eurofins | Product Service

# FCC TEST REPORT

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

**Digital transmission systems operating within the 902 – 928MHz band**

| | |
|---|---|
| **Report Reference No.** ..... : | G0M-1110-1449-TFC247D-V01 |
| **Testing Laboratory** ..... : | Eurofins Product Service GmbH |
| Address ..... : | Storkower Str. 38c<br>15526 Reichenwalde<br>Germany |
| Accreditation ..... : | FCC Filed Test Laboratory, Reg.-No.: 96970<br>A2LA Accredited Testing Laboratory, Certificate No.: 1983.01<br>A2LA ACCREDITED TESTING CERT# 1983.01 |
| **Applicant's name** ..... : | Steute Schaltgeräte GmbH & Co KG |
| Address ..... : | Brückenstr. 91<br>32584 Löhne<br>GERMANY |
| **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 | SRD-Transceiver |
| Model No. | RF95 SW 915 LR (Drahtantenne) |
| Hardware version | E194K01_06 |
| Firmware / Software version | V2.1 |
| | FCC-ID: XK5-RF95SW915LR IC: 5158A-RF95SW915LR |
| **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 ..... : | 2011-11-01 |
| Date (s) of performance of tests ..... : | 2011-11-02 - 2011-11-03 |
| Compiled by ..... : | Christian Weber |
| Tested by (+ signature) ..... : | Wilfried Treffke |
| Approved by (+ signature) ..... : | Jens Zimmermann |
| Date of issue ..... : | 2012-04-20 |
| Total number of pages ..... : | 47 |

**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:**

## REPORT INDEX

# 1 Equipment (Test item) Description:

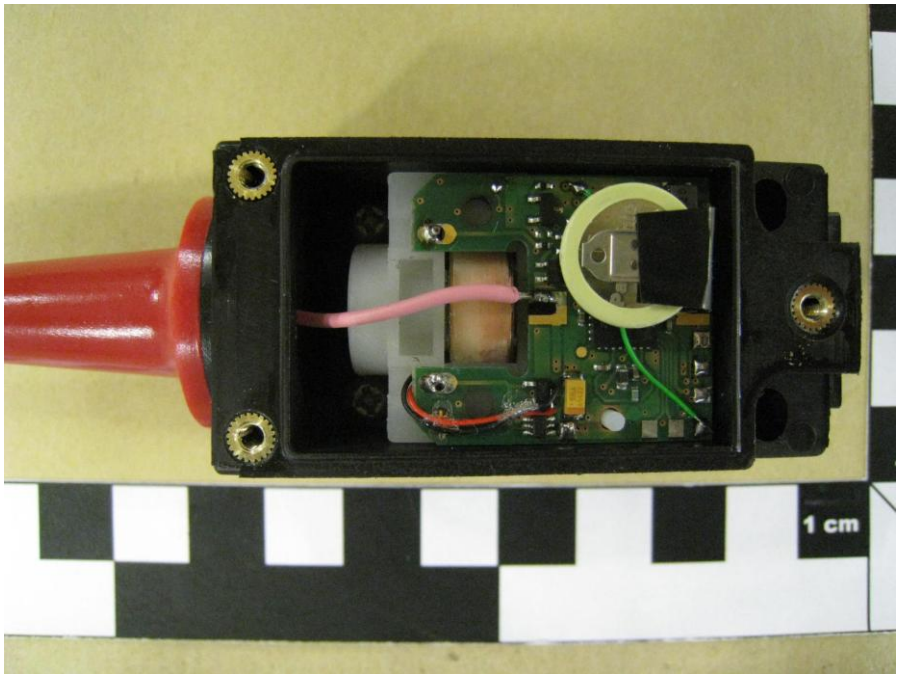
| | | |
|---|---|---|
| **Description** | SRD-Transceiver | |
| **Model** | RF95 SW 915 LR (Drahtantenne) | |
| **Serial number** | None | |
| **Hardware version** | E194K01_06 | |
| **Software / Firmware version** | V2.1 | |
| **Contains FCC-ID** | XK5-RF95SW915LR | |
| **Contains IC** | 5158A-RF95SW915LR | |
| **Equipment type** | End product | |
| **Radio type** | Transceiver | |
| **Radio technology** | custom | |
| **Operating frequency range** | 915MHz | |
| **Assigned frequency band** | 902 - 928MHz | |
| **Frequency range** | $F_{MID}$ | 915MHz |
| **Spreading** | None | |
| **Modulations** | FSK | |
| **Number of channels** | 1 Channel | |
| **Channel spacing** | None | |
| **Number of antennas** | 1 | |
| **Antenna 1** | Type | integrated |
| | Model | λ/4 wire antenna, permanently attached |
| | Manufacturer | see Manufacturer |
| | Gain | +0.0dBi |
| **Manufacturer** | IK ELEKTRONIK GmbH<br>Friedrichsgrüner Straße 11-13<br>08269 Hammerbrücke<br>GERMANY | |
| **Power supply** | $V_{NOM}$ | 3.3VDC (3V-10V, supply voltage generated by electro-mechanical energy-converter. No additional supply voltage needed (no battery or other kind of external supply voltage used) |
| | $V_{MIN}$ | N/A |
| | $V_{MIN}$ | N/A |
| **AC/DC-Adaptor** | Model | N/A |
| | Vendor | N/A |
| | Input | N/A |
| | Output | N/A |

## 1.1 Equipment photos

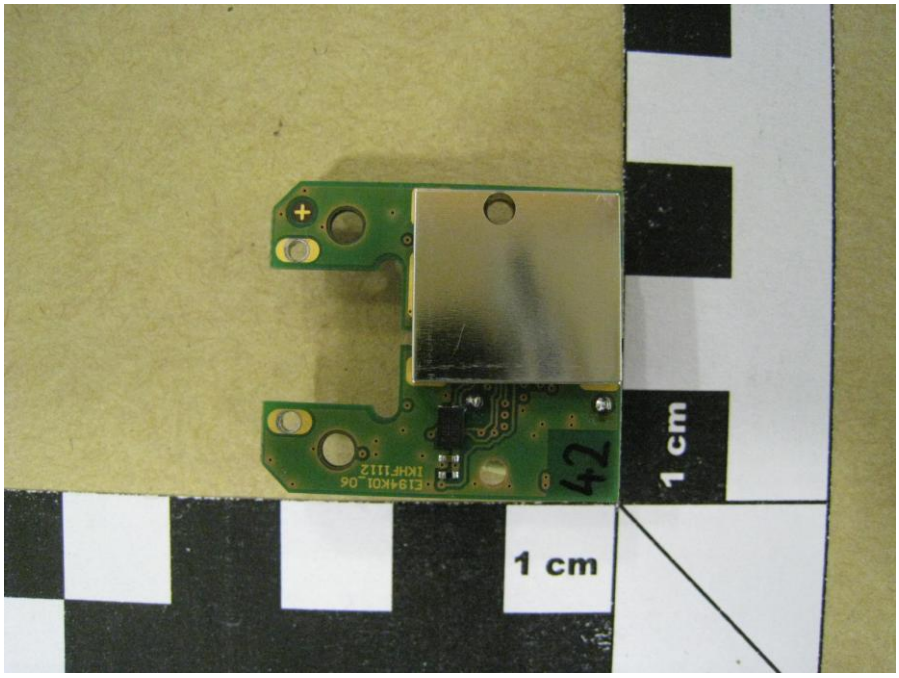
**EUT TOP**


**EUT SIDE VIEW**

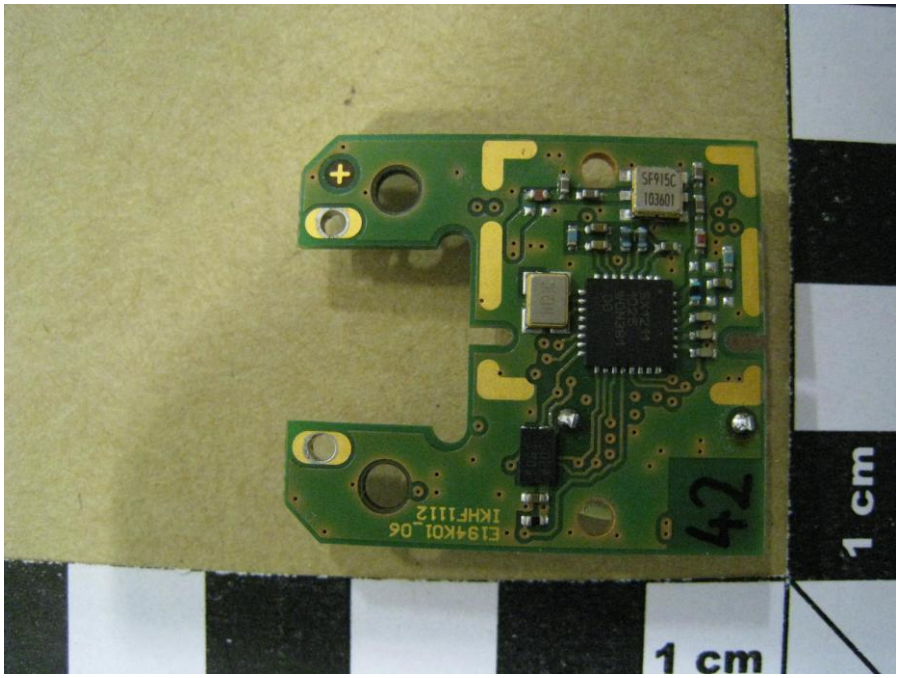
**EUT OPEN**



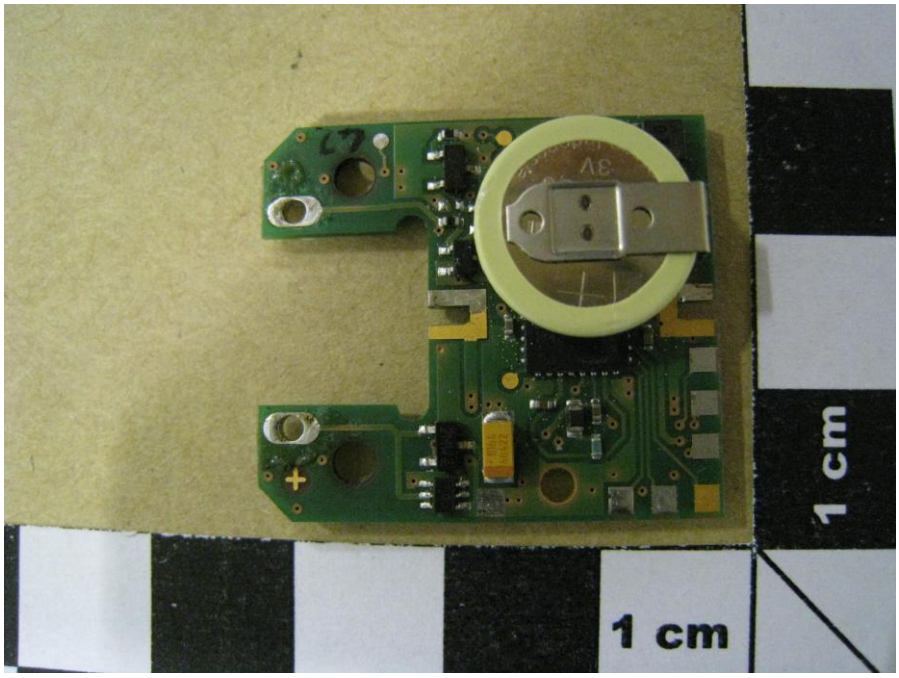

**EUT PCB TOP WITH SHIELDING**



**EUT PCB TOP WITHOUT SHIELDING**




**EUT PCB BOTTOM**



## 1.2 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

### 1.3 Test Modes:

| Mode # | Description | |
|---|---|---|
| Single | General conditions: | EUT powered by laboratory power supply |
| | Radio conditions: | Mode = standalone transmit<br>Spreading = None<br>Modulation = FSK<br>Duty cycle = 10%<br>Power level = Maximum |
| Receive | General conditions: | EUT powered by laboratory power supply |
| | Radio conditions: | Mode = standalone receive<br>Spreading = None<br>Modulation = FSK |

## 1.4 Test Equipment Used During Testing

| Occupied Bandwidth | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Spectrum Analyzer | R&S | FSP 30 | ETS 0496 | 2011-12 | 2012-12 |

| 6dB Bandwidth | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Spectrum Analyzer | R&S | FSP 30 | ETS 0496 | 2011-12 | 2012-12 |

| Maximum peak conducted power | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Spectrum Analyzer | R&S | FSP 30 | ETS 0496 | 2011-12 | 2012-12 |

| Power spectral density | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Spectrum Analyzer | R&S | FSP 30 | ETS 0496 | 2011-12 | 2012-12 |

| Band edge compliance | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Spectrum Analyzer | R&S | FSP 30 | ETS 0496 | 2011-12 | 2012-12 |

| Conducted spurious emissions | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Spectrum Analyzer | R&S | FSP 30 | ETS 0496 | 2011-12 | 2012-12 |

| Radiated spurious emissions | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Semi-anechoic chamber | Frankonia | AC 5 | ETS 0583 | - | - |
| Spectrum Analyzer | R&S | FSIQ26 | ETS 0413 | 2011-04 | 2012-04 |
| Biconical Antenna | R&S | HK 116 | ETS 0012 | 2010-01 | 2013-01 |
| LPD Antenna | R&S | HL 223 | ETS 0295 | 2011-02 | 2014-02 |
| LPD Antenna | R&S | HL 025 | ETS 0512 | 2010-02 | 2013-02 |

## 1.5 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:

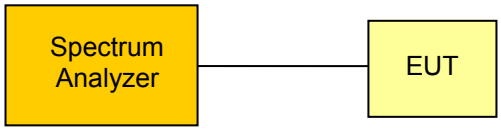
| Reading | + | AF | = | Net Reading | : | Net reading - FCC limit | = Margin |
|---|---|---|---|---|---|---|---|
| 21.5 dBµV | + | 26 dB | = | 47.5 dBµV/m | : | 47.5 dBµV/m - 57.0 dBµV/m | = -9.5 dB |

## 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/R | Informational only |
| FCC § 15.247(a)(2)<br>IC RSS-210 § A8.2 | 6dB Bandwidth | KDB Publication No. 558074 | PASS | |
| FCC § 15.247(b)(3)<br>IC RSS-210 § A8.4 | Maximum peak conducted power | KDB Publication No. 558074 | PASS | |
| FCC § 15.247(e)<br>IC RSS-210 § A8.2 | Power spectral density | KDB Publication No. 558074 | PASS | |
| 47 CFR 15.207<br>RSS-Gen 7.2.4 | AC power line conducted emissions | KDB Publication No. 558074 / ANSI C63.4 | N/R | |
| FCC § 15.247(d)<br>IC RSS-210 § A8.5 | Band edge compliance | KDB Publication No. 558074 | PASS | |
| FCC § 15.247(d)<br>IC RSS-210 § A8.5 | Conducted spurious emissions | KDB Publication No. 558074 | PASS | |
| FCC § 15.247(d)<br>FCC § 15.209<br>IC RSS-210 A8.5<br>IC RSS-Gen 4.9<br>IC RSS-Gen 7.2.5 | Transmitter radiated spurious emissions | KDB Publication No. 558074 / ANSI C 63.4 | PASS | |
| IC RSS-Gen 4.10<br>IC RSS-Gen 6.1 | Receiver radiated spurious emissions | ANSI C 63.4 | PASS | |
| **Remarks:** | | | | |

# 3 Test Conditions and Results

## 3.1 Test Conditions and Results – Occupied Bandwidth

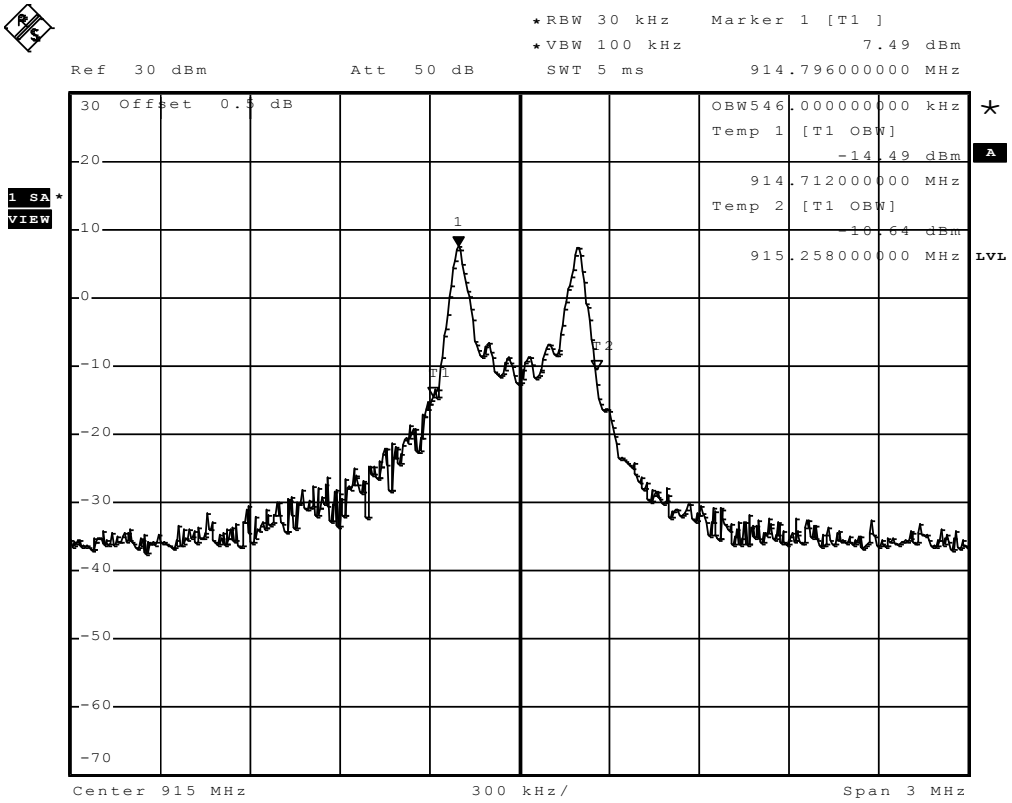
| **Occupied Bandwidth acc. IC RSS-Gen** | **Verdict: PASS** |
|---|---|
| Test according to measurement reference | Reference Method |
| | RSS-Gen 4.6.1 |
| Test frequency range | Tested frequencies |
| | $F_{MID}$ |
| EUT test mode | Single |
| **Limits** | |
| None (Informational only) | |
| **Test setup** | |
|   | |
| **Test procedure** | |
| 1. EUT set to test mode (Communication tester is used if needed)<br>2. Span set to at least twice the emission spectrum<br>3. Resolution bandwidth set to 1% of span<br>4. Occupied Bandwidth (99%) measurement with spectrum analyzer built in measurement function | |

| **Test results** | | |
|---|---|---|
| Channel | Frequency [MHz] | Occupied Bandwidth [kHz] |
| $F_{MID}$ | 915 | 546.000 |
| Comments: | | |

## Occupied Bandwidth - $F_{MID}$

**RSS Gen**
**Occupied Bandwidth**

| | |
|---|---|
| EUT | Transceiver Module |
| Model | RF95 SW 915 LR |
| Approval Holder | Steute Schaltgeräte GmbH / Ord.: G0M-1110-1449 |
| Temperature / Voltage | 25°C, Vnom |
| Test Site / Operator | Eurofins Product Service GmbH, Mr. Treffke |
| Test Specification | 4.4.1 Occupied Bandwidth |
| Comment 1 | Channel.: 915 MHz |
| Comment 2 | A spectrum analyzer with an integrated 99% power bandwidth function is used |
| Comment 3 | pass |




Comment: Occupied bandwidth: 546 KHz
Date: 3.NOV.2011 13:30:49

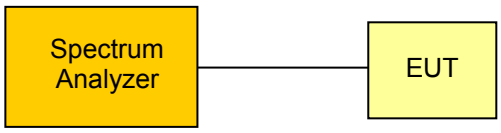
### 3.2 Test Conditions and Results – 6dB Bandwidth

| 6dB Bandwidth acc. FCC 15.247 / IC RSS-210 | Verdict: PASS |
|---|---|
| EUT requirement rule parts and clause | Reference |
| | FCC 15.247(a)(2) / IC RSS-210 A8.2 |
| Test according to measurement reference | Reference Method |
| | FCC KDB Publication No. 558074 |
| Test frequency range | Tested frequencies |
| | $F_{MID}$ |
| EUT test mode | Single |

**Limits**

≥ 500kHz

**Test setup**




**Test procedure**

1. EUT set to test mode (Communication tester is used if needed)
2. Span set to at least twice the emission spectrum
3. Detector set to peak and max hold
4. Envelope peak value of emission spectrum is selected
5. Marker on envelope of spectrum is set to level of -6dB to the left of the peak
6. Marker on envelope of spectrum is set to level of -6dB to the right of the peak
7. 6dB Bandwidth is determined by marker frequency separation

**Test results**

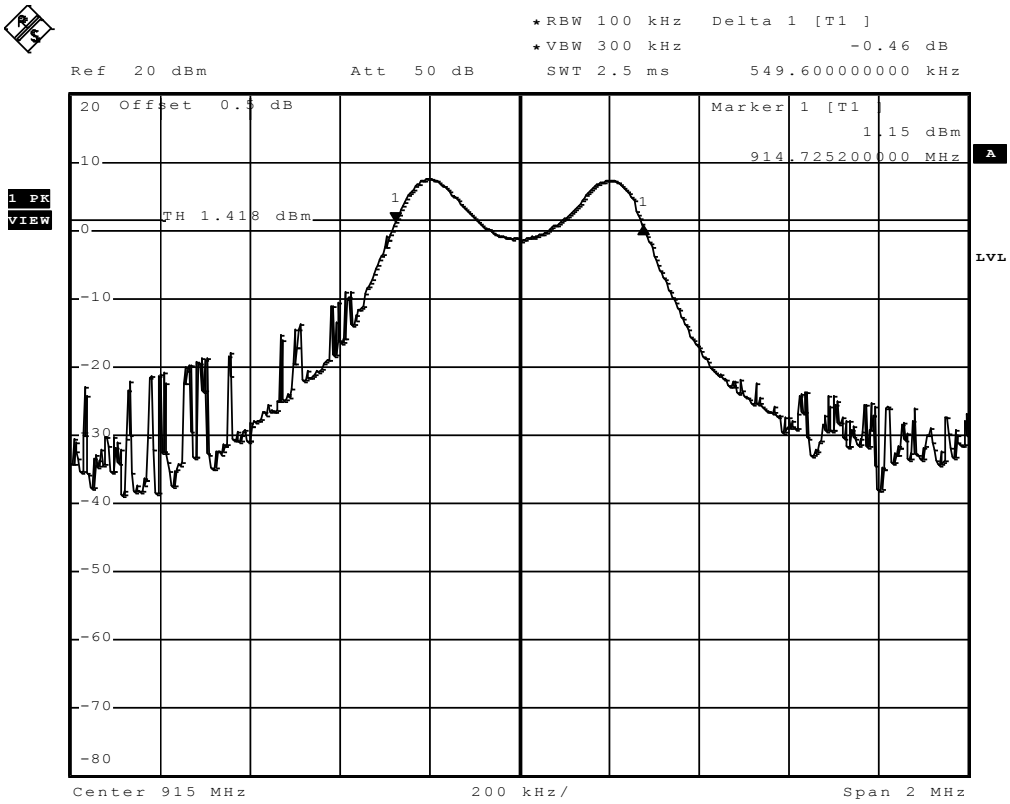
| Channel | Frequency [MHz] | 6dB Bandwidth [kHz] | Limit [kHz] | Result |
|---|---|---|---|---|
| $F_{MID}$ | 915 | 549.600 | ≥ 500 | PASS |

Comments:

## 6dB Bandwidth - $F_{MID}$

**FCC part 15.247 (a)2**
**Minimum 6 dB Bandwidth**

| | |
|---|---|
| EUT | Transceiver Module |
| Model | RF95 SW 915 LR |
| Approval Holder | Steute Schaltgeräte GmbH / Ord.: G0M-1110-1449 |
| Temperature / Voltage | 25°C, Vnom |
| Test Site / Operator | Eurofins Product Service GmbH, Mr. Treffke |
| Test Specification | FCC part 15.247 (a)2 |
| Comment 1 | Minimum 6 dB Bandwidth |
| Comment 2 | Channel : 915 MHz |
| Comment 3 | pass |




Comment: 6 dB bandwidth: 549.6 KHz > 500 KHz; verdict: PASS
Date: 3.NOV.2011 13:14:52

### 3.3 Test Conditions and Results – Maximum peak conducted power

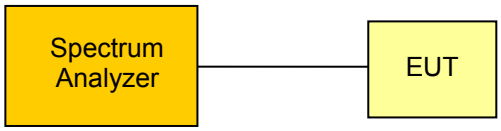
| **Maximum peak conducted power acc. FCC 15.247 / IC RSS-210** | **Verdict: PASS** |
|---|---|
| EUT requirement rule parts and clause | Reference |
| | FCC 15.247(b)(3) / IC RSS-210 A8.4 |
| Test according to measurement reference | Reference Method |
| | FCC KDB Publication No. 558074 |
| Test frequency range | Tested frequencies |
| | $F_{MID}$ |
| EUT test mode | Single |
| Measurement mode | Peak |
| Maximum antenna gain | 0dBi ⇒ Limit correction = 0dB |

**Limits**

1W (30dBm)

The conducted output power limit specified above is based on the use of antennas with directional gains that do not exceed 6dBi. If transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in the table, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6dBi.

**Test setup**




**Test procedure**

1. EUT set to test mode (Communication tester is used if needed)
2. Center frequency set to test channel center frequency
3. Span is set to be larger than the 6dB bandwidth and RBW is set to be at least the 6dB bandwidth
4. Peak output power is determined from the maximum of the emission envelope

**Test results**

| Channel | Frequency [MHz] | Voltage | Peak power [dbm] | Peak power [W] | Limit [dBm] | Margin [dB] | Result |
|---|---|---|---|---|---|---|---|
| $F_{MID}$ | 915 | 3.3VDC | 8.07 | 0.0064 | 30 | -21.93 | PASS |

Comments:

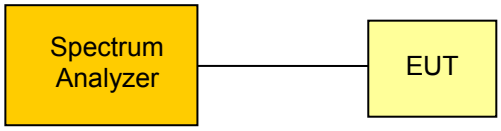
### 3.4 Test Conditions and Results – Power spectral density

| **Power spectral density acc. FCC 15.247 / IC RSS-210** | **Verdict: PASS** |
|---|---|
| EUT requirement rule parts and clause | Reference |
| | FCC 15.247(e) / IC RSS-210 A8.2 |
| Test according to measurement reference | Reference Method |
| | FCC KDB Publication No. 558074 |
| Test frequency range | Tested frequencies |
| | $F_{MID}$ |
| EUT test mode | Single |
| Measurement mode | Peak |

**Limits**

8dBm/3kHz

**Test setup**




**Test procedure**

1. EUT set to test mode (Communication tester is used if needed)
2. Center frequency set to test channel center frequency
3. Span is set large enough to capture maximum emissions in passband, RBW is set to 3kHz
4. Peak power density is determined from peak emission of envelope

**Test results**

| Channel | Frequency [MHz] | Voltage | Peak frequency [MHz] | Peak power density [dBm] | Limit [dBm/3kHz] | Margin [dB] | Result |
|---|---|---|---|---|---|---|---|
| $F_{MID}$ | 915 | 3.3VDC | 915.132 | 4.4 | 8.0 | -3.6 | PASS |

Comments:

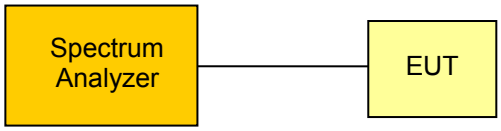
### 3.5 Test Conditions and Results – Band edge compliance

| **Band-edge compliance acc. FCC 15.247 / IC RSS-210** | **Verdict: PASS** |
|---|---|
| EUT requirement rule parts and clause | Reference |
| | FCC 15.247(d) / IC RSS-210 A8.5 |
| Test according to measurement reference | Reference Method |
| | FCC KDB Publication No. 558074 |
| Test frequency range | Tested frequencies |
| | $F_{MID}$ |
| EUT test mode | Single |

**Limits**

| Limit | Condition |
|---|---|
| ≤ -20dB/100kHz | Peak power measurement detector = Peak |
| ≤ -30dB/100kHz | Peak power measurement detector = RMS |

**Test setup**




**Test procedure**

1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100kHz
4. Markers are set to peak emission levels within frequency band and outside frequency band
5. Band edge attenuation is determined from level difference

**Test results**

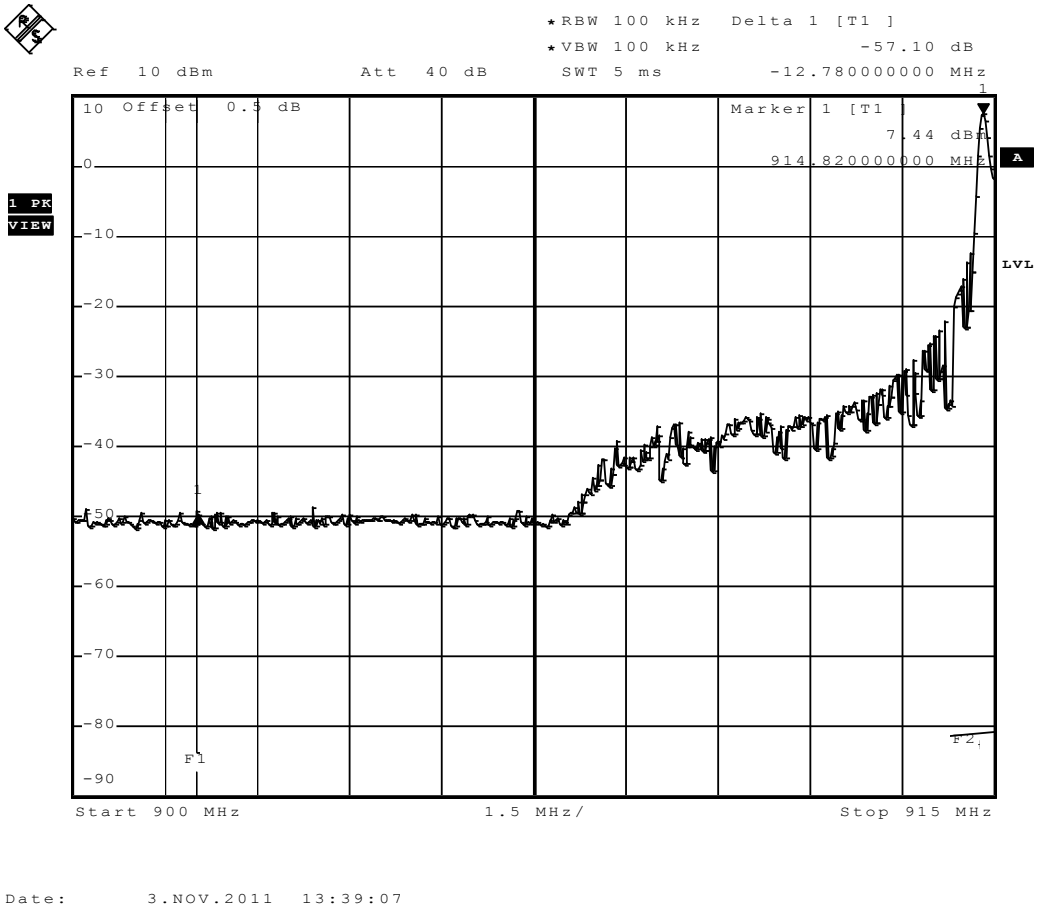
| Channel | Frequency [MHz] | Mode | Level [dBc] | Limit [dBc] | Margin [dB] | Result |
|---|---|---|---|---|---|---|
| $F_{MID}$ | 915 | Single | -57.10 | -20 | -37.10 | PASS |
| $F_{MID}$ | 915 | Single | -58.33 | -20 | -38.33 | PASS |

Comments:

## Band-edge compliance – $F_{MID}$ single – Lower Edge

**FCC part 15.247**
**Band-edge compliance of RF conducted emissions**

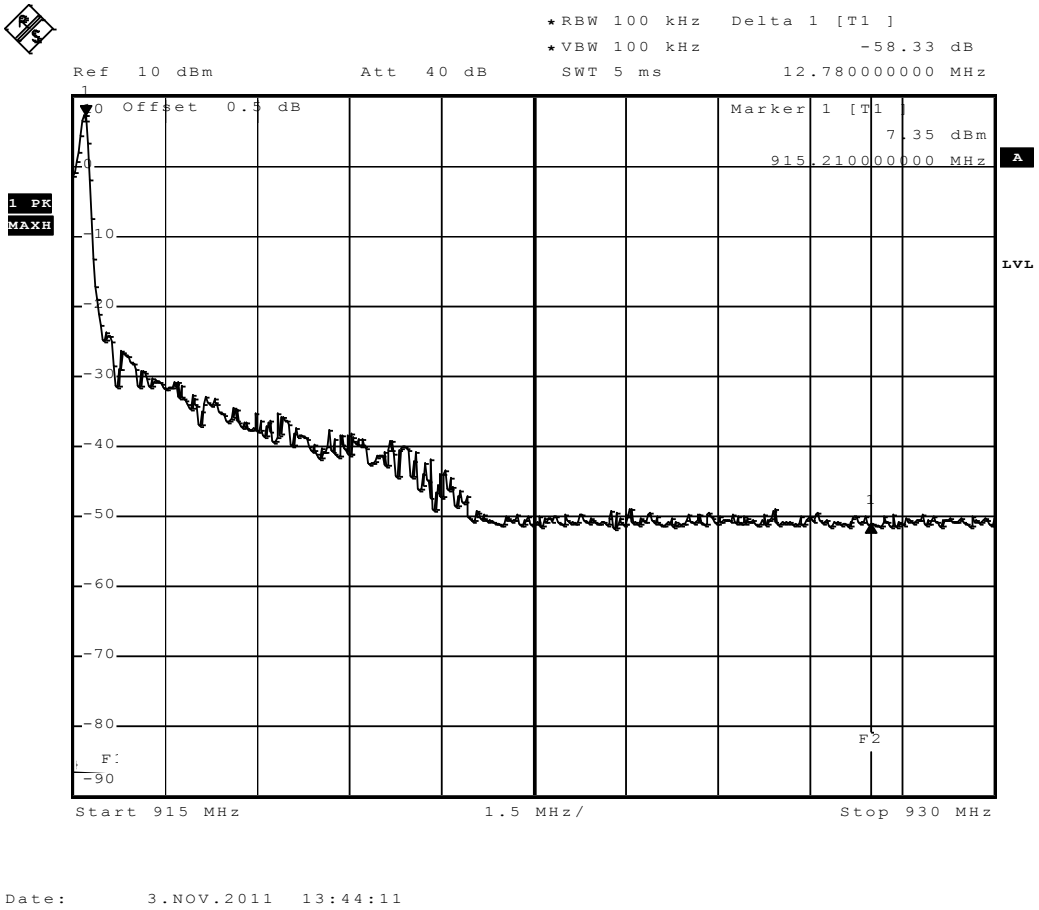
| | |
|---|---|
| EUT | Transceiver Module |
| Model | RF95 SW 915 LR |
| Approval Holder | Steute Schaltgeräte GmbH / Ord.: G0M-1110-1449 |
| Temperature / Voltage | 25°C, Vnom |
| Test Site / Operator | Eurofins Product Service GmbH, Mr. Treffke |
| Test Specification | FCC part 15 section 247(c) |
| Comment 1 | Band-edge compliance |
| Comment 2 | Channel.: 915 MHz |
| Comment 3 | pass |



## Band-edge compliance – $F_{MID}$ single – Upper Edge

**FCC part 15.247**
**Band-edge compliance of RF conducted emissions**

| | |
|---|---|
| EUT | Transceiver Module |
| Model | RF95 SW 915 LR |
| Approval Holder | Steute Schaltgeräte GmbH / Ord.: G0M-1110-1449 |
| Temperature / Voltage | 25°C, Vnom |
| Test Site / Operator | Eurofins Product Service GmbH, Mr. Treffke |
| Test Specification | FCC part 15 section 247(c) |
| Comment 1 | Band-edge compliance |
| Comment 2 | Channel.: 915 MHz |
| Comment 3 | pass |



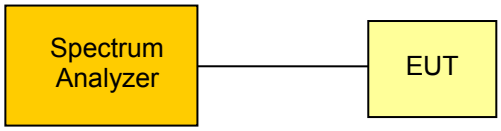
### 3.6 Test Conditions and Results – Conducted spurious emissions

| **Conducted spurious emissions acc. FCC 15.247 / IC RSS-210** | **Verdict: PASS** |
|---|---|
| EUT requirement rule parts and clause | Reference |
| | FCC 15.247(d) / IC RSS-210 A8.5 |
| Test according to measurement reference | Reference Method |
| | FCC KDB Publication No. 558074 |
| Test frequency range | Tested frequencies |
| | 10MHz – 10th Harmonic |
| EUT test mode | Single |

**Limits**

| Limit | Condition |
|---|---|
| ≤ -20dB/100kHz | Peak power measurement detector = Peak |
| ≤ -30dB/100kHz | Peak power measurement detector = RMS |

**Test setup**




**Test procedure**

1. EUT set to test mode (Communication tester is used if needed)
2. Span it set according to measurement range
3. Resolution bandwidth is set to 100kHz and detector to peak and max hold
4. Markers are set to peak emission levels within frequency band
5. Emission level is determined by second marker on emission peak
6. Attenuation is determined from level difference

**Test results**

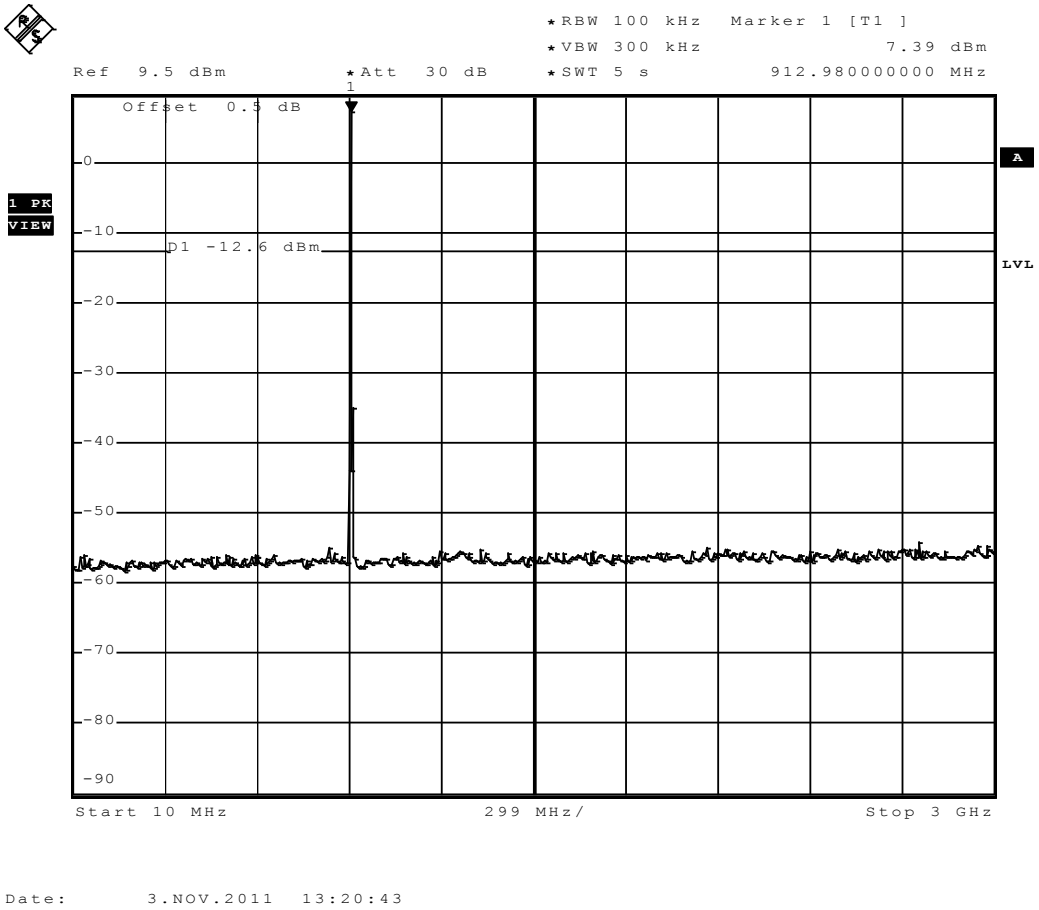
| Channel | Frequency [MHz] | Emission [MHz] | Emission Level [dbm] | Peak power [dBm] | Limit [dBm] | Margin [dB] | Result |
|---|---|---|---|---|---|---|---|
| $F_{MID}$ | 915 | 3660 | -48.29 | 7.39 | -12.61 | -35.68 | PASS |

Comments:

## Conducted spurious emissions – $F_{MID}$

**FCC part 15.247 (d)**
**Spurious Emissions**

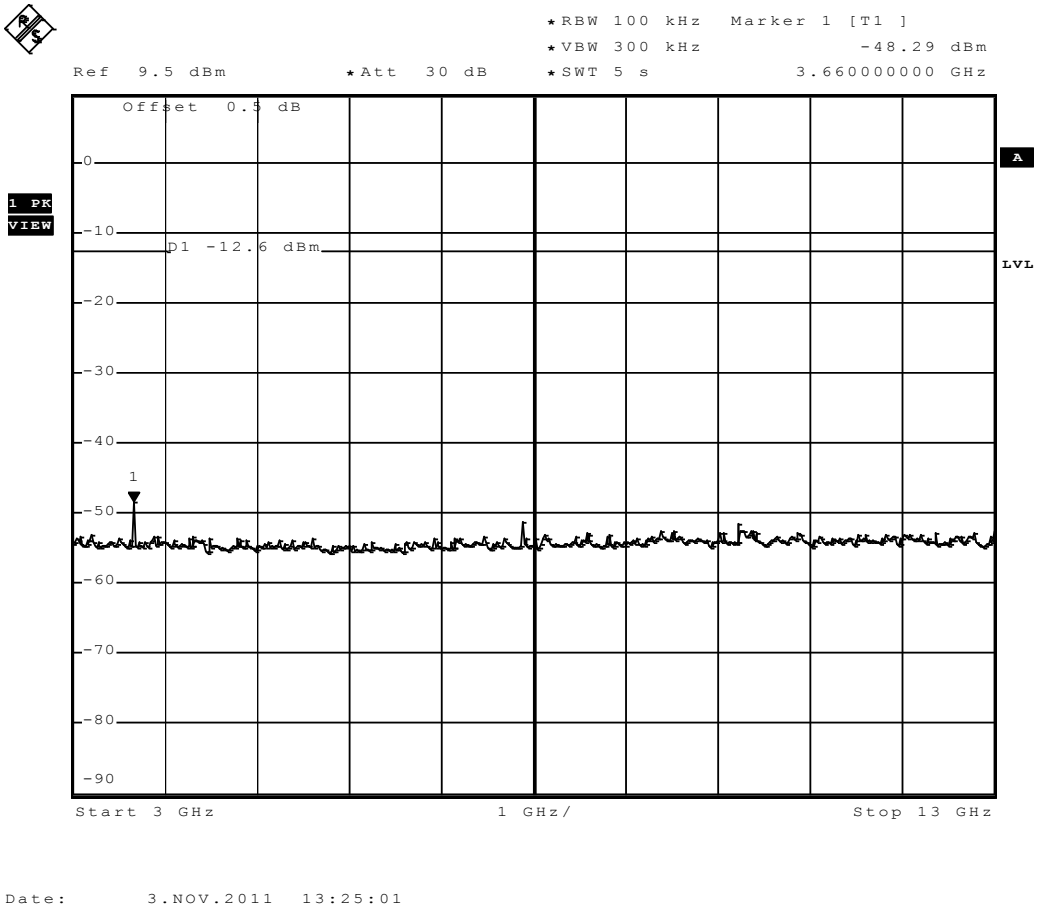
| | |
|---|---|
| EUT | Transceiver Module |
| Model | RF95 SW 915 LR |
| Approval Holder | Steute Schaltgeräte GmbH / Ord.: G0M-1110-1449 |
| Temperature / Voltage | 25°C, Vnom |
| Test Site / Operator | Eurofins Product Service GmbH, Mr. Treffke |
| Test Specification | FCC part 15.247 (d) |
| Comment 1 | Spurious Emissions conducted |
| Comment 2 | Channel : 915 MHz |
| Comment 3 | pass |



## Conducted spurious emissions – $F_{MID}$

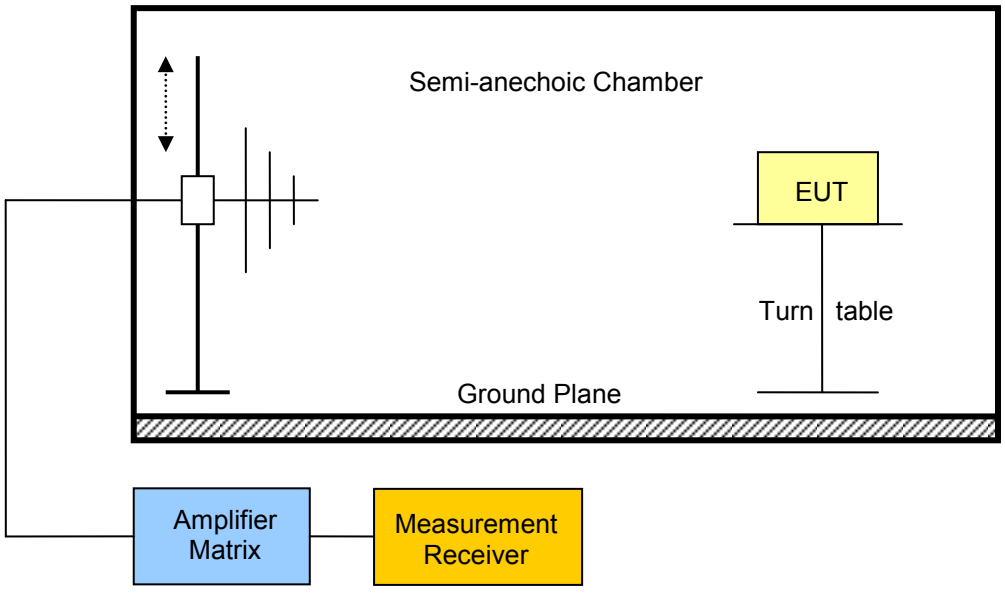
**FCC part 15.247 (d)**
**Spurious Emissions**

| | |
|---|---|
| EUT | Transceiver Module |
| Model | RF95 SW 915 LR |
| Approval Holder | Steute Schaltgeräte GmbH / Ord.: G0M-1110-1449 |
| Temperature / Voltage | 25°C, Vnom |
| Test Site / Operator | Eurofins Product Service GmbH, Mr. Treffke |
| Test Specification | FCC part 15.247 (d) |
| Comment 1 | Spurious Emissions conducted |
| Comment 2 | Channel : 915 MHz |
| Comment 3 | pass |



### 3.7 Test Conditions and Results – Transmitter radiated emissions

| **Transmitter radiated emissions acc. FCC 47 CFR 15.247 / IC RSS-210** | | | | **Verdict: PASS** |
|---|---|---|---|---|
| Test according referenced standards | | Reference Method | | |
| | | FCC 15.247(d) / IC RSS-210 A8.5 | | |
| Test according to measurement reference | | Reference Method | | |
| | | FCC KDB Publication No. 558074 / ANSI C63.4 | | |
| Test frequency range | | Tested frequencies | | |
| | | 30MHz – 10th Harmonic | | |
| EUT test mode | | Single | | |
| **Limits** | | | | |
| 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 |
| Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).<br>When average radiated emission measurements are specified, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. | | | | |
| **Test setup** | | | | |

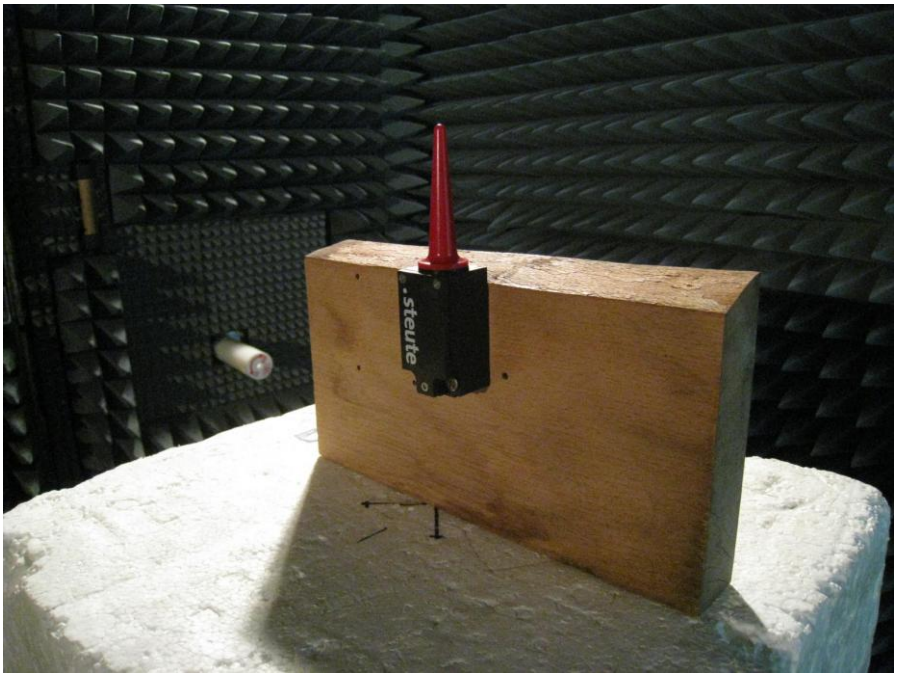


| Test procedure |
|---|
| 1. EUT set to test mode (Communication tester is used if needed)<br>2. Span it set according to measurement range<br>3. Resolution bandwidth below 1GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1MHz with peak/average detector is used above 1GHz<br>4. Markers are set to peak emission levels within restricted bands |

**Test results – Internal Antenna**

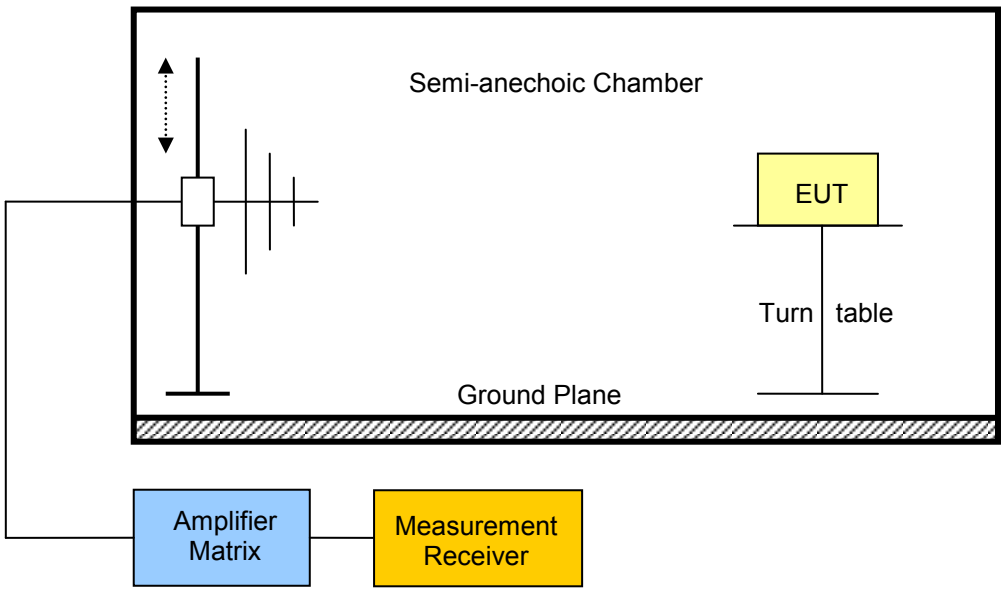
| Channel | Frequency [MHz] | Emission [MHz] | Level [dbµV/m] | Detector | Pol. | Limit [dbµV/m] | Limit distance [m]* | Margin [dB] |
|---|---|---|---|---|---|---|---|---|
| $F_{MID}$ | 915 | 4575 | 47.9 | pk | hor | 74 | 3 | -26.10 |
| $F_{MID}$ | 915 | 4575 | 42.1 | pk | ver | 74 | 3 | -31.90 |
| $F_{MID}$ | 915 | 8232 | 53.2 | pk | hor | 74 | 3 | -20.80 |

Comments: * Physical distance between EUT and measurement antenna.

| Test Setup |
| --- |
|  |

### 3.8 Test Conditions and Results – Receiver radiated emissions

| **Receiver radiated emissions acc. IC RSS-210** | | | | **Verdict: PASS** |
|---|---|---|---|---|
| Test according referenced standards | Reference Method | | | |
| | IC RSS-210 A8.5 | | | |
| Test according to measurement reference | Reference Method | | | |
| | ANSI C63.4 | | | |
| Test frequency range | Tested frequencies | | | |
| | 30MHz – 3th Harmonic | | | |
| EUT test mode | Receive | | | |
| **Limits** | | | | |
| 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 |
| **Test setup** | | | | |



| Test procedure |
|---|
| 1. EUT set to receive mode (Communication tester is used if needed)<br>2. Span it set according to measurement range<br>3. Resolution bandwidth below 1GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1MHz with peak/average detector is used above 1GHz<br>4. Markers are set to peak emission levels |

**Test results**

| Channel | Frequency [MHz] | Emission [MHz] | Emission Level [dbµV/m] | Emission Level [µV/m] | Det. | Limit [µV/m] | Margin [µV/m] |
|---|---|---|---|---|---|---|---|
| $F_{MID}$ | 915MHz | 3916 | 42.86** | 139.00 | pk | 500.00 | -361.00 |

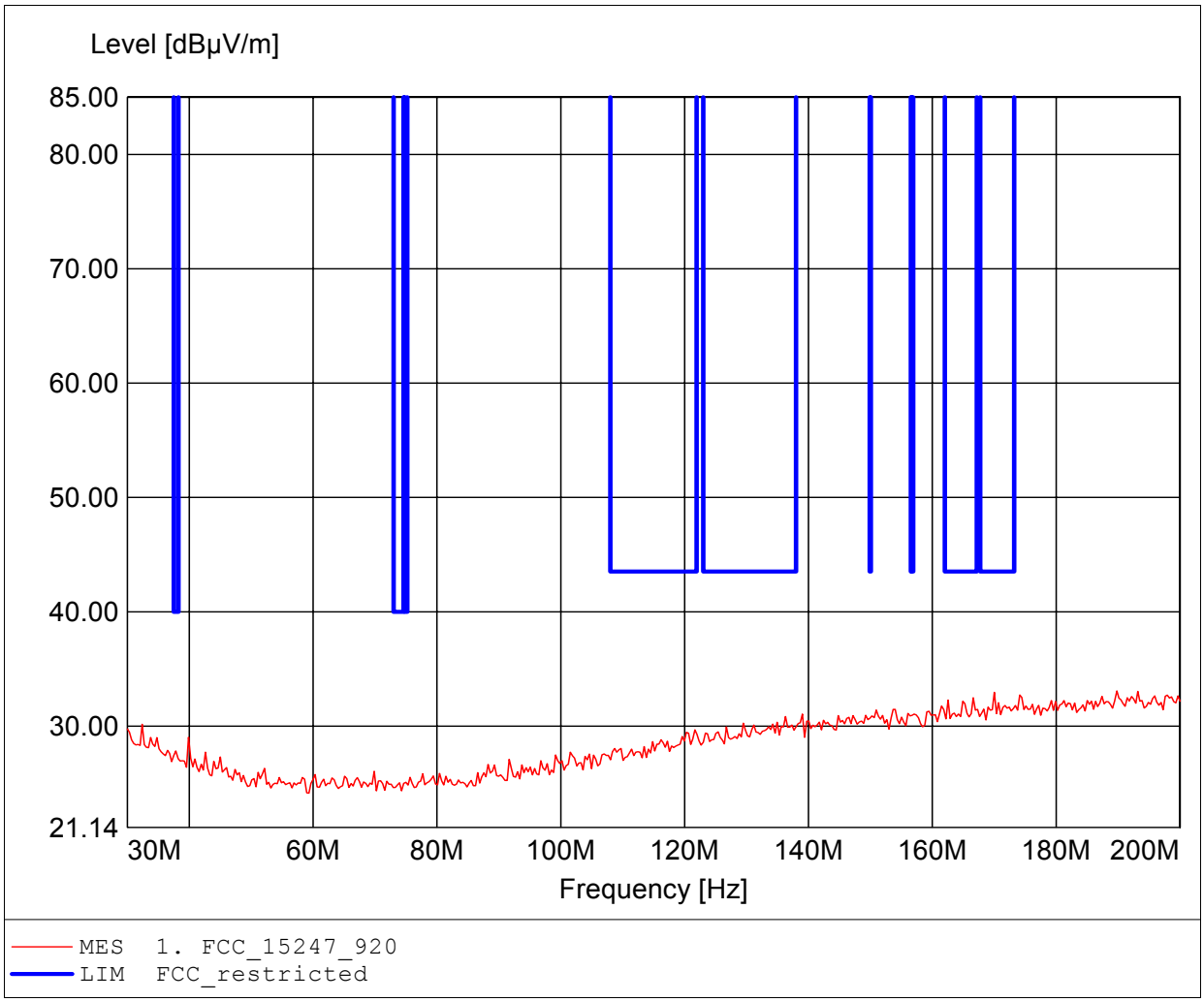
Comments:
* Physical distance between EUT and measurement antenna.
** Emission level corresponds to ambient noise floor

# ANNEX A Transmitter radiated spurious emissions

***Spurious emissions Field Strength***

***FCC RULES PART 15, SUBPART C***

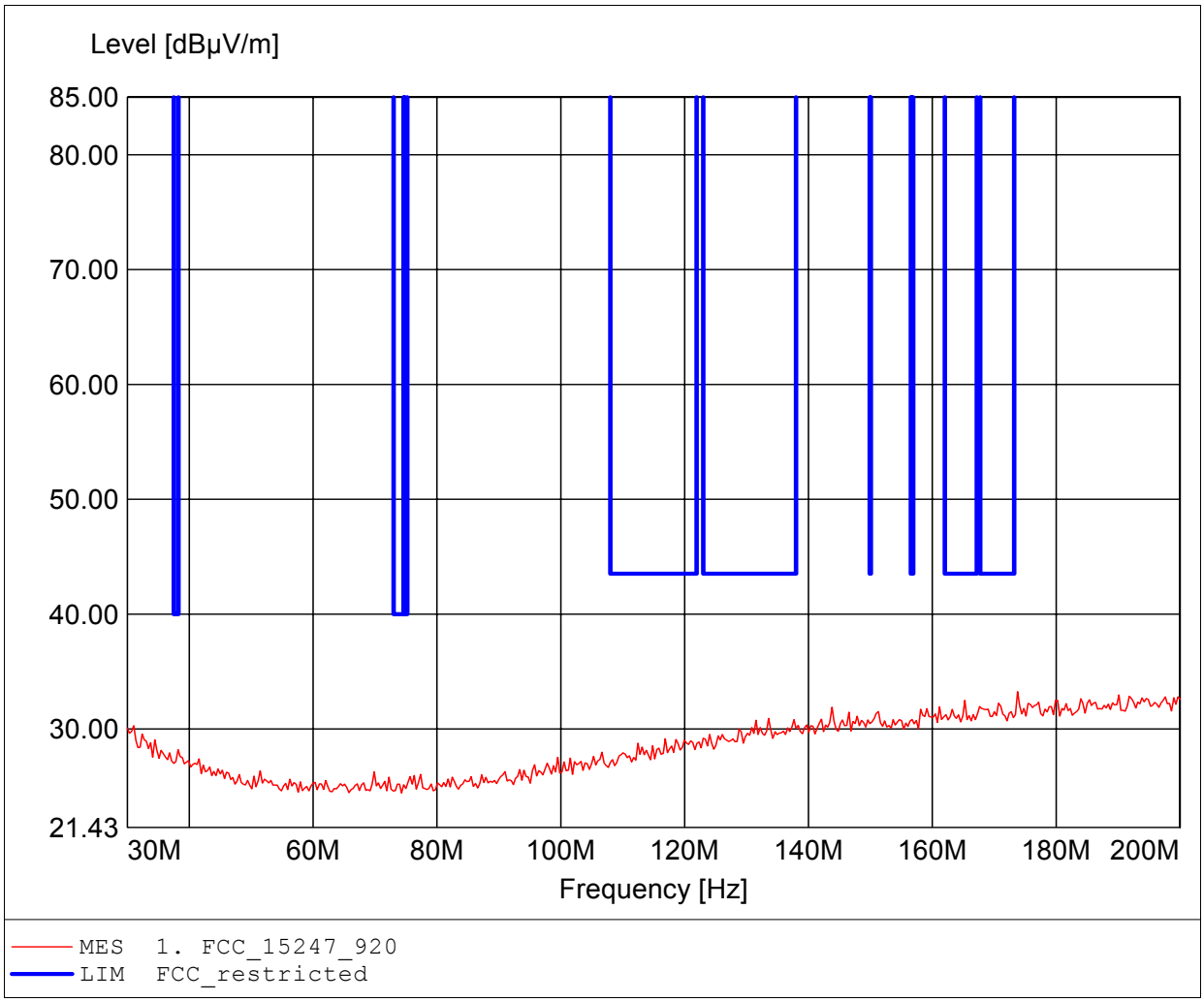
| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | according to §15.247 |
| Comment 1: | Dist.: 3m, Ant.: HK 116 |
| Comment 2: | Freq: 189.780MHz, Emax: 33.07dBµV/m, RBW: 100kHz |



***Spurious emissions Field Strength***

***FCC RULES PART 15, SUBPART C***

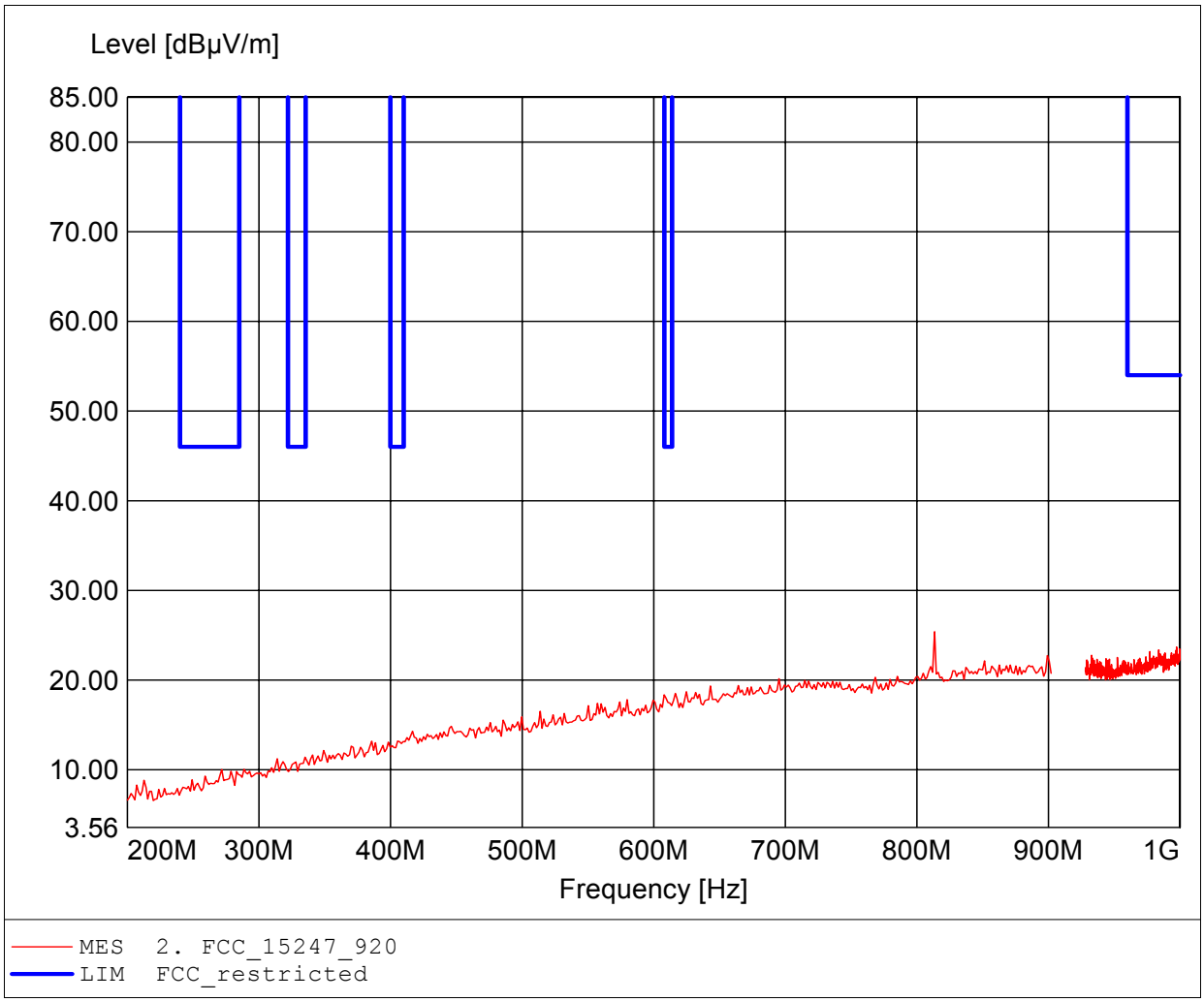
| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | according to §15.247 |
| Comment 1: | Dist.: 3m, Ant.: HK 116 |
| Comment 2: | Freq: 173.768MHz, Emax: 33.24dBµV/m, RBW: 100kHz |



***Spurious emissions Field Strength***

***FCC RULES PART 15, SUBPART C***

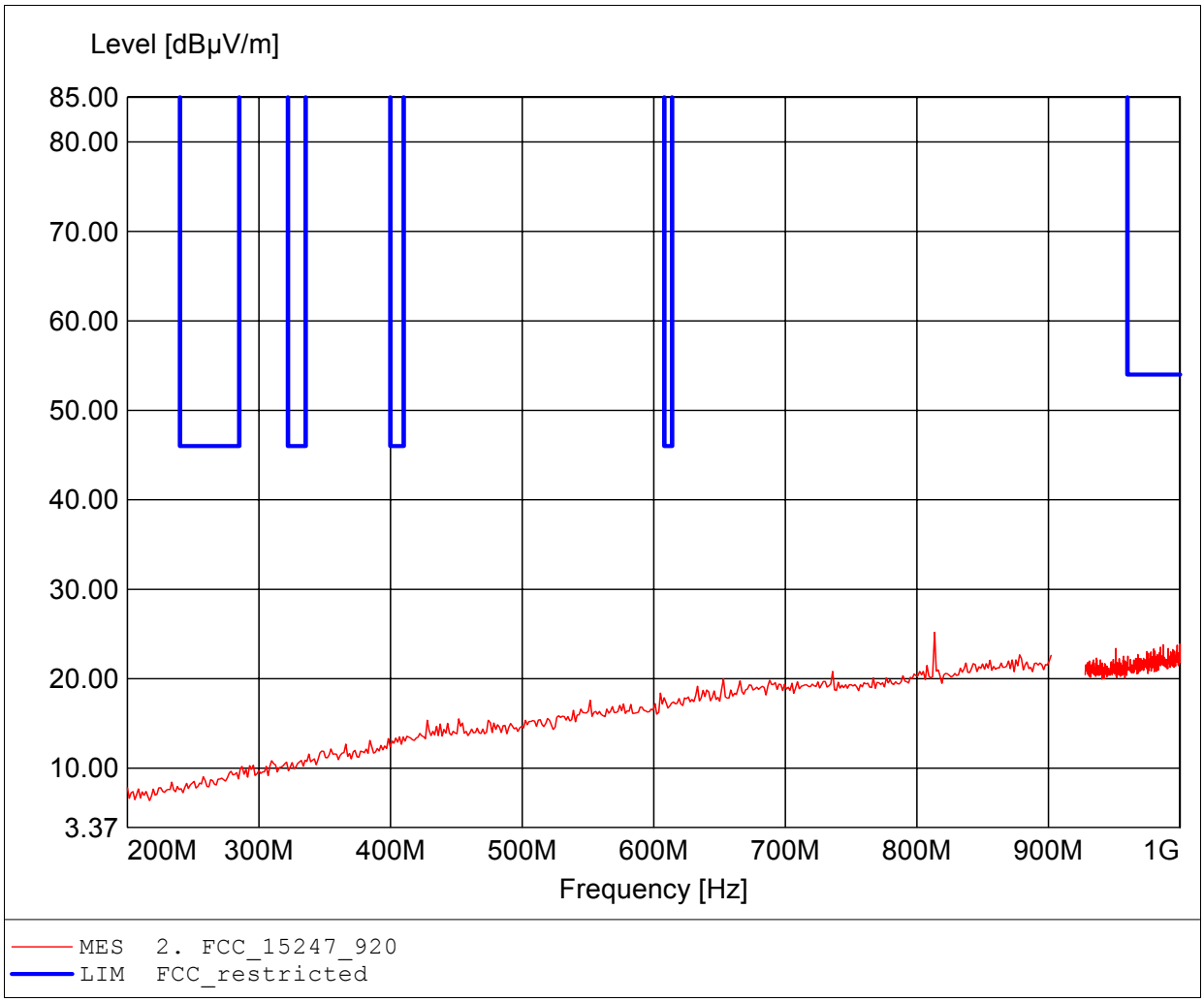
| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | according to §15.247 |
| Comment 1: | Dist.: 3m, Ant.: HL 223, amplif. |
| Comment 2: | Freq: 813.371MHz, Emax: 25.40dBµV/m, RBW: 100kHz |



***Spurious emissions Field Strength***

***FCC RULES PART 15, SUBPART C***

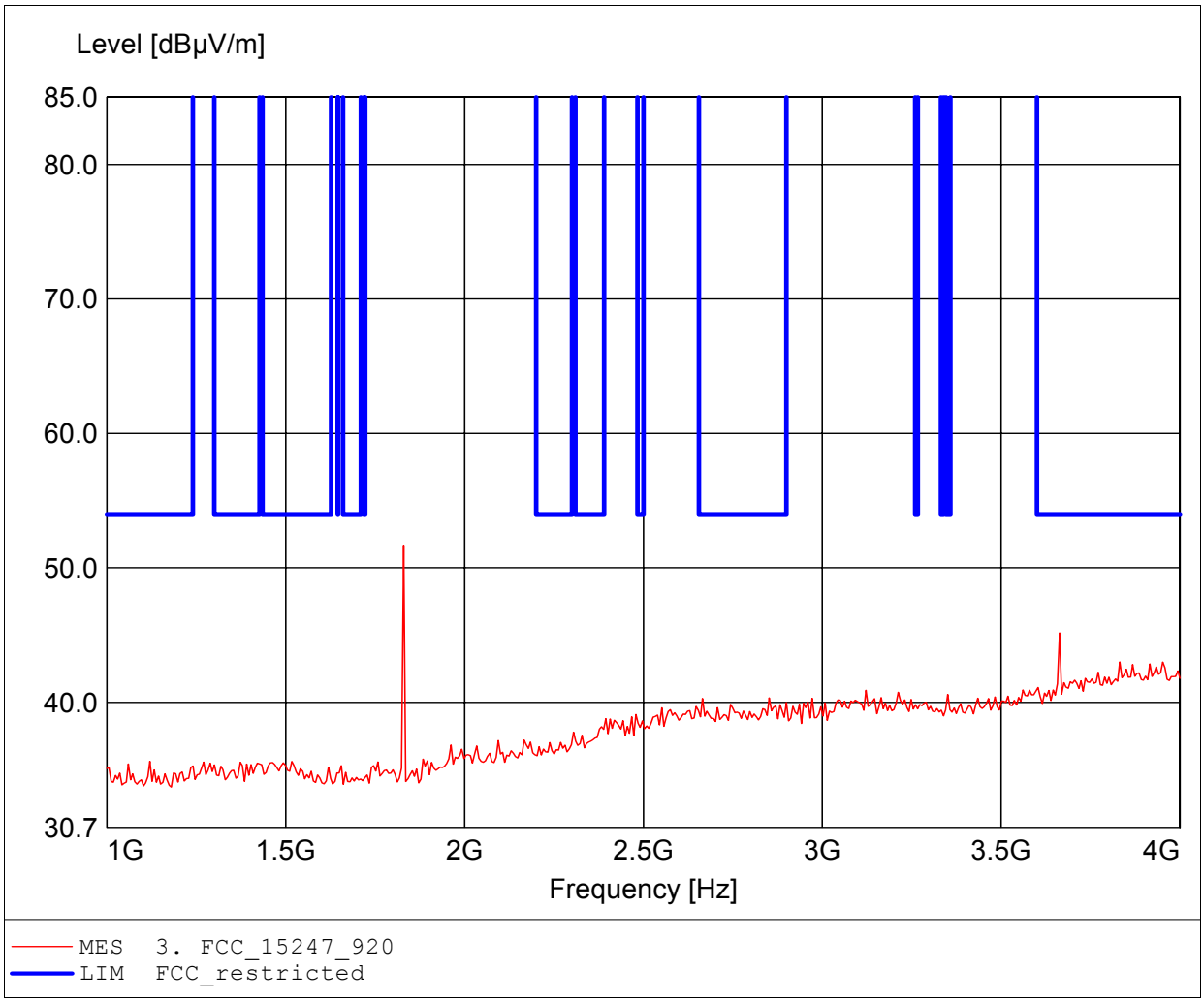
| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | according to §15.247 |
| Comment 1: | Dist.: 3m, Ant.: HL 223, amplif. |
| Comment 2: | Freq: 813.371MHz, Emax: 25.19dBµV/m, RBW: 100kHz |



***Spurious emissions Field Strength***

***FCC RULES PART 15, SUBPART C***

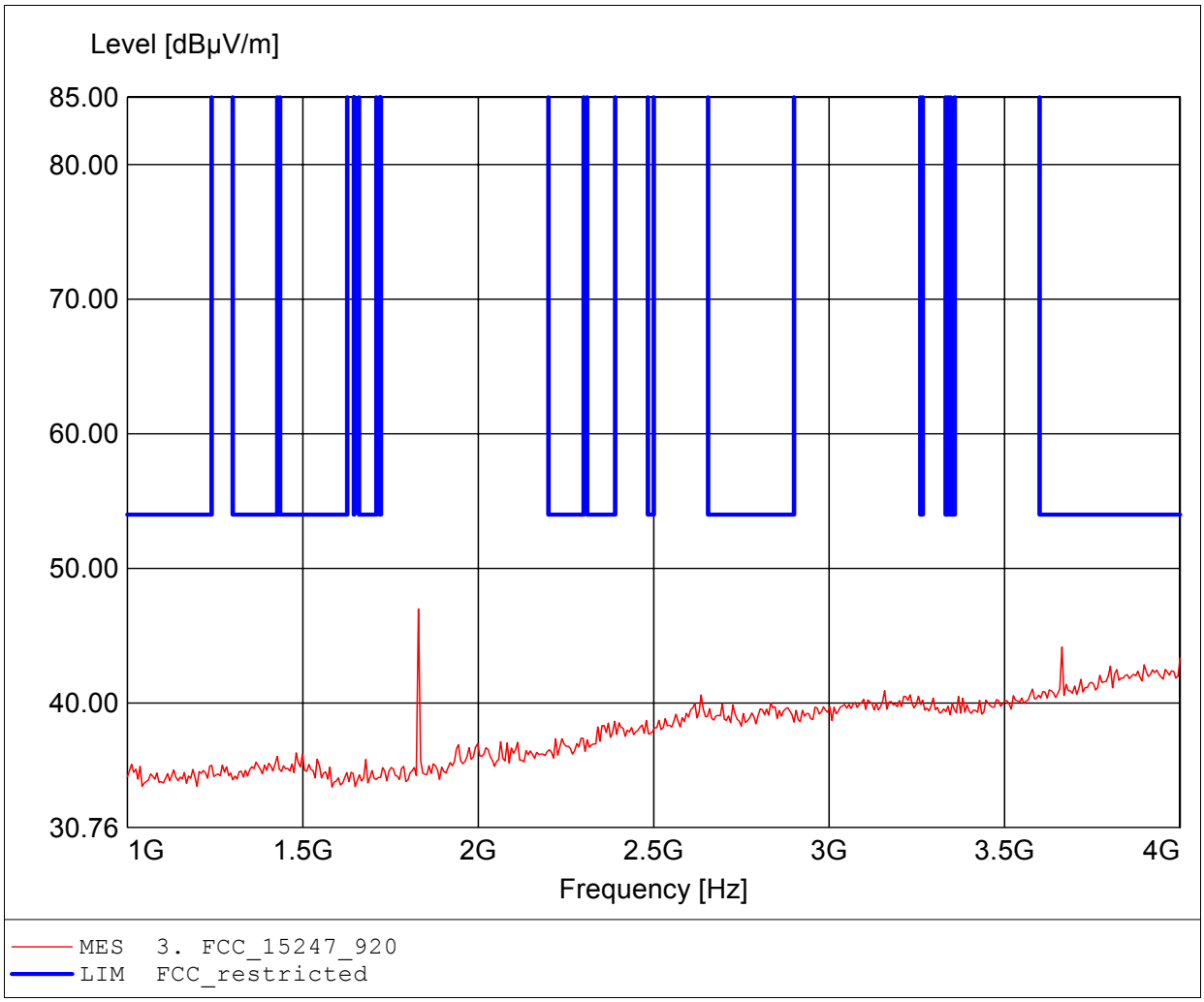
| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | according to §15.247, peak detector |
| Comment 1: | Dist.: 3m, Ant.: BBHA9120D, amplif. |
| Comment 2: | Freq: 1.830GHz, Emax: 51.68dBµV/m, RBW: 1MHz |



***Spurious emissions Field Strength***

***FCC RULES PART 15, SUBPART C***

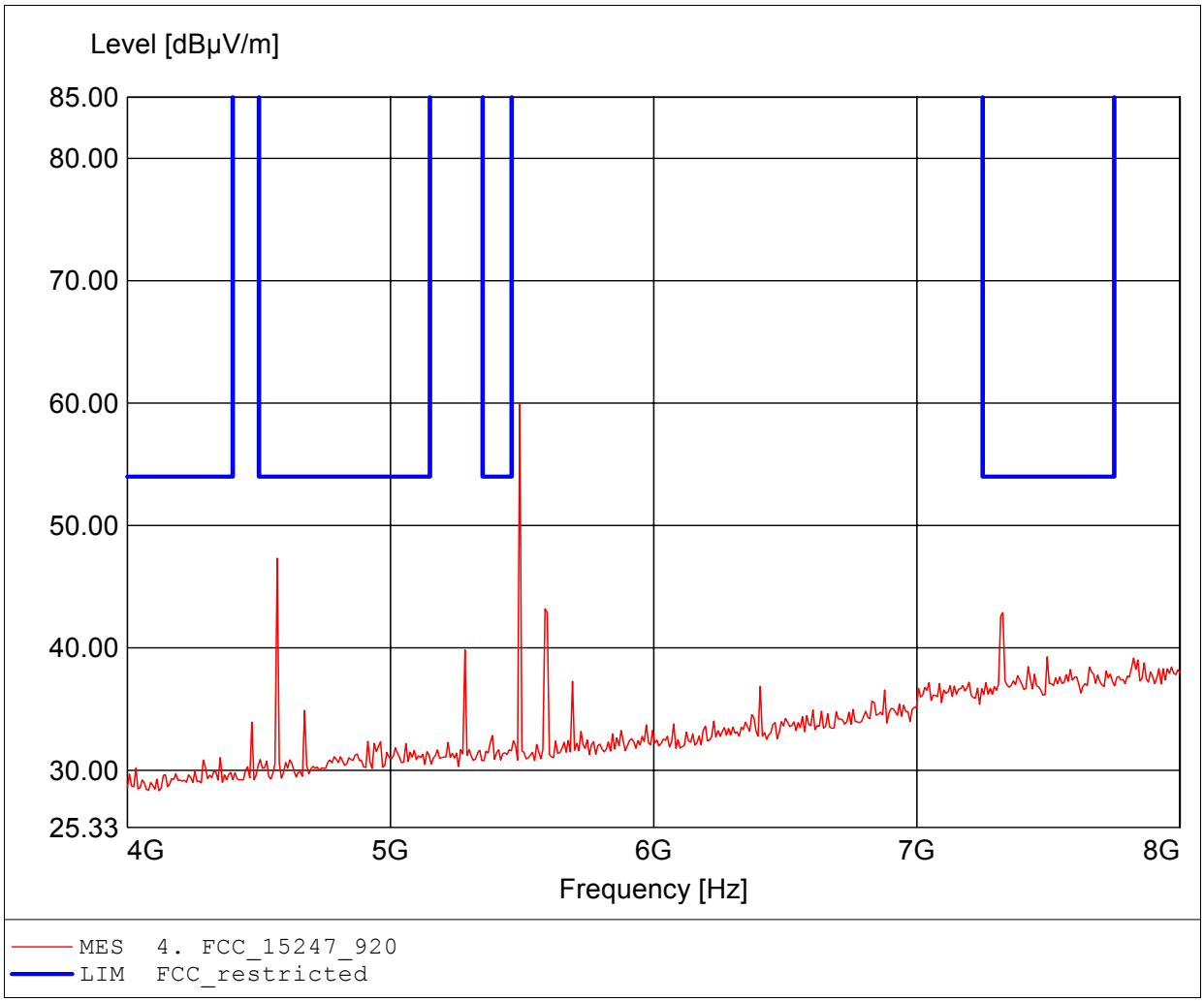
| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | according to §15.247, peak detector |
| Comment 1: | Dist.: 3m, Ant.: BBHA9120D, amplif. |
| Comment 2: | Freq: 1.830GHz, Emax: 46.99dBµV/m, RBW: 1MHz |



***Spurious emissions Field Strength***

***FCC RULES PART 15, SUBPART C***

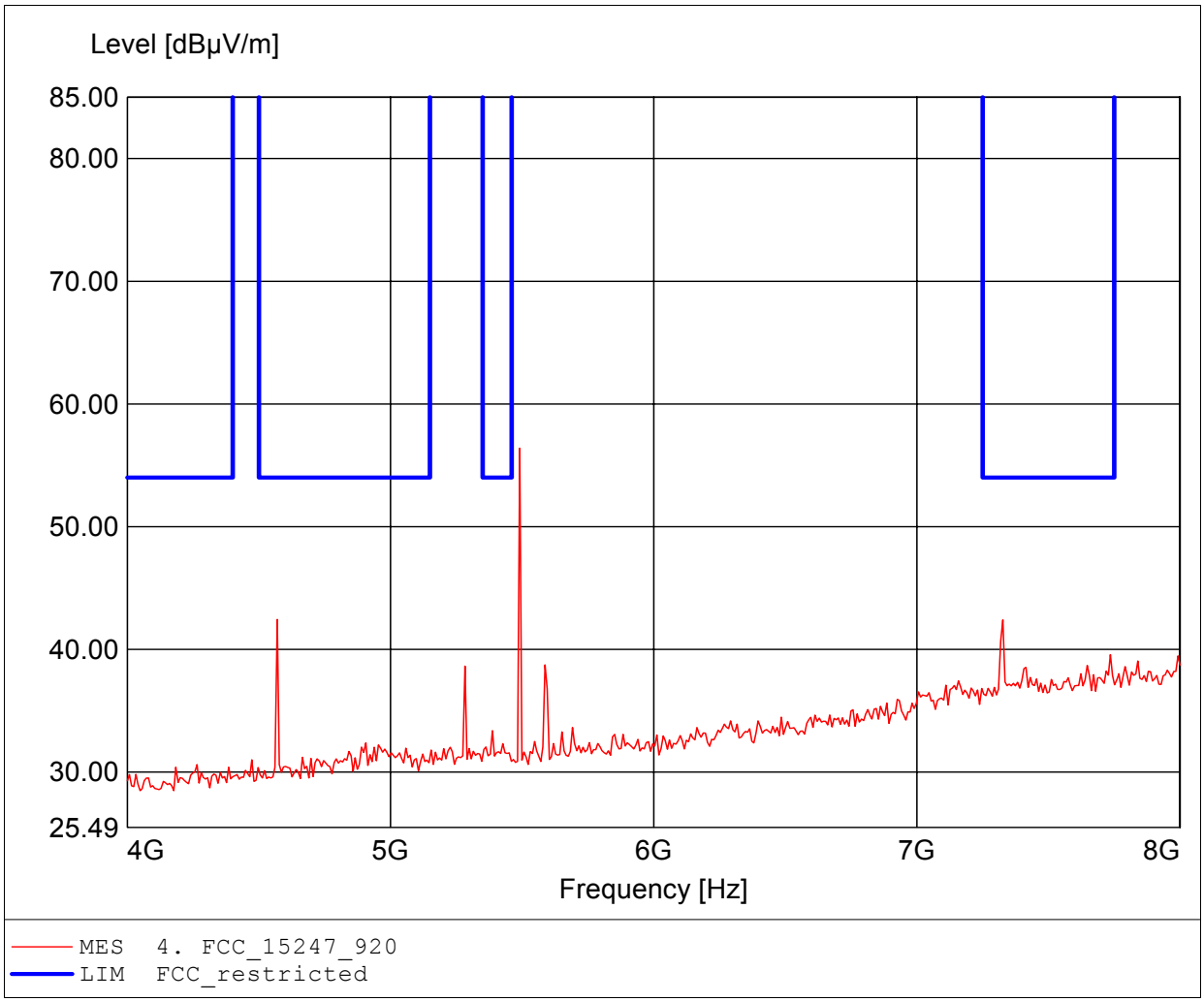
| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | according to §15.247, peak detector |
| Comment 1: | Dist.: 3m, Ant.: BBHA9120D, ampl.+HP. |
| Comment 2: | Freq: 5.491GHz, Emax: 59.93dBµV/m, RBW: 1MHz |



***Spurious emissions Field Strength***

***FCC RULES PART 15, SUBPART C***

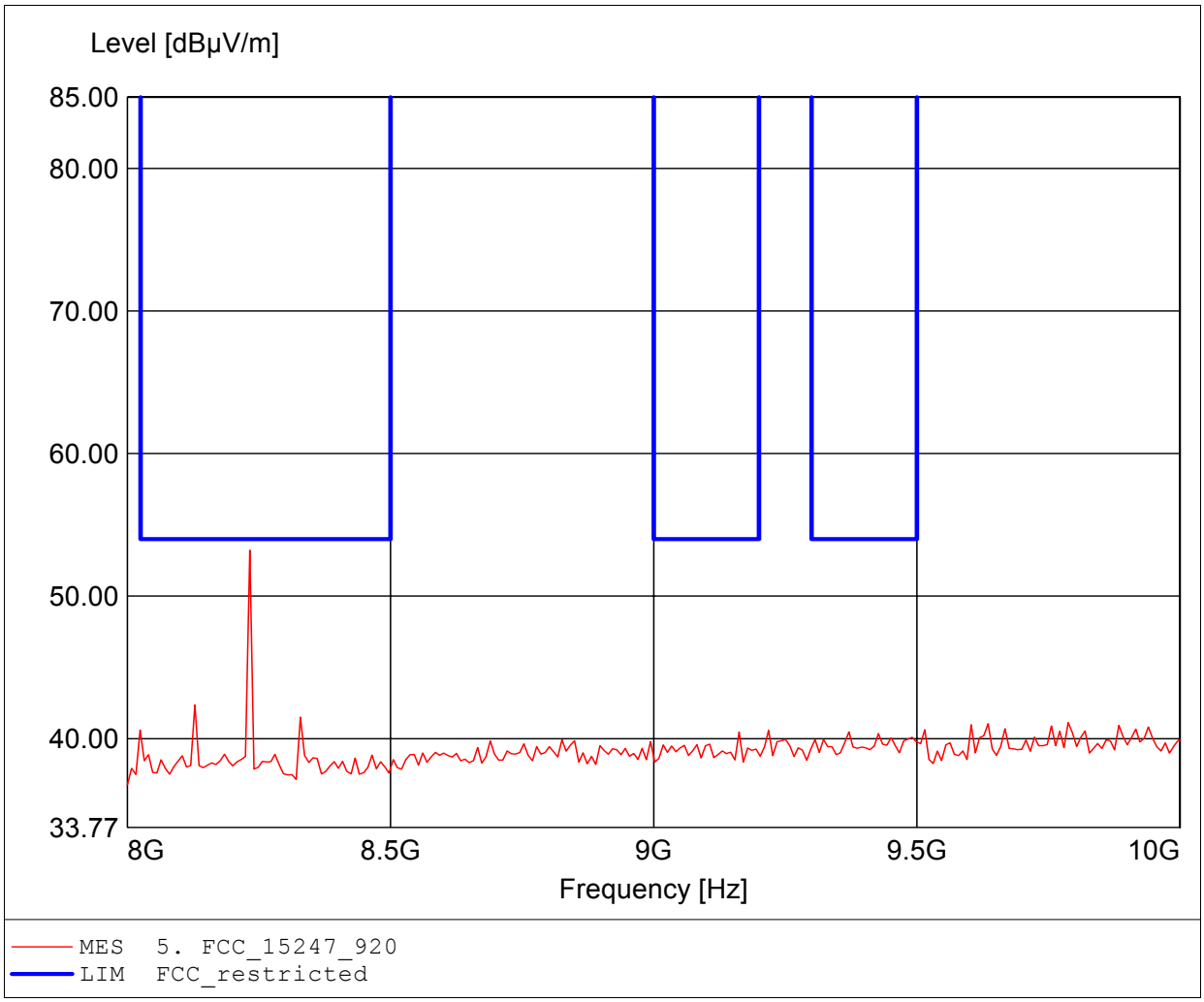
| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | according to §15.247, peak detector |
| Comment 1: | Dist.: 3m, Ant.: BBHA9120D, ampl.+HP. |
| Comment 2: | Freq: 5.491GHz, Emax: 56.39dBµV/m, RBW: 1MHz |



***Spurious emissions Field Strength***

***FCC RULES PART 15, SUBPART C***

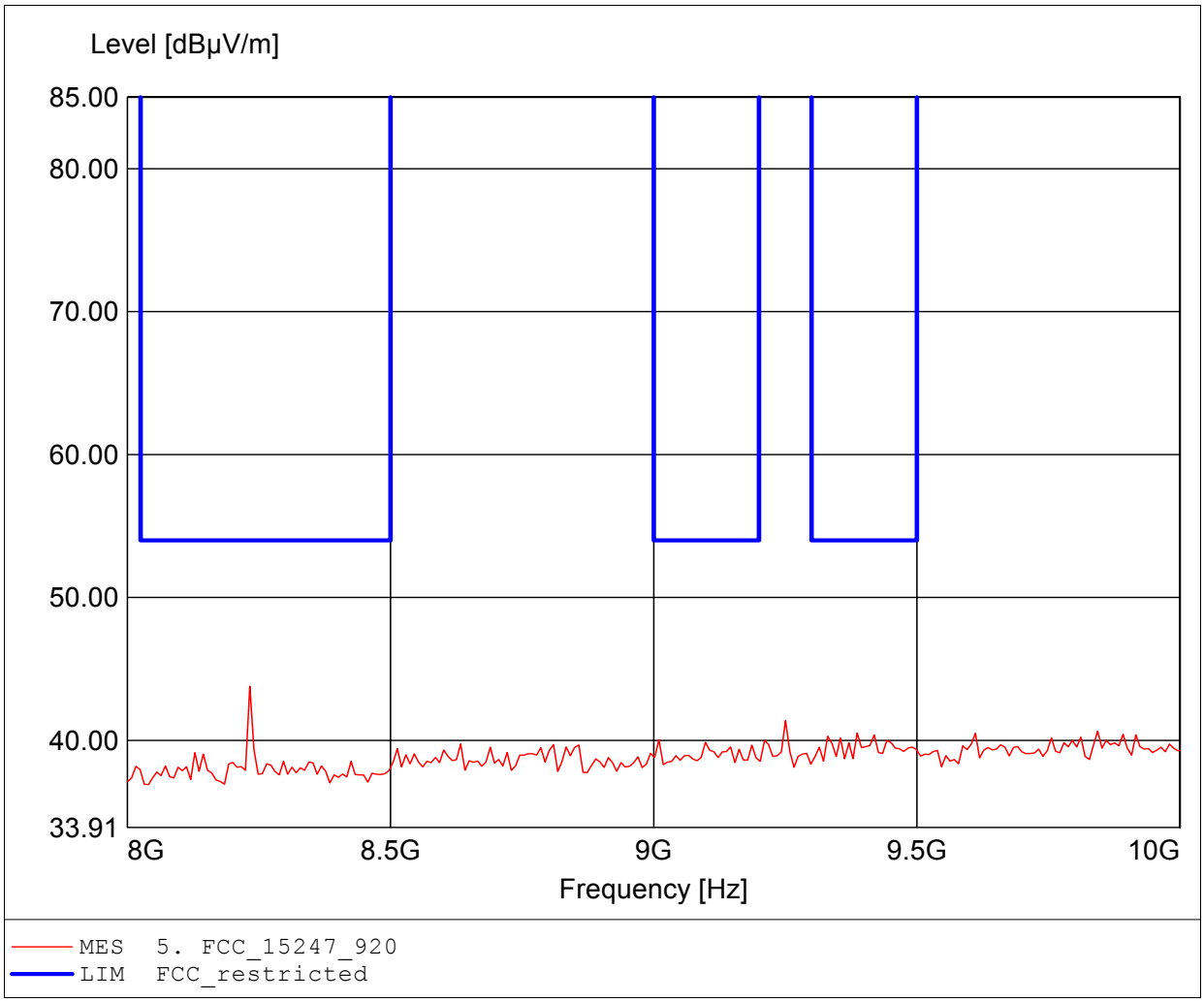
| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | according to §15.247, peak detector |
| Comment 1: | Dist.: 3m, Ant.: BBHA9120D, ampl.+HP. |
| Comment 2: | Freq: 8.232GHz, Emax: 53.22dBµV/m, RBW: 1MHz |



***Spurious emissions Field Strength***

***FCC RULES PART 15, SUBPART C***

| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | according to §15.247, peak detector |
| Comment 1: | Dist.: 3m, Ant.: BBHA9120D, ampl.+HP. |
| Comment 2: | Freq: 8.232GHz, Emax: 43.79dBµV/m, RBW: 1MHz |

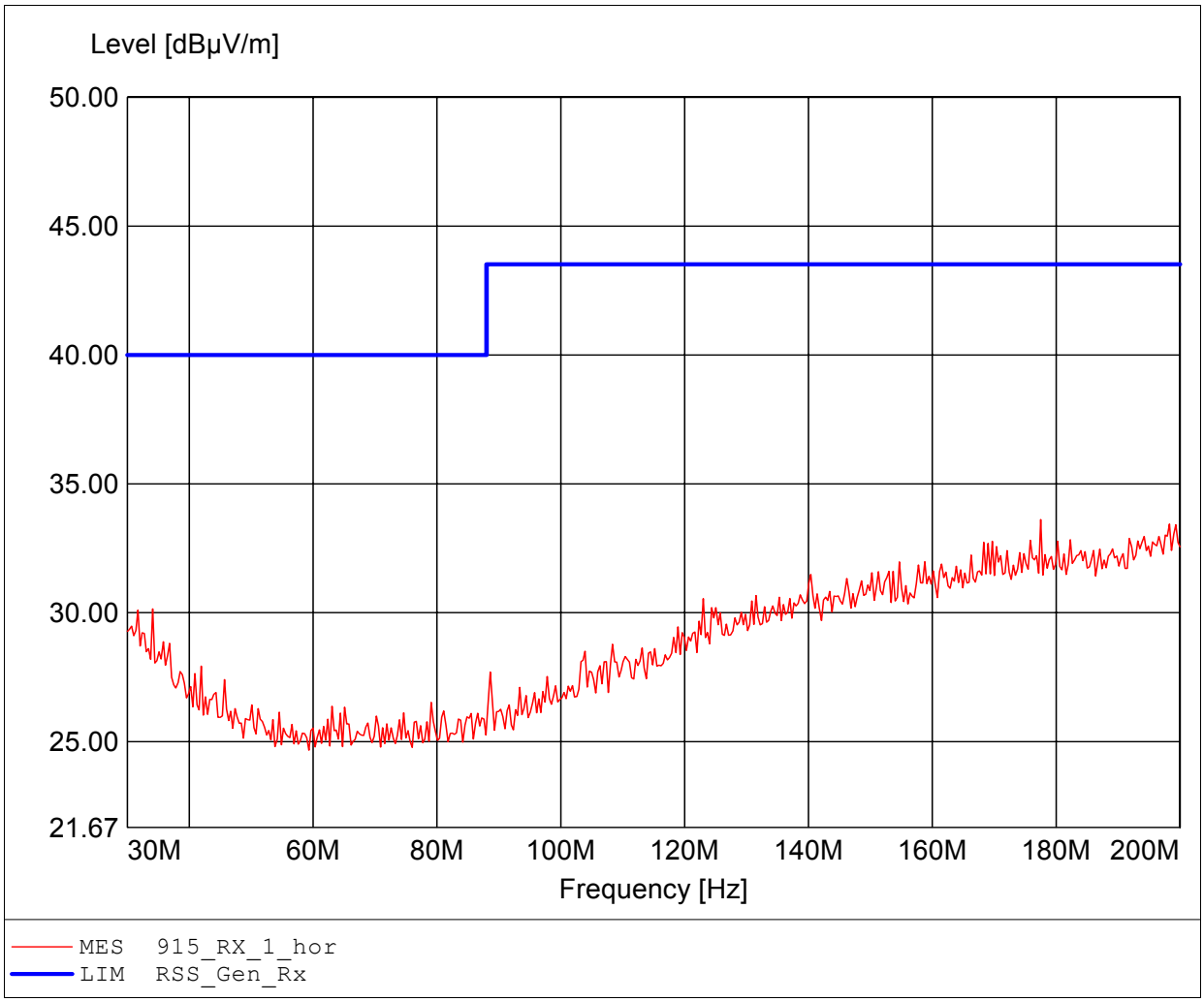


# ANNEX B Receiver radiated spurious emissions

***Field Strength under normal conditions***

***Standards Industry Canada, RSS-GEN***

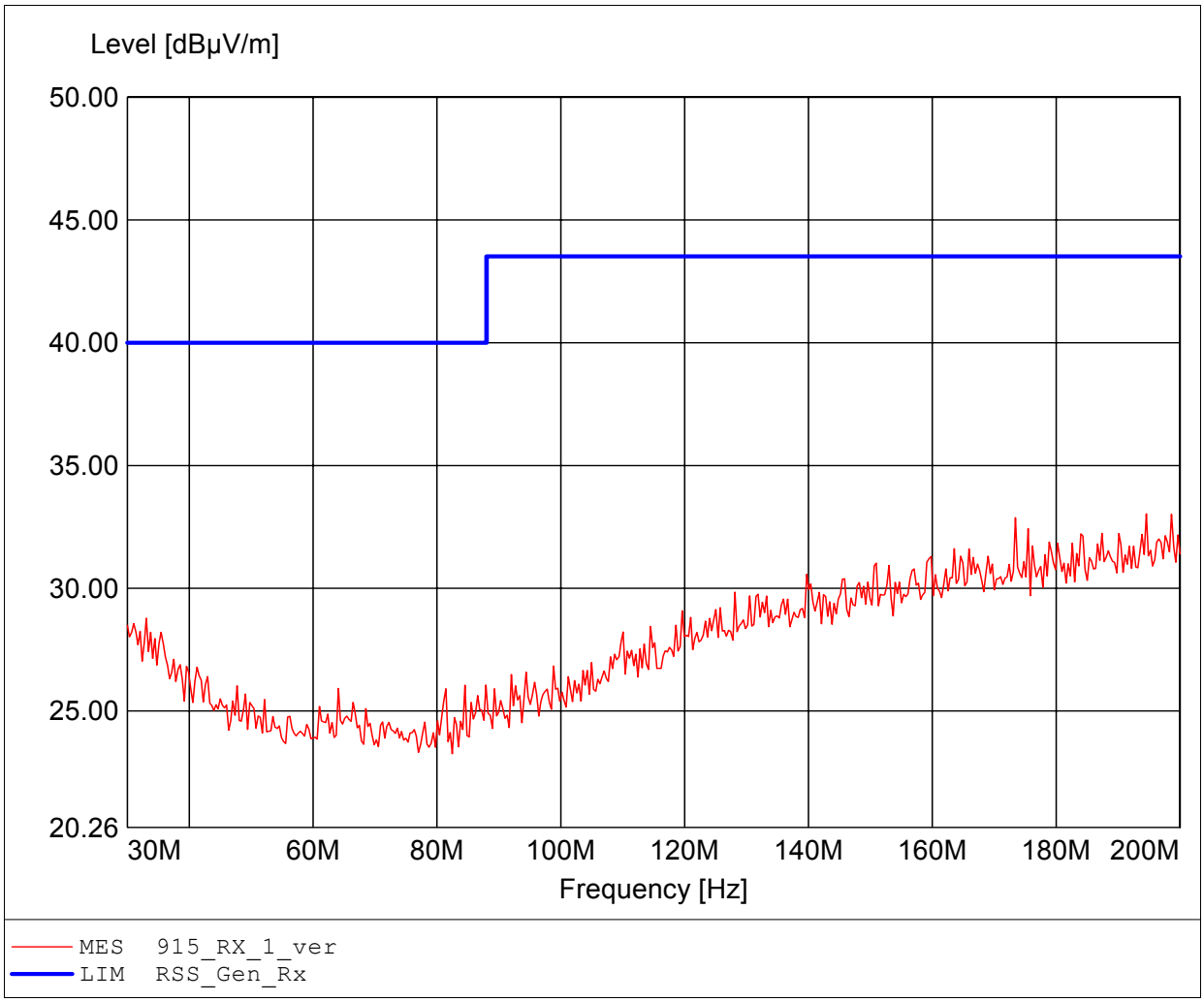
| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | Freq. / CH: 915 |
| Comment 1: | Dist.: 3m, Ant.: HK 116 |
| Comment 2: | Freq:177.515MHz Emax:33.61dBµV/m RBW: 100 kHz |



***Field Strength under normal conditions***

***Standards Industry Canada, RSS-GEN***

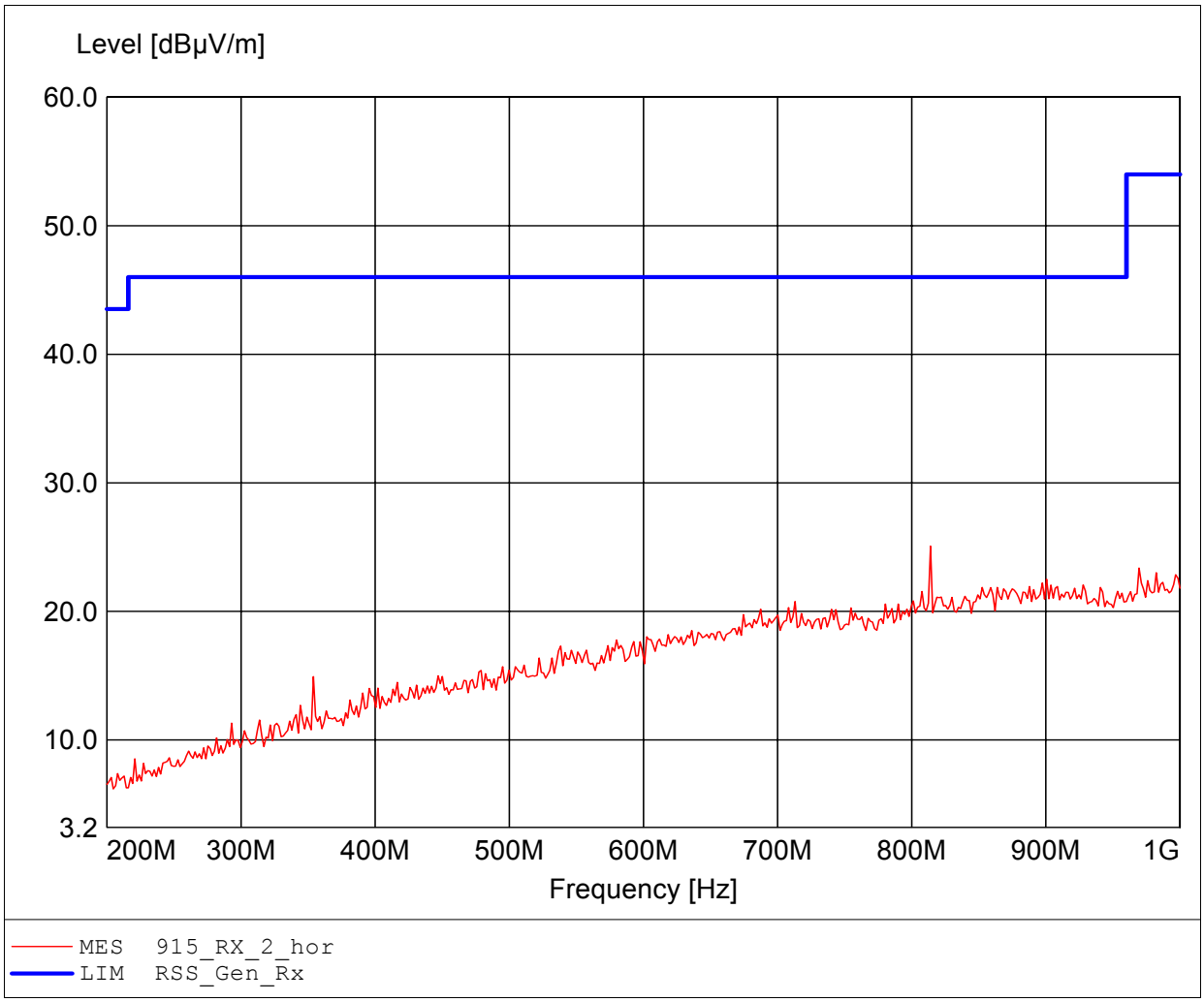
| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | Freq. / CH: 915 |
| Comment 1: | Dist.: 3m, Ant.: HK 116 |
| Comment 2: | Freq:194.549MHz Emax:33.03dBµV/m RBW: 100 kHz |



***Field Strength under normal conditions***

***Standards Industry Canada, RSS-GEN***

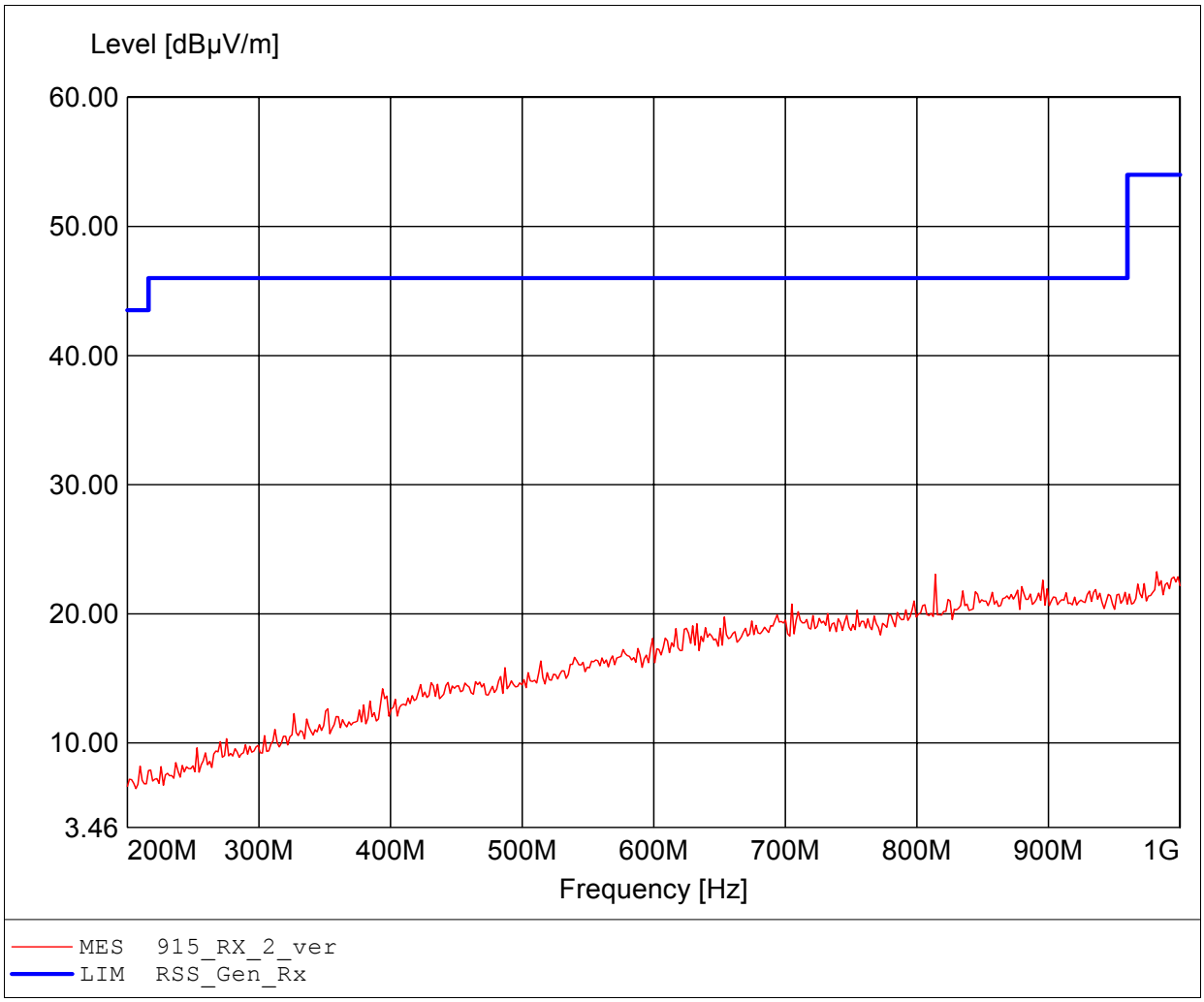
```
Approval Holder:       Steute Schaltgeräte GmbH   /   G0M-1110-1449
EUT:                   SRD-Transceiver
Model:                 RF95 SW 915 LR  /  setup: Rx, 915.0 MHz
Test Site / Operator:  Eurofins Product Service GmbH  /  Mr. Treffke
Test Condition:        Tnom.: 24°C   /   Vnom: 3.3 VDC
Test Specification:    Freq. / CH: 915
Comment 1:             Dist.: 3m, Ant.: HL 223, ampl.
Comment 2:             Freq:814.028MHz Emax:25.08dBµV/m RBW: 100 kHz
```



***Field Strength under normal conditions***

***Standards Industry Canada, RSS-GEN***

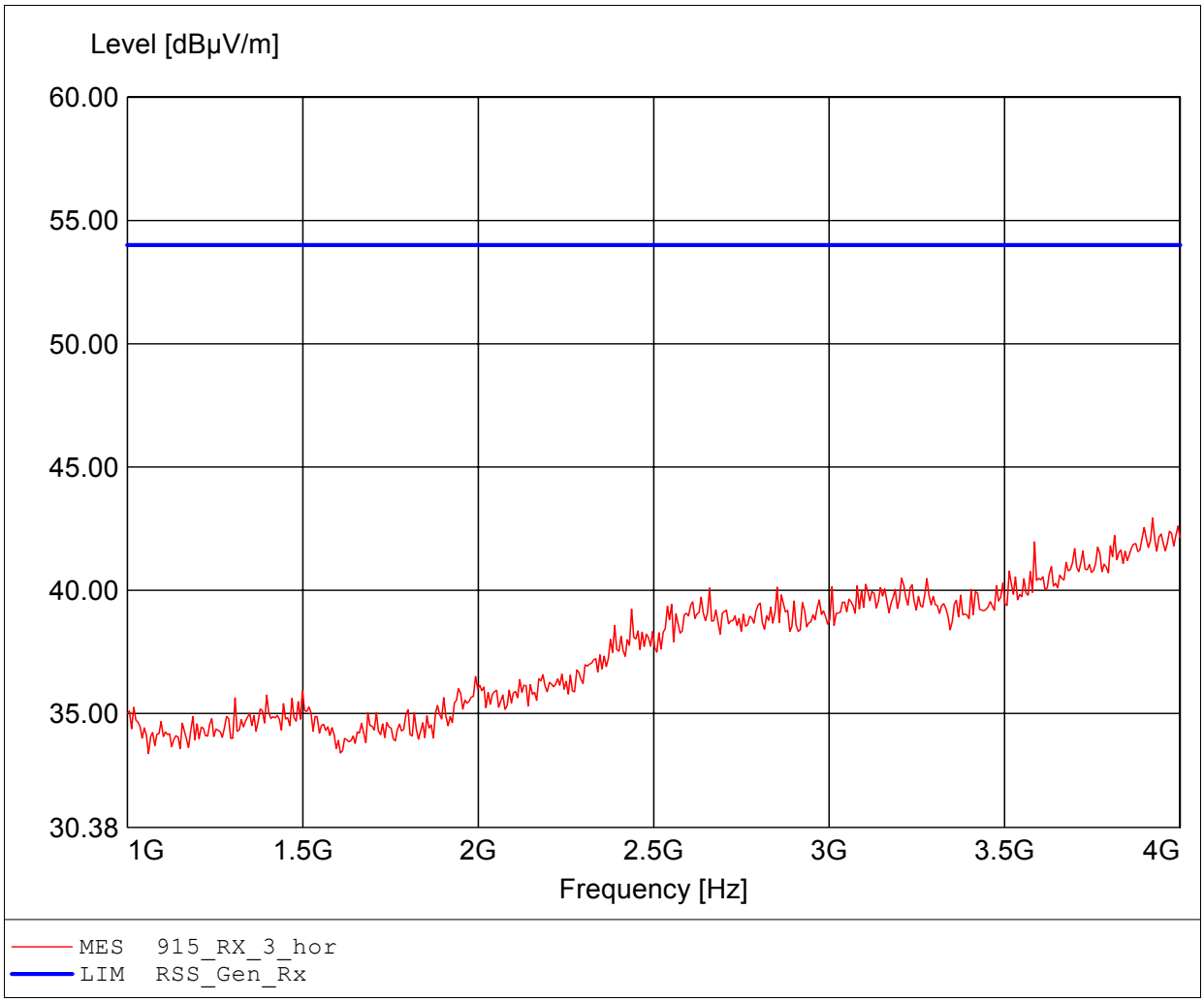
```
Approval Holder:       Steute Schaltgeräte GmbH   /   G0M-1110-1449
EUT:                   SRD-Transceiver
Model:                 RF95 SW 915 LR  /  setup: Tx, 915.0 MHz
Test Site / Operator:  Eurofins Product Service GmbH  /  Mr. Treffke
Test Condition:        Tnom.: 24°C   /   Vnom: 3.3 VDC
Test Specification:    Freq. / CH: 915
Comment 1:             Dist.: 3m, Ant.: HL 223, ampl.
Comment 2:             Freq:982.365MHz Emax:23.26dBµV/m RBW: 100 kHz
```



***Field Strength under normal conditions***

***Standards Industry Canada, RSS-GEN***

| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | Freq. / CH: 915 |
| Comment 1: | Dist.: 3m, Ant.: HL025, ampl. |
| Comment 2: | Freq:3.922GHz Emax:42.93dBµV/m RBW: 1 MHz |



***Field Strength under normal conditions***

***Standards Industry Canada, RSS-GEN***

| | |
|---|---|
| Approval Holder: | Steute Schaltgeräte GmbH / G0M-1110-1449 |
| EUT: | SRD-Transceiver |
| Model: | RF95 SW 915 LR / setup: Tx, 915.0 MHz |
| Test Site / Operator: | Eurofins Product Service GmbH / Mr. Treffke |
| Test Condition: | Tnom.: 24°C / Vnom: 3.3 VDC |
| Test Specification: | Freq. / CH: 915 |
| Comment 1: | Dist.: 3m, Ant.: HL025, ampl. |
| Comment 2: | Freq:3.916GHz Emax:42.86dBµV/m RBW: 1 MHz |