

Report on the FCC and IC Testing of the
SKIDATA AG
 RFID Reader Module. Model: SD906
 In accordance with FCC 47 CFR Part 15C and
 Industry Canada RSS-210 and Industry Canada
 RSS-GEN



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FCC ID: QSS-SD905
 IC: 6215A-SD905

COMMERCIAL-IN-CONFIDENCE

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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 15C and Industry Canada RSS-210 and Industry Canada 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 | 2018-07-09 | <i>Stumpe</i> |

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 compliant with FCC 47 CFR Part 15C, Industry Canada RSS-210 and Industry Canada RSS-GEN:2016, Edition 09 (08-2016) and Edition 04 (11-2014).

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1 Report Summary

1.1 Report Modification Record

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

| Edition | Description of Change | Date of Edition |
|---------|-----------------------|-----------------|
| 1 | First Edition | 2018-03-08 |
| 2 | ICES changed to IC | 2018-07-09 |

Table 1

1.2 Introduction

| | |
|---------------------------------|--|
| Applicant | SKIDATA AG |
| Manufacturer | SKIDATA AG |
| Model Number(s) | SD906 |
| Serial Number(s) | R173000147 |
| Hardware Version(s) | PCB: 906, HW vers.: 1, Variant: 2 |
| Software Version(s) | Firmware: 1.31 |
| Number of Samples Tested | 1 |
| Test Specification/Edition/Date | FCC 47 CFR Part 15C, Industry Canada RSS-210 and Industry Canada RSS-GEN:2016, Edition 09 (08-2016) and Edition 04 (11-2014) |
| Test Plan/Edition/Date | --- |
| Order Number | 1036822, 1042726 |
| Date | |
| Date of Receipt of EUT | 2017-10-27 |
| Start of Test | 2018-01-10 |
| Finish of Test | 2018-02-14 |
| Name of Engineer(s) | Matthias Stumpe |
| Related Document(s) | ANSI C63.10 (2013) |



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C and Industry Canada RSS-210 and Industry Canada RSS-GEN is shown below.

| Section | Specification Clause | Test Description | Result | Comments/Base Standard |
|---|---|--|--------|------------------------|
| Configuration and Mode: Normal operation - Continuous polling without RFID Tag card | | | | |
| 2.1 | 15.215 (c), N/A and 6.6 | 20 dB Bandwidth | Pass | ANSI C63.10 (2013) |
| 2.2 | 15.225 (e), B.1 to B.9 and 6.11. | Frequency Tolerance Under Temperature Variations | Pass | ANSI C63.10 (2013) |
| 2.3 | 15.225 (a)(b)(c)(d), B.1 to B.9, 6.4 and 6.5. | Field Strength of any Emission | Pass | ANSI C63.10 (2013) |
| 2.4 | 15.207, N/A and 8.8 | AC Power Line Conducted Emissions | Pass | ANSI C63.10 (2013) |
| 2.5 | --- | Exposure of Humans to RF Fields | Pass | --- |

Table 2



1.4 Application Form

1.4.1 Technical Description

The Equipment Under Test (EUT) was a SKIDATA AG SD906 RFID Reader Module. The SS906 functions as a built-in interface between a SKIDATA device and contactless data carriers (RFID). Data communication between the SD906 and the other device is provided by means of a USB connection.

1.5 Deviations from the Standard

1.6 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 |
|---------------------------|---|------------------------|--------------------------|
| Serial Number: R173000147 | | | |
| 0 | As supplied by the customer | Not Applicable | Not Applicable |
| 1 | Antenna coil has been replaced by a resistor for conducted emission test. | Applicant | 2018-01-31 |

Table 3

1.7 Test Location

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

| Test Name | Name of Engineer(s) |
|---|---------------------|
| Configuration and Mode: Normal operation - Continuous polling without RFID Tag card | |
| 20 dB Bandwidth | Matthias Stumpe |
| Frequency Tolerance Under Temperature Variations | Matthias Stumpe |
| Field Strength of any Emission | Matthias Stumpe |
| AC Power Line Conducted Emissions | Matthias Stumpe |

Table 4

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany



2 Test Details

2.1 20 dB Bandwidth

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Industry Canada RSS-210 and Industry Canada RSS-GEN, Clause 15.215 (c), N/A and 6.6

2.1.2 Equipment Under Test and Modification State

SD906, S/N: R173000147 - Modification State 0

2.1.3 Date of Test

2018-01-11

2.1.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.9.1.

2.1.5 Environmental Conditions

Ambient Temperature 21,0 °C
Relative Humidity 34,0 %

2.1.6 Test Results

Normal operation - Continuous polling without RFID Tag card

| Frequency (MHz) | 20 dB Bandwidth (Hz) | 99% Occupied Bandwidth (Hz) | F _{LOWER} (MHz) | F _{UPPER} (MHz) |
|-----------------|----------------------|-----------------------------|--------------------------|--------------------------|
| 13.56 MHz | 8 kHz | 99 kHz | 13.55594 | 13.56394 |

Table 5

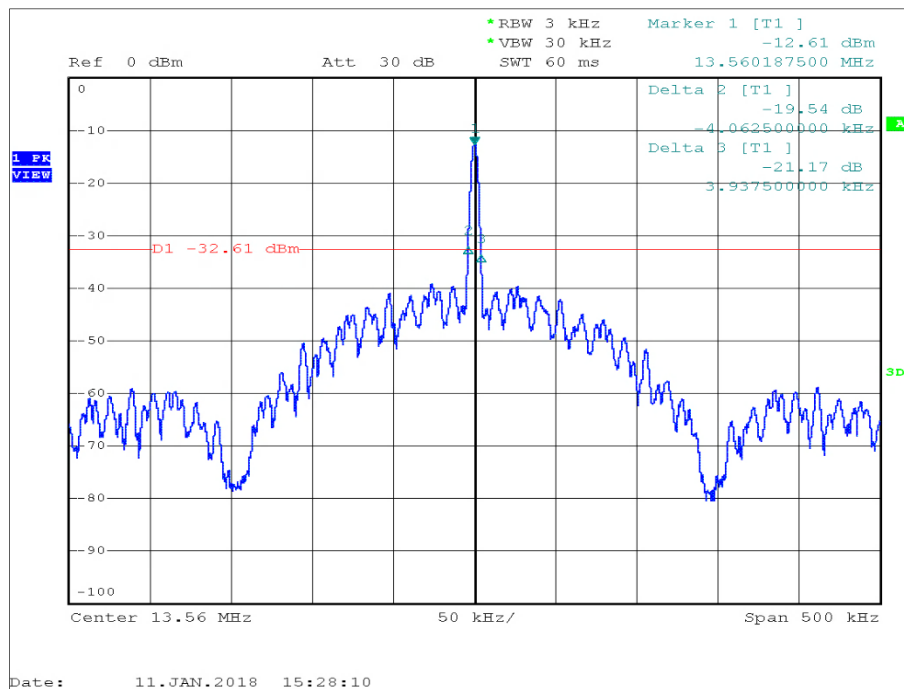


Figure 1 - 20 dB Bandwidth

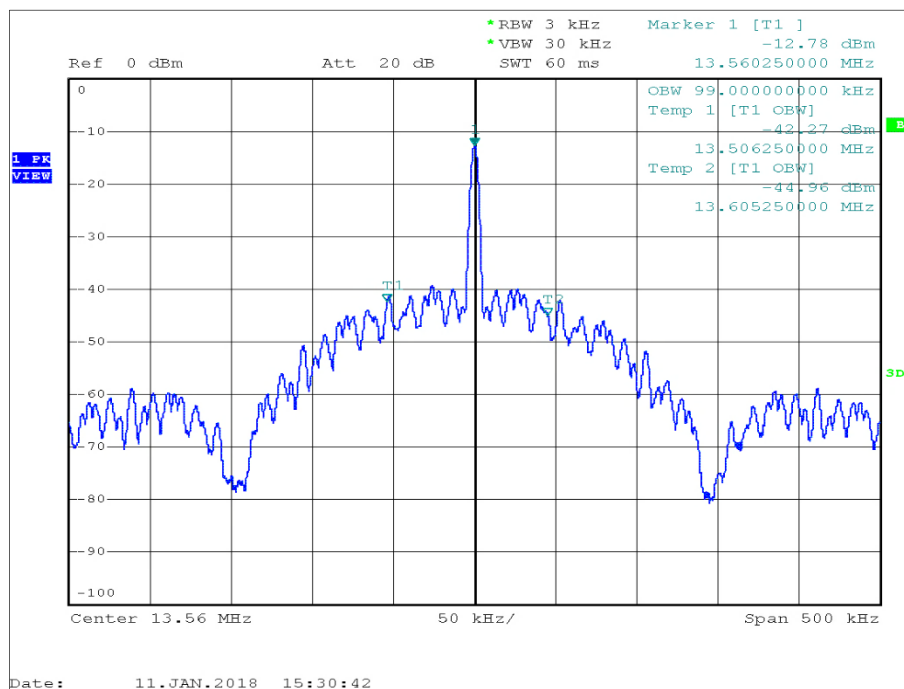


Figure 2 - 99% Occupied Bandwidth

FCC 47 CFR Part 15, Limit Clause 15.215 (c)

The 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.



Industry Canada RSS 210 and Industry Canada RSS GEN, Limit Clause

None specified.

2.1.7 Test Location and Test Equipment Used

This test was carried out in Semi anechoic room - cabin no. 8.

| Instrument | Manufacturer | Type No | T-ID | Calibration Period (months) | Calibration Due |
|-------------------|-----------------|-----------|-------|-----------------------------|-----------------|
| TRILOG Antenna | Schwarzbeck | VULB 9163 | 19691 | 24 | 2020-12-31 |
| EMI test receiver | Rohde & Schwarz | ESW26 | 28268 | 12 | 2018-06-30 |

Table 6

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment

N/A - Not Applicable



2.2 Frequency Tolerance Under Temperature Variations

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Industry Canada RSS-210 and Industry Canada RSS-GEN, Clause 15.225 (e), B.1 to B.9 and 6.11.

2.2.2 Equipment Under Test and Modification State

SD906, S/N: R173000147 - Modification State 0

2.2.3 Date of Test

2018-01-15

2.2.4 Environmental Conditions

Ambient Temperature 21,0 °C
 Relative Humidity 28,0 %

2.2.5 Test Results

Normal operation - Continuous polling without RFID Tag card

| Temperature | Voltage | Measured Frequency (MHz) | Frequency Deviation (%) | Frequency Error (ppm) |
|-------------|-----------|--------------------------|-------------------------|-----------------------|
| -40.0 °C | 5.00 V DC | 13.560071 MHz | 0.00053 | 5.25 |
| -30.0 °C | 5.00 V DC | 13.560105 MHz | 0.00077 | 7.74 |
| -20.0 °C | 5.00 V DC | 13.560116 MHz | 0.00086 | 8.57 |
| -10.0 °C | 5.00 V DC | 13.560101 MHz | 0.00075 | 7.46 |
| 0.0 °C | 5.00 V DC | 13.560075 MHz | 0.00055 | 5.53 |
| +10.0 °C | 5.00 V DC | 13.560060 MHz | 0.00044 | 4.42 |
| +20.0 °C | 5.00 V DC | 13.560060 MHz | 0.00044 | 4.42 |
| +30.0 °C | 5.00 V DC | 13.560026 MHz | 0.00019 | 1.93 |
| +40.0 °C | 5.00 V DC | 13.559985 MHz | -0.00011 | -1.11 |
| +50.0 °C | 5.00 V DC | 13.559970 MHz | -0.00022 | -2.21 |
| +60.0 °C | 5.00 V DC | 13.559955 MHz | -0.00033 | -3.32 |
| +70.0 °C | 5.00 V DC | 13.559955 MHz | -0.00033 | -3.32 |
| +80.0 °C | 5.00 V DC | 13.559970 MHz | -0.00022 | -2.21 |
| +85.0 °C | 5.00 V DC | 13.560015 MHz | 0.00011 | 1.11 |

Table 7 - Frequency Tolerance Under Temperature Variation

| Temperature | Voltage | Measured Frequency (MHz) | Frequency Deviation (%) | Frequency Error (ppm) |
|-------------|-----------|--------------------------|-------------------------|-----------------------|
| +20.0 °C | 4.25 V DC | 13.560060 | 0.00044 | 4.42 |
| +20.0 °C | 5.00 V DC | 13.560060 | 0.00044 | 4.42 |
| +20.0 °C | 5.75 V DC | 13.560030 | 0.00022 | 2.21 |

Table 8 - Frequency Tolerance Under Voltage Variation



FCC 47 CFR Part 15, Limit Clause 15.225 (e)

The frequency tolerance of the carrier signal shall be maintained within ± 0.01 % of the operating frequency.

Industry Canada RSS-210, Limit Clause B.6

Carrier frequency stability shall be maintained to $\pm 0.01\%$ (± 100 ppm)

2.2.6 Test Location and Test Equipment Used

This test was carried out in Non shielded room.

| Instrument | Manufacturer | Type No | T-ID | Calibration Period (months) | Calibration Due |
|-----------------------|-----------------|---------|-------|-----------------------------|-----------------|
| Spectrum Analyzer | Rohde & Schwarz | ESPI | 19578 | 12 | 2018-09-30 |
| Climatic test chamber | ESPEC | PL-2J | 18843 | 24 | 2019-03-31 |

Table 9

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment

N/A - Not Applicable



2.3 Field Strength of any Emission

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Industry Canada RSS-210 and Industry Canada RSS-GEN, Clause 15.225 (a)(b)(c)(d), B.1 to B.9, 6.4 and 6.5.

2.3.2 Equipment Under Test and Modification State

SD906, S/N: R173000147 - Modification State 0

2.3.3 Date of Test

2018-01-10

2.3.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.3, 6.4 and 6.5.

Measurements were made at a distance of 3 m. The limit lines shown on the plot were extrapolated from either 300 m or 30 m to the measurement distance of 3 m in accordance with ANSI C63.10 Clause 6.4.4.2.

2.3.5 Environmental Conditions

Ambient Temperature 21,0 °C
Relative Humidity 27,0 %

2.3.6 Test Results

Normal operation - Continuous polling without RFID Tag card, Carrier Results

| Frequency (MHz) | Quasi-Peak Level (dBµV/m) at 3m | Quasi-Peak Level (dBµV/m) at 30m | Quasi-Peak Level (µV/m) at 3m | Quasi-Peak Level (µV/m) at 30m |
|-----------------|---------------------------------|----------------------------------|-------------------------------|--------------------------------|
| 13.56 MHz | 79.25 | 39.25 | 9173 | 91.73 |

Table 10

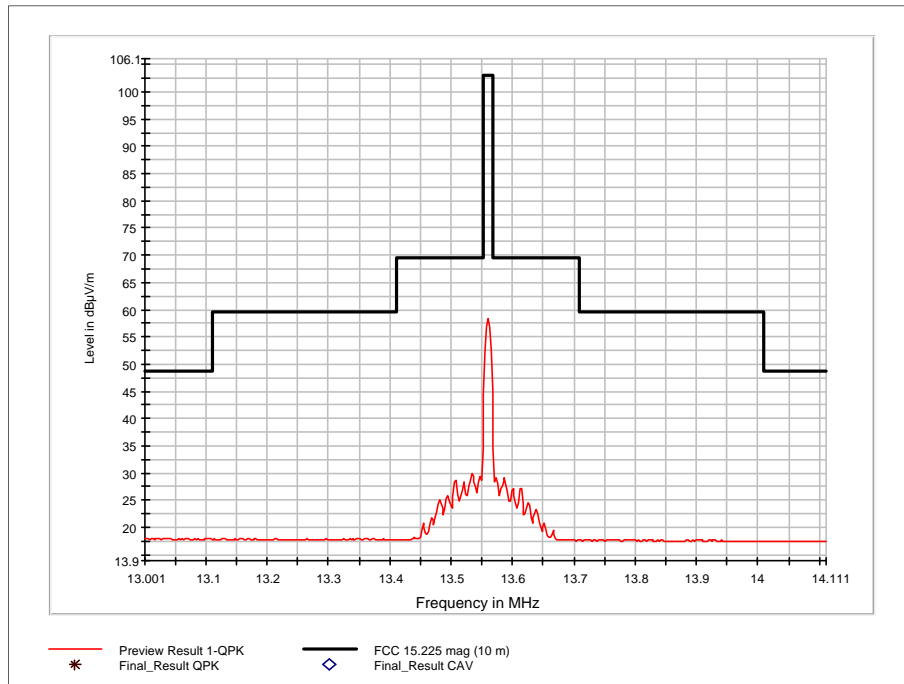


Figure 3 - Plot of the Fundamental - 13.56 MHz

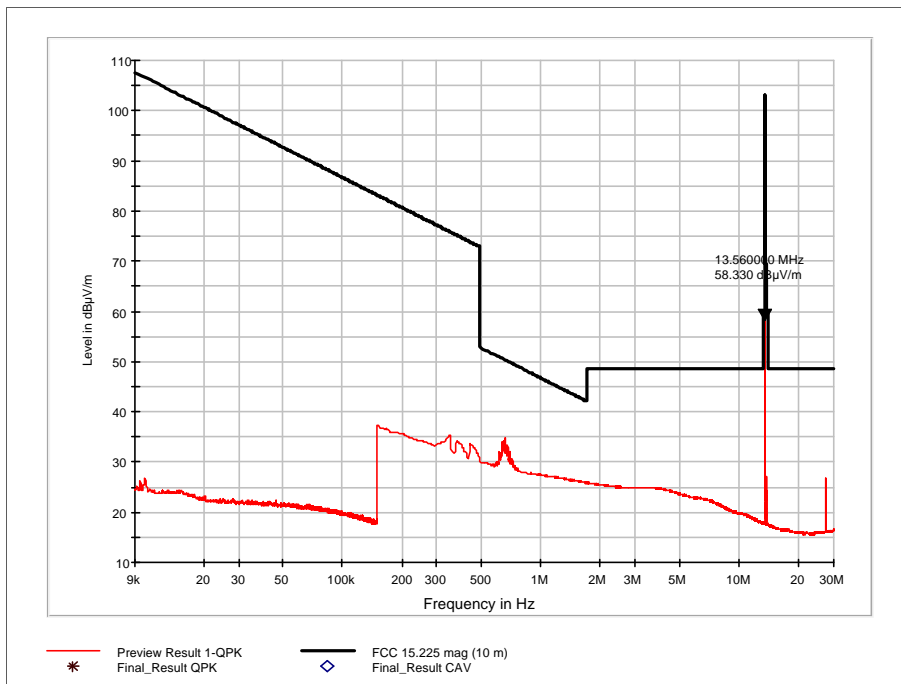


Figure 4 - 9 kHz to 30 MHz

No emissions were detected within 6 dB of the limit.



| Frequency (MHz) | Quasi Peak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|---------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 40.6800 | 34.05 | 40.00 | 5.95 | 1000.0 | 120.000 | 154.0 | V | -115.0 | 14.2 |
| 54.2400 | 36.14 | 40.00 | 3.86 | 1000.0 | 120.000 | 150.0 | V | -152.0 | 15.3 |
| 81.3600 | 36.01 | 40.00 | 3.99 | 1000.0 | 120.000 | 226.0 | H | -175.0 | 8.8 |
| 135.6000 | 34.60 | 43.50 | 8.90 | 1000.0 | 120.000 | 261.0 | H | 3.0 | 10.3 |

Table 11 - Emissions Results – 30 MHz to 1 GHz

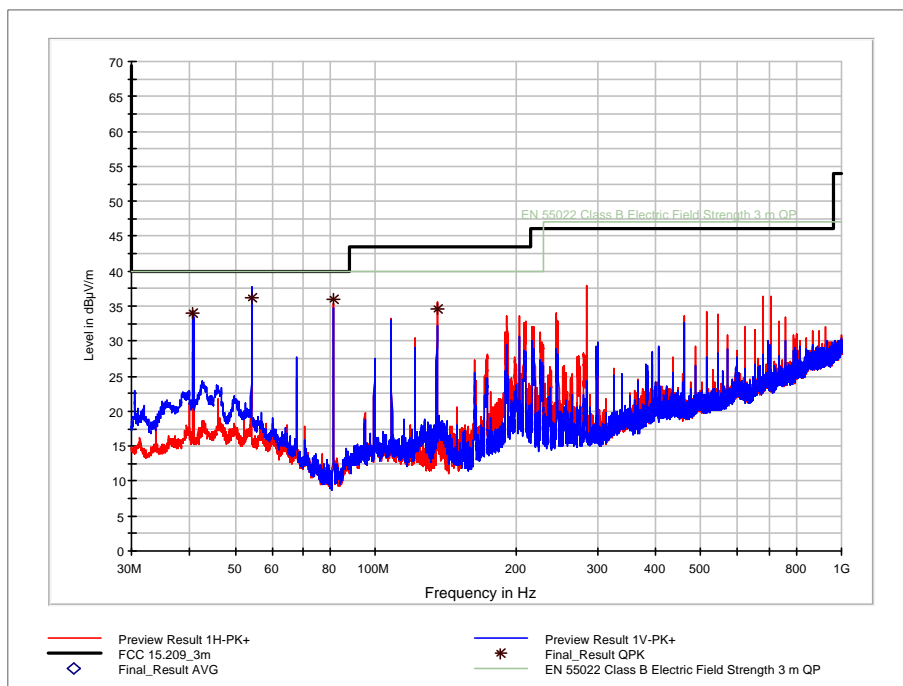


Figure 5 - 30 MHz to 1 GHz



FCC 47 CFR Part 15, Limit Clause 15.225 (a)(b)(c)(d)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 m.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 m.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 m.

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

FCC 47 CFR Part 15, Limit Clause 15.209

| Frequency (MHz) | Field Strength ($\mu\text{V/m}$) | Measurement Distance (m) |
|-----------------|------------------------------------|--------------------------|
| 0.009 to 0.490 | 2400/F (kHz) | 300 |
| 0.490 to 1.705 | 24000/F (kHz) | 30 |
| 1705 to 30 | 30 | 30 |
| 30 to 88 | 100** | 3 |
| 88 to 216 | 150** | 3 |
| 216 to 960 | 200** | 3 |
| Above 960 | 500 | 5 |

Table 12 - FCC Radiated Emission Limit



Industry Canada RSS-210, Limit Clause B.6

The field strength of any emission shall not exceed the following limits:

- (a) 15.848 mW/m (84 dBμV/m) at 30 m, within the band 13.553 – 13.567 MHz.
- (b) 334 μV/m (50.5 dBμV/m) at 30 m, withing the bands 13.410 – 13.553 MHz and 13.567 – 13.710 MHz.
- (c) 106 μV/m (40.5 dBμV/m) at 30 m, within the bands 13.110 – 13.410 MHz and 13.710 – 14.010 MHz.
- (d) RSS-GEN general field strength limits for frequencies outside the band 13.110– 14.010 MHz.

Industry Canada RSS-GEN, Limit Clause

| Frequency | Electric Field Strength (μV/m) | Magnetic Field Strength (H-Field) (μA/m) | Measurement Distance (m) |
|--------------------|--------------------------------|--|--------------------------|
| 9 - 490 kHz | 2,400/F (F in kHz) | 2,400/377F (F in kHz) | 300 |
| 490 - 1,705 kHz | 24,000/F (F in kHz) | 24,000/377F (F in kHz) | 30 |
| 1,705 kHz - 30 MHz | 30 | N/A | 30 |

Table 13 - Industry Canada Radiated Emission Limit - Less than 30 MHz

| Frequency (MHz) | Field Strength (μV/m at 3 m) |
|-----------------|------------------------------|
| 30 - 88 | 100 |
| 88 - 216 | 150 |
| 216 - 960 | 200 |
| > 960 | 500 |

Table 14 - Industry Canada Radiated Emission Limit - 30 MHz to 1 GHz

2.3.7 Test Location and Test Equipment Used

This test was carried out in Semi anechoic room - cabin no. 8.

| Instrument | Manufacturer | Type No | T-ID | Calibration Period (months) | Calibration Due |
|-------------------|-----------------|-----------|-------|-----------------------------|-----------------|
| Loop antenna | Rohde & Schwarz | HFH2-Z2 | 18876 | 24 | 2018-07-31 |
| TRILOG Antenna | Schwarzbeck | VULB 9163 | 19691 | 24 | 2020-12-31 |
| EMI test receiver | Rohde & Schwarz | ESW26 | 28268 | 12 | 2018-06-30 |

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



2.4 AC Power Line Conducted Emissions

2.4.1 Specification Reference

FCC 47 CFR Part 15C, Industry Canada RSS-210 and Industry Canada RSS-GEN, Clause 15.207, N/A and 8.8

2.4.2 Equipment Under Test and Modification State

SD906, S/N: R173000147 - Modification State 1

2.4.3 Date of Test

2018-02-14

2.4.4 Environmental Conditions

Ambient Temperature 22,0 °C
 Relative Humidity 28,0 %

2.4.5 Test Results

Normal operation - Continuous polling without RFID Tag card

Applied supply Voltage: 115 V AC
 Applied supply frequency: 60 Hz

| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Line | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|------|------------|
| 15.718000 | 45.21 | --- | 60.00 | 14.79 | 1000.0 | N | 0.3 |
| 16.046000 | --- | 37.77 | 50.00 | 12.23 | 1000.0 | N | 0.3 |
| 16.102000 | 46.49 | --- | 60.00 | 13.51 | 1000.0 | N | 0.3 |
| 16.486000 | --- | 37.55 | 50.00 | 12.45 | 1000.0 | N | 0.3 |
| 16.486000 | 46.03 | --- | 60.00 | 13.97 | 1000.0 | N | 0.3 |
| --- | --- | --- | --- | --- | --- | L1 | --- |

Table 15 - Live Line Emissions Results

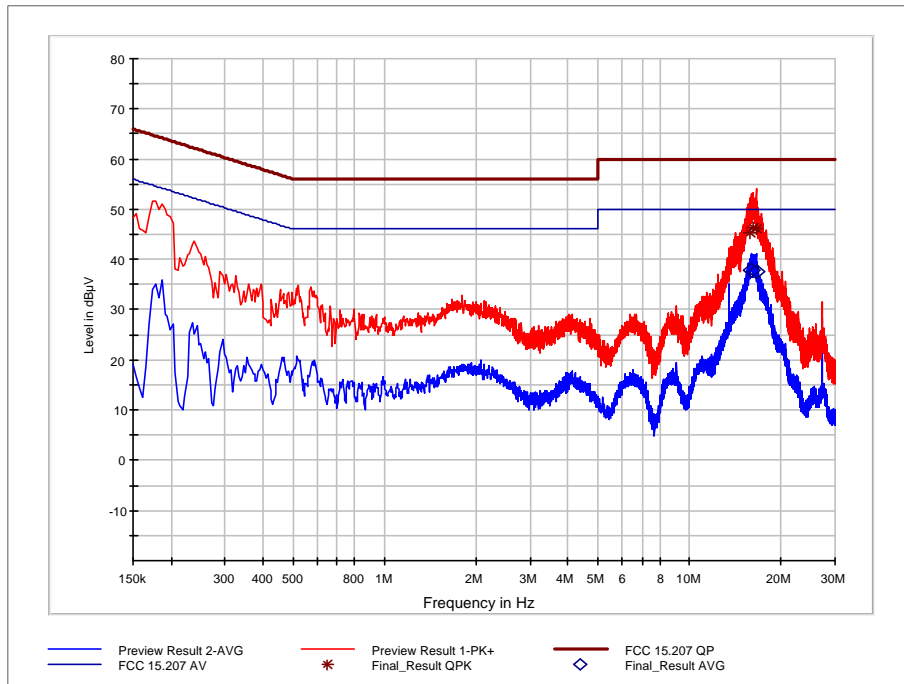


Figure 6 – Live- and Neutral-Line 150 kHz to 30 MHz



FCC 47 CFR Part 15, Limit Clause 15.207 and Industry Canada RSS-GEN, Limit Clause 8.8

| Frequency of Emission (MHz) | Conducted Limit (dBµV) | |
|-----------------------------|------------------------|-----------|
| | Quasi-Peak | Average |
| 0.15 to 0.5 | 66 to 56* | 56 to 46* |
| 0.5 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

Table 16

*Decreases with the logarithm of the frequency.

2.4.6 Test Location and Test Equipment Used

This test was carried out in Shielded room - cabin no. 4.

| Instrument | Manufacturer | Type No | TE No | Calibration Period (months) | Calibration Due |
|-------------------|-----------------|------------|-------|-----------------------------|-----------------|
| EMI test receiver | Rohde & Schwarz | 100008 | 19730 | 12 | 2018-10-31 |
| V-network | Rohde & Schwarz | 894785/005 | 18919 | 36 | 2019-10-31 |

Table 17

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



2.5 Exposure of Humans to RF Fields

2.5.1 Specification Reference

IC RSS-Gen Issue 4, section 3.2

2.5.2 Guide

IC RSS-102 Issue 5, section 2.5

2.5.3 Equipment Under Test and Modification State

SD906, S/N: R173000147 - Modification State 0

2.5.4 Date of Test

2018-01-11



2.5.5 Test Results

| Exposure of Humans to RF Fields | Applicable | Declared by applicant | Measured | Exemption |
|---|------------|-----------------------|-------------------------------------|-------------------------------------|
| The antenna is | | | | |
| <input type="checkbox"/> detachable | | | | |
| The conducted output power (CP in watts) is measured at the antenna connector: $CP = \dots\dots\dots \text{ W}$ The effective isotropic radiated power (EIRP in watts) is calculated using <input type="checkbox"/> the numerical antenna gain: $G = \dots\dots\dots$ $EIRP = G \cdot CP \Rightarrow EIRP = \dots\dots\dots \text{ W}$ <input type="checkbox"/> the field strength ¹ in V/m: $FS = \dots\dots\dots \text{ V/m}$ $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP = \dots\dots\dots \text{ W}$ with: Distance between the antennas in m: $D = \dots\dots\dots \text{ m}$ | | | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> not detachable | | | | |
| A field strength measurement has been performed with dormakaba registration unit 90 04 to determine the effective isotropic radiated power (EIRP in watts) given by $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP = 5.4 \mu\text{W}$ with: Field strength in V/m: $FS = 9.2 \text{ mV/m}$ Distance between the two antennas in m: $D = 3 \text{ m}$ | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Selection of output power | | | | |
| The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.): $TP = 25.4 \mu\text{W}$ | | | | |

¹ The conversion formula is valid only for properly matched antennas. In other cases the transmitter output power may have to be measured by a terminated measurement when applying the exemption clauses.
 If an open area test site is used for field strength measurement, the effect due to the metal ground reflecting plane should be subtracted from the maximum field strength value in order to reference it to free space, before calculating TP.



| Exposure of Humans to RF Fields (continued) | Applicable | Declared by applicant | Measured | Exemption |
|---|---|-----------------------|--------------------------|-----------|
| Separation distance between the user and the transmitting device is | | | | |
| <input checked="" type="checkbox"/> less than or equal to 20 cm | <input type="checkbox"/> greater than 20 cm | | <input type="checkbox"/> | |
| Transmitting device is | | | | |
| <input type="checkbox"/> in the vicinity of the human head | <input type="checkbox"/> body-worn | | <input type="checkbox"/> | |



| SAR evaluation | | | | | | | | | | |
|---|--|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| <p>SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in the table.</p> <p>For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in the table, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.</p> <p>For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.</p> | | | | | | | | | | |
| Frequency (MHz) | Exemption limits (mW) ² at separation distance of | | | | | | | | | |
| | • 5 mm | 10 mm | 15 mm | 20 mm | 25 mm | 30 mm | 35 mm | 40 mm | 45 mm | • 50 mm |
| • 300 ³ | 71 | 101 | 132 | 162 | 193 | 223 | 254 | 284 | 315 | 345 |
| 450 | 52 | 70 | 88 | 106 | 123 | 141 | 159 | 177 | 195 | 213 |
| 835 | 17 | 30 | 42 | 55 | 67 | 80 | 92 | 105 | 117 | 130 |
| 1900 | 7 | 10 | 18 | 34 | 60 | 99 | 153 | 225 | 316 | 431 |
| 2450 | 4 | 7 | 15 | 30 | 52 | 83 | 123 | 173 | 235 | 309 |
| 3500 | 2 | 6 | 16 | 32 | 55 | 86 | 124 | 170 | 225 | 290 |
| 5800 | 1 | 6 | 15 | 27 | 41 | 56 | 71 | 85 | 97 | 106 |

² The exemption limit in the table are based on measurements and simulations on half-wave dipole antennas at separation distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.

³ Transmitters operating between 3 kHz and 10 MHz, meeting the exemption from routine SAR evaluation, shall demonstrate compliance to the instantaneous limits in IC RSS-102, issue 5, section 4.



| | | | | |
|--|--|--|--|-------------------------------------|
| Carrier frequency: f = 13.56 MHz | | | | |
| Distance: d = 5 mm | | | | |
| Transmitter output power: TP = 25.4 μW | | | | |
| Limit: TP_{limit} = 71 mW | | | | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> SAR evaluation is documented in test report no. ... | | | | |

2.5.6 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 |
|---------------------------------|--------------|-----------|-------|-----------------------------|-----------------|
| Electromagnetic radiation meter | Narda Safety | EMR-200 | 19590 | 36 | 2019-10-31 |
| Electric field probe | Narda Safety | Type 8.3 | 19591 | 36 | 2019-10-31 |
| Magnetic field probe | Narda Safety | Type 12.1 | 19592 | 36 | 2019-10-31 |

Table 18



Product Service

3 Photographs

3.1 Equipment Under Test (EUT)

Figure 7



Figure 8



Figure 9

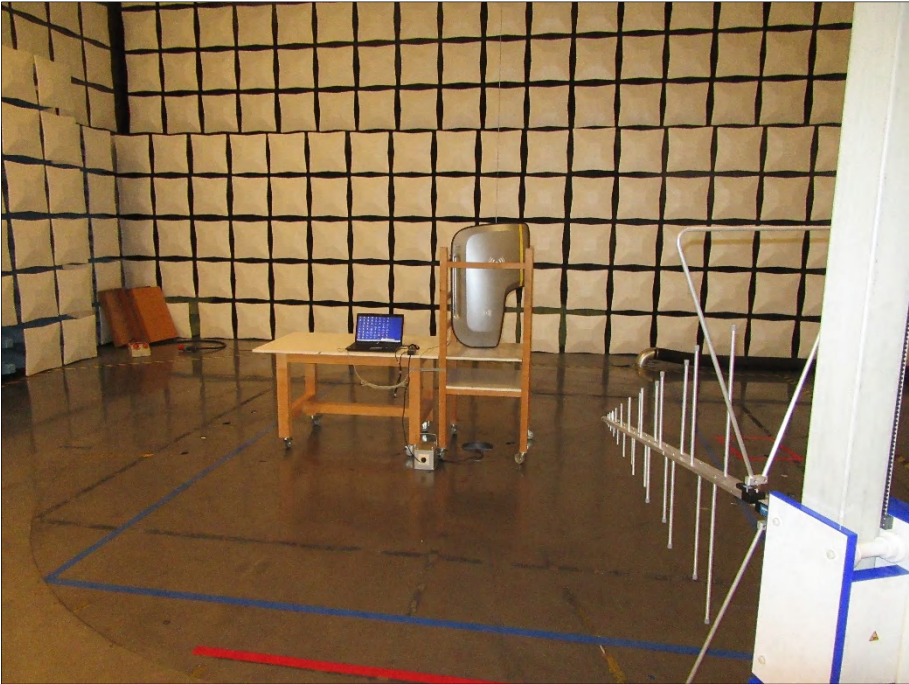


Figure 10

Figure 11



4 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 | ±1.14 % | 2 |
| RF-Frequency error | 1.96 | ±1 · 10 ⁻⁷ | 7 |
| RF-Power, conducted carrier | 2 | ±0.079 dB | 2 |
| RF-Power uncertainty for given BER | 1.96 | +0.94 dB / -1.05 | 7 |
| RF power, conducted, spurious emissions | 1.96 | +1.4 dB / -1.6 dB | 7 |
| RF power, radiated | | | |
| 25 MHz – 4 GHz | 1.96 | +3.6 dB / -5.2 dB | 8 |
| 1 GHz – 18 GHz | 1.96 | +3.8 dB / -5.6 dB | 8 |
| 18 GHz – 26.5 GHz | 1.96 | +3.4 dB / -4.5 dB | 8 |
| 40 GHz – 170 GHz | 1.96 | +4.2 dB / -7.1 dB | 8 |
| Spectral Power Density, conducted | 2.0 | ±0.53 dB | 2 |
| Maximum frequency deviation | | | |
| 300 Hz – 6 kHz | 2 | ±2,89 % | 2 |
| 6 kHz – 25 kHz | 2 | ±0.2 dB | 2 |
| Maximum frequency deviation for FM | 2 | ±2,89 % | 2 |
| Adjacent channel power 25 MHz – 1 GHz | 2 | ±2.31 % | 2 |
| Temperature | 2 | ±0.39 K | 4 |
| (Relative) Humidity | 2 | ±2.28 % | 2 |
| DC- and low frequency AC voltage | | | |
| DC voltage | 2 | ±0.01 % | 2 |
| AC voltage up to 1 kHz | 2 | ±1.2 % | 2 |
| Time | 2 | ±0.6 % | 2 |

Table 19



| 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 20



| 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 21

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 $kp = 2$, 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 $kp = 2$, 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 $kp = 2.05$, 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 $kp = 2$, 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 $kp = 2$, providing a level of confidence of $p = 95.45\%$

Note 7:

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

Note 8:

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 $kp = 1.96$, providing a level of confidence of $p = 95.45\%$



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