# *Poročilo o preskusu / Test Report*

**Št. / *No.:***

T251-0262/14

**Datum / *Date:***

2014-03-20

| **Proizvod / *Product*** | **Listov / *Pages*** |
|---|---|
| Access control terminal (CAC3 Module)<br>Type: AIO | 35 |
| | **Vrsta preskusa / *Test procedure*** |
| | EMC |
| **Naročnik / *Applicant*** | **Št. merjencev / *No. of items tested*** |
| MARGENTO R&D, družba za raziskave in razvoj elektronskega plačevanja in transakcijskih rešitev, d.o.o.<br>Gosposvetska cesta 84, 2000 Maribor, Slovenia | 1 |
| **Proizvajalec / *Manufacturer*** | **Mapa predmeta št. / *Subject file No.*** |
| OPENWAYS SAS<br>6 Le prieure, 78810 Feucherolles, France | C20131273 |
| **Blagovna znamka / *Trade Mark*** | **Kraj preskusa / *Place of test*** |
| / | SIQ Ljubljana, Laboratory for electromagnetics, Trpinčeva ul. 37 A, SI-1000 Ljubljana, Slovenia |
| **Standardi – predpisi / *Standards - regulations*** | **Opomba / *Remark*** |
| FCC Part 15, Subpart C | / |

**Zaključek / *Conclusion***

Preskušani proizvod ustreza zahtevam navedenih standardov. / *Tested product complies with the requirements of stated standards.*

Rezultati preskusov se nanašajo samo na preskušan vzorec. / *The test results relate only to the item tested.*

Datum prispetja vzorca / *Date of receipt of test item: 2014-01-31*

Datum izvedbe preskusov / *Date of performance of tests: 2014-01-31 – 2014-02-24*

Testni laboratorij je akreditiran pri Slovenski Akreditaciji, Reg. Št.:LP-009 /
*Testing laboratory is accredited by Slovenian Accreditation, Reg. No.LP-009*

**Odgovoren za preskušanje / *Responsible for the test***

Damjan Repar

**Vodja področja / *Department Manager***

Marjan Mak

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# 1 GENERAL

## *1.1 Equipment under test description*

**Access control terminal (CAC3 Module)**
**Type:** AIO

Power supply: 3 - 10 V DC (battery)
Power supply used for testing: fully charged battery, 7.2 V DC
Protective class: III.

Operating frequency: 13,56 MHz
Maximum clock frequency: 80 MHz

**NOTE:** The same electronics might be integrated into different housings. The only difference between housing types is the bottom side shape of the housing to better integrate onto different lock profiles. Herebelow is reference of two such types, and others are possible also.

**Different types of housing**

## 1.2 List of measurements performed

| PART 15 section | Test name |
|---|---|
| 15.207 | Conducted emission |
| 15.209 | Radiated emission |
| 15.215 | Bandwidth of the emission |
| 15.225 | Frequency tolerance |

## 1.3 Occupied bandwidth measurement

| Fundamental frequency | Minimum resolution bandwidth |
|---|---|
| 9 kHz to 30 MHz | 1 kHz |
| 30 to 1000 MHz | 10 kHz |
| 1000 MHz to 40 GHz | 100 kHz |

## 1.4 Quasi-peak detector

| Frequency range | Bandwidth (-6dB) |
|---|---|
| 10 Hz to 20 kHz | Full range (wideband) |
| 10 kHz to 150 kHz | 200 Hz |
| 150 kHz to 30 MHz | 9 kHz |
| 30 MHz to 1 GHz | 120 kHz |

## 1.5 Peak, rms, and average detectors

| Frequency range | Bandwidth (-6dB) |
|---|---|
| 10 Hz to 20 kHz | 10, 100, 1000 Hz |
| 10 kHz to 150 kHz | 1 and 10 kHz |
| 150 kHz to 30 MHz | 1 and 10 kHz |
| 30 MHz to 1 GHz | 10 and 100 kHz |
| 1 GHz to 40 GHz | 0.1, 1.0 and 10 MHz |

# 2 LIMITS

## 2.1 Subpart C: Intentional Radiators

### 2.1.1 Conducted emission limits:

| Frequency Range (MHz) | Limits (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 to 0.5 | 66 – 56* | 56 – 46* |
| 0.5 to 5.0 | 56 | 46 |
| 5.0 to 30.0 | 60 | 50 |

*Decreases with the logarithm of the frequency.

The shown limits in table shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

- For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.
- For all other carrier current systems: 1000 μV within the frequency band 535-1705 kHz, as measured using a 50 μH/50 ohms LISN.
- Carrier current systems operating below 30 MHz are also subject to the radiated emission limits as appropriate.

### 2.1.2 Radiated emission limits:

| Frequency Range (MHz) | Limits (dBμV/m) | | Test distance (m) |
|---|---|---|---|
| | VERTICAL | HORIZONTAL | |
| 0,009 to 0,490 | 20*log(2400/F(kHz)) | 20*log(2400/F(kHz)) | 300 |
| 0,490 to 1,705 | 20*log(2400/F(kHz)) | 20*log(2400/F(kHz)) | 30 |
| 1,705 to 30,0 | 29.5 | 29.5 | 30 |
| 30 to 88 | 40** | 40** | 3 |
| 88 to 216 | 43.5** | 43.5** | 3 |
| 216 to 960 | 46** | 46** | 3 |
| Above 960 | 54 | 54 | 3 |

** Except as provided in paragraph below, fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz.

Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.

**NOTE: For special limits refer to standard**

# 3 ALL TEST EQUIPMENT AND THEIR DESCRIPTION

## 3.1 General information

| Description | Model No. | SIQ No. | Last calibration | Calibrated until | Calibration period | Used |
|---|---|---|---|---|---|---|
| Rohde-Schwarz, AMN | ENV216 | 106765 | 2012-08 | 2014-08 | 24 months | |
| Rohde-Schwarz, RFI receiver | ESU8 | 105187 | 2013-10 | 2015-10 | 24 months | X |
| Rohde & Schwarz, Artificial main network | ESH2-Z5 | 106899 | 2013-05 | 2015-05 | 24 months | |
| Rohde & Schwarz, Loop antenna | HFH2-Z2 | / | 2013-09 | 2015-09 | 24 months | X |
| ETS, Anechoic chamber | 3m | 103949 | 2012-12 | 2014-12 | 24 months | X |
| EMCO, Antenna | model 3142 | 104351 | 2013-09 | 2015-09 | 24 months | X |
| EMCO, Antenna | model 3115 | 103002 | 2013-09 | 2015-09 | 24 months | |
| Heinrich Deisel, Turn table | DS 420.00 | 103337 | NA | NA | NA | X |
| Antenna tower | / | / | NA | NA | NA | X |
| Controller for turn table and antenna tower | / | / | NA | NA | NA | X |

## 3.2 Other instrument information and auxiliary equipment

| Description | Model No. | Bandwidth | Detector functions | Antenna factors | Cable loss | Range |
|---|---|---|---|---|---|---|
| Rohde-Schwarz, RFI receiver | ESU8 | 200Hz, 9kHz, 120kHz, 1MHz | Peak, Q-peak, Average | / | / | 20 Hz – 8 GHz |
| Hewlett Packard, RF Spectrum Analyzer | 8593E | 200Hz, 9kHz, 120kHz, 1MHz | Peak, Q-peak, Average | / | / | 9 kHz – 26.5 GHz |
| Rohde & Schwarz, Artificial main network | ESH 2-Z5 | / | / | / | / | 9 kHz – 30 MHz |
| ETS, Anechoic chamber | 3m | / | / | / | / | 30 MHz – 18 GHz |
| EMCO, Antenna | model 3142 | / | / | See tables below | / | 26 MHz – 2 GHz |
| SIQ, Conducted emission cable | SIQ | / | / | / | See tables below | / |
| SIQ, Radiated emission cable | SIQ | / | / | / | See tables below | / |

# 4 GENERAL AND SPECIAL CONDITIONS DESCRIPTION

## *4.1 General condition description*

## Interconnect and power cabling (or wiring)

### *4.1.1 Test arrangement for conducted emissions*

**4.1.1.1** Interconnecting cables that hang closer than 40 cm to the ground-plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

**4.1.1.2** I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

**4.1.1.3** EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground-plane.
4.1.1.3.1 All other equipment powered from additional LISN(s).
4.1.1.3.2 Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
4.1.1.3.3 LISN at least 80 cm from nearest part of EUT chassis.

**4.1.1.4** Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

**4.1.1.5** Non-EUT components of EUT system being tested.

**4.1.1.6** Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

**4.1.1.7** Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground-plane.

### *4.1.2 Test arrangement for conducted emissions- floor-standing equipment*

**4.1.2.1** Excess I/O cables shall be bundled in the center. If bundling is not possible, the cables shall be arranged in serpentine fashion. Bundling shall not exceed 40 cm in length.

**4.1.2.2** Excess power cords shall be bundled in the center or shortened to appropriate length.

**4.1.2.3** I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. If bundling is not possible, the cable shall be arranged in serpentine fashion.

**4.1.2.4** EUT and all cables shall be insulated, if required, from the ground-plane by up to 12 mm of insulating material.

**4.1.2.5** EUT connected to one LISN. LISN can be placed on top of, or immediately beneath, the ground-plane.
4.1.2.5.1 All other equipment powered from a second LISN or additional LISN(s).
4.1.2.5.2 Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

### *4.1.3 Test arrangement for radiated emissions tabletop equipment*

**4.1.3.1** Interconnecting cables that hang closer than 40 cm to the ground-plane shall be folded back and forth in the center, forming a bundle 30 to 40 cm long.

**4.1.3.2** I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using the correct terminating impedance. The total length shall not exceed 1 m.

**4.1.3.3** If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground-plane with the receptacle flush with the ground-plane.

**4.1.3.4** Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

**4.1.3.5** Non-EUT components of EUT system being tested.

**4.1.3.6** Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

**4.1.3.7** No vertical conducting plane used.

**4.1.3.8** Power cords drape to the floor and are routed over to receptacle.

### *4.1.4 Test arrangement for radiated emissions floor-standing equipment*

**4.1.4.1** Excess I/O cables shall be bundled in center. If bundling is not possible, the cables shall be arranged in serpentine fashion. Bundling not to exceed 40 cm in length.

**4.1.4.2** Excess power cords shall be bundled in the center or shortened to appropriate length.

**4.1.4.3** I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. If bundling is not possible, the cable shall be arranged in a serpentine fashion.

**4.1.4.4** EUT and all cables shall be insulated, if required, from the ground-plane by up to 12 mm of insulating material.

**4.1.4.5** If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground-plane with the receptacle flush with the ground plane.

## Overhead cable trays and suspended ceilings

### *4.1.5 Test arrangement for floor-standing equipment*

**4.1.5.1** Only one vertical riser may be used where typical of system under test.

**4.1.5.2** Excess power cord shall be bundled in the center or shortened to appropriate length.

**4.1.5.3** EUT and cables shall be insulated from ground-plane by up to 12 mm. Where the manual has specified or there exists a code of practice for installation of the EUT, the test arrangement shall allow the use of this practice for the tests.

**4.1.5.4** Power cords being measured connected to one LISN. All other system power cords powered through other LISN(s). A multiple receptacle strip may be used for other power cords.

**4.1.5.5** For *conducted* tests, the LISNs may be placed on top of or immediately beneath and bonded directly to the ground-plane. For *radiated* tests, the LISN(s), if used, should be installed under, with the receptacle flush with the ground-plane.

### *4.1.6 Test arrangement for floor-standing equipment*

**4.1.6.1** Only one vertical riser may be used where typical of system under test.

**4.1.6.2** Excess power cord shall be bundled in the center or shortened to appropriate length.

**4.1.6.3** EUT and cables shall be insulated from ground-plane by up to 12 mm. Where the manual has specified or there exists a code of practice for installation of the EUT, the test arrangement shall allow the use of this practice for the tests.

**4.1.6.4** Power cords being measured connected to one LISN. All other system power cords powered through other LISN(s). A multiple receptacle strip may be used for other power cords.

**4.1.6.5** For c*onducted* tests, the LISNs may be placed on top of or immediately beneath and bonded directly to the ground-plane. For *radiated* tests, the LISN(s), if used, should be installed under, with the receptacle flush with the ground-plane.

### *4.1.7 Placement and manipulation of interconnect cabling (or wiring) of tabletop equipment*

**4.1.7.1** LISN(s) may have to be positioned to the side of the table to meet the criterion that the LISN receptacle shall be 80 cm away from the EUT. LISN(s) may be above ground-plane only for conducted emission measurements.

**4.1.7.2** Accessories, such as ac power adapter, if typically table-mounted, shall occupy peripheral positions as is applicable.

**4.1.7.3** Accessories, which are typically floor-mounted, shall occupy a floor position directly below the portion of the EUT to which they are typically connected. T

**4.1.7.4** Table length may be extended beyond 1.5 m with peripherals aligned with the back edge. The table depth may be extended beyond 1 m. The 40 cm distance to the vertical conducting plane shall be maintained for conducted emission testing.

## Placement of wall-mounted equipment

### *4.1.8 Test configuration/arrangement for combination floor-standing and tabletop equipment*

**4.1.8.1** Interconnecting cables that hang closer than 40 cm to the ground-plane shall be folded back and forth in the center, forming a bundle 30 to 40 cm long.

**4.1.8.2** I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using the correct terminating impedance.

**4.1.8.3** If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground-plane with the receptacle flush with the ground-plane.

**4.1.8.4** Cables of hand-operated devices, such as keyboards, mice, etc., have to be placed as for normal use.

**4.1.8.5** Non-EUT components of EUT system being tested.

**4.1.8.6** I/O cable to floor-standing unit drapes to the ground-plane and shortened or excess bundled. Cables not reaching the metal ground-plane are draped to the height of the connector or 40 cm, whichever is lower.

**4.1.8.7** Power cords and signal cables shall drape to the floor. No extension cords shall be used to the power receptacles.

**4.1.8.8** The floor-standing unit can be placed under the table if its height permits.

## *4.2 Special condition description*

If for some reason the above measurement conditions can’t be met, the description below should be used as an appropriate measurement condition and placement.

**(Description is written additionally as the measurements differ – all is within test procedure)**

# 5 TEST SUMMARY

| | Test | | Sample | |
|---|---|---|---|---|
| | Yes | Not | Pass | Fail |
| **ANSI C63.4-2009; FCC Part 15, Subpart C** | ☑ | ☐ | ☑ | ☐ |

## *5.1 Purpose of the test*

To determine whether the equipment under test fulfils the **ANSI C63.4-2009; FCC Part 15, Subpart C** requirements.

# 6 EMISSION TESTS

## *6.1 Conducted emission measurement (intentional radiator)*

Not applicable due to battery power supply.

## 6.2 Bandwidth of the emission (intentional radiator)

**Section 15.215 Additional provisions to the general radiated emission limitations**

### 6.2.1 Test instruments

| Description & Manufacturer | Model No. | SIQ No. | Last calibration | Calibrated until | Calibration period | Used |
|---|---|---|---|---|---|---|
| ETS, Anechoic chamber | 3m | 103949 | 2012-12 | 2014-12 | 24 months | X |
| Rohde-Schwarz, RFI receiver | ESU8 | 105187 | 2013-10 | 2015-10 | 24 months | X |
| R&S, Loop antenna | HFH2-Z2 | / | 2013-05 | 2015-05 | 24 months | X |
| Heinrich Deisel, Turn table | DS 420.00 | 103337 | NA | NA | NA | X |
| Controller for turn table and antenna tower | / | / | NA | NA | NA | X |
| PC, HP Compaq | D330 uT | 104245 | / | / | / | |

### 6.2.2 Test procedure

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 m away from the interference-receiving antenna.
3. Resolution bandwidth is set to a value greater than 5% of the allowed bandwidth. If no bandwidth specifications are given, the guidelines in pt. 1.4 are used

### 6.2.3 Test results

| | | | |
|---|---|---|---|
| **EUT** | Access control terminal (CAC3 Module) | **Type:** | AIO |
| **Mode:** | Normal | **Bandwidth:** | 2,804 kHz |
| **Input voltage:** | 7,2 V DC (battery) | **Date:** | 03.02.2014 |
| **Environmental conditions:** | 25±10°C, 55±30% RH | **Tested by:** Damjan Repar | |

### 6.2.4 Summary of results

**Device passed the requirements stated in ANSI C63.4, FCC Part 15, Subpart C.**

### 6.2.4.1 Bandwidth of the emission at 3 m in an anechoic chamber

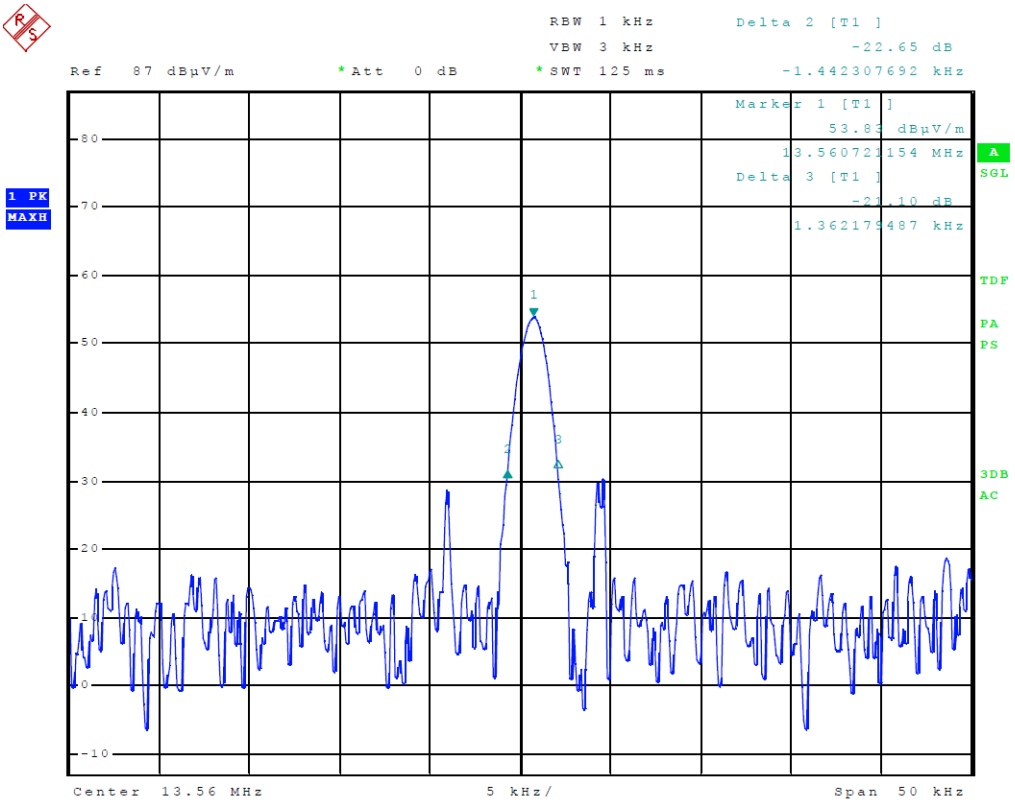
**C20131273**

03.Feb 14 07:38

| | |
|---|---|
| **Meas Type** | BANDWIDTH MEASUREMENT |
| **Equipment under Test** | ACCESS CONTROL TERMINAL, Type CAC3 MODULE |
| **Manufacturer** | OPENWAYS SAS |
| **OP Condition** | Uin 7.2V BATTERY, NORMAL |
| **Operator** | DAMJAN REPAR |
| **Test Spec** | |
| 180 DEG | |

**Sweep Settings** **Screen A**

| | | | |
|---|---|---|---|
| Center Frequency | 13.560000 MHz | Ref Level | 87.000 dBµV/m |
| Frequency Offset | 0.000000 Hz | Ref Level Offset | 0.000 dB |
| Span | 50.000000 kHz | Ref Position | 100.000 % |
| Start Frequency | 13.535000 MHz | Level Range | 100.000 dB |
| Stop Frequency | 13.585000 MHz | RF Att | 0.000 dB |
| RBW | 1.000000 kHz | | |
| VBW | 3.000000 kHz | X-Axis | LIN |
| Sweep Time | 125.00 ms | Y-Axis | LOG |




Bandwidth of the emission: 2,804 kHz

## 6.3 Spectrum mask (intentional radiator)

**Section 15.225 Operation within the band 13.110 – 14.010 MHz - pt.a – pt.d**

### 6.3.1 Test instruments

| Description & Manufacturer | Model No. | SIQ No. | Last calibration | Calibrated until | Calibration period | Used |
|---|---|---|---|---|---|---|
| ETS, Anechoic chamber | 3m | 103949 | 2012-12 | 2014-12 | 24 months | X |
| Rohde-Schwarz, RFI receiver | ESU8 | 105187 | 2013-10 | 2015-10 | 24 months | X |
| R&S, Loop antenna | HFH2-Z2 | / | 2013-05 | 2015-05 | 24 months | X |
| Heinrich Deisel, Turn table | DS 420.00 | 103337 | NA | NA | NA | X |
| Controller for turn table and antenna tower | / | / | NA | NA | NA | X |
| PC, HP Compaq | D330 uT | 104245 | / | / | / | |

### 6.3.2 Test procedure

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 m away from the interference-receiving antenna.
3. Frequencies with maximum emission were retested on OATS.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.

### 6.3.3 Test results

| | | | |
|---|---|---|---|
| **EUT** | Access control terminal (CAC3 Module) | **Type:** | AIO |
| **Mode:** | Normal | | |
| **Input voltage:** | 7,2 V DC (battery) | **Date:** | 31.01.2014 – 14.02.2014 |
| **Environmental conditions:** | 25±10°C, 55±30% RH | **Tested by:** Damjan Repar | |

### 6.3.4 Summary of results

**Device passed the requirements stated in ANSI C63.4, FCC Part 15, Subpart C.**

### 6.3.4.1 Signal measurement at 3 m in an anechoic chamber

**C20131273**

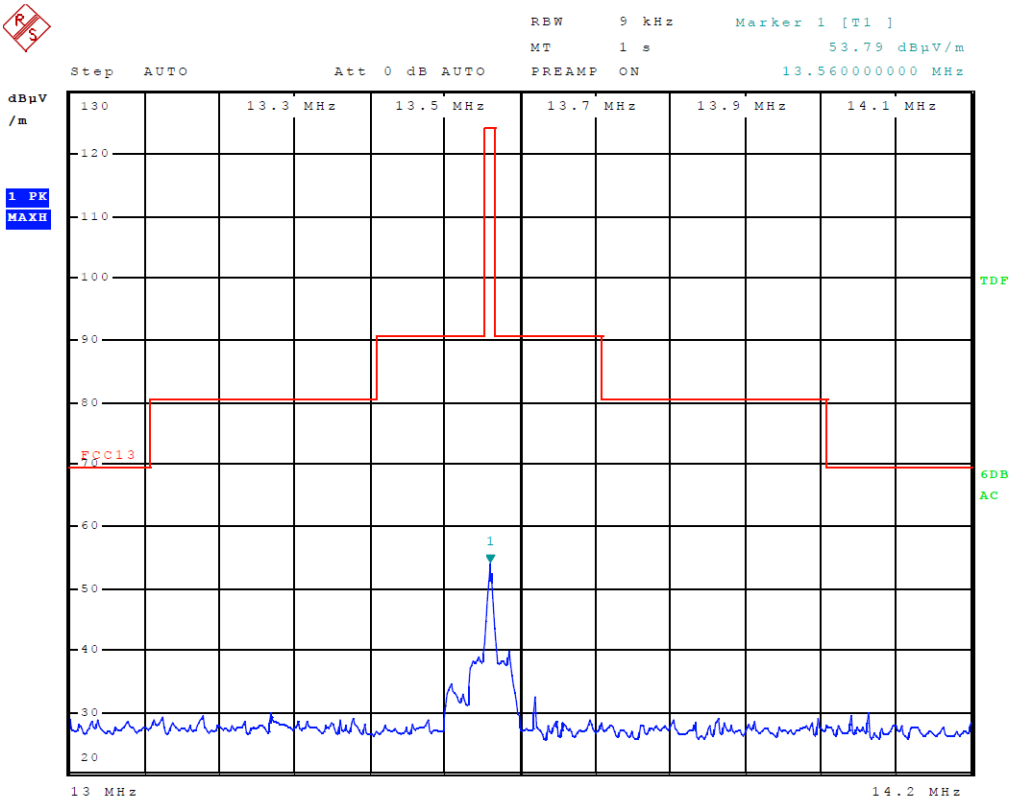
31.Jan 14 14:15

| | |
|---|---|
| **Meas Type** | RADIATED EMISSION |
| **Equipment under Test** | ACCESS CONTROL TERMINAL, Type CAC3 MODULE |
| **Manufacturer** | OPENWAYS SAS |
| **OP Condition** | Uin 7.2V BATTERY, NORMAL |
| **Operator** | DAMJAN REPAR |
| **Test Spec** | |
| 180 DEG | |

**Stepped Scan (3 Ranges)**

Scan Start: 13 MHz
Scan Stop: 14.2 MHz
Detector: Trace 1: MAX PEAK
Transducer: HFH2-Z2V

| Start Frequency | Stop Frequency | Step Size | Res BW | Meas Time | RF Atten | Preamp | Input |
|---|---|---|---|---|---|---|---|
| 13.000000 MHz | 13.496000 MHz | 4.00 kHz | 9.00 kHz | 50 ms | Auto | 20 dB | INPUT2 |
| 13.500000 MHz | 13.596000 MHz | 4.00 kHz | 9.00 kHz | 1 s | Auto | 20 dB | INPUT2 |
| 13.600000 MHz | 14.200000 MHz | 4.00 kHz | 9.00 kHz | 50 ms | Auto | 20 dB | INPUT2 |



### 6.3.4.2 Signal measurement at 10 m on OATS

**Background**

**C20140000** 14.Feb 14 13:12

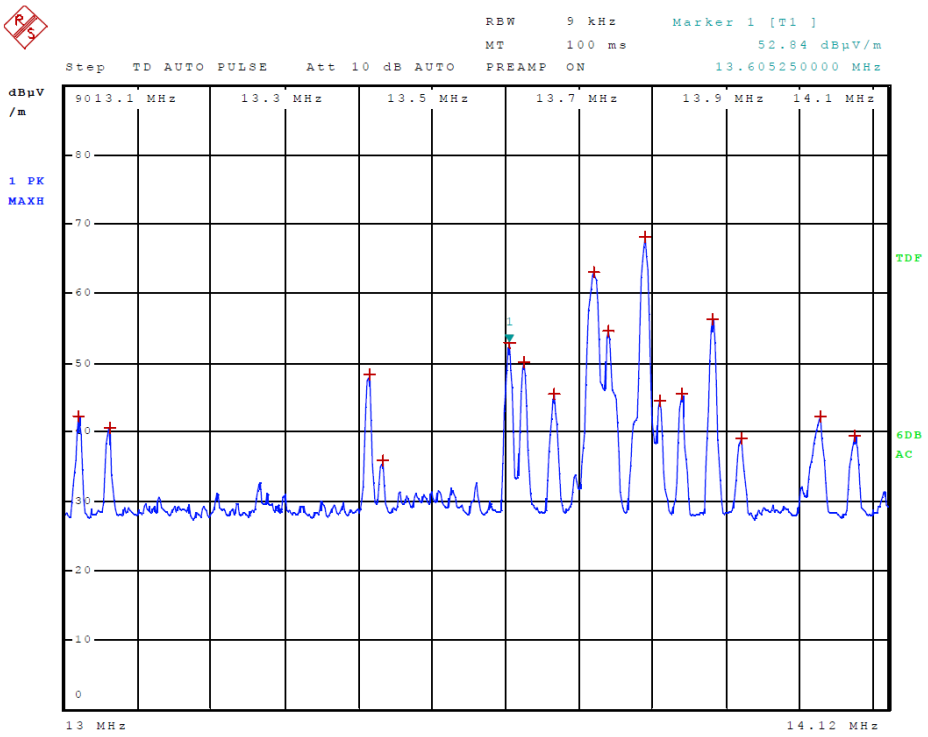
| | |
|---|---|
| **Meas Type** | radiated emission |
| **Equipment under Test** | |
| **Manufacturer** | MARGENTO |
| **OP Condition** | background |
| **Operator** | DAMJAN REPAR |

**Test Spec**
OATS 10M

**Time Domain Scan (1 Range)**

Scan Start: 13 MHz
Scan Stop: 14.12 MHz
Detector: Trace 1: MAX PEAK
Transducer: HFH2-Z2V

| Start Frequency | Stop Frequency | Step Size | Res BW | Meas Time | RF Atten | Preamp | Input |
|---|---|---|---|---|---|---|---|
| 13.000000 MHz | 14.120000 MHz | 2.25 kHz | 9.00 kHz | 50 ms | Auto | 20 dB | INPUT2 |



## C20140000

14.Feb 14 13:12

**Meas Type** radiated emission
**Equipment under Test**
**Manufacturer** MARGENTO
**OP Condition** background
**Operator** DAMJAN REPAR
**Test Spec**
OATS 10M

## Final Measurement

Meas Time: 15 s
Margin: 15 dB
Peaks: 16

| Trace | Frequency | Level (dBµV/m) | Detector | Delta Limit/dB |
|---|---|---|---|---|
| 1 | 13.018000000 MHz | 42.31 | Max Peak | |
| 1 | 13.060750000 MHz | 40.51 | Max Peak | |
| 1 | 13.414000000 MHz | 48.26 | Max Peak | |
| 1 | 13.432000000 MHz | 35.75 | Max Peak | |
| 1 | 13.605250000 MHz | 52.84 | Max Peak | |
| 1 | 13.625500000 MHz | 49.92 | Max Peak | |
| 1 | 13.666000000 MHz | 45.53 | Max Peak | |
| 1 | 13.720000000 MHz | 62.97 | Max Peak | |
| 1 | 13.740250000 MHz | 54.64 | Max Peak | |
| 1 | 13.789750000 MHz | 68.24 | Max Peak | |
| 1 | 13.810000000 MHz | 44.56 | Max Peak | |
| 1 | 13.839250000 MHz | 45.53 | Max Peak | |
| 1 | 13.882000000 MHz | 56.30 | Max Peak | |
| 1 | 13.920250000 MHz | 38.97 | Max Peak | |
| 1 | 14.028250000 MHz | 42.23 | Max Peak | |
| 1 | 14.075500000 MHz | 39.36 | Max Peak | |

## Operating mode

**C20140000** 14.Feb 14 13:18

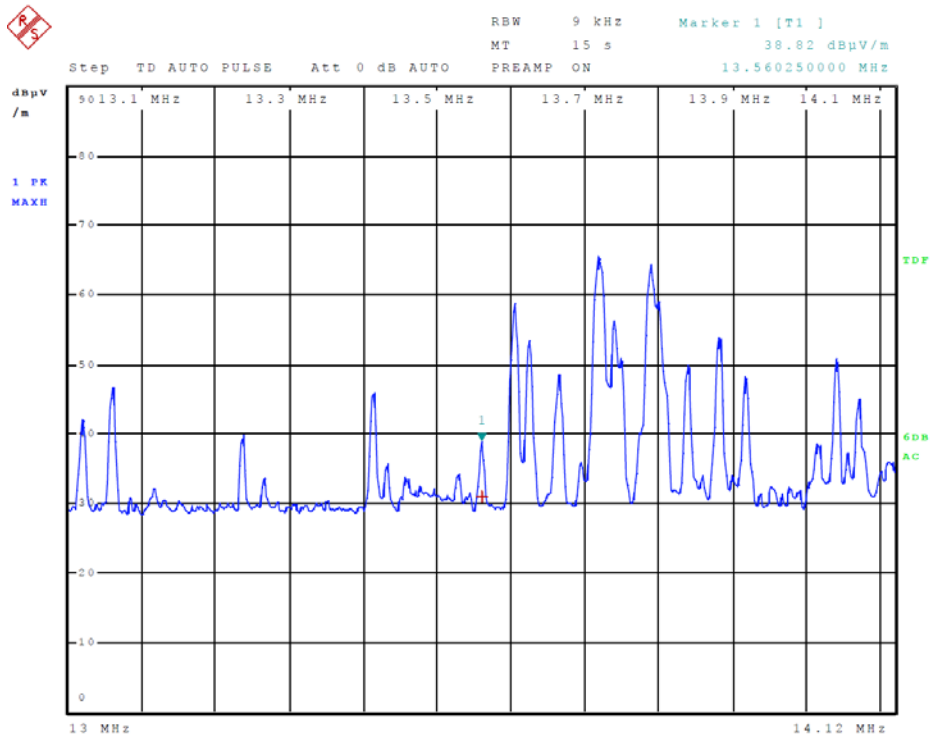
| | |
|---|---|
| **Meas Type** | radiated emission |
| **Equipment under Test** | |
| **Manufacturer** | MARGENTO |
| **OP Condition** | OPERATING F 13.56 MHZ |
| **Operator** | DAMJAN REPAR |
| **Test Spec** | |

OATS 10M

### Time Domain Scan (1 Range)

Scan Start: 13 MHz
Scan Stop: 14.12 MHz
Detector: Trace 1: MAX PEAK
Transducer: HFH2-Z2V

| Start Frequency | Stop Frequency | Step Size | Res BW | Meas Time | RF Atten | Preamp | Input |
|---|---|---|---|---|---|---|---|
| 13.000000 MHz | 14.120000 MHz | 2.25 kHz | 9.00 kHz | 50 ms | Auto | 20 dB | INPUT2 |



## C20140000

14.Feb 14 13:18

| | |
|---|---|
| **Meas Type** | radiated emission |
| **Equipment under Test** | |
| **Manufacturer** | MARGENTO |
| **OP Condition** | OPERATING F 13.56 MHZ |
| **Operator** | DAMJAN REPAR |
| **Test Spec** | |
| OATS 10M | |

### Final Measurement

| | |
|---|---|
| Meas Time: | 15 s |
| Margin: | 15 dB |
| Peaks: | 1 |

| Trace | Frequency | Level (dBµV/m) | Detector | Delta Limit/dB |
|---|---|---|---|---|
| 1 | 13.560250000 MHz | 30.93 | Quasi Peak | |

### 6.3.4.3 Calculations made from 10 m to 30 m distance

Section 15.225 Operation within the band 13.110 – 14.010 MHz.

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

At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

**Measured value at 10 m.**

| Frequency (MHz) | Measured value at 10 m (dBμV/m) | Limit at 10 m (dBμV/m) |
|---|---|---|
| 13,56 | 30.93 | 104 |

**Calculated value from 10 m to 30 m.**

| Frequency (MHz) | Measured value at 10 m (dBμV/m) | Calculated value at 30 m (dBμV/m) | Limit at 30 m (dBμV/m) |
|---|---|---|---|
| 13,56 | 30.93 | 10.93 | 84 |

## 6.4 Radiated emission measurement 9 kHz – 30 MHz (intentional radiator)

**Section 15.209 Radiated emission limits, general requirements**

### 6.4.1 Test instruments

| Description & Manufacturer | Model No. | SIQ No. | Last calibration | Calibrated until | Calibration period | Used |
|---|---|---|---|---|---|---|
| ETS, Anechoic chamber | 3m | 103949 | 2012-12 | 2014-12 | 24 months | X |
| Rohde-Schwarz, RFI receiver | ESU8 | 105187 | 2013-10 | 2015-10 | 24 months | X |
| R&S, Loop antenna | HFH2-Z2 | / | 2013-05 | 2015-05 | 24 months | X |
| Heinrich Deisel, Turn table | DS 420.00 | 103337 | NA | NA | NA | X |
| Controller for turn table and antenna tower | / | / | NA | NA | NA | X |
| PC, HP Compaq | D330 uT | 104245 | / | / | / | |

### 6.4.2 Test procedure

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of variable-height antenna tower.
3. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
4. The test-receiver system was set to PEAK and QUASI-PEAK Detect Function and Specified Bandwidth with Maximum Hold Mode.
5. The highest points would be re-tested one by one using the quasi-peak method.

### 6.4.3 Test results

| | | | |
|---|---|---|---|
| **EUT** | Access control terminal (CAC3 Module) | **Type:** | AIO |
| **Mode:** | Normal | | |
| **Input voltage:** | 7,2 V DC (battery) | **Date:** | 24.02.2014 |
| **Environmental conditions:** | 25±10°C, 55±30% RH | **Tested by:** Damjan Repar | |

### 6.4.4 Summary of results

**Device passed the requirements stated in ANSI C63.4, FCC Part 15, Subpart C.**

### 6.4.4.1 Measurement at 3 m in an anechoic chamber

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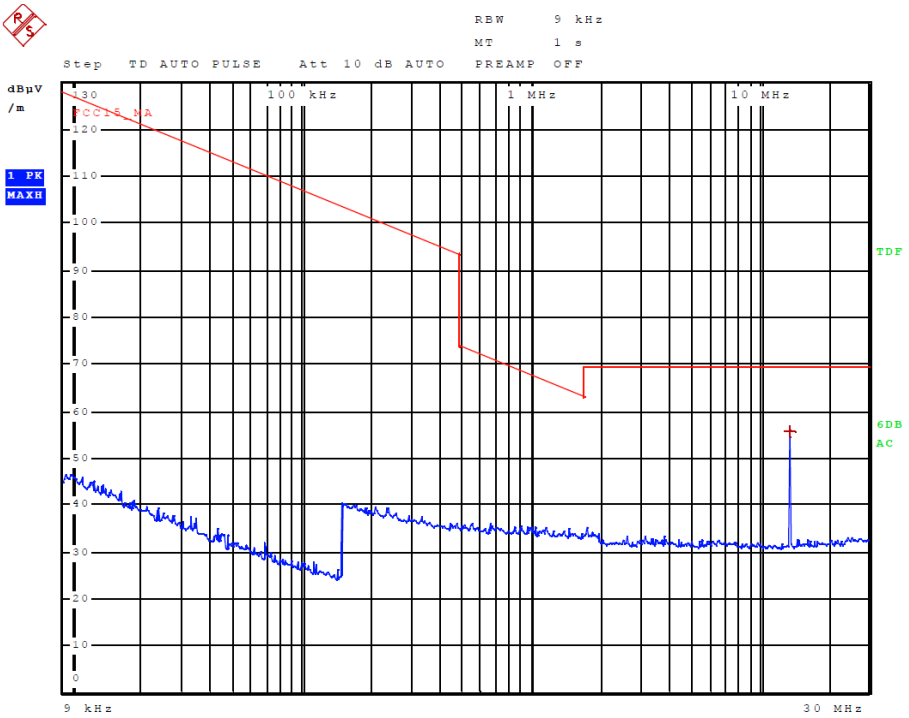
24.Feb 14 08:22

| | |
|---|---|
| **Meas Type** | RADIATED EMISSION |
| **Equipment under Test** | |
| **Manufacturer** | |
| **OP Condition** | |
| **Operator** | |
| **Test Spec** | |

**Time Domain Scan (2 Ranges)**

Scan Start: 9 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK
Transducer: HFH2-Z2V

| Start Frequency | Stop Frequency | Step Size | Res BW | Meas Time | RF Atten | Preamp | Input |
|---|---|---|---|---|---|---|---|
| 9.000000 kHz | 149.950000 kHz | 50.00 Hz | 200.00 Hz | 100 ms | Auto | 0 dB | INPUT2 |
| 150.000000 kHz | 30.000000 MHz | 2.25 kHz | 9.00 kHz | 50 ms | Auto | 0 dB | INPUT2 |



ROHDE&SCHWARZ

24.Feb 14 08:22

**Meas Type** RADIATED EMISSION
**Equipment under Test**
**Manufacturer**
**OP Condition**
**Operator**
**Test Spec**

## Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 1

| Trace | Frequency | Level (dBµV/m) | Detector | Delta Limit/dB |
|---|---|---|---|---|
| 1 | 13.560000000 MHz | 55.55 | Quasi Peak | -13.95 |

### 6.4.4.2 Calculations made from 3 m to 30 m distance

At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

**Measured value at 3 m.**

| Frequency (MHz) | Measured value at 3 m (dBμV/m) |
|---|---|
| 13,56 | 55.55 |

**Calculated value from 3 m to 30 m.**

| Frequency (MHz) | Extrapolation factor (dB/decade) | Calculated value at 30 m (dBμV/m) | Limit at 30 m (dBμV/m) |
|---|---|---|---|
| 13,56 | -40 | 15.55 | 84 |

**NOTE:** Antenna factor and cable loss are already included in measurement correction.

## 6.5 Radiated emission measurement 30 MHz – 1 GHz (intentional radiator)

**Section 15.209 Radiated emission limits, general requirements**

### 6.5.1 Test instruments

| Description & Manufacturer | Model No. | SIQ No. | Last calibration | Calibrated until | Calibration period | Used |
|---|---|---|---|---|---|---|
| ETS, Anechoic chamber | 3m | 103949 | 2012-12 | 2014-12 | 24 months | X |
| Rohde-Schwarz, RFI receiver | ESU8 | 105187 | 2013-10 | 2015-10 | 24 months | X |
| EMCO, Antenna | model 3142 | 104351 | 2013-09 | 2015-09 | 24 months | X |
| EMCO, Antenna | 3115 | 103002 | 2013-09 | 2015-09 | 24 months | |
| Heinrich Deisel, Turn table | DS 420.00 | 103337 | NA | NA | NA | X |
| Antenna tower | / | / | NA | NA | NA | X |
| Controller for turn table and antenna tower | / | / | NA | NA | NA | X |
| PC, HP Compaq | D330 uT | 104245 | / | / | / | |

### 6.5.2 Test procedure

4. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
5. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of variable-height antenna tower.
6. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
7. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
8. The test-receiver system was set to PEAK and QUASI-PEAK Detect Function and Specified Bandwidth with Maximum Hold Mode.
9. The highest points would be re-tested one by one using the quasi-peak method.

### 6.5.3 Test results

| | | | |
|---|---|---|---|
| **EUT** | Access control terminal (CAC3 Module) | **Type:** | AIO |
| **Mode:** | Normal | | |
| **Input voltage:** | 7,2 V DC (battery) | **Date:** | 24.02.2014 |
| **Environmental conditions:** | 25±10°C, 55±30% RH | **Tested by:** Damjan Repar | |

### 6.5.4 Summary of results

**Device passed the requirements stated in ANSI C63.4, FCC Part 15, Subpart C.**

#### 6.5.4.1 Signal measurement at 3 m in an anechoic chamber

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## C20131273

| | |
|---|---|
| **Meas Type** | RADIATED EMISSION |
| **Equipment under Test** | CAC3 AIO Module |
| **Manufacturer** | OPENWAYS SAS |
| **OP Condition** | Uin 7.2 V battery supply, NORMAL |
| **Operator** | DAMJAN REPAR |

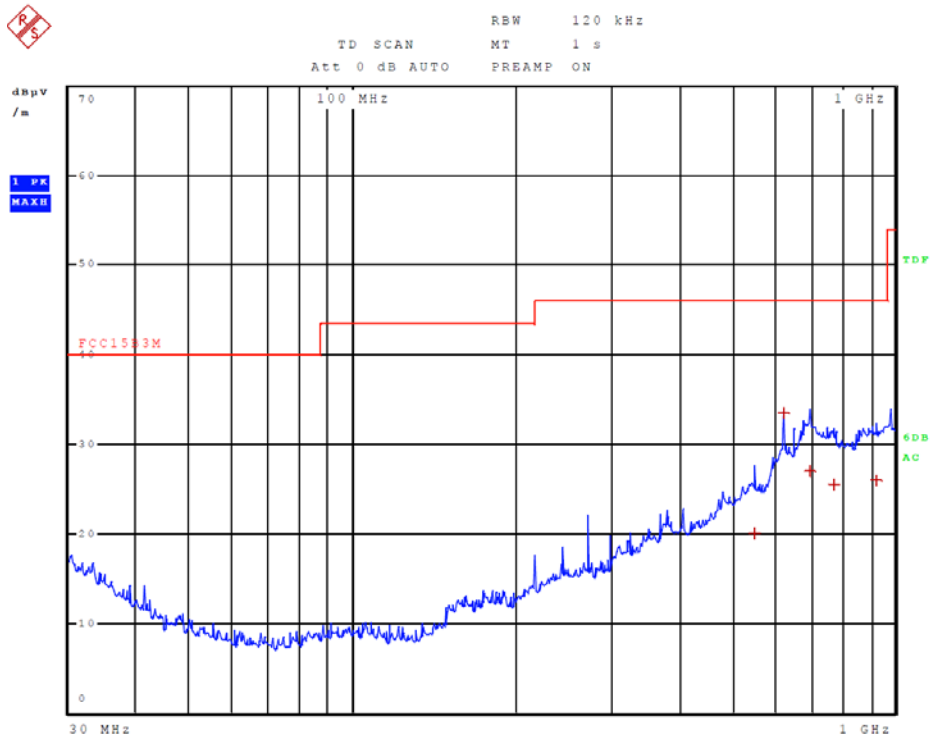
**Test Spec**

VERTICAL 100 CM 270 DEG

### Time Domain Scan (1 Range)

Scan Start: 30 MHz
Scan Stop: 1 GHz
Detector: Trace 1: MAX PEAK
Transducer: 3142B3m

| Start Frequency | Stop Frequency | Step Size | Res BW | Meas Time | RF Atten | Preamp | Input |
|---|---|---|---|---|---|---|---|
| 30.000000 MHz | 1.000000 GHz | 30.00 kHz | 120.00 kHz | 10 ms | Auto | 20 dB | INPUT2 |



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## C20131273

| | |
|---|---|
| **Meas Type** | RADIATED EMISSION |
| **Equipment under Test** | CAC3 AIO Module |
| **Manufacturer** | OPENWAYS SAS |
| **OP Condition** | Uin 7.2 V battery supply, NORMAL |
| **Operator** | DAMJAN REPAR |

**Test Spec**

VERTICAL 100 CM 270 DEG

### Final Measurement

| | |
|---|---|
| Meas Time: | 1 s |
| Margin: | 20 dB |
| Subranges: | 5 |

| Trace | Frequency | Level (dBµV/m) | Detector | Delta Limit/dB |
|---|---|---|---|---|
| 1 | 623.790000000 MHz | 33.40 | Quasi Peak | -12.60 |
| 1 | 698.940000000 MHz | 27.04 | Quasi Peak | -18.96 |
| 1 | 925.650000000 MHz | 25.94 | Quasi Peak | -20.06 |
| 1 | 773.130000000 MHz | 25.49 | Quasi Peak | -20.51 |
| 1 | 551.010000000 MHz | 20.08 | Quasi Peak | -25.92 |

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## C20131273

| | |
|---|---|
| **Meas Type** | RADIATED EMISSION |
| **Equipment under Test** | CAC3 AIO Module |
| **Manufacturer** | OPENWAYS SAS |
| **OP Condition** | Uin 7.2 V battery supply, NORMAL |
| **Operator** | DAMJAN REPAR |

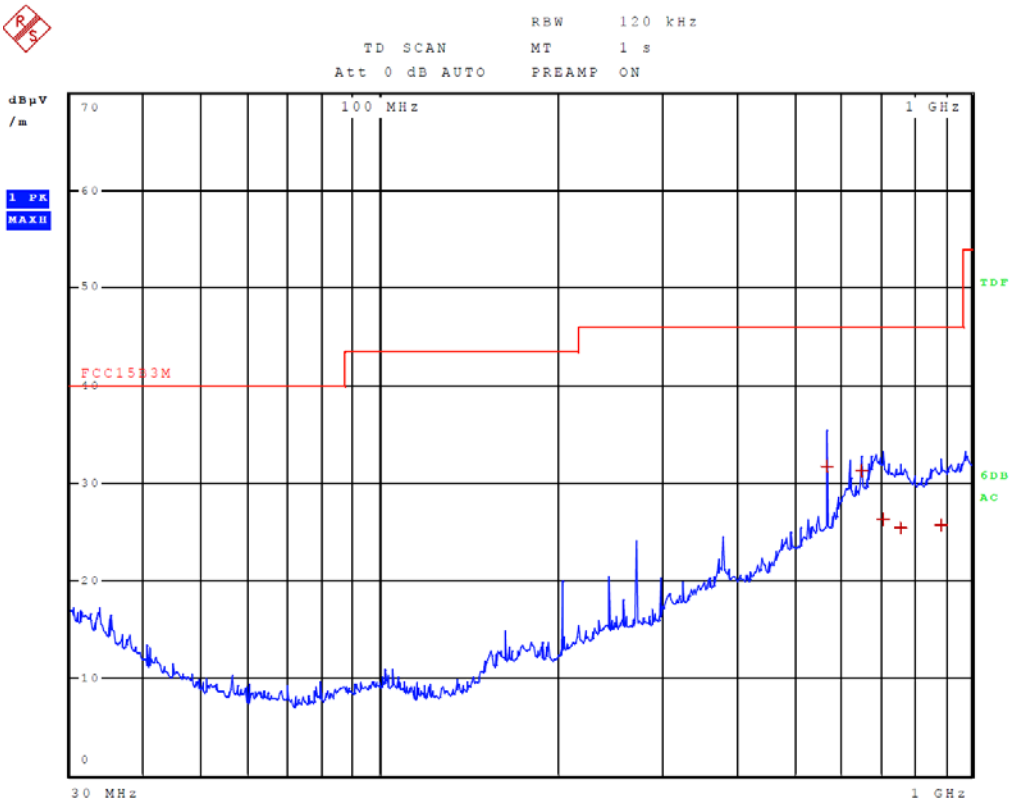
**Test Spec**

HORIZONTAL 151 CM 0 DEG

### Time Domain Scan (1 Range)

Scan Start: 30 MHz
Scan Stop: 1 GHz
Detector: Trace 1: MAX PEAK
Transducer: 3142B3m

| Start Frequency | Stop Frequency | Step Size | Res BW | Meas Time | RF Atten | Preamp | Input |
|---|---|---|---|---|---|---|---|
| 30.000000 MHz | 1.000000 GHz | 30.00 kHz | 120.00 kHz | 10 ms | Auto | 20 dB | INPUT2 |



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## C20131273

| | |
|---|---|
| **Meas Type** | RADIATED EMISSION |
| **Equipment under Test** | CAC3 AIO Module |
| **Manufacturer** | OPENWAYS SAS |
| **OP Condition** | Uin 7.2 V battery supply, NORMAL |
| **Operator** | DAMJAN REPAR |

**Test Spec**
HORIZONTAL 151 CM 0 DEG

### Final Measurement

| | |
|---|---|
| Meas Time: | 1 s |
| Margin: | 20 dB |
| Subranges: | 5 |

| Trace | Frequency | Level (dBµV/m) | Detector | Delta Limit/dB |
|---|---|---|---|---|
| 1 | 569.550000000 MHz | 31.68 | Quasi Peak | -14.32 |
| 1 | 650.910000000 MHz | 31.21 | Quasi Peak | -14.79 |
| 1 | 709.230000000 MHz | 26.26 | Quasi Peak | -19.74 |
| 1 | 890.220000000 MHz | 25.61 | Quasi Peak | -20.39 |
| 1 | 758.340000000 MHz | 25.38 | Quasi Peak | -20.62 |

## 6.6 Frequency tolerance of the carrier signal

**Section 15.225 Operation within the band 13.110 – 14.010 MHz - pt.e**

### 6.6.1 Test requirements:

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### 6.6.2 Test results

| | | | |
|---|---|---|---|
| **EUT** | Access control terminal (CAC3 Module) | **Type:** | AIO |
| **Mode:** | Normal | | |
| **Input voltage:** | 7,2 V DC (fully charged battery) | **Date:** | 21.02.2014 |
| **Environmental conditions:** | 25±10°C, 55±30% RH | **Tested by:** Damjan Repar | |

| Temperature (°C) | Supply voltage | Minutes after switch on | Frequency (MHz) | Allowed tolerance (kHz) | Measured tolerance (Hz) |
|---|---|---|---|---|---|
| 50 | New battery | 0 | 13,560712 | ±1,356 | 20 |
| | New battery | 2 | 13,560744 | ±1,356 | 52 |
| | New battery | 5 | 13,560776 | ±1,356 | 84 |
| | New battery | 10 | 13,560776 | ±1,356 | 84 |
| 40 | New battery | 0 | 13,560680 | ±1,356 | -12 |
| | New battery | 2 | 13,560712 | ±1,356 | 20 |
| | New battery | 5 | 13,560744 | ±1,356 | 52 |
| | New battery | 10 | 13,560734 | ±1,356 | 42 |
| 30 | New battery | 0 | 13,560692 | ±1,356 | 0 |
| | New battery | 2 | 13,560689 | ±1,356 | -3 |
| | New battery | 5 | 13,560702 | ±1,356 | 10 |
| | New battery | 10 | 13,560698 | ±1,356 | 6 |
| 20 | New battery | 0 | 13,560686 | ±1,356 | -6 |
| | New battery | 2 | 13,560692 | ±1,356 | 0 |
| | New battery | 5 | 13,560695 | ±1,356 | 3 |
| | New battery | 10 | **13,560692** | **-** | **Reference** |
| 10 | New battery | 0 | 13,560702 | ±1,356 | 10 |
| | New battery | 2 | 13,560698 | ±1,356 | 6 |
| | New battery | 5 | 13,560692 | ±1,356 | 0 |
| | New battery | 10 | 13,560686 | ±1,356 | -6 |
| 0 | New battery | 0 | 13,560737 | ±1,356 | 45 |
| | New battery | 2 | 13,560698 | ±1,356 | 6 |
| | New battery | 5 | 13,560718 | ±1,356 | 26 |
| | New battery | 10 | 13,560705 | ±1,356 | 13 |
| -10 | New battery | 0 | 13,560746 | ±1,356 | 54 |
| | New battery | 2 | 13,560737 | ±1,356 | 45 |
| | New battery | 5 | 13,560714 | ±1,356 | 22 |
| | New battery | 10 | 13,560711 | ±1,356 | 19 |
| -20 | New battery | 0 | 13,560708 | ±1,356 | 16 |
| | New battery | 2 | 13,560718 | ±1,356 | 26 |
| | New battery | 5 | 13,560734 | ±1,356 | 42 |
| | New battery | 10 | 13,560724 | ±1,356 | 32 |

## 7 Photos of the actual measurement place and EUT placement

**Figure 1: Radiated emission test – 30 MHz to 1 GHz**

**Figure 2: Radiated emission test – OATS measurements**

**Figure 3: Radiated emission test – below 30 MHz**