Test report for

47 CFR Part 15 Subpart C

RSS-247, RSS-Gen

The RvA is signatory to ILAC - MRA

Product name	: Simcenter SCADAS XS
Applicant	: Siemens Industry Software Netherlands BV
FCC ID	: 2AF88-SC-XS2
IC	: 28364-SCX-S2

Test report No. : P000461493 002 Ver 3.0

Laboratory information

Accreditation

Kiwa Nederland B.V. 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 L248 and is granted by the Dutch Council For Accreditation (RvA: Raad voor Accreditatie).

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Documentation

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Testing Location

Test Site	Kiwa Nederland B.V.
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
v0.5	15-01-2025	First draft	PvW
v1.0	10-03-2025	Initial release	PvW
V2.0	13-03-2025	Updated FCC ID and IC	PvW
V3.0	04-03-2025	Add SC-XS12-N variant	TK

Table of Contents

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
15.247 (b)	RSS-247 5.4 (d)	RF output power	3.2	Pass

Decision rule: Pass/Fail decisions are based on measurement results without taking into account measurement uncertainty.

1 General Description

1.1 Applicant

Client name:	Siemens Industry Software Netherlands BV
Address:	Weidehek 53, Breda, the Netherlands
Zip code:	4824 AT
Telephone:	076 5736363
E-mail:	Tom.schrijer@siemens.com
Contact name:	Mr. Tom Schrijer

1.2 Manufacturer

Manufacturer name:	Siemens Industry Software Netherlands BV
Address:	Weidehek 53, Breda, the Netherlands
Zip code:	4824 AT
Telephone:	076 5736363
E-mail:	Tom.schrijer@siemens.com
Contact name:	Mr. Tom Schrijer

1.3 Tested Equipment Under Test (EUT)

Product name:	Simcenter SCADAS XS
Brand name:	Siemens
FCC ID:	2AF88-SC-XS2
IC:	28364-SC-XS2
Product description:	Data Acquisition System
Variant model(s):	SC-XS12-AC SC-XS12-A SC-XS12-NC SC-XS12-N SC-XS6-E SC-XS6-EC
Batch and/or serial No.	
Software version:	--
Hardware version:	--
Date of receipt:	05-12-2024
Tests started:	06-12-2024
Testing ended:	12-12-2024

1.3.1 Auxiliary items

AUX1

Product name:	NGE12I05-USB
Brand name:	MeanWell
Product type:	AC/DC Switching Adaptor
Model(s):	NGE-12I05-USB
Batch and/or serial No.	SC472Y1231
Remarks:	Used for charging battery of EUT

AUX2

Product name:	--
Brand name:	--
Product type:	GNSS antenna
Model(s):	--
Batch and/or serial No.	--
Remarks:	Connects to EUT GNSS antenna port

AUX3

Product name:	HS sensor cable
Brand name:	--
Product type:	Cable
Model(s):	--
Batch and/or serial No.	--
Remarks:	Connects to EUT HS port

AUX4

Product name:	ABC Sensor cable
Brand name:	--
Product type:	Cable
Model(s):	--
Batch and/or serial No.	--
Remarks:	Connects to EUT ABC port

AUX5

Product name:	SPDIF Sensor cable
Brand name:	--
Product type:	Cable
Model(s):	--
Batch and/or serial No.	--
Remarks:	Connects to EUT SPDIF port

AUX6

Product name:	CAN Sensor cable
Brand name:	--
Product type:	Cable
Model(s):	--
Batch and/or serial No.	--
Remarks:	Connects to EUT CAN port

AUX7

Product name:	TACHO Sensor cable
Brand name:	--
Product type:	Cable
Model(s):	--
Batch and/or serial No.	--
Remarks:	Connects to EUT TACHO port

AUX8

Product name:	LAN cable
Brand name:	--
Product type:	Cable
Model(s):	--
Batch and/or serial No.	--
Remarks:	Connects to EUT LAN port

AUX9

Product name:	Laptop
Brand name:	HP
Product type:	Laptop
Model(s):	HP Probook 650 G5
Batch and/or serial No.	BA96D77C-7F70-4867-A445-17C8898BC564
Remarks:	Connects to EUT LAN port

1.4 Product specifications of Equipment under test

Tx Frequency:	WLAN: 2400 – 2483.5 MHz
Rx frequency:	WLAN: 2400 – 2483.5 MHz
Occupied channel width:	20 MHz
Antenna type:	Ceramic chip antenna
Antenna gain:	+2.0 dBi
Type of modulation:	CCK/OFDM/DBPSK/DQPSK/DSSS/64-QAM
Emission designator	802.11b: 14M0F1D

Disclaimer: The operating frequency bands are declared by the applicant
Bandwidth used for calculating emission designator is based on the bandwidth measurement from ICC test report no. FR1O0407AC Rev 01.

1.5 Environmental conditions

Test date	06-12-2024	11-12-2024	12-12-2024
Ambient temperature	19.6°C	21.2°C	20.1°C
Humidity	41.9%	29.7%	31.8%

1.6 Measurement standards

- ANSI C63.10:2013
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02

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 3

1.8 Observation and remarks

EUT orientation:

1.9 Modifications to the EUT (Equipment Under Test)

The manufacturer changed the AC power supply to the listed model to reduce conducted spurious emissions on the LAN shield.

1.10 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. Kiwa Nederland B.V. 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 : P. van Wanrooij, BASc

Review of test methods and report by:

Name : ing. M.H. Khan

The above conclusions have been verified by the following signatory:

Date : 04-04-2025

Name : ing. M.H. Khan

Function : Test Engineer

Signature :

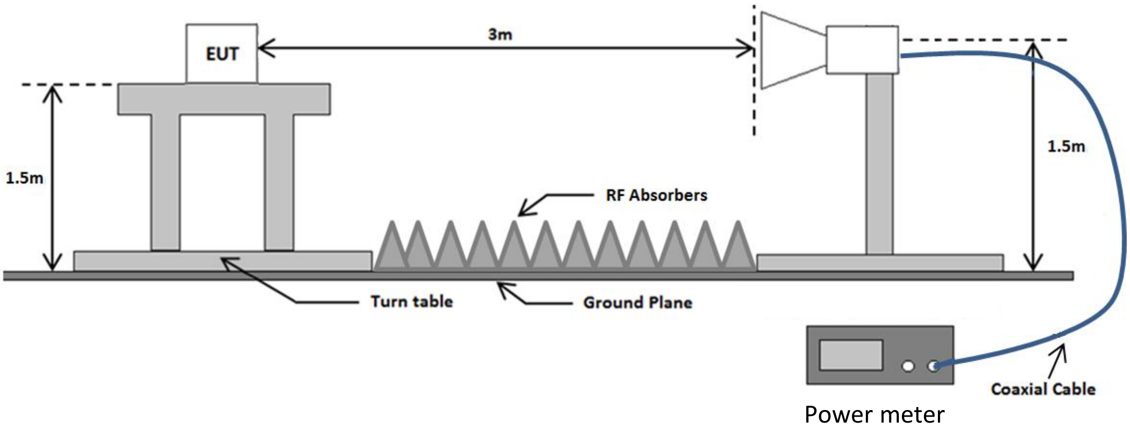
2 Test configuration of the Equipment Under Test

2.1 Test mode

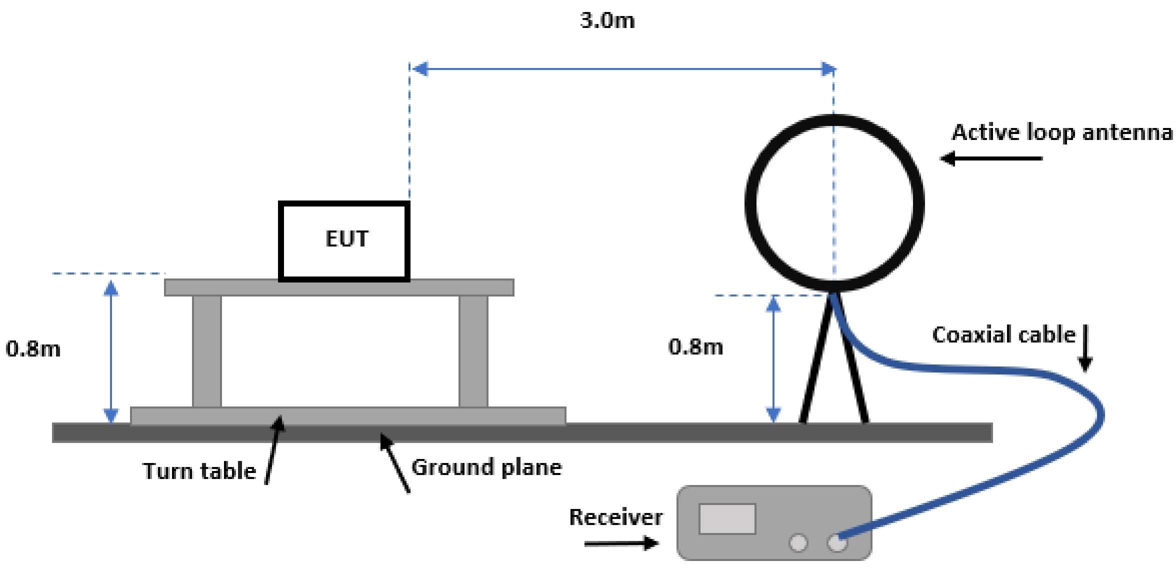
The manufacturer provided software to set the EUT in continuous transmit mode on a fixed channel.

2.2 Test setups

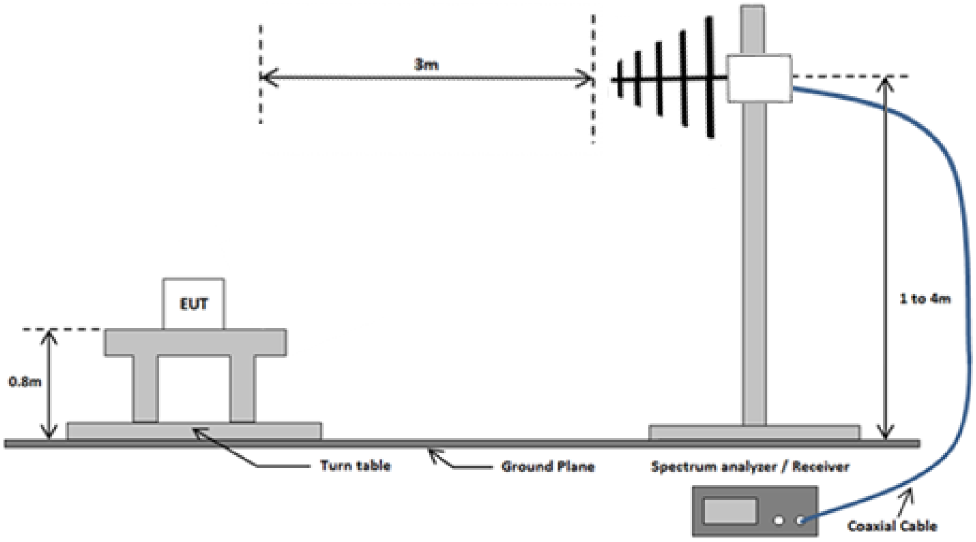
RF power measurement



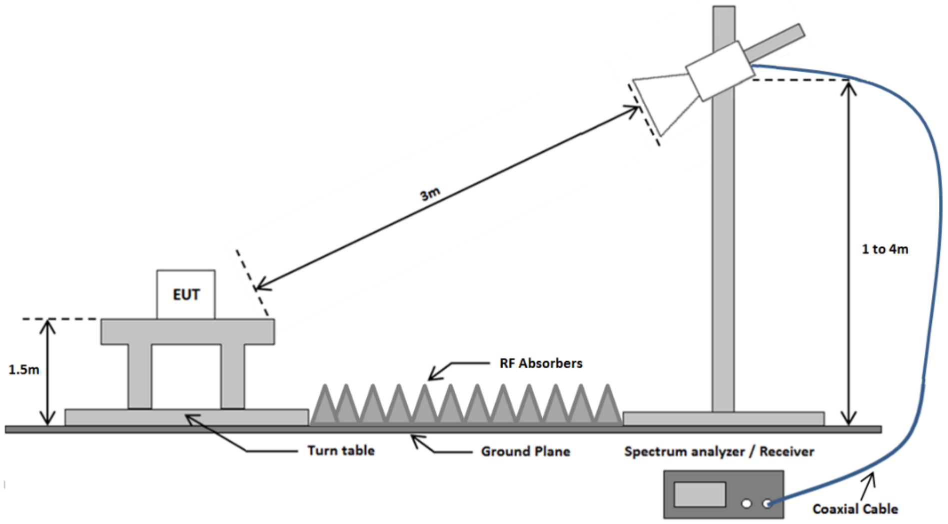
Radiated emissions test setup 9 kHz – 30 MHz



Radiated emissions test setup 30 MHz - 1 GHz

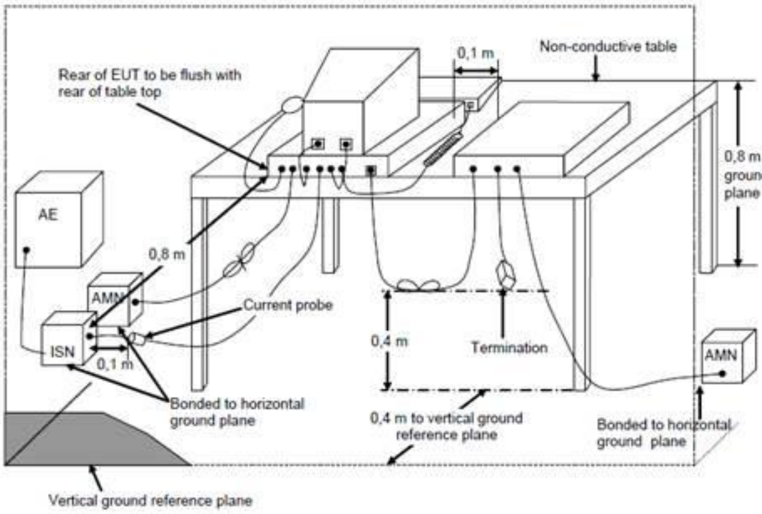


Radiated emissions test setup above 1 GHz



AC Power line conducted emissions test setup

Emissions test at AC mains



EUT orientation:

Figure 1. EUT and auxiliary setup

List of used cables					
Number	**Function**	**From**	**To**	**Length**	**Remarks**
1	AC Power	mains 120Vac 60 Hz	AUX1	< 3m	-
2	5 Vdc power	AUX1	EUT	< 3m	-
3	Ethernet	EUT	AUX9	<3m	-
4	HS sensor cable	EUT	--	<3m	-
5	ABC sensor cable	EUT	--	<3m	3 sets of this cable bundle were connected to the EUT
6	SPDIF sensor cable	EUT	--	<3m	-
7	CAN sensor cable	EUT	--	<3m	-
8	TACHO sensor cable	EUT	--	<3m	-

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	114605	11-2024	11-2025	3.1, 3.3
Spectrum Analyzer	Rohde & Schwarz	FSV3044	114923	10-2023	10-2025	3.1
3.0 GHz HPF	Wainwright	WHK3.0/18G-10EF	114682	09-2024	09-2025	3.1
Biconical antenna + 6dB attenuator	EMCO	3109	107818	06-2022	06-2025	3.1
Logperiodic antenna	EMCO	3147	114385	02-2021	02-2026	3.1
Horn antenna	EMCO	3115	114607	01-2021	01-2025	3.1
Horn antenna	FLANN-MICROWAVE	20240-25	114518	NA*	NA*	3.1
Preamplifier 1-18 GHz	µComp Nordic	MCNA-40-0010800-25-10P	114771	08-2024	08-2025	3.1
Preamplifier 18-40 GHz	Schwarzbeck	BBV-9721	115026	06-2024	06-2025	3.1
Semi-Anechoic Chamber	ETS Lindgren	SAR	114624	03-2023	03-2026	3.1
Test software	Raditeq	Radimation Version 2023.2.3	--	--	--	3.1, 3.3
LISN /Two line V-network	Rohde & Schwarz	ENV 216	114379	11-2023	11-2025	3.1, 3.3

*Note: Standard gain horn antennas do not need calibration
NA= Not Applicable

Description	Manufacturer	Model	ID	Cal. Done date	Cal. due date	Used at Par.
Anechoic room	EUROSHIELD	ANEC	114625	11-2023	11-2025	3.2
Preamplifier 1 - 26.5 GHz	HP	8449B	114432	12-2024	12-2025	3.2
Antenna 1 - 18 GHz	EMCO	3115	114434	11-2024	11-2027	3.2
Power meter	DARE	RPR3006W	114396	11-2023	11-2026	3.2

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

FCC 15.209(a)

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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 – 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 30m or 300m limit distance according to the method described in ANSI C63.10-2013, clause 6.4

RSS-GEN

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Magnetic field strength (H-Field) (µA/m)	Magnetic field strength (H-Field) (dBµA/m)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance(m)
0.009 – 0.490	6.37/F (kHz)	20*{log[6.37] -log[F(kHz)]}	N.A.	20*{log[6.37] - log[F(kHz)]} + 51.5	300*
0.490 – 1.705	63.7/F (kHz)	20*{log[63.7] -log[F(kHz)]}	N.A.	20*{log[63.7] - log[F(kHz)]} + 51.5	30*
1.705 - 30	0.08	-21.9	N.A.	29.6	30*
30 -88	N.A.	N.A.	100	40	3
88 - 216	N.A.	N.A.	150	43,5	3
216-960	N.A.	N.A.	200	46	3
Above 960	N.A.	N.A.	500	54	3

*Note: Measured values in the plots 9 kHz to 30 MHz corrected to 30m or 300m limit 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 C63.10-2013, section 6.4
30 MHz to 26.5 GHz: According to ANSI C63.10-2013, section 6.5 and 6.6

9 kHz to 30 MHz: IRN 441 – Method 10
30 MHz to 1 GHz: IRN 441 – Method 1
1 GHz to 18 GHz: IRN 441– Method 2
18 to 26 GHz: IRN 441– Method 3

In case of handheld and/or body-worn equipment, the EUT's orientation (X, Y, Z) was varied in order to ensure that maximum emission amplitudes were attained. In all other cases the associated cabling and the EUT orientation was varied for maximum emissions.

The spectrum was examined from 0.009 MHz to 10 times X GHz, not more than the 10th harmonic of the highest intentional generated frequency (X GHz). Final radiated emission measurements were made at 3m distance.

The 6 highest emission amplitudes relative to the appropriate limit were recorded in this report. Field strength values of radiated emissions at frequencies not listed in the tables are more than 20 dB below the applicable limit.

3.1.5 Measurement Uncertainty

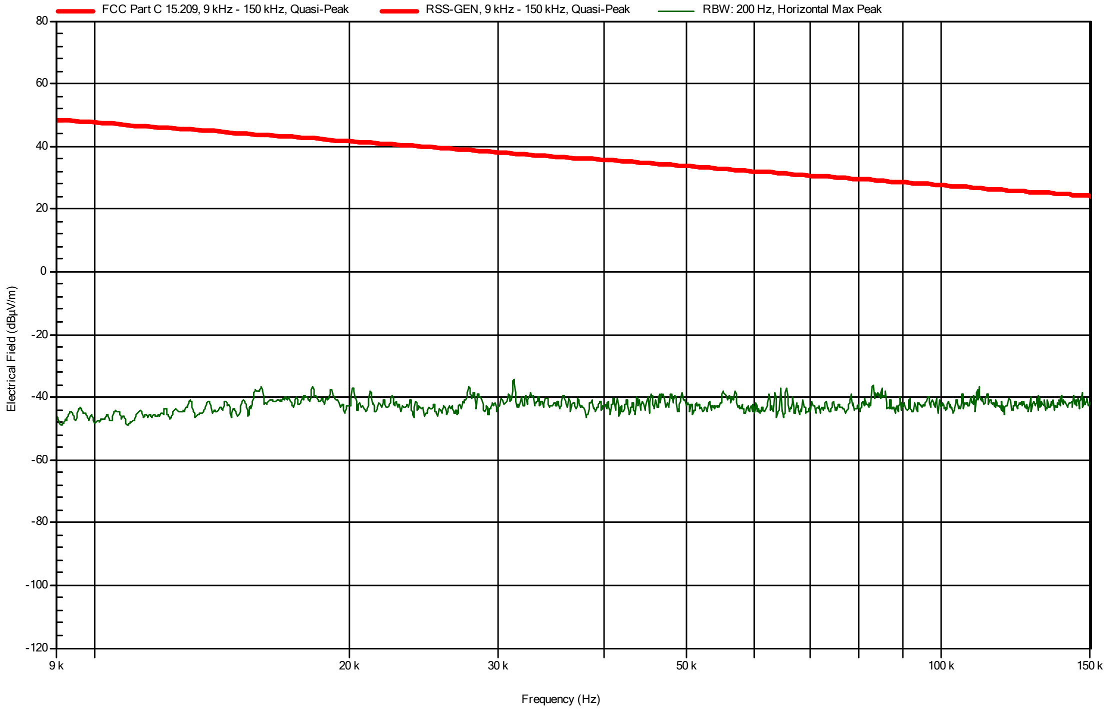
Frequency range	Polarization	Uncertainty
9 kHz – 30 MHz	--	±1.6 dB
30 – 200 MHz	Horizontal	±4.5 dB
	Vertical	±5.4 dB
200 -1000 MHz	Horizontal	±3.6 dB
	Vertical	±4.6 dB
1 – 18 GHz	Horizontal	±5.7 dB
	Vertical	±5.7 dB
18 – 26.5 GHz	Horizontal	±4.9 dB
	Vertical	±4.9 dB

3.1.6 Test results

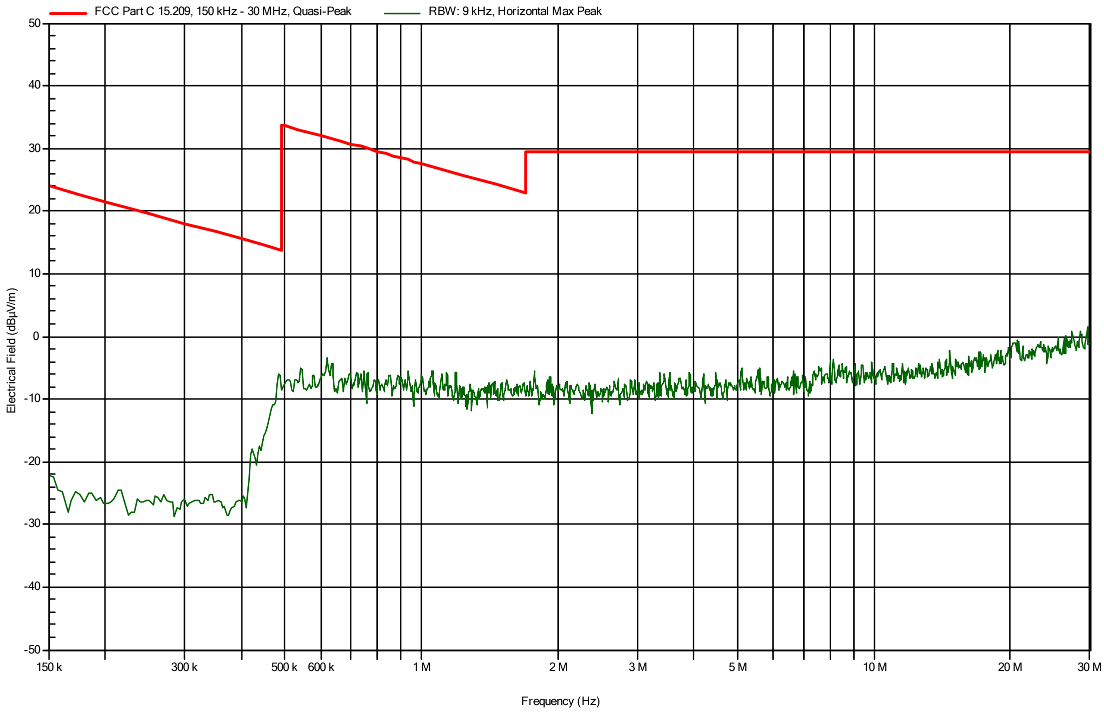
Frequency	Quasi-Peak	Quasi-Peak Limit	Height	Polarization	Status	Channel
32,329 MHz	34,3 dBµV/m	40 dBµV/m	1 m	Vertical	Pass	1
66,312 MHz	33,2 dBµV/m	40 dBµV/m	1 m	Vertical	Pass	1
77,203 MHz	27,5 dBµV/m	40 dBµV/m	1,5 m	Vertical	Pass	1
66,272 MHz	32,7 dBµV/m	40 dBµV/m	3,5 m	Horizontal	Pass	1
149,993 MHz	29,1 dBµV/m	43,5 dBµV/m	2 m	Horizontal	Pass	1
62,918 MHz	14,7 dBµV/m	40 dBµV/m	1,5 m	Horizontal	Pass	1
81,508 MHz	16,1 dBµV/m	40 dBµV/m	4 m	Horizontal	Pass	1
299,991 MHz	30,6 dBµV/m	46 dBµV/m	1,5 m	Vertical	Pass	1
349,996 MHz	26,8 dBµV/m	46 dBµV/m	1 m	Horizontal	Pass	1
450,001 MHz	29,8 dBµV/m	46 dBµV/m	1 m	Horizontal	Pass	1
865,075 MHz	28,9 dBµV/m	46 dBµV/m	1 m	Horizontal	Pass	1
31,963 MHz	33,5 dBµV/m	40 dBµV/m	1,2 m	Vertical	Pass	6
36,655 MHz	30,4 dBµV/m	40 dBµV/m	1 m	Vertical	Pass	6
66,464 MHz	28,9 dBµV/m	40 dBµV/m	1,8 m	Vertical	Pass	6
66,287 MHz	25,5 dBµV/m	40 dBµV/m	3,2 m	Horizontal	Pass	6
149,994 MHz	28,8 dBµV/m	43,5 dBµV/m	1,7 m	Horizontal	Pass	6
138,433 MHz	17,5 dBµV/m	43,5 dBµV/m	2 m	Horizontal	Pass	6
450,017 MHz	29 dBµV/m	46 dBµV/m	1 m	Horizontal	Pass	6
549,994 MHz	29,2 dBµV/m	46 dBµV/m	1,8 m	Horizontal	Pass	6
650,006 MHz	31,6 dBµV/m	46 dBµV/m	1,3 m	Horizontal	Pass	6
865,075 MHz	29,1 dBµV/m	46 dBµV/m	1 m	Horizontal	Pass	6
32,686 MHz	33,4 dBµV/m	40 dBµV/m	1 m	Vertical	Pass	11
36,538 MHz	31,1 dBµV/m	40 dBµV/m	1 m	Vertical	Pass	11
60,829 MHz	30,4 dBµV/m	40 dBµV/m	1,3 m	Vertical	Pass	11
66,274 MHz	29,6 dBµV/m	40 dBµV/m	1 m	Vertical	Pass	11
66,336 MHz	26,1 dBµV/m	40 dBµV/m	3,3 m	Horizontal	Pass	11
64,797 MHz	27,4 dBµV/m	40 dBµV/m	3,5 m	Horizontal	Pass	11
150,005 MHz	27,9 dBµV/m	43,5 dBµV/m	3,3 m	Horizontal	Pass	11
649,996 MHz	31,3 dBµV/m	46 dBµV/m	1,7 m	Horizontal	Pass	11

The results of the radiated emission tests are depicted in the table above. A selection of plots is provided on the next pages

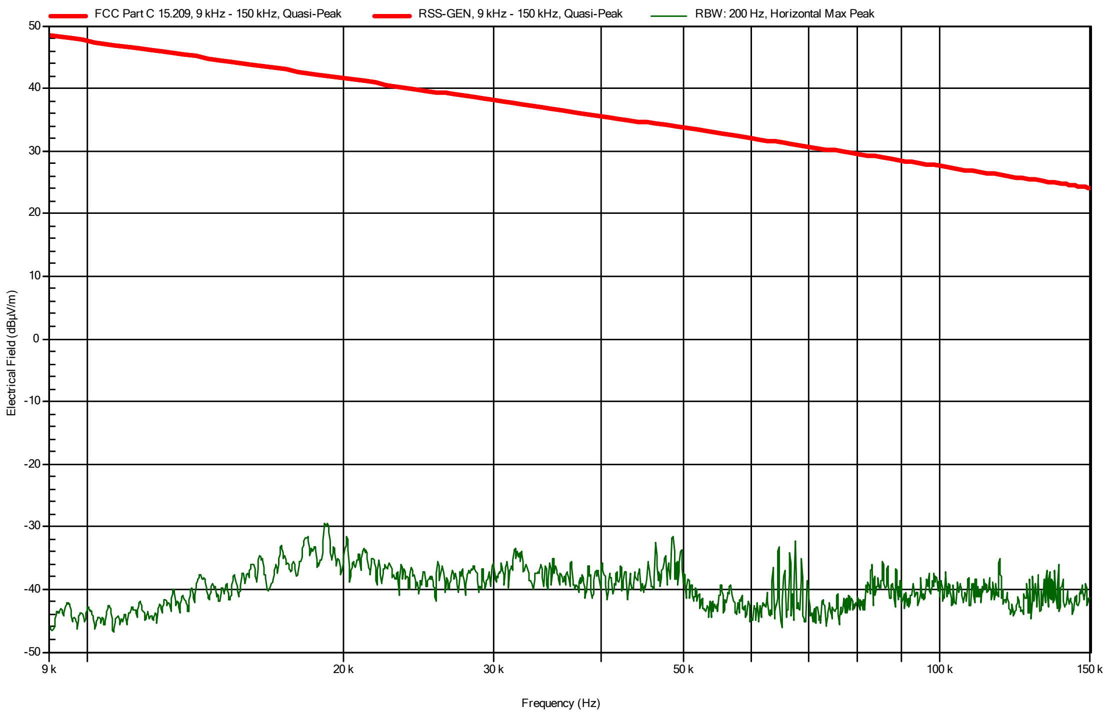
3.1.7 Plots of the Radiated Spurious Emissions Measurement



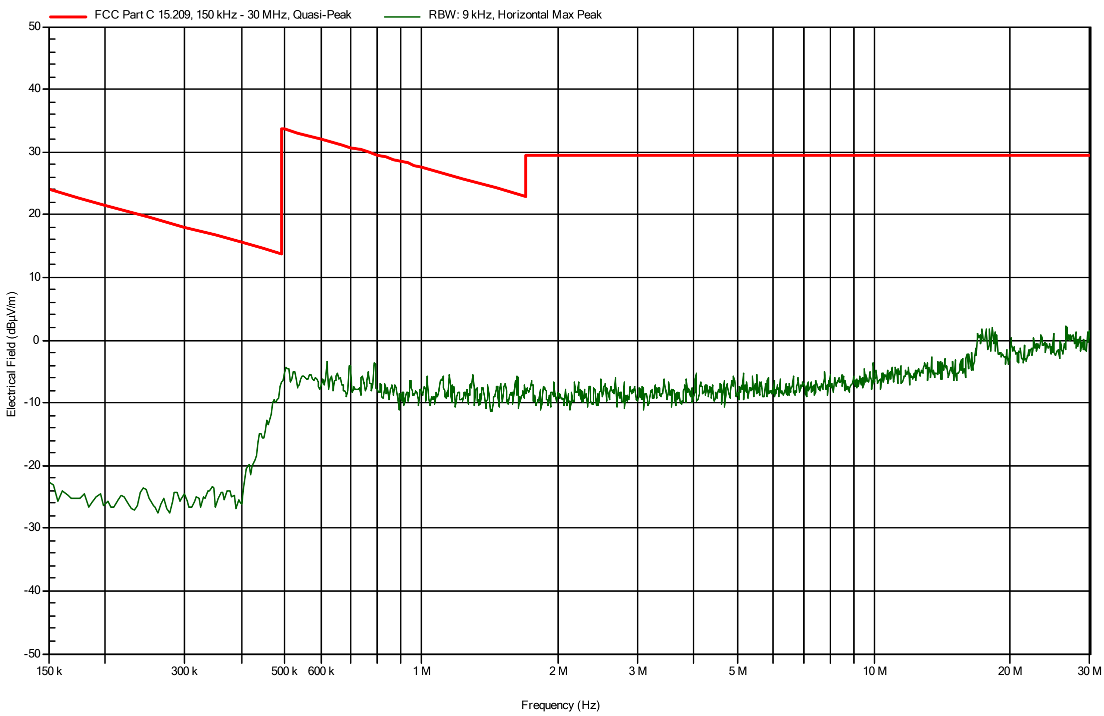
Plot 1a: radiated emissions of the EUT, Antenna perpendicular, in the range 9 – 150KHz (pre-scan peak values shown)



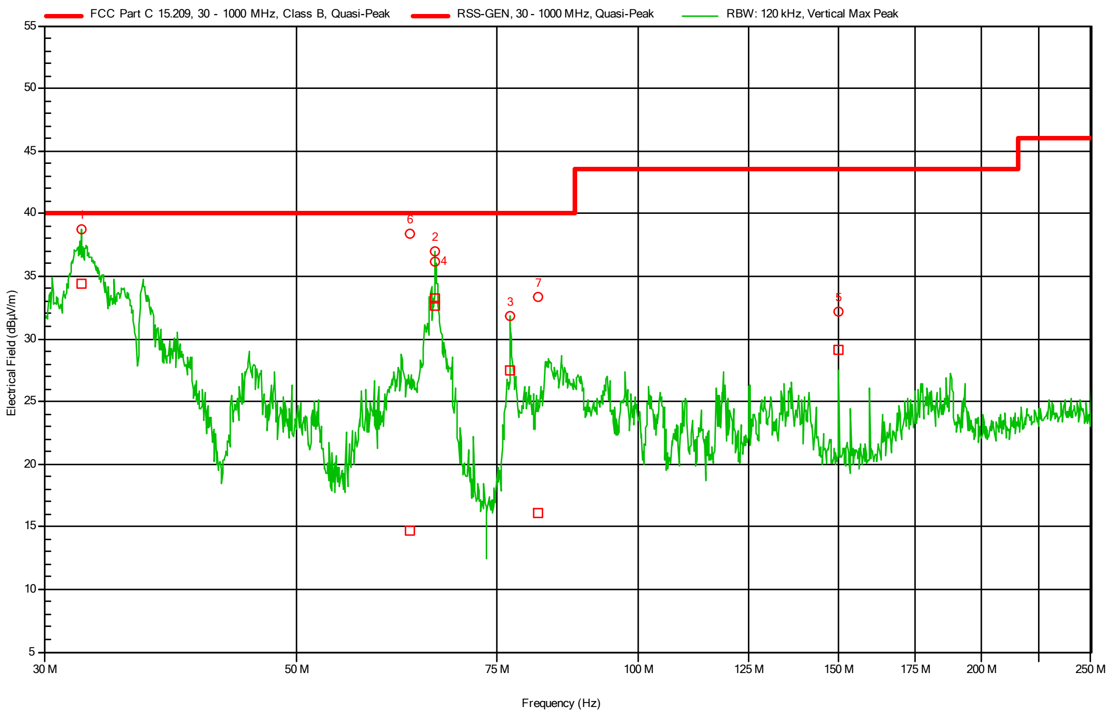
Plot 1b: radiated emissions of the EUT, Antenna parallel, in the range 9 – 150KHz (pre-scan peak values shown)



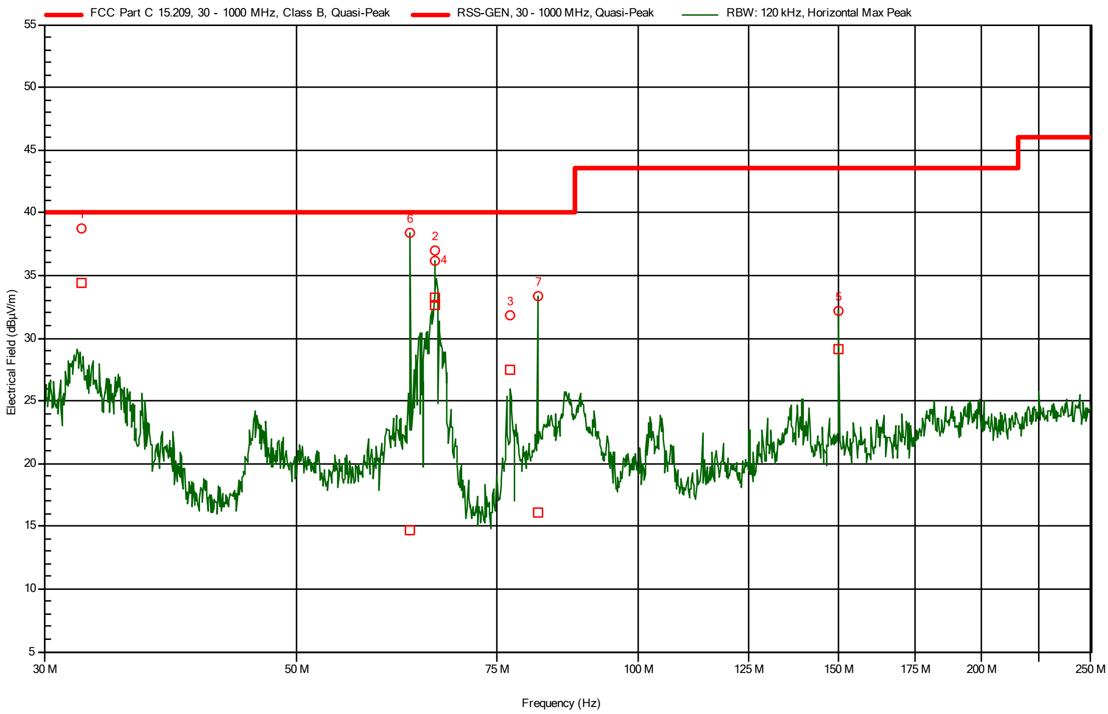
Plot 2a: radiated emissions of the EUT, Antenna perpendicular, in the range 150KHz-30 MHz
(pre-scan peak values shown)



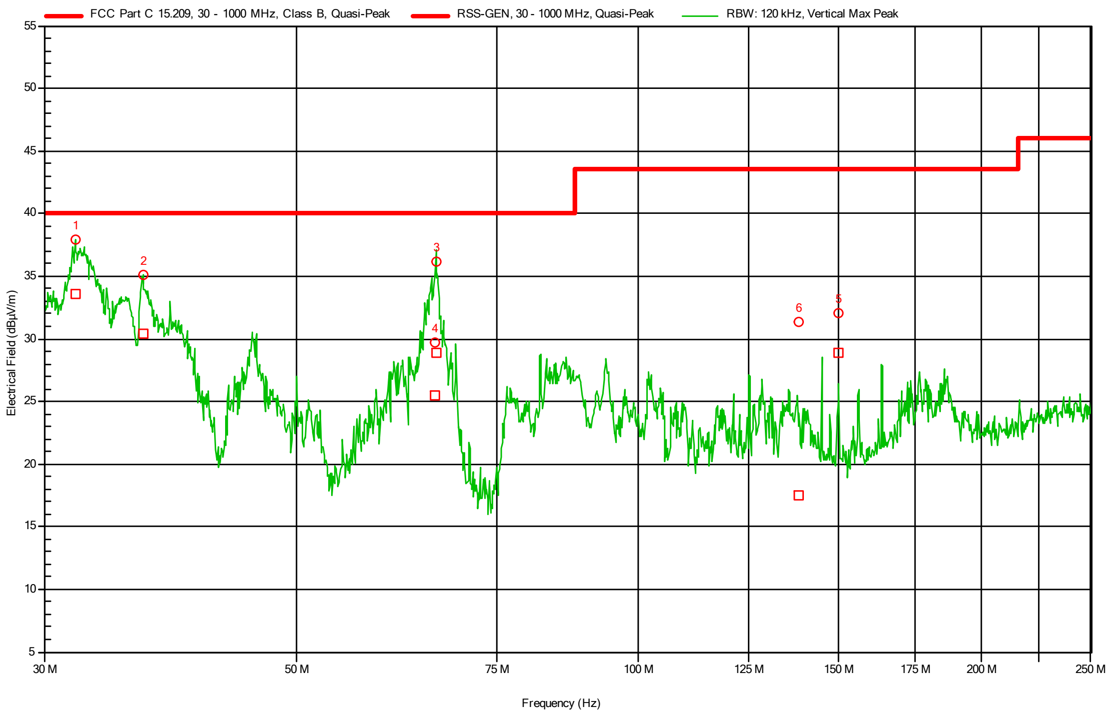
Plot 2b: radiated emissions of the EUT, Antenna parallel, in the range 150KHz-30 MHz
(pre-scan peak values shown)



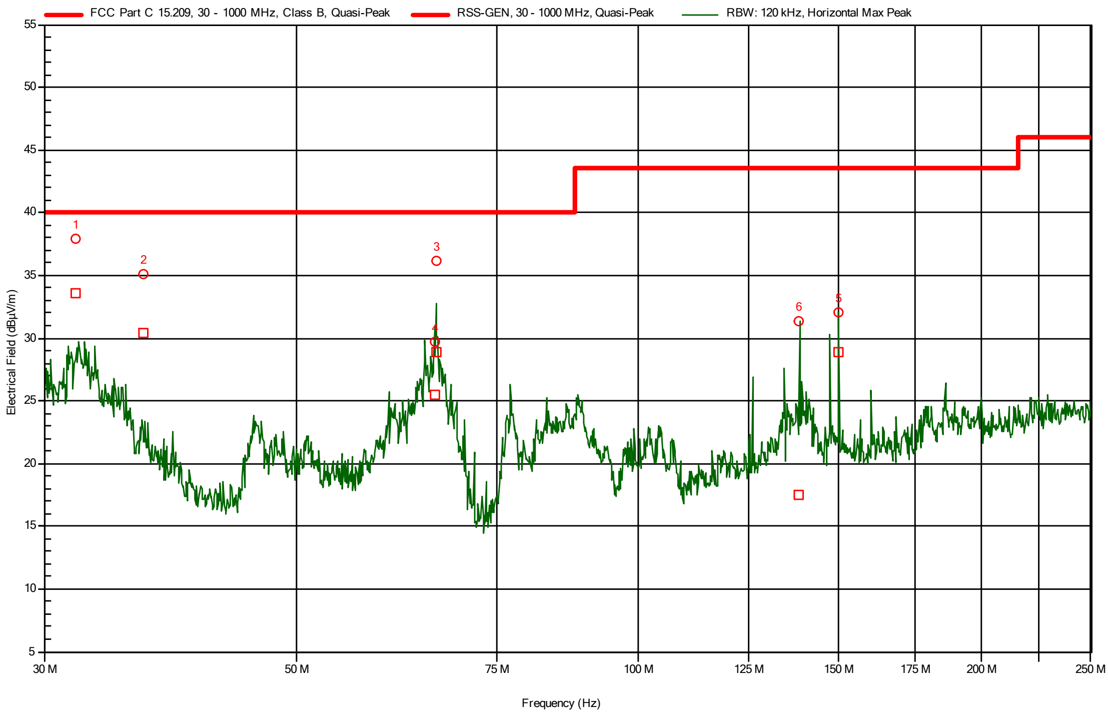
Plot 3a: radiated emissions of the EUT, Antenna vertical, in the range 30 – 250 MHz
(pre-scan peak values shown)
Low channel



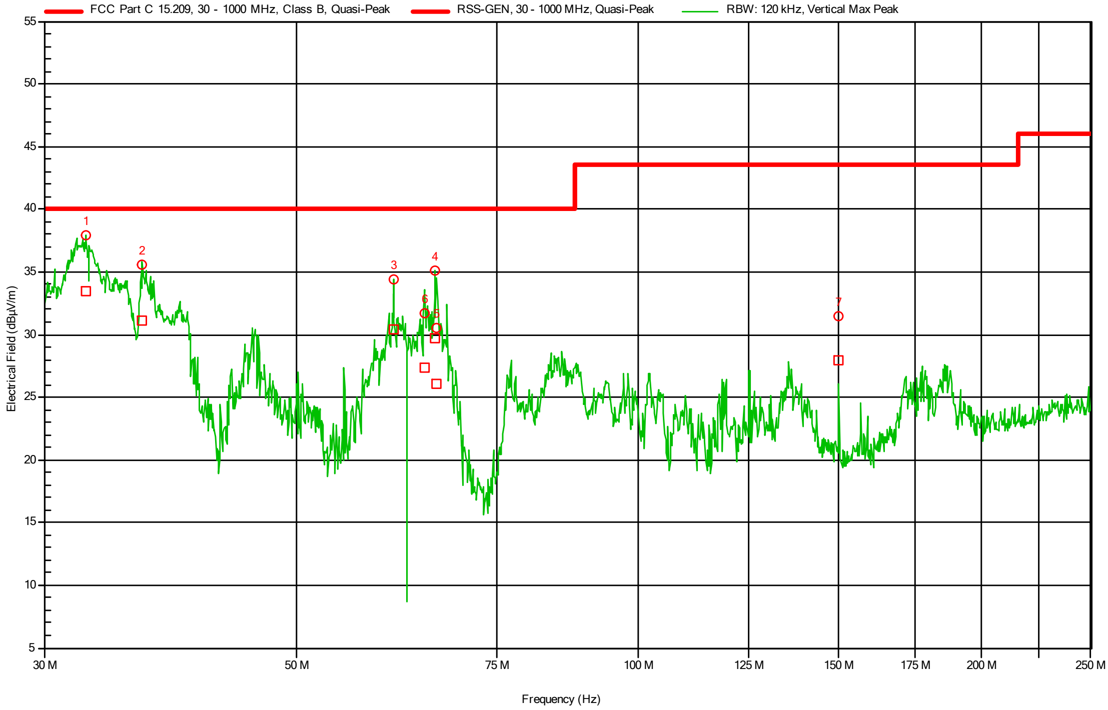
Plot 3b: radiated emissions of the EUT, Antenna horizontal, in the range 30 – 250 MHz
(pre-scan peak values shown)
Low channel



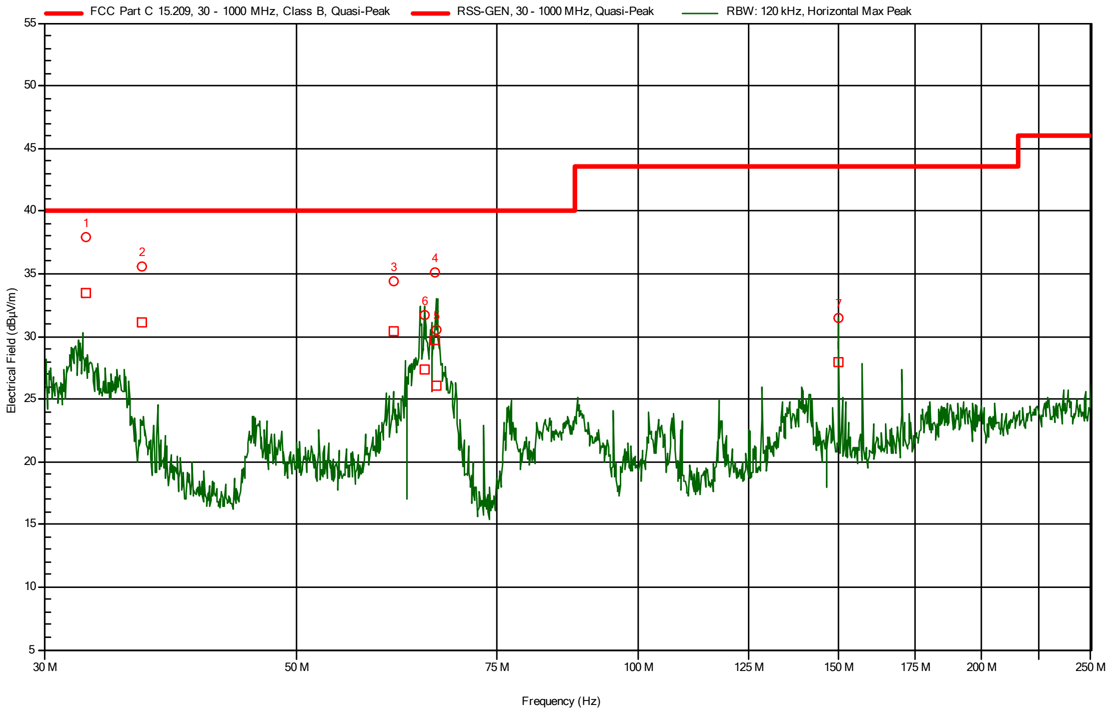
Plot 3c: radiated emissions of the EUT, Antenna vertical, in the range 30 – 250 MHz
(pre-scan peak values shown)
Middle channel



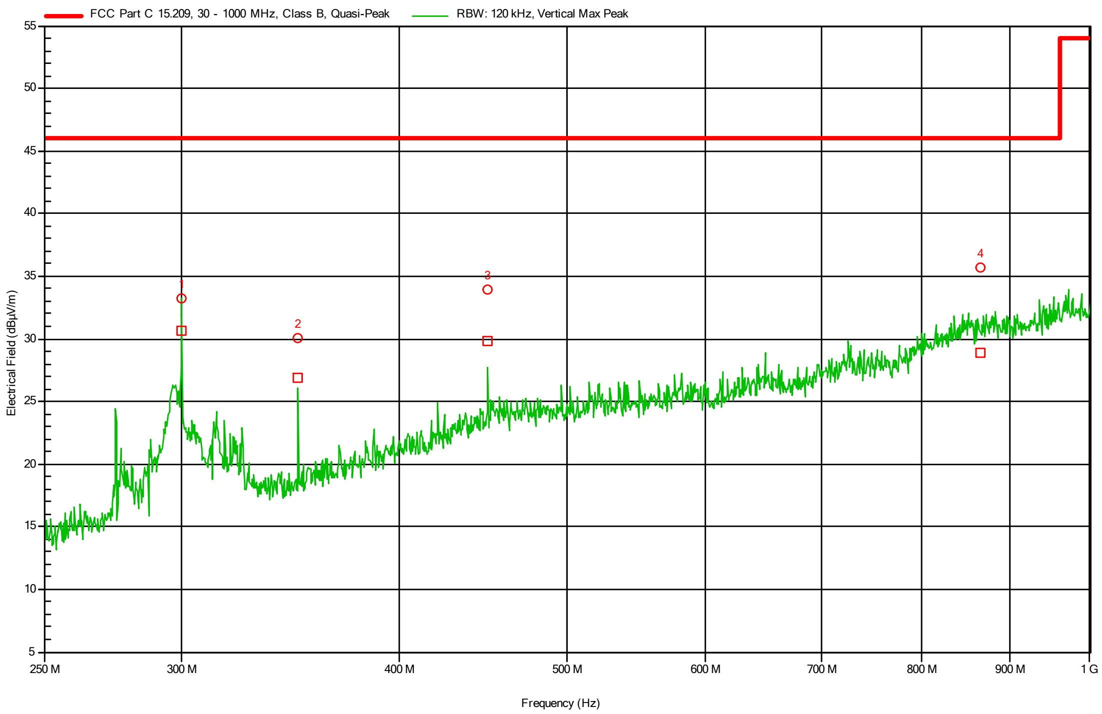
Plot 3d: radiated emissions of the EUT, Antenna horizontal, in the range 30 – 250 MHz
(pre-scan peak values shown)
Middle channel



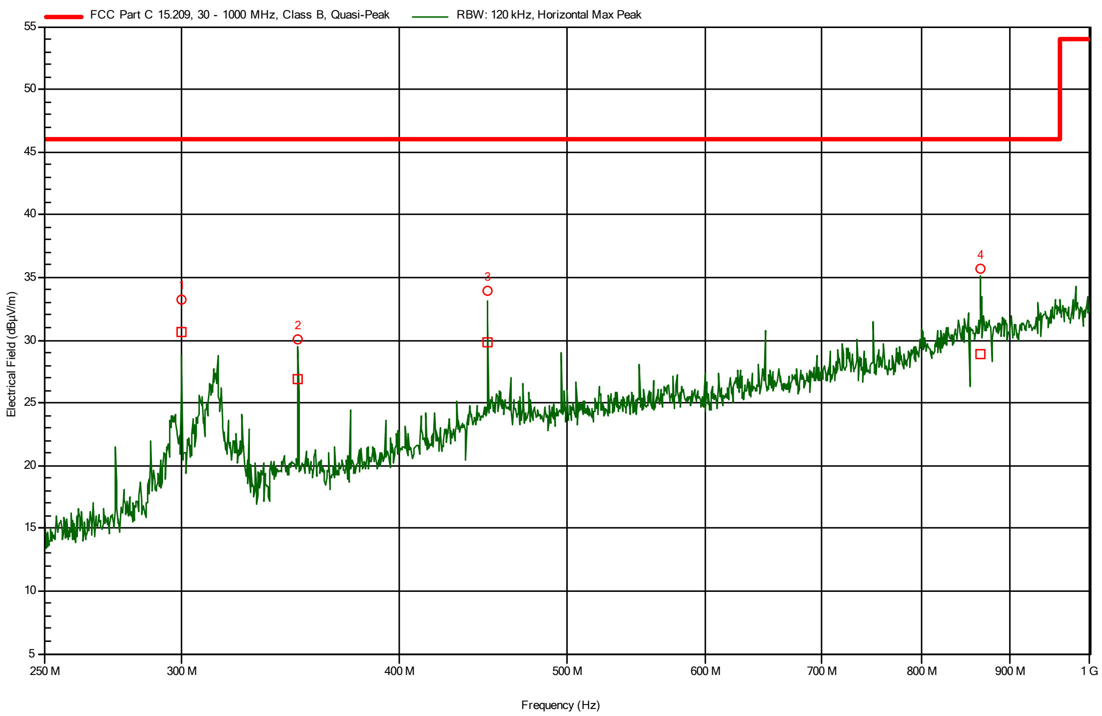
Plot 3e: radiated emissions of the EUT, Antenna vertical, in the range 30 – 250 MHz
(pre-scan peak values shown)
High channel



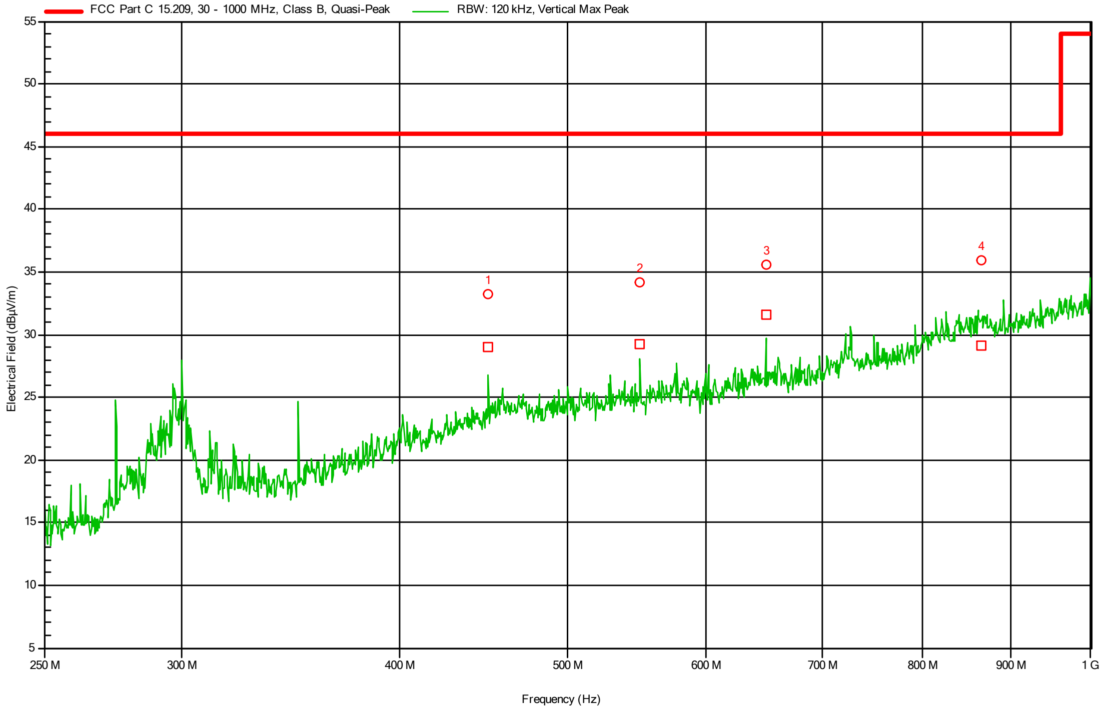
Plot 3f: radiated emissions of the EUT, Antenna horizontal, in the range 30 – 250 MHz
(pre-scan peak values shown)
High channel



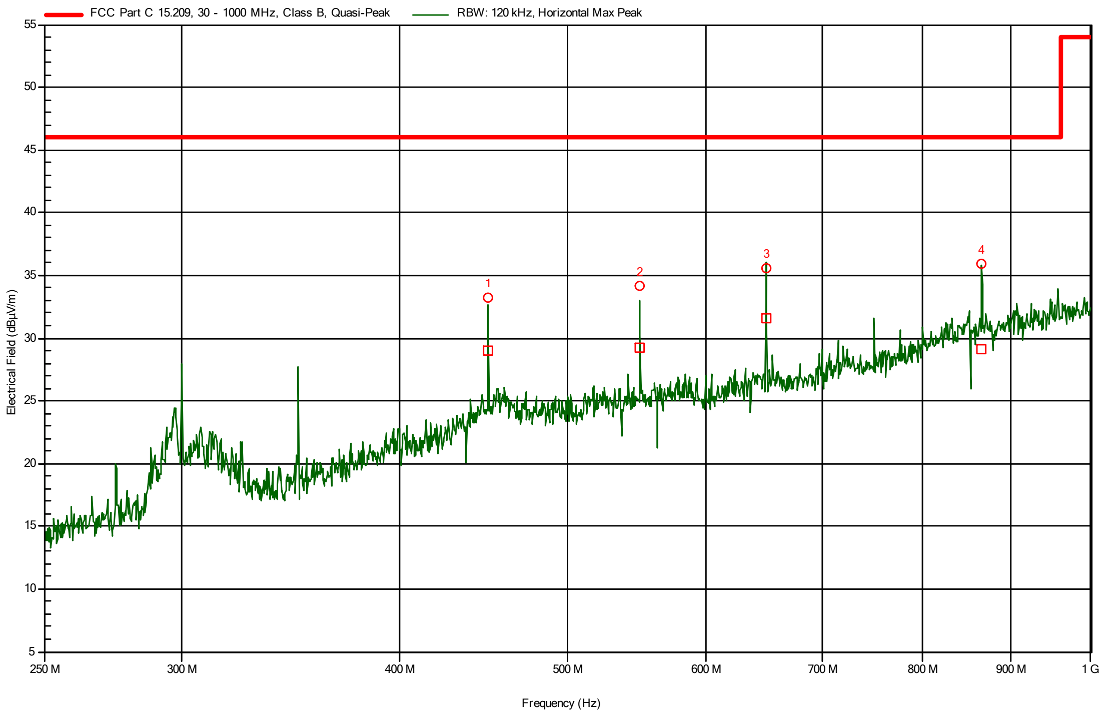
Plot 4a: radiated emissions of the EUT, Antenna vertical, in the range 250-1000 MHz
(pre-scan peak values shown)
Low channel



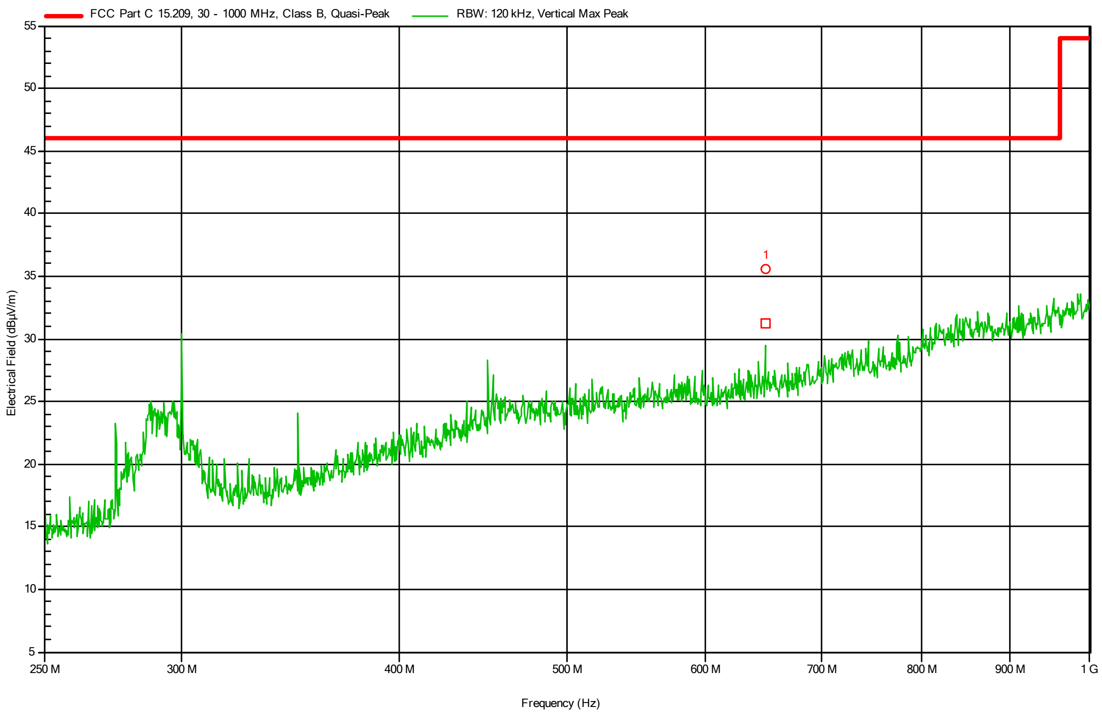
Plot 4b: radiated emissions of the EUT, Antenna horizontal, in the range 250-1000 MHz
(pre-scan peak values shown)
Low channel



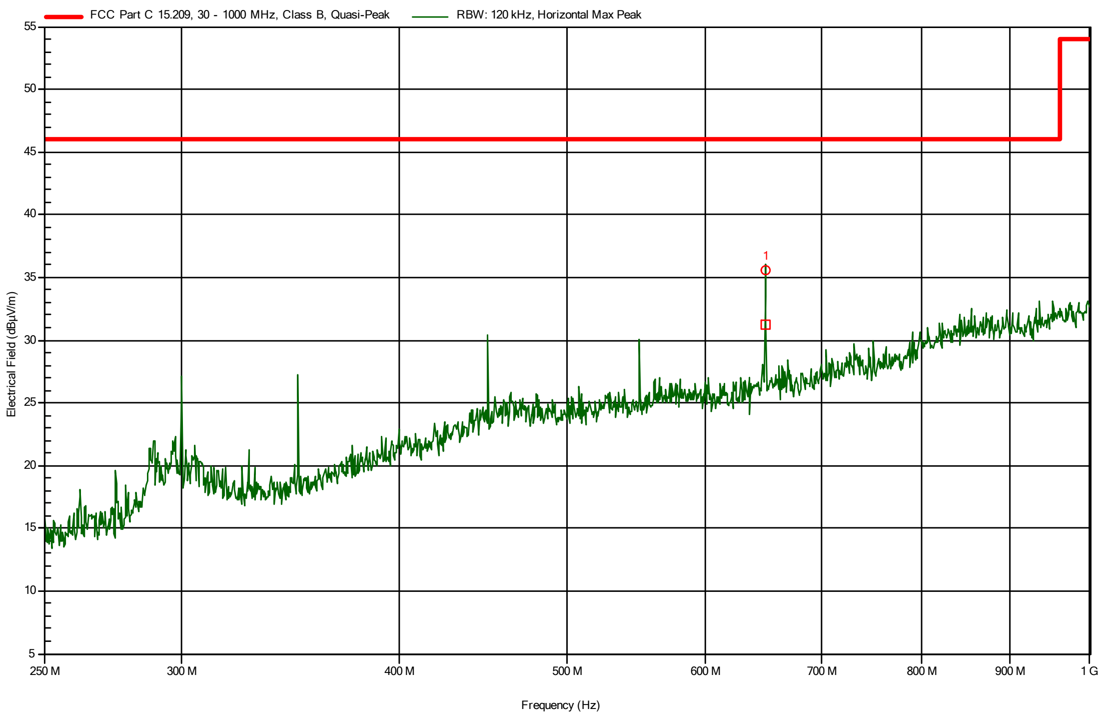
Plot 4c: radiated emissions of the EUT, Antenna vertical, in the range 250-1000 MHz
(pre-scan peak values shown)
Middle channel



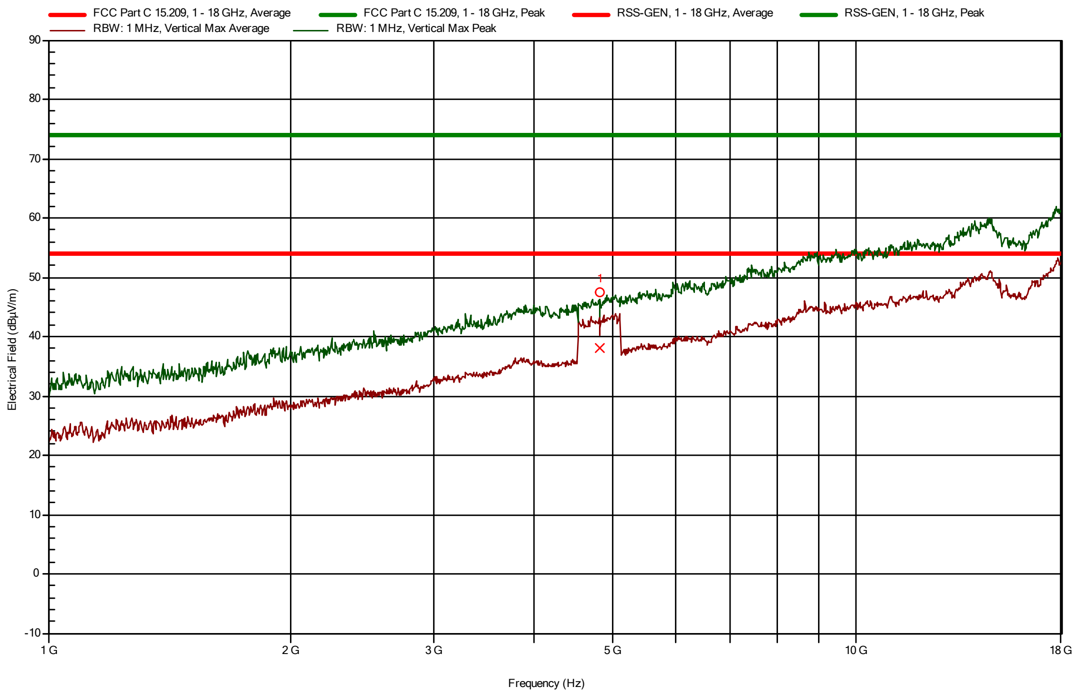
Plot 4d: radiated emissions of the EUT, Antenna horizontal, in the range 250-1000 MHz
(pre-scan peak values shown)
Middle channel



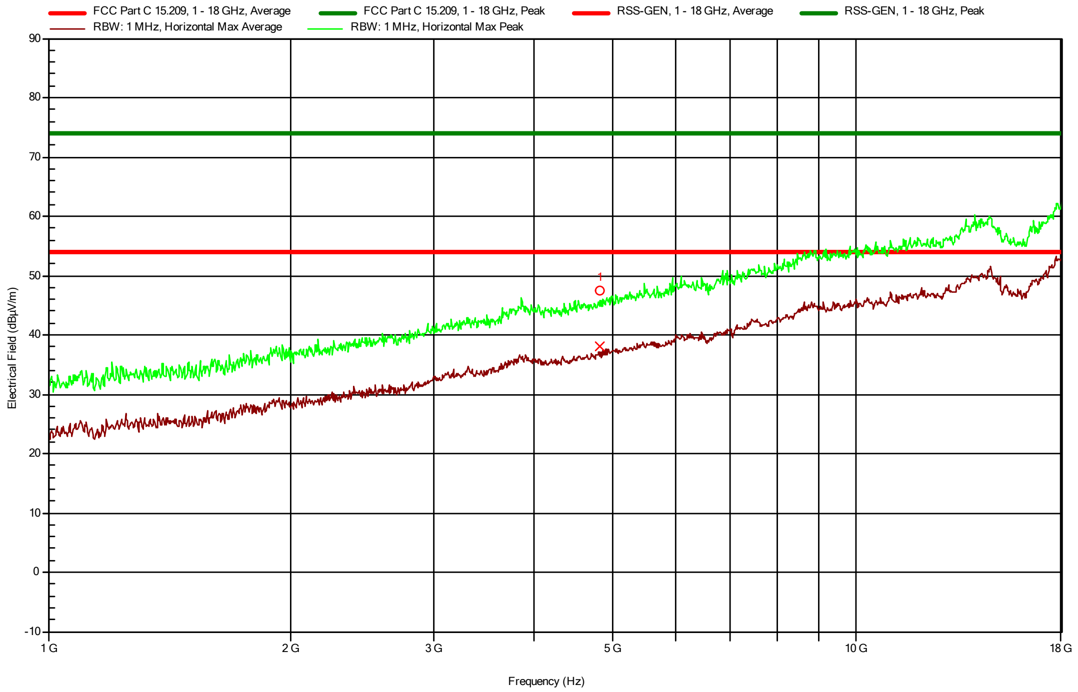
Plot 4e: radiated emissions of the EUT, Antenna vertical, in the range 250-1000 MHz
(pre-scan peak values shown)
High channel



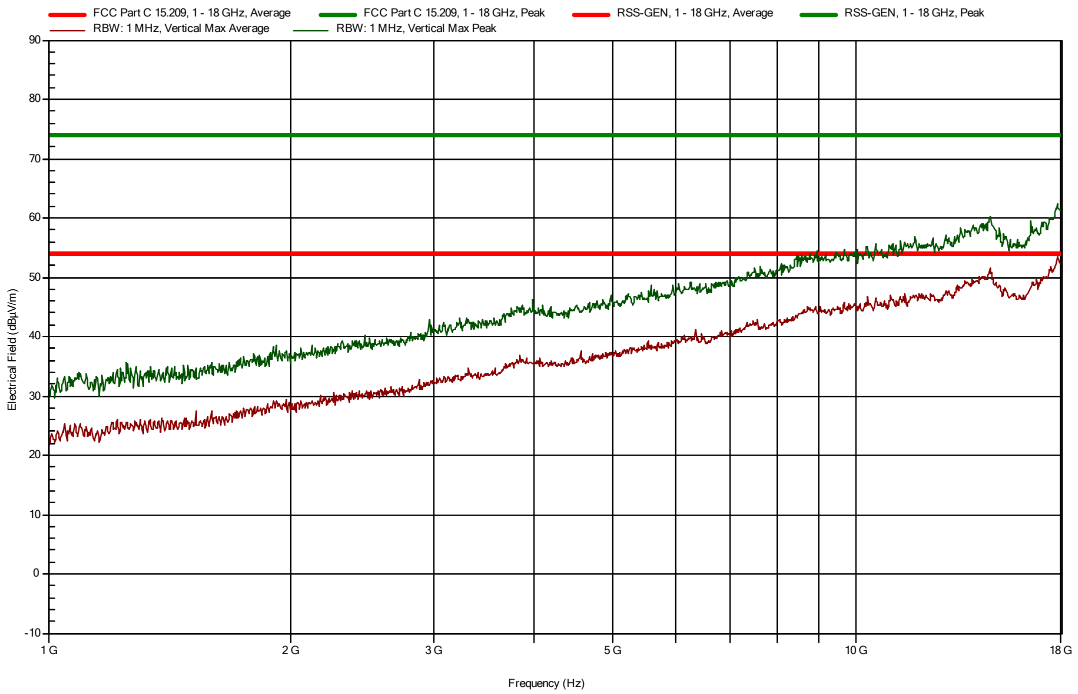
Plot 4f: radiated emissions of the EUT, Antenna horizontal, in the range 250-1000 MHz
(pre-scan peak values shown)
High channel



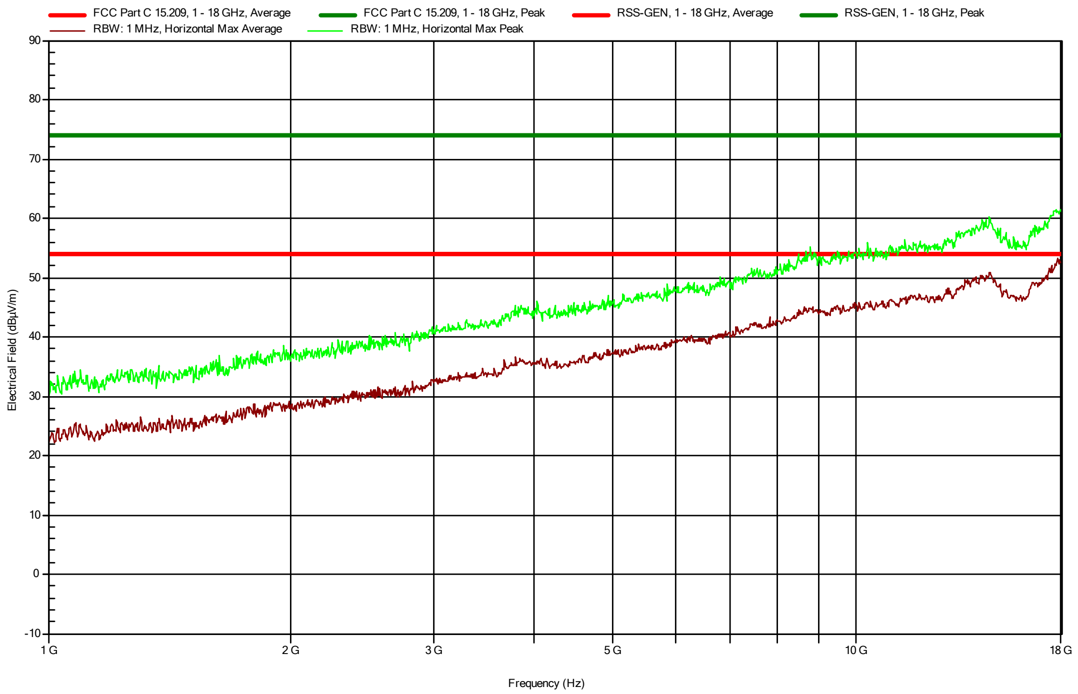
Plot 5a: radiated emissions of the EUT, Antenna vertical, in the range 1 – 18 GHz
(peak and average values shown)
Low channel



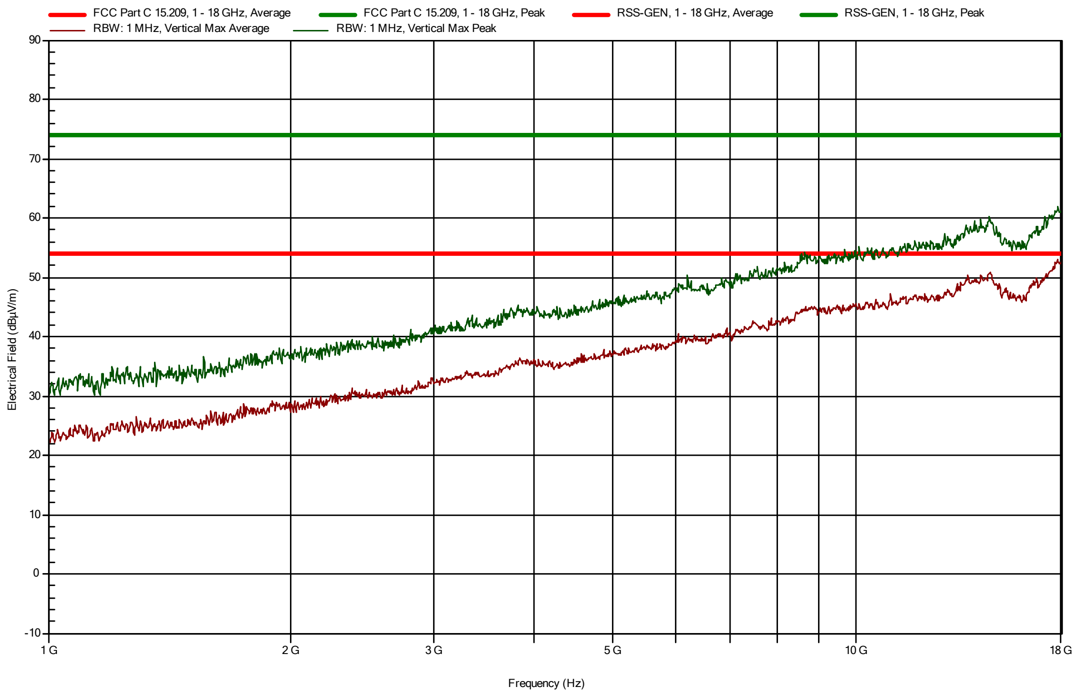
Plot 5b: radiated emissions of the EUT, Antenna horizontal, in the range 1 – 18 GHz
(peak and average values shown)
Low channel



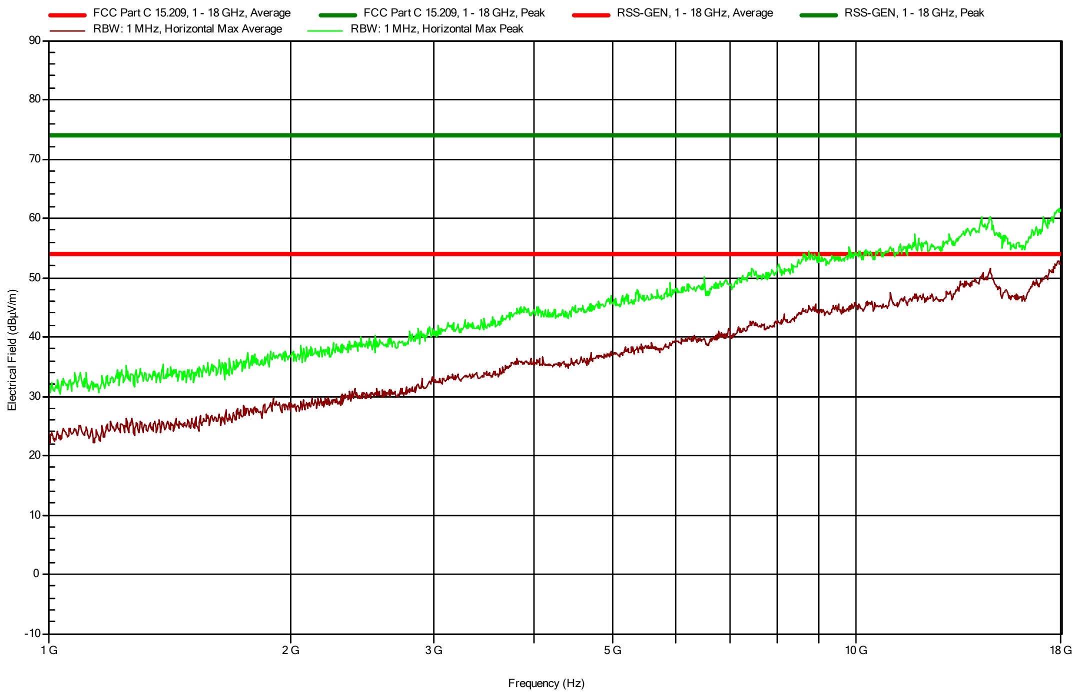
Plot 5c: radiated emissions of the EUT, Antenna vertical, in the range 1 – 18 GHz
(peak and average values shown)
Middle channel



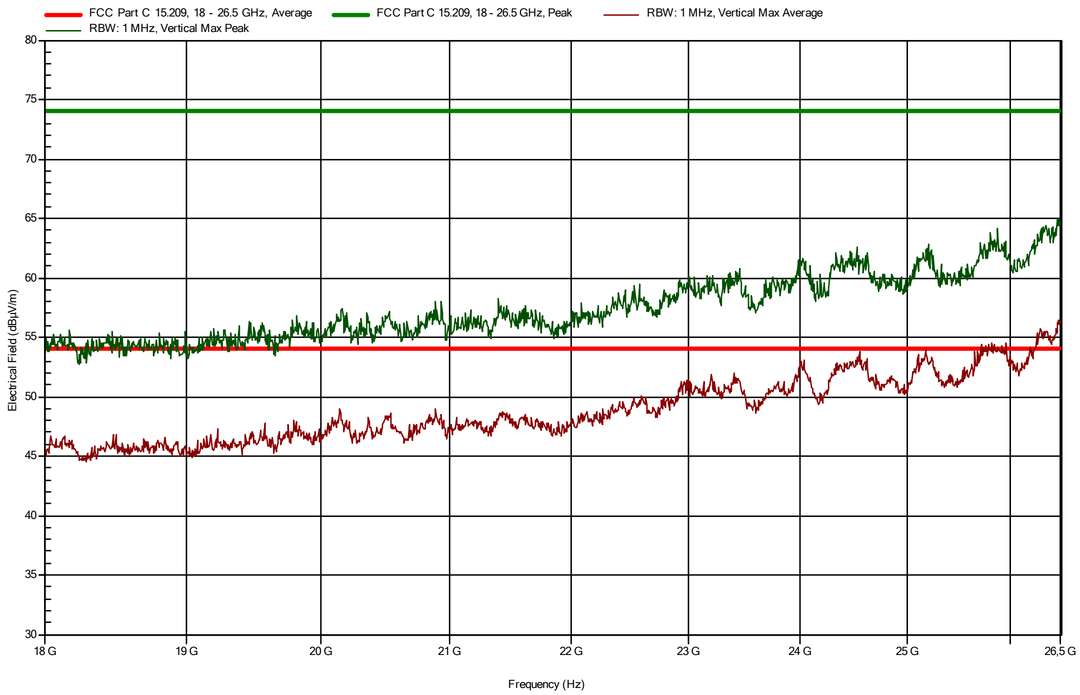
Plot 5d: radiated emissions of the EUT, Antenna horizontal, in the range 1 – 18 GHz
(peak and average values shown)
Middle channel



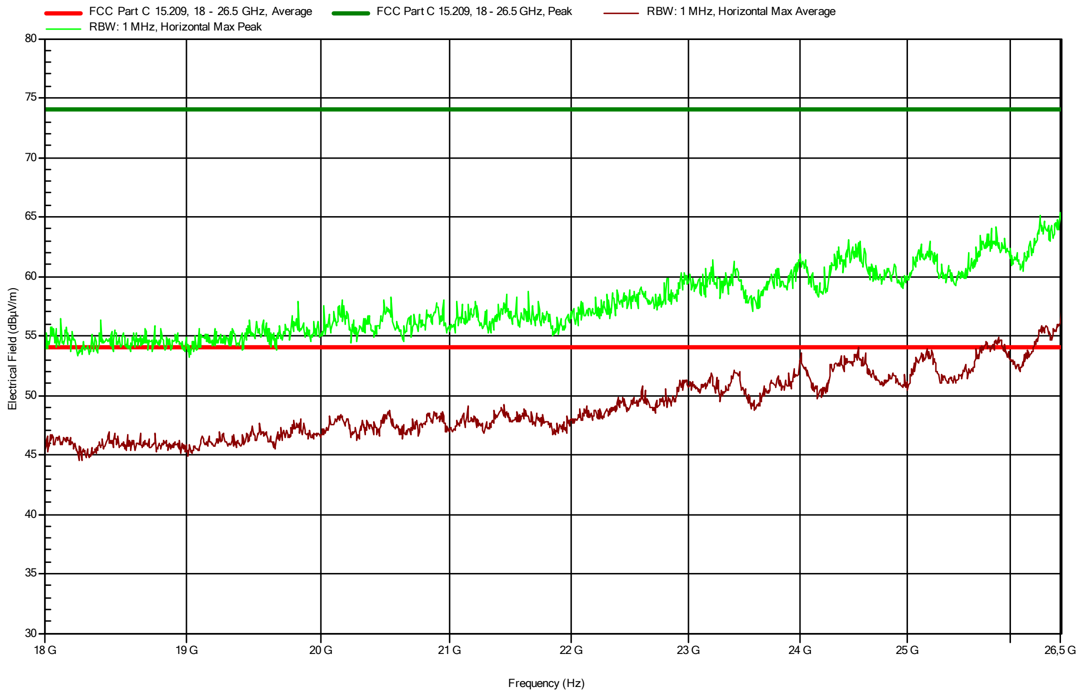
Plot 5e: radiated emissions of the EUT, Antenna vertical, in the range 1 – 18 GHz
(peak and average values shown)
High channel



Plot 5f: radiated emissions of the EUT, Antenna horizontal, in the range 1 – 18 GHz
(peak and average values shown)
High channel

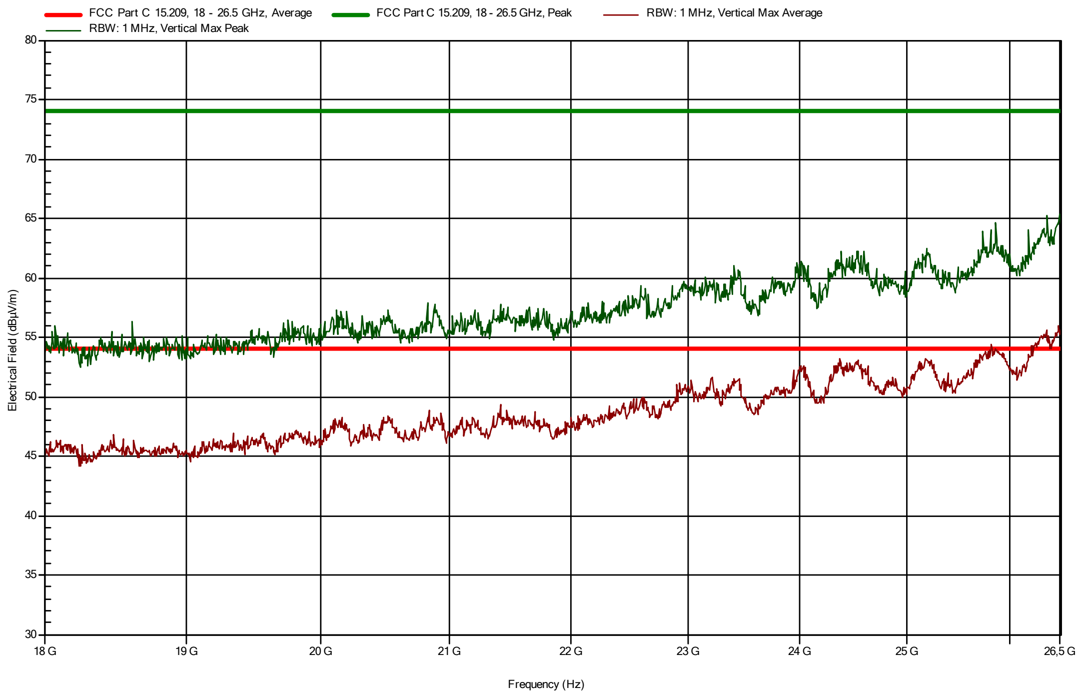


Plot 6a: radiated emissions of the EUT, Antenna vertical, in the range 18 – 26 GHz
(peak and average values shown)
Low channel

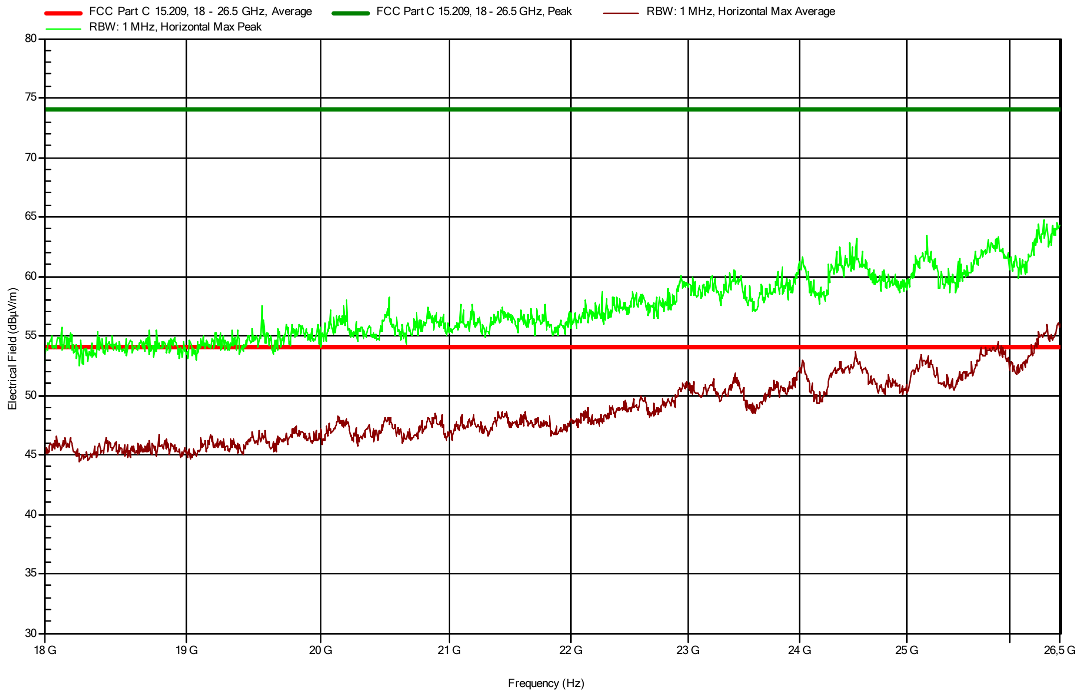


Plot 6b: radiated emissions of the EUT, Antenna horizontal, in the range 18 – 26GHz
(peak and average values shown)
Low channel

Note: The average graph exceeds the limit at certain frequencies >24 GHz. This is the noise floor of the measurement setup. Measurement plots with 100 kHz Resolution Bandwidth on page 35 show that there are no spurious emissions in this frequency range.

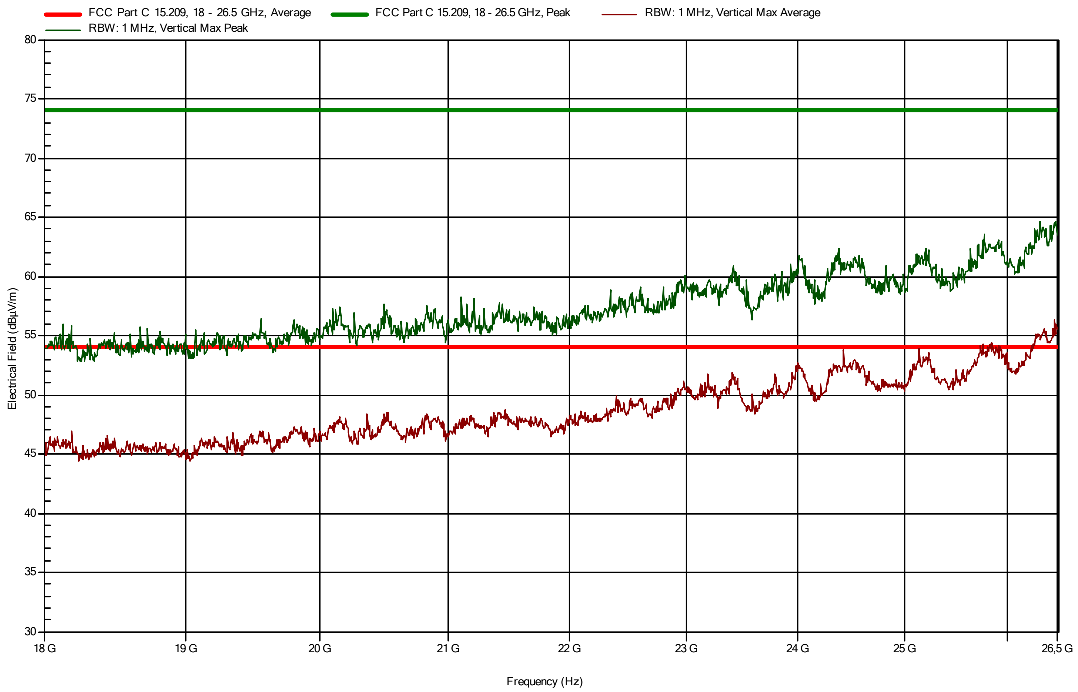


Plot 6c: radiated emissions of the EUT, Antenna vertical, in the range 18 – 26GHz
(peak and average values shown)
Middle channel

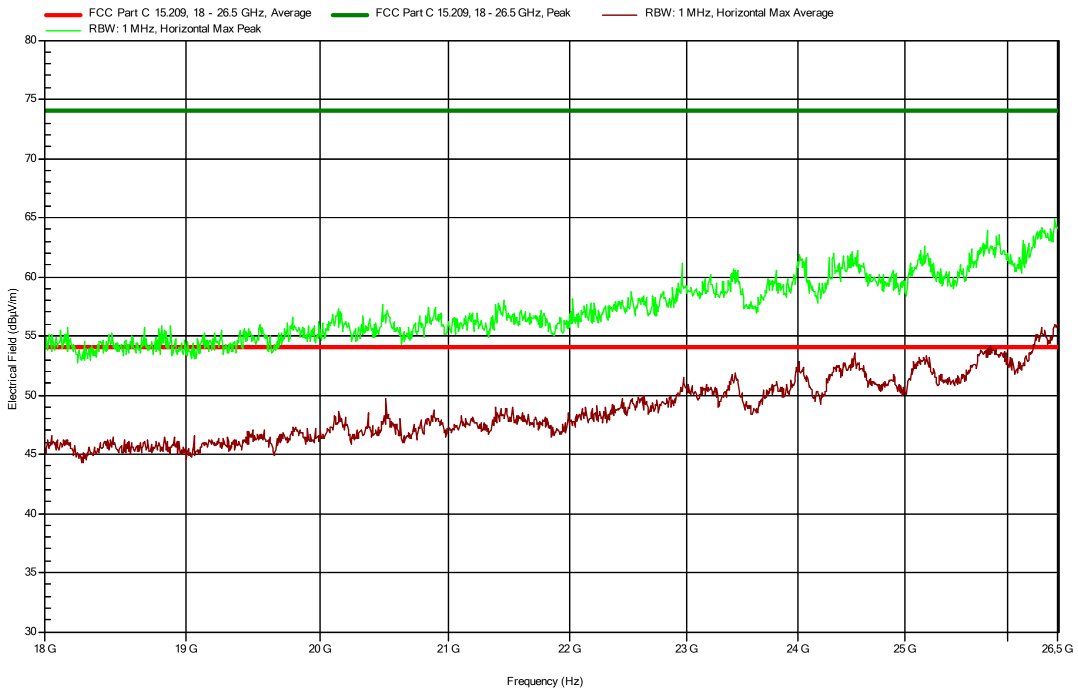


Plot 6d: radiated emissions of the EUT, Antenna horizontal, in the range 18 – 26GHz
(peak and average values shown)
Middle channel

Note: The average graph exceeds the limit at certain frequencies >24 GHz. This is the noise floor of the measurement setup. Measurement plots with 100 kHz Resolution Bandwidth on page 35 show that there are no spurious emissions in this frequency range.

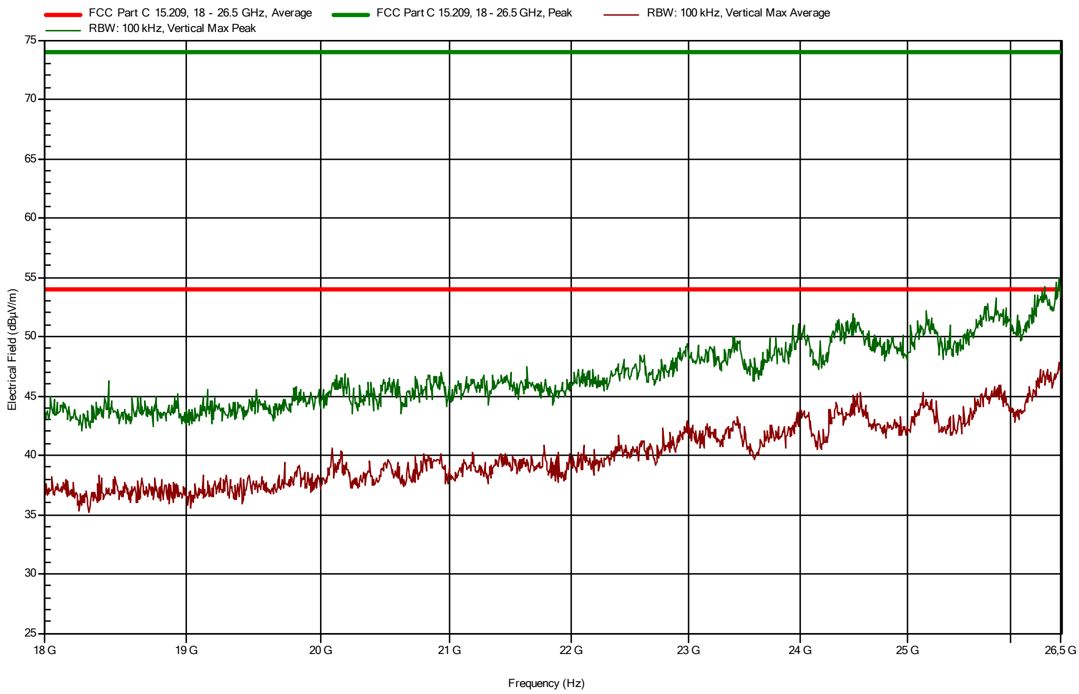


Plot 6e: radiated emissions of the EUT, Antenna vertical, in the range 18 – 26GHz
(peak and average values shown)
High channel

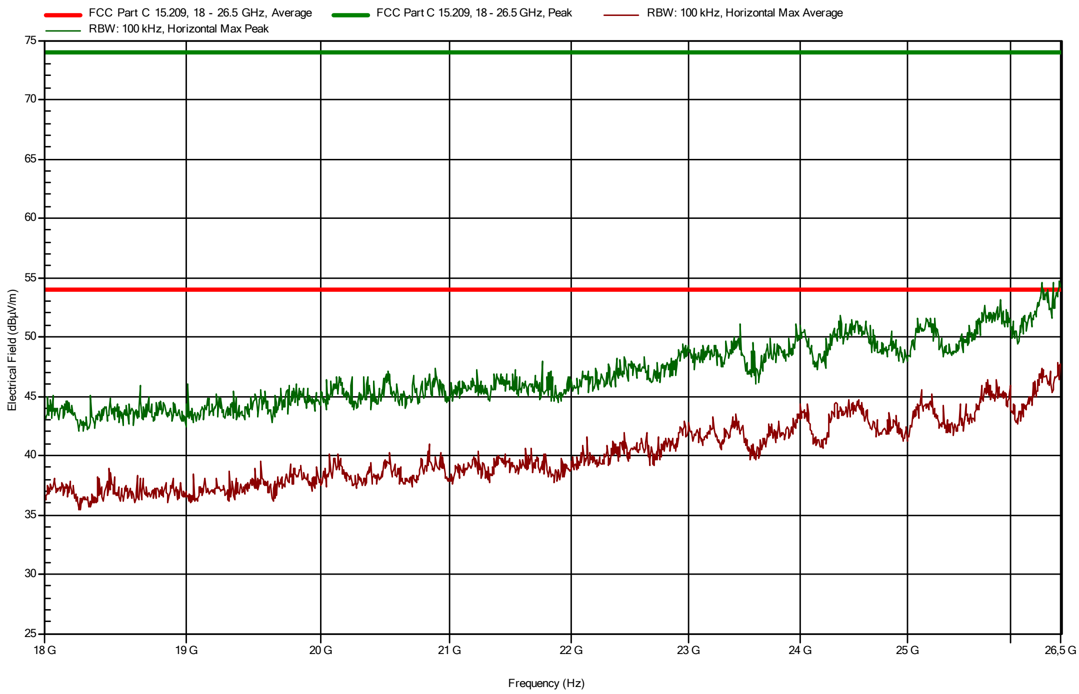


Plot 6f: radiated emissions of the EUT, Antenna horizontal, in the range 18 – 26 GHz
(peak and average values shown)
High channel

Note: The average graph exceeds the limit at certain frequencies >24 GHz. This is the noise floor of the measurement setup. Measurement plots with 100 kHz Resolution Bandwidth on page 35 show that there are no spurious emissions in this frequency range.



Plot 6g: radiated emissions of the EUT, Antenna vertical, in the range 18 – 26GHz
(peak and average values shown)



Plot 6h: radiated emissions of the EUT, Antenna horizontal, in the range 18 – 26GHz
(peak and average values shown)

Note: above plots have been measured with 100 kHz RBW to show there are spurious emissions in the frequency range >24 GHz.

3.2 Output Power Measurement

3.2.1 Limit

FCC: For systems using digital modulation in the 2400-2483.5 MHz, the limit for the peak output power is 1W (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.

RSS: For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4W

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

The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02.
IRN 402 - RF power (W) - Method 2

3.2.5 Test results of Output Power Measurement

Peak method

Technology Std.	Channel	Frequency (MHz)	Data rate	Peak output power conducted (dBm)	Peak output power conducted (W)	Peak output power EIRP (W)
802.11b	1	2412	1 Mbps	4.2	2.6	0.0042
	6	2437	1 Mbps	7.8	6.0	0.0095
	11	2462	1 Mbps	8.8	7.6	0.0120
Uncertainty	±0.71 dB					

3.3 AC Power-line conducted emissions

3.3.1 Limit

According to 15.207 (a), (c)

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN).

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.

Since the FCC and RSS limits are exactly the same, the plots only show FCC limits.

Frequency (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56[1]	56 to 46[1]
0.5 – 5	56	46
5 – 30	60	50

Note 1: The level decreases linearly with the logarithm of the frequency.

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

According to ANSI C63.10-2020 Section 6.2
IRN 439 – Method 1

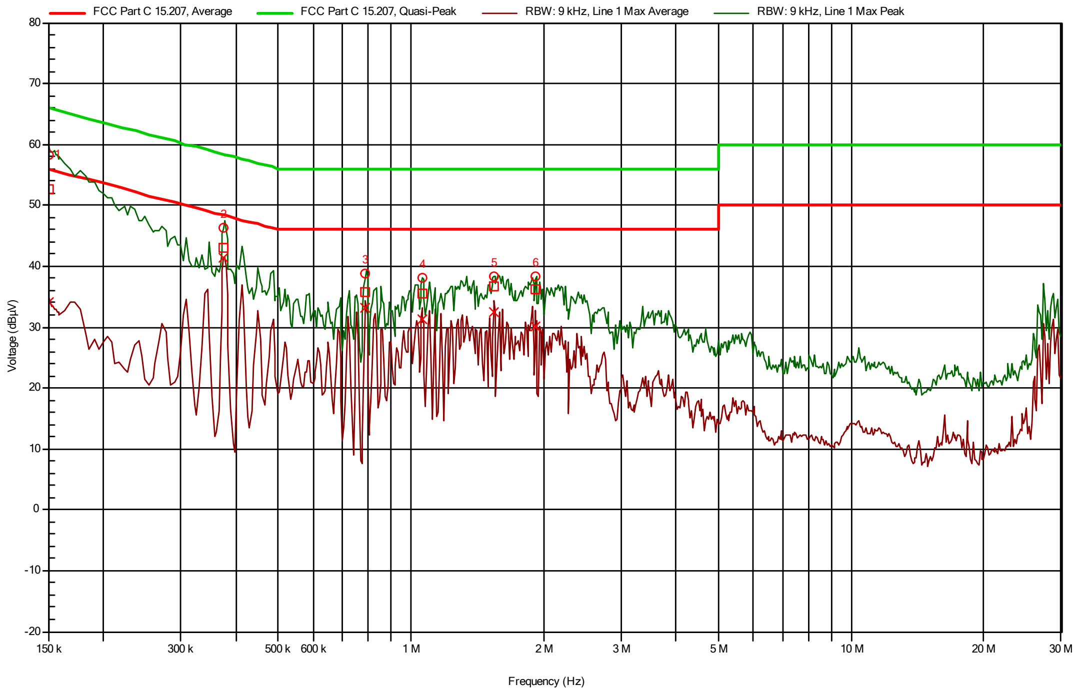
3.3.5 Measurement uncertainty

+/- 3.6 dB

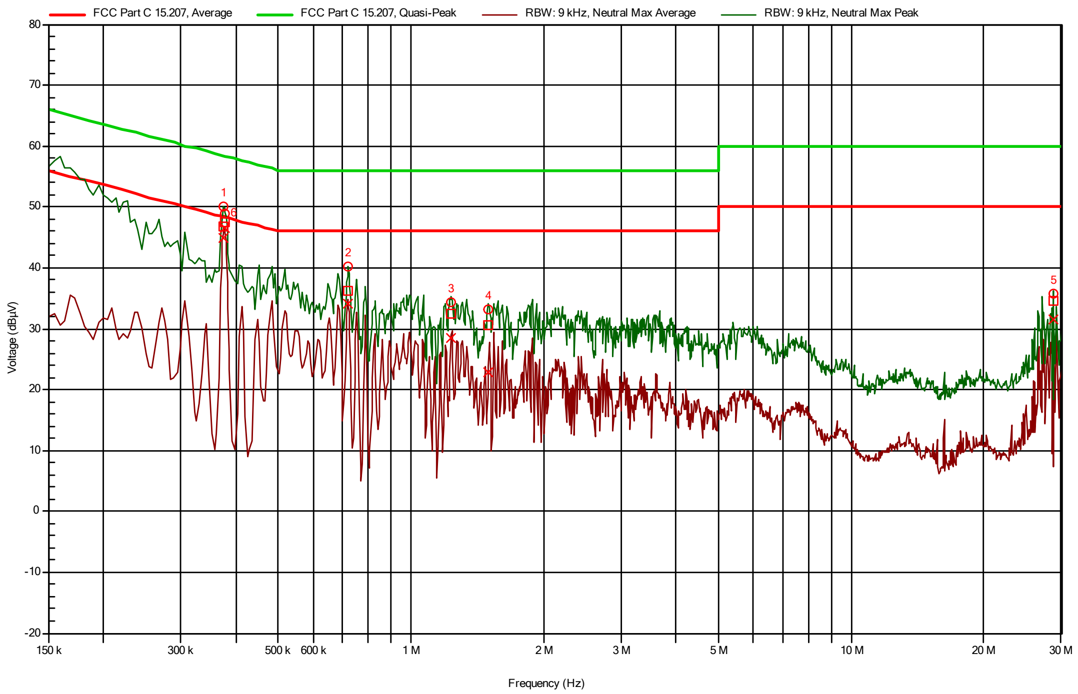
3.3.6 AC Power Line Conducted emission data of the EUT, results

Frequency	Average	Average Limit	Quasi-Peak	Quasi-Peak Limit	LISN	Status
374,1 kHz	44,8 dBµV	48,4 dBµV	46,8 dBµV	58,4 dBµV	Neutral	Pass
719,25 kHz	34 dBµV	46 dBµV	36,1 dBµV	56 dBµV	Neutral	Pass
1,237 MHz	28,4 dBµV	46 dBµV	32,4 dBµV	56 dBµV	Neutral	Pass
1,5 MHz	22,7 dBµV	46 dBµV	30,6 dBµV	56 dBµV	Neutral	Pass
28,685 MHz	31,6 dBµV	50 dBµV	34,5 dBµV	60 dBµV	Neutral	Pass
376,8 kHz	46,5 dBµV	48,3 dBµV	47,5 dBµV	58,3 dBµV	Neutral	Pass
150 kHz	34,1 dBµV	56 dBµV	52,5 dBµV	66 dBµV	Line 1	Pass
376,35 kHz	41,4 dBµV	48,4 dBµV	43 dBµV	58,4 dBµV	Line 1	Pass
789,9 kHz	33,2 dBµV	46 dBµV	35,7 dBµV	56 dBµV	Line 1	Pass
1,063 MHz	31,2 dBµV	46 dBµV	35,4 dBµV	56 dBµV	Line 1	Pass
1,54 MHz	32,5 dBµV	46 dBµV	36,8 dBµV	56 dBµV	Line 1	Pass
1,923 MHz	30 dBµV	46 dBµV	36,1 dBµV	56 dBµV	Line 1	Pass

3.3.7 Plots of the AC mains conducted spurious measurement



Pre-scan plot with peak detector of the AC Power-line Conducted emissions on **Phase**



Pre-scan plot with peak detector of the AC Power-line Conducted emissions on **Neutral**

4 Sample calculations

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

Conducted emission Measurement:

U_{lisn} (dBµV) = U (dBµV) + Corr. (dB)

Where:
U = Measuring receiver voltage
LISN insertion loss = Voltage division factor of LISN
Corr. = sum of single correction factors of used LISN, cables and pulse limiter.
Linear interpolation will be used for frequencies in between the values in the table.

Frequency (MHz)	**Voltage division LISN (db)**	**Cable loss (dB)**	**Corr. (dB)**
	114379 SN: 230000813 Rohde & Schwarz ENV 216	**TE 11134**	
0,15	9.7	0.02	9.72
0,2	9.68	0.03	9.71
0,3	9.68	0.03	9.71
0,5	9.69	0.08	9.77
0,7	9.69	0.25	9.94
0,8	9.69	0.25	9.94
1	9.68	0.11	9.79
2	9.7	0.15	9.85
3	9.71	0.21	9.92
5	9.72	0.21	9.93
7	9.76	0.25	10.01
8	9.77	0.25	10.02
10	9.77	0.29	10.06
15	9.84	0.34	10.18
20	9.88	0.37	10.25
25	9.97	0.43	10.4
30	10.08	0.45	10.53

Magnetic field strength measurement:

$$H\left[dB\left(\mu\frac{A}{m}\right)\right] = V[dB(\mu V)] + L_c[dB] + AF^H[\frac{dB}{\Omega m}]$$

Where:
H is the magnetic field strength (to be compared to the limit)
V is the voltage level measured by the receiver or spectrum analyzer
L_C is the cable loss
AF^H is the magnetic antenna factor

Frequency (MHz)	**AF**	**300m to 3m and 30m to 3m correction**	**CL (dB)**	**Corr. (dB)**
	114515 EMCO 6505 S/N:9112-2710		**SAR cable**	
0.009	18.49	104.956	0.7	-85.8
0.01	17.64	104.041	0.05	-86.4
0.02	13.23	98.02	0.07	-84.7
0.03	11.65	94.498	0.1	-82.7
0.04	10.97	91.999	0.1	-80.9
0.1	10.14	84.041	0.1	-73.8
0.2	10.01	78.02	0.1	-67.9
0.5	9.95	50.061	0.1	-40
1	9.91	44.041	0.2	-33.9
3	9.93	34.498	0.2	-24.4
5	9.93	30.061	0.3	-19.8
10	9.75	24.041	0.6	-13.7
15	9.29	20.519	0.9	-10.3
20	8.57	18.02	1	-8.5
25	7.55	16.082	0.7	-7.8
27	7.01	15.413	1.2	-7.2
30	6.03	14.498	1	-7.5

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: 107818 EMCO 3109	Cable loss (dB) Id: 114928	Attenuator ID:114525 Hewlett Packet	Corr. (dB)
30	13.5	1.8	6	21.3
100	9.2	2.7	6	17.9
150	12.6	3.2	6	21.8
200	13.6	3.6	6	23.2
250	15.2	4.3	6	25.5

Frequency (MHz)	AF (dB/m) ID: 114385 EMCO LPDA	Cable loss (dB) Id: 114928	Corr. (dB)
250	11.8	4.3	16.1
300	13	5.1	18.1
350	14.2	5.8	20.0
400	15.6	7.3	22.9
450	17.1	7.9	25.0
500	17.3	8.0	25.3
550	17.7	8.0	25.7
600	18.4	7.7	26.1
650	19.2	7.5	26.7
700	19.7	7.7	27.4
750	20.3	7.9	28.2
800	21.4	8.2	29.6
850	22.0	8.7	30.7
900	22.1	8.9	31.0
950	22.6	9.2	31.8
1000	22.5	9.6	32.1

Frequency (MHz)	AF (dB/m) **114607 Emco 3115 SN: 9412-4377**	Gain (dB) **114690 µComp Nordic MCNA-40-0010800-25-10P**	Cable loss (dB) **114691**	Corr. (dB)
1000	23.6	45.1	2.1	-19.4
2000	27.1	44.7	3.3	-14.3
3000	30.5	44.2	4.2	-9.5
4000	32.7	43.5	4.9	-5.9
5000	33.2	43.1	5.6	-4.3
6000	34.6	43.0	6.3	-2.1
7000	35.2	42.9	6.4	-1.3
8000	37.0	43.3	7.2	0.9
9000	38.1	43.3	7.9	2.7
10000	38.2	43.0	8.2	3.4
11000	38.3	42.9	8.7	4.1
12000	39.1	42.6	9.0	5.5
13000	39.2	43.6	9.8	5.4
14000	41.1	44.3	9.7	6.5
15000	40.2	44.4	10.4	6.2
16000	37.5	44.3	10.8	4.0
17000	41.1	44.5	11.4	8.0
18000	44.0	44.9	11.4	10.5

Frequency (MHz)	AF (dB/m) **Kiwa ID: 114518 Flann 20240-25 SN: 163703**	Gain (dB) **Kiwa ID: Schwarzbeck BBV 9721**	Cable loss (dB) **114691**	Corr. (dB)
18000	31.3	34.5	11.4	8.2
19000	31.5	34.9	11.2	7.8
20000	31.7	34.1	11.6	9.2
21000	31.9	33.6	12.1	10.4
22000	32.1	33.6	12.4	10.9
23000	32.2	33.3	13.6	12.5
24000	32.3	32.3	13.5	13.5
25000	32.4	33.0	13.4	12.8
26000	32.5	32.9	13.7	13.3

Frequency (MHz)	AF (dB/m) **Kiwa ID: 114487 Scientific Atlanta**	Gain (dB) **Kiwa ID: Schwarzbeck BBV 9721**	Cable loss (dB) **114691**	Corr. (dB)
26000	35.3	32.9	13.7	16.1
27000	35.4	32.6	14.9	17.7
28000	35.6	32.6	14.4	17.4
29000	35.9	32.9	14.6	17.6
30000	36.2	32.7	15.2	18.7
31000	36.1	32.9	14.9	18.1
32000	36.0	33.8	16.7	18.9
33000	36.2	34.8	16.8	18.2
34000	36.3	35.5	15.9	16.7
35000	36.4	35.5	17.5	18.4
36000	36.5	34.6	17.9	19.8
37000	36.6	33.6	18.2	21.2
38000	36.8	32.5	17.7	22.0
39000	37.0	32.1	17.7	22.6
40000	37.2	29.9	19.0	26.3

<< END OF REPORT>>