

FCC TEST REPORT FCC 47 CFR Part 15C Industry Canada RSS-210 Intentional radiator operating within the 902 – 928 MHz band	
Report Reference No.	G0M-1410-4242-TFC249DT-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 und Peter GmbH & Co. KG
Address	Tempelhofer Weg 50 12347 Berlin GERMANY
Test specification:	
Standard	47 CFR Part 15C RSS-210, Issue 8, 2010-12 RSS-Gen, Issue 4, 2014-11 ANSI C63.4:2009
Test scope	complete Radio compliance test
Equipment under test (EUT):	
Product description	Stellantrieb
Model No.	MD15-FTL-902
Additional Model(s)	None
Brand Name(s)	None
Hardware version	11628200/03
Firmware / Software version	GWC2.8.2.0-TCM300HW_TCM320HW-902Mhz
	FCC-ID: NY3MD15MES IC: N/A
Test result	Passed

Possible test case verdicts:

- neither assessed nor tested: N/N
- required by standard but not appl. to test object.....: N/A
- required by standard but not tested.....: N/T
- not required by standard for the test object: N/R
- test object does meet the requirement.....: P (Pass)
- test object does not meet the requirement.....: F (Fail)

Testing:

Test Lab Temperature.....: 20 – 23 °C

Test Lab Humidity: 32 – 38 %

Date of receipt of test item: 2015-01-07

Date (s) of performance of tests: 2015-01-07

Compiled by: Burkhard Pudell

Tested by (+ signature).....: Burkhard Pudell
(Responsible for Test)

Approved by (+ signature): Christian Weber

Date of issue: 2015-01-28

Total number of pages: 35

B. Pudell

C. Weber

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
01	2015-01-28	Initial Release	

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1 Equipment (Test item) Description

Description	Stellantrieb	
Model	MD15-FTL-902	
Additional Model(s)	None	
Brand Name(s)	None	
Serial number	None	
Hardware version	11628200/03	
Software / Firmware version	GWC2.8.2.0-TCM300HW_TCM320HW-902Mhz	
FCC-ID	NY3MD15MES	
IC	N/A	
Equipment type	End product	
Radio type	Transceiver	
Radio technology	custom	
Operating frequency range	902.875 MHz	
Assigned frequency band	902 - 928 MHz	
Frequency range	F _{MID}	902.875 MHz
Spreading	None	
Modulations	2-FSK	
Number of channels	1	
Channel spacing	None	
Number of antennas	1	
Antenna	Type	integrated
	Model	printed PCB antenna
	Manufacturer	Kieback und Peter GmbH & Co. KG
	Gain	10 dBi
Manufacturer	Kieback und Peter GmbH & Co. KG Tempelhofer Weg 50 12347 Berlin GERMANY	
Power supply	V _{NOM}	4.5 VDC (3x AA-Battery)
	V _{MIN}	N/A
	V _{MIN}	N/A
AC/DC-Adaptor	Model	N/A
	Vendor	N/A
	Input	N/A
	Output	N/A

1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
None				
*Note: Use the following abbreviations: AE : Auxiliary/Associated Equipment, or SIM : Simulator (Not Subjected to Test) CABL : Connecting cables				

1.5 Test Modes

Mode #	Description	
TX	General conditions:	EUT powered by fully battery
	Radio conditions:	Mode = standalone transmit Modulation = 2-FSK Power level = Maximum
RX	General conditions:	EUT powered by fully battery
	Radio conditions:	Mode = standalone receive Modulation = 2-FSK

1.6 Test Equipment Used During Testing

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

Field strength emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-anechoic chamber	Frankonia	AC 1	EF00062	-	-
Spectrum Analyzer	R&S	FSP 30	EF00312	2014-02	2015-02
Biconical Antenna	R&S	HK 116	EF00186	2014-02	2016-02
LPD Antenna	R&S	HL 223	EF00202	2014-02	2016-02
LPD Antenna	R&S	HL 025	EF00014	2014-01	2016-01

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:

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

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:

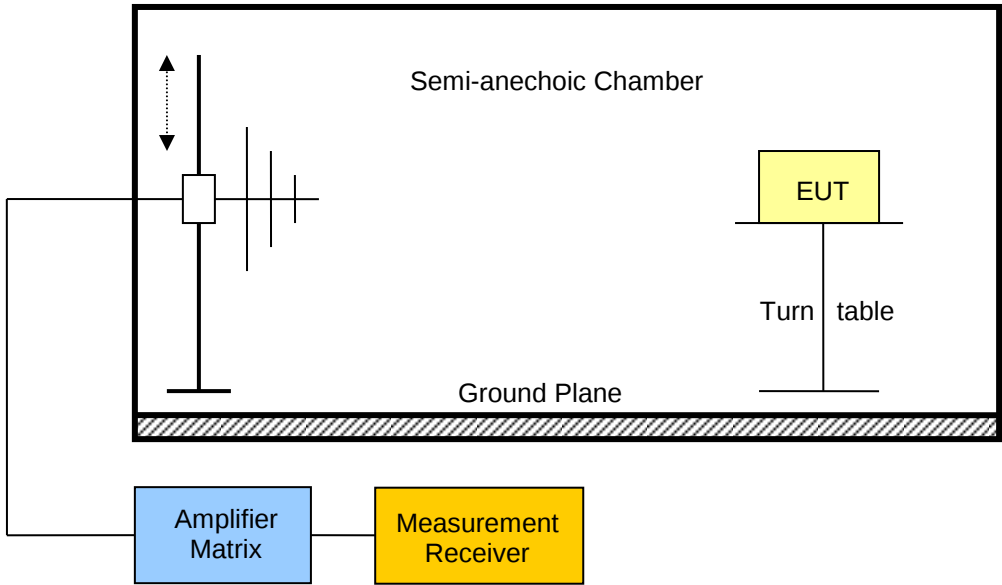
Reading	+	AF	=	Net Reading	:	Net reading - FCC limit	=	Margin
21.5 dBμV	+	26 dB	=	47.5 dBμV/m	:	47.5 dBμV/m - 57.0 dBμV/m	=	-9.5 dB

2 Result Summary

FCC 47 CFR Part 15C, IC RSS-210				
Product Specific Standard Section	Requirement – Test	Reference Method	Result	Remarks
RSS-Gen 6.6	Occupied Bandwidth	RSS-Gen 6.6	N/R	
FCC 15.249(a),(c),(e) IC RSS-210 A2.9(a)	Fundamental field strength emissions	ANSI C63.4	PASS	
FCC 15.249(a),(c),(d),(e) IC RSS-210 A2.9(a),(b)	Emission radiated outside the specified frequency band	ANSI C63.4	PASS	
IC RSS-210 Section 2.3 IC RSS-Gen 4.10 6.1	Receiver radiated spurious emissions	ANSI C63.4	PASS	
FCC § 15.207 IC RSS-Gen 7.1	AC power line conducted emissions	ANSI C63.4	N/R	
Remarks:				

3 Test Conditions and Results

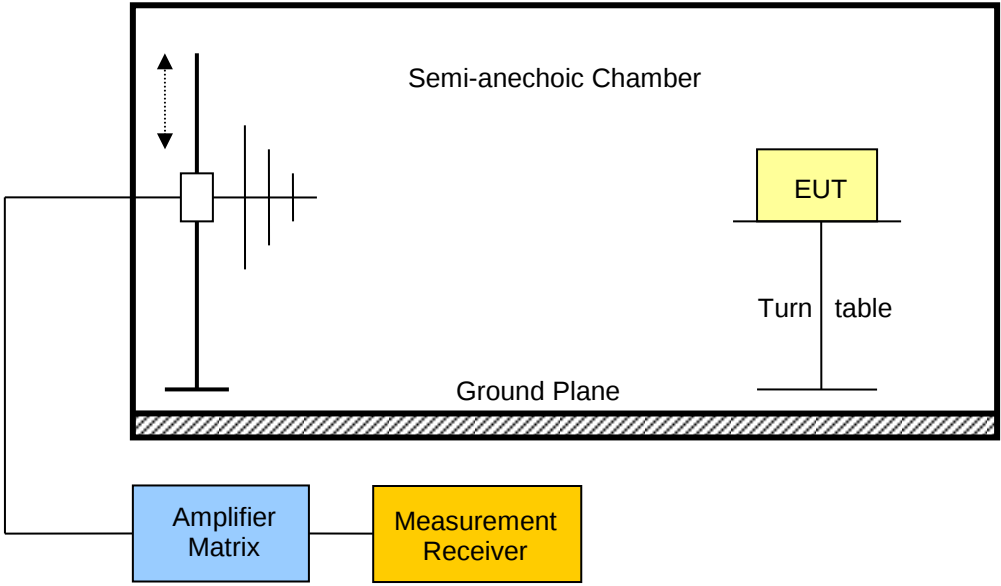
3.1 Test Conditions and Results – Fundamental field strength emissions

Field strength emissions acc. to FCC 47 CFR 15.249 / IC RSS-210				Verdict: PASS
Test according referenced standards	Reference Method			
	FCC 15.249(a),(c),(e) / IC RSS-210 A2.9(a)			
Test according to measurement reference	Reference Method			
	ANSI C63.4			
Test frequency range	Tested frequencies			
	F _{MID}			
EUT test mode	TX			
Limits				
Frequency range [MHz]	Detector	Limit [mV/m]	Limit [dBµV/m]	Limit Distance [m]
902 – 928	Quasi-Peak	50	94	3
2400 – 2483.5	Average	50	94	3
5725 - 5875	Average	50	94	3
FCC 15.249(e) : for frequencies above 1000 MHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.				
Below 1GHz a CISPR quasi-peak detector is used.				
Test setup				
				

Test procedure								
1. EUT set to test mode 2. Span it set according to measurement range 3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz 4. Markers are set to maximum emission levels								
Test results								
Channel	Frequency [MHz]	Emission [MHz]	Level [dB μ V/m]	Detector	Pol.	Limit [dB μ V/m]	Limit distance [m]*	Margin [dB]
EUT vertical								
F _{MID}	902.875	902.676	81.54	PK	ver	94	3	-12.46
F _{MID}	902.875	902.728	81.76	PK	hor	94	3	-12.24
EUT horizontal								
F _{MID}	902.832	902.830	87.42	PK	ver	94	3	-6.58
F _{MID}	902.884	902.814	91.37	PK	hor	94	3	-2.63
Comments: * Physical distance between EUT and measurement antenna.								

3.2 Test Conditions and Results – Emissions radiated outside the specified frequency band

Radiated out-of-band band emissions acc. to FCC 47 CFR 15.249 / IC RSS-210				Verdict: PASS
Test according referenced standards		Reference Method		
		FCC 15.249(a),(c),(d),(e) / IC RSS-210 A2.9(a),(b)		
Test according to measurement reference		Reference Method		
		ANSI C63.4		
Test frequency range		Tested frequencies		
		30 MHz – 10 th hamonic		
EUT test mode		TX		
Limits - Harmonics				
Frequency range [MHz]	Detector	Limit [μV/m]	Limit [dBμV/m]	Limit Distance [m]
902 – 928	Quasi-Peak	500	54	3
2400 – 2483.5	Average	500	54	3
5725 - 5875	Average	500	54	3
Limits - General				
Frequency range [MHz]	Detector	Limit [μV/m]	Limit [dBμV/m]	Limit Distance [m]
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3
FCC 15.249(e) : for frequencies above 1000 MHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.				
Except the higher order harmonics, emission radiated outside the specified frequency band shall be attenuated by at least 50 dB below the level of the fundamental or to the general field strength limits listed in 15.209 / RSS-Gen, whichever is less stringent.				

Test setup								
								
Test procedure								
5. EUT set to test mode 6. Span it set according to measurement range 7. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz 8. Markers are set to maximum emission levels								
Test results								
Channel	Frequency [MHz]	Emission [MHz]	Level [dBμV/m]	Detector	Pol.	Limit [dBμV/m]	Limit distance [m]*	Margin [dB]
EUT vertical								
F _{MID}	902.875	901.434	20.01	PK	ver	46	3	-25.99
F _{MID}	902.875	901.701	32.49	PK	hor	46	3	-13.51
F _{MID}	902.875	1804	40.44	PK	ver	74	3	-33.56
F _{MID}	902.875	3616	48.72	PK	hor	74	3	-25.28
EUT horizontal								
F _{MID}	902.875	901.400	33.10	PK	ver	46	3	-12.90
F _{MID}	902.875	902.589	21.48	PK	hor	46	3	-24.52
F _{MID}	902.875	1804	40.34	PK	hor	74	3	-33.66
Comments: * Physical distance between EUT and measurement antenna. Frequency band 902-928 MHz excluded.								

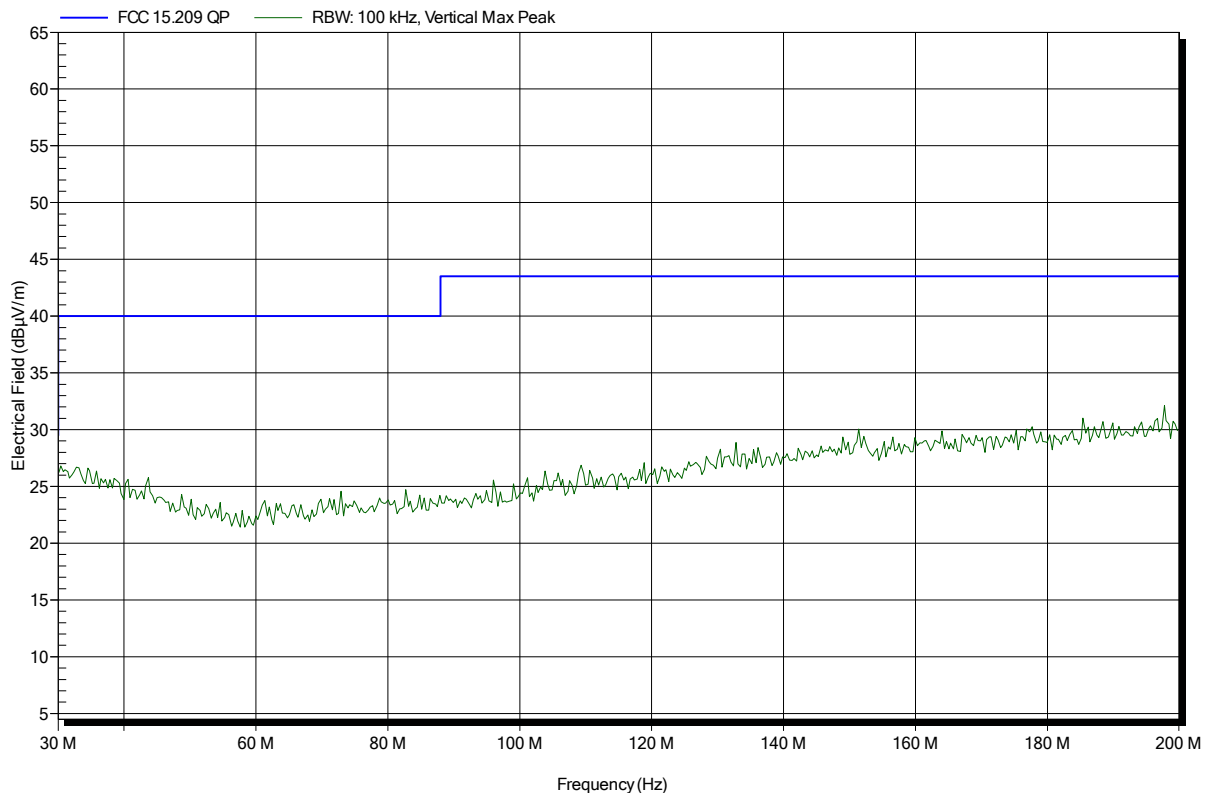
ANNEX A Transmitter radiated spurious emissions

Spurious emissions according to FCC part 15 Subpart C § 15.249

Project number: G0M-1410-4242

Applicant:	Kieback und Peter GmbH & Co. KG
EUT Name:	Stellantrieb
Model:	MD15-FTL-902
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Pudell
Test Conditions:	Tnom: 24°C, Vnom: 4.5 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	TX; SRD; 902.875 MHz; 2-FSK- Mode
Test Date:	2015-01-07
Note:	EUT horizontal

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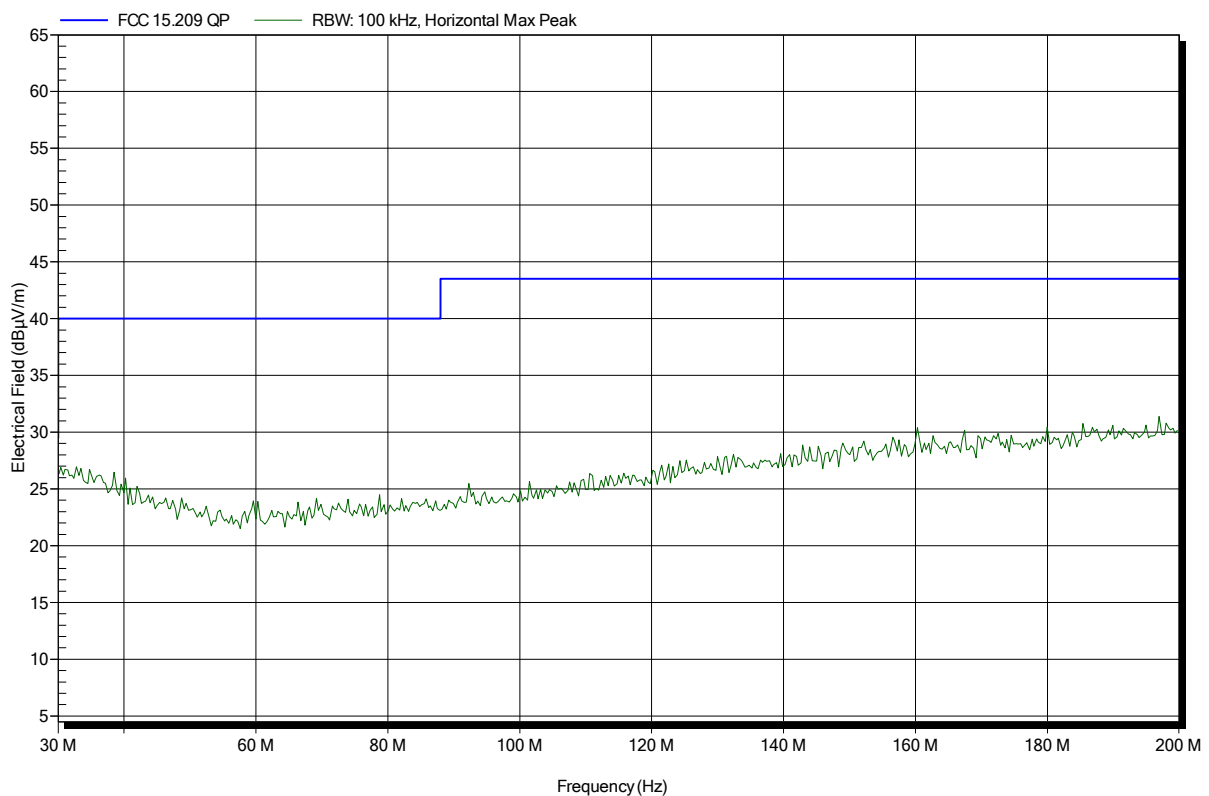


Spurious emissions according to FCC part 15 Subpart C § 15.249

Project number: G0M-1410-4242

Applicant:	Kieback und Peter GmbH & Co. KG
EUT Name:	Stellantrieb
Model:	MD15-FTL-902
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Pudell
Test Conditions:	Tnom: 24°C, Vnom: 4.5 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; SRD; 902.875 MHz; 2-FSK- Mode
Test Date:	2015-01-07
Note:	EUT horizontal

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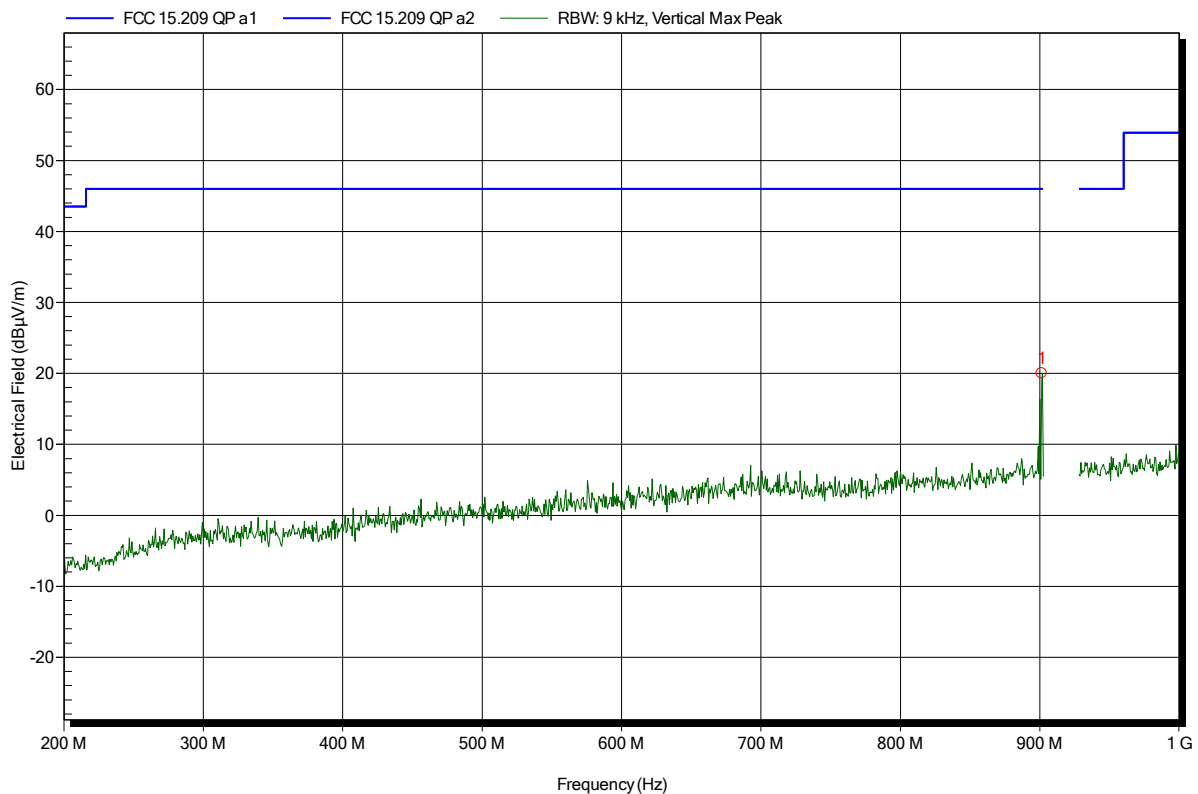


Spurious emissions according to FCC part 15 Subpart C § 15.249

Project number: GOM-1410-4242

Applicant: Kieback und Peter GmbH & Co. KG
 EUT Name: Stellantrieb
 Model: MD15-FTL-902
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pudell
 Test Conditions: Tnom: 24°C, Vnom: 4.5 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; SRD; 902.875 MHz; FSK- Mode
 Test Date: 2015-01-07
 Note: EUT horizontal

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
901.434 MHz	20.01 dBµV/m	46 dBµV/m	-25.99 dB	Pass

Test Report No.: GOM-1410-4242-TFC249DT-V01

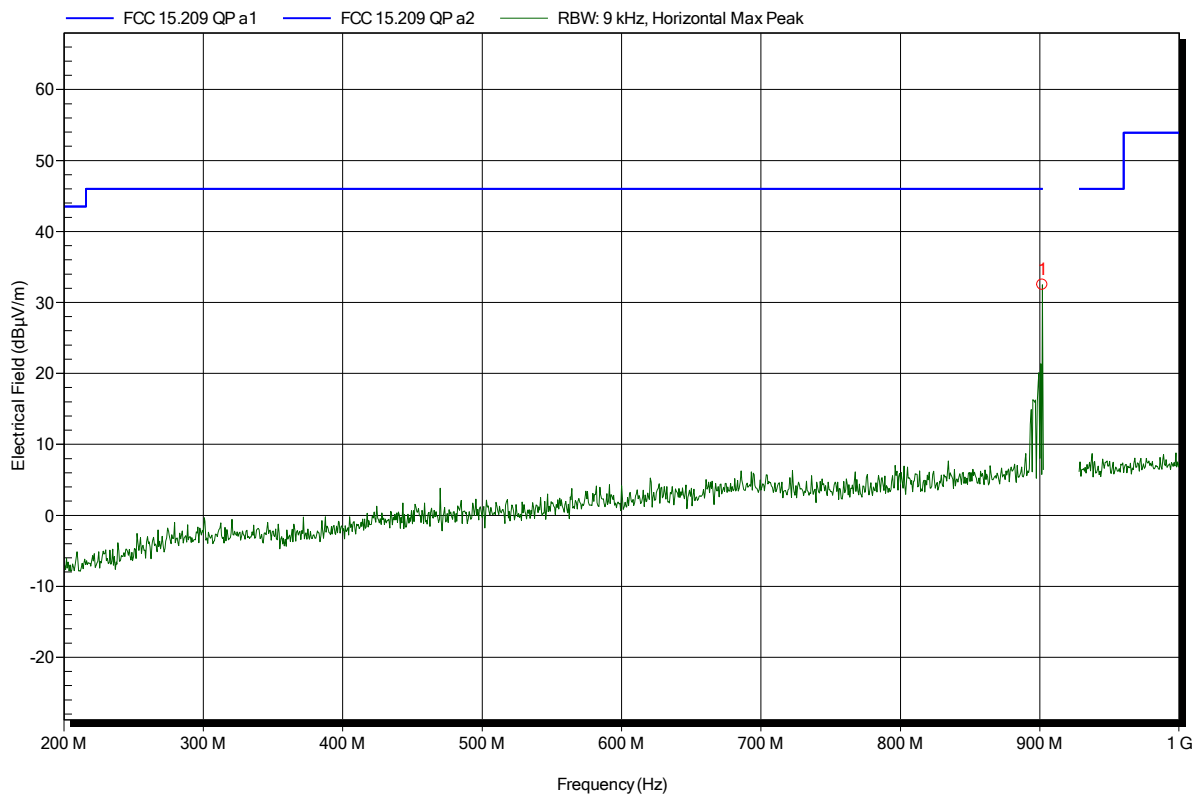
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC part 15 Subpart C § 15.249

Project number: G0M-1410-4242

Applicant: Kieback und Peter GmbH & Co. KG
 EUT Name: Stellantrieb
 Model: MD15-FTL-902
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pudell
 Test Conditions: Tnom: 24°C, Vnom: 4.5 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: TX; SRD; 902.875 MHz; FSK- Mode
 Test Date: 2015-01-07
 Note: EUT horizontal

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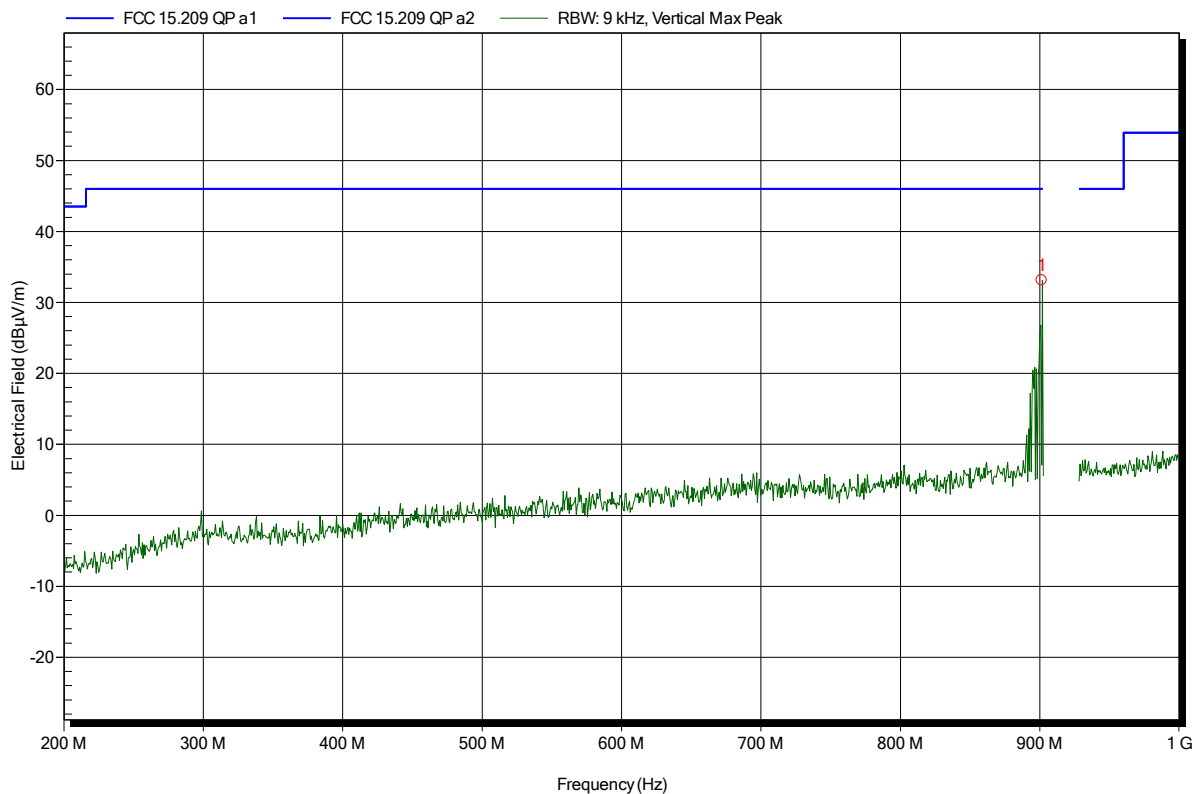
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
901.701 MHz	32.49 dBµV/m	46 dBµV/m	-13.51 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.249

Project number: GOM-1410-4242

Applicant: Kieback und Peter GmbH & Co. KG
 EUT Name: Stellantrieb
 Model: MD15-FTL-902
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pudell
 Test Conditions: Tnom: 24°C, Vnom: 4.5 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; SRD; 902.875 MHz; FSK- Mode
 Test Date: 2015-01-07
 Note: EUT vertical

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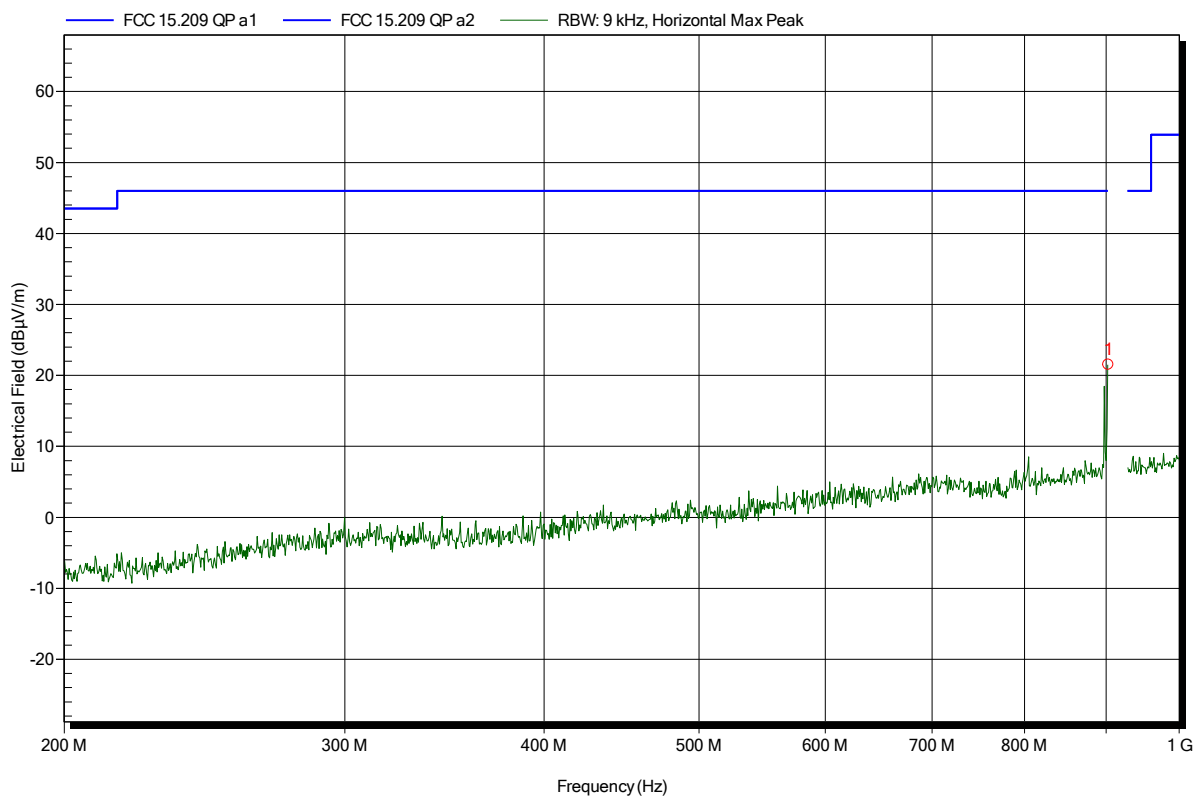
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
901.4 MHz	33.1 dBµV/m	46 dBµV/m	-12.9 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.249

Project number: G0M-1410-4242

Applicant: Kieback und Peter GmbH & Co. KG
 EUT Name: Stellantrieb
 Model: MD15-FTL-902
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pudell
 Test Conditions: Tnom: 24°C, Vnom: 4.5 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: TX; SRD; 902.875 MHz; FSK- Mode
 Test Date: 2015-01-07
 Note: EUT vertical

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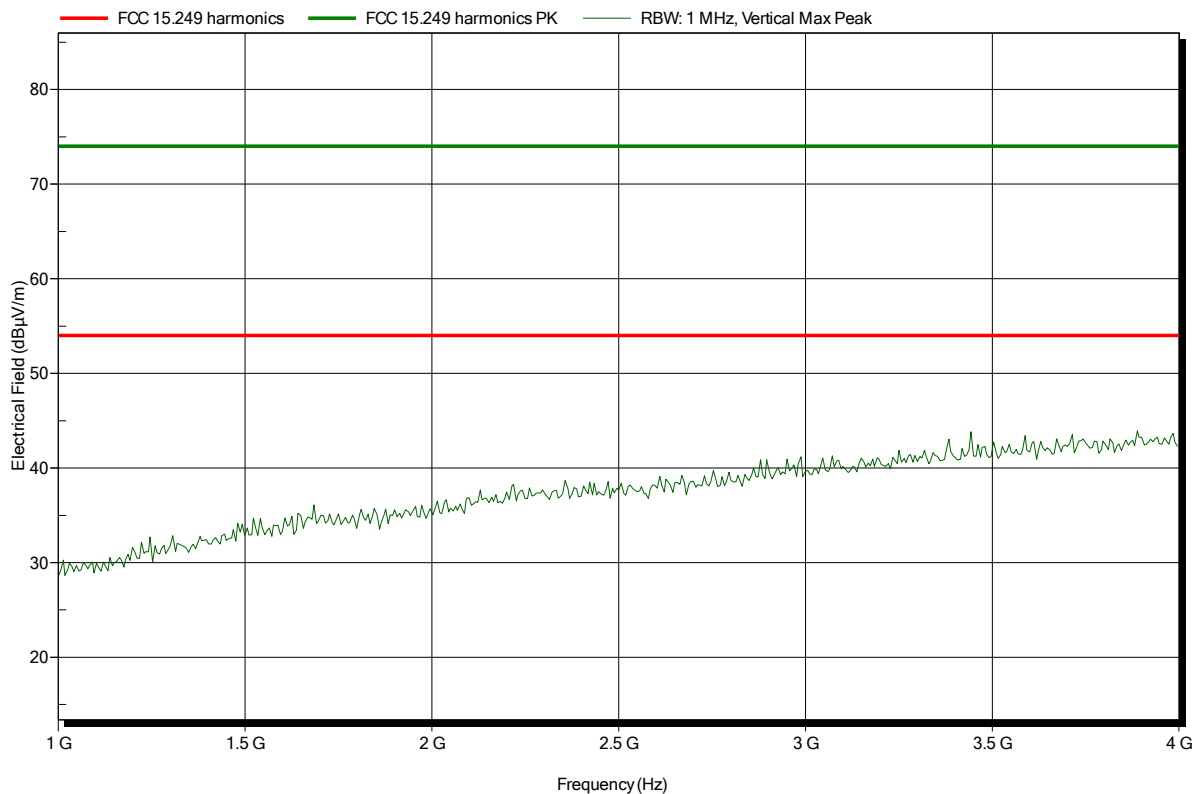
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
901.589 MHz	21.48 dBµV/m	46 dBµV/m	-24.52 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.249

Project number: GOM-1410-4242

Applicant: Kieback und Peter GmbH & Co. KG
 EUT Name: Stellantrieb
 Model: MD15-FTL-902
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pudell
 Test Conditions: Tnom: 24°C, Vnom: 4.5 VDC
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 3 m
 Mode: TX; SRD; 902.875 MHz; 2-FSK- Mode
 Test Date: 2015-01-07
 Note: EUT horizontal

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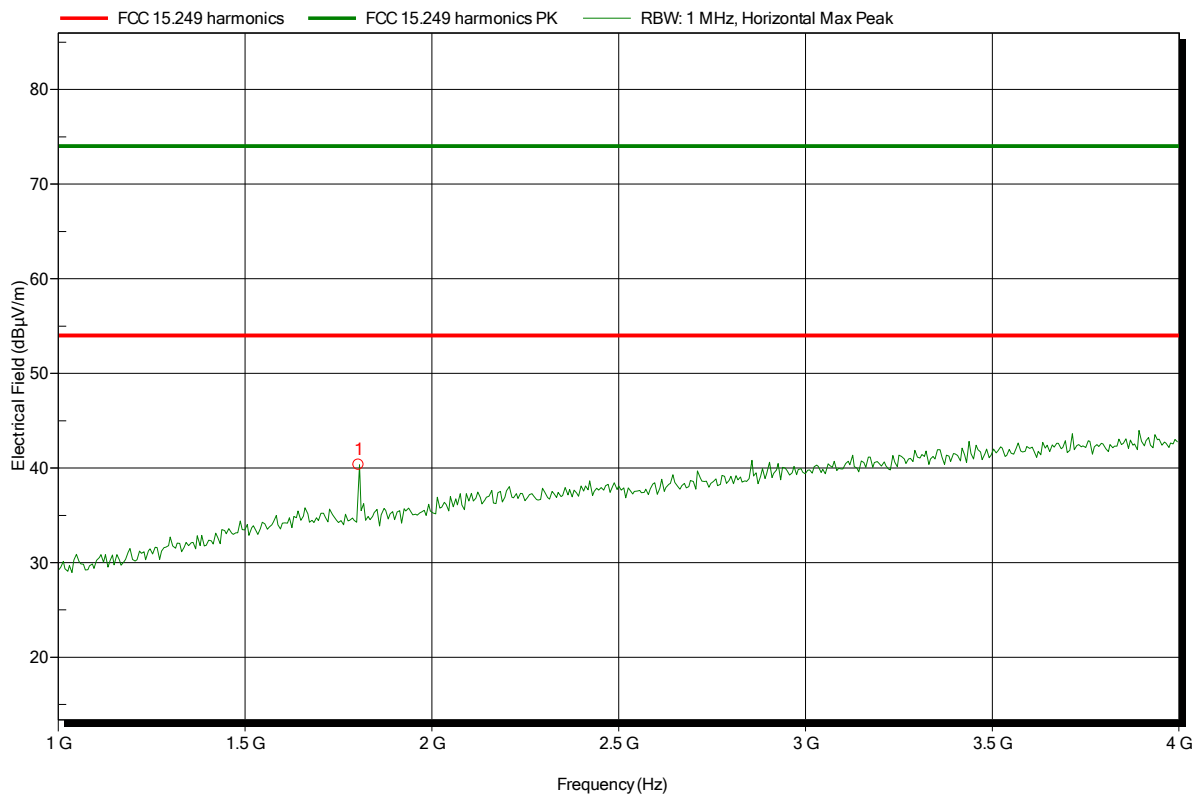


Spurious emissions according to FCC part 15 Subpart C § 15.249

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Applicant: Kieback und Peter GmbH & Co. KG
 EUT Name: Stellantrieb
 Model: MD15-FTL-902
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pudell
 Test Conditions: Tnom: 24°C, Vnom: 4.5 VDC
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 3 m
 Mode: TX; SRD; 902.875 MHz; 2-FSK- Mode
 Test Date: 2015-01-07
 Note: EUT horizontal

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.804 GHz	40.34 dBµV/m	74 dBµV/m	-33.66 dB	Pass

Test Report No.: G0M-1410-4242-TFC249DT-V01

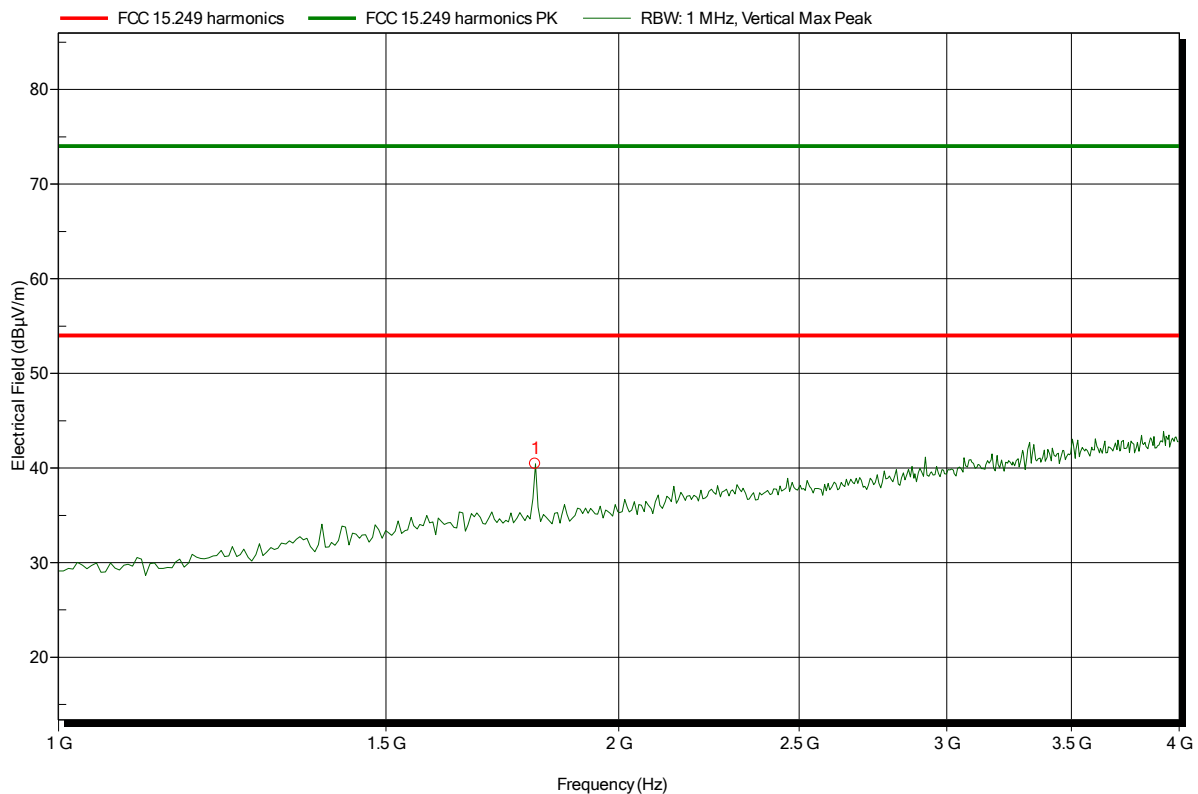
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC part 15 Subpart C § 15.249

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 Model: MD15-FTL-902
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pudell
 Test Conditions: Tnom: 24°C, Vnom: 4.5 VDC
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 3 m
 Mode: TX; SRD; 902.875 MHz; 2-FSK- Mode
 Test Date: 2015-01-07
 Note: EUT vertical

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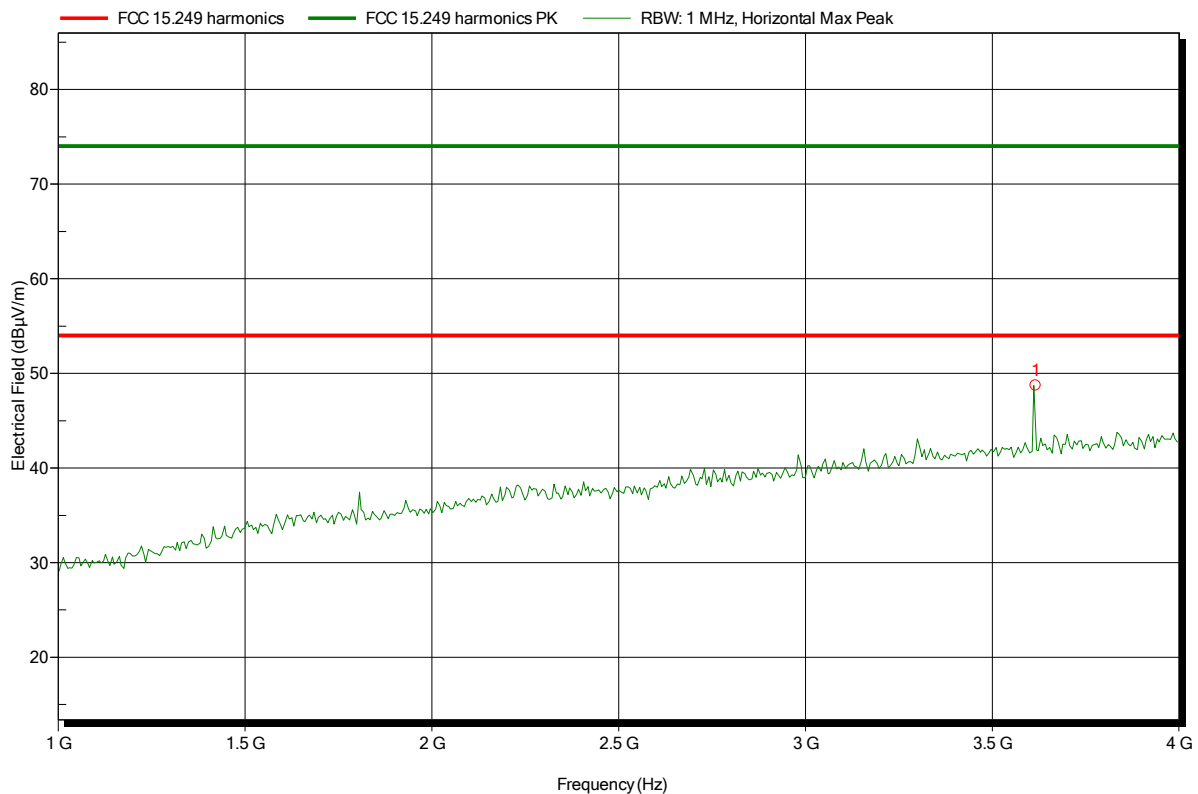
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.804 GHz	40.44 dBµV/m	74 dBµV/m	-33.56 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.249

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 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pudell
 Test Conditions: Tnom: 24°C, Vnom: 4.5 VDC
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 3 m
 Mode: TX; SRD; 902.875 MHz; 2-FSK- Mode
 Test Date: 2015-01-07
 Note: EUT vertical

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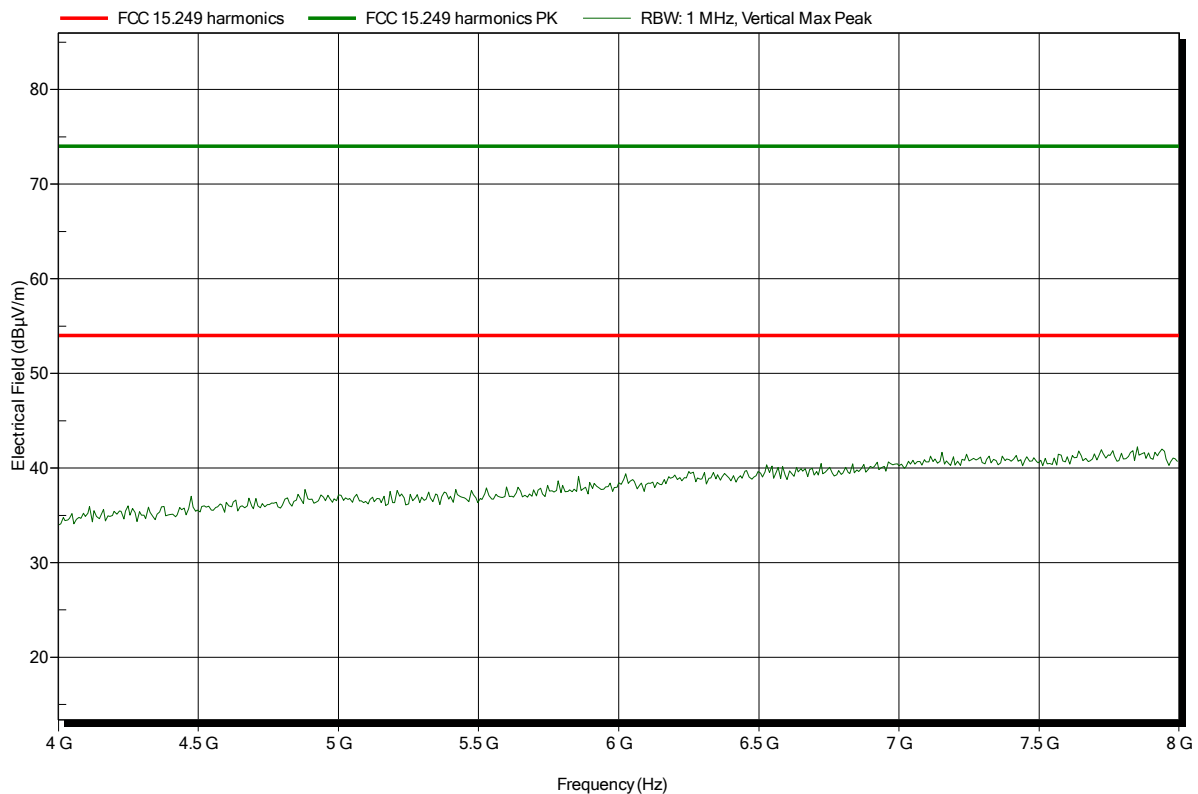
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
3.616 GHz	48.72 dBµV/m	74 dBµV/m	-25.28 dB	Pass

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 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pudell
 Test Conditions: Tnom: 24°C, Vnom: 4.5 VDC
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; SRD; 902.875 MHz; 2-FSK- Mode
 Test Date: 2015-01-07
 Note: EUT horizontal

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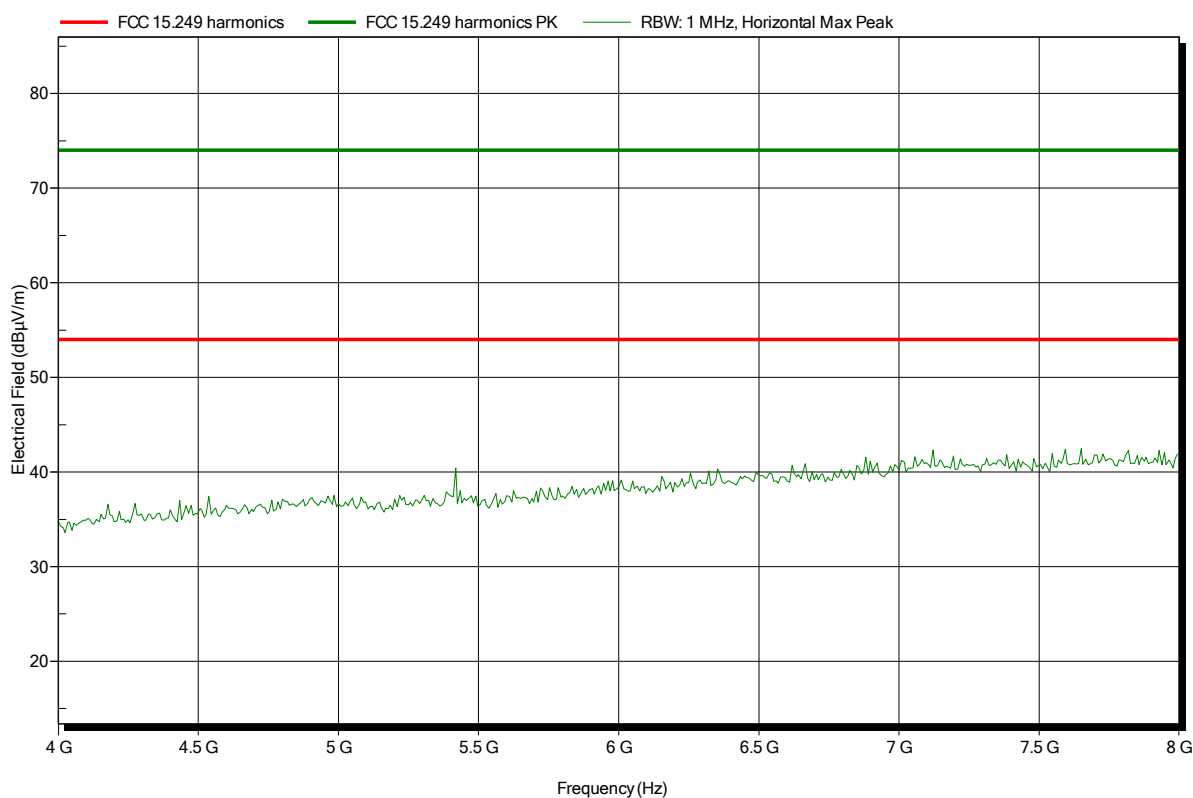


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Test Conditions:	Tnom: 24°C, Vnom: 4.5 VDC
Antenna:	Rohde & Schwarz HL 025, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; SRD; 902.875 MHz; 2-FSK- Mode
Test Date:	2015-01-07
Note:	EUT horizontal

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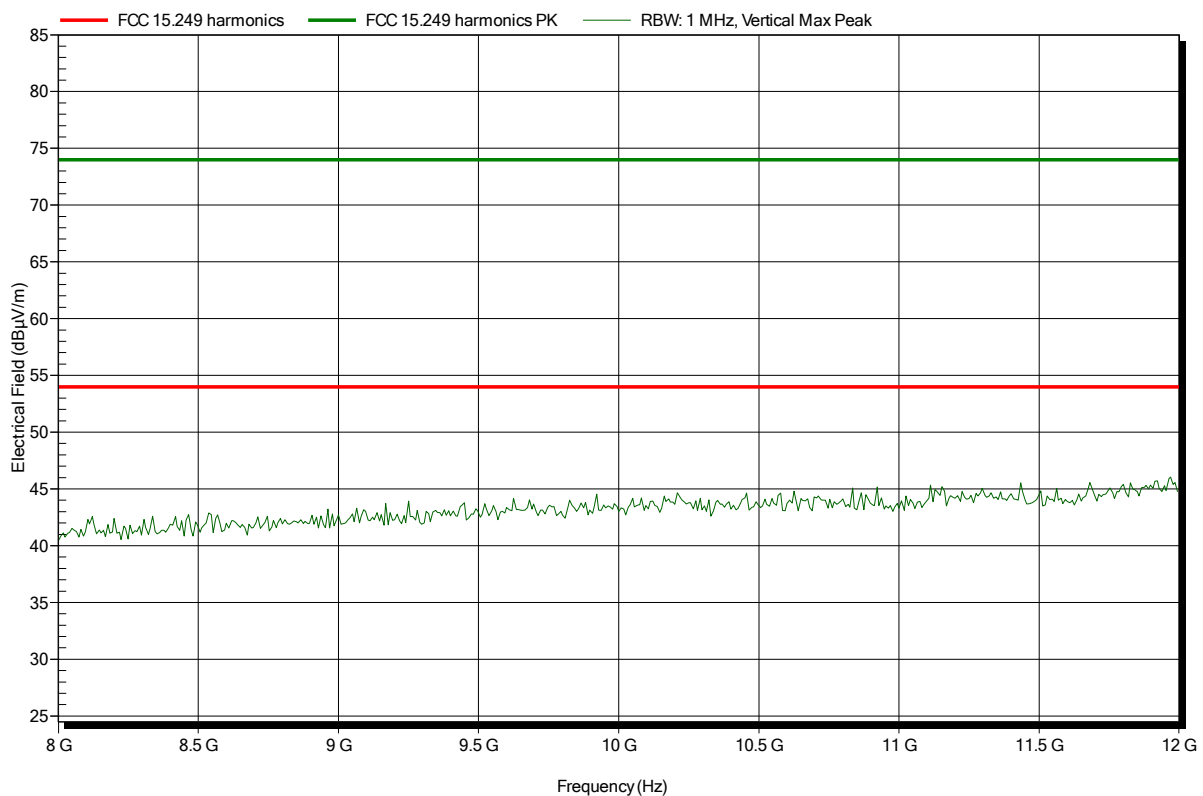


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 Measurement distance: 1 m converted to 3m
 Mode: TX; SRD; 902.875 MHz; 2-FSK- Mode
 Test Date: 2015-01-07
 Note: EUT horizontal

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Spurious emissions according to FCC part 15 Subpart C § 15.249

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EUT Name:	Stellantrieb
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Operator:	Mr. Pudell
Test Conditions:	Tnom: 24°C, Vnom: 4.5 VDC
Antenna:	Rohde & Schwarz HL 025, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; SRD; 902.875 MHz; 2-FSK- Mode
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Note:	EUT horizontal

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