R041-08-101420-2A - DM / CHB

# RADIO TEST REPORT

According to the standard(s):

FCC part 15: 2007

Equipment under test:

WORKABOUT PRO (7527C)
+ WA9005 + BT + RA2041
+ RFID Module UHF-CA2-A5
FCC ID:GM3UHFCA2A5

Company:

PSION TEKLOGIX

Diffusion: Mr PORTE (Company: PSION TEKLOGIX)

Number of pages: 15 including 1 annex

| Ed. | Date | Modified page(s) | Written by<br>Name Visa | Technical verification and Quality approval<br>Name Visa |
|---|---|---|---|---|
| 2 | 24-Apr-08 | Remake | David MONTAULON | Régis GONZALEZ<br>P.O. Olivier HEYER |

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| | | |
|---|---|---|
| *NAME OF THE EQUIPMENT UNDER TEST (E.U.T.)* | : | WORKABOUT PRO (7527C) + WA9005 + BT + RA2041 + RFID Module UHF-CA2-A5 |
| *Serial number* | : | None |
| *Part number* | : | None |
| *Software Version* | : | None |
| *MANUFACTURER'S NAME* | : | PSION TEKLOGIX |

*APPLICANT'S ADRESS:*

| | | |
|---|---|---|
| *Company* | : | PSION TEKLOGIX |
| *Adress* | : | 135 rue de la Duranne<br>BP 421000<br>13591 AIX EN PROVENCE CEDEX 3<br>FRANCE |
| *Person(s) present during the tests* | : | Mr PORTE |
| *Responsible* | : | Mr PORTE |

| | | |
|---|---|---|
| *DATE(S) OF TESTS* | : | January, 29th of 2008<br>February, from 25th to 28th of 2008<br>May, 27th of 2008 |
| *TESTS LOCATION(S)* | : | Emitech Grand Sud Laboratory in Vendargues (34)<br>Open area test site in Salinelles (30)<br>FCC Registration number: 8127-19 |
| *TESTS SUPERVISOR(S)* | : | None |
| *TESTS OPERATOR(S)* | : | David MONTAULON |

# CONTENTS

## 1. INTRODUCTION

This document submits the results of Electromagnetic Compatibility tests performed on the equipment WORKABOUT PRO (7527C) + WA9005 + BT + RA2041 + RFID Module UHF-CA2-A5 (denominated hereafter E.U.T.: equipment under test) according to document(s) listed below.
Worst case configuration is used between WAP-C, WAP-S and with or without docking station.

## 2. REFERENCE DOCUMENT(S)

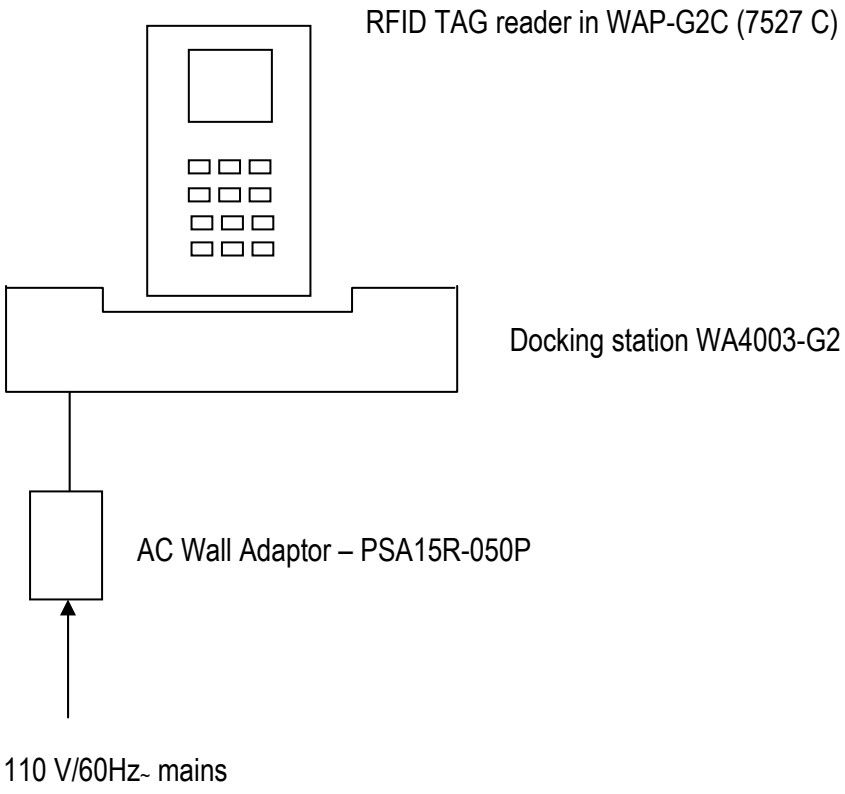
| | |
|---|---|
| FCC Part 15 (February 2006) | Code of Federal Regulations<br>Title 47 – Telecommunications<br>Chapter 1 – Federal Communications Commision<br>Part 15 – Radio frequency devices<br>Subpart C – Intentional Radiators |
| ANSI C 63.4 (2003) | American National Standard for Methods of measurement of Radio-Noise from low-voltage<br>Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |

## 3. EQUIPMENT UNDER TEST CONFIGURATION

Product description:

FCC ID: GM3UHFCA2A5
Utilization: RFID TAG reader
Antenna type: Incorporated antenna
Antenna gain: Unknown
Operating frequency range: 915MHz (Rfid), 2402MHz (Bluetooth), 2462MHz (Wifi)
Number of channels: 50 for RFID, 75 for Bluetooth and Wifi
Channel spacing: 200kHz for RFID
Power source: 5 Vdc (stand alone) or mains voltage (with docking)
Power level and frequency range are not user adjustable

## *4. EQUIPMENT UNDER TEST CONFIGURATION SCHEME*



## *5. SUMMARY OF TEST RESULTS*

| Tests designation | Results satisfying? | Comments |
|---|---|---|
| Conducted emissions - section 15.207 | YES | |
| Radiated emissions - section 15-209 and 15-247 | YES | |

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

## 6. CONDUCTED EMISSIONS SECTION 15.207

Standard: FCC part 15.207: 2007

Test method: ANSI C63.4:2003

Test configuration:

| Tested cable(s) | Measure with | E.U.T. height |
|---|---|---|
| 110Vac power supply WORKABOUT PRO (7527C) | L.I.S.N. | 80 cm |

| Frequency band | Tested cable(s) | Resolution bandwidth | Video bandwidth | Detection mode |
|---|---|---|---|---|
| 150kHz-30MHz | 110Vac power supply WORKABOUT PRO (7527C) | 10KHz | 30kHz | Peak and average |

Test method deviation: No

Test equipment list:

| CATEGORY | BRAND | TYPE | N° EMITECH |
|---|---|---|---|
| Cable | | | 2700 |
| Cable | | | 2716 |
| LISN | PMM | L3-25 | 0821 |
| Receiver | Agilent Technologies | E7405A | 2161 |
| Shielding enclosure | RAY PROOF | C.GS3 | 1123 |
| Software | Nexio | BAT EMC 3.1.7.1. | 0000 |
| Surges Suppressor | Hewlett Packard | 11947A | 0239 |

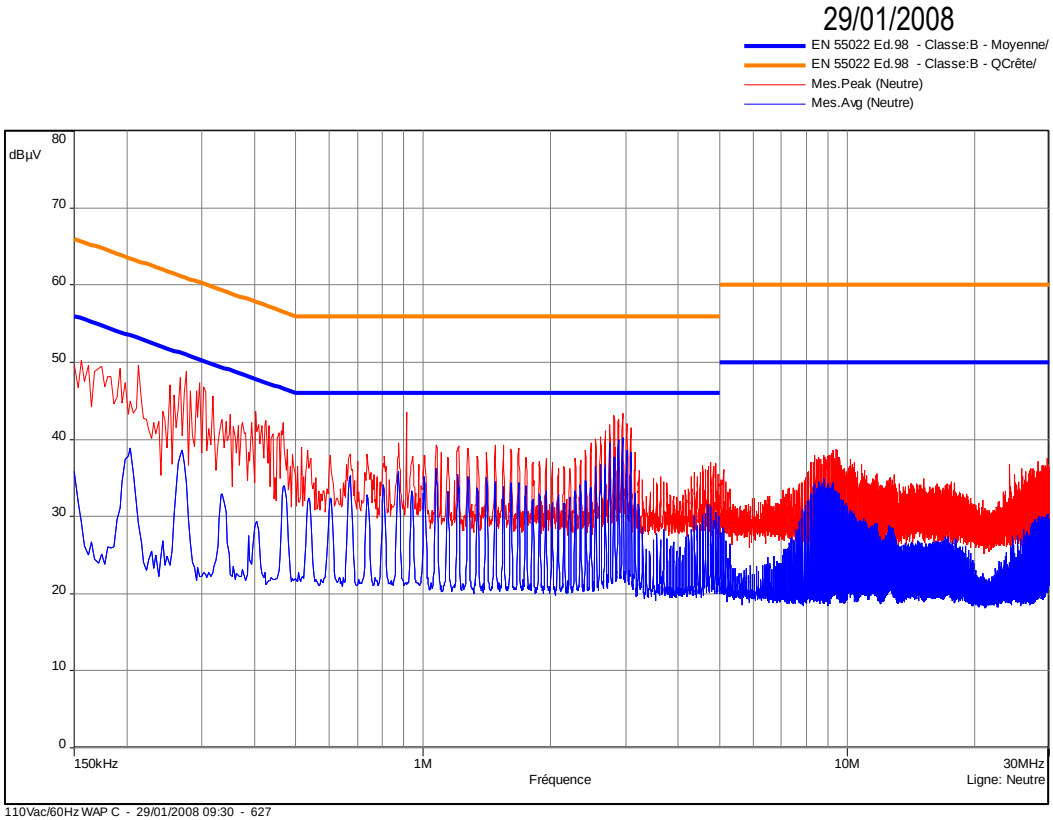
Results: See Graph(s) hereafter. Limits on the graphs are average and quasi-peak limits (upper limit).

# WORKABOUT PRO (7527C) + WA9005 + BT + RA2041 + RFID Module UHF-CA2-A5

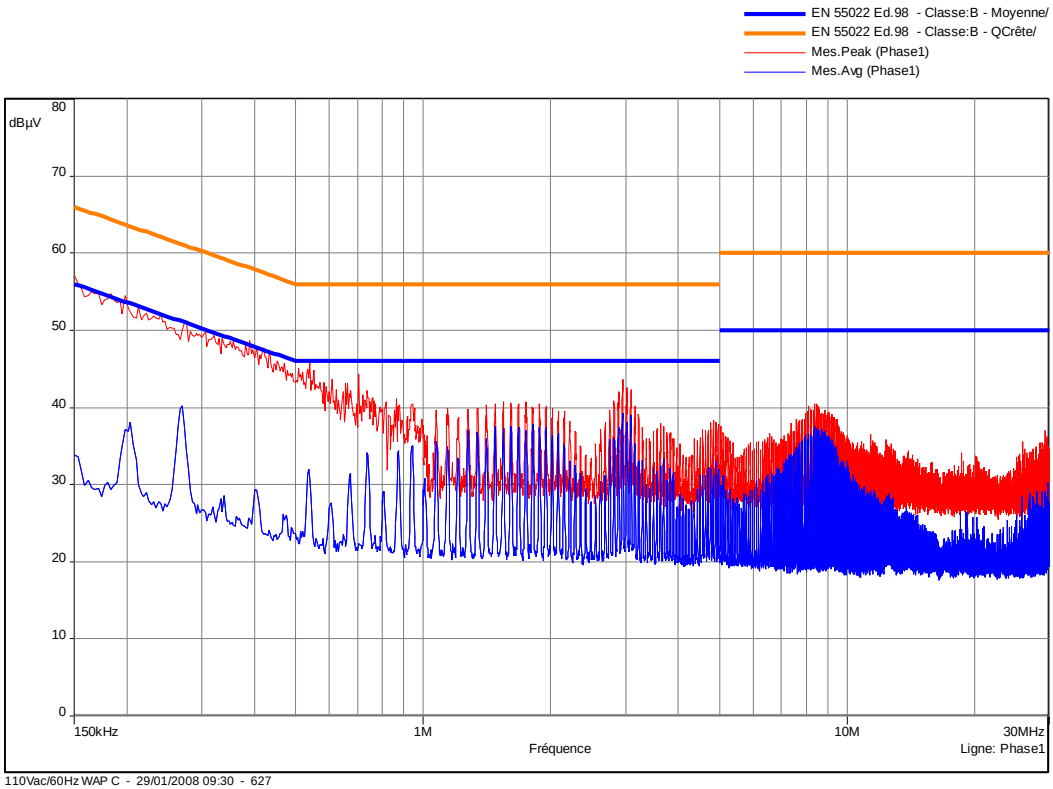
## Conducted voltage emission (measurement)

WORKABOUT PRO (7527C) with 110Vac power supply in peak and average detection.

29/01/2008




110Vac/60Hz WAP C - 29/01/2008 09:30 - 627




110Vac/60Hz WAP C - 29/01/2008 09:30 - 627

## 7. RADIATED EMISSIONS - SECTION 15-209 AND 15-247

Radiated emissions (above 30MHz)

Standard: FCC part 15.247 and 15.209: 2007

Test method: ANSI C63.4:2003

Test configuration:

| Frequency band | Configuration | Resolution bandwidth | Video bandwidth | Detection mode | E.U.T. height |
|---|---|---|---|---|---|
| 30MHz-12.75GHz | Front side (pre-measurement in semi anechoic chamber) | 100kHz | 300kHz | Quasi peak | 80cm |
| 30MHz-12.75GHz | Open area measurement | 100kHz | 300kHz | Average | 80cm |

During pre-measurement Wifi and Bluetooth are not active.

Open area measurement configuration: For each measured frequency, receiving antenna height varies between 1 m and 4 m, E.U.T. is set on a turntable in order to find the highest level. E.U.T. internal functions are all active (Wifi is active, Bluetooth is active, Rfid is active).

Test method deviation: Wifi and Bluetooth are in permanent emission, measurements are done in peak detection (worst case).

Measuring distance: 3 m

Test equipment list:

| CATEGORY | BRAND | MODEL NUMBER | N° EMITECH |
|---|---|---|---|
| Antenna | Electro-Metrics | BIA-30HF | 1107 |
| Antenna | Emco | 3115 | 1053 |
| Antenna | Rohde & Schwarz | HL223 | 3126 |
| Antenna | ETS LINDGREN | 3117 | 5456 |
| Cable | | N-8m | 3694 |
| Cable | | | 2704 |
| Cable | | N-17m | 3620 |
| Cable | | N-5m | 2716 |
| Cable | | | 2717 |
| Cable | | N-6m | 2840 |
| High pas filter | Micro-Tronics | HPM 11630 | 4392 |
| Open area test site | Emitech | Salinelles | 3482 |
| Preamplifier | MINI-CIRCUITS | RF | 1321 |
| Preamplifier | Microwave | C005180F-4B1 | 2165 |
| Software | Nexio | BAT EMC v.3.1.7.1. | 0000 |
| Spectrum analyzer | Agilent Technologies | E7405A | 2161 |

Results: See Graph(s) (indoor pre-measurements) and Board(s) hereafter

# WORKABOUT PRO (7527C) + WA9005 + BT + RA2041 + RFID Mod UHF-CA2-A5

## Radiated electric emission (pre-measurement): front side (Bluetooth and Wifi OFF) - Peak detection

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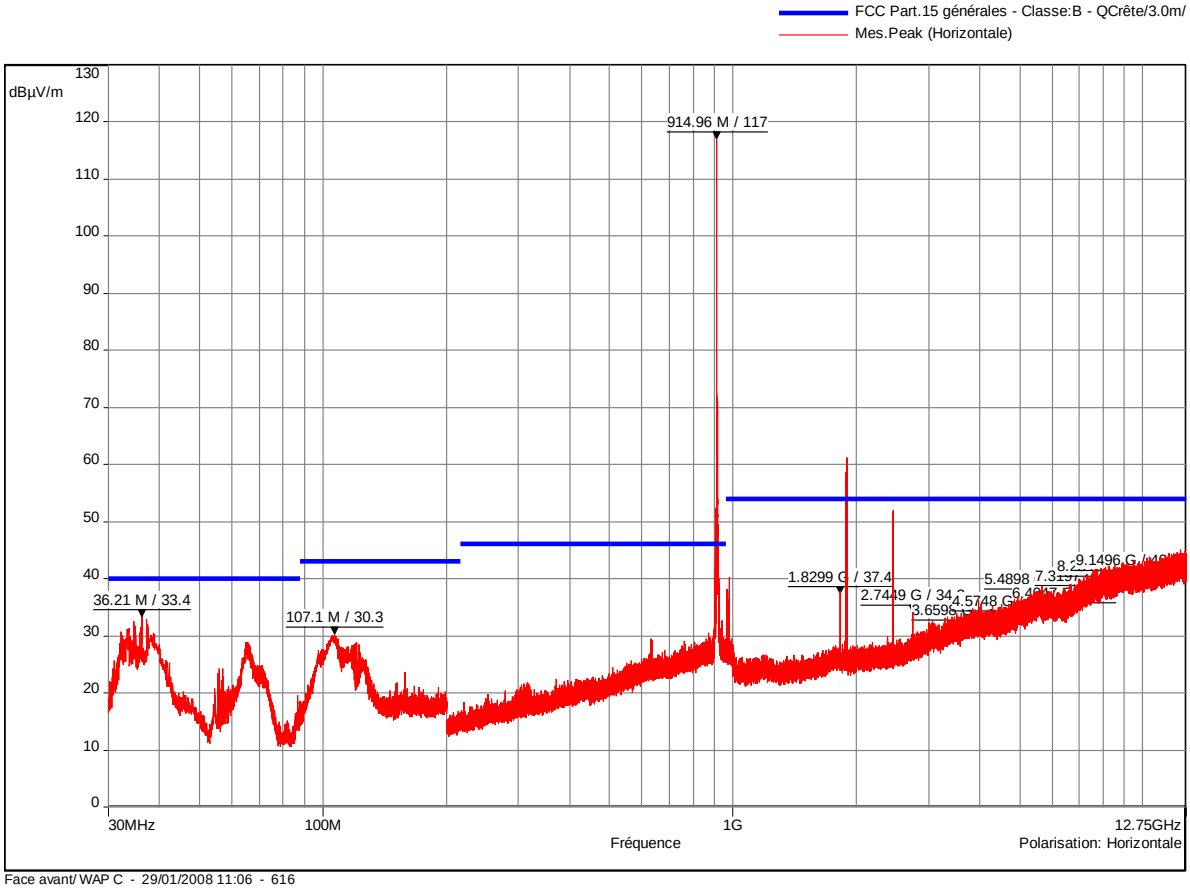
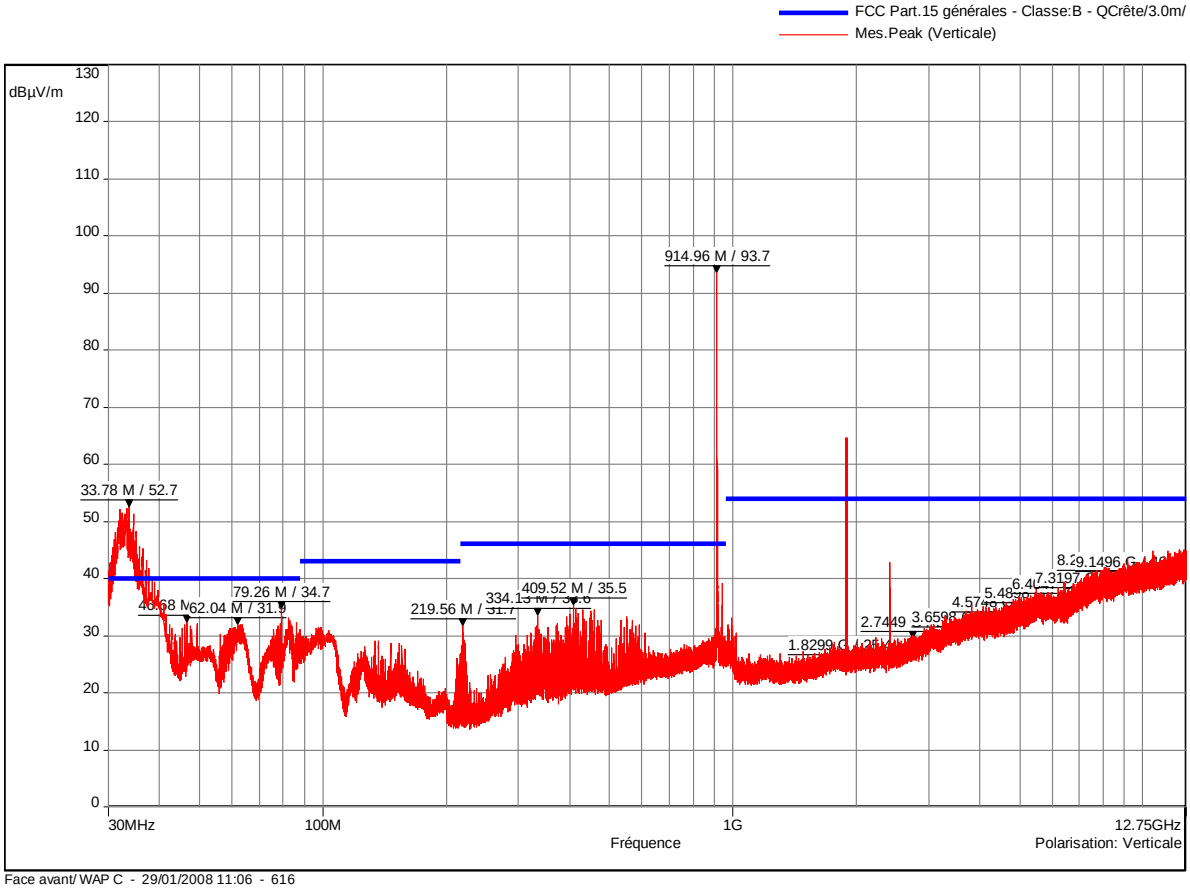



Face avant/ WAP C - 29/01/2008 11:06 - 616




Face avant/ WAP C - 29/01/2008 11:06 - 616

1) Spurious radiated emissions on Open Area Test Site at 3m:

| Frequency (MHz) | Polar. | Azimut (degrees) | Antenna height (cm) | Peak Measure (dBµV/m) | Standard limit (dBµV/m) | Average Value (dBµV/m) | Standard limit (dBµV/m) | Com. |
|---|---|---|---|---|---|---|---|---|
| 32.16 | Vertical | 0 | 100 | 22.17 | 40 | | | C |
| 40.16 | Vertical | 0 | 100 | 20.54 | 40 | | | C |
| 62.96 | Vertical | 0 | 100 | 18.00 | 40 | | | C |
| 84.90 | Vertical | 0 | 189 | 22.37 | 40 | | | C |
| 106.60 | Vertical | FM broadcast=38.30dBµV/m | | | 43 | | | C |
| 38.91 | Horizontal | 0 | 100 | 8.70 | 40 | | | C |
| 66.72 | Horizontal | 0 | 100 | 9.10 | 40 | | | C |
| 101.34 | Horizontal | FM broadcast=19.92dBµV/m | | | 43 | | | C |
| 325.01 | Horizontal | 190 | 150 | 29.37 | 46 | | | C |
| 397.82 | Horizontal | 220 | 100 | 35.68 | 46 | | | C |
| 421.21 | Horizontal | 150 | 100 | 32.21 | 46 | | | C |
| 1830.00 | Vertical | 0 | 100 | 59.62 | 74 | 38.78 | 54 | C |
| 1830.00 | Horizontal | 0 | 100 | 59.78 | 74 | 36.98 | 54 | C |
| 2745.00 | Vertical | 314 | 130 | 49.47 | 74 | 33.44 | 54 | C |
| 2745.00 | Horizontal | 185 | 130 | 57.71 | 74 | 33.94 | 54 | C |
| 3660.00 | Vertical | 90 | 140 | 46.42 | 74 | 29.70 | 54 | C |
| 3660.00 | Horizontal | 318 | 160 | 49.47 | 74 | 28.70 | 54 | C |
| 4874.00 | Vertical | 250 | 100 | 56.89 | 74 | 41.05 | 54 | C |
| 4874.00 | Horizontal | 0 | 100 | 54.95 | 74 | 40.05 | 54 | C |
| 7311.00 | Vertical | 300 | 100 | 68.54 | 74 | 47.92 | 54 | C |
| 7311.00 | Horizontal | 0 | 100 | 60.38 | 74 | 46.92 | 54 | C |
| 4804.00 | Vertical | 0 | 100 | 55.95 | 74 | 16.33 | 54 | C |
| 4804.00 | Horizontal | 0 | 100 | 54.95 | 74 | 15.33 | 54 | C |
| 7206.00 | Vertical | 0 | 100 | 61.10 | 74 | 21.48 | 54 | C |
| 7206.00 | Horizontal | 10 | 100 | 61.10 | 74 | 21.48 | 54 | C |

C= Compliant NC= Not compliant

All other radiated emissions are more than 20 dB below the limit.

(*) According to test report concerning bluetooth part (report FR5D0903-03 from SPORTON International Inc) and section 15.247(a)(1)(iii) and 15.35(c), average time of occupation on any channel is 0.33s max in 79x0.4s = 31.6s
Then a correction factor can be used to calculate average value of the emission. This factor is 20xlog(0.33/31.6) = -39.62dB

1) Rfid UHF Radiated field strenght on Open Area Test Site at 3m:

| Frequency (MHz) | Polarization | Azimut (degrees) | Antenna height (cm) | Measure (dBµV/m) | Standard limit (dBµV/m) | Comments |
|---|---|---|---|---|---|---|
| Channel 25 | | | | | | |
| 915.00 | Vertical | 8 | 104 | 104.075 | 125.2 (*) | C |
| 915.00 | Horizontal | 2 | 115 | 114.92 | 125.2 (*) | C |
| Channel 0 | | | | | | |
| 912.47 | Vertical | 0 | 114 | 115.00 | 125.2 (*) | C |
| 912.47 | Horizontal | 0 | 104 | 103.66 | 125.2 (*) | C |
| Channel 49 | | | | | | |
| 917.38 | Vertical | 0 | 100 | 103.91 | 125.2 (*) | C |
| 917.38 | Horizontal | 0 | 115 | 114.82 | 125.2 (*) | C |

C= Compliant NC= Not compliant

(*) This limit is a theorical conversion of standard limit given for 1W conducted power. E.U.T. antenna gain is less than 6dBi. Limit is reached by the following calculation:

$$E = \frac{\sqrt{30 \times P \times G}}{d}$$ with P in Watt (conducted power limit)
G= 1 (dipole antena theorical gain)
d= 3 m (test distance)
E= equivalent radiated electric field (V/m)

The maximum radiated power is then: $(E \times d)^2 / 30$. For 115dBµV we find 0.095W.

2) Wifi radiated field strength:

| Frequency (MHz) | Polarization | Azimut (degrees) | Antenna height (cm) | Peak Measure (dBµV/m) | Standard limit (dBµV/m) | Comments |
|---|---|---|---|---|---|---|
| 2437.00 | Vertical | 168 | 134 | 100.28 | 125.2 (*) | C |
| 2437.00 | Horizontal | 105 | 107 | 99.29 | 125.2 (*) | C |

C= Compliant NC= Not compliant

3) Bluetooth radiated field strength:

| Frequency (MHz) | Polarization | Azimut (degrees) | Antenna height (cm) | Peak Measure (dBµV/m) | Standard limit (dBµV/m) | Comments |
|---|---|---|---|---|---|---|
| 2402.00 | Vertical | 120 | 100 | 86.78 | 125.2 (*) | C |
| 2402.00 | Horizontal | 160 | 113 | 86.78 | 125.2 (*) | C |

C= Compliant NC= Not compliant

(*) This limit is a theorical conversion of standard limit given for 1W conducted power. E.U.T. antenna gain is less than 6dBi. Limit is reached by the following calculation:

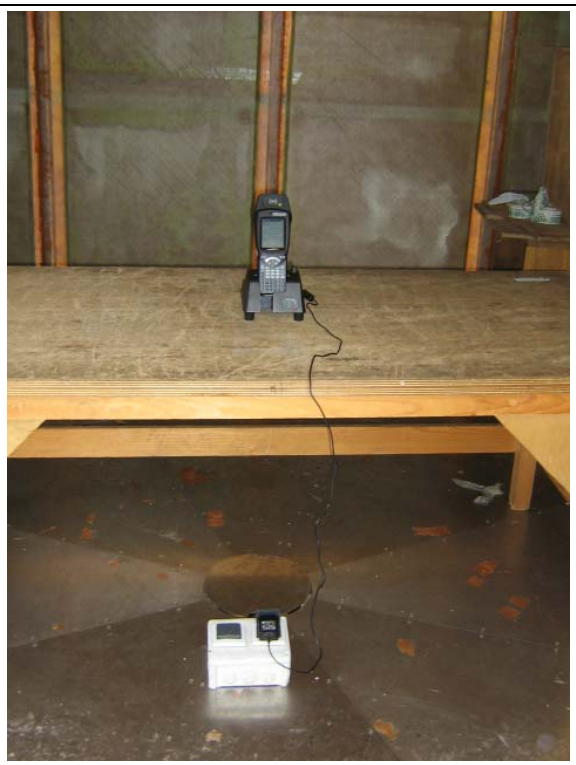
$$E = \frac{\sqrt{30 \times P \times G}}{d}$$ with P in Watt (conducted power limit)
G= 1 (dipole antena theorical gain)
d= 3 m (test distance)
E= Equivalent radiated electric field (V/m)

*□□□ End of report – 1 annex to be forwarded □□□*

# ANNEX:
# PHOTOGRAPH(S)

# EQUIPEMENT UNDER TEST (E.U.T.) PHOTOGRAPH(S)

## WORKABOUT PRO (7527C) + WA9005 + BT + RA2041 + RA3030 + RFID Module UHF-CA2-A5

| | |
|---|---|
| Radiated electric field emission on OATS |  |
| Conducted emission |  |