EMC TEST REPORT

FCC CFR Title 47 / Chapter I / Subchapter A / Part 15 / Subpart B

ISED ICES-003 Issue 7

Report Reference No	G0M-2403-2495-EF0115B-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	A2LA - Registration number: 1983.01 (ISED) ISED wireless device testing laboratory: CN 3470A 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 Standard(s)	FCC CFR Title 47 / Chapter I / Subchapter A / Part 15 / Subpart B ISED ICES-Gen Issue 1 ; Amendment 1 (February 2021) ISED ICES-003 Issue 7 ANSI C63.4:2014+A1:2017
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
IC	N/A
Test Result	**PASSED**

Possible test case verdicts:	
required by standard but not tested	N/T
not required by standard	N/R
required by standard but not appl. to test object	N/A
test object does meet the requirement	P(PASS)
test object does not meet the requirement	F(FAIL)
Testing:	
Date of receipt of test item	2024-05-14
Report:	

Compiled by	Mounir Marea	
Tested by (+ signature) (Responsible for Test)	Stephan Liebich	.....
Approved by (+ signature) (Senior EMC Test Technician)	Matthias Handrik	.....
Date of Issue	2024-11-08	
Total number of pages	52	

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.

Statement concerning the uncertainty of the measurement systems used for decisions on conformity (decision rule):
The Decision Rule is applied on the basis of CISPR 16-4-2 and/or IEC 61000-4-x (TR 61000-1-6) and their national publications. 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.
Compliance or non-compliance with a disturbance limit is determined in the following manner.

- If U_{lab} is less than or equal to U_{cispr}, then: compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit; non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
- If U_{lab} is greater than U_{cispr}, then: compliance is deemed to occur if no measured disturbance level, increased by (U_{lab} - U_{cispr}), exceeds the disturbance limit; non-compliance is deemed to occur if any measured disturbance level, increased by (U_{lab} - U_{cispr}), exceeds the disturbance limit.

Where appropriate for the test, for example for EMC pulsed immunity tests, the laboratory has demonstrated, by calibrating its equipment and facilities, that it complies with the above requirements and therefore no allowance of uncertainties has been given to the tolerances.

Additional Comments:

-

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
T_{NOM}	Nominal operating temperature
V_{NOM}	Nominal supply voltage

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2024-11-08	Initial Release	-

REPORT INDEX

1 Equipment (Test Item) Under Test

Description	zoneControl UWB-Location-System is able to measure distances between the UWB components		
Intended Use	The Jungheinrich assistance system assists the operator to mark different types of potential danger points in the warehouse as zones, to detect possible collisions with equipped persons and industrial trucks via cyclic radio distance measurements and to reduce the probability of a collision.		
Model	52445054, Anchor		
Additional Model(s)	None		
Brand Name(s)	zoneCONTROL		
Hardware Version(s)	10629		
Software Version(s)	0.0.34		
Number of tested samples	1		
Sample Identification	EUT #	Sample-ID	Serial Number
	EUT 1	48555	ID:17:B4:10:03:43:BC
EUT Dimensions [cm]	18 x 18 x 4.8 cm		
FCC-ID	2AK6M-52445054		
IC	N/A		
Class	Class A		
Equipment type	Table top		
Highest internal frequency [MHz]	6739.2 MHz		
Protective Earth	No		
Radio Module 1	Type	ZigBee Transceiver IEEE 802.15.4	
	Model	AT86RF215	
	Manufacturer	Atmel	
	FCC-ID	None	
	IC	None	
Radio Module 2	Type	ZigBee Transceiver IEEE 802.15.4	
	Model	ATmega256RFR2	
	Manufacturer	Atmel	
	FCC-ID	None	
	IC	None	
Radio Module 3 (x2)	Type	UWB Transceiver Decawave	
	Model	DW1000	
	Manufacturer	Qorvo	
	FCC-ID	None	
	IC	None	
Supply Voltage	V_{NOM}	24 V DC 48 V DC via PoE	
AC/DC-Adaptor	None		
Manufacturer	Siemens Aktiengesellschaft R&D House CHE DI PA DCP R&D 5 Rochlitzer Str. 19 09111 Chemnitz Germany		

1.1 Equipment Ports

Name	Type	Attributes		Comment
Power	DC	Count: Cable length [m]: Direction: Service only: Shielded:	1 > 30 In No No	-
PoE	DC	Count: Cable length [m]: Direction: Service only: Shielded:	1 > 30 In No Yes	-

Description:	
AC	AC mains power input/output port
DC	DC power input/output port
BAT	DC power input port connected to external battery
IO	Input/Output port
TP	Telecommunication port
NE	Non-electrical port

1.4 Support Equipment

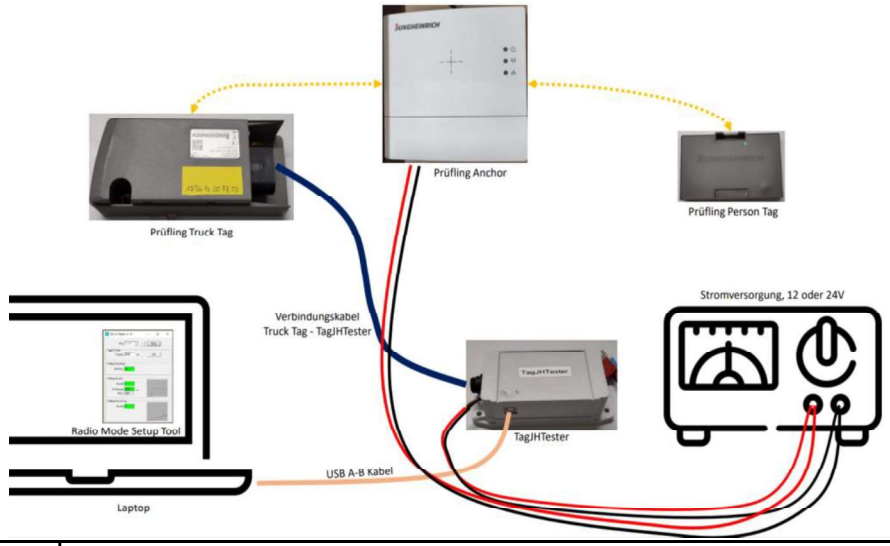
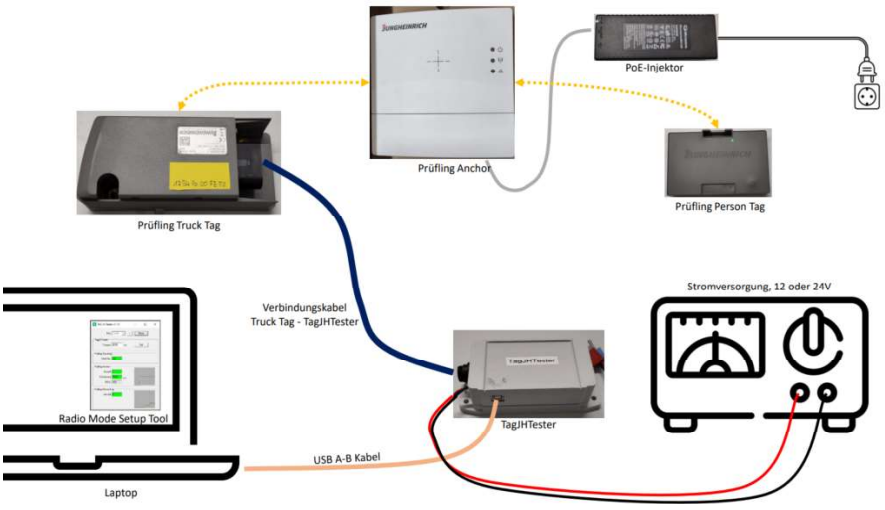
Product Type	Device	Manufacturer	Model	Comment
AE/MON	Laptop	HP	ProBook 6570b Intel CORE i5 v pro	Customer support equipment
AE	PoE Adapter	Microsemi	9001GR	Customer support equipment
AE	TagJHTester	Siemens AG	-	Customer support equipment
AE	Personal Tag	Siemens AG	51853935	Customer support equipment
AE	Truck Tag	Siemens AG	51685242	Customer support equipment
AE	Personal Tag Changing Station	Siemens AG	6GT2790-0DD20	Customer support equipment
AE	Personal Tag AC/DC adapter	MeanWell	GST60A05	Customer support equipment
CBL	LAN	unknown	CAT 6- shielded	Customer support Cable
CBL	USB -2.0	Amazon Basics	Type A to B	Customer support Cable
CBL	Connection Cord	Siemens AG		Customer support Cable
SW	Software	Siemens AG	TAG JH Tester v1.1.0	Customer support Software

Description:	
AE	Auxiliary Equipment
SIM	Simulator
MON	Monitoring Equipment
CBL	Connecting Cable
Comment:	

1.5 Operational Modes

Mode #	Description
1	EUT communicates information about distances of the Truck and a personal Tag at maximum every 4 seconds using two different wireless technologies with Radio Module 1 (0n) and one of the Radio Module 3 (on): Zigbee at 2.4 GHz Ultra-Wideband (UWB) channel 2 at 3.9 GHz
Comment: EUT can operate on UWB channel 2 at 3.9 GHz and channel 5 at 6.48 GHz, for the worst-case scenario, UWB channel 2 has been chosen.	

1.6 EUT Configuration

Configuration #	Description
1	EUT powered via 24 V DC through Power supply, TagJHTester connected to laptop via USB-2.0, sending information about the status of the communication range on the TAG JH Tester v1.1.0 software.
	
2	EUT powered via 48 V DC through PoE adapter, the adapter is powered with 120 V AC / 60 Hz, TagJHTester connected to laptop via USB-2.0, sending information about the status of the communication range on the TAG JH Tester v1.1.0 software.
Comment: 	

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 analyser in dBµV. Any external preamplifiers used are taken into account through internal analyser 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 analyser. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

Reading on Analyser (dBµV) + A.F. (dB/m) = Net field strength (dBµV/m)

Net:

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

Limit:

This is the FCC Class B radiated emission limit (in units of dBµV/m). The FCC limits are given in units of µV/m. The following formula is used to convert the units of µV/m to dBµV/m:

Limit (dBµV/m) = 20*log (µV/m)

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

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

2 Result Summary

Title 47 CFR Part 15B, ISED ICES-003 Issue 7				
Reference	**Requirement**	**Reference Method**	**Result**	**Remarks**
Emission				
FCC 15.109 ICES-003, 3.2.2	Radiated emissions	ANSI C63.4:2014 +A1:2017	PASS	-
FCC 15.107 ICES-003, 3.2.1	AC power line conducted emissions	ANSI C63.4:2014 +A1:2017	PASS	-
Comment:				

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

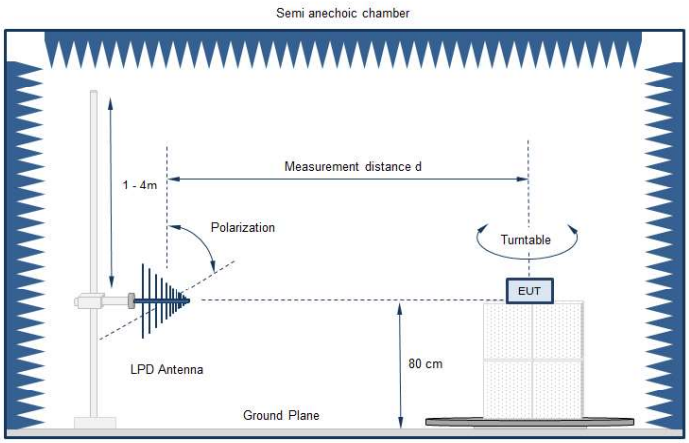
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

2.1.1 Information

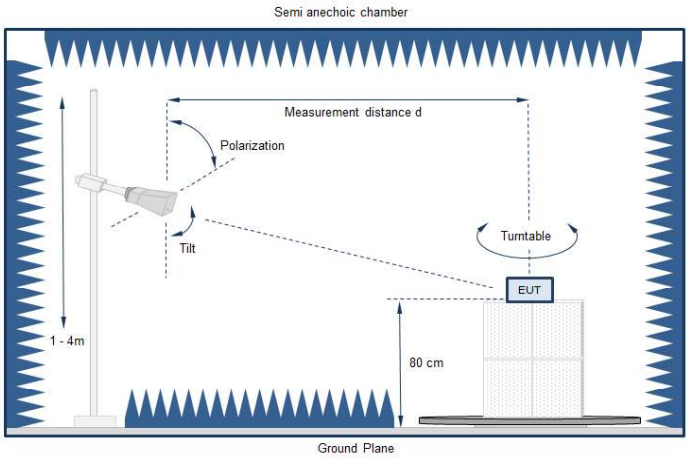
Test Information	
Reference	FCC 15.109, ICES-003, 3.2.2
Reference method	ANSI C63.4:2014+A1:2017 Section 8
Equipment class	Class A
Equipment type	Table top
Highest internal frequency [MHz]	6739.2
Measurement range	30 MHz to 40000 MHz
Temperature [°C]	24 - 27
Humidity [%]	34 – 37
Operator	Mounir Marea
Date	2024-06-12

2.1.2 Setup *Table top:*

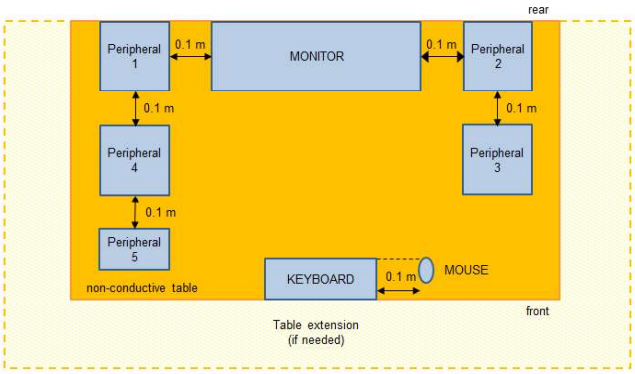
Measurement up to 1 GHz



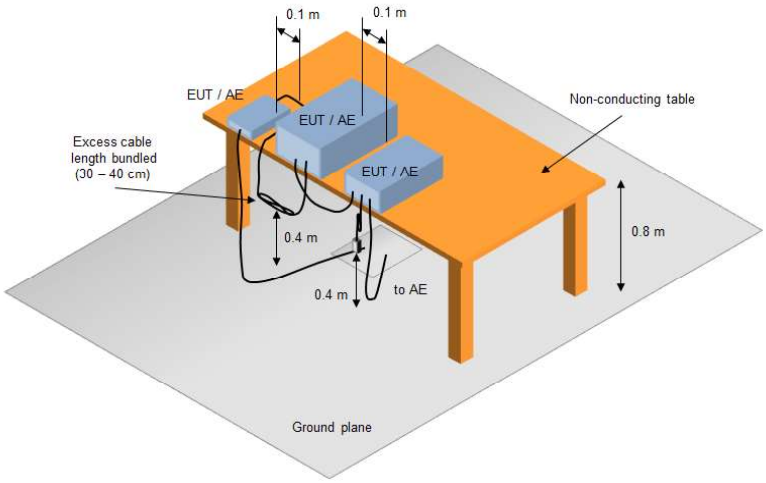
Measurement above 1 GHz



Equipment placement - Table top



Test Setup



2.1.3 Equipment

Test Software AC1			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2023.2.6

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber (NSA)	Frankonia	AC1	EF00062	2022-11	2025-11
Anechoic chamber (SVSWR)	Frankonia	AC 1	EF01011	2022-11	2024-11
Programmable AC Source	Chroma ATE Inc.	61604	EF01068	2023-08	2025-08
Test Receiver	R&S	ESW44	EF01856	2024-04	2025-04
Horn Antenna	Schwarzbeck	BBHA9120D	EF00018	2022-12	2025-12
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2023-07	2024-07

Test Software AC6			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2020.1.8

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber (NSA)	Frankonia	AC6	EF00910	2021-07	2024-07
Anechoic chamber (SVSWR)	Frankonia	AC6	EF00899	2022-10	2025-10
EMI Test Receiver	R&S	ESU26	EF00887	2024-01	2025-01
TRILOG Broadband Antenna	Schwarzbeck	VULB 9162	EF00978	2022-11	2025-11
40GHz High Gain Antenna	Amplifier Research	AT4560	EF00302	2023-09	2025-09
40GHz Standard Standard Gain Horn Antenna with Amplifier	Flann Microwave Ltd	22240-25 Amp. CBL26402075	EF00301	2023-01	2026-01
Climatic Sensor	Embedded Data Systems, LLC.	0200100000253 77E	EF01336	2024-05	2025-05

2.1.4 Procedure

Exploratory measurement Table top
1. The EUT was placed on a non-conductive table at a height of 0.8m. 2. The EUT and support equipment, if needed, were set up to simulate typical usage. 3. Cables, of type and length specified by the manufacturer, were connected to at least one port of each type and were terminated by a device or simulating load of actual usage. 4. The antenna was placed at a distance of 3 or 10 m. 5. The received signal was monitored at the measurement receiver. 6. This procedure has to be performed in both antenna polarizations, horizontal and vertical. 7. The arrangement of the equipment with the maximum emission level is shown on the setup picture at item 2.1.2

Final measurement 3m/10 Table top
1. The EUT was placed on a 0.8 m non-conductive table at a 3 or 10 m distance from the receive antenna. The antenna output was connected to the measurement receiver. 2. A broadband hybrid antenna was used for the frequency range 30 – 1000 MHz. Above one 1 GHz a Double Ridged Broadband Horn antenna was used. The antenna was placed on an adjustable height antenna mast. If required, in the range 1- 18 GHz a Double Ridged Broadband Horn antenna, in the range 18 – 40 GHz a High Gain / Standard Gain Horn was used. The antenna was placed on an adjustable height antenna mast. 3. The EUT and cable arrangement were based on the exploratory measurement results. 4. Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded. 5. The test data of the worst-case conditions were recorded and shown on the next pages.

2.1.5 Limits

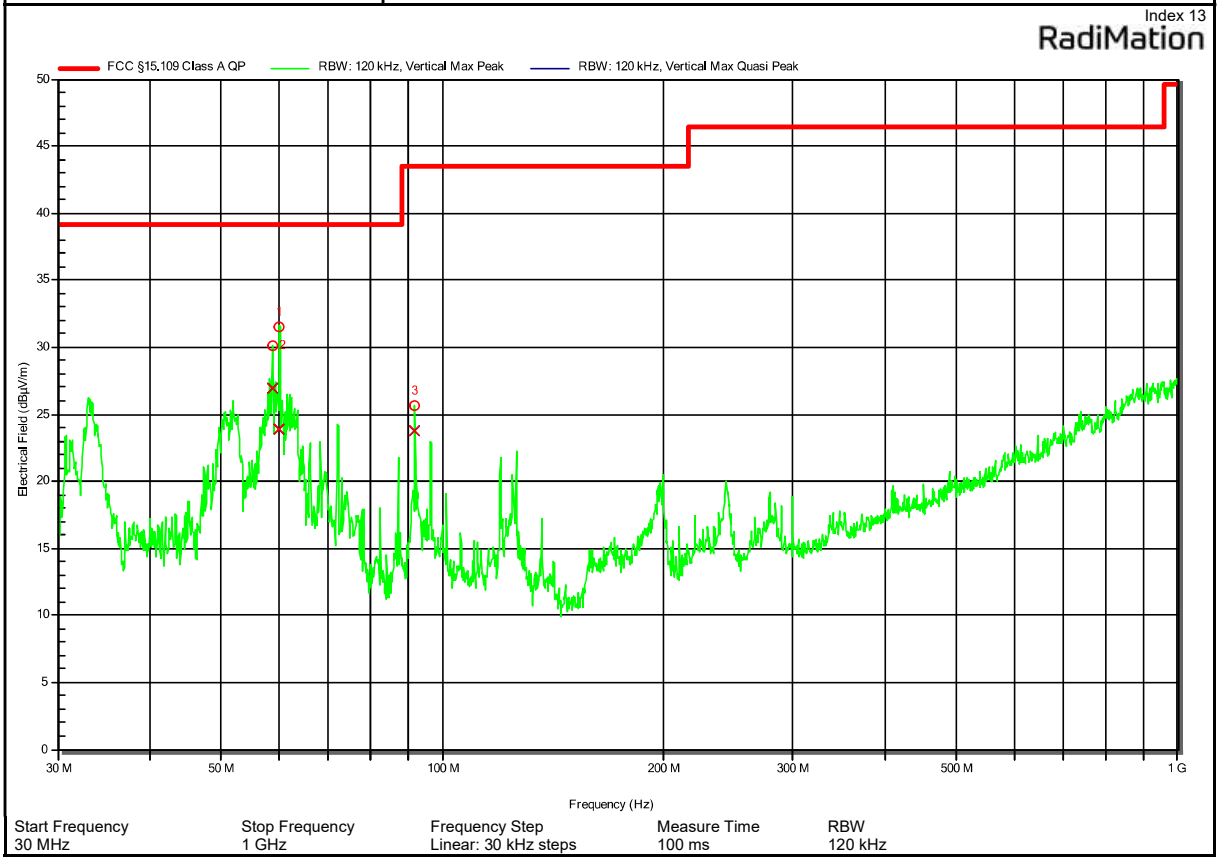
Class A @ 10 m		
Frequency [MHz]	Detector	Limit [dBµV/m]
30 - 88	Quasi-peak	39
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46.5
960 - 1000	Quasi-peak	49.5
> 1000	Peak Average	69.5 49.5

2.1.6 Results

Test Results			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	-
1	2	PASS	-

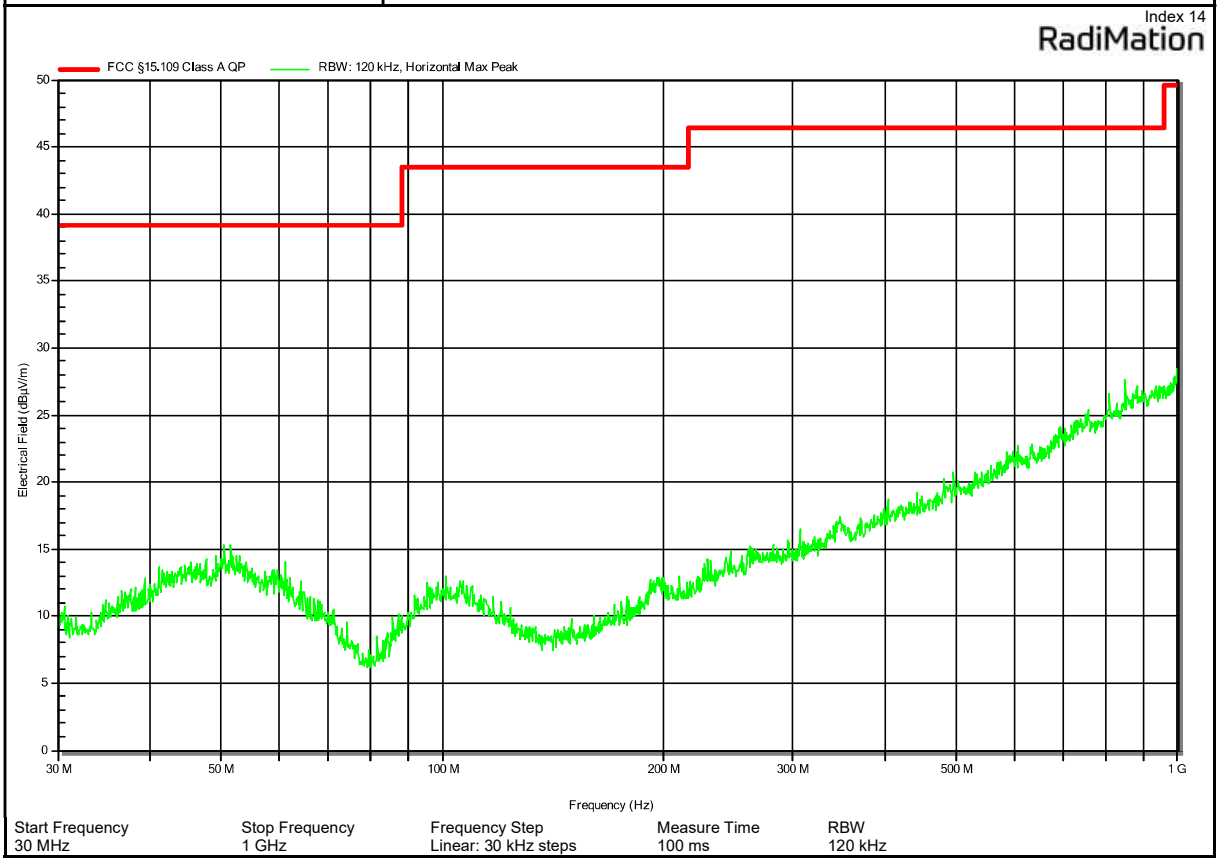
2.1.8 Records

Radiated emissions according to FCC 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System can measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marea
Test Date & Time:	2024-06-05
Operating Conditions:	ambient temperature: 23 °Celsius power input: 24 V DC
Antenna:	Schwarzbeck VULB 9162, Vertical
Measurement Distance:	10 m
Operational Mode: DUT Configuration:	1 1
Applied to Port:	Power
Note 1:	-

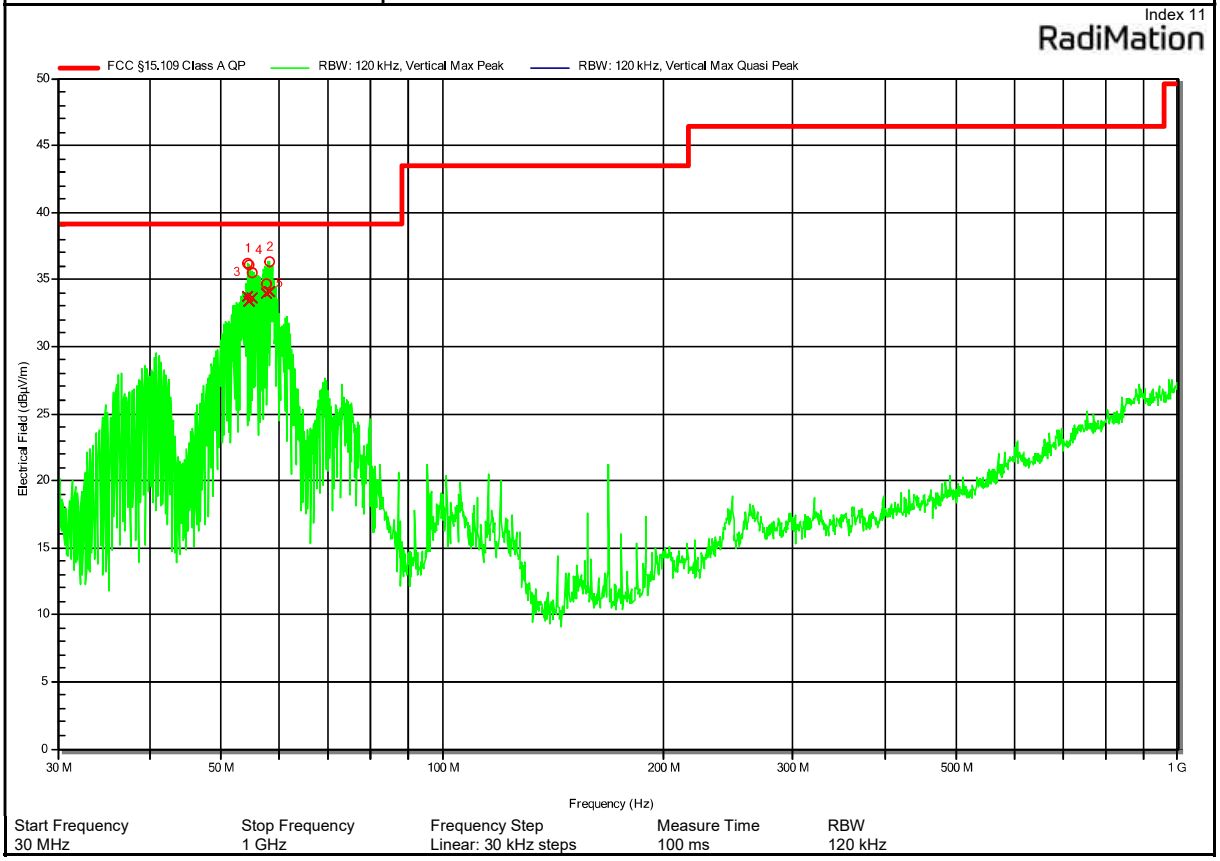


Peak Number	Frequency (MHz)	Quasi-Peak (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Quasi-Peak Difference (dB)	Quasi-Peak Status	Angle (degrees)	Height (m)
1	60.03	23.8	39.1	-15.2	Pass	-150	1
2	58.8	26.9	39.1	-12.2	Pass	-150	1
3	91.74	23.8	43.5	-19.7	Pass	-150	1

Radiated emissions according to FCC 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System can measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marea
Test Date & Time:	2024-06-05
Operating Conditions:	ambient temperature: 23 °Celsius power input: 24 V DC
Antenna:	Schwarzbeck VULB 9162, Horizontal
Measurement Distance:	10 m
Operational Mode: DUT Configuration:	1 1
Applied to Port:	Power
Note 1:	-



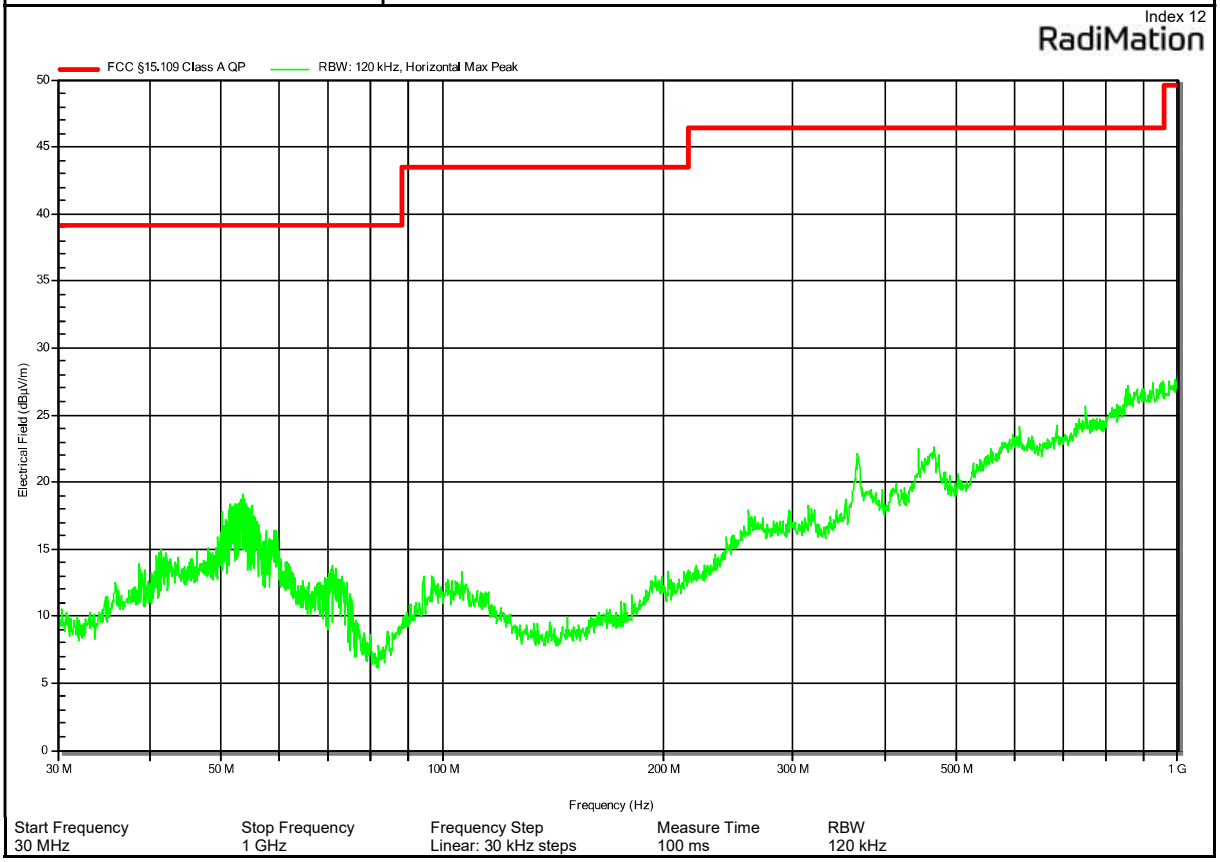
Radiated emissions according to FCC 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System can measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marea
Test Date & Time:	2024-06-05
Operating Conditions:	ambient temperature: 23 °Celsius power input: 48 V DC
Antenna:	Schwarzbeck VULB 9162, Vertical
Measurement Distance:	10 m
Operational Mode: DUT Configuration:	1 2
Applied to Port:	PoE
Note 1:	-



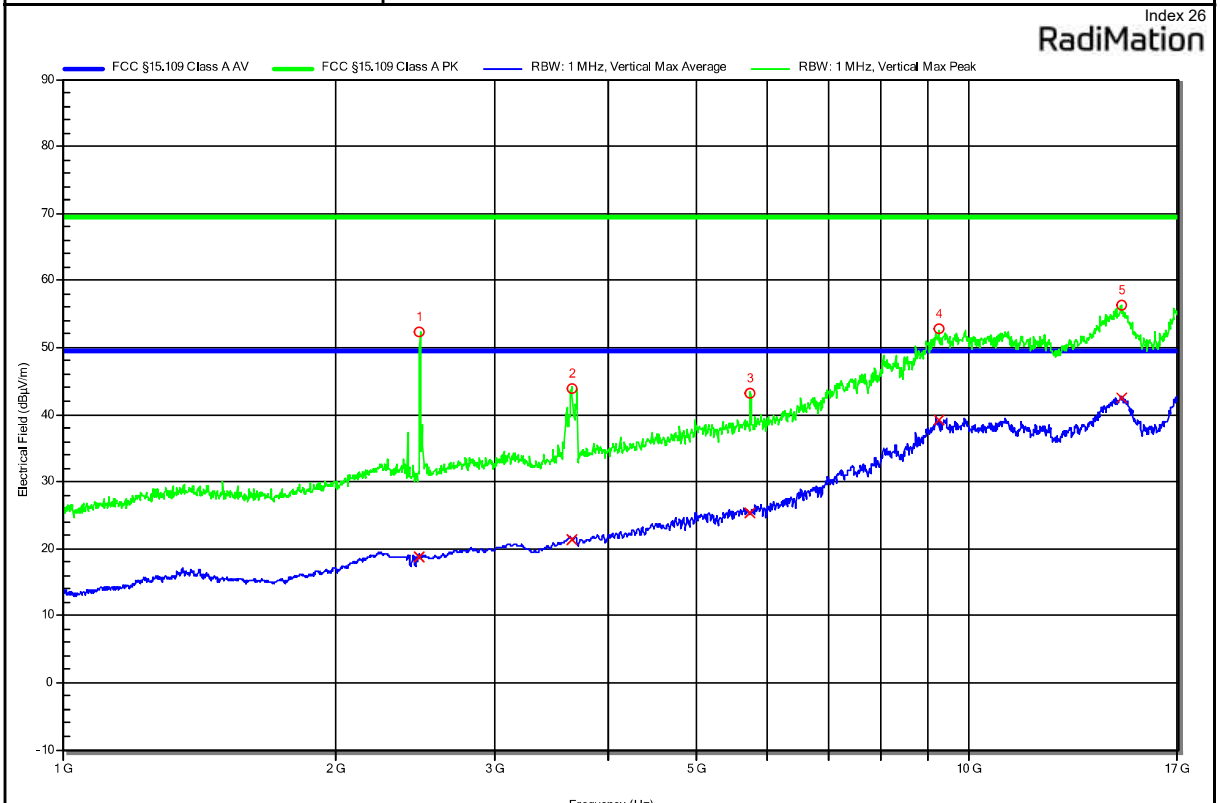
Start Frequency	Stop Frequency	Frequency Step	Measure Time	RBW
30 MHz	1 GHz	Linear: 30 kHz steps	100 ms	120 kHz

Peak Number	Frequency (MHz)	Quasi-Peak (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Quasi-Peak Difference (dB)	Quasi-Peak Status	Angle (degrees)	Height (m)
1	54.42	33.7	39.1	-5.4	Pass	0	1
2	58.11	34.1	39.1	-5.0	Pass	0	1
3	55.05	33.7	39.1	-5.4	Pass	0	1
4	54.72	33.4	39.1	-5.7	Pass	0	1
5	57.8	33.9	39.1	-5.1	Pass	0	1

Radiated emissions according to FCC 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marea
Test Date & Time:	2024-06-05
Operating Conditions:	ambient temperature: 23 °Celsius power input: 48 V DC
Antenna:	Schwarzbeck VULB 9162, Horizontal
Measurement Distance:	10 m
Operational Mode: DUT Configuration:	1 2
Applied to Port:	PoE
Note 1:	-



Radiated emissions according to FCC part 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date & Time:	2024-06-18
Operating Conditions:	ambient temperature: 24 °Celsius power input: 24 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement Distance:	3 m converted to 10 m
Operational Mode: DUT Configuration:	1 1
Applied to Port:	Power
Note 1:	-

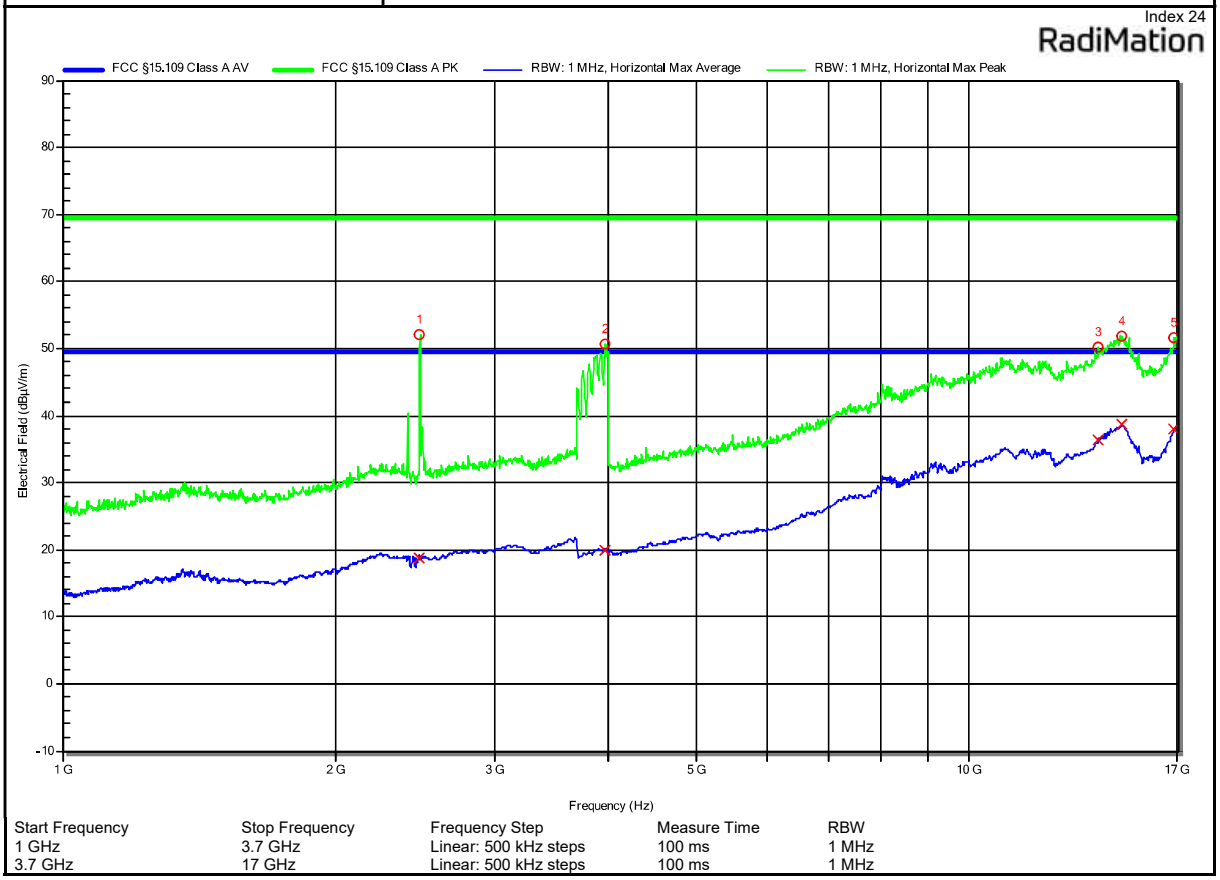


Start Frequency	Stop Frequency	Frequency Step	Measure Time	RBW
1 GHz	3.7 GHz	Linear: 500 kHz steps	100 ms	1 MHz
3.7 GHz	17 GHz	Linear: 500 kHz steps	100 ms	1 MHz

Peak Number	Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Difference (dB)	Peak Status	Angle (degrees)	Height (m)
1	2479.5	52.22	69.54	-17.32	Pass	140	1
2	3649.5	43.82	69.54	-25.72	Pass	140	1
3	5741.5	43.21	69.54	-26.33	Pass	140	1
4	9254.5	52.74	69.54	-16.8	Pass	140	1
5	14726.5	56.32	69.54	-13.22	Pass	140	1

Peak Number	Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Difference (dB)	Average Status	Angle (degrees)	Height (m)
1	2479.5	18.8	49.54	-30.74	Pass	140	1
2	3649.5	21.37	49.54	-28.17	Pass	140	1
3	5741.5	25.36	49.54	-24.18	Pass	140	1
4	9254.5	39.16	49.54	-10.38	Pass	140	1
5	14726.5	42.49	49.54	-7.05	Pass	140	1

Radiated emissions according to FCC part 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date & Time:	2024-06-18
Operating Conditions:	ambient temperature: 24 °Celsius power input: 24 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement Distance:	3 m converted to 10 m
Operational Mode: DUT Configuration:	1 1
Applied to Port:	Power
Note 1:	-

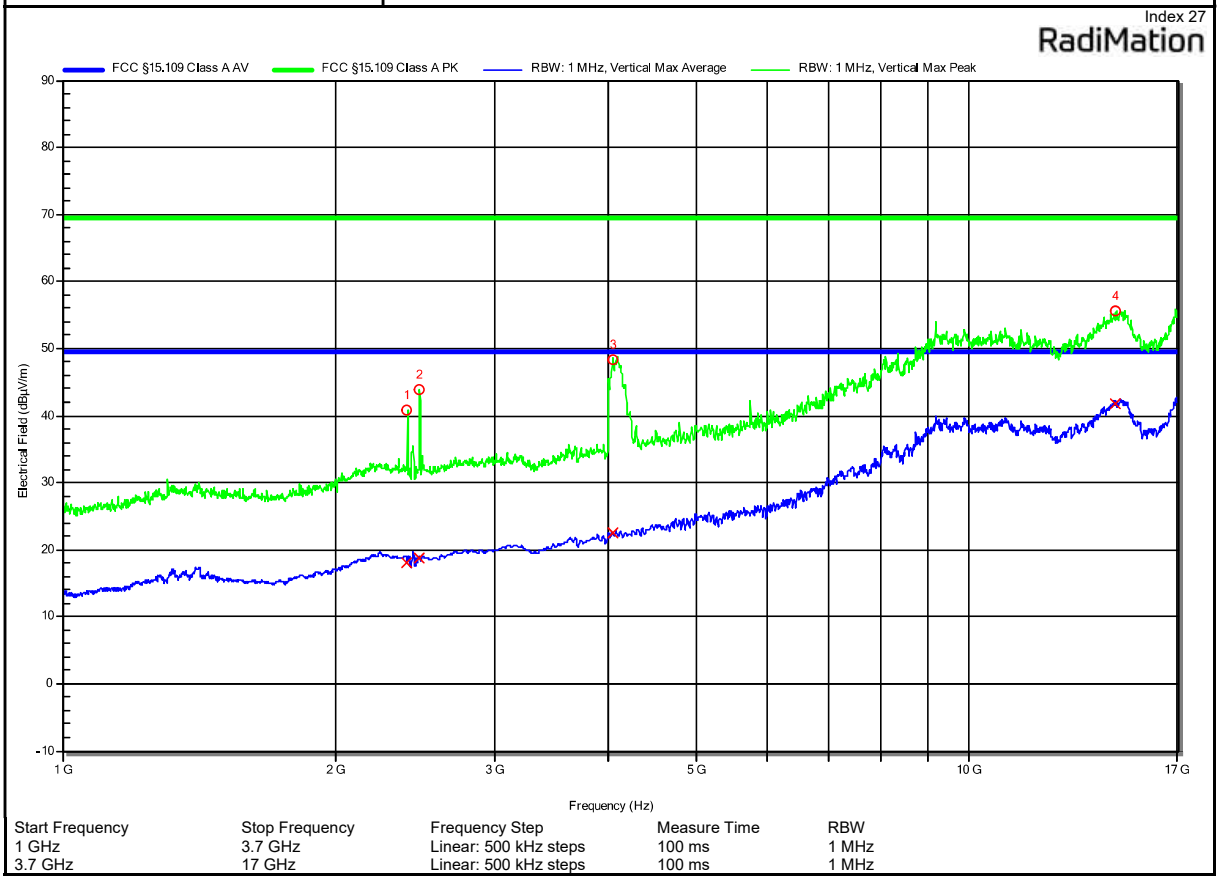


Start Frequency	Stop Frequency	Frequency Step	Measure Time	RBW
1 GHz	3.7 GHz	Linear: 500 kHz steps	100 ms	1 MHz
3.7 GHz	17 GHz	Linear: 500 kHz steps	100 ms	1 MHz

Peak Number	Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Difference (dB)	Peak Status	Angle (degrees)	Height (m)
1	2479.5	52.14	69.54	-17.4	Pass	143	1
2	3973	50.62	69.54	-18.92	Pass	143	1
3	13902.5	50.1	69.54	-19.44	Pass	143	1
4	14765.5	51.86	69.54	-17.68	Pass	143	1
5	16863	51.64	69.54	-17.9	Pass	143	1

Peak Number	Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Difference (dB)	Average Status	Angle (degrees)	Height (m)
1	2479.5	18.8	49.54	-30.74	Pass	143	1
2	3973	19.85	49.54	-29.69	Pass	143	1
3	13902.5	36.39	49.54	-13.15	Pass	143	1
4	14765.5	38.69	49.54	-10.85	Pass	143	1
5	16863	37.89	49.54	-11.65	Pass	143	1

Radiated emissions according to FCC part 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date & Time:	2024-06-18
Operating Conditions:	ambient temperature: 24 °Celsius power input: 48 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement Distance:	3 m converted to 10 m
Operational Mode: DUT Configuration:	1 2
Applied to Port:	PoE
Note 1:	-

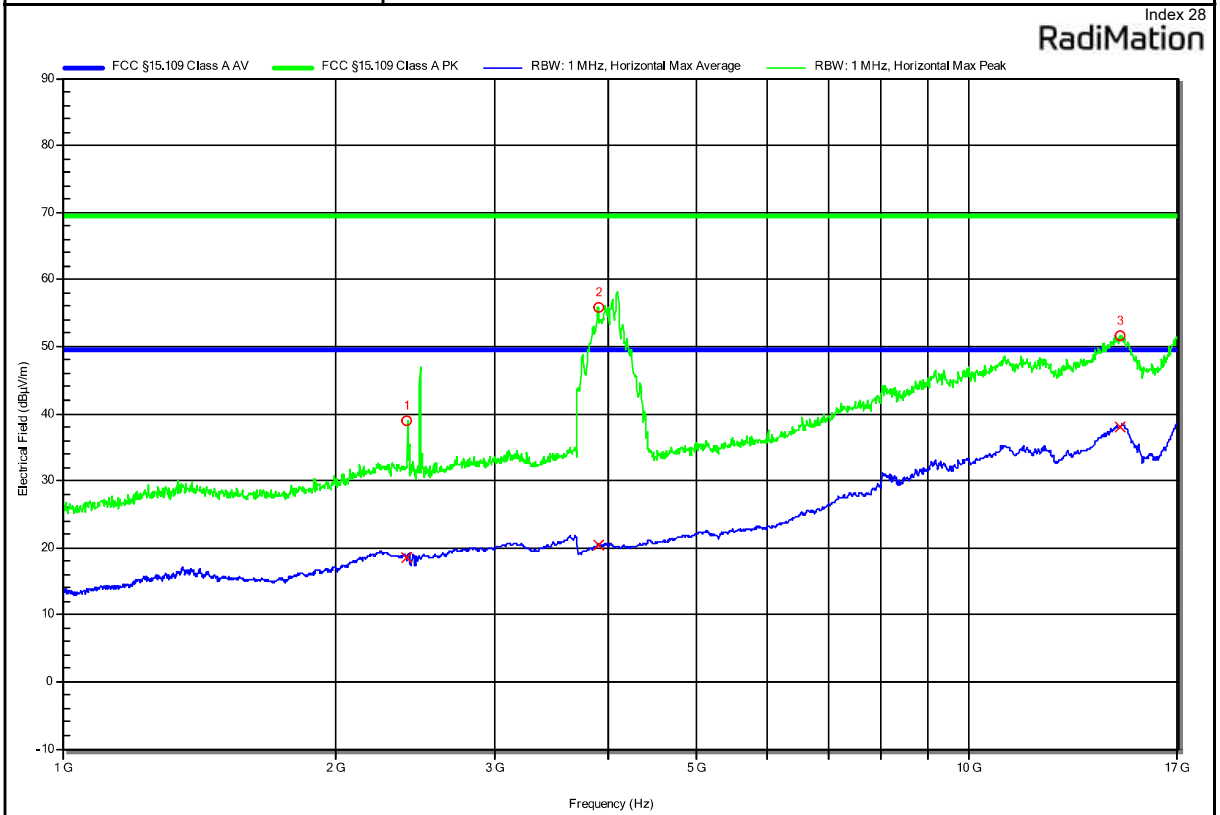


Start Frequency	Stop Frequency	Frequency Step	Measure Time	RBW
1 GHz	3.7 GHz	Linear: 500 kHz steps	100 ms	1 MHz
3.7 GHz	17 GHz	Linear: 500 kHz steps	100 ms	1 MHz

Peak Number	Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Difference (dB)	Peak Status	Angle (degrees)	Height (m)
1	2401.808	40.9	69.54	-28.64	Pass	0	1
2	2479.308	43.93	69.54	-25.61	Pass	0	1
3	4044	48.45	69.54	-21.09	Pass	0	1
4	14541	55.55	69.54	-13.99	Pass	0	1

Peak Number	Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Difference (dB)	Average Status	Angle (degrees)	Height (m)
1	2401.808	18.16	49.54	-31.38	Pass	0	1
2	2479.308	18.77	49.54	-30.77	Pass	0	1
3	4044	22.46	49.54	-27.08	Pass	0	1
4	14541	41.65	49.54	-7.89	Pass	0	1

Radiated emissions according to FCC part 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date & Time:	2024-06-18
Operating Conditions:	ambient temperature: 24 °Celsius power input: 48 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement Distance:	3 m converted to 10 m
Operational Mode: DUT Configuration:	1 2
Applied to Port:	PoE
Note 1:	-

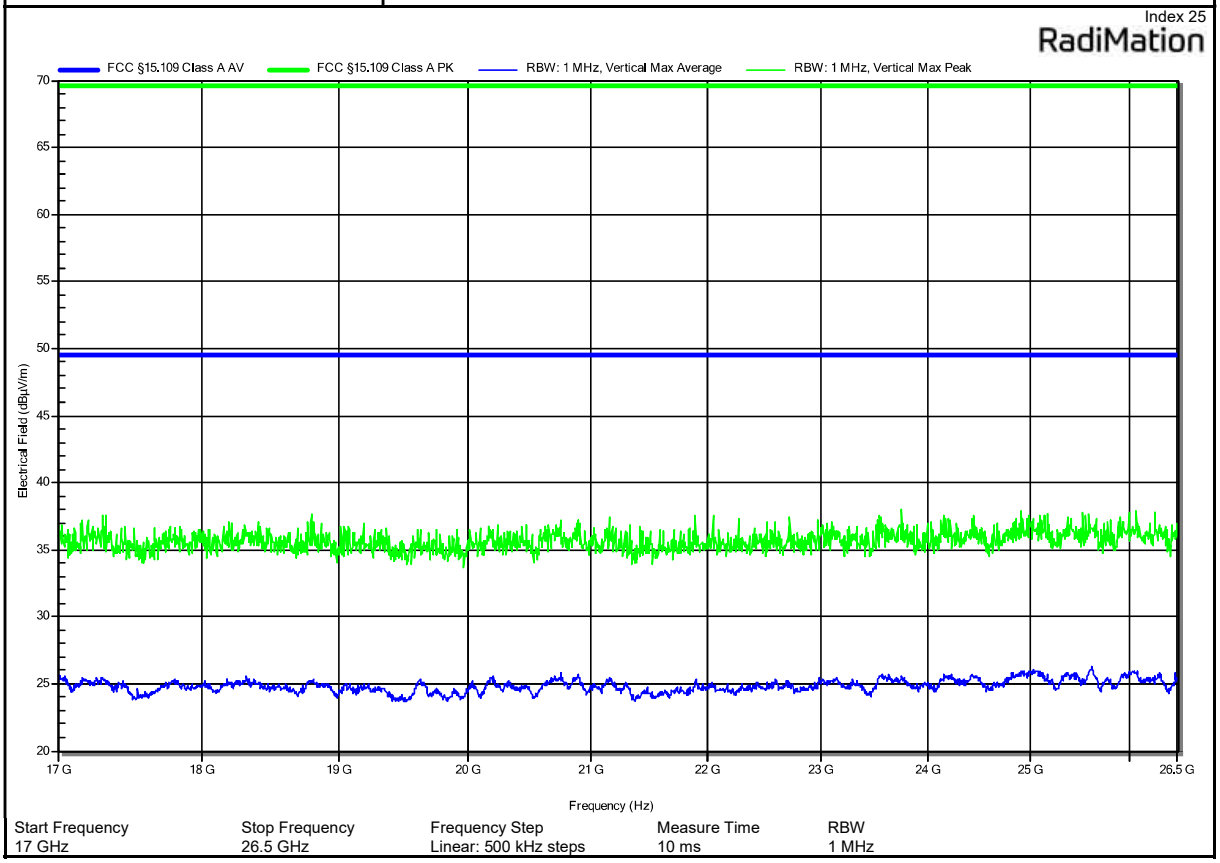


Start Frequency	Stop Frequency	Frequency Step	Measure Time	RBW
1 GHz	3.7 GHz	Linear: 500 kHz steps	100 ms	1 MHz
3.7 GHz	17 GHz	Linear: 500 kHz steps	100 ms	1 MHz

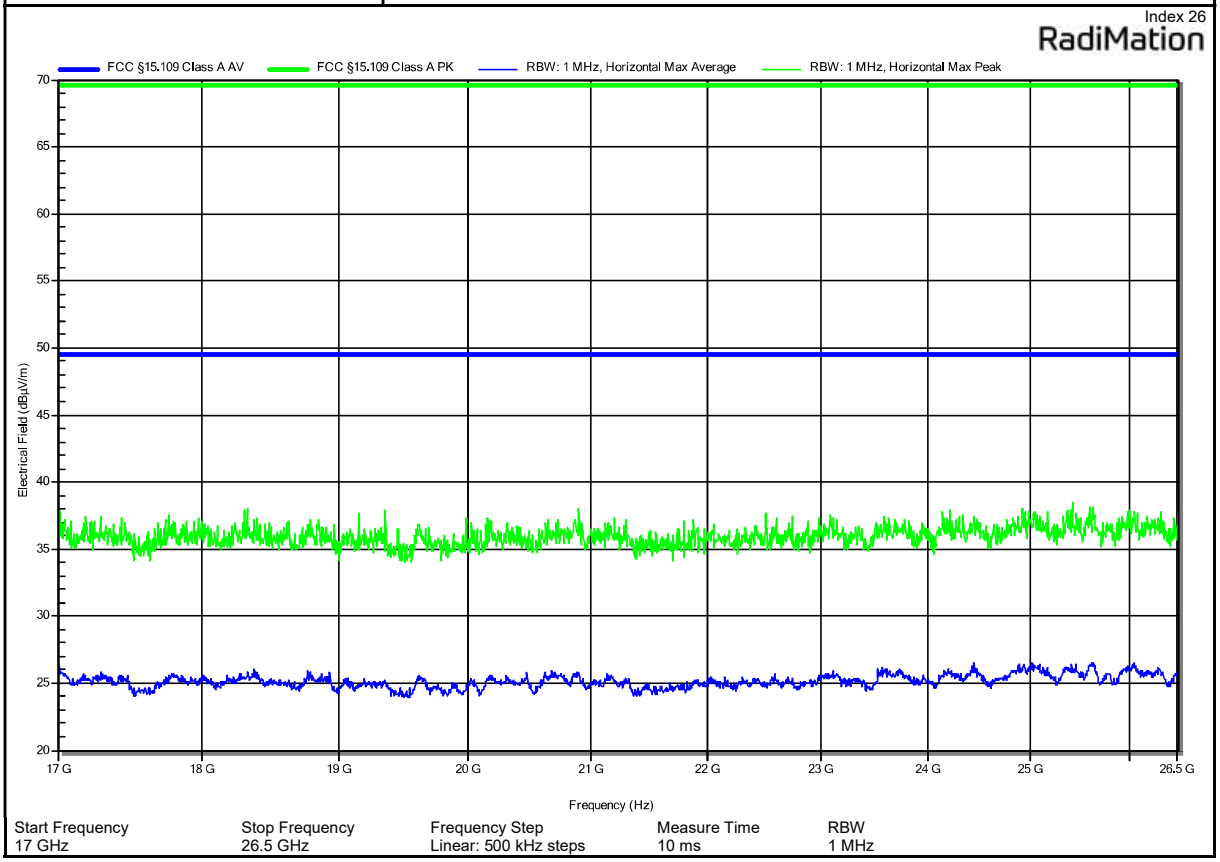
Peak Number	Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Difference (dB)	Peak Status	Angle (degrees)	Height (m)
1	2401.983	38.99	69.54	-30.55	Pass	110	1
2	3900.5	55.78	69.54	-13.76	Pass	110	1
3	14664	51.62	69.54	-17.92	Pass	110	1

Peak Number	Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Difference (dB)	Average Status	Angle (degrees)	Height (m)
1	2401.983	18.44	49.54	-31.1	Pass	110	1
2	3900.5	20.45	49.54	-29.09	Pass	110	1
3	14664	38.05	49.54	-11.49	Pass	110	1

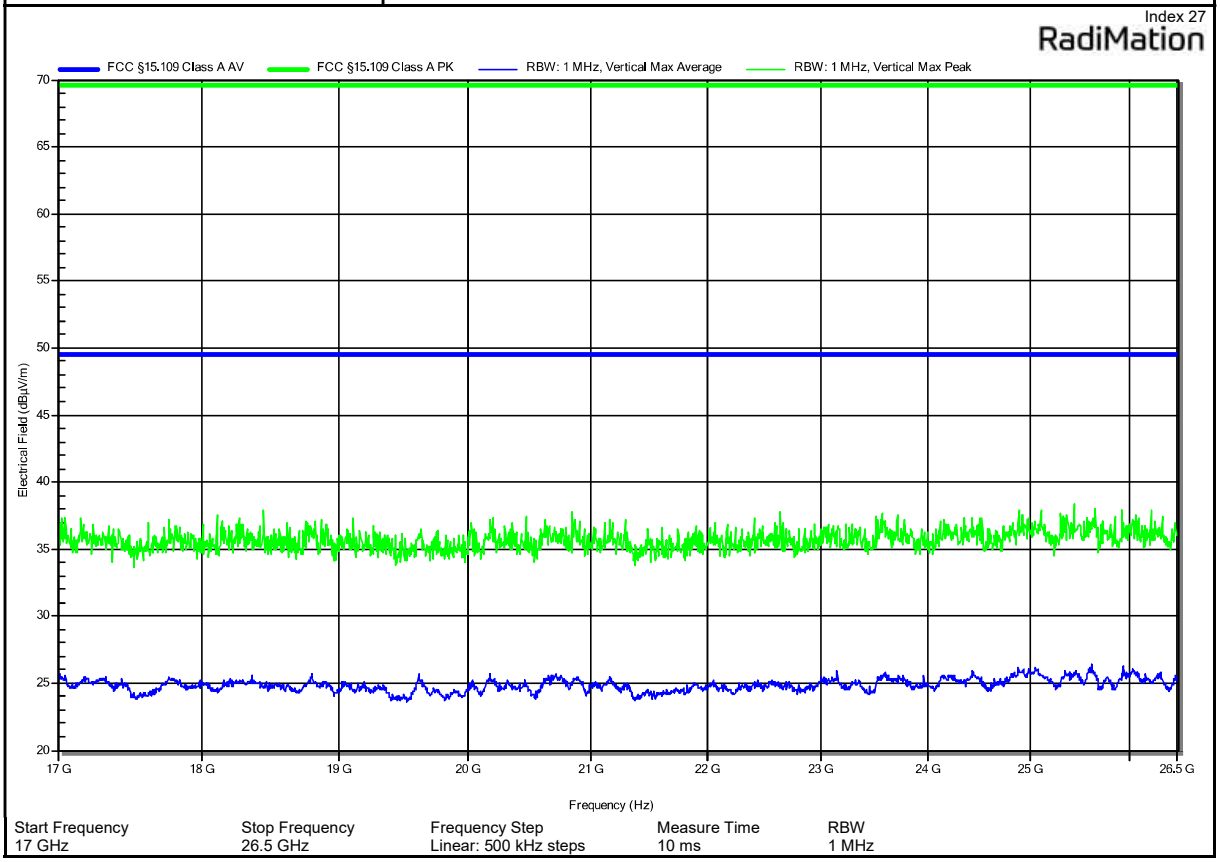
Radiated emissions according to FCC 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marea
Test Date & Time:	2024-06-05
Operating Conditions:	ambient temperature: 23 °Celsius power input: 24 V DC
Antenna:	AT4560, Vertical
Measurement Distance:	3 m converted to 10 m
Operational Mode: DUT Configuration:	1 1
Applied to Port:	Power
Note 1:	-



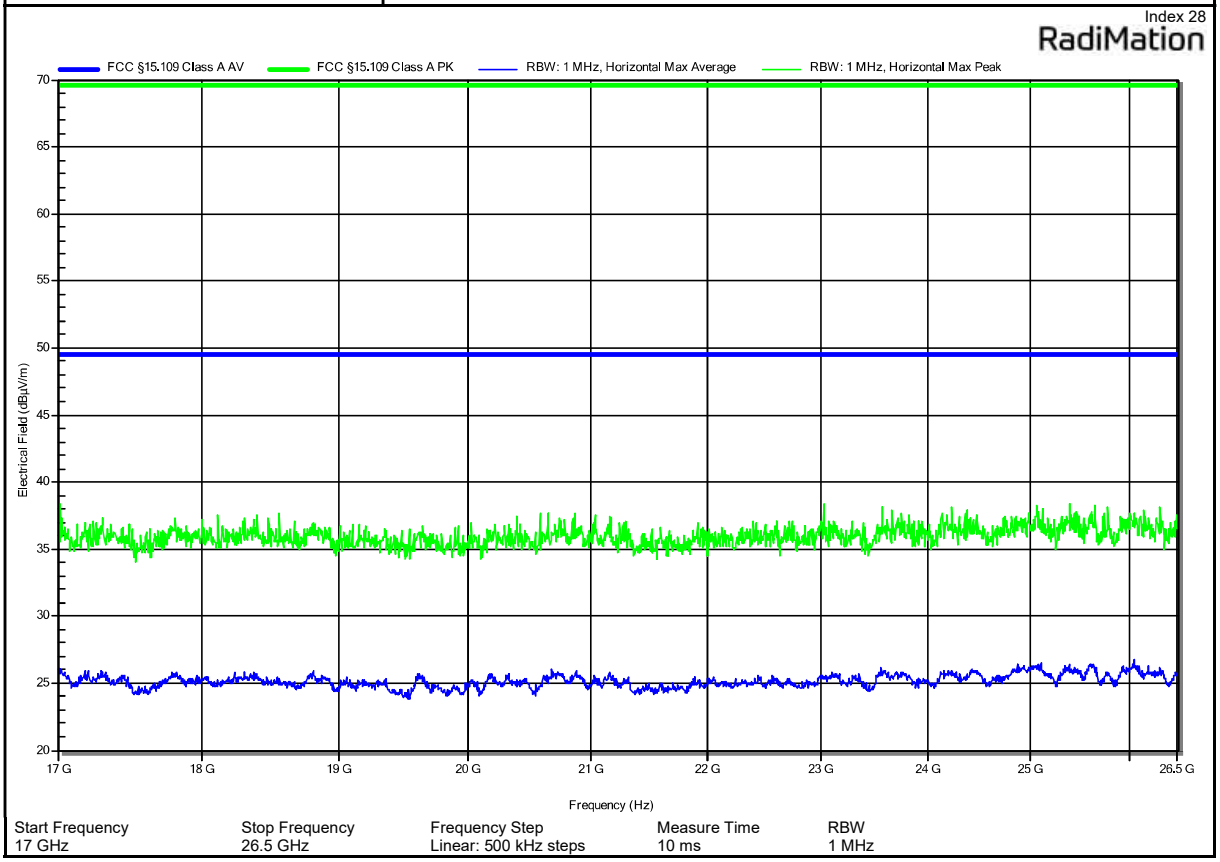
Radiated emissions according to FCC 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marea
Test Date & Time:	2024-06-05
Operating Conditions:	ambient temperature: 23 °Celsius power input: 24 V DC
Antenna:	AT4560, Horizontal
Measurement Distance:	3 m converted to 10 m
Operational Mode: DUT Configuration:	1 1
Applied to Port:	Power
Note 1:	-



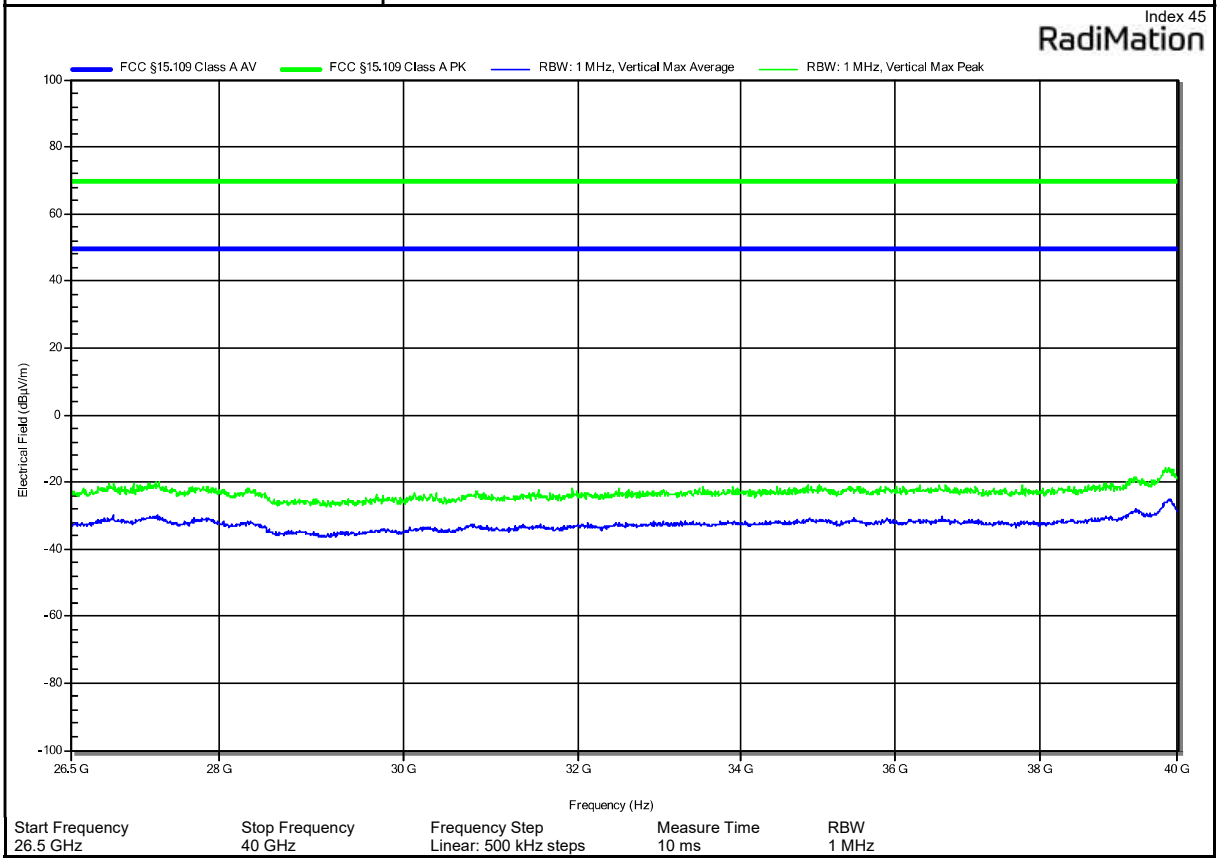
Radiated emissions according to FCC 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marea
Test Date & Time:	2024-06-05
Operating Conditions:	ambient temperature: 23 °Celsius power input: 48 V DC
Antenna:	AT4560, Vertical
Measurement Distance:	3 m converted to 10 m
Operational Mode: DUT Configuration:	1 2
Applied to Port:	PoE
Note 1:	-



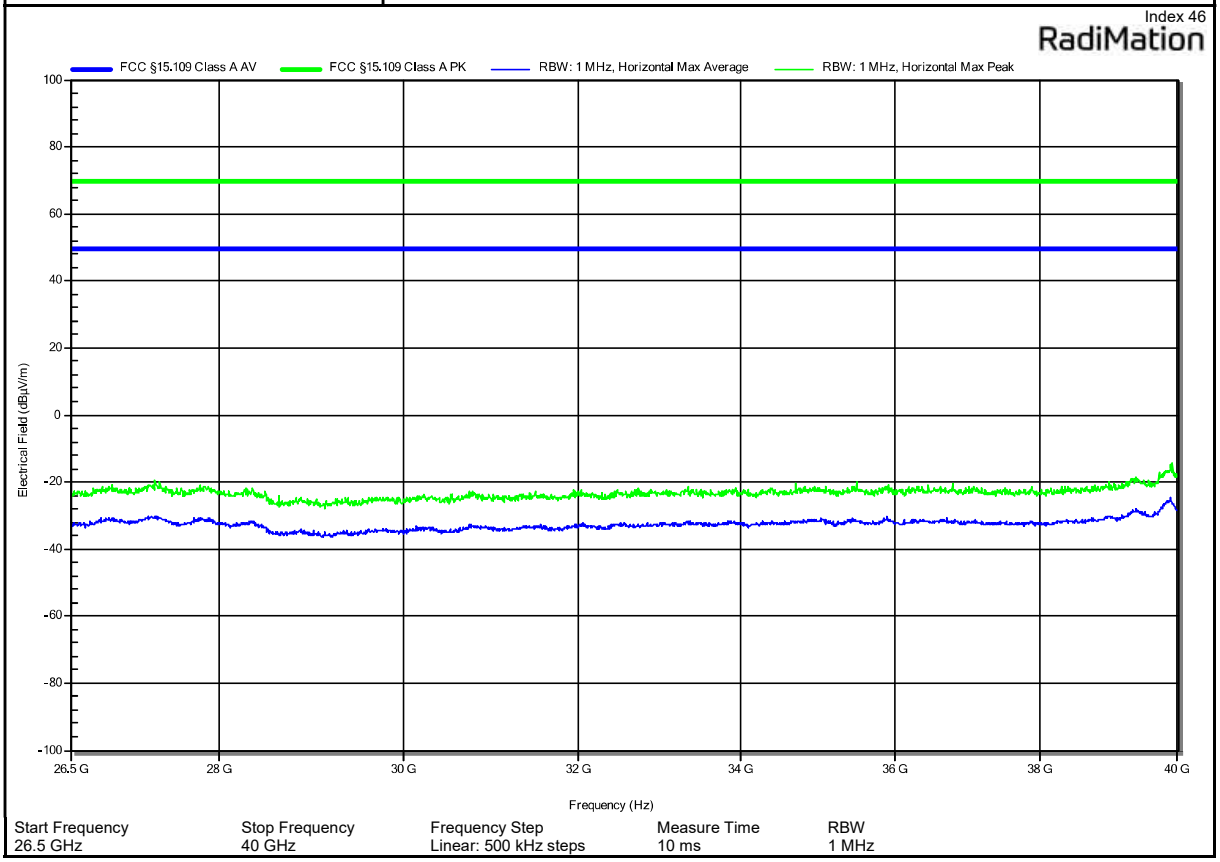
Radiated emissions according to FCC 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marea
Test Date & Time:	2024-06-05
Operating Conditions:	ambient temperature: 23 °Celsius power input: 48 V DC
Antenna:	AT4560, Horizontal
Measurement Distance:	3 m converted to 10 m
Operational Mode: DUT Configuration:	1 2
Applied to Port:	PoE
Note 1:	-



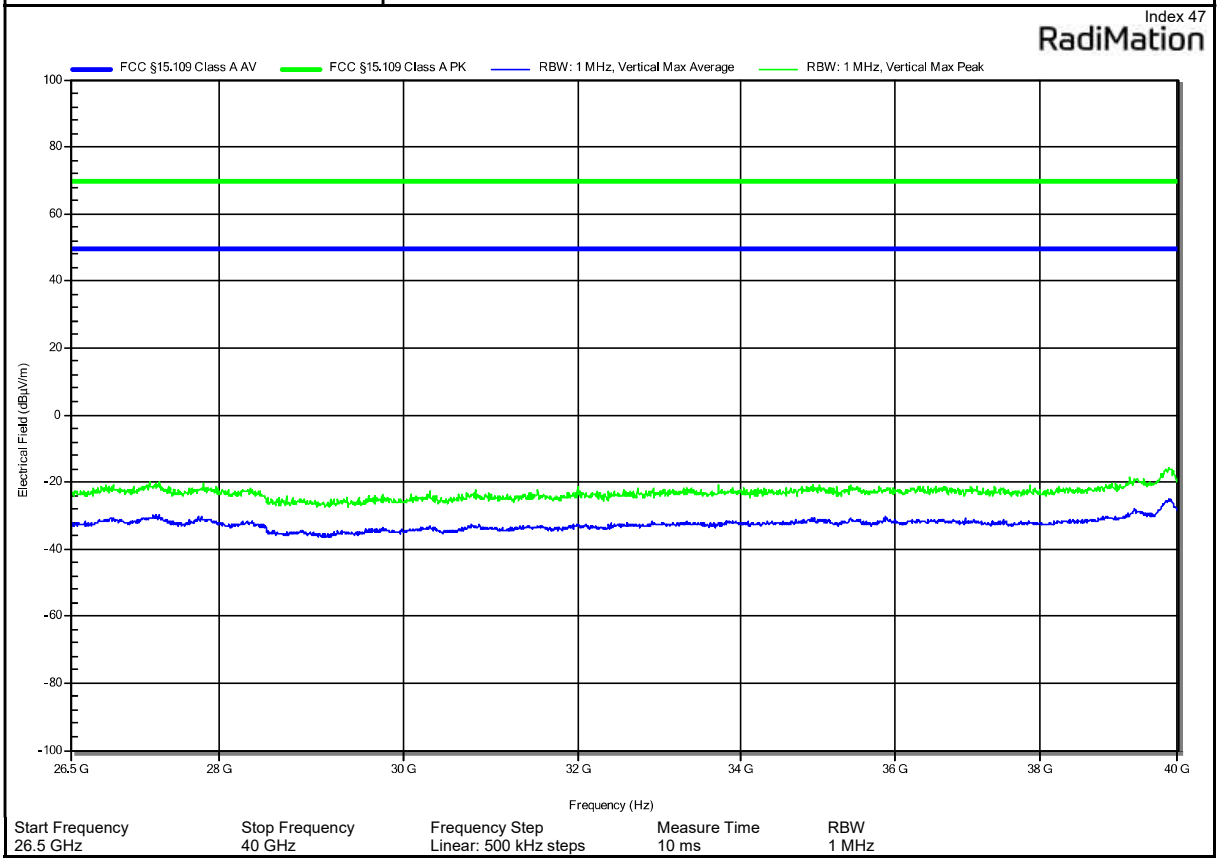
Radiated emissions according to FCC 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marea
Test Date & Time:	2024-06-06
Operating Conditions:	ambient temperature: 23 °Celsius power input: 24 V DC
Antenna:	22240-25, Vertical
Measurement Distance:	3 m converted to 10 m
Operational Mode: DUT Configuration:	1 1
Applied to Port:	Power
Note 1:	-



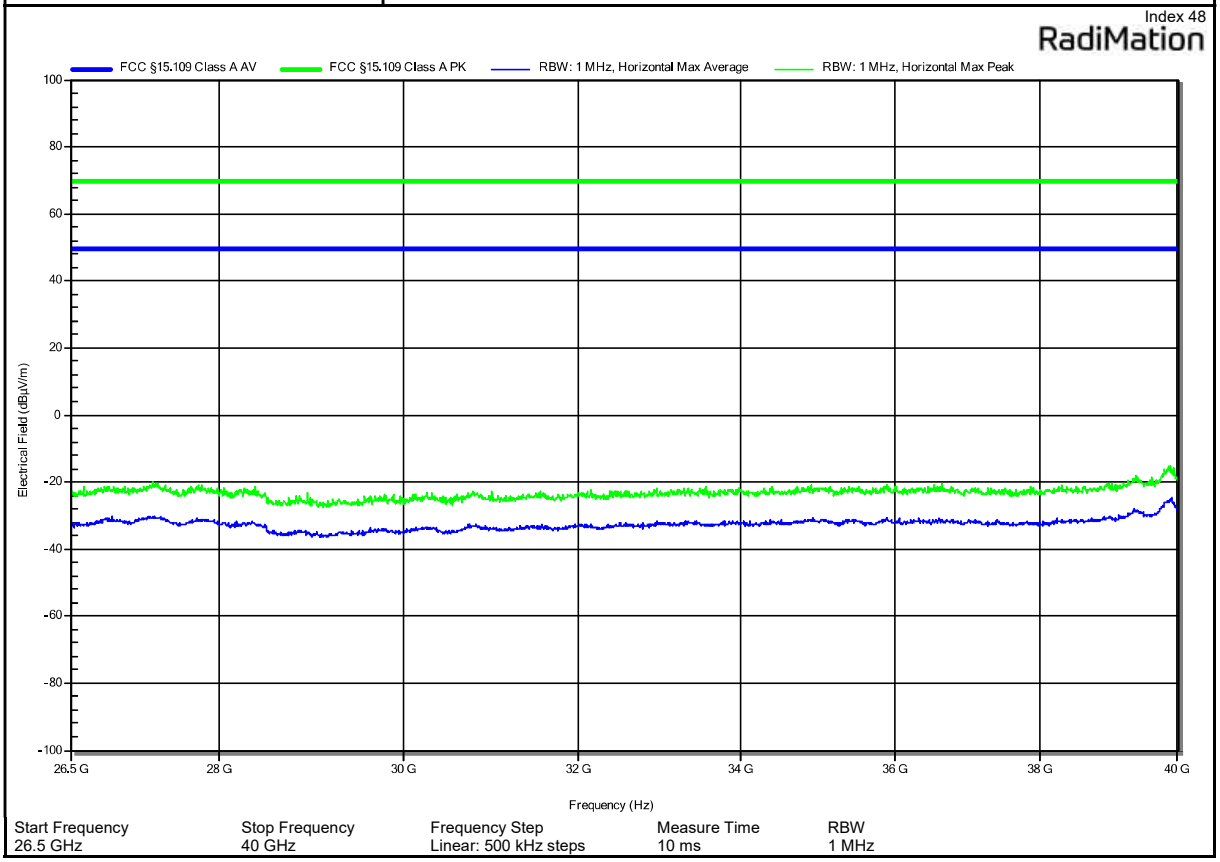
Radiated emissions according to FCC 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marea
Test Date & Time:	2024-06-06
Operating Conditions:	ambient temperature: 23 °Celsius power input: 24 V DC
Antenna:	22240-25, Horizontal
Measurement Distance:	3 m converted to 10 m
Operational Mode: DUT Configuration:	1 1
Applied to Port:	Power
Note 1:	-



Radiated emissions according to FCC 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marea
Test Date & Time:	2024-06-06
Operating Conditions:	ambient temperature: 23 °Celsius power input: 48 V DC
Antenna:	22240-25, Vertical
Measurement Distance:	3 m converted to 10 m
Operational Mode: DUT Configuration:	1 2
Applied to Port:	PoE
Note 1:	-



Radiated emissions according to FCC 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System is able to measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marea
Test Date & Time:	2024-06-06
Operating Conditions:	ambient temperature: 23 °Celsius power input: 48 V DC
Antenna:	22240-25, Horizontal
Measurement Distance:	3 m converted to 10 m
Operational Mode: DUT Configuration:	1 2
Applied to Port:	PoE
Note 1:	-



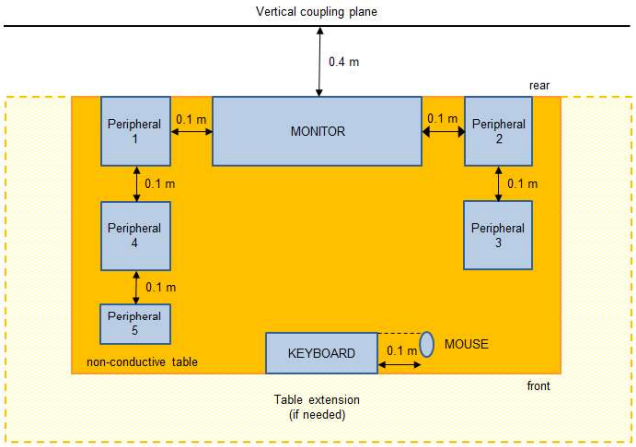
2.2 Test Conditions and Results - Conducted emissions acc. to ANSI C63.4

2.2.1 Information

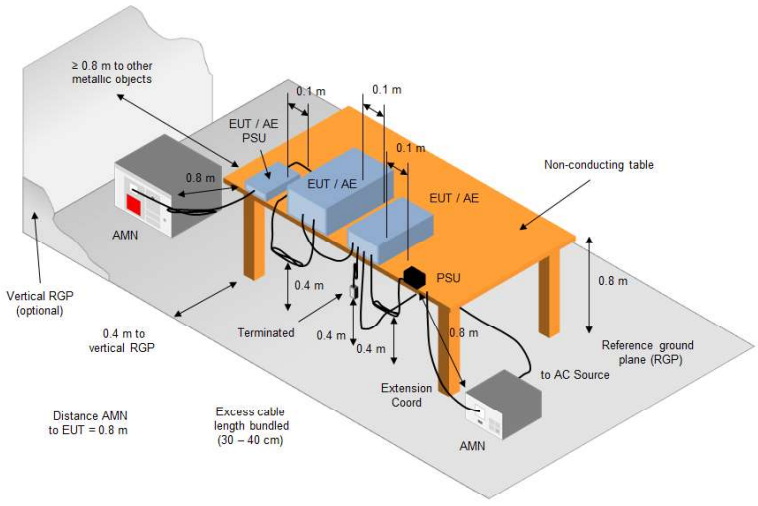
Test Information	
Reference	FCC 15.107, ICES-003, 3.2.1
Reference method	ANSI C63.4:2014+A1:2017 Section 12
Measurement range	150 kHz to 30 MHz
Equipment class	Class A
Equipment type	Table top
Temperature [°C]	23 – 26
Humidity [%]	36 – 39
Operator	Brahima Drabo
Date	2024-06-19

2.2.2 Setup *Table top*

Equipment placement



Test Setup



2.2.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2023.2.4

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	Schwarzbeck	NSLK 8127	EF01592	2023-06	2025-06
AMN	R&S	ESH3-Z5	EF00036	2023-09	2025-09
Pulse Limiter	R&S	ESH3-Z2	EF01063	2023-08	2025-08
EMI Test Receiver	R&S	ESR 7	EF00943	2023-08	2024-08
Climatic Sensor	Embedded Data Systems, LLC.	0200100000253 77E	EF01336	2024-05	2025-05

2.2.4 Procedure

Exploratory measurement Table top
1. The EUT was placed on a non conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1)
2. The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
3. The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length).
4. The LISN measurement port was connected to a measurement receiver
5. I/O cables were bundled not longer than 0.4 m
6. Measurement was performed in the frequency range 0.15 – 30MHz on each current-carrying conductor
7. To maximize the emissions the cable positions were manipulated
8. The worst configuration of EUT and cables is shown on a test setup picture at item 2.2.2

Final measurement Table Top
1. The EUT was placed on a non conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1)
2. The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
3. The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length).
4. The LISN measurement port was connected to a measurement receiver
5. The EUT and cable arrangement were based on the exploratory measurement results
6. The test data of the worst-case conditions were recorded and shown on the next pages

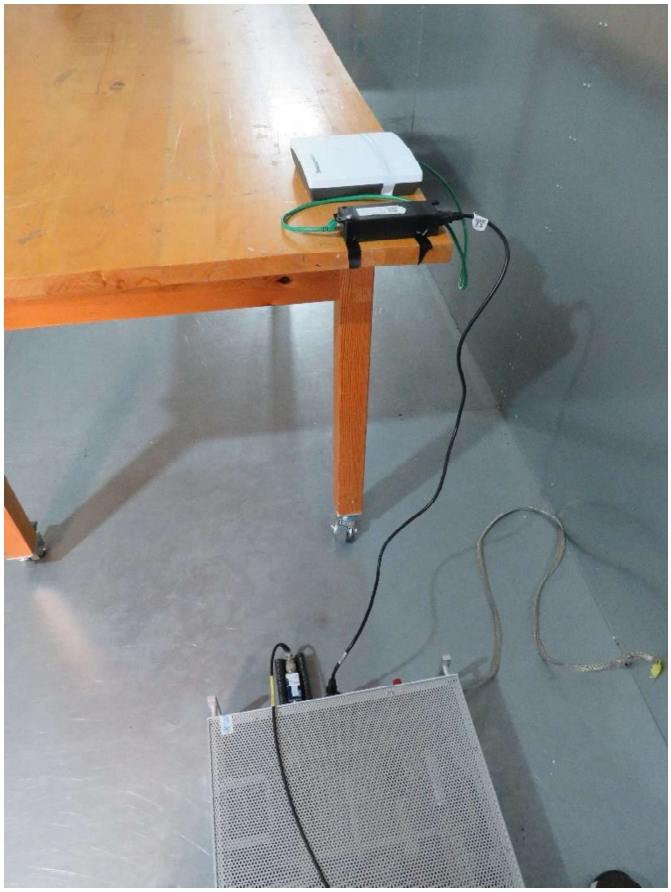
2.2.5 Limits

Class A		
Frequency [MHz]	Quasi-peak Limit [dBµV]	Average Limit [dBµV]
0.15 - 0.5	79	66
0.5 - 30	73	60

2.2.6 Results

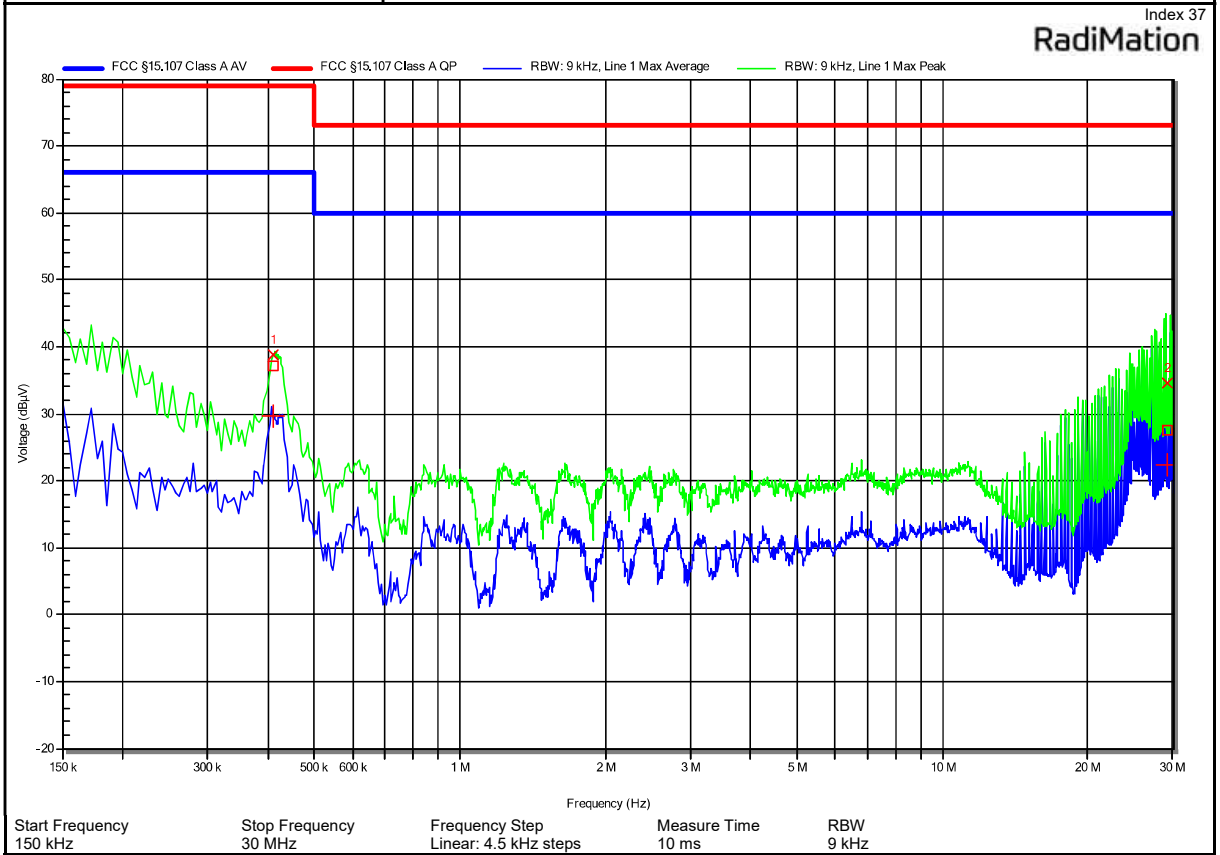
AC power line conducted emissions					
Port	Coupling	Operational mode	EUT Configuration	Verdict	Remark
Power	AMN	1	2	PASS	120 V AC / 60 Hz

2.2.7 Setup Photos

TEST SETUP


2.2.8 Records

Conducted emissions at the mains power port according to FCC part 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System can measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date:	2024-06-19
Operating Conditions:	ambient temperature: 24 °Celsius power input: 120 V AC / 60 Hz
LISN:	Schwarzbeck NSLK 8127 RC L1
Operational Mode: EUT Configuration:	1 1
Applied to Port:	PoE adapter
Note 1:	-

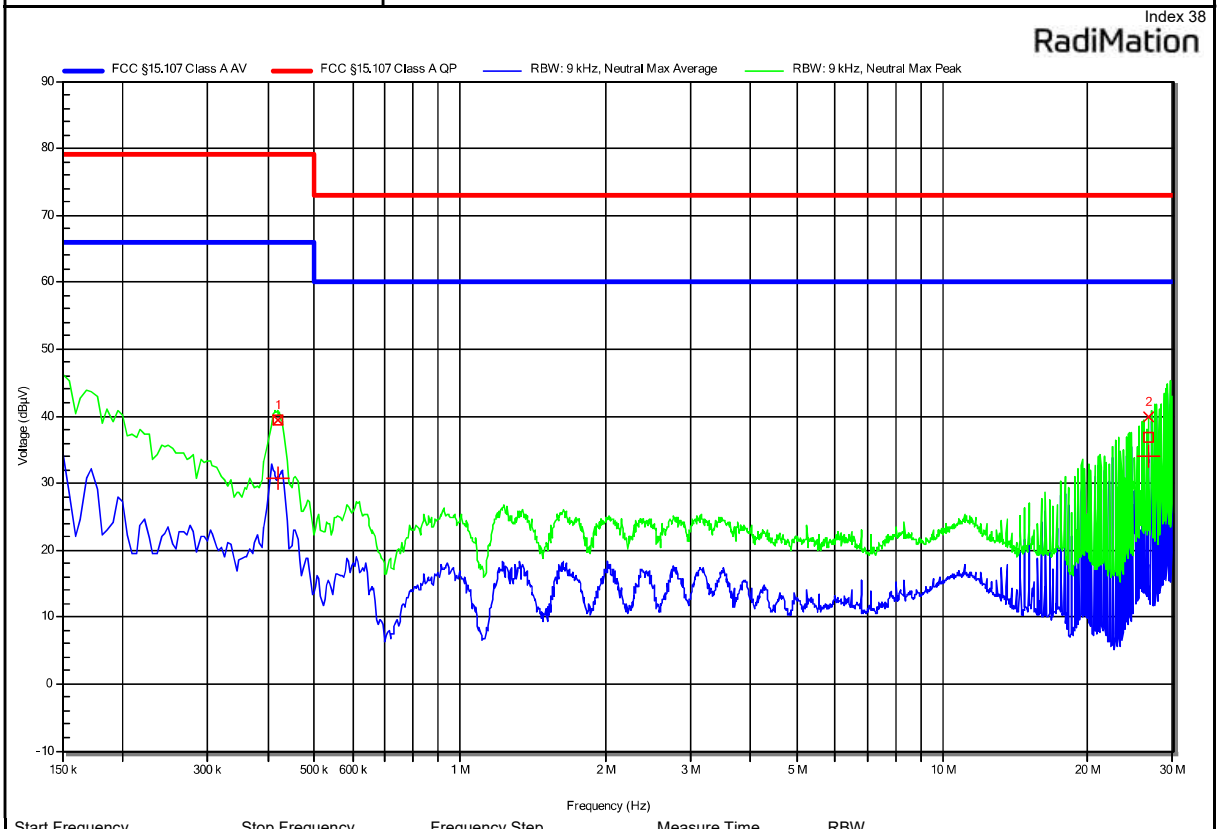


Start Frequency	Stop Frequency	Frequency Step	Measure Time	RBW
150 kHz	30 MHz	Linear: 4.5 kHz steps	10 ms	9 kHz

Peak Number	Frequency (MHz)	Quasi-Peak (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LSN
1	0.411	37.18	79	-41.82	Pass	Line 1
2	29.27	27.5	73	-45.5	Pass	Line 1

Peak Number	Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	LSN
1	0.411	29.73	66	-36.27	Pass	Line 1
2	29.27	22.27	60	-37.73	Pass	Line 1

Conducted emissions at the mains power port according to FCC part 15B	
Project Number:	G0M-2403-2495
Applicant:	Siemens AG
Model Description:	UWB-Location-System can measure distances between the UWB components
Model:	52445054, Anchor
Test Sample ID:	48555
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date:	2024-06-19
Operating Conditions:	ambient temperature: 24 °Celsius power input: 120 V AC / 60 Hz
LISN:	Schwarzbeck NSLK 8127, N
Operational Mode: EUT Configuration:	1 1
Applied to Port:	PoE adapter
Note 1:	-



Start Frequency	Stop Frequency	Frequency Step	Measure Time	RBW
150 kHz	30 MHz	Linear: 4.5 kHz steps	20 ms	9 kHz

Peak Number	Frequency (MHz)	Quasi-Peak (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LSN
1	0.42	39.47	79	-39.53	Pass	Neutral
2	26.784	36.74	73	-36.26	Pass	Neutral

Peak Number	Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	LSN
1	0.42	39.47	79	-39.53	Pass	Neutral
2	26.784	36.74	73	-36.26	Pass	Neutral

3 Measurement Uncertainty

All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2.

Test Name	Measurement Uncertainty
Conducted emissions at the mains power port	150kHz to 30MHz, 3.35dB
Radiated Emission	>1GHz to 17GHz @3m, 5.95dB

Test Name	Measurement Uncertainty
Radiated Emission	30 MHz to 1 GHz @ 10 m, 6.25 dB 17 GHz to 40GHz @ 3 m, max. 5.39 dB