eurofins | Product Service

EMC TEST REPORT

FCC 47 CFR Part 15B
Industry Canada ICES-003

Electromagnetic compatibility - Unintentional radiators

Report Reference No. ..... :	G0M-1704-6415-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 ..... :	Kieback & Peter GmbH & Co. KG
Address ..... :	Tempelhofer Weg 50 12347 Berlin GERMANY
Test specification:	
Standard..... :	47 CFR Part 15 Subpart B ICES-003, Issue 6:2016 ANSI C63.4:2014
Equipment under test (EUT):	
Product description	Actuator
Model No.	MD15-CFL-HE
Additional Models	None
Hardware version	11651000_MD15-FTL-CFL902
Firmware / Software version	Test-SW: GWC1.2.0.3_TCM300HW_TCM320HW-868MHz
	FCC-ID: NY3MD15CFL IC: N/A
Test result	**Passed**

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 .....: 2017-05-08

Date (s) of performance of tests .....: 2017-05-09 - 2017-05-31

Compiled by ..... : Andreas Pflug

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

Approved by (+ signature) ..... : Jens Marquardt .....
Deputy Head of Lab

Date of issue ..... : 2017-07-17

Total number of pages..... : 29

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	2017-07-17	Initial Release	

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

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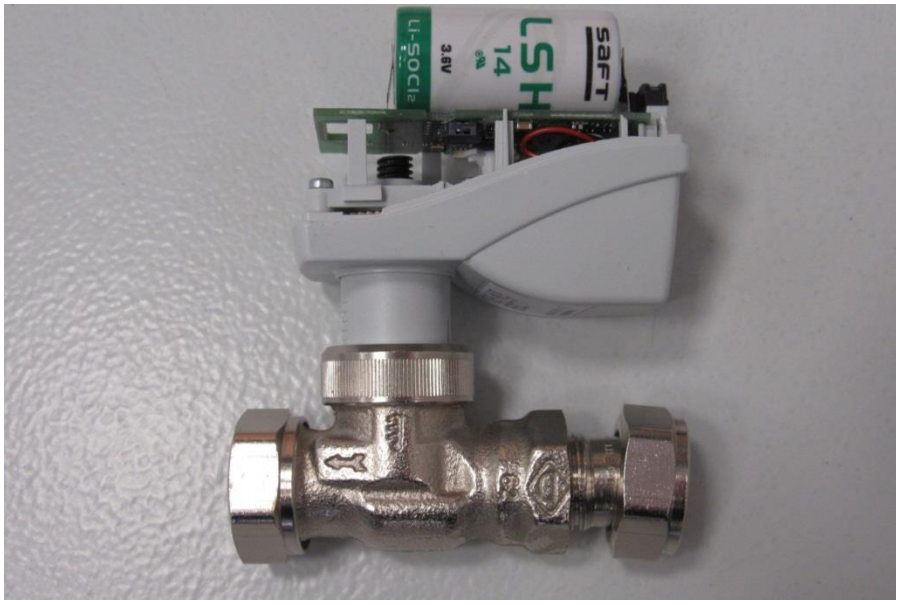
1 Equipment (Test item) Description

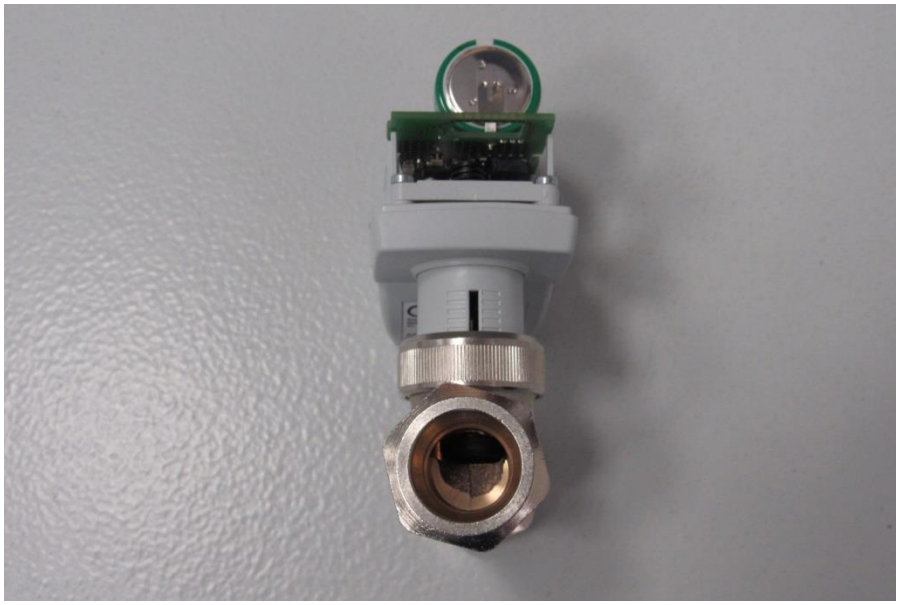
Description	Actuator
Model	MD15-CFL-HE
Additional Models	None
Serial number	SN: 097008.010 /1.00
Hardware version	11651000_MD15-FTL-CFL902
Software / Firmware version	Test-SW: GWC1.2.0.3_TCM300HW_TCM320HW-868MHz
FCC-ID	NY3MD15CFL
IC	N/A
Power supply	3.6 VDC (Lithium-battery)
Manufacturer	Kieback & Peter GmbH & Co. KG Tempelhofer Weg 50 12347 Berlin GERMANY
Highest emission frequency	Fmax [MHz] = 902.875
Sensitivity level	-90 dBm
Device classification	Class B
Equipment type	Tabletop
Number of tested samples	1

1.1 Photos – Equipment external

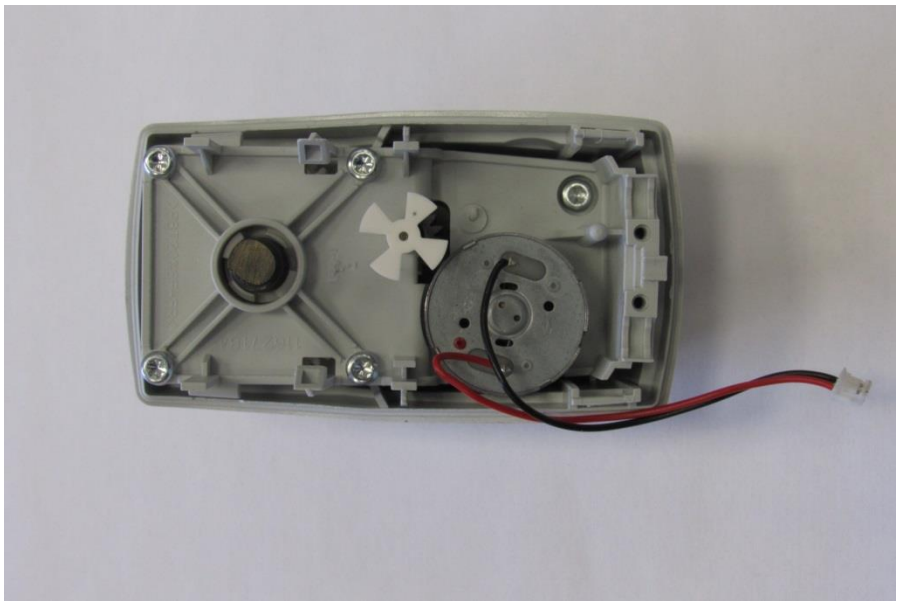
E.U.T. outside

E.U.T. outside

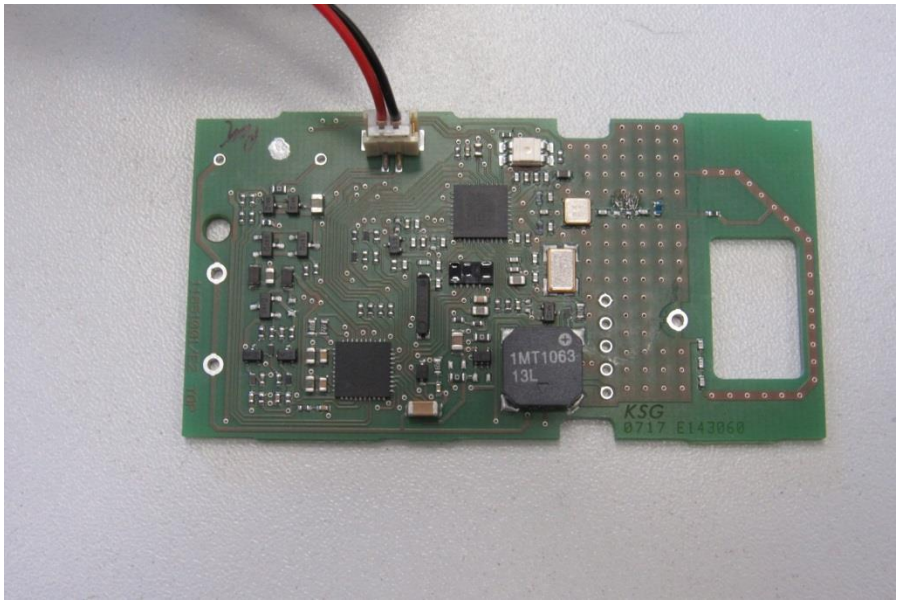
E.U.T. outside


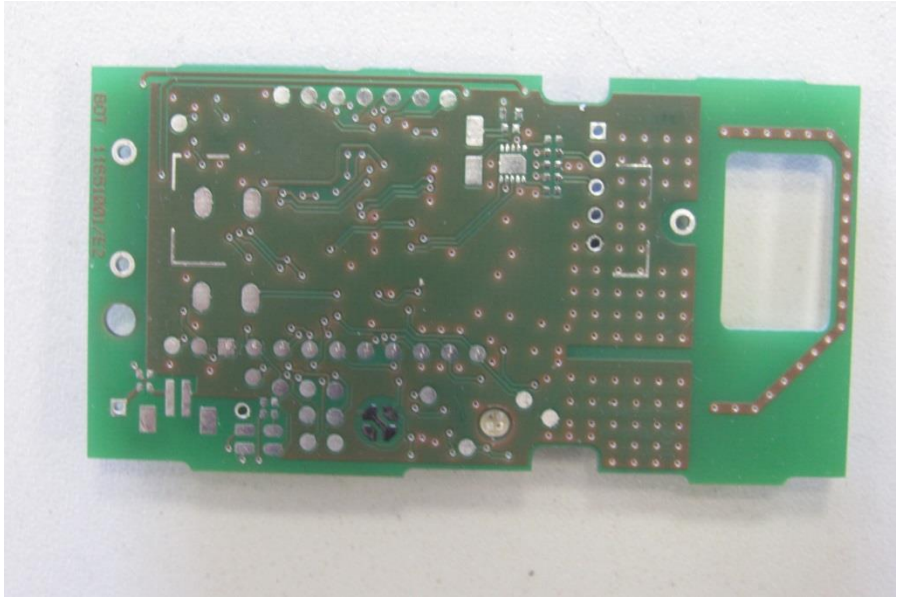
E.U.T. outside


1.2 Photos – Equipment internal

E.U.T. inside


E.U.T. inside

E.U.T. pcb-Top


E.U.T. pcb-Botton


E.U.T. label outside

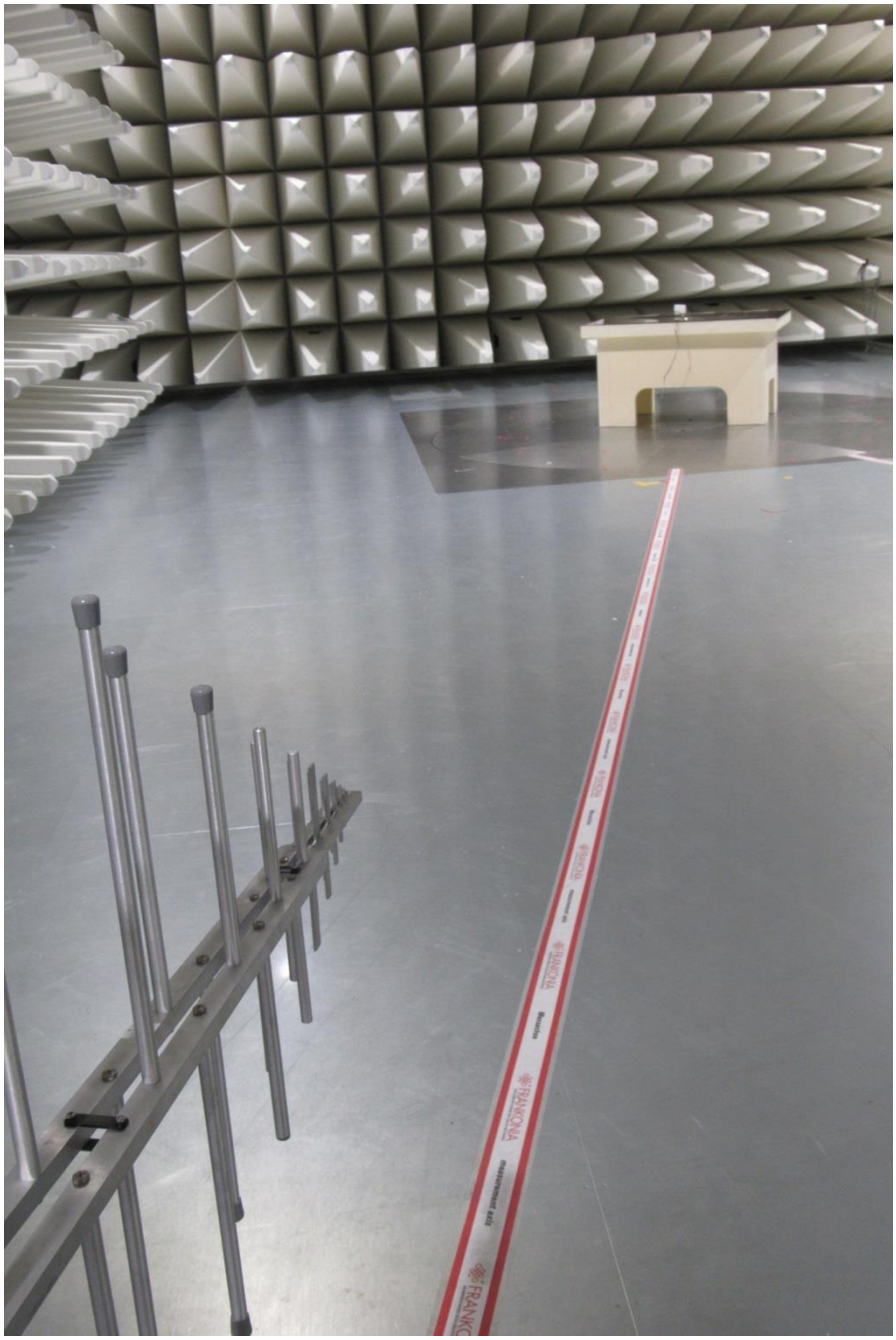
E.U.T. label outside 2

1.3 Photos – Test setup

Test Setup : Radiated Emissions

Test Setup : Radiated Emissions

Test Setup : Radiated Emissions



1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments (e.g. serial no.)
AE	Laptop	DELL	LATITUDE | E6430	Property eurofins 4250257 +Software Kieback&Peter Astda V0.9.2
AE	USB-Gateway	enocean	USB 300U	Property K&P

***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 (e.g. Cat. of Cable)
N/A					

***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	continuous transmit (TX)
2	RX mode with continuous manual variation of the actuator Soll-Position between 0% and 100% (RX)

Configuration #	EUT Configuration
1	EUT fully assabled

1.7 Test Equipment Used During Testing

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	2016.1.10

Radiated emissions AC6					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
TRILOG Broadband Antenna	Schwarzbeck	VULB 9162	EF00978	2016-11	2017-11
Double-Ridged Guide Antenna	ETS-Lindgren	3117	EF00976	2016-03	2019-03
EMI Test Receiver	R&S	ESU26	EF00887	2017-01	2018-01
RF Cable	Huber & Suhner	Sucoflex 106	-	System Cal.	System Cal
RF Cable	Huber & Suhner	Multiflex 141	-	System Cal.	System Cal

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 dBµV. 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:

Reading on Analyzer (dBµV) + A.F. (dB) = Net field strength (dBµV/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 dBµV/m). The FCC limits are given in units of µV/m. The following formula is used to convert the units of µV/m to dBµV/m:

Limit (dBµV/m) = 20*log (µV/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:

Reading	+	AF	=	Net Reading	:	Net reading - FCC limit	= Margin
21.5 dBµV	+	26 dB	=	47.5 dBµV/m	:	47.5 dBµV/m - 57.0 dBµV/m	= -9.5 dB

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	
47 CFR 15.107 ICES-003 Item 6.1	AC power line conducted emissions	ANSI C63.4	N/A	only battery powered
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	22 °C
Relative Humidity	30 to 60 %	35 %
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	
	Fmax [MHz] = 902.875	
Fully configured sample scanned over the following frequency range	Frequency range	
	30 MHz to 6 GHz	
Operating mode	1 + 2	
Configuration	1	

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 - 6000	-	-	54	PASS	74	PASS
Comment: also in 3m distance no disturbance from the actuator						

Test Procedure:

The test site is in accordance with ANSI C63-4:2014 requirements and is listed by FCC.
The measurement procedure is as follows:

Exploratory measurement:

- The EUT was placed on a non-conductive table at a height of 0.8m.
- The EUT and support equipment, if needed, were set up to simulate typical usage.
- Cables, of type and length specified by the manufacturer, were connected to at least one port of each type and were terminated by a device or simulating load of actual usage.
- The antenna was placed at a distance of 3 or 10 m.
- The received signal was monitored at the measurement receiver.
    - Cables not bundled were manipulated within the range of likely arrangements to produce the highest emission amplitude
    - To maximize the suspected emissions the EUT is rotated 360 degrees. If the signal exceeds the previous amplitude, go back to the corresponding azimuth and manipulate the cables again for maximizing the emissions if possible.
    - Move the antenna from 1 to 4m to maximize the suspected highest amplitude signal.
- This procedure has to be performed in both antenna polarizations, horizontal and vertical.
- The arrangement of the equipment with the maximum emission level is shown on the setup picture at item 1.3.

Final measurement:

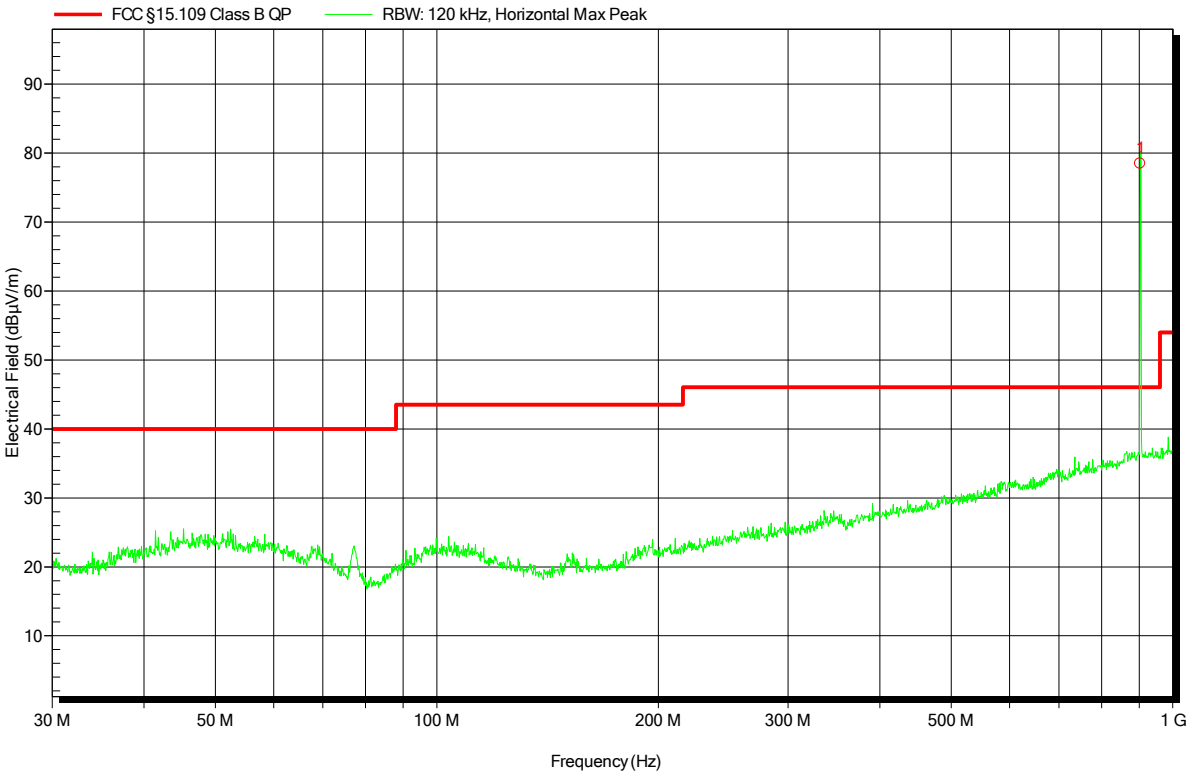
- The EUT was placed on a 0.8 m non-conductive table at a 3 m distance from the receive antenna. The antenna output was connected to the measurement receiver
- A biconical antenna was used for the frequency range 30 – 200 MHz, a logarithmic periodical antenna was used for the frequency range from 200 – 1000 MHz. Above one 1 GHz a Double Ridged Broadband Horn antenna was used. The antenna was placed on an adjustable height antenna mast
- The EUT and cable arrangement were based on the exploratory measurement results
- Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded.
- The test data of the worst-case conditions were recorded and shown on the next pages.

Radiated emissions according to FCC part 15 B

Project number: G0M-1704-6415

Applicant:	Kieback & Peter GmbH & Co. KG
EUT Name:	Actuator
Model:	MD15-CFL-HE
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Pflug
Test Conditions:	Tnom: 22°C, Unom: 3.6VDC (battery, Li-SOCL2)
Antenna:	Schwarzbeck VULB 9162, Horizontal
Measurement distance:	10m
Mode:	TX
Test Date:	2017-05-09
Note:	

Index 1



Peak Number	Frequency	Angle	Height
1 TX carrier	902,88 MHz	-33 Degree	2.3 m

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Test Site:	Eurofins Product Service GmbH
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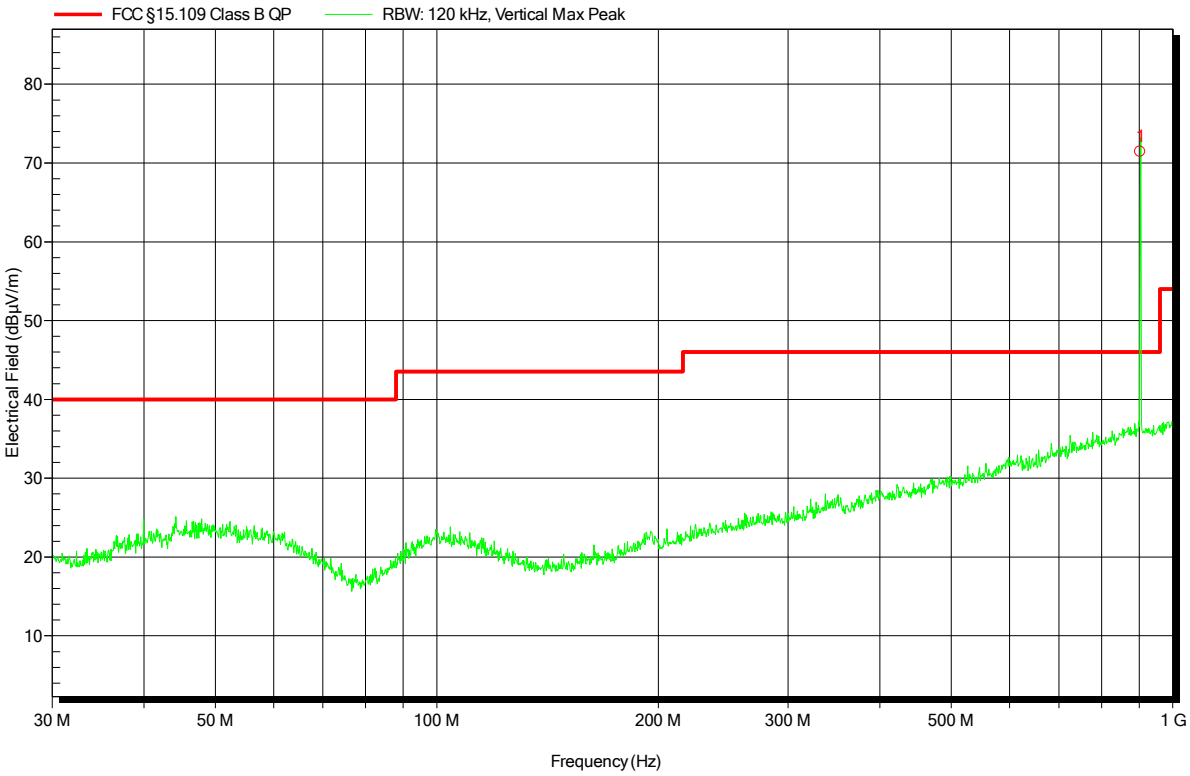
Test Conditions:	Tnom: 22°C, Unom: 3.6VDC (battery, Li-SOCL2)
Antenna:	Schwarzbeck VULB 9162, Vertical
Measurement distance:	10m
Mode:	TX
Test Date:	2017-05-09
Note:	

Index 3



Peak Number	Frequency	Angle	Height
1TX carrier	902,88 MHz	1 Degree	1.8 m

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Model:	MD15-CFL-HE
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Pflug
Test Conditions:	Tnom: 22°C, Unom: 3.6VDC (battery, Li-SOCL2)
Antenna:	ETS-Lindgren 3117, Vertical
Measurement distance:	3 m
Mode:	TX
Test Date:	2017-05-09
Note:	

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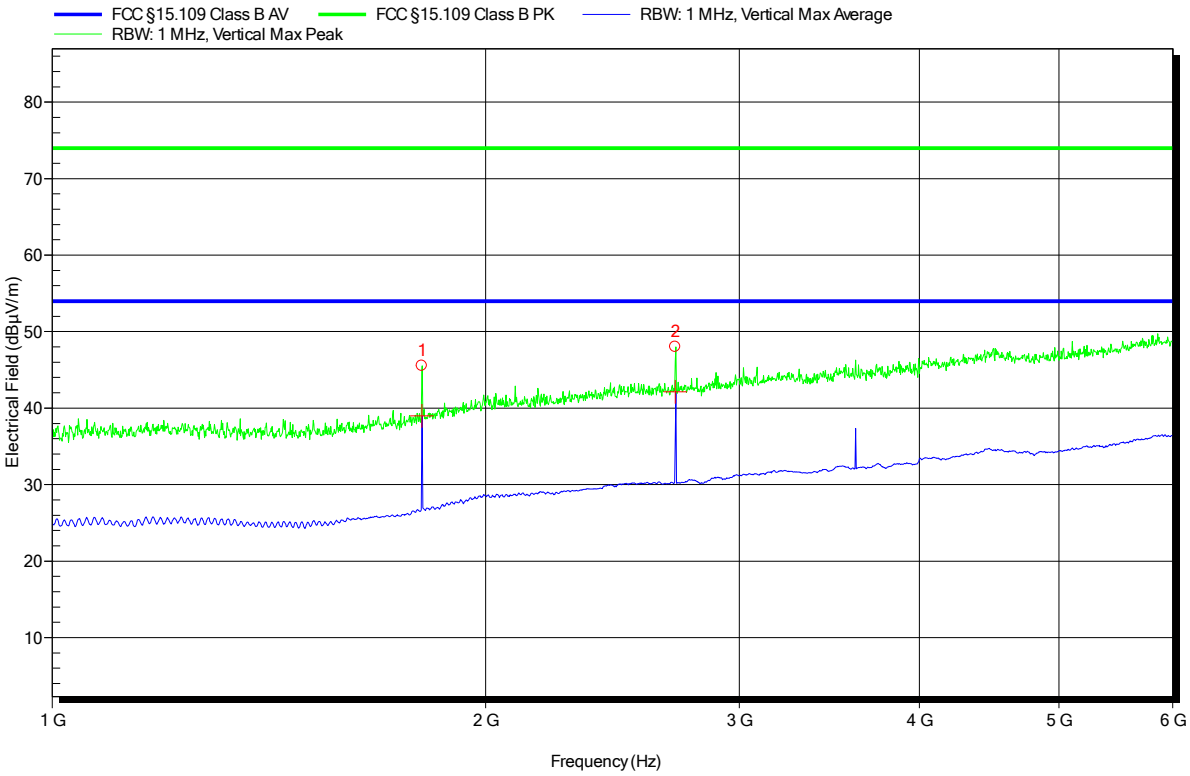

Peak Number	Frequency	Peak	Angle	Height
1 harmonics	1,806 GHz	45,5 dBµV/m	127 Degree	1.2 m
2 harmonics	2,709 GHz	48 dBµV/m	127 Degree	1.2 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1 harmonics	1,806 GHz	39 dBµV/m	54 dBµV/m	-15,0 dB	Pass	127 Degree	1.2 m
2 harmonics	2,709 GHz	42,1 dBµV/m	54 dBµV/m	-11,8 dB	Pass	127 Degree	1.2 m

Radiated emissions according to FCC part 15 B

Project number: G0M-1704-6415

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Model:	MD15-CFL-HE
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Pflug
Test Conditions:	Tnom: 22°C, Unom: 3.6VDC (battery, Li-SOCL2)
Antenna:	ETS-Lindgren 3117, Horizontal
Measurement distance:	3 m
Mode:	TX
Test Date:	2017-05-09
Note:	

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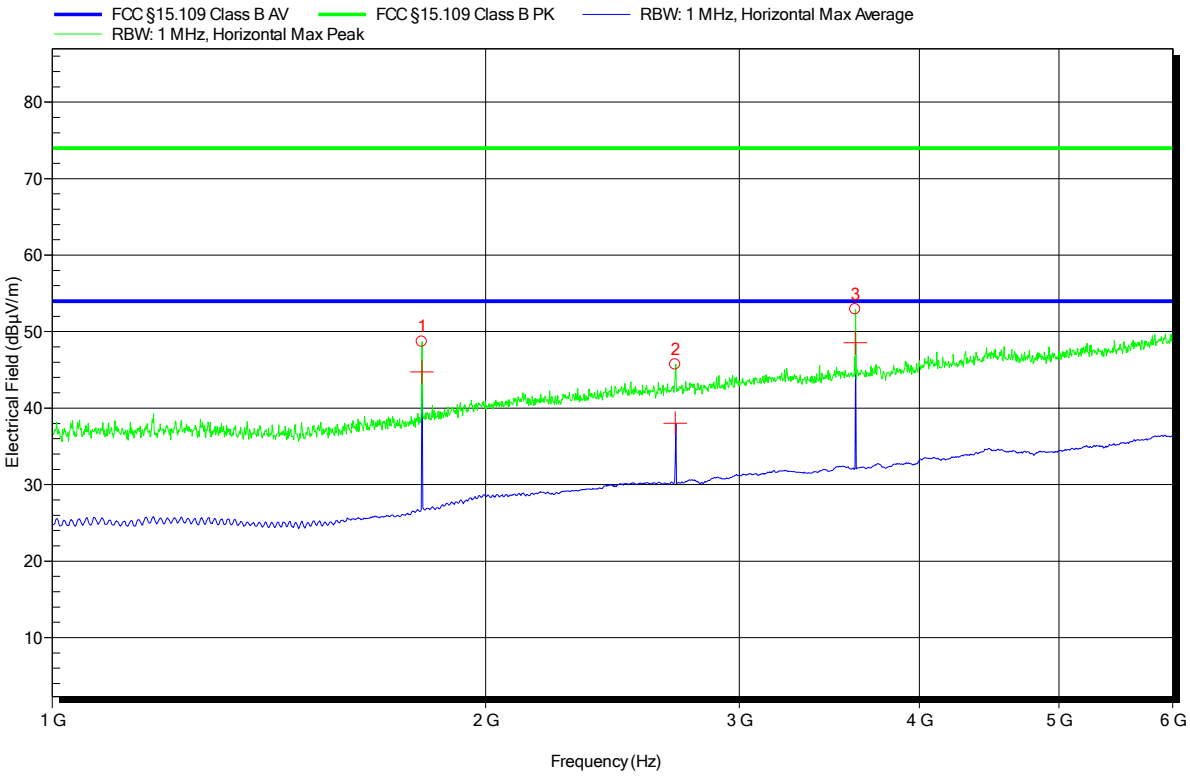

Peak Number	Frequency	Peak	Angle	Height
1 harmonics	1,806 GHz	48,7 dBµV/m	88 Degree	1.1 m
2 harmonics	2,709 GHz	45,7 dBµV/m	88 Degree	1.1 m
3 harmonics	3,612 GHz	52,9 dBµV/m	88 Degree	1.1 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1 harmonics	1,806 GHz	44,7 dBµV/m	54 dBµV/m	-9,3 dB	Pass	88 Degree	1.1 m
2 harmonics	2,709 GHz	38 dBµV/m	54 dBµV/m	-16,0 dB	Pass	88 Degree	1.1 m
3 harmonics	3,612 GHz	48,5 dBµV/m	54 dBµV/m	-5,4 dB	Pass	88 Degree	1.1 m

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EUT Name:	Actuator
Model:	MD15-CFL-HE
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Pflug
Test Conditions:	Tnom: 22°C, Unom: 3.6VDC (battery, Li-SOCL2)
Antenna:	Schwarzbeck VULB 9162, Vertical
Measurement distance:	10m
Mode:	2 without actuator-motor
Test Date:	2017-05-09
Note:	

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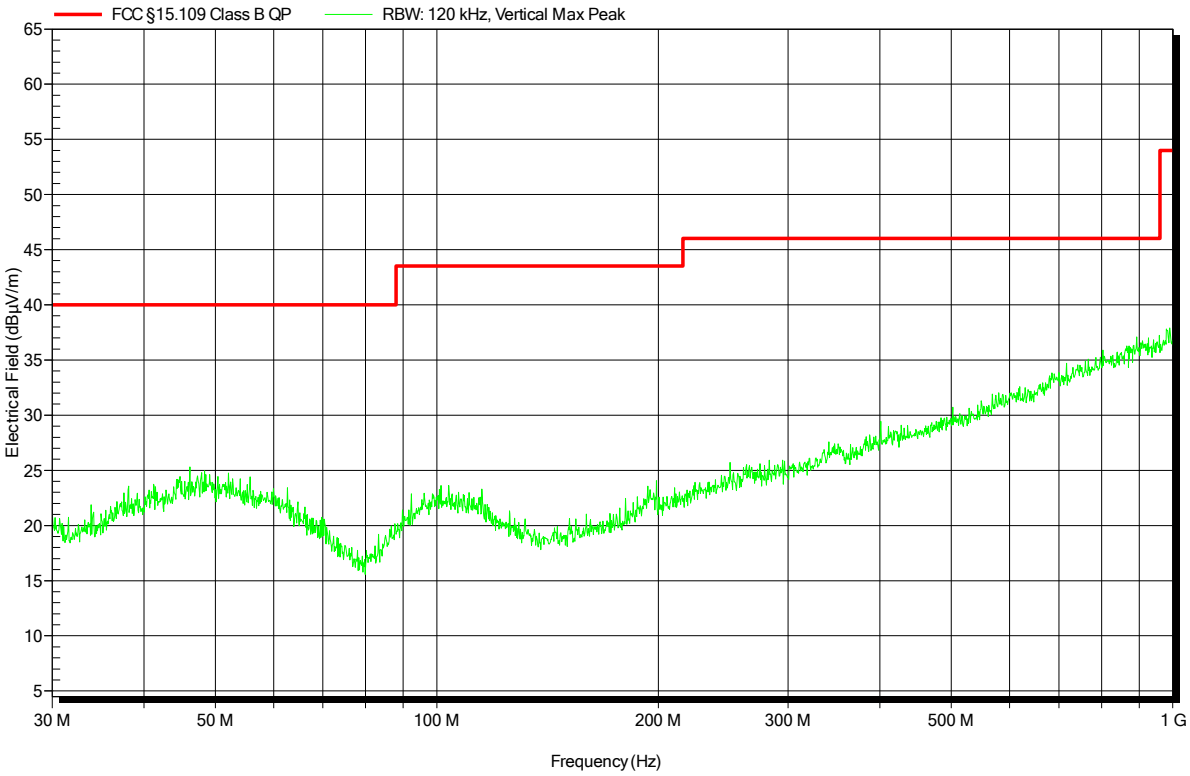

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Antenna:	Schwarzbeck VULB 9162, Horizontal
Measurement distance:	10m
Mode:	2 without actuator-motor
Test Date:	2017-05-09
Note:	

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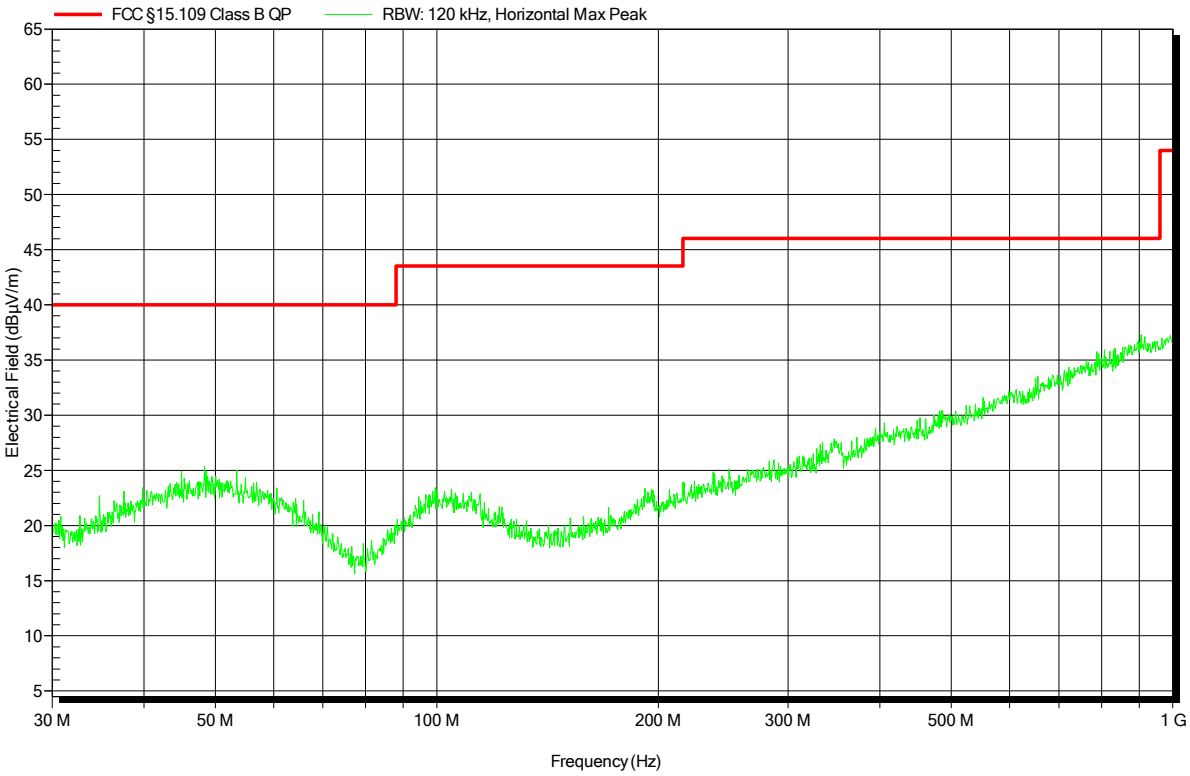

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Antenna:	ETS-Lindgren 3117, Vertical
Measurement distance:	3 m
Mode:	2 without actuator-motor
Test Date:	2017-05-09
Note:	

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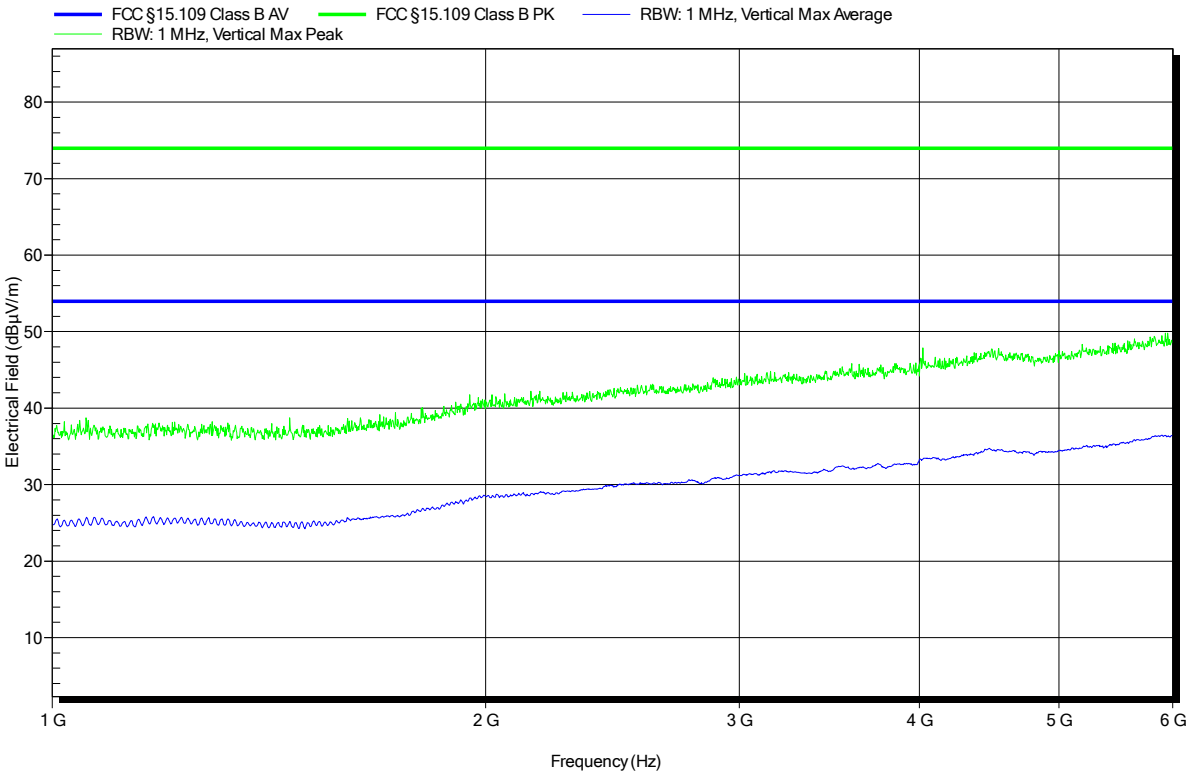

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Measurement distance:	3 m
Mode:	2 without actuator-motor
Test Date:	2017-05-09
Note:	

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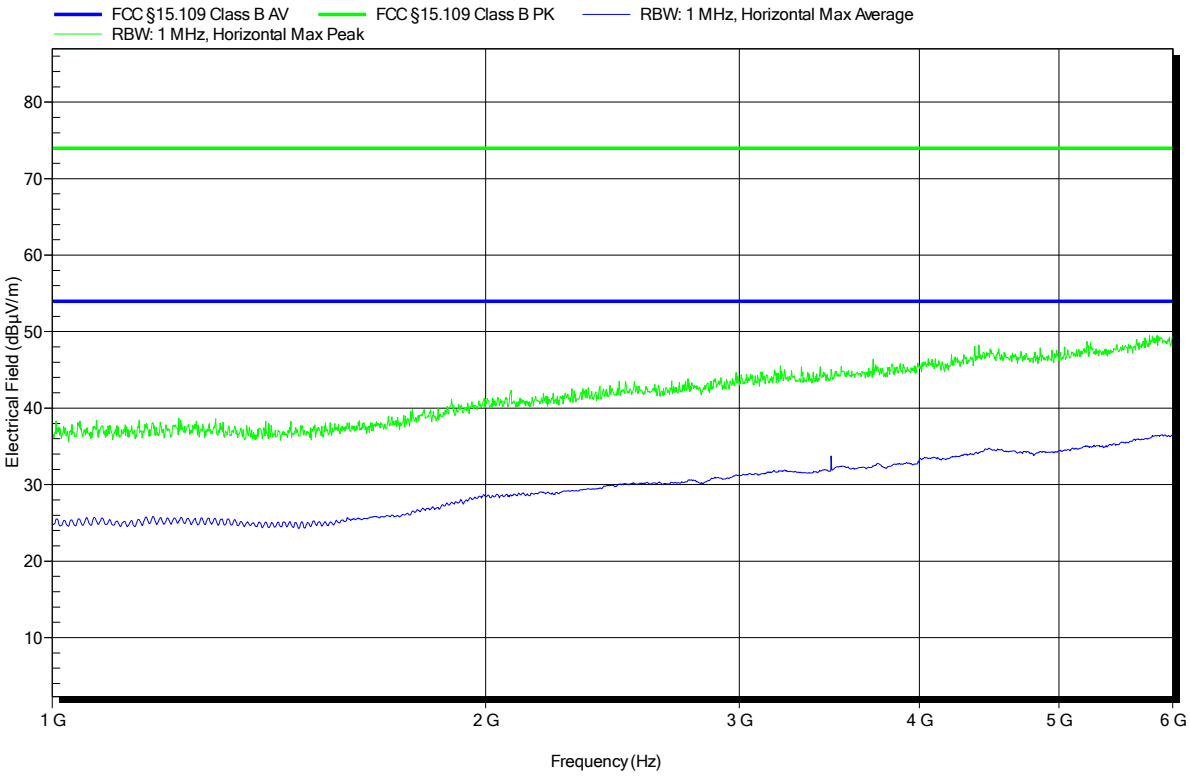

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Antenna:	Schwarzbeck VULB 9162, Horizontal
Measurement distance:	10 m
Mode:	2
Test Date:	2017-05-09
Note:	worst case!

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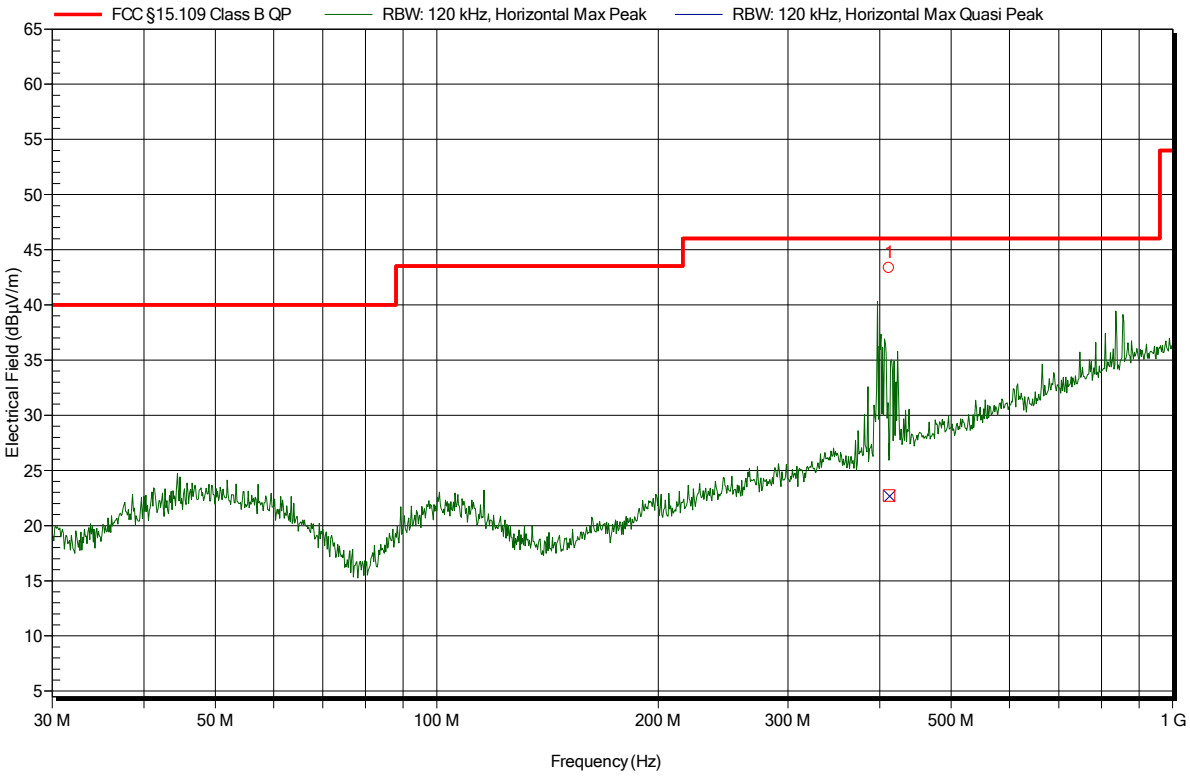

Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	411,42 MHz	22,7 dBµV/m	46 dBµV/m	-23,3 dB	Pass	145 Degree	3.1 m

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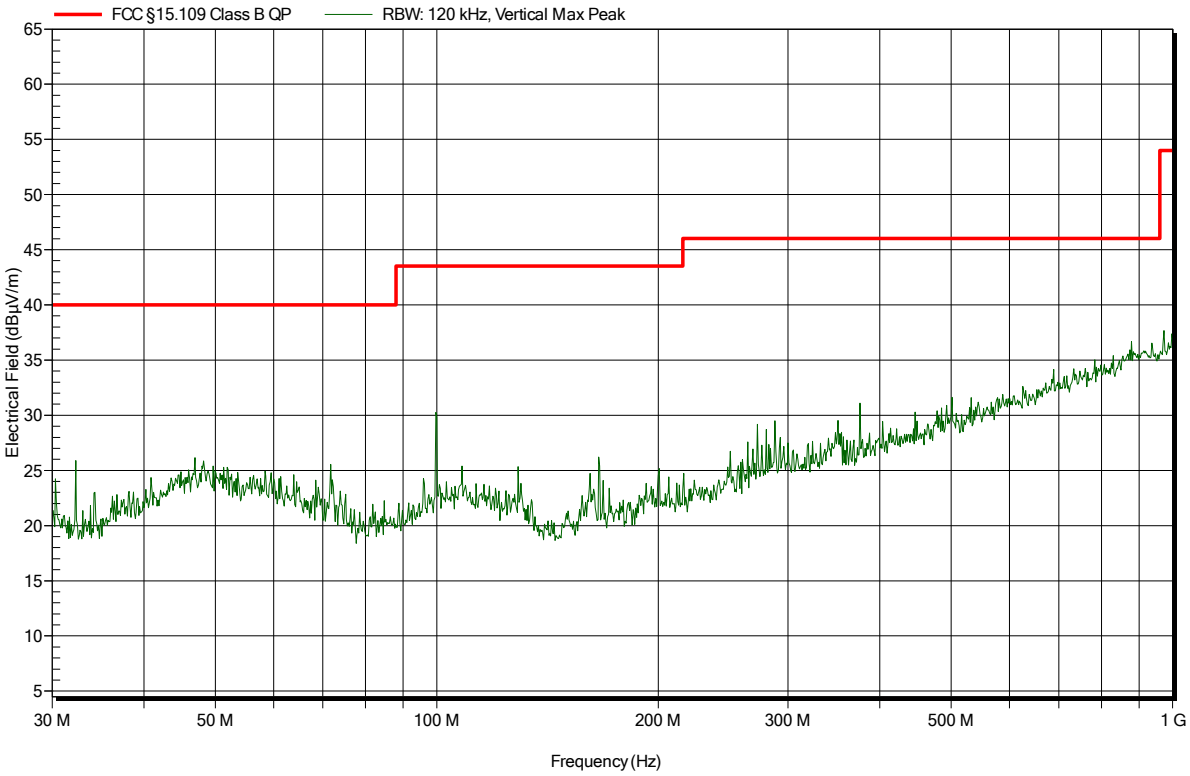
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