

FCC ID: NBG009014

Issue date: 2005-07-01



Test Report
acc. to the relevant standard:
47 CFR Part 15 C – Intentional Radiators
Measurement Procedure:
ANSI C63.4 - 1992
relating to
Hella KGaA Hueck Co.
LCDAS
Lane Change Decision Aid System

Measurement of Radio- Noise Emissions
from Low Voltage Electrical and Electronic Equipment
Technical characteristics and test methods for radio equipment
in the frequency range 9 kHz to 40 GHz

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Manufacturer's details	
Manufacturer	Hella KGaA Hueck & Co.
Manufacturer's grantee code	NBG
Manufacturer's address	Beckumer Strasse 130
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	Germany
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Relevant standard used	47 CFR Part 15C - Intentional Radiators
	ANSI C63.4-1992

Test report prepared by	
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Equipment Under Test (EUT)	
Equipment category	Field disturbance sensor
Trade name	Hella
Type designation	LCDAS – Lane Change Decision Aid System
Serial no.	Prototype
Variants	---

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0 Test result

CFR Section	Report Chapter	Requirements Headline	Test result OK		
15.203	10.1	Antenna Requirement	pass	fail	n.a.
15.245 (b)	10.2	Field Strength Limits (Fundamental)	pass	fail	n.a.
15.205(b) 15.209 15.245(b)(1)(ii) 15.245(b)(3)	10.2	Radiated Spurious Emissions	pass	fail	n.a.
15.207	10.3	Conducted emissions	pass	fail	n.a.

Test requirements kept	yes no
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Signature test personnel


.....
Ralf Trepper

Signature of the company official


.....
Manfred Dudde

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1 Testing laboratory

Company name: m.dudde high frequency technology
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 was
accepted with letter dated

Registration Number .699717

Phone: +49-2207-9689-0

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Web: <http://www.dudde.com>

2 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 had been placed by:

Manufacturer

Company name : Hella KGaA Hueck & Co.
Address : Beckumer Strasse 130
Postcode : 59552
City/town : Lippstadt
Country : Germany
Telephone : +49(0)2941 38-2815
Fax : +49(0)2941 38-47-2815
E-Mail : Thomas.Wixforth@hella.com
Date of order : 2005-05-18
References : Mr. Thomas Wixforth

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3 Product

Samples of the following apparatus were submitted for testing:

Type of equipment	: field disturbance sensor
Trademark	: Hella
Type designation	: LCDAS – Lane Change Decision Aid System
Hardware version	: Master, Slave
Serial number	: none
Software release	: X110
Power used	: 12.0VDC (Car used equipment)
Frequency range	: 24.075 GHz to 24.175 GHz
Frequency used	: 24.077 GHz to 24.172 GHz
Generated or used frequencies	: 8MHz, 16MHz, 30MHz, 2.4GHz
FCC ID	: NBG009014

4 Test schedule

Tests were carried out in accordance with the specifications detailed in chapter 7 “Summary“ of this report.

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

The test sample was received on:

- 2005-07-14

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

- 2005-08-30

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5 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 Equipment Under Test (EUT)		Annex no. 1
Internal photographs of the Equipment Under Test (EUT)		Annex no. 2
Occupied bandwidth plot		Annex no. 3
FCC ID label sample		Annex no. 4
Technical description		Annex no. 5
Test setup photos		Annex no. 6
Block diagram		Annex no. 7
Schematics		Annex no. 8

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.

6 Observations and comments

7 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 9 kHz to 40 GHz

The samples were tested according to the following specification:

47 CFR Part 15 – Intentional Radiators, ANSI C63.4 - 1992

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8 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 **24**.

Tester:

Date : 2005-07-01

Name : Ralf Trepper

Signature : 

Technical responsibility for area of testing:

Date : 2005-07-01

Name : Manfred Dudde

Signature : 

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9 Operation description

9.1 EUT details

see technical description in Annex No. 5

9.2 EUT configuration

Operation: : see Test setup photos

9.3 EUT measurement description

AS soon as the software was activated and the EUT connected to the power supply it starts, after a short delay, to operate in continuous hopping 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.

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10.1 Antenna requirement

10.1.1 Regulation

15.203 An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of 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.

10.1.2 Result

The equipment meets the requirements	yes	no	n.a.
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Further test results are attached	yes	no	page no:
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n.a ^x see page no. 22

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10.2 Radiated emissions

10.2.1 Regulation

Test Requirement: FCC CFR47, Part 15C Test Procedure: ANSI C63.4:1992

Section 15.209 (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. 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.

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15.245 (b) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (millivolts/meter)	Field Strength of Spurious Emissions (millivolts/meter)
902-928	500	1.6
2435-2465	500	1.6
5785-5815	500	1.6
10500-10550	2500	25.0
24075-24175	2500	25.0

(1) Regardless of the limits shown in the above table, harmonic emissions in the restricted band below 17.7 GHz, as specified in § 15.205, shall not exceed the field strength limits shown in § 15.209. Harmonic emissions in the restricted band at and above 17.7 GHz shall not exceed the following field strength limits:

(i) For field disturbance sensors designed for use only within a building or to open building doors, 25mV/m.

(ii) For all other field disturbance sensors, 7.5mV/m

(iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted band fully comply with the limits given in Section 15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment, vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations, or railroad locomotives, railroad cars and other equipment which travels on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration.

(2) Field strength limits are specified at a distance of 3 meters.

(3) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

(4) The emission limits shown in the above table are based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

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10.2.2 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	2004/07	2006/07
Pre-amplifier (100kHz - 1.3GHz)	Hewlett Packard 8447 E (166a)	1726A00705	2002/04	2006/04
Bilog antenna (30- 1000 MHz)	CHASE CBL611A (167)	1517	2002/04	2008/04
Horn antenna (0,86-8,5 GHz)	Schwarzbeck BBHA 9120 A (284)	236	1998/01	2008/01
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	2005/04	2008/04
Anritsu Mixer WR15 V-Band (50-75 GHz)	OM Labs MA2744A (295a)	V41027-1	2005/04	2008/04
Anritsu Mixer WR10 W-Band (75-110 GHz)	OM Labs MA2746A (296a)	W40706-2	2005/04	2008/04

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10.2.2 Test procedures

The EUT and this peripheral (when additional equipment exist) 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: 1992 Section 8 "Radiated Emissions Testing"

Radiated emissions test characteristics	
Frequency range	30 MHz - 24,500 MHz
Test distance	3 m*
Test instrumentation resolution bandwidth	120 kHz (30 MHz - 1,000 MHz)
	1 MHz (1,000 MHz - 24,500 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 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

10.2.3 Calculation of the field strength

The field strength is calculated by the following calculation:

Corrected Level = Receiver Level + Correction Factor (without the use of an Pre-amplifier)

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

Receiver Level : Receiver reading without correction factors

Correction Factor : Antenna factor + cable loss

For example:

The receiver reading is 32.7 dB μ V. 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 35.91dB μ V/m.

The 35.91dB μ V/m value can be mathematically converted to its corresponding level in μ V/m.

Level in μ V/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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10.2.4 Result

TRANSMITTER SPURIOUS RADIATION (Section 15.245(b))										
f (GHz)	Bandwidth (kHz)/Type of detector	Noted receiver level dBmV	Test distance m	Correction factor dB	Distance extrapol. factor dB	Level corrected dBmV/m	Limit dBmV/m	Margin	Polarisation EUT / antenna	Antenna height cm
24.07760	1000, PK	18.38	3	41.9	0	60.26	67.96	7.70	H / H	100
24.12610	1000, PK	19.19	3	42.1	0	61.29	67.96	6.67	H / H	100
24.17160	1000, PK	19.12	3	42.2	0	61.32	67.96	6.64	H / H	100
48.15520	1000, PK	<-48.0	3	38.6	0	-9.4	27.98	37.18	H / H	100
48.25220	1000, PK	<-48.0	3	38.8	0	-9.2	27.98	37.18	H / H	100
48.34320	1000, PK	<-48.0	3	39.1	0	-8.9	27.98	36.88	H / H	100
72.23280	1000, PK	<-43.0	1	40.1	-9.54	-12.44	27.98	40.42	H / H	100
72.37830	1000, PK	<-43.0	1	40.4	-9.54	-12.14	27.98	40.12	H / H	100
72.51480	1000, PK	<-43.0	1	40.8	-9.54	-11.74	27.98	39.72	H / H	100
96.31040	1000, PK	<-43.0	0.25	44.6	-21.58	-19.98	27.98	47.96	H / H	100
96.50440	1000, PK	<-43.0	0.25	44.9	-21.58	-19.68	27.98	47.66	H / H	100
96.68640	1000, PK	<-43.0	0.25	45.5	-21.58	-19.08	27.98	47.06	H / H	100
Measurement uncertainty			4 dB							

* Bandwidth = the measuring receiver bandwidth

- Remark: *¹ noise floor noise level of the measuring instrument ≤ 6.5dBμV @ 3m distance (30 – 1,000 MHz)
 Remark: *² noise floor noise level of the measuring instrument ≤ 10 dBμV @ 3m distance (1,000 – 2,000 MHz)
 Remark: *³ noise floor noise level of the measuring instrument ≤ 17 dBμV @ 3m distance (2,000 – 5,500 MHz)
 Remark: *⁴ noise floor noise level of the measuring instrument ≤ 12 dBμV @ 1m distance (30 – 50 GHz)
 Remark: *⁵ noise floor noise level of the measuring instrument ≤ 17 dBμV @ 0.25m distance (50 – 100 GHz)
 Remark: *⁶ for using a pre-amplifier in the range between 100 kHz and 1,000 MHz

The equipment meets the requirements	yes	no	n.a.
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Further test results are attached	yes	no	page no:
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n.a ^x see page no. 22

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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.a.
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Further test results are attached	yes	no	page no:
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n.a.^x see page no. 22

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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	Level corrected dBμV/m	Limit dBμV/m	Margin dBμV/m	Polaris. EUT / antenna	Antenna height cm
2410.0750	1000, AV	43.02	3	8.00	0	51.02	54.00	2.98	H/H	123
2411.1500	1000, AV	43.88	3	8.00	0	51.88	54.00	2.12	H/H	123
2415.2500	1000, AV	41.87	3	8.00	0	49.87	54.00	4.13	H/H	123
2419.9500	1000, AV	41.88	3	8.00	0	49.88	54.00	4.12	H/H	123
2421.1000	1000, AV	41.07	3	8.00	0	49.07	54.00	4.93	H/H	123
2425.2000	1000, AV	41.26	3	8.00	0	49.26	54.00	4.74	H/H	123
4820.1500	1000, AV	25.04	3	8.70* ⁶	0	33.74	54.00	20.26	H/H	118
4822.3000	1000, AV	25.51	3	8.70* ⁶	0	34.21	54.00	19.79	H/H	118
4830.5000	1000, AV	23.89	3	8.70* ⁶	0	32.59	54.00	21.41	H/H	118
4839.9000	1000, AV	23.80	3	8.70* ⁶	0	32.50	54.00	21.50	H/H	118
4842.2000	1000, AV	23.15	3	8.70* ⁶	0	31.85	54.00	22.15	H/H	118
4850.4000	1000, AV	23.33	3	8.70* ⁶	0	32.03	54.00	21.97	H/H	118

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 ≤ 4.5 dBμV @ 3m distance (1,000 – 2,000 MHz)
 Remark: *³ noise floor noise level of the measuring instrument ≤ 10 dBμV @ 3m distance (2,000 – 5,500 MHz)
 Remark: *⁴ noise floor noise level of the measuring instrument ≤ 14 dBμV @ 3m distance (5,500 – 14,500 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 4.0 GHz and 18.0 GHz

The equipment meets the requirements	yes	no	n.a.
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Further test results are attached	yes	no	page no:
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n.a.^x see page no. 22

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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	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	0.90	40.00	39.10	H,V/H,V	100-400
88.0000	100, AV	≤ 3.5	3	-10.80	0	-7.30	40.00	47.30	H,V/H,V	100-400
216.0000	100, AV	≤ 3.5	3	-10.30	0	-6.80	43.50	50.30	H,V/H,V	100-400
960.0000	100, AV	≤ 3.5	3	8.50	0	12.00	43.50	31.50	H,V/H,V	100-400
1700.0000	1000, AV	≤ 4.5	3	3.80	0	8.30	54.00	45.70	H,V/H,V	100-400
2250.0000	1000, AV	≤ 10	3	8.00	0	18.00	54.00	36.00	H,V/H,V	100-400
4000.0000	1000, AV	≤ 10	3	8.40* ⁶	0	18.40	54.00	35.60	H,V/H,V	100-400
5000.0000	1000, AV	≤ 10	3	9.10* ⁶	0	19.40	54.00	34.60	H,V/H,V	100-400
7500.0000	1000, AV	≤ 14	3	12.9* ⁶ ₀	0	26.90	54.00	27.10	H,V/H,V	100-400
8300.0000	1000, AV	≤ 14	3	14.80* ⁶	0	28.80	54.00	25.20	H,V/H,V	100-400
9400.0000	1000, AV	≤ 14	3	16.00* ⁶	0	30.00	54.00	24.00	H,V/H,V	100-400
11000.0000	1000, AV	≤ 14	3	18.25* ⁶	0	32.25	54.00	21.75	H,V/H,V	100-400
TRANSMITTER SPURIOUS RADIATION ABOVE 17.7 GHz (Section 15.205(e), 15.245(b))										
f (GHz)	Bandwidth (kHz)/Type of detector	Noted receiver level dBmV	Test distance m	Correction factor dB	Distance extrapol. factor dB	Level corrected dBmV/m	Limit dBmV/m	Margin dBmV/m	Polaris. EUT / antenna	Antenna height cm
17.7 to 21.4	100, AV	≤ -38	3	40.23	0	2.23	27.98	25.75	H,V/H,V	100-400
23.6 to 24.0	100, AV	≤ -38	3	41.88	0	3.88	27.98	24.10	H,V/H,V	100-400
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 ≤ 4.5 dBμV @ 3m distance (1,000 – 2,000 MHz)
 Remark: *³ noise floor noise level of the measuring instrument ≤ 10 dBμV @ 3m distance (2,000 – 5,500 MHz)
 Remark: *⁴ noise floor noise level of the measuring instrument ≤ 14 dBμV @ 3m distance (5,500 – 14,500 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 4.0 GHz and 18.0 GHz

The equipment meets the requirements	yes	no	n.a.
Further test results are attached	yes	no	page no:

n.a ^x see page no. 22

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10.3 Conducted emissions

10.3.1 Regulation

Section 15.207 (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 50 μ H/50ohms line impedance stabilization network (LISN). Compliance with this provision of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission(MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.50	66 to 56*	56 to 46*
0.50-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Section 15.207 (c) 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.

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10.3.2 Test equipment

Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration	Remarks
Receiver (9 kHz - 30MHz)	Rhode & Schwarz ESH2 (22)	882902/007	01 / 04	01 / 06	---
Protector limiter 9 kHz - 30MHz, 10 dB	Rhode & Schwarz ESH 3Z2 (272)	357,881052	01 / 04	01 / 06	---
V-LISN 50 ohms/(50 uH+5 ohms)	RFT NNB 11 (72)	13835240	08 / 02	01 / 05	---
V-LISN 50 ohms/(50 uH+5 ohms)	Dudde (73)	---	08 / 02	01 / 05	---

10.3.3 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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10.3.4 Test results

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	55	* ¹
N	0.160	10	≤-2	55.8	55	* ¹
L1	0.304	10	≤-2	51.7	52	* ¹
N	0.304	10	≤-2	51.7	52	* ¹
L1	0.475	10	≤-2	47	49	* ¹
N	0.475	10	≤-2	47	49	* ¹
L1	0.567	10	≤-2	46	48	* ¹
N	0.567	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	1.252	10	≤-2	46	48	* ¹
N	1.252	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 (0.009 – 30MHz)

Remark: *² Quasi peak measurements lower than “Specified Average Limit”

The equipment meets the requirements	yes	no	n.a. ²
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Further test results are attached	yes	no	
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11 Additional information to this test report

Remarks

- | | |
|-------------------|---|
| n.a. ¹ | not applicable, because antenna is part of the PCB |
| n.a. ² | not applicable, because EUT is directly battery powered |

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End of test report