Registration No. DAT-P-207/05

FCC ID: IYZDC08

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

- FCC Part 15.231 -

Test Report No. : **T32837-02-01HS**	08. October 2009 Date of issue

Type / Model Name : DC08 C-Klasse

Product Description : Keyless Go Controller

Applicant : Marquardt GmbH

Address : Schlossstraße 16

78604 Rietheim-Weilheim

Manufacturer : Marquardt GmbH

Address : Schlossstraße 16

78604 Rietheim-Weilheim

Licence holder : Marquardt GmbH

Address : Schlossstraße 16

78604 Rietheim-Weilheim

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

Deutscher Akkreditierungs Rat DAR
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 01, 2007)

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 B - Unintentional Radiators (October 01, 2007)

Part 15, Subpart B, Section 15.109	Radiated emissions, general requirements

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (October, 2007)

Part 15, Subpart C, Section 15.203	Antenna requirement
Part 15, Subpart C, Section 15.205	Restricted bands of operation
Part 15, Subpart C, Section 15.209	Radiated emission limits, general requirements
Part 15, Subpart C, Section 15.231	Periodic operation in the band 40.66-40.70 MHz and above 70 MHz
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
CISPR 22: 2005 EN 55022: 2006	Information technology equipment

2 SUMMARY

GENERAL REMARKS:

The EUT is a controller for keyless go events in a car and works at two frequencies,
LF = 21.845 kHz,
RF = 315.00 MHz.
The prototype of the EUT had the production status:
HW-Version: A2128207526 and
SW-Version: A2124420126.

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	:	13.October 2008
Testing concluded on	:	26 January 2009

Checked by:

Klaus Gegenfurtner
I confirm the correctness and integrity of this document
2009.10.13 09:38:50 +02'00'

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

Tested by:

Hermann Smetana
I am the author of this document
2009.10.12 16:37:46 +02'00'

Hermann Smetana
Dipl.-Ing.(FH)
Radio Expert

3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EUT – See attachment A

3.2 Power supply system utilised

Power supply voltage: : 12 V / DC

3.3 Short description of the Equipment under Test (EUT)

The EUT is a controller for keyless go systems in a car. It checks the ID for the entry and authenticates the user for the keyless go procedure.

Number of tested samples: 1
Serial number: Prototype

EUT operation mode:

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

- Continuous transmission at 315 MHz

- Receive mode

-

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 : _____

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.

4.5 Determination of worst case measurement conditions

Measurements have been made in original application to take into account the influence on the radiation direction from the chassis of the car. For the further measurement the EUT is set in the following settings:
Software setting of the RF-Amlifier was max.

5 TEST CONDITIONS AND RESULTS (TX MODE)

5.1 Conducted emissions

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

5.1.1 Description of the test location

Test location: None

Remarks: The measurement is not applicable. The EUT has no AC mains connections.

5.2 Field strength of the fundamental wave

For test instruments and accessories used see section 6 Part **CPR 2**.

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 15.231(b):
The field strength of emissions from intentional radiators shall not exceed the effective field strength limits.

5.2.2 Description of Measurement

The radiated power of the fundamental wave from the EUT is measured in the frequency range of 30 to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Floor standing equipment is placed directly on the turntable ground plane. The set up of the EUT will be in accordance to ANSI C63.4. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 m, measurement scans are made in horizontal and vertical antenna polarization and the EUT is turned 360 degrees.

The resolution bandwidth during the measurement is as follows:
30 MHz – 1000 MHz: RBW: 120 kHz

Example:

Frequency (MHz)	Level (dBµV)	+	Factor (dB/m)	=	Level dB(µV/m)	-	Limit dB(µV/m)	=	Delta (dB)
170.5	5	+	20	=	25	-	30	=	-5

5.2.3 Test result

Frequency (MHz)	Level Pk (dBµV)	Bandwidth (kHz)	Correct. factor (dB/m)	Duty cycle correction (dB)	Corrected level dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
315.0	73.6	120	17.3	-16.0	74.9	75.6	-0.7

Limit according to FCC Section 15.231(b):

Frequency (MHz)	Field strength of fundamental @ 3m		Effective limit for 315 MHz	
	(µV/m)	dB(µV/m)	(µV/m)	dB(µV/m)
40.66 – 40.70	2250	67		
70 - 130	1250	62		
130 - 174	1250 to 3750*	62 to 71.4*		
174 - 260	3750	71.4		
260 - 470	**3750 to 12500***	**71.4 to 81.9***	**6042**	**75.6**
Above 470	12500	81.9		

*Linear interpolation

The requirements are **FULFILLED.**

Remarks: _____

5.3 Correction for pulsed operation (duty cycle)

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

5.3.1 Description of the test location

Test location: OATS1

5.3.2 Photo documentation of the test set-up

5.3.3 Applicable standard

According to FCC Part 15A, Section 15.35(c):
When the radiated emission limits are expressed in terms of average value and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete puls train, including blanking intervals, as long as the pulse train does not exceed 0.1s. in cases where the puls train exceeds 0.1s, the measured field strength shall be determined from the average absolute voltage during a 0.1s interval during which the field strength is at its maximum. The exact method of calculating the average field strength shall be submitted.

5.3.4 Description of Measurement

The duty cycle was measured with a spectrum analyser in zero span mode. In the OATS a real keyless go event was performed and recorded. The duty cycle factor (dB) is calculated applying the following formula:

$$K_E = 20 \log \left((t_{iw}/T_w) * (t_{iB}/T_B) \right)$$

Where:

K_E	pulse operation correction factor
t_{iw}	pulse duration for one complete pulse track
t_{iB}	effective pulse duration
T_w	a period of the pulse track
T_B	a period of one pulse

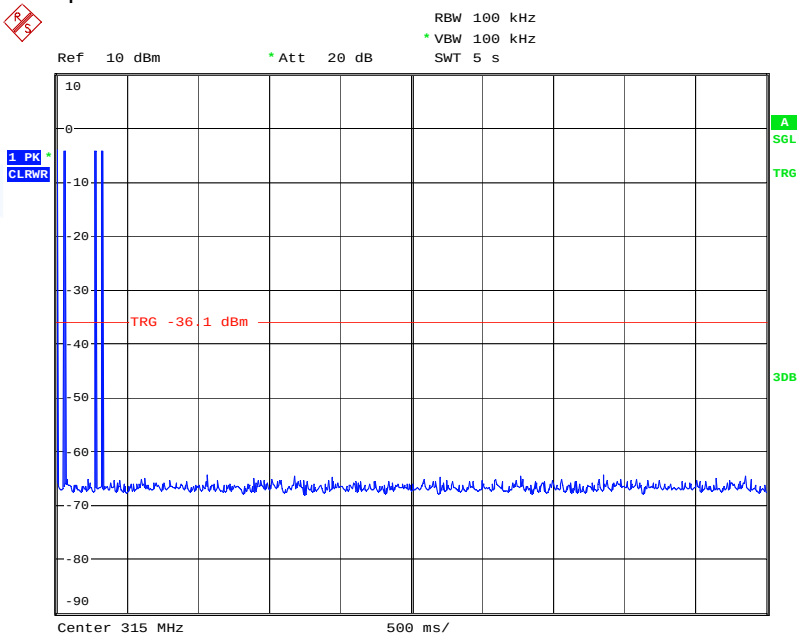
5.3.5 Test result

t_{iW} (ms)	T_W (ms)	t_{iB} (ms)	T_B (ms)	K_E (dB)
(327.6) 100	100	15.8	100	16.0

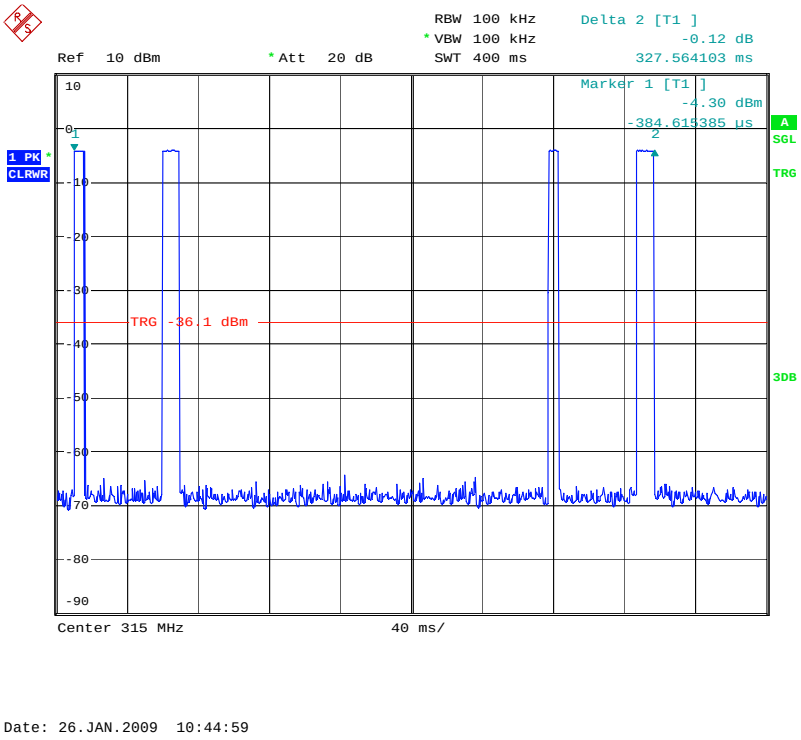
Remarks: For detailed results, please see the test protocol below.

5.3.6 Test protocol

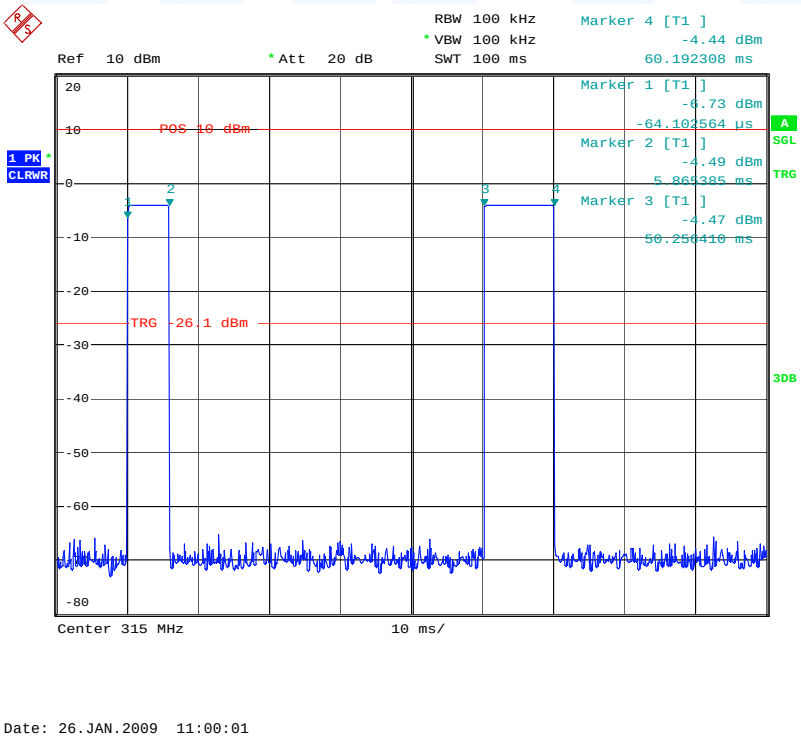
Determination of the puls train



The puls train cosists of two identical puls pairs.



Period of one pulstrain = 327.6 ms



Pulswidth 1 = 5.9 ms
Pulswidth 2 = 9.9 ms
Effective pulswidth within 100 ms = 15.8 ms

$$K_E = 20 \log ((100/100) * (15.8/100)) = 16.0 \text{ dB}$$

5.4 Spurious emissions radiated (magnetic field) 9 kHz – 30 MHz

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

5.4.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

5.4.2 Photo documentation of the test set-up

5.4.3 Applicable standard

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

5.4.4 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 equipment under test will be in accordance to ANSI C63.4. 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)(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 (dBµV)	+	Factor (dB/m)	=	Level dB(µV/m)	-	Limit dB(µV/m)	=	Delta (dB)
1.705	5	+	20	=	25	-	30	=	-5

5.4.5 Test result

Frequency (MHz)	Level (dBµV)	Bandwidth (kHz)	Correct. factor (dB/m)	Corrected level dB(µV/m)	Limit dB(µV/m)	Delta (dB)

Limit according to FCC Part 15C Section 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 unwanted emissions not recorded in the frequency range from 9 kHz to 30 MHz are more than 20 dB below the limit.

5.5 Spurious emissions radiated (electric field) 30 MHz – 4 GHz

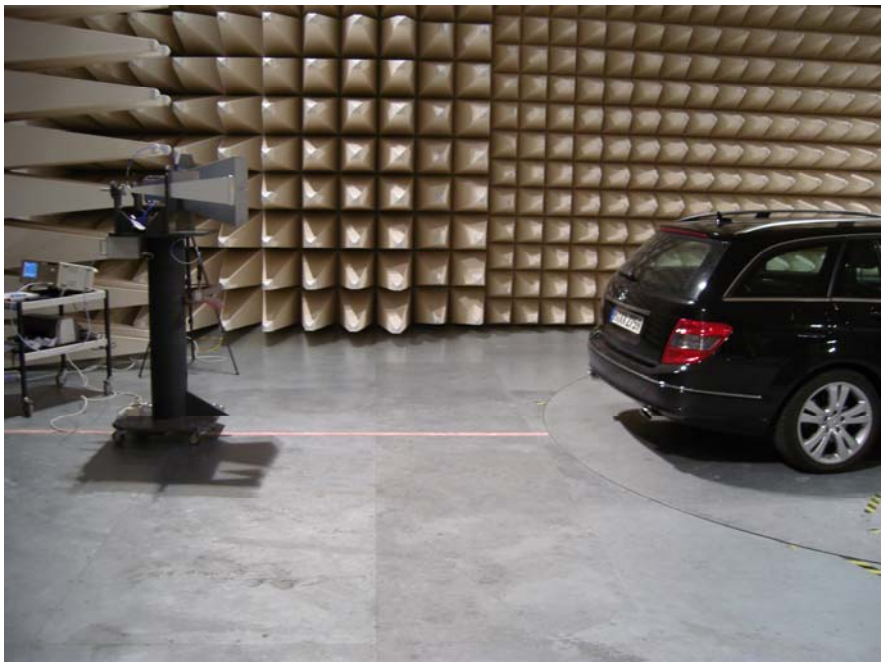
For test instruments and accessories used see section 6 Part **SER 2, SER 3**.

5.5.1 Description of the test location

Test location: OATS1
Test location: Anechoic Chamber A1

Test distance: 3 metres

5.5.2 Photo documentation of the test set-up



5.5.3 Applicable standard

According to FCC Part 15C, Section 15.231(b), Section 15.209(a) and Section 15.205(a):
The emissions from intentional radiators shall not exceed the effective field strength limits.

5.5.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in the frequency range of 30 to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Floor standing equipment is placed directly on the turntable/ground plane. The set up of the EUT will be in accordance to ANSI C63.4. The antenna was positioned 3 m horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres, measurement scans are made in horizontal and vertical antenna polarization's and the EUT is turned 360 degrees.
Measurements are made in the horizontal and vertical planes of polarization in a fully anechoic chamber using a spectrum analyser. During the tests the EUT is turned 360° to find the maximum levels of emissions. For testing above 1 GHz, if the emission level of the EUT in peak mode complies with the average limit is 20 dB lower, then testing will be stopped and peak values of the EUT will be reported, otherwise, the emission will be measured in average mode again and reported.

The resolution bandwidth during the measurement is as follows:
30 MHz – 1000 MHz: RBW: 120 kHz
1000 MHz – 18000 MHz RBW: 1 MHz
Example:

Frequency (MHz)	Level (dBµV)	+	Factor (dB/m)	=	Level dB(µV/m)	-	Limit dB(µV/m)	=	Delta (dB)
170.5	5	+	20	=	25	-	30	=	-5

5.5.5 Test result f < 1 GHz

Frequency (MHz)	Level QP (dBµV)	Band-width (kHz)	Correct. factor (dB/m)	Corrected Level QP dB(µV/m)	Limit QP dB(µV/m)	Delta (dB)
630.0	8.0	120	24.2	32.2	55.6	23.4
945.0	9.0	120	29.1	38.1	55.6	17.5

5.5.6 Test result f > 1 GHz

Frequency (MHz)	L: PK (dBµV)	L: AV (dBµV)	Bandwidth (kHz)	Correct. (dB/m)	L: PK dB(µV/m)	L: AV dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
1036	52.9	-	1000	-14.0	38.9	-	54.0	15.1
1261	54.0	-	1000	-12.9	41.1	-	55.6	14.5
1576	59.4	-	1000	-15.2	44.2	-	54.0	9.8
1891	65.8	-	1000	-10.5	55.3	-	55.6	0.3
2206	63.8	-	1000	-11.5	52.3	-	54.0	1.7
2521	56.0	-	1000	-9.8	46.2	-	55.6	9.4
3304	52.3	-	1000	-8.4	43.9	-	55.6	11.7

Limit according to FCC Section 15.231(b), Section 15.209(a) and Section 15.205(a):

Frequency (MHz)	Field strength of fundamental		Field strength of spurious emissions	
	(µV/m)	dB(µV/m)	(µV/m)	dB(µV/m)
40,66 – 40,70	2250	67	225	47
70 - 130	1250	62	125	42
130 - 174	1250 to 3750*	62 to 71,4*	125 to 375*	42 to 51,4*
174 - 260	3750	71,4	375	51,4
260 - 470	3750 to 12500*	71,4 to 81,9*	375 to 1250*	51,4 to 61,9*
Above 470	12500	81,9	1250	61,9

*Linear interpolations

Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in the table above or to the general limits shown in the table below according to § 15.209, whichever limit permits a higher field strength.

Frequency (MHz)	15.209 Limits (µV/m)	15.209 Limits dB(µV/m)
30-88	100	40
88-216	150	43,5
216-960	200	46
Above 960	500	54

Additionally there is a limit according to §15.35(b) on the radio frequency emissions, as measured with a peak detector, corresponding to 20 dB above the maximum permitted average limits.

Restricted bands of operation according to FCC Part 15C, Section 15.205(a):

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2690 – 2900	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3345.8 – 3358	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4	3600 – 4400	Above 38.6

The requirements are **FULFILLED.**

Remarks: The measurement was performed up to the 10th harmonic. All unwanted emissions not recorded in the frequency range from 30 MHz to 4 GHz are more than 20 dB below the limit.

5.6 Emission bandwidth

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

5.6.1 Description of the test location

Test location: OATS1

5.6.2 Photo documentation of the test set-up

5.6.3 Applicable standard

According to FCC Part 15C, Section 15.231(c):
The bandwidth of the emission shall not exceed the effective limits.

5.6.4 Description of Measurement

The measurement was performed conducted with intentional modulation using a spectrum analyser. The analyser span was set wide enough to capture the most of the power envelope of the signal. The function “20-dB-down” is used to determine the BW. For an overview on the adjacent restricted bands the span was set as wide as needed to show that the restricted bands are not affected.

5.6.5 Test result

Center frequency (MHz)	20dB Bandwidth f1	20dB Bandwidth f2	Measured Bandwidth (MHz)	LIMIT Fundamental f*0.0025
314.94	314.90	314.98	0.08	0.79

Limit according to FCC Part 15C Section 15.231(c):

Frequency (MHz)	20 dB BW limit dependent of the carrier (%)
70 – 900	0.25
above 900	0.50

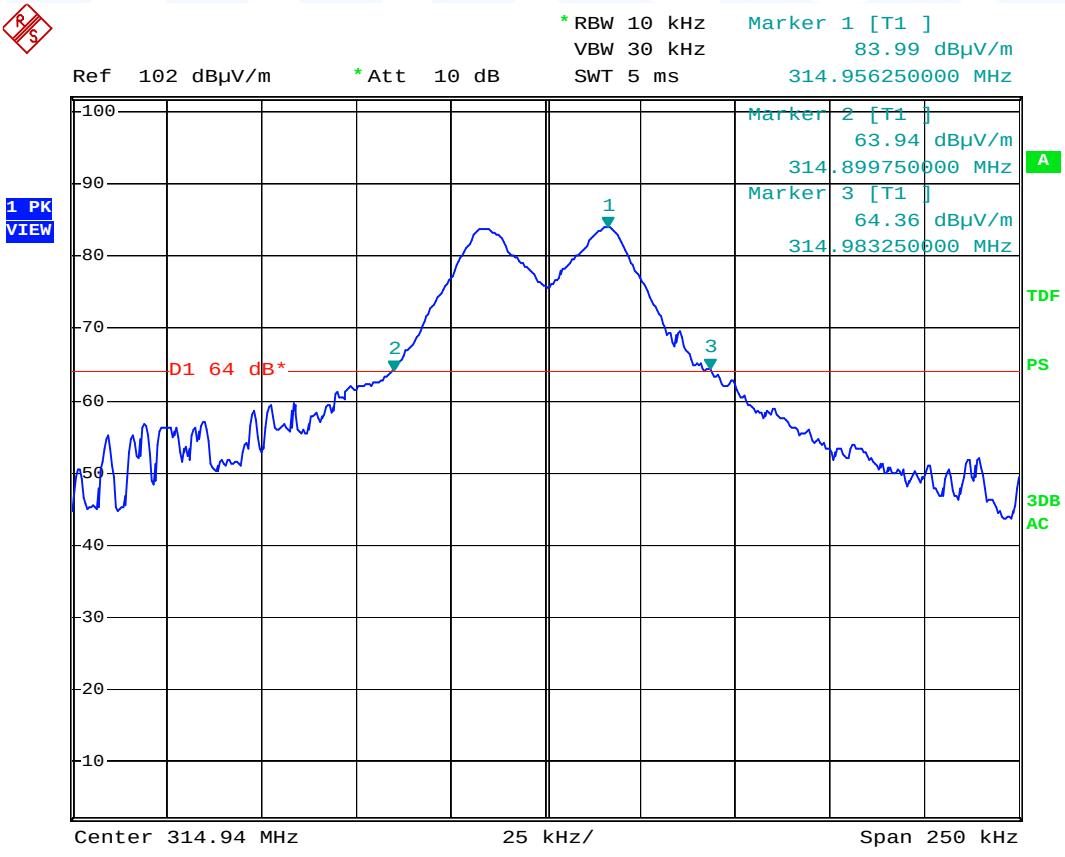
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

The requirements are **FULFILLED.**

Remarks: For detailed results, please see the test protocol below.

5.6.6 Test protocol

Emission bandwidth
FCC Part 15C Section 15.231(c)



5.7 Signal deactivation

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

5.7.1 Description of the test location

Test location: OATS1

5.7.2 Photo documentation of the test set-up

5.7.3 Applicable standard

According to FCC Part 15C, Section 15.231(a):
The emissions from intentional radiators shall not exceed the effective field strength limits.

5.7.4 Description of Measurement

The duration of transmission is measured with the spectrum analyzer. The sweep points were set to maximum for higher the time resolution. The signal is modulated; the marker of the analyzer is set to maximum amplitude at normal temperature and zero span. The analyser was set to single sweep and triggered on the button, the marker was set to the edges in order to measure the duration time and than recorded.

5.7.5 Test result

Duration of transmission (ms)	Duration after releasing the button (ms)
327.6	327.6

Limit according to FCC Part 15C, Section 15.231(a):

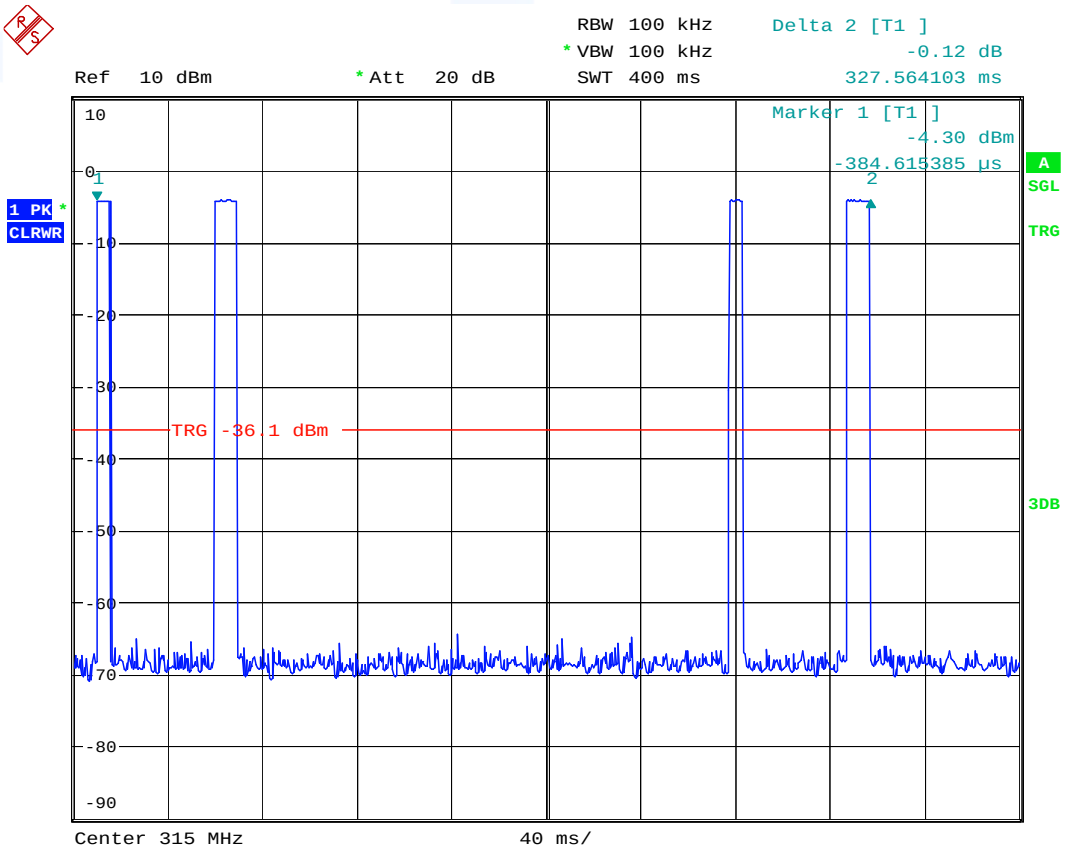
A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released and a transmitter activated automatically shall cease transmission within 5 seconds after activation.

The requirements are **FULFILLED.**

Remarks: For detailed test results, please see the test protocol below.

5.7.6 Test protocol

Signal deactivation
FCC Part 15C, Section 15.231(a)



Date: 26.JAN.2009 10:44:59

The activation of the puls train is at the same time the deactivation because no additional action for deactivation is needed.

5.8 Antenna requirements

5.8.1 Applicable standard

According to FCC Part 15C, Section 15.203:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit that broken antennas can be replaced by the user, but the use of a standard antenna jack is prohibited.

The EUT has a special connector only the furnished antenna can be used. A broken antenna can not be replaced by a user. The supplied antennas meet the requirements of part 15.203.

6 TEST CONDITIONS AND RESULTS (RX MODE)

6.1 Conducted emissions

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

6.1.1 Description of the test location

Test location: None

Remarks: The measurement is not applicable. The EUT has no AC mains connection.

6.2 Radiated emissions

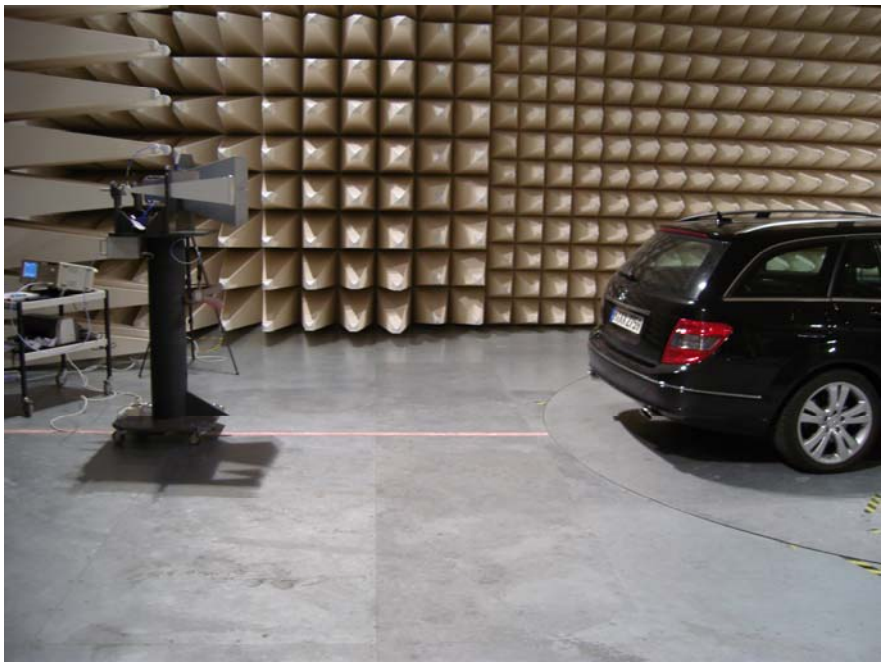
For test instruments and accessories used see section 6 Part **SER 2, SER 3**.

6.2.1 Description of the test location

Test location: OATS1
Test location: Anechoic Chamber A1

Test distance: 3 metres

6.2.2 Photo documentation of the test set-up



6.2.3 Applicable standard

According to FCC Part 15B, Section 15.109(a):
Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 m shall not exceed the given limit.

6.2.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in the frequency range of 30 to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Floor standing equipment is placed directly on the turntable/ground plane. The set up of the EUT will be in accordance to ANSI C63.4. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 m, measurement scans are made in horizontal and vertical antenna polarization and the EUT is turned 360 degrees. Measurements are made in the horizontal and vertical planes of polarization in a fully anechoic chamber using a spectrum analyser. During the tests the EUT is turned 360° to find the maximum levels of emissions. For testing above 1 GHz, if the emission level of the EUT in peak mode complies with the average limit is 20 dB lower, then testing will be stopped and peak values of the EUT will be reported, otherwise, the emission will be measured in average mode again and reported.
The resolution bandwidth during the measurement is as following:
30 MHz – 1000 MHz: RBW: 120 kHz
Above 1000 MHz: RBW: 1 MHz

6.2.5 Test result

f < 1 GHz

Frequency (MHz)	L: QP (dBµV)	L: AV (dBµV)	Bandwidth (kHz)	Correct. (dB)	L: QP dB(µV/m)	L: AV dB(µV/m)	Limit dB(µV/m)	Delta (dB)

f > 1 GHz

Frequency (MHz)	L: QP (dBµV)	L: AV (dBµV)	Bandwidth (kHz)	Correct. (dB)	L: QP dB(µV/m)	L: AV dB(µV/m)	Limit dB(µV/m)	Delta (dB)

Limit according to FCC Part 15B, Section 15.109(a):

Frequency (MHz)	Limit (µV/m)	Limit dB(µV/m)
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

The requirements are **FULFILLED.**

Remarks: All unwanted emissions not recorded in the report in the frequency range from 30 MHz to 4 GHz are more than 20 dB below the limit.

7 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	Kind of Equipment	Manufacturer	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
CPR 2	ESVS 30	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-006	07/30/2009	07/30/2008		
	VULB 9168	Trilog-Broadband Antenna	Schwarzbeck Mess-Elektronik	02-02/24-05-005	05/06/2011	05/06/2008	08/21/2008	02/21/2008
	S10162-B	RF Cable 33m	Huber + Suhner	02-02/50-05-031				
	KK-EF393-21N-16	RF Cable 20m	Huber + Suhner	02-02/50-05-033				
	NW-2000-NB	RF Cable	Huber + Suhner	02-02/50-05-113				
MB	ESCI	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-005	01/24/2009	01/24/2008		
	VULB 9168	Trilog-Broadband Antenna	Schwarzbeck Mess-Elektronik	02-02/24-05-005	05/06/2011	05/06/2008	08/21/2008	02/21/2008
	S10162-B	RF Cable 33m	Huber + Suhner	02-02/50-05-031				
	KK-EF393-21N-16	RF Cable 20m	Huber + Suhner	02-02/50-05-033				
	NW-2000-NB	RF Cable	Huber + Suhner	02-02/50-05-113				
DC	ESCI	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-005	01/24/2009	01/24/2008		
	VULB 9168	Trilog-Broadband Antenna	Schwarzbeck Mess-Elektronik	02-02/24-05-005	05/06/2011	05/06/2008	08/21/2008	02/21/2008
	S10162-B	RF Cable 33m	Huber + Suhner	02-02/50-05-031				
	KK-EF393-21N-16	RF Cable 20m	Huber + Suhner	02-02/50-05-033				
	NW-2000-NB	RF Cable	Huber + Suhner	02-02/50-05-113				

FCC ID: IYZDC08

Test ID	Model Type	Kind of Equipment	Manufacturer	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
SER 1	FMZB 1516	Magnetic Field Antenna	Schwarzbeck Mess-Elektronik	01-02/24-01-018			02/20/2009	02/20/2008
	ESCI	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-005	01/24/2009	01/24/2008		
	S10162-B	RF Cable 33m	Huber + Suhner	02-02/50-05-031				
	KK-EF393-21N-16	RF Cable 20m	Huber + Suhner	02-02/50-05-033				
	NW-2000-NB	RF Cable	Huber + Suhner	02-02/50-05-113				
SER 2	ESVS 30	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-006	07/30/2009	07/30/2008		
	VULB 9168	Trilog-Broadband Antenna	Schwarzbeck Mess-Elektronik	02-02/24-05-005	05/06/2011	05/06/2008	08/21/2008	02/21/2008
	S10162-B	RF Cable 33m	Huber + Suhner	02-02/50-05-031				
	KK-EF393-21N-16	RF Cable 20m	Huber + Suhner	02-02/50-05-033				
	NW-2000-NB	RF Cable	Huber + Suhner	02-02/50-05-113				
SER 3	R 3162	Spectrum Analyzer	Advantest	02-02/11-05-003	09/17/2009	09/17/2007	09/17/2008	09/17/2007
	AFS4-01000400-10-10P-4	RF Amplifier 1-4 GHz	PARZICH GMBH	02-02/17-05-003				
	3117	Horn Antenna 1-18 GHz	EMCO Elektronik GmbH	02-02/24-05-009	01/16/2009	01/16/2008		
	WHJS 1000-10EE	High Pass Filter	Wainwright Instruments GmbH	02-02/50-05-070				
	Sucoflex N-1600-SMA	RF Cable	novotronik Signalverarbeitung und	02-02/50-05-073				
	Sucoflex N-2000-SMA	RF Cable	novotronik Signalverarbeitung und	02-02/50-05-075				