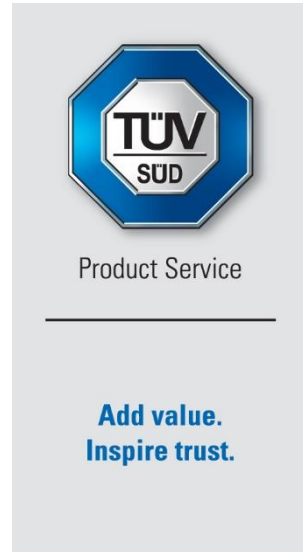


Report on the FCC and IC Testing of the Siemens AG

Access Control Reader

Model: Simatic RF1140R

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-RF1140R
IC: 267X-RF1140R

Date: 2023-07-19
Document Number: TR-713276724-12 | Revision 2

| RESPONSIBLE FOR | NAME | DATE | SIGNATURE |
|----------------------|-----------------|------------|--------------------|
| Project Management | Alexander Deese | 2023-07-19 | SIGN-ID 814324 |
| Authorised Signatory | Matthias Stumpe | 2023-07-20 | SIGN-ID 814845 |

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 | Alexander Deese | 2023-07-19 | SIGN-ID 814324 |

Laboratory Accreditation Laboratory recognition Industry Canada test site registration
DAkS Reg. No. D-PL-11321-11-02 Registration No. BNetzA-CAB-16/21-15 3050A-2
DAkS 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 header of chapter 2, and limit in section 2.1.7.2 | 2023-07-11 |
| 2 | Measurement results for magnetic field strength at 125 kHz and electric field strength at 13.56 MHz added, chapter 2.1.7.2 Exposure condition added, chapter 2.1.6 | 2023-07-19 |

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 RF1140R |
| <i>FCC ID:</i> | NXW-RF1140R |
| <i>IC:</i> | 267X-RF1140R |
| <i>Serial Number(s)</i> | Prototype |
| <i>Hardware Version(s)</i> | Prototype |
| <i>Software Version(s)</i> | Prototype |
| <i>Number of Samples Tested</i> | 2 |
| <i>Test Specification(s) / Issue / Date</i> | FCC 47 CFR Part 15 C : 2019 and ISED RSS-210, Issue 10, Amd. 1 : 2019 ISED RSS-Gen, Issue 5, Amd. 1 : 2019 |
| <i>Test Plan/Issue/Date</i> | --- |
| <i>Order Number</i> | 9707342710 |
| <i>Date</i> | 2022-10-20 |
| <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> | M. Steindl; A. Fink |
| <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

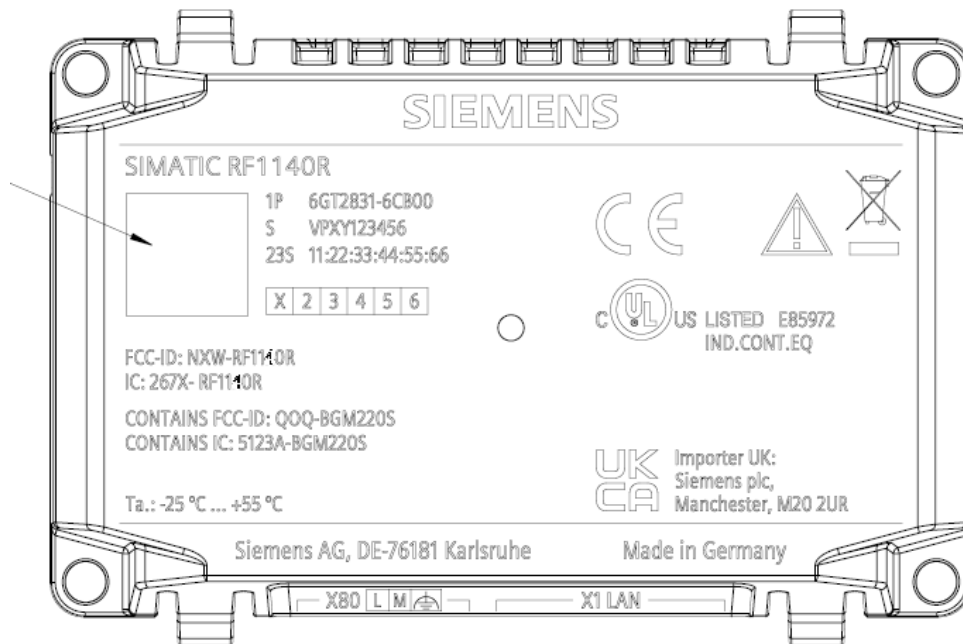
Frequency Band: 125 kHz; 13.110 – 14010 MHz

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 for 125 kHz and 13.56 MHz separately

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 | Modification acc. to documentation of applicant | 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
SPR-002 : 2022

2.1.2 Equipment under Test and Modification State

Simatic RF1140R; 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 (0 dBm), 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) |
|-----------------------|-----------------------------|--------------------------------|-----------------------------------|------------------------|
| 0.003 – 10 | 83 | 90 | --- | Instantaneous |
| 0.1 - 10 | --- | 0.73 / f | --- | 6 |
| 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 field strength 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 and whole-body exposure condition 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 | 0.0269 | 0.162 | 0.167 |

| Frequency (MHz) | EIRP (dBm) | Limit (dBm) |
|-----------------|------------|-------------|
| 2442 | -10.20 | 0.00 |

Bluetooth exempt from further evaluation

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

| Frequency (kHz) | Reference Period (minutes) | Electric field strength (V/m) | Limit (V/m) | Ratio |
|-----------------|----------------------------|-------------------------------|-------------|-------|
| 125 | Instantaneous | 1.95 | 83.00 | 0.023 |

| Frequency (kHz) | Reference Period (minutes) | Magnetic field strength (A/m) | Limit (A/m) | Ratio |
|-----------------|----------------------------|-------------------------------|-------------|-------|
| 125 | 6 | 0.524 | 5.84 | 0.090 |
| 125 | Instantaneous | 0.524 | 90 | 0.006 |

| Frequency (MHz) | Reference Period (minutes) | Electric field strength (V/m) | Limit (V/m) | Ratio |
|-----------------|----------------------------|-------------------------------|-------------|-------|
| 13.56 | 6 | 1.71 | 27.46 | 0.062 |

| Frequency (MHz) | Reference Period (minutes) | Magnetic field strength (A/m) | Limit (A/m) | Ratio |
|-----------------|----------------------------|-------------------------------|-------------|-------|
| 13.56 | 6 | 0.0269 | 0.0728 | 0.370 |

| Frequency (MHz) | EIRP | Limit | Ratio |
|-----------------|----------------------|-------------------|-------|
| 2442 | -10.2 dBm = 0.095 mW | 309 mW = 24.9 dBm | 0.001 |

Multiple frequencies

$$0.090 + 0.370 + 0.001 = 0.461 < 1$$



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 Field strength | | |
| 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 11 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 12 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 13 Decision Rule: Maximum allowed measurement uncertainty