

Prüfbericht-Nr.: <i>Test Report No.:</i>	20020702A.r01	Auftrags-Nr.: <i>Order No.:</i>	89003643	Seite 1 von 34 <i>Page 1 of 34</i>
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	1541649	Auftragsdatum: <i>Order date:</i>	2020-02-20	
Auftraggeber: <i>Client:</i>	Nedap N.V., Parallelweg 2 7141 DC Groenlo, Netherlands			
Prüfgegenstand: <i>Test item:</i>	Deactivator of disposable tags-Anti-Pilferage Device			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	SMARTDEAC in combination with DAPL-275x275 antenna			
Auftrags-Inhalt: <i>Order content:</i>	Class II Permissive Change			
Prüfgrundlage: <i>Test specification:</i>	47 CFR PART 15 (10-1-19 EDITION), Subpart 15C RSS-Gen (Issue 5 April 2018) General Requirements for Compliance of Radio Apparatus and RSS-210 (Issue 10 Dec 2019) Licence-exempt Radio Apparatus. -			

Wareneingangsdatum: <i>Date of receipt:</i>	2020-05-07
Prüfmuster-Nr.: <i>Test sample No.:</i>	SN: F528 E0155
Prüfzeitraum: <i>Testing period:</i>	2020-05-15
Ort der Prüfung: <i>Place of testing:</i>	Leek
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland Nederland B.V. Leek Laboratory
Prüfergebnis*: <i>Test result*:</i>	Pass



geprüft von / tested by:			genehmigt von / reviewed & authorized by:		
<i>Datum /date:</i> 2020-05-15 Richard van der Meer, Expert			<i>Datum /date:</i> 2020-05-18 Erik van der Wal, Expert		
Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>

Sonstiges / Other:-This test report supports the Class 2 Permissive Change in equipment authorization files under registration number. **FCC ID: CGDSMARTDEACT and IC: 1444A-SMARTDEACT.**
-issue date is equal to authorized date.

Zustand des Prüfgegenstandes bei Anlieferung:1 <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>				
* Legende: 1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhaft N/T = nicht getestet	
Legend: 1 = very good P(ass) = passed a.m.	2 = good Test specification(s)	3 = satisfactory F(ail) a.m. test specification(s)	4 = sufficient N/A = not applicable	5 = poor 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



Test Report No.:

20020702A.r01

Page 2 of 34

TEST SUMMARY

Test Specification Clause	Test Case	Pass	Fail	Not applicable	Not performed
§15.209, 15.223 / RSS-Gen Table 5	Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.207 / RSS-Gen Table 4	AC Power Line Conducted Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.223/ RSS-Gen Table 5	Bandwidth of the emission	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Revisions Revisions

Revision Revision	Datum Date	Anmerkung Remark	Verfasser Author
-	2020.05.15	First release	R. van der Meer

Note: Latest revision report will replace all previous reports

Contents

1.	GENERAL REMARKS	4
1.1.1	<i>Complementary Materials</i>	<i>4</i>
1.1.2	<i>Special Accessories</i>	<i>4</i>
1.1.3	<i>Equipment modifications</i>	<i>4</i>
2.	TEST SITES	5
2.1	TEST FACILITIES	5
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS TABLE 1: LIST OF TEST AND MEASUREMENT EQUIPMENT.....	6
2.3	MEASUREMENT UNCERTAINTY	7
3.	GENERAL PRODUCT INFORMATION.....	8
3.1	COUNTERMEASURES TO ACHIEVE COMPLIANCE	8
3.2	OPERATION MODES	8
3.3	PHYSICAL CONFIGURATION FOR TESTING	9
3.4	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	11
4.	TEST RESULTS	12
4.1.1	<i>6dB Bandwidth</i>	<i>12</i>
4.1.2	<i>Radiated Emissions of Transmitter</i>	<i>15</i>
4.1.3	<i>Radiated field strength measurements H-field, 0.009-30 MHz.</i>	<i>16</i>
	<i>Test equipment used (for reference see test equipment listing).....</i>	<i>18</i>
5	DUTY CYCLE	23
6	AC POWER LINE CONDUCTED MEASUREMENTS.....	25
6.1.1	<i>AC Power Line Conducted Emission of Transmitter.....</i>	<i>26</i>
6.1.2	<i>Plots of the AC Power-line Conducted Emissions</i>	<i>27</i>
7	TEST SETUP PHOTOGRAPHS.....	29
7.1	RADIATED EMISSIONS.	29
7.1.1	<i>Radiated field strength measurements (30 MHz – 1 GHz, E-field).....</i>	<i>29</i>
7.1.2	<i>Radiated field strength measurements (0.009 - 30 MHz, H-field)</i>	<i>30</i>
7.1.3	<i>Radiated emissions, test setup arrangement views</i>	<i>31</i>
7.1.4	<i>AC Power line test setup photographs.....</i>	<i>32</i>

Appendix A Similarity Declaration by the client

Test Report No.:

20020702A.r01

Page 4 of 34

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

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°C
Relative humidity(*) : 20 % to 75 %
Supply voltage : 120 Vac.

()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.*

Test Report No.:

20020702A.r01

Page 6 of 34

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 Emissions					
Measurement Receiver	Rohde & Schwarz	ERC7	2790497	07/2019	07/2020
Turntable	-	-	2789220	N/A	N/A
RF Cable S-AR	Gigalink	APG0500	2789217	03-10/2020	03-10/2021
Test facility	Comtest	FCC listed: 786213 IC: 2932G-2	2789009	03-15/2020	03-15/2022
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	06/2019	06/2020
Biconilog Testantenna	Teseq	CBL 6111D	2789237	11/2019	11/2020
Magnetic Loop Antenna, Active	Chase	HLA-6120	A01491	12/2017	12/2020
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
120Vac source	EMtest	DPA500N	2789197	11/2019	11/2021
LISN	Rohde & Schwarz	ESH2-Z5	2788791	06/2018	06/2020
Measurement Receiver	Rohde & Schwarz	ESCS30	2790497	07/2019	07/2020
Shielded room for Conducted emissions	--	--	2789207	NA	NA
Temperature-Humiditymeter	Extech	SD500	2789211	06/2019	06/2020

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

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.

Test Report No.:

20020702A.r01

Page 7 of 34

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

3. General Product Information

The brand Nedap model SMARTDEACT, hereafter referred to as EUT is an Anti-Pilferage Device. The SMARTDEACT is meant for deactivation of disposable tags according to the Pulse Listen method. It detects a tag in the field and shall try to deactivate it until it is not functioning anymore. The EUT is a transmitter that uses 8 discrete frequencies, the lowest of which is 7.8 MHz and the highest of which is 8.5 MHz. The 8 frequencies will be considered as one fundamental frequency centered around 8.1 MHz.

Technical Specifications

Technical Specifications	Value
Operating Frequency	7.8 -8.5 MHz (Hopping)
Operation Voltage	12Vdc
Modulation	AM (Pulsed)
Antenna Type tested	DAPL-275x275
Antenna Gain	-(magnetic loop antenna)

3.1 Countermeasures to achieve compliance

No additional measures were employed to achieve compliance.

3.2 Operation Modes

The EUT has been tested in passive(stand-by)- and deactivate mode, i.e. the EUT is ready to detect a tag and deactivate it. 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 tests have been performed with a complete functioning EUT and interconnections.

Besides the normal hopping mode, the system was also tested on modulated carriers at 7.8 MHz (Freq0), 8.1 MHz (Freq3) and 8.5 MHz (Freq7). These modes could be set by a Windows application SmartDeactivator on AUX1, as supplied by the client.

The EUTs 8 frequencies of operation are: 7.8 , 7.9 , 8.0 , 8.1 , 8.2 , 8.3 , 8.4 and 8.5 MHz.

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.

Number	Ports	From	To	Shielding	Remarks
1	Power supply	AUX2	EUT	yes / no	None
2	Antenna connection	EUT	AUX3	yes / no	None
3	Power supply	AUX5	AUX4	yes / no	None
4	Communication	EUT	AUX4	yes / no	None
5	LED indication	EUT	AUX6	yes / no	None

Operation mode 1: System "Passive", not detecting a tag.

Operation mode 2: System "Active", detecting a tag.

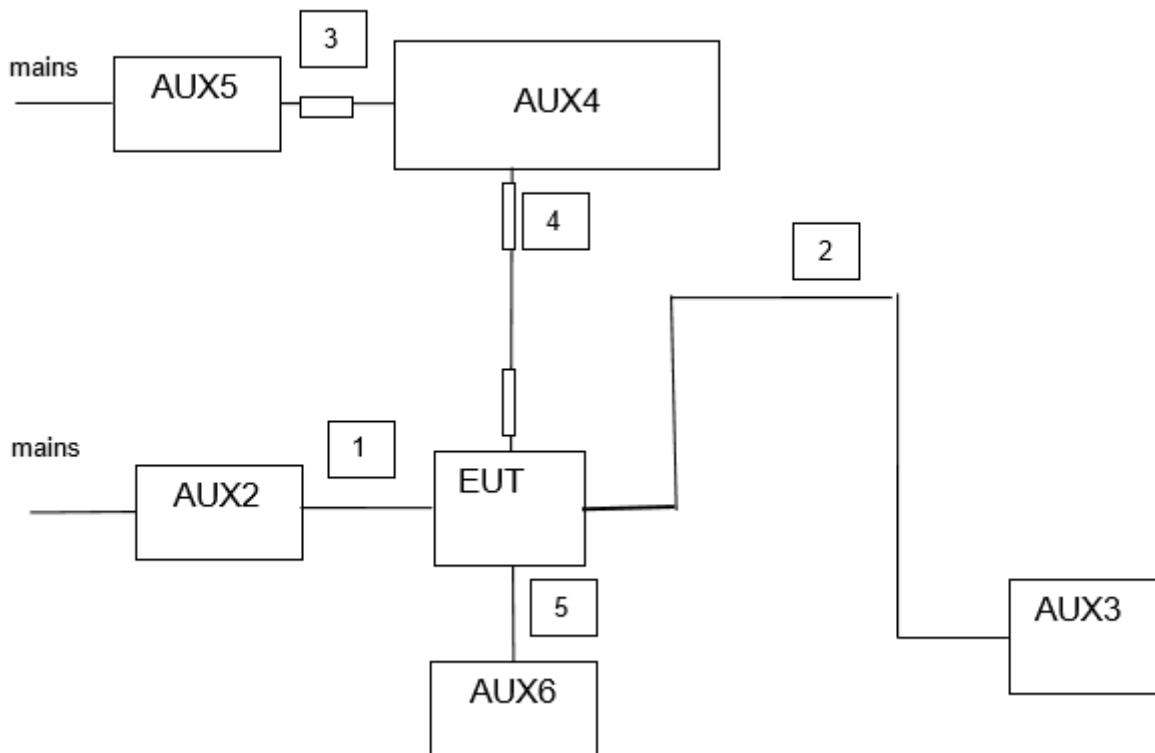
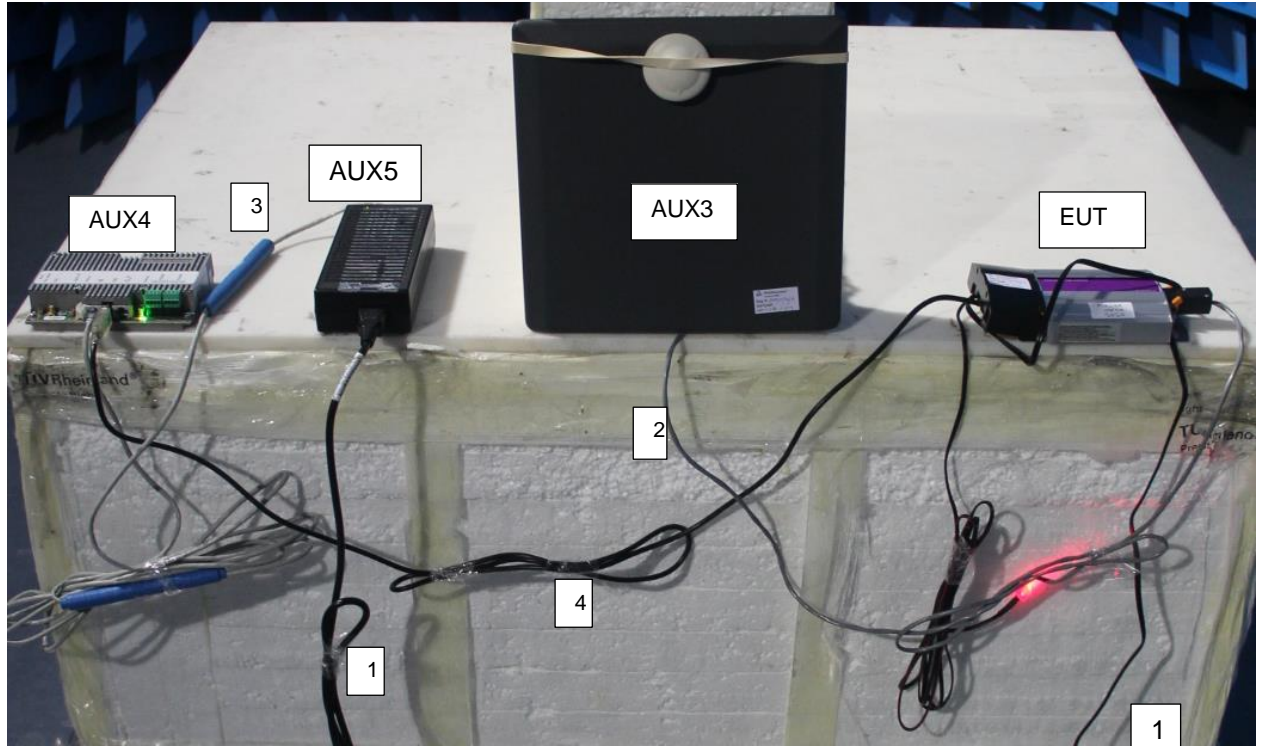


Figure 1a: Basic test setup and connections

Figure 1b: Test Setup Photos – EUT in combination with Antenna



3.4 Special Accessories and Auxiliary Equipment

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

AUX1	:	Laptop PC including power supply adapter
Manufacturer	:	HP
Brand	:	HP
Model	:	Compaq610
ID	:	2790394
Remarks	:	Required to program the EUT not part of the testsetup, property testlab
AUX2	:	Power supply
Brand	:	Power-win Technology Corp.
Model	:	PW-024A-1Y120K0
Serial number	:	-
Voltage input rating	:	100 – 240V 50-60Hz
Voltage output rating	:	12Vdc
Current output rating	:	2A
Remarks	:	Connects to EUT
AUX3	:	Antenna
Brand	:	Nedap
Model	:	DAPL-275x275
Serial number	:	A915 037
Part NO	:	9911537
Remarks	:	Connects to EUT
AUX4	:	Communication unit
Brand	:	Nedap
Model	:	RENOS
Serial number	:	0D0B89
Remarks	:	Connects to RS 485 port EUT
AUX5	:	Power supply
Brand	:	Power-win Technology Corp.
Model	:	PW-085C-1Y560HPOE
Serial number	:	73511921
Voltage input rating	:	100 – 240V 50-60Hz
Voltage output rating	:	56Vdc
Current output rating	:	1.5A
Remarks	:	Connects to AUX4
AUX6	:	LED lamp
Brand	:	Nedap
Model	:	--
Serial number	:	--
Remarks	:	--

Test Report No.:

20020702A.r01

Page 12 of 34

4. Test Results

4.1.1 6dB Bandwidth

RESULT: Pass

Tested by: R. van der Meer
Date of testing: 2020-05-15

Requirements:

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

Test procedure 6dB bandwidth:
ANSI C63.10-2013

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 skirts. 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.

Test Report No.:

20020702A.r01

Page 13 of 34

Requirements:

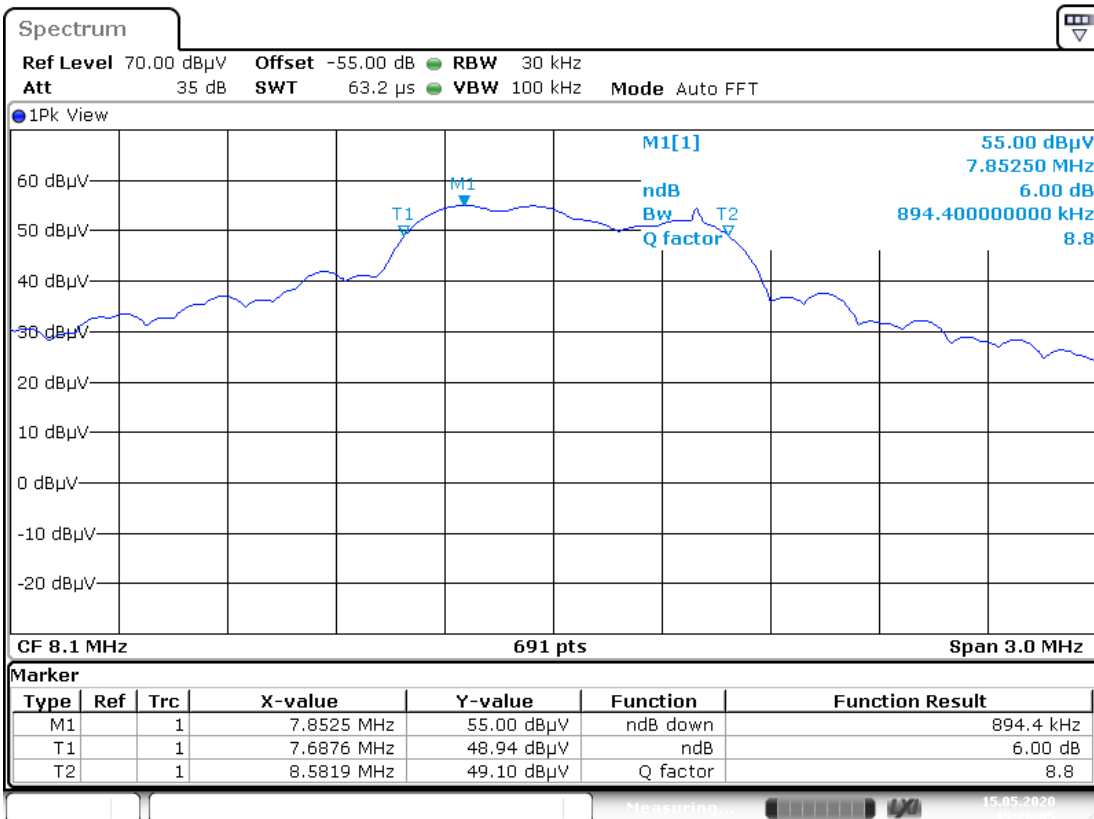
The 6 dB bandwidth of the fundamental emission shall be measured in order to find out the exact allowed limit of the field strength of any emission within the band 1.705-10.0 MHz.

Test procedure: ANSI C63.10:2013

Test results

6dB and 99% Bandwidth

Mode of operation	Operating Frequency [MHz]	99% Bandwidth [kHz]	6dB Bandwidth [kHz]	Plot number
De-activate mode	7.8 – 8.5	1680	894.4	1a/1b



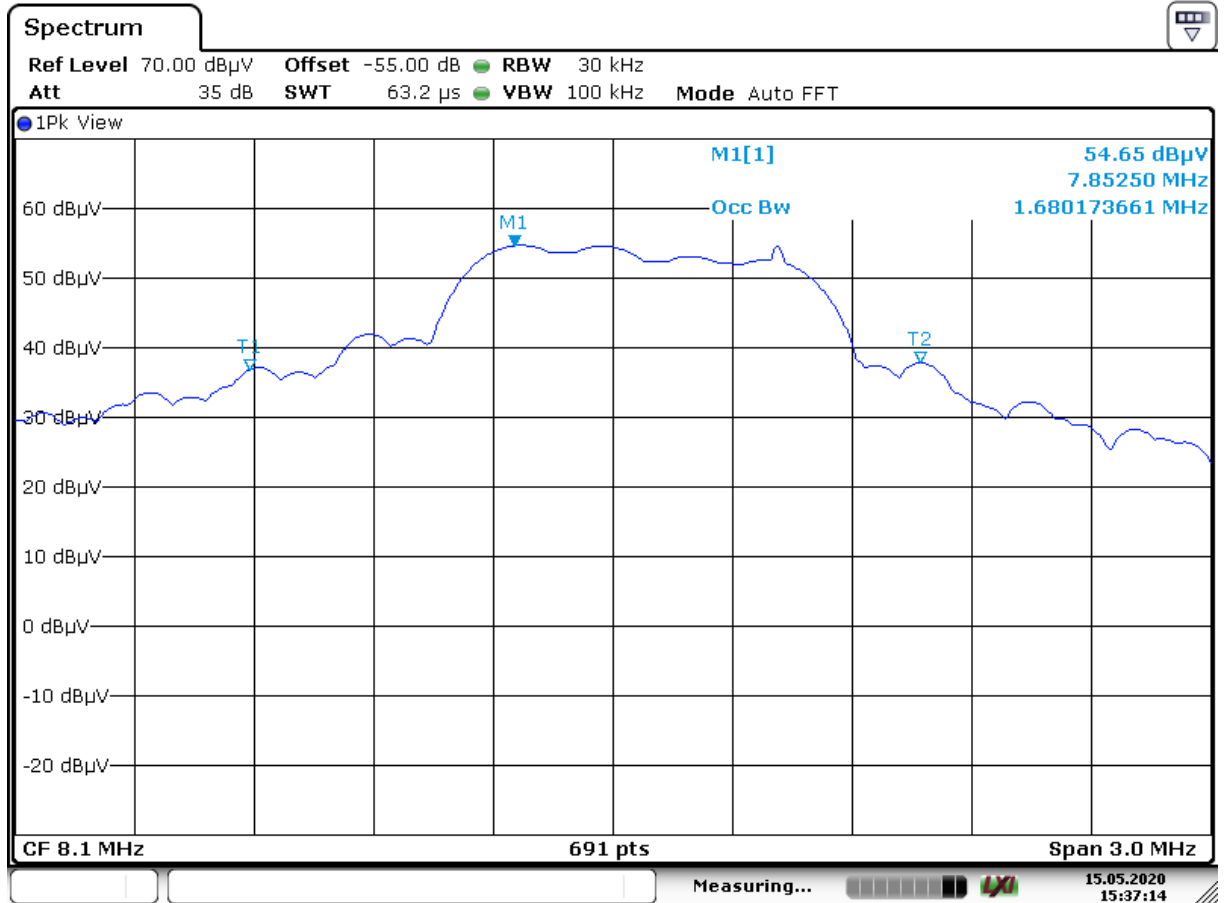
Date: 15 MAY 2020 15:26:05

Plot1a: plot of the emission. Measured value is 816.2 kHz as measured on a spectrum analyzer.

Test Report No.:

20020702A.r01

Page 14 of 34



Date: 15 MAY 2020 15:37:14

Plot1b: plot of the 99% emission bandwidth. Measured value is 1680 kHz as measured on a spectrum analyzer.

Test Report No.:

20020702A.r01

Page 15 of 34

4.1.2 Radiated Emissions of Transmitter

RESULT: Pass

Tested by: R. van der Meer
Date of testing: 2020-05-15

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 (dB μ V/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 (μ V/meter)	Field strength (dB μ 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 (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.

Test Report No.:

20020702A.r01

Page 16 of 34

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

RESULT: Pass.

Date of testing: 2020-May-15

Tested by: R. van der Meer

Requirements:

The field strength of any emission within the band 1.705–10.0 MHz shall not exceed 100 microvolts/meter at a distance of 30 meters. However, if the bandwidth of the emission is less than 10% of the center frequency, the field strength shall not exceed 15 microvolts / meter or (the bandwidth of the device in kHz) divided by (the center frequency of the device in MHz) microvolts/meter at a distance of 30 meters, whichever is the higher level. For the purposes of this section, bandwidth is determined at the points 6 dB down from the modulated carrier. The emission limits in this paragraph are based on measurement instrumentation employing an average detector. The provisions in FCC part 15.35(b) for limiting peak emissions apply.

The measured 6 dB bandwidth is 0.894 MHz (see section 3) which is more than 0.81 MHz (10% of the 8.1 MHz of center frequency), hence the limit for the field strength is 100 microvolts/meter (40 dB μ V/m) at a distance of 30 meters.

Radiated emissions tests were performed using the procedures of ANSI C63.10-2013 including methods for signal maximizations and EUT configuration. The test setup photos report shows the EUT in its maximized configuration. Radiated emission testing was performed at a distance of 3 meters in a 5 meter semi-anechoic chamber. The measured values were corrected to the 30m distance using the extrapolation factor of 40dB/decade as per FCC Part 15.31(f)(2).

Average values are obtained from application of the calculated duty cycle correction factor (See section 6) to the fundamental field strength amplitude measured with a peak detector.

Test Report No.:

20020702A.r01

Page 17 of 34

Table 3a EUT in combination with AUX3 operating at Lowest Frequency of 7.8 MHz

EUT Frequency	Measured Frequency	Measurement results	Detector	Antenna factor	Cable loss	Extrapolation factor	Measurement results (calculated)	Limits	Pass/Fail
MHz	MHz	dBµV @3m		dB	dB	dB	dBµV/m@30m	dBµV/m@30m	
7.8	7.803	73.2	Pk	19.6	1	40	53.8	60	Pass

EUT Frequency	Measured Frequency	Measurement results Peak	Duty Cycle correction factor	Measurement results Av (=Peak – DCcf) (calculated)	Limits Av	Pass/Fail
MHz	MHz	dBµV @30m	dB	dBµV/m@30m	dBµV/m@30m	
7.8	7.803	53.8	-62.3	-8.5	40	Pass

*For Duty Cycle Correction factor see section 6

Table 3b EUT in combination with AUX3 operating at Lowest Frequency of 8.1 MHz

EUT Frequency	Measured Frequency	Measurement results	Detector	Antenna factor	Cable loss	Extrapolation factor	Measurement results (calculated)	Limits	Pass/Fail
MHz	MHz	dBµV @3m		dB	dB	dB	dBµV/m@30m	dBµV/m@30m	
8.1	8.097	72.2	Pk	19.6	1	40	52.8	60	Pass

EUT Frequency	Measured Frequency	Measurement results Peak	Duty Cycle correction factor	Measurement results Av (=Peak – DCcf) (calculated)	Limits Av	Pass/Fail
MHz	MHz	dBµV @30m	dB	dBµV/m@30m	dBµV/m@30m	
8.1	8.097	52.8	-62.3	-9.5	40	Pass

*For Duty Cycle Correction factor see section 6

Table 3c EUT in combination with AUX3 operating at Lowest Frequency of 8.5 MHz

EUT Frequency	Measured Frequency	Measurement results	Detector	Antenna factor	Cable loss	Extrapolation factor	Measurement results (calculated)	Limits	Pass/Fail
MHz	MHz	dBµV @3m		dB	dB	dB	dBµV/m@30m	dBµV/m@30m	
8.5	8.484	70.5	Pk	19.6	1	40	51.1	60	Pass

EUT Frequency	Measured Frequency	Measurement results Peak	Duty Cycle correction factor	Measurement results Av (=Peak – DCcf) (calculated)	Limits Av	Pass/Fail
MHz	MHz	dBµV @30m	dB	dBµV/m@30m	dBµV/m@30m	
8.5	8.484	51.1	-62.3	-11.2	40	Pass

*For Duty Cycle Correction factor see section 6

Test Report No.:

20020702A.r01

Page 18 of 34

Emissions Outside the band - FCC Part 15.233(b)and RSS210 A2.3.

The field strength of emissions outside of the band 1.705–10.0 MHz shall not exceed the general radiated emission limits in § 15.209 and RSS-Gen section 7.2.5 table 5.

Test procedure: ANSI C63.10-2013.

EUT Frequency	Measured Frequency	Measurement results	Detector	Antenna factor	Cable loss	Extrapolation factor 3m to 30m	Measurement results (calculated)	Limits	Pass/Fail
MHz	MHz	dBµV @3m		dB	dB	dB	dBµV/m@30m	dBµV/m@30m	
7.8	15.600 ^h	18.0	Qp	19.7	1	-40	-1.3	29.5	Pass
Hopping	16.196 ^h	24.5	Qp	19.7	1	-40	5.2	29.5	Pass
8.1	24.300 ^h	34.8	Qp	19.7	1	-40	15.5	29.5	Pass
8.5	25.460 ^h	38.7	Qp	19.7	1	-40	19.4	29.5	Pass
Hopping	24.437 ^h	37.0	Qp	19.7	1	-40	17.7	29.5	Pass
Hopping	28.440	16.2	Qp	19.7	1	-40	-3.1	29.5	Pass

Table 7 Radiated emissions of the EUT in combination with AUX3, outside of the band 1.705–10.0 MHz

Restricted band operation:

The EUT is a Carrier hopped system and its hopping frequencies are: 7.8 , 7.9 , 8.0 , 8.1 , 8.2 , 8.3 , 8.4 and 8.5 MHz.

These hopping frequencies are outside of the restricted band frequencies.

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

2790499	2790033	2789220	2789217	2789214				

Notes:

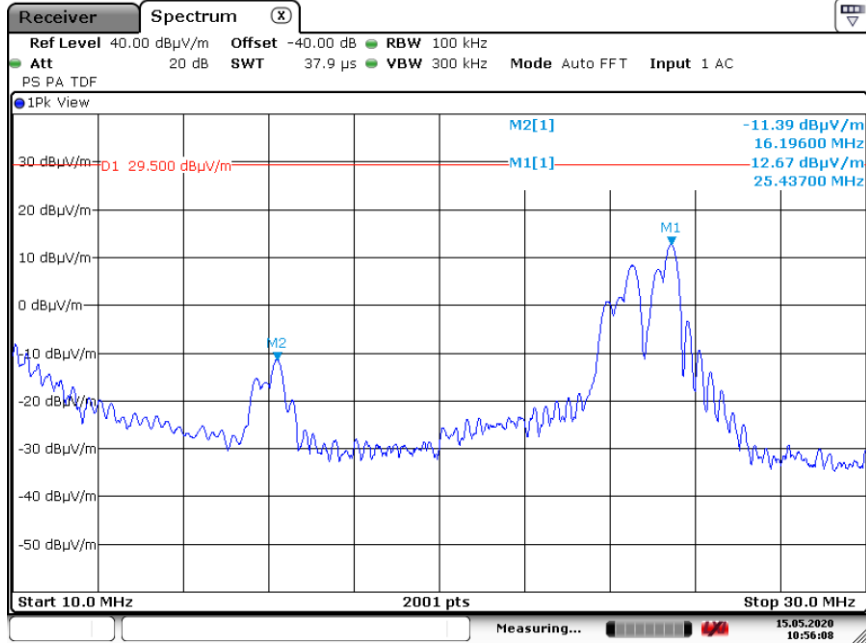
1. Calculated measurement results are obtained by using the 40 dB/decade extrapolation factor and the antenna factor and cable loss is included. For instance the corrected value for 7.8 MHz fundamental frequency is calculated as: Measurement result– Extrapolation Factor => 73.2 dBµV +19.6 +1 – 40 dB = 53.8 dBµV/m.
2. 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 ±5.0dB.

Test Report No.:

20020702A.r01

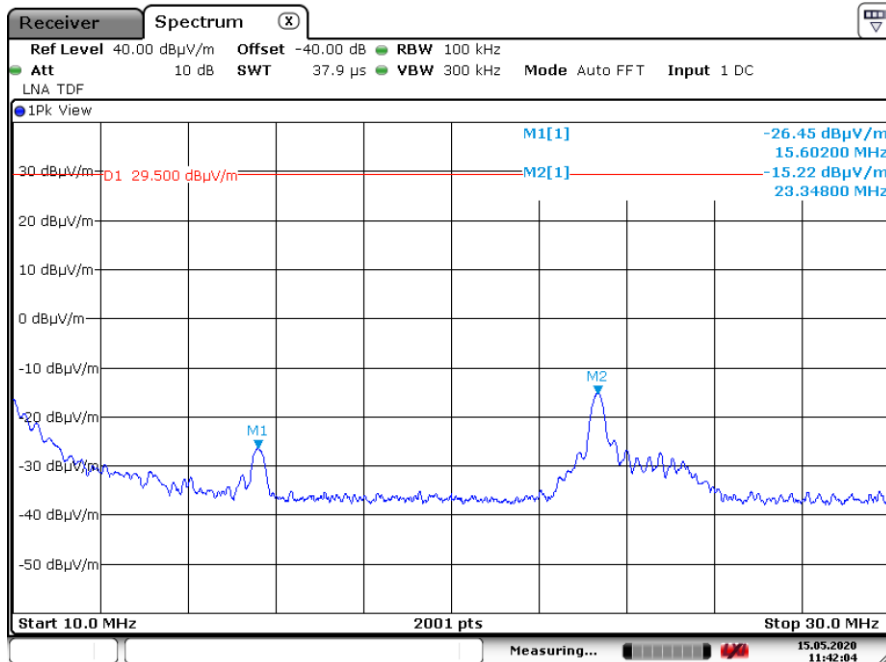
Page 19 of 34

Plots of the emissions below 30 MHz



Date: 15.MAY.2020 10:56:08

Plot of the emissions 10-30 MHz, AUX3 Vertical, Antenna axial, Normal operation, active mode (reading a tag)



Date: 15.MAY.2020 11:42:03

Plot of the emissions 10-30 MHz, AUX3 Vertical, Antenna axial, Freq0 (7.8 MHz)

Test Report No.:

20020702A.r01

Page 20 of 34

4.1.4 Radiated Spurious Emissions, 30MHz - 1GHz

RESULT: PASS

Date of testing: 2020-05-15
Frequency range: 30MHz - 1GHz

Requirements:

FCC 15.205, FCC 15.209, FCC 15.223 and IC RSS-Gen(4.9, 7.2.2 and 7.2.5) and RSS-210(2.3)

Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a), must comply with the radiated emission limits specified in FCC 15.209(a), FCC 15.223 and RSS-Gen.

Radiated emissions which fall outside the operation frequency band and outside restricted bands shall either meet the limit specified in FCC 15.209(a)/ RSS-Gen (7.2.5) or be attenuated at least 20dB below the power level in the 100kHz bandwidth within the band that contains the highest level of the desired power (the less severe limit applies).

Frequency (MHz)	Field strength (microvolts/meter)	Field strength (dBmicrovolts/meter)	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

Table of applicable limits

Test procedure:

ANSI C63.10-2013, RSS-Gen.

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 30MHz 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.

Test Report No.:

20020702A.r01

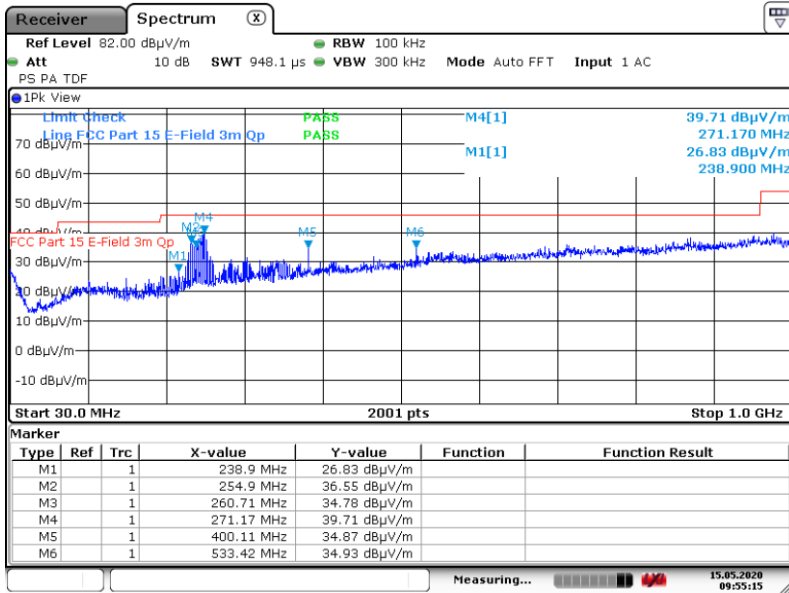
Page 21 of 34

Frequency [MHz]	EUT Orientation	Antenna Orientation	Level QP [dB μ V/m]	Limit QP [dB μ V/m]	Verdict [Pass/Fail]
42.36	Vertical	Vertical	28.2	40.0	Pass
173.7	Vertical	Vertical	25.7	43.5	Pass
218.8	Vertical	Vertical	37.3	46.0	Pass
258.6	Vertical	Horizontal	32.2	46.0	Pass
400.0	Vertical	Horizontal	32.8	46.0	Pass
723.9	Vertical	Vertical	25.3	46.0	Pass

Table 4 Radiated emissions of the EUT in combination with AUX3

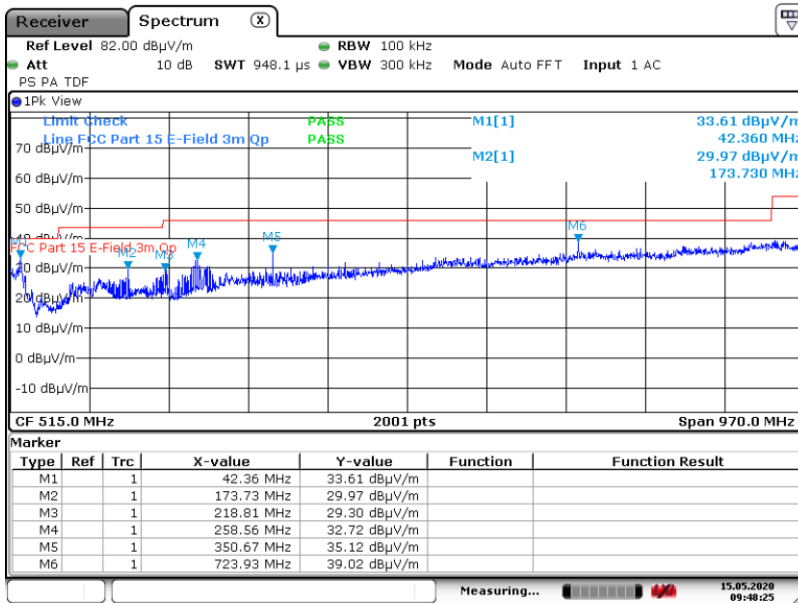
- Note:
- Level QP = Reading QP + Factor
 - Tested in modes as described in section 3.2, the 6 highest values noted.
 - *^R refers to a frequency in a restricted band, *^H refers to a harmonic of the fundamental
 - Quasi Peak detector used with a bandwidth of 120 kHz.
 - Measurement uncertainty is +/-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

4.1.5 Plots of the emissions



Date: 15.MAY.2020 09:55:15

Plot of the emissions in the range 1 – 30 MHz (Peak detector values shown), AUX3 Vertical, Antenna horizontal, Normal operation reading a tag

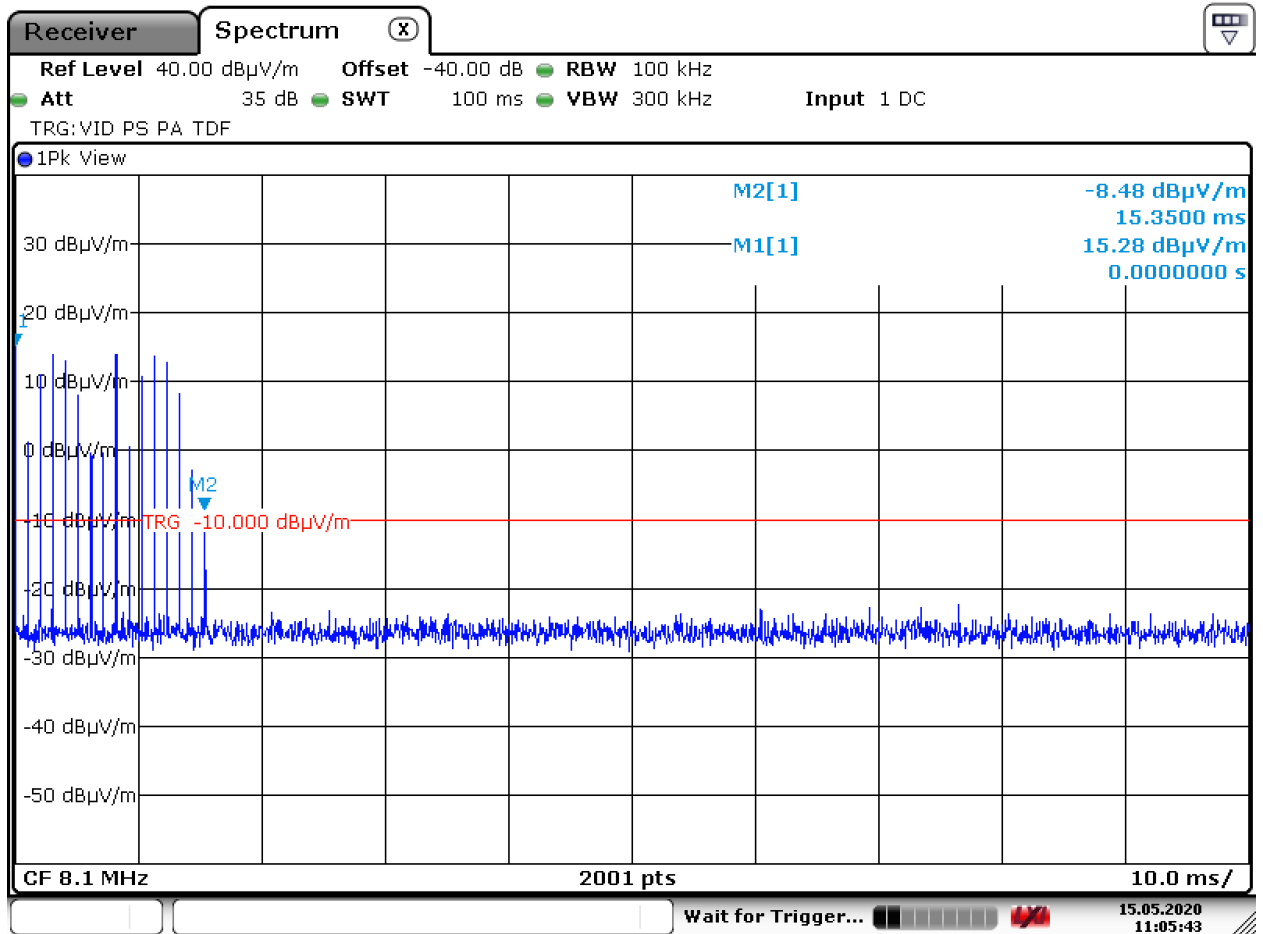


Date: 15.MAY.2020 09:48:25

Plot of the emissions in the range 1 – 30 MHz (Peak detector values shown), AUX3 Vertical, Antenna vertical, Normal operation reading a tag

5 Duty Cycle

Notes: 16 peaks were observed in a 100 ms interval. Each peak was measured to have a duration of 4.785 μ s. This yields a total on-time of 0.077 ms in a 100 ms interval. Using the formula Average factor (dB) = $20 \cdot \text{LOG}(0.077\text{ms} / 100\text{ms})$, the duty cycle average factor is therefore -62.3 dB.



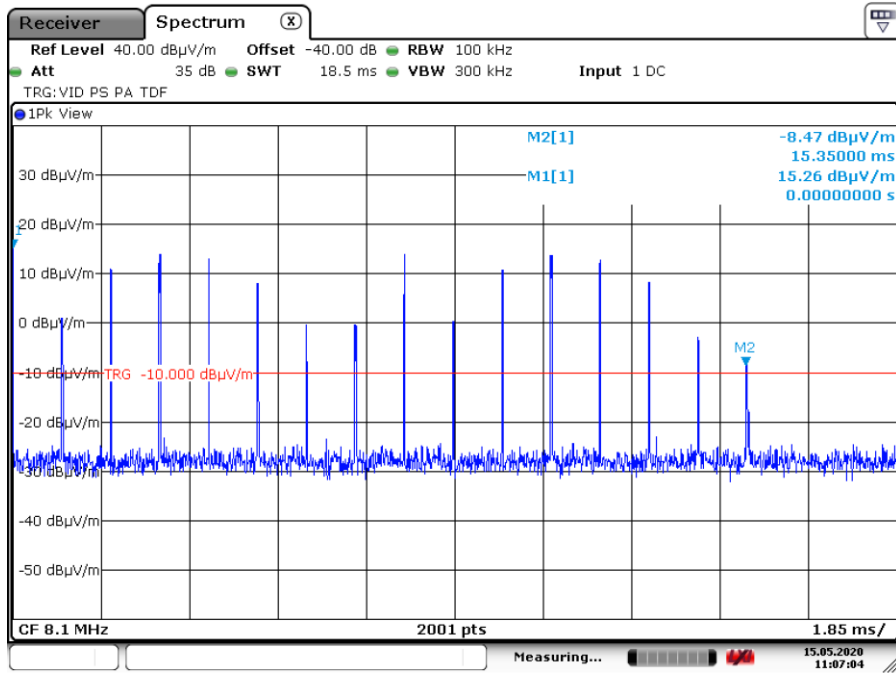
Date: 15.MAY.2020 11:05:43

Plot 2a: number of peaks in 100ms.

Test Report No.:

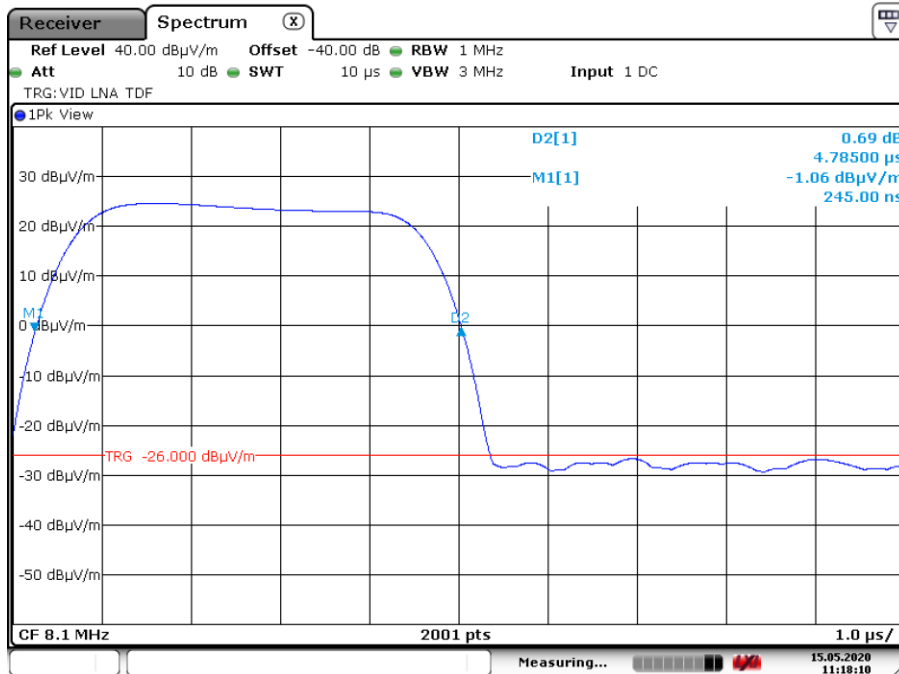
20020702A.r01

Page 24 of 34



Date: 15.MAY.2020 11:07:03

Plot 2b: number of peaks



Date: 15.MAY.2020 11:18:10

Plot 2c: peak duration

Test Report No.:

20020702A.r01

Page 25 of 34

6 AC Power Line Conducted Measurements

RESULT: Pass.

Tested by:
Date of testing:

R. van der Meer
2020-05-15

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 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.

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 C63.10-2013.

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 80cm from the LISN.

Test Report No.:

20020702A.r01

Page 26 of 34

6.1.1 AC Power Line Conducted Emission of Transmitter

Frequency (MHz)	Measurement results (dB μ V) L1		Measurement results (dB μ V) L2/Neutral		Limits (dB μ V)		Verdict (Pass/Fail)
	QP	AV	QP	AV	QP	AV	
0.385	38.6	*	38.2	*	58.1	48.1	Pass
0.555	39.5	*	36.6	*	56.0	46.0	Pass
1.125	38.1	*	33.1	*	56.0	46.0	Pass
1.665	34.2	*	36.7	*	56.0	46.0	Pass
7.88 Fundamental	47.7	*	47.6	*	60.0	50.0	Pass
24.850 (Harmonic)	40.4	*	38.3	*	60.0	50.0	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 the EUT, are depicted in the table above.

Notes:

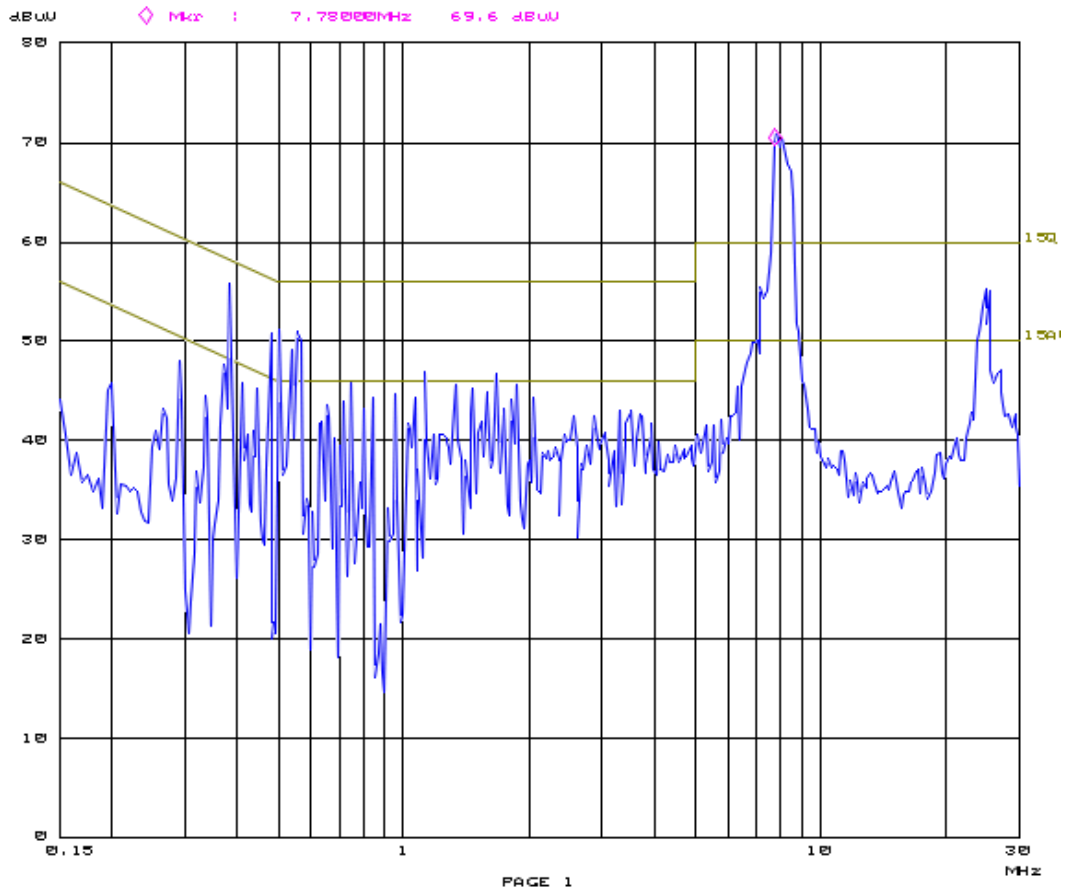
1. The resolution bandwidth used was 9 kHz.
2. From pre-test the worst case configuration proved to be mode wherein the EUT was scanning a tag in Normal operation mode. Worst case values noted.
3. Qp values already within Av limits, therefor Av not tested.
4. Measurement uncertainty is +/- 3.5 dB.
5.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

6.1.2 Plots of the AC Power-line Conducted Emissions

7 GHI

15. May 20 13:39

Scan Settings (1 Range)
:----- Frequencies -----: Receiver Settings -----:
Start Stop Step IF BW Detector M-Time Atten Presamp
150k 30M 5k 9k PK 20ms 0dB LN OFF



Plot of the AC Power-line Conducted emissions on L1

Test Report No.:

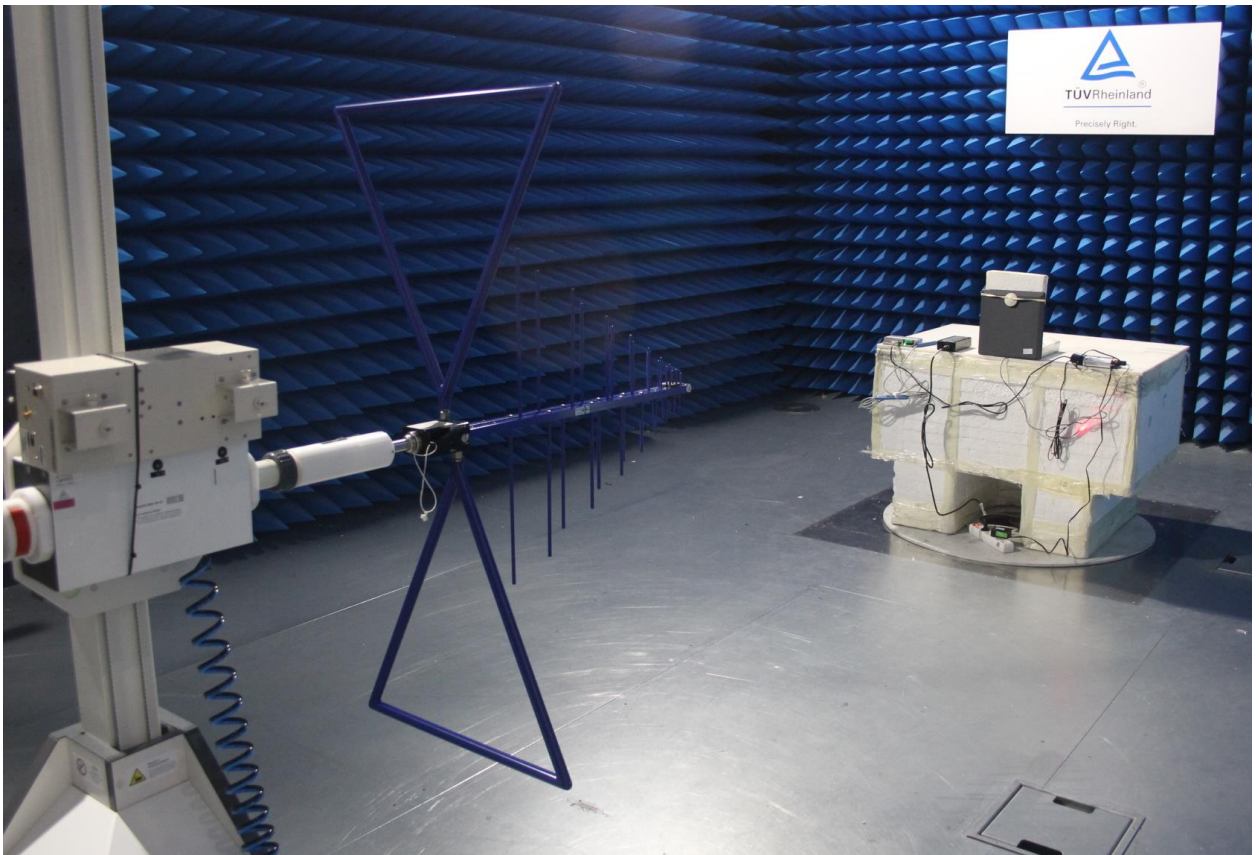
20020702A.r01

Page 29 of 34

7 Test setup photographs

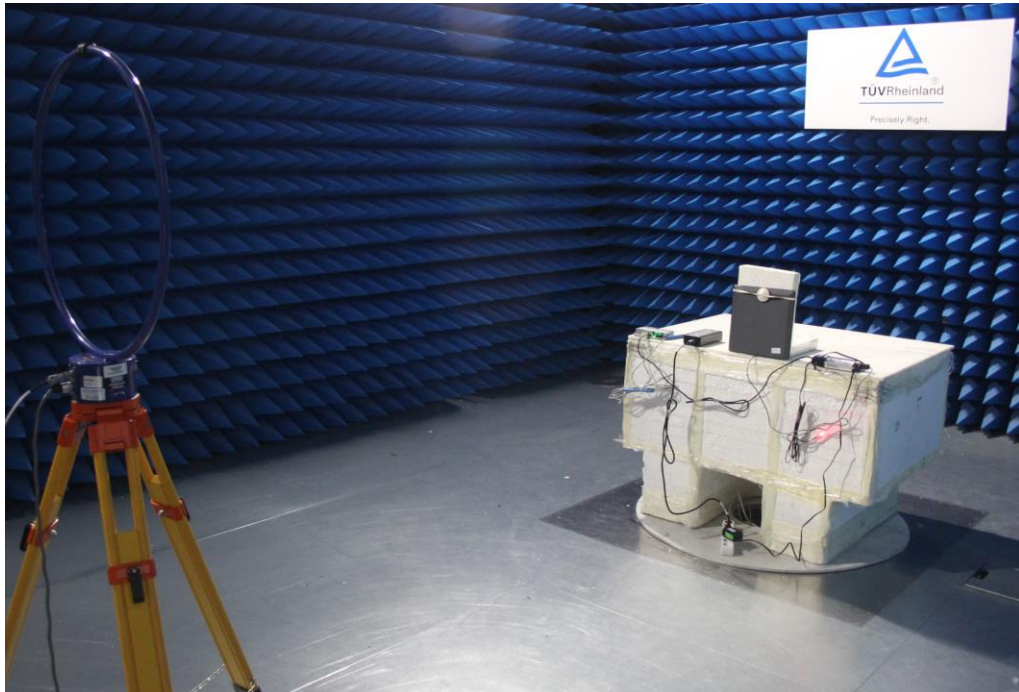
7.1 Radiated Emissions.

7.1.1 Radiated field strength measurements (30 MHz – 1 GHz, E-field)

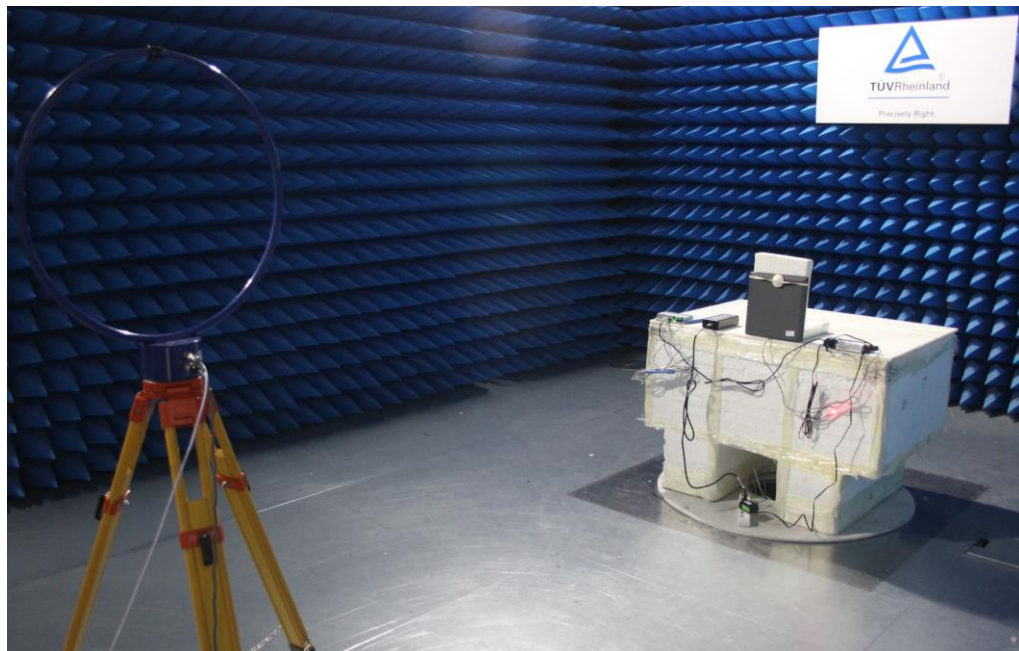


photograph of the setup, EUT in combination with AUX3

7.1.2 Radiated field strength measurements (0.009 - 30 MHz, H-field)



photograph of the setup, EUT in combination with AUX3, Antenna axial



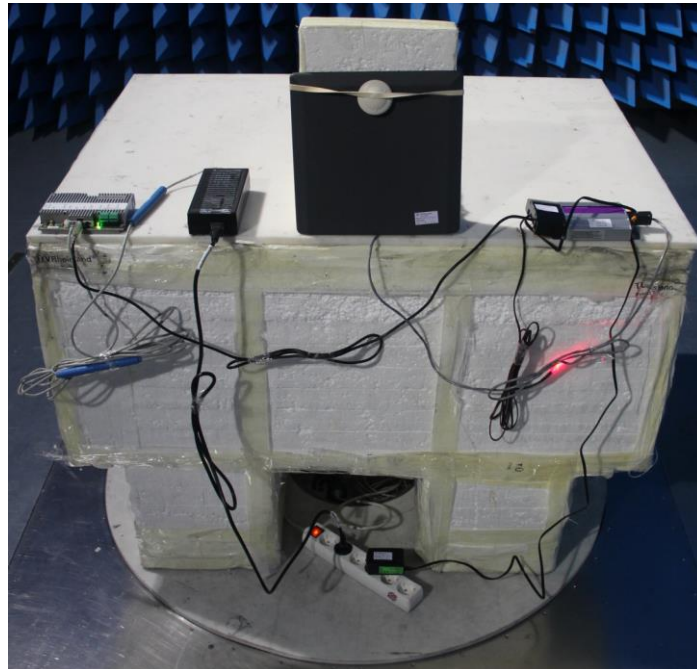
photograph of the setup, EUT in combination with AUX3, Antenna planar

Test Report No.:

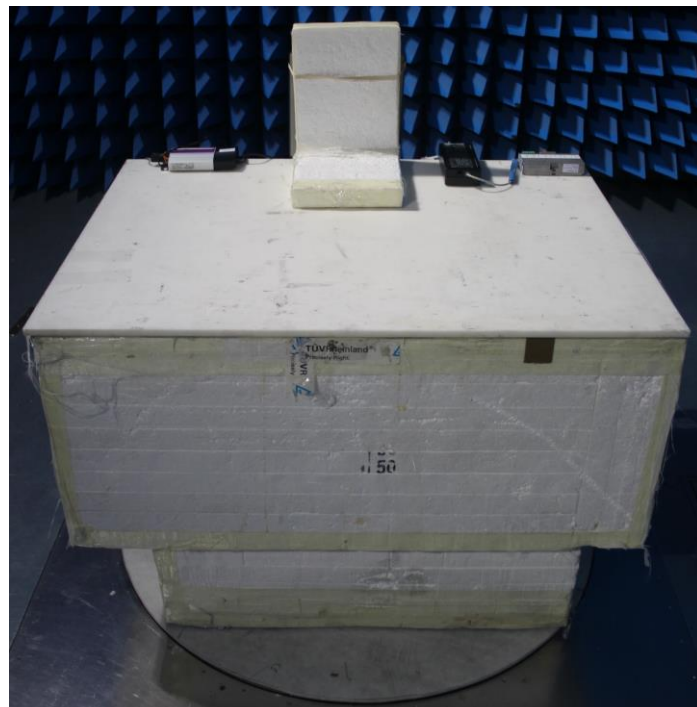
20020702A.r01

Page 31 of 34

7.1.3 Radiated emissions, test setup arrangement views



photograph of the setup, front view, EUT in combination with AUX3



photograph of the setup, rear view, EUT in combination with AUX3

Test Report No.:

20020702A.r01

Page 32 of 34

7.1.4 AC Power line test setup photographs





Test Report No.:

20020702A.r01

Page 33 of 34


End of report

Test Report No.:

20020702A.r01

Page 34 of 34

Appendix A Similarity Declaration by the client



technology that matters

Groenlo, 08 October 2015

Subject: Attestation of Similarity of antenna SDA-285x285 and DAPL 275x275

Report number: 081015.01_sim

To whom it may concern

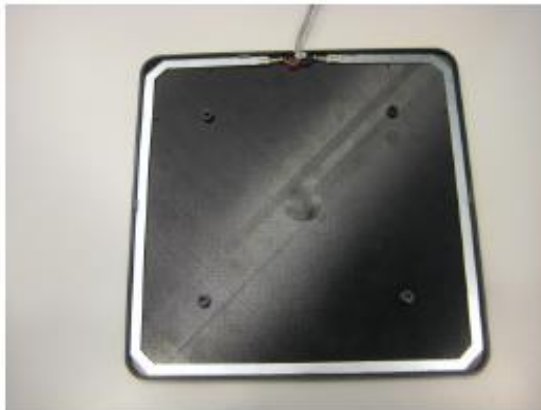
We, N.V. Nederlandsche Apparatenfabriek "Nedap", declare that the antenna SDA-285x285 has the same electrical properties as the DAPL-275x275 as mentioned in test reports 10037854 001, 10038330 001 and 10039931 001. There is no cover for the SDA-285x285 antenna. The attached pictures show the shape of the antenna SDA-285x285 and the DAPL-275x275.



DAPL-275x275




DAPL-275x275 cover removed



SDA-285x285

Best regards,
N.V. Nederlandsche Apparatenfabriek "Nedap"



Jacques Hulshof
Approval Officer

N.V. Nederlandsche Apparatenfabriek "Nedap"
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