

# Test report

### 374507-3TRFWL

Date of issue: 2019-05-30

Applicant: Inpeco Spa a socio unico Via Givoletto 15 10040 Val della Torre TO Italy

Product: RFID Device

Model: CAN Antenna 2 coil

FCC ID: Y2K-CAB2C001 IC: 11394A-CAB2C001

#### Specifications:

FCC 47 CFR Part 15 Subpart C

Intentional radiators

RSS-210, Issue 9, August 2016, Section 2.5

General field strength limits

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The test report merely corresponds to the tested sample.

The phase of sampling / collection of equipment under test is carried out by the customer.



#### **Test location**

| Company name: | Nemko Spa                                 |
|---------------|---|
| Address:      | Via del Carroccio, 4                      |
| City:         | Biassono                                  |
| Province:     | MB  |
| Postal code:  | 20853                                     |
| Country:      | Italy                                     |
| Site number:  | FCC test site registration number: 682159 |

| Tested by:   | Daniele Guarnone |
|--------------|------------------|
| Reviewed by: | Paolo Barbieri   |
| Date:        | 2019-05-30       |
| Signature:   | Dowele Guonia    |

#### Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report. This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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# Table of contents

| Table of  | contents   | 3   |
|-----------|--|-----|
| Section 1 | . Report summary   | 4   |
| 1.1       | Applicant and manufacturer   | . 4 |
| 1.2       | Test specifications  | . 4 |
| 1.3       | Test methods   | . 4 |
| 1.4       | Statement of compliance  | . 4 |
| 1.5       | Exclusions   | . 4 |
| 1.6       | Test report revision history   | . 4 |
| Section 2 | 2. Summary of test results   | 5   |
| 2.1       | FCC Part 15 Subpart C, general requirements test results                 | . 5 |
| 2.2       | IC RSS-GEN, Issue 3, test results  | . 5 |
| 2.3       | IC RSS-210, Issue 8, test results  | . 5 |
| Section 3 | B. Equipment under test (EUT) details                                    | 6   |
| 3.1       | Sample information   | . 6 |
| 3.2       | EUT information  | . 6 |
| 3.3       | Technical information  | . 6 |
| 3.4       | Product description and theory of operation                              | . 6 |
| 3.5       | EUT exercise details   | . 6 |
| 3.6       | EUT setup diagram  | . 7 |
| 3.7       | EUT sub assemblies   | . 7 |
| Section 4 | l. Engineering considerations  | 8   |
| 4.1       | Modifications incorporated in the EUT                                    | . 8 |
| 4.2       | Technical judgment   | . 8 |
| 4.3       | Deviations from laboratory tests procedures                              | . 8 |
| Section 5 | i. Test conditions   | 9   |
| 5.1       | Atmospheric conditions   | . 9 |
| 5.2       | Power supply range   | . 9 |
| Section 6 | 6. Measurement uncertainty   | 10  |
| 6.1       | Uncertainty of measurement   | 10  |
| Section 7 | 7. Test equipment  | 11  |
| 7.1       | Test equipment list  | 11  |
| Section 8 | 3. Testing data  | 12  |
| 8.1       | FCC 15.207(a) and RSS-Gen 7.2.4 AC power line conducted emissions limits | 12  |
| 8.2       | RSS-Gen 4.6.1 Occupied bandwidth   | 16  |
| 8.3       | FCC 15.209(a) and RSS-210, 2.5 Radiated emissions limits                 | 19  |
| Section 9 | ). Block diagrams of test set-ups  | 25  |
| 9.1       | Radiated emissions set-up  | 25  |
| 9.2       | Conducted emissions set-up   | 26  |



### Section 1. Report summary

### 1.1 Applicant and manufacturer

| Company name:    | Inpeco Spa a socio unico Via Givoletto 15 10040 Val della Torre TO Italy |
|------------------|--|
| Address:         | Via Givoletto 15   |
| City:            | Val della Torre  |
| Province/State:  | ТО   |
| Postal/Zip code: | 10040  |
| Country:         | Italy  |

#### 1.2 Test specifications

| FCC 47 CFR Part 15, Subpart C | Intentional radiators         |
|-------------------------------|-------------------------------|
| RSS-210, Issue 9, Section 2.5 | General field strength limits |

#### 1.3 Test methods

| ANSI C64.3 v 2003 | American National Standard for Methods of Measurement of Radio- Noise Emissions from Low-Voltage |
|-------------------|--|
| ANSI C04.5 V 2005 | Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz                              |

#### 1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

#### 1.5 Exclusions

None

#### 1.6 Test report revision history

| Revision # | Details of changes made to test report |
|------------|--|
| TRF        | Original report issued                 |



## Section 2. Summary of test results

#### 2.1 FCC Part 15 Subpart C, general requirements test results

| Part       | Test description                                | Verdict           |
|------------|---|-------------------|
| §15.207(a) | Conducted limits                                | Pass              |
| §15.31(e)  | Variation of power source                       | Pass <sup>1</sup> |
| §15.203    | Antenna requirement                             | Pass <sup>2</sup> |
| §15.209    | Radiated emission limits; general requirements. | Pass              |

Notes: <sup>1</sup> Measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, was performed with the supply voltage varied between 85 % and 115 % of the nominal rated supply voltage. No noticeable output power variation was observed

#### 2.2 IC RSS-GEN, Issue 5, test results

| Part  | Test description                                       | Verdict |
|-------|--|---------|
| 4.6.1 | Occupied bandwidth                                     | Pass    |
| 4.7   | Transmitter frequency stability                        | Pass    |
| 6.1   | Receiver spurious emissions limits (radiated)          | Pass    |
| 6.2   | Receiver spurious emissions limits (antenna conducted) | Pass    |
| 7.2.4 | AC power lines conducted emission limits               | Pass    |

Notes: <sup>1</sup> According to Notice 2012-DRS0126 (from January 2012) section 2.2 of RSS-Gen, Issue 3 has been revised. The EUT does not have a stand-alone receiver neither scanner receiver, therefore exempt from receiver requirements.

#### 2.3 IC RSS-210, Issue 9, test results

| Part  | Test description   | Verdict |
|-------|--|---------|
| 2.5   | General field strength limits  |         |
| 2.5.1 | Transmitters with Wanted Emissions that are Within the General Field Strength Limits | Pass    |

Notes: None

<sup>&</sup>lt;sup>2</sup> The Antennas are located within the enclosure of EUT and not user accessible.



# Section 3. Equipment under test (EUT) details

### 3.1 Sample information

| Receipt date           | May 20, 2019 |
|------------------------|--------------|
| Nemko sample ID number | 374507-3     |

#### 3.2 EUT information

| Product name  | RFID Device        |
|---------------|--------------------|
| Model         | CAN Antenna 2 coil |
| Model variant |                    |
| Serial number |                    |

#### 3.3 Technical information

| Operating band            | 119 kHz to 140 kHz  |
|---------------------------|---|
| Operating frequency       | 125 kHz   |
| Modulation type           | FSK   |
| Occupied bandwidth (99 %) | 280 Hz  |
| Emission designator       | 280HD1D   |
| Power requirements        | 24 Vdc and CAN BUS  |
| Antenna information       | The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator. |

### 3.4 Product description and theory of operation

The E.UT is a RFID device operating at 125 KHz used for detect the sample in a medical analysis system

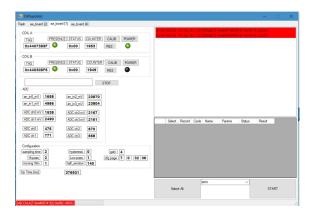




#### 3.5 EUT exercise details

E.UT. has been tested supplied and connected to PC with a USB CAN BUS adaptor. A dedicated software has been used to monitor the antenna status





### 3.6 EUT setup diagram

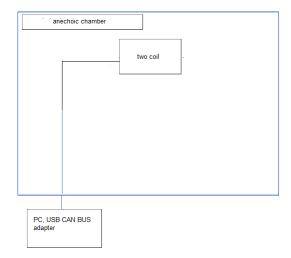


Figure 3.6-1: Setup diagram

#### 3.7 EUT sub assemblies

Table 3.7-1: EUT sub assemblies

| Description | Brand name | Model/Part number | Serial number |
|-------------|------------|-------------------|---------------|
| PC          |            |                   |               |
| USB CAN BUS |            |                   |               |
|             |            |                   |               |



# **Section 4.** Engineering considerations

#### 4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

#### 4.2 Technical judgment

None

#### 4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.



### **Section 5.** Test conditions

### 5.1 Atmospheric conditions

| Temperature       | 18–33 °C     |
|-------------------|--------------|
| Relative humidity | 30–60 %      |
| Air pressure      | 980–1060 hPa |

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

#### 5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.



# Section 6. Measurement uncertainty

#### 6.1 Uncertainty of measurement

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2 which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %;.

| EUT         | Туре      | Test  | Range and Setup features                | Measurement<br>Uncertainty | Notes |
|-------------|-----------|---|---|----------------------------|-------|
|             |           | Frequency error   | 0.001MHz ÷ 18 GHz                       | 0.08 ppm                   | (1)   |
|             |           | Carrier power   | 1MHz ÷ 18 GHz<br>With power meter       | 1.6 dB                     | (1)   |
|             |           | RF Output Power   | 1MHz ÷ 18 GHz<br>With spectrum/receiver | 3.0 dB                     | (1)   |
|             |           | Adjacent channel power  | 1MHz ÷ 18 GHz                           | 1.6 dB                     | (1)   |
|             |           | Conducted spurious emissions  | 1MHz ÷ 18 GHz                           | 4.2 dB                     | (1)   |
|             |           | Intermodulation attenuation   | 1MHz ÷ 18 GHz                           | 2.2 dB                     | (1)   |
|             |           | Attack time – frequency behaviour   | 1MHz ÷ 18 GHz                           | 2.0 ms                     | (1)   |
|             |           | Attack time – power behaviour   | 1MHz ÷ 18 GHz                           | 2.5 ms                     | (1)   |
|             |           | Release time – frequency behaviour  | 1MHz ÷ 18 GHz                           | 2.0 ms                     | (1)   |
|             | Conducted | Release time – power behaviour  | 1MHz ÷ 18 GHz                           | 2.5 ms                     | (1)   |
| Transmitter |           | Transient behaviour of the transmitter– Transient frequency behaviour                         | 1MHz ÷ 18 GHz                           | 0.2 kHz                    | (1)   |
|             |           | Transient behaviour of the transmitter – Power level slope                                    | 1MHz ÷ 18 GHz                           | 9%                         | (1)   |
|             |           | Frequency deviation - Maximum permissible frequency deviation                                 | 0.001MHz ÷ 18 GHz                       | 1.3%                       | (1)   |
|             |           | Frequency deviation - Response of<br>the transmitter to modulation<br>frequencies above 3 kHz | 0.001MHz ÷ 18 GHz                       | 0.5 dB                     | (1)   |
|             |           | Dwell time  | -                                       | 3%                         | (1)   |
|             |           | Hopping Frequency Separation  | 0.01MHz ÷ 18 GHz                        | 1%                         | (1)   |
|             |           | Occupied Channel Bandwidth  | 0.01MHz ÷ 18 GHz                        | 2%                         | (1)   |
|             |           | Modulation Bandwidth  | 0.01MHz ÷ 18 GHz                        | 2%                         | (1)   |
|             | Dadistad  | Radiated spurious emissions   | 30MHz ÷ 18 GHz                          | 6.0 dB                     | (1)   |
|             | Radiated  | Effective radiated power transmitter  | 30MHz ÷ 18 GHz                          | 6.0 dB                     | (1)   |
|             | Padiated  | Radiated spurious emissions   | 30MHz ÷ 18 GHz                          | 6.0 dB                     | (1)   |
| Receiver    | Radiated  | Sensitivity measurement   | 1MHz ÷ 18 GHz                           | 6.0 dB                     | (1)   |
|             | Conducted | Conducted spurious emissions  | 1MHz ÷ 18 GHz                           | 4.2 dB                     | (1)   |



# **Section 7.** Test equipment

## 7.1 Test equipment list

| Equipment   | Manufacturer | Model                     | Serial N° | Due date |  |
|---|--------------|---------------------------|-----------|----------|--|
| EMI receiver 2Hz ÷ 44 GHz   | R&S          | ESW44                     | 101620    | 05/2019  |  |
| EMI receiver 20 Hz ÷ 8 GHz  | R&S          | ESU8                      | 100202    | 01/2020  |  |
| Trilog Broad Band Antenna 25 MHz÷2 GHz                              | Schwarzbeck  | VULB 9162                 | 9162-025  | 07/2021  |  |
| Bilog antenna 1 ÷18 GHz   | Schwarzbeck  | STLP 9148                 | 9148-123  | 07/2021  |  |
| Broadband preamplifier 1 ÷18 GHz                                    | Schwarzbeck  | BBV 9718                  | 9718-137  | 08/2019  |  |
| Loop antenna  | TESEQ        | HLA 6121                  | 45749     | 07/2020  |  |
| Semi-anechoic chamber   | Nemko        | 10m semi-anechoic chamber | 530       | 09/2021  |  |
| Shielded room   | Siemens      | 10m control room          | 1947      | NCR      |  |
| Trilog Broad Band Antenna 25 MHz÷2 GHz                              | Schwarzbeck  | VULB 9162                 | 9162-025  | 07/2021  |  |
| Bilog antenna 1 ÷18 GHz   | Schwarzbeck  | STLP 9148                 | 9148-123  | 07/2021  |  |
| Broadband preamplifier 1 ÷18 GHz                                    | Schwarzbeck  | BBV 9718                  | 9718-137  | 08/2019  |  |
| EMI receiver 2Hz ÷ 44 GHz   | R&S          | ESW44                     | 101620    | 05/2019  |  |
| Semi-anechoic chamber   | Nemko        | 10m semi-anechoic chamber | 530       | 09/2021  |  |
| Shielded room   | Siemens      | 10m control room          | 1947      | NCR      |  |
| Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use |              |                           |           |          |  |



### **Section 8.** Testing data

#### 8.1 FCC 15.207(a) and RSS-Gen 7.2.4 AC power line conducted emissions limits

#### 8.1.1 Definitions and limits

#### FCC:

Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a  $50 \, \mu H/50 \, \Omega$  line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

#### IC

The purpose of this test is to measure unwanted radio frequency currents induced in any AC conductor external to the equipment which could conduct interference to other equipment via the AC electrical network.

Except when the requirements applicable to a given device state otherwise, for any licence-exempt radiocommunication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries.

The conducted emissions shall be measured with a 50  $\Omega/50~\mu H$  line impedance stabilization network (LISN).

Table 8.1-1: Conducted emissions limit

| Frequency of emission, | Conduct    | ted limit, dBμV |
|------------------------|------------|-----------------|
| MHz                    | Quasi-peak | Average         |
| 0.15–0.5               | 66 to 56*  | 56 to 46*       |
| 0.5–5                  | 56         | 46              |
| 5–30                   | 60         | 50              |

Note: \* - Decreases with the logarithm of the frequency.

#### 8.1.2 Test summary

| Test date:     | May 27, 2019     | Temperature:       | 21 °C     |
|----------------|------------------|--------------------|-----------|
| Test engineer: | Daniele Guarnone | Air pressure:      | 1005 mbar |
| Verdict:       | Pass             | Relative humidity: | 35 %      |

Section 8 Test name Testing data

RSS-Gen 4.6.1 Occupied bandwidth

**Specification** RSS-Gen, Issue 3



#### 8.1.3 Observations, settings and special notes

The EUT was set up as tabletop configuration.

The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Receiver settings for preview measurements:

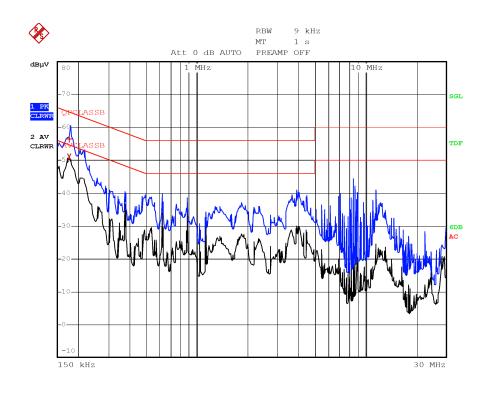
| Resolution bandwidth: | 9 kHz            |
|-----------------------|------------------|
| Video bandwidth:      | 30 kHz           |
| Detector mode:        | Peak and Average |
| Trace mode:           | Max Hold         |
| Measurement time:     | 1000 ms          |

#### Receiver settings for final measurements:

| Resolution bandwidth: | 9 kHz                  |
|-----------------------|------------------------|
| Video bandwidth:      | 30 kHz                 |
| Detector mode:        | Quasi-Peak and Average |
| Trace mode:           | Max Hold               |
| Measurement time:     | 1000 ms                |



#### 8.1.4 Test data



Date: 27.MAY.2019 18:46:19

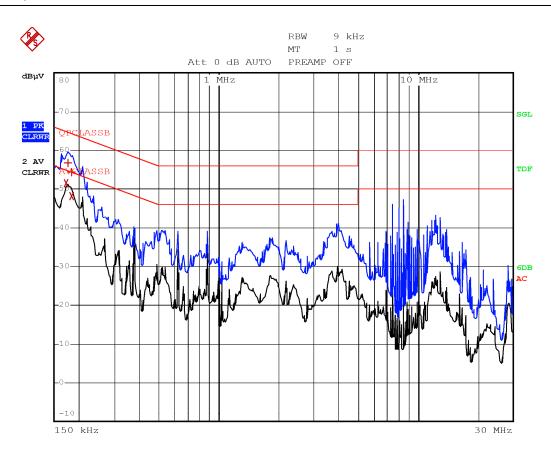
Plot 8.1-1: Conducted emissions on phase line

| Frequency (MHz) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Detector |
|-----------------|--------------|--------------|-------------|----------|
| 0.1780          | 56.5         | 64.6         | -8.0        | QP       |
| 0.1780          | 51.1         | 54.6         | -3.5        | AV       |

Table 8.1-2: Quasi-Peak conducted emissions results on phase line



#### 8.1.4 Test data, continued



Date: 27.MAY.2019 18:48:57

Plot 8.1-2: Conducted emissions on neutral line

| Frequency (MHz) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Detector |
|-----------------|--------------|--------------|-------------|----------|
| 0.1740          | 51.5         | 54.8         | -3.3        | AV       |
| 0.1780          | 56.8         | 64.6         | -7.8        | QP       |
| 0.1860          | 54.4         | 64.2         | -9.8        | QP       |
| 0.1860          | 48.3         | 54.2         | -5.9        | AV       |

Table 8.1-3: Quasi-Peak conducted emissions results on neutral line



#### 8.2 RSS-Gen 4.6.1 Occupied bandwidth

#### 8.2.1 Definitions and limits

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99 percent emission bandwidth, as calculated or measured.

The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

The span between the two recorded frequencies is the occupied bandwidth.

#### 8.2.2 Test summary

| Test date:     | May 27, 2019     | Temperature:       | 21 °C     |
|----------------|------------------|--------------------|-----------|
| Test engineer: | Daniele Guarnone | Air pressure:      | 1005 mbar |
| Verdict:       | Pass             | Relative humidity: | 35 %      |

#### 8.2.3 Observations, settings and special notes

Spectrum analyser settings:

| Resolution bandwidth: | ≥1 % of span |
|-----------------------|--------------|
| Video bandwidth:      | ≥3 × RBW     |
| Detector mode:        | Peak         |
| Trace mode:           | Max Hold     |

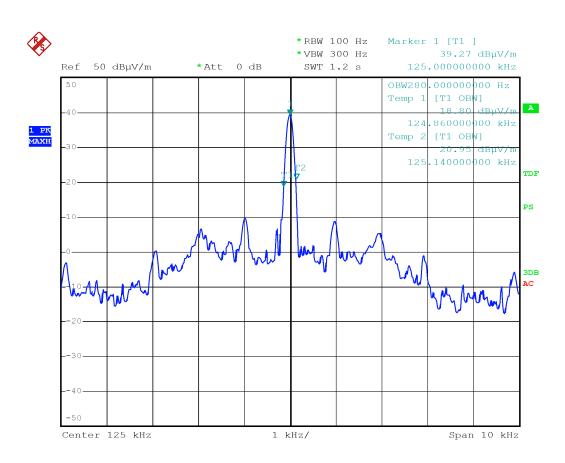
#### 8.2.4 Test data

#### Table 8.2-1: 99 % bandwidth results

| Modulation | 99 % bandwidth, Hz |
|------------|--------------------|
| FSK        | 280                |
|            |                    |
|            |                    |



#### 8.2.4 Test data, continued

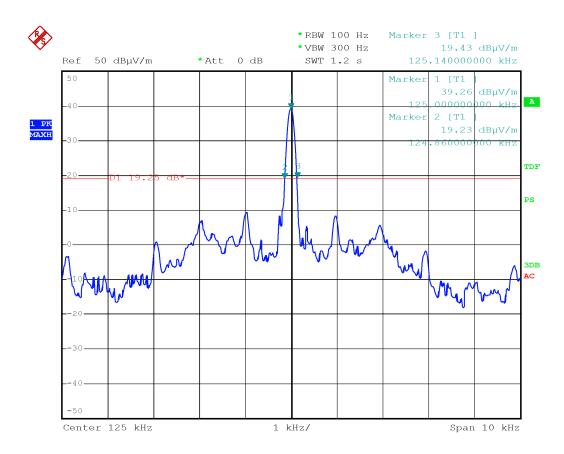


Date: 27.MAY.2019 19:17:05

Figure 8.2-1: 99 % bandwidth



#### 8.2.4 Test data, continued



Date: 27.MAY.2019 19:18:22

Figure 8.2-22: 20 dB bandwidth: 280 Hz

Test name Specification

FCC Part 15 Subpart C and RSS-210



#### 8.3 FCC 15.209(a) and RSS-210, 2.5 Radiated emissions limits

#### 8.3.1 Definitions and limits

#### FCC:

- (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the Table 8.3-1 below.
- (c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
- (d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

#### IC:

RSS-Gen includes the general field strength limits of unwanted emissions, where applicable, for transmitters and receivers operating in accordance with the provisions specified in this standard.

Unwanted emissions of transmitters and receivers are permitted to fall within the restricted bands listed in RSS-Gen, and including the TV bands, but fundamental emissions are prohibited in the restricted bands bands.

Whether or not their operation is addressed by published RSS standards, transmitters whose wanted and unwanted emissions are within the general field strength limits shown in RSS-Gen, they may operate in any of the frequency bands, other than the restricted bands listed in RSS-Gen and including the TV bands, and shall be certified under RSS-210. Under no conditions may the level of any unwanted emissions exceed the level of the fundamental emission.

Note: Devices operating below 490 kHz in which all emissions are at least 40 dB below the limit listed in RSS-Gen (General Field Strength Limits for Transmitters at Frequencies below 30 MHz) are Category II devices and are subject to RSS-310.

Field strength of emissions Measurement distance, m Frequency, MHz μV/m dBμV/m 0.009-0.490 2400/F 300  $67.6 - 20 \times \log_{10}(F)$ 24000/F 0.490 - 1.705 $87.6 - 20 \times \log_{10}(F)$ 30 1.705-30.0 30 30 29.5 30-88 100 40.0 3 88-216 150 3 43.5 216-960 200 46.0 3 above 960 500 54.0 3

Table 8.3-1: FCC §15.209 and RSS-Gen – Radiated emission limits

Notes: In the emission table above, the tighter limit applies at the band edges.

For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.



#### 8.3.1 Definitions and limits, continued

Table 8.3-2: IC restricted frequency bands

| MHz             | MHz                 | MHz           | GHz         |
|-----------------|---------------------|---------------|-------------|
| 0.090-0.110     | 12.51975-12.52025   | 399.9–410     | 5.35–5.46   |
| 2.1735-2.1905   | 12.57675-12.57725   | 608-614       | 7.25–7.75   |
| 3.020-3.026     | 13.36–13.41         | 960–1427      | 8.025–8.5   |
| 4.125-4.128     | 16.42-16.423        | 1435-1626.5   | 9.0–9.2     |
| 4.17725-4.17775 | 16.69475-16.69525   | 1645.5-1646.5 | 9.3–9.5     |
| 4.20725-4.20775 | 16.80425-16.80475   | 1660-1710     | 10.6–12.7   |
| 5.677-5.683     | 25.5–25.67          | 1718.8–1722.2 | 13.25-13.4  |
| 6.215-6.218     | 37.5-38.25          | 2200-2300     | 14.47-14.5  |
| 6.26775-6.26825 | 73–74.6             | 2310–2390     | 15.35–16.2  |
| 6.31175-6.31225 | 74.8–75.2           | 2655–2900     | 17.7–21.4   |
| 8.291-8.294     | 108–138             | 3260–3267     | 22.01–23.12 |
| 8.362-8.366     | 156.52475-156.52525 | 3332–3339     | 23.6–24.0   |
| 8.37625-8.38675 | 156.7–156.9         | 3345.8–3358   | 31.2–31.8   |
| 8.41425-8.41475 | 240–285             | 3500-4400     | 36.43–36.5  |
| 12.29–12.293    | 322–335.4           | 4500-5150     | Above 38.6  |

Note: Certain frequency bands listed in Table 8.3-2 and above 38.6 GHz are designated for low-power licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard

#### 8.3.2 Definitions and limits, continued

Table 8.3-3: FCC restricted frequency bands

| MHz               | MHz                 | MHz           | GHz         |
|-------------------|---------------------|---------------|-------------|
| 0.090-0.110       | 16.42-16.423        | 399.9–410     | 4.5-5.15    |
| 0.495-0.505       | 16.69475-16.69525   | 608-614       | 5.35-5.46   |
| 2.1735-2.1905     | 16.80425-16.80475   | 960–1240      | 7.25–7.75   |
| 4.125-4.128       | 25.5–25.67          | 1300-1427     | 8.025-8.5   |
| 4.17725-4.17775   | 37.5–38.25          | 1435–1626.5   | 9.0–9.2     |
| 4.20725-4.20775   | 73–74.6             | 1645.5-1646.5 | 9.3–9.5     |
| 6.215-6.218       | 74.8–75.2           | 1660–1710     | 10.6–12.7   |
| 6.26775-6.26825   | 108-121.94          | 1718.8–1722.2 | 13.25–13.4  |
| 6.31175-6.31225   | 123–138             | 2200–2300     | 14.47–14.5  |
| 8.291-8.294       | 149.9–150.05        | 2310–2390     | 15.35-16.2  |
| 8.362-8.366       | 156.52475–156.52525 | 2483.5–2500   | 17.7–21.4   |
| 8.37625-8.38675   | 156.7-156.9         | 2690-2900     | 22.01-23.12 |
| 8.41425-8.41475   | 162.0125–167.17     | 3260–3267     | 23.6–24.0   |
| 12.29-12.293      | 167.72-173.2        | 3332–3339     | 31.2–31.8   |
| 12.51975-12.52025 | 240–285             | 3345.8–3358   | 36.43–36.5  |
| 12.57675-12.57725 | 322-335.4           | 3600-4400     | Above 38.6  |
| 13.36–13.41       |                     |               |             |

#### 8.3.3 Test summary

| Test date:     | 2019-05-20       | Temperature:       | 21 °C     |
|----------------|------------------|--------------------|-----------|
| Test engineer: | Daniele Guarnone | Air pressure:      | 1005 mbar |
| Verdict:       | Pass             | Relative humidity: | 35 %      |

Section 8 Testing data

Test name FCC 15.209(a) and RSS-210, 2.5 Radiated emissions limits

**Specification** FCC Part 15 Subpart C and RSS-210



#### 8.3.4 Observations, settings and special notes

The spectrum was searched from 30 MHz to the  $10^{\rm th}$  harmonic. EUT was set to transmit with  $100\,\%$  duty cycle. Radiated measurements were performed at a distance of 3 m.

Spectrum analyser settings for radiated measurements within restricted bands below 1 GHz:

| Resolution bandwidth: | 100 kHz  |
|-----------------------|----------|
| Video bandwidth:      | 300 kHz  |
| Detector mode:        | Peak     |
| Trace mode:           | Max Hold |

Spectrum analyser settings for peak radiated measurements within restricted bands above 1 GHz:

| Resolution bandwidth: | 1 MHz    |
|-----------------------|----------|
| Video bandwidth:      | 3 MHz    |
| Detector mode:        | Peak     |
| Trace mode:           | Max Hold |

Spectrum analyser settings for average radiated measurements within restricted bands above 1 GHz:

| Resolution bandwidth: | 1 MHz    |
|-----------------------|----------|
| Video bandwidth:      | 10 Hz    |
| Detector mode:        | Peak     |
| Trace mode:           | Max Hold |

Spectrum analyser settings for conducted spurious emissions measurements:

| Resolution bandwidth: | 100 kHz  |
|-----------------------|----------|
| Video bandwidth:      | 300 kHz  |
| Detector mode:        | Peak     |
| Trace mode:           | Max Hold |

#### 8.3.4 Test data

Notes: Field strength includes correction factor of antenna, cable loss, amplifier, and attenuators where applicable.



#### 8.3.4 Test data, continued

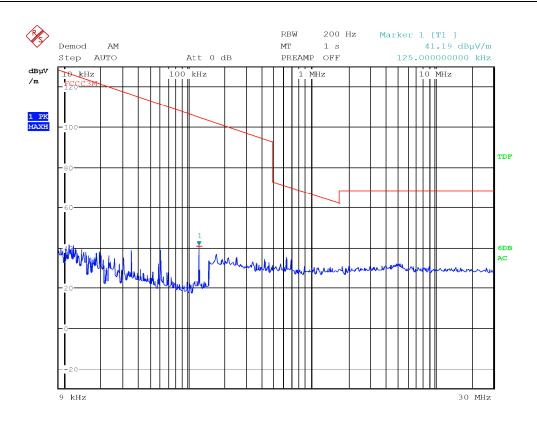
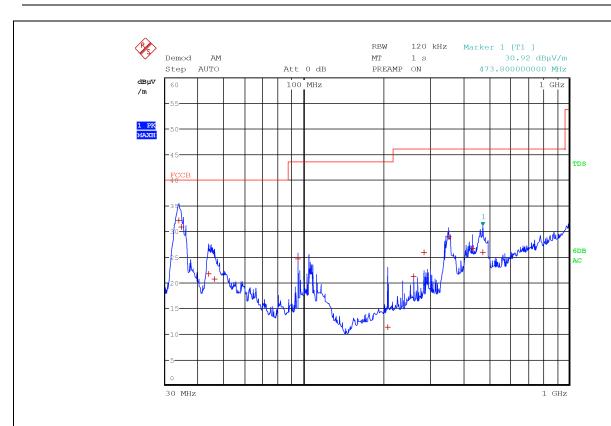


Figure 8.3-1: Radiated emissions

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Detector |
|-----------------|----------------|----------------|-------------|----------|
| 0.1250          | 40.9           | 105.1          | -64.2       | QP       |



#### 8.3.4 Test data, continued



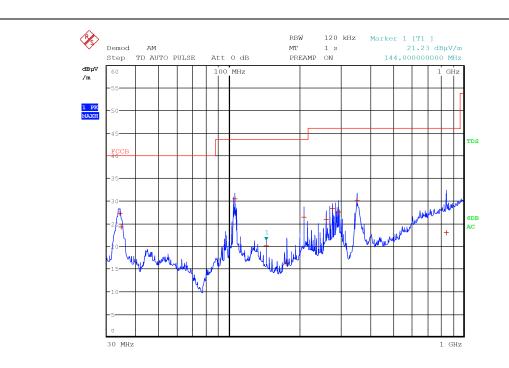
Date: 20.MAY.2019 17:38:44

#### Antenna in vertical polarization @ 3 m

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Detector |
|-----------------|----------------|----------------|-------------|----------|
| 33.7200         | 32.1           | 40.0           | -7.9        | QP       |
| 34.5600         | 30.8           | 40.0           | -9.2        | QP       |
| 43.7200         | 21.7           | 40.0           | -18.3       | QP       |
| 46.0000         | 20.8           | 40.0           | -19.2       | QP       |
| 94.7200         | 24.6           | 43.5           | -18.9       | QP       |
| 207.6400        | 11.3           | 43.5           | -32.2       | QP       |
| 260.0000        | 21.2           | 46.0           | -24.8       | QP       |
| 284.0000        | 25.9           | 46.0           | -20.1       | QP       |
| 352.0000        | 28.9           | 46.0           | -17.1       | QP       |
| 432.0000        | 26.7           | 46.0           | -19.3       | QP       |
| 473.8000        | 25.9           | 46.0           | -20.1       | QP       |



#### 8.3.4 Test data, continued



Date: 20.MAY.2019 17:28:13

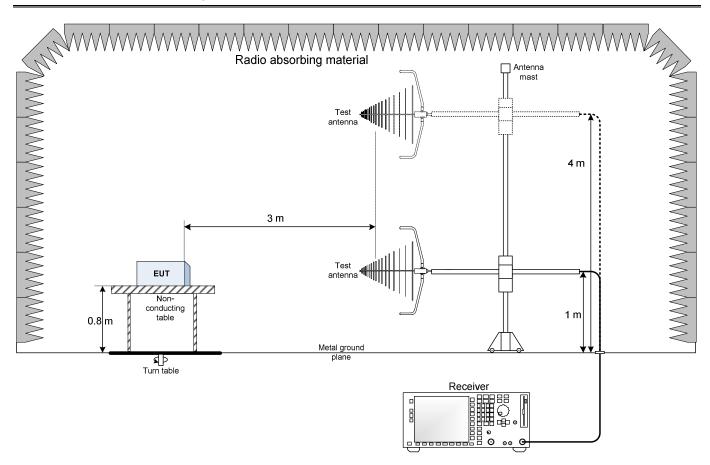
Antenna in horizontal polarization @ 3 m

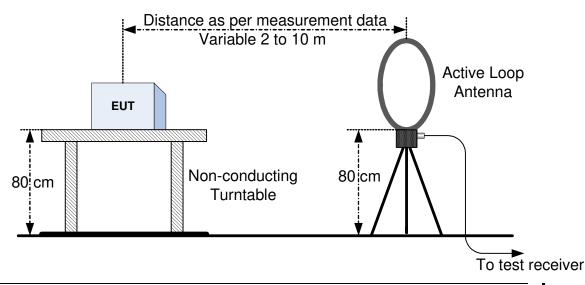
| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Detector |
|-----------------|----------------|----------------|-------------|----------|
| 34.0200         | 27.3           | 40.0           | -12.7       | QP       |
| 34.5600         | 24.2           | 40.0           | -15.8       | QP       |
| 105.4200        | 30.4           | 43.5           | -13.1       | QP       |
| 144.0000        | 20.1           | 43.5           | -23.4       | QP       |
| 175.9800        | 16.2           | 43.5           | -27.3       | QP       |
| 207.9900        | 26.4           | 43.5           | -17.1       | QP       |
| 260.0100        | 25.9           | 46.0           | -20.1       | QP       |
| 276.0000        | 28.2           | 46.0           | -17.8       | QP       |
| 291.9900        | 27.6           | 46.0           | -18.4       | QP       |
| 352.0200        | 30.0           | 46.0           | -16.0       | QP       |
| 843.3600        | 23.0           | 46.0           | -23.0       | QP       |



## Section 9. Block diagrams of test set-ups

#### 9.1 Radiated emissions set-up







#### 9.2 Conducted emissions set-up

