EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

DAT-P-225/96

Test Report
acc. to the relevant standard
47 CFR Part 15 C – Intentional Radiators
Measurement Procedure:
ANSI C63.4-2003
relating to
Siemens VDO Automotive AG
SV2008BSD
24 GHz Blind-Spot Radar Sensor

A2C53319249 (Volvo truck)
5WK43983 (Mazda J61J Right Sensor)
5WK43984 (Mazda J61J Left Sensor)
5WK43983a (MAZDA J50 Right Sensor
5WK43984a (MAZDA J50 Left Sensor)

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

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

Manufacturer's details	
Manufacturer	**Siemens VDO Automotive AG**
Manufacturer's grantee code	**KR5**
Manufacturer's address	**Siemens VDO Automotive AG**
	Siemensstrasse 12
	D-93005 Regensburg
	Germany
	Phone: +49 0941 790 6699
	Fax: +49 0941 790 136699
	E-mail: dagmar.kolar@siemens.com
Relevant standard used	47 CFR Part 15C - Intentional Radiators
	ANSI C63.4-2003

Test report prepared by	
Technical engineer	Ralf Trepper
	m.dudde hochfrequenz-technik (laboratory)
	Rottland 5a
	51429 Bergisch Gladbach
	Germany
	Phone: +49 (0) 2207 96 89-0
	Fax: +49 (0) 2207 96 89-20
	E-mail: m.duddelabor@dudde.com

Equipment **U**nder **T**est **(EUT)**	
Equipment category	24 GHz Wideband Vehicular Radar System
Trade name	Siemens VDO
Type designation	**SV2008-BSD**
Serial no.	00000045 / 00000076
Variants*	**A2C53319249 (Volvo truck)**
	5WK43983 (Mazda J61J Right Sensor)
	5WK43984 (Mazda J61J Left Sensor)
	5WK43983a (MAZDA J50 Right Sensor)
	5WK43984a (MAZDA J50 Left Sensor)

* The stated variants are all constructed equally to type SV2008-BSD. They only differ in their type designation which is due to the varying customers.

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

1. Test result summary

CFR Section	Report Chapter	Requirements Headline	Test result		
15.203	12.1	Antenna requirement	Pass	~~Fail~~	~~N.t.~~
15.205	12.2	Restricted bands of operation	Pass	~~Fail~~	~~N.t.~~
15.209	12.3	Radiated emission limits, general requirements	Pass	~~Fail~~	~~N.t.~~
15.252(a)(1)(2)(3)	12.4	Occupied bandwidth (-10 dB)	Pass	~~Fail~~	~~N.t.~~
15.252(b)(2)	12.5	Radiated output power and spurious emissions above 960 MHz	Pass	~~Fail~~	~~N.t.~~
15.252(b)(3)	12.6	Special requirements	Pass	~~Fail~~	~~N.t.~~
15.252(b)(4)	12.7	Peak level limit	Pass	~~Fail~~	~~N.t.~~
15.252(b)(5)	12.8	Spurious emissions below 960 MHz	Pass	~~Fail~~	~~N.t.~~

The equipment meets the requirements	Yes	~~No~~

Signature Technician — Ralf Trepper

Signature Manager — Manfried Dudde

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

EUT: 24 GHz Blind-Spot Radar Sensor **Date of issue: 2008-04-14**
FCC ID: KR5SV2008BSD

Table of contents

* The stated variants are all constructed equally to type SV2008-BSD. They only differ in their type designation which is due to the varying customers ... 2
1. Test result summary ... 3
2. Test laboratory ... 6
3. Introduction ... 6
4. Product ... 7
5. Test schedule ... 7
6. Product and measurement documentation ... 8
7. Observations and comments ... 8
8. Summary ... 8
9. Conclusions ... 9
10. Operational description ... 10
11.1 Test set-up for the measurement ... 11
11.1.1 Test set up: below 30 MHz ... 11
11.1.2 Test set up: 25 MHz up to 1000 MHz ... 11
11.1.3 Test set up: 1 GHz up to 14 GHz ... 12
11.1.4 Test set up: 14 GHz up to 34 GHz ... 12
11.1.5 Test set up: 34 GHz up to 110 GHz ... 13
11.2 Calculations for the Correction factors (System attenuation) ... 13
11.2.1 Calculations for frequencies from 960 MHz up to 34 GHz ... 13
11.2.1 Calculations for frequencies from 34 GHz up to 110 GHz ... 13
12.1 Antenna requirement ... 14
12.1.1 Regulation ... 14
12.1.2 Result ... 14
12.2 Restricted bands of operation ... 15
12.2.1 Regulation ... 15
12.2.2 Result ... 17
12.3 Radiated emission limits, general requirements ... 18
12.3.1 Regulation ... 18
12.3.2 Test equipment ... 19
12.3.3 Test procedure ... 20
12.3.4 Calculation of the field strength ... 21
12.3.5 Test result ... 22
12.4 Occupied Bandwidth (-10 dB) ... 25
12.4.1 Regulation ... 25
12.4.2 Test equipment ... 25
12.4.3 Test procedure ... 26
12.4.4 Test result ... 26
12.5 Radiated output power and spurious emissions above 960 MHz ... 28
12.5.1 Regulation ... 28

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

12.5.2 Test equipment 29
12.5.3 Result 30
12.6 Special requirements 34
12.6.1 Regulation 34
12.6.2 Test equipment 34
12.6.3 Result 35
12.7 Peak level limit 37
12.7.1 Regulation 37
12.7.2 Test equipment 37
12.7.3 Result 38
12.8 Radiated emissions below 960 MHz 39
12.8.1 Regulation 39
12.8.2 Test equipment 39
12.8.3 Result 39
13. Additional information to the test report 40

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

2. Test laboratory

Company name	: m.dudde hochfrequenz-technik
Street	: Rottland 5a
City	: 51429 Bergisch Gladbach
Country	: Germany
Laboratory	: FCC Registration Number: 699717 This site has been fully described in a report submitted to the FCC, and renewed with letter dated July 12, 2005, Registration Number 699717.
Phone	: +49-2207-9689-0
Fax	: +49-2207-9689-20
E-Mail	: manfred.dudde@t-online.de
Web	: http://www.dudde.com

3. Introduction

The test report 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.

This report contains the result of tests performed by m. dudde hochfrequenz - technik for the purpose of a type approval. The order for carrying out these tests has been placed by:

Manufacturer

Company name	: Siemens VDO Automotive AG
Address	: Siemensstrasse 12
Postcode	: D-93055
City/town	: Regensburg
Country	: Germany
Telephone	: +49 941 790 6699
Telefax	: +49 941 790 136699
E-mail	: dagmar.kolar@siemens.com
Date of order	: 2007-12-21
References	: Mrs. Kolar

4. Product

Samples of the following apparatus were submitted for testing:

Type of equipment	: 24 GHz Wideband Vehicular Radar System
Trademark	: Siemens VDO
Type designation	: **SV2008-BSD**
Hardware version	: **SV2008-BSD**
Serial number	: 00000076
Software release	: ---
Power used	: 12.0 VDC
Frequency used	: 24.670 GHz
Generated or used frequencies	: 8.00 MHz (Ceramic oscillator) / 80 MHz (PLL oscillator) 22.25 MHz (DRO) / 2-3 GHz (VCO)
ITU emission class	: 637MF0N
FCC ID	**: KR5SV2008BSD**

5. Test schedule

The tests were carried out in accordance with the specifications detailed in chapter 7 “Summary“ of this report at:

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

The test sample was received on:

- 2007-12-21

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

- 2008-02-25 - 2008-02-27

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

6. Product and measurement documentation

For issuing this report the following product documentation was used and the following annexes were created:

Description	Date	Identifications
External photographs of the **E**quipment **U**nder **T**est	2008-02-28	Annex no. 1
Internal photographs of the **E**quipment **U**nder **T**est	2008-02-28	Annex no. 2
Occupied bandwidth plot	2008-02-27	Annex no. 3
FCC ID label sample	2008-03-17	Annex no. 4
Functional description / User Manual	2008-03-17	Annex no. 5
Test setup photos	2008-02-27	Annex no. 6
Block diagram	2008-03-17	Annex no. 7
Schematics	2008-03-17	Annex no. 8a
Parts list	2008-03-17	Annex no. 8b
Layouts	2008-03-17	Annex no. 8c
Operational description	2008-03-17	Annex no. 9

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

7. Observations and comments

8. Summary

The product is intended for the use in the following areas of application:

Radio-Noise Emissions from Low- Voltage Electrical and Electronic Equipment in the frequency range of 9 kHz to 40 GHz

The samples were tested according to the following specification:

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

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

9. Conclusions

Samples of the apparatus were found to **CONFORM WITH** the specifications stated in chapter 7 "Summary" of this report.

In the opinion of m. dudde hochfrequenz - technik, the samples satisfied all applicable requirements relating to the network interface types specified in chapter 7 "Summary".

The results of the type tests as stated in this report are exclusively applicable to the product item as identified in this report. m. dudde hochfrequenz - technik does not accept any responsibility for the results stated in this report, with respect to the properties of product items not involved in these tests.

This report consists of a main module, modules with test results and annexes listed in chapter 5: "Product documentation". All pages have been numbered consecutively and bear the m. dudde hochfrequenz - technik logo, the report number and sub-numbers.
The total number of pages in this report is **41.**

Technical inspector:

Date : 2008-04-10

Name : Ralf Trepper

Signature : 

Technical responsibility for area of testing:

Date : 2008-04-10

Name : Manfried Dudde

Signature : 

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

10. Operational description

10.1 EUT details

See Annex no. 5 (Functional description)

10.2 EUT configuration

As soon as the equipment is powered up, the sensor starts transmitting. The BROAD BEAM (wide beam) and the TILT BEAM (small beam) antenna are activated alternately with a repetition frequency of 1 MHz and a pulse width of 25 ns. Only one antenna is transmitting at the same time.

10.3 EUT measurement description

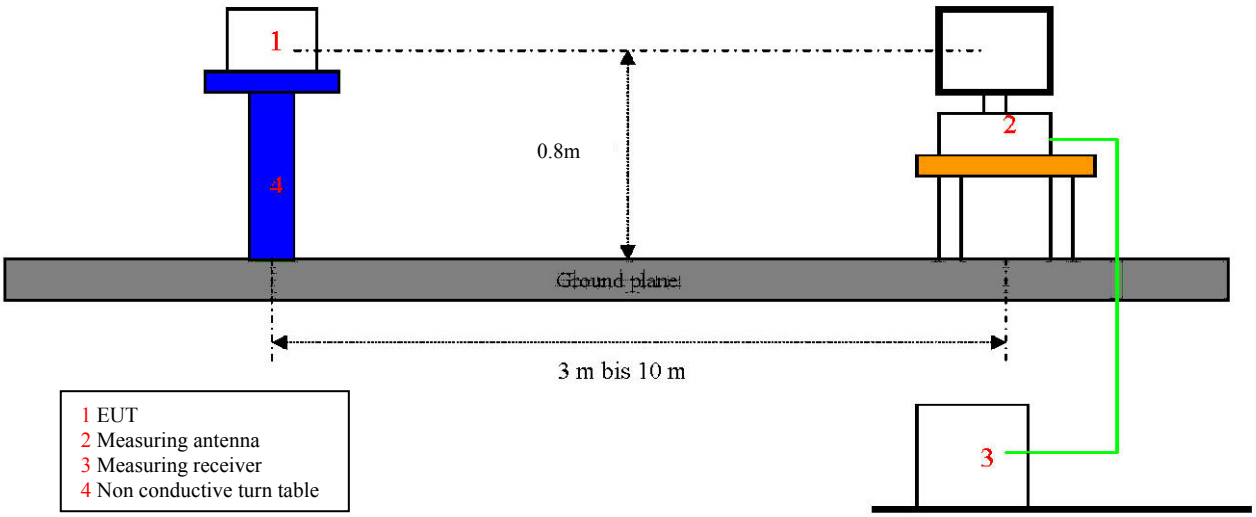
The EUT was tested in a typical fashion. During primary emission tests there had been examined all orthogonal adjustments of the EUT. In the final measurement there was chosen the adjustment in which there had been established before the highest level.

As soon as the EUT connected to the power supply it starts, after a short delay, to operate in continuous mode. The maximum radiation will be achieved, if the EUT is adjusted as described by the manufacturer in the manual. The inclination of the test sample will be brought into a prescribed angle to the aerial antenna.

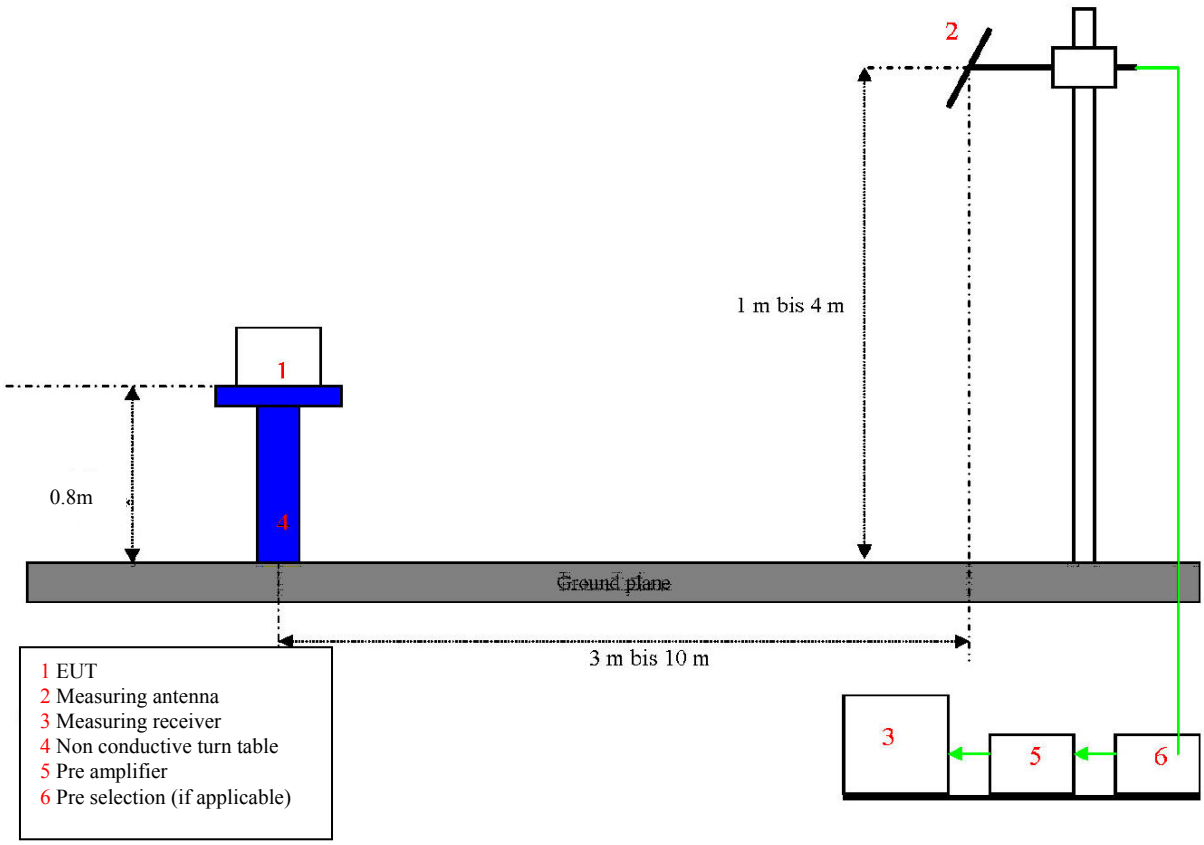
m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

11.1 Test set-up for the measurement

11.1.1 Test set up: below 30 MHz

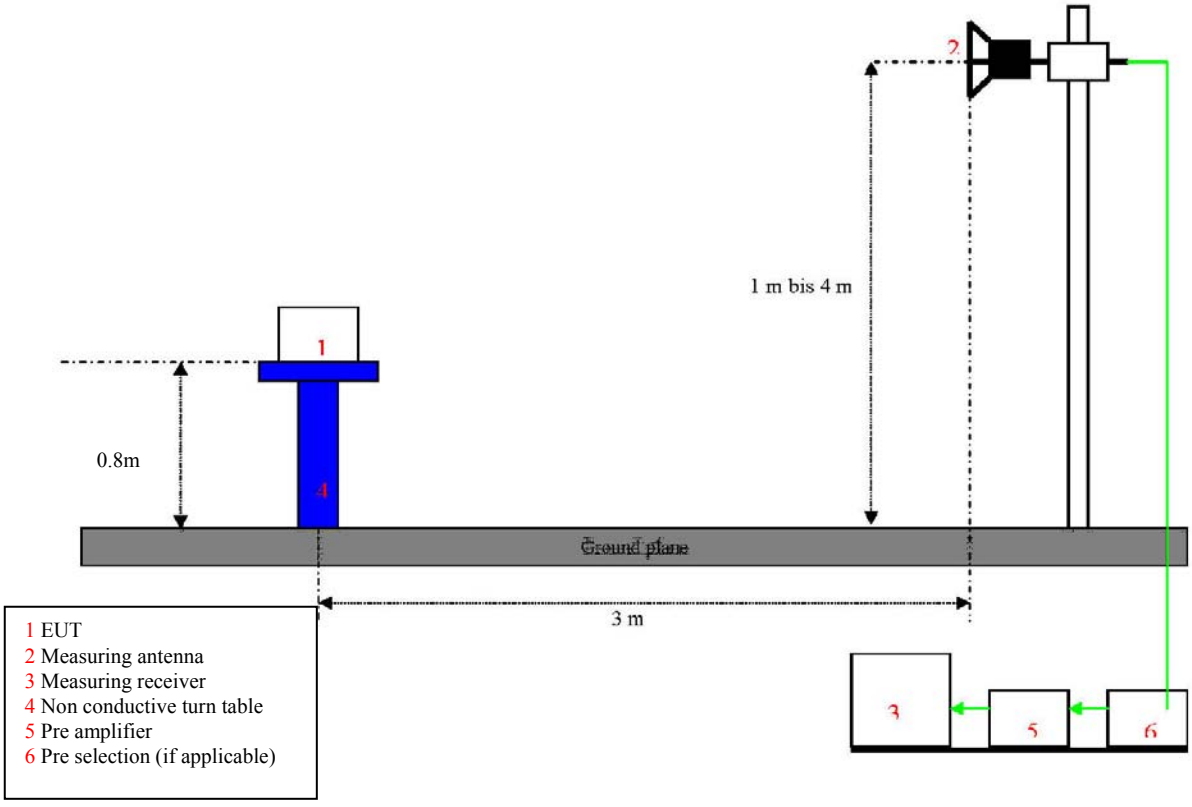


11.1.2 Test set up: 25 MHz up to 1000 MHz

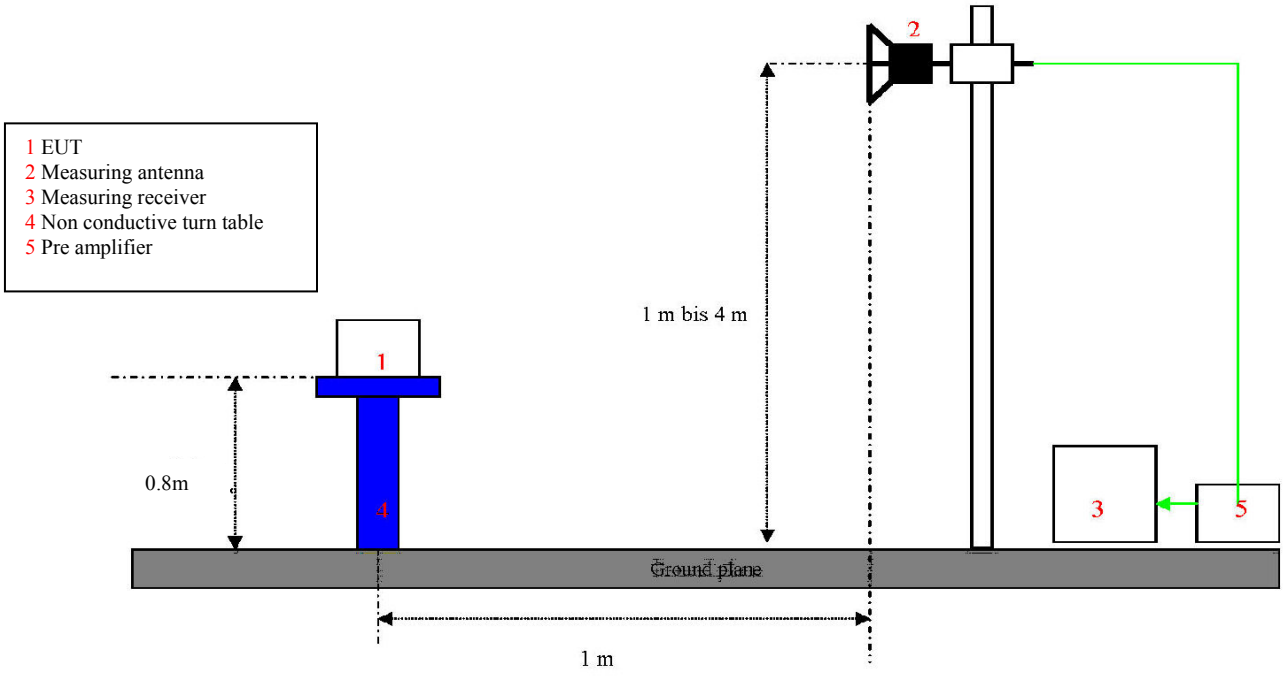


m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

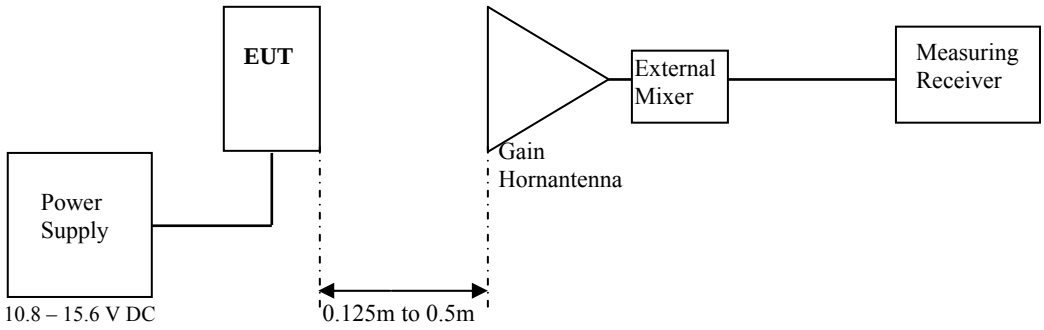
11.1.3 Test set up: 1 GHz up to 14 GHz



11.1.4 Test set up: 14 GHz up to 34 GHz



11.1.5 Test set up: 34 GHz up to 110 GHz



11.2 Calculations for the Correction factors (System attenuation)

11.2.1 Calculations for frequencies from 960 MHz up to 34 GHz

System attenuation = free space attenuation + cable loss - antenna gain – gain pre amplifier

11.2.1 Calculations for frequencies from 34 GHz up to 110 GHz

System attenuation = free space attenuation - antenna gain

12.1 Antenna requirement

12.1.1 Regulation

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 so that a broken antenna can be replaced by the user, 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.

12.1.2 Result

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

n.a.* See page no. 39

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

12.2 Restricted bands of operation

12.2.1 Regulation

(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).

(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 83 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).

12.2.2 Result

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

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

12.3 Radiated emission limits, general requirements

12.3.1 Regulation

(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

(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 §§ 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. lf 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.

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

12.3.2 Test equipment

Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Receiver (9 kHz –26.5 GHz)	Hewlett Packard Spectrum Analyzer 8593E (171)	3528U00990	2007/08	2009/08
Receiver (9 kHz –40.0 GHz) (40.0 GHz -110 GHz)	Anritsu Spectrum Analyzer MS2668 (359a)	6200163244	2008/04	2010/04
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
Pre-amplifier (24GHz)	Dudde --- (433)	---	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 (15-40 GHz)	Schwarzbeck BBHA 9170 (281)	41	2000/01	2010/01
Horn antenna (24 GHz)	MBMT K-235 (431)	---	2008/01	2013/01
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	2004/04	2009/04
Anritsu Mixer WR15 V-Band (50-75 GHz)	OM Labs MA2744A (295a)	V41027-1	2004/04	2009/04
Anritsu Mixer WR10 W-Band (75-110 GHz)	OM Labs MA2746A (296a)	W40706-2	2004/04	2009/04
RF- cable	Kabelmetal 18m [N]	K1	2008/01	2009/01
RF- cable	Sucoflex Suhner 2,13m [APC 3.5]	K17a	2008/01	2009/01
RF- cable	Sucoflex Suhner 2,13m [APC 3.5]	K18a	2008/01	2009/01
RF- cable	Aircell 0.5m [BNC]	K40	2008/01	2009/01
RF- cable	Aircell 1m [BNC/N]	K56	2008/01	2009/01
RF- cable	QMI 0.6m [APC 3.5]	K65	2008/01	2009/01
RF- cable	QMI 0.6m [APC 3.5]	K66	2008/01	2009/01
RF- cable	Sucoflex 106 Suhner 6,4m [N]	K74	2008/01	2009/01
RF- cable	Sucoflex 106 Suhner 6,4m [N]	K75	2008/01	2009/01

12.3.3 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 beamwidth 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 beamwidth 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.

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

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 - 40,000 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).

12.3.4 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).

EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

12.3.5 Test result

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°
No emissions detected									
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.**~~

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

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	-2.6*[6]	0	0	0.90	40.00	39.10	H,V/H,V	100-400
88.0000	100, AV	≤ 3.5	3	-10.8*[6]	0	0	-7.30	40.00	47.30	H,V/H,V	100-400
216.0000	100, AV	≤ 3.5	3	-10.3*[6]	0	0	-6.80	43.50	50.30	H,V/H,V	100-400
960.0000	100, AV	≤ 3.5	3	8.5*[6]	0	0	12.00	43.50	31.50	H,V/H,V	100-400
1,700.0000	1000, AV	≤ 4.5	3	3.8*[6]	0	0	8.30	54.00	45.70	H,V/H,V	100-400
2,250.0000	1000, AV	≤ 10	3	8.0*[6]	0	0	18.00	54.00	36.00	H,V/H,V	100-400
4,000.0000	1000, AV	≤ 10	3	8.4*[7]	0	0	18.40	54.00	35.60	H,V/H,V	100-400
5,000.0000	1000, AV	≤ 10	3	9.1*[7]	0	0	19.40	54.00	34.60	H,V/H,V	100-400
7,500.0000	1000, AV	≤ 14	3	12.9*[7]	0	0	26.90	54.00	27.10	H,V/H,V	100-400
8,300.0000	1000, AV	≤ 14	3	14.8*[7]	0	0	28.80	54.00	25.20	H,V/H,V	100-400
9,400.0000	1000, AV	≤ 14	3	16.0*[7]	0	0	30.00	54.00	24.00	H,V/H,V	100-400
11,000.0000	1000, AV	≤ 14	3	18.3*[7]	0	0	32.3	54.00	21.7	H,V/H,V	100-400
13,250 - 13,400	1000, AV	≤ 14	3	18.9*[7]	0	0	32.9	54.00	21.1	H,V/H,V	100-400
Measurement uncertainty			4 dB								

Bandwidth = the measuring receiver bandwidth

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

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**
14,470 - 14,500	1000, AV	≤ 14	3	24.7*[7]	0	0	38.7	54.00	15.3	H,V/H,V	100-400
15,350 - 16,200	1000, AV	≤ 14	3	34.4*[7]	0	0	48.4	54.00	5.6	H,V/H,V	100-400
17,700 - 21,400	1000, AV	≤ 25	1	18.6*[8]	-9.5	0	29.0	54.00	25.0	H,V/H,V	100-200
22,010 - 23,120	1000, AV	≤ 25	1	18.3*[8]	-9.5	0	33.8	54.00	20.2	H,V/H,V	100-200
23,600 - 24,000	1000, AV	≤ 25	1	21.2*[8]	-9.5	0	36.7	54.00	17.3	H,V/H,V	100-200
31,200 - 31,800	1000, AV	≤ 25	0.5	30.8*[9]	-15.6	0	40.2	54.00	13.8	H,V/H,V	100-200
36,430 - 36,500	1000, AV	≤ 25	0.5	35.5*[9]	-15.6	0	44.9	54.00	9.1	H,V/H,V	100-200
Measurement uncertainty		4 dB									

Bandwidth = the measuring receiver bandwidth

Remark: *[1] noise floor noise level of the measuring instrument ≤ 3.5dBµV @ 3m distance (30 – 1,000 MHz)
Remark: *[2] noise floor noise level of the measuring instrument ≤ 4.5dBµV @ 3m distance (1,000 – 2,000 MHz)
Remark: *[3] noise floor noise level of the measuring instrument ≤ 10dBµV @ 3m distance (2,000 – 5,500 MHz)
Remark: *[4] noise floor noise level of the measuring instrument ≤ 14dBµV @ 3m distance (5,500 – 18,000 MHz)
Remark: *[5] noise floor noise level of the measuring instrument ≤ 25dBµV @ 3m distance (18,000 – 40,000 MHz)
Remark: *[6] for using a pre-amplifier in the range between 100 kHz and 1,000 MHz
Remark: *[7] for using a pre-amplifier in the range between 1.0 GHz and 18.0 GHz
Remark: *[8] for using a pre-amplifier in the range between 18 GHz and 25 GHz
Remark: *[9] for using a pre-amplifier in the range between 25 GHz and 38 GHz

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

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

12.4 Occupied Bandwidth (-10 dB)

12.4.1 Regulation

(a) Operation under this section is limited to field disturbance sensors that are mounted in terrestrial transportation vehicles. Terrestrial use is limited to earth surface-based, non-aviation applications. Operation within the 16.2-17.7 GHz band is limited to field disturbance sensors that are used only for back-up assistance and that operate only when the vehicle is engaged in reverse. (1) The -10 dB bandwidth of the fundamental emission shall be located within the 16.2-17.7 GHz band or within the 23.12-29.0 GHz band, exclusive of the 23.6-24.0 GHz restricted band, as appropriate, under all conditions of operation including the effects from stepped frequency, frequency hopping or other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

(2) The -10 dB bandwidth of the fundamental emission shall be 10 MHz or greater. For transmitters that employ frequency hopping, stepped frequency or similar modulation types, measurement of the -10 dB minimum bandwidth specified in this paragraph shall be made with the frequency hop or step function disabled and with the transmitter operating continuously at a fundamental frequency following the provisions of Section 15.31(m) of this part.

(3) For systems operating in the 23.12-29.0 GHz band, the frequencies at which the highest average emission level and at which the highest peak level emission appear shall be greater than 24.075 GHz.

(4) These devices shall operate only when the vehicle is operating, *e.g.*, the engine is running. Operation shall occur only upon specific activation, such as upon starting the vehicle, changing gears, or engaging a turn signal. The operation of these devices shall be related to the proper functioning of the transportation vehicle, *e.g.*, collision avoidance.

12.4.2 Test equipment

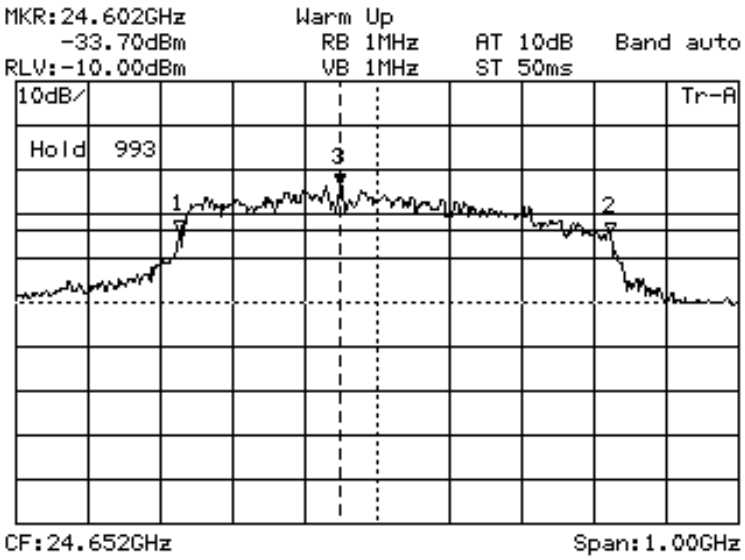
Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Receiver (9 kHz –40.0 GHz) (40.0 GHz -110 GHz)	Anritsu Spectrum Analyzer MS2668 (359a)	6200163244	2008/04	2010/04
Pre-amplifier (24GHz)	Dudde --- (433)	---	2008/02	2010/02
Horn antenna (15-40 GHz)	Schwarzbeck BBHA 9170 (281)	41	2000/01	2010/01
Horn antenna (24 GHz)	MBMT K-235 (431)	---	2008/01	2013/01
RF- cable	QMI 0.6m [APC 3.5]	K65	2008/01	2009/01
RF- cable	QMI 0.6m [APC 3.5]	K66	2008/01	2009/01

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

12.4.3 Test procedure

ANSI C63.4-2003 Section 13.1.7 Occupied Bandwidth Measurements. The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce worst-case (i.e., the widest) bandwidth. In order to measure the modulated signal properly, a resolution bandwidth that is small compared to the bandwidth required by the procuring or regulatory agency shall be used on the measuring instrument. However, the 6 dB resolution bandwidth of the measuring instrument shall be set to a value greater than 5% of the bandwidth requirements.

12.4.4 Test result



Low Frequency (F_L) = 24.3800 GHz
Low Frequency (F_H) = 24.9760 GHz
Occupied bandwidth = (F_H - F_L) = (24.9760 GHz - 24.3800 GHz)

The measured -10 dBc bandwidth under normal test conditions is: 596.00 MHz

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

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

EUT: 24 GHz Blind-Spot Radar Sensor **Date of issue: 2008-04-14**
FCC ID: KR5SV2008BSD

Normal test condition of – temperature: +15°C to +35°C, relative humidity: 20% to 75%

Applicant's declared operating frequency band:

Lowest frequency: **24.250 GHz** Highest frequency: **25.100 GHz**

Test conditions		**Limit**
		Frequency (GHz)
T_{nom} +20 °C	V_{nom} 13.2 VDC	**F_L** **24.3800**
		F_H **24.9760**
T_{min} -20 °C	V_{min} 10.8 VDC	**F_L** **24.3760**
		F_H **24.9740**
	V_{max} 15.6 VDC	**F_L** **24.4080**
		F_H **24.9780**
T_{max} +55 °C	V_{min} 10.8 VDC	**F_L** **24.4060**
		F_H **24.9400**
	V_{max} 15.6 VDC	**F_L** **24.4030**
		F_H **25.0130**
Measurement uncertainty		± 1.3 Hz

Where F_L = Lowest frequency at the appropriate spurious emission level
F_H = Highest frequency at the appropriate spurious emission level

Band edge limits: F_{LM} = Lowest F_L (measured) **24.3760 GHz**
and
F_{HM} = Highest F_H (measured) **25.0130 GHz**

The maximum calculated -10 dBc bandwidth under extreme test conditions is: 637.00 MHz
The occupied bandwidth is greater than 10 MHz
The frequency of the highest output is in every case greater than 24.075 GHz

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

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

12.5 Radiated output power and spurious emissions above 960 MHz

12.5.1 Regulation

(b) Emissions from a transmitter operating under this section shall not exceed the following equivalent isotropically radiated power (EIRP) density levels:

> (2) For transmitters operating in the 23.12-29.0 GHz band, the RMS average radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following EIRP limits based on measurements using a 1 MHz resolution bandwidth:

Frequency in MHz	EIRP in dBm
960-1610	-75.3
1610-23,120	-61.3
23,120-23,600	-41.3
23,600-24,000	-61.3
24,000-29,000	-41.3
Above 29,000	-61.3

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

12.5.2 Test equipment

Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Receiver (9 kHz –26.5 GHz)	Hewlett Packard Spectrum Analyzer 8593E (171)	3528U00990	2007/08	2009/08
Receiver (9 kHz –40.0 GHz) (40.0 GHz -110 GHz)	Anritsu Spectrum Analyzer MS2668 (359a)	6200163244	2008/04	2010/04
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
Pre-amplifier (24GHz)	Dudde --- (433)	---	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 (15-40 GHz)	Schwarzbeck BBHA 9170 (281)	41	2000/01	2010/01
Horn antenna (24 GHz)	MBMT K-235 (431)	---	2008/01	2013/01
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	2004/04	2009/04
Anritsu Mixer WR15 V-Band (50-75 GHz)	OM Labs MA2744A (295a)	V41027-1	2004/04	2009/04
Anritsu Mixer WR10 W-Band (75-110 GHz)	OM Labs MA2746A (296a)	W40706-2	2004/04	2009/04
RF- cable	Kabelmetal 18m [N]	K1	2008/01	2009/01
RF- cable	Sucoflex Suhner 2,13m [APC 3.5]	K17a	2008/01	2009/01
RF- cable	Sucoflex Suhner 2,13m [APC 3.5]	K18a	2008/01	2009/01
RF- cable	Aircell 0.5m [BNC]	K40	2008/01	2009/01
RF- cable	Aircell 1m [BNC/N]	K56	2008/01	2009/01
RF- cable	QMI 0.6m [APC 3.5]	K65	2008/01	2009/01
RF- cable	QMI 0.6m [APC 3.5]	K66	2008/01	2009/01
RF- cable	Sucoflex 106 Suhner 6,4m [N]	K74	2008/01	2009/01
RF- cable	Sucoflex 106 Suhner 6,4m [N]	K75	2008/01	2009/01

EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

12.5.3 Result

TRANSMITTER SPURIOUS RADIATION (Section 15.252(b)(2)) 960 MHz-1610 MHz									
f (GHz)	Bandwidth (MHz) Type of detector	Noted receiver level **dBm**	Test distance **m**	Correction factor **dB**	Level corrected **dBm**	Limit **dBm**	Margin	Polarisation EUT / antenna	Antenna height **cm**
0.960	1, AV RMS	≤ -95	3	15.0	-80.0	-75.3	4.7	H,V / V	100-200
1.530	1, AV RMS	≤ -95	3	13.3	-81.7	-75.3	6.4	H,V / V	100-200
1.610	1, AV RMS	≤ -95	3	14.5	-80.5	-75.3	5.2	H,V / V	100-200
0.960	1, AV RMS	≤ -95	3	16.1	-78.9	-75.3	3.6	H,V / H	100-200
1.530	1, AV RMS	≤ -95	3	14.3	-80.7	-75.3	5.4	H,V / H	100-200
1.610	1, AV RMS	≤ -95	3	15.9	-79.1	-75.3	3.8	H,V / H	100-150
Measurement uncertainty		4 dB							

Bandwidth = the measuring receiver bandwidth

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

TRANSMITTER SPURIOUS RADIATION (Section 15.252(b)(2)) 1610 MHz-23,120 MHz									
f (GHz)	Bandwidth (MHz) Type of detector	Noted receiver level **dBm**	Test distance **m**	Correction factor **dB**	Level corrected **dBm**	Limit **dBm**	Margin	Polarisation EUT / antenna	Antenna height **cm**
1.650	1, AV RMS	≤ -95	3	14.5	-80.5	-61.3	19.2	H,V / V	100-200
5.150	1, AV RMS	≤ -95	3	31.4	-63.6	-61.3	2.3	H,V / V	100-200
15.360	1, AV RMS	≤ -83	1	14.7	-68.3	-61.3	7.0	H,V / V	100-200
22.530	1, AV RMS	≤ -80	0.25	2.9	-77.1	-61.3	15.8	H,V / V	100-200
23.120	1, AV RMS	≤ -80	0.25	5.2	-74.8	-61.3	13.5	H,V / V	100-150
1.650	1, AV RMS	≤ -95	3	14.5	-80.5	-61.3	19.2	H,V / H	100-200
5.150	1, AV RMS	≤ -95	3	31.4	-63.6	-61.3	2.3	H,V / H	100-200
15.360	1, AV RMS	≤ -83	1	14.7	-68.3	-61.3	7.0	H,V / H	100-200
22.530	1, AV RMS	≤ -80	0.25	2.9	-77.1	-61.3	15.8	H,V / H	100-200
23.120	1, AV RMS	≤ -80	0.25	5.2	-74.8	-61.3	13.5	H,V / H	100-150
Measurement uncertainty		4 dB							

Bandwidth = the measuring receiver bandwidth

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

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

TRANSMITTER SPURIOUS RADIATION (Section 15.252(b)(2)) 23.120GHz to 23.600GHz									
f (GHz)	Bandwidth (MHz) Type of detector	Noted receiver level **dBm**	Test distance **m**	Correction factor $A_{Free\ spacing}$ - A_{gain} - $A_{Cable\ and\ Amlifier}$ **dB**	Level corrected **dBm**	Limit **dBm**	Margin	Polarisation EUT / antenna	Antenna height **cm**
23.125	1, AV RMS	≤ -80	0.25	5.2	-74.8	-41.3	33.5	H,V / V	100-200
23.490	1, AV RMS	≤ -80	0.25	5.2	-74.8	-41.3	33.5	H,V / V	100-200
23.600	1, AV RMS	≤ -80	0.25	5.2	-74.8	-41.3	33.5	H,V / V	100-150
23.125	1, AV RMS	≤ -80	0.25	5.2	-74.8	-41.3	33.5	H,V / H	100-200
23.490	1, AV RMS	≤ -80	0.25	5.2	-74.8	-41.3	33.5	H,V / H	100-200
23.600	1, AV RMS	≤ -80	0.25	5.2	-74.8	-41.3	33.5	H,V / H	100-150
Measurement uncertainty		4 dB							

Bandwidth = the measuring receiver bandwidth

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

TRANSMITTER SPURIOUS RADIATION (Section 15.252(b)(2)) 23,600 MHz-24,000 MHz									
f (GHz)	Bandwidth (MHz) Type of detector	Noted receiver level **dBm**	Test distance **m**	Correction factor $A_{Free\ spacing}$ - A_{gain} - $A_{Cable\ and\ Amlifier}$ **dB**	Level corrected **dBm**	Limit **dBm**	Margin	Polarisation EUT / antenna	Antenna height **cm**
23.650	1, AV RMS	≤ -80	0.25	5.2	-74.8	-61.3	13.5	H,V / V	100-200
23.720	1, AV RMS	≤ -80	0.25	5.8	-74.2	-61.3	12.9	H,V / V	100-200
24.000	1, AV RMS	≤ -80	0.25	7.8	-72.2	-61.3	10.9	H,V / V	100-150
23.650	1, AV RMS	≤ -80	0.25	5.2	-74.8	-61.3	13.5	H,V / H	100-200
23.720	1, AV RMS	≤ -80	0.25	5.8	-74.2	-61.3	12.9	H,V / H	100-200
24.000	1, AV RMS	≤ -80	0.25	7.8	-72.2	-61.3	10.9	H,V / H	100-150
Measurement uncertainty		4 dB							

Bandwidth = the measuring receiver bandwidth

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

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

TRANSMITTER SPURIOUS RADIATION (Section 15.252(b)(2)) 24.0GHz to 29.0GHz									
f (GHz)	Bandwidth (MHz) Type of detector	Noted receiver level **dBm**	Test distance **m**	Correction factor $A_{Free\ spacing}$ - A_{gain} - $A_{Cable\ and\ Amlifier}$ **dB**	Level corrected **dBm**	Limit **dBm**	Margin	Polarisation EUT / antenna	Antenna height **cm**
24.602	1, AV RMS	**-53.5**	0.25	8.3	**-45.2**	-41.3	**3.9**	V / V	100-200
25.500	1, AV RMS	≤ -80	0.25	8.9	-71.1	-41.3	29.8	H,V / V	100-200
27.500	1, AV RMS	≤ -70	0.25	9.6	60.4	-41.3	19.1	H,V / V	100-200
28.500	1, AV RMS	≤ -70	0.25	11.0	-59.0	-41.3	17.7	H,V / V	100-150
24.602	1, AV RMS	**-55.0**	0.25	8.3	**-46.7**	-41.3	**5.4**	V / H	100-200
25.500	1, AV RMS	≤ -80	0.25	8.9	-71.1	-41.3	29.8	H,V / H	100-200
27.500	1, AV RMS	≤ -70	0.25	9.6	60.4	-41.3	19.1	H,V / H	100-200
28.500	1, AV RMS	≤ -70	0.25	11.0	-59.0	-41.3	17.7	H,V / H	100-150
Measurement uncertainty		4 dB							

Bandwidth = the measuring receiver bandwidth

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

Remark: *[1] noise floor noise level of the measuring instrument ≤ -95 dBm (960 – 5,500 MHz)
Remark: *[2] noise floor noise level of the measuring instrument ≤ -83 dBm (5,500 – 18,000 MHz)
Remark: *[3] noise floor noise level of the measuring instrument ≤ -80 dBm (18,000 – 26,000 MHz)
Remark: *[4] noise floor noise level of the measuring instrument ≤ -70 dBm (26,000 – 34,000 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 GHz and 25 GHz
Remark: *[8] for using a pre-amplifier in the range between 25 GHz and 38 GHz

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

TRANSMITTER SPURIOUS RADIATION (Section 15.252(b)(2)) 29,000 MHz-110,000 MHz

f (GHz)	Bandwidth (MHz) Type of detector	Noted receiver level dBm	Test distance m	Correction factor $A_{Free\ spacing} - A_{gain}$ dB	Level corrected dBm	Limit dBm	Margin	Polarisation EUT / antenna	Antenna height cm
45.050	1, AV RMS	≤ -95	0.25	21.3	-73.7	-61.3	12.4	H,V / V	100-150
69.020	1, AV RMS	≤ -90	0.125	20.1	-69.9	-61.3	8.6	H,V / V	100-150
105.570	1, AV RMS	≤ -87	0.125	23.8	-63.2	-61.3	1.9	H,V / V	100-150
45.050	1, AV RMS	≤ -95	0.25	21.3	-74.5	-61.3	13.2	H,V / H	100-150
69.020	1, AV RMS	≤ -90	0.125	20.1	-67.2	-61.3	5.9	H,V / H	100-150
105.570	1, AV RMS	≤ -87	0.125	23.8	-63.0	-61.3	1.7	H,V / H	100-150
Measurement uncertainty		4 dB							

Bandwidth = the measuring receiver bandwidth

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

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

12.6 Special requirements

12.6.1 Regulation

(b) Emissions from a transmitter operating under this section shall not exceed the following equivalent isotropically radiated power (EIRP) density levels:

(3) In addition to the radiated emission limits specified in the tables in paragraphs (b)(1) and (b)(2) of this section, transmitters operating under the provisions of this section shall not exceed the following RMS average EIRP limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency in MHz	EIRP in dBm
1164-1240	-85.3
1559-1610	-85.3

12.6.2 Test equipment

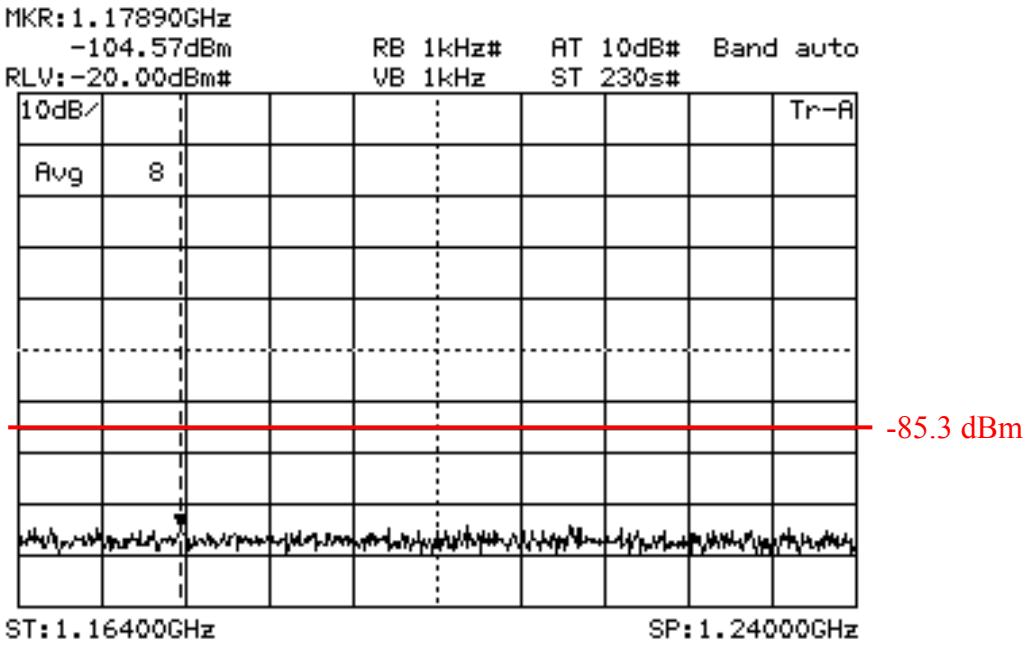
Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Receiver (9 kHz –40.0 GHz) (40.0 GHz -110 GHz)	**Anritsu Spectrum Analyzer MS2668 (359a)**	**6200163244**	**2008/04**	**2010/04**
Pre-amplifier (1GHz - 18GHz)	**Narda --- (345)**	**---**	**2008/02**	**2010/02**
Horn antenna (0,86-8,5 GHz)	**Schwarzbeck BBHA 9120 A (284)**	**236**	**2008/01**	**2013/01**
RF- cable	**Kabelmetal 18m [N]**	**K1**	**2008/01**	**2009/01**
RF- cable	**Aircell 0.5m [BNC]**	**K40**	**2008/01**	**2009/01**
RF- cable	**Aircell 1m [BNC/N]**	**K56**	**2008/01**	**2009/01**
RF- cable	**Sucoflex 106 Suhner 6,4m [N]**	**K74**	**2008/01**	**2009/01**
RF- cable	**Sucoflex 106 Suhner 6,4m [N]**	**K75**	**2008/01**	**2009/01**

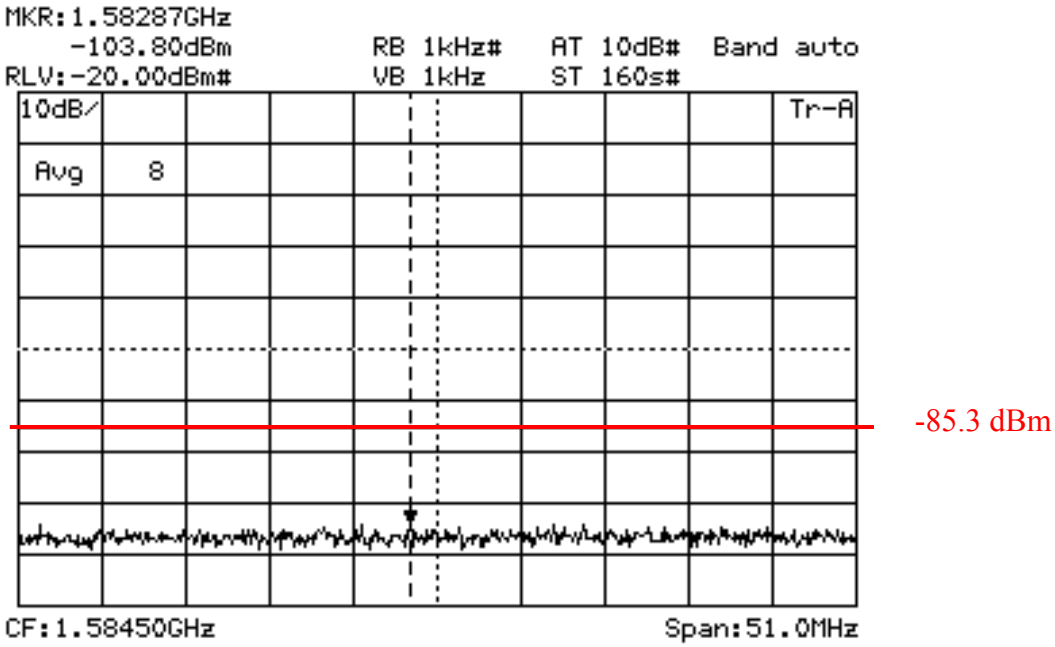
m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

12.6.3 Result





m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

TRANSMITTER SPURIOUS RADIATION (Section 15.252(b)(2)) 1164 MHz-1240 MHz									
f (GHz)	Bandwidth (kHz) Type of detector	Noted receiver level **dBm**	Test distance **m**	Correction factor **dB**	Level corrected **dBm**	Limit **dBm**	Margin	Polarisation EUT / antenna	Antenna height **cm**
1.164	1, AV RMS	≤ -104	3	13.9	-90.1	-85.3	4.8	H,V / V	100-400
1.178	1, AV RMS	≤ -104	3	13.7	-90.3	-85.3	5.0	V 10° / V	100-400
1.240	1, AV RMS	≤ -104	3	13.2	-90.8	-85.3	5.5	H,V / V	100-400
1.164	1, AV RMS	≤ -104	3	14.8	-89.2	-85.3	3.9	H,V / H	100-200
1.178	1, AV RMS	≤ -104	3	14.5	-89.5	-85.3	4.2	V 10° / H	100-400
1.240	1, AV RMS	≤ -104	3	14.1	-89.9	-85.3	4.6	H,V / H	100-400
Measurement uncertainty			4 dB						

Bandwidth = the measuring receiver bandwidth

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

TRANSMITTER SPURIOUS RADIATION (Section 15.252(b)(2)) 1559 MHz-1610 MHz									
f (GHz)	Bandwidth (kHz) Type of detector	Noted receiver level **dBm**	Test distance **m**	Correction factor **dB**	Level corrected **dBm**	Limit **dBm**	Margin	Polarisation EUT / antenna	Antenna height **cm**
1.559	1, AV RMS	≤ -104	3	14.6	-89.4	-85.3	4.1	H,V / V	100-400
1.583	1, AV RMS	≤ -104	3	14.7	-89.3	-85.3	4.0	H,V / V	100-400
1.610	1, AV RMS	≤ -104	3	14.9	-89.1	-85.3	3.8	H,V / V	100-400
1.559	1, AV RMS	≤ -104	3	14.4	-89.6	-85.3	4.3	H,V / H	100-200
1.583	1, AV RMS	≤ -104	3	14.5	-89.5	-85.3	4.2	H,V / H	100-400
1.610	1, AV RMS	≤ -104	3	14.7	-89.3	-85.3	3.9	H,V / H	100-400
Measurement uncertainty			4 dB						

Bandwidth = the measuring receiver bandwidth

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

Remark: *[1] noise floor noise level of the measuring instrument ≤ -83 dBm (5,500 – 18,000 MHz)
Remark: *[2] for using a pre-amplifier in the range between 1.0 GHz and 18.0 GHz

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

12.7 Peak level limit

12.7.1 Regulation

(b) Emissions from a transmitter operating under this section shall not exceed the following equivalent isotropically radiated power (EIRP) density levels:

> (4) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs and this 50 MHz bandwidth must be contained within the 16.2-17.7 GHz band or the 24.05-29.0 GHz band, as appropriate. The peak EIRP limit is 20 log (RBW/50) dBm where RBW is the resolution bandwidth in MHz employed by the measurement instrument. RBW shall not be lower than 1 MHz or greater than 50 MHz. Further, RBW shall not be greater than the -10 dB bandwidth of the device under test. For transmitters that employ frequency hopping, stepped frequency or similar modulation types, measurement of the -10 dB minimum bandwidth specified in this paragraph shall be made with the frequency hop or step function disabled and with the transmitter operating continuously at a fundamental frequency. The video bandwidth of the measurement instrument shall not be less than RBW. The limit on peak emissions applies to the 50 MHz bandwidth centered on the frequency at which the highest level radiated emission occurs. If RBW is greater than 3 MHz, the application for certification shall contain a detailed description of the test procedure, the instrumentation employed in the testing, and the calibration of the test setup.

12.7.2 Test equipment

Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Receiver (9 kHz –40.0 GHz) (40.0 GHz -110 GHz)	**Anritsu Spectrum Analyzer MS2668 (359a)**	**6200163244**	**2008/04**	**2010/04**
Pre-amplifier (24GHz)	**Dudde --- (433)**	**---**	**2008/02**	**2010/02**
Horn antenna (15-40 GHz)	**Schwarzbeck BBHA 9170 (281)**	**41**	**2000/01**	**2010/01**
RF- cable	**Sucoflex Suhner 2,13m [APC 3.5]**	**K17a**	**2008/01**	**2009/01**
RF- cable	**Sucoflex Suhner 2,13m [APC 3.5]**	**K18a**	**2008/01**	**2009/01**

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

12.7.3 Result

TRANSMITTER SPURIOUS RADIATION (Section 15.252(b)(4)) 24.0GHz to 29.0GHz									
f (GHz)	Bandwidth (MHz) Type of detector	Noted receiver level **dBm**	Test distance **m**	Correction factor **dB**	Level corrected **dBm**	Limit **dBm**	Margin	Polarisation EUT / antenna	Antenna height **cm**
24.602	1, PK	**44.2**	0.5	8.3	**-35.9**	-34.0	1.9	V / V	100-200
24.602	1, PK	**44.8**	0.5	8.3	**-36.5**	-34.0	2.5	V / H	100-150
Measurement uncertainty		4 dB							

Bandwidth = the measuring receiver bandwidth

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

Remark: *[1] noise floor noise level of the measuring instrument ≤ -80 dBm (18,000 – 26,000 MHz)
Remark: *[2] for using a pre-amplifier in the range between 18 GHz and 25 GHz

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

12.8 Radiated emissions below 960 MHz

12.8.1 Regulation

(b) Emissions from a transmitter operating under this section shall not exceed the following equivalent isotropically radiated power (EIRP) density levels:

> (5) Radiated emissions at or below 960 MHz shall not exceed the emission levels in Section 15.209 of this part.

12.8.2 Test equipment

See page no. 16, clause 11.3 Radiated emission limits, general requirements

12.8.3 Result

See page no. 15 to 19, clause 11.3 Radiated emission limits, general requirements

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

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

13. 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

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920

EUT: 24 GHz Blind-Spot Radar Sensor
FCC ID: KR5SV2008BSD

Date of issue: 2008-04-14

End of test report

m. dudde hochfrequenz - technik Rottland 5a D-51429 Bergisch Gladbach Tel. +49 2207-96890 Fax +49 2207 968920