Test Report acc. to FCC Title 47 CFR Part 15
relating to
Feig Electronic GmbH
ID ISC.ANT1520/680 (RFID gate)

Title 47 - Telecommunication
Part 15 - Radio Frequency Devices
Subpart C – Intentional Radiators
Measurement Procedure:
ANSI C63.4-2014
ANSI C63.10-2013

ilac-MRA

DAkkS Deutsche Akkreditierungsstelle D-PL-12053-01-00

MANUFACTURER	
Manufacturer name	**Feig Electronic GmbH**
Manufacturer's grantee code	**PJM**
Manufacturer's address	Lange Str.4, 35781 Weilburg, Germany
Phone	+49(0)6471 31 09 0
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Email	Wolfgang.Meissner@feig.de

TESTING LABORATORY	
Test engineer	Mr. Ralf Trepper
Testing laboratory name	**m. dudde hochfrequenz-technik**
Testing laboratory address	Rottland 5a, 51429 Bergisch Gladbach, Germany
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RELEVANT STANDARD	
Title	**47 - Telecommunication**
Part	**15 - Radio Frequency Devices**
Subpart	**Subpart C – Intentional Radiators - Section 15.225**
Measurement procedure	**ANSI C63.4-2014 & ANSI C63.10-2013**

Equipment **U**nder **T**est **(EUT)**	
Equipment category	**RFID Equipment**
Trade name	**OBID i-scan**
Type designation	**ID ISC.ANT1520/680 (RFID gate)**
Serial no.	**5806680 (ANT1520680-A) || 5806685 (ANT1520680-B)**
Variants	---

1. Test results

Clause	Requirements headline	Test result			Report page number
8.1	Antenna Requirement	**Pass**	~~Fail~~	~~N.t.~~*	9
8.2	Conducted limits	**Pass**	~~Fail~~	~~N.t.~~*	10 – 12
8.3	Restricted bands of operation	**Pass**	~~Fail~~	~~N.t.~~*	13 – 14
8.4	Radiated emission limits	**Pass**	~~Fail~~	~~N.t.~~*	15 – 21
8.5	Frequency tolerance	**Pass**	~~Fail~~	~~N.t.~~*	22 – 24
8.6	20 dB Bandwidth	**Pass**	~~Fail~~	~~N.t.~~*	25 – 26

* Not tested

The equipment passed all the conducted tests	**Yes**	~~No~~

Signature	Ralf Trepper	Manfred Dudde
Name	**Mr. Ralf Trepper**	**Mr. Manfred Dudde**
Designation	**RF Test engineer**	**Laboratory-Manager**
Date of issue	**2017-03-03**	**2017-03-03**

A Ftouhi

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2. Introduction

This test report **is not an expert opinion** and consists of:

- Test result summary
- List of contents
- Introduction and further information
- Performance assessment
- Detailed test information

All pages have been numbered consecutively and bear the m. dudde hochfrequenz-technik logo, the test report number, the date, the test specification in its current version as well as the type designation of the EUT. The total number of pages in this report is **31**.

The tests were carried out at:

- m. dudde hochfrequenz-technik, Rottland 5a, 51429 Bergisch Gladbach

in a representative assembly and in accordance with the test methods and/or requirements stated in:

FCC Title 47 CFR Part 15 Subpart C Section 15.225, ANSI C63.4-2014 & ANSI C63.10-2013

The sample of the product was received on:

- 2017-01-23

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

- 2017-01-23 - 2017-02-06

3. Testing laboratory

m. dudde hochfrequenz-technik
Rottland 5a, 51429 Bergisch Gladbach, Germany

Phone: +49 - (0) 22 07 / 96 89-0
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- FCC Registration Number: 699717

Accredited by:

DAkkS Deutsche Akkreditierungsstelle GmbH
DAkkS accreditation number: D-PL-12053-01

4. Applicant

Company name : Feig Electronic GmbH

Address : Lange Str. 4

35781Weilburg

Country : Germany

Telephone : +49(0)6471 31 09 0

Fax : +49(0)6471 31 09 99

Email : Wolgang.Meissner@feig.de

Date of order : 2017-01-20

References : Mr. Wolfgang Meißner

5. Product and product documentation

Samples of the following apparatus were submitted for testing:

Manufacturer : Feig Electronic GmbH

Trademark : OBID i-scan

Type designation : **ID ISC.ANT1520/680 (RFID gate)**

Variants : ---

Antennas Name : **ID ISC.ANT1520/680-A**

ID ISC.ANT1520/680-B

Serial number : 5806680 (ANT1520680-A) || 5806685 (ANT1520680-B)

Hardware version : ANT1520680-A: Reader: FE695/2 || Mux: FE553/4 || DATuning Board: FE575/3

ANT1520680-B: DATuning Board: FE575/3

Software version : ANT1520680-A: Reader: V01.13.133 || Mux: V01.07 || DATuning Board: V03.06

ANT1520680-B: DATuning Board: V03.06

Type of equipment : RFID equipment

Power supply used : 120V AC

Frequency used : 13.56 MHz

FCC-ID : PJMLRM2500

For issuing this report the following product documentation was used:

Title	Description	Version
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For issuing this report the following product documentation was used:

Description	Date	Identifications
External photographs of the Equipment Under Test (EUT)	**2017-03-03**	**Annex no. 1**
Internal photographs of the Equipment Under Test (EUT)	**2017-03-03**	**Annex no. 2**
Channel occupancy / bandwidth	**2017-03-03**	**Annex no. 3**
Label sample	**2017-03-03**	**Annex no. 4**
Functional description / User manual	**2017-03-03**	**Annex no. 5**
Test setup photos	**2017-03-03**	**Annex no. 6**
Block diagram	**2017-03-03**	**Annex no. 7**
Operational description	**2017-03-03**	**Annex no. 8**
Schematics	**2017-03-03**	**Annex no. 9**
Parts list	**2017-03-03**	**Annex no. 10**

6. Conclusions, observations and comments

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

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

m. dudde hochfrequenz-technik assumes the sample to comply with the requirements of FCC Title 47 CFR Part 15 for the respective test sector, if the test results turn out positive.

Comments:

This test report number 17010729 replaces the test report number 17010721!
The test report number 17010721 loses its validity!

Date	: 2017-03-03	Date	: 2017-03-03
Name	: Ralf Trepper	Name	: Manfried Dudde
Function	: RF Test Engineer	Function	: Laboratory Manager
Signature	: …………………	Signature	: …………………

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7. Operational description

7.1 EUT details

The EUT is RFID equipment

7.2 EUT configuration

After connecting to the power supply 120 V AC the EUT starts to run

7.3 EUT measurement description

Radiated measurements

The EUT was tested in a typical fashion. During preliminary emission tests the EUT was operated in the continuous measuring mode for worst case emission mode investigation. Therefore, the final qualification testing was completed with the EUT operated in continuous measuring mode. All tests were performed with the EUT's typical voltage: 120V AC

In order to establish the maximum radiation, firstly, there have been viewed all orthogonal adjustments of the test samples, secondly the test ample have been rotated at all adjustments around the own axis between 0° and 360°, and thirdly, the antenna polarization between horizontal and vertical had been varied.

AC Powerline Conducted measurements

The EUT was directly connected to the artificial mains network. It has been tested with the activated EUT in continuous measuring mode.

The EUT is connected via the LAN, USB to a laptop with the laptop directly connected to the artificial mains network. It has been tested in three runs: first with Laptop (inactive EUT), second with activated EUT via USB port of the laptop, and finally with activated EUT via LAN of the laptop.

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8. Compliance assessment

8.1 Antenna requirement

8.1.1 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 §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 §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

8.1.2 Result

Antenna Type	Antenna Description	Frequency	Gain	Number of Antennas
---	Loop gate antenna	13.553 MHz – 13.567 MHz	---	2

The equipment passed the conducted tests	**Yes**	~~No~~	~~N.t.*~~

Test setup photos / test results are attached	~~Yes~~	**No**	Annex no.

N.t.* see clause: 9

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8.2 Conducted limits

8.2.1 Regulation

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions 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 (dBµV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 -30	60	50

*Decreases with the logarithm of the frequency

(b) The shown limit in paragraph (a) of this Section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 µV within the frequency band 535-1705 kHz, as measured using a 50 µH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in Section 15.205 and Section 15.209, 15.221, 15.223, 15.225 or 15.227, as appropriate.

(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 that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

8.2.2 Test 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 C63.4-2014 Section 7.
Additional equipment must also be connected to a second LISN with the same specifications described in the above section (if required).

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EUT: ID ISC.ANT1520/680 (RFID gate) | **FCC ID: PJMLRM2500** | **FCC Title 47 CFR Part 15** | **Date of issue: 2017-03-03**

8.2.3 Result

Tested with dedicated AC power supply (Deutronic Elektronik GmbH, SN: ETC70G-24)

Conducted emissions (Section 15.207)						
Tested line	f MHz	Bandwidth kHz	Noted receiver level dBµV	Spec. limit (Quasipeak) dBµV	Margin dBµV	Remarks
L	0.1678	9	45.0	65.1	20.1	
N	0.1678	9	45.0	65.1	20.1	
L	0.1935	9	49.0	63.9	14.9	
N	0.1935	9	50.0	63.9	13.9	
L	0.4519	9	45.0	56.8	11.8	
N	0.4519	9	45.0	56.8	11.8	
L	13.5602	9	52.0	60.0	8.0	
N	13.5602	9	51.0	60.0	9.0	
L	27.1204	9	50.5	60.0	9.5	
N	27.1204	9	49.5	60.0	10.5	
Measurement uncertainty				< ± 2 dB		

Remark: *[1] Noise level of the measuring instrument ≤ -2dBµV (0.009 – 30MHz)
Remark: *[2] Quasi peak measurements lower than "Specified Average Limit"

Laptop AC Adapter HP Pro Book 4535s (SN: CNU1412RPF) - standalone

Conducted emissions (Section 15.207)						
Tested line	f MHz	Bandwidth kHz	Noted receiver level dBµV	Spec. limit (Quasipeak) dBµV	Margin dBµV	Remarks
L	0.1504	9	52.0	65.8	13.8	
N	0.1504	9	50.0	65.8	15.8	
L	0.4546	9	42.0	56.8	14.8	
N	0.4546	9	42.0	56.8	14.8	
L	0.9146	9	40.0	56.0	16.0	
N	0.9146	9	40.0	56.0	16.0	
Measurement uncertainty				< ± 2 dB		

EUT connected with Laptop AC Adapter HP Pro Book 4535s (SN: CNU1412RPF) over USB

Conducted emissions (Section 15.207)						
Tested line	f MHz	Bandwidth kHz	Noted receiver level dBµV	Spec. limit (Quasipeak) dBµV	Margin dBµV	Remarks
L	0.1504	9	51.5	65.8	14.3	
N	0.1504	9	50.0	65.8	15.8	
L	0.4546	9	43.5	56.8	13.3	
N	0.4546	9	43.0	56.8	13.8	
L	0.9146	9	41.5	56.0	14.5	
N	0.9146	9	41.0	56.0	15.0	
Measurement uncertainty				< ± 2 dB		

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EUT connected with Laptop AC Adapter HP Pro Book 4535s (SN: CNU1412RPF) over LAN

Conducted emissions (Section 15.207)						
Tested line	f MHz	Bandwidth kHz	Noted receiver level dBµV	Spec. limit (Quasipeak) dBµV	Margin dBµV	Remarks
L1	0.1504	9	51.5	65.8	14.3	
N	0.1504	9	50.0	65.8	14.3	
L1	0.4501	9	43.0	56.8	13.8	
N	0.4501	9	45.0	56.8	11.8	
L1	0.9106	9	40.0	56.0	16.0	
N	0.9106	9	42.0	56.0	14.0	
Measurement uncertainty			< ± 2 dB			

Test Cables used	K30
Test equipment used	72, 272, 428, 429,4a, 314

The equipment passed the conducted tests	**Yes**	~~No~~	~~N.t.~~*

Test setup photos / test results are attached	~~Yes~~	**No**	Annex no. 6

N.t.* see clause: 9

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8.3 Restricted bands of operation

8.2.1 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.

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(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 § 15.256 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).

(10) White space devices operating under subpart H of this part are exempt from complying with the requirements of this section for the 608-614 MHz band.

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

8.2.2 Result

Results could be shown in clause 8.4.4 – Blue marked values!

Test Cables used	K1a, K40, K56, K83,K84
Test equipment used	103,166a, 171a, 406,

The equipment passed the conducted tests	**Yes**	~~No~~	~~N.t.~~*

Test setup photos / test results are attached	~~Yes~~	**No**	Annex no.

N.t.* see clause: 9

8.4 Radiated emission limits

8.4.1 Regulation

The device operating in the frequency band 13.110-14.010, the field strength of any emission shall not exceed the following limits.

Frequency	Field Strength	Measurements Distance
MHz	dBµV/m	m
13.553 - 13.567	84	30
13.410 - 13.553 and 13.567 - 13.710	50.5	30
13.110 - 13.410 and 13.710 - 14.010	40.5	30

(a) Outside the band 13.110-14.010, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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

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

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

(d) 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.

(e) 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.

(f) 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.

(g) In accordance with §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

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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 §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 §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 §15.109 that are applicable to the incorporated digital device.

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

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8.4.2 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° 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 C63.4-2014 Section 8 "Radiated Emissions Testing"

Measurement procedures for electric field radiated emissions from 9 kHz - 1 GHz & 1 GHz - 40 GHz are covered in Clause 8 of ANSI C63.4-2014. The ANSI C63.4-2014 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. Sub clause 8.3.2 of ANSI C63.4-2014 states that the measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." We consider the "cone of radiation" to be the 3 dB beam width of the measurement antenna.

While the "bore-sighting" technique is not explicitly mentioned in ANSI C63.4-2014, it is a useful technique for measurements using a directional antenna, such as a double-ridged waveguide antenna. Several precautions must be observed, including: knowledge of the beam width of the antenna and the resulting illumination area relative to the size of the EUT, estimation for source of the emission and general location within larger EUTs, measuring system sensitivity, etc.

ANSI C63.4-2014 requires that the measurement antenna is kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. That means that if the directional radiation pattern of the EUT results in a maximum emission at an upwards angle from the EUT, when a directional antenna is used to make the measurement it will be necessary for it to be pointed towards the source of the emission within the EUT. This can be done by either pointing the antenna at an angle towards the source of the emission, or by rotating the EUT, in both height and polarization, to maximize the measured emission. The emission must be kept within the illumination area of the 3 dB beamwidth of the antenna so that the maximum emission from the EUT is measured.

Radiated Emissions Test Characteristics	
Frequency range	30 MHz - 1,000 MHz
Test distance	10 m, 3 m*
Test instrumentation resolution bandwidth	9 kHz (20 kHz – 30 MHz)
	120 kHz (30 MHz – 1.000 MHz)
Receive antenna height	1 m (20 kHz – 30 MHz)
Receive antenna polarization	0° or 90° (20 kHz – 30 MHz)
Receive antenna scan height	1 m - 4 m (30 MHz – 1.000 MHz)
Receive antenna polarization	Vertical or Horizontal (30 MHz – 1.000 MHz)

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

8.4.3 Calculation of the field strength

The field strength is calculated by the following calculation:

Corrected Level = Receiver Level + Correction Factor (without the use of 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) = 62.44

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

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8.4.4 Result

Radiation Emission Below 30 MHz (Section 15.225, 15.205 and 15.209)										
f	**Bandwidth, Type of detector**	**Noted receiver level**	**Test distance**	**Correction factor**	**Distance extrapol. factor**	**Level corrected**	**Limit**	**Margin**	**Polaris. EUT / antenna orientation**	
MHz		**dBµV**	**m**	**dB**	**dB**	**dBµV/m**	**dBµV/m @ meter**	**dBµV/m**	**height/cm**	
0.2500	QPK/10kHz	< 4.0	10	20.2	-59.1	-34.9	AV19.6 @ 300	54.5	V, H/0-360°	115
0.3750	QPK/10kHz	< 4.0	10	20.2	-59.1	-34.9	AV16.1 @ 300	51.0	V, H/0-360°	115
0.5000	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV33.6 @ 30	28.5	V, H/0-360°	115
0.6250	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV31.7 @ 30	26.6	V, H/0-360°	115
0.7500	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV30.1 @ 30	25.0	V, H/0-360°	115
0.8750	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV28.6 @ 30	23.5	V, H/0-360°	115
1.0000	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV27.6 @ 30	22.5	V, H/0-360°	115
1.1250	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV27.6 @ 30	22.5	V, H/0-360°	115
1.2500	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV25.6 @ 30	28.5	V, H/0-360°	115
1.5000	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV24.1 @ 30	19.00	V, H/0-360°	115
3.0000	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°	115
5.0000	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°	115
8.0000	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°	115
10.0000	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°	115
20.0000	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°	115
30.0000	QPK/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°	115
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).

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Radiation Emission Above 30 MHz (Section 15.225, 15.205 and 15.209)

f	Detect.	BW	Rx Level	MD	CF	DEF	LC	Limit	Margin	EP	Antenna Pol	Antenna H
MHz	Type	kHz	dBµV	m	dB	dB	dBµV/m	dBµV/m	dB	°	H / V	m
108.48	QPK	120	**42.4**	3	-9.9	0	**32.5**	43.5	**11.0**	110	H	1.17
122.04	QPK	120	**39.2**	3	-8.5	0	**30.7**	43.5	**12.8**	135	H	2.11
135.60	QPK	120	**35.4**	3	-7.6	0	**27.8**	43.5	**15.7**	135	H	1.75
244.08	QPK	120	**42.0**	3	-8.5	0	**33.5**	46.0	**12.5**	135	H	1.98
257.64	QPK	120	**41.4**	3	-8.1	0	**33.3**	46.0	**12.7**	155	V	1.15
271.20	QPK	120	**45.7**	3	-7.5	0	**38.2**	46.0	**7.8**	110	H	1.40
325.44	QPK	120	**48.6**	3	-5.9	0	**42.7**	46.0	**3.3**	40	V	3.06
Measurement Uncertainty: ±4 dB												

f: Frequency | Detct: Detector type | BW: Bandwidth | Rx Level : Receiver level | MD: Measurement distance | CF: Correction factor | DEF: Distance extrapolation factor | LC: Level corrected | EP: EUT Position | Pol:Antenna polarization | H: Antenna height

Bandwidth = the measuring receiver bandwidth
Remark: *1 noise floor noise level of the measuring instrument ≤ 4.0dBµV @ 10m distance (0.009 – 30 MHz)
Remark: *2 noise floor noise level of the measuring instrument ≤ 6.5dBµV @ 3m distance (30 – 1,000 MHz)
Remark: *3 noise floor noise level of the measuring instrument ≤ 10 dBµV @ 3m distance (1,000 – 2,000 MHz)
Remark: *4 noise floor noise level of the measuring instrument ≤ 17 dBµV @ 3m distance (2,000 – 5,500 MHz)
Remark: *5 for using a pre-amplifier in the range between 100 kHz and 1,000 MHz

Blue marked: restricted bands
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

N.t.* see clause: 9

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Fundamental Emission & Harmonics (Section 15.225, 15.205 and 15.209)

f	Detect.	BW	Rx Level	MD	CF	DEF	LC	Limit	Margin	EP	Antenna	
											Pol	H
MHz	Type	kHz	dBµV	m	dB	dB	dBµV/m	dBµV/m	dB	°	H / V	m
13.560	QPK	9	**74.4**	10	19.0	-19.1	**74.3**	84.0 @ 30	**9.7**	90	90	1.00
27.120	QPK	9	**20.5**	10	19.3	-19.1	**20.7**	29.5 @ 30	**8.8**	0	0	1.00
40.680	QPK	120	**42.5**	3	-7.5	0	**35.0**	40.0 @ 3	**5.0**	195	V	1.56
54.240	QPK	120	**45.8**	3	-8.4	0	**37.4**	40.0 @ 3	**2.6**	0	V	1.17
67.800	QPK	120	**42.3**	3	-10.4	0	**31.9**	40.0 @ 3	**8.1**	125	V	1.02
81.360	QPK	120	**39.2**	3	-11.7	0	**27.5**	40.0 @ 3	**12.5**	0	V	1.75
94.920	QPK	120	**39.0**	3	-11.0	0	**28.0**	43.5 @ 3	**15.5**	110	H	1.56
149.160	QPK	120	**36.2**	3	-6.7	0	**29.5**	43.5 @ 3	**14.0**	65	V	1.04
162.720	QPK	120	**33.8**	3	-6.7	0	**27.1**	43.5 @ 3	**16.4**	135	H	1.22
176.280	QPK	120	**32.5**	3	-8.7	0	**23.8**	43.5 @ 3	**19.7**	65	V	1.00
189.840	QPK	120	**45.8**	3	-10.2	0	**35.6**	43.5 @ 3	**7.9**	70	H	2.05
203.400	QPK	120	**38.7**	3	-10.6	0	**28.1**	43.5 @ 3	**15.4**	0	V	1.43
216.960	QPK	120	**43.1**	3	-9.5	0	**33.6**	46.0 @ 3	**12.4**	135	H	1.07
230.520	QPK	120	**42.0**	3	-8.7	0	**33.3**	46.0 @ 3	**12.7**	135	H	1.05
298.320	QPK	120	**48.5**	3	-6.3	0	**42.2**	46.0 @ 3	**3.8**	110	H	2.00
311.880	QPK	120	**42.4**	3	-6.1	0	**36.3**	46.0 @ 3	**9.7**	110	H	2.75
366.120	QPK	120	**39.8**	3	-4.8	0	**35.0**	46.0 @ 3	**11.0**	40	H	1.77
474.600	QPK	120	**37.5**	3	-3.0	0	**34.5**	46.0 @ 3	**11.5**	135	H	1.18
501.720	QPK	120	**34.9**	3	-2.5	0	**32.4**	46.0 @ 3	**13.6**	135	H	2.12
772.920	QPK	120	**41.5**	3	2.4	0	**43.9**	46.0 @ 3	**2.1**	135	H	2.00

Measurement Uncertainty: ±4 dB

f: Frequency | Detct: Detector type | BW: Bandwidth | Rx Level: Receiver level | MD: Measurement distance | CF: Correction factor | DEF: Distance extrapolation factor | LC: Level corrected | EP: EUT Position | Pol:Antenna polarization | H: Antenna height

Bandwidth = the measuring receiver bandwidth
Remark: *1 noise floor noise level of the measuring instrument ≤ 4.0dBµV @ 10m distance (0.009 – 30 MHz)
Remark: *2 noise floor noise level of the measuring instrument ≤ 6.5dBµV @ 3m distance (30 – 1,000 MHz)
Remark: *3 noise floor noise level of the measuring instrument ≤ 10 dBµV @ 3m distance (1,000 – 2,000 MHz)
Remark: *4 noise floor noise level of the measuring instrument ≤ 17 dBµV @ 3m distance (2,000 – 5,500 MHz)
Remark: *5 for using a pre-amplifier in the range between 100 kHz and 1,000 MHz

Blue marked: restricted bands

Bandwidth = the measuring receiver bandwidth
Remark: *1 noise floor noise level of the measuring instrument ≤ 4.0dBµV @ 10m distance (0.009 – 30 MHz)
Remark: *2 noise floor noise level of the measuring instrument ≤ 6.5dBµV @ 3m distance (30 – 1,000 MHz)
Remark: *3 noise floor noise level of the measuring instrument ≤ 10 dBµV @ 3m distance (1,000 – 2,000 MHz)
Remark: *4 noise floor noise level of the measuring instrument ≤ 17 dBµV @ 3m distance (2,000 – 5,500 MHz)
Remark: *5 for using a pre-amplifier in the range between 100 kHz and 1,000 MHz

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Test Cables used	K1a, K40, K56, K83, K84
Test equipment used	103, 166a, 171a, 23, 406, 430

The equipment passed the conducted tests	**Yes**	~~No~~	~~N.t.~~*

Test setup photos / test results are attached	**Yes**	~~No~~	Annex no. 6

N.t.* see clause: 9

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8.5 Frequency tolerance

8.5.1 Regulation

The frequency tolerance of the carrier signal shall be maintained within ± 0.01 % of the operating frequency over a temperature variation of -20 °C to +55 °C at normal supply voltage, and for a variation in the primary supply voltage from 85 % to 115 % of the rated supply voltage at a temperature of 20 °C.

8.5.2 Test procedures

Stability with respect to ambient temperature:

Supply the EUT with nominal ac voltage, or install a new or fully charged battery in the EUT. If possible, a dummy load should be connected to the EUT, because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, the EUT should be placed in the center of the chamber with the antenna adjusted to the shortest length possible. Turn the EUT on, and tune it to one of the number of frequencies required

Couple the intentional radiator output to the measuring instrument by connecting an antenna to the measurement instrument with a suitable length of coaxial cable and placing the measurement antenna near the EUT (e.g., 15 cm away) or by connecting a dummy load to the measuring instrument through an attenuator, if necessary.

Supply the EUT with nominal ac voltage, or install a new or fully charged battery in the EUT. Turn the EUT on, and couple its output to the measuring instrument by connecting an antenna to the measurement instrument with a suitable length of coaxial cable.

Adjust the location of the measurement antenna and the controls on the measuring instrument to obtain a suitable signal level (i.e., a level that will not overload the measuring instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

Tune the EUT to any one of the number of frequencies specified. Turn the EUT off, and place it inside an environmental chamber if appropriate. Allow the chamber to stabilize at +20 °C before proceeding. Turn on the EUT, and record the operating frequency of the intentional radiator at startup and two, five, and ten minutes after startup. Turn the EUT off and allow it to cool to the ambient temperature, and then repeat this procedure for the number of the frequencies specified. Four measurements are made at each operating frequency.

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Stability with respect to input voltage:

Supply the EUT with nominal ac voltage, or install a new or fully charged battery in the EUT. If possible, a dummy load should be connected to the EUT, because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, the EUT should be placed in the center of the chamber with the antenna adjusted to the shortest length possible. Turn the EUT on, and tune it to one of the number of frequencies required.

Couple the intentional radiator output to the measuring instrument by connecting an antenna to the measurement instrument with a suitable length of coaxial cable and placing the measurement antenna near the EUT (e.g., 15 cm away) or by connecting a dummy load to the measuring instrument through an attenuator, if necessary.

Adjust the location of the measurement antenna and the controls on the measuring instrument to obtain a suitable signal level (i.e., a level that will not overload the measuring instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Turn the EUT off, and place it inside an environmental temperature chamber. For devices that are normally operated continuously, the EUT may be energized while inside the test chamber. For devices that have oscillator heaters, energize only the heater circuit while the EUT is inside the chamber.

Set the temperature control on the chamber to the highest specified EUT operating temperature, and allow the temperature inside the chamber to stabilize at the set temperature before starting frequency measurements.

While maintaining a constant temperature inside the environmental chamber, turn the EUT on and record the operating frequency at startup and two, five, and ten minutes after the EUT is energized. Four measurements in total are made.

Repeat the above procedure until the number of frequencies specified has been measured. After all measurements have been made at the highest specified temperature, turn the EUT off. Repeat the above measurement process for the EUT with the test chamber set at the lowest temperature specified by the regulatory or procuring agency. Measurements shall be made at the number of frequencies specified.

8.5.3 Result

Frequency tolerance (Section 15.225)			
Test conditions T_{nom} = +20° C	Frequency Measured (MHz)	Frequency Error (kHz)	ppm
V_{min} = 108 V AC	13.560251	+0.251	18.51
V_{nom} = 120 V AC	13.560251	+0.251	18.51
V_{max} = 132 V AC	13.560251	+0.251	18.51
Maximum Frequency error (MHz)		---	---
	Measurement uncertainty	± 5*10^{-8}	

Frequency tolerance (Section 15.225)			
Test conditions V_{nom} = 120 V AC	Frequency Measured (MHz)	Frequency Error (kHz)	(ppm)
T_{min} -20 °C	13.560315	+0.315	23.23
T_{min} -10 °C	13.560334	+0.334	24.63
T_{min} 0 °C	13.560326	+0.326	24.04
T_{min} +10 °C	13.560270	+0.270	19.91
T_{min} +20 °C	13.560251	+0.251	18.51
T_{min} +30 °C	13.560236	+0.236	17.40
T_{min} +40 °C	13.560202	+0.202	14.90
T_{min} +50 °C	13.560184	+0.184	13.57
Maximum frequency error (kHz)		0.334	24.63
	Measurement uncertainty	±5*10^{-8}	

Test Cables used	K122
Test equipment used	87, 144, 155, 502, 130, test-fixture

The equipment passed the conducted tests	Yes	~~No~~	~~N.t.~~*

Test setup photos / test results are attached	~~Yes~~	No	Annex no.

N.t.* see clause: 9

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8.6 Bandwidth (20 dB)

8.6.1 Regulation

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

8.6.2 Calculation of the 20 dB bandwidth limit

Within the specified band!

8.6.3 Test procedure

ANSI C63.10-2013 Section 6.9.3 Occupied bandwidth measurements.
The occupied bandwidth is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by a specified ratio (or in decibels, a specified number of dB down from the reference value). Typical ratios, expressed in dB, are -6 dB, -20 dB, and -26 dB, corresponding to 6 dB BW, 20 dB BW, and 26 dB BW, respectively. In this sub-clause, the ratio is designated by "-xx dB." The reference value is either the level of the unmodulated carrier or the highest level of the spectral envelope of the modulated signal, as stated by the applicable requirement. Some requirements might specify a specific maximum or minimum value for the "-xx dB" bandwidth; other requirements might specify that the "−xx dB" bandwidth be entirely contained within the authorized or designated frequency band.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d) Steps a) through c) might require iteration to adjust within the specified tolerances.

e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.

f) Set detection mode to peak and trace mode to max hold.

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g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyser marker to the highest level of the displayed trace (this is the reference value).

h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum Analyser and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "- xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the "-xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labelled. Tabular data may be reported in addition to the plot(s).

8.6.4 Result

The measured 20 dB bandwidth is: 3.198 kHz

Test Cables used	K122
Test equipment used	87, 144, 155, 502, test-fixture

The equipment passed the conducted tests	**Yes**	~~No~~	~~N.t.*~~

Test setup photos / test results are attached	**Yes**	~~No~~	Annex no. 3

N.t.* see clause: 9

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9. Additional information to the test report

Remark	Description
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
N.t.[3]	Not tested, because not applicable to the EUT
N.t.[4]	Not tested, because not ordered

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10. List of test equipment

Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration	Calibration executed by
V-LISN 50 ohms//(50 uH+5 ohms)	EMCO (49b)	9512-1227	08/2014	08/2017	Dudde
V-LISN 50 ohms//(50 uH+5 ohms)	RFT NNB 11 (72)	13835240	09/2016	09/2019	Rohde & Schwarz
Protector limiter 9 kHz - 30MHz 10 dB	Rhode & Schwarz ESH 3Z2 (272)	357,881052	02/2016	02/2019	Dudde
Receiver (9 kHz - 30MHz)	Schwarzbeck FMLK 1518 (428)	1518294 9360	08/2016	08/2019	Testo
Panorama- Monitor FMLK / VUMA	PAZ1550 (429)	---	---	---	---
RF- cable	Aircell 1.5m [BNC/N]	K30	10/2016	10/2017	Dudde

Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration	Calibration executed by
OATS	Dudde (104)	---	06/2016	06/2018	Dudde
Pre-amplifier (100kHz - 1.3GHz)	Hewlett Packard 8447 E (166a)	1726A00705	07/2016	07/2018	Dudde
Receiver (9 kHz –18.0 GHz)	Rohde & Schwarz Spectrum Analyzer FSL 18 (171a)	100.117	03/2016	09/2017	Rohde & Schwarz
Bilog-antenna (30- 1000 MHz)	Schwarzbeck VULP 9168 (406)	---	04/2016	04/2019	Seibersdorf
Log. Per, Antenne (1- 18 GHz)	Schwarzbeck STLP 9148 (445a)	---	03/2016	03/2019	Seibersdorf
Horn antenna (15.0-40.0 GHz)	Schwarzbeck BBHA 9170 (280)	BBHA9170378	08/2014	08/2017	Dudde
Signal Analyzer (9 kHz –30.0 GHz)	Rohde & Schwarz FSV 30 (502)	100932	06/2016	06/2019	Rohde & Schwarz

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11. Cable list

Type	Manufacturer/ Model no.	Cable no.	Last calibration	Next calibration	Calibration executed by
RF- cable	Kabelmetal 18m [N]	K1a	10/2016	10/2017	Dudde
RF- cable	Aircell 0.5m [BNC]	K40	10/2016	10/2017	Dudde
RF- cable	Sucoflex 104 Suhner [N] 1 m	K52	10/2016	10/2017	Dudde
RF- cable	Aircell 1m [BNC/N]	K56	10/2016	10/2017	Dudde
RF- cable	Sucoflex 100 Suhner [N] 1 m	K61	10/2016	10/2017	Dudde
RF- cable	Sucoflex 106 Suhner 6,4m [N]	K74	10/2016	10/2017	Dudde
RF- cable	Sucoflex 106 Suhner 6,4m [N]	K75	10/2016	10/2017	Dudde
RF- cable	Sucoflex Suhner 13 m [N]	K144	10/2016	10/2017	Dudde
RF- cable	Sucoflex Suhner 8m [SMA]	K145	10/2016	10/2017	Dudde
RF- cable	Sucoflex Suhner 8m [SMA]	K146	10/2016	10/2017	Dudde

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End of test report

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