EUT: UMRR-P-0911
FCC ID: W34UMRR09

Date of issue: 2009-09-24

DAT-P-225/96

Test Report
acc. to the relevant standard
47 CFR Part 15 B – Unintentional Radiators
Measurement Procedure:
ANSI C63.4-2003
relating to
s.m.s. Smart Microwave Sensors GmbH
UMRR-09
(Version 2)

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

DAT-P-225/96

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Manufacturer's details	
Manufacturer	s.m.s. Smart Microwave Sensors GmbH
Manufacturer's grantee code	**W34**
Manufacturer's address	Mittelweg 7
	38106 Braunschweig
	Phone: +49 (0) 531 390 0
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	Dr. Ing. Ralph Mende, Managing Director
	Email: ralph.mende@smartmicro.de
	s.m.s. Smart Microwave Sensors GmbH
Relevant standard used	47 CFR Part 15 B - Unintentional Radiators
	ANSI C63.4-2003

Test Report prepared by	
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Equipment **U**nder **T**est **(EUT)**	
Equipment category	Field disturbance sensor
Trade name	smartmicro
Type designation	UMRR-09
Serial no.	RF # 36023 DSP # 09.0494 RF # 36024 DSP # 09.0495
Variant(s)	UMRR-P-0911

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1. Test result summary

CFR Section	Report Chapter	Requirements Headline	Test result		
15.109(a)	10.1	Radiated spurious emissions	**Pass**	~~Fail~~	~~N.t.~~
15.107(a)	10.3	Conducted emissions	**Pass**	~~Fail~~	~~N.t.~~

The equipment meets the requirements	**Yes**	~~No~~

Signature (Technical engineer) ---------- Ralf Trepper

Signature (Manager) ---------- Manfried Dudde

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Table of contents

2. Introduction

This test report consists of:

- Test result summary
- Table of contents
- Introduction and further information
- Detailed test information
- List of measurement equipment with calibration validity

All pages have been numbered consecutively and bear the m. dudde hochfrequenz-technik logo, the test report number, the date as well as the type designation of the EUT. The total number of pages in this report is **24**.

The tests were carried out at:

- m. dudde hochfrequenz-technik, D-51429 Bergisch Gladbach

in a representative assembly and in accordance with the specifications stated in:

47 CFR Part 15 C–Intentional Radiators and ANSI C63.4-2003

The sample of the product was received on:

- 2009-08-12

The tests were carried out in the following period of time:

- 2009-09-17 - 2009-09-21

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3. Testing laboratory

Company name	:	m.dudde hochfrequenz-technik
Address	:	Rottland 5a 51429 Bergisch Gladbach
Country	:	Germany
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Fax	:	+49 (0) 2207/9689-20
Email	:	manfred.dudde@t-online.de
Web	:	http://www.dudde.com

The laboratory has been accredited by DATech Deutsche Akkreditierungsstelle Technik GmbH under the DAR-registration number: DAT-P-225/96.

The Laboratory's measurement facility has been registered at the FCC under Registration Number 699717. The registration has been renewed on May 29, 2008. All measurement data will be accepted in conjunction with applications for Certification under Parts 15 and 18 of the Commission's Rules.

4. Applicant

Company name	: s.m.s. Smart Microwave Sensors GmbH
Address	: Mittelweg 7
Postcode	: 38106
City/town	: Braunschweig
Country	: Germany
Telephone	: +49 (0) 531 390 0
Fax	: +49 (0) 531 390 58
Email	: ralph.mende@smartmicro.de
Date of order	: 2008-12-11
References	: Dr. Ing. Ralph Mende (Managing Director)

5. Product and product documentation

Samples of the following apparatus were submitted for testing:

Manufacturer	: s.m.s. Smart Microwave Sensors GmbH
Type of equipment	: Radar Sensor
Trademark	: smartmicro
Type designation	: **UMRR-P-0911**
Hardware version	: UMRR-P-0911
Serial number	: RF Serial #36023 / DSP Serial #09.0494, RF Serial #36024 / DSP Serial #09.0495
Software release	: ---
Power used	: 8.0 to 32.0 V DC
Frequency range	: 24.075 GHz ... 24.175 GHz
Frequency used	: 24.075 GHz ... 24.175 GHz
Generated or used frequencies	: 24.075 GHz ... 24.175 GHz
FCC ID	: **W34UMRR09**

For issuing this report the following product documentation was used:

Description	**Date**	**Identifications**
External photographs of the **E**quipment **U**nder **T**est (EUT)	2009-09-24	Annex no. 1
Internal photographs of the **E**quipment **U**nder **T**est (EUT)	2009-09-24	Annex no. 2
Occupied bandwidth plot	2009-09-21	Annex no. 3
FCC ID label sample	2009-09-24	Annex no. 4
Technical description	2009-09-24	Annex no. 5
Test setup photos	2009-09-18	Annex no. 6
Block diagram	2009-09-24	Annex no. 7
Schematics	2009-09-24	Annex no. 8
Part list	2009-09-24	Annex no. 9
Operational description	2009-09-24	Annex no. 10

The above mentioned documentation will be filed at m. dudde hochfrequenz - technik for a period of 10 years following the issue of this report.

6. Conclusions, observations and comments

The test report will be filed at m. dudde hochfrequenz-technik for a period of 10 years following the issue of this report. It may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of m. dudde hochfrequenz-technik.

The results of the tests as stated in this report are exclusively applicable to the EUT as identified in this report. m.dudde hochfrequenz-technik cannot be held liable for properties of the EUT that have not been observed during these tests.

m.dudde hochfrequenz-technik assumes the sample to comply with the requirements of **47 CFR Part 15 B– Intentional Radiators and ANSI C63.4-2003** for the respective test sector, if the test results turn out positive.

Comments: The UMRR-P-0911 is technical identically to the existing FCC ID: W34UMRR09. They're only differ in their antennae.

Additional equipment for the tests to carry on the EUT:

Sony Vaio	**Heiden Power supply**
Model PCG-8Quem	**Type: 1108-32**
S. No. 28174651 5220103	**S. No. 005504**

Technical inspector:

Date : 2009-09-24

Name : Ralf Trepper

Signature : 

Technical responsibility for area of testing:

Date : 2009-09-24

Name : Manfried Dudde

Signature : 

7. Operation description

7.1 EUT details

Field disturbance sensor, see Functional description in Annex No. 5

7.2 EUT configuration

Operation:	:	As soon as the equipment is powered up, TX start operating
Purpose of operation	:	see User Manual in Annex No. 5

7.3 EUT measurement description

One configuration will be tested as stand alone device. In order to establish the maximum radiation, firstly, there have been viewed all orthogonal adjustments of the test sample. Secondly the test sample have been rotated at all adjustments around the own axis between 0° and 360°, and thirdly, the antenna polarization between horizontal and vertical has been varied. All generated frequencies, the lowest and the highest frequency of the **UMRR-P-0911,** have been viewed. The device was tested on a stand alone basis.

In all measurement distances the 3 dB beam width of the measuring antenna, for measurements above 1 GHz, is greater than the EUT's dimensions.

Conducted emission test (AC Port)

1.) The device was connected to the artificial mains network via Notebook over CAN/USB Interface. It has been tested in two runs: first, with inactive **UMRR-P-0911,** second with activated **UMRR-P-0911** in transmit mode. L1 and N have been viewed too.

2.) The device was connected to the artificial mains network via Notebook over CAN/USB Interface. It has been tested in two runs: first, with inactive **UMRR-P-0911,** second with activated **UMRR-P-0911** in transmit mode. L1 and N have been viewed too.

8.1 Antenna requirement

8.1.1 Regulation

Section 15.203 Antenna requirement

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 Part 15C. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31 (d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

8.1.2 Result

The equipment meets the requirements	**yes**	~~no~~	~~n.a.~~

Further test results are attached	**Yes**	~~No~~	**Annex no. 5**

N.t. * See page no. 23

8.2 Restricted bands of operation

8.2.1 Regulation

Section 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]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	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2] Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e), regardless of the field strength limits specified elsewhere in this Subpart, the provisions of this Section apply to emissions from any intentional radiator.

(d) The following devices are exempt from the requirements of this Section:

(1) Swept frequency field disturbance sensors operating between 1.705 and 37 MHz provided their emissions only sweep through the bands listed in paragraph (a), the sweep is never stopped with the fundamental emission within the bands listed in paragraph (a), and the fundamental emission is outside of the bands listed in paragraph (a) more than 99% of the time the device is actively transmitting, without compensation for duty cycle.

(2) Transmitters used to detect buried electronic markers at 101.4 kHz which are employed by telephone companies.

(3) Cable locating equipment operated pursuant to Section 15.213.

(4) Any equipment operated under the provisions of § 15.253, § 15.255 or § 15.257 of this part.

(5) Biomedical telemetry devices operating under the provisions of Section 15.242 of this part are not subject to the restricted band 608-614 MHz but are subject to compliance within the other restricted bands.

(6) Transmitters operating under the provisions of Subpart D or F of this part.

(7) Devices operated pursuant to § 15.225 are exempt from complying with this section for the 13.36-13.41 MHz band only.

(8) Devices operated in the 24.075-24.175 GHz band under § 15.245 are exempt from complying with the requirements of this section for the 48.15-48.35 GHz and 72.225-72.525 GHz bands only, and shall not exceed the limits specified in § 15.245(b).

(9) Devices operated in the 24.0-24.25 GHz band under § 15.249 are exempt from complying with the requirements of this section for the 48.0-48.5 GHz and 72.0-72.75 GHz bands only, and shall not exceed the limits specified in § 15.249(a).

(e) Harmonic emissions appearing in the restricted bands above 17.7 GHz from field disturbance sensors operating under the provisions of Section 15.245 shall not exceed the limits specified in Section 15.245(b).

8.2.2 Result

The equipment meets the requirements	**Yes**	~~No~~	~~N.t.~~

Further test results are attached	**Yes**	~~No~~	Page no: 18-19

N.t. * See page no. 23

8.3 Radiated emissions

8.3.1 Regulation

Section 15.209 Radiated emission limits, general requirements.

(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

(b) In the emission table above, the tighter limit applies at the band edges.

(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other Sections within this Part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

(e) The provisions in Sections 15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this Part.

(f) In accordance with Section 15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in Section 15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in Section 15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in Section 15.109 that are applicable to the incorporated digital device.

(g) Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.

8.3.2 Test equipment

Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Receiver (9 kHz –18.0 GHz)	Rohde & Schwarz Spectrum Analyzer FSL 18 (171a)	100.117	2008/10	2010/10
Receiver (9 kHz –40.0 GHz)	Anritsu Spectrum Analyzer MS2668C (359a)	6200163244	2009/04	2011/04
Pre-amplifier (100kHz - 1.3GHz)	Hewlett Packard 8447 E (166a)	1726A00705	2008/02	2010/02
Pre-amplifier (1GHz - 18GHz)	Narda --- (345)	---	2008/02	2010/02
Bilog antenna (30- 1000 MHz)	Schwarzbeck VULP 9168 (406)		2007/02	2013/02
Horn antenna (0.86-8.5 GHz)	Schwarzbeck BBHA 9120 A (284)	236	2008/01	2013/01
Horn antenna (2.0-14.5 GHz)	Schwarzbeck BBHA 9120 C (169)	305	2008/01	2013/01
Horn antenna (14.5-40 GHz)	Schwarzbeck BBHA 9170 (281)	41	2000/01	2010/01
RF- cable	Kabelmetal 18m [N]	K1	2009/01	2010/01
RF- cable	Aircell 0.5m [BNC]	K40	2009/01	2010/01
RF- cable	Aircell 1m [BNC/N]	K56	2009/01	2010/01
RF- cable	Sucoflex 106 Suhner 6,4m [N]	K74	2009/01	2010/01
RF- cable	Sucoflex 106 Suhner 6,4m [N]	K75	2009/01	2010/01

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Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Horn antenna (15-40 GHz)	Schwarzbeck BBHA 9170 (281)	41	2000/01	2010/01
Gain Horn antenna (33-50 GHz)	Dorado GH-22-25 (383)	040810	2005/04	2015/04
Gain Horn antenna (50-75 GHz)	Dorado GH-15-25 (384)	031003	2005/04	2015/04
Gain Horn antenna (75-110 GHz)	Dorado GH-10-25 (385)	040808	2005/04	2015/04
Anritsu Mixer WR22 Q-Band (33-50 GHz)	OM Labs MA2742A (269a)	Q40512-1	2008/04	2010/04
Anritsu Mixer WR15 V-Band (50-75 GHz)	OM Labs MA2744A (295a)	V41027-1	2008/04	2010/04
Anritsu Mixer WR10 W-Band (75-110 GHz)	OM Labs MA2746A (296a)	W40706-2	2008/04	2010/04
Horn antenna (15-40 GHz)	Schwarzbeck BBHA 9170 (281)	41	2000/01	2010/01
RF- cable	Sucoflex 100 Suhner 2,0m [APC 3.5]	K17a	2008/01	2010/01
RF- cable	Sucoflex 100 Suhner 2,0m [APC 3.5]	K18a	2008/01	2010/01
RF- cable	QMI 0.6m [APC 3.5]	K65	2008/01	2010/01
RF- cable	QMI 0.6m [APC 3.5]	K66	2008/01	2010/01

8.3.3 Test procedure

The EUT and this peripheral (when additional equipment exists) are placed on a turn table which is 0.8 m above the ground. The turn table would be allowed to rotate 360 degrees to determine the position of the maximum emission level. The test distance between the EUT and the receiving antenna are 3m. To find the maximum emission, the polarization of the receiving antenna is changed in horizontal and vertical polarization; the position of the EUT was changed in different orthogonal determinations.

ANSI C63.4: 2003 Section 8 “Radiated Emissions Testing”

Measurement procedures for electric field radiated emissions above 1 GHz are covered in Clause 8 of ANSI C63.4-2003. The C63.4-2003 measurement procedure consists of both an exploratory test and a final measurement. The exploratory test is critical to determine the frequency of all significant emissions. For each mode of operation required to be tested, the frequency spectrum is monitored. Variations in antenna height, antenna orientation, antenna polarization, EUT azimuth, and cable or wire placement is explored to produce the emission that has the highest amplitude relative to the limit.

The final measurements are made based on the findings in the exploratory testing. When making exploratory and final measurements it is necessary to maximize the measured radiated emission. Subclause 8.3.1.2 of C63.4-2003 states that the measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” We consider the “cone of radiation” to be the 3 dB beam width of the measurement antenna.

While the “bore-sighting” technique is not explicitly mentioned in C63.4-2003, it is a useful technique for measurements using a directional antenna, such as a double-ridged waveguide antenna. Several precautions must be observed, including: knowledge of the beam width of the antenna and the resulting illumination area relative to the size of the EUT, estimation for source of the emission and general location within larger EUTS, measuring system sensitivity, etc.

C63.4-2003 requires that the measurement antenna is kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. That means that if the directional radiation pattern of the EUT results in a maximum emission at an upwards angle from the EUT, when a directional antenna is used to make the measurement it will be necessary for it to be pointed towards the source of the emission within the EUT. This can be done by either pointing the antenna at an angle towards the source of the emission, or by rotating the EUT, in both height and polarization, to maximize the measured emission. The emission must be kept within the illumination area of the 3 dB beamwidth of the antenna so that the maximum emission from the EUT is measured.

Radiated emissions test characteristics	
Frequency range	30 MHz - 4,000 MHz
Test distance	3 m*
Test instrumentation resolution bandwidth	120 kHz (30 MHz - 1,000 MHz)
	1 MHz (1000 MHz - 4,000 MHz)
Receive antenna scan height	1 m - 4 m
Receive antenna polarization	Vertical/horizontal

* According to Section 15.31 (f) (1): At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

8.3.4 Calculation of the field strength

The field strength is calculated by the following calculation:

Corrected Level = Receiver Level + Correction Factor (without the use of a pre-amplifier)

Corrected Level = Receiver Level + Correction Factor – Pre-amplifier (with the use of a pre-amplifier)

Receiver Level : Receiver reading without correction factors
Correction Factor : Antenna factor + cable loss

For example:

The receiver reading is 32.7 dBµV. The antenna factor for the measured frequency is +2.5 dB (1/m) and the cable factor for the measured frequency is 0.71 dB, giving a field strength of 35.91dBµV/m.
The 35.91dBµV/m value can be mathematically converted to its corresponding level in µV/m.

Level in µV/m = Common Antilogarithm (35.91/20) = 39.8

For test distance other than what is specified, but fulfilling the requirements of Section 15.31 (f) (1) the field strength is calculated by adding additionally an extrapolation factor of 20 dB/decade (inverse linear distance for field strength measurements).

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8.3.5 Test result

For all emission other than harmonic spurious emissions

TRANSMITTER SPURIOUS RADIATION BELOW 30 MHz (Section 15.205, 15.209)									
f (MHz)	Bandwidth (kHz) Type of detector	Noted receiver level **dBµV**	Test distance **m**	Correction factor **dB**	Distance extrapol. factor **dB**	Level corrected **dBµV/m**	Limit **dBµV/m**	Margin **dBµV/m**	Polarisation EUT / antenna orientation
0.1200	PK/0.2kHz	< 4.0	10	20.2	-59.1	-34.90	Pk46.0- @ 300	80.90	V, H/0-360°
	AV/0.2kHz	< 4.0	10	20.2	-59.1	-34.90	AV26.0 @ 300	80.90	V, H/0-360°
0.5000	AV/0.2kHz	< 4.0	10	20.2	-19.1	5.10	AV33.6 @ 30	28.5	V, H/0-360°
1.5000	AV/0.2kHz	< 4.0	10	20.2	-19.1	5.10	AV24.1 @ 30	19.00	V, H/0-360°
3.0000	AV/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°
5.0000	AV/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°
8.0000	AV/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°
10.0000	AV/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°
20.0000	AV/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°
30.0000	AV/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°
All emissions lover than the noise level of the measuring instruments!									
Measurement uncertainty		4 dB							

Remark: *[1] Noise level of the measuring instrument ≤ 4.0dBµV @ 10m distance (0.009 MHz –30 MHz)
Remark: * Peak Limit according to Section 15.35 (b).

The equipment meets the requirements	**Yes**	~~No~~	~~N.t.~~

Further test results are attached	~~Yes~~	**No**	Page no.

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8.3.6 Result

For all emission other than harmonic spurious emissions

TRANSMITTER SPURIOUS RADIATION ABOVE 30 MHz (Section 15.205, 15.209)

f (MHz)	Bandwidth (kHz) Type of detector	Noted receiver level **dBµV**	Test distance **m**	Correction factor **dB**	Distance extrapol. factor **dB**	AV Correction factor **dB**	Level corrected **dBµV/m**	Limit **dBµV/m**	Margin **dBµV/m**	Polaris. EUT / antenna	Antenna height **cm**
30.0000	100, AV	≤ 3.5	3	-2.60	0	0	0.90	40.00	39.10	H,V/H,V	100-400
88.0000	100, AV	≤ 3.5	3	-10.80	0	0	-7.30	40.00	47.30	H,V/H,V	100-400
216.0000	100, AV	≤ 3.5	3	-10.30	0	0	-6.80	43.50	50.30	H,V/H,V	100-400
960.0000	100, AV	≤ 3.5	3	8.50	0	0	12.00	43.50	31.50	H,V/H,V	100-400
1700.0000	1000, AV	≤ 4.5	3	3.80	0	0	8.30	54.00	45.70	H,V/H,V	100-400
2250.0000	1000, AV	≤ 10	3	8.00	0	0	18.00	54.00	36.00	H,V/H,V	100-400
4000.0000	1000, AV	≤ 10	3	8.40*[6]	0	0	18.40	54.00	35.60	H,V/H,V	100-400
5000.0000	1000, AV	≤ 10	3	9.10*[6]	0	0	19.40	54.00	34.60	H,V/H,V	100-400
7500.0000	1000, AV	≤ 14	3	12.9*[6]0	0	0	26.90	54.00	27.10	H,V/H,V	100-400
8300.0000	1000, AV	≤ 14	3	14.80*[6]	0	0	28.80	54.00	25.20	H,V/H,V	100-400
9400.0000	1000, AV	≤ 14	3	16.00*[6]	0	0	30.00	54.00	24.00	H,V/H,V	100-400
11000.0000	1000, AV	≤ 14	3	18.25*[6]	0	0	32.25	54.00	21.75	H,V/H,V	100-400
22500.0000	300, AV	< 28.0	1	16.2*[7]	-9.5	0	34.7	54.00	19.3	H,V/H,V	100-400
28000.0000	300, AV	< 28.0	1	19.0*[7]	-9.5	0	37.5	54.00	16.5	H,V / H	100-200
No emissions detected											
Measurement uncertainty	4 dB										

Bandwidth = the measuring receiver bandwidth

Remark: *[1] noise floor noise level of the measuring instrument ≤ 4.0dBµV @ 10m distance (0.009 – 30 MHz)
Remark: *[2] noise floor noise level of the measuring instrument ≤ 6.5dBµV @ 3m distance (30 – 1,000 MHz)
Remark: *[3] noise floor noise level of the measuring instrument ≤ 10 dBµV @ 3m distance (1,000 – 2,000 MHz)
Remark: *[4] noise floor noise level of the measuring instrument ≤ 17 dBµV @ 3m distance (2,000 – 5,500 MHz)
Remark: *[5] for using a pre-amplifier in the range between 100 kHz and 1,000 MHz
Remark: *[6] for using a pre-amplifier in the range between 1.0 GHz and 18.0 GHz
Remark: *[7] for using a pre-amplifier in the range between 18.0 GHz and 29.0 GHz

The equipment meets the requirements	**Yes**	~~No~~	~~N.t.~~

Further test results are attached	~~Yes~~	**No**	Page no:

N.t. * See page no. 23

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8.2 Conducted emissions

8.2.1 Regulation

Section 15.107 (a) For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50µH/50ohms line stabilization network (LISN). Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals. The lower limit applies at the band edges.

Section 15.107 (d) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which-do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or connected to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

8.2.2 Test equipment

Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration	Remarks
Receiver (9 kHz - 30MHz)	**Schwarzbeck FMLK 1518 (428)**	**1518-294**	**06 / 2009**	**06 / 2011**	---
Protector limiter 9 kHz - 30MHz, 10 dB	**Rhode & Schwarz ESH 3Z2 (272)**	**357,881052**	**03 / 2008**	**03 / 2010**	---
V-LISN 50 ohms//(50 uH+5 ohms)	**RFT NNB 11 (72)**	**13835240**	**03 / 2007**	**03 / 2010**	---
V-LISN 50 ohms//(50 uH+5 ohms)	**emco 3810/2 LISN (49b)**	---	**03 / 2007**	**03 / 2010**	---

8.2.3 Test procedures

The EUT and the additional equipment (if required) are connected to the main power through a line impedance stabilization network (LISN). The LISN must be appropriate to ANSI C63.4: 1992 Section 7.
Additional equipment must also be connected to a second LISN with the same specifications described in the above sentence (if required).

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8.2.4 Test results

Tested with AC DC power supply (DC 24.0 V)

TRANSMITTER CONDUCTED EMISSIONS (Section 15.207)						
Tested line	Emission frequency [MHz]	Receiver bandwidth [kHz]	Result Quasi-peak [dBµV]	Spec. limit average [dBµV]	Margin [dB]	Remarks
L1	0.160	10	≤-2	55.8	57.8	*[1]
N	0.160	10	≤-2	55.8	57.8	*[1]
L1	0.304	10	≤-2	51.7	53.7	*[1]
N	0.304	10	≤-2	51.7	53.7	*[1]
L1	0.475	10	≤-2	47	49	*[1]
N	0.475	10	≤-2	47	49	*[1]
L1	0.600	10	≤-2	46	48	*[1]
N	0.600	10	≤-2	46	48	*[1]
L1	0.725	10	≤-2	46	48	*[1]
N	0.725	10	≤-2	46	48	*[1]
L1	0.850	10	≤-2	46	48	*[1]
N	0.850	10	≤-2	46	48	*[1]
L1	1.000	10	≤-2	46	48	*[1]
N	1.000	10	≤-2	46	48	*[1]
L1	1.125	10	≤-2	46	48	*[1]
N	1.125	10	≤-2	46	48	*[1]
L1	2.000	10	≤-2	46	48	*[1]
N	2.000	10	≤-2	46	48	*[1]
L1	4.000	10	≤-2	46	48	*[1]
N	4.000	10	≤-2	46	48	*[1]
L1	6.7644	10	≤-2	50	52	*[1]
N	6.7644	10	≤-2	50	52	*[1]
L1	13.5288	10	≤-2	50	52	*[1]
N	13.5288	10	≤-2	50	52	*[1]
L1	20.2931	10	≤-2	50	52	*[1]
N	20.2931	10	≤-2	50	52	*[1]
L1	27.0575	10	≤-2	50	52	*[1]
N	27.0575	10	≤-2	50	52	*[1]

Remark: *[1] Noise level of the measuring instrument ≤ -2 dBµV (0.150 – 30MHz)

The equipment meets the requirements	**Yes**	~~No~~	~~N.t.~~

Further test results are attached	~~yes~~	**no**	page no:

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Tested with Sony Notebook over CAN/USB Interface

TRANSMITTER CONDUCTED EMISSIONS (Section 15.207)						
Tested line	Emission frequency [MHz]	Receiver bandwidth [kHz]	Result Quasi-peak [dBµV]	Spec. limit average [dBµV]	Margin [dB]	Remarks
L1	**0.187**	**10**	**44.5**	**53.2**	**8.7**	***[2]**
N	**0.187**	**10**	**44.0**	**53.2**	**9.2**	***[2]**
L1	0.350	10	≤-2	51.7	53.7	*[1]
N	0.350	10	≤-2	51.7	53.7	*[1]
L1	0.475	10	≤-2	47	49	*[1]
N	0.475	10	≤-2	47	49	*[1]
L1	**0.561**	**10**	**33.5**	**46**	**12.5**	***[2]**
N	**0.561**	**10**	**35.0**	**46**	**11.0**	***[2]**
L1	0.725	10	≤-2	46	48	*[1]
N	0.725	10	≤-2	46	48	*[1]
L1	0.850	10	≤-2	46	48	*[1]
N	0.850	10	≤-2	46	48	*[1]
L1	**1.001**	**10**	**30.5**	**46**	**15.5**	***[2]**
N	**1.001**	**10**	**30.5**	**46**	**15.5**	***[2]**
L1	1.125	10	≤-2	46	48	*[1]
N	1.125	10	≤-2	46	48	*[1]
L1	**1.751**	**10**	**30.0**	**46**	**16.0**	***[2]**
N	**1.751**	**10**	**31.0**	**46**	**15.0**	***[2]**
L1	4.000	10	≤-2	46	48	*[1]
N	4.000	10	≤-2	46	48	*[1]
L1	6.7644	10	≤-2	50	52	*[1]
N	6.7644	10	≤-2	50	52	*[1]
L1	13.5288	10	≤-2	50	52	*[1]
N	13.5288	10	≤-2	50	52	*[1]
L1	24.0041	10	≤-2	50	52	*[1]
N	24.0041	10	≤-2	50	52	*[1]
L1	27.0575	10	≤-2	50	52	*[1]
N	27.0575	10	≤-2	50	52	*[1]

Remark: *[1] Noise level of the measuring instrument ≤ -2 dBµV (0.150 – 30MHz)

No different result between inactive and active UMRR-P-0911!

The equipment meets the requirements	**Yes**	~~No~~	~~N.t.~~

Further test results are attached	~~yes~~	**no**	page no:

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9. Additional information to the test report

Remarks

N.t.[1] Not tested, because the antenna is part of the PCB

N.t.[2] Not tested, because the EUT is directly battery powered

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End of test report

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