



Product Service

Report on the FCC and IC Testing of the
Siemens AG
Simatic RF615R with antenna RF660A and
RF642A
In accordance with FCC 47 CFR Part 15C and
ISED RSS-GEN

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



Product Service

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FCC ID: NXW-RF615R
IC: 267X-RF615R

COMMERCIAL-IN-CONFIDENCE

Date: 2020-02-03
Document Number: TR-72654-66388-01 | Issue: 01

| RESPONSIBLE FOR | NAME | DATE | SIGNATURE |
|----------------------|-----------------|------------|--|
| Project Management | Matthias Stumpe | 2020-02-03 |  SIGN-ID 331933 |
| Authorised Signatory | Martin Steindl | 2020-02-03 |  SIGN-ID 333541w |

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 | Matthias Stumpe | 2020-02-03 |  SIGN-ID 331934 |

Laboratory Accreditation
DAkkS Reg. No. D-PL-11321-11-02 Laboratory recognition
Registration No. BNetzA-CAB-16/21-15 Industry 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 15C and ISED RSS-GEN.

Contents

| | | |
|----------|---|-----------|
| 1 | Report Summary | 3 |
| 1.1 | Report Modification Record | 3 |
| 1.2 | Introduction | 3 |
| 1.3 | Brief Summary of Results | 4 |
| 1.4 | Measurement Procedures | 5 |
| 1.5 | Product Information | 6 |
| 1.6 | Deviations from the Standard | 6 |
| 1.7 | EUT Modification Record | 6 |
| 1.8 | Test Location | 6 |
| 2 | Test Details | 7 |
| 2.1 | Radiated Emissions and Conducted emission | 7 |
| 3 | Photographs | 15 |
| 3.1 | Equipment Under Test (EUT) | 15 |
| 4 | Test Equipment Information | 17 |
| 4.1 | General Test Equipment Used | 17 |



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ACCREDITATION

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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 | 2020-02-03 |

Table 1

1.2 Introduction

| | |
|-------------------------------|---------------------------------|
| Applicant | Siemens AG |
| Manufacturer | Siemens AG |
| Model Number(s) | Prototype |
| Serial Number(s) | Prototype |
| Hardware Version(s) | FS 02 |
| Software Version(s) | --- |
| Number of Samples Tested | 1 |
| Test Specification/Issue/Date | FCC 47 CFR Part 15C |
| Test Plan/Issue/Date | --- |
| Order Number | 9704939264 |
| Date | 2019-07-30 |
| Date of Receipt of EUT | 2019-11-04 |
| Start of Test | 2019-12-17 |
| Finish of Test | 2020-02-03 |
| Name of Engineer(s) | Matthias Stumpe, Patrick Müller |
| Related Document(s) | ANSI C63.10-2013-2014 |

1.3 Brief Summary of Results

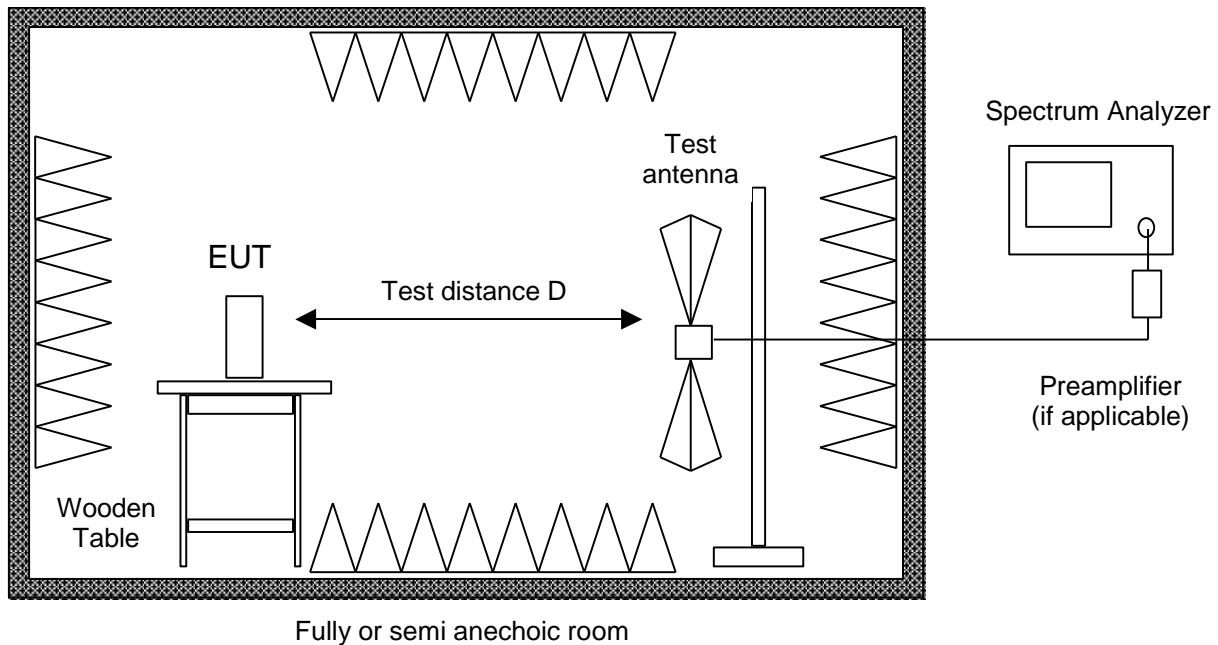
A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C and ISED RSS-GEN is shown below.

| Section | Specification Clause | Test Description | Result | Comments/Base Standard |
|---|----------------------|--|--------|----------------------------|
| Configuration and Mode: Simatic RF615R connected with antenna RF660A and RF642A | | | | |
| 2.1 | 15.209 and 15.207 | Radiated Emission and conducted emission | Pass | ANSI C63.10-2013, 6.2, 6.3 |

Table 2

1.4 Measurement Procedures

Radiated emissions in a 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.

1.5 Product Information

Frequency range. 902 – 928 MHz

1.5.1 Technical Description

The SIMATIC RF615 are suitable for reading and writing tasks in the UHF range and very long ranges up to 8m.

The readers are especially well-suited for use in production environments where a high protection class and integration into SIMATIC controllers are required. These readers also come with an extensive toolset for commissioning and diagnostics.

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: 120 V AC / 60 Hz Powered | |
| Radiated Emissions | Matthias Stumpe, Patrick Müller |
| Conducted emission | Matthias Stumpe, Patrick Müller |

Table 4

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany



2 Test Details

2.1 Radiated Emissions and Conducted emission

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.209 and Clause 15.207 and ISED RSS-GEN.

2.1.2 Equipment Under Test and Modification State

SIMATIC RF615 with Antenna RF660A FCC and RF642A FCC

2.1.3 Date of Test

2019-11-07 – 2020-01-29

2.1.4 Test Method

ANSI C63.10-2013, Clause 6.2 and 6.3

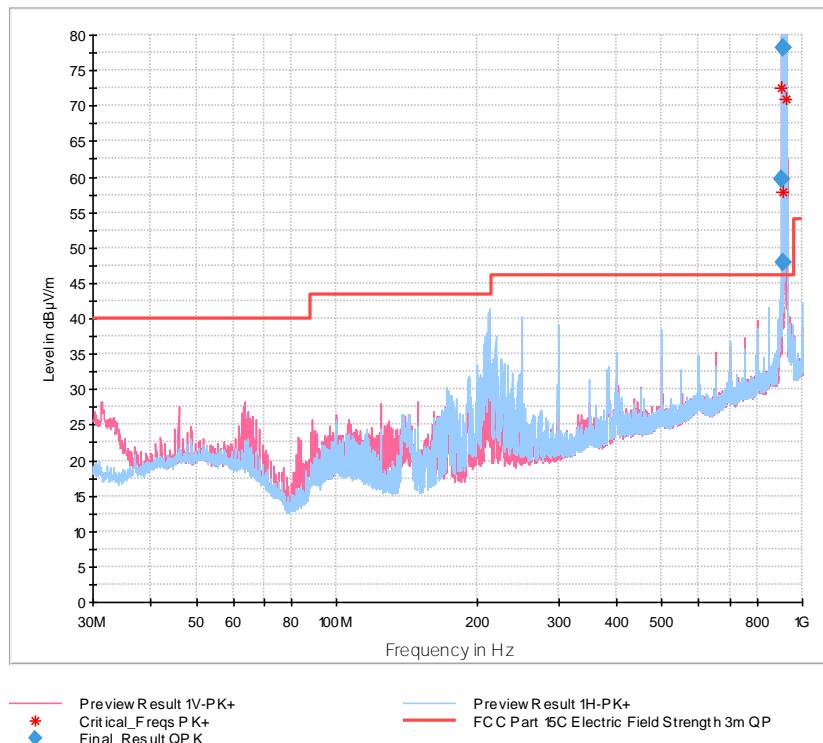
2.1.5 Environmental Conditions

| | |
|---------------------|---------|
| Ambient Temperature | 20.0 °C |
| Relative Humidity | 52.0 % |

2.1.6 Test Results

120V/60Hz AC powered

RF615R with antenna RF642A - Radiated emission: 30MHz-1GHz

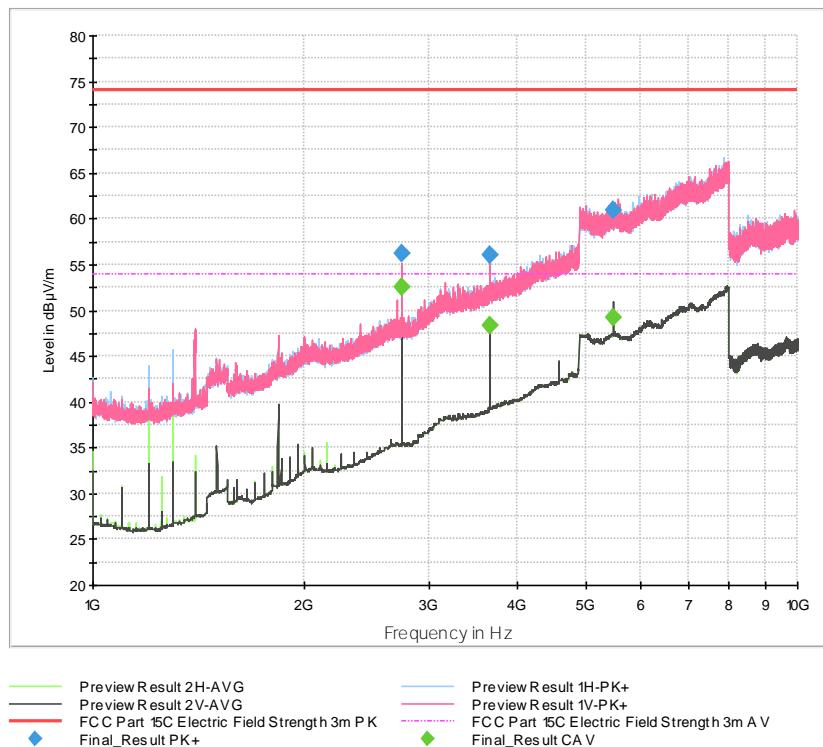


Final Results 1:

| Frequency MHz | QuasiPeak dB μ V/m | Limit dB μ V/m | Margin dB | Meas. Time ms | Bandwidth kHz | Height cm | Pol | Azimuth deg | Corr. dB/m |
|------------------|---------------------------|-----------------------|--------------|---------------------|------------------|--------------|-----|----------------|---------------|
| 903.960000 | 59.57 | 46.02 | -13.55 | 1000.0 | 120.000 | 148.0 | V | 16.0 | 28.6 |
| 906.810000 | 48.02 | 46.02 | -2.00 | 1000.0 | 120.000 | 383.0 | H | -117.0 | 28.6 |
| 910.620000 | 78.18 | 46.02 | -32.16 | 1000.0 | 120.000 | 237.0 | H | 100.0 | 28.6 |
| 923.670000 | 95.56 | 46.02 | -49.54 | 1000.0 | 120.000 | 128.0 | V | 8.0 | 28.6 |

NA #1 – Intentional Radiation with Operating frequency band.

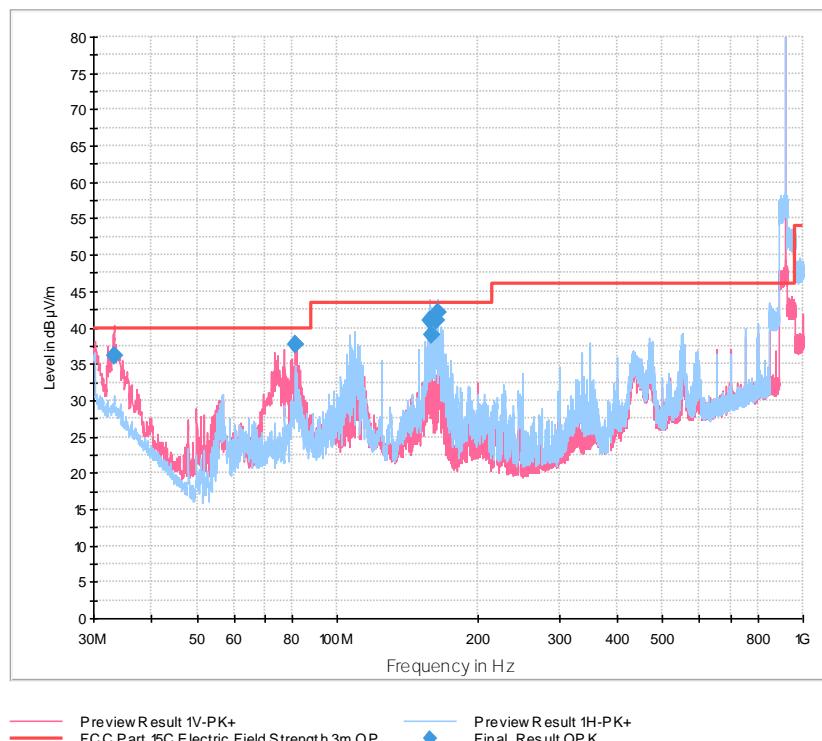
RF615R with antenna RF 642A - Radiated emission: 1-10GHz



Final Results 1:

| Frequency MHz | MaxPeak dB μ V/m | CAverage dB μ V/m | Limit dB μ V/m | Margin dB | Meas. Time ms | Bandwidth kHz | Height cm | Pol | Azimuth deg | Corr. dB/m |
|------------------|-------------------------|--------------------------|-----------------------|--------------|---------------------|------------------|--------------|-----|----------------|---------------|
| 2745.750000 | 56.28 | --- | 73.98 | 17.70 | 1000.0 | 1000.000 | 275.0 | V | 100.0 | 33.6 |
| 2745.750000 | --- | 52.61 | 53.98 | 1.37 | 1000.0 | 1000.000 | 275.0 | V | 100.0 | 33.6 |
| 3661.000000 | 56.01 | --- | 73.98 | 17.97 | 1000.0 | 1000.000 | 125.0 | V | -116.0 | 37.0 |
| 3661.000000 | --- | 48.25 | 53.98 | 5.73 | 1000.0 | 1000.000 | 125.0 | V | -116.0 | 37.0 |
| 5491.750000 | --- | 49.20 | 53.98 | 4.78 | 1000.0 | 1000.000 | 232.0 | V | 107.0 | 40.5 |
| 5491.750000 | 61.00 | ---- | 73.98 | 12.98 | 1000.0 | 1000.000 | 232.0 | V | 107.0 | 40.5 |

RF615R with antenna RF660A - Radiated emission: 30MHz-1GHz

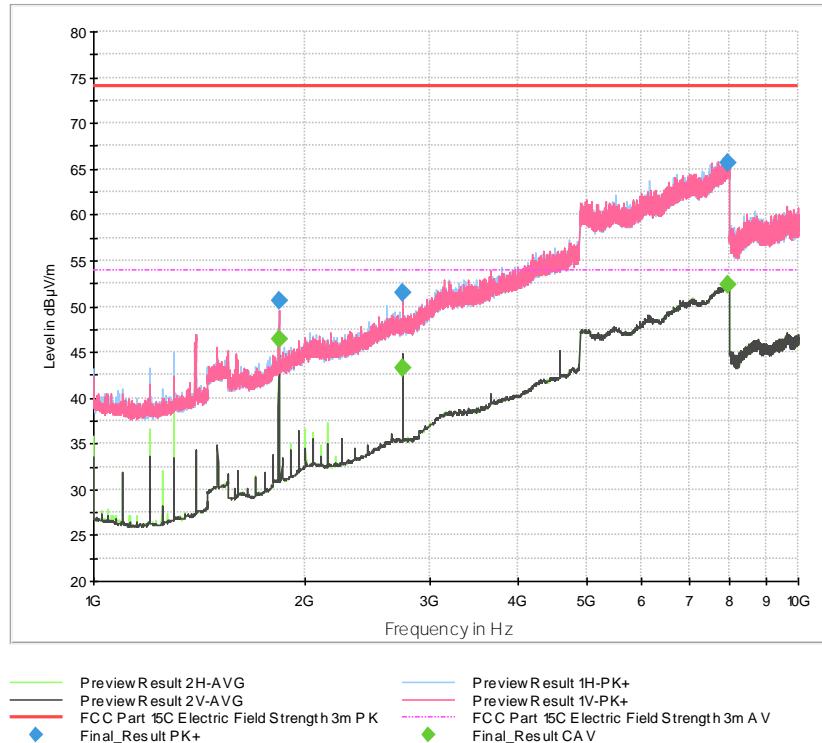


Final Results 1:

| Frequency MHz | QuasiPeak dB μ V/m | Limit dB μ V/m | Margin dB | Meas. Time ms | Bandwidth kHz | Height cm | Pol | Azimuth deg | Corr. dB/m |
|------------------|---------------------------|-----------------------|--------------|---------------------|------------------|--------------|-----|----------------|---------------|
| 33.270000 | 36.18 | 40.00 | 3.82 | 1000.0 | 120.000 | 104.0 | V | -122.0 | 24.1 |
| 81.210000 | 37.72 | 40.00 | 2.28 | 1000.0 | 120.000 | 107.0 | V | 37.0 | 16.3 |
| 158.400000 | 41.00 | 43.50 | 2.50 | 1000.0 | 120.000 | 195.0 | H | 59.0 | 16.2 |
| 159.630000 | 38.93 | 43.50 | 4.57 | 1000.0 | 120.000 | 244.0 | H | 57.0 | 16.2 |
| 162.810000 | 40.99 | 43.50 | 2.51 | 1000.0 | 120.000 | 246.0 | H | 49.0 | 16.4 |
| 163.950000 | 42.12 | 43.50 | 1.38 | 1000.0 | 120.000 | 225.0 | H | 47.0 | 16.5 |

NA #1 – Intentional Radiation with Operating frequency band.

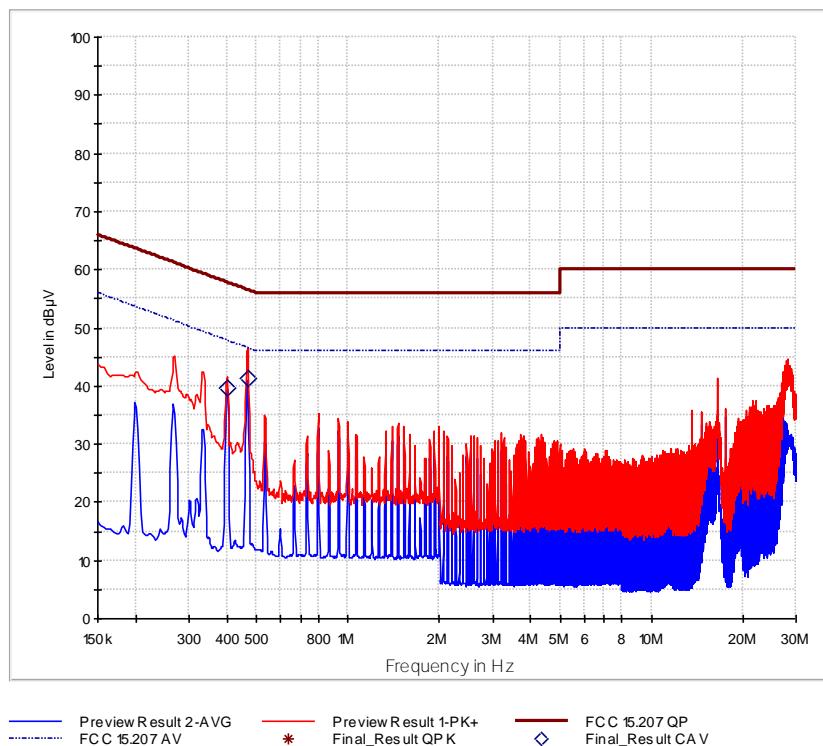
RF615R with antenna RF660A - Radiated emission: 1-10GHz



Final Results 1:

| Frequency MHz | MaxPeak dB μ V/m | CAverage dB μ V/m | Limit dB μ V/m | Margin dB | Meas. Time ms | Bandwidth kHz | Height cm | Pol | Azimuth deg | Corr. dB/m |
|------------------|-------------------------|--------------------------|-----------------------|--------------|---------------------|------------------|--------------|-----|----------------|---------------|
| 1830.500000 | 50.65 | --- | 73.98 | 23.33 | 1000.0 | 1000.000 | 383.0 | H | 127.0 | 30.2 |
| 1830.500000 | --- | 46.35 | 53.98 | 7.63 | 1000.0 | 1000.000 | 383.0 | H | 127.0 | 30.2 |
| 2745.500000 | --- | 43.22 | 53.98 | 10.76 | 1000.0 | 1000.000 | 257.0 | V | 105.0 | 33.6 |
| 2745.500000 | 51.42 | --- | 73.98 | 22.55 | 1000.0 | 1000.000 | 257.0 | V | 105.0 | 33.6 |
| 7946.750000 | 65.69 | --- | 73.98 | 8.29 | 1000.0 | 1000.000 | 378.0 | V | -161.0 | 43.4 |
| 7946.750000 | --- | 52.31 | 53.98 | 1.67 | 1000.0 | 1000.000 | 378.0 | V | -161.0 | 43.4 |

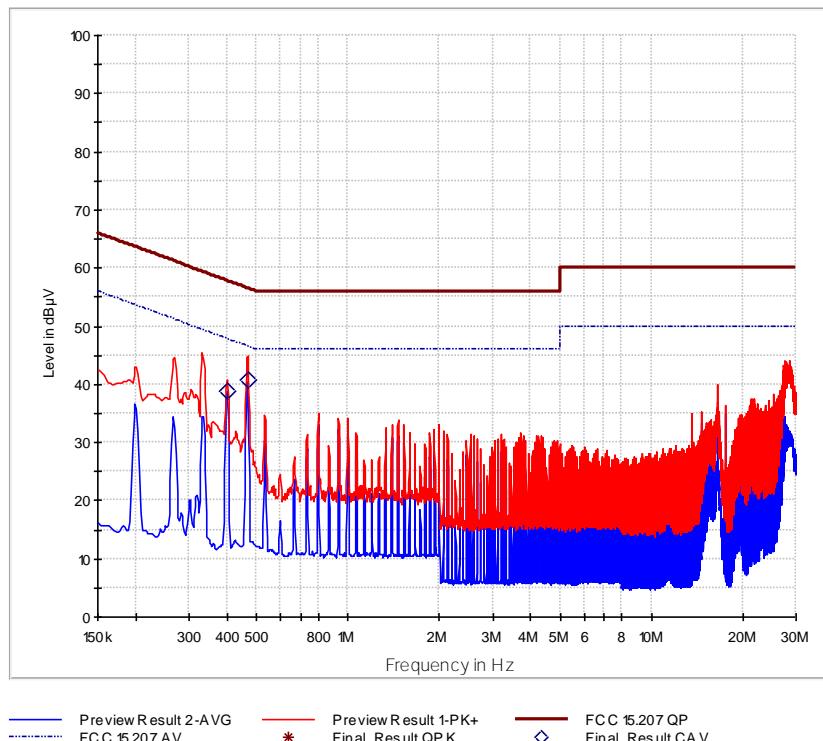
Conducted emission: 150k-30M L (Phase)



Final Results 1:

| Frequency MHz | QuasiPeak dB μ V | CAverage dB μ V | Limit dB μ V | Margin dB | Meas. Time ms | Bandwidth kHz | Line | Filter | Corr. dB |
|---------------|----------------------|---------------------|------------------|-----------|---------------|---------------|------|--------|----------|
| 0.399750 | --- | 39.63 | 47.86 | 8.22 | 1000.0 | 9.000 | L1 | ON | 10.0 |
| 0.467250 | --- | 41.21 | 46.56 | 5.35 | 1000.0 | 9.000 | L1 | ON | 10.0 |

Conducted emission: 150k-30M N (Neutral)



Final Results 1:

| Frequency MHz | QuasiPeak dB μ V | CAverage dB μ V | Limit dB μ V | Margin dB | Meas. Time ms | Bandwidth kHz | Line | Filter | Corr. dB |
|---------------|----------------------|---------------------|------------------|-----------|---------------|---------------|------|--------|----------|
| 0.399750 | --- | 38.90 | 47.86 | 8.96 | 1000.0 | 9.000 | N | ON | 10.0 |
| 0.467250 | --- | 40.66 | 46.56 | 5.90 | 1000.0 | 9.000 | N | ON | 10.0 |

2.1.7 Test Location and Test Equipment Used

This test was carried out in Semi anechoic room - cabin no. 11 and Shielded room - cabin no. 9.

| Instrument | Manufacturer | Type No | TE No | Calibration Period (months) | Calibration Due |
|--------------------------|-----------------|---------|--------|-----------------------------|-----------------|
| Spectrum Analyzer | Rohde & Schwarz | ESW44 | 39897 | 12 | 2020-02-29 |
| 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 |
| EMI test receiver | Rohde & Schwarz | ESU8 | 19904 | 18 | 2020-01-31 |
| V-Network | Rohde & Schwarz | ENV216 | 39910 | 12 | 2020-02-29 |
| Shielded room no.9 | Albatross | --- | 21083 | --- | --- |

Table 5

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment

N/A - Not Applicable

3 Photographs

3.1 Equipment Under Test (EUT)

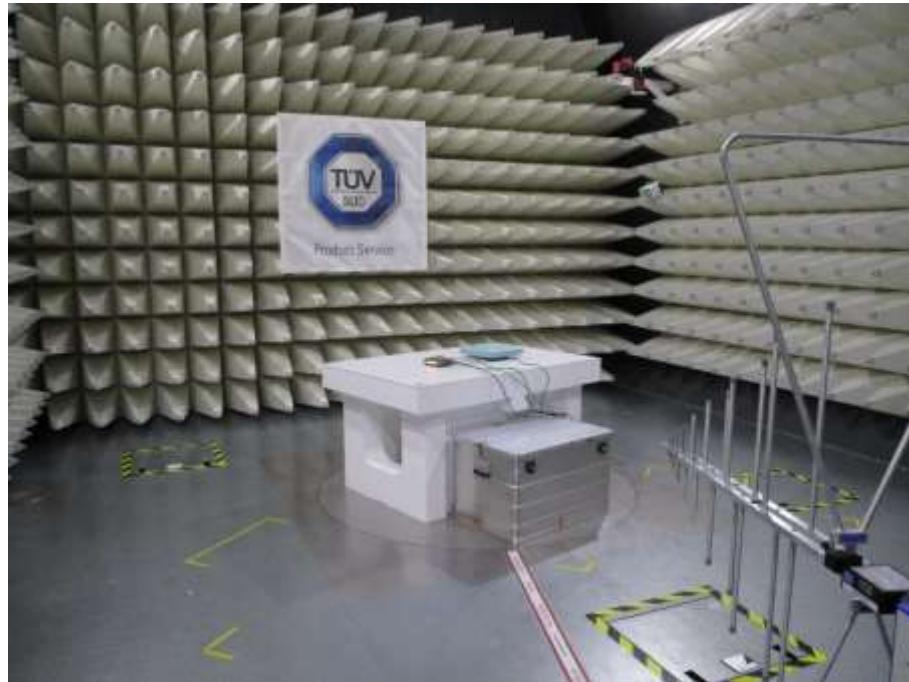


Figure 1 - Radiated emission 30MHz – 1GHz

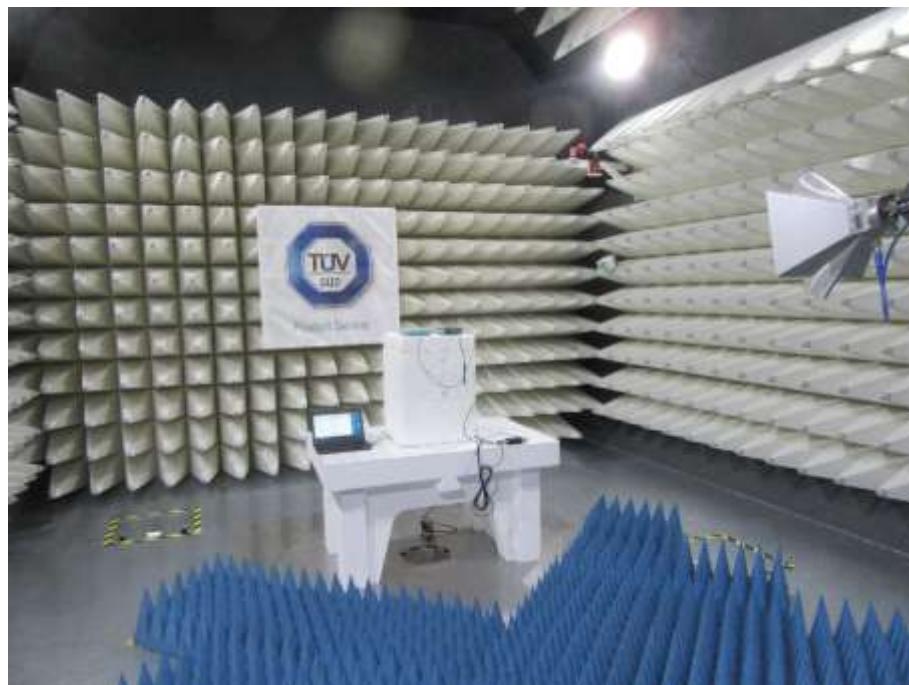


Figure 2 – Radiated emission 1 – 5 GHz



Figure 3 – Conducted emission

4 Test Equipment Information

4.1 General Test Equipment Used

| Instrument | Manufacturer | Type No | TE No | Calibration Period (months) | Calibration Due |
|--------------------------|-----------------|---------|--------|-----------------------------|-----------------|
| Spectrum Analyzer | Rohde & Schwarz | ESW44 | 39897 | 12 | 2020-02-29 |
| 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 |
| EMI test receiver | Rohde & Schwarz | ESU8 | 19904 | 18 | 2020-01-31 |
| V-Network | Rohde & Schwarz | ENV216 | 39910 | 12 | 2020-02-29 |
| Shielded room no.9 | Albatross | --- | 21083 | --- | --- |

Table 6

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment

N/A - Not Applicable