

## EMC TEST REPORT

FCC 47 CFR Part 15B  
Industry Canada RSS-Gen

Electromagnetic compatibility - Unintentional radiators

Report Reference No. .... : G0M-1502-4515-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 ..... : Roth & Rau - Ortnier GmbH

Address ..... : Manfred-von-Ardenne-Ring 7  
01099 Dresden  
GERMANY

### Test specification:

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

### Equipment under test (EUT):

Product description	RFID reader with CAN interface
Model No.	HF-CAN-M
Additional Models	None
Hardware version	2.0
Firmware / Software version	HF CANopen reader trampoline 0x80008000 11.02.2015
FCC ID	FCC-ID: YTV-HF-1356-CAN      IC: N/A
<b>Test result</b>	<b>Passed</b>

Test Report No.: G0M-1502-4515-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 .....: 2015-03-06

Date (s) of performance of tests .....: 2015-03-05 – 2015-04-10

Compiled by .....: Marcus Klein

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

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

Head of Lab

Date of issue .....: 2015-08-26

Total number of pages .....: 31


**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	2015-08-26	Initial Release	

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## 1 Equipment (Test item) Description

<b>Description</b>	RFID reader with CAN interface	
<b>Model</b>	HF-CAN-M	
<b>Additional Models</b>	None	
<b>Serial number</b>	RRO9xxxxx	
<b>Hardware version</b>	2.0	
<b>Software / Firmware version</b>	HF CANOpen reader trampoline 0x80008000 11.02.2015	
<b>FCC-ID</b>	YTV-HF-1356-CAN	
<b>IC</b>	N/A	
<b>Power supply</b>	24 VDC	
<b>AC/DC-Adaptor</b>	Model : SYS1308-2424-W2E Manufacturer : Dehner Elektronik Input : 100-240VAC / 50-60Hz Output : 24VDC / 1.0A	
<b>Radio module</b>	Type	RFID Module
	Model	hf-unireader v11
	Manufacturer	SitoSite
	HW Version	V1.1
<b>Manufacturer</b>	Roth & Rau - Ortner GmbH Manfred-von-Ardenne-Ring 7 01099 Dresden GERMANY	
<b>Highest emission frequency</b>	13.9 MHz	
<b>Device classification</b>	Class B	
<b>Equipment type</b>	Tabletop	
<b>Number of tested samples</b>	1	

#### 1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
AE	Notebook	-	-	-
AE	Test Software	Roth & Rau GmbH	Ortner Test Suite	-
AE	CAN Interface	Roth & Rau GmbH	CAN2WEB-A-MINI	-
EUT	Antenna	Roth & Rau GmbH	ANT-HF-87-54E	-
EUT	Antenna	Roth & Rau GmbH	ANT-HF-120-120E	-

**\*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	AC Mains	AC	<3 m	No	@ CAN Interface
2	CAN IN	I/O	100 m	Yes	
3	CAN OUT	I/O	100 m	Yes	
4	Antenna	I/O	3.6 m	Yes	

**\*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	CAN communication

Configuration #	EUT Configuration
1	EUT configured with antenna ANT-HF-87-54E
2	EUT configured with antenna ANT-HF-120-120E

## 1.7 Test Equipment Used During Testing

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	2014.1.15

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

Conducted emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	R&S	ESH2-Z5	EF00182	2014-11	2016-11
AMN	R&S	ESH3-Z5	EF00036	2014-12	2016-12
EMI Test Receiver	R&S	ESCS 30	EF00295	2014-10	2015-10



## 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:

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

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 6.13	Radiated emissions	ANSI C 63.4	PASS	
47 CFR 15.107 RSS-Gen 8.8	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 %			42%		
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] = 13.9 MHz					
Fully configured sample scanned over the following frequency range		Frequency range					
		30 MHz to 1 GHz					
Operating mode		1					
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	-		-		-
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:

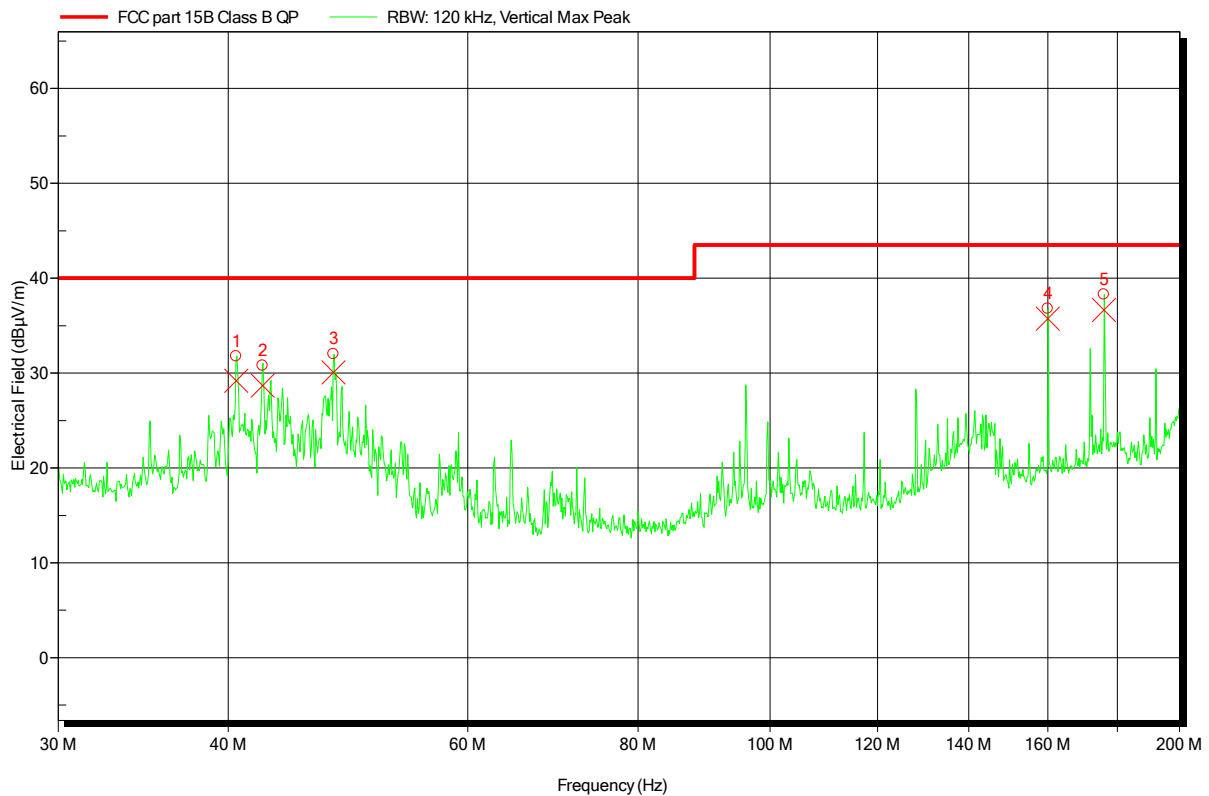
- 1) The EUT was placed on a 0.8 m non conductive table at a 3 m distance from the receive antenna (ANSI C63.4: 2009 item 6.2)
- 2) The antenna output was connected to the measurement receiver
- 3) A biconical antenna was used for the frequency range 30 – 200 MHz, a logarithmic periodical antenna was 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-1502-4515

Applicant: Roth & Rau - Ortner GmbH  
 EUT Name: RFID reader with CAN interface  
 Model: HF-CAN-M  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: +24VDC (CAN-feeding)  
 Antenna: Rohde & Schwarz HK 116, Vertical  
 Measurement distance: 3m  
 Mode: CAN-link with ANT-HF-87-54E-antenna  
 Test Date: 2015-03-05  
 Note:

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Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
40.554 MHz	29.21 dBµV/m	40 dBµV/m	-10.79 dB	Pass
42.396 MHz	28.69 dBµV/m	40 dBµV/m	-11.31 dB	Pass
47.802 MHz	30.08 dBµV/m	40 dBµV/m	-9.92 dB	Pass
159.99 MHz	35.73 dBµV/m	43.5 dBµV/m	-7.77 dB	Pass
175.992 MHz	36.65 dBµV/m	43.5 dBµV/m	-6.85 dB	Pass

Test Report No.: G0M-1502-4515-EF0115B-V01

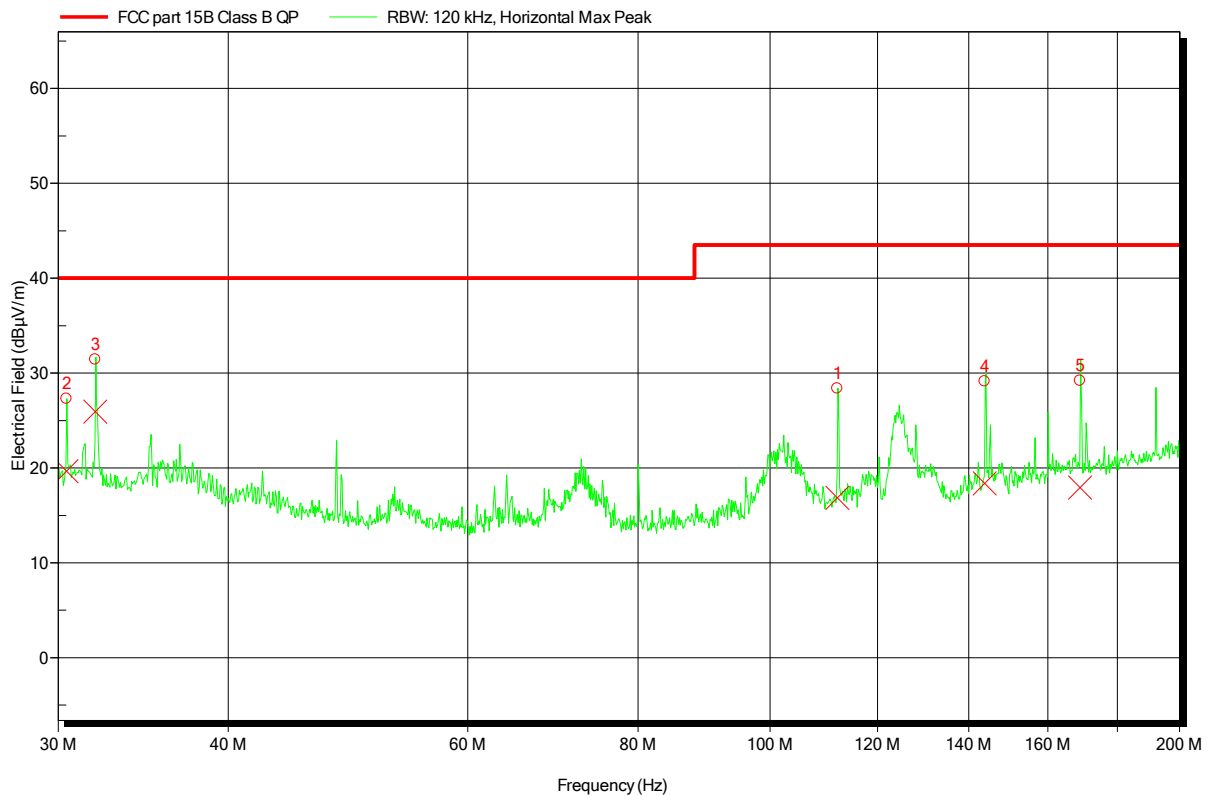
Eurofins Product Service GmbH  
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

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

Project number: G0M-1502-4515

Applicant: Roth & Rau - Ortner GmbH  
 EUT Name: RFID reader with CAN interface  
 Model: HF-CAN-M  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: +24VDC (CAN-feeding)  
 Antenna: Rohde & Schwarz HK 116, Horizontal  
 Measurement distance: 3m  
 Mode: CAN-link with ANT-HF-87-54E-antenna  
 Test Date: 2015-03-13  
 Note:

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Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
30.426 MHz	19.67 dBµV/m	40 dBµV/m	-20.33 dB	Pass
31.95 MHz	25.93 dBµV/m	40 dBµV/m	-14.07 dB	Pass
112.098 MHz	16.83 dBµV/m	43.5 dBµV/m	-26.67 dB	Pass
143.772 MHz	18.38 dBµV/m	43.5 dBµV/m	-25.12 dB	Pass
169.008 MHz	17.93 dBµV/m	43.5 dBµV/m	-25.57 dB	Pass

Test Report No.: G0M-1502-4515-EF0115B-V01

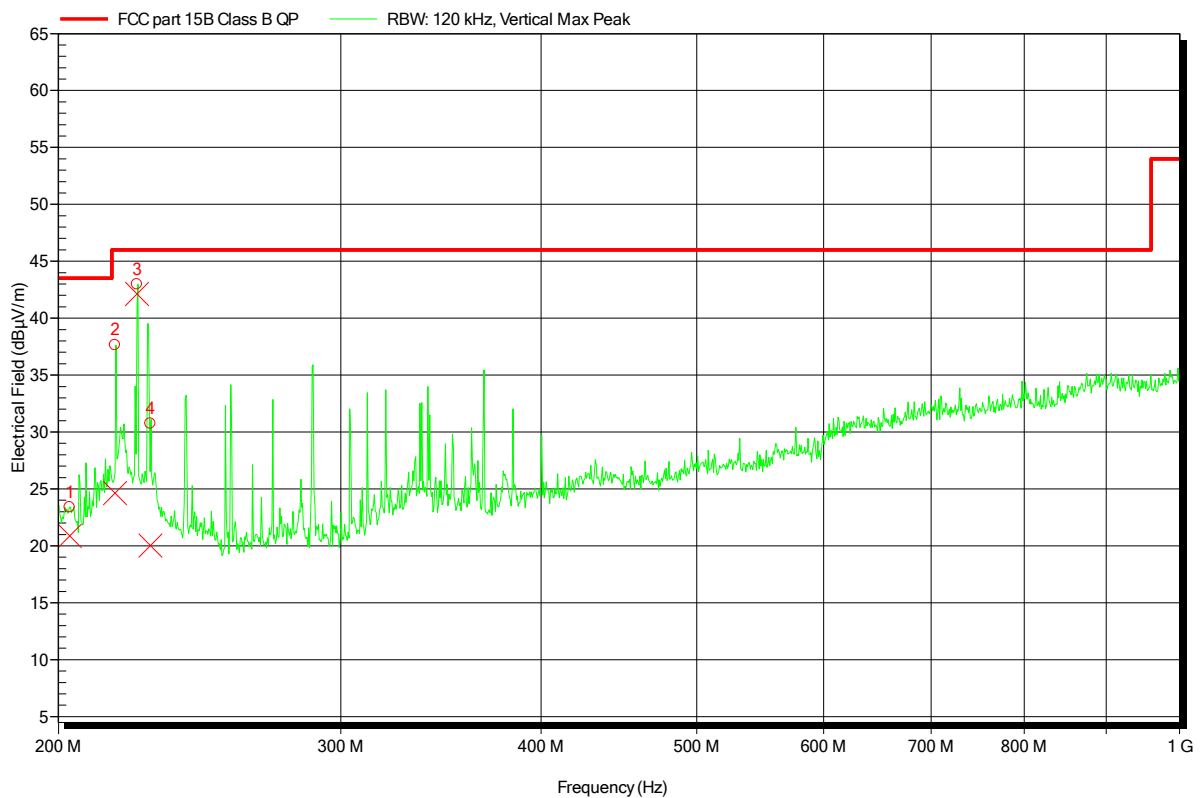
Eurofins Product Service GmbH  
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

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

Project number: G0M-1502-4515

Applicant: Roth & Rau - Ortner GmbH  
EUT Name: RFID reader with CAN interface  
Model: HF-CAN-M  
Test Site: Eurofins Product Service GmbH  
Operator: Mr. Pflug  
Test Conditions: Tnom: 23°C, Unom: +24VDC (CAN-feeding)  
Antenna: Rohde & Schwarz HL 223, Vertical  
Measurement distance: 3m  
Mode: CAN-link with ANT-HF-87-54E-antenna  
Test Date: 2015-03-05  
Note:

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Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
203.384 MHz	20.89 dBµV/m	43.5 dBµV/m	-22.61 dB	Pass
217.046 MHz	24.64 dBµV/m	46 dBµV/m	-21.36 dB	Pass
223.994 MHz	42.12 dBµV/m	46 dBµV/m	-3.88 dB	Pass
228.356 MHz	20.02 dBµV/m	46 dBµV/m	-25.98 dB	Pass

Test Report No.: G0M-1502-4515-EF0115B-V01

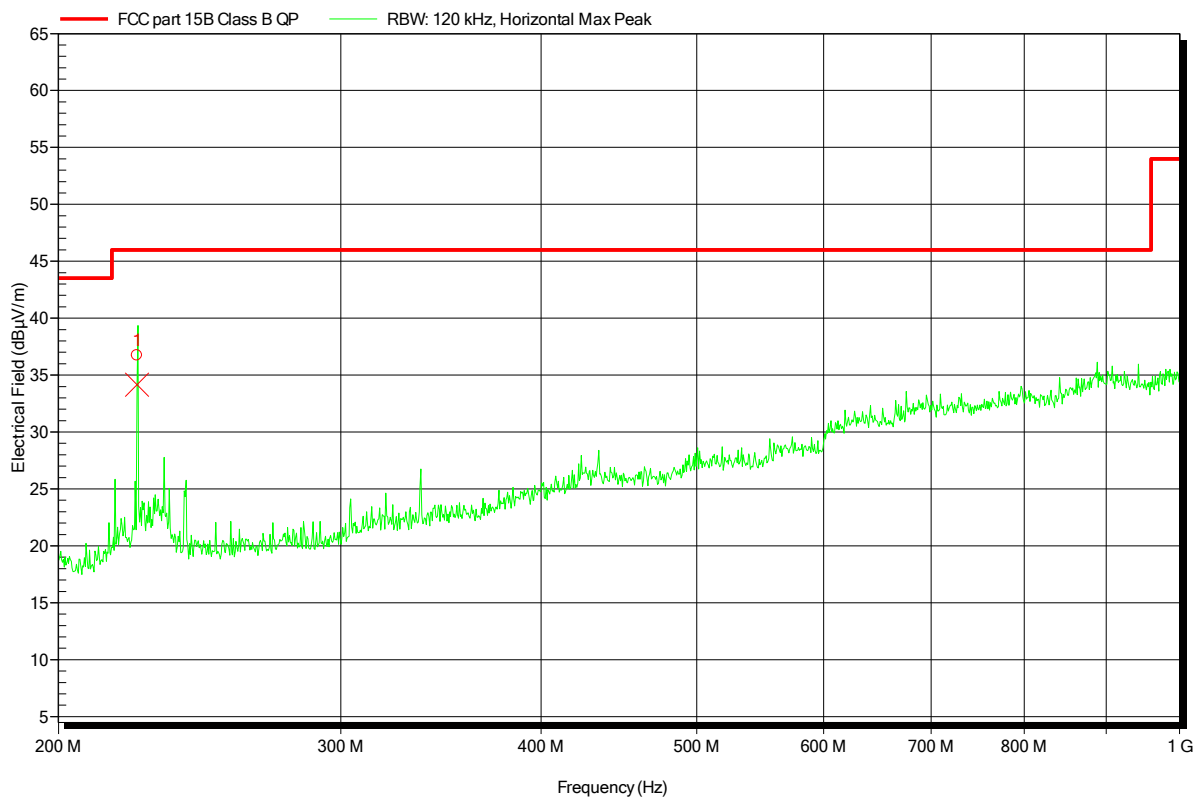
Eurofins Product Service GmbH  
Storkower Str. 38c, D-15526 Reichenwalde, Germany

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

Project number: G0M-1502-4515

Applicant: Roth & Rau - Ortner GmbH  
 EUT Name: RFID reader with CAN interface  
 Model: HF-CAN-M  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: +24VDC (CAN-feeding)  
 Antenna: Rohde & Schwarz HL 223, Horizontal  
 Measurement distance: 3m  
 Mode: CAN-link with ANT-HF-87-54E-antenna  
 Test Date: 2015-03-05  
 Note:

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Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
223.975 MHz	34.16 dBµV/m	46 dBµV/m	-11.84 dB	Pass

Test Report No.: G0M-1502-4515-EF0115B-V01

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

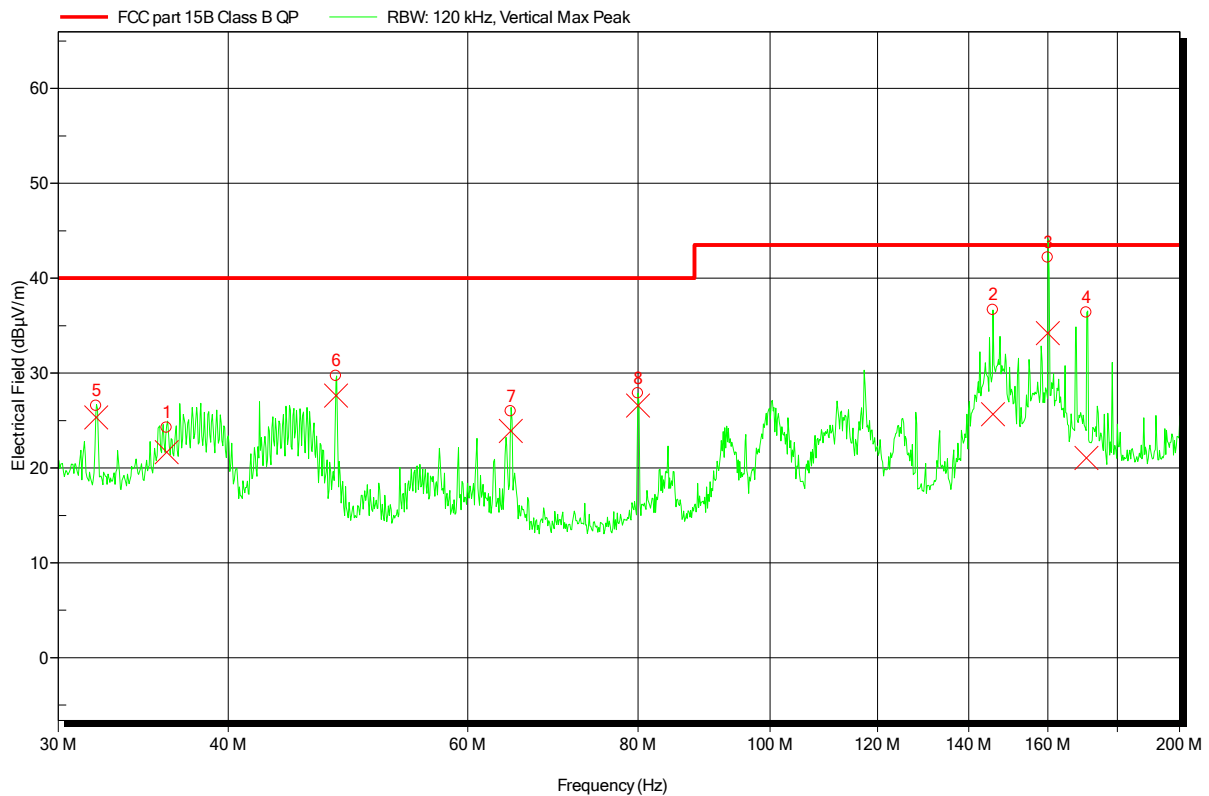


## Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1502-4515

Applicant: Roth & Rau - Ortner GmbH  
 EUT Name: RFID reader with CAN interface  
 Model: HF-CAN-M  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: +24VDC (CAN-feeding)  
 Antenna: Rohde & Schwarz HK 116, Vertical  
 Measurement distance: 3m  
 Mode: CAN-link with metraTec-antenna  
 Test Date: 2015-03-13  
 Note:

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Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
31.998 MHz	25.32 dBµV/m	40 dBµV/m	-14.68 dB	Pass
36.054 MHz	21.67 dBµV/m	40 dBµV/m	-18.33 dB	Pass
47.994 MHz	27.62 dBµV/m	40 dBµV/m	-12.38 dB	Pass
64.524 MHz	23.91 dBµV/m	40 dBµV/m	-16.09 dB	Pass
79.998 MHz	26.59 dBµV/m	40 dBµV/m	-13.41 dB	Pass
145.824 MHz	25.66 dBµV/m	43.5 dBµV/m	-17.84 dB	Pass
159.978 MHz	34.21 dBµV/m	43.5 dBµV/m	-9.29 dB	Pass
170.784 MHz	21.05 dBµV/m	43.5 dBµV/m	-22.45 dB	Pass

Test Report No.: G0M-1502-4515-EF0115B-V01

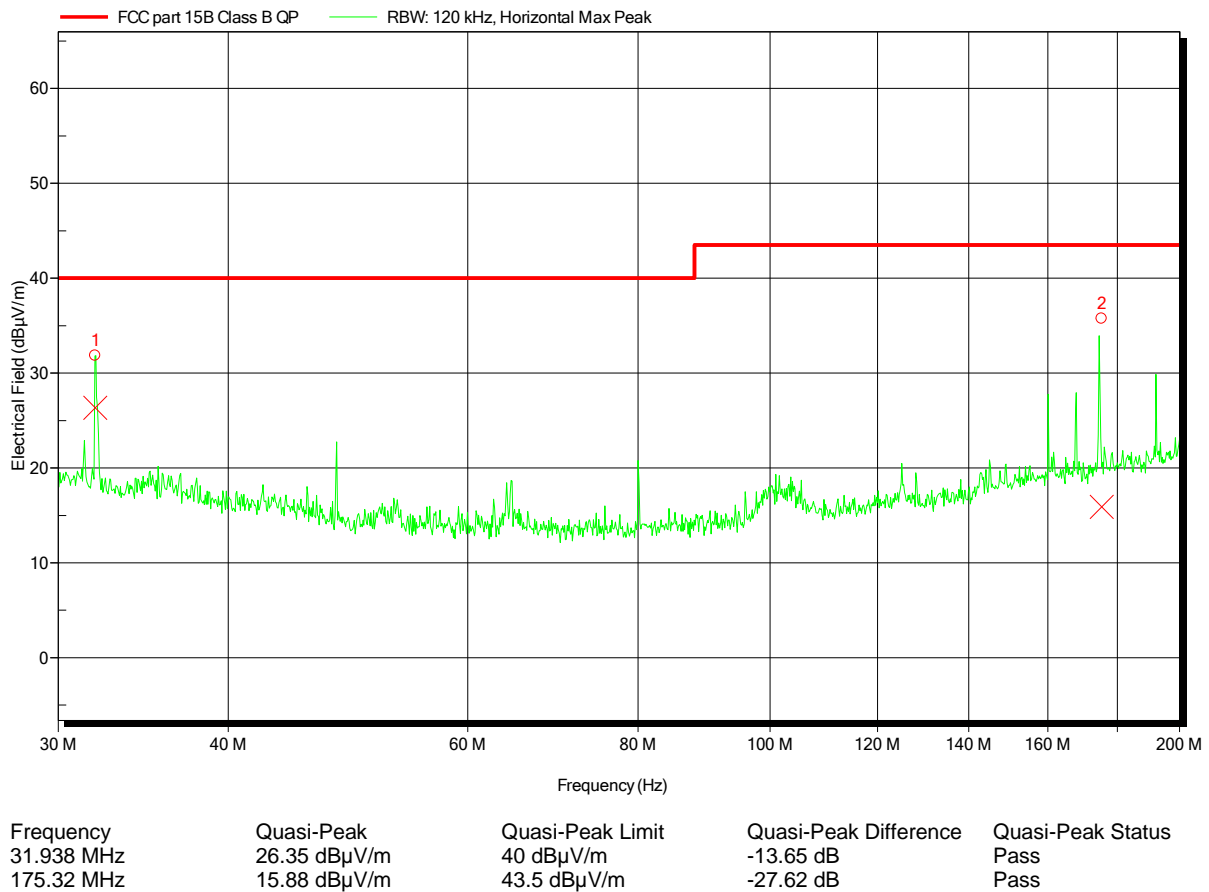
Eurofins Product Service GmbH  
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

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

Project number: G0M-1502-4515

Applicant: Roth & Rau - Ortner GmbH  
 EUT Name: RFID reader with CAN interface  
 Model: HF-CAN-M  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: +24VDC (CAN-feeding)  
 Antenna: Rohde & Schwarz HK 116, Horizontal  
 Measurement distance: 3m  
 Mode: CAN-link with metraTec-antenna  
 Test Date: 2015-03-13  
 Note:

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Test Report No.: G0M-1502-4515-EF0115B-V01

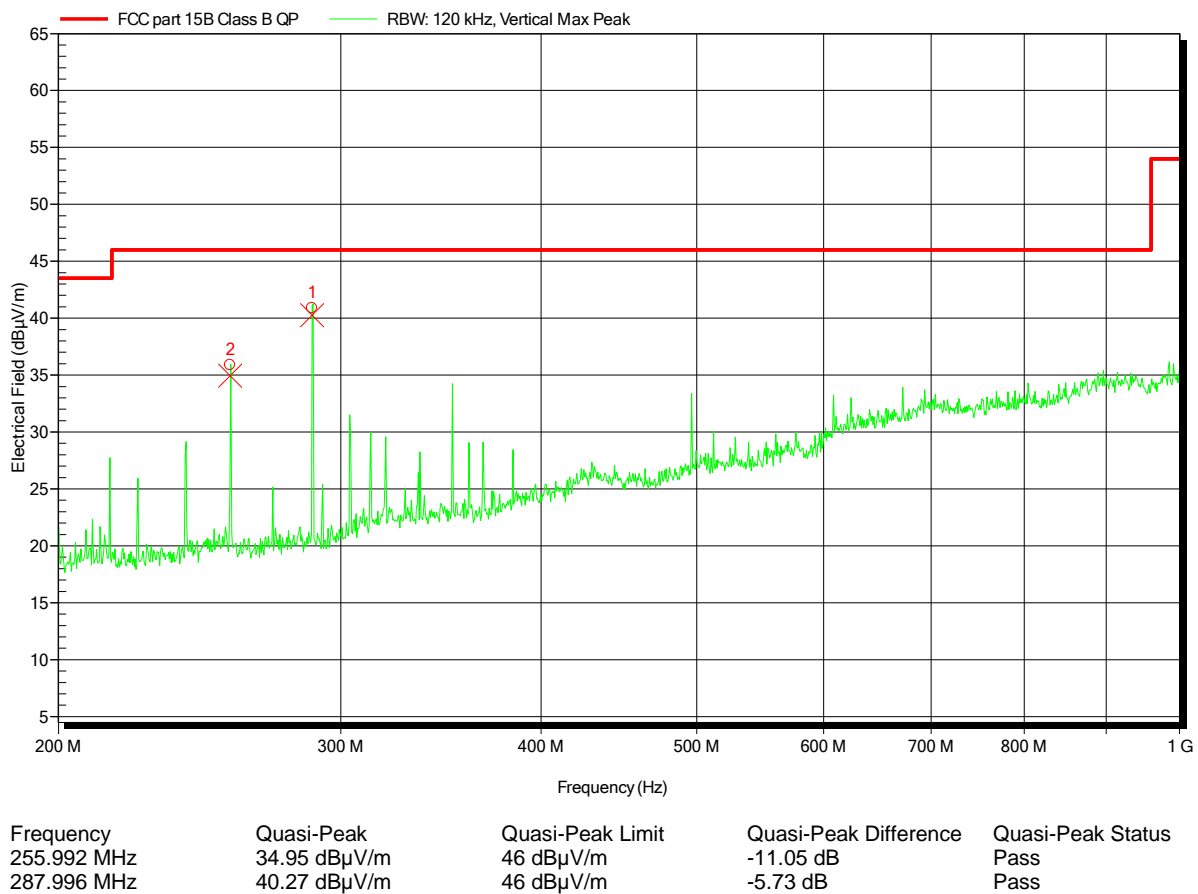
Eurofins Product Service GmbH  
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

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

Project number: G0M-1502-4515

Applicant: Roth & Rau - Ortner GmbH  
 EUT Name: RFID reader with CAN interface  
 Model: HF-CAN-M  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: +24VDC (CAN-feeding)  
 Antenna: Rohde & Schwarz HL 223, Vertical  
 Measurement distance: 3m  
 Mode: CAN-link with metraTec-antenna  
 Test Date: 2015-03-13  
 Note:

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Test Report No.: G0M-1502-4515-EF0115B-V01

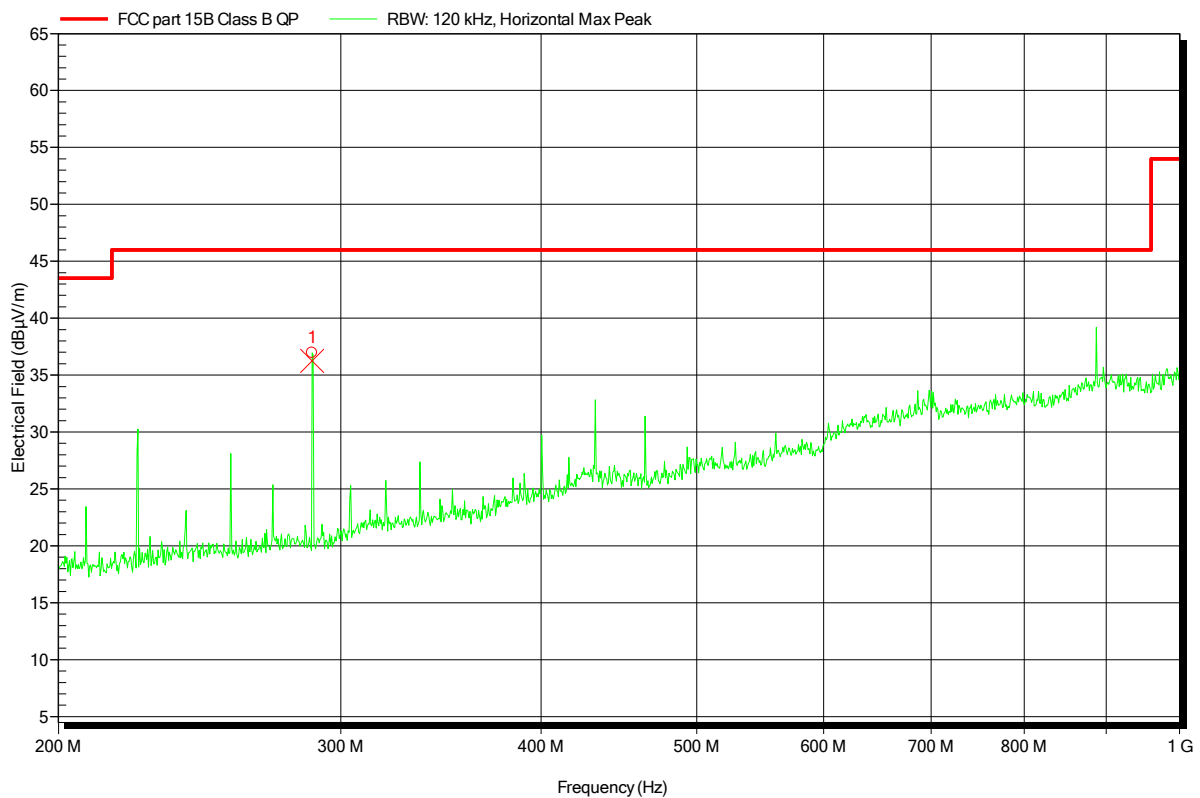
Eurofins Product Service GmbH  
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

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

Project number: G0M-1502-4515

Applicant: Roth & Rau - Ortner GmbH  
 EUT Name: RFID reader with CAN interface  
 Model: HF-CAN-M  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Pflug  
 Test Conditions: Tnom: 23°C, Unom: +24VDC (CAN-feeding)  
 Antenna: Rohde & Schwarz HL 223, Horizontal  
 Measurement distance: 3m  
 Mode: CAN-link with metraTec-antenna  
 Test Date: 2015-03-13  
 Note:

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Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
287.99 MHz	36.26 dBµV/m	46 dBµV/m	-9.74 dB	Pass

Test Report No.: G0M-1502-4515-EF0115B-V01

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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 %	41%	
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		
Configuration		1 + 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.				

**Test Procedure:**

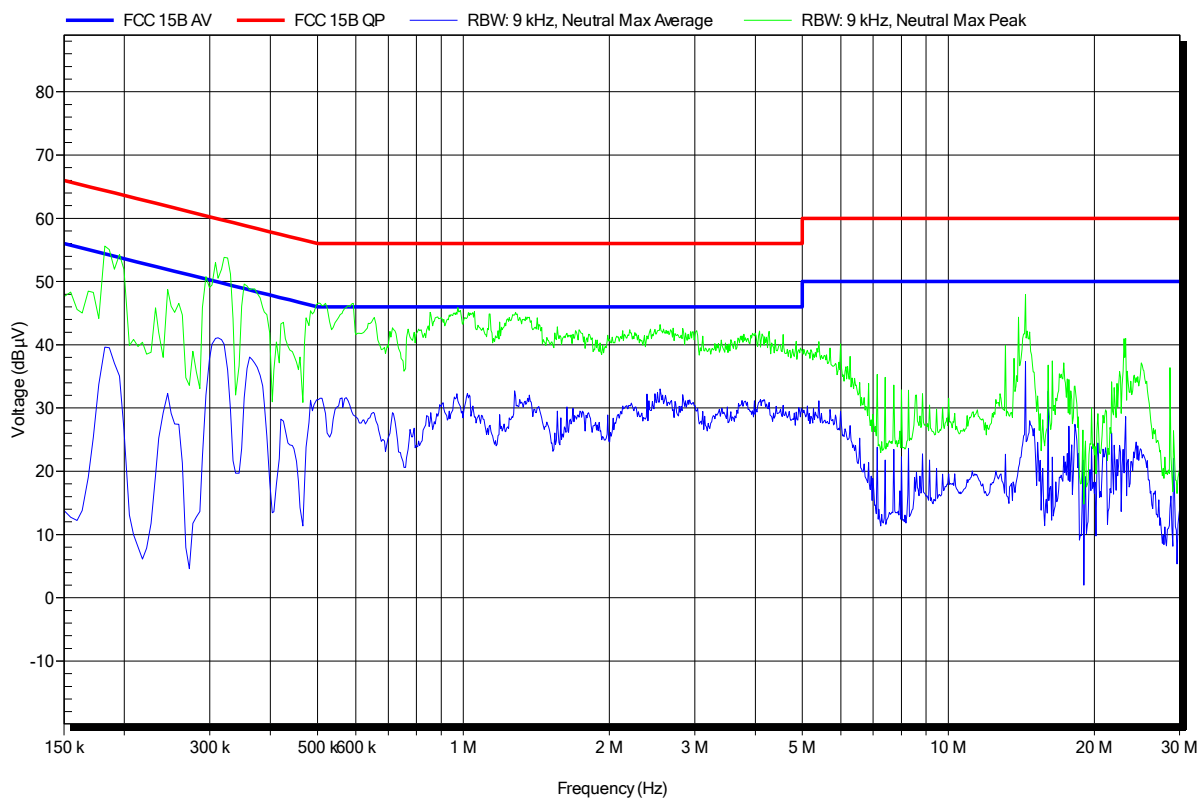
- 1) The EUT was placed on a non conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2009 item 7.3.1)
- 2) The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
- 3) The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length).
- 4) The LISN measurement port was connected to a measurement receiver
- 5) I/O cables were bundled not longer than 0.4 m
- 6) Measurement was performed in the frequency range 0.15 – 30MHz on each current-carrying conductor

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

Project number: G0M-1502-4515

Applicant:	Roth & Rau - Ortner GmbH
EUT Name:	RFID reader with CAN interface
Model:	HF-CAN-M
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Pflug
Test Conditions:	Tnom: 23°C, Unom: 120VAC
LISN:	ESH2-Z5 N
Mode:	CAN-link with ANT-HF-87-54E-antenna
Test Date:	2015-03-13
Note:	

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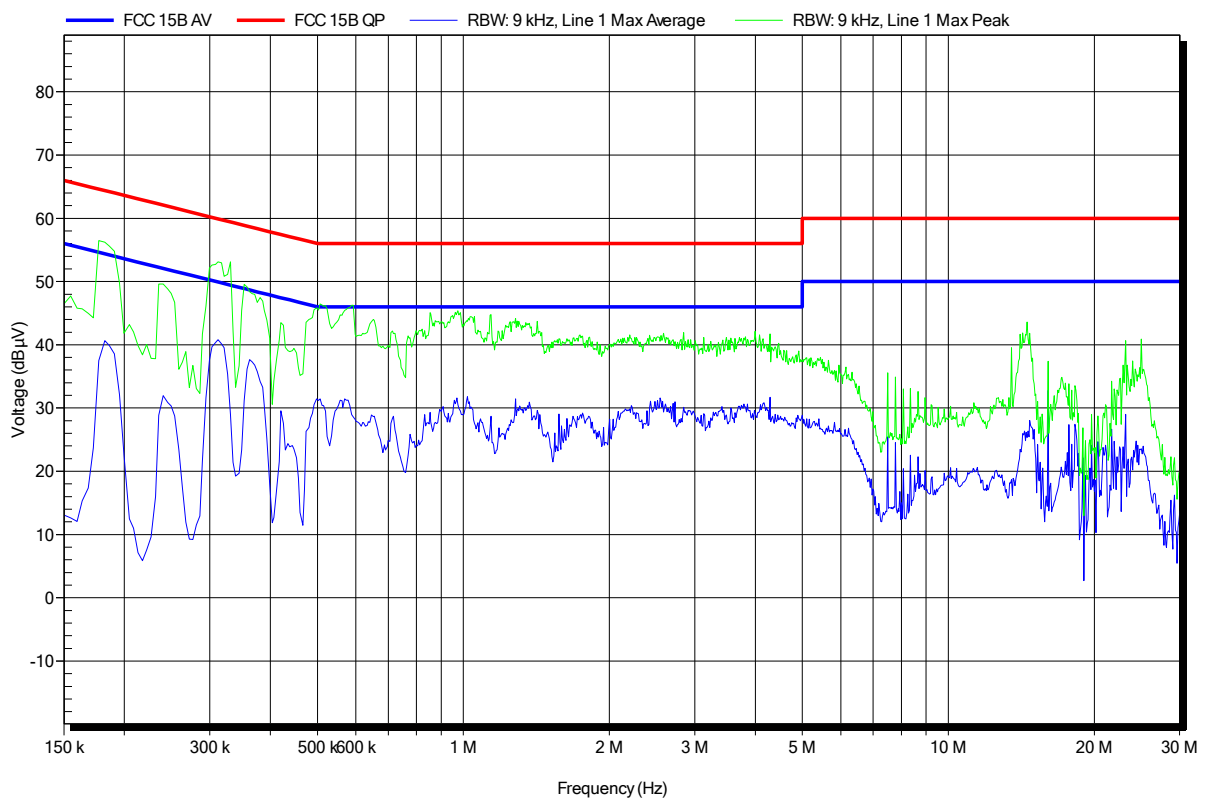


## EMI voltage test in the ac-mains according to FCC Part 15b

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Applicant:	Roth & Rau - Ortner GmbH
EUT Name:	RFID reader with CAN interface
Model:	HF-CAN-M
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Pflug
Test Conditions:	Tnom: 23°C, Unom: 120VAC
LISN:	ESH2-Z5 L
Mode:	CAN-link with ANT-HF-87-54E-antenna
Test Date:	2015-03-13
Note:	

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Test Report No.: G0M-1502-4515-EF0115B-V01

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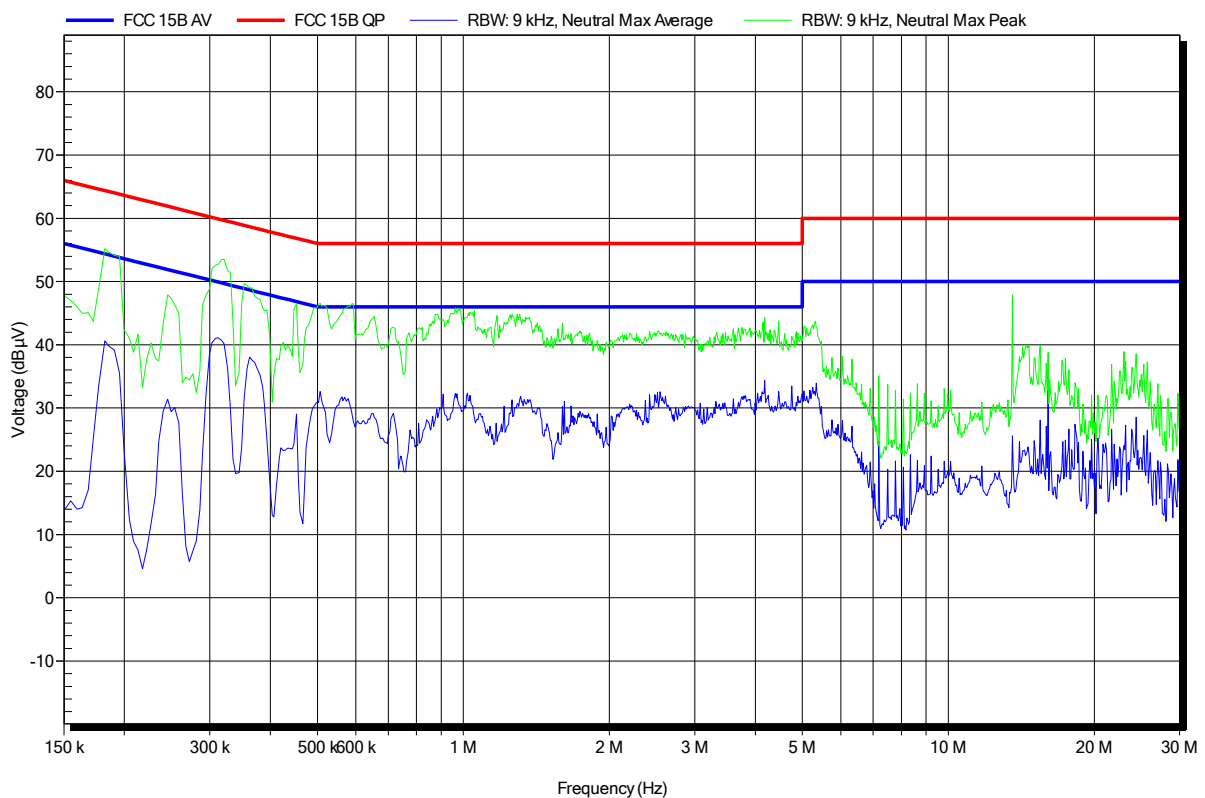


**EMI voltage test in the ac-mains according to FCC Part 15b**

Project number: G0M-1502-4515

Applicant:	Roth & Rau - Ortner GmbH
EUT Name:	RFID reader with CAN interface
Model:	HF-CAN-M
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Pflug
Test Conditions:	Tnom: 23°C, Unom: 120VAC
LISN:	ESH2-Z5 N
Mode:	CAN-link with metraTec-antenna
Test Date:	2015-03-13
Note:	

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

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Applicant:	Roth & Rau - Ortner GmbH
EUT Name:	RFID reader with CAN interface
Model:	HF-CAN-M
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Pflug
Test Conditions:	Tnom: 23°C, Unom: 120VAC
LISN:	ESH2-Z5 L
Mode:	CAN-link with metraTec-antenna
Test Date:	2015-03-13
Note:	

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