

FCC ID: NSZ-AKSE3

EMI - TEST REPORT

- FCC Part 15.209 -



Test Report No. :	T34833-00-02KG	23. March 2011 Date of issue
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Type / Model Name : AKSE ASIC3

Product Description : Child seat presence & orientation detection system

Applicant : IEE S.A.

Address : ZAE Weiergewan, 11, rue Edmond Reuter
L-5326 Contern, Luxembourg

Manufacturer : IEE S.A.

Address : ZAE Weiergewan, 11, rue Edmond Reuter
L-5326 Contern, Luxembourg

Licence holder : IEE S.A.

Address : ZAE Weiergewan, 11, rue Edmond Reuter
L-5326 Contern, Luxembourg

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

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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 15.207	Conducted limits
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.
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ANSI C95.1: 2005	IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
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CISPR 16-4-2: 2003	Uncertainty in EMC measurement
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CISPR 22: 2005 EN 55022: 2006	Information technology equipment
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2 SUMMARY

GENERAL REMARKS:

None

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 : 16 February 2011

Testing concluded on : 22 March 2011

Checked by:

Tested by:

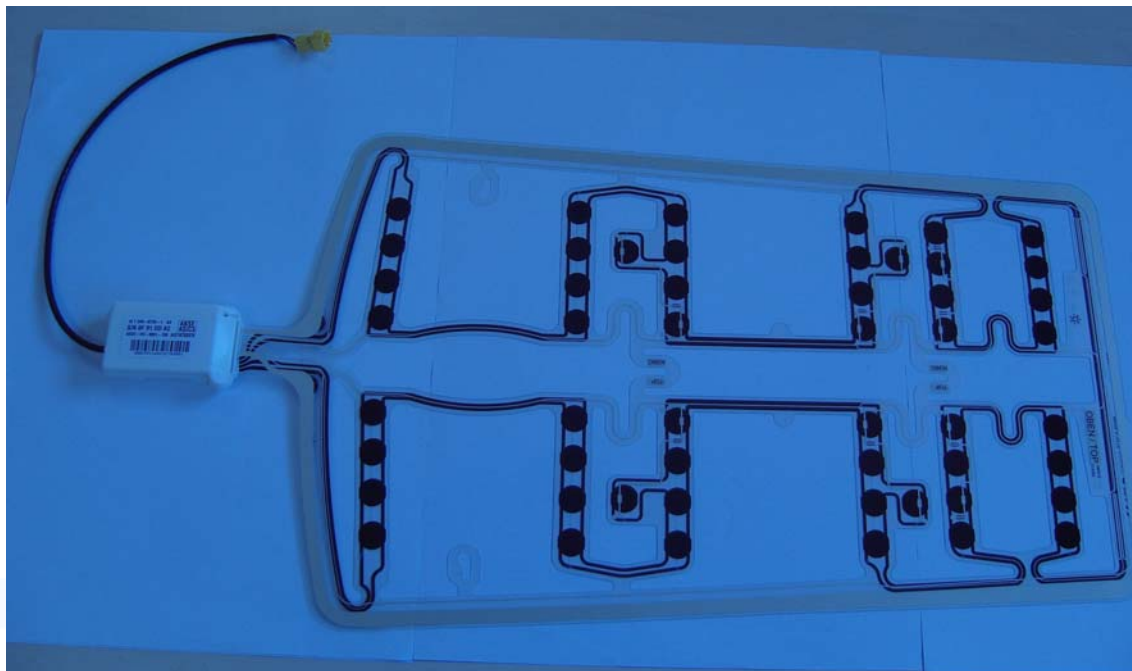
Thomas Weise
Dipl.-Ing.(FH)
Laboratory Manager

Klaus Gegenfurtner
Dipl.-Ing.(FH)

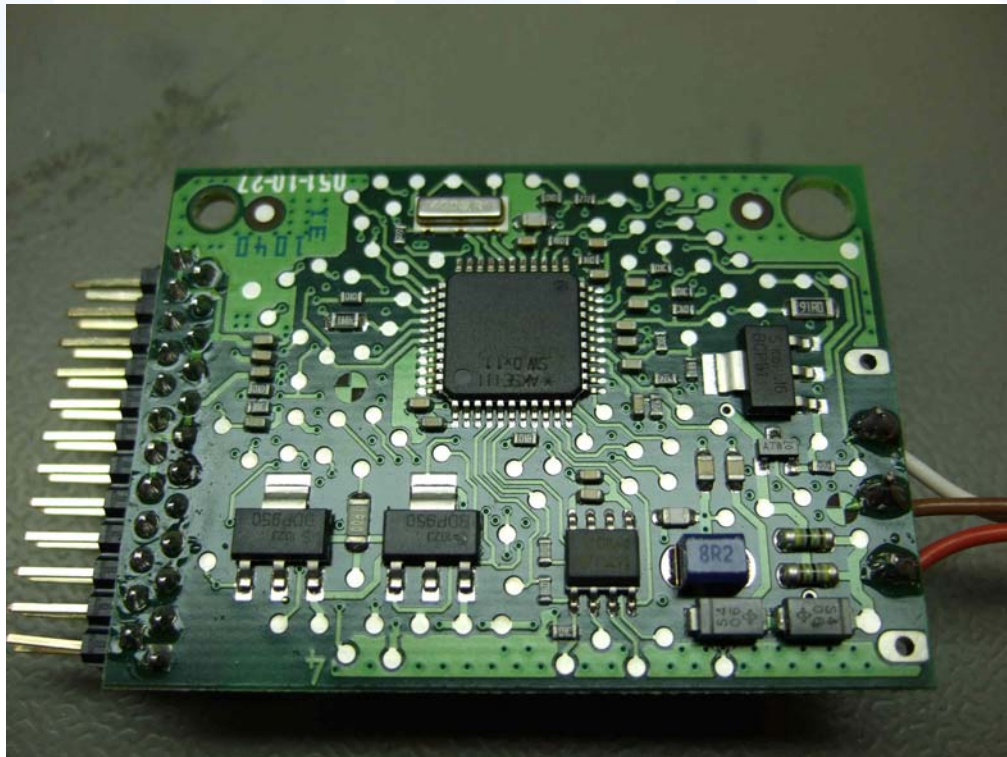
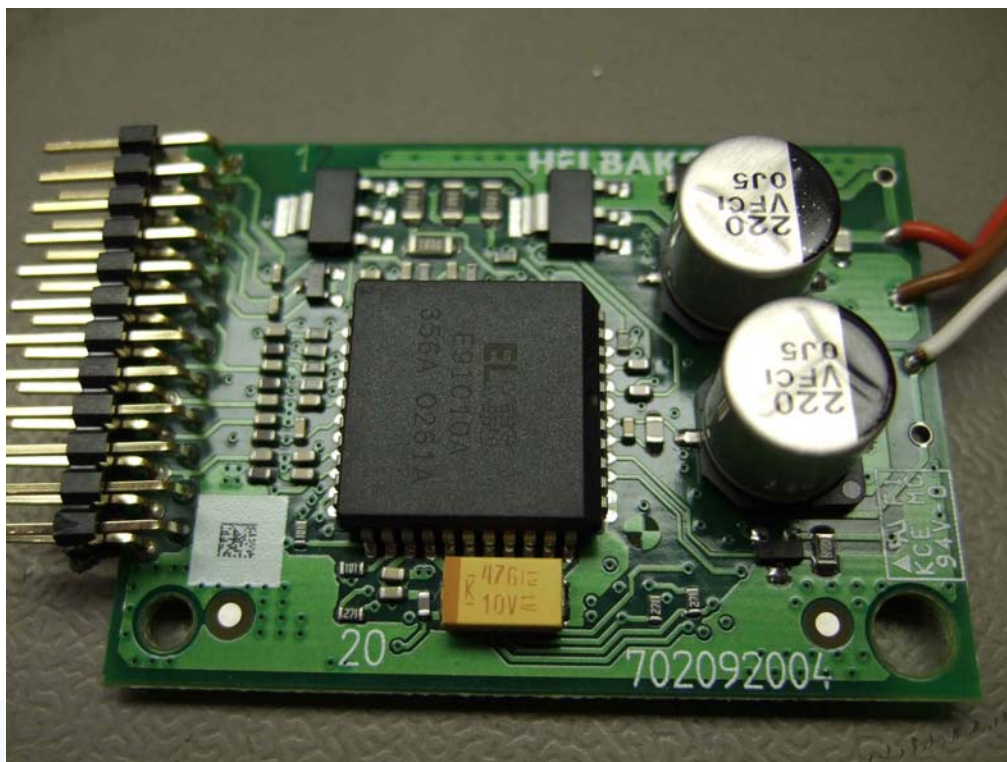
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3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EUT



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3.2 Power supply system utilised

Power supply voltage: : 13,5 V / DC

3.3 Short description of the equipment under test (EUT)

ASKE is an RFID sensing system, which is capable of determining the presence and orientation of a CRS placed on a passenger seat.

The EUT works on the following frequencies:

CH1 = 123.3 kHz
CH2 = 125.2 kHz
CH3 = 127.2 KHz
CH4 = 129.2 kHz
CH5 = 131.4 kHz
CH6 = 133.6 kHz

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 sweep mode on 6 frequencies between 123 kHz and 134 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 : _____
- _____	Model : _____

- 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

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.

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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

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 given limits.

5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.4 described under item 4.4.3. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

5.1.5 Test result

Limit according to FCC Part 15, Section 15.207(a):

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

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

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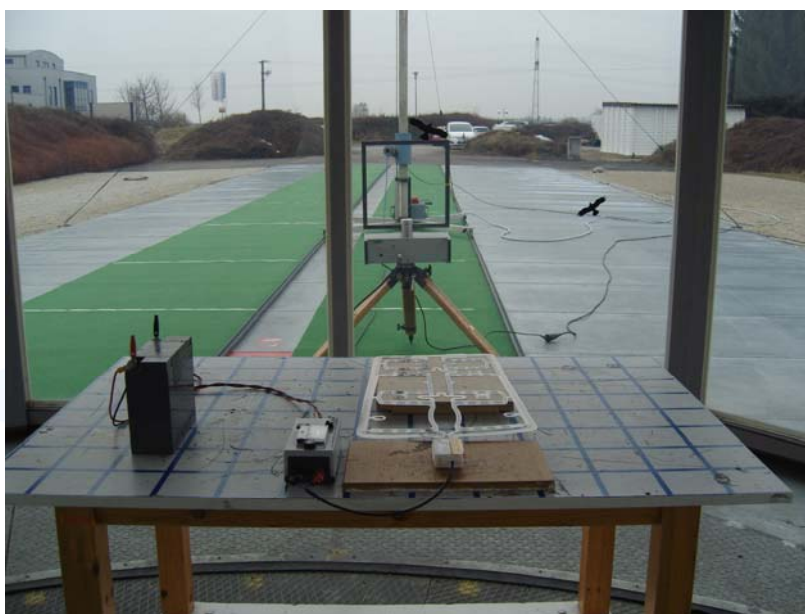
5.2 Field strength of the fundamental wave

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.

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5.2.2 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. 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)	=	Level dB(μV/m)	-	Limit dB(μV/m)	=	Delta (dB)
1.705	5	+	20	=	25	-	30	=	-5

5.2.3 Test result

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

The following test results are measured in normal installation position (Horizontal position):

Frequency (kHz)	Level PK (dBμV)	Level AV (dBμV)	Level QP (dBμV)	Ant. factor (dB/m)	Field strength AV dB(μV/m)	Distance corr. (dB)	Corrected level AV dB(μV/m)	Limit dB(μV/m)	Delta (dB)
123,31	71,8	31,6	63,2	20,0	51,6	-80,0	-28,4	25,8	-54,2
125,22	72,0	32,3	62,8	20,0	52,3	-80,0	-27,7	25,7	-53,4
127,20	71,8	31,7	62,4	20,0	51,7	-80,0	-28,3	25,5	-53,8
129,26	72,0	33,6	63,4	20,0	53,6	-80,0	-26,4	25,4	-51,8
131,39	71,8	33,0	63,5	20,0	53,0	-80,0	-27,0	25,2	-52,2
133,58	72,0	33,7	63,7	20,0	53,7	-80,0	-26,3	25,1	-51,4

Additionally one channel (CH4) was re-measured in the non typical vertical position of the EuT, because of max. Field strength in this position:

Frequency (kHz)	Level AV (dBμV)	Ant. factor (dB/m)	Field strength AV dB(μV/m)	Distance corr. (dB)	Corrected level AV dB(μV/m)	Limit dB(μV/m)	Delta (dB)
129,26	56,2	20,0	76,2	-80,0	-3,8	25,4	-29,2

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

Frequency (MHz)	Field strength of fundamental wave (μV/m)	dB(μV/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	29.5	30

The requirements are **FULFILLED**.

Remarks:

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5.3 Spurious emissions

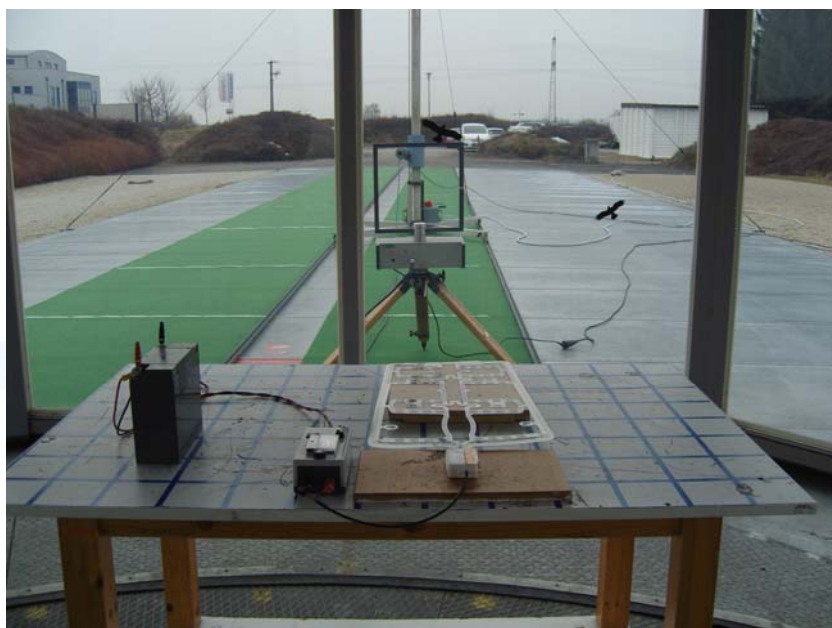
For test instruments and accessories used see section 6 Part SER 1, SER 2.

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



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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 radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.4. 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 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).

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The resolution bandwidth during the measurement is as follows:

9 kHz – 150 kHz:	RBW:	200 Hz
150 kHz – 30 MHz:	RBW:	9 kHz
30 MHz – 1000 MHz:	RBW:	120 kHz

5.3.5 Test result

The following test results are measured in normal installation position (Horizontal position):

Frequency (kHz)	Level PK (dBμV)	Ant. factor (dB/m)	Field strength PK dB(μV/m)	Distance corr. (dB)	Corrected level PK dB(μV/m)	Limit AV dB(μV/m)	Delta (dB)
246,60	27,9	20,0	47,9	-80,0	-32,1	19,8	-51,9
250,48	28,5	20,0	48,5	-80,0	-31,5	19,6	-51,1
254,42	27,0	20,0	47,0	-80,0	-33,0	19,5	-52,5
258,56	27,8	20,0	47,8	-80,0	-32,2	19,4	-51,6
262,76	27,2	20,0	47,2	-80,0	-32,8	19,2	-52,0
267,08	27,5	20,0	47,5	-80,0	-32,5	19,1	-51,6
370,13	17,2	20,0	37,2	-80,0	-42,8	16,2	-58,9
375,77	17,0	20,0	37,0	-80,0	-43,0	16,1	-59,1
381,40	18,2	20,0	38,2	-80,0	-41,8	16,0	-57,8
387,86	19,0	20,0	39,0	-80,0	-41,0	15,8	-56,8
394,20	18,5	20,0	38,5	-80,0	-41,5	15,7	-57,2
400,78	19,0	20,0	39,0	-80,0	-41,0	15,5	-56,5

Additionally one channel (CH4) was re-measured in vertical position of the EuT, because of max. Field strength in this position:

Frequency (kHz)	Level AV (dBμV)	Ant. factor (dB/m)	Field strength AV dB(μV/m)	Distance corr. (dB)	Corrected level AV dB(μV/m)	Limit dB(μV/m)	Delta (dB)
258,56	26,0	20,0	46,0	-80,0	-34,0	19,4	-53,4
387,86	16,4	20,0	36,4	-80,0	-43,6	15,8	-59,4

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

Frequency (MHz)	Field strength of spurious emissions (μV/m)	Field strength of spurious emissions dB(μV/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	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

The requirements are **FULFILLED**.

Remarks: All other unwanted emissions, measured in peak mode, were at least 20dB under the limits

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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

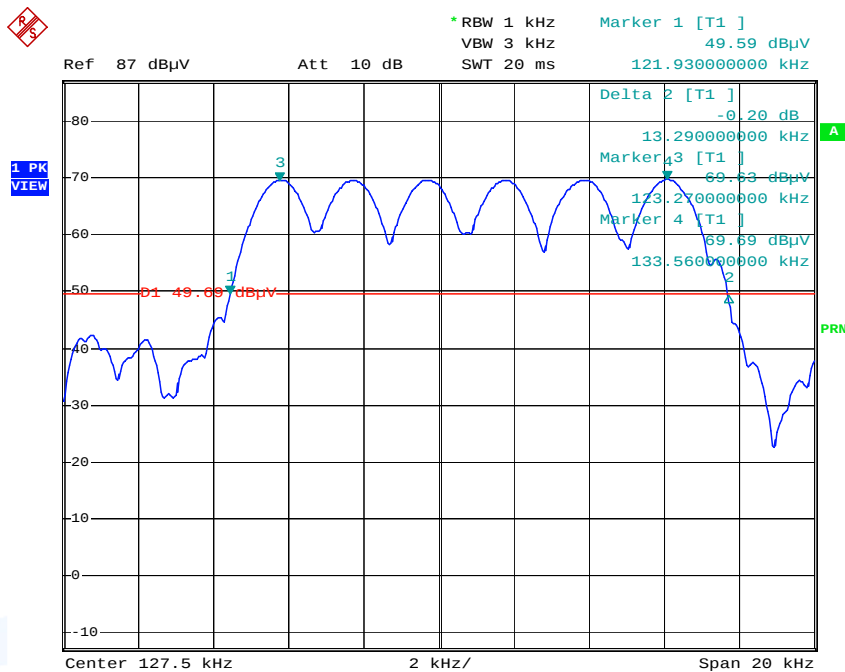


Fundamental (kHz)	20dB Bandwidth f1 (kHz)	20dB Bandwidth f2 (kHz)	Measured bandwidth (kHz)	LIMIT
123 -134	121,93	135,22	13,29	-
129,26	129,004	129,492	0,496	-

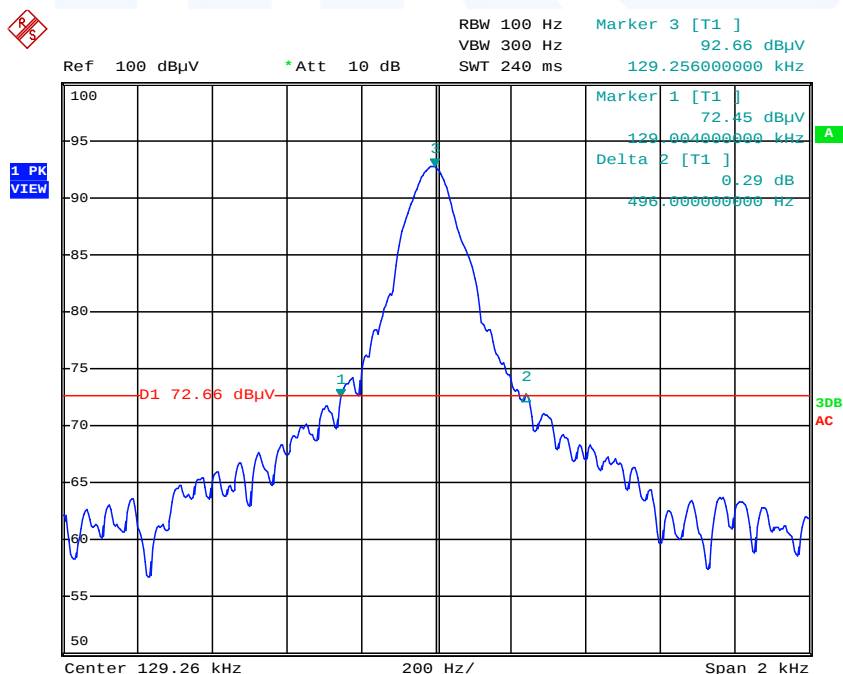
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5.4.3 Test protocol

Emission Bandwidth plot of all 6 channels



Emission Bandwidth plot of one channel – CH4



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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 1	FMZB 1516	Magnetic Field Antenna	Schwarzbeck Mess-Elektron	01-02/24-01-018
	ESCI	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-005
	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
MB	FSP 30	Spectrum Analyser	Rohde & Schwarz München	02-02/11-05-001
	HZ-10	Magnetic Field Antenna	Rohde & Schwarz München	02-02/24-05-012
SER 1	FMZB 1516	Magnetic Field Antenna	Schwarzbeck Mess-Elektron	01-02/24-01-018
	ESCI	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-005
	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 2	ESVS 30	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-006
	VULB 9168	Trilog Broadband Antenn	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

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
CPR1	FMZB 1516 ESCI	01-02/24-01-018	19/11/2011	19/11/2010	16/02/2012	16/02/2011
		02-02/03-05-005				
MB	FSP	02-02/11-05-001	04/05/2011	04/05/2010		
SER1	FMZB 1516 ESCI	01-02/24-01-018	19/11/2011	19/11/2010	16/02/2012	16/02/2011
		02-02/03-05-005				
SER2	ESVS 30 VULB 9168	02-02/03-05-006	11/06/2011	11/06/2010	16/09/2011	16/09/2010
		02-02/24-05-005	06/05/2011	06/05/2009		