Report on the FCC and IC Testing of the Siemens AG

Model: SIMATIC RTLS4030T
MLFB: 6GT2700-3DA13

In accordance with FCC 47 CFR Part 15 F and ISED RSS-220 and ISED RSS-Gen

Product Service

Add value. Inspire trust.

Prepared for:	Siemens AG 76181 Karlsruhe Germany
FCC ID:	SCF6032701
IC	---

COMMERCIAL-IN-CONFIDENCE

Date: 2024-02-06
Document Number: TR-713308979-00 | Revision 2

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Alexander Deese	2024-02-06	Deese SIGN-ID 880779
Authorised Signatory	Matthias Stumpe	2024-02-06	SIGN-ID 880789

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

Engineering Statement:
This measurement shown in this report were made in accordance with the procedures described on test pages.
All reporded testing was carried out on a sample equipment to demonstrate limited compilance with with FCC 47 CFR Part 15 E and ISED RSS-220 and RSS-GEN.
The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Alexander Deese	2024-02-06	Deese SIGN-ID 880779

Laboratory Accreditation	Laboratory recognition	Industry Canada test site registration
DAkkS Reg. No. D-PL-11321-11-02	Registration No. BNetzA-CAB-16/21-15	3050A-2
DAkkS Reg. No. D-PL-11321-11-03		

Executive Statement:
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15 F:2021 and ISED RSS220:2018 and ISED RSSGen:2019

Trade Register Munich
HRB 85742
VAT ID No. DE129484267
Information pursuant to Section 2(1) DL-InfoV (Germany) at www.tuvsud.com/imprint

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Product Service

Content

1 Report Summary

1.1 Modification Report

Alternations and additions of this report will be issued to the holders of each copy in the form of a complete document.

Revision	*Description of changes*	*Date of Issue*
0	First Issue	2023-11-29
1	Specification clause references updated.	2024-01-30
2	Chapter 2.1 Antenna requirement added.	2024-02-06

Table 1: Report of Modifications

1.2 Introduction

Applicant	Siemens AG
Manufacturer	Siemens AG
Model Number(s)	SIMATIC RTLS4030T MLFB: 6GT2700-3DA13
Serial Number(s)	A51232
Hardware Version(s)	FS:01
Software Version(s)	FS:01
Number of Samples Tested	1
Test Specification(s) / Issue / Date	FCC 47 CFR Part15 F : 2019, FCC 47 CFR Part15 C : 2019 and ISED RSS-220, Issue 1, Amd. 1 : 2018 ISED RSS-Gen, Issue 5, Amd. 1 : 2019
Test Plan/Issue/Date	---
Order Number	9707940255
Date	2023-08-16
Date of Receipt of EUT	2023-07-31
Start of Test	2023-11-02
Finish of Test	2023-11-21
Name of Engineer(s)	Alexander Deese
Related Document(s)	ANSI C63.10:2013

Product Service

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15 F and ISED RSS-220 and RSS-Gen is shown below.

Section	*Specification Clause*	*Test Description*	*Result*
Transmitting continuously			
2.1	15.203	Antenna requirement	Pass
2.2	15.503(a), (b), (c), (d)	Bandwidth of Signal	Pass
2.3	15.519(e), 15.521	Peak Power	Pass
2.4	15.505(a), 15.519(c), 15.521(c), 15.521(h), 15.209	Radiated Emissions	Pass
2.5	15.519(d)	Radiated Emissions in GPS bands	Pass
	15.505(a), 15.207	Conducted Disturbance at Mains Terminal	Not applicable, battery supplied
2.5	15.519(a)	Signal deactivation	Pass

Table 2: Results according to FCC 47 CFR Part 15 F

Section	*Specification Clause*	*Test Description*	*Result*
Transmitting continuously			
2.2	2	Bandwidth of Signal	Pass
2.3	5.3.1(g), Annex 4	Peak Power	Pass
2.4	5.3.1(c) 5.3.1(d)	Radiated Emissions	Pass
2.5	5.3.1(e)	Radiated Emissions in GPS bands	Pass
2.5	5.3.1(b)	Signal deactivation	Pass

Table 3: Results according to ISED RSS-220

Section	*Specification Clause*	*Test Description*	*Result*
Transmitting continuously			
2.2	6.7	Bandwidth of Signal	Pass
	8.11	Temperature Stability	N/A
	8.8	AC Power Line Conducted Emissions	Not applicable, battery supplied
2.4	8.9, 8.10	Radiated Emissions	Pass

Table 4: Results according to ISED RSS-Gen

Product Service

1.4 Product Information

1.4.1 Technical Description

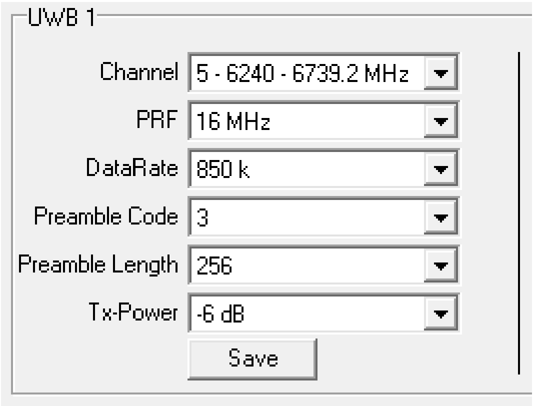
RTLS-Transponder

Frequency Band	2405 – 2480 MHz 3993.6 – 6489.6 MHz
Supply Voltage:	3 V
Supply Frequency:	DC, battery supplied

1.5 Test Configuration

The device was 3 V DC power supplied. UWB was transmitting continuously. Y-axis of the device was determined as the worst case for measurements in this report.

1.6 Modes of Operation



1.7 Deviations from Standard

1.8 EUT Modifications Record

The table below details modifications made to the EUT during the test program.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer	Not Applicable	Not Applicable

Table 5

1.9 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing test laboratory:

Test Name	Name of Engineer(s)
Transmitting continuously	
Bandwidth of Signal	Alexander Deese
Peak Power	Alexander Deese
Radiated Emissions	Alexander Deese
Radiated Emissions in GPS bands	Alexander Deese
Signal deactivation	Alexander Deese

Office Address:
Äußere Frühlingstraße 45
94315 Straubing
Germany

2 Test Details

2.1 Antenna requirement

2.1.1 Specification Reference

FCC 47 CFR Part 15 C, Clauses 15.203

2.1.2 Equipment under Test and Modification State

SIMATIC RTLS4030T; S/N A51232; Modification state 0

2.1.3 Date of Test

2.1.4 Specification Limits

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some fields disturbance sensors, or to other intentional radiators which must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits are not exceeded.

2.1.5 Test Results

The antenna is permanently attached.

2.2 Bandwidth of Signal

2.2.1 Specification Reference

FCC 47 CFR Part 15 F, Clause 15.503(a), (b), (c), (d)
ISED RSS-220, Clause 2
ISED RSS-Gen, Clause 6.7

2.2.2 Equipment under Test and Modification State

SIMATIC RTLS4030T; S/N A51232; Modification state 0

2.2.3 Date of Test

2023-11-21

2.2.4 Environmental Conditions

Ambient Temperature	21 °C
Relative Humidity	45 %

2.2.5 Specification Limits

A UWB device is an intentional radiator that has either a -10 dBc bandwidth ($\frac{f_H+f_L}{2}$) of at least 500 MHz or a -10 dB ($2\frac{f_H-f_L}{f_H+f_L}$) fractional bandwidth greater than 0.2.

2.2.6 Test Method

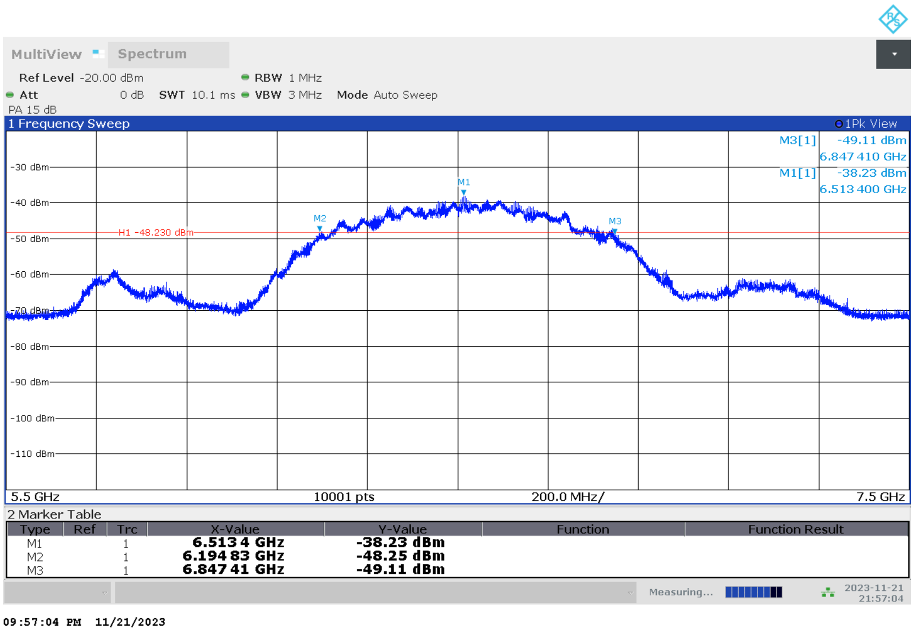
The test was performed according to ANSI C63.10, clauses 6.9 and 10.1.

Product Service

2.2.7 Test Results

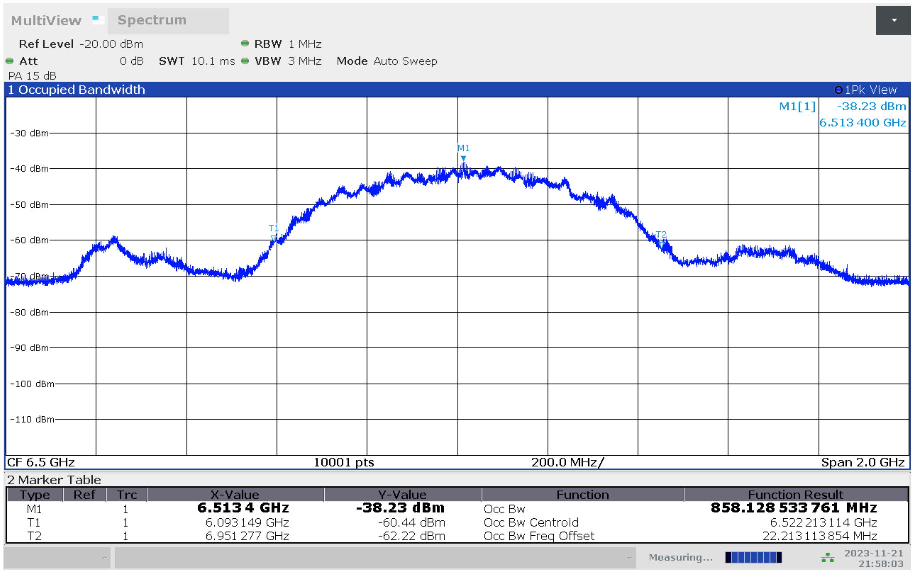
Frequency Channel	*f_L (GHz)*	*f_H (GHz)*	*-10 dB Bandwidth (MHz)*	*Minimum -10 dB Band-width (MHz)*
5	6.19483	6.84741	652.58	500

Table 6: 10 dB bandwidth and fractional bandwidth



Frequency Channel	*99% Bandwidth (MHz)*
5	858.129

Table 7: 99% bandwidth



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2.2.8 Test Location and Test Equipment

The test was carried out in fully anechoic chamber no. 2:

Instrument	Manufacturer	Type No	TE No	Calibra-tion Pe-riod (months)	Calibration Due
Signal and Spectrum Analyser	Rohde & Schwarz	FSW43	53496	12	2024-04-30
Double ridged horn antenna	EMCO	3115	19383	36	2026-04-30

Table 8

Product Service

2.3 Peak Power

2.3.1 Specification Reference

FCC 47 CFR Part 15 F, Clause 15.519(e) and 15.521
ISED RSS-220, Clauses 4. 5.3.1(g) and Annex 4

2.3.2 Equipment under Test and Modification State

SIMATIC RTLS4030T; S/N A51232; Modification state 0

2.3.3 Date of Test

2023-11-20

2.3.4 Environmental Conditions

Ambient Temperature	21 °C
Relative Humidity	43 %

2.3.5 Specification Limits

There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, f_M. That limit is 0 dBm e.i.r.p. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures.

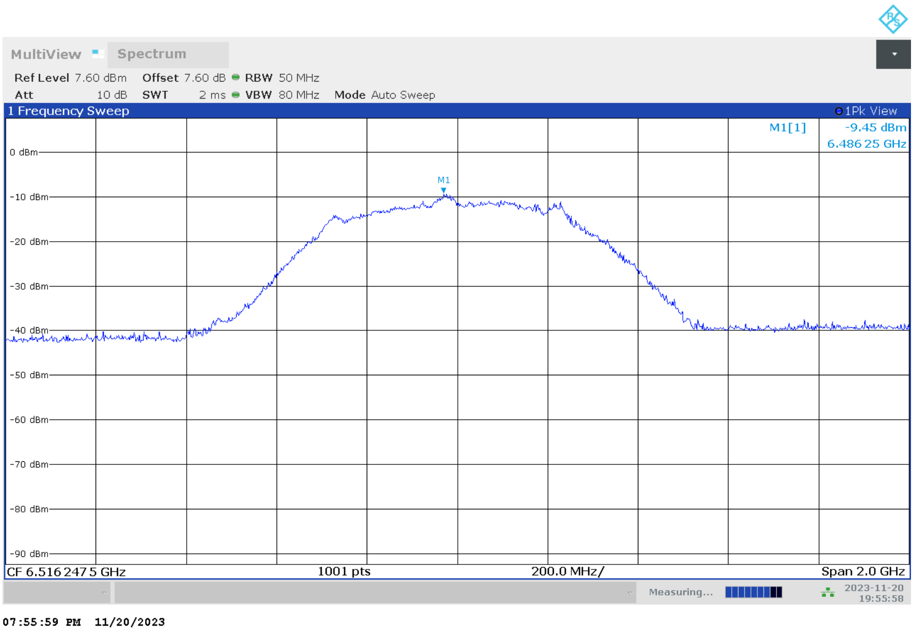
2.3.6 Test Method

The test was performed according to ANSI C63.10, section 10.3.5

2.3.7 Test Results

Frequency Channel	*f_M (GHz)*	*Resolution Bandwidth (MHz)*	*Peak Power (dBm)*	*Peak Power Limit (dBm)*
5	6.5162475	50	-9.45	0

Table 9: Peak Power



f_M of 6.516 GHz is contained within the UWB Bandwidth of f_L of 6.195 and f_H of 6.847.

2.3.8 Test Location and Test Equipment

The test was carried out in fully anechoic chamber no. 2:

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Signal and Spectrum Analyser	Rohde & Schwarz	FSW43	53496	12	2024-04-30
Double ridged horn antenna	EMCO	3115	19383	36	2026-04-30

Table 10

2.4 Radiated Emissions

2.4.1 Specification Reference

FCC 47 CFR Part 15 F, Clauses 15.505(a), 15.519(c),15.521(c), 15.521(h)
FCC 47 CFR Part 15 C, Clauses 15.209
ISED RSS-220, Clause 5.3.1(c), 5.3.1(d)
ISED RSS-Gen, Clauses 8.9

2.4.2 Equipment under Test and Modification State

SIMATIC RTLS4030T; S/N A51232; Modification state 0

2.4.3 Date of Test

2023-11-20

2.4.4 Environmental Conditions

Ambient Temperature	21 °C
Relative Humidity	43 %

2.4.5 Specification Limits

2.4.5.1 Radiated emissions up to 960 MHz according to 47 CFR 15.517(c), 15.519(c), 15.209 and ISED RSS-220, Clause 5.2.1 (c), 5.2.1 (c), 5.3.1 (d), 5.3.1 (d)

The radiated emissions at or below 960 MHz from a device operating under the provisions of this sections shall not exceed the general radiated emission limits:

General radiated emission limits:					
Frequency Range (MHz)	*Test distance (m)*	*Field strength*		*Field strength*	
		(µA/m)	*(dBµA/m)*	*(µV/m)*	*(dBµV/m)*
0.009 – 0.49	300	6.37 / *f*	20*lg(6.37 / *f*)	2400 / *f*	20*lg(2400 / *f*)
0.49 – 1.705	30	63.7 / *f*	20*lg(63.7 / *f*)	24000 / *f*	20*lg(24000 / *f*)
1.705 - 30	30	0.08	20*lg(0.08 / *f*)	30	20*lg(30 / *f*)
30 – 88	3	---	---	100	40
88 – 216	3	--	---	150	43.5
126 – 960	3	--	---	200	46
Note 1: *f* in kHz					

Table 11 General radiated emission limits

At frequencies at or above 30 MHz, measurements may be performed at distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements.

At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempts should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

2.4.5.2 Radiated emissions above 960 MHz according to 47 CFR 15.519(c)

The radiated emissions above 960 MHz shall not exceed the following average (RMS) limits when measured using a resolution bandwidth of 1 MHz:

Frequency range	*EIRP*
960 MHz – 1610 MHz	-75.3 dBm
1610 MHz – 1990 MHz	-63.3 dBm
1990 MHz – 3.1 GHz	-61.3 dBm
3.1 GHz – 10.6 GHz	-41.3 dBm
above 10.6 GHz	-61.3 dBm

2.4.5.3 Radiated emissions above 960 MHz according to ISED RSS-220, Clause 5.2.1 (d)

The radiated emissions above 960 MHz shall not exceed the following average (RMS) limits when measured using a resolution bandwidth of 1 MHz:

Frequency range	*EIRP*
960 MHz – 1610 MHz	-75.3 dBm
1610 MHz – 4750 MHz	-70.0 dBm
4750 MHz – 10.6 GHz	-41.3 dBm
above 10.6 GHz	-51.3 dBm

2.4.5.4 Radiated emissions above 960 MHz according to ISED RSS-220, Clause 5.3.1 (d)

The radiated emissions above 960 MHz shall not exceed the following average (RMS) limits when measured using a resolution bandwidth of 1 MHz:

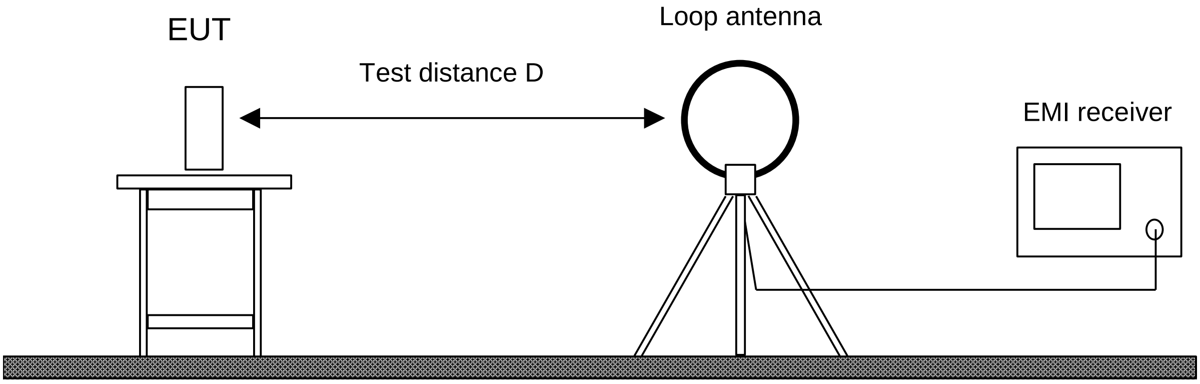
Frequency range	*EIRP*
960 MHz – 1610 MHz	-75.3 dBm
1610 MHz – 4750 MHz	-70.0 dBm
4750 MHz – 10.6 GHz	-41.3 dBm
above 10.6 GHz	-61.3 dBm

2.4.6 Test Method

The test was performed according to ANSI C63.10, sections 11.11 and 11.12

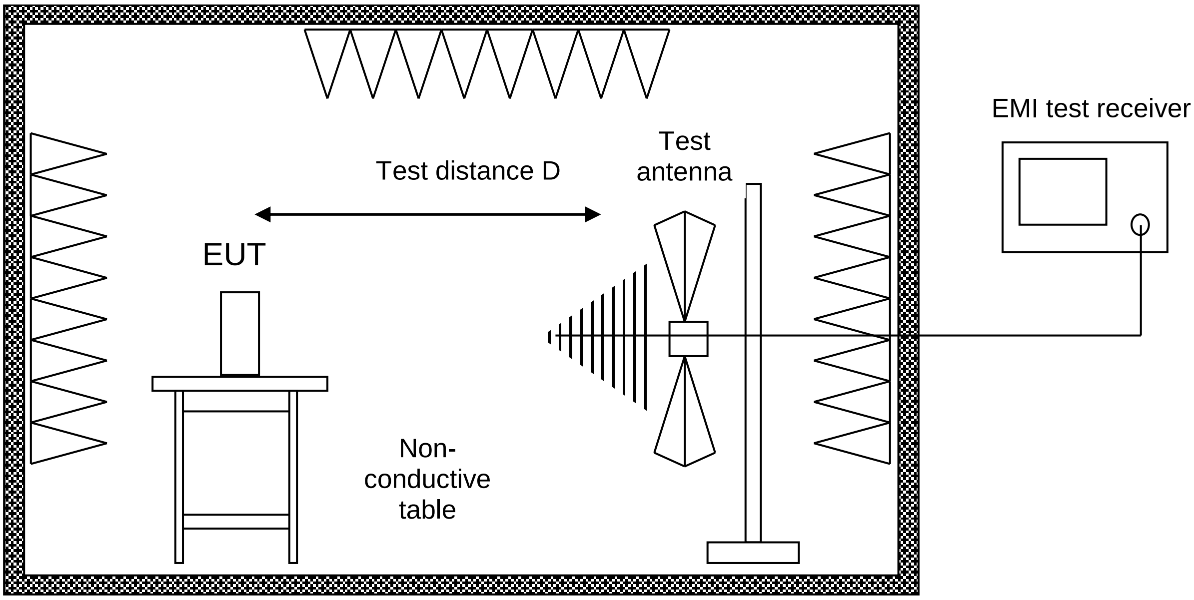
Prescans are performed in six positions of the EUT to get the full spectrum of emission caused by the EUT with the measuring antenna raised and lowered from 1 m to 4 m with vertical and horizontal polarisation to find the combination of table position, antenna height and antenna polarisation for the maximum emission levels.
Data reduction is applied to these results to select those levels having less margin than 10 dB or exceeding the limit using subranges and limited number of maximums.
Further maximisation for adjusting the maximum position is following.
Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

2.4.6.1 Frequency range 9 kHz – 30 MHz



The EUT was placed on a non-conductive table, 0.8 m above the ground.
Radiated emissions in the frequency 9 kHz – 30 MHz is measured within a semi-anechoic room with an active loop antenna with the measurement detector set to peak. In addition in the frequency range 9 kHz to 490 kHz also an average detector was used. The measurement bandwidth of the receiver was set to 300 Hz in the frequency range 9 kHz to 150 kHz and 10 kHz in the frequency range 150 kHz to 30 MHz. Prescans were performed in six positions of the EUT.
For final measurements the detector was set to CISPR quasi-peak and in addition to CISPR average in the frequency range 9 kHz to 490 kHz with a resolution bandwidth 200 Hz in the frequency range 9 kHz to 150 kHz and 9 kHz in the frequency range 150 kHz to 30 MHz. Final tests were performed immediately after a final frequency and zoom (for drifting disturbances) and maximum adjustment.

2.4.6.2 Frequency range 30 MHz – 1 GHz



Alternate test site (semi anechoic room)

The EUT was placed on a non-conductive table, 0.8 m above the ground plane
Radiated emissions in the frequency range 30 MHz – 1 GHz is measured within a semi-anechoic room with groundplane complying with the NSA requirements of ANSI C63.4. for alternative test sites. A linear polarised logarithmic periodic antenna combined with a 4:1 broadband dipole (“Trilog broadband antenna”) is used.
For prescan tests the test receiver is set to peak-detector with a bandwidth of 120 kHz.
With the measurement bandwidth of the test receiver set to 120 kHz CISPR quasi-peak detector is selected for final measurements following immediately after a final frequency zoom (for drifting disturbances) and maximum adjustment.

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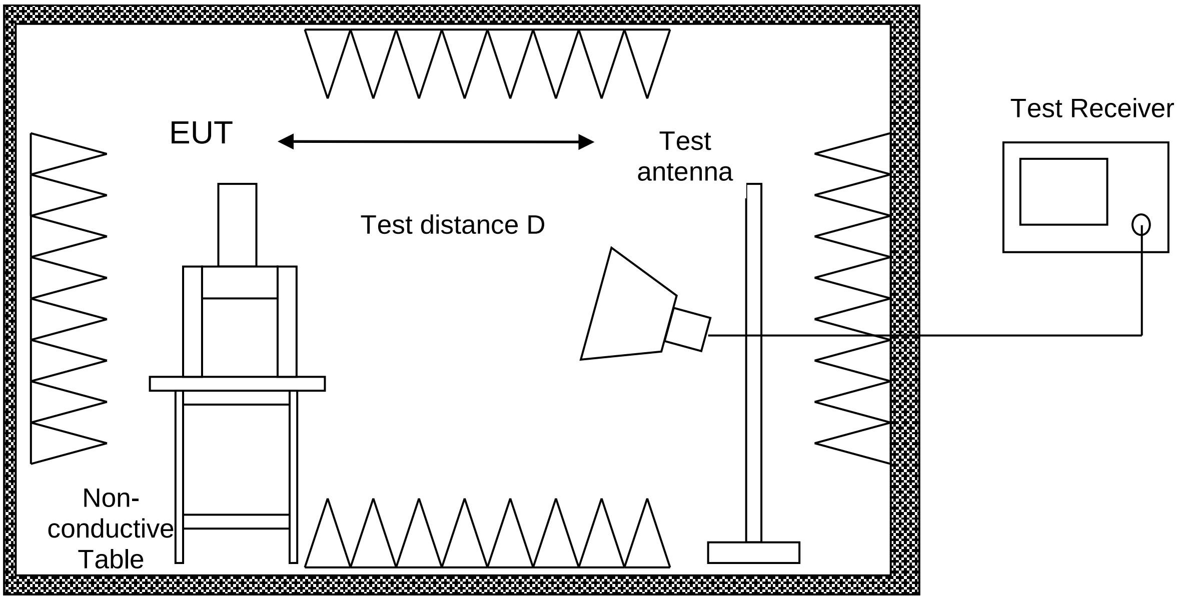
2.4.6.3 Frequency range above 1 GHz



Fully anechoic room

The EUT was placed on a non-conductive table, 1.5 m above the ground plane
Radiated emission tests above 1 GHz are performed in a fully anechoic room with the SVSWR requirements of ANSI C63.4. Measurements are performed both in the horizontal and vertical planes of polarisation using a test receiver with the detector function set to peak and average and the resolution bandwidth set to 1 MHz. Testing above 1 GHz is performed with horn antennas with the EUT in boresight of the antenna.
For prescan tests the test receiver is set to peak- and average-detector with a bandwidth of 1 MHz. With the measurement bandwidth of the test receiver set to 1 MHz and peak- and CISPR average-detector is selected for final measurements following immediately after a final frequency zoom (for drifting disturbances) and maximum adjustment.

2.4.7 Test Results

Frequency range	*Test distance*
9 kHz to 30 MHz	3 m
30 MHz to 1 GHz	3 m
960 MHz to 8.2 GHz	0.5 m
8.2 GHz to 18 GHz	1 m
18 GHz to 26.5 GHz	0.5 m
26.5 GHz to 40 GHz	0.1 m

Table 12

Sample calculation:

Final Value (dBµV/m) = Reading Value (dBµV) + (Cable attenuation (dB) + Antenna Transducer (dB(1/m)))

Additional correction of limit in the frequency range 9 – 490 kHz (300 m to 3 m): +80.0 dB
Additional correction of limit in the frequency range 490 kHz – 30 MHz (30 m to 3 m): +40.0 dB
Additional correction of limit in the frequency ranges above 1 GHz (3 m to 1 m): +9.54 dB

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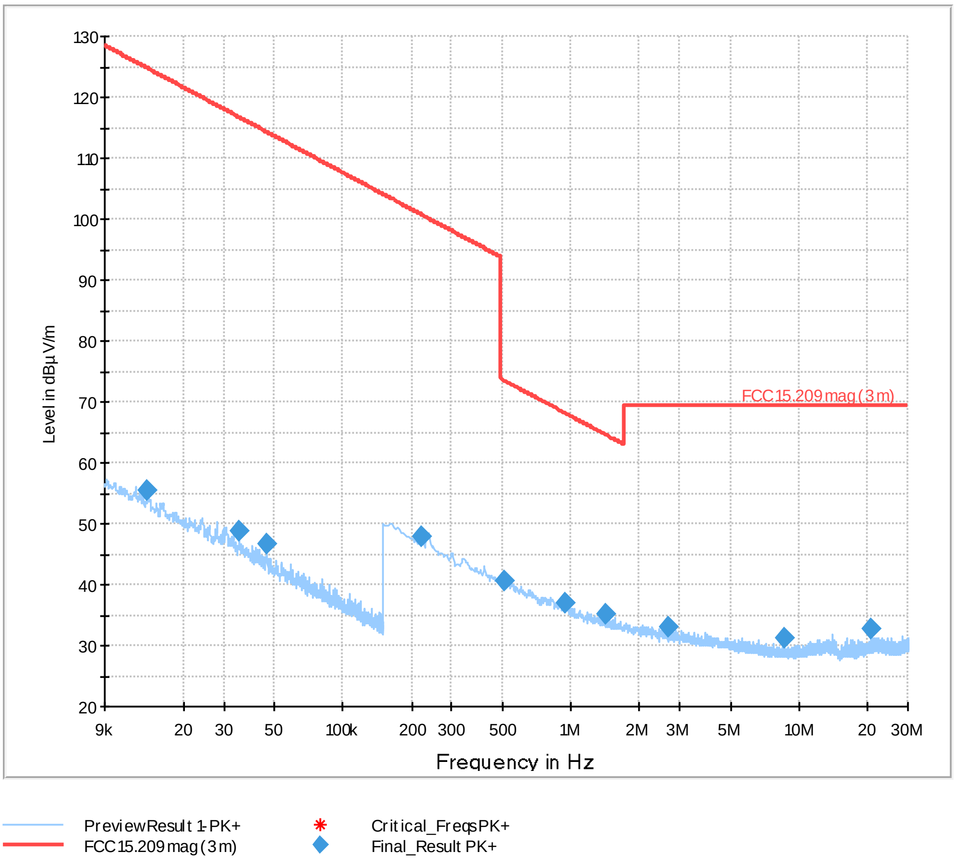
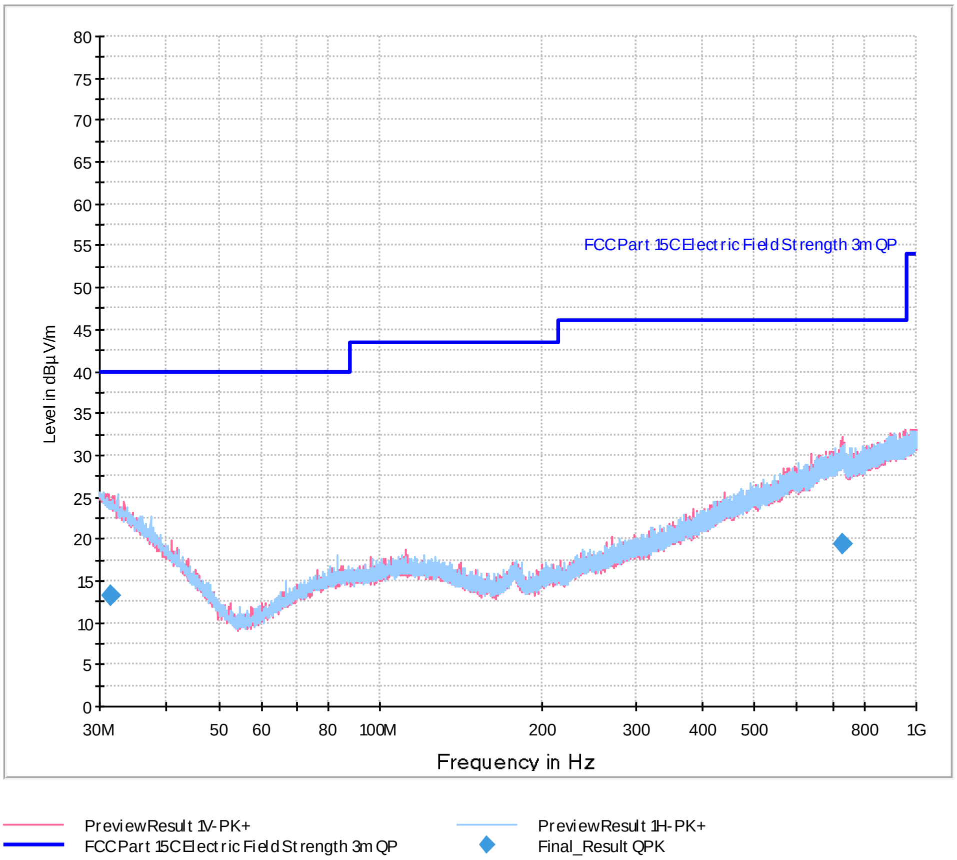


Final Results:

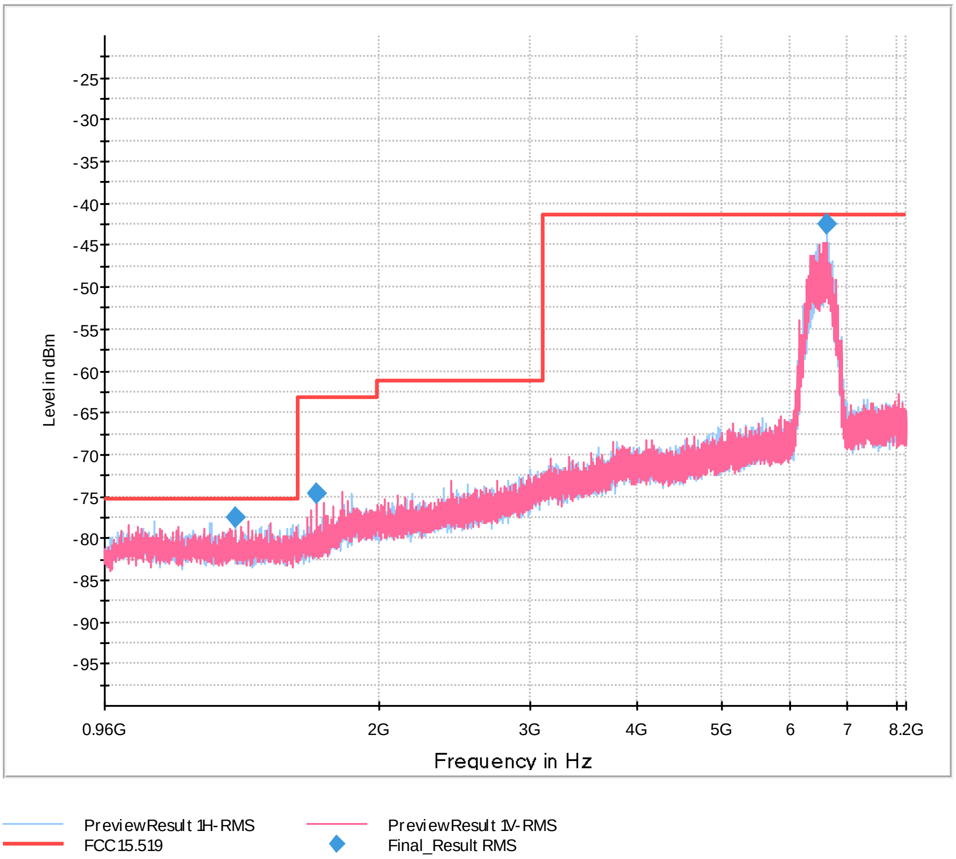
Frequency MHz	MaxPeak dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Pol	Azimuth deg	Corr. dB/m
0.013865	55.43	124.75	69.32	10.0	0.300	H	104.0	20
0.035050	48.93	116.70	67.77	10.0	0.300	H	119.0	20
0.046083	46.62	114.32	67.70	10.0	0.300	H	331.0	20
0.221640	47.88	100.69	52.81	10.0	10.000	H	67.0	20
0.508200	40.74	73.48	32.74	10.0	10.000	H	145.0	20
0.949980	36.83	68.07	31.24	10.0	10.000	V	181.0	20
1.430565	35.27	64.52	29.25	10.0	10.000	H	112.0	20
2.666355	33.06	69.50	36.44	10.0	10.000	H	99.0	20
8.609490	31.18	69.50	38.32	10.0	10.000	H	320.0	20
20.806200	32.85	69.50	36.65	10.0	10.000	V	342.0	20



Final Results:

Frequency MHz	QuasiPeak dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
31.470000	13.15	40.00	26.85	1000.0	120.000	150.0	H	-113.0	24.4
730.830000	19.41	46.02	26.61	1000.0	120.000	213.0	V	181.0	28.5

X-axis:



Final Results:

Frequency MHz	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
1363.177500	-77.56	-75.30	2.26	2.5	1000.000	150.0	H	125.0	-113.5
1689.430000	-74.70	-63.30	11.40	2.5	1000.000	150.0	H	34.0	-112.8
6637.517500	-42.56	-41.30	1.26	2.5	1000.000	150.0	H	278.0	-99.5

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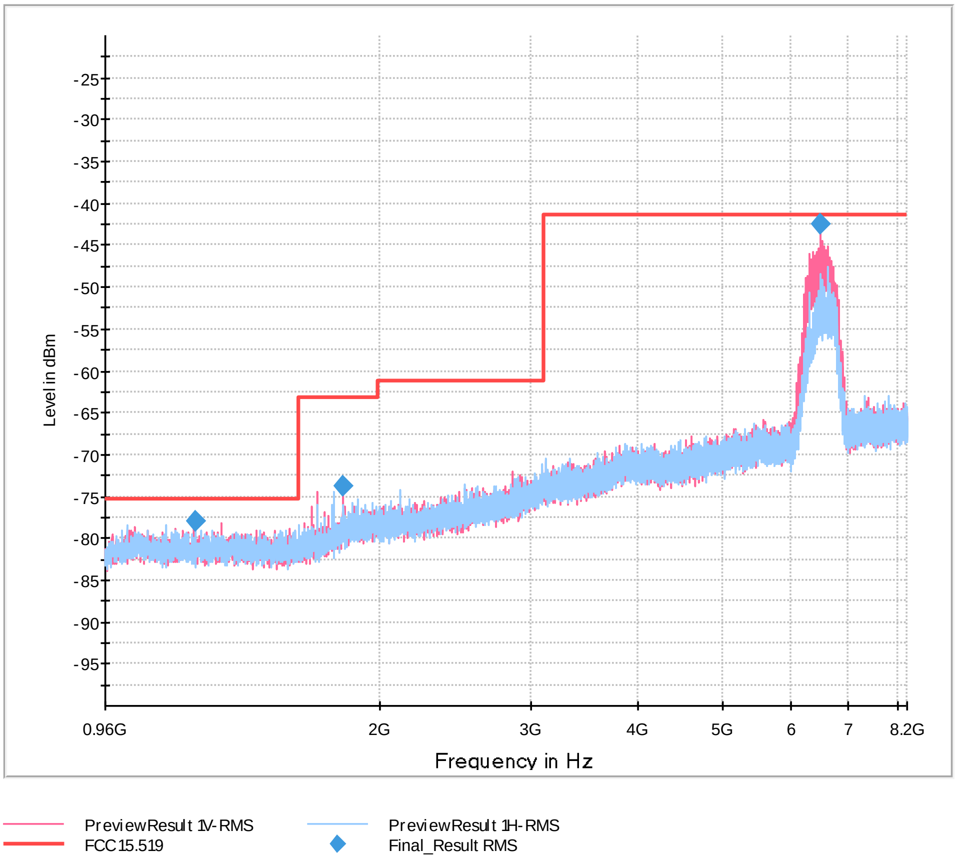
Y-axis:

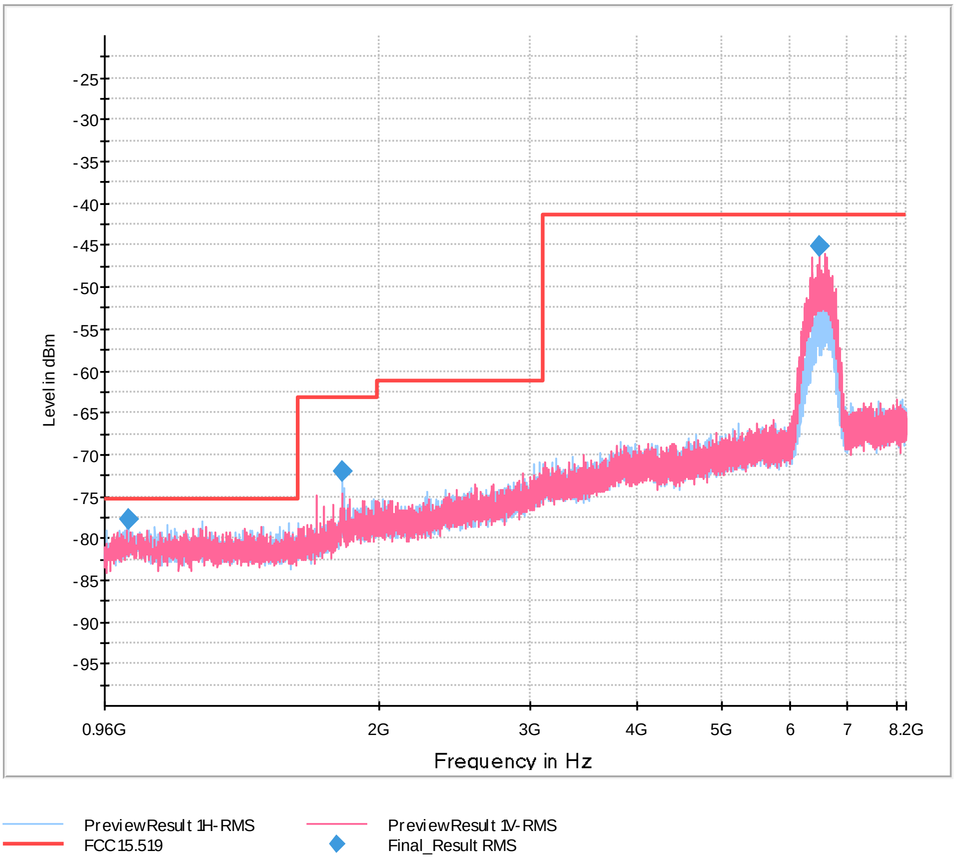


Final Results:

Frequency MHz	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
1220.187500	-77.88	-75.30	2.58	2.5	1000.000	150.0	H	152.0	-113.5
1809.795000	-73.74	-63.30	10.44	2.5	1000.000	150.0	V	57.0	-111.3
6516.247500	-42.38	-41.30	1.08	2.5	1000.000	150.0	V	286.0	-99.4

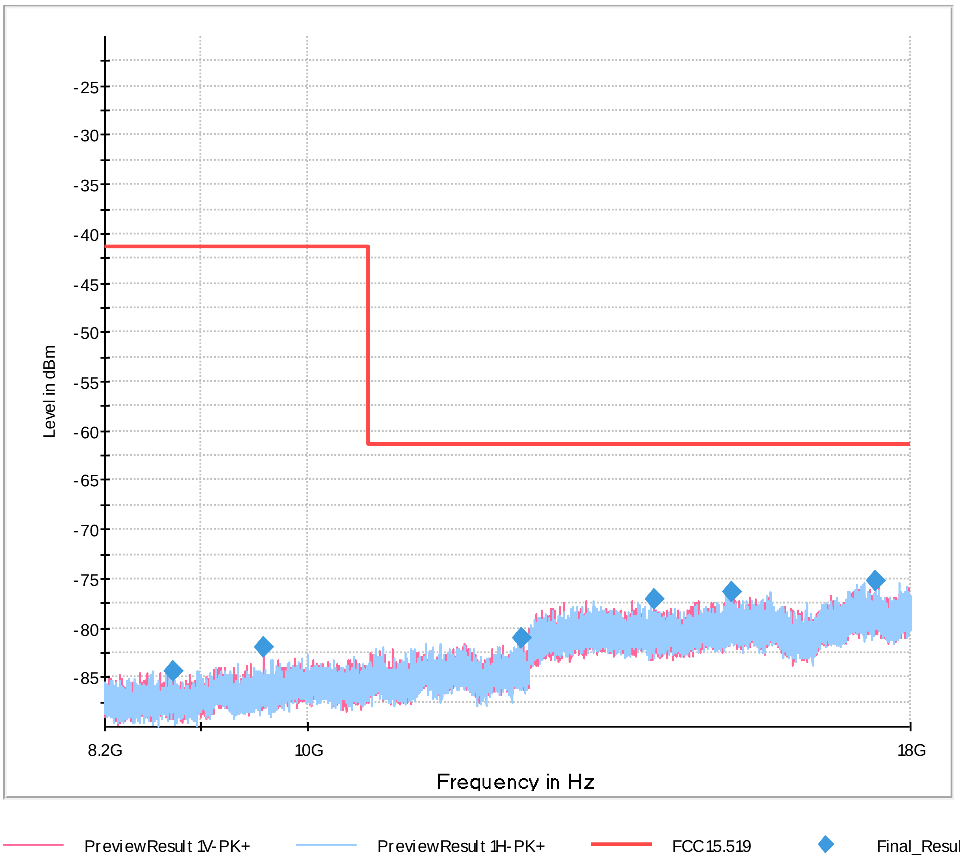
Y-axis was chosen as worst case for further and previous measurements.

Z-axis:



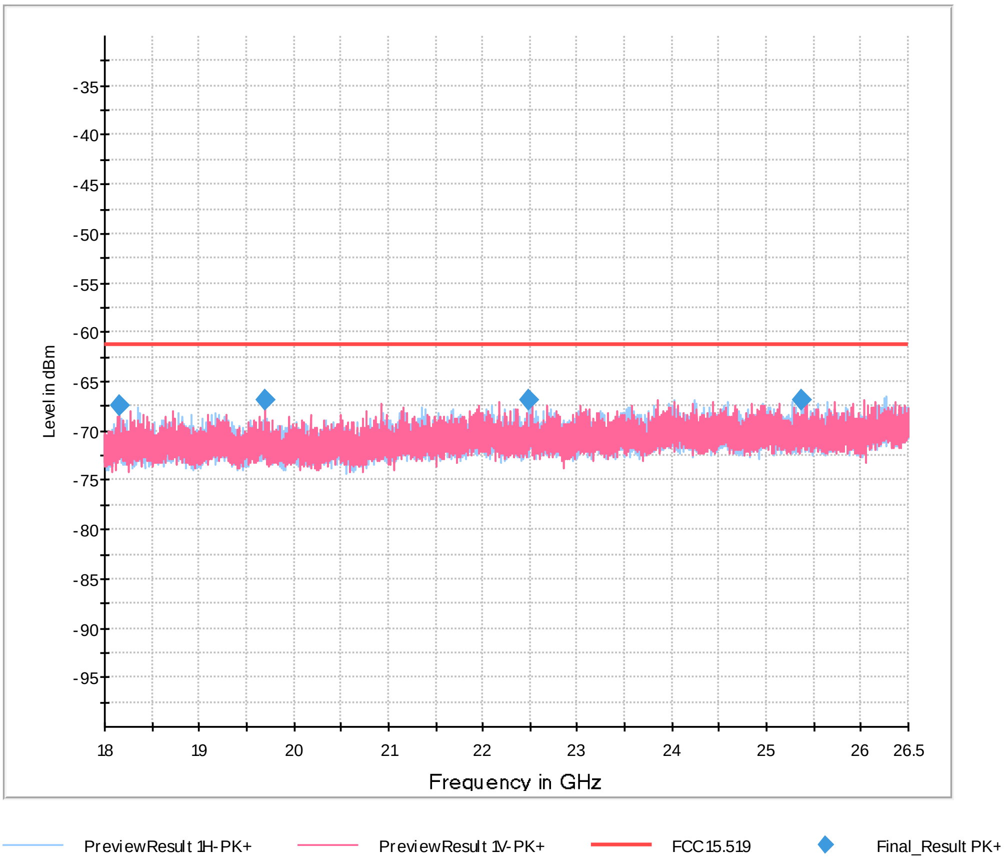
Final Results:

Frequency MHz	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
1024.707500	-77.82	-75.30	2.52	2.5	1000.000	150.0	H	42.0	-113.4
1812.510000	-71.97	-63.30	8.67	2.5	1000.000	150.0	H	166.0	-111.3
6507.197500	-45.18	-41.30	3.88	2.5	1000.000	150.0	V	279.0	-99.4



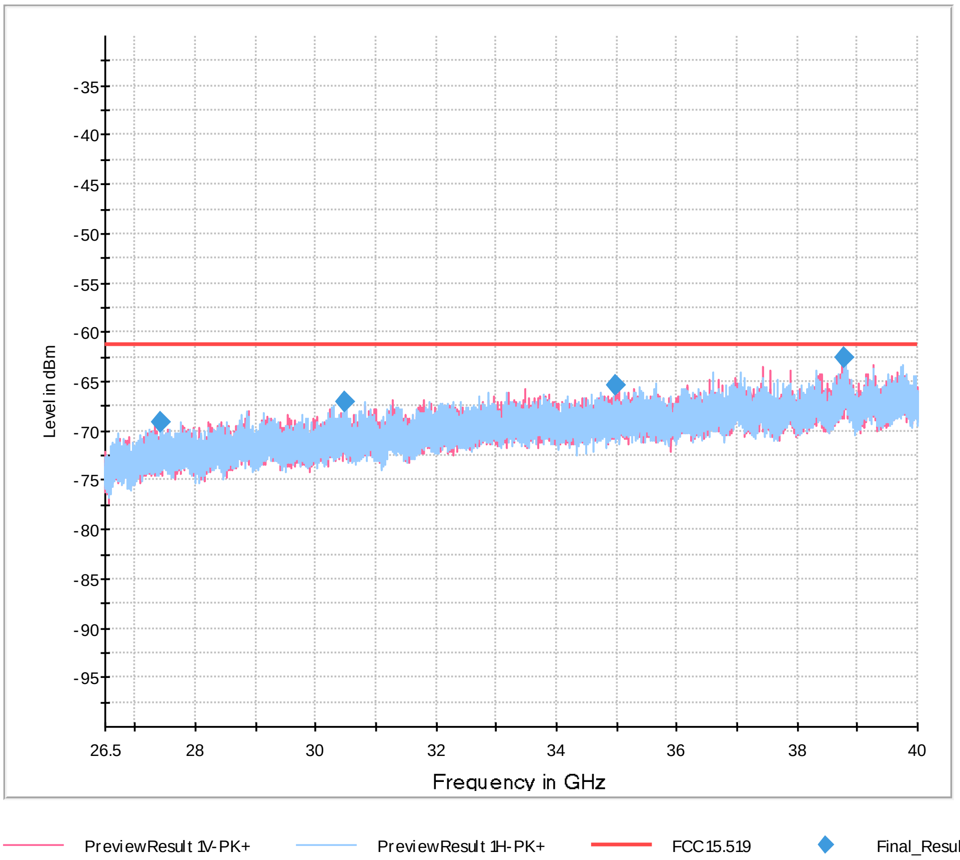
Final Results:

Frequency MHz	MaxPeak dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
8768.750000	-84.35	-41.30	43.05	2.5	1000.000	150.0	V	0.0	-98.6
9574.450000	-81.92	-41.30	40.62	2.5	1000.000	150.0	V	65.0	-97.8
12304.800000	-80.99	-61.30	19.69	2.5	1000.000	150.0	V	162.0	-96.2
14005.450000	-77.15	-61.30	15.85	2.5	1000.000	150.0	V	216.0	-92.3
15123.350000	-76.30	-61.30	15.00	2.5	1000.000	150.0	H	277.0	-91.6
17395.200000	-75.18	-61.30	13.88	2.5	1000.000	150.0	H	0.0	-90.0



Final Results:

Frequency MHz	MaxPeak dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
18164.050000	-67.39	-61.30	6.09	20.0	1000.000	150.0	V	44.0	-82.7
19692.350000	-66.88	-61.30	5.58	20.0	1000.000	150.0	V	74.0	-82.7
22476.100000	-66.84	-61.30	5.54	20.0	1000.000	150.0	H	39.0	-82.1
25376.725000	-66.78	-61.30	5.48	20.0	1000.000	150.0	H	225.0	-82.0



Final Results:

Frequency MHz	MaxPeak dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
27412.150000	-69.09	-61.30	7.79	20.0	1000.000	150.0	H	149.0	-83.9
30486.100000	-67.11	-61.30	5.81	20.0	1000.000	150.0	H	32.0	-83.1
34982.500000	-65.45	-61.30	4.15	20.0	1000.000	150.0	V	66.0	-82.1
38785.900000	-62.50	-61.30	1.20	20.0	1000.000	150.0	H	212.0	-81.3

2.4.8 Test Location and Test Equipment

The test was carried out in fully anechoic chamber no. 2 and semi anechoic chamber no. 11:

Instrument	Manufacturer	Type No	TE No	Calibra-tion Pe-riod (months)	Calibration Due
Signal and Spectrum Analyser	Rohde & Schwarz	FSW43	53496	12	2024-04-30
Double ridged horn antenna	EMCO	3115	19383	36	2026-04-30
Horn antenna	EMCO	3160-07	18874	---	---
Horn antenna	EMCO	3160-08	18875	---	---
Horn antenna	EMCO	3160-09	19125	---	---
Horn antenna	EMCO	3160-10	19442	---	---
Loop antenna	Schwarzbeck	FMZB 1519 B	44334	36	2026-06-30
ULTRALOG Antenna	Rohde & Schwarz	HL562E	61486	36	2026-04-30
Fixed anttenuator	Aeroflex	ATT 6dB	61491	36	2026-04-30
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	2024-04-30

Table 13

2.5 Radiated Emissions in GPS bands

2.5.1 Specification Reference

FCC 47 CFR Part 15 F, Clauses 15.519 (d)
ISED RSS-220, Clause 5.3.1 (d)

2.5.2 Equipment under Test and Modification State

SIMATIC RTLS4030T; S/N A51232; Modification state 0

2.5.3 Date of Test

2023-11-20

2.5.4 Environmental Conditions

Ambient Temperature	21 °C
Relative Humidity	43 %

2.5.5 Specification Limits

In addition to the radiated emission limits above, UWB transmitters shall not exceed the following average (RMS) limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency range	*EIRP*
1164 MHz – 1240 MHz	-85.3 dBm
1559 MHz – 1620 MHz	-85.3 dBm

2.5.6 Test Method

The test was performed according to ANSI C63.10, sections 11.11 and 11.12

2.5.7 Test Results

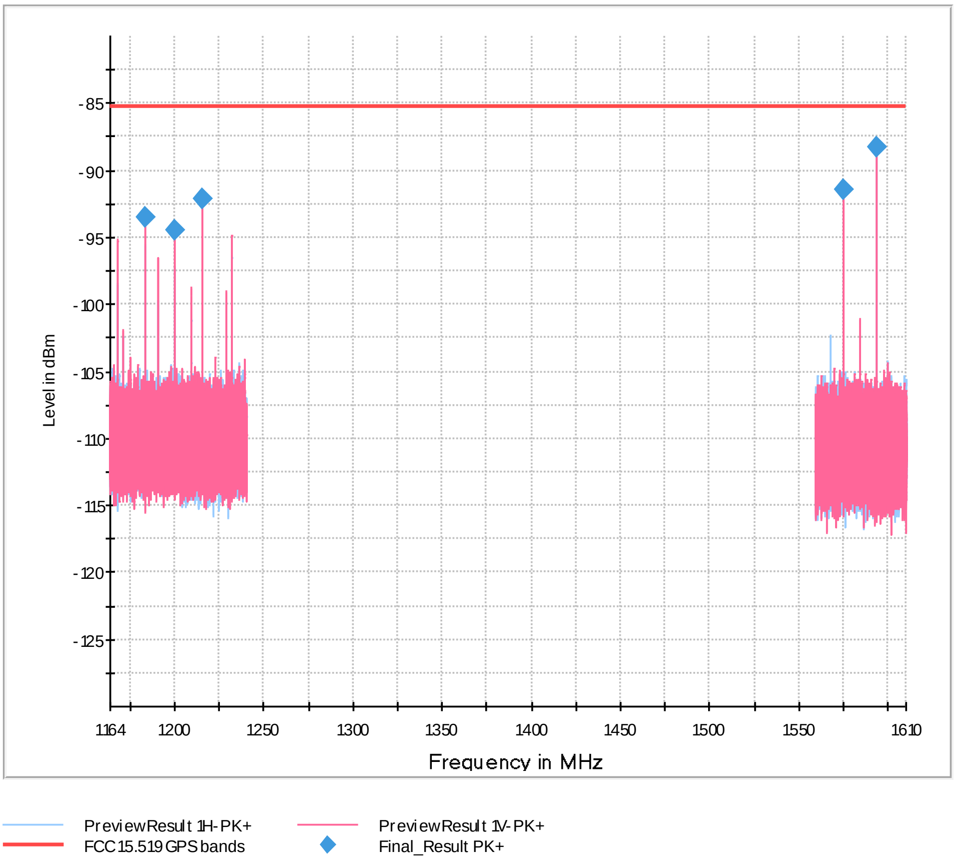
Frequency range	*Test distance*
1164 MHz – 1240 MHz	0.5 m
1559 MHz – 1620 MHz	0.5 m

Table 14

Sample calculation:

Final Value (dBµV/m) = Reading Value (dBµV) + (Cable attenuation (dB) + Antenna Transducer (dB(1/m)))

Product Service



Final Results:

Frequency MHz	*MaxPeak dBm*	*Limit dBm*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Height cm*	*Pol*	*Azimuth deg*	*Corr. dB*
1184.007000	-93.51	-85.30	8.21	2.5	1.000	150.0	V	57.0	-114
1200.006900	-94.52	-85.30	9.22	2.5	1.000	150.0	V	70.0	-114
1216.007180	-92.08	-85.30	6.78	2.5	1.000	150.0	V	78.0	-113
1574.396900	-91.49	-85.30	6.19	2.5	1.000	150.0	V	57.0	-113
1593.596615	-88.27	-85.30	2.97	2.5	1.000	150.0	V	44.0	-113

2.5.8 Test Location and Test Equipment

The test was carried out in fully anechoic chamber no. 2:

Instrument	Manufacturer	Type No	TE No	Calibra-tion Pe-riod (months)	Calibration Due
Signal and Spectrum Analyser	Rohde & Schwarz	FSW43	53496	12	2024-04-30
Double ridged horn antenna	EMCO	3115	19383	36	2026-04-30

Table 15

2.6 Signal deactivation

2.6.1 Specification Reference

FCC 47 CFR Part 15 F, Clause 15.519(a)
ISED RSS-220, Clauses 4 and 5.3.1(b)

2.6.2 Equipment under Test and Modification State

SIMATIC RTLS4030T; S/N A51232; Modification state 0

2.6.3 Date of Test

2023-11-21

2.6.4 Environmental Conditions

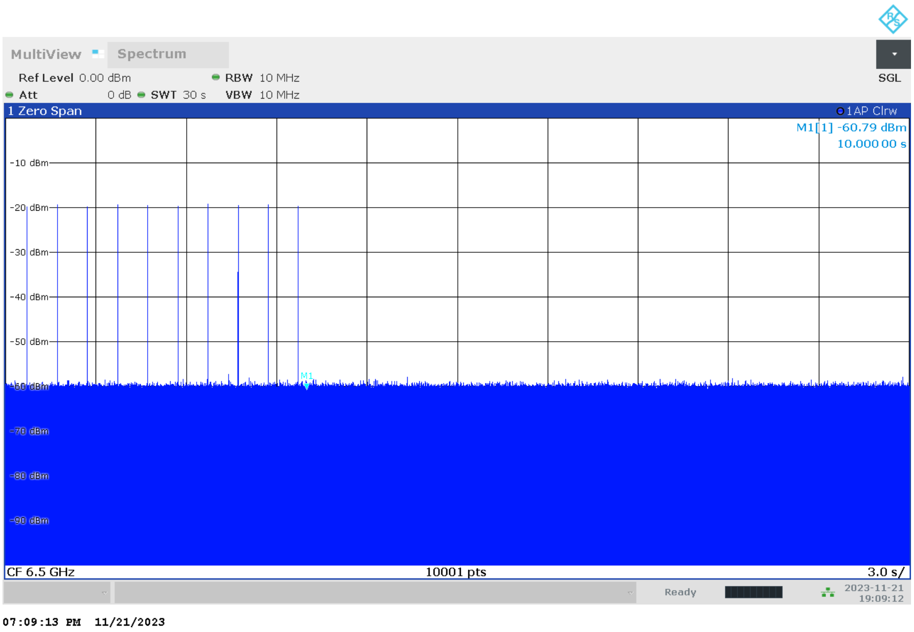
Ambient Temperature	21 °C
Relative Humidity	45 %

2.6.5 Specification Limits

A UWB device operating under the provisions of this section 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.

2.6.6 Test Method

2.6.7 Test Results



The associated receiver was turned off at the beginning of the measurement. Device under test ceased transmission within 10s.

2.6.8 Test Location and Test Equipment

The test was carried out in fully anechoic chamber no. 2:

Instrument	Manufacturer	Type No	TE No	Calibra-tion Pe-riod (months)	Calibration Due
Signal and Spectrum Analyser	Rohde & Schwarz	FSW43	53496	12	2024-04-30
Double ridged horn antenna	EMCO	3115	19383	36	2026-04-30

Table 16

3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Radio Interference Emission Testing		
Test Name	*kp*	*Expanded Uncertainty*
Conducted Voltage Emission		
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB
100 kHz to 200 MHz (50Ω/5µH AMN)	2	± 3.6 dB
Discontinuous Conducted Emission		
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB
Conducted Current Emission		
9 kHz to 200 MHz	2	± 3.5 dB
Magnetic Fieldstrength		
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB
Radiated Emission		
30 MHz to 300 MHz	2	± 4.9 dB
300 MHz to 1 GHz	2	± 5.0 dB
1 GHz to 6 GHz	2	± 4.6 dB
Test distance 10 m		
30 MHz to 300 MHz	2	± 4.9 dB
300 MHz to 1 GHz	2	± 4.9 dB
The expanded uncertainty reported according to to CISPR16-4-2: 2011 + A1 + A2 + Cor1 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%		

Table 17 Measurement uncertainty based on CISPR 16-4-2

Radio Interference Emission Testing		
Test Name	*kp*	*Expanded Uncertainty*
Occupied Bandwdith	2	± 5 %
Conducted Power		
9 kHz ≤ f < 30 MHz	2	± 1.0 dB
30 MHz ≤ f < 1 GHz	2	± 1.5 dB
1 GHz ≤ f ≤ 40 GHz	2	± 2.5 dB
1 MS/s power sensor (TS8997)	2	± 1.5 dB
Occupied Bandwidth	2	± 5 %
Power Spectral Density	2	± 3.0 dB
Radiated Power		
25 MHz – 6 GHz	1.96	±4.4 dB
1 GHz – 18 GHz	1.96	±4.7 dB
18 GHz – 40 GHz	1.96	±4.9 dB
40 GHz – 325 GHz	1.96	±6.1 dB
Conducted Spurious Emissions	2	± 3.0 dB
Radiated Spurious Emissions	2	± 6.0 dB
Voltage		
DC	2	± 1.0 %
AC	2	± 2.0 %
Time (automatic)	2	± 5 %
Frequency	2	± 10^{-7}
The expanded uncertainty reported according to to ETSI TR 100 028:2001 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%		

Table 18 Measurement uncertainty based on ETSI TR 100 028

The measurement uncertainty in the laboratory is less than or equal to the maximum measurement uncertainty according to CISPR16-4-2: 2011 + A1 + A2 + Cor1 (U_{CISPR}) and as specified in the test report below. This normative regulation means that the measured value is also the value to be assessed in relation to the limit value.

Test Name	*Expanded Uncertainty*
Occupied Bandwidth	±5 %
Conducted Power	
9 kHz ≤ f < 30 MHz	±1.0 dB
30 MHz ≤ f < 1 GHz	±1.5 dB
1 GHz ≤ f ≤ 40 GHz	±2.5 dB
1 MS/s power sensor (2.4 / 5 GHz band)	±1.5 dB
Power Spectral Density	±3.0 dB
Radiated Power	
25 MHz – 26.5 GHz	±6.0 dB
26.5 GHz – 66 GHz	±8.0 dB
40 GHz – 325 GHz	±10.0 dB
Conducted Spurious Emissions	±3.0 dB
Radiated Field Strength 9 kHz – 40 GHz	±6.0 dB
Voltage	
DC	± 1.0 %
AC	± 2.0 %
Time (automatic)	± 5 %
Frequency	± 10^{-7}

Table 19 Decision Rule: Maximum allowed measurement uncertainty