TEST REPORT CONCERNING THE COMPLIANCE OF A INDUCTIVE PROXIMITY CARD READER ADD-ON MODULE, OPERATING IN THE RANGE 115 – 148 kHz BRAND INID, MODEL 40XX. WITH 47 CFR PART 15 (10-1-09)

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March 28, 2012

FCC listed : 90828
Industry Canada : 2932G-1
VCCI Registered : R-1518, C-1598
R&TTE, LVD, EMC Notified Body : 1856

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MEASUREMENT/TECHNICAL REPORT

INID BV
Model : 40XX

FCC ID: YAB-NGRPAOLF

This report concerns:	Limited Single Modular Approval ~~Class 2 change Verification~~
Equipment type:	Inductive Proximity Card Reader add-on module, operating in the range 115 - 148 kHz.

Report prepared by:		
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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), 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: March 28, 2012 Signature:

O. Hoekstra
Senior 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	:	Inductive Proximity Card Reader add-on module, operating in the range 115 - 148 kHz
Manufacturer	:	INID BV
Brand	:	INID
Model(s)	:	40XX
Serial number(s)	:	--
Revision	:	n.a.
FCC ID	:	YAB-NGRPAOLF
Receipt date	:	March 12, 2012

Applicant information

Applicant's representative	:	Mr. Mark de Olde
Company	:	INID BV
Address	:	Mariëttahof 27
Postal code	:	2033WS
City	:	Haarlem
Country	:	The Netherlands
Telephone number	:	+31(0)23 53 35 420
Telefax number	:	+31(0)23 53 53 096
e-mail address		Mark@inid-readers.com

Test(s) performed

Location	:	Leek
Test(s) started	:	March 12, 2012
Test(s) completed	:	March 23, 2012
Purpose of test(s)	:	Equipment Authorization (Original grant/certification)
Test specification(s)	:	47 CFR Part 15 (10-1-09 Edition)
Test engineer(s)	:	R. van der Meer
Report written by	:	R. van der Meer
Report date	:	March 28, 2012

Table of contents

1 General information.

1.1 Product description.

1.1.1 Introduction.

The EUT is an inductive proximity card reader intended to be used in access control systems, parking systems and other applications using RFID readers. The content of this report and measurement results have not been changed other than the way of presenting the data

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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: YAB-NGRPAOLF.

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 add-on module, operating in the range 115 - 148 kHz
Manufacturer	:	INID BV
Brand	:	INID
Model	:	40XX
Serial number	:	--
Voltage input rating	:	7 - 24 Vdc
Voltage output rating	:	--
Current input rating	:	not provided
Antenna	:	Cupperwire loop antenna soldered on PCB
Remarks	:	--

AUX1	:	MultiSmart multi technology inductive proximity card reader operating on 13.56 MHz
Manufacturer	:	INID BV
Brand	:	INID
Model	:	50XX range (model 50XX with add-on module model 4000)
Model name	:	INID MultiSmart AC reader
Serial number	:	--
Voltage input rating	:	7 – 24 Vdc (12 Vdc recommended)
Voltage output rating	:	--
FCC ID	:	YAB-ISOACRDR
Remark	:	host for EUT

AUX2	:	Laptop PC including power supply adapter
Manufacturer	:	Lenovo
Brand	:	Lenovo
Model	:	Thinkpad R60
Serial number	:	L3-BF847 07/02
Voltage input rating	:	20Vdc
Voltage output rating	:	--
Remark	:	required to read data from EUT

AUX3	:	Power supply
Manufacturer	:	Ansmann
Brand	:	Ansmann
Model	:	ML120P080E
Serial number	:	-
Voltage input rating	:	100 – 240Vac 50-60 Hz
Voltage output rating	:	12 Vdc
Remark	:	--

Figure 1: system in typical setup

1.3.1 Description of input and output ports.

Number	Terminal	From	To	Remarks	
1	AC Mains	AC Mains	AUX1	Non Shielded cable	
2	DC Power	AUX1	EUT	Non Shielded cable	
3	Serial port	AUX1	AUX2	Non Shielded cable	

1.4 Test Summary

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

Test Standard		Description		Pass / Fail
47 CFR Part 15 (10-1-09 Edition)			Page	
15.207(a)		Conducted emissions	13	Pass
15.209		Radiated emissions	10 - 12	Pass

Table : testspecifications

Testmethods: ANSI C63:2009

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, 15.207 and 15.209.

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 in Leek, 9351VT Eiberkamp 10, 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.

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 – the DC output was varied across the voltage range specified by the manufacturer
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 EUT was tested with the various host (AUX1) as mentioned in the attestation.

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 card and active mode i.e. the EUT is reading 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 and interconnections.

2.3 Special accessories.

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

2.4 Equipment modifications.

Only for the Conducted Emissions testing (section 4) test, the host unit was modified to add a resistive termination in lieu of the antenna of the host device AUX1 according to KDB 174176. For all other tests no modifications have been made to the equipment.

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 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
33.24	11.3	7.5	17.9	29.2	25.4	40.0	Pass
161.52	24.6	22.4	13.1	37.7	35.5	43.5	Pass
216.04	24.4	28.8	12.8	37.2	41.6	46.0	Pass
244.24	22.9	27.2	15.7	38.6	42.9	46.0	Pass
434.12	12.9	14.3	22.4	35.3	36.7	46.0	Pass
842.08	3.6	3.6	32.3	35.9	35.9	46.0	Pass

Table 1 Radiated emissions of the EUT

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.209, are depicted in Table 1. The system is tested as in whole, so with all equipment as shown in Figure.1 in place and functioning. Being the worst case situation.

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 ±5.0dB
3. The reported field strength values are the worst case values at the indicated frequency. The EUT was varied in three positions, the 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 cardin its proximity) and in activated mode (i.e. with a card in its proximity). Maximum values have been noted.
6. Values noted are in combination with host AUX1 model 5020 with modulation without PIN, which proved from pre-test to be the worst case.

Used test equipment and ancillaries:

99069	99070	99071	99107	99608	99609	99699	99547	15453

Test engineer

Signature :

Name : Richard van der Meer
Date : March 12, 2012

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

Frequency (MHz)	(a) Measurement results	Detector	(b) Antenna factor	(c) Cable loss	(d) Extrapolation factor	Measurement results (calculated =a+b+c-d)	Limits
	dBµV @3m		dB	dB	dB	dBµV/m@30m (unless otherwise stated)	dBµV/m@30m (unless otherwise stated)
0.0181	19.5	Pk	20.1	1	80	-39.4 @300m	62.45 @300m
0.0426	2.0	Pk	20.1	1	80	-56.9 @300m	35.02 @300m
0.0730	3.2	Pk	20.1	1	80	-55.7 @300m	30.34 @300m
0.132565 fundamental	61.6	Pk	20.1	1	80	2.7 @300m	25.16 @300m
0.1600	13.5	Pk	20.1	1	80	-45.4 @300m	23.52 @300m
0.4000	21.4	Pk	20.1	1	80	-37.5 @300m	15.56 @300m
6.0100	16.1	Qp	19.5	1	40	-3.4	29.5
27.1200	22.5	Qp	19.5	1	40	3.0	29.5

Table 2a Radiated emissions of the EUT, Peak and Quasi Peak values

Fundamental Frequency (MHz)	(a) Measurement results Peak (dBµV)	(b) Duty cycle factor	Measurement results Average (calculated =a-b)	Limits Part 15.209
	300 m	dB	dBµV/m	dBµV/m @ 300m
0.0181	-39.4	0	-39.4	42.45
0.0426	-56.9	0	-56.9	35.02
0.0730	-55.7	0	-55.7	30.34
0.132565 fundamental	2.7	0	2.7	25.16
0.1600	-45.4	0	-45.4	23.52
0.4000	-37.5	0	-37.5	15.56

Table 2b Emissions of the fundamental of the EUT, average values

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.209, with the EUT operating in continuous transmit mode, are depicted in Table 2a & 2b. Where Table 2b represents the average values calculated from the peak values of Table 2a. See section 5 for the duty cycle factor calculation.

Notes:

1. Calculated measurement results for the fundamental at 0.132565 MHz are obtained by using the 80dB/decade extrapolation factor, antenna factor and cable loss.
   i.e at 0.132565 MHz: 61.6 dBµV + 20.1dB + 1dB - 80dB= 2.7 dBµV /m.
2. A resolution bandwidth of 9kHz was used during testing
3. Field strength values of radiated emissions at frequencies not listed in Table 2a are more than 20 dB below the applicable limit
4. The EUT was varied in three positions, 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 both normal mode (i.e. without a card in its proximity) and in activated mode (i.e. with a card in its proximity).
6. Measurement uncertainty is ±5.0dB.
7. Values noted are in combination with host AUX1 model 5020 with constant carrier without PIN and with RS-232 connection, which proved from pre-test to be the worst case.
8. Duty cycle factor calculation is presented in section 5 of this report.

Used test equipment and ancillaries:

99069	99070	99107	99120	15453	99608	99609	15667	99547

Test engineer

Signature : 

Name : R. van der Meer

Date : March 23, 2012

4 Conducted emission data.

4.1 Conducted emission data of the EUT

Frequency (MHz)	Measurement results dB(µV) Line 1		Measurement results dB(µV) Neutral/Line 2		Limits dB(µV)		Result
	QP	AV	QP	AV	QP	AV	
0.15862	26.4	Note 5	<20.0	Note 5	65.5	55.5	PASS
0.15926	<20.0	Note 5	27.0	Note 5	65.5	55.5	PASS
0.19915	<20.0	Note 5	15.7	Note 5	63.6	53.6	PASS
0.20155	15.5	Note 5	<20.0	Note 5	63.6	53.6	PASS
0.23930	10.5	Note 5	8.1	Note 5	62.1	52.1	PASS
6.471	15.5	Note 5	<20.0	Note 5	60.0	50.0	PASS
7.652	22.0	Note 5	<20.0	Note 5	60.0	50.0	PASS
9.158	20.5	Note 5	<20.0	Note 5	60.0	50.0	PASS
10.079	<20.0	Note 5	23.6	Note 5	60.0	50.0	PASS

Table 3 Conducted emission measurements

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15 section 15.207, at the 120 Volts AC mains connection terminals of the AC/DC power supply which was connected to AUX1, are depicted in Table 3. The EUT was tested in both passive and active mode (while detecting a card). Maximum values recorded. The system is tested as in whole, so with all equipment as shown in Figure.1 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. Values of conducted emissions at frequencies not listed in Table 3 are more than 20 dB below the applicable limit.
4. The host unit was modified to add a resistive termination in lieu of the antenna of the host device AUX1 according to KDB 174176.
5. Qp values already within Av limits, there for Av not tested.
6. Tested at 12VDC (recommended voltage) supply voltage to the host, AUX1.

Used test equipment and ancillaries:

99548	99161	12512	15667	13313	99624	

Test engineer

Signature : 

Name : R. van der Meer

Date : March 22, 2012

5 Peak to Average values correction

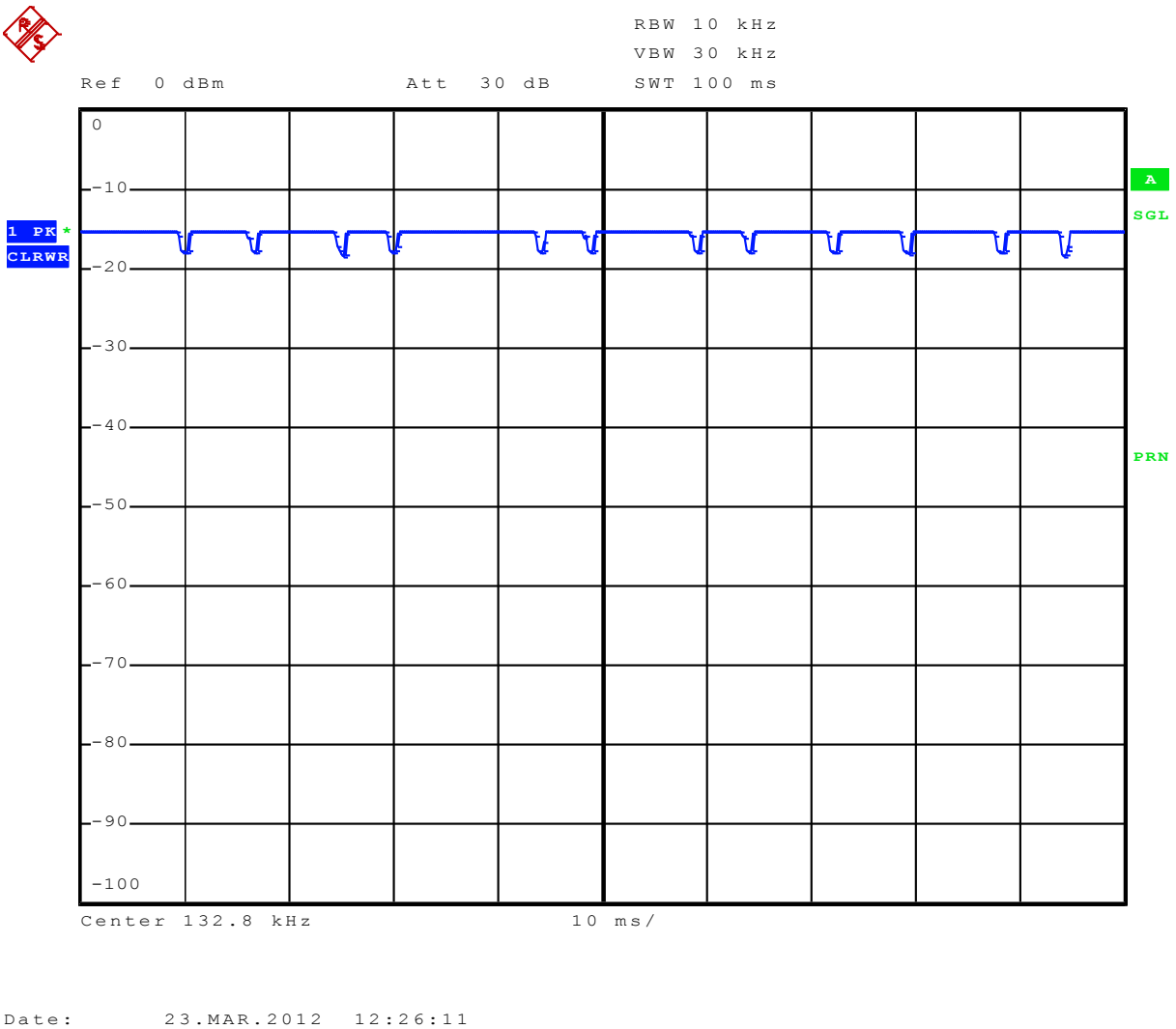
The plots below shows the duty cycle of the EUT.

From the measured Peak values the average values are calculated by the formula:

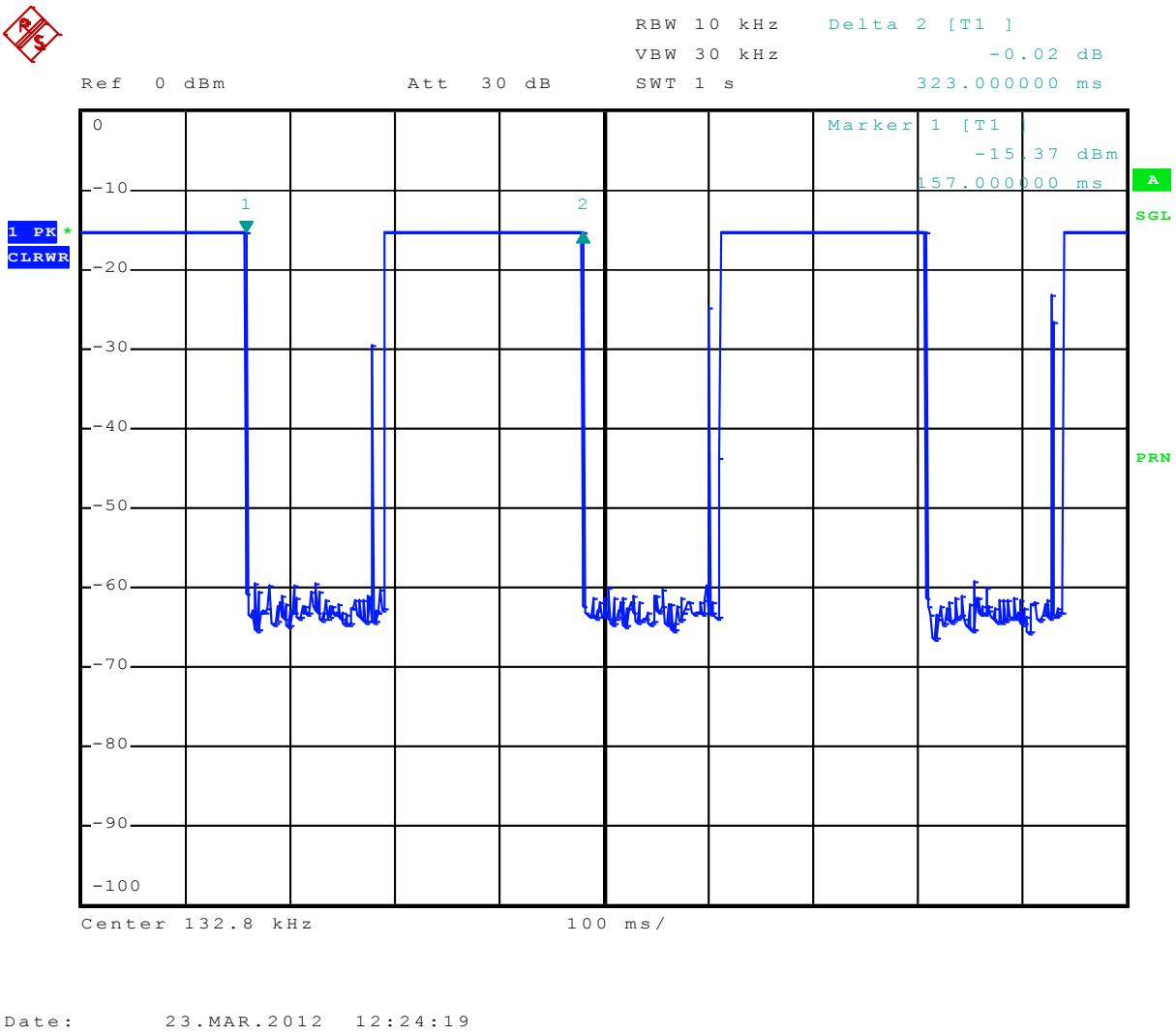
Average value = Peak value – Duty cycle factor

The duty cycle factor is obtained from the actual RF On time in a 100ms period. From plot 1 and plot 2 it can be seen that the RF On time of the EUT is more than 100ms. In this case the Duty cycle factor results in:

Duty cycle factor = 20 Log (T^{ON} / 0,1) = 20 Log (0,1 / 0,1) = 0 dB.



Plot 1: Duty cycle in a 100ms period, measured on a spectrum analyzer



Plot 2: actual RF ON time of the EUT, measured on a spectrum analyzer

6 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12476	Antenna mast	EMCO	TR3	NA	NA
12477	Antenna mast 1-4 mtr	Poelstra	NA	NA	NA
12512	LISN	EMCO	3625/2	01/2012	01/2014
13313	Pulse Limiter	R&S	ESH3-Z2	02/2012	02/2013
15453	Active loopant. 60 cm	Chase	HLA6120	05/2011	05/2012
15633	Biconilog Testantenna	Chase	CBL 6111B	02/2012	02/2013
15667	Measuring receiver	R&S	ESCS30	06/2011	06/2012
99069	Coax 5m RG213	NMi Certin B.V.	KABEL 5M	10/2011	10/2012
99070	Coax 15m RG213	NMi Certin B.V.	KABEL 15M	10/2011	10/2012
99071	Coax 10m RG213	NMi Certin B.V.	KABEL 15M	10/2011	10/2012
99107	Controller	Heinrich Deisel	4630-100	NA	NA
99120	DC supply 0-30V/1,2A	Voltcraft	TNG30	NA	NA
99161	Variac 250V 6A	RFT	LTS006	NA	NA
99538	Spectrum analyzer	R&S	FSP40	05/2011	05/2012
99547	Temperature-Humiditymeter	Europe supplies	WS-7082	10/2011	10/2012
99548	Temperature-Humiditymeter	Europe supplies	WS-7082	10/2011	10/2012
--	Anechoic Room	Siepel	FCC listed: 90828	02/2012	02/2015
99608	Controller (OATS)	EMCS	DOC202	NA	NA
99609	Antenna mast	EMCS	AP-4702C	NA	NA
99624	Power supply	Delta	--	04/2011	04/2012
99651	Variac	NA	Vast Activa: 08-9510	NA	NA
99683	Loop antenna, 6cm	NA	7405-901	9/2011	9/2012
99699	Measurement Receiver (9kHz-3GHz)	Rohde & Schwarz	ESCI	02/2011	02/2012

NA= Not Applicable