RR051-15-102465-1-A Ed. 0

Certification Radio test report

According to the standard:
CFR 47 FCC PART 15

Equipment under test:
WAP 4 with stick external antenna

FCCID: QG2AIR300

Company: AGRIDENT GmbH

DISTRIBUTION: Mr RUPPERT (Company: AGRIDENT GmbH)

Number of pages: 28 with 3 appendixes

Ed.	Date	Modified pages	Written by Name Visa	Technical Verification and Quality Approval Name Visa
0	30-JUL-2015	Creation	T. LEDRESSEUR T.L	O. ROY

Duplication of this test report is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above.
This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.

DESIGNATION OF PRODUCT:	WAP 4 with stick external antenna
Serial number (S/N):	WAP 4: WAPCACD48022B1 Antenna: 000571
Reference / model (P/N):	WAP 4: 1073100 Antenna: 5006
Software version:	Not communicated
MANUFACTURER:	WAP 4: MOTOROLA Antenna: AGRIDENT

COMPANY SUBMITTING THE PRODUCT:

Company:	AGRIDENT
Address:	Steinklippenstrasse 10 D-30890 BARSINGHAUSEN Germany
Responsible:	Mr RUPPERT

DATES OF TEST:	27-APR-2015
TESTING LOCATION:	EMITECH ANGERS laboratory at JUIGNE SUR LOIRE (49) FRANCE EMITECH ANGERS open area test site in JUIGNE SUR LOIRE (49) FRANCE 21 rue de la Fuye 49610 Juigne sur Loire France FCC 2.948 Listed Site Registration Number: 90469
TESTED BY:	*T. LEDRESSEUR*

CONTENTS

1. INTRODUCTION

This report presents the results of radio test carried out on the following equipment WAP 4 with stick external antenna , in accordance with normative reference.

2. PRODUCT DESCRIPTION

The RFID module is plugged into the internal expansion port of the WORKABOUT PRO4 Handheld Computer.

Class:	B
Utilization:	Residential use
Antenna type and gain:	stick antenna
Operating frequency range:	134.25 kHz
Number of channels:	1
Power source:	120 Vac- 60 Hz

Power level, frequency range and channels characteristics are not user adjustable.
The details pictures of the product and the circuit boards are joined with this file.

3. NORMATIVE REFERENCE

The standards and testing methods related throughout this report are those listed below.
They are applied on the whole test report even though the extensions (version, date and amendment) are not repeated.

CFR 47 FCC Part 15 (2014)	Radio Frequency Devices
ANSI C63.4	2014 Methods of measurement of Radio-Noise Emissions from low-voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI C63.10	2009 Testing Unlicensed Wireless Devices.

4. TEST METHODOLOGY

Radio performance tests procedures given in CFR 47 part 15:

Subpart B –Unintentional Radiators
- Paragraph 107: conducted limits
- Paragraph 109: radiated emission limits

Subpart C – Intentional Radiators
- Paragraph 207: Conducted limits
- Paragraph 209: Radiated emission limits; general requirements

5. TEST EQUIPMENT CALIBRATION DATES

Equipment	Model	Type	Last verification	Next verification	Validity
0000	BAT-EMC V3.6.0.32	Software	/	/	/
1406	EMCO 6502	Loop antenna	27/01/2015	27/01/2017	27/03/2017
4088	R&S FSP40	Spectrum Analyzer	22/08/2013	22/08/2015	22/10/2015
8508	California instruments 1251RP	Power source	22/08/2014	22/08/2015	22/10/2015
8511	HP 8447D	Low noise preamplifier	20/08/2014	20/08/2015	20/10/2015
8526	Schwarzbeck VHBB 9124	Biconical antenna	12/06/2012	12/06/2016	12/08/2016
8528	Schwarzbeck VHA 9103	Biconical antenna	24/09/2013	24/09/2017	24/11/2017
8535	Emco 3115	Horn antenna	29/10/2012	29/10/2016	29/12/2016
8543	Schwarzbeck UHALP 9108A	Log periodic antenna	12/06/2012	12/06/2016	12/08/2016
8593	SIDT Cage 2	Full anechoic room	/	/	/
8635	R&S EZ-25	High-pass filter	05/08/2014	05/08/2016	05/10/2016
8671	HUGER	Meteo station	04/09/2014	04/09/2016	04/11/2016
8675	AOIP MN5102B	Multimeter	23/02/2015	23/02/2017	23/04/2017
8707	R&S ESI7	Test receiver	11/12/2014	11/12/2016	11/02/2017
8719	Thurbly Thandar Instruments 1600	LISN	23/06/2014	23/06/2016	23/08/2016
8732	Emitech	OATS	23/08/2013	23/08/2016	23/10/2016
8750	La Crosse Technology WS-9232	Meteo station	03/09/2014	03/09/2016	03/11/2016
8893	Emitech	Outside room	/	/	/
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
10317	Fluke 177	Multimeter	12/06/2013	12/06/2015	12/08/2015
10651	Absorber sheath current	Emitech	17/10/2013	17/10/2015	17/12/2015

* The equipment is not verified; instead, the output voltage is checked before each measurement with the calibrated multimeter.

6. TESTS RESULTS SUMMARY

6.1 unintentional radiator (subpart B)

Test procedure	Description of test	Respected criteria?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.107	CONDUCTED LIMITS	X				*Class B*
FCC Part 15.109	RADIATED EMISSION LIMITS	X				*Class B*

NAp: Not Applicable NAs: Not Asked

6.2 intentional radiator (subpart C)

Test procedure	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.203	ANTENNA REQUIREMENTS	X				*Note 1*
FCC Part 15.207	CONDUCTED LIMITS	X				
FCC Part 15.209	RADIATED EMISSION LIMITS; GENERAL REQUIREMENTS	X				

NAp: Not Applicable NAs: Not Asked

Note 1: Dedicated antenna. See connector antenna in appendix 1.

« To declare, or not, the compliance with the specifications, it was not explicitly taken into account of uncertainty associated with the results »

7. MEASUREMENT UNCERTAINTY

Measurement Expanded uncertainty :

Uncertainties are only considered for the measurement chain.
Uncertainties obtained with K = 2:

Parameter	Emitech Uncertainty
Conducted measurements	
9 kHz < F < 150kHz:	3.3 dB
150 kHz < F < 30 MHz:	3.58 dB
All emissions radiated	
F < 62.5 MHz:	± 5.14 dB
62.5 MHz < F < 1 GHz:	± 5.13 dB
RF output power, radiated :	± 5.16 dB
Temperature	± 1°C
Humidity	± 5 %

8. CONDUCTED LIMITS

Standard: FCC Part 15

Test procedure: Paragraph 15.107

Limits: Class B

Software used: BAT-EMC V3.6.0.32

Test set up:

The EUT is isolated and placed on a wooden table, 0.8 m over an horizontal reference plane and 0.4 m from a vertical reference plane. It is powered by an artificial main network placed on the ground reference plane.
The equipment is powered with the AC power operating voltage of 120 V / 60 Hz.

See photos in appendix 2

Frequency range: 150 kHz - 30 MHz

Detection mode: Peak / Quasi-peak / Average

Bandwidth: 10 kHz / 9 kHz

Equipment under test operating condition:

The equipment is blocked in standby mode.

Ambient temperature (°C): 21.9
Relative humidity (%): 36

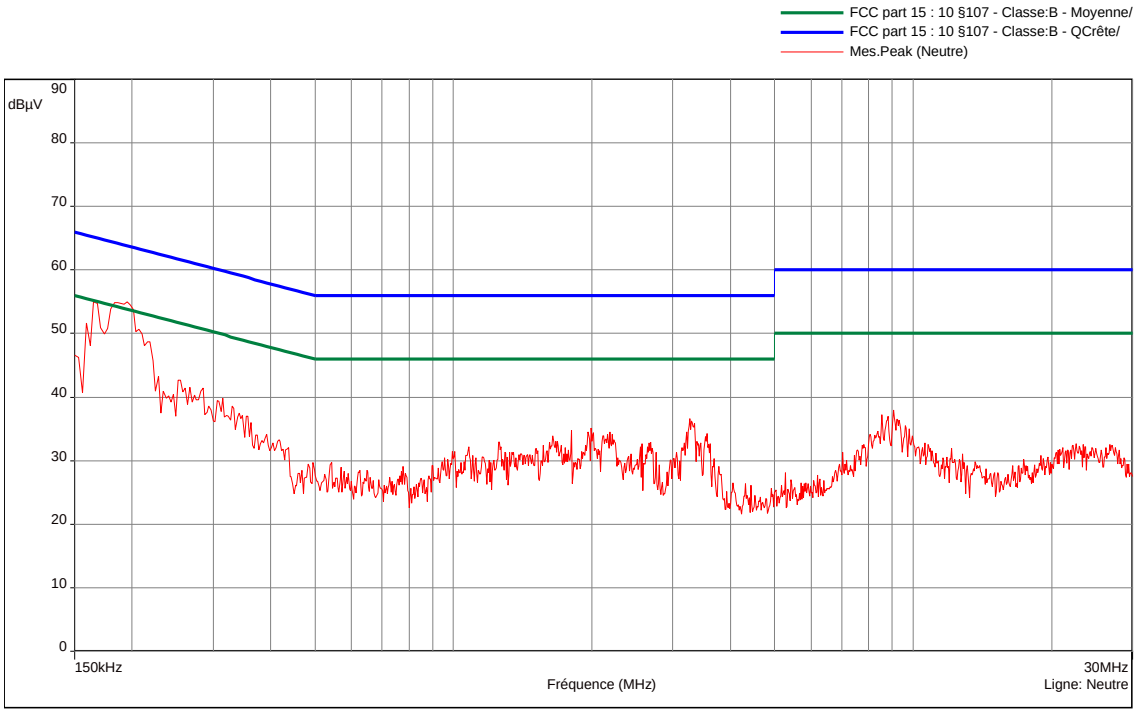
Results:

Sample N° 1:

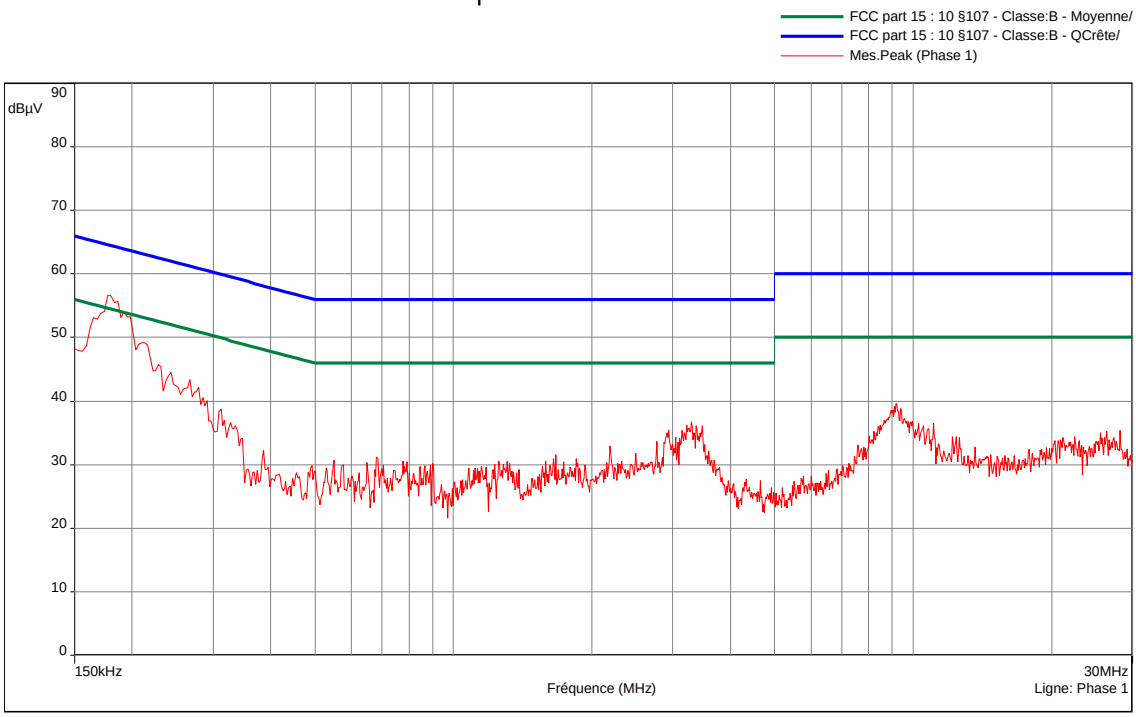
Measurement on the mains power supply:

The measurement is first realized with Peak detector.

Curve N° 1: measurement on the Neutral with peak detector

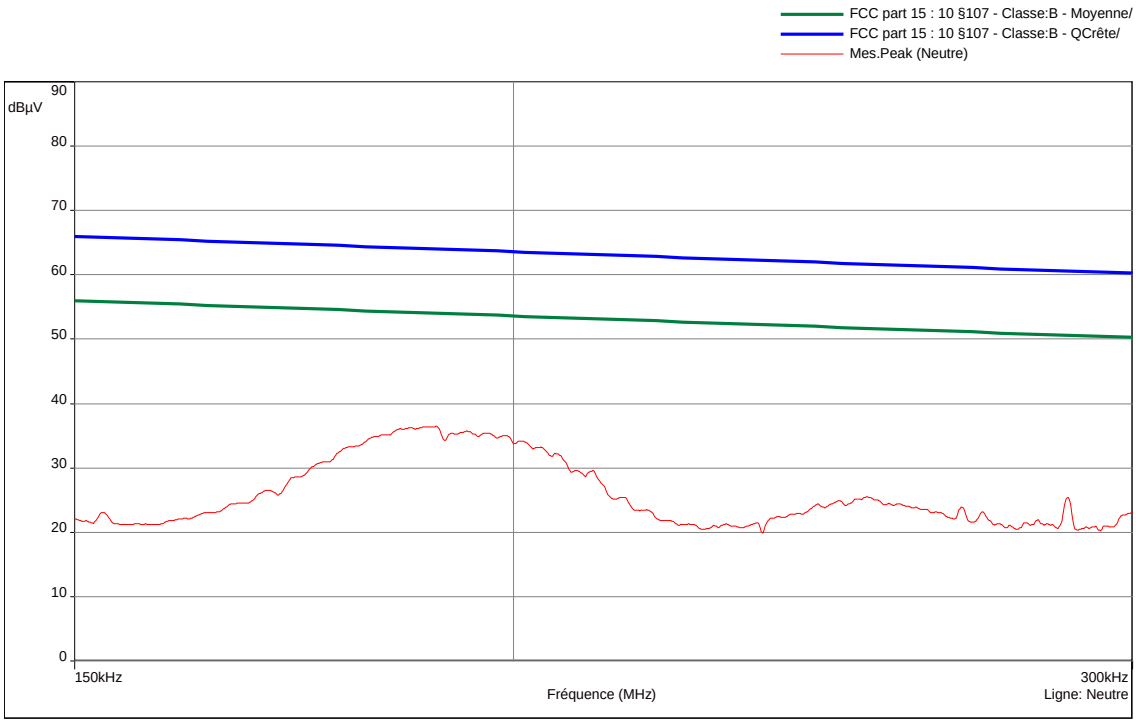


Curve N° 2: measurement on the Line with peak detector

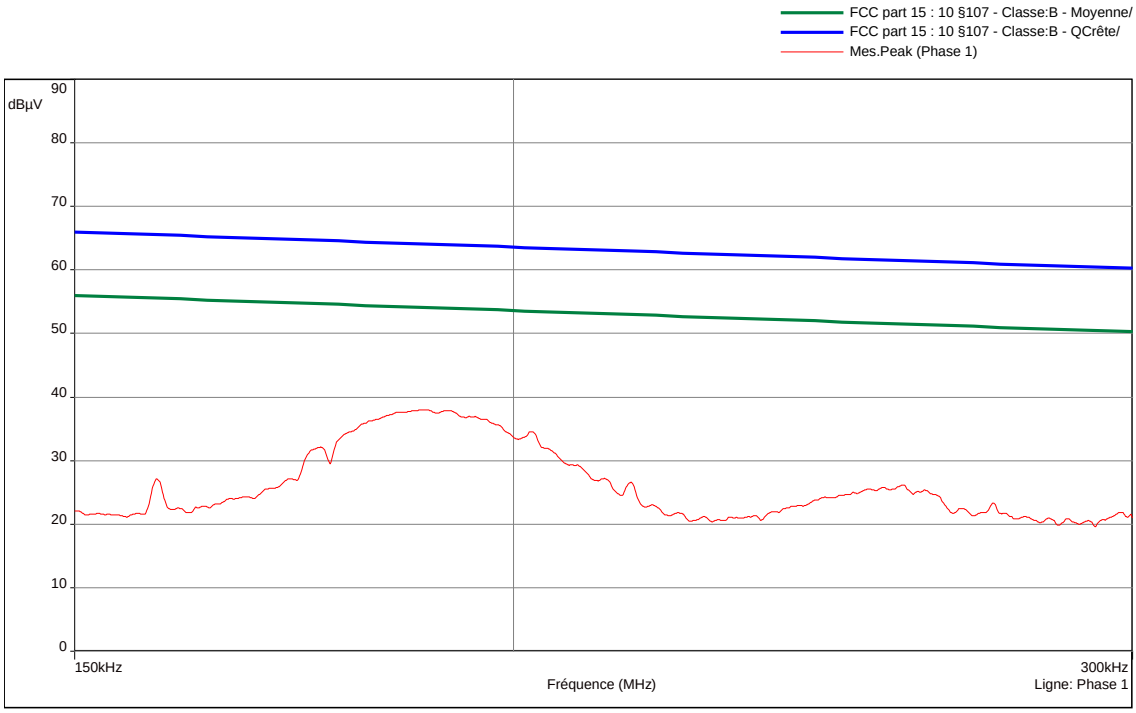


The frequencies which are not 6 dB under the Average limit are then analyzed with Average detector.

Curve N° 3: average measurement on the Neutral, for the frequency range:



Curve N° 4: average measurement on the Line, for the frequency range:



Test conclusion:

RESPECTED STANDARD

9. RADIATED EMISSION LIMITS

Standard: FCC Part 15

Test procedure: paragraph 109

Limit class: Class B

Test set up:

First an exploratory radiated measurement was performed in anechoic chamber. During this phase the product is oriented in three orthogonal planes.

Then the final measurement is realized with the product on the most critical orientation.

The measure is realized on open area test site under 1 GHz.

When the system is tested in an open area test site (OATS), the EUT is placed on a rotating table, 0.8m from a ground plane.

Zero degree azimuths correspond to the front of the device under test.

See photos in appendix 2.

Frequency range: From 9 kHz to 1000 MHz

Detection mode: Quasi-peak (F < 1 GHz) Average (F > 1 GHz)

Bandwidth: 120 kHz (F < 1 GHz) 1 MHz (F > 1 GHz)

Distance of antenna: 10 meters (in open area test site) / 3 meters (in anechoic room)

Antenna height: 1 to 4 meters (in open area test site) / 1.5 meter (in anechoic room)

Antenna polarization: vertical and horizontal (only the highest level is recorded)

Equipment under test operating condition:

The equipment is blocked in standby mode.

Results:

Ambient temperature (°C): 21.9
Relative humidity (%): 36

Power source: 120 V – 60 Hz

Sample N° 1

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak	Antenna height (cm)	Azimuth (degree)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
30.520	QP	100	113	V	16.74	30	-13.26
36.210	QP	339	33	H	13.60	30	-16.40
42.480	QP	244	122	H	10.49	30	-19.51
59.530	QP	100	14	V	16.00	30	-14.00
144.020	QP	100	1	V	20.68	33	-12.32

Test conclusion:

RESPECTED STANDARD

10. CONDUCTED LIMITS

Standard: FCC Part 15

Test procedure: Paragraph 15.207

Software used: BAT-EMC V3.6.0.32

Test set up:

The EUT is isolated and placed on a wooden table, 0.8 m over an horizontal reference plane and 0.4 m from a vertical reference plane. It is powered by an artificial main network placed on the ground reference plane.
The equipment is powered with the AC power operating voltage of 120 V / 60 Hz.

See photos in appendix 2

Frequency range: 150 kHz - 30 MHz

Detection mode: Peak / Quasi-peak / Average

Bandwidth: 10 kHz / 9 kHz

Equipment under test operating condition:

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Ambient temperature (°C): 21.9
Relative humidity (%): 39

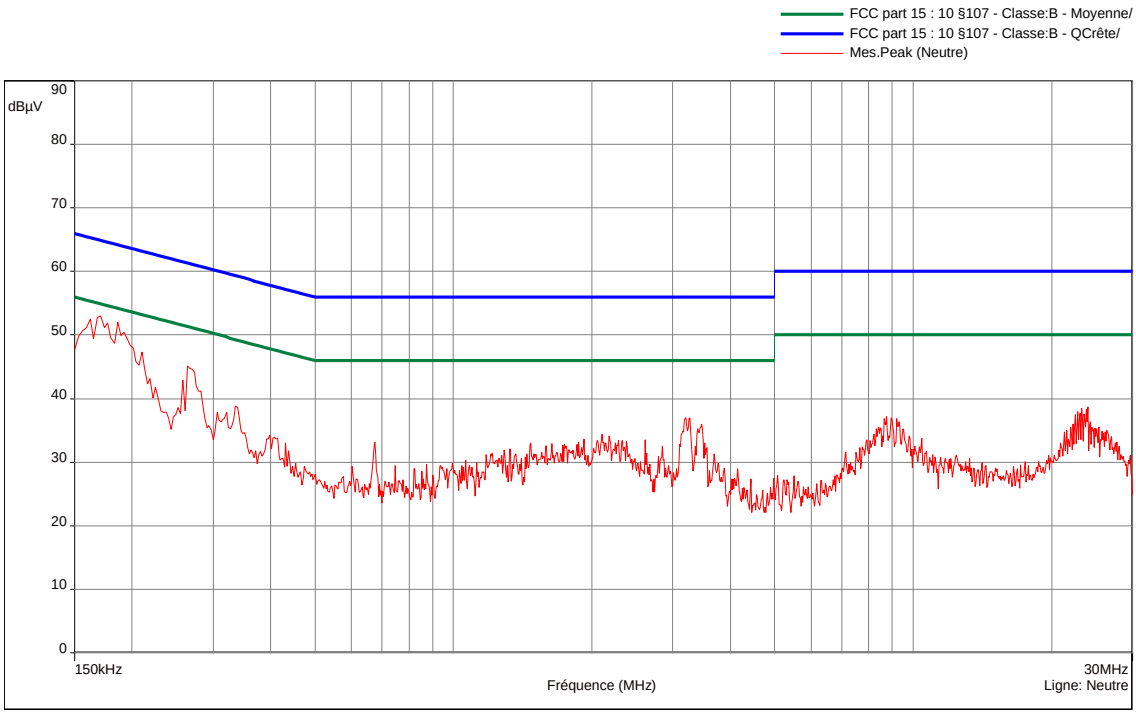
Results:

Sample N° 1:

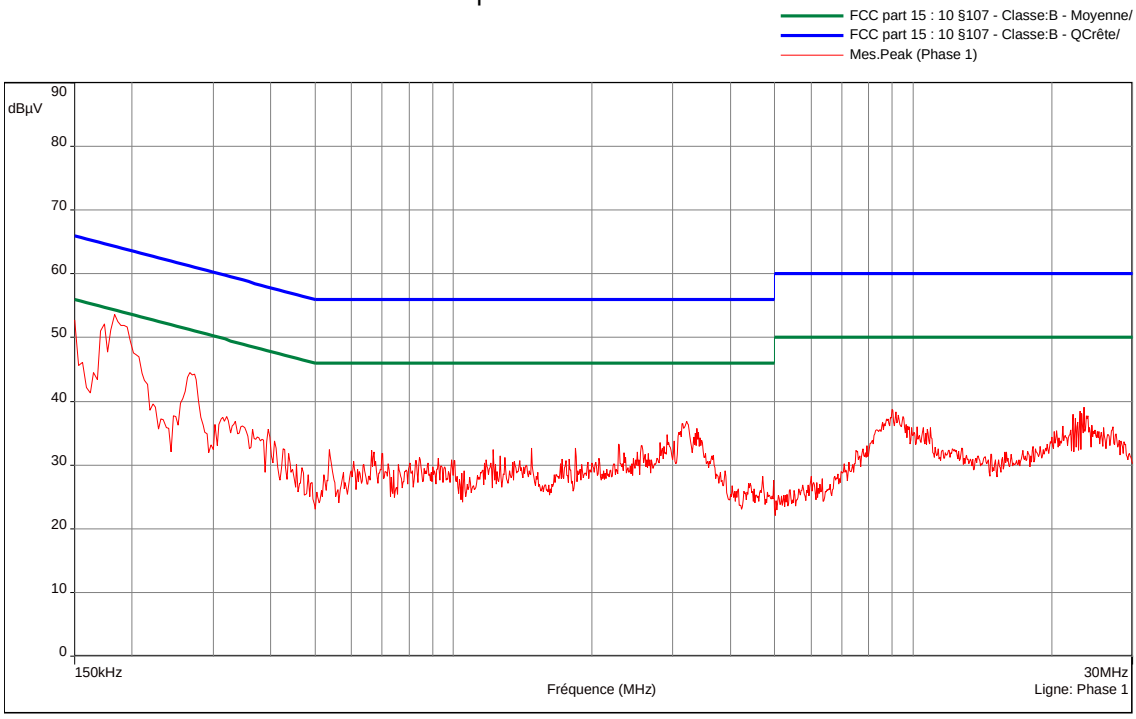
Measurement on the mains power supply:

The measurement is first realized with Peak detector.

Curve N° 5: measurement on the Neutral with peak detector

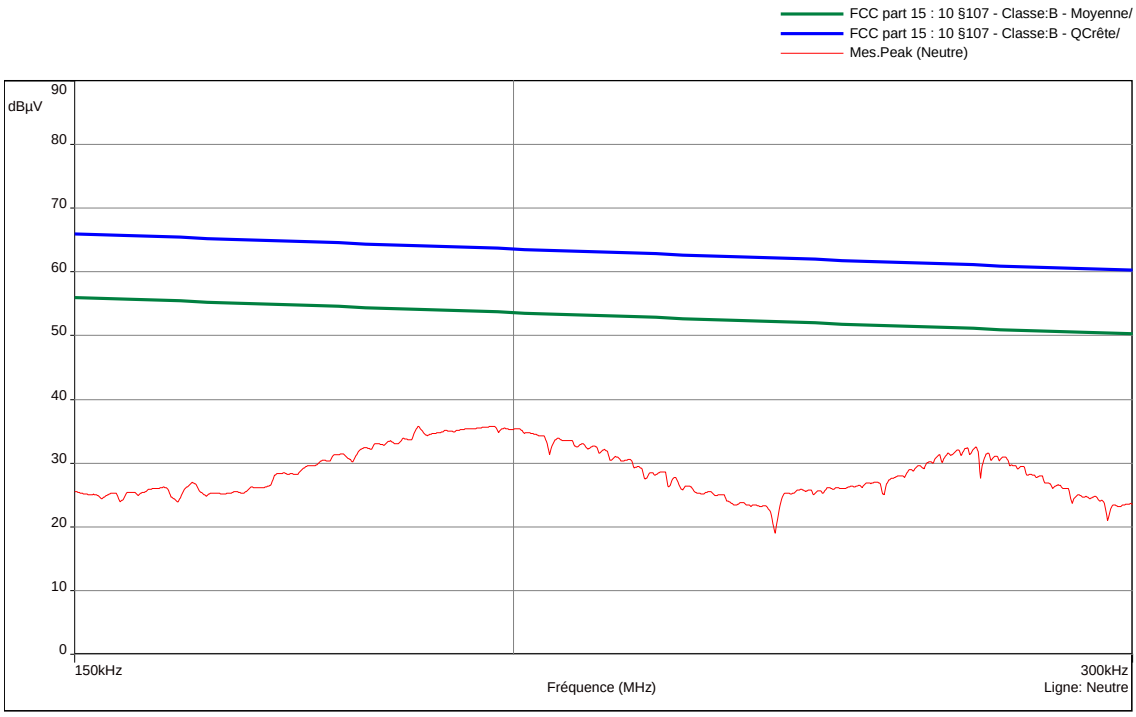


Curve N° 6: measurement on the Line with peak detector

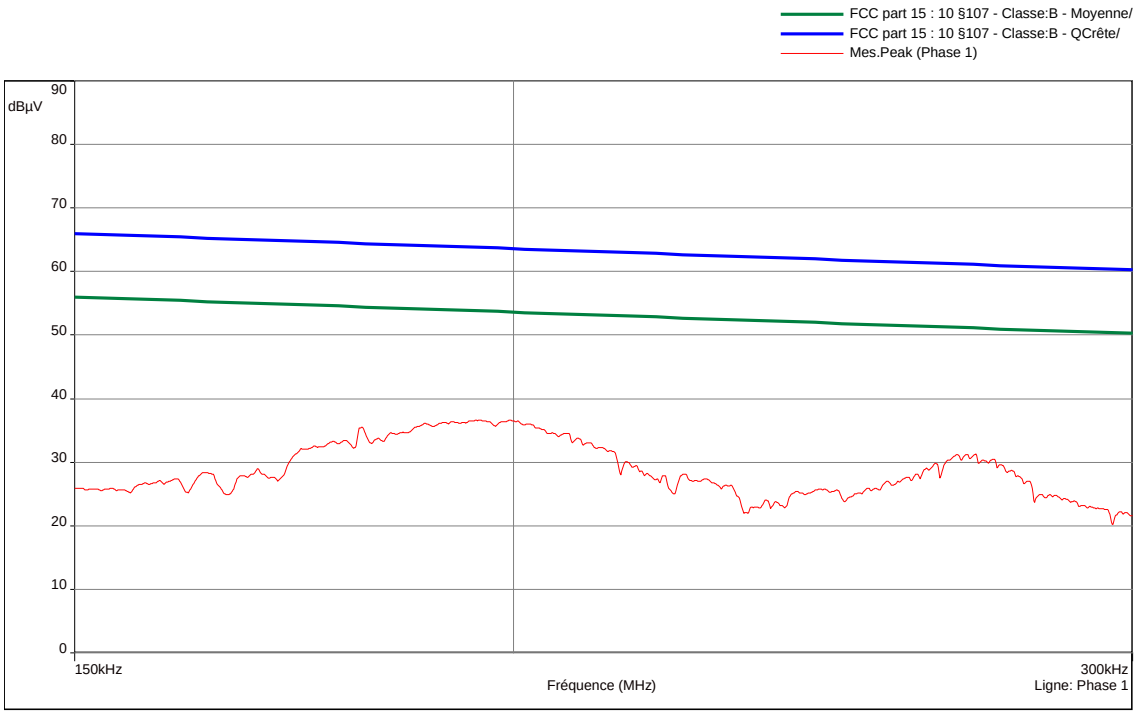


The frequencies which are not 6 dB under the Average limit are then analyzed with Average detector.

Curve N° 7: average measurement on the Neutral, for the frequency range:



Curve N° 8: average measurement on the Line, for the frequency range:



Test conclusion:

RESPECTED STANDARD

11. RADIATED EMISSION LIMITS; general requirements

Standard: FCC Part 15

Test procedure: paragraph 209

Test set up:

First an exploratory radiated measurement was performed in anechoic chamber. During this phase the product is oriented in three orthogonal planes.

Then the final measurement is realized with the product on the most critical orientation.

The measure is realized on open area test site under 1 GHz and in anechoic chamber above 1 GHz.

When the system is tested in an open area test site (OATS), the EUT is placed on a rotating table, 0.8m from a ground plane.

When the system is tested in anechoic chamber, the EUT is placed on a rotating table, 1.5m from a ground plane.

Zero degree azimuths correspond to the front of the device under test.

See photos in appendix 2.

Frequency range: From 9 kHz to 1000 MHz

Detection mode: Quasi-peak (F < 1 GHz) Average (F > 1 GHz)

Bandwidth: 200Hz (9 kHz < F < 150kHz)
9 kHz (150 kHz < F < 30MHz)
120 kHz (30 MHz < F < 1 GHz)
1 MHz (F > 1 GHz)

Distance of antenna: 10 meters (in open area test site) / 3 meters (in anechoic room)

Antenna height: 1 to 4 meters (in open area test site) / 1.5 meter (in anechoic room)

Test method deviation:

From 9 kHz to 30MHz: measurements are made in peak detection instead of average mode in frequency band 9 kHz-500 kHz

Measuring distance is 10 meters instead of 30 and 300 meters.
Radiated emissions limits in this frequency band are specified at 30 or 300 meters.
Pre measurement distance used during the test, subject of this report, is 3 meters.
Then published limits come from a theoretical conversion using an extrapolation factor of 40dB / decade.

Equipment under test operating condition:

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Results:

Ambient temperature (°C): 21.9
Relative humidity (%): 36

Power source: 120 Vac – 60 Hz

Sample N° 1 Carrier

FREQUENCIES (kHz)	Detector P: Peak QP: Quasi-Peak	Antenna height (cm)	Azimuth (degree)	Polarization	Field strength (dBµV/m)	Limits (dBµV/m) (1)	Margin (dB)
134.25	Pk	100	224	Circular 90 °	45.18	84.75	-39.57
134.25	Pk	100	266	Circular 45 °	46.9	84.75	-37.85
134.25	Pk	100	300	Circular 0 °	48.8	84.75	-35.95

(1) Using an extrapolation factor of 40 dB/decade (as described in section 15.31 (f)), the level at 300m is about -10.28 dBµV/m (0.55µV/m) for a limit at 19.2 µV/m.

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak	Antenna height (cm)	Azimuth (degree)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
30.000	QP	400	111	H	14.97	30	-15.03
35.200	QP	220	275	V	14.17	30	-15.83
42.770	QP	172	18	V	11.97	30	-18.03
59.900	QP	176	322	V	8.50	30	-21.50
108.020	QP	100	110	V	21.08	33	-11.92
120.020	QP	94	114	V	22.23	33	-10.77
132.020	QP	100	111	V	22.25	33	-10.75
144.020	QP	100	260	V	32.44	33	-0.56
156.020	QP	100	100	V	24.42	33	-8.58
168.020	QP	100	274	V	20.09	33	-12.91
180.020	QP	352	345	V	17.44	33	-15.56
215.980	QP	309	239	H	29.50	33	-3.50
239.980	QP	101	222	V	30.52	36	-5.48
432.020	QP	329	8	V	29.63	36	-6.37

Note: any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.

Test conclusion:

RESPECTED STANDARD

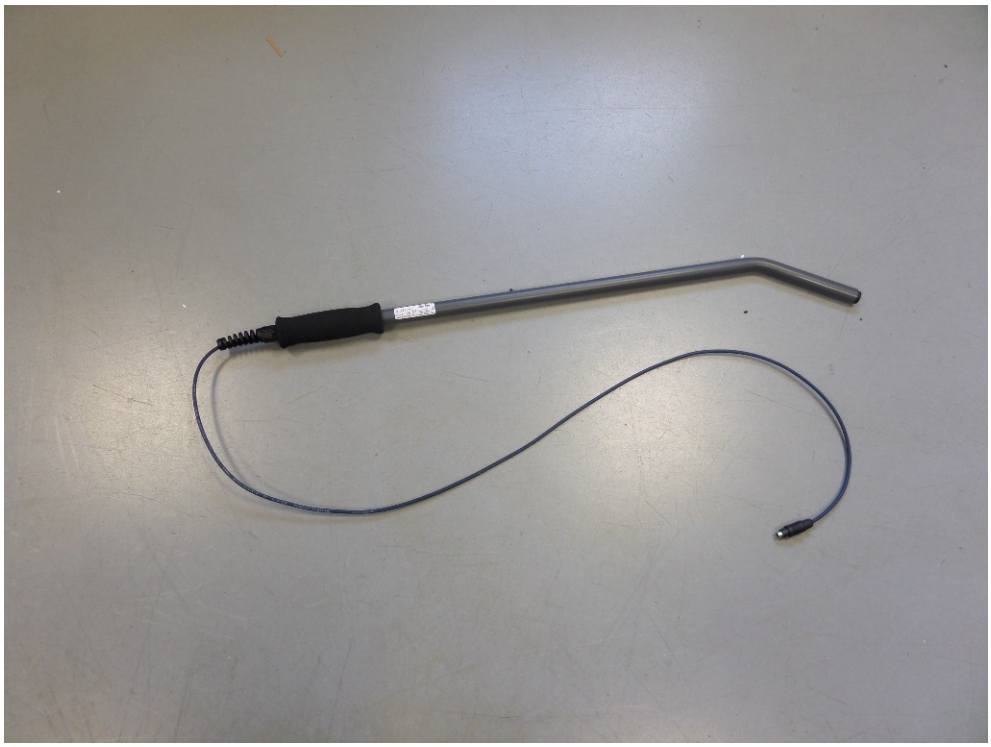
□□□ End of report, 3 appendixes to be forwarded □□□

APPENDIX 1: Photos of the equipment under test

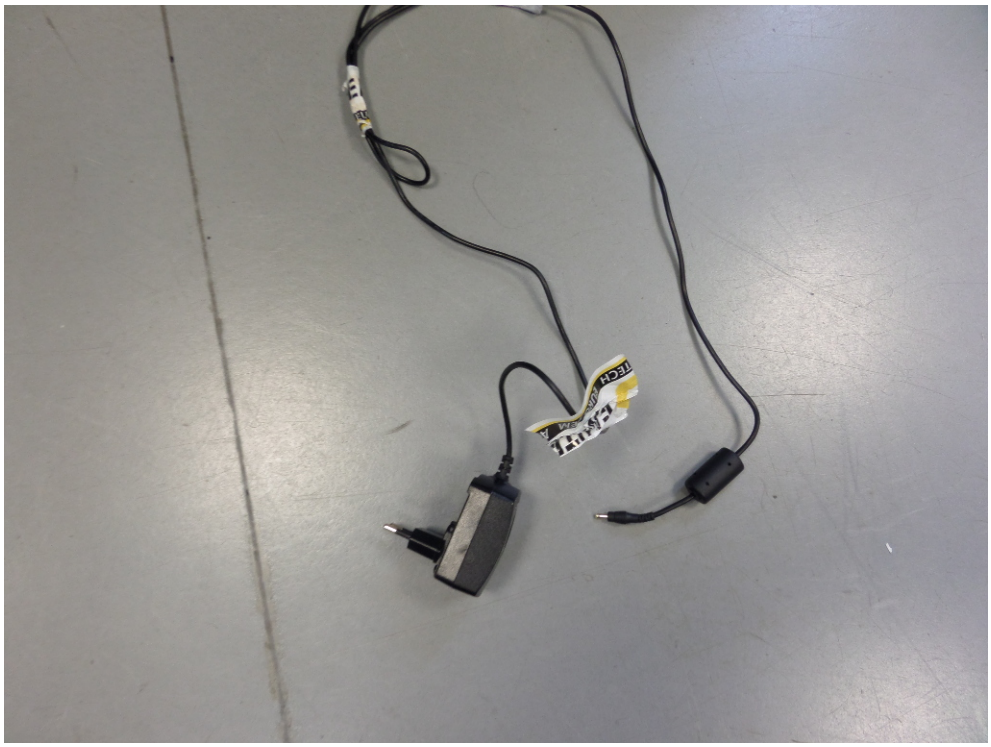
Wap 4

Antenna connector

Antenna



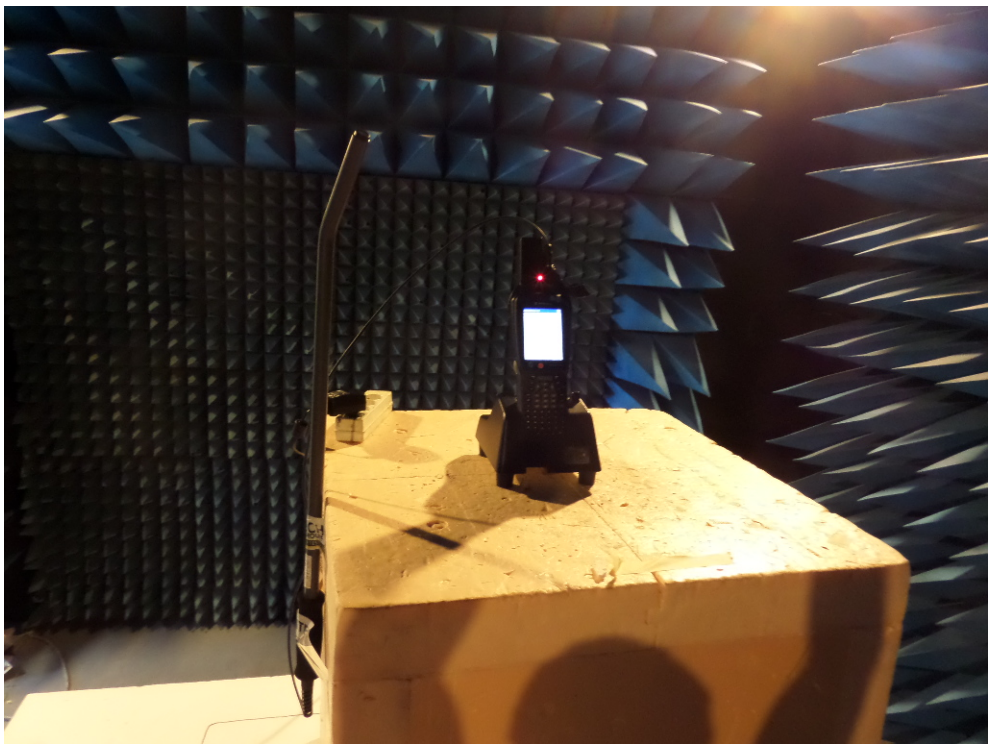
AC adapter

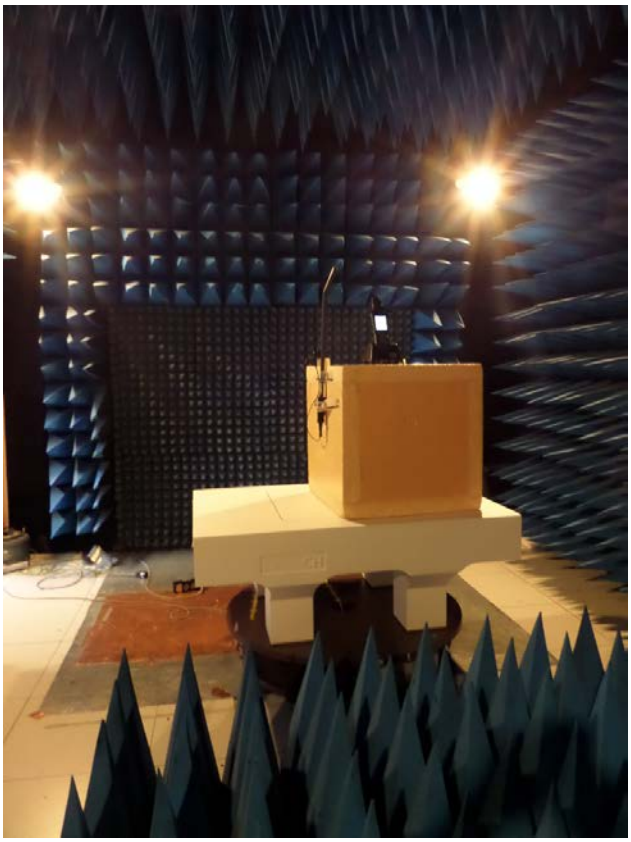



PHIHONG
MJP
SWITCHING POWER SUPPLY 电源适配器
MODEL(机型): PSA15R-050P
INPUT (输入): AC100-240V~
0.5A 50-60Hz
OUTPUT(输出): DC5.0V⎓ 3.0A
A001670
Q 041593
JET
Psion Teklogix K.K.
N136
LISTED
MADE IN CHINA 中国制造
(AK1)-R

APPENDIX 2: Test set up

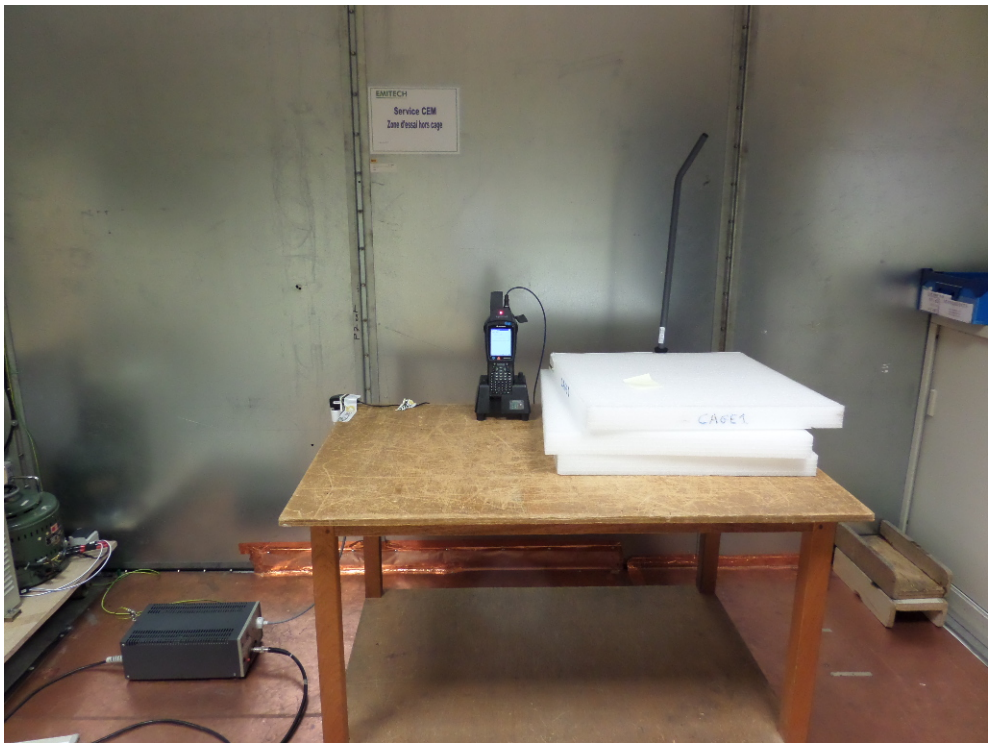
Anechoic chamber





Open area test site

Conducted setup



APPENDIX 3: Test equipment list

Conducted emission limits

TYPE	MANUFACTURER	EMITECH NUMBER
Outside room Hors cage	Emitech	8893
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
LISN Thurbly Thandar Instruments 1600	Rohde & Schwarz	8719
High-pass filter EZ-25	Rohde & Schwarz	8635
Absorber sheath current	Emitech	10651
Cable N-4m RG214	GYL Technologies	8572
Power source 1251RP	California instruments	8508
Multimeter 177	Fluke	10317
Meteo station	HUGER	8671
Software	BAT-EMC V3.6.0.32	0000

Receiver radiated emission

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Loop antenna EMCO 6502	EMCO	1406
Biconical antenna VHBB 9124	Schwarzbeck	8526
Biconical antenna VHA 9103	Schwarzbeck	8528
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Low-noise amplifier 8447D	Hewlett Packard	8511
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000

Conducted emission limits

TYPE	MANUFACTURER	EMITECH NUMBER
Outside room Hors cage	Emitech	8893
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
LISN Thurbly Thandar Instruments 1600	Rohde & Schwarz	8719
High-pass filter EZ-25	Rohde & Schwarz	8635
Absorber sheath current	Emitech	10651
Cable N-4m RG214	GYL Technologies	8572
Power source 1251RP	California instruments	8508
Multimeter 177	Fluke	10317
Meteo station	HUGER	8671
Software	BAT-EMC V3.6.0.32	0000

Radiated emission limits; general requirements

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Loop antenna EMCO 6502	EMCO	1406
Biconical antenna VHBB 9124	Schwarzbeck	8526
Biconical antenna VHA 9103	Schwarzbeck	8528
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Low-noise amplifier 8447D	Hewlett Packard	8511
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000