TEST REPORT CONCERNING THE COMPLIANCE OF AN ARTICLE SURVEILLANCE (EAS) SYSTEM, BRAND Nedap, MODEL ASSY FLR RF+MD+RFID

WITH THE STANDARDS:

47 CFR PART 15 (10-1-13 EDITION) and THE REQUIREMENTS OF INDUSTRY CANADA: RSS-GEN (ISSUE 3, DECEMBER 2010) AND RSS-210 (ISSUE 8, DECEMBER 2010).

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MEASUREMENT/TECHNICAL REPORT

N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand: Nedap
Model: ASSY FLR RF+MD+RFID

FCC ID: CGDFLRRFMDRFID
IC: 1444A-FLRRFMDRFID

This report concerns: Original grant/certification ~~Class 2 change~~ ~~Verification~~ Equipment type: Anti-Pilferage Device, operating on 7565.00-8571.25 kHz and 125.1 kHz		
Report prepared by:	Name	: Richard van der Meer
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (10-1-13 edition), RSS-GEN, RSS-210 and the measurement procedures of ANSI C63.4-2009. TÜV Rheinland Nederland 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: October 01, 2014

Signature: 

O. Hoekstra
Senior Engineer Telecom TÜV Rheinland Nederland 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	:	Article Surveillance System (EAS) with Metal Detection (MD) and RFID
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand	:	Nedap
Model	:	ASSY FLR RF+MD+RFID
Serial number(s)	:	E701 A001 (Antenna 1) and E702 A001 (Antenna 2)
Revision	:	n.a.

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	:	+31 544 463 475
E-mail		Jacques.Hulshof@Nedap.com

Test(s) performed

Location	:	Leek
Test(s) started	:	July 16, 2014
Test(s) completed	:	August 20, 2014
Purpose of test(s)	:	Original grant/certification FCC and IC
Test specification(s)	:	47 CFR Part 15 (10-1-13 Edition) and RSS-GEN (ISSUE 3, DECEMBER 2010) AND RSS-210 (ISSUE 8, DECEMBER 2010).
Test engineer(s)	:	R. van der Meer
Report written by	:	R. van der Meer
Report date	:	October 01, 2014

Table of contents

1 General information.

1.1 Product description.

1.1.1 Introduction.

The system is an EAS (Electronic Article Surveillance) system for detection of 8.2MHz EAS labels used for in-store retail applications.

The system operates in the frequency range: 7565.00 kHz up to 8571.25 kHz including Metal Detection (MD) at 125.1 kHz and it is also provided with a RFID Reader operating in the range 902.75-927.25 MHz (supported in a separate report).

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 FCC ID: CGDFLRRFMDRFID and IC:1444A-FLRRFMDRFID.

1.3 Tested system details.

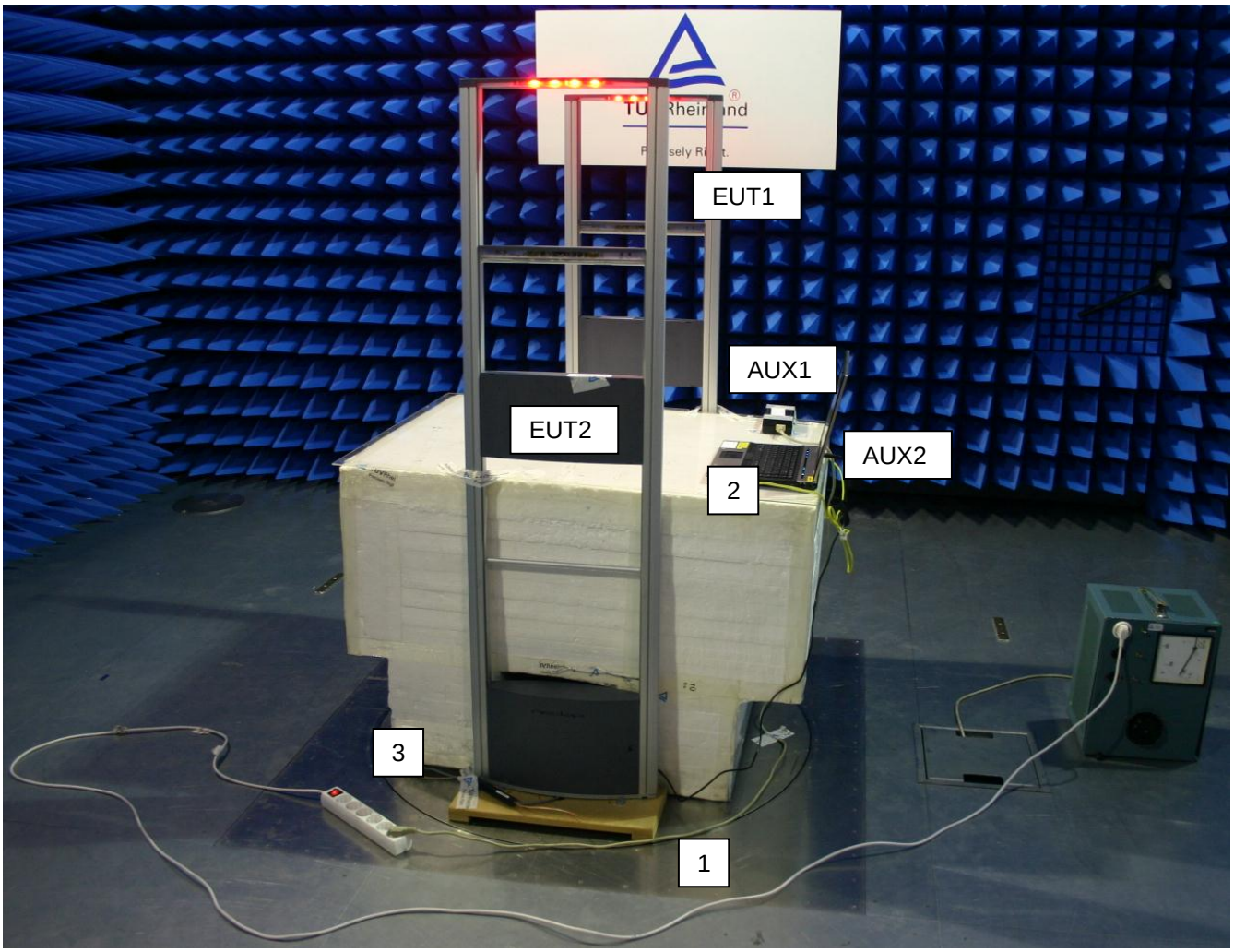
Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT1	:	Transmitter (Antenna 1)
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand	:	Nedap
Model (Type)	:	ASSY FLR RF+MD+RFID
Serial number	:	E701 A001
Voltage input rating	:	56Vdc
Voltage output rating	:	n.a.
Current input rating	:	n.a.
Remarks	:	--

EUT2	:	Receiver (Antenna 2)
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand	:	Nedap
Model (Type)	:	ASSY FLR RF+MD+RFID
Serial number	:	E702 A001
Voltage input rating	:	56Vdc
Voltage output rating	:	n.a.
Current input rating	:	n.a.
Remarks	:	--

Test item (AUX1)	:	Power Inserter
Manufacturer	:	Power-Win Technology Corp.
Brand	:	Power-Win Technology Corp.
Model	:	PW-085C-1Y560HPOE
Serial number	:	73766261
Voltage input rating	:	100-240Vac 50-60 Hz
Voltage output rating	:	56Vdc
Remark	:	--

AUX2	:	Laptop PC including power supply adapter
Manufacturer	:	HP
Brand	:	HP
Model	:	Elite 8530p
Serial number	:	2CE943F14R
Voltage input rating	:	--
Voltage output rating	:	--
Current input rating	:	--
Remarks	:	Required to program the EUT, property applicant



Photograph of the EUT in the testsetup (schematic overview is given on the next page).

1.3.1 Description of input and output ports.

Number	Terminal	From	To	Remarks	
1	Mains	Mains	AUX1 and AUX2	--	
2	LAN	AUX1 Out	EUT1 In	Shielded cable	
3	Antenna coax cable	EUT1 transmitter	EUT2 receiver	Shielded cable	
4	Power over Ethernet	AUX2	AUX1 In	Shielded cable	
5	LAN	EUT1 Out	EUT2 In	Shielded cable	

Operation mode 1: System "Passive", not detecting a label and metal.
Operation mode 2: System "Active", detecting a label and metal

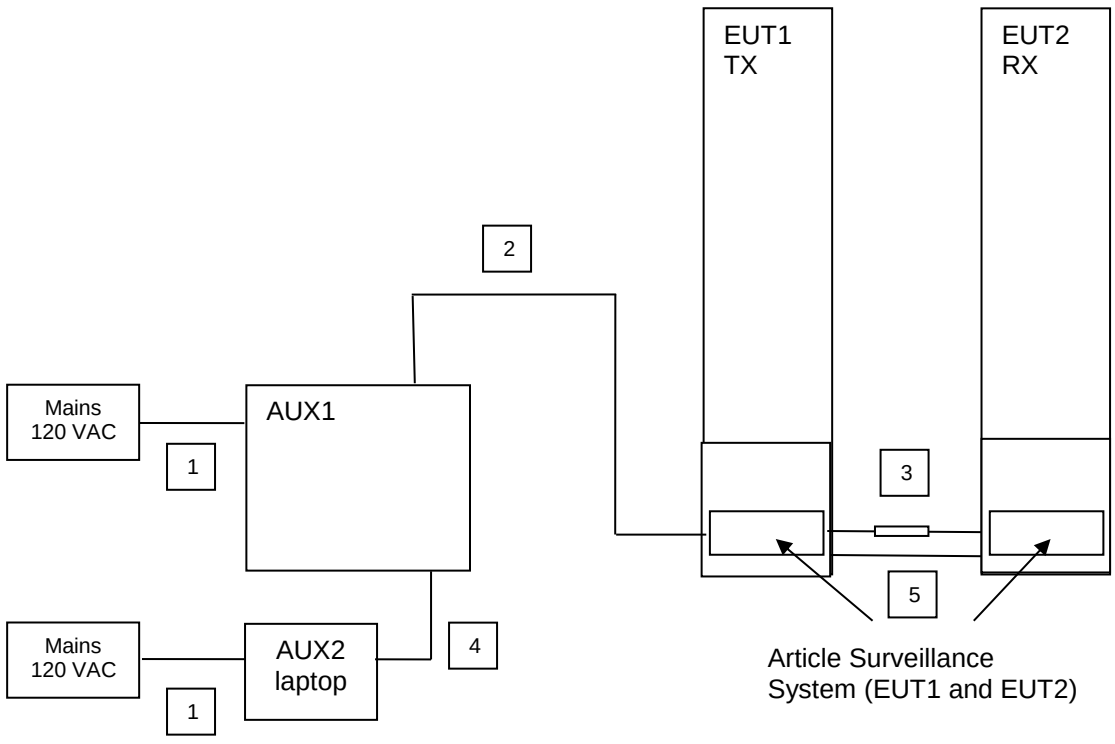


Figure 1: Basic testsetup and connections

1.4 Test results summary

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

Test Standard		Description		Pass / Fail
47 CFR Part 15 (10-1-13 Edition)	**RSS-210 Issue 8, December 2010**		**Page**	
15.207(a)	RSS-Gen(7.2.4)	AC power-line conducted emissions	19 - 22	Pass
15.209	RSS-Gen(4.9 and 7.2.5) and RSS-210(2.5)	Radiated emissions	12 – 18	Pass
15.205 and 15.223	RSS-Gen(7.2.2)	Radiated emissions in restricted bands	17	Pass
15.215(c) and 15.223(a)	RSS-Gen(4.6.1) and RSS-Gen (4.6.2) RSS-210(A2.3)	Occupied bandwidth and Bandwidth of the emission	23 - 25	Pass

Table : testspecifications

Testmethods: ANSI C63.4-2009 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 (10-1-13 Edition), sections 15.31, 15.205,15.207, 15.209 and 15.223, RSS-GEN (ISSUE 3, DECEMBER 2010) 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 measurement receiver is switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the measurement 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 Nederland 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.

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-2. 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	: 120VAC/60Hz to the AC/DC Power Supply
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.

1.8 Measurement Uncertainty

Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes.

The expanded uncertainty (k = 2) for radiated emissions below 1000 MHz has been determined to be: ±5.0 dB at 3m.
The expanded uncertainty (k = 2) for radiated emissions above 1000 MHz has been determined to be: ±5.0 dB at 3m.
The expanded uncertainty (k = 2) for mains conducted emissions from 150 kHz to 30 MHz has been determined to be: ±3.5 dB.

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

Besides the normal hopping mode, the system was also tested on the carriers at
7565.00 kHz (low), 8177.50 kHz (mid) and 8571.25 kHz (high).

The EUTs 24 frequencies of operation are provided in section 3.
The Metal Detection (MD) system operates on an unmodulated single carrier of 125.1 kHz.

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 in order to achieve compliance.

2.5 Product Labelling

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 No operation in restricted bands

The frequencies used are:

Nr.	Frequency (kHz)	Nr.	Frequency (kHz)	Nr.	Frequency (kHz)
1	7565.00	9	7915.00	17	8265.00
2	7608.75	10	7958.75	18	8308.75
3	7652.50	11	8002.50	19	8352.50
4	7696.25	12	8046.25	20	8396.25
5	7740.00	13	8090.00	21	8440.00
6	7783.75	14	8133.75	22	8483.75
7	7827.50	15	8177.50	23	8527.50
8	7871.25	16	8221.25	24	8571.25

So the fundamental emission are outside of the bands listed in Section 15.205 (a).

4 Radiated emission data.

RESULT: PASS

Date of testing: 2014-07-16

Frequency range: 30MHz - 1GHz

Requirements:

FCC 15.205, FCC 15.209, FCC 15.223 and IC RSS-Gen(4.9, 7.2.2 and 7.2.5) and RSS-210(2.3)

Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a), must comply with the radiated emission limits specified in FCC 15.209(a). FCC 15.223 and RSS-210 (A2.5).

Radiated emissions which fall outside the operation frequency band and outside restricted bands shall either meet the limit specified in FCC 15.209(a)/ RSS-Gen (7.2.5) or be attenuated at least 20dB below the power level in the 100kHz bandwidth within the band that contains the highest level of the desired power (the less severe limit applies).

Frequency (MHz)	Field strength (microvolts/meter)	Field strength (dBmicrovolts/meter)	Measurement distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Table of applicable limits

Test procedure:

ANSI C63.4-2009, RSS-Gen.

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile. The physical arrangement of the test system, the associated cabling and the EUT orientation (X, Y, Z) were varied in order to ensure that maximum emission amplitudes were attained.

The spectrum was examined from 30MHz to 1 GHz. Final radiated emission measurements were made at 3m distance.

At each frequency where a spurious emission was found, the EUT was rotated 360° and the antenna was raised and lowered from 1 to 4m in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations.

The highest emission amplitudes relative to the appropriate limit were recorded in this report. Field strength values of radiated emissions at frequencies not listed in the tables are more than 20 dB below the applicable limit.

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

Freq. [MHz]	Antenna Orientation	Level QP [dBµV/m]	Limit [dBµV/m]	Result Pass/Fail
42.029	Vertical	34.4	40.0	Pass
55.149	Vertical	25.5	40.0	Pass
250.309^{R}	Horizontal	27.5	46.0	Pass
404.469^{R}	Vertical	31.2	46.0	Pass
770.189	Vertical	39.3	46.0	Pass
825.949	Vertical	41.0	46.0	Pass

Table 1a Radiated emissions of the EUT, normal mode.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.209 and RSS-210 are depicted in Table 1a. The system is tested as in whole, being the worst case situation. So with all equipment as shown in Figure1 in place and functioning.

Notes:

1. The six worst case values relative to the applicable limit were noted.
2. Measurement uncertainty is ±5.0dB
3. The receiving antenna was varied in horizontal and vertical orientations and also in height (between 1m and 4m).
4. A Quasi-peak detector was used with a resolution bandwidth of 120 kHz.
5. The EUT was tested in both passive mode (i.e. without a tag in its proximity) and in activated mode (i.e. with a tag in its proximity). Maximum values (which proved to be passive mode) have been noted.
6. All 3 transmitters (RF, mD and RFID) were transmitting at the same time.
7. Tested with Low, Mid, High frequency and Hopping mode, worst case values are noted.
8. R = restricted band.

Used test equipment and ancillaries:

99608	99699	99847/99580	99861	99858				

Test engineer

Signature :

Name : Richard van der Meer
Date : July 16, 2014

4.2 Radiated field strength measurements (30 MHz – 1 GHz, E-field), Part 15B / ICES-003 verification

Freq. [MHz]	Antenna Orientation	Level QP [dBµV/m]	Limit [dBµV/m]	Result Pass/Fail
43.12	Horizontal	31.2	40.0	Pass
105.44	Horizontal	28.2	43.5	Pass
239.92	Horizontal	29.4	46.0	Pass
261.24	Vertical	29.4	46.0	Pass
298.96	Horizontal	28.5	46.0	Pass
636.80	Vertical	36.7	46.0	Pass

Table 2b Radiated emissions of the EUT, normal mode.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.109(a) and ICE-003 section 6.2 are depicted in Table 1b. The system is tested as in whole, being the worst case situation. So with all equipment as shown in Figure1 in place and functioning.

Notes:

1. Measurement uncertainty is ±5.0dB
2. The reported field strength values are the six worst case values (relative to the applicable limit) at the indicated frequency.
3. The receiving antenna was varied in horizontal and vertical orientations and also in height (between 1m and 4m).
4. A Quasi-peak detector was used with a resolution bandwidth of 120 kHz.
5. The EUT was tested in both passive mode (i.e. without a tag in its proximity) and in activated mode (i.e. with a tag in its proximity). Maximum values (which proved to be passive mode) have been noted.
6. All 3 transmitters (RF, MD and RFID) were transmitting at the same time.

Used test equipment and ancillaries:

99608	99699	99847/99580	99861	99858				

Test engineer

Signature :

Name : Richard van der Meer
Date : August 04, 2014

4.3 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field), Peak and Average values.

RESULT: Pass.

Date of testing: 2014-07-18

Requirements:

The field strength of any emission within the band 1.705–10.0 MHz shall not exceed 100 microvolts/meter at a distance of 30 meters. However, if the bandwidth of the emission is less than 10% of the center frequency, the field strength shall not exceed 15 microvolts / meter or (the bandwidth of the device in kHz) divided by (the center frequency of the device in MHz) microvolts/meter at a distance of 30 meters, whichever is the higher level. For the purposes of this section, bandwidth is determined at the points 6 dB down from the modulated carrier. The emission limits in this paragraph are based on measurement instrumentation employing an average detector. The provisions in FCC part 15.35(b) for limiting peak emissions apply.

The measured 6 dB bandwidth is 1.253 MHz (see section 5) which is more than 0.82 MHz (10% of the 8.2 MHz of center frequency), hence the limit for the field strength is 100 microvolts/meter (40 dBµV/m) at a distance of 30 meters.

Radiated and FCC emissions tests were performed using the procedures of ANSI C63.4 including methods for signal maximizations and EUT configuration. The test setup photos report shows the EUT in its maximized configuration. Radiated emission testing was performed at a distance of 3 meters in a 5 meter semi-anechoic chamber. The measured values were corrected to the 30m distance using the extrapolation factor of 40dB/decade as per FCC Part 15.31(f)(2).

Average values are obtained from application of the calculated duty cycle correction factor (See section 6) to the fundamental field strength amplitude measured with a peak detector.

4.3.1 Testresults

Frequency (kHz)	Measurement results	Detector	Antenna factor	Cable loss	Extrapolation factor	Measurement results (calculated)	Limits
	dBµV/m @3m		dB	dB	dB	dBµV/m@30m	dBµV/m@30m
7565.00 (low)	55.4	Pk	19.5	1	40	35.9	60
8177.50 (mid)	47.0	Pk	19.5	1	40	27.5	60
8571.25 (high)	58.4	Pk	19.5	1	40	38.9	60

Note: Sweep stopped at lowest, middle and highest frequency

Table 2a Radiated emissions of the EUT, 8 MHz transmitter, sweep stopped, Peak values

Frequency (kHz)	Measurement results Peak	Detector	Correction factor	Measurement results (calculated Average)	Limits
	dBµV/m @30m		dB	dBµV/m@30m	dBµV/m@30m
7565.00 (low)	35.9	Pk	-2.98	32.9	40.0
8177.50 (mid)	27.5	Pk	-2.98	24.5	40.0
8571.25 (high)	38.9	Pk	-2.98	35.9	40.0

Table 2b Radiated emissions of the EUT 8 MHz transmitter, Average calculated values

Frequency (kHz)	Measurement results	Detector	Antenna factor	Cable loss	Extrapolation factor	Measurement results (calculated)	Limits
	dBµV/m @3m		dB	dB	dB	dBµV/m@30m (unless otherwise noted)	dBµV/m@30m (unless otherwise noted)
125.1	64.5	Pk	20.1	1	80	5.6 Pk @300m	25.67 Av @300m
250.2	11.0	Pk	20.1	1	80	-47.9 Pk @300m	19.65 Av @300m
375.3	9.9	Pk	20.1	1	80	-49.0 Pk @300m	16.12 Av @300m
500.4	7.5	Qp	20.0	1	40	-11.5	33.62

Table 2c Radiated emissions of the EUT, the 125.1 kHz transmitter, Peak and Quasi Peak values
Peak values are already within Average limits.

See page 18 for notes.

4.4 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field), Quasi Peak, Sweep stopped.

Emissions Outside the band - FCC Part 15.233(b)and RSS210 A2.3.

The field strength of emissions outside of the band 1.705–10.0 MHz shall not exceed the general radiated emission limits in § 15.209 and RSS-Gen section 7.2.5 table 5.

Test procedure: ANSI C63.4-2009.

EUT Frequency	Measured Frequency	Measurement results	Detector		Antenna factor	Cable loss	Extrapolation factor	Measurement results (calculated)	Limits	Pass/Fail
MHz	MHz	dBµV @3m			dB	dB	dB	dBµV/m@30m	dBµV/m@30m	
7.56500 (low)	7.107	26.7		Qp	19.5	1	40	7.2	29.5	Pass
7.56500 (low)	13.308	29.0		Qp	19.6	1	40	9.6	29.5	Pass
7.56500 (low)	15.164	29.0		Qp	19.7	1	40	9.7	29.5	Pass
7.56500 (low)	18.956	31.4		Qp	19.7	1	40	12.1	29.5	Pass
8.57125 (high)	12.864	31.0		Qp	19.6	1	40	11.6	29.5	Pass
8.57125 (high)	18.728	27.0		Qp	19.7	1	40	7.7	29.5	Pass

Table 2d Radiated emissions of the EUT, outside of the band 1.705–10.0 MHz.

Restricted band operation:
The EUT is a Carrier hopped system and its hopping frequencies are provided in section 3.
These hopping frequencies are outside of the restricted band frequencies.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.223 and 15.35 and RSS-Gen(4.9 and 7.2.5) and RSS-210(2.5) with the EUT operating in continuous transmit mode, are depicted in Table 2a, 2b, 2c and 2d.

Notes:

1. Calculated measurement results are obtained by using the 40dB/decade extrapolation factor, antenna factor and cable loss. i.e at 8571.25 kHz: 58.4 dBµV + 19.5dB + 1dB - 40dB= 38.9 dBµV/m.
2. A resolution bandwidth of 9kHz was used during testing
3. The six highest values-relative to the applicable limits- were noted.
4. The loop 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.
5. The EUT was tested in passive mode (i.e. without a tag in its proximity) which proved from pre-test to generate the highest emission levels. Maximum values have been noted.
6. Tested with Low, Mid, High frequency and Hopping mode, worst case values noted.
7. Tested with all 3 transmitters (RF,MD and RFID) transmitting at the same time.
8. Restricted bands especially between 7 MHz and 9 MHz were investigated and were found to be below the levels as reported in Tables 2a, 2b, 2c and 2d.
9. Measurement uncertainty is ±5.0dB.
10. Correction factor is the Duty Cycle of the EUT, see section 7.

Used test equipment and ancillaries:

15453	99699	99861	99847/99580	99855	99857	99858		

Test engineer

Signature :
Name : R. van der Meer
Date : July 18, 2014.

5 AC Power-line Conducted Emission Data.

RESULT: Pass.

Date of testing: 2014-08-19

Requirements: Except when the requirements applicable to a given device state otherwise, for any license-exempt radio communication 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 the following table. The tighter limit applies at the frequency range boundaries.

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

*Decreases with the logarithm of the frequency.

Test procedure:

ANSI C63.4-2009.

Each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a 50 µH / 50 Ω LISN. The frequency range from 150kHz to 30MHz was searched.
The six highest EUT emissions relative to the limit were noted for three supply voltages.
In the case of tabletop equipment, the EUT is placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane and 40cm from a vertical ground reference plane. The rear of the EUT was positioned flush with the backside of the table and directly over the LISNs. The power and I/O cables were routed over the edge of the table and bundled approximately 40cm from the ground plane.

5.1 AC Power-line conducted emission data of the EUT.

Frequency (MHz)	Measure-ment results L1 (dBµV) Qp	Measure-ment results L1 (dBµV) Av	Measure-ment results Neutral (dBµV) Qp	Measure-ment results Neutral (dBµV) Av	Limits (dBµV) Qp	Limits (dBµV) Av	Pass/ Fail
0.15781	52.2	38.0	50.5	34.6	65.5	55.5	Pass
0.18125	46.3	27.2	47.4	36.3	64.5	54.5	Pass
0.30234	38.2	20.2	36.4	22.2	60.2	50.2	Pass
0.67734	30.3	13.2	30.2	20.0	56.0	46.0	Pass
8.38828	52.1	40.4	50.0	40.0	60.0	50.0	Pass
8.40781	50.0	40.0	51.6	41.1	60.0	50.0	Pass

Table 4 Conducted emission measurements.

The results of the conducted emission tests in the range of 150 kHz up to 30 MHz, carried out in accordance with 47 CFR Part 15 section 15.207 and RSS-Gen(7.2.4), at the 120 Volts AC mains connection terminals of AUX1 which was connected to the EUT, are depicted in Table 4. Maximum values recorded. The system is tested as in whole, so with all equipment as shown in Figure1 in place and functioning. Being the worst case situation.

Notes:

1. Measurement uncertainty is ±3.5dB
2. The resolution bandwidth used was 9 kHz.
3. The six highest values-relative to the applicable limits- were noted.
4. The EUT was tested successively in both normal mode (i.e. without a tag in its proximity) and in activated mode (i.e. with a tag in its proximity), continuously transmitting.
5. All 3 transmitters (RF, MD and RFID) were transmitting at the same time.
6. For FCC part 15B section 15.107(a) and ICES-003 Section 6.1 verification these values are also applicable, no change in emissions.

Used test equipment and ancillaries:

12512	13313	99161	15667	99852	99855	

Test engineer

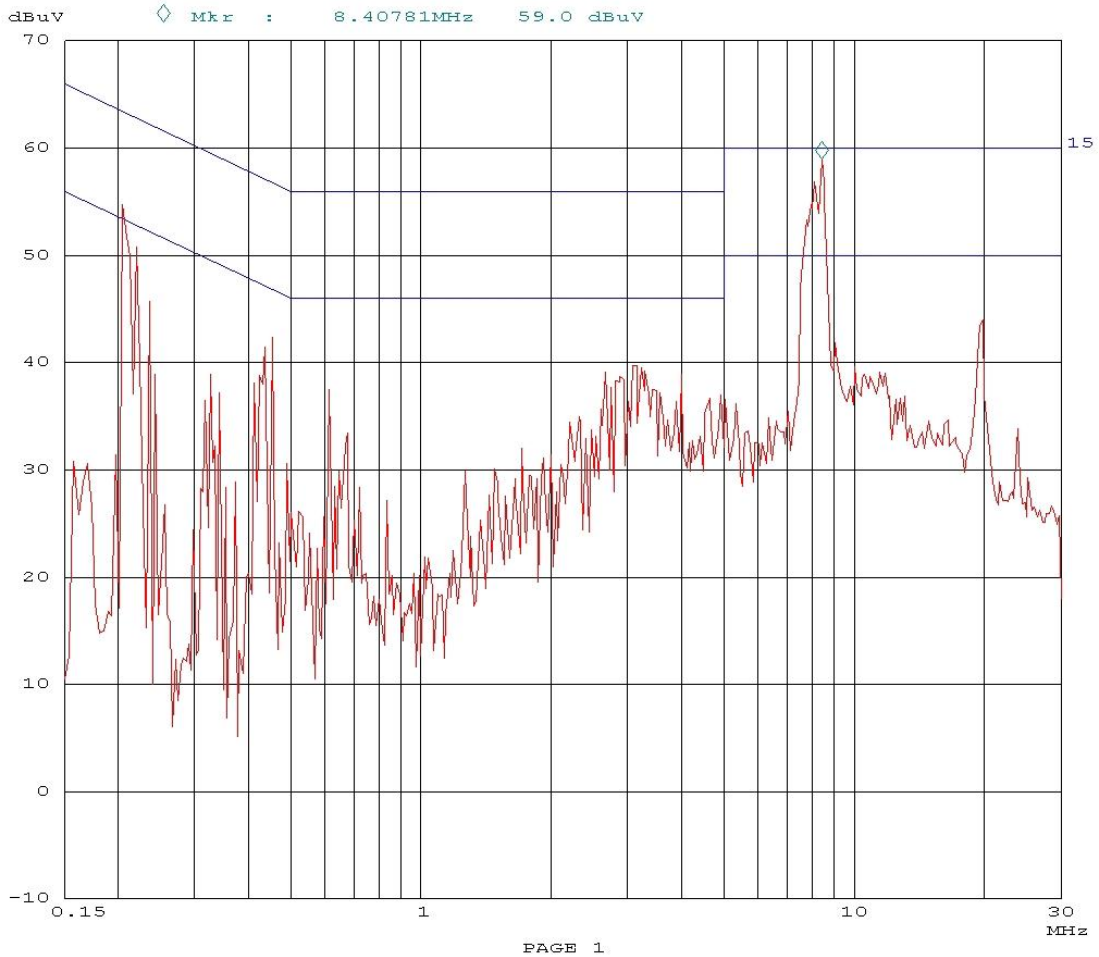
Signature : 

Name : R. van der Meer
Date : August 18, 2014

25. Aug 14 12:09

Overview Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	30M	3.9k	9k	AV	0.05ms	0dBLN	OFF

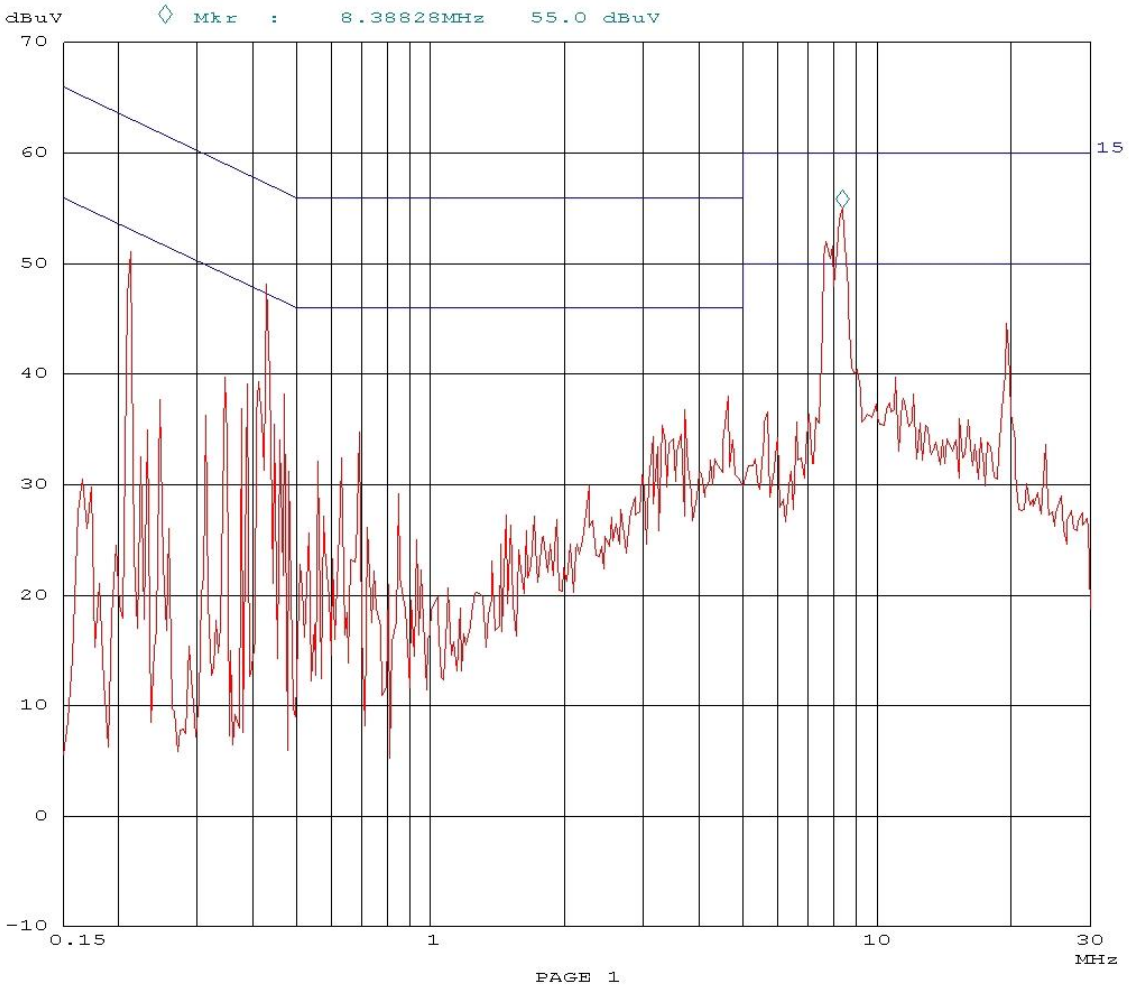


Plot of the Conducted power line emissions of the EUT on L1

25. Aug 14 12:15

Overview Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	30M	3.9k	9k	AV	0.05ms	0dBLN	OFF



Plot of the Conducted power line emissions of the EUT on L2

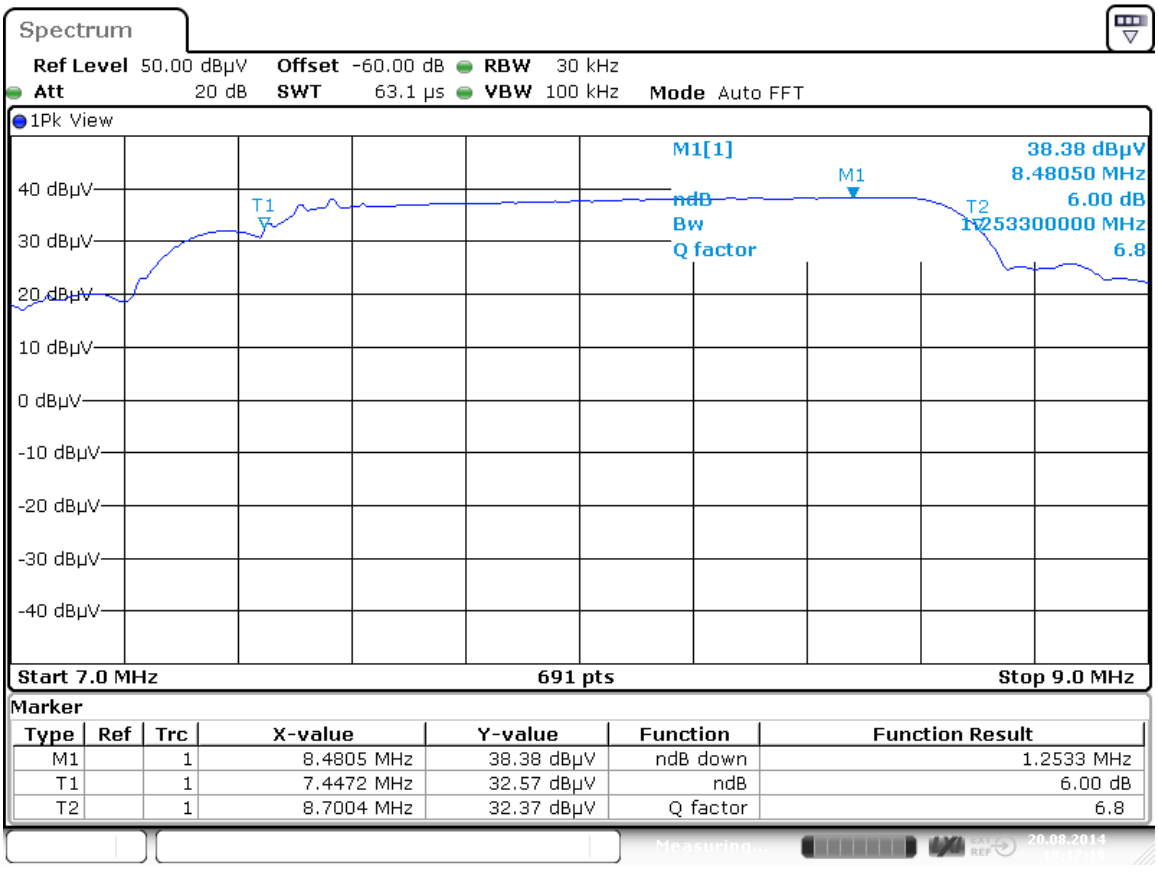
6 Bandwidth of the emission

RESULT: PASS

Date of testing: 2014-08-20

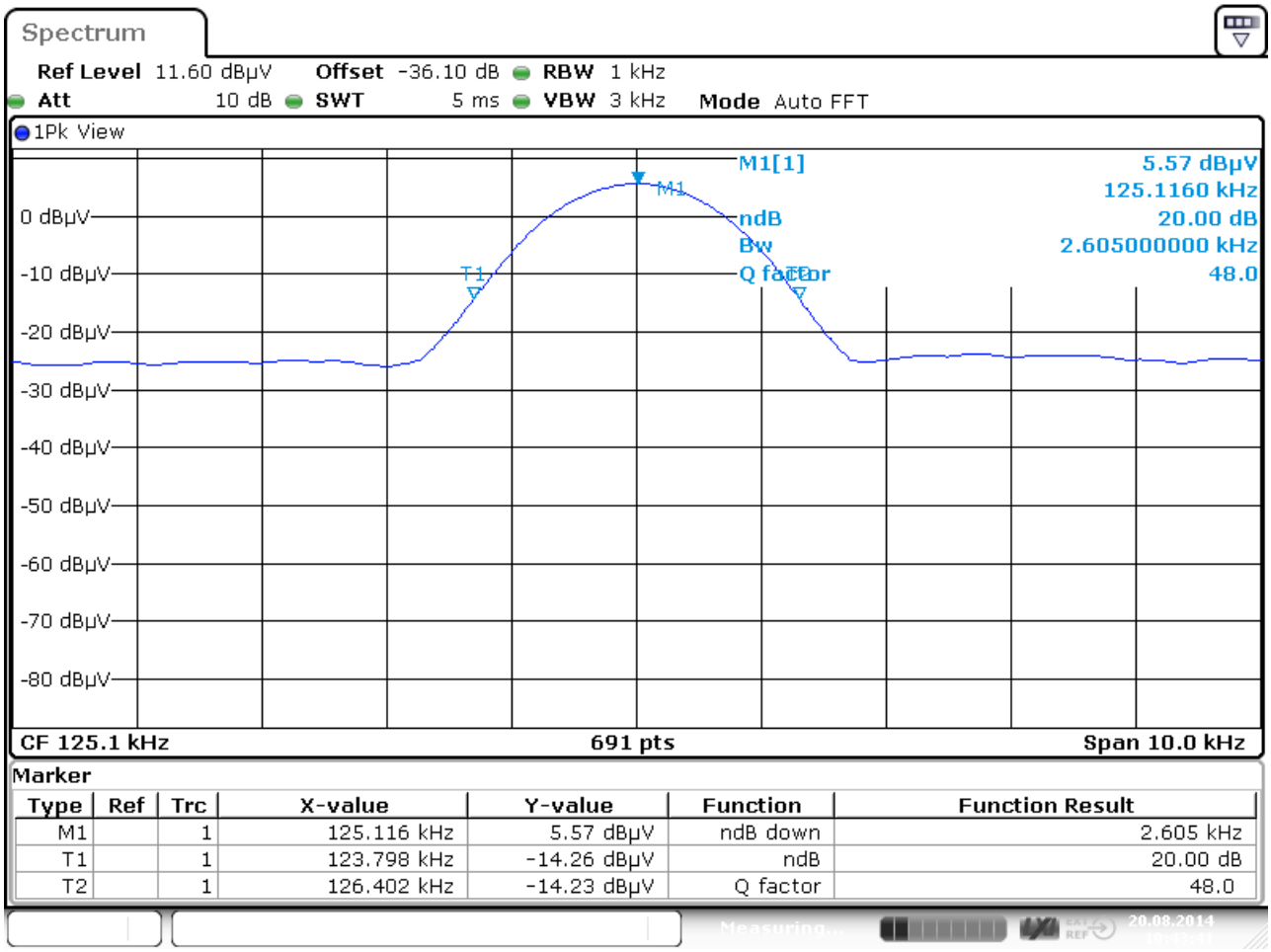
Requirements:

The plot below shows compliance with the 47 CFR Part 15 section 15.223(a), this section requires the 6 dB emission bandwidth is more than 10% of the center frequency in order to allow a field strength of emissions of maximum 40 dBµV/m (equal to 100 µV/m). The center frequency of the EUT is stated at 8.2 MHz, therefor the 6dB bandwidth most be larger than 820 kHz. Plot 1 below, shows a 6dB bandwidth of: 1253 kHz as measured on a spectrum analyzer.



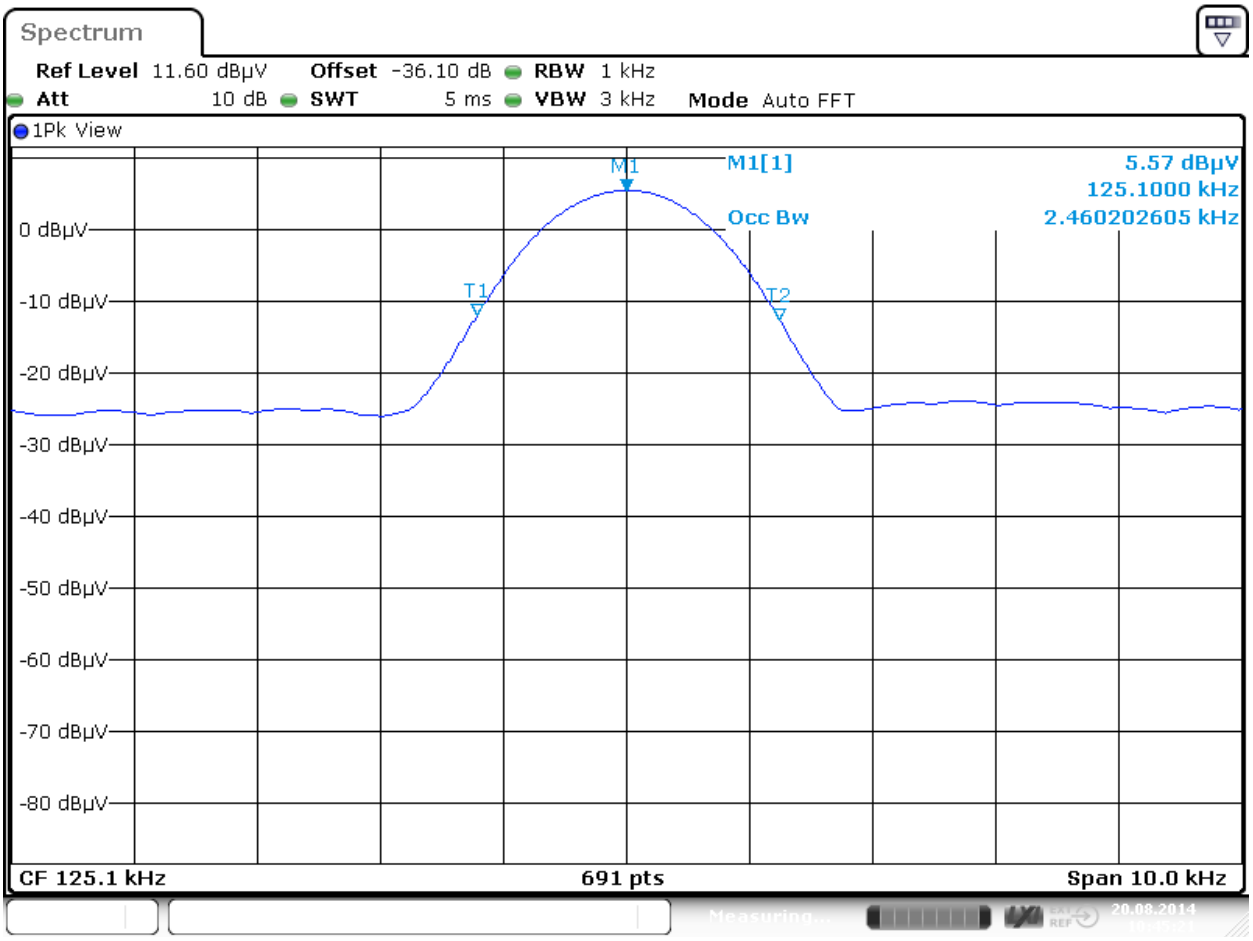
Date: 20.AUG.2014 10:17:19

Plot 1: 6 dB bandwidth is 1253 kHz



Date: 20.AUG.2014 10:43:42

Plot 2a: 20 dB bandwidth of the 125.1 kHz signal is 2.605 kHz as measured on a spectrum analyzer



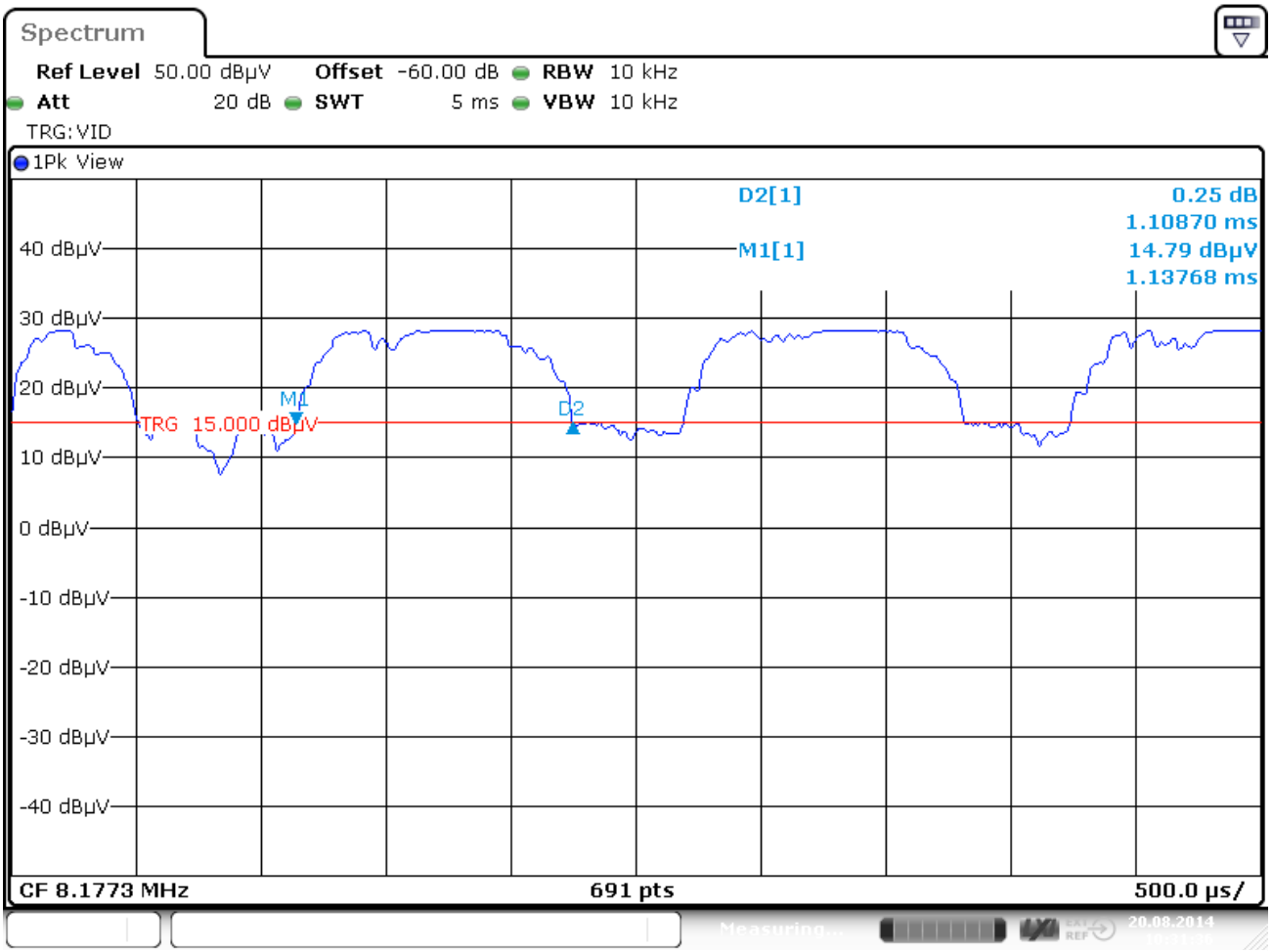
Date: 20.AUG.2014 10:45:21

Plot 2b: 99% bandwidth of the 125.1 kHz is 2.46 kHz as measured on a spectrum analyzer

7 Duty Cycle correction

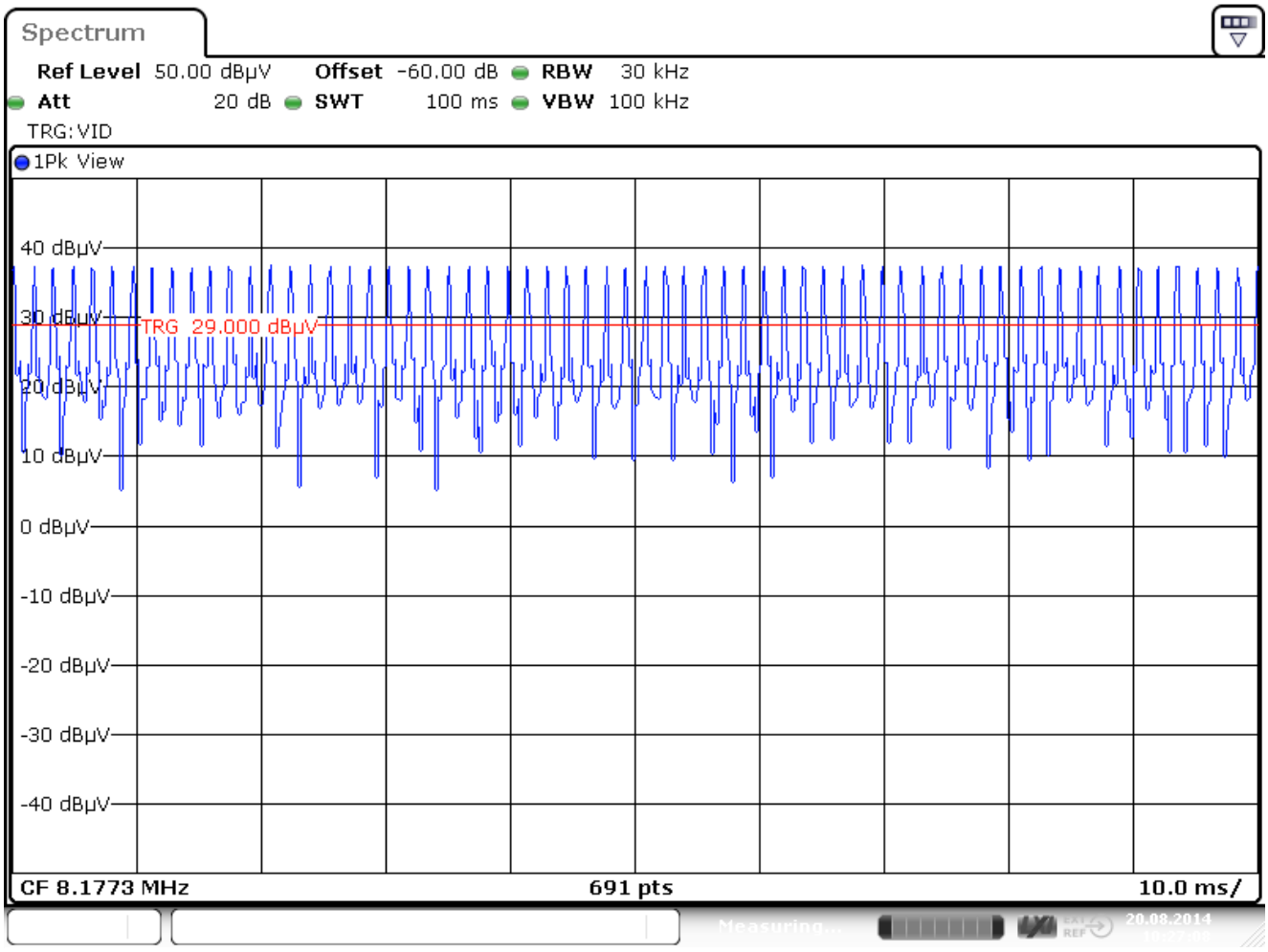
Notes: 64 peaks were observed in a 100 ms interval. Each peak was measured to have a duration of 1.1087 ms. This yields a total on-time of 70.96 ms in a 100 ms interval. Using the formula Average factor (dB) = 20*LOG(70.96ms /100ms), the duty cycle average factor is therefore -2.98 dB.

Plot 3a and 3b below show the RF On/Off characteristics of the EUT's emissions. From these characteristics a correction factor is calculated that is required to derive Average values from the measured peak values of the emissions.



Date: 20.AUG.2014 10:31:36

Plot 3a RF On Time



Date: 20.AUG.2014 10:27:08

Plot 3b Number of pulses (64) in 100 ms.

8 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12512	LISN	EMCO	3625/2	01/2014	01/2015
13313	Pulse Limiter	R&S	ESH3-Z2	01/2014	01/2015
15453	Active loopant. 60 cm	Chase	HLA6120	05/2014	05/2015
15667	Measuring receiver	R&S	ESCS30	09/2013	09/2014
99877	Biconilog Testantenna	Teseq	CBL 6111D	06/2014	06/2015
99755	Variac 250V 6A	Tektronix	-	NA	NA
99161	Variac 120Vac	RFT	LTS001	NA	NA
99861	Turntable controller	Maturo	SCU/088/8090811	NA	NA
99852/ 99857/ 99858	Temperature-Humiditymeter	EXtech	SD500	02/2014	02/2015
99580/ 99847	Test facility	Comtest	FCC listed: 90828 IC listed: 2932G-2	07-01/2014	07-01/2017
99608	Controller	EMCS	DOC202	NA	NA
99609	Antenna mast	EMCS	AP-4702C	NA	NA
99651	Variac	NA	--	NA	NA
99683	Loop antenna, 6cm	--	7405-901	09/2013	09/2014
99858	RF Cable S-AR	Gigalink	APG0500	01/2014	01/2015

NA= Not Applicable