

RADIO REPORT FCC 47 CFR Part 15F Ultra Wide Band Devices	
Report Reference No	G0M-2403-2495-TFC15FUW-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	  DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	Jungheinrich AG
Address	Friedrich-Ebert-Damm 129 22047 Hamburg Germany
Test Specification	47 CFR Part 15F
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	UWB-Location-System is able to measure distances between the UWB components
Model(s)	52445054, Anchor
Additional Model(s)	None
Brand Name(s)	zoneCONTROL
Hardware Version(s)	10629
Software Version(s)	0.0.34
FCC ID	2AK6M-52445054
Test Result	PASSED

Possible test case verdicts:		
Required by standard but not tested	N/T	
Not required by standard	N/R	
Not applicable to EUT	N/A	
Test object does meet the requirement	P(PASS)	
Test object does not meet the requirement	F(FAIL)	
Testing:		
Test Lab Temperature	20 °C - 30 °C	
Test Lab Humidity	25 % - 55 %	
Date of receipt of test item	2024-05-14	
Report:		
Compiled by	Florian Voigt	
Tested by (+ signature)	Md Abu Bakar Siddique	
Approved by (+ signature) (Test Lab Engineer)	Florian Voigt	
Date of Issue	2024-11-26	
Total number of pages	106	
General Remarks:		
The test results presented in this report relate only to the object tested. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.		
Additional Comments:		
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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
μ_{-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	52445054, Anchor	
Additional Model(s)	None	
Brand Name(s)	zoneCONTROL	
Serial Number(s)	ID:17:B4:10:03:19:D8	
Test Sample Id(s)	48554	
Hardware Version(s)	10629	
Software Version(s)	0.0.34	
FCC ID	2AK6M-52445054	
Equipment class	Indoor (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	2	
Antenna 1 (UWB1)	Type	Integrated antenna
	Model	PCB Antenna
	Manufacturer	Siemens
	Gain	4.81 dBi @ 4.0 GHz 5.99 dBi @ 6.5 GHz
Antenna 2 (UWB2)	Type	Integrated antenna
	Model	PCB Antenna
	Manufacturer	Siemens
	Gain	3.33 dBi @ 4.0 GHz 5.11 dBi @ 6.5 GHz
Supply Voltage	V _{NOM}	24 V DC (External DC source) 48 V DC (PoE)
Operating Temperature	T _{NOM}	20 °C
AC/DC-Adaptor	None	
Manufacturer	Siemens Aktiengesellschaft R&D House CHE DI PA DCP R&D 5 Rochlitzer Str. 19 09111 Chemnitz Germany	

1.3 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Laptop	HP	ProBook	For setting test modes
AE	PoE Midspan	Microsemi	9001GR	--
AE	USB-Serial-Adapter	Agilon	Not specified	--
CBL	Cable	Siemens	Not specified	From PCB with COM port to 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: --				

1.4 Test Modes

Mode	Description
Transmit	Mode = Transmit Modulation = BPSK with BPM Duty cycle = 100% Power setting = -3 dB (power level set by software)
Comment: --	

1.5 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx / Rx	2	3993.6
F2	Tx / Rx	5	6489.6

1.6 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 μ 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 μ V/m). The FCC limits are given in units of μ V/m. The following formula is used to convert the units of μ V/m to dB μ 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 μ V	+ 26 dB/m	:	47.5 dB μ V/m	- 57.0 dB μ V/m	= -9.5

2 Result Summary

FCC 47 CFR Part 15F				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
FCC 15.503(a), 15.517(b),	UWB (-10 dB) Bandwidth	ANSI C63.10-2013	PASS	--
FCC 15.517(e)	Peak power	ANSI C63.10-2013	PASS	--
FCC 15.517(c)(d)	Transmitter radiated emissions	ANSI C63.10-2013	PASS	--
FCC 15.207	AC power line conducted emissions	ANSI C63.10-2013	PASS	--
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.				

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

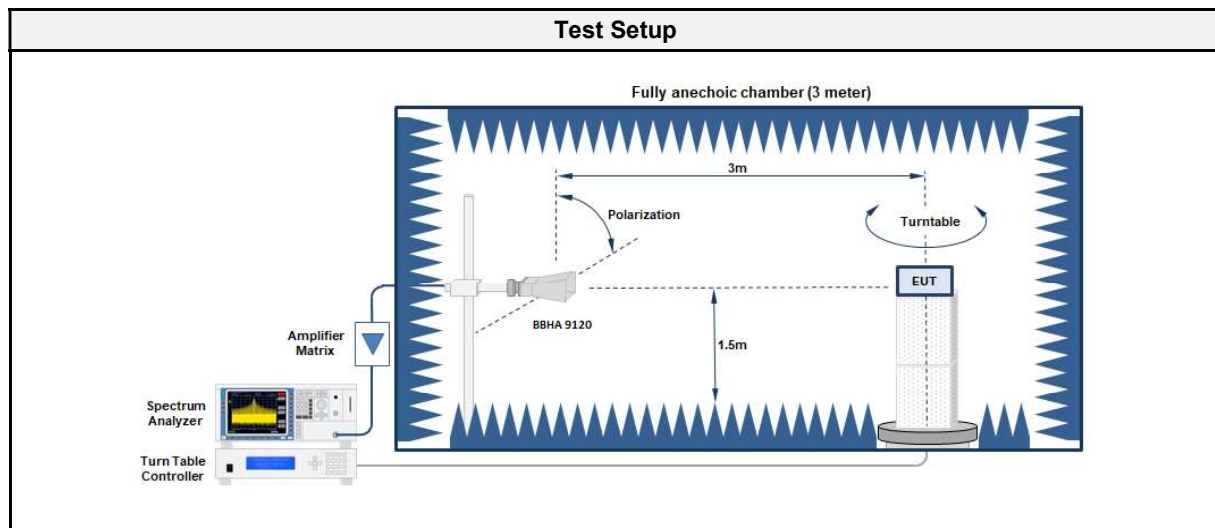
3.1.1 Information

Test Information	
Product Standard Reference	FCC Part 15.517 (b)
Measurement Method	ANSI C63.10 10.1
Measurement Uncertainty	$\pm 1.26 \%$
Date	2024-06-19 to 2024-06-20
Operator	Md Abu Bakar Siddique

3.1.2 Limits

Limits
UWB (-10 dB) bandwidth totally contained in the band 3.1 - 10.6 GHz additionally UWB (-10 dB) bandwidth ≥ 500 MHz or fractional bandwidth ≥ 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

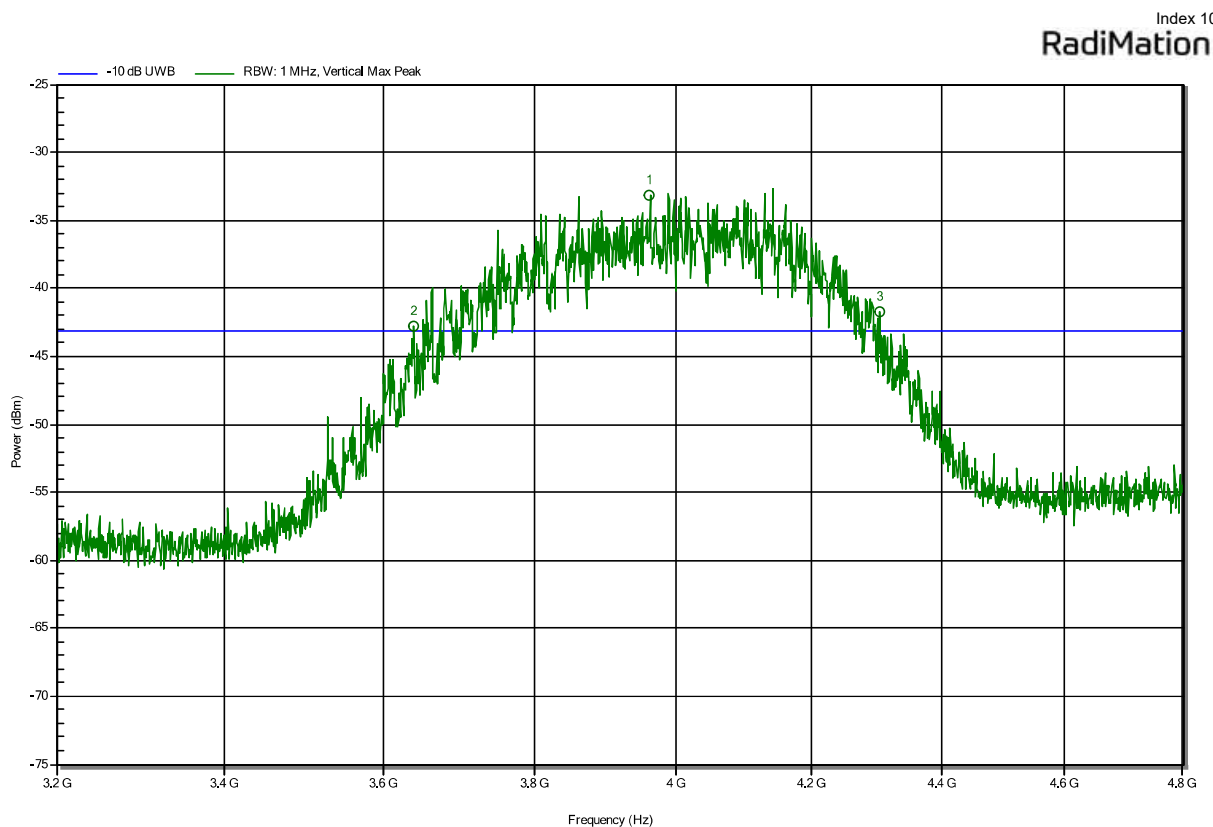
3.1.6 Results

Test Results - Antenna 1 (UWB1)							
Channel [MHz]	f_M [MHz]	f_C [MHz]	B_{-10} [MHz]	f_L [MHz]	f_H [MHz]	μ_{-10} [MHz]	Verdict
3993.6	3961.28	3972.02	665.97	3639.04	4305.01	0.1677	PASS
6489.6	6462.80	6479.46	682.20	6138.36	6820.56	0.1053	PASS

Test Results - Antenna 2 (UWB2)							
Channel [MHz]	f_M [MHz]	f_C [MHz]	B_{-10} [MHz]	f_L [MHz]	f_H [MHz]	μ_{-10} [MHz]	Verdict
3993.6	4014.13	3991.11	569.65	3706.29	4275.94	0.1427	PASS
6489.6	6489.76	6515.02	645.32	6192.36	6837.68	0.0990	PASS

UWB (-10 dB) Bandwidth according to 47 CFR Part 15.517

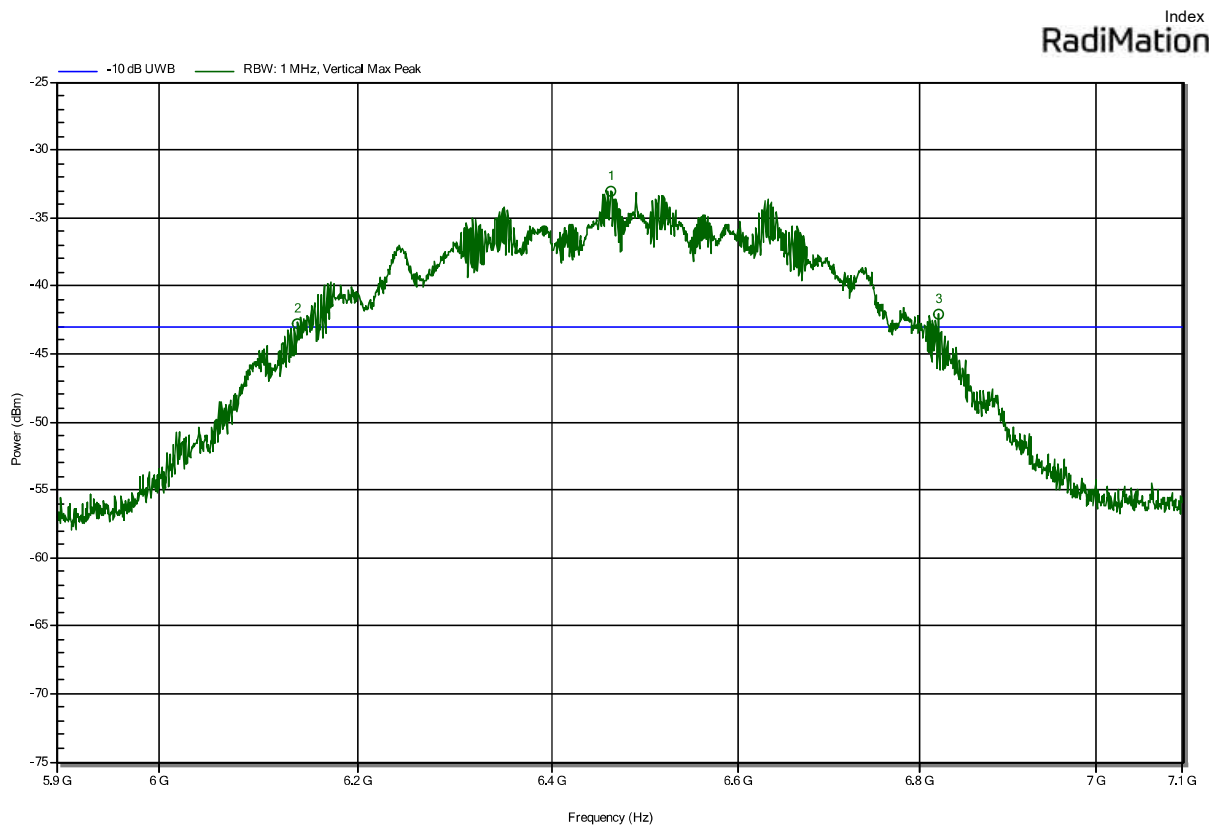
Project Number: G0M-2403-2495
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System is able to measure distances between the UWB components
 Model: 52445054, Anchor
 Test Sample ID: 48554
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Siddique
 Measurement software: RadiMation, 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, UWB1
 Test Date: 2024-06-20



Peak Number	Frequency (MHz)	Peak (dBm)	Polarization
1	3961.28	-33.1	Vertical
2	3639.04	-42.8	Vertical
3	4305.0133	-41.8	Vertical

UWB (-10 dB) Bandwidth according to 47 CFR Part 15.517

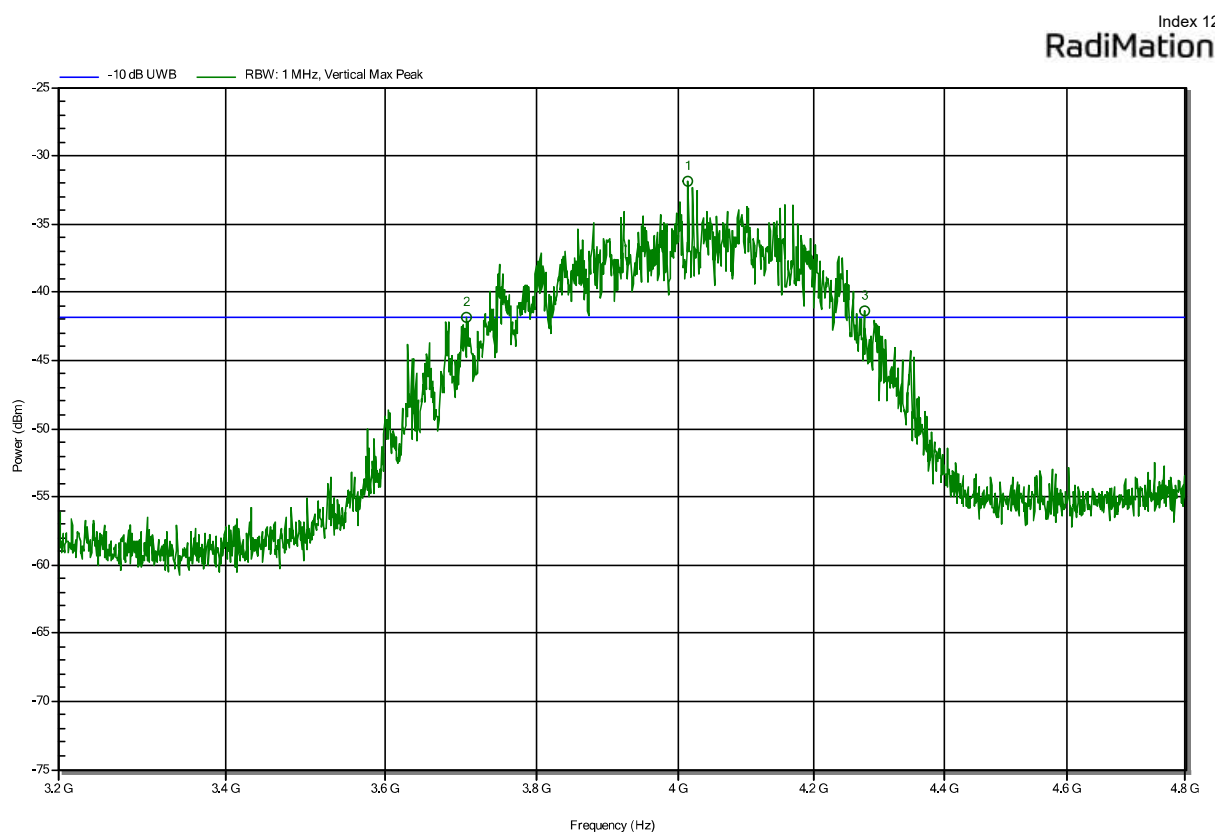
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 Model Description: UWB-Location-System is able to measure distances between the UWB components
 Model: 52445054, Anchor
 Test Sample ID: 48554
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Siddique
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 24 V DC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; 6489.6 MHz, BPSK, UWB1
 Test Date: 2024-06-19



Peak Number	Frequency (MHz)	Peak (dBm)	Polarization
1	6462.8	-33	Vertical
2	6138.36	-42.8	Vertical
3	6820.56	-42.1	Vertical

UWB (-10 dB) Bandwidth according to 47 CFR Part 15.517

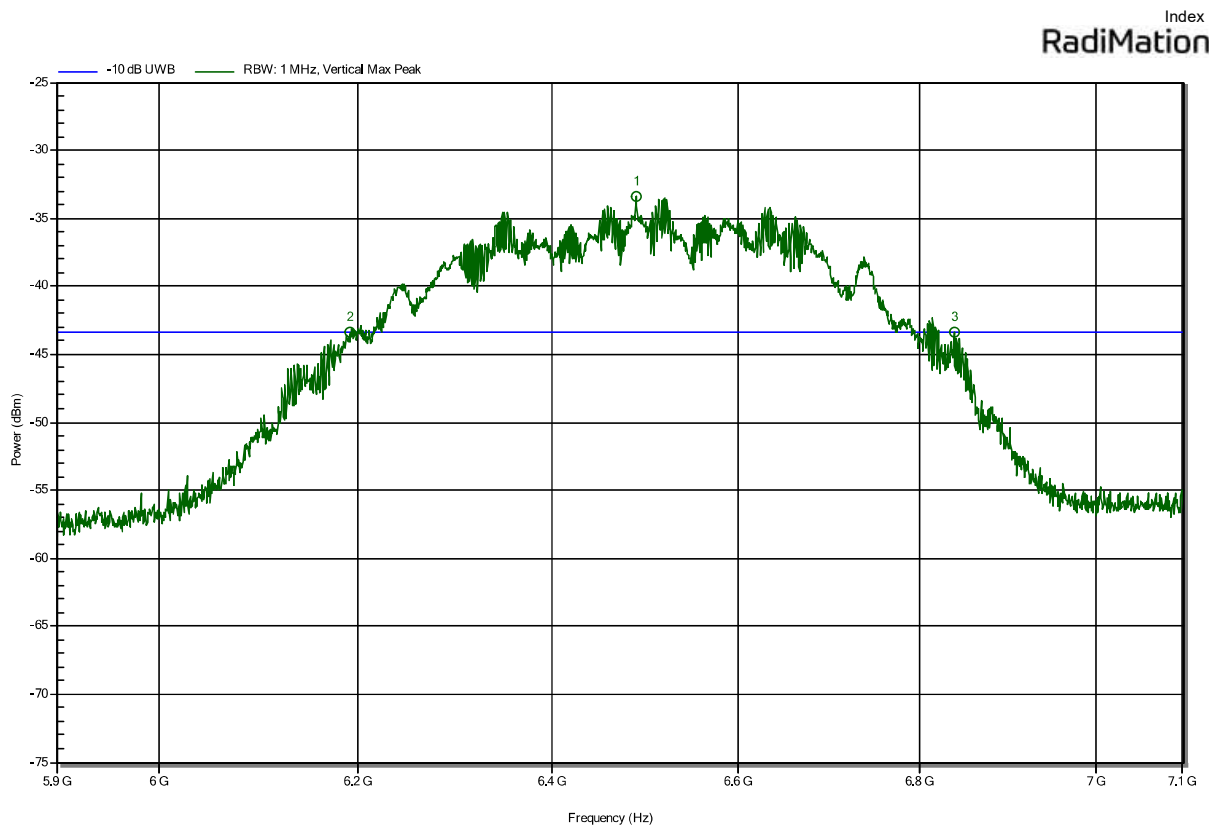
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 Applicant: Jungheinrich AG
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 Model: 52445054, Anchor
 Test Sample ID: 48554
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Siddique
 Measurement software: RadiMation, version 2023.2.6
 Test Conditions: Tnom: 24 °Celsius, Vnom: 24 V DC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 3993.6 MHz, BPSK, UWB2
 Test Date: 2024-06-20



Peak Number	Frequency (MHz)	Peak (dBm)	Polarization
1	4014.1333	-31.9	Vertical
2	3706.2933	-41.9	Vertical
3	4275.9467	-41.3	Vertical

UWB (-10 dB) Bandwidth according to 47 CFR Part 15.517

Project Number: G0M-2403-2495
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System is able to measure distances between the UWB components
 Model: 52445054, Anchor
 Test Sample ID: 48554
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Siddique
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 24 V DC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; 6489.6 MHz, BPSK, UWB2
 Test Date: 2024-06-19



Peak Number	Frequency (MHz)	Peak (dBm)	Polarization
1	6489.76	-33.4	Vertical
2	6192.36	-43.4	Vertical
3	6837.68	-43.3	Vertical

3.2 Test Conditions and Results - Maximum Peak Power

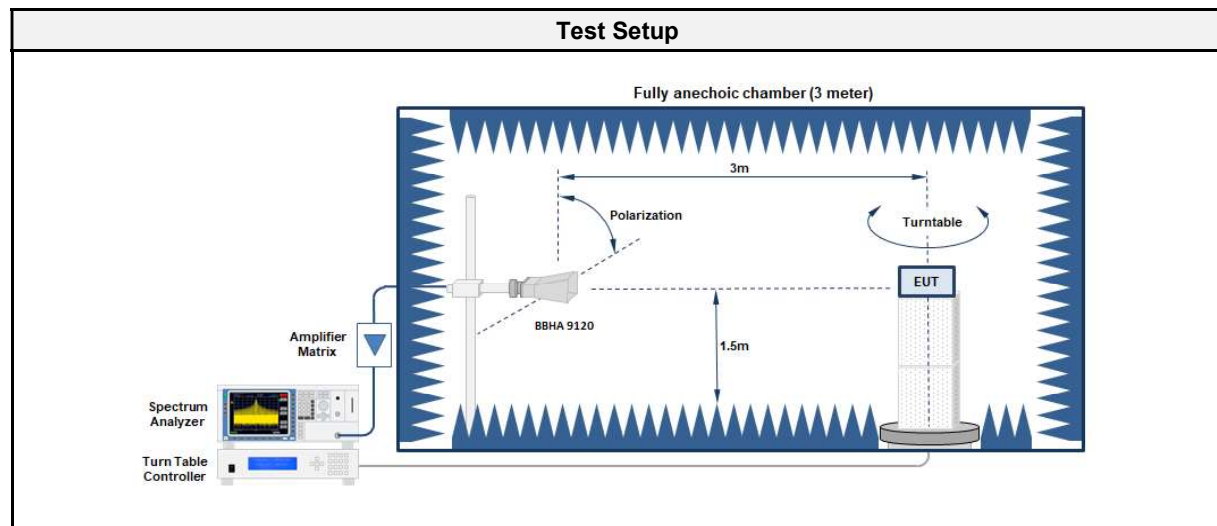
3.2.1 Information

Test Information	
Product Standard Reference	FCC Part 15.517 (e)
Date	2024-06-19 to 2024-06-20
Operator	Md Abu Bakar Siddique
Measurement Method	ANSI C63.10 10.3.5, 10.3.6, 10.3.9
Measurement Uncertainty	± 2.86 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	FSU26	EF01407	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

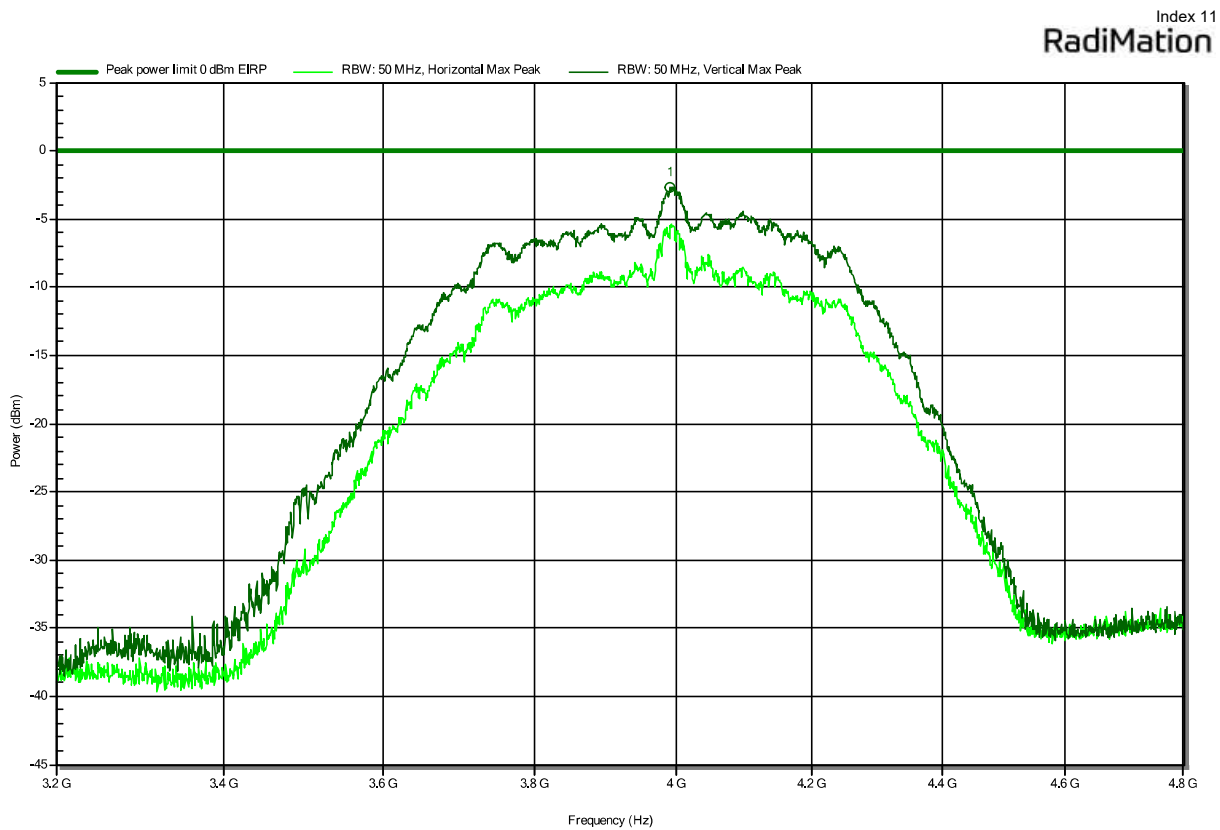
3.2.6 Results

Test Results - Antenna 1 (UWB1)				
Channel [MHz]	Emission [MHz]	Power [dBm EIRP]	Limit [dBm EIRP]	Margin [dB]
3993.6	3991.25	-2.7	0	-2.74
6489.6	6492.53	-6.7	0	-6.67

Test Results - Antenna 2 (UWB2)				
Channel [MHz]	Emission [MHz]	Power [dBm EIRP]	Limit [dBm EIRP]	Margin [dB]
3993.6	3999.9467	-3.6	0	-3.65
6489.6	6485.96	-7.4	0	-7.37

Maximum Peak Power according to 47 CFR Part 15.517

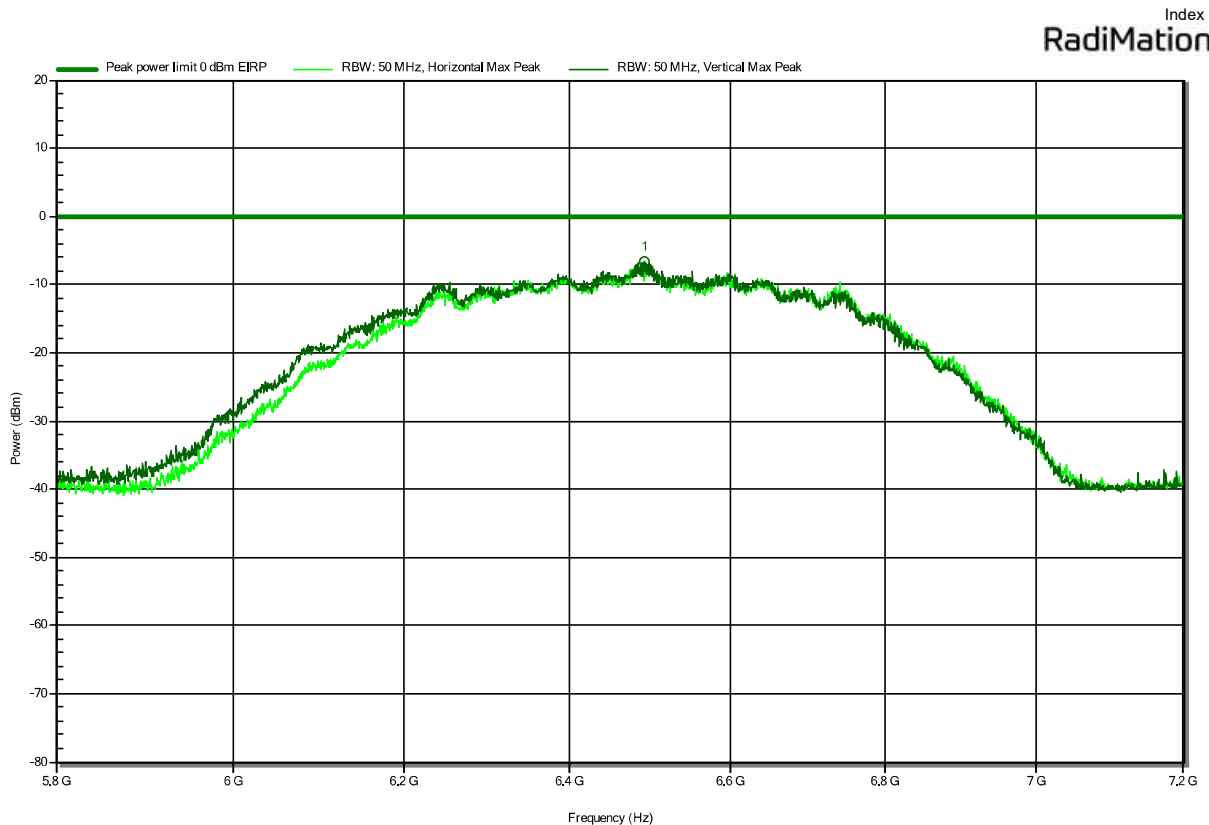
Project Number: G0M-2403-2495
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System is able to measure distances between the UWB components
 Model: 52445054, Anchor
 Test Sample ID: 48554
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Siddique
 Measurement software: RadiMation, 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, UWB1
 Test Date: 2024-06-20



Peak Number	Frequency (MHz)	Peak (dBm)	Peak (dBm)	Limit	Peak Difference (dB)	Peak Status	Polarization
1	3991.2533	-2.7	0		-2.74	Pass	Vertical

Maximum Peak Power according to 47 CFR Part 15.517

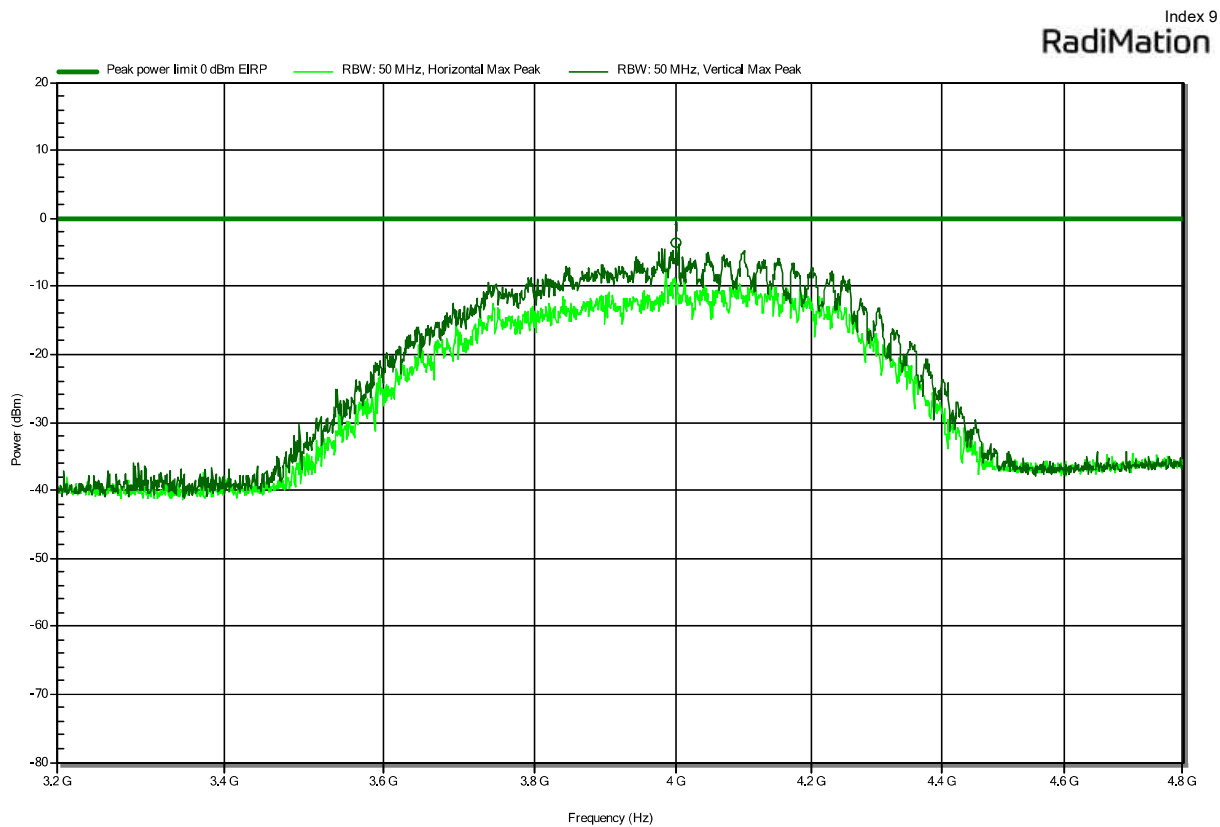
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 Model: 52445054, Anchor
 Test Sample ID: 48554
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Siddique
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 24 V DC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; 6489.6 MHz, BPSK, UWB1
 Test Date: 2024-06-19



Peak Number	Frequency (MHz)	Peak (dBm)	Peak (dBm)	Limit (dB)	Peak Difference	Peak Status	Polarization
1	6492.5333	-6.7	0	-6.67		Pass	Vertical

Maximum Peak Power according to 47 CFR Part 15.517

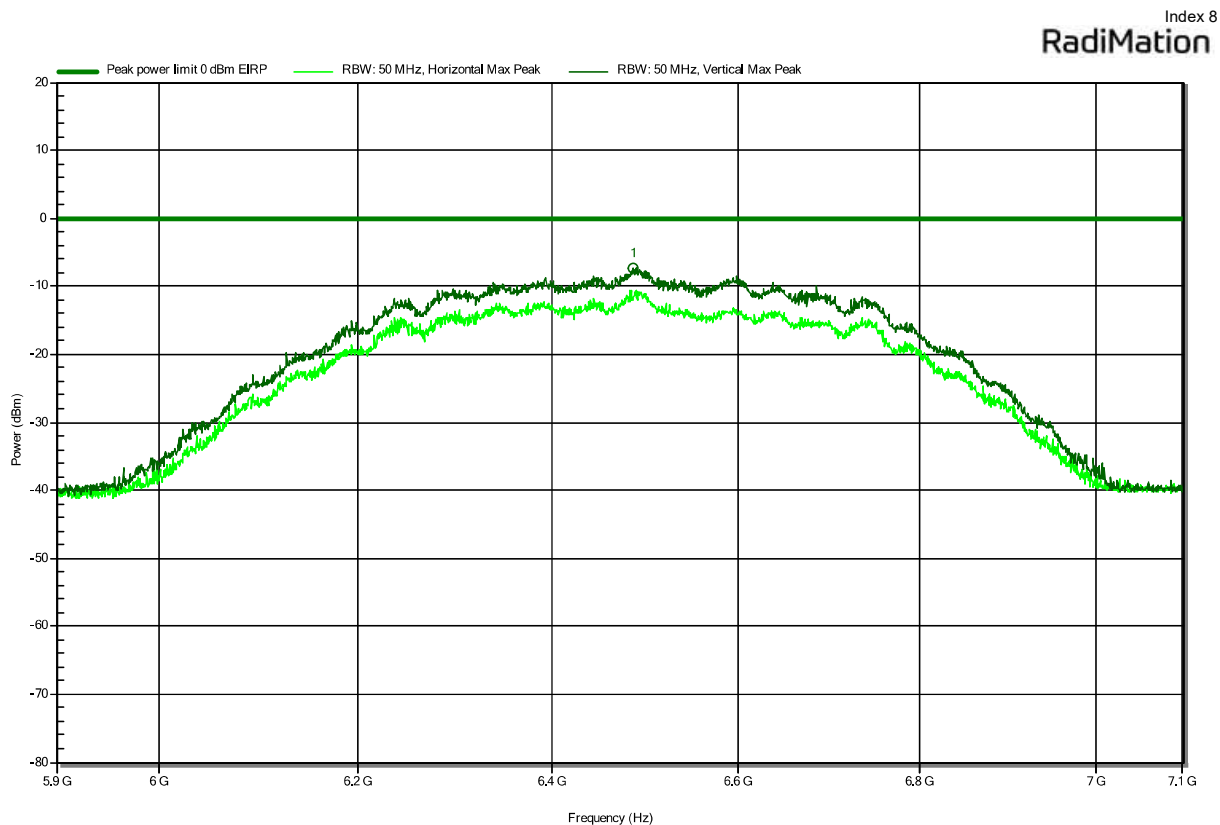
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 Applicant: Jungheinrich AG
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 Model: 52445054, Anchor
 Test Sample ID: 48554
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Siddique
 Measurement software: RadiMation, version 2023.2.6
 Test Conditions: Tnom: 24 °Celsius, Vnom: 24 V DC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 3993.6 MHz, BPSK, UWB2, Tx Power
 Test Date: 2024-06-20



Peak Number	Frequency (MHz)	Peak (dBm)	Peak (dBm)	Limit (dB)	Peak Difference (dB)	Peak Status	Polarization
1	3999.9467	-3.6	0	-3.65		Pass	Vertical

Maximum Peak Power according to 47 CFR Part 15.517

Project Number: G0M-2403-2495
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 Model: 52445054, Anchor
 Test Sample ID: 48554
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Siddique
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 24 V DC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; 6489.6 MHz, BPSK, UWB2, Tx Power
 Test Date: 2024-06-19



Peak Number	Frequency (MHz)	Peak (dBm)	Peak (dBm)	Limit (dB)	Peak Difference	Peak Status	Polarization
1	6485.96	-7.4	0	-7.37		Pass	Vertical

3.3 Test Conditions and Results - Transmitter radiated emissions

3.3.1 Information

Test Information	
Product Standard Reference	FCC Part 15.517 (c)(d)
Measurement Method	ANSI C63.10 10.2, 10.3
Measurement Uncertainty	± 5.95 dB
Date	2024-06-19 - 2024-06-26
Operator	Md Abu Bakar Siddique

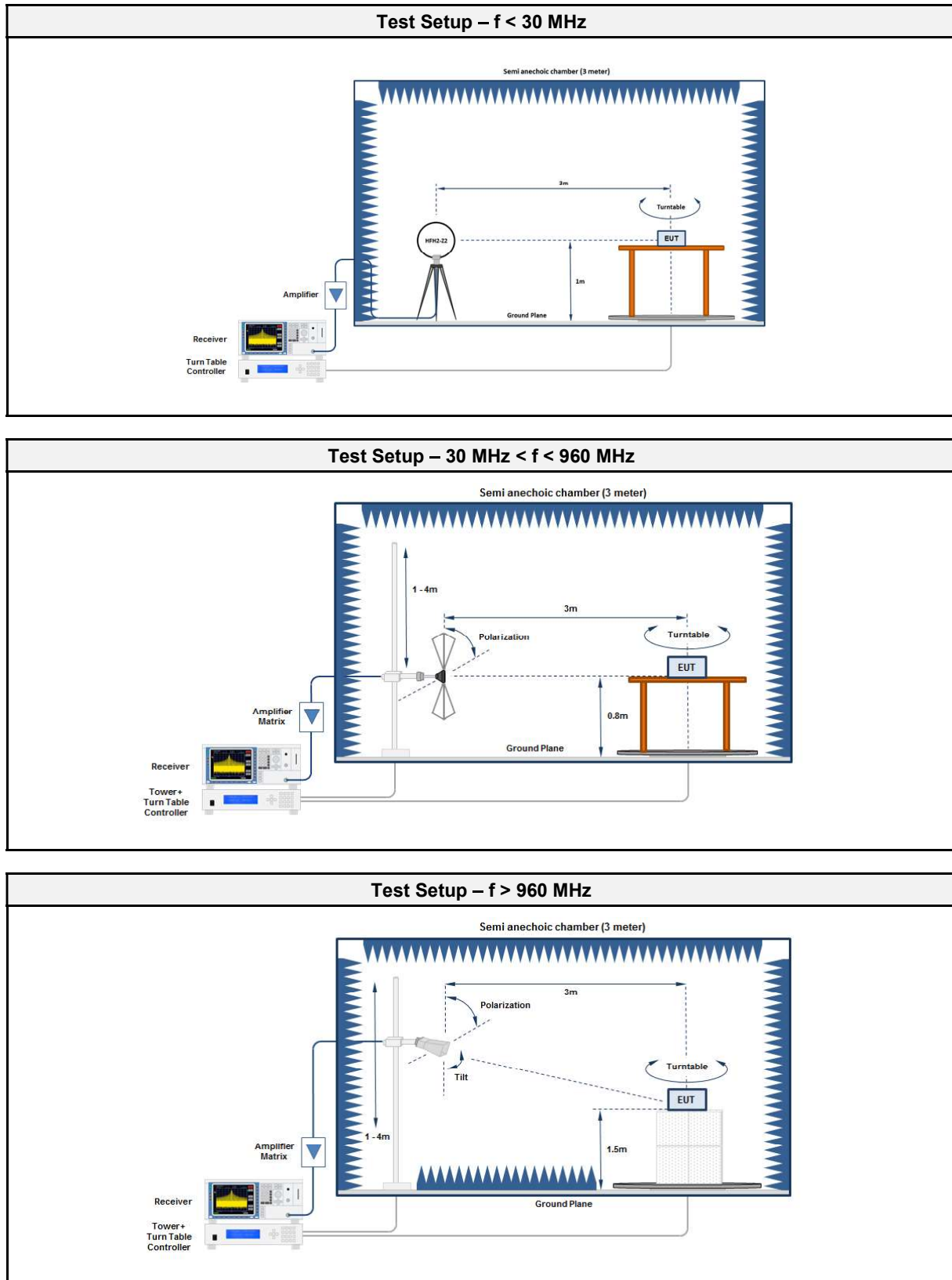
3.3.2 Limits

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	-53.3	41.9	51.5
1990-3100	1 MHz	RMS	-51.3	43.9	53.5
3100-10600	1 MHz	RMS	-41.3	53.9	63.5
> 10600	1 MHz	RMS	-51.3	43.9	53.5

Limits - GNSS 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

3.3.3 Setup



3.3.4 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	2022-11	2025-11
Loop Antenna	R&S	HFH2-Z2	EF00184	2024-02	2027-02
Test Receiver	Rohde & Schwarz	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	Rohde & Schwarz	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	Rohde & Schwarz	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 (1-10GHz)	EF01678	2024-05	2027-05
Double Ridged Waveguide Horn Antenna	Schwarzbeck	HWRD 650 (6,5-18GHz)	EF01679	2024-05	2027-05
Antenna	Amplifier Research	AT4560	EF00302	2023-09	2025-09
Antenna	Flann Microwave Ltd	22240-25 Amp. CBL26402075	EF00301	2023-01	2026-01

3.3.5 Procedure

Test Procedure f < 30 MHz	
1.	EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground
2.	EUT set to test mode
3.	The receiver is set to peak and average detection with max hold
4.	The EUT is rotated through 360°
5.	All significant emissions are measured again using the corresponding final detector
Test Procedure 30 - 960 MHz	
1.	EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground
2.	EUT set to test mode
3.	The receiver is set to peak detection with max hold
4.	The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5.	All significant emissions are measured again using the corresponding final detector
Test Procedure 960 - 4800 MHz	
1.	EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground
2.	EUT set to test mode
3.	The receiver is set to RMS detection with max hold, measure time is set to 1 ms, step size is set to RBW/2.
4.	The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
Test Procedure > 4800 MHz	
1.	EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground
2.	EUT set to test mode
3.	The receiver is set to RMS detection with max hold, 30001 sweep points and 30 s sweep time.
4.	The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m

3.3.6 Results

Test Results - Antenna 1 (UWB1) – f < 30 MHz					
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Limit [dBμV/m]	Margin [dB]
3993.6	0.018	-14.9	pk	62.4	-77.31
3993.6	0.018	-15.4	avg	42.4	-57.71
3993.6	0.459	-17.1	pk	34.4	-51.44
3993.6	0.459	-18.7	avg	14.4	-33.07
3993.6	0.913	5	pk	28.4	-23.36
3993.6	1.375	-1.1	pk	24.9	-25.92
6489.6	0.018	-18.4	pk	62.3	-80.76
6489.6	0.018	-18.7	avg	42.3	-61
6489.6	0.459	-17.6	pk	34.4	-52.01
6489.6	0.459	-18.7	avg	14.4	-33.04
6489.6	0.913	5.2	pk	28.4	-23.18

Test Results - Antenna 1 (UWB1) – 30 - 960 MHz						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
3993.6	52.63	31.5	pk	ver	40	-8.52
3993.6	159.89	30.2	pk	hor	43.5	-13.29
3993.6	242.66	34	pk	hor	46	-11.97
3993.6	365.42	28.7	pk	ver	46	-17.31
6489.6	52.63	29.6	pk	ver	40	-10.41
6489.6	160.51	30.8	pk	hor	43.5	-12.72
6489.6	255.37	33	pk	hor	46	-12.99

Test Results - Antenna 1 (UWB1) – 960 MHz - 40 GHz						
Channel [MHz]	Emission [MHz]	Level [dBm]	Det.	Pol.	Limit [dBm]	Margin [dB]
3993.6	3993.6533	-43.6	RMS	ver	-41.3	-2.31
3993.6	9911.6667	-66.5	RMS	ver	-41.3	-25.2
3993.6	17849.3333	-65.3	RMS	ver	-51.3	-13.98
3993.6	39898.75	-67.6	RMS	ver	-51.3	-16.31
6489.6	6489.6	-41.9	RMS	ver	-41.3	-0.59
6489.6	9911.6667	-66.2	RMS	ver	-41.3	-24.9
6489.6	12979.3333	-63.2	RMS	hor	-51.3	-11.92
6489.6	39900.55	-67.6	RMS	ver	-51.3	-16.31

Test Results - Antenna 1 (UWB1) – GNSS Band						
Channel [MHz]	Emission [MHz]	Level [dBm]	Det.	Pol.	Limit [dBm]	Margin [dB]
3993.6	1200	-90.6	RMS	ver	-85.3	-5.32
3993.6	1599.995	-88.1	RMS	hor	-85.3	-2.78
6489.6	1200	-89.9	RMS	ver	-85.3	-4.58
6489.6	1574.99	-92.4	RMS	ver	-85.3	-7.1
6489.6	1599.995	-91.1	RMS	ver	-85.3	-5.79

Test Results - Antenna 2 (UWB2) – f < 30 MHz					
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Limit [dBμV/m]	Margin [dB]
3993.6	0.018	-14.8	pk	62.3	-77.18
3993.6	0.018	-15.1	avg	42.3	-57.38
3993.6	0.459	-17.2	pk	34.4	-51.54
3993.6	0.459	-18.5	avg	14.4	-32.89
3993.6	0.913	5.5	pk	28.4	-22.88
3993.6	1.375	0	pk	24.9	-24.82
3993.6	22.475	14.3	pk	29.5	-15.21
6489.6	0.018	-18	pk	62.3	-80.39
6489.6	0.018	-18.4	avg	42.3	-60.77
6489.6	0.459	-17.3	pk	34.4	-51.63
6489.6	0.459	-18.6	avg	14.4	-32.99
6489.6	0.913	5	pk	28.4	-23.38
6489.6	1.375	0.2	pk	24.9	-24.66

Test Results - Antenna 2 (UWB2) – 30 - 960 MHz						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
3993.6	52.63	32.5	pk	ver	40	-7.48
3993.6	149.97	28.5	pk	hor	43.5	-15.02
3993.6	189.34	27.7	pk	ver	43.5	-15.75
3993.6	243.59	33.6	pk	hor	46	-12.43
3993.6	361.08	27.5	pk	ver	46	-18.49
6489.6	52.63	32.1	pk	ver	40	-7.92
6489.6	154.62	27.9	pk	hor	43.5	-15.59
6489.6	191.2	30.6	pk	ver	43.5	-12.86
6489.6	240.18	31.9	pk	hor	46	-14.12
6489.6	274.28	31.2	pk	hor	46	-14.76

Test Results - Antenna 2 (UWB2) – 960 MHz - 40 GHz						
Channel [MHz]	Emission [MHz]	Level [dBm]	Det.	Pol.	Limit [dBm]	Margin [dB]
3993.6	3993.6	-44.4	RMS	ver	-41.3	-3.14
3993.6	7987.3067	-54.5	RMS	ver	-41.3	-13.22
3993.6	39901	-67.6	RMS	ver	-51.3	-16.3
6489.6	6489.6	-42.4	RMS	ver	-41.3	-1.13
6489.6	39900.1	-67.6	RMS	ver	-51.3	-16.27

Test Results - Antenna 2 (UWB2) – GNSS Band						
Channel [MHz]	Emission [MHz]	Level [dBm]	Det.	Pol.	Limit [dBm]	Margin [dB]
3993.6	1200	-91	RMS	ver	-85.3	-5.72
3993.6	1575.005	-92.1	RMS	hor	-85.3	-6.85
3993.6	1599.995	-92.2	RMS	hor	-85.3	-6.85
6489.6	1200	-91.3	RMS	ver	-85.3	-6
6489.6	1574.99	-92.8	RMS	hor	-85.3	-7.53
6489.6	1599.995	-91.3	RMS	hor	-85.3	-5.98

3.4 Test Conditions and Results - AC powerline conducted emissions

3.4.1 Information

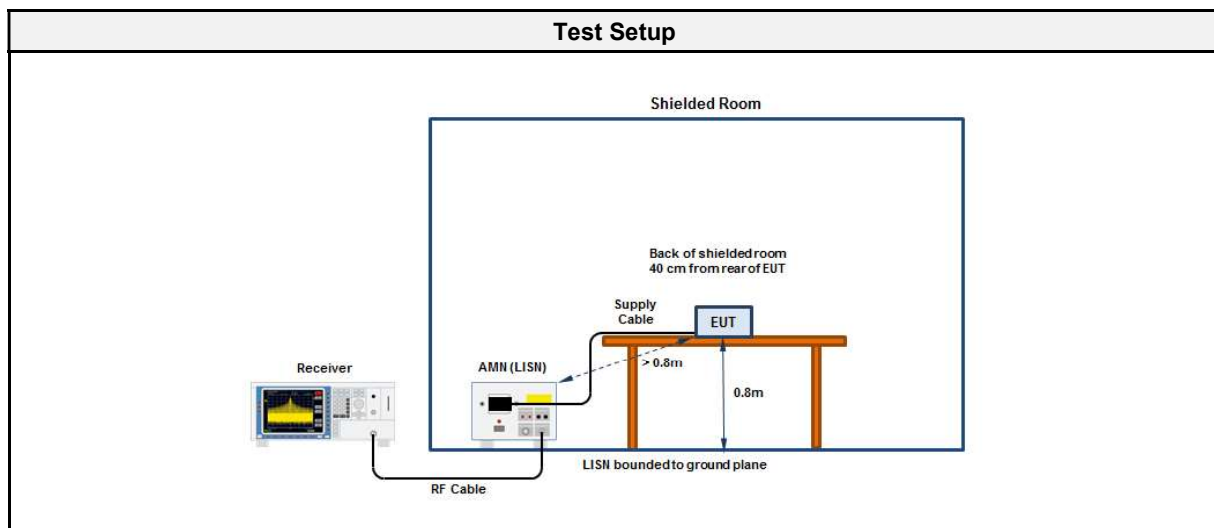
Test Information	
Reference	FCC 15.207
Measurement Method	ANSI C63.10 6.2
Measurement Uncertainty	± 3.82 dB
Operator	Md Abu Bakar Siddique
Date	2024-06-27

3.4.2 Limits

Limits		
Frequency [MHz]	Quasi-Peak [dB μ V]	Average [dB μ V]
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50

* Limit decreases linearly with the logarithm of the frequency

3.4.3 Setup



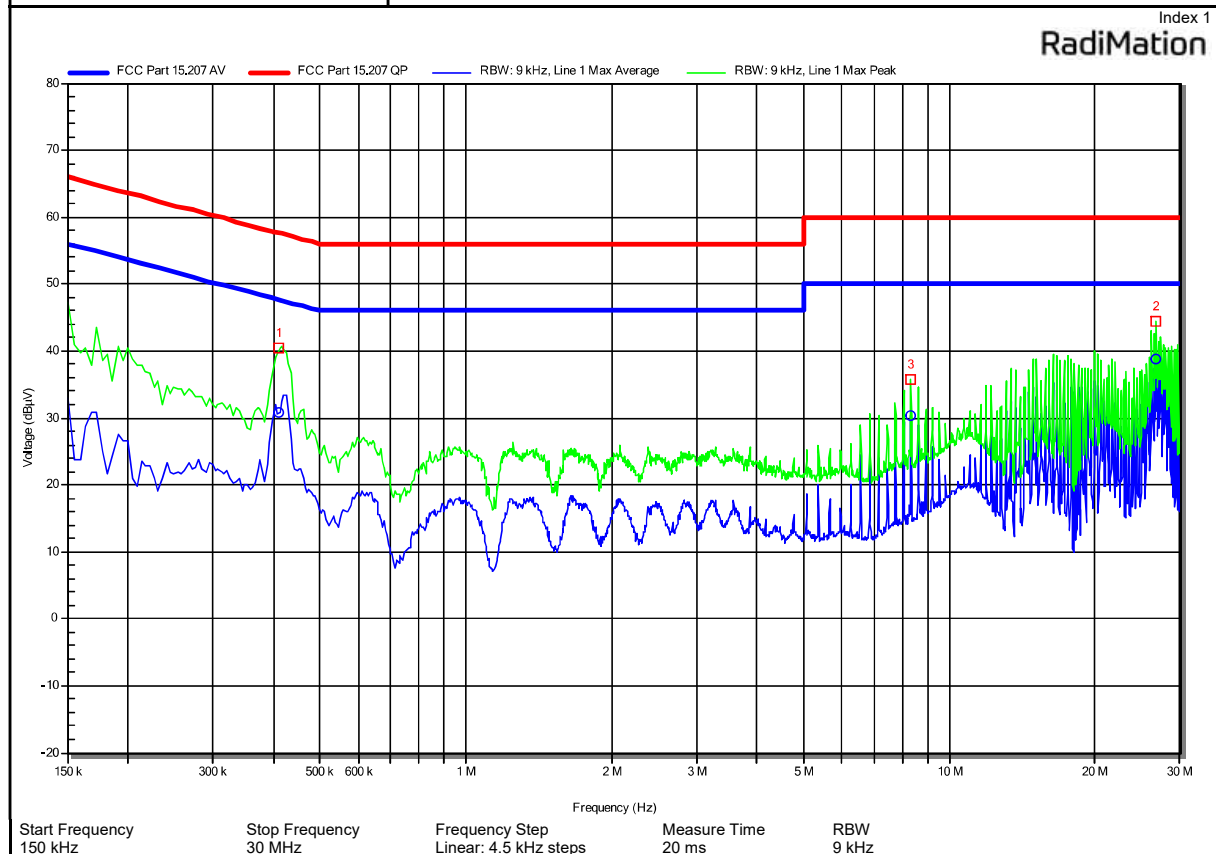
3.4.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	R&S	ESU26	EF00887	2024-01	2025-01
Pulse Limiter	R&S	ESH3-Z2	EF01222	2023-08	2025-08
LISN	Schwarzbeck	NSLK 8127 RC	EF01592	2023-06	2025-06

3.4.5 Results

Radiated emissions according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-06-27
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode:	3993.6 MHz, BPSK, UWB1, PoE power supply
DUT Configuration:	
Applied to Port:	Mains



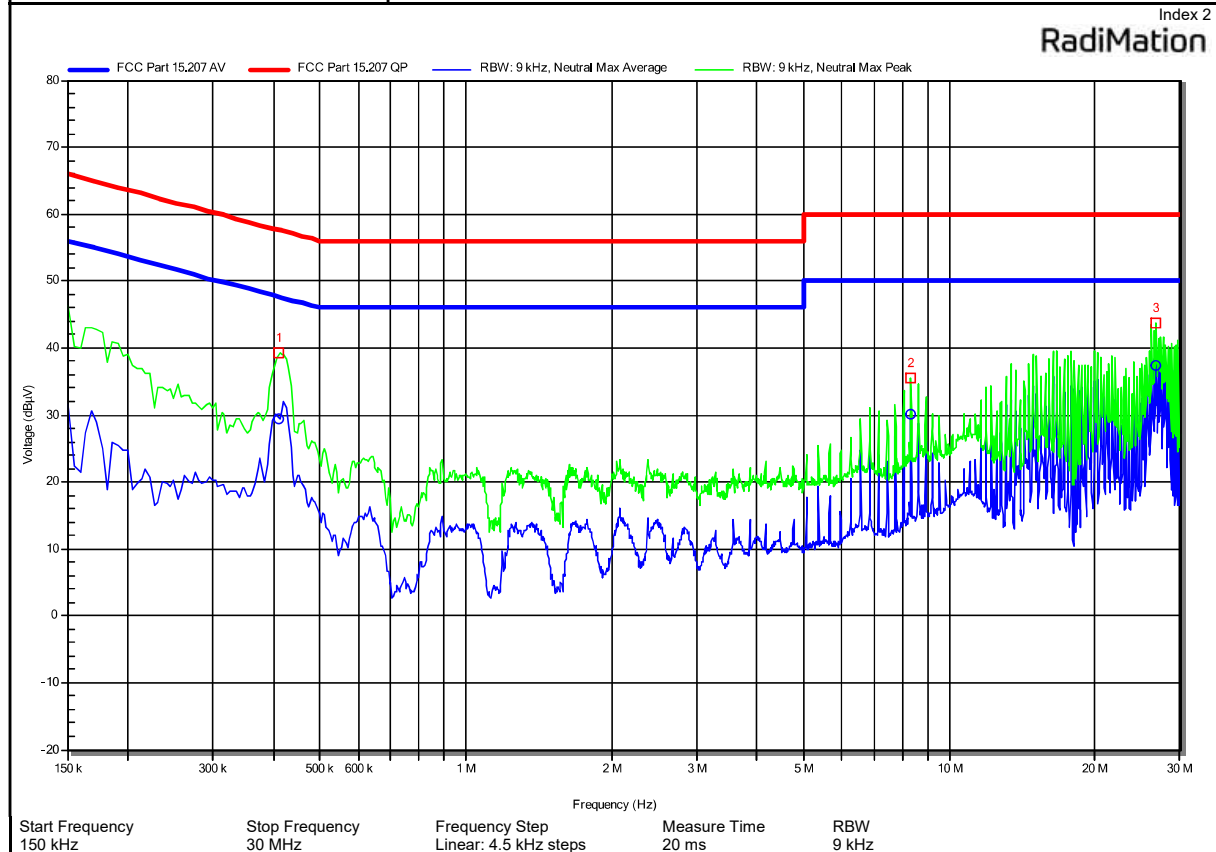
Peak Number	Frequency (MHz)	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	0.411	40.38	57.63	-17.25	Pass	Line 1
2	26.759	44.38	60	-15.62	Pass	Line 1
3	8.327	35.79	60	-24.21	Pass	Line 1

Peak Number	Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	LISN
1	0.411	30.76	47.63	-16.87	Pass	Line 1
2	26.759	38.81	50	-11.19	Pass	Line 1
3	8.327	30.29	50	-19.71	Pass	Line 1

Test Report No.: G0M-2403-2495-TFC15FUW-V01

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

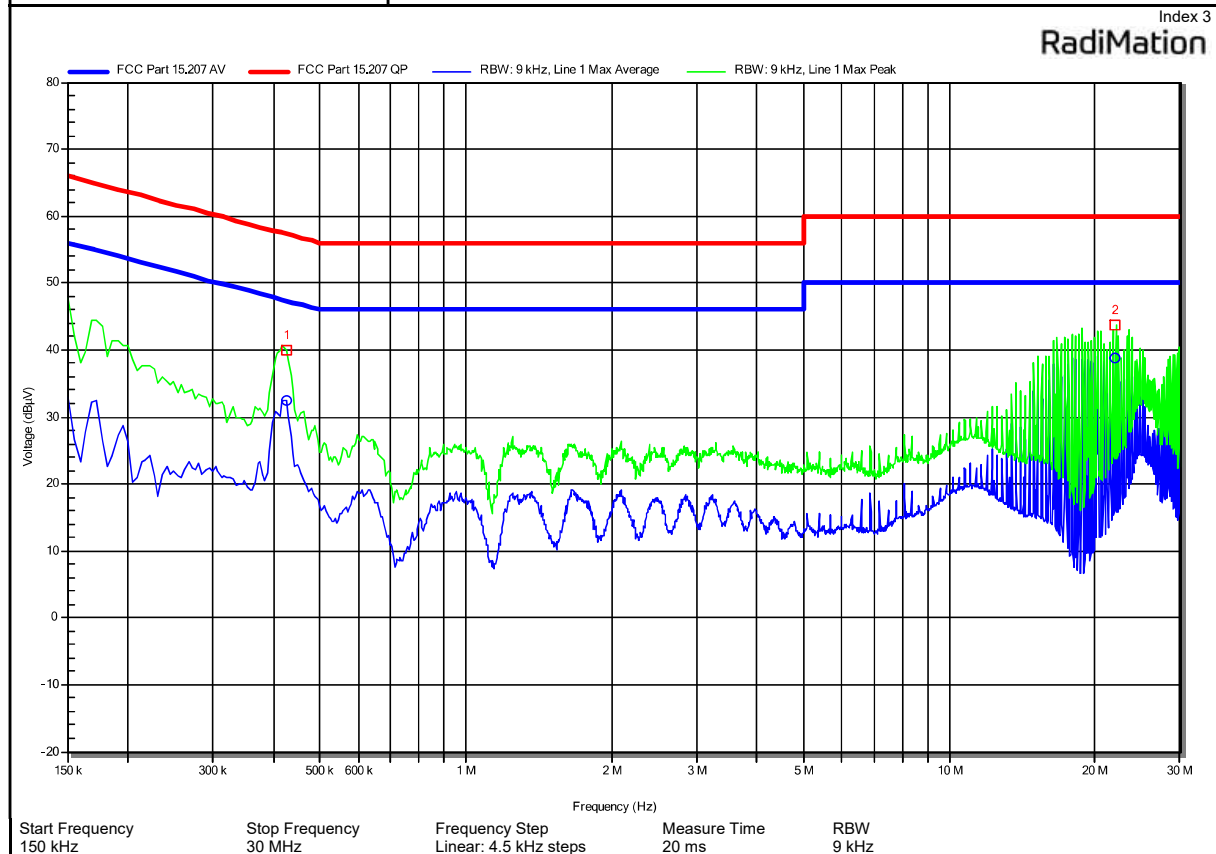
Radiated emissions according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-06-27
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	3993.6 MHz, BPSK, UWB1, PoE power supply
Applied to Port:	Mains



Peak Number	Frequency (MHz)	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	0.411	39.25	57.63	-18.38	Pass	Neutral
2	8.322	35.5	60	-24.5	Pass	Neutral
3	26.759	43.78	60	-16.22	Pass	Neutral

Peak Number	Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	LISN
1	0.411	29.43	47.63	-18.2	Pass	Neutral
2	8.322	30.09	50	-19.91	Pass	Neutral
3	26.759	37.29	50	-12.71	Pass	Neutral

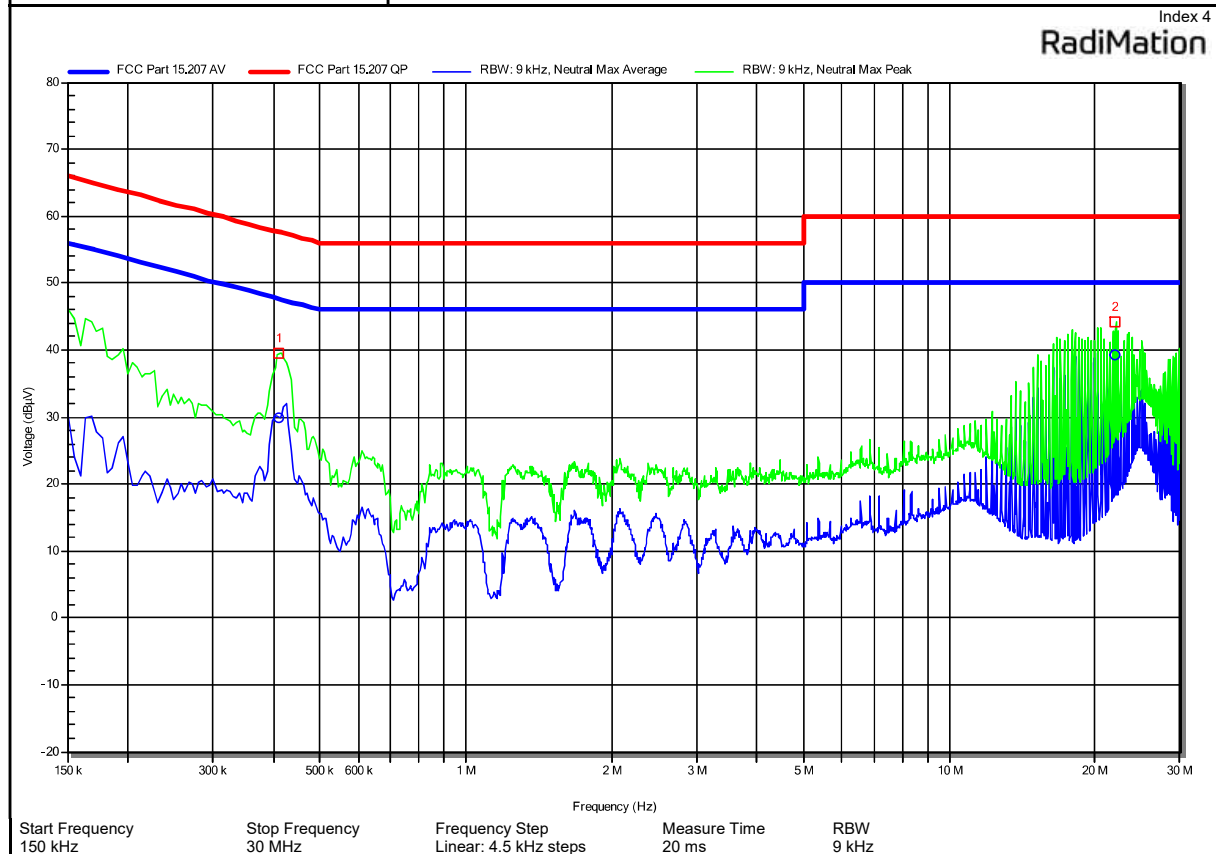
Radiated emissions according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-07-01
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	6489.6 MHz, BPSK, UWB1, PoE power supply
Applied to Port:	Mains



Peak Number	Frequency (MHz)	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	0.424	39.87	57.36	-17.49	Pass	Line 1
2	22.065	43.8	60	-16.2	Pass	Line 1

Peak Number	Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	LISN
1	0.424	32.46	47.36	-14.9	Pass	Line 1
2	22.065	38.87	50	-11.13	Pass	Line 1

Radiated emissions according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-07-01
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	6489.6 MHz, BPSK, UWB1, PoE power supply
Applied to Port:	Mains

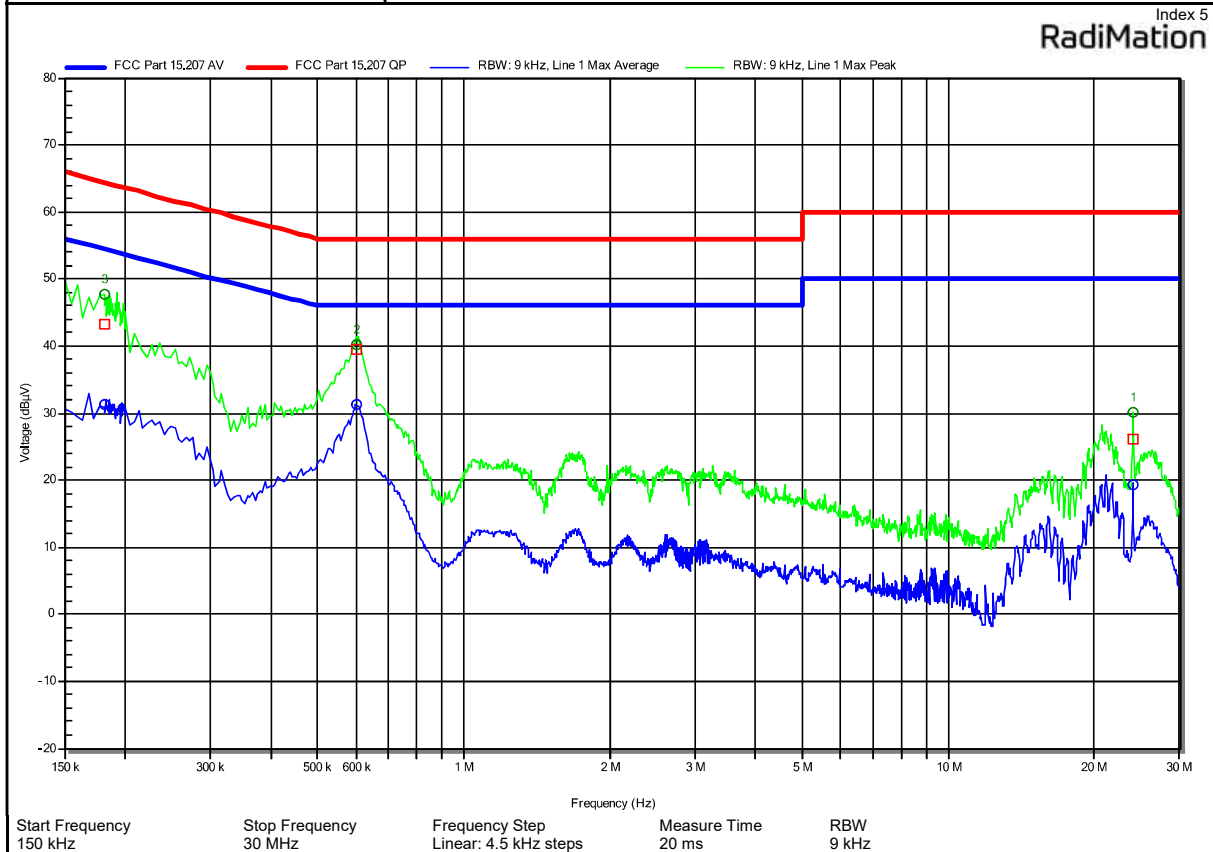


Peak Number	Frequency (MHz)	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	0.411	39.4	57.63	-18.23	Pass	Neutral
2	22.025	44.19	60	-15.81	Pass	Neutral

Peak Number	Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	LISN
1	0.411	29.91	47.63	-17.72	Pass	Neutral
2	22.025	39.29	50	-10.71	Pass	Neutral

Conducted emissions at the mains power port according to FCC 15.207

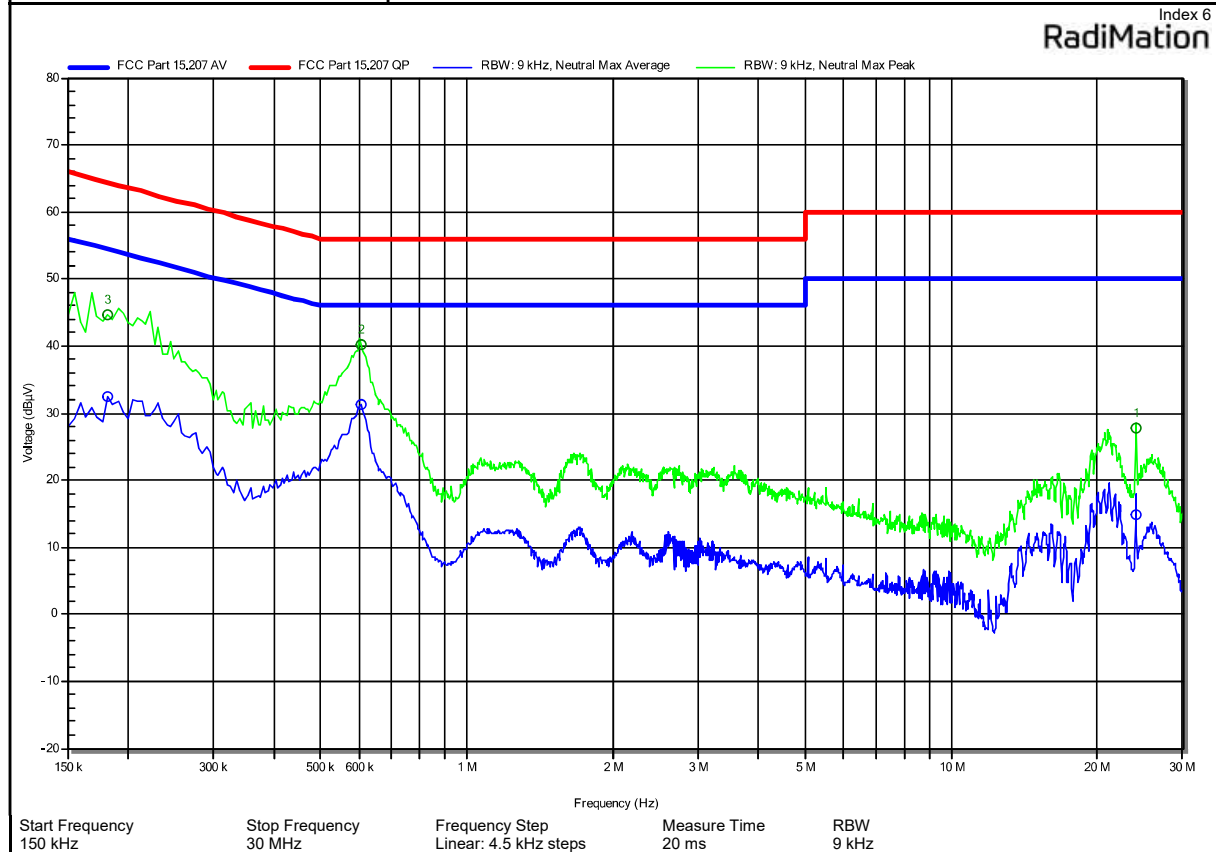
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-11-22
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	3993.6 MHz, BPSK, UWB1, DC power supply
Applied to Port:	Mains



Peak Number	Frequency (MHz)	Quasi-Peak (dBμV)	Quasi-Peak Limit (dBμV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	24.003	26.05	60	-33.95	Pass	Line 1
2	0.6	39.53	56	-16.47	Pass	Line 1
3	0.181	43.33	64.42	-21.09	Pass	Line 1

Peak Number	Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average Difference (dB)	Average Status	LISN
1	24.003	19.26	50	-30.74	Pass	Line 1
2	0.6	31.18	46	-14.82	Pass	Line 1
3	0.181	31.26	54.42	-23.16	Pass	Line 1

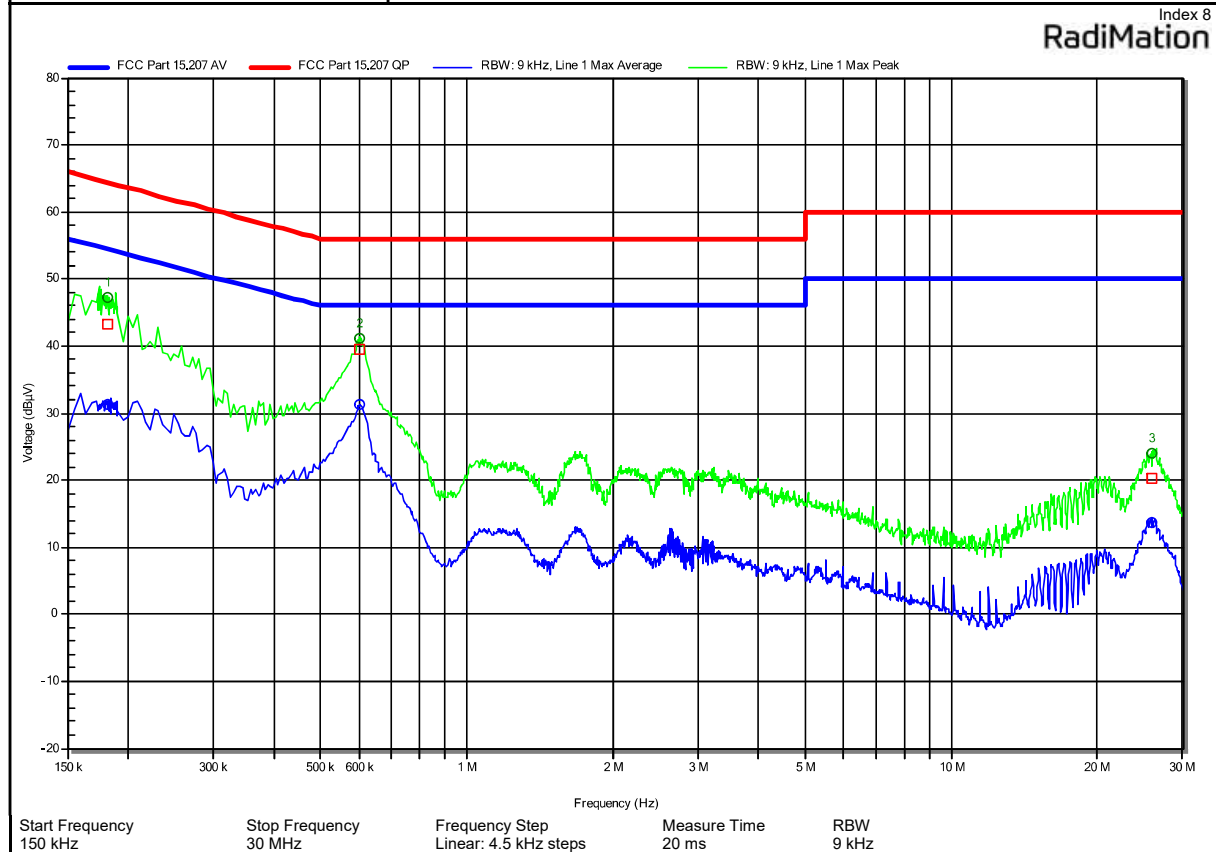
Conducted emissions at the mains power port according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-11-22
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	3993.6 MHz, BPSK, UWB1, DC power supply
Applied to Port:	Mains



Peak Number	Frequency (MHz)	Quasi-Peak (dBμV)	Quasi-Peak Limit (dBμV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	24.041	27.73	60	-32.27	Pass	Neutral
2	0.604	40.41	56	-15.59	Pass	Neutral
3	0.181	44.98	64.42	-19.44	Pass	Neutral

Peak Number	Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average Difference (dB)	Average Status	LISN
1	24.041	14.87	50	-35.13	Pass	Neutral
2	0.604	31.26	46	-14.74	Pass	Neutral
3	0.181	32.56	54.42	-21.86	Pass	Neutral

Conducted emissions at the mains power port according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-11-22
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	6489.6 MHz, BPSK, UWB1, DC power supply
Applied to Port:	Mains

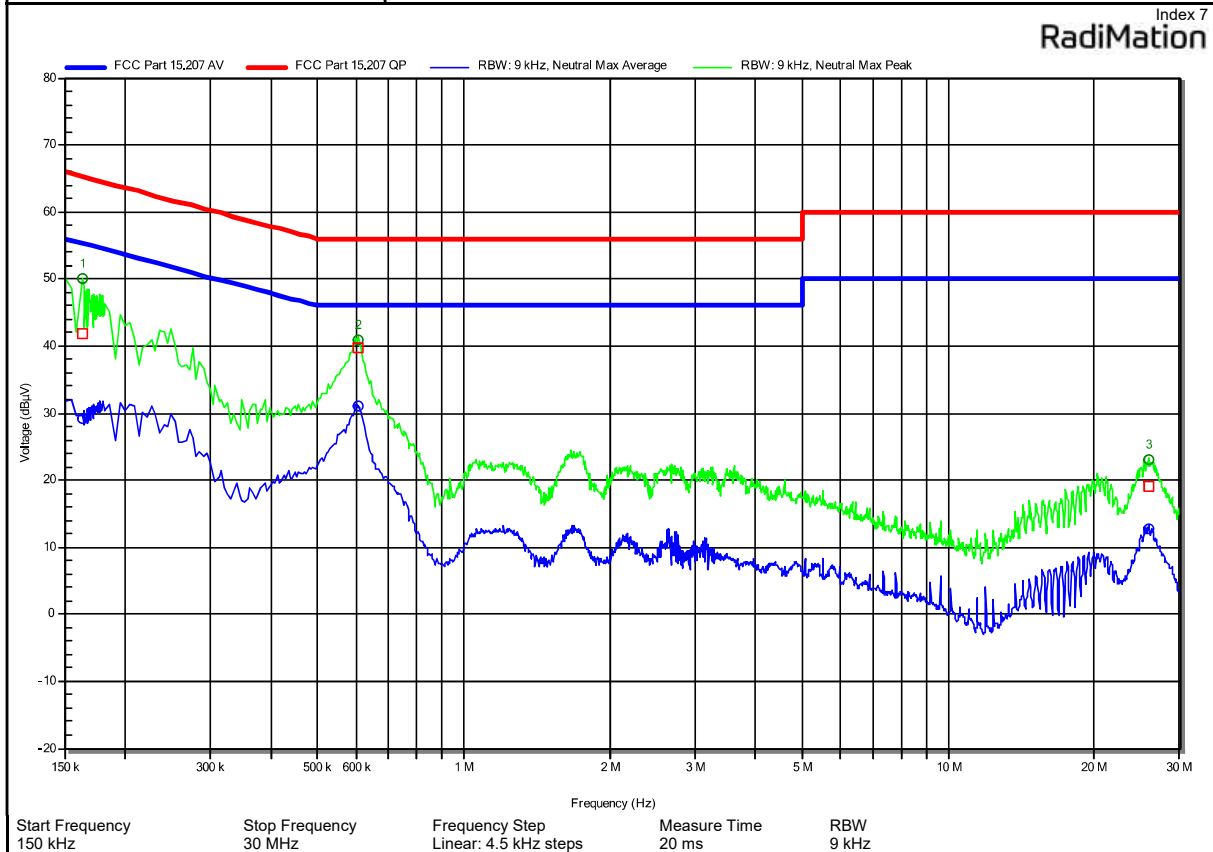


Peak Number	Frequency (MHz)	Quasi-Peak (dBμV)	Quasi-Peak Limit (dBμV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	0.181	43.28	64.42	-21.14	Pass	Line 1
2	0.6	39.54	56	-16.46	Pass	Line 1
3	25.899	20.22	60	-39.78	Pass	Line 1

Peak Number	Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average Difference (dB)	Average Status	LISN
1	0.181	31.26	54.42	-23.15	Pass	Line 1
2	0.6	31.23	46	-14.77	Pass	Line 1
3	25.899	13.78	50	-36.22	Pass	Line 1

Conducted emissions at the mains power port according to FCC 15.207

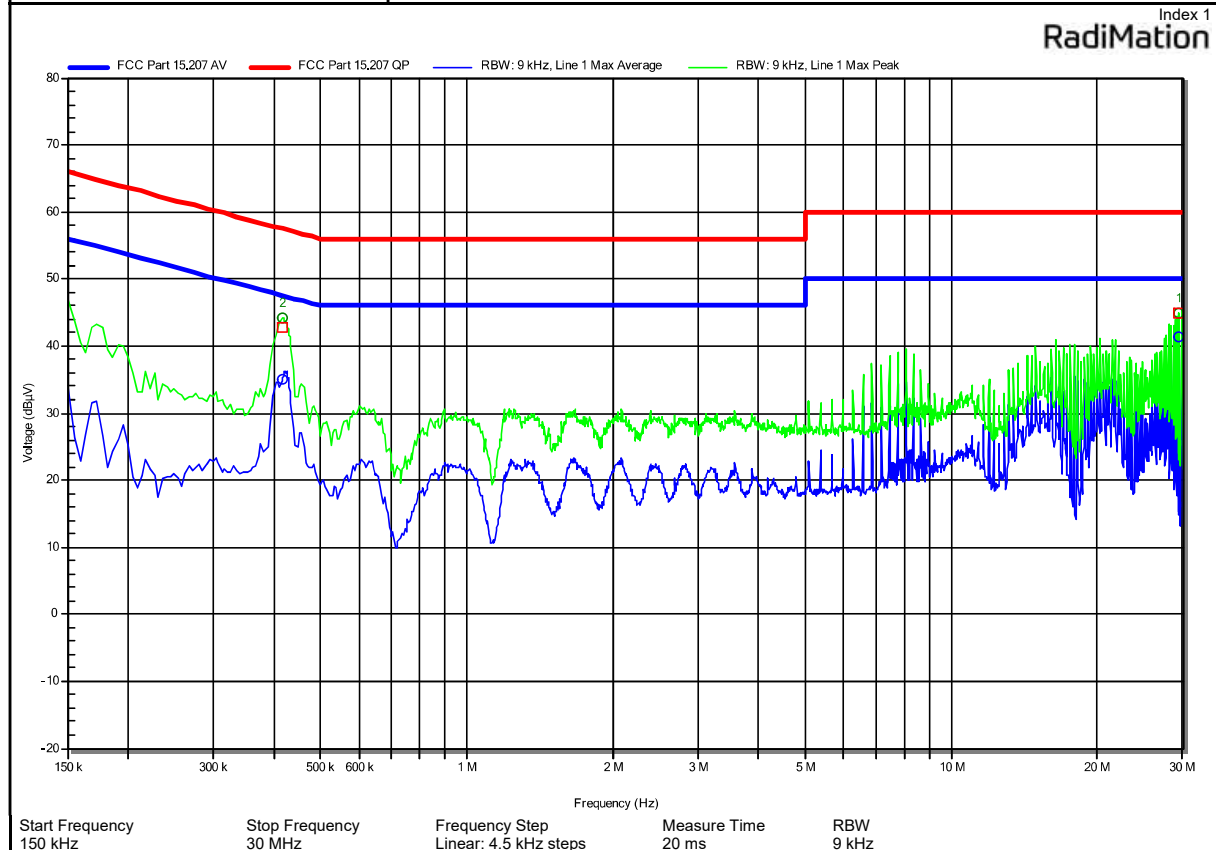
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-11-22
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	6489.6 MHz, BPSK, UWB1, DC power supply
Applied to Port:	Mains



Peak Number	Frequency (MHz)	Quasi-Peak (dBμV)	Quasi-Peak Limit (dBμV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	0.163	41.89	65.28	-23.39	Pass	Neutral
2	0.604	39.63	56	-16.37	Pass	Neutral
3	25.832	19.02	60	-40.98	Pass	Neutral

Peak Number	Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average Difference (dB)	Average Status	LISN
1	0.163	29.15	55.28	-26.13	Pass	Neutral
2	0.604	31.09	46	-14.91	Pass	Neutral
3	25.832	12.78	50	-37.22	Pass	Neutral

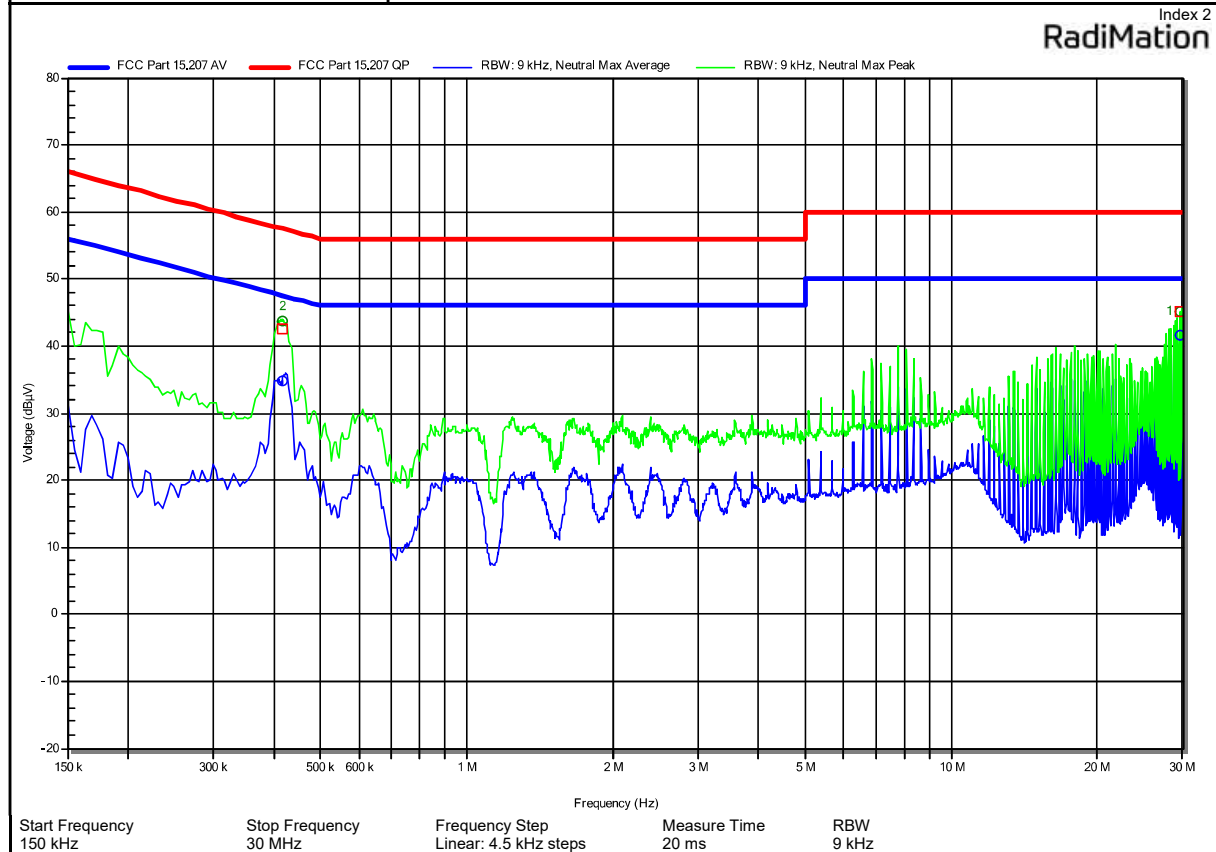
Conducted emissions at the mains power port according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-11-22
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	3993.6 MHz, BPSK, UWB2, PoE power supply
Applied to Port:	Mains



Peak Number	Frequency (MHz)	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	29.544	44.89	60	-15.11	Pass	Line 1
2	0.415	42.85	57.54	-14.68	Pass	Line 1

Peak Number	Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	LISN
1	29.544	41.46	50	-8.54	Pass	Line 1
2	0.415	35.07	47.54	-12.47	Pass	Line 1

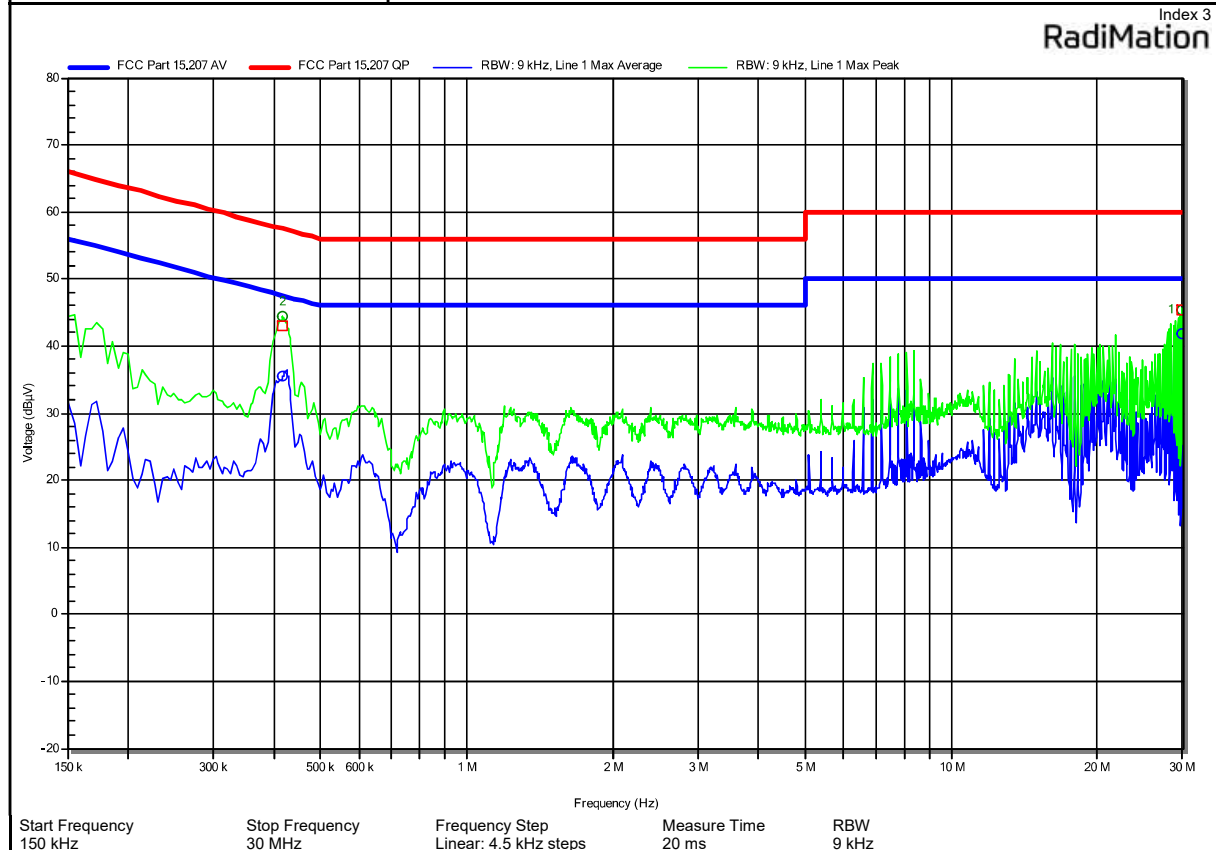
Conducted emissions at the mains power port according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-11-22
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	3993.6 MHz, BPSK, UWB2, PoE power supply
Applied to Port:	Mains



Peak Number	Frequency (MHz)	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	29.556	45.09	60	-14.91	Pass	Neutral
2	0.415	42.63	57.54	-14.91	Pass	Neutral

Peak Number	Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	LISN
1	29.556	41.6	50	-8.4	Pass	Neutral
2	0.415	34.77	47.54	-12.77	Pass	Neutral

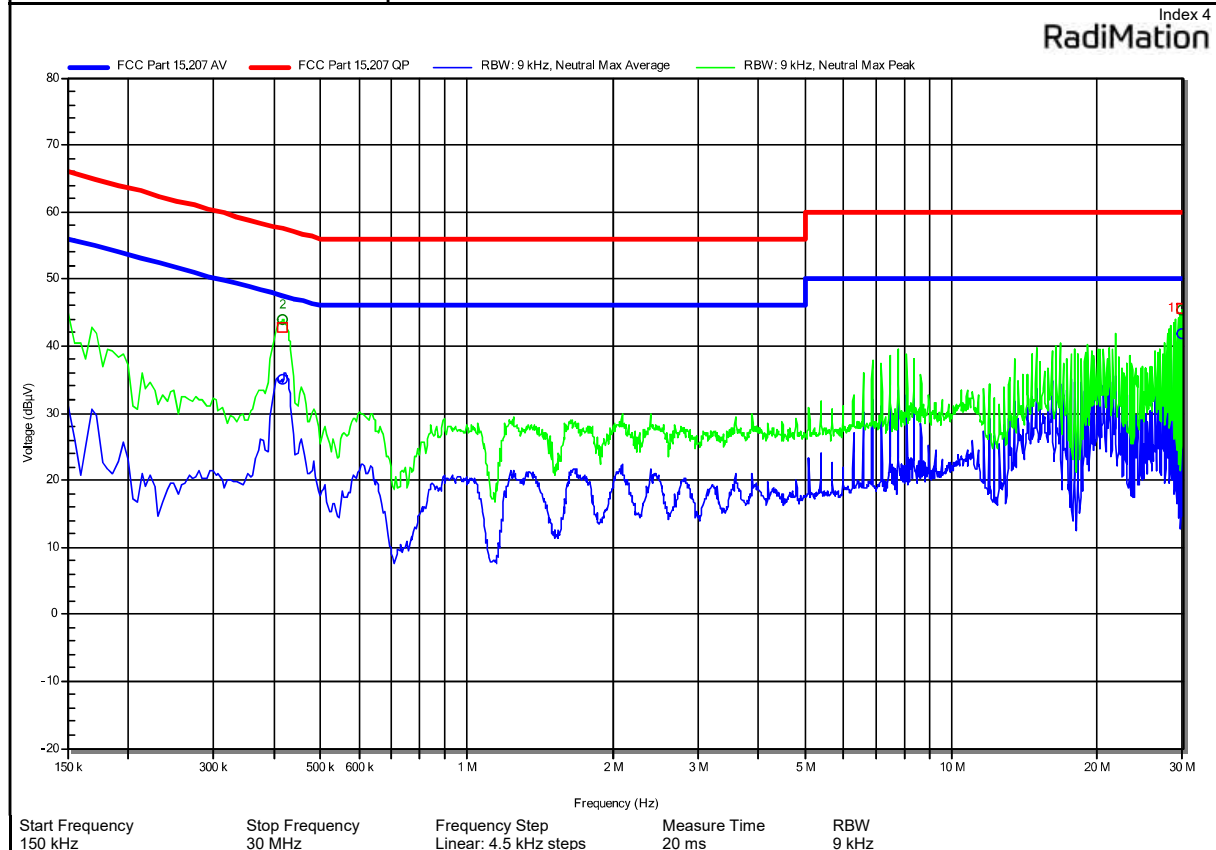
Conducted emissions at the mains power port according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-11-22
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	6489.6 MHz, BPSK, UWB2, PoE power supply
Applied to Port:	Mains



Peak Number	Frequency (MHz)	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	29.86	45.36	60	-14.64	Pass	Line 1
2	0.416	43.09	57.52	-14.43	Pass	Line 1

Peak Number	Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	LISN
1	29.86	41.86	50	-8.14	Pass	Line 1
2	0.416	35.45	47.52	-12.07	Pass	Line 1

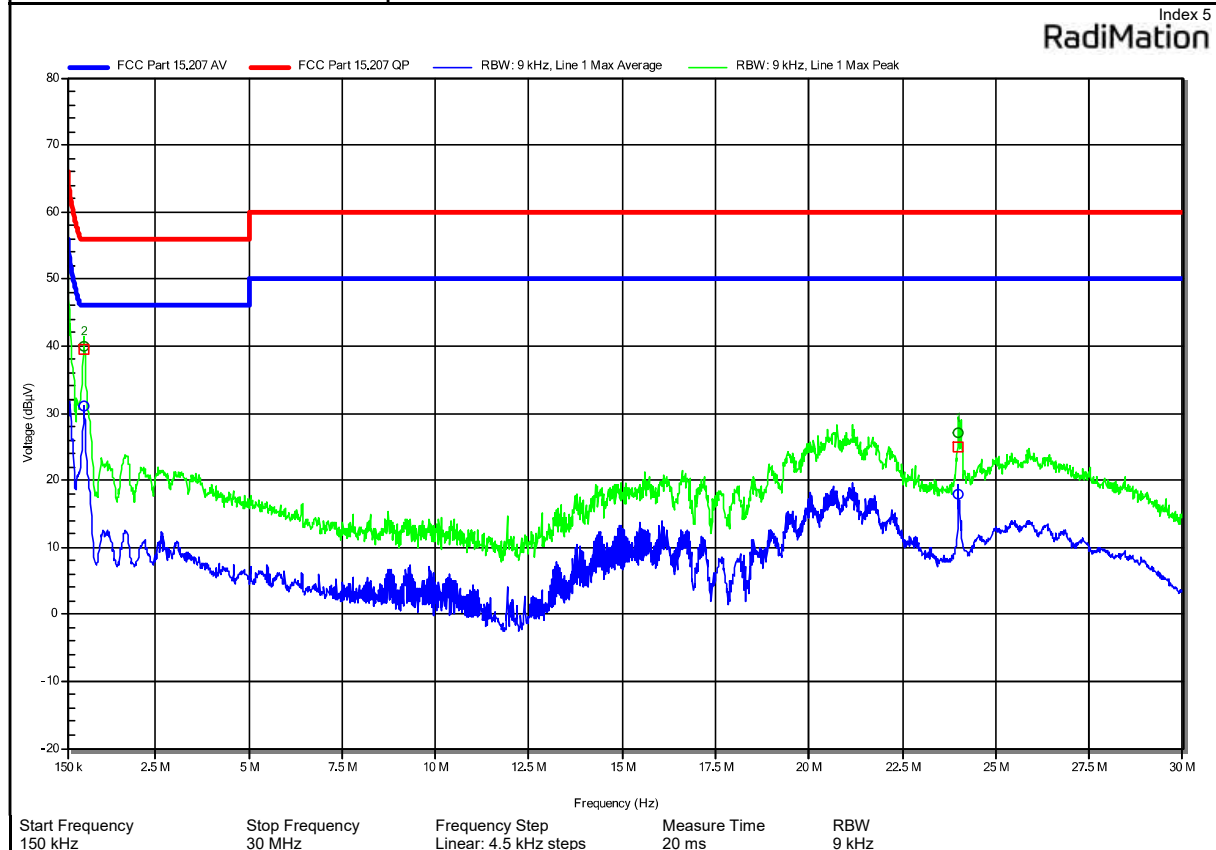
Conducted emissions at the mains power port according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-11-22
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	6489.6 MHz, BPSK, UWB2, PoE power supply
Applied to Port:	Mains



Peak Number	Frequency (MHz)	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	29.866	45.49	60	-14.51	Pass	Neutral
2	0.416	42.8	57.53	-14.73	Pass	Neutral

Peak Number	Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	LISN
1	29.866	41.93	50	-8.07	Pass	Neutral
2	0.416	34.97	47.53	-12.56	Pass	Neutral

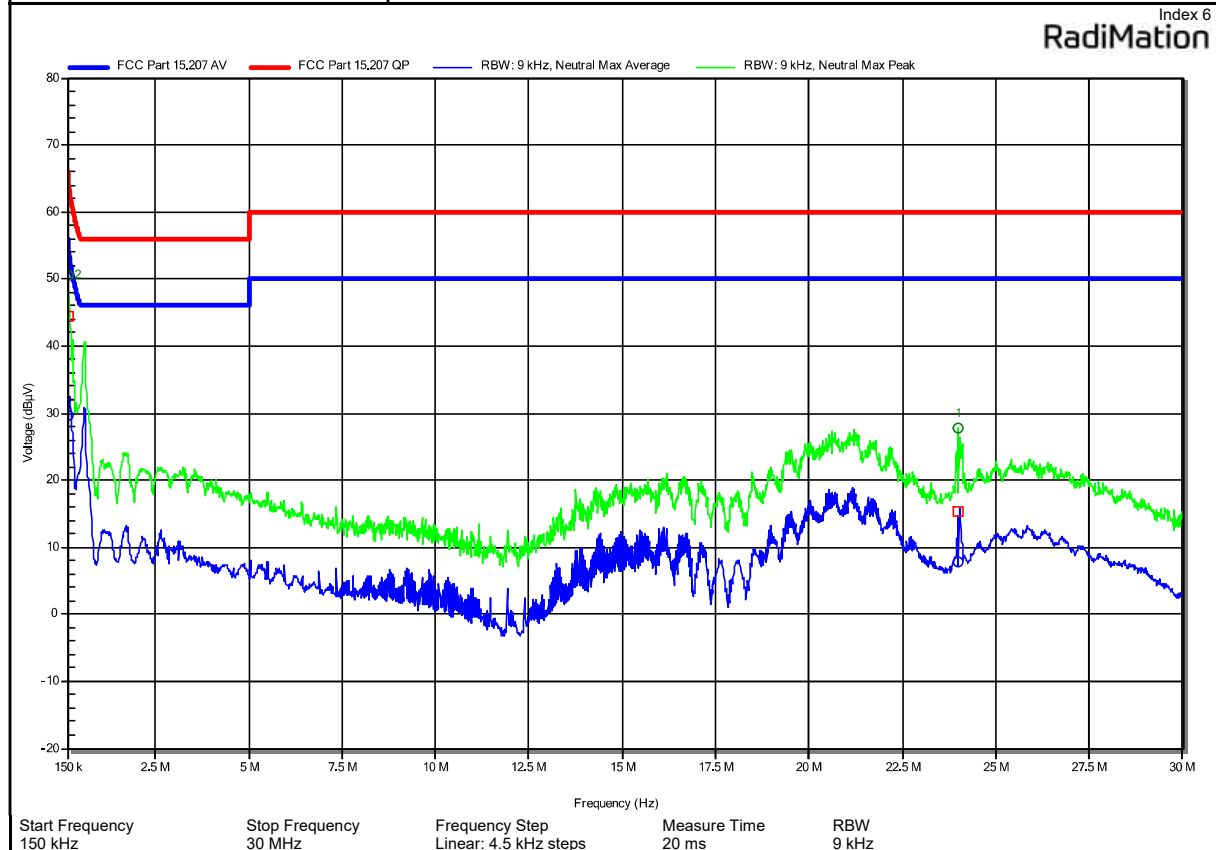
Conducted emissions at the mains power port according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-11-22
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	3993.6 MHz, BPSK, UWB2, DC power supply
Applied to Port:	Mains



Peak Number	Frequency (MHz)	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	24.009	24.97	60	-35.03	Pass	Line 1
2	0.6	39.48	56	-16.52	Pass	Line 1

Peak Number	Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	LISN
1	24.009	17.97	50	-32.03	Pass	Line 1
2	0.6	30.95	46	-15.05	Pass	Line 1

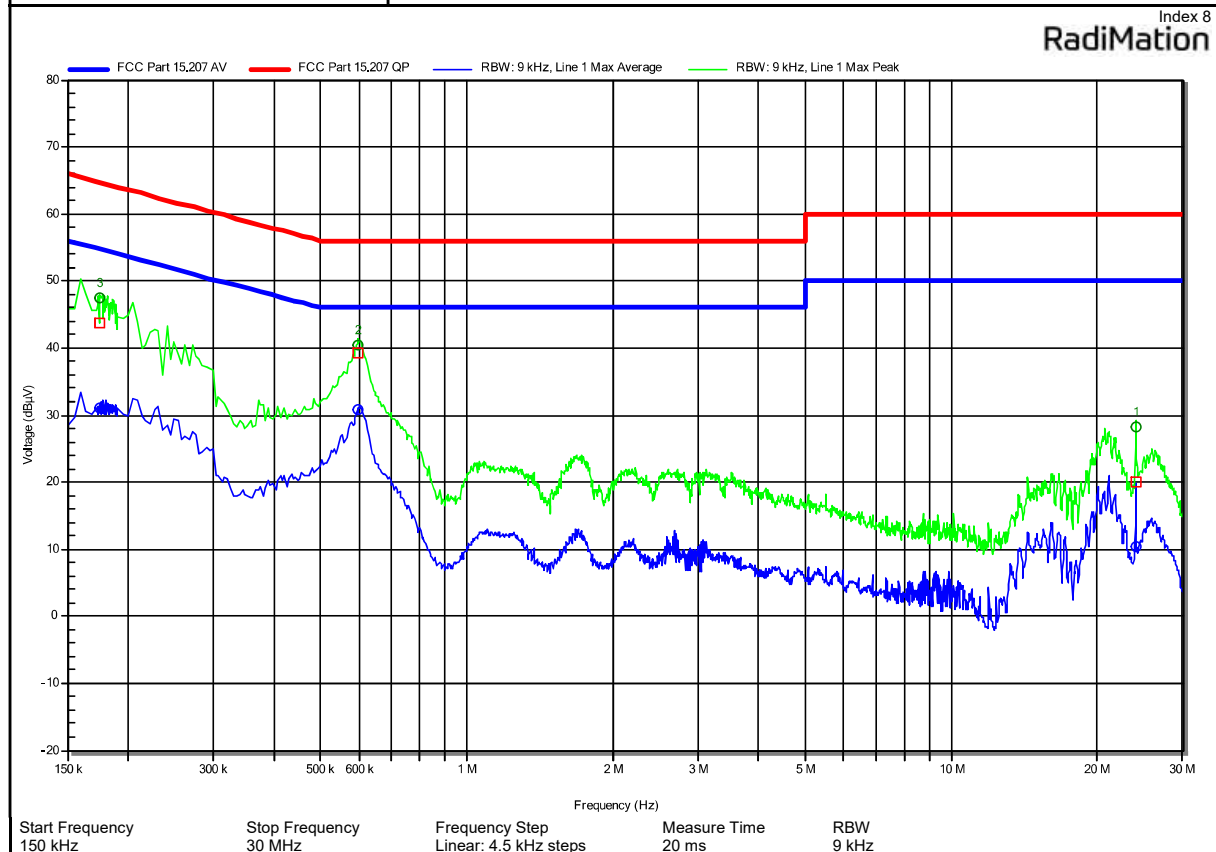
Conducted emissions at the mains power port according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-11-22
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	3993.6 MHz, BPSK, UWB2, DC power supply
Applied to Port:	Mains



Peak Number	Frequency (MHz)	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	24	15.28	60	-44.72	Pass	Neutral
2	0.15	44.33	66	-21.67	Pass	Neutral

Peak Number	Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	LISN
1	24	7.82	50	-42.18	Pass	Neutral
2	0.15	29.71	56	-26.29	Pass	Neutral

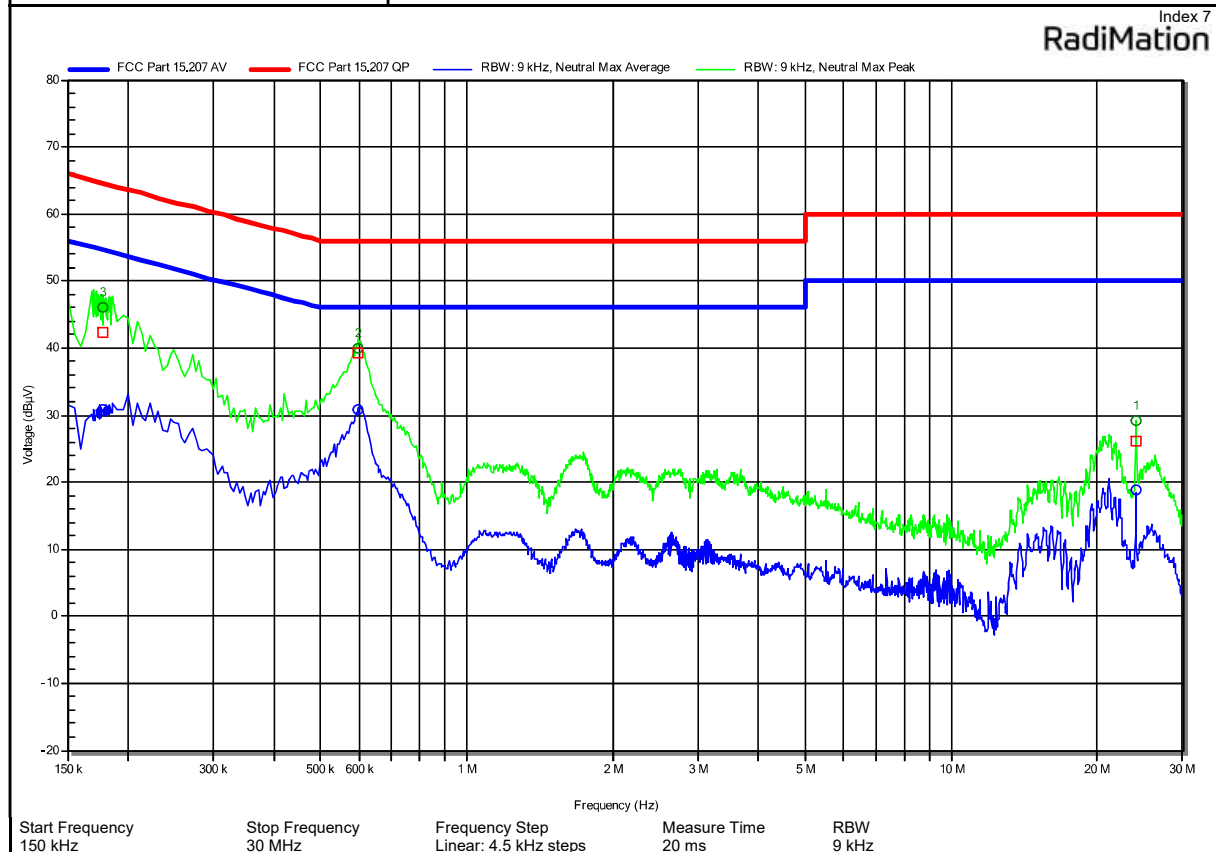
Conducted emissions at the mains power port according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-11-22
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	6489.6 MHz, BPSK, UWB2, DC power supply
Applied to Port:	Mains



Peak Number	Frequency (MHz)	Quasi-Peak (dBμV)	Quasi-Peak Limit (dBμV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	24.095	19.97	60	-40.03	Pass	Line 1
2	0.595	39.25	56	-16.75	Pass	Line 1
3	0.175	43.66	64.71	-21.05	Pass	Line 1

Peak Number	Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average Difference (dB)	Average Status	LISN
1	24.095	10.31	50	-39.69	Pass	Line 1
2	0.595	30.86	46	-15.14	Pass	Line 1
3	0.175	31.06	54.71	-23.65	Pass	Line 1

Conducted emissions at the mains power port according to FCC 15.207	
Project Number:	G0M-2403-2495
Applicant:	Jungheinrich AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48554
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Siddique
Test Date & Time:	2024-11-22
Operating Conditions:	ambient temperature: 26 °Celsius power input: 120 V AC
AMN:	Schwarzbeck NSLK 8127
Operational Mode: DUT Configuration:	6489.6 MHz, BPSK, UWB2, DC power supply
Applied to Port:	Mains



Peak Number	Frequency (MHz)	Quasi-Peak (dBμV)	Quasi-Peak Limit (dBμV)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	24.001	26.07	60	-33.93	Pass	Neutral
2	0.595	39.22	56	-16.78	Pass	Neutral
3	0.177	42.21	64.63	-22.41	Pass	Neutral

Peak Number	Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average Difference (dB)	Average Status	LISN
1	24.001	18.78	50	-31.22	Pass	Neutral
2	0.595	30.87	46	-15.13	Pass	Neutral
3	0.177	30.82	54.63	-23.81	Pass	Neutral

3.4.6 Setup photos

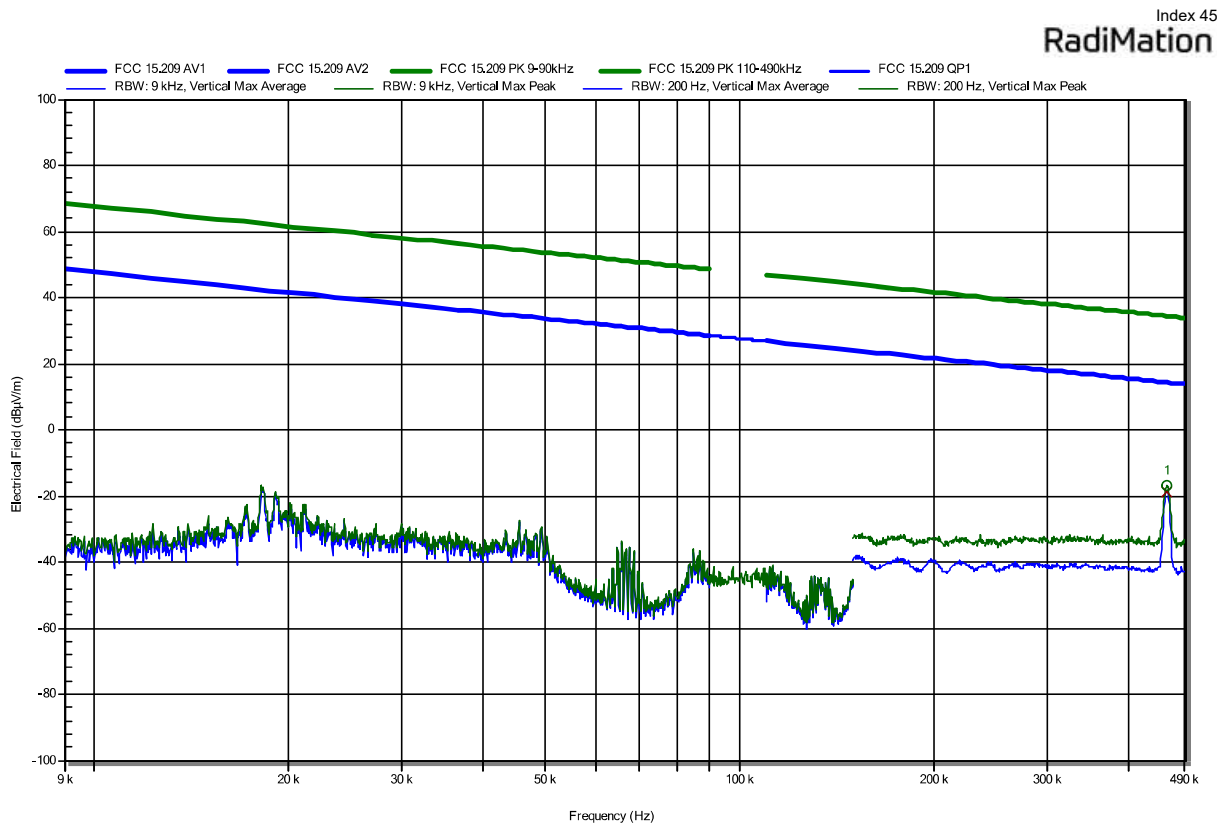
Test Report No.: G0M-2403-2495-TFC15FUW-V01

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

ANNEX A Transmitter radiated emissions (Antenna 1 - UWB1)

Radiated Spurious Emissions according to 47 CFR Part 15.517

Project Number: G0M-2403-2495
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System is able to measure distances between the UWB components
 Model: 52445054, Anchor
 Test Sample ID: 48554
 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: Rohde & Schwarz HFH 2-Z2, Vertical
 Measurement distance: 3 m, converted to 300 m
 Mode: Tx; 3993.6 MHz, BPSK, UWB1
 Test Date: 2024-06-26
 Note: Antenna parallel to EUT PCB



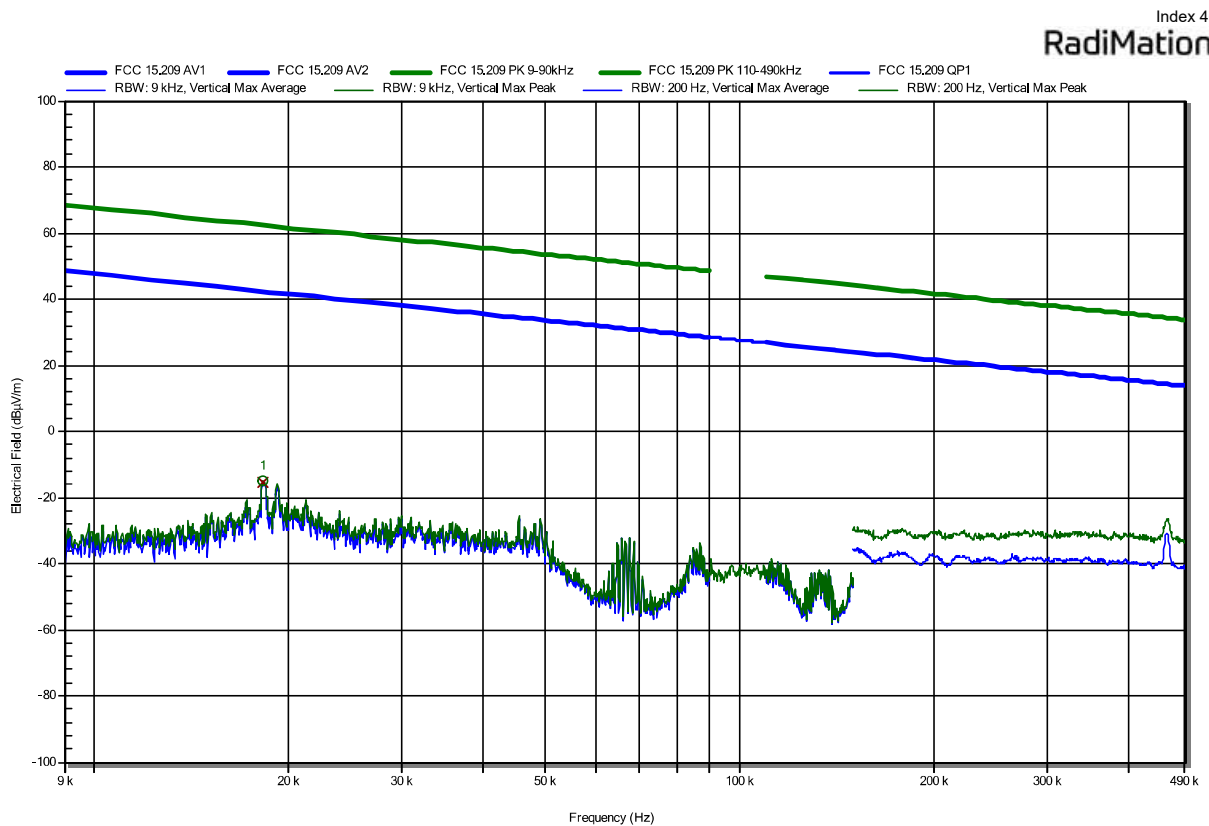
Peak Number	Frequency (MHz)	Peak (dBµV/m)	Peak (dBµV/m)	Limit (dB)	Difference	Peak Status
1	0.459	-17.1	34.4	-51.44		Pass
Peak Number	Frequency (MHz)	Average (dBµV/m)	Average (dBµV/m)	Limit (dB)	Difference	Average Status
1	0.459	-18.7	14.4	-33.07		Pass

Test Report No.: G0M-2403-2495-TFC15FUW-V01

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

Radiated Spurious Emissions according to 47 CFR Part 15.517

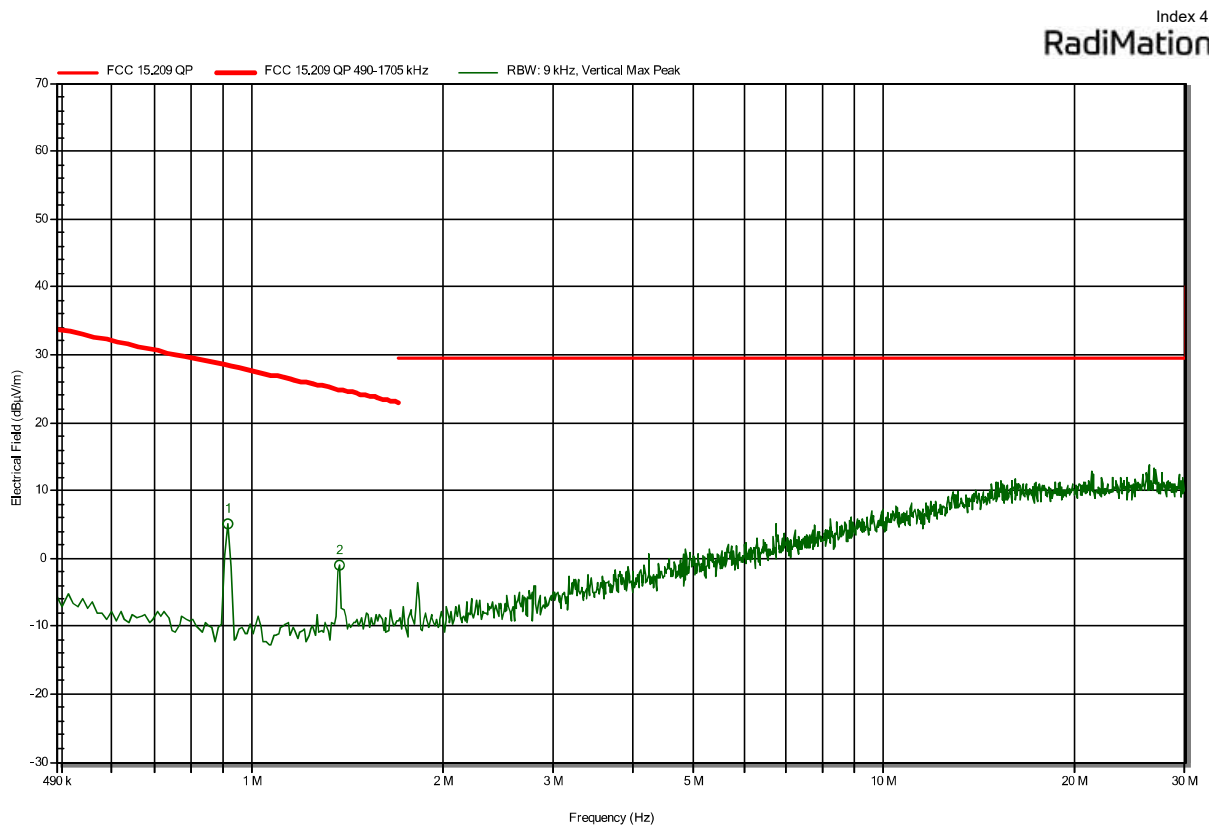
Project Number: G0M-2403-2495
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System is able to measure distances between the UWB components
 Model: 52445054, Anchor
 Test Sample ID: 48554
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Siddique
 Measurement software: RadiMation, version 2023.2.6
 Test Conditions: Tnom: 24 °Celsius, Vnom: 24 V DC
 Antenna: Rohde & Schwarz HFH 2-Z2, Vertical
 Measurement distance: 3 m, converted to 300 m
 Mode: Tx; 3993.6 MHz, BPSK, UWB1
 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	-77.31		Pass
Peak Number	Frequency (MHz)	Average (dBµV/m)	Average (dBµV/m)	Limit (dB)	Difference	Average Status
1	0.018	-15.4	42.4	-57.71		Pass

Radiated Spurious Emissions according to 47 CFR Part 15.517

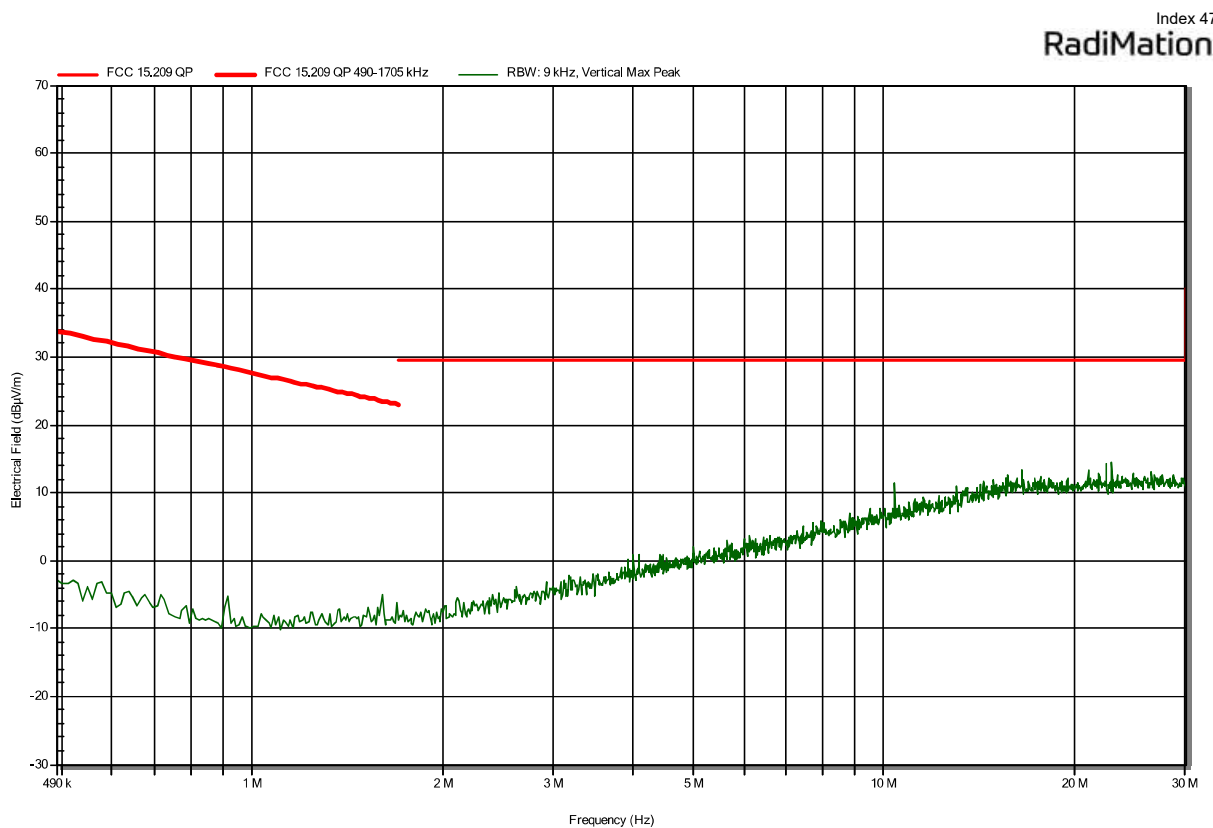
Project Number: G0M-2403-2495
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System is able to measure distances between the UWB components
 Model: 52445054, Anchor
 Test Sample ID: 48554
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Siddique
 Measurement software: RadiMation, version 2023.2.6
 Test Conditions: Tnom: 24 °Celsius, Vnom: 24 V DC
 Antenna: Rohde & Schwarz HFH 2-Z2
 Measurement distance: 3 m
 Mode: Tx; 3993.6 MHz, BPSK, UWB1
 Test Date: 2024-06-26
 Note: Antenna parallel to EUT PCB



Peak Number	Frequency (MHz)	Peak (dBµV/m)	Peak (dBµV/m)	Limit (dB)	Peak Difference	Peak Status	Polarization
1	0.913	5	28.4	-23.36		Pass	Vertical
2	1.375	-1.1	24.9	-25.92		Pass	Vertical

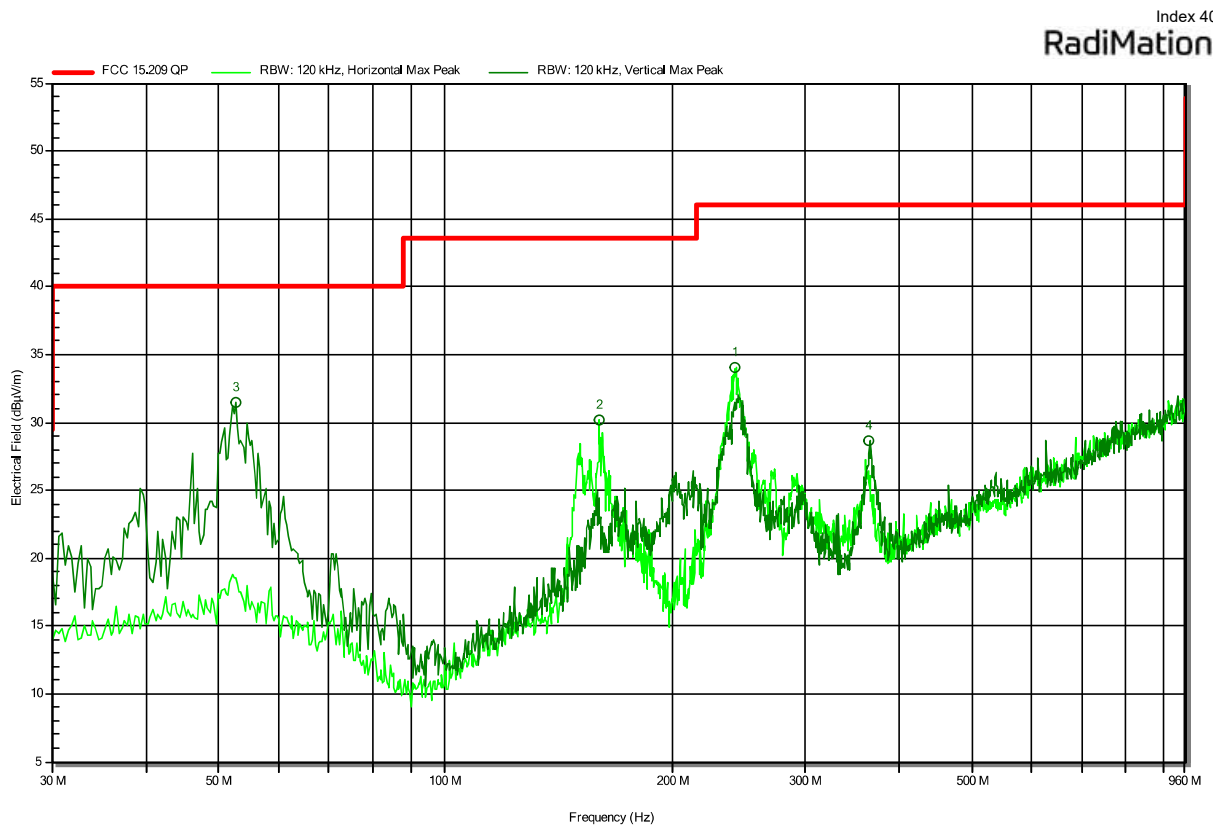
Radiated Spurious Emissions according to 47 CFR Part 15.517

Project Number: G0M-2403-2495
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System is able to measure distances between the UWB components
 Model: 52445054, Anchor
 Test Sample ID: 48554
 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: Rohde & Schwarz HFH 2-Z2
 Measurement distance: 3 m
 Mode: Tx; 3993.6 MHz, BPSK, UWB1
 Test Date: 2024-06-26
 Note: Antenna perpendicular to EUT PCB



Radiated Spurious Emissions according to 47 CFR Part 15.517

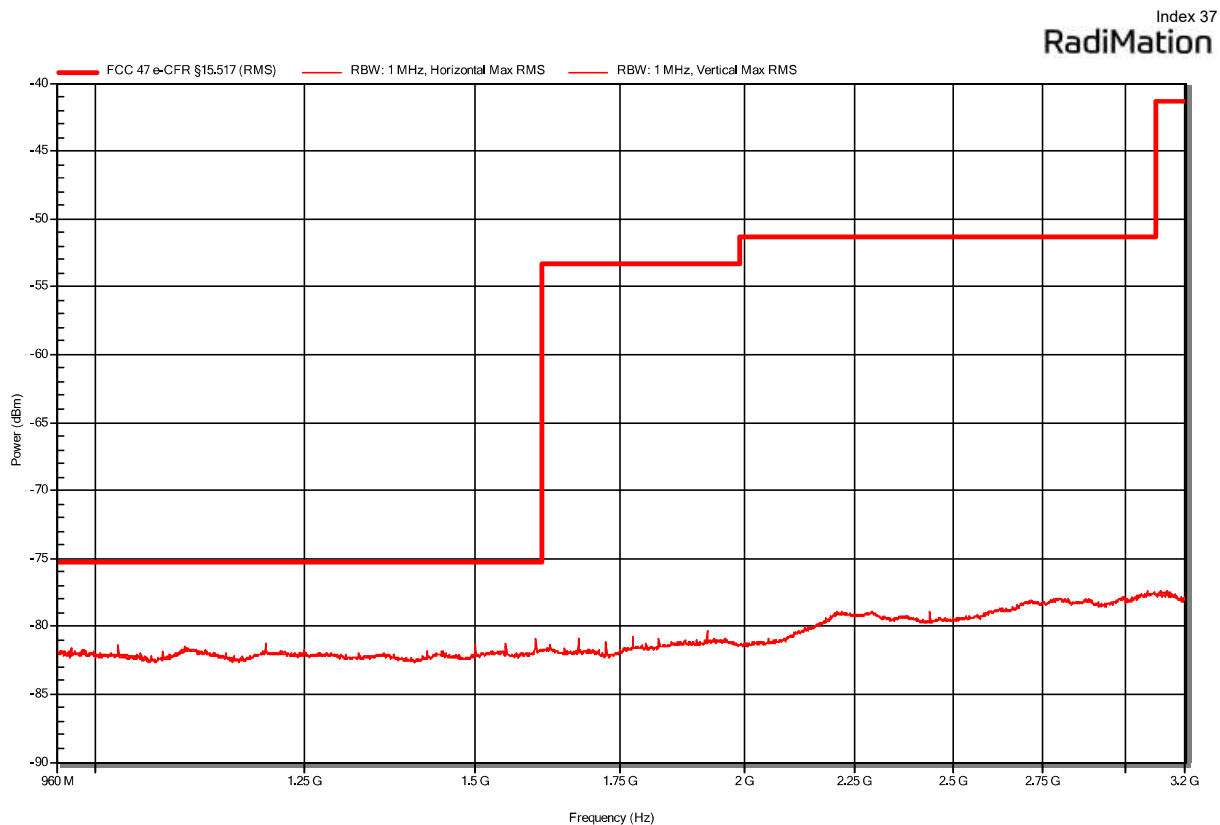
Project Number: G0M-2403-2495
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System is able to measure distances between the UWB components
 Model: 52445054, Anchor
 Test Sample ID: 48554
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Siddique
 Measurement software: RadiMation, version 2023.2.6
 Test Conditions: Tnom: 24 °Celsius, Vnom: 24 V DC
 Antenna: Schwarzbeck VULB 9168
 Measurement distance: 3 m
 Mode: Tx; 3993.6 MHz, BPSK, UWB1
 Test Date: 2024-06-25



Peak Number	Frequency (MHz)	Peak (dBμV/m)	Peak (dBμV/m)	Limit (dB)	Peak Difference	Peak Status	Polarization
1	242.66	34	46	-11.97		Pass	Horizontal
2	159.89	30.2	43.5	-13.29		Pass	Horizontal
3	52.63	31.5	40	-8.52		Pass	Vertical
4	365.42	28.7	46	-17.31		Pass	Vertical

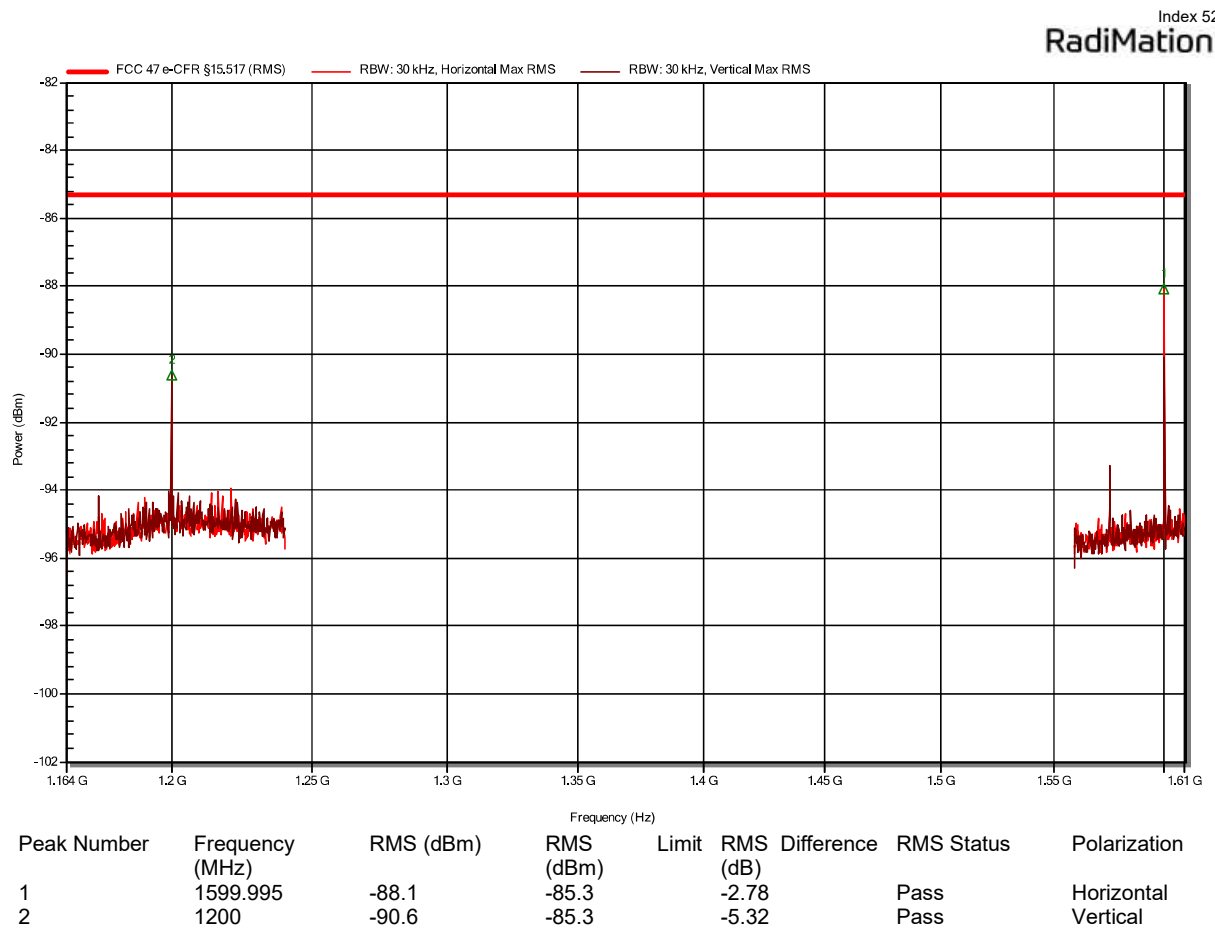
Radiated Spurious Emissions according to 47 CFR Part 15.517

Project Number: G0M-2403-2495
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System is able to measure distances between the UWB components
 Model: 52445054, Anchor
 Test Sample ID: 48554
 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, UWB1
 Test Date: 2024-06-25



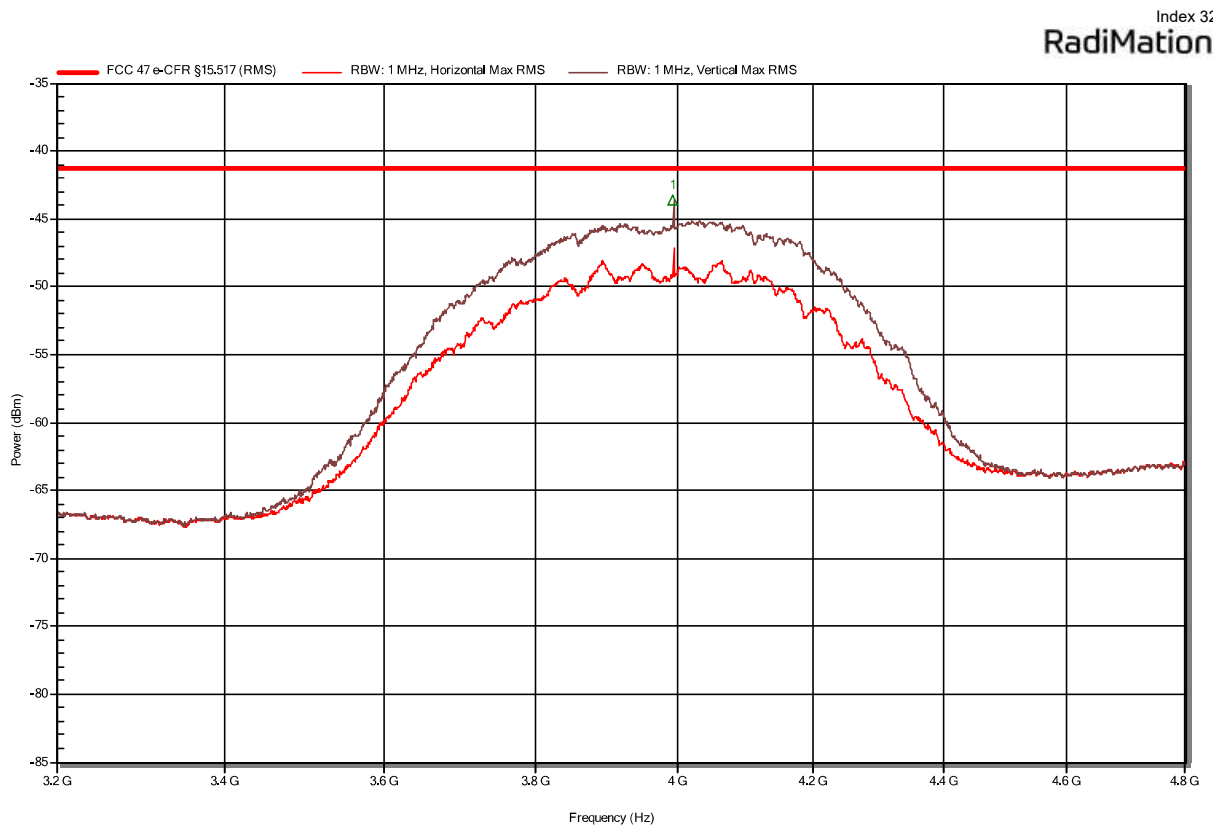
Radiated Spurious Emissions according to 47 CFR Part 15.517

Project Number: G0M-2403-2495
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System is able to measure distances between the UWB components
 Model: 52445054, Anchor
 Test Sample ID: 48554
 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, UWB1
 Test Date: 2024-06-29



Radiated Spurious Emissions according to 47 CFR Part 15.517

Project Number: G0M-2403-2495
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System is able to measure distances between the UWB components
 Model: 52445054, Anchor
 Test Sample ID: 48554
 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, UWB1
 Test Date: 2024-06-22



Peak Number	Frequency (MHz)	RMS (dBm)	RMS (dBm)	Limit	RMS Difference	RMS Status	Polarization
1	3993.6533	-43.6	-41.3	-2.31		Pass	Vertical