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

Product name : FU8002-915

Applicant : MEDKONSULT medical technology s.r.o.

FCC ID : 2A8XBFU8002-915V1

Test report No. : P000145994 005 Ver 3.0

Laboratory information

Accreditation

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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The Industry Canada company number for Telefication is: 4173A. The CABID is NL0001.

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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 Telefication 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	23-09-2022	First draft	KK
v1.00	12-01-2023	Final version	KK
V2.0	01-09-2023	Added block diagram for conducted testing to clause 2.2 Added specification about worst case position for spurious emissions to clause 3.1.4 Updated peak limit on page 19	PvW
V3.0	18-03-2024	Specified antenna type in clause 1.4	PvW

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Summary of Test results

FCC	ISED	Description	Section in report	Verdict
15.247(d) 15.209 (a)	RSS-Gen 8.9	Radiated spurious emissions	3.1	Pass
15.205 (a)	RSS Gen 8.10	Spurious emissions in the restricted bands	3.1	Pass
15.247 (a)	RSS-247 5.2(a)	6 dB bandwidth	3.2	Pass
--	RSS-Gen 6.7	99% bandwidth	3.3	Pass
15.247 (b)	RSS-247 5.4 (d)	RF output power	3.4	Pass
15.247 (e)	RSS-247 5.2 (b)	Power spectral density	3.5	Pass
15.247 (d)	RSS-247 5.5	Band edge	3.6	Pass

1 General Description

1.1 Applicant

Client name:	MEDKONSULT medical technology s.r.o.
Address:	Pasteurova 67/15, Olomouc, Czech Republic
Zip code:	77900
Telephone:	+420771169201
E-mail:	martin.skutek@mmtsystems.com
Contact name:	Martin Škutek

1.2 Manufacturer

Manufacturer name:	MEDKONSULT medical technology s.r.o.
Address:	K Mrazirnam 130/16, hall D41, Olomouc, Czech Republic
Zip code:	77900
Telephone:	+420771169201
E-mail:	martin.skutek@mmtsystems.com
Contact name:	Martin Škutek

1.3 Tested Equipment Under Test (EUT)

Product name:	FU8002-915
Brand name:	MEDKONSULT medical technology s.r.o.
FCC ID:	2A8XBFU8002-915V1
Product type:	Build-In Radio module for UROMIC and DANFLOW series of medical devices at 915 MHz communication band
Model(s):	-
Batch and/or serial No.	10335000 Series
Software version:	FW 1.2.0
Hardware version:	Schematic rev. 1.2, PCB rev. 1.2, BOM rev. 4.0
Date of receipt	01-09-2022
Tests started:	20-09-2022
Testing ended:	27-09-2022

1.4 Product specifications of Equipment under test

Tx Frequency:	Proprietary: 915.1 MHz
Rx frequency:	Proprietary: 915.1 MHz
Occupied Channel Width:	841.3 kHz
Antenna type:	External antenna, model: GSM-ANT-FPC02 (Flat patch antenna)
Antenna gain:	3.0 dBi
Type of modulation:	Proprietary
Emission designator	608KF1D

Disclaimer: The antenna gain and operating frequency bands are declared by the applicant

1.5 Environmental conditions

Test date	20-09-2022
Ambient temperature	22.1 C°
Humidity	42.8 %

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
- RSS-Gen Issue 5
- RSS-247 Issue 2

1.8 Observation and remarks

Customer provide a software for testing to set the device continuous transmission mode. EUT is DC powered device.

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 : ing. M.H. Khan

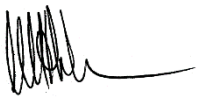
The above conclusions have been verified by the following signatory:

Date : 19-03-2024

Name : ing. M.H. Khan

Function : Test engineer

Signature :



2 Test configuration of the Equipment Under Test

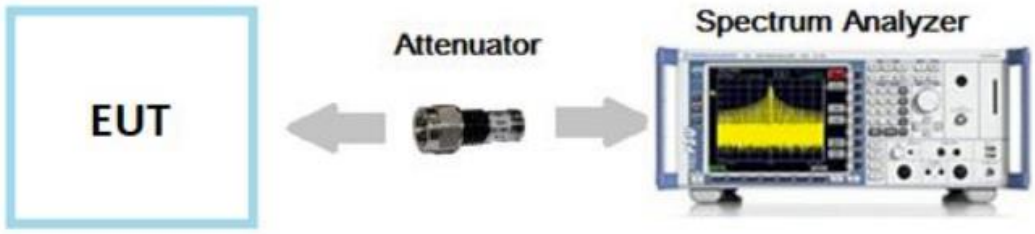
2.1 Test mode

Technology	Channel	Frequency (MHz)	Data rate
Proprietary	1	915.1	100 kbps

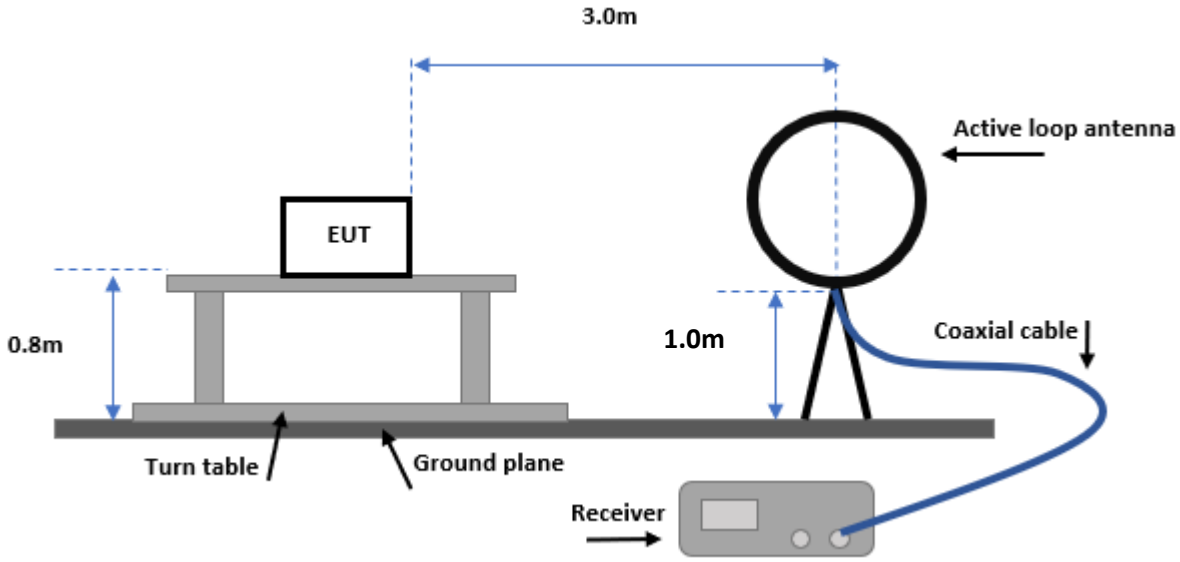
2.2 Test setups

Antenna port conducted tests

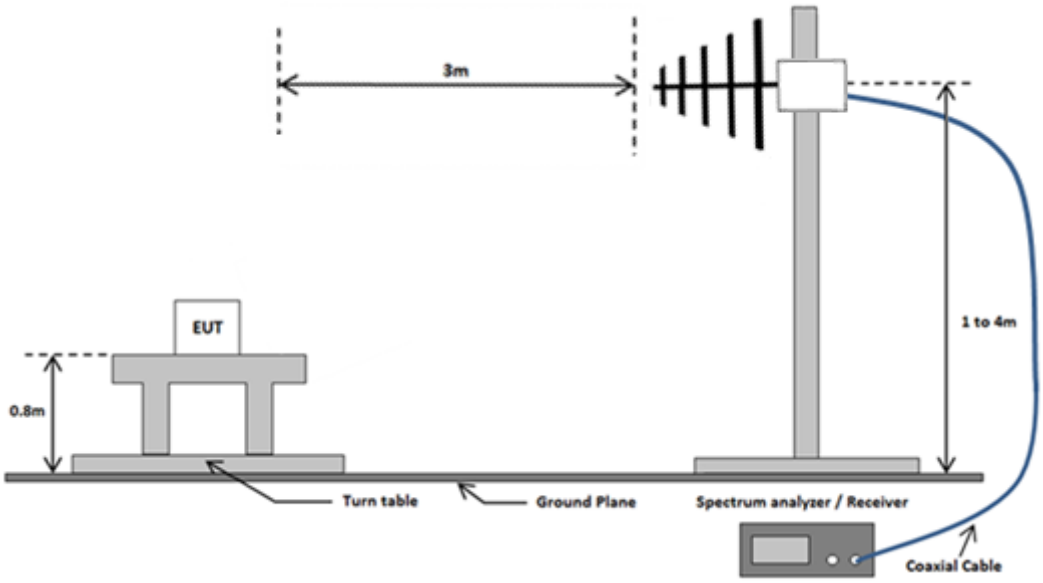
Conducted test setup



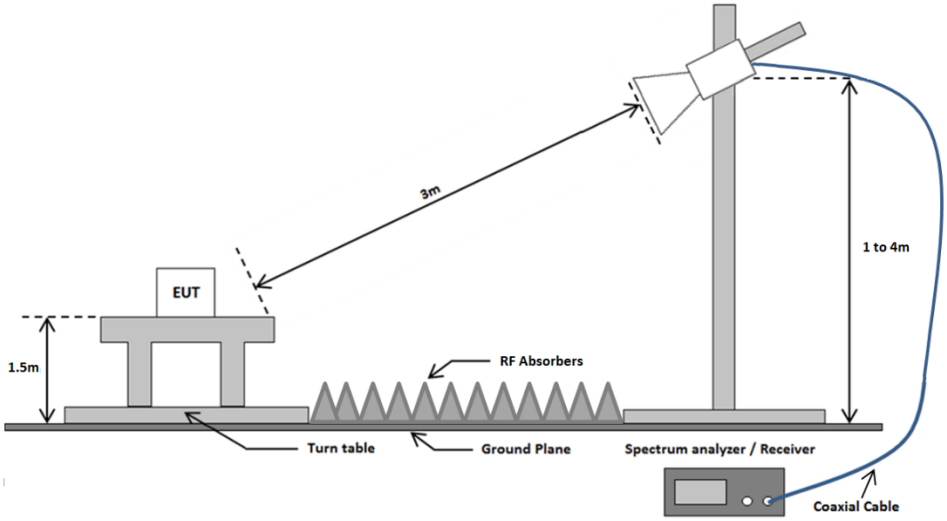
Radiated emissions test setup 9 kHz – 30 MHz



Radiated emissions test setup 30 MHz - 1 GHz



Radiated emissions test setup above 1 GHz



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
Spectrum analyzer	Rohde & Schwarz	FSP40	TE11125	03-2022	03-2023	3.1 – 3.6
Active loop antenna	EMCO	6502	114515	01-2022	01-2024	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
Horn antenna	FLANN-MICROWAVE	20240-25	114518	NA*	NA*	3.1
Horn antenna	Scientific atlanta	12A-26	11487	NA*	NA*	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

*Note: Standard gain horn antennas do not need calibration

2.4 Sample calculations

All formulas for data conversions and conversion factors are reported in chapter 4 of this test report.

3 Test results

3.1 Radiated spurious emissions

3.1.1 Limit

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: Measured values in the plots 9 kHz to 30 MHz 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

Prior to running the measurements, the EUT has been investigated in the X, Y and Z dimensions to determine the worst case configuration for spurious emissions. The worst case configuration is with the PCB flat on the test table.

9 kHz – 30 MHz: According to ANSI C63.10-2013, section 5.4.2 and 8.2.3
30 MHz to 26.5 GHz: According to ANSI C63.10-2013, 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

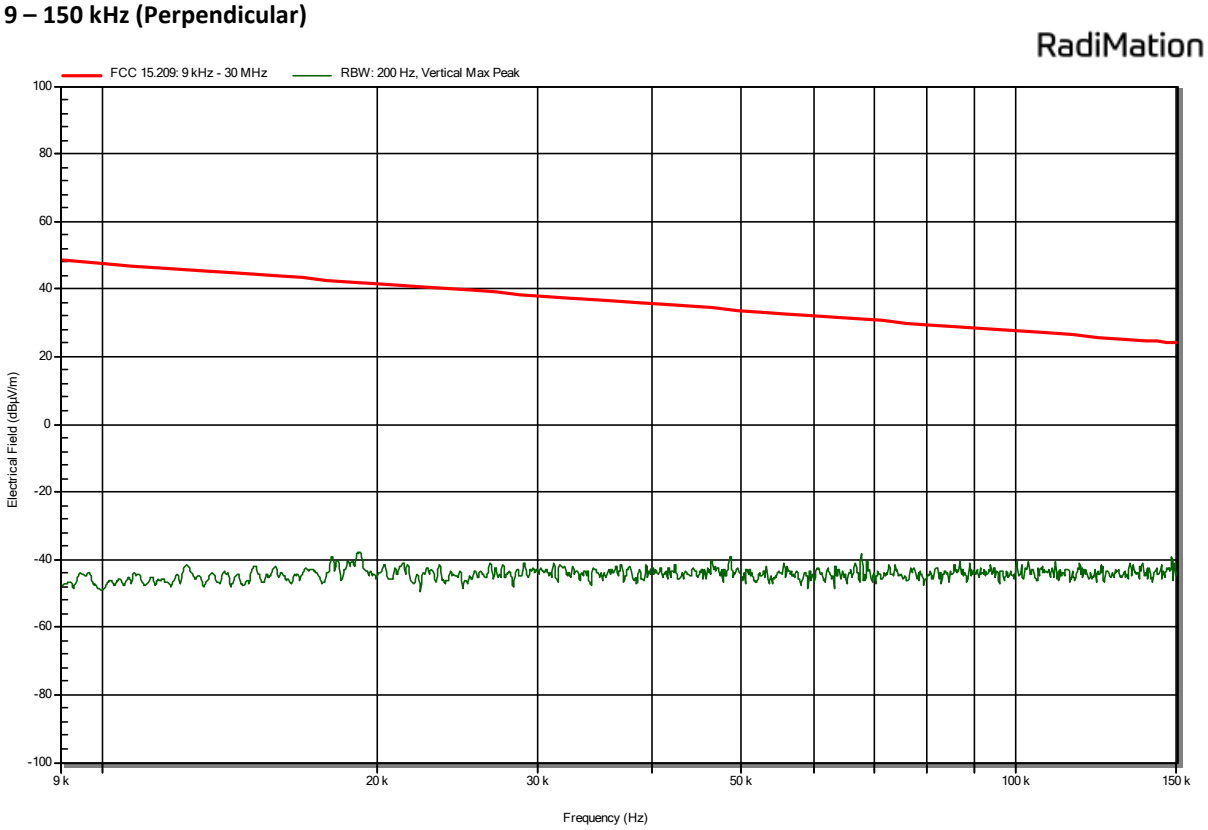
Frequency range	Polarization	Uncertainty
9 kHz – 30 MHz	--	±1.6 dB
30 – 200 MHz	Horizontal	±4.5 dB
	Vertical	±5.4 dB
200 -1000 MHz	Horizontal	±3.6 dB
	Vertical	±4.6 dB
1 – 18 GHz	Horizontal	±5.7 dB
	Vertical	±5.7 dB
18 – 26.5 GHz	Horizontal	±4.9 dB
	Vertical	±4.9 dB

3.1.6 Peak tables of the radiated spurious emissions measurement

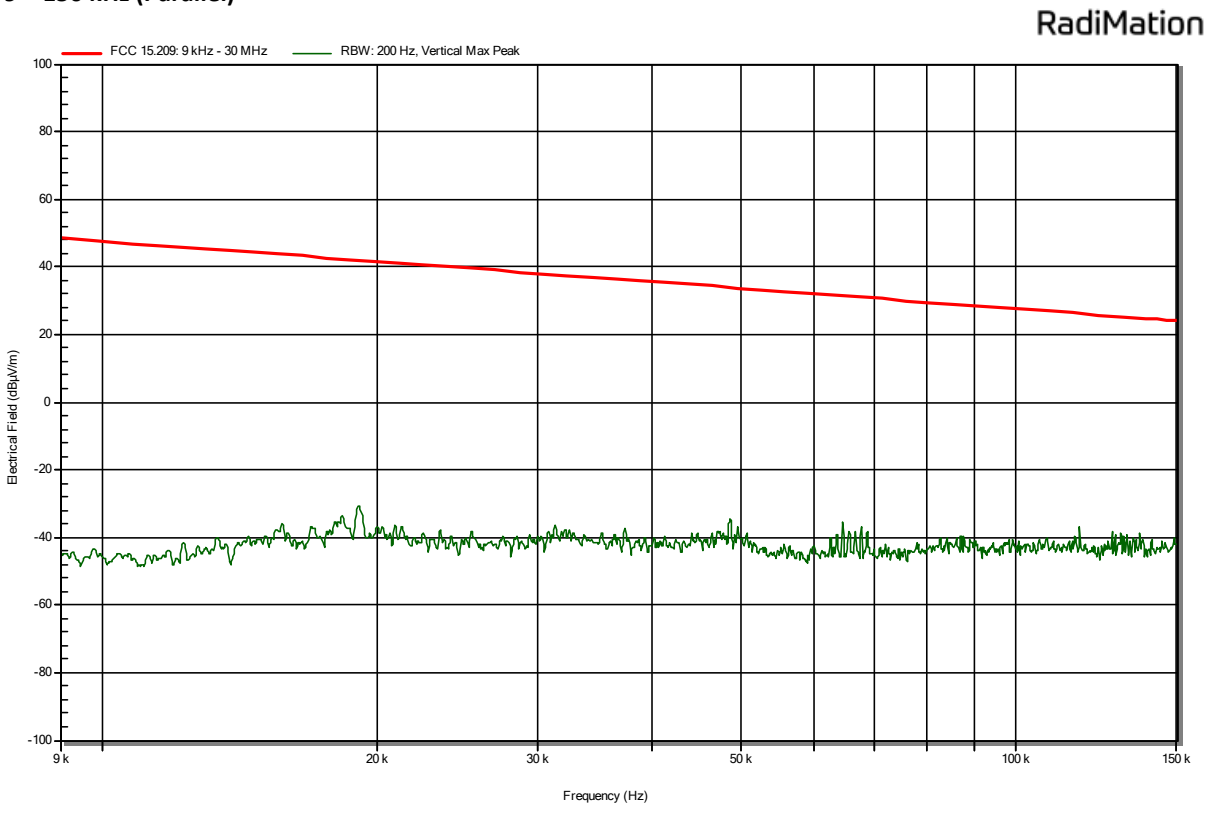
Frequency	Peak	Peak Limit	Average	Average Limit	Status	Polarization
3,661 GHz	50,1 dBµV/m	74 dBµV/m	45,3 dBµV/m	54 dBµV/m	Pass	Horizontal
4,575 GHz	51,6 dBµV/m	74 dBµV/m	47,5 dBµV/m	54 dBµV/m	Pass	Vertical
1,017 GHz	41,9 dBµV/m	74 dBµV/m	35,1 dBµV/m	54 dBµV/m	Pass	Horizontal
215,488 MHz	26,3 dBµV/m	44 dBµV/m	-	-	Pass	Vertical
31,485 MHz	26,2 dBµV/m	40 dBµV/m	-	-	Pass	Vertical
146,298 MHz	23,2 dBµV/m	44 dBµV/m	-	-	Pass	Horizontal

3.1.7 Plots of the Radiated Spurious Emissions Measurement

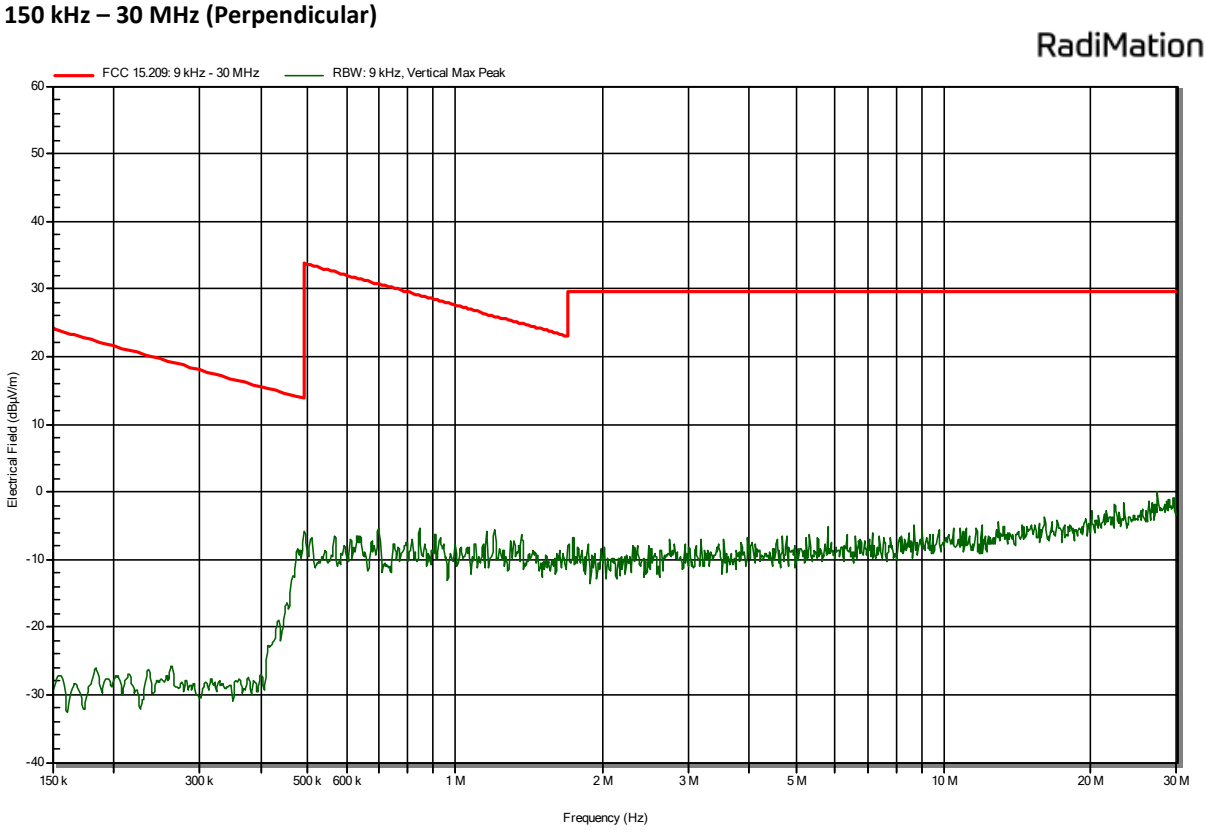
9 – 150 kHz (Perpendicular)



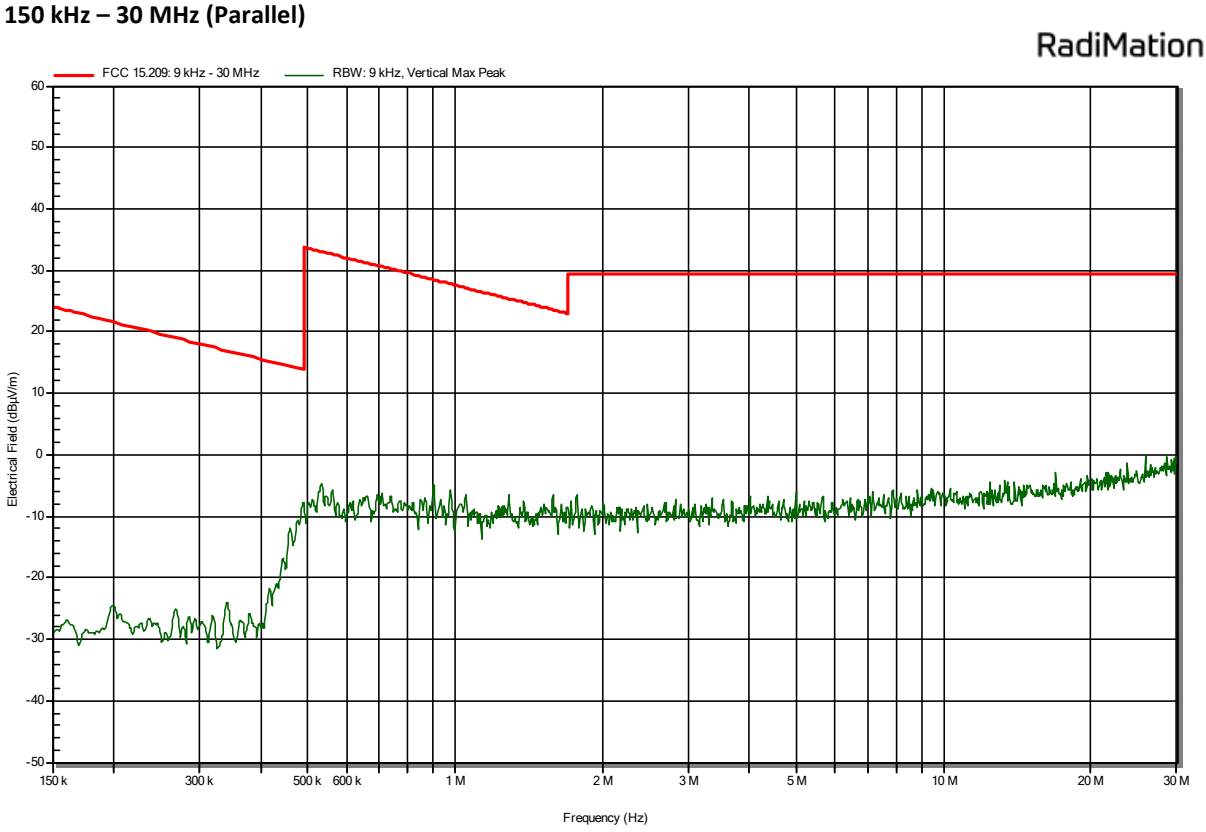
9 – 150 kHz (Parallel)



150 kHz – 30 MHz (Perpendicular)

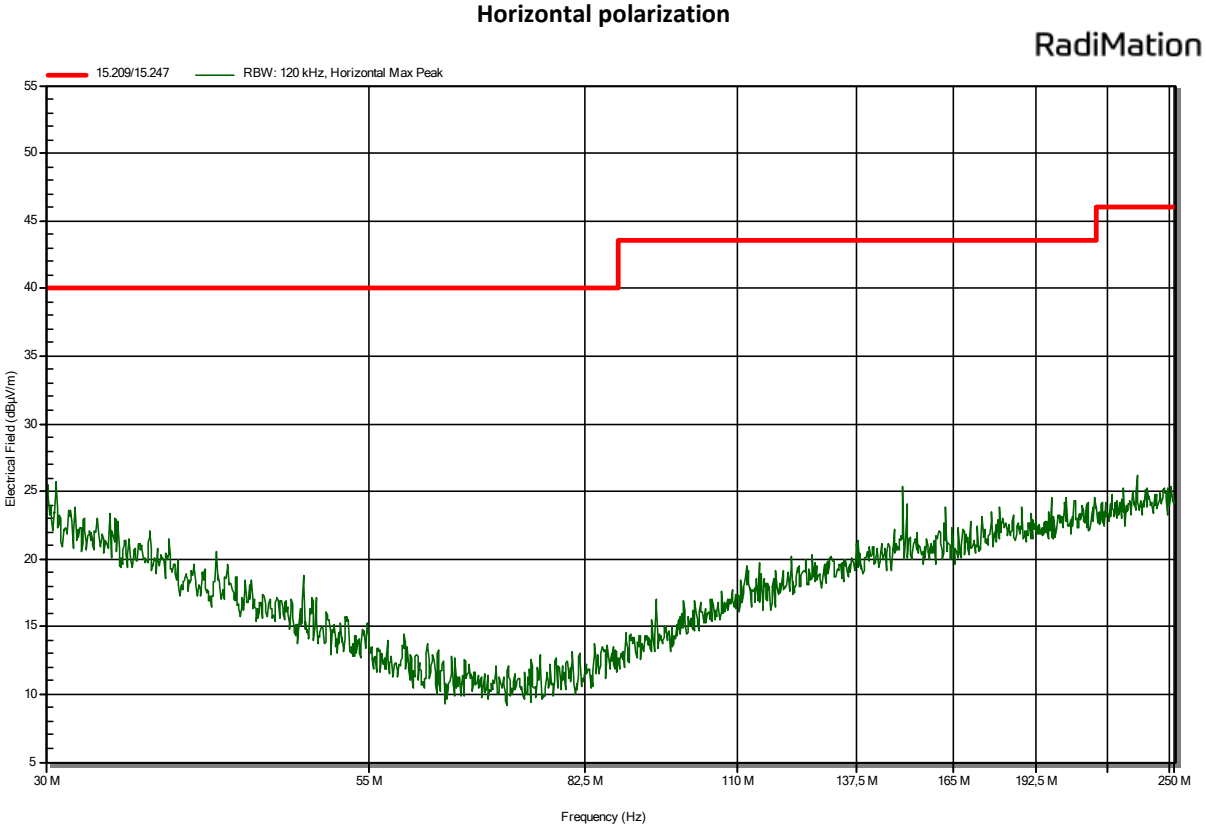


150 kHz – 30 MHz (Parallel)

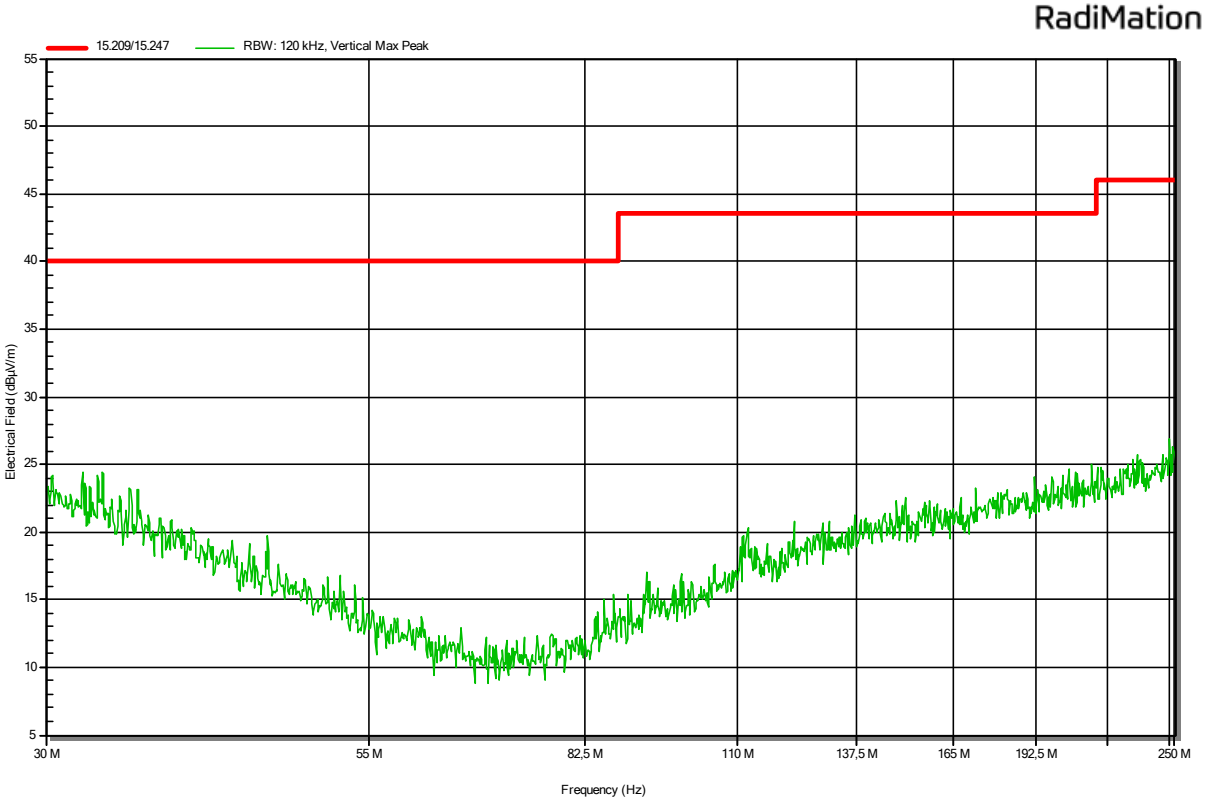


30 – 250 MHz

Horizontal polarization

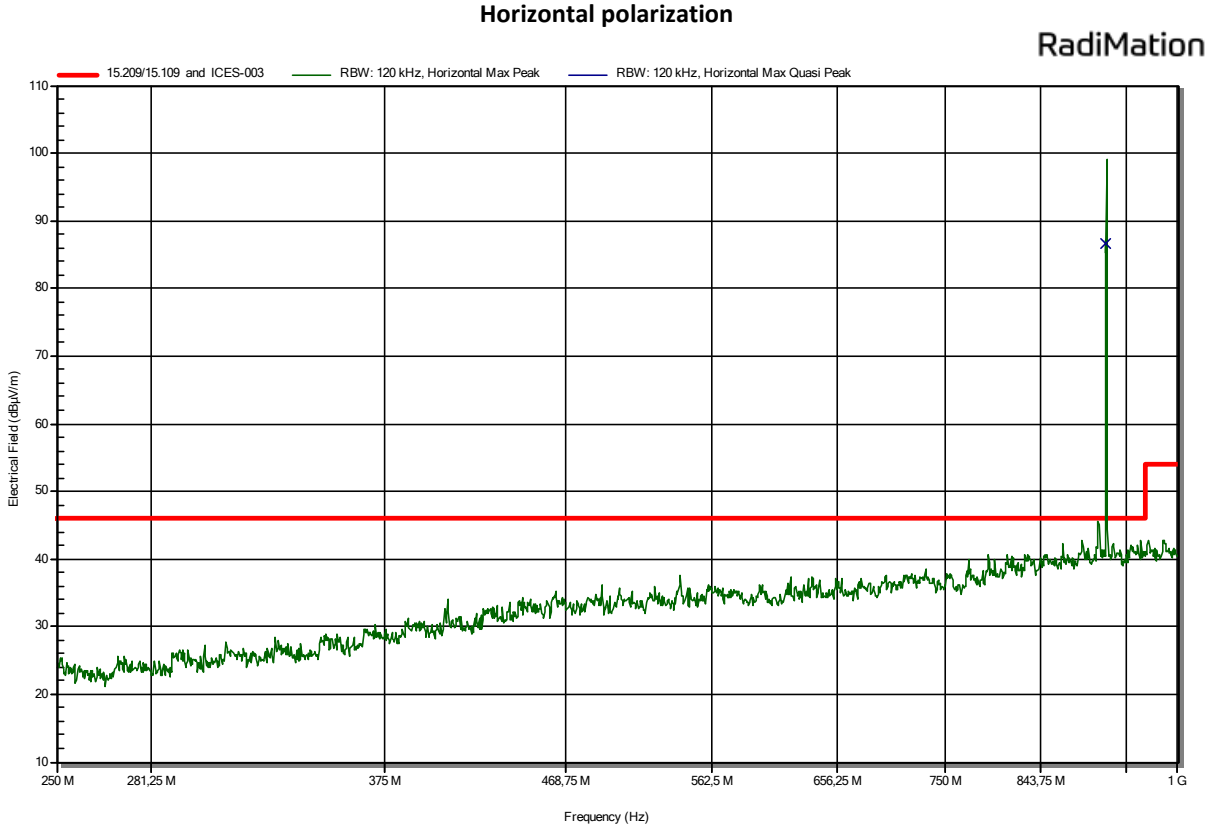


Vertical polarization

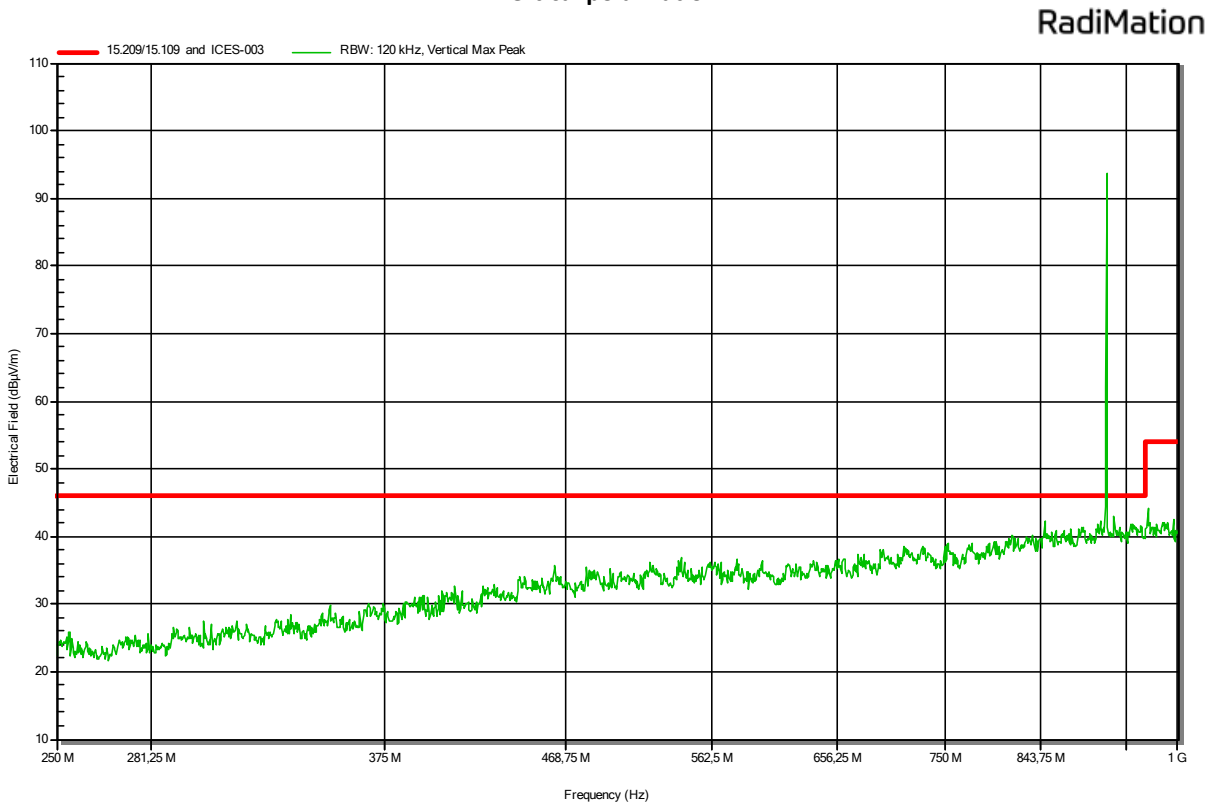


250 – 1000 MHz

Horizontal polarization



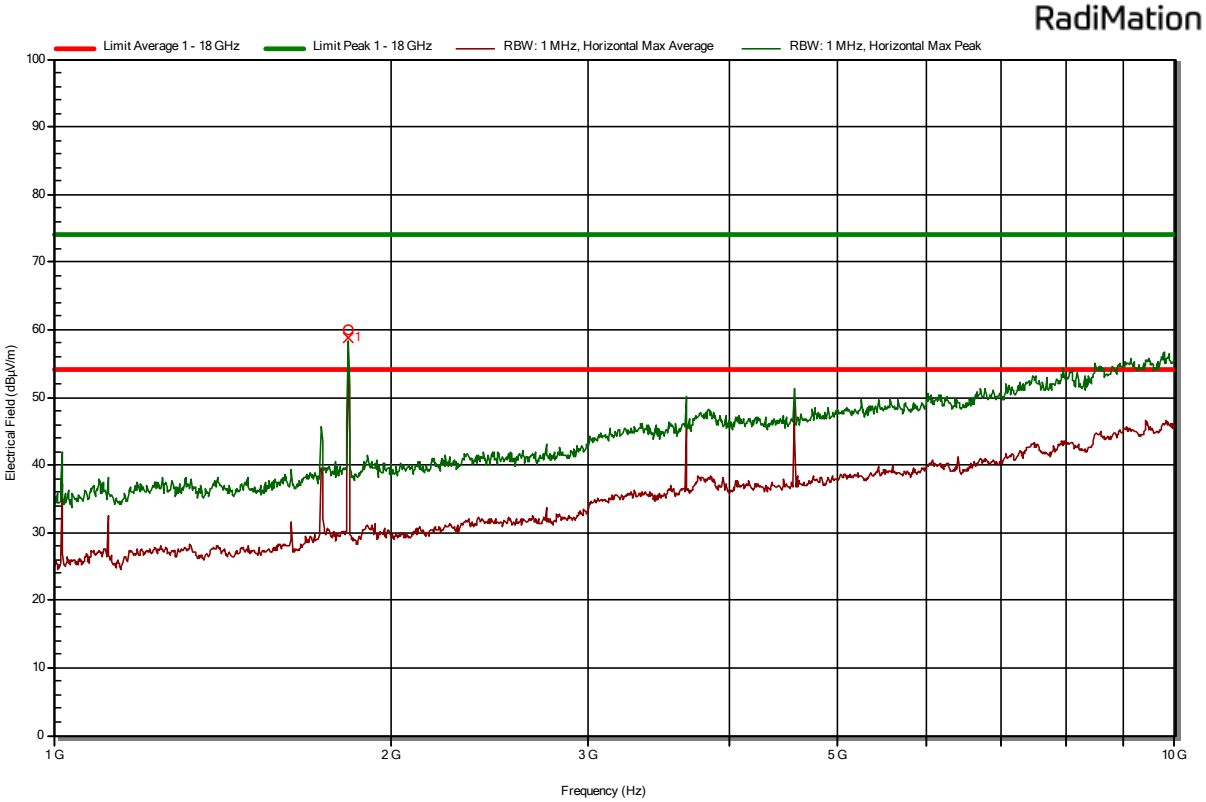
Vertical polarization



Note: The peaks in the 902 - 928 MHz range seen in the plots above are the transmission frequencies and therefore not subject to the spurious limit.

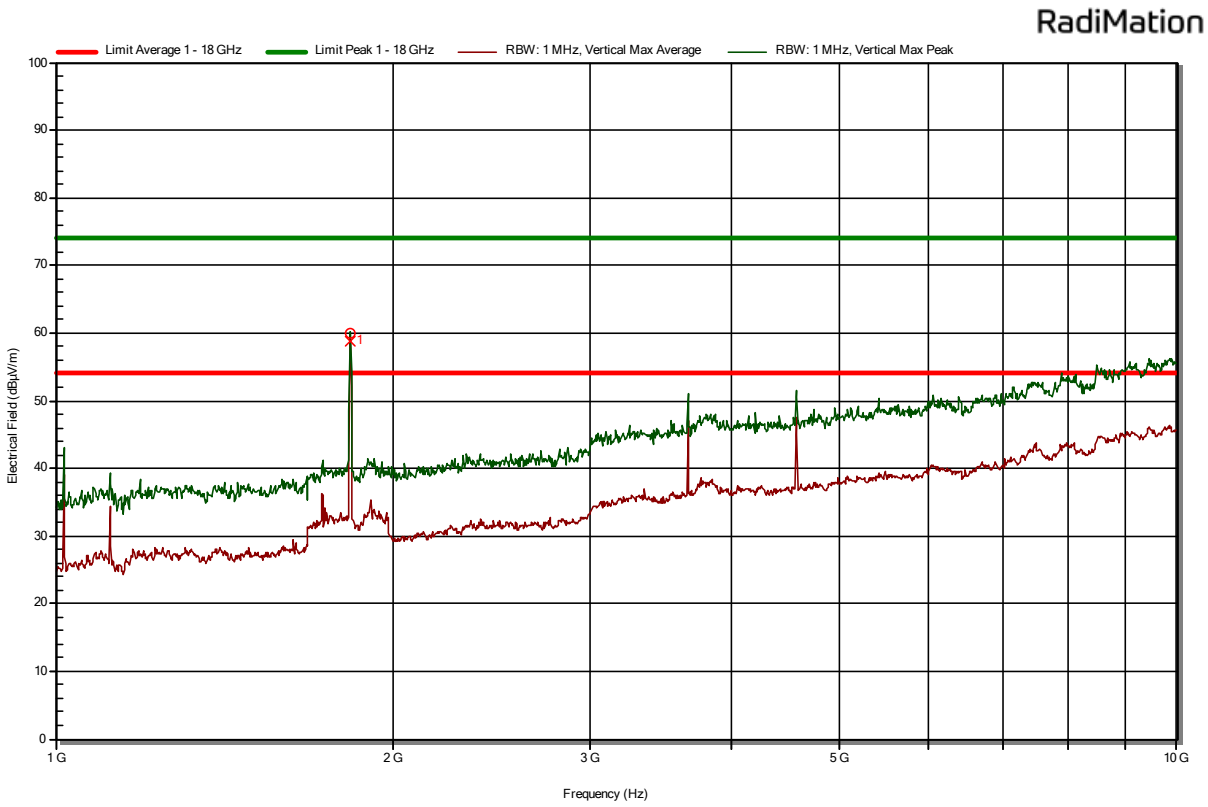
1 – 10 GHz

Horizontal polarization



Note: The harmonics seen in the plots above are falls inside of restricted bands of operation defined in Part 15.205 of the FCC regulation. Thus as described in FCC Part 15.247 sub-section (d) the actual applicable limit shall be 20 dB lower of the actual transmitter peak value which is 94.39 dBµV/m for this case.

Vertical polarization



Frequency	Peak	Peak Limit	Average	Average Limit	Status	Angle	Height	Polarization
1,83 GHz	59,9 dBµV/m	103.59 dBµV/m	58,8 dBµV/m	83.59 dBµV/m	Pass	167 degrees	1,5 m	Vertical

Note: The harmonics seen in the plots above are falls inside of restricted bands of operation defined in Part 15.205 of the FCC regulation. Thus as described in FCC Part 15.247 sub-section (d) the actual applicable limit shall be 20 dB lower of the actual transmitter peak value which is 103.59 dBµV/m for this case.

3.2 6dB bandwidth Measurement

3.2.1 Limit

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

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.

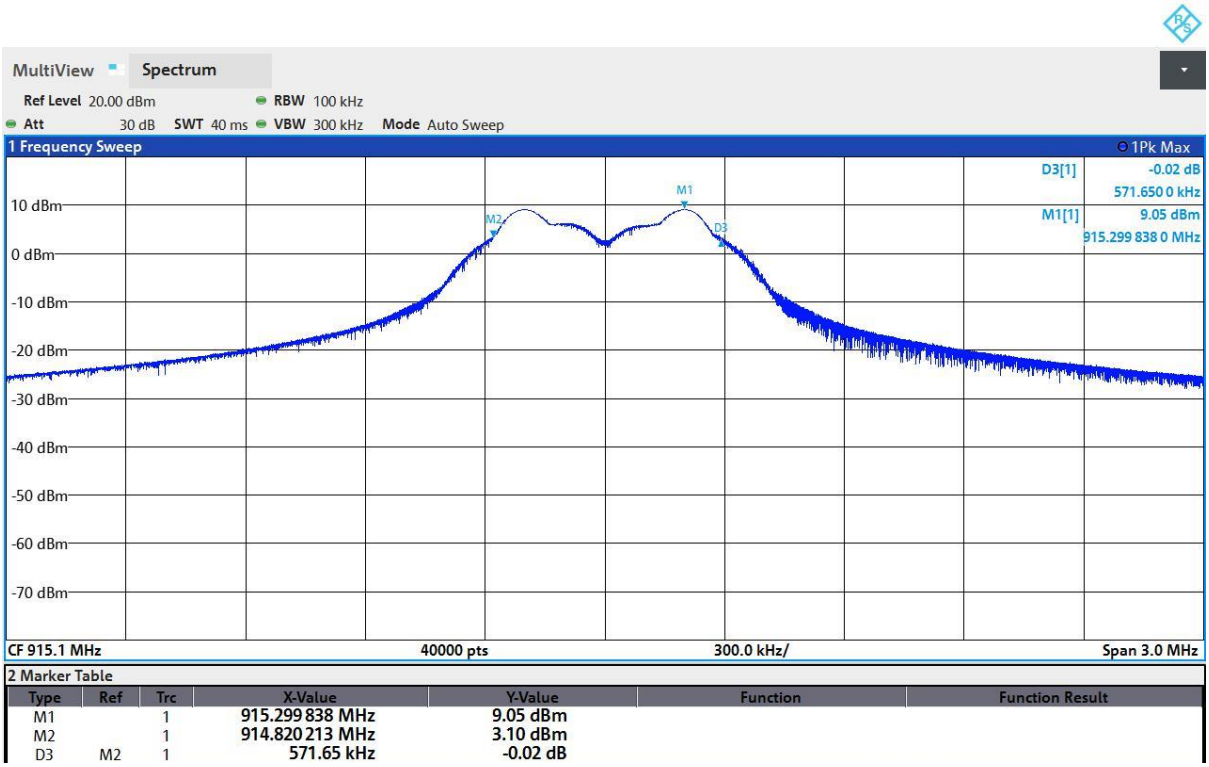
3.2.4 Test procedure

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

3.2.5 Test Results of the 6 dB bandwidth Measurement

Technology Std.	Channel	Frequency (MHz)	Data rate	6dB bandwidth (kHz)
Proprietary	1	915.1	100 kbps	571.65
Uncertainty	± 36.2 kHz			

3.2.6 Plots of the 6dB bandwidth measurement



3.3 99% Occupied Bandwidth

3.3.1 Limit

According to RSS-Gen 6.7

3.3.2 Measurement instruments

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

3.3.3 Test setup

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

3.3.4 Test procedure

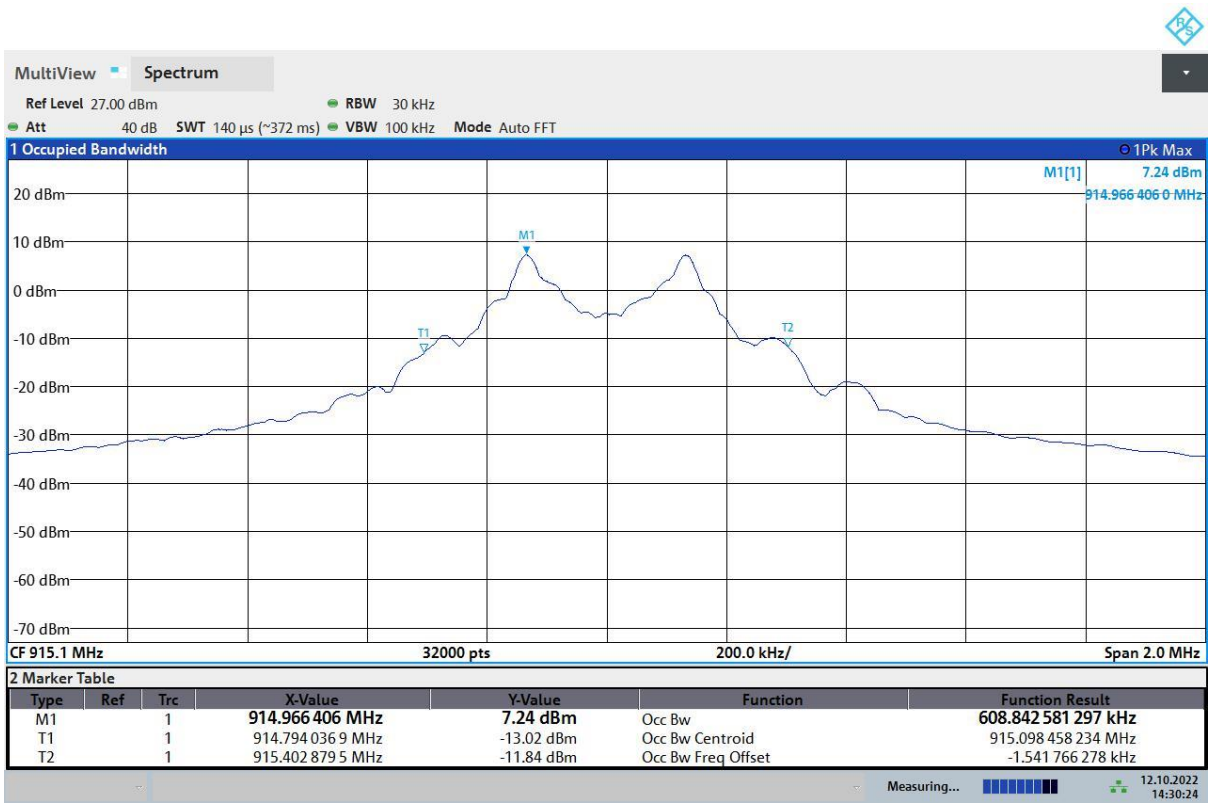
IRN 017 - Occupied bandwidth (Hz) Method 1 – XX % power bandwidth.

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.

3.3.5 Test results of the 99% occupied bandwidth measurement

Technology Std.	Channel	Frequency (MHz)	Data rate	99% bandwidth (kHz)
Proprietary	1	915.1	100 kbps	608.8
Uncertainty	± 12 kHz			

3.3.6 Plots of the 99% occupied bandwidth measurement



3.4 Output Power Measurement

3.4.1 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.

3.4.2 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

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

IRN 014 - RF power (W) - Method 6

3.4.5 Test results of Output Power Measurement

Peak method

Technology Std.	Channel	Frequency (MHz)	Data rate	Peak conducted output power (dBm)
Proprietary	1	915.1	100 kbps	8.36
Uncertainty	±0.71 dB			

3.5 Power Spectral Density

3.5.1 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.

3.5.2 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

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)

3.5.5 Test results of Power Spectral Density Measurement

Peak Power spectral density

Technology Std.	Channel	Frequency (MHz)	Data rate	PSD (dBm/3 kHz)
Proprietary	1	915.1	100 kbps	1.91
Uncertainty	±2 dB			

3.6 Band edge Measurement

3.6.1 Limit

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

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

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

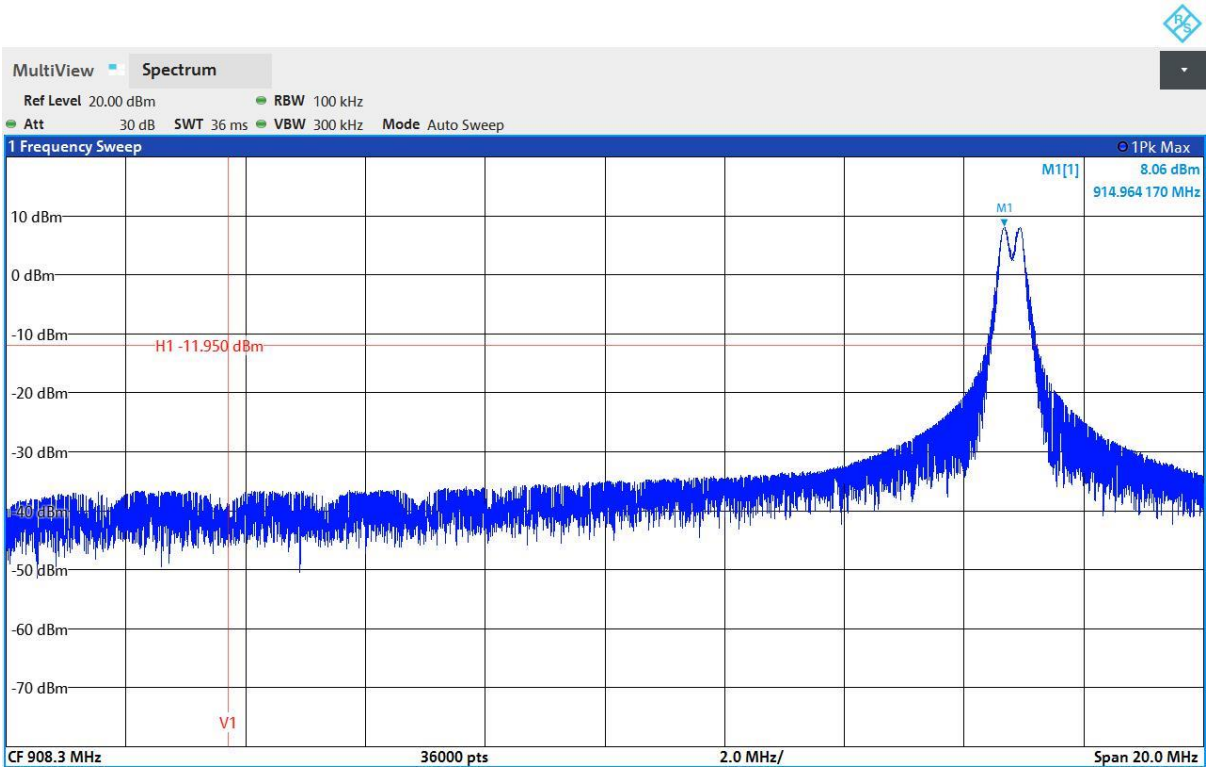
3.6.5 Measurement Uncertainty

± 5.7 dB.

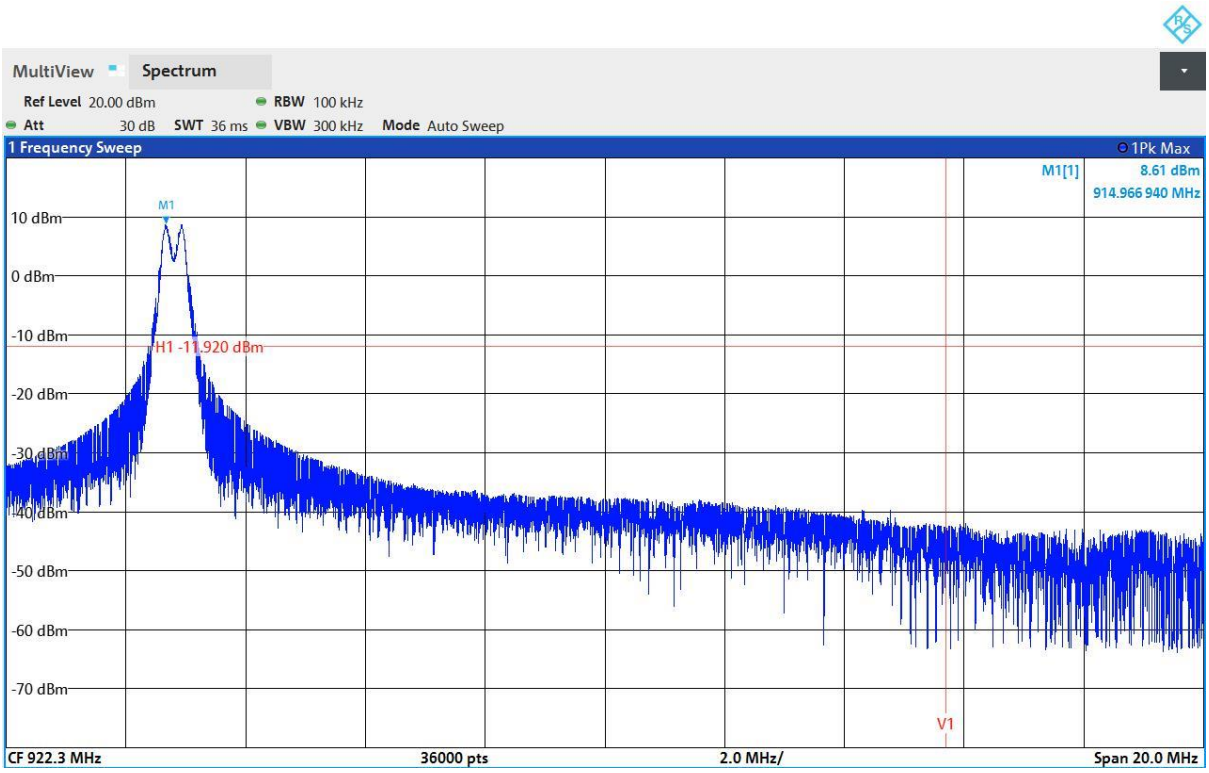
3.6.6 Plots of the Band edge Measurements

See next page

Proprietary lower band edge



Proprietary upper band edge



4 Sample calculations

All formulas for data conversions and conversion factors are reported in this chapter.

Field Strength Measurement:

E (dBµV/m) = U(dBµV) + AF (dB/m) + Corr. (dB)

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

Corr. = sum of single correction factors of used cable and amplifier (if applicable).
Linear interpolation will be used for frequencies in between the values in the table.
Tables shows an extract of the values.

Frequency (Mhz)	**AF (dB/m)** **Id: 114436** **Schwarzbeck** **VHA9103+BBA9106** **SN: 9856**	**Cable loss (dB)** **Id: SAR cable**	**Corr. (dB)**
30	18,64	0,68	19,32
100	10,43	1,15	11,58
150	14,76	1,41	16,17
200	16,04	1,63	17,67
250	16,89	1,93	18,82

Frequency (Mhz)	**AF (dB/m)** **Id: 114385** **EMCO 3147** **SN: 9104-1031**	**Cable loss (dB)** **Id: SAR cable**	**Corr. (dB)**
250	11,8	1,93	13,73
300	13	2,12	15,12
350	14,2	2,2	16,4
400	15,6	2,29	17,89
450	17,1	2,53	19,63
500	17,3	2,67	19,97
550	17,7	2,9	20,6
600	18,4	3,02	21,42
650	19,2	3,09	22,29
700	19,7	3,22	22,92
750	20,3	3,56	23,86
800	21,4	3,69	25,09
900	22,1	3,81	25,91
950	22,6	3,91	26,51
1000	22,5	4,3	26,8

Frequency (Mhz)	AF (dB/m) TE 00531 Emco 3115 SN: 9412-4377	Gain (dB) TE 11132 Miteq JS4-18004000-30-8P-A1	Cable loss (dB) TE 01315	Corr. (dB)
1000	23,6	40,4	2,0	66
1500	25,1	40,5	2,4	68
2000	27,1	40,5	2,7	70,3
2500	28,6	40,7	3,2	72,5
3000	30,5	40,7	3,2	74,4
3500	31,2	40,7	3,4	75,3
4000	32,7	40,9	4,9	78,5
4500	32,4	40,9	4,4	77,7
5000	33,2	40,7	4,6	78,5
5500	34,0	40,5	4,5	79
6000	34,6	40,0	5,2	79,8
6500	34,3	39,4	5,9	79,6
7000	35,2	38,6	5,7	79,5
7500	36,4	39,2	5,9	81,5
8000	37,0	38,9	6,3	82,2
8500	37,5	38,4	6,4	82,3
9000	38,1	37,4	6,5	82
9500	37,8	37,0	7,1	81,9
10000	38,2	36,5	7,3	82
10500	38,1	36,7	7,6	82,4
11000	38,3	36,9	8,3	83,5
11500	38,5	37,6	8,1	84,2
12000	39,1	38,3	8,4	85,8
12500	38,7	38,5	8,3	85,5
13000	39,2	38,9	9,2	87,3
13500	40,5	40,2	8,3	89
14000	41,1	40,0	8,2	89,3
14500	41,4	40,1	8,2	89,7
15000	40,2	41,4	8,3	89,9
15500	37,9	41,4	8,6	87,9
16000	37,5	42,8	9,2	89,5
16500	38,6	42,3	8,8	89,7
17000	41,1	43,1	9,4	93,6
17500	42,7	43,2	9,4	95,3
18000	44,0	44,2	9,8	98

Frequency (Mhz)	AF (dB/m) TE 00818 Flann 20240-25 SN: 163703	Gain (dB) TE 11131 Miteq JS4-18004000-30-8P-A1	Cable loss (dB) TE 01315	Corr. (dB)
18000	31,3	26,2	9,8	67,3
19000	31,5	26,1	9,6	67,2
20000	31,7	25,9	11	68,6
21000	31,9	24,3	10,7	66,9
22000	32,1	18,3	10,5	60,9
23000	32,2	18,9	10,8	61,9
24000	32,3	23,6	11,4	67,3
25000	32,4	24,5	11,6	68,5
26000	32,5	25,3	11,7	69,5

< End of the report >