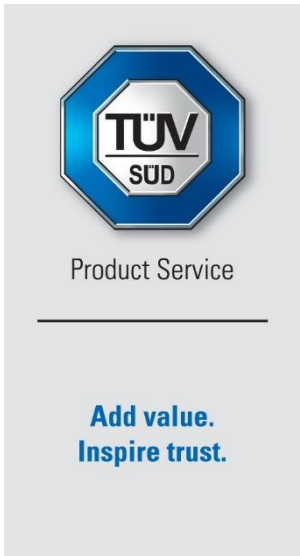


Report on Radio Testing of the
Siemens AG

Model: SIMATIC RF1070R

In accordance with ARIB STD-T82 #

Prepared for: Siemens AG
Gleiwitzer Str. 555
90475 Nürnberg
Germany



COMMERCIAL-IN-CONFIDENCE

Date: 2025-11
Document Number: TR-713380375-00 | Revision 2

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
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Authorised Signatory	Martin Steindl	2025-11-19	 SIGN-ID 1089171

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

Executive Statement:

A sample of this product was tested and found to be compliant with ARIB STD-T82 #.

not accredited



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Annex A: Photographs of Test Setups



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. The current version replaces all previous versions.

<i>Revision</i>	<i>Description of changes</i>	<i>Date of Issue</i>
0	First Issue	2025-09-08
1	Photos of Test Setup removed to Annex.	2025-10-13
2	Summary for MIC added, page 3.	2025-11-19

Table 1: Report of Modifications

1.2 Introduction

<i>Applicant</i>	Siemens AG
<i>Manufacturer</i>	Siemens AG 76181 Karlsruhe Germany
<i>Model Number(s)</i>	SIMATIC RF1070R
<i>MLFB Number(s)</i>	6GT2831-6BA60
<i>Serial Number(s)</i>	44117611
<i>Hardware Version(s)</i>	---
<i>Software Version(s)</i>	---
<i>Number of Samples Tested</i>	1
<i>Test Specification(s) / Issue / Date</i>	ARIB STD-T82 Version 1.1 (2005-11-30) #
<i>Test Plan/Issue/Date</i>	---
<i>Order Number</i>	9709244985
<i>Date</i>	2025-07-09
<i>Date of Receipt of EUT</i>	2025-08-19
<i>Start of Test</i>	2025-08-25
<i>Finish of Test</i>	2025-08-25
<i>Name of Engineer(s)</i>	Alexander Deese
<i>Related Document(s)</i>	Test method of 13.56 MHz RFID by TELECOM (2002-09-19)

not accredited.



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with ARIB STD-T82 is shown below.

Section	Specifica- tion Clause	Article	Test Description	Result
2.1	3.2.1	RERA Article 44, paragraph 1, item 2, 2. RERA Article 46-2, paragraph 1, item 1, 1.	Carrier frequency	Pass
2.1	3.2.2	RERA Article 2-59 RERA Article 46-2, paragraph 1, item 1, 2. ORE Article 59-2	Frequency tolerance	Pass
2.2	3.2.3	RERA Article 46-2, paragraph 1, item 1, 3. ORE Article 61-2	Leakage electric field strength	Pass
2.3	3.2.4	RERA Article 46-2, paragraph 1, item 1, 4. ORE Article 62-2	Emission of harmonics or subharmonics radio wave	Pass
2.4	3.2.5	RERA Article 46-2, paragraph 1, item 1, 5.	Human radio wave exposure strength	Pass

Table 2: Results for Transmitter Conformance Requirements

RERA: Regulation for Enforcement of the Radio Act
ORE: Ordinance Regulating Radio Equipment



1.4 Product Information

1.4.1 General Technical Description

Frequency Band: 13.553 MHz – 13.567 MHz

Supply Voltage: 5 V (USB powered)

Supply Frequency: DC





1.5 Test Configuration

The EUT was 5 V / DC power supplied.

1.6 Modes of Operation

RFID continuously reading.

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.

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

Table 3



Product Service

1.9 Test Location

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

<i>Test Name</i>	<i>Name of Engineer(s)</i>
Configuration according to 1.5 and 1.6	
Frequency tolerance	Alexander Deese
Leakage electric field strength	Alexander Deese
Emission of harmonics or subharmonics radio wave	Alexander Deese
Human radio wave exposure strength	Alexander Deese

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany



2 Test Results

Design Document		Reference No.		
		Designation No.		
1. Type Code	6GT2831-6BA60		2. Manufacturer name	Siemens AG
3. Frequency of carrier	13.56 MHz		4. High frequency output by harmonics and sub-harmonics	< 50 μW (-13 dBm)
5. Electric field intensity of leak waves	(1) Frequency between 13.553 MHz (inclusive) and 13.567 MHz (inclusive)	(2) Frequency between 13.41 MHz (inclusive and 13.553 MHz (exclusive) or between 13.567 MHz (exclusive) and 13.71 MHz (inclusive)	(3) Frequency between 13.11 MHz (inclusive and 13.41 MHz (exclusive) or between 13.71 MHz (exclusive and 14.01 MHz (inclusive)	(4) Other frequencies
	< 93.5 dBμV/m	< 60.5 dBμV/m	< 49.9 dBμV/m	< 43.0 dBμV/m
6. Status of safety facilities to intensity of radio waves	Electric field intensity: < 40 V/m Magnetic field intensity: < 0.15 A/m			
8. Remarks	---			



Test Record SIMATIC RF1070R		9. Serial No.	600108
		10. Date of manufacture	2023-05
11. Frequency of carrier waves	(1) Design value	(2) Measurement value	14. Measurement conditions etc. Measurement location: Semianechoic room No. 11. Measuring organisation: TÜV SÜD Product Service GmbH; see page 6 of this test report Date of measurement: 2025-08-25 Metrological conditions: Temperature: 23 °C Relative Humidity: 48 % Measuring instruments: Radiated emissions: Test receiver ESW44 Loop antenna FMZB 1519 C Signal and spectrum analyser FSW43 Electromagnetic radiation meter EMR-200 Calibration data: See Test Details of this test report Measurement method: Field strength test has been performed at 3 m distance in a semi anechoic room. Electrical field intensity of leak waves has been measured with the EUT modulated signal.
	13.56 MHz	13.56000 MHz (see section 3.1)	
12. High frequency output by harmonics and subharmonics	(1) Design value	(2) Measurement value	
	< 50 µW (-13 dBm)	27.12 MHz: -60.41 dBm 40.68 MHz: -55.55 dBm 54.24 MHz: -82.99 dBm 67.8 MHz: -63.76 dBm 81.36 MHz: -79.71 dBm 94.92 MHz: -83.43 dBm (see section 3.3)	
13. Electric field intensity of leak waves	(1) Frequency between 13.553 MHz (inclusive) and 13.567 MHz (inclusive)	13.560 MHz: 59.97 dBµV/m (see section 3.2)	
	(2) Frequency between 13.41 MHz (inclusive) and 13.553 MHz (exclusive) or between 13.567 MHz (exclusive) and 13.71 MHz (inclusive)	13.5529 MHz: 44.41 dBµV/m (see section 3.2) 13.5671 MHz: 44.23 dBµV/m (see section 3.2)	
	(3) Frequency between 13.11 MHz (inclusive) and 13.41 MHz (exclusive) or between 13.71 MHz (exclusive) and 14.01 MHz (inclusive)	13.409 MHz: 23.30 dBµV/m (see section 3.2) 13.711 MHz: 23.10 dBµV/m (see section 3.2)	
	(4) Other frequencies	13.109 MHz: 21.69 dBµV/m (see section 3.2) 14.011 MHz: 17.68 dBµV/m (see section 3.2)	
Status of safety facilities to intensity of radio waves	(1) Design value	(2) Measurement value	
Electric field intensity	< 40 V/m	20.25 V/m (see section 3.4)	
Magnetic field intensity	< 0.15 A/m	0.1150 A/m (see section 3.4)	



3 Test Details

3.1 Frequency tolerance

3.1.1 Specification Reference

ARIB STD-T82, clause 3.2.1 and 3.2.2

3.1.2 Equipment under Test and Modification State

SIMATIC RF1070R; S/N 44117611; Modification state 0

3.1.3 Date of Test

2025-08-25

3.1.4 Environmental Conditions

Ambient Temperature	23 °C
Relative Humidity	48 %

3.1.5 Specification Limits

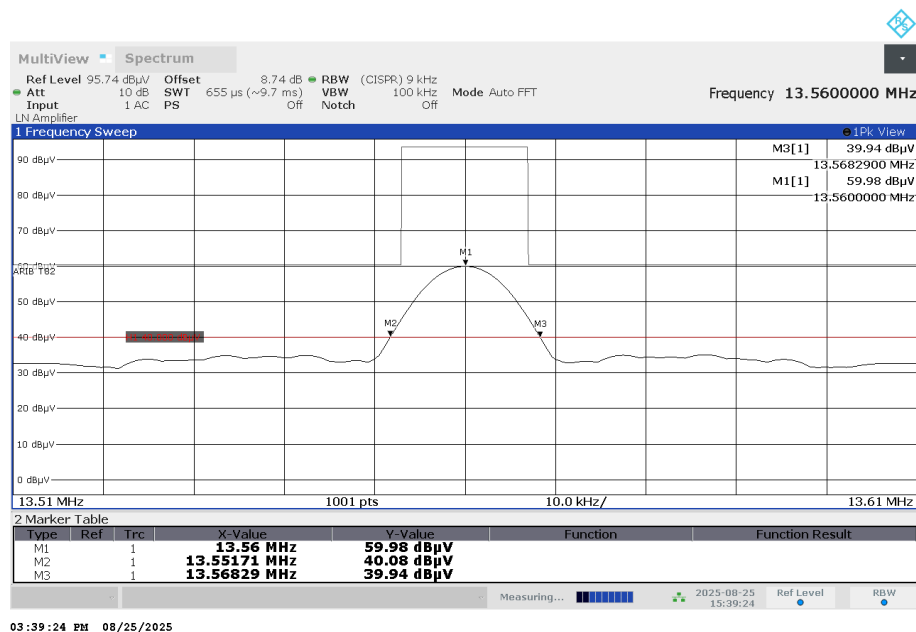
Frequency tolerance: 50 ppm (parts per million).

3.1.6 Test Method

Test method of 13.56 MHz RFID by TELECOM (2002-09-19)

3.1.7 Test Results

Lower frequency [MHz]	Upper frequency [MHz]	Center frequency [MHz]	Assigned frequency [MHz]	Variance [ppm]	Limit [ppm]	Result
13.55171	13.56829	13.56000 MHz	13.56 MHz	0	50	Pass



3.1.8 Test Location and Test Equipment

The test was carried out in semi anechoic room no. 11:

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Last Calibration	Calibration Due
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	2025-03-13	2026-03-31
Loop antenna	Schwarzbech	FMZB 1519 C	72526	36	2025-01-14	2028-01-31
Semi anechoic room	Frankonia	Cabin no. 11	42961	---	---	---

Table 4



3.2 Leakage electric field strength

3.2.1 Specification Reference

ARIB STD-T82, clause 3.2.3

3.2.2 Equipment under Test and Modification State

SIMATIC RF1070R; S/N 44117611; Modification state 0

3.2.3 Date of Test

2025-08-25

3.2.4 Environmental Conditions

Ambient Temperature 23 °C
Relative Humidity 48 %

3.2.5 Specification Limits

<i>Frequency band</i>	<i>Limit</i>
13.11 MHz to 13.41 MHz	316 µV/m
13.41 MHz to 13.553 MHz	1.061 mV/m
13.553 MHz to 13.567 MHz	47.544 mV/m
13.567 MHz to 13.7 MHz	1.061 mV/m
13.71 MHz to 14.01 MHz	316 µV/m
Other frequencies	150 µV/m

3.2.6 Test Method

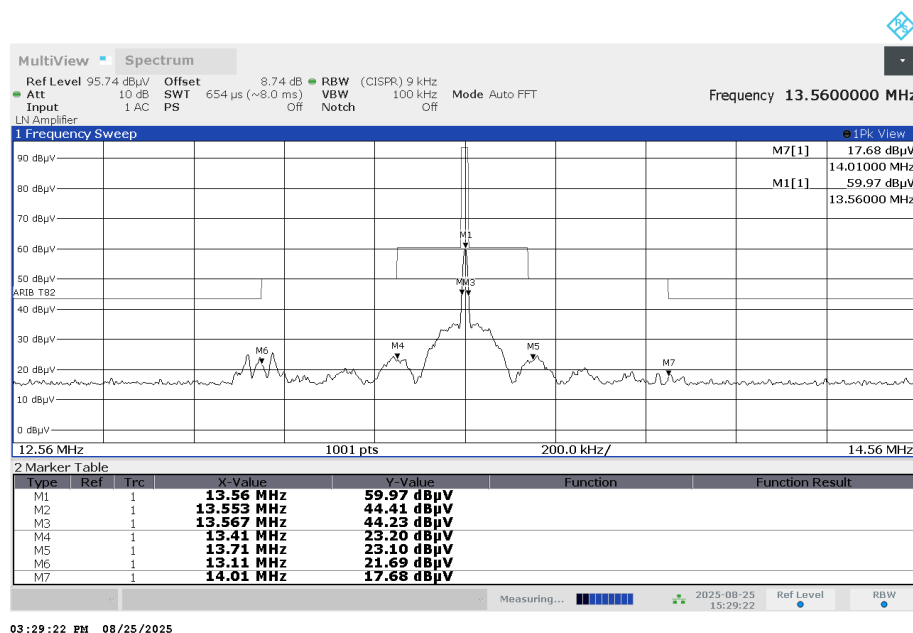
Test method of 13.56 MHz RFID by TELEC (2002-09-19)



3.2.7 Test Results

Frequency [MHz]	Field strength [dBµV/m]	Field strength [mV/m]	Limit [mV/m]	Result
13.11	21.69	0.01215	0.150	Pass
13.41	23.20	0.01445	0.316	Pass
13.553	44.41	0.1661	1.061	Pass
13.56	59.97	0.9966	47.544	Pass
13.567	44.23	0.1627	1.061	Pass
13.71	23.10	0.01429	0.316	Pass
14.01	17.68	0.007656	0.150	Pass

A prescan has been conducted to determine the worst-case positioning and polarization of the EUT. The following plot shows the leakage at the worst-case positioning:



The measurement was conducted at a distance of 3 m and converted to a distance of 10 m using following formula. The values in the plot above have already been converted to a distance of 10 m:

$$E1 = \left(\frac{D}{10\text{ m}} \right) \times E2 = \left(\frac{3\text{ m}}{10\text{ m}} \right) \times E2$$

with
E1: calculated value at 10 meters [µV/m]
E2: measured value at arbitrary distance [µV/m]
D: Measurement distance [m] = 3 m



3.2.8 Test Location and Test Equipment

The test was carried out in semi anechoic room no. 11:

<i>Instrument</i>	<i>Manufacturer</i>	<i>Type No</i>	<i>TE No</i>	<i>Calibration Period (months)</i>	<i>Last Calibration</i>	<i>Calibration Due</i>
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	2025-03-13	2026-03-31
Loop antenna	Schwarzbeck	FMZB 1519 C	72526	36	2025-01-14	2028-01-31
Semi anechoic room	Frankonia	Cabin no. 11	42961	---	---	---

Table 5



3.3 Emission of harmonics or subharmonics radio wave

3.3.1 Specification Reference

ARIB STD-T82, clause 3.2.4

3.3.2 Equipment under Test and Modification State

SIMATIC RF1070R; S/N 44117611; Modification state 0

3.3.3 Date of Test

2025-08-25

3.3.4 Environmental Conditions

Ambient Temperature	23 °C
Relative Humidity	48 %

3.3.5 Specification Limits

Emission of harmonics or subharmonics radio wave shall be 50 μ W or less.

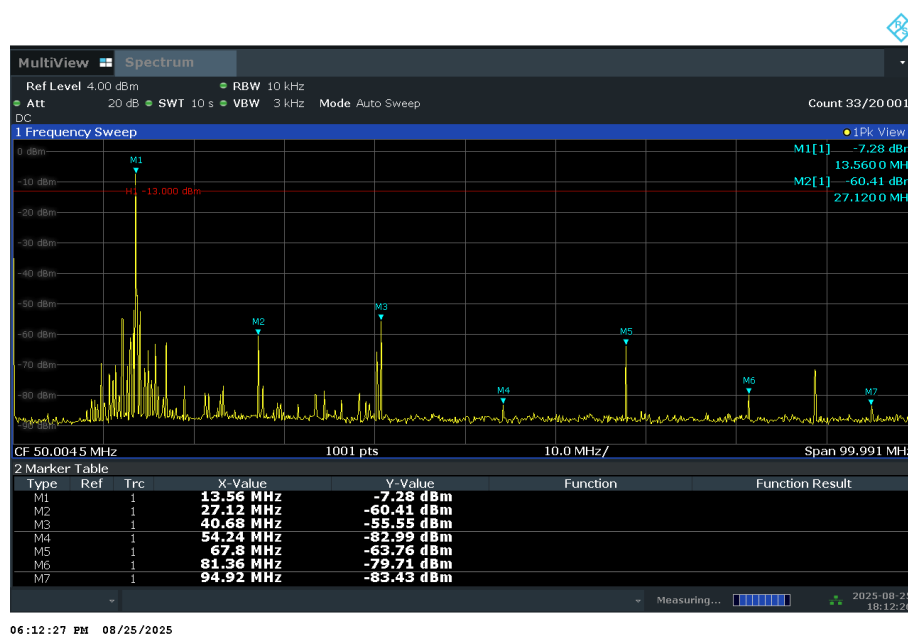
3.3.6 Test Method

Test method of 13.56 MHz RFID by TELEC (2002-09-19)



3.3.7 Test Results

Harmonic	Frequency [MHz]	Output power [dBm]	Output power [μ W]	Limit [μ W]	Result
1 st	27.12	-60.41	0.0009099	50	Pass
2 nd	40.68	-55.55	0.002786	50	Pass
3 rd	54.24	-82.99	0.000005023	50	Pass
4 th	67.8	-63.76	0.0004207	50	Pass
5 th	81.36	-79.71	0.00001069	50	Pass
6 th	94.92	-83.43	0.000004539	50	Pass



3.3.8 Test Location and Test Equipment

The test was carried out in the test laboratory:

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Last Calibration	Calibration Due
Signal and spectrum Analyser	Rohde & Schwarz	FSW43	53496	12	2025-04-02	2026-04-30

Table 6



3.4 Human radio wave exposure strength

3.4.1 Specification Reference

ARIB STD-T82, clause 3.2.5

3.4.2 Equipment under Test and Modification State

SIMATIC RF1070R; S/N 44117611; Modification state 0

3.4.3 Date of Test

2025-08-25

3.4.4 Environmental Conditions

Ambient Temperature	23 °C
Relative Humidity	48 %

3.4.5 Specification Limits

Electric field strength: 60.77 V/m
Magnetic field strength: 0.16 A/m

3.4.6 Test Method

Test method of 13.56 MHz RFID by TELEC (2002-09-19)



3.4.7 Test Results

<i>Frequency [MHz]</i>	<i>Electric field strength [V/m]</i>	<i>Limit [V/m]</i>	<i>Result</i>
13.56	20.25	60.77	Pass

<i>Frequency [MHz]</i>	<i>Magnetic field strength [A/m]</i>	<i>Limit [A/m]</i>	<i>Result</i>
13.56	0.1150	0.16	Pass

The field strength was recorded at a test distance of 0 cm.

3.4.8 Test Location and Test Equipment

The test was carried out in the test laboratory:

<i>Instrument</i>	<i>Manufacturer</i>	<i>Type No</i>	<i>TE No</i>	<i>Calibration Period (months)</i>	<i>Last Calibration</i>	<i>Calibration Due</i>
Electromagnetic radiation meter	Narda	EMR-200 (Model 2244/21)	19590	36	2022-12-13	2025-12-31
Electric field probe	Narda	Type 8.3 (Model 2244/90.20)	19591	36	2022-12-13	2025-12-31
Magnetic field probe	Narda	Type 12.1 (Model 2244/90.28)	19592	36	2022-12-13	2025-12-31

Table 7



4 Measurement Uncertainty

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

Test Name	k_p	Expanded Uncertainty
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
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 Field Strength 9 kHz – 40 GHz	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 and ETSI TR 102 273:2001 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 8 Measurement uncertainty based on ETSI TR 100 028 and ETSI TS 102 273

The measurement uncertainty in the laboratory is less than or equal to the maximum measurement uncertainty as specified in EN 300 330 V2.1.1. This normative regulation means that the measured value is also the value to be assessed in relation to the limit value.

End of Test Report