

FCC and IC Test report for parts 15.207, 15.209, RSS-Gen

Additional to report 171200011 06

Product name : Gateway
Applicant : Neways Technologies
FCC ID : 2AO8D-IOT
IC ID : 23695-H2OALERTIOT

Test report No. : 171200011 028 Ver 1.00

Laboratory information

Accreditation

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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
v0.50	22-03-2019	First draft	PS
v1.00	05-07-2019	First issue	PS

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Summary of Test results

FCC	ISED	Description	Section in report	Verdict
15.209 (a)	RSS-Gen 8.9	Radiated spurious emissions	3.1	Pass
15.207 (c)	RSS-Gen 8.8	Conducted spurious emissions on AC mains	3.2	Pass

1 General Description

1.1 Applicant

Client name:	Neways Technologies
Address	Voltaweg 10
Zip code:	6101XK, Echt, The Netherlands
Telephone:	+31(0) 646287548
E-mail:	Tim.van.der.loo@newayselectronics.com
Contact name:	Mr. Tim van der Loo

1.2 Manufacturer

Manufacturer name:	BekoSense
Address:	Hoofdstraat 100
Zip code:	4265HA, Genderen, The Netherlands
Telephone:	+31 90) 653272390
E-mail:	ekolsteeg@bekosense.com

1.3 Tested Equipment Under Test (EUT)

Product name:	Gateway
Brand name:	H2O-ALERT
FCC ID:	2A08D-IOT
ISED ID:	23695-H2OALERTIOT
Product type:	1003310
Batch and/or serial No.	--
Software version:	1.4.1
Hardware version:	Rev1
Date of receipt	18-02-2019
Tests started:	18-02-2019
Testing ended:	26-03-2019

1.4 Product specifications of Equipment under test

Type of equipment	Gateway
TX frequency range:	EGPRS: 850/900/1800/1900 MHz LTE bands: 1, 2, 3, 4, 5, 8, 12, 13, 18, 19, 20, 28 LoRa: 915.0 - 915.4 MHz
RX frequency range:	EGPRS: 850/900/1800/1900 MHz LTE bands: 1, 2, 3, 4, 5, 8, 12, 13, 18, 19, 20, 28 LoRa: 915.0 – 915.4 MHz
Conducted output power	23 dBm
Antenna	Omnidirectional

1.5 Environmental conditions

Test date	18-02-2019	26-03-2019
Ambient temperature	19.9 °C	23.4 °C
Humidity	36.1 %	33.4 %

1.6 Measurement standards

- ANSI C63.10:2013

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 §15.207
- FCC Part 15 Subpart C §15.209
- RSS-Gen Issue 5

1.8 Observation and remarks

The product has been upgraded with a certified Quectel BG96 module.

The H2Oalert is a water quality detection system which measures temperature and conductivity changes inside drinking water tanks for cows.

The system has one or more sensors and a gateway.

The sensor measures every minute the temperature and the conductivity of the water. If these values are within the alarm trigger range, an data transfer over the air by use of LORA will happen in the first available timeslot. The Gateway receives this data and will transmit it over GPRS to a webserver which triggers the alarm and inform the end user.

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 : ing. P.A. Suringa

Review of test methods and report by:

Name : ing R. van Barneveld

The above conclusions have been verified by the following signatory:

Date : 05-07-2019

Name : ing. K.A Roes

Function : Coordinator Radio Laboratory

Signature :

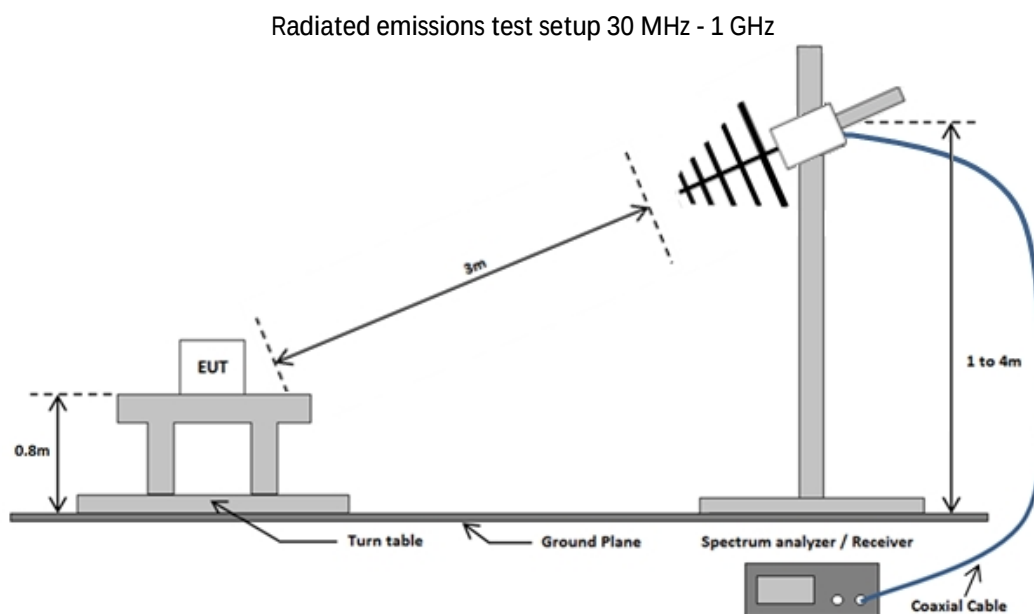
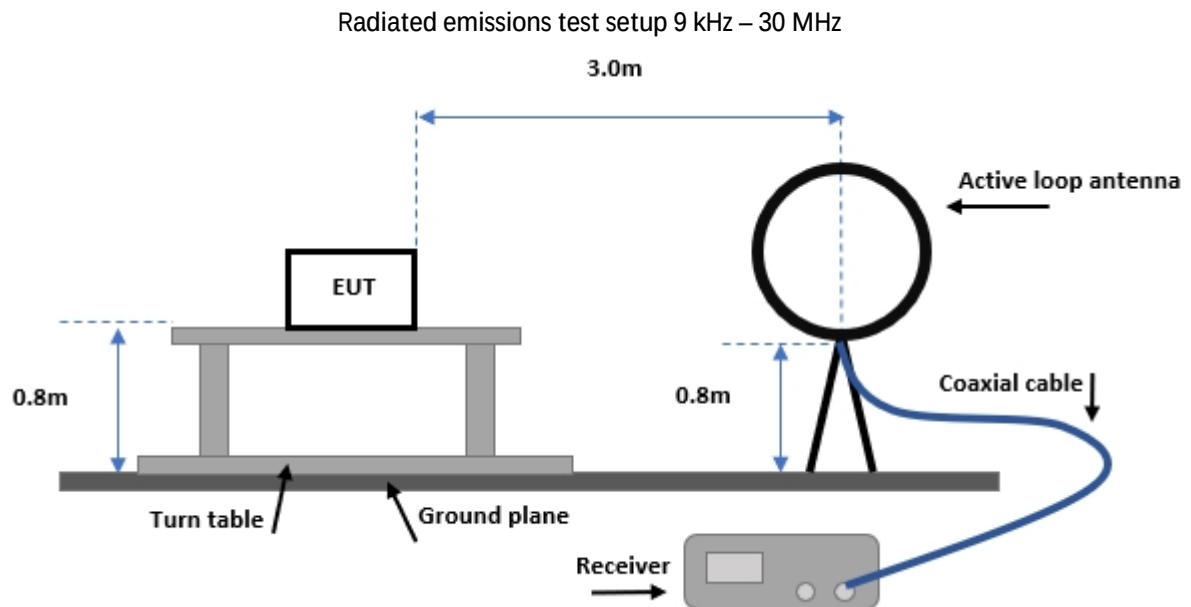


2 Test configuration of the Equipment Under Test

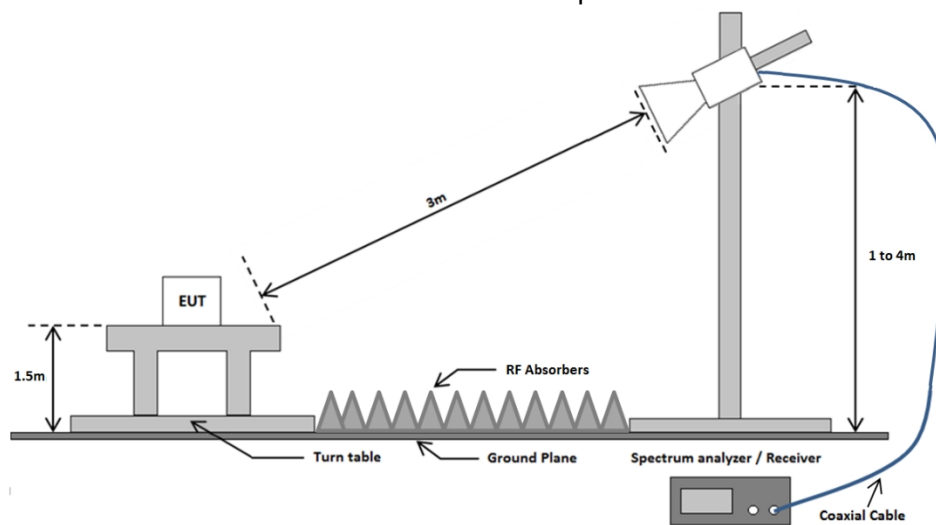
2.1 Test mode

Not applicable.

2.2 Test setups

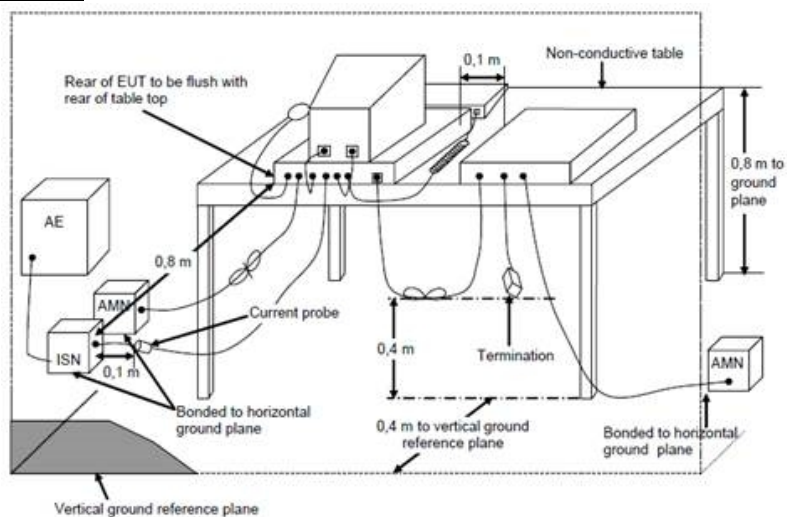


Radiated emissions test setup above 1 GHz



Conducted emissions test setup

Emissions test at AC mains



2.3 Equipment used in the test configuration

Description	Manufacturer	Model	ID	Used at Par.
Biconilog Antenna	Chase	CBL6112A	TE00967	3.1
Horn Antenna	EMCO The Electro – Mechanics Co	3115	TE00531	3.1
Pre-amplifier	Miteq	AFS42-041001800-29-OP-42	TE11132	3.1
Semi Anechoic Chamber (SAC)	Comtest Engineering BV	-	TE00861	3.1
Measurement software	DARE!! RadiMation®	Ver. 2018.1.3	--	3.1
Artificial Mains network	Rohde & Schwarz	ESH3-Z5	TE00208	3.2
Communication analyzer	Rohde & Schwarz	CMW 290	TE11163	3.1
Spectrum Analyzer	Rohde & Schwarz	FSP	TE0	3.1
EMI receiver	Rohde & Schwarz	ESCI	TE11128	3.1, 3.2
Band reject filter	Wainwright instruments GmbH	WRCG1710/1755-1535/1930-40/4SSFL	--	3.1
Pulse limiter	Rohde & Schwarz	ESH3-Z2	TE00756	3.2
Communication analyzer	Rohde & Schwarz	CMU	TE01166	3.1
AC source	Chroma	61601	TE02001	3.1, 3.2
Loop antenna	Rohde & Schwarz	HFH2-Z2	TE00746	3.1

2.4 Sample calculations

Field Strength Measurement example:

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 Radiated spurious emissions

3.1.1 Limit

15.209(a)

The field strength of any emissions shall not exceed the general radiated emission limits in part 15.209(a).

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance(m)
0.009 – 0.490	2400/F(kHz)	$20*\{\log[2400]-\log[F(\text{kHz})]\}$	300*
0.490 – 1.705	24000/F(kHz)	$20*\{\log[24000]-\log[F(\text{kHz})]\}$	30*
1.705 – 13.11 14.01 – 30.0	30	29.5	30*
30 -88	100	40	3
88 - 216	150	43,5	3
216-960	200	46	3
Above 960	500	54	3

*Note: Limit lines in the plots corrected to 3m measurement distance according to the method described in ANSI C63.10-2013, clause 6.4

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

9 kHz – 30 MHz: According to ANSI C63.4-2014, section 5.4.2 and 8.2.3

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

9 kHz to 30 MHz: IRN 026 – Method 10

30 MHz to 1 GHz: IRN 026 – Method 1

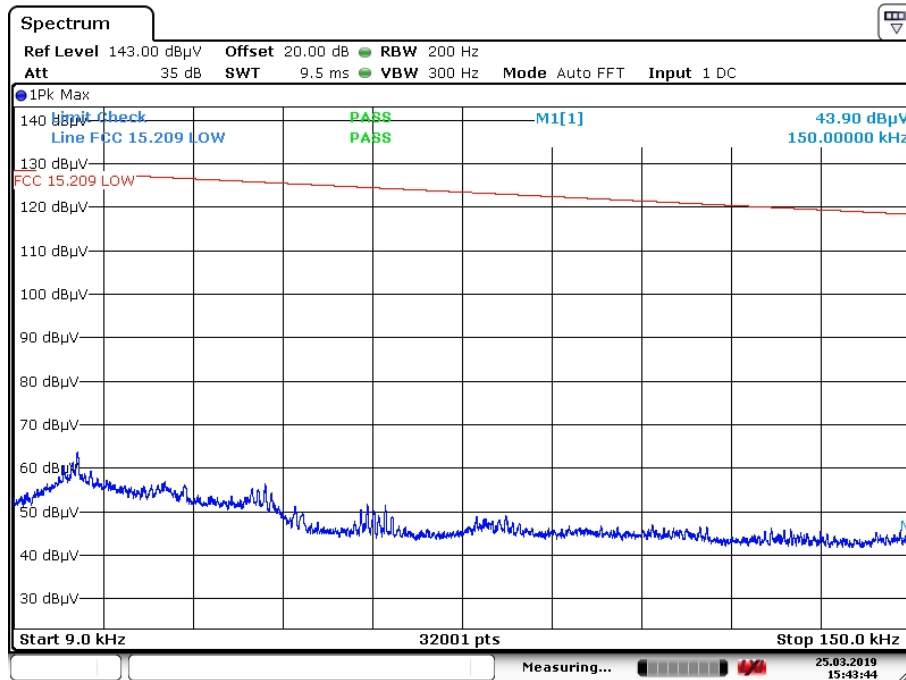
1 GHz to 18 GHz: IRN 026 – Method 2

3.1.5 Measurement Uncertainty

Frequency range	Polarization	Uncertainty
9 kHz – 30 MHz	--	±1.6 dB
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

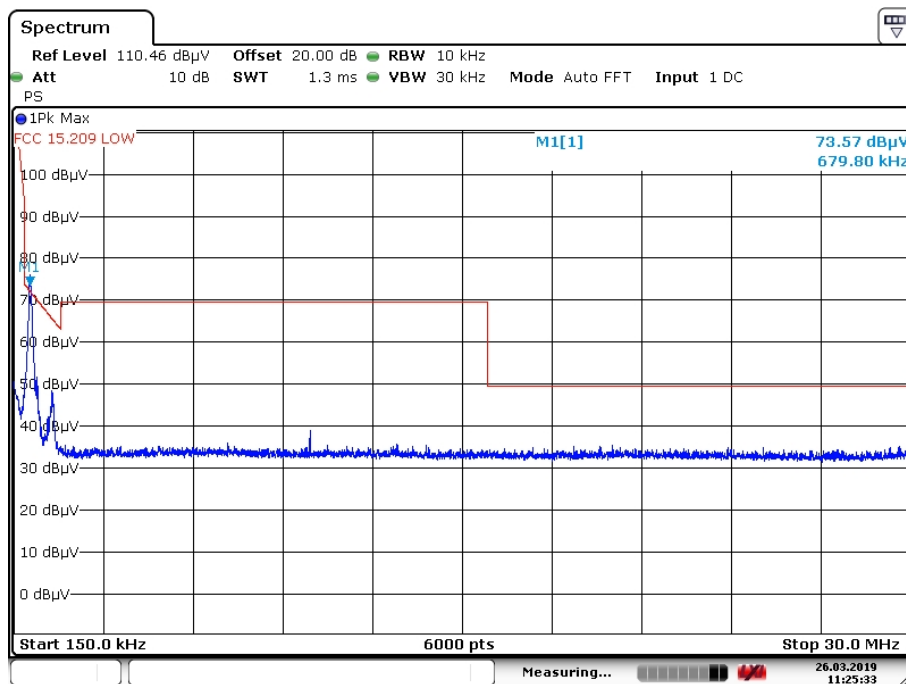
3.1.6 Plots of the Radiated Spurious Emissions Measurement

9 – 150 kHz



Date: 25.MAR.2019 15:43:44

0.15 – 30 MHz



Date: 26.MAR.2019 11:25:29

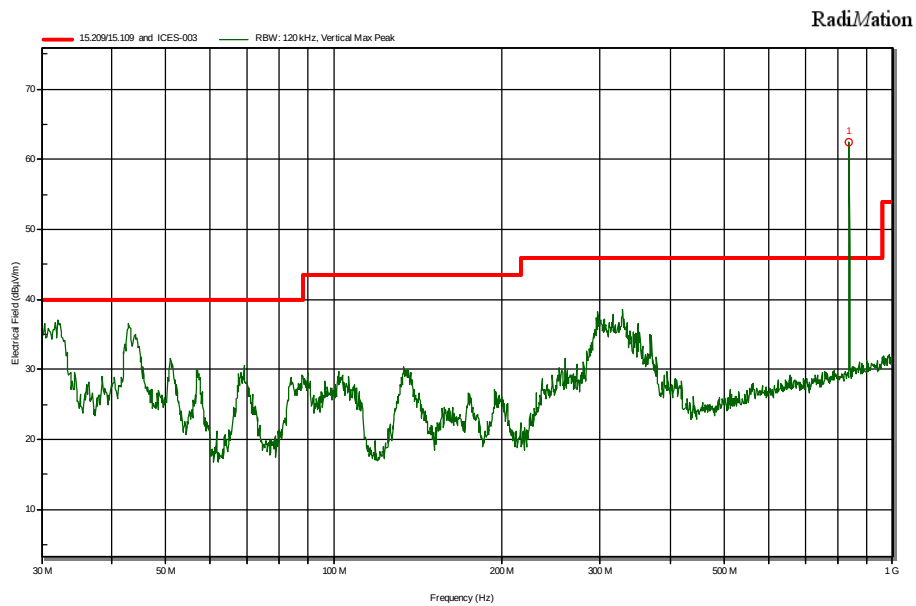
Frequency (kHz)	Level PK (dBμV/m)	Level QP (dBμV/m)	Margin w.r.t. limit (dB)
679.8	73.6	66	5

GSM 850

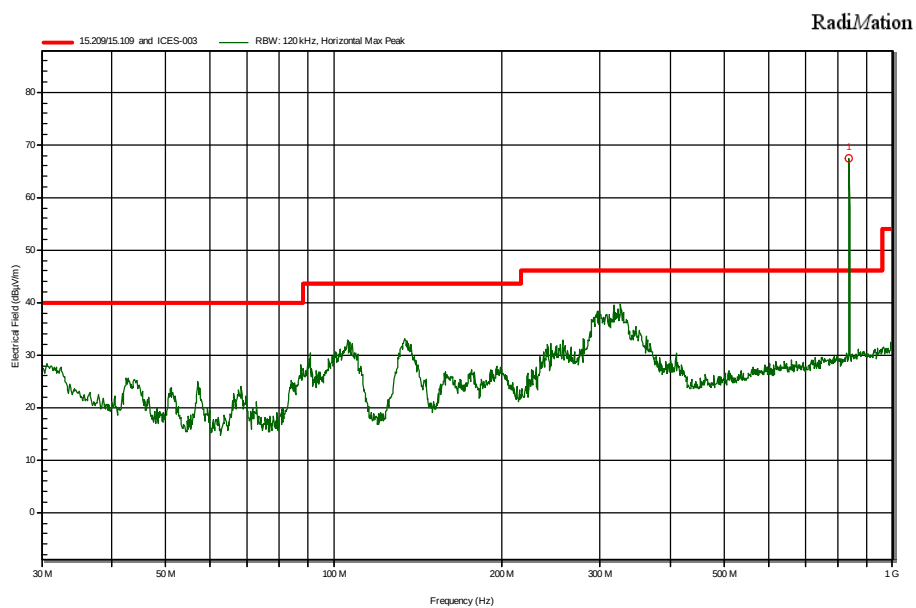
14 dBm power setting

30 -1000 MHz

Vertical polarization



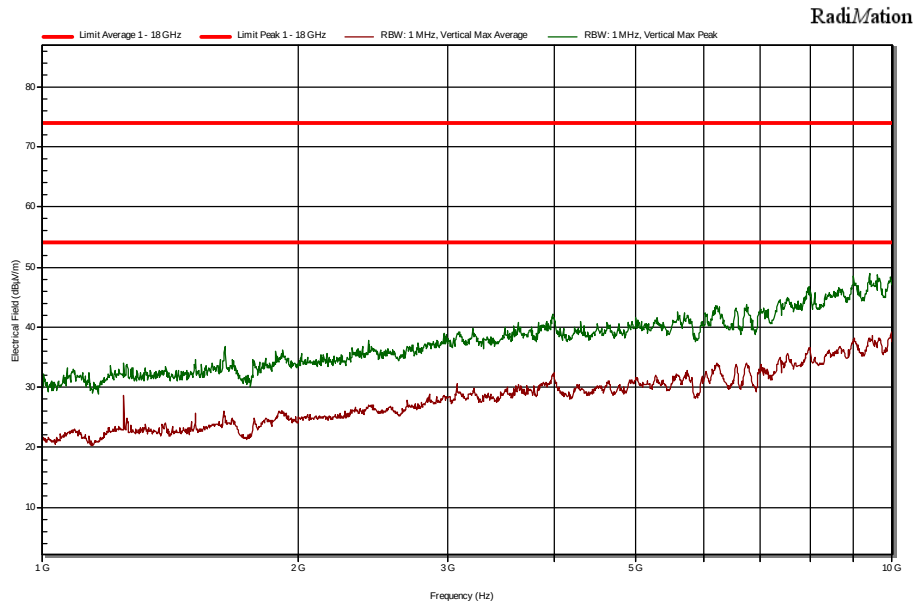
Horizontal polarization



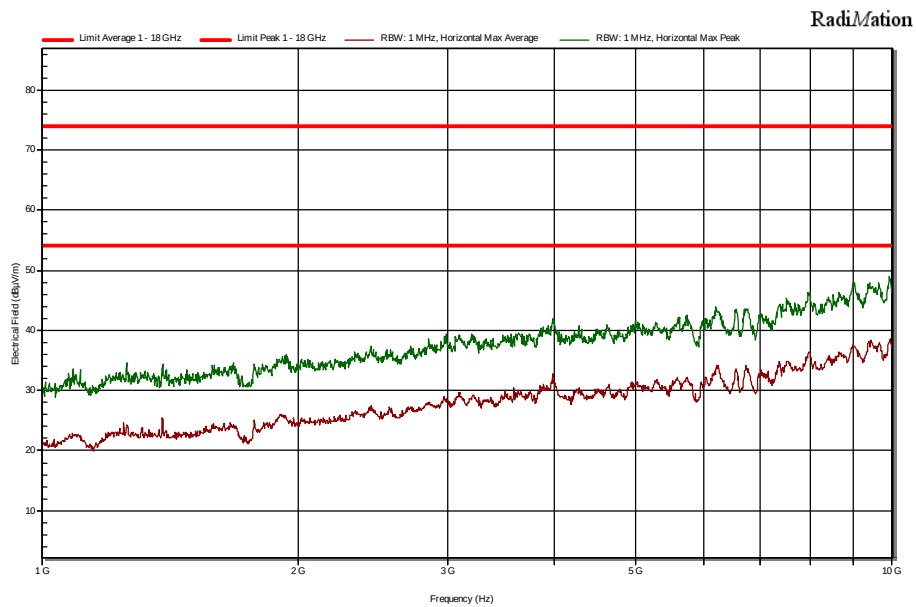
Note: The emission peak at the marker is the fundamental signal and therefore not subject to the limit.

1 – 10 GHz

Vertical polarization



Horizontal polarization

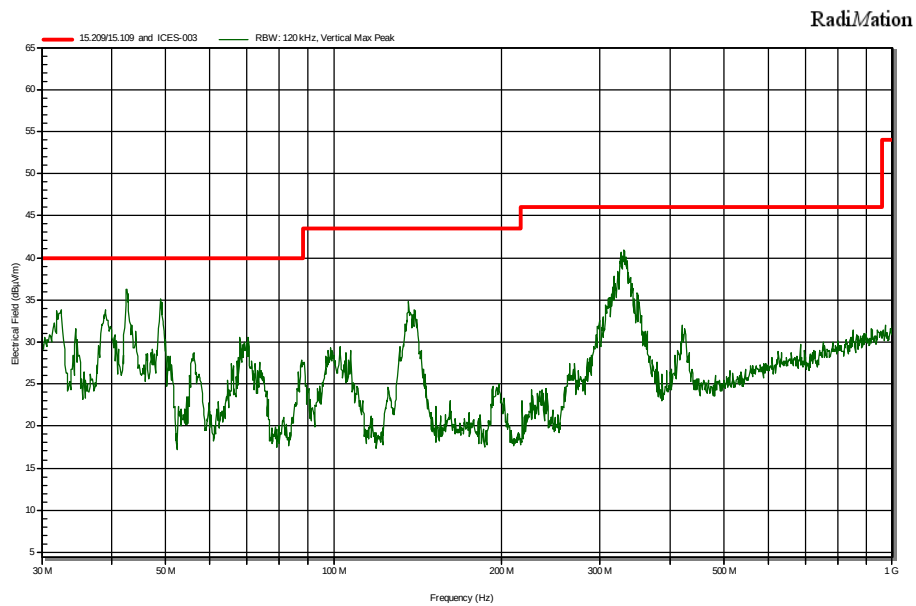


LTE band 4

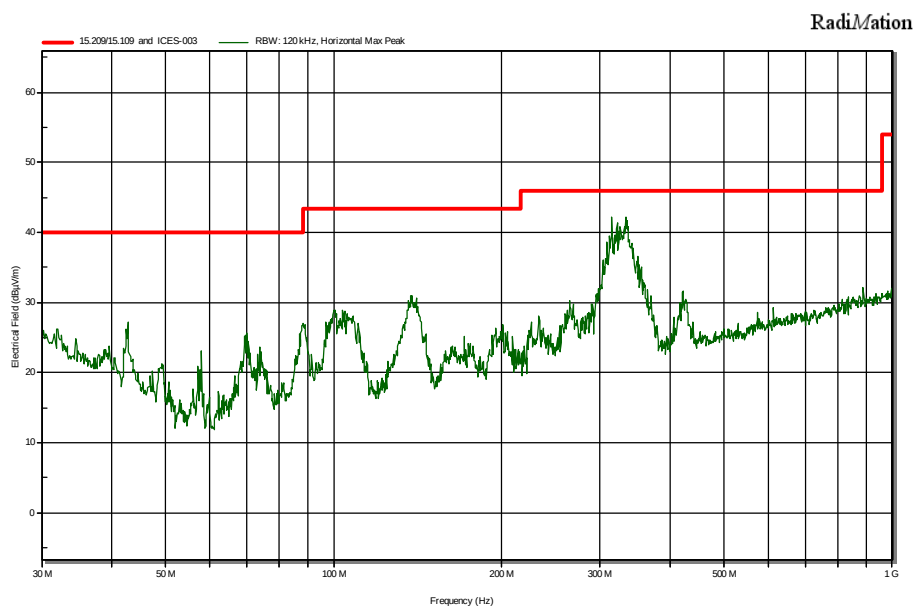
20 dBm power setting

30 -1000 MHz

Vertical polarization

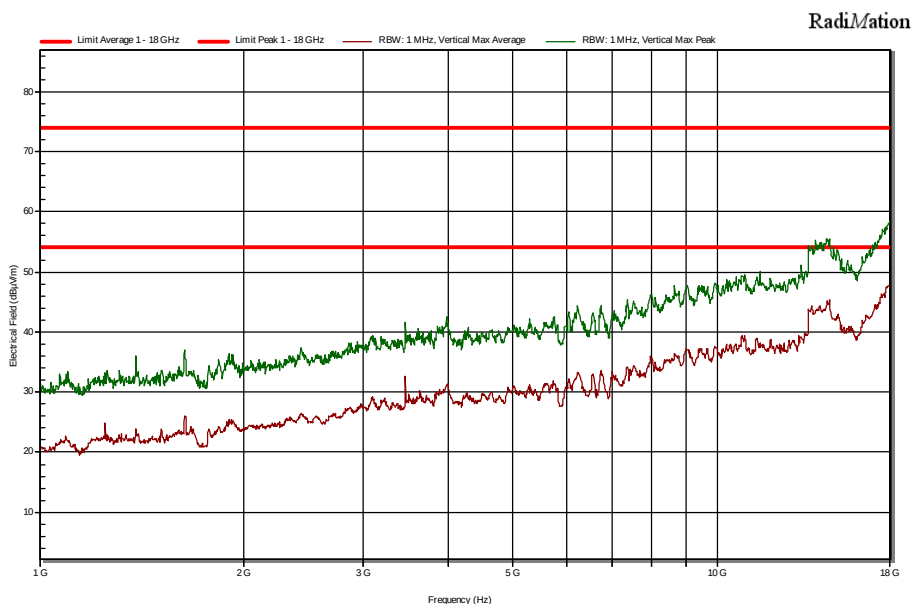


Horizontal polarization

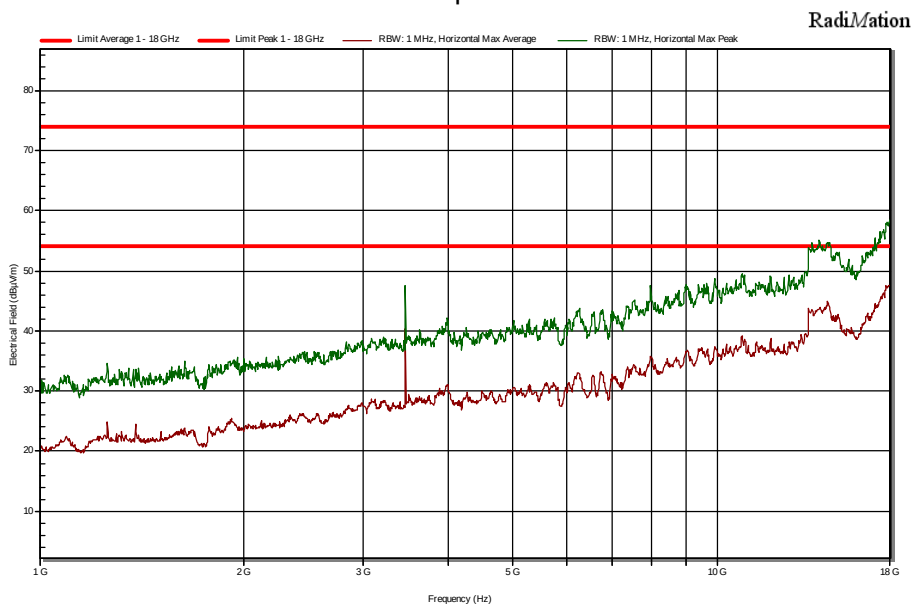


1 – 18 GHz

Vertical polarization



Horizontal polarization



Note: band reject filter has been used

3.2 Conducted emissions

3.2.1 Limit

According to 15.207 (c)

Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	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

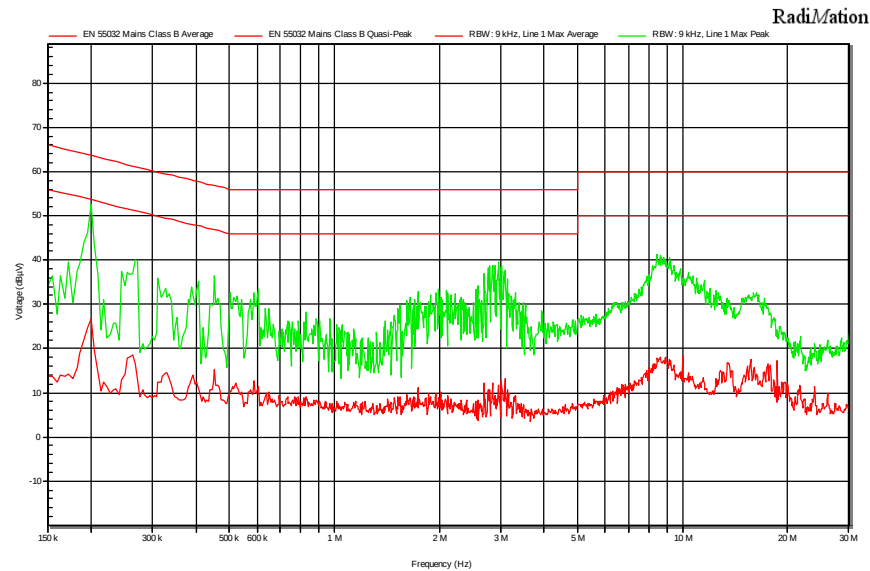
See next page.

3.2.6 Measurement uncertainty

+/- 3.6 dB

3.2.7 Plots of the AC mains conducted spurious measurement

110 V 60 Hz Phase



110 V 60 Hz Neutral

