EUT: Diver-DXT
FCC ID: V43DIVERDXT

Date of issue: 2008-05-22

DAT-P-225/96

Test Report
acc. to the relevant standard
47 CFR Part 15 C – Intentional Radiators
Measurement Procedure:
ANSI C63.4-2003
relating to
Van Essen Instruments bv
Diver-DXT

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

DAT-P-225/96

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

EUT: Diver-DXT
FCC ID: V43DIVERDXT

Date of issue: 2008-05-22

Manufacturer's details	
Manufacturer	Van Essen Instruments bv
Manufacturer's grantee code	**V43**
Manufacturer's address	Delftechpark 20
	2628 XH, Delft
	The Netherlands
	Phone: +31 15 2755000
	Fax: +31 15 2755055
	Email: rruizenaar@slb.com
Relevant standard used	47 CFR Part 15C - Intentional Radiators
	ANSI C63.4-2003

Test report prepared by	
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	51429 Bergisch Gladbach
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Equipment **U**nder **T**est **(EUT)**	
Equipment category	Transceiver
Trade name	Schlumberger Water Services
Type designation	Diver-DXT
Serial no.	---
Variants	---

EUT: Diver-DXT
FCC ID: V43DIVERDXT

Date of issue: 2008-05-22

1. Test result summary

CFR Section	Report Chapter	Requirements Headline	Test result		
15.203	**11.1**	**Antenna requirement**	**Pass**	~~**Fail**~~	~~**N.t.**~~
15.205	**11.2**	**Restricted bands of operation**	**Pass**	~~**Fail**~~	~~**N.t.**~~
15.209	**11.3**	**Radiated emission limits, general requirements**	**Pass**	~~**Fail**~~	~~**N.t.**~~
15.249(a)	**11.4**	**Fundamental frequencies / Field strength limits**	**Pass**	~~**Fail**~~	~~**N.t.**~~
15.215(c)	**11.6**	**Bandwidth (20 dB)**	**Pass**	~~**Fail**~~	~~**N.t.**~~

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

Signature
Technician Ralf Trepper

Signature
Manager Manfried Dudde

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

2. Test laboratory

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

3. Introduction

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of m. dudde hochfrequenz - technik.

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

Manufacturer

Company name	: Van Essen Instruments bv
Address	: Delftechpark 20
Postcode	: 2626 XH
City/town	: Delft
Country	: The Netherlands
Telephone	: +31 15 2755000
Fax	: +31 15 2755055
Email	: rruizenaar@slb.com
Date of order	: 2007-10-23
References	: Mr. R.J.B. Ruizenaar

4. Product

Samples of the following apparatus were submitted for testing:

Type of equipment	:	Transceiver
Trademark	:	Schlumberger Water Services
Type designation	:	Diver-DXT
Hardware version	:	Diver-DXT
Serial number	:	---
Software release	:	---
Power used	:	3.6V DC
Frequency used	:	2.405 GHz to 2.480 GHz (16 Channels)
Generated or used frequencies	:	2.405 GHz to 2.480 GHz, 16 MHz Crystal, 32.768 kHz Crystal
FCC ID	:	**V43DIVERDXT**

5. Test schedule

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

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

The test sample was received on:

- 2008-03-18

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

- 2008-04-23 - 2008-04-25

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6. Product and measurement documentation

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

Description	Date	Identifications
External photographs of the **E**quipment **U**nder **T**est	2008-05-22	Annex no. 1
Internal photographs of the **E**quipment **U**nder **T**est	2008-05-22	Annex no. 2
Occupied bandwidth plot	2008-05-22	Annex no. 3
Label sample	2008-05-19	Annex no. 4
Product description	2008-05-19	Annex no. 5
Test setup photos	2008-05-21	Annex no. 6
Block diagram	2008-05-22	Annex no. 7
Schematics	2006-04-24	Annex no. 8a
Parts list	2007-05-21	Annex no. 8b
Operational description	2008-05-21	Annex no. 9

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

7. Observations and comments

8. Summary

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

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

The samples were tested according to the following specification:

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

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9. Conclusions

Samples of the apparatus were found to **CONFORM WITH** the specifications stated in chapter 8 "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 8.

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 6. 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 **34.**

Technical inspector:

Date : 2008-05-22

Name : Ralf Trepper

Signature : 

Technical responsibility for area of testing:

Date : 2008-05-22

Name : Manfried Dudde

Signature : 

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10. Operational description

10.1 EUT details

See Annex no. 5

10.2 EUT configuration

In order to initiate a radio transmission, the *Transceiver Diver-DXT* has to be direct connected to an integrated battery. With the implemented testsoftware and jumper settings there will be established different transmission modes.

10.3 EUT measurement description

Radiated emission test

The *Transceiver Diver-DXT* will be tested. In order to establish the maximum radiation, firstly, there have been viewed all orthogonal adjustments of the test sample, secondly the test sample have been rotated at all adjustments around the own axis between 0° and 360°, and thirdly, the antenna polarization between horizontal and vertical had been varied.

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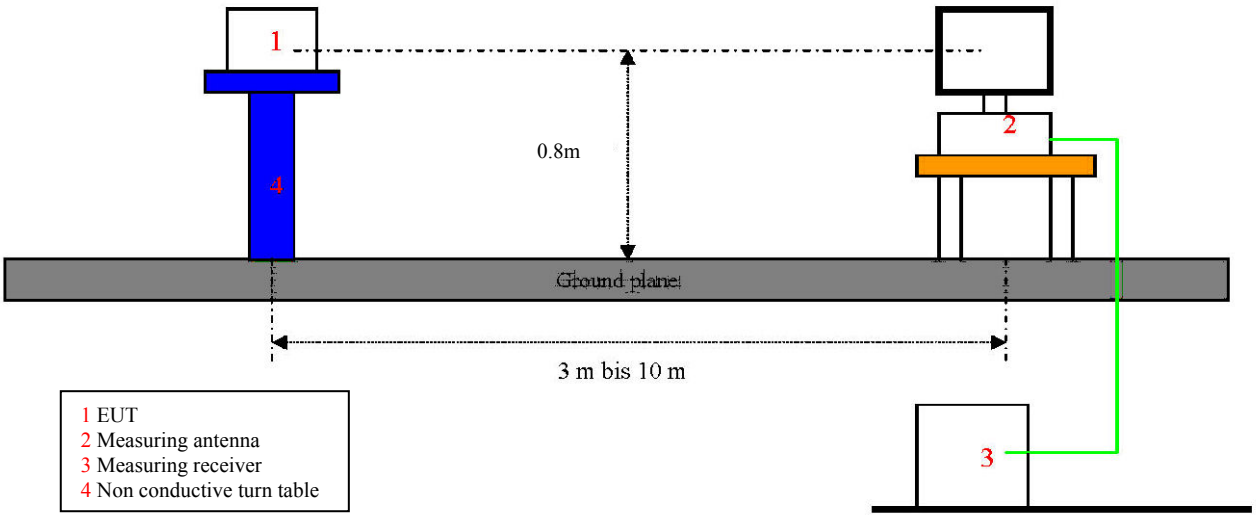
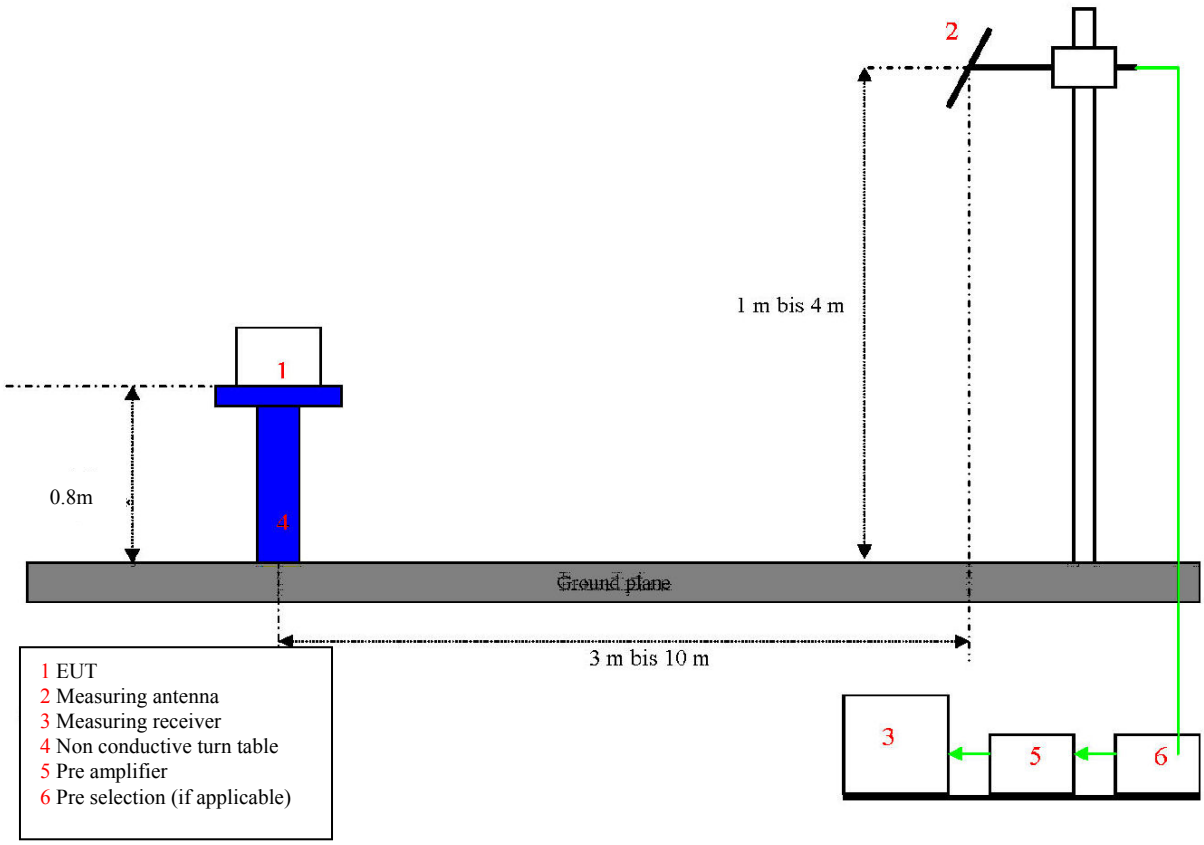
11.1 Test set-up for the measurement

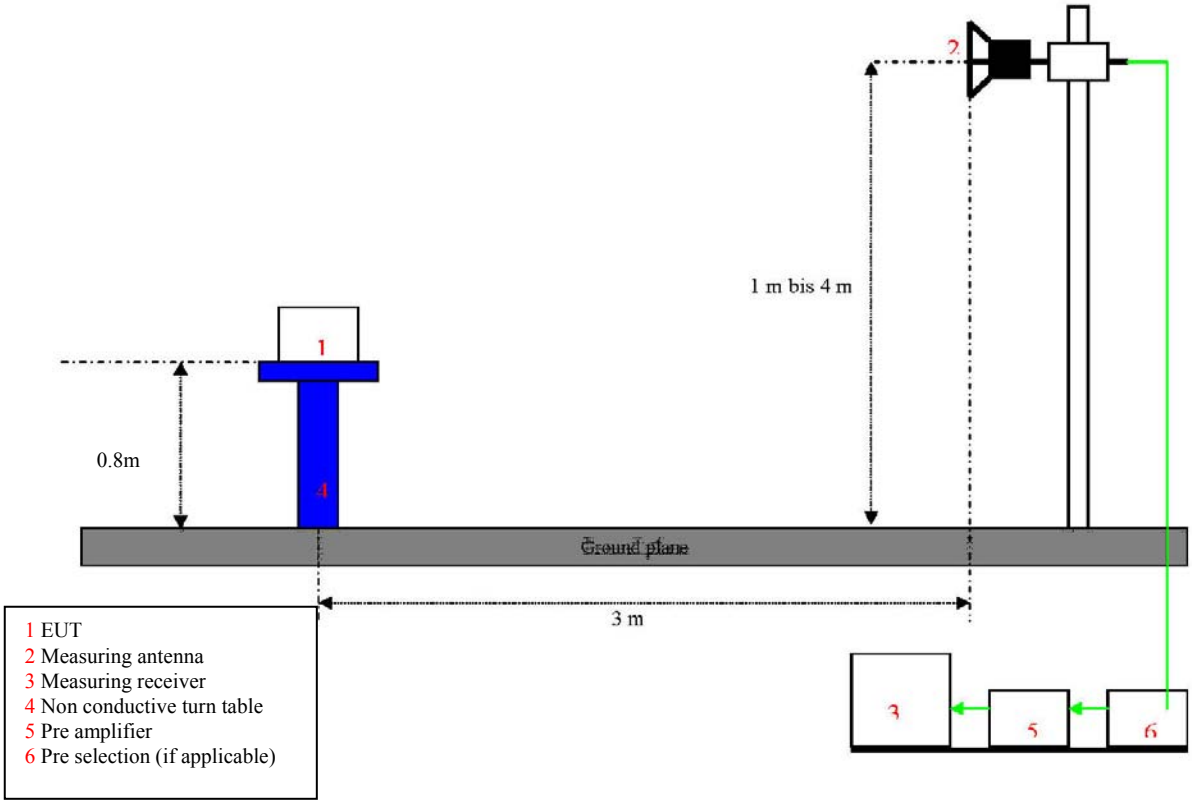
11.1.1 Test set up: below 30 MHz



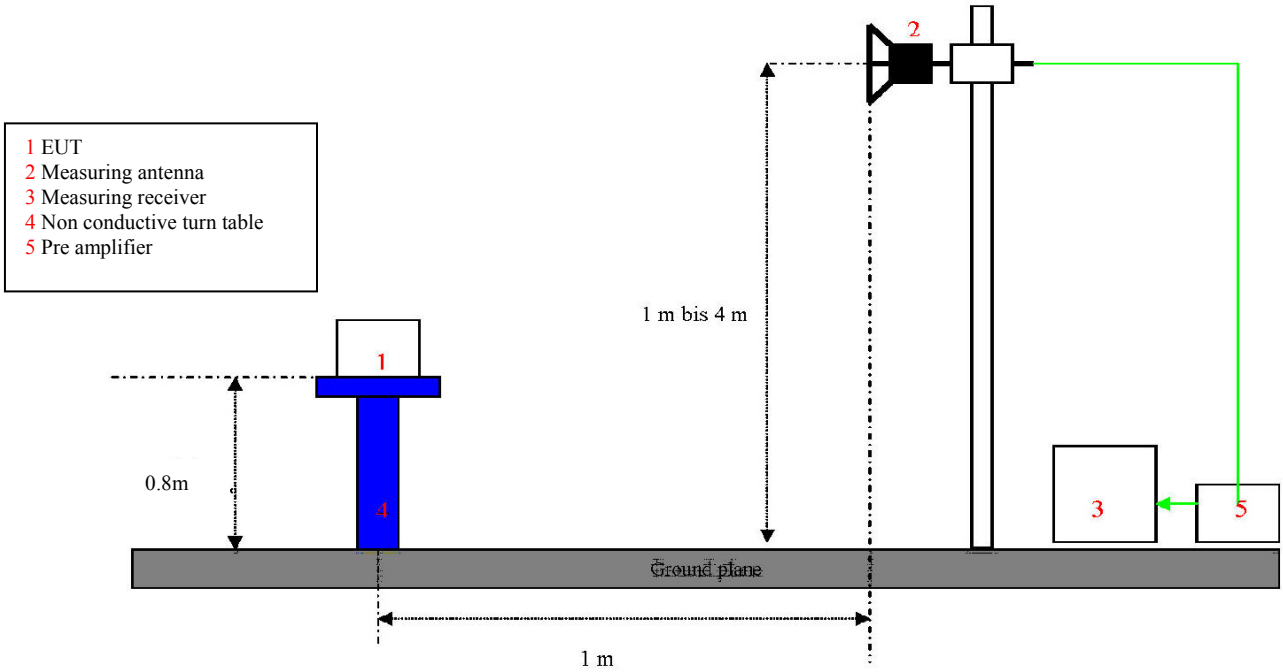
11.1.2 Test set up: 25 MHz up to 1000 MHz



11.1.3 Test set up: 1 GHz up to 14 GHz



11.1.4 Test set up: 14 GHz up to 34 GHz



11.2 Antenna requirement

11.2.1 Regulation

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

11.2.2 Result

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

Further test results are attached	~~**Yes**~~	**No**	

n.a.* See page no. 24

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11.3 Restricted bands of operation

11.3.1 Regulation

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

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(9) Devices operated in the 24.0-24.25 GHz band under § 15.249 are exempt from 83 complying with the requirements of this section for the 48.0-48.5 GHz and 72.0-72.75 GHz bands only, and shall not exceed the limits specified in § 15.249(a).

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

11.3.2 Result

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

Further test results are attached	~~**Yes**~~	**No**	

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11.4 Radiated emission limits, general requirements

11.4.1 Regulation

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

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

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

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

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

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

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

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11.4.2 Test equipment

Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Receiver (9 kHz –26.5 GHz)	**Hewlett Packard Spectrum Analyzer 8593E (171)**	**3528U00990**	**2007/08**	**2009/08**
Receiver (9 kHz –40.0 GHz) (40.0 GHz -110 GHz)	**Anritsu Spectrum Analyzer MS2668 (359a)**	**6200163244**	**2008/04**	**2010/04**
Pre-amplifier (100kHz - 1.3GHz)	**Hewlett Packard 8447 E (166a)**	**1726A00705**	**2008/02**	**2010/02**
Pre-amplifier (1GHz - 18GHz)	**Narda --- (345)**	**---**	**2008/02**	**2010/02**
Pre-amplifier (24GHz)	**Dudde --- (433)**	**---**	**2008/02**	**2010/02**
Loop antenna (0.009 - 30 MHz)	Schwarzbeck FMZB 1516 (23)	**---**	**2007/07**	**2010/07**
Bilog antenna (30- 1000 MHz)	**Schwarzbeck VULP 9168 (406)**		**2007/02**	**2013/02**
Horn antenna (0,86-8,5 GHz)	**Schwarzbeck BBHA 9120 A (284)**	**236**	**2008/01**	**2013/01**
Horn antenna (15-40 GHz)	**Schwarzbeck BBHA 9170 (281)**	**41**	**2000/01**	**2010/01**
RF- cable	**Kabelmetal 18m [N]**	**K1**	**2008/01**	**2009/01**
RF- cable	**Sucoflex Suhner 2,13m [APC 3.5]**	**K17a**	**2008/01**	**2009/01**
RF- cable	**Sucoflex Suhner 2,13m [APC 3.5]**	**K18a**	**2008/01**	**2009/01**
RF- cable	**Aircell 0.5m [BNC]**	**K40**	**2008/01**	**2009/01**
RF- cable	**Aircell 1m [BNC/N]**	**K56**	**2008/01**	**2009/01**
RF- cable	**Sucoflex 106 Suhner 6,4m [N]**	**K74**	**2008/01**	**2009/01**
RF- cable	**Sucoflex 106 Suhner 6,4m [N]**	**K75**	**2008/01**	**2009/01**

11.4.3 Test procedure

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

ANSI C63.4: 2003 Section 8 "Radiated Emissions Testing"

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

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

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

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

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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).

11.4.4 Calculation of the field strength

The field strength is calculated by the following calculation:

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

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

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

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

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

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

EUT: Diver-DXT
FCC ID: V43DIVERDXT

Date of issue: 2008-05-22

11.4.5 Test result

TRANSMITTER SPURIOUS RADIATION BELOW 30 MHz (Section 15.205, 15.209)									
f (MHz)	Bandwidth (kHz) Type of detector	Noted receiver level **dBµV**	Test distance **m**	Correction factor **dB**	Distance extrapol. factor **dB**	Level corrected **dBµV/m**	Limit **dBµV/m**	Margin **dBµV/m**	Polarisation EUT / antenna orientation
0.1200	*PK/0.2kHz*	*< 4.0*	*10*	20.2	*-59.1*	-34.90	*Pk46.0- @ 300*	80.90	V, H/0-360°
	AV/0.2kHz	*< 4.0*	*10*	20.2	*-59.1*	-34.90	*AV26.0 @ 300*	80.90	V, H/0-360°
0.5000	*AV/0.2kHz*	*< 4.0*	*10*	20.2	*-19.1*	5.10	*AV33.6 @ 30*	28.5	V, H/0-360°
1.5000	*AV/0.2kHz*	*< 4.0*	*10*	20.2	*-19.1*	5.10	*AV24.1 @ 30*	19.00	V, H/0-360°
3.0000	*AV/9.0kHz*	*< 4.0*	*10*	20.2	*-19.1*	5.10	*AV29.5 @ 30*	24.4	V, H/0-360°
5.0000	*AV/9.0kHz*	*< 4.0*	*10*	20.2	*-19.1*	5.10	*AV29.5 @ 30*	24.4	V, H/0-360°
8.0000	*AV/9.0kHz*	*< 4.0*	*10*	20.2	*-19.1*	5.10	*AV29.5 @ 30*	24.4	V, H/0-360°
10.0000	*AV/9.0kHz*	*< 4.0*	*10*	20.2	*-19.1*	5.10	*AV29.5 @ 30*	24.4	V, H/0-360°
20.0000	*AV/9.0kHz*	*< 4.0*	*10*	20.2	*-19.1*	5.10	*AV29.5 @ 30*	24.4	V, H/0-360°
30.0000	*AV/9.0kHz*	*< 4.0*	*10*	20.2	*-19.1*	5.10	*AV29.5 @ 30*	24.4	V, H/0-360°
No emissions detected									
Measurement uncertainty		4 dB							

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

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

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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**	AV Correction factor **dB**	Level corrected **dBµV/m**	Limit **dBµV/m**	Margin **dBµV/m**	Polaris. EUT / antenna	Antenna height **cm**
30.0000	100, AV	≤ 3.5	3	-2.6*[6]	0	0	0.90	40.00	39.10	H,V/H,V	100-400
88.0000	100, AV	≤ 3.5	3	-10.8*[6]	0	0	-7.30	40.00	47.30	H,V/H,V	100-400
216.0000	100, AV	≤ 3.5	3	-10.3*[6]	0	0	-6.80	43.50	50.30	H,V/H,V	100-400
960.0000	100, AV	≤ 3.5	3	8.5*[6]	0	0	12.00	43.50	31.50	H,V/H,V	100-400
1,700.0000	1000, AV	≤ 4.5	3	3.8*[6]	0	0	8.30	54.00	45.70	H,V/H,V	100-400
2,250.0000	1000, AV	≤ 10	3	8.0*[6]	0	0	18.00	54.00	36.00	H,V/H,V	100-400
4,000.0000	1000, AV	≤ 10	3	8.4*[7]	0	0	18.40	54.00	35.60	H,V/H,V	100-400
5,000.0000	1000, AV	≤ 10	3	9.1*[7]	0	0	19.40	54.00	34.60	H,V/H,V	100-400
7,500.0000	1000, AV	≤ 14	3	12.9*[7]	0	0	26.90	54.00	27.10	H,V/H,V	100-400
8,300.0000	1000, AV	≤ 14	3	14.8*[7]	0	0	28.80	54.00	25.20	H,V/H,V	100-400
9,400.0000	1000, AV	≤ 14	3	16.0*[7]	0	0	30.00	54.00	24.00	H,V/H,V	100-400
11,000.0000	1000, AV	≤ 14	3	18.3*[7]	0	0	32.3	54.00	21.7	H,V/H,V	100-400
13,250 - 13,400	1000, AV	≤ 14	3	18.9*[7]	0	0	32.9	54.00	21.1	H,V/H,V	100-400
Measurement uncertainty			4 dB								

Bandwidth = the measuring receiver bandwidth

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

Bandwidth = the measuring receiver bandwidth

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

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

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11.5 Fundamental frequencies / Field strength limits

11.5.1 Regulation

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
902 - 928 MHz	50	500
2400 - 2438.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F) - 6136.3636; for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this Section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in Section 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of Section 15.205 shall be demonstrated using the measurement instrumentation specified in that section.

(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in Section 15.209, whichever limit permits a higher field strength.

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11.5.2 Test equipment

Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Receiver	Hewlett Packard Spectrum Analyzer	3528U00990	2007/08	2009/08
(9 kHz –26.5 GHz) Receiver (9 kHz –40.0 GHz) (40.0 GHz -110 GHz)	8593E (171) Anritsu Spectrum Analyzer MS2668 (359a)	6200163244	2008/04	2010/04
Pre-amplifier	Hewlett Packard	1726A00705	2008/02	2010/02
(100kHz - 1.3GHz) Pre-amplifier	8447 E (166a) Narda	---	2008/02	2010/02
(1GHz - 18GHz)	--- (345)			
Pre-amplifier	Dudde	---	2008/02	2010/02
RF- cable	Kabelmetal 18m [N]	K1	2008/01	2009/01
RF- cable	Sucoflex Suhner 2,13m [APC 3.5]	K17a	2008/01	2009/01
RF- cable	Sucoflex Suhner 2,13m [APC 3.5]	K18a	2008/01	2009/01
RF- cable	Aircell 0.5m [BNC]	K40	2008/01	2009/01
RF- cable	Aircell 1m [BNC/N]	K56	2008/01	2009/01
RF- cable	Sucoflex 106 Suhner 6,4m [N]	K74	2008/01	2009/01
RF- cable	Sucoflex 106 Suhner 6,4m [N]	K75	2008/01	2009/01

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11.5.3 Test procedure

The EUT and this peripheral (when additional equipment exists) are placed on a turn table which is 0.8m 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 are changed in horizontal and vertical polarization, the position of the EUT was changed in different orthogonal determinations.

ANSI C63.4: 2003 Section 8 “Radiated emission measurements”

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

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

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

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

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Radiated emissions test characteristics	
Frequency range	30 MHz - 4,000 MHz
Test distance	3 m*
Test instrumentation resolution bandwidth	120 kHz (30 MHz - 1,000 MHz)
	1 MHz (1000 MHz - 40,000 MHz)
Receive antenna scan height	1 m - 4 m
Receive antenna polarization	Vertical/horizontal

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

10.5.5 Calculation of the 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.

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10.5.6 Calculation of the field strengths

The field strength is calculated by the following calculation:

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

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

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

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

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

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

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10.5.7 Test result

Lowest frequency (Channel 11: 2.405 GHz)

TRANSMITTER SPURIOUS RADIATION (Section 15.249)										
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 dBµV/m	Polarisation EUT / antenna	Antenna height cm
2.40500	**1000, AV**	**80.7**	**3**	**8.1*[7]**	**0**	**88.8**	**94**	**5.2**	**V,0° / H**	**143**
4.81000	**1000, AV**	**29.9**	**3**	**8.4*[7]**	**0**	**38.3**	**54**	**15.7**	**V,0° / H**	**100**
7.21500	1000, AV	< 14	3	12.9*[7]	0	26.9	54	27.1	H,V/H,V	100 - 400
9.62000	1000, AV	< 14	3	16.6*[7]	0	30.6	54	23.4	H,V/H,V	100 - 400
12.02500	1000, AV	< 14	3	18.5*[7]	0	32.5	54	21.5	H,V/H,V	100 - 400
14.43000	1000, AV	< 14	3	24.7*[7]	0	38.7	54	15.3	H,V/H,V	100 - 400
16.83500	1000, AV	< 18	3	34.4*[7]	0	52.4	54	1.6	H,V/H,V	100 - 400
19.24000	1000, AV	< 18	1	18.6*[8]	-9.5	27.1	54	26.9	H,V/H,V	100 - 400
21.64500	1000, AV	< 18	1	18.4*[8]	-9.5	26.9	54	27.1	H,V/H,V	100 - 400
24.05000	1000, AV	< 18	1	21.2*[8]	-9.5	29.7	54	24.3	H,V/H,V	100 - 400
26.45500	1000, AV	< 18	1	25.1*[8]	-9.5	33.6	54	20.4	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 – 18,000 MHz)
Remark: *[5] noise floor noise level of the measuring instrument ≤ 25dBµV @ 3m distance (18,000 – 40,000 MHz)
Remark: *[6] for using a pre-amplifier in the range between 100 kHz and 1,000 MHz
Remark: *[7] for using a pre-amplifier in the range between 1.0 GHz and 18.0 GHz
Remark: *[8] for using a pre-amplifier in the range between 18 GHz and 25 GHz
Remark: *[9] for using a pre-amplifier in the range between 25 GHz and 38 GHz

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

Further test results are attached	~~**Yes**~~	**No**	

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Middle frequency (Channel 18: 2.440 GHz)

TRANSMITTER SPURIOUS RADIATION (Section 15.249)

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 dBµV/m	Polarisation EUT / antenna	Antenna height cm
2.44000	**1000, AV**	**80.8**	**3**	**8.1*[7]**	**0**	**88.9**	**94**	**5.1**	**V,0° / H**	**141**
4.88000	**1000, AV**	**30.8**	**3**	**8.4*[7]**	**0**	**39.2**	**54**	**14.8**	**V,0° / H**	**105**
7.320000	1000, AV	< 14	3	12.9*[7]	0	26.9	54	27.1	H,V/H,V	100 - 400
9.76000	1000, AV	< 14	3	16.6*[7]	0	30.6	54	23.4	H,V/H,V	100 - 400
12.20000	1000, AV	< 14	3	18.5*[7]	0	32.5	54	21.5	H,V/H,V	100 - 400
14.64000	1000, AV	< 14	3	24.7*[7]	0	38.7	54	15.3	H,V/H,V	100 - 400
17.08000	1000, AV	< 18	3	34.4*[7]	0	52.4	54	1.6	H,V/H,V	100 - 400
19.52000	1000, AV	< 18	1	18.6*[8]	-9.5	27.1	54	26.9	H,V/H,V	100 - 400
21.96000	1000, AV	< 18	1	18.4*[8]	-9.5	26.9	54	27.1	H,V/H,V	100 - 400
24.40000	1000, AV	< 18	1	21.2*[8]	-9.5	29.7	54	24.3	H,V/H,V	100 - 400
26.84000	1000, AV	< 18	1	25.1*[8]	-9.5	33.6	54	20.4	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 – 18,000 MHz)
Remark: *[5] noise floor noise level of the measuring instrument ≤ 25dBµV @ 3m distance (18,000 – 40,000 MHz)
Remark: *[6] for using a pre-amplifier in the range between 100 kHz and 1,000 MHz
Remark: *[7] for using a pre-amplifier in the range between 1.0 GHz and 18.0 GHz
Remark: *[8] for using a pre-amplifier in the range between 18 GHz and 25 GHz
Remark: *[9] for using a pre-amplifier in the range between 25 GHz and 38 GHz

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

Further test results are attached	~~**Yes**~~	**No**	

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Highest frequency (Channel 16: 2.480 GHz)

TRANSMITTER SPURIOUS RADIATION (Section 15.249)										
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 dBµV/m	Polarisation EUT / antenna	Antenna height cm
2.48000	**1000, AV**	**80.8**	**3**	**8.1*[7]**	**0**	**88.9**	**94**	**5.1**	**V,0° / H**	**141**
4.96000	**1000, AV**	**34.0**	**3**	**8.4*[7]**	**0**	**42.4**	**54**	**11.6**	**V,0° / H**	**117**
7.449000	1000, AV	< 14	3	12.9*[7]	0	26.9	54	27.1	H,V/H,V	100 - 400
9.932000	1000, AV	< 14	3	16.6*[7]	0	30.6	54	23.4	H,V/H,V	100 - 400
12.415000	1000, AV	< 14	3	18.5*[7]	0	32.5	54	21.5	H,V/H,V	100 - 400
14.898000	1000, AV	< 14	3	24.7*[7]	0	38.7	54	15.3	H,V/H,V	100 - 400
17.381000	1000, AV	< 18	3	34.4*[7]	0	52.4	54	1.6	H,V/H,V	100 - 400
19.864000	1000, AV	< 18	1	18.6*[8]	-9.5	27.1	54	26.9	H,V/H,V	100 - 400
22.347000	1000, AV	< 18	1	18.4*[8]	-9.5	26.9	54	27.1	H,V/H,V	100 - 400
24.830000	1000, AV	< 18	1	21.2*[8]	-9.5	29.7	54	24.3	H,V/H,V	100 - 400
27.313000	1000, AV	< 18	1	25.1*[8]	-9.5	33.6	54	20.4	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 – 18,000 MHz)
Remark: *[5] noise floor noise level of the measuring instrument ≤ 25dBµV @ 3m distance (18,000 – 40,000 MHz)
Remark: *[6] for using a pre-amplifier in the range between 100 kHz and 1,000 MHz
Remark: *[7] for using a pre-amplifier in the range between 1.0 GHz and 18.0 GHz
Remark: *[8] for using a pre-amplifier in the range between 18 GHz and 25 GHz
Remark: *[9] for using a pre-amplifier in the range between 25 GHz and 38 GHz

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

Further test results are attached	~~**Yes**~~	**No**	

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11.6 Bandwidth (20 dB)

11.6.1 Regulation

(c) 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. 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.

11.6.2 Calculation of the 20 dB bandwidth limit

The 20 dB bandwidth limit = 0.005 * 2.480 GHz = 12.4 MHz

11.6.3 Test equipment

Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Receiver (9 kHz –26.5 GHz)	**Hewlett Packard Spectrum Analyzer 8593E (171)**	**3528U00990**	**2007/08**	**2009/08**
Test fixture for relative measurement	**Dudde**	**---**	**---**	**---**
Power supply	**Hewlett Packard (DC Power Supply) 6034L (226)**	**---**	**2008/05**	**2010/05**

11.6.4 Test procedure

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

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11.6.5 Test result

The measured 20 dB bandwidth of channel 11 is: **4.2 MHz**

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

Further test results are attached	**yes**	~~no~~	Annex no: 3

The measured 20 dB bandwidth of channel 18 is: **4.1 MHz**

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

Further test results are attached	**yes**	~~no~~	Annex no: 3

The measured 20 dB bandwidth of channel 26 is: **4.1 MHz**

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

Further test results are attached	**yes**	~~no~~	Annex no: 3

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12. Additional information to the test report

Remarks

N.t.[1]	Not tested, because the antenna is part of the PCB
N.t.[2]	Not tested, because the EUT is directly battery powered
N.t.[3]	Not tested, because not applicable for this type of equipment

End of test report

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