

| <b>RADIO REPORT</b><br><b>FCC 47 CFR Part 15F</b><br><b>Ultra Wide Band Devices</b> |                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report Reference No</b>                                                          | G0M-2403-2508-TFC15FUW-V01                                                                                                                                                                                                                                               |
| <b>Testing Laboratory</b>                                                           | Eurofins Product Service GmbH                                                                                                                                                                                                                                            |
| <b>Address</b>                                                                      | Storkower Str. 38c<br>15526 Reichenwalde<br>Germany                                                                                                                                                                                                                      |
| <b>Accreditation</b>                                                                |  <br>DAkkS - Registration number: D-PL-12092-01-04 (FCC)<br>FCC Filed Test Laboratory, Reg.-No.: 96970 |
| <b>Applicant</b>                                                                    | Jungheinrich AG                                                                                                                                                                                                                                                          |
| <b>Address</b>                                                                      | Friedrich-Ebert-Damm 129<br>22047 Hamburg<br>Germany                                                                                                                                                                                                                     |
| <b>Test Specification</b>                                                           | 47 CFR Part 15F                                                                                                                                                                                                                                                          |
| <b>Non-Standard Test Method</b>                                                     | None                                                                                                                                                                                                                                                                     |
| <b>Equipment under Test (EUT):</b>                                                  |                                                                                                                                                                                                                                                                          |
| <b>Product Description</b>                                                          | UWB-Location-System is able to measure distances between the UWB components                                                                                                                                                                                              |
| <b>Model(s)</b>                                                                     | 52445052, Truck Tag                                                                                                                                                                                                                                                      |
| <b>Additional Model(s)</b>                                                          | None                                                                                                                                                                                                                                                                     |
| <b>Brand Name(s)</b>                                                                | zoneCONTROL                                                                                                                                                                                                                                                              |
| <b>Hardware Version(s)</b>                                                          | 10625 FS:04                                                                                                                                                                                                                                                              |
| <b>Software Version(s)</b>                                                          | 0.0.51                                                                                                                                                                                                                                                                   |
| <b>FCC ID</b>                                                                       | 2AK6M-52445052                                                                                                                                                                                                                                                           |
| <b>Test Result</b>                                                                  | <b>PASSED</b>                                                                                                                                                                                                                                                            |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                       |                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------|
| <b>Possible test case verdicts:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |                                                                                       |
| 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)               |                                                                                       |
| <b>Testing:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                       |                                                                                       |
| Test Lab Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 20 °C - 30 °C         |                                                                                       |
| Test Lab Humidity                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 25 % - 55 %           |                                                                                       |
| Date of receipt of test item                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2024-05-14            |                                                                                       |
| <b>Report:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                       |                                                                                       |
| Compiled by                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Florian Voigt         |                                                                                       |
| Tested by (+ signature)                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Md Abu Bakar Siddique |    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                       |                                                                                       |
| Approved by (+ signature)<br>(Test Lab Engineer)                                                                                                                                                                                                                                                                                                                                                                                                                               | Florian Voigt         |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                       |                                                                                       |
| Date of Issue                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2024-11-26            |                                                                                       |
| Total number of pages                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 67                    |                                                                                       |
| <b>General Remarks:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                                                                                       |
| <p>The test results presented in this report relate only to the object tested.</p> <p>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.</p> <p>This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p> |                       |                                                                                       |
| <b>Additional Comments:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                       |                                                                                       |
| ---                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |                                                                                       |

## ADDITIONAL VARIANTS

| Additional Variants<br>(not tested and not evaluated variants)                                                                                                                                                                                             |                          |                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------------------------------------------------------------------|
| Not-tested Variant                                                                                                                                                                                                                                         | Description              |                                                                             |
| 1                                                                                                                                                                                                                                                          | Product Type Description | UWB-Location-System is able to measure distances between the UWB components |
|                                                                                                                                                                                                                                                            | Model name               | 52445053, Truck Tag                                                         |
|                                                                                                                                                                                                                                                            | Brand name               | zoneCONTROL                                                                 |
|                                                                                                                                                                                                                                                            | Hardware Version         | 10625 FS:04                                                                 |
|                                                                                                                                                                                                                                                            | Software Version         | 0.0.51                                                                      |
| Comment: Those named additional variants above have not been tested. Those additional variants of the series have been declared by the manufacturer. The test report explicitly states that those variants were neither tested nor assessed nor evaluated. |                          |                                                                             |

## VERSION HISTORY

| Version History |            |                 |            |
|-----------------|------------|-----------------|------------|
| Version         | Issue Date | Remarks         | Revised By |
| 01              | 2024-11-26 | Initial Release |            |

## ABBREVIATIONS AND ACRONYMS

| Acronyms    |                                                                             |
|-------------|-----------------------------------------------------------------------------|
| Acronym     | Description                                                                 |
| EUT         | Equipment Under Test                                                        |
| FCC         | Federal Communications Commission                                           |
| RBW         | Resolution bandwidth                                                        |
| RFID        | Radio Frequency Identification                                              |
| RMS         | Root mean square                                                            |
| VBW         | Video bandwidth                                                             |
| $V_{NOM}$   | Nominal supply voltage                                                      |
| $f_L$       | Low edge frequency of UWB (-10) dB bandwidth                                |
| $f_H$       | High edge frequency of UWB (-10) dB bandwidth                               |
| $f_M$       | UWB frequency with highest peak power in UWB (-10) dB bandwidth measurement |
| $f_C$       | Centre frequency of UWB (-10) dB bandwidth                                  |
| $B_{-10}$   | -10 dB bandwidth                                                            |
| $\mu_{-10}$ | -10 dB fractional bandwidth                                                 |

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## 1 Equipment (Test Item) Under Test

|                           |                                                                                                                |                                          |
|---------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Description               | UWB-Location-System is able to measure distances between the UWB components                                    |                                          |
| Model                     | 52445052, Truck Tag                                                                                            |                                          |
| Additional Model(s)       | None                                                                                                           |                                          |
| Brand Name(s)             | zoneCONTROL                                                                                                    |                                          |
| Serial Number(s)          | 51853934                                                                                                       |                                          |
| Test Sample Id(s)         | 48550                                                                                                          |                                          |
| Hardware Version(s)       | 10625 FS:04                                                                                                    |                                          |
| Software Version(s)       | 0.0.51                                                                                                         |                                          |
| FCC ID                    | 2AK6M-52445052                                                                                                 |                                          |
| Equipment class           | Hand held (Customer declaration)                                                                               |                                          |
| Equipment type            | End Product                                                                                                    |                                          |
| Radio type                | Transceiver                                                                                                    |                                          |
| Operating frequency range | 3.1 – 10.6 GHz                                                                                                 |                                          |
| Radio technology          | Ultra Wide-band                                                                                                |                                          |
| Modulation                | BPSK with BPM                                                                                                  |                                          |
| Number of UWB radios      | 1                                                                                                              |                                          |
| Antenna                   | Type                                                                                                           | Integrated antenna                       |
|                           | Model                                                                                                          | PCB Antenna                              |
|                           | Manufacturer                                                                                                   | Siemens                                  |
|                           | Gain                                                                                                           | 3.47 dBi @ 4.0 GHz<br>5.65 dBi @ 6.5 GHz |
| Supply Voltage            | V <sub>NOM</sub>                                                                                               | 24 VDC                                   |
| Operating Temperature     | T <sub>NOM</sub>                                                                                               | 25 °C                                    |
| AC/DC-Adaptor             | None                                                                                                           |                                          |
| Manufacturer              | Siemens Aktiengesellschaft<br>R&D House CHE DI PA DCP R&D 5<br>Rochlitzer Str. 19<br>09111 Chemnitz<br>Germany |                                          |

#### 1.4 Support Equipment

| Product Type | Device                      | Manufacturer | Model         | Comment                              |
|--------------|-----------------------------|--------------|---------------|--------------------------------------|
| AE           | Laptop                      | HP           | ProBook       | For setting test modes               |
| AE           | USB-Serial-Adapter          | Agilon       | Not specified | --                                   |
| AE           | JH-Tester                   | Siemens      | Tag Mobile    | Test hardware to attach the EUTs CAN |
| CBL          | Cable                       | Siemens      | Not specified | From PCB with COM port to EUT        |
| CBL          | Connection Cord             | Siemens      | Not specified | Link between Tester and EUT          |
| CBL          | USB Cable                   | A-B Cable    | Not specified | --                                   |
| SFT          | RadioMode Setup Tool v3.1.0 | Siemens      | Not specified | For setting test modes               |
| Description: |                             |              |               |                                      |
| AE           | Auxiliary Equipment         |              |               |                                      |
| SIM          | Simulator                   |              |               |                                      |
| CBL          | Connecting Cable            |              |               |                                      |
| SFT          | Software                    |              |               |                                      |
| Comment: --  |                             |              |               |                                      |

## 1.5 Test Modes

| Mode        | Description                                                                                                                            |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Transmit    | Mode = Transmit<br>Modulation = BPSK with BPM<br>Duty cycle = 100%<br>Power setting = -6 dB (set by the software provided by customer) |
| Comment: -- |                                                                                                                                        |

## 1.6 Test Frequencies

| Designator | Mode | Channel | Frequency [MHz] |
|------------|------|---------|-----------------|
| F1         | Tx   | 2       | 3993.6          |
| F2         | Tx   | 5       | 6489.6          |

## 1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dB $\mu$ V. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB/m)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

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.

Field strength limit:

This is the FCC Class B radiated emission limit (in units of dB $\mu$ V/m). The FCC limits are given in units of  $\mu$ V/m. The following formula is used to convert the units of  $\mu$ V/m to dB $\mu$ V/m:

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

Example only for radiated field strength:

|                  |               |   |                   |                        |          |
|------------------|---------------|---|-------------------|------------------------|----------|
| Reading + AF     | = Net Reading | : | Net reading       | - Field strength limit | = Margin |
| +21.5 dB $\mu$ V | + 26 dB/m     | : | 47.5 dB $\mu$ V/m | - 57.0 dB $\mu$ V/m    | = -9.5   |

## 2 Result Summary

| FCC 47 CFR Part 15F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                              |                  |        |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|------------------|--------|---------|
| Product Standard Reference                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Requirement                                  | Reference Method | Result | Remarks |
| FCC 15.503(a), 15.519(b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | UWB (-10 dB) Bandwidth                       | ANSI C63.10-2013 | PASS   | --      |
| FCC 15.519(e)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Peak power                                   | ANSI C63.10-2013 | PASS   | --      |
| FCC 15.519(a)(1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Cease of transmitter operation               | ANSI C63.10-2013 | PASS   | --      |
| FCC 15.519(c)(d)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Transmitter radiated emissions               | ANSI C63.10-2013 | PASS   | --      |
| FCC 15.207                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | AC power line conducted emissions            | ANSI C63.10-2013 | N/R    | Note 1  |
| Note 1: EUT is not connected directly or indirectly via AC-Mains                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |                  |        |         |
| <p>Comment: The Decision Rule is applied on the basis of ETSI TR 102 273 and ETSI TR 100 028. These standards provide guidance on how to calculate and apply measurement uncertainty whilst providing maximum uncertainties allowance. In all cases due consideration will be given to ILAC-G8:09/2019. Where a result is considered conditional in respect of its proximity to the limit line, the customer would be made aware of situation so that they can make an informed decision on how to proceed.</p> |                                              |                  |        |         |
| 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 - UWB (-10 dB) Bandwidth

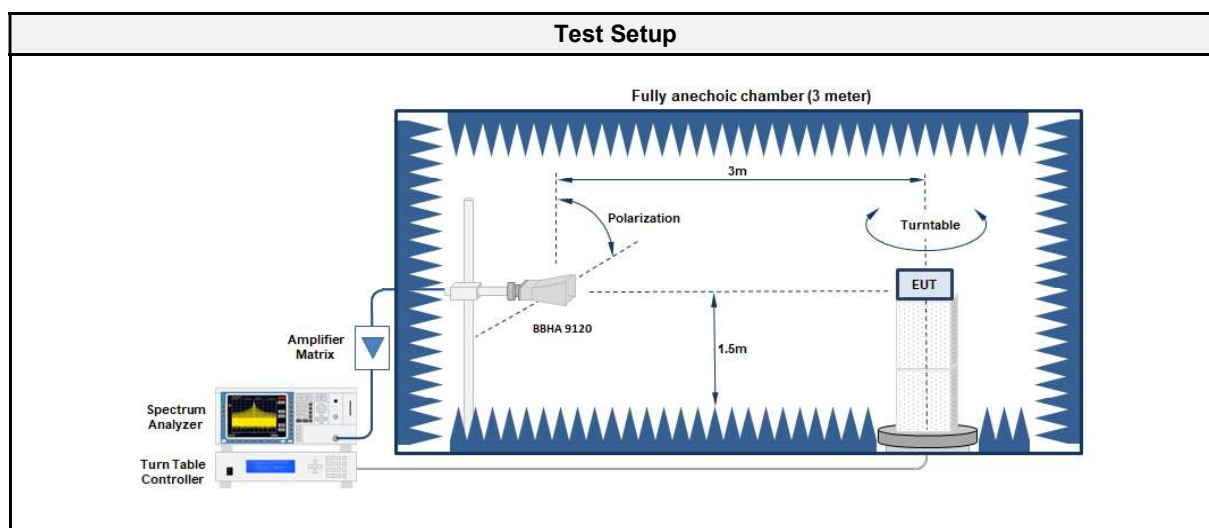
##### 3.1.1 Information

| Test Information           |                          |
|----------------------------|--------------------------|
| Product Standard Reference | FCC Part 15.519 (a)      |
| Measurement Method         | ANSI C63.10 10.1         |
| Measurement Uncertainty    | $\pm 1.26 \%$            |
| Date                       | 2024-06-19 to 2024-06-26 |
| Operator                   | Md Abu Bakar Siddique    |

##### 3.1.2 Limits

| Limits                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UWB (-10 dB) bandwidth totally contained in the band 3.1 - 10.6 GHz<br>additionally UWB (-10 dB) bandwidth $\geq 500$ MHz or fractional bandwidth $\geq 0.20$ |

##### 3.1.3 Setup



##### 3.1.4 Equipment

| Test Software |                  |            |          |
|---------------|------------------|------------|----------|
| Description   | Manufacturer     | Name       | Version  |
| EMC Software  | DARE Instruments | RadiMation | 2020.1.8 |
| EMC Software  | DARE Instruments | RadiMation | 2023.2.6 |

| Test Equipment    |                 |            |            |           |          |
|-------------------|-----------------|------------|------------|-----------|----------|
| Description       | Manufacturer    | Model      | Identifier | Cal. Date | Cal. Due |
| Anechoic Chamber  | Frankonia       | AC1        | EF00062    | 2022-11   | 2025-11  |
| Test Receiver     | Rohde & Schwarz | ESW44      | EF01856    | 2024-04   | 2025-04  |
| Antenna           | Schwarzbeck     | BBHA 9120D | EF01561    | 2021-11   | 2024-11  |
| Anechoic Chamber  | Frankonia       | AC2        | EF01616    | 2023-12   | 2024-12  |
| Spectrum analyzer | R&S             | FSW43      | EF00896    | 2023-08   | 2024-08  |
| Antenna           | Schwarzbeck     | BBHA 9120B | EF01678    | 2024-05   | 2027-05  |

### 3.1.5 Procedure

| Test Procedure |                                                                                                                           |
|----------------|---------------------------------------------------------------------------------------------------------------------------|
| 1.             | EUT set to test mode                                                                                                      |
| 2.             | The turntable and antenna polarization are set to the maximum emission level for the fundamental emission of the EUT      |
| 3.             | Span is set so that the complete fundamental emission spectrum is captured                                                |
| 3.             | Resolution bandwidth set to 1 MHz and the VBW is set to 3 MHz with peak detector and max. hold                            |
| 4.             | The emission spectrum is corrected by the antenna gain cable loss, low-noise amplifier gain                               |
| 5.             | The maximum of the spectrum envelope is determined as reference                                                           |
| 6.             | The spectrum is searched from the left edge to the center of the spectrum in order to find the lower -10 dB frequency     |
| 7.             | The spectrum is searched from the right edge to the center of the spectrum in order to find the upper -10 dB frequency    |
| 8.             | From the lower and upper frequency the center frequency, the -10 dB bandwidth and the fractional bandwidth are calculated |

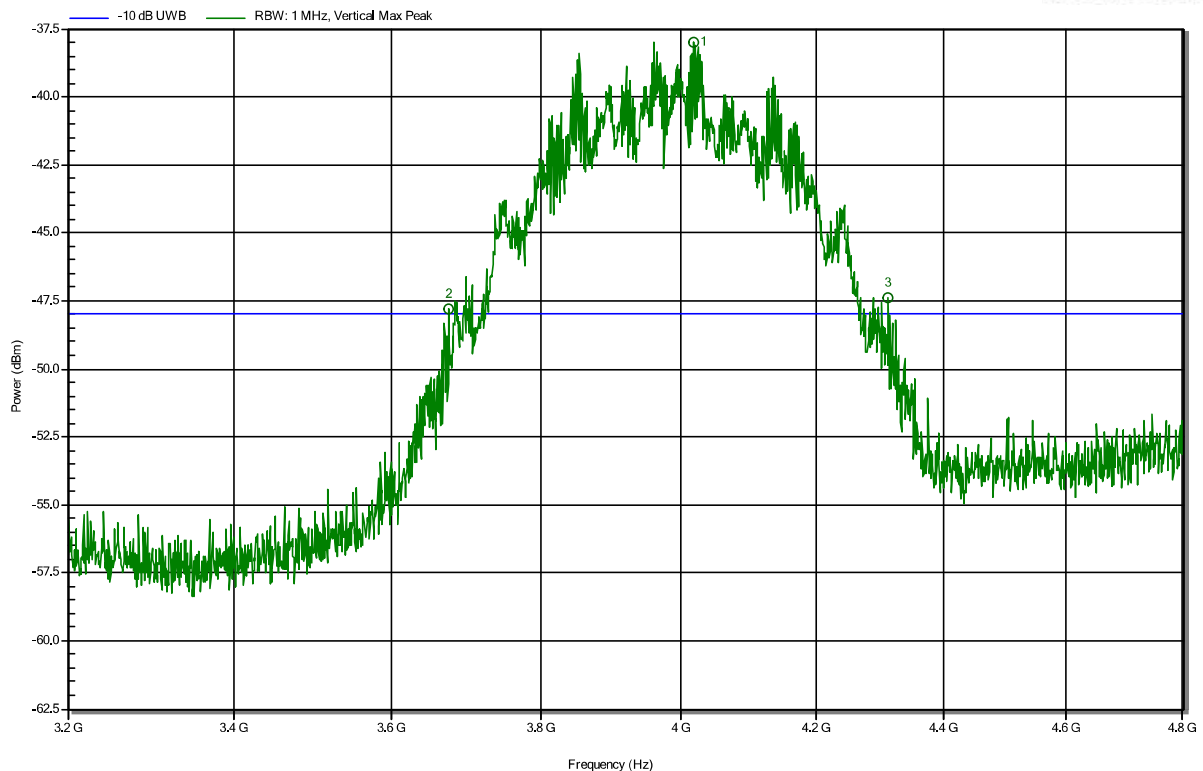
### 3.1.6 Results

| Test Results - Antenna 1 (UWB1) |             |             |                 |             |             |                   |         |
|---------------------------------|-------------|-------------|-----------------|-------------|-------------|-------------------|---------|
| Channel [MHz]                   | $f_M$ [MHz] | $f_C$ [MHz] | $B_{-10}$ [MHz] | $f_L$ [MHz] | $f_H$ [MHz] | $\mu_{-10}$ [MHz] | Verdict |
| 3993.6                          | 4017.6      | 3993.52     | 636.4266        | 3675.3067   | 4311.7333   | 0.1593            | PASS    |
| 6489.6                          | 6631.3667   | 6507.7      | 583.6134        | 6215.8933   | 6799.5067   | 0.0896            | PASS    |

## UWB (-10 dB) Bandwidth according to 47 CFR Part 15.519

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120D  
 Measurement distance: 3 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB  
 Test Date: 2024-06-26

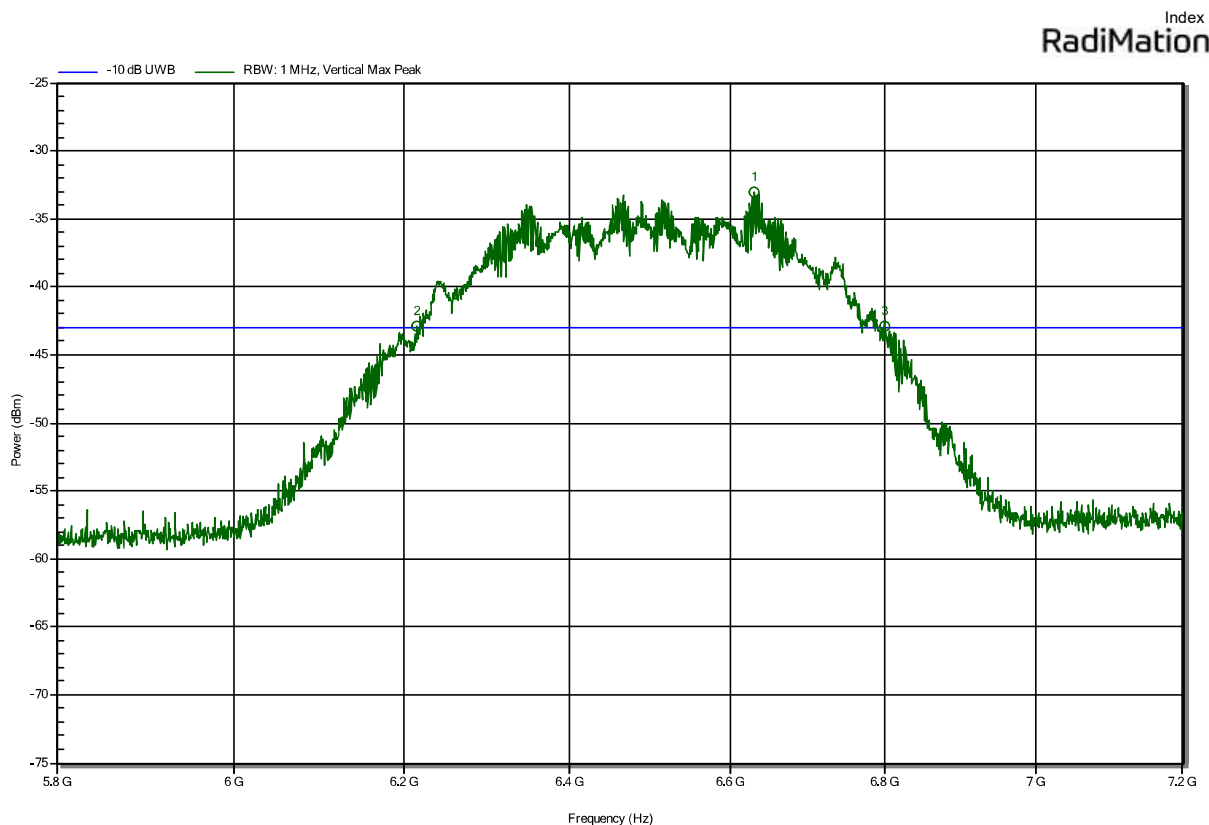
Index 6  
**RadiMation**



| Peak Number | Frequency (MHz) | Peak (dBm) | Peak (dBm) | Limit | Peak Difference (dB) | Peak Status | Polarization |
|-------------|-----------------|------------|------------|-------|----------------------|-------------|--------------|
| 1           | 4017.6          | -38        | -48        | 10    | --                   | --          | Vertical     |
| 2           | 3675.3067       | -47.8      | -48        | 0.23  | --                   | --          | Vertical     |
| 3           | 4311.7333       | -47.4      | -48        | 0.62  | --                   | --          | Vertical     |

**UWB (-10 dB) Bandwidth according to 47 CFR Part 15.519**

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2020.1.8  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120B  
 Measurement distance: 3 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB  
 Test Date: 2024-06-19



| Peak Number | Frequency (MHz) | Peak (dBm) | Peak (dBm) | Limit | Peak Difference (dB) | Peak Status | Polarization |
|-------------|-----------------|------------|------------|-------|----------------------|-------------|--------------|
| 1           | 6631.3667       | -33        | -43        | 10    | --                   | --          | Vertical     |
| 2           | 6215.8933       | -42.9      | -43        | 0.12  | --                   | --          | Vertical     |
| 3           | 6799.5067       | -42.9      | -43        | 0.1   | --                   | --          | Vertical     |

## 3.2 Test Conditions and Results - Maximum Peak Power

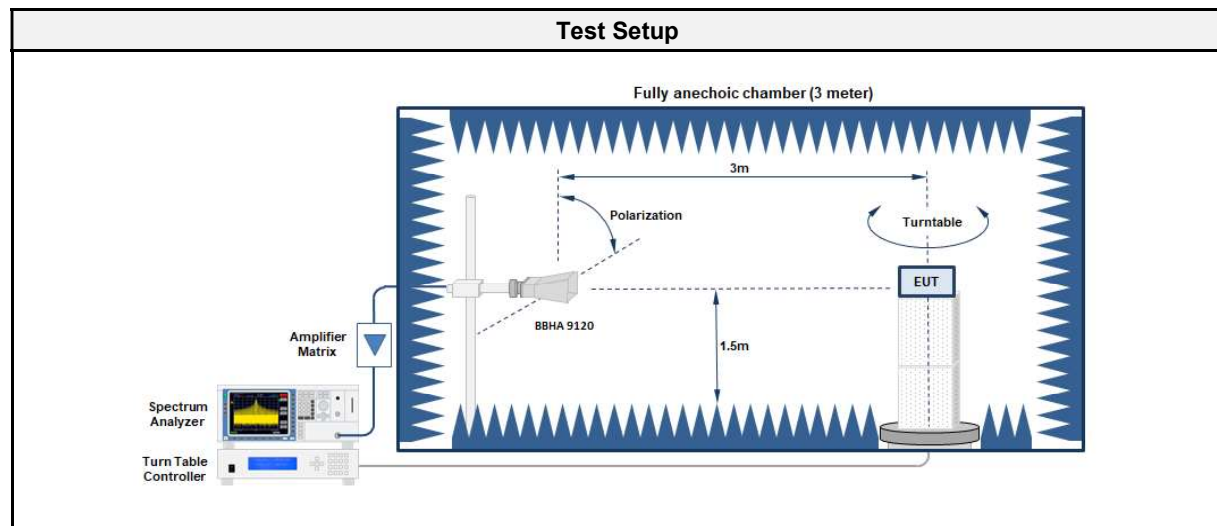
### 3.2.1 Information

| Test Information           |                                    |
|----------------------------|------------------------------------|
| Product Standard Reference | FCC Part 15.519 (e)                |
| Date                       | 2024-06-19 to 2024-06-26           |
| Operator                   | Md Abu Bakar Siddique              |
| Measurement Method         | ANSI C63.10 10.3.5, 10.3.6, 10.3.9 |
| Measurement Uncertainty    | $\pm 4.21$ dB                      |

### 3.2.2 Limits

| Limits          |                  |
|-----------------|------------------|
| Bandwidth [MHz] | Power [dBm EIRP] |
| 50              | 0                |

### 3.2.3 Setup



### 3.2.4 Equipment

| Test Software |                  |            |          |
|---------------|------------------|------------|----------|
| Description   | Manufacturer     | Name       | Version  |
| EMC Software  | DARE Instruments | RadiMation | 2020.1.8 |
| EMC Software  | DARE Instruments | RadiMation | 2023.2.6 |

| Test Equipment    |                 |            |            |           |          |
|-------------------|-----------------|------------|------------|-----------|----------|
| Description       | Manufacturer    | Model      | Identifier | Cal. Date | Cal. Due |
| Anechoic Chamber  | Frankonia       | AC1        | EF00062    | 2022-11   | 2025-11  |
| Test Receiver     | Rohde & Schwarz | ESW44      | EF01856    | 2024-04   | 2025-04  |
| Antenna           | Schwarzbeck     | BBHA 9120D | EF01561    | 2021-11   | 2024-11  |
| Anechoic Chamber  | Frankonia       | AC2        | EF01616    | 2023-12   | 2024-12  |
| Spectrum analyzer | R&S             | FSW43      | EF00896    | 2023-08   | 2024-08  |
| Antenna           | Schwarzbeck     | BBHA 9120B | EF01678    | 2024-05   | 2027-05  |

### 3.2.5 Procedure

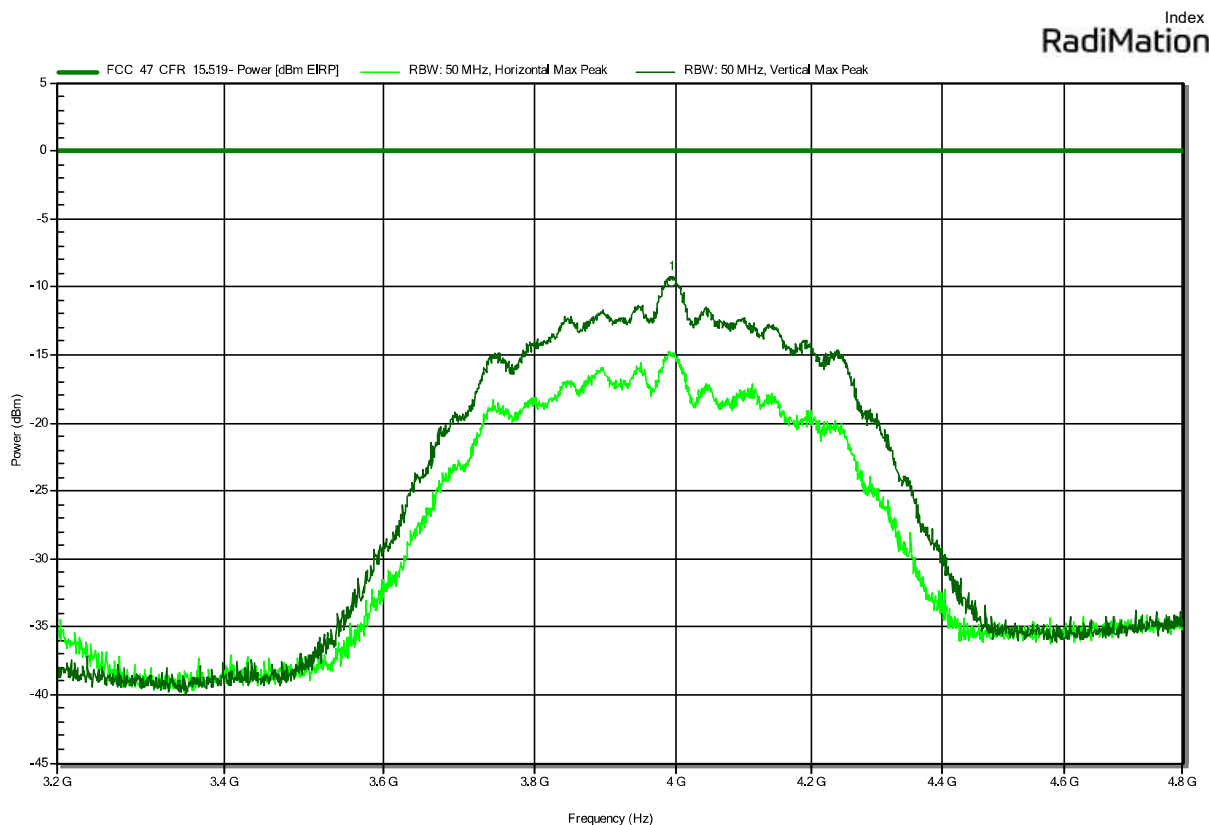
| Test Procedure |                                                                                                                      |
|----------------|----------------------------------------------------------------------------------------------------------------------|
| 1.             | EUT set to test mode                                                                                                 |
| 2.             | The turntable and antenna polarization are set to the maximum emission level for the fundamental emission of the EUT |
| 3.             | Span is set so that the complete fundamental emission spectrum is captured                                           |
| 3.             | Resolution bandwidth set to 50 MHz and the VBW is set to maximum with peak detector and max. hold                    |
| 4.             | The emission spectrum is corrected by the antenna gain cable loss, low-noise amplifier gain and path loss            |
| 5.             | The maximum of the spectrum envelope is determined and compared to the limit                                         |

### 3.2.6 Results

| Test Results  |                |                  |                  |             |
|---------------|----------------|------------------|------------------|-------------|
| Channel [MHz] | Emission [MHz] | Power [dBm EIRP] | Limit [dBm EIRP] | Margin [dB] |
| 3993.6        | 3993.33        | -9.7             | 0                | -9.7        |
| 6489.6        | 6483.01        | -5.4             | 0                | -5.4        |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

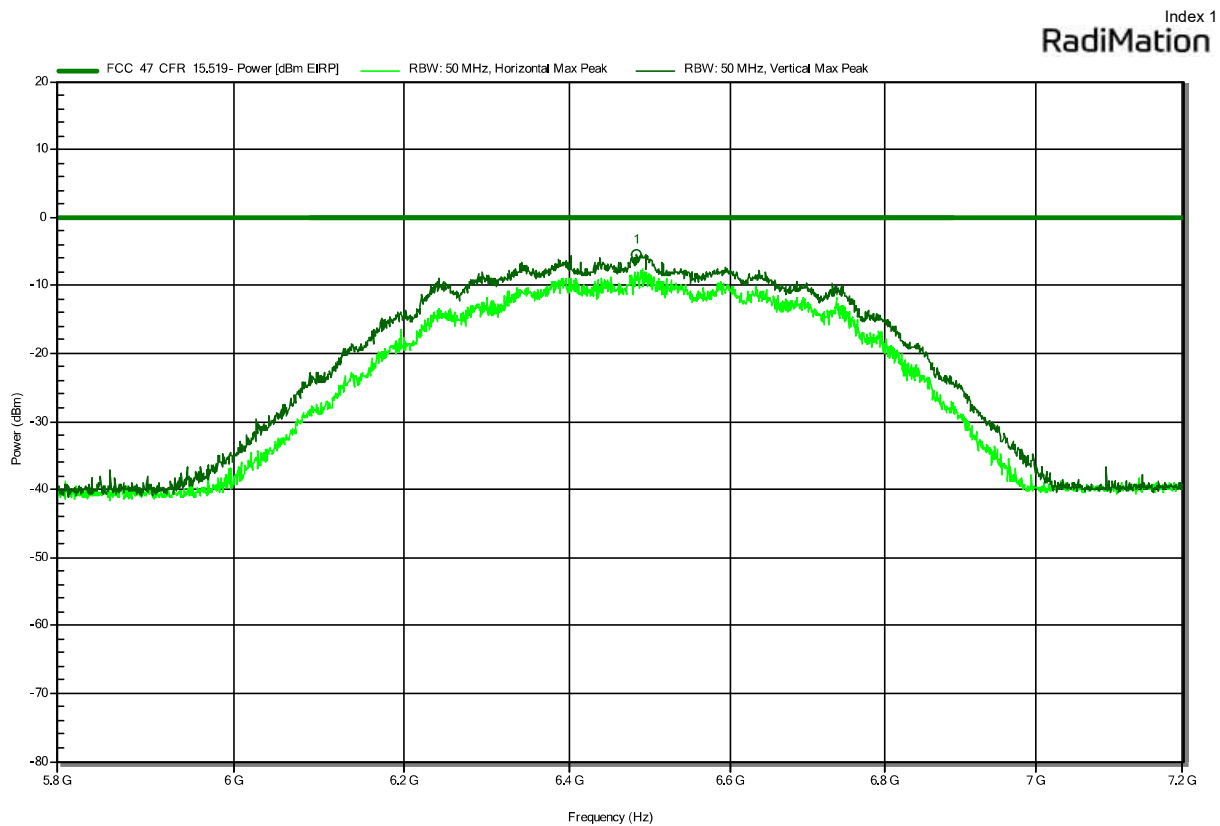
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120D  
 Measurement distance: 3 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB  
 Test Date: 2024-06-26



| Peak Number | Frequency (MHz) | Peak (dBm) | Peak (dBm) | Limit | Peak Difference (dB) | Peak Status | Polarization |
|-------------|-----------------|------------|------------|-------|----------------------|-------------|--------------|
| 1           | 3993.3333       | -9.7       | 0          | -9.7  |                      | Pass        | Vertical     |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2020.1.8  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120B  
 Measurement distance: 3 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB  
 Test Date: 2024-06-19



| Peak Number | Frequency (MHz) | Peak (dBm) | Peak (dBm) | Limit (dB) | Peak Difference | Peak Status | Polarization |
|-------------|-----------------|------------|------------|------------|-----------------|-------------|--------------|
| 1           | 6483.0133       | -5.4       | 0          | -5.4       |                 | Pass        | Vertical     |

### 3.3 Test Conditions and Results - Cease of transmitter operation

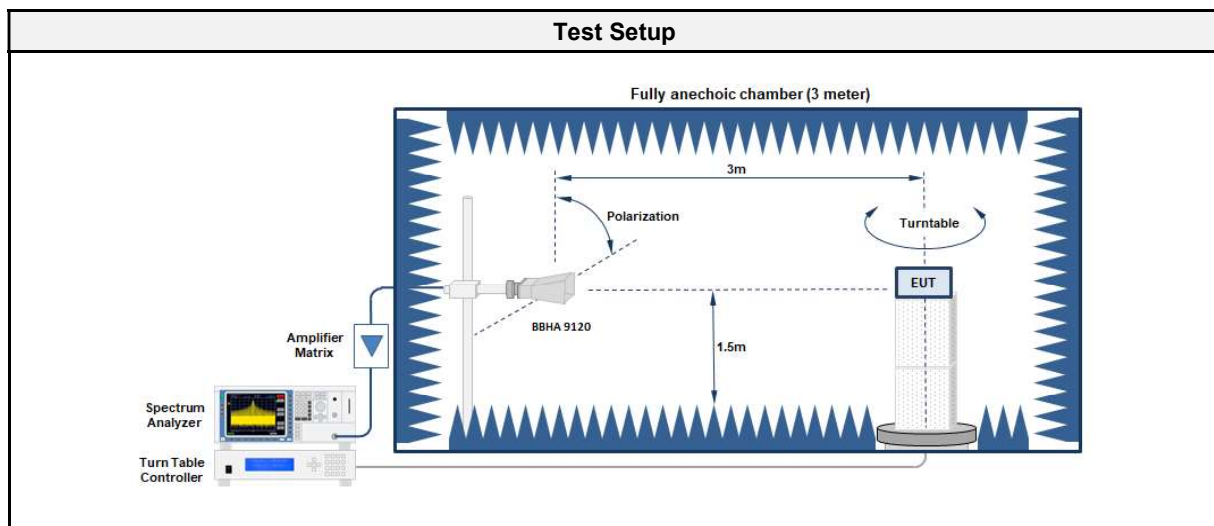
#### 3.3.1 Information

| Test Information           |                        |
|----------------------------|------------------------|
| Product Standard Reference | FCC Part 15.519 (a)(1) |
| Date                       | 2024-08-02             |
| Operator                   | Md Abu Bakar Siddique  |

#### 3.3.2 Limits

| Limits - FCC                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>A UWB device shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.</p> |

#### 3.3.3 Setup



#### 3.3.4 Equipment

| Test Equipment    |              |            |            |           |          |
|-------------------|--------------|------------|------------|-----------|----------|
| Description       | Manufacturer | Model      | Identifier | Cal. Date | Cal. Due |
| Anechoic chamber  | Frankonia    | AC 4       | EF00200    | --        | --       |
| Spectrum Analyzer | R&S          | FSU 26     | EF01407    | 2023-08   | 2024-08  |
| Antenna           | Schwarzbeck  | BBHA 9120D | EF00019    | 2023-12   | 2026-12  |

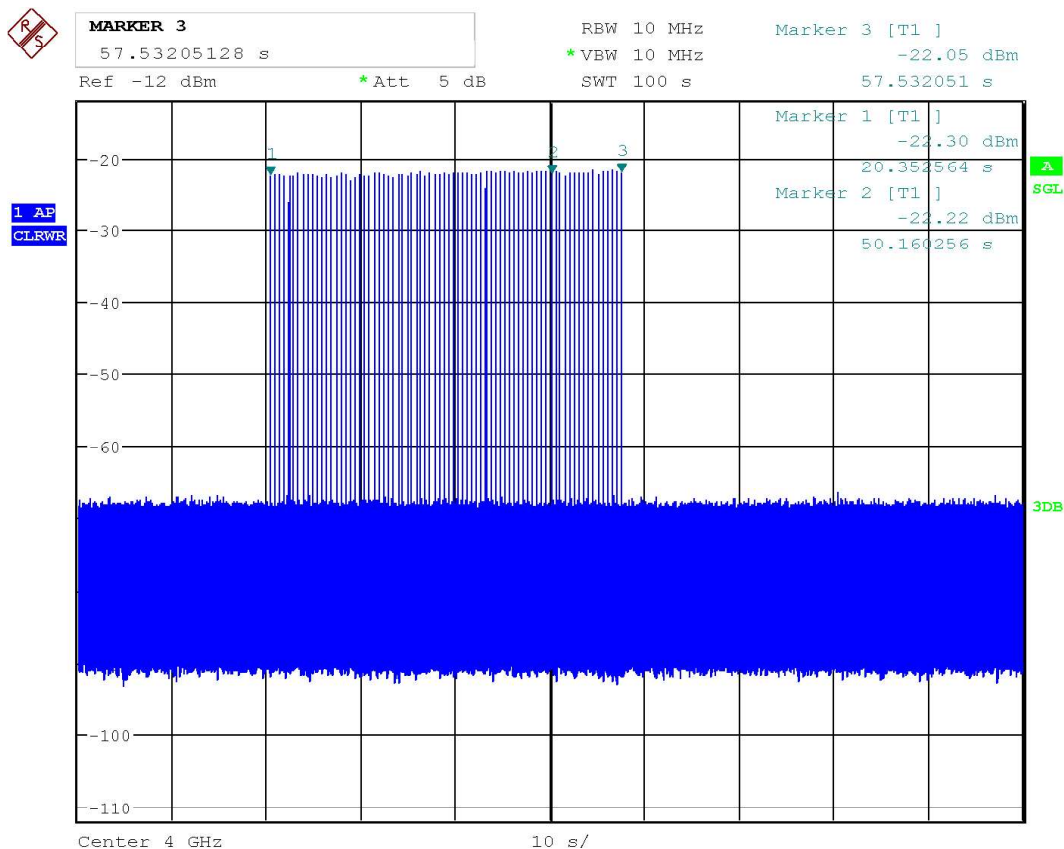
### 3.3.5 Procedure

| Test Procedure |                                                                                                                                          |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 1.             | EUT set to normal operation                                                                                                              |
| 2.             | The emissions of the EUT are captured with a spectrum analyzer                                                                           |
| 3.             | The transmitter is stopped either by switching off the companion device or by releasing the manual switch                                |
| 4.             | From the moment the transmitter is released the emission are recorded and a marker is set to the moment the transmitter has switched off |
| 5.             | The marker time is recorded and compared to the limit                                                                                    |

### 3.3.6 Results

| Test Results     |                               |              |               |
|------------------|-------------------------------|--------------|---------------|
| Channel<br>[MHz] | Transmission stop time<br>[s] | Limit<br>[s] | Margin<br>[s] |
| 4000             | 7.372                         | 10           | -2.628        |

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Test Date: 2024-08-02



Date: 2.AUG.2024 12:54:07

| Marker Number | Time(s) | Comment                                                 |
|---------------|---------|---------------------------------------------------------|
| 1             | 20.352  | Start of communication between EUT and companion device |
| 2             | 50.160  | Companion device was turned off                         |
| 3             | 57.532  | Cease of transmit from EUT                              |

### 3.4 Test Conditions and Results - Transmitter radiated emissions

#### 3.4.1 Information

| Test Information                                                                                                                                                                                                                                                                                                                            |                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Product Standard Reference                                                                                                                                                                                                                                                                                                                  | FCC Part 15.519 (c)(d)   |
| Measurement Method                                                                                                                                                                                                                                                                                                                          | ANSI C63.10 10.2, 10.3   |
| Measurement Uncertainty                                                                                                                                                                                                                                                                                                                     | ± 5.95 dB                |
| Date                                                                                                                                                                                                                                                                                                                                        | 2024-06-21 to 2024-08-02 |
| Operator                                                                                                                                                                                                                                                                                                                                    | Md Abu Bakar Siddique    |
| Comment: Some non-ultrawideband emissions generated by digital circuits have been found. This emissions do not comply with the requirements defined in § 15.519(c). However this emission do comply with the requirements defined in § 15.209(a) as permissible by § 15.521(c).<br>Detailed evaluation of this issues is listed in ANNEX B. |                          |

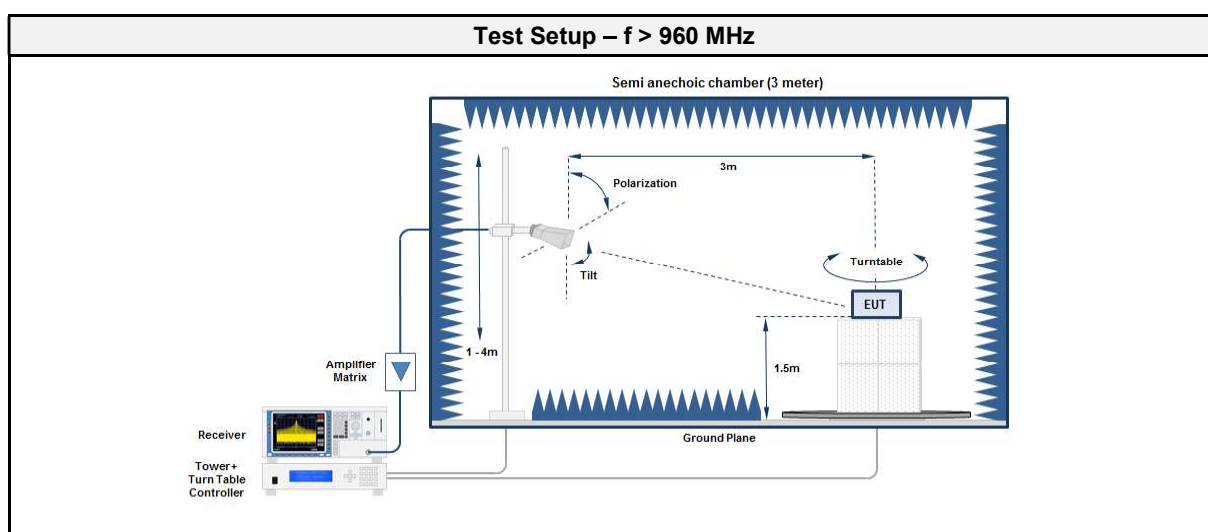
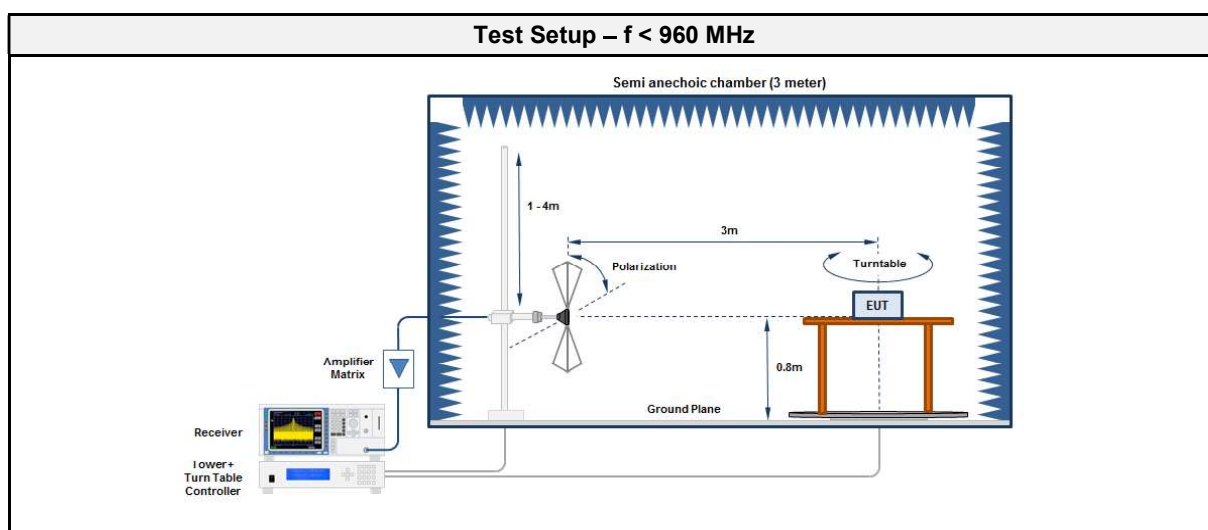
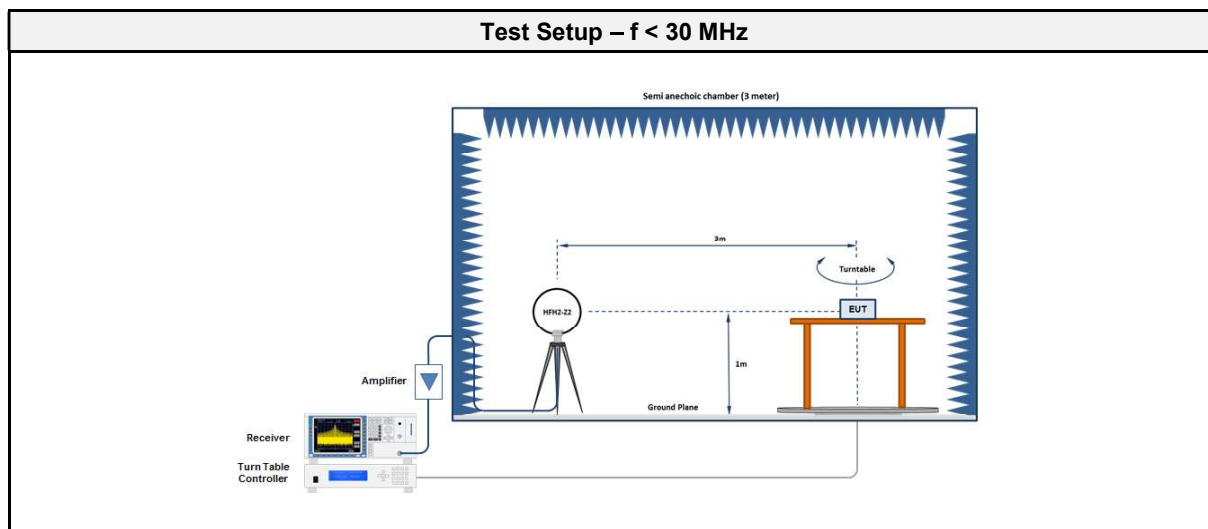
#### 3.4.2 Limits

| Limits - below 960 MHz |            |                       |                          |
|------------------------|------------|-----------------------|--------------------------|
| Frequency [MHz]        | Detector   | Field strength [µV/m] | Measurement distance [m] |
| 0.009 - 0.09           | Average    | 2400/F[kHz]           | 300                      |
| 0.09 - 0.110           | Quasi-Peak | 2400/F[kHz]           | 300                      |
| 0.110 - 0.490          | Average    | 2400/F[kHz]           | 300                      |
| 0.490 - 1.705          | Quasi-Peak | 24000/F[kHz]          | 30                       |
| 1.705 - 30.0           | Quasi-Peak | 30                    | 30                       |
| 30 - 88                | Quasi-Peak | 100                   | 3                        |
| 88 - 216               | Quasi-Peak | 150                   | 3                        |
| 216 - 960              | Quasi-Peak | 200                   | 3                        |

| Limits - FCC - above 960 MHz |           |          |                  |                            |                            |
|------------------------------|-----------|----------|------------------|----------------------------|----------------------------|
| Frequency [MHz]              | Bandwidth | Detector | Power [dBm EIRP] | Field Strength [dBµV/m@3m] | Field Strength [dBµV/m@1m] |
| 960-1610                     | 1 MHz     | RMS      | -75.3            | 19.9                       | 29.5                       |
| 1610-1990                    | 1 MHz     | RMS      | -63.3            | 31.9                       | 41.5                       |
| 1990-3100                    | 1 MHz     | RMS      | -61.3            | 33.9                       | 43.5                       |
| 3100-10600                   | 1 MHz     | RMS      | -41.3            | 53.9                       | 63.5                       |
| > 10600                      | 1 MHz     | RMS      | -61.3            | 33.9                       | 43.5                       |

| Limits - GPS Band |           |          |                  |                            |                            |
|-------------------|-----------|----------|------------------|----------------------------|----------------------------|
| Frequency [MHz]   | Bandwidth | Detector | Power [dBm EIRP] | Field Strength [dBµV/m@3m] | Field Strength [dBµV/m@1m] |
| 1164-1240         | 1 kHz     | RMS      | -85.3            | 9.9                        | 19.5                       |
| 1559-1610         | 1 kHz     | RMS      | -85.3            | 9.9                        | 19.5                       |

### 3.4.3 Setup



### 3.4.4 Equipment

| Test Software |                  |            |          |
|---------------|------------------|------------|----------|
| Description   | Manufacturer     | Name       | Version  |
| EMC Software  | DARE Instruments | RadiMation | 2020.1.8 |
| EMC Software  | DARE Instruments | RadiMation | 2023.2.6 |

| Test Equipment f < 30 MHz |              |         |            |           |          |
|---------------------------|--------------|---------|------------|-----------|----------|
| Description               | Manufacturer | Model   | Identifier | Cal. Date | Cal. Due |
| Anechoic Chamber          | Frankonia    | AC1     | EF00062    | --        | --       |
| Loop Antenna              | R&S          | HFH2-Z2 | EF00184    | 2024-02   | 2027-02  |
| Test Receiver             | R&S          | ESW44   | EF01856    | 2024-04   | 2025-04  |

| Test Equipment 30 - 960 MHz |              |           |            |           |          |
|-----------------------------|--------------|-----------|------------|-----------|----------|
| Description                 | Manufacturer | Model     | Identifier | Cal. Date | Cal. Due |
| Anechoic Chamber            | Frankonia    | AC1       | EF00062    | 2022-11   | 2025-11  |
| Antenna                     | Schwarzbeck  | VULB 9168 | EF01824    | 2022-10   | 2025-10  |
| Test Receiver               | R&S          | ESW44     | EF01856    | 2024-04   | 2025-04  |

| Test Equipment 0.96 – 4.8 GHz |              |            |            |           |          |
|-------------------------------|--------------|------------|------------|-----------|----------|
| Description                   | Manufacturer | Model      | Identifier | Cal. Date | Cal. Due |
| Anechoic Chamber              | Frankonia    | AC1        | EF01011    | 2023-11   | 2024-11  |
| Antenna                       | Schwarzbeck  | BBHA 9120D | EF01561    | 2021-11   | 2024-11  |
| Test Receiver                 | R&S          | ESW44      | EF01856    | 2024-04   | 2025-04  |

| Test Equipment f > 4.8 GHz              |                     |                              |            |           |          |
|-----------------------------------------|---------------------|------------------------------|------------|-----------|----------|
| Description                             | Manufacturer        | Model                        | Identifier | Cal. Date | Cal. Due |
| Anechoic chamber                        | Frankonia           | AC 2                         | EF01616    | 2023-12   | 2024-12  |
| Spectrum analyzer                       | R&S                 | FSW43                        | EF00896    | 2023-08   | 2024-08  |
| Horn antenna                            | Schwarzbeck         | BBHA 9120B<br>(1-10GHz)      | EF01678    | 2024-05   | 2027-05  |
| Double Ridged Waveguide<br>Horn Antenna | Schwarzbeck         | HWRD 650<br>(6,5-18GHz)      | EF01679    | 2024-05   | 2027-05  |
| Antenna                                 | Amplifier Research  | AT4560                       | EF00302    | 2023-09   | 2025-09  |
| Antenna                                 | Flann Microwave Ltd | 22240-25 Amp.<br>CBL26402075 | EF00301    | 2023-01   | 2026-01  |

### 3.4.5 Procedure

| Test Procedure $f < 30$ MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> <li>1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground</li> <li>2. EUT set to test mode</li> <li>3. The receiver is set to peak and average detection with max hold</li> <li>4. The EUT is rotated through <math>360^\circ</math></li> <li>5. All significant emissions are measured again using the corresponding final detector</li> </ol>                                             |
| Test Procedure 30 - 960 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <ol style="list-style-type: none"> <li>1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground</li> <li>2. EUT set to test mode</li> <li>3. The receiver is set to peak detection with max hold</li> <li>4. The EUT is rotated through <math>360^\circ</math> and the height of the antenna is varied from 1 m to 4 m</li> <li>5. All significant emissions are measured again using the corresponding final detector</li> </ol> |
| Test Procedure 960 - 4800 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <ol style="list-style-type: none"> <li>1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground</li> <li>2. EUT set to test mode</li> <li>3. The receiver is set to RMS detection with max hold, measure time is set to 1 ms, step size is set to RBW/2.</li> <li>4. The EUT is rotated through <math>360^\circ</math> and the height of the antenna is varied from 1 m to 4 m</li> </ol>                                         |
| Test Procedure $> 4800$ MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <ol style="list-style-type: none"> <li>1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground</li> <li>2. EUT set to test mode</li> <li>3. The receiver is set to RMS detection with max hold, 30001 sweep points and 30 s sweep time.</li> <li>4. The EUT is rotated through <math>360^\circ</math> and the height of the antenna is varied from 1 m to 4 m</li> </ol>                                                         |

### 3.4.6 Results

| Test Results – below 960 MHz |                |                |      |      |                |             |
|------------------------------|----------------|----------------|------|------|----------------|-------------|
| Channel [MHz]                | Emission [MHz] | Level [dBμV/m] | Det. | Pol. | Limit [dBμV/m] | Margin [dB] |
| 3993.6                       | 0.018          | -19.3          | pk   | Ver  | 62.3           | -81.64      |
| 3993.6                       | 0.018          | -19.8          | avg  | ver  | 42.3           | -62.19      |
| 3993.6                       | 0.018          | -14.9          | pk   | ver  | 62.4           | -77.24      |
| 3993.6                       | 0.018          | -16.3          | avg  | ver  | 42.4           | -58.68      |
| 3993.6                       | 0.52           | 3.3            | pk   | ver  | 33.3           | -30.01      |
| 3993.6                       | 64.72          | 26.7           | pk   | ver  | 40             | -13.32      |
| 3993.6                       | 153.69         | 26             | pk   | hor  | 43.5           | -17.52      |
| 3993.6                       | 350.85         | 30.2           | pk   | ver  | 46             | -15.81      |
| 3993.6                       | 787.02         | 37             | pk   | hor  | 46             | -9.02       |
| 6489.6                       | 0.019          | -19.1          | pk   | ver  | 62             | -81.06      |
| 6489.6                       | 0.019          | -19.6          | avg  | ver  | 42             | -61.59      |
| 6489.6                       | 0.52           | 1.8            | pk   | ver  | 33.3           | -31.46      |
| 6489.6                       | 0.018          | -16.9          | pk   | ver  | 62.4           | -79.27      |
| 6489.6                       | 0.018          | -17.1          | avg  | ver  | 42.4           | -59.47      |
| 6489.6                       | 780.82         | 36.1           | pk   | ver  | 46             | -9.89       |
| 6489.6                       | 352.4          | 30.6           | pk   | ver  | 46             | -15.37      |
| 6489.6                       | 62.24          | 25.5           | pk   | hor  | 40             | -14.54      |
| 6489.6                       | 263.43         | 26.3           | pk   | hor  | 46             | -19.7       |

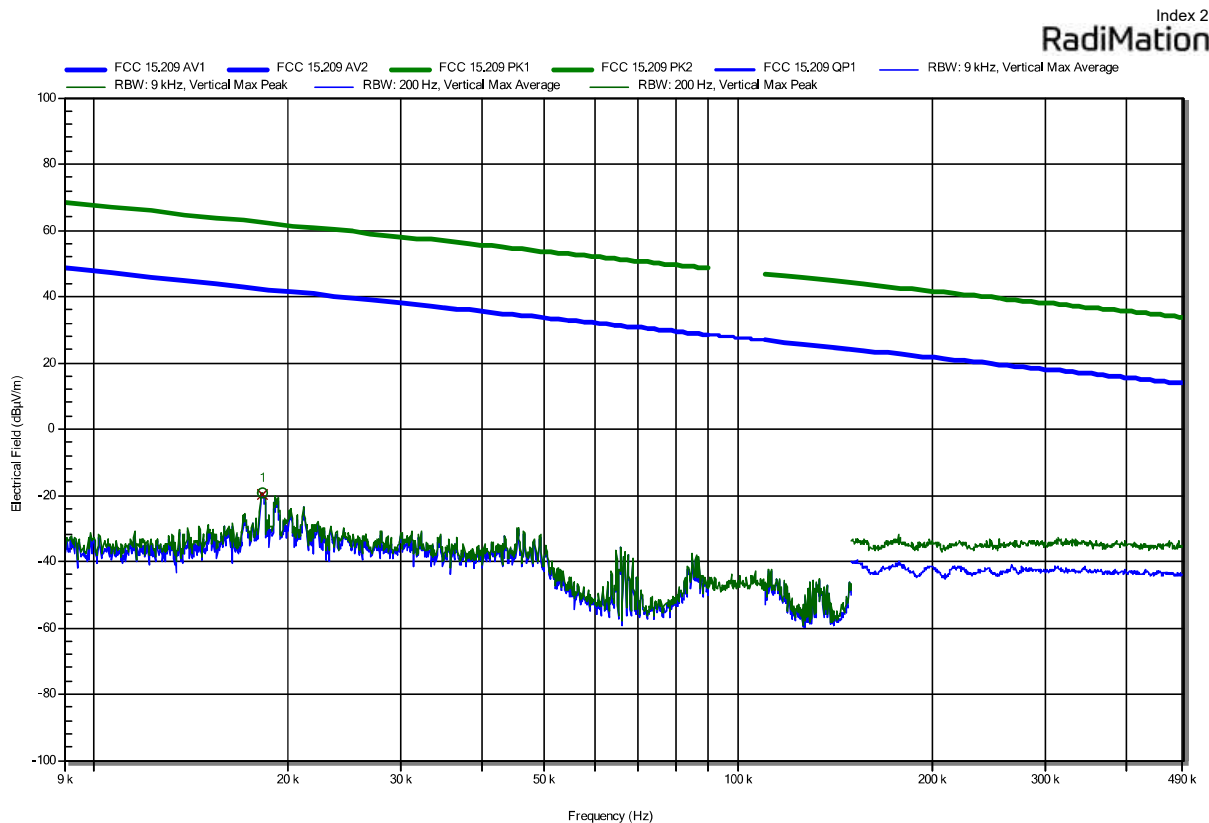
| Test Results – above 960 MHz |                |             |      |      |             |             |
|------------------------------|----------------|-------------|------|------|-------------|-------------|
| Channel [MHz]                | Emission [MHz] | Level [dBm] | Det. | Pol. | Limit [dBm] | Margin [dB] |
| 3993.6                       | 1360.4373      | -63.4       | RMS  | hor  | -75.3       | 11.9*       |
| 3993.6                       | 1606.1087      | -75.1       | RMS  | hor  | -85.3       | 10.21*      |
| 3993.6                       | 3993.6         | -47.6       | RMS  | ver  | -41.3       | -6.33       |
| 3993.6                       | 7987.312       | -53.2       | RMS  | ver  | -41.3       | -11.89      |
| 3993.6                       | 39897.85       | -67.5       | RMS  | ver  | -61.3       | -6.2        |
| 6489.6                       | 1376.5         | -63.8       | RMS  | ver  | -75.3       | 11.46*      |
| 6489.6                       | 1008           | -74.1       | RMS  | hor  | -75.3       | 1.16*       |
| 6489.6                       | 1607.705       | -80.9       | RMS  | hor  | -85.3       | 4.4*        |
| 6489.6                       | 6489.6         | -41.9       | RMS  | ver  | -41.3       | -0.64       |
| 6489.6                       | 12979.0975     | -65         | RMS  | ver  | -61.3       | -3.68       |
| 6489.6                       | 17893.3333     | -65.1       | RMS  | ver  | -61.3       | -3.81       |
| 6489.6                       | 26001.333      | -83.2       | RMS  | ver  | -61.3       | -21.89      |
| 6489.6                       | 39899.65       | -67.6       | RMS  | ver  | -61.3       | -6.31       |

Note \*: Emission is above the ultra wide band limit but is not an ultra wide band emission. See Annex B for further evaluation.

## ANNEX A Transmitter radiated emissions

### Radiated Spurious Emissions according to 47 CFR Part 15.519

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Rohde & Schwarz HFH 2-Z2, Vertical  
 Measurement distance: 3 m, converted to 300 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB  
 Test Date: 2024-06-26  
 Note: Antenna parallel to EUT PCB



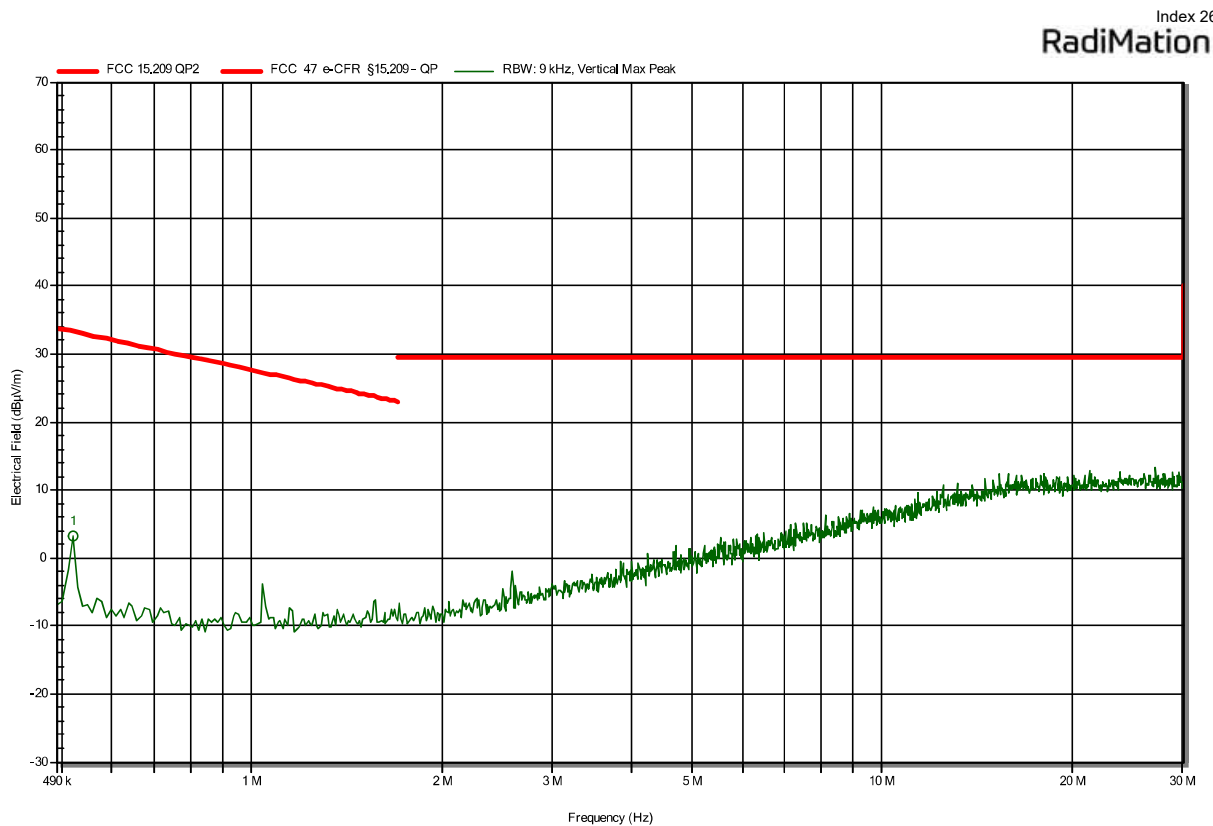
| Peak Number | Frequency (MHz) | Peak (dBµV/m)    | Peak (dBµV/m)    | Limit | Peak (dB)    | Difference | Peak Status    |
|-------------|-----------------|------------------|------------------|-------|--------------|------------|----------------|
| 1           | 0.018           | -19.3            | 62.3             |       | -81.64       |            | Pass           |
| Peak Number | Frequency (MHz) | Average (dBµV/m) | Average (dBµV/m) | Limit | Average (dB) | Difference | Average Status |
| 1           | 0.018           | -19.8            | 42.3             |       | -62.19       |            | Pass           |

Test Report No.: G0M-2403-2508-TFC15FUW-V01

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

## Radiated Spurious Emissions according to 47 CFR Part 15.519

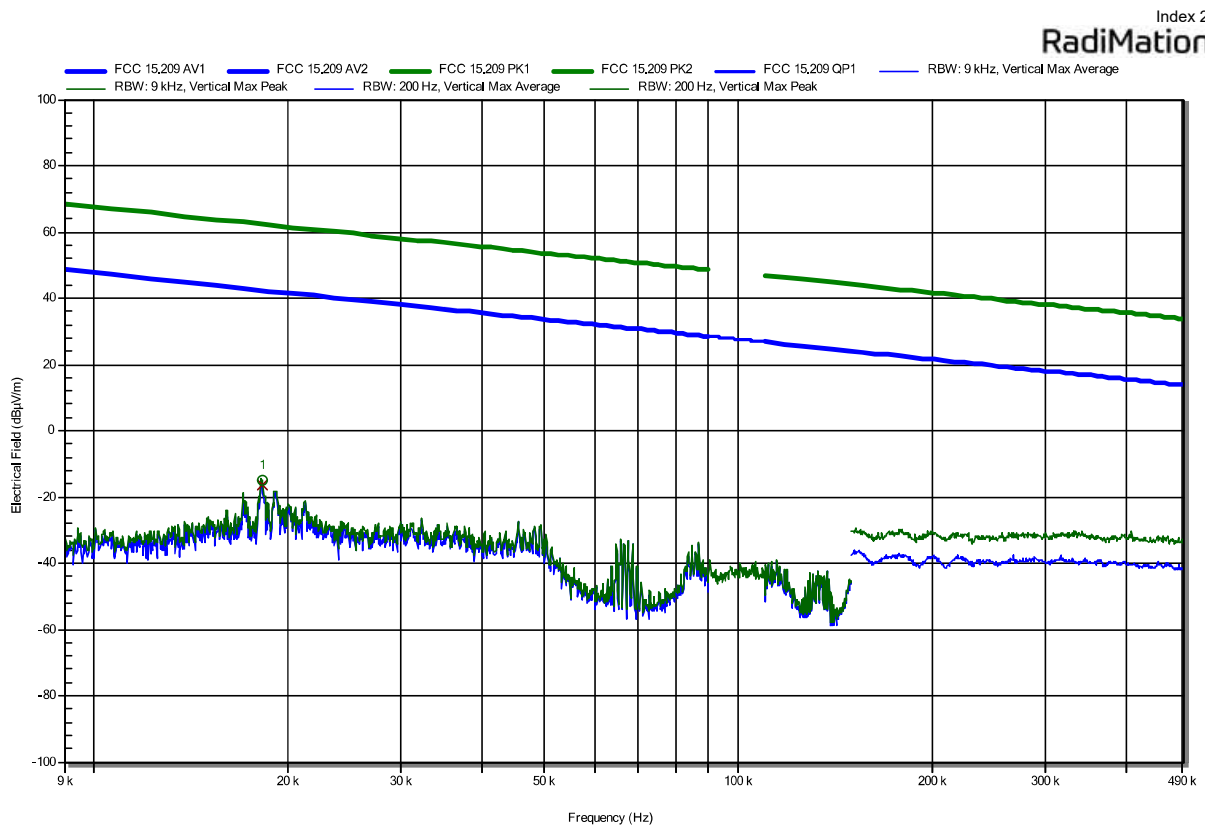
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Rohde & Schwarz HFH 2-Z2, Vertical  
 Measurement distance: 3 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB  
 Test Date: 2024-06-26  
 Note: Antenna parallel to EUT PCB



| Peak Number | Frequency (MHz) | Peak (dBµV/m) | Peak (dBµV/m) | Limit  | Peak (dB) | Difference | Peak Status |
|-------------|-----------------|---------------|---------------|--------|-----------|------------|-------------|
| 1           | 0.52            | 3.3           | 33.3          | -30.01 |           |            | Pass        |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Rohde & Schwarz HFH 2-Z2, Vertical  
 Measurement distance: 3 m, converted to 300 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB  
 Test Date: 2024-06-26  
 Note: Antenna perpendicular to EUT PCB



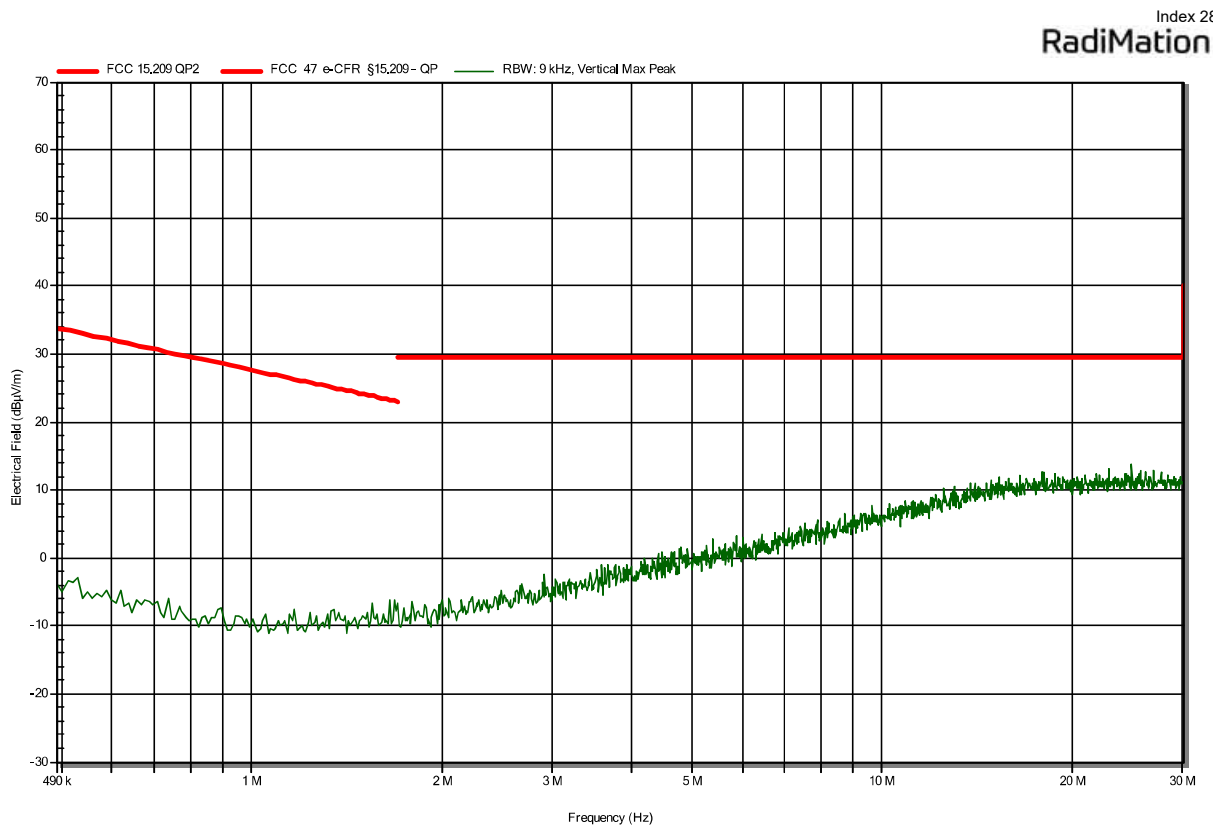
| Peak Number | Frequency (MHz) | Peak (dBµV/m)    | Peak (dBµV/m)    | Limit (dB) | Difference | Peak Status    |
|-------------|-----------------|------------------|------------------|------------|------------|----------------|
| 1           | 0.018           | -14.9            | 62.4             | -77.24     |            | Pass           |
| Peak Number | Frequency (MHz) | Average (dBµV/m) | Average (dBµV/m) | Limit (dB) | Difference | Average Status |
| 1           | 0.018           | -16.3            | 42.4             | -58.68     |            | Pass           |

Test Report No.: G0M-2403-2508-TFC15FUW-V01

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

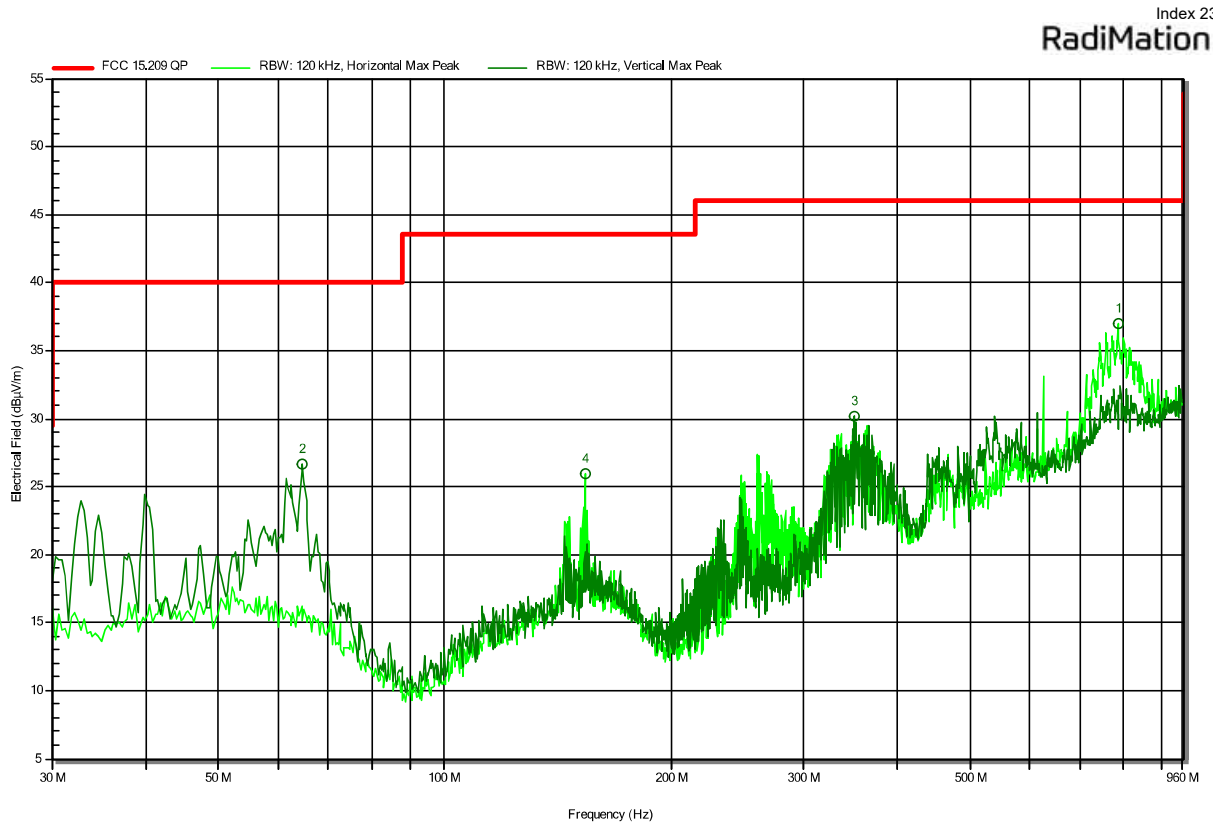
## Radiated Spurious Emissions according to 47 CFR Part 15.519

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Rohde & Schwarz HFH 2-Z2, Vertical  
 Measurement distance: 3 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB  
 Test Date: 2024-06-26  
 Note: Antenna perpendicular to EUT PCB



## Radiated Spurious Emissions according to 47 CFR Part 15.519

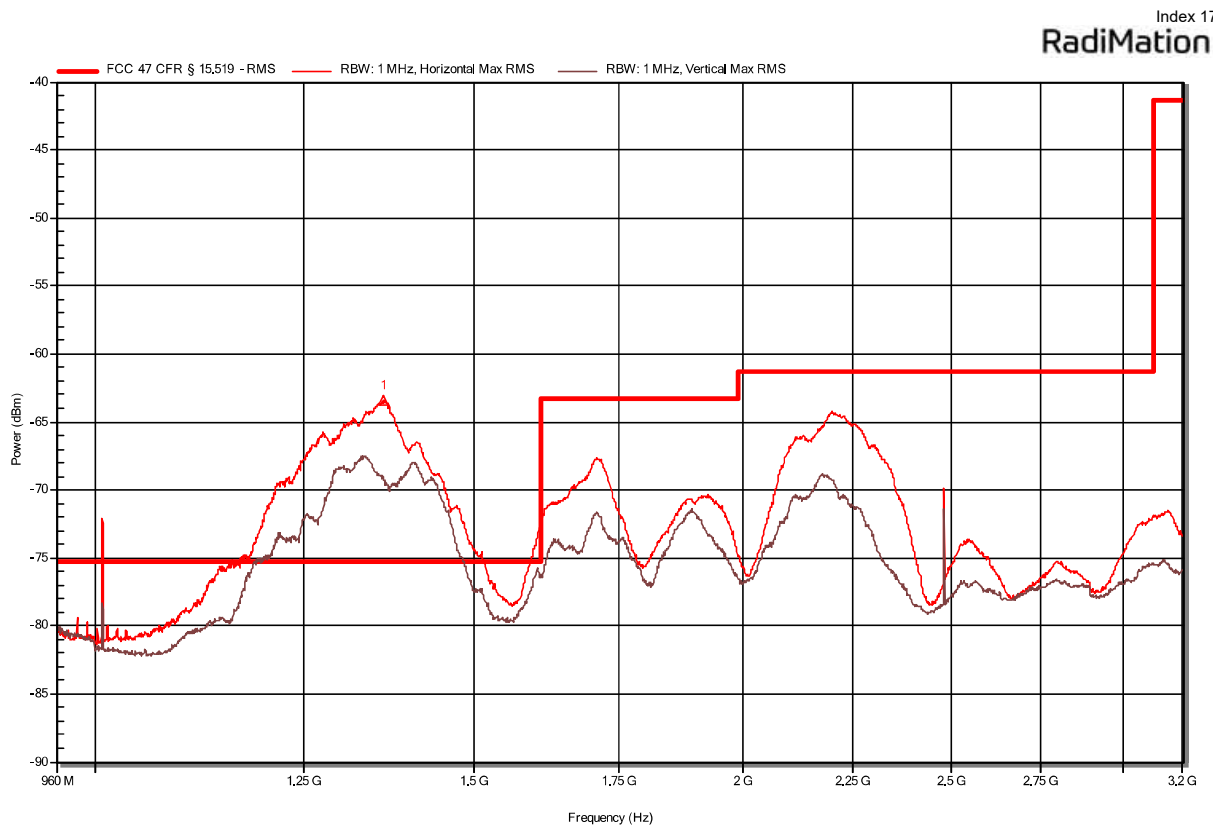
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck VULB 9168  
 Measurement distance: 3 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB  
 Test Date: 2024-06-25



| Peak Number | Frequency (MHz) | Peak (dBµV/m) | Peak (dBµV/m) | Limit (dB) | Peak Difference | Peak Status | Polarization |
|-------------|-----------------|---------------|---------------|------------|-----------------|-------------|--------------|
| 1           | 787.02          | 37            | 46            | -9.02      |                 | Pass        | Horizontal   |
| 2           | 64.72           | 26.7          | 40            | -13.32     |                 | Pass        | Vertical     |
| 3           | 350.85          | 30.2          | 46            | -15.81     |                 | Pass        | Vertical     |
| 4           | 153.69          | 26            | 43.5          | -17.52     |                 | Pass        | Horizontal   |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

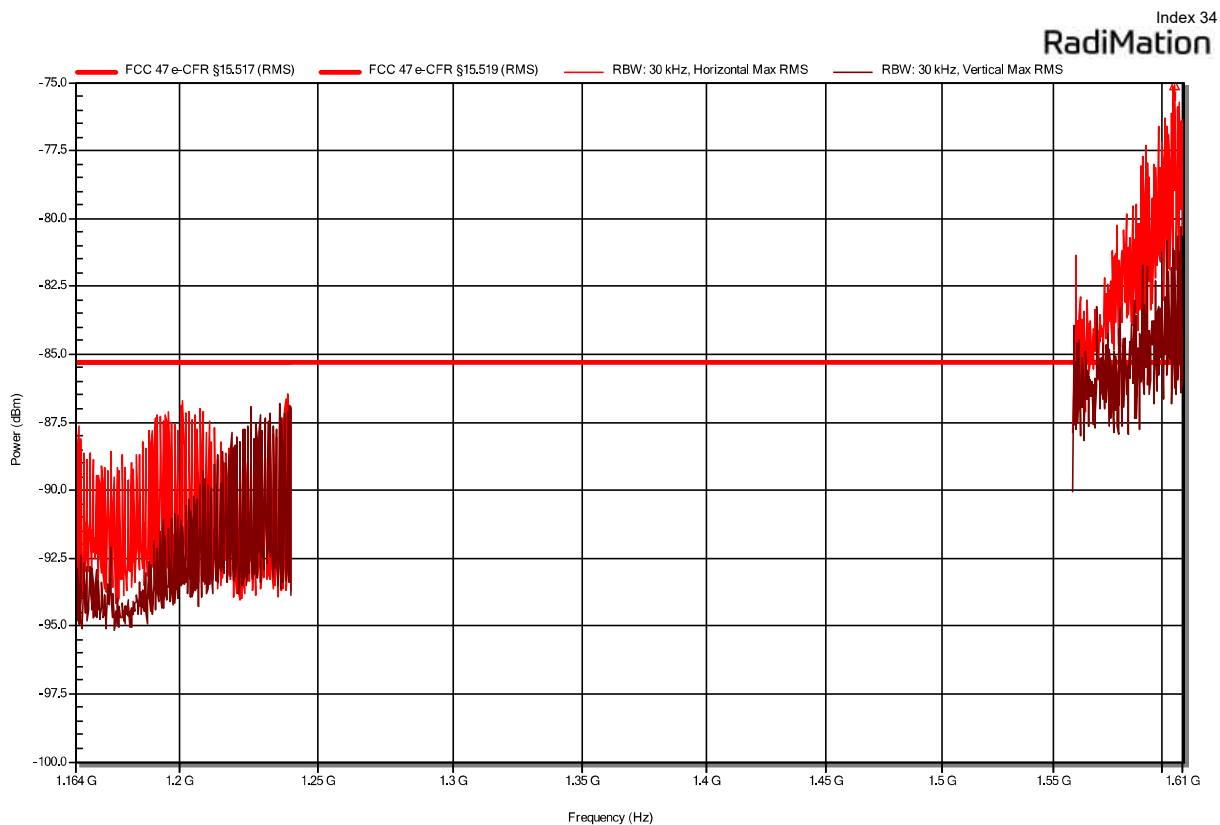
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120D  
 Measurement distance: 3 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB  
 Test Date: 2024-06-22  
 Note: Non UWB emissions below 2 GHz on plot, see ANNEX B



| Peak Number | Frequency (MHz) | RMS (dBm) | RMS (dBm) | Limit (dB) | Difference | RMS Status  | Polarization |
|-------------|-----------------|-----------|-----------|------------|------------|-------------|--------------|
| 1           | 1360.4373       | -63.4     | -75.3     | 11.9       |            | See ANNEX B | Horizontal   |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

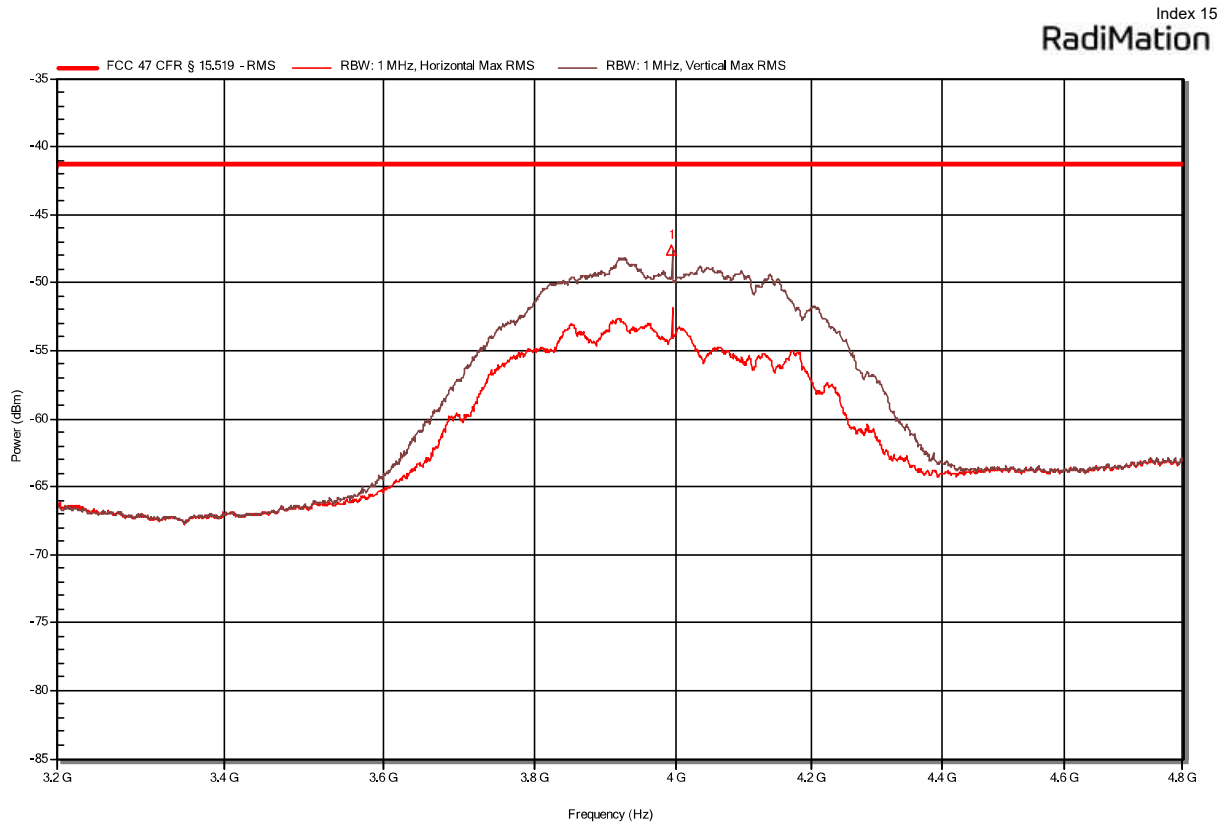
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 23 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120D  
 Measurement distance: 1.5 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB  
 Test Date: 2024-06-29  
 Note: Non UWB emissions on plot, see ANNEX B, page 63 and page 65 for evaluation



| Peak Number | Frequency (MHz) | RMS (dBm) | RMS (dBm) | Limit | RMS Difference (dB) | RMS Status  | Polarization |
|-------------|-----------------|-----------|-----------|-------|---------------------|-------------|--------------|
| 1           | 1606.1087       | -75.1     | -85.3     |       | 10.21               | See ANNEX B | Horizontal   |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

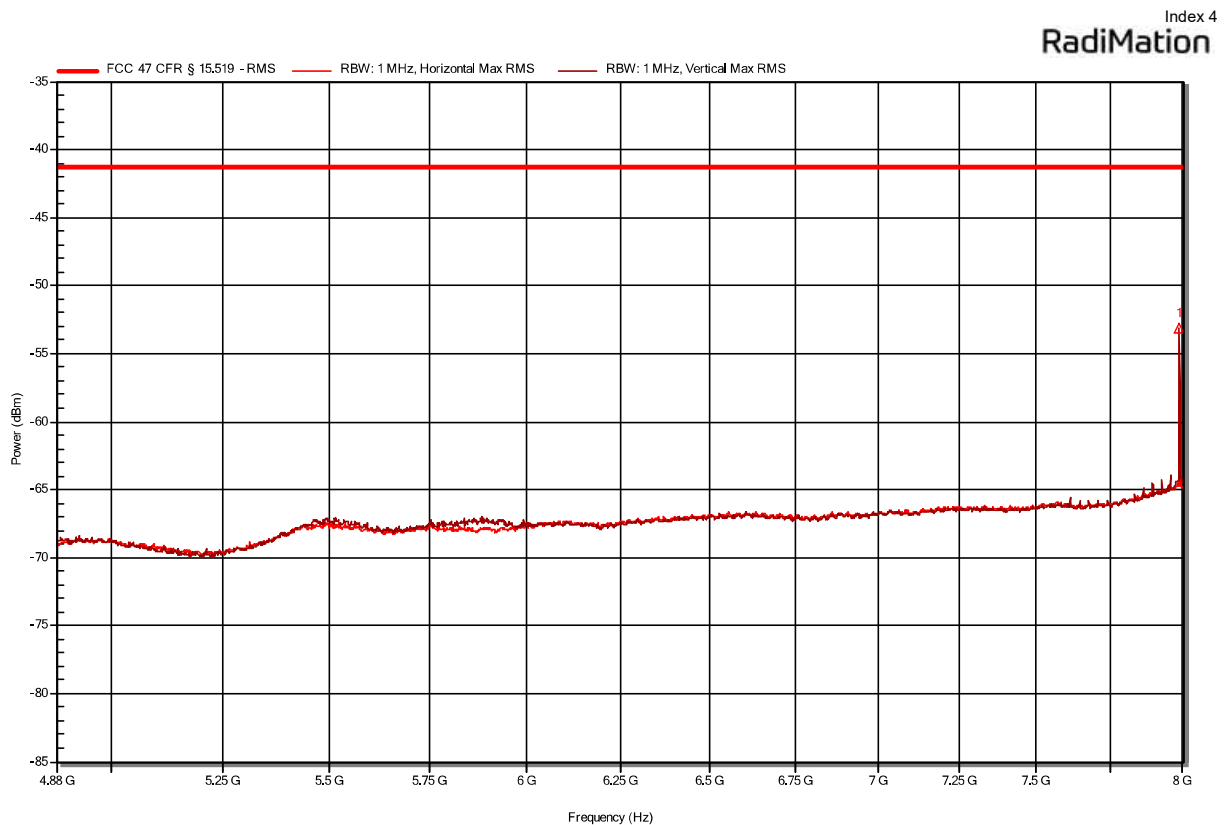
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120D  
 Measurement distance: 3 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB  
 Test Date: 2024-06-22



| Peak Number | Frequency (MHz) | RMS (dBm) | RMS (dBm) | Limit | RMS Difference | RMS Status | Polarization |
|-------------|-----------------|-----------|-----------|-------|----------------|------------|--------------|
| 1           | 3993.6          | -47.6     | -41.3     | -6.33 |                | Pass       | Vertical     |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

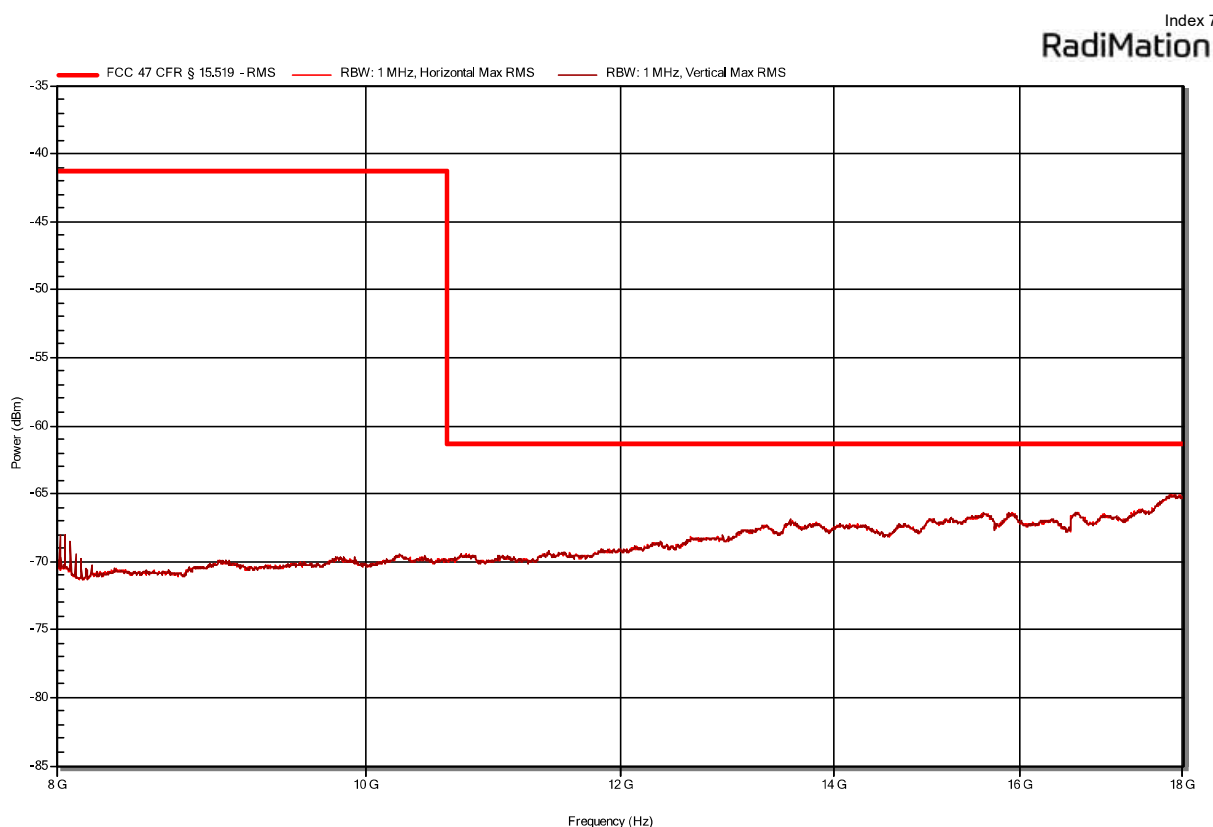
|                       |                                                                             |
|-----------------------|-----------------------------------------------------------------------------|
| Project Number:       | G0M-2403-2508                                                               |
| Applicant:            | Jungheinrich AG                                                             |
| Model Description:    | UWB-Location-System is able to measure distances between the UWB components |
| Model:                | 52445052, Truck Tag                                                         |
| Test Sample ID:       | 48550                                                                       |
| Test Site:            | Eurofins Product Service GmbH                                               |
| Operator:             | Mr. Siddique                                                                |
| Measurement software: | RadiMation, version 2020.1.8                                                |
| Test Conditions:      | Tnom: 25 °Celsius, Vnom: 24 V DC                                            |
| Antenna:              | Schwarzbeck BBHA 9120B                                                      |
| Measurement distance: | 3 m                                                                         |
| Mode:                 | Tx; 3993.6 MHz, BPSK, UWB                                                   |
| Test Date:            | 2024-06-20                                                                  |



| Peak Number | Frequency (MHz) | RMS (dBm) | RMS (dBm) | Limit | RMS Difference (dB) | RMS Status | Polarization |
|-------------|-----------------|-----------|-----------|-------|---------------------|------------|--------------|
| 1           | 7987.312        | -53.2     | -41.3     |       | -11.89              | Pass       | Vertical     |

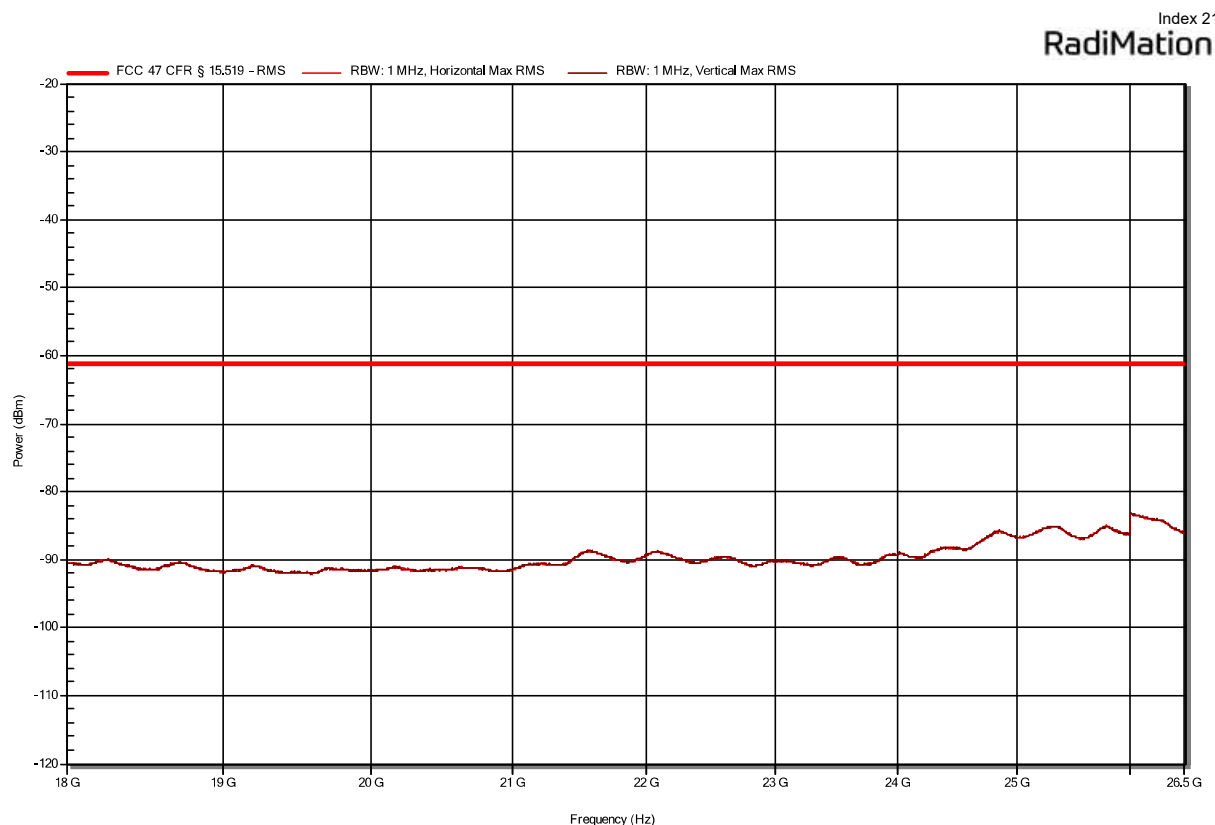
## Radiated Spurious Emissions according to 47 CFR Part 15.519

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2020.1.8  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck HWRD 650  
 Measurement distance: 3 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB  
 Test Date: 2024-06-20



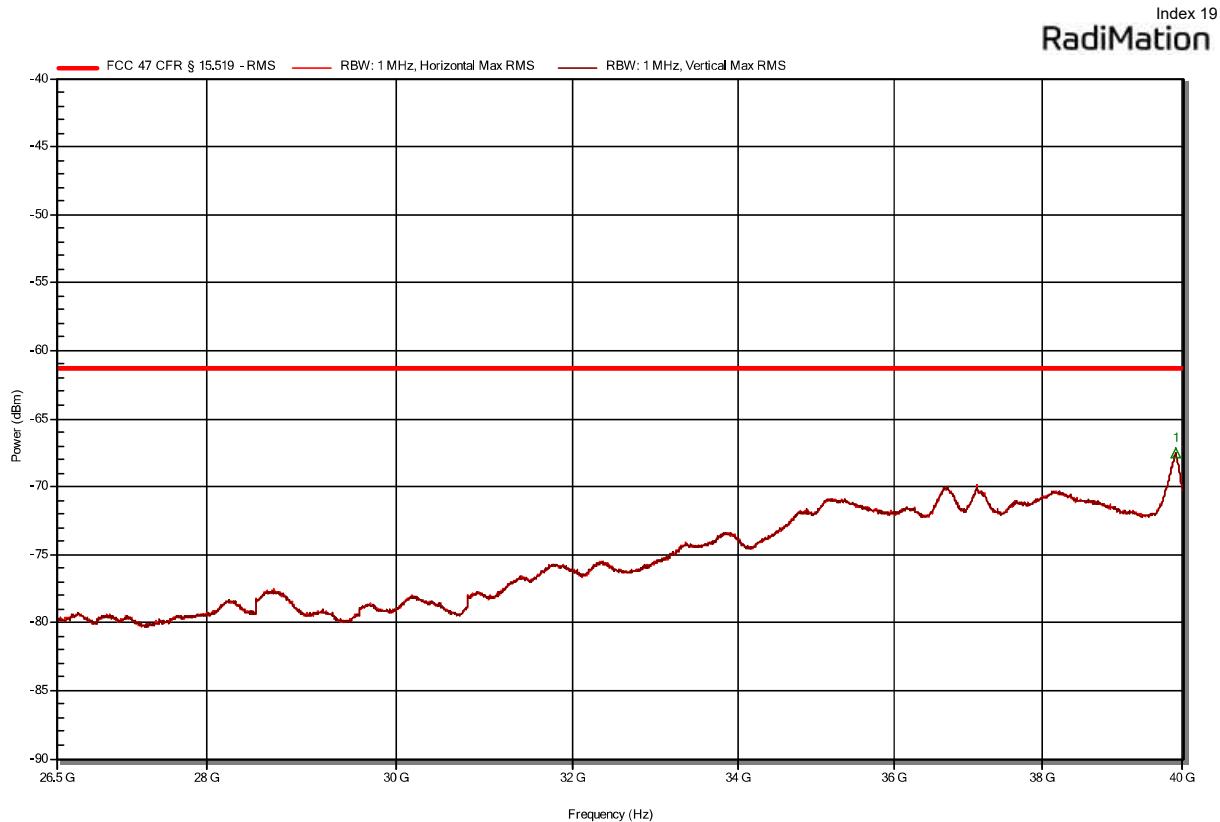
## Radiated Spurious Emissions according to 47 CFR Part 15.519

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Amplifier Research AT4560  
 Measurement distance: 3 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB  
 Test Date: 2024-06-24



## Radiated Spurious Emissions according to 47 CFR Part 15.519

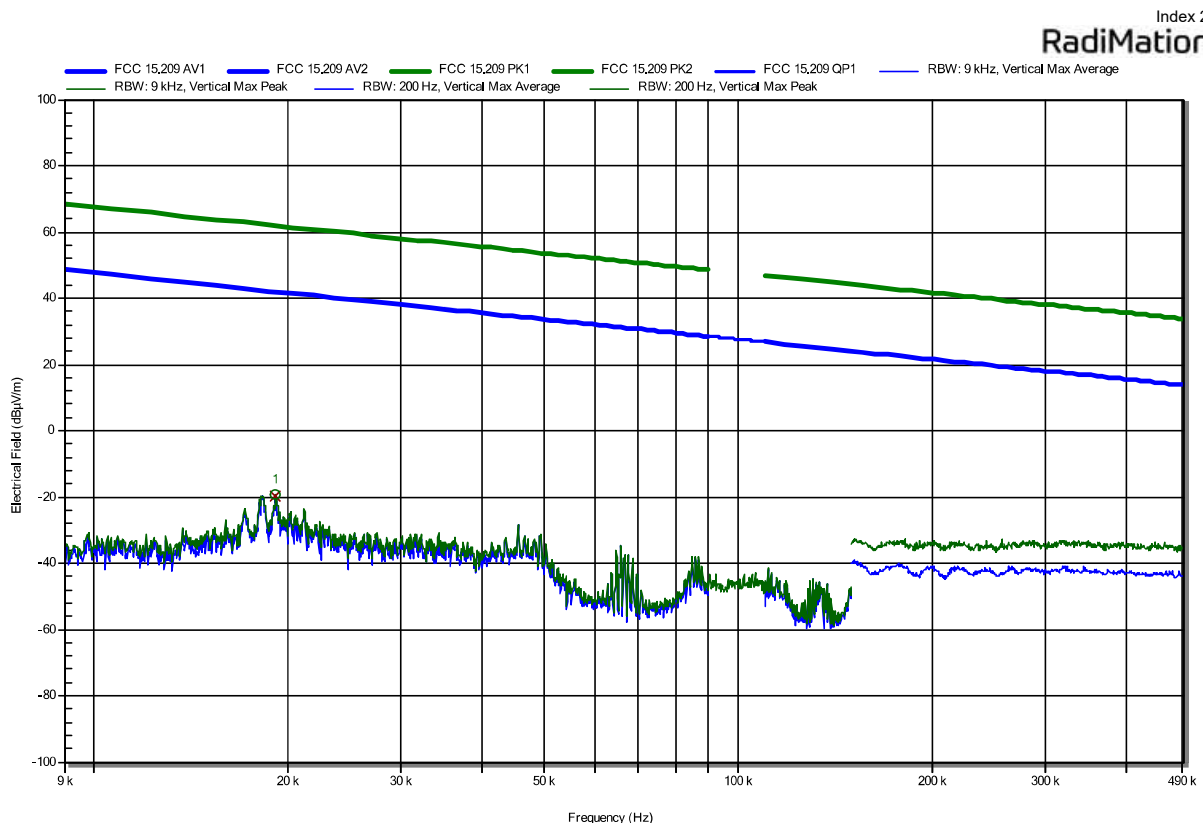
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Flann 22240-25  
 Measurement distance: 1 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB  
 Test Date: 2024-06-24



| Peak Number | Frequency (MHz) | RMS (dBm) | RMS (dBm) | Limit (dB) | RMS Difference | RMS Status | Polarization |
|-------------|-----------------|-----------|-----------|------------|----------------|------------|--------------|
| 1           | 39897.85        | -67.5     | -61.3     | -6.2       |                | Pass       | Vertical     |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Rohde & Schwarz HFH 2-Z2, Vertical  
 Measurement distance: 3 m, converted to 300 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB  
 Test Date: 2024-06-26  
 Note: Antenna parallel to EUT PCB



| Peak Number | Frequency (MHz) | Peak (dBµV/m) | Peak (dBµV/m) | Limit | Peak (dB) | Difference | Peak Status |
|-------------|-----------------|---------------|---------------|-------|-----------|------------|-------------|
| 1           | 0.019           | -19.1         | 62            |       | -81.06    |            | Pass        |

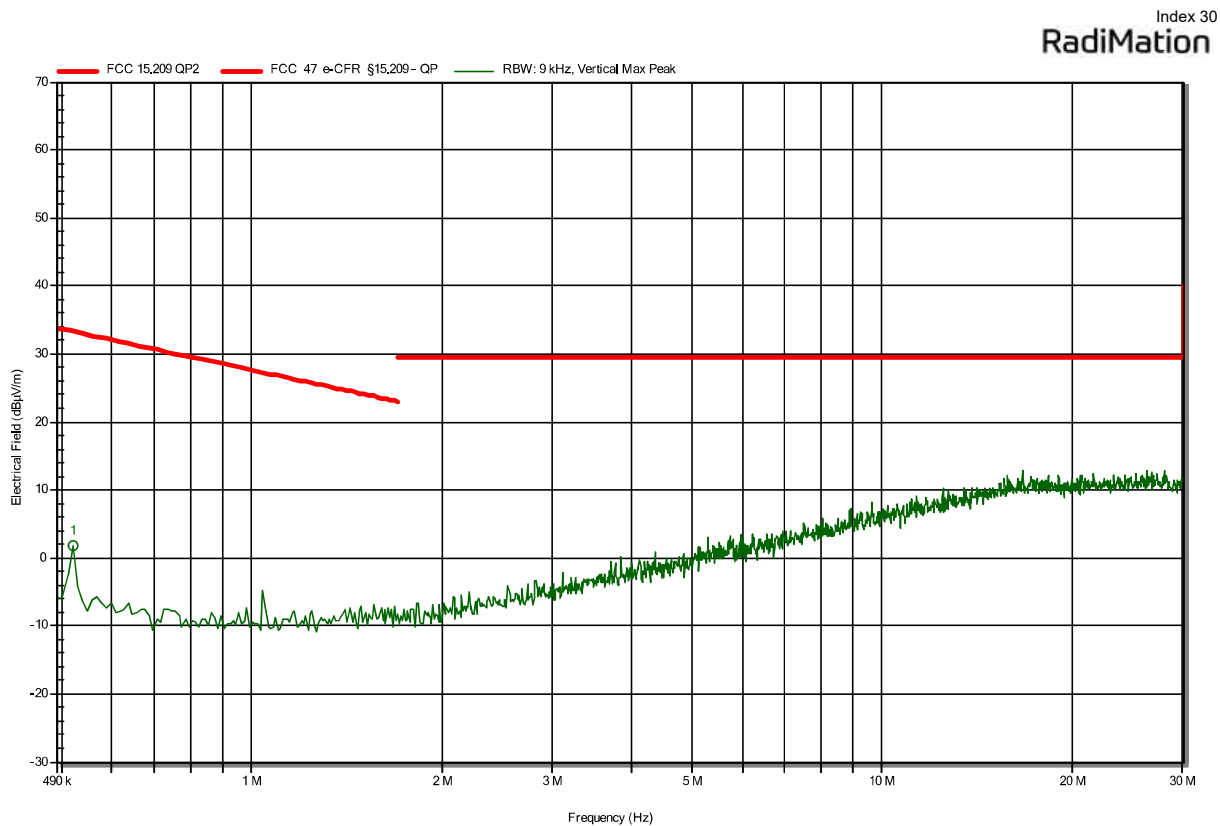
| Peak Number | Frequency (MHz) | Average (dBµV/m) | Average (dBµV/m) | Limit | Average (dB) | Difference | Average Status |
|-------------|-----------------|------------------|------------------|-------|--------------|------------|----------------|
| 1           | 0.019           | -19.6            | 42               |       | -61.59       |            | Pass           |

Test Report No.: G0M-2403-2508-TFC15FUW-V01

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

## Radiated Spurious Emissions according to 47 CFR Part 15.519

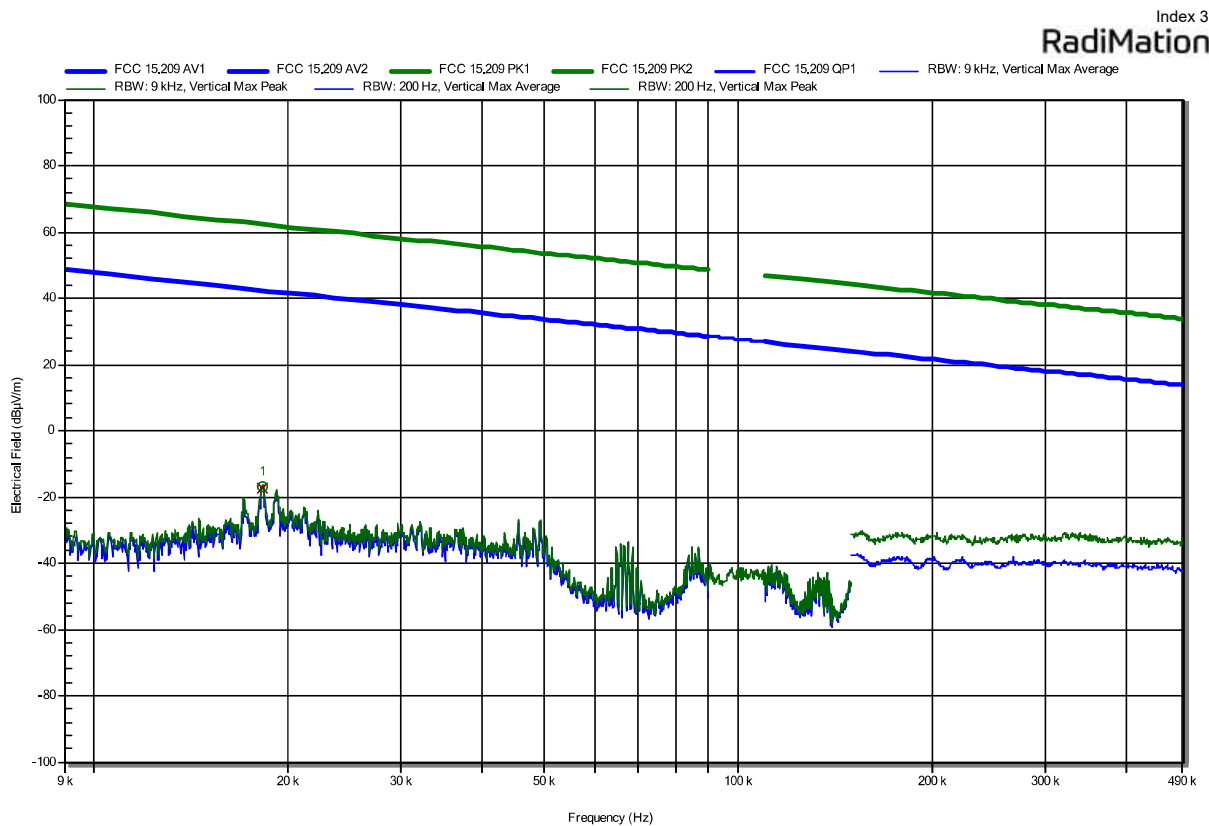
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Rohde & Schwarz HFH 2-Z2, Vertical  
 Measurement distance: 3 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB  
 Test Date: 2024-06-26  
 Note: Antenna parallel to EUT PCB



| Peak Number | Frequency (MHz) | Peak (dBµV/m) | Peak (dBµV/m) | Limit | Peak (dB) | Difference | Peak Status |
|-------------|-----------------|---------------|---------------|-------|-----------|------------|-------------|
| 1           | 0.52            | 1.8           | 33.3          |       | -31.46    |            | Pass        |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Rohde & Schwarz HFH 2-Z2, Vertical  
 Measurement distance: 3 m, converted to 300 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB  
 Test Date: 2024-06-26  
 Note: Antenna perpendicular to EUT PCB



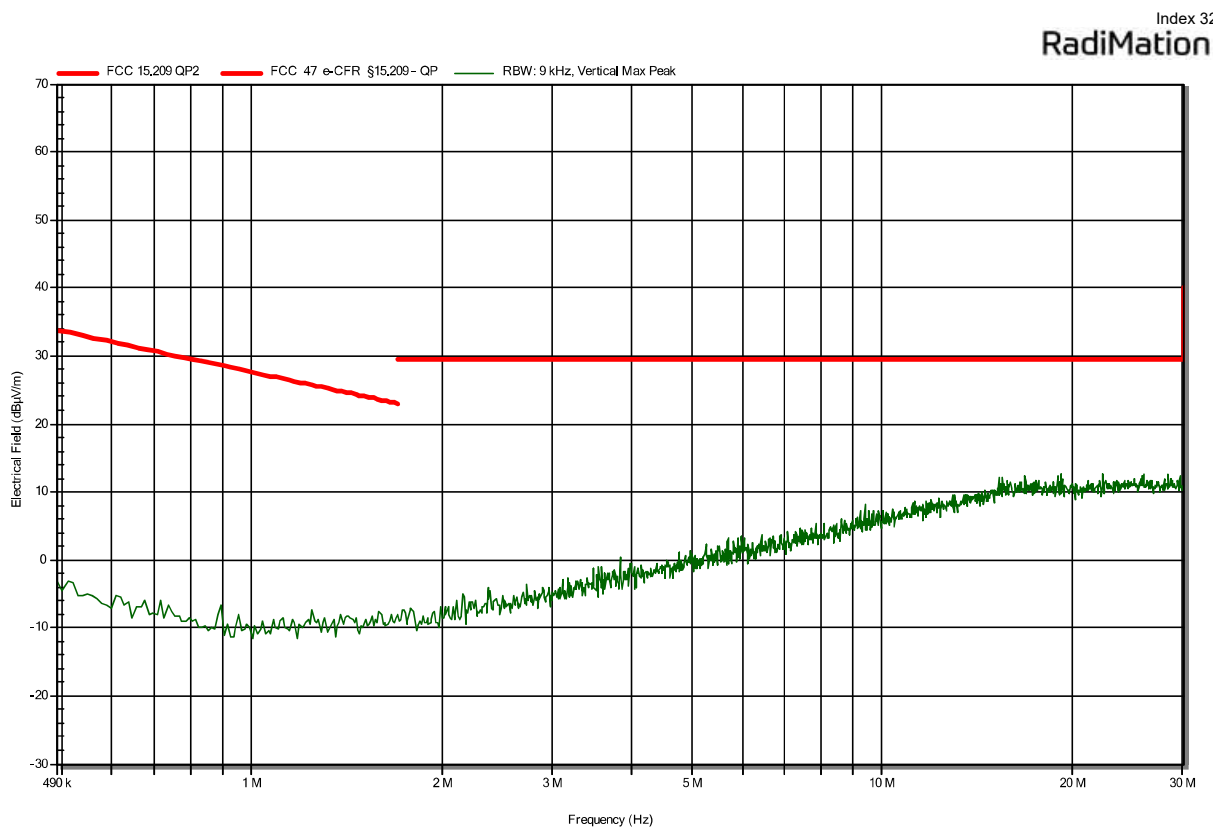
| Peak Number | Frequency (MHz) | Peak (dBµV/m)    | Peak (dBµV/m)    | Limit (dB) | Difference | Peak Status    |
|-------------|-----------------|------------------|------------------|------------|------------|----------------|
| 1           | 0.018           | -16.9            | 62.4             | -79.27     |            | Pass           |
| Peak Number | Frequency (MHz) | Average (dBµV/m) | Average (dBµV/m) | Limit (dB) | Difference | Average Status |
| 1           | 0.018           | -17.1            | 42.4             | -59.47     |            | Pass           |

Test Report No.: G0M-2403-2508-TFC15FUW-V01

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

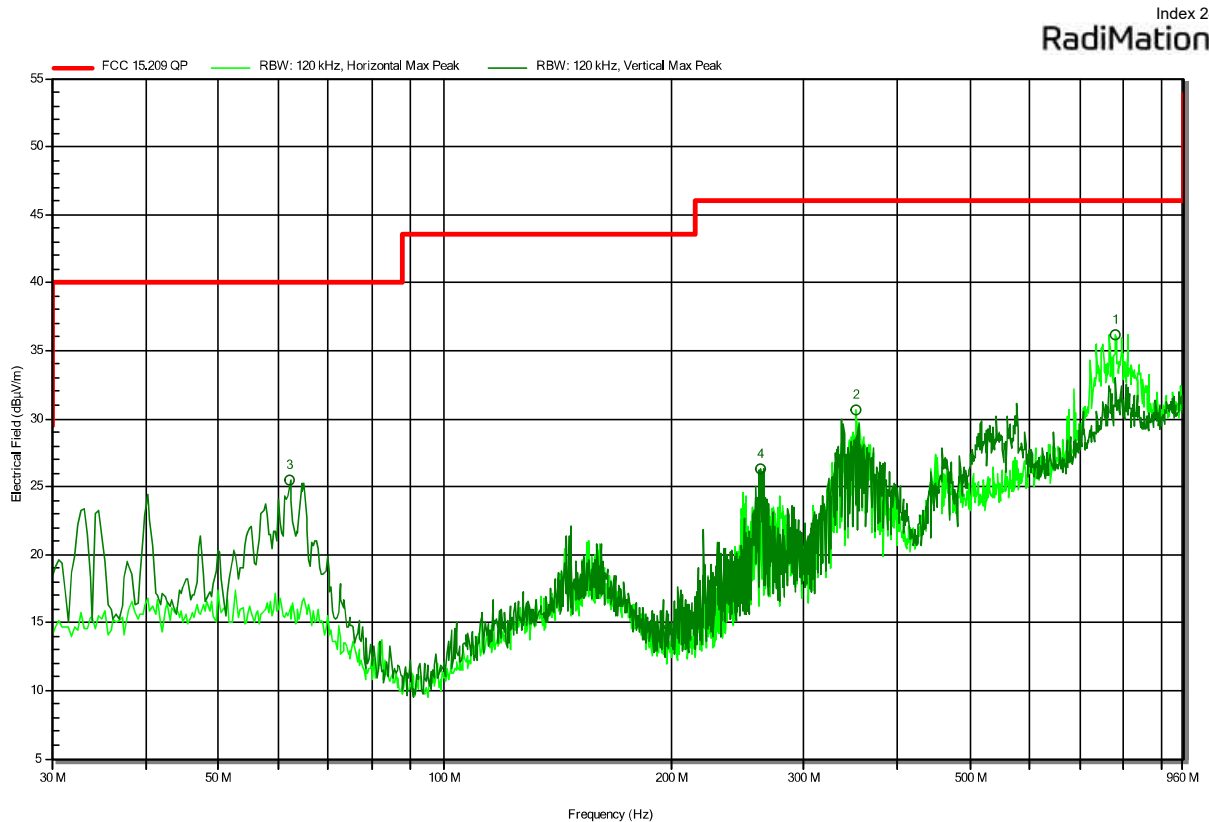
## Radiated Spurious Emissions according to 47 CFR Part 15.519

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Rohde & Schwarz HFH 2-Z2, Vertical  
 Measurement distance: 3 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB  
 Test Date: 2024-06-26  
 Note: Antenna perpendicular to EUT PCB



## Radiated Spurious Emissions according to 47 CFR Part 15.519

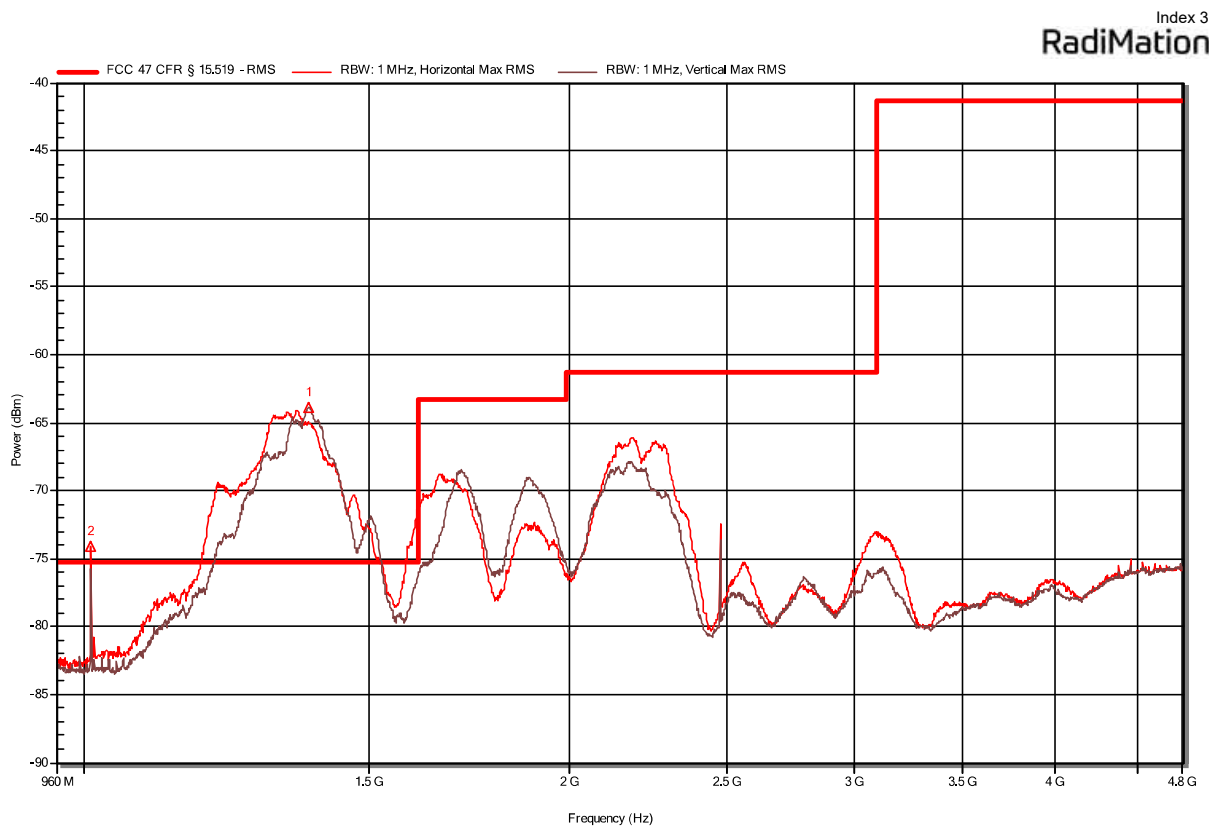
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck VULB 9168  
 Measurement distance: 3 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB  
 Test Date: 2024-06-25



| Peak Number | Frequency (MHz) | Peak (dBμV/m) | Peak (dBμV/m) | Limit (dB) | Peak Difference | Peak Status | Polarization |
|-------------|-----------------|---------------|---------------|------------|-----------------|-------------|--------------|
| 1           | 780.82          | 36.1          | 46            | -9.89      |                 | Pass        | Horizontal   |
| 2           | 352.4           | 30.6          | 46            | -15.37     |                 | Pass        | Horizontal   |
| 3           | 62.24           | 25.5          | 40            | -14.54     |                 | Pass        | Vertical     |
| 4           | 263.43          | 26.3          | 46            | -19.7      |                 | Pass        | Vertical     |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

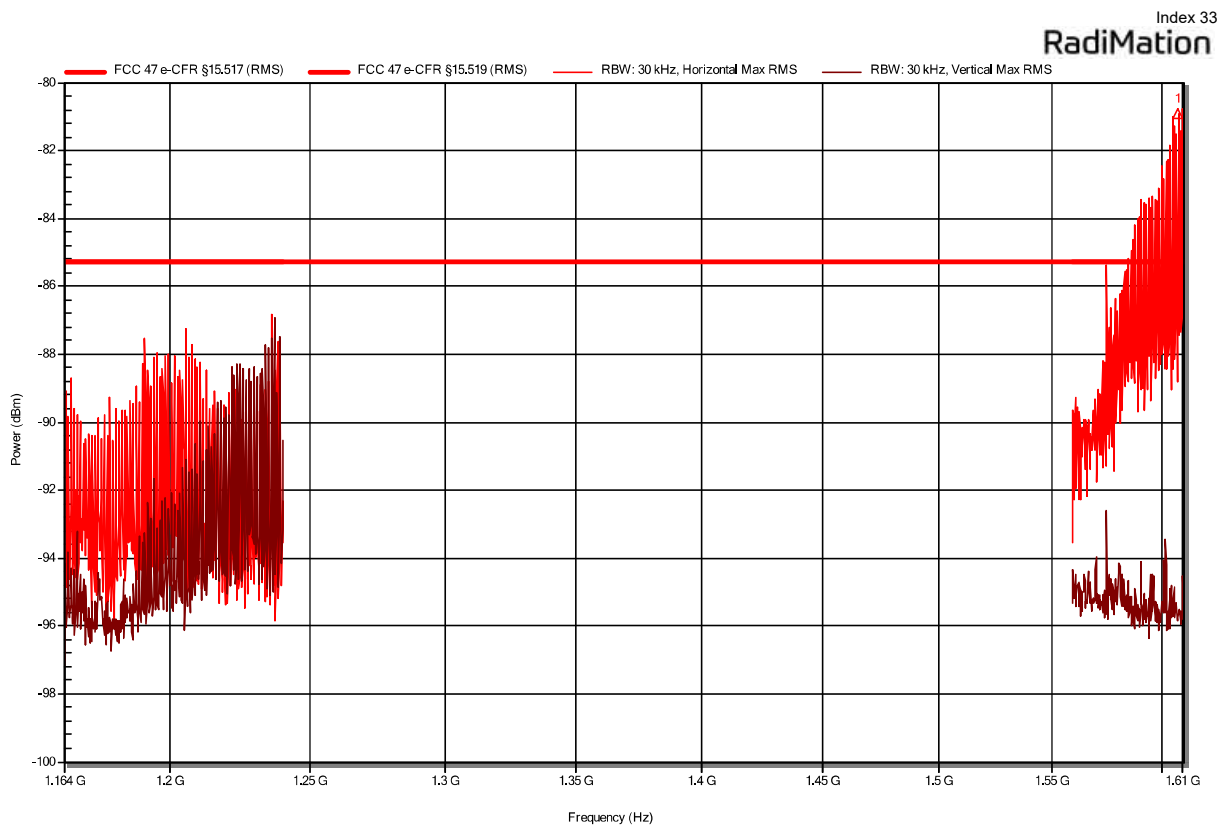
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120D  
 Measurement distance: 1.5 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB  
 Test Date: 2024-06-29  
 Note: Non UWB emissions on plot, see ANNEX B



| Peak Number | Frequency (MHz) | RMS (dBm) | RMS (dBm) | Limit (dB) | RMS Difference | RMS Status  | Polarization |
|-------------|-----------------|-----------|-----------|------------|----------------|-------------|--------------|
| 1           | 1376.5          | -63.8     | -75.3     | 11.46      |                | See ANNEX B | Vertical     |
| 2           | 1008            | -74.1     | -75.3     | 1.16       |                | See ANNEX B | Horizontal   |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

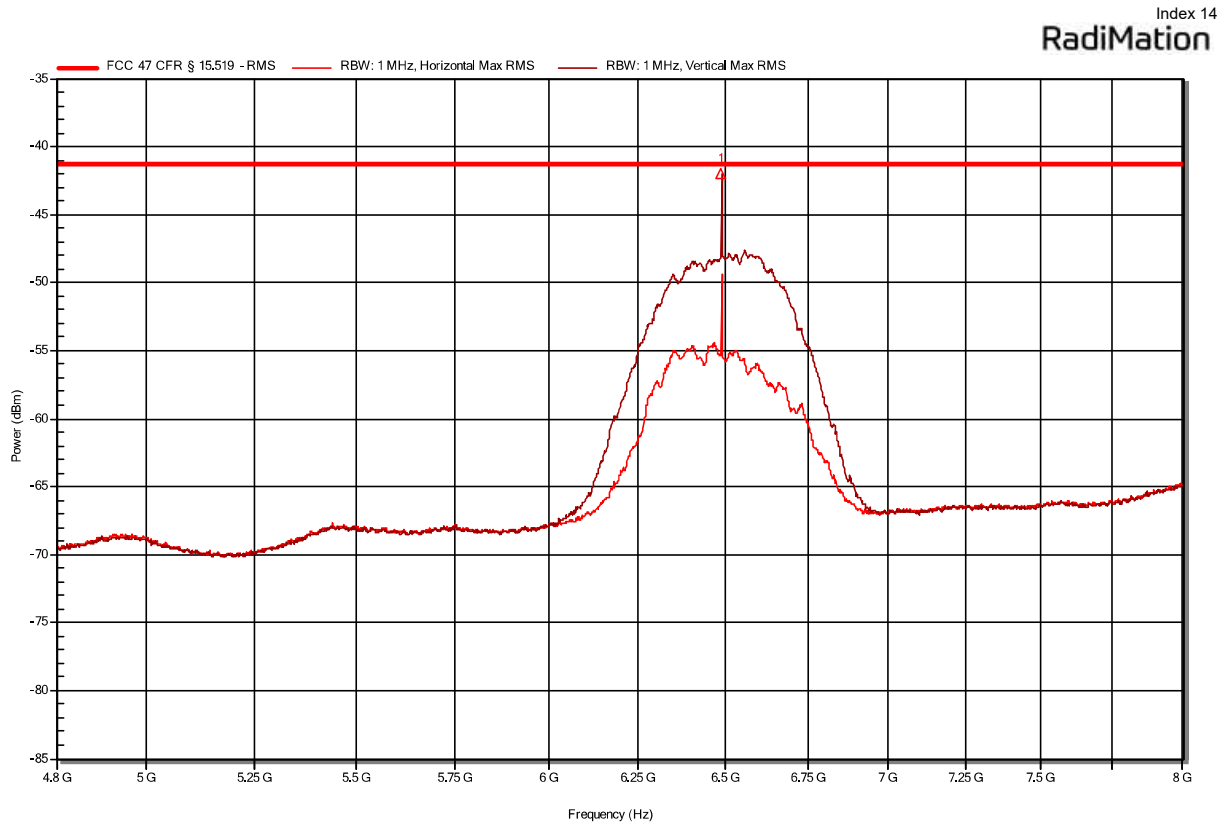
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 23 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120D  
 Measurement distance: 1.5 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB  
 Test Date: 2024-06-29  
 Note: Non UWB emissions on plot, see ANNEX B, page 64 and page 65 for evaluation



| Peak Number | Frequency (MHz) | RMS (dBm) | RMS (dBm) | Limit (dB) | RMS Difference | RMS Status  | Polarization |
|-------------|-----------------|-----------|-----------|------------|----------------|-------------|--------------|
| 1           | 1607.705        | -80.9     | -85.3     | 4.4        |                | See ANNEX B | Horizontal   |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

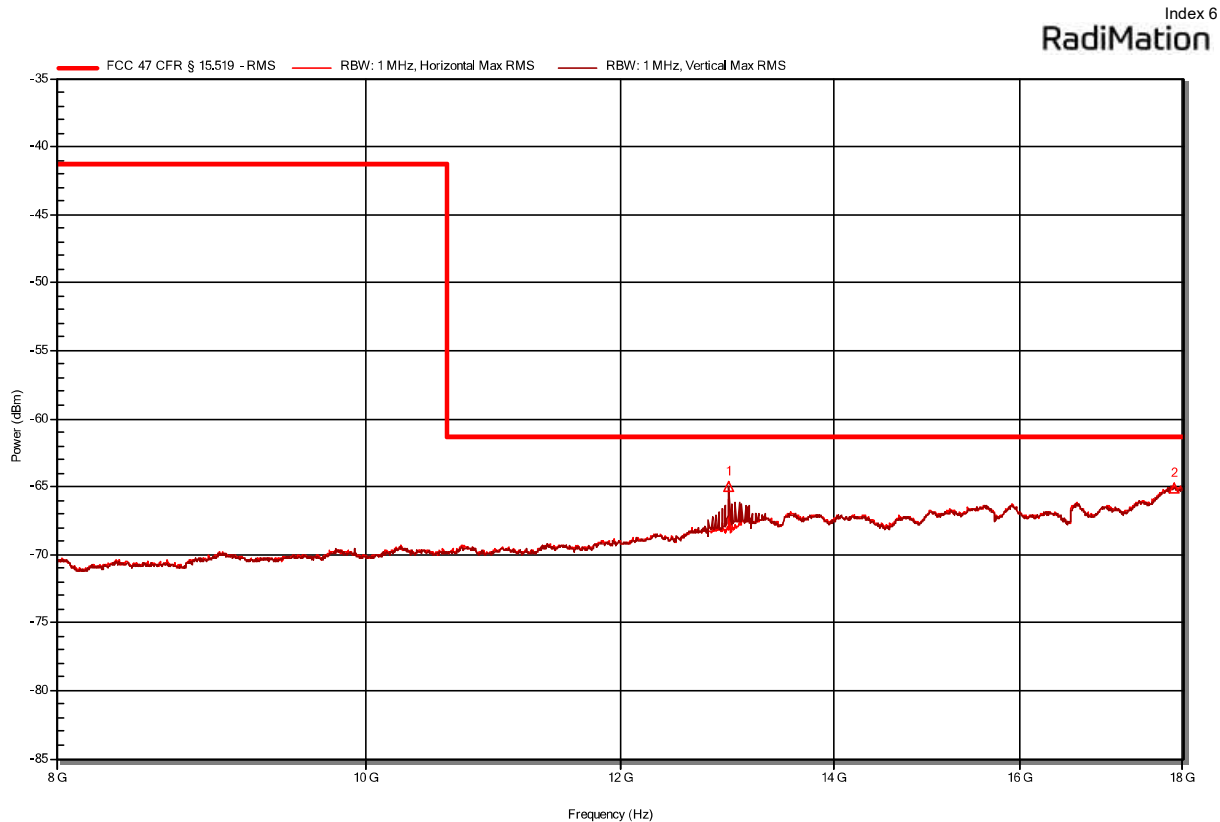
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120B  
 Measurement distance: 3 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB  
 Test Date: 2024-06-21



| Peak Number | Frequency (MHz) | RMS (dBm) | RMS (dBm) | Limit | RMS Difference | RMS Status | Polarization |
|-------------|-----------------|-----------|-----------|-------|----------------|------------|--------------|
| 1           | 6489.6          | -41.9     | -41.3     | -0.64 |                | Pass       | Vertical     |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

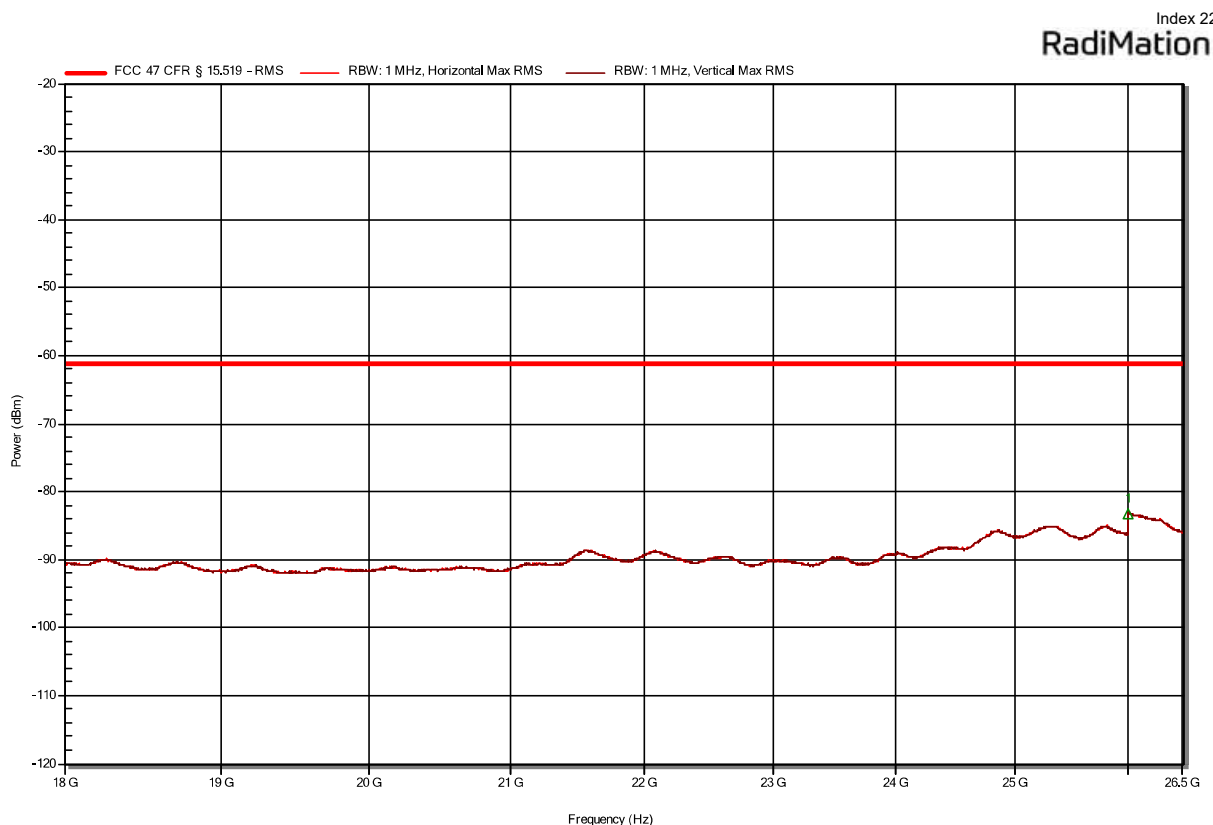
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2020.1.8  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck HWRD 650  
 Measurement distance: 3 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB  
 Test Date: 2024-06-20



| Peak Number | Frequency (MHz) | RMS (dBm) | RMS (dBm) | Limit (dB) | RMS Difference | RMS Status | Polarization |
|-------------|-----------------|-----------|-----------|------------|----------------|------------|--------------|
| 1           | 12979.0975      | -65       | -61.3     | -3.68      |                | Pass       | Vertical     |
| 2           | 17893.3333      | -65.1     | -61.3     | -3.81      |                | Pass       | Vertical     |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

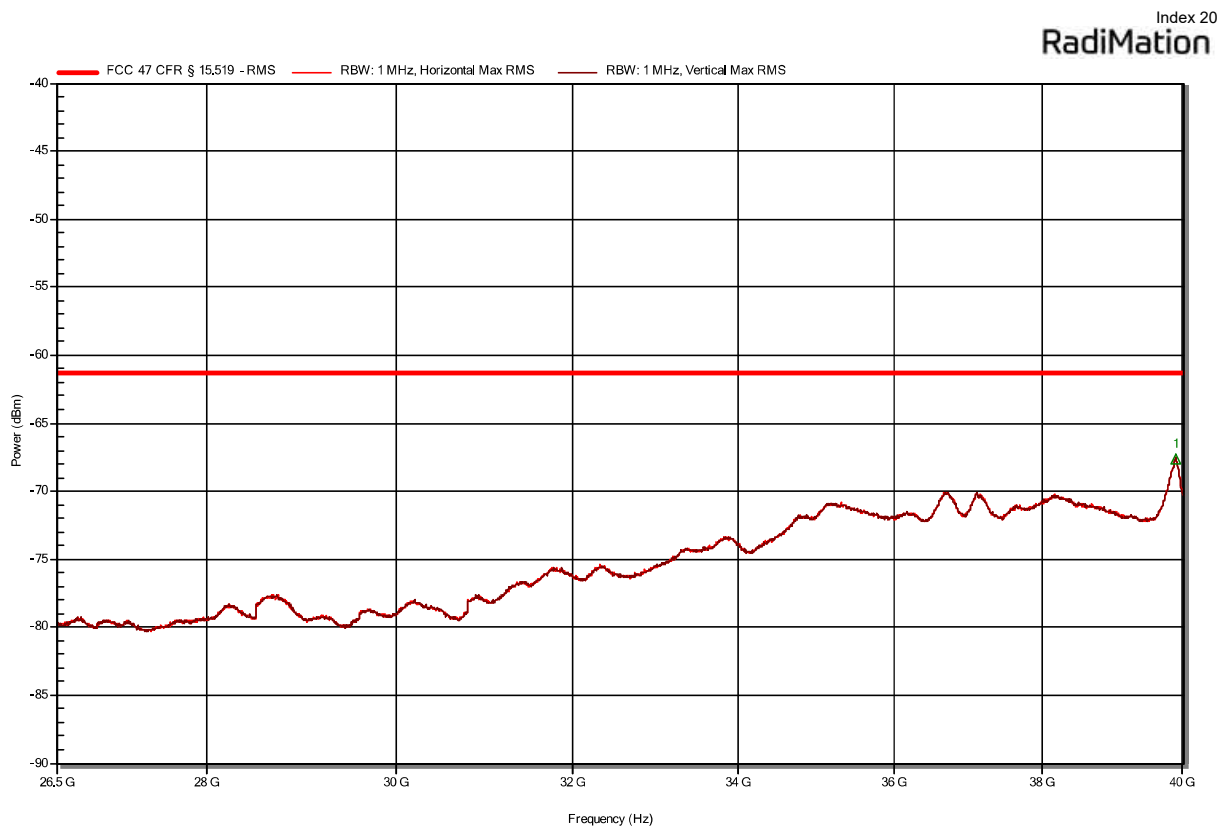
Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Amplifier Research AT4560  
 Measurement distance: 1 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB  
 Test Date: 2024-06-24



| Peak Number | Frequency (MHz) | RMS (dBm) | RMS (dBm) | Limit  | RMS Difference (dB) | RMS Status | Polarization |
|-------------|-----------------|-----------|-----------|--------|---------------------|------------|--------------|
| 1           | 26001.333       | -83.2     | -61.3     | -21.89 |                     | Pass       | Vertical     |

## Radiated Spurious Emissions according to 47 CFR Part 15.519

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Flann 22240-25  
 Measurement distance: 1 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB  
 Test Date: 2024-06-24



| Peak Number | Frequency (MHz) | RMS (dBm) | RMS (dBm) | Limit (dB) | RMS Difference | RMS Status | Polarization |
|-------------|-----------------|-----------|-----------|------------|----------------|------------|--------------|
| 1           | 39899.65        | -67.6     | -61.3     | -6.31      |                | Pass       | Vertical     |

## ANNEX B Fail Analysis

### Radiated Spurious Emissions according to 47 CFR Part 15.519

Project Number: G0M-2403-2508

Applicant: Jungheinrich AG

Model Description: UWB-Location-System is able to measure distances between the UWB components

Model: 52445052, Truck Tag

Test Sample ID: 48550

Test Site: Eurofins Product Service GmbH

Operator: Mr. Siddique

Measurement software: RadiMation, version 2023.2.6

Test Conditions: Tnom: 24 °Celsius, Vnom: 24 V DC

Antenna: Schwarzbeck BBHA 9120D

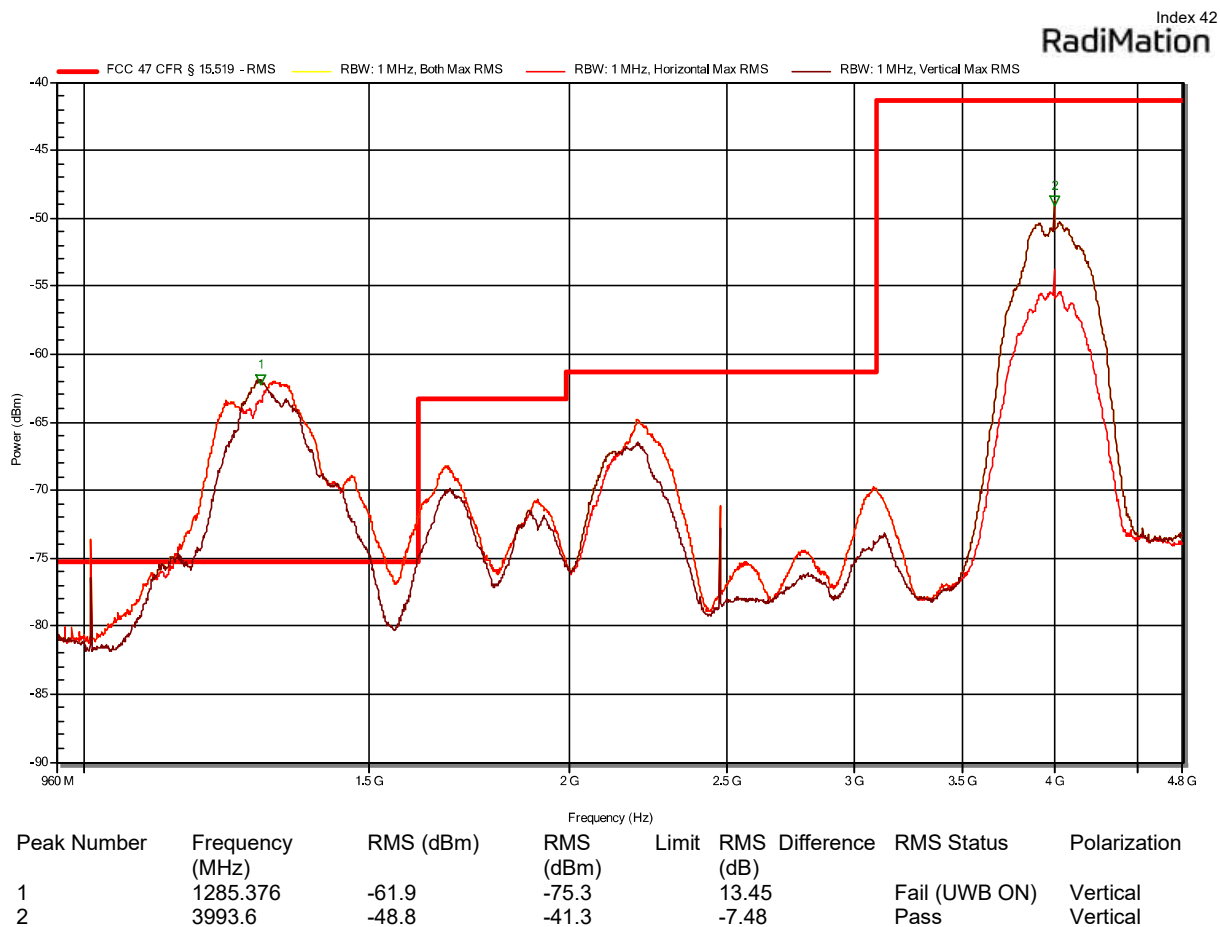
Measurement distance: 1.5 m

Mode: Tx; 3993.6 MHz, BPSK, UWB\_active

Test Date: 2024-08-02

Note: UWB radio is active and and Peak 1 is above the limit

Comment: According to 47 CFR Part 15.521, emissions form digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in § 15.209, rather than the limits specified in § 15.519. To prove that the emission is not from UWB transmitter, The measurement was repeated with UWB transmitter turned off and § 15.209 limit was used (Results at page 63).

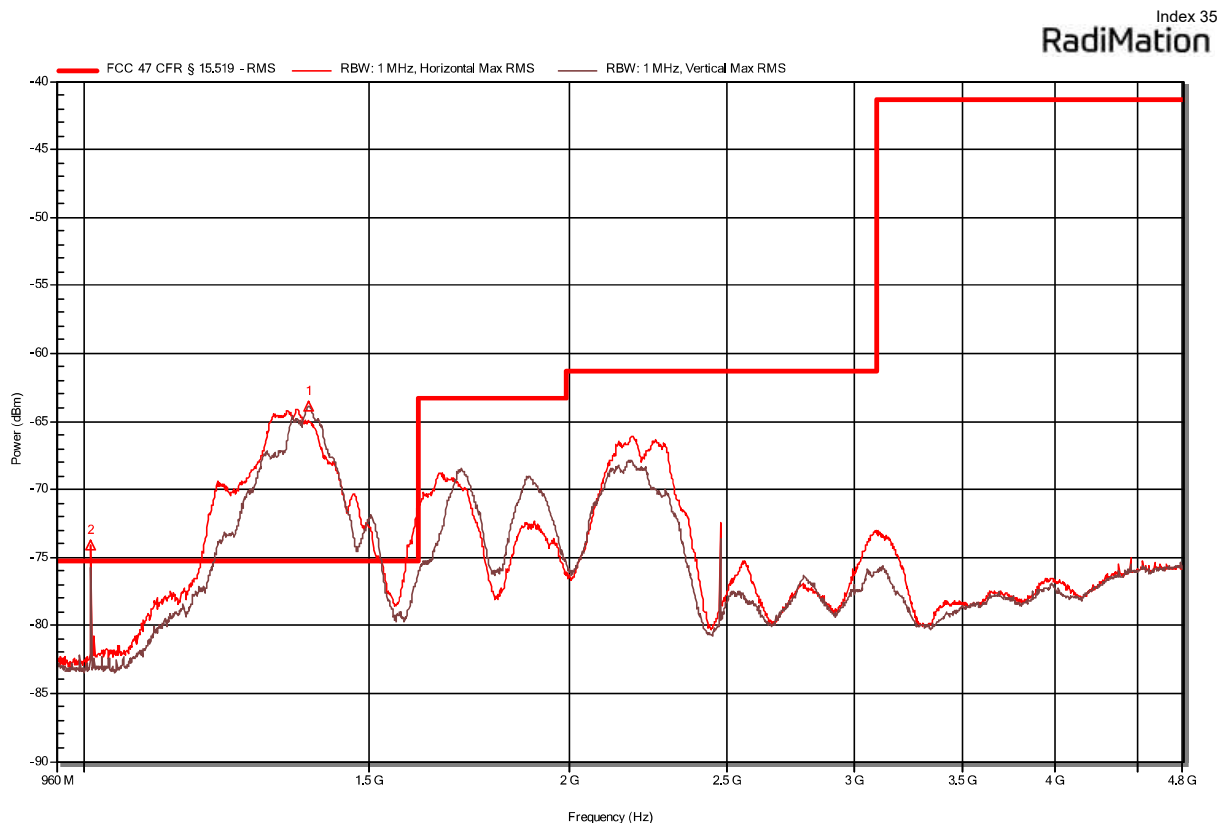


Test Report No.: G0M-2403-2508-TFC15FUW-V01

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

## Radiated Spurious Emissions according to 47 CFR Part 15.519

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 25 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120D  
 Measurement distance: 1.5 m  
 Mode: Tx; 6489.6 MHz, BPSK, UWB active  
 Test Date: 2024-06-29  
 Note: UWB radio is active and and Peak 1 is above the limit  
 According to 47 CFR Part 15.521, emissions from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in § 15.209, rather than the limits specified in § 15.519. To prove that the emission is not from UWB transmitter, The measurement was repeated with UWB transmitter turned off and § 15.209 limit was used (Results at page 63).



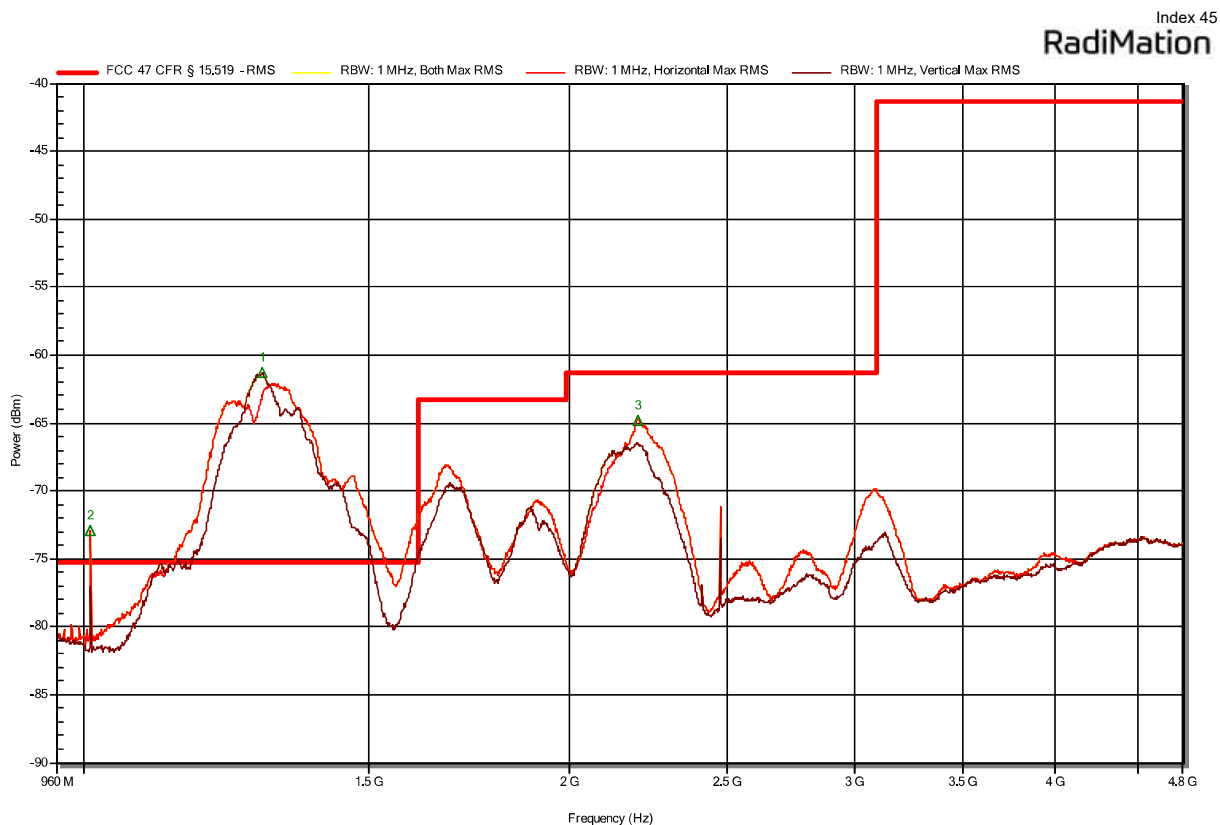
| Peak Number | Frequency (MHz) | RMS (dBm) | RMS (dBm) | Limit (dB) | RMS Difference | RMS Status    | Polarization |
|-------------|-----------------|-----------|-----------|------------|----------------|---------------|--------------|
| 1           | 1376.5          | -63.8     | -75.3     | 11.46      |                | Fail (UWB ON) | Vertical     |
| 2           | 1008            | -74.1     | -75.3     | 1.16       |                | Fail (UWB ON) | Horizontal   |

Test Report No.: G0M-2403-2508-TFC15FUW-V01

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

## Radiated Spurious Emissions according to 47 CFR Part 15.519

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 24 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120D  
 Measurement distance: 1.5 m  
 Mode: UWB\_inactive  
 Test Date: 2024-08-02  
 Note: UWB transmitter was deactivated, but same behavior was observed. Emission at Peak 1 and 2 is not produced by the UWB transmitter, because the UWB transmitter is inactive.



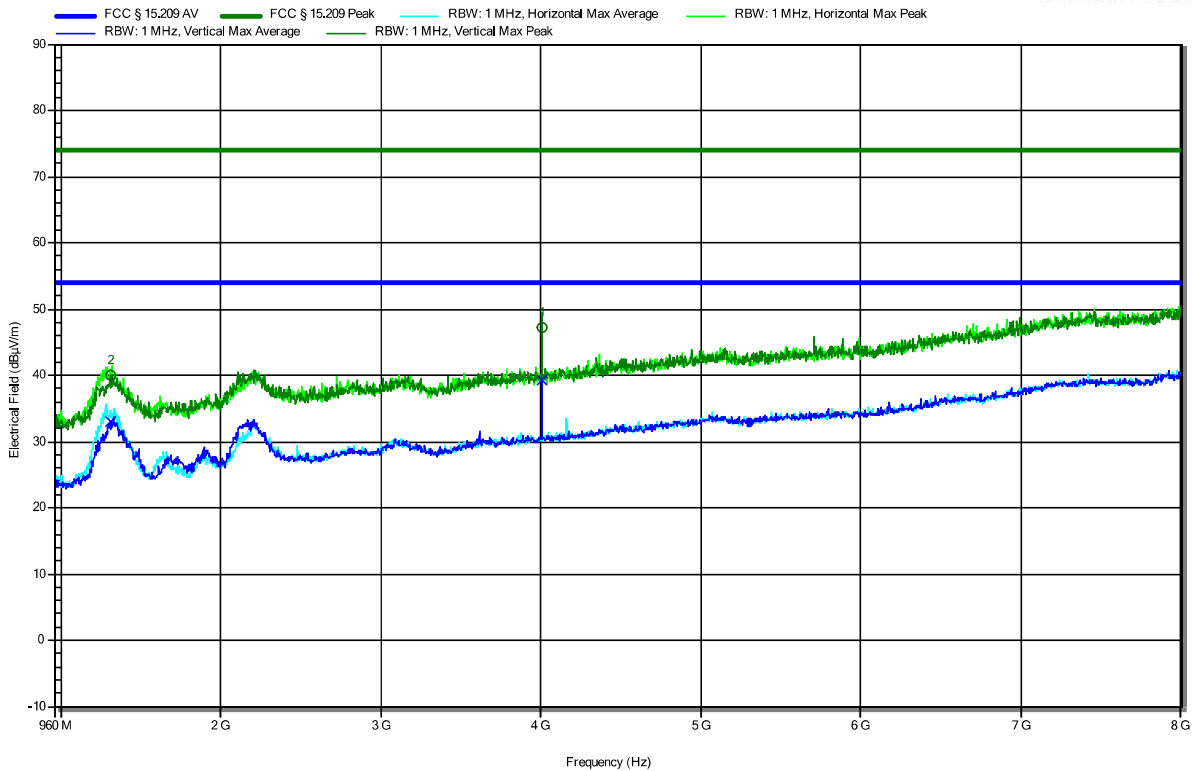
| Peak Number | Frequency (MHz) | RMS (dBm) | RMS (dBm) | Limit (dB) | RMS Difference (dB) | RMS Status     | Polarization |
|-------------|-----------------|-----------|-----------|------------|---------------------|----------------|--------------|
| 1           | 1289.984        | -61.2     | -75.3     | 14.05      |                     | Fail (UWB OFF) | Vertical     |
| 2           | 1007.872        | -72.9     | -75.3     | 2.43       |                     | Fail (UWB OFF) | Horizontal   |
| 3           | 2202.496        | -64.8     | -61.3     | -3.47      |                     | Pass           | Horizontal   |

## Radiated Spurious Emissions according to 47 CFR Part 15.521

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 24 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120D  
 Measurement distance: 3 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB\_inactive  
 Test Date: 2024-10-04  
 Note: UWB transmitter was deactivated, and measurement was done with § 15.519 limit line. In this case Peak 2 is below the limit line. Emission at Peak 2 is not produced by the UWB transmitter, because the UWB transmitter is inactive.

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RadiMation



| Peak Number | Frequency (MHz) | Peak (dBμV/m) | Peak (dBμV/m) | Limit | Peak Difference (dB) | Peak Status | Polarization |
|-------------|-----------------|---------------|---------------|-------|----------------------|-------------|--------------|
| 1           | 4007.381        | 47.14         | 74            |       | -26.86               | Pass        | Vertical     |
| 2           | 1308.48         | 40.1          | 74            |       | -33.9                | Pass        | Vertical     |

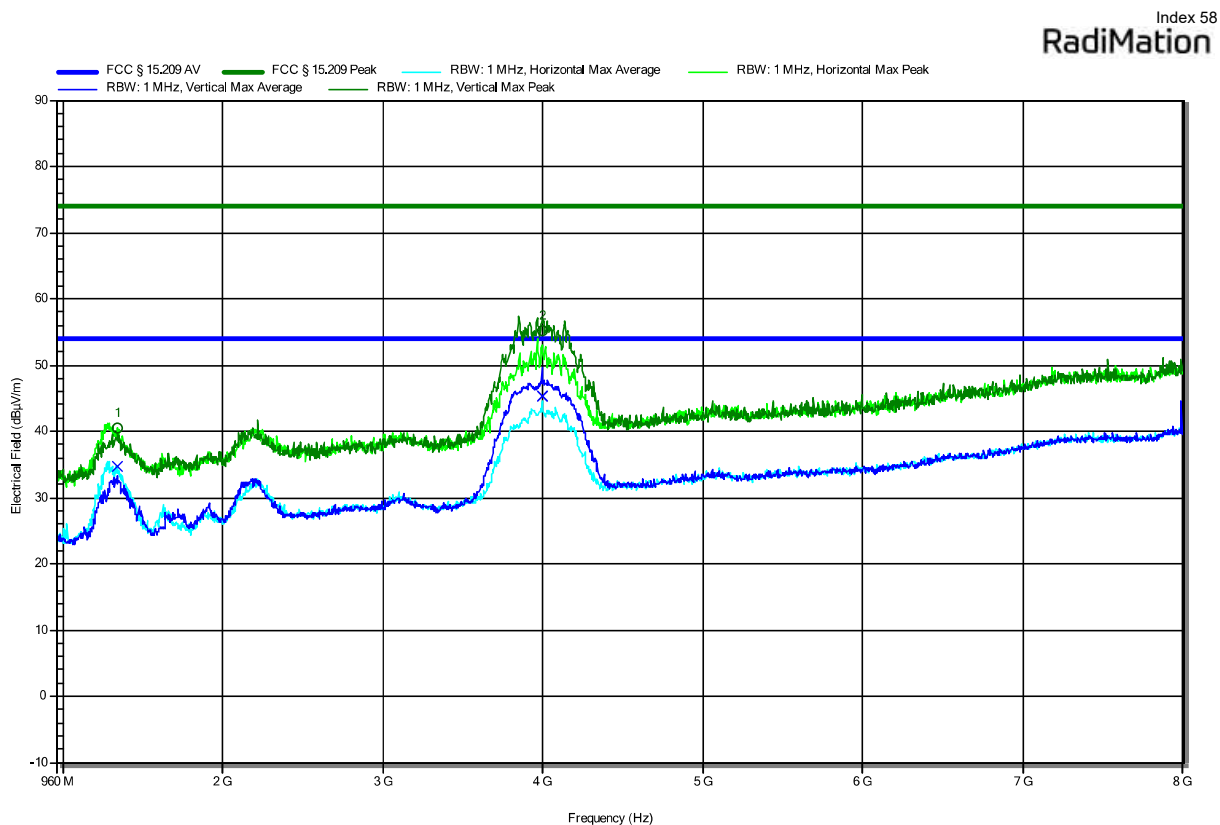
| Peak Number | Frequency (MHz) | Average (dBμV/m) | Average (dBμV/m) | Limit | Average Difference (dB) | Average Status | Polarization |
|-------------|-----------------|------------------|------------------|-------|-------------------------|----------------|--------------|
| 1           | 4007.381        | 39.39            | 53.98            |       | -14.59                  | Pass           | Vertical     |
| 2           | 1308.48         | 33.04            | 53.98            |       | -20.94                  | Pass           | Vertical     |

Test Report No.: G0M-2403-2508-TFC15FUW-V01

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

## Radiated Spurious Emissions according to 47 CFR Part 15.521

Project Number: G0M-2403-2508  
 Applicant: Jungheinrich AG  
 Model Description: UWB-Location-System is able to measure distances between the UWB components  
 Model: 52445052, Truck Tag  
 Test Sample ID: 48550  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Siddique  
 Measurement software: RadiMation, version 2023.2.6  
 Test Conditions: Tnom: 24 °Celsius, Vnom: 24 V DC  
 Antenna: Schwarzbeck BBHA 9120D  
 Measurement distance: 3 m  
 Mode: Tx; 3993.6 MHz, BPSK, UWB\_active  
 Test Date: 2024-10-04  
 Note: UWB transmitter was activated (for comparison)



| Peak Number | Frequency (MHz) | Peak (dBμV/m) | Peak (dBμV/m) | Limit (dB) | Peak Difference (dB) | Peak Status | Polarization |
|-------------|-----------------|---------------|---------------|------------|----------------------|-------------|--------------|
| 1           | 1341.333        | 40.4          | 74            | -33.6      |                      | Pass        | Horizontal   |
| 2           | 3993.301        | 55.12         | 74            | -18.88     |                      | Pass        | Vertical     |

| Peak Number | Frequency (MHz) | Average (dBμV/m) | Average (dBμV/m) | Limit (dB) | Average Difference (dB) | Average Status | Polarization |
|-------------|-----------------|------------------|------------------|------------|-------------------------|----------------|--------------|
| 1           | 1341.333        | 34.62            | 53.98            | -19.36     |                         | Pass           | Horizontal   |
| 2           | 3993.301        | 45.22            | 53.98            | -8.76      |                         | Pass           | Vertical     |

===== End of test report =====

Test Report No.: G0M-2403-2508-TFC15FUW-V01

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