FCC ID: LTQFI3125

Registration No. DAT-P-207/05

EMI -- T E S T R E P O R T

- FCC Part 15.209 -

Test Report No. : **T34360-00-02HU**	01. September 2010 Date of issue

Type / Model Name : FI3-125kHz

Product Description : Vehicle Immobilizer

Applicant : Delphi Deutschland GmbH

Address : Wiehlpuhl 4

D-51766 Engelskirchen

Manufacturer : Delphi Deutschland GmbH

Address : Wiehlpuhl 4

D-51766 Engelskirchen

Licence holder : Delphi Deutschland GmbH

Address : Wiehlpuhl 4

D-51766 Engelskirchen

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

Deutscher Akkreditierungs Rat

DAT-P-207/05-00

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (October, 2009)

Part 15, Subpart A, Section 15.31	Measurement standards
Part 15, Subpart A, Section 15.33	Frequency range of radiated measurements
Part 15, Subpart A, Section 15.35	Measurement detector functions and bandwidths

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (October, 2009)

Part 15, Subpart C, Section 15.203	Antenna requirement
Part 15, Subpart C, Section 15.204	External radio frequency power amplifiers and antenna modifications
Part 15, Subpart C, Section 15.205	Restricted bands of operation
Part 15, Subpart C, Section 15.209	Radiated emission limits, general requirements
ANSI C63.4: 2003	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI C95.1:1992	IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
CISPR 16-4-2: 2003	Uncertainty in EMC measurement

2 SUMMARY

GENERAL REMARKS:

The carrier frequency is 125.0 kHz

FINAL ASSESSMENT:

The equipment under test **fulfills** the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 02. August 2010

Testing concluded on : 09. August 2010

Checked by:

Klaus Gegenfurtner
I confirm the correctness and integrity of this document
2010.09.28 08:14:08 +02'00'

Klaus Gegenfurtner
Dipl.-Ing.(FH)
Manager: Radio Group

Tested by:

Markus Huber
I'm the author of this document
2010.09.01 09:47:21 +02'00'

Huber Markus

3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EUT – Detailed photos see Attachment A

3.2 Power supply system utilised

Power supply voltage: : 13.5 V / DC

3.3 Short description of the Equipment under Test (EUT)

The EuT is a transceiver for an immobilizer system for vehicular use.

Number of tested samples: 1
Serial number: see Photo documentation of the EuT under Point 3 / Equipment Under Test

Art. No.: Delphi 28293141; Chrysler 04692336 xx
HW: 0303
Variant: L2
Project: FI73BC

EUT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- Tx mode at 125 kHz

-

-

EUT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

The following peripheral devices and interface cables were connected during the measurements:

- _____ Model : _____
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____

- customer specific cables

- unscreened power cables

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

mikes-testingpartners gmbh
Ohmstrasse 2-4
94342 STRASSKIRCHEN
GERMANY

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader may notice that tolerances within the calibration of the equipment and facilities may cause additional uncertainty. The measurement uncertainty is calculated for all measurements listed in this test report acc. to CISPR 16-4-2 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurement“ and documented in the mikes-testingpartners gmbh quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, mikes-testingpartners gmbh, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component diversity and modifications in production process of devices may result in additional deviation. If necessary, refer to the test lab for the actual measurement uncertainty for the specific test. The manufacturer has the sole responsibility of continued compliance of the EUT.

4.4 Measurement Protocol for FCC, VCCI and AUSTEL

4.4.1 GENERAL INFORMATION

4.4.1.1 Test Methodology

Conducted and radiated disturbance testing is performed according to the procedures set out by the International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.
The test methods used comply with CISPR Publication 22, EN 55022 - " Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and with ANSI C63.4 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."
In compliance with 47 CFR Part 15 Subpart A, Section 15.38 testing for FCC compliance may be achieved by following the procedures set out in ANSI C63.4 and applying the CISPR 22 limits.

4.4.1.2 Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

5 TEST CONDITIONS AND RESULTS

5.1 Conducted emissions

For test instruments and accessories used see section 6 Part **A 4**.

5.1.1 Description of the test location

5.1.2 Photo documentation of the test set-up

5.1.3 Applicable standard

According to FCC Part 15, Section 15.207(a):
Except as shown in paragraphs (b) and (c) of this Section, for an intentional radiator 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.

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency

5.1.4 Test result

Frequency range:

Min. limit margin

Remarks: The measurement is not applicable. The EuT is battery powered.

5.2 Field strength of the fundamental wave

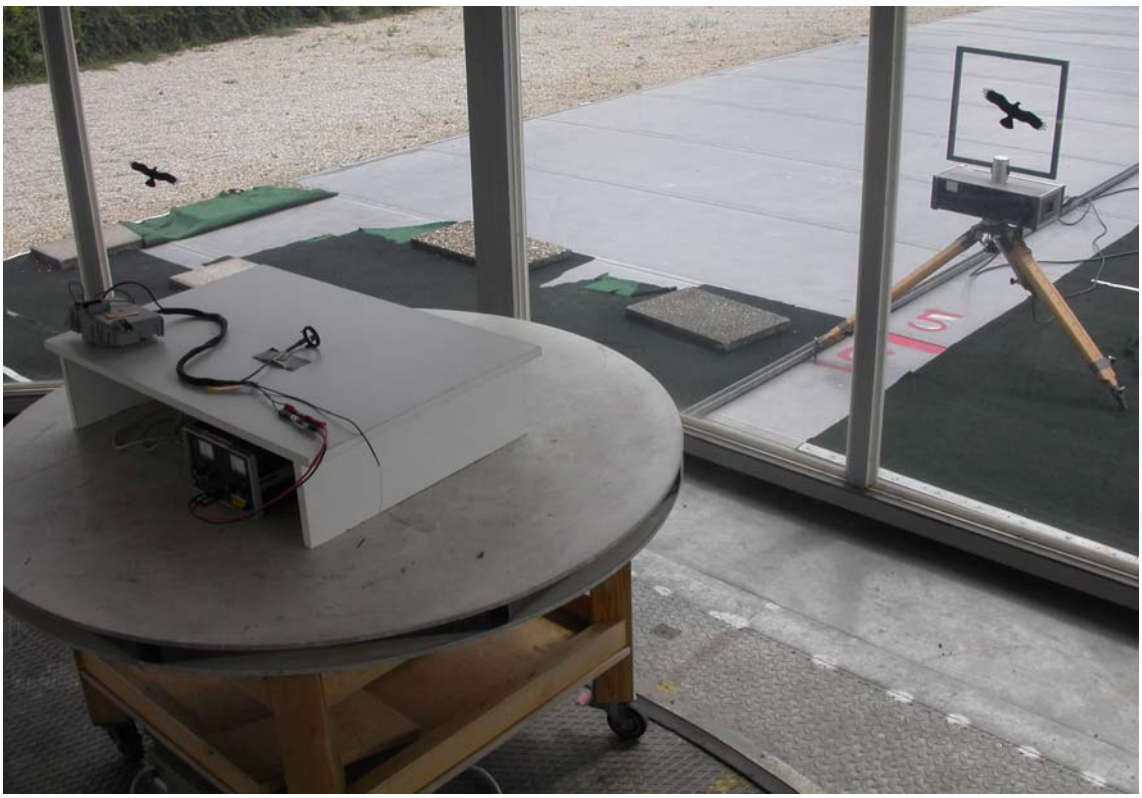
For test instruments and accessories used see section 6 Part **CPR 1**.

5.2.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

5.2.2 Photo documentation of the test set-up



5.2.1 Applicable standard

According to FCC Part 15C, Section 15.209:
The emissions from intentional radiators shall not exceed the effective field strength limits.

5.2.2 Description of Measurement

The spurious emissions of the EUT have to be measured at an open area test site in the frequency range from 9 kHz to 1000 MHz using a tuned EMI receiver. The set up of the equipment under test will be in accordance with ANSI C63.4. The measurement has been performed at 3 m. The results have been compared to the limits defined at 30 m or 300 m distances according to FCC Part 15C, Section 15.31(f)(2) using an inverse linear distance extrapolation factor of 40 dB/decade. The final measurement has been performed with the EMI receiver using Quasi peak detector except for the frequency bands 9 kHz to 90 kHz and 110 to 490 kHz where an average detector will be used, according to Section 15.209(d).
The resolution bandwidth during the measurement is as follows:
9 kHz – 150 kHz: RBW: 200 Hz
150 kHz – 30 MHz: RBW: 9 kHz

Example:

Frequency (MHz)	Level (dBµV)	+	Factor (dB)	=	Level dB(µV/m)	-	Limit dB(µV/m)	=	Delta (dB)
1.705	5	+	20	=	25	-	30	=	-5

5.2.3 Test result

Measurement distance: 3 m

Frequency (MHz)	Level PK (dBµV)	Level AV (dBµV)	Level QP (dBµV)	Band-width (kHz)	Correct. factor (dB)	Corrected Level PK dB(µV/m)	Corrected Level AV dB(µV/m)	Corrected Level QP dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
0.125	72.7	44.7	60.9	0.2	20	92.7	64.7	80.9	105.0	40.3

Calculated value at distance: 300 m

Frequency (MHz)	Level PK (dBµV)	Level AV (dBµV)	Level QP (dBµV)	Band-width (kHz)	Correct. factor (dB)	Corrected Level PK dB(µV/m)	Corrected Level AV dB(µV/m)	Corrected Level QP dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
0.125	-7.3	-35.3	-19.1	0.2	20	12.7	-15.3	0.9	25.0	40.3

Limit according to FCC Part 15C, Section 15.209(a):

Frequency	Field strength of fundamental wave		Measurement distance
(MHz)	(µV/m)	dB(µV/m)	(metres)
0.009-0.490	**2400/F(kHz)**	**--**	**300**
0.490-1.705	24000/F (kHz)	--	30
1.705-30.0	30	29.5	30

The requirements are **FULFILLED.**

Remarks: _____

5.3 Spurious emissions (magnetic field) 9 kHz – 30 MHz

For test instruments and accessories used see section 6 Part **SER 1**.

5.3.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

5.3.2 Photo documentation of the test set-up

5.3.3 Applicable standard

According to FCC Part 15C, Section 15.209:
The emissions from intentional radiators shall not exceed the effective field strength limits.

5.3.4 Description of Measurement

The spurious emissions of the EUT have to be measured at an open area test site in the frequency range from 9 kHz to 1000 MHz using a tuned EMI receiver. The set up of the equipment under test will be in accordance with ANSI C63.4. The measurement has been performed at 3 m. The results have been compared to the limits defined at 30 m or 300 m distances according to FCC Part 15C, Section 15.31(f)(2) using an inverse linear distance extrapolation factor of 40 dB/decade. The final measurement has been performed with the EMI receiver using Quasi peak detector except for the frequency bands 9 kHz to 90 kHz and 110 to 490 kHz where an average detector will be used, according to Section 15.209(d).
The resolution bandwidth during the measurement is as follows:
9 kHz – 150 kHz: RBW: 200 Hz
150 kHz – 30 MHz: RBW: 9 kHz

Example:

Frequency (MHz)	Level (dBµV)	+	Factor (dB)	=	Level dB(µV/m)	-	Limit dB(µV/m)	=	Delta (dB)
1.705	5	+	20	=	25	-	30	=	-5

5.3.5 Test result

Measurement distance: 3 m

Frequency (MHz)	Level PK (dBµV)	Level AV (dBµV)	Level QP (dBµV)	Band-width (kHz)	Correct. factor (dB)	Corrected Level PK dB(µV/m)	Corrected Level AV dB(µV/m)	Corrected Level QP dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
0.375	34.65	6.65	21.95	9	20	54.65	26.65	41.95	95.5	68.9

Calculated value at distance: 300m

Frequency (MHz)	Level PK (dBµV)	Level AV (dBµV)	Level QP (dBµV)	Band-width (kHz)	Correct. factor (dB)	Corrected Level PK dB(µV/m)	Corrected Level AV dB(µV/m)	Corrected Level QP dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
0.375	-45.35	-73.35	-58.05	9	20	-25.35	-53.35	-38.05	15.5	68.9

Values at distance: 30m

Frequency (MHz)	Level PK (dBµV)	Level AV (dBµV)	Level QP (dBµV)	Band-width (kHz)	Correct. factor (dB)	Corrected Level PK dB(µV/m)	Corrected Level AV dB(µV/m)	Corrected Level QP dB(µV/m)	Limit dB(µV/m)	Delta (dB)
0.49 – 30.0				9	20				29.5	> 40

Limit according to FCC Part 15 Subpart 15.209(a):

Frequency	Field strength of spurious emissions		Measurement distance
(MHz)	(µV/m)	dB(µV/m)	(metres)
0.009-0.490	**2400/F(kHz)**	**--**	**300**
0.490-1.705	24000/F (kHz)	--	30
1.705-30.0	30	29.5	30

The requirements are **FULFILLED.**

Remarks: All other unwanted emissions in the frequency range from 9 kHz to 30 MHz below < -10.5 dBµV/m.

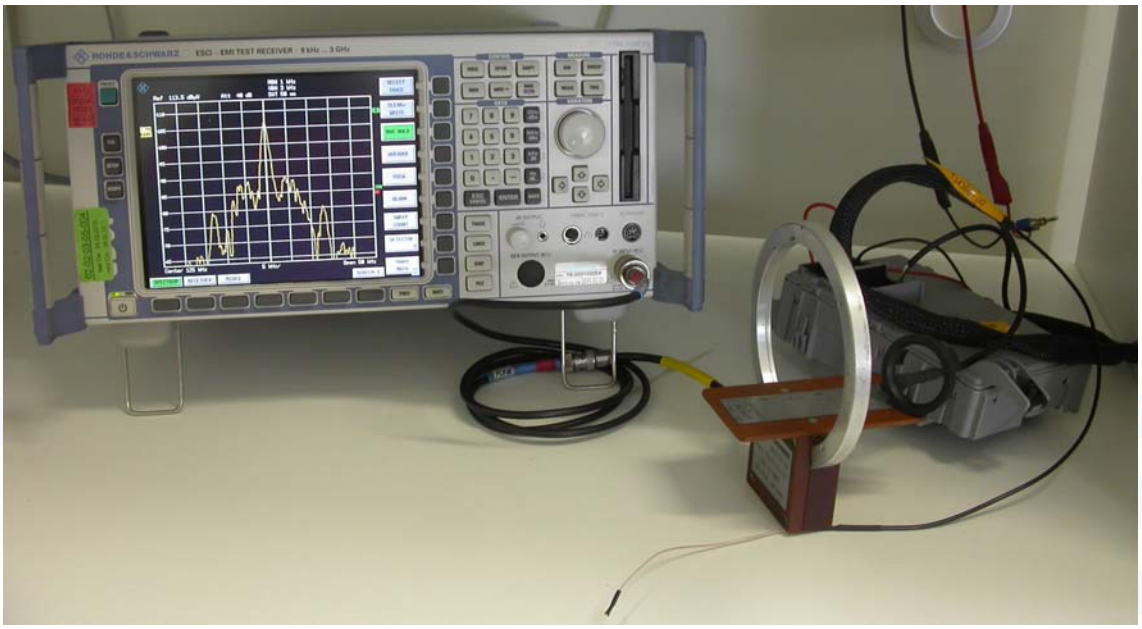
5.4 Emission Bandwidth

For test instruments and accessories used see section 6 Part **MB**.

5.4.1 Description of the test location

Test location: AREA4

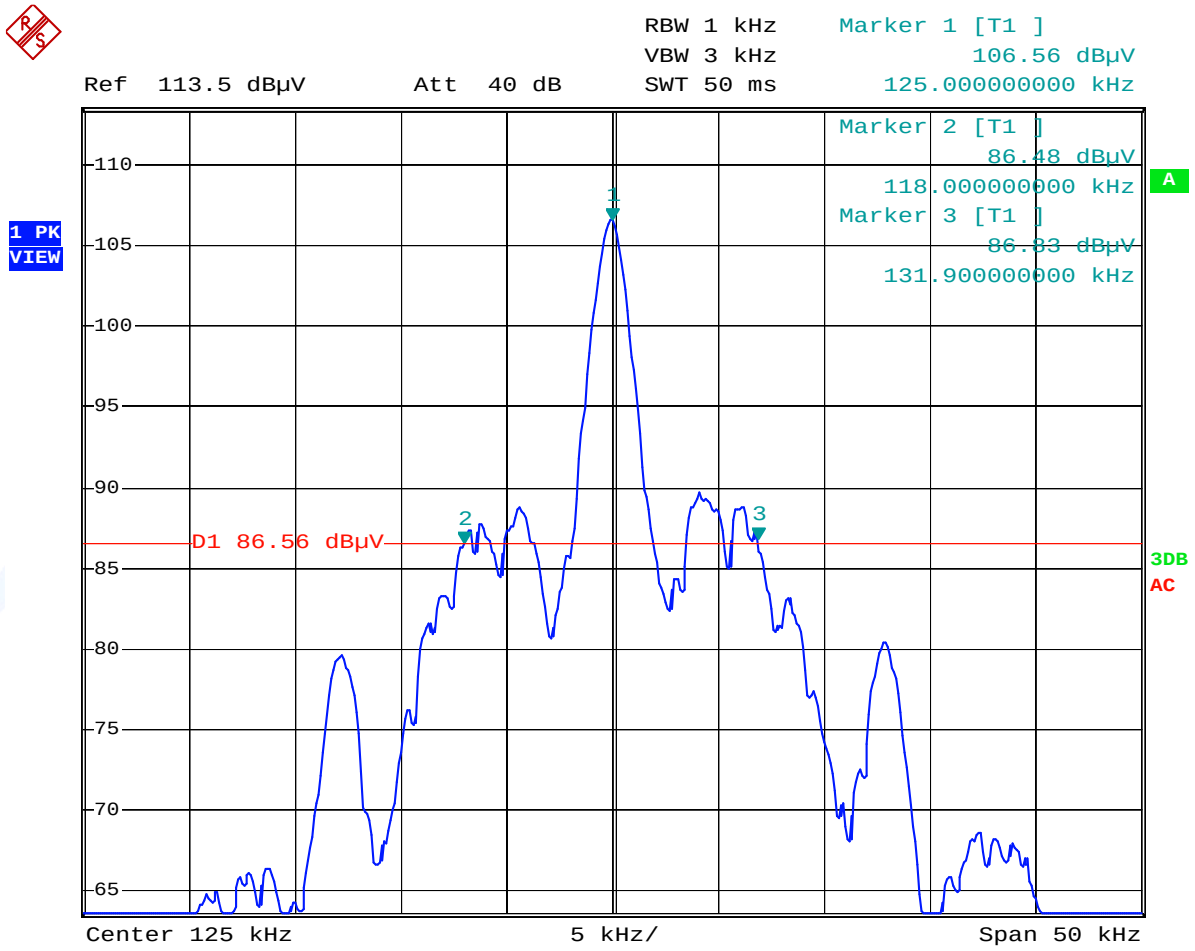
5.4.2 Photo documentation of the test set-up



Fundamental [kHz] See Plot 1	20dB Bandwidth F1	20dB Bandwidth F2	Measured Bandwidth [kHz]
125.00	118.00	131.90	13.9

5.4.3 Test protocol

Emission Bandwidth plots



6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
CPR 1	FMZB 1516	01-02/24-01-018			15/02/2011	15/02/2010
	ESCI	02-02/03-05-004	09/02/2011	09/02/2010		
	S10162-B	02-02/50-05-031				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
MB	ESCI	02-02/03-05-004	09/02/2011	09/02/2010		
	HZ-10	02-02/24-05-012				
SER 1	FMZB 1516	01-02/24-01-018			15/02/2011	15/02/2010
	ESCI	02-02/03-05-004	09/02/2011	09/02/2010		
	S10162-B	02-02/50-05-031				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				