FCC ID: UF9IPS137 Date of issue: 2007-09-14

Deutscher Akkreditierungs Rat
DAR
DAT-P-225/96-02

Test Report
acc. to the relevant standard
47 CFR Part 15 C – Intentional Radiators
Measurement Procedure:
ANSI C63.4 - 1992
relating to
G. Lufft Mess- und Regeltechnik GmbH
24 GHz-Radar-Sensor
IPS-137

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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FCC ID: UF9IPS137 Date of issue: 2007-09-14

Manufacturer's details	
Manufacturer	G. Lufft Mess- und Regeltechnik GmbH
Manufacturer's grantee code	UF9
Manufacturer's address	G. Lufft Mess- und Regeltechnik GmbH
	Gutenbergstr. 20
	D-70736 Fellbach
	Germany
	Phone: +49 (0) 711 51822 0
	Fax: +49 (0) 711 51822 41
Relevant standard used	47 CFR Part 15C - Intentional Radiators
	ANSI C63.4-2003

Test report prepared by	
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	Germany
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Equipment **U**nder **T**est **(EUT)**	
Equipment category	Field disturbance sensor
Trade name	Lufft
Type designation	24 GHz Radar Sensor IPS-137
Serial no.	---
Variants	R^2S (Variant in which the 24GHz Radar Sensor IPS-137 will be built in)

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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.**~~

Test requirements kept	**yes**	~~**no**~~

Signature
(Technical engineer) .....
Ralf Trepper

Signature
(Manager) .....
Manfried Dudde

FCC ID: UF9IPS137 Date of issue: 2007-09-14

List of contents Page

1 Testing 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

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 has been placed by:

Manufacturer

Company name	: G. Lufft Mess- und Regeltechnik GmbH
Address	: Gutenbergstr. 20
Postcode	: 70736
City/town	: Fellbach
Country	: Germany
Telephone	: +49 (0) 711 51822 67
Fax	: +49 (0) 711 51822 41
Date of order	: 2007-04-18
References	: Mr. Axel Schmitz-Hübsch
E-mail	: Axel.Schmitz-Huebsch@lufft.de

3 Product

Samples of the following apparatus were submitted for testing:

Type of equipment	: field disturbance sensor
Trademark	: lufft
Type designation	: 24 GHz Radar Sensor IPS-137
Hardware version	: 24 GHz Radar Sensor IPS-137
Serial number	: 070405-3
Software release	: ---
Power used	: 5.0 V DC
Frequency range	: 24.075 GHz ... 24.175 GHz
Frequency used	: typical: 24.125 GHz, test sample: 24.117 GHz
Generated or used frequencies	: typical: 24.125 GHz
FCC ID	**: UF9IPS137**

4 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:

- 2007-04-18

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

- 2007-09-02 - 2007-09-04

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 **E**quipment **U**nder **T**est (EUT)	2007-09-04	Annex no. 1
Internal photographs of the **E**quipment **U**nder **T**est (EUT)	2007-09-04	Annex no. 2
Occupied bandwidth plot	2007-09-04	Annex no. 3
FCC ID label sample	2007-09-04	Annex no. 4
User Manual	2007-06	Annex no. 5
Test setup photos	2007-09-02	Annex no. 6
Block diagram	2007-05-07	Annex no. 7
Schematics	2007-05-07	Annex no. 8
Technical description	2007-05-07	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.

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 of 9 kHz to 40 GHz

The samples were tested according to the following specification:

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

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 **21.**

Tester:

Date : 2007-09-14

Name : Ralf Trepper

Signature :

Technical responsibility for area of testing:

Date : 2006-09-14

Name : Manfried Dudde

Signature :

9 Operation description

9.1 EUT details

see User Manual in Annex No. 5

9.2 EUT configuration

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

9.3 EUT measurement description

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.

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.~~

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

n.a [x] See page no.18

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 (µV/m)**	**Measurement distance (m)**
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.

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 (mV/m)	Field strength of spurious emissions (mV/m)
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.

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	2006/05	2008/05
Receiver **(9 kHz –40.0 GHz)** **(40.0 GHz -110 GHz)**	Anritsu Spectrum Analyzer MS2668 (359a)	6200163244	2006/02	2008/02
Pre-amplifier (100kHz - 1.3GHz)	Hewlett Packard 8447 E (166a)	1726A00705	2006/03	2008/03
Bilog antenna (30- 1000 MHz)	CHASE CBL611A (167)	1517	2003/09	2009/09
Horn antenna (0,86-8,5 GHz)	Schwarzbeck BBHA 9120 A (284)	236	1998/01	2008/01
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

10.2.2.1 Test procedures

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: 1992 Section 8 "Radiated Emissions Testing"

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).

10.2.3 Calculation of field strength limits

For example: Transmitter working on 315 MHz
Limit for average measurements → 41.6667*(315 MHz) – 7083.3333 = 6041.677µV/m = 75.6dBµV/m @3m
Limit for peak measurements → Limit for average measurements + 20dB = 95.6dBµV/m @3m

10.2.4 Calculation of average correction factor

The average correction factor is computed by analyzing the "worst case" on time in any 100msec time period and using the formula: Corrections Factor + 20*log (worst case on time/100msec). Analysis of the remote transmitter worst case on time in any 100msec time period is an on time of 50msec, therefore the correction factor is 20*log (50/100) = - 6 dB. The maximum correction factor to be applied is 20 dB per section 15.35 of the FCC rules.

10.2.5 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).

10.2.6 Result

DC input-power: 4.75 VDC

TRANSMITTER SPURIOUS RADIATION (Section 15.245(b))										
f (GHz)	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	Polarisation EUT / antenna	Antenna height **cm**
24.11715	1000, PK	**77.16**	3	42.1	0	**119.26**	128	8.74	V 10° / V	125
48.23430	1000, PK	< 28.0	1	38.7	-9.54	57.16	77.5	20.34	H,V / V	100-200
72.35145	1000, PK	< 23.0	1	40.2	-9.54	53.66	77.5	23.84	H,V / V	100-200
96.46860	1000, PK	< 23.0	0.25	45.5	-21.58	46.92	77.5	30.58	H,V / V	100-150
24.11715	1000, PK	**74.78**	3	42.1	0	**116.88**	128	11.12	V 10° / H	117
48.23430	1000, PK	< 28.0	1	38.7	-9.54	57.16	77.5	20.34	H,V / H	100-200
72.35145	1000, PK	< 23.0	1	40.2	-9.54	53.66	77.5	23.84	H,V / H	100-200
96.46860	1000, PK	< 23.0	0.25	45.5	-21.58	46.92	77.5	30.58	H,V / H	100-150
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 – 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 1.0 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. 20

10.2.6 Result

DC input-power: 5.25 VDC

TRANSMITTER SPURIOUS RADIATION (Section 15.245(b))										
f (GHz)	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	Polarisation EUT / antenna	Antenna height **cm**
24.12275	1000, PK	**76.95**	3	42.1	0	**119.05**	128	8.95	V 10° / V	125
48.24550	1000, PK	< 28.0	1	38.7	-9.54	57.16	77.5	20.34	H,V / V	100-200
72.36825	1000, PK	< 23.0	1	40.2	-9.54	53.66	77.5	23.84	H,V / V	100-200
96.49100	1000, PK	< 23.0	0.25	45.5	-21.58	46.92	77.5	30.58	H,V / V	100-150
24.12275	1000, PK	**74.11**	3	42.1	0	**116.21**	128	11.79	V 10° / H	117
48.24550	1000, PK	< 28.0	1	38.7	-9.54	57.16	77.5	20.34	H,V / H	100-200
72.36825	1000, PK	< 23.0	1	40.2	-9.54	53.66	77.5	23.84	H,V / H	100-200
96.49100	1000, PK	< 23.0	0.25	45.5	-21.58	46.92	77.5	30.58	H,V / H	100-150
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 – 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 1.0 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. 20

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.**~~

Further test results are attached	yes	no	page no:

n.a [x] See page no. 20

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
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 – 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 1.0 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. 20

11 Additional information to this test report

Remarks

n.a.[1]	Not applicable, because the antenna is part of the PCB
n.a.[2]	Not applicable, because the EUT is directly battery powered

End of test report