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April 30, 2019

Prüfbericht / *Test Report* Nr. / *No.* TR-72654-33448-01 (Edition 3)

Applicant:	Siemens AG
Type of equipment:	RFID Reader, 13.56 MHz
Type designation:	SIMATIC RF 310R
Order No.:	9703762961
Test standards:	FCC Code of Federal Regulations, CFR 47, Part 15, (partly) Sections 15.207 Industry Canada Radio Standards Specifications RSS-GEN Issue 5, Sections 8.9 (partly)

Note:

The test data of this report is related only to the individual item which has been tested. This report shall not be reproduced except in full extent without the written approval of the testing laboratory.

Bundesnetzagentur

BNetzA-CAB-16/21-15

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TÜV SÜD Product Service GmbH

Äußere Frühlingstraße 45
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Germany

Table of Contents

1 Description of the Equipment Under Test (EUT)

General data of EUT	
Type designation[1]:	SIMATIC RF 310R
Parts[2]:	
Serial number(s):	---
Manufacturer:	Siemens AG Gleiwitzer Str. 555 D-90475 Nürnberg Germany
Type of equipment:	RFID Reader, 13.56 MHz
Version (HW / SW):	As received
FCC ID:	---
Industry Canada ID:	---
Additional parts/accessories:	

[1] Type designation of the system if EUT consists of more than one part.
[2] Type designations of the parts of the system, if applicable.

Technical data of EUT	
Application frequency range:	13.11 MHz - 14.01 MHz
Frequency range:	13.553 MHz – 13.567 MHz
Operating frequency:	13.56 MHz
Type of modulation:	---
Pulse train:	---
Pulse width:	---
Number of RF-channels:	1
Channel spacing:	---
Designation of emissions[3]:	---
Type of antenna:	Integrated on printed board
Size/length of antenna:	---
Connection of antenna:	☐ detachable ☒ not detachable

[3] Also known as "Class of Emission".

2 Administrative Data

Application details	
Applicant (full address):	Siemens AG Gleiwitzer Str. 555 90475 Nürnberg Germany
Contact person:	Mr. Bernd Hennig
Order number:	---
Receipt of EUT:	2018-05-07
Date(s) of test:	2018-05-07 to 2018-06-25
Note(s):	---

Report details	
Report number:	TR-72654-33448-01
Edition:	3
Issue date:	April 30, 2019

3 Identification of the Test Laboratory

Details of the Test Laboratory	
Company name:	TÜV SÜD Product Service GmbH
Address:	Aeussere Fruehlingstrasse 45 D-94315 Straubing Germany
Laboratory recognition:	Registration No. BNetzA-CAB-16/21-15
Industry Canada test site registration:	3050A-2
Contact person:	Mr. Markus Biberger Phone: +49 9421 5522-0 Fax: +49 9421 5522-99

4 Summary

Summary of test results
The tested sample complies with the requirements set forth in the **Code of Federal Regulations CFR 47, Part 15, Sections 15.207 (partly)** of the Federal Communication Commission (FCC) and the **Radio Standards Specifications** **RSS-GEN Issue 5, Sections 8.9 (partly)** of Industry Canada (IC).

Die Prüfergebnisse beziehen sich ausschließlich auf das zur Prüfung vorgestellte Prüfmuster. Ohne schriftliche Genehmigung des Prüflabors darf der Prüfbericht auszugsweise nicht vervielfältigt werden. *The test results relate only to the individual item which has been tested. Without the written approval of the test laboratory this report may not be reproduced in extracts.*

Datum / *Date*	Geprüft von / *Tested by*	Freigabe durch / *Checked by*
April 30, 2019	Karl Roidt Responsible for testing	Markus Biberger Reviewer

Prüfergebnis / *Test Result*

☒ **Erfüllt / *Passed***

☐ **Nicht erfüllt / *Not passed***

5 Operation Mode and Configuration of EUT

Operation Mode(s)
Reading tag continuously

Configuration(s) of EUT
The EUT was configured as stand alone device

List of ports and cables				
Port	*Description*	*Classification*[4]	*Cable type*	*Cable length*
S1	Serial interface (with DC)	signal/control port	Shielded	4 m

List of devices connected to EUT				
Item	*Description*	*Type Designation*	*Serial no. or ID*	*Manufacturer*
1	Testsetup			Siemens AG

[4] Ports shall be classified as ac power, dc power or signal/control port

6 Measurement Procedures

6.1 Radiated Emission at Alternative Test Site

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, sections 15.205(b) and 15.225(d) IC RSS-GEN Issue 5, sections 8.9 and 8.10(b)(c) and IC RSS-210 Issue 9, section B.6
Guide:	ANSI C63.10

Radiated emission in the frequency range 30 MHz to 1 GHz is measured within a semi-anechoic room with groundplane complying with the NSA requirements of ANSI C63.4 respectively ANSI C63.10 for alternative test sites. A linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna") is used. The measurement bandwidth of the test receiver is set to 120 kHz with quasi-peak detector selected.

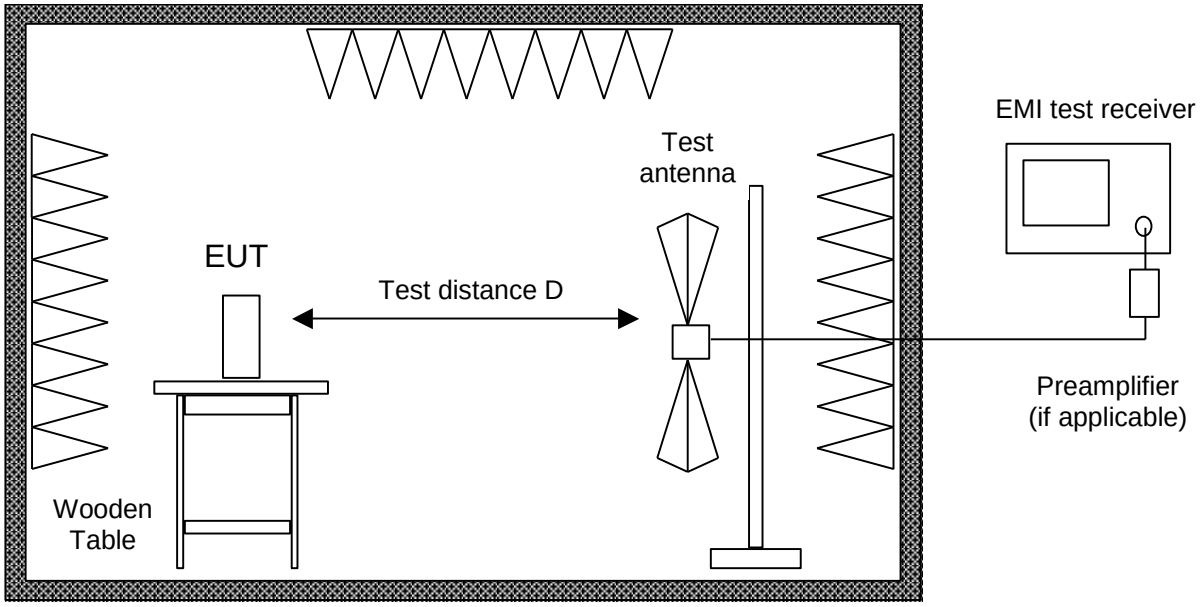
If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Hand-held or body-worn devices are tested in the position producing the highest emission relative to the limit as verified by prescans in fully anechoic room.

If no prescan in a fully anechoic room is used first a peak scan is performed in four positions to get the whole spectrum of emission caused by EUT with the measuring antenna raised and lowered from 1 to 4 m to find table position, antenna height and antenna polarization for the maximum emission levels.
Data reduction is applied to these results to select those levels having less margin than 10 dB to or exceeding the limit using subranges and limited number of maximums. Further maximization is following.
With detector of the test receiver set to quasi-peak final measurements are performed immediately after frequency zoom (for drifting disturbances) and maximum adjustment.
Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

In cases where prescans in a fully anechoic room are taken (e. g. if EUT is operating for a short time only or battery is dircharged quickly) final measurements with quasi-peak detector are performed manually at frequencies indicated by prescan with EUT rotating all around and receiving antenna raising and lowering within 1 meter to 4 meters to find the maximum levels of emission.
Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For measuring emissions of intentional radiators and receivers a test distance D of 3 meters is selected. Testing of unintentional radiators is performed at a distance of 10 meters. If limits specified for 3 meters shall be used for measurements performed at 10 meters distance the limits are calculated according to CFR 47 Part 15 section 15.31(d) and (f)(1) using an inverse linear-distance extrapolation factor of 20 dB/decade.



Alternate test site (semi anechoic room)

Test instruments used:

	Type	*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	EMI test receiver	ESU8	2044	100232	Rohde & Schwarz
☐	EMI test receiver	ESR7	22643	101713	Rohde & Schwarz
☒	EMI test receiver	ESW26	28268	101315	Rohde & Schwarz
☒	Trilog antenna Cabin no. 8	VULB 9163	2058	9163-408	Schwarzbeck
☒	Microwave cable Cabin no. 8	EF393	2053	---	Albatross Projects
☐	Microwave cable Cabin no. 8	LCF12-50	2057	P1.6.19	RFS
☐	Microwave cable Cabin no. 8	LCF12-50	2057	P1.3.9	RFS
☐	Microwave cable Cabin no. 8	FA210AF04000505	2068	64610-1	Rosenberger Micro-Coax
☒	Microwave cable Cabin no. 8	FA210AF040005050G	2127	72061-01	Rosenberger Micro-Coax
☒	Semi anechoic room	No. 8	2057	---	Albatross
☒	Measurement Software	EMC32_K8 V9.25.00	1852	100016	Rohde & Schwarz
☒	Measurement Software	EMC32_K8 V10.20.01	1852	100016	Rohde & Schwarz

7 Photographs Taken During Testing

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Test setup for radiated emission measurement (alternate test site)

8 Test Results

FCC CFR 47 Parts 2 and 15			
Section(s)	*Test*	*Page*	*Result*
	Radiated emission 30 MHz to 1 GHz	14	Test passed

8.1 Radiated Emission Measurement 30 MHz to 1 GHz

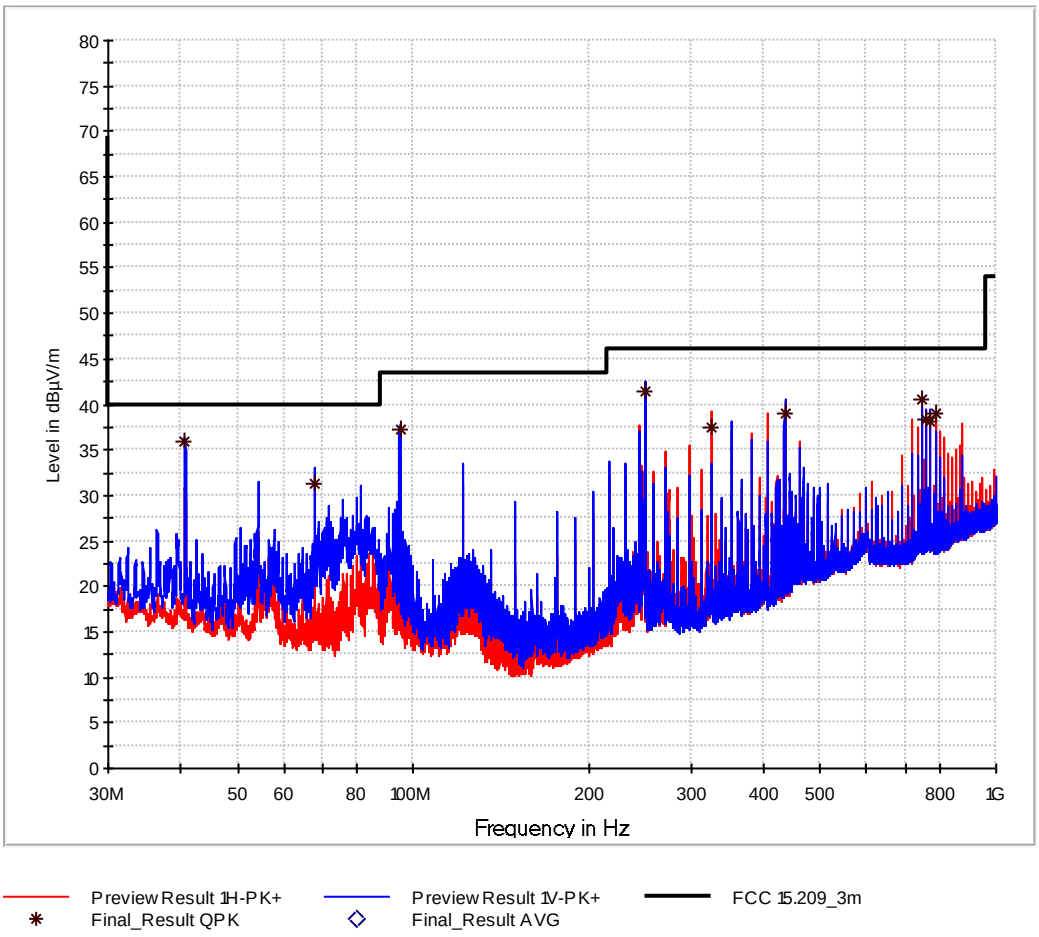
Rules and specifications:	CFR 47 Part 15, sections 15.205(b) and 15.225(d) IC RSS-GEN Issue 5, sections 8.9 and 8.10(b)(c) and IC RSS-210 Issue 9, section B.6		
Guide:	ANSI C63.10		
Limit:	Frequency of Emission (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)
	30 - 88	100	40.0
	88 - 216	150	43.5
	216 - 960	200	46.0
	Above 960	500	54.0
	Additionally, the level of any unwanted emissions shall not exceed the level of the fundamental emission.		
Measurement procedures:	Radiated Emission at Alternative Test Site (6.1)		

Test Result:	Test passed

Sample calculation of final values:

Final Value (dBµV/m) = Reading Value (dBµV) + Correction Factor (dB/m) + Pulse Train Correction (dB)

Comment:	Transmitting continuously
Date of test:	2018-06-21
Test site:	Semi-anechoic room, cabin no. 8
Test distance:	Frequencies ≤ 8.2 GHz: 3 meters



Final Results 1:

Frequency MHz	*QuasiPeak dBµV/m*	*Average dBµV/m*	*Limit dBµV/m*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Height cm*	*Pol*	*Azimuth deg*	*Corr. dB*
40,680000	35,91	0,00	40,00	4,09	1000,0	120,000	100,0	V	150,0	14,6
67,825000	31,26	0,00	40,00	8,74	1000,0	120,000	110,0	V	64,0	11,1
94,920000	37,31	0,00	43,50	6,19	1000,0	120,000	103,0	V	-119,0	12,9
249,990000	41,49	0,00	46,00	4,51	1000,0	120,000	103,0	V	36,0	14,2
325,410000	37,40	0,00	46,00	8,60	1000,0	120,000	100,0	H	122,0	15,9
433,890000	38,98	0,00	46,00	7,02	1000,0	120,000	103,0	V	150,0	18,4
745,740000	40,63	0,00	46,00	5,37	1000,0	120,000	135,0	H	147,0	23,7
759,300000	38,43	0,00	46,00	7,57	1000,0	120,000	106,0	V	-85,0	23,8
772,860000	38,22	0,00	46,00	7,78	1000,0	120,000	100,0	V	-83,0	23,8
786,420000	38,91	0,00	46,00	7,09	1000,0	120,000	215,0	H	34,0	23,8

9 Referenced Regulations

All tests were performed with reference to the following regulations and standards:

☒	CFR 47 Part 2	Code of Federal Regulations Part 2 (Frequency allocation and radio treaty matters; General rules and regulations) of the Federal Communication Commission (FCC)	October 1, 2016
☒	CFR 47 Part 15	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)	October 1, 2016
☐	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	June 13, 2014 (published on June 20, 2014)
☒	ANSI C63.10	American national Standard of Procedures for Compilance Testing of Unlicensed Wireless Devices	June 27, 2013 (published on September 13, 2013)
☒	RSS-Gen	Radio Standards Specification RSS-GEN Issue 5 containing General Requirements for Compilance of Radio Apparatus, published by Industry Canada	November 2014
☒	RSS-210	Radio Standards Specification RSS-210 Issue 9 for Licence-Exempt Radio Apparatus: Category I Equipment, published by Industry Canada	August 2016
☐	RSS-310	Radio Standards Specification RSS-310 Issue 3 for Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category II Equipment, published by Industry Canada	December 2010
☒	RSS-102	Radio Standards Specification RSS-102 Issue 5: Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), published by Industry Canada	March 2015
☐	ICES-003	Interference-Causing Equipment Standard ICES-003 Issue 6: Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement, published by Industry Canada	January 2016
☒	CISPR 22	Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, “Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement”	1997

☐	CAN/CSA CISPR 22-10	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement (Adopted IEC CISPR 22:2008, sixth edition, 2008-09)	2010
☒	TRC-43	Designation of Emissions, Class of Station and Nature of Service, published by Industry Canada	November 2012

10 Test Equipment List with Calibration Data

Type	*Inv.-No.*	*Type Designation*	*Serial Number*	*Manufacturer*	*Calibration Organization*	*Last Calibration*	*Next Calibration*
EMI test receiver	28268	ESW26	101315	Rohde & Schwarz	Rohde & Schwarz	2018/05	2019/05
TRILOG Broadband Antenna	2058	VULB 9163	9163-408	Schwarzbeck	Rohde & Schwarz	2016/07	2018/07
Semi anechoic room	2057	Cabin No. 8	---	Albatross	No cal. req.	No cal. req.	No cal. req.

Note 1: No calibration required.
Note 2: Not calibrated separately but with the whole test system when recording calibration data.
Note 3: No calibration required. Devices are checked before use.
Note 4: No calibration required. Devices are checked by calibrated equipment during test.

11 Revision History

Revision History			
Edition	*Date*	*Issued by*	*Modifications*
1	2018-07-02	Karl Roidt	First Edition
3	2019-04-30	Karl Roidt	Third Edition: RSS-GEN Issue 4 updated to Issue 5