

EMC TEST REPORT

FCC 47 CFR Part 15B
Industry Canada RSS-Gen

Electromagnetic compatibility - Unintentional radiators

Report Reference No. : G0M-1211-2402-EF01-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 : Robert Bosch GmbH

Address : Postfach 10 01 56
70745 Leinfelden-Echterdingen
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 Industrial Controller with Bluetooth Access Point

Model No. Bosch EXAConnect II (0 602 491 003)

Additional Models None

Hardware version E

Firmware / Software version 2.00.3

FCC-ID: TD8-EXACONNECT-II IC: 3887B-491003

Test result Passed

Test Report No.: G0M-1211-2402-EF01-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: 2013-07-23

Date (s) of performance of tests: 2013-07-31

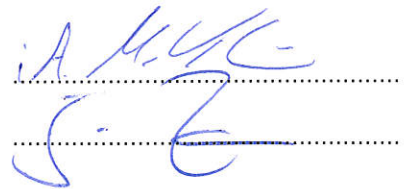
Compiled by: Antje Bartusch

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

Approved by (+ signature): Jens Zimmermann

Date of issue: 2013-09-11

Total number of pages: 22


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:

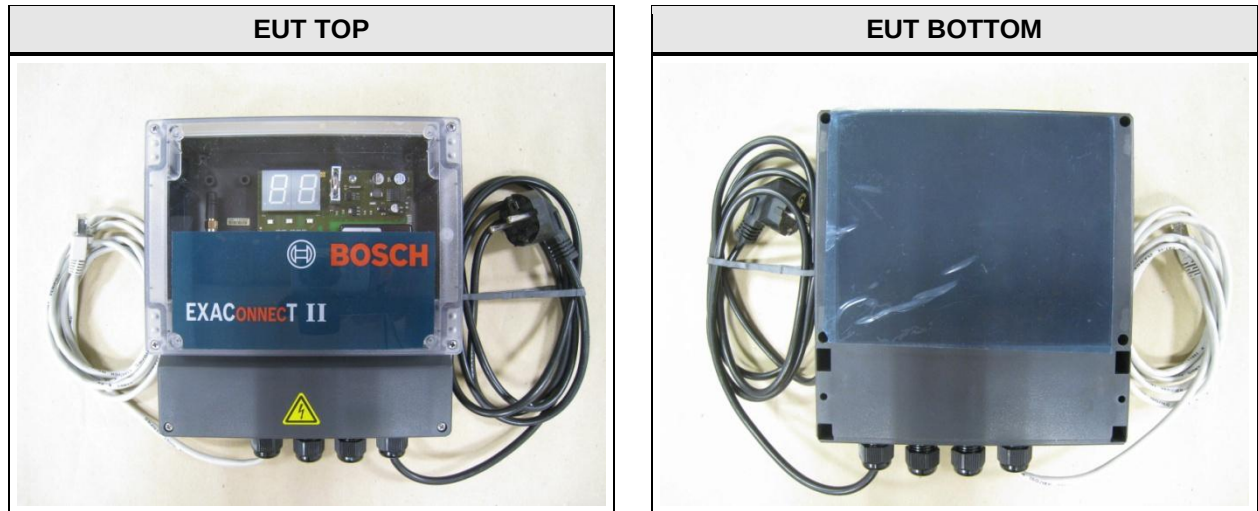
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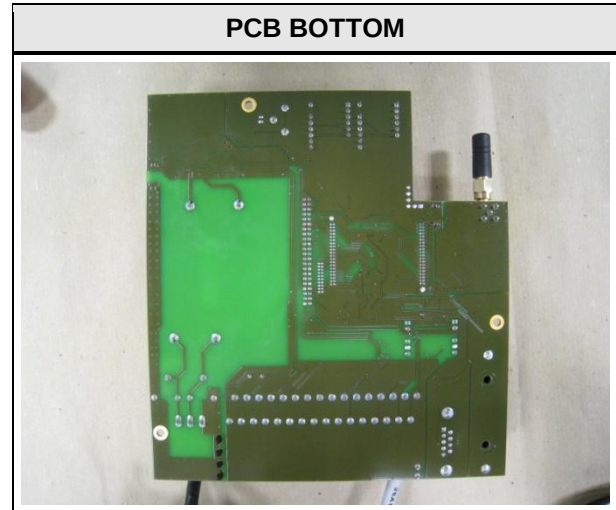
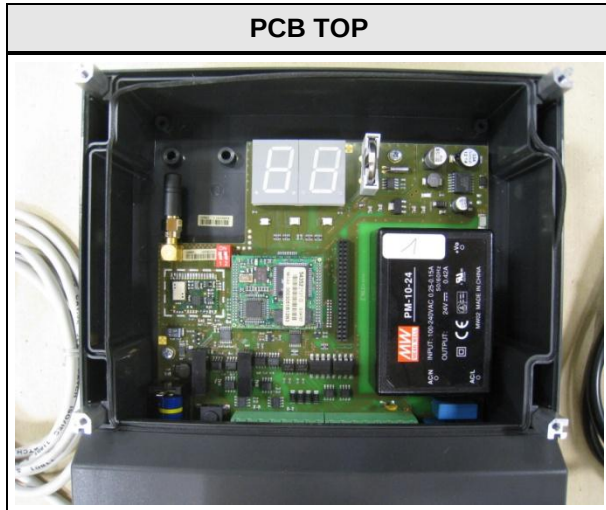
1 Equipment (Test item) Description

Description	Industrial Controller with Bluetooth Access Point	
Model	Bosch EXAConnect II (0 602 491 003)	
Additional Models	None	
Serial number	None	
Hardware version	E	
Software / Firmware version	2.00.3	
FCC-ID	TD8-EXACONNECT-II	
IC	3887B-491003	
Power supply	120 VAC	
AC/DC-Adaptor	None	
Radio module	Type	Bluetooth Module
	Model	PAN 1315
	Manufacturer	Panasonic
	HW Version	unspecified
	SW Version	unspecified
Manufacturer	MSC Vertriebs GmbH Industriestraße 16 76297 Stutensee Germany	
Highest emission frequency	Fmax [MHz] =16	
Device classification	Class B	
Equipment type	Tabletop	
Number of tested samples	1	

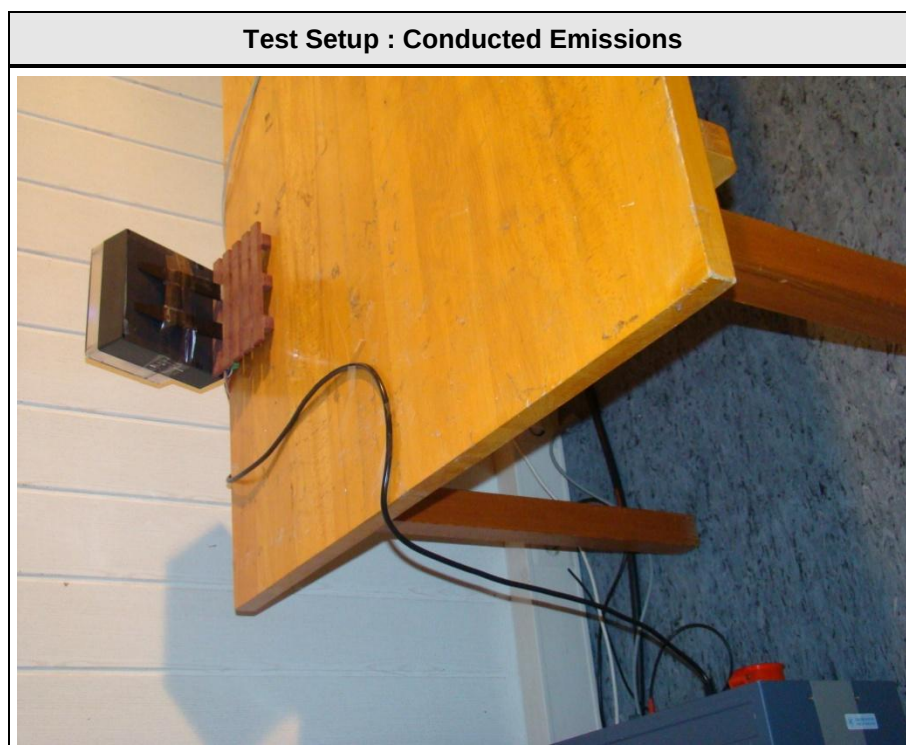
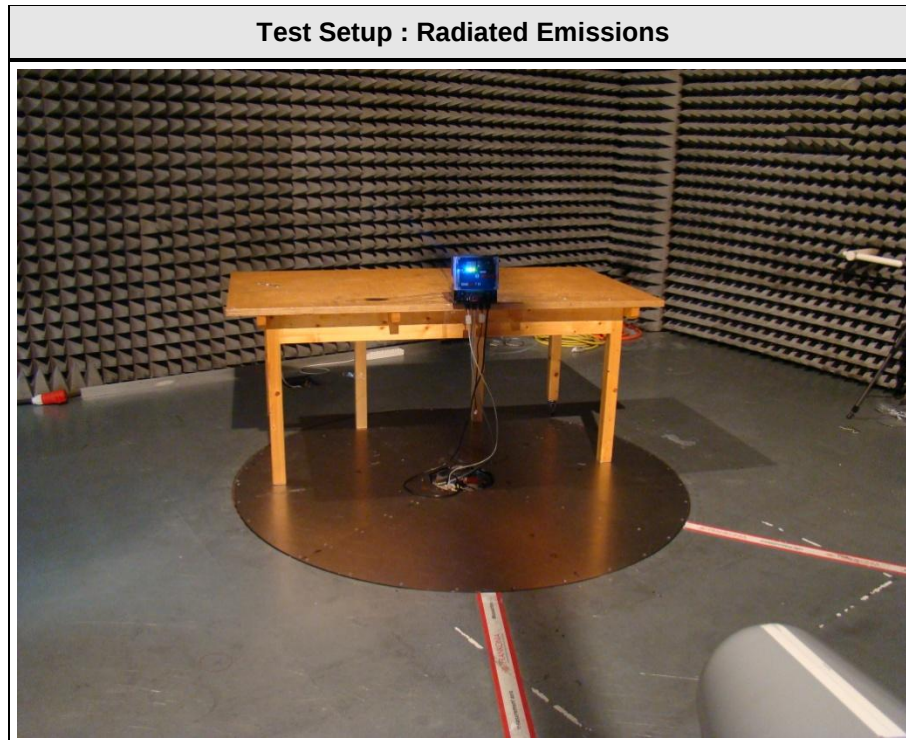
1.1 Photos – Equipment external



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	Ethernet switch	---	---	
AE	Notebook	Lenovo	R61	
AE	Bluetooth Screwdriver	Bosch	BT EXACT 12	
*Note: Use the following abbreviations: AE : Auxiliary/Associated Equipment, or SIM : Simulator (Not Subjected to Test) CABL : Connecting cables				

1.5 Operating Modes

Mode #	Description
1	Access Point Software operational, Ethernet connected to PC via switch, Monitoring Screen on PC, 1 Bluetooth Screwdriver connected via Bluetooth (permanent connection).

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	2011-02	2014-02
LPD-Antenna	R&S	HL 025	EF00327	2013-02	2016-02
EMI Test Receiver	R&S	ESU8	EF00379	2013-03	2014-03
EMI Test Receiver	R&S	ESCS 30	EF00297	2012-09	2013-09

Conducted emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	R&S	ESH2-Z5	EF00182	2012-10	2014-10
AMN	R&S	ESH3-Z5	EF00036	2012-11	2014-11
EMI Test Receiver	R&S	ESCS 30	EF00297	2012-09	2013-09

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 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:

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

Net:

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

Limit:

This is the FCC Class B radiated emission limit (in units of 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:

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

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:

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 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

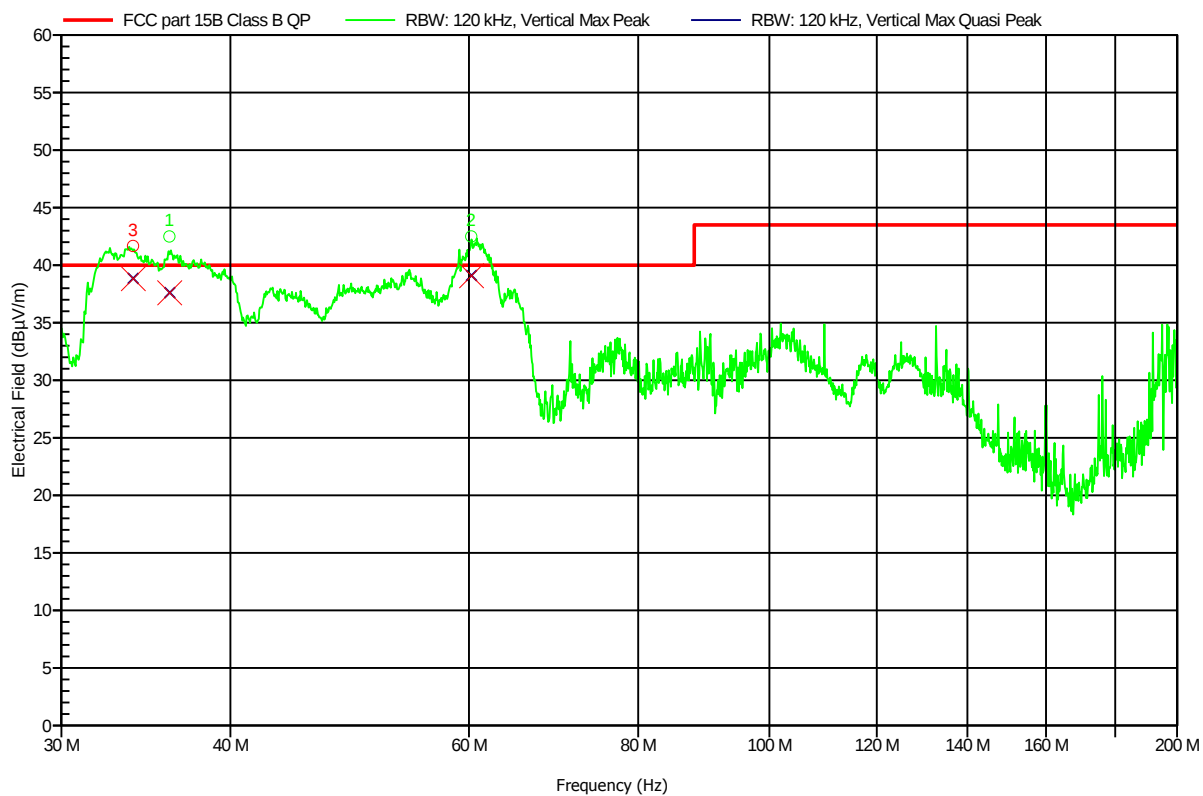
Radiated emissions acc. FCC 47 CFR 15.109 / IC RSS-Gen					Verdict: PASS	
Laboratory Parameters:		Required prior to the test		During the test		
Ambient Temperature		15 to 35 °C		23		
Relative Humidity		30 to 60 %		51		
Test according referenced standards		Reference Method				
		ANSI C63.4				
Sample 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] =16				
Fully configured sample scanned over the following frequency range		Frequency range				
		30 MHz to 5 GHz				
Operating mode		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	-	-	54	PASS	74	PASS
Comments:						

Spurious emissions under normal conditions according to FCC PART 15B

Project number: G0M-1211-2404

Manufacturer: MSC Vertriebs GmbH
 EUT Name: Bluetooth Access Point XAConnectT II Typ:0 602 491 003
 Model: Bosch EXAConnect Ser.No.306000049
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pflug
 Test Conditions: Tnom: 23°C, Unom: 120 VAC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3m, converted to 10m
 Mode: link
 Test Date: 2013-07-30
 Note:

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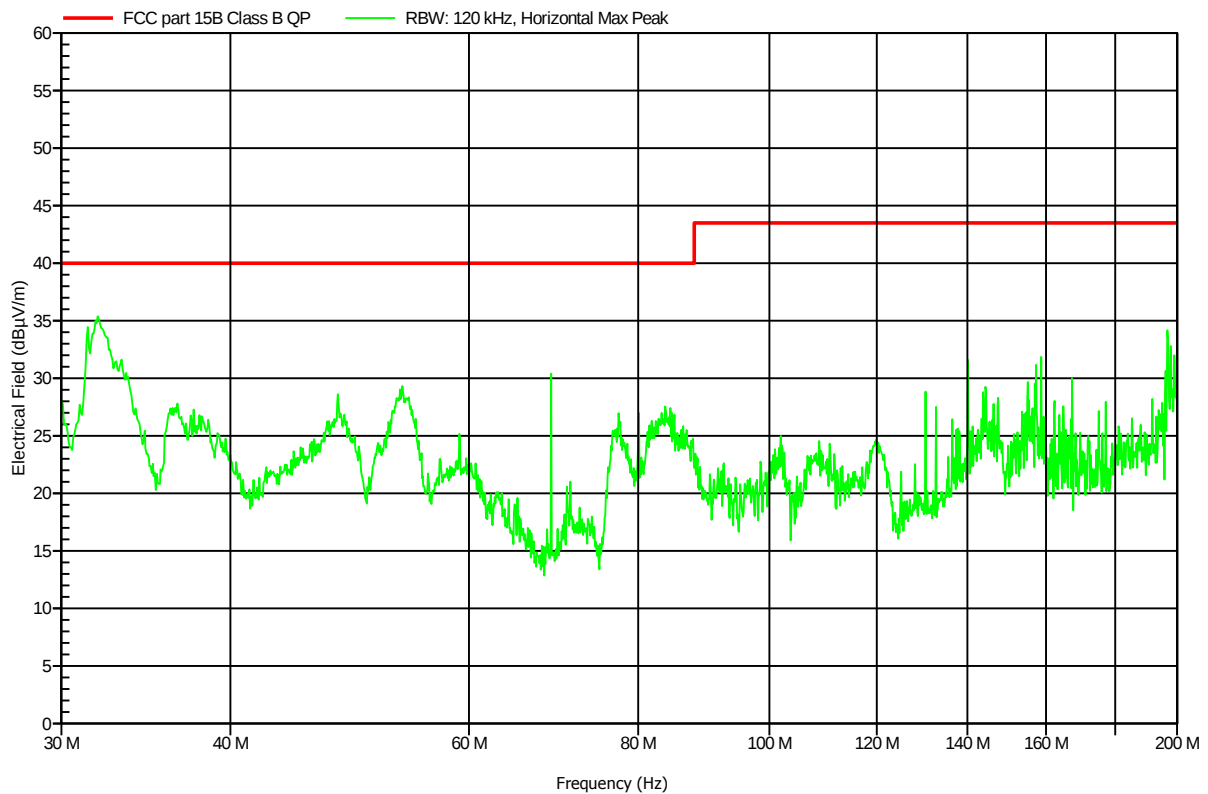
Nr	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
3	33.9 MHz	38.85 dBµV/m	40 dBµV/m	-1.15 dB	Pass
1	36.06 MHz	37.62 dBµV/m	40 dBµV/m	-2.38 dB	Pass
2	60.24 MHz	39.11 dBµV/m	40 dBµV/m	-0.89 dB	Pass

Spurious emissions under normal conditions according to FCC PART 15B

Project number: GOM-1211-2404

Manufacturer: MSC Vertriebs GmbH
 EUT Name: Bluetooth Access Point EXAConnect II Typ:0 602 491 003
 Model: Bosch EXAConnect Ser.No.306000049
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pflug
 Test Conditions: Tnom: 23°C, Unom: 120 VAC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3m, converted to 10m
 Mode: link
 Test Date: 2013-07-30
 Note:

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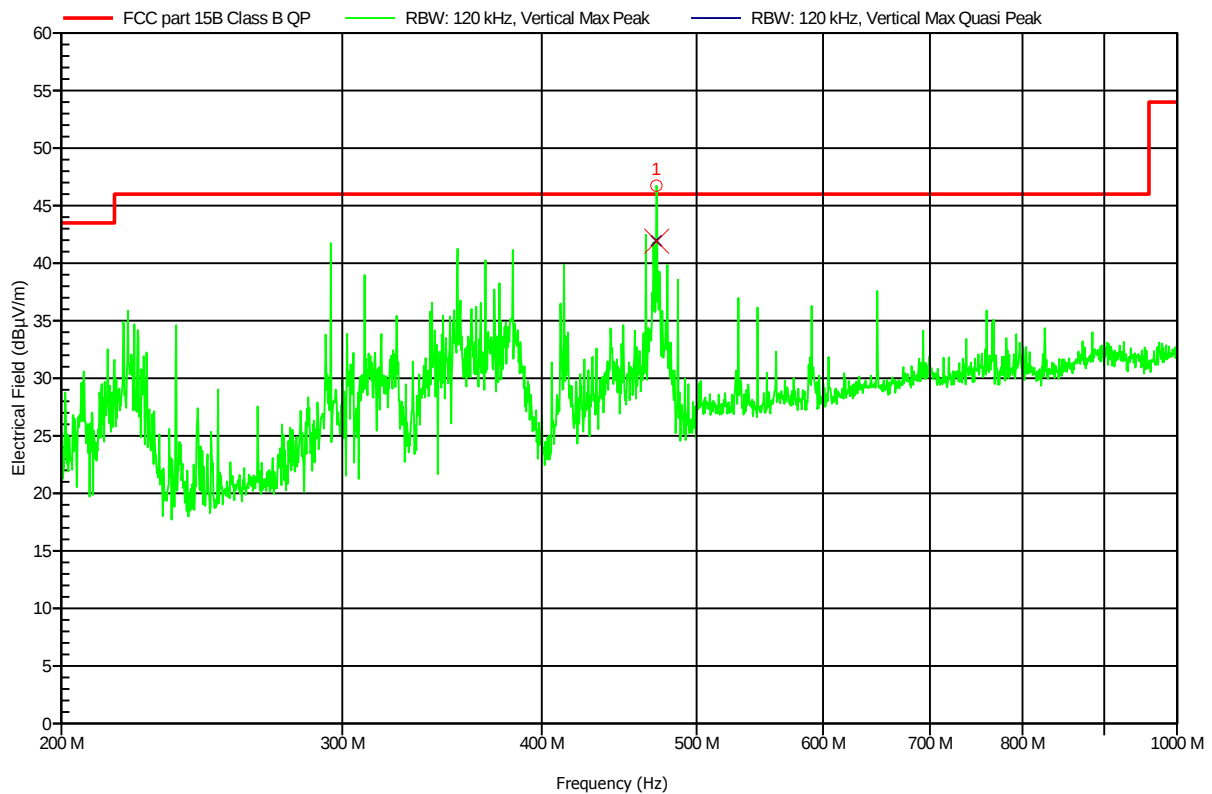


Spurious emissions under normal conditions according to FCC PART 15B

Project number: G0M-1211-2404

Manufacturer: MSC Vertriebs GmbH
 EUT Name: Bluetooth Access Point EXAConnect II Typ:0 602 491 003
 Model: Bosch EXAConnect Ser.No.306000049
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pflug
 Test Conditions: Tnom: 23°C, Unom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3m, converted to 10m
 Mode: link
 Test Date: 2013-07-30
 Note:

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Nr	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	471.854 MHz	41.94 dBµV/m	46 dBµV/m	-4.06 dB	Pass

Test Report No.: G0M-1211-2402-EF01-V01

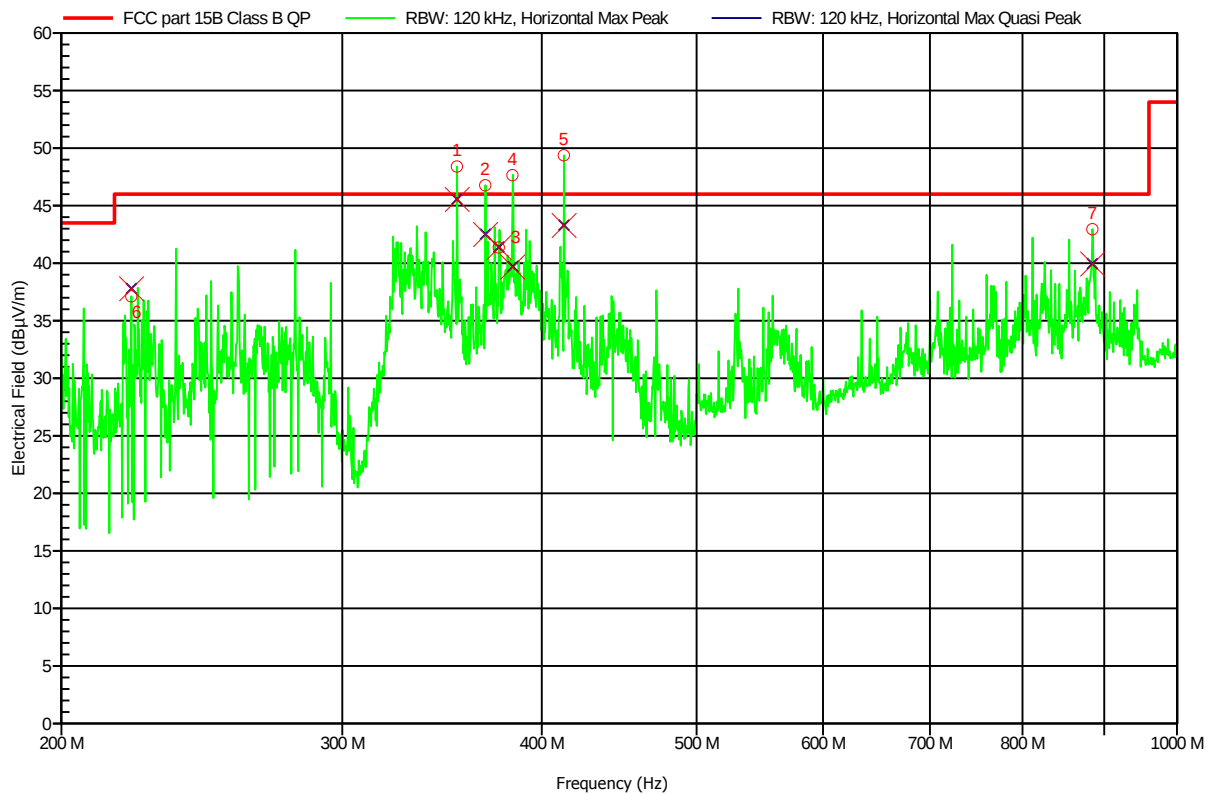
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions under normal conditions according to FCC PART 15B

Project number: GOM-1211-2404

Manufacturer: MSC Vertriebs GmbH
 EUT Name: Bluetooth Access Point EXAConnect II Typ:0 602 491 003
 Model: Bosch EXAConnect Ser.No.306000049
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pflug
 Test Conditions: Tnom: 23°C, Unom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3m, converted to 10m
 Mode: link
 Test Date: 2013-07-30
 Note:

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Nr	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
6	221.294 MHz	37.8 dBµV/m	46 dBµV/m	-8.2 dB	Pass
1	353.894 MHz	45.56 dBµV/m	46 dBµV/m	-0.44 dB	Pass
2	368.636 MHz	42.51 dBµV/m	46 dBµV/m	-3.49 dB	Pass
3	375.914 MHz	41.39 dBµV/m	46 dBµV/m	-4.61 dB	Pass
4	383.39 MHz	39.69 dBµV/m	46 dBµV/m	-6.31 dB	Pass
5	412.874 MHz	43.3 dBµV/m	46 dBµV/m	-2.7 dB	Pass
7	884.714 MHz	39.95 dBµV/m	46 dBµV/m	-6.05 dB	Pass

Test Report No.: GOM-1211-2402-EF01-V01

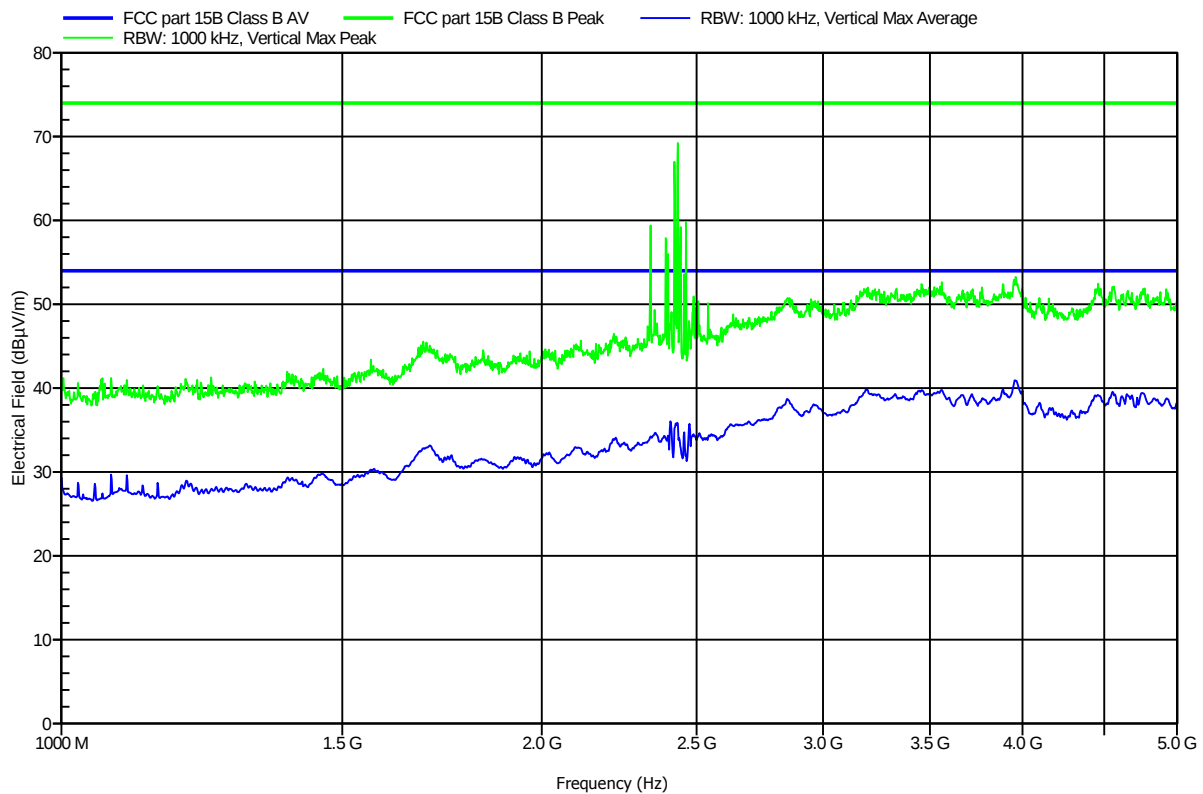
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions under normal conditions according to FCC PART 15B

Project number: G0M-1211-2404

Manufacturer:	MSC Vertriebs GmbH
EUT Name:	Bluetooth Access Point EXAConnect II Typ:0 602 491 003
Model:	Bosch EXAConnect Ser.No.306000049
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Pflug
Test Conditions:	Tnom: 23°C, Unom: 120 VAC
Antenna:	Rohde & Schwarz HL 025, Vertical
Measurement distance:	3m, converted to 10m
Mode:	link
Test Date:	2013-07-31
Note:	

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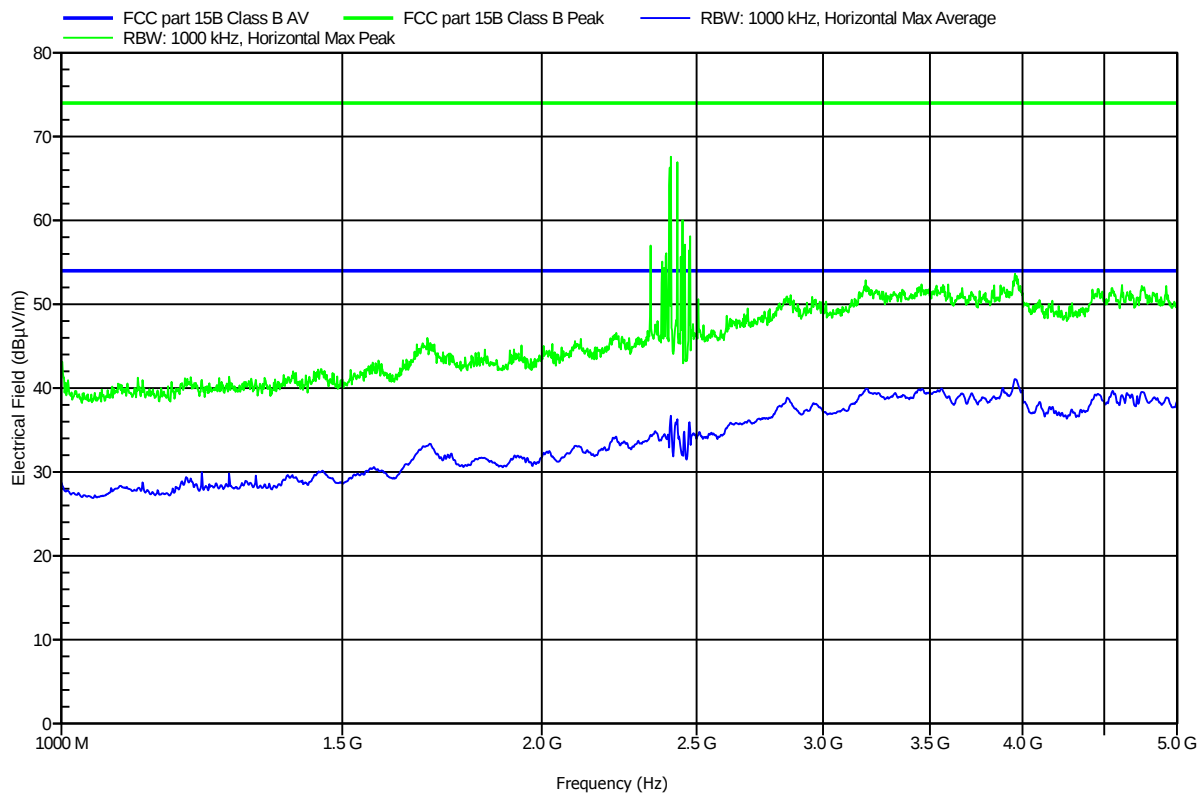


Spurious emissions under normal conditions according to FCC PART 15B

Project number: GOM-1211-2404

Manufacturer: MSC Vertriebs GmbH
 EUT Name: Bluetooth Access Point EXAConnect II Typ:0 602 491 003
 Model: Bosch EXAConnect Ser.No.306000049
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pflug
 Test Conditions: Tnom: 23°C, Unom: 120 VAC
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 3m, converted to 10m
 Mode: link
 Test Date: 2013-07-31
 Note:

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3.2 Test Conditions and Results – AC power line conducted emissions

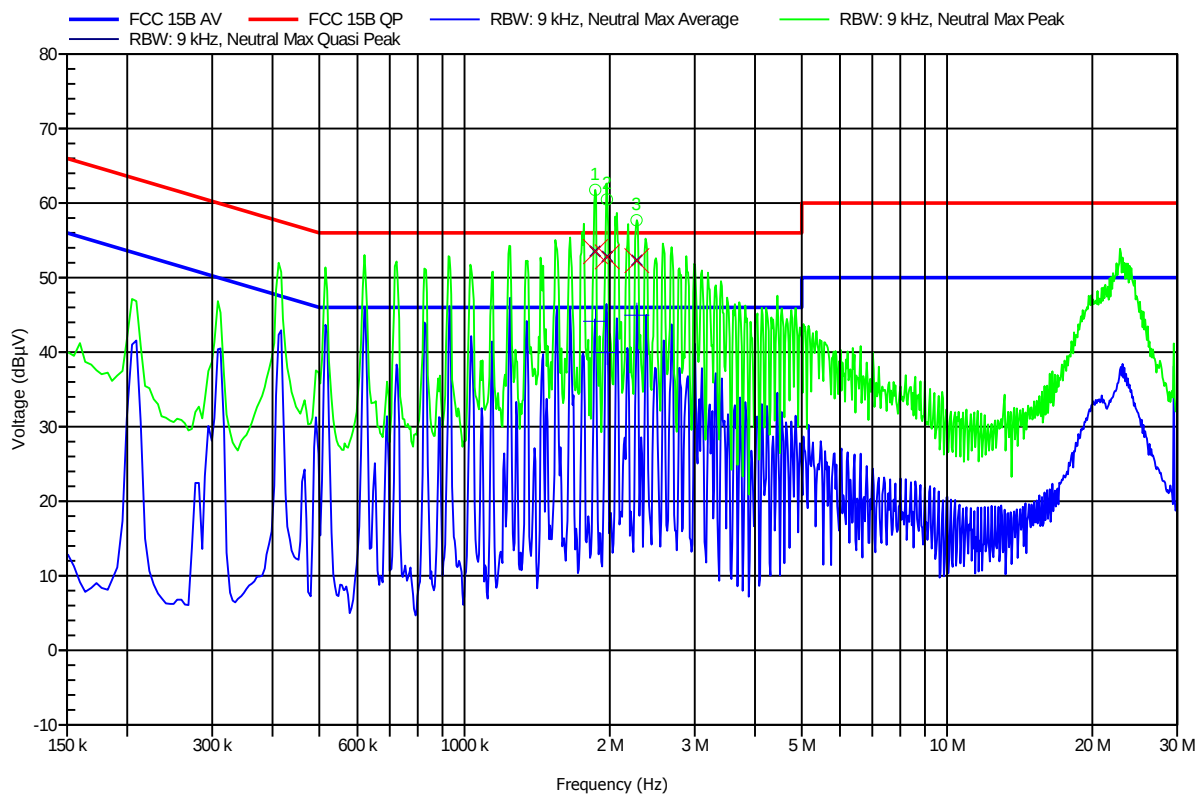
Conducted emissions acc. FCC 47 CFR 15.107 / IC RSS-Gen			Verdict: PASS	
Laboratory Parameters:		Required prior to the test	During the test	
Ambient Temperature		15 to 35 °C	23°C	
Relative Humidity		30 to 60 %	51%	
Test according referenced standards		Reference Method		
		ANSI C63.4		
Fully configured 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		1		
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: GOM-1211-2404

Manufacturer: MSC Vertriebs GmbH
 EUT Name: Bluetooth Access Point EXAConnect II Typ:0 602 491 003
 Model: Bosch EXAConnect Ser.No.306000049
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pflug
 Test Conditions: Tnom: 23°C, Unom: 120 VAC
 LISN: ESH2-Z5 N
 Mode: link
 Test Date: 2013-07-31
 Note:

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Nr	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	1.865 MHz	53.53 dBμV	56 dBμV	-2.47 dB	Pass
2	1.972 MHz	52.82 dBμV	56 dBμV	-3.18 dB	Pass
3	2.273 MHz	52.31 dBμV	56 dBμV	-3.69 dB	Pass

Nr	Frequency	Average	Average Limit	Average Difference	Average Status
1	1.865 MHz	44.19 dBμV	46 dBμV	-1.81 dB	Pass
2	1.972 MHz	39.99 dBμV	46 dBμV	-6.01 dB	Pass
3	2.273 MHz	45 dBμV	46 dBμV	-1 dB	Pass

Test Report No.: GOM-1211-2402-EF01-V01

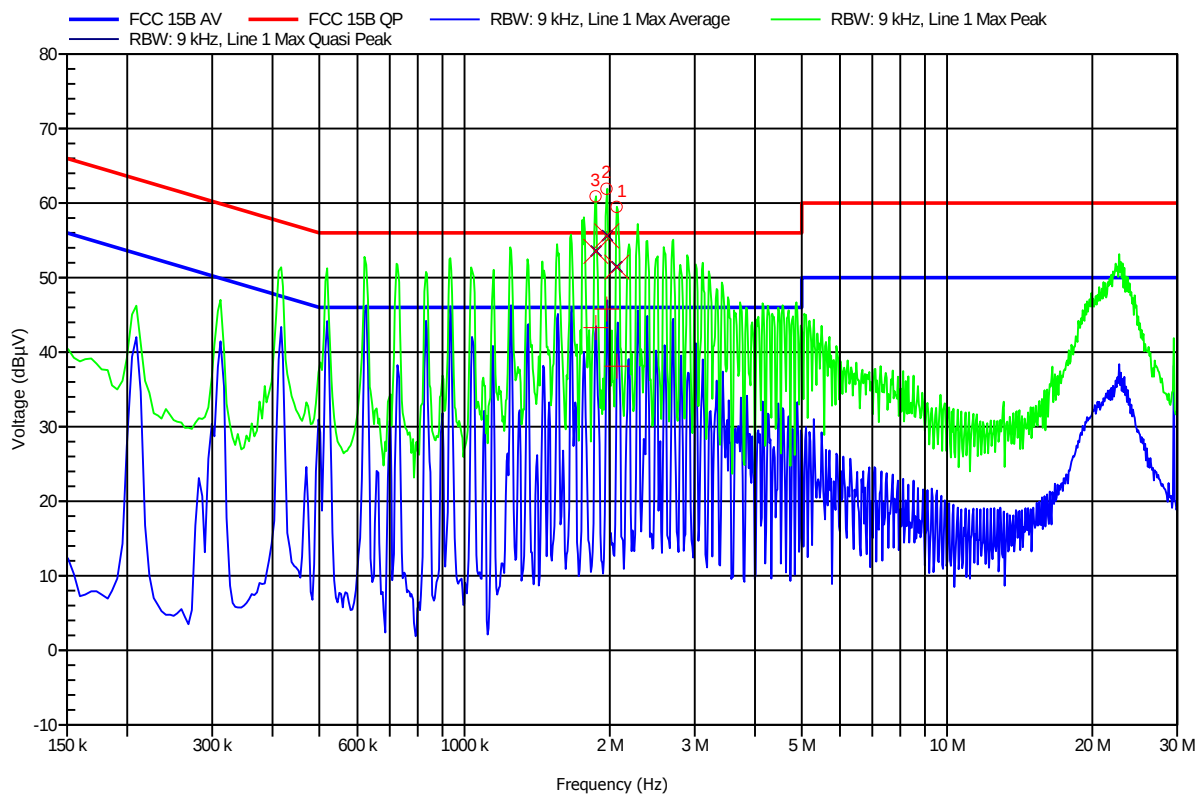
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

EMI voltage test in the ac-mains according to FCC part 15B

Project number: GOM-1211-2404

Manufacturer: MSC Vertriebs GmbH
 EUT Name: Bluetooth Access Point EXAConnect II Typ:0 602 491 003
 Model: Bosch EXAConnect Ser.No.306000049
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pflug
 Test Conditions: Tnom: 23°C, Unom: 120 VAC
 LISN: ESH2-Z5 L
 Mode: link
 Test Date: 2013-07-31
 Note:

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Nr	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
3	1.869 MHz	53.56 dBμV	56 dBμV	-2.44 dB	Pass
2	1.969 MHz	55.64 dBμV	56 dBμV	-0.36 dB	Pass
1	2.067 MHz	51.45 dBμV	56 dBμV	-4.55 dB	Pass

Nr	Frequency	Average	Average Limit	Average Difference	Average Status
3	1.869 MHz	43.33 dBμV	46 dBμV	-2.67 dB	Pass
2	1.969 MHz	45.82 dBμV	46 dBμV	-0.18 dB	Pass
1	2.067 MHz	38.16 dBμV	46 dBμV	-7.84 dB	Pass

Test Report No.: GOM-1211-2402-EF01-V01

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 Storkower Str. 38c, D-15526 Reichenwalde, Germany