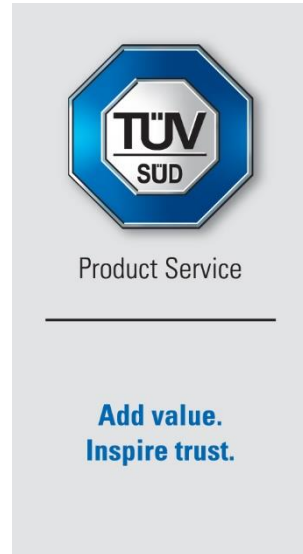


Report on the FCC and IC Testing of the Siemens AG

Access Control Reader

Model: Simatic RF1170R

In accordance with FCC 47 CFR § 1.1310 and § 2.1091 and ISED RSS-102 and ISED RSS-Gen



Prepared for: Siemens AG
DI PA DCP R&D 1
Gleiwitzer Str. 555
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COMMERCIAL-IN-CONFIDENCE

FCC ID: NXW-RF1170R
IC: 267X-RF1170R

Date: 2022-07-11
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RESPONSIBLE FOR	NAME	DATE	SIGNATURE
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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 reported testing was carried out on a sample equipment to demonstrate limited compliance with with FCC 47 CFR § 1.1310 and § 2.1091 and ISED RSS-102 and RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Martin Steindl	2023-07-11	<i>Steindl Martin</i> SIGN-ID 810576

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 2022 and ISED RSS-102:2015 + Amd.1 : 2021 and ISED RSS-Gen:2019

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1 Report Summary

1.1 Modification Report

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

<i>Revision</i>	<i>Description of changes</i>	<i>Date of Issue</i>
0	First Issue	2023-07-06
1	Correction of limit in section 2.1.7.2	2023-07-11

Table 1: Report of Modifications

1.2 Introduction

<i>Applicant</i>	Siemens AG DI PA DCP R&D 1 Gleiwitzer Str. 555 90475 Nürnberg, Germany
<i>Manufacturer</i>	Siemens AG 76181 Karlsruhe, Germany
<i>Model Number(s)</i>	Simatic RF1170R
<i>FCC ID:</i>	NXW-RF1170R
<i>IC:</i>	267X-RF1170R
<i>Serial Number(s)</i>	Prototype
<i>Hardware Version(s)</i>	Prototype
<i>Software Version(s)</i>	Prototype
<i>Number of Samples Tested</i>	1
<i>Test Specification(s) / Issue / Date</i>	CFR 47, Part, 1, § 1.1310 CFR 47, Part, 2, § 2.1091 RSS-102, Issue 5 (2015) + Amd. 1 (2021)
<i>Test Plan/Issue/Date</i>	---
<i>Order Number</i>	9707341357
<i>Date</i>	2022-10-22
<i>Date of Receipt of EUT</i>	2023-01-09
<i>Start of Test</i>	2023-01-10
<i>Finish of Test</i>	2023-02-03
<i>Name of Engineer(s)</i>	A. Deese
<i>Related Document(s)</i>	ANSI C63.10:2013



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Parts 1 and 2 and ISED RSS-102 and RSS-Gen is shown below.

<i>Section</i>	<i>Specification Clause</i>	<i>Test Description</i>	<i>Result</i>
2.1	1.1310	Radiofrequency radiation exposure limits	Pass

Table 2: Results according to FCC 47 CFR Parts 1 and 2

<i>Section</i>	<i>Specification Clause</i>	<i>Test Description</i>	<i>Result</i>
2.1	B.6 b.	Exemption limits for routine evaluation – SAR Evaluation	Pass

Table 3: Results according to ISED RSS-102



1.4 Product Information

1.4.1 Technical Description

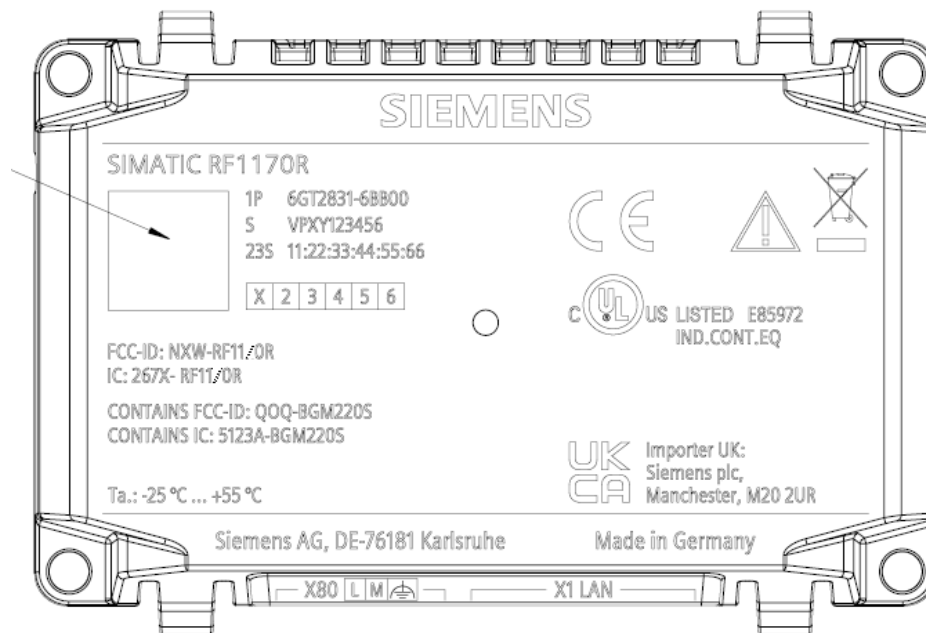
Frequency Band: 13.110 – 14010 MHz

Emission designator: A1D

Supply Voltage: 24 V / PoE

Supply Frequency: 0 Hz

Highest clock frequency (non-radio part): 1000 MHz



Marking plate

1.4.2 EUT Ports / Cables identification

Port	Max Cable Length specified	Usage	Screened
DC supply	N/A	DC supply	No
Ethernet	N/A	Telecommunication	Yes

Table 4



1.4.3 List of support devices

<i>Description</i>	<i>Type designation</i>	<i>Serial No. or ID</i>	<i>Manufacturer</i>
Switching Power Supply	POE20U-56(G)	Rev. C	Phihong

Table 5

1.4.4 Modules in EUT

<i>Type designation</i>	<i>Manufacturer</i>	<i>FCC ID</i>	<i>IC</i>
BGM220S22A	Silicon Labs	QOQ-BGM220S	5123A-BGM220S

Table 6

1.5 Test Configuration

The applicant provided a test software to control the EUT over ethernet interface.

1.6 Modes of Operation

The test was performed with maximum power reading a transponder tag

1.7 EUT Modifications Record

The table below details modifications made to the EUT during the test programme.
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
1	As applied by customer	Siemens AG	2023-02-03

Table 7



Product Service

1.8 Test Location

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

Test Name	Name of Engineer(s)
RF Exposure	A. Deese

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany



2 Test Details

2.1 Bandwidth of Signal

2.1.1 Specification Reference

FCC 47 CFR Part 1, § 1.1307, § 1.1310
FCC 47 CFR Part 2, § 2.1091
ISED RSS-102, Clause 2.5
ISED RSS-Gen, Clause 3.2

2.1.2 Equipment under Test and Modification State

Simatic RF1170R; Modification State 0

2.1.3 Date of Test

2023-01-23

2.1.4 Environmental Conditions

Ambient Temperature	20 °C
Relative Humidity	35 %

2.1.5 Specification Limits

Specification limits for uncontrolled environment
For multiple frequencies the sum of the ratios should be smaller than 1.



2.1.5.1 Specification Limits acc. to CFR 47 § 1.1307(b)(3)

For single RF sources: A single RF source is exempt if:

- (A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. The exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section.

2.1.5.2 Specification Limits acc. to CFR 47 § 1.1310, Table 1 (ii)

Frequency range (MHz)	Electric Field (V rms)	Magnetic field (A/m rms)	Power density (W/m ²)	Reference period (min)
1.34 – 30	824 / f	2.19 / f	180 / f ²	< 30
1500 – 100000	---	---	1.0	< 30

Table 8

2.1.5.3 Specification Limits acc. to RSS-102

Frequency (MHz)	At separation distance of ≥ 50 mm
2450	309 mW

Table 9, SAR evaluation exemption acc. to Table 1

Frequency range (MHz)	Electric Field (V rms)	Magnetic field (A/m rms)	Power density (W/m ²)	Reference period (min)
10 – 20	27.46	0.0728	2	6
300 – 6000	3.142 / f ^{0.3417}	0.008335 / f ^{0.3417}	0.02619 / f ^{0.6834}	6

Table 10, RF fieldstrength limit acc. to Table 4

2.1.6 Test Method

The antenna was moved all over the equipment under test using a test distance of 5 cm as declared by the applicant.

Bluetooth was exempt from evaluation with an eirp carrier power measurement.



2.1.7 Test Results

2.1.7.1 Test Results acc. to CFR 47 § 1.1310, Table 1 (ii)

Frequency (MHz)	Magnetic field strength (A/m)	Limit (A/m)	Ratio
13.56	0.0270	0.162	0.167

Frequency (MHz)	EIRP (dBm)	Limit (dBm)
2442	-4.78	0.00

Bluetooth exempt from further evaluation

2.1.7.2 Test Results acc. to RSS-102, Tables 1 and 4

Frequency (MHz)	Magnetic field strength (A/m)	Limit (A/m)	Ratio
13.56	0.0270	0.0728	0.371

Frequency (MHz)	EIRP	Limit	Ratio
2442	-4.78 dBm = 0.333 mW	309 mW = 24.9 dBm	0.001

Multiple frequencies

$$0.371 + 0.001 = 0.372 < 1$$



2.1.8 Test Location and Test Equipment

The test was carried out in radio test laboratory

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Electromagnetic radiation meter	Narda	EMR-200	19590	36	2025-12-31
Electric field probe	Narda	Type 8.3	19591	36	2025-12-31
Magnetic field probe	Narda	Type 12.1	19592	36	2025-12-31
Waveguide horn antenna	EMCO	3115	19383	36	2023-03-31
Spectrum analyzer	Rohde & Schwarz	FSW43	53496	12	2023-04-30

Table 11



3 Measurement Uncertainty

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

<i>Radio Interference Emission Testing</i>		
<i>Test Name</i>	<i>kp</i>	<i>Expanded Uncertainty</i>
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 CISPR16-4-2: 2011 + A1 + A2 + Cor1 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$		

Table 12 Measurement uncertainty based on CISPR 16-4-2



<i>Radio Interference Emission Testing</i>		
<i>Test Name</i>	<i>kp</i>	<i>Expanded Uncertainty</i>
Occupied Bandwidth	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 ETSI TR 100 028:2001 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$		

Table 13 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.



<i>Test Name</i>	<i>Expanded Uncertainty</i>
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 14 Decision Rule: Maximum allowed measurement uncertainty