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# DELTA Test Report

*TEST REPORT issued by an Accredited Testing Laboratory*

1688
ISO/IEC 17025

## Radio parameter test of RFID radio in Aperio Reader R100-PA2

## Performed for Hanchett Entry Systems, Inc.

REC-E704276_16 Rev. A
Project no.: E704276
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26 August 2015

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| | |
|---|---|
| **Title** | Radio parameter test of RFID radio in Aperio Reader R100-PA2 |
| **Test object** | Aperio Reader R100-PA2 |
| **Report no.** | REC-E704276_16 Rev. A |
| **Project no.** | E704276 |
| **Test period** | 23 April 2015 to 12 May 2015 |
| **Client** | Hanchett Entry Systems, Inc.<br>10027 S. 51st St. Ste. 102<br>Phoenix, AZ 85044<br>USA |
| **Contact person** | Joshua Peabody<br>Tel: 623-582-4626 |
| **Client observer** | Fredrik Thorsell WSI AB<br>E-mail: frth@wsi.nu |
| **Manufacturer** | Hanchett Entry Systems, Inc. |
| **Specifications** | FCC CFR47 Part 15 subpart C<br>RSS-Gen, issue 4:2014, RSS-210, issue 8:2010 |
| **Results** | The test object was found to be in compliance with the specifications, as listed in Section 1 |
| **Test personnel** | Lars Johnsson |
| **Date** | 26 August 2015 |

**Project Manager**

Lars Johnsson
DELTA

**Responsible**

Ulf Bjerke. Technical manager
DELTA

LAJ

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# 1. Summary of tests

| Tests | Test methods | Results |
|---|---|---|
| Measurement of radio frequency electromagnetic field 9kHz-30 MHz (§15.209, RSS Gen 6.13) | ANSI C63.10:2013 | Passed |
| Measurement of radio frequency electromagnetic field 30-1000 MHz (§15.209, RSS Gen 6.13) | ANSI C63.10:2013 | Passed |

This document covers the results from radio parameter tests performed on the 125 kHz RFID radio. The 2.4 GHz Aperio radio which is a part of the complete test object is not included in this report.

**Conclusion**

The test object(s) mentioned in this report meet(s) the requirements of the standard(s) stated below.

- FCC CFR 47 Part 15C (Intentional radiator at 125 kHz)
- Industry Canada IC Radio Standards Specification, RSS-Gen, issue 4:2014, *General Requirements and Information for the Certification of Radio Apparatus*
- Industry Canada IC Radio Standards Specification, RSS-210, issue 8:2010, *Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment*

The test results relate only to the object(s) tested.

# 2. Test object(s) and auxiliary equipment

## 2.1 Test object(s)

Photo 2.1.1 Test object.

**Test object 2.1.1**

| | |
|---|---|
| Name of test object | Aperio Reader |
| Model / type | R100-PA2 |
| Part no. | R100-PA2 |
| Serial no. | MAC adress: 03 C6 96 |
| FCC ID | VC3-KKSR100PA |
| IC ID | 7160A-KKSR100622PA |
| Manufacturer | Hanchett Entry Systems, Inc. |
| Supply voltage | 3 VDC battery |
| Software version | 7.99.30479 |
| Cycle time | - |
| Received | Date: 23 April 2015 Status: Prototype |

## 2.2 Radio specifications, receiver and transmitter

The RFID radio (125 kHz) of the test object has the following specified RF parameters. The below mentioned information regarding the receiver and the transmitter is declared by the manufacturer.

| | | |
|---|---|---|
| Type of equipment | : | Low power device (125 kHz) |
| Operating frequency range | : | 125 MHz |
| Antenna | : | Permanently attached PCB antenna |
| Power level | : | Fixed |
| No of channels | : | 1 |
| Modulation | : | FSK |
| Data rate | : | 11 kbits |
| Temperature category | : | -20 to +50 ºC. |

## 2.3 Auxiliary equipment

**Auxiliary equipment 2.3.1**

| | |
|---|---|
| Name of auxiliary equipment | Aperio Hub |
| Model / type | AH30 |
| Serial no. | MAC ID 00.17.7a.01.02.04.44.da |
| FCC ID | Y88-AH20R01 |
| Manufacturer | ASSA ABLOY |
| Supply voltage | 8-24 VDC |
| Comment | Auxiliary equipment supplied by the client, who also has the responsibility for its correct function and set up.<br>Used to configure the test object before test. |

**Auxiliary equipment 2.3.2**

| | |
|---|---|
| Name of auxiliary equipment | Laptop PC |
| Model / type | HP Compaq 6910p |
| Part no. | gb949ET#ak8 |
| Serial no. | cnd821lwtf |
| Manufacturer | HP |
| Supply voltage | 230 VAC |
| Comment | Auxiliary equipment supplied by the client, who also has the responsibility for its correct function and set up.<br>Used to configure the test object before test. |

**Auxiliary equipment 2.3.3**

| | |
|---|---|
| Name of auxiliary equipment | TriBee USB |
| Model / type | 200300 |
| Part no. | gb949ET#ak8 |
| Serial no. | cnd821lwtf |
| FCC ID | YVB-200300 |
| Manufacturer | TriTech |
| Supply voltage | 5 VDC |
| Comment | Auxiliary equipment supplied by the client, who also has the responsibility for its correct function and set up.<br>Used to configure the test object before test. |

# 3. General test conditions

## 3.1 Test setup during test

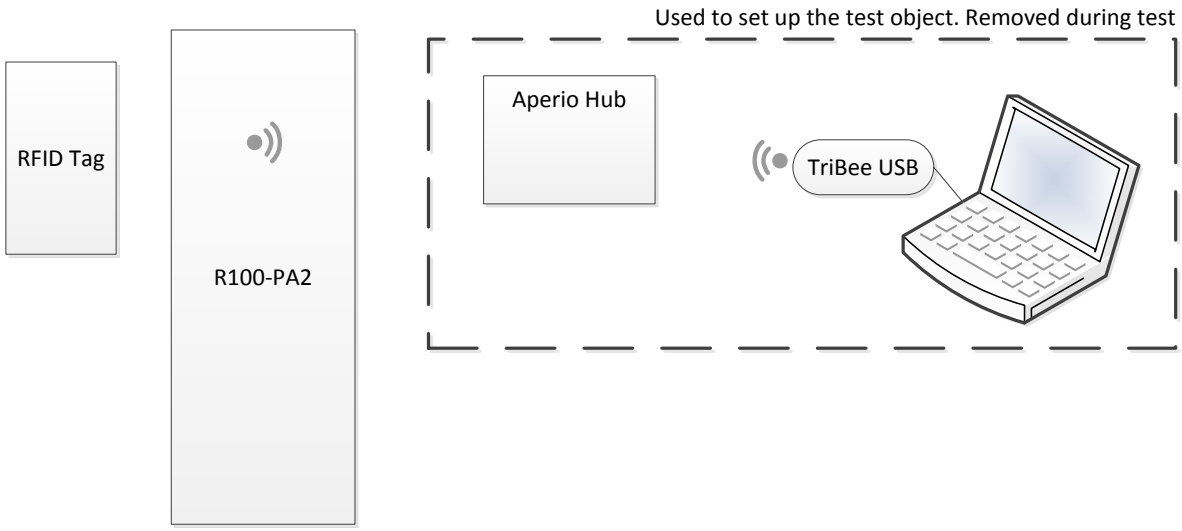



Figure 3.1.1 Block diagram of test object(s) with cables and auxiliary equipment.

### 3.1.1 Description and intended use of test object

The R100-PA2 is a Aperio Reader. It is paired to an Aperio Hub (2.4 GHz) to form real-time access control to individual cabinet doors. It uses ID badges (125 kHz) for the access control.

### 3.1.2 Modifications of the test object

No modifications were incorporated.

### 3.1.3 Test sequence

The tests described in this test report were performed in the following sequence:

1. Measurement of radio frequency electromagnetic field 30-1000 MHz (§15.209 and RSS Gen 6.13)
2. Measurement of radio frequency electromagnetic field 0.009 - 30 MHz (§15.209, RSS Gen 6.13)
3. Measurement of BW (RSS Gen 6.6, 6.11, 6.12

# 4. Test results

## 4.1 Measurement of radiated emission 9 kHz – 30 MHz

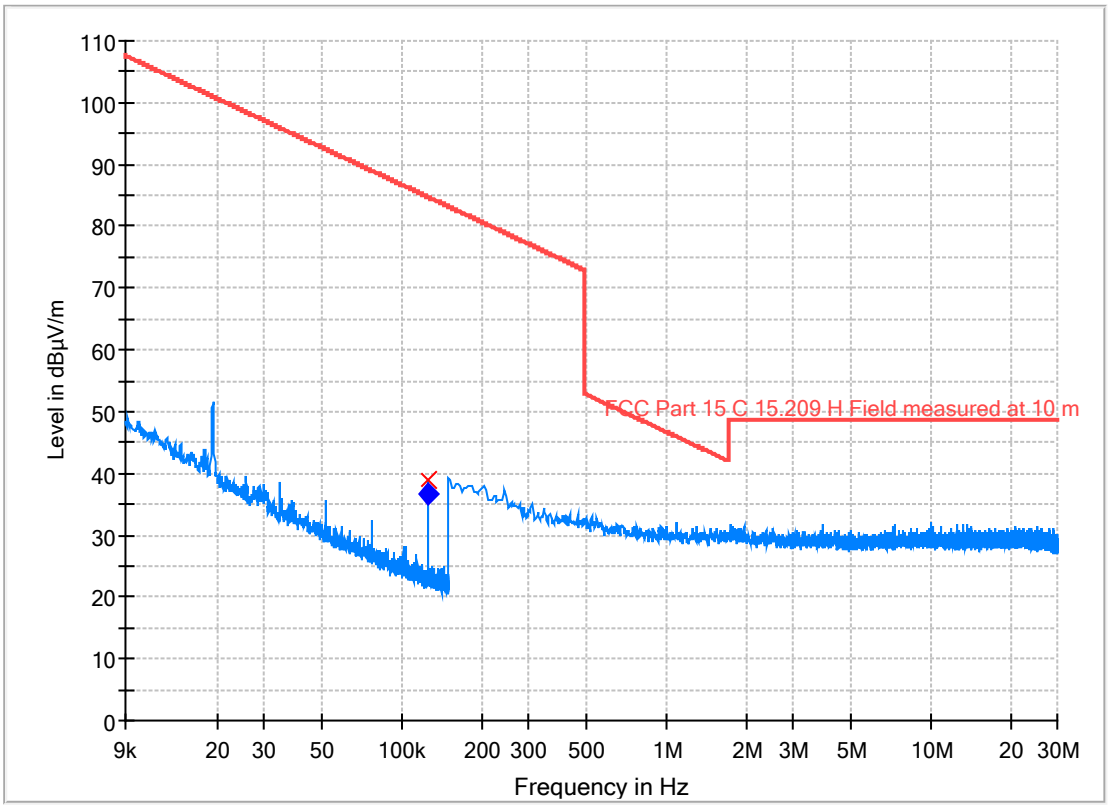
| | | | |
|---|---|---|---|
| Test object | Aperio Reader | Sheet | RE_Spur-1 |
| Type | R100-PA2 | Project no. | E704276 |
| Serial no. | MAC adress: 03 C6 96 | Date | 11 May 2015 |
| Client | ASSA AB | Initials | LAJ |
| Specification | FCC CFR47 Part 15 subpart C §15.225,15.209 and RSS Gen 6.13 | Frequency | 9kHz-30MHz |

| | | | |
|---|---|---|---|
| Test method<br>Characteristics | ANSI C63.10:2013<br>Complete search, Antenna distance 10 m | Temperature<br>Humidity | 21 °C<br>41 % RH |
| Detector | Peak, quasi peak and average | Bandwidth | 200 Hz/<br>10 kHz |
| Test equipm. | EMC Hall A Västerås Setup VED1 | Uncertainty | 3.2 dB |

| | |
|---|---|
| Test result | The measured field strengths are below the limit |
| Test Port | Enclosure |
| Test mode | Continuous Tx - normal modulation |
| Condition | Normal temperature and supply voltage. |
| Compliant | Yes |
| Comment | As seen in the graph below the level of the transmitter carrier is below the spurious emission limit. |

# Radiated Emission Test

| | |
|---|---|
| Test Description: | Radiated emission. Complete measurement 9 kHz - 30 MHz |
| Date: | 2015-05-11 |
| EUT Name: | R100-PA2 |
| Manufacturer: | Hanchett Entry Systems |
| Serial Number: | 03 C6 96 |
| Operating Conditions: | Continous Tx |
| Test Site: | DELTA Development Technology AB |
| Operator Name: | Lars J |
| Test Specification: | FCC CFR47 Part 15 subpart C |
| Comment: | Antenna 3 orthogonal positions |




## Final_Result

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) |
|---|---|---|---|---|---|---|---|
| 0.124950 | 39.0 | 36.8 | 100.0 | 0.200 | 100.0 | V | 210.0 |

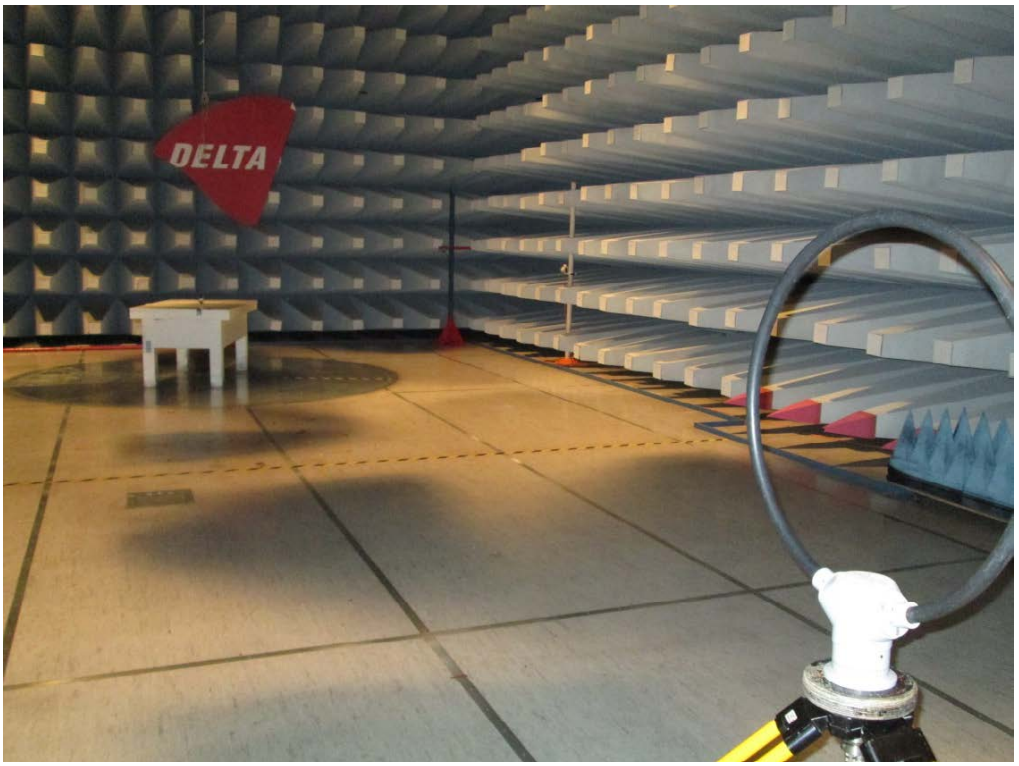



Photo 4.1.1 Test setup regarding measurement of radiated emission 9 kHz – 30 MHz

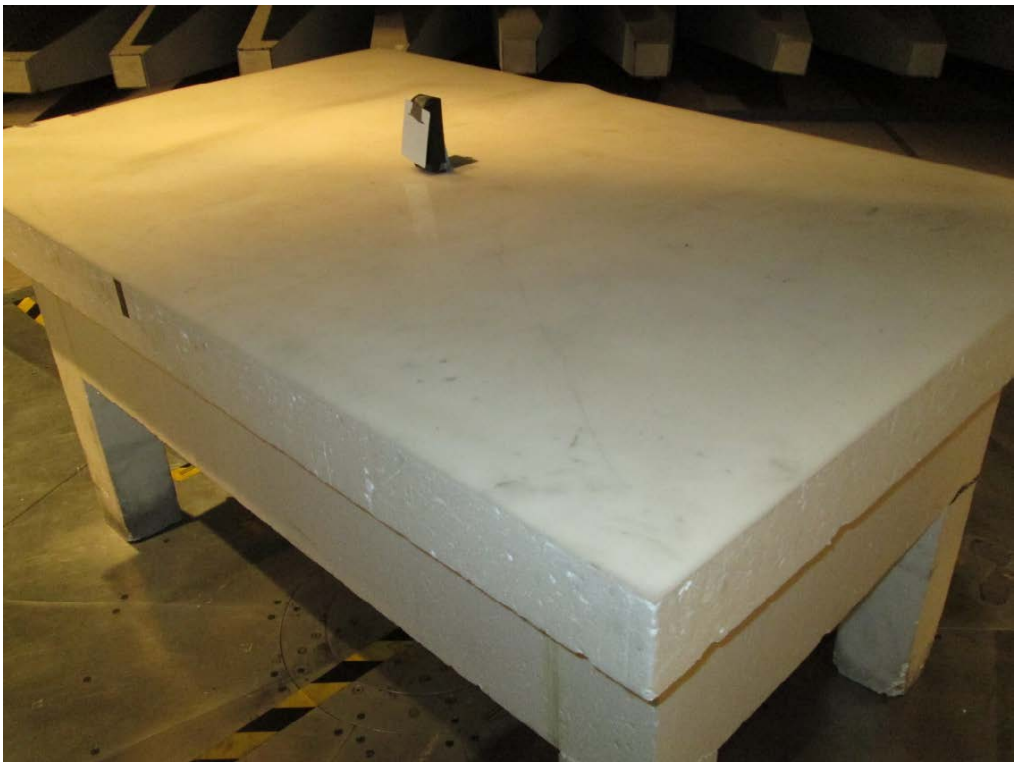


Photo 4.1.2 Test setup regarding measurement of radiated emission 9 kHz – 30 MHz

## 4.2 Measurement of radiated emission 30 – 1000 MHz

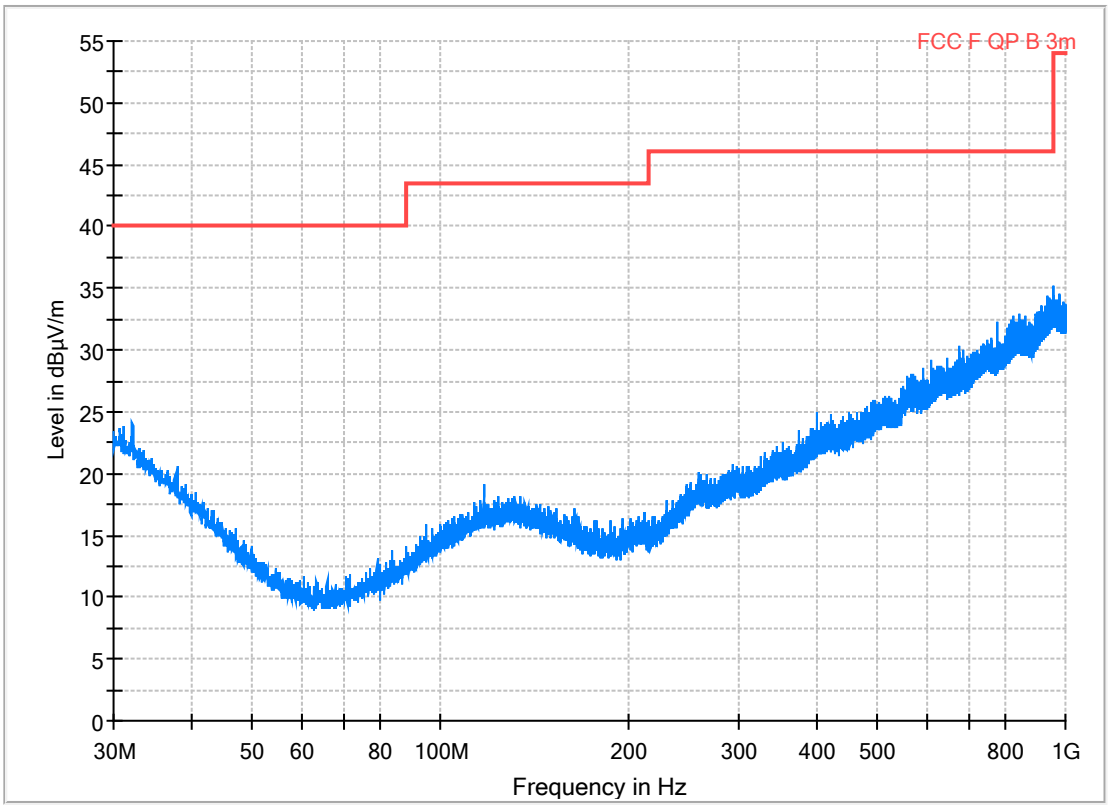
| | | | |
|---|---|---|---|
| Test object | Aperio Reader | Sheet | RE_Spur-2 |
| Type | R100-PA2 | Project no. | E704276 |
| Serial no. | MAC adress: 03 C6 96 | Date | 30 Apr. 2015 |
| Client | ASSA AB | Initials | LAJ |
| Specification | FCC CFR47 Part 15 subpart C §15.209, 15.225, 15.249 and RSS Gen 6.13 | Frequency | 30-1000 MHz |

| | | | |
|---|---|---|---|
| Test method<br>Characteristics | ANSI C63.10:2013<br>Complete search, Antenna distance 3 m | Temperature<br>Humidity | 21 °C<br>41 % RH |
| Detector | Peak and quasi peak | Bandwidth | 120 kHz |
| Test equipm. | EMC Hall A Västerås Setup VEC1 | Uncertainty | 5.1 dB |

| | |
|---|---|
| Test result | The measured field strengths are below the limit |
| Test Port | Enclosure |
| Test mode | Continuous Tx - Normal modulation |
| Condition | Normal temperature and supply voltage. |
| Compliant | Yes |

# Radiated Emission Test

| | |
|---|---|
| Test Description: | Radiated emission. Complete measurement 30 - 1000 MHz |
| Date: | 2015-04-30 |
| EUT Name: | R100-PA |
| Manufacturer: | ASSA AB |
| Serial Number: | MAC adress: 03 C6 96 |
| Operating Conditions: | Continous 2.4 GHz Tx |
| Test Site: | DELTA Development Technology AB |
| Operator Name: | Lars J |
| Test Specification: | FCC CFR47 part 15. Subpart C. 15.209 |
| Comment: | |




Preview Result 1-PK+ | Critical_Freqs PK+ | FCC F QP B 3m
Final_Result QPK | Final_Result AVG

## Final_Result

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 65.610000 | 29.36 | 40.00 | 10.64 | 1000.0 | 120.000 | 113.0 | V | 105.0 | -15.6 |
| 66.330000 | 29.00 | 40.00 | 11.00 | 1000.0 | 120.000 | 128.0 | V | 107.0 | -15.6 |
| 143.550000 | 33.54 | 43.50 | 9.96 | 1000.0 | 120.000 | 100.0 | V | 102.0 | -9.1 |
| 143.580000 | 34.14 | 43.50 | 9.36 | 1000.0 | 120.000 | 100.0 | V | 109.0 | -9.1 |
| 148.950000 | 34.87 | 43.50 | 8.63 | 1000.0 | 120.000 | 100.0 | V | 106.0 | -9.4 |
| 150.390000 | 34.02 | 43.50 | 9.48 | 1000.0 | 120.000 | 100.0 | V | 118.0 | -9.5 |

Photo 4.2.1 Test setup regarding measurement of radiated emission 30 – 1000 MHz

Photo 4.2.2 Test setup regarding measurement of radiated emission30 – 1000 MHz

# 5. National registrations and accreditations

## 5.1 SWEDAC Accreditation

**Organization:** Swedish Board for Accreditation and Conformity Assessment - SWEDAC, see www.swedac.se and www.ilac.org

**Registration Number:** 1688

SWEDAC is part of ILAC (International Laboratory Accreditation Cooperation) including its MRA (Mutual Recognition Arrangement).

## 5.2 FCC Registrations

**Organization:** Federal Communications Commission, USA

**Registration Number:** 516880

**Facilities:** EMC chamber A 3 and 10 m

## 5.3 IC Registrations

**Organization:** Industry Canada, Certification and Engineering Bureau

**Registration Number:** 9347A

**Facilities:** EMC chamber A (9347A-1)

# 6. List of instruments

| Setup VEC1 | | | | | | |
|---|---|---|---|---|---|---|
| Measurement of radio frequency electromagnetic field | | | | | | |
| *Last Cal.* | *Next Cal.* | *ID no.* | *Description* | *Manufacturer* | *Type no.* | *Setup uncertainty* |
| - | - | 36070 | Software | Rohde & Schwarz | EMC32 ver. 9.15.01 | 5.1 dB 30-1000 MHz (10 m)<br>6.2 dB 30-1000 MHz (3 m)<br>4.5 dB 1-6 GHz (3 m) |
| 2014-08 | 2015-08 | IE-B758 | Preamplifier | HP | 8447F | |
| 2014-08 | 2015-08 | 36020 | Measuring receiver | Rohde & Schwarz | ESU26 | |
| 2013-07 | 2015-07 | IE-B928 | Antenna Bilog | Chase | CBL6111A | |
| 2014-08 | 2015-08 | 36065 | Measuring receiver | Rohde & Schwarz | ESL6 | |
| - | - | 36071 | Controller | Maturo | NCD | |
| - | - | 36072 | Tilt antenna mast | Maturo | TAM 4.0-E | |
| - | - | - | Turntable | Heinrich Deisel | DT 440 | |

| Setup VED1 | | | | | | |
|---|---|---|---|---|---|---|
| Measurement of radio frequency electromagnetic field (Loop antenna) | | | | | | |
| *Last Cal.* | *Next Cal.* | *ID no.* | *Description* | *Manufacturer* | *Type no.* | *Setup uncertainty* |
| - | - | 36070 | Software | Rohde & Schwarz | EMC32 ver. 9.15.01 | 3.24 dB |
| 2014-08 | 2015-08 | 36020 | Measuring receiver | Rohde & Schwarz | ESU26 | |
| 2013-07 | 2015-07 | 35047 | Loop antenna | Rohde & Schwarz | HFH2-Z2 | |

| Setup Climate | | | | | | |
|---|---|---|---|---|---|---|
| Climatic tests | | | | | | |
| *Last Cal.* | *Next Cal.* | *ID no.* | *Description* | *Manufacturer* | *Type no.* | *Setup uncertainty* |
| - | - | 36070 | Climatic chamber | Weiss | WK1-1000/40/5 | |
| - | - | IE-B758 | Temperature Oven | MEMMERT | UL-40 / 791003 | |
| 2015-03 | 2016-03 | IM-A308 | Temperature- and hygrometer | Vaisala | HMI31 | |

# 7. Revision

| Rev. index | Description | Date/ Init |
|---|---|---|
| - | New document | 18 Aug 2015/ LAJ |
| A | Standard references updated. | 26 Aug 2015/ LAJ |