

FCC and ISED Test Report for 47 CFR Part 15 subpart 15 C, sections 15.225 and 15.207; subpart 15B section 15.107 and 15.109, and RSS-210

Product name : DCNM-IDESKVID
Applicant : Bosch Security Systems B.V.
FCC ID : UX8-DCNM-IDESKX
ISED ID : 1249D-DCNMIDESKX

Test report No. : 170701795 003 Ver 2.00

Laboratory information

Accreditation

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).

Telefication is designated by the FCC as an Accredited Test Firm for compliance testing of equipment subject to Certification under Parts 15 & 18. The Designation number is: NL0001.

The Industry Canada registration number for the 3 meter test chamber of Telefication is: 4173A-1.

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. +31889983600 Fax. +31316583189
Test Site FCC	NL0001

Revision History

Version	Date	Remarks	By
v0.50	24-09-2018	First draft	PvW
v1.00	27-09-2018	Final version	PvW
v2.00	01-10-2018	Updated version, changes: Updated name Updated ISED ID Added calculation for limit line Added full range plots for conducted emissions Added plot of 99% OBW Corrected output power value	PvW

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Summary of Test results

FCC	RSS	Description	Paragraph	Verdict
15.225(a),(b),(c)	RSS-210, B.6(a),(b),(c)	Field strength of emissions	3.1	Pass
15.225(d)	RSS-210 B.6(d)	Field strength of unwanted emissions	3.2	Pass
15.225(e)	RSS-210 B.6	Frequency Tolerance	3.3	Pass
--	RSS-Gen 6.7	99% occupied bandwidth	3.4	Pass
15.109	RSS-210 B.6(d)	Radiated Spurious Emissions	3.5	Pass
15.207	RSS-Gen A8.8	Conducted emissions	3.6	Pass

1 General Description

1.1 Applicant

Client name:	Bosch Security Systems B.V.
Address	Torenallee 49, Eindhoven, the Netherlands
Zip code:	5617 BA
Telephone:	+31 40 2577 044
E-mail:	--
Contact name:	Mr. Roel van Zon

1.2 Manufacturer

Manufacturer name:	Bosch Security Systems B.V.
Address:	Torenallee 49, Eindhoven, the Netherlands
Zip code:	5617 BA
Telephone:	+31 40 2577 044
E-mail:	--
Contact name:	Mr. Roel van Zon

1.3 Tested Equipment Under Test (EUT)

Product name:	DCNM-IDEKVID
Brand name:	Bosch
FCC ID:	UX8DCNM-IDEKX
ISED ID:	1249D-DCNMIDEKX
Product type:	Discussion device
Model(s):	DCNM-IDEKVID DCNM-IDEK
Batch and/or serial No.	045291985601042003
Software version:	V 2.80.19033
Hardware version:	01/00
Date of receipt	07-08-2018
Tests started:	07-08-2018
Testing ended:	01-10-2018

1.4 Product specifications of Equipment under test

Tx Frequency:	13.56 MHz
Rx frequency:	13.56 MHz
Antenna type	PCB 4 loop antenna
Type of modulation:	ASK
Emission designator	13M6A1D

1.5 Environmental conditions

Test date	08-08-2018	09-08-2018	17-08-2018	01-10-2018
Ambient temperature	26.9 °C	28.0 °C	22.5 °C	20.1°C
Humidity	49.6 %	37.7 %	56.0 %	47.0%

1.6 Measurement standards

- ANSI C63.4:2014
- ANSI C63.10:2013
- RSS-Gen Issue 5 (04-2018)
- RSS-210 Issue 9 (08-2016)

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 C §15.225
- FCC Part 15 Subpart B §15.109
- FCC Part 15 Subpart C §15.207
- RSS-210, chapter B.6
- RSS-Gen

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 R. van Barneveld

The above conclusions have been verified by the following signatory:

Date : 02-10-2018

Name : ing K.A. Roes

Function : Coordinator Radio Laboratory

Signature :



2 Test configuration of the Equipment Under Test

2.1 Test mode

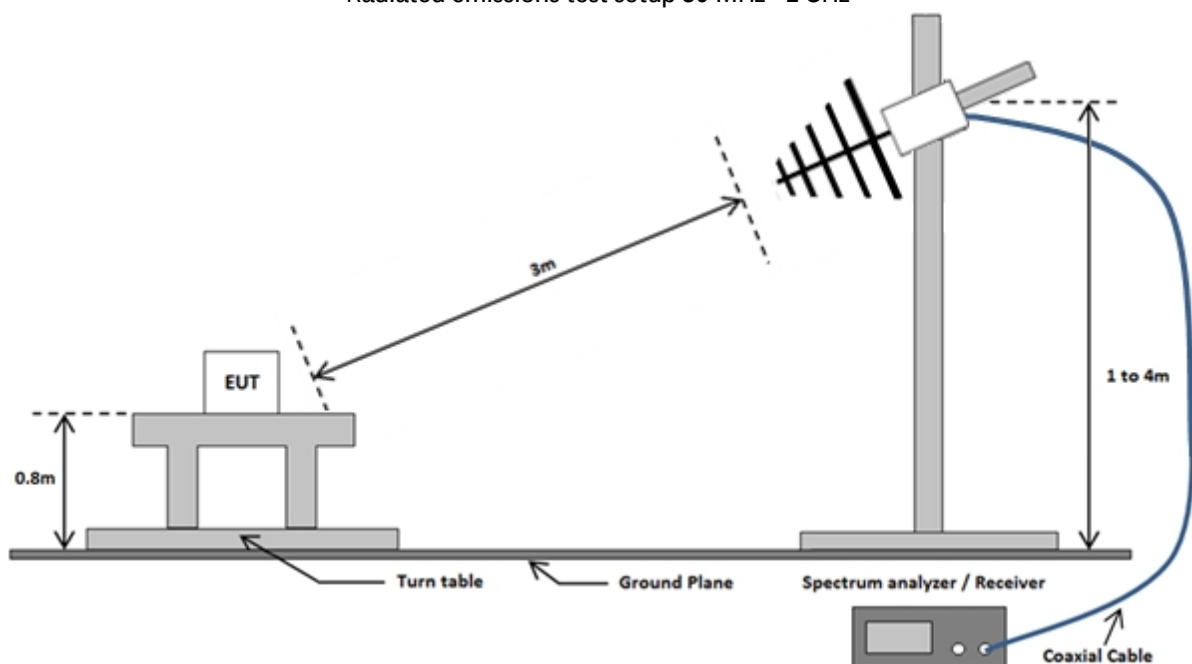
The applicant provided test mode software for the EUT, with which it was possible to configure the EUT to transmit continuously.

2.2 Test setups

Radiated emissions test setup below 30 MHz

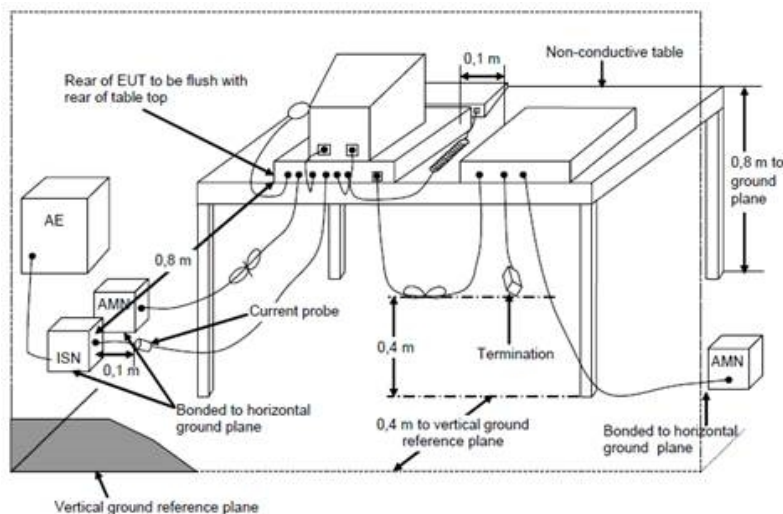


Radiated emissions test setup 30 MHz - 1 GHz



Conducted emissions test setup

Emissions test at AC mains



2.3 Equipment used in the test configuration

Description	Manufacturer	Model	ID	Used at Par.
Climate chamber	CTS	-40/350	TE00741	3.3
Active loop antenna	Rohde & Schwarz	HFH2-Z2	TE00746	3.2, 3.4
DC power supply	Delta	60V/0.6A	TE00597	3.3
Spectrum Analyzer	Rohde & Schwarz	ESR7	TE01220	3.1 – 3.6
Software	D.A.R.E Instruments	Radimation 2018.1.3	--	3.5, 3.6

Description	ID	Used at paragraphs
Semi-anechoic chamber	TS00004	3.5
Conducted emission measurement system	TS00005	3.6

2.4 Sample calculations

Field Strength Measurement example(see chapter 3.1):

Frequency (MHz)	Polarization	Height(m)	Quasi-Peak (dBμV/m)
135,6	Horizontal	1	40,4

The following relation applies:

$$E \text{ (dB}\mu\text{V/m)} = U \text{ (dB}\mu\text{V)} + AF \text{ (dB/m)} + CL \text{ (dB)}$$

Where:

E = Electric field strength

U = Measuring receiver voltage

AF = Antenna factor

CL = Cable loss

$$(40.4 = 27.23 + 11.8 + 1.37)$$

3 Test results

3.1 Field strength of emissions and spurious emissions <30 MHz

3.1.1 Limit

RSS-210, section B.6 (a)(b)(c)

15.225 (a)(b)(c)

Frequency (MHz)	$\mu\text{V/m}$ at 30 meter	$\text{dB}\mu\text{V/m}$ at 30 meter	$\text{dB}\mu\text{V/m}$ at 3 meter
13.553 – 13.567	15,848	84	108.3
13.410 – 13.553 and 13.567 – 13.710	334	50.5	74.8
13.110 – 13.410 and 13.710 - 14.010	106	40.5	64.8

15.225(d)

RSS-Gen section 8.9

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance(m)
0.009 - 0.490	$2400/F(\text{kHz})$	$20*\log[2400/F(\text{kHz})]$	300
0.490 – 1.705	$24000/F(\text{kHz})$	$20*\log[24000/F(\text{kHz})]$	30
1.705 – 13.110 and 14.010 - 30	30	29.5	30

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance(m)
0.009 - 0.490	$2400/F(\text{kHz})$	$20*\log[2400/F(\text{kHz})]+80$	3
0.490 – 1.705	$24000/F(\text{kHz})$	$20*\log[24000/F(\text{kHz})]+40$	3
1.705 – 13.110 and 14.010 – 15.91	30	$29.5+40$	3
15.91 – 30.0	30	$29.5+20$	3

Note: field strength limits converted to 3m limit according to ANSI C63.10-2013, chapter 6.4.4.2
Measurement distance is 3m so the $\lambda/2\pi$ break point is 15.91 MHz.

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

According to ANSI C63.10-2013, section 6.4.4.2.

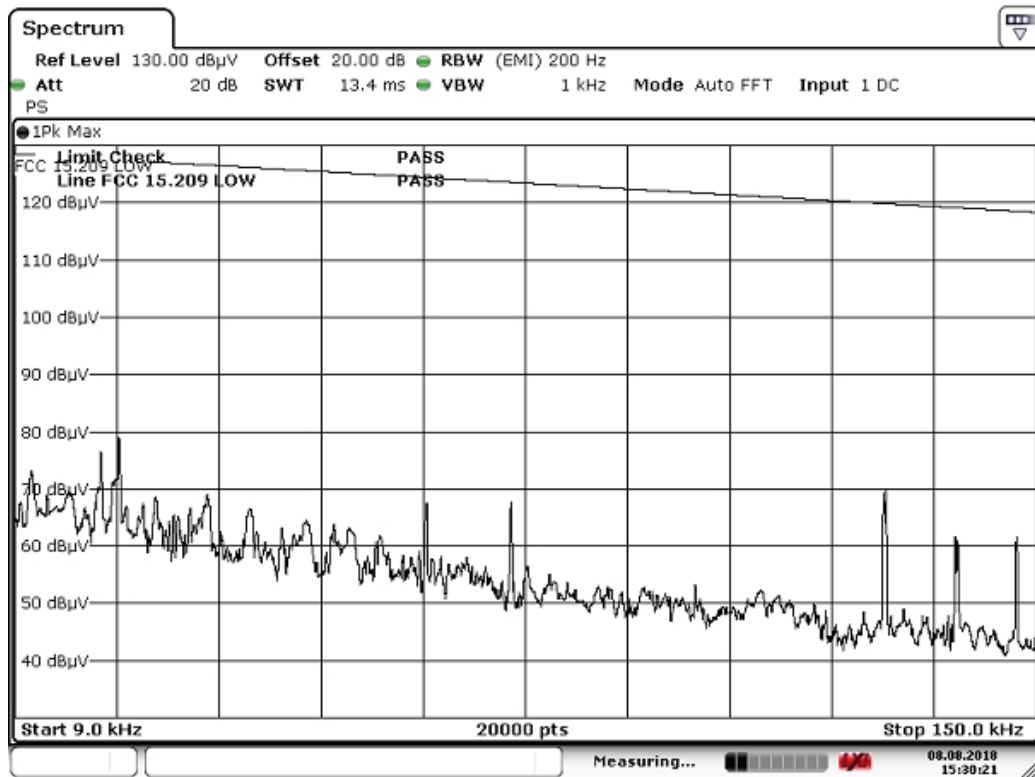
IRN027 Radiated magnetic disturbance – Method 1 Loop antenna.

3.1.5 Test results of Field strength of emissions

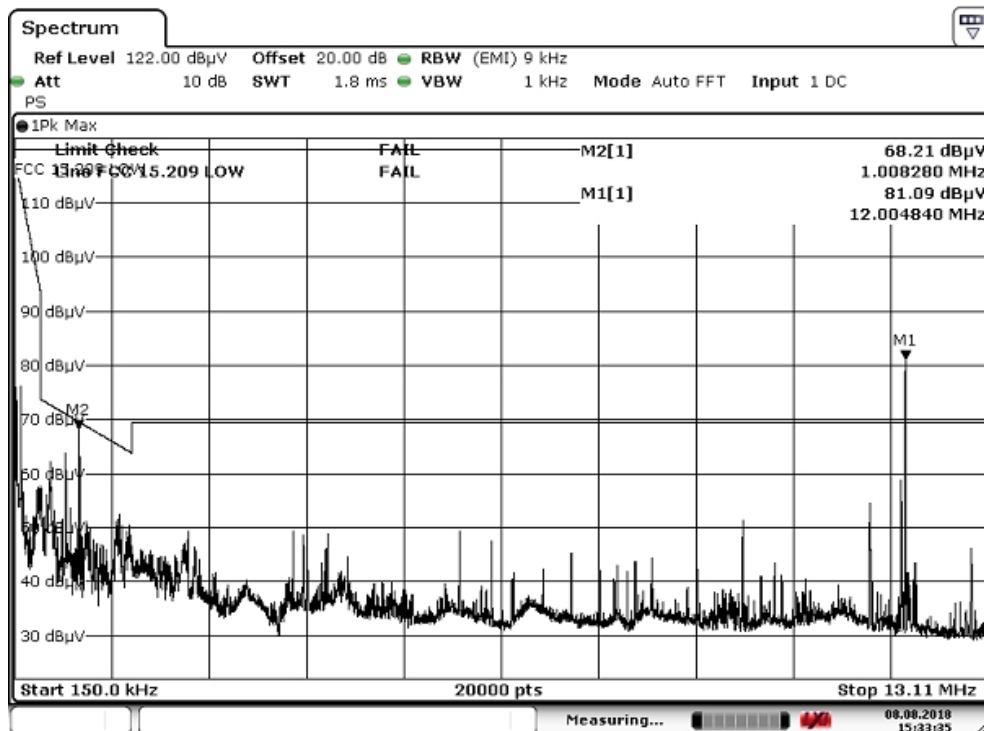
Frequency (MHz)	Max Field strength at 3m ($\text{dB}\mu\text{V/m}$)
13.56	49.7
Uncertainty	+3.0 / -2.5 dB

3.1.6 Plots of Field strength of emissions Measurement

9 kHz – 150 kHz



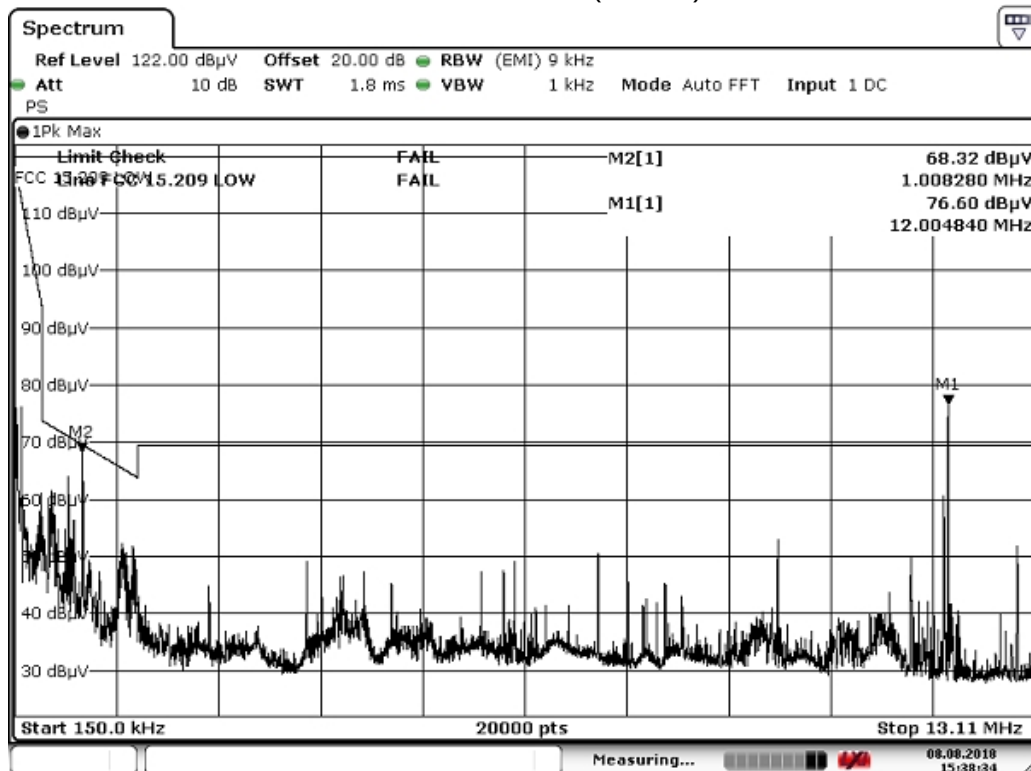
150 kHz to 13.11 MHz



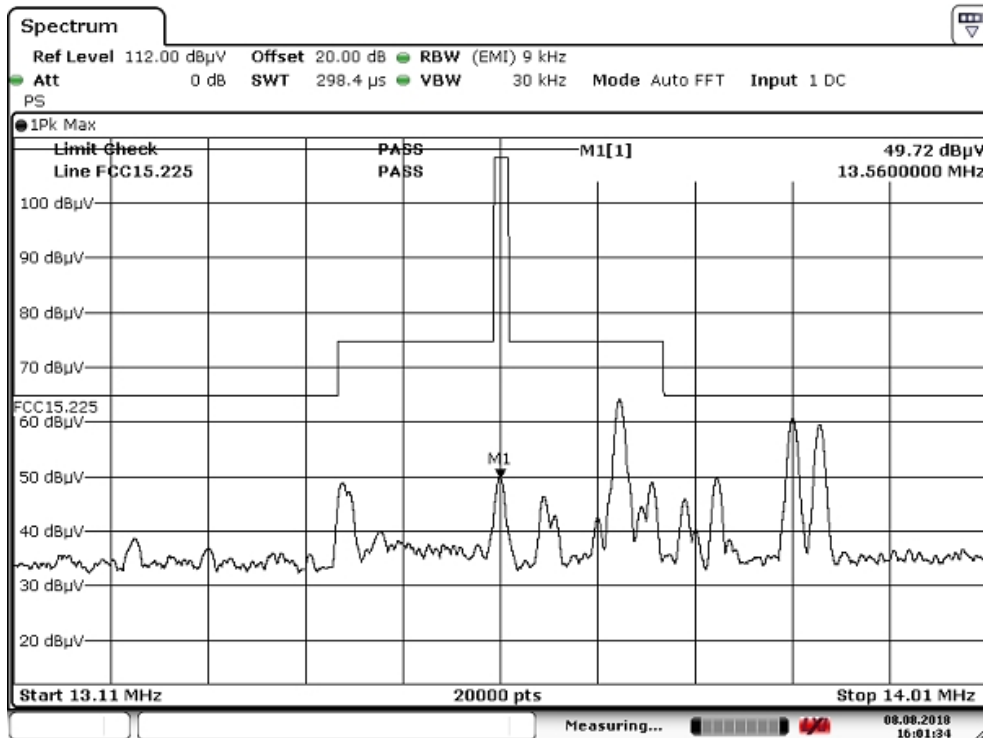
Note: in the plots above a distance factor of - 40 dB/decade to convert to 3 m distance has been used (ref. 47 CFR part 15B, §15.31 f (2)).

Note: The peaks at 1 and 12 MHz are caused by ambient signals. When the EUT is powered off, these peaks are still present. See ambient plot below.

150 kHz to 13.11 MHz (ambient)

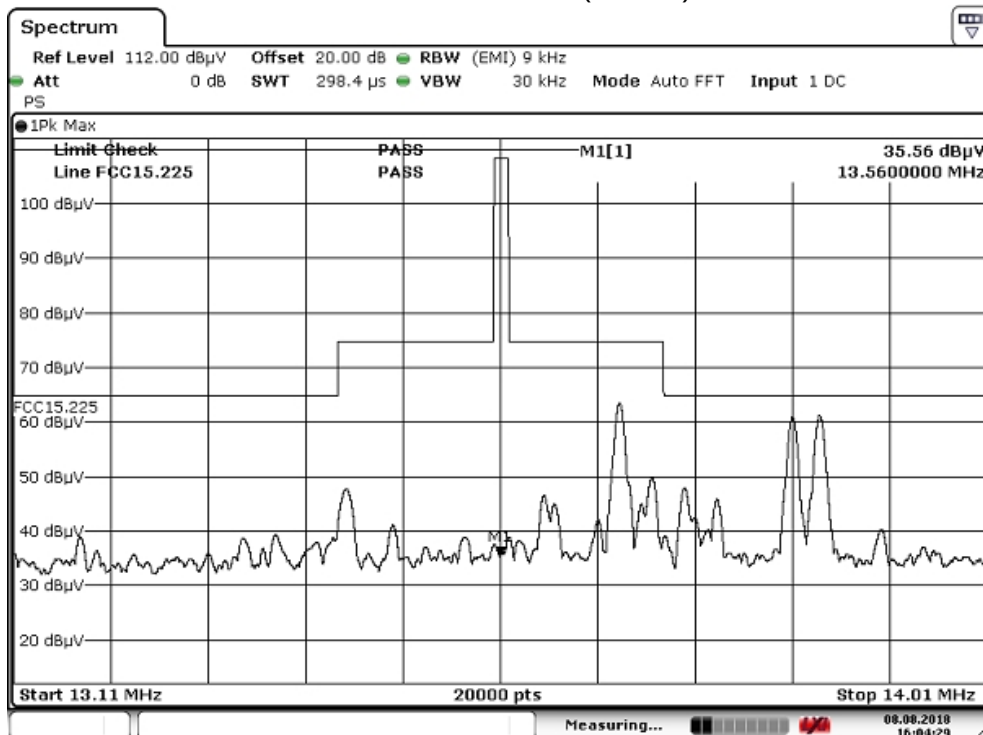


13.11 MHz to 14.01 MHz

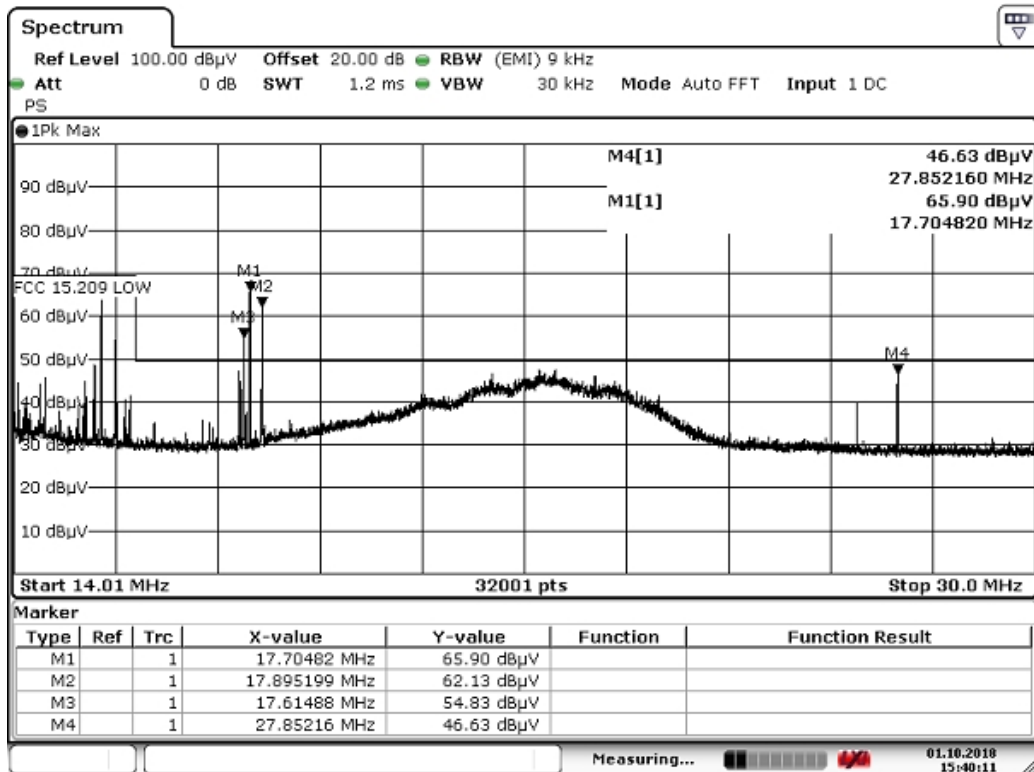


Note: the limit has been converted to 3 m distance according to the procedure as given in ANSI C63.10; 2013, §6.4.4.2
Note: the peaks other than the transmission signal are caused by ambient signals. When the EUT is powered off, these peaks are still present with the same signal strength. See the plot below.

13.11 Mhz to 14.01 MHz (ambient)



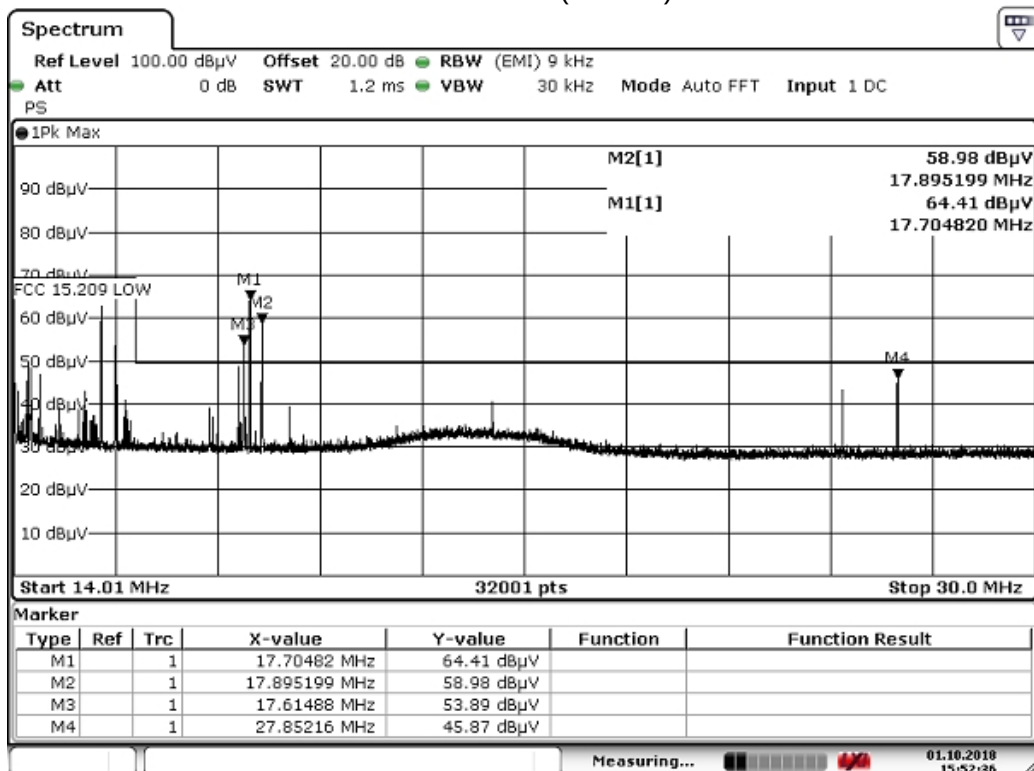
14.01 MHz to 30 MHz



Note: the limit has been converted to 3 m distance according to the procedure as given in ANSI C63.10; 2013, §6.4.4.2

Note: the peaks at 17.7, 17.9, 17.6 and 27.9 MHz are caused by ambient signals. When the EUT is off, these remain present. See plot below. The wide bump in the middle of the plot is caused by the APS, ancillary equipment required to power the EUT. The APS and EUT have been powered off in the plot below.

14.01 to 30 MHz (Ambient)



3.2 Field Strength of Unwanted Emissions

3.2.1 Limit

15.225(d)

The field strength of any radio-generated emissions appearing outside of the 13.110 -14.010 MHz band shall not exceed the general radiated emission limits in part 15.209.

RSS-Gen section 8.9 and 15.209

Frequency (MHz)	Field strength ($\mu\text{V}/\text{m}$)	Field strength ($\text{dB}\mu\text{V}/\text{m}$)	Measurement distance(m)
30 -88	100	40	3
88 - 216	150	43,5	3
216-960	200	46	3
Above 960	500	54	3

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 5.4.2 and 8.2.3.

IRN 026 Radiated electrical disturbance – Method 1: 30 MHz – 1 GHz in SAR.

3.2.5 Measurement Uncertainty

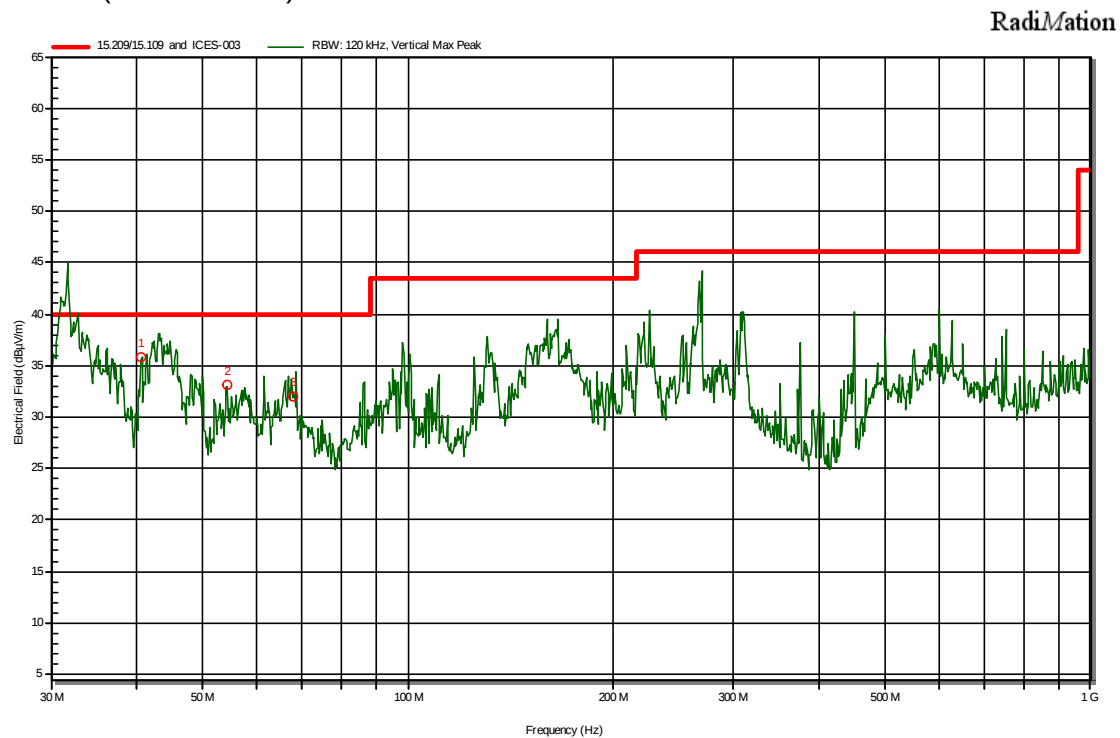
Horizontal polarization	
30 – 200 MHz	4.5 dB
Vertical polarization	
30 – 200 MHz	5.4 dB

3.2.6 Results of the Field strength of unwanted emissions measurement

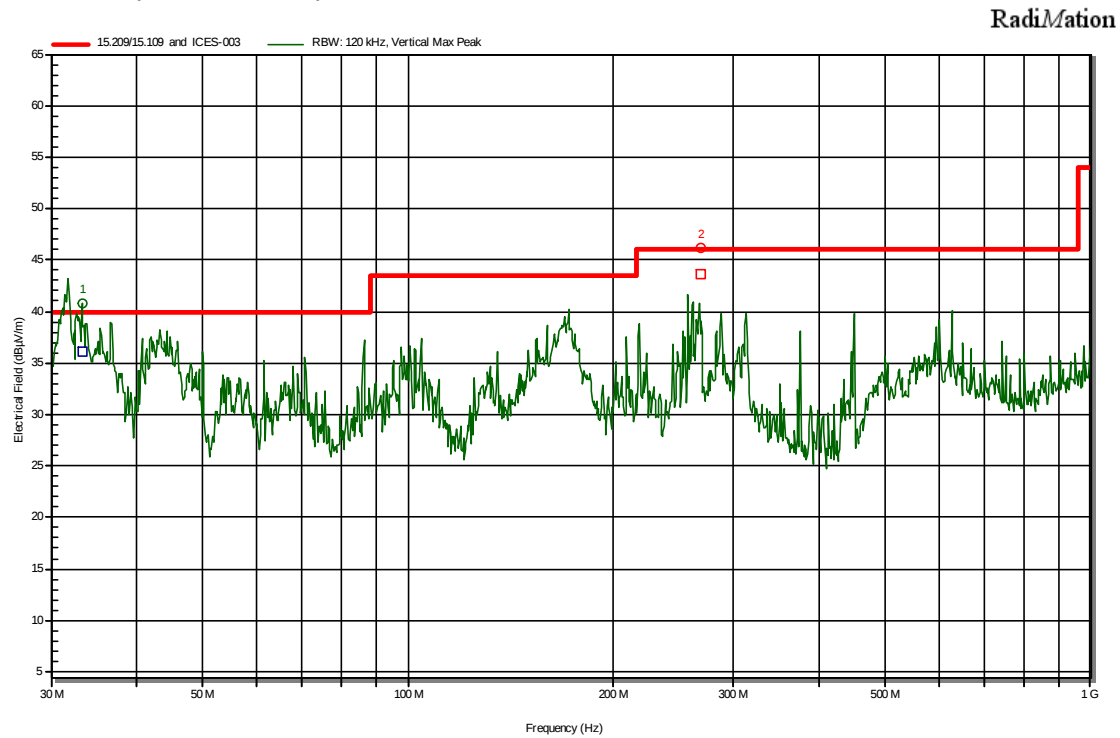
Frequency (MHz)	Level at horizontal pol. ($\text{dB}\mu\text{V}/\text{m}$)	Level at vertical pol. ($\text{dB}\mu\text{V}/\text{m}$)	Limit ($\text{dB}\mu\text{V}/\text{m}$)
40.68	29.4	35.8	40
54.24	--	33.0	40
67.80	24.4	32.0	40
81.36	--	--	40

3.2.7 Plots of the unwanted emissions measurement

Vertical (Card read mode)



Horizontal (Card read mode)



Note: The peaks exceeding the limit at 31 MHz in the plots above are not generated by the RF part of the EUT, and therefore subject to the 15.109(b) limits, not the 15.209 limits pictured in the plots above. See chapter 3.5 of this report for spurious emission measurements of the non-radio part of the device.

3.3 Frequency Tolerance

3.3.1 Limit

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to 55 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. Note: Only the most extreme temperature conditions have been measured, results at these temperatures are considered representative for the entire applicable temperature range.

3.3.2 Measurement instruments

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

3.3.3 Test setup

The test has been performed in a climatic chamber using a test fixture.

3.3.4 Test procedure

According to ANSI C63.10-2013, section 6.8.

According to RSS-Gen Issue 5, section 6.11.

IRN 005 Frequency – Method 2: Spectrum analyser.

3.3.5 Test results of Frequency Tolerance Measurements

Temperature variation:

Temp. (°C)	-20	55
Frequency (MHz)	13.55952	13.55939
Deviation (%)*)	-0.0035	- 0.0045
Limit (%)	0.01	0.01

*) w.r.t. nominal frequency of 13.56 MHz

Voltage variation:

Voltage	Frequency (MHz)	Deviation (%)*)	Limit (%)
40.8	13.55945	0.0041	0.01
55.2	13.55944	0.0041	0.01

*) w.r.t. nominal frequency of 13.56 MHz

3.3.6 Measurement Uncertainty

Measurement uncertainty = ± 10 Hz.

3.4 99% Occupied Bandwidth

3.4.1 Limit

No limit

3.4.2 Measurement instruments

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

3.4.3 Test setup

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

3.4.4 Test procedure

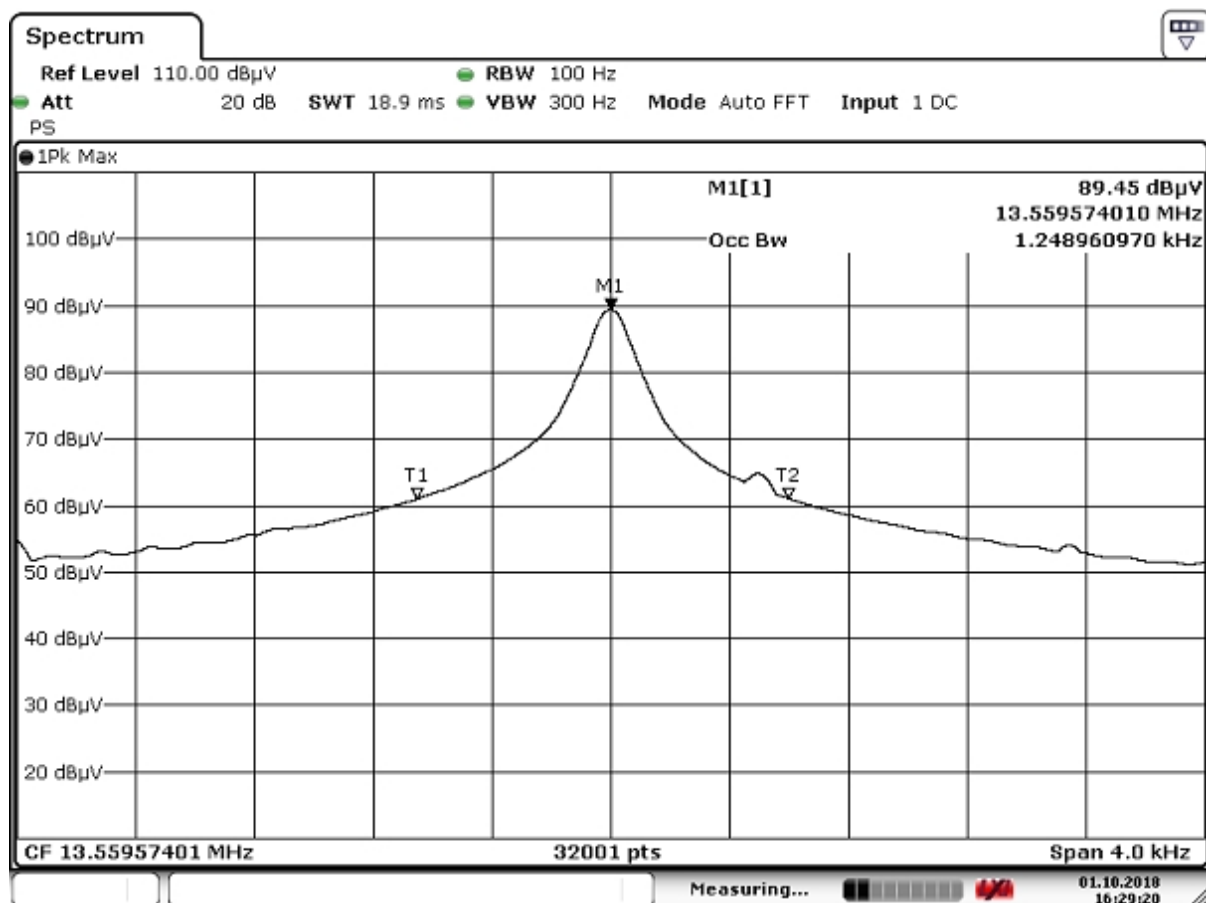
According to RSS-Gen Issue 5, section 6.7.

IRN 017 Occupied bandwidth – Method 1: XX% power bandwidth.

3.4.5 Test results of the 99% Occupied Bandwidth Measurement

Technology Std.	Frequency (MHz)	99% Occupied Bandwidth (kHz)
NFC	13.56	1.25
Uncertainty	± 0.17 kHz	

3.4.6 Plots of the 99% occupied bandwidth measurement



3.5 Radiated Spurious Emissions

3.5.1 Limit

15.109(b)

Class A limits

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance(m)
30 -88	90	49	3
88 - 216	150	53.5	3
216-960	210	56.4	3
Above 960	300	59.5	3

3.5.2 Measurement instruments

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

3.5.3 Test setup

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

3.5.4 Test procedure

According to ANSI C63.4-2014, section 8.3.

IRN 026 Radiated electrical disturbance – Method 1: 30 MHz – 1 GHz in SAR.

3.5.5 Measurement Uncertainty

Measurement uncertainty Radiated emissions below 1 GHz

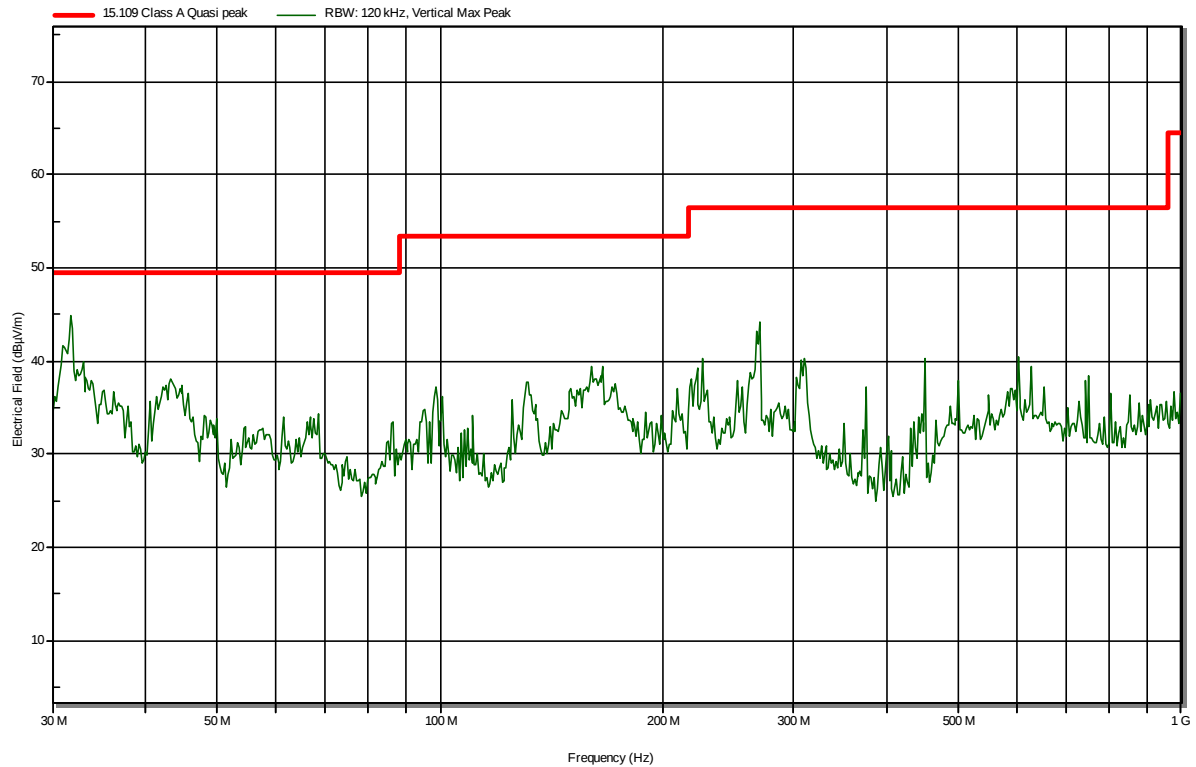
Horizontal polarization	
30 – 200 MHz	4.5 dB
200 – 1000 MHz	3.6 dB
Vertical polarization	
30 – 200 MHz	5.4 dB
200 – 1000 MHz	4.6 dB

3.5.6 Plots of the Radiated Spurious Emissions Measurement

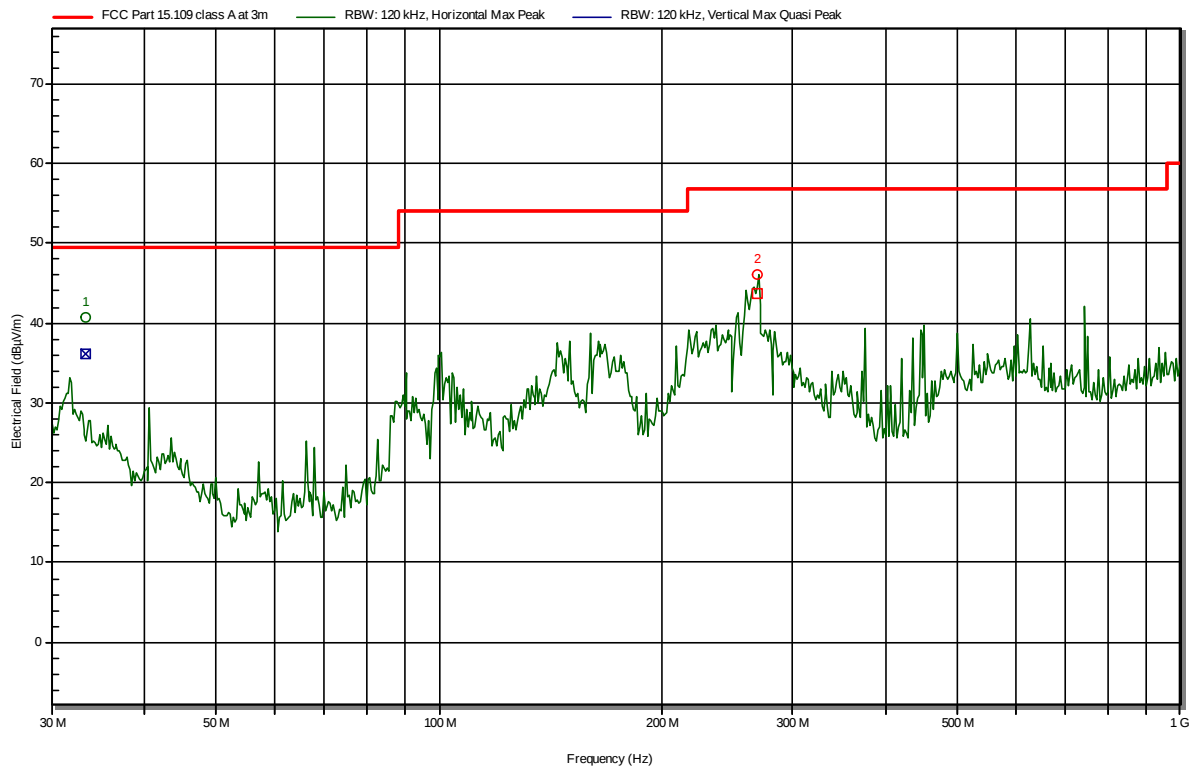
30 -1000 MHz

Vertical polarization

RadiMation



Horizontal polarization



3.6 Conducted emissions

3.6.1 Limit

Radio part: According to 15.207 (a)

According to RSS-Gen issue 5, 04-2018, section 8.8

Frequency range (MHz)	Quasi-peak limit (dB μ V)	Average limit (dB μ V)
0.15 – 0.50	66 to 56	56 to 46
0.50 – 5	56	46
5 – 30	60	50

Non-radio part: according to 15.107 (b)

Frequency range (MHz)	Quasi-peak limit (dB μ V)	Average limit (dB μ V)
0.15 – 0.50	79	66
0.50 – 30	73	60

3.6.2 Measurement instruments

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

3.6.3 Test setup

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

3.6.4 Test procedure

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

IRN 029 Conducted Disturbance – Method 1: AC mains conducted disturbance.

3.6.5 Measurement uncertainty

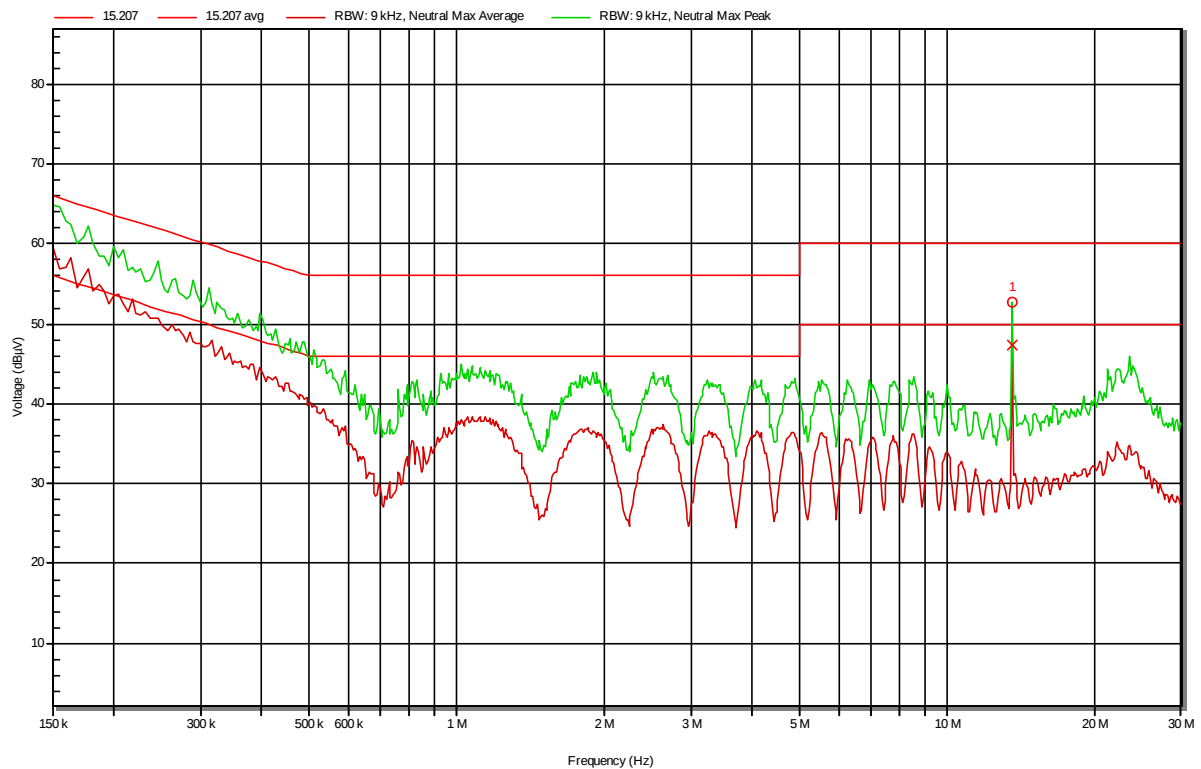
+/- 3.6 dB.

3.6.6 Plots of the AC mains conducted spurious measurement

See next page

Phase (Radio part)

RadiMation

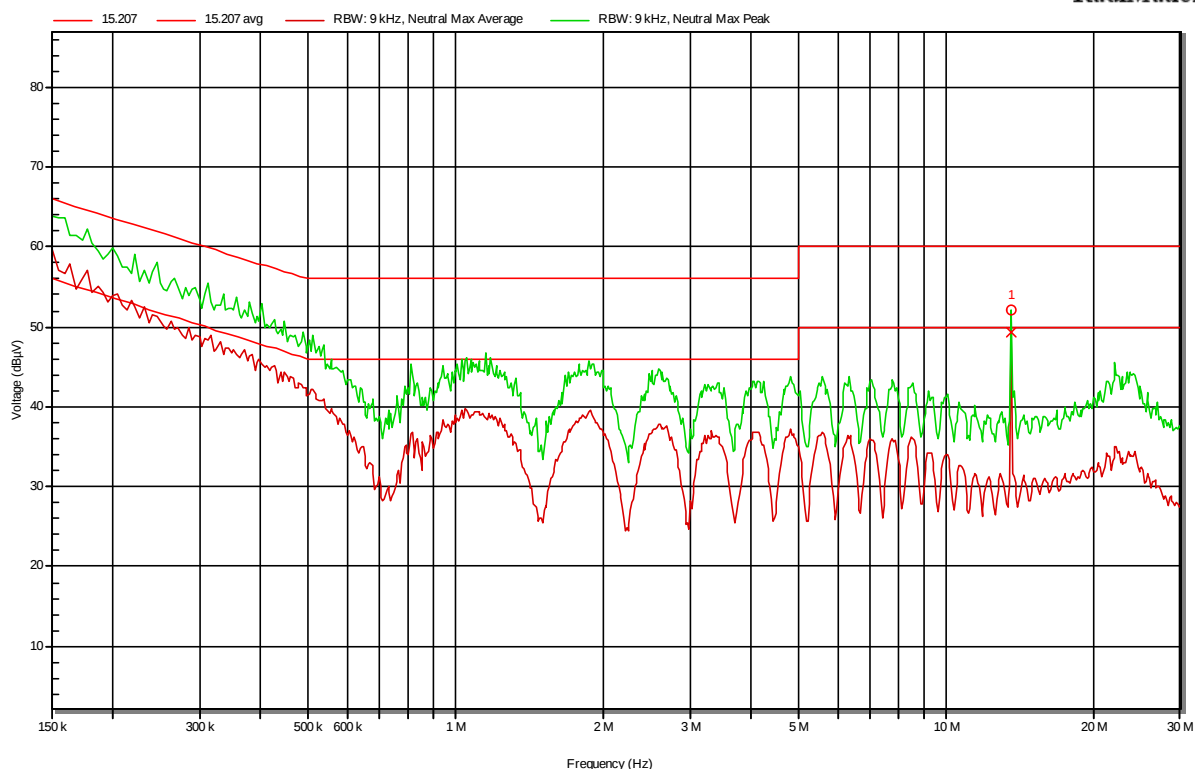


Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Average	Average Limit	Average Difference	Status
1	13,56 MHz	52,7 dBμV	60 dBμV	-7,3 dB	47,3 dBμV	50 dBμV	-2,7 dB	Pass

Note: The average emissions in the 150-200kHz range are caused by the ancillary equipment, and are subject to the class A limits of part 15.107. See plots below titled "Non-radio part".

Neutral (Radio part)

RadiMation

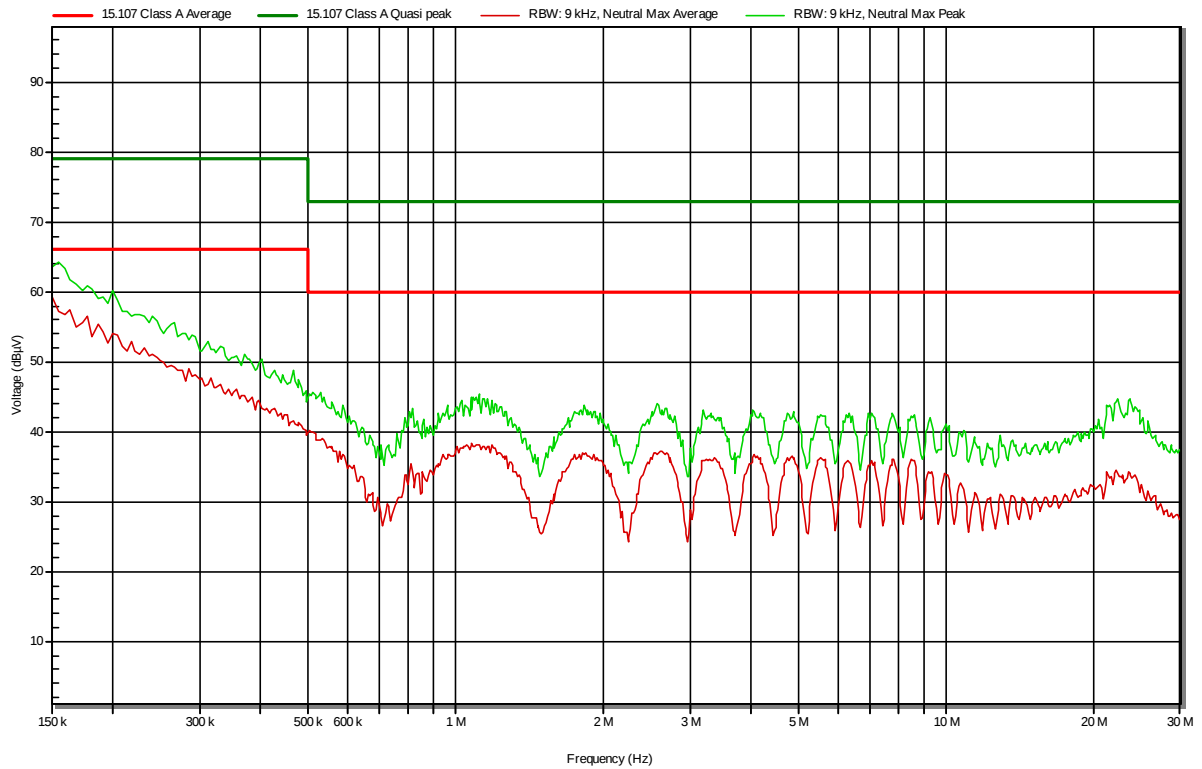


Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Average	Average Limit	Average Difference	Status
1	13,56 MHz	52,1 dBμV	60 dBμV	-7,9 dB	49,3 dBμV	50 dBμV	-0,7 dB	Pass

Note: The average emissions exceeding the average limit in the 150-200kHz range are caused by the ancillary equipment, and are subject to the class A limits of part 15.107. See plots below titled "Non-radio part"

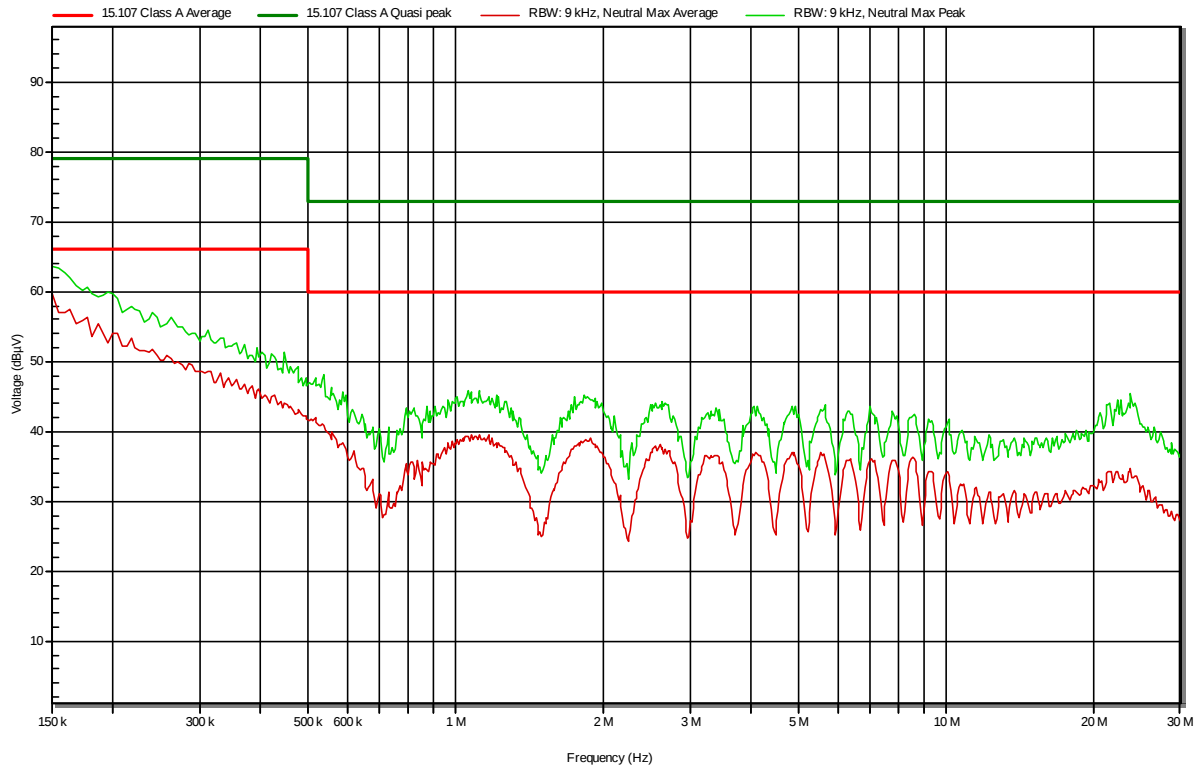
Phase (non-radio part)

RadiMation



Neutral (non-radio part)

RadiMation



Note: Plots of emission the non-radio part have been measured with the NFC radio of the equipment disabled.