



Prüfbericht-Nr.: Test Report No.:	20042101.r02	Auftrags-Nr.: Order No.:	89003933	Seite 1 von 25 Page 1 of 25		
Kunden-Referenz-Nr.: Client Reference No.:	POC-LM-000544	Auftragsdatum: Order date:	2020-05-12			
Auftraggeber: Client:	Nedap N.V., Parallelweg 2 71	41 DC Groenlo, Ne	therlands			
Prüfgegenstand: Test item:	134.2 kHz Inductive RFID tag	134.2 kHz Inductive RFID tag Reader				
Bezeichnung / Typ-Nr.: Identification / Type No.:	VP1105B					
Auftrags-Inhalt: Order content.	Compliance with regulatory re	equirements				
<b>Prüfgrundlage:</b> Test specification:	47 CFR PART 15 (10-1-19 El RSS-Gen (Issue 5 April 2018 Apparatus and RSS-210 (Issu -	) General Requirem	ents for Complian			

Wareneingangsdatum: Date of receipt.	2020-05-29	
Prüfmuster-Nr.: Test sample No.:	20042101-1	
Prüfzeitraum: Testing period:	2020-06-10 / 2020-06-18	Tryphenolem     The Tryphenolem     The Tryphenolem     Simple (1) / 20 / 10 / 1) / 20 / 10 / 1) / 20 / 10 / 1) / 20 / 10 / 1) / 20 / 10 / 1) / 20 / 10 / 1) / 20 / 10 / 10 / 10 / 10 / 10 / 10 / 10
Ort der Prüfung: Place of testing:	Leek	
Prüflaboratorium: Testing laboratory:	TÜV Rheinland Nederland B.V. Leek Laboratory	www.lely.com
Prüfergebnis*: Test result*:	Pass	

Datum /da						
2020-06-1	8 Richard van d	er Meer, Expert		2020-06-18	Erik van der Wal, Ex	pert
Datum	Name / Stellun	g Unt	erschrift	Datum	Name / Stellung	Unterschrift
Date	Name / Positior	n Sigi	nature	Date	Name / Position	Signature
	des Prüfgegenstan		ung:2		llständig und unbeschä	adigt
	n of the test item at a	2 = gut	3 = befriedigend	Test item com	llständig und unbeschä plete and undamaged 4 = ausreichend e(n) N/A = nicht anwendbar	5 = mangelhaft





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# **TEST SUMMARY**

Test Specification Clause	Test Case	Pass	Fail	Not applicable	Not performed
§15.209 / RSS-Gen Table 5	Radiated Emissions	$\boxtimes$			
§15.207 / RSS-Gen Table 4	AC Power Line Conducted Emissions	$\square$			

# Revisions Revision Datum Anmerkung Verfasser Revision Date Remark Author 2020.06.18 First release R. van der Meer Image: Note: Latest revision report will replace all previous reports Exposure Exposure





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# 1. General Remarks

## **1.1.1 Complementary Materials**

There is no attachment to this test report.

# 1.1.2 Special Accessories

None.

# 1.1.3 Equipment modifications

None





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# 2. Test Sites

## 2.1 Test Facilities

The Semi-Anechoic chamber and AC Line Conducted measurement facility used to collect the radiated and conducted data has been constructed in accordance with ANSI C63.7. The site has been measured in accordance with and verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 meters. The site is listed with the FCC and ISED and accredited by RvA (Cert #L484). The 3 meter semi-anechoic chamber used to collect the radiated data has been verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 meter. H-field measurements have been done in the Semi-Anechoic chamber to identify emissions from the EUT and final testing been performed on the outside facilities at 3m, 5m and 10m distance.

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 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.

Normal test conditions:

Temperature (\*): +15°C to +35°CRelative humidity(\*): 20 % to 75 %Supply voltage: 25 Vdc.

(\*)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.





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#### 2.2 List of Test and Measurement Instruments

#### **Table 1: List of Test and Measurement Equipment**

Kind of Equipment	Manufacturer	Model Name	Inventory number	Calibration date (mm/yyyy)	Calibration due date (mm/yyyy)
For Radiated Emission	าร				
Measurement Receiver	Rohde & Schwarz	ERC7	2790499	08/2019	08/2020
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
Spectrum Analyzer	Rohde & Schwarz	FSV	2790106	07/2018	07/2020
Antenna mast+control	Innco	CO3000	9002463	N/A	N/A
Temperature- Humiditymeter	Extech	SD500	2789214	07/2019	07/2020
Biconilog Testantenna	Teseq	CBL 6111D	2789237	11/2019	11/2020
Magnetic Loop Antenna, Active	Chase	HLA-6120	2790033	12/2017	12/2020
Magnetic Loop Antenna, Passive	EMCO	6509	2788774	12/2017	12/2020
25Vdc power supply	Delta Elektronika	E 030-3	2788897	02/2020	02/2021
120Vac source	EMtest	DPA500N	2789197	11/2019	11/2021
Kind of Equipment	Manufacturer	Model Name	Inventory number	Calibration date (mm/yyyy)	Calibration due date (mm/yyyy)
For AC Powerline Conducted Emissions					
Pulse limiter	R&S	ESH3-Z2	2788823	09/2019	09/2020

LISN	Rohde & Schwarz	ESH2-Z5	2788791	06-27/2018	06-27/2020
Measurement Receiver	Rohde & Schwarz	ESCS30	2790497	07/2019	07/2020
Shielded room for Conducted emissions			2789207	NA	NA
Temperature- Humiditymeter	Extech	SD500	2789211	07/2019	07/2020
25Vdc power supply	Delta Elektronika	E 030-3	2788897	02/2020	02/2021

DPA500N

2789197

11/2019

11/2021

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

#### Accreditation

120Vac source

EMtest

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 <u>www.tuv.com/nl</u>. You can find the relevant declarations under the download link.





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# 2.3 Measurement Uncertainty

#### **Table 2: Emission Measurement Uncertainty**

Measurement Type	Frequency	Uncertainty
Radiated Emission	9kHz - 30MHz	±5.0dB
	30MHz - 1GHz	±5.0dB
AC Power Line Conducted Emissions	150kHz - 30MHz	±3.5dB





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# 3. General Product Information

The EUT is used for electronic animal identification through RFID. The EUT has the capability of operating on 134.2 kHz. For details refer to the User Guide, data sheet and circuit diagram.

**Technical Specifications** 

Technical Specifications	Value
Operating Frequency	134.2 kHz
Channel number	1
Operation Voltage	25 Vdc
Modulation	None
Antenna Type tested	Internal magnetic wire loop
Antenna Gain	-(loop antenna)

#### 3.1 Countermeasures to achieve compliance

No additional measures were employed to achieve compliance.

#### 3.2 Operation Modes

Testing was performed at 134.2 kHz, the only operating frequency at MaximumHfPowerLevel of 100%. Extra power option=1 for maximum boost was enabled.





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## 3.3 Physical Configuration for Testing

The EUT was tested on a stand-alone basis as per Figure 1.

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 C63.10-2013.

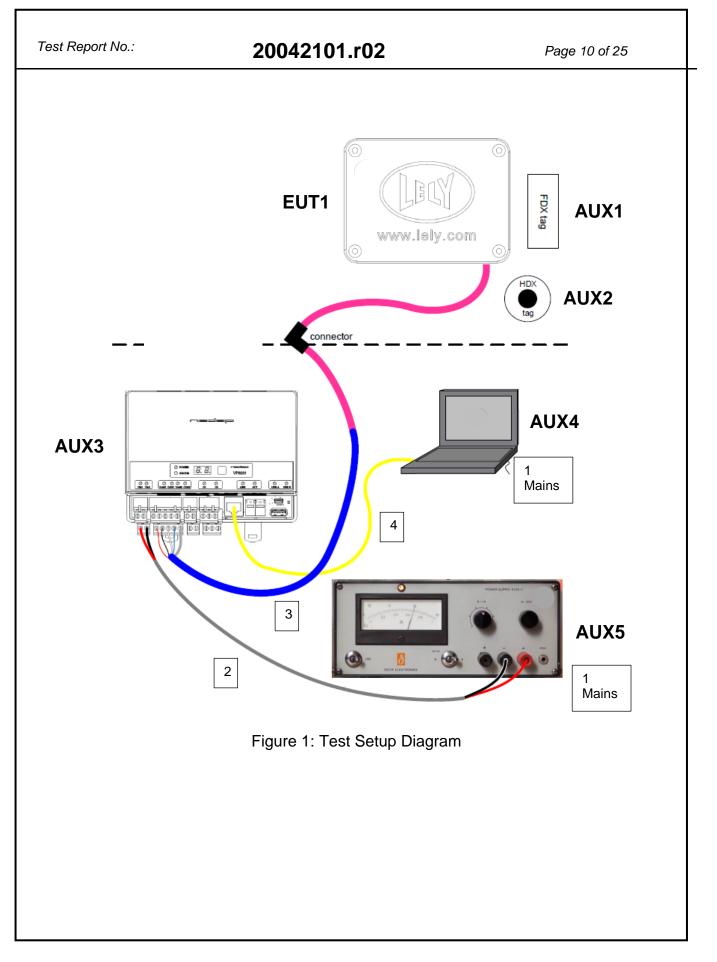
Test setup as in Fig.1. After starting VPU (on AUX4), connection with the tags is made automatically.

	List of tested cables							
Number	Function	From	То	Length	Remarks			
1	mains	mains	AUX4&5	> 3m	Both in one			
2	DC power Main	AUX5	AUX3	> 3m	screened cable			
3	DC power &CAN EUT	AUX3	EUT	> 3m	-			
4	com	AUX3	AUX4	<3m	-			

See Figure 1 on the next page.











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# 3.4 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

Test item (EUT1)	: Inductive RFID tag Reader
Manufacturer	: Nedap Livestock Management
Brand mark	: Nedap
Model	: VP1105B
Serial number	: 9228004
Applied software	: Nedap VPU
Test item (AUX1)	: RFID transponder
Model	: FDX
Test item (AUX2)	: RFID Transponder
Model	: HDX
Test item (AUX3)	: Processing control unit
Manufacturer	: Nedap Livestock Management
Brand mark	: Nedap
Model	: VP8001
Serial number	: 9911057
Test item (AUX4)	: Laptop
Manufacturer	: Hewlett Packard
Brand mark	: Hewlett Packard
Model	: EliteBook 840 G6
Serial number	: 5CG93278NN
Test item (AUX5)	: Power Supply
Manufacturer	: Delta Elektronika
Brand mark	: Delta
Model	: E030-3
Serial number	: 08855 (Inventory nr. 2788897)





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# 4. Test Results

#### 4.1.1 20dB and 99% Bandwidth

**RESULT: PASS** 

Tested by: Date of testing: R. van der Meer 2020-06-18

Requirements:

For 99% Bandwidth: RSS-Gen Section 4.6.1: No requirement is given.

Test procedure 20dB bandwidth:

ANSI C63.10-2013 section 11.8.1

A spectrum analyzer was connected to the antenna port of the EUT. The spectrum analyzer resolution bandwidth was set to 200 Hz, video bandwidth to 1kHz and the span wide enough to capture the modulated carrier.

For 99% Bandwidth:

Test procedure: RSS-Gen.

The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission sideskirts. The resolution bandwidth shall be set as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

A spectrum analyzer was connected to the antenna port of the EUT. The spectrum analyzer resolution bandwidth was set to 1% of the selected span, Video bandwidth was set to 3 times the resolution bandwidth. The span was set to capture the whole modulation process. The Spectrum analyzers automated function for 99% BW was used.





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#### 20dB and 99% Bandwidth

Operating Frequency [MHz]	99% Bandwidth [kHz]	20dB Bandwidth [kHz]	Plot number
0.1342	1.75	1.02	A1/A2

Ref Level				RBW 200		_			
Att	15 c	IB SWT	9.4 ms	<b>• VBW</b> 500	Hz Mo	ode Auto FF1	Γ		
●1Pk View			1		<del></del>				
						-M1[1]			10.34 dBµ 34.20000 kH
				N.	<b>1</b> 1	-Occ Bw			34.20000 KF i1124438 kF
10 dBµV							1	1.75	1124438 KH
0 dBµV									
10 40.44		<b>T</b> 4						+	
-10 dBµV-+		T1 							
THE TRUNK									
-20 <sup>-</sup> dBµV									
-30 dBµV									
-30 UBHV									
-40 dBµV									
-40 ubµv									
-50 dBµV—									
-JO UBHV									
-60 dBµV									
-70 dBµV—									
-,0 0000									
CF 134.2 kł	-lz			200:	l pts			S	pan 3.0 kHz
Aarker					_ <b>·</b>				•
Type   Ref	Trc	X-value	.	Y-value	F	unction	Fi	unction Res	ult
M1	1		1.2 kHz	10.34 dB					
Τ1	1	133.361	92 kHz	-14.32 dB	μV	Occ Bw		1.75	51124438 kHz
T2	1	135.113	04 kHz	-14.39 dB	μV				

Date: 18.JUN.2020 08:26:09

Plot A1, 99% dB BW, with tags (is worst case)



200	421	01.I	r <b>02</b>

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Spectrum									(₩
Ref Level 2				<b>RBW</b> 200					
Att	15 dB	SWT	9.4 ms (	<b>VBW</b> 500	Hz Mo	de Auto FFT			
)1Pk View									
						-M1[1]			10.34 dBµV
				M	1			134	.20000 kHz
10 dBµV—+					<u> </u>	-ndB			20.00 dB
						Bw		1.024	000000 kHz
) dвµV——						Q factor			131.1
			T1 V			Т2			
-10 dBµV—									
								<u> </u>	
20 dBµV									
-30 dBµV—									
.40 dBµV—									
-50 dBµV—									
.60 dBµV				_					
.70 dBµV—				_					-
CF 134.2 kH	lz		1	2001	pts			Sp	an 3.0 kHz
1arker								•	
Type   Ref	Trc	X-value	e	Y-value	Fu	nction	Fun	ction Resul	t
M1	1	134	4.2 kHz	10.34 dBµ		idB down			1.024 kHz
T1	1	133.69	948 kHz	-9.66 dBµ	IV .	ndB			20.00 dB
T2	1	134.71	.87 kHz	-9.66 dBµ	IV	Q factor			131.1
	)(					leasuring			18.06.2020 08:27:09

Date: 18.JUN.2020 08:27:08

Plot A2 20 dB BW, with tags (is worst case)

Test Report No.:





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## 4.1.2 Radiated Emissions of Transmitter

**RESULT: PASS** 

Tested by: Date of testing: R. van der Meer 2020-06-15 / 2020-06-17

Frequency range:

9kHz - 1GHz

Requirements:

FCC 15.209 and RSS-Gen

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following tables:

Frequency (MHz)	Field strength (microvolts/meter)	Field strength (dBµV/m)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	43.5-13.8	300
0.490-1.705	24000/F(kHz)	33.8-22.9	30
1.705-30.0	30	29.5	30

Table 2a. Field strength limits

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 (Av), 74 (Pk)	3

Table 2b applicable limits

Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and RSS-Gen Table 7, must comply with the radiated emission limits specified in FCC 15.209(a) and RSS-Gen Table 5&6.





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Test procedure:

Test Report No .:

ANSI C63.10-2013.

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 were varied in order to ensure that maximum emission amplitudes were attained. The spectrum was examined from 9 kHz to 1 GHz. Radiated emission testing was performed at a distance of 3 meters in a 5 meter semi-anechoic chamber. I

Final radiated emission measurements below 30MHz were made at 3m, 5m and 10m distance on the outside open field facility. The measured values were corrected to the 30m distance using the extrapolation factor of 40dB/decade as per FCC Part 15.31(f)(2) or by determining the proper extrapolation factor by using the measurement results at 3m and 10m 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.





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#### 4.1.3 Radiated field strength measurements H-field, 0.009-30 MHz.

Frequency (MHz)	Measurement results	Measurement results (for info only)	results	Detector	Extrapolation factor	Measurement results (calculated)	Limits	Pass/ Fail
	dBµV @3m	dBµV @5m	dBµV @10m		dB	dBµV/m @300m	dBµV/m @300m	
0.1342 (fundamental)	116,2 (x) 92.4 (y) 93.7 (z)	99.9 (x) 86.2 (y) 89.8 (z)	88.5 (x) 83.5 (y) 86.2 (z)	Pk	105.9 * <sup>1</sup>	10.3 (x)	45.1	Pass
0.1342 (fundamental)	112.9 (x) 87.8 (y) 89.4 (z)	95.4(x) 78.4 (y) 83.9 (z)	85.7 (x) 75.1 (y) 77.4 (z)	Av	104.0 *1	8.9 (x)	25.1	Pass
0.2684 *H	76,2 (x)	-	-	Pk	80	-3,8 (x)	39.0	Pass
0.2684 *H	43,7 (x)	-	-	Av	80	-36,3 (x)	19.0	Pass
0.4026 *H	55,3 (x)	-	-	Pk	80	-24,7 (x)	35.5	Pass
0.4026 *H	41,6 (x)	-	-	Av	80	-38,4 (x)	15.5	Pass
7,17	45,1 (x)	-	-	Pk <sup>6</sup>	40	5,1 (x)	29.5@30m	Pass

Table 3 Radiated emissions of the EUT

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

2789083	2790033	2788774	2789217	2788897		

#### 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 0.2684 MHz fundamental frequency is calculated as: Measurement result– Extrapolation Factor => 76.2 dBµV– 80 dB = -3.8 dBµV/m. For the fundamental the extrapolation factor is calculated from the measured value obtained at 3m and 10m by using the equation: (d1/d2)<sup>n</sup> = (H<sub>d2</sub>/H<sub>d1</sub>).
- In the frequency range 9 kHz 10 MHz Peak detector used during measurements with a
  resolution bandwidth of 9kHz was used. Most Peak values were already within Av limits. For the
  frequency range 10 MHz 30 MHz a Quasi peak detector used during measurements with a
  resolution bandwidth of 9kHz was used.
- 3. Field strength values of radiated emissions at frequencies in the frequency range 0.009 30 MHz not listed in Table 3 are more than 20 dB below the applicable limit. The reported value is the worst case found at the reported frequency. Measurement antenna in axial position was the worst case.
- 4. Restricted bands were investigated and were found to be below the levels as reported in Table 3.
- 5. Measurement uncertainty is  $\pm 5.0$ dB.
- 6. Pk value within Qp limit.





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#### 4.1.4 Radiated Spurious Emissions, 30MHz - 1GHz

Frequency [MHz]	EUT Orientation	Antenna Orientation	Level QP [dBµV/m]	Limit QP [dBµV/m]	Verdict [Pass/Fail]
30,7	Vertical	Vertical	29.1	40.0	Pass
36,5	Vertical	Vertical	30.1	40.0	Pass
98,6	Vertical	Vertical	24.7	43.5	Pass
236.2	Vertical	Horizontal	34.3	46.0	Pass
300.3	Z	Horizontal	30.1	46.0	Pass
397.3	Z	Vertical	26.5	46.0	Pass

Table 4 Radiated emissions of the EUT

Note: - Level QP = Reading QP + Factor

- Tested in modes as described in section 3.2, the 6 highest values noted.
- \*<sup>R</sup> refers to a frequency in a restricted band, \*<sup>H</sup> refers to a harmonic of the fundamental
- Quasi Peak detector used with a bandwidth of 120 kHz.
- Measurement uncertainty is +/- 5.0 dB.
- a selection of plots are provided on the next pages





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#### 4.1.5 Plots of the emissions [₩ Spectrum Receiver X Ref Level 80.00 dBµV/m 🔵 RBW 100 kHz 10 dB SWT 37.9 µs 👄 VBW 300 kHz Mode Auto FFT Input 1 AC Att 🕯 PS PA TDF ●1Pk View M1[1] 45.14 dBµV/m 7.1690 MHz 70 dBµV/m· 60 dBµV/m 5<mark>0</mark> dBμV/m· Μ1 J. Aa. 40 dBµV/m· 30 dBµV/m· 20 dBµV/m 10 dBµV/m 0 dBµV/m--10 dBµV/m Start 150.0 kHz 2001 pts Stop 30.0 MHz 15.06.2020 11:07:52 Measuring... ••••

Date: 15.JUN.2020 11:07:52

Plot of the emissions in the range 1 - 30 MHz (Peak detector values shown), EUT vertical





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Ref L Att	evel (	32.00 dBj		048 1 115	<ul> <li>RBW 100 kH</li> <li>VBW 300 kH</li> </ul>		ito FFT Inp	ut 1 AC		▽
PS PA			0 UB 3WI	940.1 µs	- YBW 300 KH	2 Mode Ad	логга тар	ut I AC		
∋1Pk V										
	nit tih				ASS	M1[1]		38	5.82 dBµV	
70 dBµ	//m	:15c	++	F	ASS				30.730 N	
						M2[1]		3.	F.59 dBµV 36.540 №	
60 dBµ\	//m+						1	1	30.340 #	1112
50 dBµ	//m+-								F	
CC15c	(m+				M6			وردالالعامين ورساله والمحدد الالعام	un many and and and	A. water
30 dBµ			M4M5		<b>•</b>	والمصحر التناوير المحدور وال		A CONTRACTOR OF		
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- V *	//m	um ul	U. Juleunenlyter	deployed the deployed	**************************************					
10 dBµV 0 dBµV)	//m //m /m	de mandel	U. Juleunaulite	ikiti ana kita da kita						
10 dBµ	//m //m /m	um y	V. J. Jake and the second states	ikiti wasite dukit						
( 10 dBμV 0 dBμV/ -10 dBμ	//m //m //m //m //m		Und when the second star	\$15.000 A.Herladd	2001 pt				970.0 Mł	
10 dBμV 0 dBμV -10 dBμ CF 515	//m //m //m //m //m		Un portugation of the second sec	ikiti nan tiken tukki						
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10 dBµV 0 dBµV/ -10 dBµ CF 515 Marker Type M1 M2	//m //m //m //m //m	Iz Trc 1 1	X-value 30.7: 36.5-	3 MHz 4 MHz	2001 pt 2001 pt <u>Y-value</u> 35.82 dBµV/m 34.59 dBµV/m	ts		Spar	970.0 MI	
10 dBµV 0 dBµV -10 dBµ CF 515 Marker Type M1 M2 M3	//m //m //m //m //m	Iz Trc 1 1 1 1	X-value 30.7 36.5 98.5	3 MHz 4 MHz 9 MHz	2001 pt 2001 pt Y-value 35.82 dBµV/m 34.59 dBµV/m 33.64 dBµV/m	ts		Spar	970.0 MI	
10 dBµV, -10 dBµV, -10 dBµV, <b>CF 515</b> Marker Type M1 M2 M3 M4	//m //m //m //m //m	Trc   1 1 1 1 1	X-value 30.7: 36.5: 98.5: 236.2:	3 MHz 4 MHz 9 MHz 5 MHz	2001 pt 2001 pt 35.82 dBµV/m 34.59 dBµV/m 33.64 dBµV/m 29.31 dBµV/m	ts		Spar	970.0 MI	
10 dBµV 0 dBµV -10 dBµ CF 515 Marker Type M1 M2 M3	//m //m //m //m //m	Iz Trc 1 1 1 1	X-value 30.7 36.5 98.5	3 MHz 4 MHz 5 MHz 5 MHz 9 MHz	2001 pt 2001 pt Y-value 35.82 dBµV/m 34.59 dBµV/m 33.64 dBµV/m	ts		Spar	970.0 MI	

Plot of the emissions in the range 30 – 1000 MHz (Peak detector values shown), Test Antenna Vertical EUT vertical (X)

Receiver	5	pectrum	×					
Ref Level : Att PS PA TDF	82.00 (	1.1	948.1 µs	<ul> <li>RBW 100 kH</li> <li>VBW 300 kH</li> </ul>		e Auto	FFT Input 1	AC
⊖1Pk View								
Limit dh Line FCC 70 dBµV/m				PASS PASS		4[1] 1[1]		35.21 dBµV/r 236.260 MH 27.42 dBµV/r
60 dBµV/m 50 dBµV/m		,						30.730 MH
20 dBµV/m 20 dBµV/m	the strait.	M3 M5 M6	hiles and a second	10011-01-11-10-10-10-11-11-11-11-11-11-1	alath Wendsmanner	مارور شکو دونداد	and the second second second	here we do a ser an
20 dBL////// 10 dBµV/m								
-10 dBµV/m								
CF 515.0 MH	łz			2001 p	ts			Span 970.0 MHz
Marker								
	Trc	X-value		Y-value	Func	tion	Fun	ction Result
M1	1		73 MHz	27.42 dBµV/m				
M2	1		54 MHz	24.09 dBµV/m				
M3 M4	1		94 MHz 26 MHz	30.46 dBµV/m 35.21 dBµV/m				
M4 M5	1		59 MHz	30.30 dBµV/m	-			
M6	1		77 MHz	32.38 dBµV/m				
	][				Mea	suring.		15.06.2020 09:32:21

Date: 15.JUN.2020 09:32:21

Plot of the emissions in the range 30 - 1000 MHz (Peak detector values shown), Test Antenna Horizontal, EUT vertical (X)





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Ref Lo Att				X									(₩
	evel	32.00 di				RBW 100							
PS PA	TDE		10 dB <b>S</b>	WT 94	48.1 µs	VBW 300	kHz Moo	le Auto	FFT	Input 1	AC		
1Pk Vi													
	it dh	eck		-		PASS	N	14[1]			29	38 dBµ	V/m
						PASS						36.400	
70 d <mark>b</mark> j/	7m+						N	11[1]				32 dBµ	
50 dBµ\	/m											30.730	
io oppa													
50 dBµ\	/m+-							+					-
	les		_										
CC150	<i>"</i> "T		M4	M5	М					ملعانية بريون والمر	والمعرب والمعادية والمعرب المعادية	بالأنبي وملاي	Mentilipation
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γr	/m	- And the	in the second states	sılasyışdı.	مىنى لەيرىكى بىلىكى بىلىكى بىلىكى بىلىكى	and the second							
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ут .0 dВµ∿ I dВµ∨/	/m //m //m m	J. March	Landar Marian	Sul a Standor	nga ang kang kang kang kang kang kang ka								
ут 10 dBµV ) dBµV/ 10 dBµ	/m //m //m //m //m	Hz	in the second	hulahu pale	And								
ут 10 dBµV 0 dBµV/ -10 dBµ <b>Start 3</b>	/m //m //m //m //m	Hz	e de la constantia de l	s.plasije dr	And	2001						op 1.0 (	
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M2 M3	//m //m //m //m D.0 M	Trc 1 1	X-va	alue 30.73 36.54 98.24	MHz MHz MHz MHz MHz	2001 Y-value 33.32 dBµV/i 34.37 dBµV/i 32.62 dBµV/i	pts Fund m m m m m				St	op 1.0 (	

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Plot of the emissions in the range 30 – 1000 MHz (Peak detector values shown), Test Antenna Vertical EUT horizontal (Y)

Receiver	Sp	ectrum 🙁	ſ						Ę
Ref Level 8 Att PS PA TDF			8.1 µs 🖷	RBW 100 kH VBW 300 kH		e Auto	FFT Input	t 1 AC	
●1Pk View									
Limit the			PA	55	M	4[1]			0.53 dBµV∕
70 dBuV/m	15c		PA	88					236.460 MH
, o appy,					M	1[1]		3:	3.36 dBµV∕
60 dBµV/m							1	1	30.730 MF
50 dBµV/m									
									Internals
	5	M4 M6				الدينية والمراد	ماجدا جذبها محودة معمد مدداه	and the second second	(and and a state of the state o
			والجواري المراجل	adatelika wakindiki katali 1930					
20 ABUNO	الجب الجب	the stand and the stand	mental of					_	_
1									
10 dBµV/m									
-10 dBµV/m								_	
Start 30.0 MH	lz			2001 p	ts			S	top 1.0 GH
Marker									
Type Ref		X-value		Y-value	Func	tion	F	unction Res	ult
M1	1	30.73 N		33.36 dBµV/m					
M2	1	36.54 N		30.83 dBµV/m					
M3	1	110.36 N		32.63 dBµV/m					
M4 M5	1	236.46 N 150.66 N		30.53 dBµV/m 27.79 dBµV/m					
M6	1	299.97 N		27.79 dBµV/m 27.80 dBµV/m					
	<u> </u>				Mea	suring.			15.06.2020 09:46:55

Date: 15.JUN.2020 09:46:55

Plot of the emissions in the range 30 - 1000 MHz (Peak detector values shown), Test Antenna Vertical EUT sideways (z)





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# **2** AC Power Line Conducted Measurements

**RESULT: Pass.** 

Tested by: Date of testing: R. van der Meer 2020-06-10

Requirements: 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  $\mu$ 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.

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 C63.10-2013.

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 was positioned at least 80cm from the LISN.





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#### 2.1.1 AC Power Line Conducted Emission of Transmitter

Frequency (MHz)	Measurement results (dBµV) L1		Measurement results (dBµV) L2/Neutral		Limits (dBµV)		Verdict (Pass/Fail)
	QP	AV	QP	AV	QP	AV	
0.6773	41.7	*	40.1	*	56.0	46.0	Pass
0.7160	41.0	*	41.3	*	56.0	46.0	Pass
0.7242	42.9	*	42.0	*	56.0	46.0	Pass
0.8961	42.3	*	40.1	*	56.0	46.0	Pass
0.9703	35.0	*	36.2	*	56.0	46.0	Pass
1.0055	30.0	*	33.9	*	56.0	46.0	Pass

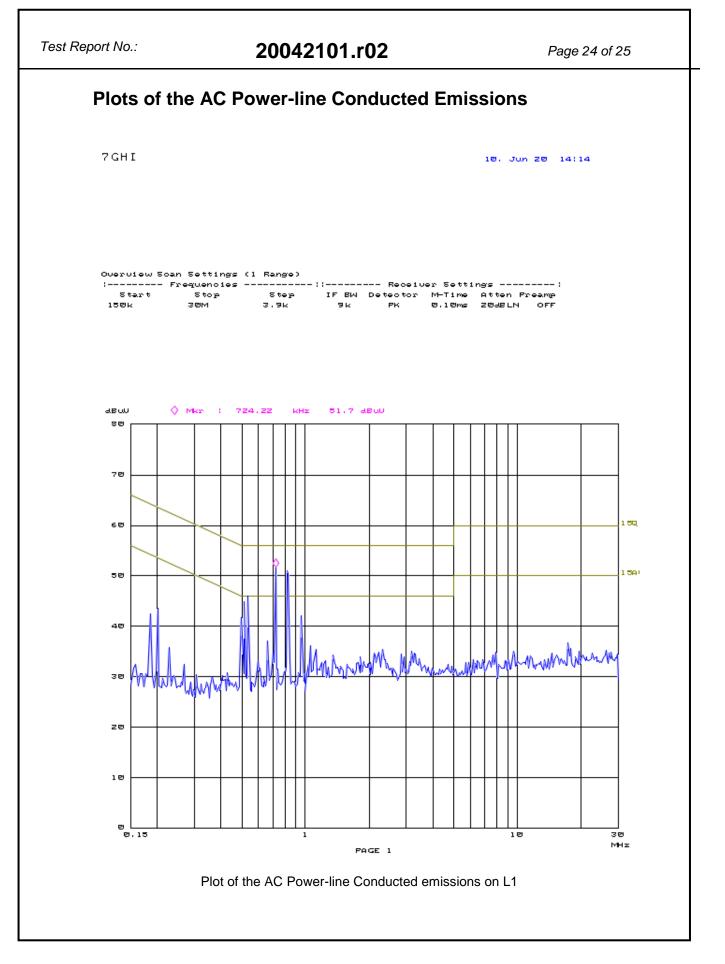
The results of the AC power line conducted emission tests, carried out in accordance with 47 CFR Part 15 section 15.207(a) and RSS-Gen section 8.8, at the 120 Volts/ 60 Hz AC mains connection terminals of AUX5, are depicted in the table above.

Notes:

- 1. The resolution bandwidth used was 9 kHz.
- 2. From pre-test the worst case configuration proved to be mode wherein the EUT was not scanning a tag. Worst case values noted.
- 3. Qp values already within Av limits, therefor Av not tested.
- 4. Measurement uncertainty is +/- 3.5 dB.
- 5. Plots are provided on the next pages.







Prüfbericht - Produkte Test Report - Products





