



FCC LISTED,
REGISTRATION NUMBER:
720267
IC LISTED REGISTRATION
NUMBER IC 4621A-1

Test report No:
NIE: 46347RRF.002

Test report

USA FCC Part 15.209

CANADA RSS-Gen

Identificación del objeto ensayado..... Identification of item tested	Radio frequency transmitter-receiver user in vehicle car access systems
Marca Trademark	Continental
Modelo y/o referencia tipo Model and /or type reference	HFM_CMFB_01
Other identification of the product	FCC ID: KR5HFMCMFB01 IC: 7812D-HFMCMFB01
Final HW version	---
Final SW version	---
Características Features	Remote functions for vehicle access. Hand free functions for vehicle access and engine start, Immobilizer, LF (125 kHz) Antennae management
Fabricante Manufacturer	Continental Automotive GmbH Siemensstraße 12, 93055 Regensburg, Germany.
Método de ensayo solicitado, norma..... Test method requested, standard	USA FCC Part 15.209 (10–1–14 Edition).: Radiated emission limits, general requirements. CANADA RSS-Gen Issue 4 (November 2014). Transmitter Emission Limits for Licence-Exempt Radio Apparatus.
Resultado..... Summary	IN COMPLIANCE
Aprobado por (nombre / cargo y firma) .. Approved by (name / position & signature)	A. Llamas RF Lab. Manager
Fecha de realización Date of issue	2015-11-16
Formato de informe No. Report template No	FDT08_17

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Competences and guarantees

AT4 wireless is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

AT4 wireless is a laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 720267.

AT4 wireless is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number: IC 4621A-1.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance program for its measurement equipment.

AT4 wireless guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at AT4 wireless at the time of performance of the test.

AT4 wireless is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the AT4 wireless internal document PODT000.

Usage of samples

Samples undergoing test have been selected by: the client

Sample M/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
46347B/002	125 kHz LF transmitter	HFM_CMFB_01	---	2015-10-23

1. Sample M/01 has undergone the test(s) specified in subclause "Test method requested".

Test sample description

The product includes 125 kHz LF transmitter and a 433.92 MHz RF receiver. It drives 5 external dedicated antennae for the 125 kHz transmission. Two are located in the doors trims, one in the bumper and two within the vehicle cockpit.

Identification of the client

Continental Automotive GmbH

Siemensstraße 12, 93055 Regensburg, Germany.

Testing period

The performed test started on 2015-10-23 and finished on the same day.

The tests have been performed at AT4 wireless.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k Ω
Reference resistance to earth	< 1 Ω

In the semianechoic chamber the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k Ω
Reference resistance to earth	< 1 Ω
Normal site attenuation (NSA)	< ± 4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

Remarks and comments

1: Used instrumentation.

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber IR 11. BS	N.A.	N.A.
2.	Hybrid Bilog antenna Sunol Sciences Corporation JB6	2014/07	2017/07
3.	Multi device controller ETS 2090	N.A.	N.A.
4.	Active Loop Antenna 9 kHz-30 MHz HEWLETT PACKARD 11966A	2014/03	2016/03
5.	EMI Test Receiver R&S ESIB26	2015/06	2017/06
6.	Spectrum analyser Agilent E4440A	2015/10	2017/10
7.	RF pre-amplifier 10 MHz-6 GHz SCHWARZBECK BBV9743	2015/03	2016/03

Testing verdicts

Not applicable	N/A
Pass	P
Fail	F
Not measured	N/M

FCC PART 15 PARAGRAPH	VERDICT			
	NA	P	F	NM
15.209 Subclause (a) / RSS-Gen Clause 8.9. Radiated emission limits; general requirements		P		

Appendix A – Test result

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TEST CONDITIONS

Power supply (V):

$$V_{\text{nominal}} = 12.0 \text{ Vdc}$$

The subscripts nom, min and max indicate voltage test conditions (nominal, minimum and maximum respectively, as declared by the applicant).

Type of power supply = DC voltage from external power supply.

Type of antenna = External antenna

Operating Temperature Range (°C):

$$T_n = +15 \text{ to } +35$$

TEST FREQUENCIES:

Nominal Operating frequency: 125.00 kHz

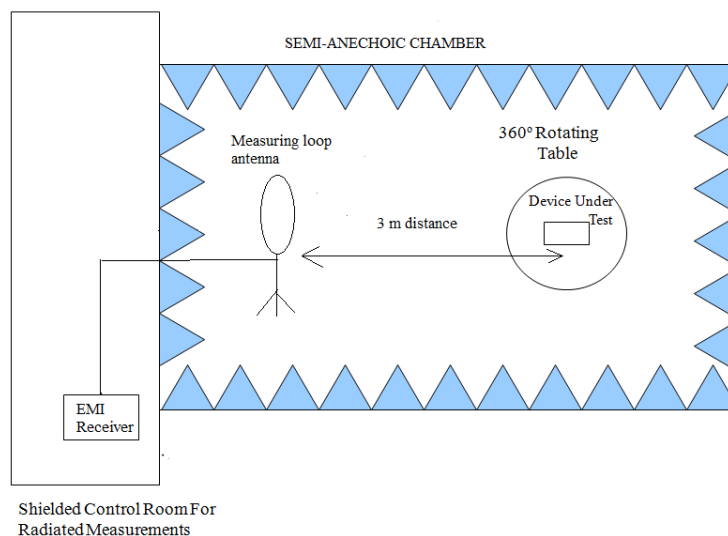
RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Loop antenna for the range between 9 kHz to 30 MHz) is situated at a distance of 3 m.

For radiated emissions in the range 9 kHz to 30 MHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 40 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive (wooden) platform one meter above the ground plane and the situation and orientation was varied to find the maximum radiated emission.

In the range between 9 kHz and 30 MHz the measurements were made in the three different orientation planes of the loop antenna to determine the maximum received field.

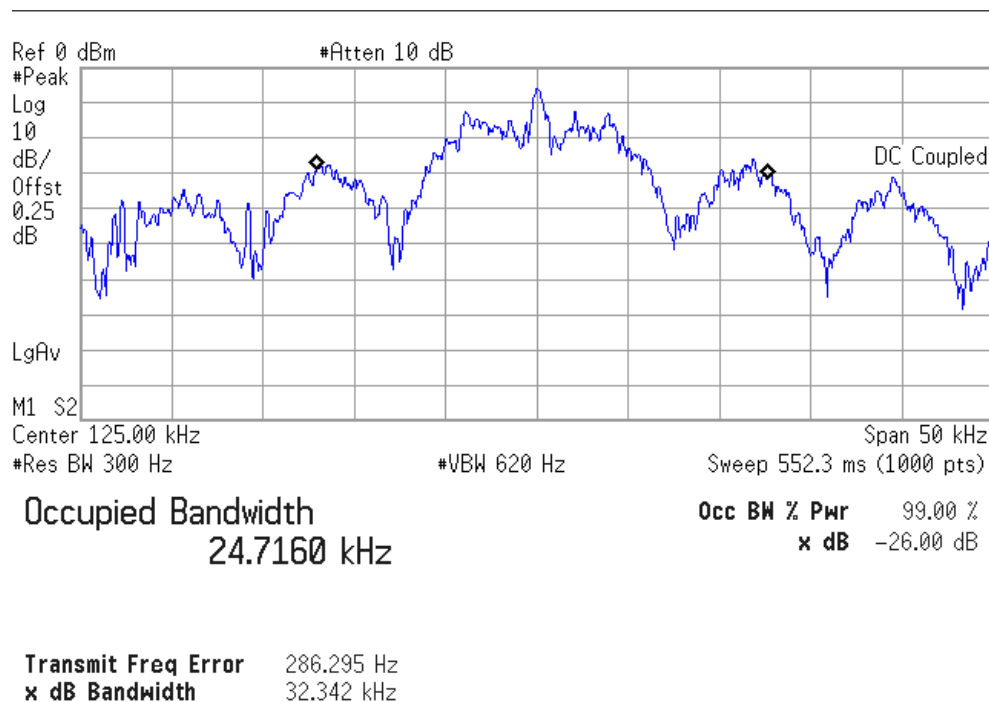


Occupied Bandwidth

RESULTS

(see next plots).

99% bandwidth (kHz)	24.716
-26 dBc bandwidth (kHz)	32.342
Measurement uncertainty (kHz)	<±0.17



Section 15.209 Subclause (a) / RSS-Gen Clause 8.9. Radiated emission limits; general requirements

SPECIFICATION

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

Frequency Range (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	29.54	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

RESULTS:

All tests were performed in a semi-anechoic chamber at a distance of 3 m.

The spectrum was inspected from 9 kHz to 30 MHz searching for spurious signals.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyser. This correction factor includes antenna factor, cable loss and pre-amplifier gain.

Frequency range 9 kHz-30 MHz.

The maximum field strength of fundamental emission:

Frequency (kHz)	Maximum field strength ($\text{dB}\mu\text{V/m}$) measured at 3 m (average detector)	Maximum field strength ($\text{dB}\mu\text{V/m}$) extrapolated to 300 m (40 dB/decade)	Maximum field strength ($\mu\text{V/m}$) extrapolated to 300 m (40 dB/decade)	Limit ($\mu\text{V/m}$)
125.00	82.49	2.49	1.331	19.2
Measurement uncertainty (dB)	< ± 3.61			

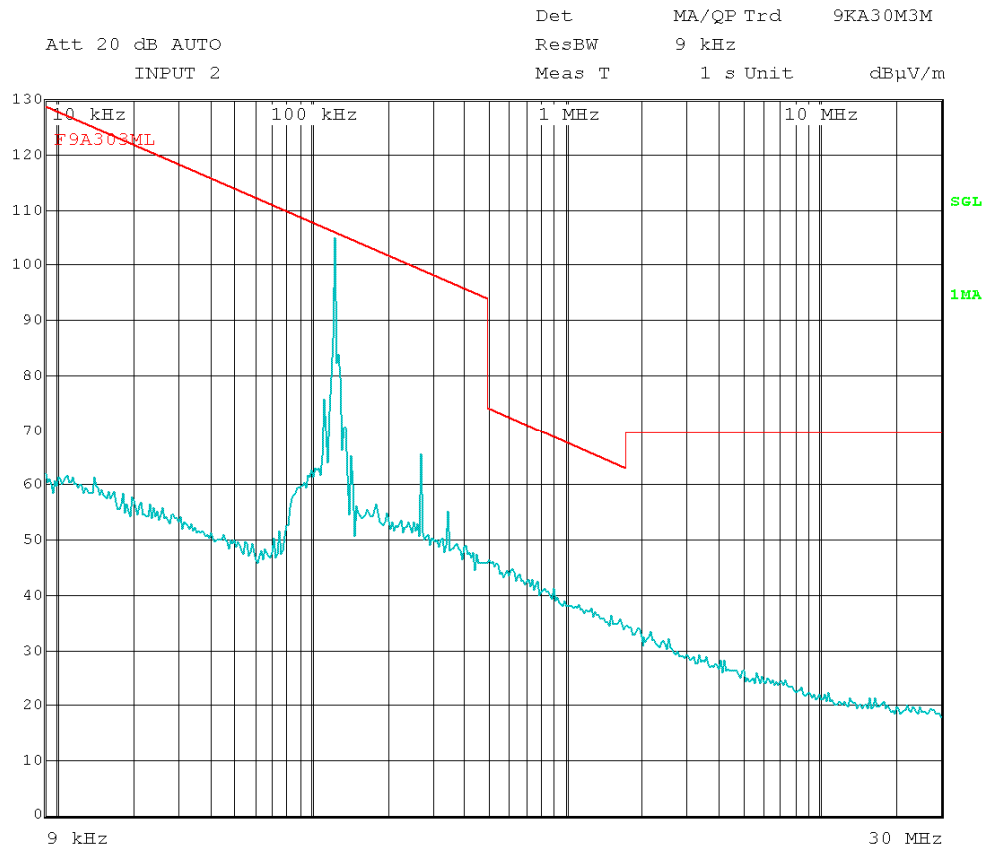
Verdict: PASS

Spurious signals closest to the limit:

Spurious frequency (kHz)	Detector	Emission Level (dBµ V/m) at 3 m	Emission Level (dBµ V/m) extrapolated at 300 m (40 dB/decade)	Emission Level (µ V/m) extrapolated at 300 m (40 dB/decade)	Limit (µ V/m)
266	Average	41.71	-38.29	0.012	9.022
342	Average	39.57	-40.43	0.009	7.017
Measurement uncertainty (dB)	<± 3.61				

Verdict: PASS

FREQUENCY RANGE 9 kHz-30 MHz.



Resolution bandwidth:

200 Hz for $9 \text{ kHz} \leq f \leq 150 \text{ kHz}$

9 kHz for $150 \text{ kHz} \leq f \leq 30 \text{ MHz}$

Note: The scan is performed with a peak detector. The peaks closest to the limit are re-measured with the detector type as specified in FCC 15.209.

The limits shown in the above plot are extrapolated to 3 meters. The highest peak corresponds to the carrier level.