RC-032-PTE-09-104318-1-A

E.M.C. TESTS REPORT

According to the standard:
FCC Part 15 : 2008

Equipment under test:
RFID Module HF-AM2-G2
with WiFi module type RA2041

Company:
COPPERNIC

FCC listed : 910 701

Distribution: Mr PIEPERS

(Company: COPPERNIC)

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NAME OF THE EQUIPMENT UNDER TEST (E.U.T.)	:	RFID Module HF-AM2-G2 with WiFi module type RA2041
Type		-
Serial number	:	-
Part number	:	-
Software Version	:	-
MANUFACTURER'S NAME	:	PSION TEKLOGIX

APPLICANT'S ADDRESS:

Company	:	COPPERNIC
Address	:	185 avenue Archimède BP421000 13857 AIX-EN-PROVENCE CEDEX 3
Person present during the tests	:	Mr SIMONETTI-DIEZ
Responsible	:	Mr PIEPERS
DATE OF TESTS	:	19/08/2009
TESTS LOCATION	:	Open area test site at Aunainville (28) - FRANCE
TESTS OPERATOR	:	F. LHEUREUX

CONTENTS

1. INTRODUCTION

This document submits the results of Electromagnetic Compatibility tests performed on the equipment « RFID Module HF-AM2-G2 with WiFi module type RA2041» (denominated hereafter E.U.T.: equipment under test) according to document listed below.

2. REFERENCE DOCUMENT

FCC Part 15: 2008
Code of federal regulations
Title 47- Telecommunication Chapter 1- Federal Communication Commission
Part 15- Radio frequency devices Subpart B- Unintentional Radiators
Limits and methods of measurement of radio disturbance
Characteristic of information technology equipment.

ANSI C 63.4 : 2003
Methods of Measurement of Radio-Noise Emissions from Low-voltage Electrical and Electronics Equipment in the range of 9 kHz to 40 GHz.

3. EQUIPMENT UNDER TEST CONFIGURATION

Equipment under test (E.U.T.) description:

The E.U.T is composed a RFID module at 13.56 MHz, a bluetooth module, a WiFi module, 2D Imager, Finger print, and MRZ reader.
It can be powered by 5 Vdc (stand alone) or mains voltage (with docking).

Cycle and operating mode during emission tests:

The bluetooth emission on channel 1 ⇨ 2402 MHz
The bluetooth emission on channel 6 ⇨ 2432 MHz
The bluetooth emission on channel 79 ⇨ 2480 MHz

The WiFi emission on channel 1 ⇨ 2412 MHz
The WiFi emission on channel 7 ⇨ 2442 MHz
The WiFi emission on channel 13 ⇨ 2472 MHz

The RFID emission is in continuous emission at 13.56 MHz without modulation.

Modification of the equipment during the test: No

Photographies of the equipment under test (EUT)


P823021116A7


PHIHONG
MJP
SWITCHING POWER SUPPLY
MODEL(机型): PSA15R-050P
INPUT (输入): AC100-240V~
0.5A 50-60Hz
OUTPUT(输出): DC5.0V⎓ 3.0A
Q 041593
MADE IN CHINA 中国制造
(AK1)-R

4. SUMMARY OF TEST RESULTS

The following table summarizes test results of the EUT.

Designation of test	Test results				Comments
	Pass	Fail	N.A.	N.P.	
Unintentional radiated emissions in the band 30 MHz – 25 GHz	x				Section 15.109 15.209 15.205

N.A.: Not Applicable
N.P.: Not Performed

5. UNINTENTIONAL RADIATED EMISSIONS IN THE BAND 30 MHZ – 25 GHZ

Standard: FCC PART 15: 2008

Sections: 15.109
15.209
15.205

Test method: ANSI C 63.4: 2003

Equipment under test arrangement:

Category of equipment: Table-top equipment

The equipment under test (EUT) is placed on a non-conductive test table at 0.8 m above the horizontal reference ground plane.

For maximum meter reading at each frequency, the antenna height is adjusted between 1 m and 4 m above the ground plane. A 360 degrees rotation of the EUT is performed in vertical and horizontal polarization. The frequency azimuth and antenna height are presented in the tables on the next pages.

Test configuration photographies:

Frequency range: 30 MHz - 25 GHz

Detection mode: Quasi-peak for the frequency band 30 MHz – 1 GHz
Average value for the frequency band 1 GHz – 25 GHz

Resolution bandwidth: 120 kHz for the frequency band 30 MHz – 1 GHz
1 MHz for the frequency band 1 GHz – 25 GHz

Measurement distance: 3 meters

Limit: The EUT must satisfy requirements of the section 15.109 and 15.209 as shown in table below.

Frequency range (MHz)	Limit (dBµV/m)
30 to 88	40.0
88 to 216	43.5
216 to 960	46.0
960 to 25000	54.0

Operating mode during the test: EUT is in permanent transmission with modulation.

Instrumentation test list:

CATEGORY	BRAND	TYPE	Nr EMITECH
Antenna	Schwarzbeck	Biconique VHA9103	317
Antenna	Oritel	Cornet CM 42-25	1045
Antenna	Schwarzbeck	Log-périodique UHALP 9108	3106
Antenna	Emco	Cornet 3115	3374
Antenna mast	HD GmbH	MA240	2341
Antenna mast	HD GmbH	HD100	2342
Cable	Câbles & Connectiques	N-12m	2450
Cable	Câbles & Connectiques	N-2m	2451
Cable	Câbles & Connectiques	N-13m	2452
Cable	Câbles & Connectiques	N-SMA	2864
Cable	C&C	N-13m	2896
Filter	Trilithic	passe haut	1097
Filter	Trilithic	passe haut	1529
Filter	Micro-tronics	Passe haut	4691
Open area test site	Emitech	Site champ libre Aunainville	187
Power supply AC	SECAS	CF1000 50/60	2102
Pre-Amplifier	MITEQ	HF	3229
Receiver	Rohde & Schwarz	R&S ESVP	1057
Spectrum analyzer	Rohde & Schwarz	R&S FSP40	5175

Results:

Table reference	Comments
Table 1	Measurement in vertical polarization with Bluetooth on channel 1 + WiFi on channel 7 + RFID
Table 2	Measurement in horizontal polarization with Bluetooth on channel 1 + WiFi on channel 7 + RFID
Table 3	Measurement in vertical polarization with Bluetooth on channel 6 + WiFi on channel 13 + RFID
Table 4	Measurement in horizontal polarization with Bluetooth on channel 6 + WiFi on channel 13 + RFID
Table 5	Measurement in vertical polarization with Bluetooth on channel 79 + WiFi on channel 1 + RFID
Table 6	Measurement in horizontal polarization with Bluetooth on channel 79 + WiFi on channel 1 + RFID

Test site: Open area test site TABLE 1

Radiated emission: Electric field

Standard: FCC Part 15 : 2008

Test distance: 3 m

Polarization: Vertical

Configuration: Bluetooth on channel 1 + WiFi on channel 7 + RFID

FREQUENCY (MHz)	ANTENNA HEIGHT (cm)	AZIMUTH (degrees)	MEASUREMENT (dBµV/m)	LIMIT (dBµV/m)	MARGIN (dB)
165.000	100	0	32.5	43.5	11.0
310.528	160	330	36.0	46.0	10.0
362.762	128	180	40.5	46.0	5.5
4804.00	192	148	36.7	54.0	17.3
4883.97	154	253	38.4	54.0	15.6

Test site: Open area test site TABLE 2

Radiated emission: Electric field

Standard: FCC Part 15 : 2008

Test distance: 3 m

Polarization: Horizontal

Configuration: Bluetooth on channel 1 + WiFi on channel 7 + RFID

FREQUENCY (MHz)	ANTENNA HEIGHT (cm)	AZIMUTH (degrees)	MEASUREMENT (dBµV/m)	LIMIT (dBµV/m)	MARGIN (dB)
4803.98	229	50	39.6	54.0	14.4
4883.89	154	253	43.7	54.0	10.3

Test site: Open area test site TABLE 3

Radiated emission: Electric field

Standard: FCC Part 15 : 2008

Test distance: 3 m

Polarization: Vertical

Configuration: Bluetooth on channel 6 + WiFi on channel 13 + RFID

FREQUENCY (MHz)	ANTENNA HEIGHT (cm)	AZIMUTH (degrees)	MEASUREMENT (dBµV/m)	LIMIT (dBµV/m)	MARGIN (dB)
164.974	100	20	32.3	43.5	11.2
367.200	150	160	41.0	46.0	5.0
4864.14	190	287	36.2	54.0	17.8
4943.87	190	287	40.9	54.0	13.1

Test site: Open area test site TABLE 4

Radiated emission: Electric field

Standard: FCC Part 15 : 2008

Test distance: 3 m

Polarization: Horizontal

Configuration: Bluetooth on channel 6 + WiFi on channel 13 + RFID

FREQUENCY (MHz)	ANTENNA HEIGHT (cm)	AZIMUTH (degrees)	MEASUREMENT (dBµV/m)	LIMIT (dBµV/m)	MARGIN (dB)
359.555	276	20	35.6	46.0	10.4
4864.00	107	227	39.2	54.0	14.8
4943.99	107	227	44.2	54.0	9.8

Test site: Open area test site TABLE 5

Radiated emission: Electric field

Standard: FCC Part 15 : 2008

Test distance: 3 m

Polarization: Vertical

Configuration: Bluetooth on channel 79 + WiFi on channel 1 + RFID

FREQUENCY (MHz)	ANTENNA HEIGHT (cm)	AZIMUTH (degrees)	MEASUREMENT (dBµV/m)	LIMIT (dBµV/m)	MARGIN (dB)
166.100	100	0	37.0	43.5	6.5
371.200	160	270	43.5	46.0	2.5
4824.12	149	274	43.6	54.0	10.4
4960.30	149	28	35.7	54.0	18.5

Test site: Open area test site TABLE 6

Radiated emission: Electric field

Standard: FCC Part 15 : 2008

Test distance: 3 m

Polarization: Horizontal

Configuration: Bluetooth on channel 79 + WiFi on channel 1 + RFID

FREQUENCY (MHz)	ANTENNA HEIGHT (cm)	AZIMUTH (degrees)	MEASUREMENT (dBµV/m)	LIMIT (dBµV/m)	MARGIN (dB)
366.200	278	0	40.1	46.0	5.9
4824.11	225	253	43.4	54.0	10.6
4959.98	225	270	36.3	54.0	17.7

□□□ *End of report, 2 annexes to be forwarded* □□□

ANNEX 1:

ANTENNA FACTORS, INSERTION LOSSES AND AMPLIFIER VALUES

BILL OF MATERIAL

The test antenna used for the radiated emission between 30 MHz and 200 MHz is the biconical antenna n°317. Antenna factors are given in table 1.

The test antenna used for the radiated emission between 200 MHz and 1 GHz is the log-periodic antenna n°3106. Antenna factors are given in table 2.

The test antenna used for the radiated emission between 1 GHz and 25 GHz is the horn antenna n°3374 and n°1045. Antenna factors are given in table 3 and table 4.

The measuring receiver n°1057 used in the frequency range 30 MHz to 1 GHz has an integrated preamplifier.

The test cable used between 30 MHz and 1 GHz to connect the antennas to the receiver for measurements at a distance of 3 meters has losses given in table 5.

The amplifier n°3229 and its cable used to connect the spectrum analyzer to the test cable has gain values given in the table 6.

The test cable used between 1 GHz and 25 GHz to connect the horn antenna to the amplifier for measurements at a distance of 3 meters has losses given in table 7.

Frequency (MHz)	Antenna factor (dB/m)	Frequency (MHz)	Antenna factor (dB/m)
30	12.5	120	10.9
35	10.4	-	-
40	9.3	140	11.1
45	8.9	-	-
50	8.4	160	12.9
60	8.5	-	-
70	8.5	180	14.1
80	9.2	200	15.8
90	9.5	-	-
100	10.0	-	-

TABLE 1 : BICONICAL ANTENNA

Frequency (MHz)	Antenna factor (dB/m)	Frequency (MHz)	Antenna factor (dB/m)
200	23.2	-	-
300	14.4	700	20.8
400	16.3	800	21.2
500	17.7	900	21.9
600	19.3	1000	22.5

TABLE 2 : LOG-PERIODIC ANTENNA

Frequency (GHz)	Antenna factor (dB/m)	Frequency (GHz)	Antenna factor (dB/m)
1.0	23.6	8.0	36.9
1.5	25.2	8.5	37.6
2.0	27.5	9.0	38.0
2.5	29.0	9.5	37.9
3.0	29.9	10.0	38.3
3.5	31.1	11.0	38.3
4.0	32.6	12.0	39.2
4.5	32.3	13.0	39.9
5.0	33.5	14.0	41.9
5.5	34.2	15.0	41.0
6.0	34.4	16.0	38.0
6.5	34.2	17.0	39.9
7.0	35.3	18.0	47.4
7.5	36.7	-	-

TABLE 3 : HORN ANTENNA 3374 (1 to 18 GHz)

Frequency (GHz)	Antenna factor (dB/m)
18.0	29.8
19.0	30.9
20.0	30.6
21.0	30.9
22.0	30.6
23.0	31.5
24.0	31.2
25.0	31.1
26.0	31.4

TABLE 4 : HORN ANTENNA 1045 (18 to 25 GHz)

Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)
30	0.8	-	-
35	0.9	160	2.0
40	1.0	180	2.2
45	1.1	200	2.3
50	1.1	-	-
60	1.2	300	2.8
70	1.3	400	3.3
80	1.4	500	3.7
90	1.5	600	4.0
100	1.6	700	4.3
120	1.7	800	4.7
-	-	900	5.0
140	1.9	1000	5.3

TABLE 5 : TEST CABLE FOR 3M MEASUREMENT INTO 30 MHz AND 1 GHz

Frequency (GHz)	Gain value (dB)	Frequency (GHz)	Gain value (dB)	Frequency (GHz)	Gain value (dB)
1.0	35.3	7.0	34.7	15.0	34.5
1.5	35.6	8.0	34.2	16.0	33.1
2.0	35.9	9.0	33.3	17.0	34.2
2.5	35.8	10.0	31.9	18.0	34.4
3.0	35.6	11.0	32.0	20.0	33.5
4.0	35.5	12.0	32.8	22.0	31.6
5.0	35.9	13.0	33.1	24.0	33.9
6.0	35.2	14.0	33.6	26.0	31.2

TABLE 6 : AMPLIFIER (1 – 26 GHz)

Frequency (GHz)	Loss (dB)	Frequency (GHz)	Loss (dB)
1.0	2.4	11.0	8.9
1.5	3.0	12.0	9.3
2.0	3.7	13.0	9.8
2.5	3.9	14.0	10.2
3.0	4.3	15.0	10.7
3.5	4.7	16.0	11.0
4.0	5.2	17.0	11.5
4.5	5.5	18.0	11.8
5.0	5.8	19.0	12.3
6.0	6.4	20.0	14.2
7.0	7.0	21.0	13.9
8.0	7.4	22.0	15.0
9.0	8.0	24.0	14.6
10.0	8.4	26.0	14.6

TABLE 7: TEST CABLE FOR 3 M MEASUREMENT

ANNEX 2:

CALIBRATION DATE

N° EMITECH	LAST CALIBRATION	CALIBRATION DUE DATE
0187	18/06/2007	20/08/2009
1057	04/07/2007	02/09/2009
5175	17/09/2007	17/09/2009
2451	17/09/2007	17/09/2009
2864	06/01/2009	06/01/2011
3229	08/04/2009	08/04/2010
1529	26/02/2009	26/02/2011
1097	26/02/2009	26/02/2011
4691	26/02/2009	26/02/2011
2452	11/06/2008	11/06/2010
2896	06/01/2009	06/01/2011
2450	13/03/2009	13/03/2011
0317	18/06/2007	18/06/2011
3106	09/03/2009	09/03/2013
3374	04/03/2008	04/03/2012
1045	04/03/2008	04/03/2012