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Chamber of Commerce
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FCC and ISED Test report for parts 15.209,15.247, 15.205 RSS-247, RSS-Gen

Product name	: DS02
Applicant	: TWTG R&D B.V.
FCC ID	: 2ATYF-DS02
IC	: 28385-DS02

Test report No. : P000052180 001 Ver 3.10

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).

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.

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	Kiwa Telefication BV
Test Site location	Wilmersdorf 50 7327 AC Apeldoorn The Netherlands Tel. +31 88998 3393
Test Site FCC	NL0001

Revision History

Version	Date	Remarks	By
v0.50	04-10-2022	Draft version	KK
v1.00	08-11-2022	Release version	KK
v2.00	14-11-2022	Product name changed	KK
v3.00	07-12-2022	Chapter 3.6 updated Updated references to other chapters in clauses 3.1.2; 3.1.3; 3.2.2 and 3.2.3 Removed reference to occupancy values in clause 1.8 and added details about worst case orientation	KK
v3.10	14-12-2022	Chapter 3.7.5 has been modified Chapter 3.8.5 additional information added	KK

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Summary of Test results

FCC	ISED	Description	Section in report	Verdict
125 kHz bandwidth mode (FHSS)				
15.247(d) 15.209 (a)	RSS-Gen 8.9	Radiated spurious emissions	3.4	Pass
15.205 (a)	RSS Gen 8.10	Spurious emissions in the restricted bands	3.4	Pass
--	RSS-Gen 6.7	99% bandwidth	3.3	Pass
15.247 (b)	RSS-247 5.4	RF output power	3.1	Pass
15.247 (d)	RSS-247 5.5	Band edge	3.5	Pass
15.247(f)	RSS-247 5.3 (a)	Average time of occupancy	3.6	Pass
15.247(a)	15.247 (a)	Carrier frequency separation	3.7	Pass
15.247(a)	15.247 (a)	Number of hoping frequencies	3.8	Pass
500 kHz bandwidth mode (DTS)				
15.247(d) 15.209 (a)	RSS-Gen 8.9	Radiated spurious emissions	3.4	Pass
15.205 (a)	RSS Gen 8.10	Spurious emissions in the restricted bands	3.4	Pass
--	RSS-Gen 6.7	99% bandwidth	3.3	Pass
15.247 (b)	RSS-247 5.4	RF output power	3.1	Pass
15.247 (e)	RSS-247 5.2 (b)	Power spectral density	3.2	Pass
15.247 (d)	RSS-247 5.5	Band edge	3.5	Pass

1 General Description

1.1 Applicant

Client name:	TWTG R&D B.V.
Address:	Schaardijk 386, 2909LA, Zuid Holland, Capelle a/d Ijssel, The Netherlands
Telephone:	+31 10 203 7905
E-mail:	wesley.kerstens@twtg.io
Contact name:	Wesley Kerstens

1.2 Manufacturer

Manufacturer name:	TWTG R&D B.V.
Address:	Schaardijk 386, 2909LA, Zuid Holland, Capelle a/d Ijssel, The Netherlands
Telephone:	+31 10 203 7905
E-mail:	info@twtg.io
Contact name:	Dimer Schaefer

1.3 Tested Equipment Under Test (EUT)

Product name:	DS02
Brand name:	TWTG R&D B.V.
FCC ID:	2ATYF-DS02
IC:	28385-DS02
Model(s):	-
Software version:	1.0
Hardware version:	A8
Date of receipt	17-11-2021
Tests started:	27-07-2022
Testing ended:	27-09-2022

1.4 Product specifications of Equipment under test

Tx Frequency:	902 – 928 MHz
Rx frequency:	902 – 928 MHz
Antenna type	PCB Antenna
Antenna gain:	-0.54 dBd
Type of modulation:	Proprietary
Emission designator	541KG1D 127KG1D

1.5 Environmental conditions

Test date	27-07-2022	19-09-2022
Ambient temperature	21.5 °C	21.3
Humidity	43.4 %	49.6

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 §15.247
- RSS-Gen Issue 5
- RSS-247 Issue 2

1.8 Observation and remarks

The RF section of the EUT was modified to suppress spurious emission, all test have been performed with this modification in place. EUT is battery powered device. The EUT has been tested in worst case orientations that radiates the highest emissions.

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 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 : 14-12-2022

Name : P. van Wanrooij

Function : Test Engineer

Signature :

2 Test configuration of the Equipment Under Test

2.1 Test mode

The applicant provided test mode firmware for the Lora radio, in which it was possible to configure the radio to transmit continuously.

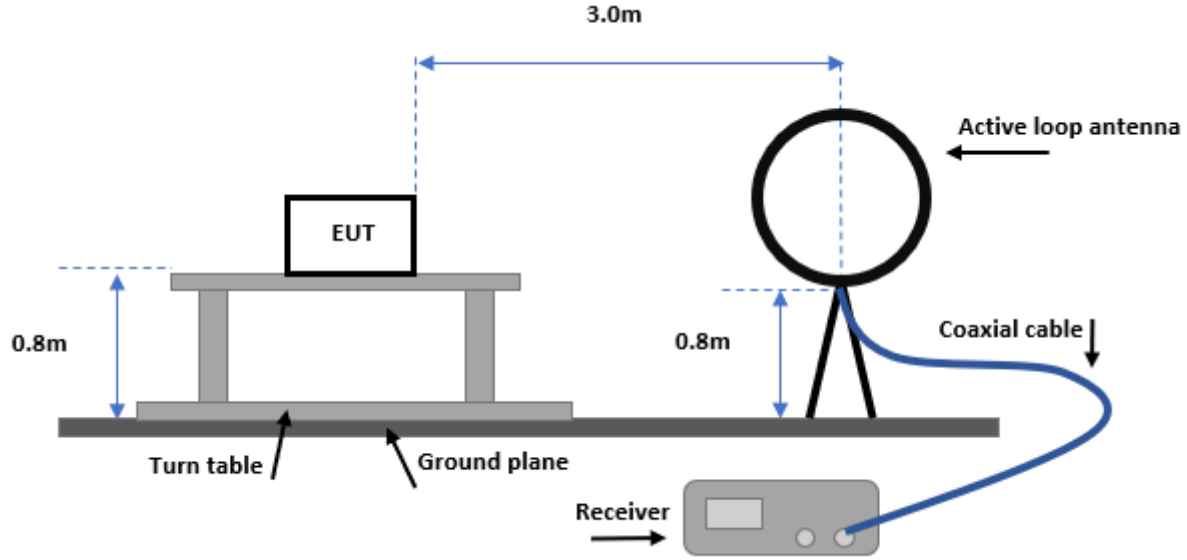
2.2 Tested channels and Data rates

Technology	Channels	Bandwidth (kHz)	Frequency (MHz)	Power setting
Lora	0	125	902.3	7
	32	125	908.7	7
	63	125	914.9	7
	64	500	903	7
	68	500	909.4	7
	71	500	914.2	7

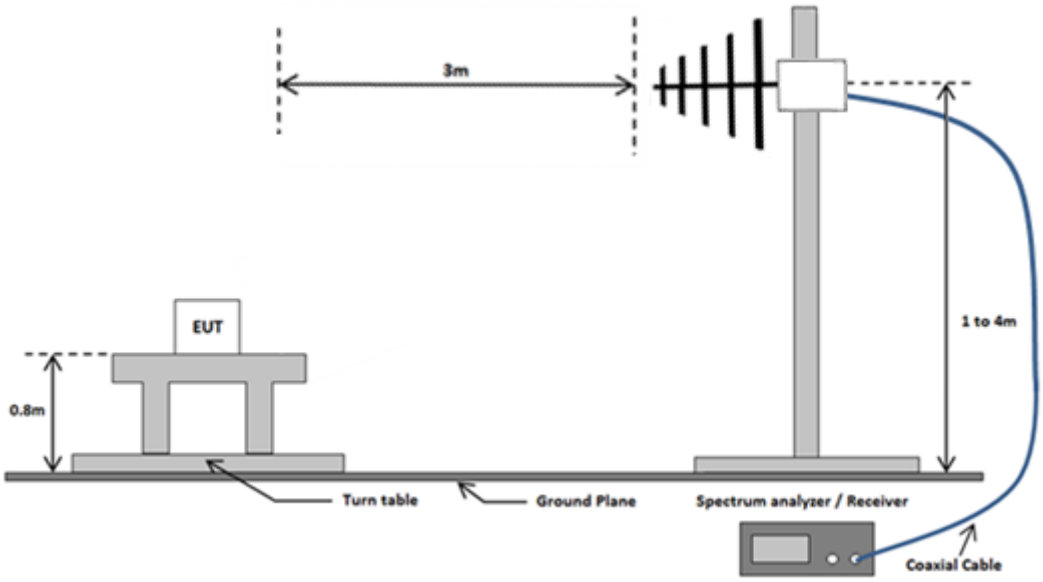
2.3 Test setups

2.3.1 Radiated test setups

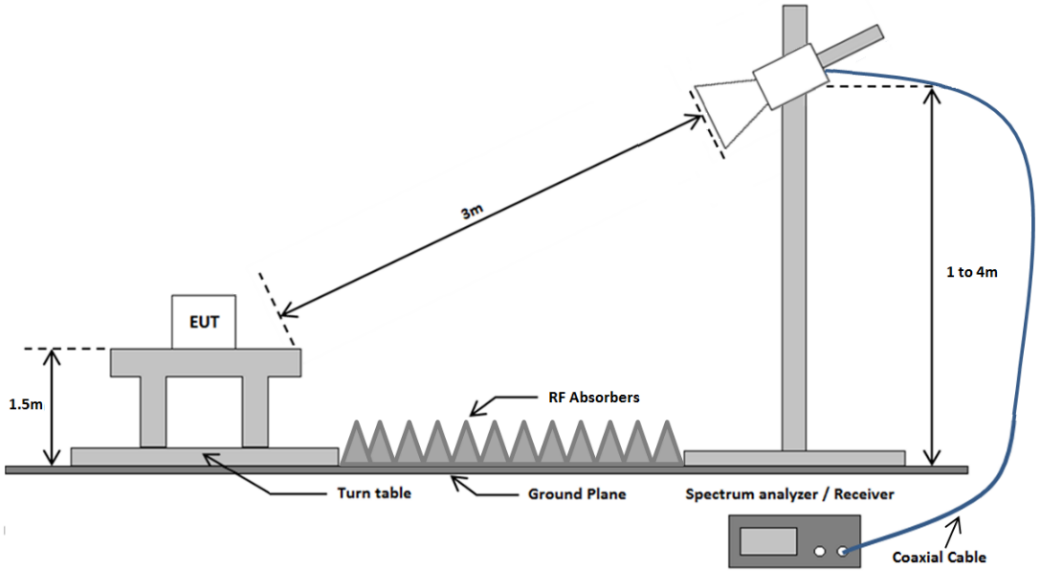
Radiated emissions test setup 9 kHz – 30 MHz



Radiated emissions test setup 30 MHz - 1 GHz

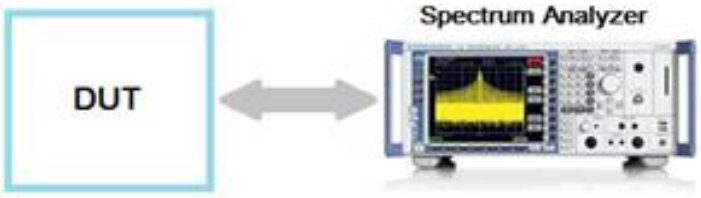


Radiated emissions test setup above 1 GHz



2.3.2 Conducted test setups

Conducted RF test setup



2.4 Equipment used in the test configuration

Description	Manufacturer	Model	ID	Cal. Done date	Cal. due date	Used at Par.
Spectrum analyzer	Rohde & Schwarz	FSP40	TE11125	03-2022	03-2023	3.4
Test software	DARE	Radimation	--	-	-	3.4
Spectrum Analyzer	Rohde & Schwarz	FSV40	TE01269	09-2022	09-2023	3.1 -3.7
1.1 GHz HPF	Wainwright	WHK1.1/15G-10EF	TE01139	01-2022	01-2024	3.4
Active loop antenna	EMCO	6502	TE11171	01-2022	01-2024	3.4
Biconical antenna + 6dB attenuator	Schwarzbeck + HP	VHA9103 + 8491A	114436 + 114254	03-2021	03-2024	3.4
Horn antenna	EMCO	3115	114607	01-2021	01-2024	3.4
Preamplifier 1-18 GHz	µComp Nordic	MCNA-40-0010800-25-10P	TE11175	01-2022	01-2023	3.4

2.5 Sample calculations

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

3 Test results

3.1 Output Power Measurement

3.1.1 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.

3.1.2 Measurement instruments

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

3.1.3 Test setup

The antenna port conducted test setup is as shown in chapter 2.3.2 of this report.

3.1.4 Test procedure

The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02.
IRN 014 - RF power (W) - Method 1 – AVGSA (DTS) according to ANSI C63.10.

3.1.5 Test results of Output Power Measurement

Technology Std.	Channel	Frequency (MHz)	Data rate	Bandwidth (kHz)	Output power (dBm)
LoRa	Low	902.3	5470	125	6.21
	Middle	908.7	5470	125	6.09
	High	914.9	5470	125	5.67
LoRa	Low	903.0	5470	500	6.06
	Middle	909.4	5470	500	5.87
	High	914.2	5470	500	5.65
Uncertainty	±0.71 dB				

3.2 Power Spectral Density

3.2.1 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.

3.2.2 Measurement instruments

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

3.2.3 Test setup

The test setup is as shown in chapter 2.3.2 of this report.

3.2.4 Test procedure

The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02.

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

3.2.5 Test results of Power Spectral Density Measurement

Power spectral density

Technology Std.	Channel	Frequency (MHz)	Data rate	Bandwidth (kHz)	PSD (dBm/3 kHz)
LoRa	Low	903.0	5470	500	-6.69
	Middle	909.4	5470	500	-6.17
	High	914.2	5470	500	-4.81
Uncertainty					

Note: 125 kHz bandwidth, DC correction factor = 2.08 dB. 500 kHz bandwidth, DC correction factor = 8.07 dB.

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 2.4 of this report.

3.3.3 Test setup

The antenna port conducted test setup is as shown in chapter 2.3.2 of this report.

3.3.4 Test procedure

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

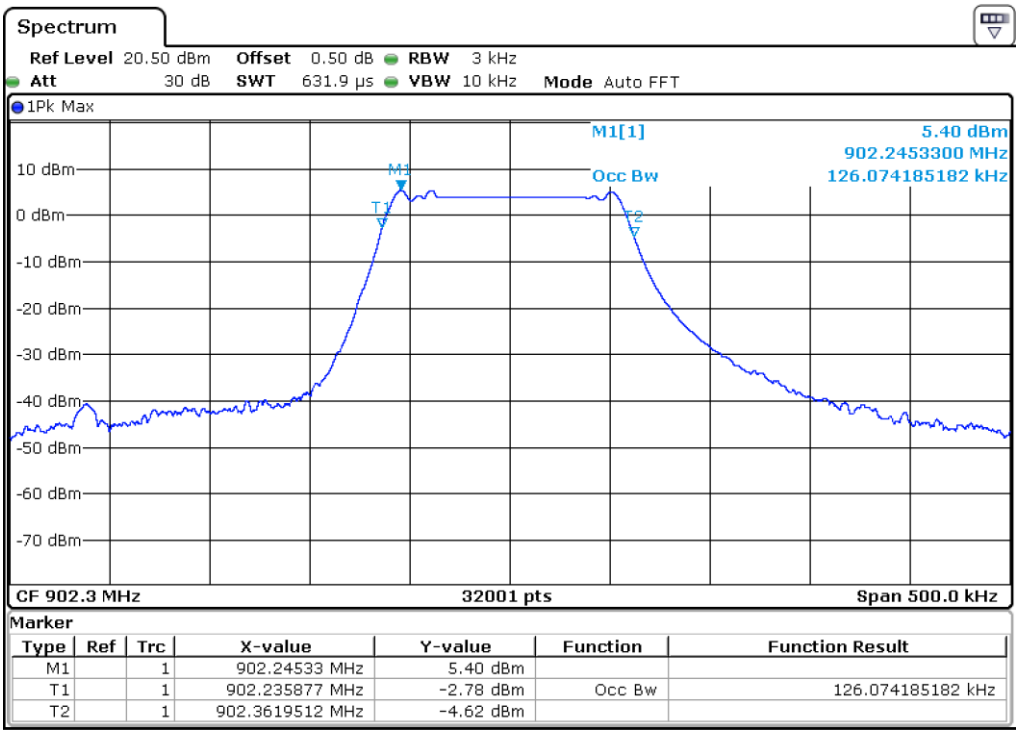
1. Set the centre frequency to the nominal EUT channel centre frequency
2. Set span = 1.5 times to 0.5 times the Occupied Bandwidth
3. Set VBW ≥ 3x RBW
4. Video averaging is not permitted. Where practical, detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until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

3.3.5 Test results of the 99% occupied bandwidth measurement

Technology Std.	Channel	Frequency (MHz)	99% bandwidth (kHz)
LoRa	Low	902.3	126.01
	Middle	908.7	126.13
	High	914.9	127.10
LoRa	Low	903.0	540.54
	Middle	909.4	538.42
	High	914.2	539.60
Uncertainty	± 12 kHz		

3.3.6 Plots of the 99% occupied bandwidth measurement

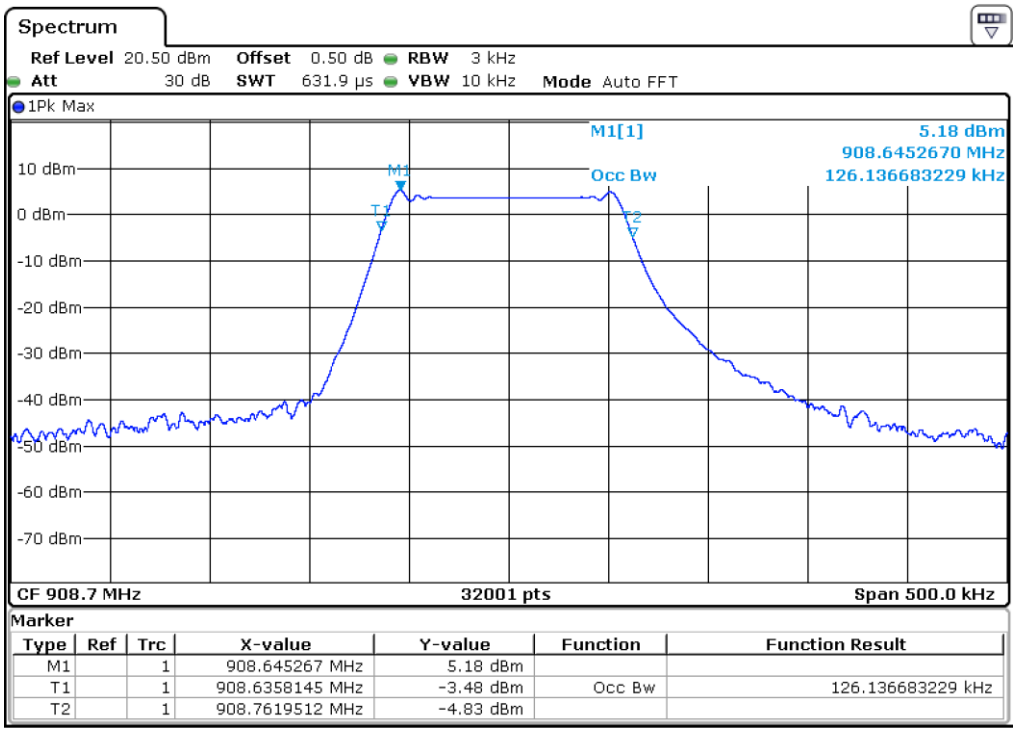
125 kHz
Channel Low



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	902.24533 MHz	5.40 dBm		
T1		1	902.235877 MHz	-2.78 dBm	Occ Bw	126.074185182 kHz
T2		1	902.3619512 MHz	-4.62 dBm		

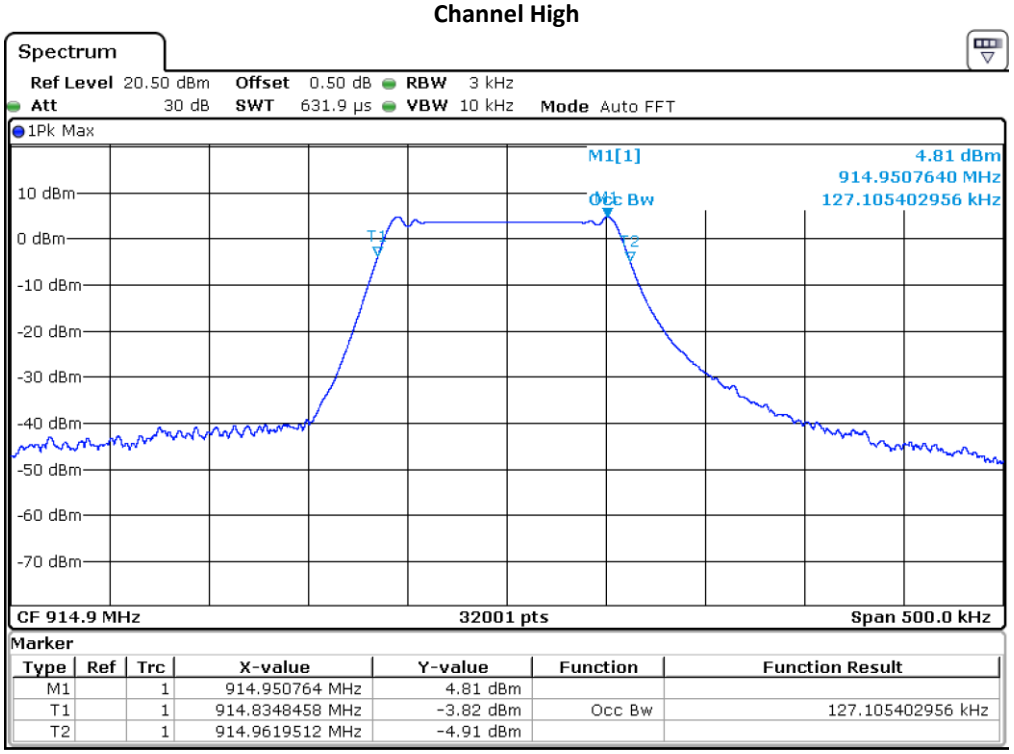
Channel Mid



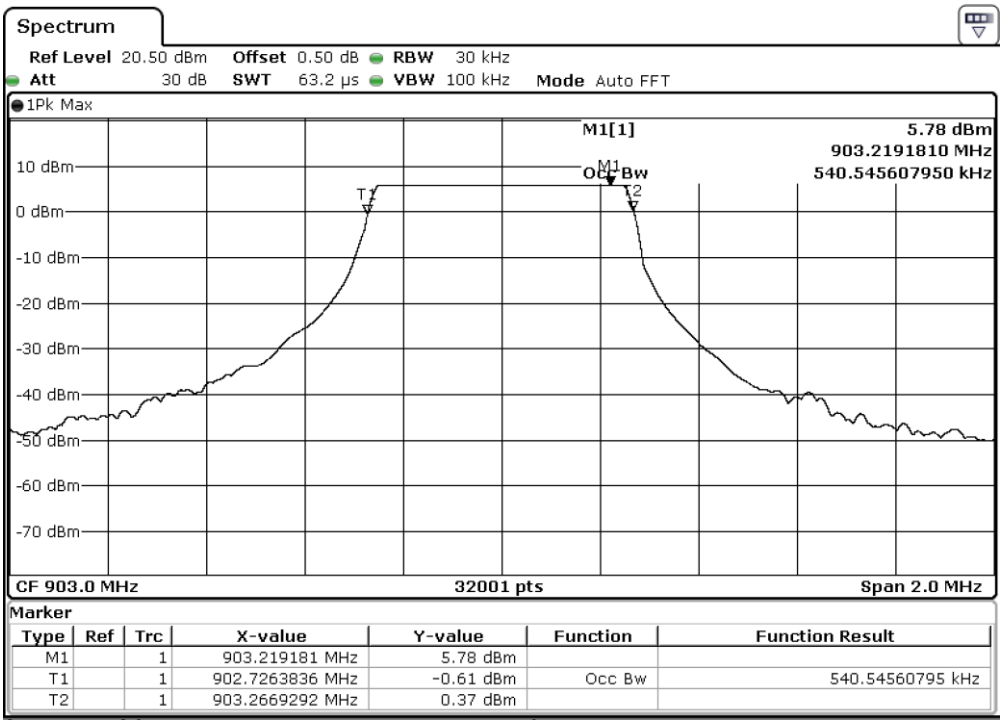
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	908.645267 MHz	5.18 dBm		
T1		1	908.6358145 MHz	-3.48 dBm	Occ Bw	126.136683229 kHz
T2		1	908.7619512 MHz	-4.83 dBm		

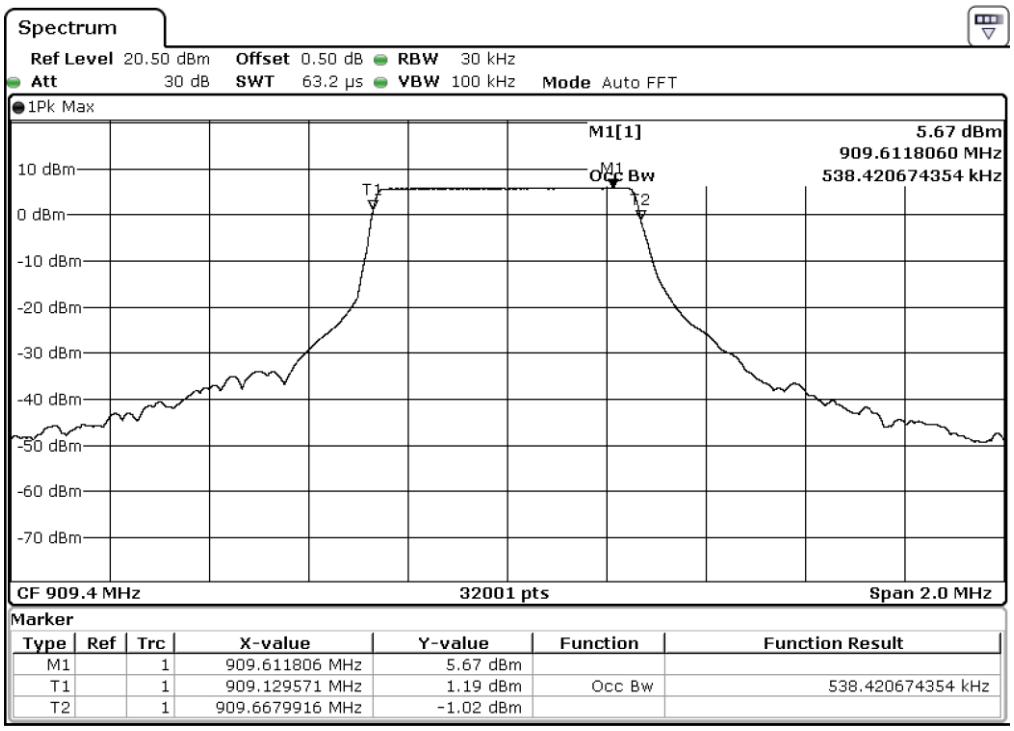
Channel High



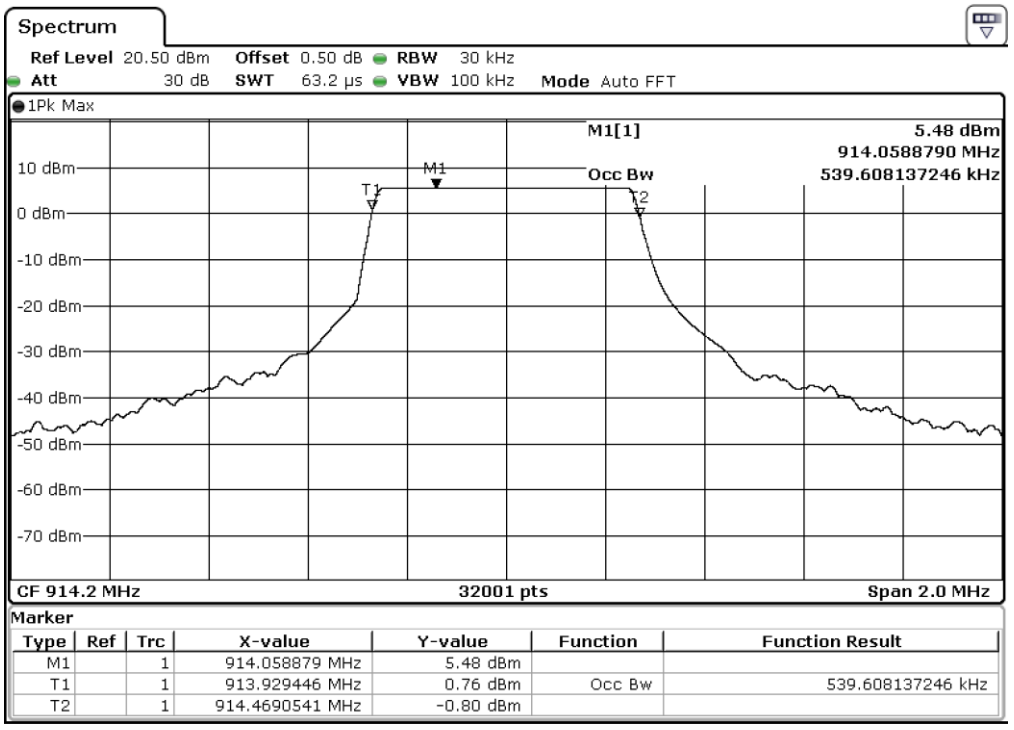
500 kHz
Channel Low



Channel Mid



Channel High



3.4 Radiated spurious emissions

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

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 2.3.1 of this report.

3.4.4 Test procedure

9 kHz – 30 MHz: According to ANSI C63.10-2013
30 MHz to 26.5 GHz: According to ANSI C63.10-2013

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

3.4.5 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

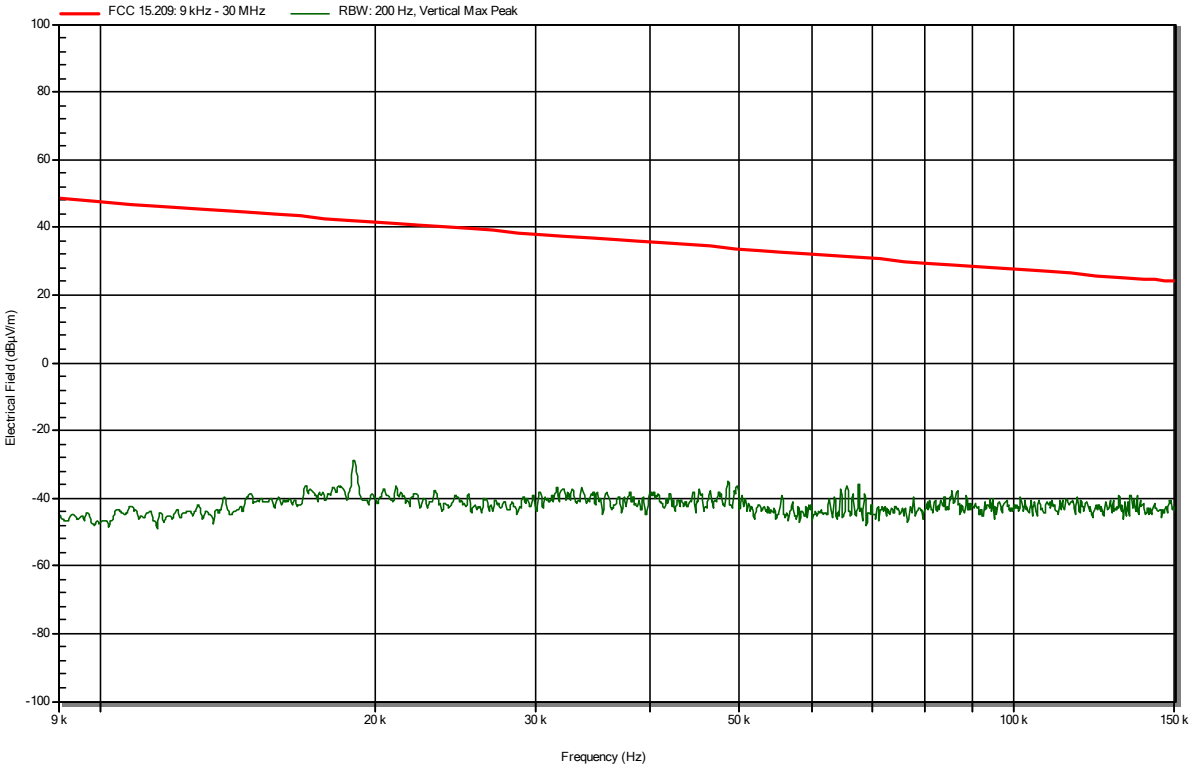
Peak table

Frequency	Peak	Peak Limit	Average	Average Limit	Status	Angle	Height	Polarization
6,316 GHz	57,5 dBµV/m	74 dBµV/m	53,7 dBµV/m	54 dBµV/m	Pass	289 degrees	2 m	Vertical
5,414 GHz	56,4 dBµV/m	74 dBµV/m	51,4 dBµV/m	54 dBµV/m	Pass	7 degrees	1,3 m	Horizontal
2,707 GHz	54,4 dBµV/m	74 dBµV/m	52,4 dBµV/m	54 dBµV/m	Pass	305 degrees	1,5 m	Vertical
2,726 GHz	53,9 dBµV/m	74 dBµV/m	51,6 dBµV/m	54 dBµV/m	Pass	326 degrees	1,2 m	Vertical
2,745 GHz	54,1 dBµV/m	74 dBµV/m	51,9 dBµV/m	54 dBµV/m	Pass	291 degrees	1,5 m	Vertical
6,32 GHz	55,6 dBµV/m	74 dBµV/m	50,9 dBµV/m	54 dBµV/m	Pass	10 degrees	1,5 m	Horizontal
5,419 GHz	53,8 dBµV/m	74 dBµV/m	49,5 dBµV/m	54 dBµV/m	Pass	0 degrees	1 m	Horizontal

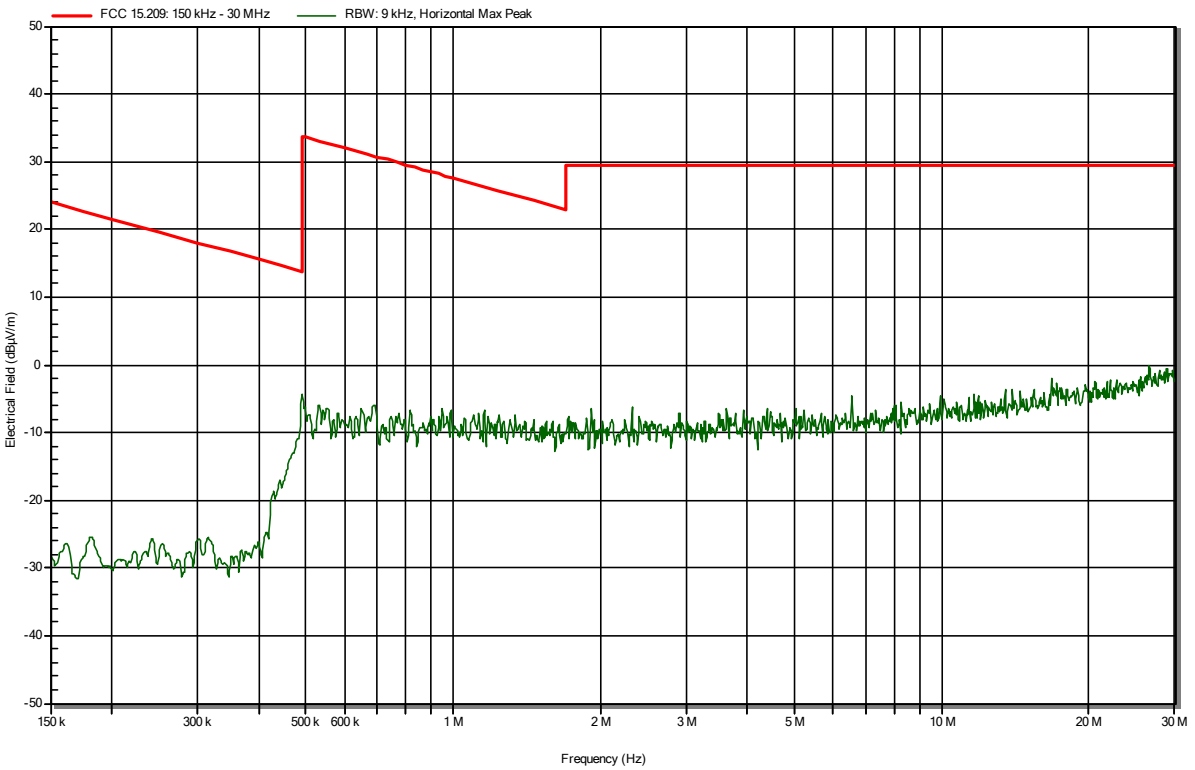
3.4.6 Plots of the Radiated Spurious Emissions Measurement

9 kHz to 30 MHz parallel

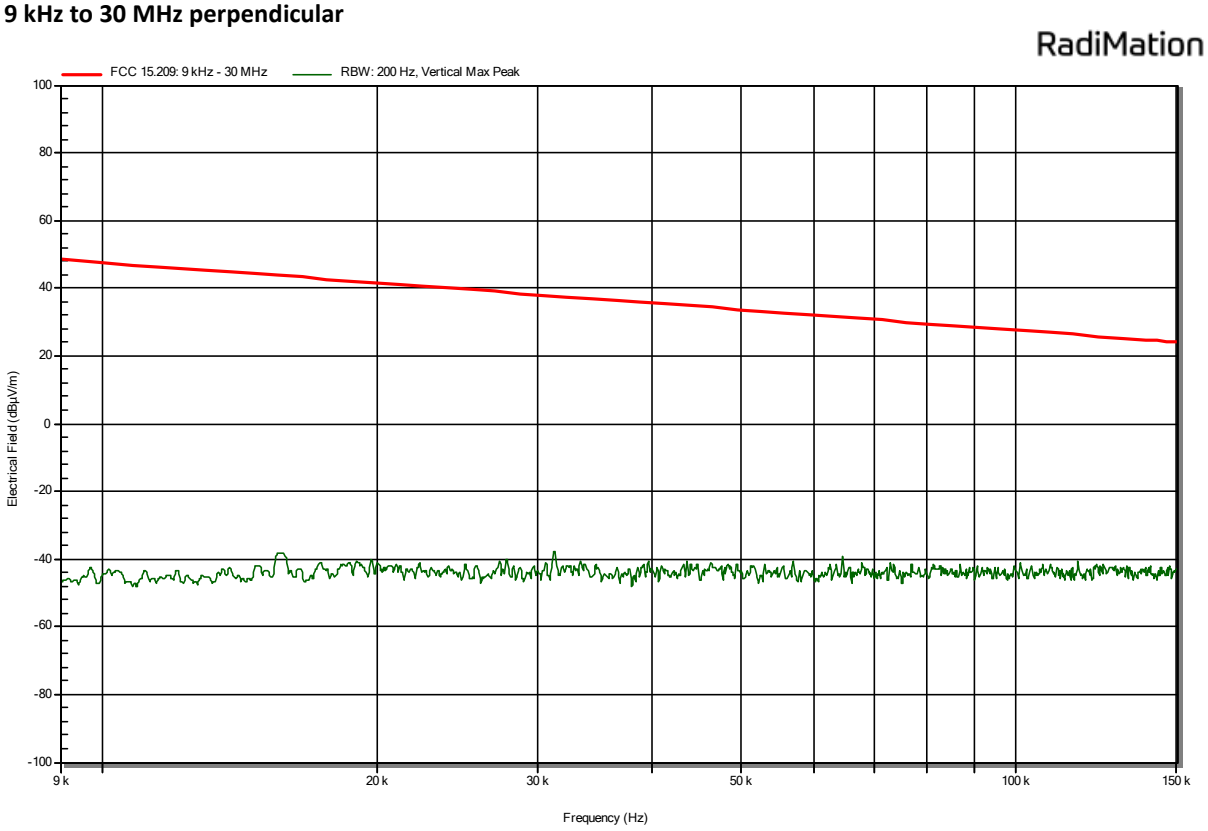
RadiMation

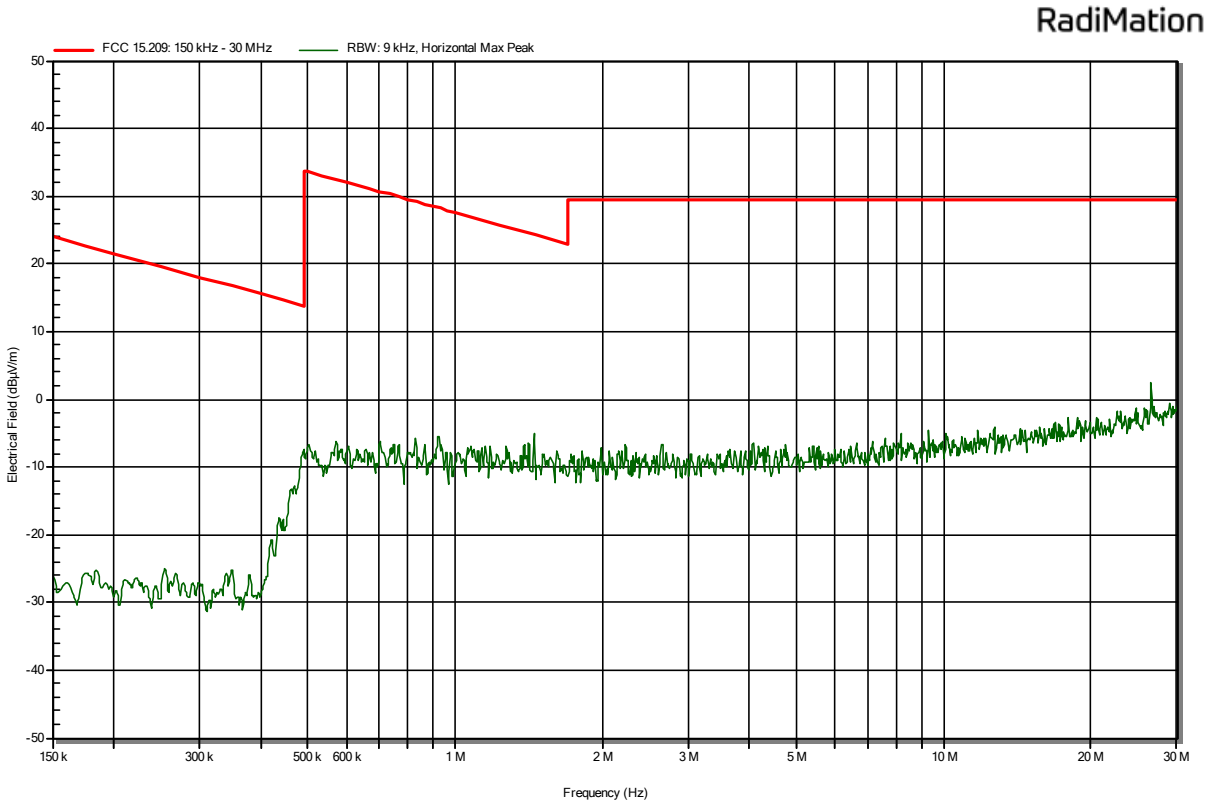


RadiMation



9 kHz to 30 MHz perpendicular

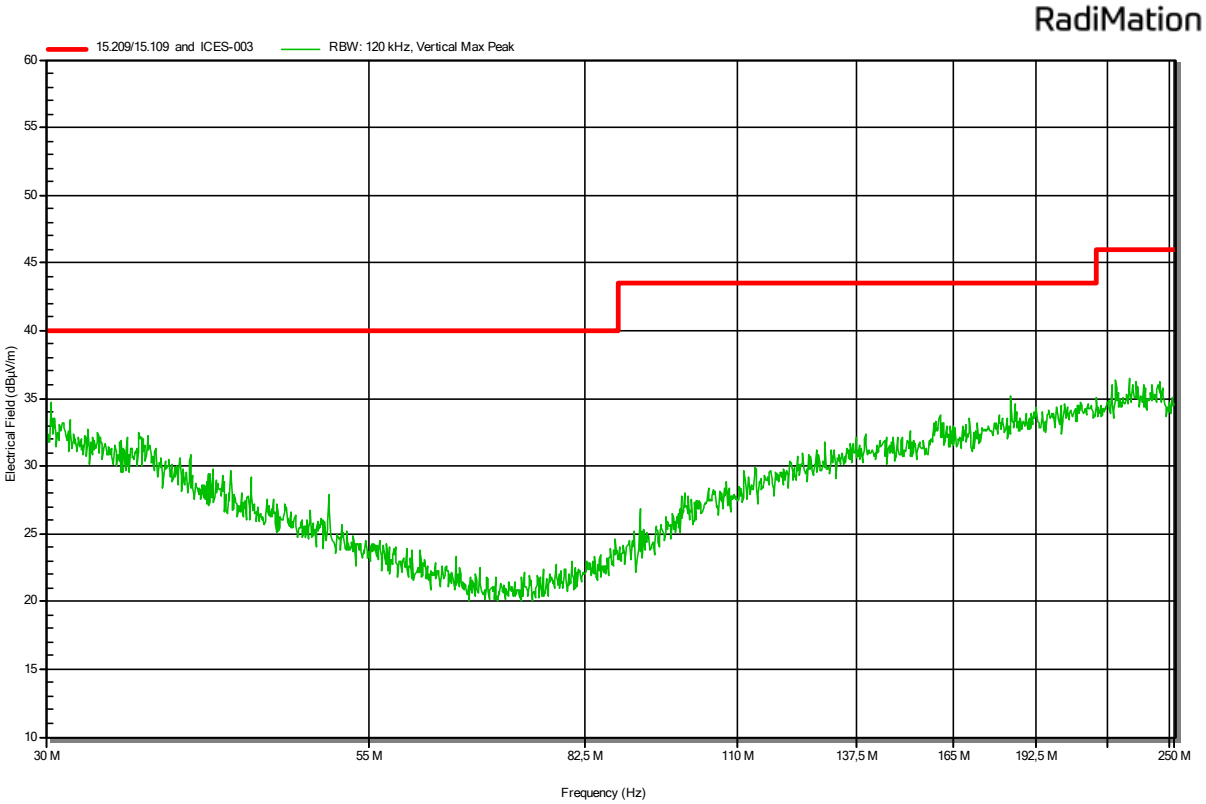




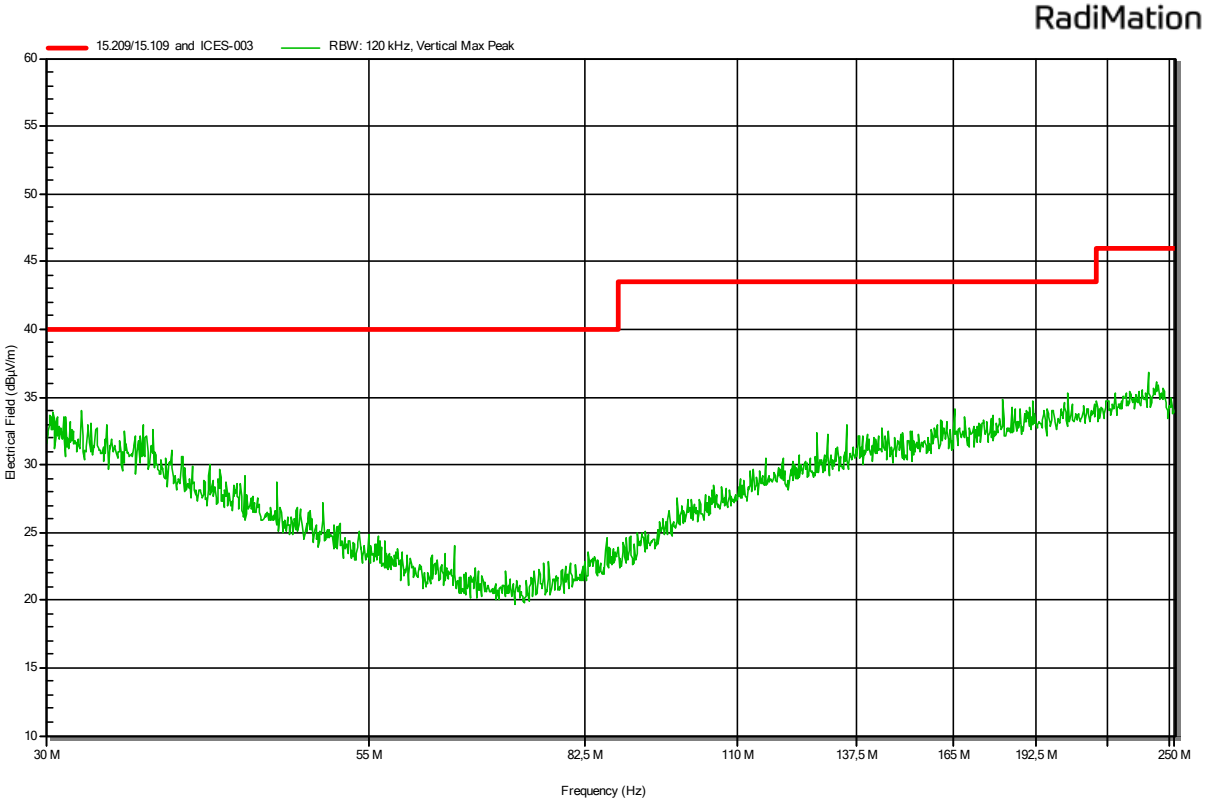
30 MHz to 250 MHz

125 kHz bandwidth
Vertical polarization

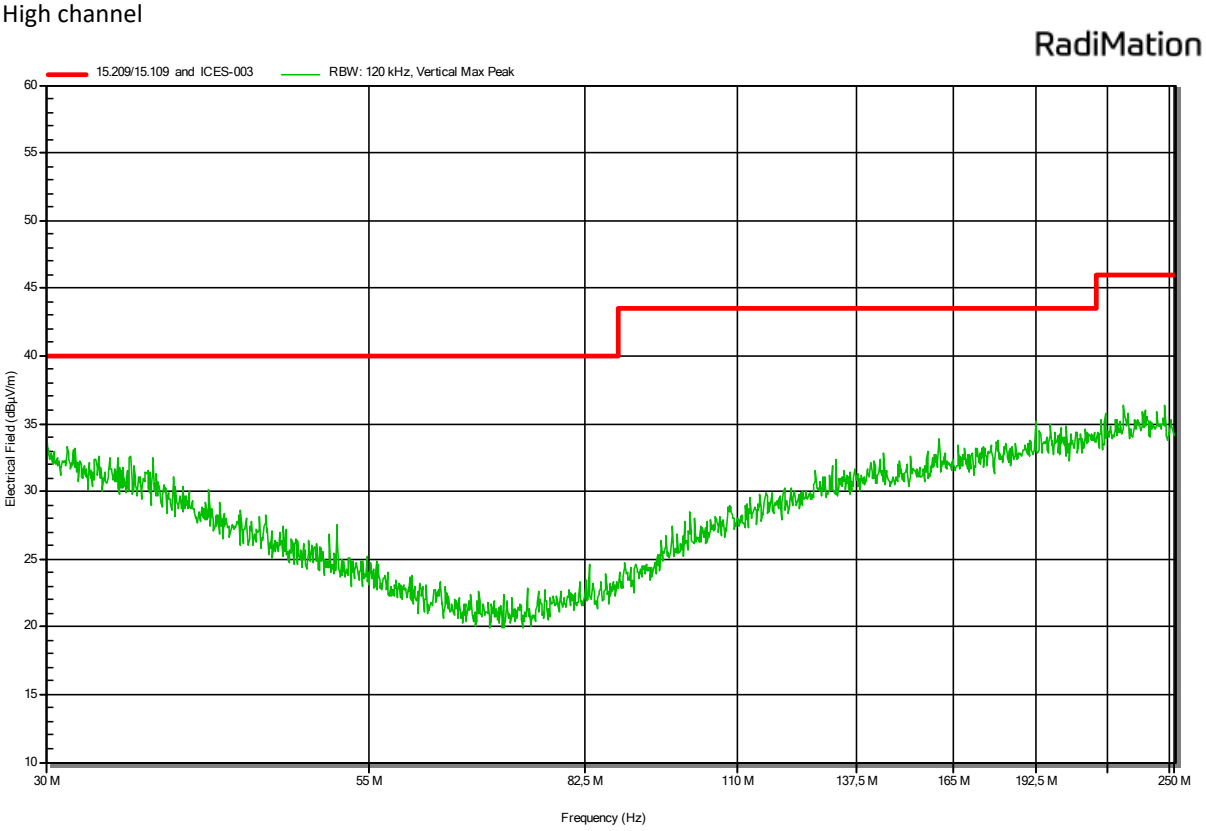
Low channel



Mid channel

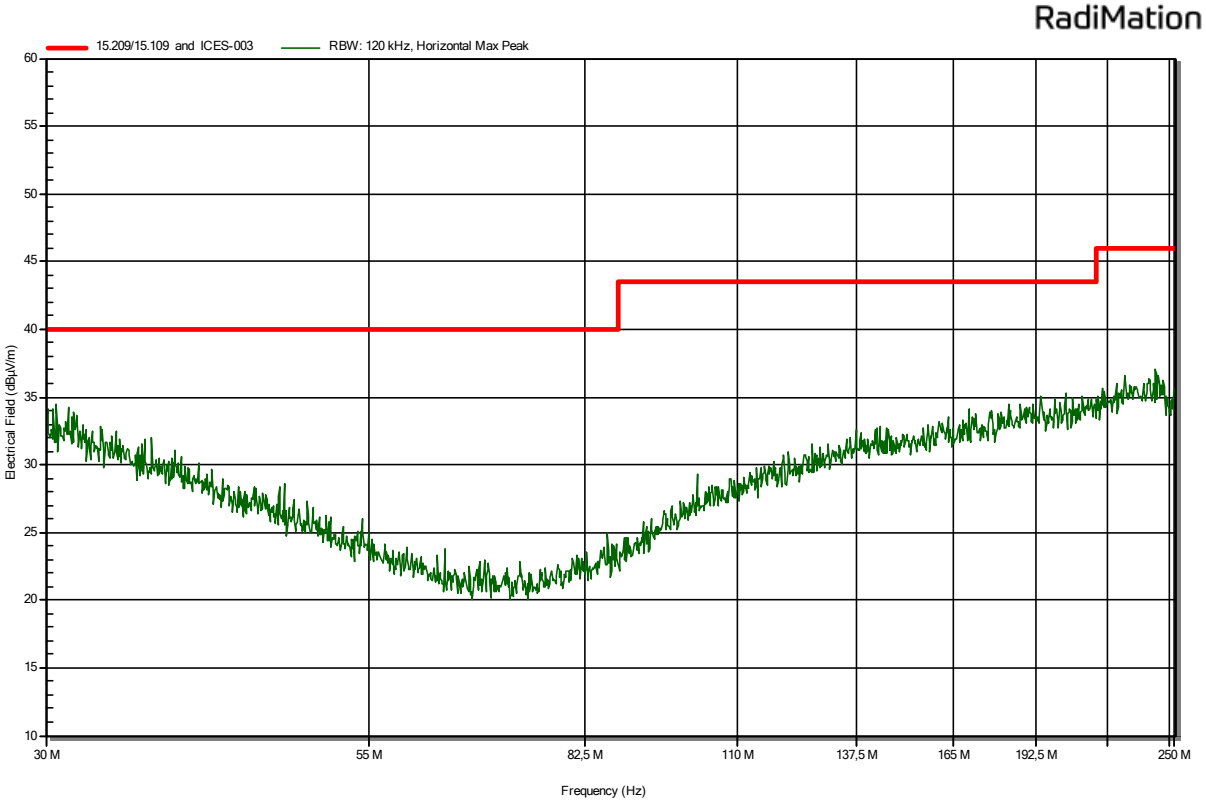


High channel

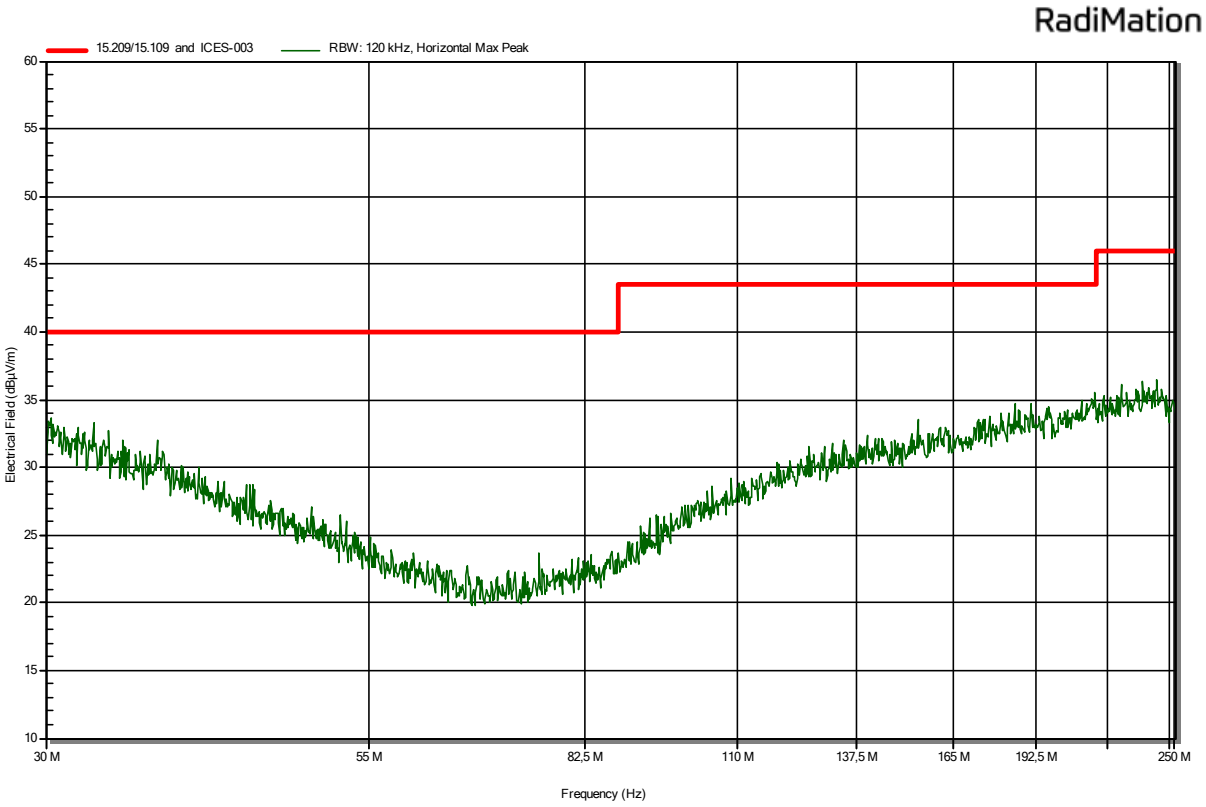


Horizontal polarization

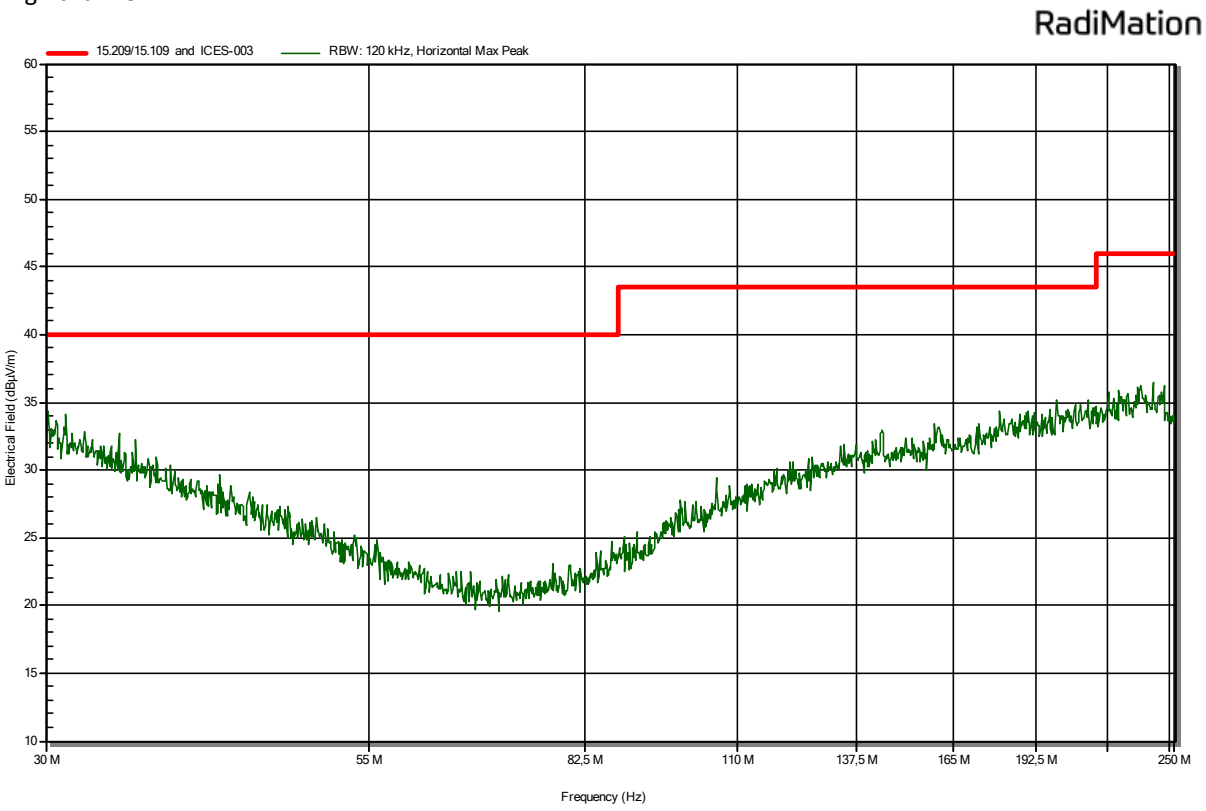
Low channel



Mid channel

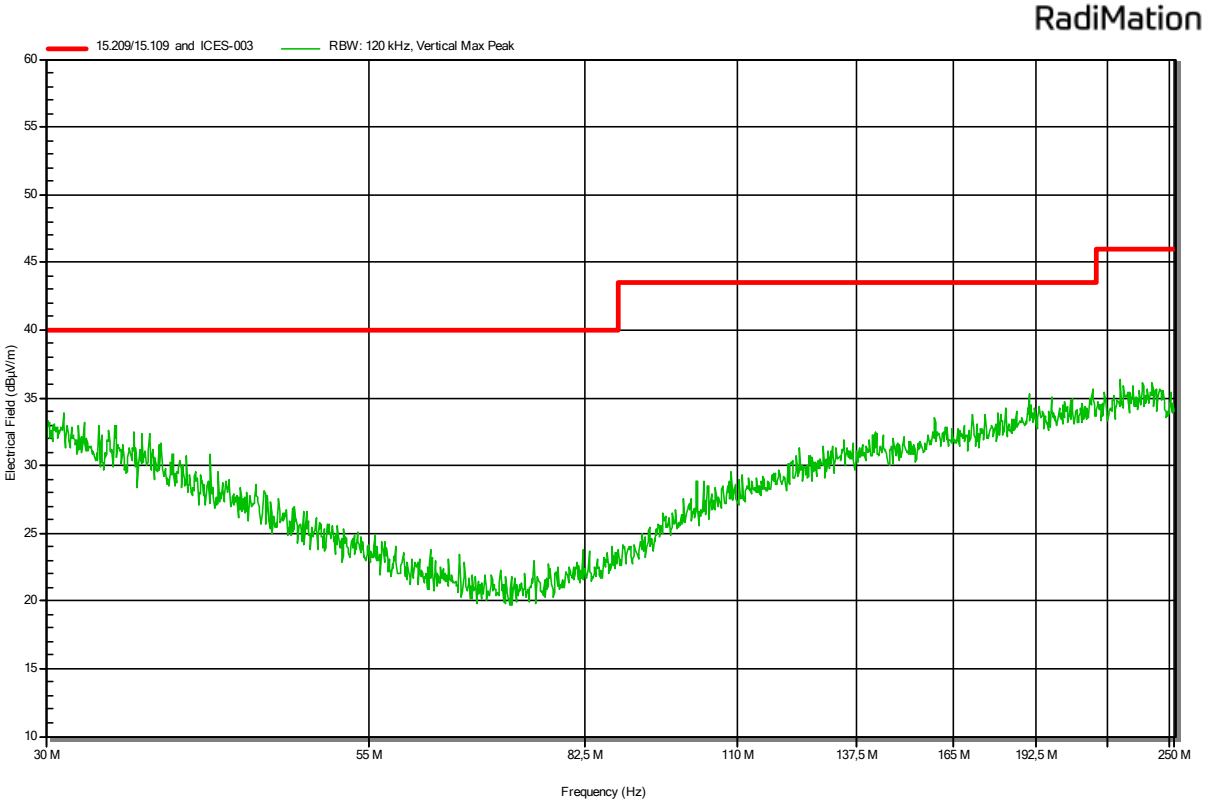


High channel

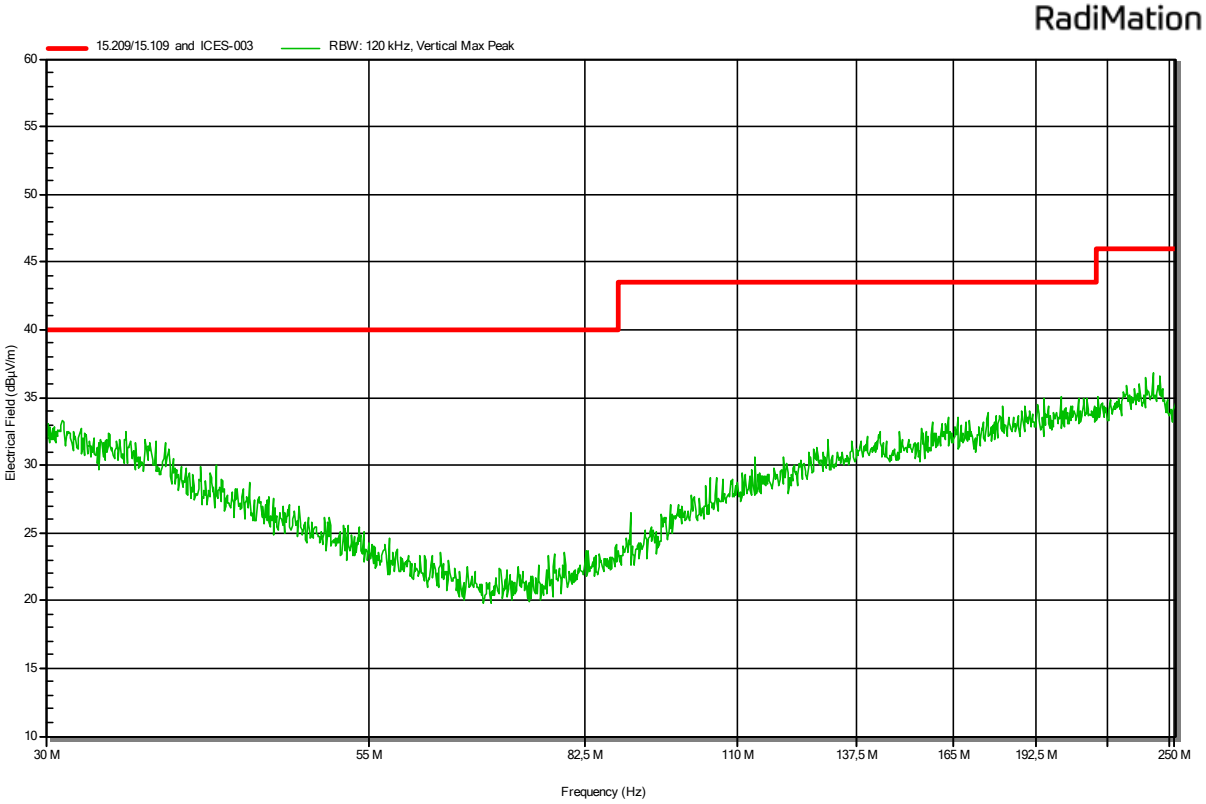


500 kHz bandwidth
Vertical polarization

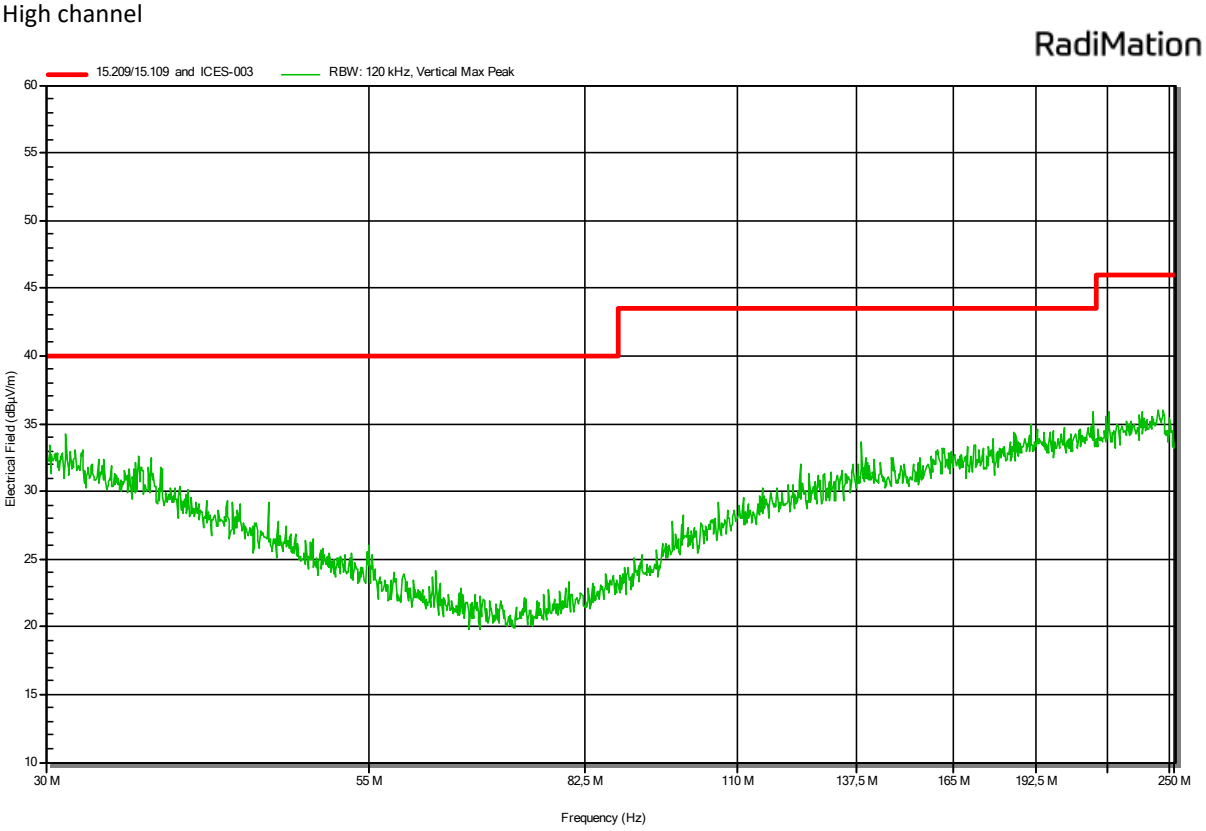
Low channel



Mid channel

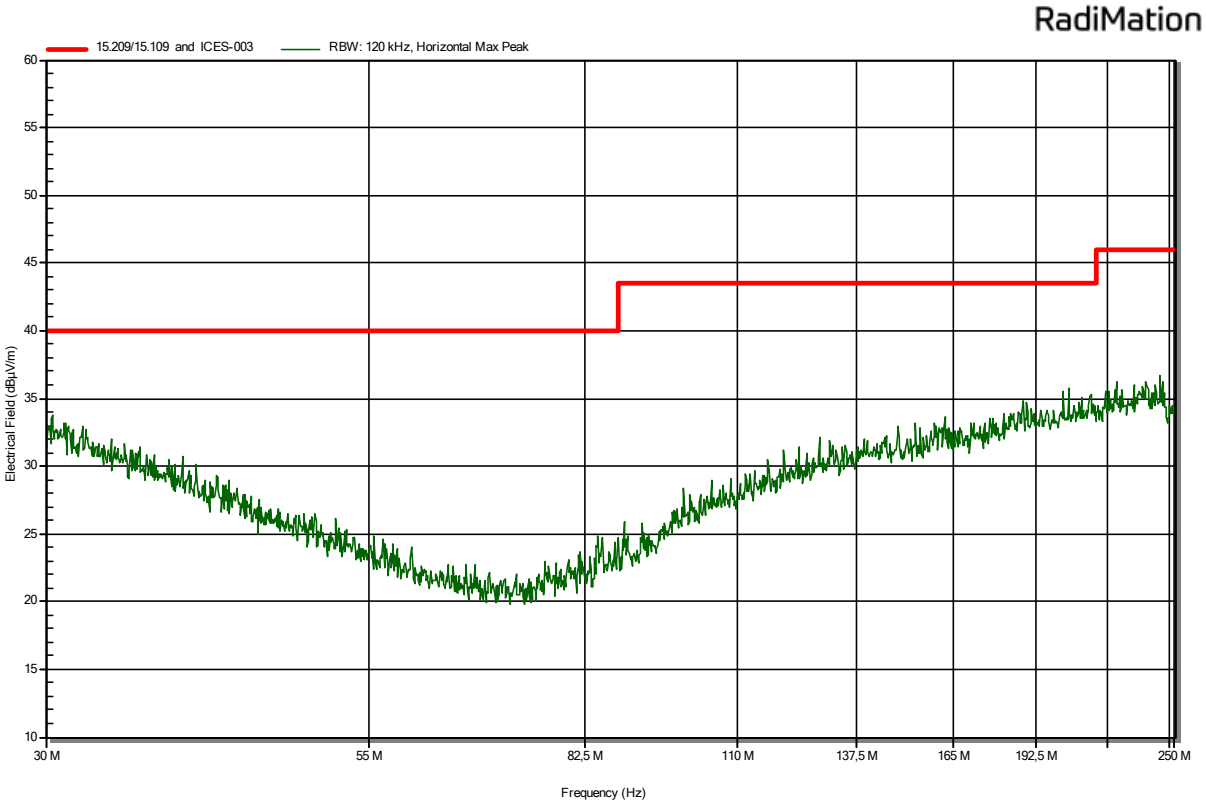


High channel

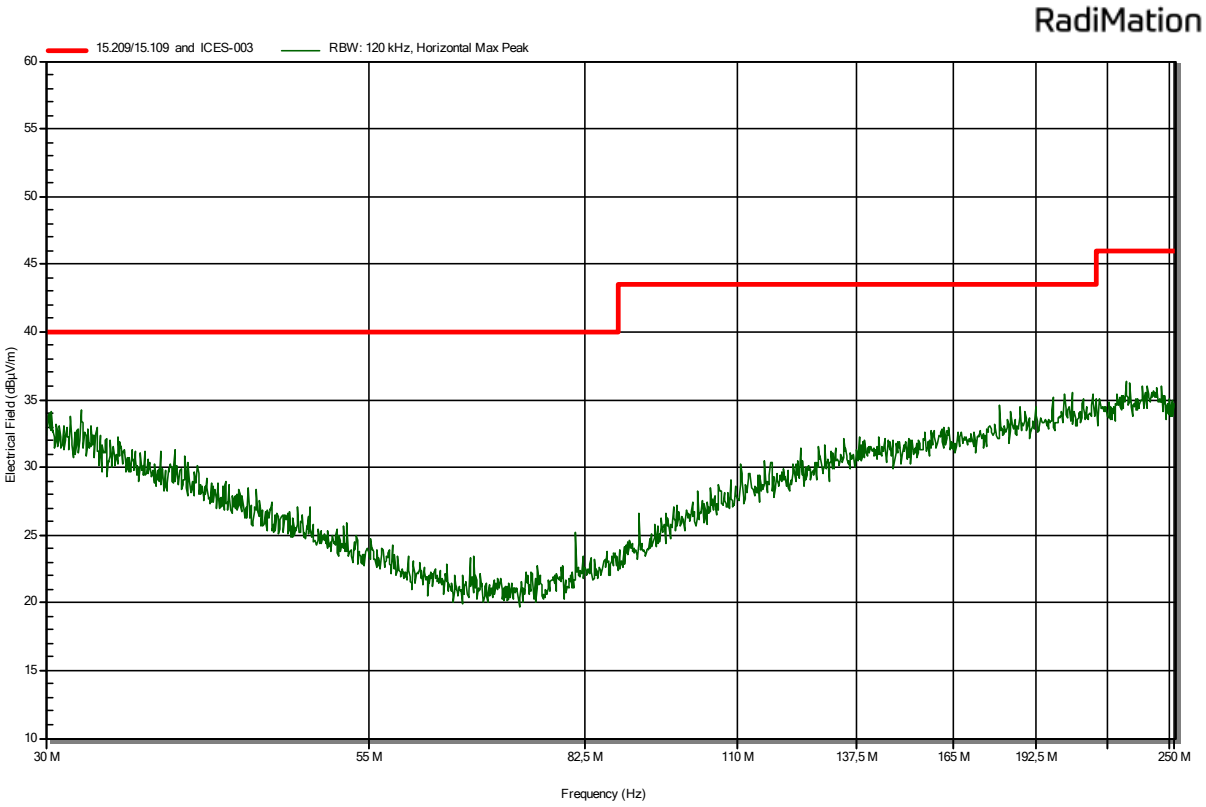


Horizontal polarization

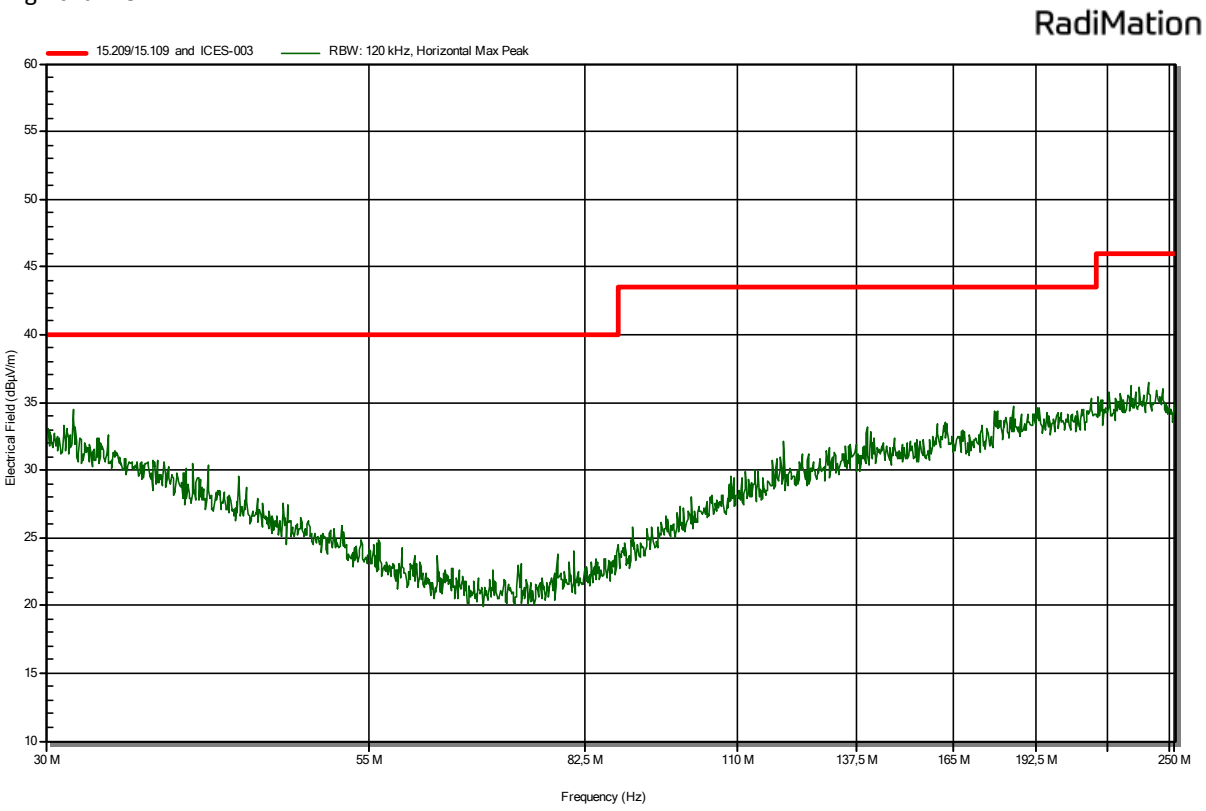
Low channel



Mid channel



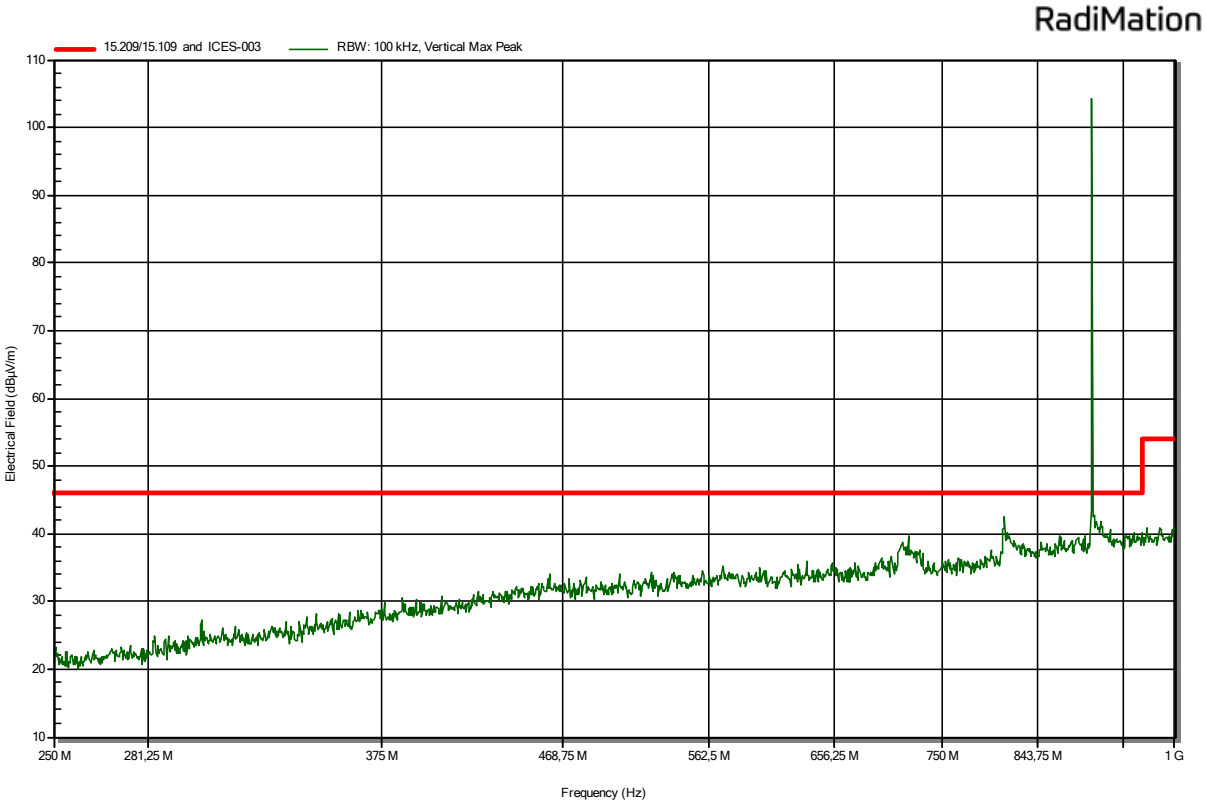
High channel



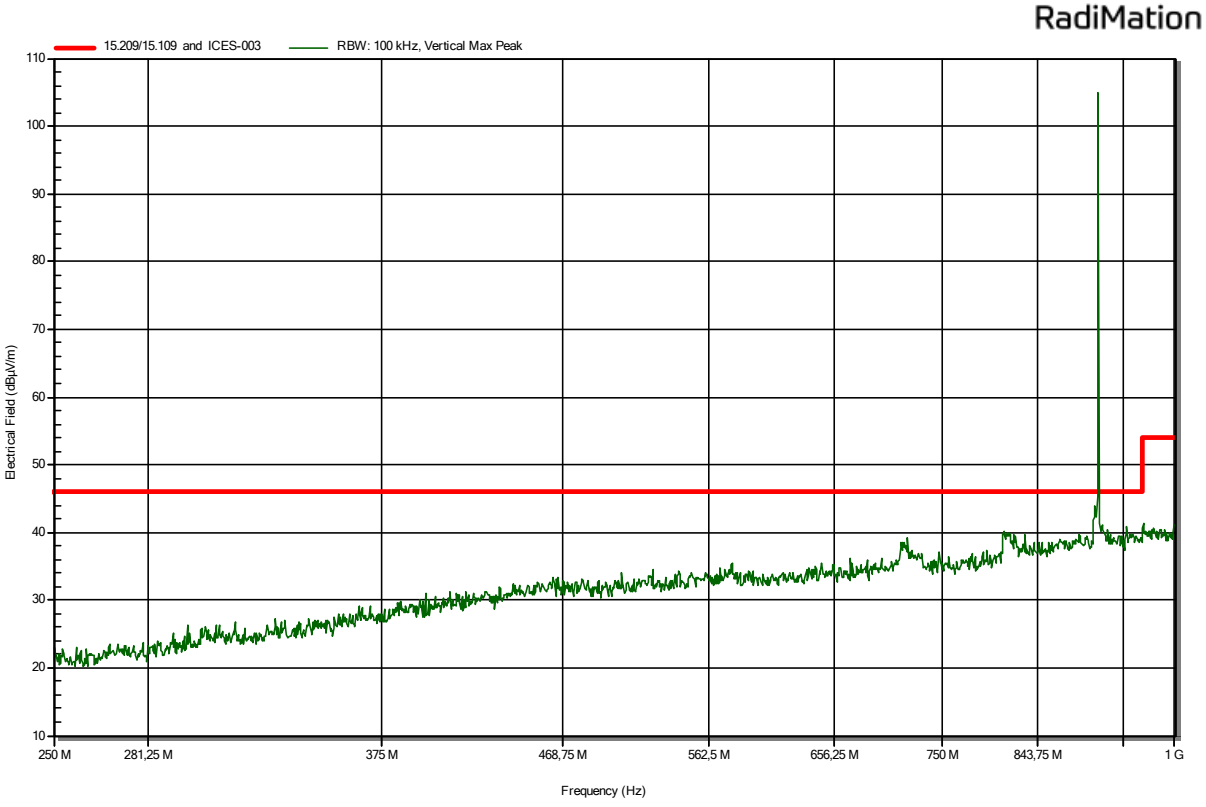
250 MHz to 1 GHz

125 kHz bandwidth mode
Vertical polarization

Low channel

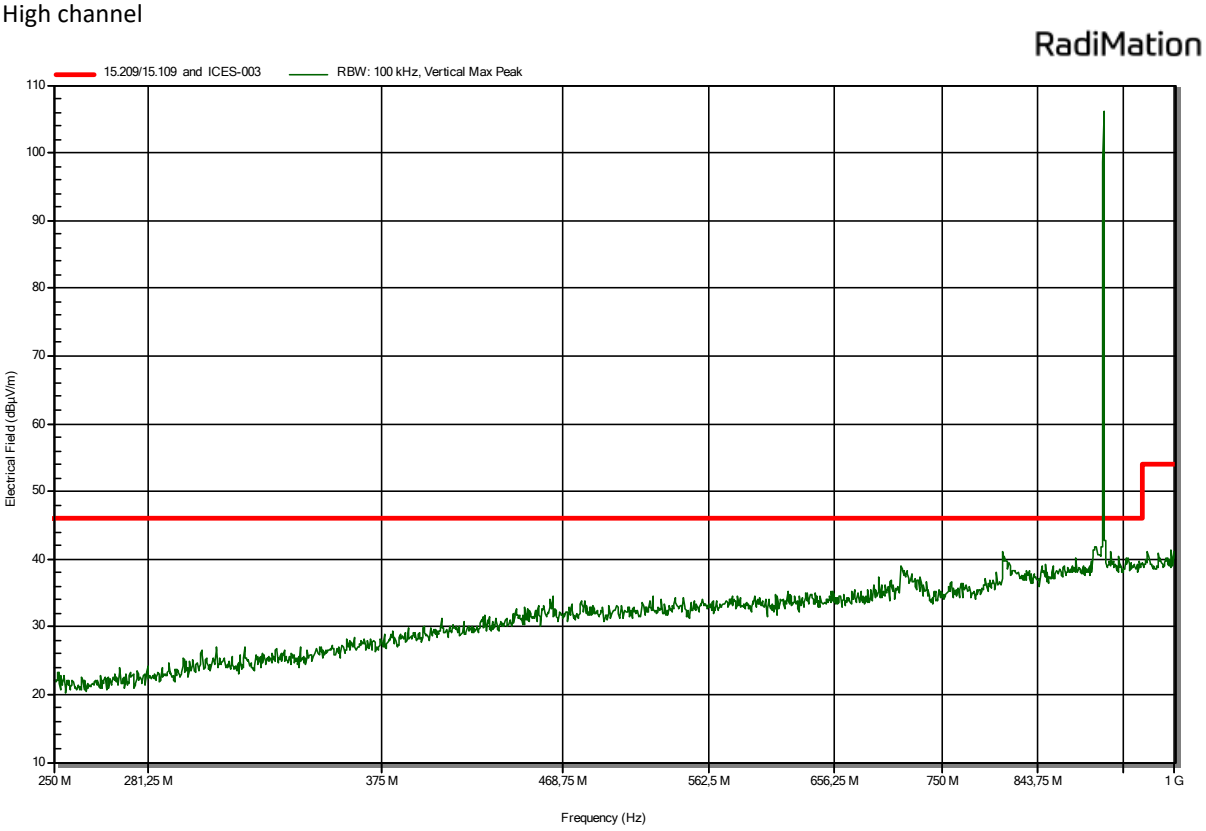


Mid channel



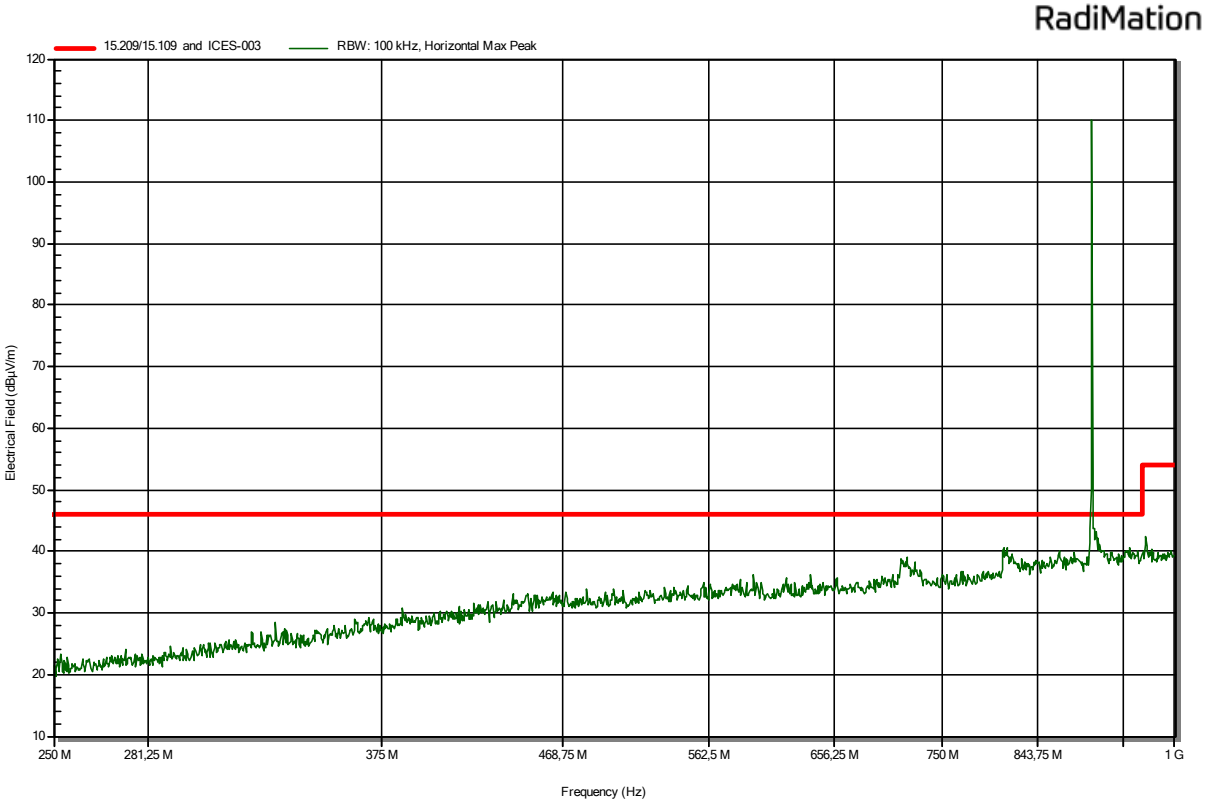
Note: the peak seen in the plot is the fundamental frequency , and is not subject to the limit in the plot.

High channel



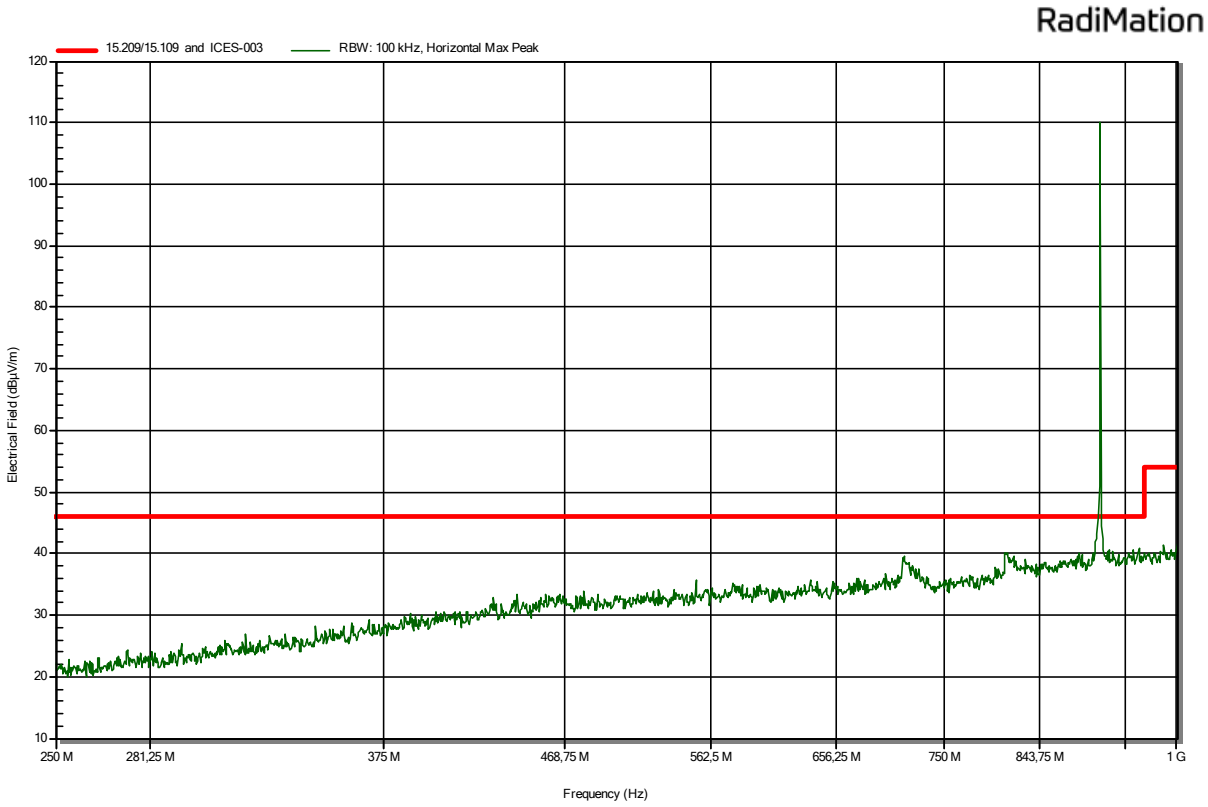
Horizontal polarization

Low channel

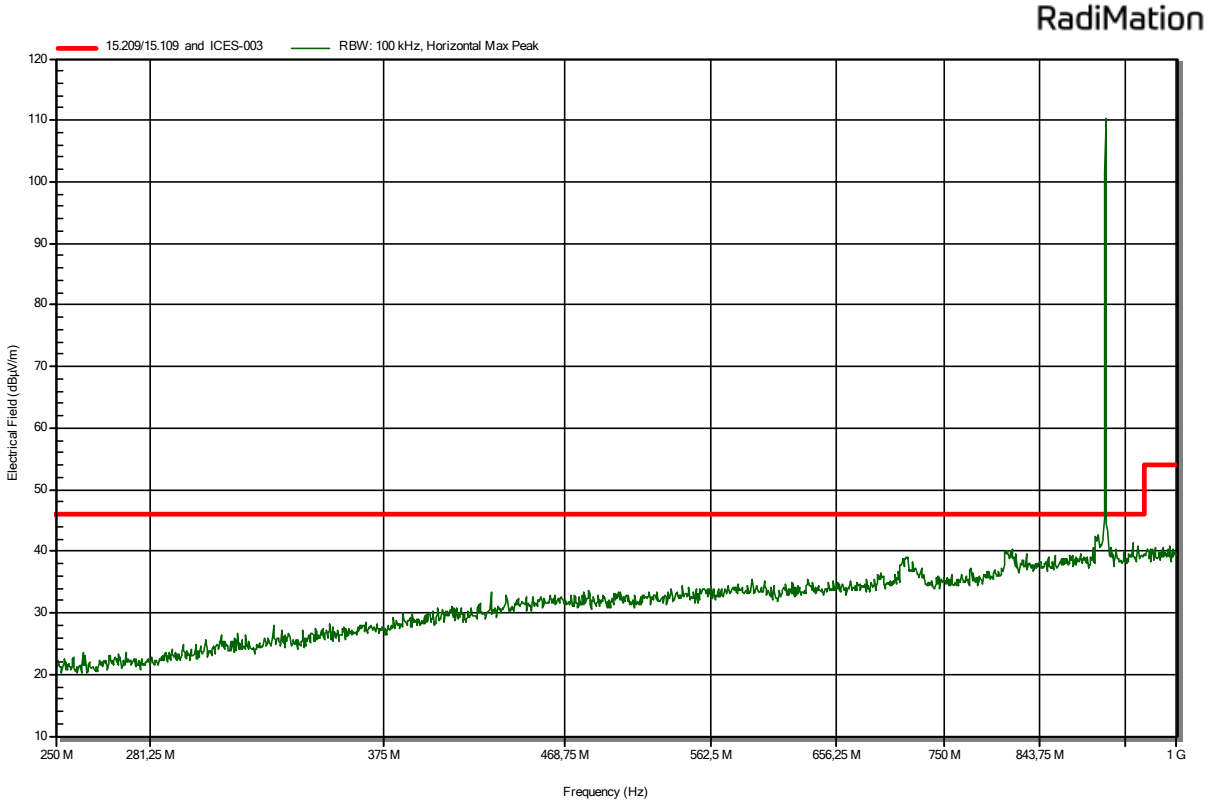


Note: the peak seen in the plot is the fundamental frequency , and is not subject to the limit in the plot.

Mid channel



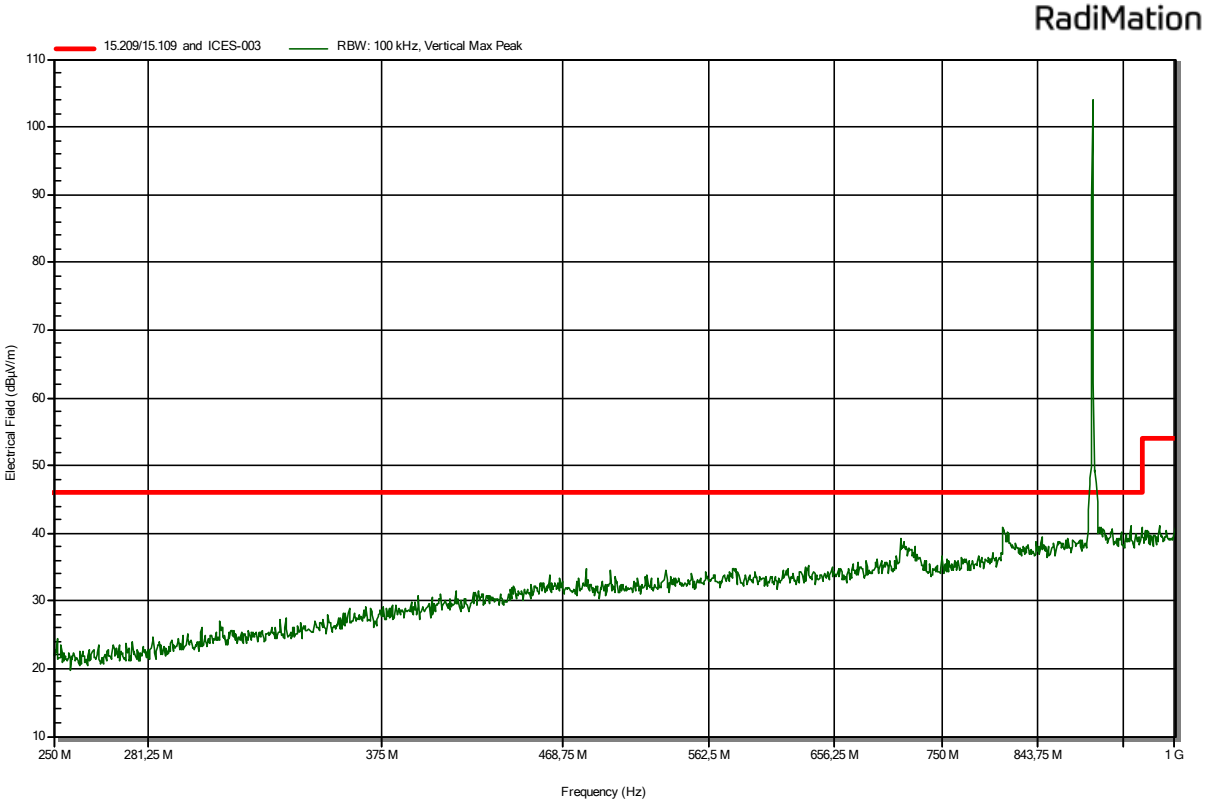
High channel



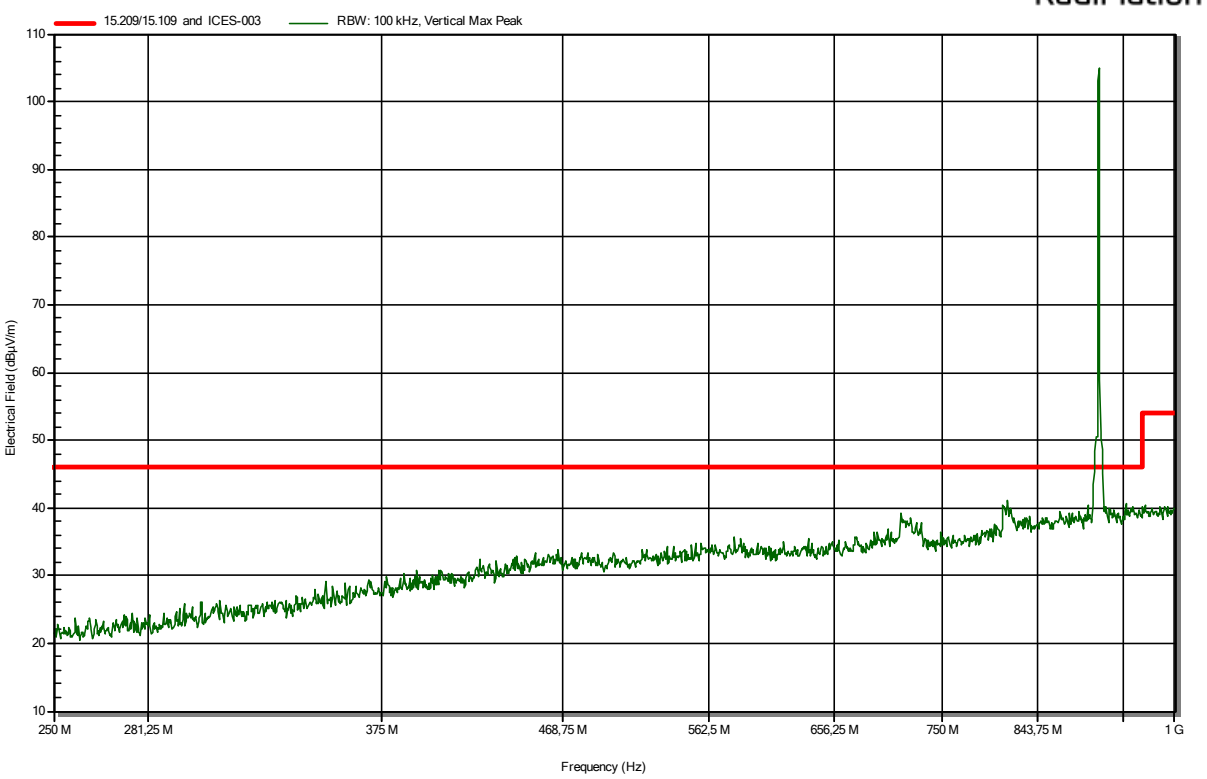
Note: the peak seen in the plot is the fundamental frequency , and is not subject to the limit in the plot.

500 kHz bandwidth mode
Vertical polarization

Low channel

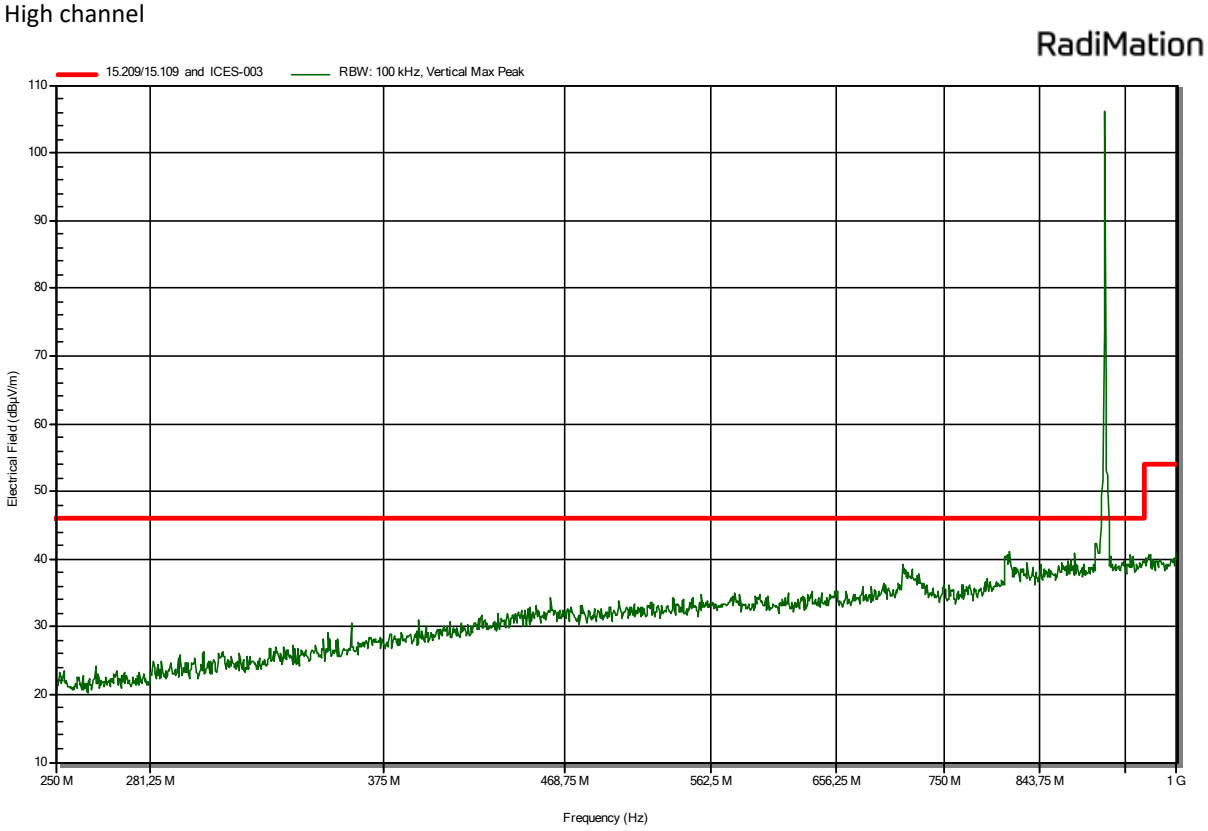


Mid channel



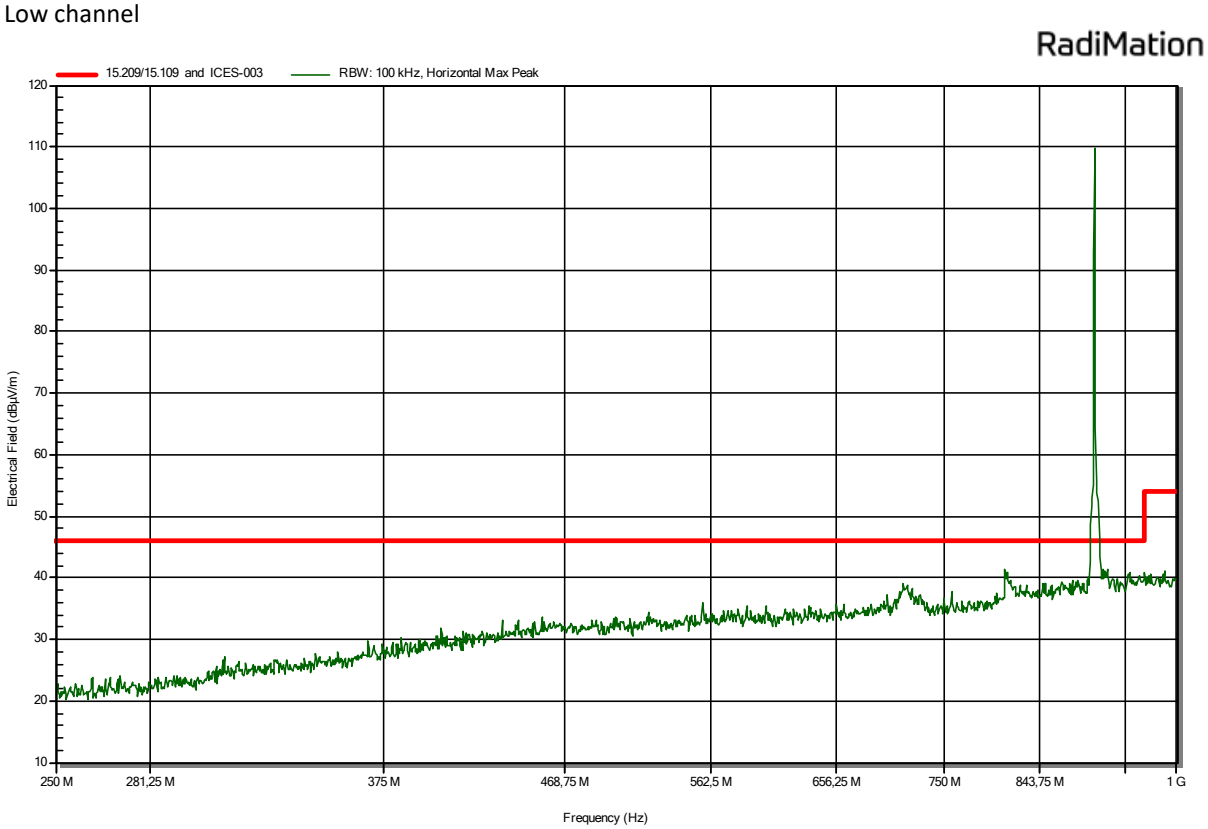
Note: the peak seen in the plot is the fundamental frequency , and is not subject to the limit in the plot.

High channel



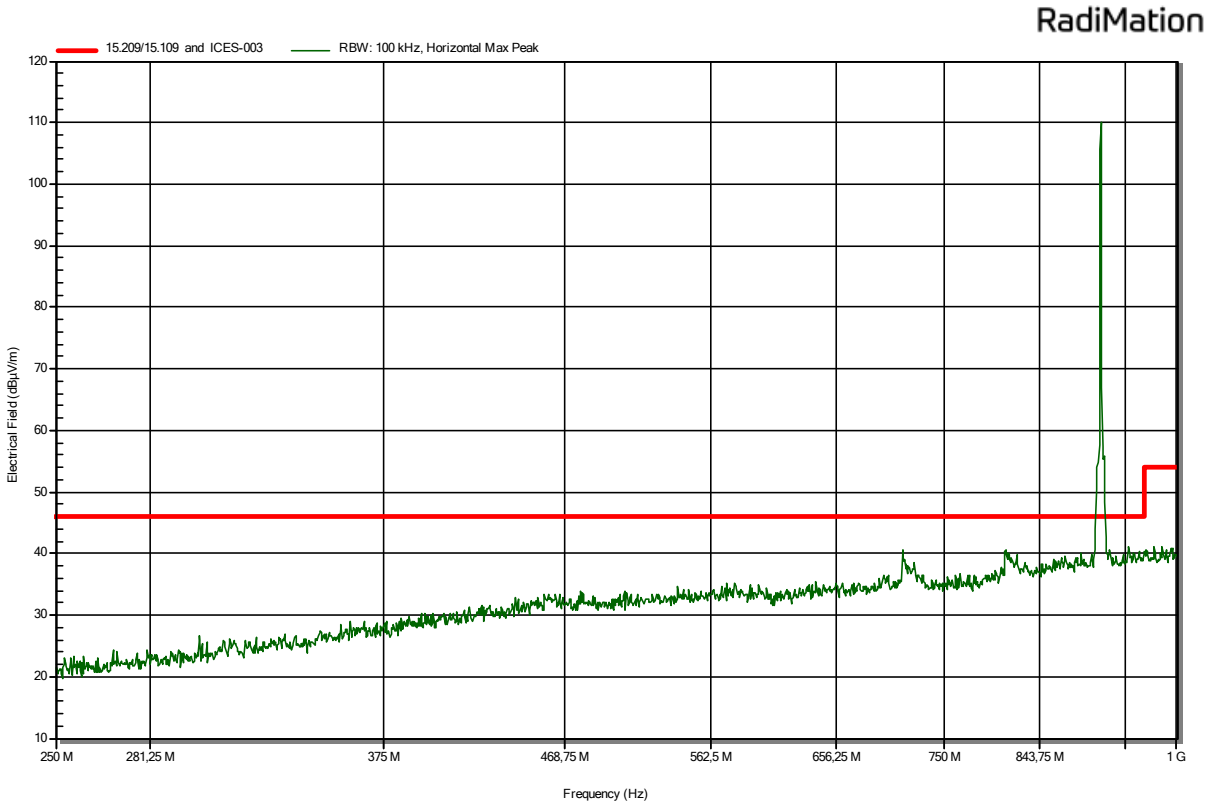
Horizontal polarization

Low channel

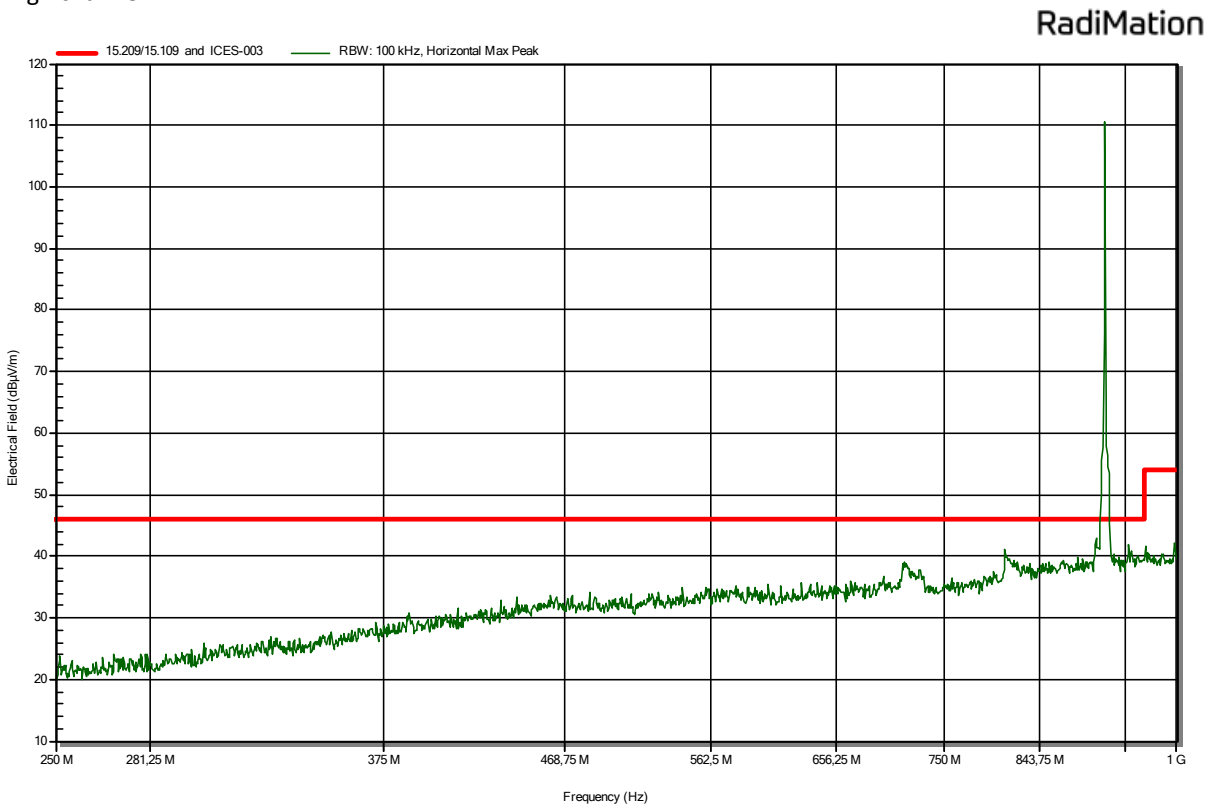


Note: the peak seen in the plot is the fundamental frequency , and is not subject to the limit in the plot.

Mid channel



High channel

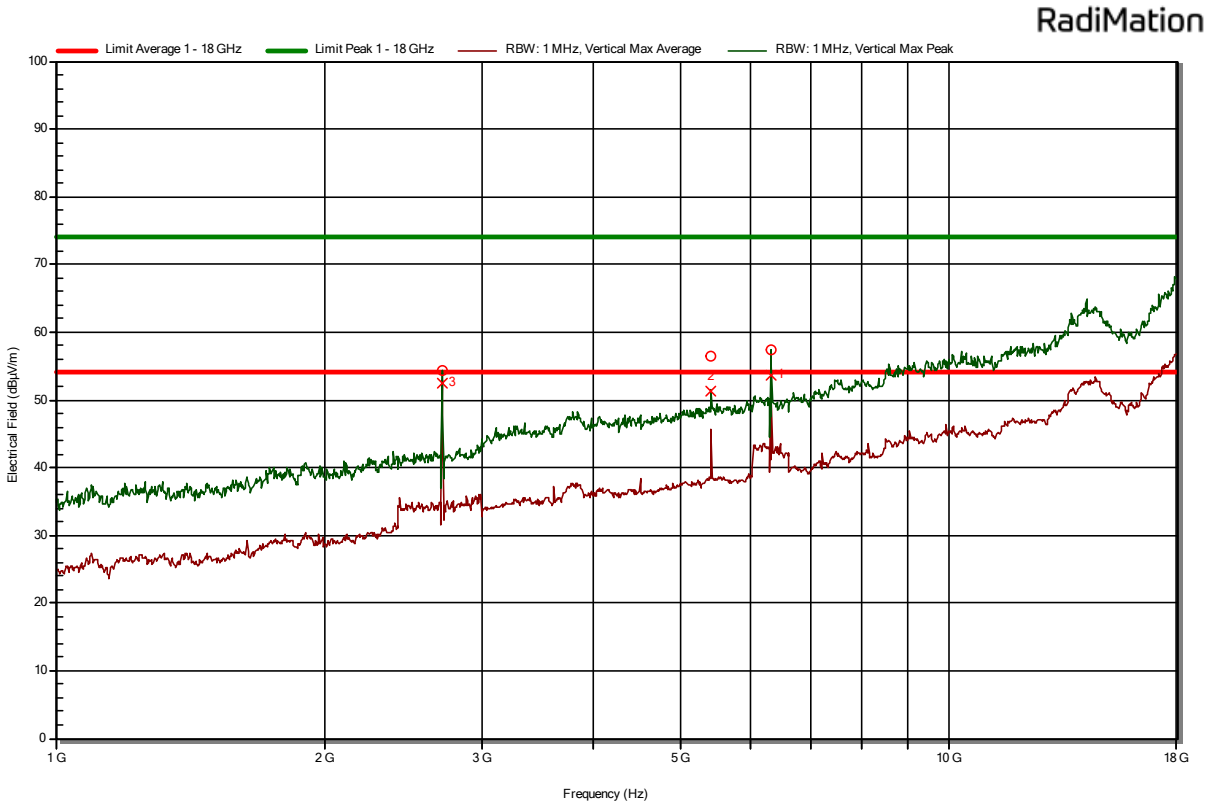


Note: the peak seen in the plot is the fundamental frequency , and is not subject to the limit in the plot.

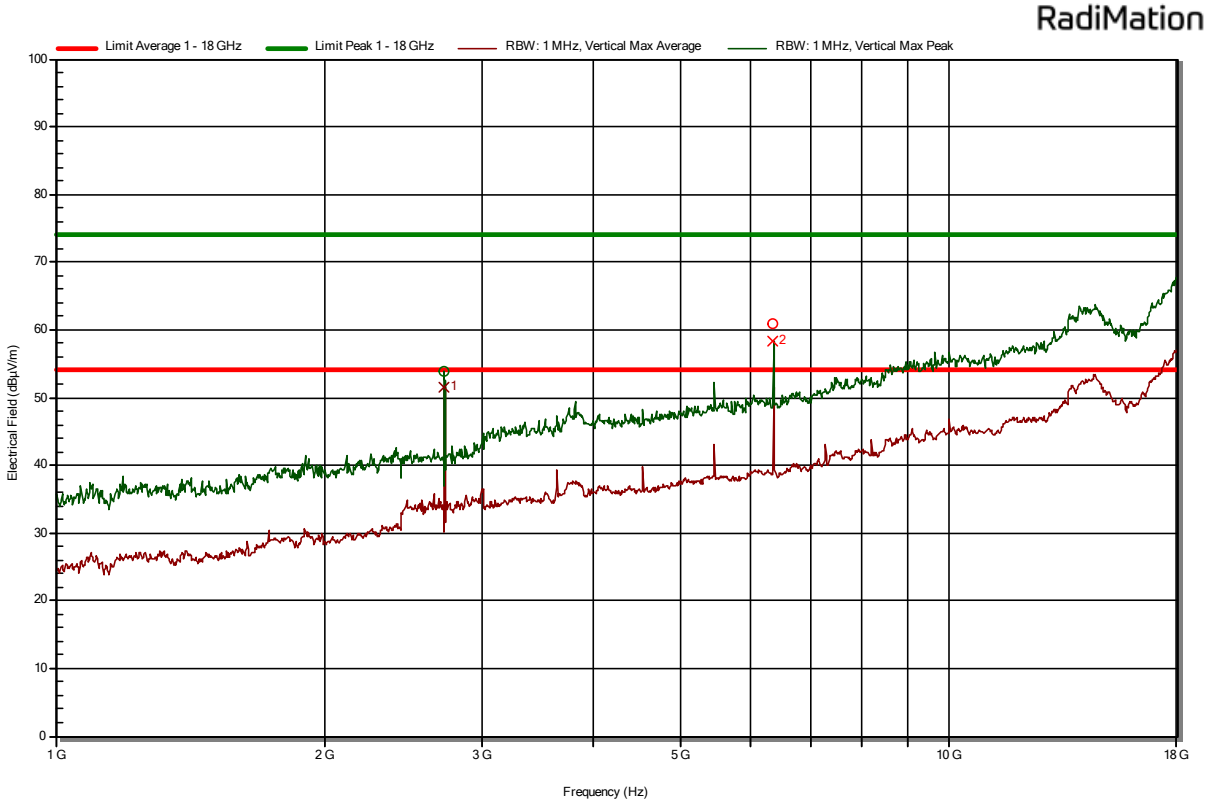
1 GHz to 18 GHz

125 kHz bandwidth mode
Vertical polarization

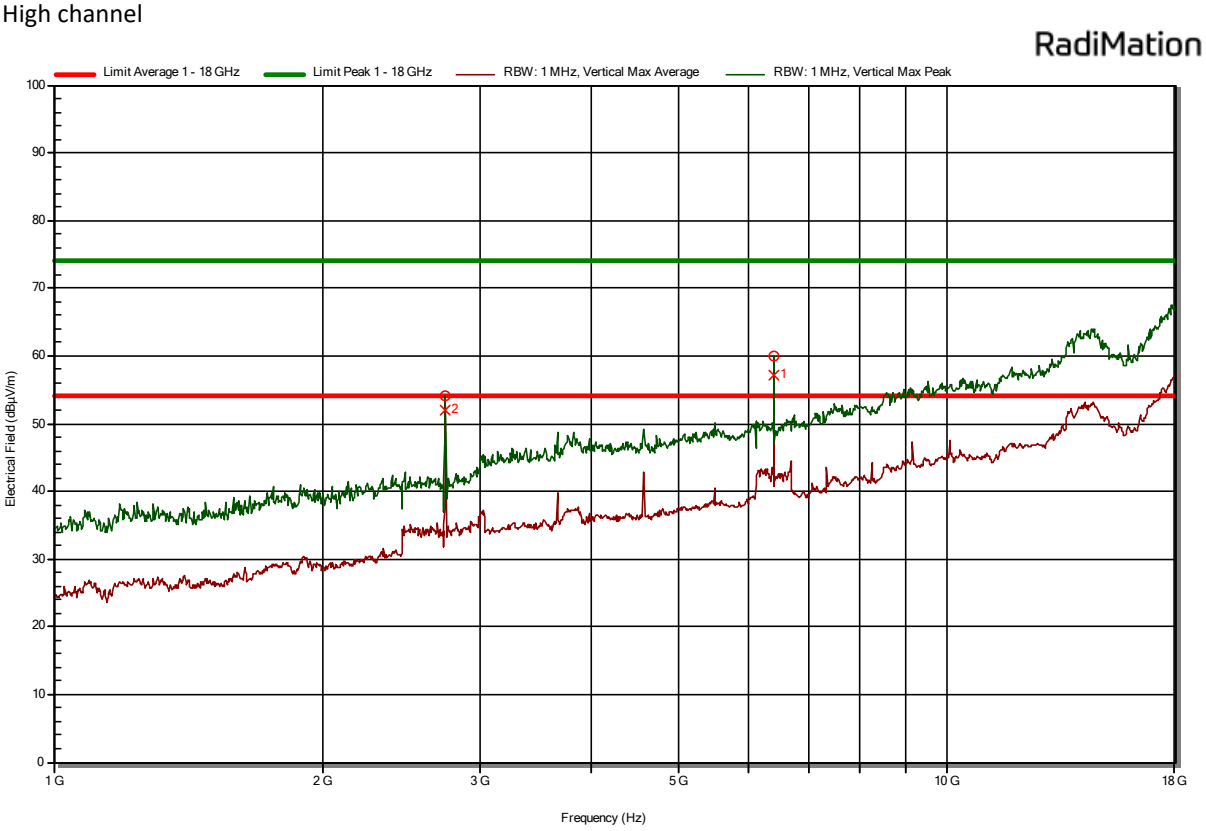
Low channel



Mid channel

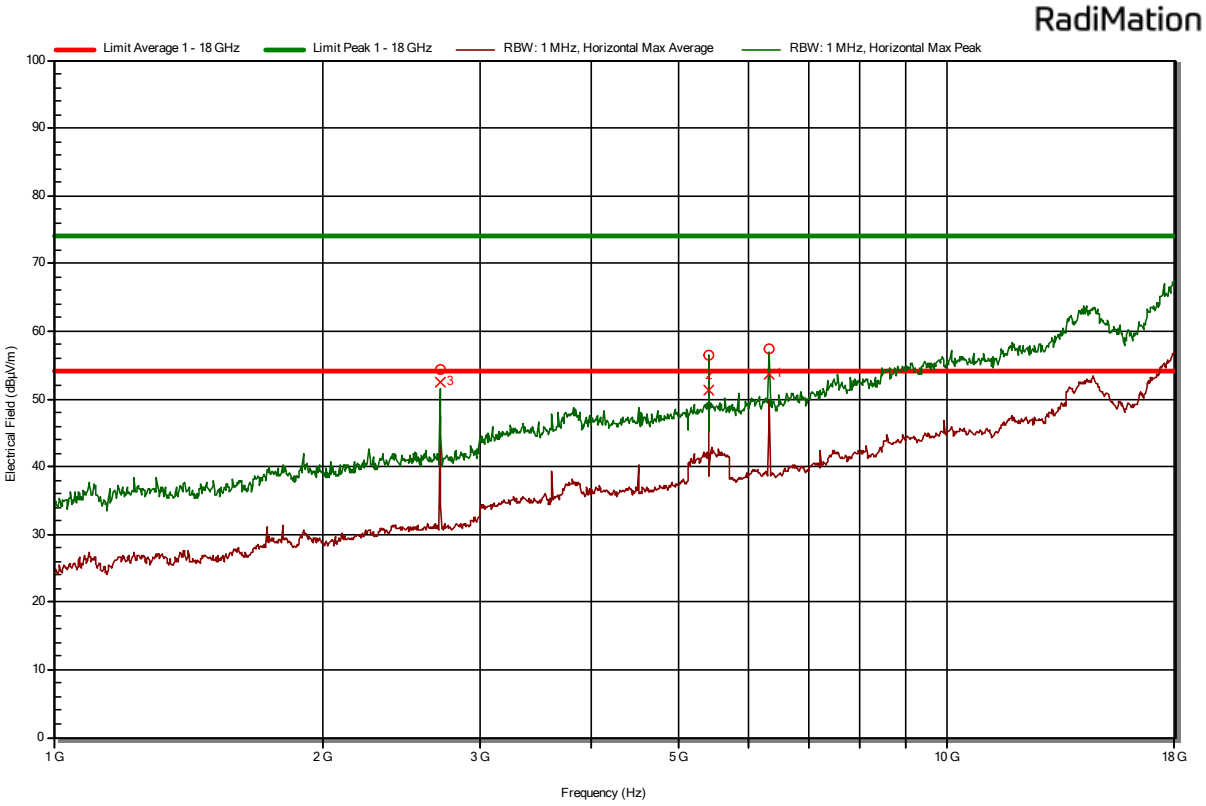


High channel

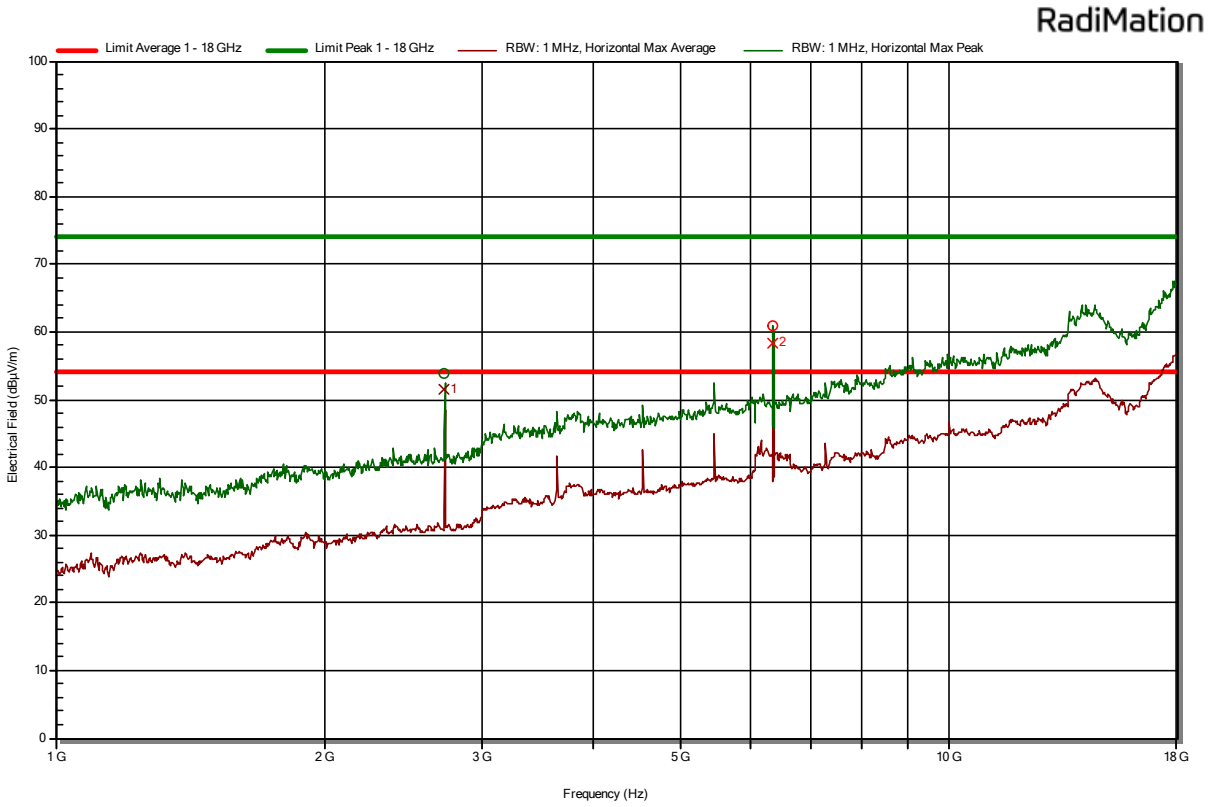


Horizontal polarization

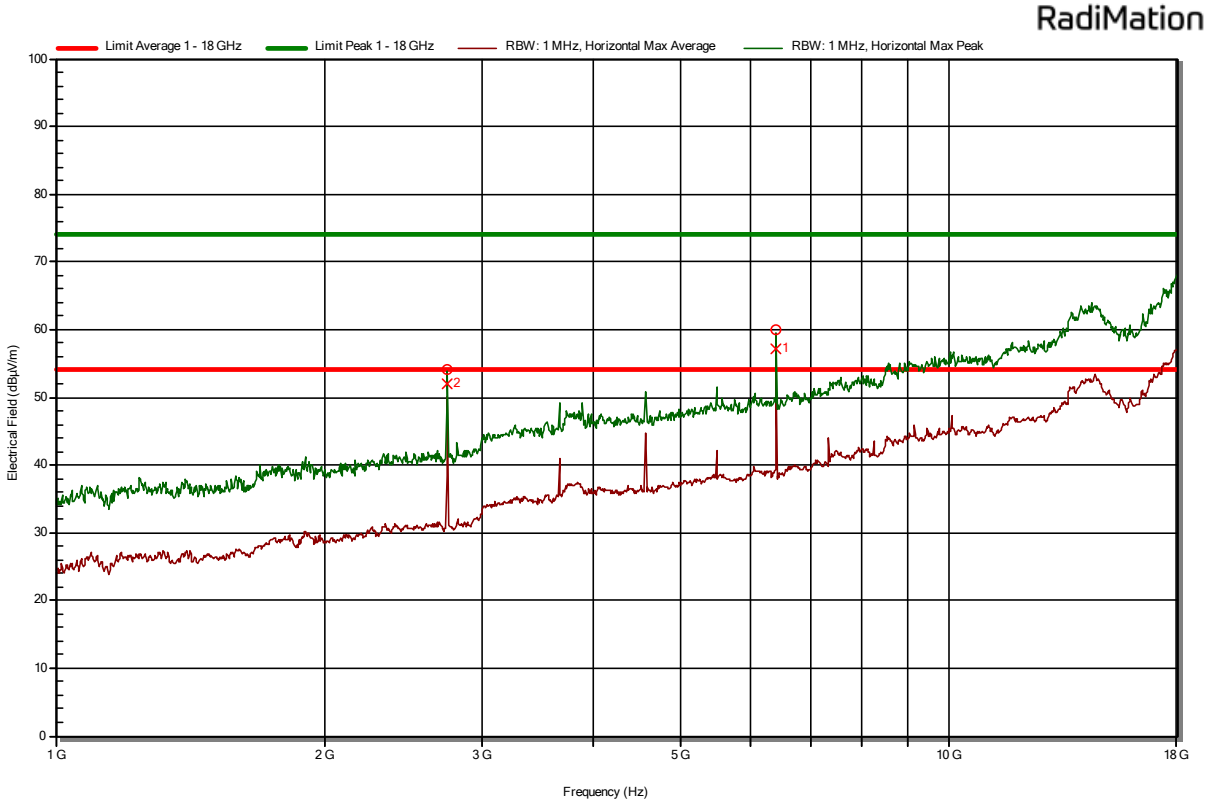
Low channel



Mid channel

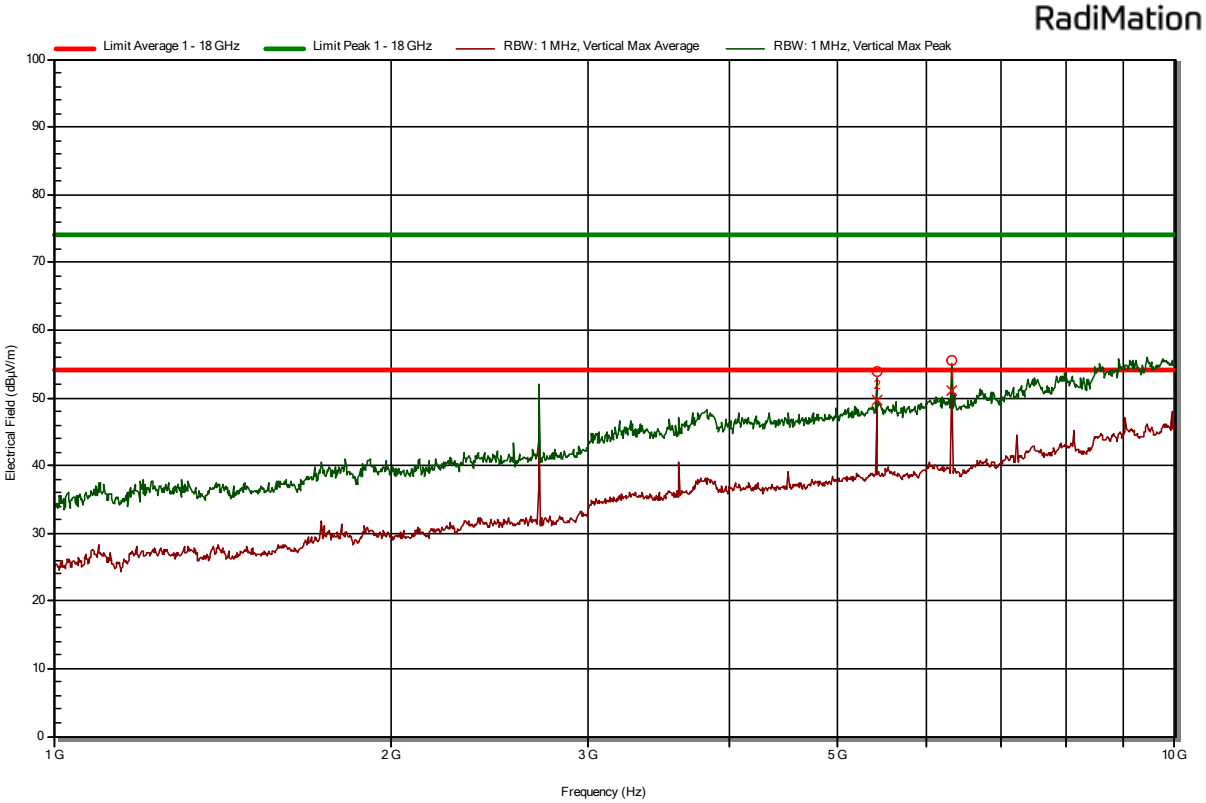


High channel

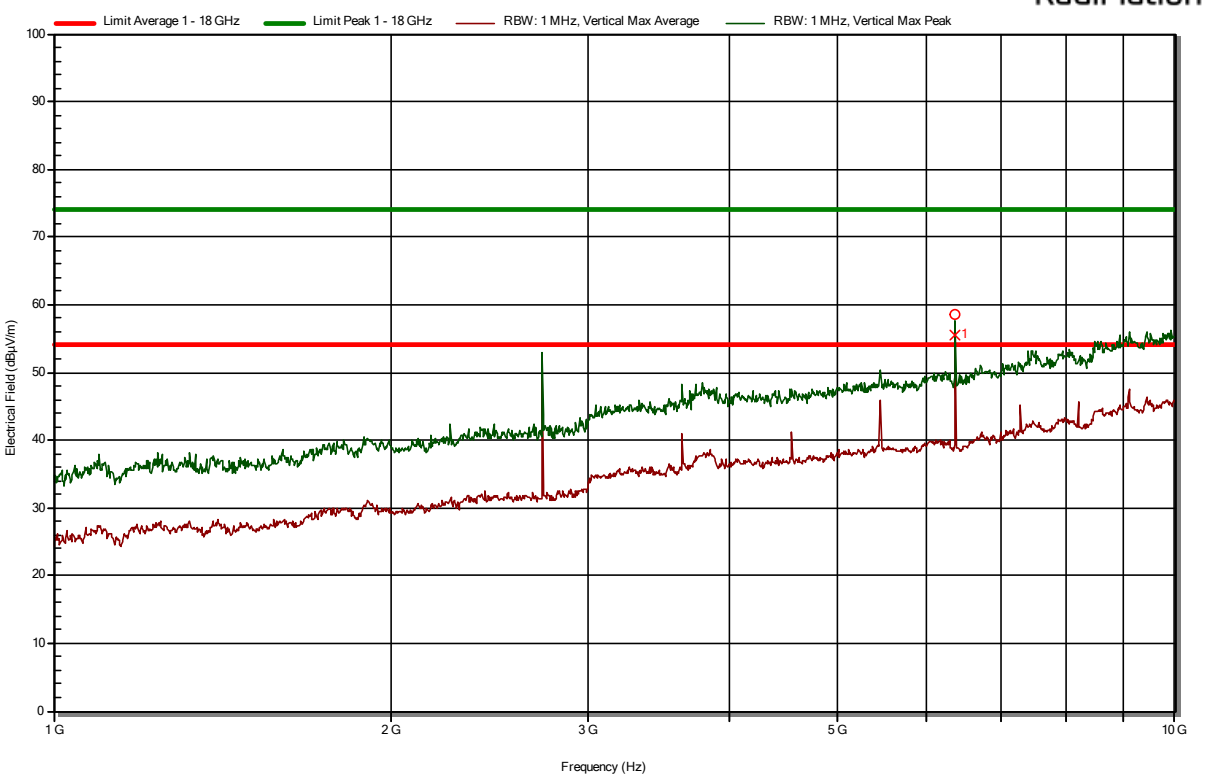


500 kHz bandwidth mode
Vertical polarization

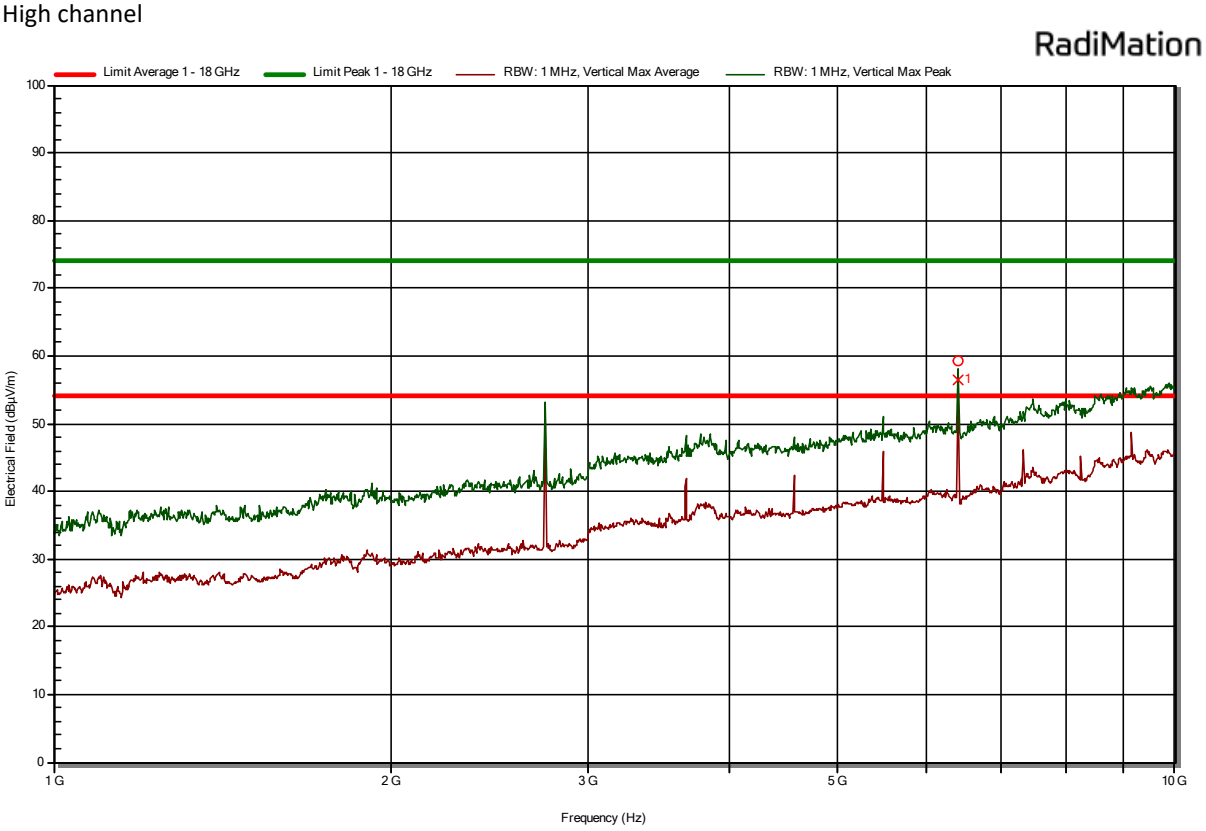
Low channel



Mid channel

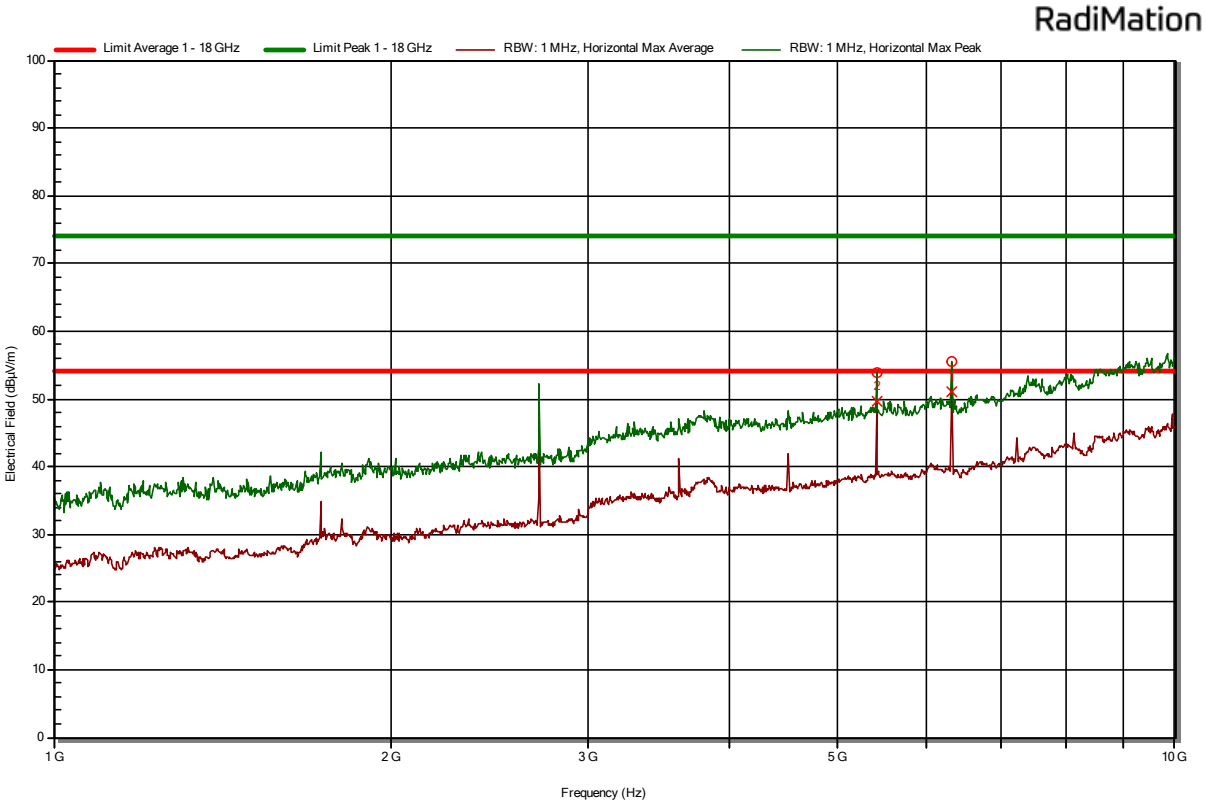


High channel

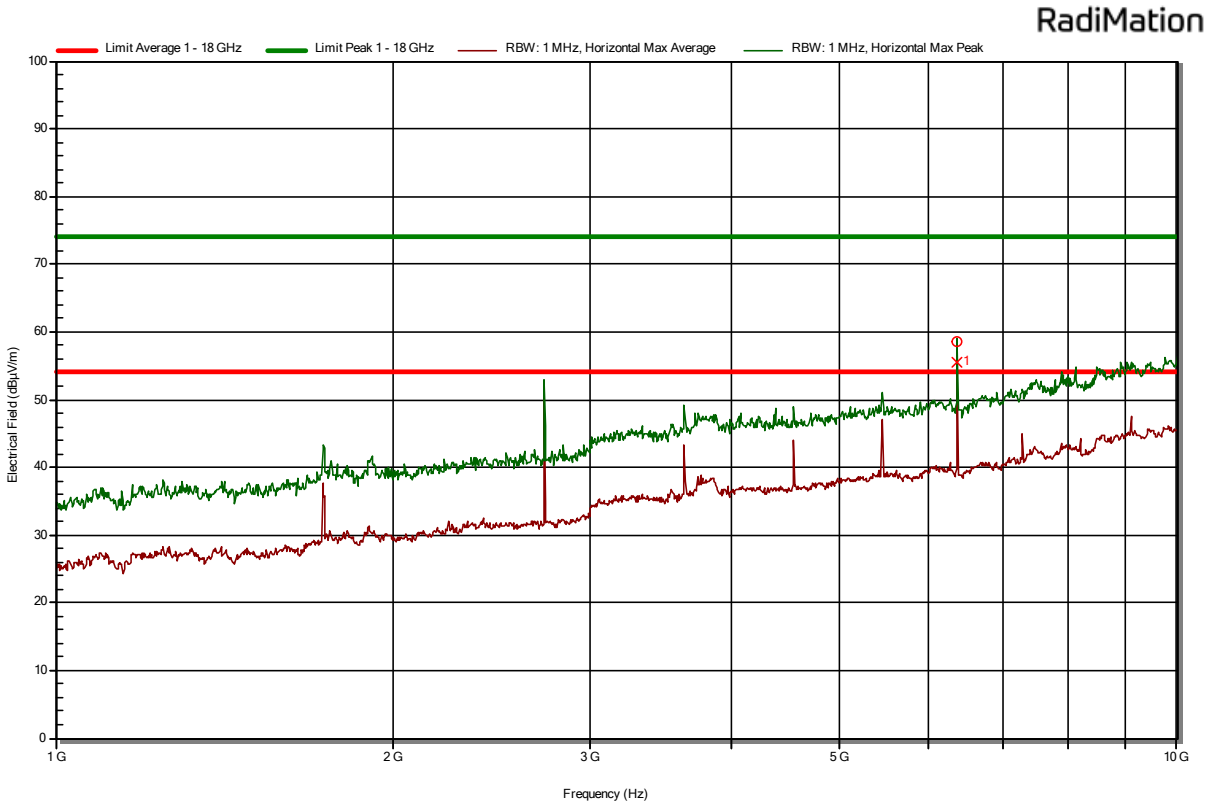


Horizontal polarization

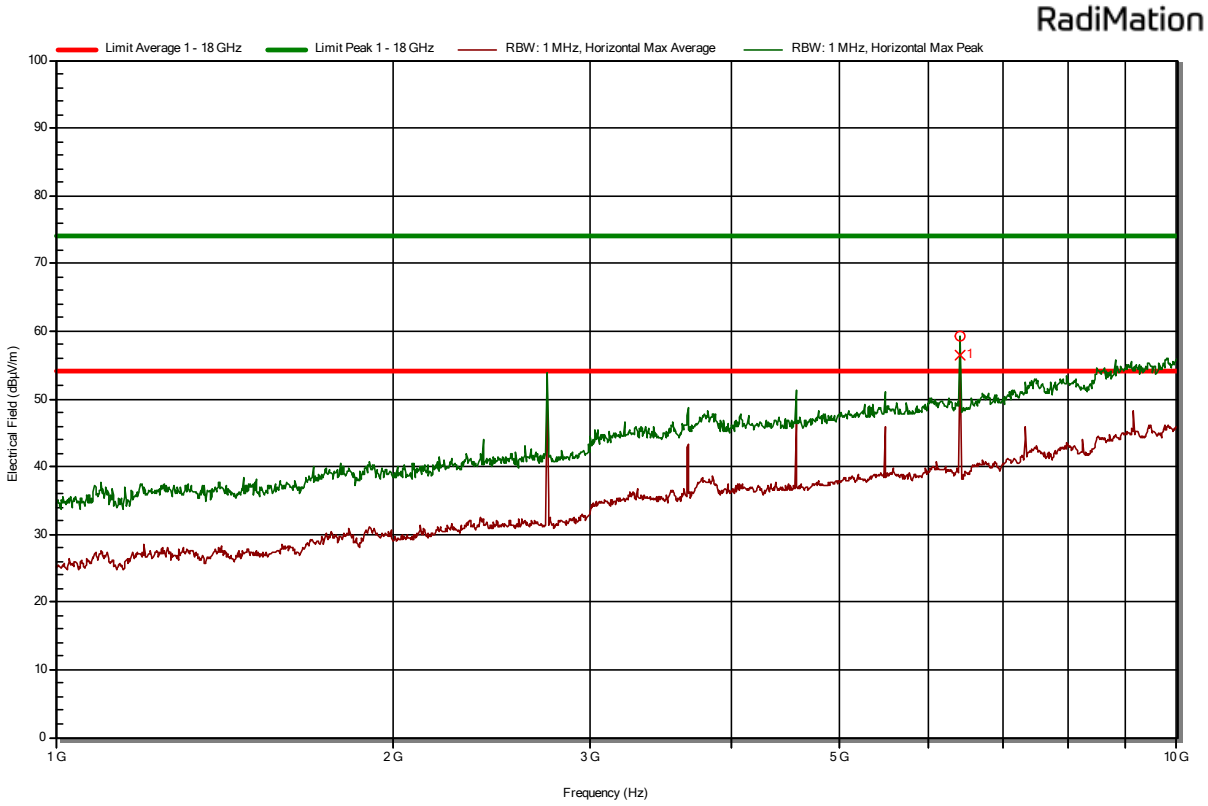
Low channel



Mid channel



High channel



3.5 Band edge Measurement

3.5.1 Limit

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

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 2.3.2 of this report.

3.5.4 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.

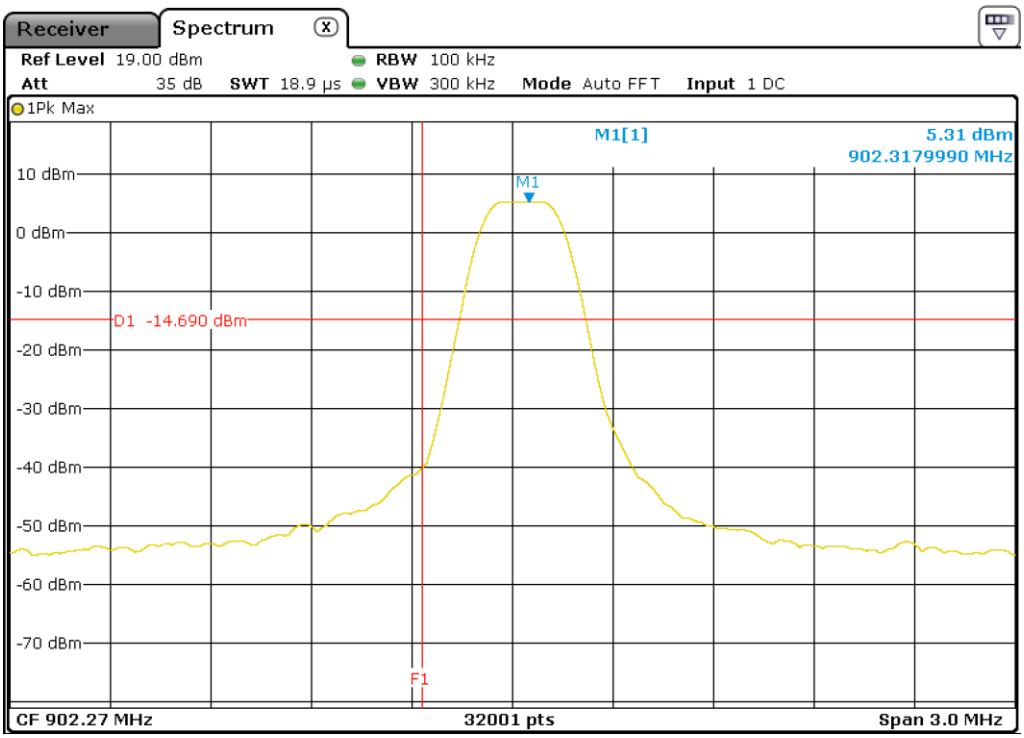
3.5.5 Measurement Uncertainty

± 0.14 dB

3.5.6 Plots of the Band edge Measurements

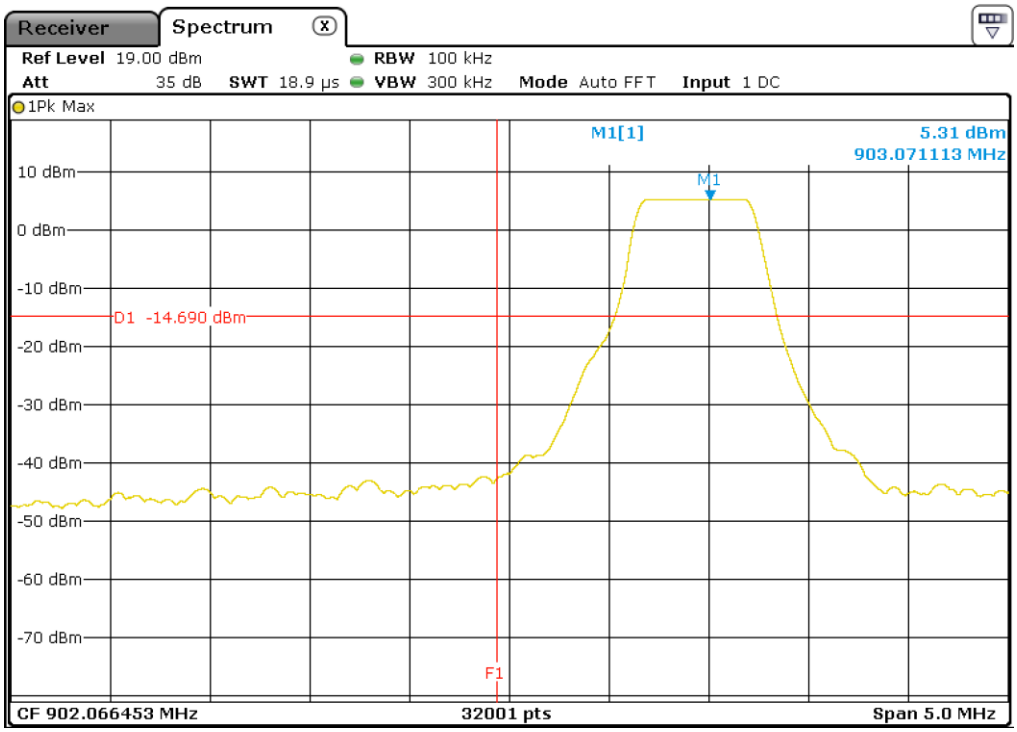
See next page.

LoRa 125 kHz Lower band edge

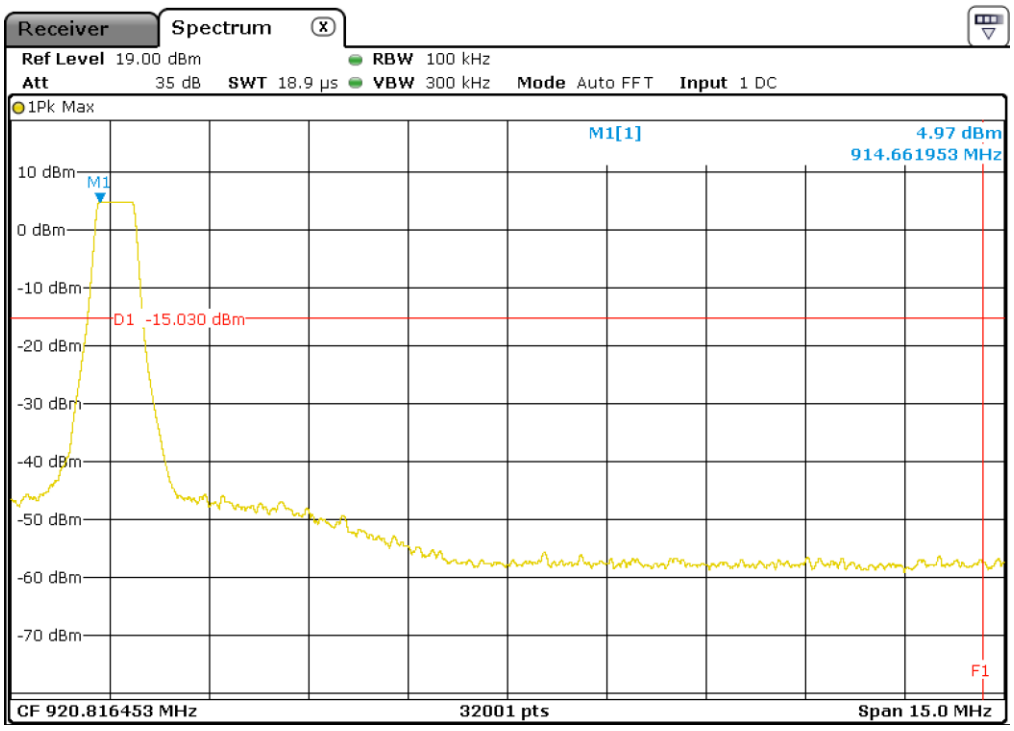


Note: upper band edge in 125 kHz mode is not measured as it is more than 10 MHz from the band edge.

LoRa 500 kHz Lower band edge



LoRa 500 kHz Upper band edge



3.6 Average time of occupancy

3.6.1 Limit

The average time of occupancy on any frequency shall not exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4.

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 2.3.2 of this report.

3.6.4 Test procedure

According to ANSI C63.10: 2013 section 7.8

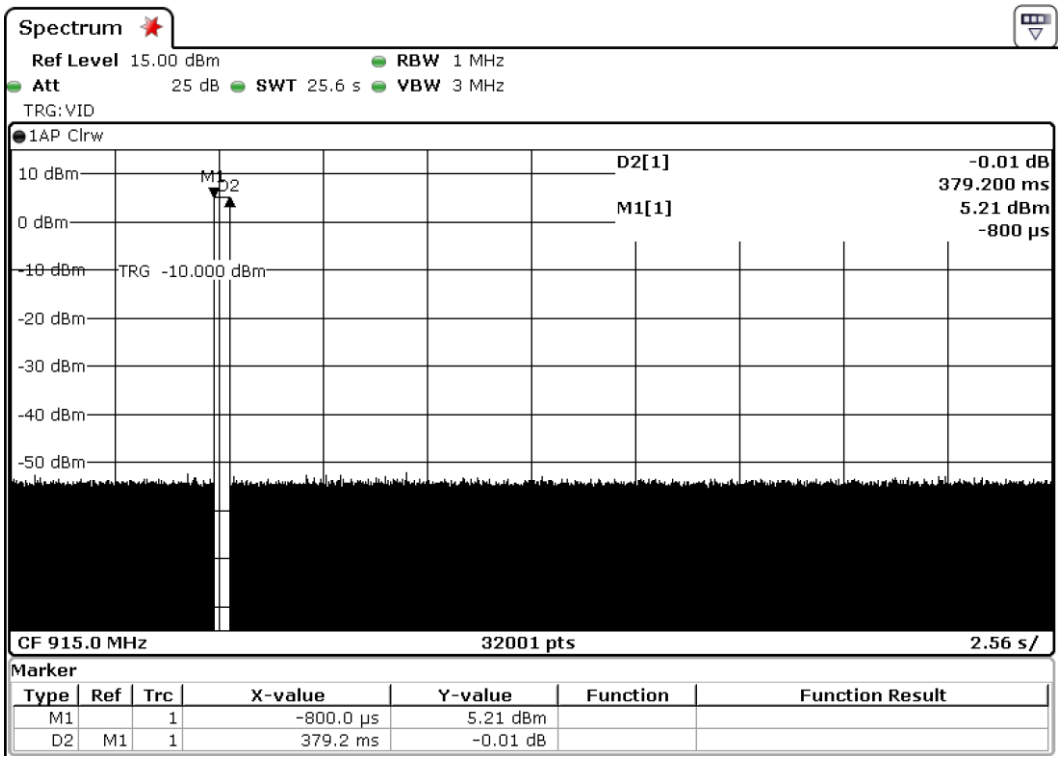
IRN 013 - Duty cycle (%) - Method 2

3.6.5 Average time of occupancy calculations.

For 125 kHz BW with SF7 setting, there are 64 hopping channels, when we multiply 64 with 0.4 seconds we get 25.6 seconds as time period, so the within the 25.6 seconds the average time of occupancy should not exceed the 0.4 seconds.

3.6.6 Measurement plots

For 125 kHz BW



3.6.7 Measurement uncertainty

± 5.7%

3.7 Carrier Frequency separation

3.7.1 Limit

Frequency hopping systems operating in the 902 – 928 MHz shall have hopping frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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 2.3.2 of this report.

3.7.4 Test procedure

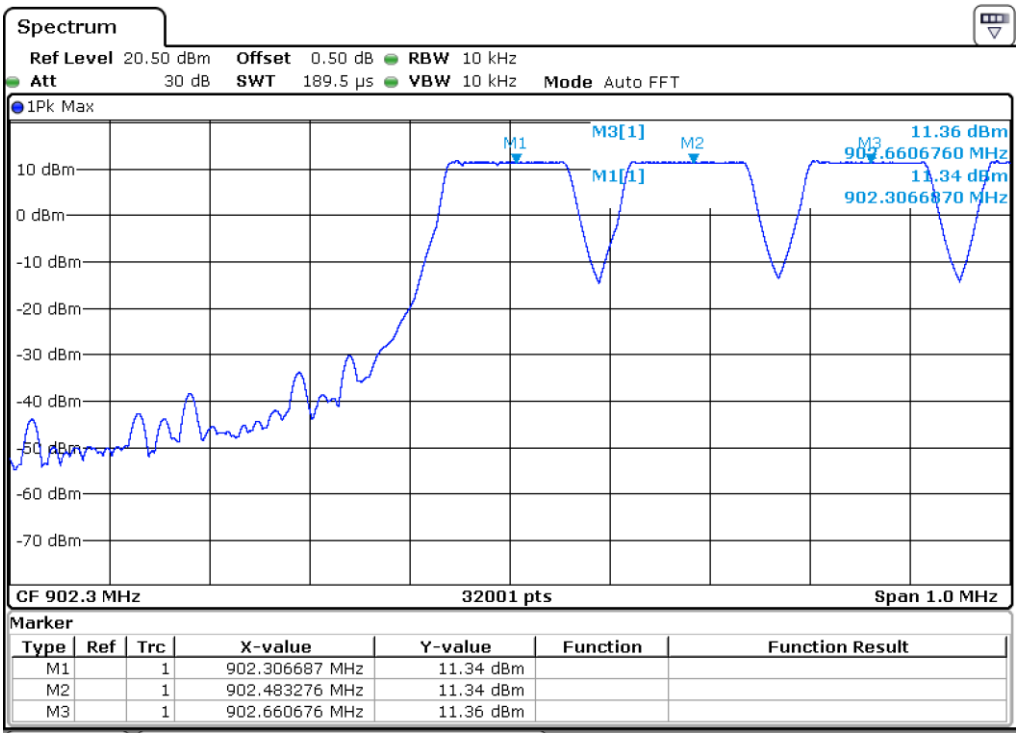
According to ANSI C63.10: 2013 section 7.8
IRN 013 - Duty cycle (%) - Method 2

3.7.5 Measurement calculation.

The carrier separation between the centre frequencies of channels are 176 kHz.

3.7.6 Plot of the carrier frequency separation measurement.

Separation for 125 kHz BW



3.8 Number of hopping channels

3.8.1 Limit

For frequency hopping systems operating in the 902 – 928 MHz: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies.

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 2.3.2 of this report.

3.8.4 Test procedure

The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05.
IRN 005 - Method 2

3.8.5 Test results for the number of hopping channels measurement.

In 125 kHz bandwidth mode the EUT uses 64 hopping channels. The carrier separation between the channels are 176 kHz. When we multiply the number of channels with the carrier separation 176 kHz x 64 = 11.264 MHz, we can see that with hopping mode the EUT transmits within the 11.264 MHz band. When we consider that the lowest frequency of the EUT, all 64 hopping channels are operate in the 902 – 928 MHz frequency band.

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)** **TE 00967** **Chase CBL6112A** **SN: 2308**	**Cable loss (dB)** **Id: SAR cable**	**Corr. (dB)**
30	18,6	0,68	19,28
100	10,7	1,15	11,85
150	10,6	1,41	12,01
200	9,3	1,63	10,93
250	12,6	1,93	14,53
300	13,3	2,12	15,42
350	14,6	2,2	16,8
400	15,5	2,29	17,79
450	16,9	2,53	19,43
500	17,5	2,67	20,17
550	18,4	2,9	21,3
600	18,8	3,02	21,82
650	19,2	3,09	22,29
700	19	3,22	22,22
750	19,8	3,56	23,36
800	19,7	3,69	23,39
900	20,4	3,81	24,21
950	20,8	3,91	24,71
1000	21,2	4,3	25,5

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 00531 Emco 3115 SN: 9412-4377	Gain (dB) TE 11132 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 >