Prüfbericht-Nr.: *Test Report No.:*	**50051170 001**	**Auftrags-Nr.:** *Order No.:*	114041540	Seite 1 von 21 *Page 1 of 21*
Kunden-Referenz-Nr.: *Client Reference No.:*	N/A	**Auftragsdatum:** *Order date:*	10-Sep-2015	
Auftraggeber: *Client:*	N.V. Nederlandsche Apparatenfabriek "Nedap", Parallelweg 2, 7141 DC Groenlo, The Netherlands			
Prüfgegenstand: *Test item:*	RFID Reader MidRanger MR-100-UE			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	MidRanger			
Auftrags-Inhalt: *Order content:*	FCC Part 15C Test Report ISED RSS-210 Test Report			
Prüfgrundlage: *Test specification:*	FCC 47CFR Part 15: Subpart C Section 15.225 RSS-210 (08-2016) B.6			

Wareneingangsdatum: *Date of receipt:*	13-Jul-2016
Prüfmuster-Nr.: *Test sample No.:*	A000393528
Prüfzeitraum: *Testing period:*	27-Jul-16 - 9-Nov-16
Ort der Prüfung: *Place of testing:*	EMC/RF Laboratory Taipei
Prüflaboratorium: *Testing laboratory:*	TUV Rheinland Taiwan Ltd.
Prüfergebnis*: *Test result*:*	Pass

geprüft von / *tested by:*			**kontrolliert von** / *reviewed by:*		
14-Dec-2016	Ryan W. T. Chen / Project Engineer		14-Dec -2016	Rene Charton / Senior Project Manager	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other:*

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 P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut	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. test specification(s)*	*2 = good*	*3 = satisfactory* *F(ail) = failed a.m. test specification(s)*	*4 = sufficient* *N/A = not applicable*	*5 = poor* *N/T = not tested*

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT
RESULT: Passed

5.1.2 FIELD STRENGTH OF FUNDAMENTAL
RESULT: Passed

5.1.3 FREQUENCY STABILITY
RESULT: Passed

5.1.4 99% BANDWIDTH
RESULT: Passed

5.1.5 SPURIOUS EMISSION
RESULT: Passed

5.2.1 CONDUCTED EMISSIONS LINE AND NEUTRAL
RESULT: Passed

Contents

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix D: Test Result of Radiated Emissions
(File Name: 50051170APPENDIX D)

Appendix P: Photo Documentation
(File Name: 50051170APPENDIX P)

Appendix S: Test Set-up
(File Name: 50051170APPENDIX S)

Test Specifications

Table 1: Applied Standard and Test Levels

Radio
FCC CFR47 Part 15: Subpart C Section 15.225 RSS-210 Issue 9, August 2016 RSS-Gen, Issue 4, November 2014 ANSI C63.10:2013

2. Test Sites

2.1 Test Facilities

TUV Rheinland Taiwan Ltd.

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

FCC Registration No.: 799772
IC Canada Registration No.: 9465A-1

Testing Laboratory
0759

2.2 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Last Calibration	Next Calibration
Test Software	Farad	EZ_EMC	Ver. TUV3A1	N/A	N/A
EMI Test Receiver	R&S	ESR7	101062	2016/09/12	2017/09/12
Spectrum Analyzer	R&S	FSV 40	100921	2016/04/21	2017/04/21
Spectrum Analyzer	Agilent	N9010A	MY53470241	2016/04/25	2017/04/24
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	2016/07/29	2017/07/29
Preamplifier (18 GHz -40 GHz)	COM-POWER	PAM-840	461257	2015/11/19	2016/11/19
Pre-Amplifier (1GHz~18GHz)	EM Electronics	EM01G18G	060558	2015/11/19	2016/11/19
Bilog Antenna	TESEQ	CBL6111D	29804	2016/06/23	2017/06/23
Horn Antenna	ETS-Lindgren	3117	138160	2016/05/03	2017/05/03
Horn Antenna (18GHz~40GHz)	COM-POWER	AH840	101031	2015/11/02	2016/11/02
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	2016/05/11	2017/05/11
EMI Test Receiver	R&S	ESCI7	100797	2015/12/28	2016/12/27
Spectrum Analyzer	R&S	FSL3	101943	2015/09/07	2016/09/07
Temp. & Humid. Chamber	Giant Force	GCT-099-40-S	MAF0103-007	2015/07/13	2017/07/12
LISN (1 phase)	R&S	ENV216	101243	2016/06/02	2017/06/02
LISN	R&S	ENV216	101262	2016/06/16	2017/06/16

2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements are ±3dB.

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-7}
RF power, conducted	± 1.5 dB
Radiated emission of transmitter, valid up to 18 GHz	± 6 dB
Radiated emission of receiver, valid up to 18 GHz	± 6 dB
Temperature	± 2 ºC
Humidity	± 10 %

3. General Product Information

3.1 Product Function and Intended Use

"The EUT is a multi-purpose solution for reading RFID activated library items on 13.56 MHz. The product can be used as a desktop solution or can be mounted under a (non-metal) table.
The reader and antenna terminals are both based on the 50Ω standard, which allows for the length of the cable between the antenna and the reader to be altered."

For details refer to the User Guide, Data Sheet and Circuit Diagram.

The EUT was tested with the Antenna MidRange 50 Ohm, Model No.: 9564918

For more details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 Ratings and System Details

Table 4: Basic Information of EUT

Item	EUT information
Kind of Equipment	RFID Reader MidRanger MR-100-UE
Type Designation	MidRanger
FCC ID	CGDMIDRANGER
Canada ID	1444A-MIDRANGER

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequency	13.56 MHz
Operation Voltage	100 - 240 Vac
Extreme Voltage Range	102~276 V
Modulation	ASK

3.3 Independent Operation Modes

Basic operation modes are:
A. Transmitting

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum emission level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Setup for testing: The EUT is a set up into reading mode. Then it is placed onto the test site transmitting the carrier continously

4.3 Special Accessories and Auxiliary Equipment

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

Kind of Equipment	Manufacturer	Model Name	S/N
Laptop	HP	HSTNN-Q78C-3	CNF0339QBM

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test

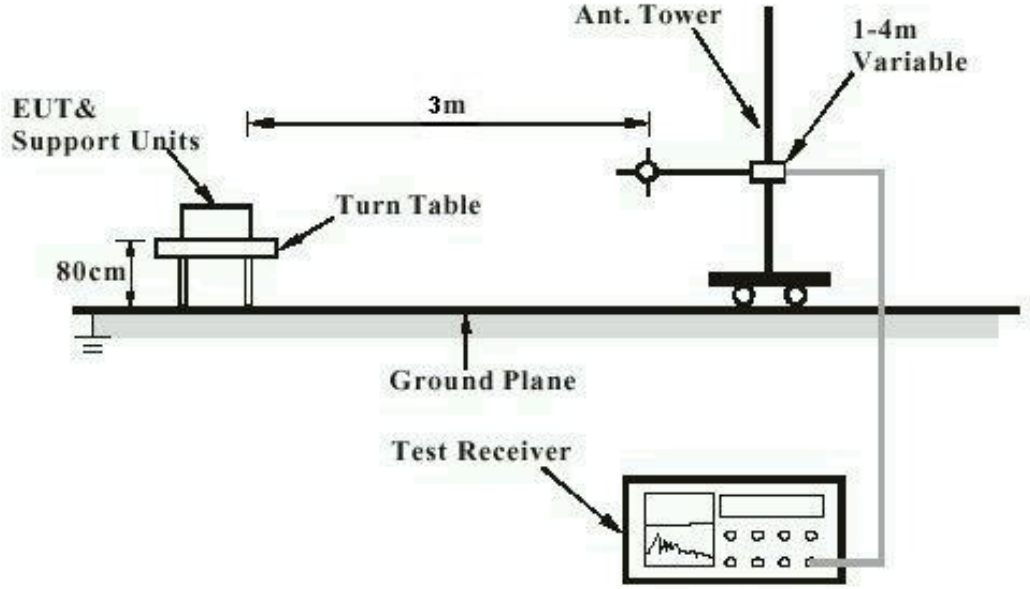
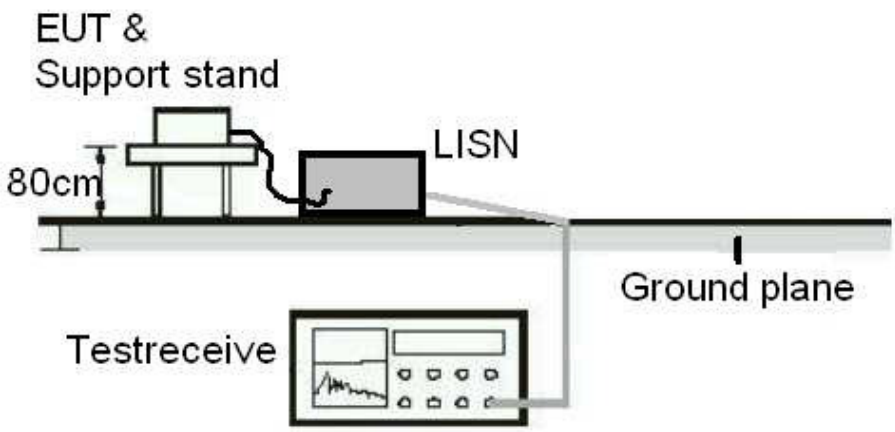


Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Passed**

Standard	:	FCC Part 15.203 and RSS-Gen 7.1.4
Requirement	:	use of approved antennas only

The antenna is connected with a SMA connector. However, the system will always be professionally installed, thus there is no possibility of replacement with a non-approved antenna by the end-user of the system Therefore, the EUT is considered to comply with this provision.

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5.1.2 Field strength of fundamental

RESULT: **Passed**

Test standard : FCC Part 15. 225
RSS-210 B.6

Basic standard : ANSI C63.10:2013

Test setup

Test Frequency : 13.56 MHz
Operation Mode : A

Table 6: Test result of Field strength of fundamental and modulation sidebands

Frequency (MHz)	Meas. Result	Detector	Test Result	Limits (QP)		Pass/Fail
	dBµV/m @1.2m		dBµV/m @30m	dBµV/m @3m	dBµV/m@ 30m	
13.110–13.410	<60	Pk	<4.1	80.5	40.5	Pass
13.410–13.553	<98.67	Pk	<42.77	90.5	50.5	Pass
13.560	98.67	Pk	42.77	124.0	84.0	Pass
13.567–13.710	<98.67	Pk	<42.77	90.5	50.5	Pass
13.710–14.010	<60	Pk	<4.1	80.5	40.5	Pass

For details refer to Appendix D.

5.1.3 Frequency Stability

RESULT: **Passed**

Test standard	:	FCC Part 15. 225(e) RSS-210 B.6
Basic standard	:	ANSI C63.10:2013
Kind of test site	:	Shielded room

Test setup

Test Frequency	:	13.56 MHz
Operation Mode	:	A
Relative humidity	:	50-65 %
Atmospheric pressure	:	100-103 kPa

Table 7: Test result of Frequency Stability

Fundamental frequency (MHz)	Temperature (°C)	Voltage	Measurement frequency (MHz)	Frequency Error (ppm)	Limit ±0.01%
13.56	-20	Normal	13.561140	84.07	±100ppm
	-10	Normal	13.561130	83.33	
	0	Normal	13.561110	81.86	
	10	Normal	13.561140	84.07	
	20	85%	13.561130	83.33	
	20	Normal	13.561130	83.33	
	20	115%	13.561130	83.33	
	30	Normal	13.561120	82.60	
	40	Normal	13.561100	81.12	
	50	Normal	13.561090	80.38	

Voltage Normal: 120V

Voltage High: 276V (115%)
Voltage Low: 102V (85%)

5.1.4 99% Bandwidth

RESULT: **Passed**

Test standard	:	RSS-Gen
Basic standard	:	ANSI C63.10:2013, KDB558074
Kind of test site	:	Shielded room

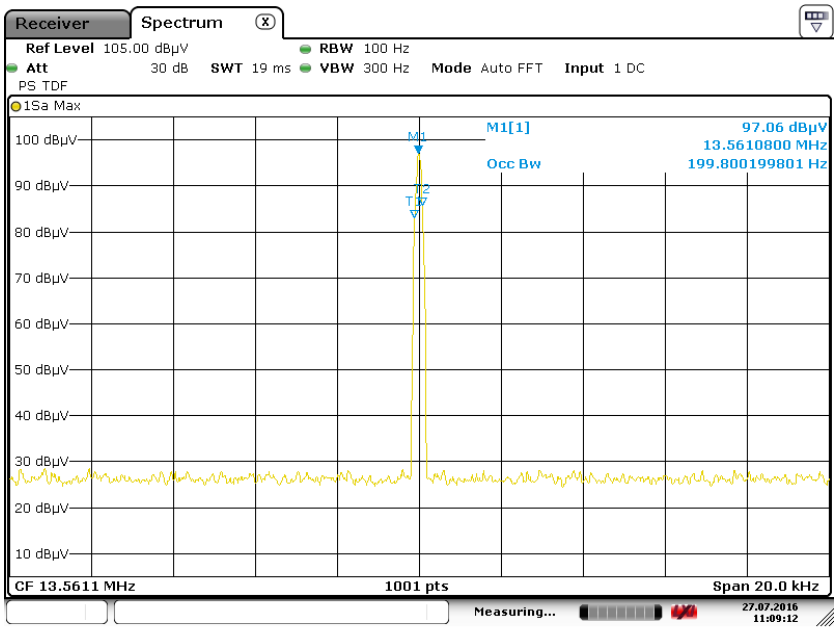
Test setup

Operation Mode	:	A
Ambient temperature	:	22-26 °C
Relative humidity	:	50-65 %
Atmospheric pressure	:	100-103 kPa
Test Voltage	:	120V

Table 8: Test result of 99% Bandwidth

Channel	Frequency (MHz)	99% Bandwidth (Hz)	
1	13.56	200	

Test Plot of 99% Bandwidth



Date: 27.JUL.2016 11:09:12

5.1.5 Spurious Emission

RESULT: **Passed**

Test standard	:	FCC part 15.209 FCC part 15.225 RSS-210 B.6
Basic standard	:	ANSI C63.10: 2009
Limits	:	The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in § 15.209. RSS-210: RSS-Gen general field strength limits for frequencies outside the band 13.110-14.010 MHz.
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Operation mode	:	A

Remark: Testing was carried out within frequency range 30MHz to the tenth harmonic.

For details refer to Appendix D.

The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The worst-case Axis orientation is recorded in this test report.

5.2 Mains Conducted Emissions

5.2.1 Conducted Emissions Line and Neutral

RESULT: **Passed**

Test standard	:	FCC Part 15.207 FCC Part 15.107 RSS-Gen
Limits	:	Mains Conducted emissions as defined in FCC Part 15.207, must comply with the mains conducted emission limits specified in FCC Part 15.207
Kind of test site	:	Shielded Room

Test setup

Operation mode	:	A

For this test, the antenna has been replaced with a resistive Dummy Load connected to the 50 Ohm Antenna terminal of the Transmitter Box.

Remark: For details refer to Appendix D.

6. List of Tables