

Test report for FCC part 15 B, ICES-003 and ICES-GEN

Product name : Deeper CHIRP+2
Applicant : Deeper

Test report No. : P000197855 001 Ver 3.00

Laboratory information

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Telefication complies with the accreditation criteria for test laboratories as laid down in ISO/IEC 17025:2017. 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	Kiwa Nederland BV
Test Site location	Wilmersdorf 50 7327 AC Apeldoorn The Netherlands Tel. +31 88998 3393
Test Site FCC	NL0001
CABID	NL0001

Revision History

Version	Date	Remarks	By
v0.50	01-11-2022	First draft	KK
v1.00	15-11-2022	Final report	KK
v2.00	17-01-2023	Section 3.2, additional test added Section 2.2, test setup added Section 1.7, applicable standard added	KK
v3.00	03-02-2023	Section 3.2.7, Measurement updated	KK

Table of Contents

Revision History.....	2
Summary of Test results	4
1 General Description	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Tested Equipment Under Test (EUT)	5
1.4 Product specifications of Equipment under test.....	6
1.5 Environmental conditions	6
1.6 Measurement standards	6
1.7 Applicable standards	6
1.8 Observation and remarks	6
1.9 Conclusions	7
2 Test configuration of the Equipment Under Test.....	8
2.1 Test mode	8
2.2 Test setups	8
2.3 Equipment used in the test configuration	10
3 Test results.....	11
3.1 Radiated spurious emissions.....	11
3.1.1 Limit	11
3.1.2 Measurement instruments	11
3.1.3 Test setup	11
3.1.4 Test procedure.....	11
3.1.5 Measurement Uncertainty	11
3.1.6 Peak table	12
3.1.7 Plots of the Radiated Spurious Emissions Measurement	13
3.2 Conducted emissions	16
3.2.1 Limit	16
3.2.2 Measurement instruments	16
3.2.3 Test setup	16
3.2.4 Test procedure.....	16
3.2.5 Test results and plots of the AC mains conducted measurement	16
3.2.6 Measurement uncertainty	16
3.2.7 Plots of the AC mains conducted spurious measurement.....	17

Summary of Test results

FCC	ISED	Description	Section in report	Verdict
15.109 (b)	ICES-003 Table 5	Radiated spurious emissions < 1GHz	3.1	Pass
15.109 (b)	ICES-003 Table 7	Radiated spurious emissions > 1GHz	3.1	Pass
15.107 (a)	ICES-003 Table 2	AC power-line conducted emissions	3.2	Pass

1 General Description

1.1 Applicant

Client name:	Deeper, UAB
Address	Antakalnio g. 17, Vilnius, Lithuania
Zip code:	10312
Telephone:	+37066261439
E-mail:	mindaugas.spelveris@deeper.eu
Contact name:	Mindaugas Spelveris

1.2 Manufacturer

Manufacturer name:	Deeper, UAB
Address:	Antakalnio g. 17, Vilnius, Lithuania
Zip code:	10312
Telephone:	+37066261439
E-mail:	mindaugas.spelveris@deeper.eu
Contact name:	Mindaugas Spelveris

1.3 Tested Equipment Under Test (EUT)

Product name:	Deeper CHIRP+2
Brand name:	Deeper, UAB
Product type:	Wireless sonar with GNSS
Model(s):	DP4H10S10 DP4H20S10
Batch and/or serial No.	-
Software version:	-
Hardware version:	-
Date of receipt	01-11-2022
Tests started:	01-11-2022
Testing ended:	01-11-2022

1.4 Product specifications of Equipment under test

None.

1.5 Environmental conditions

Test date	01-11-2022
Ambient temperature	21.2 C°
Humidity	45.4 %

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
- ICES-003, Issue 7
- ICES-Gen, Issue 1

1.8 Observation and remarks

The EUT is considered class B equipment. The EUT is battery powered device. The battery is rechargeable by means of a power adapter.

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 : Koray Korcum, Msc

Review of test methods and report by:

Name : Raoul Tolud, Msc

The above conclusions have been verified by the following signatory:

Date : 06-02-2023

Name : P. van Wanrooij

Signature :



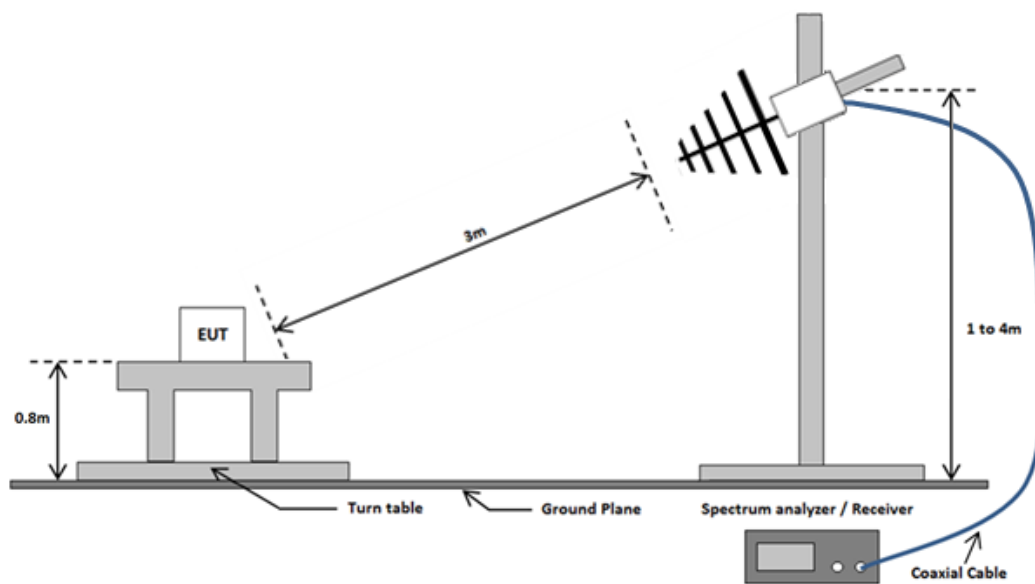
2 Test configuration of the Equipment Under Test

2.1 Test mode

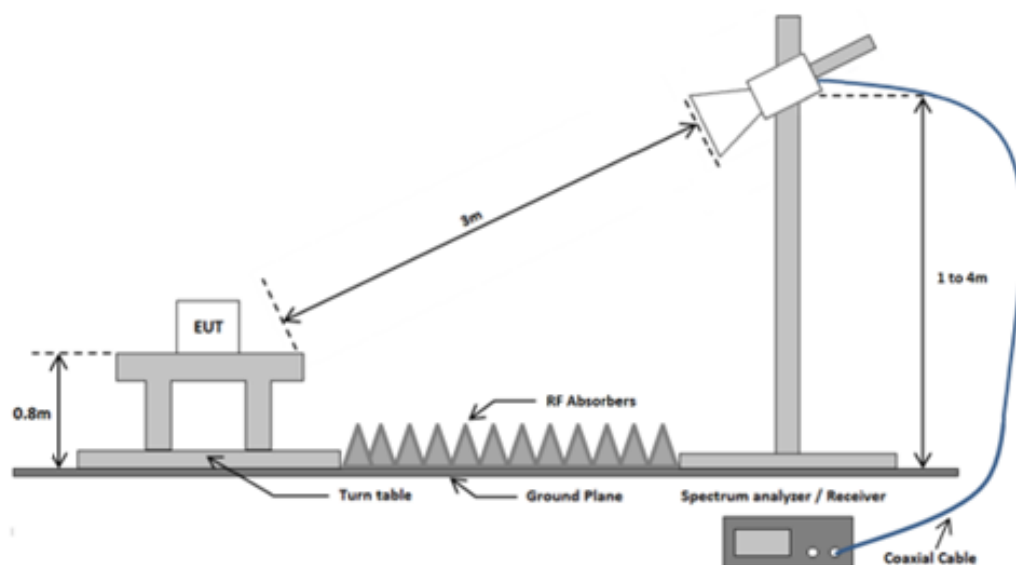
The EUT is tested in normal operating mode, with all ports connected.

2.2 Test setups

Radiated emissions test setup 30 MHz - 1 GHz

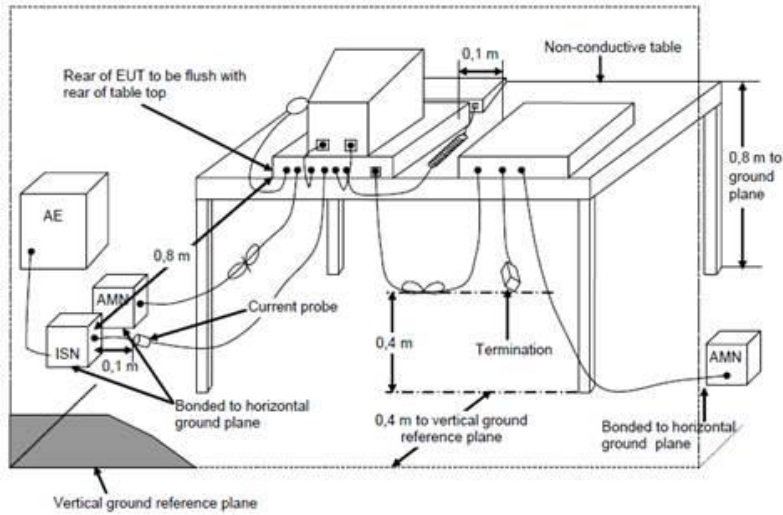


Radiated emissions test setup above 1 GHz



Conducted emissions test setup

Emissions test at AC mains



2.3 Equipment used in the test configuration

Description	Manufacturer	Model	ID	Cal. Done date	Cal. due date	Used at Par.
EMI Receiver	Rohde & Schwarz	ESR7	114534	01-2022	01-2023	3.1, 3.2
Spectrum analyzer	Rohde & Schwarz	FSP40	TE11125	03-2022	03-2023	3.1
Biconical antenna + 6dB attenuator	Schwarzbeck + HP	VHA9103 + 8491A	114436 + 114254	03-2021	03-2024	3.1
Logperiodic antenna	EMCO	3147	114385	03-2021	03-2024	3.1
Horn antenna	EMCO	3115	114607	01-2021	01-2024	3.1
Preamplifier 1-18 GHz	µComp Nordic	MCNA-40-0010800-25-10P	114690	01-2022	01-2023	3.1
Test software	Raditeq	Radimation Version 2021.1.9	TE 02008	--	--	3.1, 3.2
LISN /Two line V-network	Rohde & Schwarz	ENV 216	114379	07-2021	07-2023	3.2

3 Test results

3.1 Radiated spurious emissions

3.1.1 Limit

15.109 (a)

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 (dB μ V/m)
30 - 88	49.5
88 - 216	54.0
216 - 960	56.9
960 and above	60.0

15.109 (b)

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

Frequency of emission (MHz)	Field strength at 3m (dB μ V/m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
960 and above	54.0

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 26.5 GHz: According to ANSI C63.4-2014, section 8.3

30 MHz to 1 GHz: IRN 026 – Method 1

1 GHz to 18 GHz: IRN 026 – Method 2

18 to 26.5 GHz: IRN 026 – Method 3

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
1 – 18 GHz	Horizontal	± 5.7 dB
	Vertical	± 5.7 dB
18 – 26.5 GHz	Horizontal	± 4.9 dB
	Vertical	± 4.9 dB

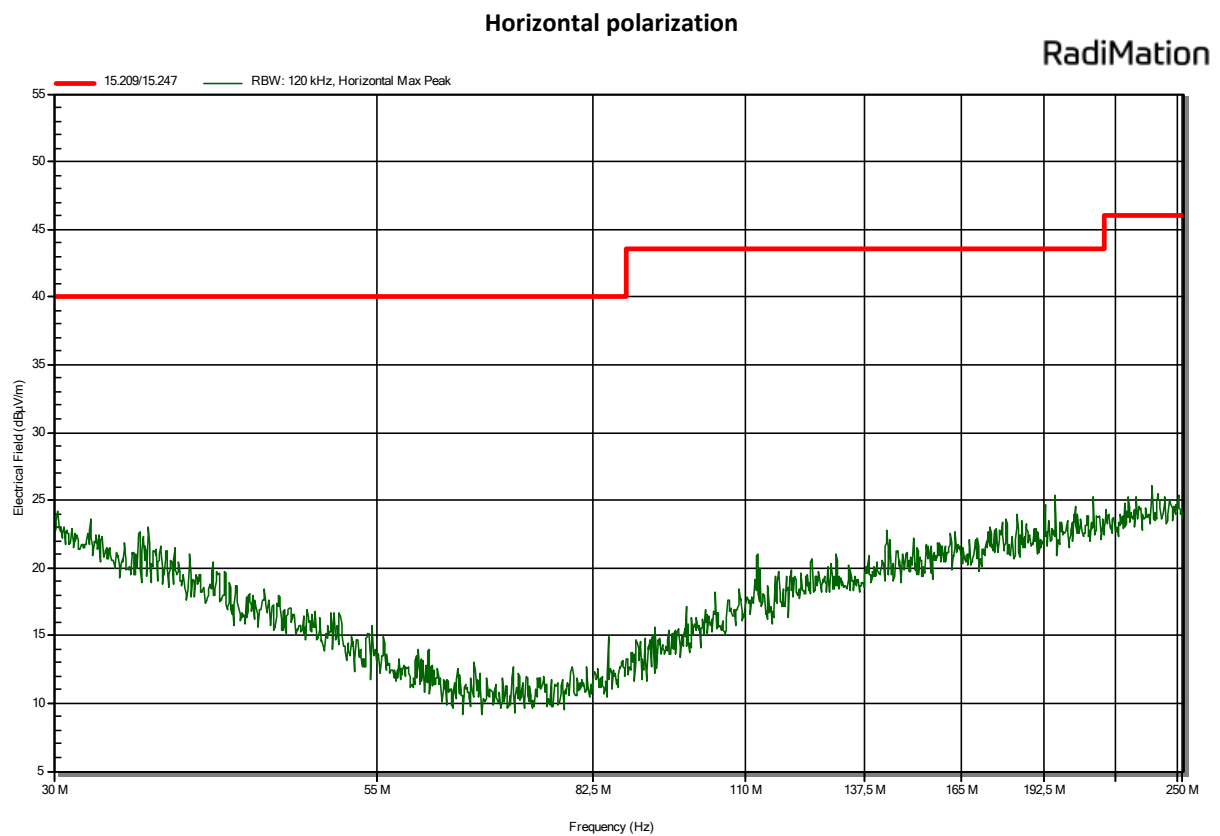
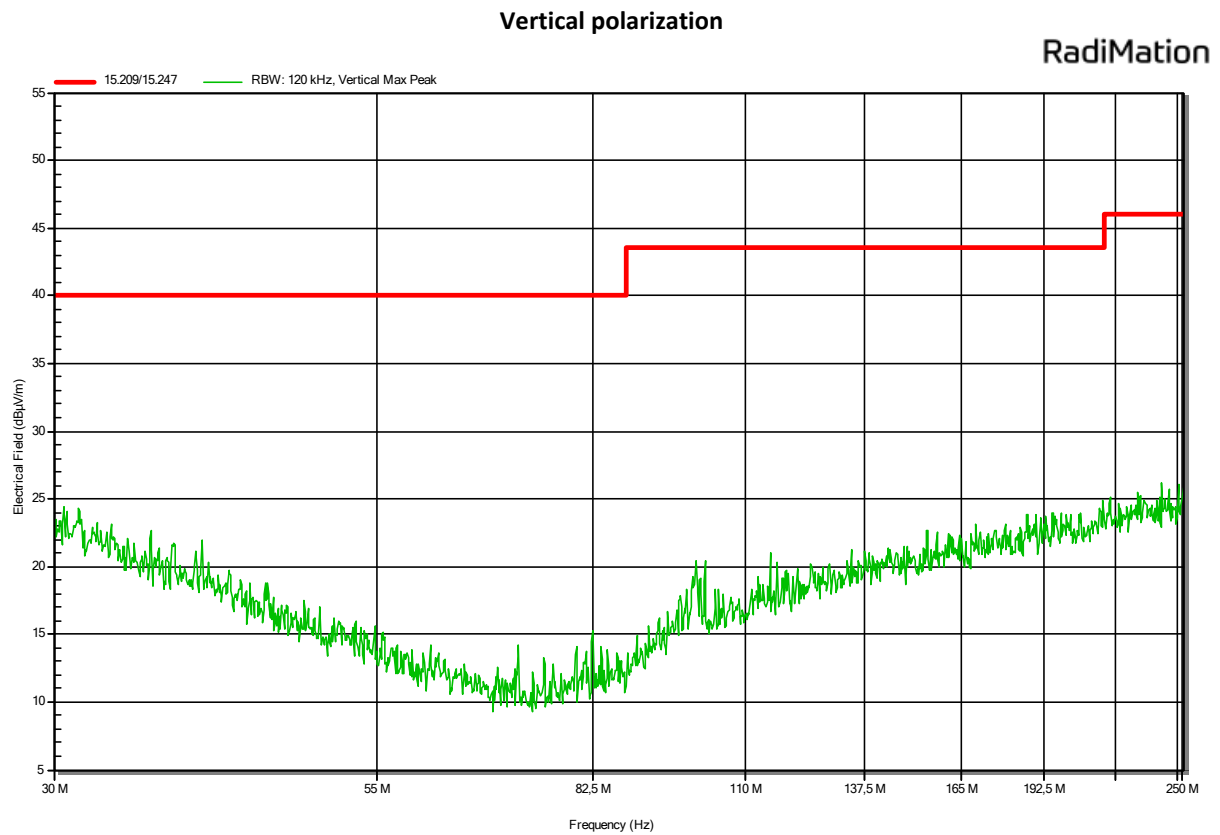
3.1.6 Peak table

Frequency	Peak	Peak Limit	Average	Average Limit	Status	Angle	Height	Polarization
1,234 GHz	34,1 dB μ V/m	74 dB μ V/m	19,7 dB μ V/m	54 dB μ V/m	Pass	114 degrees	1 m	Horizontal
14,235 GHz	52,5 dB μ V/m	74 dB μ V/m	40,7 dB μ V/m	54 dB μ V/m	Pass	19 degrees	1 m	Horizontal
7,515 GHz	42,8 dB μ V/m	74 dB μ V/m	32,2 dB μ V/m	54 dB μ V/m	Pass	114 degrees	1 m	Horizontal

Frequency	Peak	Peak Limit	Status	Angle	Height	Polarization
462,906 MHz	36,9 dB μ V/m	46 dB μ V/m	Pass	1 degrees	2,5 m	Vertical
424,844 MHz	35 dB μ V/m	46 dB μ V/m	Pass	143 degrees	3 m	Horizontal
867,344 MHz	44 dB μ V/m	46 dB μ V/m	Pass	145 degrees	2,5 m	Vertical

3.1.7 Plots of the Radiated Spurious Emissions Measurement

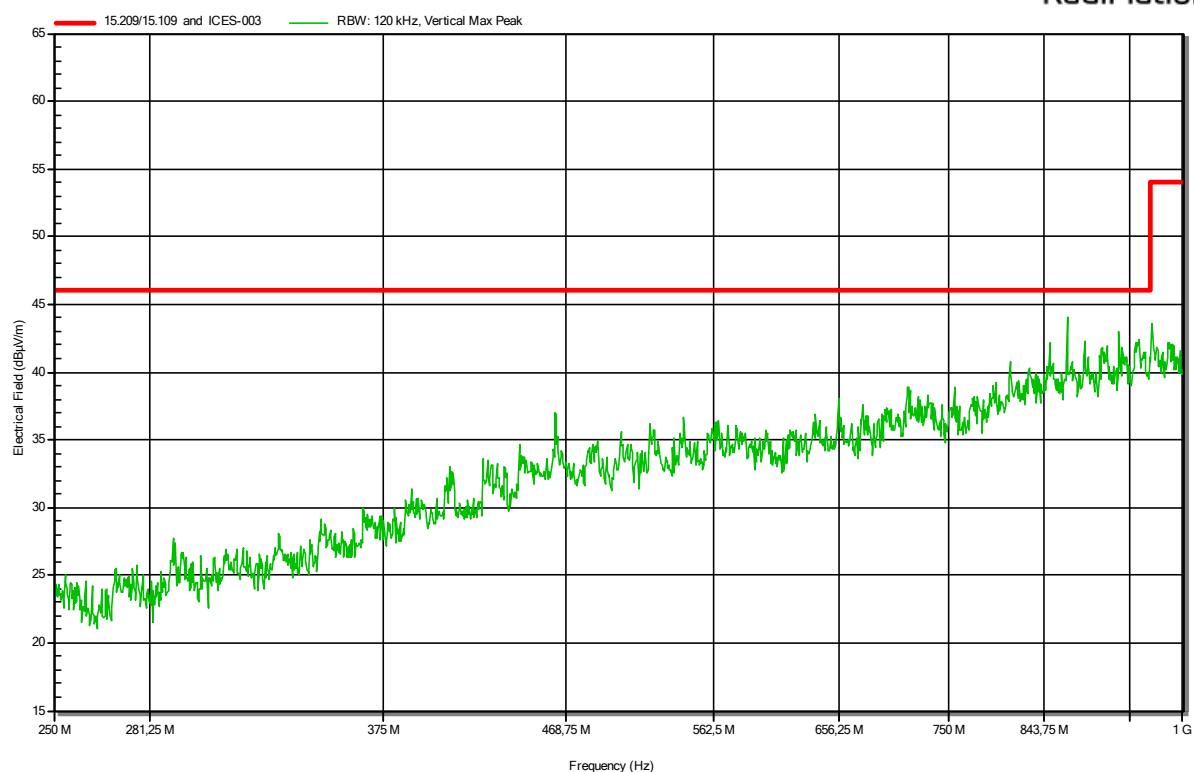
30 -250 MHz



250 -1000 MHz

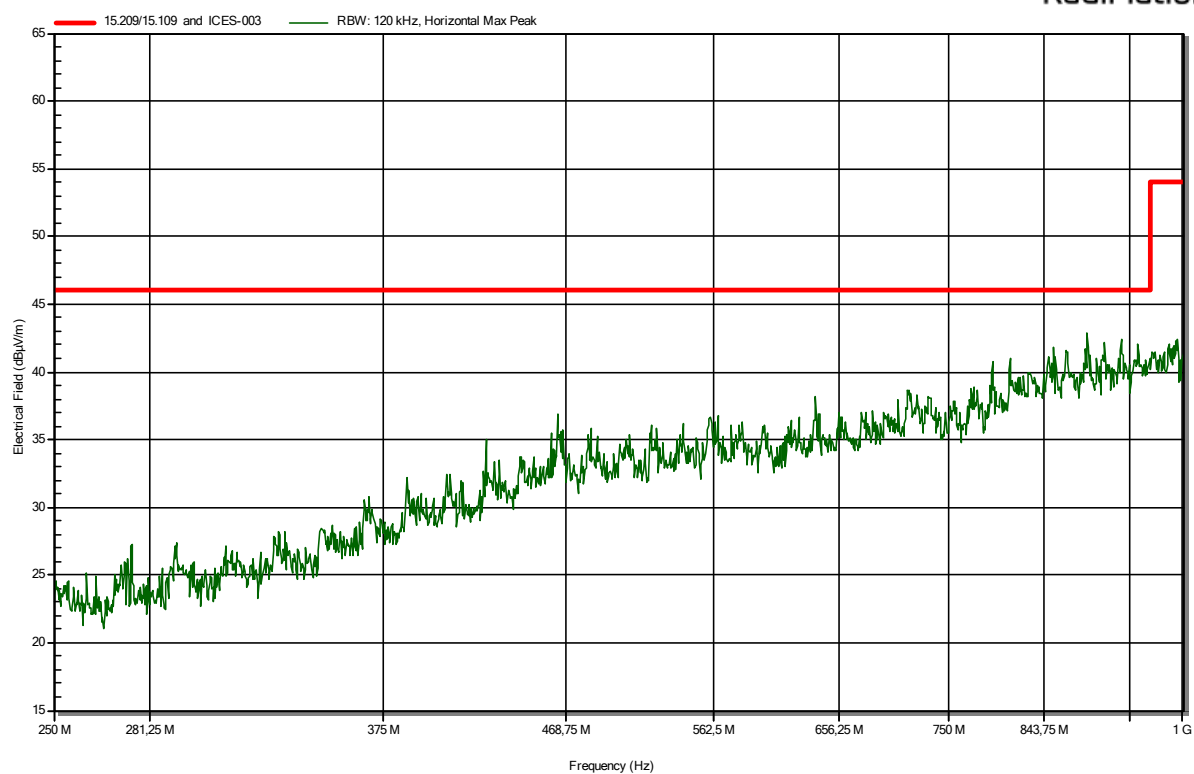
Vertical polarization

RadiMation



Horizontal polarization

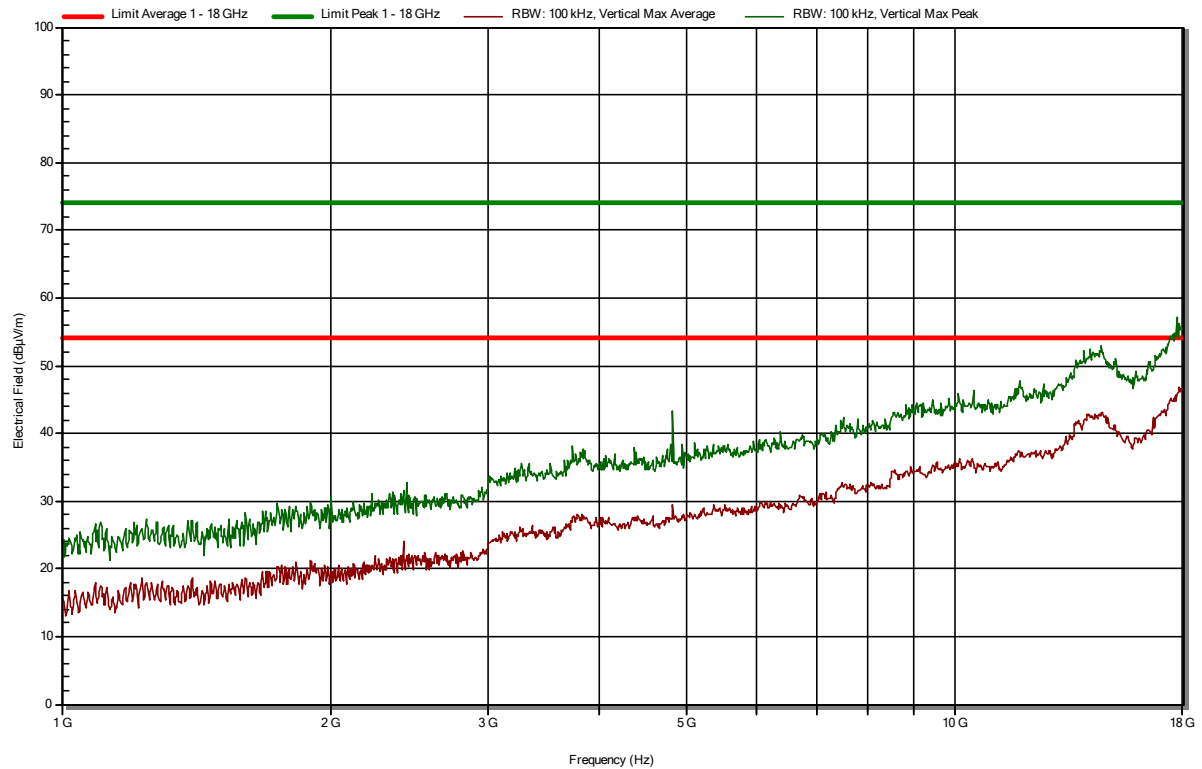
RadiMation



1 – 18 GHz

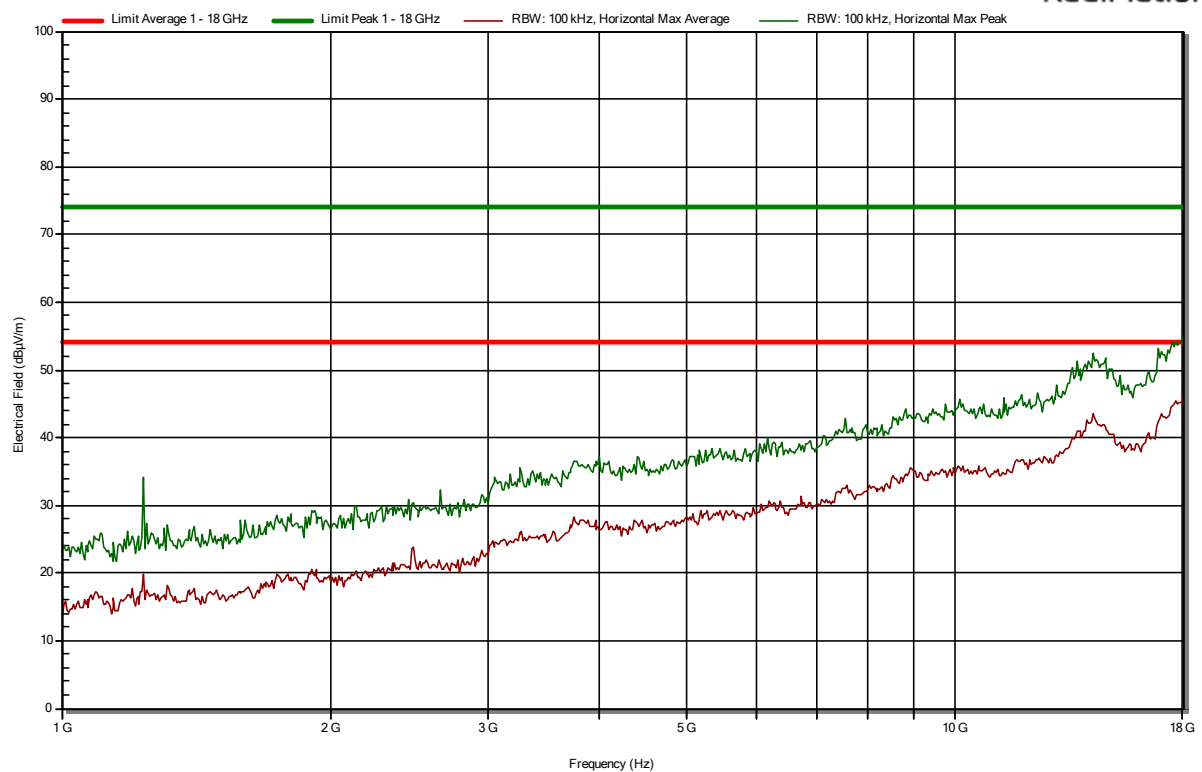
Vertical polarization

RadiMation



Horizontal polarization

RadiMation



3.2 Conducted emissions

3.2.1 Limit

According to 15.107 (b), Class A

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

According to 15.107(a), Class B

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-Peak	Average
0.15 – 0.50	66 to 56*	56 to 46*
0.50 – 5.0	56	46
5.0 - 30	60	50

*decreases with the logarithm of the frequency

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

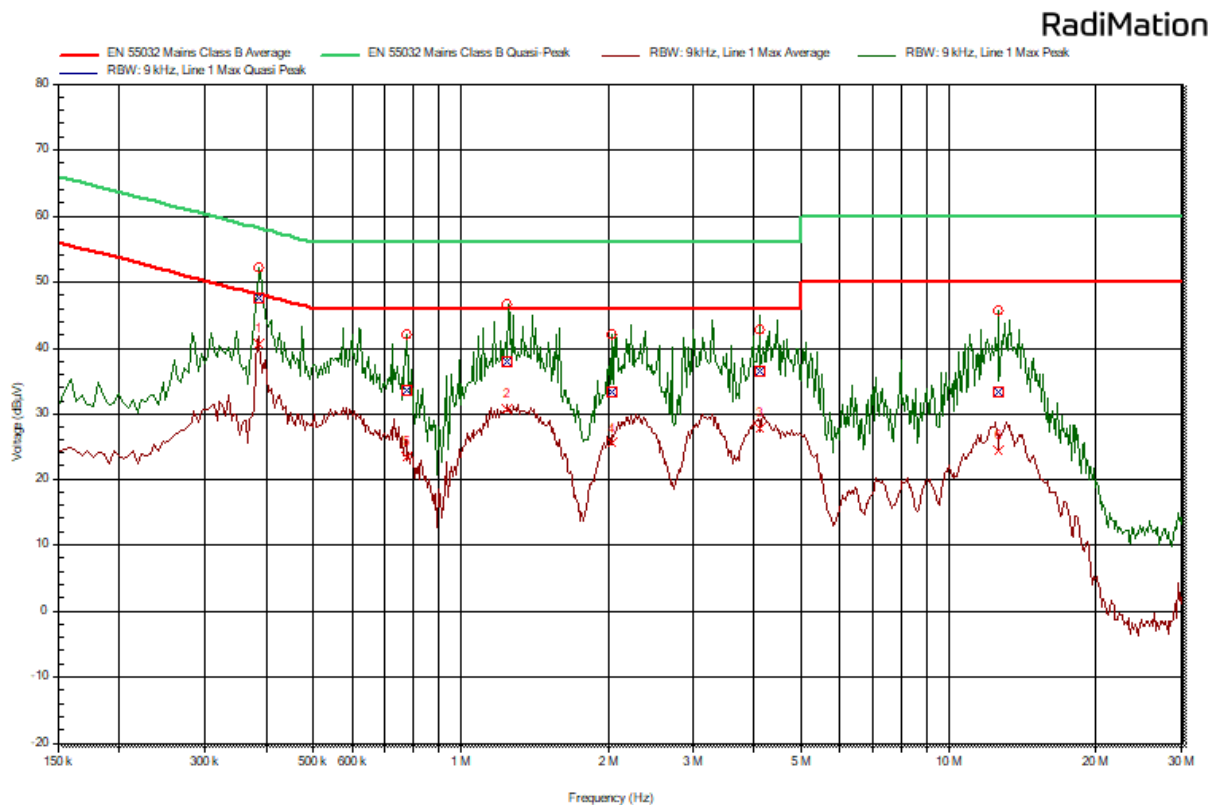
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3.2.6 Measurement uncertainty

+/- 3.6 dB

3.2.7 Plots of the AC mains conducted spurious measurement

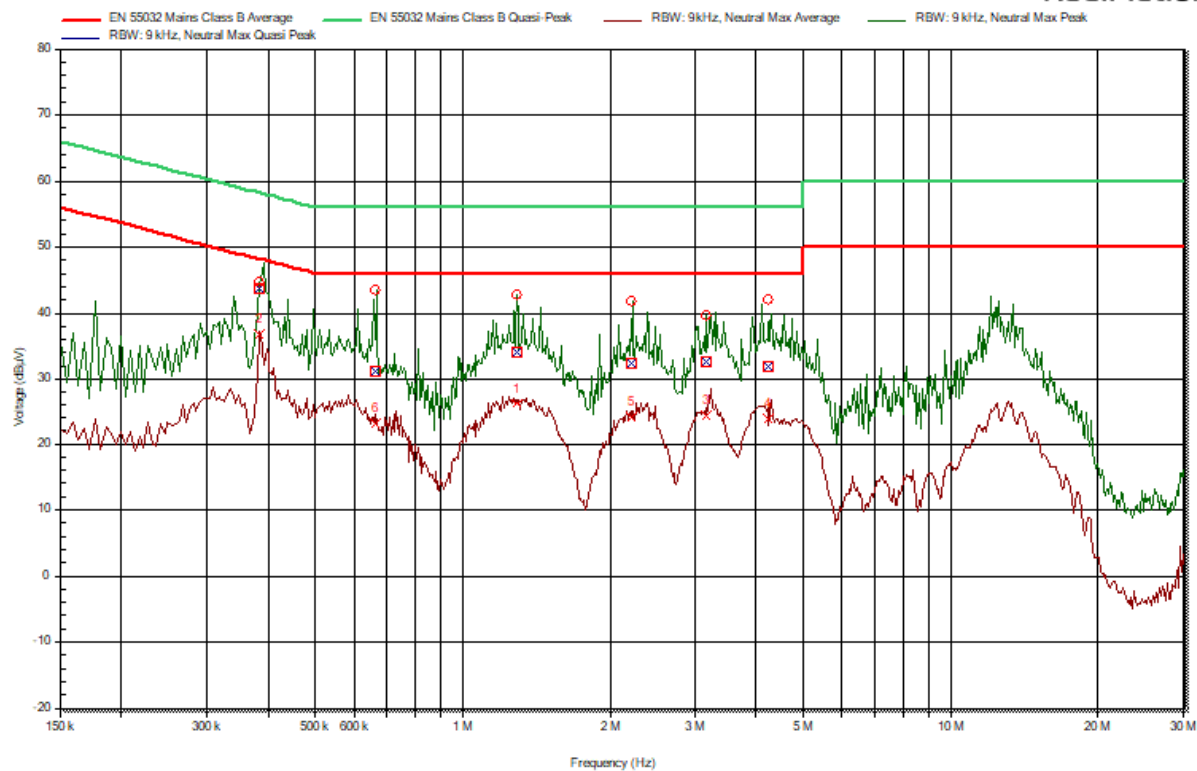
Phase



Frequency	Peak	Average	Average Limit	Quasi-Peak	Quasi-Peak Limit	Status	LISN
386,25 kHz	52,1 dBμV	40,5 dBμV	48,1 dBμV	47,7 dBμV	58,1 dBμV	Pass	Line 1
1,247 MHz	46,5 dBμV	30,7 dBμV	46 dBμV	37,8 dBμV	56 dBμV	Pass	Line 1
4,118 MHz	42,7 dBμV	27,9 dBμV	46 dBμV	36,5 dBμV	56 dBμV	Pass	Line 1
2,037 MHz	42 dBμV	25,5 dBμV	46 dBμV	33,5 dBμV	56 dBμV	Pass	Line 1
773,7 kHz	42,1 dBμV	23,2 dBμV	46 dBμV	33,5 dBμV	56 dBμV	Pass	Line 1
12,669 MHz	45,6 dBμV	24,1 dBμV	50 dBμV	33,4 dBμV	60 dBμV	Pass	Line 1

Neutral

RadiMation



Frequency	Peak	Average	Average Limit	Quasi-Peak	Quasi-Peak Limit	Status	LISN
1,285 MHz	42,9 dBμV	26 dBμV	46 dBμV	34,1 dBμV	56 dBμV	Pass	Neutral
384,45 kHz	44,8 dBμV	36,7 dBμV	48,2 dBμV	43,7 dBμV	58,2 dBμV	Pass	Neutral
3,17 MHz	39,6 dBμV	24,3 dBμV	46 dBμV	32,5 dBμV	56 dBμV	Pass	Neutral
4,254 MHz	42 dBμV	23,7 dBμV	46 dBμV	32 dBμV	56 dBμV	Pass	Neutral
2,218 MHz	41,8 dBμV	24 dBμV	46 dBμV	32,5 dBμV	56 dBμV	Pass	Neutral
664,8 kHz	43,5 dBμV	23,1 dBμV	46 dBμV	31,3 dBμV	56 dBμV	Pass	Neutral

< End of the report >