



**TEST REPORT CONCERNING THE COMPLIANCE OF AN
INDUCTIVE PROXIMITY CARD READER, OPERATING ON
13.56 MHz
BRAND Nedap, MODEL Smart Card Booster 2G,
WITH 47 CFR PART 15 (10-1-09 EDITION) AND THE
REQUIREMENTS OF INDUSTRY CANADA:
RSS-GEN AND RSS-210 (ISSUE 8, DECEMBER 2010)**

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Industry Canada : 2932G-1
VCCI Registered : R-1518, C-1598
R&TTE, LVD, EMC Notified Body : 1856

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MEASUREMENT/TECHNICAL REPORT

N.V. Nederlandsche Apparatenfabriek "Nedap"

Brand: Nedap
Model: Smart Card Booster 2G
FCC ID: CGDBOOSTER7
IC: 1444A-BOOSTER7

| | | | |
|-----------------------|---------------------------------|--------------------------------------|-------------------------|
| This report concerns: | Original grant/certification | Class 2 Permissive Change | Verification |
| Equipment type: | Inductive Proximity Card Reader | | |
| Report prepared by: | Name | : O.H. Hoekstra | |
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (10-1-09 Edition), RSS-GEN AND RSS-210 and the measurement procedures of ANSI C63.4-2009. TÜV Rheinland EPS B.V. at Leek, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: June 15, 2012

Signature:



R. van der Meer
Engineer Telecom TÜV Rheinland EPS B.V.

Summary

The device under test does:

- fulfill the general approval requirements as identified in this test report
- not fulfill the general approval requirements as identified in this test report

Description of test item

Test item (EUT) : Inductive Proximity Card Reader
Manufacturer : N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand : Nedap
Model(s) : Smart Card Booster 2G
Serial number(s) : --
FCC ID : CGDBOOSTER7
IC : 1444A-BOOSTER7
Receipt date : March 28, 2012


Applicant information


Applicant's representative : Mr. J. Hulshof
Company : N.V. Nederlandsche Apparatenfabriek "Nedap"
Address : Parallelweg 2
Postal code : 7141 DC
City : Groenlo
Country : The Netherlands
Telephone number : +31 544 471 162
Telefax number : +31 544 466 475

Test(s) performed

Location : Leek
Test(s) started : March 28, 2012
Test(s) completed : April 4, 2012
Purpose of test(s) : Equipment Authorization (Original grant/certification)

Test specification(s) : 47 CFR Part 15 (10-1-09 Edition) and RSS-GEN AND RSS-210
Compliance statement : The test has demonstrated that this unit complies with stipulated standards.

Test engineer(s) : O.H. Hoekstra 

Report written by : O.H. Hoekstra 

Report date : June 15, 2012

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

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1 General information.

1.1 Product description.

1.1.1 Introduction.

The Inductive Proximity Card Reader, brand Nedap, model Smart Card Booster 2G, hereafter referred to as EUT is an inductive proximity card reader intended to be used to access parking lots. It is capable of reading 13.56 MHz inductive tags.

The content of this report and measurement results have not been changed other than the way of presenting the data.

1.2 Related submittal(s) and/or Grant(s).

1.2.1 General.

This test report supports the original grant/certification in equipment authorization files under registration number. **FCC ID: CGDBOOSTER7 and IC: 1444A-BOOSTER7.**

1.3 Tested system details.

Details and an overview of the system and all of its components, as it has been tested, may be found below.

| | | |
|-----------------------|---|---|
| EUT | : | Inductive Proximity Card Reader |
| Manufacturer | : | N.V. Nederlandsche Apparatenfabriek "Nedap" |
| Brand | : | Nedap |
| Model | : | Smart Card Booster 2G |
| Serial number | : | -- |
| Voltage input rating | : | 3 Vdc Battery operated (2* AAA) |
| Voltage output rating | : | -- |
| Current input rating | : | -- |
| Antenna | : | Integral |
| Operating frequency | : | 13.56 MHz |
| Remarks | : | n.a. |



Photo 1a: EUT (front)



Photo 1b: EUT (back)

1.3.1 Description of input and output ports.

EUT has no specific input and output ports.

1.4 Test Summary

The EUT was tested in accordance with the specifications given in Table 1 below.

| Test Standard | | Description | Pass / Fail |
|---|-----------------------------------|--|-------------|
| 47 CFR Part 15.225 (10-1-09 Edition) | RSS-210 Issue 8, December 2010 | | |
| 15.207(a) | RSS-Gen(7.2.4) | Conducted emissions | Pass |
| 15.225(a) | RSS-210(A2.6(a)) | Emissions in the band 13.553-13.567 MHz | Pass |
| 15.225(d), 15.209 | RSS-210(A2.6) | Emissions outside the band 13.110-14.010 MHz | Pass |
| 15.225(e) | RSS-210(A2.6) | Frequency stability | Pass |
| 15.215(c) | RSS-Gen(4.6.1) | Occupied bandwidth | Pass |

Table 1: Test specifications

Test methods: ANSI C63:2009 and RSS-Gen Issue 3, December 2010

1.5 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (10-1-09 Edition), sections 15.31, 15.35, 15.205, 15.209, 15.209 and 15.225 and RSS-GEN AND RSS-210 (ISSUE 8, DECEMBER 2010).

The test methods, which have been used, are based on ANSI C63.4: 2009.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters.

Radiated emission tests below 30 MHz were performed at a measurement distance of 3 meters.

To calculate the field strength level from these results to the appropriate distance at which the limit is specified, the appropriate extrapolation factor is used.

The receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

1.6 Test facility.

The Federal Communications Commission and Industry Canada has reviewed the technical characteristics of the test facilities at TÜV Rheinland EPS B.V., located at Eiberkamp 10, 9351 VT Leek, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948(10-1-06 edition).

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The description of the test facilities has been filed to Industry Canada under registration number 2932G-1. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

1.7 Test conditions.

Normal test conditions:

| | |
|----------------------|-----------------------------------|
| Temperature (*) | : +15°C to +35°C |
| Relative humidity(*) | : 20 % to 75 % |
| Supply voltage | : 3 Vdc Battery operated (2* AAA) |
| Air pressure | : 950 – 1050 hPa |

When it was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.

2 System test configuration.

2.1 Justification.

The system was configured for testing in a typical situation as a customer would normally use it. The test sample was configured by the applicant to enable continuous transmit.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2009.

2.2 EUT mode of operation.

The EUT has been tested in active mode, i.e. the EUT is ready to detect a card. To assess the behavior of the EUT while reading the card, the EUT is tested with a card presented such that it continuously reads the card. The intentional radiator tests have been performed with a complete functioning EUT.

2.3 Special accessories.

No special accessories are used and/or needed to achieve compliance.

2.4 Equipment modifications.

No modifications have been made to the equipment.

2.5 Product Labeling

The product labeling information is available in the technical documentation package.

2.6 Block diagram of the EUT.

The block diagram is available in the technical documentation package.

2.7 Schematics of the EUT.

The schematics are available in the technical documentation package.

2.8 Part list of the EUT.

The part list is available in the technical documentation package.

3 Radiated emission data.

3.1 Radiated field strength measurements (30 MHz – 1 GHz, E-field)

| Frequency (MHz) | Measurement results @3m Vertical (dBµV) | Measurement results @3m Horizontal (dBµV) | Correction factor (dB) | Results after correction Vertical (dBµV/m) | Results after correction Horizontal (dBµV/m) | Limits @3m (dBµV/m) | Pass/Fail |
|--------------------|---|---|------------------------|--|--|---------------------|-----------|
| 40.68 | <3.0 | <3.0 | 13.0 | <16.0 | <16.0 | 40.0 | Pass |
| 54.24 | 12.8 | 9.3 | 6.2 | 19.0 | 15.5 | 40.0 | Pass |
| 81.36 | 13.1 | 13.8 | 7.6 | 20.7 | 21.4 | 40.0 | Pass |
| 94.92 | 12.4 | 11.8 | 9.7 | 22.1 | 21.5 | 43.5 | Pass |
| 108.48 | 14.8 | 15.4 | 11.2 | 26.0 | 26.6 | 43.5 | Pass |
| 122.04 | 15.5 | 16.2 | 11.8 | 27.3 | 28.0 | 43.5 | Pass |
| 135.60 | 12.6 | 16.7 | 11.9 | 24.5 | 28.6 | 43.5 | Pass |
| 149.16 | 20.8 | 23.8 | 11.2 | 32.0 | 35.0 | 43.5 | Pass |
| 162.70 | 15.6 | 18.8 | 10.6 | 26.2 | 29.4 | 43.5 | Pass |
| 176.28 | 24.3 | 27.4 | 10.0 | 34.3 | 37.4 | 43.5 | Pass |
| 189.84 | 11.3 | 13.8 | 9.4 | 20.7 | 23.2 | 43.5 | Pass |
| 203.40 | 22.1 | 26.4 | 10.4 | 32.5 | 36.8 | 43.5 | Pass |
| 216.96 | 17.6 | 7.0 | 11.4 | 29.0 | 18.4 | 46.0 | Pass |
| 230.52 | 19.7 | 23.7 | 12.4 | 32.1 | 36.1 | 46.0 | Pass |
| 284.76 | <6.0 | 15.0 | 14.0 | <20.0 | 29.0 | 46.0 | Pass |
| 406.80 | 21.6 | 7.4 | 17.9 | 39.5 | 25.3 | 46.0 | Pass |
| 420.36 | 19.8 | 6.0 | 18.3 | 38.1 | 24.3 | 46.0 | Pass |
| 433.92 | 24.2 | 7.0 | 18.8 | 43.0 | 25.8 | 46.0 | Pass |
| 447.49 | 13.0 | <0.0 | 19.2 | 32.2 | <19.2 | 46.0 | Pass |
| 461.05 | 20.0 | <0.0 | 19.7 | 39.7 | <19.7 | 46.0 | Pass |
| 488.16 | 16.8 | 4.7 | 20.5 | 37.3 | 25.2 | 46.0 | Pass |
| 542.40 | 14.6 | 3.4 | 22.3 | 36.9 | 25.7 | 46.0 | Pass |

Table 2 Radiated emissions of the EUT

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.205, 15.209 and 15.225 and RSS-210 and RSS-Gen, section 2.2 and 2.6 are depicted in Table 2.

Notes:

1. Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
2. Measurement uncertainty is ± 5.0 dB.
3. The EUT was varied in three positions, the measuring antenna was varied in horizontal and vertical orientations and also around its axis. The reported value is the worst case found at the reported frequency.
4. The EUT was tested in both normal mode (i.e. without a label in its proximity) and in activated mode (i.e. with a label in its proximity). Worst case noted.
5. A Quasi-peak detector was used with a bandwidth of 120 kHz.

3.1.1 Test equipment used (for reference see test equipment listing).

| | | | | | | |
|-------|-------|-------|-------|-------|-------|--|
| 15633 | 99580 | 99609 | 99613 | 99699 | 99733 | |
|-------|-------|-------|-------|-------|-------|--|

Test engineer

Signature :



Name : O.H. Hoekstra

Date : April 4, 2012

3.2 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field).

| Frequency (MHz) | Measurement results | Detector | Antenna factor | Cable loss | Extrapolation factor | Measurement results (calculated) | Limits | Pass/Fail |
|-----------------|---------------------|----------|----------------|------------|----------------------|----------------------------------|--------|-----------|
| | dBµV @3m | | | | | dB | | |
| 13.108 | <-10.0 | Qp | 19.6 | 1 | 40 | <-29.4 | 29.5 | Pass |
| 13.342 | <-10.0 | Qp | 19.6 | 1 | 40 | <-29.4 | 40.5 | Pass |
| 13.535 | -4.6 | Qp | 19.6 | 1 | 40 | -24.0 | 50.5 | Pass |
| 13.560 | 42.3 | Qp | 19.6 | 1 | 40 | 22.9 | 84.0 | Pass |
| 13.586 | -3.7 | Qp | 19.6 | 1 | 40 | -23.1 | 50.5 | Pass |
| 13.779 | <-10.0 | Qp | 19.6 | 1 | 40 | <-29.4 | 40.5 | Pass |
| 14.011 | <-10.0 | Qp | 19.6 | 1 | 40 | <-29.4 | 29.5 | Pass |
| 27.120 | -8.8 | Qp | 19.7 | 1 | 40 | -28.1 | 29.5 | Pass |

Table 3 Radiated emissions of the EUT, in the frequency range 0.009 – 30 MHz

The results of the radiated emission tests in the frequency range 0.009 – 30 MHz, carried out in accordance with 47 CFR Part 15 section 15.209, 15.225 and RSS-210 and RSS-Gen are depicted in Table 3.

Notes:

1. Calculated measurement results are obtained by using the 40dB/decade factor (antenna factor and cable loss is included). i.e at 13.562 MHz: 70.5 dBµV + 19.6 dB + 1dB - 40dB= 51.1 dBµV/m.
2. A resolution bandwidth of 9 kHz was used during testing
3. Field strength values of radiated emissions at frequencies not listed in Table 3 are more than 20 dB below the applicable limit
4. The loop antenna was varied in horizontal and vertical orientations and also around it's axis. The reported value is the worst case found at the reported frequency.
5. The EUT was tested in horizontal and vertical orientations. Worst case values noted.
6. Measurement uncertainty is ±5.0dB

3.2.1 Test equipment used (for reference see test equipment listing).

| | | | | | | |
|-------|-------|-------|-------|--|--|--|
| 15453 | 99413 | 99699 | 99733 | | | |
|-------|-------|-------|-------|--|--|--|

Test engineer

Signature :



Name : O.H. Hoekstra

Date : April 4, 2012

4 Conducted emission data.

4.1 Conducted emission data of the EUT.

Not applicable, EUT is battery powered only.

Test engineer

Signature

: 

Name : O.H. Hoekstra

Date : April 4, 2012

5 Carrier stability under special conditions.

5.1 Frequency stability (on 13.56 MHz) in accordance with 47 CFR Part 15, section 15.225 (e) & RSS-Gen section 4.7 and 7.2.4 and RSS-210 section A2.6:

- 1) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 °C to +50 °C at normal supply voltage (see Table 4).

| Stability under special conditions | Supply Voltage | Measured frequency (MHz) | Frequency deviation (limit $\pm 0.01\%$) (%) | PASS/FAIL |
|------------------------------------|----------------|--------------------------|---|-----------|
| Temperature (°C) | (Vdc) | | | |
| 21.0 | 3.0 | 13.560516 (reference) | N.A. | N.A. |
| -20.0 | 3.0 | 13.560617 | < 0.01 | PASS |
| 50.0 | 3.0 | 13.560456 | < 0.01 | PASS |

Table 4 The frequency tolerance of the carrier signal

5.1.1 At 85% and 115% of rated voltage supply level

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency at 85% and at 115% of the rated power supply voltage (+3.0 Vdc) at 20 °C environmental temperature. The results are stated in Table 5.

| Stability under special conditions | Measured frequency (MHz) | Frequency deviation (limit $\pm 0.01\%$) (%) | PASS/FAIL |
|------------------------------------|--------------------------|---|-----------|
| % variation U | | | |
| 100.0 (3.0 Vdc) | 13.560516 (reference) | N.A. | N.A. |
| 85.0 (2.55 Vdc) | 13.560516 | < 0.01 | PASS |
| 115.0 (3.45 Vdc) | 13.560517 | < 0.01 | PASS |

Table 5 The frequency tolerance of the carrier signal

5.2 Bandwidth of the emission on 13.56 MHz in accordance with RSS-Gen section 4.7 and 7.2.4 and RSS-210 section A2.6.

Limit: 20 dB of the bandwidth of the emission shall be within the specified frequency band.
Bandwidth of the emission is determined at 99% Occupied Bandwidth.
Specified frequency band: 13553 kHz - 13567 kHz.

| Temperature (°C) | Minimum frequency (kHz) | Maximum frequency (kHz) |
|------------------|-------------------------|-------------------------|
| +20.0 | 13559.190 | 13561.794 |
| -20.0 | 13559.291 | 13561.895 |
| +50.0 | 13559.130 | 13561.734 |
| Bandwidth | 13559.130 | 13561.895 |

Table 6 Bandwidth of the emission

The measured minimum frequency of 13.559130 MHz and maximum frequency of 13.561895 MHz are well within the specified frequency bandwidth.

5.2.1 Test equipment used (for reference see test equipment listing).

| | | | | | | |
|-------|-------|-------|-------|--|--|--|
| 12640 | 99318 | 99413 | 99733 | | | |
|-------|-------|-------|-------|--|--|--|

Test engineer

Signature :

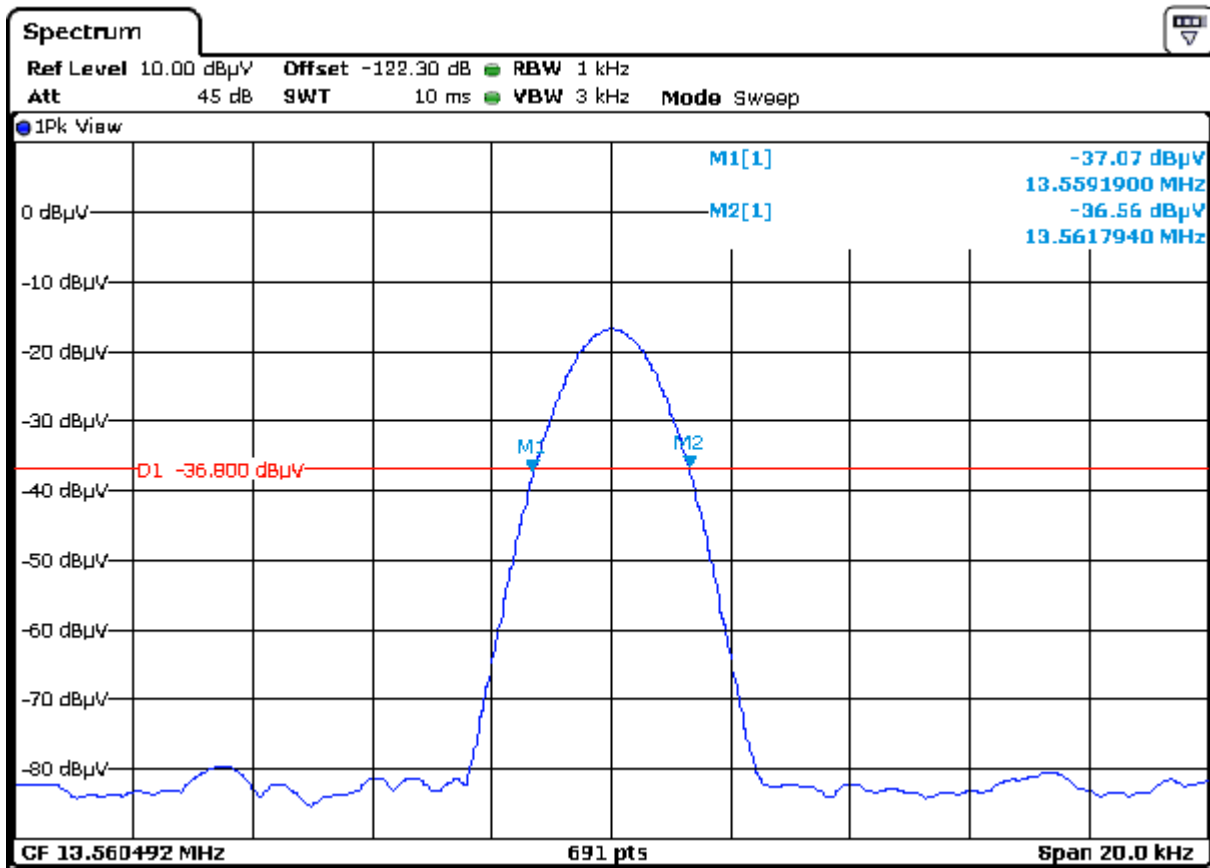


Name : O.H. Hoekstra

Date : April 4, 2012

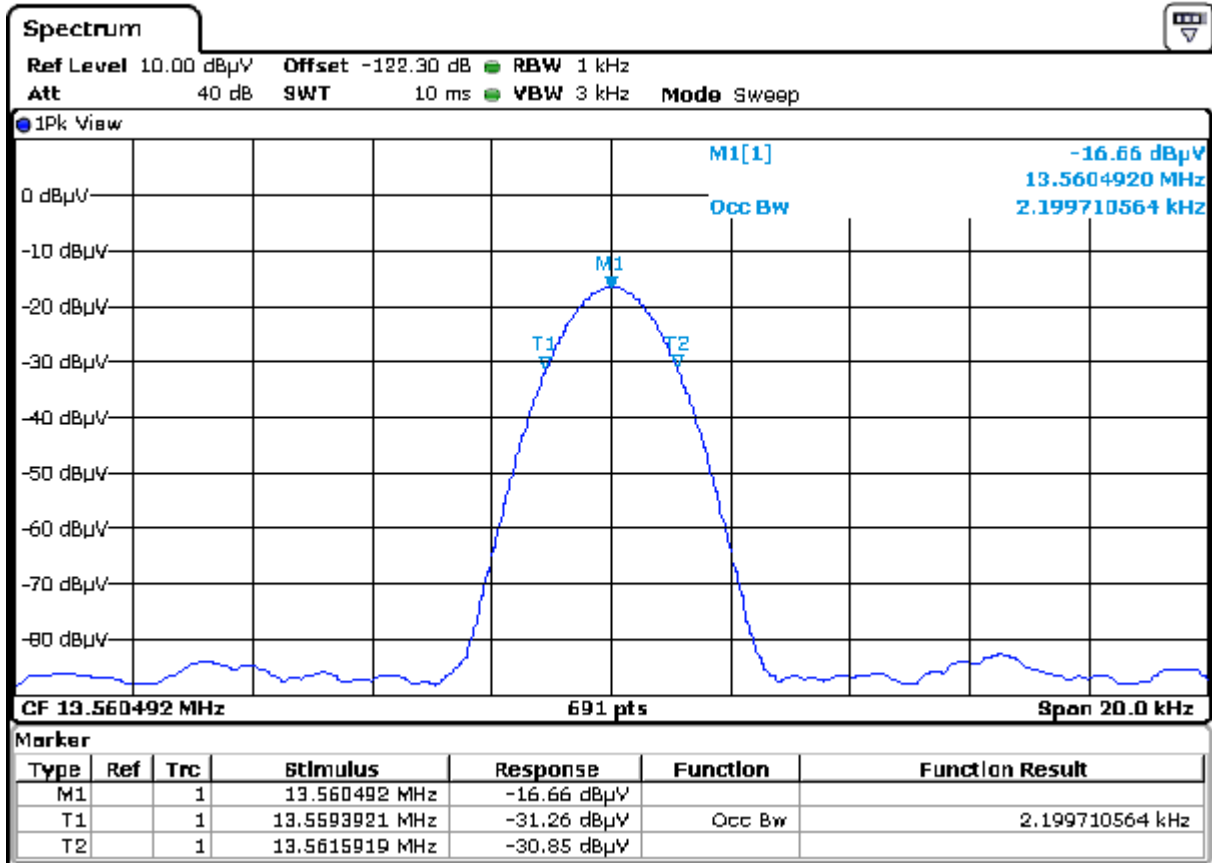
6 Plots of measurement data

6.1 Bandwidth of the emission



Plot1

Emission Bandwidth (-20 dB down points) of the emission at 13.56 MHz (Fundamental Carrier),
 Occupied bandwidth is 2.604 kHz as measured on a psectrum analyzer.



Plot2

Occupied Bandwidth (99% points) is 2.1997 kHz of the emission at 13.56 MHz (Fundamental Carrier)
As determined with the Spectrum analyzer function.

7 List of utilized test equipment.

| Inventory number | Description | Brand | Model | Last cal. | Next cal. |
|------------------|---------------------------|-----------------|-------------------|-----------|-----------|
| 12640 | Temperature chamber | Heraeus | VEM03/500 | NA | NA |
| 15453 | Active loop antenna 60 cm | Chase | HLA6120 | 04-2011 | 04-2012 |
| 15633 | Biconilog Test antenna | Chase | CBL 6111B | 01-2012 | 01-2013 |
| 99318 | Digital multimeter | HP | 34401A | 10-2011 | 10-2012 |
| 99413 | Temperature-Hygrometer | Tempcontrol | P570 | 01-2012 | 01-2013 |
| 99538 | Spectrum Analyzer | R&S | FSP40 | 11-2011 | 11-2012 |
| 99580 | Semi Anechoic Room | Siepel | FCC listed: 90828 | 12-2011 | 12-2014 |
| 99609 | Antenna mast | EMCS | AP-4702C | NA | NA |
| 99613 | Temperature-Humiditymeter | Europe supplies | WS-7082 | 10-2011 | 10-2012 |
| 99623 | Power Supply | EA | PS 2016-050 | 12-2011 | 12-2012 |
| 99699 | Measuring receiver | R&S | ESCI | 02-2012 | 02-2013 |
| 99733 | Spectrum Analyzer | R&S | FSV30 | 06-2011 | 06-2012 |

NA= Not Applicable