

EMC TEST REPORT

FCC 47 CFR Part 15B
Industry Canada ICES-003

Electromagnetic compatibility - Unintentional radiators

Report Reference No. : G0M-1509-5067-EF0115B-V01

Testing Laboratory : Eurofins Product Service GmbH

Address : Storkower Str. 38c
15526 Reichenwalde
Germany

Accreditation :



A2LA Accredited Testing Laboratory, Certificate No.: 1983.01
FCC Filed Test Laboratory, Reg.-No.: 96970
IC OATS Filing assigned code: 3470A

Applicant's name : Kamstrup A/S

Address : Industrivej 28
8660 Skanderborg
DENMARK

Test specification:

Standard..... : 47 CFR Part 15 Subpart B
ICES-003, Issue 5:2012
ANSI C63.4:2014

Equipment under test (EUT):

Product description	READY Gateway for Siemens MAG8000 [Us]	
Model No.	READY Gateway	
Additional Models	None	
Hardware version	55501431 B8 + 5550 1429 D3 + 55501350 A6 (antenna)	
Firmware / Software version	50981200 B1 (fw) + 5514 1416 A1 Eeprom	
Contains	FCC-ID: OUY-READYGW1	IC: N/A
Test result	Passed	

Test Report No.: G0M-1509-5067-EF0115B-V01

Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Possible test case verdicts:

- not applicable to test object: N/A
- test object does meet the requirement.....: P (Pass)
- test object does not meet the requirement.....: F (Fail)

Testing:

Date of receipt of test item: 2015-10-22

Date (s) of performance of tests: 2015-10-22 to 2015-10-26

Compiled by: Yu Yu

Tested by (+ signature).....: Yu Yu / Andreas Pflug

Approved by (+ signature): Marcus Klein

Head of Lab

Date of issue: 2015-10-26

Total number of pages: 38



General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

Additional comments:

Version History

Version	Issue Date	Remarks	Revised by
V01	2015-10-26	Initial Release	

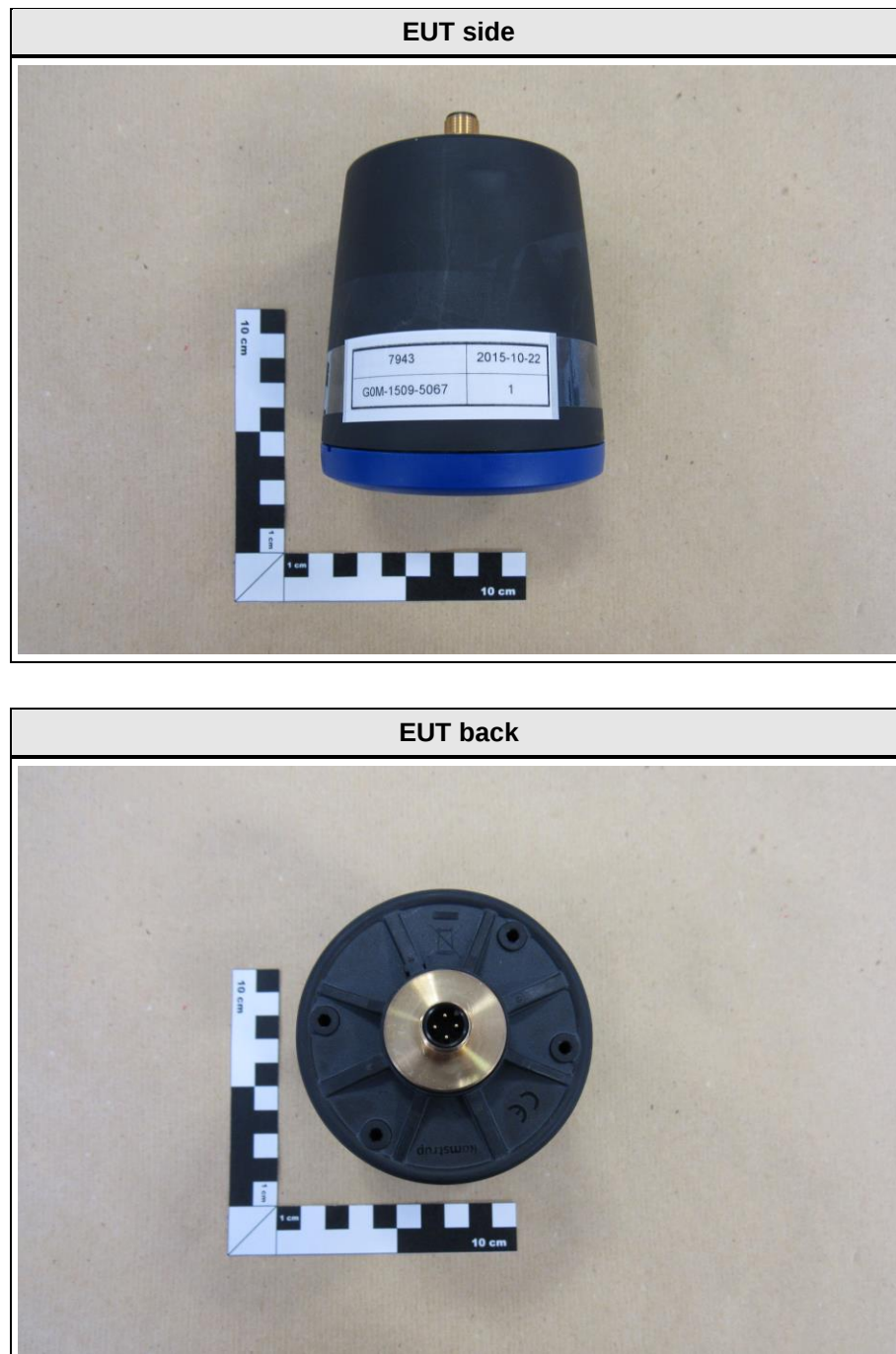
REPORT INDEX

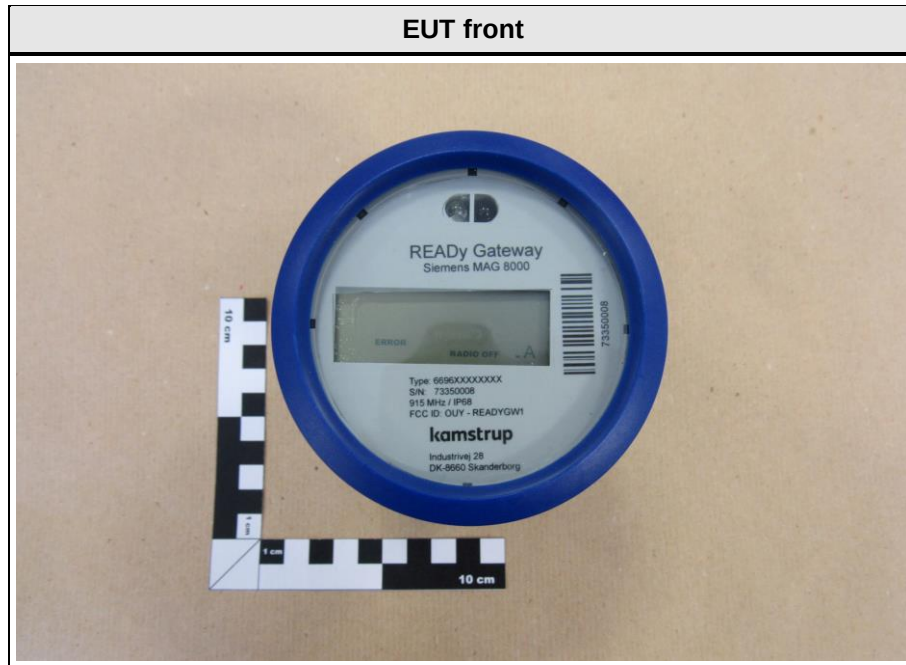
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1 Equipment (Test item) Description

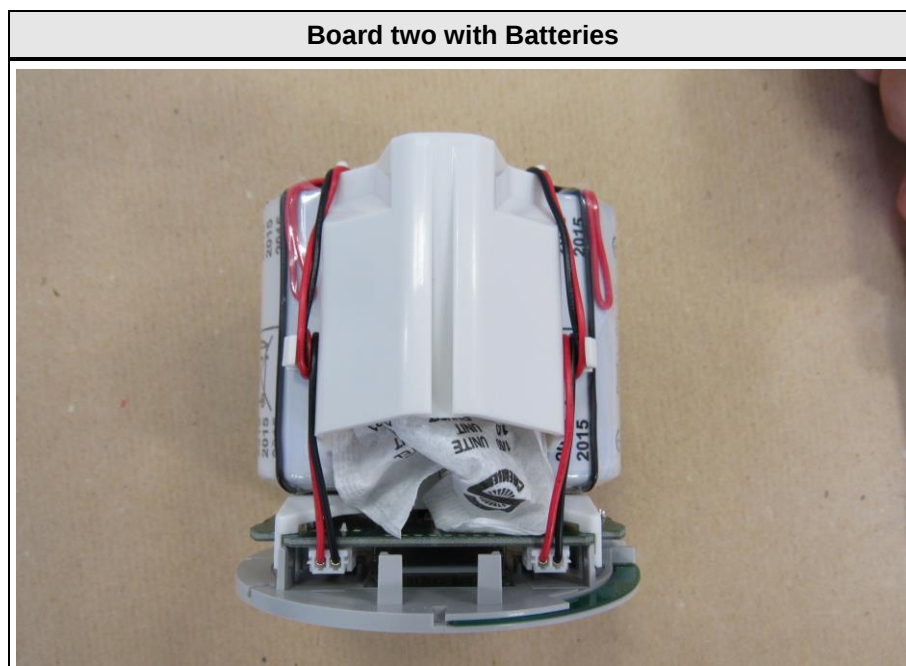
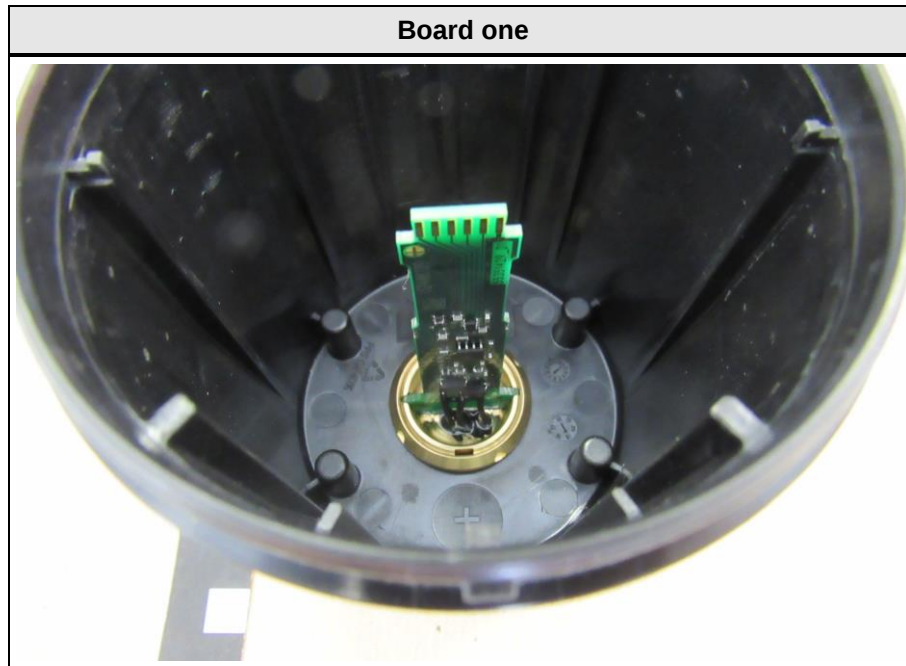
Description	READY Gateway for Siemens MAG8000 [Us]	
Model	READY Gateway	
Additional Models	None	
Serial number	73350008	
Hardware version	55501431 B8 + 5550 1429 D3 + 55501350 A6 (antenna)	
Software / Firmware version	50981200 B1 (fw) + 5514 1416 A1 Eeprom	
Contains FCC-ID	OUY-READYGW1	
Contains IC	N/A	
Power supply	3.6 VDC via Battery	
Radio module	Type	SRD Radio
	Frequency range	912.5 - 918.5 MHz
	Manufacturer	Kamstrup
Manufacturer	Kamstrup A/S Industrivej 28 8660 Skanderborg DENMARK	
Highest emission frequency	Fmax[MHz]=3674	
Device classification	Class B	
Equipment type	Tabletop	
Number of tested samples	1	

1.1 Photos – Equipment external

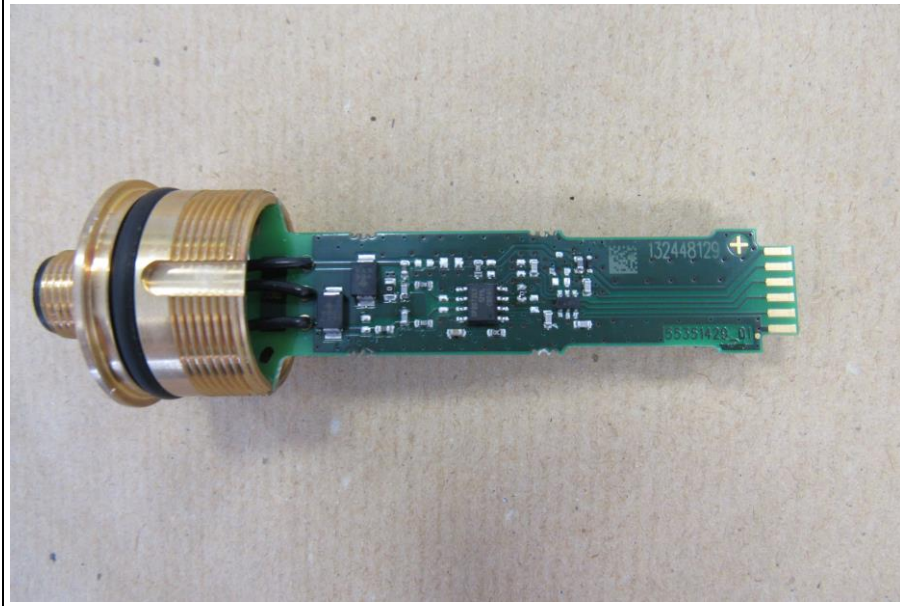




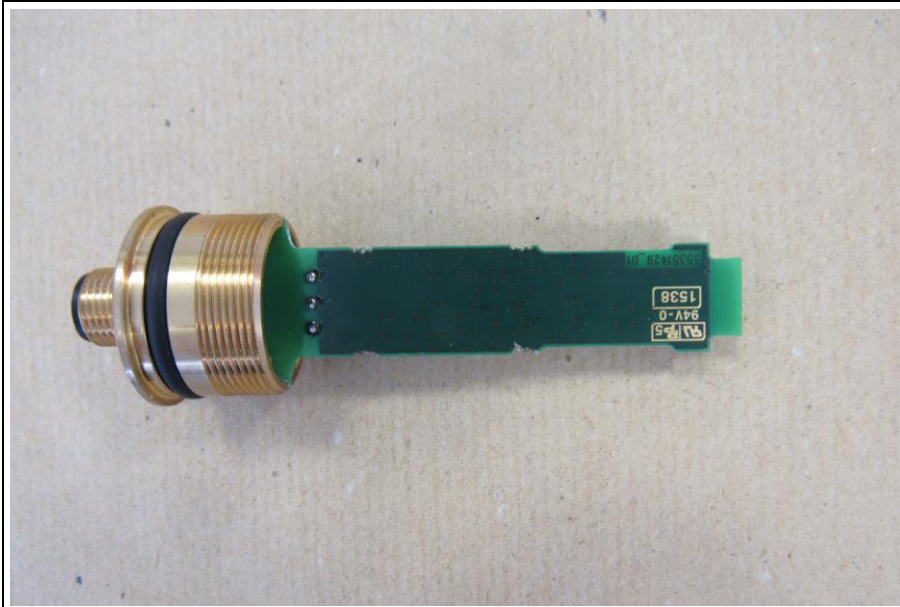
1.2 Photos – Equipment internal



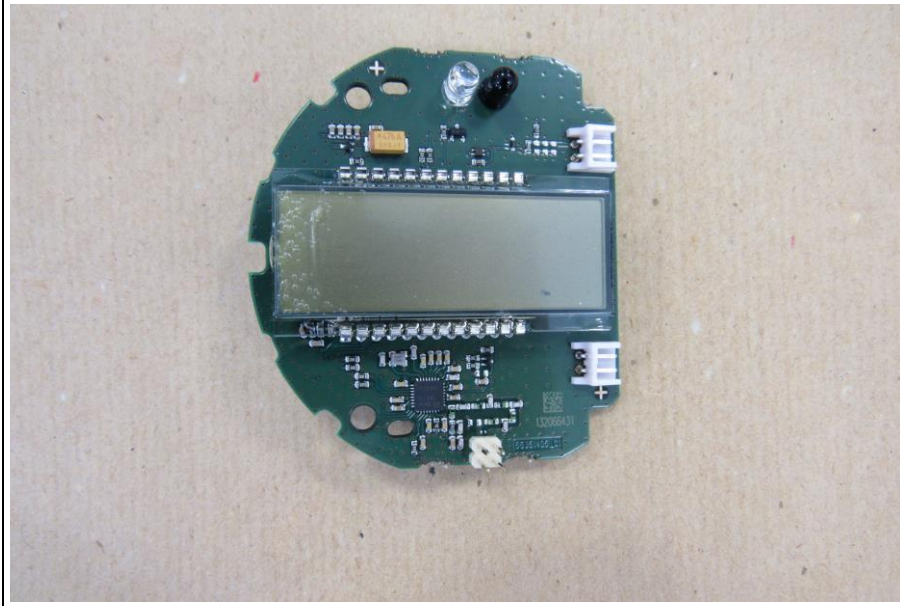
Board one front



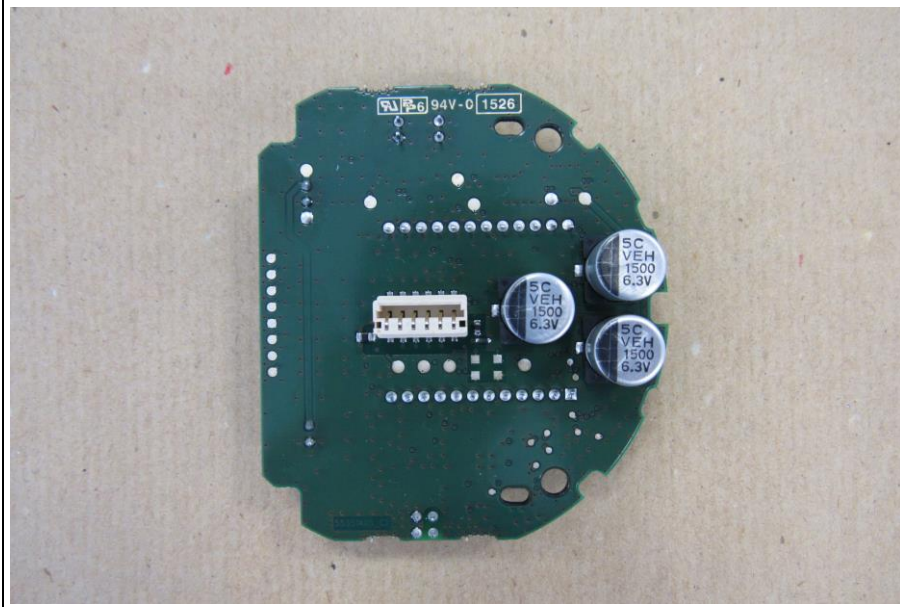
Board one back



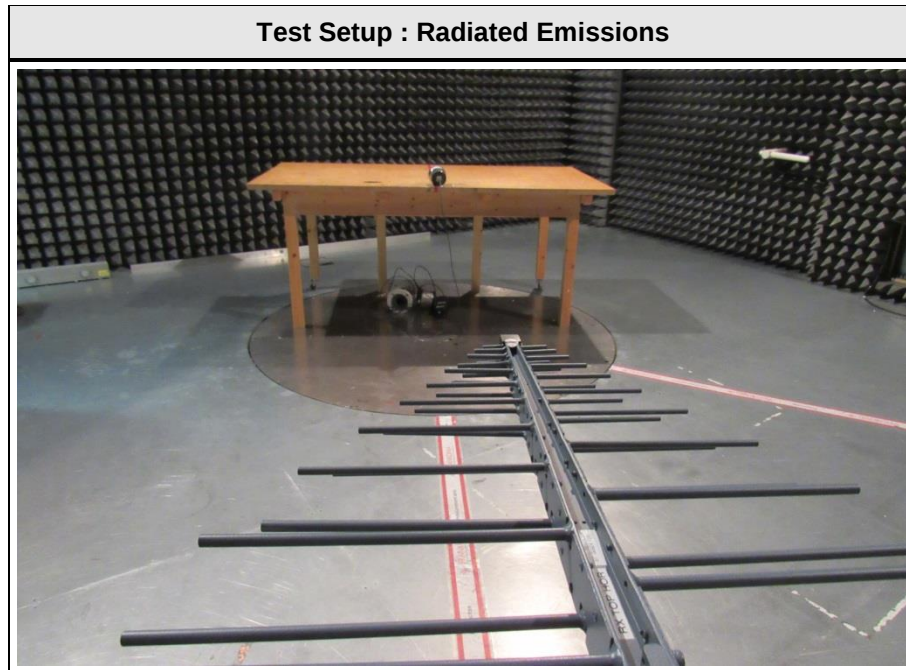
Board two front



Board two back



1.3 Photos – Test setup



1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
AE	Flow meter and Modbus modem	Siemens	MAG 8000	
*Note: Use the following abbreviations: AE : Auxiliary/Associated Equipment, or SIM : Simulator (Not Subjected to Test) CABL : Connecting cables				

1.5 Input / Output Ports

Port #	Name	Type*	Max. Cable Length	Cable Shielded	Comments
1	RS485	I/O	10m	yes	3 wires, on companion device only
*Note: Use the following abbreviations: AC : AC power port DC : DC power port N/E : Non electrical I/O : Signal input or output port TP : Telecommunication port					

1.6 Operating Modes and Configurations

Mode #	Description
1	RS485 data traffic
2	SRD transmission

Configuration #	EUT Configuration
1	Standard configuration with AE turned on for mode1
2	Standard configuration with AE turned off for mode 2

1.7 Test Equipment Used During Testing

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	2015.1.15

Radiated emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Biconical Antenna	R&S	HK 116	EF00012	2013-02	2016-02
LPD-Antenne	R&S	HL 223	EF00187	2014-03	2017-03
Horn antenna	Schwarzbeck	BBHA 9120D	EF00018	2013-09	2016-09
EMI Test Receiver	R&S	ESU26	EF00887	2015-01	2016-01

1.8 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dB μ V. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dB μ V/m). The FCC limits are given in units of μ V/m. The following formula is used to convert the units of μ V/m to dB μ V/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 * \log (\mu\text{V/m})$$

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

$$\begin{array}{rclclcl} \text{Reading} & + & \text{AF} & = & \text{Net Reading} & : & \text{Net reading - FCC limit} & = & \text{Margin} \\ 21.5 \text{ dB}\mu\text{V} & + & 26 \text{ dB} & = & 47.5 \text{ dB}\mu\text{V/m} & : & 47.5 \text{ dB}\mu\text{V/m} - 57.0 \text{ dB}\mu\text{V/m} & = & -9.5 \text{ dB} \end{array}$$

2 Result Summary

FCC 47 CFR Part 15B, Industry Canada ICES-003				
Product Specific Standard	Requirement – Test	Reference Method	Result	Remarks
47 CFR 15.109 ICES-003 Item 6.2	Radiated emissions	ANSI C 63.4	PASS	
Remarks:				

3 Test Conditions and Results

3.1 Test Conditions and Results – Radiated emissions

Radiated emissions acc. FCC 47 CFR 15.109 / ICES-003				Verdict: PASS		
Laboratory Parameters:		Required prior to the test		During the test		
Ambient Temperature		15 to 35 °C		23°C		
Relative Humidity		30 to 60 %		40%		
Test according referenced standards		Reference Method				
		ANSI C63.4				
Sample is tested with respect to the requirements of the equipment class		Equipment class				
		Class B				
Test frequency range determined from highest emission frequency		Highest emission frequency				
		3674 MHz				
Fully configured sample scanned over the following frequency range		Frequency range				
		30 MHz to 18.5 GHz				
Operating mode		1/2				
Configuration		1/2				
Limits and results Class B						
Frequency [MHz]	Quasi-Peak [dBµV/m]	Result	Average [dBµV/m]	Result	Peak [dBµV/m]	Result
30 – 88	40	PASS	-		-	-
88 – 216	43.5	PASS	-		-	-
216 – 960	46	PASS	-		-	-
960 – 1000	54	PASS	-		-	-
> 1000	-	-	54	PASS	74	PASS
Comments:						

Test Procedure:

The test site is in accordance with ANSI C63-4:2009 requirements and is listed by FCC.

The measurement procedure is as follows:

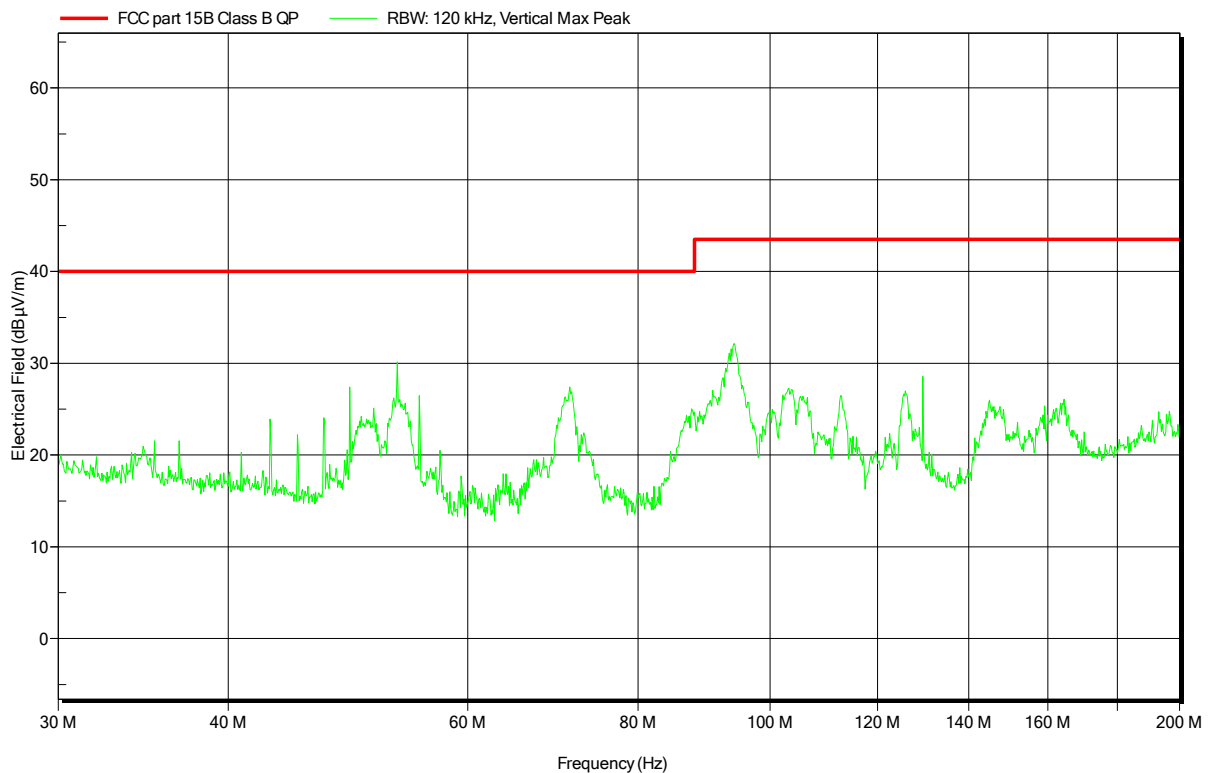
- 1) The EUT was placed on a 0.8 m non conductive table at a 3 m distance from the receive antenna (ANSI C63.4: 2009 item 6.2)
- 2) The antenna output was connected to the measurement receiver
- 3) A biconical antenna was used for the frequency range 30 – 200 MHz, a logarithmic periodical antenna was used for the frequency range from 200 – 1000 MHz. Above one 1 GHz a Double Ridged Broadband Horn antenna was used. The antenna was placed on an adjustable height antenna mast
- 4) Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded.

Spurious emissions under normal conditions according to FCC Part 15B

Project number: G0M-1509-5067

Applicant:	Kamstrup A/S
EUT Name:	READY Gateway for Siemens MAG8000[Us]
Model:	READY Gateway
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Yu
Test Conditions:	Tnom: 23°C, Unom: 3.6 VDC via Battery
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3m
Mode:	1
Test Date:	2015-10-22
Note:	

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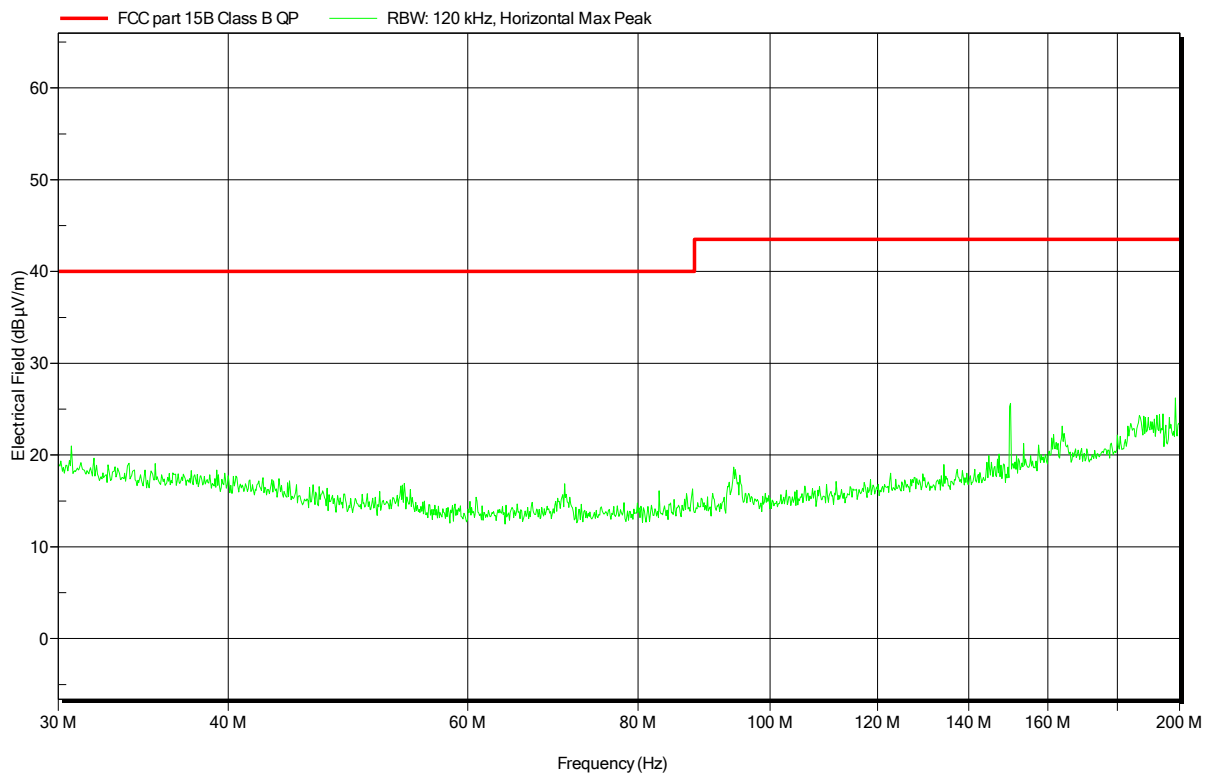


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Operator:	Mr. Yu
Test Conditions:	Tnom: 23°C, Unom: 3.6 VDC via Battery
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3m
Mode:	1
Test Date:	2015-10-22
Note:	

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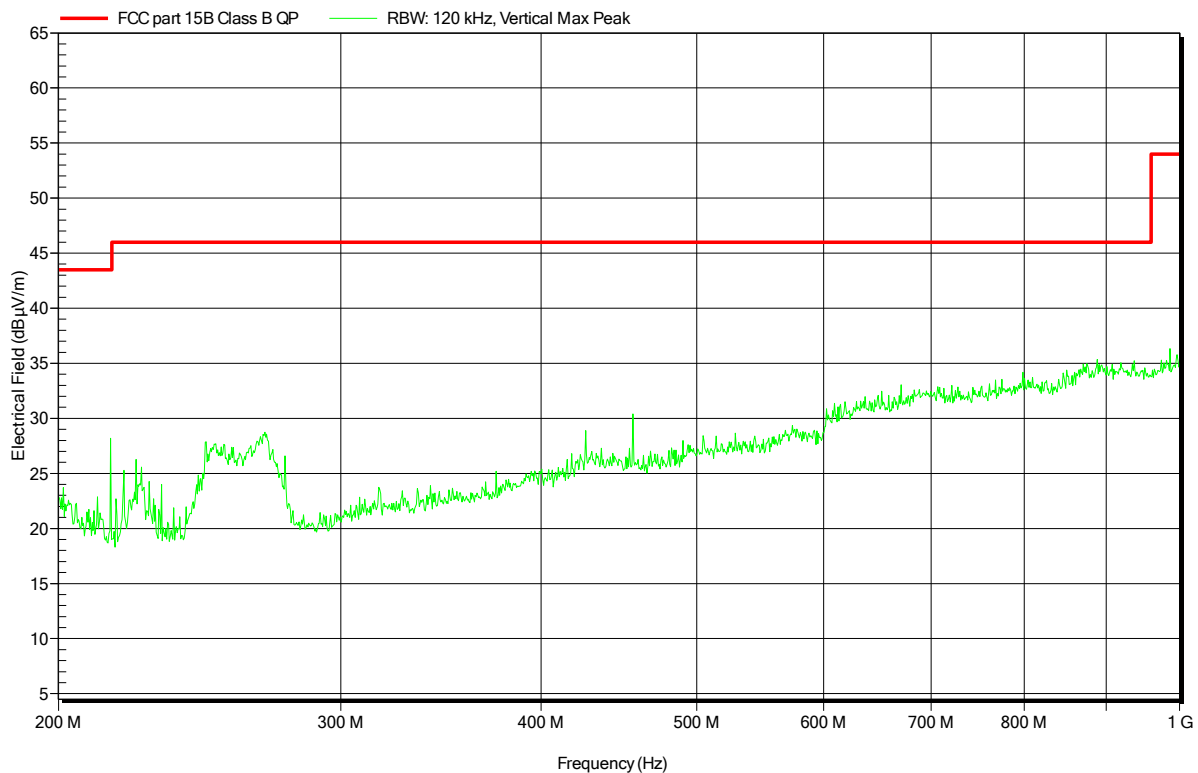
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

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Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3m
Mode:	1
Test Date:	2015-10-22
Note:	

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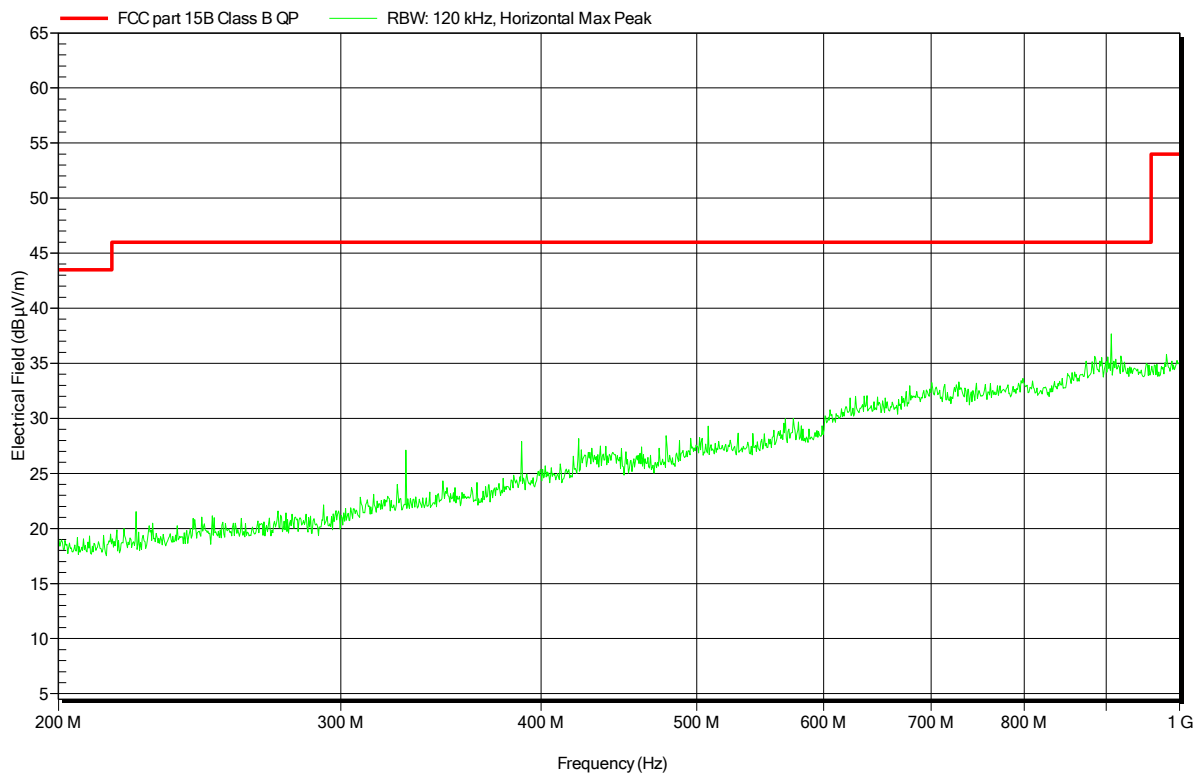


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Mode:	1
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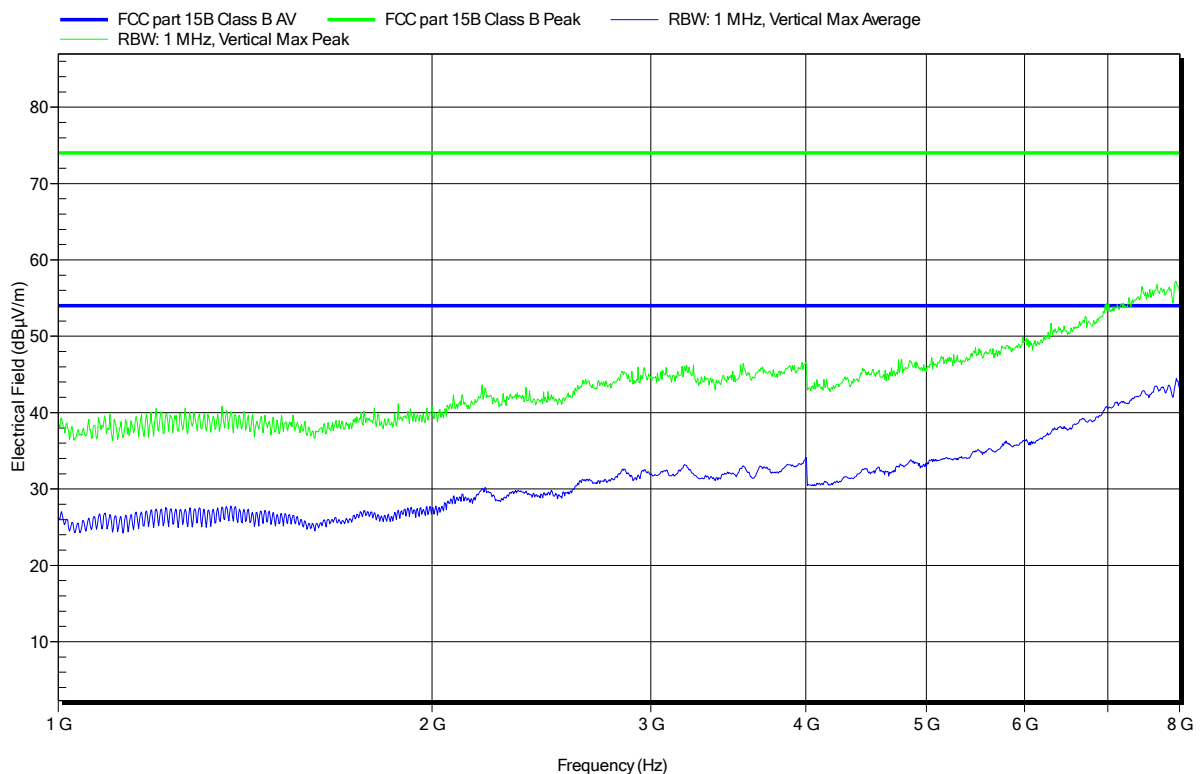


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 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Yu
 Test Conditions: Tnom: 23°C, Unom: 3.6 VDC via Battery
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3m
 Mode: 1
 Test Date: 2015-10-22
 Note:

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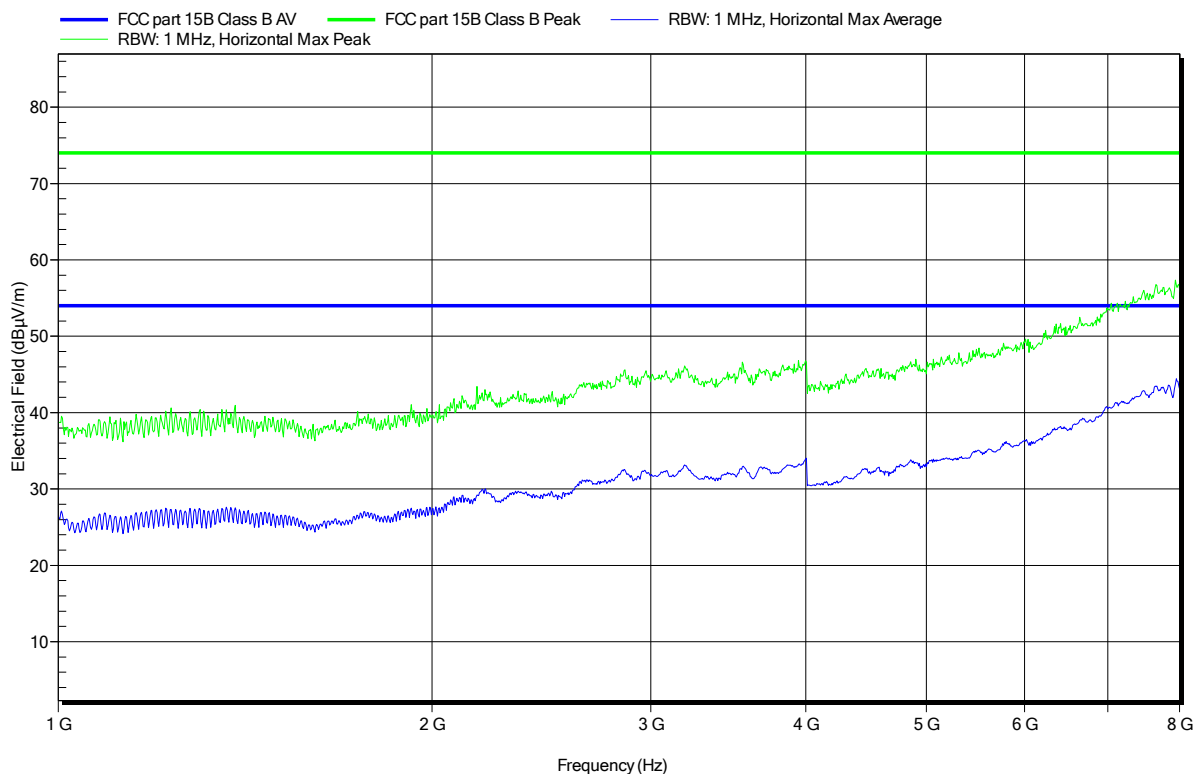


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 Test Site: Eurofins Product Service GmbH
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 Test Conditions: Tnom: 23°C, Unom: 3.6 VDC via Battery
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3m
 Mode: 1
 Test Date: 2015-10-22
 Note:

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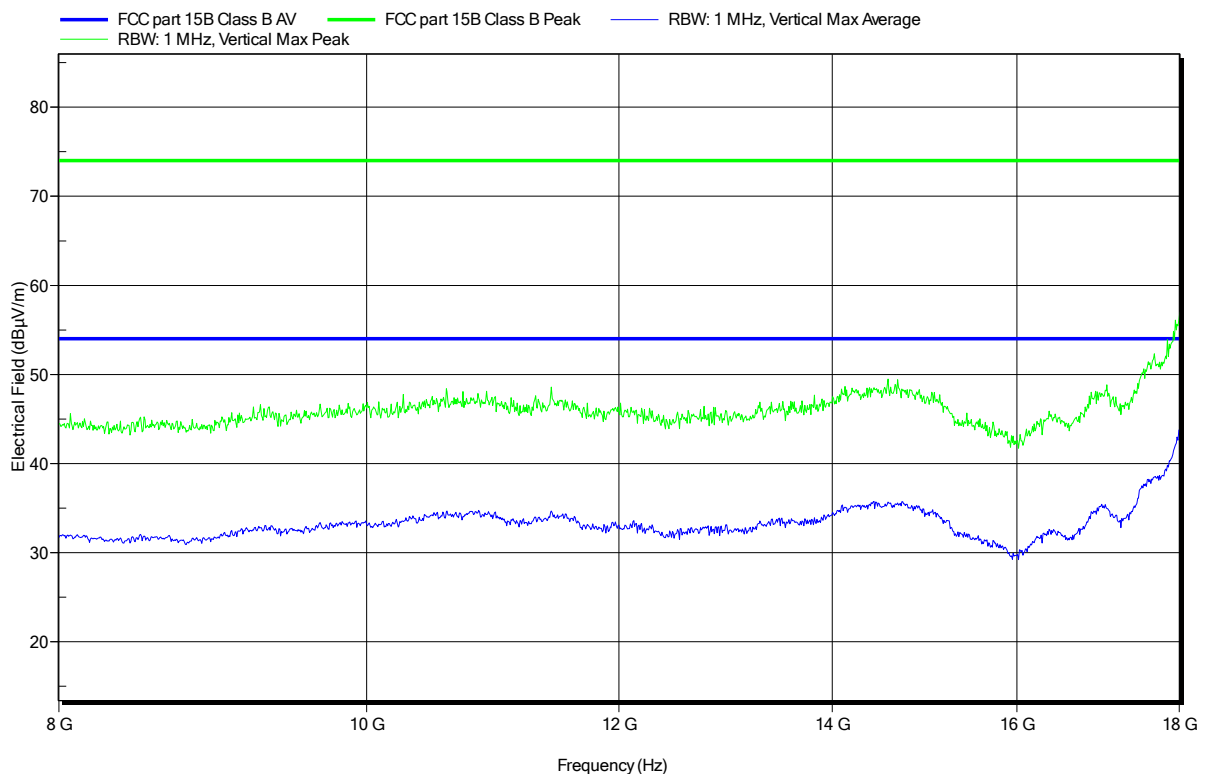


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 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3m
 Mode: 1
 Test Date: 2015-10-23
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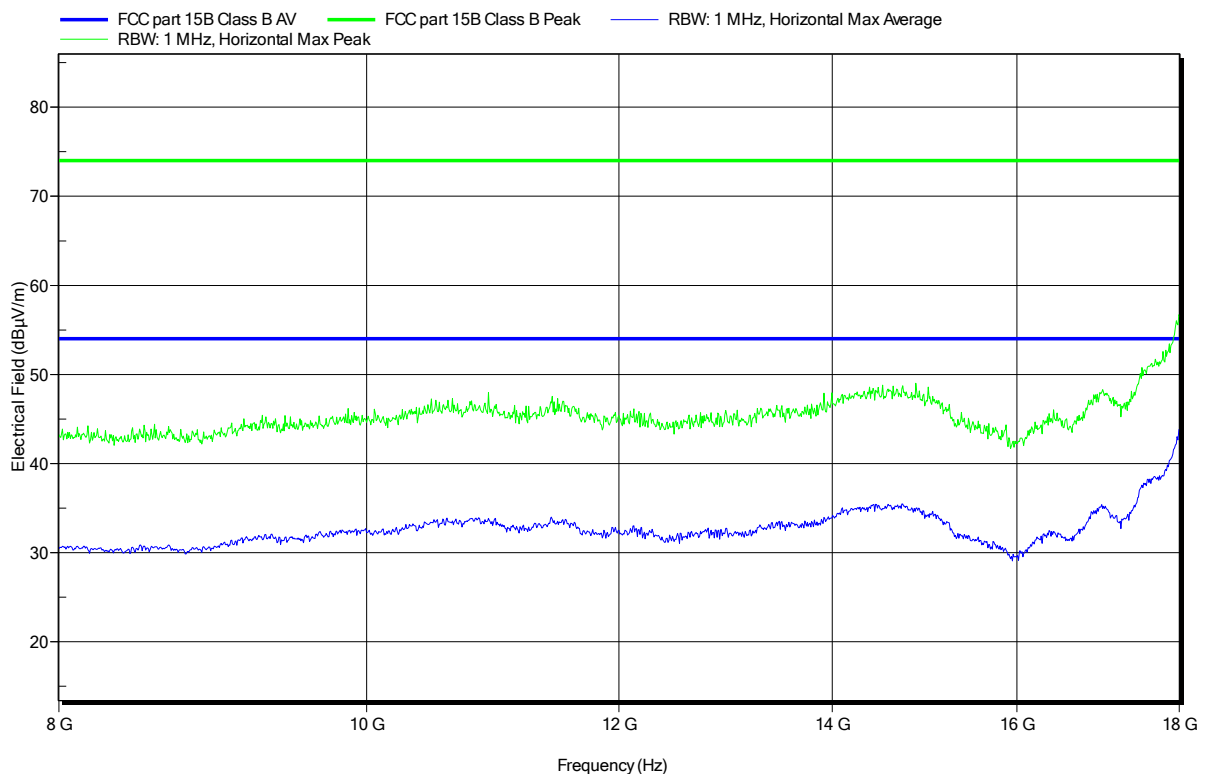


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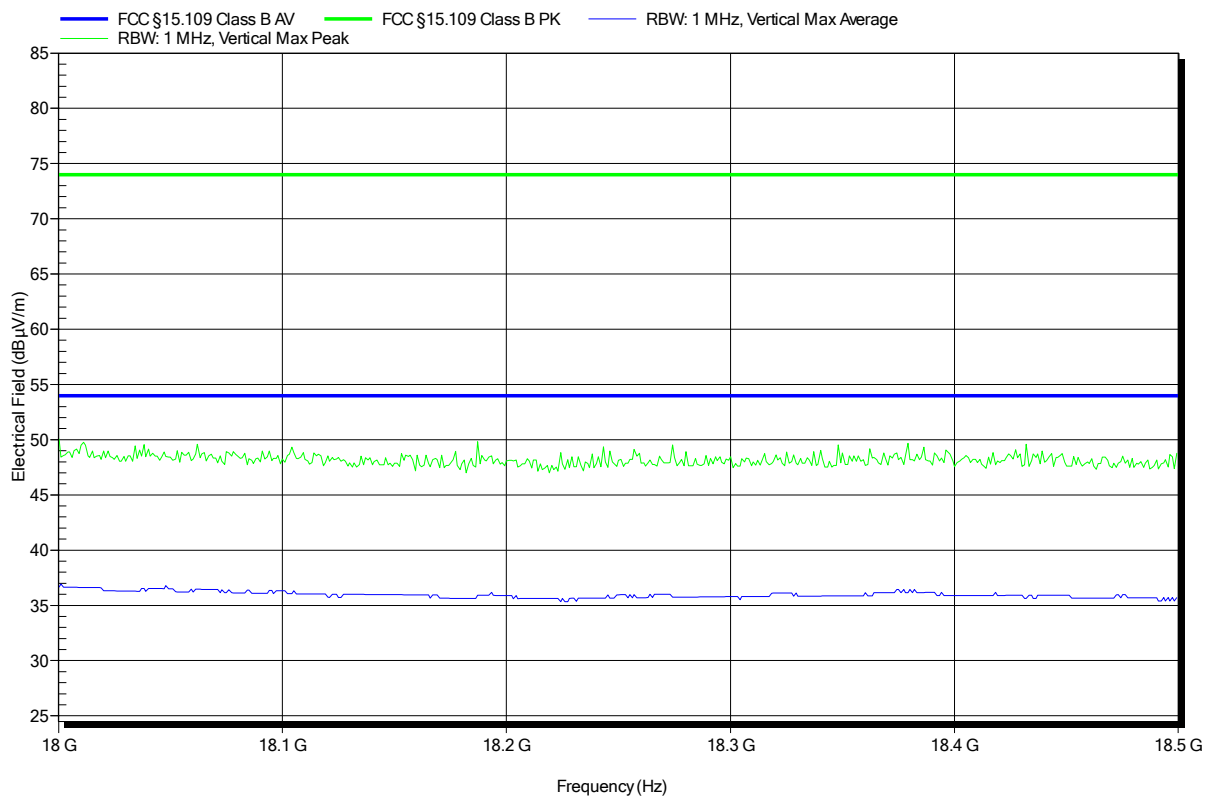
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

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Applicant: Kamstrup A/S
 EUT Name: READY Gateway for Siemens MAG8000[Us]
 Model: READY Gateway
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Yu
 Test Conditions: Tnom: 23°C, Unom: 3.6 VDC via Battery
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: 1
 Test Date: 2015-10-22
 Note:

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Test Report No.: G0M-1509-5067-EF0115B-V01

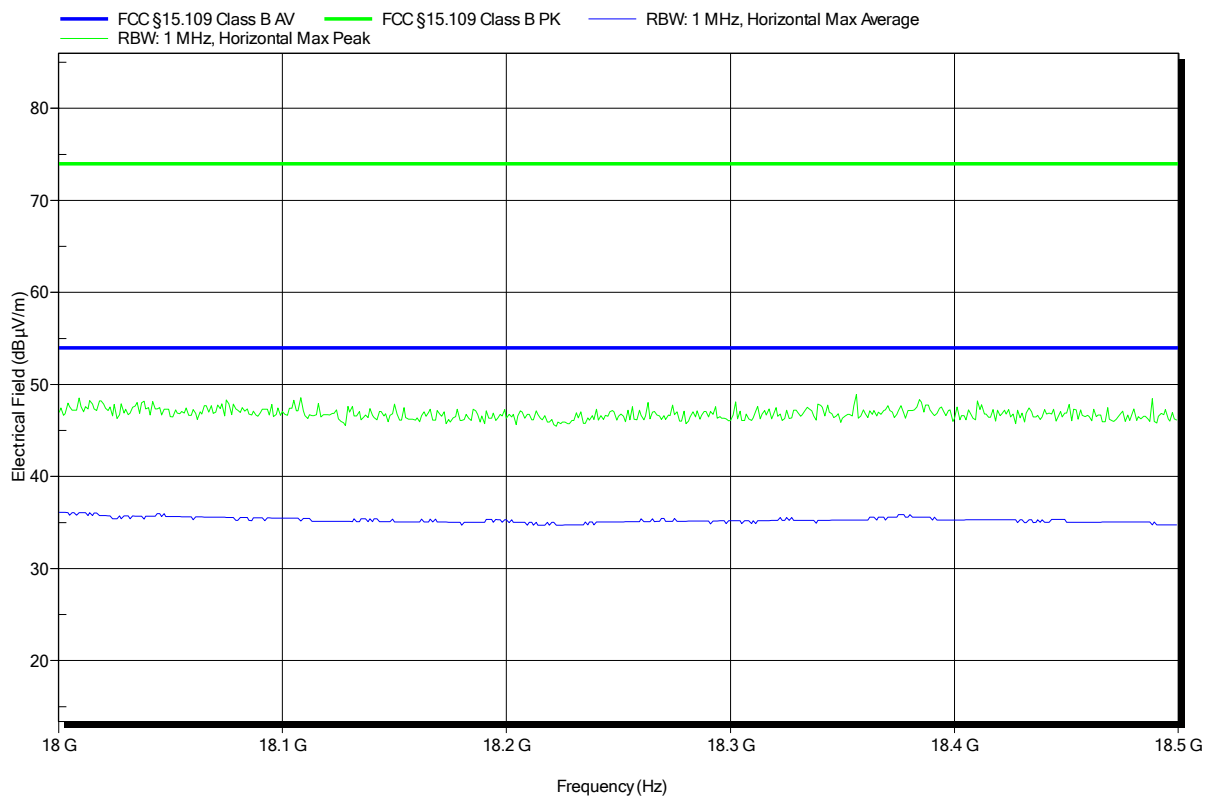
Eurofins Product Service GmbH
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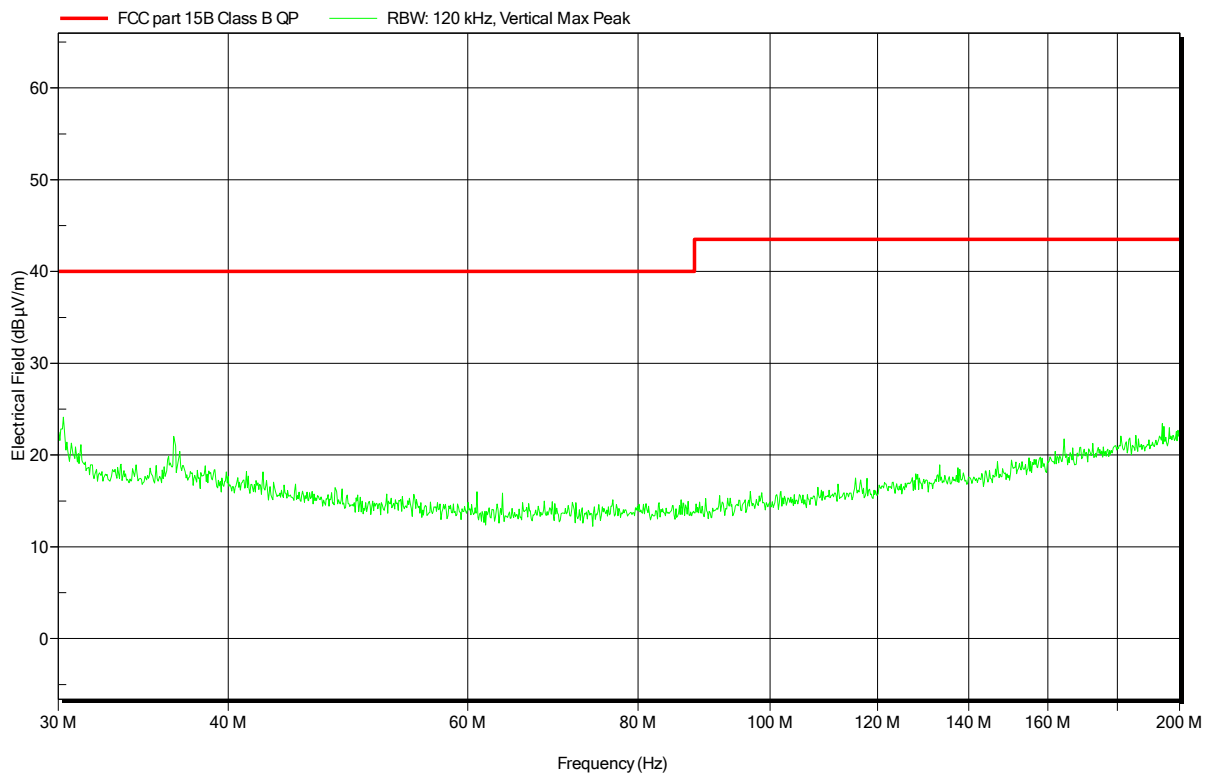
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Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3m
Mode:	2
Test Date:	2015-10-23
Note:	

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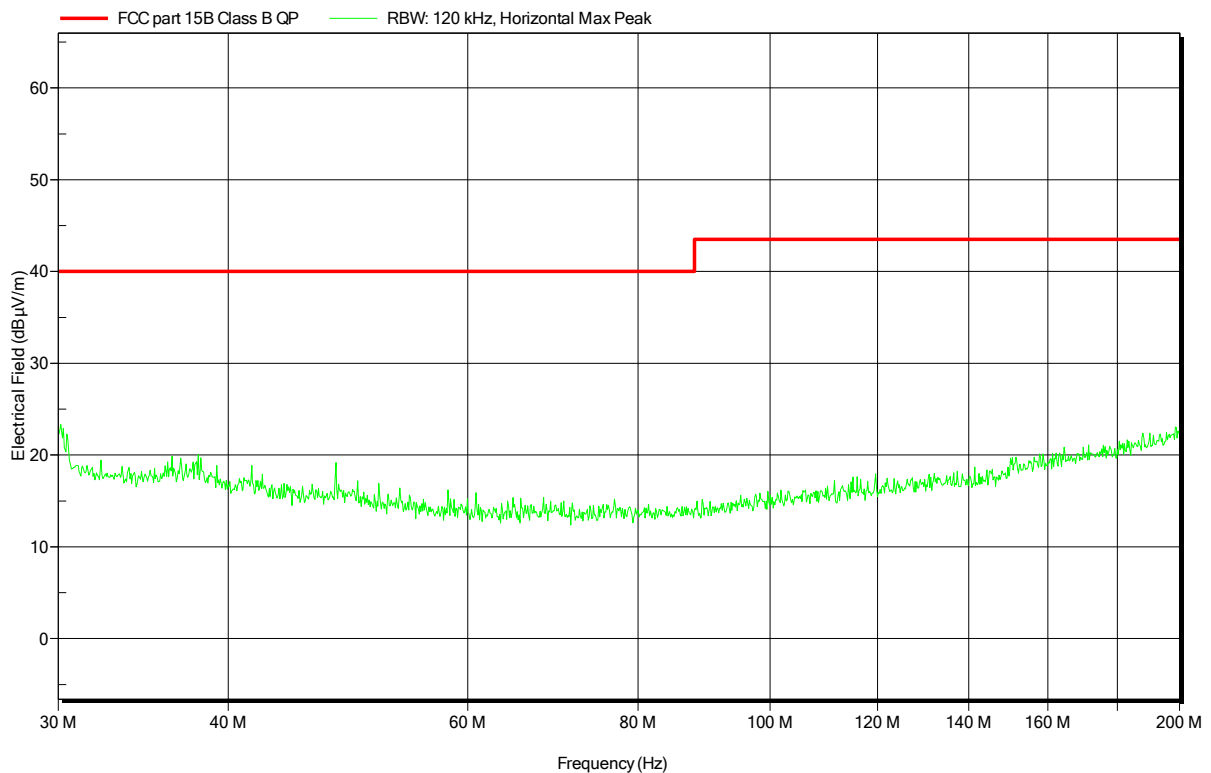
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Measurement distance:	3m
Mode:	2
Test Date:	2015-10-23
Note:	

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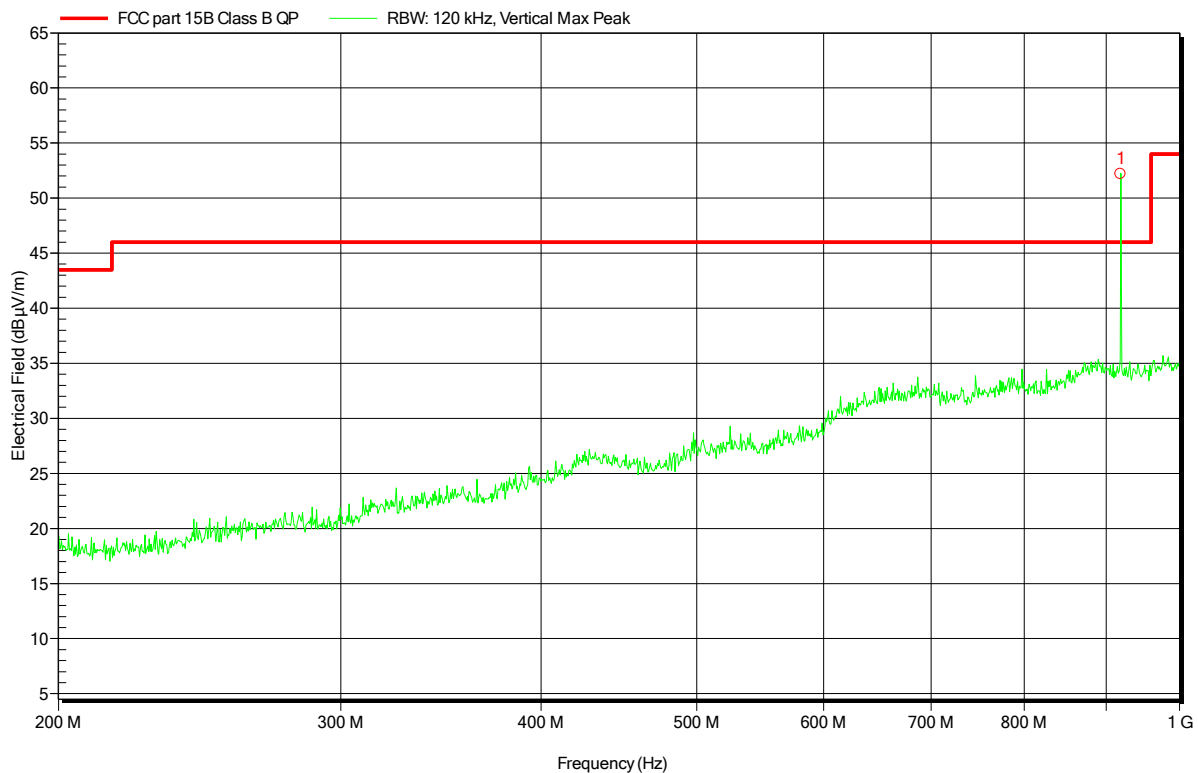
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Frequency
918.68 MHz

SRD Carrier

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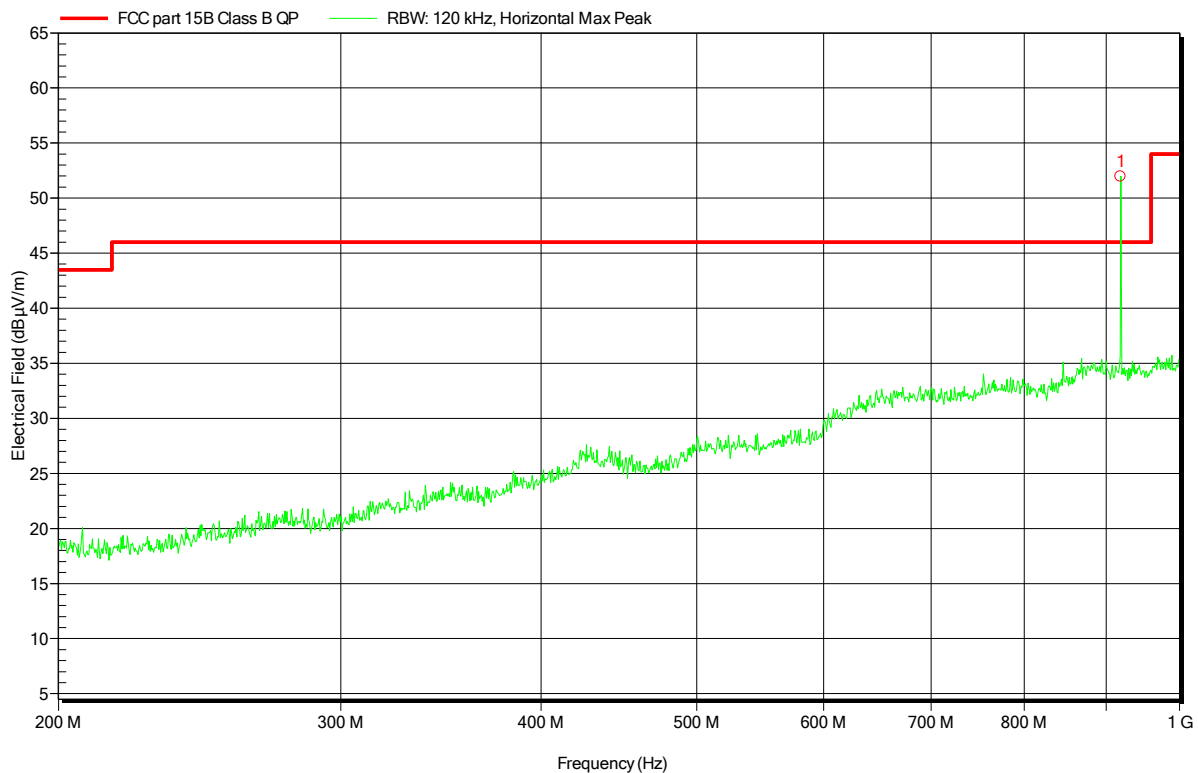
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Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3m
Mode:	2
Test Date:	2015-10-23
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Frequency
918.7 MHz

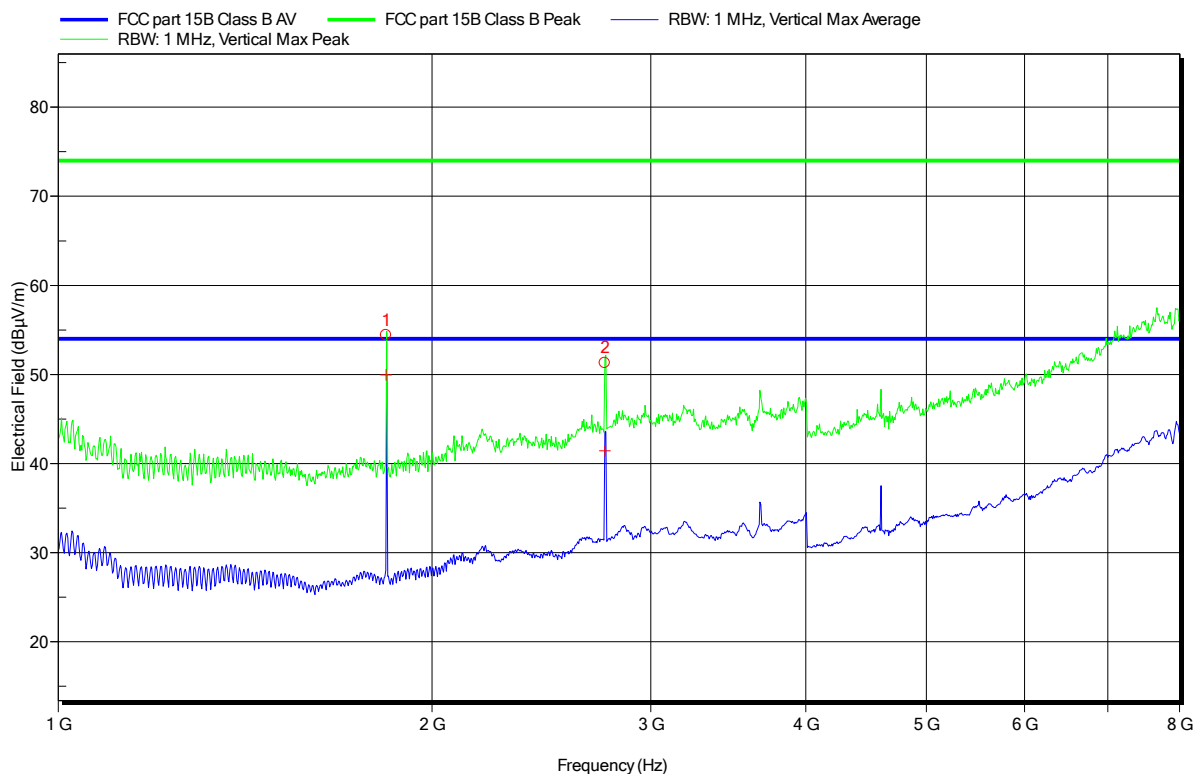
SRD Carrier

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Frequency	Average	Average Limit	Average Difference	Average Status
1.837 GHz	49.97 dBµV/m	54 dBµV/m	-4.03 dB	Pass
2.756 GHz	41.41 dBµV/m	54 dBµV/m	-12.59 dB	Pass

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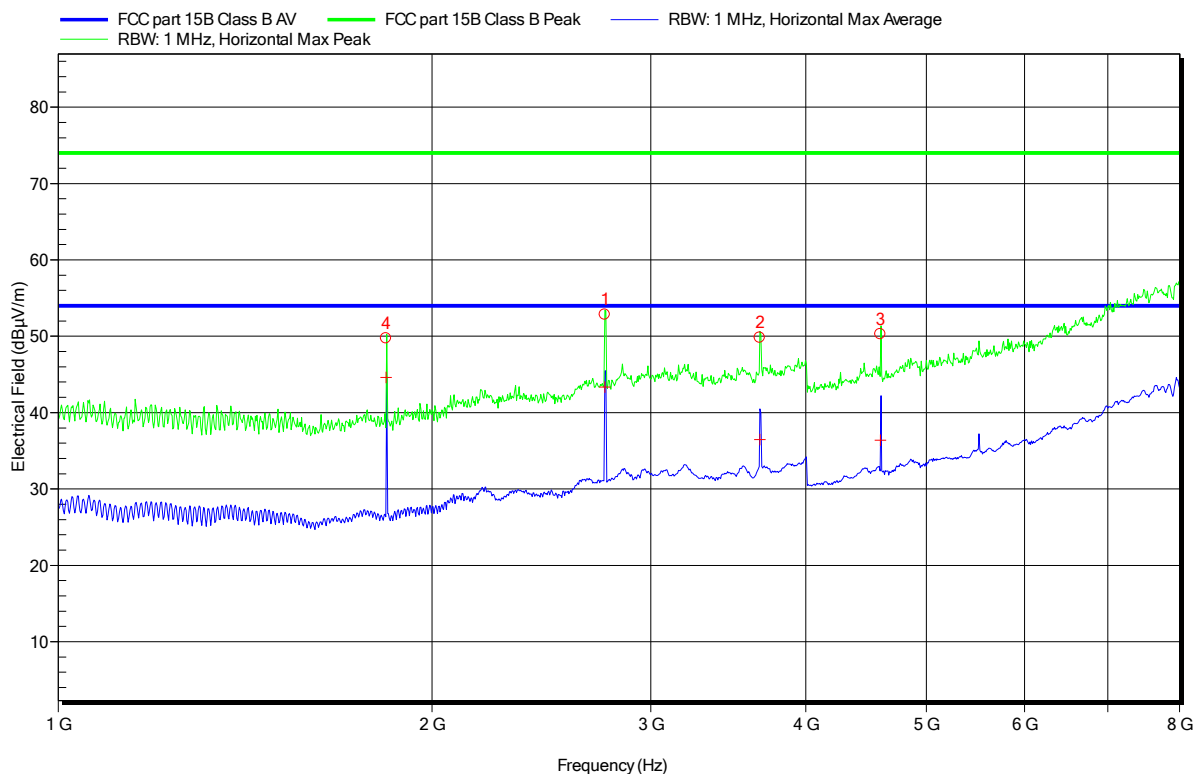
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Frequency	Average	Average Limit	Average Difference	Average Status
1.837 GHz	44.61 dBµV/m	54 dBµV/m	-9.39 dB	Pass
2.756 GHz	43.36 dBµV/m	54 dBµV/m	-10.64 dB	Pass
3.674 GHz	36.48 dBµV/m	54 dBµV/m	-17.52 dB	Pass
4.593 GHz	36.38 dBµV/m	54 dBµV/m	-17.62 dB	Pass

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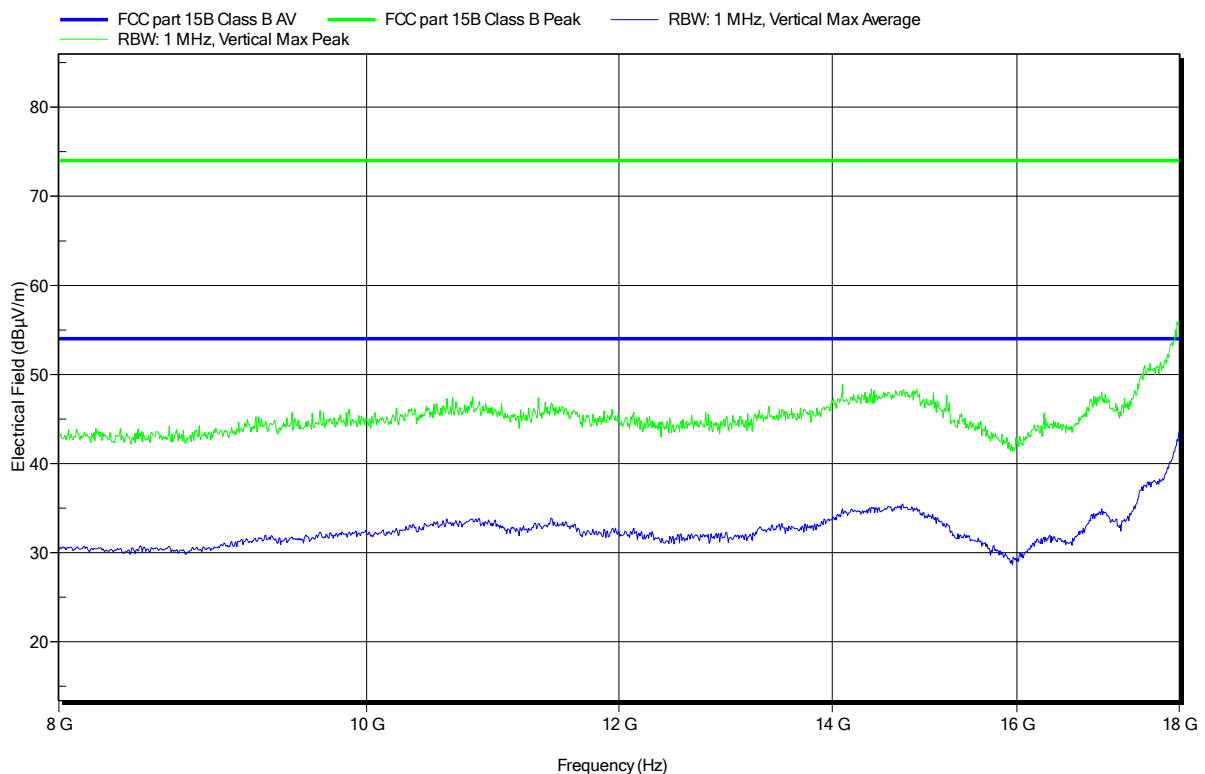
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Applicant: Kamstrup A/S
 EUT Name: READY Gateway for Siemens MAG8000[Us]
 Model: READY Gateway
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Yu
 Test Conditions: Tnom: 23°C, Unom: 3.6 VDC via Battery
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3m
 Mode: 2
 Test Date: 2015-10-23
 Note:

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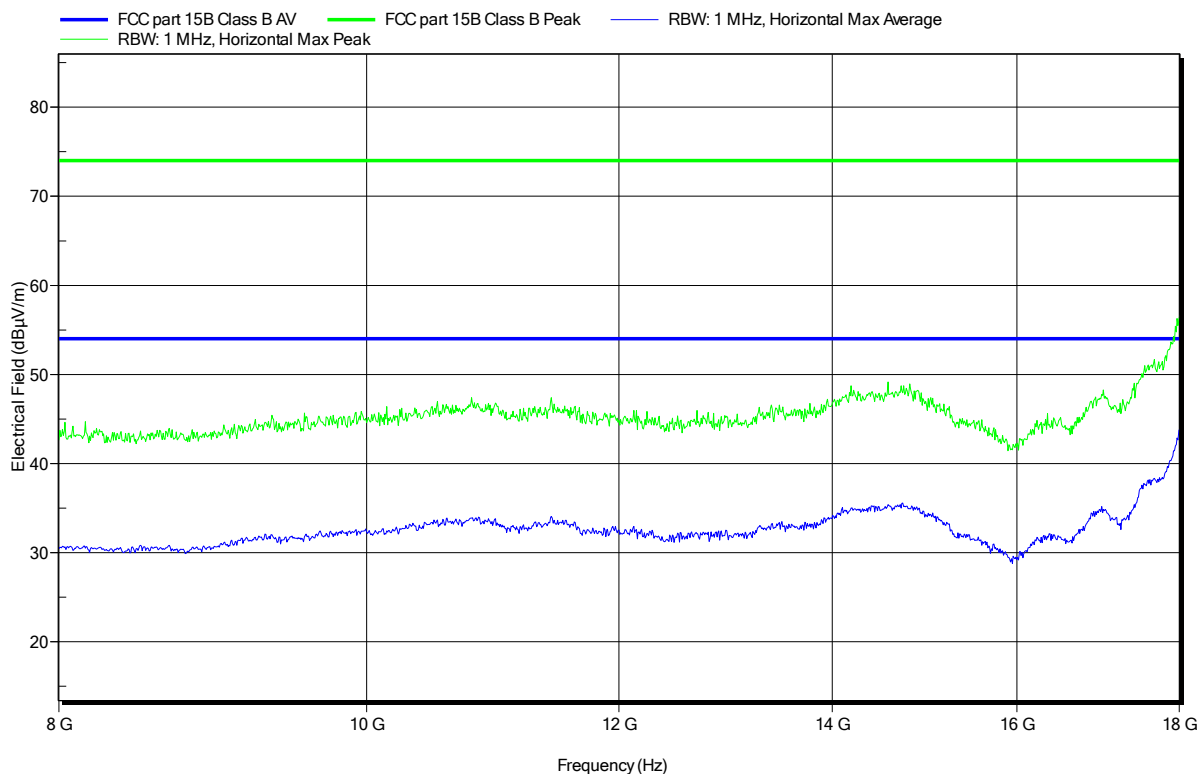


Spurious emissions under normal conditions according to FCC Part 15B

Project number: G0M-1509-5067

Applicant: Kamstrup A/S
 EUT Name: READy Gateway for Siemens MAG8000[Us]
 Model: READy Gateway
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Yu
 Test Conditions: Tnom: 23°C, Unom: 3.6 VDC via Battery
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3m
 Mode: 2
 Test Date: 2015-10-23
 Note:

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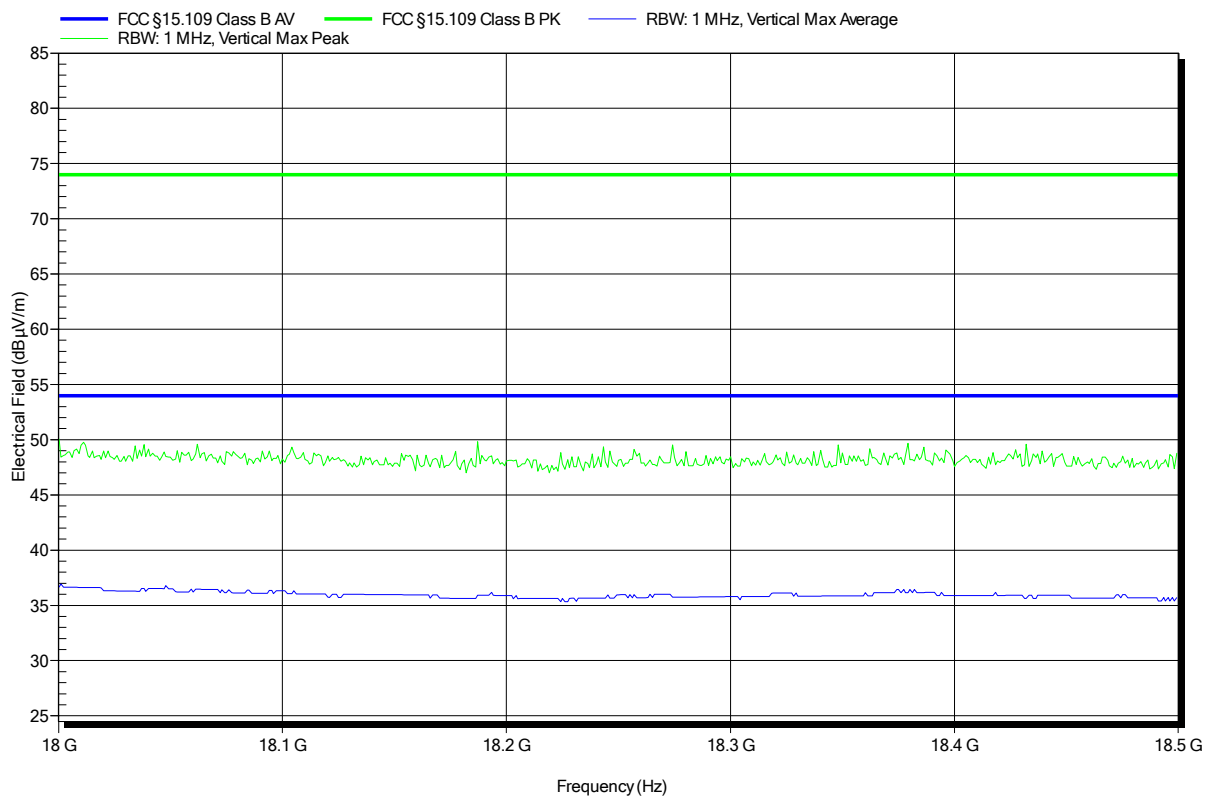


Spurious emissions under normal conditions according to FCC Part 15B

Project number: G0M-1509-5067

Applicant:	Kamstrup A/S
EUT Name:	READY Gateway for Siemens MAG8000[Us]
Model:	READY Gateway
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Yu
Test Conditions:	Tnom: 23°C, Unom: 3.6 VDC via Battery
Antenna:	Rohde & Schwarz HL 025, Vertical
Measurement distance:	1 m converted to 3m
Mode:	2
Test Date:	2015-10-22
Note:	

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Test Report No.: G0M-1509-5067-EF0115B-V01

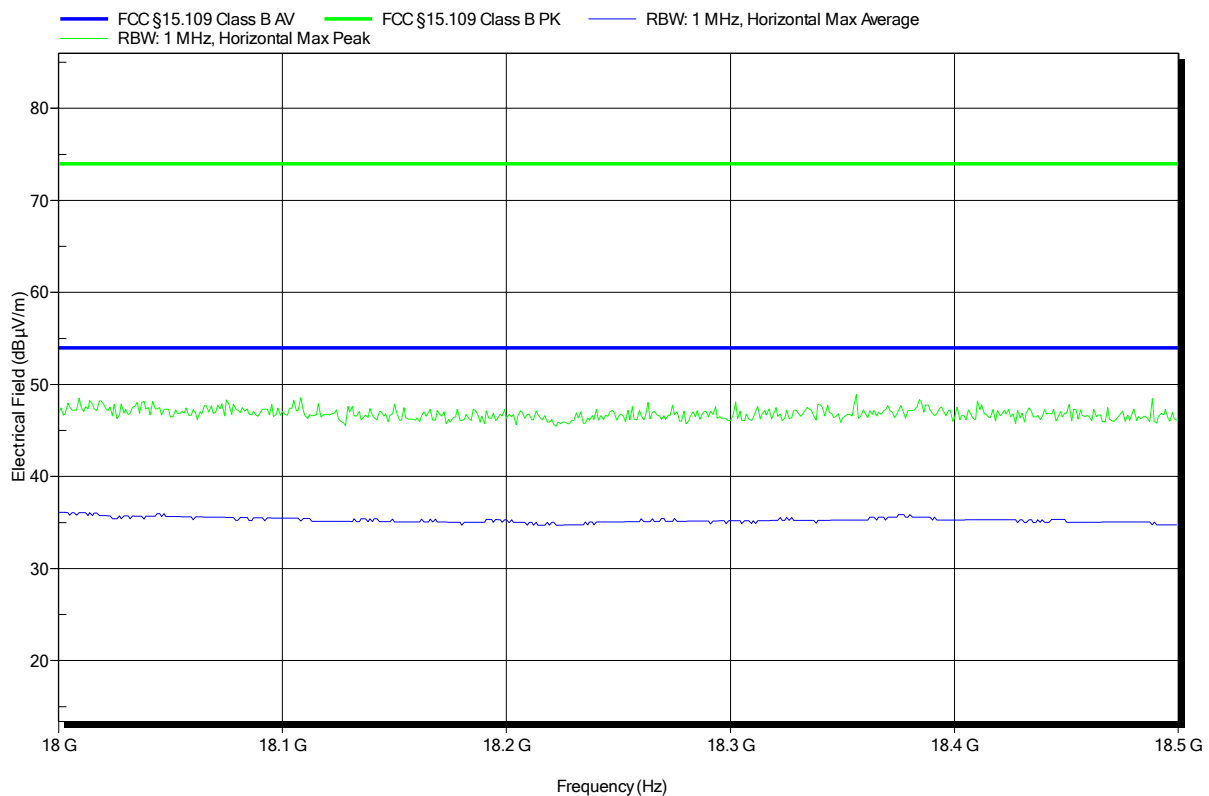
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions under normal conditions according to FCC Part 15B

Project number: G0M-1509-5067

Applicant: Kamstrup A/S
 EUT Name: READy Gateway for Siemens MAG8000[Us]
 Model: READy Gateway
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Yu
 Test Conditions: Tnom: 23°C, Unom: 3.6 VDC via Battery
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: 2
 Test Date: 2015-10-22
 Note:

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Test Report No.: G0M-1509-5067-EF0115B-V01

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany