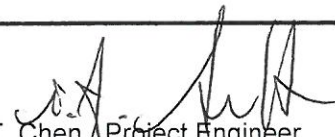


Prüfbericht-Nr.: <i>Test Report No.:</i>	10048903 001	Auftrags-Nr.: <i>Order No.:</i>	114036404	Seite 1 von 21 <i>Page 1 of 21</i>
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	22-May-2015	
Auftraggeber: <i>Client:</i>	N.V. Nederlandsche Apparatenfabriek "Nedap" , Parallelweg 2, NL-7141 DC, Groenlo, The Netherlands			
Prüfgegenstand: <i>Test item:</i>	Long-range vehicle and driver identification reader			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	TRANSIT ULTIMATE			
Auftrags-Inhalt: <i>Order content:</i>	FCC Part15C /IC RSS-210 Test report for 2.4 GHz portion			
Prüfgrundlage: <i>Test specification:</i>	FCC 47CFR Part 15: Subpart C Section 15.245 RSS-210 Issue 8, December 2010			
Wareneingangsdatum: <i>Date of receipt:</i>	5-Jun-2015			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000210273-001			
Prüfzeitraum: <i>Testing period:</i>	10-Jun-2015 - 26-Aug-2015			
Ort der Prüfung: <i>Place of testing:</i>	EMC Laboratory Taipei			
Prüflaboratorium: <i>Testing laboratory:</i>	TUV Rheinland Taiwan Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
 27-Aug-2015 Ryan W. T. Chen / Project Engineer Datum Name / Stellung Unterschrift Date Name / Position Signature		 27-Aug-2015 Rene Charton / Senior Project Manager Datum Name / Stellung Unterschrift Date Name / Position Signature		
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* 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) = failed 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 a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.				

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT

RESULT: Passed

5.1.2 FIELD STRENGTH OF FUNDAMENTAL

RESULT: Passed

5.1.3 99% BANDWIDTH

RESULT: Passed

5.1.4 SPURIOUS EMISSION

RESULT: Passed

5.2.1 CONDUCTED EMISSIONS LINE AND NEUTRAL

RESULT: Passed

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1. General Remarks

1.1 Complementary Materials

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

Appendix S: Test Setup Photo Documentation
(File Name: 10048903APPENDIX S)

Appendix D: Test Result of Radiated Emissions
(File Name: 10048903APPENDIX D)

Test Specifications
The following standards were applied.

Table 1: Applied Standard and Test Levels

Radio
FCC 47CFR Part 15: Subpart C Section 15.245 RSS-210 Issue 8, December 2010 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.: 365730
IC Canada Registration No.: 9465A-1
TAF Accredited NCC Test Lab. No.:0759
TAF ISO17025 Certification effective periods: 2013-Jul-1st to 2016-Jun-30th



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
EMI Test Receiver	R&S	ESR7	101062	31-Aug-14	30-Aug-15
Bilog Antenna	TESEQ	CBL6111D	29802	4-Jul-14	3-Jul-16
Spectrum Analyzer	R&S	FSV 40	100921	17-Dec-14	16-Dec-15
Spectrum Analyzer	Agilent	N9010A	MY53470241	1-Apr-15	30-Mar-16
Horn Antenna	ETS-Lindgren	3117	138160	12-Jan-15	11-Jan-17
Horn Antenna (18GHz~40GHz)	COM-POWER	AH840	101031	30-Oct-13	29-Oct-15
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	23-Aug-14	22-Aug-15
Preamplifier (18 GHz -40 GHz)	COM-POWER	PAM-840	461257	26-Aug-14	25-Aug-15
Pre-Amplifier (1GHz~18GHz)	EM Electronics	EM30180	60558	4-Nov-14	3-Nov-15
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	22-Oct-14	21-Oct-15
EMI Test Receiver	R&S	ESC17	100797	28-Dec-14	27-Dec-15
Spectrum Analyzer	R&S	FSL3	101943	14-Sep-14	13-Sep-15
LISN (1 phase)	R&S	ENV216	101243	1-Jun-15	31-May-16
LISN	Rolf Heine	NNB-2/16Z	99080	26-Aug-14	25-Aug-15

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 basis using in house standards or comparisons.

2.5 Measurement Uncertainty

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

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
RF power, conducted	± 1.5 dB
Adjacent channel power	± 3 dB
Radiated emission of transmitter, valid up to 26 GHz	± 6 dB
Radiated emission of receiver, valid up to 26 GHz	± 6 dB
Temperature	± 2 °C
Humidity	± 10 %

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a 2.4 GHz RFID Reader with a 433 MHz RF control Channel. As an option, the device can have an external 120 kHz Card reader. This test report is for the 2.4 GHz portion. For 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	Long-range vehicle and driver identification reader
Type Designation	TRANSIT ULTIMATE
FCC ID	CGDTRANSITULTI
Canada ID	1444A-TRANSITULTI

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequencies	2.4384 - 2.4570 GHz
Channel Spacing	600kHz
Channel number	32, 600 kHz spacing
Operation Voltage	100 - 240 VAC or 24 VDC
Modulation	CW

3.3 Independent Operation Modes

Basic operation modes are:

- A. Transmitting
 - 1. Low channel
 - 2. Middle channel
 - 3. High channel

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

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 operating frequency can be set with a DIP-Switch inside the device.

4.3 Special Accessories and Auxiliary Equipment

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

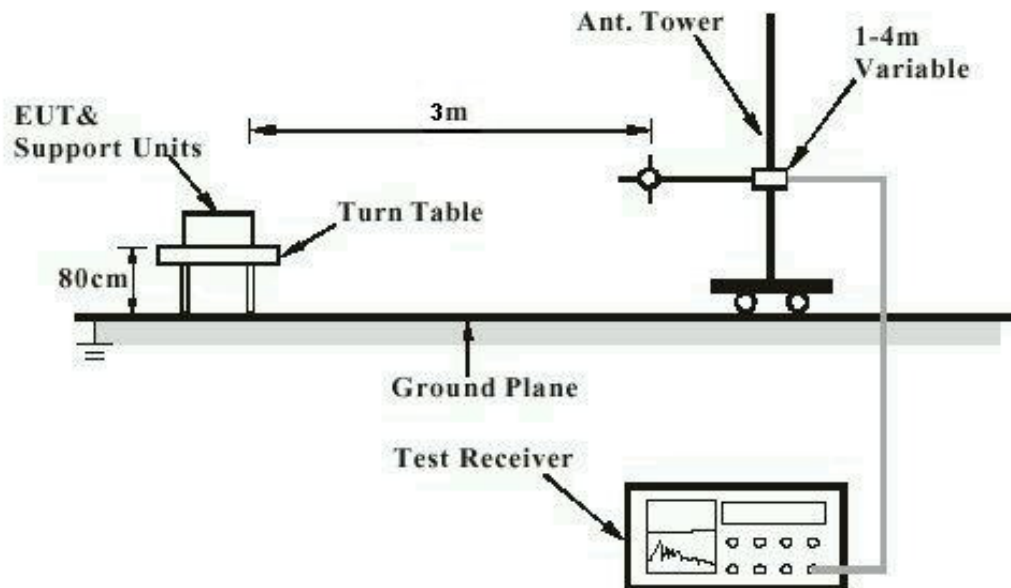
None.

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.

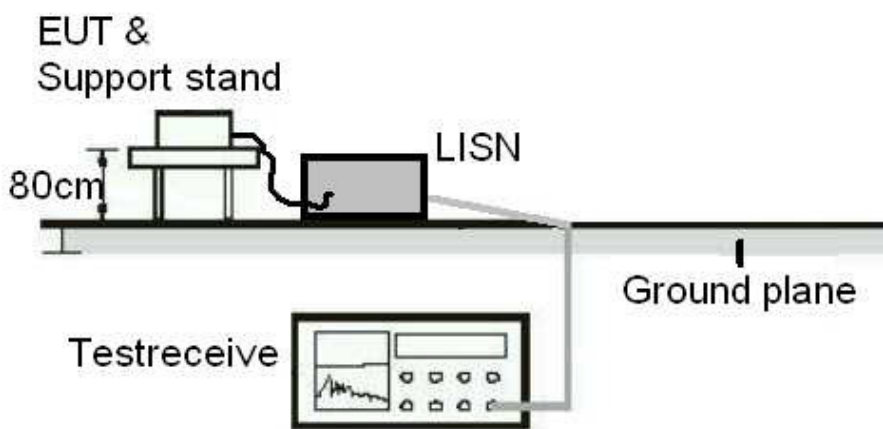
4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m

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 : LP0002(2011): 2.2
Part 15.203 and RSS-Gen 7.1.4
Requirement : use of approved antennas only

The antenna is a Chip Antenna soldered to the PCB with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

5.1.2 Field strength of fundamental

RESULT:**Passed**

Test standard : FCC Part 15.245(b), RSS-210 A7.1

Basic standard : ANSI C63.10:2013

Kind of test site : Semi-Anechoic Chamber

Test setup

Test Channel : Low/ Middle/ High

Operation Mode : A

Atmospheric pressure : 100-103 kPa

In the table below the maximum results found are reported.

For detailed results of all frequencies tested, please refer to Appendix D.

Table 6: Test result of Field strength of fundamental

Channel Frequency (MHz)	Test result			
	Level (dBuV/m)	Limit (dBuV/m)	Antenna orientation	Detector
2438.4	110.61	134	Horizontal	Peak
2438.4	110.52	114		Average
2438.4	108.36	134	Vertical	Peak
2438.4	108.25	114		Average
2448	110.78	134	Horizontal	Peak
2448	110.65	114		Average
2448	108.87	134	Vertical	Peak
2448	108.74	114		Average
2457	110.09	134	Horizontal	Peak
2457	110.01	114		Average
2457	108.49	134	Vertical	Peak
2457	108.37	114		Average

Remark: For details refer to Appendix D.

5.1.3 99% Bandwidth**RESULT:****Passed**

Test standard : RSS-Gen
Basic standard : ANSI C63.10:2013

Test setup

Test Channel : Middle
Operation Mode : A

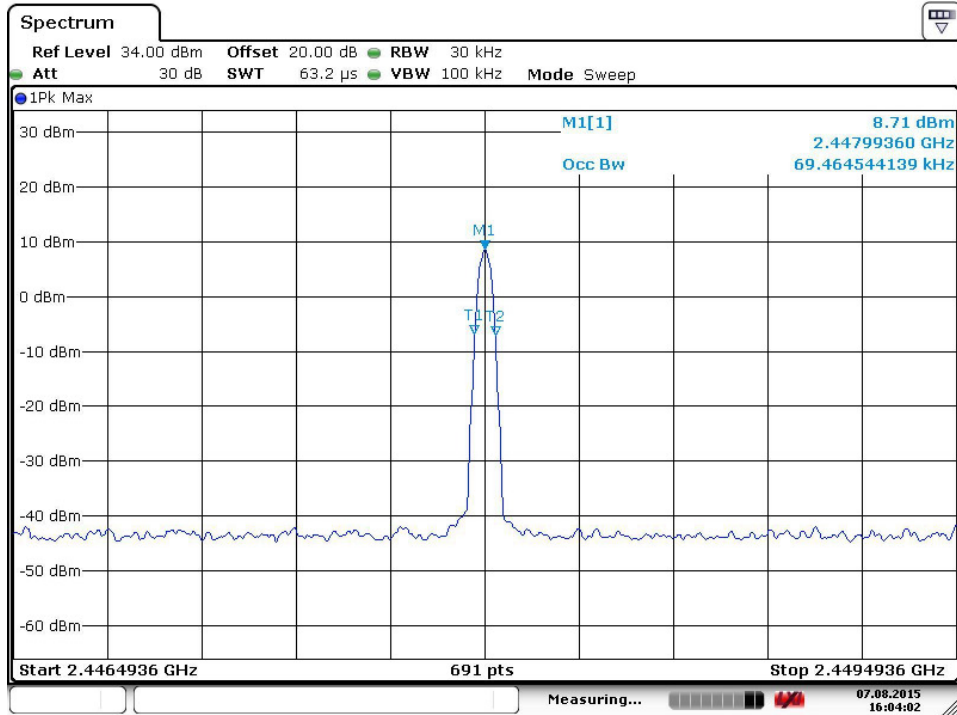
Ambient temperature : 22-26 °C
Relative humidity : 50-65 %
Atmospheric pressure : 100-103 kPa

Table 7: Test result of 99% Bandwidth,

Channel	Channel Frequency (MHz)	99% Bandwidth (kHz)
Mid Channel	2448	69.46

Test Plot of 99% Bandwidth

Middle Channel



Date: 7.AUG.2015 16:04:02

5.1.4 20dB Bandwidth

RESULT:
Passed

Test standard : FCC Part 15.215,
 Basic standard : ANSI C63.10:2013

Test setup

Test Channel : Low / High
 Operation Mode : A
 Ambient temperature : 22-26°C
 Relative humidity : 50-65%
 Atmospheric pressure : 100-103kPa

Table 8: Test result of 20dB Bandwidth

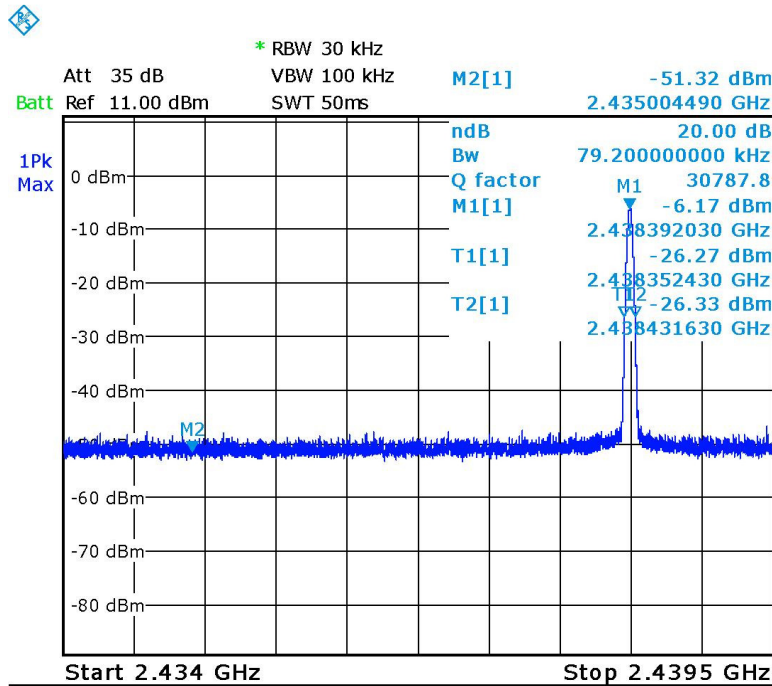
Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Limit (MHz)	Result
Low Channel	2438.4	79.2	6.8	Pass
High Channel	2457.0	79.0	16	Pass

Lower Band limit.: 2435.0 MHz
 Lowest Frequency used: 2438.4 MHz
 20 dB BW limit at low edge: 3.4 MHz *2

Upper Band limit.: 2465.0 MHz
 Highest Frequency used: 2457.0 MHz
 20 dB BW limit at heigh edge: 8 MHz *2

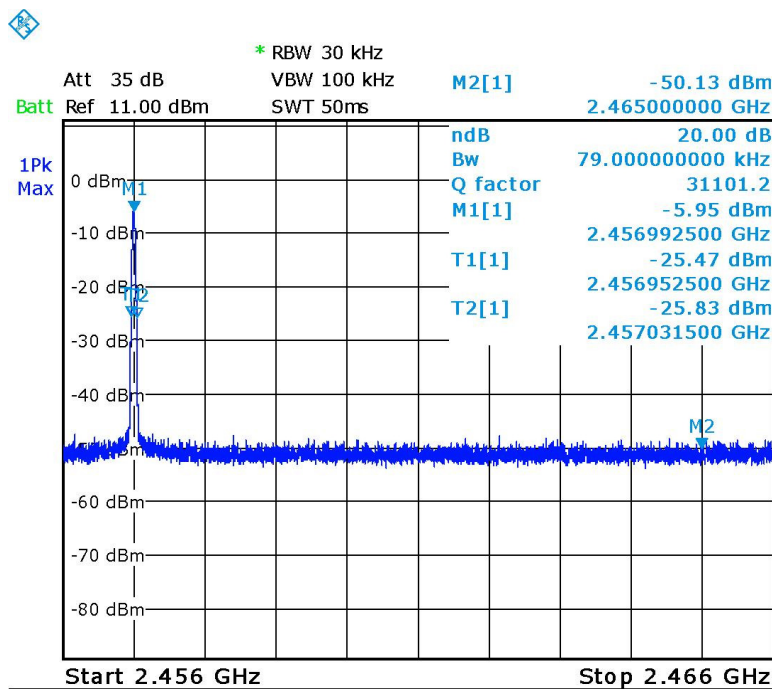
Test Plot of 20dB Bandwidth

Low Channel



Date: 26.AUG.2015 13:22:39

High Channel



Date: 26.AUG.2015 13:25:04

5.1.5 Spurious Emission

RESULT:**Passed**

Test standard	:	Part 15.245(b) and Part 15.245(b)(1), FCC 15.205, FCC 15.209, RSS-210 2.2, RSS-210 A7, RSS-Gen 7.2.1 LP0002: 2.8
Basic standard	:	ANSI C63.10: 2013
Limits	:	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). Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in FCC 15.209(a) and FCC 15.245 (b)(3).
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/ Middle/ High
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 7.2.4 LP0002: 2.3
Limits	:	Mains Conducted emissions as defined in above test standards must comply with the mains conducted emission limits specified
Kind of test site	:	Shielded Room
Test setup		
Test Channel	:	Middle
Operation mode	:	Operate at 2.45G&433M supplied from AC

Remark: For details refer to Appendix D.