

EUT: Internet Media Tablet A5H Model Number 7502
FCC ID: SOV7502

Date of issue: 2009-08-18



DAT-P-225/96

Test Report
acc. to the relevant standard
47 CFR Part 15 B – Unintentional Radiators
Measurement Procedure:
ANSI C63.4-2003
relating to
ARCHOS S.A.
Internet Media Tablet A5H
Model Number 7502

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

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Manufacturer's details	
Manufacturer	ARCHOS S.A.
Manufacturer's grantee code	SOV
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	France
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	Phone: +33 (0)1 6933 1690 E-mail: dauce@archos.com
Relevant standard used	47 CFR Part 15 C - Intentional Radiators
	ANSI C63.4-2003


Test Report prepared by	
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Equipment Under Test (EUT)	
Equipment category	FM Receiver
Trade name	ARCHOS
Type designation	Internet Media Tablet A5H, Model Number 7502
Serial no.	---
Variants	---

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FCC ID: SOV7502**Date of issue: 2009-08-18****1. Test result summary**

CFR Section	Report Chapter	Requirements Headline	Test result		
			Pass	Fail	N.t.
15.203	8.1	Antenna requirement	Pass	Fail	N.t.
15.205	8.2	Restricted bands of operation	Pass	Fail	N.t.
15.209	8.3	Radiated emissions	Pass	Fail	N.t.
15.109 (a)(f)	8.4	Receiver radiated emission	Pass	Fail	N.t.
15.111	8.5	Antenna power conducted emissions for receivers	Pass	Fail	N.t.

The equipment meets the requirements	Yes	No
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Signature
(Technical engineer)
Ralf TrepperSignature
(Manager)
Manfred Dudde

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2. Introduction

This test report consists of:

- Test result summary
- Table of contents
- Introduction and further information
- Detailed test information
- List of measurement equipment with calibration validity

All pages have been numbered consecutively and bear the m. dudde hochfrequenz-technik logo, the test report number, the date as well as the type designation of the EUT. The total number of pages in this report is **28**.

The tests were carried out at:

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

in a representative assembly and in accordance with the specifications stated in:

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

The sample of the product was received on:

- 2009-06-17

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

- 2009-07-03 - 2009-08-12

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3. Testing laboratory

Company name : m.dudde hochfrequenz-technik
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51429 Bergisch Gladbach
Country : Germany
Phone : +49 (0) 2207/9689-0
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The laboratory has been accredited by DATech Deutsche Akkreditierungsstelle Technik GmbH under the DAR-registration number: DAT-P-225/96.

The Laboratory's measurement facility has been registered at the FCC under Registration Number 699717. The registration has been renewed on May 29, 2008. All measurement data will be accepted in conjunction with applications for Certification under Parts 15 and 18 of the Commission's Rules.

4. Applicant

Company name : ARCHOS S.A.
Address : 12 rue Ampère
Postcode : 91430
City/town : Igny
Country : France
Telephone : +33 (0)1 6933 1690
Fax : +33 (0)1 6933 1699
E-mail : dauce@archos.com
Date of order : 2009.06.04
References : Mr. Christophe Dauce

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5. Product and product documentation

Samples of the following apparatus were submitted for testing:

Type of equipment : FM broadcast receiver
Trademark : ARCHOS
Type designation : Internet Media Tablet A5H Model Number 7502
Hardware version : Internet Media Tablet A5H Model Number 7502
Serial number(s) : ---
Software release : ---
Power used : 3.5 V DC
Frequency used : 87.5 MHz up to 108.0 MHz (FM Band II broadcast receiver)

Generated or used frequencies : 32.768 kHz (quarz tube), 32.768 kHz (crystal), 12.00 MHz (crystal),
38.4000 MHz (crystal), 16.368 MHz (crystal), 2.412 GHz to 2.462 GHz

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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)	2009-08-16	Annex no. 1
Internal photographs of the Equipment Under Test (EUT)	2009-08-16	Annex no. 2
FCC ID label sample	2009-08-16	Annex no. 4
Functional description	2009-08-16	Annex no. 5
Test setup photos	2009-08-16	Annex no. 6
Block diagram	2009-08-16	Annex no. 7
Schematics	2009-08-16	Annex no. 8
Parts list	2009-08-16	Annex no. 9
Operational description	2009-08-16	Annex no. 10
Antenna description	2009-08-16	Annex no. 11

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

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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 **47 CFR Part 15 C–Intentional Radiators and ANSI C63.4-2003** for the respective test sector, if the test results turn out positive.

Comments: ---

Tester:

Date : 2009-08-16

Name : Ralf Trepper

Signature : 

Technical responsibility for area of testing:

Date : 2009-08-16

Name : Manfred Dudde

Signature : 

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7. Operation description

7.1 EUT details

FM Band II broadcast receiver,

7.2 EUT configuration

Operation: : As soon as the equipment is powered up, RX start operating after selecting the appropriate test mode.
Purpose of operation : see User Manual in Annex No. 5

7.3 EUT measurement description

As soon as the EUT tune up to the FM Band II test mode it starts, after a short delay, to operate in continuous mode. One configuration will be tested as stand alone device. 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 has been varied. All generated frequencies, the lowest and the highest frequency of the **A5H**, have been viewed. The device was tested on a stand alone basis.

In all measurement distances the 3 dB beam width of the measuring antenna, for measurements above 1 GHz, is greater than the EUT's dimensions.

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8.1 Antenna requirement

8.1.1 Regulation

Section 15.203 Antenna requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of Part 15C. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31 (d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

8.1.2 Result

The equipment meets the requirements	Yes	No	N.t.
Further test results are attached	Yes	No	Page no:

N.t. * See page no. 18

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8.2 Restricted bands of operation

8.2.1 Regulation

Section 15.205 Restricted bands of operation

(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.

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(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).

8.2.2 Result

The equipment meets the requirements	Yes	No	N.t.
Further test results are attached	Yes	No	Page no: 17-18

N.t. * See page no. 18

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8.3 Radiated emissions

8.3.1 Regulation

Section 15.209 Radiated emission limits, general requirements.

(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

** 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., Sections 15.231 and 15.241.

(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 Sections 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.

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

(g) 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.

8.3.2 Test equipment

Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Receiver (9 kHz –18.0 GHz)	Rohde & Schwarz Spectrum Analyzer FSL 18 (171a)	100.117	2008/10	2010/10
Receiver (9 kHz –40.0 GHz)	Anritsu Spectrum Analyzer MS2668C (359a)	6200163244	2009/04	2011/04
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
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 (2.0-14.5 GHz)	Schwarzbeck BBHA 9120 C (169)	305	2008/01	2013/01
Horn antenna (14.5-40 GHz)	Schwarzbeck BBHA 9170 (281)	41	2000/01	2010/01
RF- cable	Kabelmetal 18m [N]	K1	2009/01	2010/01
RF- cable	Aircell 0.5m [BNC]	K40	2009/01	2010/01
RF- cable	Aircell 1m [BNC/N]	K56	2009/01	2010/01
RF- cable	Sucoflex 106 Suhner 6,4m [N]	K74	2009/01	2010/01
RF- cable	Sucoflex 106 Suhner 6,4m [N]	K75	2009/01	2010/01

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Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Gain Horn antenna (33-50 GHz)	Dorado GH-22-25 (383)	040810	2005/04	2015/04
Gain Horn antenna (50-75 GHz)	Dorado GH-15-25 (384)	031003	2005/04	2015/04
Gain Horn antenna (75-110 GHz)	Dorado GH-10-25 (385)	040808	2005/04	2015/04
Anritsu Mixer WR22 Q-Band (33-50 GHz)	OM Labs MA2742A (269a)	Q40512-1	2008/04	2010/04
Anritsu Mixer WR15 V-Band (50-75 GHz)	OM Labs MA2744A (295a)	V41027-1	2008/04	2010/04
Anritsu Mixer WR10 W-Band (75-110 GHz)	OM Labs MA2746A (296a)	W40706-2	2008/04	2010/04
RF- cable	Sucoflex 100 Suhner 2,0m [APC 3.5]	K17a	2009/01	2010/01
RF- cable	Sucoflex 100 Suhner 2,0m [APC 3.5]	K18a	2009/01	2010/01
RF- cable	QMI 0.6m [APC 3.5]	K67	2009/01	2010/01
RF- cable	QMI 0.6m [APC 3.5]	K68	2009/01	2010/01

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8.3.3 Test procedure

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

ANSI C63.4: 2003 Section 8 “Radiated Emissions Testing”

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

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

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).

8.3.4 Calculation of the field strength

The field strength is calculated by the following calculation:

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

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

Receiver Level : Receiver reading without correction factors

Correction Factor : Antenna factor + cable loss

For example:

The receiver reading is 32.7 dB μ V. The antenna factor for the measured frequency is +2.5 dB (1/m) and the cable factor for the measured frequency is 0.71 dB, giving a field strength of 35.91dB μ V/m.

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

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

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

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8.3.6 Test result

RECEIVER 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	NA
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Further test results are attached	Yes	No	Page no.
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8.3.6 Result

RECEIVER SPURIOUS RADIATION ABOVE 30 MHz (Section 15.205, 15.209)

f (MHz)	Bandwidth (kHz) Type of detector	Noted receiver level dBμV	Test distance m	Correction factor dB	Distance extrapol. factor dB	AV Correction factor dB	Level corrected dBμV/m	Limit dBμV/m	Margin dBμV/m	Polaris. EUT / antenna	Antenna height cm
30.0000	100, AV	≤ 3.5	3	-2.60	0	0	0.90	40.00	39.1	H,V/H,V	100-400
88.0000	100, AV	≤ 3.5	3	-10.80	0	0	-7.30	40.00	47.3	H,V/H,V	100-400
216.0000	100, AV	≤ 3.5	3	-10.30	0	0	-6.80	43.50	50.3	H,V/H,V	100-400
960.0000	100, AV	≤ 3.5	3	8.50	0	0	12.00	43.50	31.5	H,V/H,V	100-400
1700.0000	1000, AV	≤ 4.5	3	3.80	0	0	8.30	54.00	45.7	H,V/H,V	100-400
2250.0000	1000, AV	≤ 10	3	8.00	0	0	18.00	54.00	36.0	H,V/H,V	100-400
4000.0000	1000, AV	≤ 10	3	8.40* ⁶	0	0	18.40	54.00	35.6	H,V/H,V	100-400
5000.0000	1000, AV	≤ 10	3	9.10* ⁶	0	0	19.40	54.00	34.6	H,V/H,V	100-400
7500.0000	1000, AV	≤ 14	3	12.9* ⁶ 0	0	0	26.90	54.00	27.1	H,V/H,V	100-400
8300.0000	1000, AV	≤ 14	3	14.80* ⁶	0	0	28.80	54.00	25.2	H,V/H,V	100-400
9400.0000	1000, AV	≤ 14	3	16.00* ⁶	0	0	30.00	54.00	24.0	H,V/H,V	100-400
11000.0000	1000, AV	≤ 14	3	18.25* ⁶	0	0	32.25	54.00	21.7	H,V/H,V	100-400
22500.0000	300, AV	< 28.0	1	16.2* ⁷	-9.5	0	34.7	54.00	19.3	H,V/H,V	100-400
28000.0000	300, AV	< 28.0	1	19.0* ⁷	-9.5	0	37.5	54.00	16.5	H,V / H	100-200

No emissions detected

Measurement uncertainty

4 dB

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
 Remark: *⁶ for using a pre-amplifier in the range between 1.0 GHz and 18.0 GHz
 Remark: *⁷ for using a pre-amplifier in the range between 18.0 GHz and 29.0 GHz

The equipment meets the requirements	Yes	No	N.t.
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Further test results are attached	Yes	No	Page no:
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N.t. * See page no. 27

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8.4 Receiver radiated emission

8.4.1 Regulation

Test requirement: FCC CFR47, Part 15B Test procedure: ANSI C63.4:2003

15.109(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

(c) In the emission tables above, the tighter limits applies at the band edges. Section 15.33 and 15.35 which specify the frequency range over which radiated emissions are to be measured and the detector functions and other measurement standards apply.

(f) For a receiver which employs terminals for the connection of an external receiving antenna, the receiver shall be tested to demonstrate compliance with the provisions of this Section with an antenna connected to the antenna terminals unless the antenna conducted power is measured as specified in Section 15.111(a). If a permanently attached receiving antenna is used, the receiver shall be tested to demonstrate compliance with the provisions of this Section.

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

ANSI C63.4: 1992 Section 8 "Radiated Emissions Testing"

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

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

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8.4.3 Calculation of field strength limits

For example: Receiver working on 315 MHz

Limit for average measurements → (315 MHz) $200\mu\text{V/m} = 46.0\text{dB}\mu\text{V/m @3m}$

8.4.5 Calculation of the field strength

The field strength is calculated by the following calculation:

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

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

Receiver Level : Receiver reading without correction factors

Correction Factor : Antenna factor + cable loss

For example:

The receiver reading is $32.7\text{ dB}\mu\text{V}$. The antenna factor for the measured frequency is $+2.5\text{ dB (1/m)}$ and the cable factor for the measured frequency is 0.71 dB , giving a field strength of $35.91\text{ dB}\mu\text{V/m}$.

The $35.91\text{ dB}\mu\text{V/m}$ value can be mathematically converted to its corresponding level in $\mu\text{V/m}$.

Level in $\mu\text{V/m} = \text{Common Antilogarithm } (35.91/20) = 39.8$

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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8.4.6 Result

(88.0 MHz)

RECEIVER SPURIOUS RADIATION (Section 15.109(a))										
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	Antenna height cm
77.300	120, QPK	< 6.5	3	-11.4* ⁴	0	-4.9	40.0	44.9	H, V/H, V	100-400
154.600	120, QPK	< 6.5	3	-7.1* ⁴	0	-0.6	40.0	40.6	H, V/H, V	100-400
231.900	120, QPK	< 6.5	3	-8.9* ⁴	0	-2.4	43.5	45.9	H, V/H, V	100-400
309.200	120, QPK	< 6.5	3	-5.8* ⁴	0	0.7	43.5	42.8	H, V/H, V	100-400
386.500	120, QPK	< 6.5	3	-4.1* ⁴	0	2.4	43.5	41.1	H, V/H, V	100-400
463.800	120, QPK	< 6.5	3	-2.6* ⁴	0	3.9	43.5	39.6	H, V/H, V	100-400
541.100	120, QPK	< 6.5	3	-1.1* ⁴	0	5.4	43.5	38.1	H, V/H, V	100-400
618.400	120, QPK	< 6.5	3	+0.6* ⁴	0	7.1	43.5	36.4	H, V/H, V	100-400
695.700	120, QPK	< 6.5	3	+1.7* ⁴	0	8.2	43.5	35.3	H, V/H, V	100-400
773.000	120, QPK	< 6.5	3	+2.9* ⁴	0	9.4	43.5	34.1	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 $\leq 6.5\text{dB}\mu\text{V}$ @ 3m distance (30 – 1,000 MHz)

Remark: *² noise floor noise level of the measuring instrument $\leq 10\text{dB}\mu\text{V}$ @ 3m distance (1,000 – 2,000 MHz)

Remark: *³ noise floor noise level of the measuring instrument $\leq 12\text{dB}\mu\text{V}$ @ 3m distance (2,000 – 5,500 MHz)

Remark: *⁴ for using a pre-amplifier in the range between 100 kHz and 1,000 MHz

The equipment meets the requirements	Yes	No	No
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Further test results are attached	Yes	No	page no:
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(108.0 MHz)

RECEIVER SPURIOUS RADIATION (Section 15.109(a))										
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	Antenna height cm
97.300	120, QPK	< 6.5	3	-11.7* ⁴	0	-5.2	40.0	45.2	H, V/H, V	100-400
194.600	120, QPK	< 6.5	3	-11.0* ⁴	0	-4.5	40.0	44.5	H, V/H, V	100-400
291.900	120, QPK	< 6.5	3	-7.6* ⁴	0	-1.1	43.5	44.6	H, V/H, V	100-400
389.200	120, QPK	< 6.5	3	-4.5* ⁴	0	2.0	43.5	41.5	H, V/H, V	100-400
486.500	120, QPK	< 6.5	3	-2.7* ⁴	0	3.8	43.5	39.7	H, V/H, V	100-400
583.800	120, QPK	< 6.5	3	-0.7* ⁴	0	5.8	43.5	37.7	H, V/H, V	100-400
681.100	120, QPK	< 6.5	3	+0.9* ⁴	0	7.4	43.5	36.1	H, V/H, V	100-400
778.400	120, QPK	< 6.5	3	+2.4* ⁴	0	8.9	43.5	34.6	H, V/H, V	100-400
875.700	120, QPK	< 6.5	3	+3.3* ⁴	0	9.8	43.5	33.7	H, V/H, V	100-400
973.000	120, QPK	< 6.5	3	+5.0* ⁴	0	11.5	43.5	32.0	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 ≤ 6.5dBμV @ 3m distance (30 – 1,000 MHz)

Remark: *² noise floor noise level of the measuring instrument ≤ 10dBμV @ 3m distance (1,000 – 2,000 MHz)

Remark: *³ noise floor noise level of the measuring instrument ≤ 12dBμV @ 3m distance (2,000 – 5,500 MHz)

Remark: *⁴ for using a pre-amplifier in the range between 100 kHz and 1,000 MHz

The equipment meets the requirements	Yes	No	Not
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Further test results are attached	Yes	No	page no:
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8.5 Antenna power conduction limits for receivers

Test requirement: FCC CFR47, Part 15B Test procedure: ANSI C63.4:2003

8.5.1 Regulation

15.111(a) In addition to the radiated emission limits, receivers that operate (tune) in the frequency range 30 to 960 MHz and CB receivers that provide terminals for the connection of an external receiving antenna may be tested to demonstrate compliance with the provisions of Section 15.109 with the antenna terminals shielded and terminated with the resistive termination equal to the impedance specified for the antenna, provided these receivers also comply with the following: with the receiver antenna terminal connected to a resistive termination equal to the impedance specified or employed for the antenna, the power at the antenna terminal at any frequency within the range of measurements specified in Section 15.33 shall not exceed 2.0 nW.

8.5.2 Test equipment

Type	Manufacturer/ Model no.	Serial no.	Last calibration	Next calibration
Receiver (9 kHz –18.0 GHz)	Rohde & Schwarz Spectrum Analyzer FSL 18 (171a)	100.117	2008/10	2010/10
Pre-amplifier (100kHz - 1.3GHz)	Hewlett Packard 8447 E (166a)	1726A00705	2008/02	2010/02

8.5.3 Test Procedures

Preview tests are performed to determine the "worst case" mode of operation. With the EUT operating in "worst case" mode, emissions from the unit are measured by direct connecting via cable to a receiver, with the antenna terminals shielded and terminated with the resistive termination equal to the impedance specified for the antenna.

8.5.4 Calculation of average correction factor

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

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8.5.5 Calculation of antenna power conduction limits for receivers

The conducted antenna power is calculated by adding the receiver reading and cable factor. The basic equation with a sample calculation is as follows:

$AP = RA + CF$ where AP Antenna Power in dBm RA Receiver Amplitude in dBm CF Cable Attenuation Factor in dB

Assume a receiver reading of -70 dBm is obtained. The cable factor of 1.9 dB is added, giving an antenna power of -71.9 dBm. The -71.9 dBm value can be mathematically converted to its corresponding level in nW.

$$AP = -65 + 1.1 = -63.9 \text{ [dBm]}$$

$$\text{Level in W} = 10^{(AP/10-3)} = 10^{(-63.9/10-3)} = 0.4 \cdot 10^{-9} = 0.407 \text{ nW}$$

8.5.6 Test results

RECEIVER SPURIOUS RADIATION CONDUCTED (Section 15.211)						
f (MHz)	Bandwidth (kHz) Type of detector	Noted receiver level dBm	Correction factor dB	Level corrected dBm	Limit dBm	Margin dB
	120, PK	< -110			-57	
	120, PK	< -110			-57	
	120, PK	< -108			-57	
	120, PK	< -108			-57	
	120, PK	< -108			-57	
	120, PK	< -108			-57	
	120, PK	< -108			-57	
	120, PK	≤ -100			-57	
	120, PK	≤ -100			-57	
	120, PK	≤ -100			-57	
	120, PK	≤ -100			-57	
	120, PK	≤ -100			-57	
Measurement uncertainty			2 dB			

* Bandwidth = the measuring receiver bandwidth

Remark: *¹ noise floor noise level of the measuring instrument ≤ -110 dBm (30 – 1,000 MHz)

Remark: *² noise floor noise level of the measuring instrument ≤ -108 dBm (1,000 – 2,000 MHz)

Remark: *³ noise floor noise level of the measuring instrument ≤ -100 dBm (2,000 – 5,500 MHz)

The equipment meets the requirements	Yes	No	N.t.²
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Further test results are attached	Yes	No	page no:
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9. 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 antenna is integrated |
| N.t. ³ | Not tested, because the EUT is directly battery powered |

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End of test report