

FCC Test report for parts 15.107, 15.109

Product name : Triton

Applicant : Accerion (Unconstrained Robotics B.V.)

Test report No. : 190901389 001 Ver 1.0

Laboratory information

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Telefication complies with the accreditation criteria for test laboratories as laid down in ISO/IEC 17025:2005. The accreditation covers the quality system of the laboratory as well as the specific activities as described in the authorized annex bearing the accreditation number L021 and is granted on 30 November 1990 by the Dutch Council For Accreditation (RvA: Raad voor Accreditatie).

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Documentation

The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 10 years at Telefication Netherlands.

Testing Location

Test Site	Telefication BV
Test Site location	Edisonstraat 12a 6902 PK Zevenaar The Netherlands Tel. +31316583180 Fax. +31316583189
Test Site FCC	NL0001

Revision History

Version	Date	Remarks	By
v0.5	18-10-2019	First draft	PvW
v1.0	01-11-2019	Final version	PvW

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Summary of Test results

FCC	Description	Section in report	Verdict
15.109 (b)	Radiated spurious emissions	3.1	Pass
15.107 (b)	Conducted spurious emissions on AC mains	3.2	Pass

1 General Description

1.1 Applicant

Client name: Accerion (Unconstrained Robotics B.V.)
Address: Kazernestraat 19, Venlo, the Netherlands
Zip code: 5928 NL
Telephone: +31 (0)6 212 376 98
E-mail: willemjan@accerion.tech
Contact name: Mr. Willem-Jan Lamers

1.2 Manufacturer

Manufacturer name: Accerion (Unconstrained Robotics B.V.)
Address: Kazernestraat 19, Venlo, the Netherlands
Zip code: 5928 NL
Telephone: +31 (0)6 212 376 98
E-mail: willemjan@accerion.tech
Contact name: Mr. Willem-Jan Lamers

1.3 Tested Equipment Under Test (EUT)

Product name: Triton
Brand name: Accerion
Product type: Localization sensor for autonomous mobile robots
Model(s): Triton V1
Batch and/or serial No.: `--
Software version: V3.0.0
Hardware version: 1
Date of receipt: 03-10-2019
Tests started: 03-10-2019
Testing ended: 04-10-2019

1.4 Product specifications of Equipment under test

The device is a localization sensor for autonomous mobile robots. The device can operate on a 12Vdc or a 24Vdc power supply. The device can use 3 different illumination durations, 10, 30 and 100 μ s.

1.5 Environmental conditions

Test date	03-10-2019	04-10-2019
Ambient temperature	20.6 °C	20.4 °C
Humidity	52.4 %	55.4 %

1.6 Measurement standards

- ANSI C63.4:2014

1.7 Applicable standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart B §15.107
- FCC Part 15 Subpart B §15.109

1.8 Observation and remarks

None.

1.9 Conclusions

The sample of the product showed NO NON-COMPLIANCES to the specifications stated in paragraph 1.7 of this report.

The results of the test as stated in this report, are exclusively applicable to the product items as identified in this report. Telefication accepts no responsibility for any properties of product items in this test report, which are not supported by the tests as specified in paragraph 1.7 "*Applicable standards*".

All conducted tests are performed by:

Name : P. van Wanrooij, BASc

Review of test methods and report by:

Name : ing. P.A. Suringa

The above conclusions have been verified by the following signatory:

Date : 14-11-2019

Name : ing K.A. Roes

Function : Coordinator Wireless & EMC

Signature :



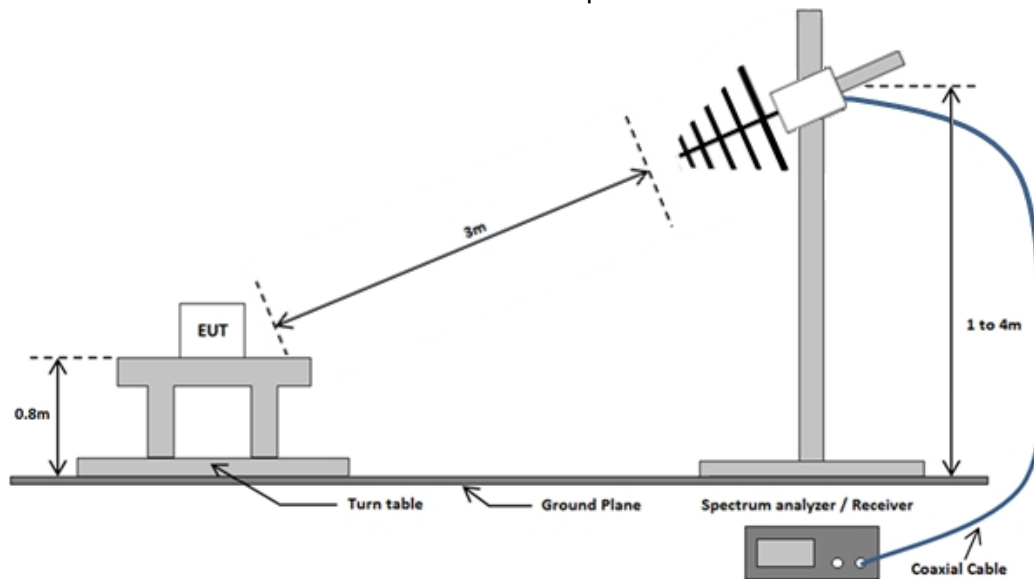
2 Test configuration of the Equipment Under Test

2.1 Test mode

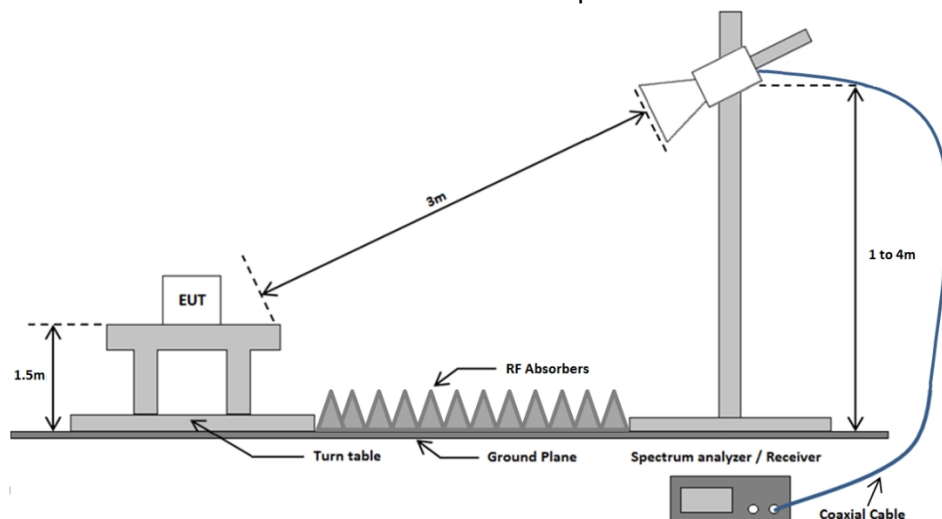
The EUT is tested in normal operating mode, with all ports connected. The EUT is tested while operating at 12V and 24V, and while operating with 10, 30 and 100 μ s duration flashes.

2.2 Test setups

Radiated emissions test setup 30 MHz - 1 GHz

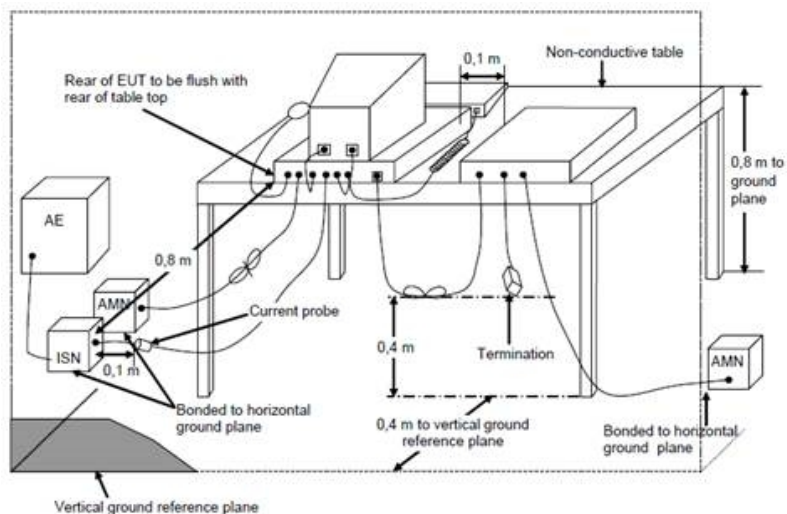


Radiated emissions test setup above 1 GHz



Conducted emissions test setup

Emissions test at AC mains



2.3 Equipment used in the test configuration

Test site	Site ID	Used at paragraphs
Semi-Anechoic Chamber	TS 00004	3.1
Conducted emission measurement system	TS 00005	3.2
Measurement software	DARE!! RadiMation® Ver. 2019.1.8	3.1
	DARE!! RadiMation® Ver. 2019.1.5	3.2

3 Test results

3.1 Radiated spurious emissions

3.1.1 Limit

15.109 (b)

The field strength of radiated emissions from a Class A digital device shall not exceed the following:

Frequency of emission (MHz)	Field strength at 3m
30 - 88	49.5
88 – 216	54.0
216 – 960	56.9
960 and above	60.0

3.1.2 Measurement instruments

The measurement instruments are listed in chapter 2.3 of this report.

3.1.3 Test setup

The test setup is as shown in chapter 2.2 of this report.

3.1.4 Test procedure

30 MHz to 1 GHz: According to ANSI C63.4-2014, section 8.3.

30 MHz to 1 GHz: IRN 026 – Method 1.

3.1.5 Measurement Uncertainty

Frequency range	Polarization	Uncertainty
30 – 200 MHz	Horizontal	±4.5 dB
	Vertical	±5.4 dB
200 -1000 MHz	Horizontal	±3.6 dB
	Vertical	±4.6 dB

3.1.6 Test results of the radiated spurious emissions measurement

Measured peaks Vertical 30 – 1000 MHz 10 us; 12V

Frequency	Polarization	Height	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference
32,835 MHz	Vertical	1,5 m	34,7 dBμV/m	40 dBμV/m	-5,3 dB

Measured peaks Vertical 30 – 1000 MHz 30 us; 12V

Frequency	Polarization	Height	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference
33,103 MHz	Vertical	1,5 m	34,6 dBμV/m	40 dBμV/m	-5,4 dB

Measured peaks Vertical 30 – 1000 MHz 100 us; 12V

Frequency	Polarization	Height	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference
33,139 MHz	Vertical	1 m	35,3 dBμV/m	40 dBμV/m	-4,7 dB

Measured peaks Vertical 30 – 1000 MHz 10 us; 24V

Frequency	Polarization	Height	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference
32,95 MHz	Vertical	1 m	35,3 dBμV/m	40 dBμV/m	-4,7 dB

Measured peaks Vertical 30 – 1000 MHz 30 us; 24V

Frequency	Polarization	Height	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference
33,381 MHz	Vertical	1,5 m	33,3 dBμV/m	40 dBμV/m	-6,7 dB

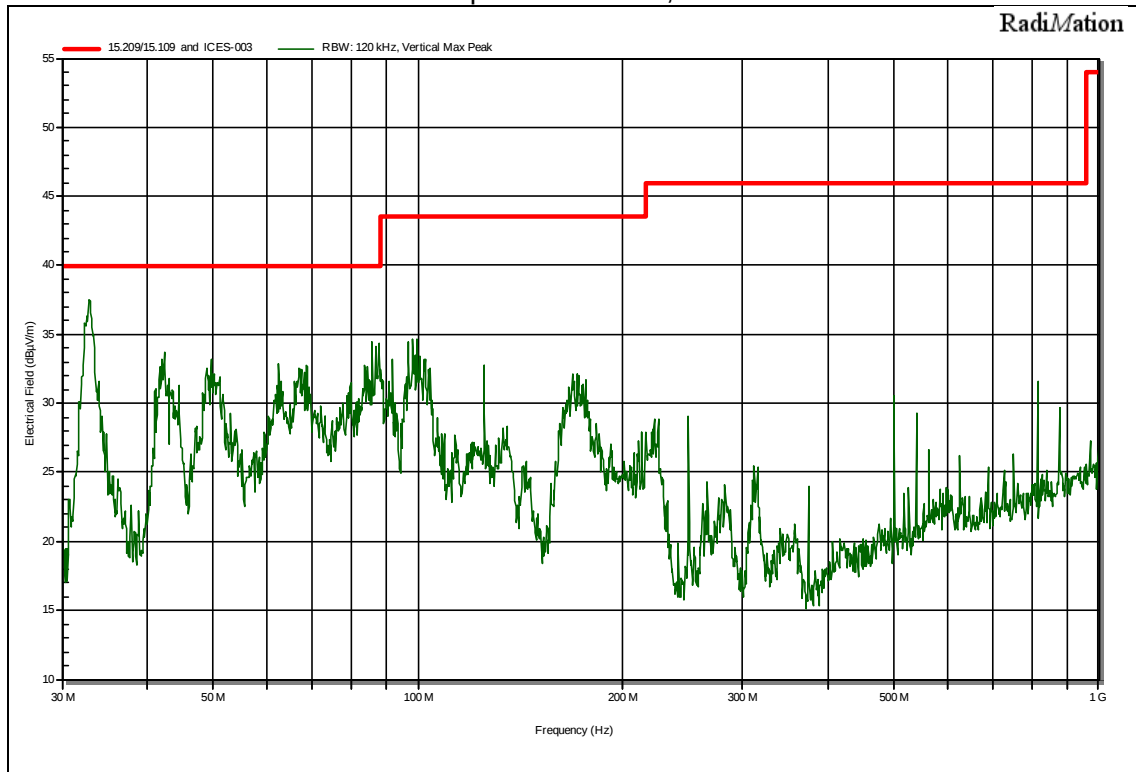
Measured peaks Vertical 30 – 1000 MHz 100 us; 24V

Frequency	Polarization	Height	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference
33,199 MHz	Vertical	1 m	35 dBμV/m	40 dBμV/m	-5,0 dB

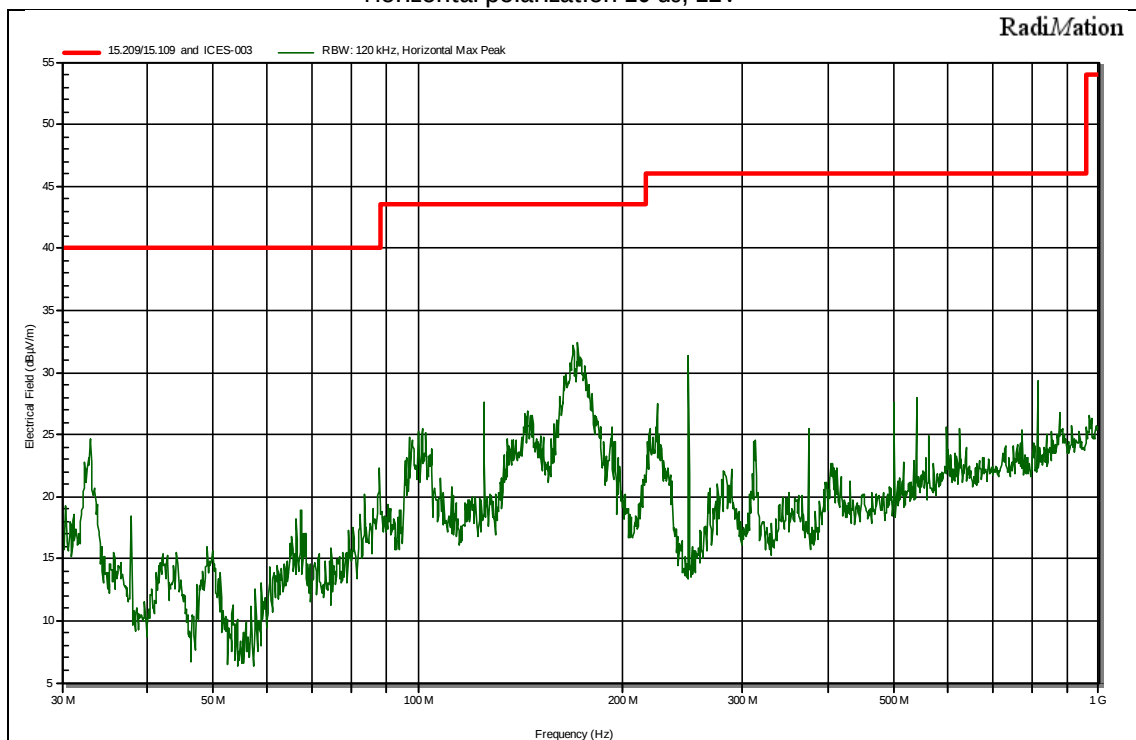
3.1.7 Plots of the Radiated Spurious Emissions Measurement

30 MHz to 1 GHz

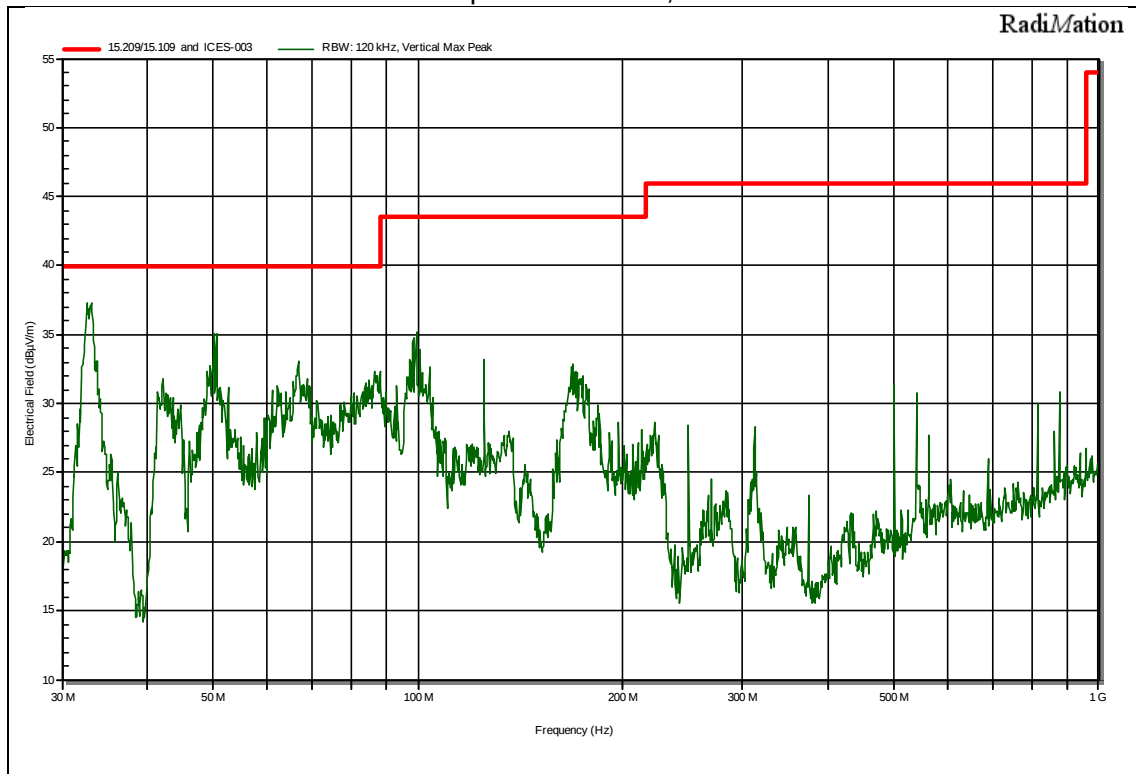
Vertical polarization 10 us; 12V



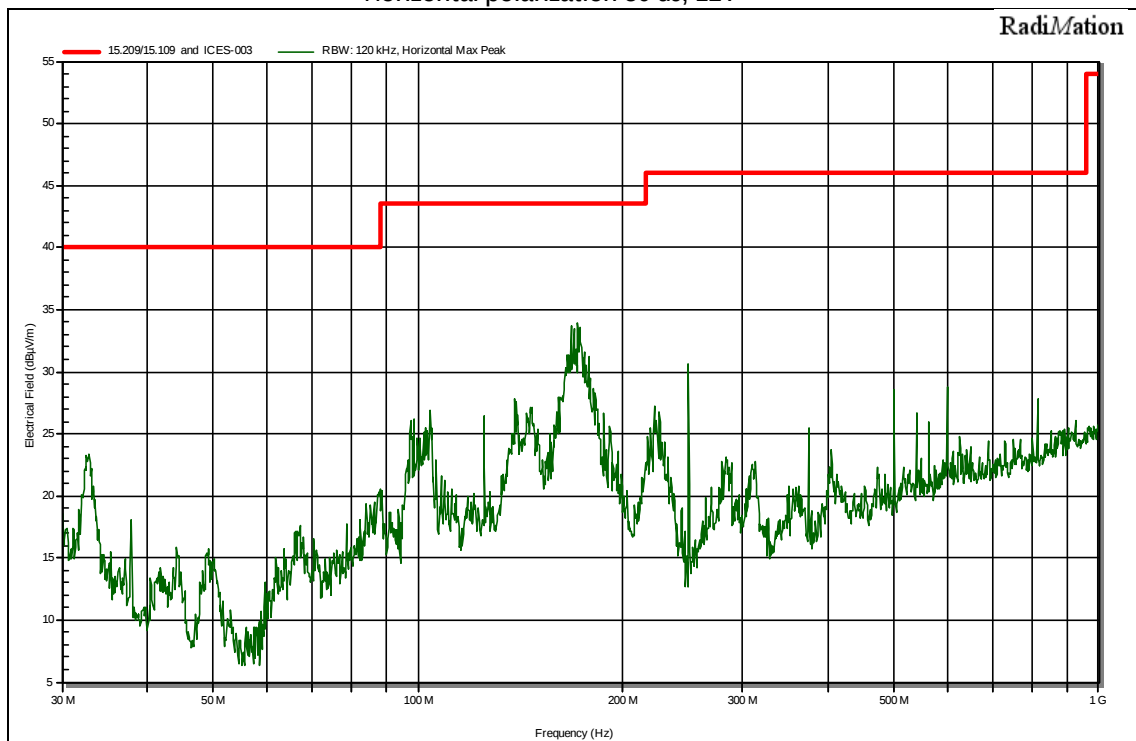
Horizontal polarization 10 us; 12V



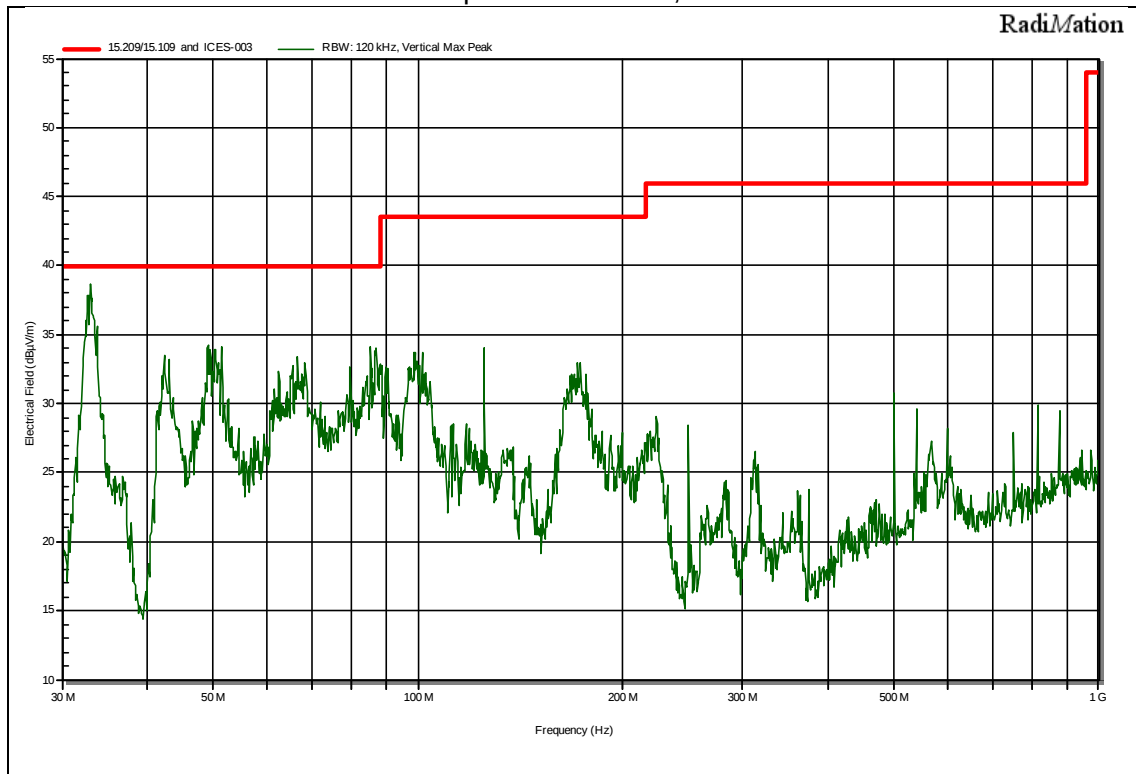
Vertical polarization 30 us; 12V



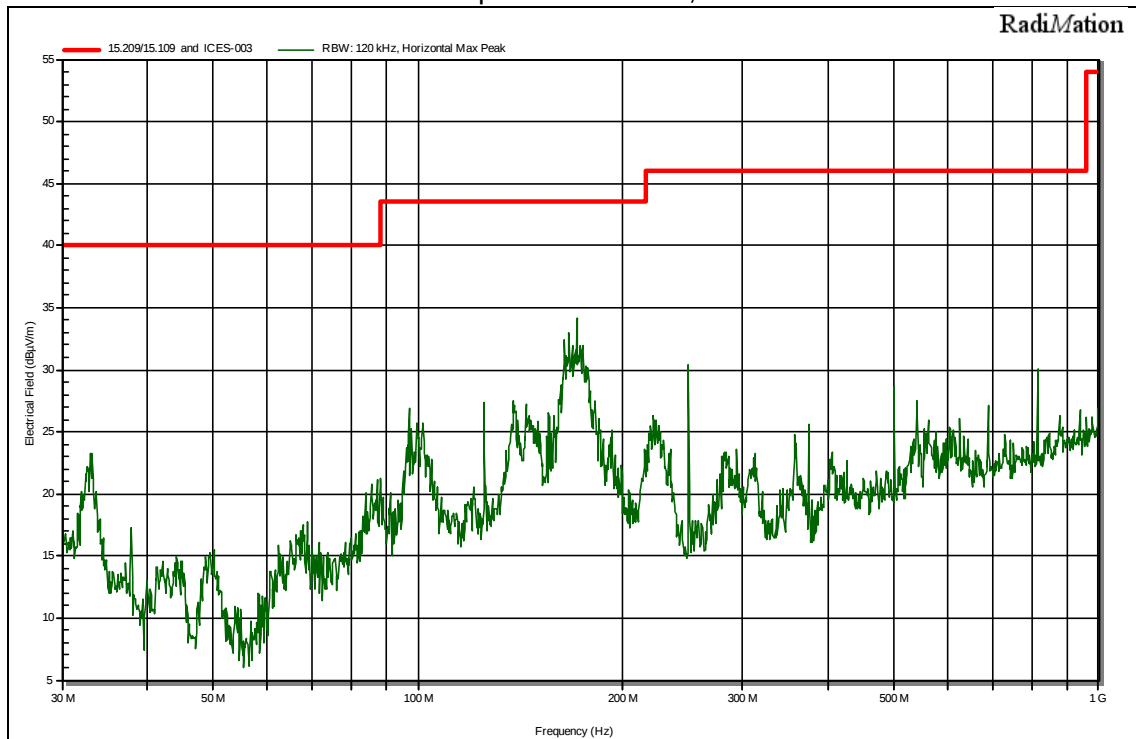
Horizontal polarization 30 us; 12V



Vertical polarization 100 us; 12V

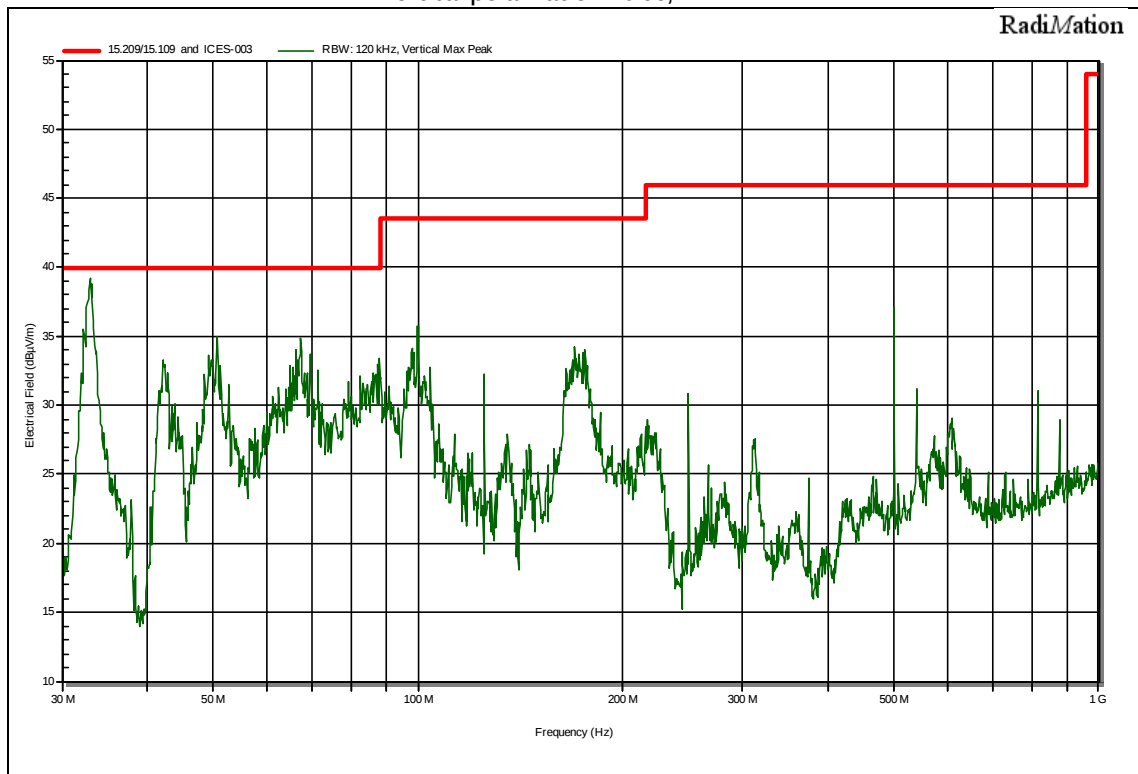


Horizontal polarization 100 us; 12V



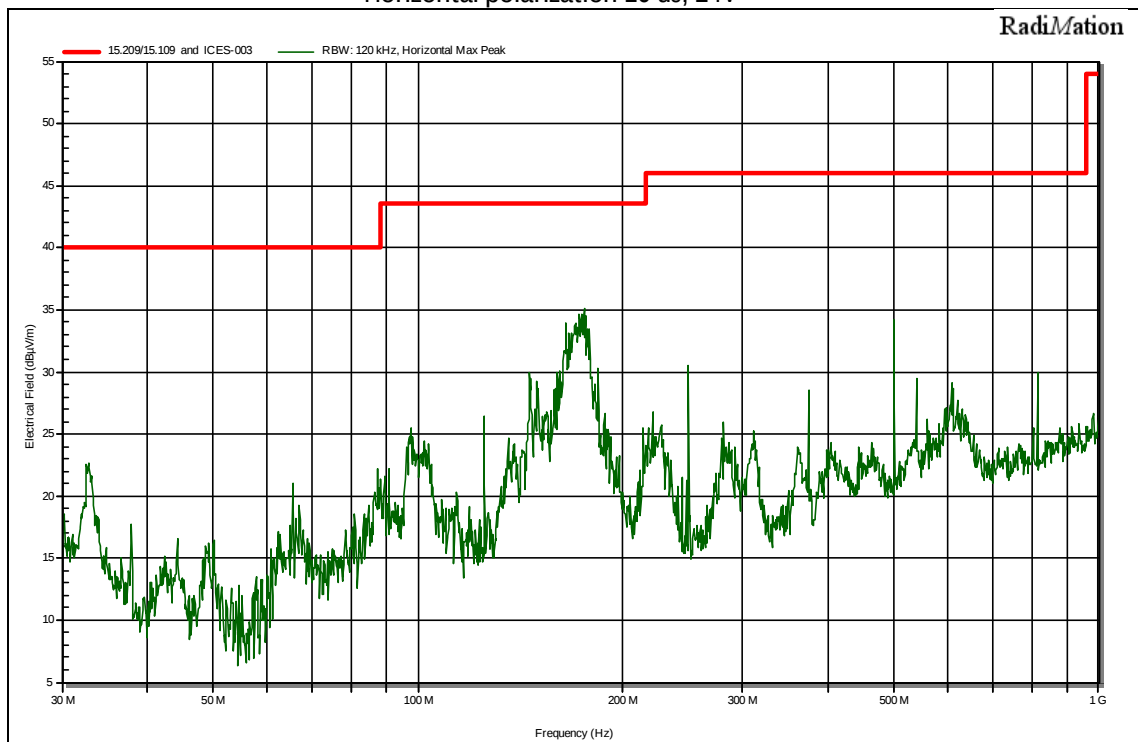
30 MHz to 1 GHz

Vertical polarization 10 us; 24V



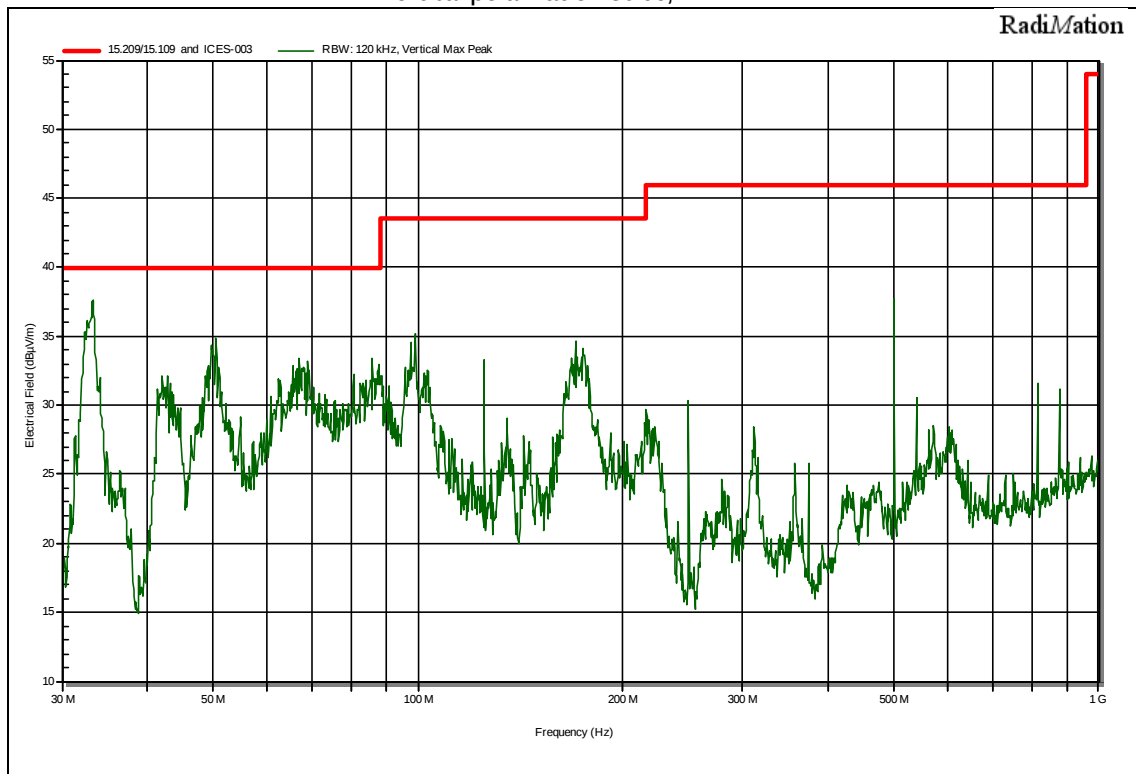
30 MHz to 1 GHz

Horizontal polarization 10 us; 24V



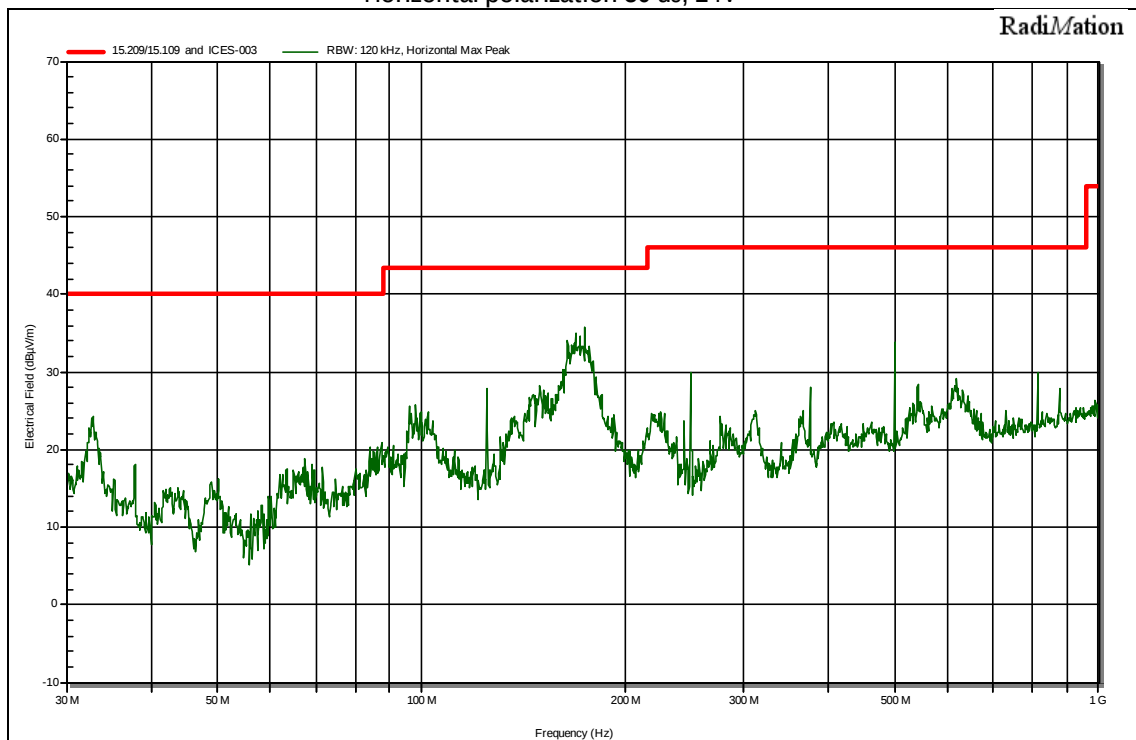
30 MHz to 1 GHz

Vertical polarization 30 us; 24V



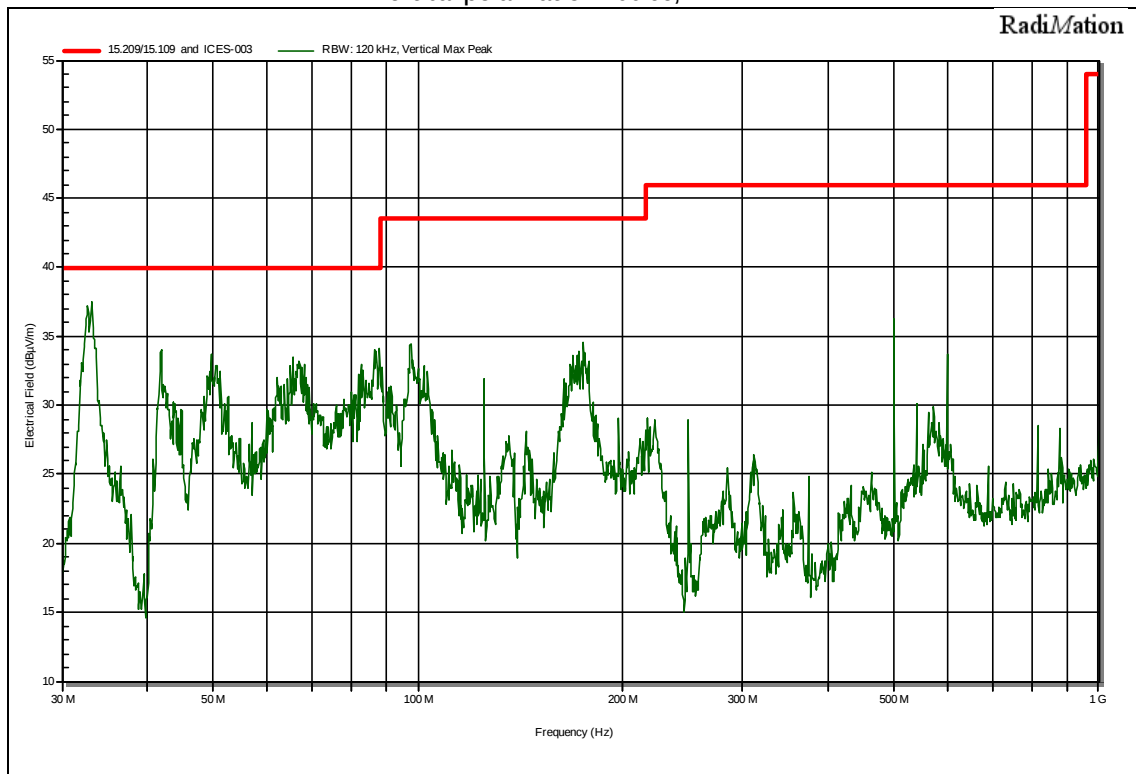
30 MHz to 1 GHz

Horizontal polarization 30 us; 24V

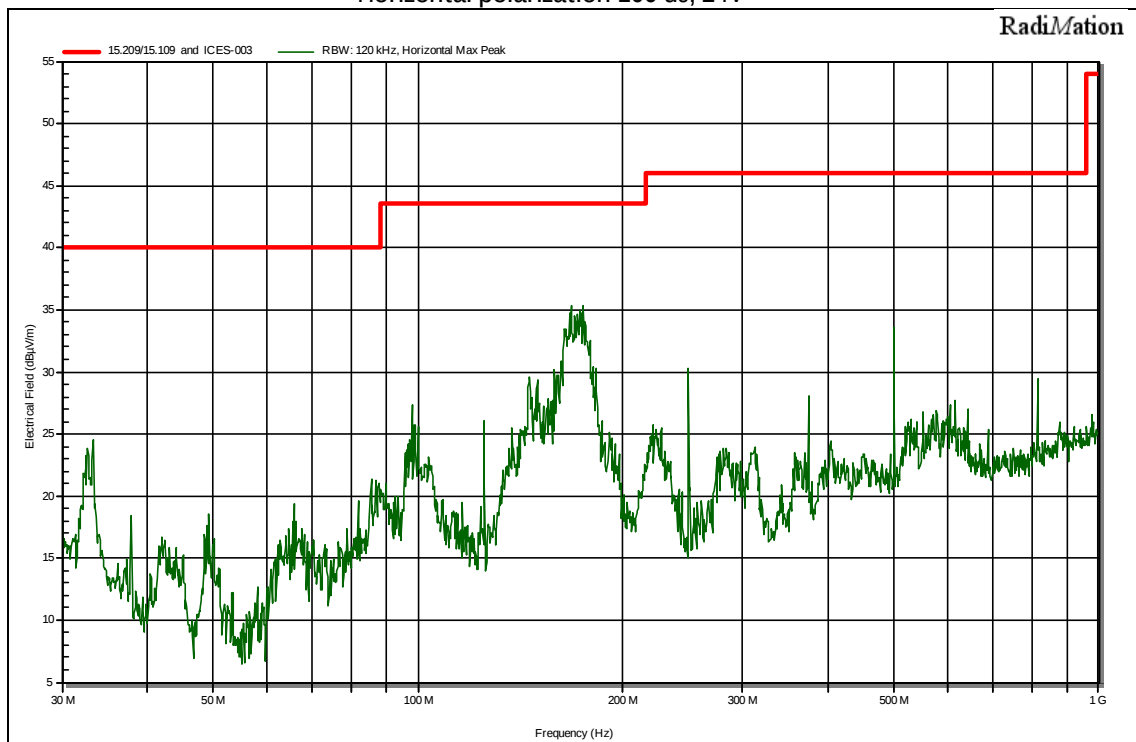


30 MHz to 1 GHz

Vertical polarization 100 us; 24V



30 MHz to 1 GHz
Horizontal polarization 100 us; 24V



3.2 Conducted emissions

3.2.1 Limit

According to 15.107 (b)

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-Peak	Average
0.15 – 0.50	79	66
0.50 – 30.0	73	60

3.2.2 Measurement instruments

The measurement instruments are listed in chapter 2.3 of this report.

3.2.3 Test setup

The test setup is as shown in chapter 2.2 of this report.

3.2.4 Test procedure

According to ANSI C63.4: 2014, section 13.3.

IRN 029 – Method 1.

3.2.5 Test results and plots of the AC mains conducted measurement

See next page.

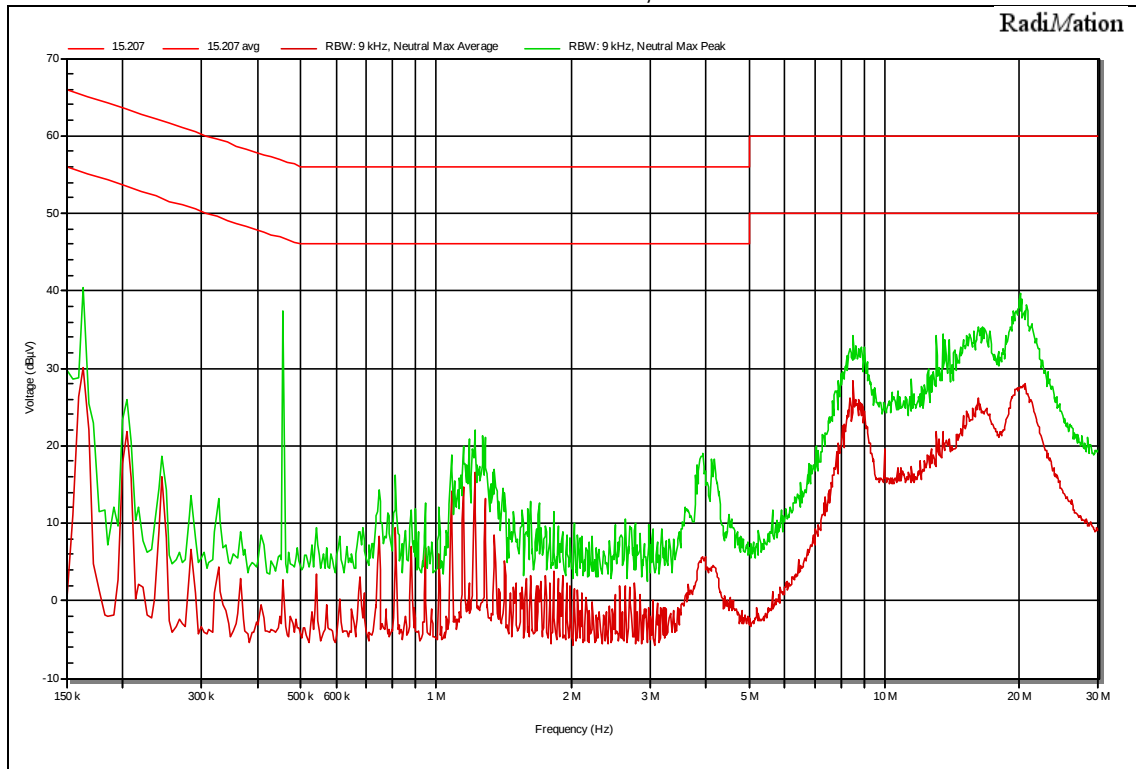
3.2.6 Measurement uncertainty

+/- 3.6 dB.

3.2.7 Plots of the AC mains conducted spurious measurement

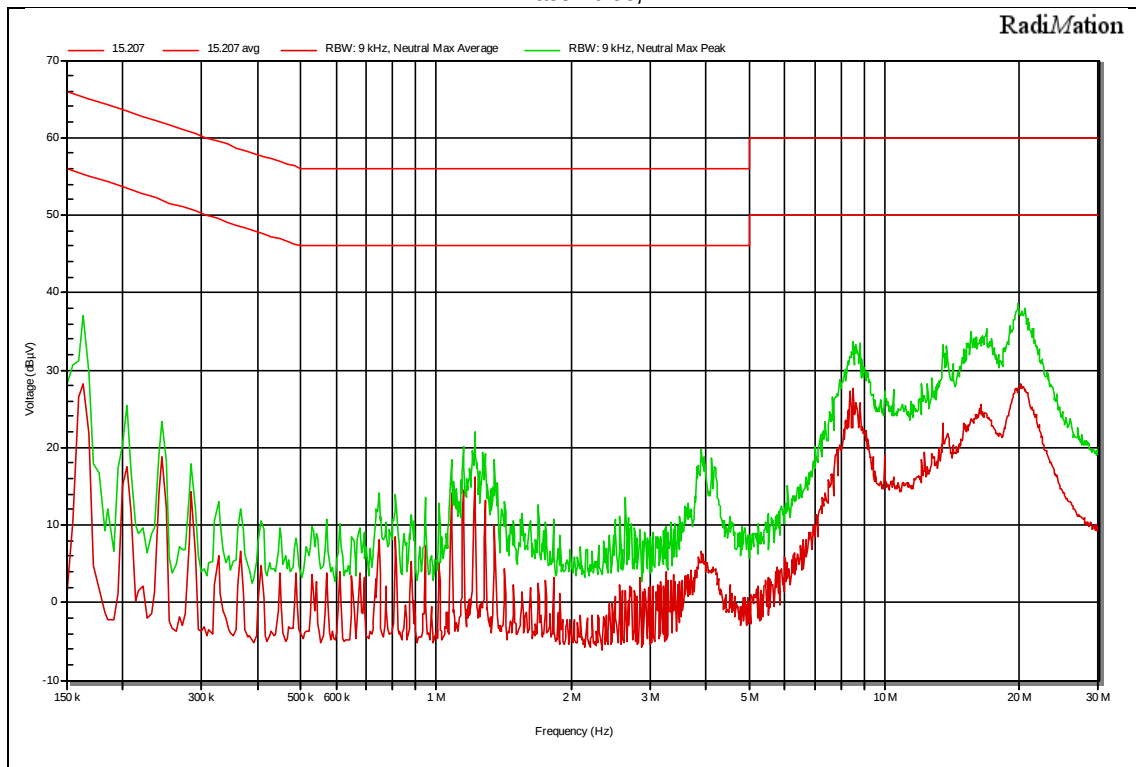
150 kHz to 30 MHz

Neutral 10 us; 12V



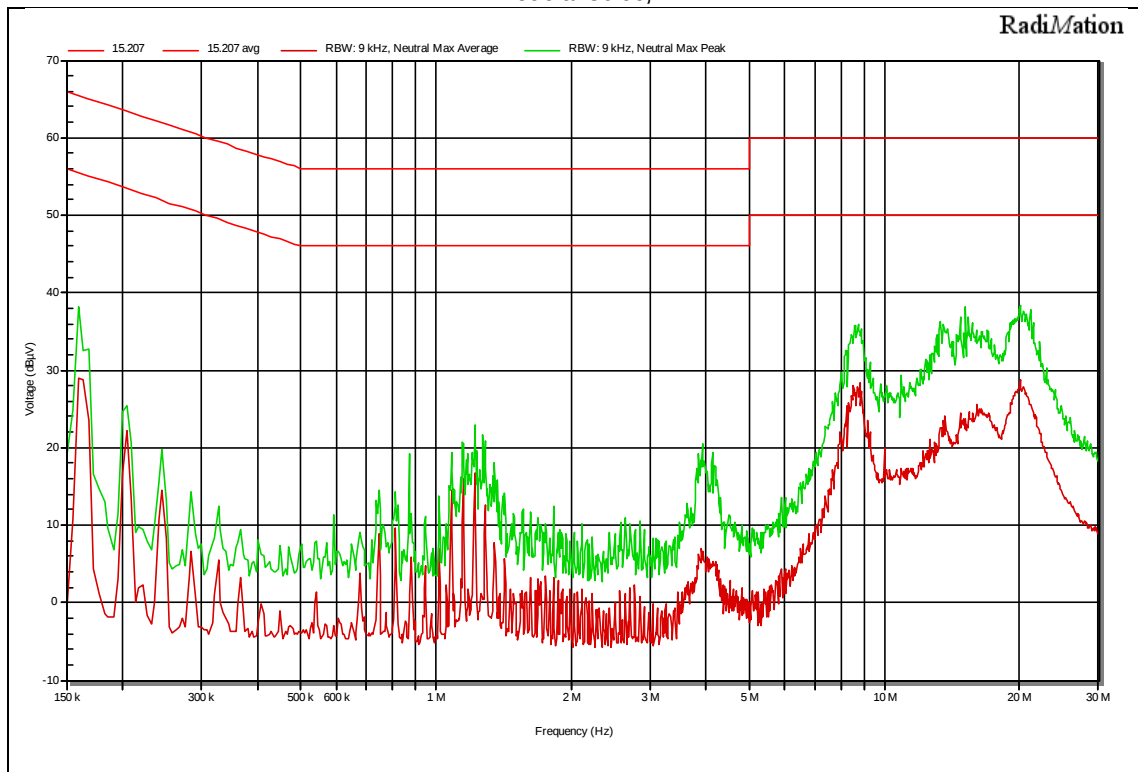
150 kHz to 30 MHz

Phase 10 us; 12V



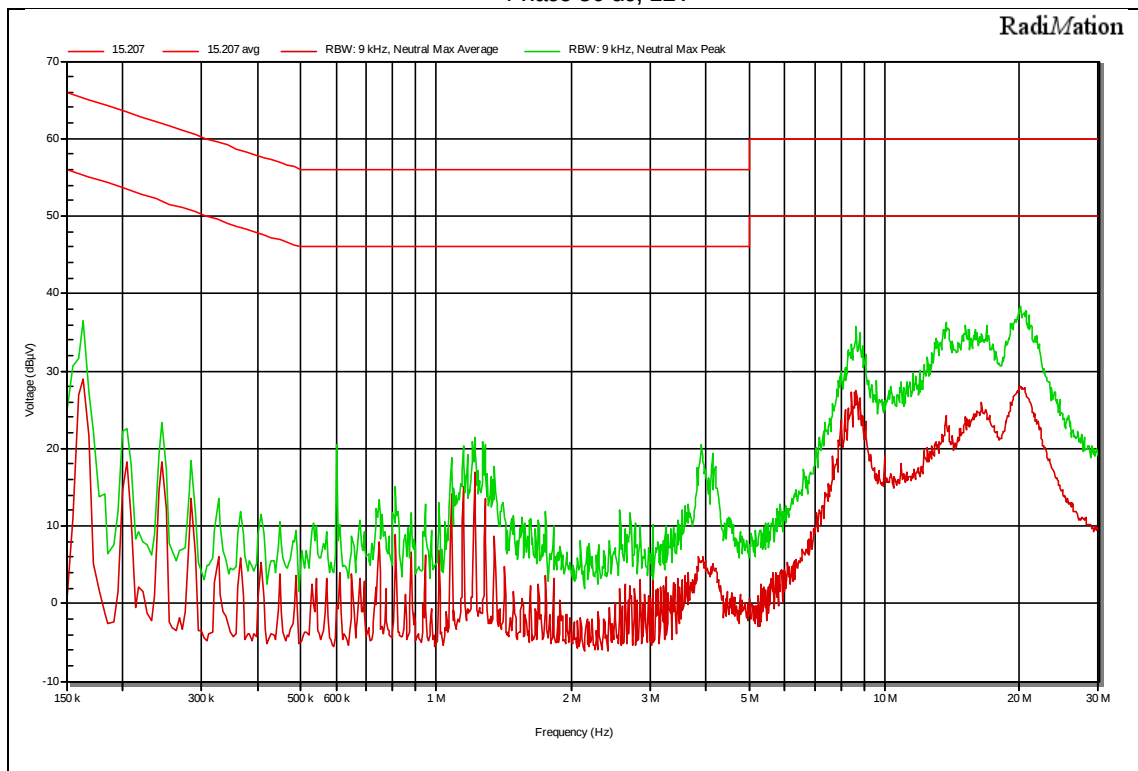
150 kHz to 30 MHz

Neutral 30 us; 12V



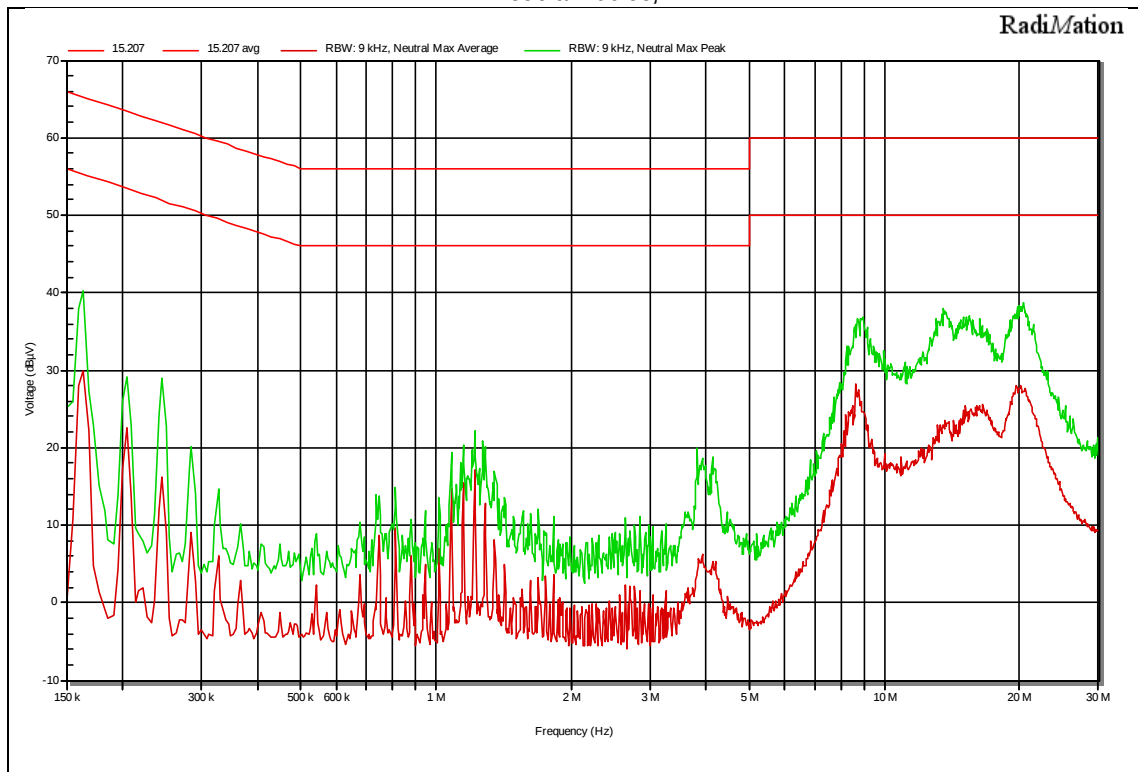
150 kHz to 30 MHz

Phase 30 us; 12V



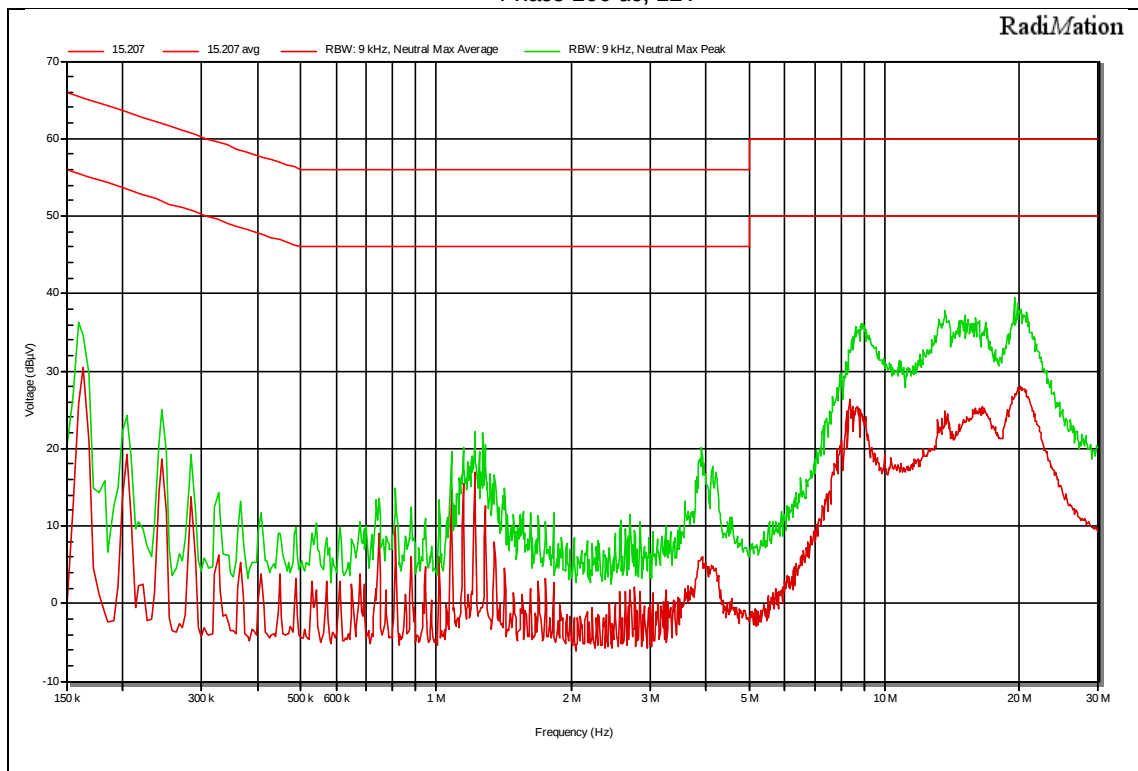
150 kHz to 30 MHz

Neutral 100 us; 12V



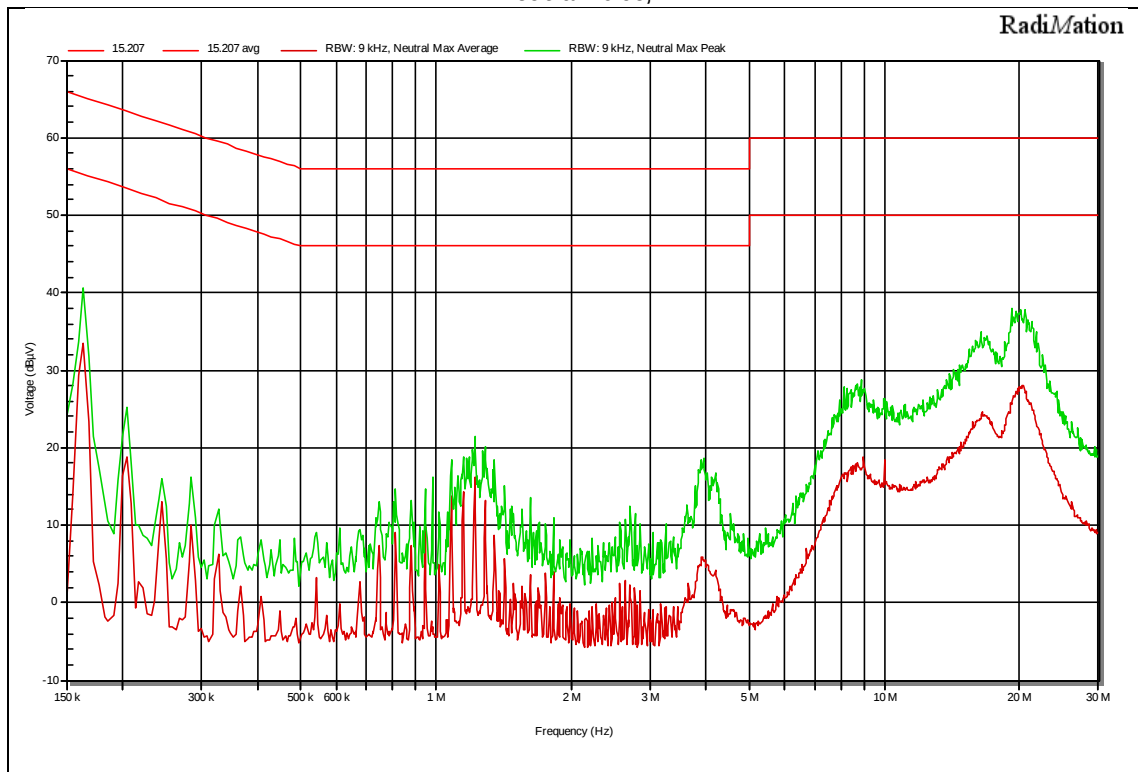
150 kHz to 30 MHz

Phase 100 us; 12V



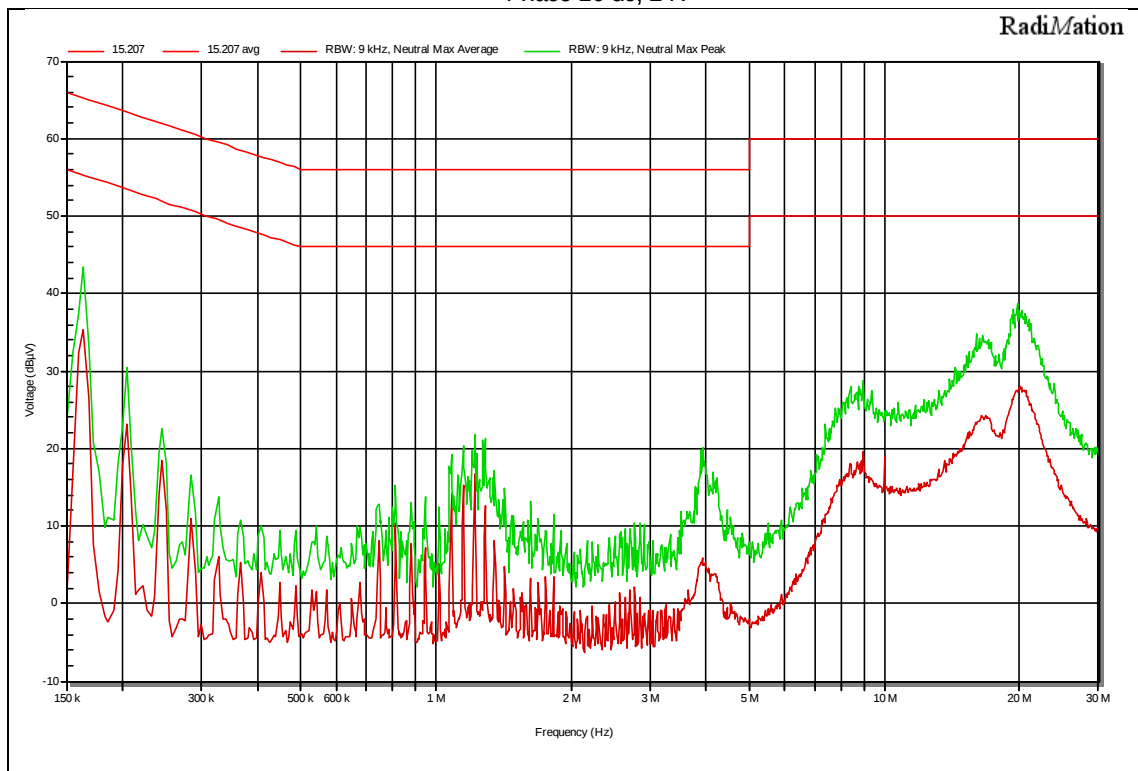
150 kHz to 30 MHz

Neutral 10 us; 24V



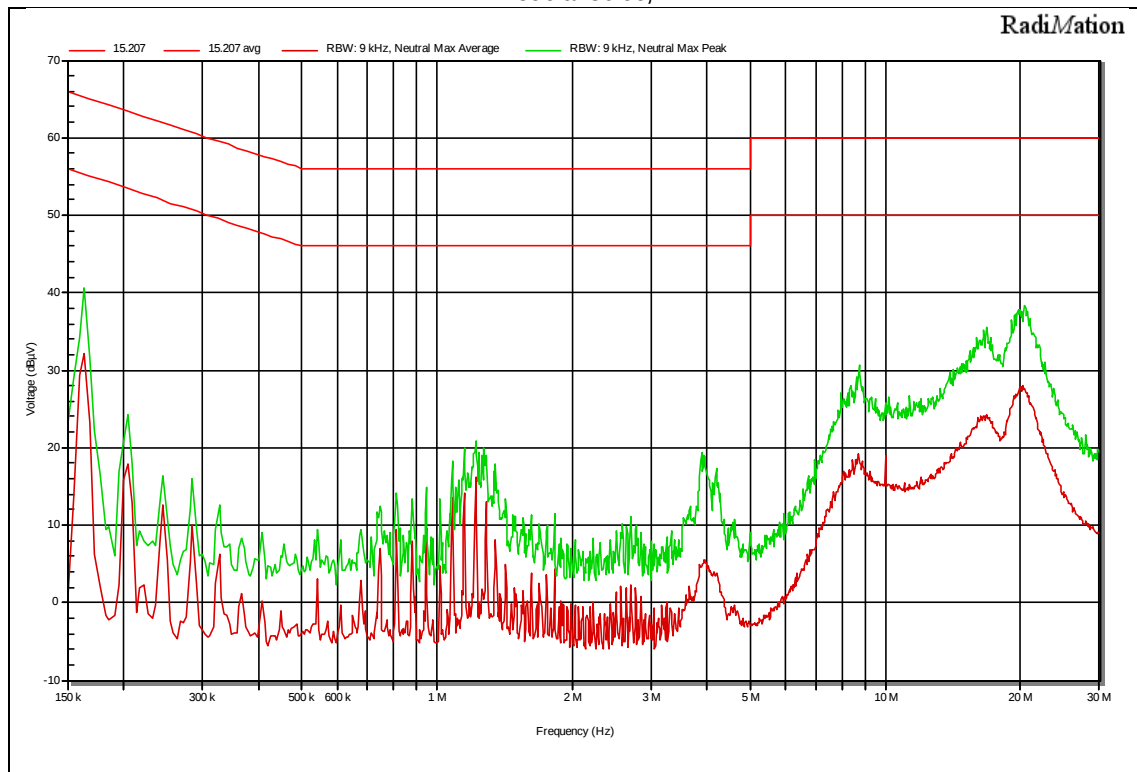
150 kHz to 30 MHz

Phase 10 us; 24V



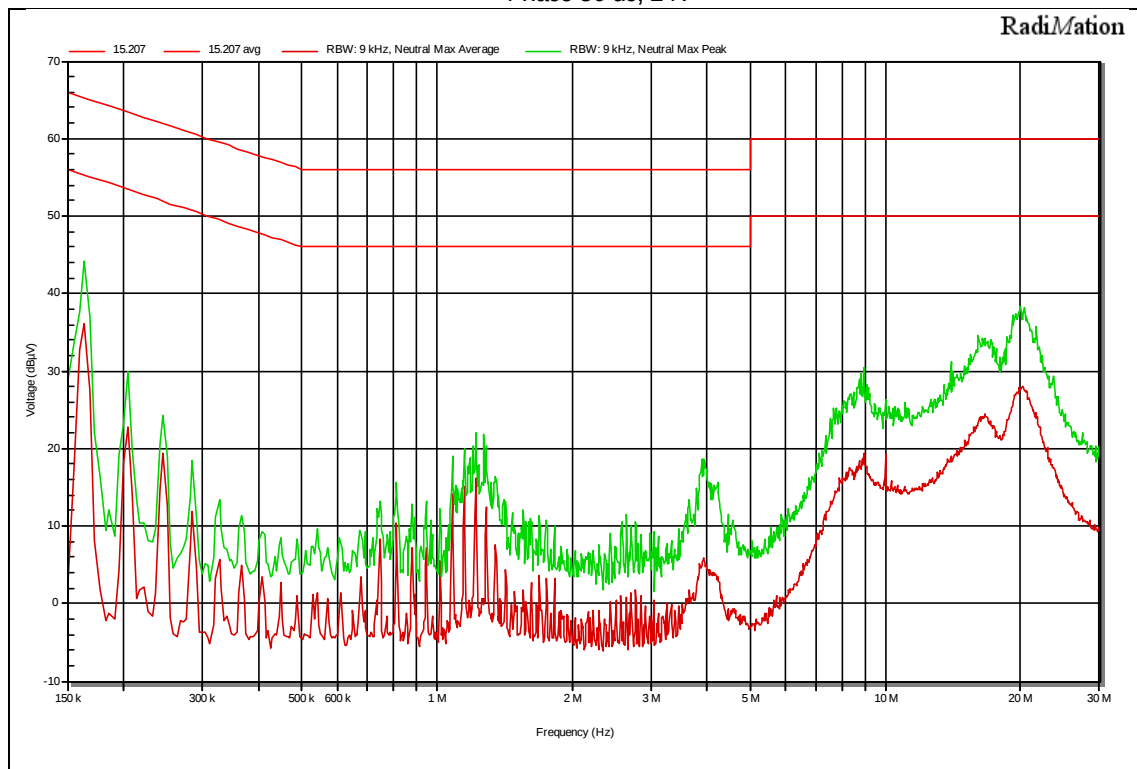
150 kHz to 30 MHz

Neutral 30 us; 24V



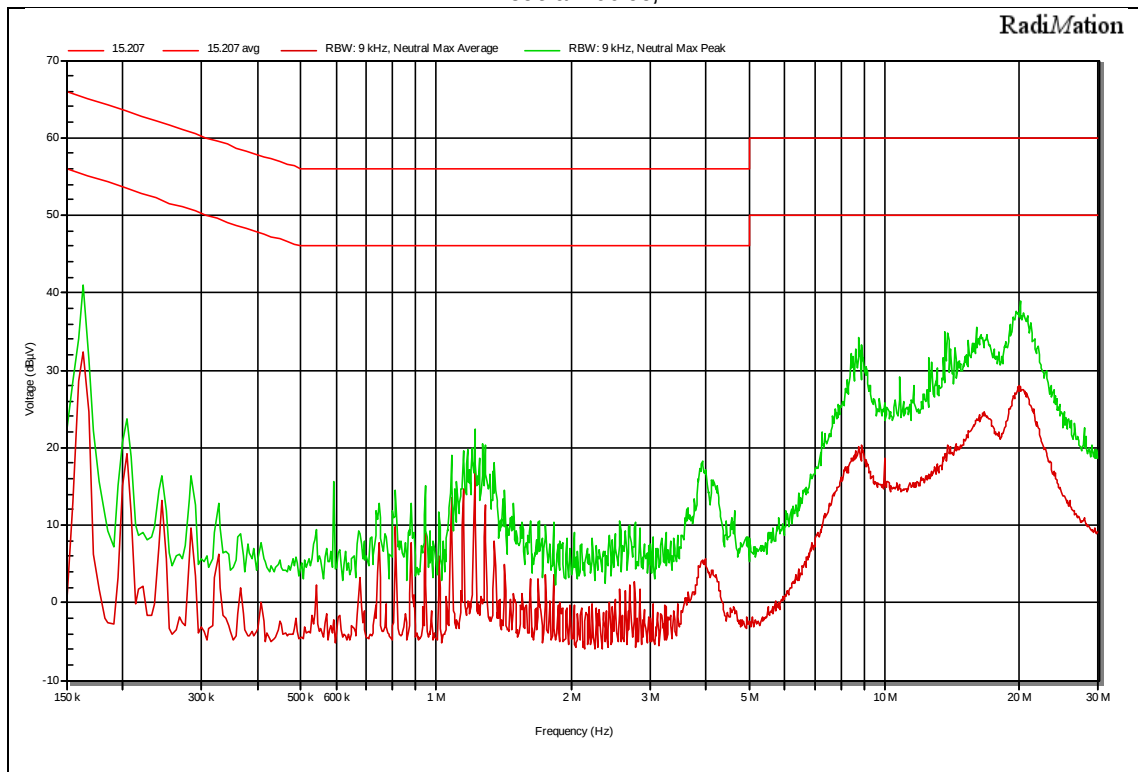
150 kHz to 30 MHz

Phase 30 us; 24V



150 kHz to 30 MHz

Neutral 100 us; 24V



150 kHz to 30 MHz

Phase 100 us; 24V

