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**TEST REPORT CONCERNING THE VERIFICATION OF  
COMPLIANCE OF A PHERIPHERAL DEVICE,  
BRAND HEYREX, MODEL R4  
WITH 47 CFR PART 15-SUBPART B (10-1-14 Edition)  
AND THE  
REQUIREMENTS OF INDUSTRY CANADA:  
ICES-003 (ISSUE 6, JANUARY 2016).**

**15111603.fcc02  
January 26, 2016**

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FCC listed : 90828  
Industry Canada : 2932G-2  
R&TTE and EMC Notified Body : 1856

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## MEASUREMENT/TECHNICAL REPORT

**Brand: Heyrex**  
**Model: R4**

**FCC ID: RGZ-R4**  
**IC: 12380A-R4**

This report concerns: Original certification Class 2 change—Verification

Equipment type: JBP Computer Device Peripheral

Report prepared by:

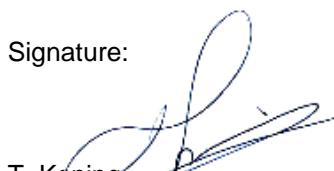
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15, Subpart B (10-1-14 edition), ICES-003 (Issue 6, January 2016) and the measurement procedures of ANSI C63.4-2014.

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: January 26, 2016

Signature:



T. Koning  
Senior Engineer 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 : JBP Computing Device Peripheral  
Manufacturer : Heyrex  
Brand : Heyrex  
Model : R4  
Serial number : Unidentified test sample  
Revision : --

### Applicant information

Applicant's representative : Mr. M. Koop  
Company : Teleconformity  
Address : Constructieweg 1  
Postal code : 7451PS  
City : Holten  
Country : The Netherlands  
Telephone number : +31 53 4785267  
Telefax number : +31 84 8362566

### Test(s) performed

Location : Leek  
Test(s) started : January 19, 2016  
Test(s) completed : January 26, 2016  
Purpose of test(s) : Declaration of Conformity (DoC)

Test specification(s) : 47 CFR Part 15, subpart B (10-1-14 Edition) and ICES-003 (ISSUE 6, JANUARY 2016)

Test engineer(s) : R. van der Meer



Report written by : R. van der Meer



Report date : January 26, 2016

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

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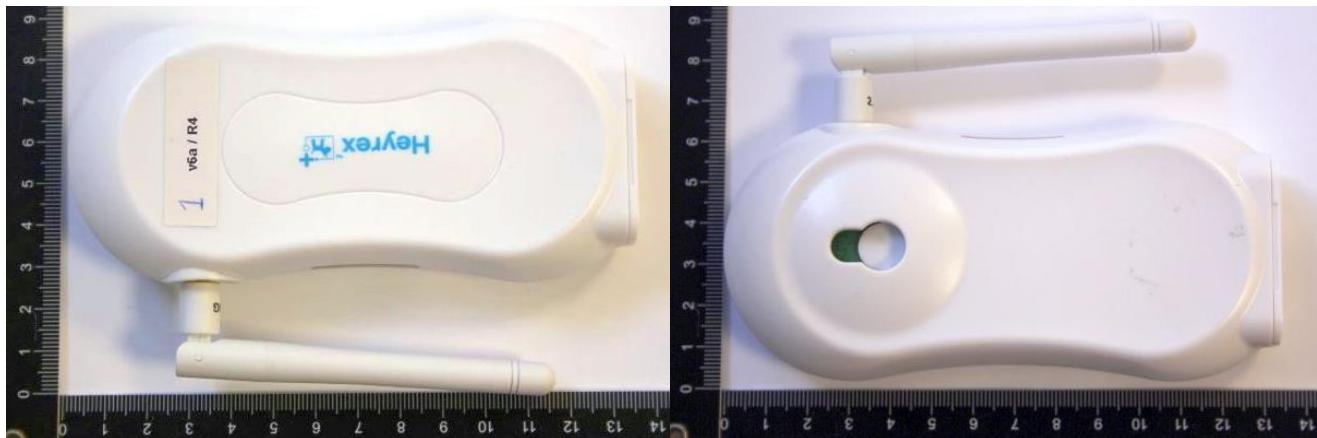
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## 1 General information.

### 1.1 Product description.

#### 1.1.1 Introduction.

The EUT is a Pheripheral Device as part of a Spread Spectrum Transmitter (DSS) device and is a part of an animal activity and health monitoring system. The EUT is factory configured for the 2402-2462 MHz band.



Photographs of the EUT, top (left) and bottom (right)

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: RGZ-R4 and IC: 12380A-R4.

### 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	JBP Computing Device Peripheral
Manufacturer	Heyrex
Brand	Heyrex
Model	R4
Serial number	unidentified test sample
Voltage input rating	5 Vdc
Voltage output rating	n.a.
Current input rating	--
Antenna	external
Operation frequency	2402 – 2462 MHz
Modulation	GFSK (2Mbps)
Spreading technique	FHSS
Remarks	21 channels

AUX1	Mains Power Supply Adapter
Brand	V-INFINITY
Model	EMSA050100
Serial number	--
Voltage input rating	100-240V, 50-60Hz
Voltage output rating	5 Vdc 1.0A
Remark	power supply for EUT



AUX2	Laptop Computer
Brand	Dell
Model	Latitude E6410
Serial number	BY93ZN1
Remark	Contains software for programming the EUT

AUX3	Computer Mouse
Brand	Logitech
Model	M100
Serial number	1317HS02NDC8
Remark	-

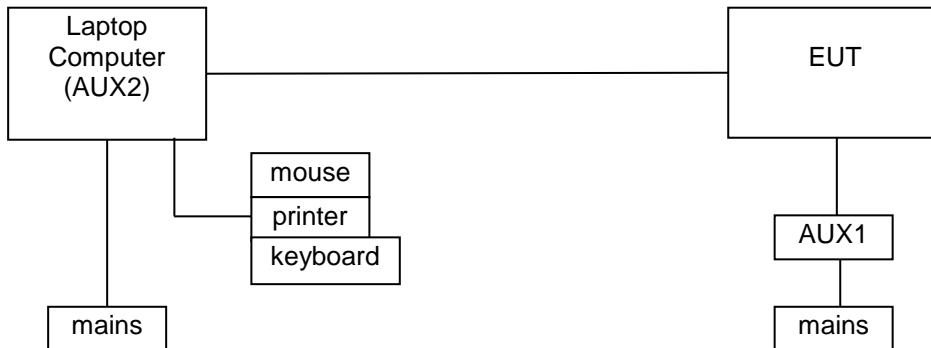
AUX4	Printer
Brand	HP
Model	PSC 2175
Serial number	MY42JF7516
Remark	--

AUX5	Computer Keyboard
Brand	Logitech
Model	K120
PID	SC33617
Remark	--

### 1.3.1 Description of input and output ports.

Number	Terminal	From	To	Remarks
1	Mains	AUX1	EUT	--
2	Mains	Mains	AUX2	--
3	LAN connection	AUX2	EUT	shielded cable, for programming only

Table 1: Interconnection between EUT and auxiliary equipment



### 1.4 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 Subpart B (10-1-14 Edition)	ICES-003 Issue 6, January 2016			
15.107(a)	Section 6.1 Table 2	AC Power Line Conducted emissions	12 – 15	Pass
15.109(a)	Section 6.2.1 Table 5	Radiated emissions	10 – 11	Pass

Table : testspecifications

Testmethods: ANSI C63.4-2014

Note: see end of the report for setup photographs.

### 1.5 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15, Subpart B (10-1-14 Edition), sections 15.107 and 15.109 and ICES-003 Issue 5 (august 2012) Sections 6.1 and 6.2.

The test methods, which have been used, are based on ANSI C63.4-2014.

Radiated emission tests 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 Nederland 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.

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 (AUX1)  
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 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 C63.4-2014.

### 2.2 EUT mode of operation.

Testing was performed while EUT was operating in normal operating mode

### 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.

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.

#### RESULT: PASS

Date of testing: 2016-01-25

Frequency range: 30MHz - 1000MHz

#### Requirements:

FCC 15.109(a) and IC ICES-003 section 6.2

Except for Class A digital devices, the field strength of radiated emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength ( $\mu$ V/m)	Field strength (dB $\mu$ V/m)	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

#### Test procedure:

ANSI C63.4-2014.

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 30 MHz 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.

### 3.1 Radiated emissions data (30 MHz – 1 GHz).

Frequency (MHz)	Antenna polarization	Results @3m (dB $\mu$ V/m)	Limits @3m (dB $\mu$ V/m)	Pass/Fail
36.122	Vertical	36.9	40.0	Pass
49.400	Vertical	28.1	43.5	Pass
344.280	Vertical	23.7	43.5	Pass
381.140	Vertical	23.3	43.5	Pass
761.380	Horizontal	34.8	43.5	Pass
829.280	Horizontal	31.2	43.5	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 15.109 and ICES-003 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  $\pm 5.0$ dB
3. The reported field strength values are the worst case values at the indicated frequency.
4. A Quasi-peak detector was used with a resolution bandwidth of 120 kHz.
5. The EUT was tested in normal operation mode. Worst case values have been noted.

Used test equipment and ancillaries:

A00257	A00258	A00314	A00450	A00447	A00235	A00466	A01829	

## 4 AC Power-line Conducted emission data.

### RESULT: Not Applicable.

Date of testing: 2016-01-25

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 (dB $\mu$ V) Quasi-Peak	Conducted Limit (dB $\mu$ V) 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 C63.4-2013.

Each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a 50  $\mu$ H / 50  $\Omega$  LISN. The frequency range from 150kHz to 30MHz was searched. The six highest EUT emissions relative to the limit were noted. The EUT is placed on a non-conductive table 0.8m above the ground plane. The EUT was positioned at least 80cm from the LISN. The power cable was routed over the non-conductive plate to the LISN.

#### 4.1.1 Testresults

Frequency (MHz)	Measurement results L1 (dB $\mu$ V)		Measurement results L2/Neutral (dB $\mu$ V)		Limits (dB $\mu$ V)		Verdict (Pass/Fail)
	QP	AV	QP	AV	QP	AV	
	42.4	Note 3	40.8	Note 3	63.6	53.6	Pass
0.29844	37.8	Note 3	40.1	Note 3	60.2	50.2	Pass
0.40781	41.3	Note 3	42.2	Note 3	57.6	47.6	Pass
0.48984	42.0	Note 3	42.2	Note 3	56.2	46.2	Pass
0.50547	44.2	Note 3	42.2	Note 3	56.0	46.0	Pass
0.61484	39.4	Note 3	40.4	Note 3	56.0	46.0	Pass
0.70078	35.9	Note 3	36.0	Note 3	56.0	46.0	Pass
0.79063	35.0	Note 3	35.0	Note 3	56.0	46.0	Pass
0.88828	32.9	Note 3	31.8	Note 3	56.0	46.0	Pass
1.18125	31.1	Note 3	30.9	Note 3	56.0	46.0	Pass
1.28672	32.6	Note 3	31.9	Note 3	56.0	46.0	Pass
1.44688	30.4	Note 3	30.6	Note 3	56.0	46.0	Pass
1.77109	29.0	Note 3	29.6	Note 3	56.0	46.0	Pass
2.31016	28.9	Note 3	29.7	Note 3	56.0	46.0	Pass
4.57578	28.6	Note 3	30.1	Note 3	56.0	46.0	Pass
9.44297	29.0	Note 3	28.6	Note 3	60.0	50.0	Pass
29.23594	35.2	Note 3	36.1	Note 3	60.0	50.0	Pass

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15 section 15.107(a) and ICES-003 Section 6.1 Table 2 Class B, at the 120 Volts/ 60 Hz AC mains connection terminals of the EUT, are depicted in the table above.

Notes:

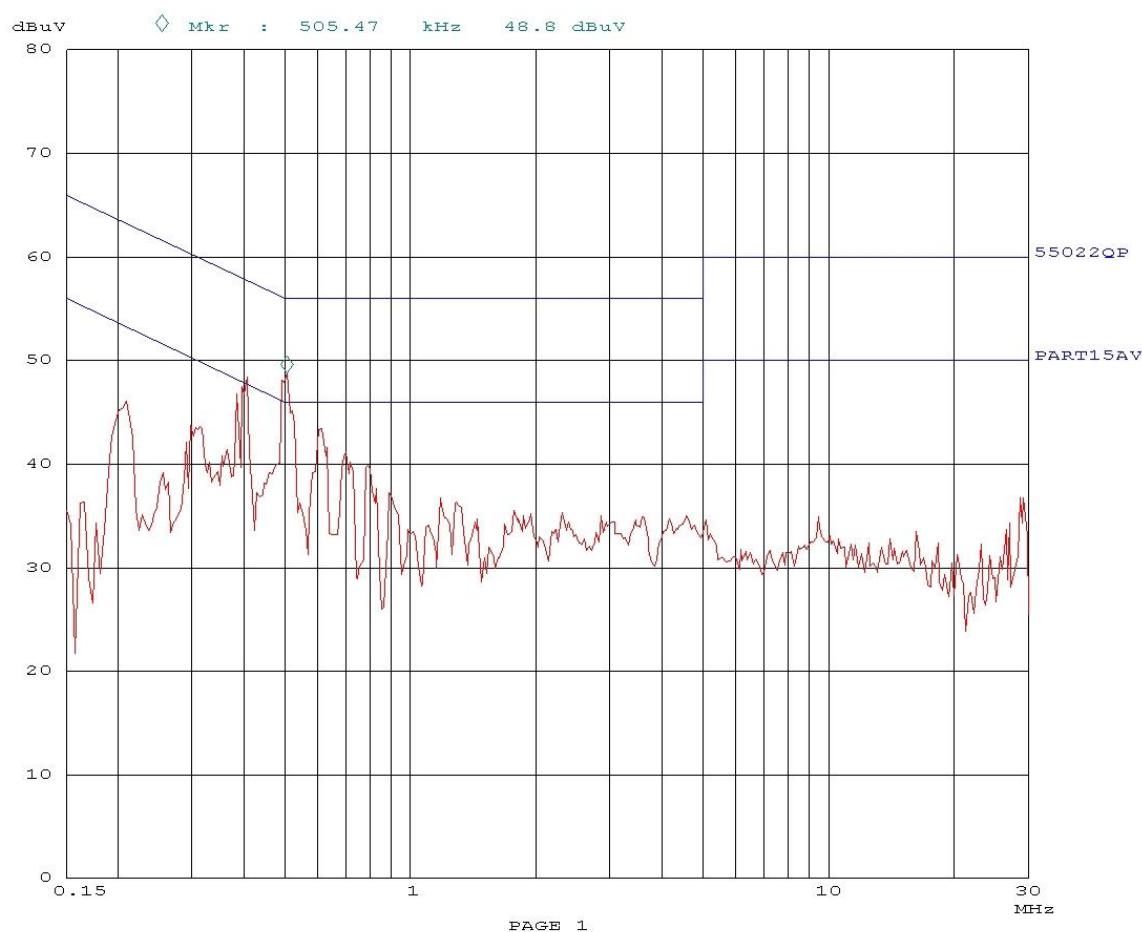
1. The resolution bandwidth used was 9 kHz.
2. Tested in the normal operation mode. Worst case values noted.
3. Qp values already within Av limits, therefor Av not tested.
4. Emissions not listed in the table above are more than 20 dB below the applicable limit
5. Measurement uncertainty is  $\pm 3.5$  dB
6. Plots are provided on the next pages.

Used test equipment and ancillaries:

A00022	A00051	A00171	A00437	A00444	A00726	

25. Jan 16 11:54

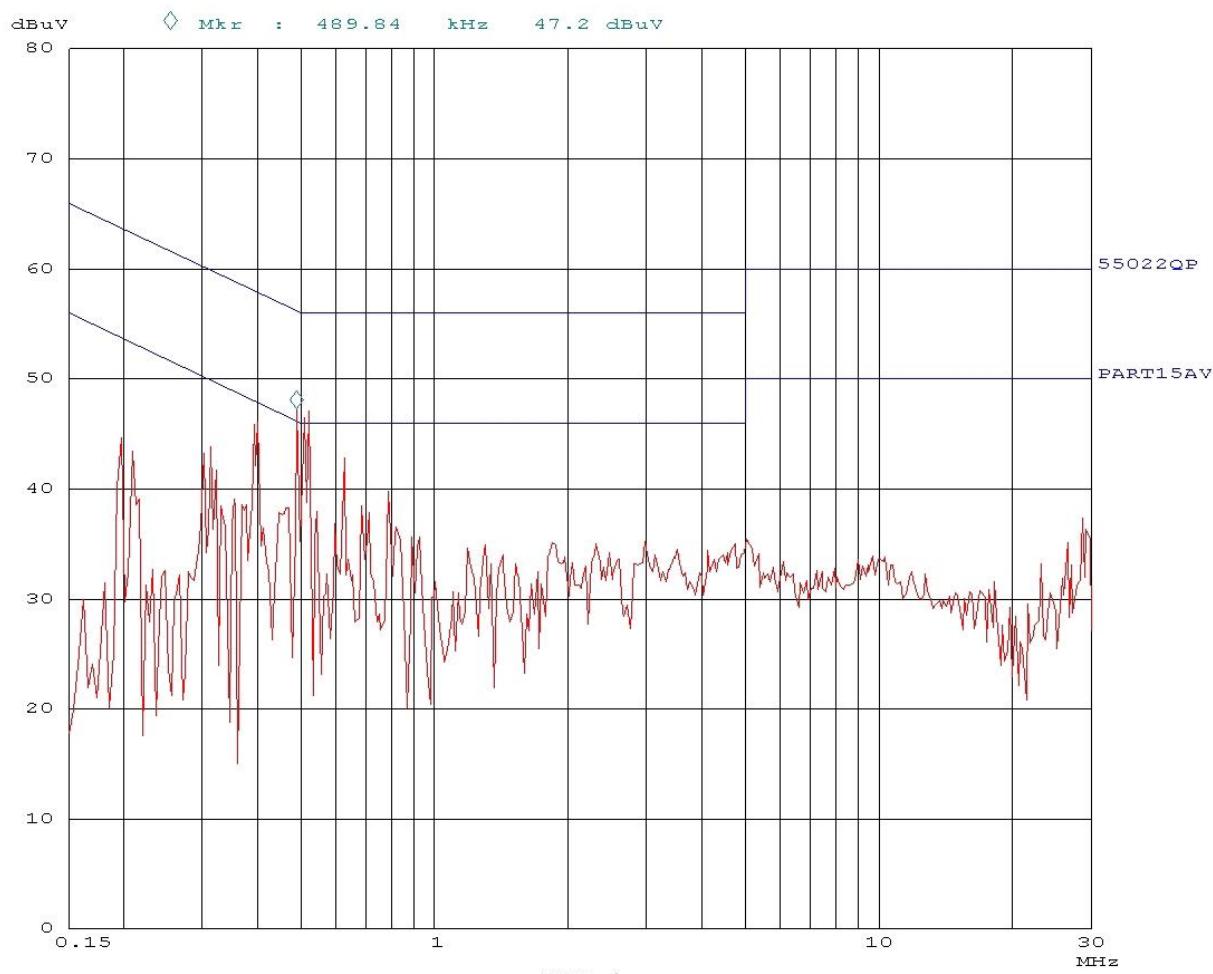
Overview Scan Settings (1 Range)  
 |----- Frequencies -----| |----- Receiver Settings -----|  
 Start Stop Step IF BW Detector M-Time Atten Preamp  
 150k 30M 3.9k 9k PK 0.10ms OdBLN OFF  
 Final Measurement: x QP  
 Meas Time: 1 s  
 Subranges: 25  
 Acc Margin: 6dB



Plot 1 Conducted emissions on L1 (Peak values)

25. Jan 16 12:03

Overview Scan Settings (1 Range)  
 |----- Frequencies -----| |----- Receiver Settings -----|  
 Start Stop Step IF BW Detector M-Time Atten Preamp  
 150k 30M 3.9k 9k PK 0.10ms OdBLN OFF  
 Final Measurement: x OP  
 Meas Time: 1 s  
 Subranges: 25  
 Acc Margin: 6dB



Plot 2 Conducted emissions on L2 (Peak values)

## 5 List of utilized test equipment.

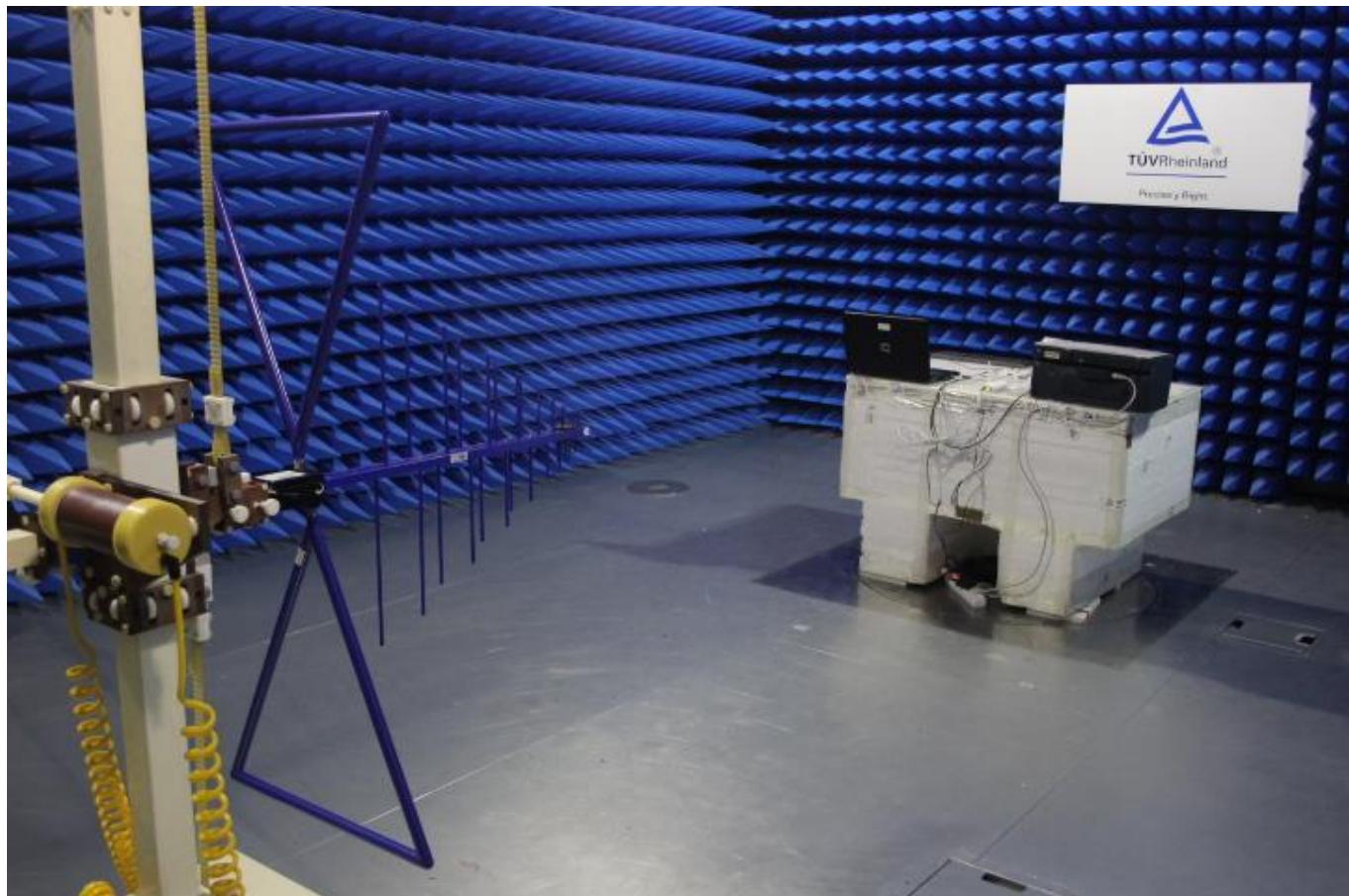
Kind of Equipment	Manufacturer	Model Name	Inventory number	Calibration date (mm/yyyy)	Calibration due date (mm/yyyy)
<b>For Radiated Emissions</b>					
Measurement Receiver	Rohde & Schwarz	ESCI	A00314	03/2015	03/2016
RF Cable S-AR	Gigalink	APG0500	A00447	01-30/2015	01-30/2016
Controller	Maturo	SCU/088/8090811	A00450	N/A	N/A
Controller	EMCS	DOC202	A00257	N/A	N/A
Test facility	Comtest	FCC listed: 90828 IC: 2932G-2	A00235	04/2014	04/2017
Measuring receiver	R&S	ESCI	A00314	03/2015	03/2016
Antenna mast	EMCS	AP-4702C	A00258	N/A	N/A
Temperature-Humiditymeter	Extech	SD500	A00444	03/2015	03/2016
Biconilog Testantenna	Teseq	CBL 6111D	A00466	06/2015	06/2016
<b>For AC Power Line</b>					
	<b>Conducted</b>	<b>Emissions</b>			
Pulse limiter	R&S	ESH3-Z2	A00051	01-05/2016	01-05/2017
Variac	RFT	LSS020	A00171	NA	NA
LISN	EMCO	3625/2	A00022	01-18/2016	01-18/2018
Measurement Receiver	Rohde & Schwarz	ESCS30	A00726	09/2014	09/2015
Shielded room for Conducted emissions	--	--	A00437	NA	NA
Temperature-Humiditymeter	Extech	SD500	A00444	03/2015	03/2016

NA= Not Applicable

Conformance of the used measurement and test equipment with the requirements of ISO/IEC 17025:2005 has been confirmed before testing.

## 6 Testsetup photographs

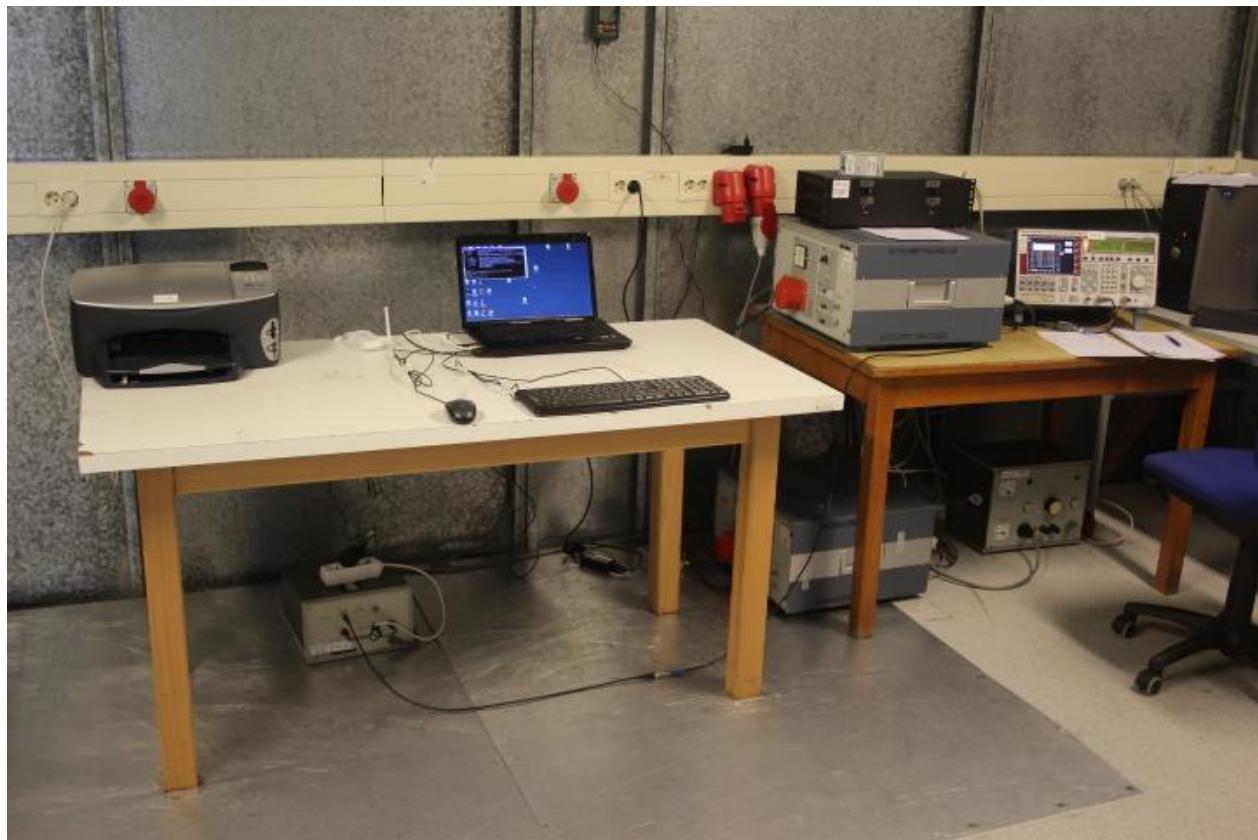
### 6.1 Testsetup photographs radiated emissions



#### 6.1.1 Testsetup photographs radiated emissions



#### 6.1.2 Testsetup photographs AC power line conducted emissions



Test specification(s): FCC Part 15B, ICES-003  
Description of EUT: PHERIPHERAL DEVICE  
Manufacturer: Heyrex  
Brand mark: Heyrex  
Model: R4  
FCC ID: RGZ-R4  
IC: 12380A-R4

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**END OF REPORT**