



RC-032-C42-08-101503-4-A

E.M.C Test Report

According to the standard:
FCC PART 15 : 2007


Equipment under test:
SPY RF Modem

Company:
JULES RICHARD INSTRUMENTS

DISTRIBUTION: Mr PEYRICHOU

(Company: JULES RICHARD INSTRUMENTS)

Number of pages: 22 with 3 annexes

| Ed. | Date | Modified page (s) | Written by | | Verification / Approval | |
|-----|----------|-------------------|---------------------|------|--|------|
| | | | Name | Visa | Name | Visa |
| 0 | 01/09/08 | Creation | F. LHEUREUX F.L. | |  Eric COEURET Responsable Laboratoire CEM et Radio EMC and Radio Laboratory Manager | |

Duplication of this report is only permitted for an integral photographic facsimile. It includes the number of pages referenced 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 production of the item tested.



TEST CERTIFICATION FOR: Fcc Certification

NAME OF THE EQUIPMENT UNDER TEST:

Reference: 06337

Serial number: A16291

NAME OF THE MANUFACTURER: JULES RICHARD INSTRUMENTS

ADDRESS OF THE APPLICANT:

Company: JULES RICHARD INSTRUMENTS

Address: 116 Quai de Bezons
95100 ARGENTEUIL
FRANCE

Person in charge: Mr PEYRICHOU

DATES OF TESTS: 2008, the 23rd of June, the 02nd of July and the 28th of August

TESTS LOCATIONS: Open area test site in Aunainville (28) - FRANCE
EMITECH Laboratory in Montigny le Bretonneux (78)
FRANCE

TESTS OPERATORS: B. PELLERIN / F. LHEUREUX

TABLE OF CONTENTS

| | | |
|----|---|----|
| 1. | <i>INTRODUCTION</i> | 4 |
| 2. | <i>REFERENCE DOCUMENT</i> | 4 |
| 3. | <i>PRODUCT DESCRIPTION</i> | 4 |
| 4. | <i>EQUIPMENT UNDER TEST (EUT) CONFIGURATION</i> | 4 |
| 5. | <i>SUMMARY OF TEST RESULTS</i> | 5 |
| 6. | <i>MEASUREMENT OF CONDUCTED EMISSION ON AC MAINS PORTS</i> | 6 |
| 7. | <i>INTENTIONAL RADIATED EMISSION IN THE BAND 902-928 MHz</i> | 10 |
| 8. | <i>UNINTENTIONAL RADIATED EMISSIONS IN THE BAND 30 MHz - 10 GHz</i> | 12 |

Annex 1: Antenna factors, insertion losses and amplifier values

Annex 2: EUT photographs

Annex 3: Test setup photographs

1. INTRODUCTION

This document presents the results of Electromagnetic Compatibility tests performed on the equipment «SPY RF Modem» according to reference document listed below.

2. REFERENCE DOCUMENT

FCC Part 15: 2007
Code of Federal Regulations
Title 47- Telecommunication
Chapter 1- Federal Communication Commission
Part 15- Radio frequency devices

3. PRODUCT DESCRIPTION

| | |
|----------------------------|-------------------------|
| ITU Emission code: | Not communicated |
| Class: | Not communicated |
| Utilization: | Modem |
| Operating frequency range: | From 902 MHz to 928 MHz |
| Number of channels: | 1 |
| Channel spacing: | - |
| Frequency generation: | Not communicated |
| Modulation: | GFSK |
| Power source: | 110 Vdc – 60 Hz |

Power level, frequency range and channels characteristics are not user adjustable.

4. EQUIPMENT UNDER TEST (EUT) CONFIGURATION

- See antenna factors, insertion losses and amplifier values in annex 1.
- See EUT photographs in annex 2.
- See setup photographs in annex 3.

Modification of the equipment during the tests: Yes

As a value to software – 2 dBm, the tests are carried out with a value -10 dBm.

5. SUMMARY OF TEST RESULTS

The following table summarizes test results of the EUT.

| Test procedure | Designation of test | Test results | | | | Comments |
|-------------------|--|--------------|------|------|------|----------|
| | | Pass | Fail | N.A. | N.P. | |
| 15.207 | Measurement of conducted emission on AC mains ports | X | | | | |
| 15.249 | Intentional radiated emissions in the band 902 – 928 MHz | X | | | | |
| 15.205 and 15.209 | Unintentional radiated emissions in the band 30 MHz – 10 GHz | X | | | | |

N.A.: Not Applicable

N.P.: Not Performed

Conclusion:

The tested sample "SPY RF Modem" submitted to the tests complies with the requirements of the standard:

- FCC PART 15: 2007

According to the limits specified in this report.

6. MEASUREMENT OF CONDUCTED EMISSION ON AC MAINS PORTS

Standard: FCC Part 15: 2007

Section: 15.207

Test configuration:

The equipment under test (EUT) is operating on a non conductive test table at 0.8 m above the horizontal metal ground plane and at 0.4 m above the vertical metal ground plane.

The EUT is supplied through LISN (Line Impedance Stabilization Network) bonded to the ground reference plane.

| Tested cable | Measure with | E.U.T. height (cm) |
|------------------------------|--------------|--------------------|
| 110 Vac (60 Hz) power supply | LISN | 80 |

| Frequency band | Tested cable | Resolution bandwidth | Video bandwidth | Detection mode |
|------------------|------------------------------|----------------------|-----------------|----------------|
| 150 kHz – 30 MHz | 110 Vac (60 Hz) power supply | 10 kHz | 30 kHz | Peak |

Test method deviation: None

Detection mode: Peak

Limit: The EUT must satisfy requirements of the standard as shown in table below.

| Frequency range (MHz) | Limit (dB μ V) | |
|-----------------------|--------------------|---------|
| | Quasi-peak | Average |
| 0,15 to 0,5 | 66 - 56 | 56 - 46 |
| 0,5 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

Operating mode during the test:

The equipment under test is in continuous emission without and with amplifier.

Instrumentation test list:

| CATEGORY | BRAND | TYPE | Nr EMITECH |
|-------------------|-----------------|---------|------------|
| Cable | - | N-4m | 2809 |
| Cable | - | N-2m | 2812 |
| LISN | Rohde & Schwarz | ESH2-Z5 | 3290 |
| Logiciel software | Nexio | BAT EMC | 0000 |
| Power supply | CHROMA | 6415 | 5331 |
| Quasi peak unit | Hewlett Packard | 85650 A | 491 |
| Spectrum analyzer | Hewlett Packard | 8568 B | 19 |
| Test enclosure | Emitech | JD | 1804 |
| Transient limiter | Hewlett Packard | 11947A | 1094 |

Results:

| Curve reference | Comments |
|-----------------|---|
| Curve 1 | Measurement of peak detection on wire 1 without amplifier |
| Curve 2 | Measurement of peak detection on wire 2 without amplifier |
| Curve 3 | Measurement of peak detection on wire 1 with amplifier |
| Curve 4 | Measurement of peak detection on wire 2 with amplifier |

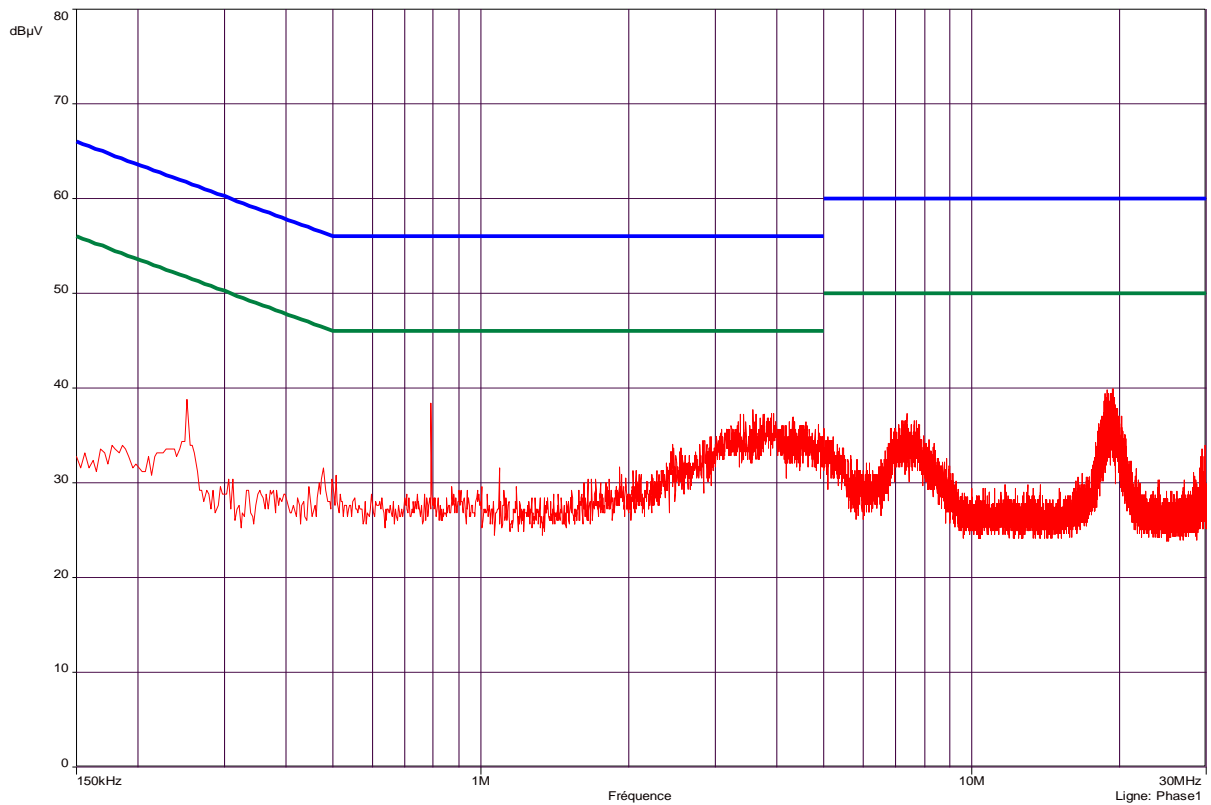
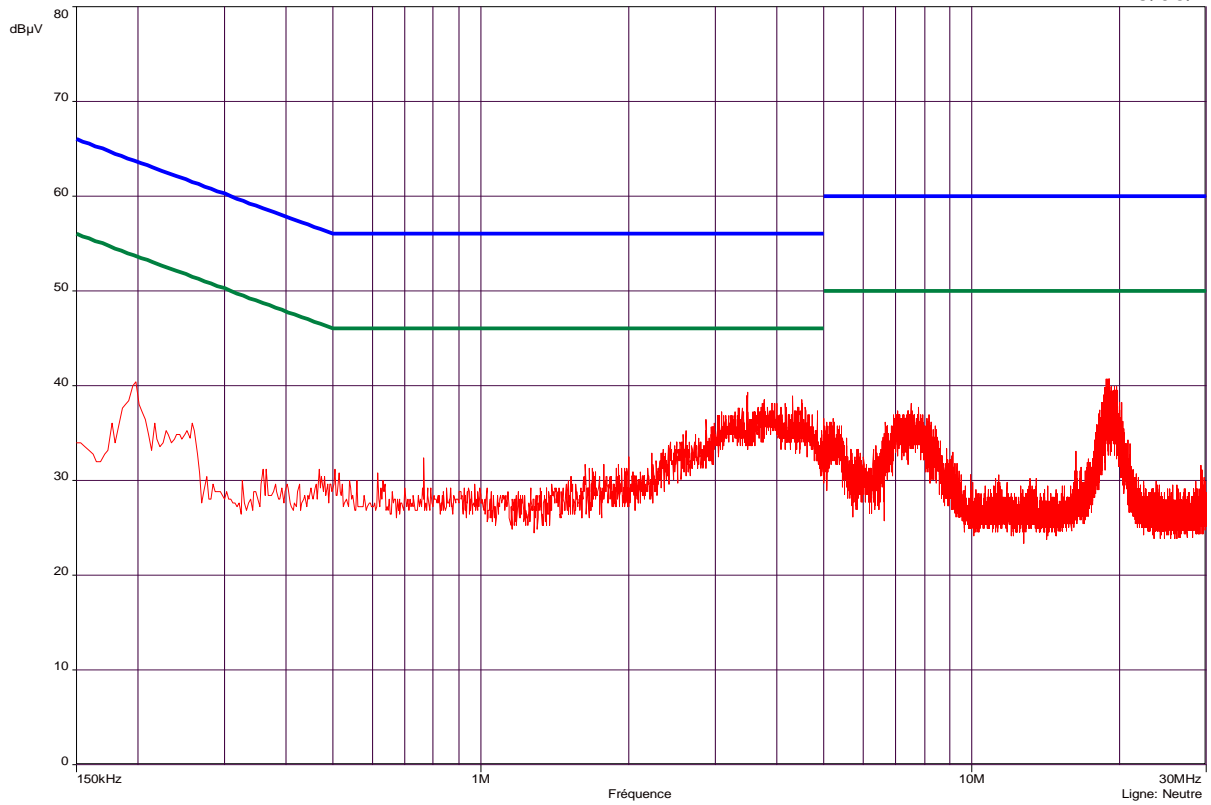
Observation during the test:

The equipment complies with the requirement of the FCC PART 15.207: 2007.

SPY RF MODEM

Measurement of conducted emission on AC mains ports
 Peak detection, in low power configuration.

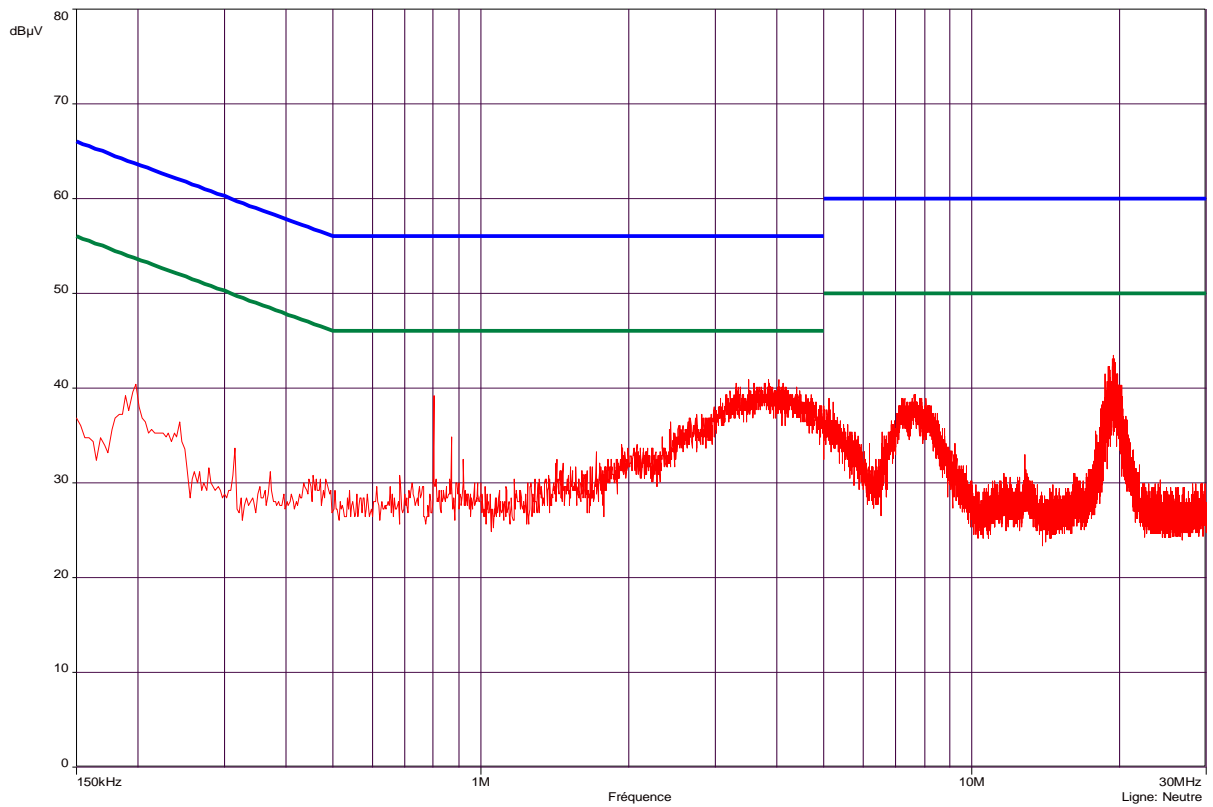
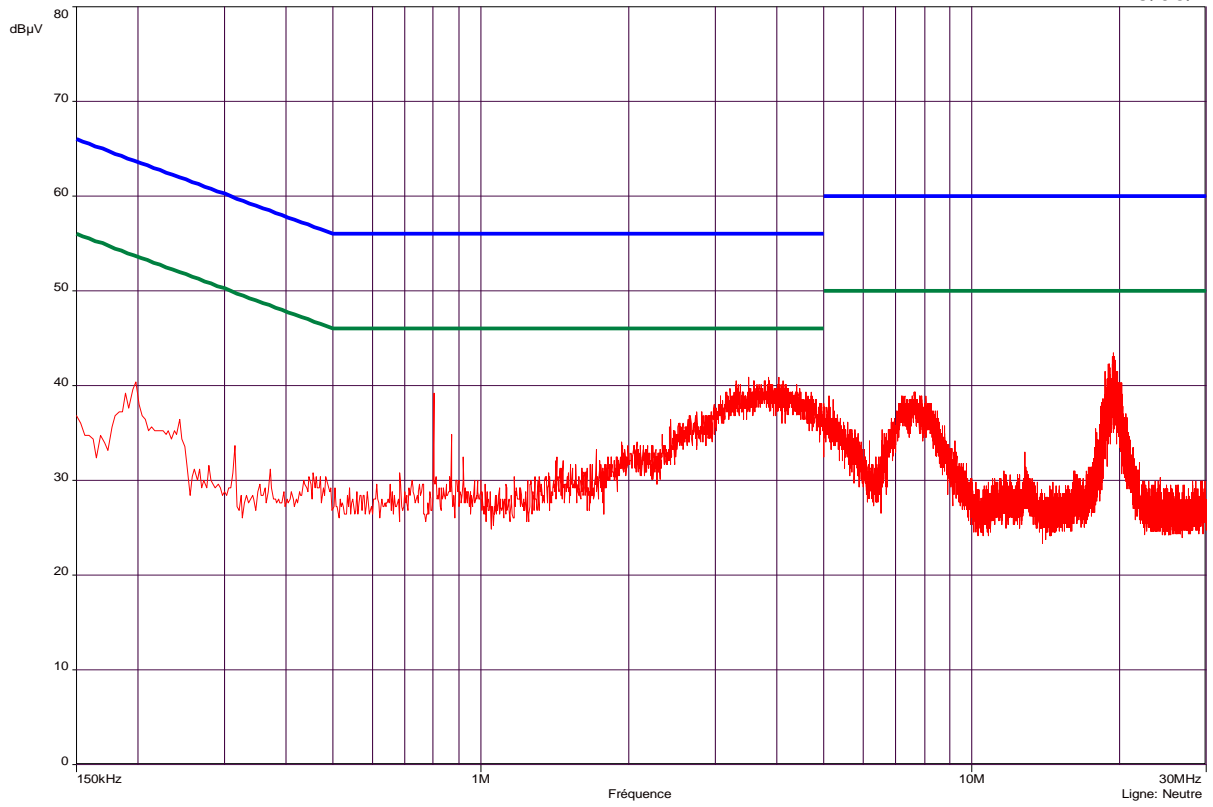
23/06/2008



SPY RF MODEM

Measurement of conducted emission on AC mains ports
Peak detection, in high power configuration.

23/06/2008



7. INTENTIONAL RADIATED EMISSION IN THE BAND 902-928 MHz

Standard: FCC PART 15: 2007

Section: 15.249

Test configuration:

The system is tested in an open area test site (OATS).

The test is placed on a rotating table, 0.8 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

The level was maximised in antenna height, azimuth and polarization. The maximum level measured on the spectrum analyser was recorded.

Instrumentation test list:

| CATEGORY | BRAND | TYPE | Nr EMITECH |
|-----------------|-----------------------|------------------|------------|
| Antenna | Schwarzbeck | UHALP 9108 | 3106 |
| Antenna mast | HD GmbH | MA 240 | 2341 |
| Cable | Cables & Connectiques | HF 12m | 2450 |
| Cable | Cables & Connectiques | HF 2m | 2451 |
| Cable | Cables & Connectiques | HF 13m | 2452 |
| Mast controller | HD GmbH | HD 100 | 2342 |
| OATS | Emitech | Site champ libre | 187 |
| Power supply | Secas | CF1000 50/60 | 2102 |
| Receiver | Rohde & Schwarz | ESVP | 1057 |

Equipment under test operating condition:

EUT is in continuous emission with and without amplifier.

Measure conditions:

Ambient temperature (°C): 19 / 17

Relative humidity (%): 78 / 76

Power source: 110 Vd.c.

For RF peak level: Resolution bandwidth: 100 kHz

Video bandwidth: 300 kHz

Results:

Polarization of test antenna: vertical (height: 120 cm, Az: 180°) without amplifier

Frequency: 902.419 MHz

| | | Level dB μ V | Cable loss dB | Antenna factor dB | Electro-magnetic field (dB μ V/m) | Limit (dB μ V/m) |
|---------------------------|-------------------------------------|---------------------|------------------|----------------------|--|-------------------------|
| Normal test conditions | Nominal power source (V): 110 | 62.6 | 5.0 | 21.9 | 89.5 | 94.0 |

Polarization of test antenna: vertical (height: 117 cm, Az: 174°) with amplifier

Frequency: 902.637 MHz

| | | Level dB μ V | Cable loss dB | Antenna factor dB | Electro-magnetic field (dB μ V/m) | Limit (dB μ V/m) |
|---------------------------|-------------------------------------|---------------------|------------------|----------------------|--|-------------------------|
| Normal test conditions | Nominal power source (V): 110 | 54.0 | 5.0 | 21.9 | 80.9 | 94.0 |

Test conclusion: Complies with the requirements of the standard.

8. UNINTENTIONAL RADIATED EMISSIONS IN THE BAND 30 MHZ - 10 GHZ

Standard: FCC PART 15: 2007

Sections: 15.205, 15.209 and 15.247

Equipment under test arrangement:

The equipment under test (EUT) is placed on a non-conductive test table at 0.8 m above the horizontal metal 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 table on the next pages.

The equipment is not in continuous transmission. No possibility to choice particular frequency channel.

Frequency range: 30 MHz - 1 GHz
1 GHz - 10 GHz

Detection mode: Quasi-peak for 30 MHz - 1 GHz
Average for 1 GHz - 10 GHz

Resolution bandwidth: 120 kHz for 30 MHz - 1 GHz
1 MHz for 1 GHz - 10 GHz

Measurement distance: 3 meters

Limit: For restrictive bands (see paragraph 15.205), the EUT must satisfy requirements of the section 15.209 as shown in table below.

| Frequency range (MHz) | Limit (dB μ V/m) |
|-----------------------|----------------------|
| 30 to 88 | 40.0 |
| 88 to 216 | 43.5 |
| 216 to 960 | 46.0 |
| 960 to 18000 | 54.0 |

Instrumentation test list:

| CATEGORY | MARQUE | TYPE | Nr EMITECH |
|-------------------|-----------------------|---------------------|------------|
| Antenna | Schwarzbeck | UHALP 9108 | 3106 |
| Antenna | Emco | 3115 | 3374 |
| Antenna mast | HD GmbH | MA 240 | 2341 |
| Biconical antenna | Schwarzbeck | VHBA 9123 | 1144 |
| Cable | Cables & Connectiques | HF 12m | 2450 |
| Cable | Cables & Connectiques | HF 2m | 2451 |
| Cable | Cables & Connectiques | HF 13m | 2452 |
| Cable | Cables & Connectiques | N-SMA | 2864 |
| Filter | Micro-tronics | HPM 14758 | 4691 |
| High pass filter | Trilithic | 6HC1300-2.5-KK | 1097 |
| Mast controller | HD GmbH | HD 100 | 2342 |
| Open site | Emitech | Aunainville | 0187 |
| Preamplifier | Miteq | AMF-6D-010250-70-7P | 3229 |
| Receiver | Rohde & Schwarz | ESVP | 1057 |
| Spectrum analyzer | Rohde & Schwarz | FSP40 | 5175 |

Results:

Without amplifier and with a value software – 10 dBm

| Frequency (MHz) | Polarization | Azimet (degress) | Antenna height (cm) | Measure (dB μ V/m) | Standard limit (dB μ V/m) | DELTA (dB) | Comments |
|-----------------|--------------|------------------|---------------------|------------------------|-------------------------------|------------|----------|
| 33.734 | Vertical | 270 | 100 | 35.0 | 40.0 | 5.0 | Pass |
| 33.734 | Horizontal | 320 | 350 | 21.3 | 40.0 | 18.7 | Pass |
| 451.215 | Vertical | 200 | 110 | 37.0 | 46.0 | 9.0 | Pass |
| 451.215 | Horizontal | 190 | 110 | 36.3 | 46.0 | 9.7 | Pass |
| 881.100 | Vertical | 205 | 115 | 43.7 | 46.0 | 2.3 | Pass |
| 881.100 | Horizontal | 330 | 180 | 39.6 | 46.0 | 6.4 | Pass |
| 1804.83 | Vertical | 17 | 126 | 35.7 | 54.0 | 18.3 | Pass |
| 1804.81 | Horizontal | 350 | 100 | 35.3 | 54.0 | 18.7 | Pass |
| 2707.22 | Vertical | 236 | 112 | 45.2 | 54.0 | 8.8 | Pass |
| 2707.15 | Horizontal | 140 | 173 | 51.9 | 54.0 | 2.0 | Pass |

With amplifier and with a value software – 10 dBm

| Frequency (MHz) | Polarization | Azimut (degress) | Antenna height (cm) | Measure (dB μ V/m) | Standard limit (dB μ V/m) | DELTA (dB) | Comments |
|-----------------|--------------|------------------|---------------------|------------------------|-------------------------------|------------|----------|
| 33.233 | Vertical | 0 | 100 | 34.3 | 40.0 | 5.7 | Pass |
| 33.233 | Horizontal | 0 | 360 | 21.0 | 40.0 | 19.0 | Pass |
| 854.637 | Vertical | 130 | 120 | 44.2 | 46.0 | 1.8 | Pass |
| 854.637 | Horizontal | 0 | 250 | 41.2 | 46.0 | 4.8 | Pass |
| 878.639 | Vertical | 190 | 110 | 43.6 | 46.0 | 2.4 | Pass |
| 878.639 | Horizontal | 230 | 160 | 40.1 | 46.0 | 5.9 | Pass |
| 1805.23 | Vertical | 172 | 100 | 46.8 | 80.5 | 33.7 | Pass |
| 1805.27 | Horizontal | 0 | 119 | 46.6 | 80.5 | 33.9 | Pass |
| 2707.75 | Vertical | 330 | 156 | 46.1 | 54.0 | 7.9 | Pass |
| 2707.74 | Horizontal | 140 | 114 | 48.1 | 54.0 | 5.9 | Pass |

Test conclusion:

The equipment complies with the requirements of the standard FCC PART 15.205,15.209 : 2007 and 15.247 : 2007

« □□□ End of report, 3annexes 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°1144. 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 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 3.

The test antenna used for the radiated emission between 1 GHz and 18 GHz is the horn antenna n°3374. Antenna factors are given in table 4.

The amplifier n°3229 and its cable used to connect the spectrum analyzer to the test cable has gain values given in the table 5.

The test cable used between 1 GHz and 18 GHz to connect the horn antenna to the amplifier for measurements at a distance of 3 meters has losses given in table 6.

| Frequency (MHz) | Antenna factor (dB/m) | Frequency (MHz) | Antenna factor (dB/m) |
|-----------------|-----------------------|-----------------|-----------------------|
| 30 | 12.5 | 90 | 9.5 |
| 35 | 10.4 | 100 | 10 |
| 40 | 9.3 | 120 | 10.9 |
| 45 | 8.9 | 140 | 11.1 |
| 50 | 8.4 | 160 | 12.9 |
| 60 | 8.5 | 180 | 14.1 |
| 70 | 8.5 | 200 | 15.8 |
| 80 | 9.2 | - | - |
| 90 | 9.5 | - | - |
| 100 | 10.0 | - | - |

TABLE 1 : BICONICAL ANTENNA

| Frequency (MHz) | Antenna factor (dB/m) | Frequency (MHz) | Antenna factor (dB/m) |
|-----------------|-----------------------|-----------------|-----------------------|
| 200 | 23.6 | 700 | 20.4 |
| 300 | 14.3 | 800 | 20.6 |
| 400 | 16.1 | 900 | 21.7 |
| 500 | 17.4 | 1000 | 22.0 |
| 600 | 18.6 | - | - |

TABLE 2 : LOG-PERIODIC ANTENNA

| Frequency (MHz) | loss (dB) | Frequency (MHz) | loss (dB) |
|-----------------|-----------|-----------------|-----------|
| 30 | 0.6 | 160 | 1.8 |
| 35 | 0.8 | 180 | 2.0 |
| 40 | 0.8 | 200 | 2.1 |
| 45 | 1.0 | 300 | 2.7 |
| 50 | 1.0 | 400 | 2.9 |
| 60 | 1.1 | 500 | 3.1 |
| 70 | 1.1 | 600 | 3.4 |
| 80 | 1.2 | 700 | 3.7 |
| 90 | 1.3 | 800 | 4.0 |
| 100 | 1.5 | 900 | 4.4 |
| 120 | 1.5 | 1000 | 4.8 |
| 140 | 1.7 | - | - |

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

| Frequency (GHz) | Antenna factor (dB/m) | Frequency (GHz) | Antenna factor (dB/m) | Frequency (GHz) | Antenna factor (dB/m) |
|-----------------|-----------------------|-----------------|-----------------------|-----------------|-----------------------|
| 1.0 | 23.6 | 6.0 | 34.4 | 11.0 | 38.3 |
| 1.5 | 25.2 | 6.5 | 34.2 | 11.5 | 38.8 |
| 2.0 | 27.5 | 7.0 | 35.3 | 12.0 | 39.2 |
| 2.5 | 29.0 | 7.5 | 36.7 | 13.0 | 39.9 |
| 3.0 | 29.9 | 8.0 | 36.9 | 14.0 | 41.9 |
| 3.5 | 31.1 | 8.5 | 37.6 | 15.0 | 41.0 |
| 4.0 | 32.6 | 9.0 | 38.0 | 16.0 | 38.0 |
| 4.5 | 32.3 | 9.5 | 37.9 | 17.0 | 39.9 |
| 5.0 | 33.5 | 10.0 | 38.3 | 18.0 | 47.4 |
| 5.5 | 34.2 | 10.5 | 38.1 | - | - |

TABLE 4 : HORN ANTENNA 3374 (1 to 18 GHz)

| Frequency (GHz) | Gain value (dB) | Frequency (GHz) | Gain value (dB) | Frequency (GHz) | Gain value (dB) |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1.0 | 25.3 | 7.0 | 27.5 | 15 | 25.2 |
| 1.5 | 25.8 | 8.0 | 27.3 | 16 | 22.8 |
| 2.0 | 25.3 | 9.0 | 25.3 | 17 | 23.8 |
| 2.5 | 24.5 | 10.0 | 25.1 | 18 | 24.8 |
| 3.0 | 24.0 | 11.0 | 25.3 | 20 | 24.0 |
| 4.0 | 23.0 | 12.0 | 26.8 | 22 | 25.2 |
| 5.0 | 23.6 | 13.0 | 29.5 | - | - |
| 6.0 | 25.7 | 14 | 28.6 | - | - |

TABLE 5 : AMPLIFIER (1 – 26 GHz)

| Frequency (GHz) | loss (dB) | Frequency (GHz) | loss (dB) | Frequency (GHz) | Loss (dB) |
|-----------------|-----------|-----------------|-----------|-----------------|-----------|
| 1.0 | 2.4 | 4.0 | 5.0 | 12 | 9.0 |
| 1.5 | 2.9 | 4.5 | 5.2 | 15 | 10.2 |
| 2.0 | 3.5 | 5 | 5.6 | 18 | 11.2 |
| 2.5 | 3.9 | 6 | 6.2 | 21 | 13.3 |
| 3.0 | 4.2 | 8 | 7.2 | 24 | 14.9 |
| 3.5 | 4.6 | 10 | 8.2 | - | - |

TABLE 6: TEST CABLE FOR 3 M MEASUREMENT

ANNEX 2

EUT PHOTOGRAPHIES



ANNEX 3

TEST SETUP PHOTOGRAPHIES

