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FCC and IC Test report for parts 15.207, 15.209, 15.225, 15.247 RSS-210, RSS-247, RSS-Gen

Product name	: OmniAssure Touch
Applicant	: Novar GmbH – Honeywell Security group
FCC ID	: UA2OT4XXXBHON
IC ID	: 6587A-OT4XXXBH

Test report No. : 181201116 004 Ver 1.00

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.

Telefication is a Wireless Device Testing laboratory recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements.
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Telefication is a registered Conformity Assessment body (CAB) under the Japan-EC MRA (Agreement on Mutual Recognition between Japan and the European Community). The registration number is: 201.

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	31-01-2019	First draft	PvW
v1.00	05-06-2019	Final version	PvW

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Summary of Test results

FCC	ISED	Description	Section in report	Verdict
15.225(a),(b),(c)	RSS-210 B.6	Field strength of emissions	3.1	Pass
15.247(d) 15.225(d) 15.209 (a)	RSS-Gen 8.9	Radiated spurious emissions	3.2	Pass
15.205 (a)	RSS Gen 8.10	Spurious emissions in the restricted bands	3.2	Pass
15.225(e)	RSS-210 B.6	Frequency Stability	3.3	Pass
15.247 (a)	RSS-247 5.2(a)	6 dB bandwidth	3.4	Pass
--	RSS-Gen 6.7	99% bandwidth	3.5	Pass
15.247 (b)	RSS-247 5.4 (d)	RF output power	3.6	Pass
15.247 (e)	RSS-247 5.2 (b)	Power spectral density	3.7	Pass
15.247 (d)	RSS-247 5.5	Band edge	3.8	Pass
15.207 (c)	RSS-Gen 8.8	Conducted spurious emissions on AC mains	3.9	Pass

1 General Description

1.1 Applicant

Client name:	Novar GmbH – Honeywell Security Group
Address:	Johannes-Mauthe-Straße 14, Albstadt – Baden-Württemberg, Germany
Zip code:	--
Telephone:	+49 74318010
E-mail:	Tobias König
Contact name:	Tobias.Koenig@honeywell.com

1.2 Manufacturer

Manufacturer name:	Novar GmbH – Honeywell Security Group
Address:	Johannes-Mauthe-Straße 14, Albstadt – Baden-Württemberg, Germany
Zip code:	--
Telephone:	+49 74318011210
E-mail:	Klaus Wank
Contact name:	Klaus.wank@honeywell.com

1.3 Tested Equipment Under Test (EUT)

Product name:	OmniAssure Touch
Brand name:	Novar/Honeywell
FCC ID:	UA2OT4XXXBHON
IC ID:	6587A-OT4XXXBH
Product type:	Wireless card reader
Model(s):	See table in clause 1.8
Batch and/or serial No.	--
Software version:	4.2
Hardware version:	--
Date of receipt	06-12-2018
Tests started:	06-12-2018
Testing ended:	24-01-2019

1.4 Product specifications of Equipment under test

Tx Frequency:	LF: 134 kHz HF: 13.56 MHz BLE: 2400 – 2483.5 MHz
Rx frequency:	LF: 134 kHz HF: 13.56 MHz BLE: 2400 – 2483.5 MHz
Antenna type and gain	LF: PCB loop antenna HF: PCB loop antenna BLE: Ceramic chip antenna, +0.5 dBi
Type of modulation:	LF: Carrier or 100% AM HF:12% or 100% AM BLE: GFSK
Emission designator	LF: 5K32N0N (if Carrier) or 5K32KXN (if Amplitude Modulated) HF: 5K60KXN BLE: 1M34F1D

1.5 Environmental conditions

Test date	21-01-2019	23-1-2019	24-01-2019
Ambient temperature	23.6 °C	18.7 °C	21.3 °C
Humidity	24.1 %	30.9 %	28.3 %
Atmospheric pressure	Between 86 and 106 kPa	Between 86 and 106 kPa	Between 86 and 106 kPa

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
- FCC Part 15 Subpart C §15.225
- FCC Part 15 Subpart C §15.247
- RSS-Gen Issue 5
- RSS-210 Issue 9
- RSS-247 Issue 2

1.8 Observation and remarks

The EUT product family consists of different models with a different form factor. The tested model is OT4816BHONG, this is the worst case model, containing 134 kHz, 13.56 MHz and BLE radios, and a keypad with 16 keys. See tables below for descriptions of the various reader models. Note: LF designates the transmissions at 134 kHz. HF designates the transmissions at 13.56 MHz.

The manufacturer made a number of changes to the EUT to reduce radiated and conducted spurious emissions. Decoupling was added for the power supply and LF receiver. The trace connecting B9 and B10 (page 4 of the PCB layout) has been adjusted so it follows the other traces.

Variant models of the EUT

Type	Description	Trademark	Designation
OEM	OmniAssure Touch MultiTech Square 16 keys black	OmniAssureTouch	OT4816BHONG
Variant	OmniAssure Touch MultiTech Square 2 keys black	OmniAssureTouch	OT4802BHONG
Variant	OmniAssure Touch MultiTech Square 0 keys black	OmniAssureTouch	OT4800BHONG
Variant	OmniAssure Touch MultiTech Square 16 keys white	OmniAssureTouch	OT4816WHONG
Variant	OmniAssure Touch MultiTech Square 2 keys white	OmniAssureTouch	OT4802WHONG
Variant	OmniAssure Touch MultiTech Square 0 keys white	OmniAssureTouch	OT4800WHONG
Variant	OmniAssure Touch Smart Square 16 keys black	OmniAssureTouch	OT4716BHONG
Variant	OmniAssure Touch Smart Square 2 keys black	OmniAssureTouch	OT4702BHONG
Variant	OmniAssure Touch Smart Square 0 keys black	OmniAssureTouch	OT4700BHONG
Variant	OmniAssure Touch Smart Square 16 keys white	OmniAssureTouch	OT4716WHONG
Variant	OmniAssure Touch Smart Square 2 keys white	OmniAssureTouch	OT4702WHONG
Variant	OmniAssure Touch Smart Square 0 keys white	OmniAssureTouch	OT4700WHONG
Variant	OmniAssure Touch Prox Square 16 keys black	OmniAssureTouch	OT4916BHONG
Variant	OmniAssure Touch Prox Square 2 keys black	OmniAssureTouch	OT4902BHONG
Variant	OmniAssure Touch Prox Square 0 keys black	OmniAssureTouch	OT4900BHONG
Variant	OmniAssure Touch Prox Square 16 keys white	OmniAssureTouch	OT4916WHONG
Variant	OmniAssure Touch Prox Square 2 keys white	OmniAssureTouch	OT4902WHONG
Variant	OmniAssure Touch Prox Square 0 keys white	OmniAssureTouch	OT4900WHONG

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 : 10-03-2020

Name : ing. R. van Barneveld

Function : Test Engineer

Signature :

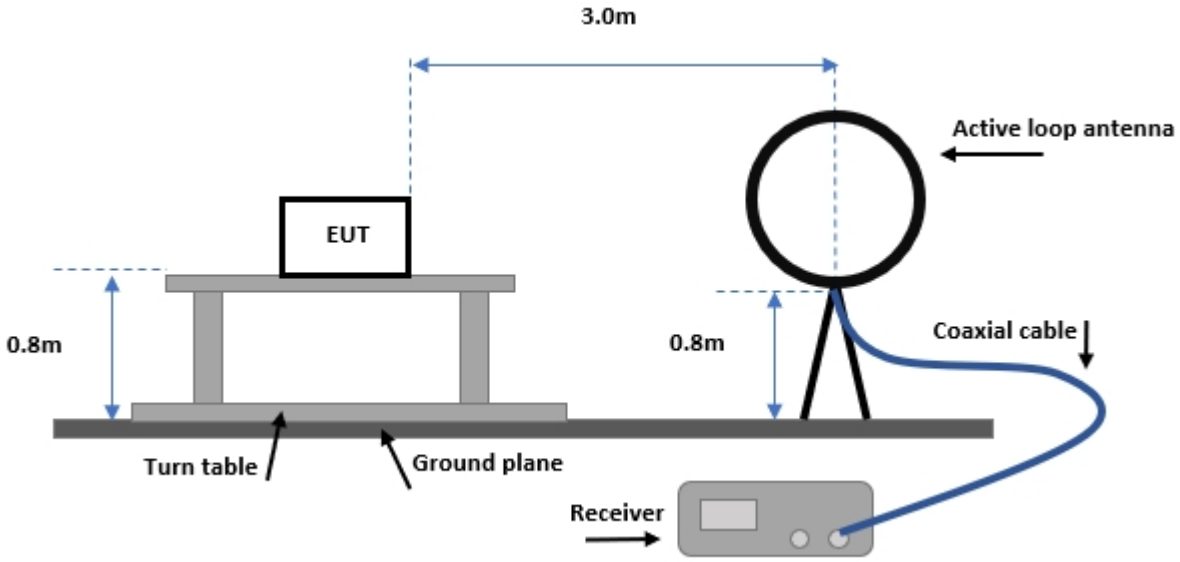
2 Test configuration of the Equipment Under Test

2.1 Test mode

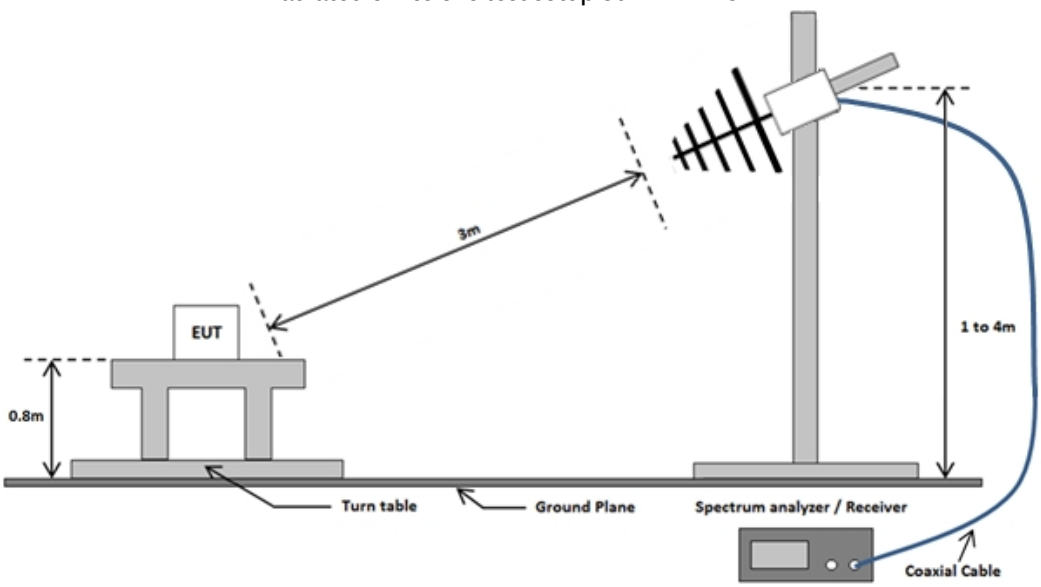
The applicant provided test mode firmware for the BLE radio, in which it was possible to configure the radio to transmit continuously. The BLE radio was set to transmit at the highest possible power setting. The 13.56 MHz and 134 kHz radios have been tested in normal operation mode, which means they are continuously alternating transmission.

2.2 Test setups

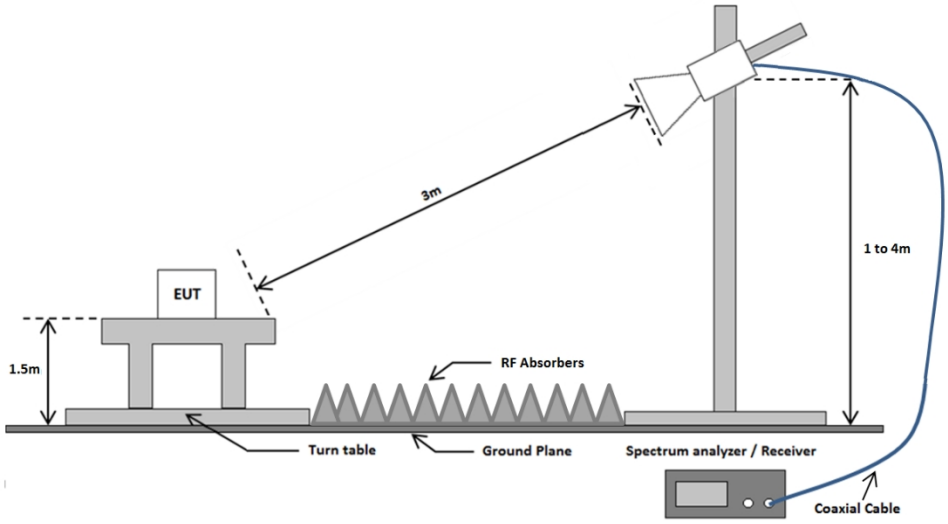
Radiated emissions test setup 9 kHz – 30 MHz



Radiated emissions test setup 30 MHz - 1 GHz

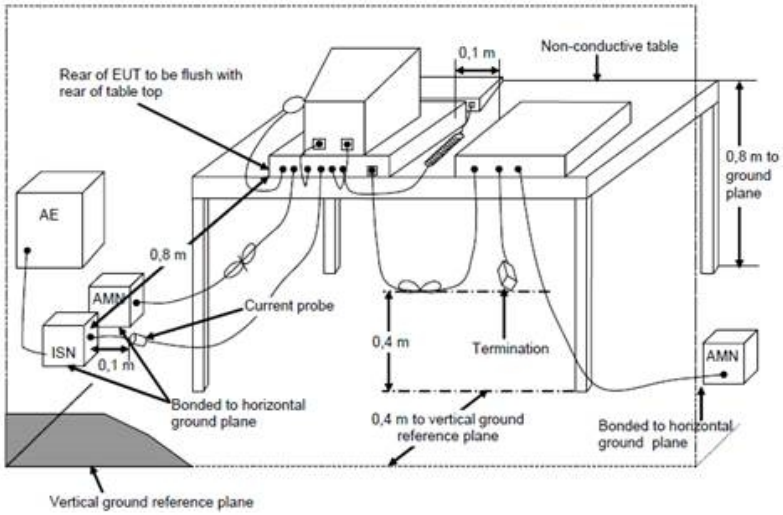


Radiated emissions test setup above 1 GHz



Conducted emissions test setup

Emissions test at AC mains



2.3 Equipment used in the test configuration

Description	Manufacturer	Model	ID	Used at Par.
Spectrum analyzer	Rohde & Schwarz	ESR7	TE 01220	3.1, 3.2, 3.3
Power supply	Delta Elektroniks	E06006	TE 00597	3.3
Active loop antenna	Rohde & Schwarz	HFH2-Z2	TE 00746	3.1, 3.2
Climate Chamber	CTS	C-40/350	TE 00741	3.3
Multimeter	Fluke	87-5	TE 01305	3.3

Test site	Site ID	Used at paragraphs
Semi-Anechoic Chamber	TS 00004	3.1, 3.2, 3.4 – 3.8
Conducted emission measurement system	TS 00005	3.9

2.4 Sample calculations

Field Strength Measurement example(see chapter 3.2):

Frequency (MHz)	Polarization	Height(m)	Quasi-Peak (dBµV/m)
54,231	Vertical	1	35,5

The following relation applies:

E (dBµV/m) = U(dBµV) + AF (dB/m) + CL (dB)

Where:

E = Electric field strength
U = Measuring receiver voltage
AF = Antenna factor
CL = Cable loss

(35.5 = 22.33 + 11.8 + 1.37)

3 Test results

3.1 Field strength of emissions

3.1.1 Limit

Frequency (MHz)	µV/m at 30 meter	dBµV/m at 30 meter
13.553 – 13.567	15,848	84
13.410 – 13.553 and 13.567 – 13.710	334	50.5
13.110 – 13.410 and 13.710 - 14.010	106	40.5

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.
IRN 026 – Method 10.

3.1.5 Test results of Field strength of emissions

Frequency (MHz)	Max Field strength at 30m (dBµV/m) (Perpendicular to site axis)	Max Field strength at 30m (dBµV/m) (Orthogonal to site axis)
13.56	51.16	55.72
Uncertainty	+3.0 / -2.5 dB	

Note: Field strength measured at 3m and converted to 30m according to the method in ANSI C63.10:2013, clause 6.4 using the following equation:

$$FS_{@30m} = FS_{meas} - 40 * \log_{10}\left(\frac{d_{nearfield}}{d_{measure}}\right) - 20 * \log_{10}\left(\frac{d_{limit}}{d_{nearfield}}\right)$$

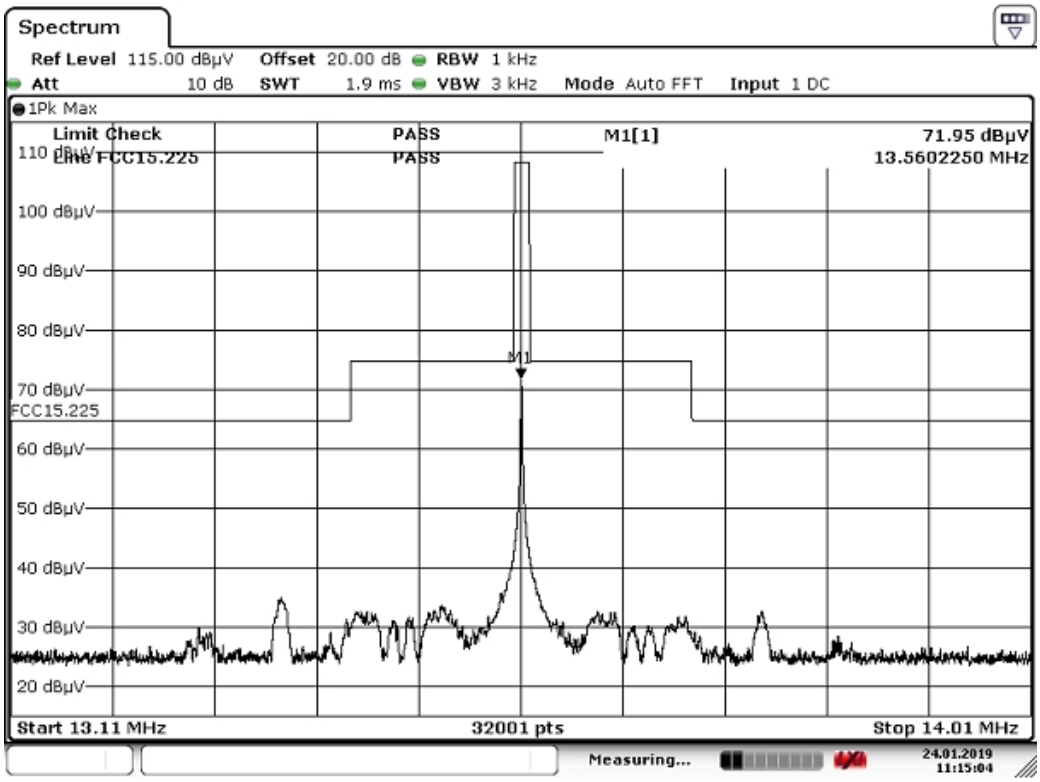
Where

$FS_{@30m}$ is the calculation of field strength at the limit distance, expressed in dBµV/m
FS_{meas} is the measured field strength, expressed in dBµV/m
$d_{nearfield}$ is the λ/2π distance (3.523)
$d_{measure}$ is the distance of the measurement point from the EUT (3.00m)
d_{limit} is the reference limit distance (30.00m)

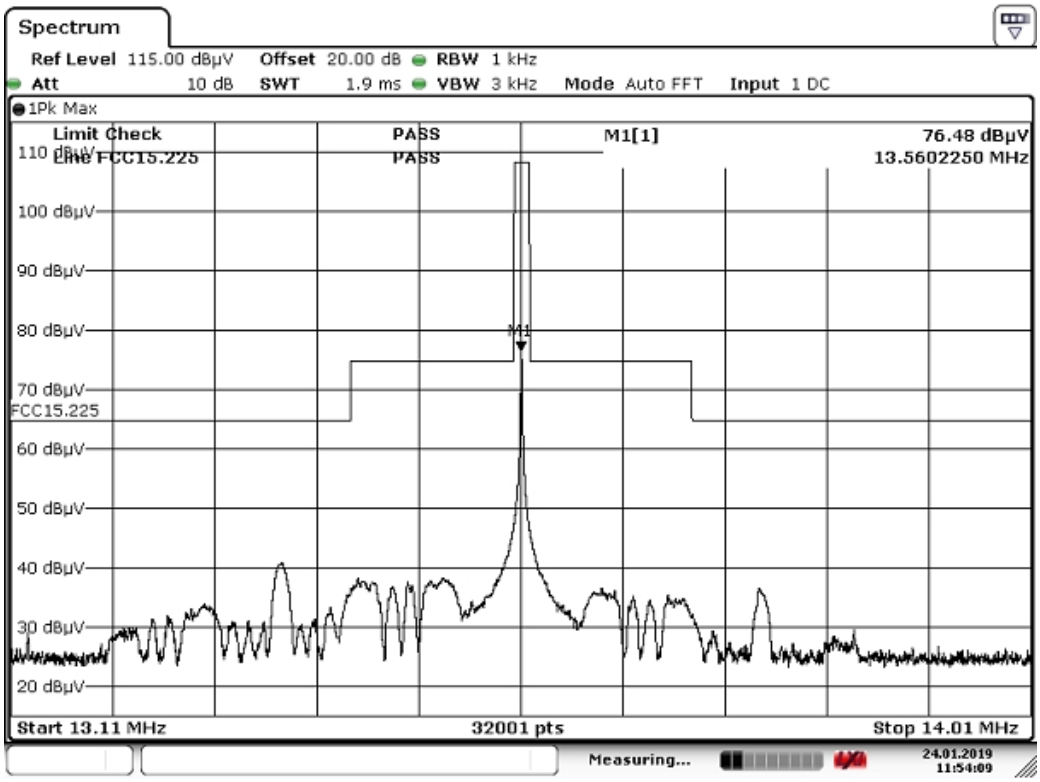
Note: In the plots below, the limit line has been adjusted from 30m to 3m according to the method in ANSI C63.10, clause 6.4

3.1.6 Plots of Field strength of emissions Measurement

13.11 – 14.01 MHz (Perpendicular)



13.11 – 14.01 MHz (Orthogonal)



3.2 Radiated spurious emissions

3.2.1 Limit

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

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(kHz)]}	300*
0.490 – 1.705	24000/F(kHz)	20*{log[24000]-log[F(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

3.2.2 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

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.

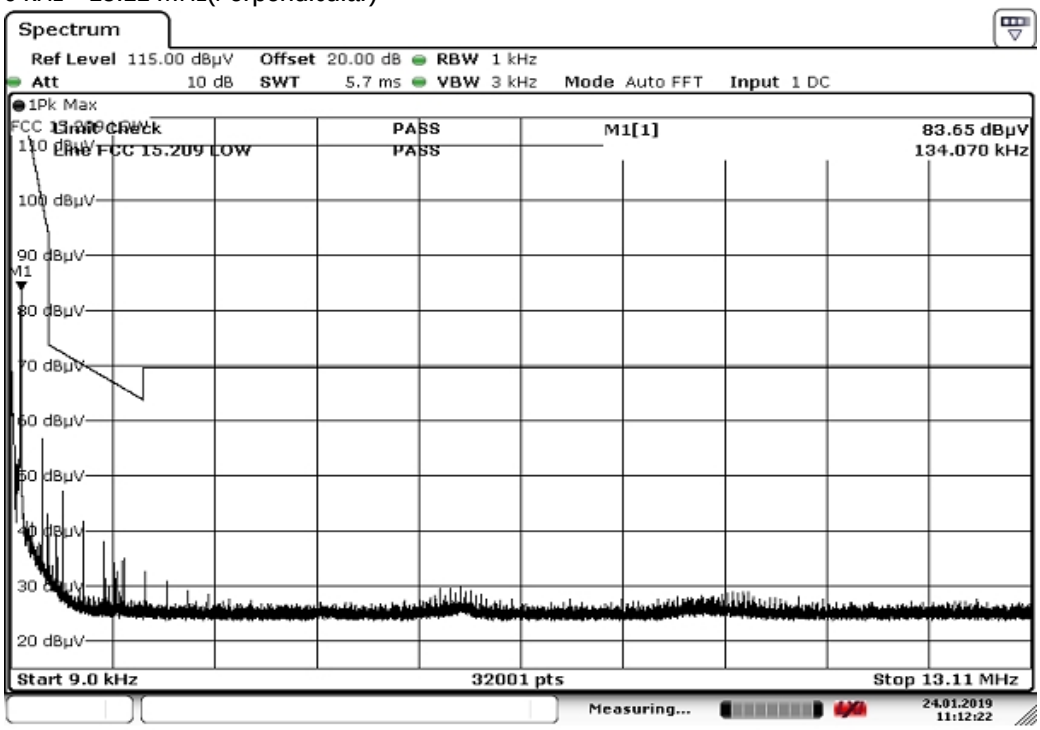
9 kHz to 30 MHz: IRN 026 – Method 10.
30 MHz to 1 GHz: IRN 026 – Method 1.
1 GHz to 18 GHz: IRN 026 – Method 2.
18 to 26.5 GHz: IRN 026 – Method 3.

3.2.5 Measurement Uncertainty

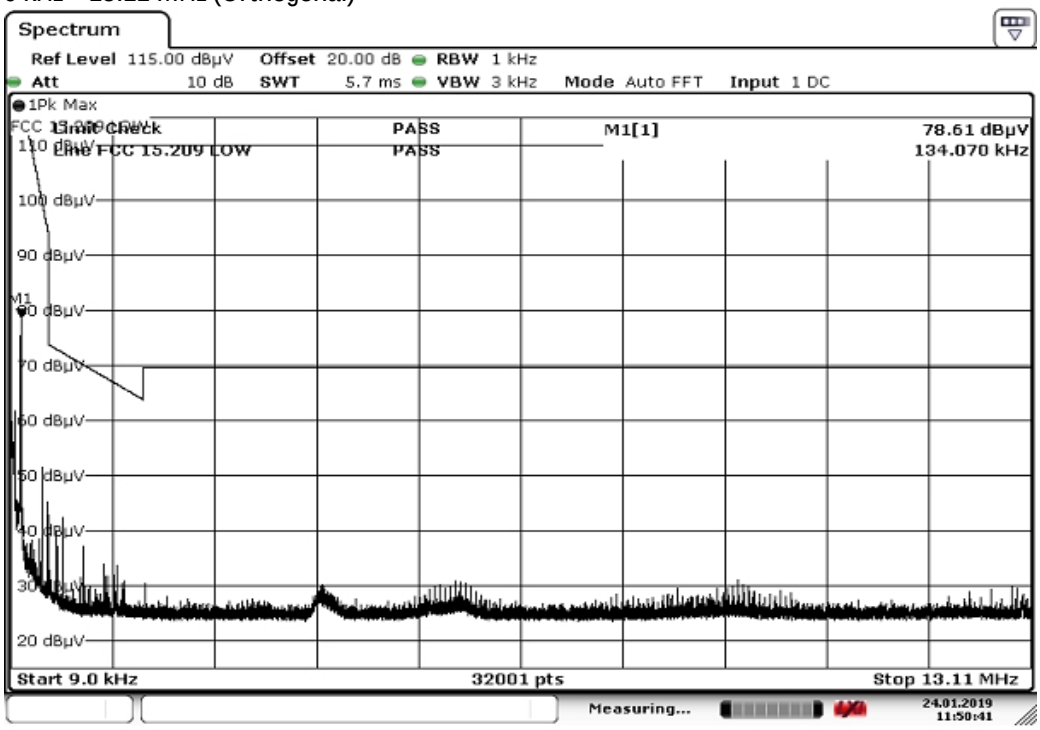
Frequency range	Polarization	Uncertainty
9 kHz – 30 MHz	--	±1.6 dB
30 – 200 MHz	Horizontal	±4.5 dB
	Vertical	±5.4 dB
200 -1000 MHz	Horizontal	±3.6 dB
	Vertical	±4.6 dB
1 – 18 GHz	Horizontal	±5.7 dB
	Vertical	±5.7 dB
18 – 26.5 GHz	Horizontal	±4.9 dB
	Vertical	±4.9 dB

3.2.6 Plots of the Radiated Spurious Emissions Measurement

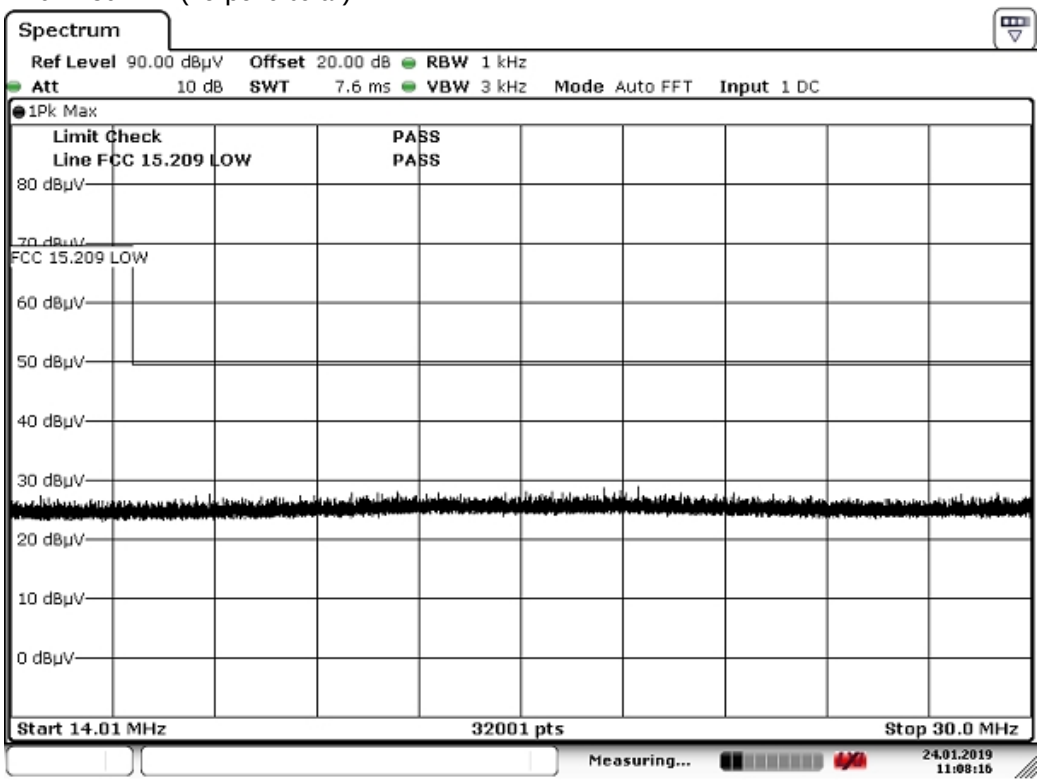
9 kHz – 13.11 MHz(Perpendicular)



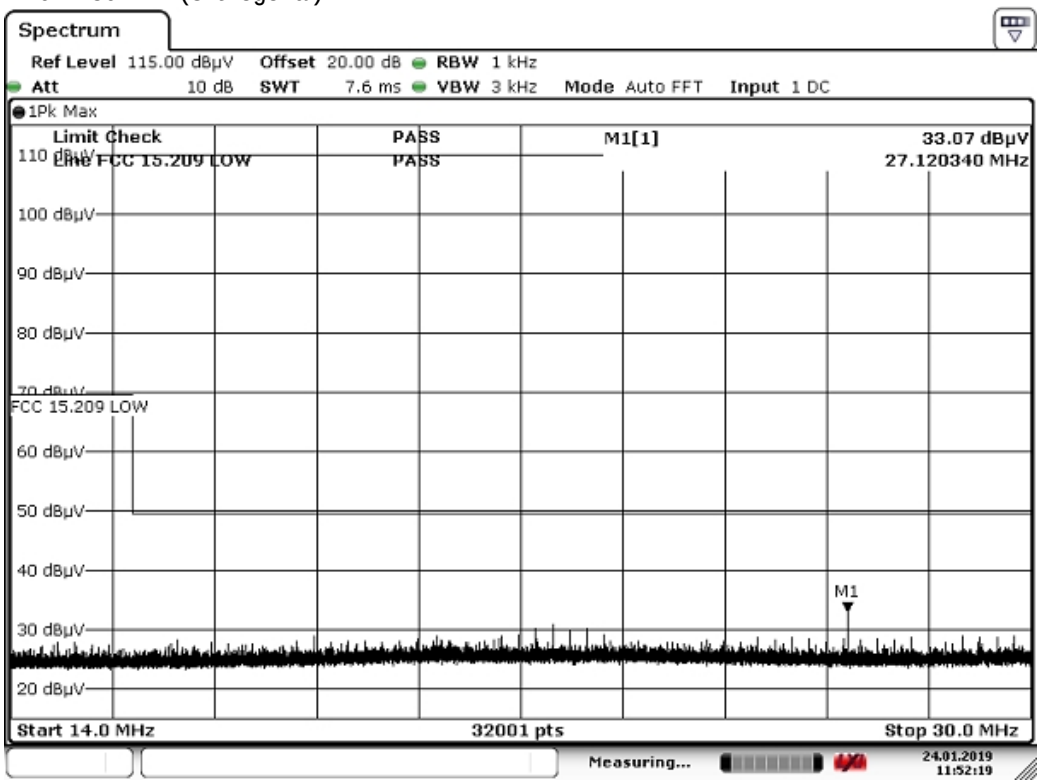
9 kHz – 13.11 MHz (Orthogonal)



14.01 – 30 MHz (Perpendicular)

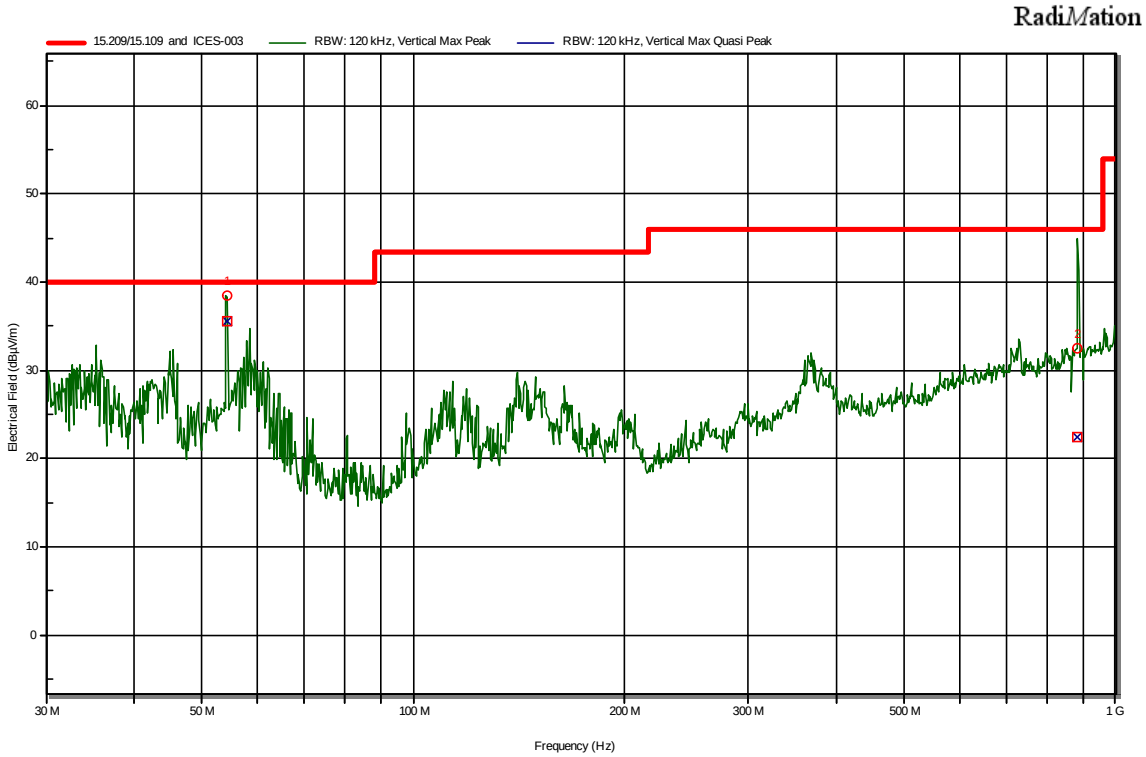


14.01 – 30 MHz (Orthogonal)



30 -1000 MHz (LF and HF active)

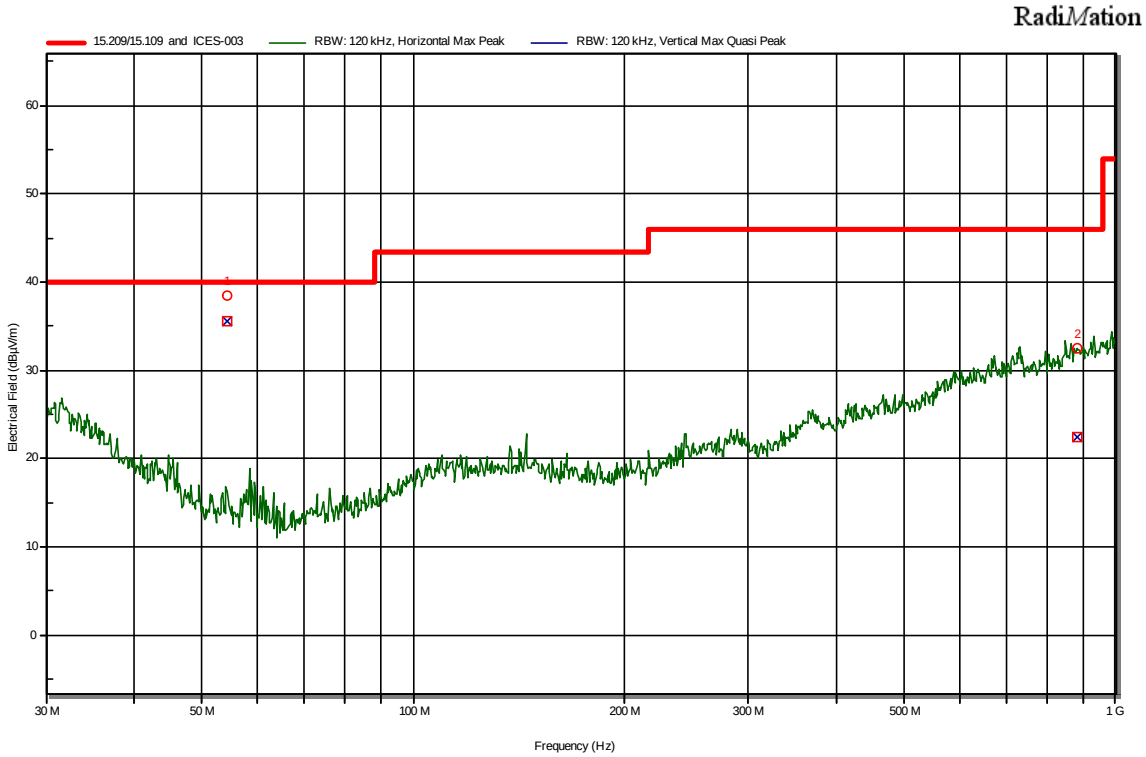
Vertical polarization



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Status	Polarization
1	54,241 MHz	35,5 dBµV/m	40 dBµV/m	Pass	Vertical
2	880,478 MHz	22,5 dBµV/m	46 dBµV/m	Pass	Vertical

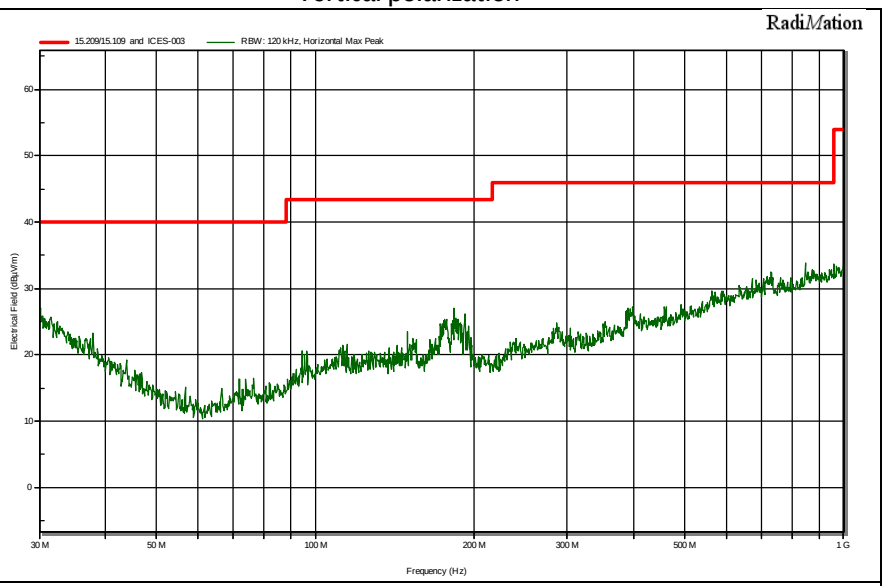
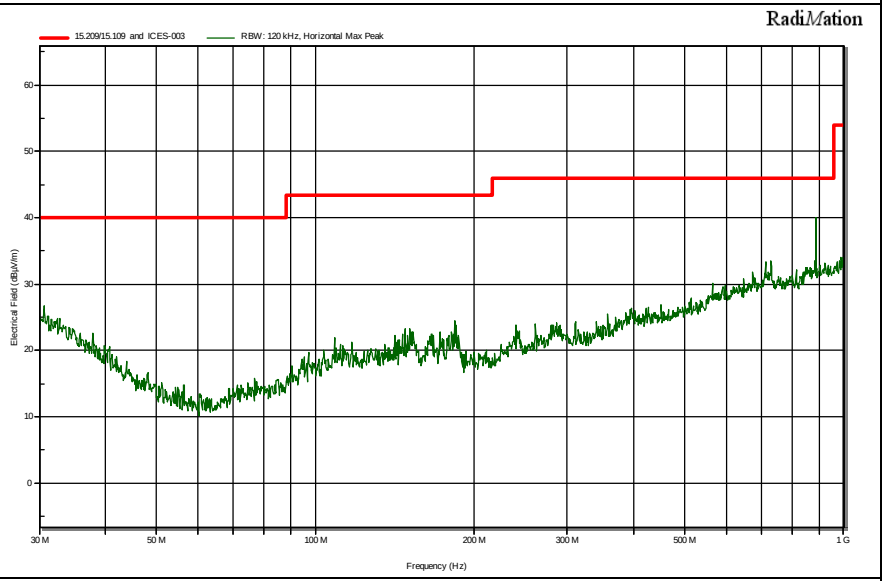
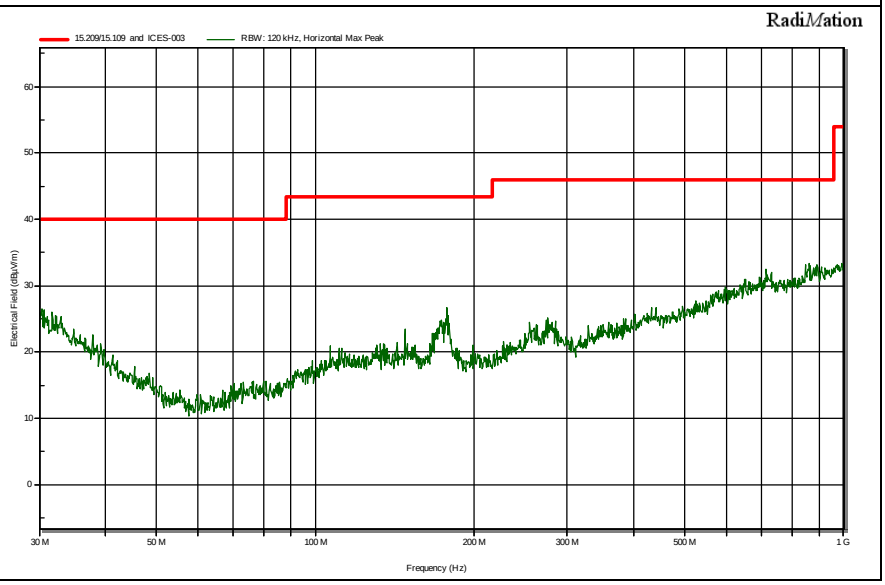
30 -1000 MHz (LF and HF active)

Horizontal polarization



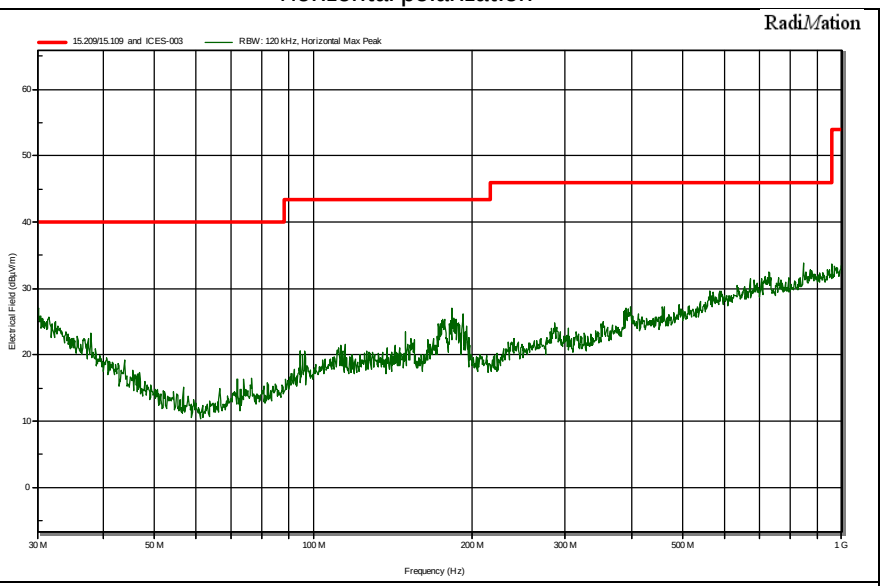
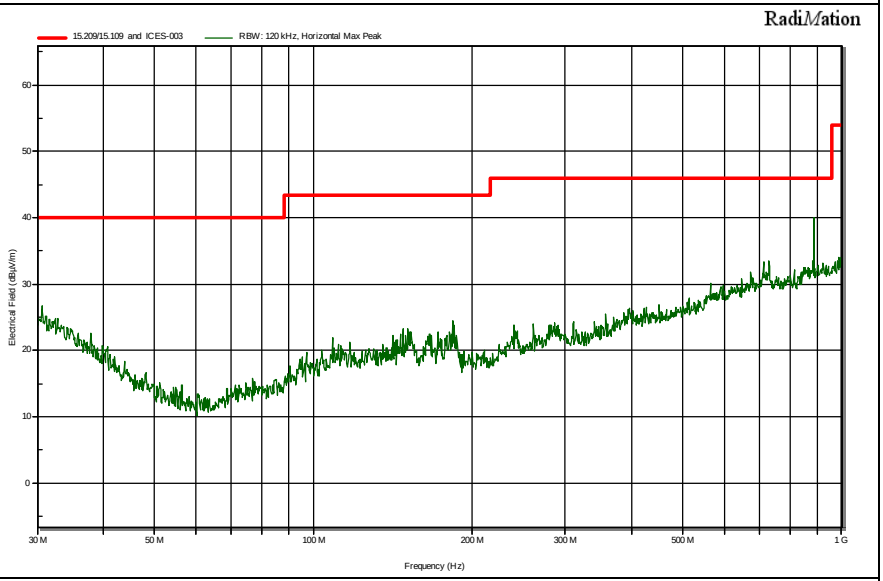
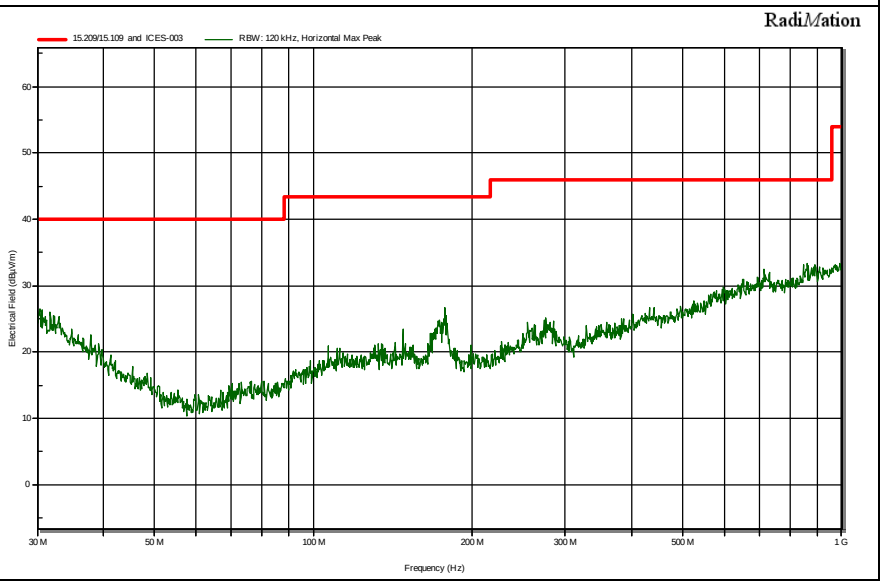
30 MHz to 1 GHz (BLE active)

Vertical polarization

Low ch	
Mid ch	
High ch	

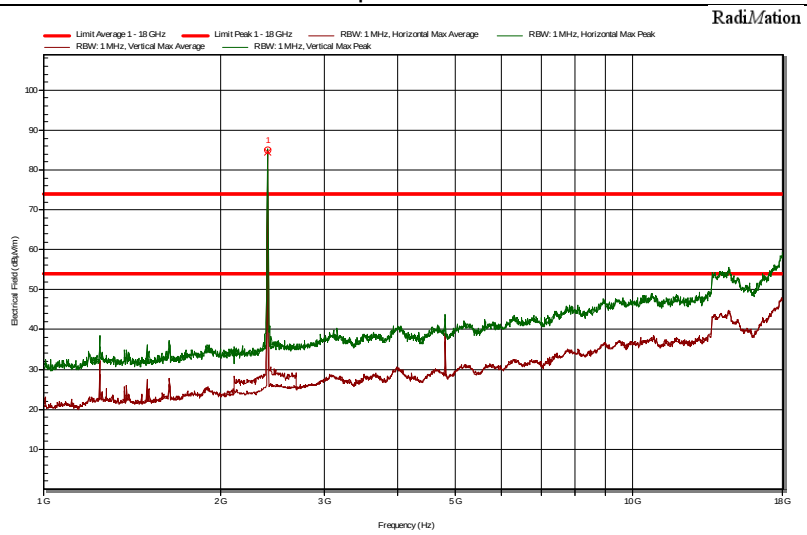
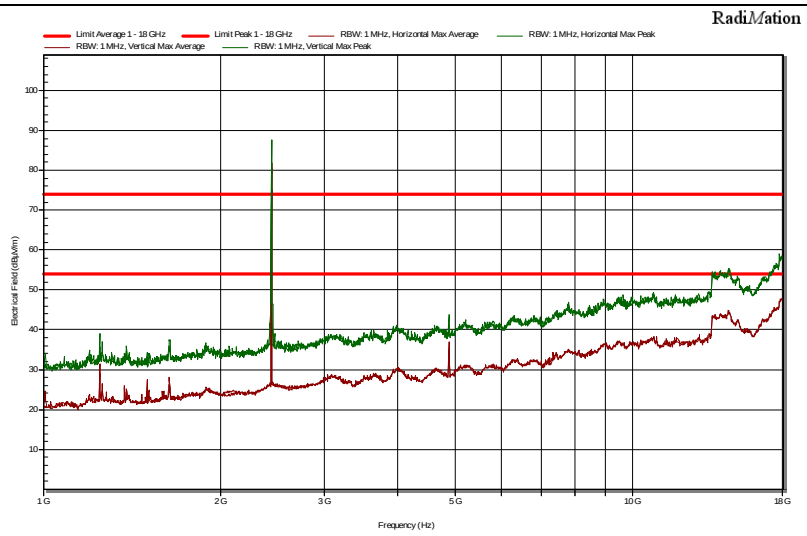
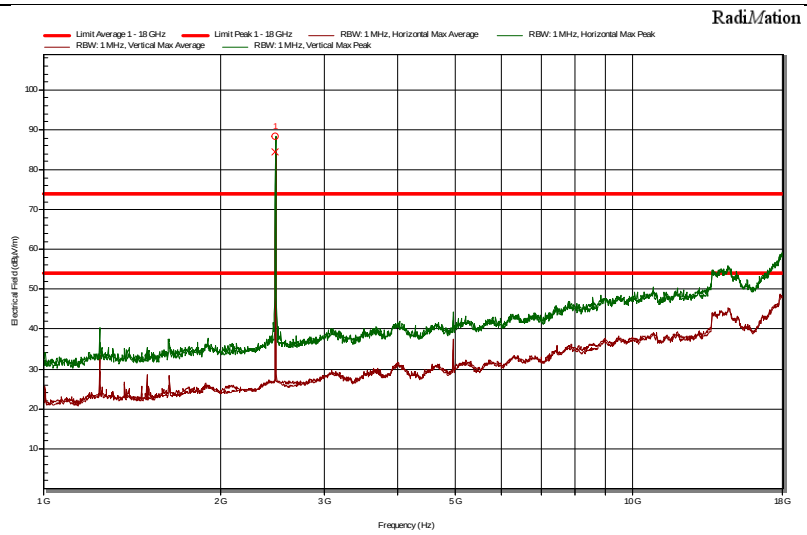
30 MHz to 1 GHz (BLE active)

Horizontal polarization

Low ch	
Mid ch	
High ch	

1 GHz to 18 GHz (BLE active)

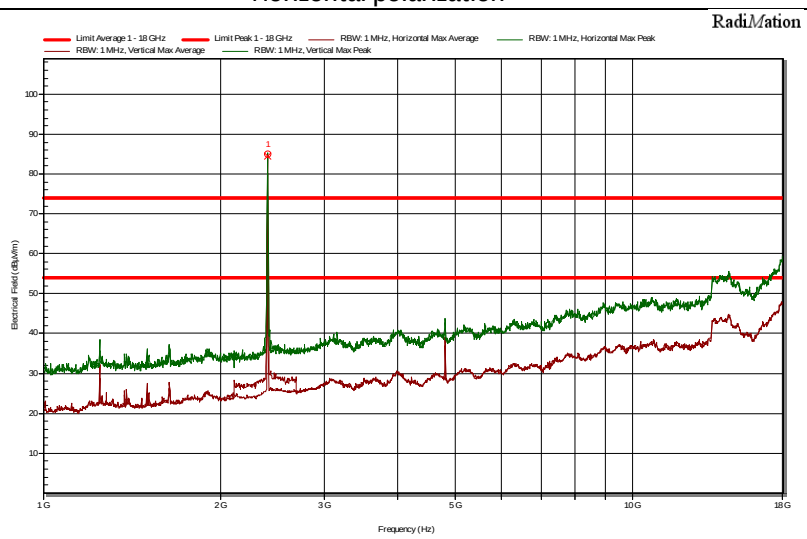
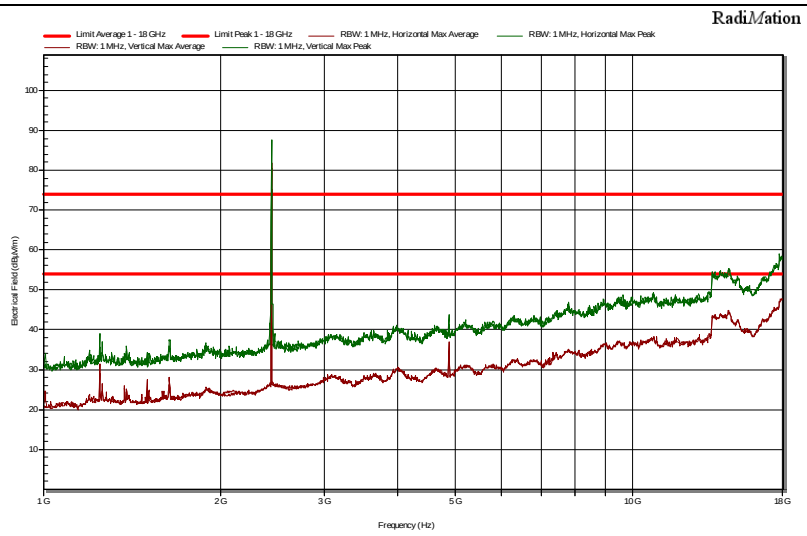
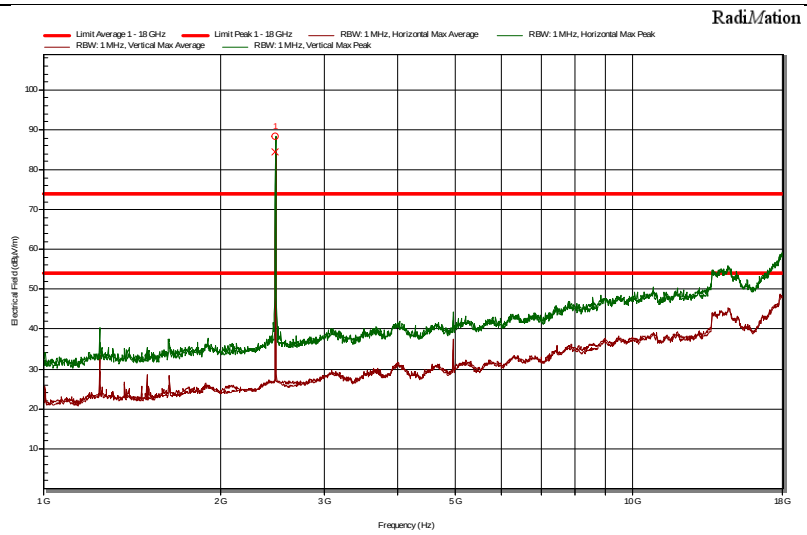
Vertical polarization

Low ch	
Mid ch	
High ch	

Note: The peak at 2.4 – 2.5 GHz in the plots above is the transmission frequency and therefore not subject to the spurious limit.

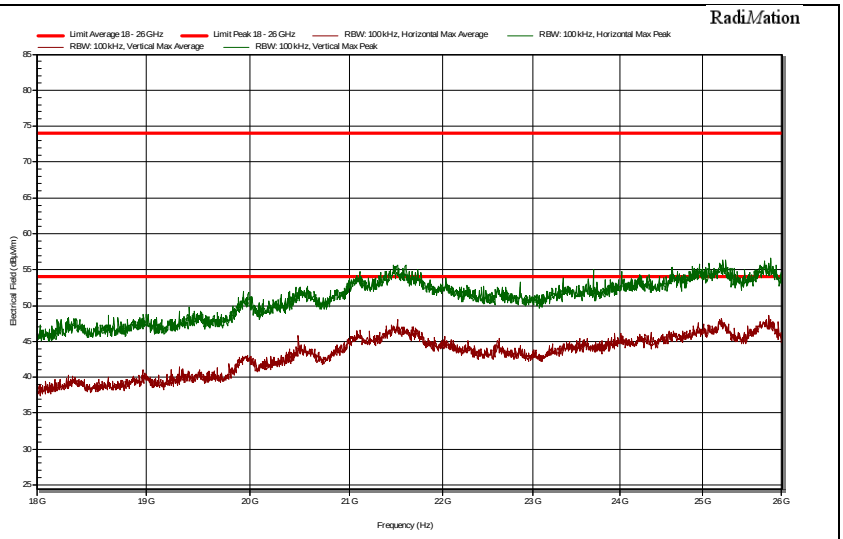
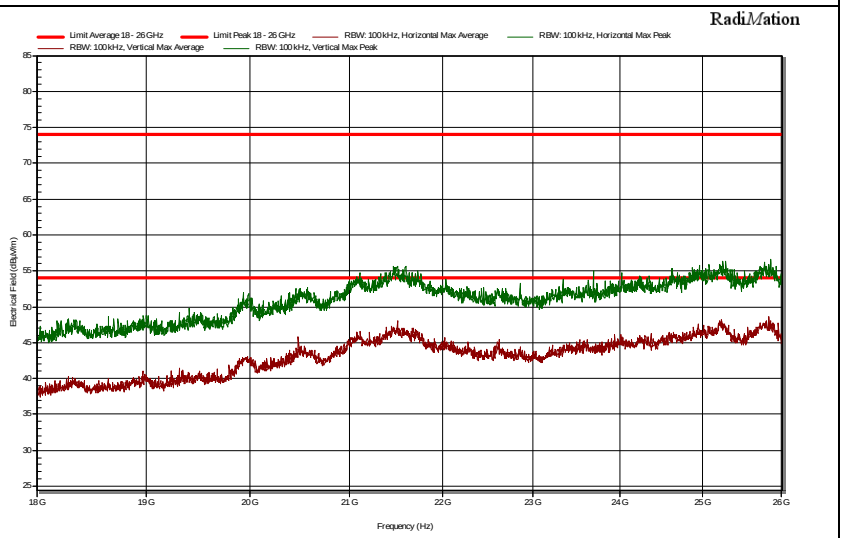
1 GHz to 18 GHz (BLE active)

Horizontal polarization

Low ch	
Mid ch	
High ch	

Note: The peak at 2.4 – 2.5 GHz in the plots above is the transmission frequency and therefore not subject to the spurious limit.

18-26.5 GHz (BLE active)

Mid ch Horizontal	
Mid ch Vertical	

3.3 Frequency Stability

3.3.1 Limit

The frequency stability of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of –20 degrees to 50 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.

The measured frequency for the 13.56 MHz radio shall be within the limits 13558.644 kHz ≤ f ≤ 13561.356 kHz.

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.
IRN 005 – Method 2.

3.3.5 Test results of Frequency Stability Measurements

Measured frequency after temperature variation:

	Time after power on	2 minutes	5 minutes	10 minutes
Temperature				
50°C		13560.219 kHz	13560.228 kHz	13560.239 kHz
40°C		13560.214 kHz	13560.216 kHz	13560.214 kHz
30°C		13560.223 kHz	13560.216 kHz	13560.214 kHz
20°C		13560.258 kHz	13560.245 kHz	13560.238 kHz
10°C		13560.289 kHz	13560.278 kHz	13560.267 kHz
0°C		13560.294 kHz	13560.220 kHz	13560.286 kHz
-10°C		13560.325 kHz	13560.322 kHz	13560.323 kHz
-20°C		13560.327 kHz	13560.334 kHz	13560.336 kHz

Measured frequency after voltage variation:

Voltage	Frequency (kHz)
10.2V	13560.241
12V (nominal)	13560.219
13.8V	13560.241

3.3.6 Measurement Uncertainty

Measurement uncertainty = + /- 12 Hz.

3.4 6dB bandwidth Measurement

3.4.1 Limit

The minimum 6 dB Bandwidth shall be at least 500 kHz.

3.4.2 Measurement instruments

The measurement instruments are listed in chapter 2.4 of this report.

3.4.3 Test setup

The test setup is as shown in chapter 2.3 of this report.

3.4.4 Test procedure

Tests according to ANSI C63.10.
IRN 017 - Occupied bandwidth (Hz) Method 4 – DTS Bandwidth.

3.4.5 Test Results of the 6 dB bandwidth Measurement

Technology Std.	Channel	Frequency (MHz)	Data rate	6dB bandwidth (kHz)
Bluetooth Low energy	1	2402	1 Mbps	691.1
	18	2440	1 Mbps	688.7
	39	2480	1 Mbps	691.7
Uncertainty	± 36.2 kHz			

3.5 99% Occupied Bandwidth

3.5.1 Limit

According to RSS-Gen 6.7.

3.5.2 Measurement instruments

The measurement instruments are listed in chapter 2.4 of this report.

3.5.3 Test setup

The test setup is as shown in chapter 2.3 of this report.

3.5.4 Test procedure

IRN 017 - Occupied bandwidth (Hz) Method 1 – XX % power bandwidth.

1. Set the centre frequency to the nominal EUT channel centre frequency
2. Set span = 1.5 times to 0.5 times the Occupied Bandwidth
3. Set VBW ≥ 3x RBW
4. Video averaging is not permitted. Where practical, detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

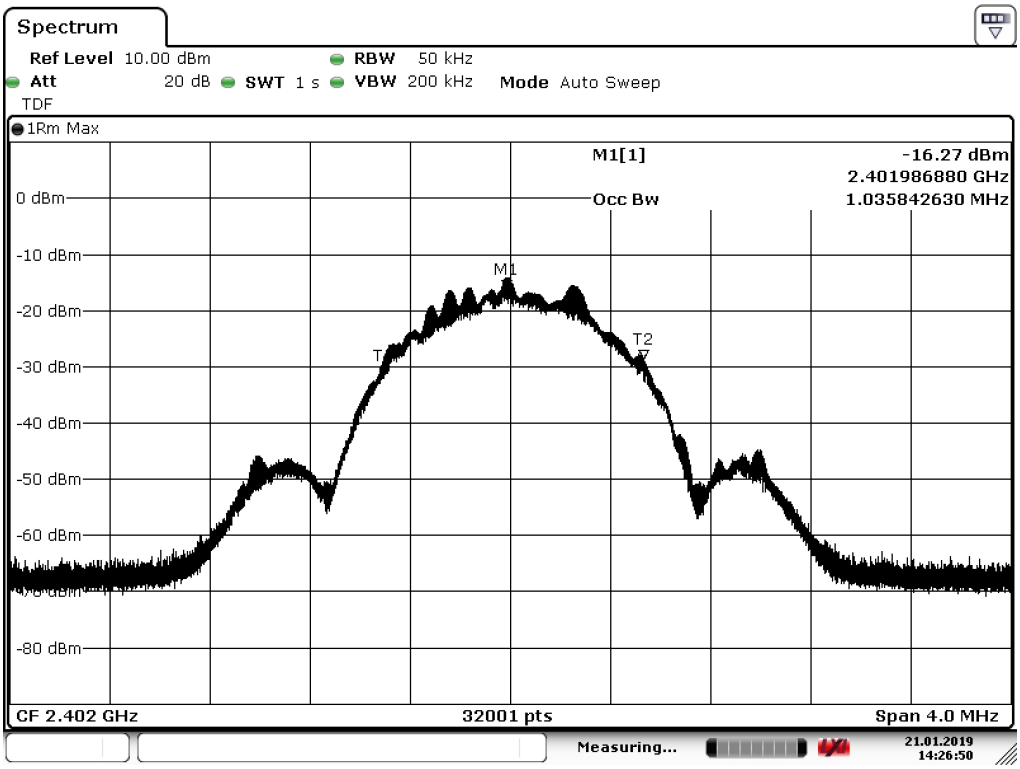
3.5.5 Test results of the 99% occupied bandwidth measurement

Technology Std.	Channel	Frequency (MHz)	Data rate	99% bandwidth (kHz)
Bluetooth Low energy	1	2402	1 Mbps	1036
	18	2440	1 Mbps	1037
	39	2480	1 Mbps	1032
Uncertainty	± 12 kHz			

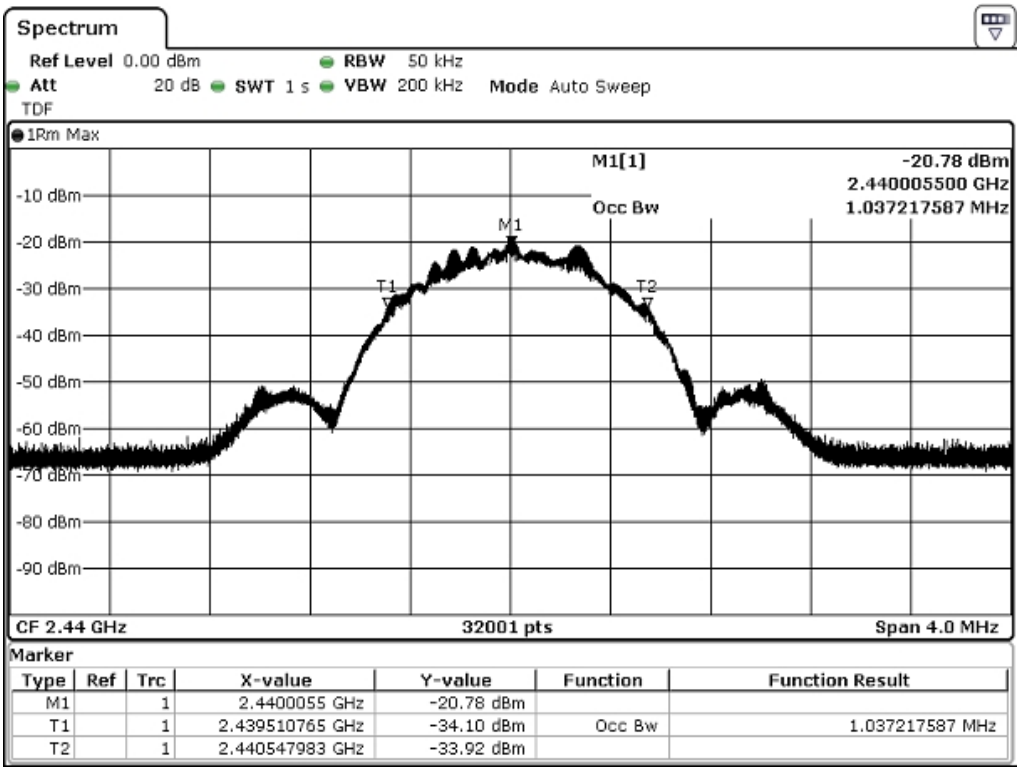
Technology Std.	Channel	Frequency (MHz)	Data rate	99% bandwidth (kHz)
RFID (LF)	--	0.134	--	5.32
RFID (HF)	--	13.56	--	5.60
Uncertainty	± 125 Hz			

3.5.6 Plots of the 99% occupied bandwidth measurement

BLE Channel 1

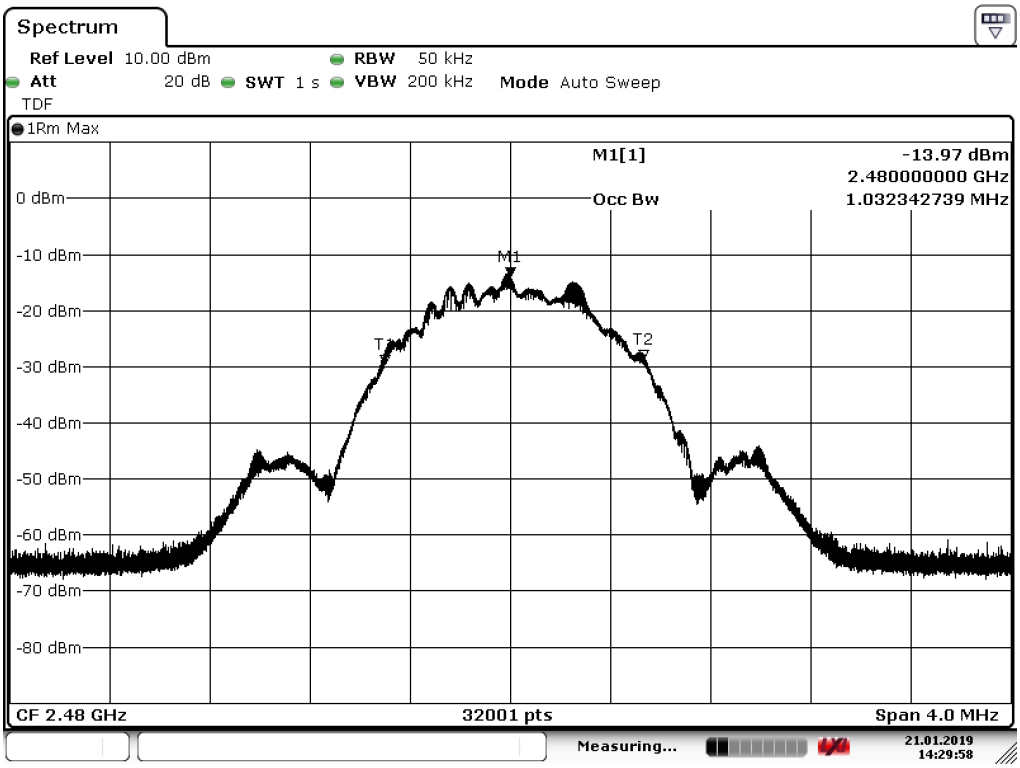


BLE Channel 18

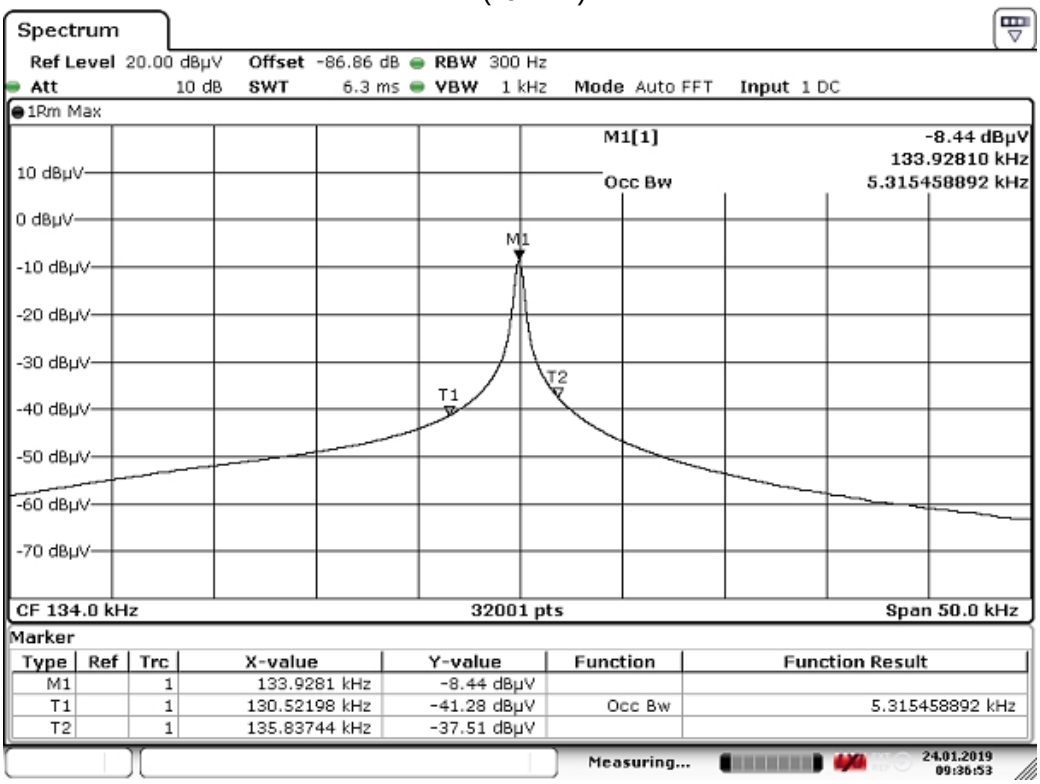


Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4400055 GHz	-20.78 dBm		
T1		1	2.439510765 GHz	-34.10 dBm	Occ Bw	1.037217587 MHz
T2		1	2.440547983 GHz	-33.92 dBm		

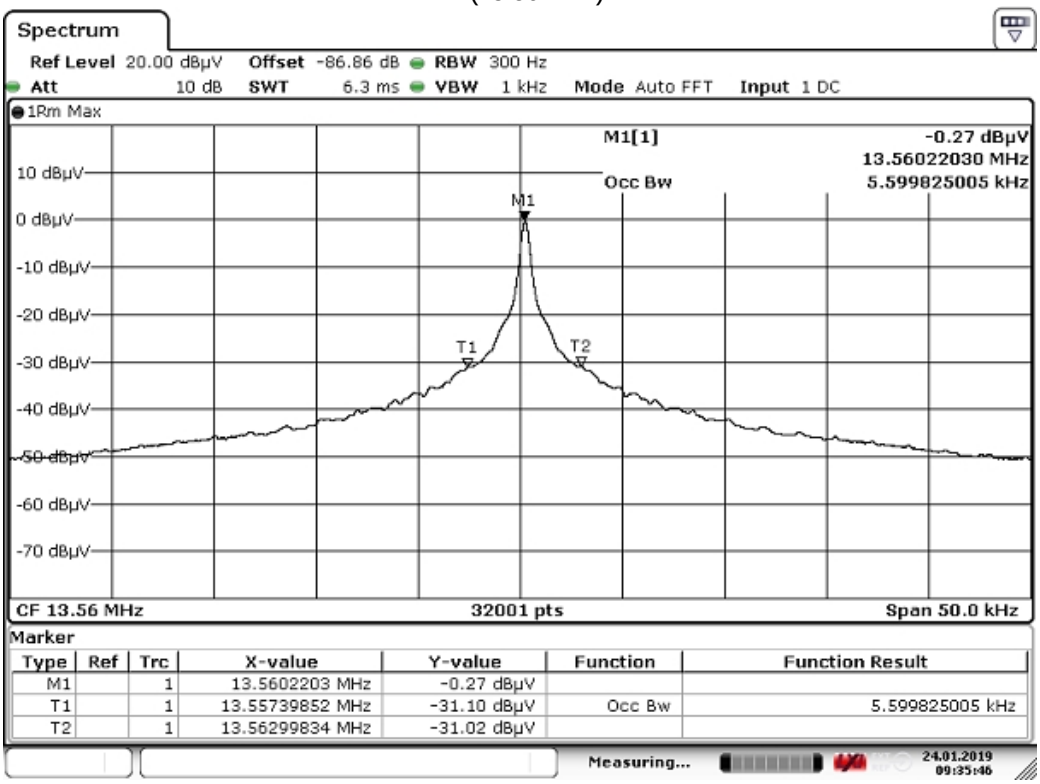
BLE Channel 39



LF (134 kHz)



HF (13.56 MHz)



3.6 Output Power Measurement

3.6.1 Limit

For systems using digital modulation in the 2400-2483.5 MHz, the limit for the peak output power is 30 dBm. If transmitting antenna of directional gain greater than 6 dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point to point operation, the limit has to be reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

3.6.2 Measurement instruments

The measurement instruments are listed in chapter 2.4 of this report.

3.6.3 Test setup

The test setup is as shown in chapter 2.3 of this report.

3.6.4 Test procedure

The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05.

IRN 014 - RF power (W) - Method 1 – AVGSA (DTS) according to ANSI C63.10.

3.6.5 Test results of Output Power Measurement

Peak method

Technology Std.	Channel	Frequency (MHz)	Data rate	Peak output power (dBm)
Bluetooth Low Energy	1	2402	1 Mbps	-11.3
	18	2440	1 Mbps	-11.3
	39	2480	1 Mbps	-10.7
Uncertainty	±0.71 dB			

3.7 Power Spectral Density

3.7.1 Limit

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band at any time interval of continuous transmission.

3.7.2 Measurement instruments

The measurement instruments are listed in chapter 2.4 of this report.

3.7.3 Test setup

The test setup is as shown in chapter 2.3 of this report.

3.7.4 Test procedure

The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05.

IRN 030 - Spectral power density (W per n.Hz) - Method 5 – Peak method PKPSD (PSD in 3 kHz band).

3.7.5 Test results of Power Spectral Density Measurement

Peak Power spectral density

Technology Std.	Channel	Frequency (MHz)	Data rate	PSD/3 kHz (dBm)
Bluetooth Low Energy	1	2402	1 Mbps	-26
	18	2440	1 Mbps	-26
	39	2480	1 Mbps	-26
Uncertainty	±2 dB			

3.8 Band edge Measurement

3.8.1 Limit

Band edge:
At the edge of the authorized band the RF power shall be at least 20 dB down.

3.8.2 Measurement instruments

The measurement instruments are listed in chapter 2.4 of this report.

3.8.3 Test setup

The test setup is as shown in chapter 2.3 of this report.

3.8.4 Test procedure

According to KDB Publication 558074 V05, sections 11.3 and 12.1.
IRN 026 - Radiated electrical disturbance (V per m) Method 6 – Radiated electrical disturbance at the Authorized band edge.

3.8.5 Measurement Uncertainty

± 5.7 dB.

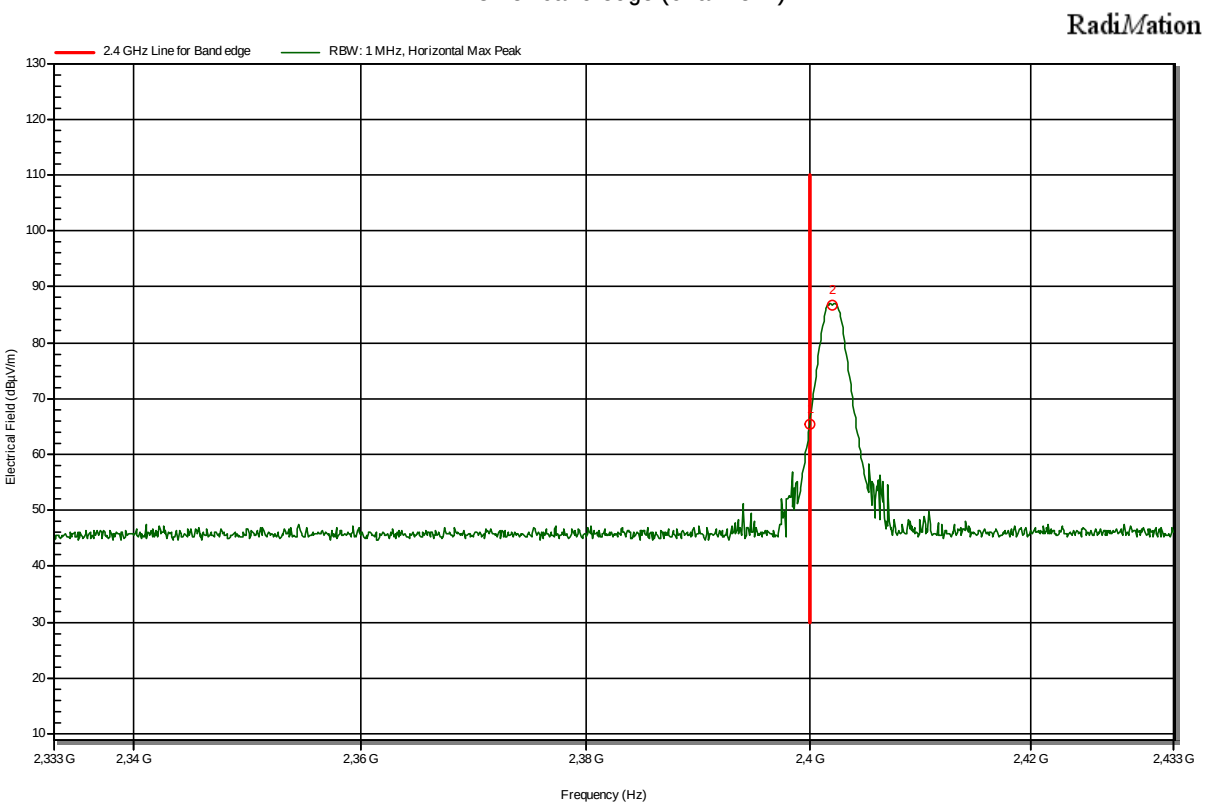
3.8.6 Results of the band edge measurement

	Peak power (dBµV/m)	Band edge power (dBµV/m)	Difference (dBµV/m)	Minimum required difference (dBµV/m)
Lower Band Edge	86.7	65.5	21.2	20.0
Upper band edge	87.3	50.4	37.3	20.0

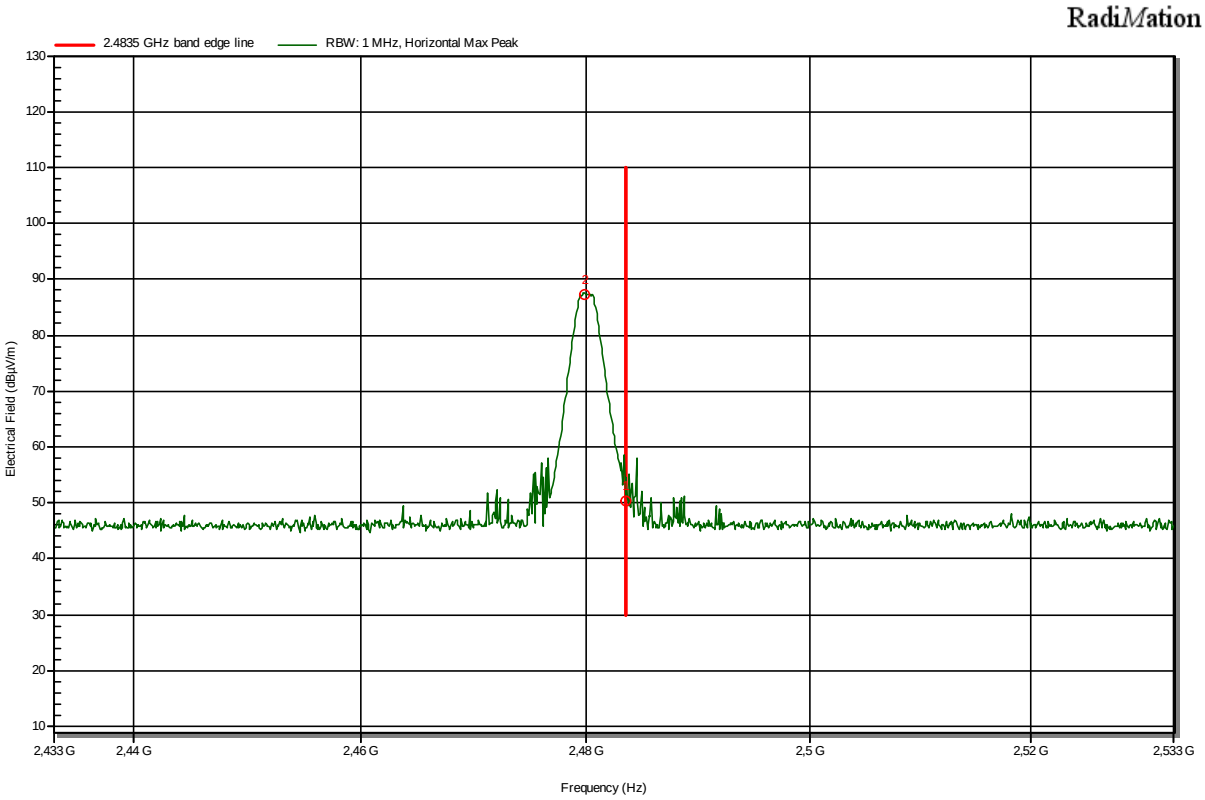
3.8.7 Plots of the Band edge Measurements

See next page.

BLE Lower band edge (Channel 1)



BLE Upper band edge (Channel 39)



3.9 Conducted emissions

3.9.1 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 (dBµV)	
	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.

3.9.2 Measurement instruments

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

3.9.3 Test setup

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

3.9.4 Test procedure

According to ANSI C63.4: 2014, section 13.3.
IRN 029 – Method 1.

3.9.5 Test results of the AC mains conducted measurement

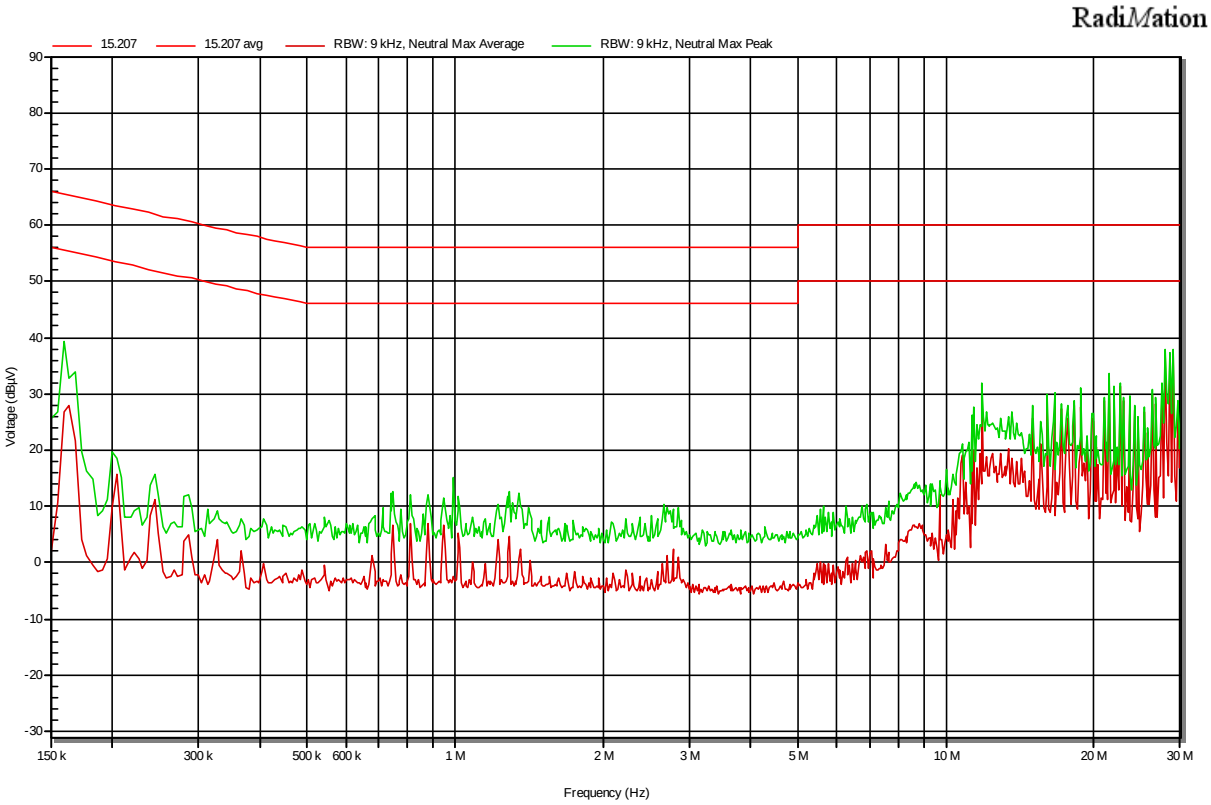
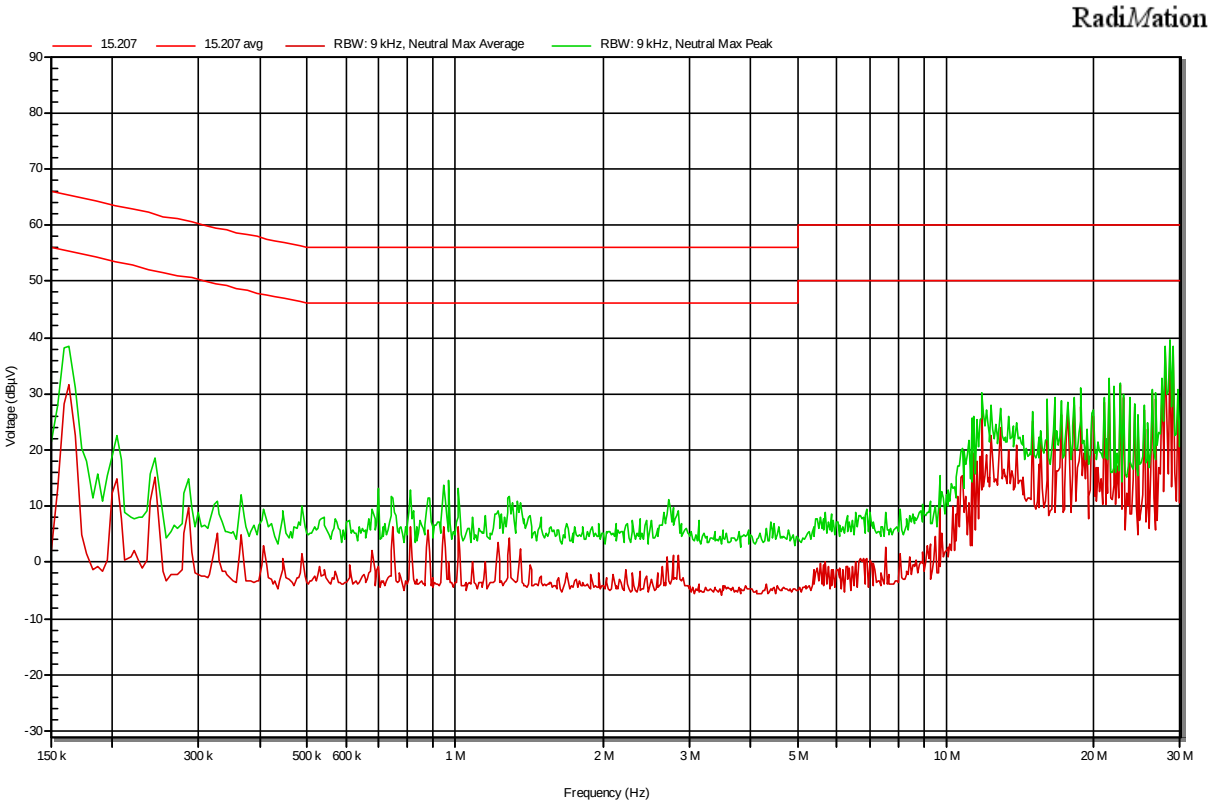
See next page.

3.9.6 Measurement uncertainty

+/- 3.6 dB.

3.9.7 Plots of the conducted spurious emissions measurement

Neutral



Phase