# RADIO REPORT

**FCC 47 CFR Part 15E**

**Unlicensed National Information Infrastructure Devices in the 5 GHz Bands**

| | |
|---|---|
| **Report Reference No** | G0M-1907-8361-TFC407WF-V02 |
| **Testing Laboratory** | Eurofins Product Service GmbH |
| Address | Storkower Str. 38c<br>15526 Reichenwalde<br>Germany |
| Accreditation | DAkkS - Registration number : D-PL-12092-01-04<br>FCC Filed Test Laboratory, Reg.-No.: 96970 |
| **Applicant** | R3 - Reliable Realtime Radio Communications GmbH |
| **Address** | Bismarckstr. 10-12<br>10625 Berlin<br>GERMANY |
| **Test Specification** | 47 CFR Part 15E |
| Non-Standard Test Method | None |
| **Equipment under Test (EUT):** | |
| Product Description | EchoRing Ethernet Bridge |
| Model(s) | ER-EB 1001M |
| Additional Model(s) | None |
| Brand Name(s) | ECHORING |
| Hardware Version(s) | V2.2 |
| Software Version(s) | V2 |
| FCC-ID | 2AWGE3CH0 |
| **Test Result** | **PASSED** |

| | | |
|---|---|---|
| **Possible test case verdicts:** | | |
| Required by standard but not tested | N/T | |
| Not required by standard | N/R | |
| Not applicable to EUT | N/A | |
| 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 | 2019-04-28 | Test Sample ID 29090 |
| **Report:** | | |
| Compiled by | Abdullah Al Jamal | |
| Tested by (+ signature)<br>(Responsible for Test) | Abdullah Al Jamal | ..... |
| Approved by (+ signature)<br>(Deputy Head of Lab) | Toralf Jahn | ..... |
| Date of Issue | 2020-09-29 | |
| Total number of pages | 148 | |
| **General Remarks:** | | |
| **The test results presented in this report relate only to the object tested.**<br>**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.**<br>This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. | | |
| **Additional Comments:** | | |
| None. | | |

## VERSION HISTORY

| Version History | | | |
|---|---|---|---|
| Version | Issue Date | Remarks | Revised By |
| 01 | 2020-09-18 | Initial Release | |
| 02 | 2020-09-29 | Spurious emission result tables corrected | Abdullah Al Jamal |

## ABBREVIATIONS AND ACRONYMS

| Acronyms | |
|---|---|
| Acronym | Description |
| BPSK | Binary Phase Shift Keying |
| EIRP | Equivalent Isotropic Radiated Power |
| EUT | Equipment Under Test |
| FCC | Federal Communications Commission |
| HT | High Throughput |
| IEEE 802.11 | MAC and PHY Layer for WiFi |
| OFDM | Orthogonal Frequency Division Multiplexing |
| QAM | Quadrature Amplitude Modulation |
| QPSK | Quadrature Phase Shift Keying |
| RBW | Resolution bandwidth |
| RMS | Root mean square |
| TPC | Transmit Power Control |
| VBW | Video bandwidth |
| VHT | Very High Throughput |

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# 1 Equipment (Test Item) Under Test

| | | |
|---|---|---|
| Description | EchoRing Ethernet Bridge | |
| Model | ER-EB 1001M | |
| Additional Model(s) | None | |
| Brand Name(s) | ECHORING | |
| Serial Number(s) | 00 00 00 04 | |
| Hardware Version(s) | V2.2 | |
| Software Version(s) | V2 | |
| FCC-ID | 2AWGE3CH0 | |
| Equipment type | End Product | |
| Device type | Access point, Client | |
| Radio type | Transceiver | |
| Assigned frequency bands | 5150 MHz - 5250 MHz<br>5725 MHz - 5850 MHz | |
| Radio technology | Proprietary (Similar to IEEE 802.11, mode a) | |
| Modulation | BPSK 1/2, BPSK 3/4,<br>QPSK 1/2, QPSK 3/4,<br>16-QAM 1/2, 16-QAM 3/4, 64 QAM 2/3 | |
| Number of antenna ports | 1 | |
| Transmit power control | No | |
| Antenna | Type | External antenna (dedicated antenna) |
| | Model | W5097 |
| | Manufacturer | Pulse Larsen |
| | Gain | 3.5 dBi<br>(decalred by applicant) |
| Supply Voltage | $V_{NOM}$ | 24.0 VDC |
| | $V_{MIN}$ | 21.6 VDC |
| | $V_{MAX}$ | 26.4 VDC |
| Operating Temperature | $T_{NOM}$ | 20 °C |
| | $T_{MIN}$ | -20 °C |
| | $T_{MAX}$ | 65 °C |
| Battery supply | No | |
| AC/DC-Adaptor | Model | DRB120241 |
| | Vendor | TDK Lambda |
| | Input | 85 VAC - 265 VAC |
| | Output | 24 VDC |
| Manufacturer | WEPTECH elektronik GmbH<br>Ostring 10<br>76829 Landau<br>Germany | |

## 1.1 Photos – Equipment External

| VIEW A[1] |
|---|
| |

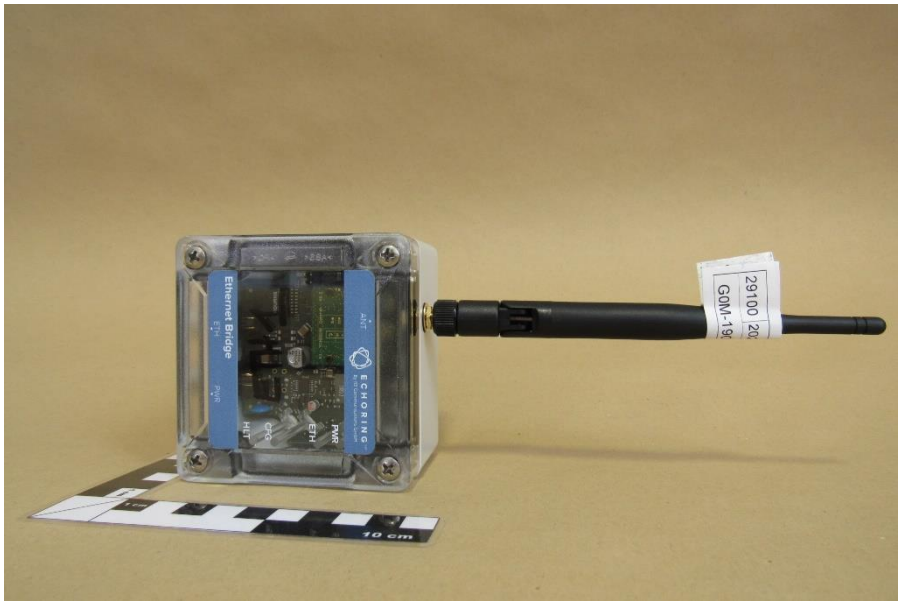


| VIEW B[2] |
|---|
| |

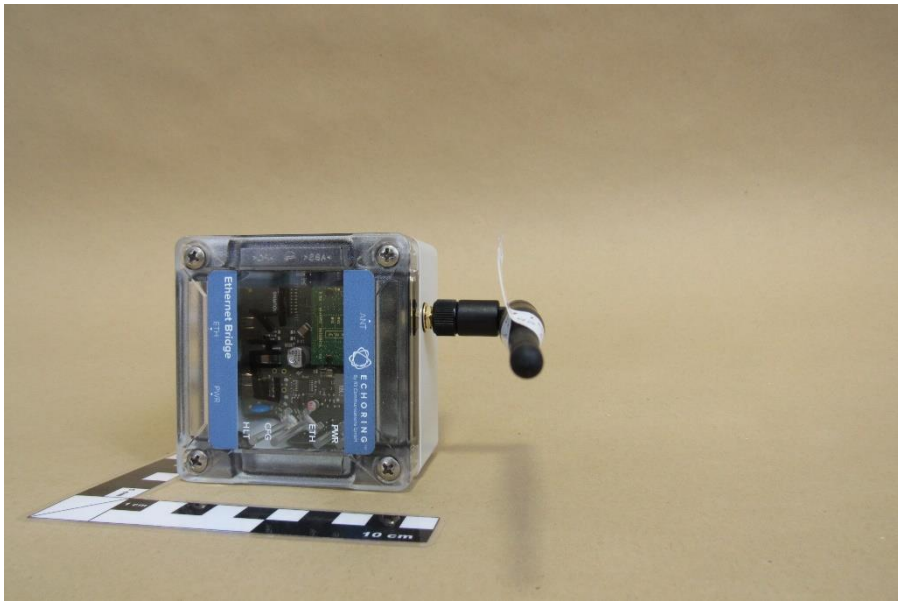


[1]EUT measurement position HORIZONTAL, antenna 0°
[2]EUT measurement position HORIZONTAL, antenna 90°

**VIEW C[3]**




**VIEW D[4]**



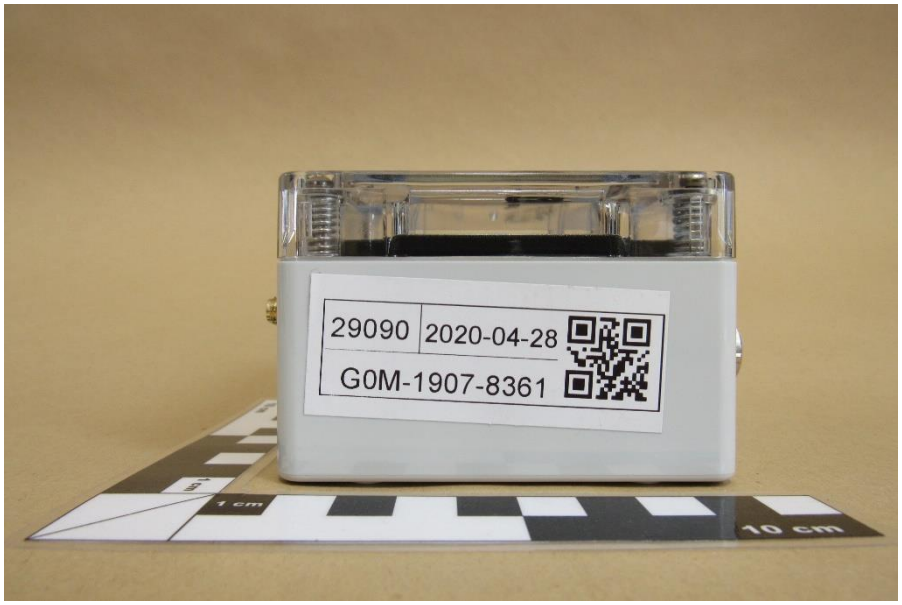

[3]EUT measurement position VERTICAL, antenna 0°
[4]EUT measurement position VERTICAL, antenna 90°

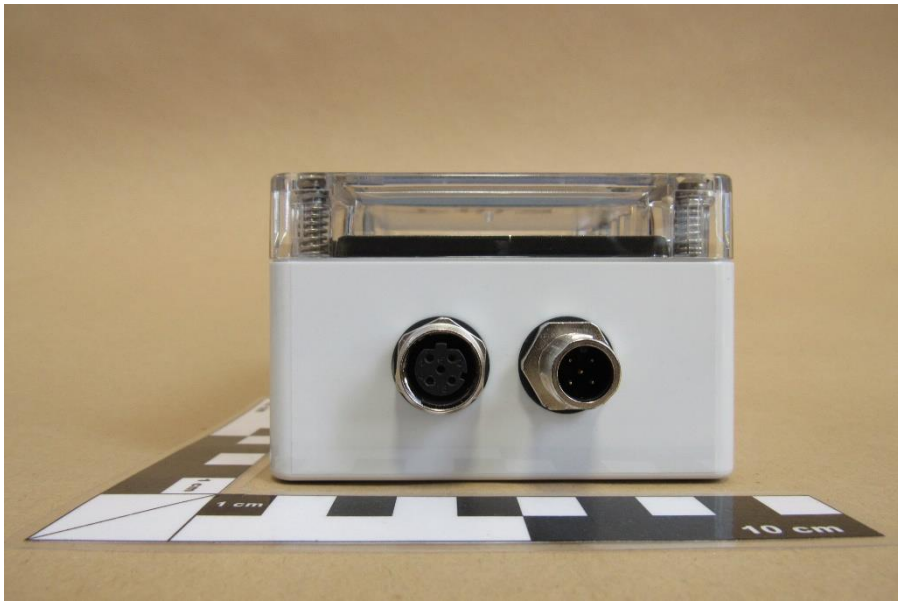
**VIEW E**

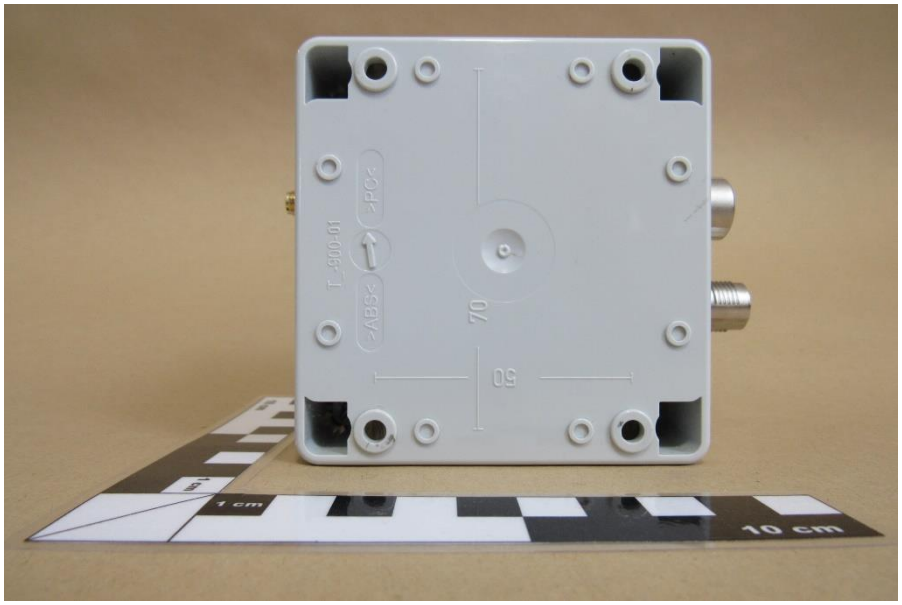
ECHORING™
Ethernet Bridge
Art. Nr: ER-EB 1000M
S/N: 00 00 00 04
CE
R3 - Reliable Realtime Radio
Communications GmbH
Bismarckstr. 10-12
D-10625 Berlin
www.echoring.de
IP65
look into manual
MADE IN GERMANY
1 cm
10 cm

**VIEW F**

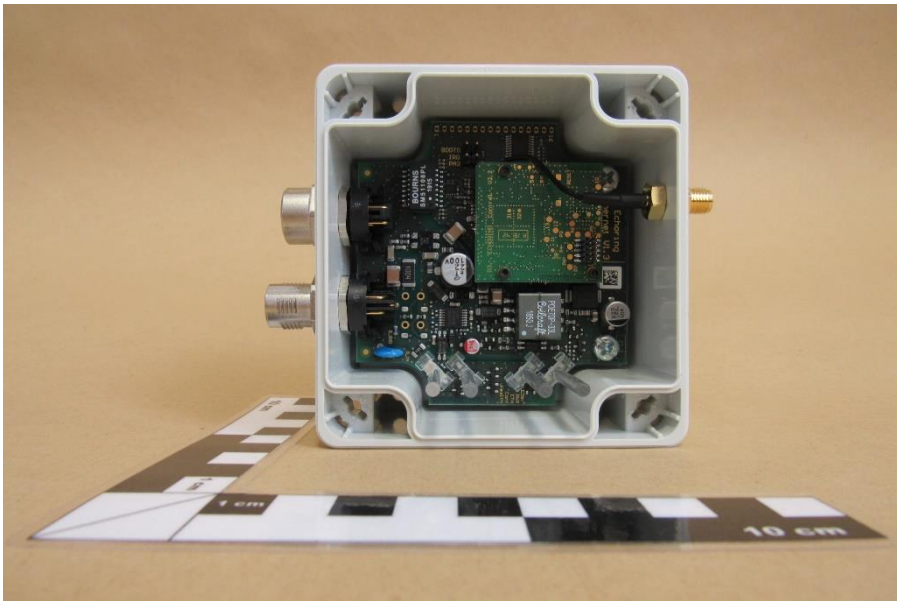
1 cm
10 cm

| VIEW G |
| --- |
|   |

| VIEW H |
| --- |
|   |

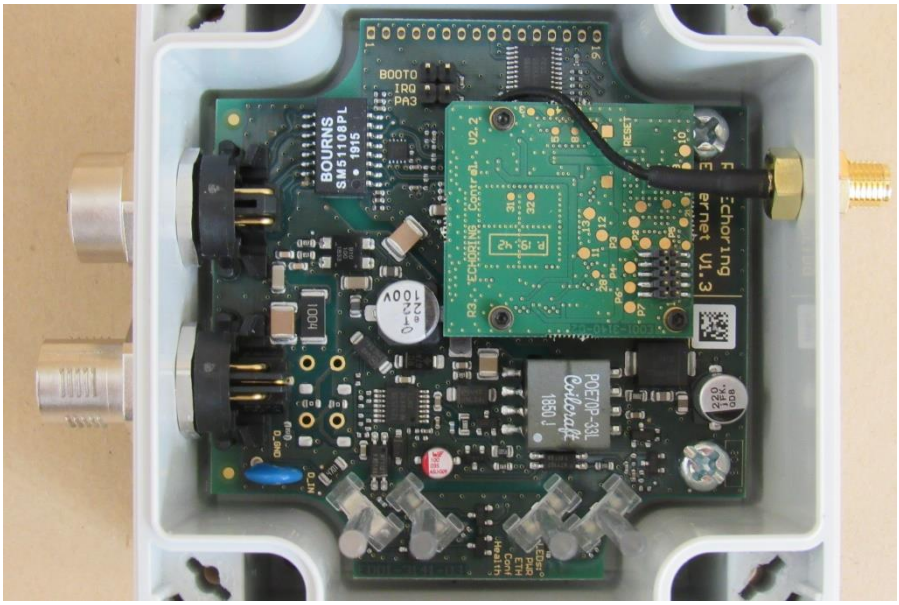
| VIEW I |
| --- |
|  |

| VIEW J |
| --- |
| |

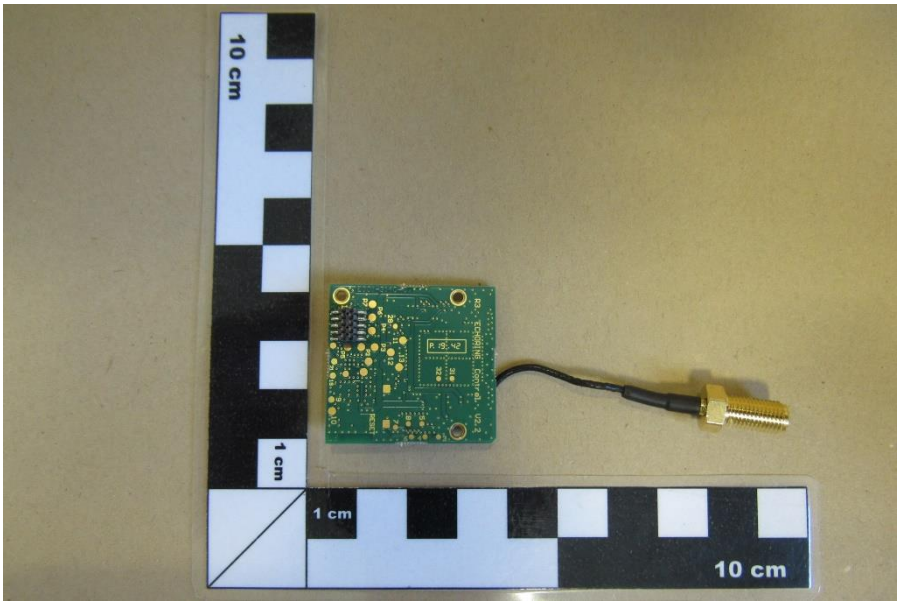
| VIEW K |
| --- |
|  |

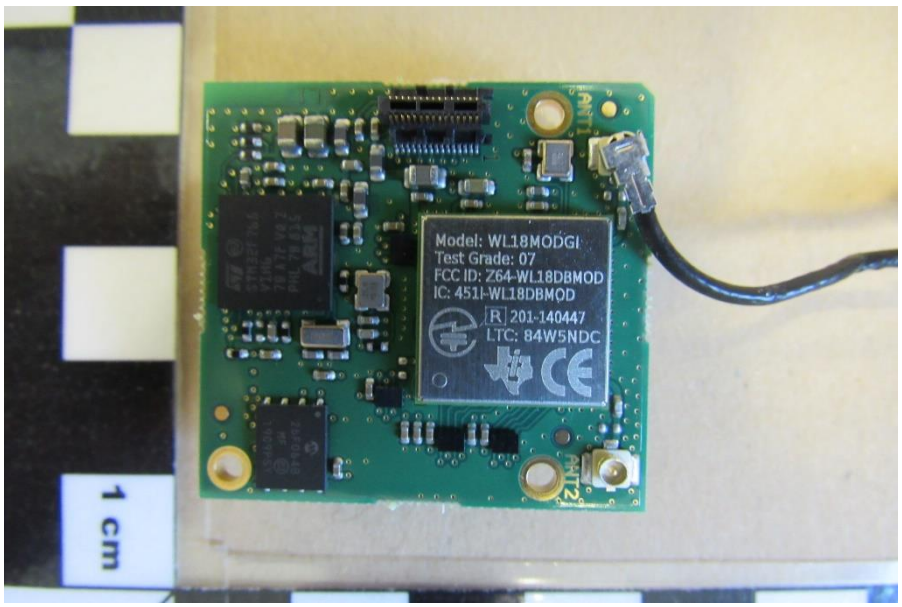
## 1.2 Photos – Equipment Internal

**VIEW A**




**VIEW B**

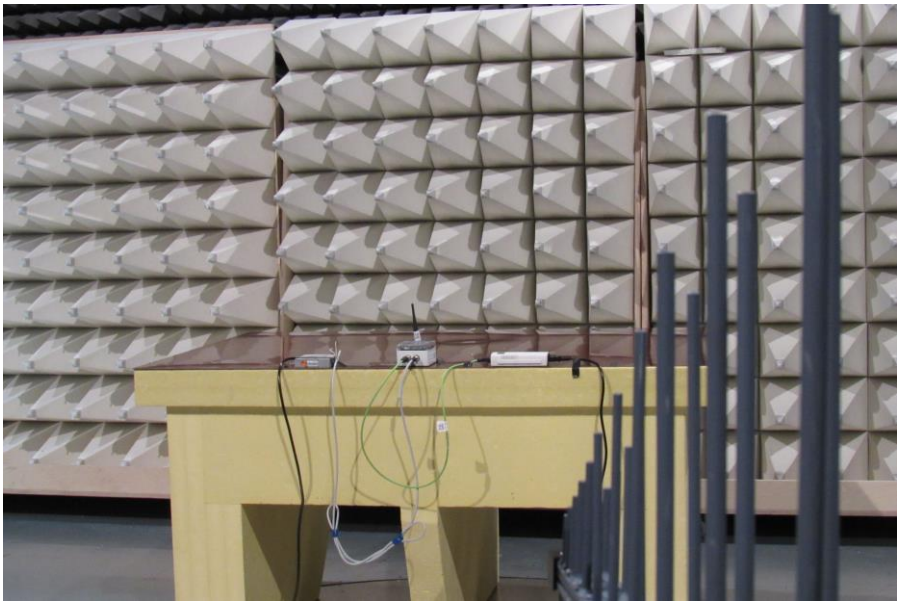


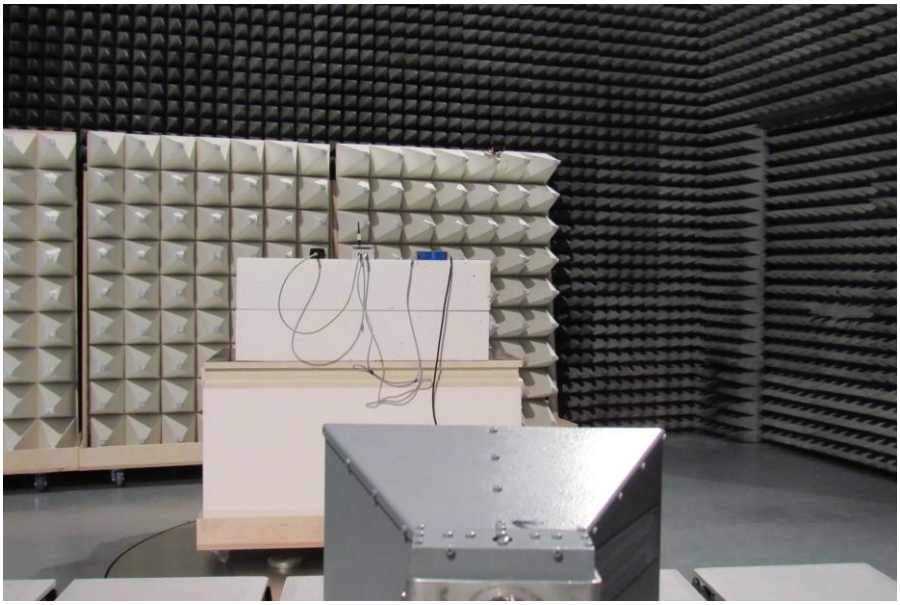
| VIEW C |
| --- |
|  |

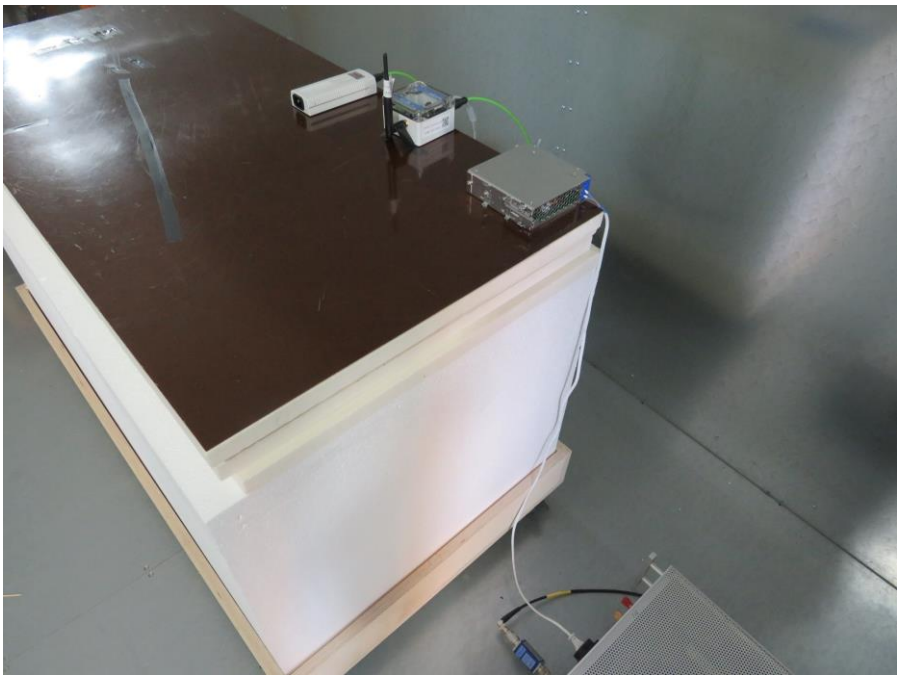
Model: WL18MODGI
Test Grade: 07
FCC ID: Z64-WL18DBMOD
IC: 451I-WL18DBMOD
R 201-140447
LTC: 84W5NDC
1 cm

## 1.3 Photos – Test Setup

| View C1 |
| --- |
| |

| View C2 |
| --- |
|  |

| View C3 |
| --- |
|  |

| View C4 |
| --- |
|  |

## 1.4 Support Equipment

| Product Type | Device | Manufacturer | Model | Comment |
|---|---|---|---|---|
| AE1 | Notebook | Lenovo | E590 | Serial number PF-1ZNAPR 19/10 |
| AE2 | Power Supply AC Adapter | Lenovo | ADLX65YCC3D | MFG Date 2019/09 |
| AE3 | Power Supply AC Adapter | TDK Lambda | DRB120-24-1 | Power Supply EUT – Test Sample ID 28891 |
| CBL | M12 Eth Cable | LEONI protec cable systems GmbH | Not specified | Industrial Ethernet – Test Sample ID 26531 |
| Description: | | | | |
| AE1 – AE3 | Auxiliary Equipment | | | |
| SIM | Simulator | | | |
| CBL | Connecting Cable | | | |
| SFT | Software | | | |
| Comment: None. | | | | |

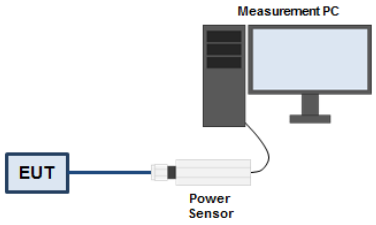
## 1.5 Test mode data rate evaluation

### 1.5.1 Information

| Test Information | |
|---|---|
| Measurement Method | KDB 789033 E |

### 1.5.2 Setup

**Test Setup**




### 1.5.3 Equipment

| Test Equipment | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Power Sensor | ETS-Lindgren | 7002-006 | EF00935 | 2020-04 | 2021-04 |

### 1.5.4 Procedure

**Test Procedure**

1. EUT set to test mode on the first supported channel for each modulation and data rate
2. The conducted power is measured with a wide band power sensor
3. The power is measured for all data rates/modulations supported by the EUT
4. The data rate with the highest output power is selected for test mode

### 1.5.5 Results

**Test Results**

| Frequency [MHz] | Output power [dBm] | | | | | | |
|---|---|---|---|---|---|---|---|
| | 6 Mbps | 9 Mbps | 12 Mbps | 18 Mbps | 24 Mbps | 36 Mbps | 48 Mbps |
| 5180 | 16.8 | 16.9 | 17.0 | **17.0**[1] | 16.0 | 14.9 | 14.1 |
| 5200 | 16.7 | 16.9 | 17.0 | **17.0**[1] | 15.8 | 14.7 | 14.1 |
| 5240 | 17.0 | 16.9 | 16.9 | **17.0**[1] | 15.7 | 14.9 | 14.1 |
| 5745 | 16.1 | 16.3 | 16.3 | **16.4** | 15.2 | 14.3 | 13.5 |
| 5785 | 16.3 | 16.3 | 16.3 | **16.4** | 15.2 | 14.3 | 13.5 |
| 5825 | 16.3 | 16.3 | 16.3 | **16.6** | 15.1 | 14.1 | 13.5 |

Comment: [1]A higher duty cycle correction applies.

## 1.6 Test mode duty cycle evaluation

### 1.6.1 Information

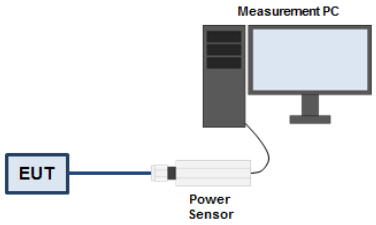
| Test Information | |
|---|---|
| Measurement Method | ANSI C63.10 12.2 |

### 1.6.2 Requirements

| Requirements | |
|---|---|
| Duty cycle | Duty cycle correction |
| ≥ 98 % | No correction required |
| < 98 % | Correction required (10 x $Log_{10}$(1/DC)) |

### 1.6.3 Setup

**Test Setup**




### 1.6.4 Equipment

| Test Equipment | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Power Sensor | ETS-Lindgren | 7002-006 | EF00935 | 2020-04 | 2021-04 |

### 1.6.5 Procedure

**Test Procedure**

1. EUT set to test mode
2. Sweep time is set long enough to capture at least 5 bursts
3. The maximum burst duration TON is measured
4. The minimum idle duration TOFF is measured
5. The duty cycle is calculated by DC = $T_{ON}$ / ($T_{ON}$ + $T_{OFF}$)
6. The duty cycle correction is calculated by DC = 10 x $Log_{10}$($T_{ON}$ / ($T_{ON}$ + $T_{OFF}$))

### 1.6.6 Results

| Test Results | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency [MHz] | Duty Cycle [%] | | | | | | |
| | 6 Mbps | 9 Mbps | 12 Mbps | 18 Mbps | 24 Mbps | 36 Mbps | 48 Mbps |
| 5180 | 98.2 | 96.6 | 97.2 | 96.2 | 95.1 | 94.0 | 92.0 |
| 5200 | 96.1 | 98.0 | 97.2 | 96.2 | 95.7 | 93.6 | 92.0 |
| 5240 | 96.1 | 96.6 | 97.2 | 95.5 | 95.7 | 93.6 | 92.1 |
| 5745 | 96.1 | 96.7 | 97.2 | 96.2 | 95.2 | 93.7 | 92.1 |
| 5785 | 98.2 | 98.1 | 97.2 | 96.2 | 95.2 | 93.7 | 92.1 |
| 5825 | 98.2 | 96.7 | 97.2 | 96.2 | 95.2 | 93.7 | 92.1 |

| Duty Cycle Results | | | |
|---|---|---|---|
| Channel [MHz] | Data rate | Duty Cycle [%] | Correction Factor [dB] |
| 5180 | 18 Mbps | 96.2 | 0.17 |
| 5200 | 18 Mbps | 96.2 | 0.17 |
| 5240 | 18 Mbps | 95.5 | 0.20 |
| 5745 | 18 Mbps | 96.2 | 0.17 |
| 5785 | 18 Mbps | 96.2 | 0.17 |
| 5825 | 18 Mbps | 96.2 | 0.17 |

## 1.7 Test Modes

| Mode | Description |
|---|---|
| Proprietary 1 (OFDM) | Mode = Transmit<br>Modulation = QPSK 3/4<br>Spreading = OFDM<br>Bandwidth = 20 MHz<br>Duty cycle = 96.2 %<br>Power setting = 18 Mbps (software setting for provided test software)<br>Data rate = 18 Mbps |
| Proprietary 2 (OFDM) | Mode = Transmit<br>Modulation = QPSK 3/4<br>Spreading = OFDM<br>Bandwidth = 20 MHz<br>Duty cycle = 95.5 %<br>Power setting = 18 Mbps (software setting for provided test software)<br>Data rate = 18 Mbps |
| Receive | Mode = Receive (Scan) |
| Comment: The above settings were found as worst case during pre-tests. | |

## 1.8 Test Frequencies

| Designator | Mode | Channel[1] | Frequency [MHz] |
|---|---|---|---|
| F1 | Tx / Rx | 36 | 5180 |
| F2 | Tx / Rx | 40 | 5200 |
| F3 | Tx / Rx | 48 | 5240 |
| F4 | Tx / Rx | 149 | 5745 |
| F5 | Tx / Rx | 157 | 5785 |
| F6 | Tx / Rx | 165 | 5825 |
| Comment: [1]Equivalent to the dedicated channel of the IEEE 802.11 standard. | | | |

## 1.9 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/m) = 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/m | = 47.5 dBµV/m | : | 47.5 dBµV/m - 57.0 dBµV/m | = -9.5 dB |

## 1.10 Normative References

| References | |
|---|---|
| Designator | Reference |
| KDB 789033 | KDB 789033 D02 v02r01 |
| ANSI C63.10 | ANSI C63.10:2013 |

## 2 Result Summary

| FCC 47 CFR Part 15E | | | | |
|---|---|---|---|---|
| **Product Standard Reference** | **Requirement** | **Reference Method** | **Result** | **Remarks** |
| FCC 15.407(e) | 6 dB bandwidth | KDB 789033 C.2 | PASS | Only required in 5725-5850 MHz band. |
| FCC 15.407(a)(2),(a)(5),(h)(2) | 26 dB bandwidth | KDB 789033 C.1 | PASS | No limit. Basis for other measurements. |
| FCC 15.407(a) | Maximum output power | KDB 789033 E | PASS | |
| FCC 15.407(a) | Transmit power control | KDB 789033 E | N/R | Required in 5250-5350 and 5470-5725 MHz bands. Not required for EIRP < 500 mW. |
| FCC 15.407(a) | Power spectral density | KDB 789033 F | PASS | |
| FCC 15.407(g) | Frequency stability | ANSI C63.10 6.8 | PASS | |
| FCC 15.207 | AC power line conducted emissions | ANSI C63.10 6.2 | PASS | |
| FCC 15.407(b) | Transmitter radiated emissions | KDB 789033 G | PASS | |
| FCC 15.407(a) | Radiation pattern | KDB 789033 H | N/R | 5150-5250 MHz band only with EIRP > 21 dBm |
| Comment: None. | | | | |

| Possible Test Case Verdicts | |
|---|---|
| PASS | Test object does meet the requirements |
| FAIL | Test object does not meet the requirements |
| N/T | Required by standard but not tested |
| N/R | Not required by standard for the test object |

# 3 Test Conditions and Results

## 3.1 Test Conditions and Results - 6 dB bandwidth

### 3.1.1 Information

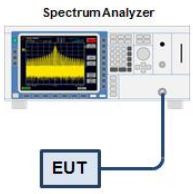
| Test Information | |
|---|---|
| Reference | FCC 15.407(e) |
| Measurement Method | KDB 789033 C.2 |
| Operator | Abdullah Al Jamal |
| Date | 2020-05-08 |
| Measurement uncertainty | ±1.26 % |

### 3.1.2 Limits

| Limits |
|---|
| ≥ 500 kHz |

### 3.1.3 Setup

**Test Setup**




### 3.1.4 Equipment

| Test Equipment | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Spectrum Analyzer | R&S | FSU 43 | EF01631 | 2019-12 | 2020-12 |
| Cable | Gigalane | SMS111B | EF00779 CAAAZ | 2018-10 | 2020-10 |

### 3.1.5 Procedure

**Test Procedure**

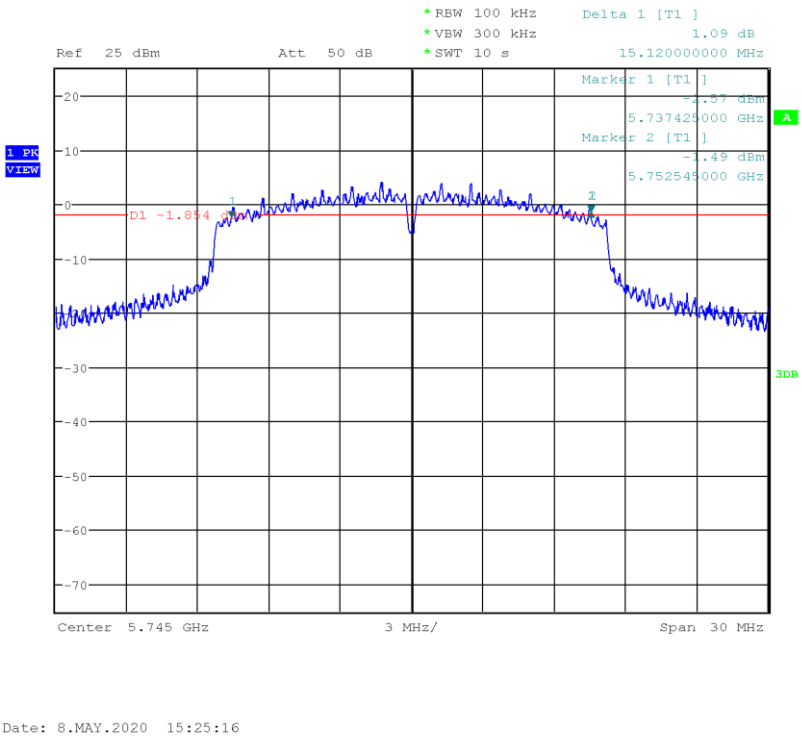
1. EUT transmitter is activated in test mode under normal conditions
2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the nominal channel bandwidth
3. The resolution bandwidth is set to 100 kHz and video bandwidth ≥ 3 x RBW
4. The peak of the emission spectrum is determined
5. The left most frequency that corresponds to an emission level 6 dB below the maximum is determined
6. The right most frequency that corresponds to an emission level 6 dB below the maximum is determined
7. The 6 dB bandwidth is calculated from the two edge frequencies

### 3.1.6 Results

| Test Results - 5725 - 5850 MHz | | | | | |
|---|---|---|---|---|---|
| Mode | Channel | Frequency [MHz] | Nominal BW [MHz] | BW [kHz] | Verdict |
| OFDM | 149 | 5745 | 20 | 15120.0 | PASS |
| OFDM | 157 | 5785 | 20 | 15120.0 | PASS |
| OFDM | 165 | 5825 | 20 | 15120.0 | PASS |

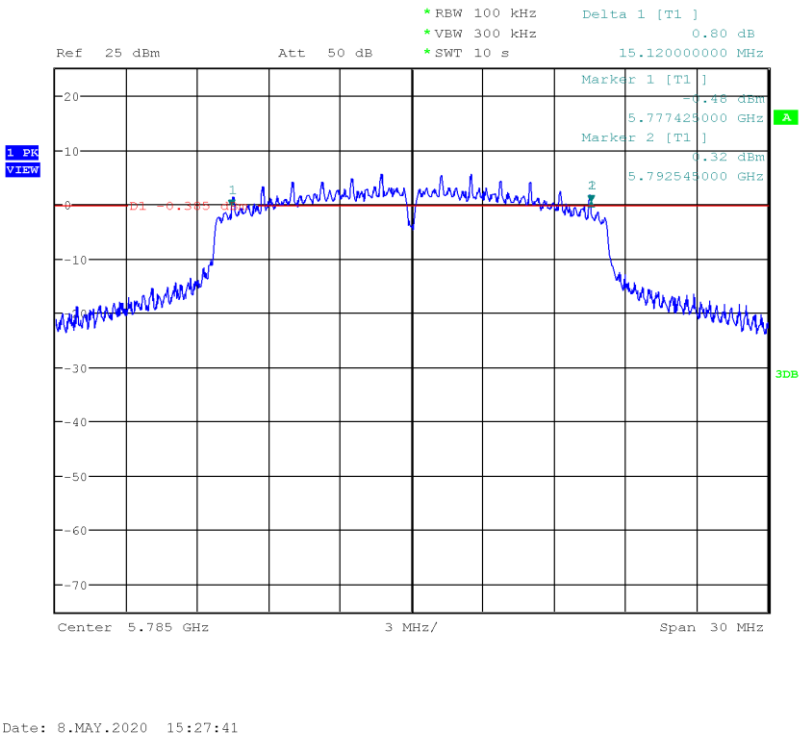
## DTS (6 dB) Bandwidth

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 11.8.1 Option 1 |
| Operational Mode: | Proprietary, Channel: 149, 5745 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Antenna Port: | 1 |
| Lower Frequency [MHz]: | 5737.425 |
| Upper Frequency [MHz]: | 5752.545 |
| 6 dB Bandwidth [kHz]: | 15120.0 |



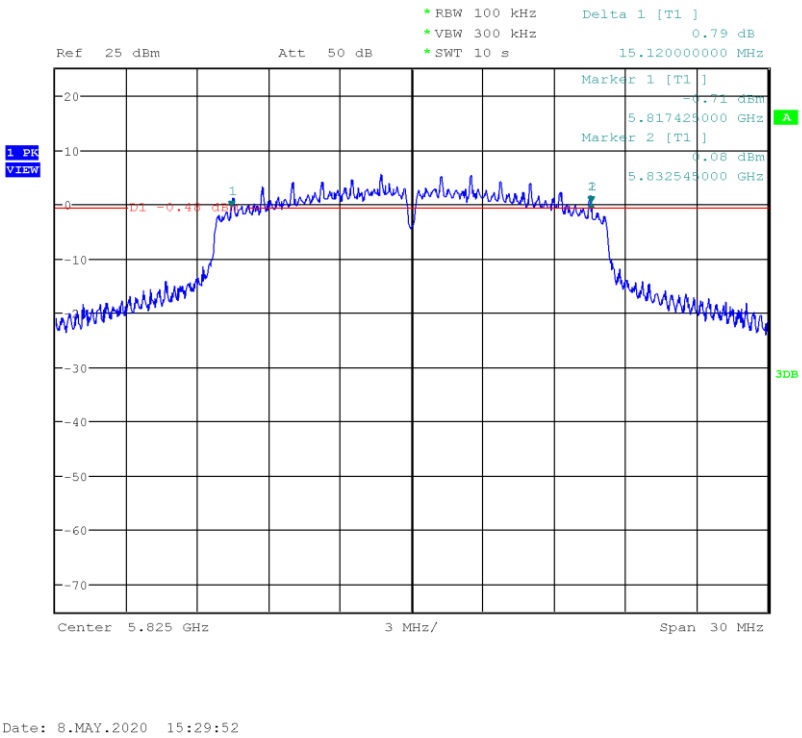
## DTS (6 dB) Bandwidth

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 11.8.1 Option 1 |
| Operational Mode: | Proprietary, Channel: 157, 5785 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Antenna Port: | 1 |
| Lower Frequency [MHz]: | 5777.425 |
| Upper Frequency [MHz]: | 5792.545 |
| 6 dB Bandwidth [kHz]: | 15120.0 |



## DTS (6 dB) Bandwidth

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 11.8.1 Option 1 |
| Operational Mode: | Proprietary, Channel: 165, 5825 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Antenna Port: | 1 |
| Lower Frequency [MHz]: | 5817.425 |
| Upper Frequency [MHz]: | 5832.545 |
| 6 dB Bandwidth [kHz]: | 15120.0 |



## 3.2 Test Conditions and Results - 26 dB emission bandwidth

### 3.2.1 Information

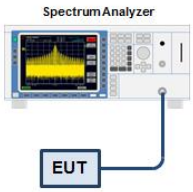
| Test Information | |
|---|---|
| Reference | FCC 15.407(a)(2),(a)(5),(h)(2) |
| Measurement Method | KDB 789033 C.1 |
| Operator | Abdullah Al Jamal |
| Date | 2020-05-08 |
| Measurement uncertainty | ±1.26 % |

### 3.2.2 Limits

| Limits |
|---|
| None, used to determine power limit and necessary DFS functionality |

### 3.2.3 Setup

**Test Setup**




### 3.2.4 Equipment

| Test Equipment | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Spectrum Analyzer | R&S | FSU 43 | EF01631 | 2019-12 | 2020-12 |
| Cable | Gigalane | SMS111B | EF00779 CAAAZ | 2018-10 | 2020-10 |

### 3.2.5 Procedure

**Test Procedure**

1. EUT transmitter is activated in test mode under normal conditions
2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the nominal channel bandwidth
3. The resolution bandwidth is set to approximately 1% of the emission bandwidth and video bandwidth ≥ RBW
4. The peak of the emission spectrum is determined
5. The left most frequency that corresponds to an emission level 26 dB below the maximum is determined
6. The right most frequency that corresponds to an emission level 26 dB below the maximum is determined
7. The 26 dB bandwidth is calculated from the two edge frequencies
8. The RBW is corrected and the measurement is repeated if needed

### 3.2.6 Results

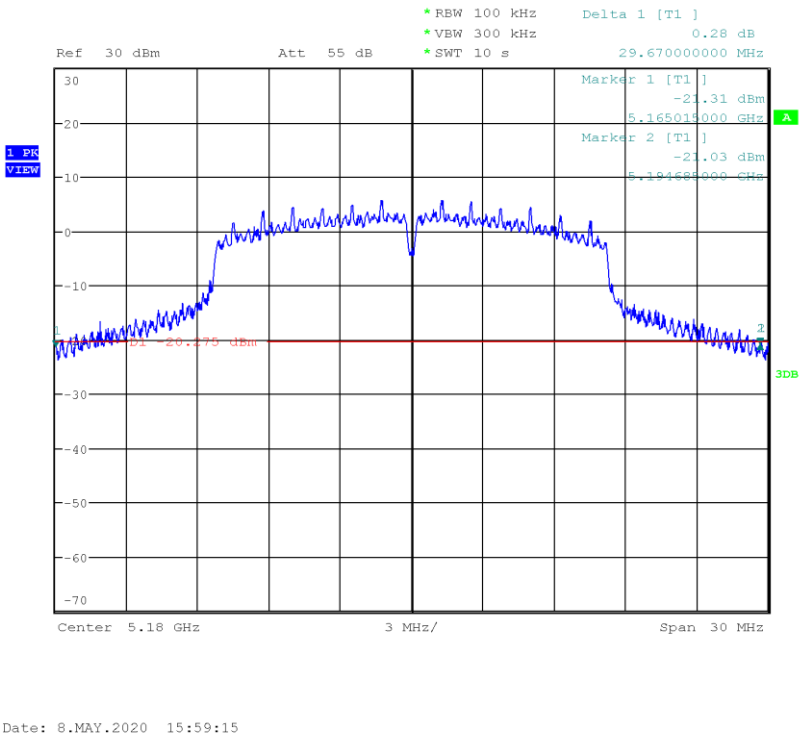
| Test Results - 5150 - 5250 MHz | | | | | |
|---|---|---|---|---|---|
| Mode | Channel | Frequency [MHz] | Nominal BW [MHz] | BW Upper Edge [MHz] | BW [MHz] |
| OFDM | 36 | 5180 | 20 | 5194.685 | 29.670 |
| OFDM | 40 | 5200 | 20 | 5214.700 | 29.385 |
| OFDM | 48 | 5240 | 20 | 5254.970 | 29.955 |

| Test Results - 5150 - 5250 MHz - 99% BW | | | | | |
|---|---|---|---|---|---|
| Mode | Channel | Frequency [MHz] | Nominal BW [MHz] | BW Upper Edge [MHz] | BW [MHz] |
| OFDM | 48 | 5240 | 20 | 5249.620 | 19.140 |
| If the Emission Bandwidth (26 dB) does not fall entirely in the band, Occupied Bandwidth (99%) can be used instead to determine whether DFS testing is required for this band | | | | | |

| Test Results - 5725 - 5850 MHz | | | | | |
|---|---|---|---|---|---|
| Mode | Channel | Frequency [MHz] | Nominal BW [MHz] | BW Lower Edge [MHz] | BW [MHz] |
| OFDM | 149 | 5745 | 20 | 5730.030 | 29.625 |
| OFDM | 157 | 5785 | 20 | 5770.015 | 29.700 |
| OFDM | 165 | 5825 | 20 | 5810.510 | 29.175 |

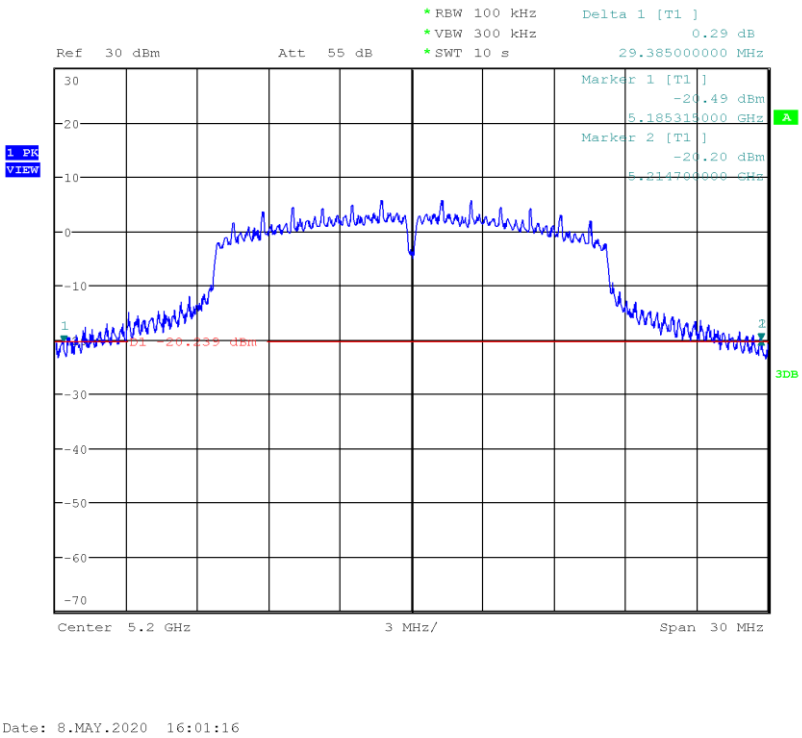
## 26 dB Bandwidth

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 11.8.1 Option 1 |
| Operational Mode: | Proprietary, Channel: 36, 5180 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Antenna Port: | 1 |
| Lower Frequency [MHz]: | 5165.015 |
| Upper Frequency [MHz]: | 5194.685 |
| 26 dB Bandwidth [MHz]: | 29.670 |



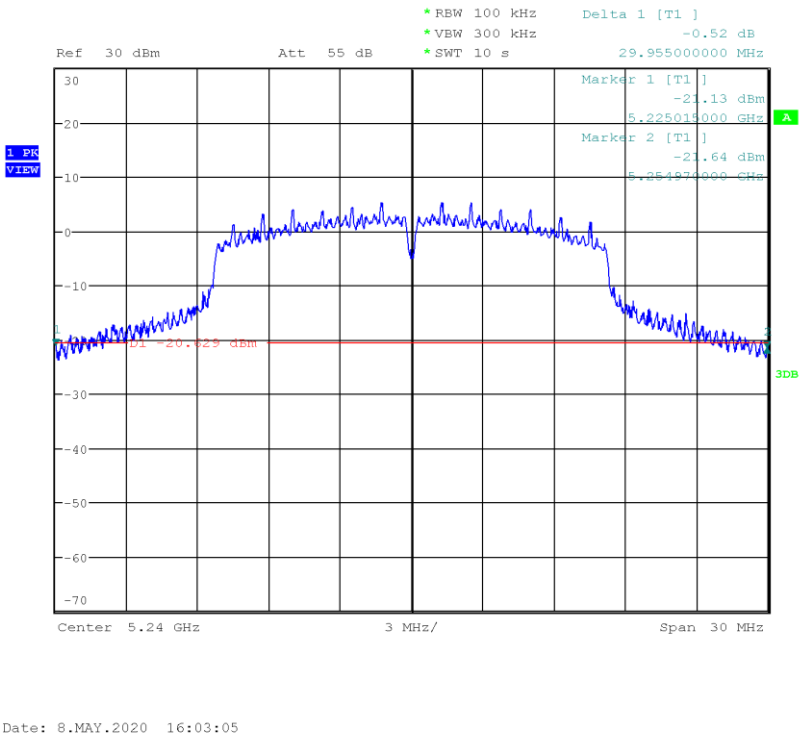
## 26 dB Bandwidth

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 11.8.1 Option 1 |
| Operational Mode: | Proprietary, Channel: 40, 5200 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Antenna Port: | 1 |
| Lower Frequency [MHz]: | 5185.315 |
| Upper Frequency [MHz]: | 5214.700 |
| 26 dB Bandwidth [MHz]: | 29.385 |



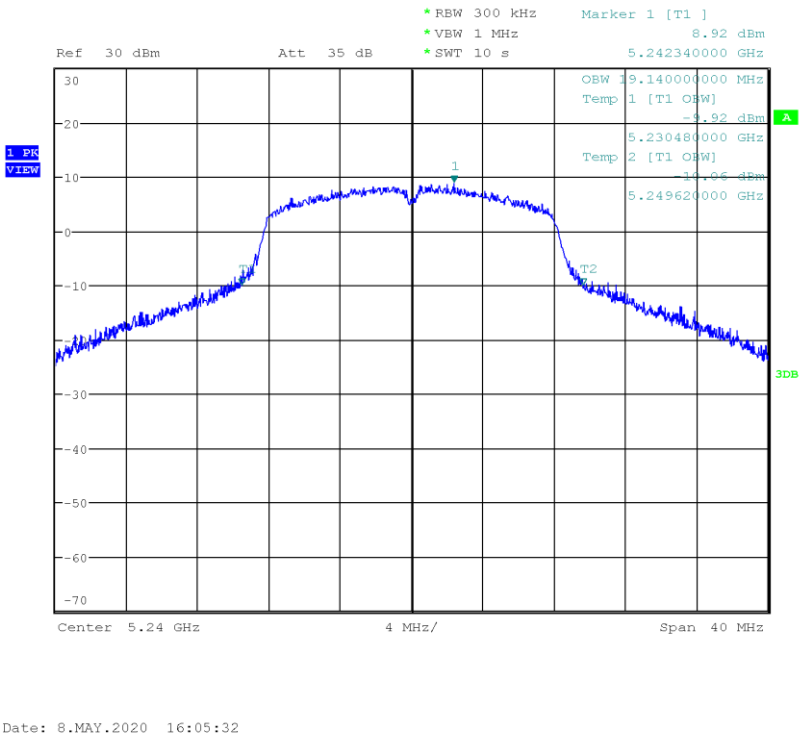
## 26 dB Bandwidth

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 11.8.1 Option 1 |
| Operational Mode: | Proprietary, Channel: 48, 5240 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Antenna Port: | 1 |
| Lower Frequency [MHz]: | 5225.015 |
| Upper Frequency [MHz]: | 5254.970 |
| 26 dB Bandwidth [MHz]: | 29.955 |



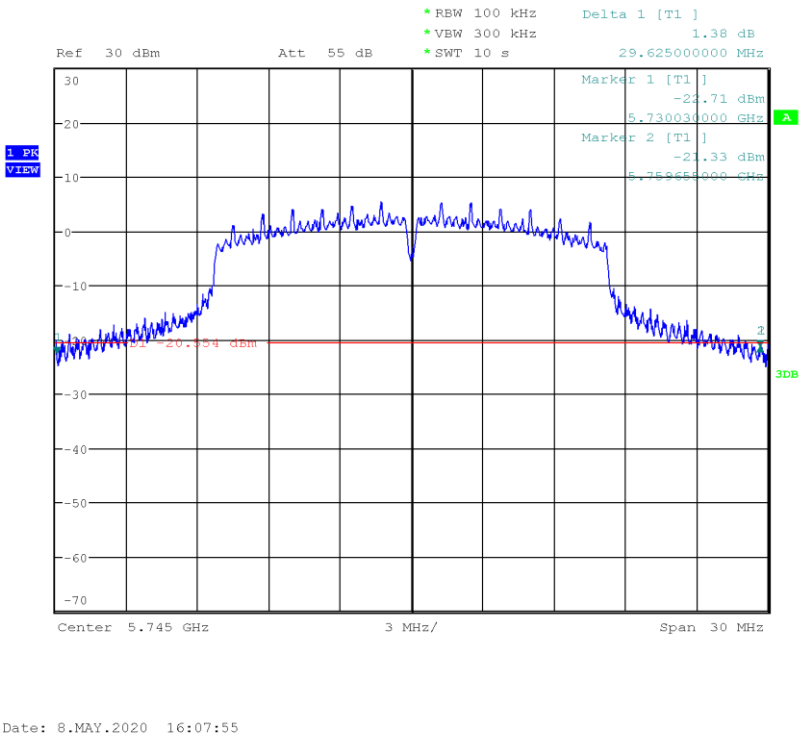
## Occupied Bandwidth

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 6.9.3 |
| Operational Mode: | Proprietary, Channel: 48, 5240 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Antenna Port: | 1 |
| Occ. Bandwidth Lower Edge [MHz]: | 5230.480 |
| Occ. Bandwidth Upper Edge [MHz]: | 5249.620 |
| Occupied Bandwidth [MHz]: | 19.140 |



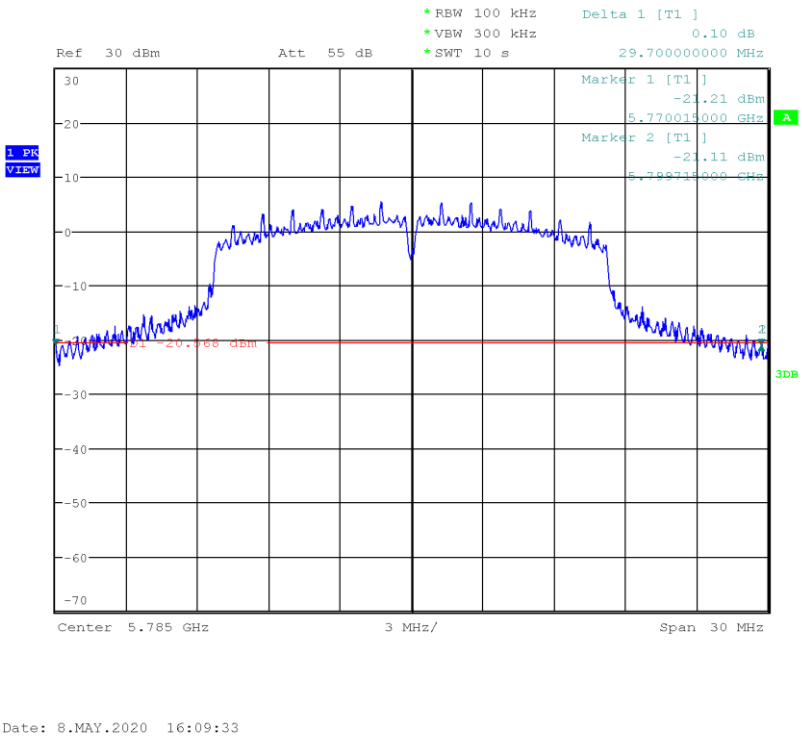
## 26 dB Bandwidth

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 11.8.1 Option 1 |
| Operational Mode: | Proprietary, Channel: 149, 5745 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Antenna Port: | 1 |
| Lower Frequency [MHz]: | 5730.030 |
| Upper Frequency [MHz]: | 5759.655 |
| 26 dB Bandwidth [MHz]: | 29.625 |



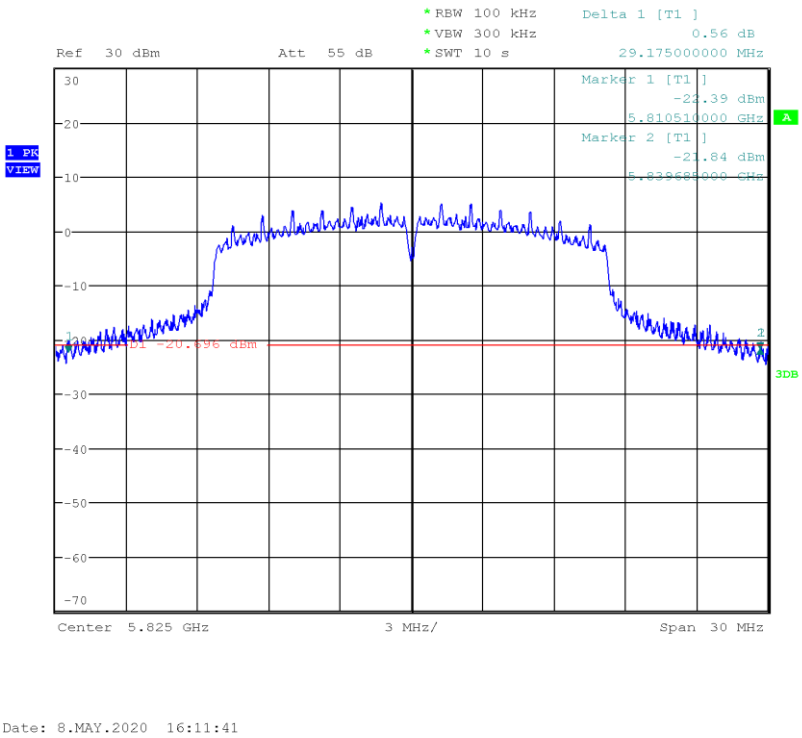
## 26 dB Bandwidth

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 11.8.1 Option 1 |
| Operational Mode: | Proprietary, Channel: 157, 5785 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Antenna Port: | 1 |
| Lower Frequency [MHz]: | 5770.015 |
| Upper Frequency [MHz]: | 5799.715 |
| 26 dB Bandwidth [MHz]: | 29.700 |



## 26 dB Bandwidth

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 11.8.1 Option 1 |
| Operational Mode: | Proprietary, Channel: 165, 5825 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Antenna Port: | 1 |
| Lower Frequency [MHz]: | 5810.510 |
| Upper Frequency [MHz]: | 5839.685 |
| 26 dB Bandwidth [MHz]: | 29.175 |



## 3.3 Test Conditions and Results - Maximum output power

### 3.3.1 Information

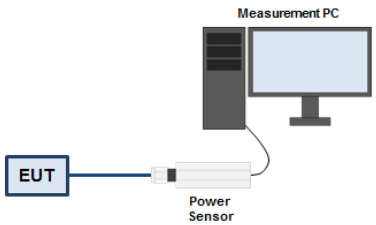
| Test Information | |
|---|---|
| Reference | FCC 15.407(a) |
| Measurement Method | KDB 789033 E |
| Operator | Abdullah Al Jamal |
| Date | 2020-05-08 |
| Test Sample ID | 29090 |
| Measurement uncertainty | ±1.59 % |

### 3.3.2 Limits

| Limits | | | |
|---|---|---|---|
| Frequency band | Condition | Power limit | Maximum antenna gain[1] |
| 5150 - 5250 MHz | Access point, indoor | 1 W/30 dBm | 6 dBi |
| 5150 - 5250 MHz | Access point, outdoor | 1 W/30 dBm | 6 dBi |
| 5150 - 5250 MHz | Access point, fixed point to point | 1 W/30 dBm | 23 dBi |
| 5150 - 5250 MHz | Client | 250 mW/24 dBm | 6 dBi |
| 5250 - 5350 MHz | - | Minimum of 250 mW/24 dBm or 11 dBm + 10*$Log_{10}$(BW[3]) | 6 dBi |
| 5470 - 5725 MHz | - | Minimum of 250 mW/24 dBm or 11 dBm + 10*$Log_{10}$(BW[3]) | 6 dBi |
| 5725 - 5850 MHz | - | 1 W/30 dBm[2] | 6 dBi |
| Note 1: The maximum output power must be reduced by the amount in dB that the gain exceeds the maximum allowed gain<br>Note 2: Fixed point to point applications are excluded from power reduction according to Note 1<br>Note 3: BW is the 26 dB bandwidth in MHz | | | |

### 3.3.3 Setup

**Test Setup**




### 3.3.4 Equipment

| Test Equipment | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Power sensor | ETS-Lindgren | 7002-006 | EF00935 | 2020-04 | 2021-04 |
| Cable | Gigalane | SMS111B | EF00779 CAAAZ | 2018-10 | 2020-10 |

| Test Software | | | |
|---|---|---|---|
| Description | Manufacturer | Name | Version |
| EMC Software | DARE Instruments | RadiMation | 2018.2.7 |

### 3.3.5 Procedure

| Test Procedure |
|---|
| 1. One wide band power sensor is connected to each antenna port of the EUT |
| 1. EUT transmitter is activated in test mode under normal conditions |
| 2. The output power is measured simultaneously at all antenna ports |
| 3. The maximum power level is determined |

### 3.3.6 Results

| Test Results - 5150 - 5250 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Mode | Channel | Frequency [MHz] | Nominal BW [MHz] | Power [dBm] | Limit [dBm] | Verdict |
| OFDM | 36 | 5180 | 20 | 17.0 | 30.0 | PASS |
| OFDM | 40 | 5200 | 20 | 17.0 | 30.0 | PASS |
| OFDM | 48 | 5240 | 20 | 17.0 | 30.0 | PASS |

| Test Results - 5725 - 5850 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Mode | Channel | Frequency [MHz] | Nominal BW [MHz] | Power [dBm] | Limit [dBm] | Verdict |
| OFDM | 149 | 5745 | 20 | 16.4 | 30.0 | PASS |
| OFDM | 157 | 5785 | 20 | 16.4 | 30.0 | PASS |
| OFDM | 165 | 5825 | 20 | 16.4 | 30.0 | PASS |

## 3.4 Test Conditions and Results - Power spectral density

### 3.4.1 Information

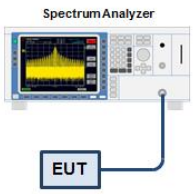
| Test Information | |
|---|---|
| Reference | FCC 15.407(a) |
| Measurement Method | KDB 789033 F |
| Operator | Abdullah Al Jamal |
| Date | 2020-05-08 |
| Test Sample ID | 29090 |
| Measurement uncertainty | ±2.86 % |

### 3.4.2 Limits

| Limits | | | |
|---|---|---|---|
| Frequency band | Condition | PSD limit | Maximum antenna gain[1] |
| 5150 - 5250 MHz | Access point, indoor | 17 dBm/MHz | 6 dBi |
| 5150 - 5250 MHz | Access point, outdoor | 17 dBm/MHz | 6 dBi |
| 5150 - 5250 MHz | Access point, fixed point to point | 17 dBm/MHz | 23 dBi |
| 5150 - 5250 MHz | Client | 11 dBm/MHz | 6 dBi |
| 5250 - 5350 MHz | All devices | 11 dBm/MHz | 6 dBi |
| 5470 - 5725 MHz | All devices | 11 dBm/MHz | 6 dBi |
| 5725 - 5850 MHz | All devices | 30 dBm/500 kHz | 6 dBi |
| Note 1: The power density limit must be reduced by the amount in dB that the gain exceeds the maximum allowed gain | | | |

### 3.4.3 Setup

**Test Setup**




### 3.4.4 Equipment

| Test Equipment | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Spectrum Analyzer | R&S | FSU 43 | EF01631 | 2019-12 | 2020-12 |
| Cable | Gigalane | SMS111B | EF00779 CAAAZ | 2018-10 | 2020-10 |

### 3.4.5 Procedure

| Test Procedure |
|---|
| 1. EUT transmitter is activated in test mode under normal conditions |
| 2. The spectrum analyzer is set to rms detection with a span over the emission bandwidth |
| 3. The resolution bandwidth is set to 1 MHz / 500 kHz and video bandwidth to ≥ 3 MHz |
| 4. The number of sweep points is set ≥ 2 x span / RBW and the sweep time is set to auto |
| 5. Trace averaging is set to 100 |
| 6. The maximum of the emission envelope is determined |
| 7. The duty cycle (10 x $Log_{10}$(1/duty cycle)) correction is added to the measurement result |

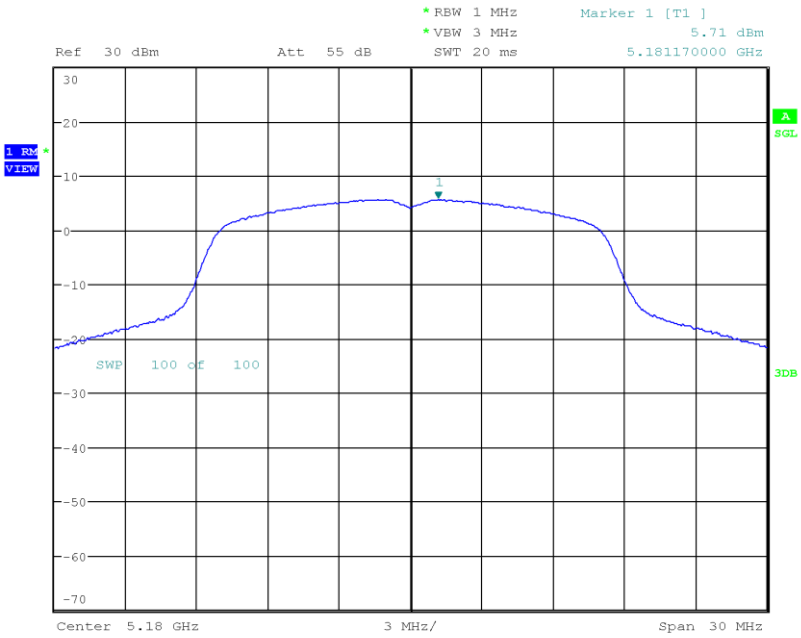
### 3.4.6 Results

| Test Results - 5150 - 5250 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Mode | Channel | Frequency [MHz] | Nominal BW [MHz] | PSD [dBm/RBW] | Limit | Verdict |
| OFDM | 36 | 5180 | 20 | 5.707 | 17 dBm/MHz | PASS |
| OFDM | 40 | 5200 | 20 | 5.711 | 17 dBm/MHz | PASS |
| OFDM | 48 | 5240 | 20 | 5.355 | 17 dBm/MHz | PASS |

| Test Results - 5725 - 5850 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Mode | Channel | Frequency [MHz] | Nominal BW [MHz] | PSD [dBm/RBW] | Limit | Verdict |
| OFDM | 149 | 5745 | 20 | 2.453 | 30 dBm/500 kHz | PASS |
| OFDM | 157 | 5785 | 20 | 2.333 | 30 dBm/500 kHz | PASS |
| OFDM | 165 | 5825 | 20 | 2.363 | 30 dBm/500 kHz | PASS |

## Maximum Power Spectral Density

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 12.5; KDB 789033 v02r02, Section F |
| Operational Mode: | Proprietary, Channel: 36, 5180 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Number of Antenna Ports: | 1 |
| Antenna Port(s): | N/A |
| Maximum Frequency [MHz]: | 5181.170 |
| Spectral Density [dBm/RBW]: | 5.707 |
| Resolution Bandwidth [MHz]: | 1 |

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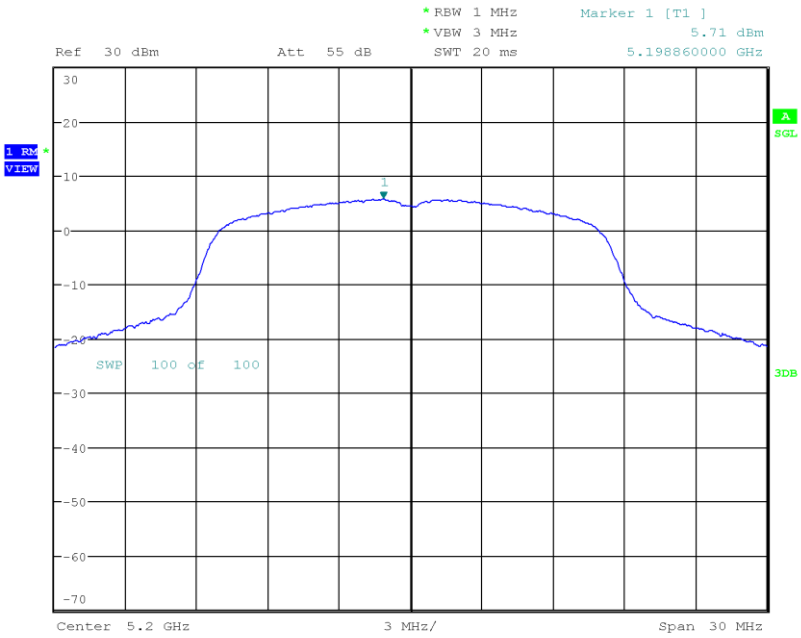
## Maximum Power Spectral Density

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 12.5; KDB 789033 v02r02, Section F |
| Operational Mode: | Proprietary, Channel: 40, 5200 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Number of Antenna Ports: | 1 |
| Antenna Port(s): | N/A |
| Maximum Frequency [MHz]: | 5198.860 |
| Spectral Density [dBm/RBW]: | 5.711 |
| Resolution Bandwidth [MHz]: | 1 |

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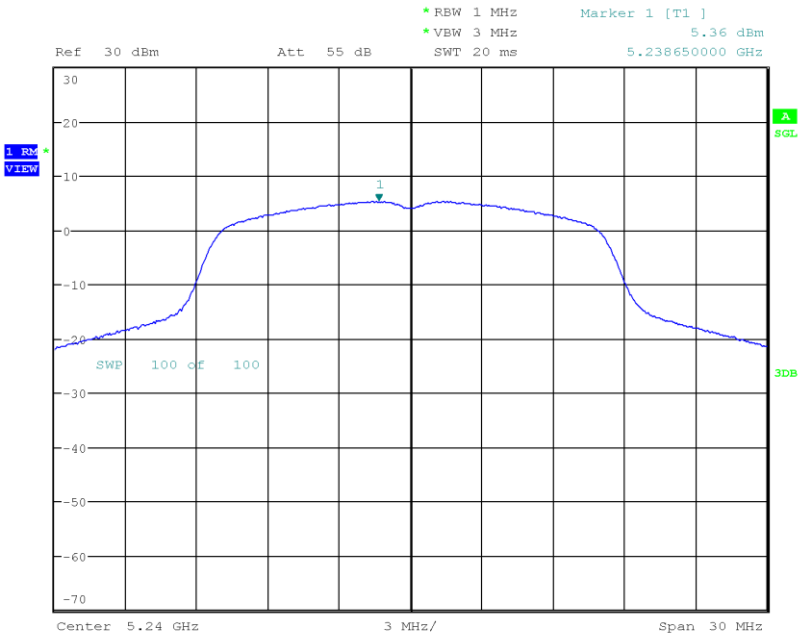
## Maximum Power Spectral Density

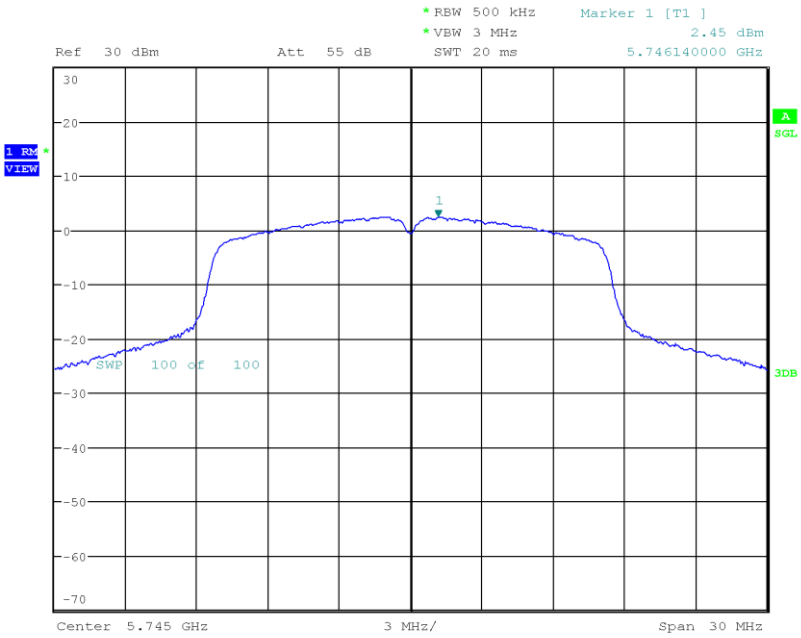
| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 12.5; KDB 789033 v02r02, Section F |
| Operational Mode: | Proprietary, Channel: 48, 5240 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Number of Antenna Ports: | 1 |
| Antenna Port(s): | N/A |
| Maximum Frequency [MHz]: | 5238.650 |
| Spectral Density [dBm/RBW]: | 5.355 |
| Resolution Bandwidth [MHz]: | 1 |




Date: 8.MAY.2020 16:30:24

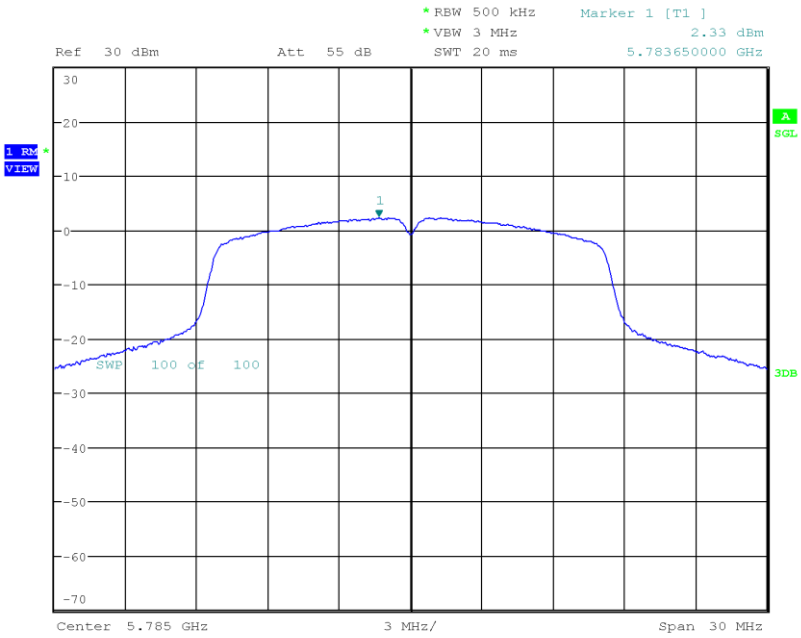
## Maximum Power Spectral Density

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 12.5; KDB 789033 v02r02, Section F |
| Operational Mode: | Proprietary, Channel: 149, 5745 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Number of Antenna Ports: | 1 |
| Antenna Port(s): | N/A |
| Maximum Frequency [MHz]: | 5746.140 |
| Spectral Density [dBm/RBW]: | 2.453 |
| Resolution Bandwidth [MHz]: | 0.5 |



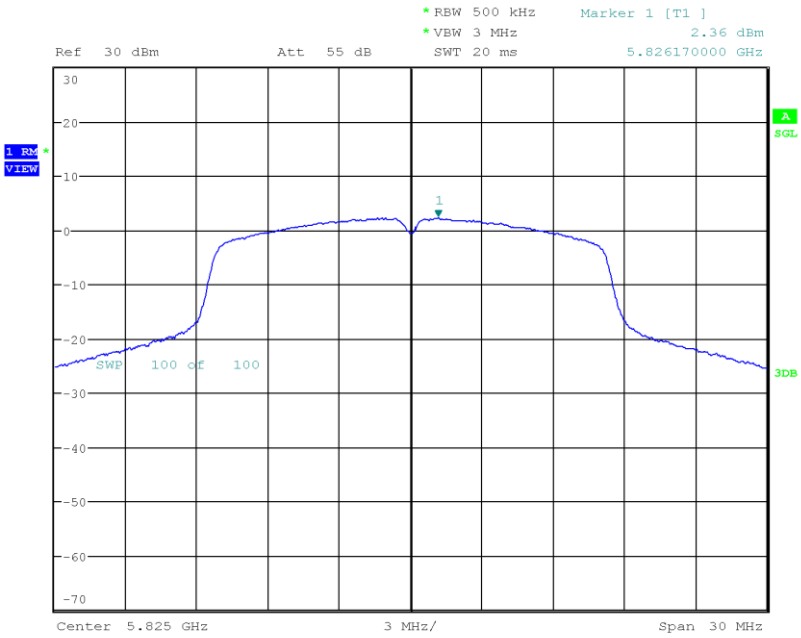
## Maximum Power Spectral Density

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 12.5; KDB 789033 v02r02, Section F |
| Operational Mode: | Proprietary, Channel: 157, 5785 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Number of Antenna Ports: | 1 |
| Antenna Port(s): | N/A |
| Maximum Frequency [MHz]: | 5783.650 |
| Spectral Density [dBm/RBW]: | 2.333 |
| Resolution Bandwidth [MHz]: | 0.5 |



## Maximum Power Spectral Density

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1001M |
| Test Sample ID: | 29090 |
| Reference Standards: | FCC 15.407, RSS-247 |
| Reference Method: | ANSI C63.10:2013, Section 12.5; KDB 789033 v02r02, Section F |
| Operational Mode: | Proprietary, Channel: 165, 5825 MHz |
| Operating Conditions: | Tnom/Vnom |
| Operator: | Abdullah Al Jamal |
| Test Site: | Eurofins Product Service GmbH |
| Test Date: | 2020-05-08 |
| Number of Antenna Ports: | 1 |
| Antenna Port(s): | N/A |
| Maximum Frequency [MHz]: | 5826.170 |
| Spectral Density [dBm/RBW]: | 2.363 |
| Resolution Bandwidth [MHz]: | 0.5 |



## 3.5 Test Conditions and Results - Frequency stability

### 3.5.1 Information

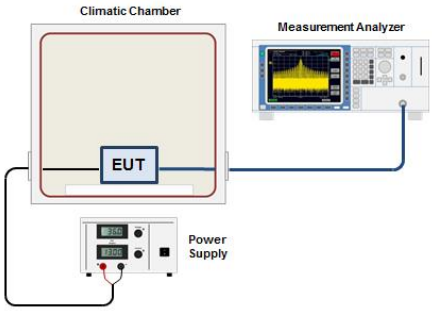
| Test Information | |
|---|---|
| Reference | FCC 15.407(g), KDB 789033 A.3 |
| Measurement Method | ANSI C63.10 6.8 |
| Operator | Abdullah Al Jamal |
| Date | 2020-05-11 |
| Test Sample ID | 29090 |
| Measurement uncertainty | ±0.06 ppm |

### 3.5.2 Limits

| Limits |
|---|
| Emission is maintained within the band of operation under all conditions of normal operation;<br>The frequency deviation combined with the 26 dB bandwidth edges must be within the assigned frequency band |

### 3.5.3 Setup

**Test Setup**




### 3.5.4 Equipment

| Test Equipment | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Spectrum Analyzer | R&S | FSU 43 | EF01631 | 2019-12 | 2020-12 |
| Climatic chamber | Vötsch | VT 4010 | EF00134 | 2019-08 | 2020-08 |
| Cable | Gigalane | SMS111B | EF00779 CAAAZ | 2018-10 | 2020-10 |

### 3.5.5 Procedure

**Test Procedure with respect to ambient temperature**

1. The EUT is turned off and placed inside the temperature chamber
2. The temperature chamber is set to the highest operating temperature
3. The EUT is turned on at nominal supply voltage and the carrier frequency is measured at startup, at 2 minutes, 5 minutes and 10 minutes after EUT is energized
4. The EUT is turned off again
5. The temperature of the chamber is lowered by 10 °C
6. The carrier frequency measurement is repeated after temperature has stabilized
7. The procedure is repeated until the lowest operating temperature is reached

| Test Procedure when varying supply voltage |
|---|
| 1. The EUT is supplied with nominal supply voltage or a fully charged battery at room temperature (15 to 25 °C)<br>2. The carrier frequency is measured<br>3. The procedure is repeated at 85 % and 115 % of the nominal supply voltage or at the battery endpoint for battery operated equipment |

| Test Procedure of carrier frequency measurement |
|---|
| 1. The emission spectrum is measured using a resolution band width of 100 kHz with peak detection and maximum hold<br>2. The peak of the emission spectrum is determined<br>3. The left most frequency $f_1$ 10 dB below the peak emission is searched<br>4. The right most frequency $f_2$ 10 dB below the peak emission is searched<br>5. The center frequency is calculated from $f_c = (f_1+f_2)/2$<br>6. The center frequency and the deviation from the nominal center frequency are recorded |

3.5.6 Results

| Test Results - 5180 MHz - Variation of supply voltage | | | | | |
|---|---|---|---|---|---|
| Channel | Nominal Frequency [MHz] | Voltage[1] [VDC] | Temperature [°C] | Frequency [MHz] | Deviation [kHz] |
| 36 | 5180 | 24.0 | 20 | 5179.993250 | -6.750 |
| 36 | 5180 | 26.4 | 20 | 5179.995950 | -4.050 |
| 36 | 5180 | 21.6 | 20 | 5180.000300 | 0.300 |

| Test Results - 5180 MHz - Variation of ambient temperature | | | | | | |
|---|---|---|---|---|---|---|
| Channel | Nominal Frequency [MHz] | Voltage[1] [VDC] | Temperature [°C] | Time after activation | Frequency [MHz] | Deviation [kHz] |
| 36 | 5180 | 24.0 | 65 | 0 | 5179.996600 | -3.400 |
| 36 | 5180 | 24.0 | 65 | 2 | 5179.992250 | -7.750 |
| 36 | 5180 | 24.0 | 65 | 5 | 5179.998800 | -1.200 |
| 36 | 5180 | 24.0 | 65 | 10 | 5179.992700 | -7.300 |
| 36 | 5180 | 24.0 | 60 | 0 | 5179.995200 | -4.800 |
| 36 | 5180 | 24.0 | 60 | 2 | 5179.997100 | -2.900 |
| 36 | 5180 | 24.0 | 60 | 5 | 5180.003500 | 3.500 |
| 36 | 5180 | 24.0 | 60 | 10 | 5179.994000 | -6.000 |
| 36 | 5180 | 24.0 | 50 | 0 | 5179.993500 | -6.500 |
| 36 | 5180 | 24.0 | 50 | 2 | 5179.995300 | -4.700 |
| 36 | 5180 | 24.0 | 50 | 5 | 5180.003500 | 3.500 |
| 36 | 5180 | 24.0 | 50 | 10 | 5180.002100 | 2.100 |
| 36 | 5180 | 24.0 | 40 | 0 | 5179.992350 | -7.650 |
| 36 | 5180 | 24.0 | 40 | 2 | 5179.999650 | -0.350 |
| 36 | 5180 | 24.0 | 40 | 5 | 5179.994200 | -5.800 |
| 36 | 5180 | 24.0 | 40 | 10 | 5179.997100 | -2.900 |
| 36 | 5180 | 24.0 | 30 | 0 | 5179.992300 | -7.700 |
| 36 | 5180 | 24.0 | 30 | 2 | 5179.999100 | -0.900 |
| 36 | 5180 | 24.0 | 30 | 5 | 5179.996050 | -3.950 |
| 36 | 5180 | 24.0 | 30 | 10 | 5179.993000 | -7.000 |
| 36 | 5180 | 24.0 | 20 | 0 | 5179.994800 | -5.200 |
| 36 | 5180 | 24.0 | 20 | 2 | 5179.998050 | -1.950 |
| 36 | 5180 | 24.0 | 20 | 5 | 5180.001650 | 1.650 |
| 36 | 5180 | 24.0 | 20 | 10 | 5179.998950 | -1.050 |
| 36 | 5180 | 24.0 | 10 | 0 | 5179.994600 | -5.400 |
| 36 | 5180 | 24.0 | 10 | 2 | 5179.996350 | -3.650 |
| 36 | 5180 | 24.0 | 10 | 5 | 5180.003200 | 3.200 |
| 36 | 5180 | 24.0 | 10 | 10 | 5179.998300 | -1.700 |
| 36 | 5180 | 24.0 | 0 | 0 | 5179.994500 | -5.500 |
| 36 | 5180 | 24.0 | 0 | 2 | 5179.996450 | -3.550 |
| 36 | 5180 | 24.0 | 0 | 5 | 5179.994150 | -5.850 |
| 36 | 5180 | 24.0 | 0 | 10 | 5179.992500 | -7.500 |
| 36 | 5180 | 24.0 | -10 | 0 | 5179.994750 | -5.250 |
| 36 | 5180 | 24.0 | -10 | 2 | 5180.005150 | 5.150 |
| 36 | 5180 | 24.0 | -10 | 5 | 5179.995950 | -4.050 |
| 36 | 5180 | 24.0 | -10 | 10 | 5179.997900 | -2.100 |
| 36 | 5180 | 24.0 | -20 | 0 | 5180.001500 | 1.500 |
| 36 | 5180 | 24.0 | -20 | 2 | 5180.003000 | 3.000 |
| 36 | 5180 | 24.0 | -20 | 5 | 5179.998200 | -1.800 |
| 36 | 5180 | 24.0 | -20 | 10 | 5179.997650 | -2.350 |

## 3.6 Test Conditions and Results - AC power line conducted emissions

### 3.6.1 Information

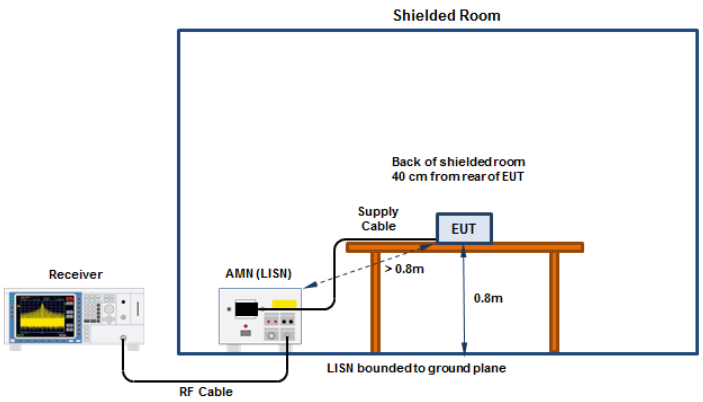
| Test Information | |
|---|---|
| Reference | FCC 15.207 |
| Measurement Method | ANSI C63.10 6.2 |
| Operator | Abdullah Al Jamal |
| Date | 2020-05-15 |
| Test Sample ID | 29090 |
| Measurement uncertainty | ±3.82 % |

### 3.6.2 Limits

| Limits | | |
|---|---|---|
| Frequency [MHz] | Quasi-Peak [dBµV] | Average [dBµV] |
| 0.15 - 0.5 | 66 - 56* | 56 - 46* |
| 0.5 - 5 | 56 | 46 |
| 5 - 30 | 60 | 50 |
| * Limit decreases linearly with the logarithm of the frequency | | |

### 3.6.3 Setup

**Test Setup**




### 3.6.4 Equipment

| Test Software | | | |
|---|---|---|---|
| Description | Manufacturer | Name | Version |
| EMC Software | DARE Instruments | RadiMation | 2016.1.10 |

| Test Equipment | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| EMI Receiver | R&S | ESU 26 | EF00241 | 2019-07 | 2021-07 |
| LISN | Schwarzbeck | NSLK 8127 RC | EF01592 | 2019-10 | 2020-10 |

## Conducted emissions at the mains power port according to FCC part 15 C

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Date: | 2020-05-15 |
| Operating Conditions: | ambient temperature: 25°C<br>power input: 24 VDC |
| LISN: | Schwarzbeck NSLK 8127 RC L |
| Mode: | CH36 – AC/DC-adapter – Test Sample ID 29090 |

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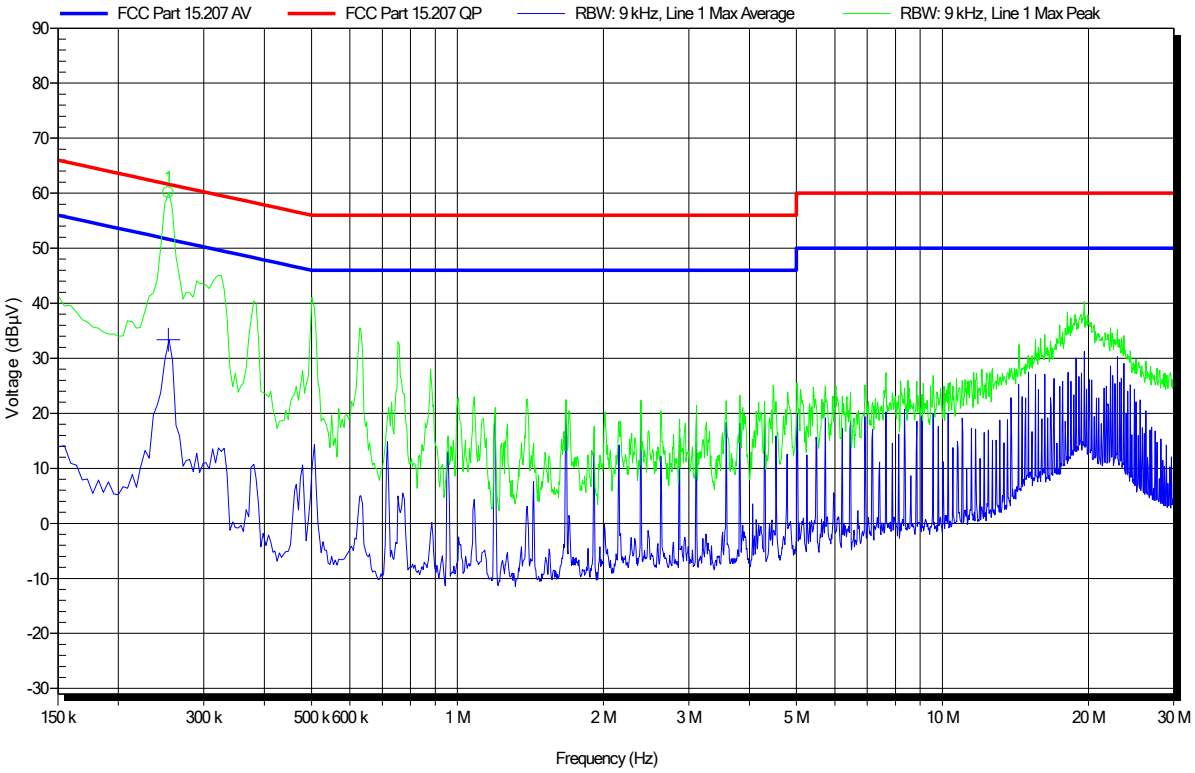


| Peak Number | Frequency | LISN |
|---|---|---|
| 1 | 253.5 kHz | Line 1 |

| Peak Number | Frequency | Average | Average Limit | Average Difference | Average Status | LISN |
|---|---|---|---|---|---|---|
| 1 | 253.5 kHz | 33.35 dBµV | 51.64 dBµV | -18.29 dB | Pass | Line 1 |

## Conducted emissions at the mains power port according to FCC part 15 C

| | |
|---|---|
| Project Number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| Model Description: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Date: | 2020-05-15 |
| Operating Conditions: | ambient temperature: 25°C<br>power input: 24 VDC |
| LISN: | Schwarzbeck NSLK 8127 RC N |
| Mode: | CH36 – AC/DC-adapter – Test Sample ID 29090 |

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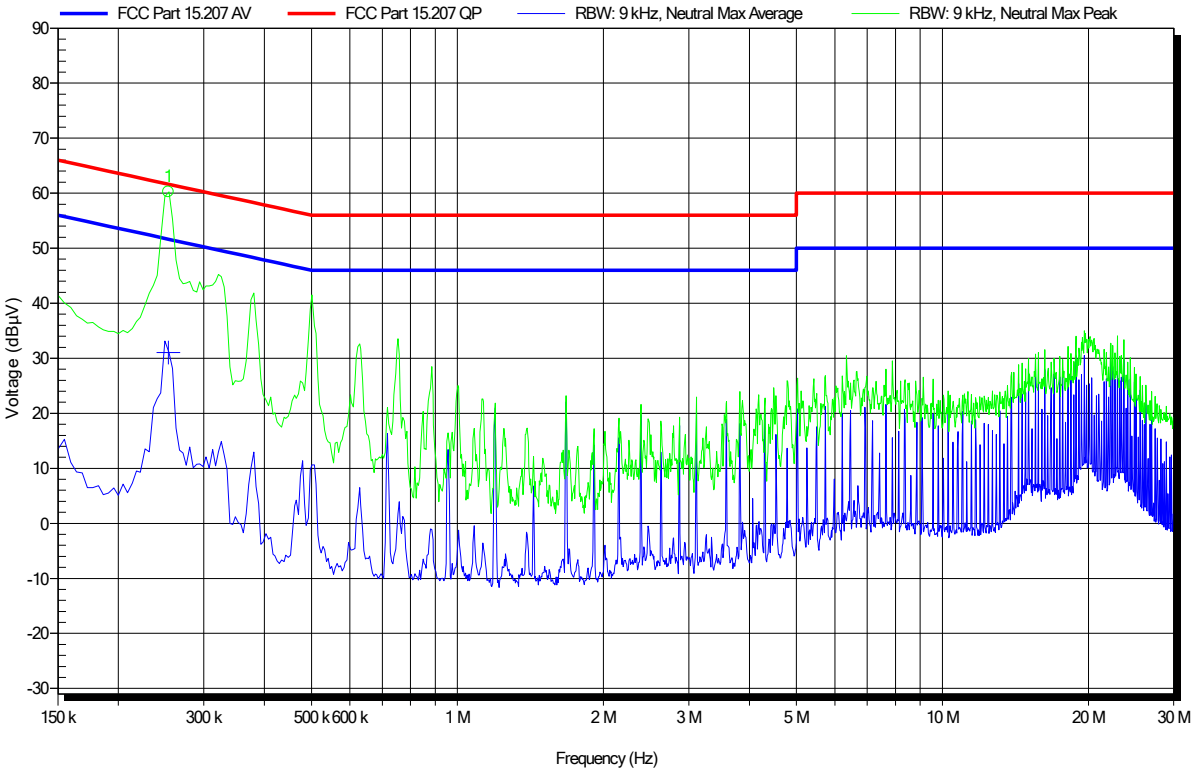



| Peak Number | Frequency | LISN |
|---|---|---|
| 1 | 253.5 kHz | Neutral |

| Peak Number | Frequency | Average | Average Limit | Average Difference | Average Status | LISN |
|---|---|---|---|---|---|---|
| 1 | 253.5 kHz | 31.03 dBµV | 51.64 dBµV | -20.61 dB | Pass | Neutral |

## 3.7 Test Conditions and Results - Transmitter radiated emissions

### 3.7.1 Information

| Test Information | |
|---|---|
| Reference | FCC 15.407(b) |
| Measurement Method | KDB 789033 G |
| Operator | Abdullah Al Jamal |
| Date | 2020-04-28<br>2020-05-11<br>2020-05-12 |
| Test Sample ID | 29090 |
| Measurement note | Measurement plots not listed in this test report (related to the frequency range to be measured) contain noise floor only. No significant emissions could be measured in these measurement ranges. An evaluation was performed manually with the spectrum analyser. |
| Measurement uncertainty | ±5.1 % |

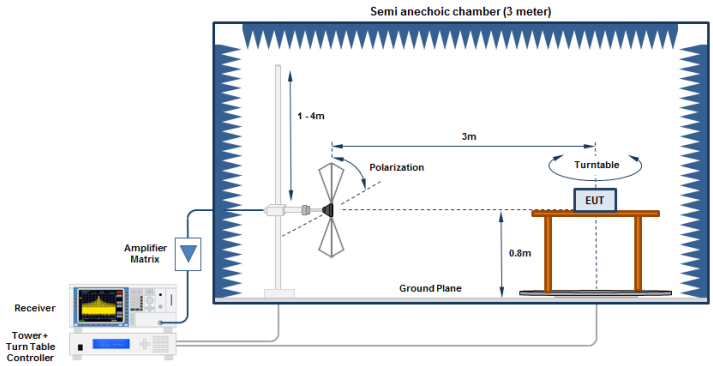
### 3.7.2 Limits

| Limits - Restricted frequency bands and below 1 GHz | | | |
|---|---|---|---|
| Frequency [MHz] | Detector | Field strength [µV/m] | Measurement distance [m] |
| 30 - 88 | Quasi-Peak | 100 | 3 |
| 88 - 216 | Quasi-Peak | 150 | 3 |
| 216 - 960 | Quasi-Peak | 200 | 3 |
| 960 - 1000 | Quasi-Peak | 500 | 3 |
| >1000 | Average | 500 | 3 |

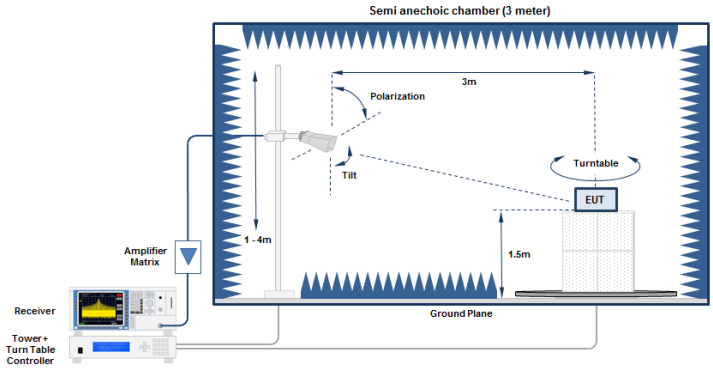
| Limits - Outside restricted frequency bands above 1 GHz | | | |
|---|---|---|---|
| Frequency band [MHz] | Power limit [dBm EIRP] | Field strength limit [dBµV/m] | Measurement distance [m] |
| 5150 - 5250 | -27 dBm/MHz | 68.2 | 3 |
| 5250 - 5350 | -27 dBm/MHz | 68.2 | 3 |
| 5470 - 5725 | -27 dBm/MHz | 68.2 | 3 |
| 5725 - 5850 | -27 dBm/MHz<br>–<br>@ ±75 MHz from band edge | 68.2 | 3 |
| 5725 - 5850 | 10 to -27 dBm/MHz<br>–<br>@ ±25 to ±75 MHz from band edge | 105.2 to 68.2 | 3 |
| 5725 - 5850 | 15.6 to 10 dBm/MHz<br>–<br>@ ±5 to ±25 MHz from band edge | 110.8 to 105.2 | 3 |
| 5725 - 5850 | 27 to 15.6 dBm/MHz<br>–<br>@ ±0 to ±5 MHz from band edge | 122.2 to 110.8 | 3 |

### 3.7.3 Setup

**Test Setup 30 - 1000 MHz**




**Test Setup > 1 GHz**




### 3.7.4 Equipment

| Test Software | | | |
|---|---|---|---|
| Description | Manufacturer | Name | Version |
| EMC Software | DARE Instruments | RadiMation | 2016.1.10 |

| Test Equipment 30 - 1000 MHz | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Anechoic Chamber | Frankonia | AC1 | EF00062 | 2018-07 | 2021-07 |
| Measurement Receiver | Agilent | N9038A-526/WXP | EF01070 | 2019-09 | 2020-09 |
| Antenna | R&S | HK 116 | EF00203 | 2018-06 | 2020-06 |
| Antenna | R&S | HL 223 | EF00013 | 2018-06 | 2020-06 |

| Test Equipment > 1 GHz | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
| Anechoic Chamber | Frankonia | AC1 | EF00062 | 2018-07 | 2021-07 |
| Measurement Receiver | Agilent | N9038A-526/WXP | EF01070 | 2019-09 | 2020-09 |
| Antenna | Schwarzbeck | BBHA 9120D | EF00018 | 2019-10 | 2022-10 |
| Antenna | Amplifier Research | AT4560 | EF01152 | 2018-10 | 2020-10 |
| Antenna | Flann Microwave Ltd | 22240-25 Amp. CBL26402075 | EF00301 | 2019-12 | 2022-12 |

### 3.7.5 Procedure

| Test Procedure 30 - 1000 MHz |
|---|
| 1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground |
| 2. EUT set to test mode |
| 3. The receiver is set to peak detection with max hold |
| 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m |
| 5. All significant emissions are measured again using the corresponding final detector |

| Test Procedure > 1 GHz |
|---|
| 1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground |
| 2. EUT set to test mode |
| 3. The receiver is set to peak detection with max hold |
| 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m |
| 5. All significant emissions are measured again using the corresponding final detector |

### 3.7.6 Results

| Test Results | | | | | | |
|---|---|---|---|---|---|---|
| Channel | Emission [MHz] | Level [dBµV/m] | Det. | Pol. | Limit [dBµV/m] | Margin [dB] |
| CH36 | 73.1109 | 24.60 | qpk | hor | 40.00 | -15.45 |
| CH36 | 73.3064 | 25.30 | qpk | ver | 40.00 | -14.66 |
| CH36 | 73.6719 | 24.60 | qpk | ver | 40.00 | -15.42 |
| CH36 | 74.0799 | 25.50 | qpk | hor | 40.00 | -14.54 |
| CH36 | 74.2796 | 27.90 | qpk | ver | 40.00 | -12.11 |
| CH36 | 74.9426 | 29.00 | pk | hor | 40.00 | -11.05 |
| CH36 | 74.9766 | 28.50 | qpk | ver | 40.00 | -11.52 |
| CH36 | 5149 | 64.44 | pk | hor | 54.00 | 10.44 |
| CH36 | 5149 | 53.63 | RMS | hor | 54.00 | -00.37 |
| CH40 | 73.6209 | 24.70 | qpk | ver | 40.00 | -15.29 |
| CH40 | 74.3349 | 20.30 | qpk | hor | 40.00 | -19.70 |
| CH40 | 74.3901 | 28.20 | qpk | ver | 40.00 | -11.80 |
| CH40 | 74.8831 | 28.80 | qpk | ver | 40.00 | -11.17 |
| CH40 | 75.0574 | 26.80 | qpk | hor | 40.00 | -13.22 |
| CH40 | 135.0064 | 35.80 | pk | hor | 43.50 | -07.70 |
| CH40 | 4936 | 40.97 | pk | ver | 54.00 | -13.03 |
| CH40 | 5450 | 39.93 | pk | ver | 54.00 | -14.07 |
| CH48 | 73.6124 | 33.90 | pk | hor | 40.00 | -06.09 |
| CH48 | 73.6804 | 26.60 | qpk | ver | 40.00 | -13.35 |
| CH48 | 74.2371 | 26.80 | qpk | hor | 40.00 | -13.20 |
| CH48 | 74.3646 | 29.60 | qpk | ver | 40.00 | -10.44 |
| CH48 | 74.9894 | 26.90 | qpk | hor | 40.00 | -13.06 |

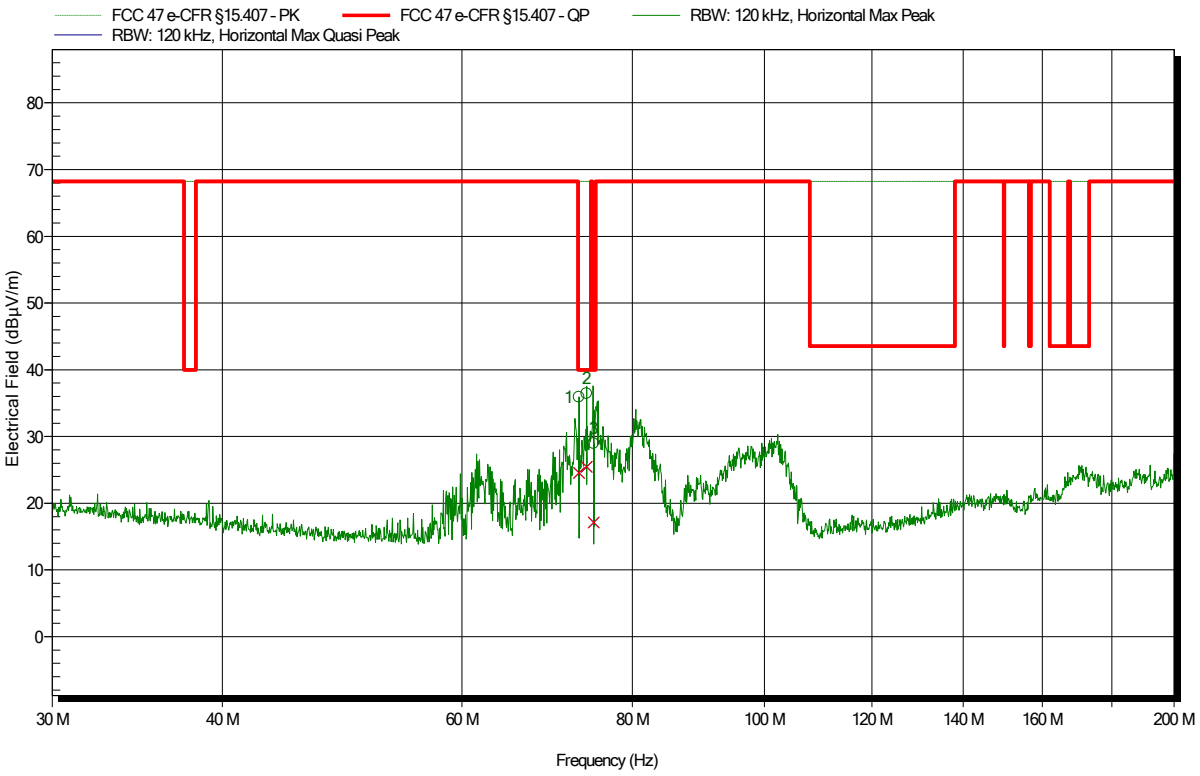
| | | | | | | |
|---|---|---|---|---|---|---|
| CH149 | 73.9779 | 27.50 | qpk | ver | 40.00 | -12.52 |
| CH149 | 74.9001 | 23.10 | qpk | hor | 40.00 | -16.95 |
| CH149 | 74.9341 | 28.50 | qpk | ver | 40.00 | -11.54 |
| CH157 | 73.9057 | 27.50 | qpk | ver | 40.00 | -12.46 |
| CH157 | 73.9184 | 29.70 | pk | hor | 40.00 | -10.26 |
| CH157 | 74.9554 | 26.60 | qpk | hor | 40.00 | -13.42 |
| CH157 | 75.0956 | 30.00 | qpk | ver | 40.00 | -10.04 |
| CH157 | 3861 | 37.02 | pk | hor | 54.00 | -16.98 |
| CH157 | 3861 | 38.96 | pk | ver | 54.00 | -15.04 |
| CH157 | 3861 | 37.06 | pk | hor | 54.00 | -16.94 |
| CH157 | 3861 | 37.85 | pk | hor | 54.00 | -16.15 |
| CH165 | 74.3009 | 28.00 | qpk | hor | 40.00 | -11.99 |
| CH165 | 75.0446 | 25.10 | qpk | hor | 40.00 | -14.91 |
| CH165 | 75.0489 | 30.00 | qpk | ver | 40.00 | -09.97 |
| CH165 | 3885 | 40.52 | pk | ver | 54.00 | -13.48 |

# ANNEX A Transmitter spurious emissions

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HK 116, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; CH36 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

Index 1

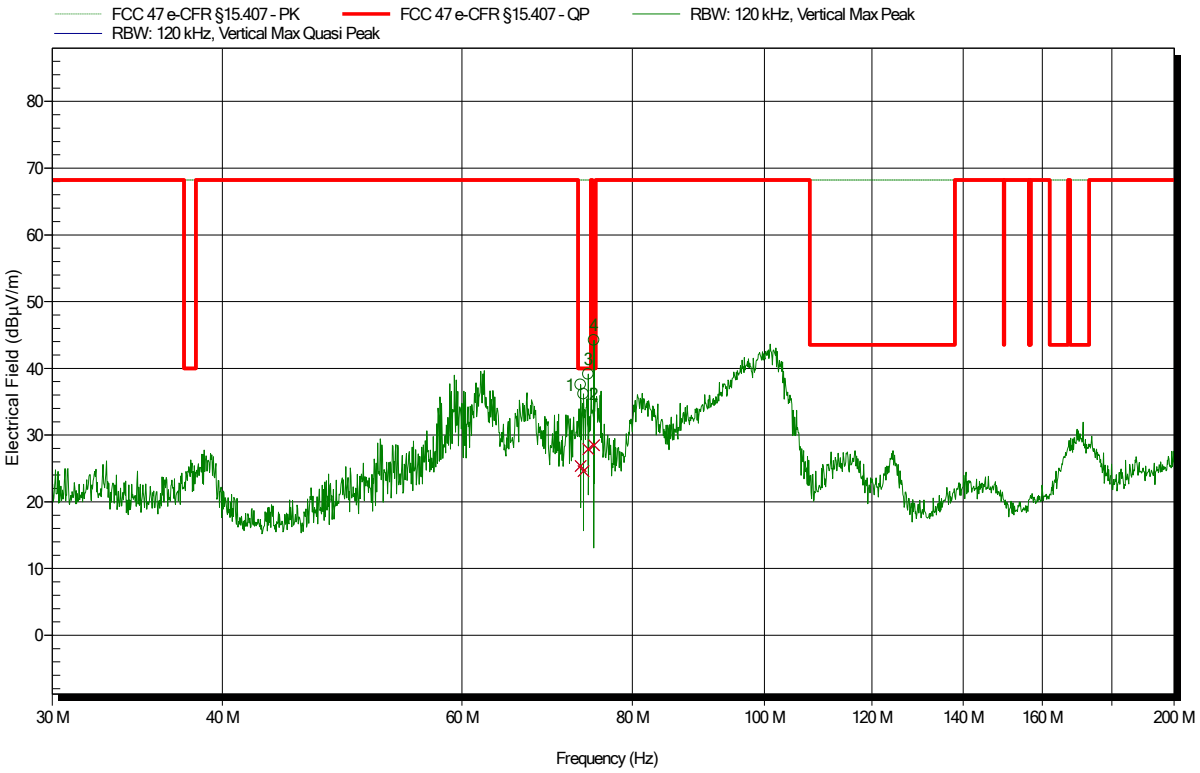



| Frequency | Quasi-Peak | Quasi-Peak Limit | Quasi-Peak Difference | Quasi-Peak Status | Height |
|---|---|---|---|---|---|
| 73.1109 MHz | 24.6 dBµV/m | 40 dBµV/m | -15.45 dB | Pass | 3.35 m |
| 74.0799 MHz | 25.5 dBµV/m | 40 dBµV/m | -14.54 dB | Pass | 3 m |
| 74.9426 MHz | 17.1 dBµV/m | 40 dBµV/m | -22.88 dB | Pass | 1.1 m |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HK 116, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; CH36 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

Index 2




| Frequency | Quasi-Peak | Quasi-Peak Limit | Quasi-Peak Difference | Quasi-Peak Status | Height |
|---|---|---|---|---|---|
| 73.3064 MHz | 25.3 dBµV/m | 40 dBµV/m | -14.66 dB | Pass | 1.85 m |
| 73.6719 MHz | 24.6 dBµV/m | 40 dBµV/m | -15.42 dB | Pass | 1 m |
| 74.2796 MHz | 27.9 dBµV/m | 40 dBµV/m | -12.11 dB | Pass | 1.5 m |
| 74.9766 MHz | 28.5 dBµV/m | 40 dBµV/m | -11.52 dB | Pass | 1.75 m |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HL 223, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; CH36 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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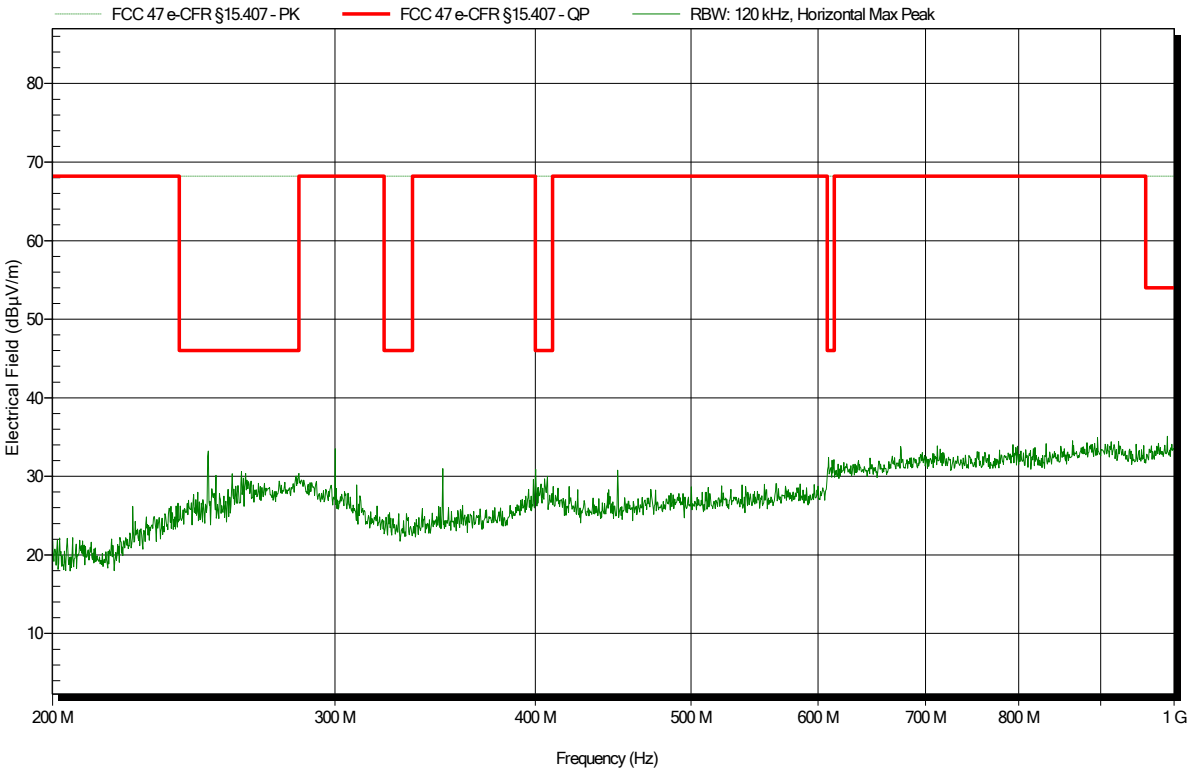

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HL 223, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; CH36 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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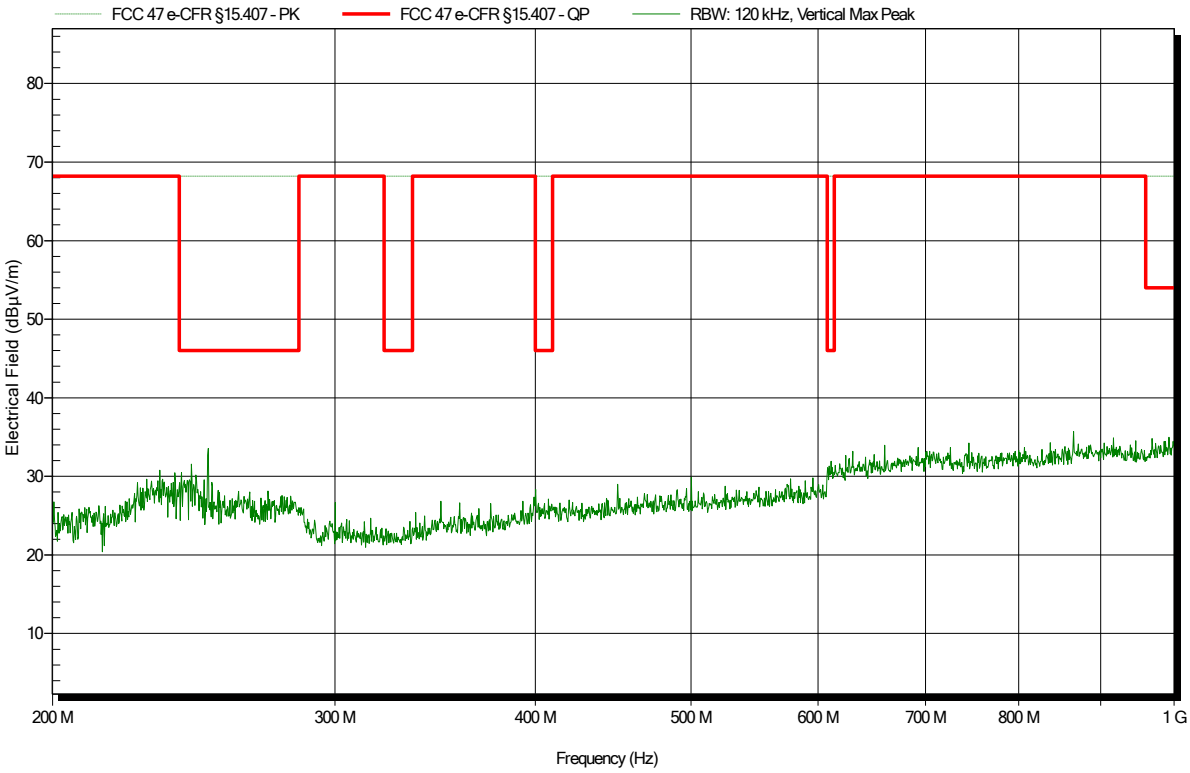
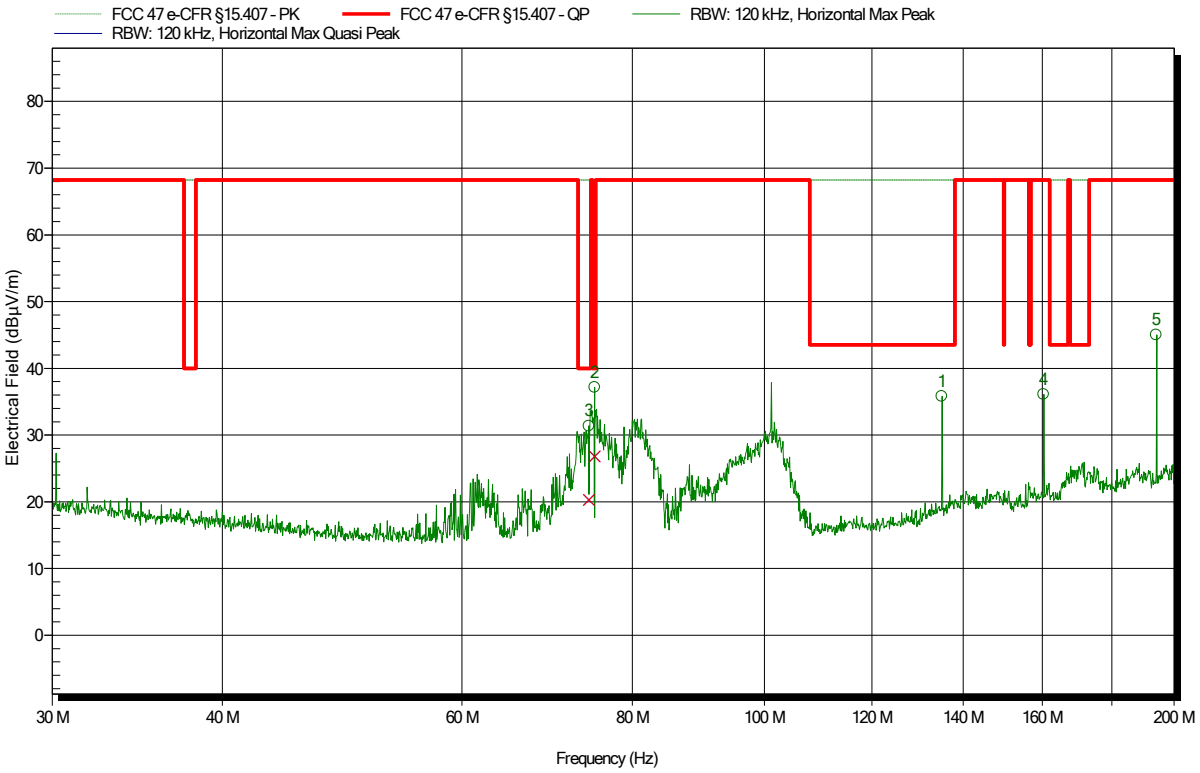


**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HK 116, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; CH40 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

Index 3




| Frequency | Peak | Peak Limit | Peak Difference | Peak Status | Height |
|---|---|---|---|---|---|
| 135.0064 MHz | 35.8 dBµV/m | 43.5 dBµV/m | -7.7 dB | Pass | 4 m |
| 160.3485 MHz | 36.1 dBµV/m | 68.2 dBµV/m | -32.1 dB | Pass | 4 m |
| 194.0119 MHz | 45 dBµV/m | 68.2 dBµV/m | -23.16 dB | Pass | 4 m |

| Frequency | Quasi-Peak | Quasi-Peak Limit | Quasi-Peak Difference | Quasi-Peak Status | Height |
|---|---|---|---|---|---|
| 74.3349 MHz | 20.3 dBµV/m | 40 dBµV/m | -19.7 dB | Pass | 3.05 m |
| 75.0574 MHz | 26.8 dBµV/m | 40 dBµV/m | -13.22 dB | Pass | 2.75 m |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HK 116, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; CH40 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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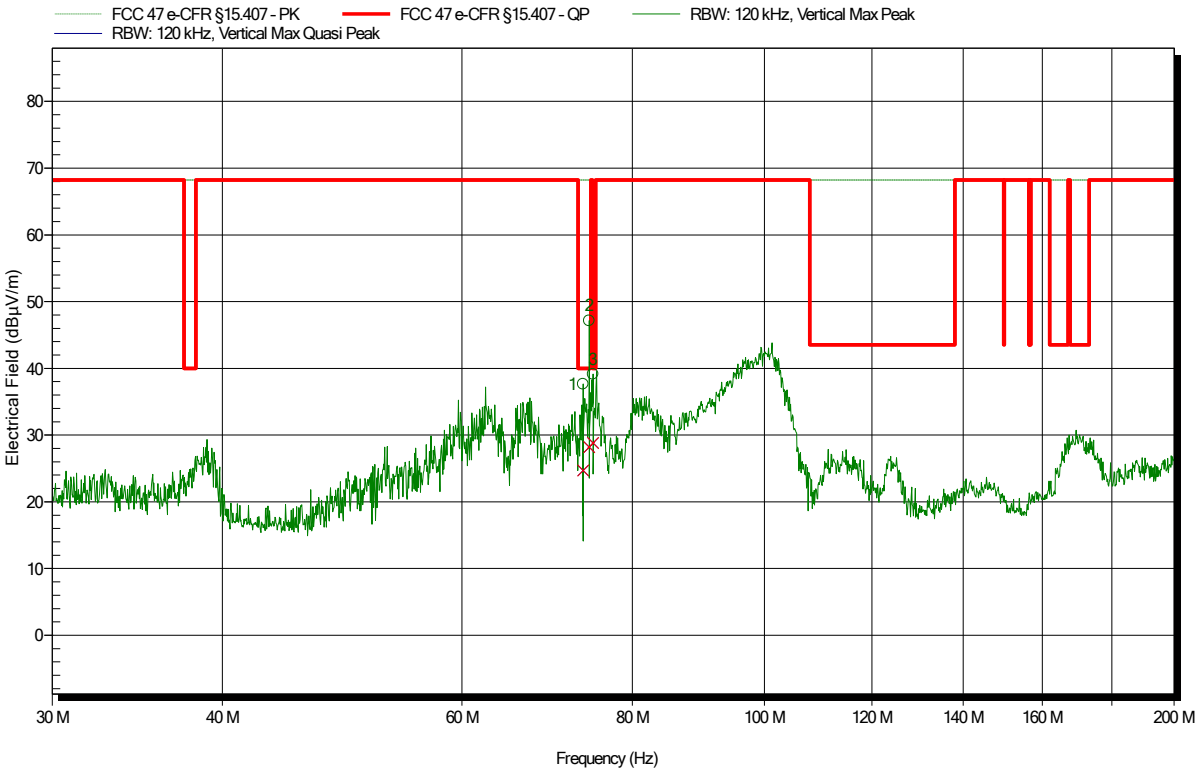


| Frequency | Quasi-Peak | Quasi-Peak Limit | Quasi-Peak Difference | Quasi-Peak Status | Height |
|---|---|---|---|---|---|
| 73.6209 MHz | 24.7 dBµV/m | 40 dBµV/m | -15.29 dB | Pass | 3.15 m |
| 74.3901 MHz | 28.2 dBµV/m | 40 dBµV/m | -11.8 dB | Pass | 1.25 m |
| 74.8831 MHz | 28.8 dBµV/m | 40 dBµV/m | -11.17 dB | Pass | 1.55 m |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HL 223, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; CH40 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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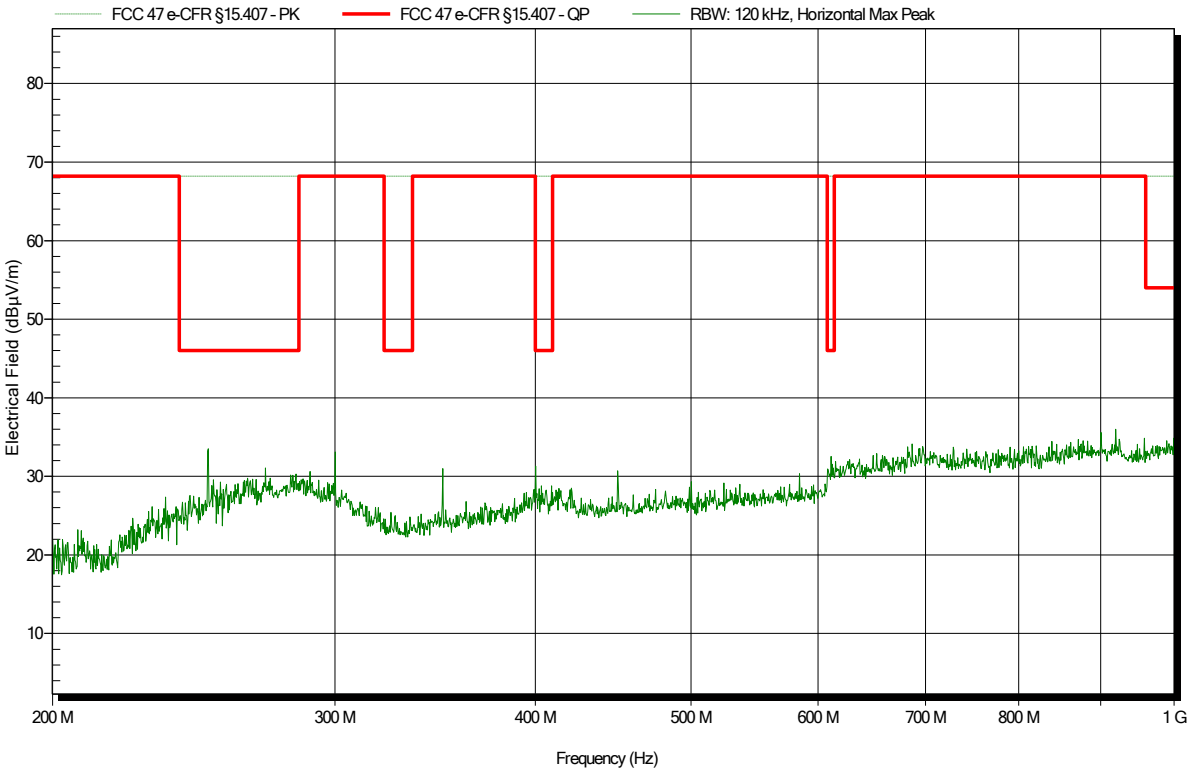

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HL 223, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; CH40 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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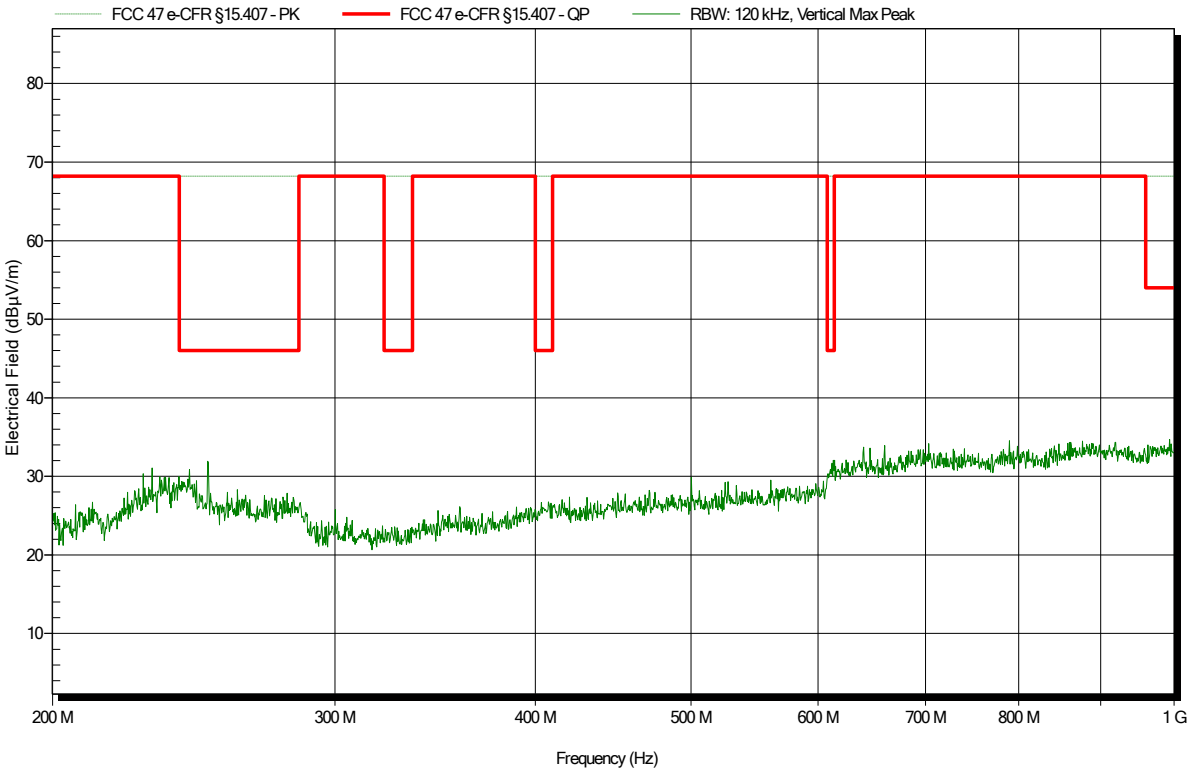

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HK 116, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; CH48 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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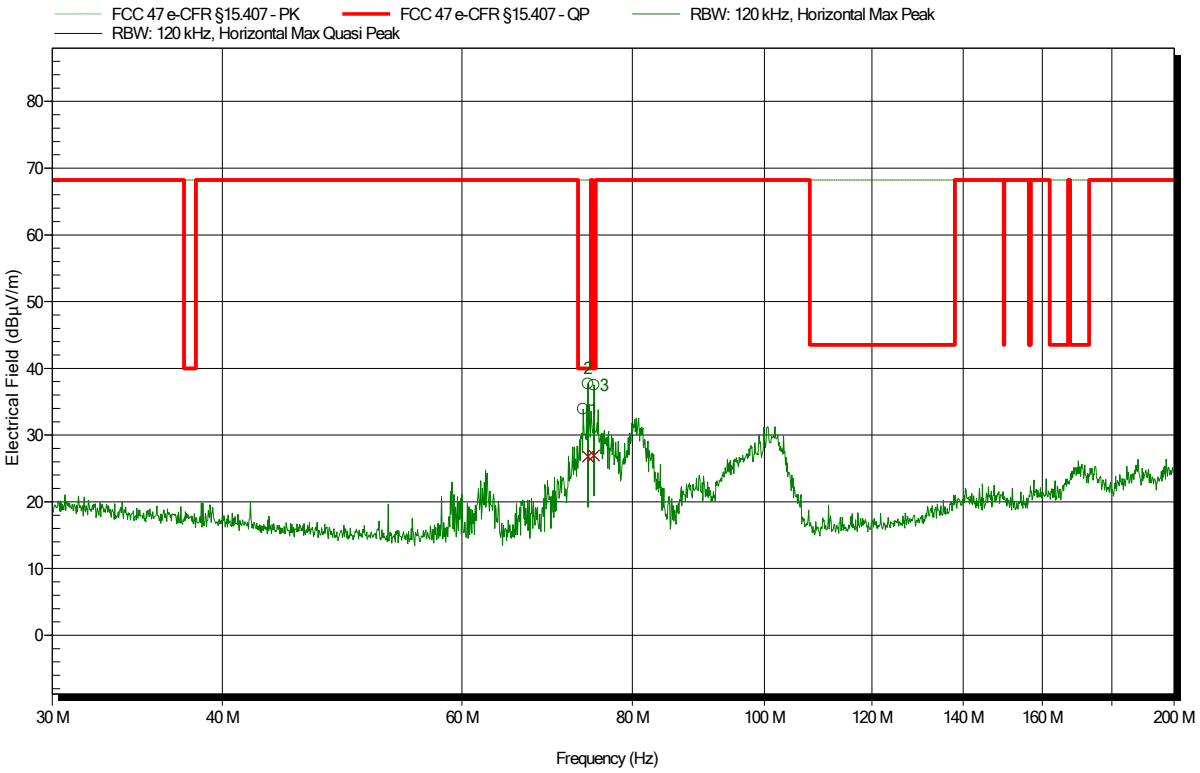


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status | Height |
|---|---|---|---|---|---|
| 73.6124 MHz | 33.9 dBµV/m | 40 dBµV/m | -6.09 dB | Pass | 3.25 m |

| Frequency | Quasi-Peak | Quasi-Peak Limit | Quasi-Peak Difference | Quasi-Peak Status | Height |
|---|---|---|---|---|---|
| 74.2371 MHz | 26.8 dBµV/m | 40 dBµV/m | -13.2 dB | Pass | 2.7 m |
| 74.9894 MHz | 26.9 dBµV/m | 40 dBµV/m | -13.06 dB | Pass | 2.75 m |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HK 116, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; CH48 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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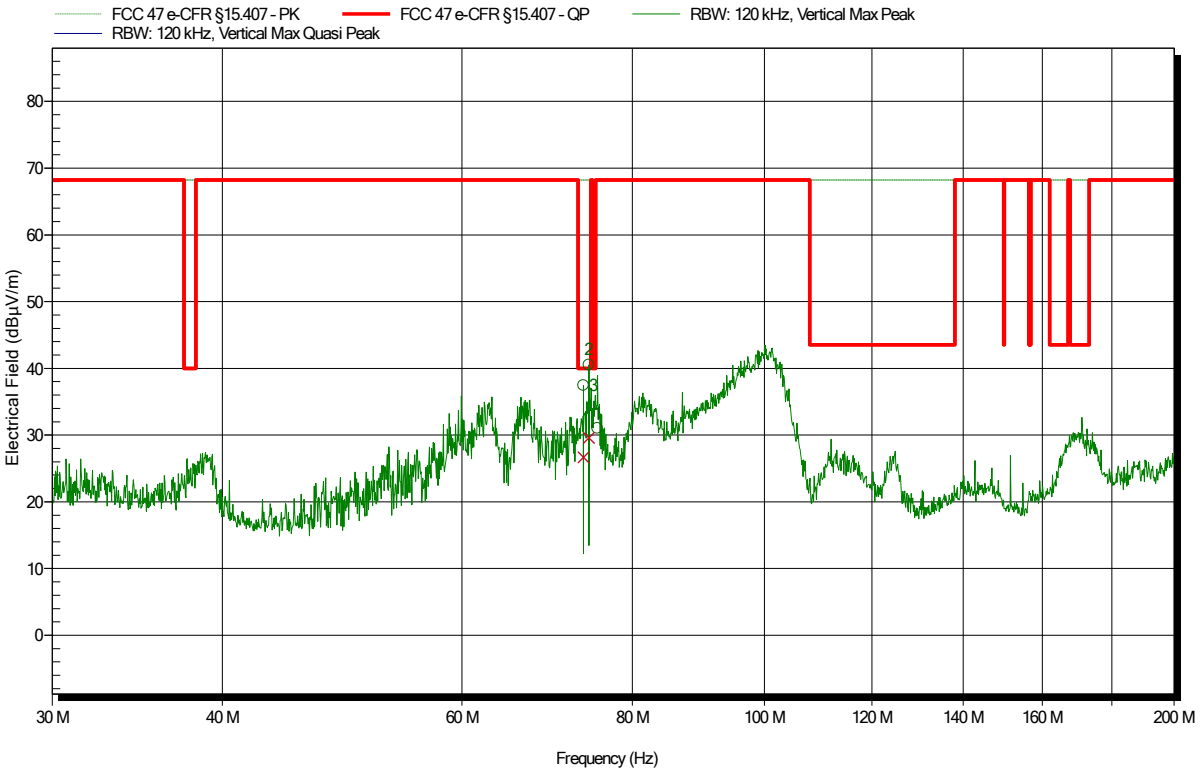


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status | Height |
|---|---|---|---|---|---|
| 75.4271 MHz | 31 dBµV/m | 68.2 dBµV/m | -37.19 dB | Pass | 3.25 m |

| Frequency | Quasi-Peak | Quasi-Peak Limit | Quasi-Peak Difference | Quasi-Peak Status | Height |
|---|---|---|---|---|---|
| 73.6804 MHz | 26.6 dBµV/m | 40 dBµV/m | -13.35 dB | Pass | 1.1 m |
| 74.3646 MHz | 29.6 dBµV/m | 40 dBµV/m | -10.44 dB | Pass | 1.1 m |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HL 223, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; CH48 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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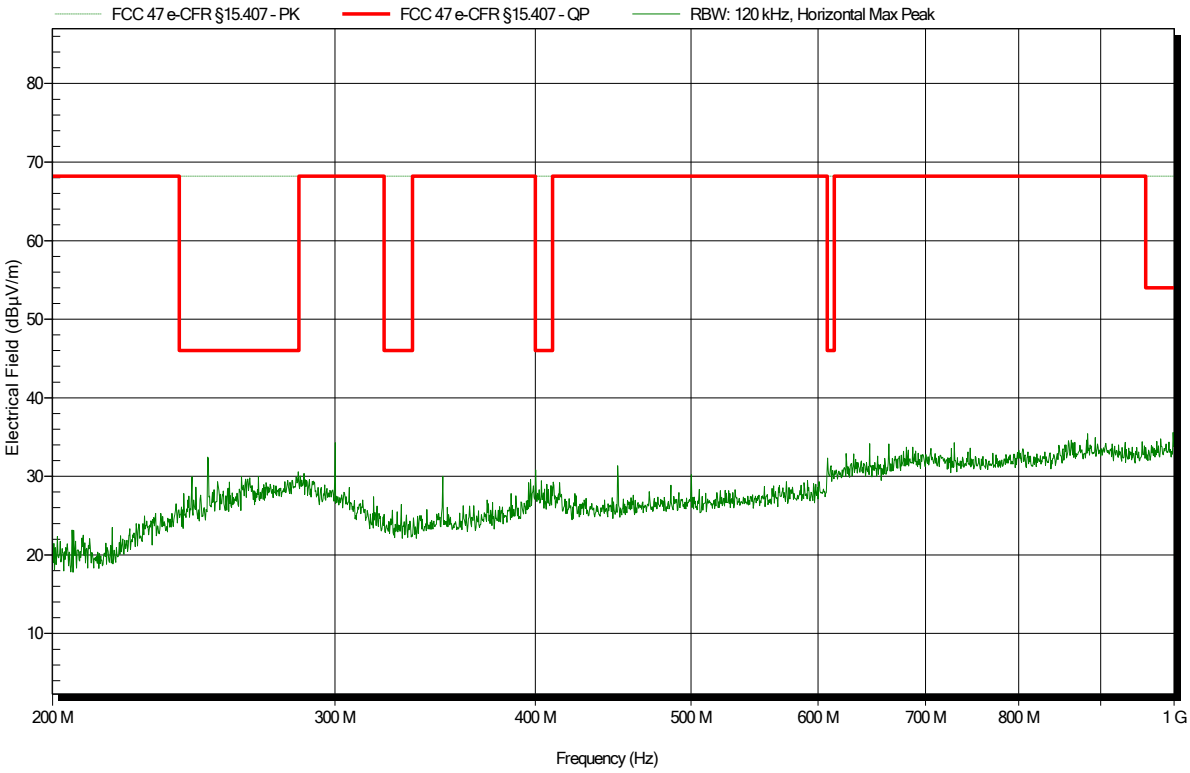

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HL 223, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; CH48 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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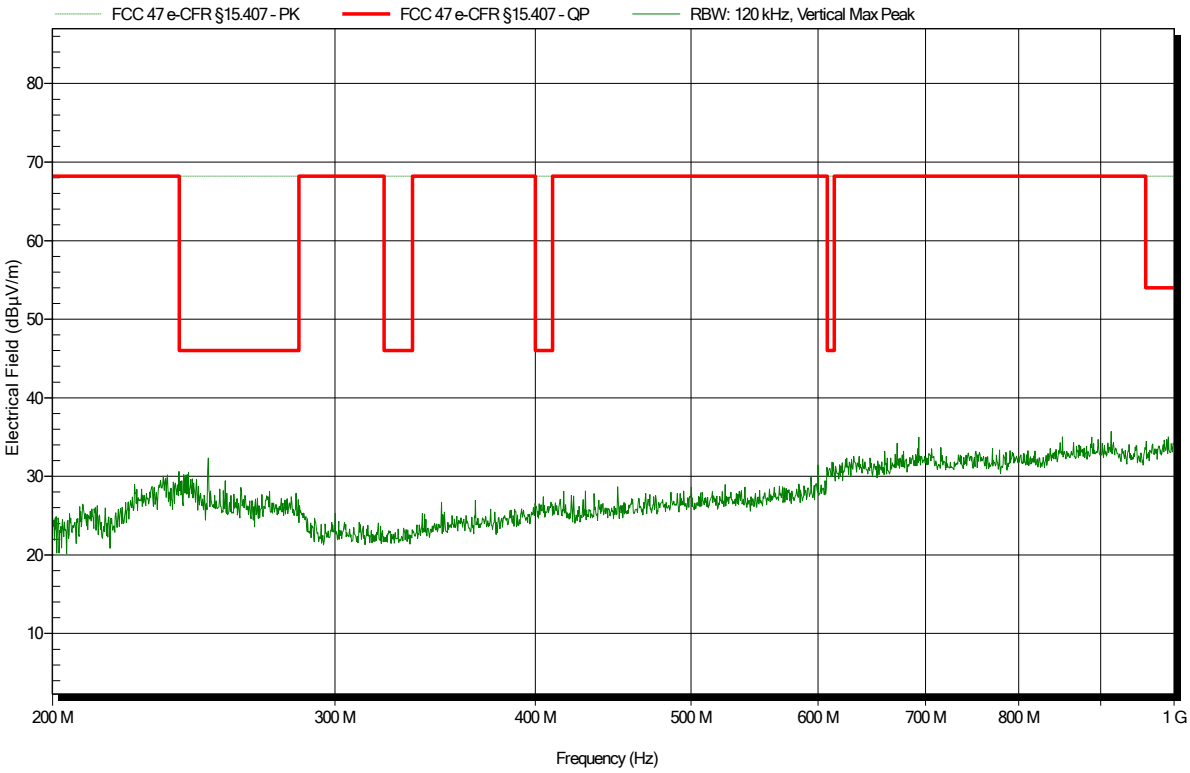

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HK 116, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; CH149 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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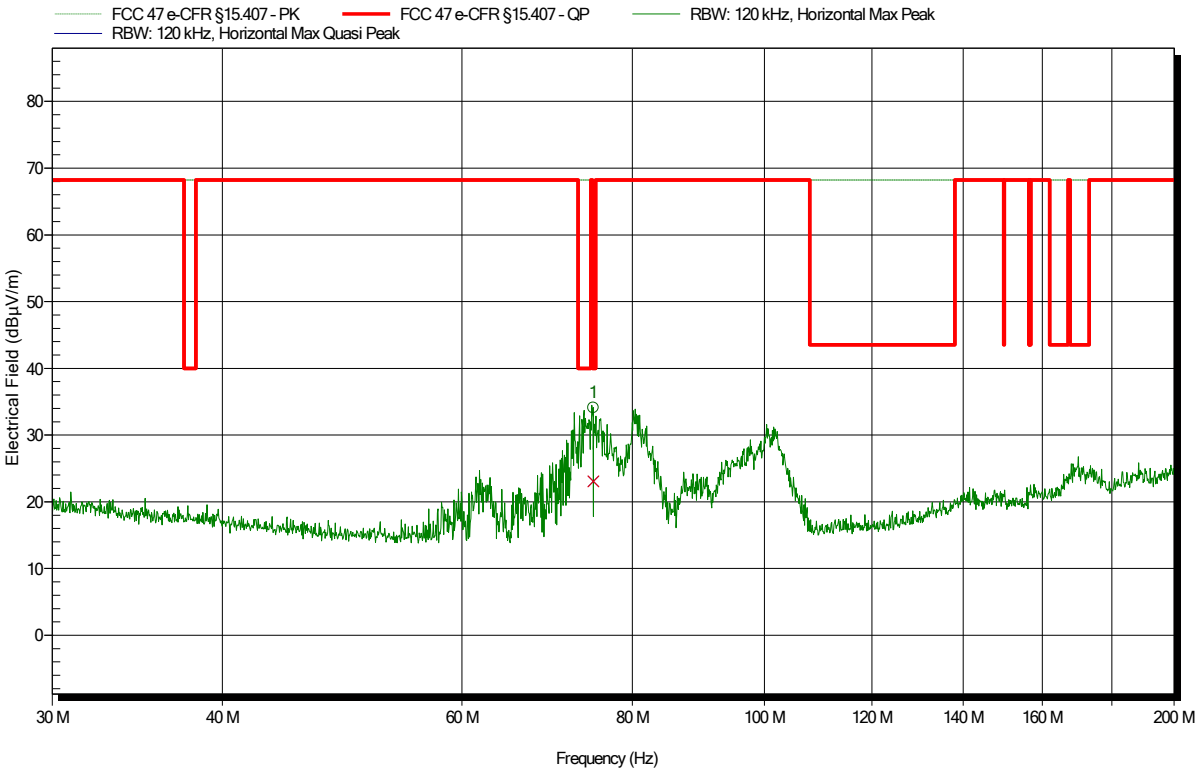


| Frequency | Quasi-Peak | Quasi-Peak Limit | Quasi-Peak Difference | Quasi-Peak Status | Height |
|---|---|---|---|---|---|
| 74.9001 MHz | 23.1 dBµV/m | 40 dBµV/m | -16.95 dB | Pass | 3.75 m |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HK 116, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; CH149 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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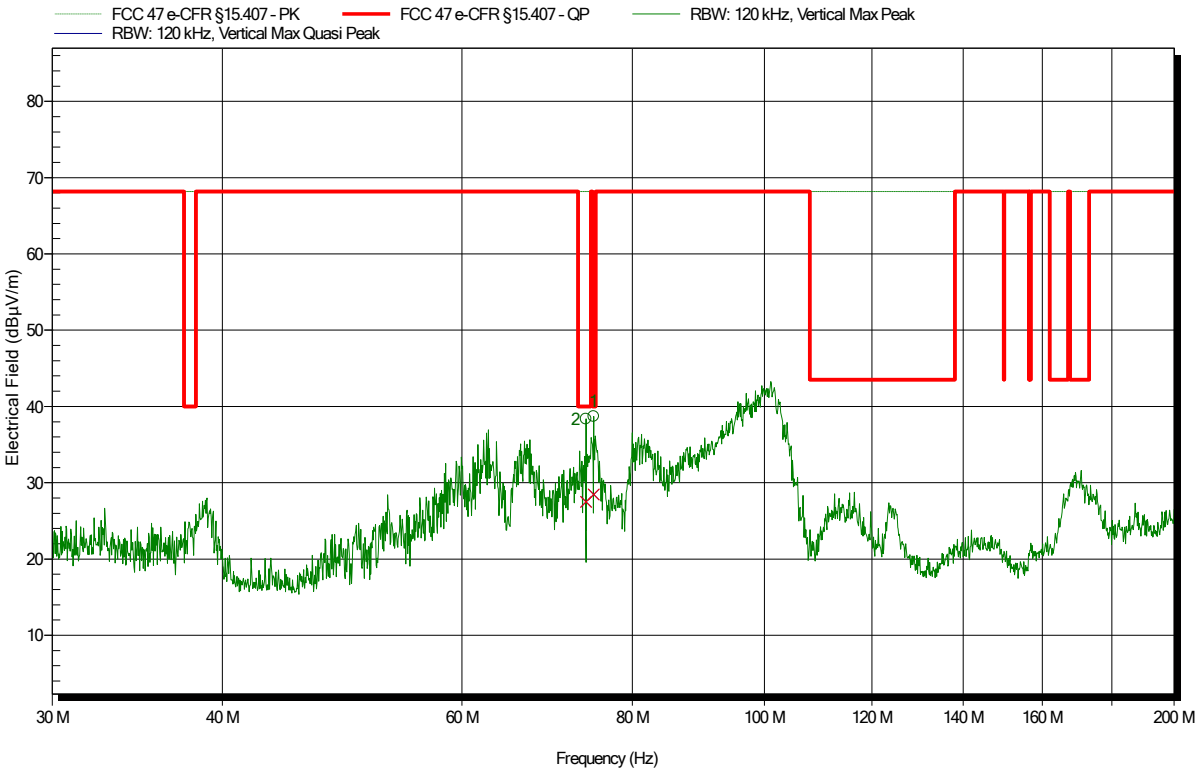


| Frequency | Quasi-Peak | Quasi-Peak Limit | Quasi-Peak Difference | Quasi-Peak Status | Height |
|---|---|---|---|---|---|
| 73.9779 MHz | 27.5 dBµV/m | 40 dBµV/m | -12.52 dB | Pass | 1.55 m |
| 74.9341 MHz | 28.5 dBµV/m | 40 dBµV/m | -11.54 dB | Pass | 1.1 m |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HL 223, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; CH149 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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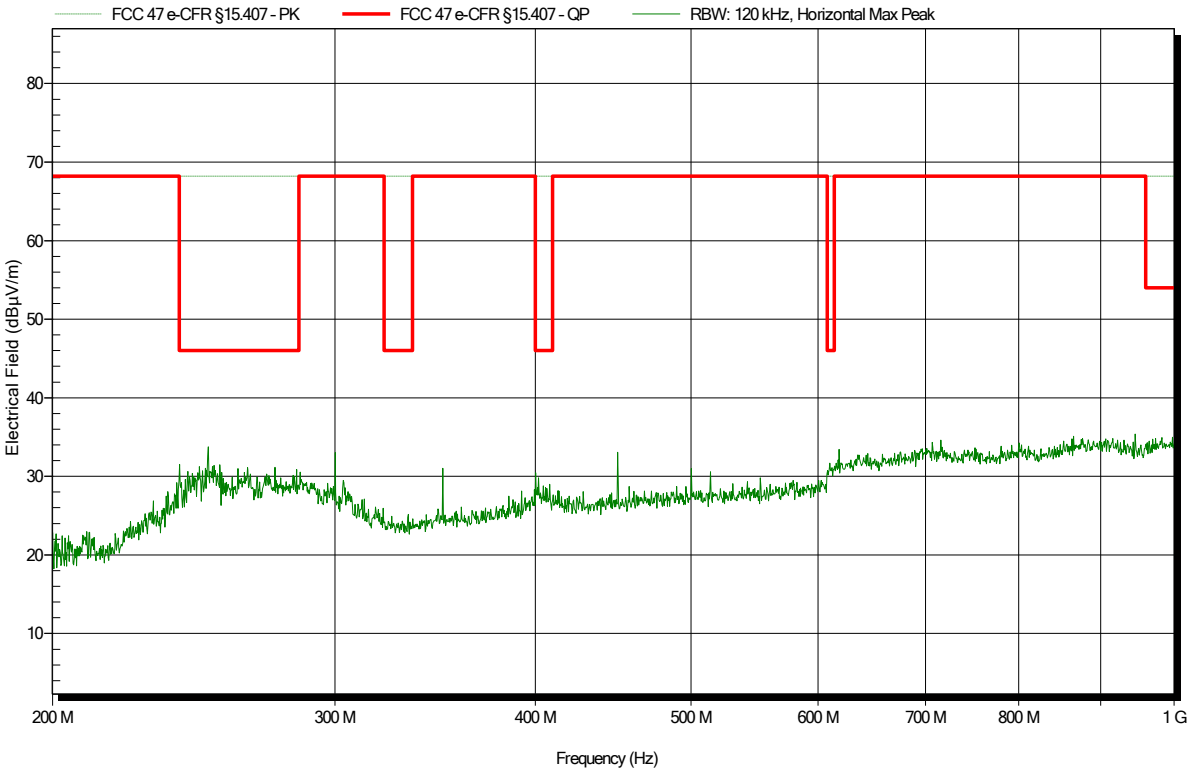

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HL 223, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; CH149 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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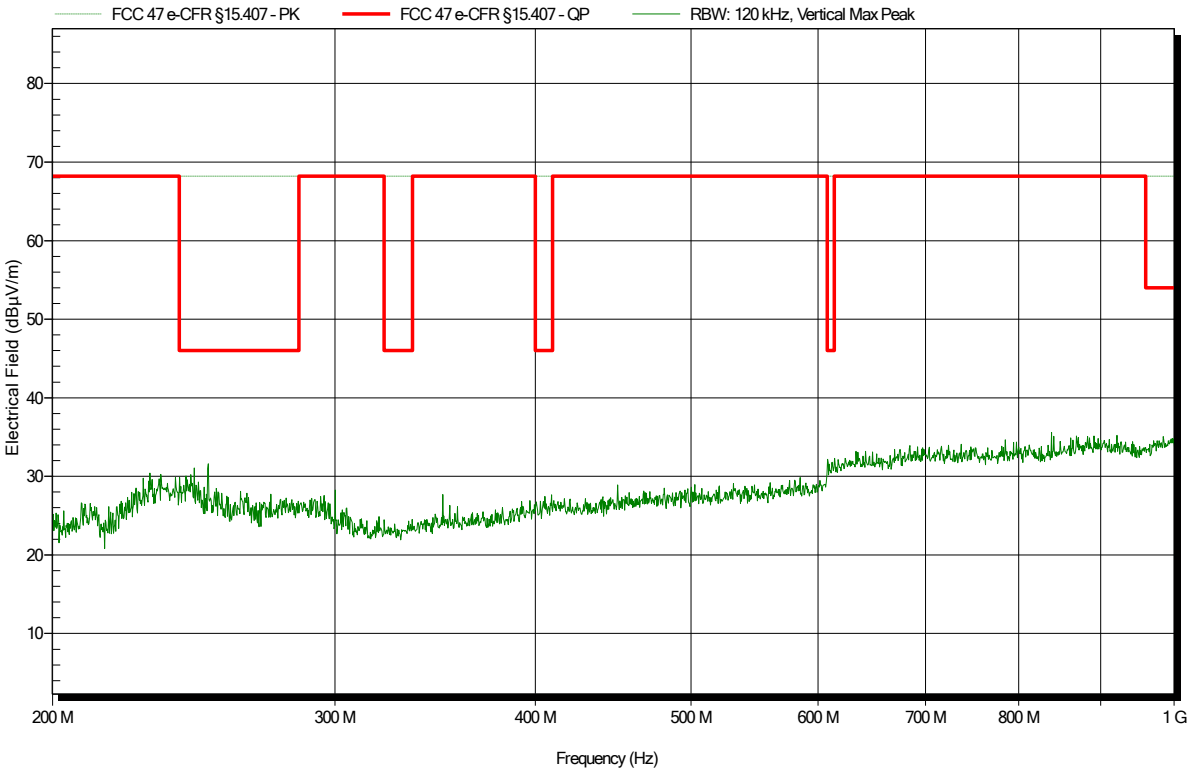

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HK 116, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; CH157 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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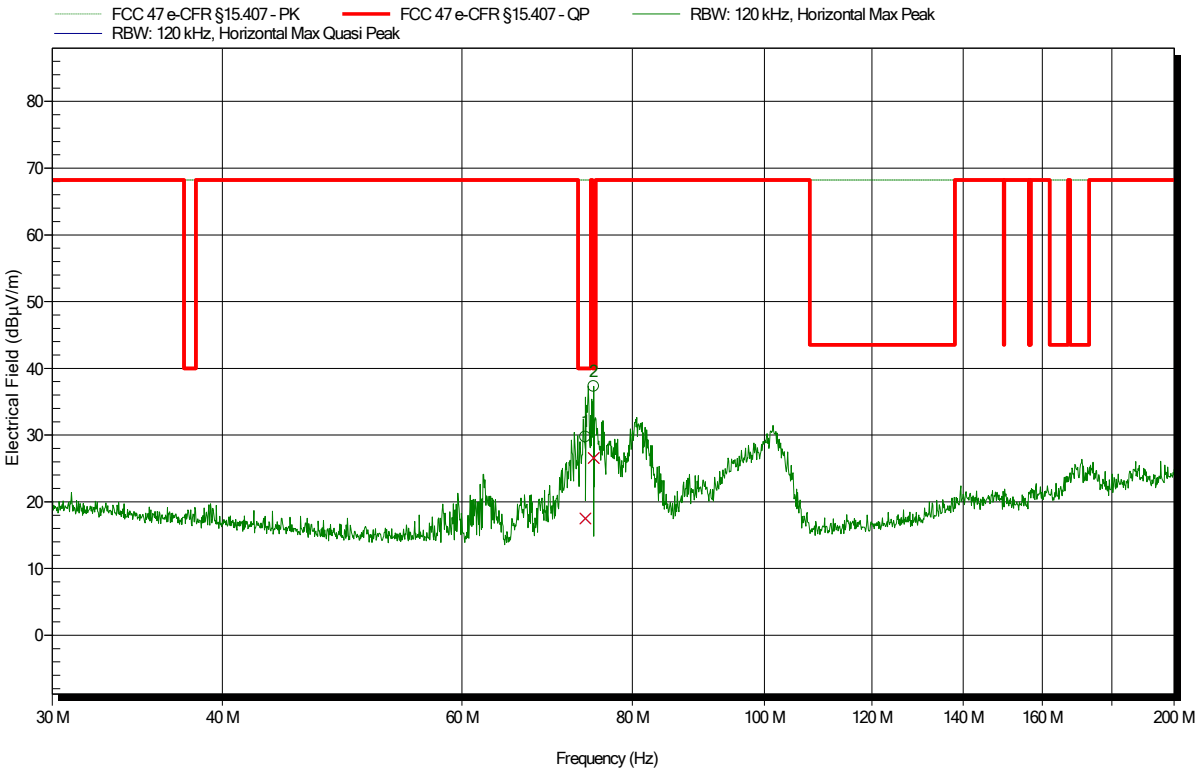


| Frequency | Quasi-Peak | Quasi-Peak Limit | Quasi-Peak Difference | Quasi-Peak Status | Height |
|---|---|---|---|---|---|
| 73.9184 MHz | 17.5 dBµV/m | 40 dBµV/m | -22.52 dB | Pass | 2.4 m |
| 74.9554 MHz | 26.6 dBµV/m | 40 dBµV/m | -13.42 dB | Pass | 2.75 m |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HK 116, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; CH157 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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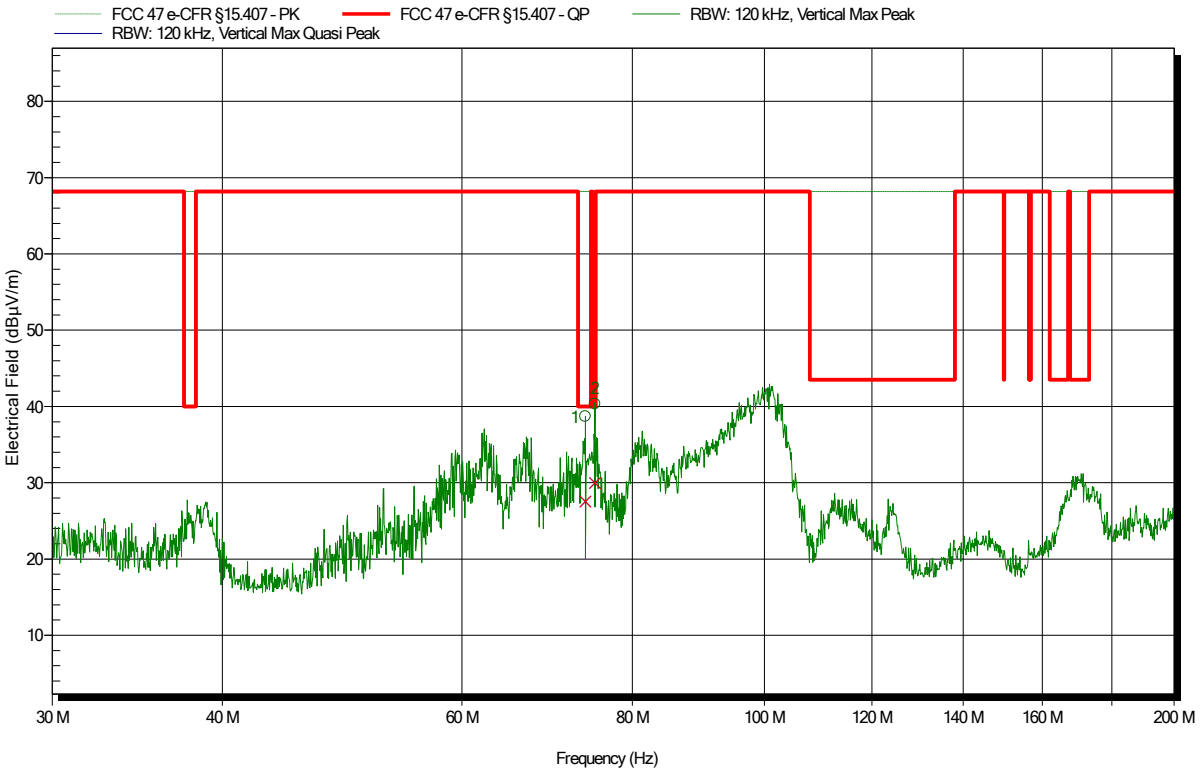


| Frequency | Quasi-Peak | Quasi-Peak Limit | Quasi-Peak Difference | Quasi-Peak Status | Height |
|---|---|---|---|---|---|
| 73.9057 MHz | 27.5 dBµV/m | 40 dBµV/m | -12.46 dB | Pass | 1.2 m |
| 75.0956 MHz | 30 dBµV/m | 40 dBµV/m | -10.04 dB | Pass | 1.2 m |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HL 223, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; CH157 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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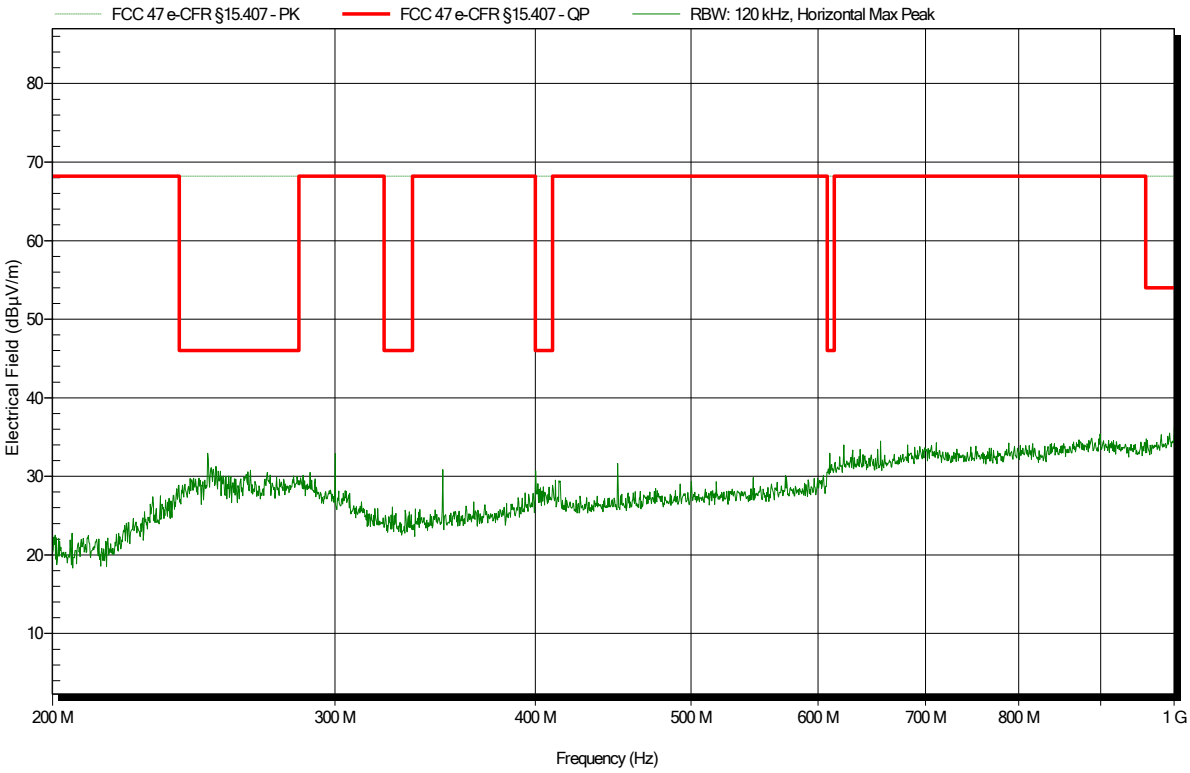

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HL 223, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; CH157 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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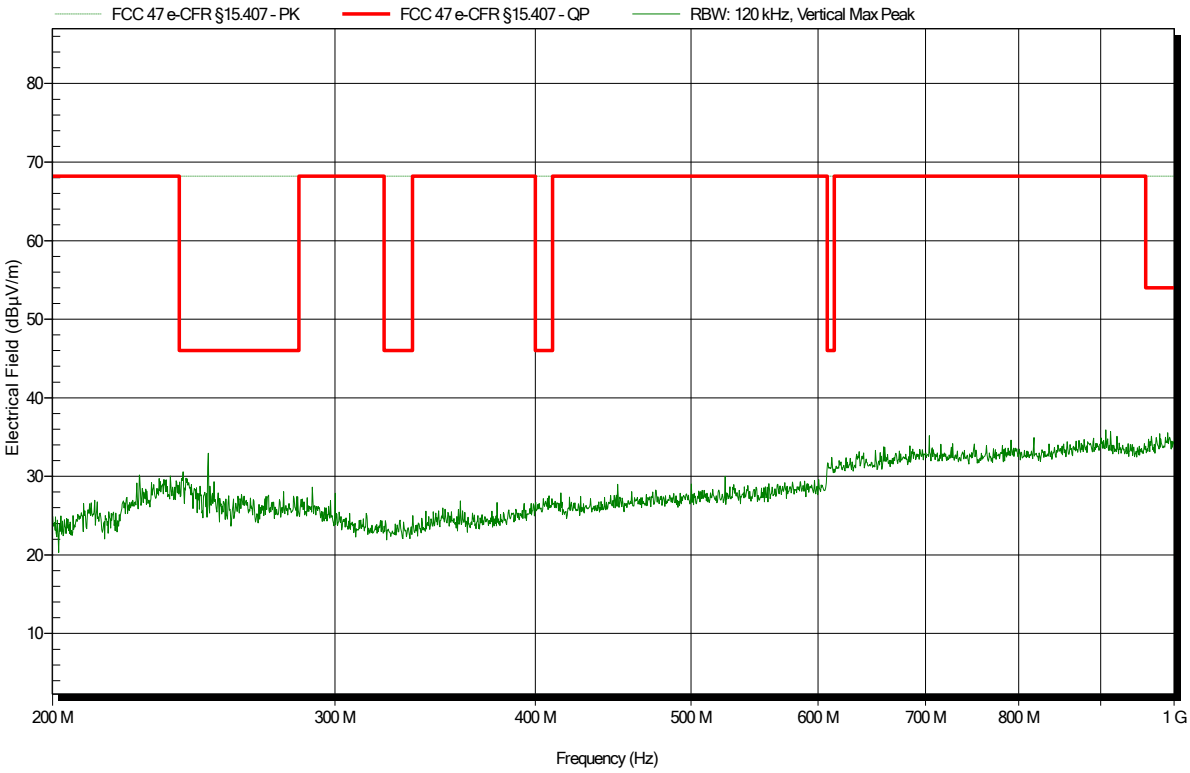

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HK 116, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; CH165 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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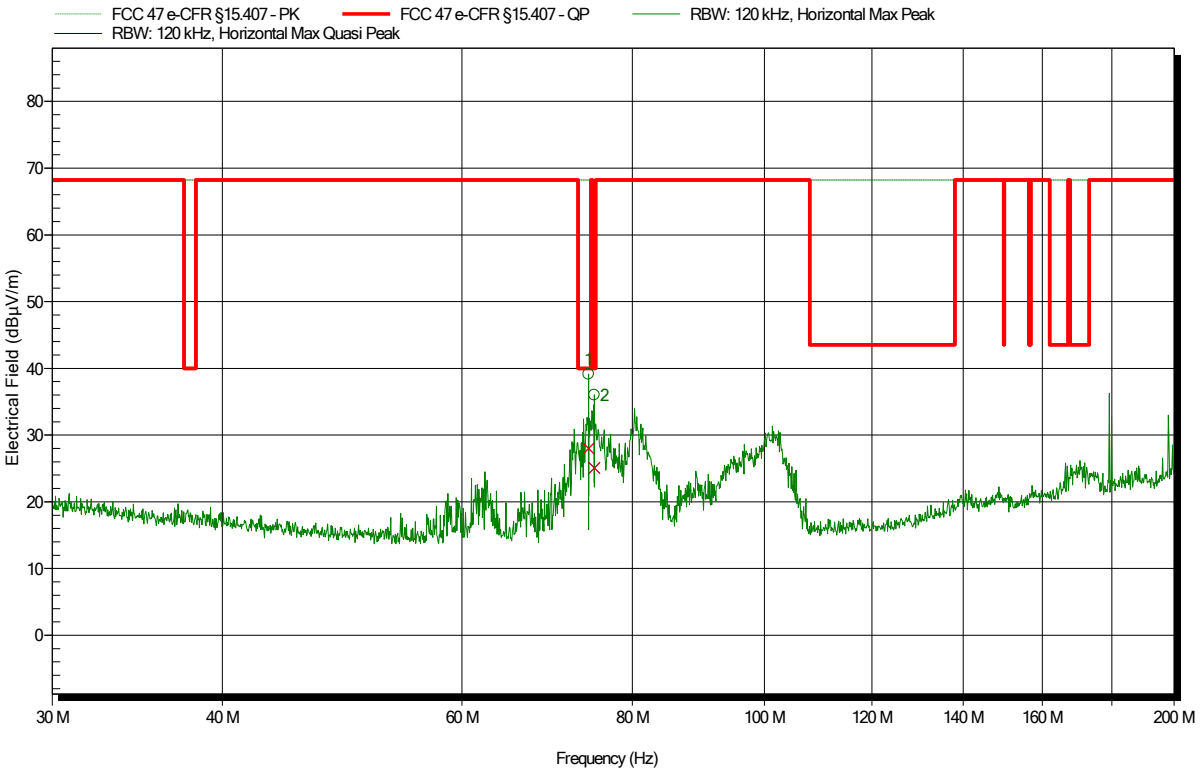


| Frequency | Quasi-Peak | Quasi-Peak Limit | Quasi-Peak Difference | Quasi-Peak Status | Height |
|---|---|---|---|---|---|
| 74.3009 MHz | 28 dBµV/m | 40 dBµV/m | -11.99 dB | Pass | 2.8 m |
| 75.0446 MHz | 25.1 dBµV/m | 40 dBµV/m | -14.91 dB | Pass | 3.8 m |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HK 116, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; CH165 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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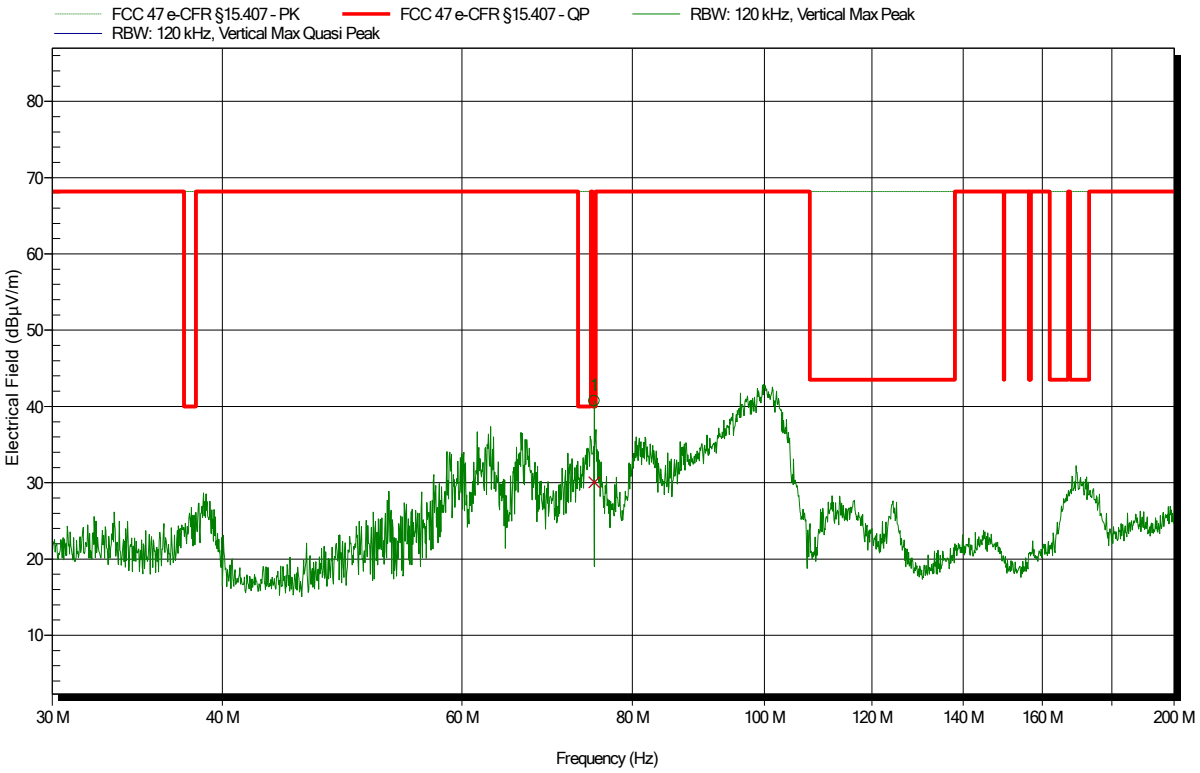


| Frequency | Quasi-Peak | Quasi-Peak Limit | Quasi-Peak Difference | Quasi-Peak Status | Height |
|---|---|---|---|---|---|
| 75.0489 MHz | 30 dBµV/m | 40 dBµV/m | -9.97 dB | Pass | 1 m |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HL 223, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; CH165 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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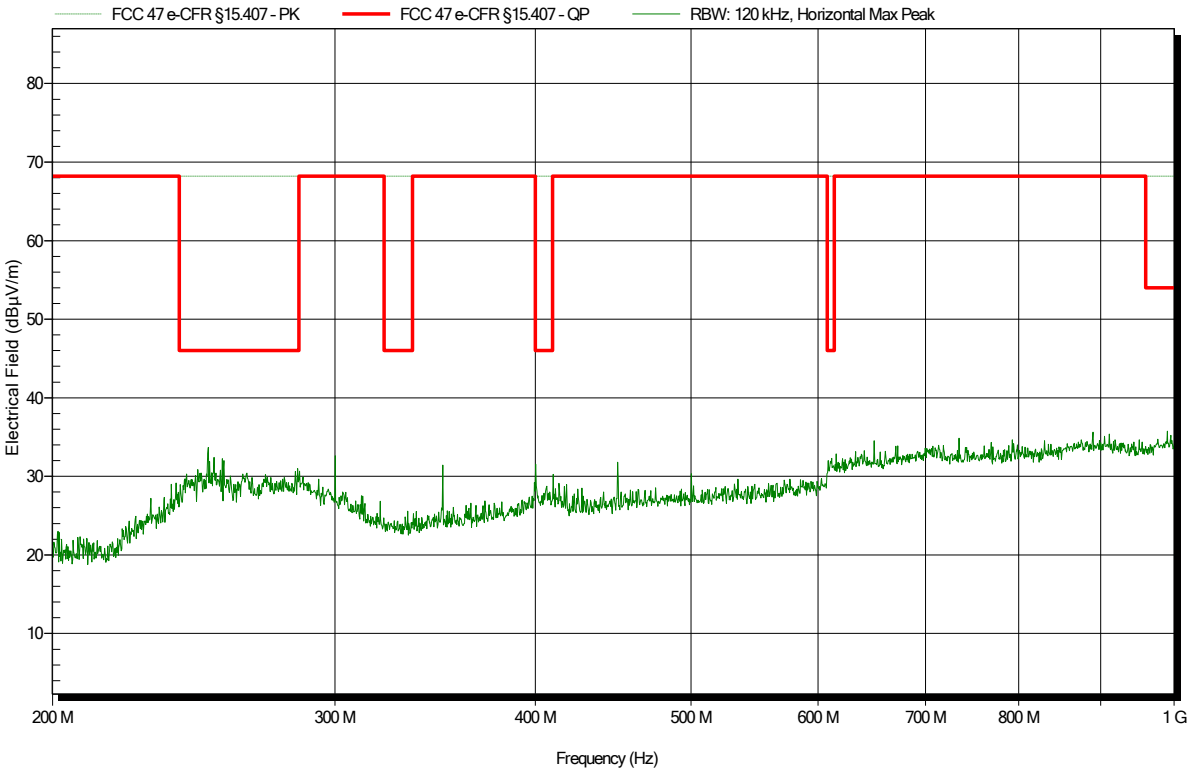

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Measurement software: | RadiMation, version 2016.1.10 |
| Test Conditions: | Tnom: 23.9°C, Vnom: 24.0 VDC (AC/DC-adapter) and 48.0 VDC PoE |
| Antenna: | Rohde & Schwarz HL 223, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; CH165 – Test Sample ID 29090 |
| Test Date: | 2020-04-28 |
| Note: | |

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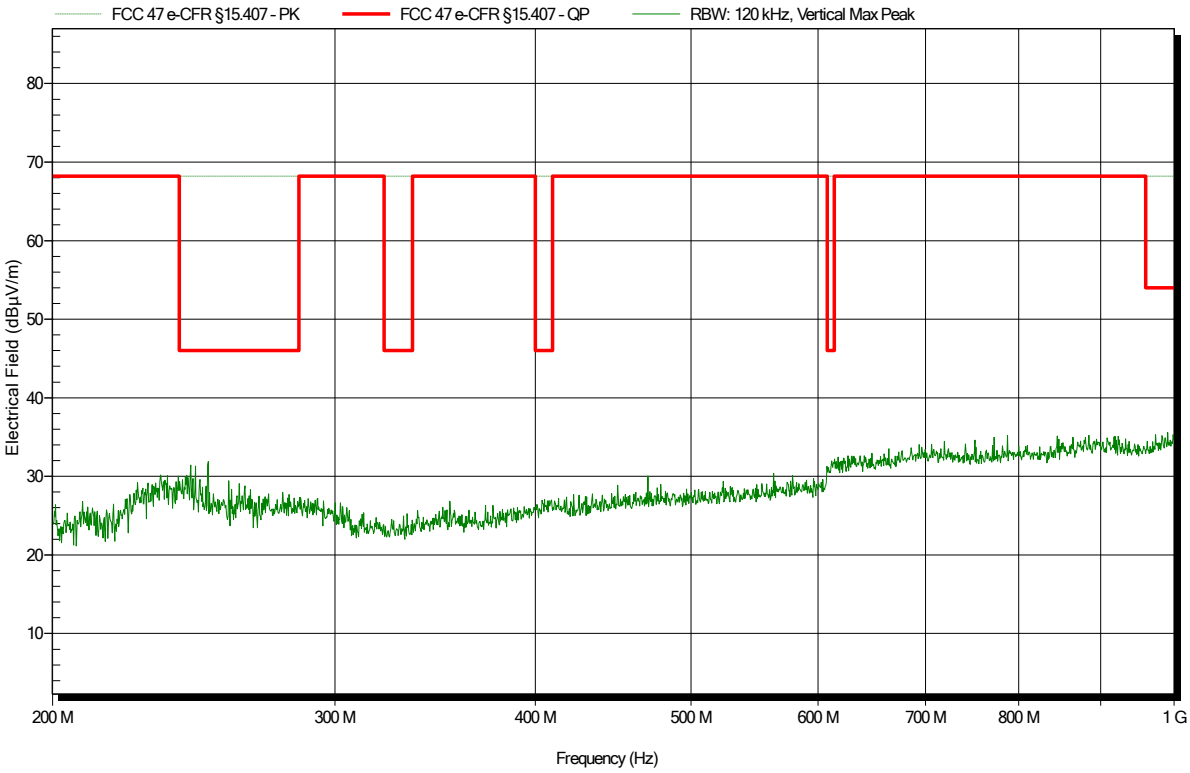

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 3 m |
| Mode: | TX; CH36 – EUT horizontal (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | lower band area |

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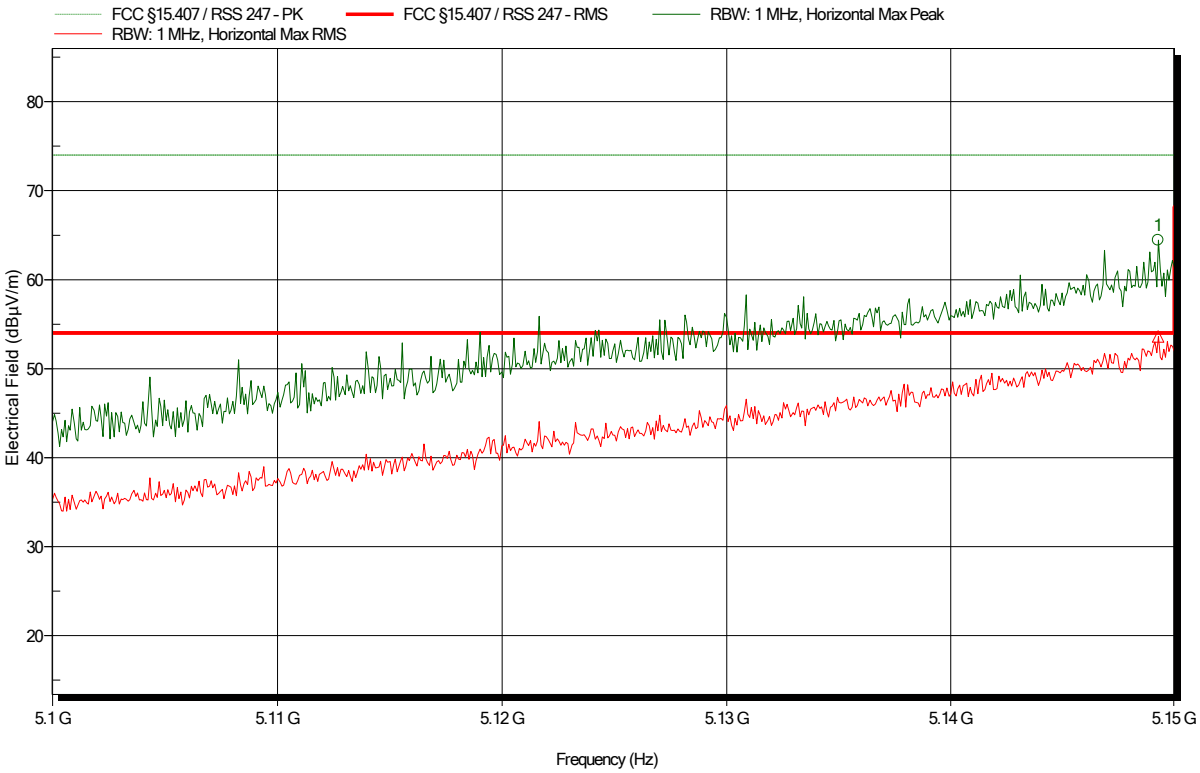


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 5.149 GHz | 64.44 dBµV/m | 54 dBµV/m | 10.44 dB | Fail |

| Frequency | RMS | RMS Limit | RMS Difference | RMS Status |
|---|---|---|---|---|
| 5.149 GHz | 53.63 dBµV/m | 54 dBµV/m | -0.37 dB | Pass |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 3 m |
| Mode: | TX; CH36 – EUT horizontal (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | lower band area |

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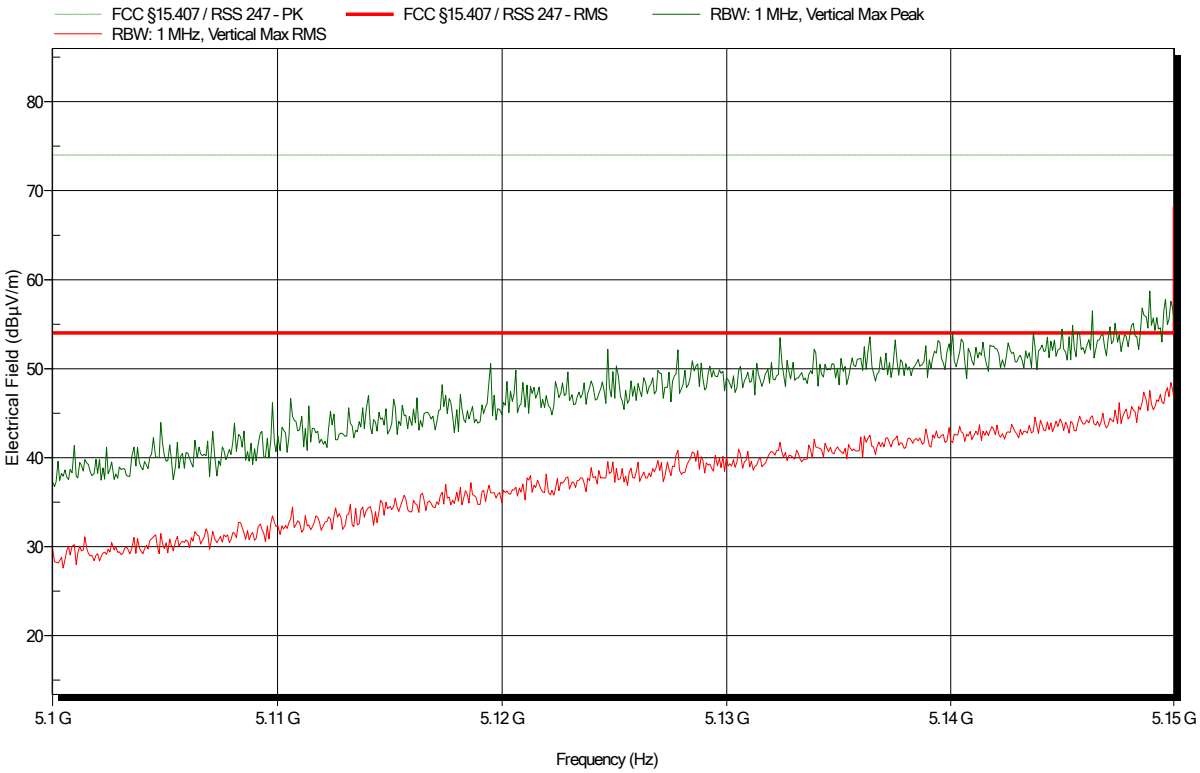

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH36 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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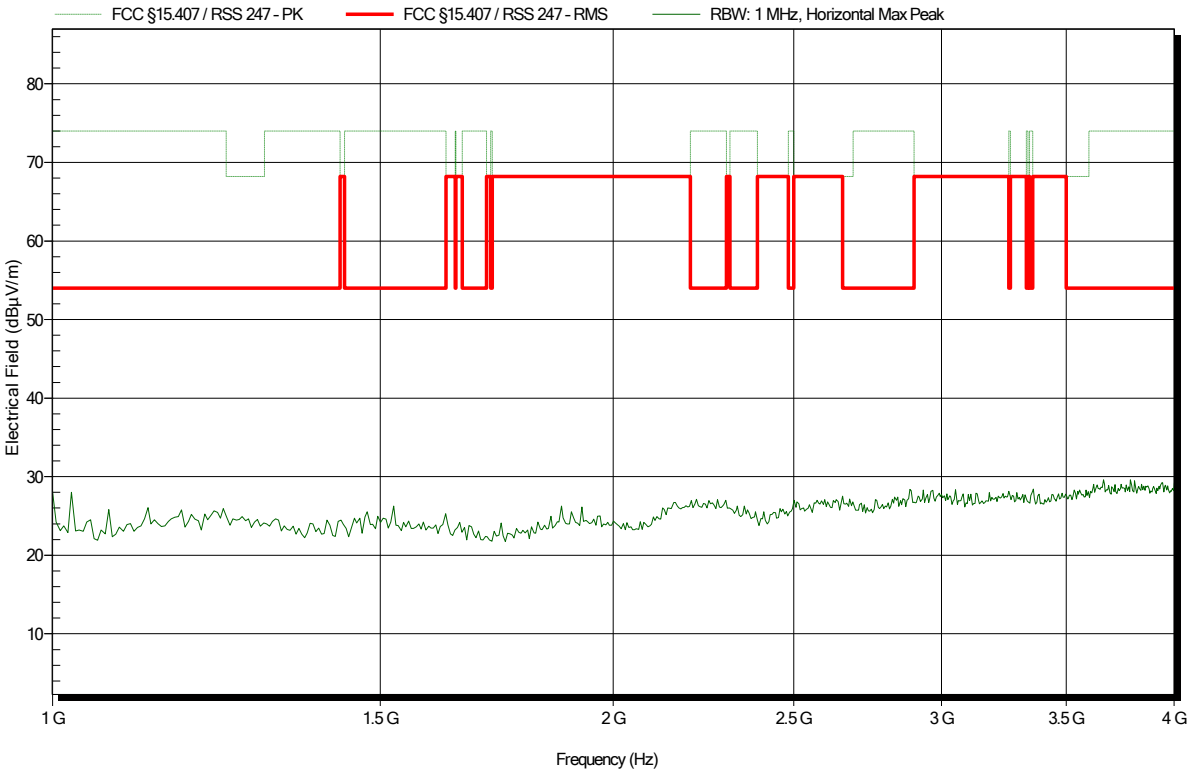

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH36 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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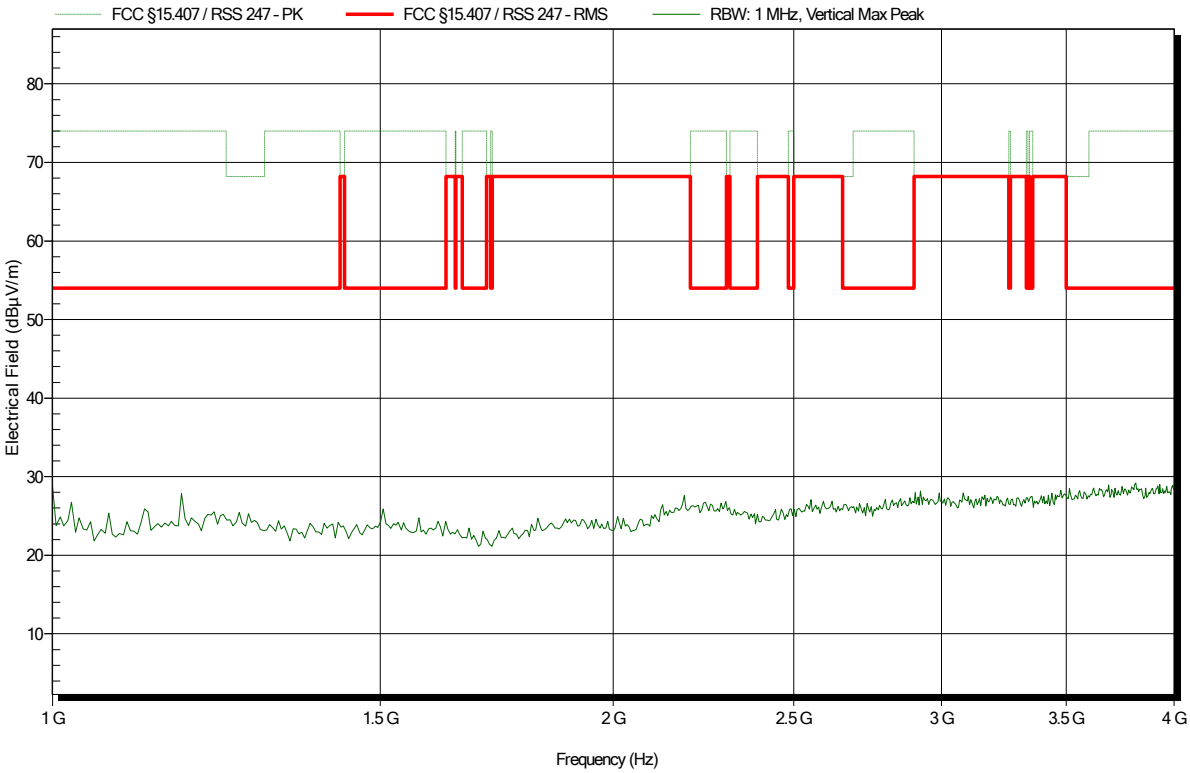

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH36 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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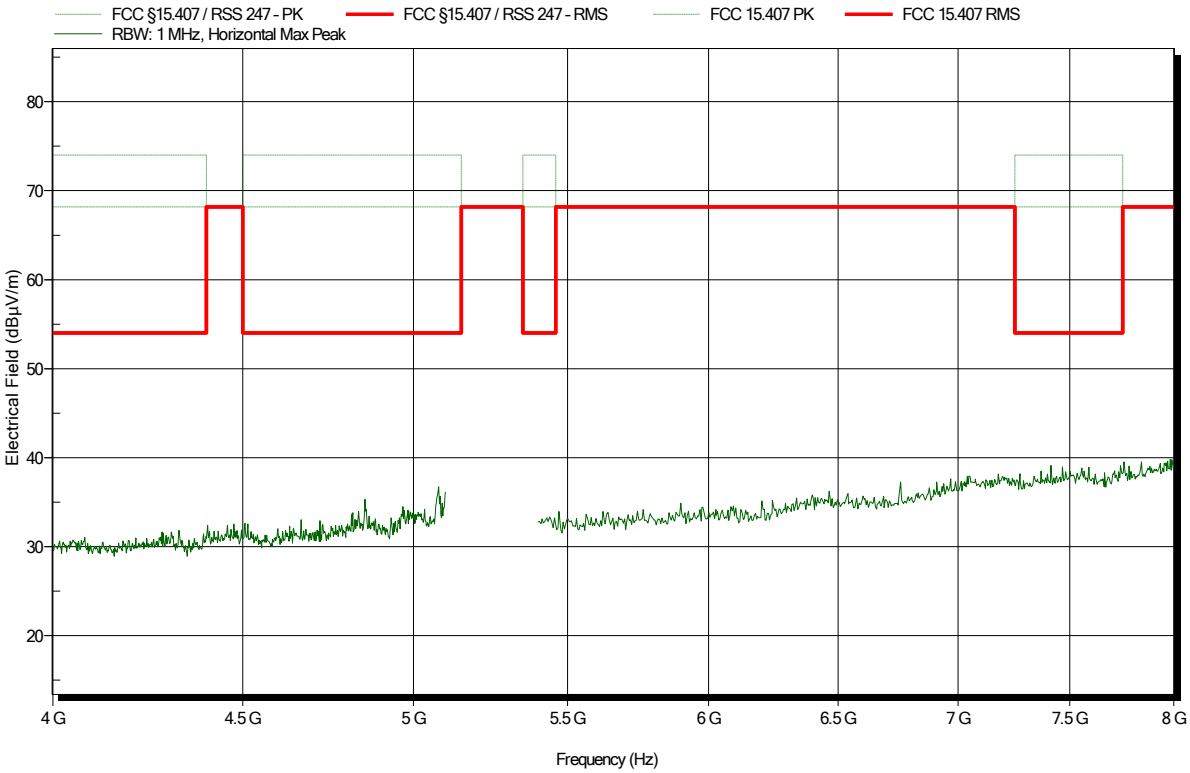

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH36 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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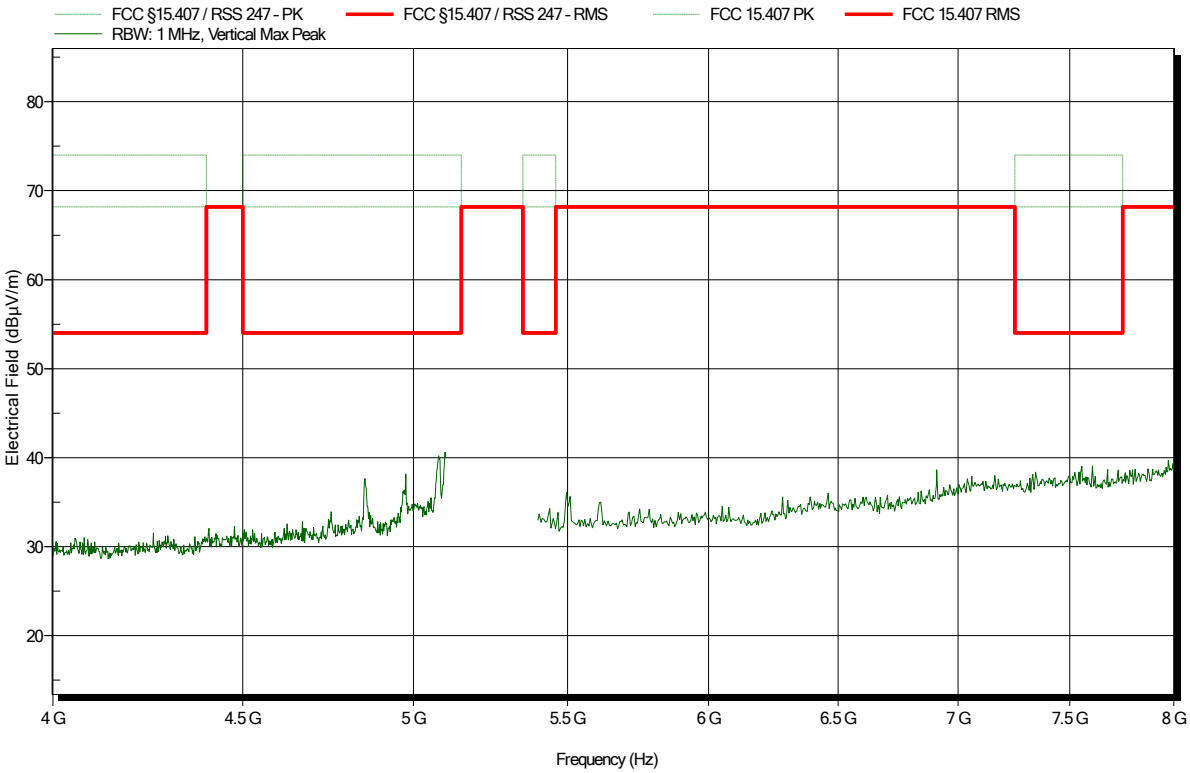

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH36 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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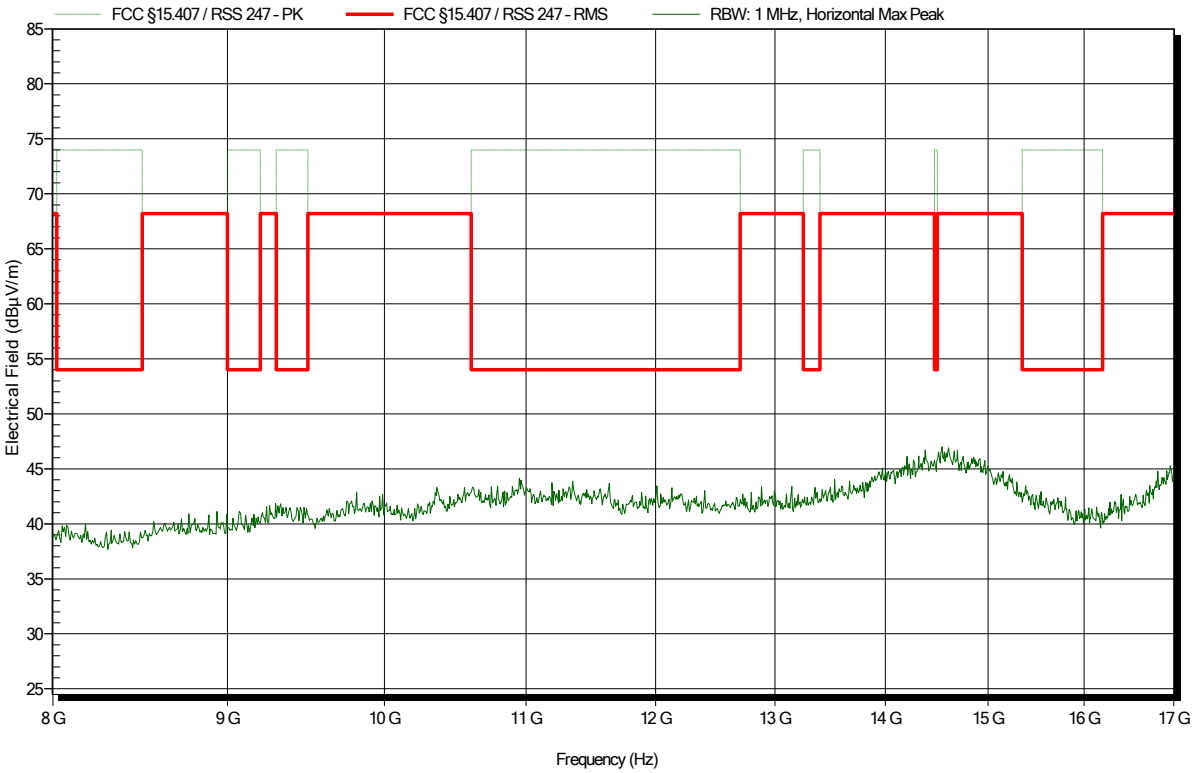

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH36 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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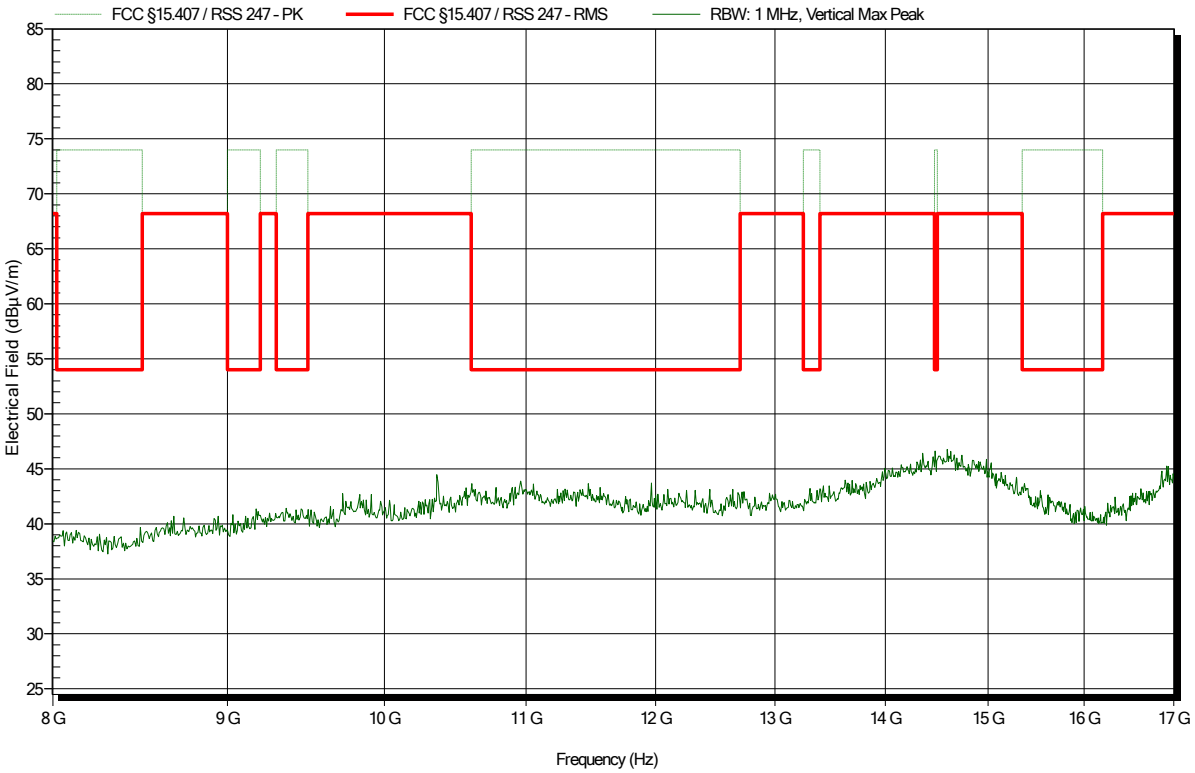

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH40 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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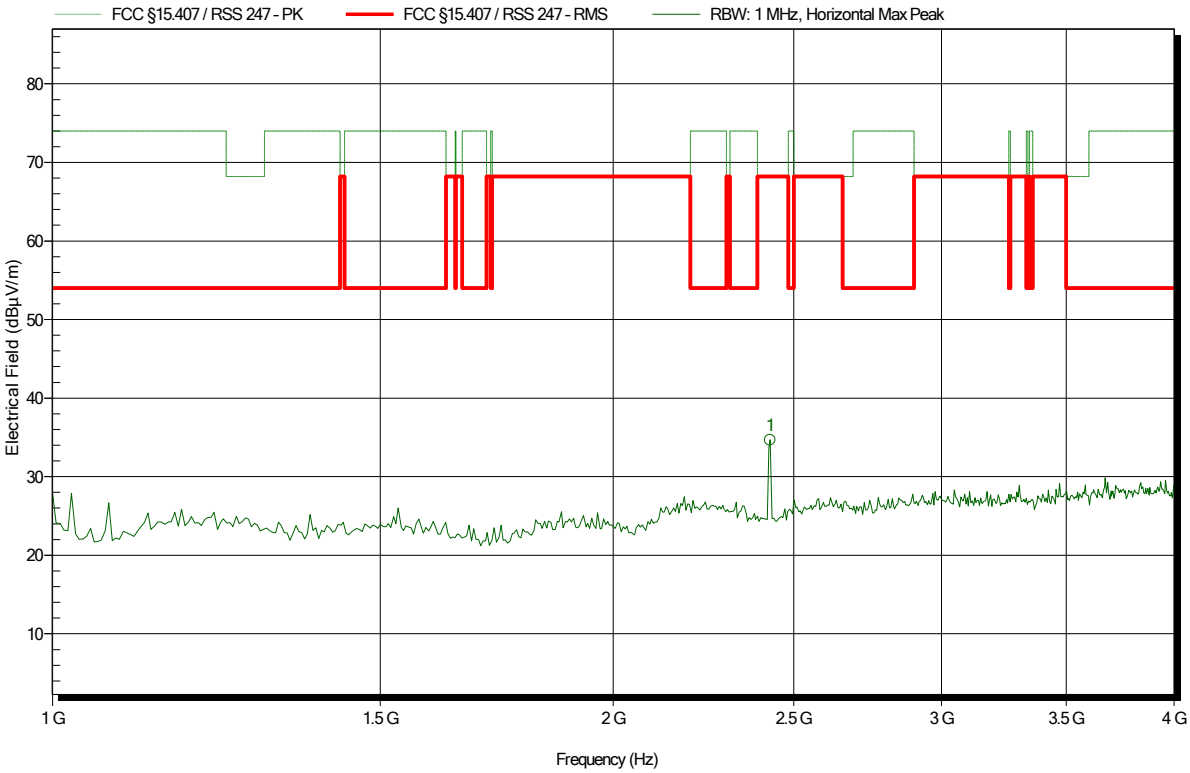


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 2.428 GHz | 34.67 dBµV/m | 68.2 dBµV/m | -33.53 dB | Pass |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH40 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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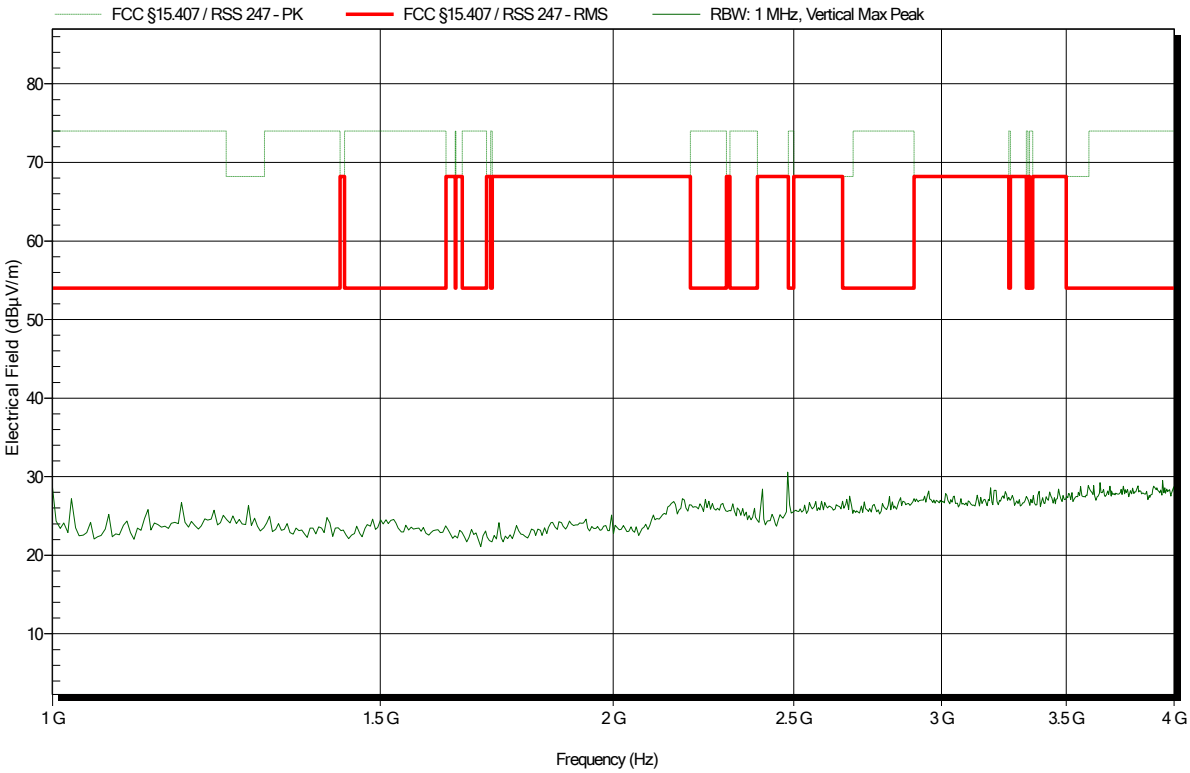

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH40 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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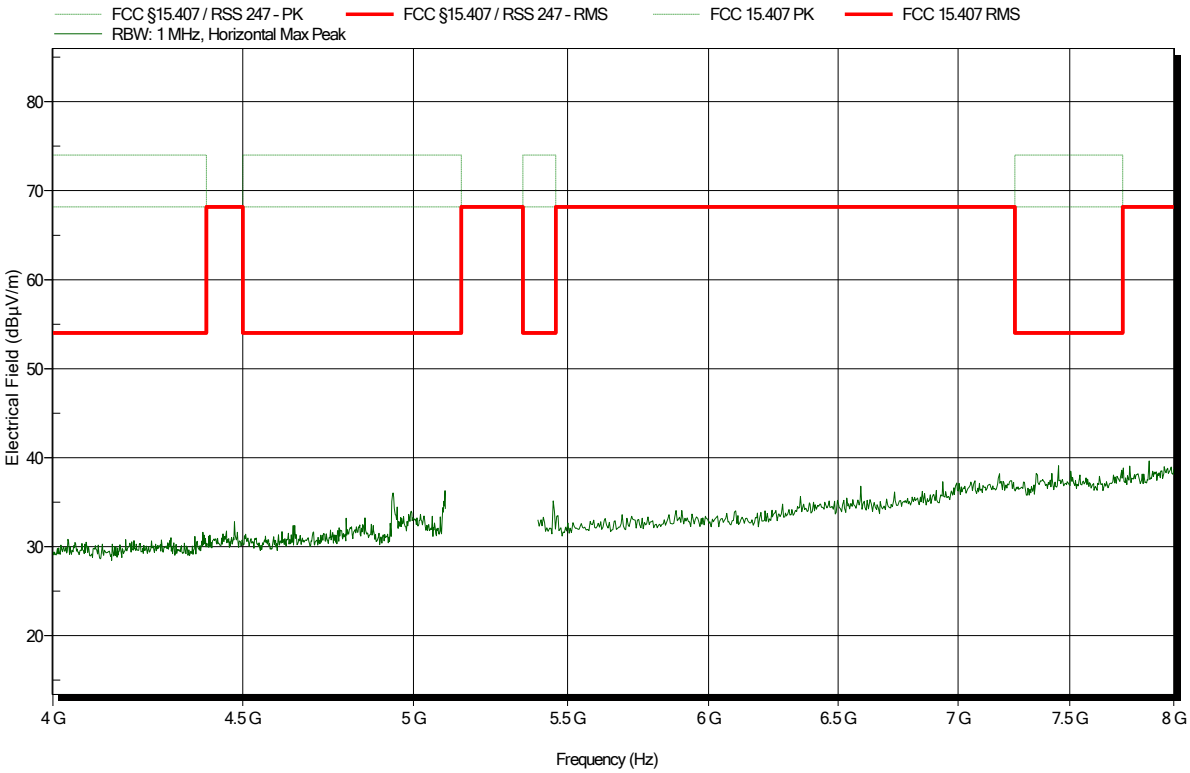

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| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH40 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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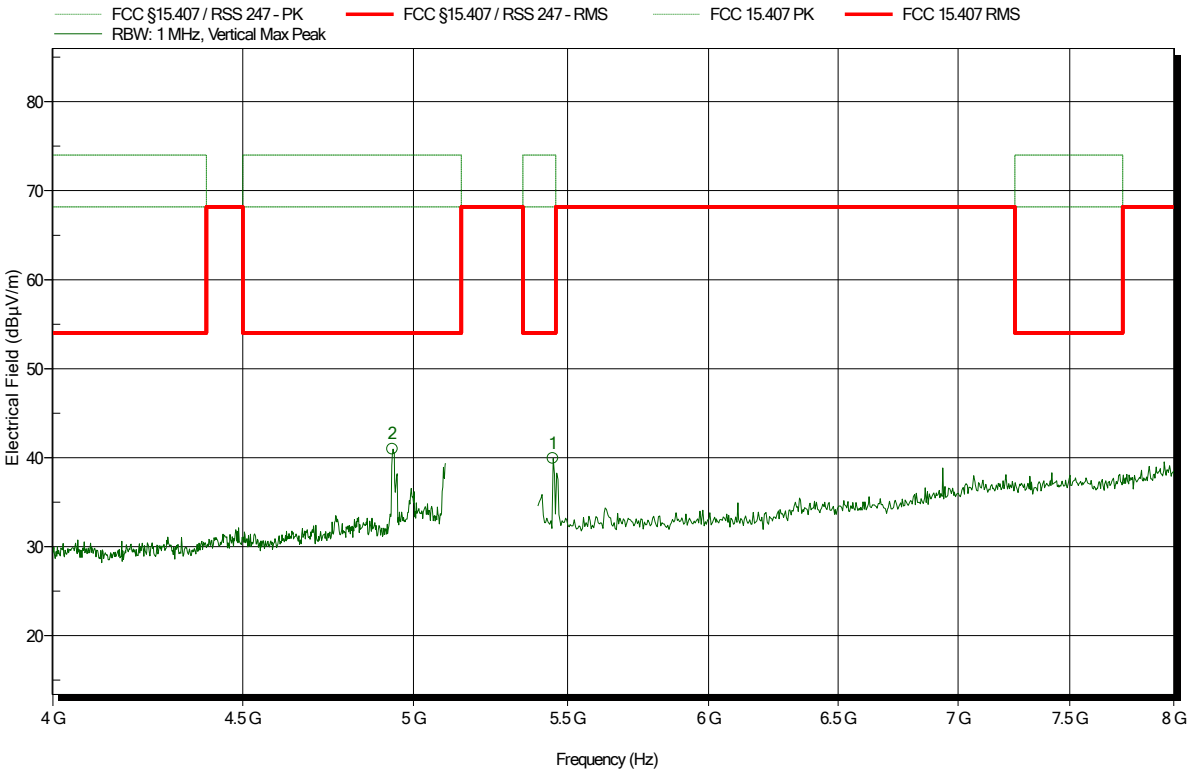


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 4.936 GHz | 40.97 dBµV/m | 54 dBµV/m | -13.03 dB | Pass |
| 5.45 GHz | 39.93 dBµV/m | 54 dBµV/m | -14.07 dB | Pass |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
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| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH40 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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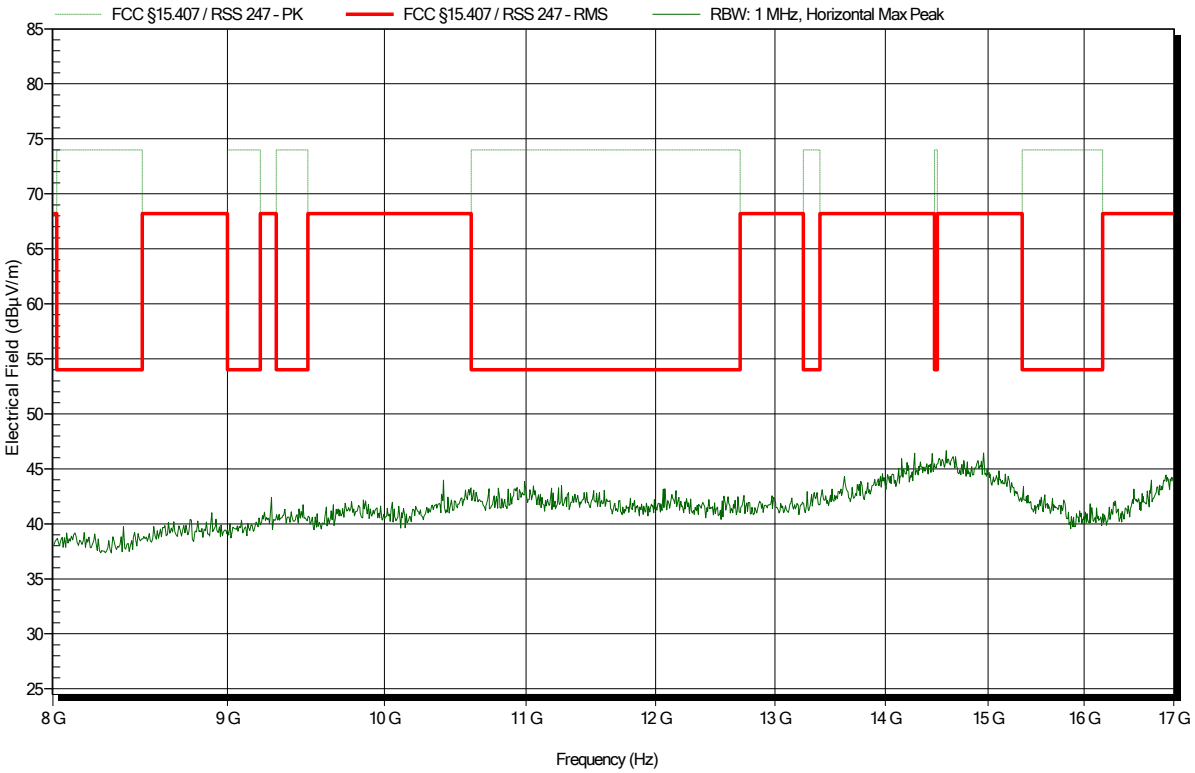

**Spurious emissions according to FCC 47 CFR 15.407**

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|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH40 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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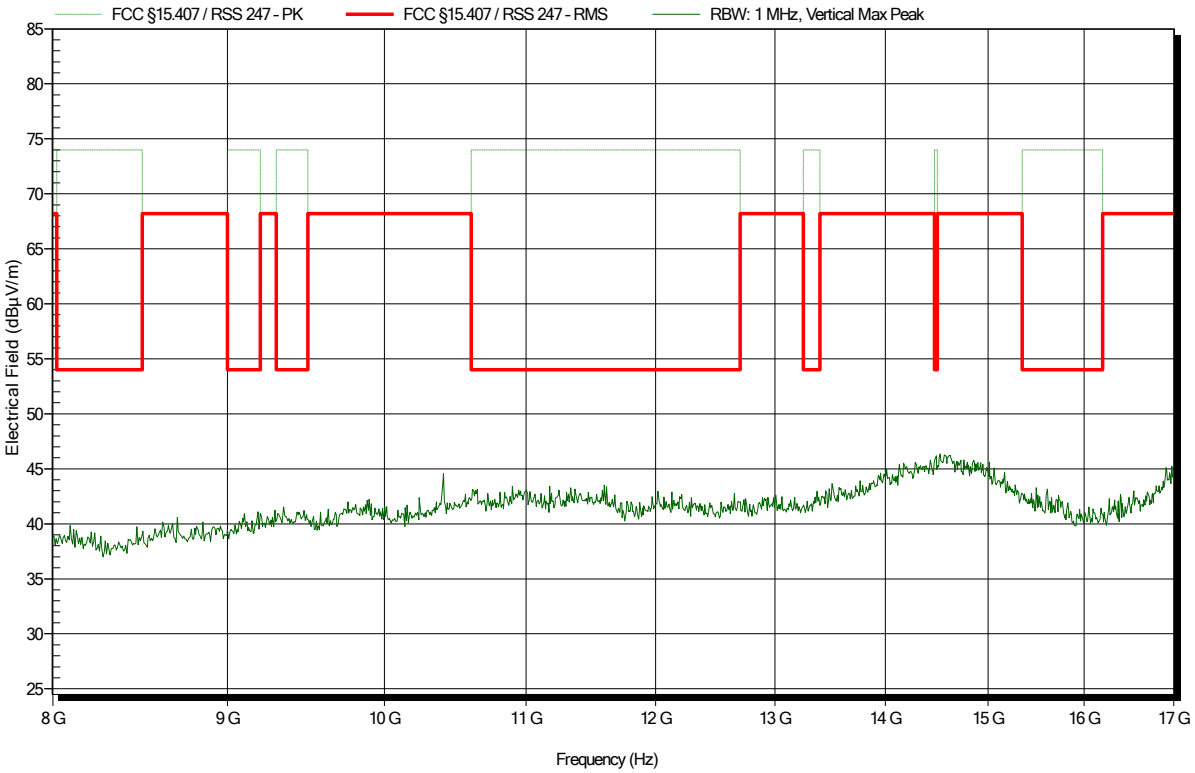

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH48 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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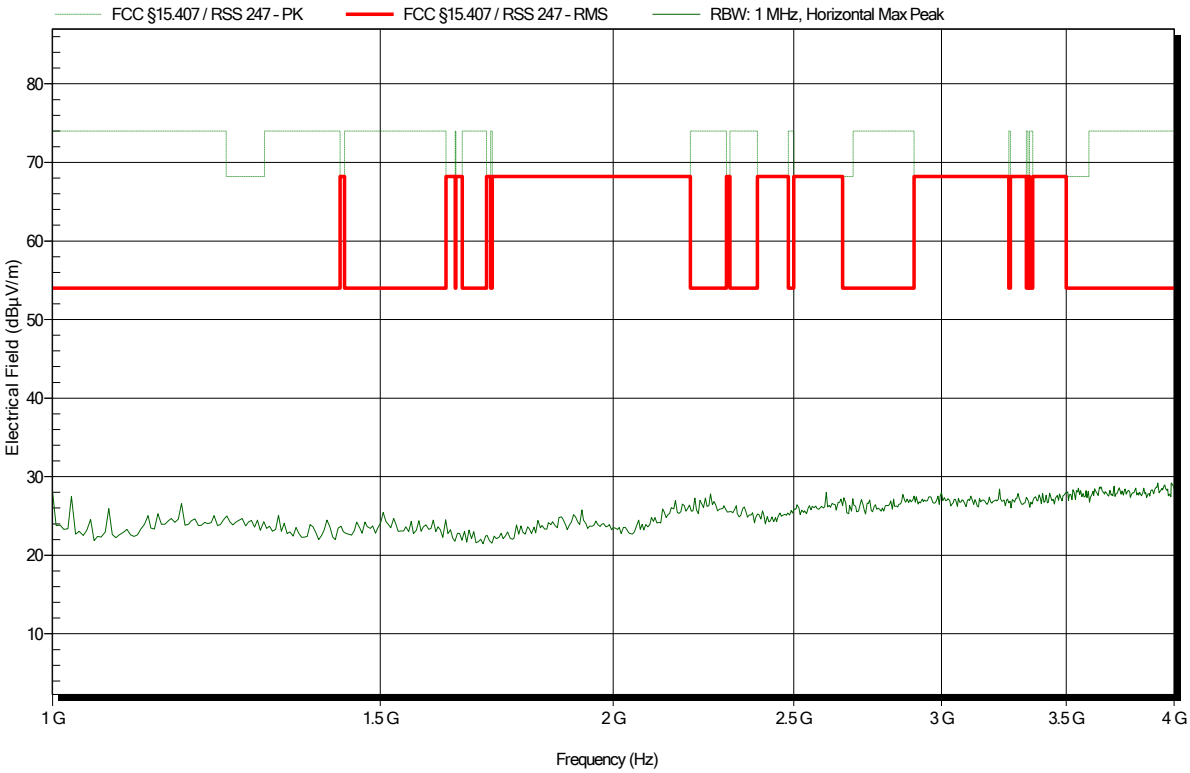

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH48 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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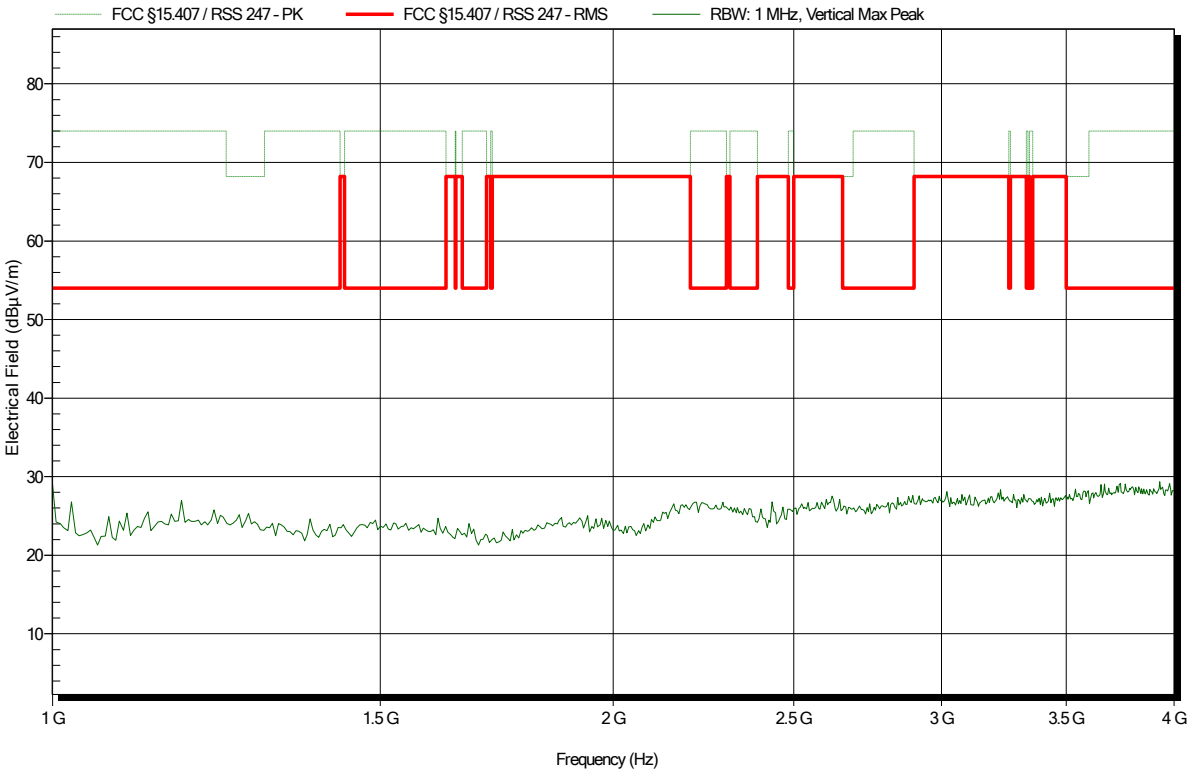

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH48 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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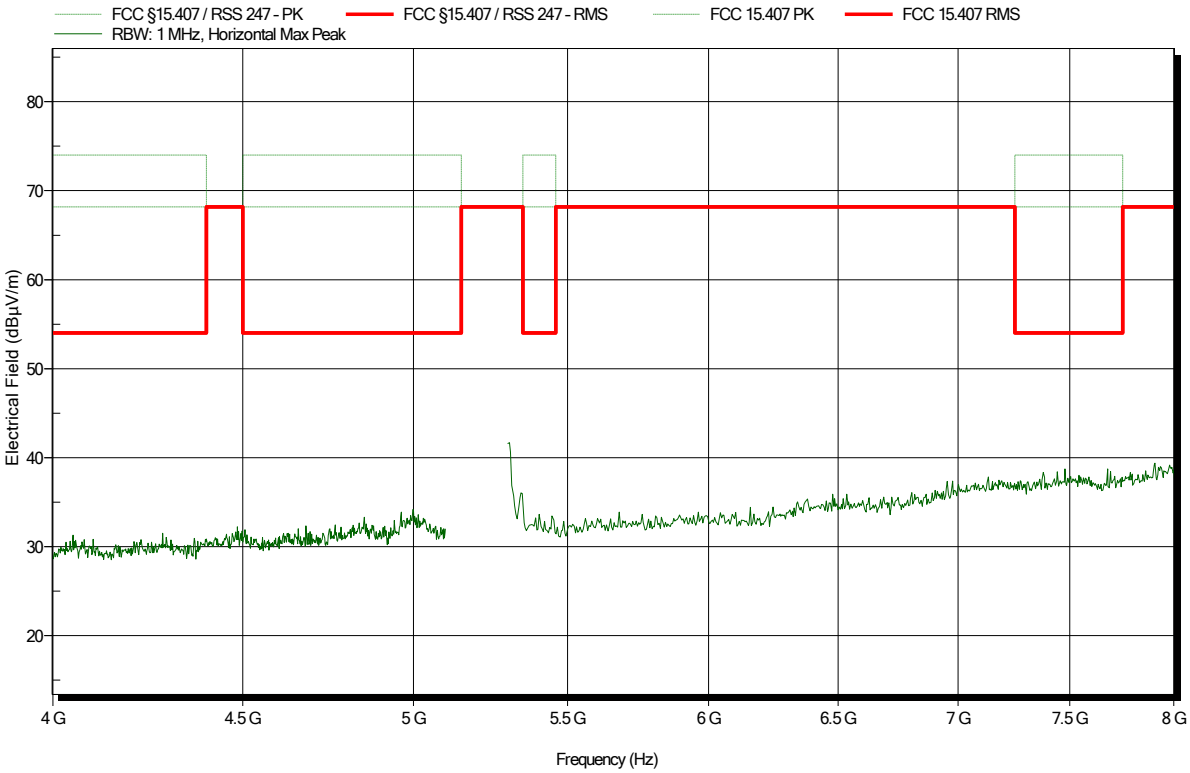

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH48 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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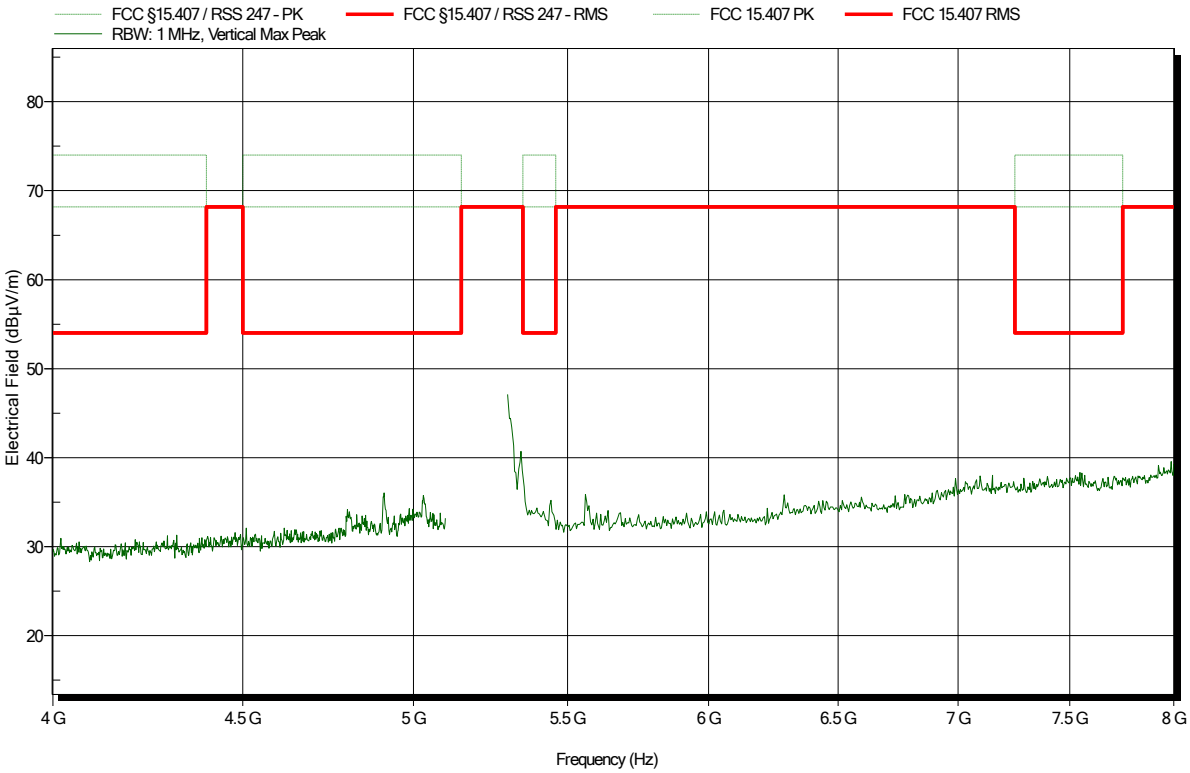

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH48 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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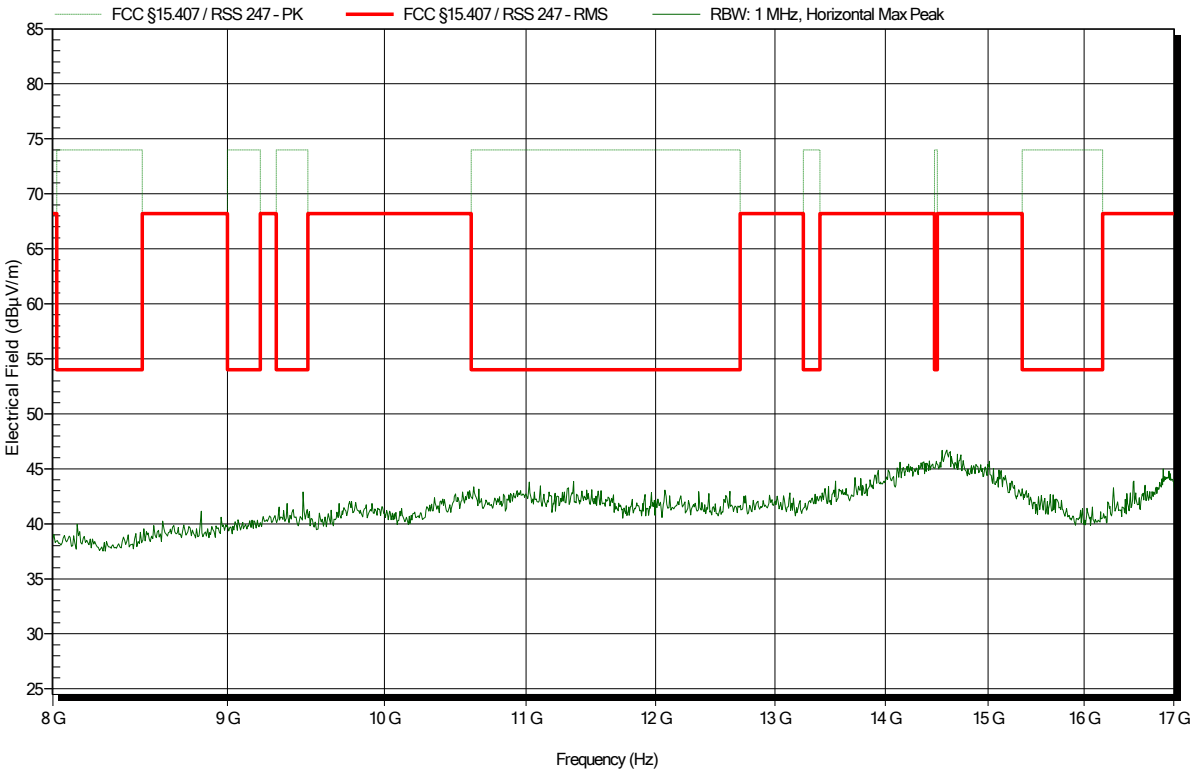

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 24.8°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH48 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-11 |
| Note: | |

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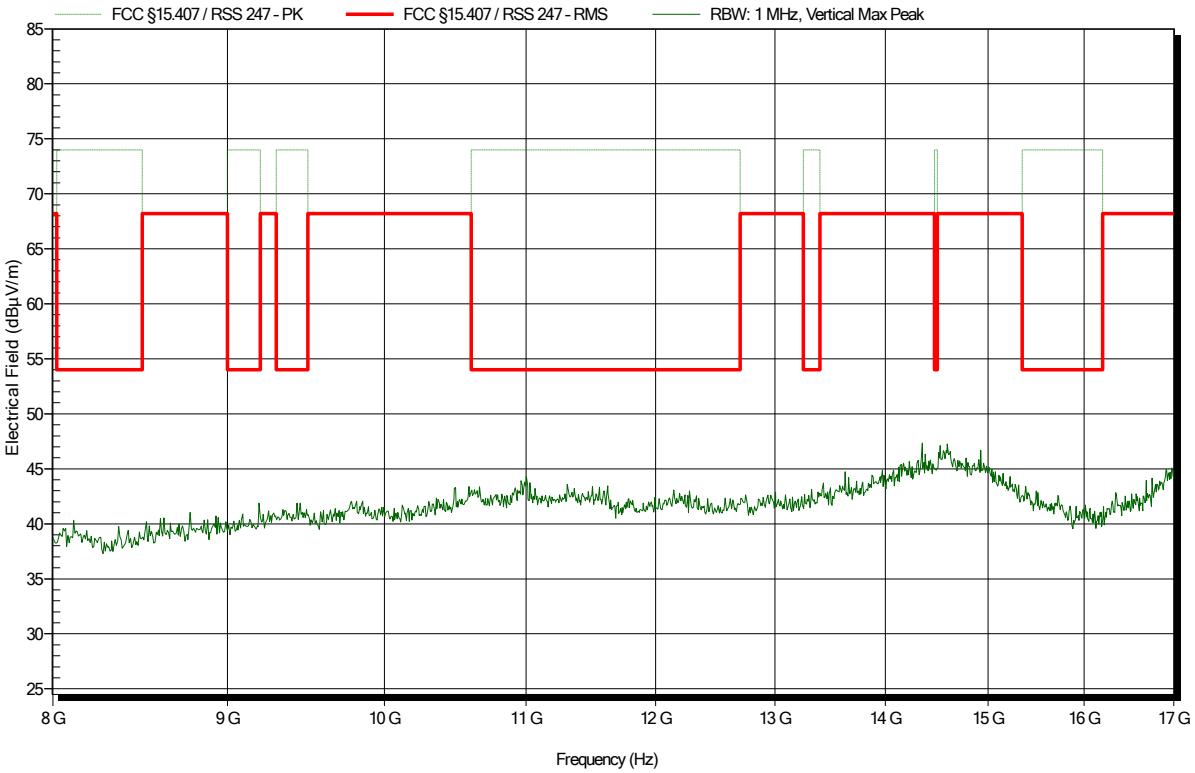

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT horizontal (antenna 0°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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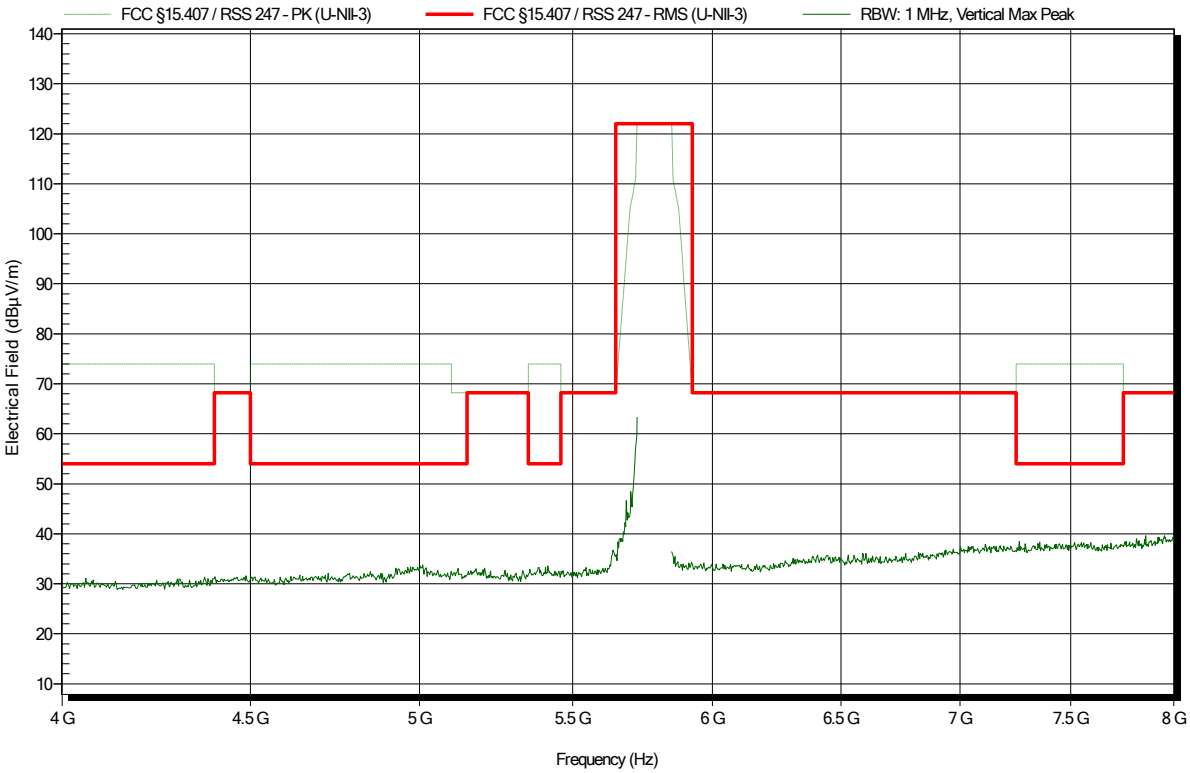

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| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT horizontal (antenna 0°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | lower band area |

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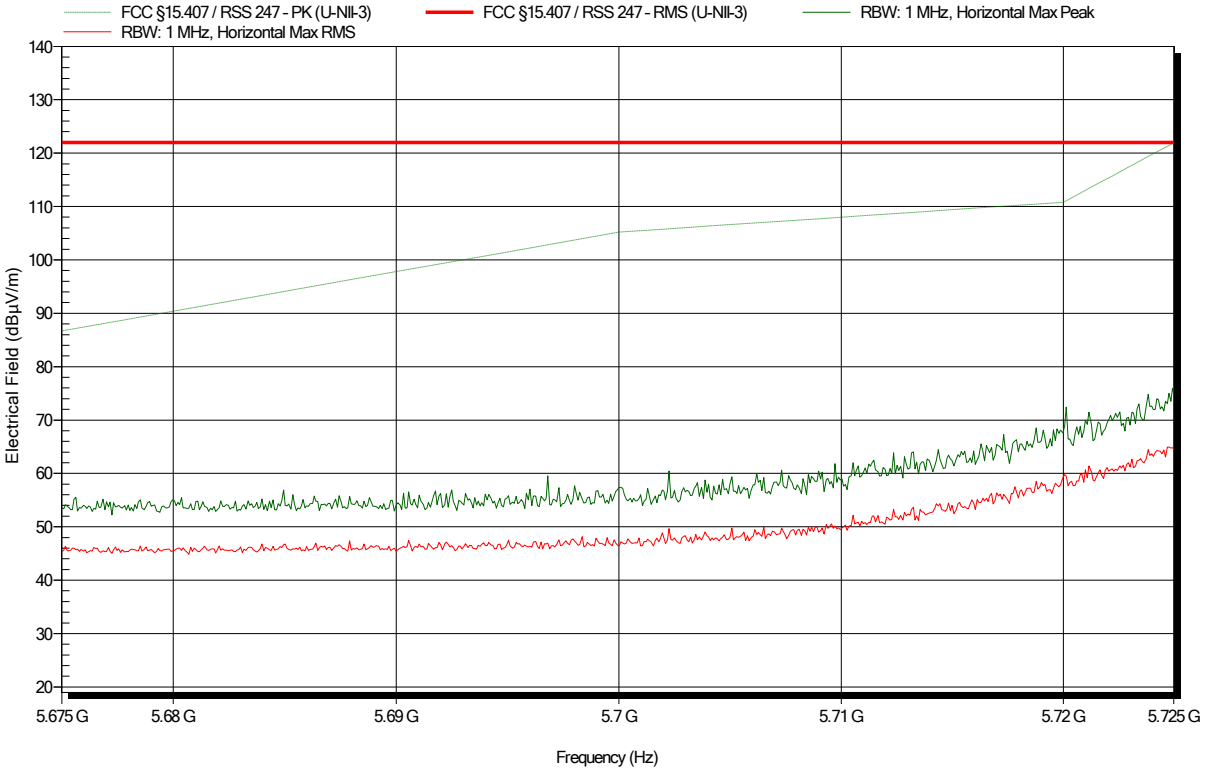

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT horizontal (antenna 0°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | lower band area |

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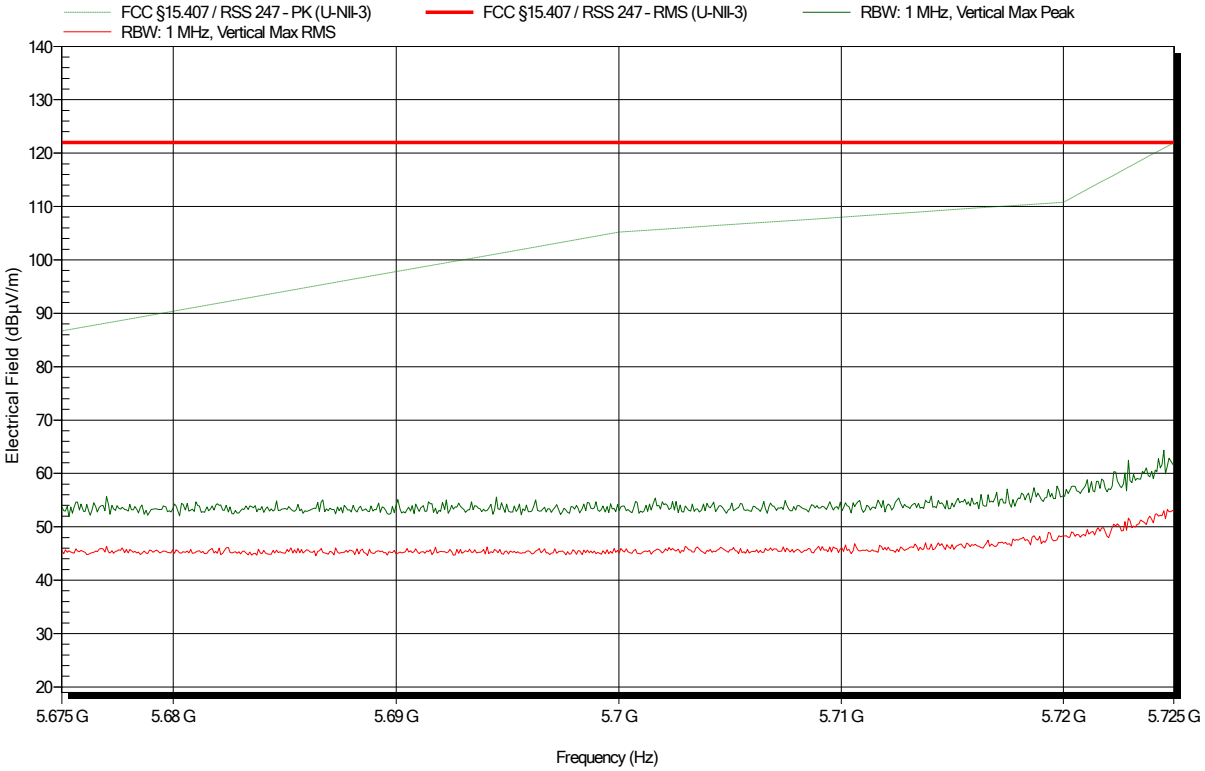

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT horizontal (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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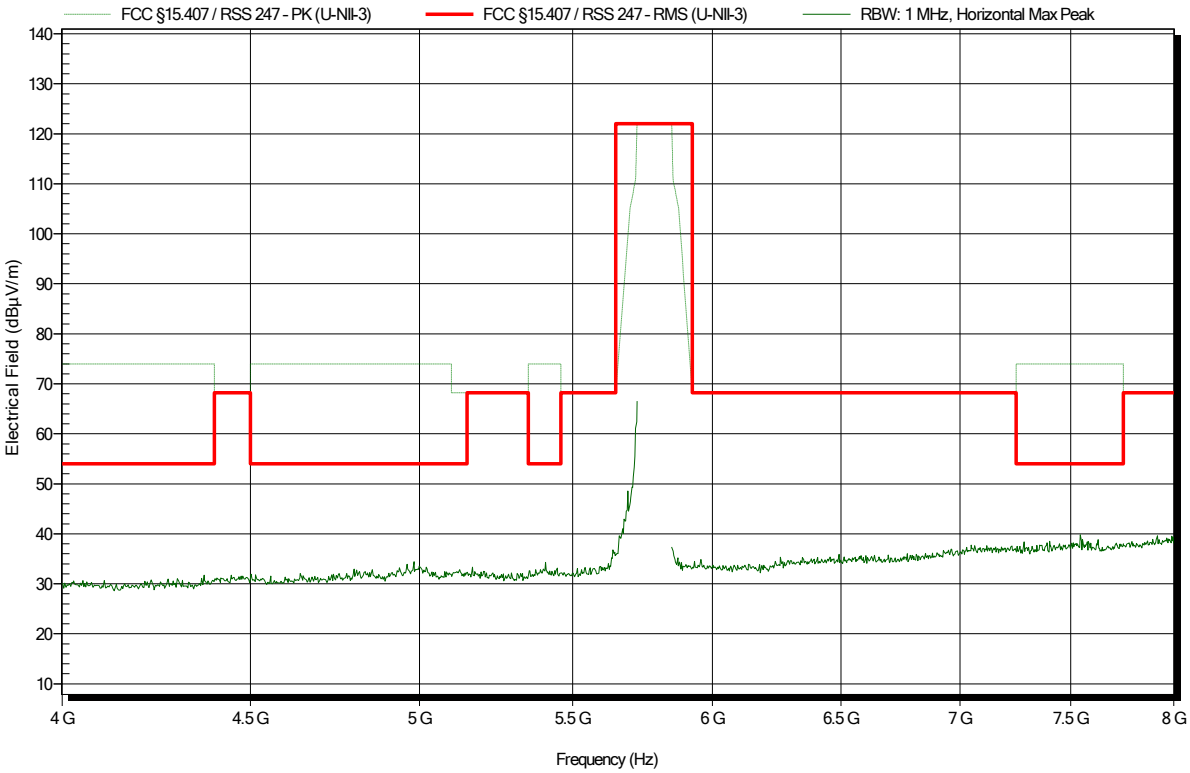

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT horizontal (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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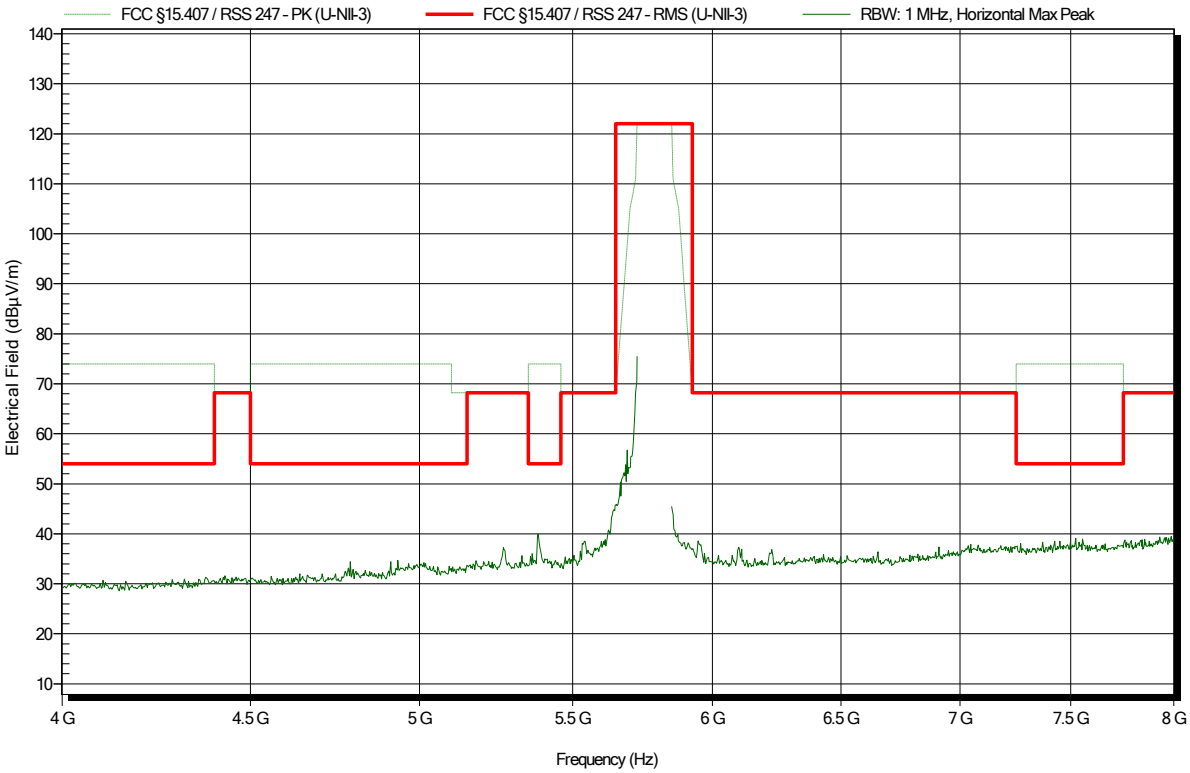

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT horizontal (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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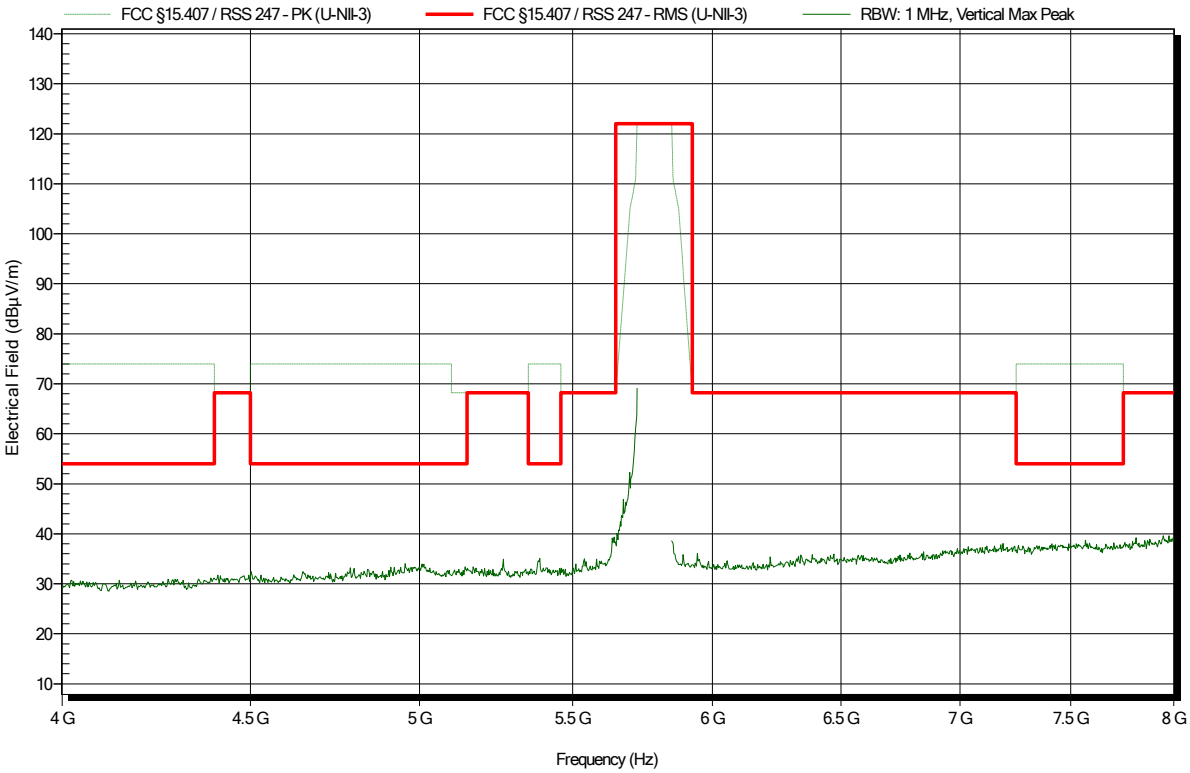

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT horizontal (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | lower band area |

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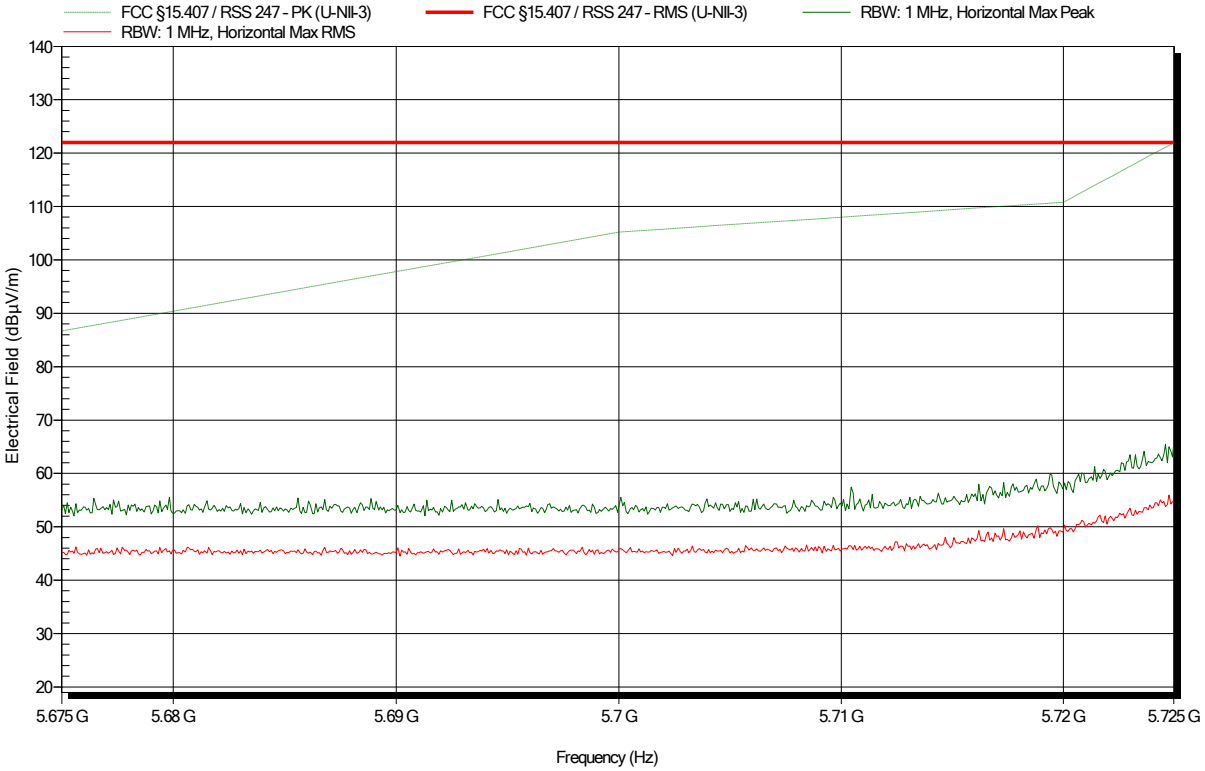

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT horizontal (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | lower band area |

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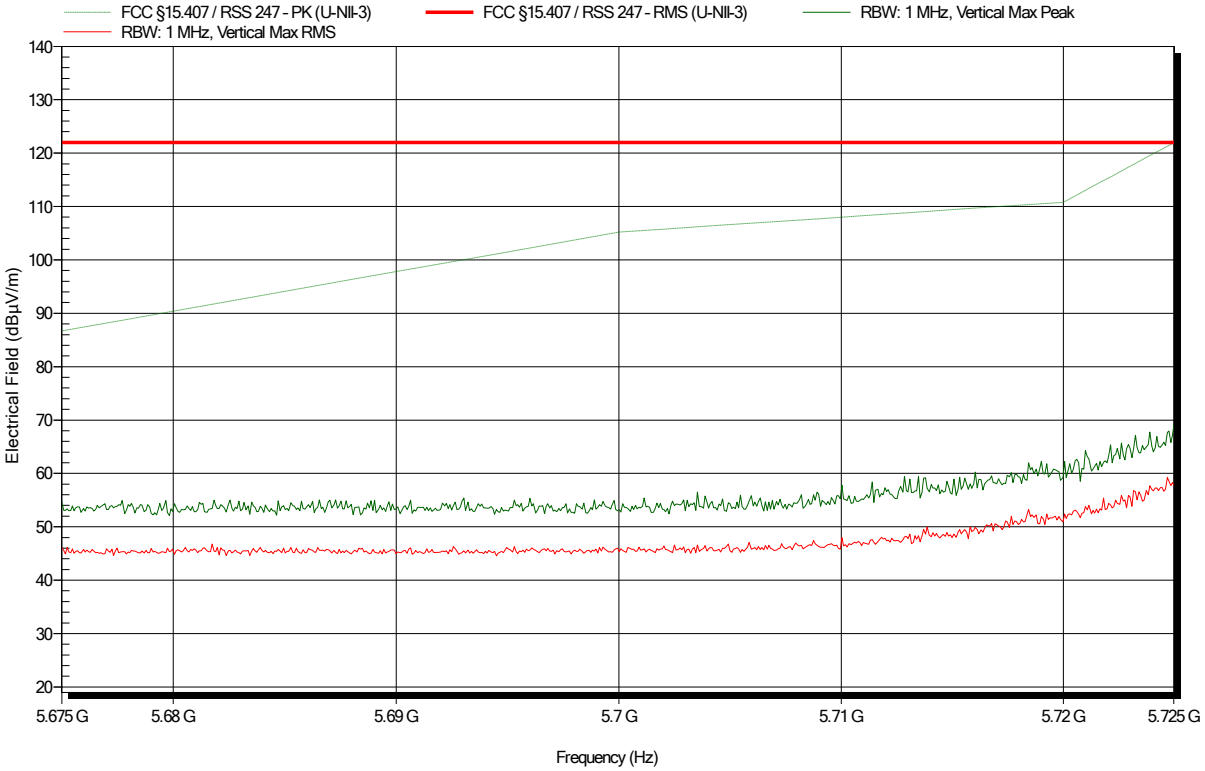

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT vertical (antenna 0°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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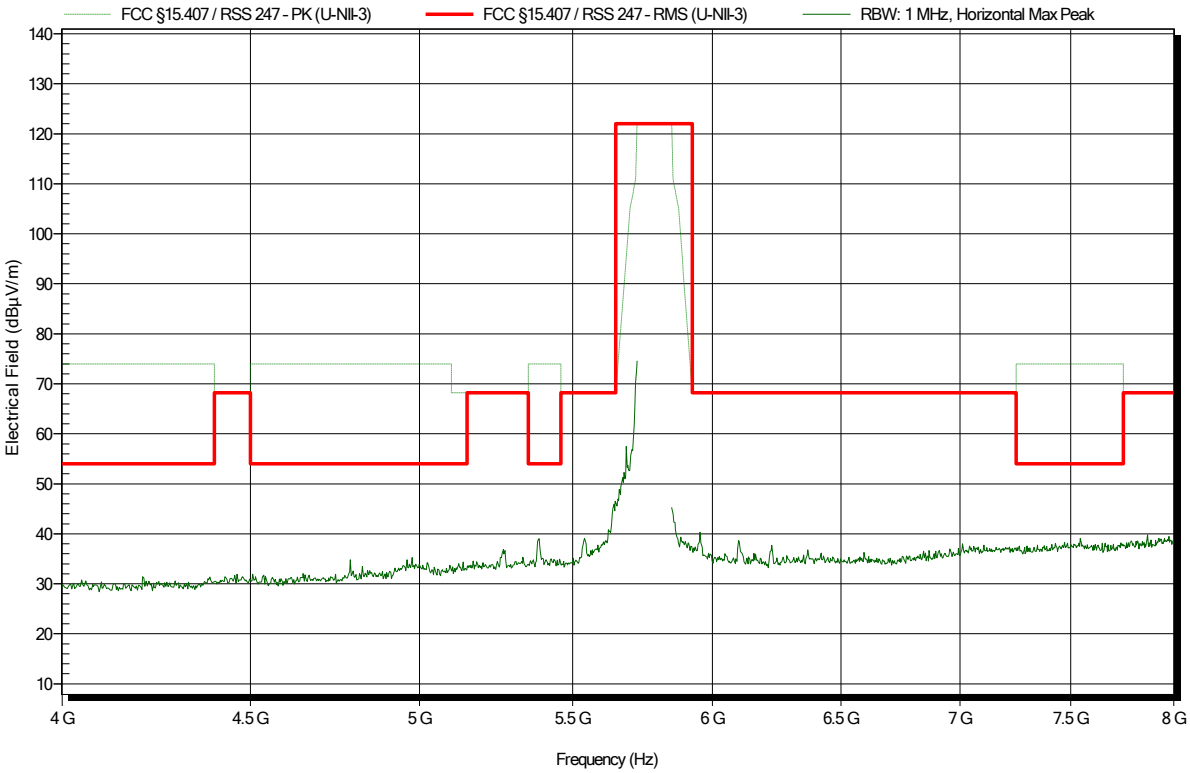

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT vertical (antenna 0°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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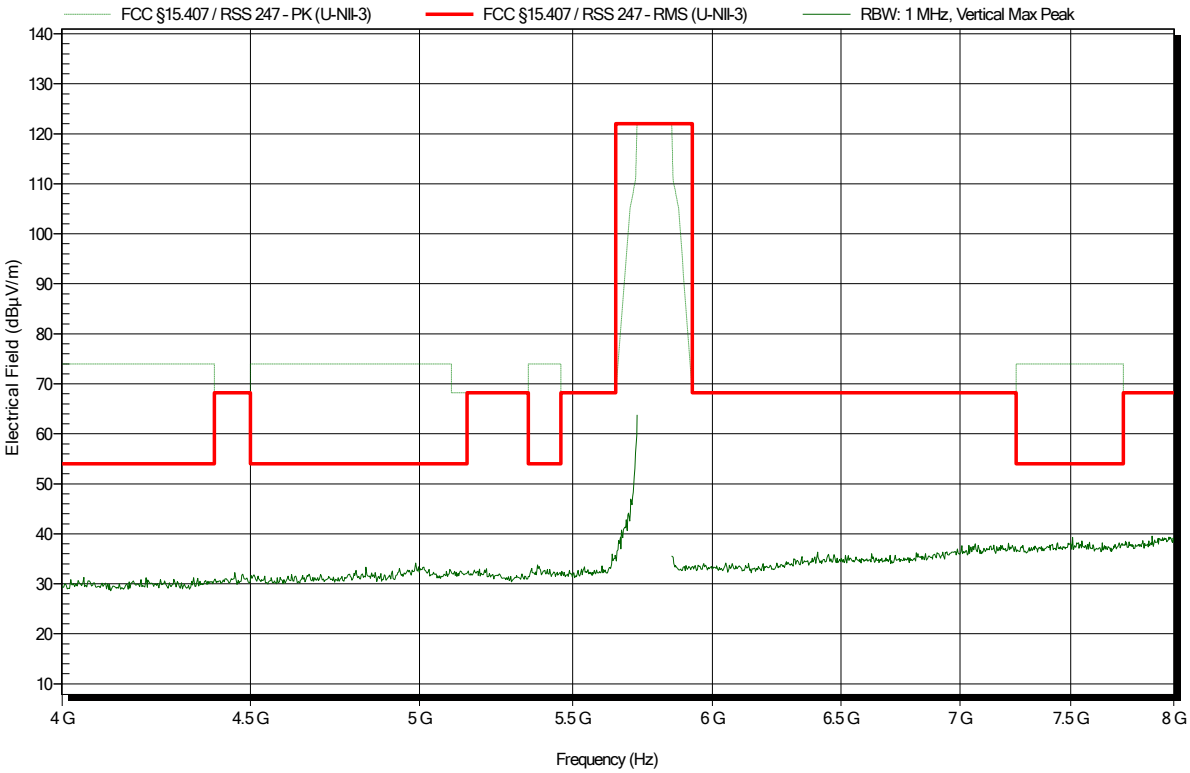

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT vertical (antenna 0°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | lower band area |

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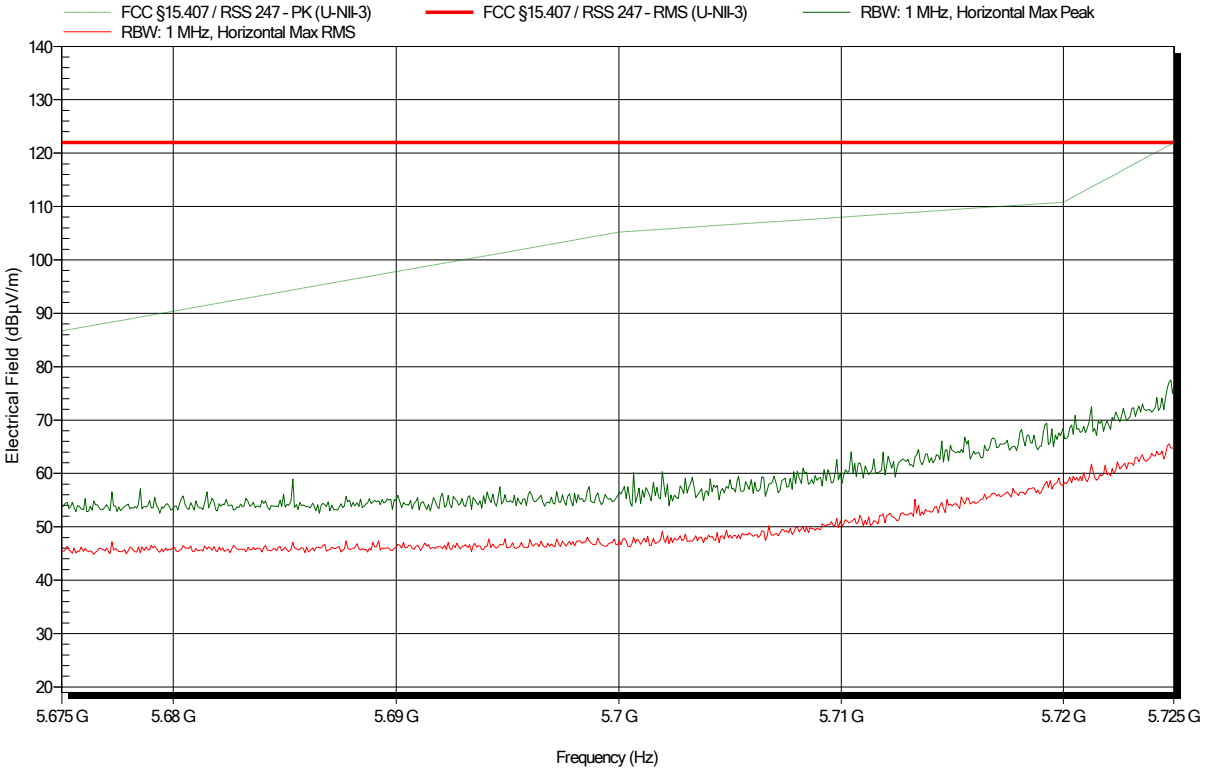

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT vertical (antenna 0°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | lower band area |

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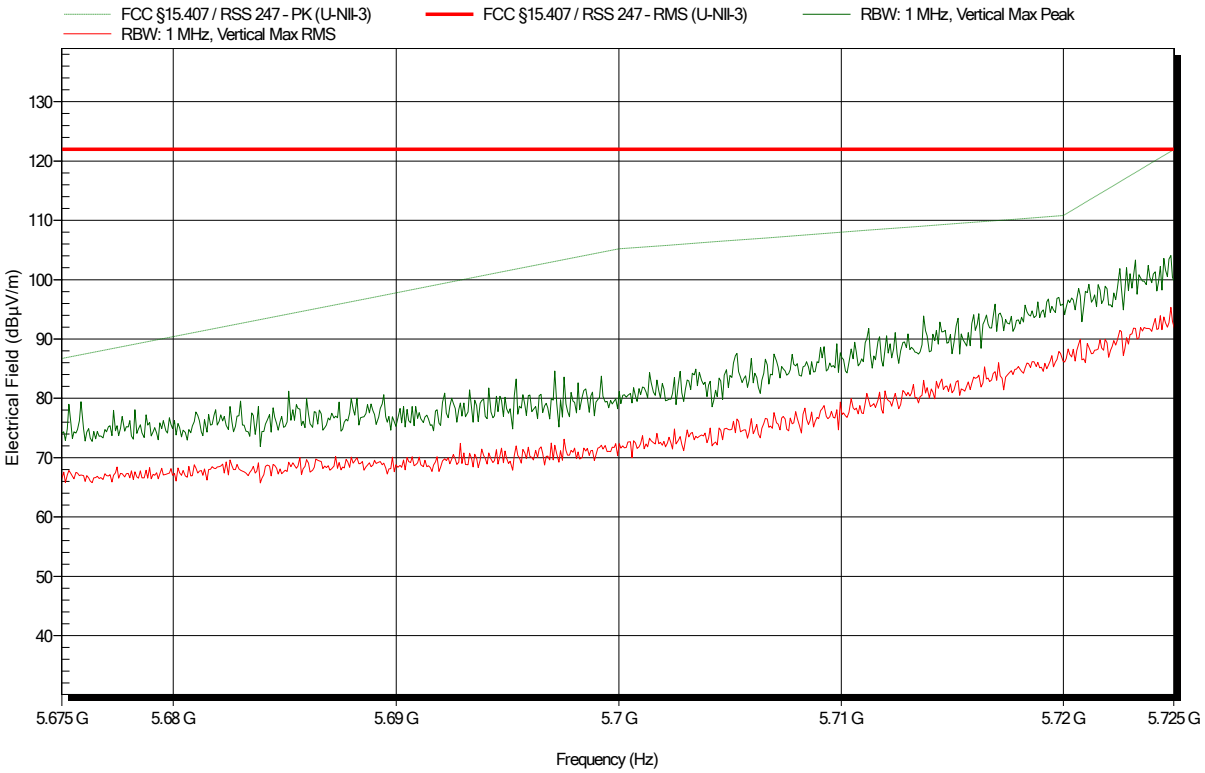

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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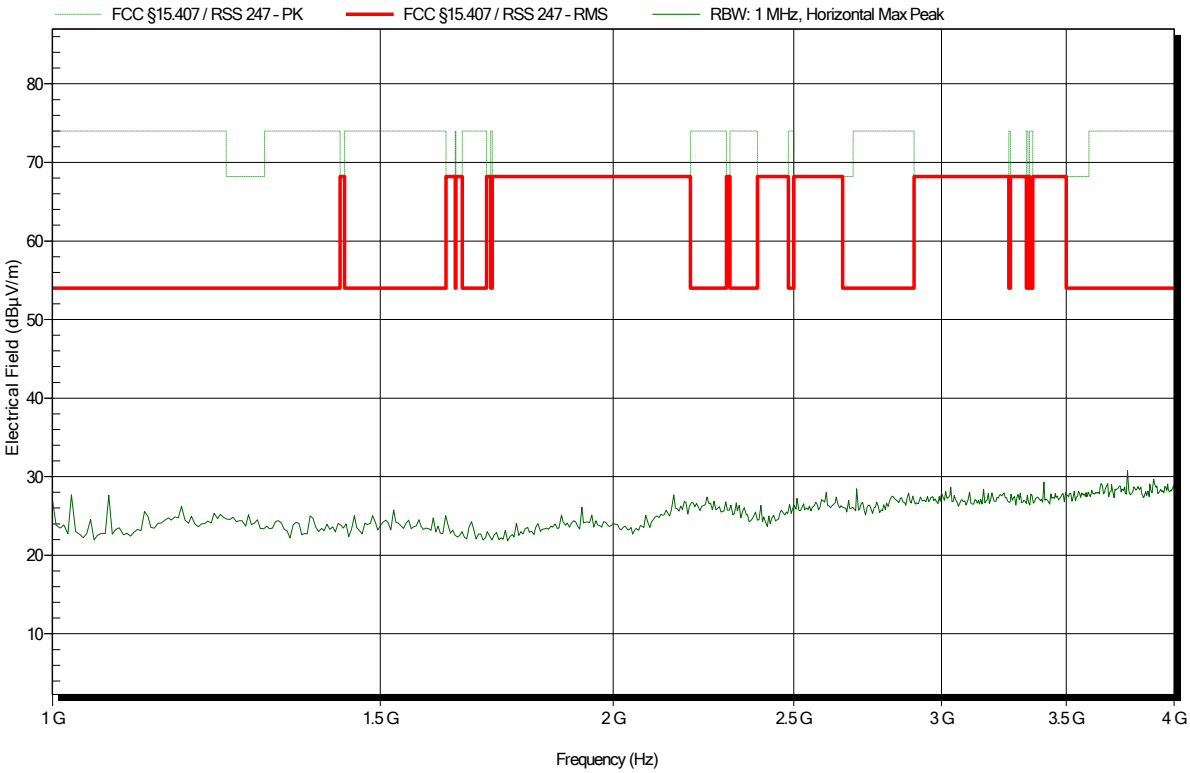

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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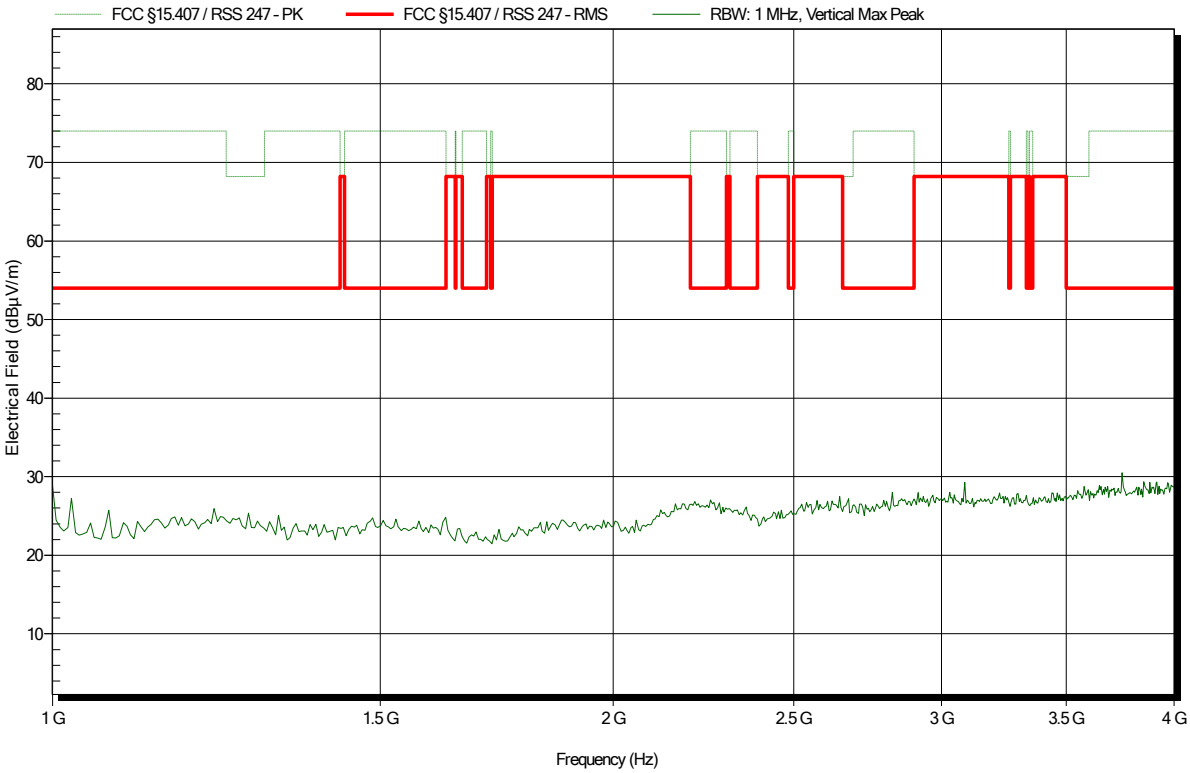

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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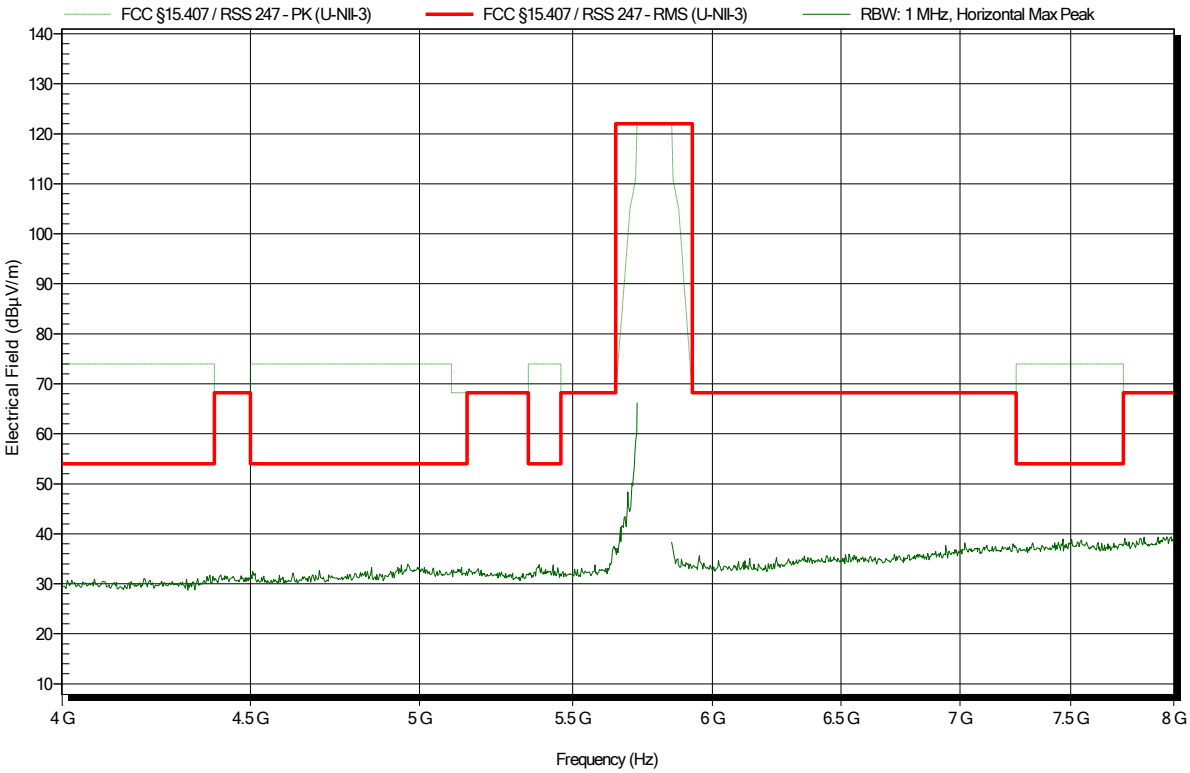

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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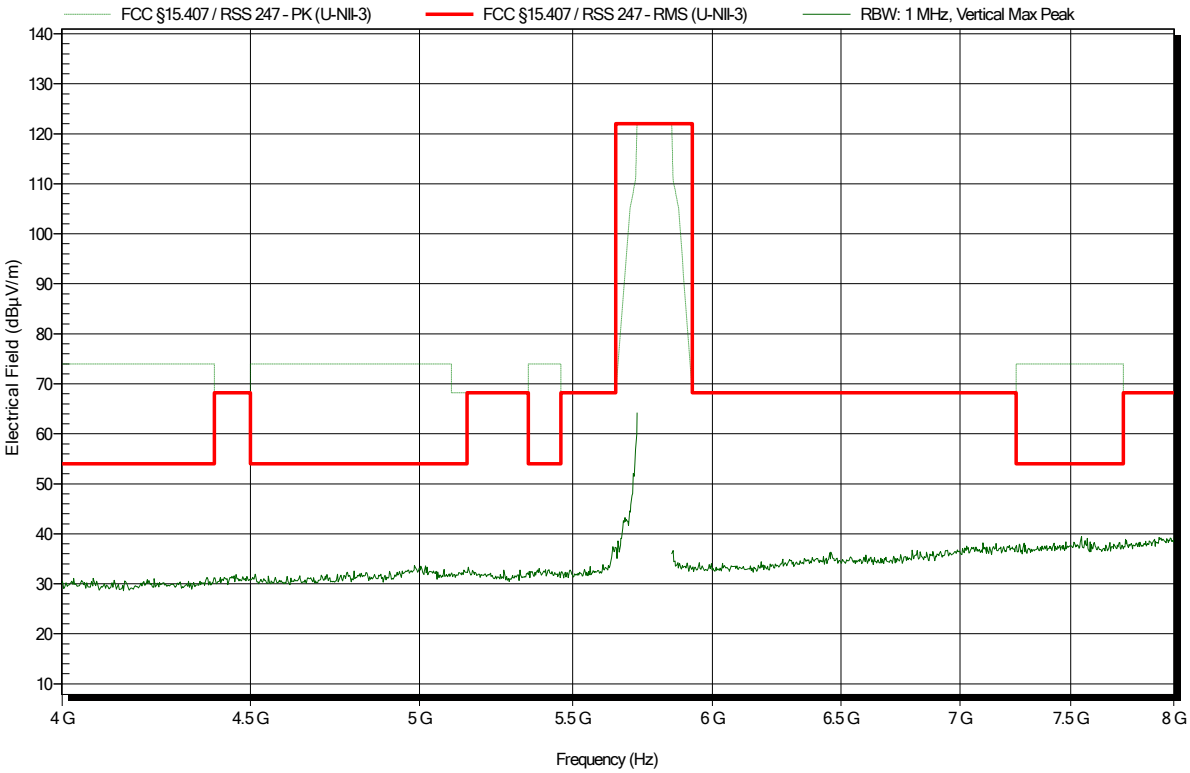

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | lower band area |

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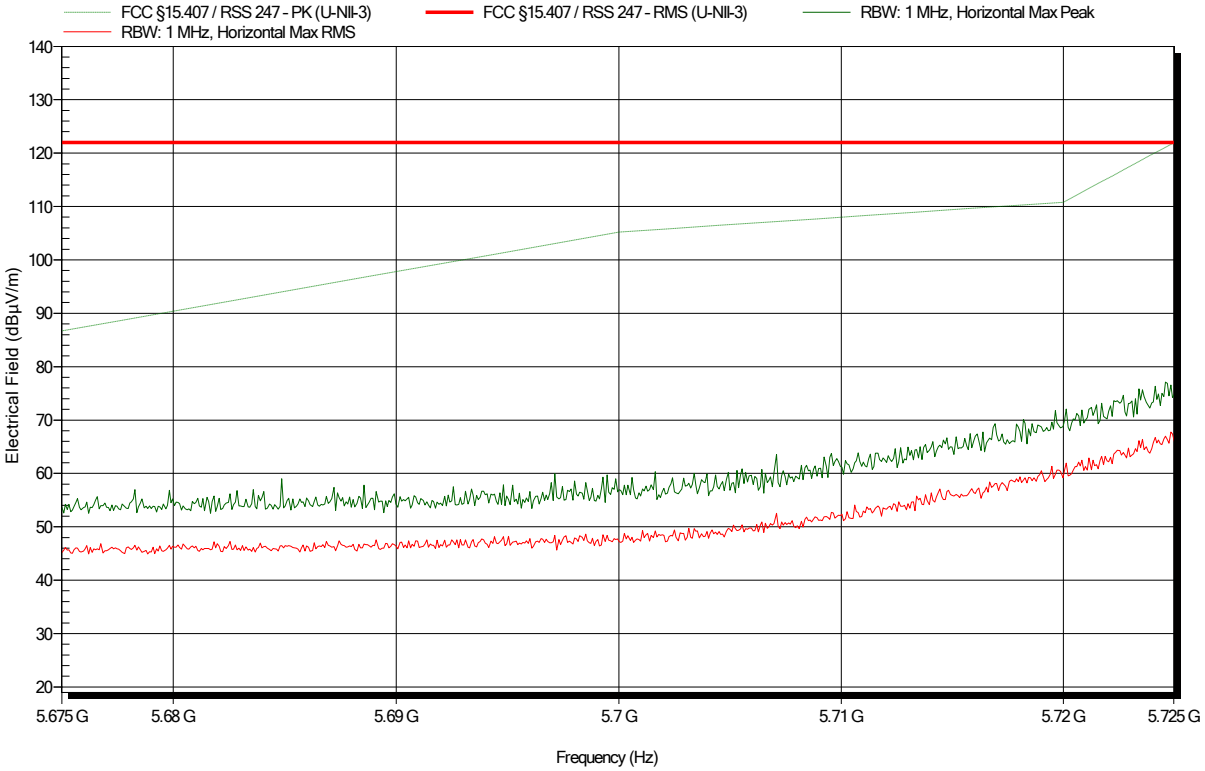

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | lower band area |

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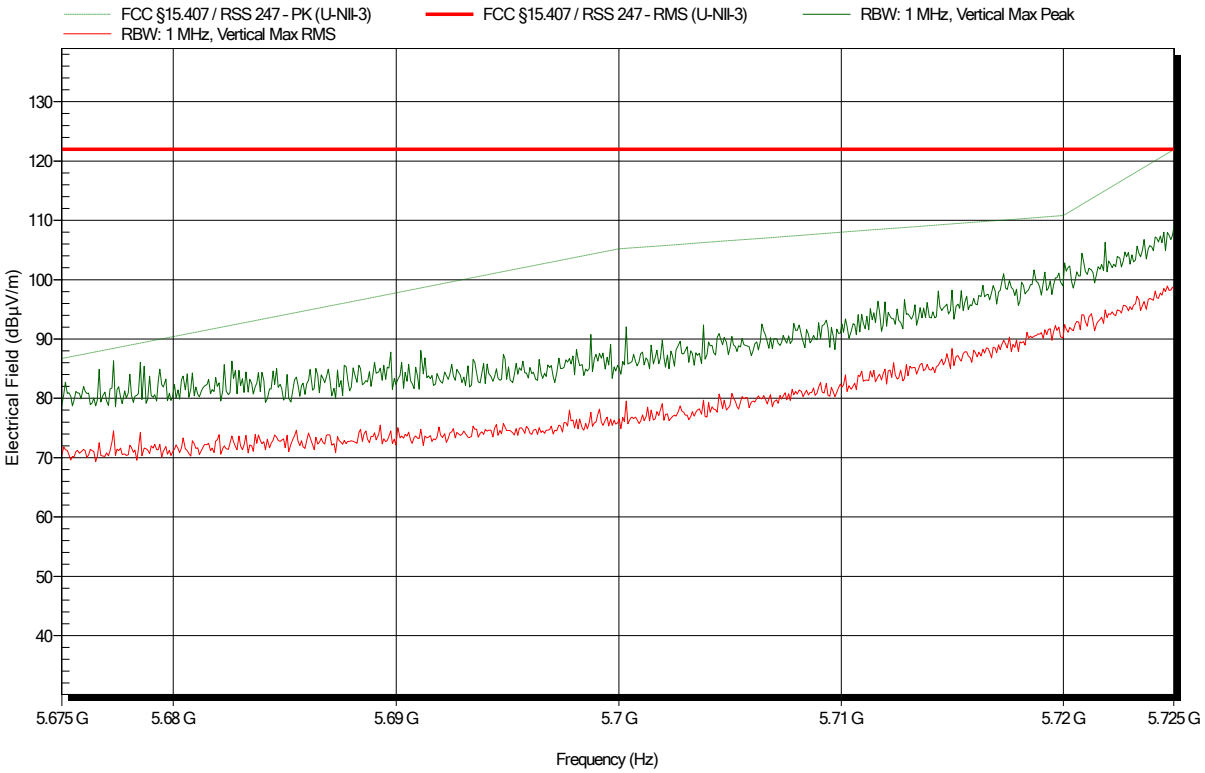

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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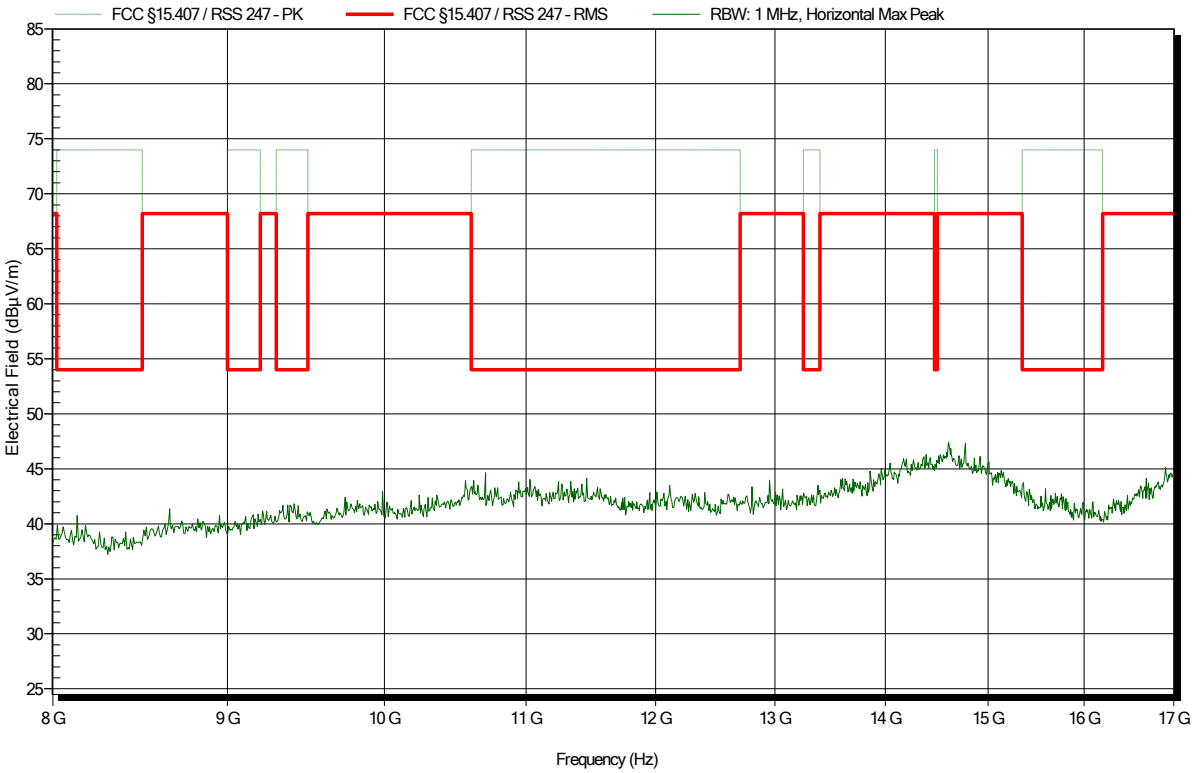

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH149 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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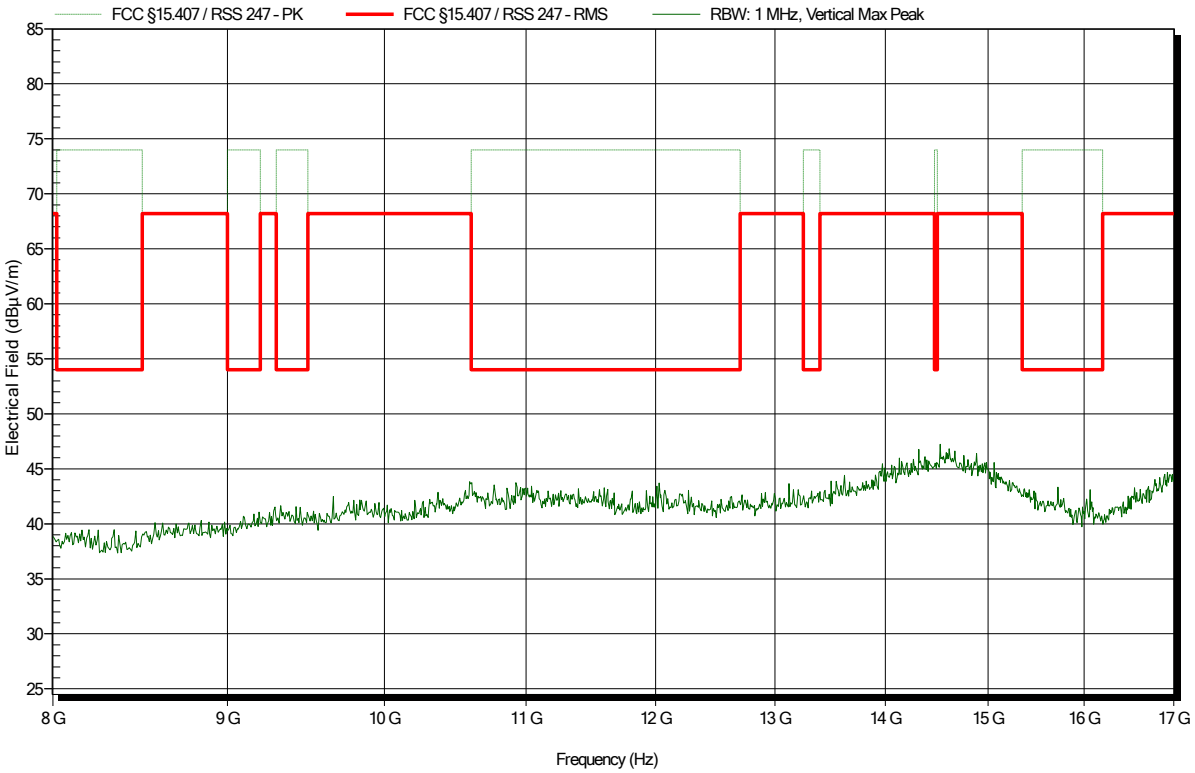

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH157 – EUT horizontal (antenna 0°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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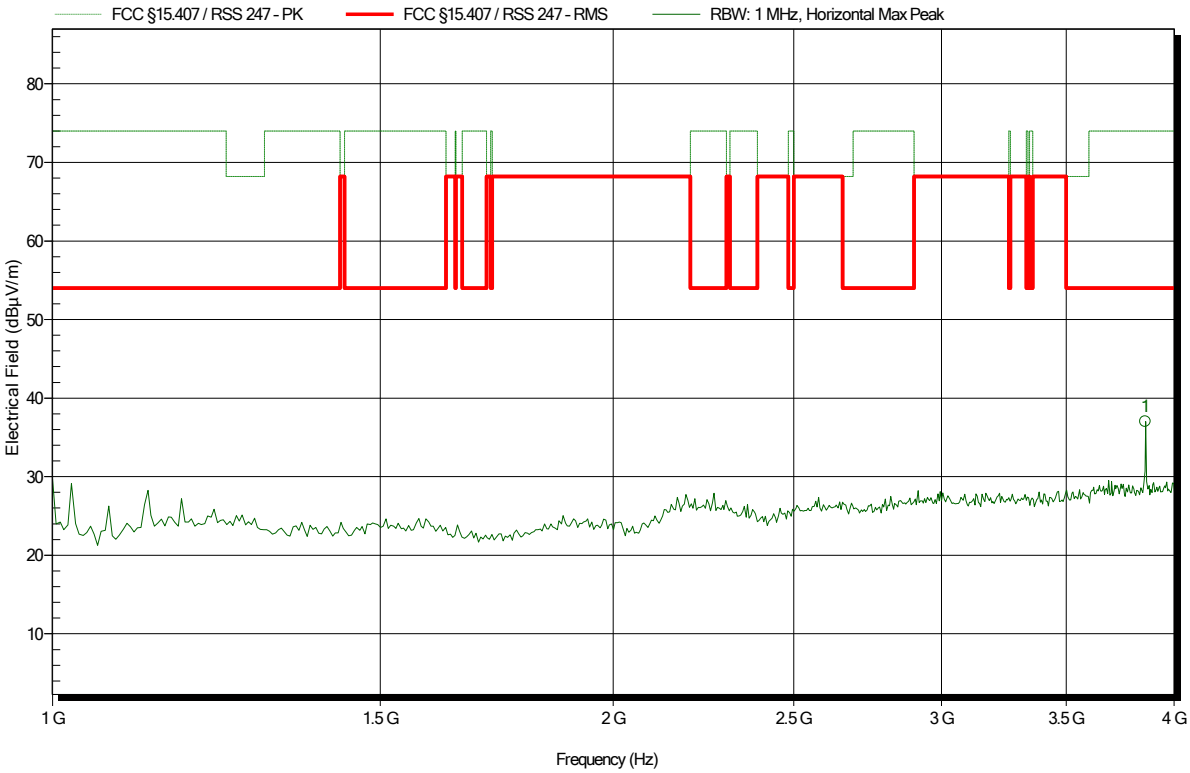


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 3.861 GHz | 37.02 dBµV/m | 54 dBµV/m | -16.98 dB | Pass |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH157 – EUT horizontal (antenna 0°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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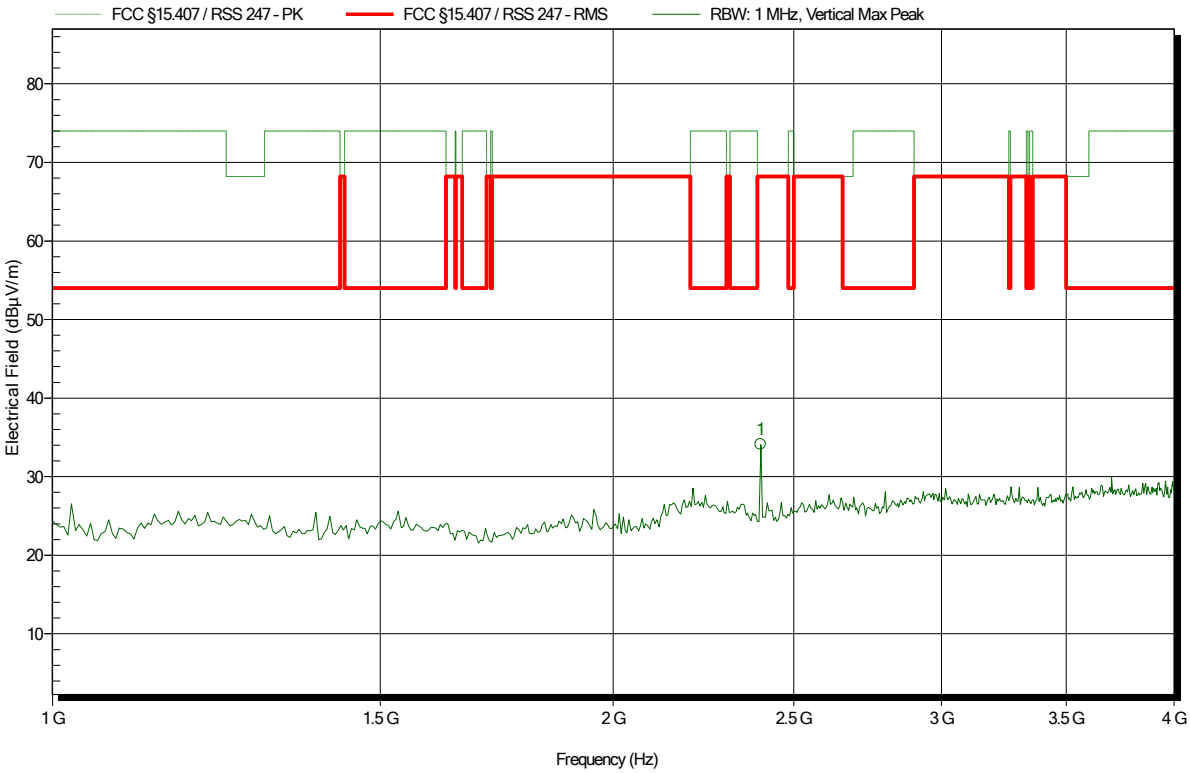


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 2.399 GHz | 34.11 dBµV/m | 68.2 dBµV/m | -34.09 dB | Pass |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH157 – EUT horizontal (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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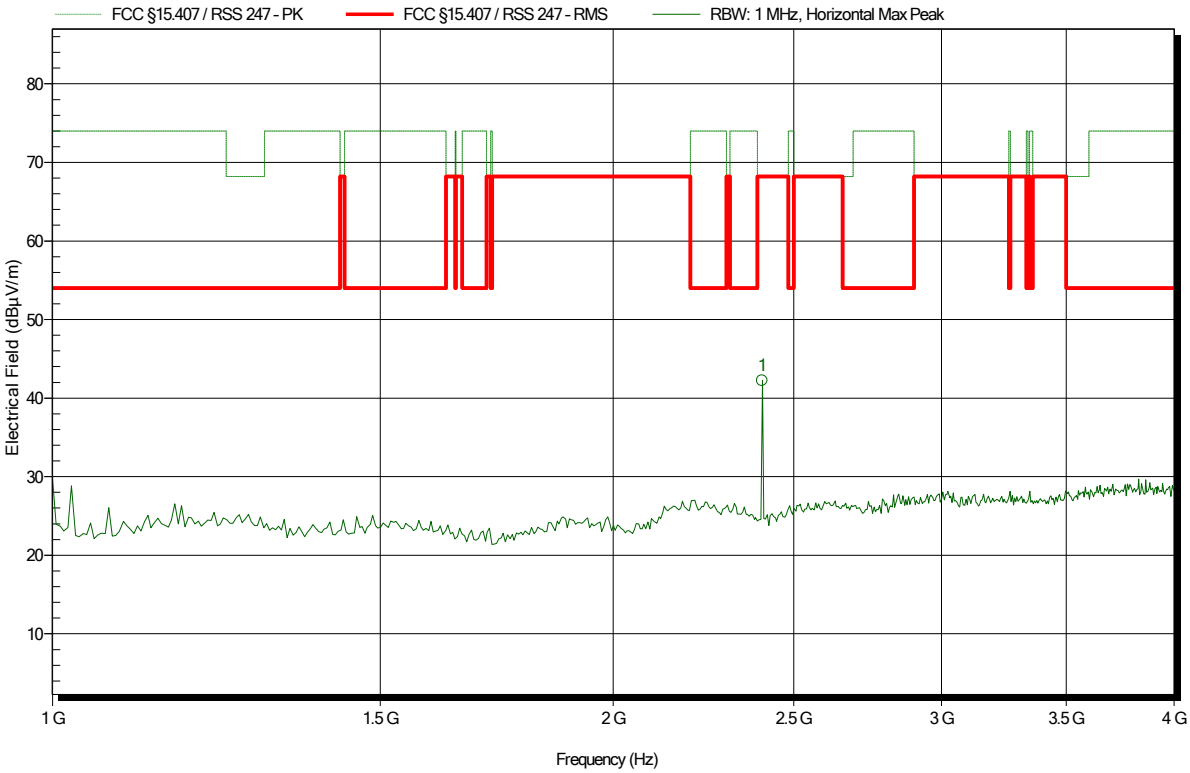


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 2.404 GHz | 42.21 dBµV/m | 68.2 dBµV/m | -25.99 dB | Pass |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH157 – EUT horizontal (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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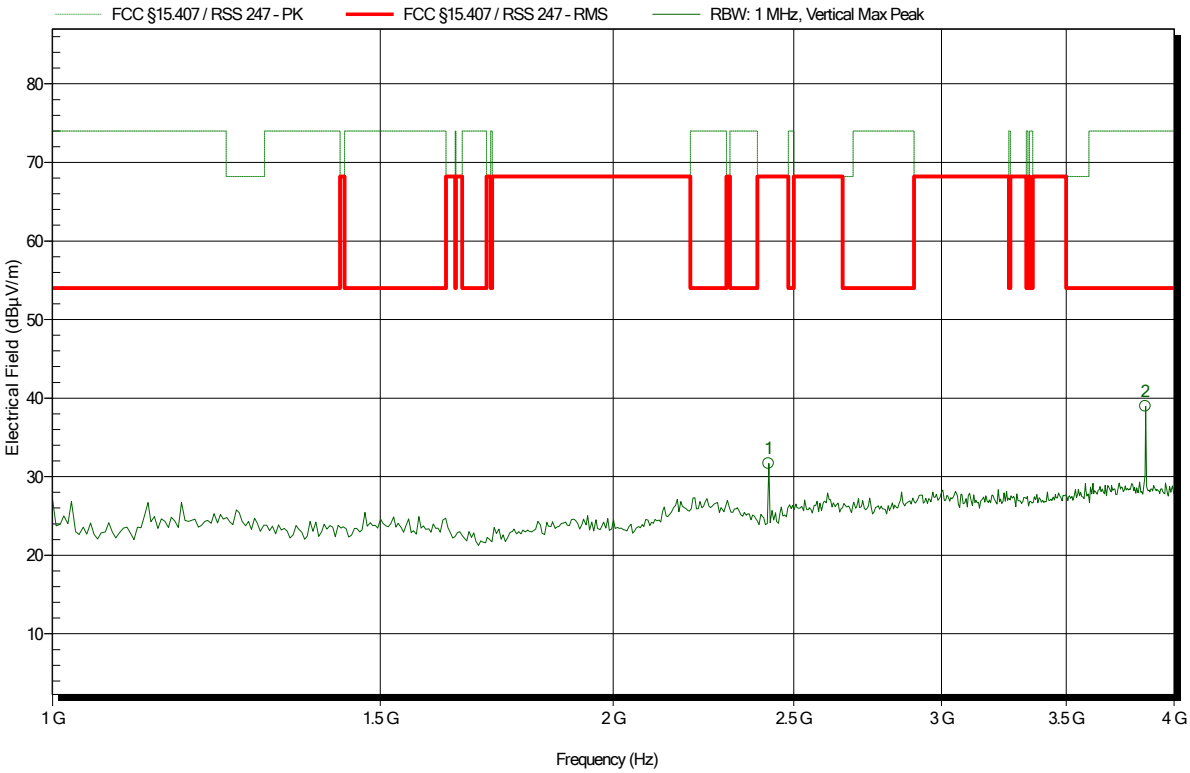


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 2.423 GHz | 31.69 dBµV/m | 68.2 dBµV/m | -36.51 dB | Pass |
| 3.861 GHz | 38.96 dBµV/m | 54 dBµV/m | -15.04 dB | Pass |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH157 – EUT vertical (antenna 0°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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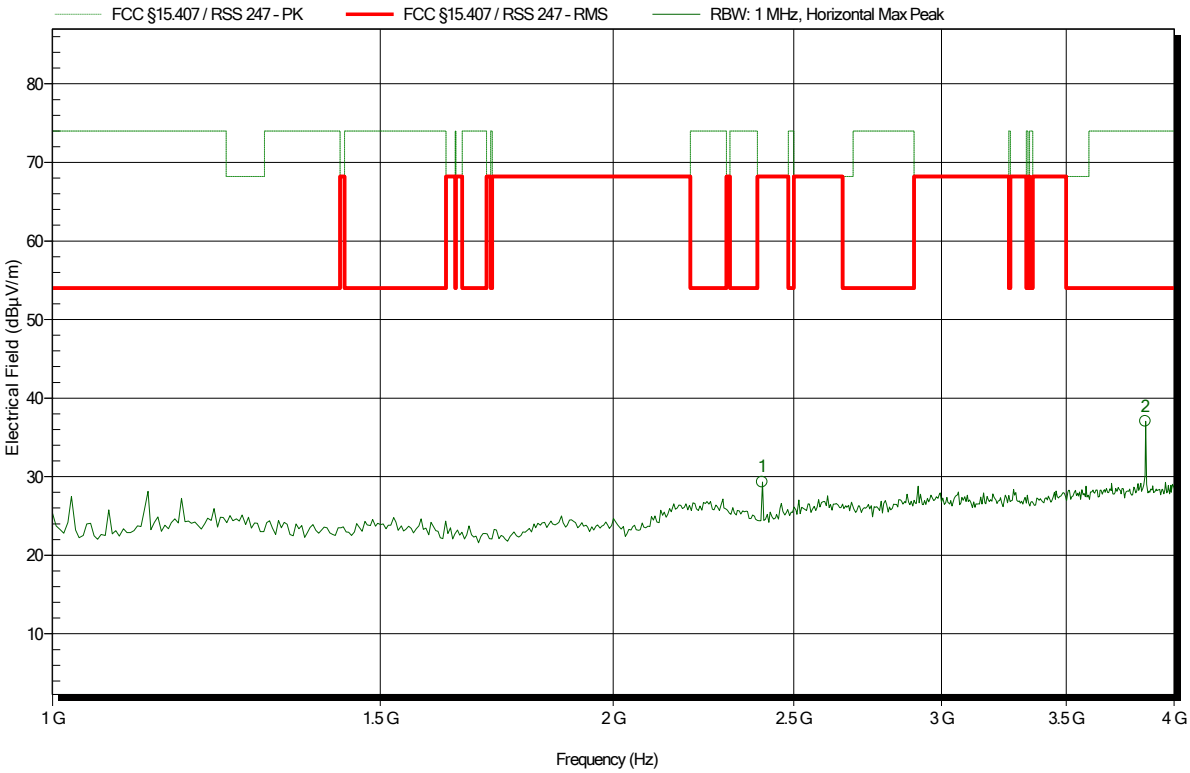


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 2.404 GHz | 29.32 dBµV/m | 68.2 dBµV/m | -38.88 dB | Pass |
| 3.861 GHz | 37.06 dBµV/m | 54 dBµV/m | -16.94 dB | Pass |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH157 – EUT vertical (antenna 0°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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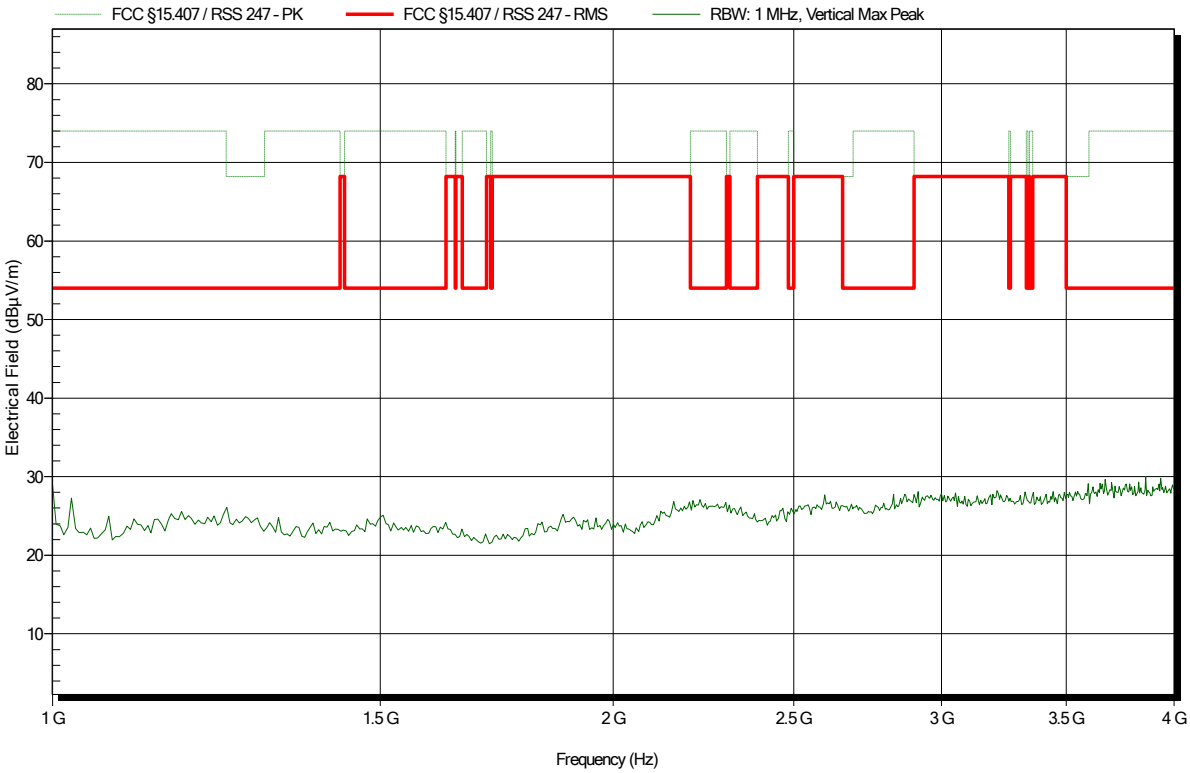

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH157 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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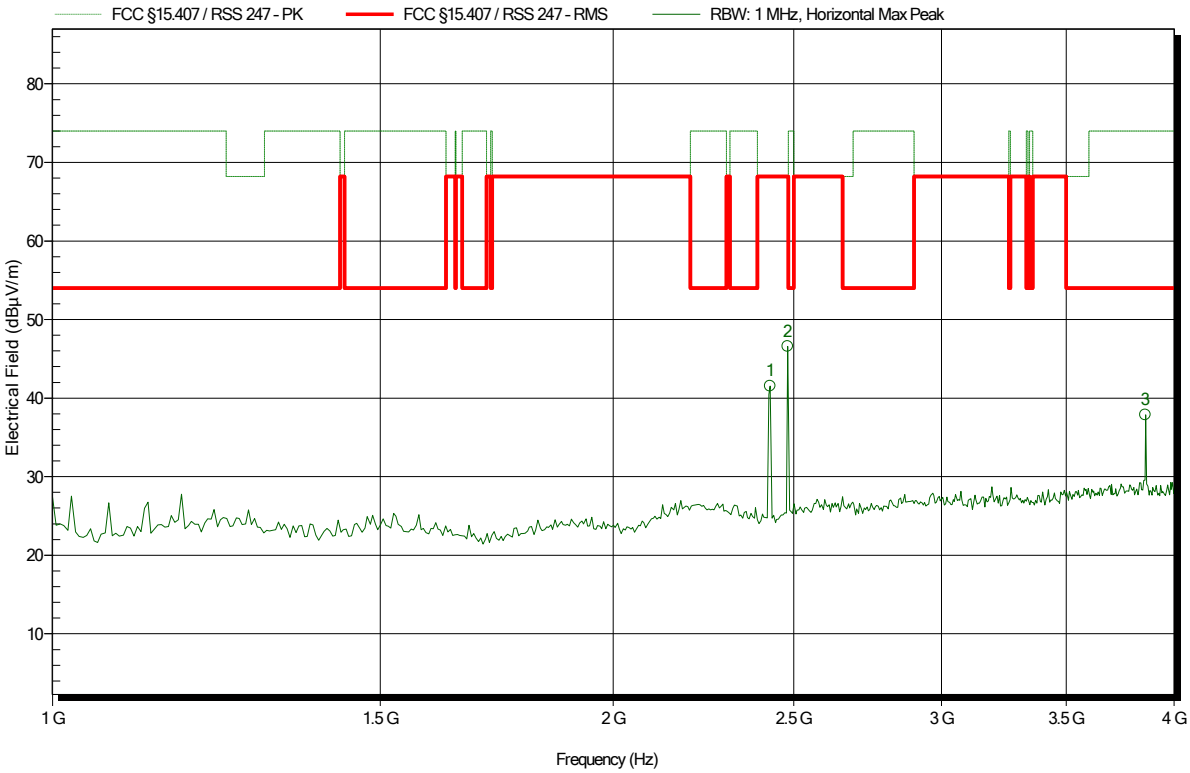


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 2.428 GHz | 41.53 dBµV/m | 68.2 dBµV/m | -26.67 dB | Pass |
| 2.481 GHz | 46.57 dBµV/m | 68.2 dBµV/m | -21.63 dB | Pass |
| 3.861 GHz | 37.85 dBµV/m | 54 dBµV/m | -16.15 dB | Pass |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH157 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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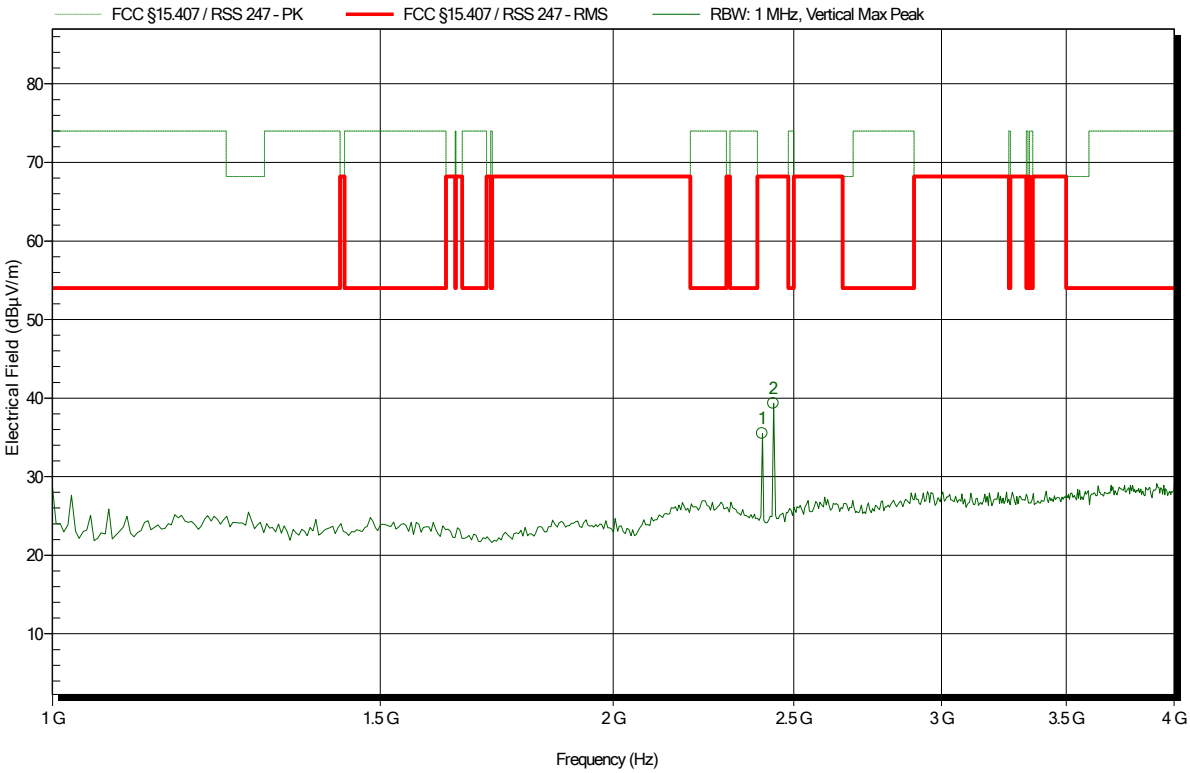


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 2.404 GHz | 35.49 dBµV/m | 68.2 dBµV/m | -32.71 dB | Pass |
| 2.438 GHz | 39.33 dBµV/m | 68.2 dBµV/m | -28.87 dB | Pass |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH157 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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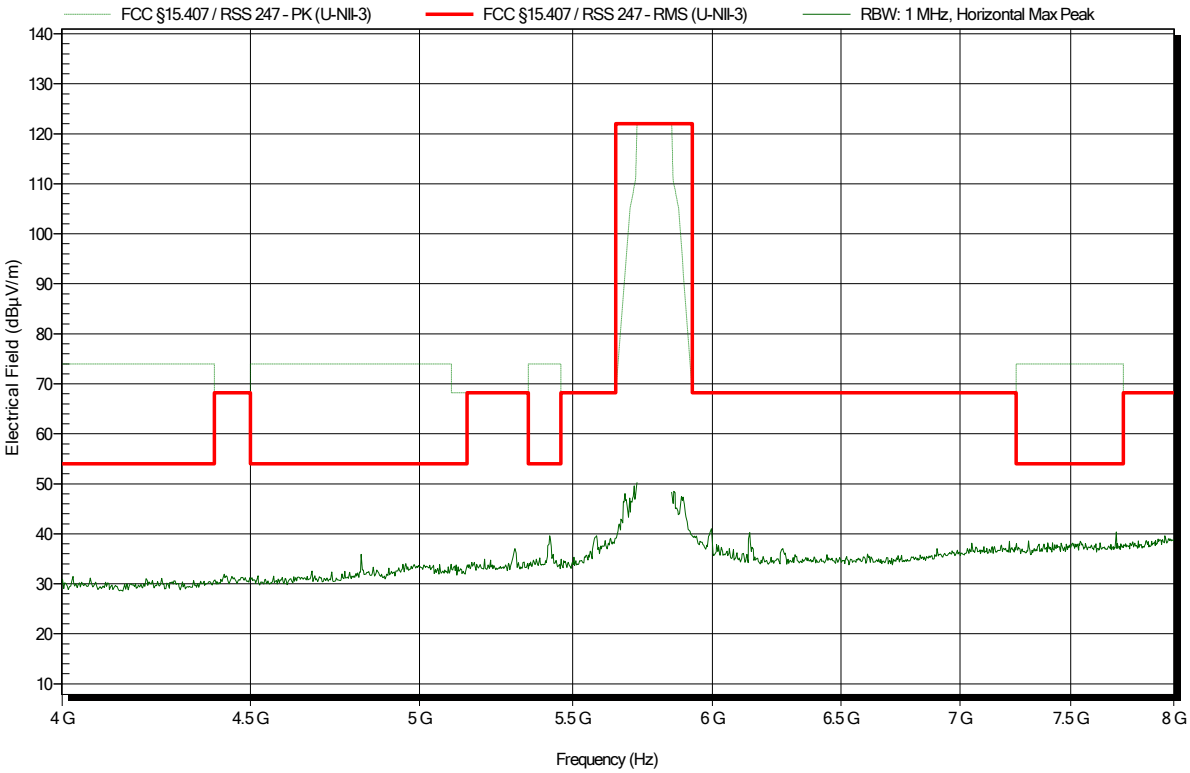

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH157 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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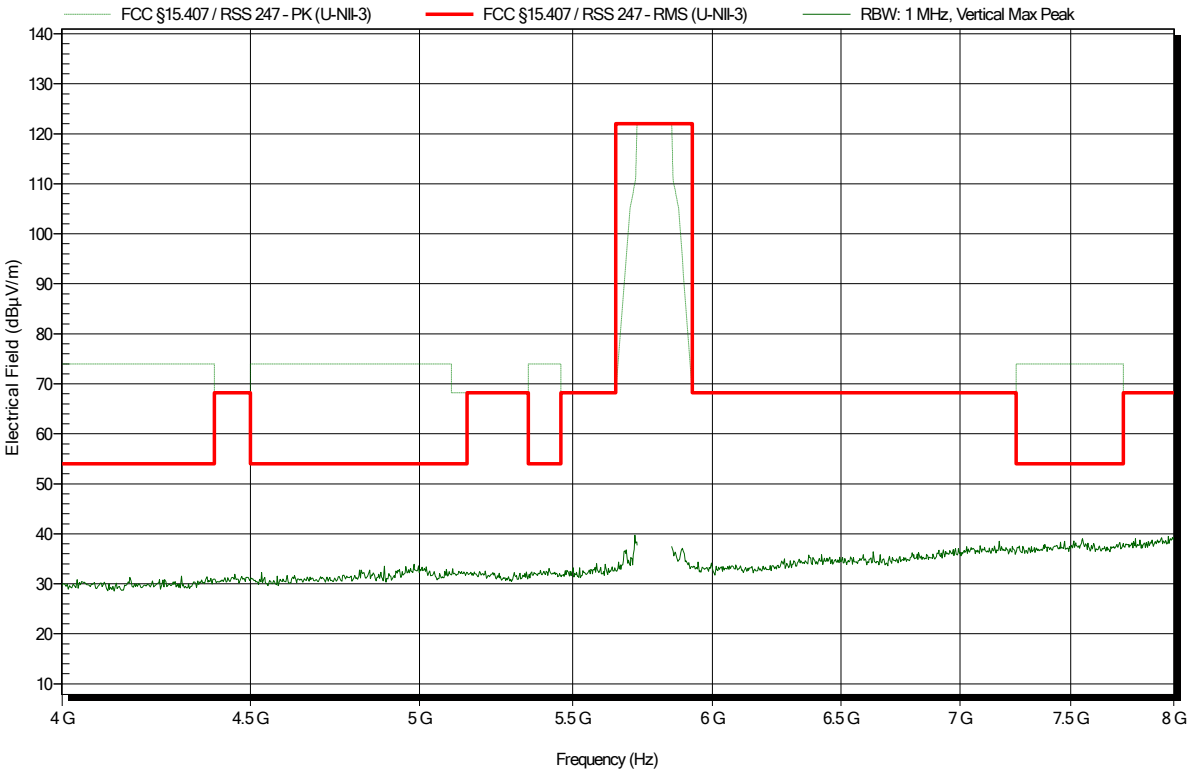

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH157 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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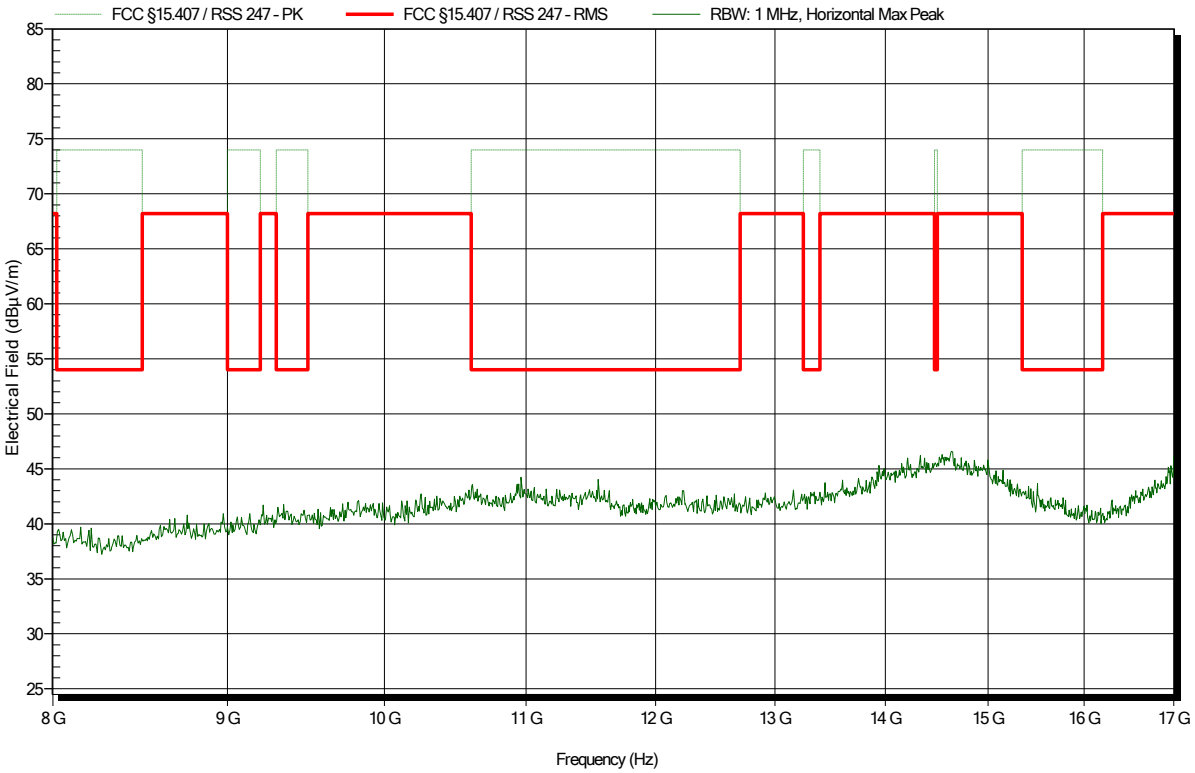

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH157 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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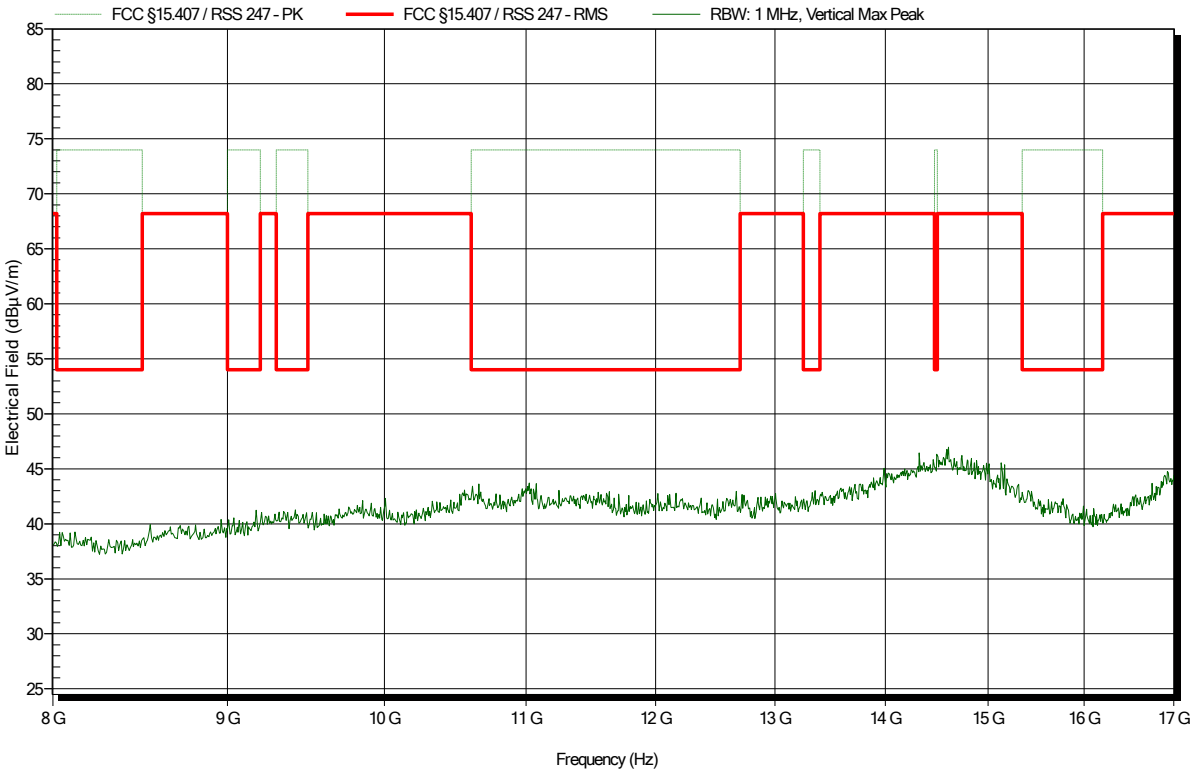

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH165 – EUT horizontal (antenna 0°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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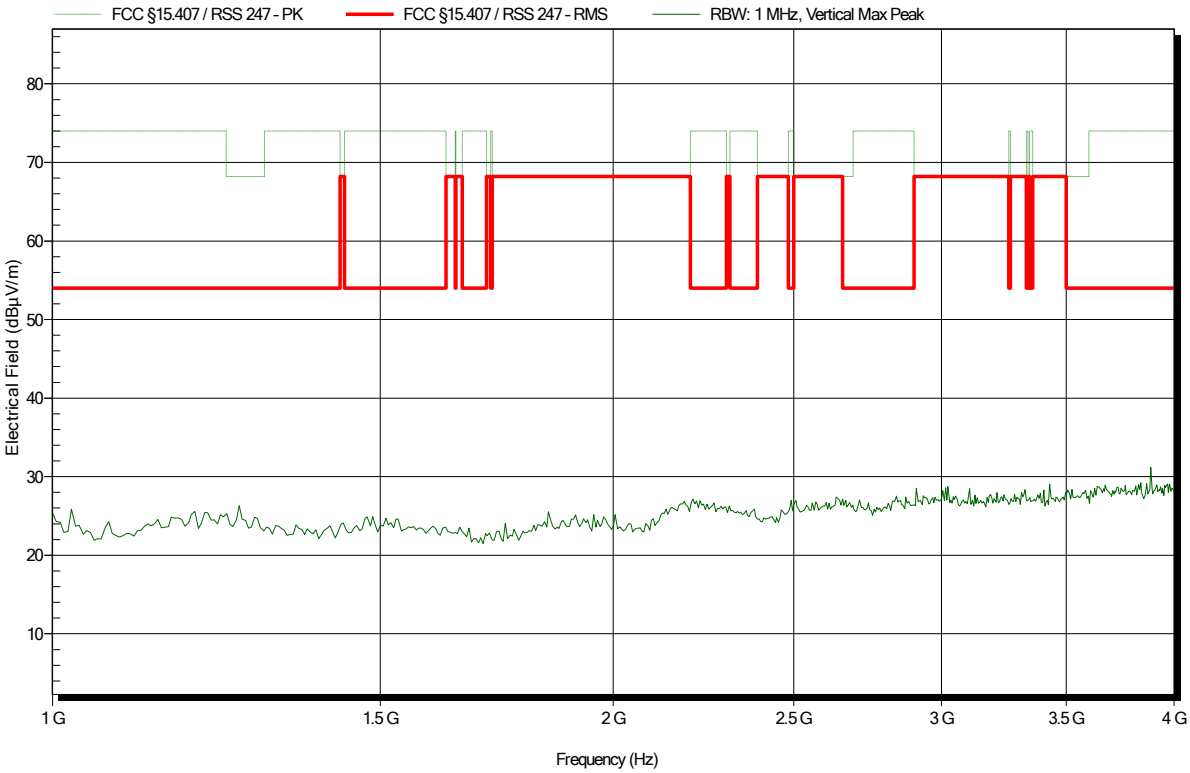

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH165 – EUT horizontal (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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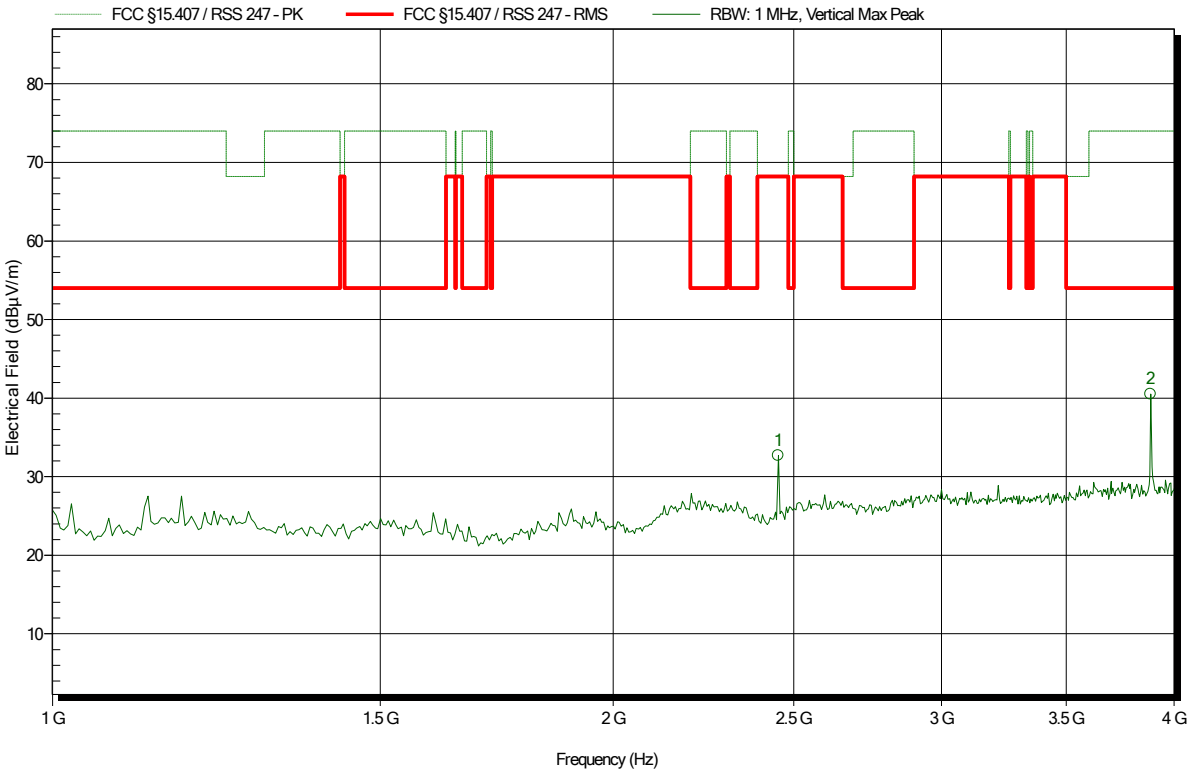


| Frequency | Peak | Peak Limit | Peak Difference | Peak Status |
|---|---|---|---|---|
| 2.452 GHz | 32.68 dBµV/m | 68.2 dBµV/m | -35.52 dB | Pass |
| 3.885 GHz | 40.52 dBµV/m | 54 dBµV/m | -13.48 dB | Pass |

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH165 – EUT vertical (antenna 0°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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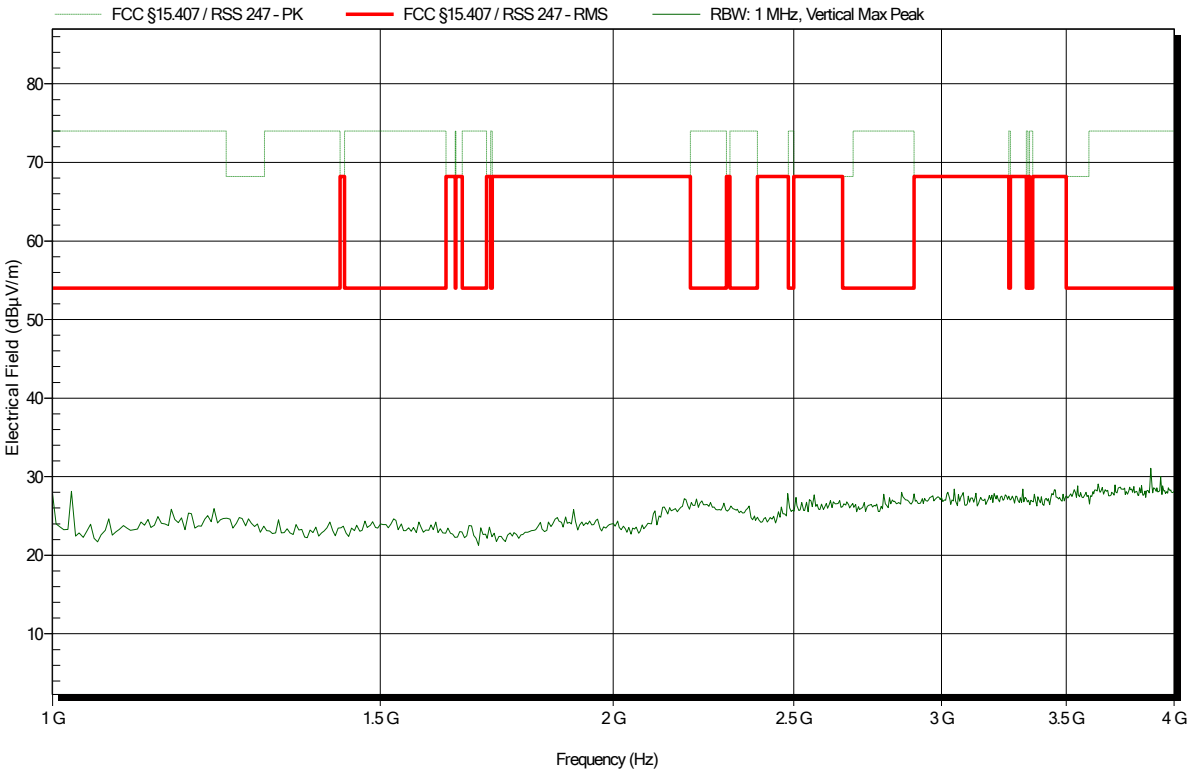

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH165 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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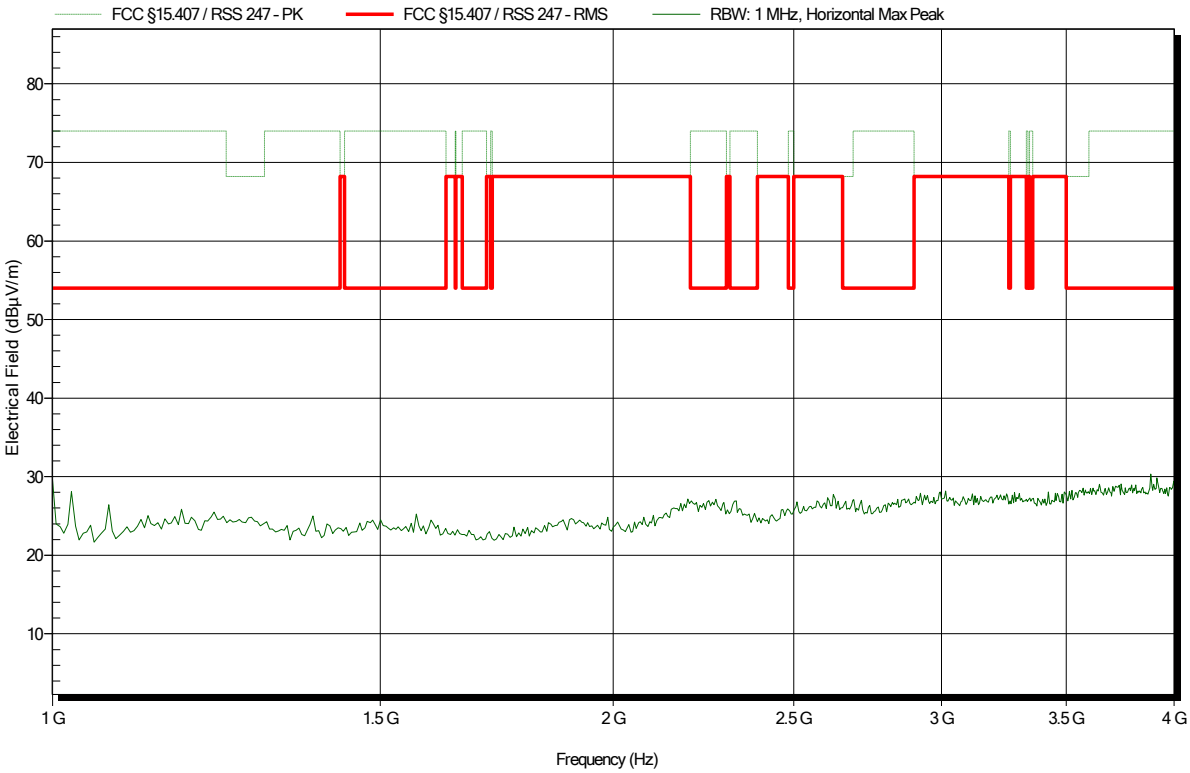

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH165 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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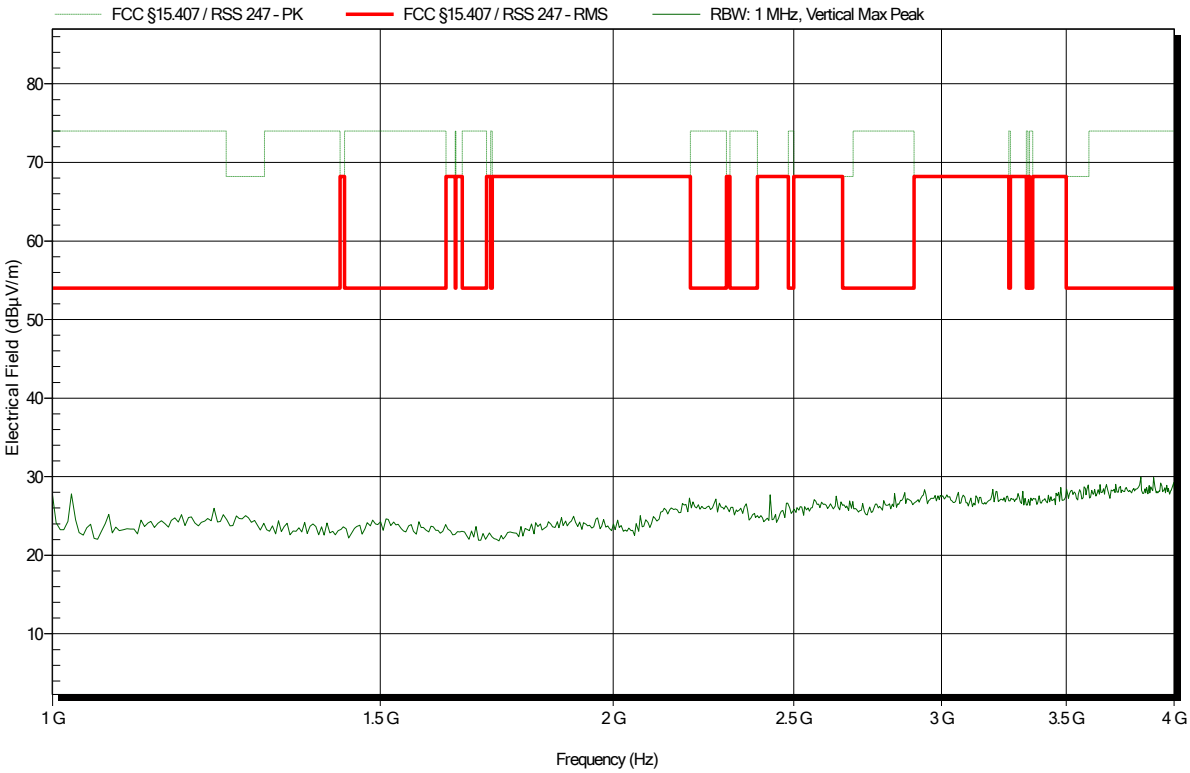

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH165 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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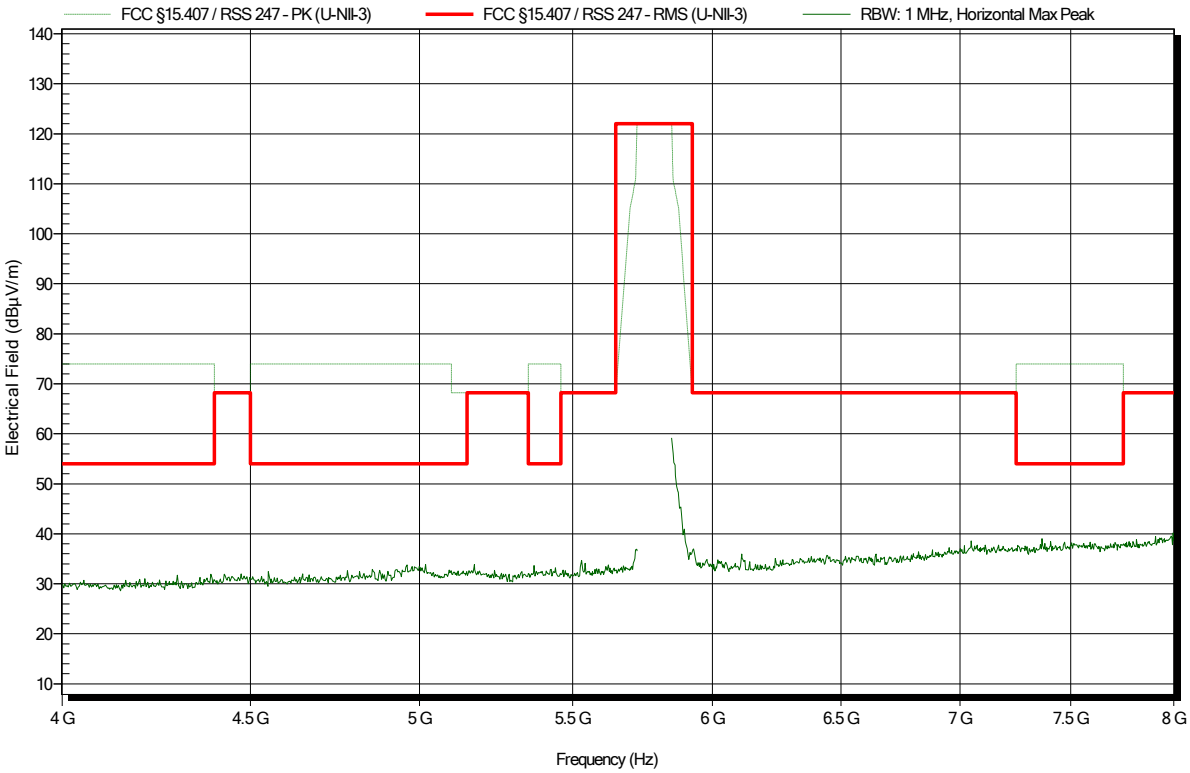

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH165 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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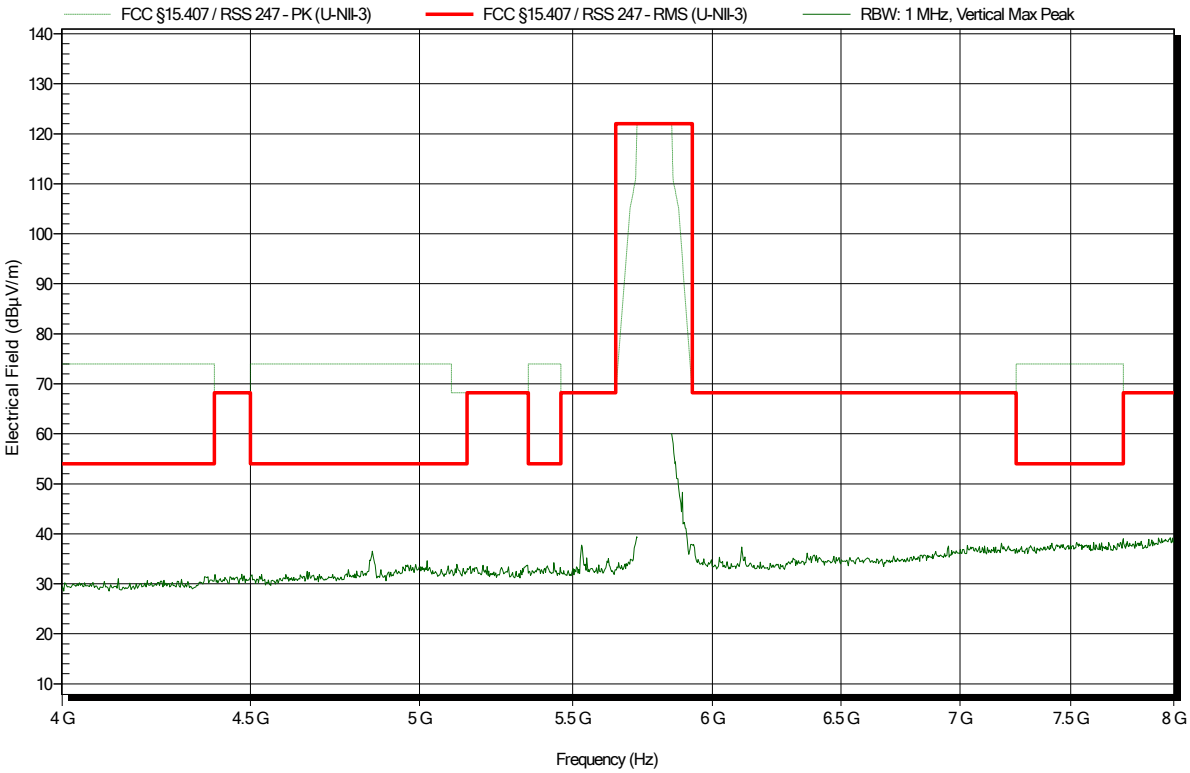

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH165 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | lower band area |

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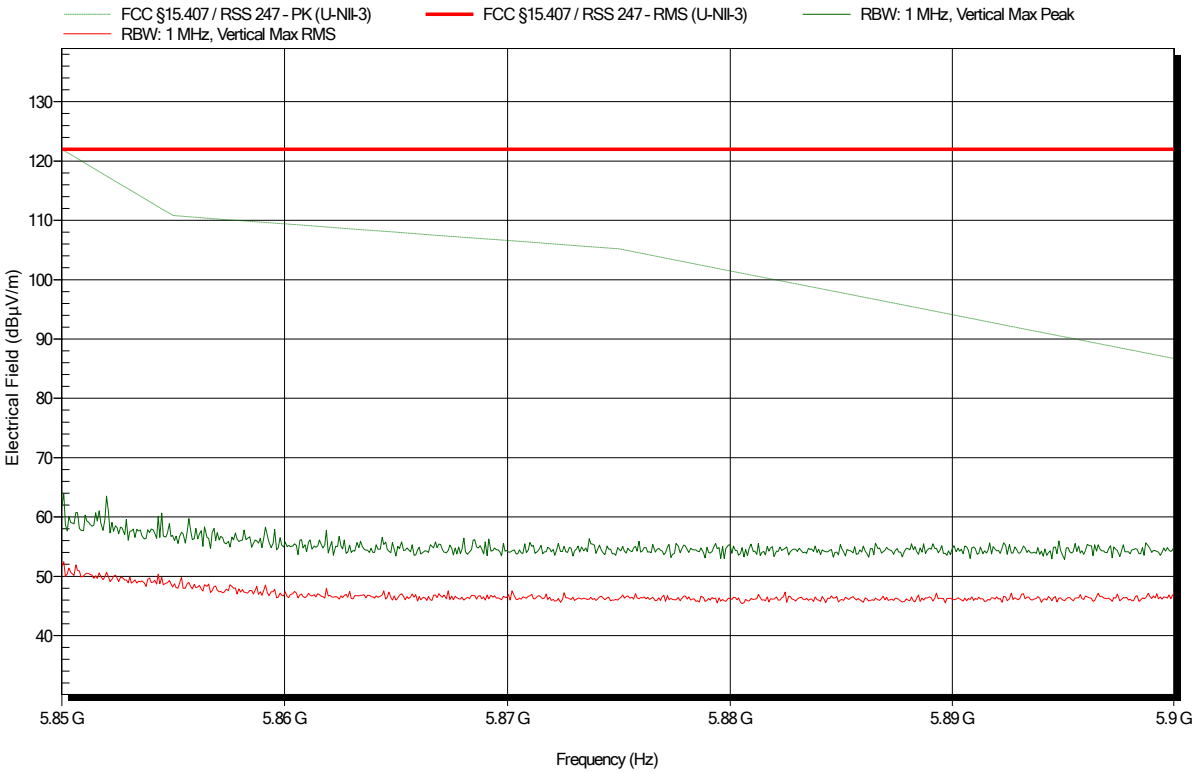

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m |
| Mode: | TX; CH165 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | lower band area |

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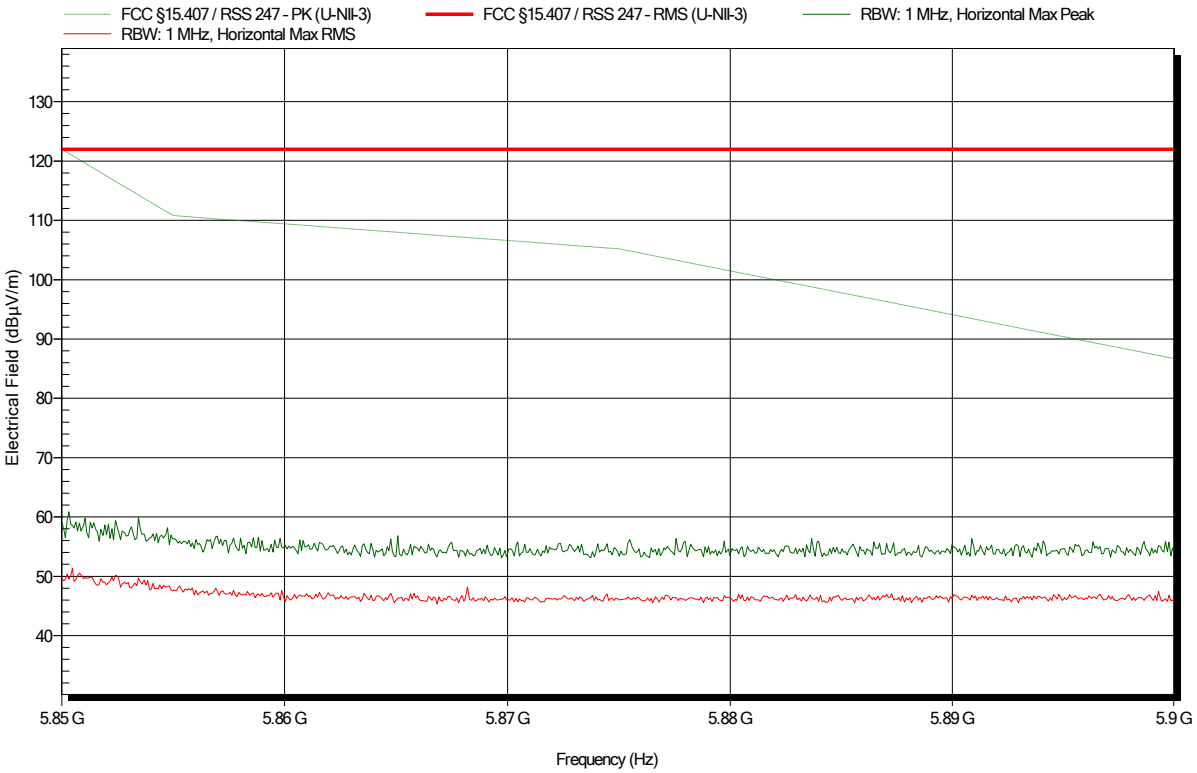

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH165 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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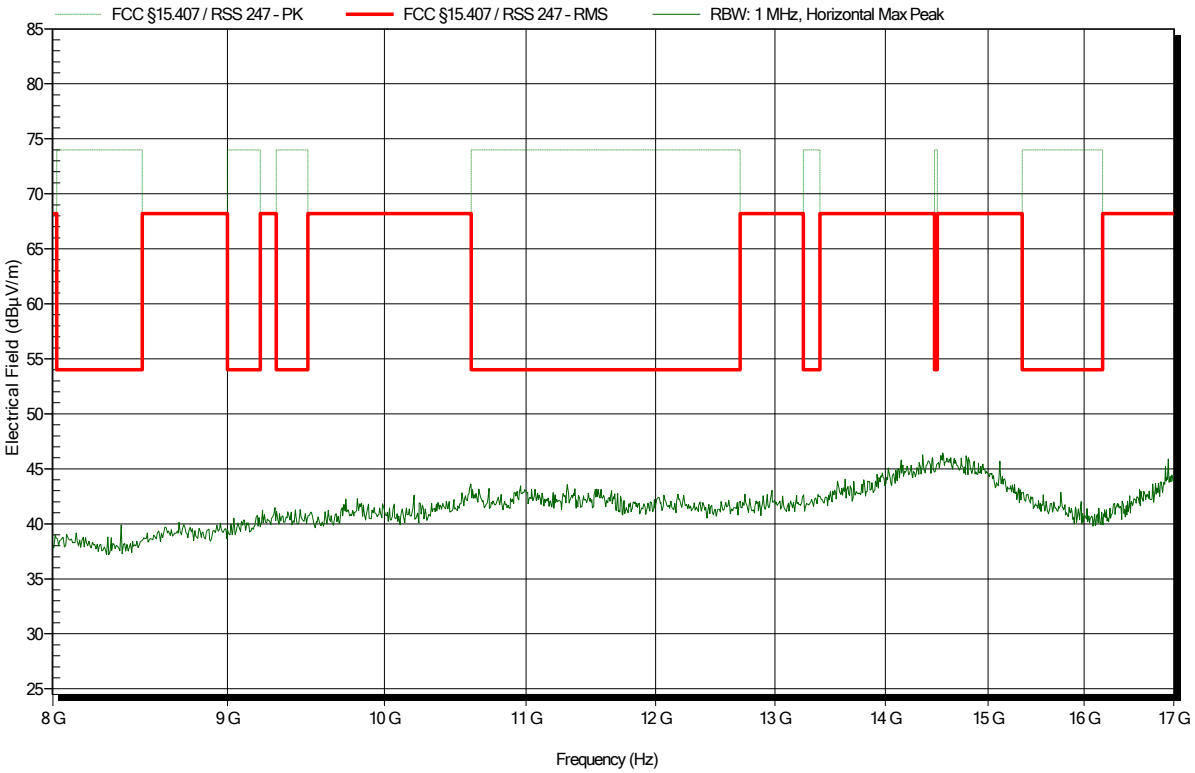

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Schwarzbeck BBHA 9120D, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH165 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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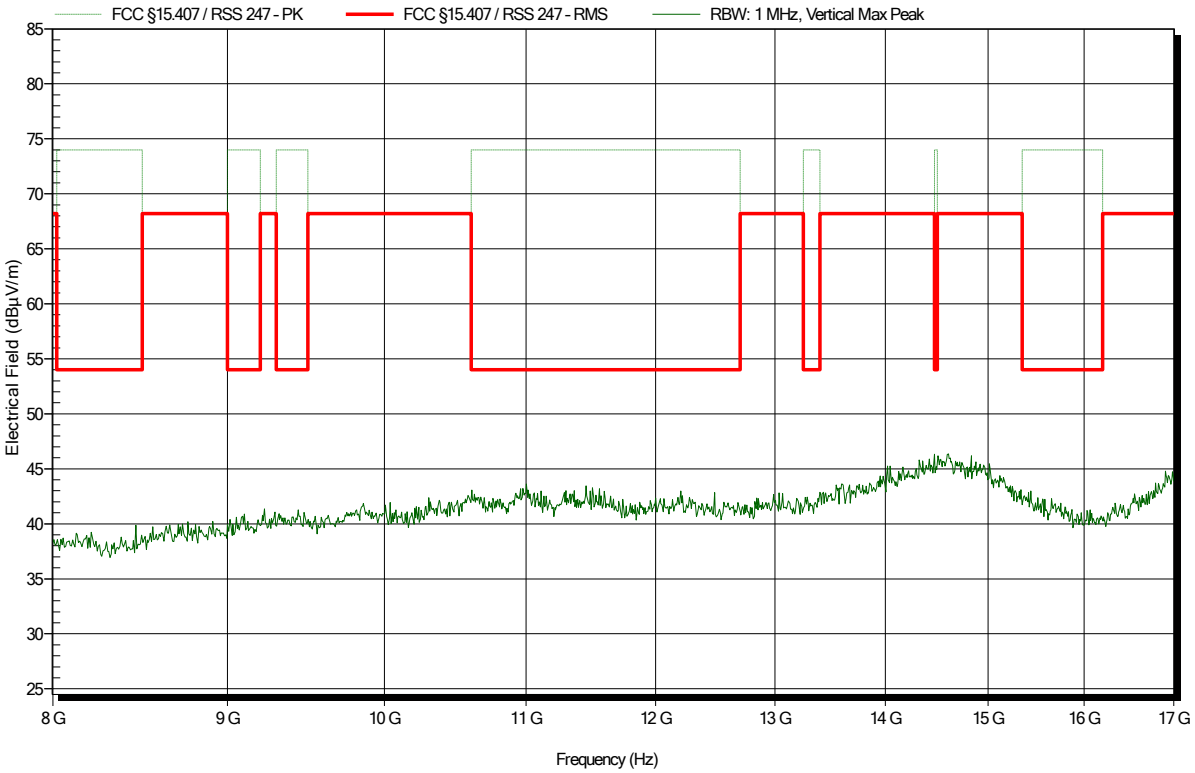

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Amplifier Research AT4560, Horizontal |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH165 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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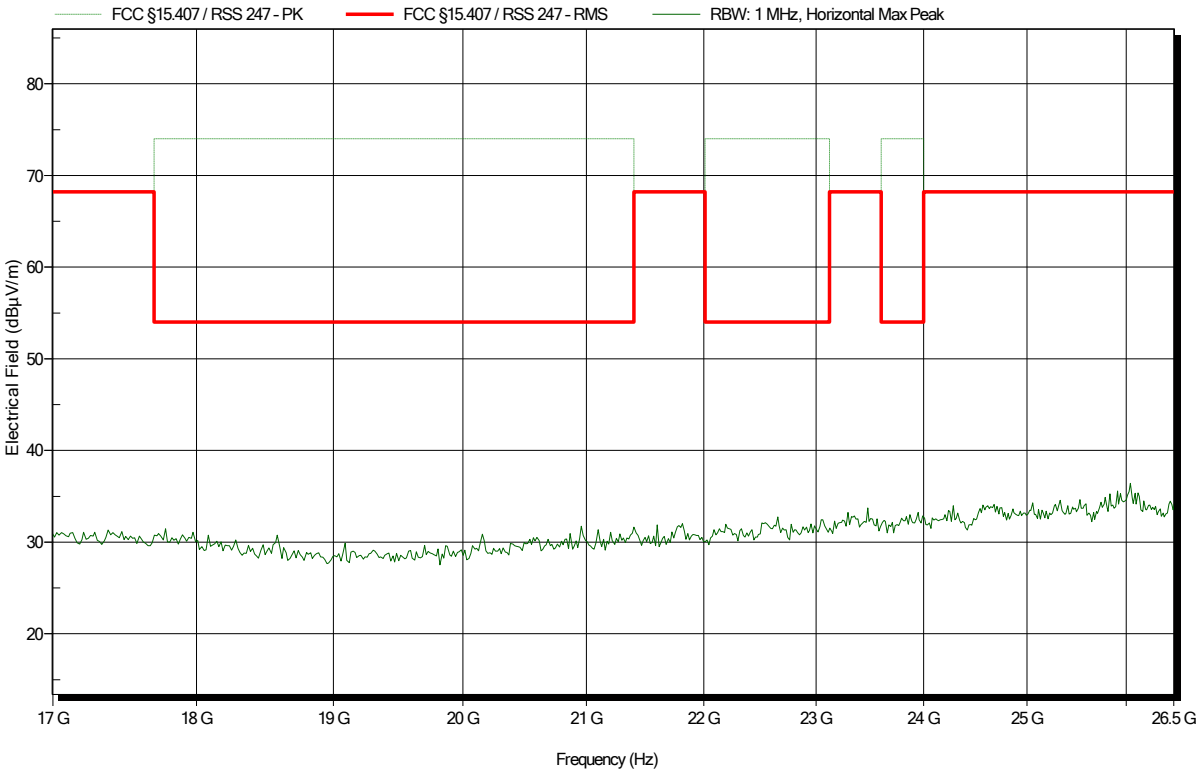

**Spurious emissions according to FCC 47 CFR 15.407**

| | |
|---|---|
| Project number: | G0M-1907-8361 |
| Applicant: | R3 - Reliable Realtime Radio Communications GmbH |
| EUT Name: | EchoRing Ethernet Bridge |
| Model: | ER-EB 1000M |
| Test Site: | Eurofins Product Service Germany |
| Operator: | Abdullah Al Jamal |
| Test Conditions: | Tnom: 25°C, Vnom: |
| Antenna: | Amplifier Research AT4560, Vertical |
| Measurement distance: | 1 m converted to 3m |
| Mode: | TX; CH165 – EUT vertical (antenna 90°) – Test Sample ID 29090 |
| Test Date: | 2020-05-12 |
| Note: | |

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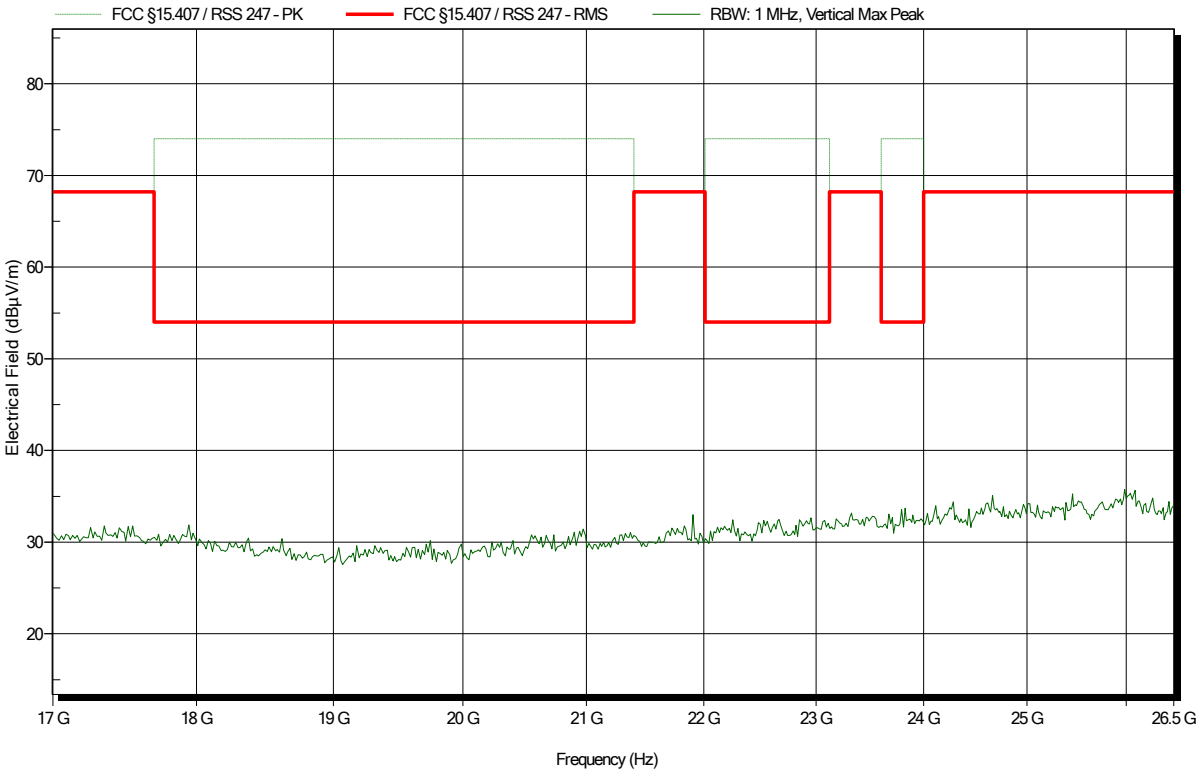


= = = END OF TEST REPORT = = =