Registration No. DAT-P-207/05

FCC ID: WNS-020000007

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

- FCC Part 15.231 -

Test Report No. : **T32833-01-00HS**	03. November 2008 Date of issue

Type / Model Name : 020000007

Product Description : Keyless entry system

Applicant : Delphi Delco Electronics Europe GmbH

Address : TecCenter
31162 BAD SALZDETFURTH
GERMANY

Manufacturer : Delphi Delco Electronics Europe GmbH

Address : TecCenter
31162 BAD SALZDETFURTH
GERMANY

Licence holder : Delphi Delco Electronics Europe GmbH

Address : TecCenter
31162 BAD SALZDETFURTH
GERMANY

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

Deutscher Akkreditierungs Rat
DAR
DAT-P-207/05-00

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 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 15.107	AC Line conducted emissions
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 15.204	External radio frequency power amplifiers and antenna modifications
Part 15, Subpart C, Section 15.205	Restricted bands of operation
Part 15, Subpart C, Section 15.207	Conducted limits
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 device with dedicated antenna. The antenna is realised as a special structure in the rear window defroster of a car. For the firmware output power setting please see point 4.5 determination of worst case. The measurements with antenna were performed using an original installed window antenna in a car in order to get real circumstances for radiating.
Hardware version: 13
Software version: 49

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 : 5 August 2008

Testing concluded on : 03 September 2008

Checked by:

Klaus Gegenfurtner
Ich bestätige die Richtigkeit und Integrität dieses Dokuments
2008.11.04 08:21:44 +01'00'

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

Tested by:

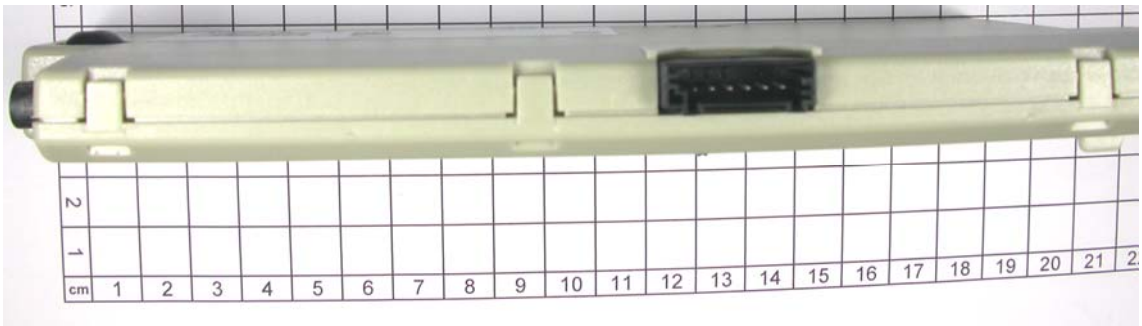
Digital unterschrieben von Hermann Smetana
Grund: Ich bin der Verfasser dieses Dokuments
Datum: 2008.11.03 16:40:45 +01'00'

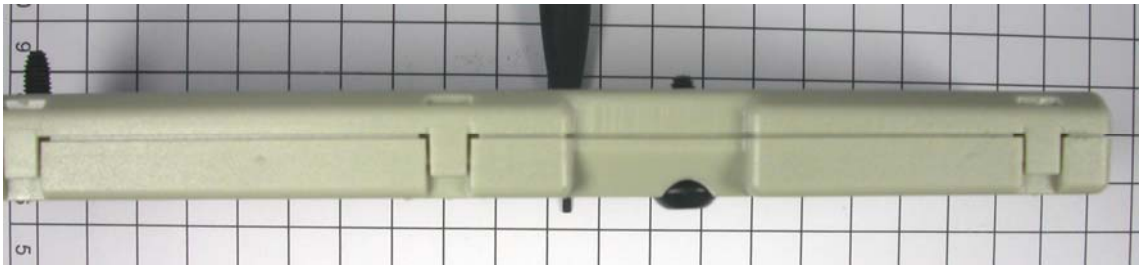
Hermann Smetana
Dipl.-Ing.(FH)
Radio Expert

3 EQUIPMENT UNDER TEST

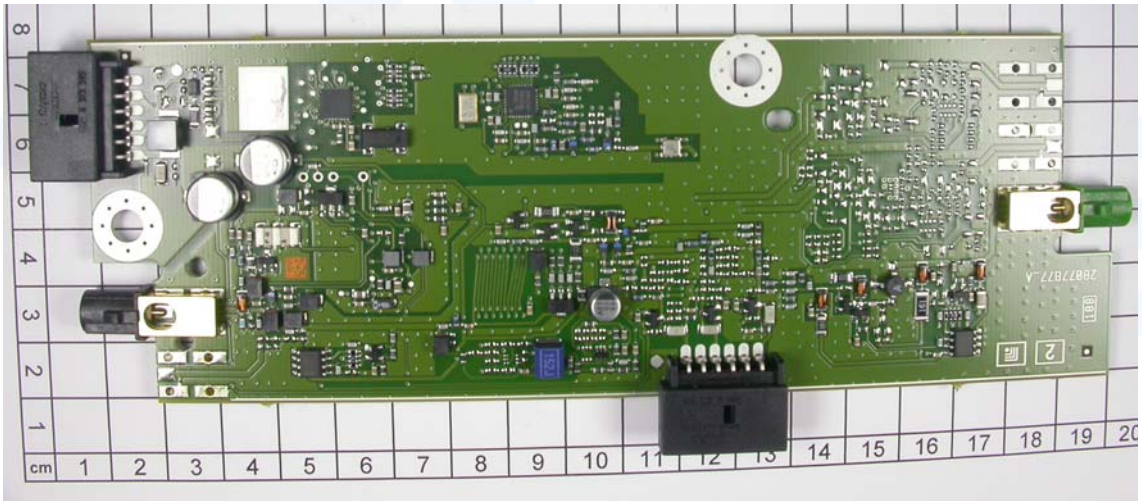
3.1 Photo documentation of the EUT

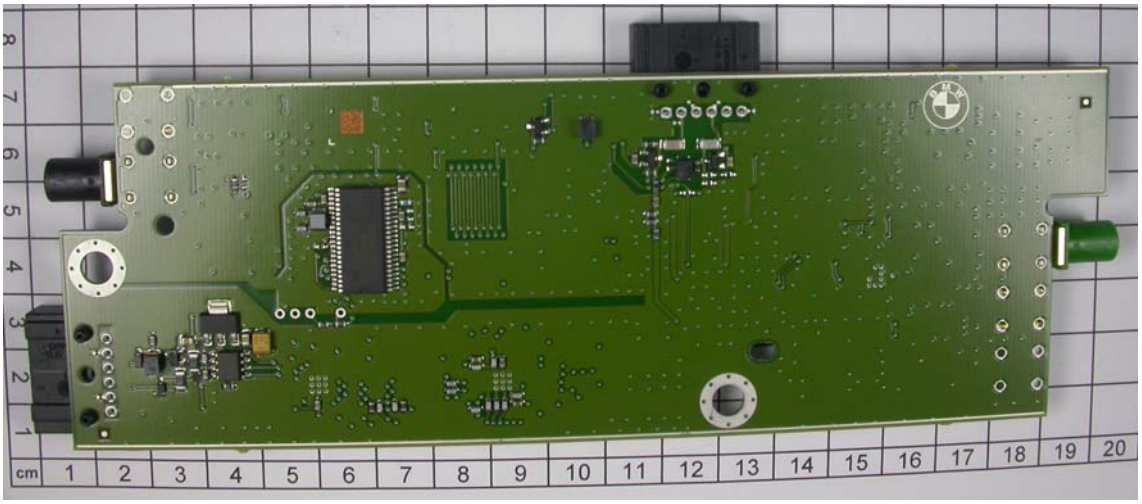
External view:

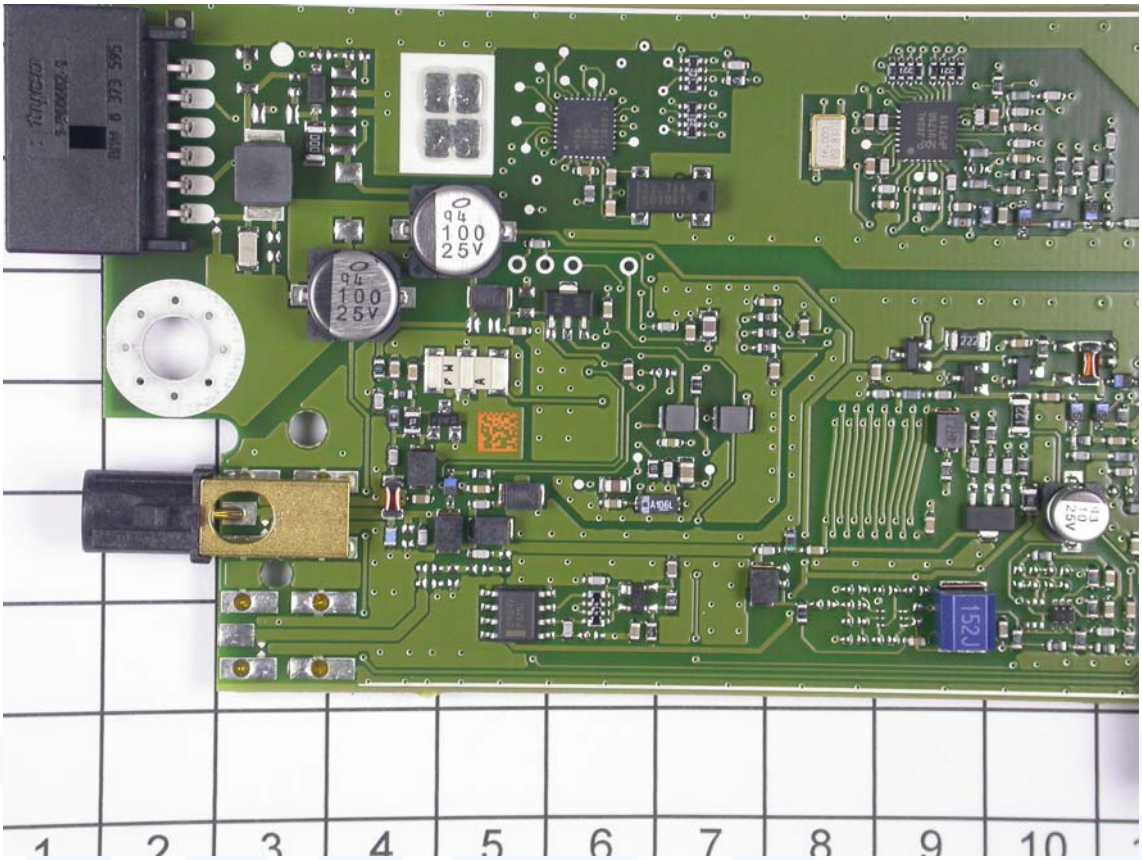


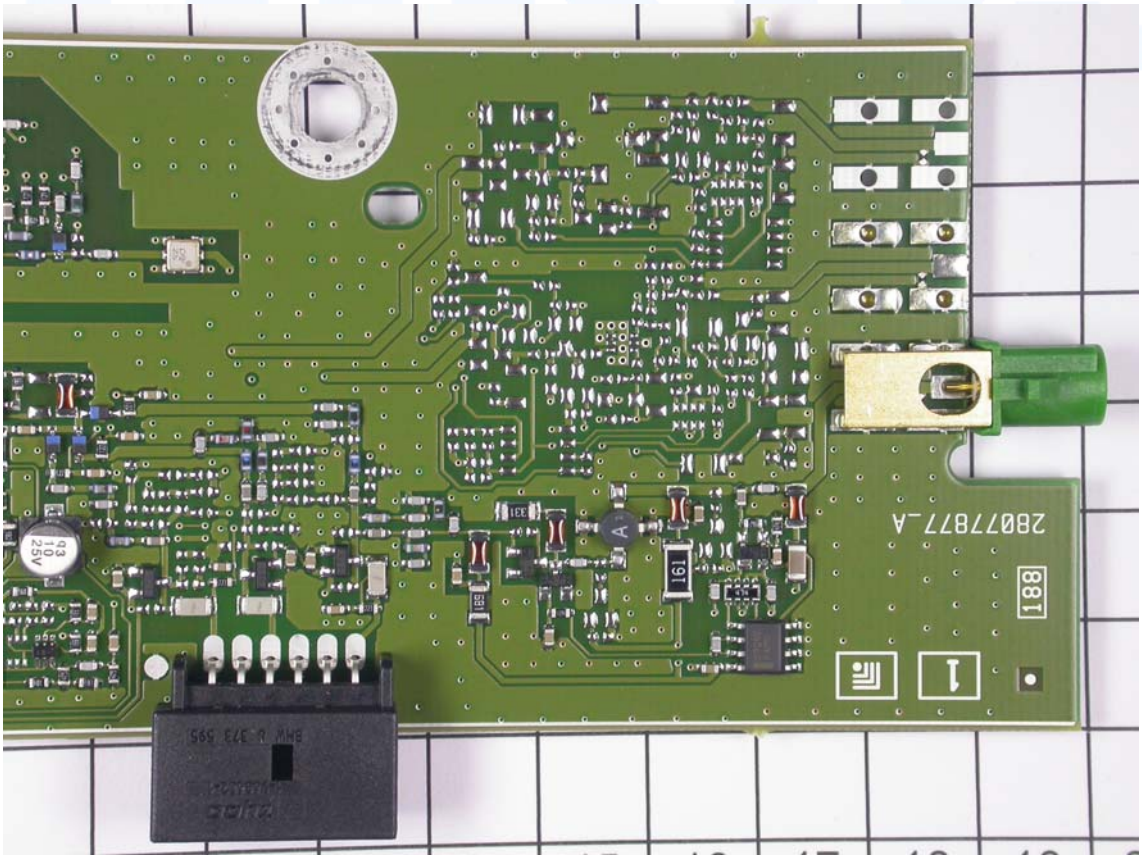


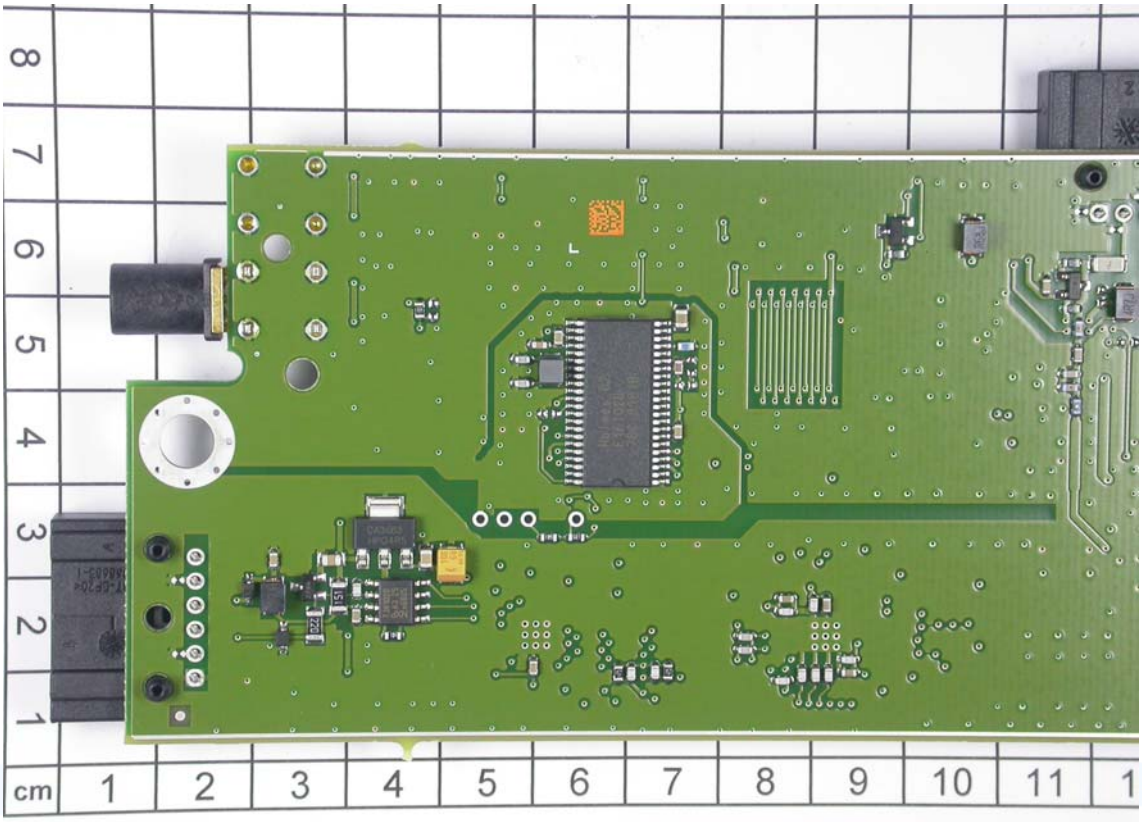
Internal view:

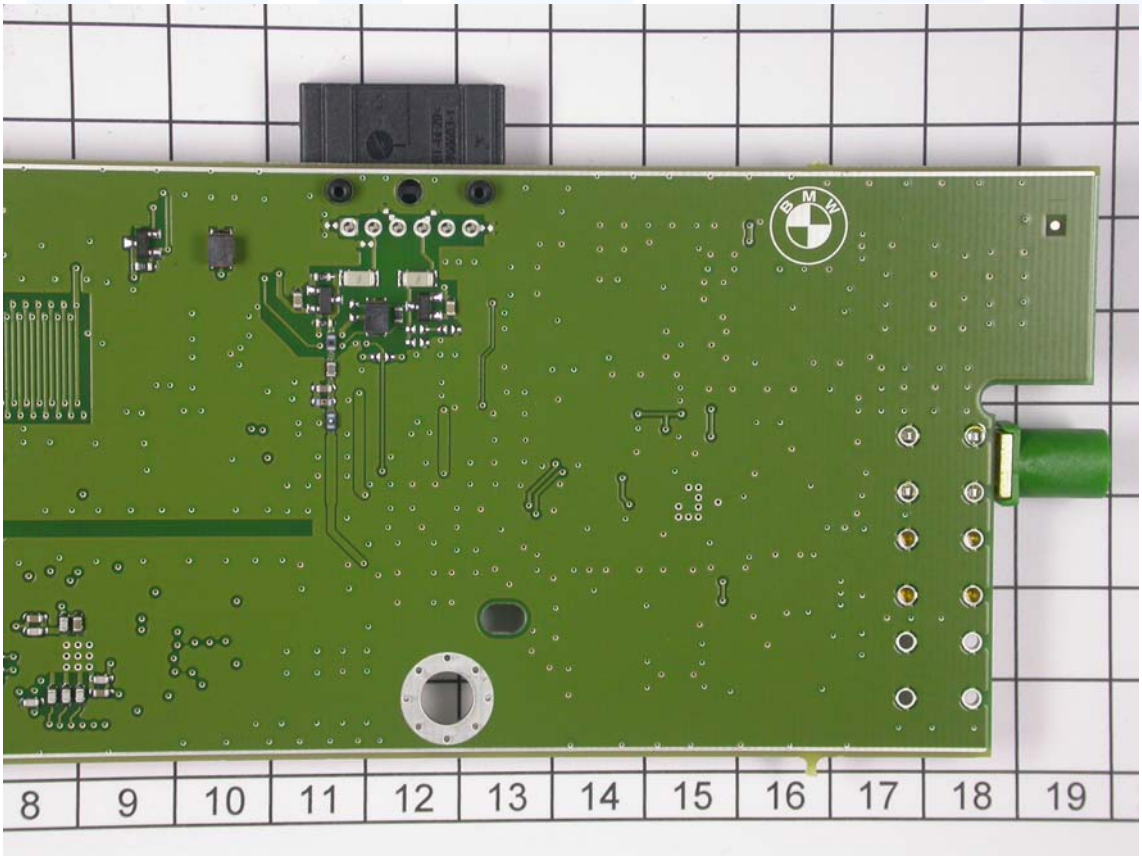




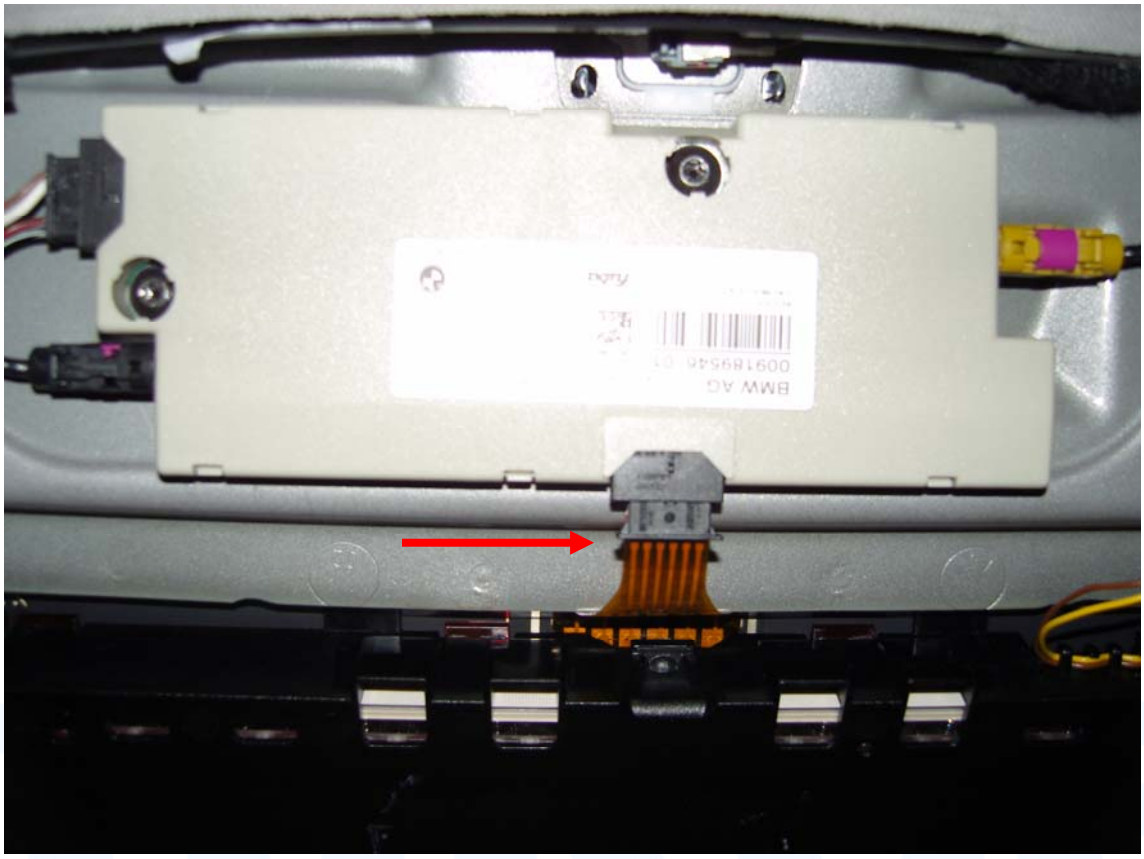








EUT connected to the dedicated window antenna in the original integration of a car.



3.2 Power supply system utilised

Power supply voltage: : 12 VDC

3.3 Short description of the Equipment under Test (EUT)

The EUT is a transceiver for car entry systems. As an option the EUT may have additionally an antenna preamplifier for DAB III, TV and AM/FM/Diversity. The EUT was equipped with all options. The EUT may work together with remote controller Radio – TV – DVD devices and diagnostic systems. The EUT is a multi channel system using 2 RF channels and is controlled via LIN-Bus. The transmit frequency channel 1 is 314.600 MHz and channel 2 is 315.000 MHz.

Number of tested samples: 1
Serial number: 81970097

EUT operation mode:

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

- TX continuous mode

- RX 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:

- Power Supply Model : Hewelett-Packard 6543A
- _____ 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 all three orthogonal axes and the settings of the EUT were changed to locate at which position and at what setting of the EUT produce the maximum of the emissions. For the further measurement the EUT is set in X position and by firmware on the output power “11” in a hex range from 1 to 1F.

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

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. Table top equipment is placed on a 1.0 X 1.5 metres non-conducting table 80 cm above the ground plane. 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 Interface cables that are closer than 40 cm to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 cm from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. 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 m. Measurement scans are made in horizontal and vertical antenna polarization's and the EUT is rotated 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)	=	Corr. 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)	Duty cycle correction (dB)	Corrected level AV dB(µV/m)	Effective limit dB(µV/m)	Delta (dB)
314.60	87.2	120	-16.5	70.7	75.6	-4.9
315.00	86.5	120	-16.5	70.0	75.6	-5.6

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 Radiated emissions 9 kHz – 3.15 GHz

For test instruments and accessories used see section 6 Part **SER 1, SER 2, SER 3**.

5.3.1 Description of the test location

Test location: OATS1
Test location: Anechoic Chamber A1

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

5.3.4 Description of Measurement

The radiated power of the fundamental wave from the EUT is measured in the frequency range of 9 kHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. Measurements between 9 kHz and 1000 MHz are made with quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 cm above the ground plane. 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 m, measurement scans are made in horizontal and vertical antenna polarization's and the EUT is rotated 360 degrees.
The radiated power of the fundamental wave from the EUT is measured in the frequency range above 1 GHz using a spectrum analyser and appropriate linear polarized antennas. 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 in height (approx. 1.30 m) on the max radiation from the EUT carrier frequency and 3 m horizontally from the EUT. Measurements are made in the horizontal and vertical planes of polarization in a fully anechoic chamber. During the tests the EUT is rotated 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:
9 kHz – 30 MHz RBW: 9 kHz
30 MHz – 1000 MHz: RBW: 120 kHz
1000 MHz – 3150 MHz RBW: 1 MHz
Example:

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

5.3.5 Test result f < 1 GHz

Channel	Frequency (MHz)	Level QP (dBµV)	Measurement bandwidth (kHz)	Correct. factor (dB)	Corrected level QP dB(µV/m)	Limit QP dB(µV/m)	Delta (dB)
CH1							
CH2							

Remark: All emissions in this range are more than 20 dB below the limit and therefore not recorded.

5.3.6 Test result f > 1 GHz

Channel	Frequency (MHz)	L: PK (dBµV)	Bandwidth (kHz)	Correct. (dB)	L: PK dB(µV/m)	L: AV dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
CH1	1498	54.8	1000	-14.6	40.2		54.0	-13.8
CH1	1990	53.7	1000	-10.6	43.1		55.6	-12.5
CH2	1498	55.9	1000	-14.6	41.3		54.0	-12.7

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

Frequency (MHz)	Field strength of spurious emissions @ 3m		Effective field strength for 315 MHz	
	(µV/m)	dB(µV/m)	(µV/m)	dB(µV/m)
40,66 – 40,70	225	47		
70 - 130	125	42		
130 - 174	125 to 375*	42 to 51,4*		
174 - 260	375	51,4		
260 - 470	**375 to 1250***	**51,4 to 61,9***	**604**	**55.6**
Above 470	1250	61,9		

*Linear interpolations

Spurious emissions shall be attenuated to the average (or 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

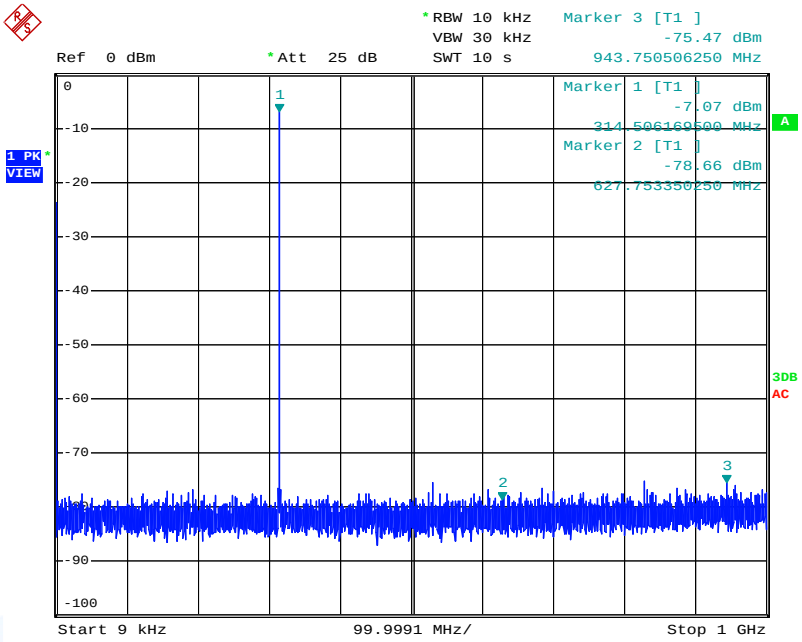
MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	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.**

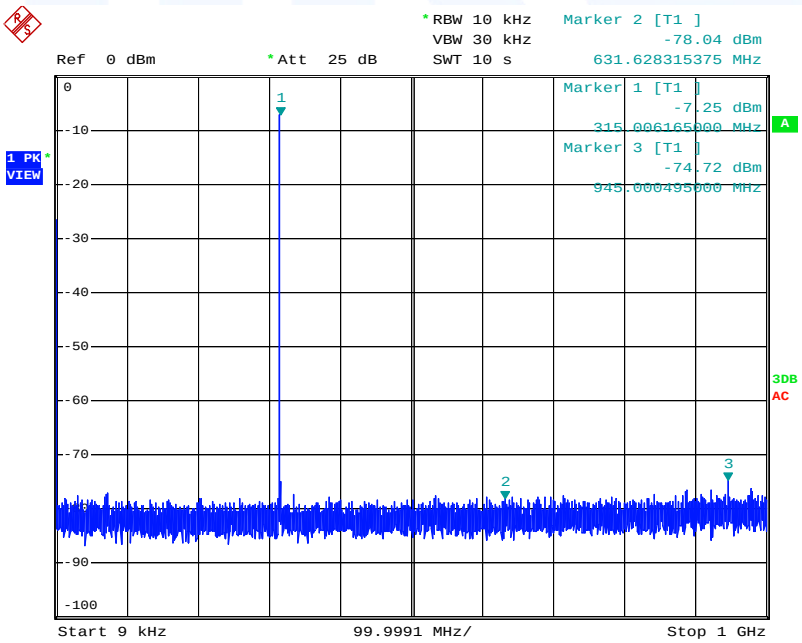
Remarks: Only spurious emissions falling not in restricted bands have been measured conducted. The measurement was performed up to the 10th harmonic. All emissions not recorded are more than 20 dB below the specified limit. For detailed test results refer to following test protocols .

5.3.7 Test protocol

SEC CH1 as verification for no spurious and harmonics below 1 GHz



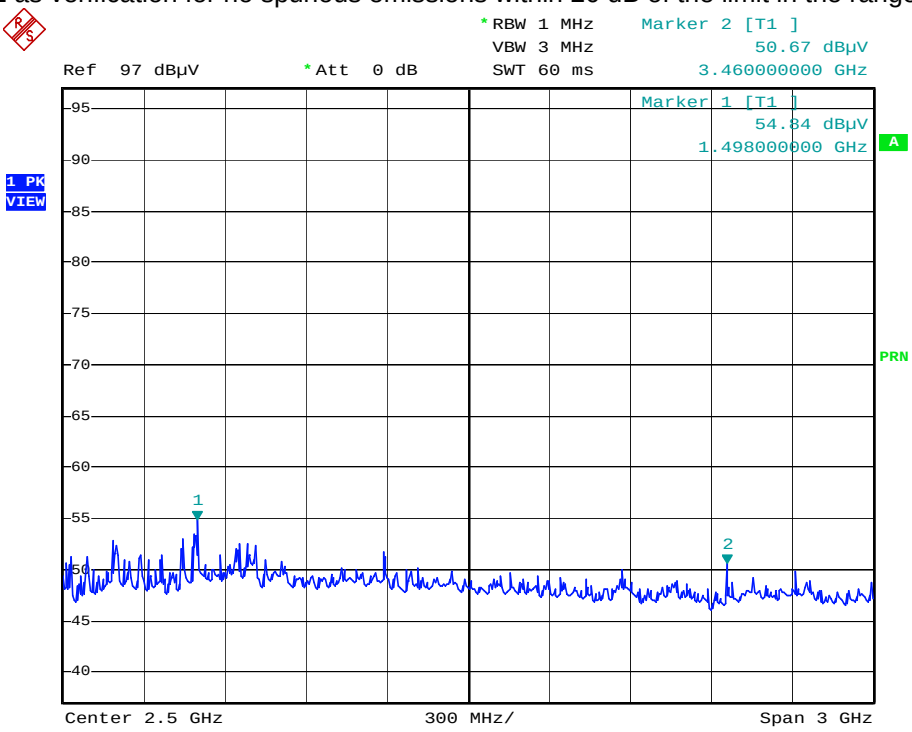
SEC CH2 as verification for no spurious and harmonics below 1 GHz



Remark: The RBW was set to 10 kHz for more sensitivity of the analyser to get the harmonics displayed.

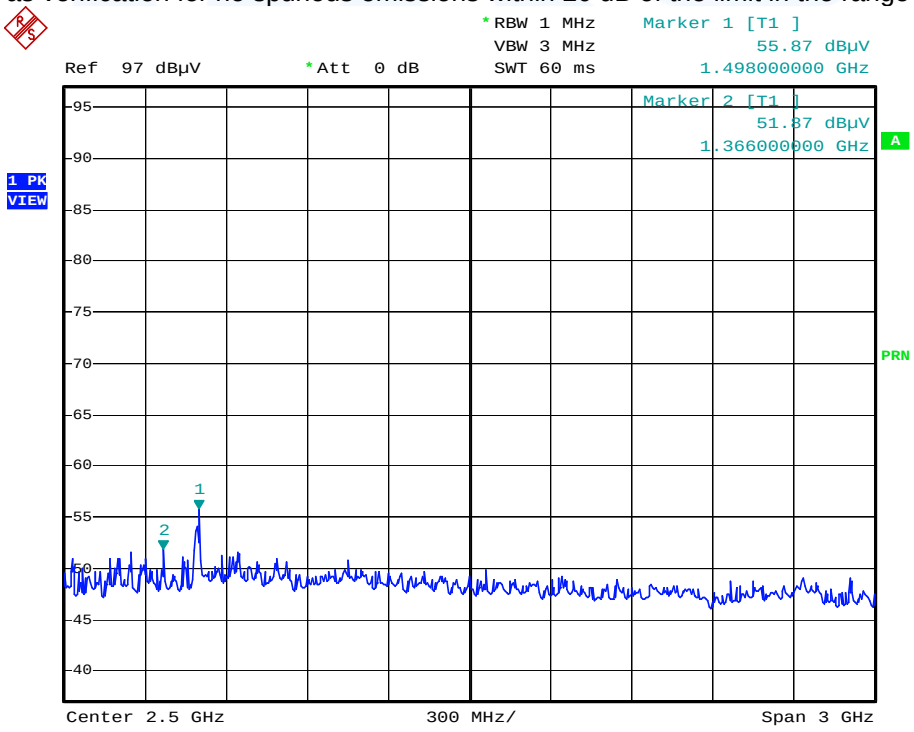
FCC ID: WNS-020000007

SER3 CH1 as verification for no spurious emissions within 20 dB of the limit in the range 1 GHz to 4 GHz.



Comment: 315MHzTV, Ch1, hor, Fz, HP, Emco
Date: 27.AUG.2008 14:04:38

SER3 CH2 as verification for no spurious emissions within 20 dB of the limit in the range 1 GHz to 4 GHz.



Comment: 315MHzTV, Ch2, hor, Fz, HP, Emco
Date: 27.AUG.2008 14:06:21

5.4 Correction for pulse operation (duty cycle)

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

5.4.1 Description of the test location

Test location: AREA4

5.4.2 Photo documentation of the test set-up

5.4.3 Applicable standard

According to FCC Part 15C, Section 15.35(c):
The emissions from intentional radiators shall not exceed the effective field strength limits.

5.4.4 Description of Measurement

The duty cycle measurement is performed using an arbitrary waveform generator and an RF-Generator as stimulus for the receiver. The spectrum analyser displays the puls train in cero span mode. The EUT is only able to send the right puls train in normal mode. The stimulus shall provide with the shortest reaction possible for this programmed puls train. The puls train have two main pulses, a “button pressed acknowledge puls” and a “button released acknowledge puls”. The puls train is programmed for CH1 and CH2 as “button pressed puls” (14.5 ms) + min blank time (45 ms) + “button released telegram” (37 ms) + blank time (4 ms) + “button released acknowledge puls” (14.5 ms). The puls train is recorded. Other usable remote controller show the same behaviour as below described, the difference between the remote controllers is the Byte “Mode only”.

5.4.5 Test result

5.4.5.1 The communication between IDG and FBDII

The FBDII checks a received telegram (is WUP FBDII=WUP IDG) and decides whether the telegram is valid or not. An ACK signal is sent by the FBDII if a valid telegram is received from the remote controller. The ACK signal consists of 2 pulses, the first pulse acknowledge the “button-pressed” telegram and the second pulse acknowledge the “button-released” telegram. Between the first pulse and the second pulse is a forced space. The space depends on the user and his intention to control the several functions which are implemented as interpretation on how long the button is pressed.

5.4.5.2 Function “lock, unlock”

The function is achieved by pressing the button of the remote controller (Door, Trunk) a short time. Thereby the shortest follow up time of the 2 acknowledge pulses is set.

5.4.5.3 Additional function

If the button “lock/unlock Door” is still pressed after the door is locked/unlocked the additional function “window close/open” controls dependent on the time how long the button is pressed how wide the windows are closed/opened. The limit hereby is 60 s. After this time the second ACK is sent autonomously and stops the further transmission of the remote controller whether the button is still pressed or not. The max. forced space time between the first ACK pulse and the second ACK pulse is therefore limited to 60 s.

5.4.5.4 No ACK

In case that the WUP of the FBDII is not the same as sent by the IDG or the remote controller is out of the detecting area the FBDII doesn’t send any ACK. The IDG repeats the code-telegram on the second cannel. Is than no ACK received, after 500 ms the event starts again on the first channel, if the button is still pressed and no ACK is received by IDG. This sequence starts two times after additionally 500 ms.

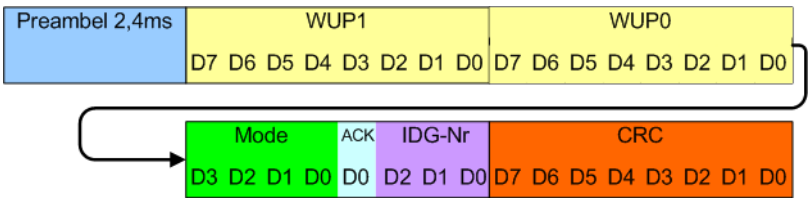
5.4.5.5 Other remote controllers

FBDII is able to communicate with other approved remote controllers (THS, IDG, FFB, DVM). The communication is based on the same routines and protocols as described before. The difference between the remote controller signals is the byte “mode” of the code-telegram.

5.4.5.6 The acknowledge telegram includes the follow data:

- First part is the preamble that only consists bits changes there state from zero to one for 2.4 ms.
- WUP1 and WUP0 stands for Wake Up-Pattern. WUP is unique for every car and is the ID for this entry system.
- The four byte in the mode section gives the type of the telegram, here “acknowledge”.
- The ACK bit indicates a successful receive of a valuable telegram.
- The IDG-Nr. indicates the key from which the communication has started. Up to 8 keys are possible.
- CRC is Cyclic Redundancy Check

Data content of every part of the acknowledge puls



Abbreviation	Description
WUP	Wake Up Pattern
Mode	diff. state
ACK	Ok or Not Ok
IDG-Nr.	Key 0-8

Calculation of the correction factor:

The shortest possible puls train

t_{iw} = 14.5 ms + 45 ms + 37 ms + 4 ms + 14.5 ms = 115 ms

Tolerances of the devices may cause an uncertainty of the puls length up to 15 ms. Therefore in the following calculation a puls length of 15 ms is assumed as worst case for both channels.

The duty cycle factor (dB) is calculated applying the following formula:

$K_E = 20 \log ((tiB*p)/Tw)$ =20 log ((15*1)/100)) = -16.5 dB

K_E	pulse operation correction factor	(dB)
t_{iw}	pulse duration for one complete pulse track	(ms)
t_{iB}	pulse duration for one pulse	(ms)
T_w	a period of the pulse track	(ms)
p	number of pulses in one train	

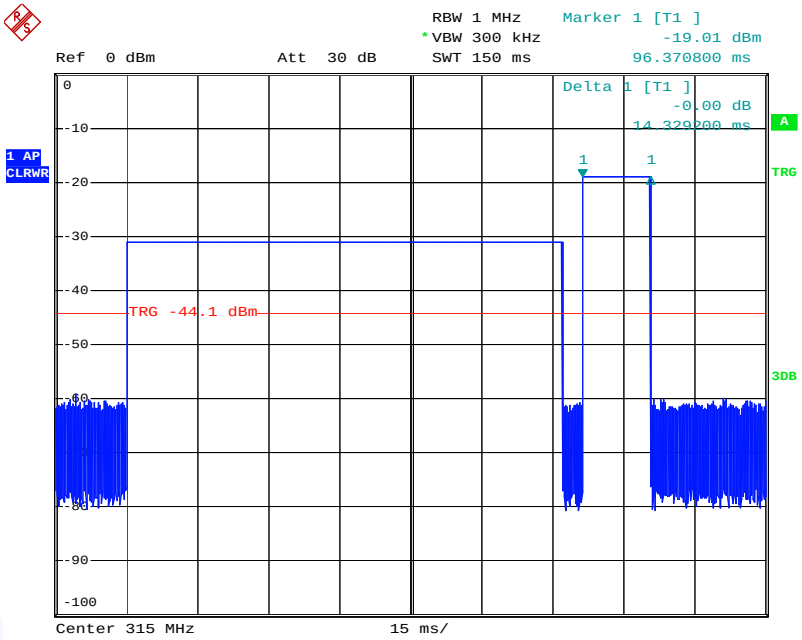
Duty cycle	t_{iW} (ms)	T_W (ms)	t_{iB} (ms)	p	K_E (dB)
Within 100 ms		100	15	1	-16.5

Remarks: The pulse train (*Tw*) exceeds 100 ms, therefore the duty cycle have been calculated by averaging the sum of the pulses over the 100 ms time window with the highest average values.

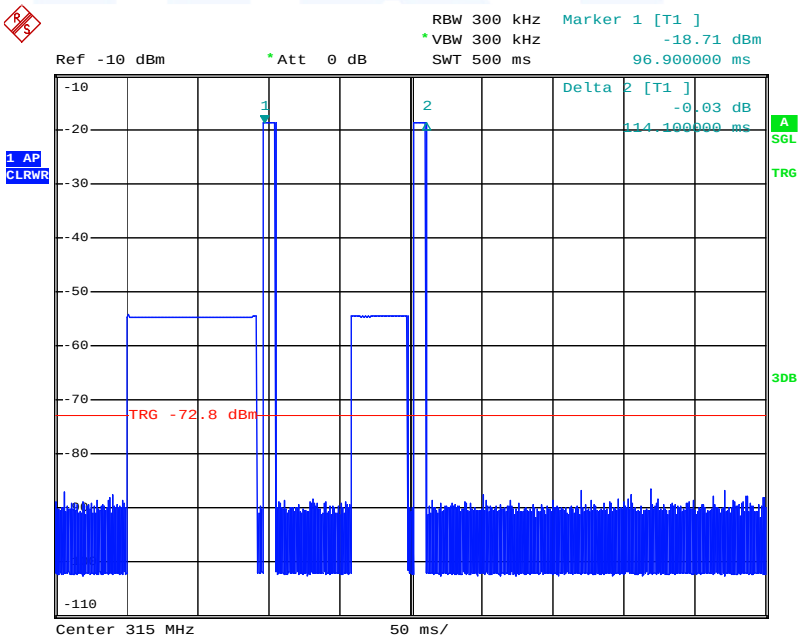
For detailed results, please see the test protocol below.

5.4.6 Test protocol

Determination of the pulse length



Complete pulse train



The first puls in the diagram mean the telegram sent by the external key (IDG) “button pressed”. The second puls marked by marker 1 means the first part of the acknowledge puls “button pressed” by the EUT. The third puls means the telegram sent by the external key “button released” after a forced blank period. The fourth puls is the second part of the acknowledge puls “button released” by the EUT. The forced blank period can be enlarged by the user staying on the pressed button up to 60 s. After this period the IDG sends autonomously the signal “button released” and stops after receiving the acknowledge puls further activities, this means saving of battery power of the IDG.

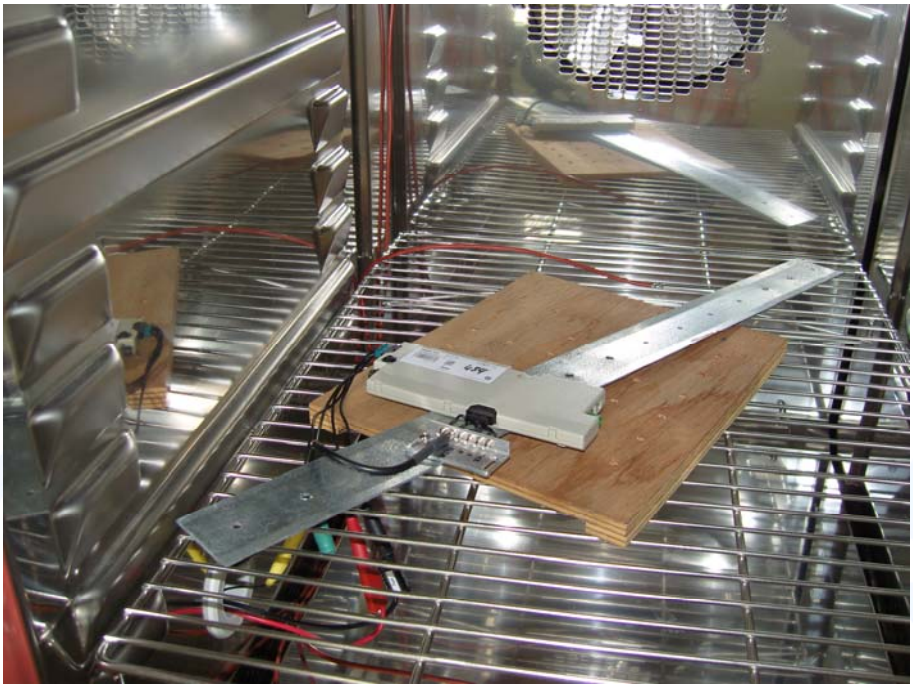
5.5 Emission bandwidth

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

5.5.1 Description of the test location

Test location: AREA4

5.5.2 Photo documentation of the test set-up



5.5.3 Applicable standard

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

5.5.4 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.

5.5.5 Test result

Channel	Center frequency (MHz)	20dB bandwidth f1 (MHz)	20dB bandwidth f2 (MHz)	Measured bandwidth (kHz)	Limit fundamental (kHz)
CH1	314.59775	314.55275	314.64275	90.0	786.5
CH2	314.99775	314.95275	315.04275	90.0	787.5

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

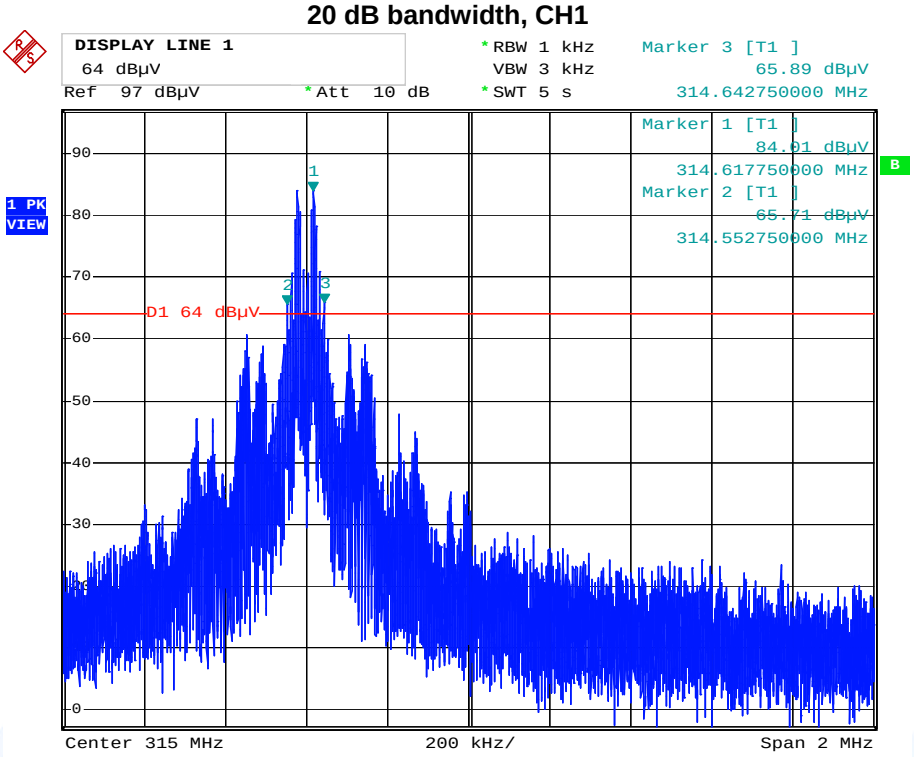
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

The requirements are **FULFILLED.**

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

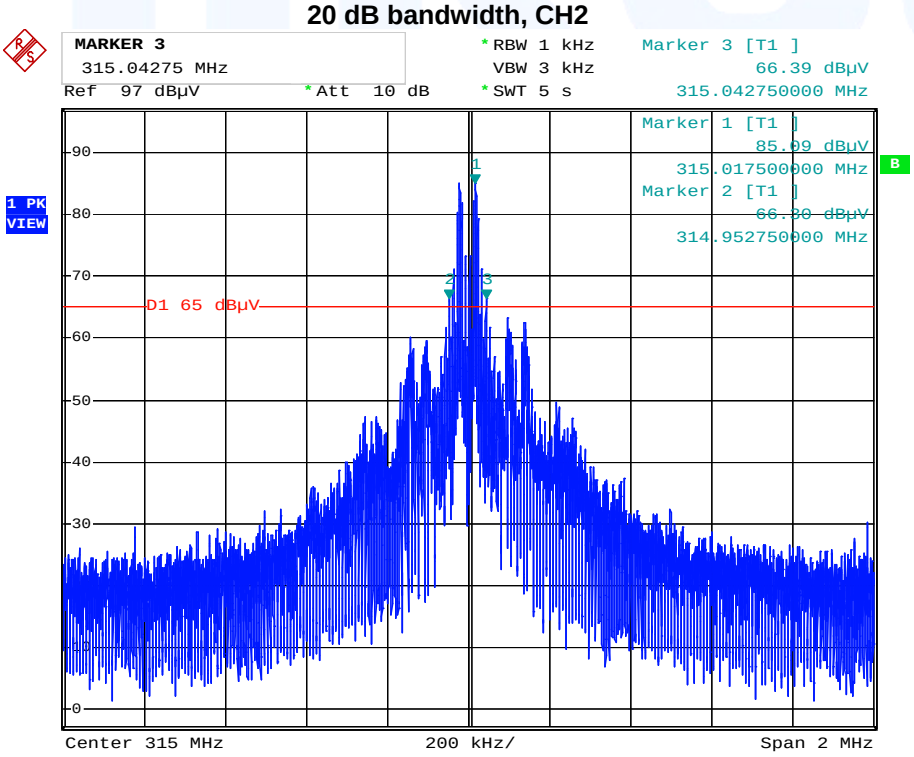
5.5.6 Test protocol

20 dB bandwidth, CH1



Date: 5.AUG.2008 16:17:36

20 dB bandwidth, CH2



Date: 5.AUG.2008 16:14:40

5.6 Signal deactivation

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

5.6.1 Description of the test location

Test location: AREA4

5.6.2 Photo documentation of the test set-up

5.6.3 Applicable standard

According to FCC Part 15C, Section 15.231(a)(1):
A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter not exceeding the defined on time limit.

5.6.4 Description of Measurement

The duration of transmission is measured using an arbitrary waveform generator and an RF-Generator as stimulus for the receiver. The spectrum analyser displays the puls train in cero span mode. The EUT is only able to send the right puls train in normal mode. The stimulus shall provide with a usually reaction for this programmed puls train. The puls train exists from two pulses, a “button pressed acknowledge puls” and a “button released acknowledge puls”. The puls train is programmed for CH1 and CH2 as “button pressed puls” (14.5 ms) + min blank time (45 ms) + “button released telegram” (37 ms) + blank time (4 ms) + “button released acknowledge puls” (14.5 ms). The puls train is recorded.

5.6.5 Test result

The duration after releasing the button the following part of the puls train is summed:
t_{off} = 45 ms + 37 ms + 4 ms + 14.5 ms = 100.5 ms

Tolerances of the devices may enable an uncertainty of the puls duration up to 15 ms. Therefore in the following calculation a puls duration of 15 ms is assumed as worst case for both channels.

Duration of transmission (ms)	Duration after releasing the button (s)
15	0.100

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.

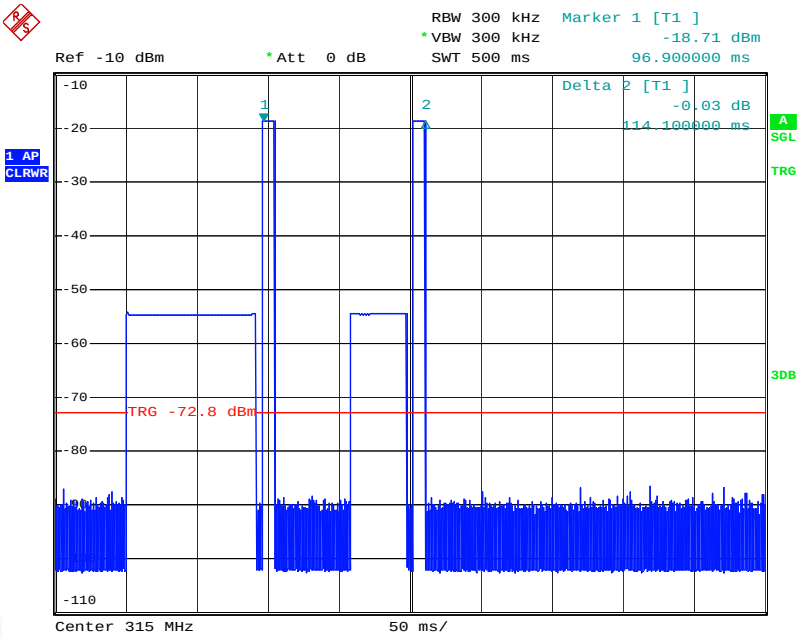
The requirements are **FULFILLED.**

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

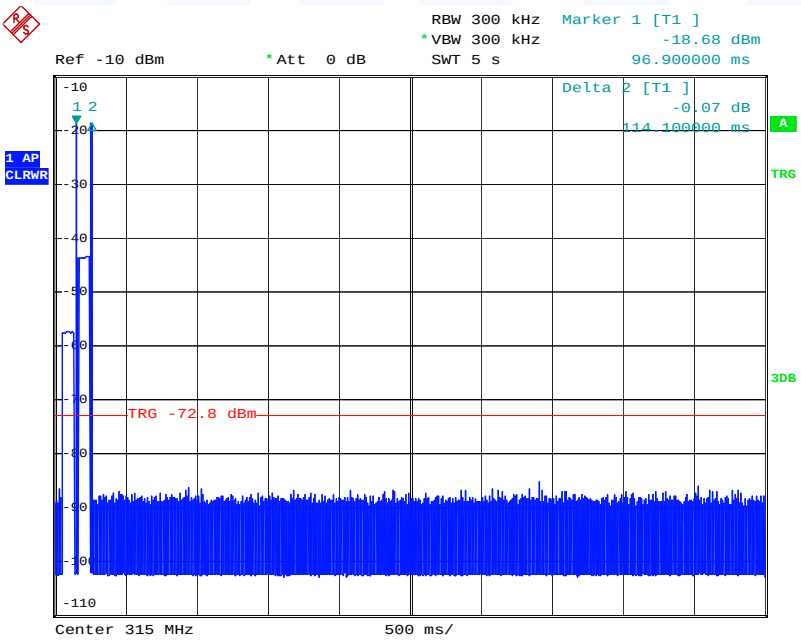
5.6.6 Test protocol

Signal deactivation

FCC Part 15C, Section 15.231(a)



Long term observation



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	Kind of Equipment	Manufacturer	Equipment No.
CPR 2	ESVS 30	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-006
	VULB 9168	Trilog-Broadband Anten	Schwarzbeck Mess-Elektron	02-02/24-05-005
	S10162-B	RF Cable 33 m	Huber + Suhner	02-02/50-05-031
	KK-EF393-21N-16	RF Cable 20 m	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	02-02/03-05-004
	33120A	Function/Arbitrary Wave	HP Hewelett-Packard	02-02/05-05-007
	SMY 01	Signal Generator	Rohde & Schwarz München	02-02/05-05-016
	6011	Power Divider DC-118 G	Tactron Elektronik	02-02/50-05-080
	PE1540	Power Supply	Phillips Fluke GmbH	02-02/50-07-033
MB	FSP 30	Spectrum Analyzer	Rohde & Schwarz München	02-02/11-05-001
	WK-340/40	Climatic Chamber	Weiss Umwelttechnik GmbH	02-02/45-05-001
	6543A	Power Supply	HP Hewelett-Packard	02-02/50-05-157
SER 1	FMZB 1516	Magnetic Field Antenna	Schwarzbeck Mess-Elektron	01-02/24-01-018
	ESVS 30	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-003
	S10162-B	RF Cable 33 m	Huber + Suhner	02-02/50-05-031
	KK-EF393-21N-16	RF Cable 20 m	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
	VULB 9168	Trilog-Broadband Anten	Schwarzbeck Mess-Elektron	02-02/24-05-005
	S10162-B	RF Cable 33 m	Huber + Suhner	02-02/50-05-031
	KK-EF393-21N-16	RF Cable 20 m	Huber + Suhner	02-02/50-05-033
	NW-2000-NB	RF Cable	Huber + Suhner	02-02/50-05-113
SER 3	AFS4-01000400-10-10P-4	RF Amplifier 1-4 GHz	PARZICH GMBH	02-02/17-05-003
	AMF-4F-04001200-15-10P	RF Amplifier 4-12 GHz	PARZICH GMBH	02-02/17-05-004
	AFS5-12001800-18-10P-6	RF Amplifier 12-18 GHz	PARZICH GMBH	02-02/17-06-002
	3117	Horn Antenna 1-18 GHz	EMCO Elektronik GmbH	02-02/24-05-009
	Sucoflex N-1600-SMA	RF Cable	novotronik Signalverarbeitung	02-02/50-05-073
	Sucoflex N-2000-SMA	RF Cable	novotronik Signalverarbeitung	02-02/50-05-075
TP	ESCI	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-004
	33120A	Function/Arbitrary Wave	HP Hewelett-Packard	02-02/05-05-007
	SMY 01	Signal Generator	Rohde & Schwarz München	02-02/05-05-016
	6011	Power Divider DC-118 G	Tactron Elektronik	02-02/50-05-080
	PE1540	Power Supply	Phillips Fluke GmbH	02-02/50-07-033

Equipment No.	Next Calibration	Last Calibration	Next Verification	Last Verification
02-02/03-05-006	07/30/2009	07/30/2008		
02-02/24-05-005	05.06.2011	05.06.2008	02/28/2009	08/29/2008
02-02/50-05-031				
02-02/50-05-033				
02-02/50-05-113				
02-02/03-05-004	01.08.2009	01.08.2008		
02-02/05-05-007				
02-02/05-05-016	05/26/2010	05/26/2007	05/26/2009	05/26/2008
02-02/50-05-080				
02-02/50-07-033				
02-02/11-05-001	04.08.2009	04.08.2008		
02-02/45-05-001	09.01.2010	09.01.2005	12/17/2008	06/17/2008
02-02/50-05-157				
01-02/24-01-018	02/20/2009	02/20/2008		
02-02/03-05-003	05/14/2009	05/14/2008		
02-02/50-05-031				
02-02/50-05-033				
02-02/50-05-113				
02-02/03-05-006	07/30/2009	07/30/2008		
02-02/24-05-005	05.06.2011	05.06.2008	02/28/2009	08/29/2008
02-02/50-05-031				
02-02/50-05-033				
02-02/50-05-113				
02-02/17-05-003				
02-02/17-05-004				
02-02/17-06-002				
02-02/24-05-009	01/16/2009	01/16/2008		
02-02/50-05-073				
02-02/50-05-075				
02-02/03-05-004	01.08.2009	01.08.2008		
02-02/05-05-007				
02-02/05-05-016	05/26/2010	05/26/2007	05/26/2009	05/26/2008
02-02/50-05-080				
02-02/50-07-033				