

FCC ID: KR540737300

EMI - TEST REPORT

- FCC Part 15.209 -

Test Report No. :	T39329-03-00JP	09. March 2015
		Date of issue

Type / Model Name : 40737300

Product Description : Body Control Module (BCM)

Applicant : Continental Automotive GmbH

Address : Siemensstr. 12

93055 Regensburg

GERMANY

Manufacturer : See General remarks

Address : See General remarks

Licence holder : Continental Automotive GmbH

Address : Siemensstr. 12

93055 Regensburg

GERMANY

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



The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

Contents

1	<u>TEST STANDARDS</u>	3
2	<u>SUMMARY</u>	4
3	<u>EQUIPMENT UNDER TEST</u>	5
3.1	Photo documentation of the EUT	5
3.2	Power supply system utilised	7
3.3	Short description of the equipment under test (EUT)	7
4	<u>TEST ENVIRONMENT</u>	8
4.1	Address of the test laboratory	8
4.2	Environmental conditions	8
4.3	Statement of the measurement uncertainty	8
4.4	Measurement protocol for FCC	9
5	<u>TEST CONDITIONS AND RESULTS</u>	11
5.1	Field strength of the fundamental wave	11
5.2	Spurious emissions	13
5.3	Emission bandwidth	15
6	<u>USED TEST EQUIPMENT AND ACCESSORIES</u>	17

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (September, 2014)

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (September, 2014)

Part 15, Subpart C, Section 15.209

Radiated emission limits, general requirements

ANSI C63.4: 2009

Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

CISPR 16-4-2: 2003

Uncertainty in EMC measurement

2 SUMMARY

GENERAL REMARKS:

Manufacturer 1: Continental Automotive Guadalajara México, S.A. de C.V.
Camino a la Tijera No. 3
45640 Tlajomulco de Zuñiga
Jalisco
Mexico

Manufacturer 2: Continental Automotive Changchun Co., Ltd.
1981 Wuhan Avenue,
130033 Changchun
China

The EuT is intended to be used in transportation vehicles and will be supplied by the vehicles battery. According to this the conducted emission testing according to FCC Part 15.207 is not applicable.

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 : 12. February 2015

Testing concluded on : 25. February 2015

Checked by:

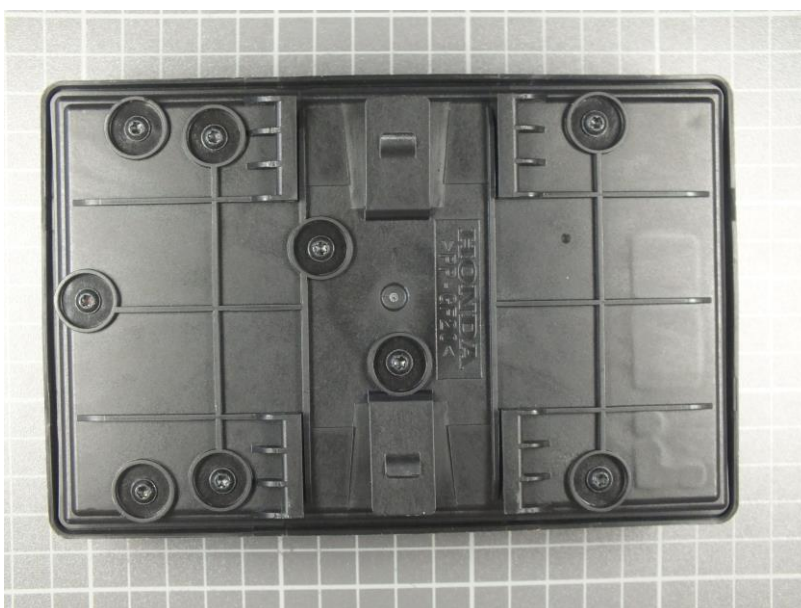
Tested by:

Klaus Gegenfurtner
Teamleader Radio

Jürgen Pessinger

3 EQUIPMENT UNDER TEST

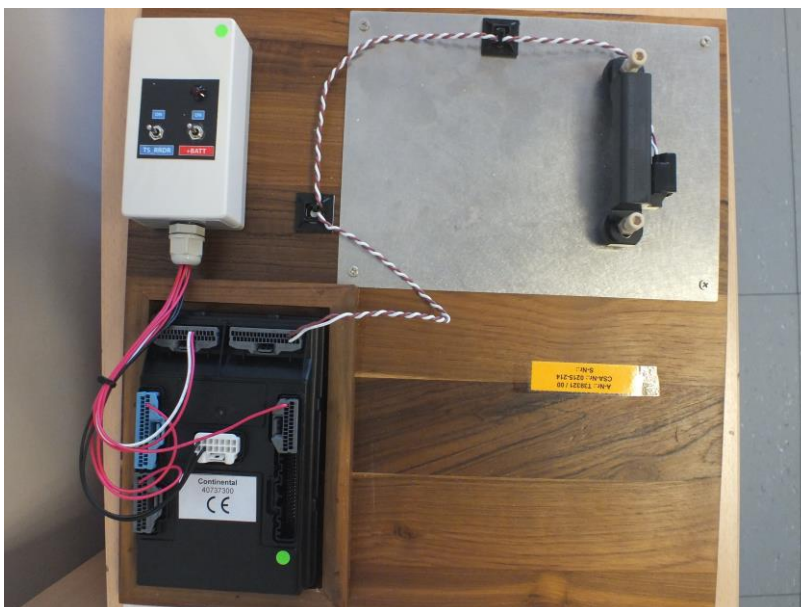
3.1 Photo documentation of the EUT



Antenna



Test setup



3.2 Power supply system utilised

Power supply voltage: : 13.5 V / DC (battery supplied)

3.3 Short description of the equipment under test (EUT)

The observed part of the EuT is a 125 kHz transmitter for the use in vehicles.

Number of tested samples: 1
Serial number: none

EUT operation mode:

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

- TX mode 125kHz

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:

- none Model : none

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**CSA Group Bayern GmbH
Ohmstrasse 1-4
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. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 / 11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern 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 and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.4 Measurement protocol for FCC

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.

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.

4.4.2 DETAILS OF TEST PROCEDURES

General Standard information

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.

4.4.3 Conducted emission

The final level, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC limit or to the CISPR limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20 \cdot \log(\mu\text{V});$$

$$\mu\text{V} = 10^{(\text{dB}\mu\text{V}/20)};$$

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50 Ω /50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin of a peak mode measurement appears to be less than 20 dB, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

4.4.4 Radiated emission (electrical field 30 MHz - 1 GHz)

Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is established in accordance with ANSI C63.4. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so that they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is

FCC ID: KR540737300

positioned 3, 10 or 30 meters horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters and the EUT is rotated 360 degrees. The final level in dB μ V/m is calculated by taking the reading from the EMI receiver (Level dB μ V) and adding the correction factors and cable loss factor (dB). The FCC or CISPR limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:

30 MHz – 1000 MHz: RBW: 120 kHz

Example:

Frequency Delta (MHz)	Level (dB μ V)	+	Factor (dB)	=	Level (dB μ V/m)	-	CISPR Limit (dB μ V/m)	=	(dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

5 TEST CONDITIONS AND RESULTS

5.1 Field strength of the fundamental wave

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

5.1.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

5.1.2 Photo documentation of the test set-up



5.1.1 Applicable standard

According to FCC Part 15C, Section 15.209:

The emissions from intentional radiators shall not exceed the effective field strength limits.

5.1.2 Description of Measurement

The magnetic field strength from the EUT will be measured on an open area test site in the frequency range of 9 kHz to 30 MHz using a tuned receiver and a shielded loop antenna. The set up of the EUT will be in accordance to ANSI C63.4. Measurements have been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions. In the case where larger measuring distances are required the results will extrapolated based on the values measured on the closer distances according to Section 15.31(f)(2). The final measurement will be performed with an EMI receiver set to 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)(2).

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 (dB μ V)	+	Factor (dB)	=	Level dB(μ V/m)	-	Limit dB(μ V/m)	=	Delta (dB)
1.705	5	+	20	=	25	-	30	=	-5

5.1.3 Test result

The measurement value is calculated from a distance of 3 m to 300 m by subtracting the factor 40 dB/decade.

f (kHz)	Level AV (dB μ V)	Ant. factor (dB/m)	Field strength dB(μ V/m)	Distance corr. (dB)	Corrected level AV dB(μ V/m)	Limit dB(μ V/m)	Delta (dB)
125	69.6	20	89.6	-80	9.6	25.6	-16.0

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

Frequency (MHz)	Field strength (μ V/m)	Measurement distance (metres)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30

The requirements are **FULFILLED**.

Remarks: none

5.2 Spurious emissions

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



5.2.3 Applicable standard

According to FCC Part 15C, Section 15.209:

The emissions from intentional radiators shall not exceed the effective field strength limits.

5.2.4 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 30 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 PK detector. The PK result was compared with the quasi peak limit, except for the frequency bands 9 kHz to 90 kHz and 110 to 490 kHz where the average limit will be used, to show compliance.

The resolution bandwidth during the measurement is as follows:

9 kHz – 150 kHz:	RBW:	200 Hz
150 kHz – 30 MHz:	RBW:	9 kHz

5.2.5 Test result

The measurement value is calculated from a distance of 3 m to 30 or 300 m by subtracting the factor 40 dB/decade.

f (kHz)	Level PK (dB μ V)	Ant. factor (dB/m)	Field strength dB(μ V/m)	Distance corr. (dB)	Corrected level PK dB(μ V/m)	Limit QP/AV dB(μ V/m)	Delta (dB)
250	53.8	20	73.8	-80	-6.2	19.6	-25.8
375	44.3	20	64.3	-80	-15.7	16.1	-31.8
500	38.7	20	58.7	-40	18.7	33.6	-14.9

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

Frequency (MHz)	Field strength (μ V/m)	Measurement distance (metres)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30

The requirements are **FULFILLED**.

Remarks: Measured frequency range: 9kHz – 30MHz

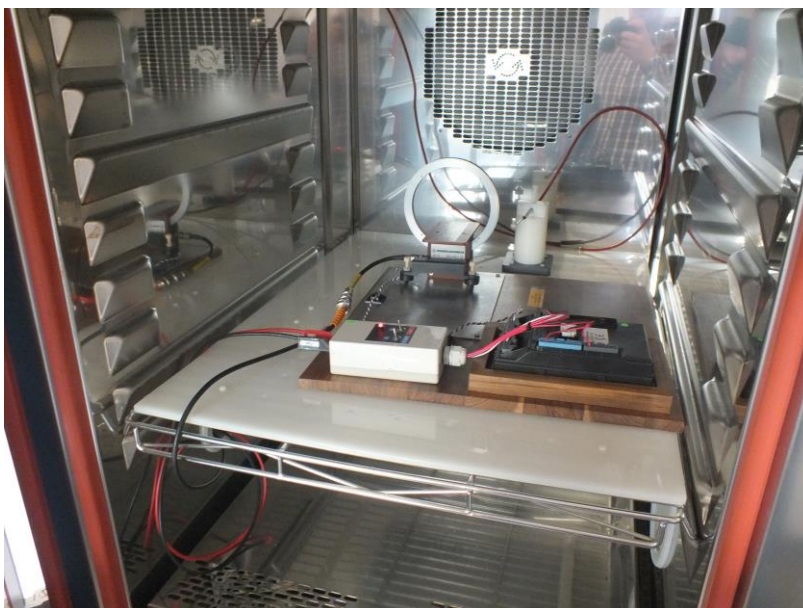
5.3 Emission bandwidth

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

5.3.1 Description of the test location

Test location: AREA4

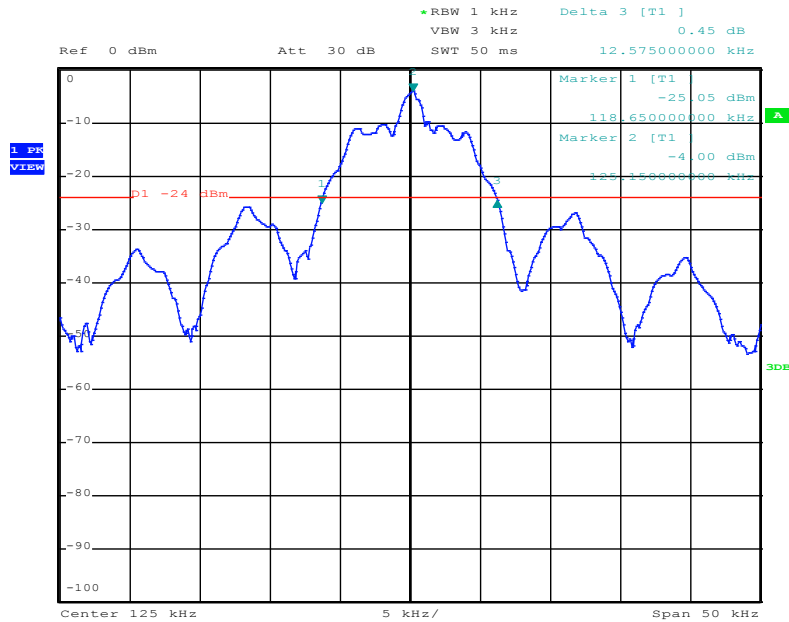
5.3.2 Photo documentation of the test set-up



Remarks: none

5.3.3 Test protocol

Emission Bandwidth plot



Date: 25.FEB.2015 14:27:38

Fundamental [kHz]	20dB Bandwidth [kHz]	Limit [kHz]
125.00	12.575	none

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			19/01/2016	19/01/2015
	ESCI	02-02/03-05-005	09/12/2015	09/12/2014		
	S10162-B	02-02/50-05-032				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
MB	FSP 30	02-02/11-05-001	20/10/2015	20/10/2014		
	HZ-10	02-02/24-05-012				
	METRA HIT World	02-02/32-10-001	21/08/2015	21/08/2014		
	6543A	02-02/50-05-157				
SER 1	FMZB 1516	01-02/24-01-018			19/01/2016	19/01/2015
	ESCI	02-02/03-05-005	09/12/2015	09/12/2014		
	S10162-B	02-02/50-05-032				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				