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EMC TEST REPORT

FCC 47 CFR Part 15B
Industry Canada RSS-Gen

Electromagnetic compatibility - Unintentional radiators

Report Reference No. ..... :	G0M-1309-3213-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 ..... :	inmotiotec GmbH
Address ..... :	Oberregauer Straße 48 4844 Regau AUSTRIA
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	Transponder
Model No.	LPM Ref.Tp. Compact
Additional Models	None
Hardware version	H2.3
Firmware / Software version	fcc0
FCC-ID:	2AATD-REFTPV23
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 ..... : 2013-08-05

Date (s) of performance of tests ..... : 2013-08-26

Compiled by..... : Antje Bartusch

Tested by (+ signature)..... : Matthias Handrik i.A.

Approved by (+ signature) ..... : Jens Zimmermann

Date of issue..... : 2013-09-17

Total number of pages..... : 20

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.

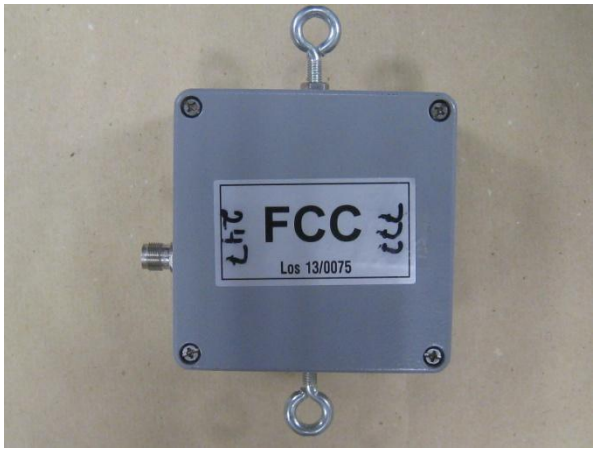
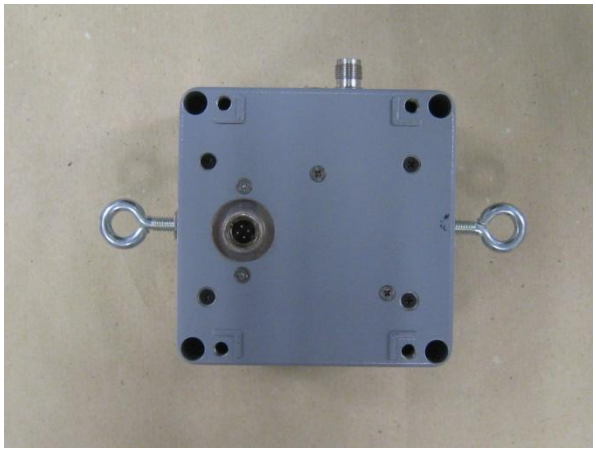
Additional comments:

REPORT INDEX

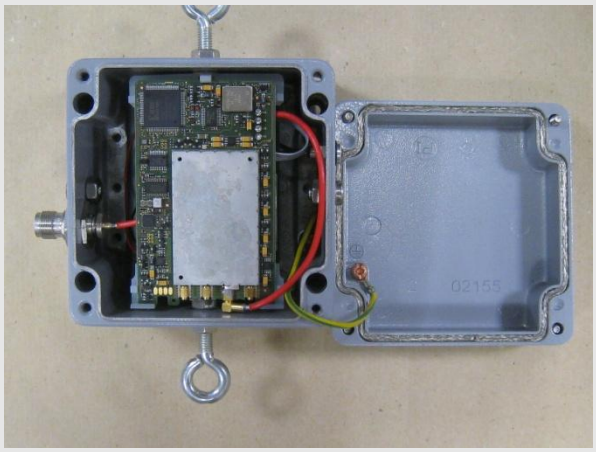
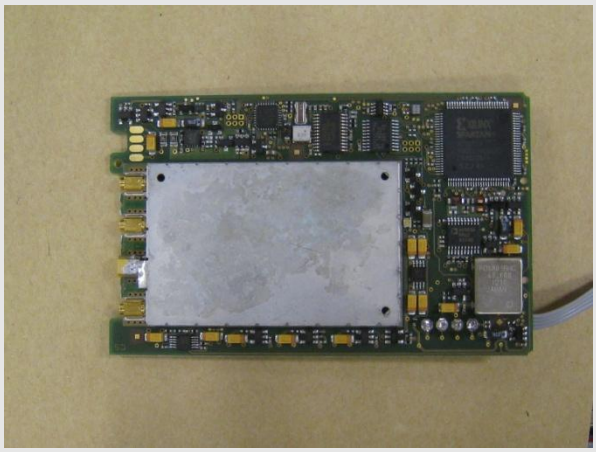
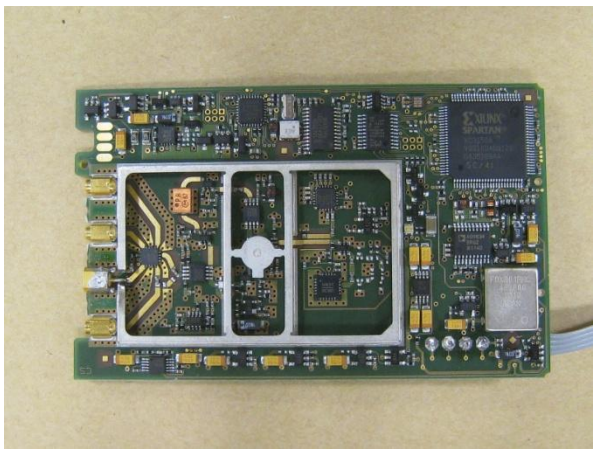
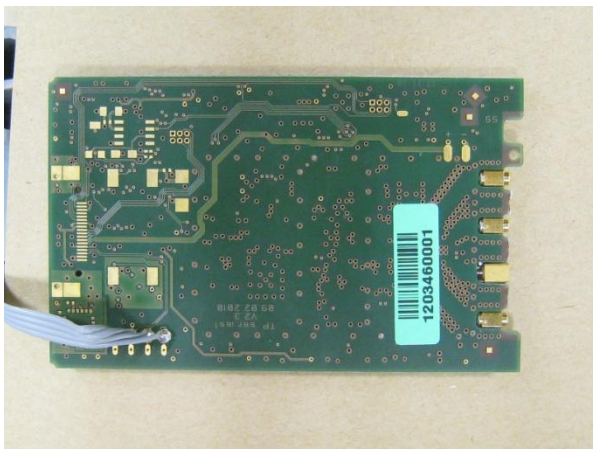
1 Equipment (Test item) Description

Description	Transponder	
Model	LPM Ref.Tp. Compact	
Additional Models	None	
Serial number	None	
Hardware version	H2.3	
Software / Firmware version	fcc0	
FCC-ID	2AATD-REFTPV23	
Power supply	120 VAC	
AC/DC-Adaptor	Model	MW3H36GS
	Vendor	MW
	Input	100-240VAC, 50-60Hz, 800mA
	Output	12V; 3A
Manufacturer	Abatec Group AG Oberregauerstraße 48 4844 Regau Austria	
Highest emission frequency	Fmax [MHz] = 48	
Device classification	Class B	
Equipment type	Tabletop	
Number of tested samples	1	

1.1 Photos – Equipment external

EUT TOP	EUT BOTTOM
	
EUT FRONT	**AC/DC ADAPTER**
	
Antenna 1 (SOA-5600/360/5/0/V)	**Antenna 2 (SWA-2459/360/4/45/V)**
	

1.2 Photos – Equipment internal

EUT OPEN	PCB TOP
	
PCB WITHOUT SHEILDING	**PCB BOTTOM**
	

1.3 Photos – Test setup

TESTSETUP RADIATED MEASUREMENTS


TESTSETUP CONDUCTED MEASUREMENTS


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 Operating Modes

Mode #	Description
1	Transmit mode active, powered by 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	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:

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 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 %	45%
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] = 48	
Fully configured sample scanned over the following frequency range	Frequency range	
	30 MHz to 1 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 15B

Project number: G0M-1309-3213

Manufacturer:	inmotiotec GmbH
EUT Name:	Transponder
Model:	LPM Ref.Tp. Compact
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 23°C, Unom: 120 V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3m
Mode:	Powered by AC/DC Adaptor
Test Date:	2013-08-26
Note:	

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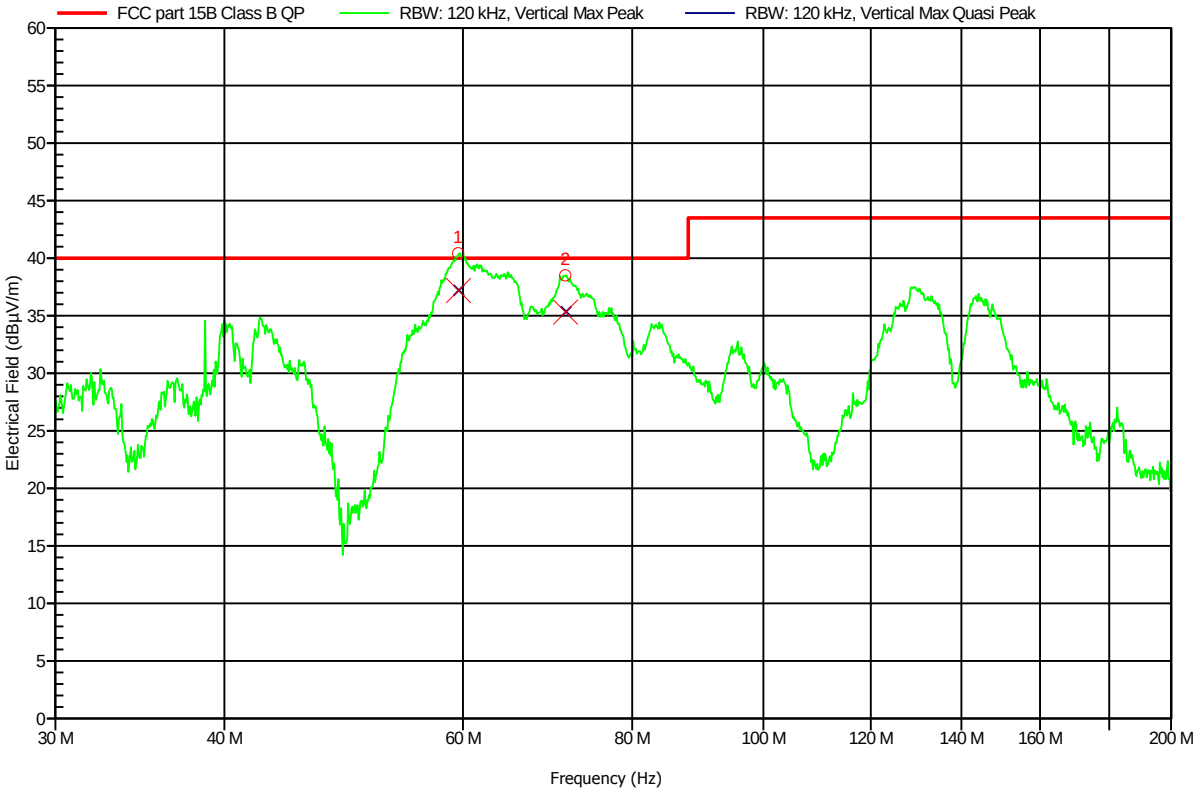

Nr	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	59.52 MHz	37.22 dBµV/m	40 dBµV/m	-2.78 dB	Pass
2	71.4 MHz	35.34 dBµV/m	40 dBµV/m	-4.66 dB	Pass

Spurious emissions under normal conditions according to FCC 15B

Project number: G0M-1309-3213

Manufacturer:	inmotiotec GmbH
EUT Name:	Transponder
Model:	LPM Ref.Tp. Compact
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 23°C, Unom: 120 V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3m
Mode:	Powered by AC/DC Adaptor
Test Date:	2013-08-26
Note:	

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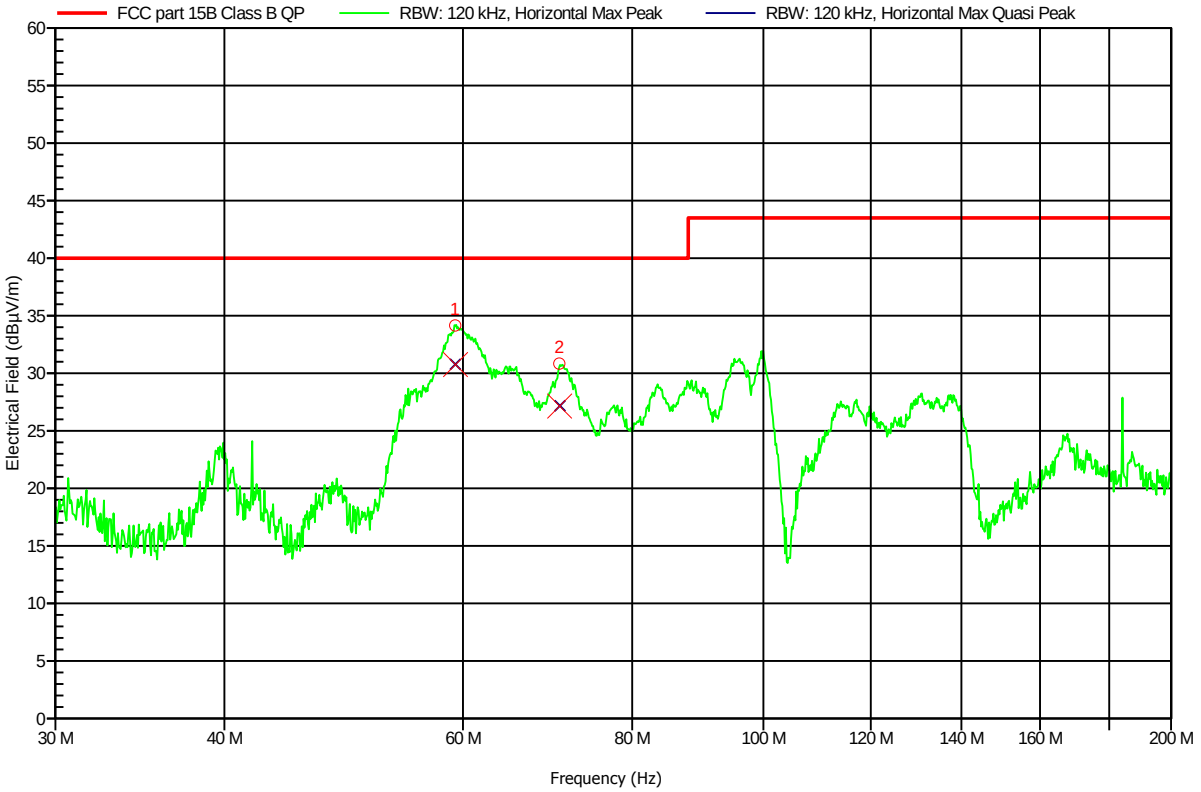

Nr	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	59.22 MHz	30.78 dBµV/m	40 dBµV/m	-9.22 dB	Pass
2	70.68 MHz	27.17 dBµV/m	40 dBµV/m	-12.83 dB	Pass

Spurious emissions under normal conditions according to FCC 15B

Project number: G0M-1309-3213

Manufacturer:	inmotiotec GmbH
EUT Name:	Transponder
Model:	LPM Ref.Tp. Compact
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 23°C, Unom: 120 V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3m
Mode:	Powered by AC/DC Adaptor
Test Date:	2013-08-26
Note:	

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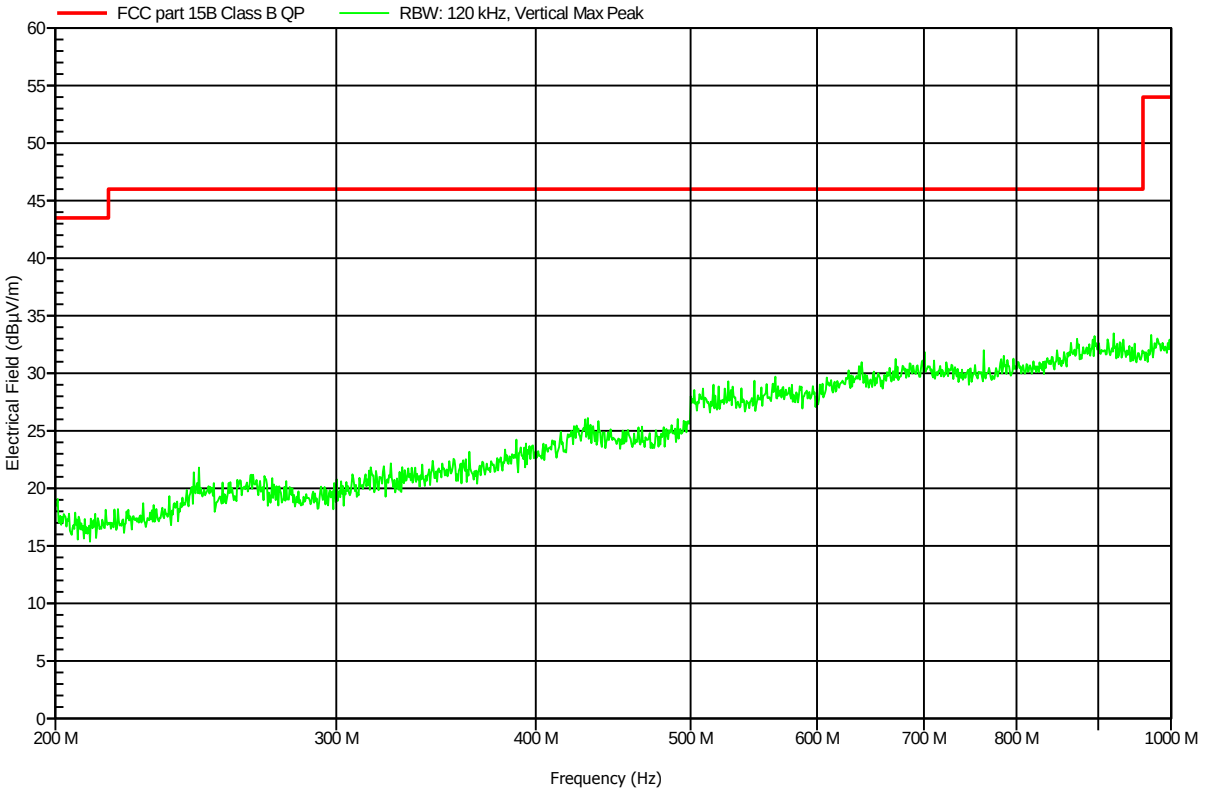

Spurious emissions under normal conditions according to FCC 15B

Project number: G0M-1309-3213

Manufacturer:	inmotiotec GmbH
EUT Name:	Transponder
Model:	LPM Ref.Tp. Compact
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 23°C, Unom: 120 V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3m
Mode:	Powered by AC/DC Adaptor
Test Date:	2013-08-26
Note:	

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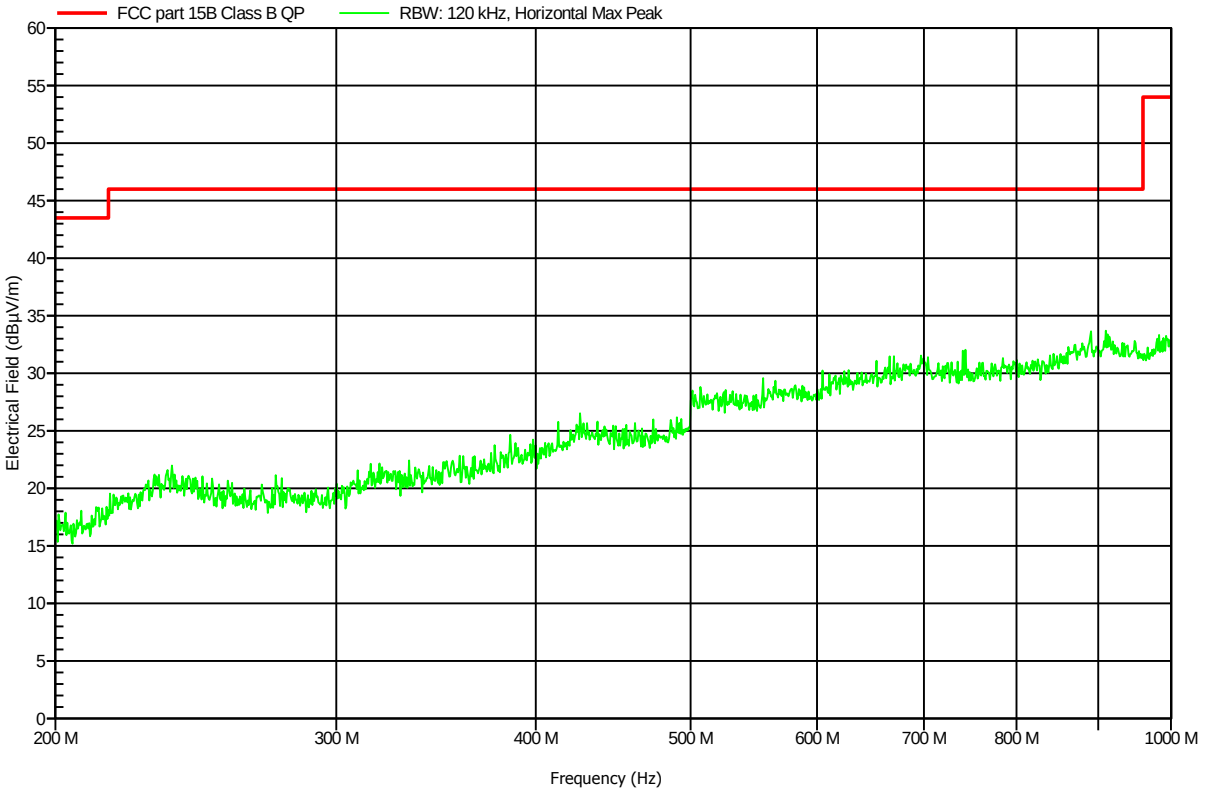

3.2 Test Conditions and Results – AC power line conducted emissions

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 %	45%
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 15B

Project number: G0M-1308-3097 Ref

Manufacturer:	inmotiotec GmbH
EUT Name:	Transponder
Model:	LPM Ref.Tp. Compact
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 23°C, Unom: 120 V AC (AC/DC adaptor)
LISN:	ESH2-Z5 N
Mode:	Powered by AC/DC Adaptor
Test Date:	2013-08-26
Note:	

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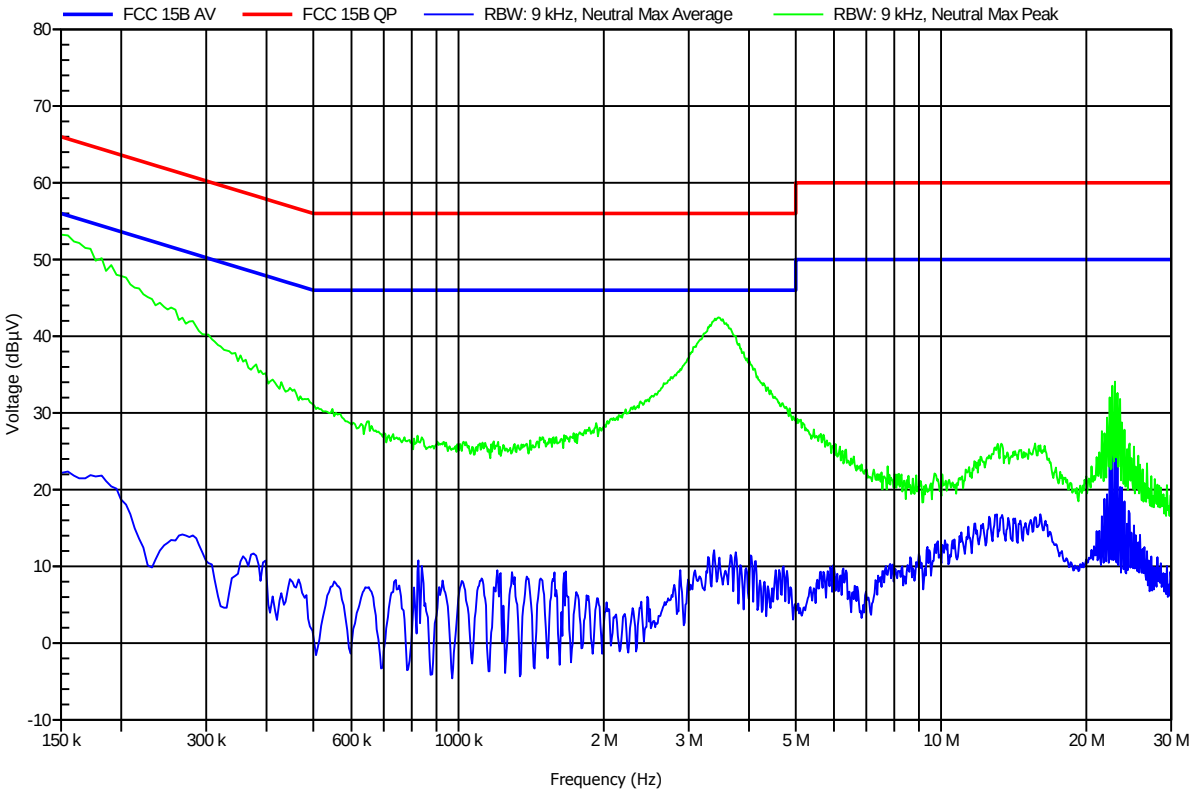

EMI voltage test in the ac-mains according to FCC 15B

Project number: G0M-1308-3097 Ref

Manufacturer:	inmotiotec GmbH
EUT Name:	Transponder
Model:	LPM Ref.Tp. Compact
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 23°C, Unom: 120 V AC (AC/DC adaptor)
LISN:	ESH2-Z5 L
Mode:	Powered by AC/DC Adaptor
Test Date:	2013-08-26
Note:	

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