

## EMC TEST REPORT

FCC 47 CFR Part 15B  
Industry Canada RSS-Gen

Electromagnetic compatibility - Unintentional radiators

Report Reference No. .... : G0M-1404-3769-EF0115B-V02

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 ..... : BEACONinside GmbH

Address ..... : Czeminskistr. 7  
10829 Berlin  
GERMANY

### Test specification:

Standard..... : 47 CFR Part 15 Subpart B  
RSS-Gen, Issue 3, 2010-12  
ANSI C63.4:2009

### Equipment under test (EUT):

Product description ..... : bluetooth low energy transceiver

Model No. .... : B0001-A

Additional Models ..... : None

Hardware version ..... : 1.0

Firmware / Software version ..... : 1.03

FCC-ID: 2ACCT-B0001A

IC: 11976A-B0001A

Test result ..... : **Passed**

Test Report No.: G0M-1404-3769-EF0115B-V02

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 .....: 2014-04-29

Date (s) of performance of tests .....: 2014-04-29 – 2014-04-30

Compiled by .....: Jens Marquardt

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

Approved by (+ signature) .....: Marcus Klein

Date of issue .....: 2014-05-09

Total number of pages .....: 25


**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:**

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## Version History

Version	Issue Date	Remarks	Revised by
V01	2014-04-30	Initial Release	
V02	2014-05-09	Replaced document: G0M-1402-3769-EF0115B-V01 Replaced by: G0M-1402-3769-EF0115B-V02  Reason: <ul style="list-style-type: none"><li>• Page 1: FCC an IC ID added</li><li>• Page 1 &amp; 5: model name changed from BEACONinside Rev. 1.0 to B0001-A</li></ul>	J. Marquardt

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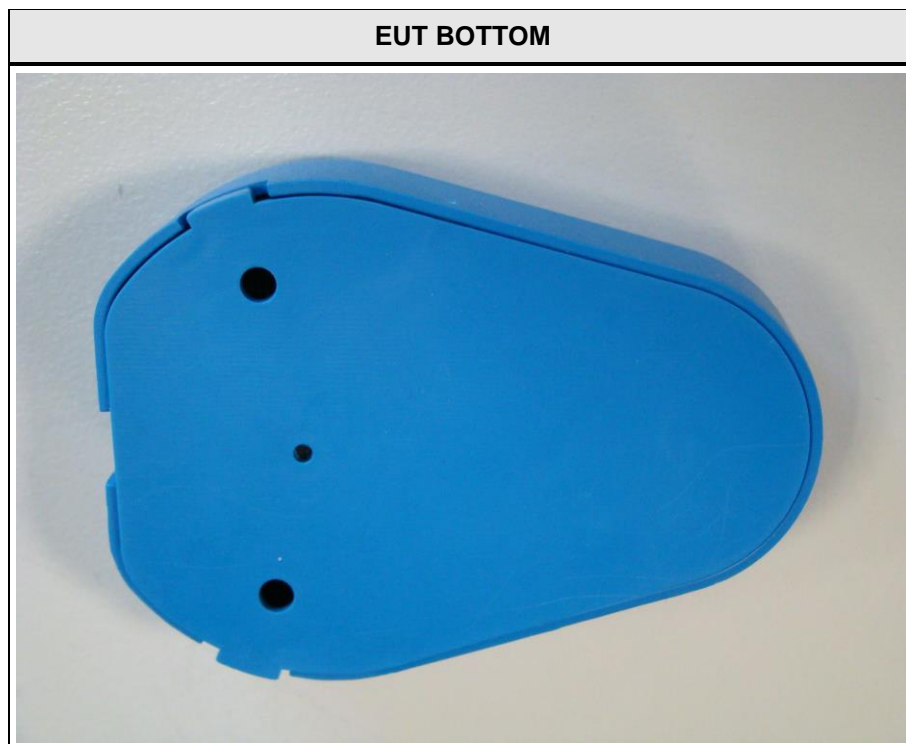
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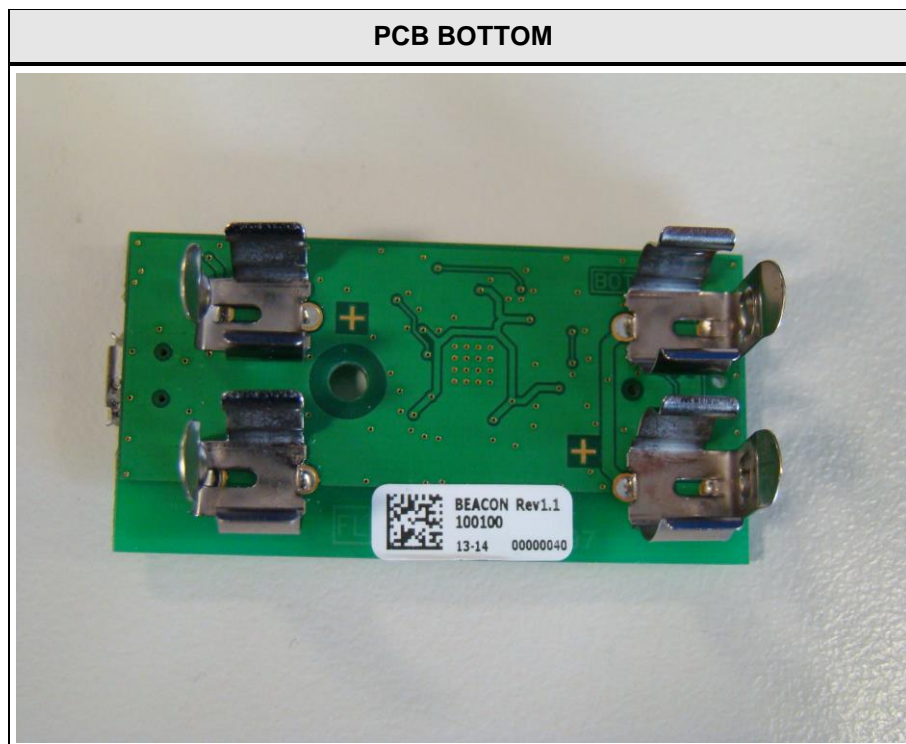
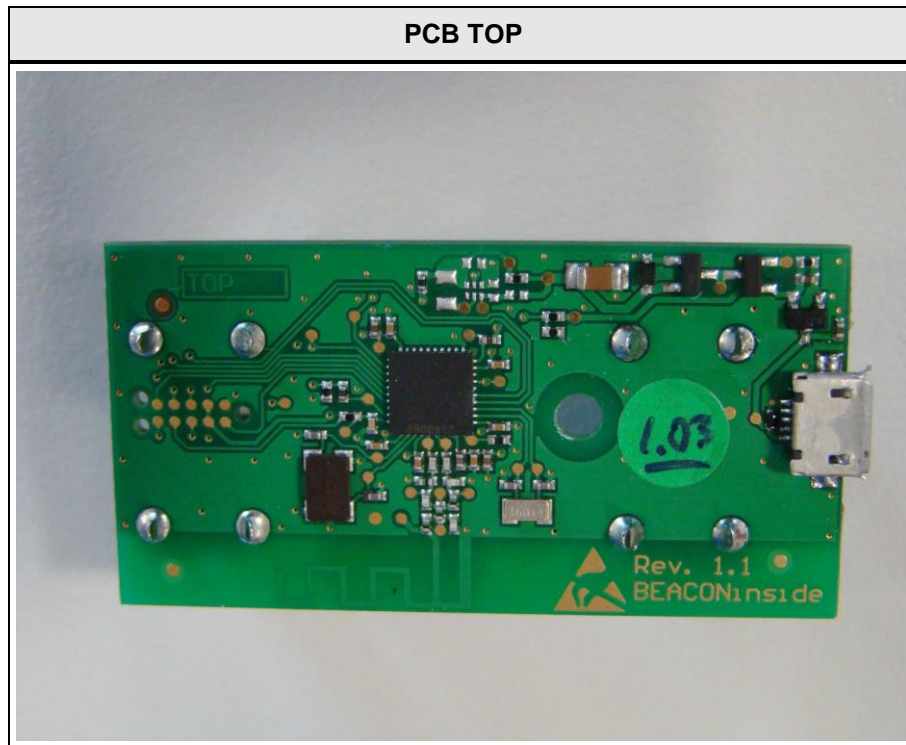
## 1 Equipment (Test item) Description

<b>Description</b>	bluetooth low energy transceiver
<b>Model</b>	B0001-A
<b>Additional Models</b>	None
<b>Serial number</b>	None
<b>Hardware version</b>	1.0
<b>Software / Firmware version</b>	1.03
<b>Power supply</b>	3 VDC (battery) or 5 VDC (via AC/DC adapter)
<b>AC/DC-Adaptor</b>	Model : HW-050055E1W Manufacturer : HUAWAI Input : 100-240VAC / 50-60Hz Output : 5 VDC / 0.55 A
<b>Manufacturer</b>	BEACONinside GmbH Czeminskistr. 7 10829 Berlin GERMANY
<b>Highest emission frequency</b>	Fmax [MHz] = 32
<b>Device classification</b>	Class B
<b>Equipment type</b>	Tabletop
<b>Number of tested samples</b>	1

## 1.1 Photos – Equipment external

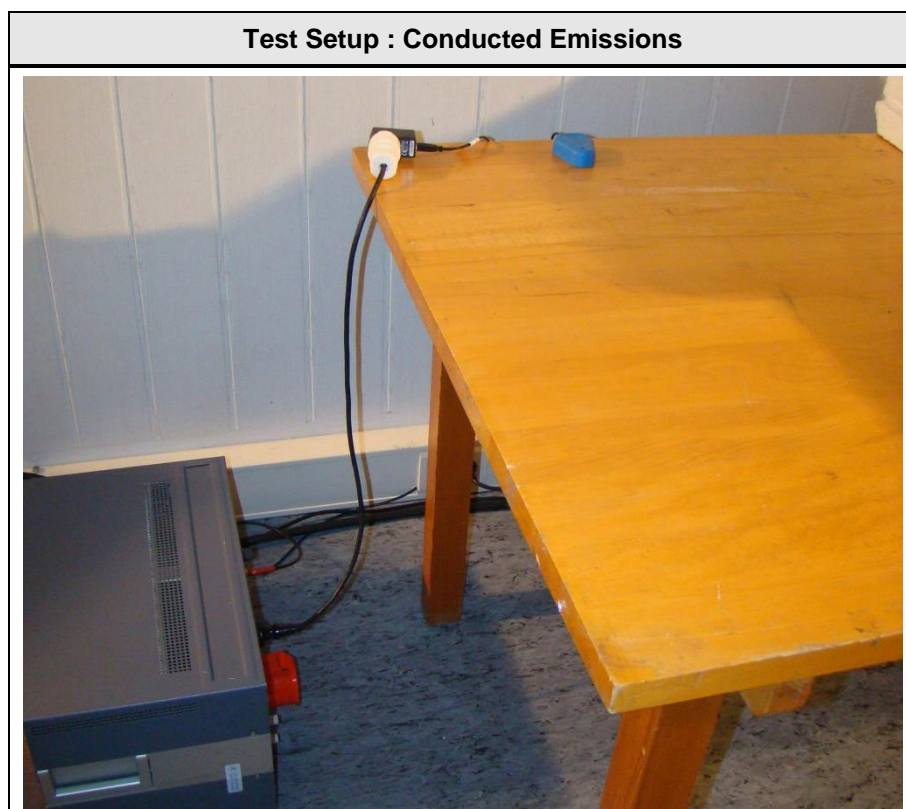
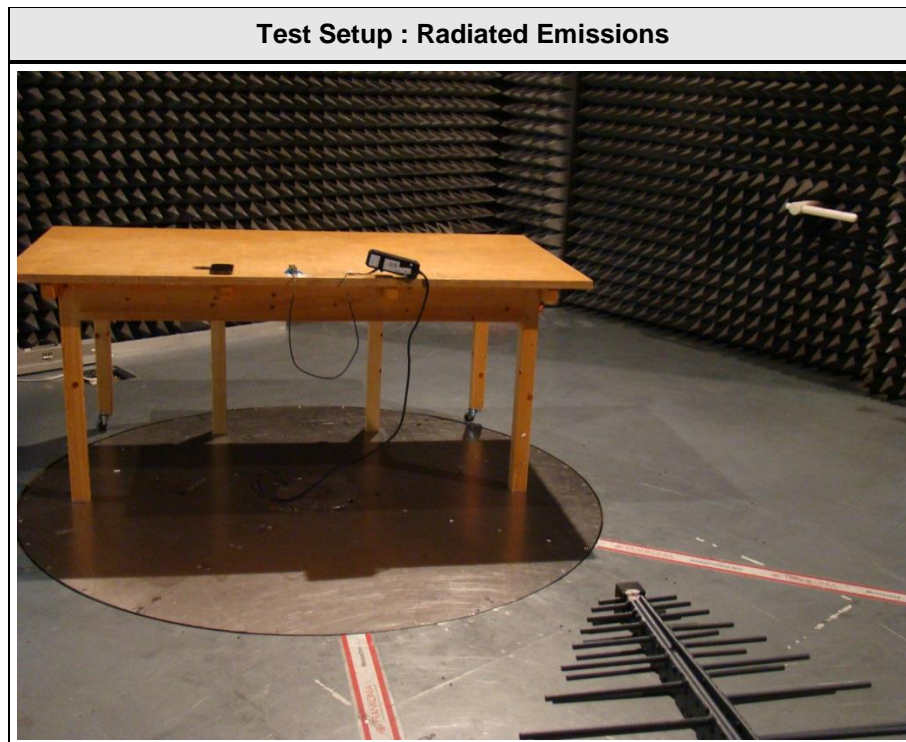


## 1.2 Photos – Equipment internal





### 1.3 Photos – Test setup





#### 1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
AE	Smart Phone	Samsung	Galaxy S4	
<p><b>*Note:</b> Use the following abbreviations:</p> <p>AE : Auxiliary/Associated Equipment, or</p> <p>SIM : Simulator (Not Subjected to Test)</p> <p>CABL : Connecting cables</p>				

### 1.5 Operating Modes

Mode #	Description
1	BT link to smart phone, EUT supplied via battery
2	BT link to smart phone, EUT supplied via AC/DC adaptor

## 1.6 Test Equipment Used During Testing

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
LPD-Antenna	R&S	HL 025	EF00327	2013-02	2016-02
EMI Test Receiver	R&S	ESU26	EF00887	2014-01	2015-01

Conducted emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	R&S	ESH2-Z5	EF00182	2012-10	2014-10
EMI Test Receiver	R&S	ESCS 30	EF00295	2013-10	2014-10

## 1.7 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 $\mu$ 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 $\mu$ V/m). The FCC limits are given in units of  $\mu$ V/m. The following formula is used to convert the units of  $\mu$ V/m to dB $\mu$ 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:

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

## 2 Result Summary

FCC 47 CFR Part 15B, Industry Canada RSS-Gen				
Product Specific Standard	Requirement – Test	Reference Method	Result	Remarks
47 CFR 15.109 RSS-Gen 4.9 & 4.10	Radiated emissions	ANSI C 63.4	PASS	
47 CFR 15.107 RSS-Gen 7.2.4	AC power line conducted emissions	ANSI C63.4	PASS	
Remarks:				

### 3 Test Conditions and Results

#### 3.1 Test Conditions and Results – Radiated emissions

Radiated emissions acc. FCC 47 CFR 15.109 / IC RSS-Gen					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 %		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] = 32				
Fully configured sample scanned over the following frequency range		Frequency range				
		30 MHz to 1 GHz				
Operating mode		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	-		-	-
Comments:						

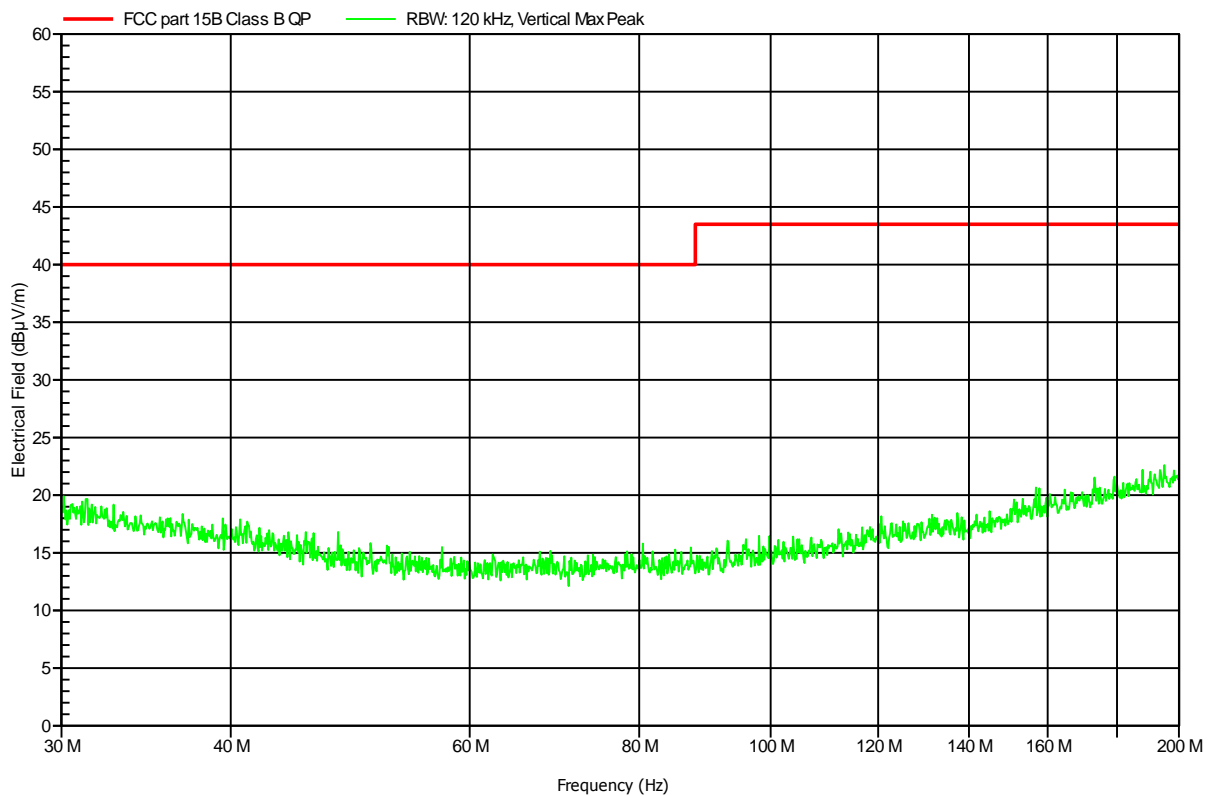


## Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1404-3769

Manufacturer: BEACONinside GmbH  
 EUT Name: bluetooth low energy transceiver  
 Model: B0001-A  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: 2x1.5VDC(battery-AAA)  
 Antenna: Rohde & Schwarz HK 116, Vertical  
 Measurement distance: 3m  
 Mode: link to Samsung S4  
 Test Date: 2014-04-29  
 Note:

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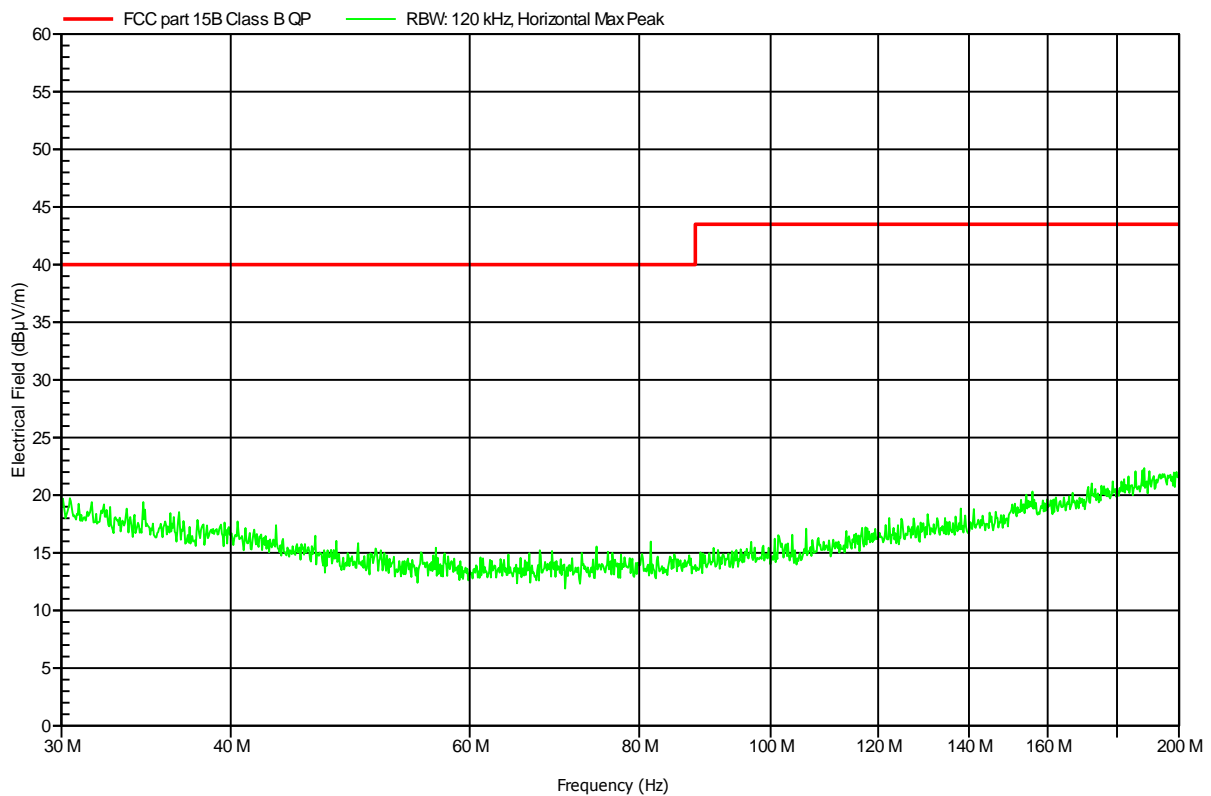
Eurofins Product Service GmbH  
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

**Spurious emissions under normal conditions according to FCC Part 15b**

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 EUT Name: bluetooth low energy transceiver  
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 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: 2x1.5VDC(battery-AAA)  
 Antenna: Rohde & Schwarz HK 116, Horizontal  
 Measurement distance: 3m  
 Mode: link to Samsung S4  
 Test Date: 2014-04-29  
 Note:

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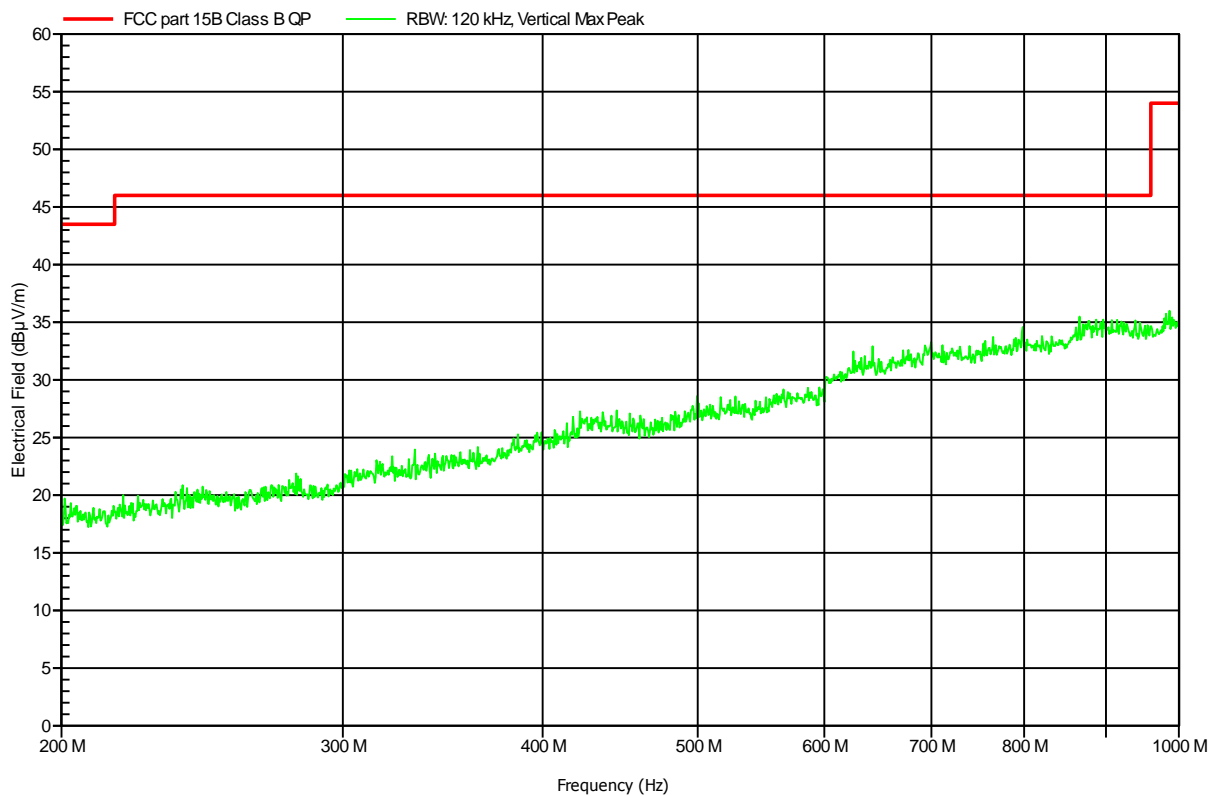


## Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1404-3769

Manufacturer: BEACONinside GmbH  
 EUT Name: bluetooth low energy transceiver  
 Model: B0001-A  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: 2x1.5VDC(battery-AAA)  
 Antenna: Rohde & Schwarz HL 223, Vertical  
 Measurement distance: 3m  
 Mode: link to Samsung S4  
 Test Date: 2014-04-29  
 Note:

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Test Report No.: G0M-1404-3769-EF0115B-V02

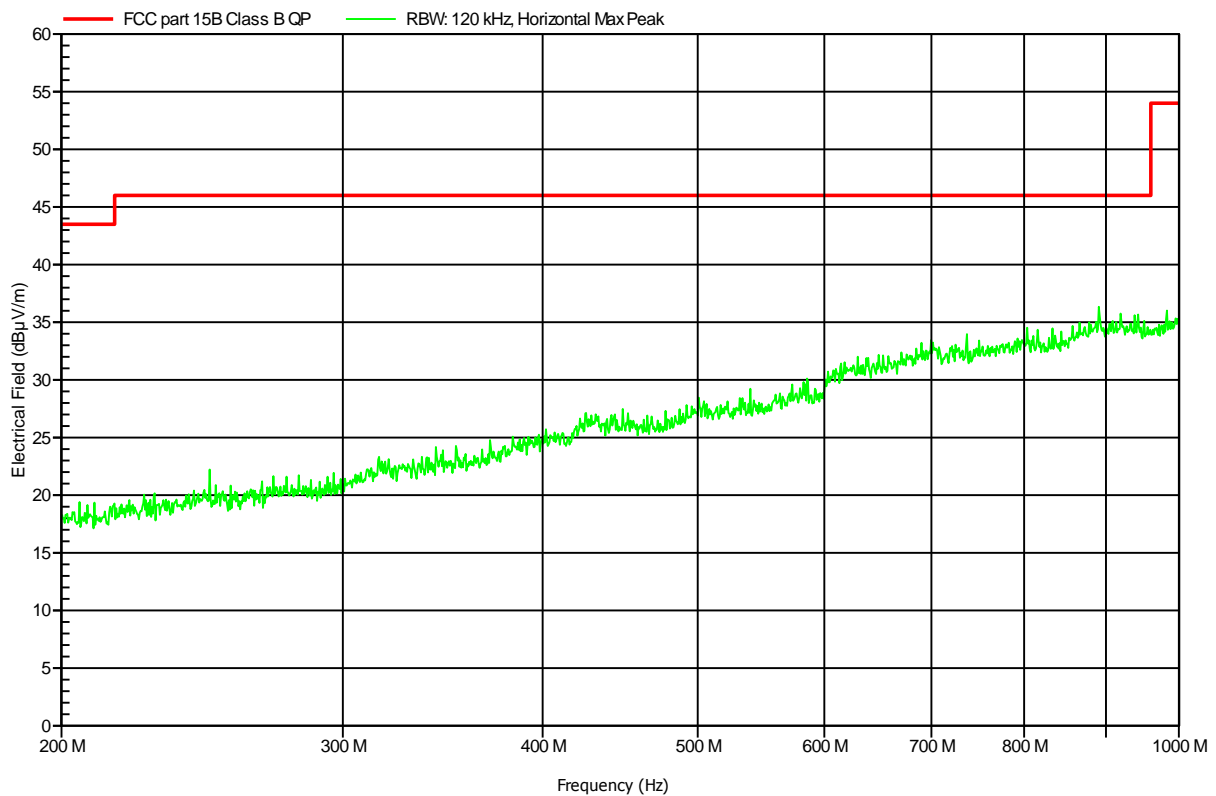
Eurofins Product Service GmbH  
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

## Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1404-3769

Manufacturer: BEACONinside GmbH  
 EUT Name: bluetooth low energy transceiver  
 Model: B0001-A  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: 2x1.5VDC(battery-AAA)  
 Antenna: Rohde & Schwarz HL 223, Horizontal  
 Measurement distance: 3m  
 Mode: link to Samsung S4  
 Test Date: 2014-04-29  
 Note:

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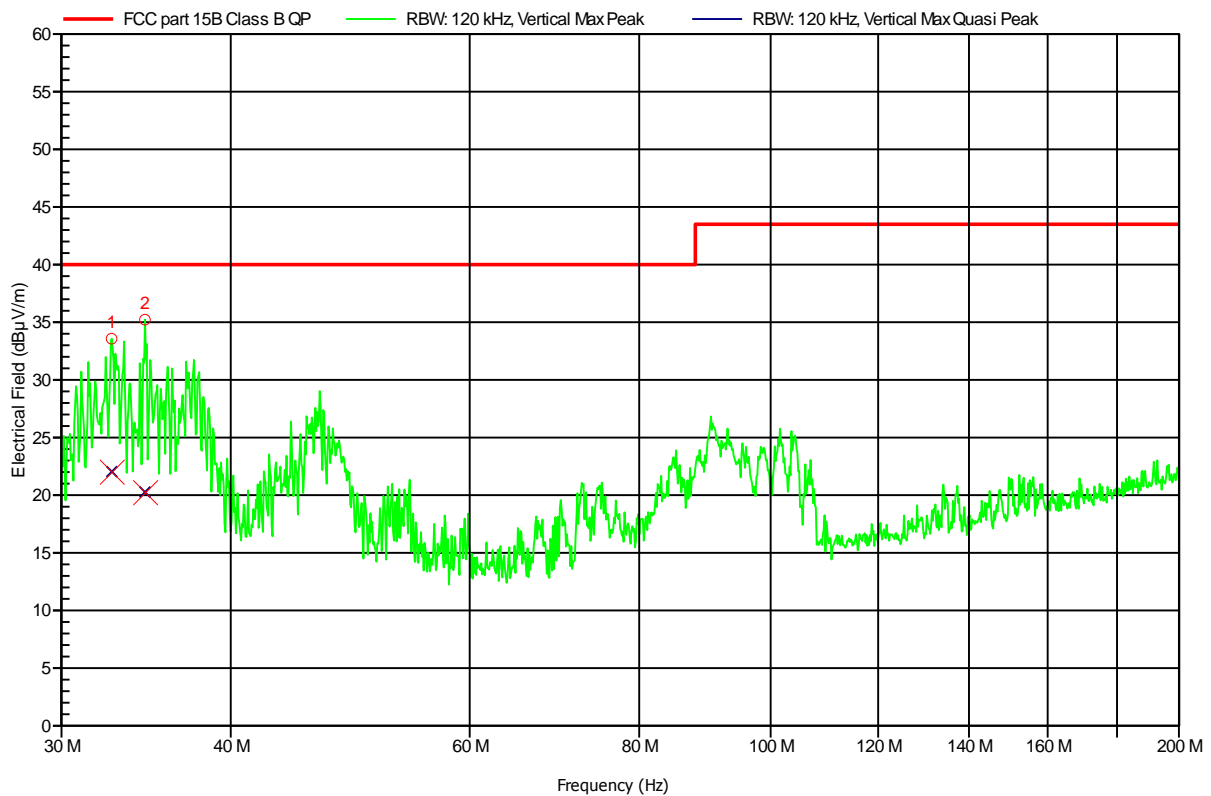


## Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1404-3769

Manufacturer: BEACONinside GmbH  
 EUT Name: bluetooth low energy transceiver  
 Model: B0001-A  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: 230VAC(AC/DC-adapter)  
 Antenna: Rohde & Schwarz HK 116, Vertical  
 Measurement distance: 3m  
 Mode: link to Samsung S4  
 Test Date: 2014-04-29  
 Note:

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Nr	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	32.676 MHz	22.04 dBµV/m	40 dBµV/m	-17.96 dB	Pass
2	34.584 MHz	20.27 dBµV/m	40 dBµV/m	-19.73 dB	Pass

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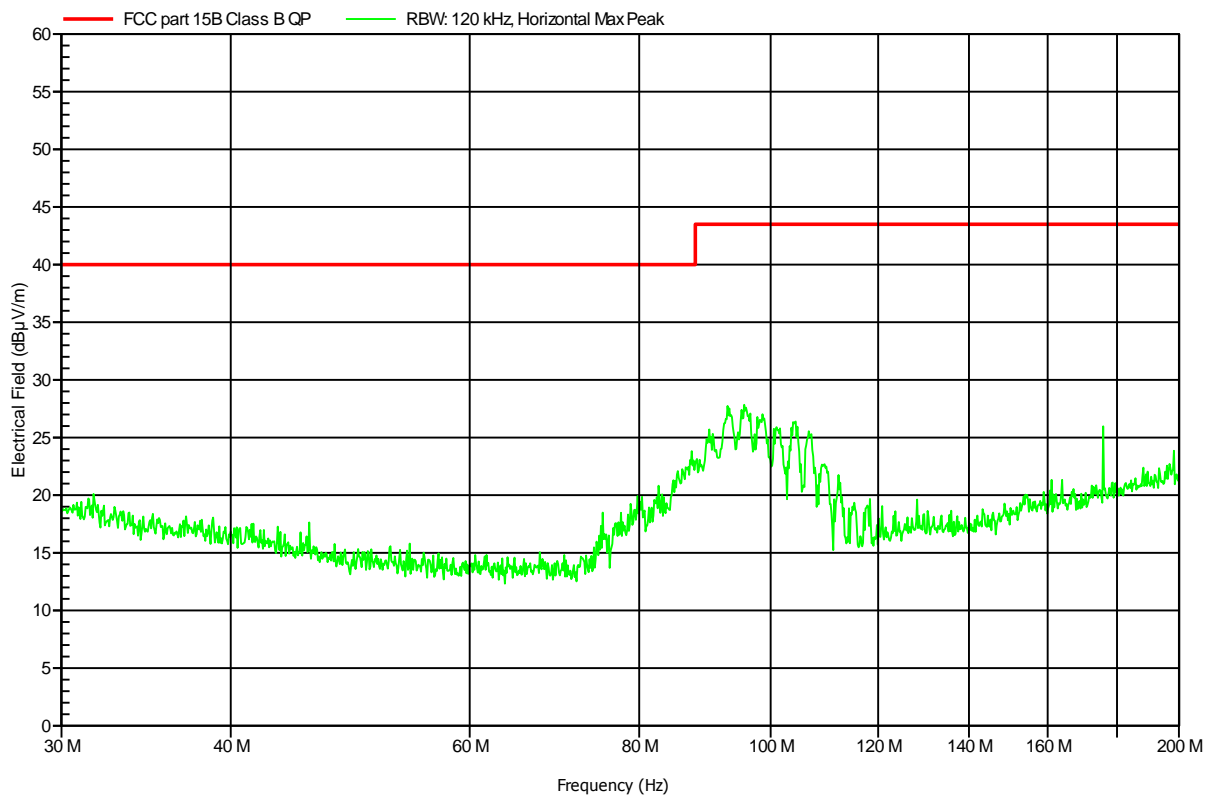
Eurofins Product Service GmbH  
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

## Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1404-3769

Manufacturer: BEACONinside GmbH  
 EUT Name: bluetooth low energy transceiver  
 Model: B0001-A  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: 230VAC(AC/DC-adapter)  
 Antenna: Rohde & Schwarz HK 116, Horizontal  
 Measurement distance: 3m  
 Mode: link to Samsung S4  
 Test Date: 2014-04-29  
 Note:

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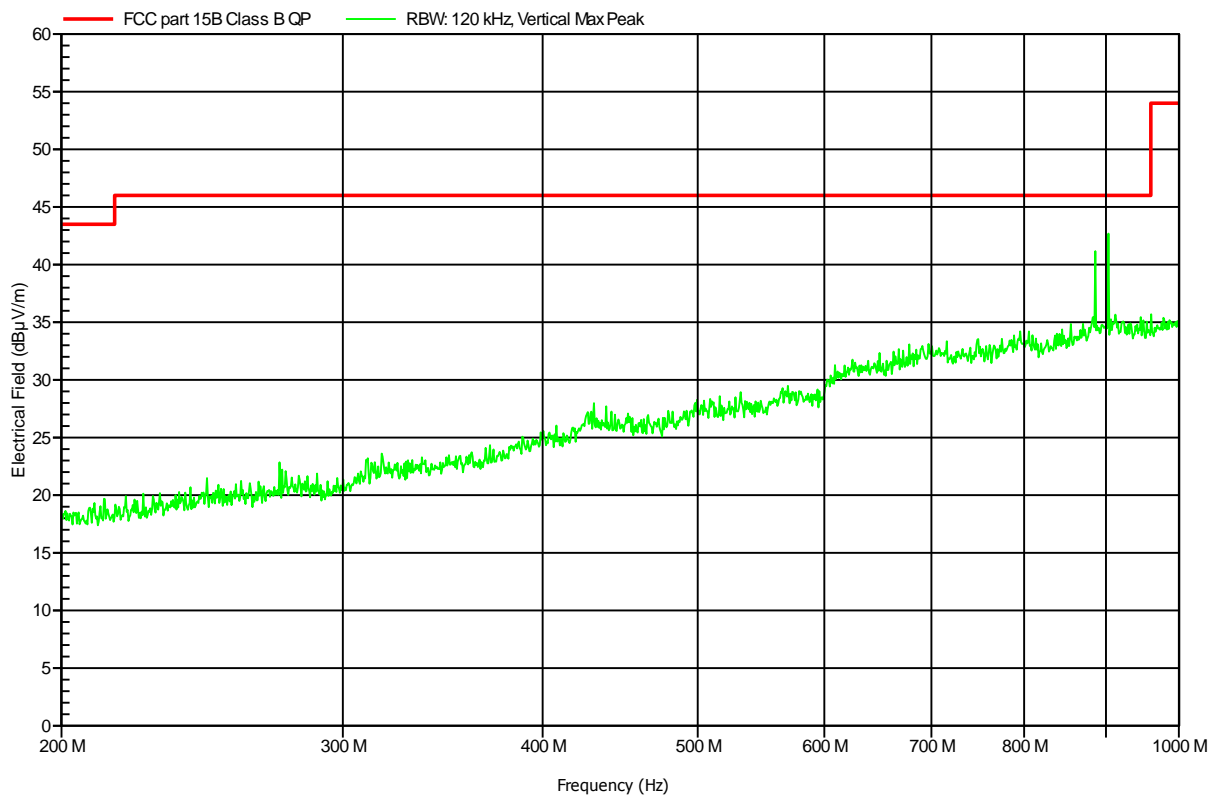


**Spurious emissions under normal conditions according to FCC Part 15b**

Project number: G0M-1404-3769

Manufacturer: BEACONinside GmbH  
 EUT Name: bluetooth low energy transceiver  
 Model: B0001-A  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: 230VAC(AC/DC-adapter)  
 Antenna: Rohde & Schwarz HL 223, Vertical  
 Measurement distance: 3m  
 Mode: link to Samsung S4  
 Test Date: 2014-04-29  
 Note:

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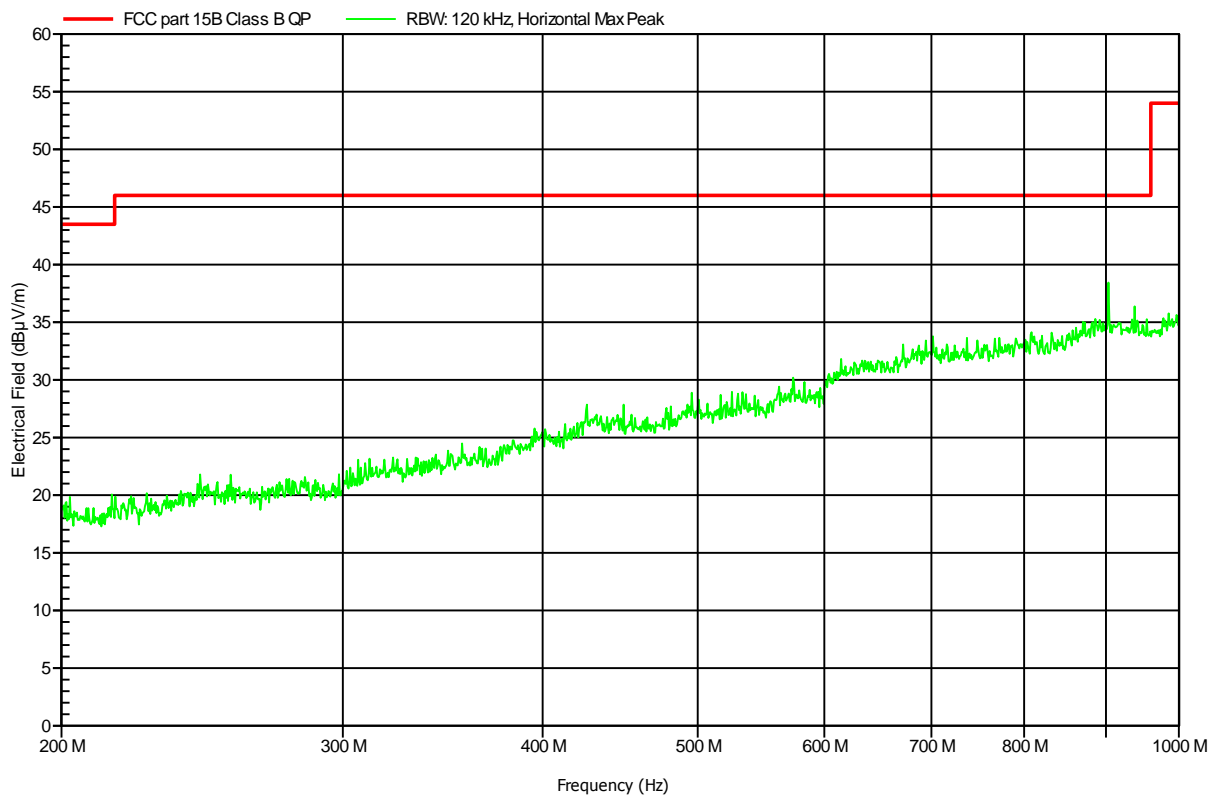


**Spurious emissions under normal conditions according to FCC Part 15b**

Project number: G0M-1404-3769

Manufacturer: BEACONinside GmbH  
 EUT Name: bluetooth low energy transceiver  
 Model: B0001-A  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: 230VAC(AC/DC-adapter)  
 Antenna: Rohde & Schwarz HL 223, Horizontal  
 Measurement distance: 3m  
 Mode: link to Samsung S4  
 Test Date: 2014-04-29  
 Note:

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### 3.2 Test Conditions and Results – AC power line conducted emissions

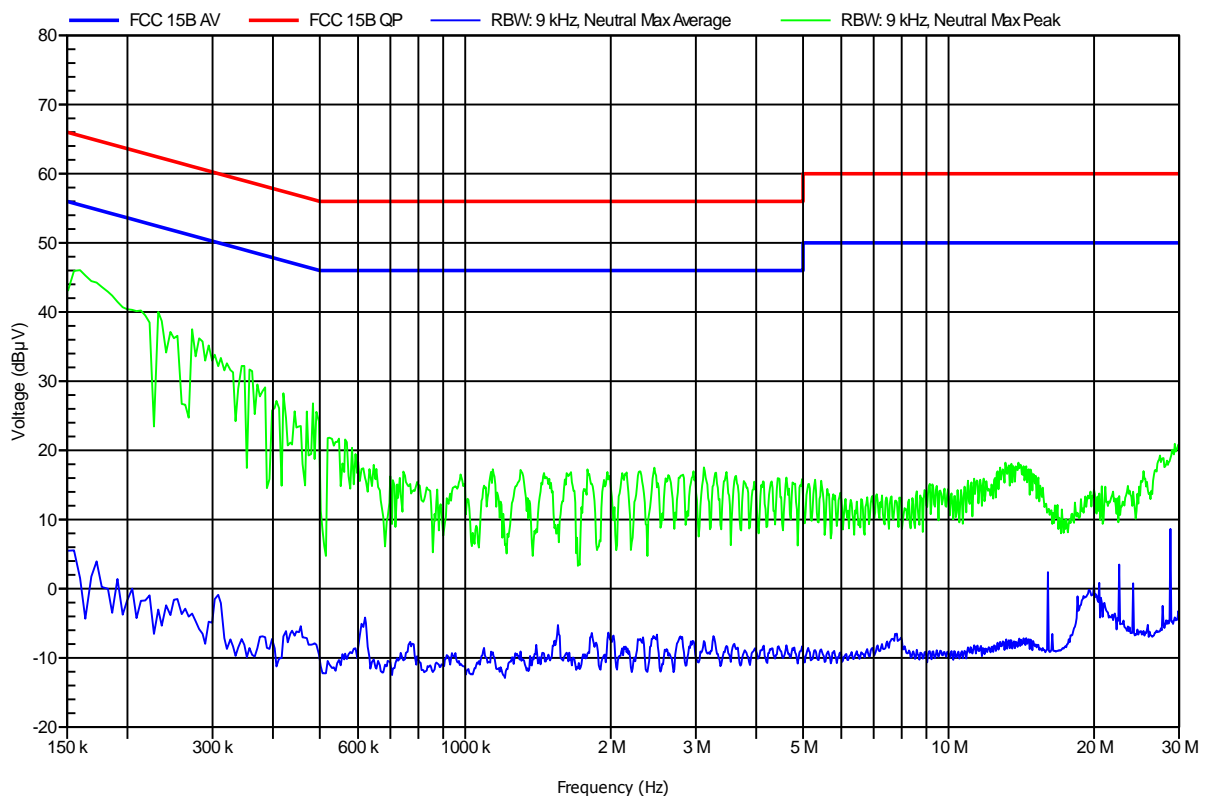
Conducted emissions acc. FCC 47 CFR 15.107 / IC RSS-Gen			Verdict: PASS	
Laboratory Parameters:		Required prior to the test	During the test	
Ambient Temperature		15 to 35 °C	23°C	
Relative Humidity		30 to 60 %	35%	
Test according referenced standards		Reference Method		
		ANSI C63.4		
Fully configured sample scanned over the following frequency range		Frequency range		
		0.15 MHz to 30 MHz		
Sample is tested with respect to the requirements of the equipment class		Equipment class		
		Class B		
Points of Application		Application Interface		
AC Mains		LISN		
Operating mode		2		
Limits and results Class B				
Frequency [MHz]	Quasi-Peak [dBµV]	Result	Average [dBµV]	Result
0.15 to 5	66 to 56*	PASS	56 to 46*	PASS
0.5 to 5	56	PASS	46	PASS
5 to 30	60	PASS	50	PASS
Comments:				
* Limit decreases linearly with the logarithm of the frequency.				

## EMI voltage test in the ac-mains according to FCC Part 15b

Project number: G0M-1404-3769

Manufacturer: BEACONinside GmbH  
 EUT Name: bluetooth low energy transceiver  
 Model: B0001-A  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: 120VAC(AC/DC-adapter)  
 LISN: ESH2-Z5 N  
 Mode: link to Samsung S4  
 Test Date: 2014-04-29  
 Note:

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Test Report No.: G0M-1404-3769-EF0115B-V02

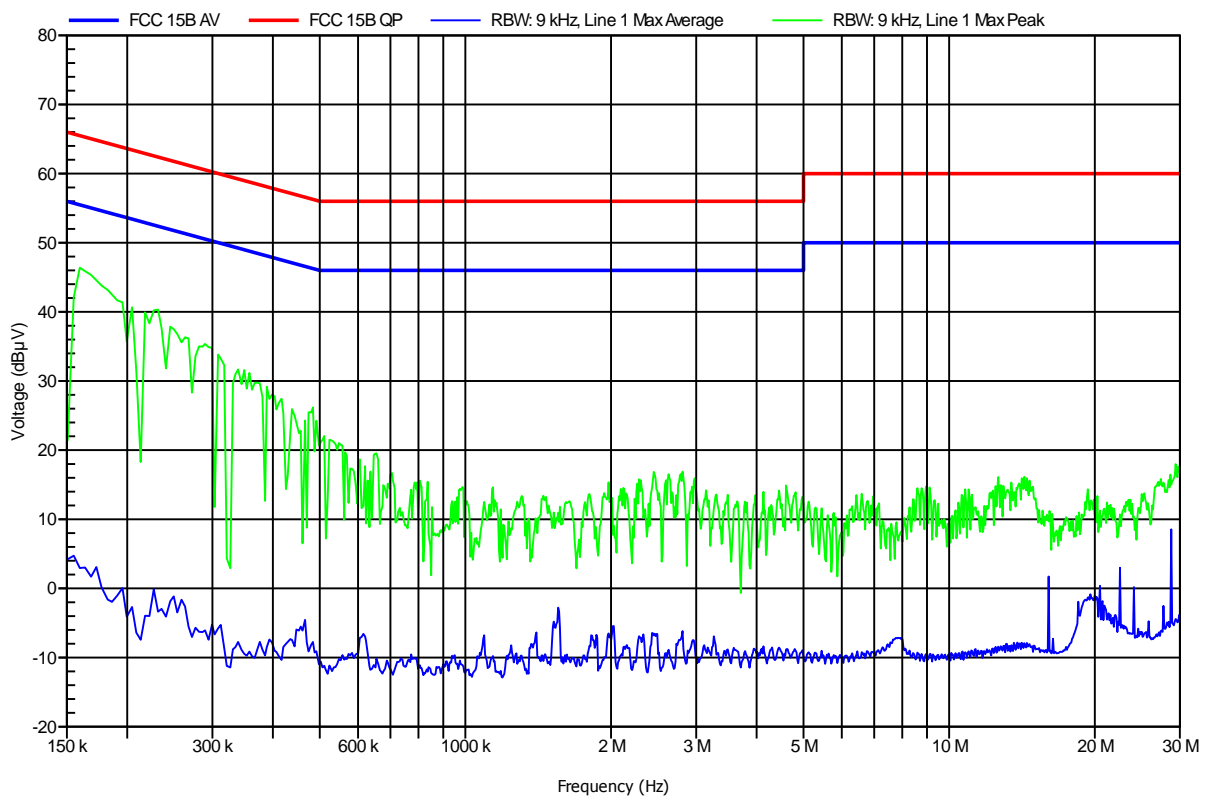
Eurofins Product Service GmbH  
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

**EMI voltage test in the ac-mains according to FCC Part 15b**

Project number: G0M-1404-3769

Manufacturer: BEACONinside GmbH  
 EUT Name: bluetooth low energy transceiver  
 Model: B0001-A  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: 120VAC(AC/DC-adapter)  
 LISN: ESH2-Z5 L  
 Mode: link to Samsung S4  
 Test Date: 2014-04-29  
 Note:

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