Product Service

Report on the FCC and IC Testing of the Siemens AG

Model: SIMATIC RF680R FCC

In accordance with FCC 47 CFR Part 15C and ISED RSS-GEN (partly)

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

FCC ID: NXW-RF600R2
IC: 267X-RF600R2

COMMERCIAL-IN-CONFIDENCE

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RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Michael Ingerl	2020-07-13	SIGN-ID 377695
Authorised Signatory	Markus Biberger	2020-07-13	SIGN-ID 377885

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 15C and ISED RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Michael Ingerl	2020-07-13	SIGN-ID 377696

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

EXECUTIVE SUMMARY
A sample of this product was tested and found to be partly compliant with FCC 47 CFR Part 15C and ISED RSS-GEN.
This is a C2PC Test Report.

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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	2020-07-13

Table 1

1.2 Introduction

Applicant	Siemens AG
Manufacturer	Siemens AG
Model Number(s)	SIMATIC RF680R FCC
Serial Number(s)	K1003642
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C
Test Plan/Issue/Date	---
Order Number	5316788
Date of Receipt of EUT	2020-05-15
Start of Test	2020-06-22
Finish of Test	2020-06-22
Name of Engineer(s)	Michael Ingerl
Related Document(s)	ANSI C63.10-2013-2014

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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 15C and ISED RSS-GEN is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: Transmitting continuously - Normal operation mode				
2.1	15.209, 4.3 and 6.13	Field Strength of any Emission	Pass	ANSI C63.10-2013
2.2	15.247	Maximum peak conducted output power	Pass	ANSI C63.10-2013
2.3	15.205, 4.1 and 8.10	Restricted Band Egdes	Pass	ANSI C63.10-2013

Table 2

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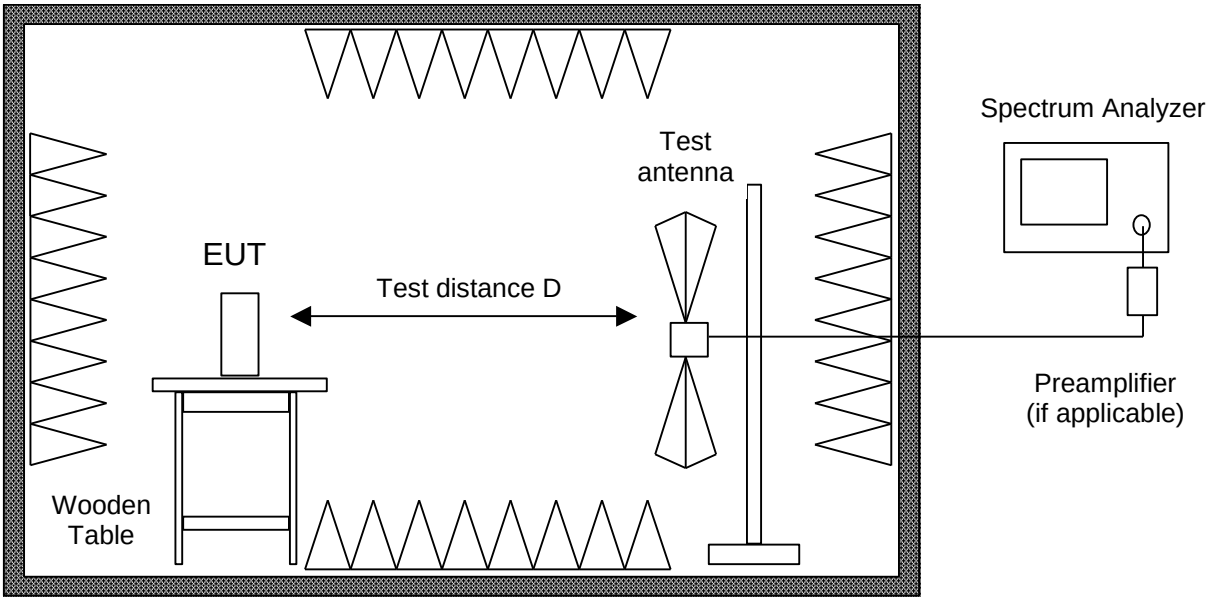
1.4 Measurement Procedures

Radiated emissions in a fully or semi anechoic room



Fully or semi anechoic room

Radiated emission in fully or semi anechoic room is measured in the frequency range from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33.

Measurements are made in both the horizontal and vertical planes of polarization using a EMI test receiver with the detector function set to peak and resolution as well as video bandwidth set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz).

Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used.

All tests below 8 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance may be reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation factor of 20 dB/decade. If required, preamplifiers are used for the whole frequency range. Special care is taken to avoid overload, using appropriate attenuators and filters, if necessary.

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 rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

During testing the EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For final testing below 1 GHz a semi anechoic room complying with the NSA requirements of ANSI C63.10-2013 for alternative test sites is used. If prescans are recorded in fully anechoic room they are indicated appropriately.

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1.5 Product Information

1.5.1 Technical Description

Equipment characteristics		
Application:	Radio Frequency Identification Equipment	
Equipment class:	Equipment for fixed use	
Kind of equipment	Transceiver	
Operating Frequency:	902.75…927.25 MHz	
Standby mode:	Not Applicable	
Power supply:	Nominal:	24 V
	Nominal frequency:	DC

1.6 Deviations from the Standard

NA

1.7 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	Not Applicable	Not Applicable

Table 3

1.8 Test Location

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

Test Name	Name of Engineer(s)
Configuration and Mode: Transmitting continuously - Normal operation mode	
Radiated Emissions	Michael Ingerl
Maximum peak conducted output power	Michael Ingerl
Restricted Band Edges	Michael Ingerl

Table 4

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany

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2 Test Details

2.1 Field Strength of any Emission

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15 and ISED RSS-GEN.

2.1.2 Equipment Under Test and Modification State

SIMATIC RF680R FCC - S/N: K1003642 - Modification State 0

2.1.3 Date of Test

2020-06-22

2.1.4 Test Method

ANSI C63.10-2013, Clause 6.2 and 6.3

2.1.5 Environmental Conditions

Ambient Temperature	20.0 °C
Relative Humidity	45.0 %

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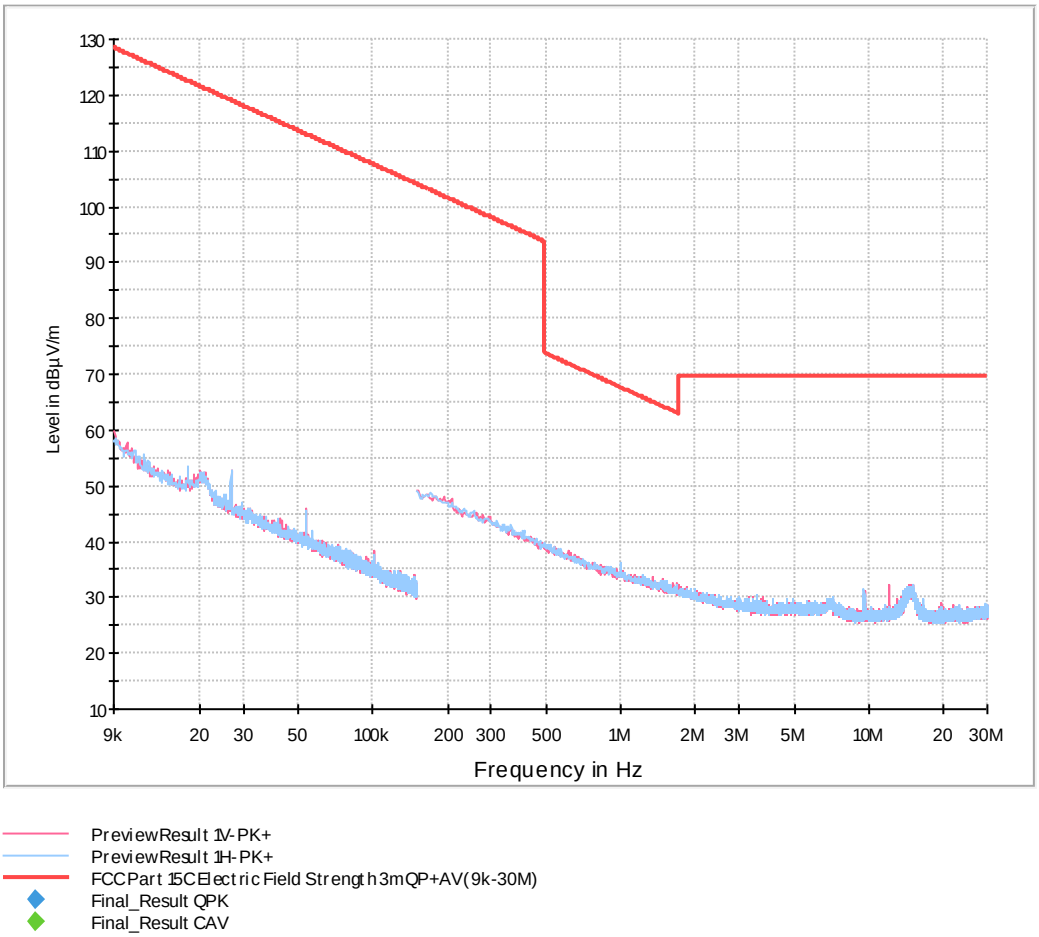
2.1.6 Test Results

SIMATIC RF680R with antenna RF642A



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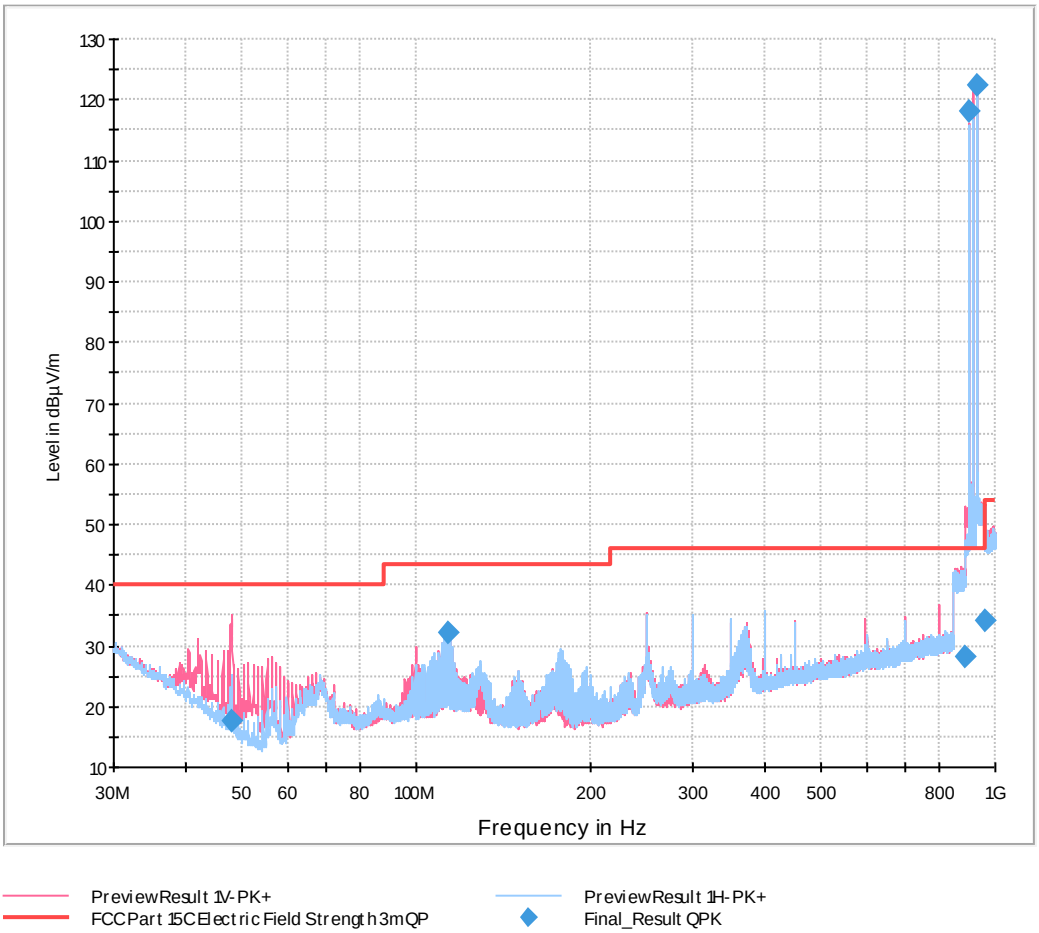
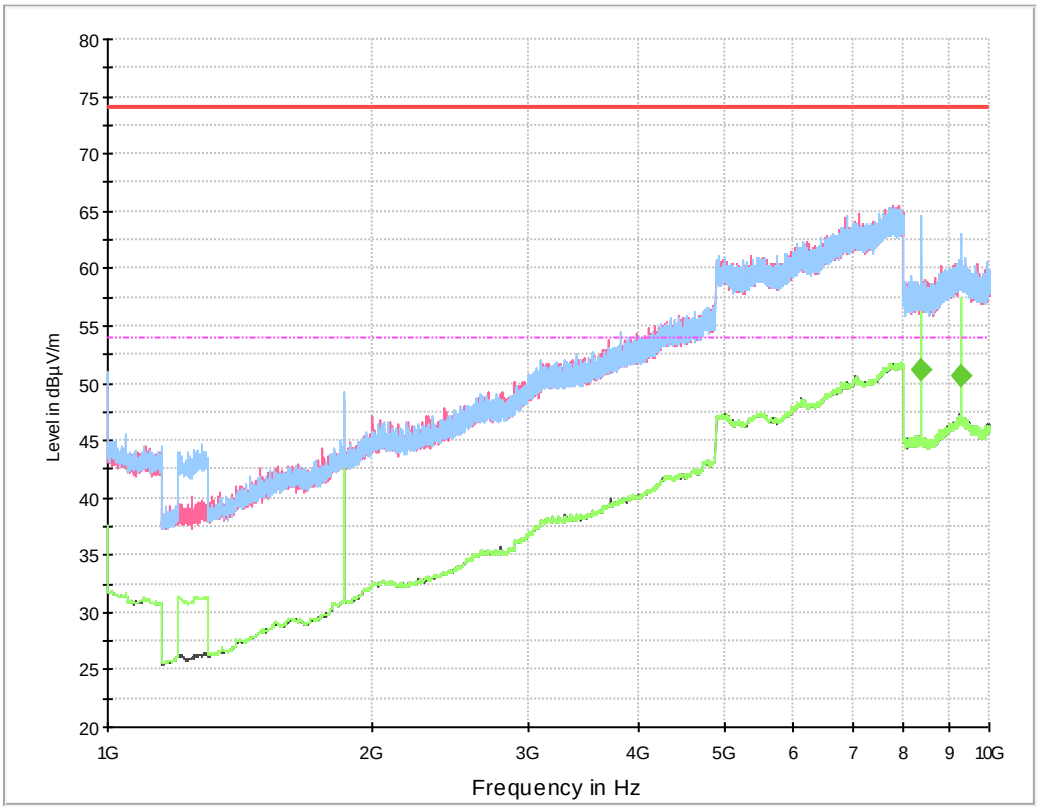


Final Results 1:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
47.820000	17.59	40.00	22.41	1000.0	120.000	106.0	V	-120.0	15.0
113.430000	32.14	43.50	11.36	1000.0	120.000	297.0	V	62.0	18.3
886.260000	28.31	46.02	17.71	1000.0	120.000	175.0	V	22.0	28.6
902.700000	118.16	#1	#1	1000.0	120.000	125.0	V	-111.0	29.0
927.990000	122.33	#1	#1	1000.0	120.000	306.0	H	79.0	29.1
961.230000	34.20	53.98	19.78	1000.0	120.000	325.0	V	98.0	29.4

#1 – Intentional Radiator



Final Results 1:

Frequency *MHz*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
8352.000000	51.16	53.98	2.82	1000.0	1000.000	300.0	H	90.0	44.0
9280.000000	50.57	53.98	3.41	1000.0	1000.000	300.0	H	90.0	44.9

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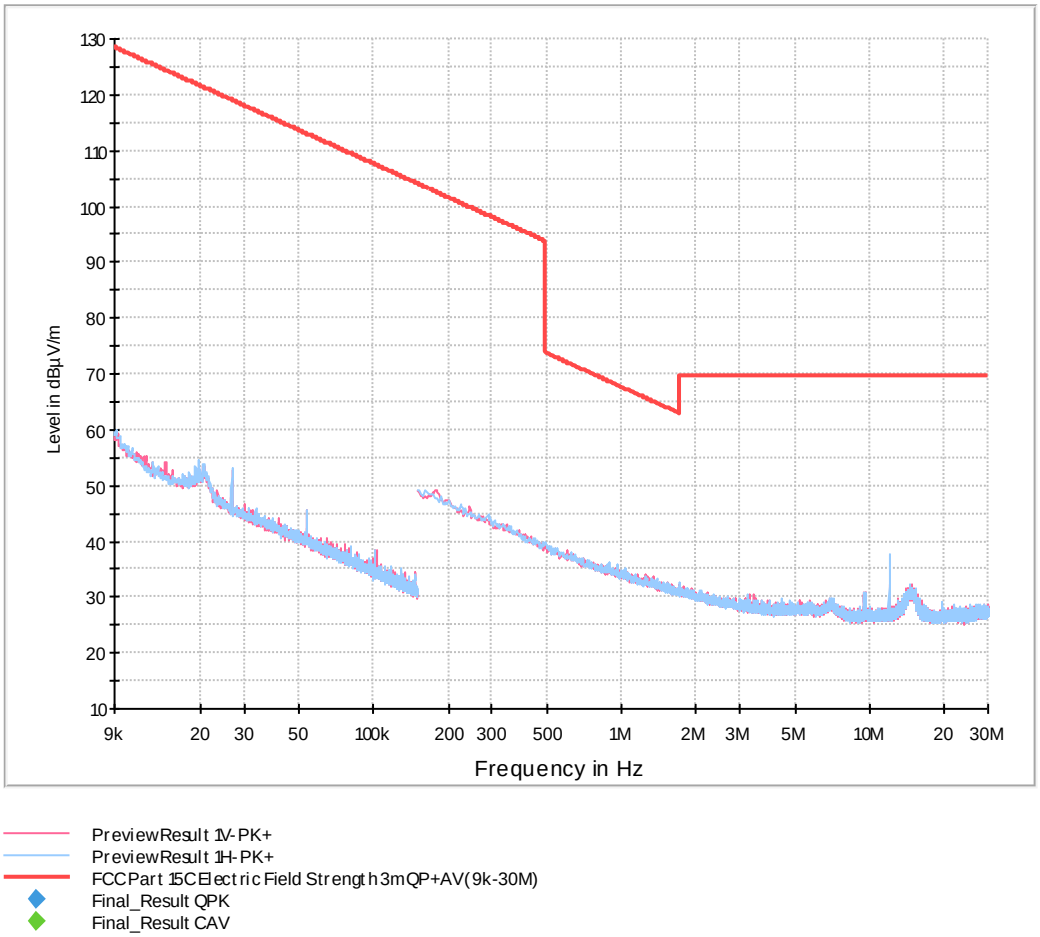
SIMATIC RF680R with antenna RF660A



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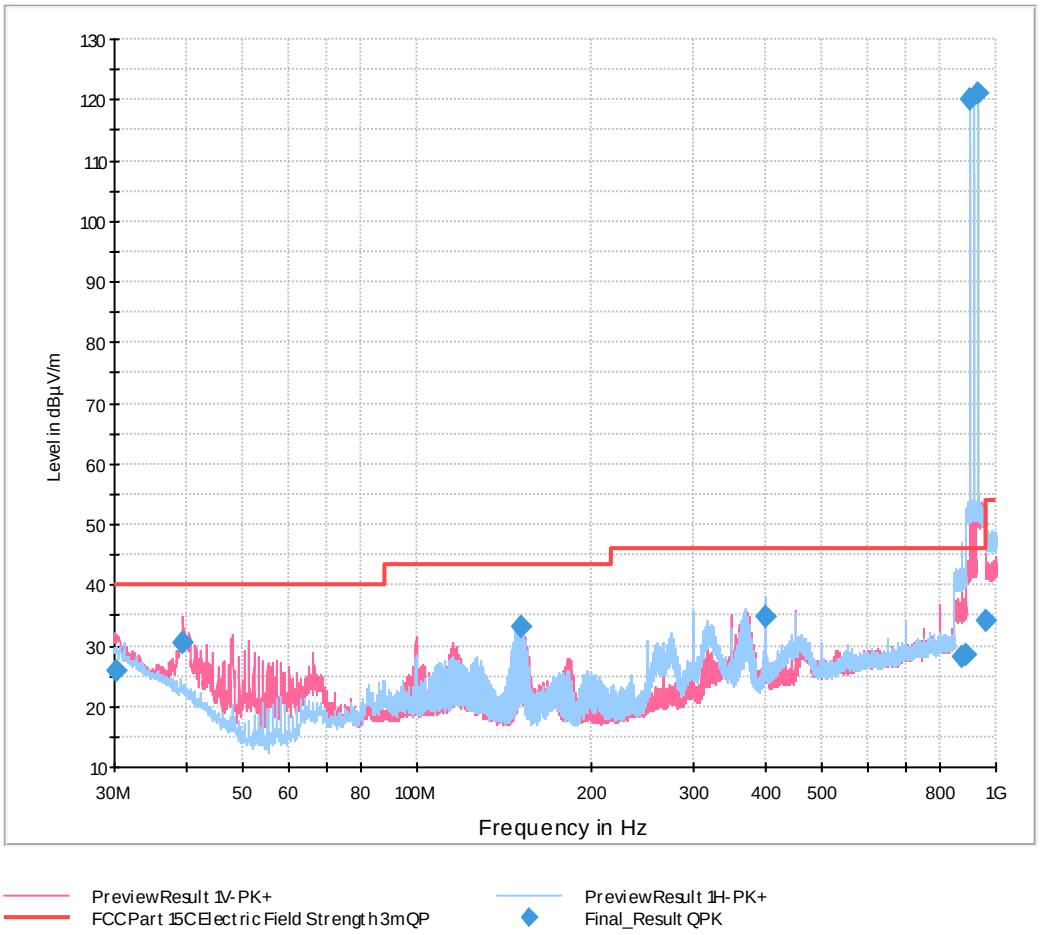
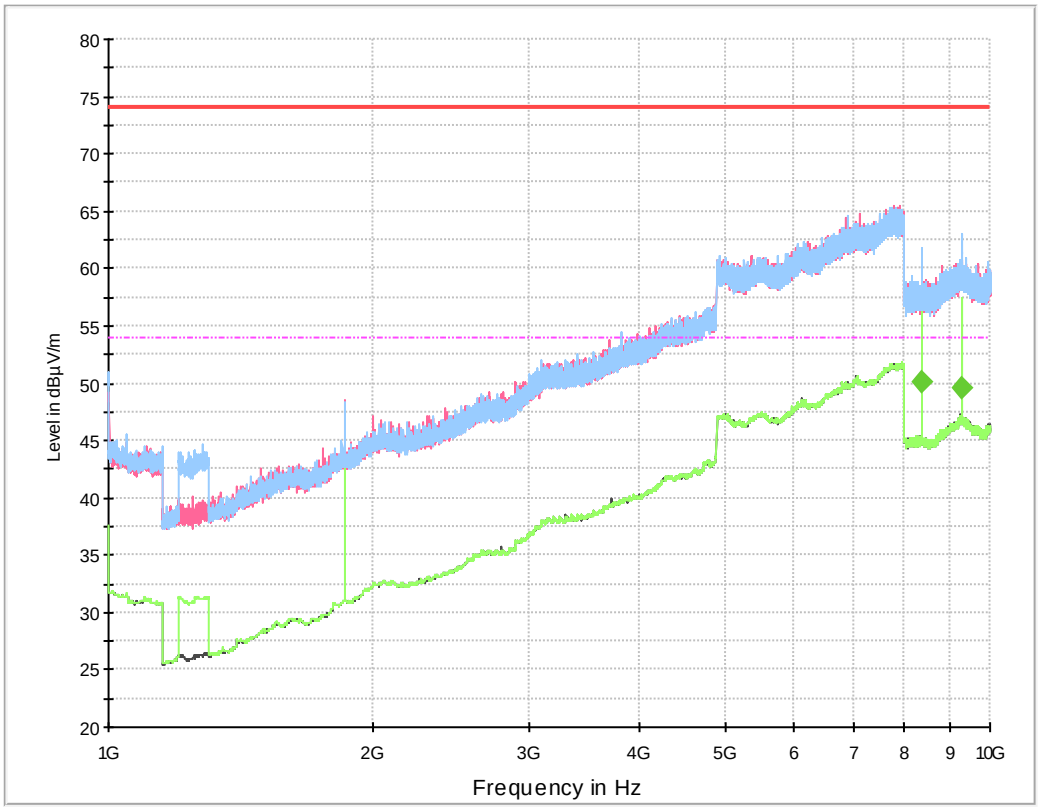


Final Results 1:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
30.120000	25.84	40.00	14.16	1000.0	120.000	100.0	V	177.0	25.7
39.450000	30.55	40.00	9.45	1000.0	120.000	105.0	V	180.0	20.6
151.860000	32.99	43.50	10.51	1000.0	120.000	100.0	V	159.0	16.0
399.960000	34.95	46.02	11.07	1000.0	120.000	105.0	H	-60.0	21.7
875.970000	28.22	46.02	17.80	1000.0	120.000	325.0	H	11.0	28.4
885.660000	28.36	46.02	17.66	1000.0	120.000	314.0	H	30.0	28.6
901.410000	120.09	#1	#1	1000.0	120.000	298.0	H	2.0	28.9
927.990000	121.05	#1	#1	1000.0	120.000	304.0	H	71.0	29.1
962.640000	34.22	53.98	19.76	1000.0	120.000	322.0	V	152.0	29.4

#1 – Intentional Radiator



Final Results 1:

Frequency *MHz*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
8352.000000	50.14	53.98	3.84	1000.0	1000.000	300.0	H	90.0	44.0
9280.000000	49.57	53.98	4.41	1000.0	1000.000	300.0	H	90.0	44.9

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2.1.7 Test Location and Test Equipment Used

This test was carried out in Semi anechoic room - cabin no. 11

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	ESW44	39897	12	2021-03-31
ULTRALOG Antenna	Rohde & Schwarz	HL562E	39969	36	2022-11-30
Horn antenna	Rohde & Schwarz	HF907	100154	24	2021-07-31
Semi anechoic room No.11	Frankonia	---	42961	36	2022-08-31

Table 5

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

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2.2 Maximum peak conducted output power

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15 and ISED RSS-GEN.

2.2.2 Equipment Under Test and Modification State

SIMATIC RF680R FCC - S/N: K1003642 - Modification State 0

2.2.3 Date of Test

2020-06-22

2.2.4 Test Method

2.2.5 Environmental Conditions

Ambient Temperature	20.0 °C
Relative Humidity	45.0 %

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2.2.6 Test Results

SIMATIC RF680R measured conducted

	902.75 MHz	915.25 MHz	927.25 MHz
Peak Power (dBm)	29.6	29.4	29.2
Limit (dBm)	30	30	30

2.2.7 Test Location and Test Equipment Used

This test was carried out in a non shielded room.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Signal and Spectrum Analysator	Rohde & Schwarz	FSV40	20219	12	2021-01-31

Table 6

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

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2.3 Restricted Band Edges

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Industry Canada RSS-210 and Industry Canada RSS-GEN, Clause 15.205, 4.1 and 8.10

2.3.2 Equipment Under Test and Modification State

SIMATIC RF680R FCC - S/N: K1003642 - Modification State 0

2.3.3 Date of Test

2020-06-22

2.3.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.13.1.

Plots for average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.3.

Final average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.2.

2.3.5 Environmental Conditions

Ambient Temperature	20.0 °C
Relative Humidity	45.0 %

2.3.6 Test Results

No restricted band in the range

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2.3.7 Test Location and Test Equipment Used

This test was carried out in Semi anechoic room - cabin no. 11

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	ESW44	39897	12	2021-03-31
ULTRALOG Antenna	Rohde & Schwarz	HL562E	39969	36	2022-11-30
Horn antenna	Rohde & Schwarz	HF907	100154	24	2021-07-31
Semi anechoic room No.11	Frankonia	---	42961	36	2022-08-31

Table 7

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

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3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	ESW44	39897	12	2021-03-31
ULTRALOG Antenna	Rohde & Schwarz	HL562E	39969	36	2022-11-30
Horn antenna	Rohde & Schwarz	HF907	100154	24	2021-07-31
Semi anechoic room No.11	Frankonia	---	42961	36	2022-08-31
Signal and Spectrum Analysator	Rohde & Schwarz	FSV40	20219	12	2021-01-31

Table 8

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable