eurofins | Product Service

# FCC TEST REPORT

**FCC 47 CFR Part 15C**
**Industry Canada RSS-210**

**Intentional radiator operating within the 5725 - 5875 MHz band**

| | |
|---|---|
| **Report Reference No**. ..... : | G0M-1308-3085-TFC249D-V01 |
| **Testing Laboratory** ..... : | Eurofins Product Service GmbH |
| Address ..... : | Storkower Str. 38c<br>15526 Reichenwalde<br>Germany |
| Accreditation ..... : | A2LA Accredited Testing Laboratory, Certificate No.: 1983.01<br>FCC Filed Test Laboratory, Reg.-No.: 96970<br>IC OATS Filing assigned code: 3470A |
| **Applicant's name** ..... : | inmotiotec GmbH |
| Address ..... : | Oberregauer Straße 48<br>4844 Regau<br>AUSTRIA |
| **Test specification:** | |
| Standard..... : | 47 CFR Part 15C<br>RSS-210, Issue 8, 2010-12<br>RSS-Gen, Issue 3, 2010-12<br>ANSI C63.4:2009 |
| **Equipment under test (EUT):** | |
| Product description | Transponder |
| Model No. | LPM Min T13 |
| Hardware version | H1.3 |
| Firmware / Software version | fcc0 |
| | FCC-ID: 2AATD-MINTV13 |
| **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:**

| | | |
|---|---|---|
| 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)..... : (Testing Manager) | Wilfried Treffke | W. Treffke ..... |
| Approved by (+ signature) ..... : (Test Lab Manager) | Christian Weber | C. Weber ..... |
| Date of issue ..... : | 2013-09-19 | |
| Total number of pages ..... : | 32 | |

**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.**



**Additional comments:**

The transmission mode of the EUT combines two different transmissions; a chirp spread spectrum mode that shifts an unmodulated carrier over the frequency range of 5735 – 5865 MHz and a single channel FSK modulated telemetry transmission mode on the frequency of 5862 MHz. Each transmission cycle starts with the chirp transmission mode and is ended with the telemetry data transmission mode.

# Version History

| Version | Issue Date | Remarks | Revised by |
|---|---|---|---|
| 01 | 2013-09-19 | Initial Release | |

## REPORT INDEX

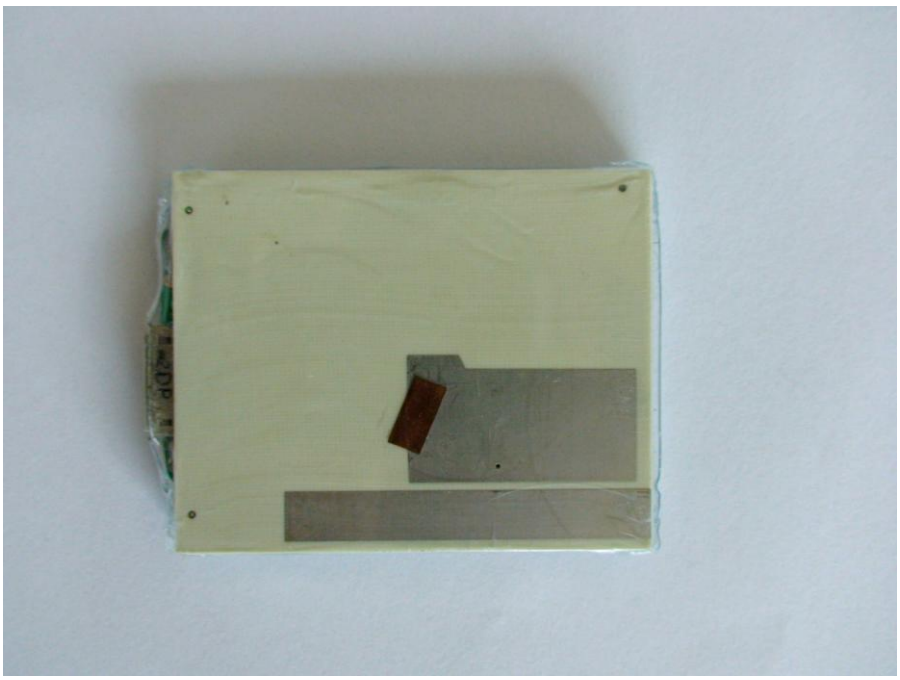
# 1 Equipment (Test item) Description

| | | |
|---|---|---|
| **Description** | Transponder | |
| **Model** | LPM Min T13 | |
| **Serial number** | None | |
| **Hardware version** | H1.3 | |
| **Software / Firmware version** | fcc0 | |
| **FCC-ID** | 2AATD-MINTV13 | |
| **Equipment type** | End product | |
| **Radio type** | Transceiver | |
| **Radio technology** | custom | |
| **Operating frequency range** | 5735 - 5865 MHz | |
| **Assigned frequency band** | 5725 - 5875 MHz | |
| **Frequency range CSS** | $F_{MID}$ | 5735 - 5865 MHz |
| **Frequency range FSK** | $F_{MID}$ | 5862 MHz |
| **Spreading** | CSS & None (FSK) | |
| **Modulations** | None (CSS) & FSK for telemetry mode | |
| **Channel spacing** | None | |
| **Number of antennas** | 1 | |
| **Antenna** | Type | integrated |
| | Model | PCB Antenna |
| | Manufacturer | Abatec |
| | Gain | 2 dBi |
| **Manufacturer** | Abatec Group AG<br>Oberregauerstraße 48<br>4844 Regau<br>Austria | |
| **Power supply** | $V_{NOM}$ | 3.7 VDC (Lithium-Battery)<br>120VAC (Charging station) |
| | $V_{MIN}$ | N/A |
| | $V_{MIN}$ | N/A |
| **AC/DC-Adaptor** | Model | N/A |
| | Vendor | N/A |
| | Input | N/A |
| | Output | N/A |

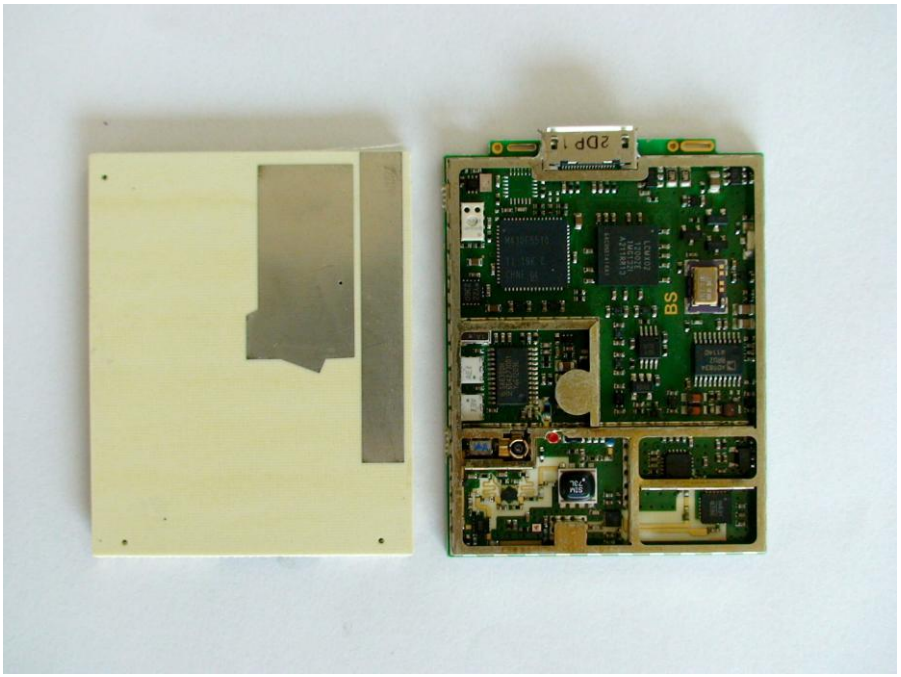
## 1.1 Photos – Equipment External

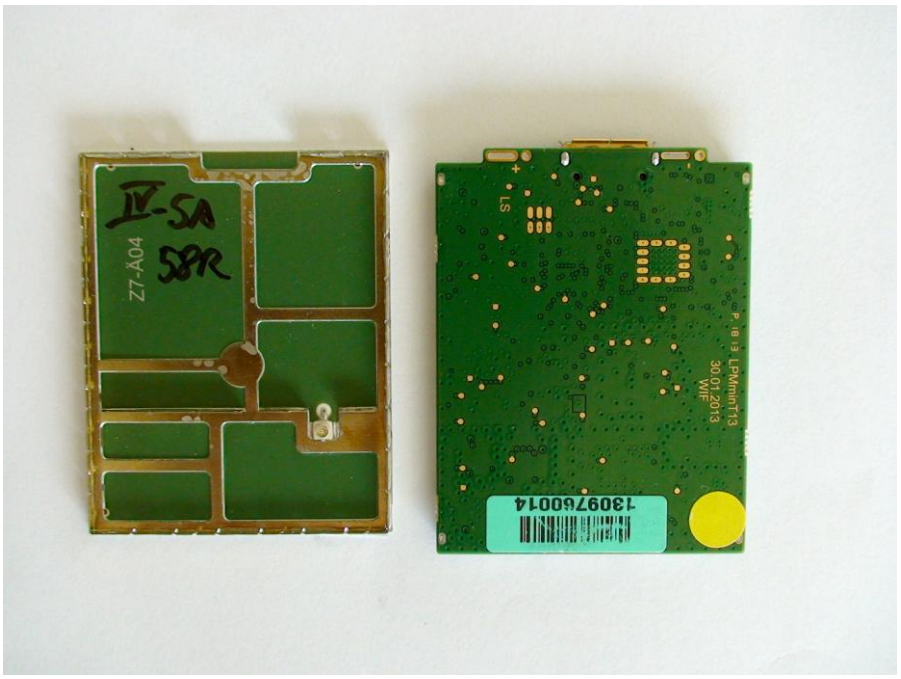
| EUT TOP |
| --- |
|  |



| EUT BOTTOM |
| --- |
|  |

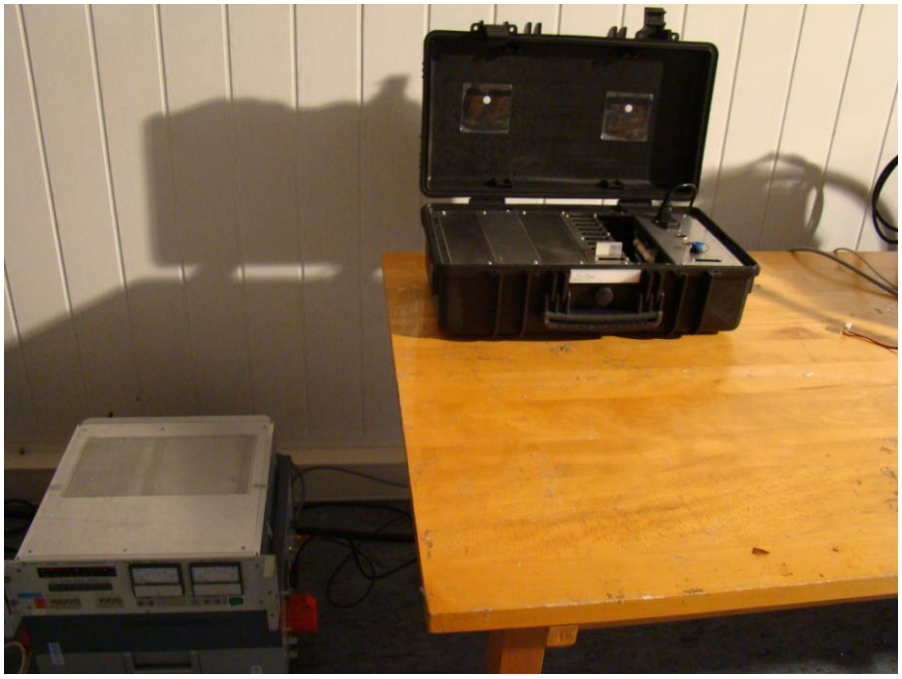
## 1.2 Photos – Equipment internal

| PCB TOP |
| --- |
|  |

| 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 |
|---|---|---|---|---|
| AE | Charging Station | Inmotiotec | LPM | |

***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 | |
|---|---|---|
| Single | General conditions: | EUT powered by fully charged battery |
| | Radio conditions: | Mode = standalone transmit<br>Modulation = FMCW / FSK<br>Power level = Maximum |

### 1.6 Test Equipment Used During Testing

| Field strength emissions | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Semi-anechoic chamber | Frankonia | AC 5 | EF00395 | calibration | calibration |
| Spectrum Analyzer | R&S | FSIQ26 | EF00242 | 2013-06 | 2014-06 |
| Biconical Antenna | R&S | HK 116 | EF00012 | 2013-02 | 2016-02 |
| LPD Antenna | R&S | HL 223 | EF00187 | 2011-02 | 2014-02 |
| LPD Antenna | R&S | HL 025 | EF00327 | 2013-02 | 2016-02 |

| AC powerline 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 | EF00295 | 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 |

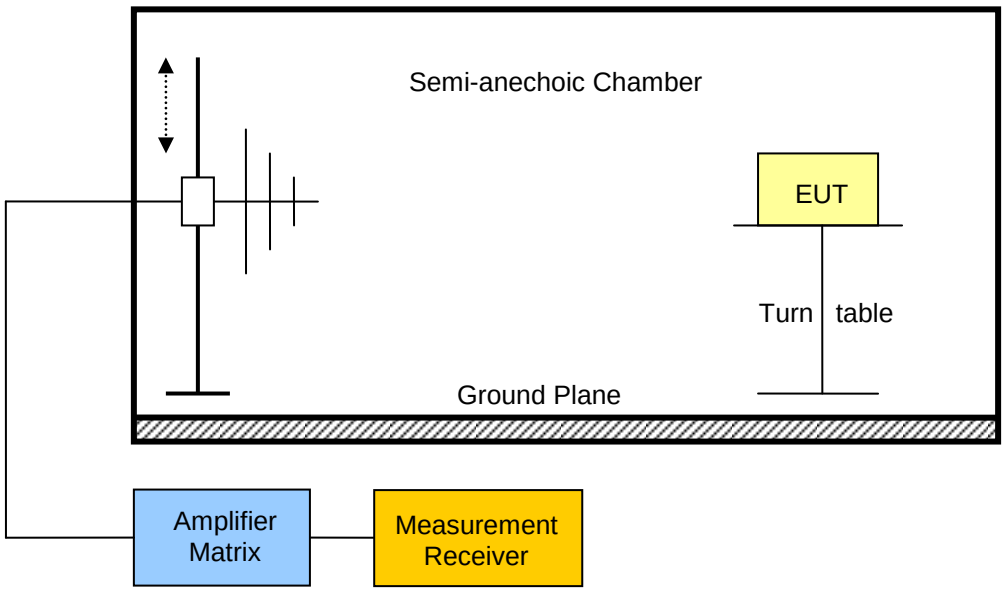
## 2 Result Summary

| FCC 47 CFR Part 15C, IC RSS-210 | | | | |
|---|---|---|---|---|
| **Product Specific Standard Section** | **Requirement – Test** | **Reference Method** | **Result** | **Remarks** |
| RSS-Gen 4.6.1 | Occupied Bandwidth | RSS-Gen 4.6.1 | N/N | |
| FCC 15.249(a),(c),(e)<br>IC RSS-210 A2.9(a) | Fundamental field strength emissions | ANSI C63.4 | PASS | |
| FCC 15.249(a),(c),(d),(e)<br>IC RSS-210 A2.9(a),(b) | Emission radiated outside the specified frequency band | ANSI C63.4 | PASS | |
| IC RSS-210 Section 2.3<br>IC RSS-Gen 4.10 6.1 | Receiver radiated spurious emissions | ANSI C63.4 | N/N | |
| FCC § 15.207<br>IC 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 – Fundamental field strength emissions

| **Field strength emissions acc. 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 | | Single | | |
| **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.<br><br>Below 1GHz a CISPR quasi-peak detector is used. | | | | |
| **Test setup** | | | | |



| Test procedure |
|---|
| 1. EUT set to test mode<br>2. Span it set according to measurement range<br>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<br>4. 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] |
|---|---|---|---|---|---|---|---|---|
| $F_{MID}$ | 5735 - 5865 | 5736 | 110.13 | pk | ver | 114.00 | 3 | -03.87 |
| $F_{MID}$ | 5735 - 5865 | 5736 | 66.21 | avg | ver | 94.00 | 3 | -27.79 |
| $F_{MID}$ | 5735 - 5865 | 5777 | 102.62 | pk | hor | 114.00 | 3 | -11.38 |
| $F_{MID}$ | 5735 - 5865 | 5777 | 62.40 | avg | hor | 94.00 | 3 | -31.60 |
| $F_{MID}$ | 5735 - 5865 | 5862 | 102.09 | pk | hor | 114.00 | 3 | -11.91 |
| $F_{MID}$ | 5735 - 5865 | 5862 | 81.63 | avg | hor | 94.00 | 3 | -12.37 |
| $F_{MID}$ | 5735 - 5865 | 5862 | 105.79 | pk | ver | 114.00 | 3 | -08.21 |
| $F_{MID}$ | 5735 - 5865 | 5862 | 84.96 | avg | ver | 94.00 | 3 | -09.04 |

Comments: * Physical distance between EUT and measurement antenna.

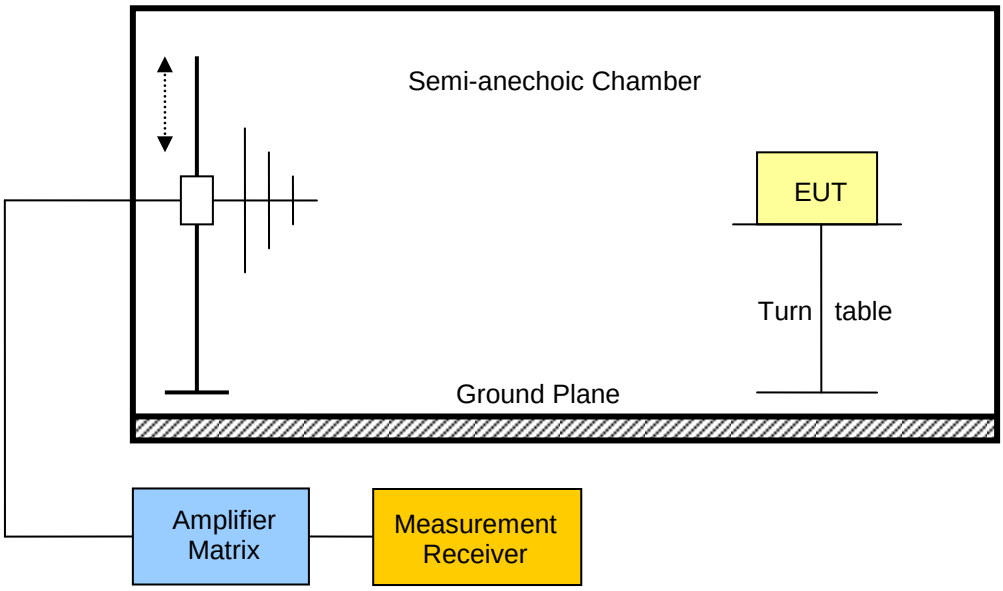
### 3.2 Test Conditions and Results – Emissions radiated outside the specified frequency band

| **Radiated out-of-band band emissions acc. 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$^{th}$ harmonic | | |
| EUT test mode | | Single | | |
| **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] |
|---|---|---|---|---|---|---|---|---|
| $F_{MID}$ | 5735 - 5865 | 5718 | 71.54 | pk | ver | 74.00 | 3 | -02.46 |
| $F_{MID}$ | 5735 - 5865 | 5718 | 32.6 | avg | ver | 54.00 | 3 | -21.40 |
| $F_{MID}$ | 5735 - 5865 | 5725 | 58.43 | pk | hor | 74.00 | 3 | -15.57 |
| $F_{MID}$ | 5735 - 5865 | 5725 | 31.35 | avg | hor | 54.00 | 3 | -22.65 |
| $F_{MID}$ | 5735 - 5865 | 5875 | 68.3 | pk | hor | 74.00 | 3 | -05.70 |
| $F_{MID}$ | 5735 - 5865 | 5875 | 32.17 | avg | hor | 54.00 | 3 | -21.83 |
| $F_{MID}$ | 5735 - 5865 | 5875 | 70.9 | pk | ver | 74.00 | 3 | -03.10 |
| $F_{MID}$ | 5735 - 5865 | 5875 | 32.49 | avg | ver | 54.00 | 3 | -21.51 |
| $F_{MID}$ | 5735 - 5865 | 11612 | 53.19 | pk | hor | 74.00 | 3 | -20.81 |
| $F_{MID}$ | 5735 - 5865 | 11612 | 30.29 | avg | hor | 54.00 | 3 | -23.71 |
| $F_{MID}$ | 5735 - 5865 | 11703 | 61.77 | pk | ver | 74.00 | 3 | -12.23 |
| $F_{MID}$ | 5735 - 5865 | 11703 | 30.61 | avg | ver | 54.00 | 3 | -23.39 |

Comments: * Physical distance between EUT and measurement antenna.

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

| **Power line conducted emissions acc. FCC 47 CFR 15.207 / IC RSS-Gen** | | | | **Verdict: PASS** |
|---|---|---|---|---|
| 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 | | | |
| Points of Application | Application Interface | | | |
| AC Mains | LISN | | | |
| EUT test mode | AC-Powerline | | | |
| **Limits and results** | | | | |
| 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:<br>* Limit decreases linearly with the logarithm of the frequency. | | | | |

## Conducted Emissions

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

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
| EUT Name: | Minitransponder |
| Model: | LPM Min T13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Handrik |
| Test Conditions: | Tnom: 23°C, Vnom: 3.7 V DC |
| LISN: | ESH2-Z5 N |
| Mode: | active; charging |
| Test Date: | 2013-08-26 |
| Note: | |

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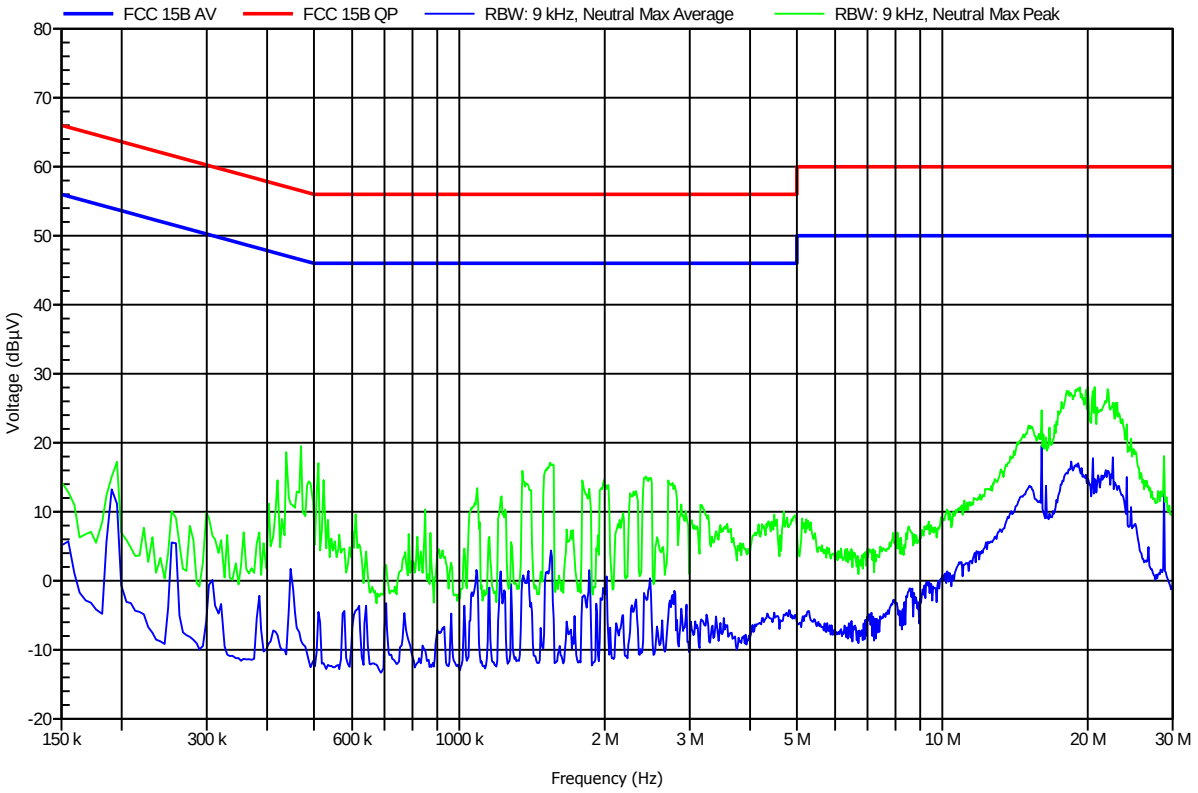
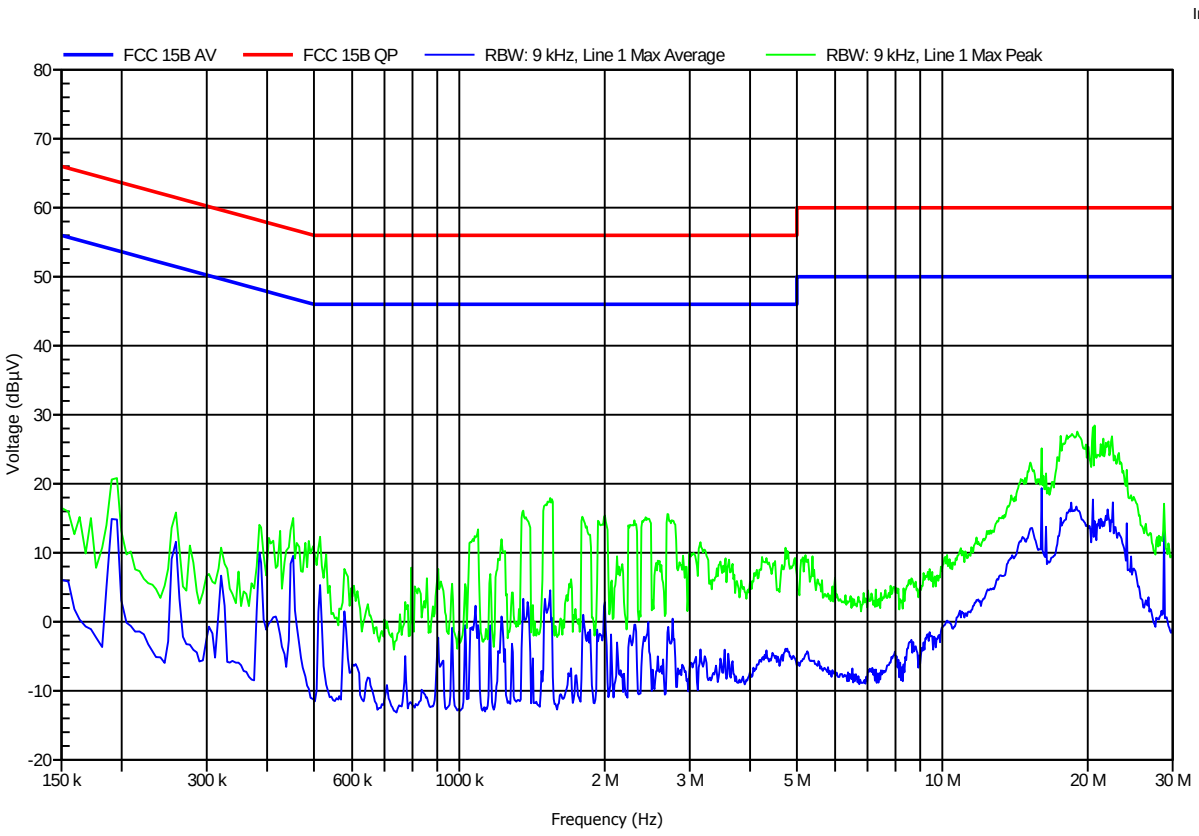


## Conducted Emissions

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

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
| EUT Name: | Minitransponder |
| Model: | LPM Min T13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Handrik |
| Test Conditions: | Tnom: 23°C, Vnom: 3.7 V DC |
| LISN: | ESH2-Z5 L |
| Mode: | active; charging |
| Test Date: | 2013-08-26 |
| Note: | |



# ANNEX A Fundamental field strength emissions

**Field Strength of Emissions according to FCC 15.249**

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
| EUT Name: | Transponder |
| Model: | LPM MinT13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Treffke |
| Test Conditions: | Tnom: 25°C, Vnom: 3.7 V DC lithium battery |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; Chirp + FSK Telemetry |
| Test Date: | 2013-08-26 |
| Note: | |

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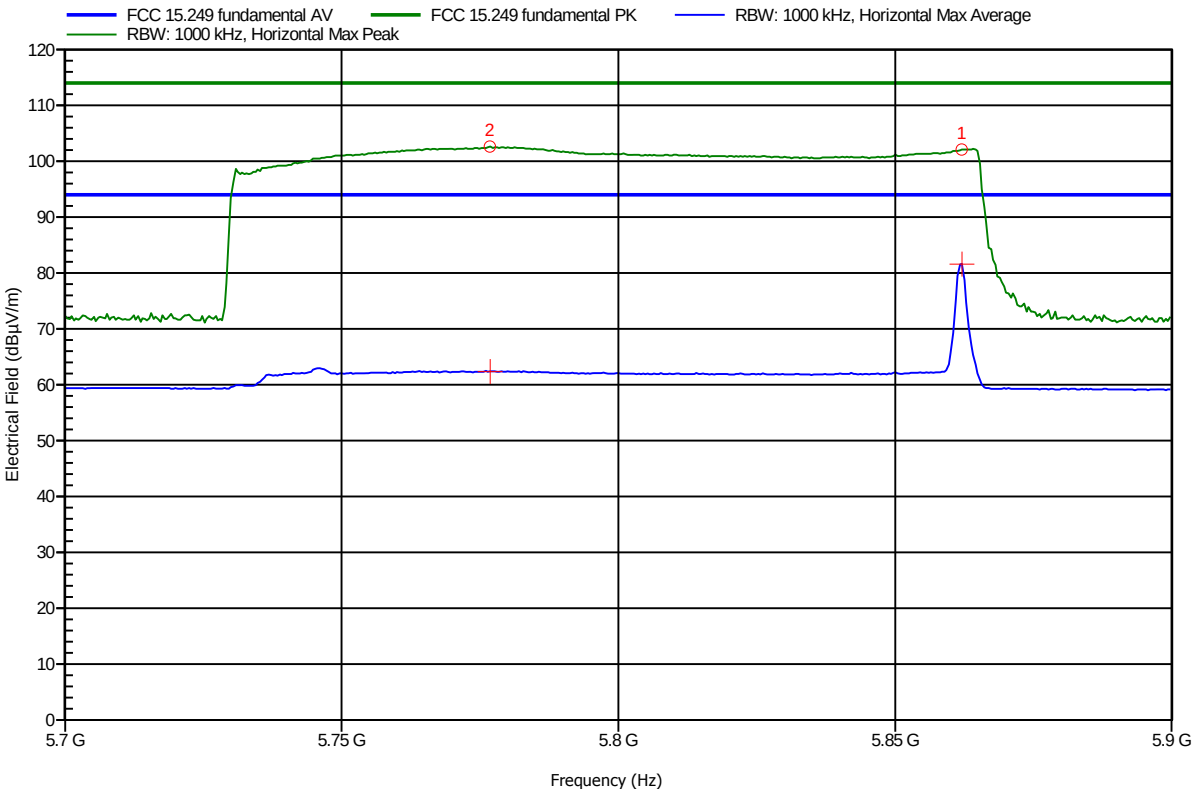


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 5.777 GHz | 102.62 dBµV/m | 114 dBµV/m | -11.38 dB | Pass |
| 5.862 GHz | 102.09 dBµV/m | 114 dBµV/m | -11.91 dB | Pass |

| Frequency | Average | Average Limit | Average Difference | Average Status |
|---|---|---|---|---|
| 5.777 GHz | 62.4 dBµV/m | 94 dBµV/m | -31.6 dB | Pass |
| 5.862 GHz | 81.63 dBµV/m | 94 dBµV/m | -12.37 dB | Pass |

**Field Strength of Emissions according to FCC 15.249**

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
| EUT Name: | Transponder |
| Model: | LPM MinT13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Treffke |
| Test Conditions: | Tnom: 25°C, Vnom: 3.7 V DC lithium battery |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; Chirp + FSK Telemetry |
| Test Date: | 2013-08-26 |
| Note: | |

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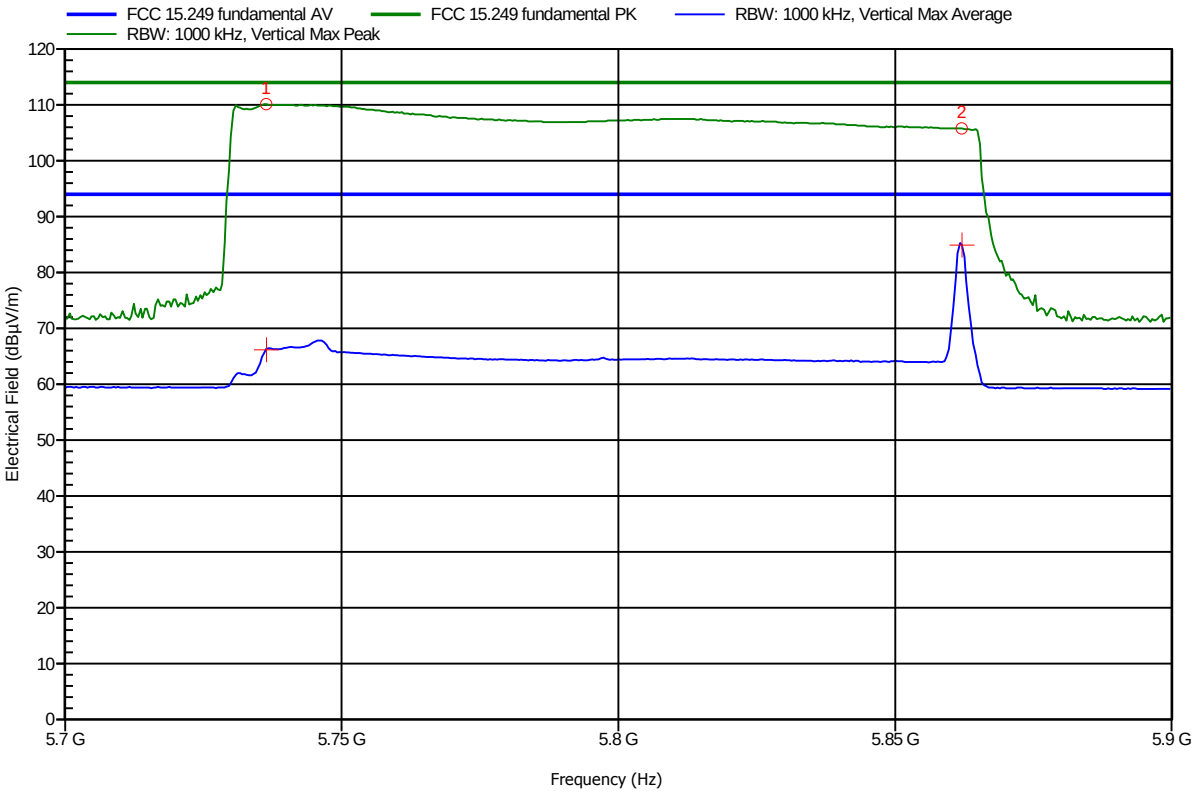


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 5.736 GHz | 110.13 dBµV/m | 114 dBµV/m | -3.87 dB | Pass |
| 5.862 GHz | 105.79 dBµV/m | 114 dBµV/m | -8.21 dB | Pass |

| Frequency | Average | Average Limit | Average Difference | Average Status |
|---|---|---|---|---|
| 5.736 GHz | 66.21 dBµV/m | 94 dBµV/m | -27.79 dB | Pass |
| 5.862 GHz | 84.96 dBµV/m | 94 dBµV/m | -9.04 dB | Pass |

# ANNEX B Transmitter radiated spurious emissions

**Spurious emissions according to FCC 15.249**

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
| EUT Name: | Transponder |
| Model: | LPM MinT13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Treffke |
| Test Conditions: | Tnom: 25°C, Vnom: 3.7 V DC lithium battery |
| Antenna: | Rohde & Schwarz HK 116, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; Chirp + FSK Telemetry |
| Test Date: | 2013-08-26 |
| Note: | |

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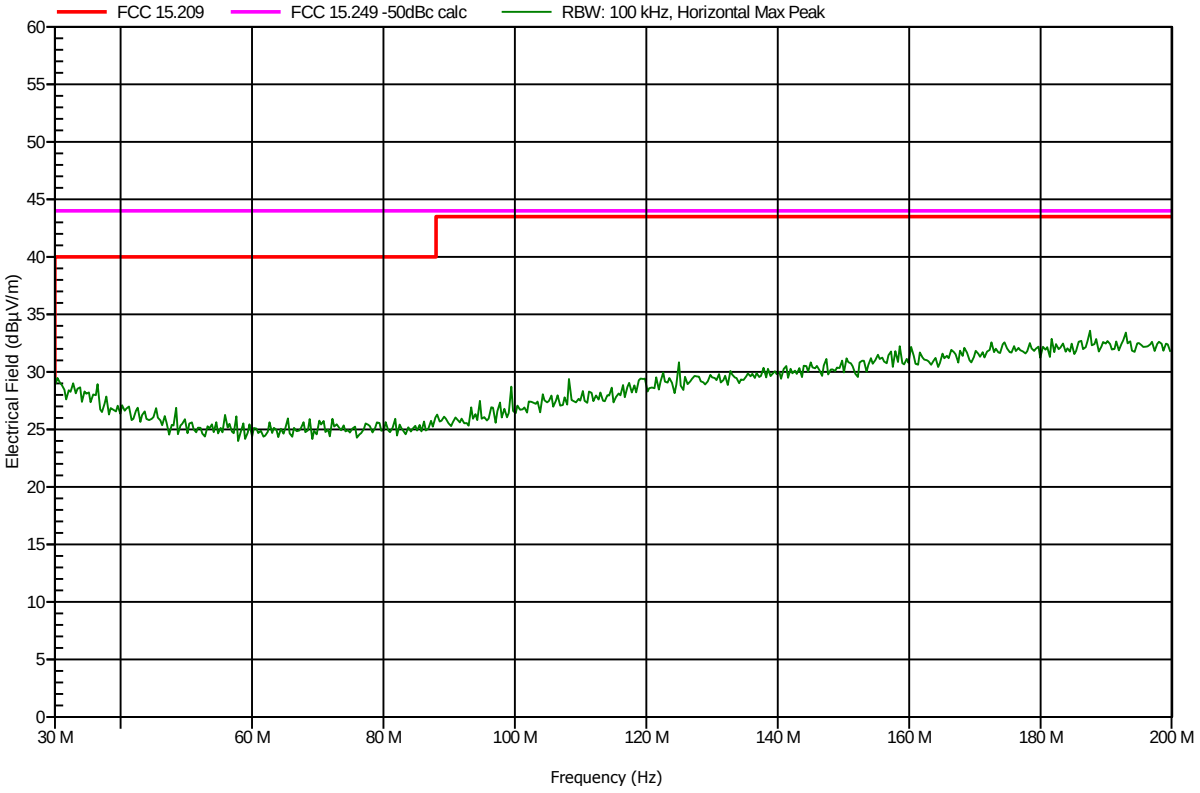

**Spurious emissions according to FCC 15.249**

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
| EUT Name: | Transponder |
| Model: | LPM MinT13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Treffke |
| Test Conditions: | Tnom: 25°C, Vnom: 3.7 V DC lithium battery |
| Antenna: | Rohde & Schwarz HK 116, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; Chirp + FSK Telemetry |
| Test Date: | 2013-08-26 |
| Note: | |

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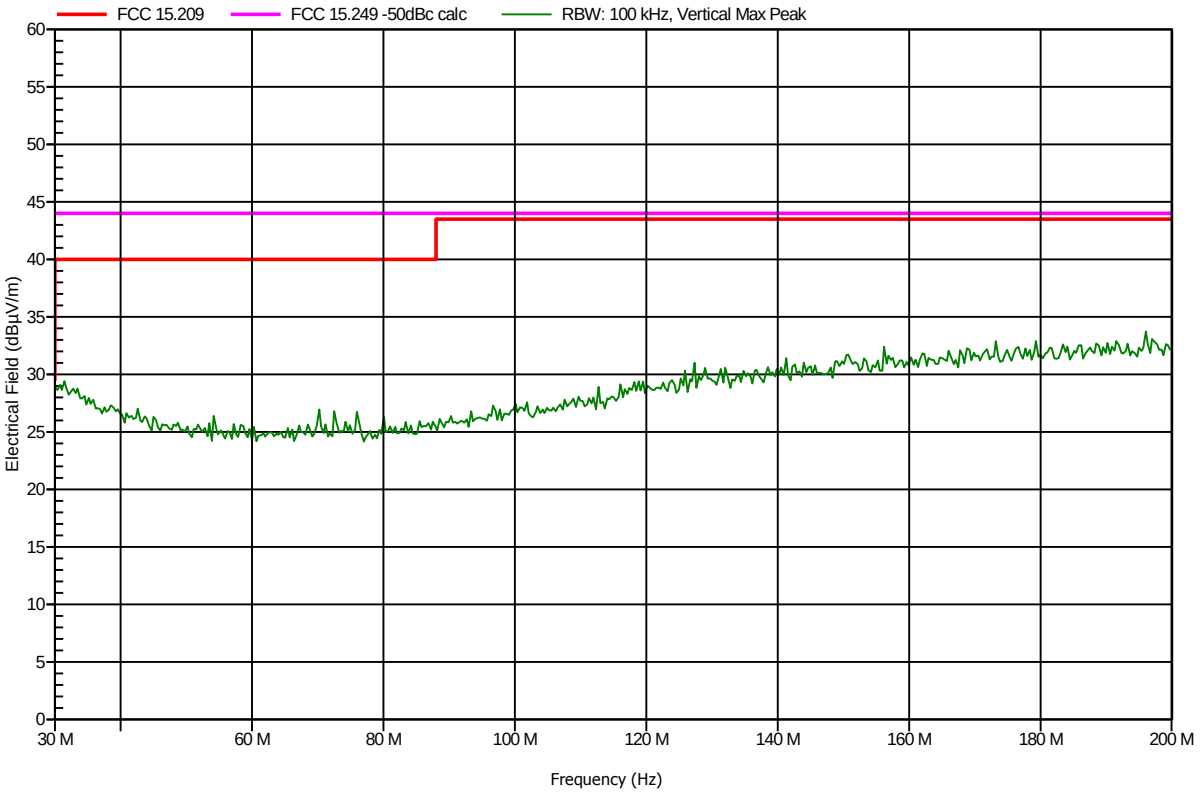

**Spurious emissions according to FCC 15.249**

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
| EUT Name: | Transponder |
| Model: | LPM MinT13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Treffke |
| Test Conditions: | Tnom: 25°C, Vnom: 3.7 V DC lithium battery |
| Antenna: | Rohde & Schwarz HL 223, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; Chirp + FSK Telemetry |
| Test Date: | 2013-08-26 |
| Note: | |

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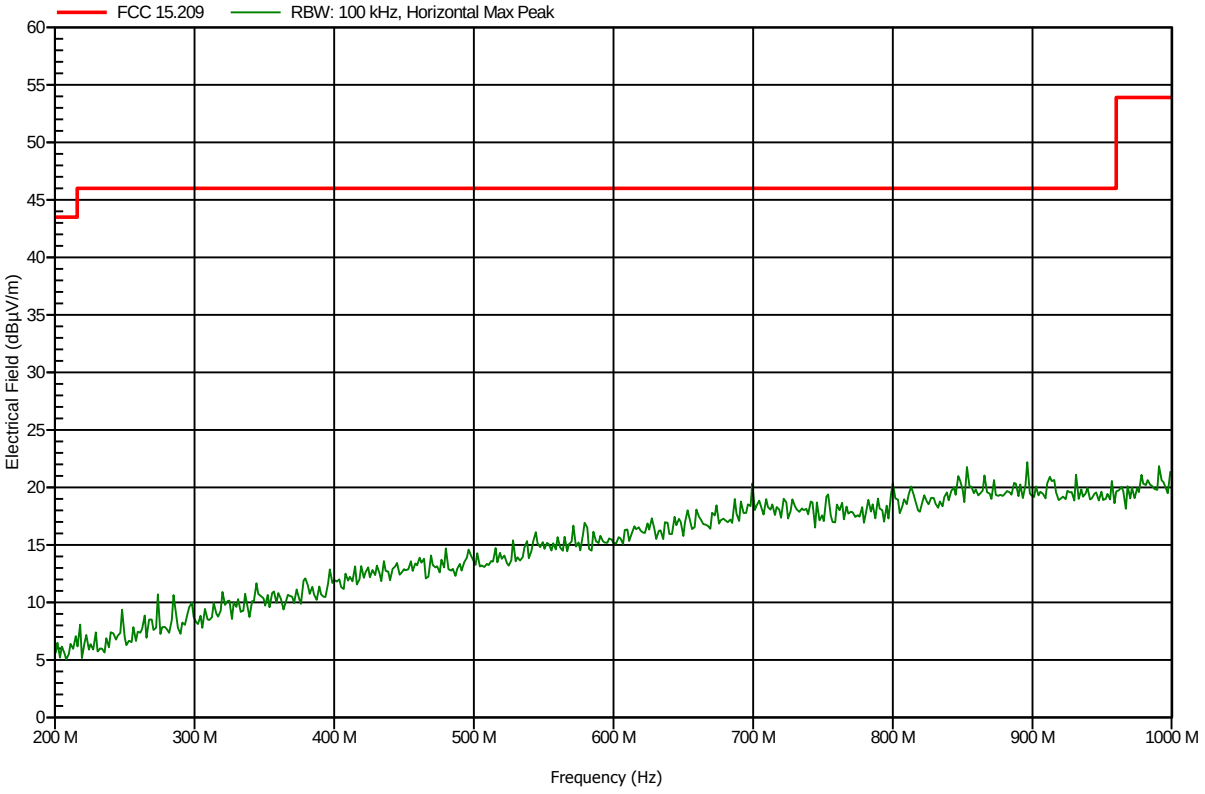

**Spurious emissions according to FCC 15.249**

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
| EUT Name: | Transponder |
| Model: | LPM MinT13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Treffke |
| Test Conditions: | Tnom: 25°C, Vnom: 3.7 V DC lithium battery |
| Antenna: | Rohde & Schwarz HL 223, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; Chirp + FSK Telemetry |
| Test Date: | 2013-08-26 |
| Note: | |

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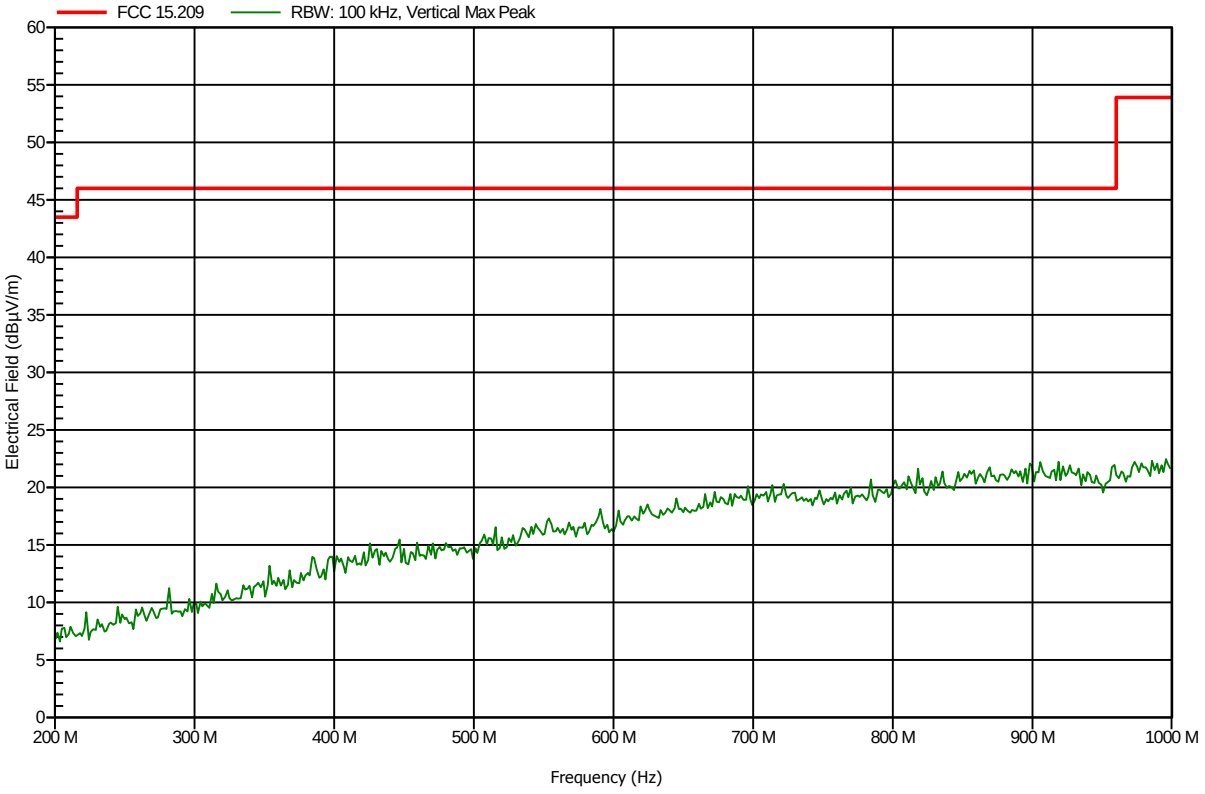

**Spurious emissions according to FCC 15.249**

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
| EUT Name: | Transponder |
| Model: | LPM MinT13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Treffke |
| Test Conditions: | Tnom: 25°C, Vnom: 3.7 V DC lithium battery |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; Chirp + FSK Telemetry |
| Test Date: | 2013-08-26 |
| Note: | |

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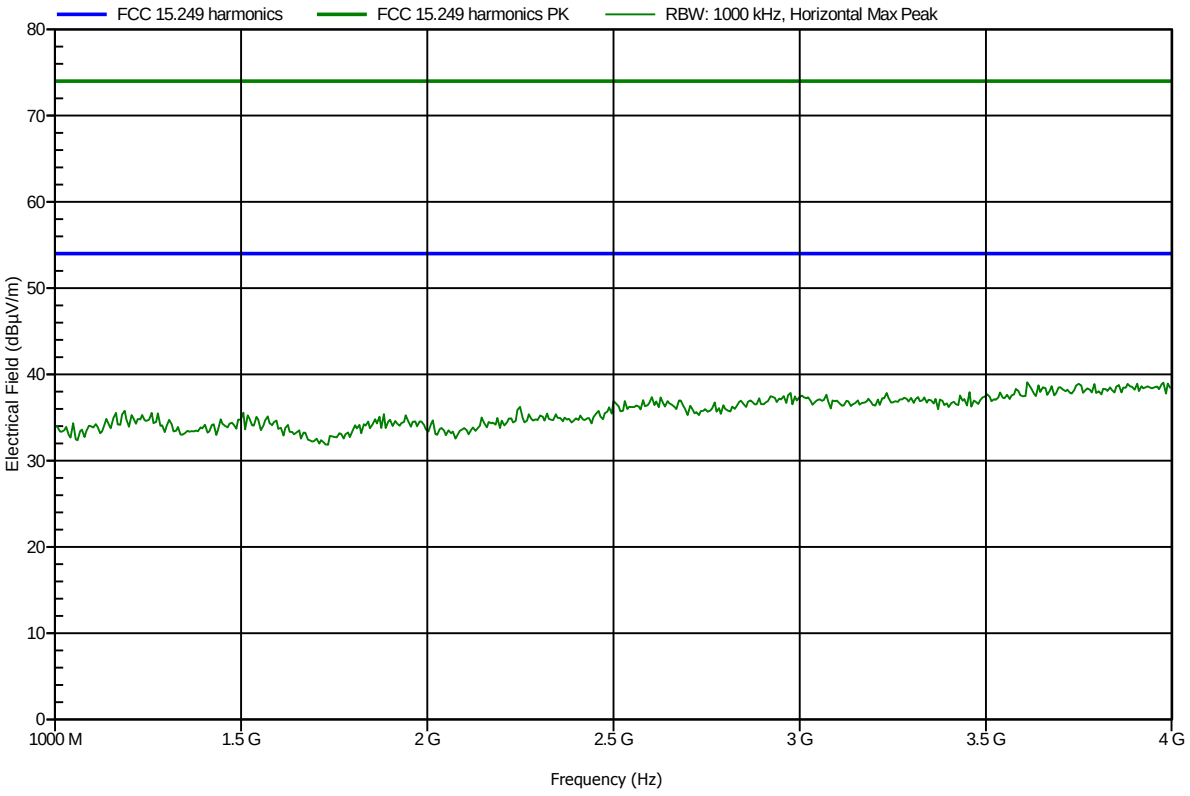

**Spurious emissions according to FCC 15.249**

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
| EUT Name: | Transponder |
| Model: | LPM MinT13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Treffke |
| Test Conditions: | Tnom: 25°C, Vnom: 3.7 V DC lithium battery |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; Chirp + FSK Telemetry |
| Test Date: | 2013-08-26 |
| Note: | |

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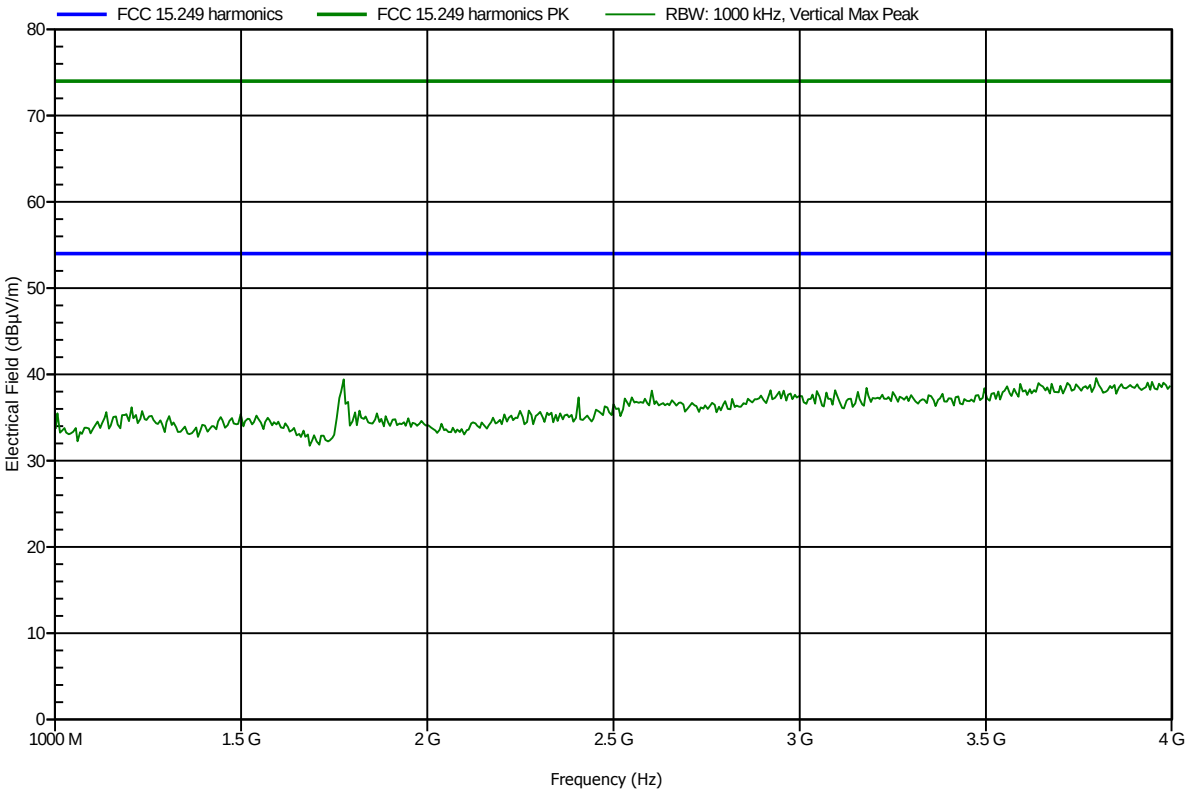

**Spurious emissions according to FCC 15.249**

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
| EUT Name: | Transponder |
| Model: | LPM MinT13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Treffke |
| Test Conditions: | Tnom: 25°C, Vnom: 3.7 V DC lithium battery |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; Chirp + FSK Telemetry |
| Test Date: | 2013-08-26 |
| Note: | |

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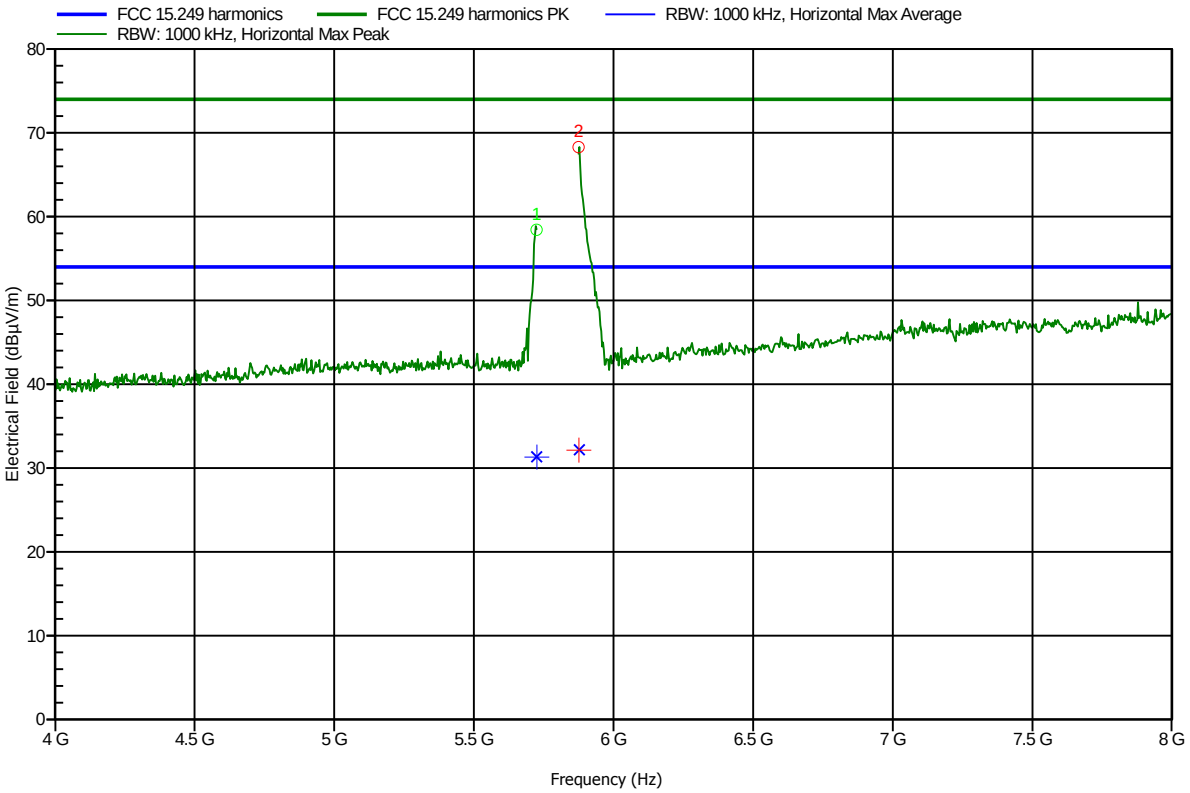


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 5.725 GHz | 58.43 dBµV/m | 74 dBµV/m | -15.57 dB | Pass |
| 5.875 GHz | 68.3 dBµV/m | 74 dBµV/m | -5.7 dB | Pass |

| Frequency | Average | Average Limit | Average Difference | Average Status |
|---|---|---|---|---|
| 5.725 GHz | 31.35 dBµV/m | 54 dBµV/m | -22.65 dB | Pass |
| 5.875 GHz | 32.17 dBµV/m | 54 dBµV/m | -21.83 dB | Pass |

**Spurious emissions according to FCC 15.249**

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
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| Model: | LPM MinT13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Treffke |
| Test Conditions: | Tnom: 25°C, Vnom: 3.7 V DC lithium battery |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; Chirp + FSK Telemetry |
| Test Date: | 2013-08-26 |
| Note: | |

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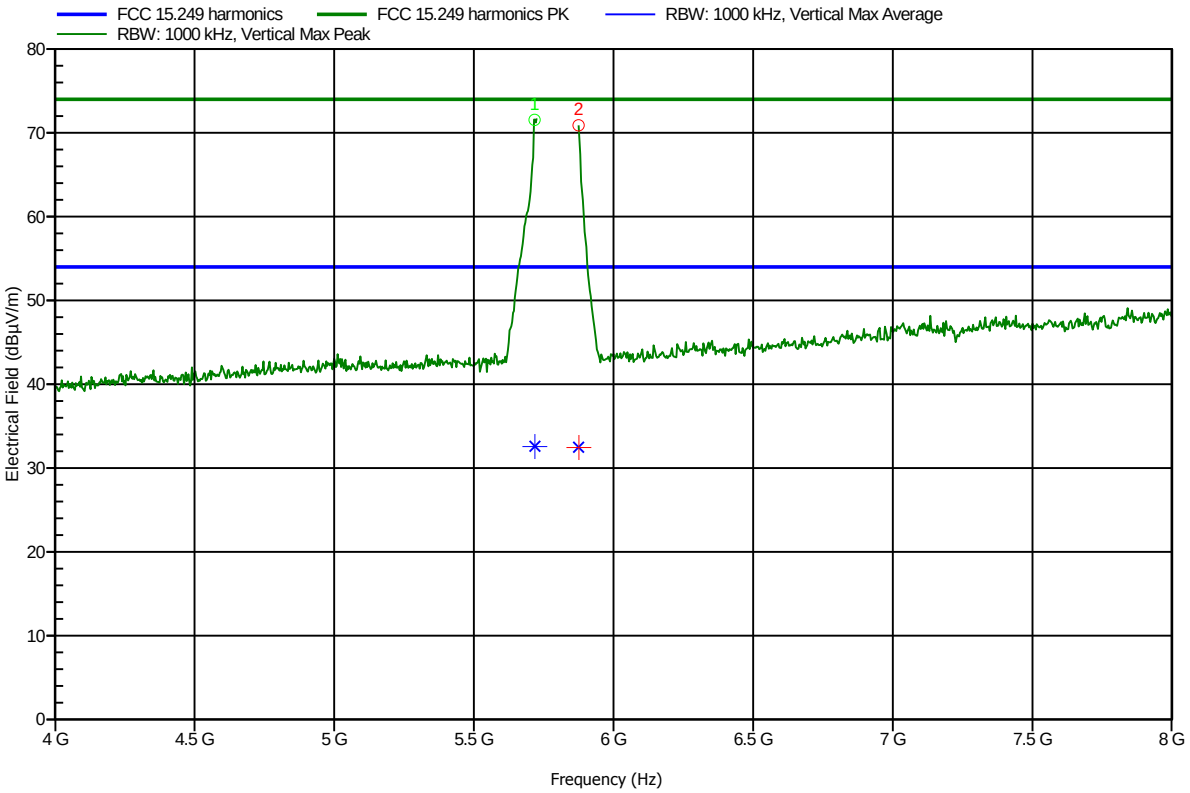


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 5.718 GHz | 71.54 dBµV/m | 74 dBµV/m | -2.46 dB | Pass |
| 5.875 GHz | 70.9 dBµV/m | 74 dBµV/m | -3.1 dB | Pass |

| Frequency | Average | Average Limit | Average Difference | Average Status |
|---|---|---|---|---|
| 5.718 GHz | 32.6 dBµV/m | 54 dBµV/m | -21.4 dB | Pass |
| 5.875 GHz | 32.49 dBµV/m | 54 dBµV/m | -21.51 dB | Pass |

**Spurious emissions according to FCC 15.249**

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
| EUT Name: | Transponder |
| Model: | LPM MinT13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Treffke |
| Test Conditions: | Tnom: 25°C, Vnom: 3.7 V DC lithium battery |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 100 cm converted to 3m |
| Mode: | TX; Chirp + FSK Telemetry |
| Test Date: | 2013-08-27 |
| Note: | |

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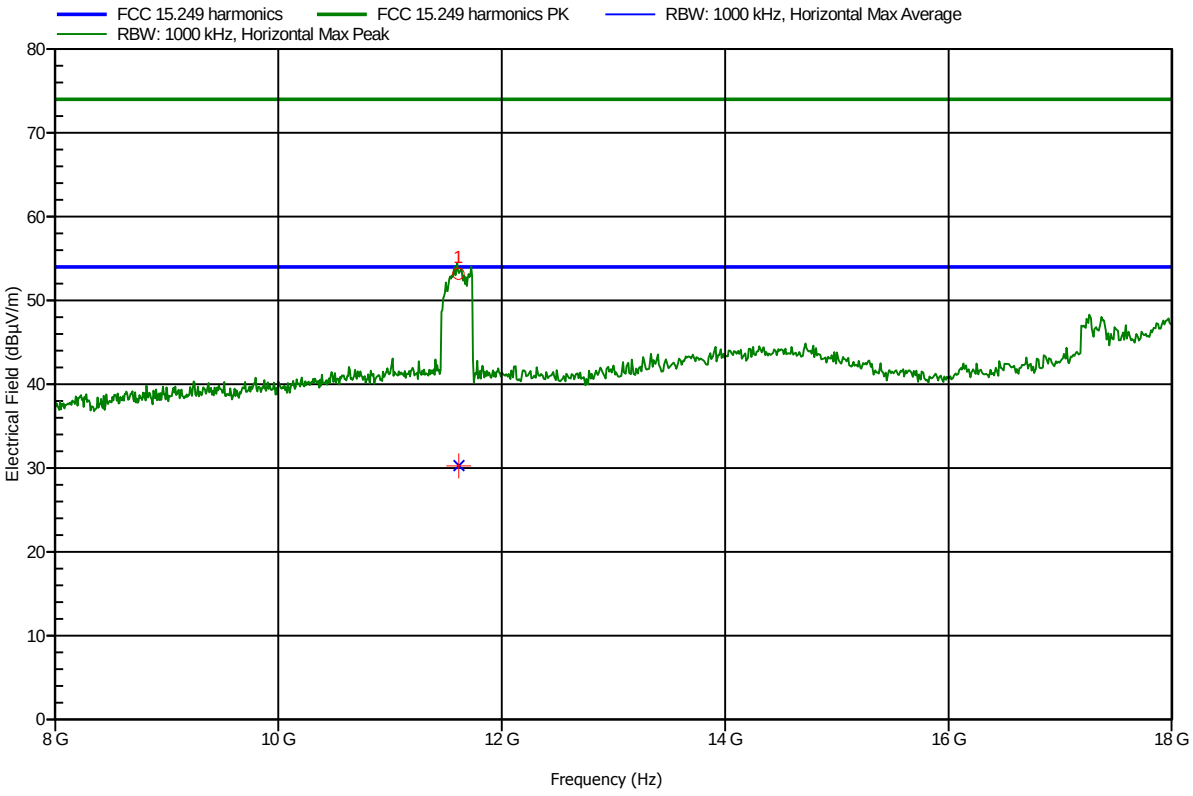


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 11.612 GHz | 53.19 dBµV/m | 74 dBµV/m | -20.81 dB | Pass |

| Frequency | Average | Average Limit | Average Difference | Average Status |
|---|---|---|---|---|
| 11.612 GHz | 30.29 dBµV/m | 54 dBµV/m | -23.71 dB | Pass |

**Spurious emissions according to FCC 15.249**

Project number: G0M-1308-3085

| | |
|---|---|
| Manufacturer: | inmotiotec GmbH |
| EUT Name: | Transponder |
| Model: | LPM MinT13 |
| Test Site: | Eurofins Product Service GmbH |
| Operator: | Mr. Treffke |
| Test Conditions: | Tnom: 25°C, Vnom: 3.7 V DC lithium battery |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 100 cm converted to 3m |
| Mode: | TX; Chirp + FSK Telemetry |
| Test Date: | 2013-08-27 |
| Note: | |

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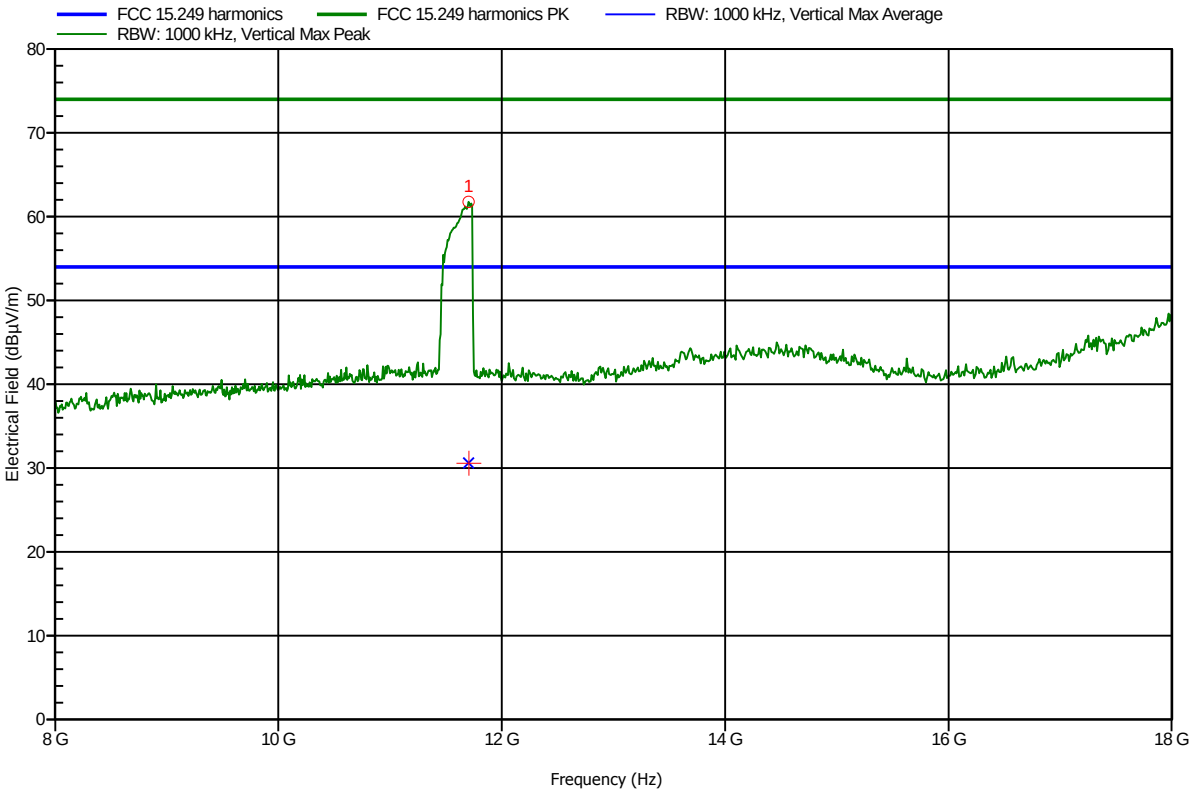


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 11.703 GHz | 61.77 dBµV/m | 74 dBµV/m | -12.23 dB | Pass |

| Frequency | Average | Average Limit | Average Difference | Average Status |
|---|---|---|---|---|
| 11.703 GHz | 30.61 dBµV/m | 54 dBµV/m | -23.39 dB | Pass |