

Radio Testing of the  
 Kronegger GmbH  
 RFID Module for Vehicular Environment.  
 Model: Kronegger NFC P&P Reader customised  
 for Autolib Car, RS232 and SAM  
 In accordance with FCC 47 CFR Part 15C

Kronegger GmbH  
 Parkring 1  
 8074 Grambach bei Graz  
 Austria

FCC ID: ZKCICRB-9921-2025



Product Service

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## COMMERCIAL-IN-CONFIDENCE

Figure 1

Date: 2017-09-27

Document Number: TR-063633-107059-03 Edition 1

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Matthias Stumpe	27.09.2017	
Authorised Signatory	Markus Biberger	27.09.2017	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

### ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Matthias Stumpe	27.09.2017	

FCC Accreditation  
 Registration No. BNetzA-CAB-16/21-15

Industry Canada Accreditation  
 3050A-2

Table 1

### EXECUTIVE SUMMARY

A sample of this product was tested and found to be in compliance with FCC 47 CFR Part 15C.

Table 2

Trade Register Munich  
 HRB 85742  
 VAT ID No. DE129484267  
 Information pursuant to Section 2(1)  
 DL-InfoV (Germany) at  
[www.tuev-sued.com/imprint](http://www.tuev-sued.com/imprint)

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## 1 Report Summary

### 1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2017-09-27

**Table 3**

### 1.2 Introduction

Applicant	Kronegger GmbH
Manufacturer	Kronegger GmbH
Model Number(s)	Kronegger NFC P&P Reader customised for Autolib Car, RS232 and SAM
Serial Number(s)	Prototype
Hardware Version(s)	--
Software Version(s)	--
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C:2014
Test Plan/Issue/Date	--
Order Number/Date	2017042501/2017-04-25
Date of Receipt of EUT	2017-09-25
Start of Test	2017-07-10
Finish of Test	2017-09-25
Name of Engineer(s)	Markus Biberger
Related Document(s)	--



### 1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: DC Powered 12 V Transmitting continuously				
2.1	15.207	AC Line Conducted Emissions	Pass	
2.2	15.209	Radiated Emissions (General Requirements)	Pass	
2.3	15.215 (c)	20 dB Bandwidth	Pass	
2.4	15.225 (a)(b)(c)(d)	Field Strength of any Emission	Pass	
2.5	15.225 (e)	Frequency Tolerance Under Temperature Variations	Pass	

**Table 4**



## 1.4 Product Information

### 1.4.1 Technical Description

The NFC P&P Reader is device to read/write 13.56 MHz RFID Transponders RS232. It generates a 13.56 MHz field to power the transponder and communicate with it. It uses ASK modulation to modulate the 13.56 MHz carrier frequency. The Output power is 250mW. It has a loop antenna on the pcb. Power supply is an external 12V Power supply. The data rate to the transponder is 106 kBit/sec.

The Kronegger Plug & Play Boards are intended as host print for the Kronegger OEM Reader series to provide the necessary antenna and a communication interface to the PC. Interface is a RS232. It reads and writes contactless tags compatible to ISO14443A. The module also supports SAM Controllers for high security applications

## 1.5 Description of the Equipment under Test

### 1.5.1 Technical data of EUT:

Application frequency range:	13.110 - 14.010 MHz
Frequency range:	13.553 – 13-567 MHz
Operating frequency:	13.56 MHz
Type of modulation:	ASK
Pulse train:	--
Pulse width:	--
Number of RF-channels:	1
Channel spacing:	
Designation of emissions <sup>1</sup> :	4K9A1D
Type of antennas:	Integrated loop on board printed antenna
Antenna size:	--
Connection of antenna:	Not detachable
Type of power supply:	Battery supplied
Specifications for power supply:	nominal voltage: 12 V minimum voltage: 10.8 V maximum voltage: 13.2 V

<sup>1</sup> Also known as "Class of Emission".

**1.5.2 List of ports and cables:**

<i>Port</i>	<i>Description</i>	<i>Classification<sup>2</sup></i>	<i>Cable type</i>	<i>Cable length</i>
1	Wiring harness with DC and RS-232	signal/control port	Unshielded	0,7 m

**1.5.3 List of devices connected to EUT**

<i>Item</i>	<i>Description</i>	<i>Type designation</i>	<i>Serial no. or ID</i>	<i>Manufacturer</i>
--	--	--	--	--

**1.5.4 List of support devices**

<i>Item</i>	<i>Description</i>	<i>Type designation</i>	<i>Serial no. or ID</i>	<i>Manufacturer</i>
1	Tag transponder	--	--	--
2	Laptop PC	Latitude D810	--	DELL

---

<sup>2</sup> Ports shall be classified as ac power, dc power or signal/control port

## 1.7 Deviations from the Standard

--

## 1.8 EUT Modification Record

The table below details modifications made to the EUT during the test programme. The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Serial Number: Prototype			
0	As supplied by the customer	Not Applicable	Not Applicable

**Table 5**

## 1.9 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing Test Laboratory.

Test Name	Name of Engineer(s)	Comment
Configuration and Mode: DC Powered 12 V Transmitting continuously		
AC Line Conducted Emissions	Markus Biberger	--
Radiated Emissions (General Requirements)	Markus Biberger	--
20 dB Bandwidth	Markus Biberger	--
Field Strength of any Emission	Markus Biberger	--
Frequency Tolerance Under Temperature Variations	Markus Biberger	--

**Table 6**

Office Address:

Äußere Frühlingstraße 45  
94315 Straubing  
Germany

## 2 Test Details

### 2.1 AC Line Conducted Emissions

#### 2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.207

#### 2.1.2 Equipment Under Test and Modification State

Kronegger NFC P&P Reader customised for Autolib Car, RS232, SAM, S/N: Prototype -  
Modification State 0

#### 2.1.3 Date of Test

2017-09-19

#### 2.1.4 Test Method

The test was performed in accordance with KDB 174176 D01 v01 and ANSI C63.10, clause 6.2.

#### Remarks

A mains supply cable of 1 m length was used to supply mains power to the EUT from the LISN.

All final measurements were assessed against the Class A emission limits in Clause 15.207 of FCC 47 CFR Part 15.

#### 2.1.5 Environmental Conditions

Ambient Temperature	23,0 °C
Relative Humidity	32,0 %

#### 2.1.6 Test Results

DC Powered 12 V Transmitting continuously, Live Line

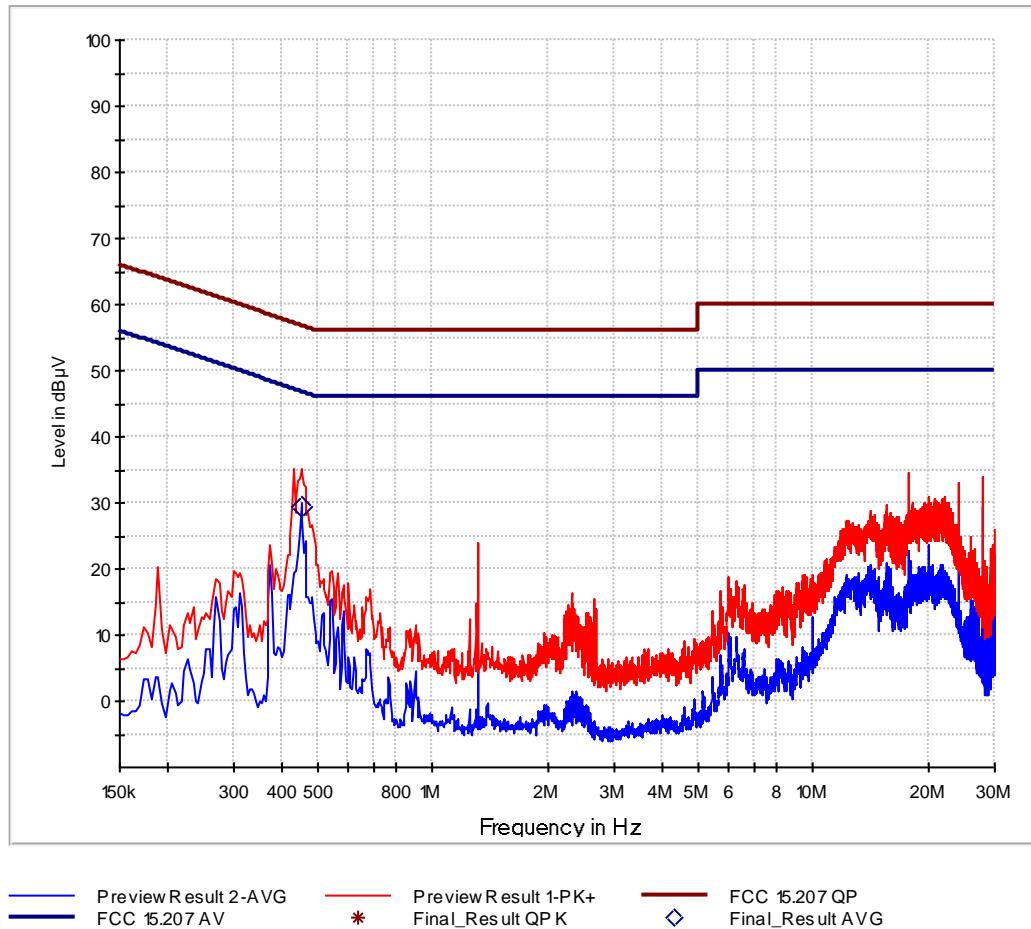
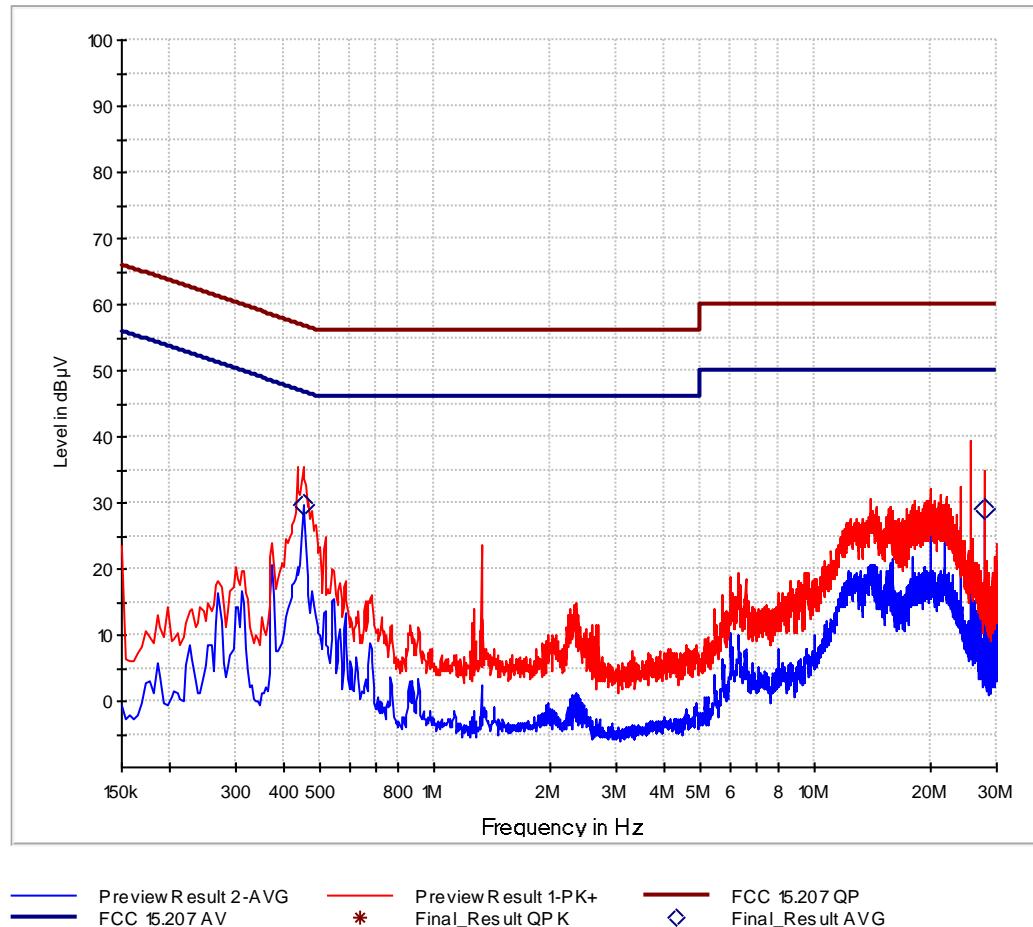


Figure 2

Frequency MHz	Average dB $\mu$ V	Limit dB $\mu$ V	Margin dB	Line	PE	Corr. dB
0.450000	29.34	46.88	17.53	L1	GND	0.0

Table 7

DC Powered 12 V Transmitting continuously, Neutral Line



**Figure 3**

Frequency MHz	Average dB $\mu$ V	Limit dB $\mu$ V	Margin dB	Line	PE	Corr. dB
0.450000	29.65	46.88	17.22	L1	GND	0.0
28.002000	28.99	50.00	21.01	L1	GND	0.4

**Table 8**

FCC 47 CFR Part 15, Limit Clause 15.207

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

**Table 9**

\*Decreases with the logarithm of the frequency.

## 2.2 Radiated Emissions (General Requirements)

### 2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.209

### 2.2.2 Equipment Under Test and Modification State

Kronegger NFC P&P Reader customised for Autolib Car, RS232, SAM, S/N: Prototype - Modification State 0

### 2.2.3 Date of Test

2017-07-10

### 2.2.4 Test Method

The test was performed in accordance with ANSI C63.4, Clause 8.

#### Remarks

When frequencies greater than 18 GHz were measured the EUT was positioned 1 m above the horizontal reference ground plane.

All final measurements were assessed against the Class A emission limits in FCC 47 CFR Part 15, Clause 15.109.

### 2.2.5 Environmental Conditions

Ambient Temperature 25,0 °C  
Relative Humidity 29,0 %

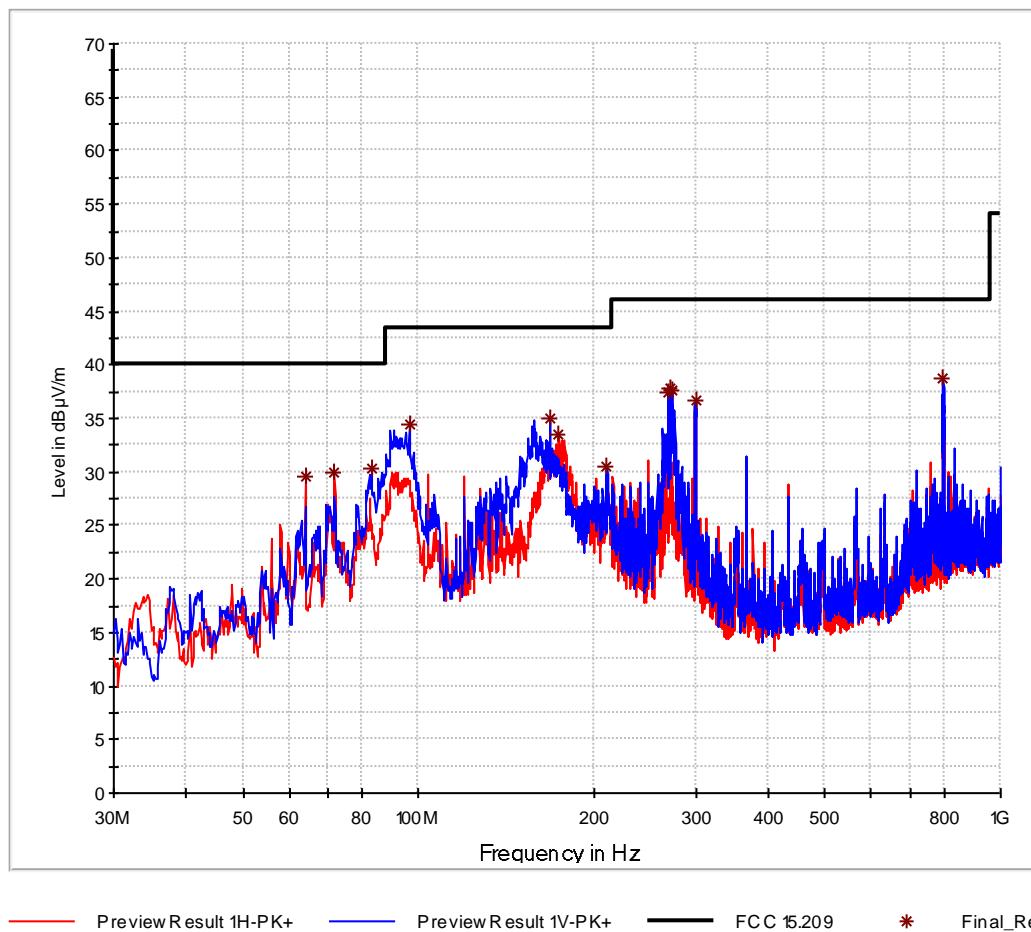
### 2.2.6 Test Results

#### DC Powered 12 V Transmitting continuously, 9 kHz to 30 MHz Emissions Results

Frequency (MHz)	Average Level (dB $\mu$ V/m)	Peak Level (dB $\mu$ V/m)	Average Level ( $\mu$ V/m)	Peak Level ( $\mu$ V/m)	Angle (deg)	Height (m)	Polarisation
0.062100	--	44.84	--	174,58	142	1	Vertical
13,56000	--	55,63	--	604,64	-172	1	Vertical

Table 10

DC Powered 12 V Transmitting continuously, Field Strength of any Emission Results, 30 MHz to 1 GHz



**Figure 4**

Frequency MHz	MaxPeak dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Pol	Azimuth deg	Corr. dB	Comment
63.950000	29.49	40.00	10.51	H	185.0	-16.6	
71.904000	29.99	40.00	10.01	H	158.0	-19.9	
83.350000	30.40	40.00	9.60	V	62.0	-19.5	
96.542000	34.43	43.50	9.07	V	68.0	-17.0	
168.322000	35.00	43.50	8.50	V	110.0	-19.2	
174.530000	33.47	43.50	10.03	H	63.0	-19.2	
211.002000	30.57	43.50	12.93	V	249.0	-17.5	
269.202000	37.36	46.00	8.64	V	145.0	-15.7	
270.754000	37.74	46.00	8.26	V	142.0	-15.7	
272.500000	37.70	46.00	8.30	V	142.0	-15.7	
299.272000	36.77	46.00	9.23	H	82.0	-15.1	
797.852000	38.77	46.00	7.23	V	197.0	-7.9	

**Table 11**

Frequency (MHz)	Field Strength ( $\mu$ V/m)	Measurement Distance (m)
0.009 to 0.490	2400/F(kHz)	300
0.490 to 1.705	24000/F(kHz)	30
1.705 to 30	30	30
30 to 88	100	3
88 to 216	150	3
216 to 960	200	3
Above 960	500	3

**Table 12**

**2.3 20 dB Bandwidth**

**2.3.1 Specification Reference**

FCC 47 CFR Part 15C, Clause 15.215 (c)

**2.3.2 Equipment Under Test and Modification State**

Kronegger NFC P&P Reader customised for Autolib Car, RS232, SAM, S/N: Prototype - Modification State 0

**2.3.3 Date of Test**

2017-09-25

**2.3.4 Test Method**

The test was performed in accordance with ANSI C63.10, clause 6.9.1.

**2.3.5 Environmental Conditions**

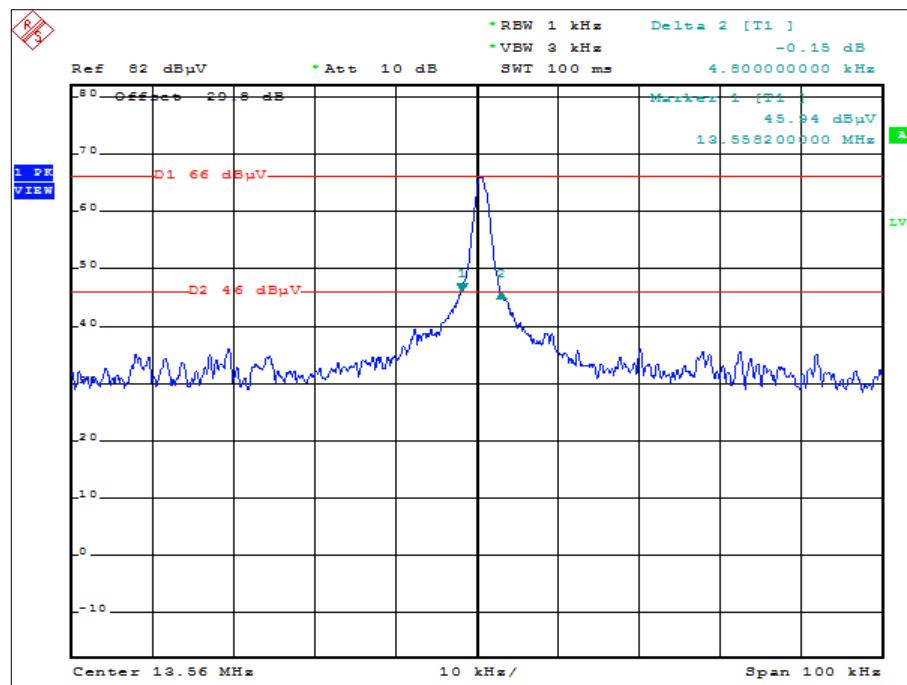
Ambient Temperature 21,0 °C  
Relative Humidity 34,0 %

**2.3.6 Test Results**

DC Powered 12 V Transmitting continuously

Frequency (MHz)	20 dB Bandwidth (Hz)
13,56	13,56

**Table 13**



**Figure 5**

FCC 47 CFR Part 15, Limit Clause 15.215 (c)

The 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

## 2.4 Field Strength of any Emission

### 2.4.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.225 (a)(b)(c)(d)

### 2.4.2 Equipment Under Test and Modification State

Kronegger NFC P&P Reader customised for Autolib Car, RS232, SAM, S/N: Prototype - Modification State 0

### 2.4.3 Date of Test

2017-08-02

### 2.4.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.3, 6.4 and 6.5.

### 2.4.5 Environmental Conditions

Ambient Temperature 25,0 °C  
Relative Humidity 29,0 %

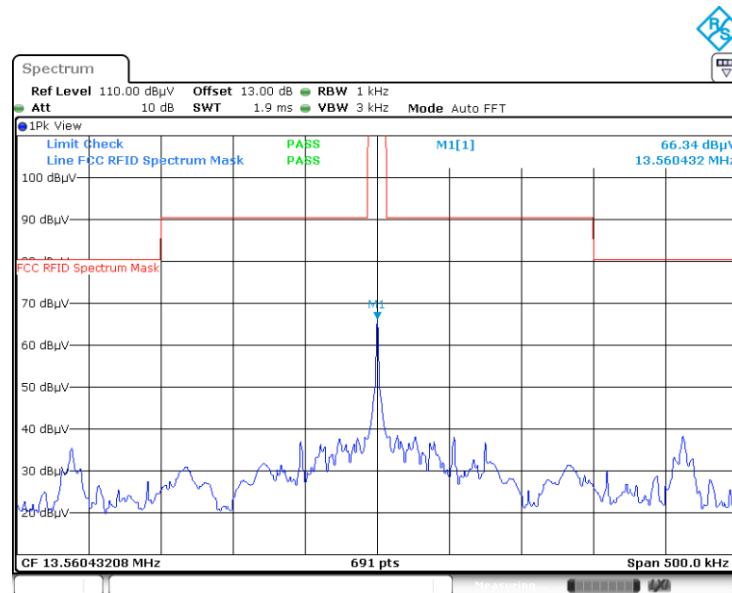
### 2.4.6 Test Results

#### DC Powered 12 V Transmitting continuously, Carrier Results

Frequency (MHz)	Quasi-Peak Level (dB $\mu$ V/m) at 3m	Quasi-Peak Level (dB $\mu$ V/m) at 30m	Quasi-Peak Level ( $\mu$ V/m) at 30m	Quasi-Peak Level ( $\mu$ V/m) at 3m	Angle (°)	Height (m)	Polarisation
13,560000	66,34	46,34	207,49	2074,91	-172	1	Vertical

**Table 14**

\*The level at 30m was calculated using the dB $\mu$ V/m measurement at 3m and extrapolating this result to produce a level at 30m. This value was then converted to obtain the value in  $\mu$ V/m.



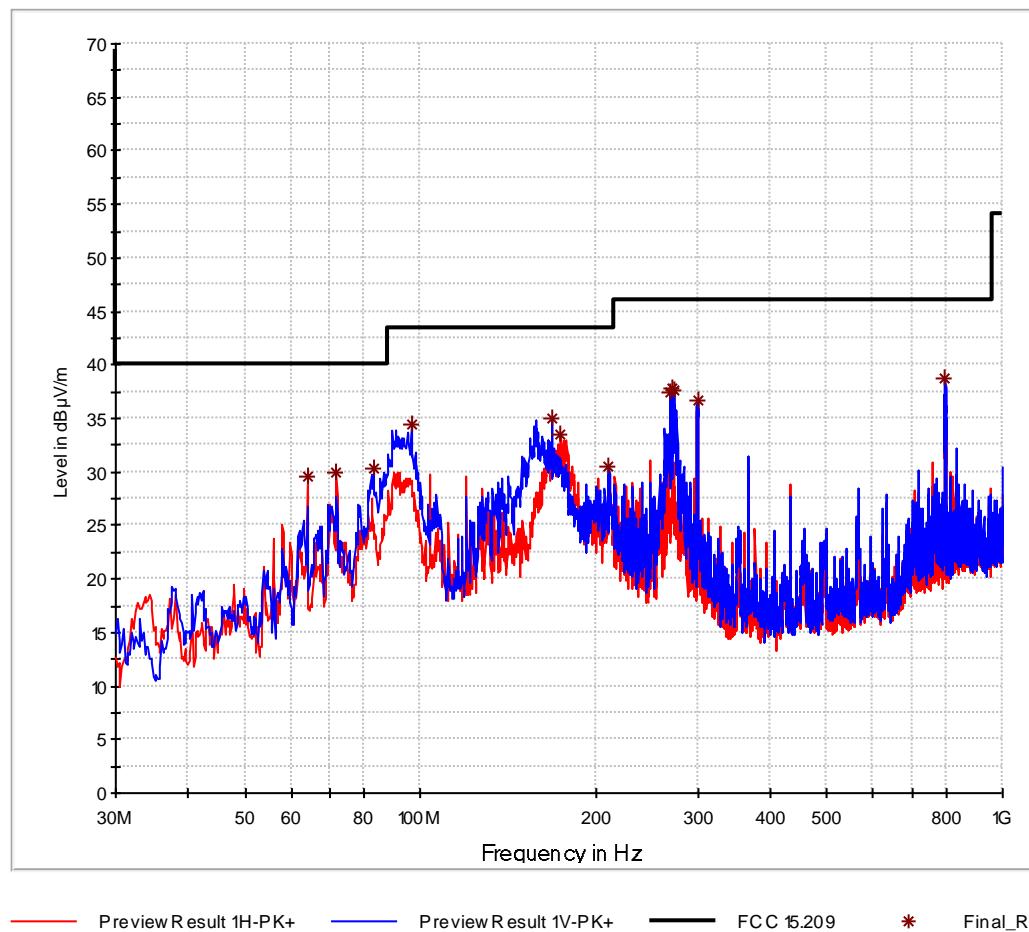
**Figure 6**

DC Powered 12 V Transmitting continuously, Field Strength of any Emission Results, 9 kHz to 30 MHz

Frequency (MHz)	Quasi-Peak Level (dBμV/m) at 3m	Quasi-Peak Level (dBμV/m) at 30m	Quasi-Peak Level (μV/m) at 30m	Quasi-Peak Level (μV/m) at 3m	Angle (°)	Height (m)	Polarisation
0,0621000	55,30	35,30	58,21	582,10	143	1	Vertical

**Table 15**

DC Powered 12 V Transmitting continuously, Field Strength of any Emission Results, 30 MHz to 1 GHz



**Figure 7**

Frequency MHz	MaxPeak dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Pol	Azimuth deg	Corr. dB	Comment
63.950000	29.49	40.00	10.51	H	185.0	-16.6	
71.904000	29.99	40.00	10.01	H	158.0	-19.9	
83.350000	30.40	40.00	9.60	V	62.0	-19.5	
96.542000	34.43	43.50	9.07	V	68.0	-17.0	
168.322000	35.00	43.50	8.50	V	110.0	-19.2	
174.530000	33.47	43.50	10.03	H	63.0	-19.2	
211.002000	30.57	43.50	12.93	V	249.0	-17.5	
269.202000	37.36	46.00	8.64	V	145.0	-15.7	
270.754000	37.74	46.00	8.26	V	142.0	-15.7	
272.500000	37.70	46.00	8.30	V	142.0	-15.7	
299.272000	36.77	46.00	9.23	H	82.0	-15.1	
797.852000	38.77	46.00	7.23	V	197.0	-7.9	

**Table 16**



- (a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) 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.

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength ( $\mu$ V/m)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30
30 to 88	100**	3
88 to 216	150**	3
216 to 960	200**	3
Above 960	500	5

**Table 17**

## 2.5 Frequency Tolerance Under Temperature Variations

### 2.5.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.225 (e)

### 2.5.2 Equipment Under Test and Modification State

Kronegger NFC P&P Reader customised for Autolib Car, RS232, SAM, S/N: Prototype - Modification State 0

### 2.5.3 Date of Test

2017-09-25

### 2.5.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.8.

### 2.5.5 Environmental Conditions

Ambient Temperature 21,0 °C  
Relative Humidity 32,0 %

### 2.5.6 Test Results

DC Powered 12 V Transmitting continuously

Temperature	Voltage	Measured Frequency (MHz)	Frequency Error (ppm)
-30.0 °C	DC 12V	13,56043208	3,4
-20.0 °C	DC 12V	13,56040849	5,1
-10.0 °C	DC 12V	13,56040806	5,2
0.0 °C	DC 12V	13,56036102	8,6
10.0 °C	DC 12V	13,56036146	8,6
20.0 °C	DC 10.8V	13,55992800	9,6
20.0 °C	DC 12V	13,56047800	0,0
20.0 °C	DC 13.2V	13,56034762	9,6
30.0 °C	DC 12V	13,56040923	5,1
40.0 °C	DC 12V	13,56041781	4,4
50.0 °C	DC 12V	13,56043345	3,3
60.0 °C	DC 12V	13,56043515	3,2
70.0 °C	DC 12V	13,56043746	3,0
80.0 °C	DC 12V	13,56071908	17,8
90.0 °C	DC 12V	13,56099221	37,9
100.0 °C	DC 12V	13,56107288	43,9



Temperature	Voltage	Measured Frequency (MHz)	Frequency Error (ppm)
105.0 °C	DC 12V	13,56119069	52,6

FCC 47 CFR Part 15, Limit Clause 15.225 (e)

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency.



## **2.6      Restricted Band Edges**

### **2.6.1    Specification Reference**

FCC 47 CFR Part 15C, Industry Canada RSS-210 and Industry Canada RSS-GEN, Clause 15.205, 4.1 and 8.10

### **2.6.2    Equipment Under Test and Modification State**

91 25, S/N: 6185 - Modification State 1

### **2.6.3    Date of Test**

2017-09-08

### **2.6.4    Test Method**

This test was performed in accordance with ANSI C63.10, clause 11.13.1.

Plots for average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.3.

Final average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.2.

### **2.6.5    Environmental Conditions**

Ambient Temperature	21,0 - 23,0 °C
Relative Humidity	34,0 %

### **2.6.6    Test Results**

#### DC Powered 12 V Transmitting continuously

See "Spectrum Mask" for the 13.36 to 13.41 MHz band. For all other restricted bands see "Radiated Emission".



FCC 47 CFR Part 15, Limit Clause 15.205

	Peak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)
Restricted Bands of Operation	74	54

**Table 18**  
Industry Canada RSS-GEN, Limit Clause 8.9

Frequency (MHz)	Field Strength ( $\mu$ V/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

**Table 19**

\*Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

## 3 Test Equipment Information

### 3.1 General Test Equipment Used

Instrument	Designation	Inv. No.	Serial no. or ID	Manufacturer	Last Calibration	Next Calibration
Spectrum analyzer	FSV40	2364	101448	Rohde & Schwarz	11/2016	11/2017
EMI test receiver	ESR7	22643	101713	Rohde & Schwarz	11/2016	11/2017
Spectrum analyzer	ESCI3	1863	100008	Rohde & Schwarz	10/2016	10/2017
Loop antenna	HFH2-Z2	1016	882964/1	Rohde & Schwarz	07/2016	07/2018
V-network	ESH3-Z5	1059	894785/005	Rohde & Schwarz	10/2016	10/2019
TRILOG Broadband Antenna	VULB 9163	2058	9163-408	Schwarzbeck	7/2016	07/2018
Climate test chamber	2183	PL-2J	15001626	Espec	03/2017	03/2019
DC power supply	1267	NGSM 32/10	203	Rohde & Schwarz		see note 1
Multimeter	1653	21 III	76530546	Fluke	03/2016	03/2019

Note 1: No calibration required. Devices are checked by calibrated equipment during test.

## 4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Radio Testing			
Test Name	kp	Expanded Uncertainty	Note
Occupied Bandwidth	2.0	$\pm 1.14 \%$	2
RF-Frequency error	1.96	$\pm 1 \cdot 10^{-7}$	7
RF-Power, conducted carrier	2	$\pm 0.079 \text{ dB}$	2
RF-Power uncertainty for given BER	1.96	+0.94 dB / -1.05	7
RF power, conducted, spurious emissions	1.96	+1.4 dB / -1.6 dB	7
RF power, radiated			
25 MHz – 4 GHz	1.96	+3.6 dB / -5.2 dB	8
1 GHz – 18 GHz	1.96	+3.8 dB / -5.6 dB	8
18 GHz – 26.5 GHz	1.96	+3.4 dB / -4.5 dB	8
40 GHz – 170 GHz	1.96	+4.2 dB / -7.1 dB	8
Spectral Power Density, conducted	2.0	$\pm 0.53 \text{ dB}$	2
Maximum frequency deviation			
300 Hz – 6 kHz	2	$\pm 2.89 \%$	2
6 kHz – 25 kHz	2	$\pm 0.2 \text{ dB}$	2
Maximum frequency deviation for FM	2	$\pm 2.89 \%$	2
Adjacent channel power 25 MHz – 1 GHz	2	$\pm 2.31 \%$	2
Temperature	2	$\pm 0.39 \text{ K}$	4
(Relative) Humidity	2	$\pm 2.28 \%$	2
DC- and low frequency AC voltage			
DC voltage	2	$\pm 0.01 \%$	2
AC voltage up to 1 kHz	2	$\pm 1.2 \%$	2
Time	2	$\pm 0.6 \%$	2

Table 20

Radio Interference Emission Testing			
Test Name	kp	Expanded Uncertainty	Note
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5µH AMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Fieldstrength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 1 m (ALSE)			
9 kHz to 150 kHz	2	± 4.6 dB	1
150 kHz to 30 MHz	2	± 4.1 dB	1
30 MHz to 200 MHz	2	± 5.2 dB	1
200 MHz to 2 GHz	2	± 4.4 dB	1
2 GHz to 3 GHz	2	± 4.6 dB	1
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 5.0 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.9 dB	1
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			4
Voltage Changes, Voltage Fluctuations and Flicker			4

Table 21

Immunity Testing			
Test Name	kp	Expanded Uncertainty	Note
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2	+32.2 / -24.3 %	5
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances, induced by RF-Fields			
via CDN	2	+15.1 / -13.1 %	6
via EM clamp	2	+42.6 / -29.9 %	6
via current clamp	2	+43.9 / -30.5 %	6
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips, Short Interruptions and Voltage Variations			4
Oscillatory Waves			4
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			4

Table 22

Note 1:

The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 2:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 3:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2.05, providing a level of confidence of p = 95.45%

Note 4:

It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95% confidence.

Note 5:

The expanded uncertainty reported according to IEC 61000-4-3 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 6:

The expanded uncertainty reported according to IEC 61000-4-6 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 7:

The expanded uncertainty reported according ETSI TR 100 028 V1.4.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96, providing a level of confidence of p = 95.45%

Note 8:

The expanded uncertainty reported according to ETSI TR 102 273 V1.2.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96, providing a level of confidence of p = 95.45%