



RA-24-08103494-2/A Ed. 0

**FCC CERTIFICATION
RADIO Measurement
Technical Report**

**standard to apply:
FCC Part 15
Modular approval**

**Equipment under test:
Bluetooth module CK5050+ IA 06**

**FCC ID :
RKXCK5050PIA06**

**Company:
PARROT**

DISTRIBUTION: Mr LEBLANC

Company: PARROT

Number of pages: 37 including 5 annexes

| Ed. | Date | Modified pages | Written by | | Technical Verification Quality Approval | |
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| | | | Name | Visa | Name | Visa |
| 0 | 13-Feb-09 | Creation | L. BERTHAUD | LB | | |

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PRODUCT: Bluetooth module

Reference / model: CK5050+ IA 06

Serial number: PI040138AC

MANUFACTURER: PARROT

COMPANY SUBMITTING THE PRODUCT:

Company: PARROT

Address: 174 Quai de Jemmapes
75010 PARIS
FRANCE

Responsible: Mr LEBLANC

DATE(S) OF TEST: 17, 18 and 19 December 2008

TESTING LOCATION: EMITECH ATLANTIQUE laboratory at ANGERS (49) FRANCE
EMITECH ATLANTIQUE open area test site in LA POUZE (49)
FRANCE

Registration Number by FCC: 101696/FRN: 0006 6490 08

TESTED BY: L. BERTHAUD

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1. INTRODUCTION

This document presents the result of RADIO test carried out on the following equipment: Bluetooth module CK5050+ IA 06, in accordance with normative reference.

2. PRODUCT DESCRIPTION

ITU Emission code: 1M00F7D

Class: B (residential environment)

Utilization: Bluetooth module

Antenna type: integral antenna

Operating frequency range: from 2402 MHz to 2480 MHz

Number of channels: 79

Channel spacing: 1 MHz

Frequency generation: SAW Resonator Crystal Synthetiser

Modulation: Frequency Hopping Spread Spectrum (FHSS)
 Amplitude Digital Frequency Phase

Power source: 6 Vd.c.

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.

FCC Part 15 (2008) Code of Federal Regulations
Title 47 - Telecommunication
Chapter 1 - Federal Communications Commission
Part 15 - Radio frequency devices
Subpart C - Intentional Radiators

ANSI C63.4 (2003) Methods of Measurement of Radio-Noise Emissions from Low-voltage Electrical and Electronics Equipment in the range of 9 kHz to 40 GHz.

Public Notice DA 00-705 Filing and Measurement Guideline for Frequency Hopping Spread Spectrum Systems.

4. TEST METHODOLOGY

Radio performance tests procedures given in part 15:

- Paragraph 33: frequency range of radiated measurements
- Paragraph 35: measurement detector functions and bandwidths
- Paragraph 107: conducted limits
- Paragraph 109: radiated emission limits
- Paragraph 203: antenna requirement
- Paragraph 205: restricted bands of operation
- Paragraph 207: conducted limits
- Paragraph 209: radiated emission limits; general requirements
- Paragraph 247: operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz

5. ADD ATTACHMENTS FILES

- “Synoptic “***
- “Block diagram “***
- “External photos and Product labeling “***
- “Assembly of components “***
- “Internal photos “***
- “Layout pcb “***
- “Bil of materials “***
- “Schematics “***
- “Product description “***
- “User guide “***

6. TESTS AND CONCLUSIONS

6.1 Subpart C

| Test procedure | Description of test | Respected criteria? | | | | Comment |
|-----------------|--|---------------------|----|-----|-----|---------|
| | | Yes | No | NAp | NAs | |
| FCC Part 15.203 | ANTENNA REQUIREMENT | X | | | | Note 1 |
| FCC Part 15.205 | RESTRICTED BANDS OF OPERATION | X | | | | |
| FCC Part 15.207 | CONDUCTED LIMITS | | | X | | |
| FCC Part 15.209 | RADIATED EMISSION LIMITS; general requirements | X | | | | Note 2 |
| FCC Part 15.247 | OPERATION WITHIN THE BAND 902-928 MHZ, 2400-2483.5 MHz and 5725-5850 MHz | | | | | |
| | (a) (1) <i>hopping systems</i> | X | | | | Note 3 |
| | (a) (1) (i) 902 – 928 MHz | | | X | | |
| | (a) (1) (ii) 5725 – 5850 MHz | | | X | | |
| | (a) (1) (iii) 2400 – 2483.5 MHz | X | | | | Note 4 |
| | (a) (2) <i>digital modulation techniques</i> | | | X | | |
| | (b) <i>max output power</i> | X | | | | Note 5 |
| | (c) <i>operation with directional antenna gains > 6 dBi</i> | | | X | | Note 6 |
| | (d) <i>intentional radiator</i> | X | | | | |
| | (e) <i>peak power spectral density</i> | | | X | | |
| | (f) <i>hybrid system</i> | | | X | | |
| | (g) | X | | | | |
| | (h) | X | | | | |
| | (i) <i>RF exposure compliance</i> | X | | | | Note 7 |
| DA 00-705 | BAND EDGE COMPLIANCE | X | | | | |

NAp: Not Applicable

NAs: Not Asked

Note 1: *internal antenna (pcb antenna), see photos in annex 4.*

Note 2: *see FCC part 15.247 (d).*

Note 3: *the system hops to channel frequencies from a pseudo randomly ordered list of hopping frequencies. Each frequency is used equally on the average by the transmitter, and separated by a minimum of 20 dB bandwidth of the hopping channel (704 kHz; see annex 1).*

Note 4: *the frequency hopping system uses 79 channels (see annex 2).*

The timing by channel is 154.4 μs. During 79 channels × 0.4 s (part 15) = 31.6 s, any channel is used 44 times, then 44 × 154.4 μs = 6.8 ms, thus the average time of occupancy on any channel is less than 400 ms within a period of 0.4 s multiplied by the number of hopping channels employed, in normal operating mode (see annex 3).

Note 5: *conducted measurement is not possible (integral antenna), so we used the radiated method in open field.*

Note 6: *the antenna gain is less than 6 dBi.*

Note 7: *this type of equipment uses less than 0.5 W of output power with a high signal transmitting duty factor (section 3 from Oet 65c).*

6.2 Subpart B

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

NAp: Not Applicable

NAs: Not Asked

Conclusion:

The sample of Bluetooth module CK5050+ IA 06 submitted to the tests complies with the regulations of the standard FCC Part 15 in accordance with the limits or criteria defined in this report.

7. PEAK OUTPUT POWER

Standard: FCC Part 15

Test procedure: paragraph 15.247

Test equipment:

| TYPE | BRAND | EMITECH NUMBER |
|---------------------------------|-----------------|-----------------------|
| Spectrum analyzer FSP 40 | Rohde & Schwarz | 4088 |
| Antenna RGA60 | Electrometrics | 1204 |
| Open site | EMITECH | 1274 |
| Radio frequency generator SME06 | Rohde & Schwarz | 1669 |
| High pass filter HPM11630 | Micro-tronics | 1673 |
| Low-noise amplifier 1 to 18 GHz | ALC | 2648 |
| Power meter 8541B | Gigatronics | 3479 |
| Power sensor 80401A | Gigatronics | 3182 |
| Variac R213 | Dereix | 1419 |
| 2.4 GHz bandpass filter | BL microwave | 5625 |
| Power source E3610A | Hewlett Packard | 4195 |

Test set up:

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

The test unit 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.

A measurement of the electro-magnetic field is realized, with a resolution bandwidth and video bandwidth adjusted at 1 MHz.

Distance of antenna: 3 meters

Antenna height: 1 to 4 meters

Antenna polarization: vertical and horizontal

Equipment under test operating condition:

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

Results:

Ambient temperature (°C): 17.5

Relative humidity (%): 47

Power source: 6 Vd.c.

Sample n° 1 Channel 1

| | Level dB μ V | Cable loss dB | Antenna factor dB | Electro-magnetic field (dB μ V/m): | P* (W) |
|-------------------------------|------------------|---------------|-------------------|--|------------------------|
| Normal test conditions | 57.65 | 4.97 | 28.61 | 91.23 | 0.241×10^{-3} |

Polarization of test antenna: vertical (height: 147 cm)
 Position of equipment: on its workbench (azimuth: 219 degrees)

Sample n° 1 Channel 40

| | Level dB μ V | Cable loss dB | Antenna factor dB | Electro-magnetic field (dB μ V/m): | P* (W) |
|-------------------------------|------------------|---------------|-------------------|--|------------------------|
| Normal test conditions | 57.79 | 5.01 | 28.72 | 91.52 | 0.258×10^{-3} |

Polarization of test antenna: vertical (height: 154 cm)
 Position of equipment: on its workbench (azimuth: 220 degrees)

Sample n° 1 Channel 79

| | Level dB μ V | Cable loss dB | Antenna factor dB | Electro-magnetic field (dB μ V/m): | P* (W) |
|-------------------------------|------------------|---------------|-------------------|--|------------------------|
| Normal test conditions | 57.42 | 5.06 | 28.84 | 91.32 | 0.246×10^{-3} |

Polarization of test antenna: vertical (height: 160 cm)
 Position of equipment: on its workbench (azimuth: 224 degrees)

* $P = (E \times d)^2 / (30 \times G_p)$ with $d = 3$ m and $G_p = 1.65$

Test conclusion:

RESPECTED STANDARD

8. RADIATED EMISSION OF TRANSMITTER

Standard: FCC Part 15

Test procedure: paragraph 15.205
 paragraph 15.209
 paragraph 15.247

Test equipment:

| TYPE | BRAND | EMITECH NUMBER |
|----------------------------------|-----------------|----------------|
| Test receiver ESH3 | Rohde & Schwarz | 1058 |
| Test receiver ESVS 10 | Rohde & Schwarz | 1219 |
| Spectrum analyzer FSP 40 | Rohde & Schwarz | 4088 |
| Loop antenna | EMCO | 1406 |
| Biconical antenna HP 11966C | Hewlett Packard | 728 |
| Log periodic antenna HL 223 | Rohde & Schwarz | 1999 |
| Open site | Emitech | 1274 |
| Antenna RGA-60 | Electrometrics | 1204 |
| Low-noise amplifier 2 to 18 GHz | Microwave DB | 1922 |
| High pass filter HP12/3200-5AA | Filtek | |
| Antenna WR42 | IMC | 1939 |
| Low-noise amplifier 18 to 26 GHz | ALC | 3036 |
| Power source E3610A | Hewlett Packard | 4195 |

Test set up:

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

The test unit 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.

Frequency range: from 9 kHz to harmonic 10 ($F_{\text{carrier}} \leq 10 \text{ GHz}$)

Bandwidth: 120 kHz ($F < 1 \text{ GHz}$) or 100 kHz, following 15.205 or 15.247
 1 MHz ($F > 1 \text{ GHz}$) or 100 kHz, following 15.205 or 15.247

Distance of antenna: between 30 m and 3 m according the frequencies and the limits.

Antenna height: 1 to 4 meters

Antenna polarization: vertical and horizontal, only the highest level is recorded.

Equipment under test operating condition:

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

Results:

Ambient temperature (°C): 19.5

Relative humidity (%): 51

Power source: 6 Vd.c.

The polarity column refers to the antenna polarity at which the maximum emissions level is measured.

Channel 1

Not any spurious has been detected.

Channel 40

Not any spurious has been detected.

Channel 79

Not any spurious has been detected.

Applicable limits: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

The highest level recorded in a 100 kHz bandwidth is 91.37 dB μ V/m on channel 40.

So the applicable limit is **71.37 dB μ V/m**.

In addition, radiated emissions which fall in the restricted band, as defined in section 15.205 (a), must also comply with the radiated emission limits specified in section 15.209 (a) (see section 15.205 (c)).

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

TEST CONCLUSION:

RESPECTED STANDARD

9. BAND EDGE COMPLIANCE

Standard: FCC Part 15.247

Test procedure: Public Notice DA 00-705, Delta Marker method

Test equipment used:

| TYPE | MANUFACTURER | EMITECH NUMBER |
|--------------------------|-----------------|----------------|
| Spectrum analyzer FSP 40 | Rohde & Schwarz | 4088 |
| Antenna RGA-60 | Electrometrics | 1204 |
| Variac R213 | Dereix | 1419 |

Test procedure:

An in band field strength measurement of the fundamental Emission using the RBw and detector function required by C63.4-2003 and FCC Rules.

Test operating condition of the equipment:

The equipment is blocked in frequency hopping mode.

Results:

Lower Band Edge: from 2310 MHz to 2390 MHz, CURVE n° 1

Upper Band Edge: from 2483.5 MHz to 2500 MHz, CURVE n° 2

Sample n°1:

| Fundamental frequency (MHz) | Field Strength Level of fundamental (dB μ V/m) | Detector (Peak or Average) | Frequency of maximum Band-edges Emission (MHz) | Delta Marker (dB)* | Calculated Max Out of Band Emission Level (dB μ V/m)** | Limit (dB μ V/m) | Margin (dB) |
|-----------------------------|--|----------------------------|--|--------------------|--|----------------------|-------------|
| 2402 | 91.23 | Peak | 2322.8 | -45.96 | 45.27 ⁽¹⁾ | 53.98 | 8.71 |
| 2480 | 91.32 | Peak | 2485.92 | -44.91 | 46.41 ⁽¹⁾ | 53.98 | 7.57 |

* according to step 2 of Marker-Delta Method DA 00-705.

** according to step 3 of Marker-Delta Method:

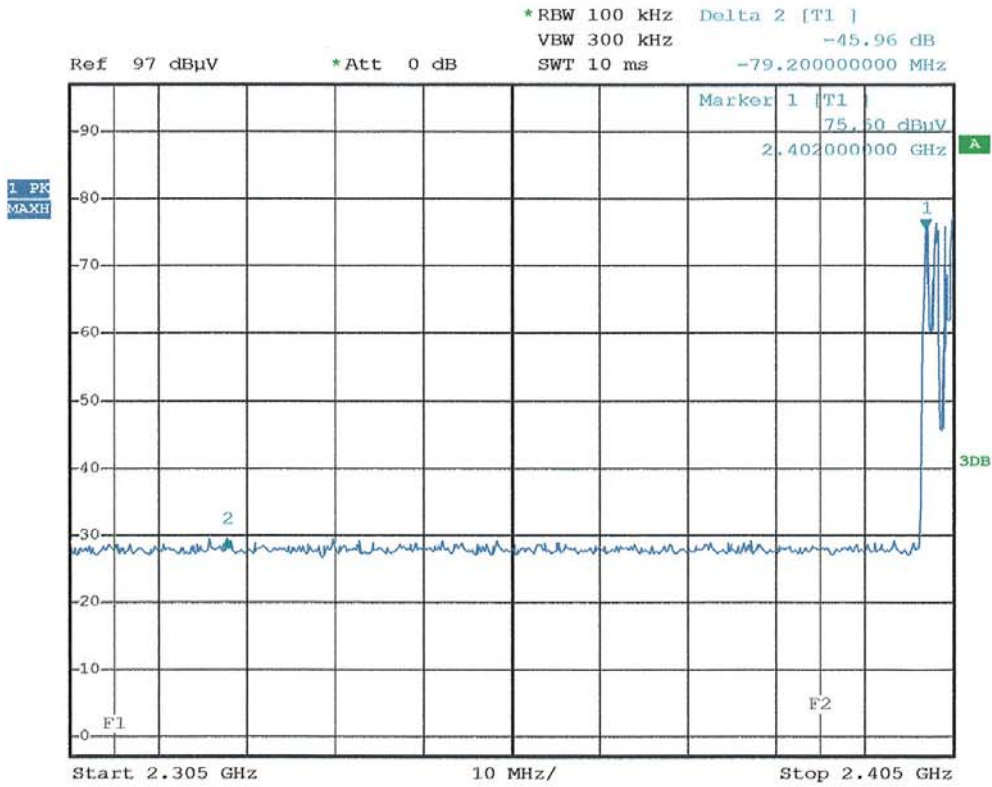
Calculated Emission Level = Field Strength Level – Delta Marker Level

⁽¹⁾ the peak level is lower than the average limit (53.98 dB μ V/m).

Test conclusion:

RESPECTED PUBLIC NOTICE

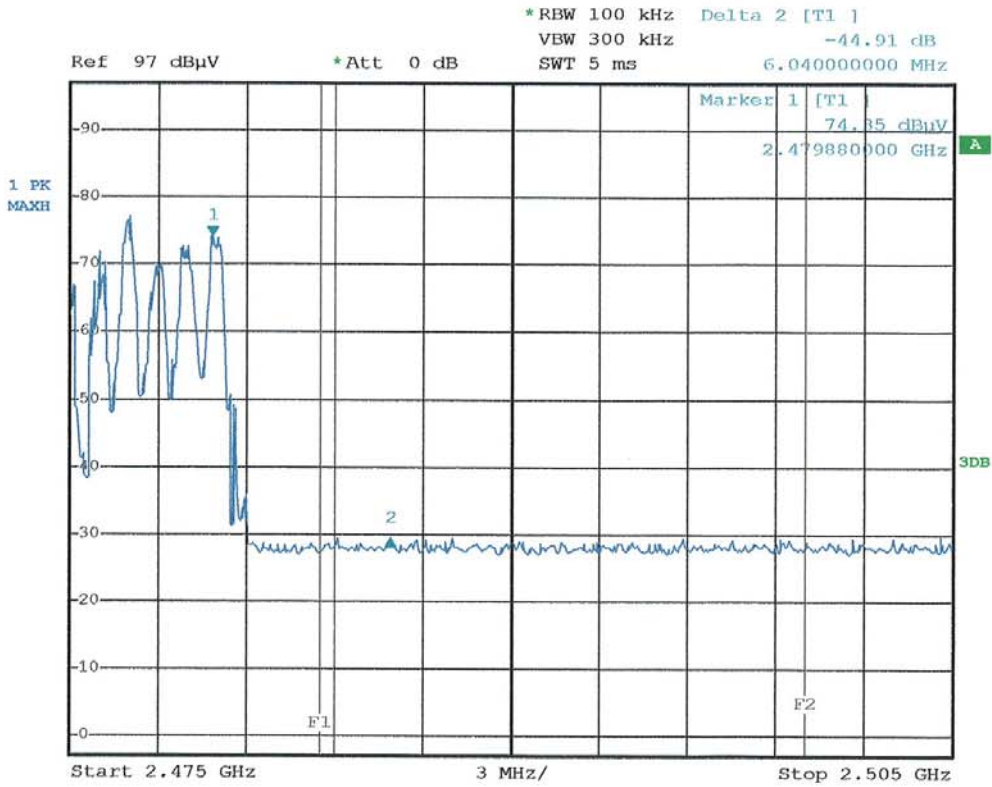
CURVE N°: 1.



MDI

Date: 19.DEC.2008 09:36:03

CURVE N°: 2.



MDI

Date: 19.DEC.2008 09:51:36

10. RADIATED EMISSION LIMITS

Standard: FCC Part 15

Test procedure: paragraph 109

Test equipment:

| TYPE | BRAND | EMITECH NUMBER |
|-----------------------------|-------------------------|----------------|
| Test receiver | Rohde & Schwarz ESVS 10 | 1219 |
| Biconical antenna | Hewlett Packard 11966 C | 728 |
| Log periodic antenna | Rohde & Schwarz HL 223 | 1999 |
| Double ridged guide antenna | Electrometrics EM 6961 | 1204 |
| Spectrum analyzer | Rohde & Schwarz FSP40 | 4088 |
| Open area test site | EMITECH | 1274 |
| Preamplifier 1 to 18 GHz | DBS Microwave DB97-1852 | 2648 |
| High pass filter | Micro-tronics HPM11630 | 1673 |
| Power source | Hewlett Packard E3610A | 4195 |

Test set up:

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

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

Only the emissions radiated by the cabinet and the structure are checked.

Frequency range: from 30 MHz to harmonic 10 ($F_{\text{carrier}} \leq 1 \text{ GHz}$)

Detection mode: Quasi-peak or average ($F < 1 \text{ GHz}$)

Peak ($F > 1 \text{ GHz}$)

Bandwidth: 120 kHz ($F < 1 \text{ GHz}$)

1 MHz ($F > 1 \text{ GHz}$)

Distance of antenna: 3 meters

Antenna height: 1 to 4 meters

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

Equipment under test operating condition:

The equipment is blocked in continuous reception mode (which corresponds to standby mode of transmitter).

Results:

Ambient temperature (°C): 21

Relative humidity (%): 47

Power source: 6 Vd.c.

Not any spurious has been detected.

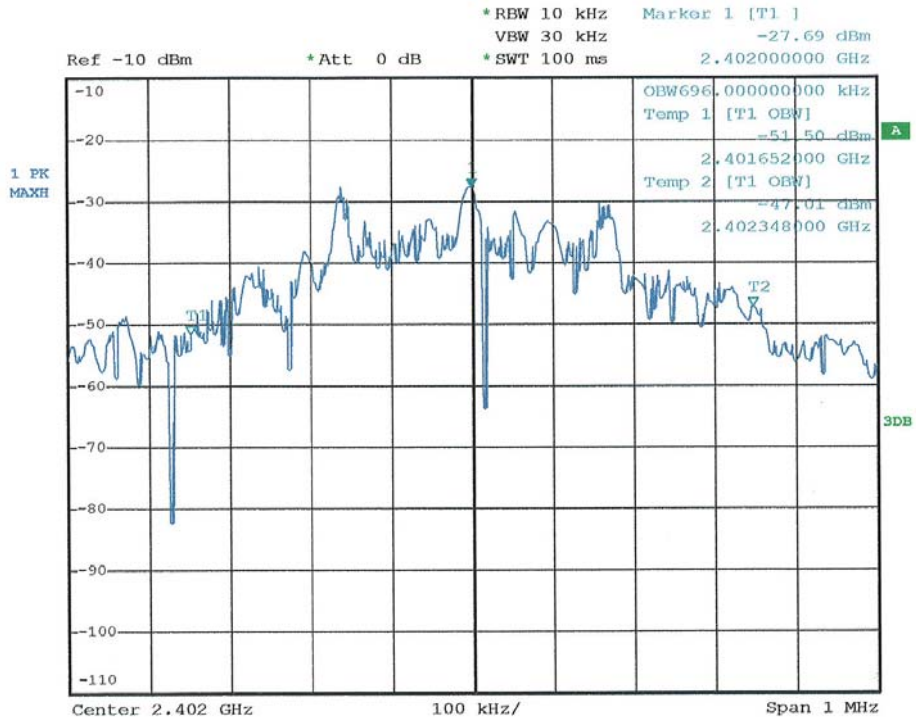
Any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.

TEST CONCLUSION:

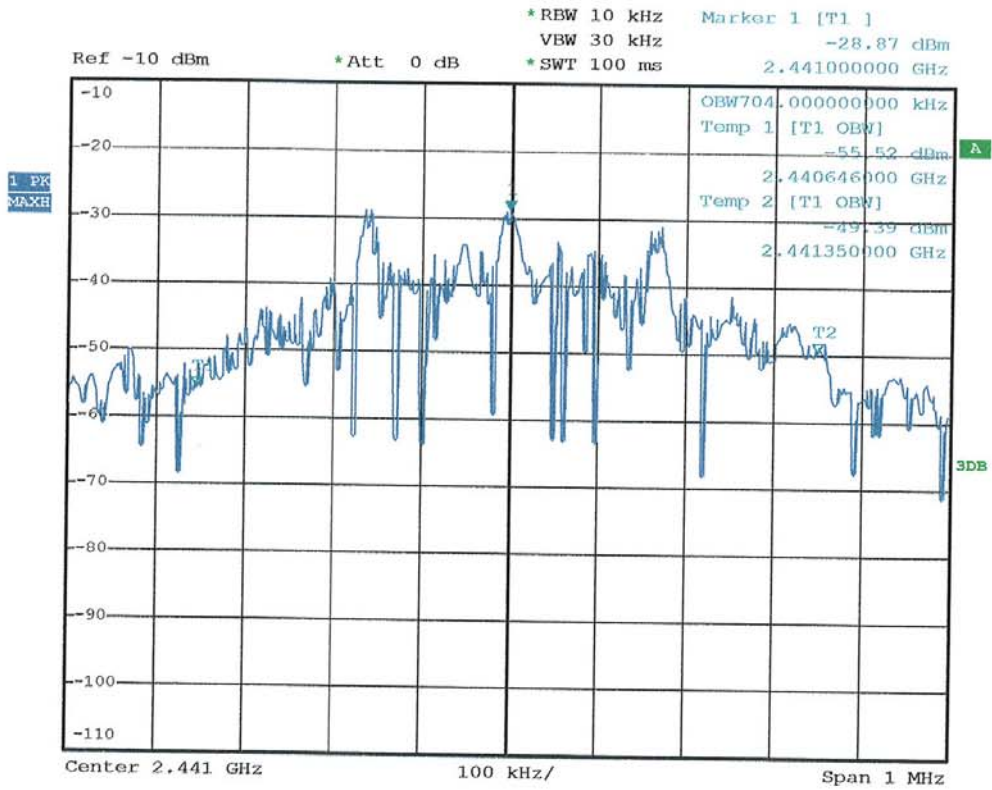
RESPECTED STANDARD

□□□ End of report, 5 annexes to be forwarded □□□

ANNEX 1: OCCUPIED POWER BANDWIDTH AND CHANNEL SEPARATION

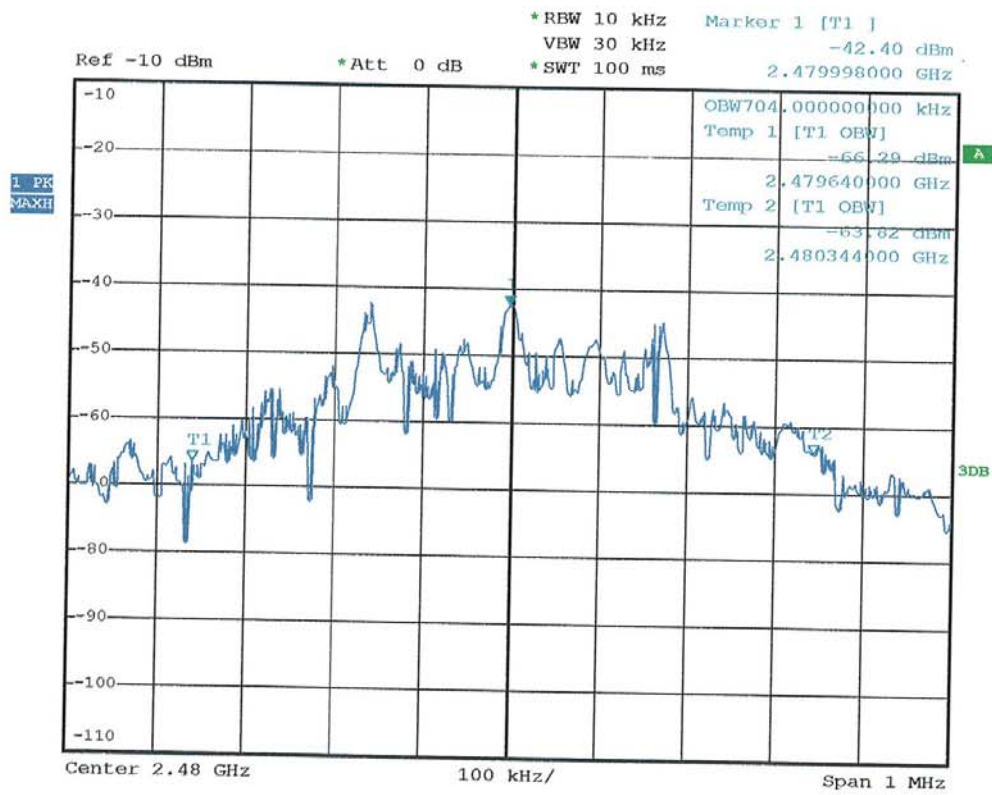


MDI
 Date: 19.DEC.2008 04:59:47



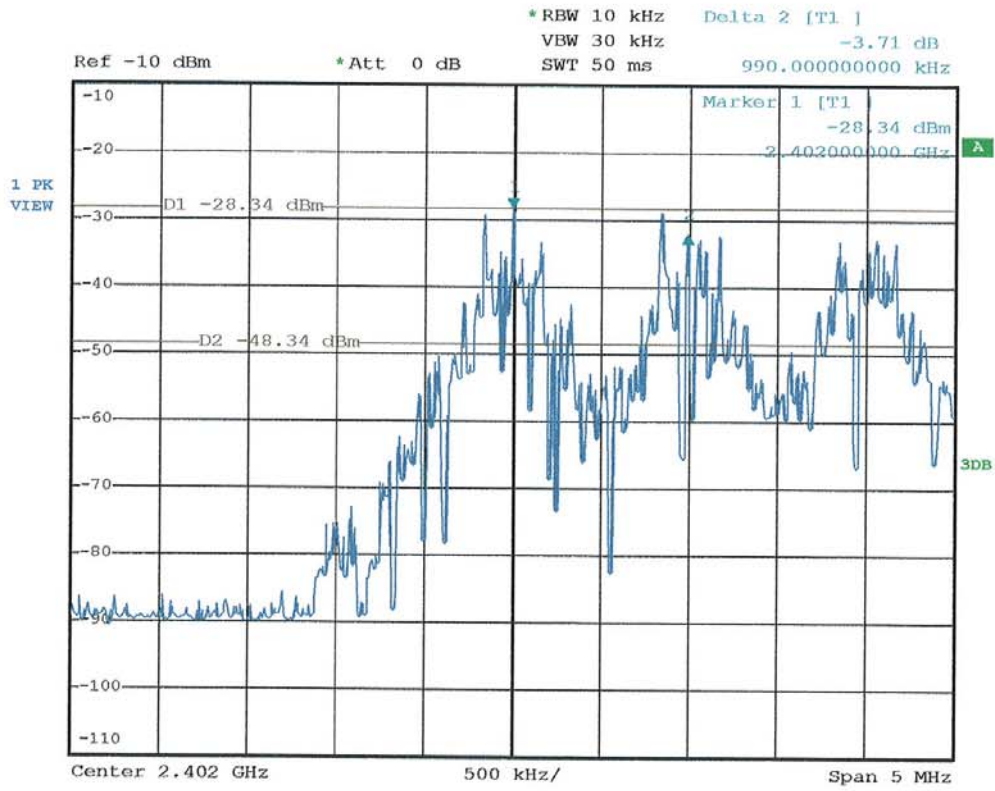
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Date: 19.DEC.2008 05:14:29



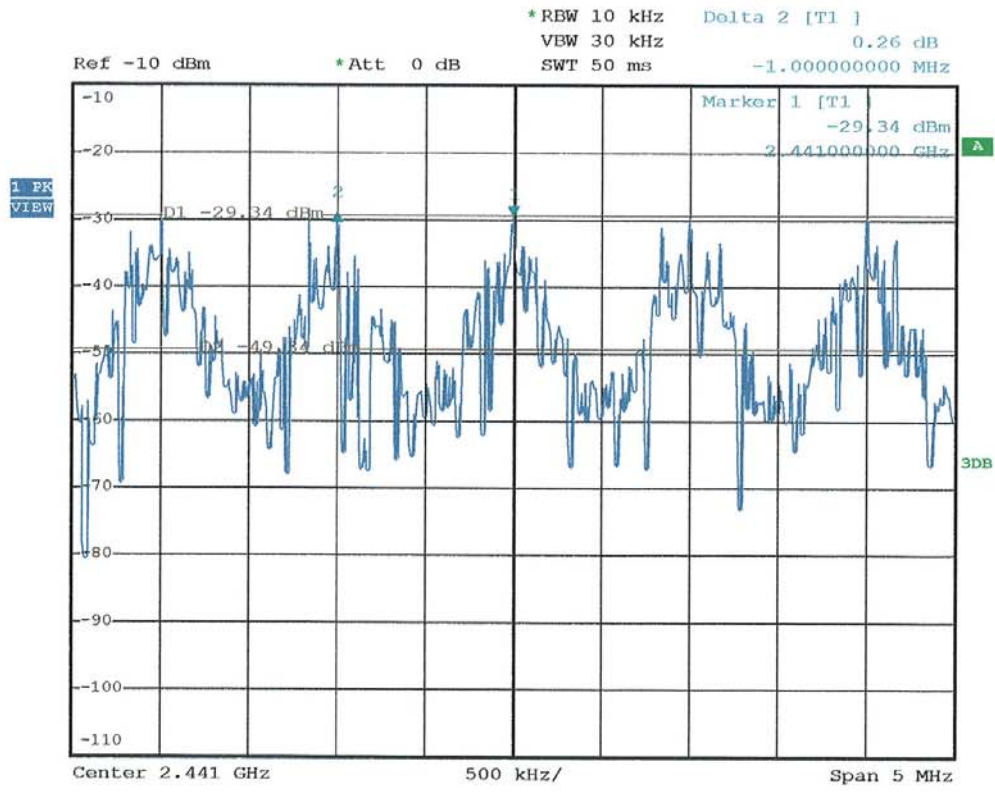
MDI

Date: 19.DEC.2008 05:42:09



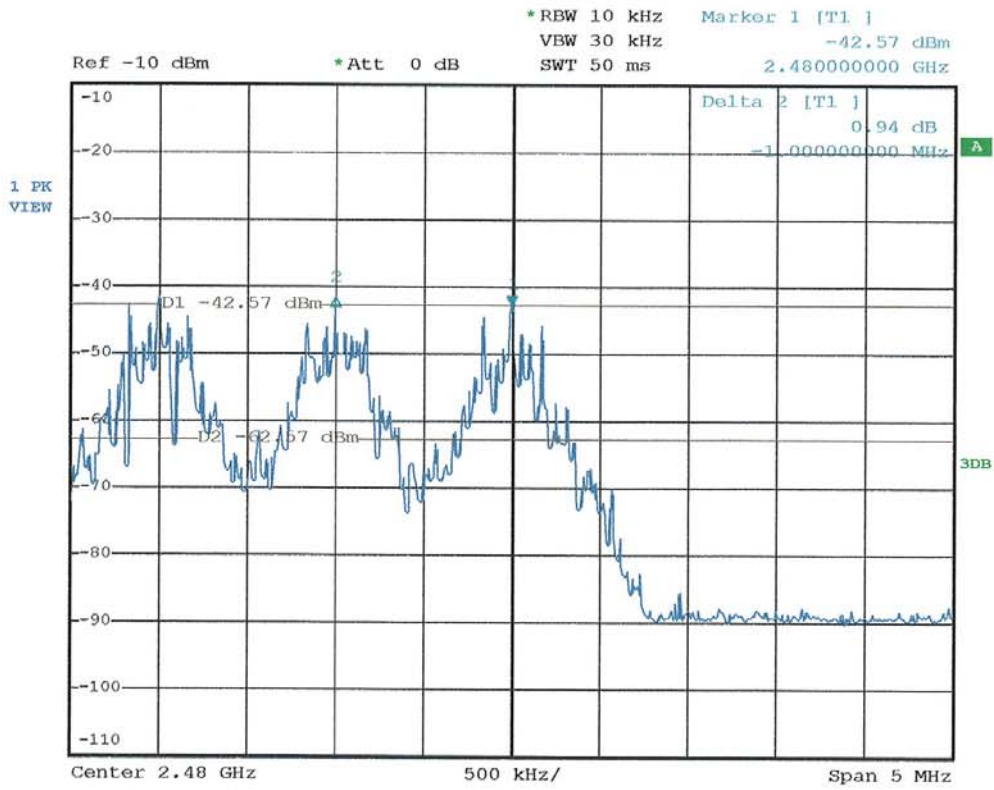
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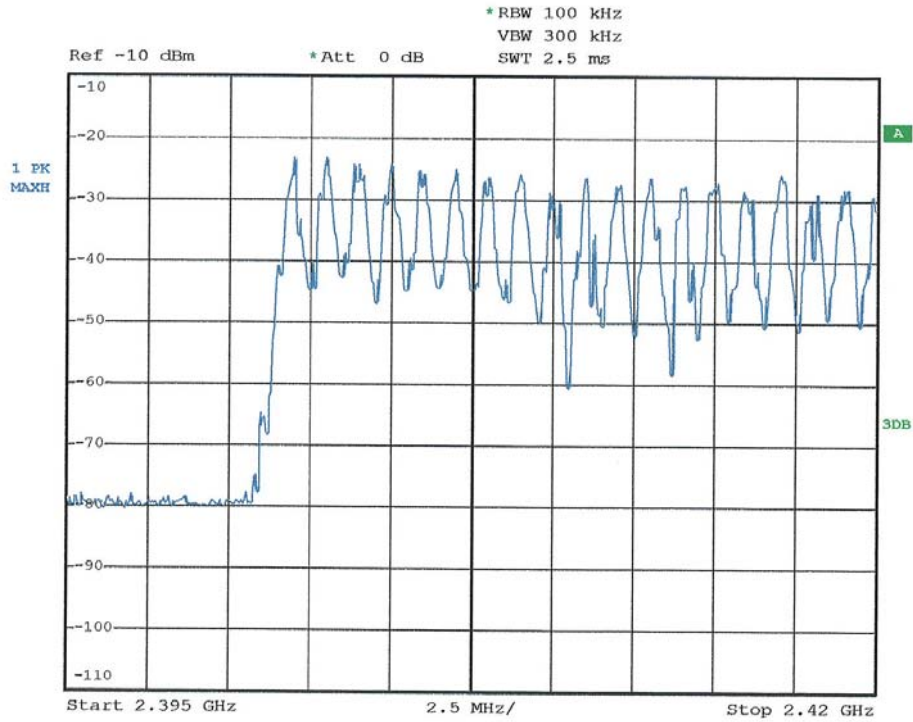
MDI

Date: 19.DEC.2008 06:42:35



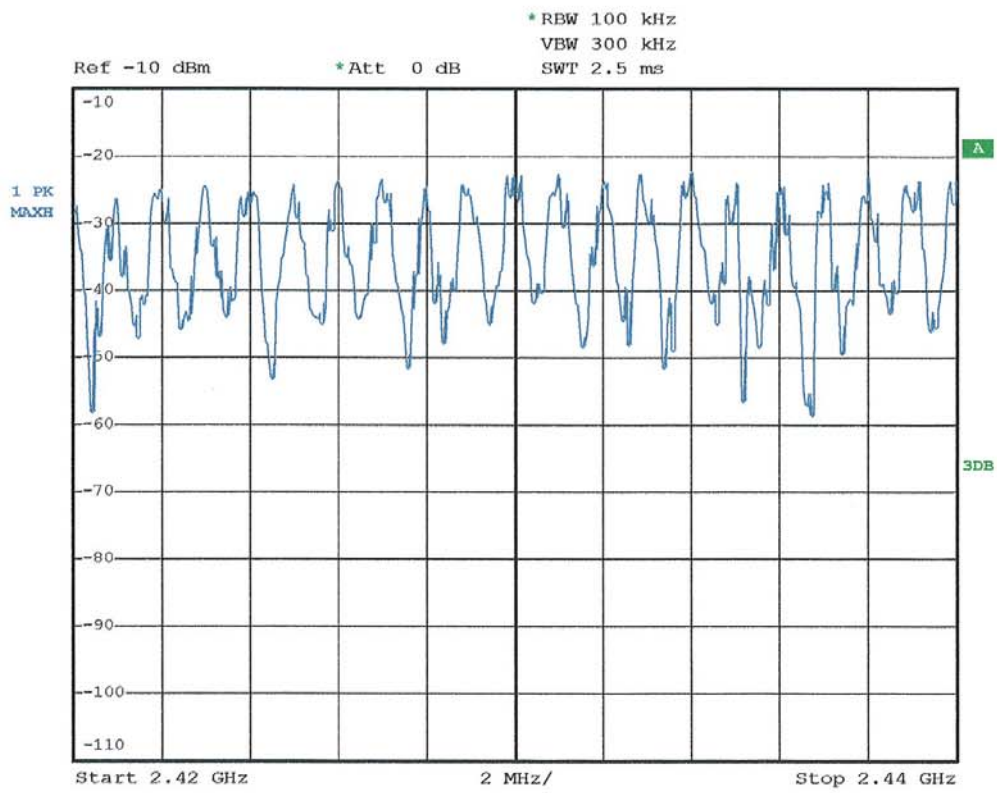
MDI
Date: 19.DEC.2008 06:58:31

ANNEX 2: NUMBER OF HOPPING FREQUENCIES



MDI

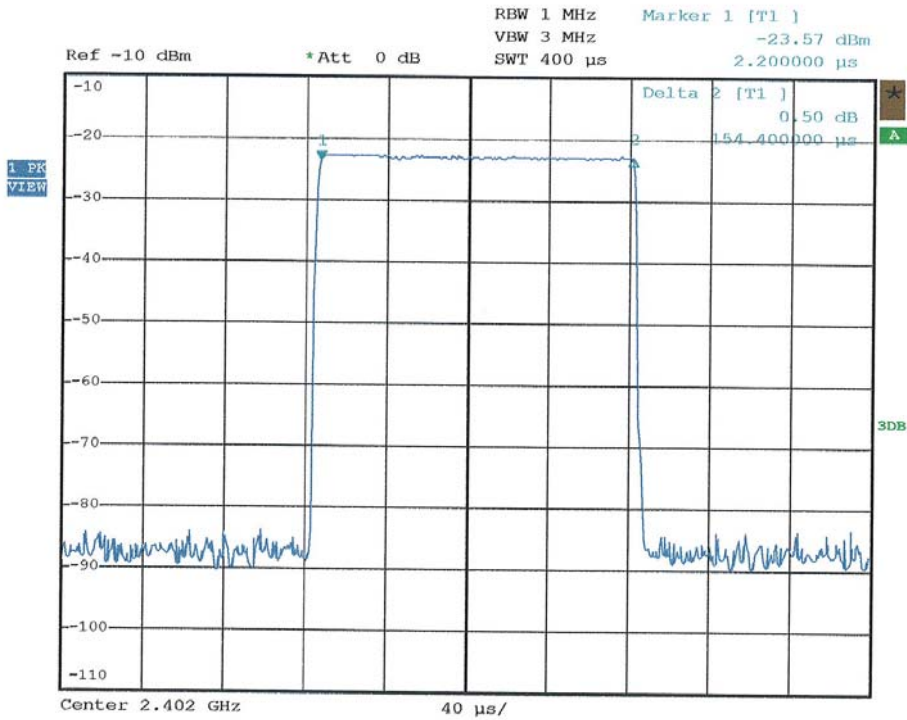
Date: 19.DEC.2008 07:28:38



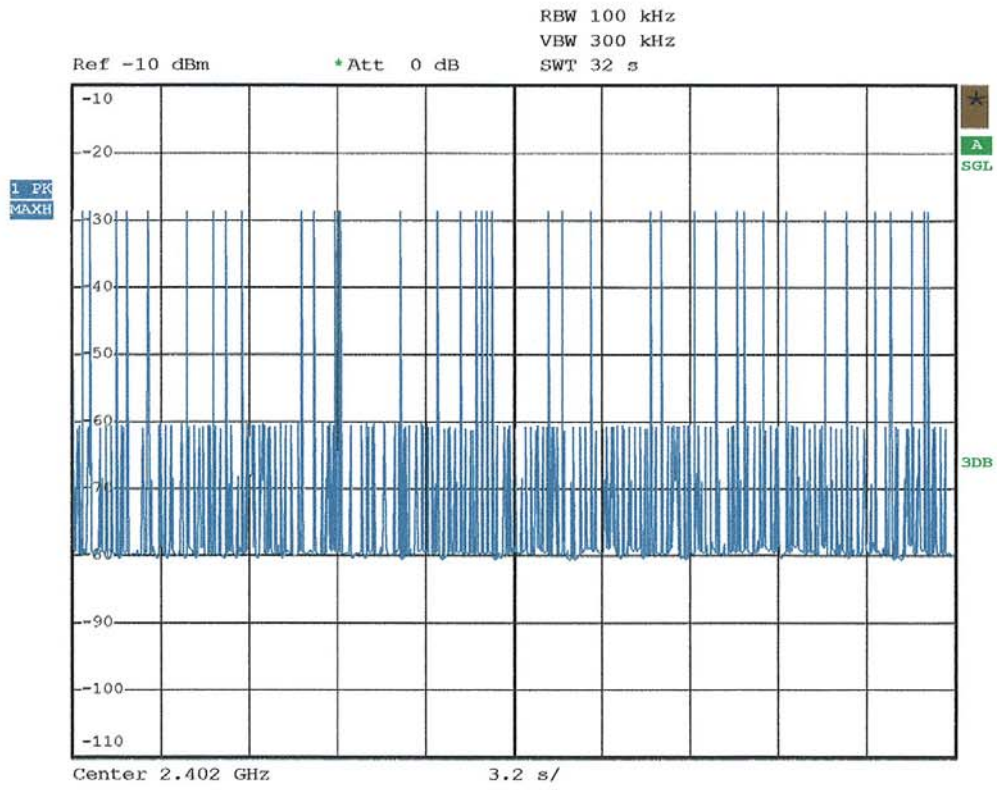
MDI

Date: 19.DEC.2008 07:21:25

ANNEX 3: AVERAGE TIME OF OCCUPANCY ON ANY FREQUENCY

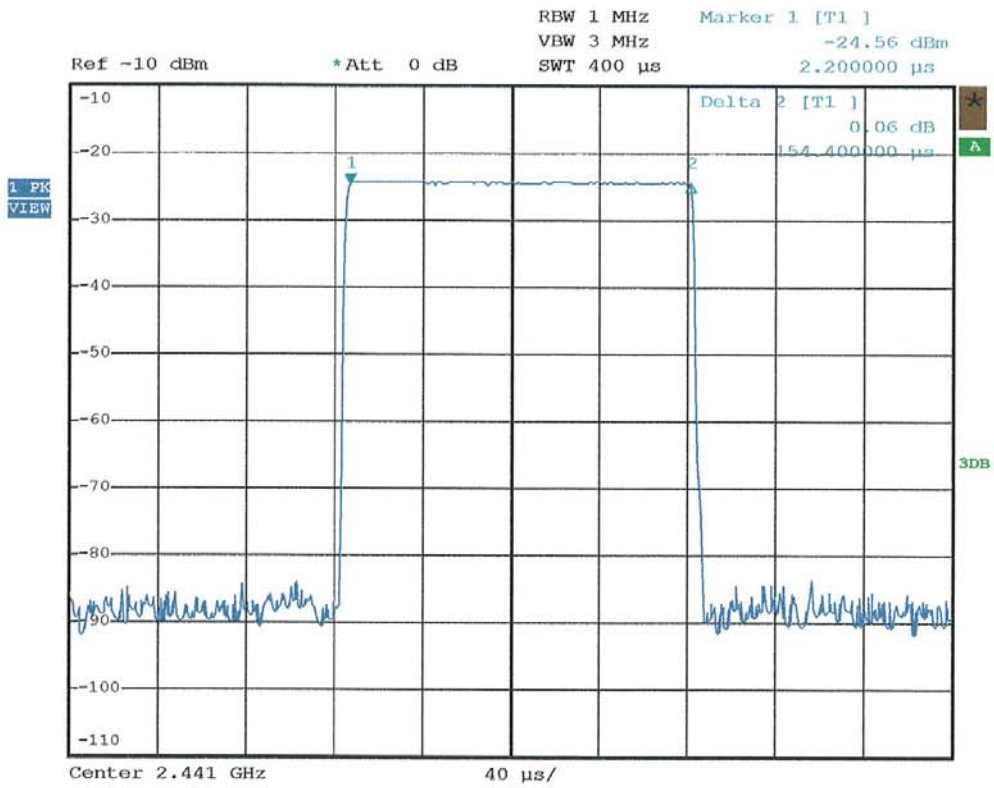


MDI
Date: 19.DEC.2008 05:45:35



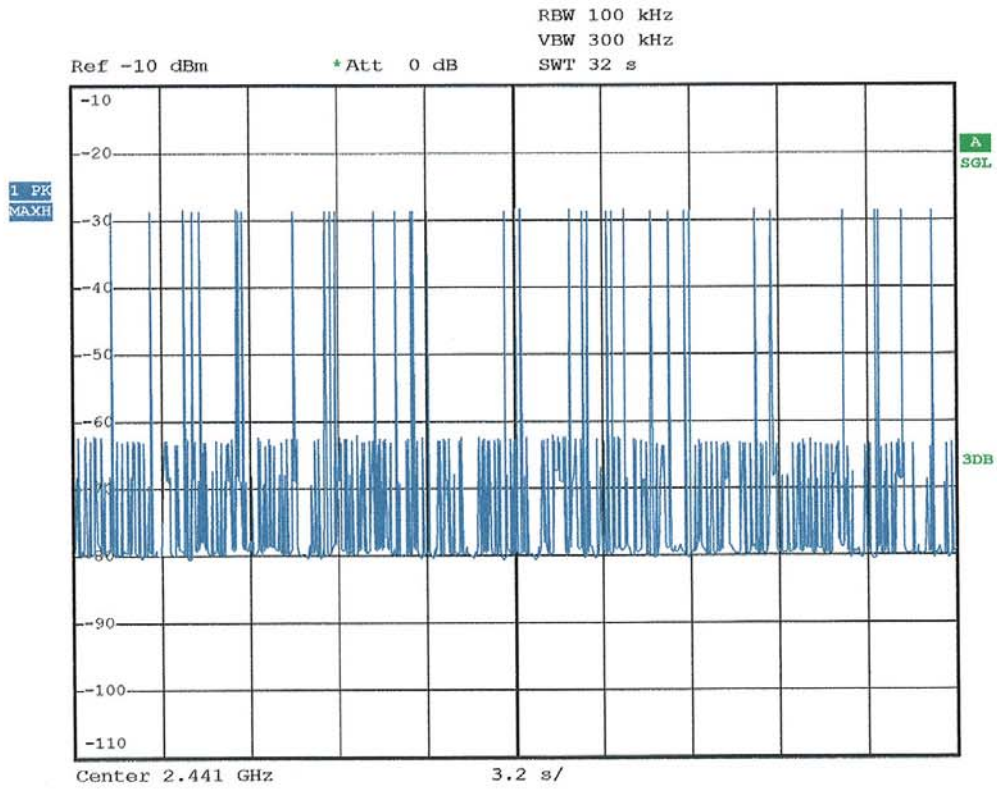
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Date: 19.DEC.2008 09:16:40



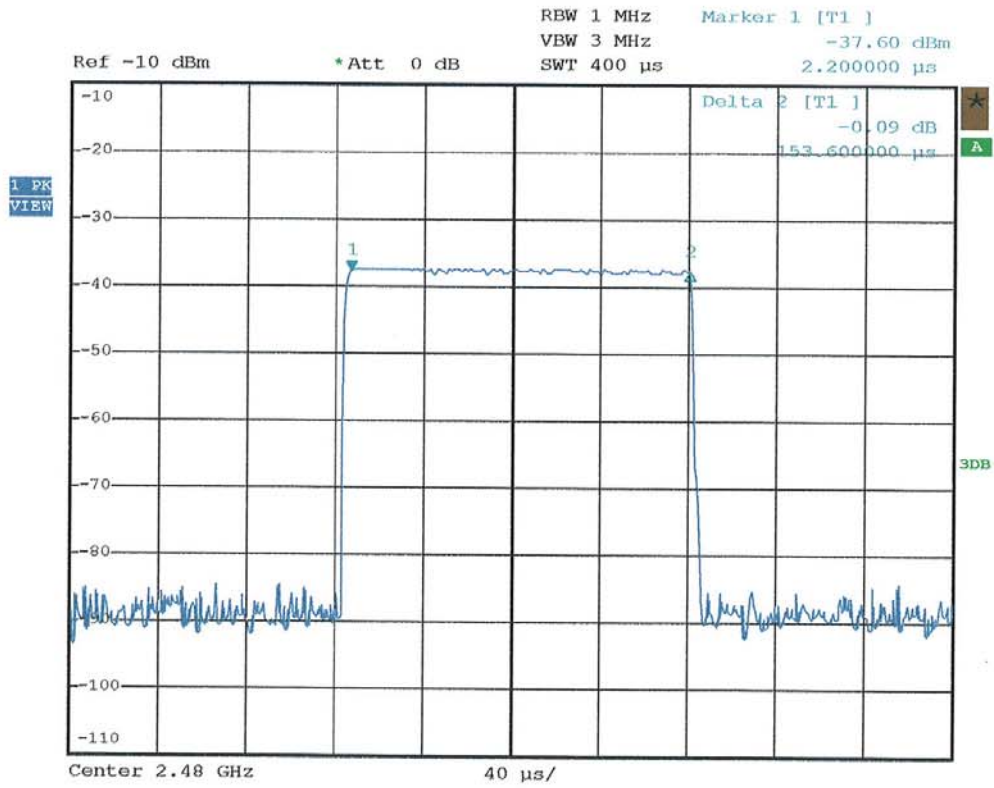
MDI

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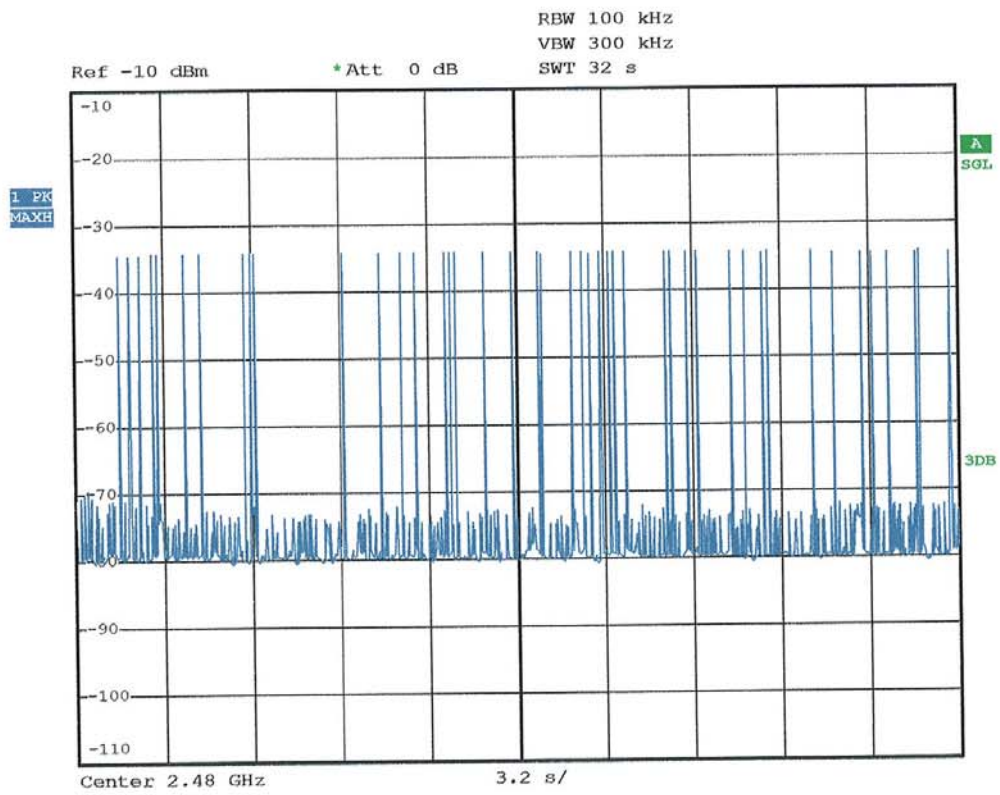


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Date: 19.DEC.2008 09:24:39



MDI
Date: 19.DEC.2008 05:50:10



MDI

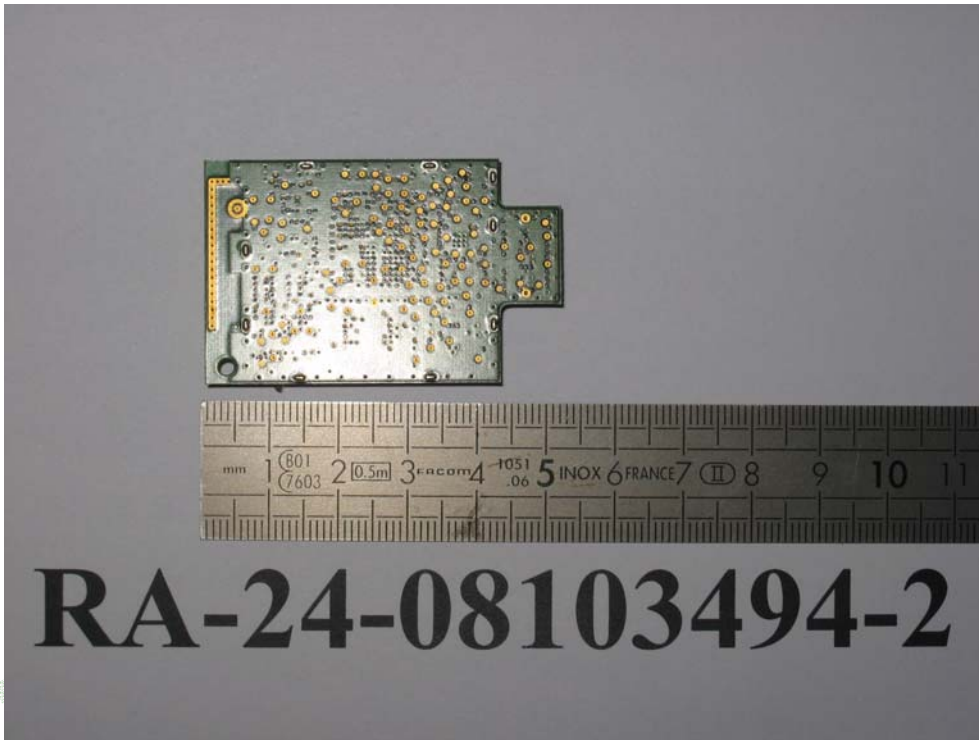
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ANNEX 4: PHOTOS OF THE EQUIPMENT UNDER TEST

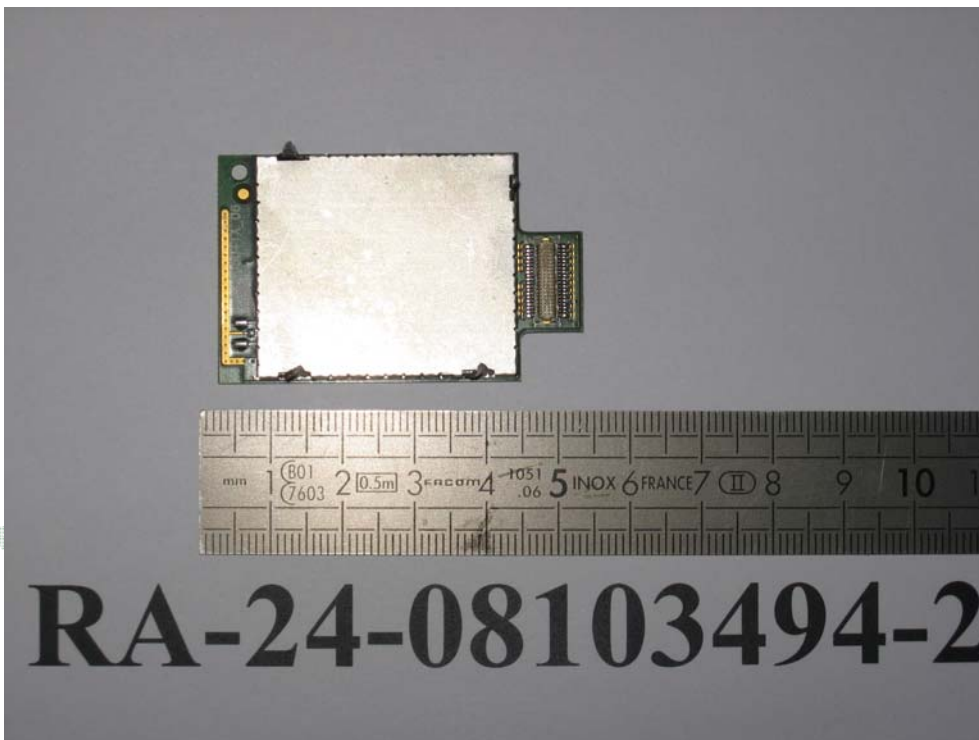
EQUIPMENT ON ITS WORKBENCH



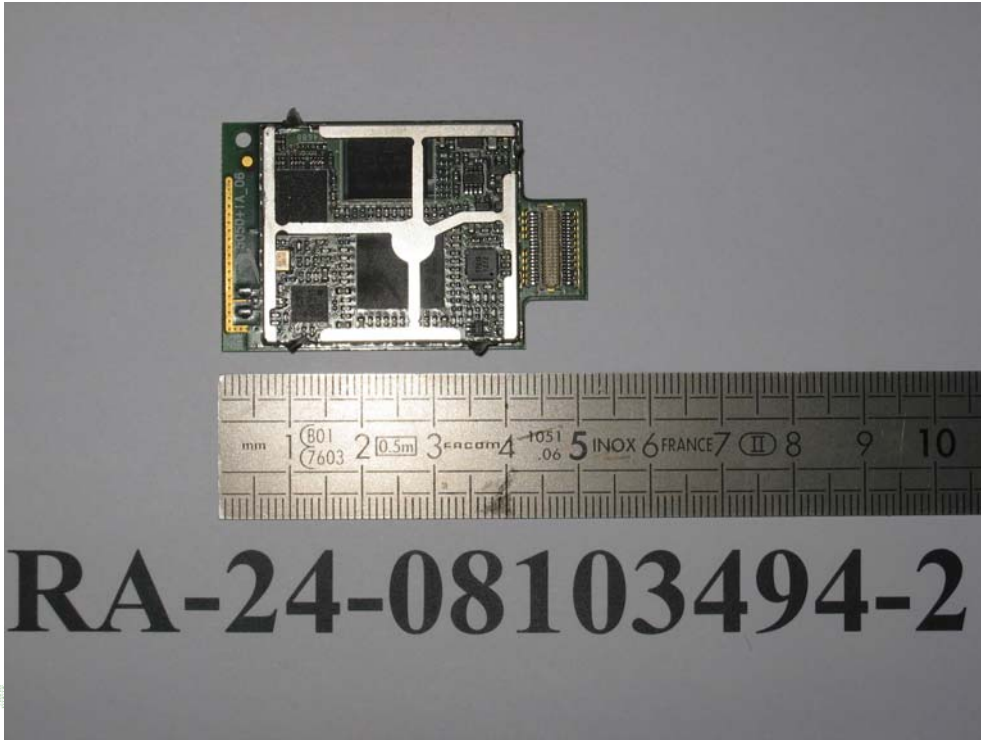
Printed circuit board: face 1



Printed circuit board: face 2



EQUIPMENT WITHOUT SHIELD



EMITECH

CH

EMITECH

EMITECH

EMITECH

EMITECH

ANNEX 5: TEST SET UP AND OPEN AREA TEST SITE

TEST SET UP FOR RADIATED MEASUREMENT



OPEN AREA TEST SITE



EMITECH

CH

EMITECH

EMITECH

EMITECH

EMITECH