

Prüfbericht-Nr.: Test Report No.:	20071401.r03	Auftrags-Nr.: Order No.:	89217437	Seite 1 von 17 Page 1 of 17
Kunden-Referenz-Nr.: Client Reference No.:	POC-LM-000674	Auftragsdatum: Order date:	2020-08-25	
Auftraggeber: Client:	Nedap N.V., Parallelweg 2 7141 DC Groenlo, Netherlands			
Prüfgegenstand: Test item:	134.2 kHz Inductive RFID tag Reader / Motor control Unintentional radiator - Digital Device part			
Bezeichnung / Typ-Nr.: Identification / Type No.:	VP1004B			
Auftrags-Inhalt: Order content:	Compliance with regulatory requirements			
Prüfgrundlage: Test specification:	47 CFR PART 15 (10-1-19 EDITION), Subpart 15B ICES-003 (Issue 6, January 2016) -			

Wareneingangsdatum: Date of receipt:	2020-09-23	
Prüfmuster-Nr.: Test sample No.:	1229	
Prüfzeitraum: Testing period:	2020-10-29 - 2020-11-12	
Ort der Prüfung: Place of testing:	Leek	
Prüflaboratorium: Testing laboratory:	TÜV Rheinland Nederland B.V. Leek Laboratory	
Prüfergebnis*: Test result*:	Pass	

geprüft von / tested by: 			genehmigt von / reviewed & authorized by:		
Datum /date: 2020-12-21 R. van der Meer, Expert			2020-12-21 T. Koning, Senior Expert		
Datum Date	Name / Stellung Name / Position	Unterschrift Signature	Datum Date	Name / Stellung Name / Position	Unterschrift Signature
Sonstiges / Other: this report concerns the Unintentional radiator part. Issue date is equal to authorized date.					
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:			Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet					
Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. Test specification(s) F(ail) a.m. test specification(s) N/A = not applicable N/T = not tested					
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the above mentioned testsample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This report does not entitle to carry any test mark					

V04

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Liste der verwendeten Prüfmittel
List of used test equipment

Conformance of the used measurement and test equipment with the requirements of ISO/IEC 17025:2005 has been confirmed before testing.
NA= Not Applicable

Prüfmittel Kind of Equipment	Hersteller / Manufacturer	Bezeichnung / Model Name	Prüfmittel- Nr. / ID-Nr. Equipment No. / ID-No.	Kalibrierung Calibration (mm/yyyy)	Nächste Kalibrierung Next calibration (mm/yyyy)
For Radiated Emissions					
Measurement Receiver	Rohde & Schwarz	ERC7	2790497	08/2020	08/2021
RF Cable S-AR	Gigalink	APG0500	2789217	03/2020	03/2021
Test facility	Comtest	FCC listed: 786213 IC: 2932G-2	2789009	03/2020	03/2022
120Vac source	EMtest	DPA500N	2789197	11/2019	11/2021
Spectrum Analyzer	Rohde & Schwarz	FSV	2790106	09/2020	09/2021
Antenna mast+control	Innco	CO3000	9002463	N/A	N/A
Temperature- Humiditymeter	Extech	SD500	2789214	07/2020	07/2021
Biconilog Testantenna	Teseq	CBL 6111D	2789237	08/2020	08/2021

Prüfmittel Kind of Equipment	Hersteller / Manufacturer	Bezeichnung / Model Name	Prüfmittel- Nr. / ID-Nr. Equipment No. / ID-No.	Kalibrierung Calibration (mm/yyyy)	Nächste Kalibrierung Next calibration (mm/yyyy)
For AC Powerline Conducted Emissions					
Pulse limiter	R&S	ESH3-Z2	2788823	09/2020	09/2021
120Vac source	EMtest	DPA500N	2789197	11/2019	11/2021
LISN	Rohde & Schwarz	ESH2-Z5	2788791	07/2020	07/2021
Measurement Receiver	Rohde & Schwarz	ESCS30	2789421	10/2020	10/2021
Shielded room for Conducted emissions	--	--	2789207	NA	NA
Temperature- Humiditymeter	Extech	SD500	2789211	07/2020	07/2021

Accreditation

The reported tests were performed under ISO17025 accreditation, unless otherwise specified as 'not under Accreditation'. An overview of all TÜV Rheinland Nederland B.V. accreditations, notifications and designations, please visit our website www.tuv.com/nl. You can find the relevant declarations under the download link.

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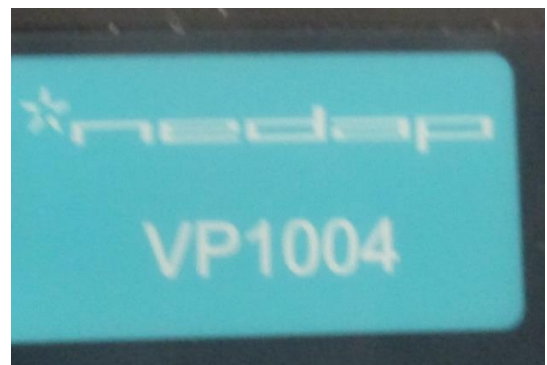
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Produktbeschreibung
Product description

1	Produktdetails <i>Product details</i>	134.2 kHz Inductive RFID tag Reader-Motor control
2	Maße / Gewicht <i>Dimensions / Weight</i>	L x W x H = 143 x 120 x 68 mm / ± 430 g
3	Bedienelemente <i>Operating elements</i>	None
4	Ausstattung / Zubehör <i>Equipment / Accessories</i>	2x Switch, 1 x Lamp, 5 x Antenna, VP1001, Power Supply VP2002, VPU VP8002, Laptop
5	Verwendete Materialien <i>Used materials</i>	None
6	Sonstiges <i>Other</i>	none



Absatz				
Clause	Anforderungen – Prüfungen / Requirements - Tests			
1	47 CFR Part 15 (10-1-19 Edition) - 15.107(a) ICES-003 (Issue 6, January 2016) – Section 6.1 Table 2	AC Power Line Conducted Emissions	P F N/A N/T	☒ ☐ ☐ ☐
2	47 CFR Part 15 (10-1-19 Edition) - 15.109 ICES-003 (Issue 6, January 2016) – Section 6.2.1 Table 5	Radiated unwanted emissions	P F N/A N/T	☒ ☐ ☐ ☐

Testmethods: ANSI C63.4-2014.

Revisions Revisions			
Revision Revision	Datum Date	Anmerkung Remark	Verfasser Author
-	2020.12.21	First release	R. van der Meer
Note: Latest revision report will replace all previous reports			

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1.1 Tested system details/ disclaimer.

Info as provided by the client.

The VP1004B is a reader with an RFID interface. Up to 8 antennas may be connected. Antennas are scanned one by one. It is used to identify animals for location, feeding, weighing, milking, heat detection, etc. 2 input switches and pilot lights may be connected

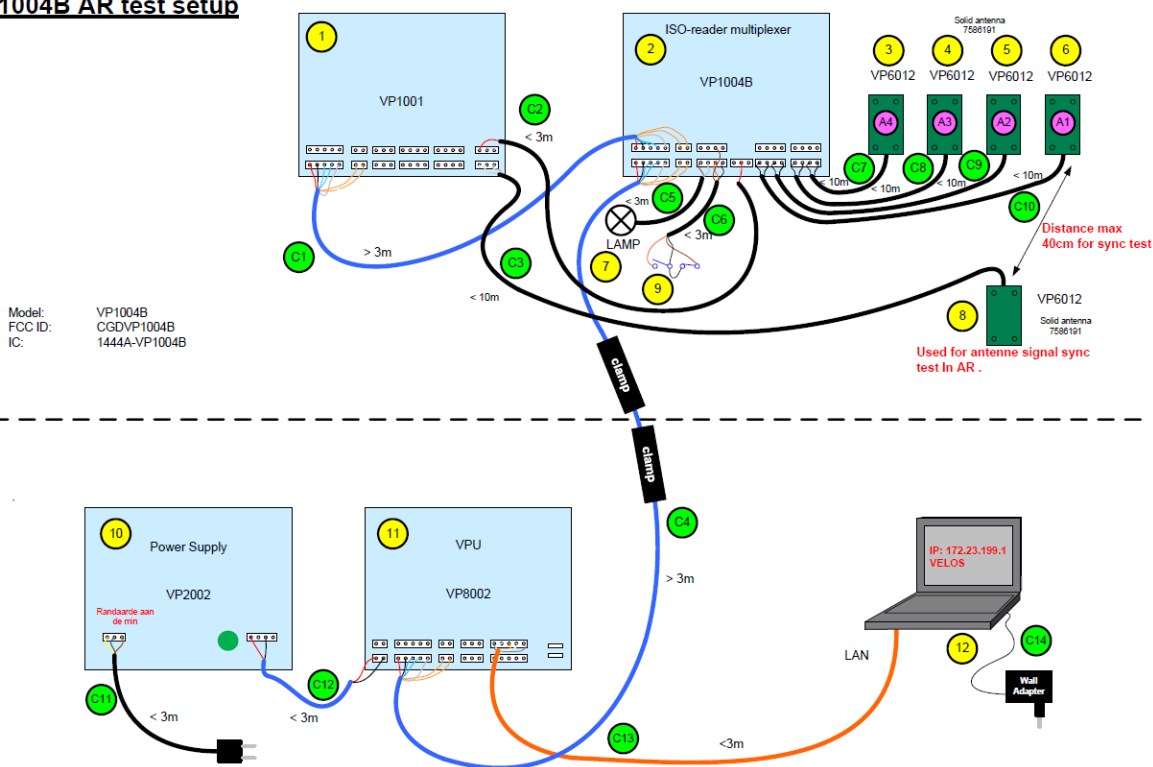
Technical Specifications

Technical Specifications	Value
Operating Frequency	134.2 kHz
Channel number	1
Operation Voltage	25 Vdc
Output power / MaximumHfPowerlevel (%)	100
Extra Power option	0
Modulation	None
Antenna Type tested	External magnetic wire loop VP 6012
Antenna Gain	-(loop antenna)

The setup is build up as in Fig. 1 below. The connection is monitored and the antennas are tuned with a laptop and Velos software from Nedap.

VP1004B AR test setup

28 Oktober 2020



List of used cables

Number	Function	From	To	Length	Remarks
C1	CAN	EUT	VP1001	> 3m	
C2	FSYNC	EUT	VP1001	< 3m	
C3	Antenna	VP1001	Antenna	< 10m	
C4	CAN	VPU (VP8002)	EUT	> 3m	
C5	Lamp	EUT	Lamp	< 3m	
C6	I/O Switch	EUT	Switches	< 3m	
C7	Antenna	EUT	Antenna	< 10m	
C8	Antenna	EUT	Antenna	< 10m	
C9	Antenna	EUT	Antenna	< 10m	
C10	Antenna	EUT	Antenna	< 10m	
C11	AC Mains	Mains	PSU (VP2002)	< 3m	Outside S-AR/F-AR
C12	Power supply	VP2002	VPU (VP8002)	< 3m	Outside S-AR/F-AR
C13	Ethernet	VPU (VP8002)	Laptop	< 3m	Outside S-AR/F-AR
C14	Laptop Adapter	AC/DC Adapter	Laptop	< 3m	Outside S-AR/F-AR

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

Test item EUT pos 2	:	EUT
Manufacturer	:	Nedap N.V.
Brand mark	:	Nedap
Models	:	VP1004B
Serial number(s)	:	Engineering Sample
Remark	:	I/O connected to VP1001, VPU, lamp, switches, antenna's
Test item (AUX1) Pos 1	:	ISO Reader
Manufacturer	:	Nedap N.V.
Brand mark	:	Nedap
Model	:	VP1001
Serial number	:	KO18 D 0005
Test item (AUX2) Pos. 10	:	Power supply
Manufacturer	:	Nedap N.V.
Brand	:	Nedap
Models	:	VP2002
Serial number	:	J331 A 0007
Voltage input rating	:	100 - 240V/ 50 - 60 Hz
Voltage output rating	:	25Vdc 2.5 Amp
Test item (AUX3) Pos 11	:	VPU
Manufacturer	:	Nedap N.V.
Brand	:	Nedap
Models	:	VP8002
Serial number	:	M630 A 0009
Test item (AUX4) Pos 3,4,5,6,8	:	Antenna's
Manufacturer	:	Nedap N.V.
Brand	:	Nedap
Models	:	VP6012
Serial number	:	---
Test item (AUX5) Pos 12	:	Laptop
Manufacturer	:	HP
Brand	:	HP
Models	:	EliteBook 840 G6
Serial number	:	5CG93278NN

1.2 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (10-1-19 Edition), sections 15.31, 15.107 and 15.109 and ICES-003 Issue 6 (January 2016) 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.

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.

1.3 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 Designation Number NL0005 (test site registration number: 786213). 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 CABID number NL0002 (test site 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.

1.4 Test conditions.

Normal test conditions:

Temperature (*)	: +15°C to +35°C
Relative humidity(*)	: 20 % to 75 %
Supply voltage	: 120 Vac / 60 Hz (25Vdc to EUT)

**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 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.

The unintentional radiator tests have been performed with a complete functioning system.

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.

3 Radiated emission data.

RESULT: PASS

Tested by: R. van der Meer
Date of testing: 2020-10-29

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 (µV/meter)	Field strength (dBµV/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

Table1 applicable limits

Test procedure:

ANSI C63.4-2014.

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 1.0 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 field strength measurements (30 MHz – 1.0 GHz)

Results and limits						
Frequency (MHz)	Result (dB μ V/m)	Antenna polarization	Limit (dB μ V/m)	Margin	Height (cm)	Angle (deg)
107.36	27.3	Vertical	40.0	12.7	99.7	143.1
139.03	21.1	Vertical	40.0	18.9	99.8	38.4
214.72	23.1	Horizontal	40.0	16.9	160.8	59.1
386.49	29.2	Vertical	47.0	17.9	138.6	17.0
547.53	33.2	Horizontal	47.0	13.8	99.7	47.1
547.54	35.9	Vertical	47.0	11.1	99.8	0.9
569.01	33.1	Horizontal	47.0	13.9	99.7	51.8
569.01	37.6	Vertical	47.0	9.4	99.8	4.7

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, 15.109 and ISD-003, section 6.2 are depicted in Table 2.

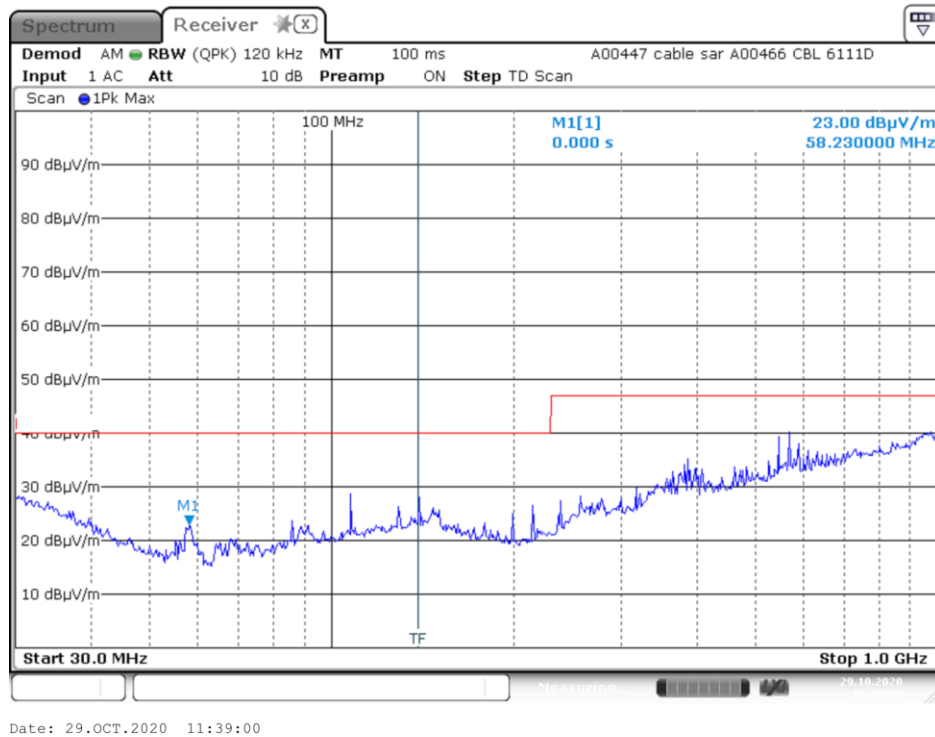
Notes:

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 5.1 dB.
3. The measuring antenna was varied in horizontal and vertical orientations and also around its axis and height. The reported value is the worst case found at the reported frequency.
4. *R refers to a frequency in a restricted band.
5. Qp detector used with a bandwidth of 120 kHz.
6. a selection of plots is provided on the next pages.

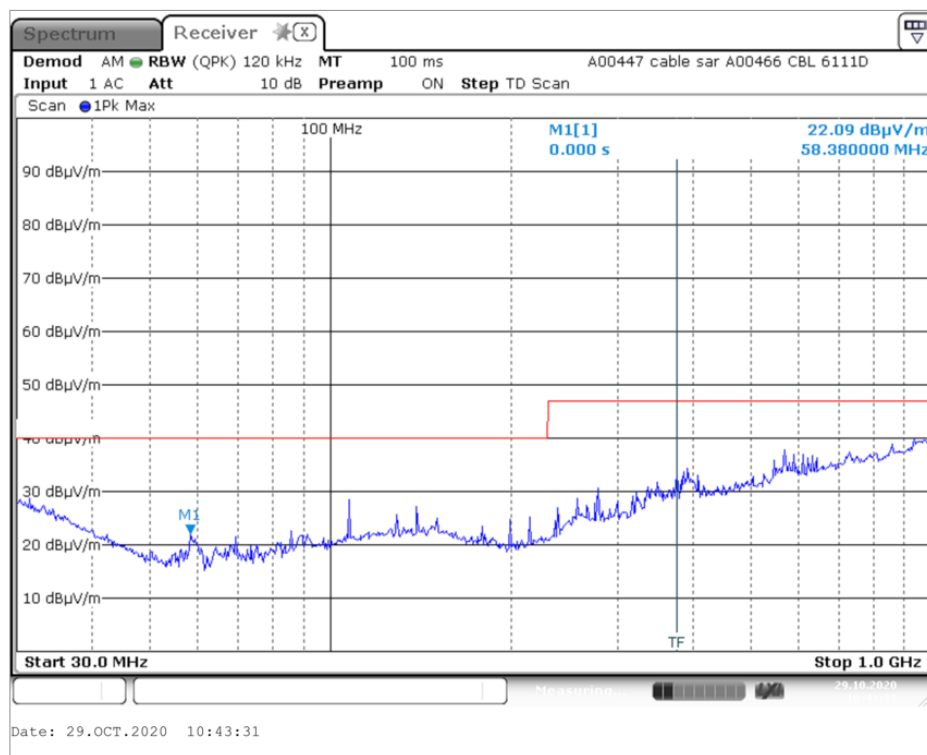
3.1.1 Test equipment used (for reference see test equipment listing).

2790499	2789217	2789009	2789214	2789237	9002463	
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3.1.2 Plot of the emissions



Plot 1a: radiated emissions of the EUT(vertical), Antenna vertical, in the range 30 – 1000 MHz (pre-scan -peak values shown).



Plot 1b: radiated emissions of the EUT(horizontal), Antenna vertical, in the range 30 – 1000 MHz (pre-scan -peak values shown).

4 AC Power line Conducted emission data.

4.1 AC Power Line Conducted Emission data of the EUT

RESULT: PASS

Tested by: R. van der Meer
Date of testing: 2020-11-12

Requirements: 15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Table 3

Frequency of Emission (MHz)	Conducted Limit (dB μ V) Quasi-Peak	Conducted Limit (dB μ 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 C63.4-2014.

Each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a 50 μ H / 50 Ω LISN. The frequency range from 150kHz to 30MHz was searched. The six highest EUT emissions relative to the limit were noted. The EUT was positioned at least 40cm from a vertical ground reference plane and at least 80cm from the LISN.

4.2 AC Power Line Conducted emission data of the EUT, results.

Results and limits Neutral						
Frequency (MHz)	Quasi peak detector			Average detector		
	Result	Limit	Margin	Result	Limit	Margin
0.16	44.5	65.5	21.0	24.7	55.5	30.8
0.38	35.0	58.3	23.3	23.8	48.3	24.5
0.40	37.1	57.8	20.7	29.5	47.8	18.3
0.43	32.1	57.3	25.1	22.6	47.3	24.7
0.48	30.9	56.3	25.4	22.5	46.3	23.9
11.31	34.7	60.0	25.4	30.1	50.0	20.0

Results and limits L1						
Frequency (MHz)	Quasi peak detector			Average detector		
	Result	Limit	Margin	Result	Limit	Margin
0.16	45.3	65.5	20.2	28.2	55.5	27.2
0.38	32.4	58.3	25.9	20.5	48.3	27.8
0.40	39.1	57.8	18.7	33.0	47.8	14.8
0.43	33.3	57.3	24.0	22.8	47.3	24.5
1.09	30.0	56.0	26.0	23.1	46.0	22.9
11.31	36.7	60.0	23.3	32.0	50.0	18.0

Table 4a/b AC Power Line Conducted emission measurements of the EUT

The results of the AC power line conducted emission tests, carried out in accordance with 47 CFR Part 15 section 15.107 and ICES-003 Section 6.1, at the 100-120 Volts AC mains connection terminals of AUX5, are depicted in Table 4a/b. Maximum values were 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.

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

2788823	2788794	2789421	2789207	2789211	2790478 / 2789158	
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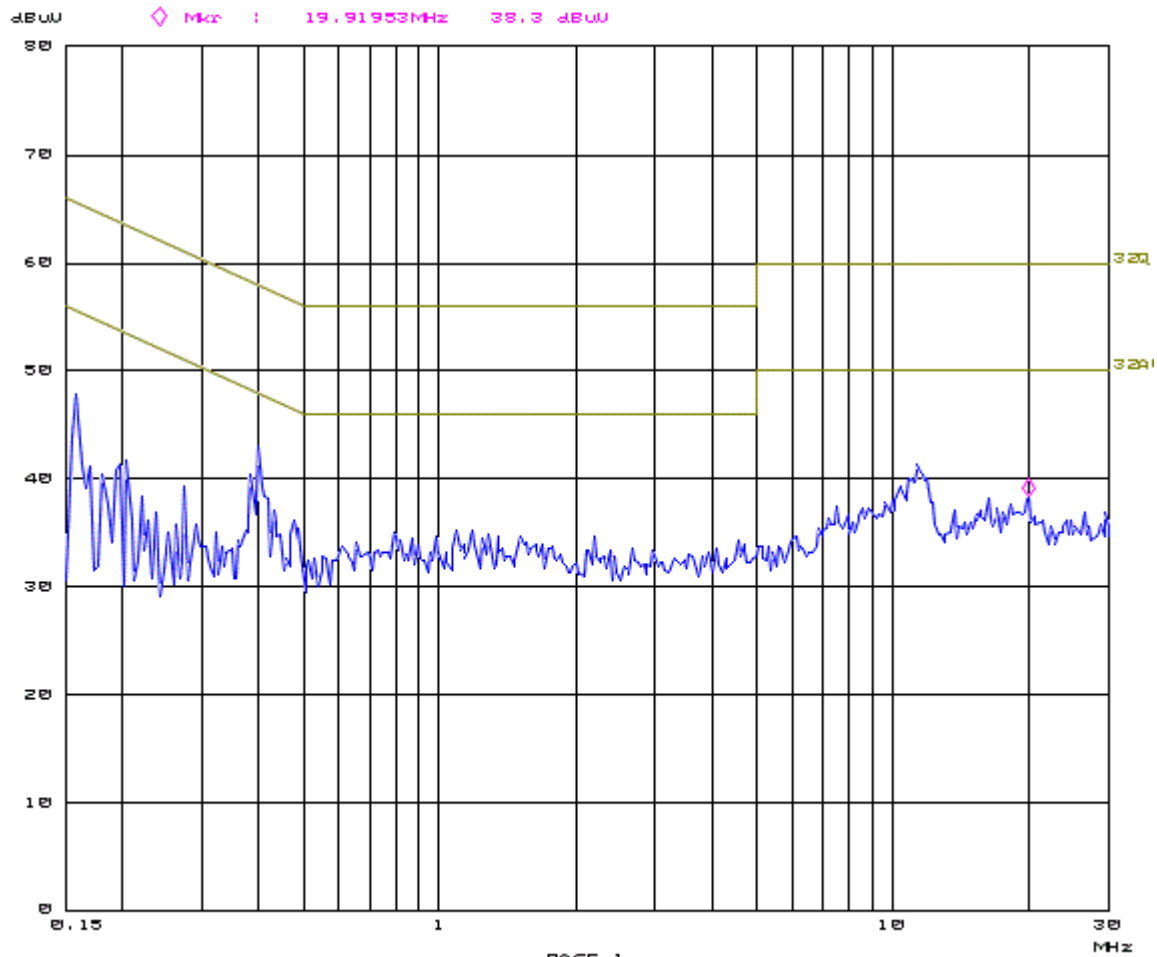
4.2.2 Plots of the AC Power Line Conducted Emissions

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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	20dB LN	OFF



Pre-scan plot with peak detector of the AC Power-line Conducted emissions
Max hold of L1 and N

<< End of report >>