



**TEST REPORT CONCERNING THE COMPLIANCE OF A
13.56 MHZ INDUCTIVE PROXIMITY TAG READER,
BRAND COLLIS, MODEL SMARTWAVE BOX
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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June 27, 2011**

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

**TÜV Rheinland EPS B.V.
P.O. Box 15
9822 ZG Niekerk (NL)
Smidshornerweg 18
9822 TL Niekerk (NL)**

Telephone: +31 594 505005
Telefax: +31 594 504804

E-mail: info@tuv-eps.com
Web: www.tuv-eps.com

MEASUREMENT/TECHNICAL REPORT

COLLIS

Model : SmartWave Box

FCC ID: XKD-SMARTWAVEBOX

IC: 8417A-SWBOX

June 27, 2011

This report concerns: ~~Original grant/certification~~ Class 2 change ~~Verification~~

Equipment type: 13.56 MHz Inductive proximity tag reader

Report prepared by:	Name	: Richard van der Meer
	Company name	: TÜV Rheinland EPS B.V.
	Address	: Smidshornerweg 18
	Postal code/city	: 9822 TL Niekerk
	Mailing address	: P.O. Box 15
	Postal code/city	: 9822 ZG Niekerk
	Country	: The Netherlands
	Telephone number	: + 31 594 505 005
	Telefax number	: + 31 594 504 804
	E-mail	: info@tuv-eps.com

The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (10-1-09 Edition), RSS-GEN, RSS-210 and the measurement procedures of ANSI C63.4-2009. TÜV Rheinland EPS B.V. at Niekerk, 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 27, 2011

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 tag reader, operating on 13.56 MHz
Manufacturer	:	Collis B.V.
Brand	:	Collis
Model(s)	:	SmartWave Box
Serial number(s)	:	n.a.
Revision	:	2.21

Applicant information

Applicant's representative	:	Mr. R. Jozefzoon
Company	:	Collis B.V.
Address	:	De Heyderweg 1
Postal code	:	2314 XZ
City	:	Leiden
Country	:	The Netherlands
Telephone number	:	+31 71 581 36 36
Telefax number	:	+31 71 581 36 30
Email	:	info@collis.nl
Internet	:	www.collis.nl

Test(s) performed

Location	:	Niekerk
Test(s) started	:	April 01, 2011
Test(s) completed	:	April 11, 2011
Purpose of test(s)	:	Equipment Authorization (Class 2 Permissive Change)
Test specification(s)	:	47 CFR Part 15 (10-1-09 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	:	June 27, 2011

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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 Contactless Smartcard reader & simulator, brand Collis, model SmartWave Box, operates on a frequency of 13.56 MHz and is therefore classified as an inductive proximity card reader. The SmartWave Box is a hardware tool that acts as a card simulator, using the SmartWave Box Probe to wave in the terminal's target field for contactless cards. A PC with a software package, the TEST REPORT , is set up by placing Collis SmartWave Box (in the case of contactless cards) in between the card and the terminal/reader. This picks up the communication between the two entities and sends it to the PC where the TEST REPORT software is running.

Some changes have been made to the hardware from the originally certified device for added functionality. The changes require a Class 2 Permissive Change and this testreports.

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 Permissive Change 2 in equipment authorization files under FCC ID: XKD-SMARTWAVEBOX and IC: 8417A-SWBOX.

1.3 Test Summary

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

Test Standard		Description	Page	Pass / Fail
47 CFR Part 15 (10-1-09 Edition)	RSS-210 Issue 8, December 2010			
15.207(a)	RSS-Gen(7.2.4)	Conducted emissions	14 - 15	Pass
15.209, 15.225	RSS-Gen(4.9 and 7.2.5) and RSS-210(2.5)	Radiated emissions	11 - 13	Pass

Table: testspecifications

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

2 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	:	Contactless Smartcard reader & simulator
Manufacturer	:	Collis B.V.
Brand	:	Collis
Model	:	SmartWave Box
Serial number	:	n.a.
Voltage input rating	:	18 Vdc
Voltage output rating	:	n.a.
Current input rating	:	not provided
Antenna	:	Internal
Remarks	:	v02.21

AUX1	:	Probe
Manufacturer	:	Collis B.V.
Brand	:	Collis
Model	:	v02.00
Serial number	:	N.a.
Remark	:	Connect to EUT with FireWire cable

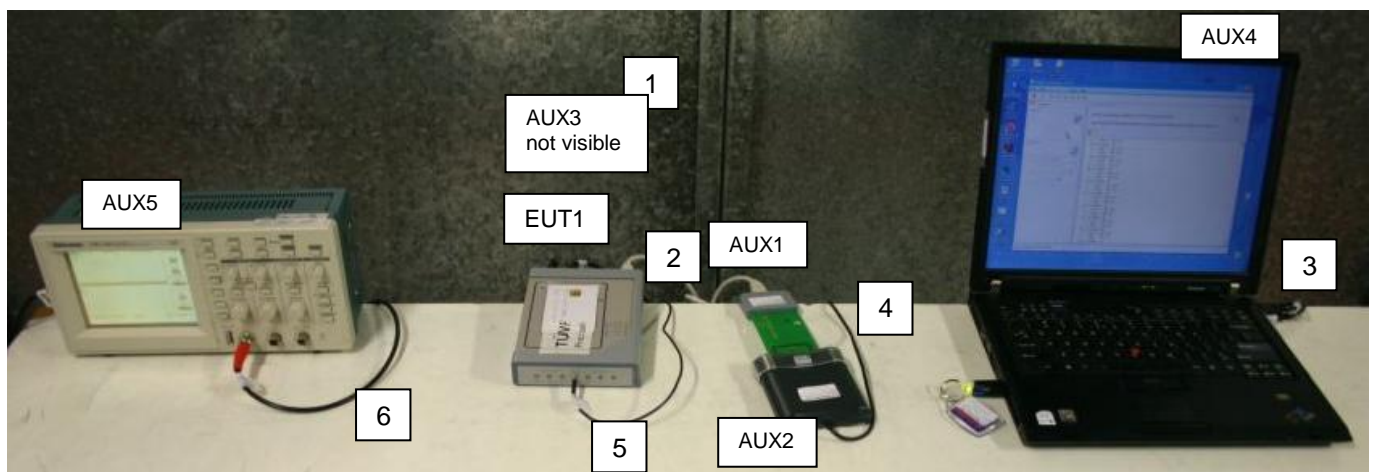
AUX2	:	Cardman
Manufacturer	:	Omnikey
Brand	:	Cardman
Models	:	5321
Serial number	:	---
Voltage input rating	:	---
Current input rating	:	---
Remark	:	Connect to AUX4 with USB cable

AUX3 : Adapter
Manufacturer : Friwo
Brand : Friwo
Models : FW75550/18
Serial number : ---
Voltage input rating : 100-240Vac 50/60Hz
Current input rating : 18Vdc/840mA
Remark : Connect to EUT

AUX4 : Laptop
Manufacturer : Lenovo
Brand : Lenovo
Models : IBM ThinkPad
Serial number : L3-BF847 07/02
Voltage input rating : 18Vdc
Current input rating : 18Vdc/5A
Remark : Connect to AUX2
Software : Collis Card Spy v1.0

AUX5 : Oscilloscope Inventory Number 15232 (see section 6 for details)

AUX2 and AUX4 are only used to program the EUT and were not part of the testsetup.



Photograph of the system

2.1.1 Description of input and output ports.

Number	Terminal	From	To	Remarks
1	Mains	Adapter	EUT	Cable 1.5m
2	Probe	AUX1	EUT	Cable 1.8m
3	Link cable	Laptop	EUT	Cable 60cm
4	USB	Laptop	AUX2	Cable 1.5m
5	Trig In	Trig Out front	Trig In rear	Coax
6	Trig Out	Trig Out rear	Oscilloscope CH-1	Coax

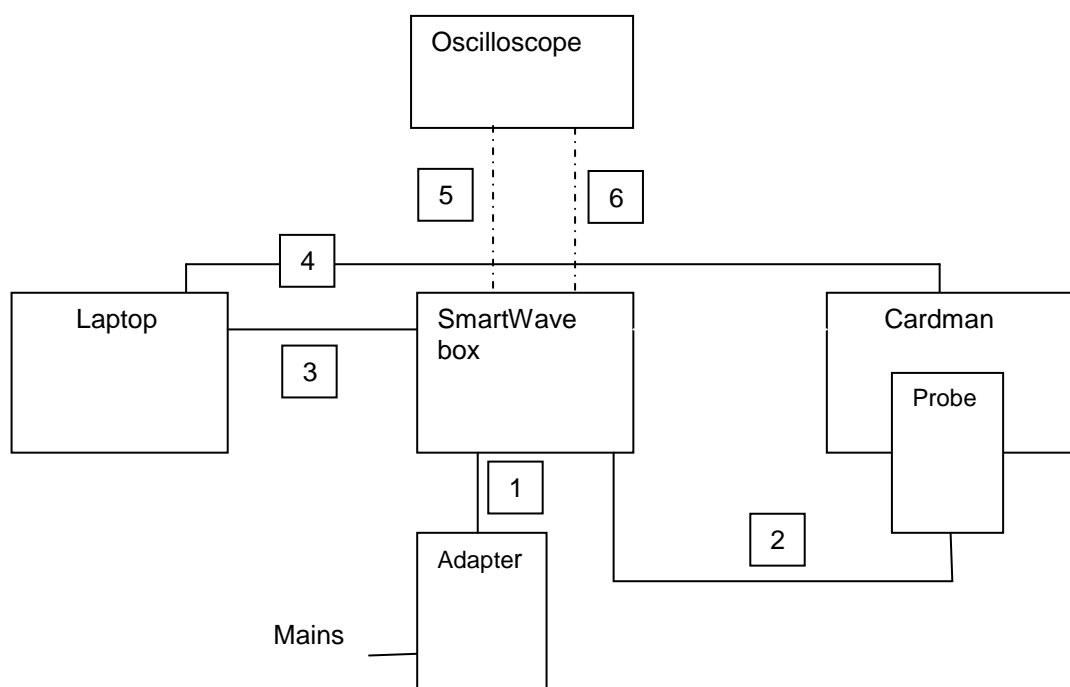


Figure 1. Basic set-up normal use

2.2 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, 15.209, 15.225 and 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 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.

2.3 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 Niekerk, 9822 TL Smidshornerweg 18, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948, per October 23, 2000.

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.

2.4 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.

3 System test configuration.

3.1 Justification.

The system was configured for testing in a typical fashion (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.

3.2 EUT mode of operation.

The EUT has been tested in active mode, i.e. the EUT is ready to detect 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.

3.3 Special accessories.

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

3.4 Equipment modifications.

No modifications have been made to the equipment in order to achieve compliance.

3.5 Product Labelling

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

3.6 Block diagram of the EUT.

The block diagram is available in the technical documentation package.

3.7 Schematics of the EUT.

The schematics are available in the technical documentation package.

3.8 Part list of the EUT.

The part list is available in the technical documentation package.

4 Radiated emission data.

4.1 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
54.7	15.7	7.7	8.1	23.8	15.8	40.0	Pass
57.2	10.9	7.1	7.5	18.4	14.6	40.0	Pass
135.6	14.1	12.3	14.1	28.2	26.4	43.5	Pass
149.16	9.1	8.4	13.7	22.8	22.1	43.5	Pass
271.2	8.7	11.6	16.9	25.6	28.5	46.0	Pass
436.2	5.9	5.9	22.4	28.3	28.3	46.0	Pass
975.7	7.1	6.9	34.7	41.8	41.6	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, 15.225 and RSS-Gen with the EUT operating in on 13.56 MHz are depicted in Table 1. The system is tested without AUX 2 and AUX4 and the associating cables. AUX2 and AUX4 were only used in the situation for programming the EUT for continues transmitting.

Notes:

- Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
- Measurement uncertainty is ± 5.0 dB
- 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).
- A Quasi-peak detector was used with a resolution bandwidth of 120 kHz

Used test equipment and ancillaries:

15232	99070	99071	99107	99608	99609	99699	99547	15453
99580								

Test engineer

Signature :



Name : Richard van der Meer

Date : April 01, 2011

4.2 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
	dBμV @3m		dB	dB	dB	dBμV/m@30m (unless otherwise stated)	dBμV/m@30m (unless otherwise stated)
0.749	10.0	Qp	20.1	1	40	-8.9	32.0
1.00964	7.0	Qp	20.1	1	40	-11.9	23.8
9.546	4.7	Qp	19.7	1	40	-14.6	29.5
13.56 (fundamental)	49.2	Qp	19.6	1	40	29.8	84
15.67	15.1	Qp	19.7	1	40	-4.2	29.5
27.12	45.0	Qp	20.0	1	40	26.0	29.5

Table 2: Radiated emissions of the EUT

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.209, 15.225 and RSS-210 and RSS-Gen with the EUT operating in continuous transmit mode on 13.56 MHz, are depicted in Table 2.

Notes:

- Calculated measurement results are obtained by using the 40 dB/decade extrapolation factor and the antenna factor and cable loss is included. For instance the corrected value for the 13.56 MHz fundamental is calculated as: Measurement result + Antenna Factor + Cable loss – Extrapolation Factor => 49.2 dBuV + 19.6 dB + 1 dB – 40 dB = 29.8 dBuV/m.
- Frequency range:
 - 9- 90 kHz Average detector used during measurements
 - 110-490 kHz Average detector used during measurements
- A resolution bandwidth of 9kHz was used during testing
- n.i. Indicates that no field strength values could be measured on the listed frequencies or in the listed frequency range.
- Field strength values of radiated emissions at frequencies not listed in Table 2 are more than 20 dB below the applicable limit
- 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.
- The EUT was tested in both normal mode (i.e. without a tag in its proximity) and in activated mode (i.e. with a tag in its proximity).
- Measurement uncertainty is ±5.0dB

Used test equipment and ancillaries:

99580	99070	99107	99120	15453	99608	99609	99699	99547
15232								



Test engineer

Signature : 

Name : R. van der Meer

Date : April 01, 2011

5 Conducted emission data.

5.1 Conducted emission data of the EUT

Frequency (MHz)	Measurement results dB(μV) Neutral		Measurement results dB(μV) Line 1		Limits dB(μV)		Result
	QP	AV	QP	AV	QP	AV	
0.198	33.2	Note 4	25.7	Note 4	63.6	53.6	PASS
0.794	31.4	"	27.3	"	56.0	46.0	PASS
0.898	17.8	"	30.3	"	56.0	46.0	PASS
2.074	31.5	"	29.6	"	56.0	46.0	PASS
2.670	23.7	"	31.8	"	56.0	46.0	PASS
2.786	27.4	"	30.9	"	56.0	46.0	PASS
2.994	27.9	"	30.9	"	56.0	46.0	PASS
3.786	22.4	"	31.9	"	56.0	46.0	PASS
4.554	19.9	"	31.7	"	56.0	46.0	PASS
5.478	23.8	"	31.2	"	60.0	50.0	PASS
6.282	23.2	"	30.7	"	60.0	50.0	PASS
7.950	27.2	"	31.7	"	60.0	50.0	PASS
13.558	35.9	"	34.8	"	60.0	50.0	PASS
27.118	26.8	"	28.0	"	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 and RSS-Gen section 7.2.4, at the 120 Volts AC mains connection terminals of the AC/DC power supply which was connected to the EUT, 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 ± 3.5 dB
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. QP (Quasi Peak) values already within Av (Average) limits, therefore Av not tested.

Used test equipment and ancillaries:

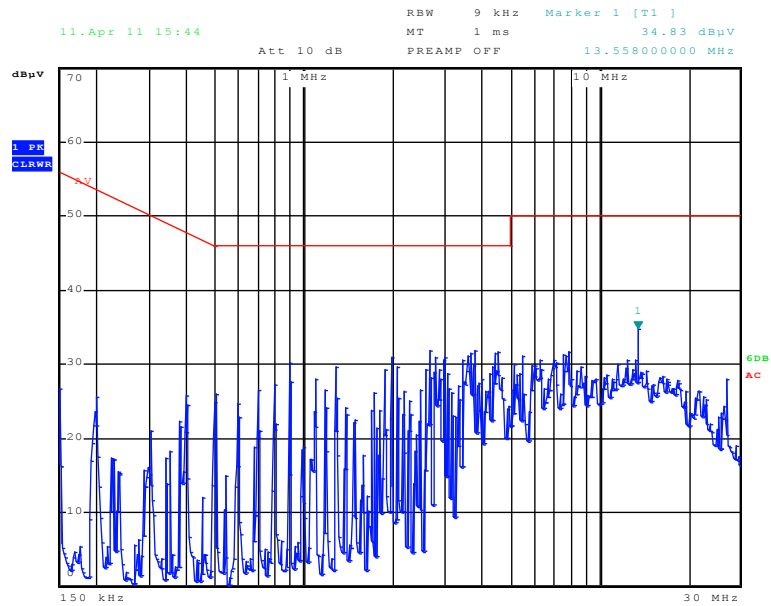
99548	99161	12512	15232???	13313	99699	

Test engineer

Signature : 

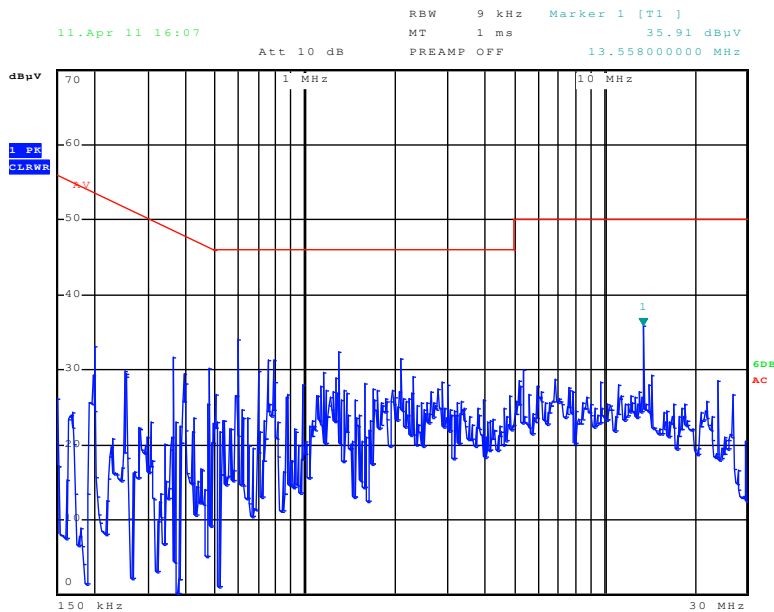
Name : R. van der Meer

Date : April 11, 2011



Date: 11 APR 2011 15:44:48

Plot 1: Conducted emissions of the EUT on L1

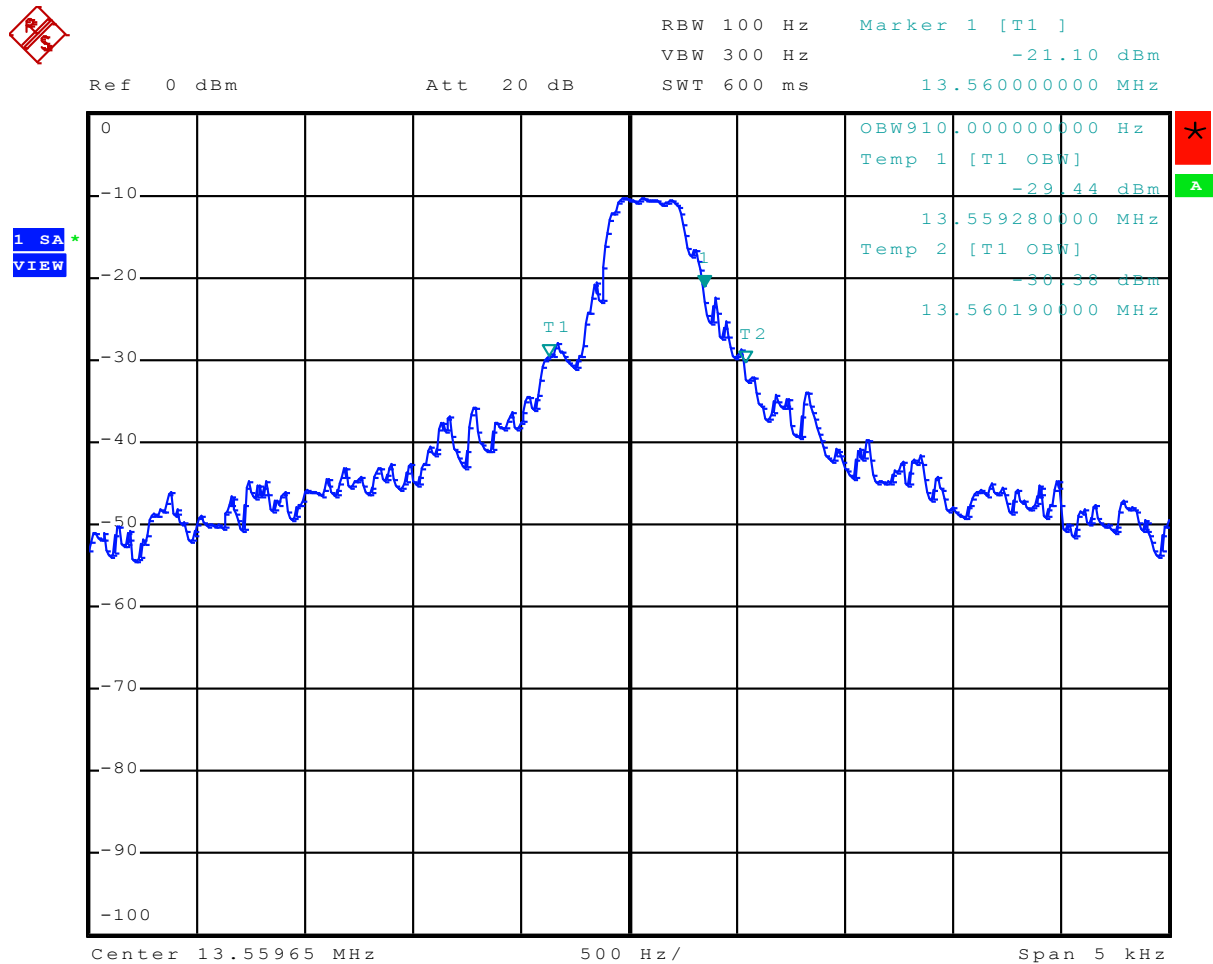


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Plot 2: Conducted emissions of the EUT on Neutral



6 Plot of the Occupied bandwidth



Date: 27.MAY.2009 14:53:53

Plot 3: Occupied bandwidth = 0,910 kHz as measured with a spectrum analyzer (taken from the original filing)

7 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12512	LISN	EMCO	3625/2	01/2010	01/2012
13313	Pulse Limiter	R&S	ESH3-Z2	02/2011	02/2012
15232	Oscilloscope	Teltronix	TDS-220	02/2011	02/2012
15453	Active loopant. 60 cm	Chase	HLA6120	05/2010	05/2011
15633	Biconilog Testantenna	Chase	CBL 6111B	02/2011	02/2012
99070	Coax 15m RG213 OATS	NMi Certin B.V.	KABEL 15M OATS	10/2010	10/2011
99071	Coax OATS ground	NMi Certin B.V.	KABEL GROND OATS	10/2010	10/2011
99107	Controller OATS	Heinrich Deisel	4630-100	NA	NA
99161	Variac 250V 6A	RFT	LTS006	NA	NA
99547	Temperature-Humiditymeter	Europe supplies	WS-7082	10/2010	10/2011
99580	OATS	Comtest	FCC listed: 90828	08/2008	08/2011
99608	Controller (OATS)	EMCS	DOC202	NA	NA
99609	Antenna mast	EMCS	AP-4702C	NA	NA
99699	Measuring receiver	R&S	ESCI	02/2011	02/2012
12476	Antenna mast	EMCO	TR3	NA	NA
12477	Antenna mast 1-4 mtr	Poelstra	NA	NA	NA
99608	Controller (OATS)	EMCS	DOC202	NA	NA
99651	Variac	NA	Vast Activa: 08-9510	NA	NA

NA= Not Applicable