

Report on the FCC and IC Testing of the Siemens AG SIMATIC RTLS PCB OEM AC In accordance with FCC 47 CFR Part 1.1310 and Part 2.1091 and RSS-102

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FCC ID: NXWOEMAC
IC: 267X-OEMAC



Product Service

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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

The measurements 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 FCC 47 CFR Part 1.1310 and Part 2.1091 and RSS-102, Issue 5, (4), Table 4. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Alex Fink	2020-03-13	 SIGN-ID 338698

Laboratory Accreditation

DAkkS Reg. No. D-PL-11321-11-02

DAkkS Reg. No. D-PL-11321-11-03

Laboratory recognition

Registration No. BNetzA-CAB-16/21-15

ISED Canada test site registration

3050A-2

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 1.1310 and Part 2.1091 and RSS-102, Issue 5, (4), Table 4.

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1 Report Summary

1.1 Report Modification Record

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

Issue	Description of Change	Date of Issue
1	First Issue	2019-10-30
2	Page 2: MLFB added. Page 4: Equipment characteristics added.	2019-11-11
3	Report updated for RSS-102	2019-11-14
4	Section 1.4: Frequency range corrected.	2020-02-14
5	Page 5: Minimum Distance of the Antenna to the human body corrected from 20 cm to 20 mm	2020-03-13

Table 1

1.2 Introduction

Applicant	Siemens AG
Manufacturer	Siemens AG
Model Number(s)	SIMATIC RTLS PCB OEM AC
MLFB	6GT2700-8DF00-0AX1 6GT2700-8DF10-0AX1 6GT2700-8DF20-0AX1 6GT2700-8DF30-0AX1
Serial Number(s)	A55882
Hardware Version(s)	0606
Software Version(s)	2.1.0
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 1.1310 and Part 2.1091 RSS-102, Issue 5, (4), Table 4
Test Plan/Issue/Date	NA
Order Number	B18-09018
Date	2018-09-05
Date of Receipt of EUT	2018-09-20
Start of Test	2019-05-02
Finish of Test	2019-05-02
Name of Engineer(s)	Alex Fink
Related Document(s)	KDB 447498 D01 General RF Exposure Guidance v06 ANSI C63.10 (2013)



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1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 1.1310 and Part 2.1091 is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: Continuously transmitting				
2.1	1.1310 RSS-102	RF Exposure Evaluation	Pass	KDB 447498 D01 v06

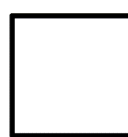
Table 2



1.4 Application Form

Eigenschaften des Prüflings: Equipment characteristics:				
Type of equipment:	Communication and Real Time Location System in 2.4 GHz ISM Band and UWB			
Type designation:	SIMATIC RTLS PCB OEM AC			
MLFB	6GT2700-8DF00-0AX1 6GT2700-8DF10-0AX1 6GT2700-8DF20-0AX1 6GT2700-8DF30-0AX1			
Parts of the system:	Tag			
Intended use	Communication and Real Time Location System			
Hardware Version:	0606			
Software Version:	2.1.0			
Intended area of use	☐ residential environment (home) ☒ industrial environment		☐ vehicle (automotive)	
Power supply:	☐ AC Nominal: Minimum: Maximum: Nominal frequency: Hz		☒ DC Nominal: 3.3 V Minimum: 3.1 V Maximum: 3.4 V	☐ Batterie Nominal: Max.
Dimensions (in cm)	2.5 x 2.5 x 1.8 cm			
General requirements according to RED:	☒ Funk / Radio	☒ Sicherheit / Safety	☒ EMV / EMC	☒ EMF
Application:	Short Range Devices			
Kind of equipment:	Transceiver			
Frequency band:	Phase: 2400 – 2483.5 MHz; UWB: 3100 – 4800 MHz (EU, USA), UWB: 6000 - 7000 MHz (EU, USA), UWB: 6240 – 6739.2 MHz (Canada and China)			
Number of RF-channels:	Phase: 14 (2410 MHz – 2480 MHz) UWB: 2 (Channel 2, without DAA, Center 3993.6 MHz) (Channel 5, without DAA, Center 6489.6 MHz)			
Channel spacing	Phase: 5 MHz UWB: 499.2 MHz			
Rated Carrier Power:	Phase: 4 dBm UWB: -14.31 dBm			
Type(s) of Modulation (e.g. BPSK, FSK, ASK, ...)	Phase: OQPSK in ISM 2.4 GHz UWB: BPSK with BPM			



Type of radio transmission / Use of frequency spectrum (e.g. DSSS, OFDM,.)	Phase: 4QAM UWB: BPM-BPSK
Number / Type of Antenna(s)	2 PCB antennas (both internal)
Antenna Gain	2 dBi
Minimum Distance of the Antenna to the human body	> 20 mm
Nominal Temperature & Temperature Range:	20°C / 0 °C to +50 °C
Marking plate	FCC: SIEMENS SIMATIC RTLS PCB OEM AC 1P 6GT2700-8DF10-0AX1 S VP JM123456 3S ADDR: 17:85:40:00:28:01 FCC ID: NXWOEMAC IC: 267X-OEMAC     Siemens AG DE-76181 Karlsruhe Made in Germany ISED: SIEMENS SIMATIC RTLS PCB OEM AC 1P 6GT2700-8DF30-0AX1 S VP JM123456 3S ADDR: 17:85:40:00:28:01 FCC ID: NXWOEMAC IC: 267X-OEMAC     Siemens AG DE-76181 Karlsruhe Made in Germany



1.5 EUT Modification 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 (S/N: A55882))	Not Applicable	Not Applicable

Table 3

1.6 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing Test Laboratory.

Test Name	Name of Engineer(s)
Configuration and Mode: Continuously transmitting	
RF Exposure Evaluation	Alex Fink

Table 4

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany



2 Test Details

2.1 RF Exposure Assessment

2.1.1 Specification Reference

CFR 47 Pt.1.1310 and RSS-102, Issue 5, (4) Table 4

2.1.2 Equipment Under Test and Modification State

SIMATIC RTLS PCB OEM AC, S/N: A55882 - Modification State 0

2.1.3 Test Method

The test was performed in accordance with KDB 447498 D01 v06
Evaluation distance is 2 cm.

2.1.4 Test Results

In accordance with KDB 447498 D01 v06:

$$S = \frac{EIRP}{4\pi R^2}$$

S= power density

R= distance to the center of radiation of the antenna

Operation Mode	Operating frequency	Measured maximum EIRP [dBm]	Measured maximum EIRP [mW]	Duty cycle [%]	MPE-Value [mW/cm ²]	MPE-Limit [mW/cm ²]	Margin to Limit [mW/cm ²]
ZigBee 2.4 GHz	2410 MHz	+ 13.7	23.442	100	0.466370	1.0000	0.5336
	2445 MHz	+ 13.5	22.387		0.445379	1.0000	0.5546
	2480 MHz	+ 13.0	19.953		0.396945	1.0000	0.6031
UWB 4 GHz	4.00 GHz	- 5.89 [dBm/50MHz]	0.258	100	0.005125	1.0000	0.9949
UWB 6.4 GHz	6.49 GHz	- 6.98 [dBm/50MHz]	0.200	100	0.003988	1.0000	0.9960

Maximum calculated MPE value for co-location assessment (ZigBee 2410 MHz and UWB 4 GHz):

$$0.466370 + 0.003988 = \underline{0.471495} \quad [\text{mW/cm}^2]$$

The measurements results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile devices and RSS-102, Issue 5, (4) Table 4.



3 Measurement Uncertainty

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

Radio Testing			
Test Name	kp	Expanded Uncertainty	Note
Occupied Bandwidth	2.0	$\pm 1.14 \%$	2
RF-Frequency error	1.96	$\pm 1 \cdot 10^{-7}$	7
RF-Power, conducted carrier	2	$\pm 0.079 \text{ dB}$	2
RF-Power uncertainty for given BER	1.96	$+0.94 \text{ dB} / -1.05$	7
RF power, conducted, spurious emissions	1.96	$+1.4 \text{ dB} / -1.6 \text{ dB}$	7
RF power, radiated			
25 MHz – 4 GHz	1.96	$+3.6 \text{ dB} / -5.2 \text{ dB}$	8
1 GHz – 18 GHz	1.96	$+3.8 \text{ dB} / -5.6 \text{ dB}$	8
18 GHz – 26.5 GHz	1.96	$+3.4 \text{ dB} / -4.5 \text{ dB}$	8
40 GHz – 170 GHz	1.96	$+4.2 \text{ dB} / -7.1 \text{ dB}$	8
Spectral Power Density, conducted	2.0	$\pm 0.53 \text{ dB}$	2
Maximum frequency deviation			
300 Hz – 6 kHz	2	$\pm 2.89 \%$	2
6 kHz – 25 kHz	2	$\pm 0.2 \text{ dB}$	2
Maximum frequency deviation for FM	2	$\pm 2.89 \%$	2
Adjacent channel power 25 MHz – 1 GHz	2	$\pm 2.31 \%$	2
Temperature	2	$\pm 0.39 \text{ K}$	4
(Relative) Humidity	2	$\pm 2.28 \%$	2
DC- and low frequency AC voltage			
DC voltage	2	$\pm 0.01 \%$	2
AC voltage up to 1 kHz	2	$\pm 1.2 \%$	2
Time	2	$\pm 0.6 \%$	2

Table 5



Radio Interference Emission Testing			
Test Name	kp	Expanded Uncertainty	Note
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50μH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50μH AMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5μH AMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50μH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50μH AMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Fieldstrength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 1 m (ALSE)			
9 kHz to 150 kHz	2	± 4.6 dB	1
150 kHz to 30 MHz	2	± 4.1 dB	1
30 MHz to 200 MHz	2	± 5.2 dB	1
200 MHz to 2 GHz	2	± 4.4 dB	1
2 GHz to 3 GHz	2	± 4.6 dB	1
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 5.0 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.9 dB	1
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			4
Voltage Changes. Voltage Fluctuations and Flicker			4

Table 6



Immunity Testing			
Test Name	kp	Expanded Uncertainty	Note
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2	+32.2 / -24.3 %	5
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances. induced by RF-Fields			
via CDN	2	+15.1 / -13.1 %	6
via EM clamp	2	+42.6 / -29.9 %	6
via current clamp	2	+43.9 / -30.5 %	6
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips. Short Interruptions and Voltage Variations			4
Oscillatory Waves			4
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			4

Table 7

Note 1:

The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$. providing a level of confidence of $p = 95.45\%$

Note 2:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1. 2002-08) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$. providing a level of confidence of $p = 95.45\%$

Note 3:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1. 2002-08) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2.05$. providing a level of confidence of $p = 95.45\%$

Note 4:

It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95%confidence.

Note 5:

The expanded uncertainty reported according to IEC 61000-4-3 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$. providing a level of confidence of $p = 95.45\%$

Note 6:

The expanded uncertainty reported according to IEC 61000-4-6 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$. providing a level of confidence of $p = 95.45\%$

Note 7:

The expanded uncertainty reported according ETSI TR 100 028 V1.4.1 (all parts) to is based on a standard uncertainty multiplied by a coverage factor of $k_p = 1.96$. providing a level of confidence of $p = 95.45\%$

Note 8:



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The expanded uncertainty reported according to ETSI TR 102 273 V1.2.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 1.96$, providing a level of confidence of $p = 95.45\%$