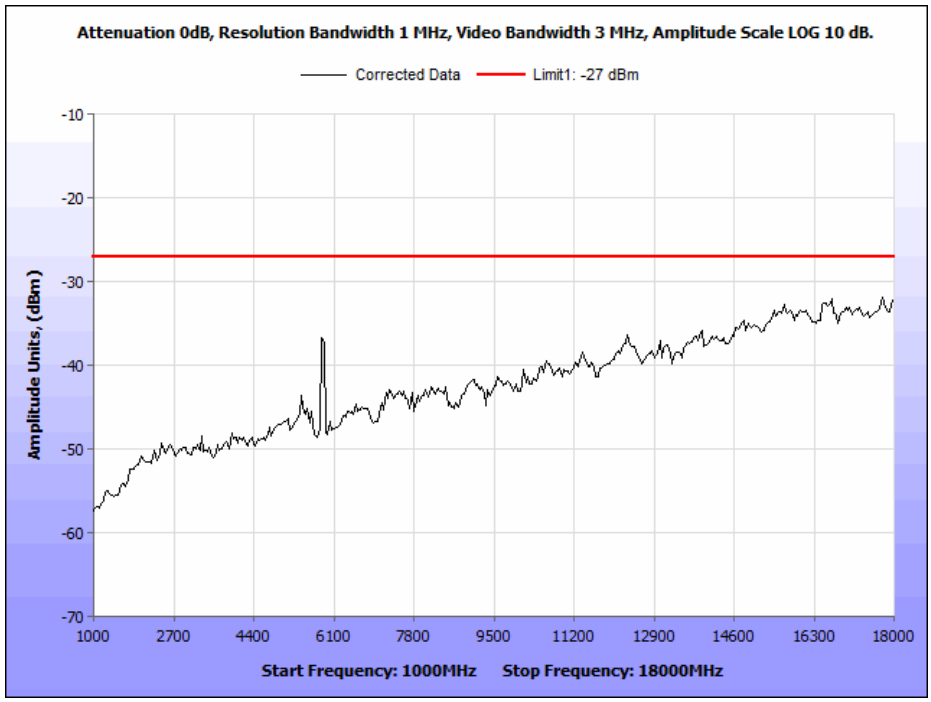


Figure 13: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 10MHz - 5845MHz - 1-18GHz

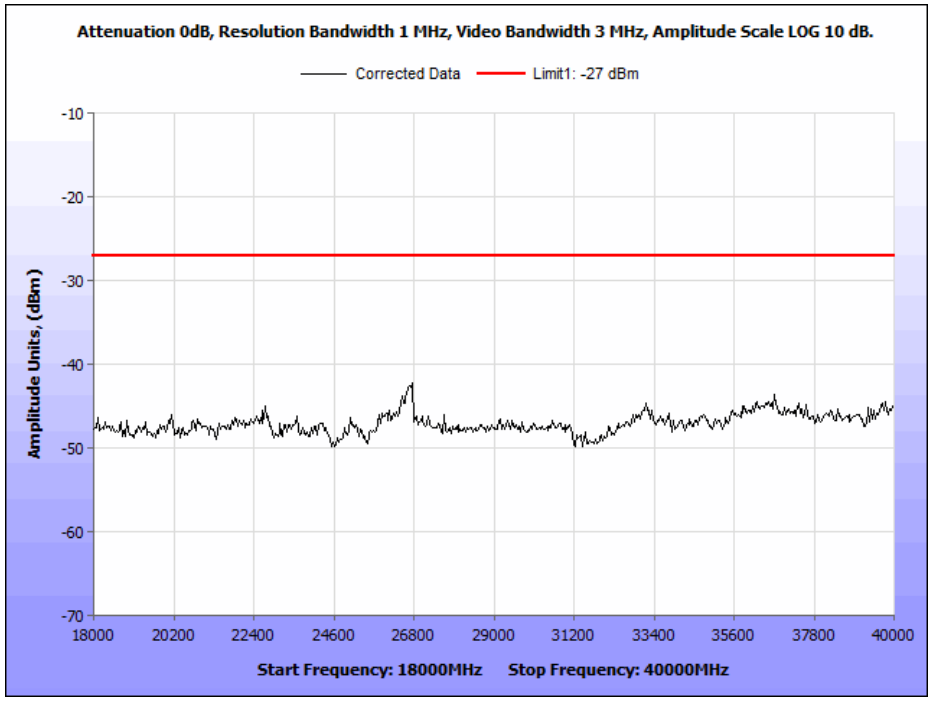


Figure 14: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 10MHz - 5845MHz - 18-40GHz

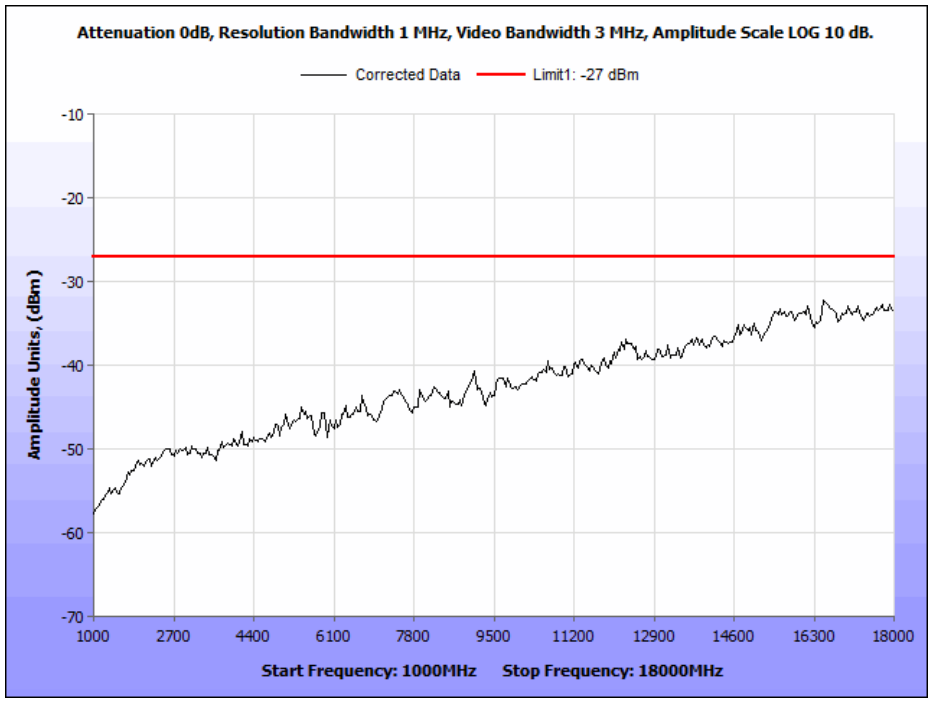


Figure 15: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 20MHz - 5750MHz - 1-18GHz

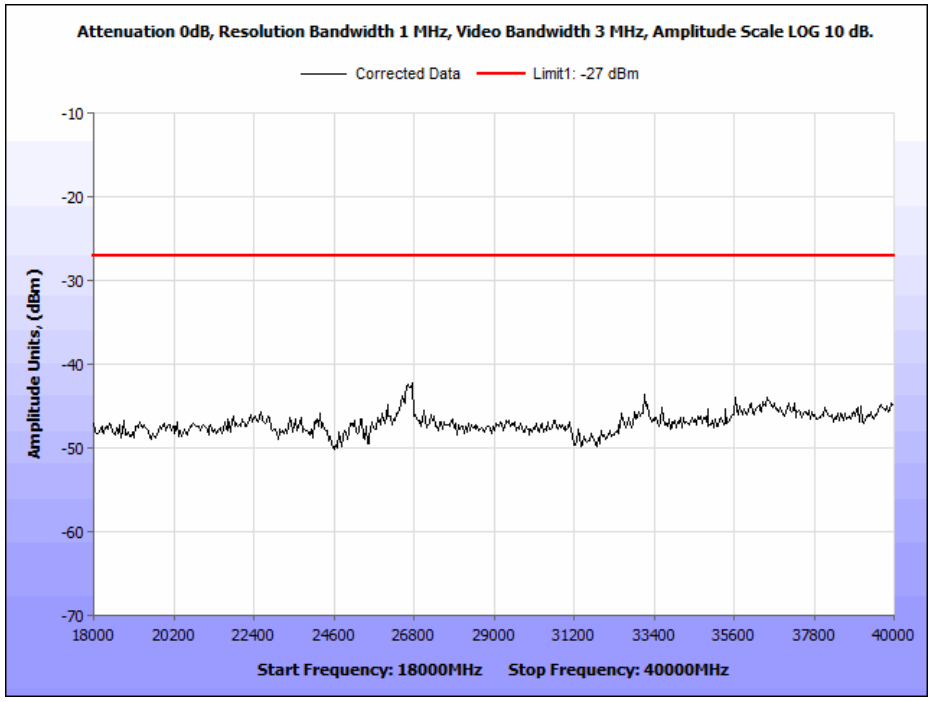


Figure 16: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 20MHz - 5750MHz - 18-40GHz

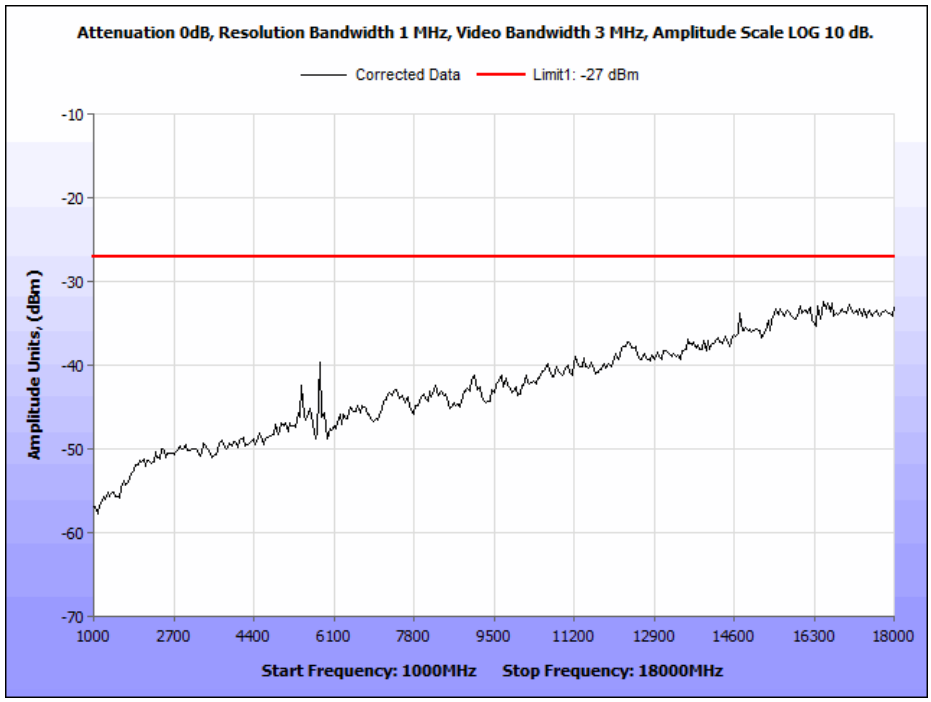


Figure 17: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 20MHz - 5790MHz - 1-18GHz

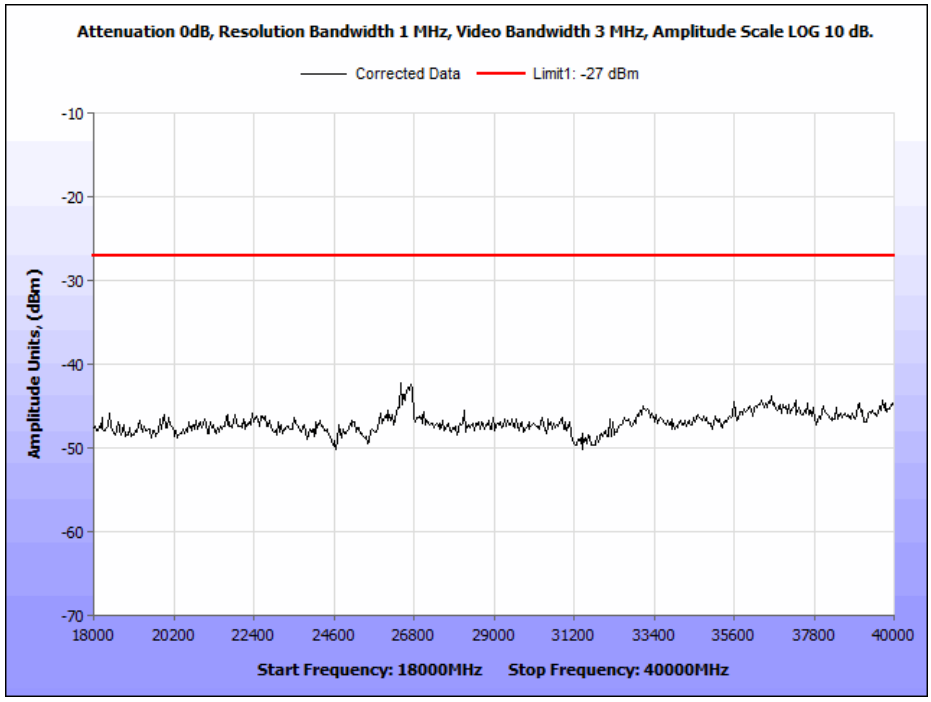


Figure 18: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 20MHz - 5790MHz - 18-40GHz

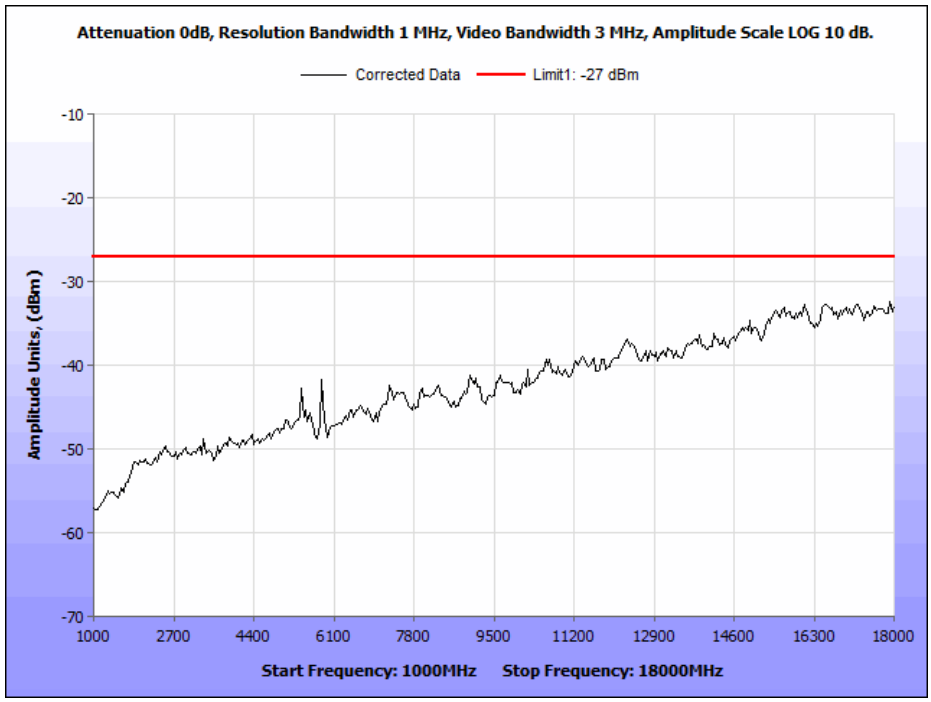


Figure 19: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 20MHz - 5830MHz - 1-18GHz

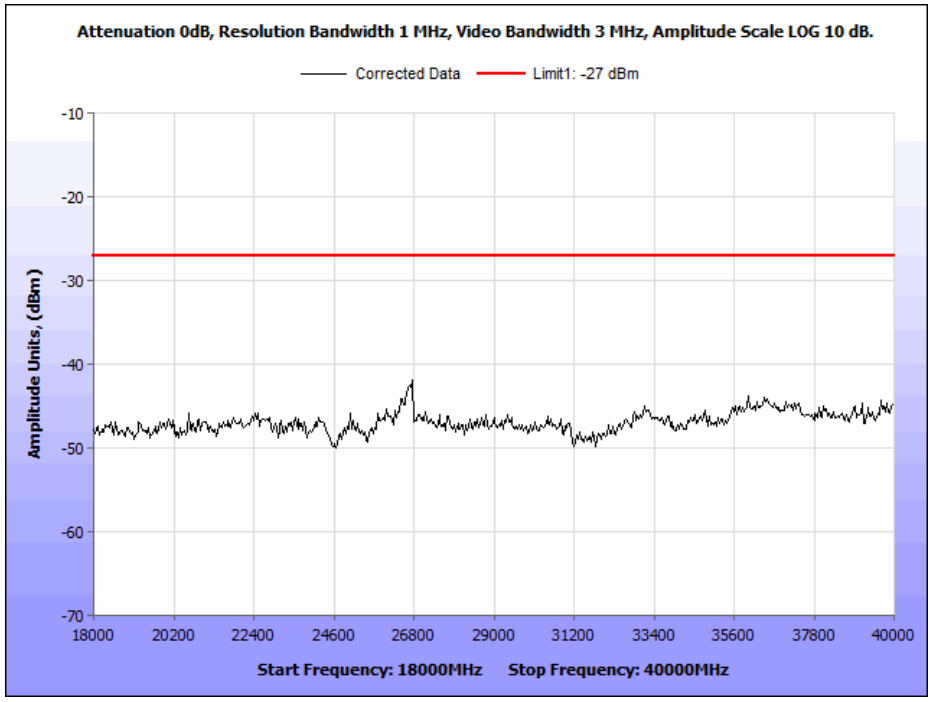


Figure 20: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 20MHz - 5830MHz - 18-40GHz

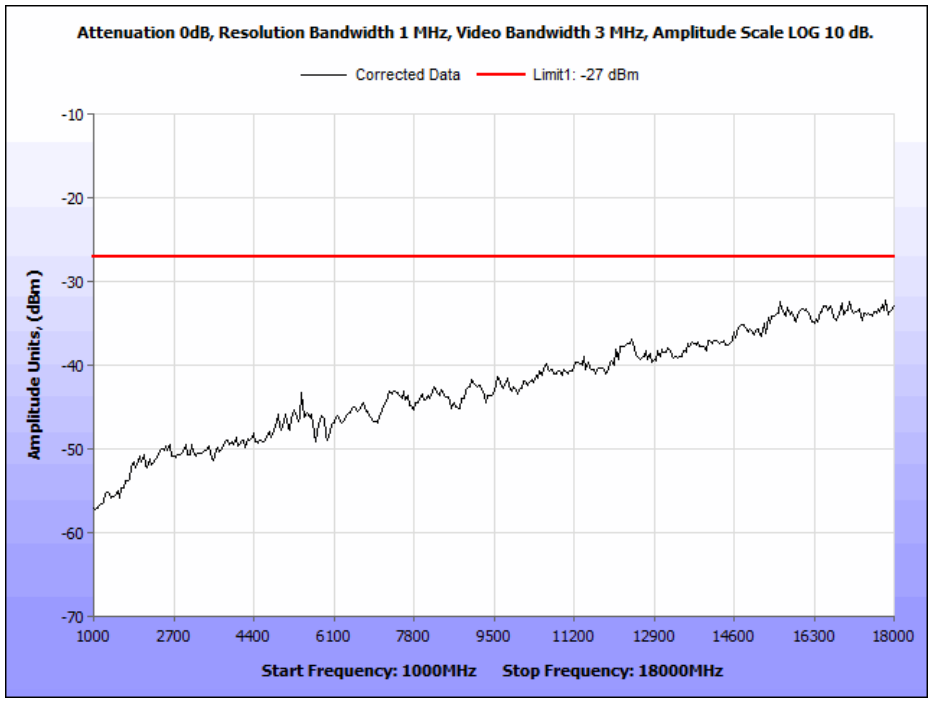


Figure 21: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 40MHz - 5760MHz - 1-18GHz

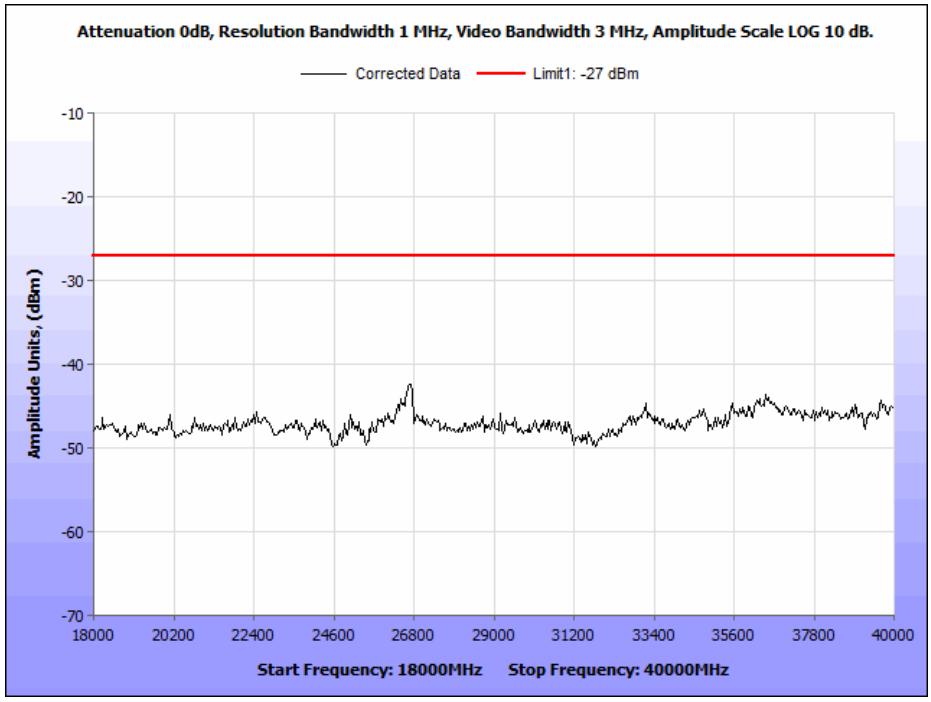


Figure 22: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 40MHz - 5760MHz - 18-40GHz

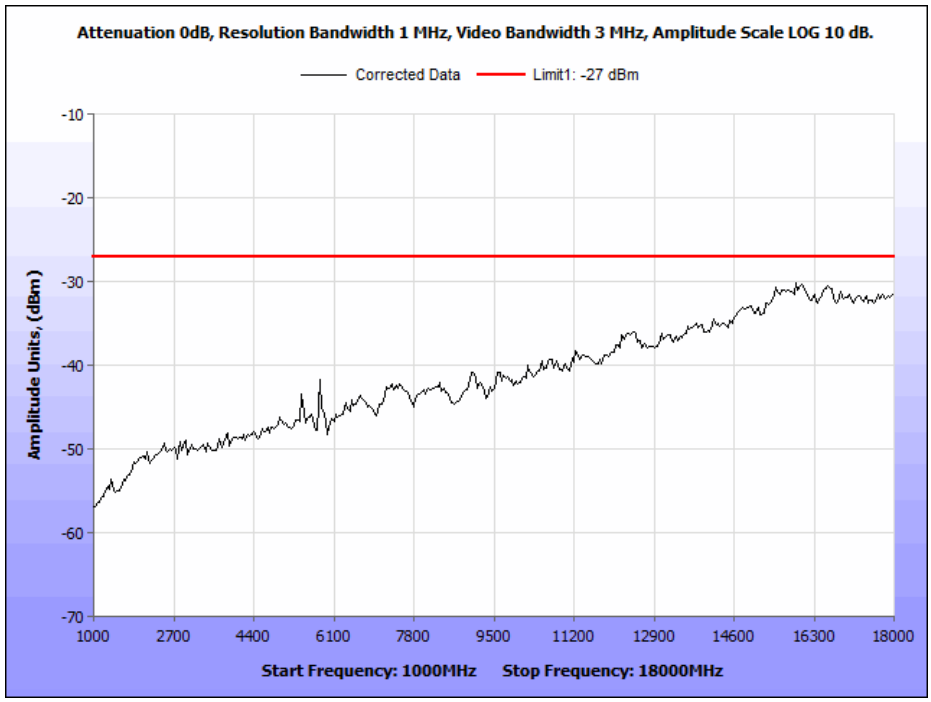


Figure 23: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 40MHz - 5800MHz - 1-18GHz

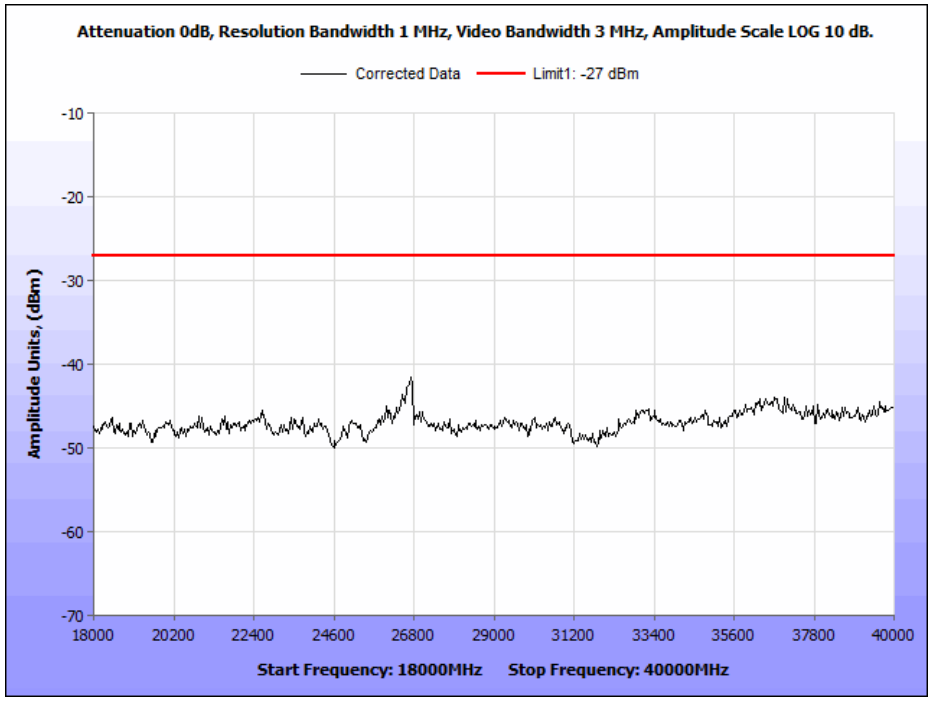


Figure 24: §15.407(b)(4) & (6 – 7) Undesirable Emissions, 15.407 -27dBm Radiated Emissions - 40MHz - 5800MHz - 18-40GHz

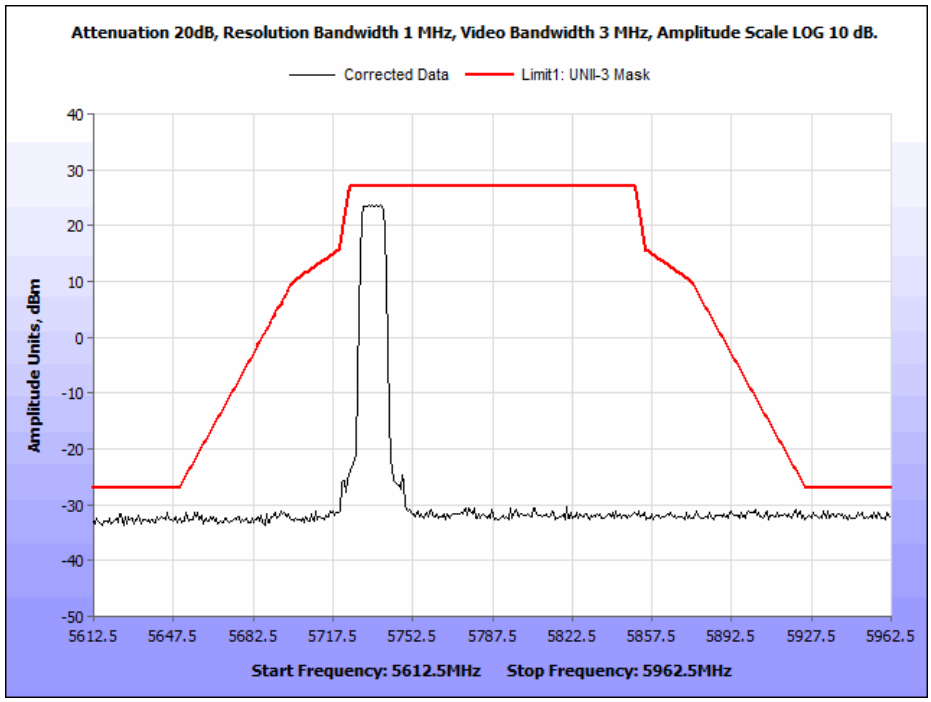


Figure 25: § 15.407(b)(6) Conducted Emissions, UNII-3 Emission Mask - 10MHz - 5735 MHz

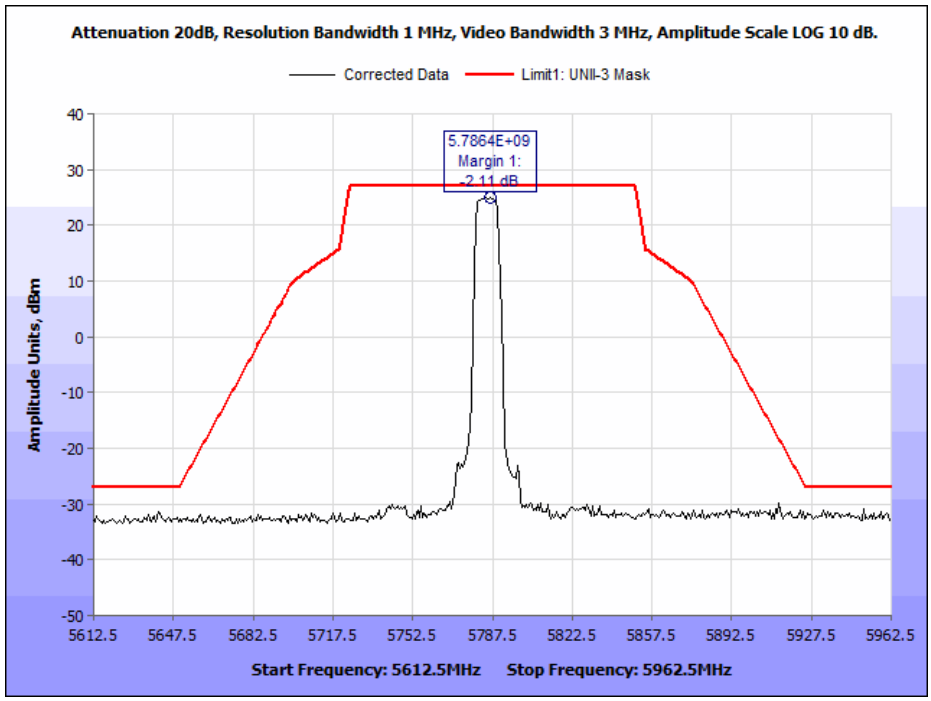


Figure 26: § 15.407(b)(6) Conducted Emissions, UNII-3 Emission Mask - 10MHz - 5785 MHz

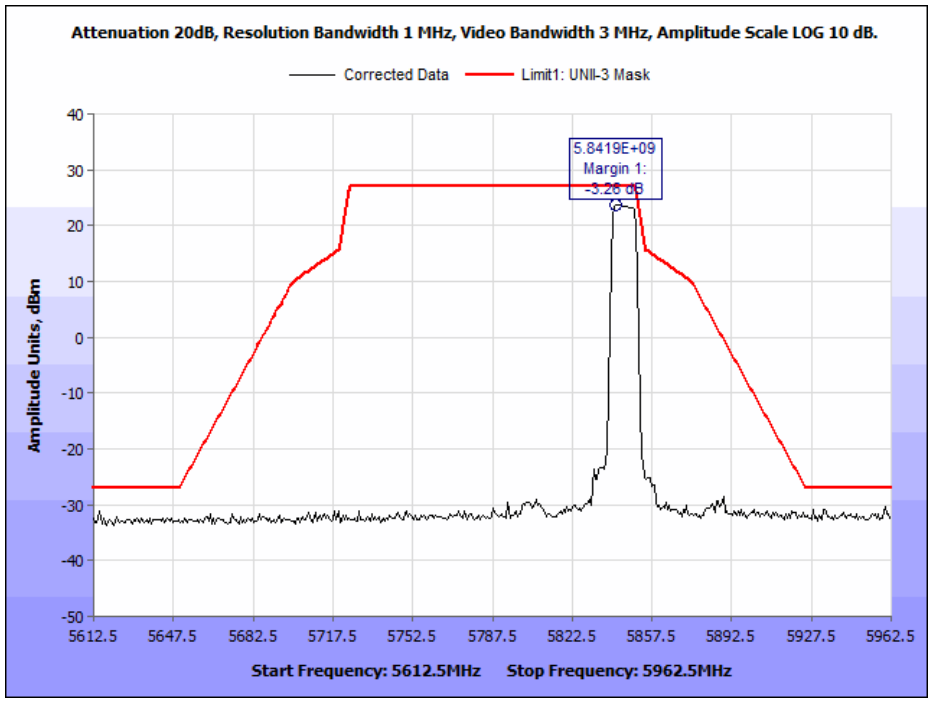


Figure 27: § 15.407(b)(6) Conducted Emissions, UNII-3 Emission Mask - 10MHz - 5845 MHz

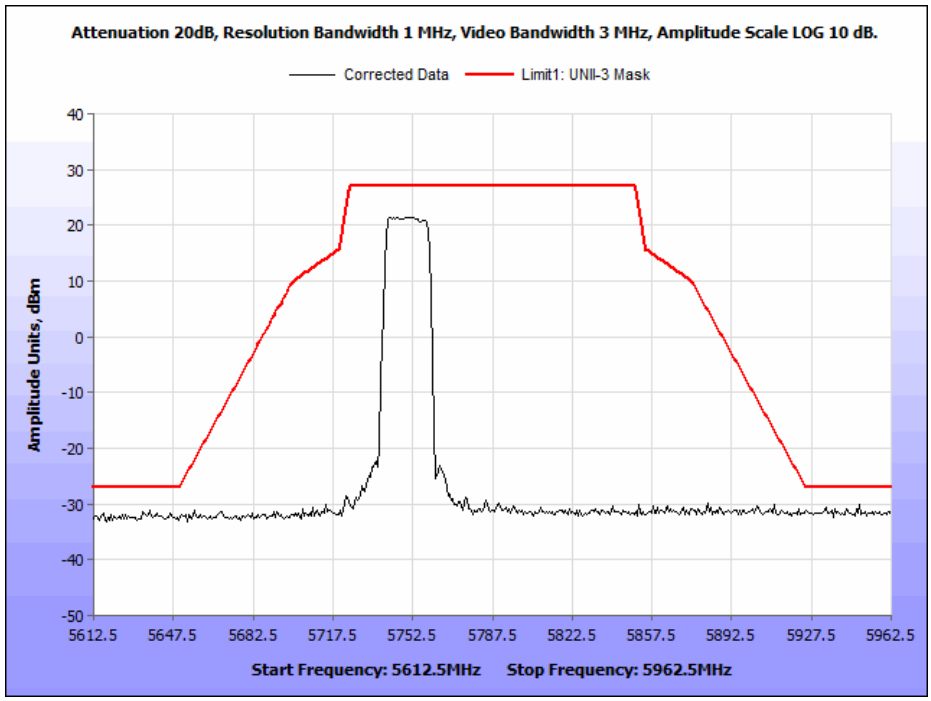


Figure 28: § 15.407(b)(6) Conducted Emissions, UNII-3 Emission Mask - 20MHz - 5750 MHz

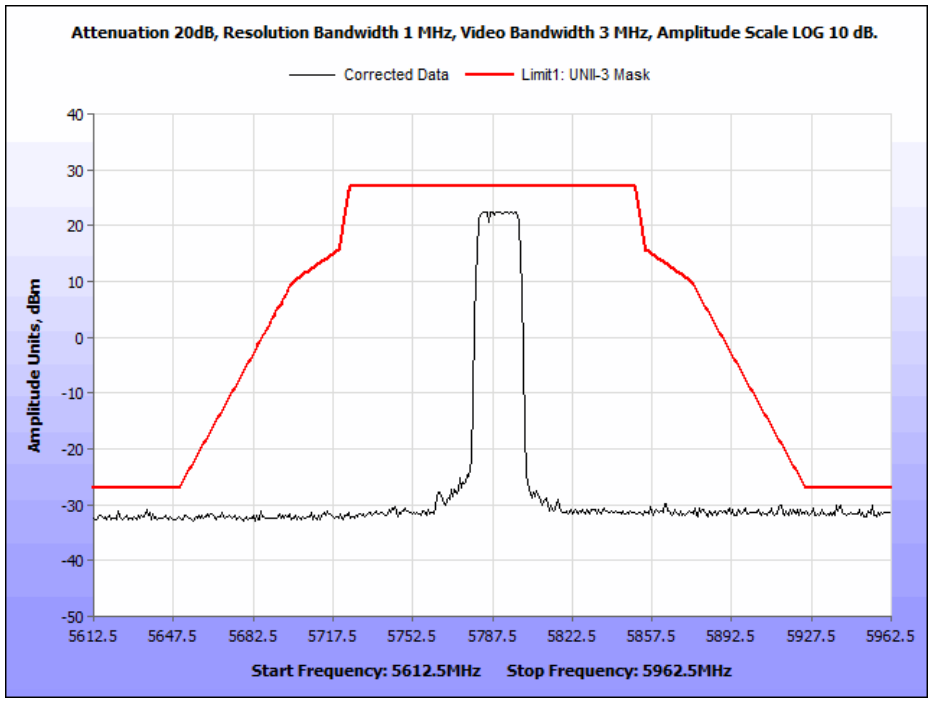


Figure 29: § 15.407(b)(6) Conducted Emissions, UNII-3 Emission Mask - 20MHz - 5790 MHz

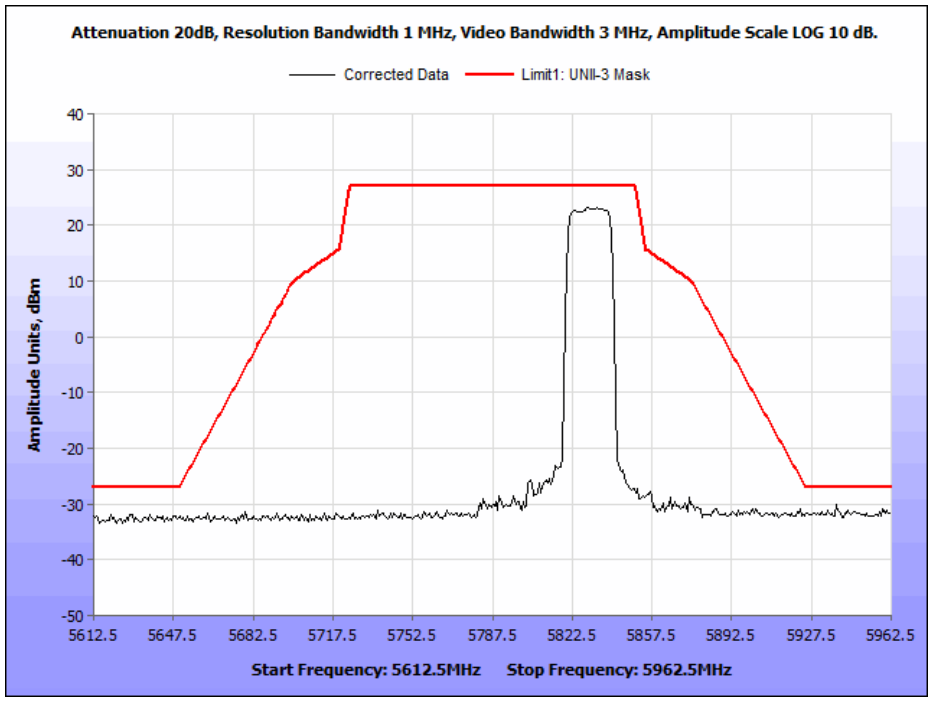


Figure 30: § 15.407(b)(6) Conducted Emissions, UNII-3 Emission Mask - 20MHz - 5830 MHz

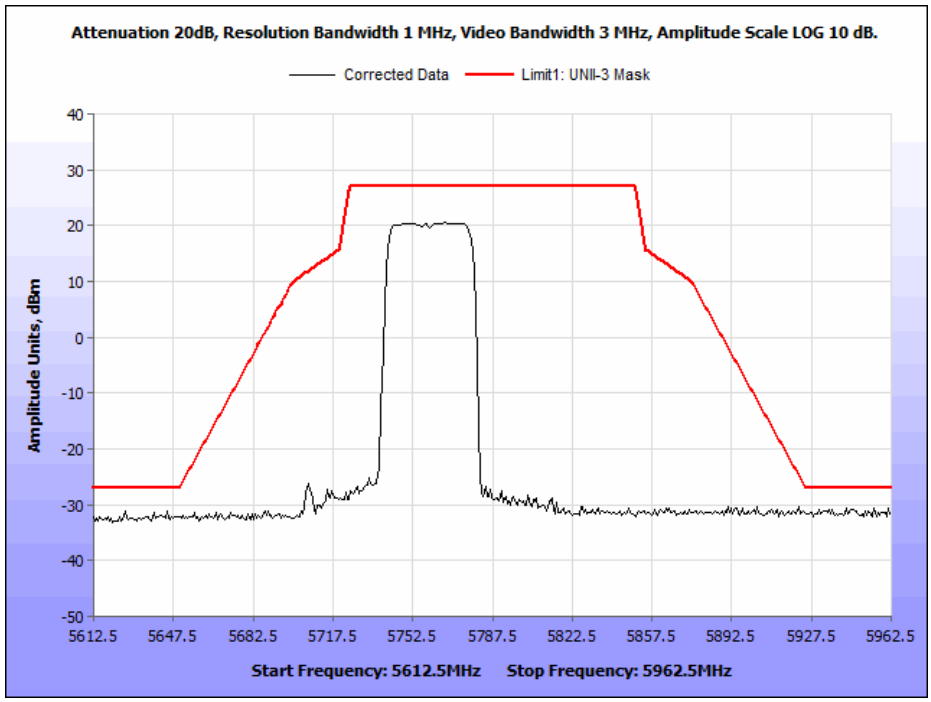


Figure 31: § 15.407(b)(6) Conducted Emissions, UNII-3 Emission Mask - 40MHz - 5760 MHz

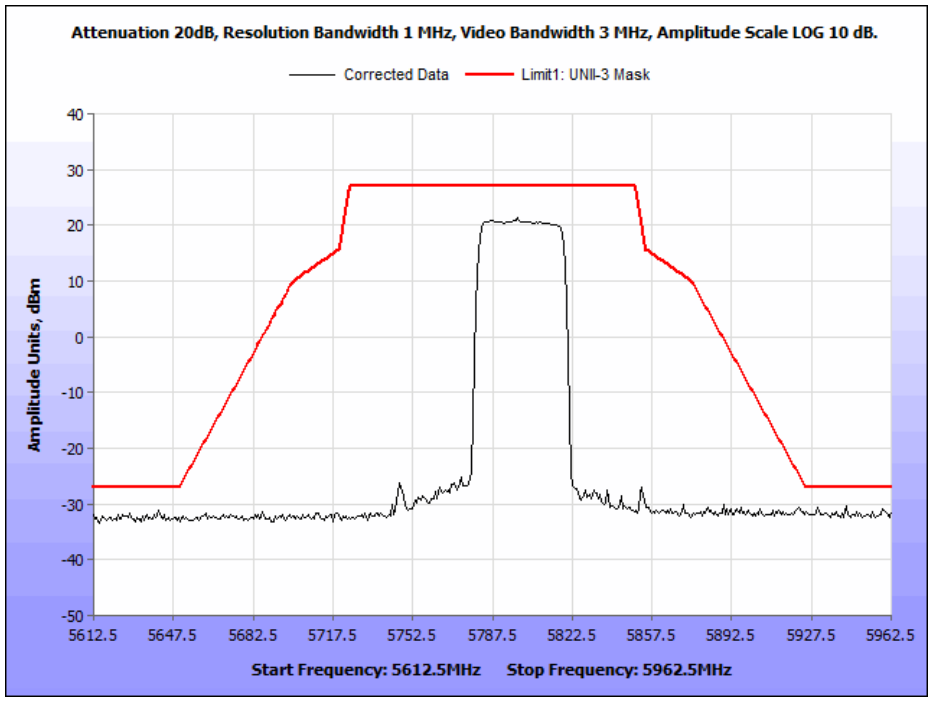


Figure 32: § 15.407(b)(6) Conducted Emissions, UNII-3 Emission Mask - 40MHz - 5800 MHz

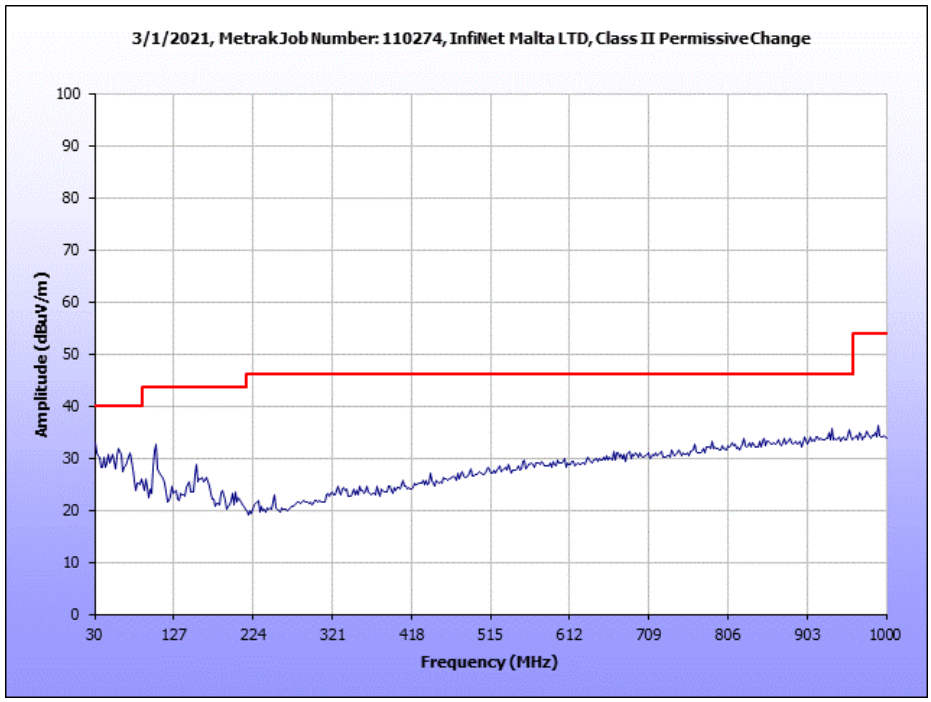


Figure 33: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Radiated Spurious Emissions - 10 MHz - 5735 MHz - 30-1000MHz

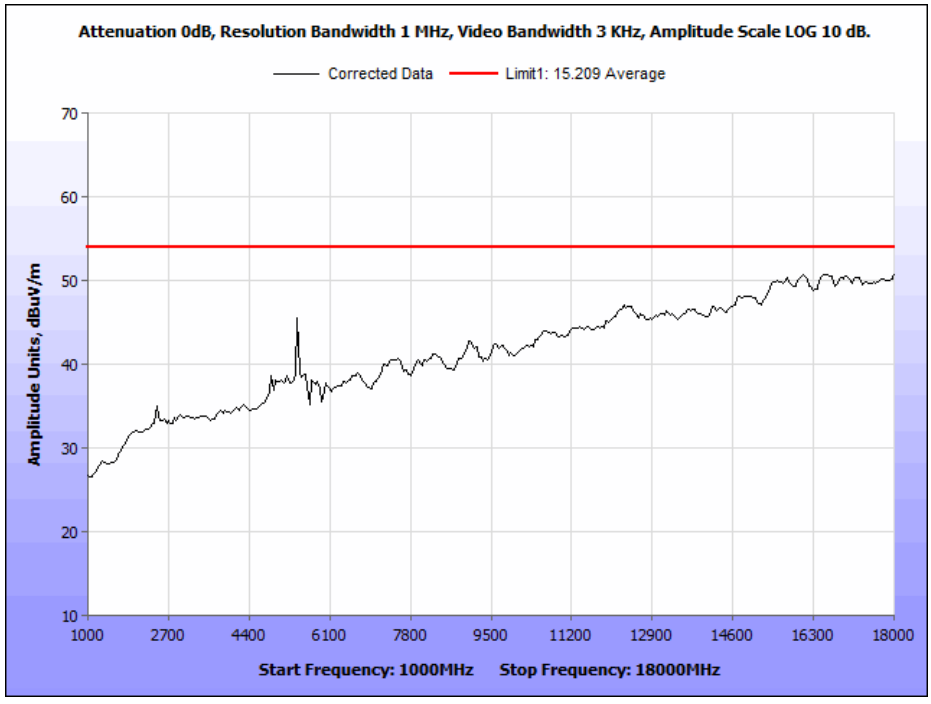


Figure 34: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 10MHz - 5735MHz - 1-18GHz

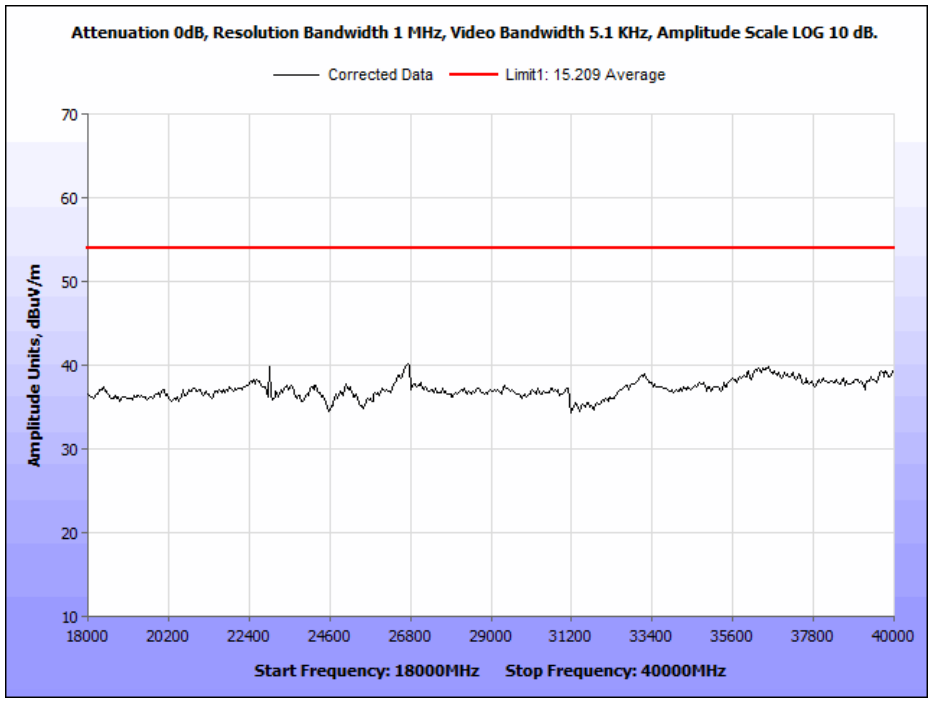


Figure 35: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 10MHz - 5735MHz - 18-40GHz

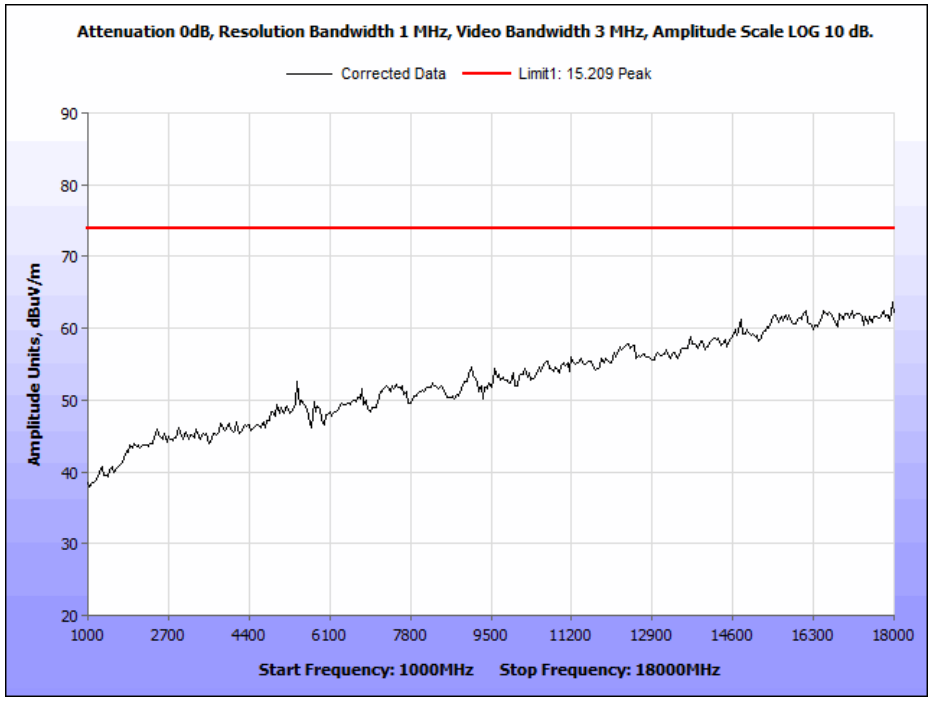


Figure 36: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 10MHz - 5735MHz - 1-18GHz

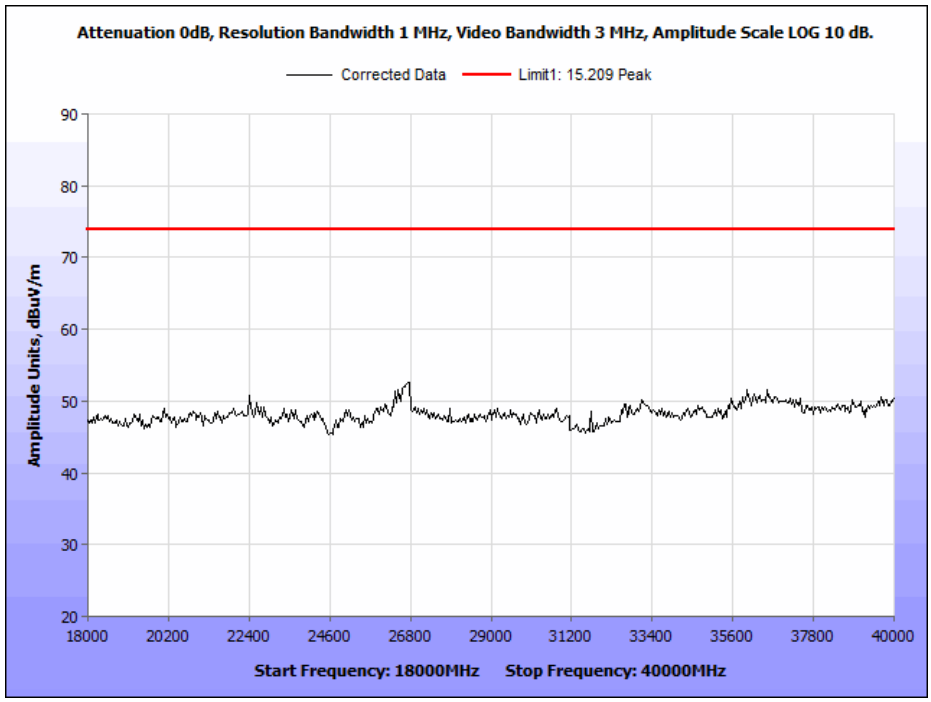


Figure 37: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 10MHz - 5735MHz - 18-40GHz

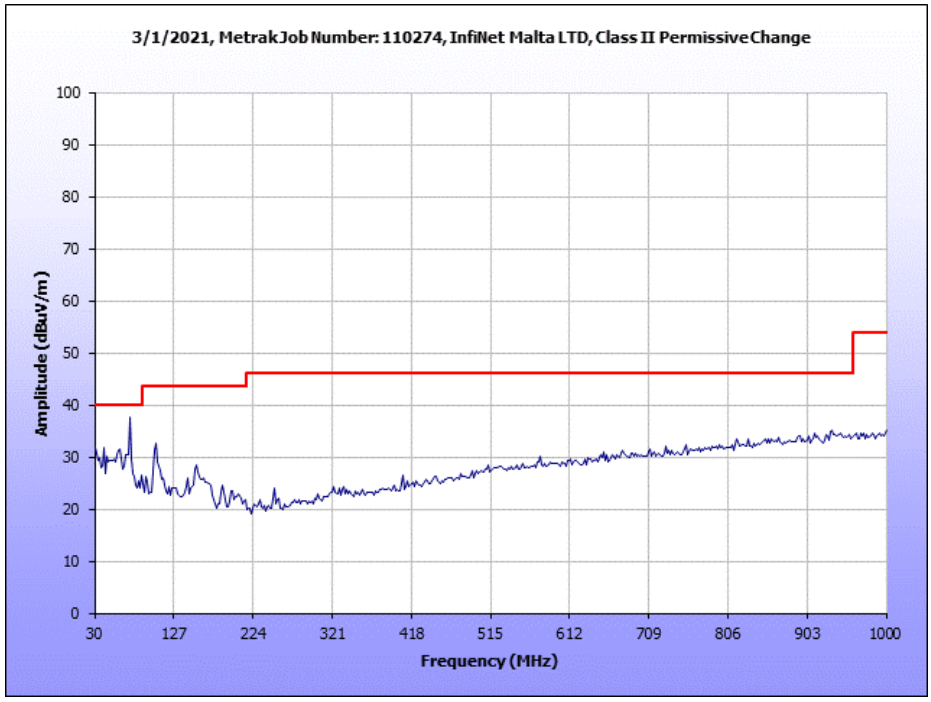


Figure 38: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Radiated Spurious Emissions - 10 MHz - 5785 MHz - 30-1000MHz

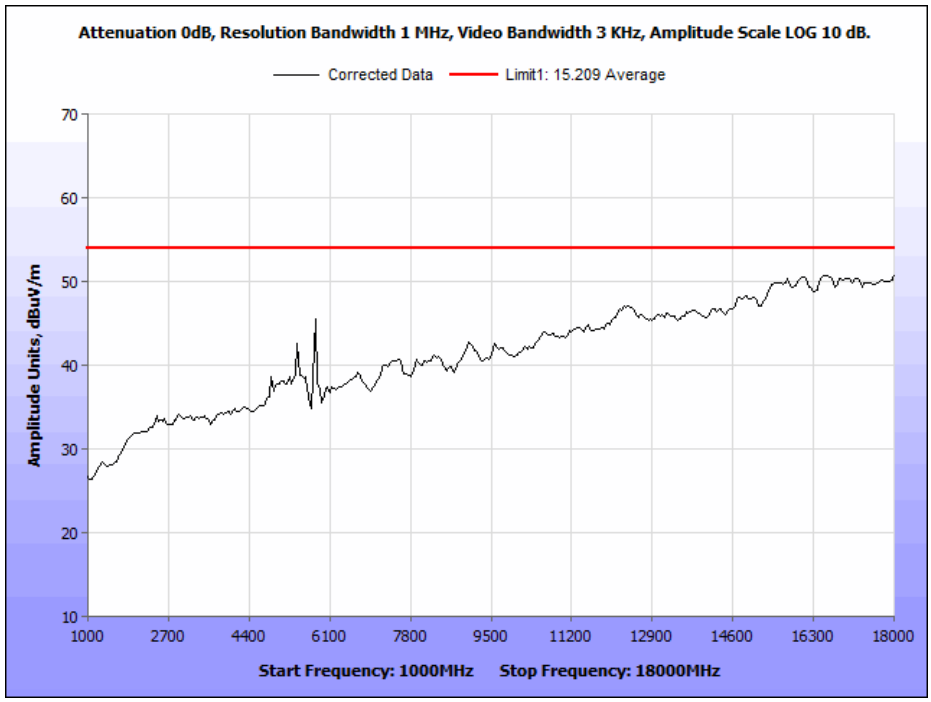


Figure 39: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 10MHz - 5785MHz - 1-18GHz

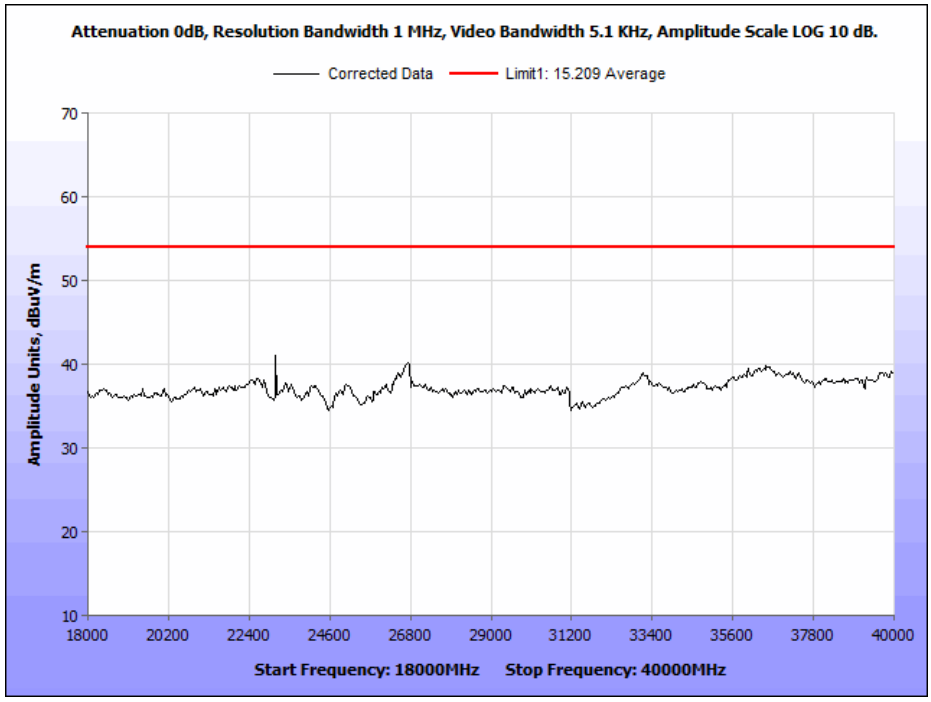


Figure 40: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 10MHz - 5785MHz - 18-40GHz

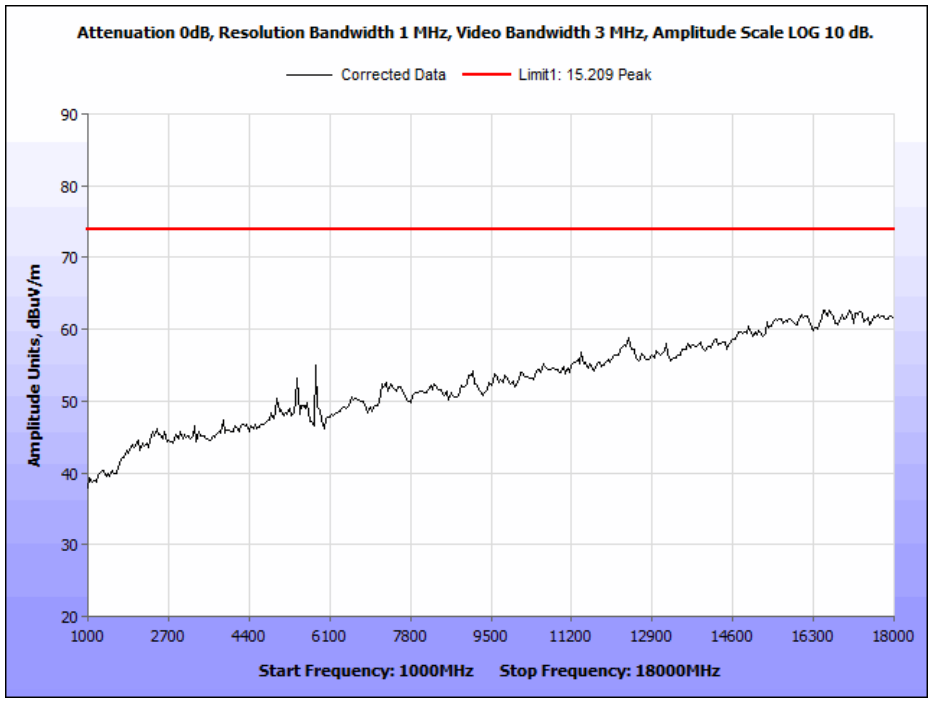


Figure 41: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 10MHz - 5785MHz - 1-18GHz

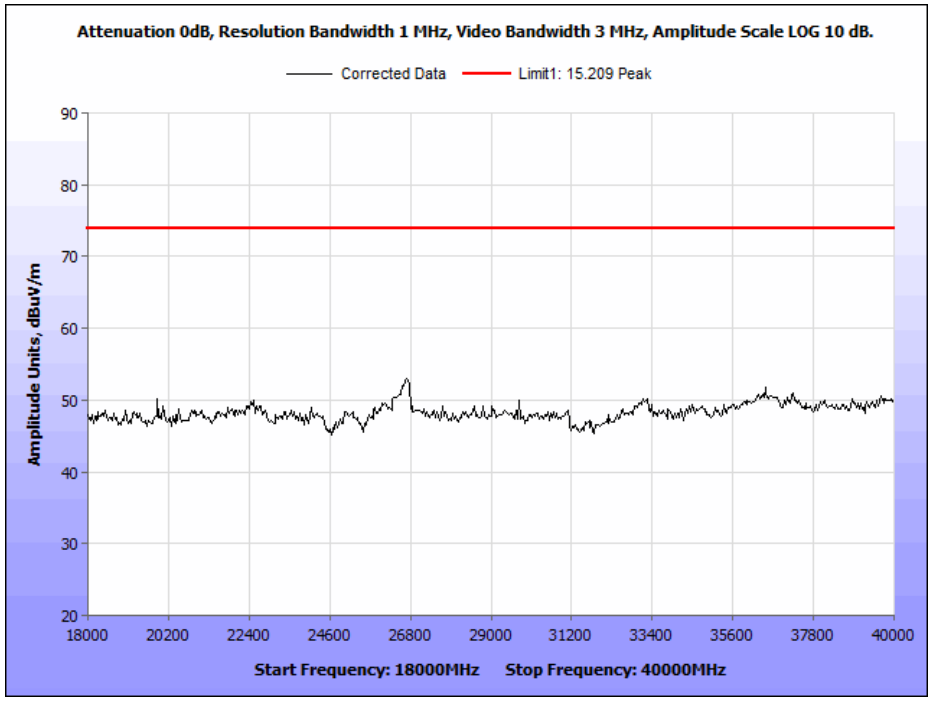


Figure 42: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 10MHz - 5785MHz - 18-40GHz

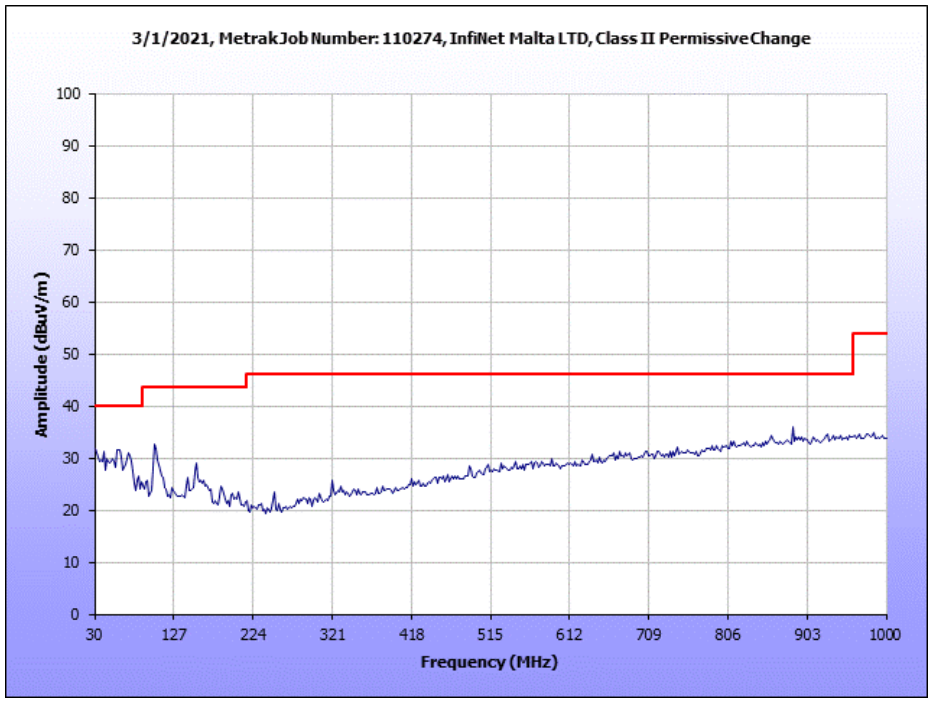


Figure 43: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Radiated Spurious Emissions - 10 MHz - 5845 MHz - 30-1000MHz

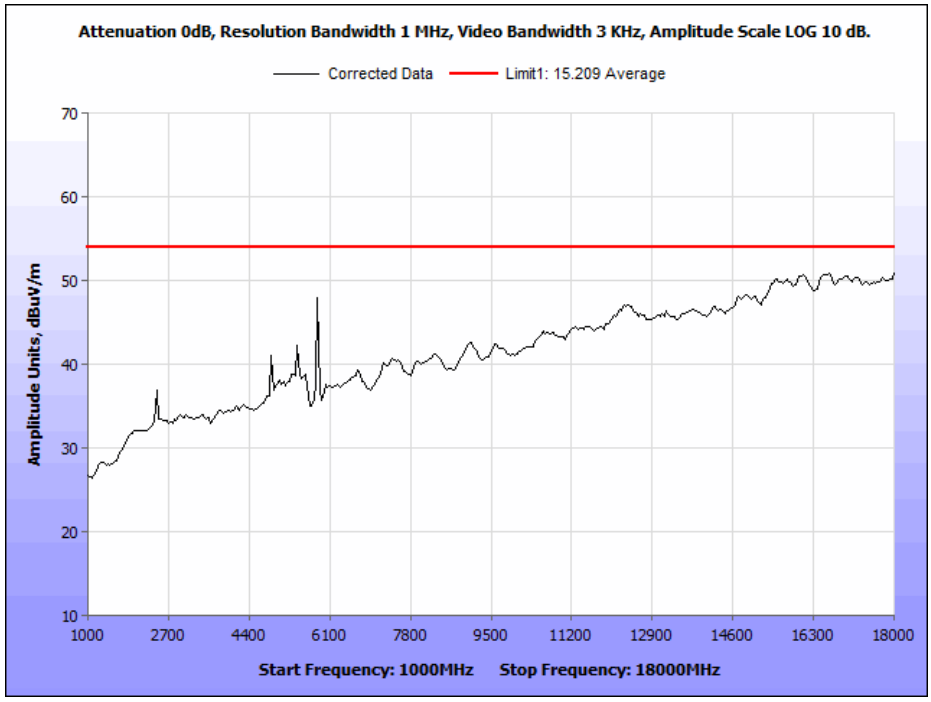


Figure 44: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 10MHz - 5845MHz - 1-18GHz

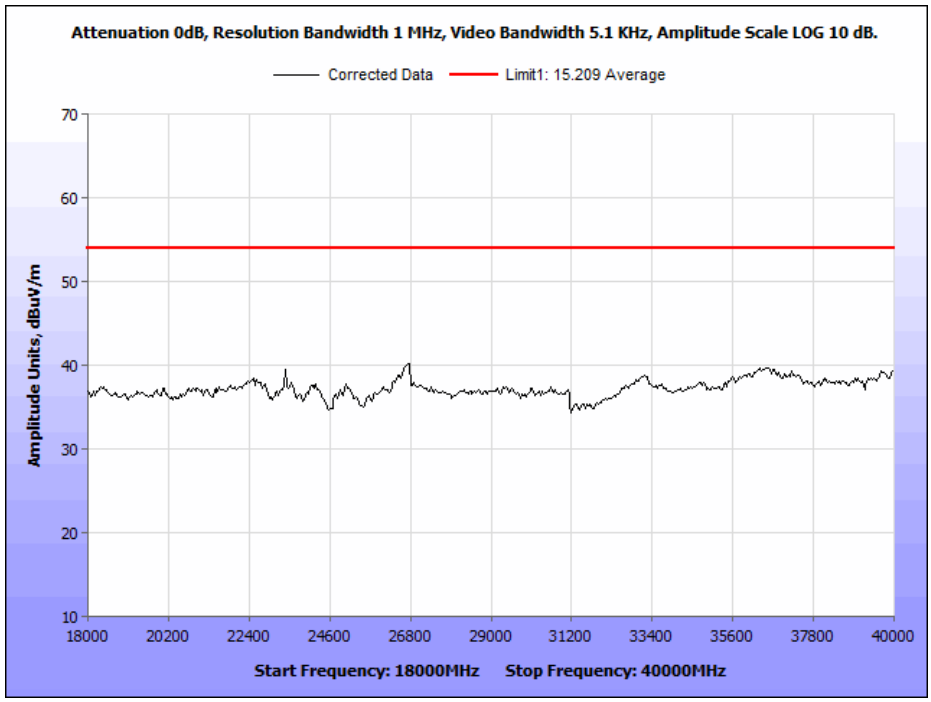


Figure 45: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 10MHz - 5845MHz - 18-40GHz

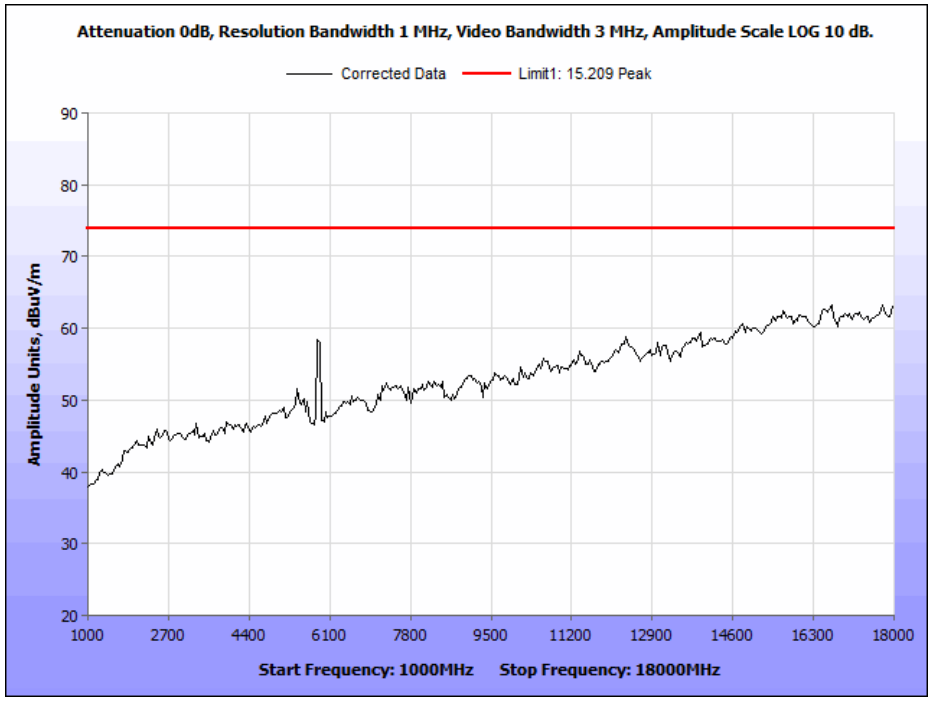


Figure 46: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 10MHz - 5845MHz - 1-18GHz

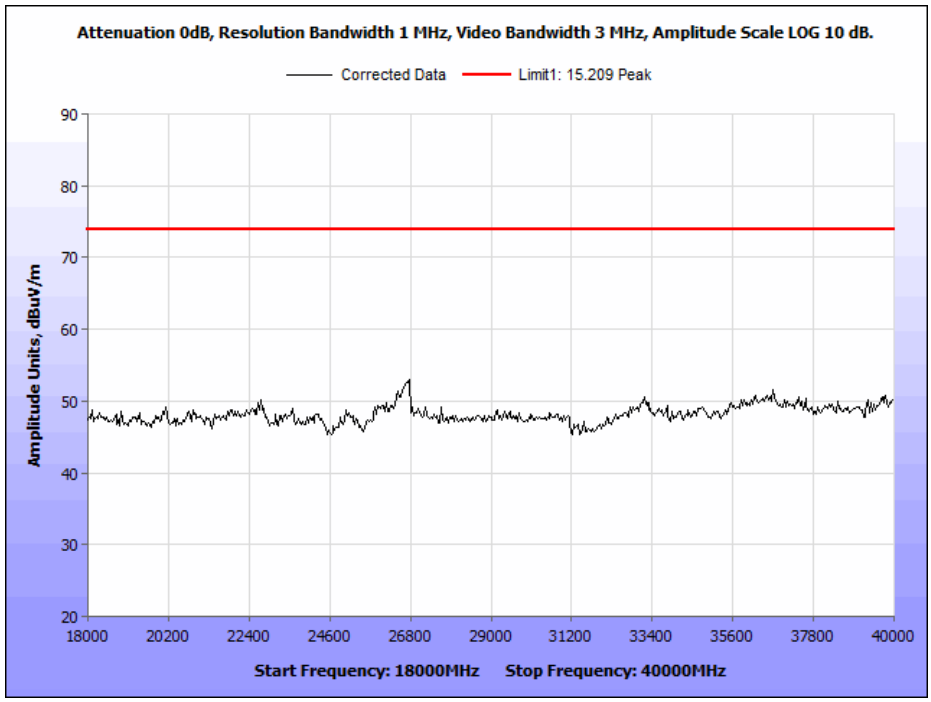


Figure 47: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 10MHz - 5845MHz - 18-40GHz

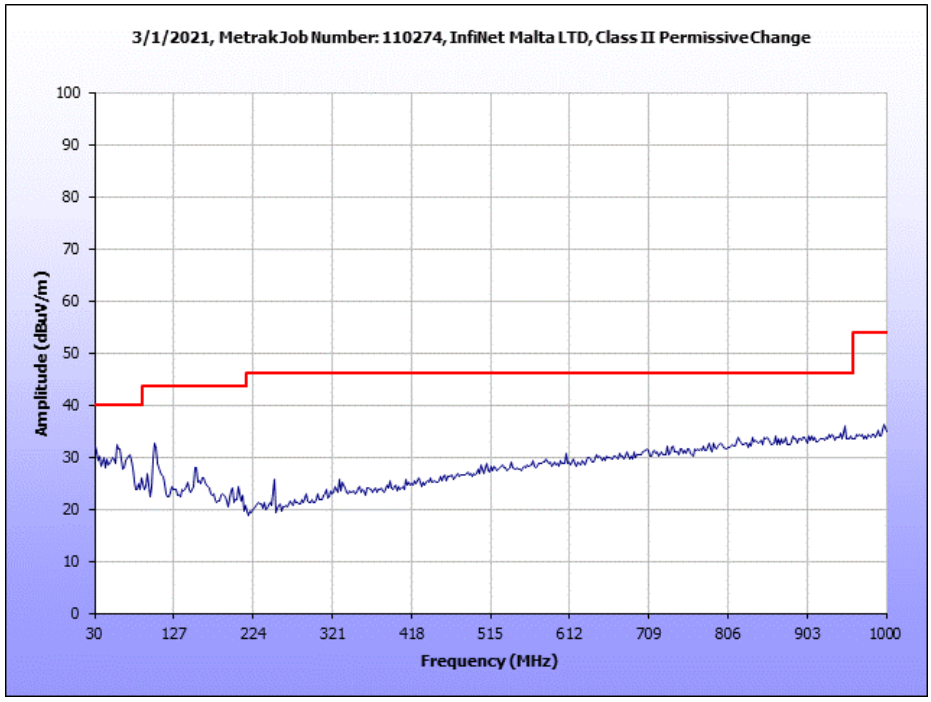


Figure 48: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Radiated Spurious Emissions - 20 MHz - 5750 MHz - 30-1000MHz

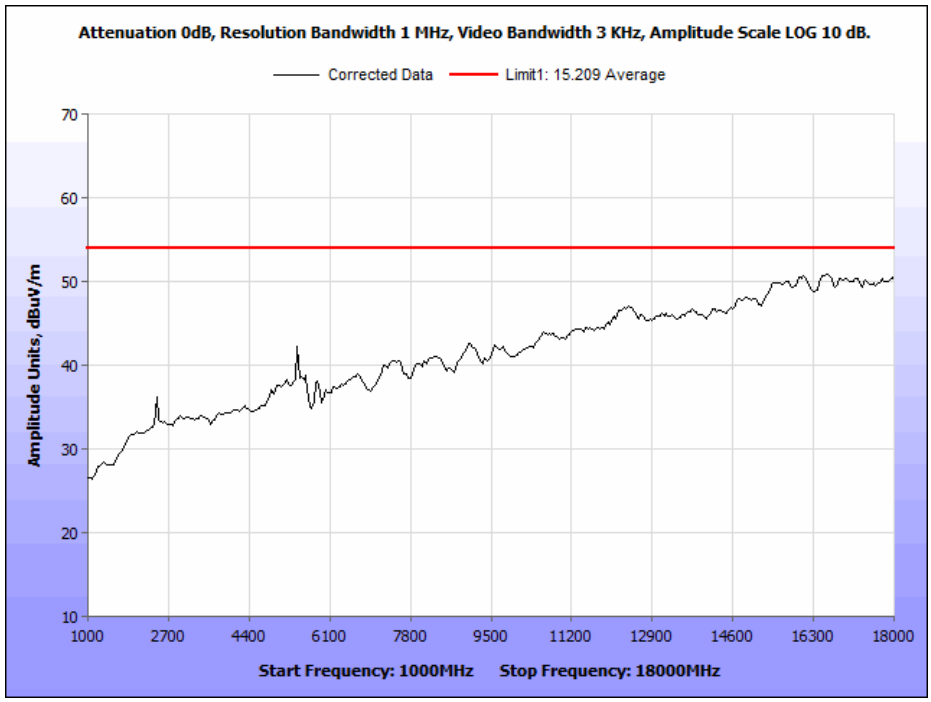


Figure 49: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 20MHz - 5750MHz - 1-18GHz

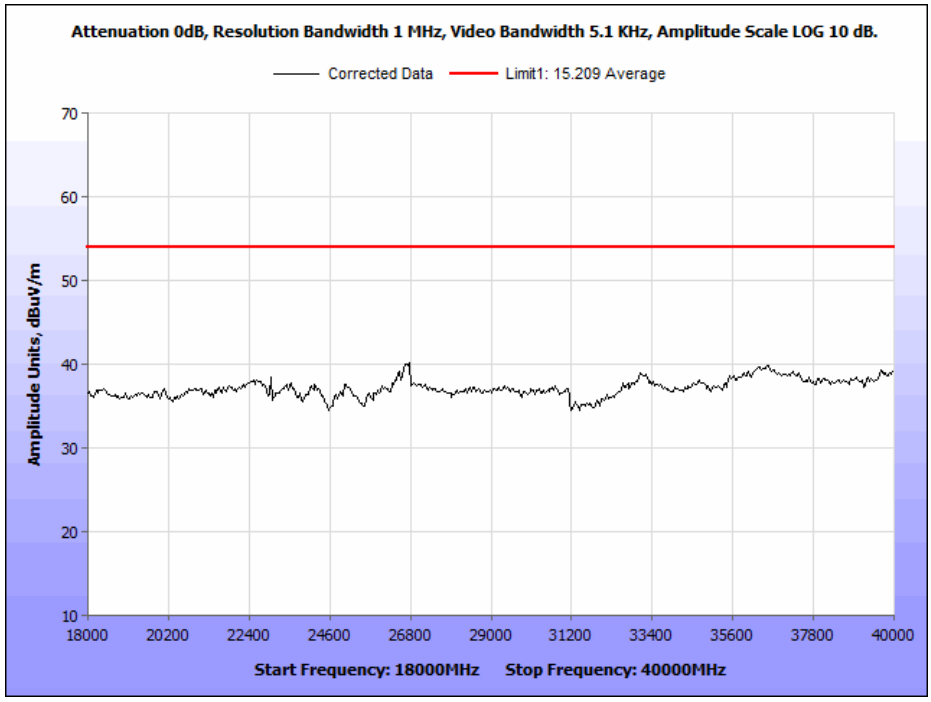


Figure 50: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 20MHz - 5750MHz - 18-40GHz

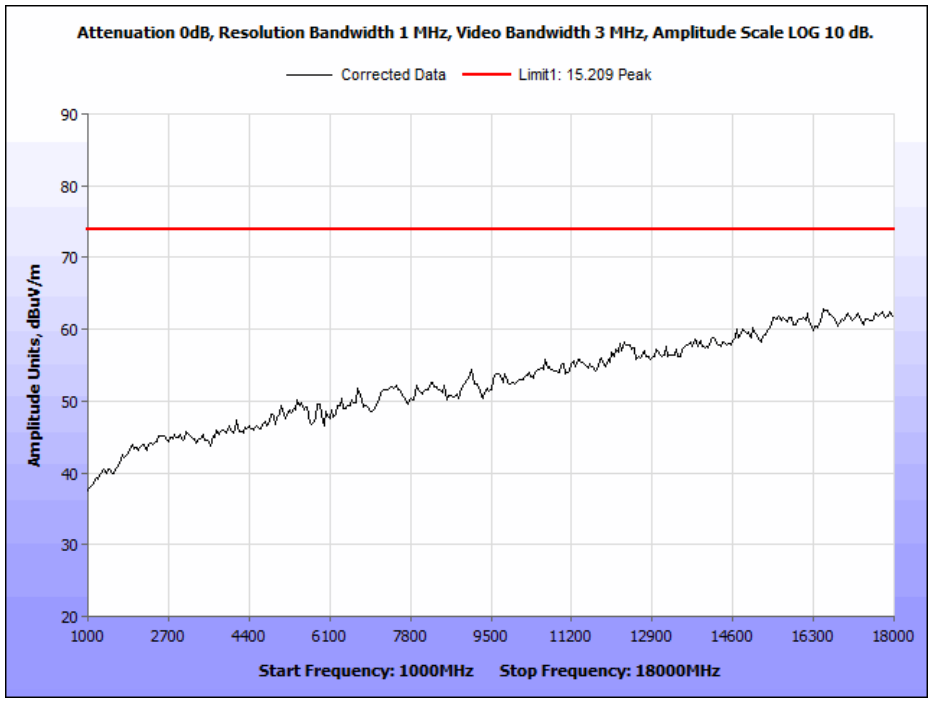


Figure 51: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 20MHz - 5750MHz - 1-18GHz

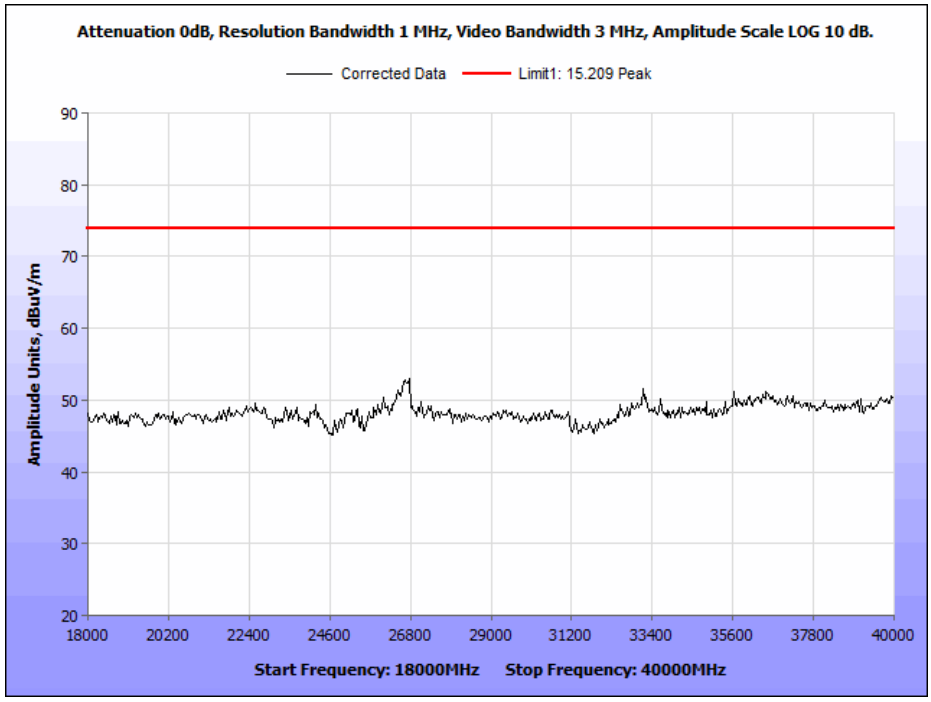


Figure 52: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 20MHz - 5750MHz - 18-40GHz

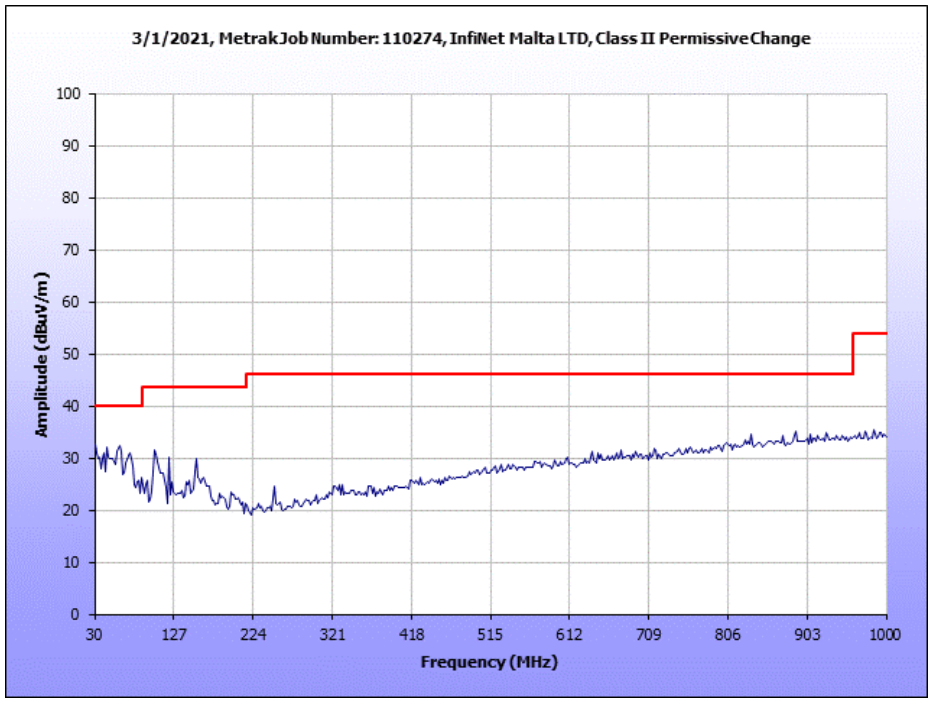


Figure 53: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Radiated Spurious Emissions - 20 MHz - 5790 MHz - 30-1000MHz

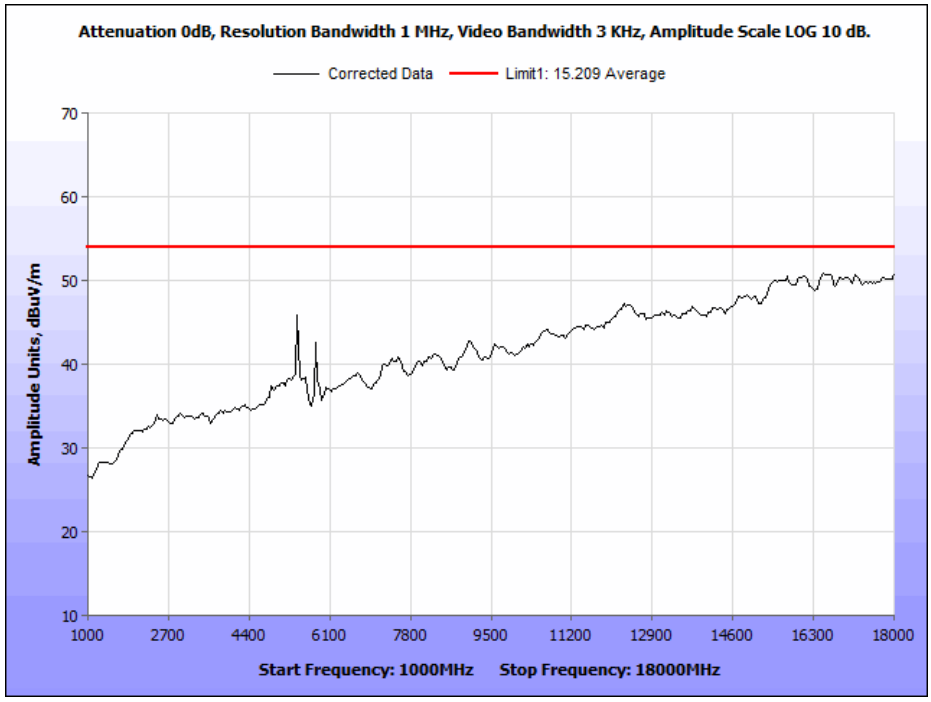


Figure 54: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 20MHz - 5790MHz - 1-18GHz

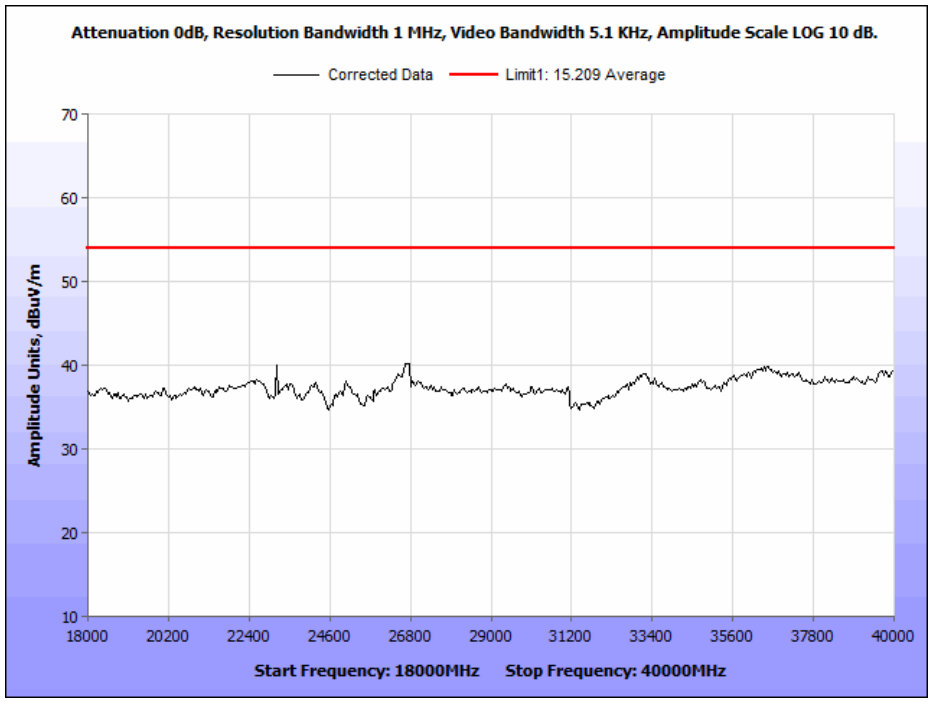


Figure 55: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 20MHz - 5790MHz - 18-40GHz

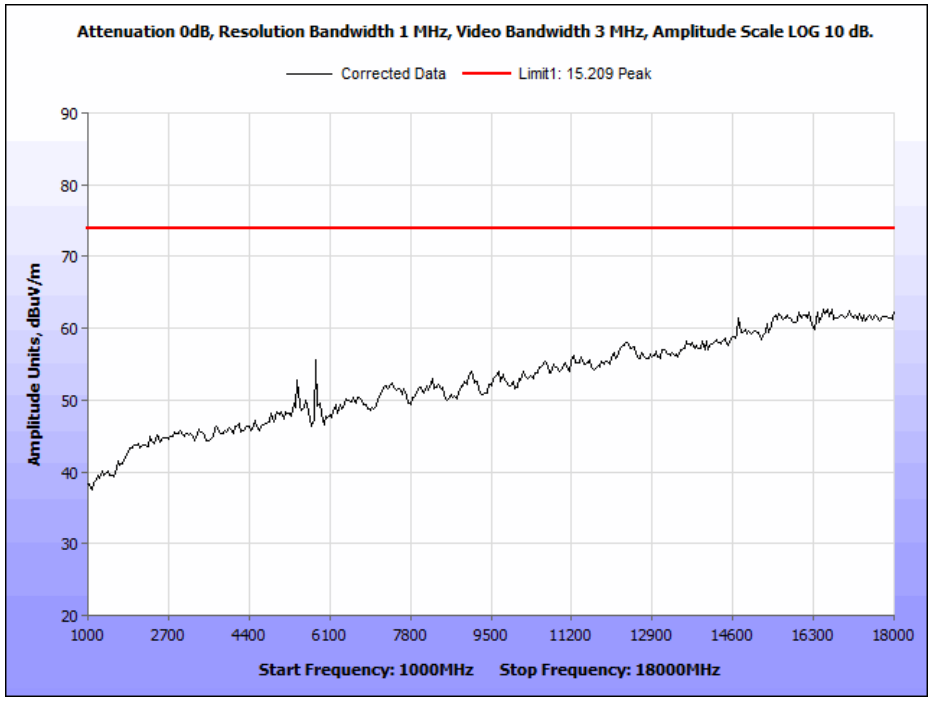


Figure 56: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 20MHz - 5790MHz - 1-18GHz

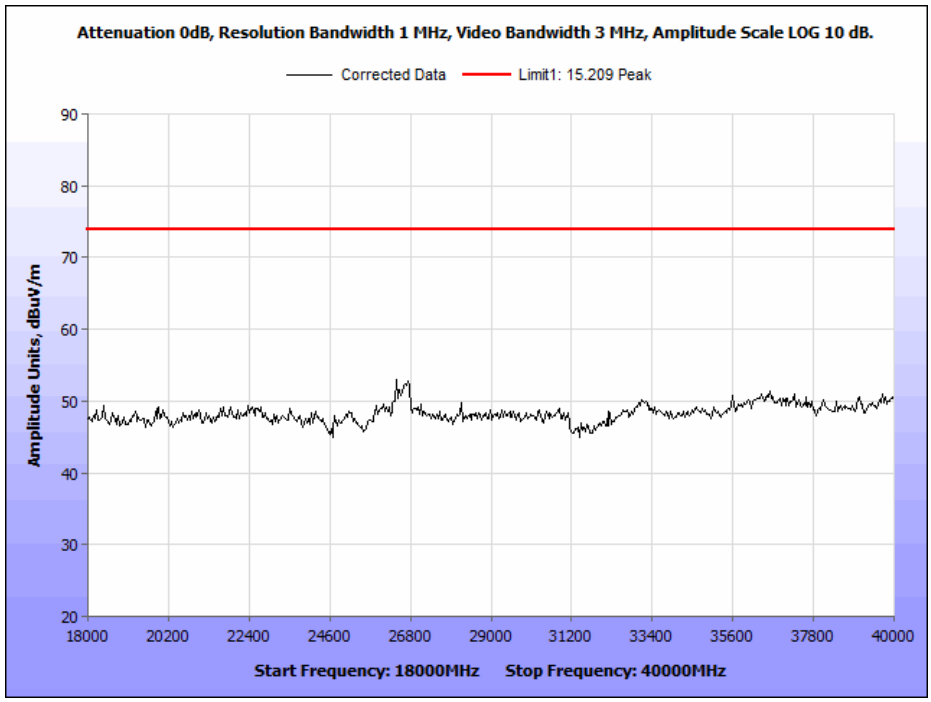


Figure 57: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 20MHz - 5790MHz - 18-40GHz

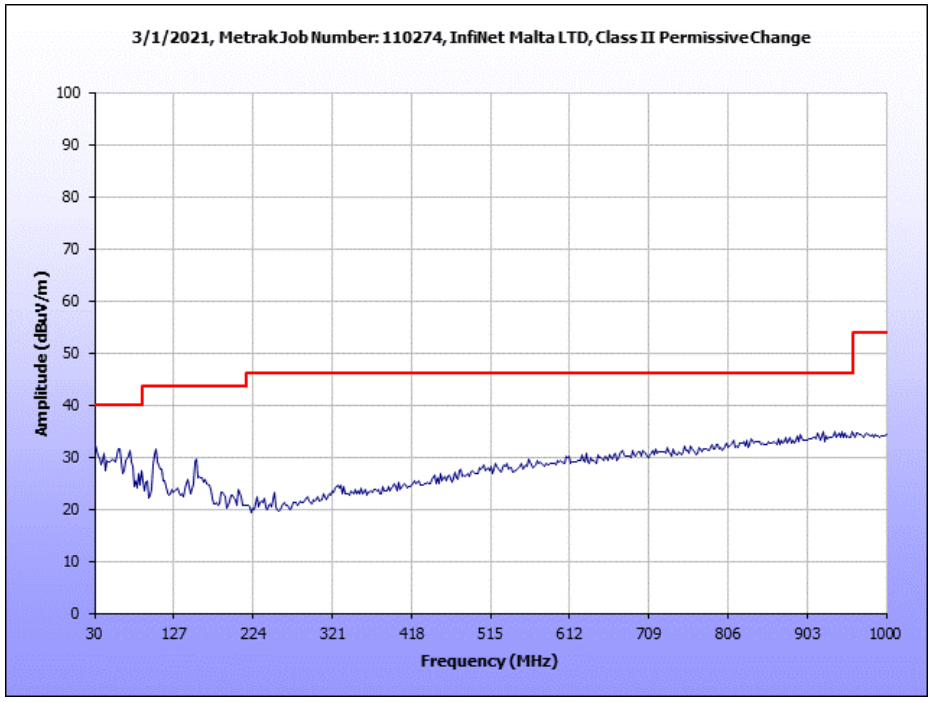


Figure 58: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Radiated Spurious Emissions - 20 MHz - 5830 MHz - 30-1000MHz

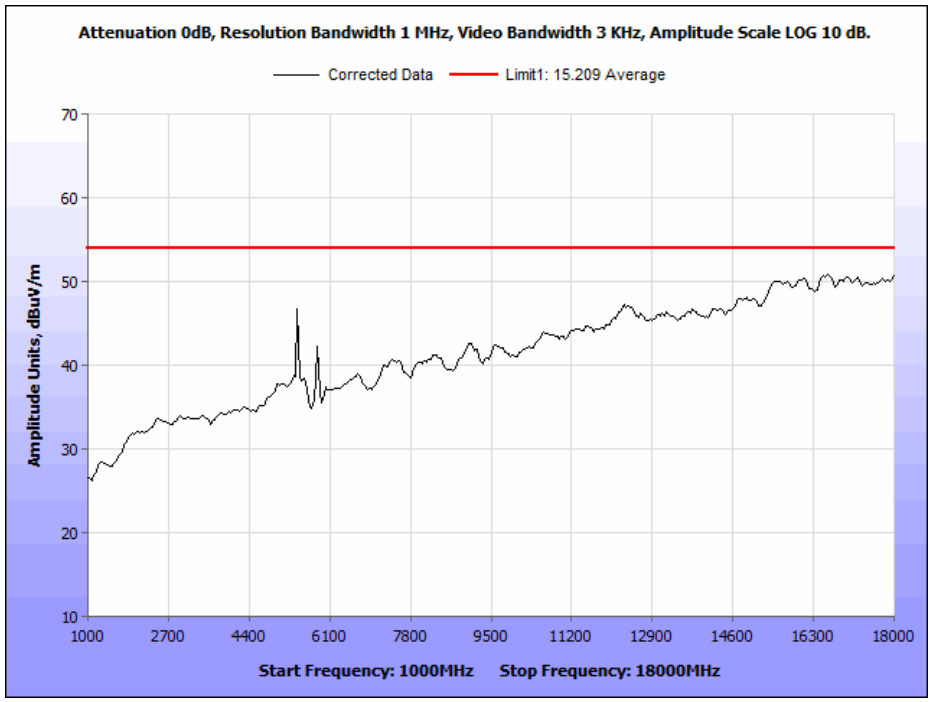


Figure 59: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 20MHz - 5830MHz - 1-18GHz

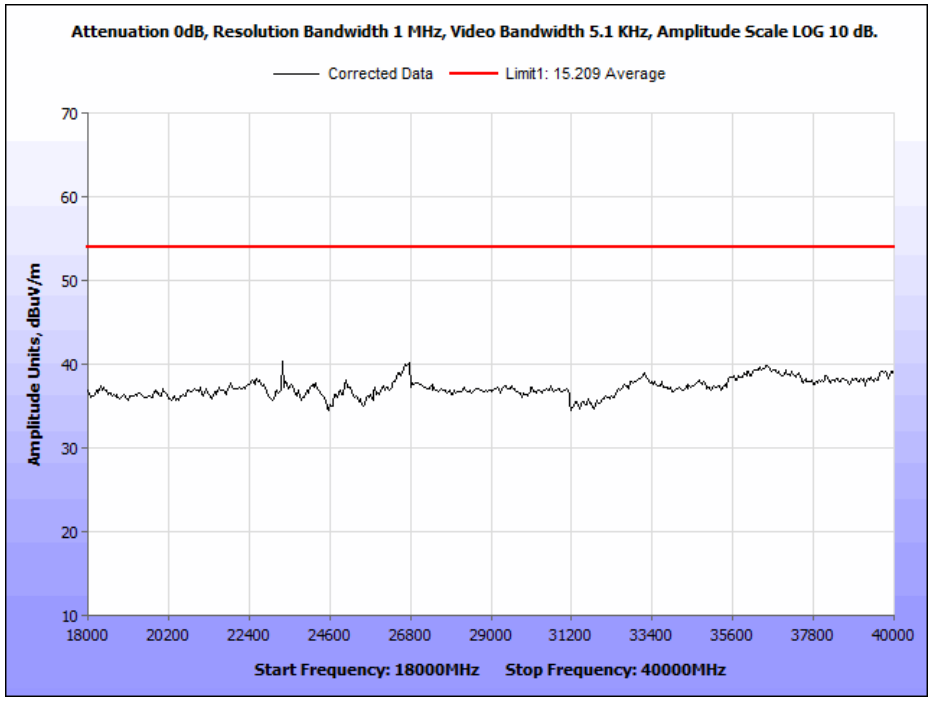


Figure 60: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 20MHz - 5830MHz - 18-40GHz

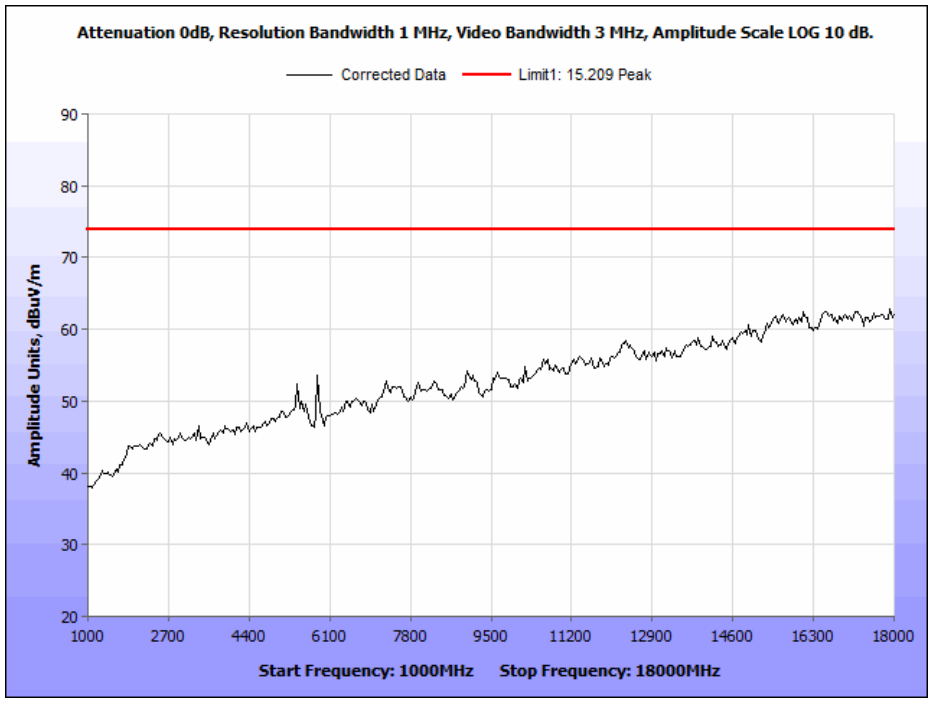


Figure 61: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 20MHz - 5830MHz - 1-18GHz

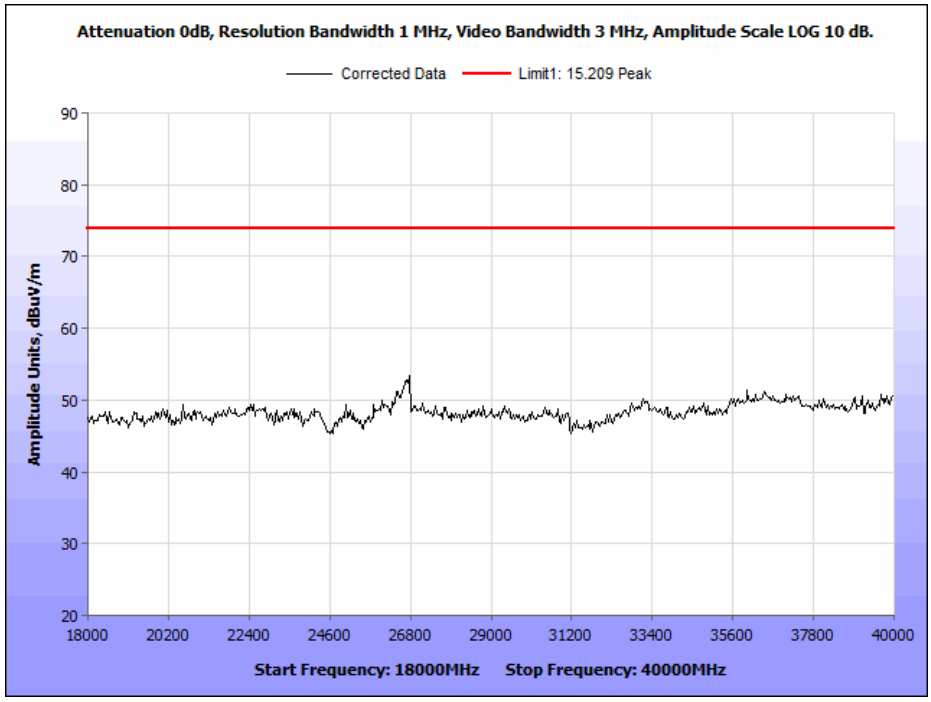


Figure 62: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 20MHz - 5830MHz - 18-40GHz

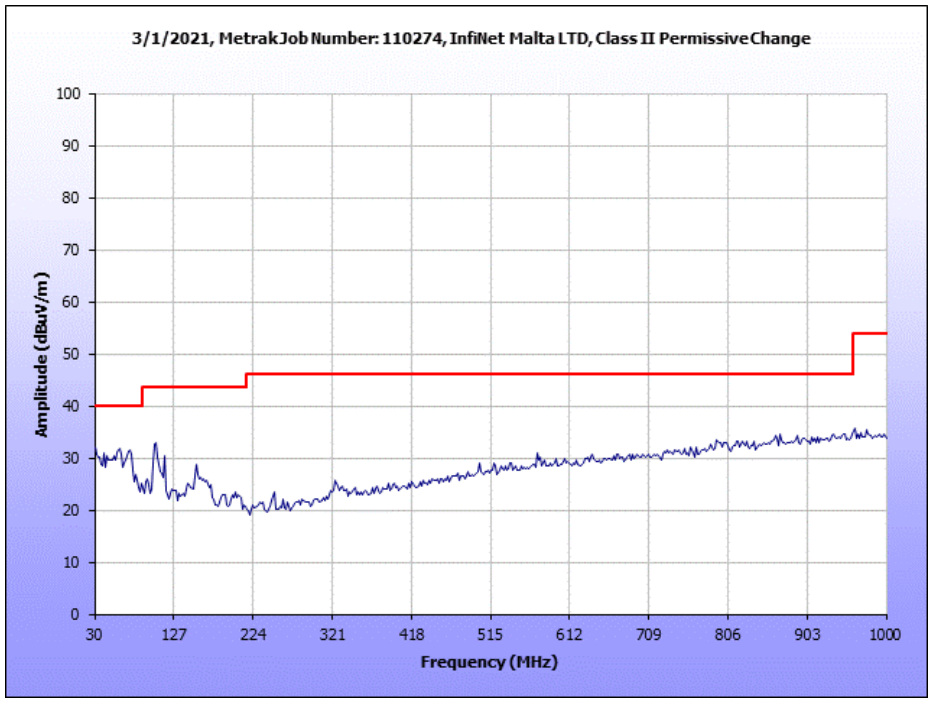


Figure 63: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Radiated Spurious Emissions - 40 MHz - 5760 MHz - 30-1000MHz

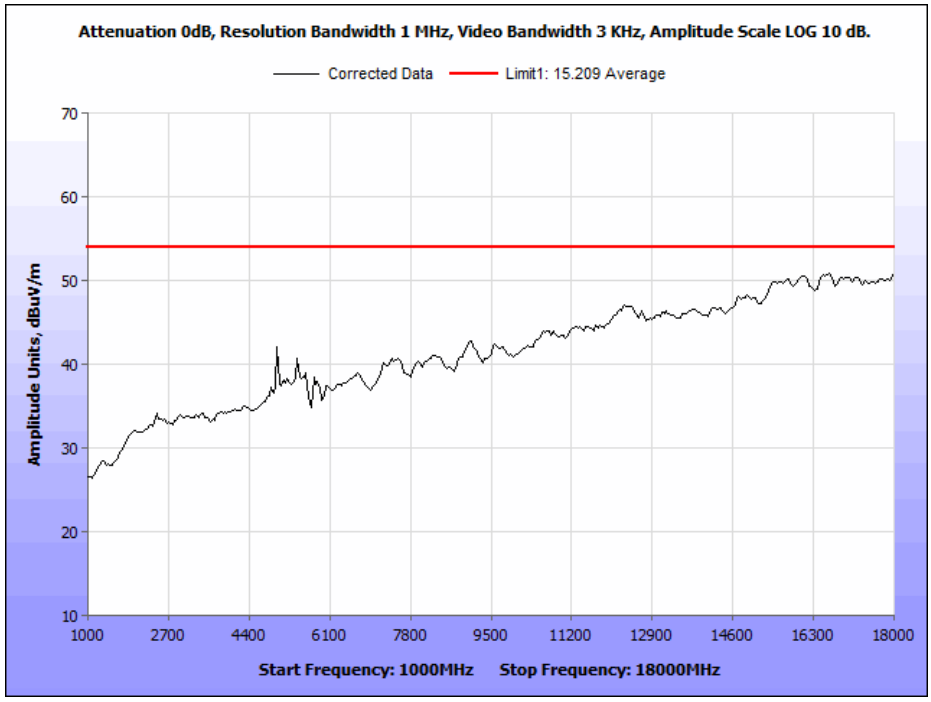


Figure 64: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 40MHz - 5760MHz - 1-18GHz

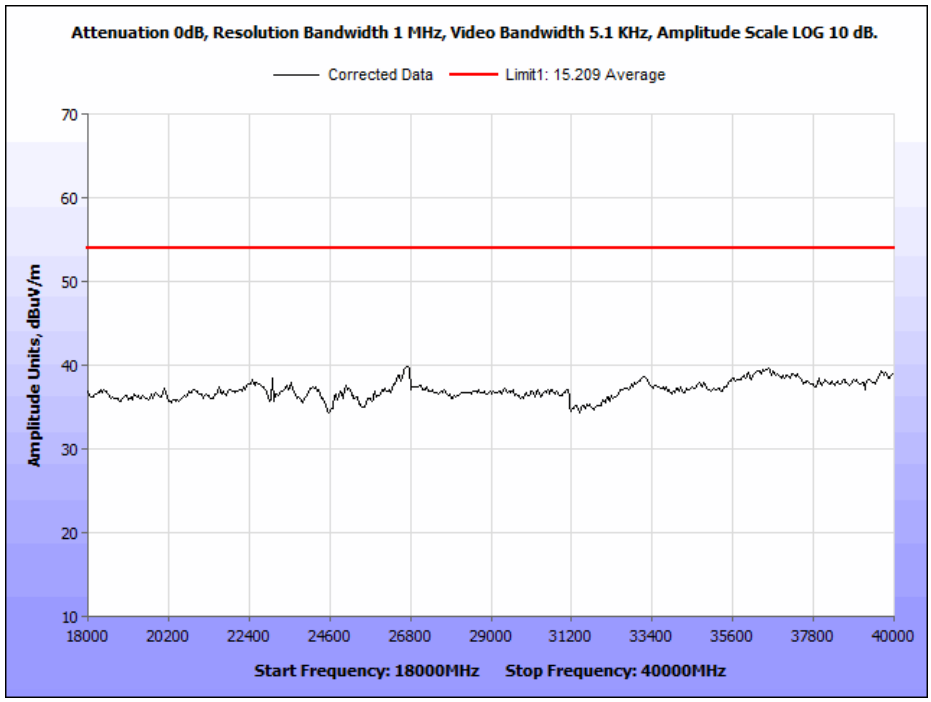


Figure 65: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 40MHz - 5760MHz - 18-40GHz

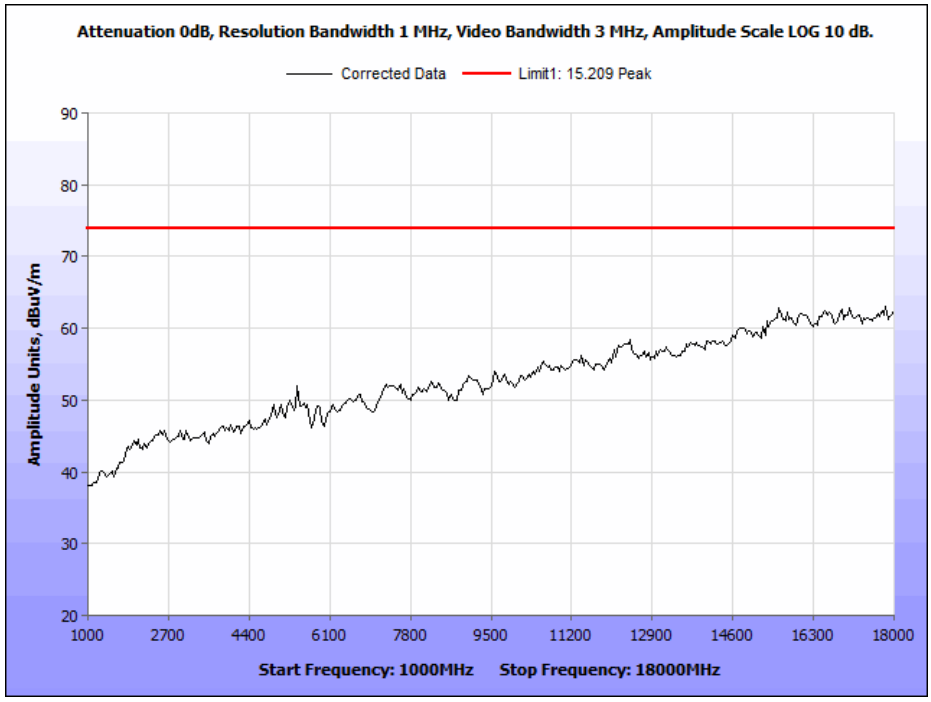


Figure 66: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 40MHz - 5760MHz - 1-18GHz

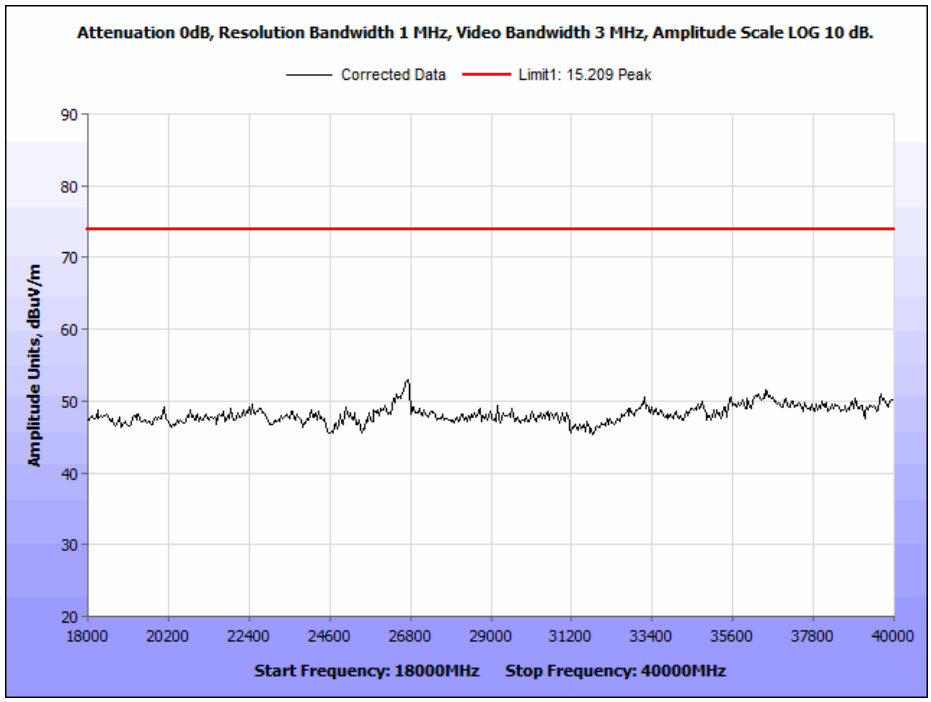


Figure 67: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 40MHz - 5760MHz - 18-40GHz

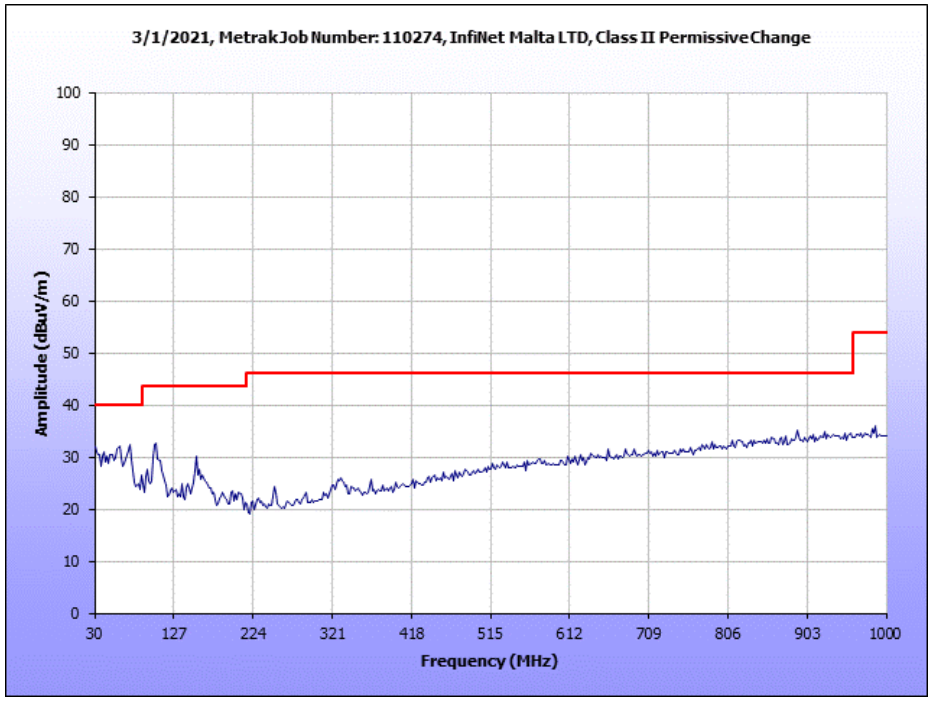


Figure 68: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Radiated Spurious Emissions - 40 MHz - 5800 MHz - 30-1000MHz

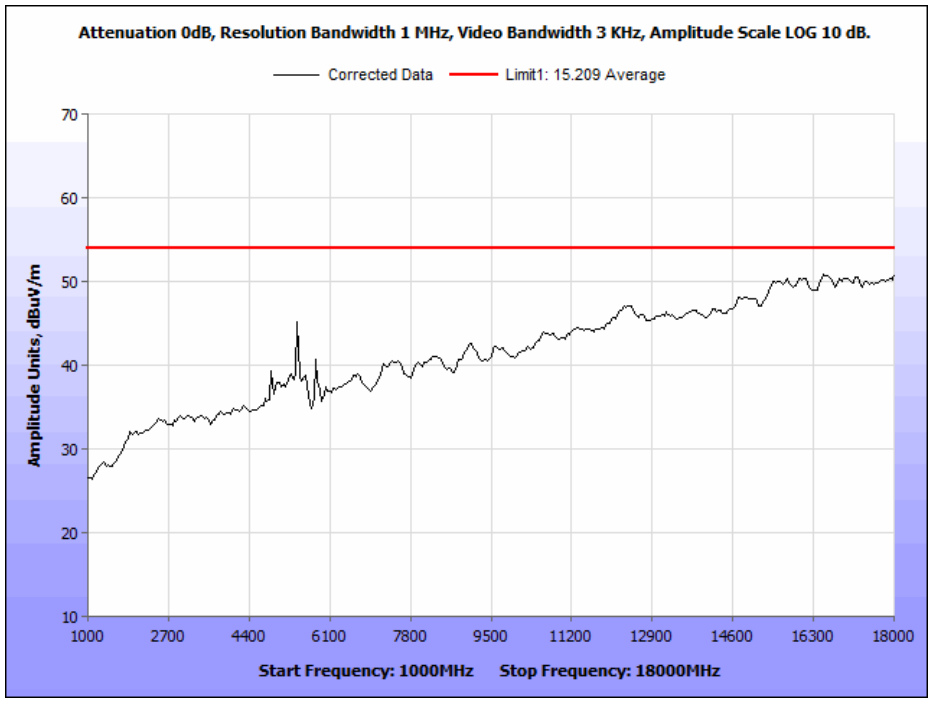


Figure 69: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 40MHz - 5800MHz - 1-18GHz

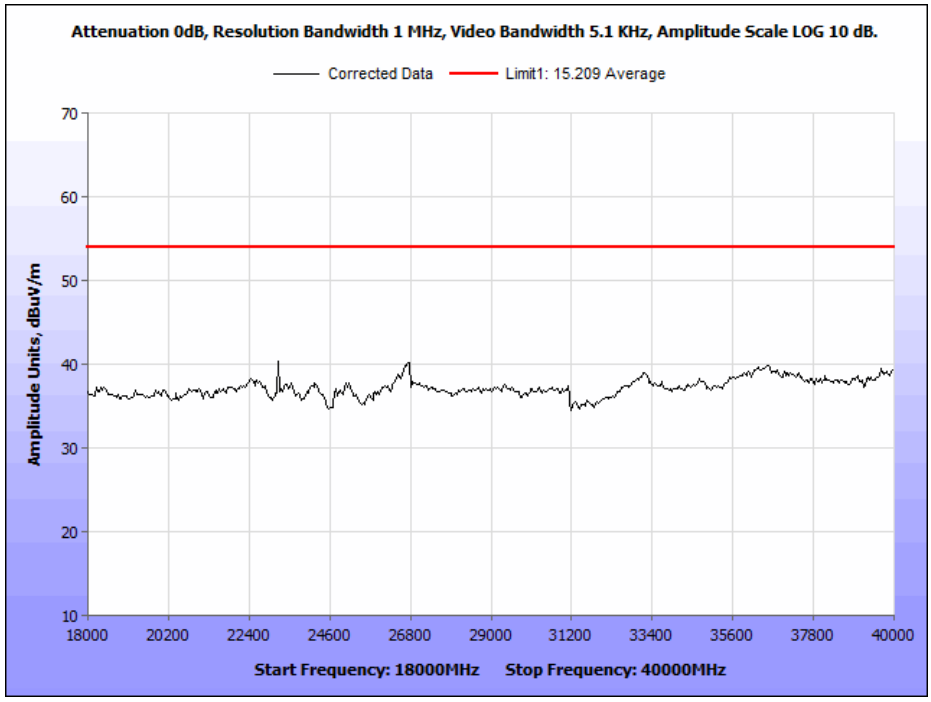


Figure 70: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Average Radiated Emissions - 40MHz - 5800MHz - 18-40GHz

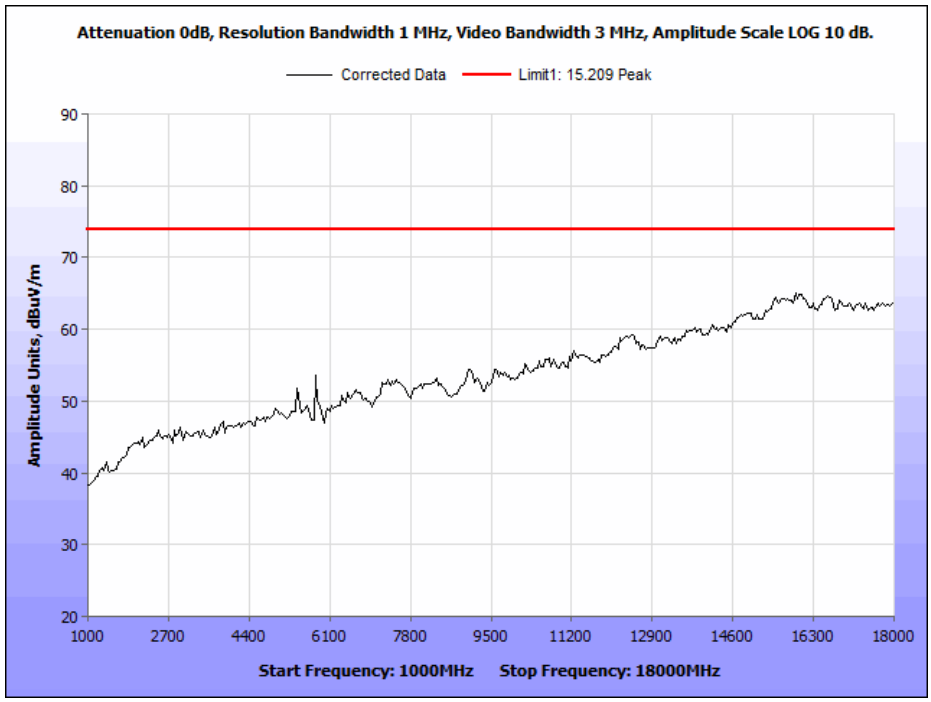


Figure 71: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 40MHz - 5800MHz - 1-18GHz

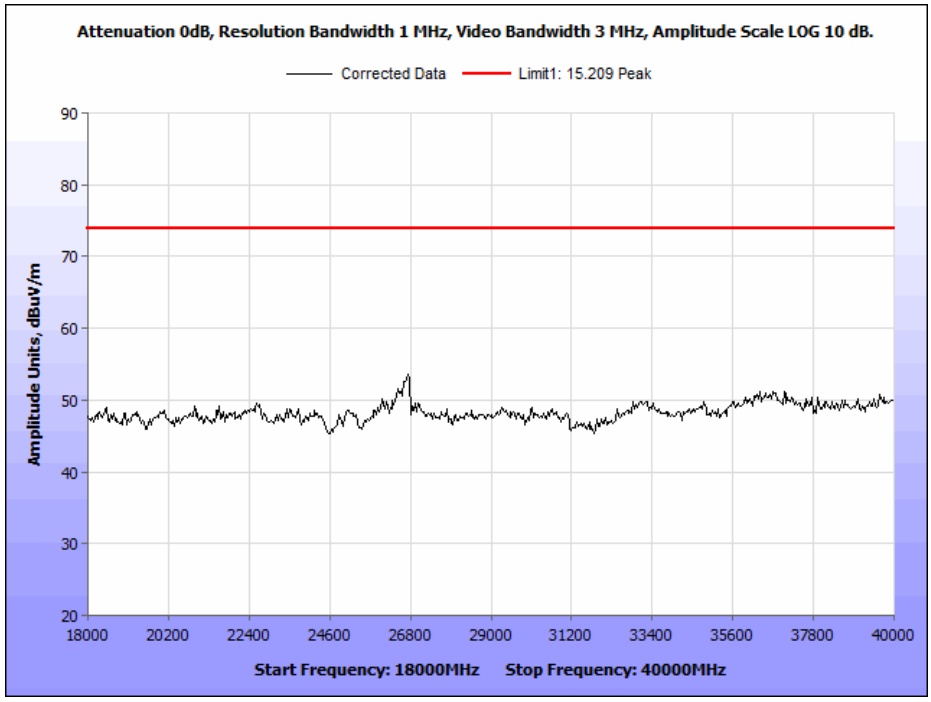


Figure 72: §15. 407(a)(3) Maximum Conducted Output Power, 15.209 Peak Radiated Emissions - 40MHz - 5800MHz - 18-40GHz

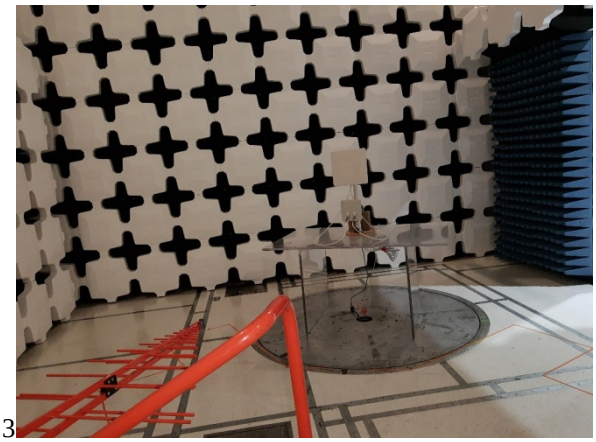
3 

Figure 73: Radiated Emissions Test Setup 30-1000MHz

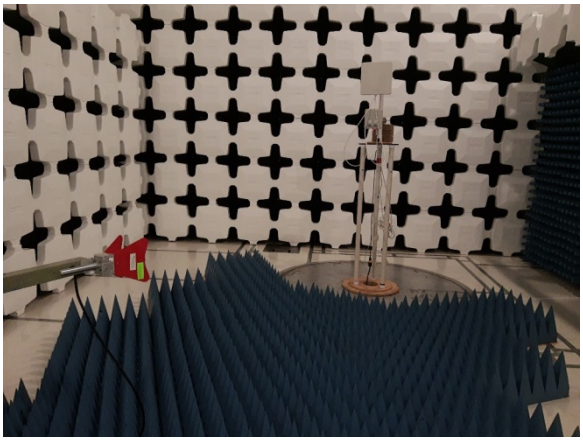


Figure 74: Radiated Emissions Test Setup 1-18GHz

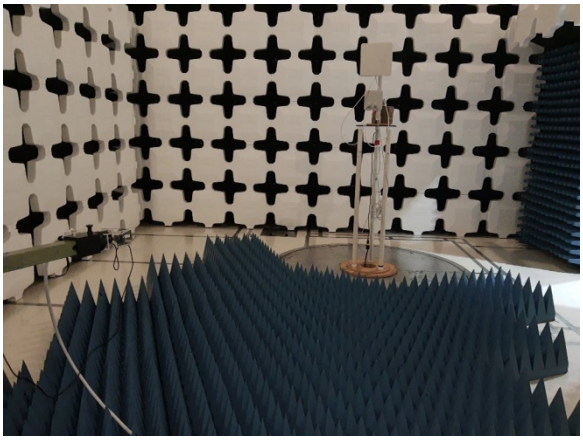


Figure 75: Radiated Emissions Test Setup 18-40GHz

Electromagnetic Compatibility Criteria for Intentional Radiators
§ 15.407(b)(8) Conducted Emissions

Test Requirement(s):

§ 15.407 (b)(8): Any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

§ 15.207 (a): For 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 30MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 Σ line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dBμV)	
	Quasi-Peak	Average
* 0.15- 0.45	66 – 56	56 - 46
0.45 - 0.5	56	46
0.5 - 30	60	50

Figure 76: Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure:

The EUT was placed on a non-metallic table inside a screen room. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω/50 μH Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.10-2013*

Test Results:

The EUT was **Not Tested/Evaluated at MET**

Electromagnetic Compatibility Criteria for Intentional Radiators
§ 15.407(c) Automatic Discontinue of Transmission

Test Requirement(s): **§ 15.207 (c):** The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

Test Results: The EUT was **Not Tested/Evaluated at MET**

Electromagnetic Compatibility Criteria for Intentional Radiators
§ 15. 407(e) 6 dB Bandwidth

Test Requirements: **§ 15.407(e):** Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure: The transmitter was set to low, mid, and high operating frequencies at the highest output power and connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% of the total emission bandwidth, VBW > RBW. The 6 dB Bandwidth was measured and recorded.

Test Results: The EUT was **Not Tested/Evaluated at MET**

Electromagnetic Compatibility Criteria for Intentional Radiators
§ 15.407(f) Maximum Permissible Exposure

Test Requirement(s): **§15.407(f):** U-NII devices are subject to the radio frequency radiation exposure requirements specified in §1.1307(b), §2.1091 and §2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment.

RF Exposure Requirements: **§1.1307(b)(1) and §1.1307(b)(2):** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

RF Radiation Exposure Limit: **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

MPE Limit: EUT's operating frequencies @ 5725 - 5850 MHz; **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

Equation from page 18 of OET 65, Edition 97-01

$$S = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{(PG / 4\pi S)}$$

where, S = Power Density (mW/cm^2)
P = Power Input to antenna (mW)
G = Antenna Gain (numeric value)
R = Distance (cm)

Test Results: The EUT was **Not Tested/Evaluated at MET**

Electromagnetic Compatibility Criteria for Intentional Radiators
§ 15.407(g) Frequency Stability

Test Requirements: Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

Test Procedure: The EUT was connected directly to a spectrum analyzer through an attenuator. The 1st trace of the Spectrum Analyzer was taken at ambient conditions and used as a reference. A 2nd trace was used to show the drift of the carrier at extreme conditions. A delta marker was used to find the drift at a given extreme condition.

Test Results: The EUT was **Not Tested/Evaluated at MET**

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

ASSET #	EQUIPMENT	MANUFACTURER	MODEL	LAST CAL	CAL DUE
1T4300B	SEMI-ANECHOIC 3M CHAMBER SVSWR	EMC TEST SYSTEMS	NONE	8/16/2019	8/16/2021
1T4300	SEMI-ANECHOIC CHAMBER (NSA)	EMC TEST SYSTEMS	NONE	8/16/2019	8/16/2021
1T4753	ANTENNA - BILOG	SUNOL SCIENCES	JB6	12/21/2020	6/21/2022
1T4757	ANTENNA; HORN	ETS-LINDGREN	3117	6/29/2020	12/29/2021
1S2698	DOUBLE RIDGE GUIDE HORN ANTENNA	A.H. SYSTEMS, INC.	SAS-574	6/3/2020	6/3/2022
1T8743	PREAMPLIFIER	A.H. SYSTEMS, INC.	PAM-0118P	FUNC VERIFY	FUNC VERIFY
1S3865	TABLE TOP AMPLIFIER	MITEQ	TTA1840-35-HG	FUNC VERIFY	FUNC VERIFY
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	1/21/2021	1/21/2022
1T4681	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4448A	4/7/2020	4/7/2021
1T4612	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4407B	3/4/2020	9/4/2021

Figure 77: Test Equipment List

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

End of Report