

# CETECOM ICT Services GmbH

Radio Satellite Communication

Untertürkheimer Straße 6-10 . D-66117 Saarbrücken

Telephone: +49 (0)681 598-0

Telefax: -9075

RSC14

issue test report consist of 69 Pages

Page 1 (69)

Recognized by the  
Federal Communications Commission  
**FCC–Identification Number: 90462**  
**TCB ID: DE 0001**



Accredited by the  
German Accreditation Council  
**DAR–Registration Number**  
**TTI–P–G 166/98**



Independent ETSI  
compliance test house



**Accredited Bluetooth™ Test Facility (BQTF)**

**Test Report No.: 2-2955-01-03/02**  
**FCC Part 15.247 / CANADA RSS-210**  
**BIRMA P4**  
**FCC ID: QXB-BIRMABT-V50**

CETECOM – ICT Services GmbH  
Untertürkheimerstr. 6-10  
66117 Saarbrücken, Germany

Telephone: + 49 (0) 681 / 598-0  
Fax: + 49 (0) 681 / 9075

## **Table of Contents**

### **1      General Information**

#### **1.1    Notes**

#### **1.2    Testing Laboratory**

#### **1.3    Details of Applicant**

#### **1.4    Application Details**

#### **1.5    Test Item**

#### **1.6    Test Specifications**

### **2      Technical Test**

#### **2.1    Summary of Test Results**

#### **2.2    Test Report**

## 1 General Information

### 1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

### Test Laboratory Manager:

|            |         |         |
|------------|---------|---------|
| 2003-03-06 | RSC8411 | Berg M. |
| Date       | Section | Name    |

  
Signature

### Technical Responsibility for Area of Testing:

|            |         |               |
|------------|---------|---------------|
| 2003-03-06 | RSC8412 | Hausknecht D. |
| Date       | Section | Name          |

  
Signature

## 1.2      Testing Laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10

66117 Saarbrücken

Germany

Telephone      : + 49 681 598 - 0

Telefax        : + 49 681 598 - 9075

E-mail        : info@ict.cetecom.de

Internet       : www.cetecom-ict.de

**Accredited testing laboratory**

**The Test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025.**

**DAR-registration number : TTI-P-G 166/98-30**

**Accredited Bluetooth™ Test Facility (BQTF)**

[BLUETOOTH is a trademark owned by Bluetooth SIG, Inc. and licensed to CETECOM](#)

## 1.3      Details of Applicant

**Name        : Flander Oy**

**Street       : Satakunnankatu 18B**

**City         : F-33210 Tampere**

**Country     : Finland**

**Telephone : +35-83233 9000**

**Telefax     : +35-83233 9090**

**Contact     : Mr. Mika Heikinheimo**

**Telephone : +35-83233 9000**

## 1.3      Application Details

Date of receipt of application      : 2002-08-13

Date of receipt of test item        : 2003-01-27

Date of test                            : 2003-01-29/30/31

## 1.4 Test Item

Type of equipment : **JPEG Image receiver from PDA's**  
Type designation : **BIRMA P4**  
Manufacturer : **See applicant**  
Street :  
City :  
Country :  
Serial number :  
FCC ID : **QXB-BIRMABT-V50**  
Hardware : 4.0  
Software : 1.0  
**Additional information :**  
Frequency : 2402 – 2480 MHz  
Type of modulation : 1M00FXD / 79M8FXD (FHSS)  
Number of channels : 79  
Antenna : Print antenna  
Power supply : Ext. AC/DC Adapter 100-240V AC/ 12V DC  
Output power : EIRP: 1.08 mW (worst case); conducted : 1.38 mW  
Temperature range : 0°C - +35°C

## 1.5 Test Specifications:

**FCC Part 15 §15.247**  
**CANADA RSS-210**

## 2      Technical Test

### 2.1      Summary of Test Results

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are conform with specifications ANSI C63.2-1987 clause 15 and ANSI C63.4-1992 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.4-1992 clause 4.2.

Antennas are conform with ANSI C63.2-1996 item 15.

150 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth, passive loop antenna.

30 MHz - 200 MHz: Quasi Peak measurement, 120KHz Bandwidth, biconical antenna

200MHz - 1GHz: Quasi Peak measurement, 120KHz Bandwidth, log periodic antenna

1GHz: Average, RBW 1MHz, VBW 10 MHz, waveguide horn

All measurements are done in accordance with the Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems DA 00-705 and Appendix A "BLUETOOTH APPROVALS"

The product fulfills also the requirements for CANADA RSS-210

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

**Final verdict : PASS**

Remark :

## 2.2      Test Report

### TEST REPORT

Test Report No. : 2-2955-01-03/02

## TEST REPORT REFERENCE

## LIST OF MEASUREMENTS

| Paragraph           | PARAMETER TO BE MEASURED                   | PAGE |
|---------------------|--------------------------------------------|------|
|                     | Transmitter parameters                     |      |
|                     | Antenna gain                               | 9    |
| § 15.247 (a)(1)     | Carrier frequency separation               | 10   |
| § 15.247 (a)(1)     | Number of hopping channels                 | 11   |
| § 15.247 (a)(1 iii) | Time of occupancy (dwell time)             | 13   |
| § 15.247 (d)        | Power spectral density (Inquiry/Page mode) | 14   |
| § 15.247 (a)(1)     | Spectrum bandwidth of a FHSS System        | 15   |
| § 15.247 (b)(2)     | Maximum peak output power                  | 19   |
| §15.247 (c)         | Band edge compliance                       | 24   |
| § 15.247 (c)        | Emission limitations                       | 33   |
|                     | Receiver parameters                        |      |
| § 15.109            | Spurious radiations - Radiated             | 50   |
| § 15.107            | Conducted emissions                        | 56   |
|                     | Test equipment listing                     | 58   |
|                     | Photographs of the equipment               | 60   |



Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## Antenna Gain

The antenna gain of the complete system is calculated by the difference of conducted power of the module and the radiated power in EIRP.

|                 | low channel | mid channel | high channel |
|-----------------|-------------|-------------|--------------|
| Conducted power | +0.87 dBm   | 1.13 dBm    | +1.41 dBm    |
| Radiated power  | +0.35 dBm   | 0.00 dBm    | 0.08 dBm     |
| Gain            | -0.52 dB    | -1.13 dB    | -1.33 dB     |

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
(for reference numbers see test equipment listing)

-

Test Report No.: 2-2955-01-03/02 Issue Date: 2003-01-31 Page 10 (69)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

Carrier frequency separation

§15.247(a1)



Date: 31.JAN.2003 10:58:10

Channel separation is ~ 1 MHz

**Limit: minimum 25 kHz or the 20 dB Bandwidth of the hopping system**

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Test Report No.: 2-2955-01-03/02 Issue Date: 2003-01-31 Page 11 (69)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

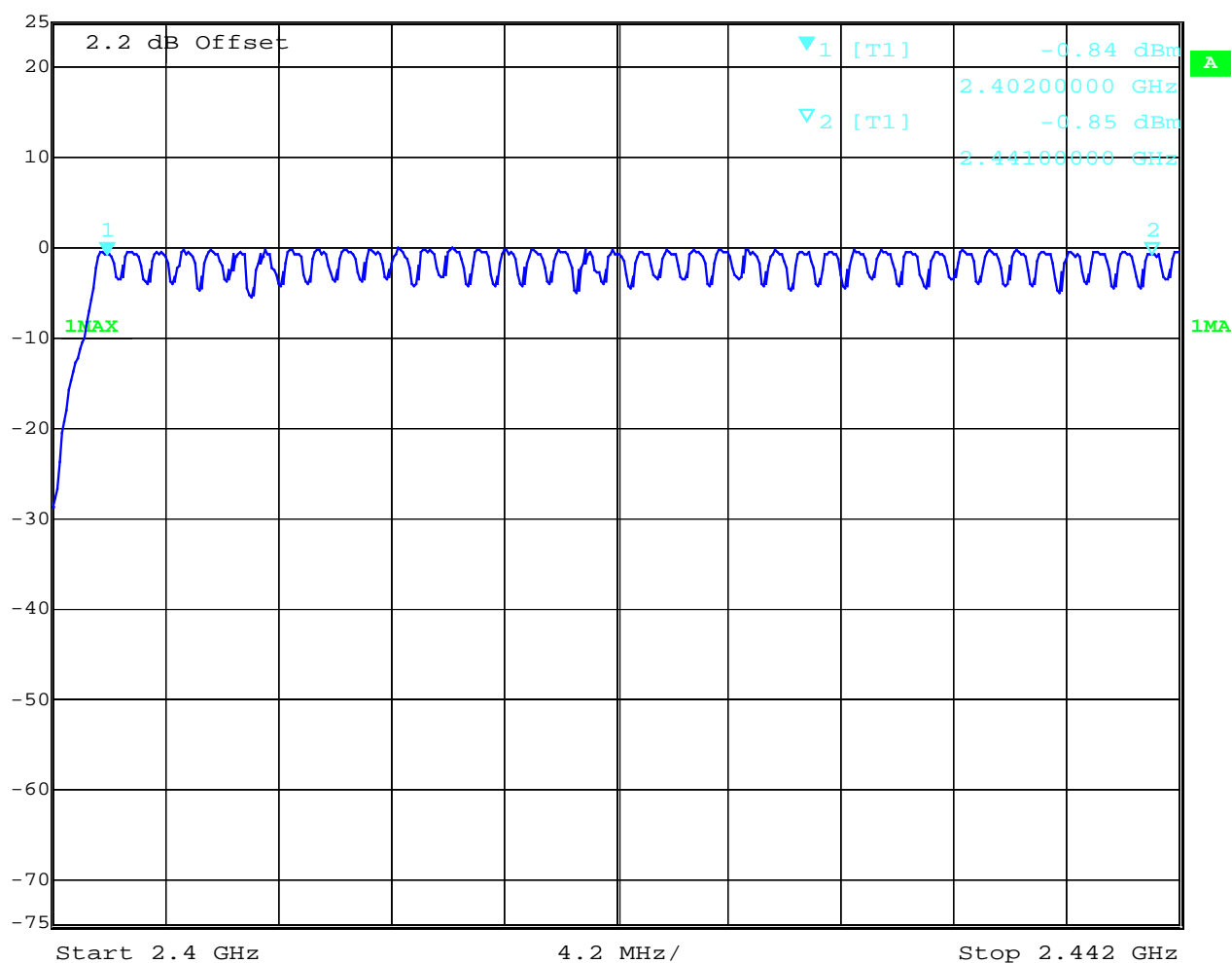
Relative humidity : 28%

Number of hopping channels

§15.247(a1)

Channel 1 - 40

Marker 1 [T1] RBW 500 kHz RF Att 40 dB  
 Ref Lvl -0.84 dBm VBW 500 kHz  
 25 dBm 2.40200000 GHz SWT 5 ms Unit dBm



Date: 31.JAN.2003 11:00:20

The number of hopping channels is 79.

Limit: at least 15 non-overlapping channels

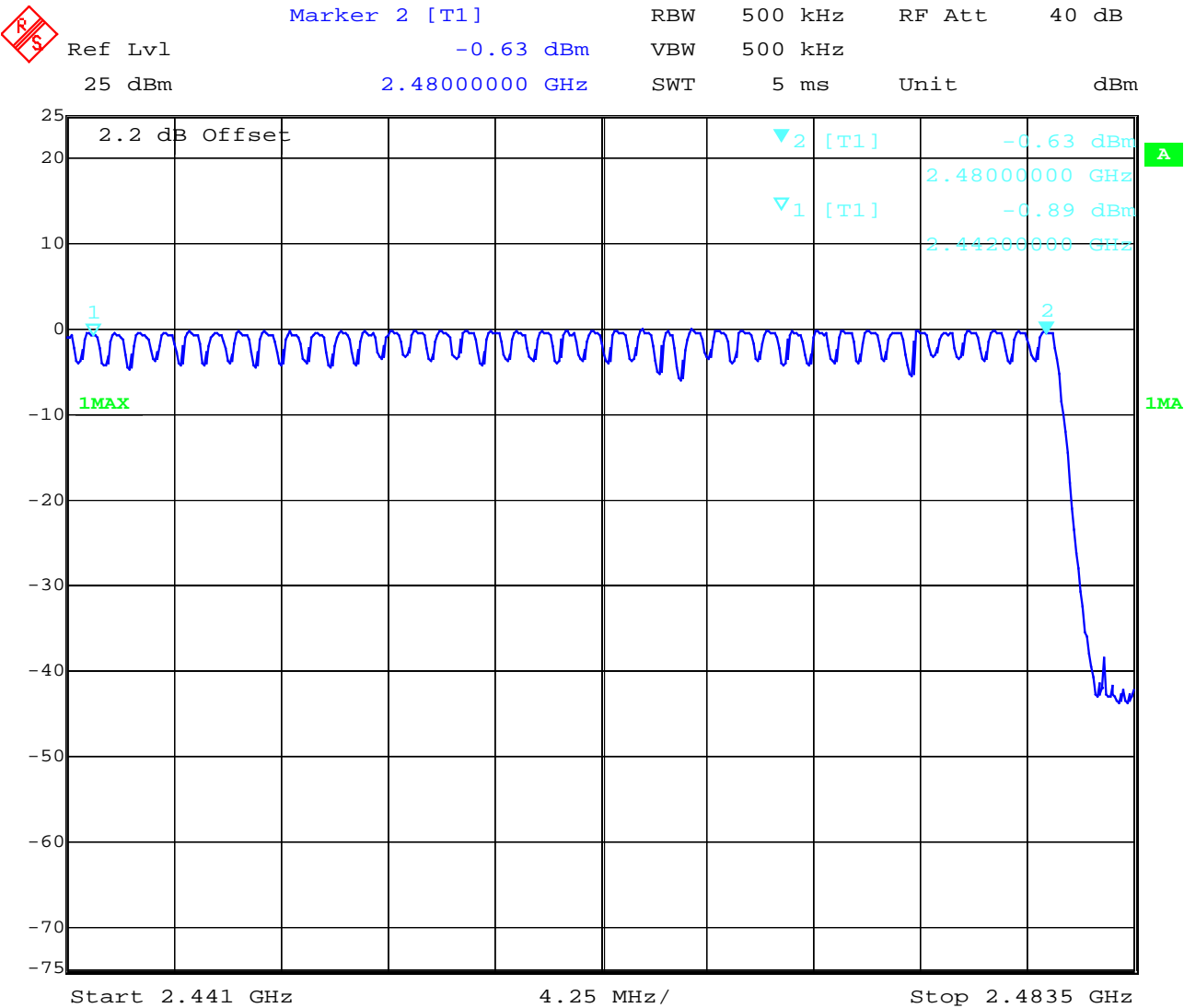
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Equipment under test : BIRMA P4  
Ambient temperature : 23.3°C  
Relative humidity : 28%

Number of hopping channels  
Channel 41 - 79

§15.247(a1)



Date: 31.JAN.2003 11:01:53

The number of hopping channels is 79.

Limit: at least 15 non-overlapping channels

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
(for reference numbers see test equipment listing)

**Equipment under test : BIRMA P4****Ambient temperature : 23.3°C****Relative humidity : 28%****Time of occupancy (dwell time)****§15.247(a1 iii)****For Bluetooth devives:**

The dwell time of 0.3797s within a 30 second period in data mode is independent from the packet type (packet length). The calculation for a 30 second period is a follows:

Dwell time = time slot length \* hop rate / number of hopping channels \*30s

Example for a DH1 packet (with a maximum length of one time slot)

Dwell time =  $625 \mu\text{s} * 1600 \text{ 1/s} / 79 * 30\text{s} = 0.3797\text{s}$  (in a 30s period)

For multi-slot packet the hopping is reduced according to the length of the packet.

Example for a DH5 packet (with a maximum length of five time slots)

Dwell time =  $5 * 625 \mu\text{s} * 1600 * 1/5 * 1/s / 79 * 30\text{s} = 0.3797\text{s}$  (in a 30s period)

This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for all Bluetooth devices. Therefore, all Bluetooth devices **comply** with the FCC dwell time requirement in the data mode.

This was checked during the Bluetooth Qualification tests.

The Dwell time in hybrid mode is approximately 2.6 mS (in a 12.8s period)

**REFERENCE NUMBER(S) OF TEST EQUIPMENT USED****(for reference numbers see test equipment listing)**

Test Report No.: 2-2955-01-03/02 Issue Date: 2003-01-31 Page 14 (69)

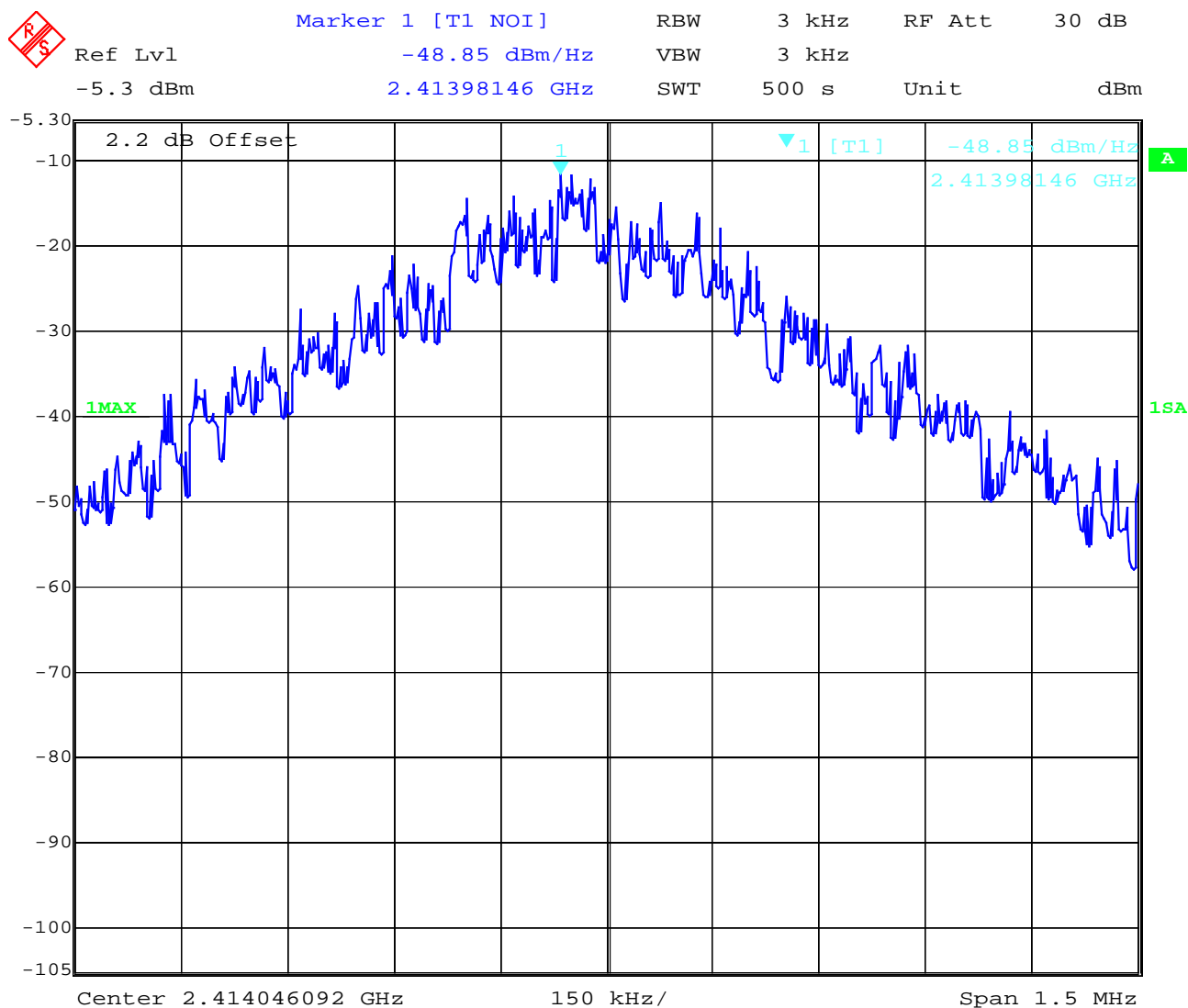
Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

Power Spectral density (Hybrid system in Inquiry mode / Page scan)

§15.247(d)



Date: 31.JAN.2003 12:02:45

Power density : -48.85 dBm/Hz = ---14.85 dBm / 3 KHz

Correction factor from dBm/Hz to dBm/3KHz is +34,8 dB

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

Spectrum Bandwidth of a FHSS System

§15.247(a1)

20 dB bandwidth

| TEST CONDITIONS           |                           | 20 dB BANDWIDTH ( kHz ) |         |         |
|---------------------------|---------------------------|-------------------------|---------|---------|
| Frequency (MHz)           |                           | 2402                    | 2441    | 2480    |
| T <sub>nom</sub> ( 24 )°C | V <sub>nom</sub> ( 110 )V | 835.671                 | 835.671 | 835.671 |
| Measurement uncertainty   |                           | ±1kHz                   |         |         |

RBW / VBW as provided in the „Measurement Guidelines“ (DA 00-705, March 30, 2000)

RBW: 10 kHz / VBW 100 kHz

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Test Report No.: 2-2955-01-03/02

Issue Date: 2003-01-31

Page 16 (69)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

Spectrum Bandwidth of a FHSS System

§15.247(a1)

20 dB bandwidth

Channel 1



Date: 31.JAN.2003 11:25:25

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)



Test Report No.: 2-2955-01-03/02

Issue Date: 2003-01-31

Page 17 (69)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

Spectrum Bandwidth of a FHSS System

§15.247(a1)

20 dB bandwidth

Channel 2



Date: 31.JAN.2003 11:27:01

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Test Report No.: 2-2955-01-03/02 Issue Date: 2003-01-31 Page 18 (69)

Equipment under test : BIRMA P4

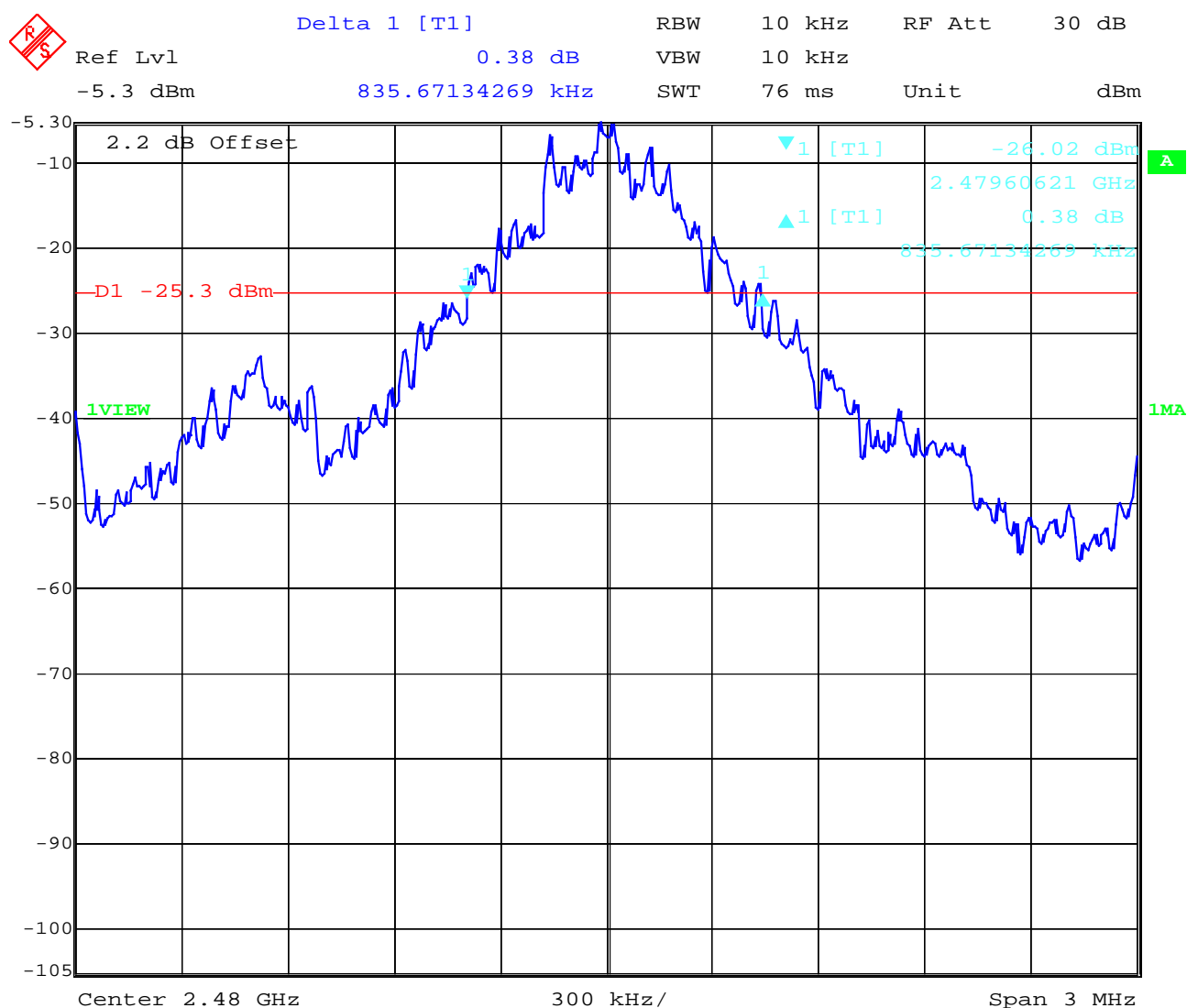
Ambient temperature : 23.3°C

Relative humidity : 28%

Spectrum Bandwidth of a FHSS System  
20 dB bandwidth

§15.247(a1)

Channel 3:



Date: 31.JAN.2003 11:28:45

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
(for reference numbers see test equipment listing)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## MAXIMUM PEAK OUTPUT POWER (conducted)

SUBCLAUSE § 15.247 (b) (1)

| TEST CONDITIONS             |                           | MAXIMUM PEAK OUTPUT POWER (mW) |      |             |             |
|-----------------------------|---------------------------|--------------------------------|------|-------------|-------------|
| Frequency (MHz)             |                           | 2402                           |      | 2442        | 2480        |
| T <sub>nom</sub> ( 23.3 )°C | V <sub>nom</sub> ( 3.7 )V | PK                             | 1.22 | 1.30        | 1.38        |
|                             |                           |                                |      |             |             |
| De facto EIRP (Peak)        |                           | 1.08 mW                        |      | 1.00 mW     | 1.02mw      |
| (Antenna gain)              |                           | (-0.52 dBi)                    |      | (-1.13 dBi) | (-1.33 dBi) |
| Measurement uncertainty     |                           | ±3dB                           |      |             |             |

RBW / VBW : 3 MHz

## LIMIT

SUBCLAUSE § 15.247 (b) (1)

| Frequency range | RF power output |
|-----------------|-----------------|
| 2400-2483.5 MHz | 1.0 Watt        |

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
(for reference numbers see test equipment listing)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

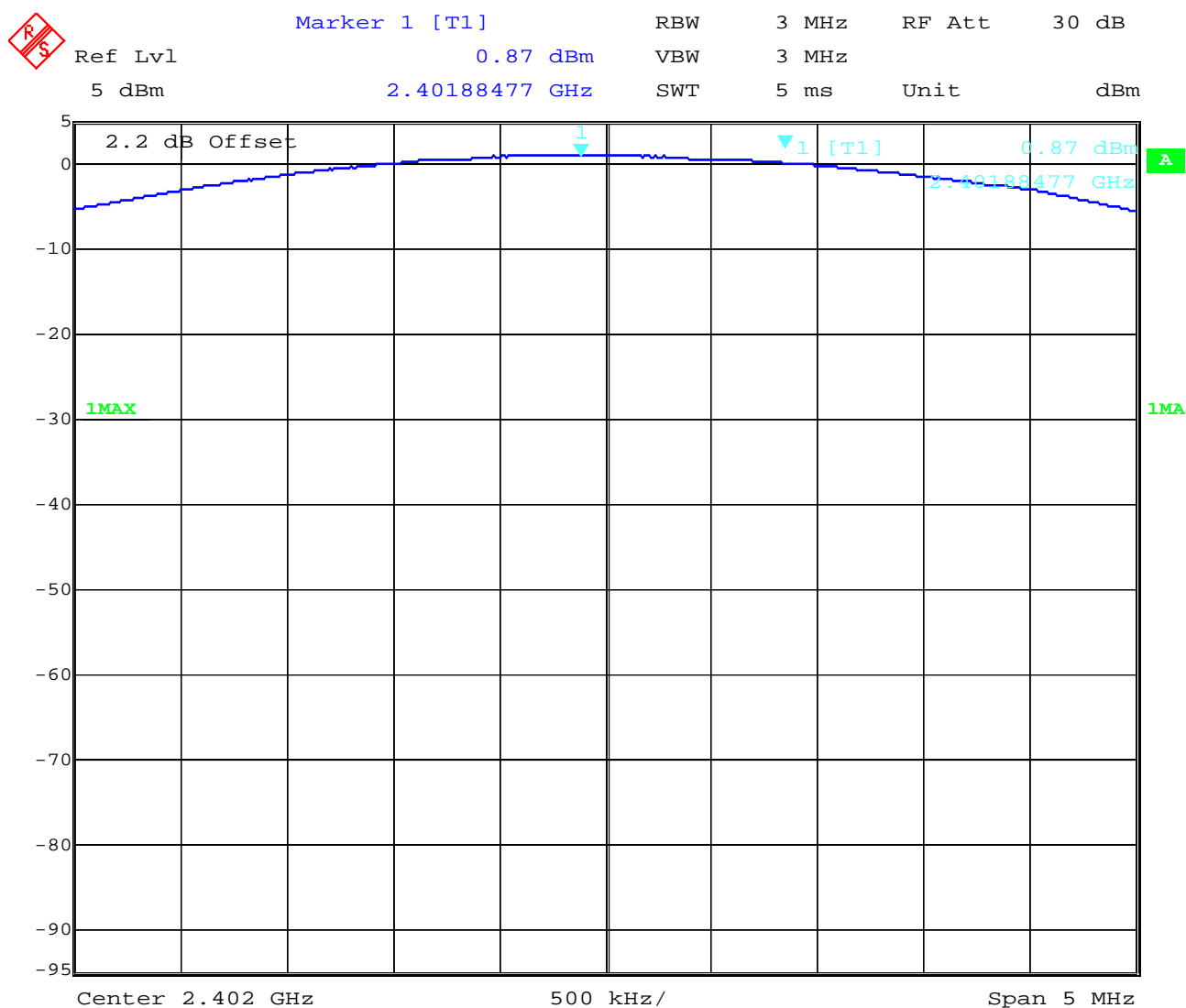
Relative humidity : 28%

## MAXIMUM PEAK OUTPUT POWER

SUBCLAUSE § 15.247 (b) (1)

(conducted)

Channel 1



Date: 31.JAN.2003 11:13:09

## LIMIT

SUBCLAUSE § 15.247 (b) (1)

| Frequency range | RF power output |
|-----------------|-----------------|
| 2400-2483.5 MHz | 1.0 Watt        |

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Test Report No.: 2-2955-01-03/02 Issue Date: 2003-01-31 Page 21 (69)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

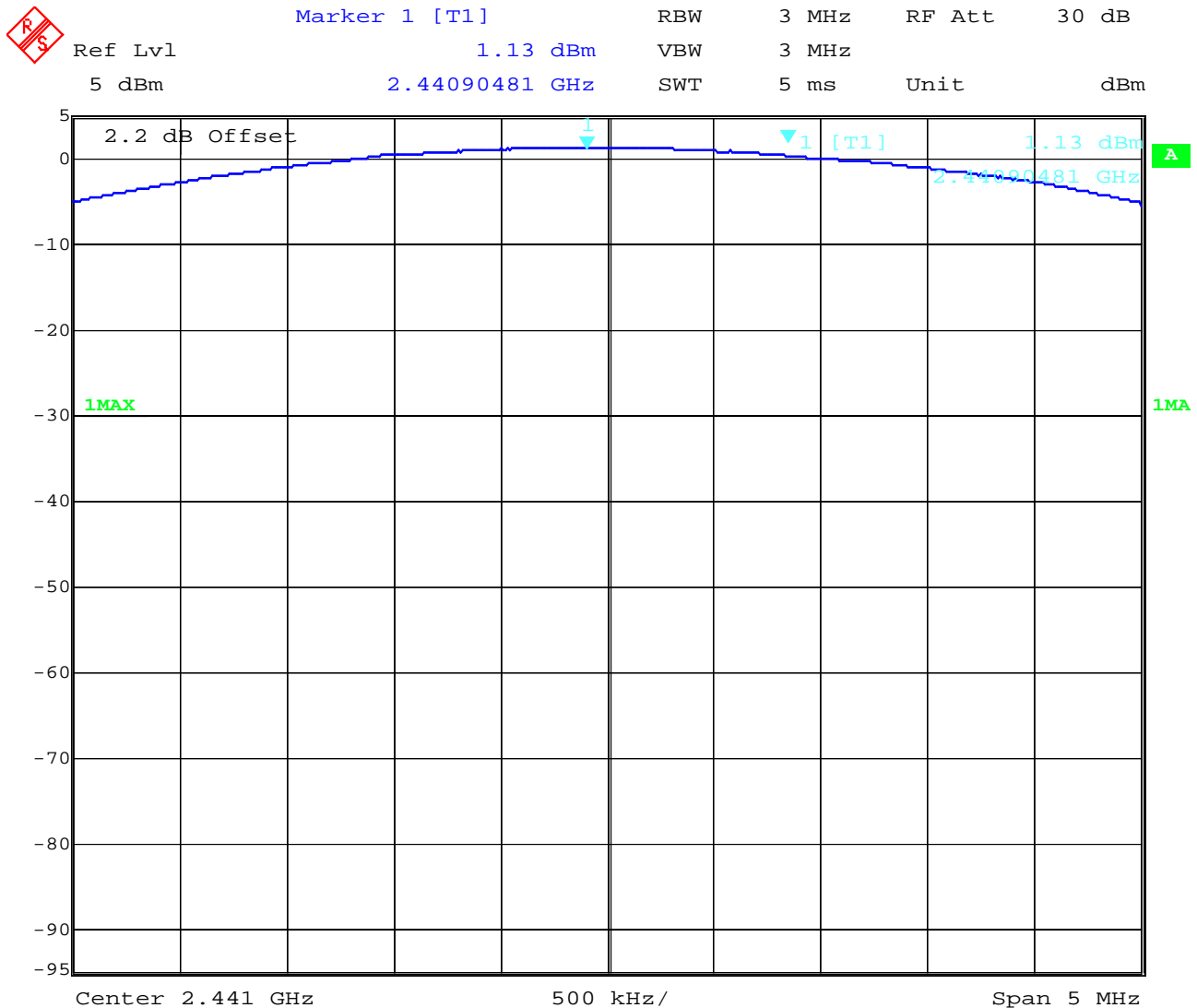
Relative humidity : 28%

## MAXIMUM PEAK OUTPUT POWER

SUBCLAUSE § 15.247 (b) (1)

(conducted)

Channel 2



Date: 31.JAN.2003 11:13:55

## LIMIT

SUBCLAUSE § 15.247 (b) (1)

| Frequency range | RF power output |
|-----------------|-----------------|
| 2400-2483.5 MHz | 1.0 Watt        |

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C


Relative humidity : 28%

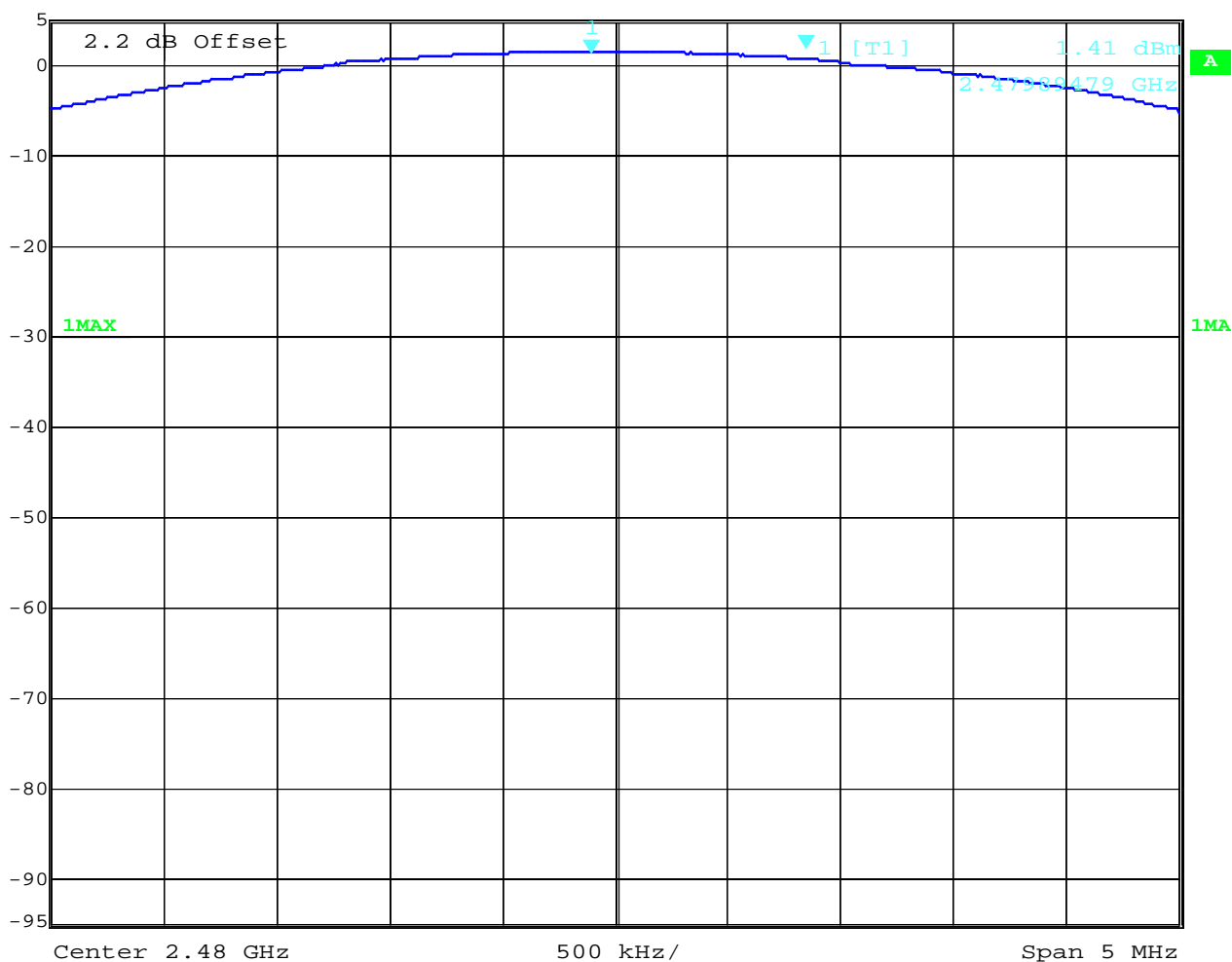
## MAXIMUM PEAK OUTPUT POWER

SUBCLAUSE § 15.247 (b) (1)

(conducted)

Channel 3


 Marker 1 [T1] RBW 3 MHz RF Att 30 dB  
 Ref Lvl 1.41 dBm VBW 3 MHz  
 5 dBm 2.47989479 GHz SWT 5 ms Unit dBm



Date: 31.JAN.2003 11:14:32

## LIMIT

SUBCLAUSE § 15.247 (b) (1)

| Frequency range | RF power output |
|-----------------|-----------------|
| 2400-2483.5 MHz | 1.0 Watt        |

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## MAXIMUM PEAK OUTPUT POWER (RADIATED)

SUBCLAUSE § 15.247 (b) (1)

| TEST CONDITIONS                                                         |                           | MAXIMUM PEAK OUTPUT POWER<br>EIRP (mW) |                |                |
|-------------------------------------------------------------------------|---------------------------|----------------------------------------|----------------|----------------|
| Frequency (MHz)                                                         |                           | 2402                                   | 2441           | 2480           |
| T <sub>nom</sub> ( 23.3 )°C                                             | V <sub>nom</sub> ( 110 )V | 1.08 mW                                | 1.00 mW        | 1.02mw         |
| Maximum deviation from output power under extreme test conditions (dBc) |                           | not applicable                         | not applicable | not applicable |
| Measurement uncertainty                                                 |                           | ±3dB                                   |                |                |

RBW/VBW : 3 MHz

Measured at a distance of 3m

## LIMIT

SUBCLAUSE § 15.247 (b) (1)

| Frequency range | RF power output |
|-----------------|-----------------|
| 2400-2483.5 MHz | 1.0 Watt        |

Equipment under test : BIRMA P4

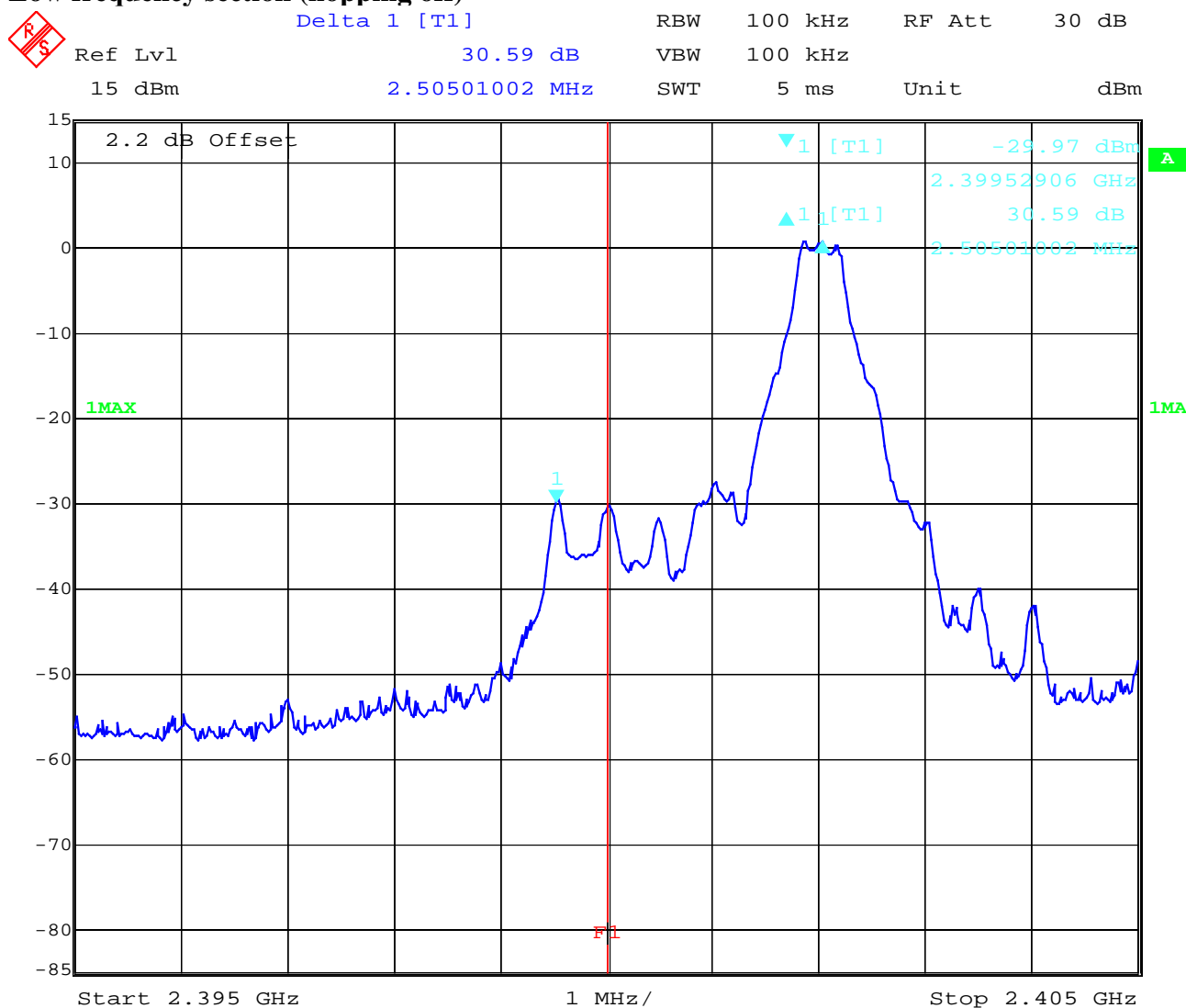
Ambient temperature : 23.3°C

Relative humidity : 28%

## Band-edge compliance of conducted emissions

§15.247 (c)

### Low frequency section (hopping off)



Date: 31.JAN.2003 11:09:02

Limit: 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, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, 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)).

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
(for reference numbers see test equipment listing)



**Relative humidity** : 28%

**§15.247 (c)**

Date: 31.JAN.2003 11:10:22

17 - 24

**Relative humidity** : 28%

**§15.247 (c)**

Date: 31.JAN.2003 11:07:50

17 - 24

Equipment under test : BIRMA P4

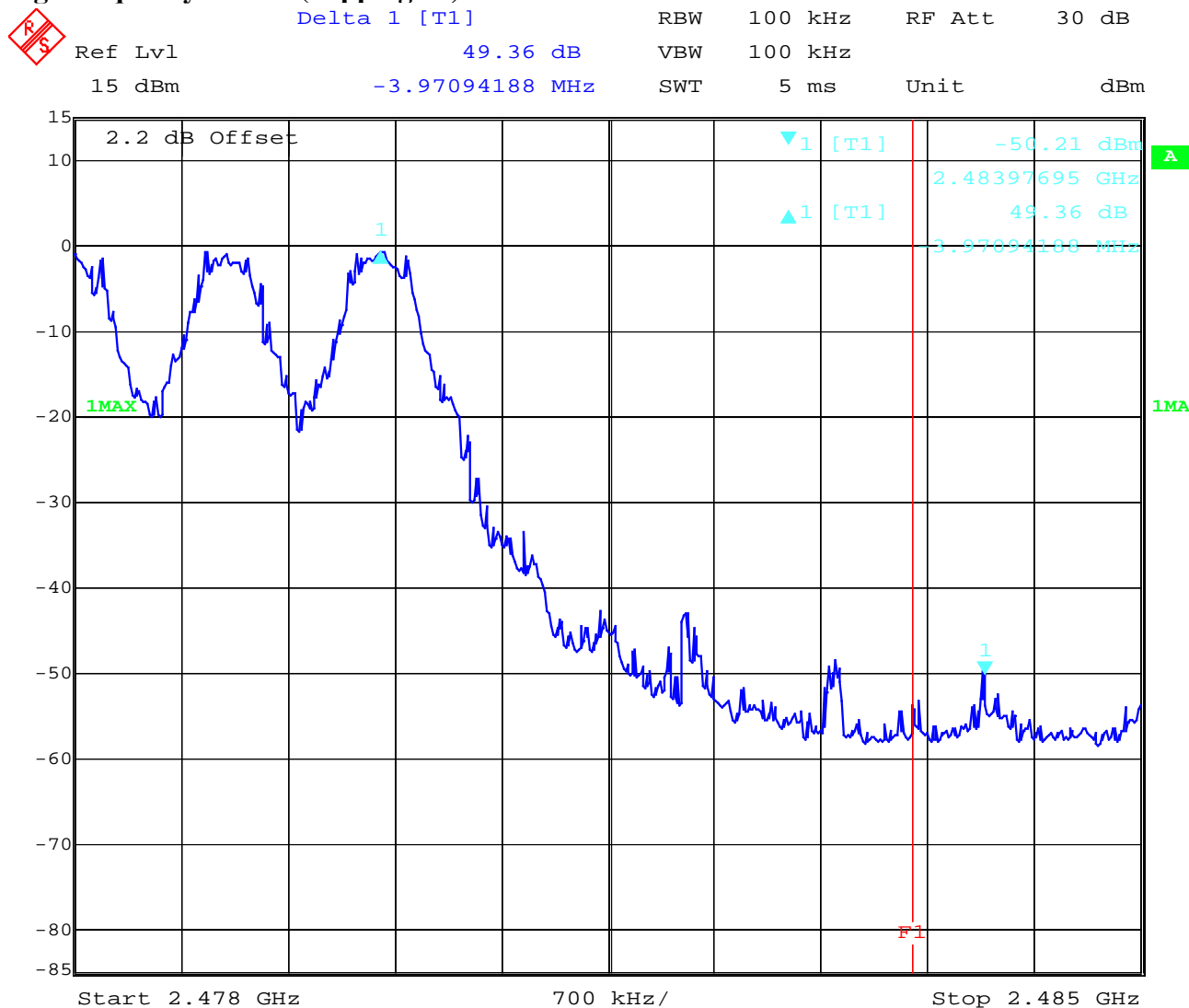
Ambient temperature : 23.3°C

Relative humidity : 28%

## Band-edge compliance of conducted emissions

§15.247 (c)

### high frequency section (hopping on)



Date: 31.JAN.2003 11:06:44

Limit: 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, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, 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)).

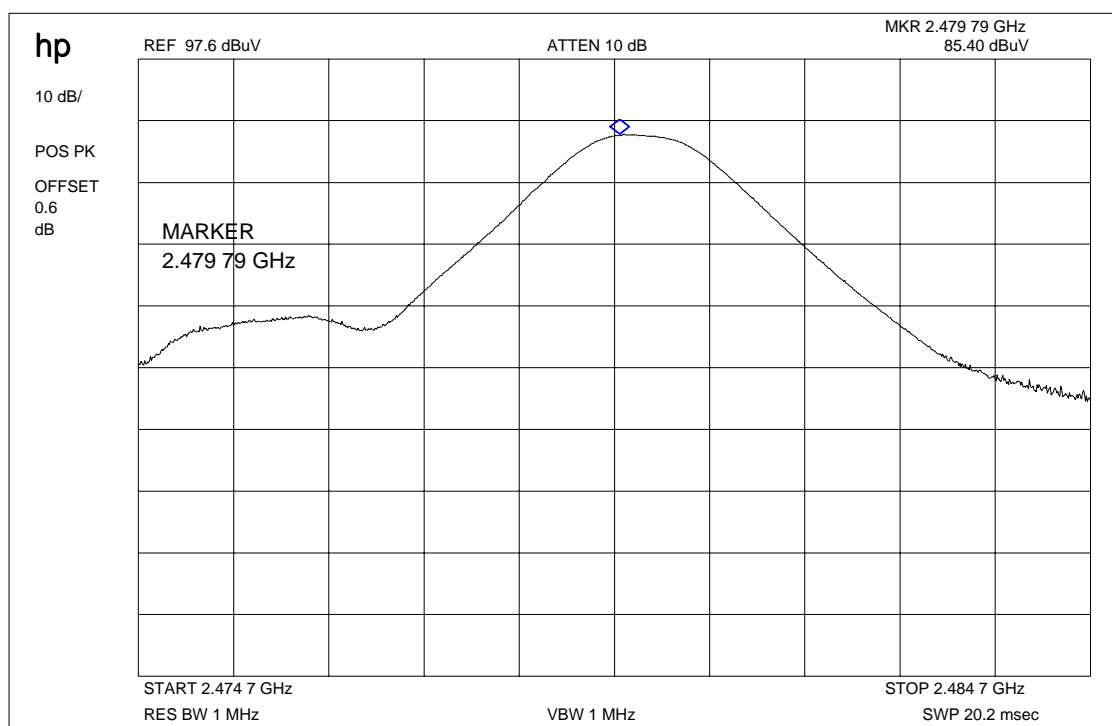
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
(for reference numbers see test equipment listing)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

**Band-edge compliance radiated**  
**Max field strength in 3m distance**  
**(singel frequency)**



| Frequency | Meter reading   | Cable loss                              | Antenna factor | Results           |
|-----------|-----------------|-----------------------------------------|----------------|-------------------|
| 2480 MHz  | 84.8 dB $\mu$ V | 7.8 dB                                  | -7.2           | 85.4 dB $\mu$ V/m |
|           |                 | Coreccting factor in grafic implemented |                |                   |

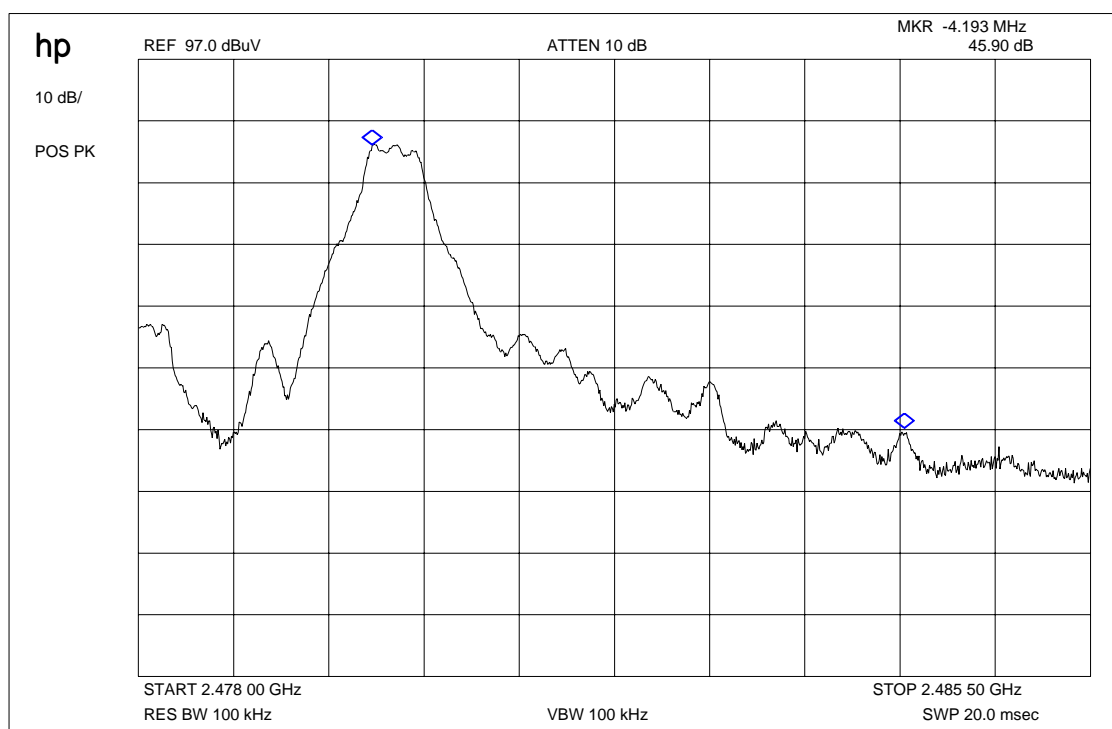
Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## Band-edge compliance radiated

### Marker-Delta Method (single carrier)



Marker-Delta-Value : 45.90dB

This measurement was made to show that the behavior of the system is conform to

FCC 15.205 (restricted bands)

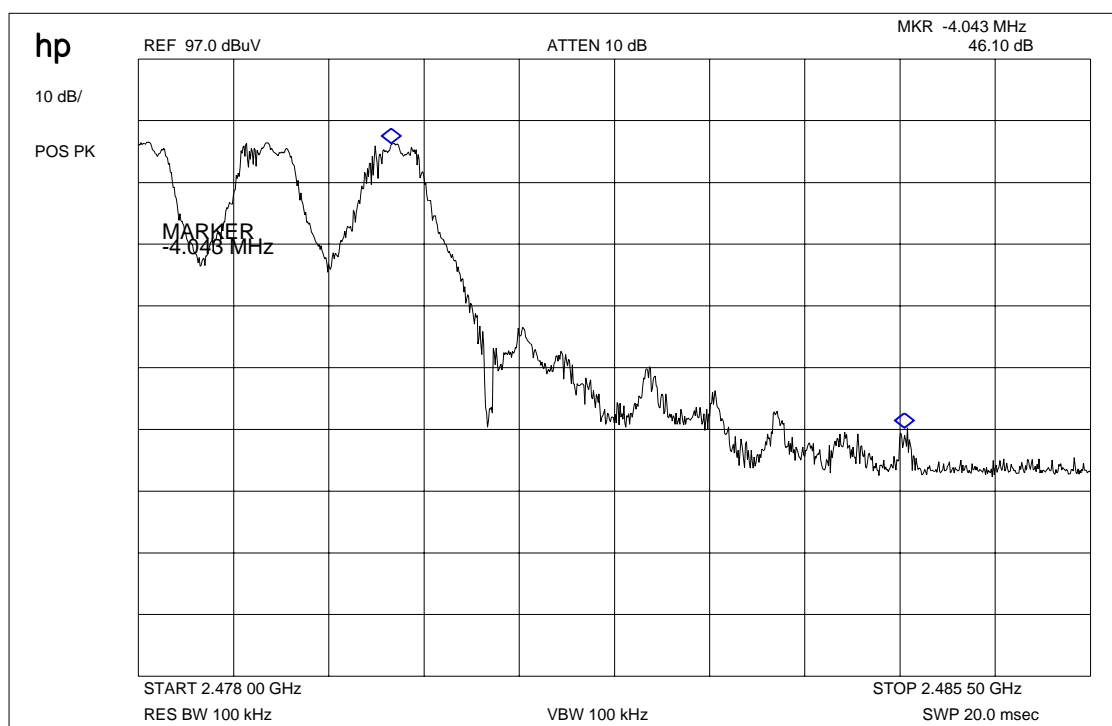
Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## Band-edge compliance radiated

### Marker-Delta Method (hopping mode)



Marker-Delta-Value : 46.10 dB

This measurement was made to show that the behavior of the system is conform to FCC 15.205 (restricted bands)

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
(for reference numbers see test equipment listing)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

Band-edge compliance of radiated emissions

§15.205

Radiated field strength

The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

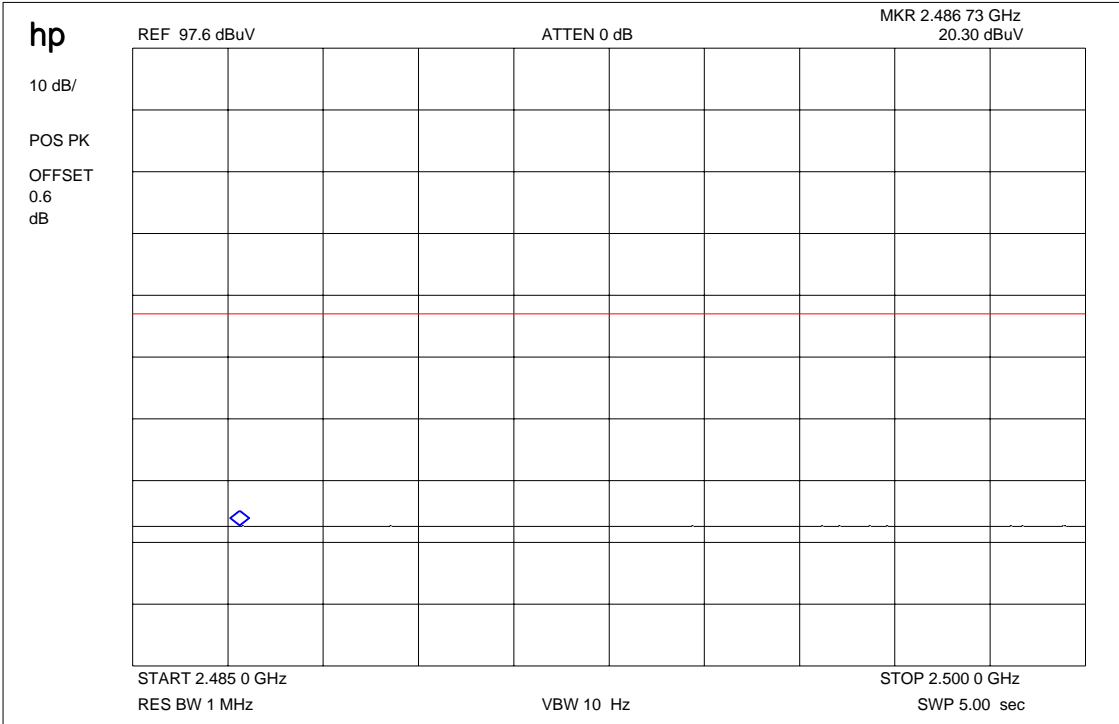
| high channel       | setup                                        | measured value (3m)                                 | correction factor (3m)                | calculated value (3m)                                                    |
|--------------------|----------------------------------------------|-----------------------------------------------------|---------------------------------------|--------------------------------------------------------------------------|
| Max. peak value    | 1 MHz RBW<br>1 MHz VBW                       | 84.8 dB $\mu$ V/m                                   | +0,6 dB                               | 85.4 dB $\mu$ V/m                                                        |
| Max. average value | Calculated with duty cycle correction factor | 85.4 dB $\mu$ V/m peak                              | -8.41 dB duty cycle correction factor | 76.99 dB $\mu$ V/m                                                       |
| Delta value        | Peak<br>30 kHz<br>RBW/VBW                    | 45.9 dB (single carrier)<br>46.10 dB (hopping mode) | -                                     | -                                                                        |
| Value at band edge | limit 54 dB $\mu$ V/m                        |                                                     |                                       | 31.09 dB $\mu$ V/m (single carrier)<br>30.89 dB $\mu$ V/m (hopping mode) |
| Statement:         |                                              |                                                     |                                       | Complies                                                                 |

The product complies with the limit of the restricted bands.

Delta marker plots see above pages

Equipment under test : BIRMA P4  
Ambient temperature : 23.3°C  
Relative humidity : 28%

Band-edge compliance radiated (average)  
Restricted band)





Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

| EMISSION LIMITATIONS    |  |                                   |                                            |                                                                  |                        |
|-------------------------|--|-----------------------------------|--------------------------------------------|------------------------------------------------------------------|------------------------|
| f<br>(MHz)              |  | amplitude<br>of emission<br>(dBm) | limit<br>max. allowed<br>emmision<br>power | actual<br>attenuation<br>below<br>frequency of<br>operation (dB) | results                |
| 2402                    |  | 0.87                              | 30 dBm                                     | -                                                                | Operating<br>frequency |
| 1202.4                  |  | -54.41                            | -20 dBc<br>(-19.13 dBm)                    | 55.28                                                            | complies               |
|                         |  |                                   |                                            |                                                                  |                        |
|                         |  |                                   |                                            |                                                                  |                        |
|                         |  |                                   |                                            |                                                                  |                        |
| 2441                    |  | 1.13                              | 30 dBm                                     | -                                                                | Operating<br>frequency |
| 14529                   |  | -55.13                            | -20 dBc<br>(-18.87 dBm)                    | 56.26                                                            | complies               |
|                         |  |                                   |                                            |                                                                  | complies               |
|                         |  |                                   |                                            |                                                                  |                        |
|                         |  |                                   |                                            |                                                                  |                        |
| 2480                    |  | 1.41                              | 30 dBm                                     |                                                                  | Operating<br>frequency |
| 1202.4                  |  | -53.67                            | -20 dBc<br>(-18.59 dBm)                    | 55.08                                                            | complies               |
|                         |  |                                   |                                            |                                                                  | complies               |
|                         |  |                                   |                                            |                                                                  |                        |
| Measurement uncertainty |  | ± 3dB                             |                                            |                                                                  |                        |

RBW : 100 kHz VBW: 100 MHz

For emissions that fall into restricted bands you find the radiated emissions later in the report.

## LIMITS

SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24, 64

Equipment under test : BIRMA P4

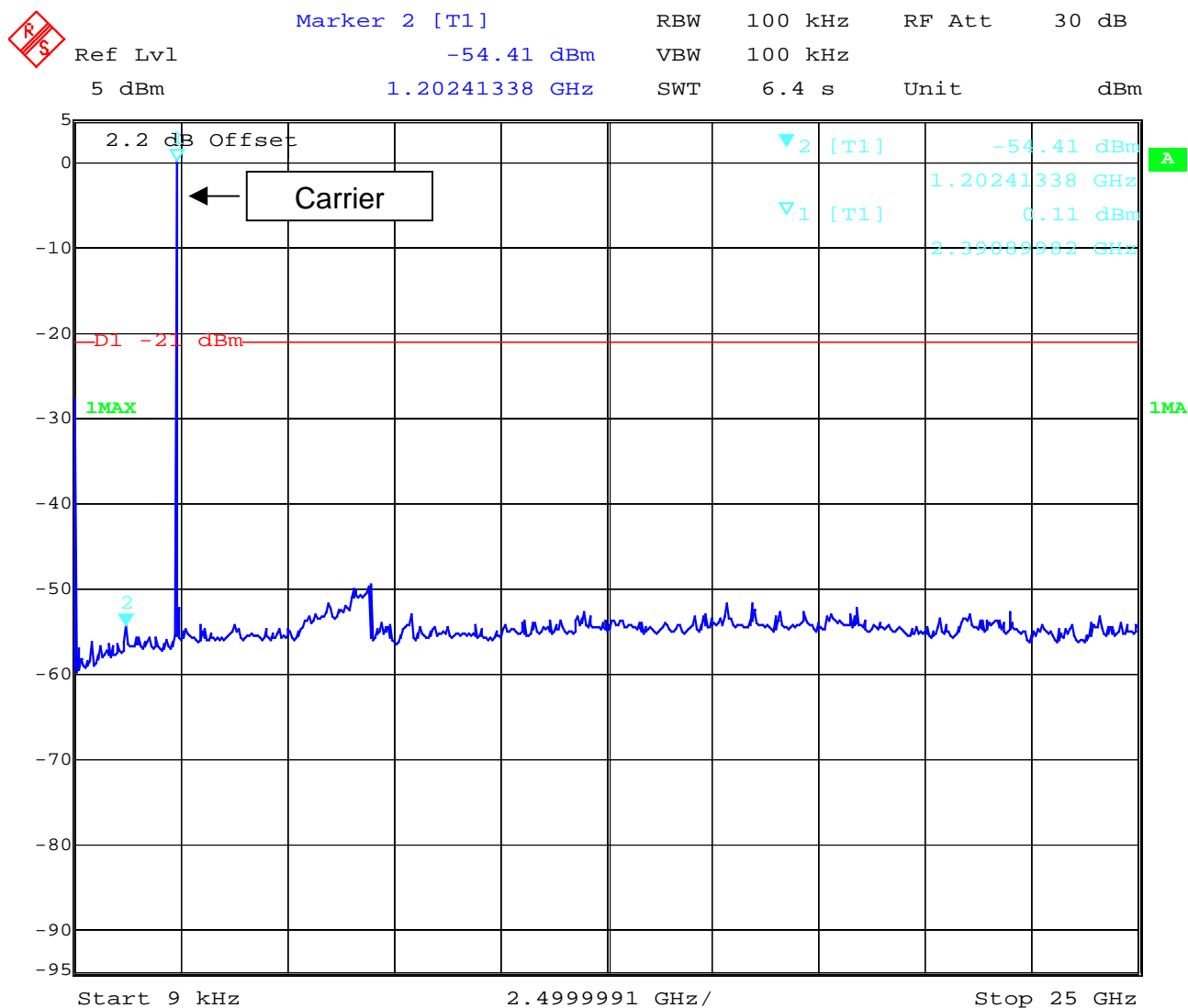
Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 1: 9 kHz - 25 GHz



Date: 31.JAN.2003 11:20:47

RBW:100 kHz / VBW: 100 kHz

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 - 24, 64

Equipment under test : BIRMA P4

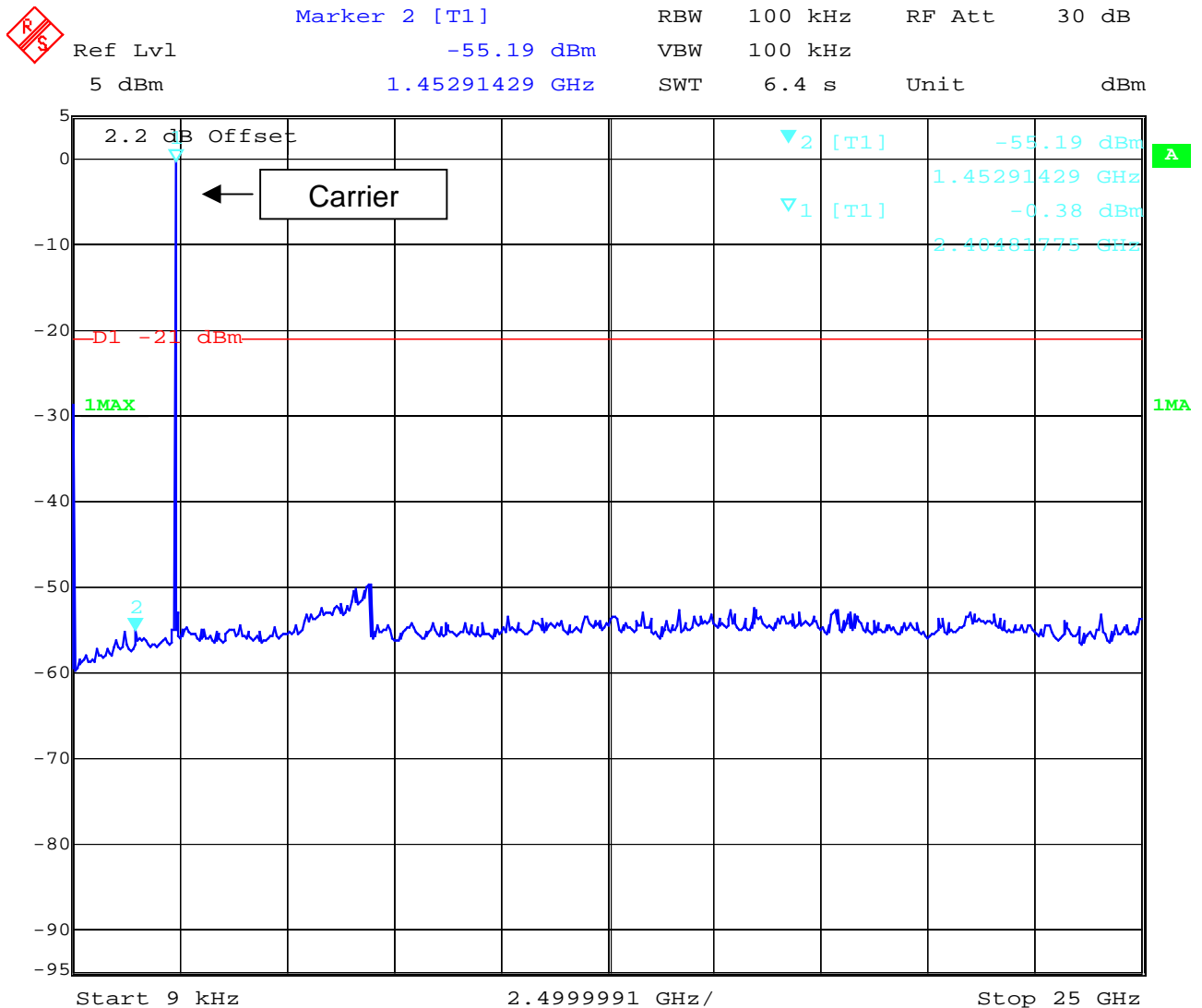
Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 2: 9 kHz – 25 GHz



Date: 31.JAN.2003 11:22:32

RBW:100 kHz / VBW: 100 kHz

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24, 64

Equipment under test : BIRMA P4

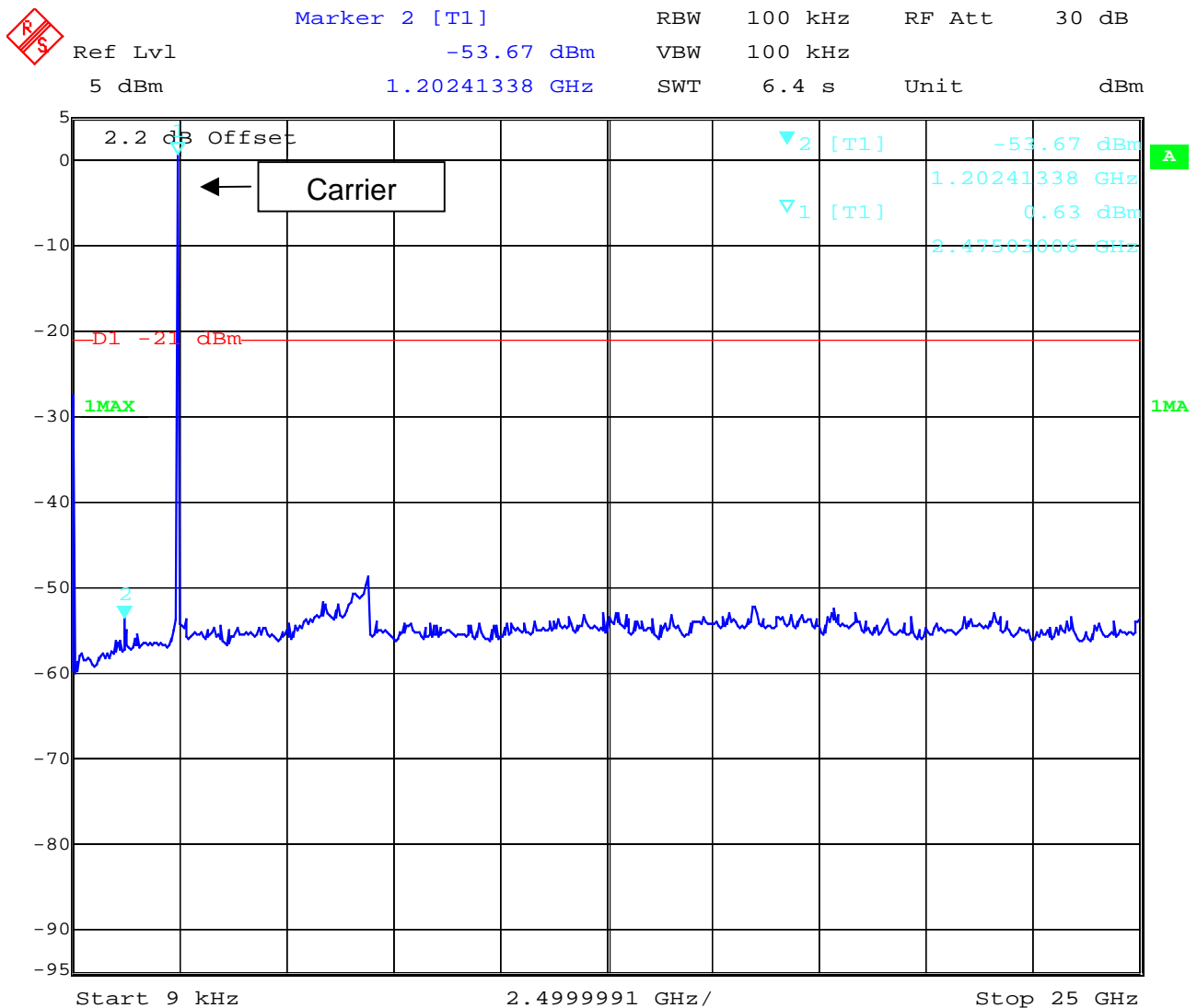
Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

### Channel 3: 9kHz – 25 GHz



Date: 31.JAN.2003 11:18:15

RBW:100 kHz / VBW: 100 kHz

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24, 64

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## SPURIOUS RADIATED EMISSION

§ 15.247 (c) (1)

| SPURIOUS EMISSIONS LEVEL (µV/m) |          |              |          |          |              |          |          |              |
|---------------------------------|----------|--------------|----------|----------|--------------|----------|----------|--------------|
| 2402 MHz                        |          |              | 2441 MHz |          |              | 2480 MHz |          |              |
| f (MHz)                         | Detector | Level (µV/m) | f (MHz)  | Detector | Level (µV/m) | f (MHz)  | Detector | Level (µV/m) |
| 46.58                           | QP/V     | 26.2         | 46.58    | QP/V     | 23.1         | 46.58    | QP/V     | 27.8         |
| 69.88                           | QP/H     | 24.3         | 69.88    | QP/H     | 22.3         | 69.88    | QP/H     | 26.0         |
| 103.32                          | QP/V     | 17.2         | 141.27   | QP/V     | 28.1         | 103.32   | QP/V     | 18.4         |
| 141.27                          | QP/V     | 28.7         | 200.86   | QP/V     | 24.7         | 141.27   | QP/V     | 30.6         |
| 200.86                          | QP/H     | 23.4         | 278.69   | QP/V     | 22.3         | 200.86   | QP/H     | 22.6         |
| 278.69                          | QP/H     | 26.2         | 418.14   | QP/H     | 30.7         | 278.69   | QP/H     | 27.0         |
| 418.14                          | QP/H     | 31.4         | 566.15   | QP/H     | 41.5         | 418.14   | QP/H     | 29.7         |
| 566.15                          | QP/H     | 41.9         | 740.78   | QP/H     | 28.2         | 566.15   | QP/H     | 41.7         |
| 1127.8                          | AV/V     | 36.0         | 1127.8   | AV/V     | 35.3         | 1122.3   | AV/V     | 36.1         |
| 1190.1                          | AV/V     | 31.1         | 1190.1   | AV/H     | 30.3         | 1190.1   | AV/V     | 30.2         |
| 1651.3                          | AV/V     | 35.8         | 1255.9   | AV/H     | 30.1         | 1651.3   | AV/V     | 34.9         |
|                                 |          |              | 1391.7   | AV/H     | 30.3         |          |          |              |
|                                 |          |              | 1651.3   | AV/V     | 35.5         |          |          |              |
| Measurement uncertainty         |          |              | ±3 dB    |          |              |          |          |              |

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

## LIMITS

SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## Limits

SUBCLAUSE § 15.209

| Frequency (MHz) | Field strength (µV/m) | Measurement distance (m) |
|-----------------|-----------------------|--------------------------|
| 30 - 88         | 100 (40 dBµV/m)       | 3                        |
| 88 - 216        | 150 (43.5 dBµV/m)     | 3                        |
| 216 - 960       | 200 (46 dBµV/m)       | 3                        |
| above 960       | 500 (54 dBµV/m)       | 3                        |

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17-24,64

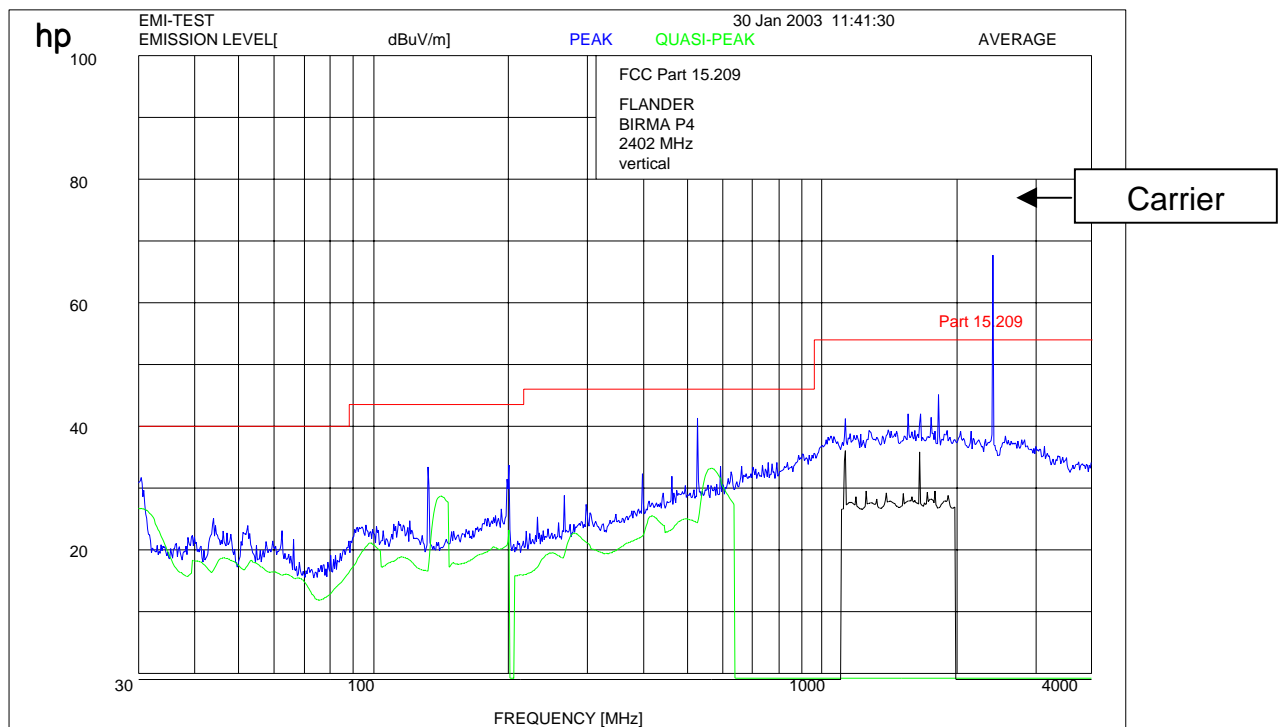
Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS 2402 MHz

## SUBCLAUSE § 15.247 (c) (1)



$f < 1 \text{ GHz}$  : RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$  : RBW/VBW: 1 MHz

## LIMITS

## SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17-24,64

Equipment under test : BIRMA P4

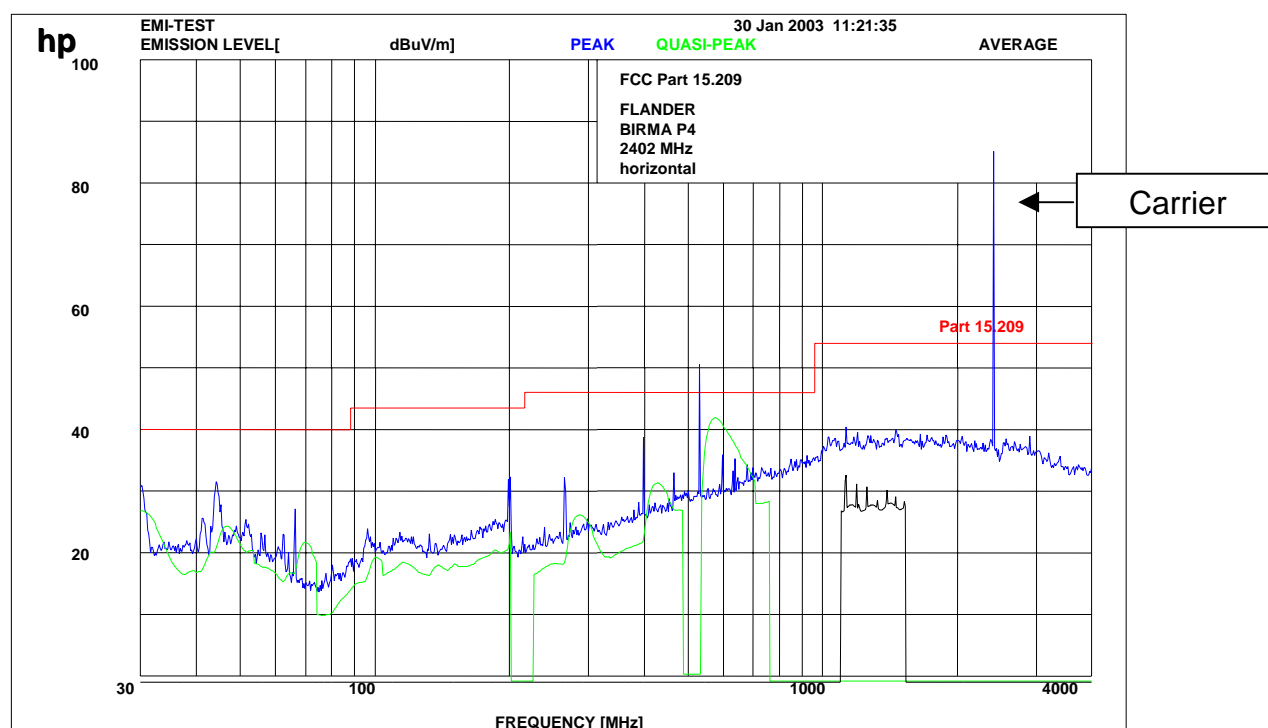
Ambient temperature : 23.3°C

Relative humidity : 28%

EMISSION LIMITATIONS

2402 MHz

SUBCLAUSE § 15.247 (c) (1)



$f < 1 \text{ GHz}$  : RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$  : RBW/VBW: 1 MHz

## LIMITS

SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17-24,64

Equipment under test : BIRMA P4

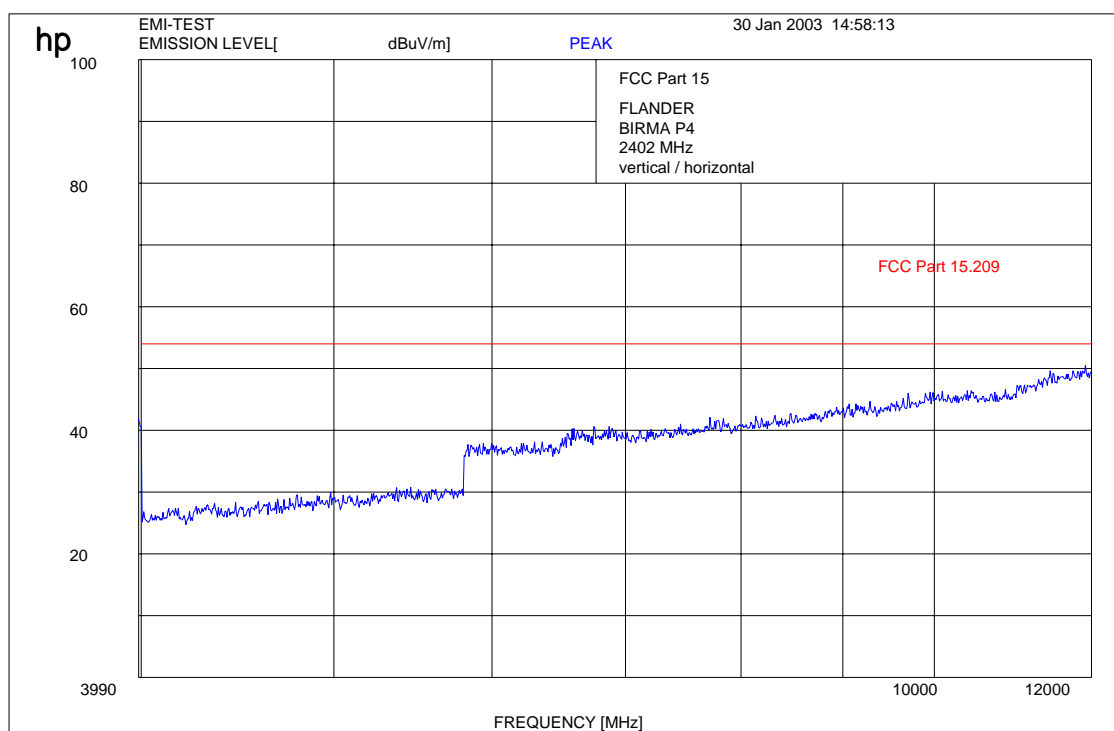
Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS

## SUBCLAUSE § 15.247 (c) (1)

2402 MHz



$f < 1 \text{ GHz}$  : RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$  : RBW/VBW: 1 MHz

## LIMITS

## SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17-24,64



Test Report No.: 2-2955-01-03/02 Issue Date: 2003-01-31 Page 41 (69)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS

## SUBCLAUSE § 15.247 (c) (1)

2402 MHz



Marker 1 [T1]

RBW 1 MHz RF Att 0 dB

Ref Lvl 39.27 dBμV

VBW 1 MHz

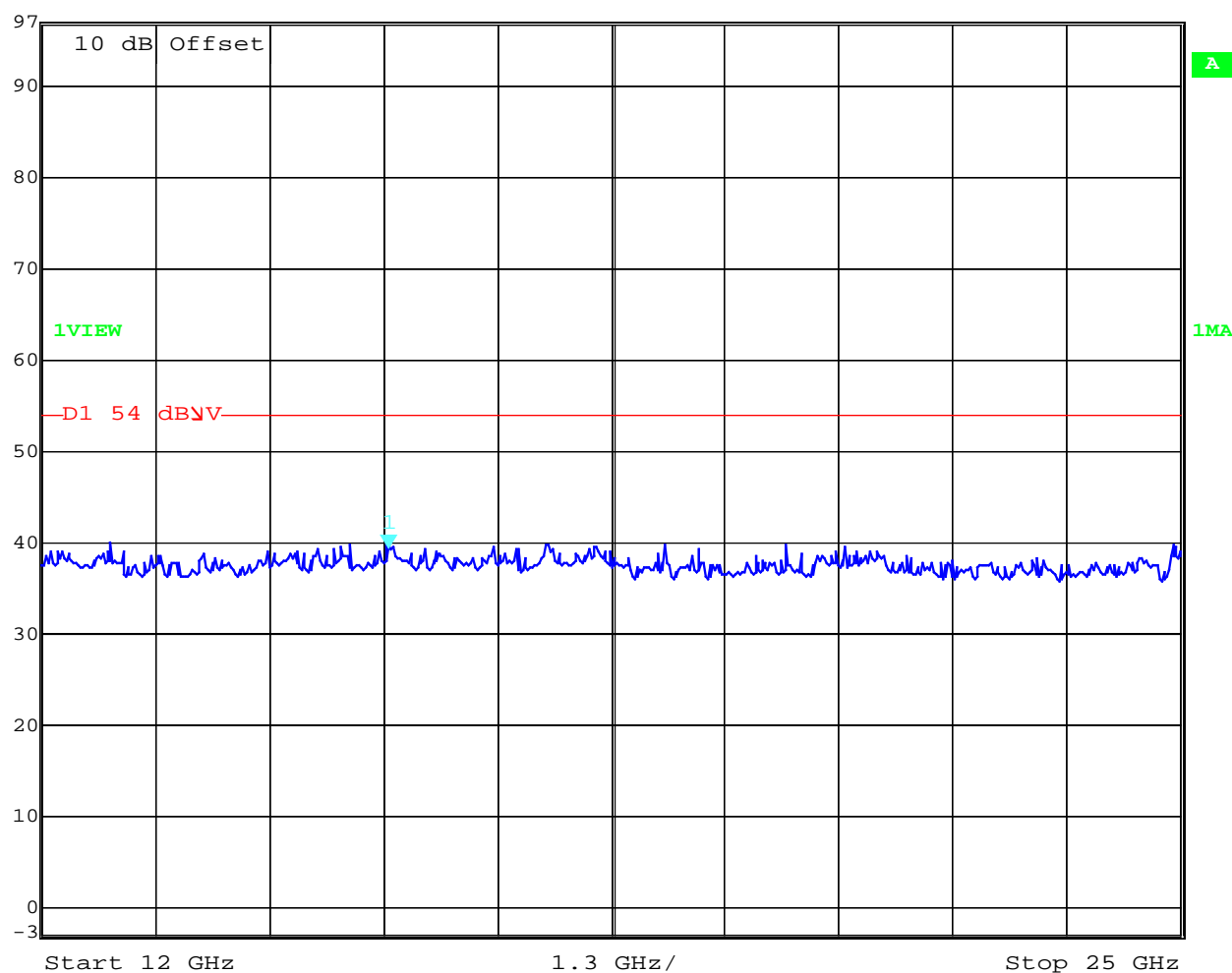
97 dBμV

15.95991984 GHz

SWT 74 ms

Unit

dBμV



Date: 31.JAN.2003 10:43:47

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

## LIMITS

## SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17-24,64

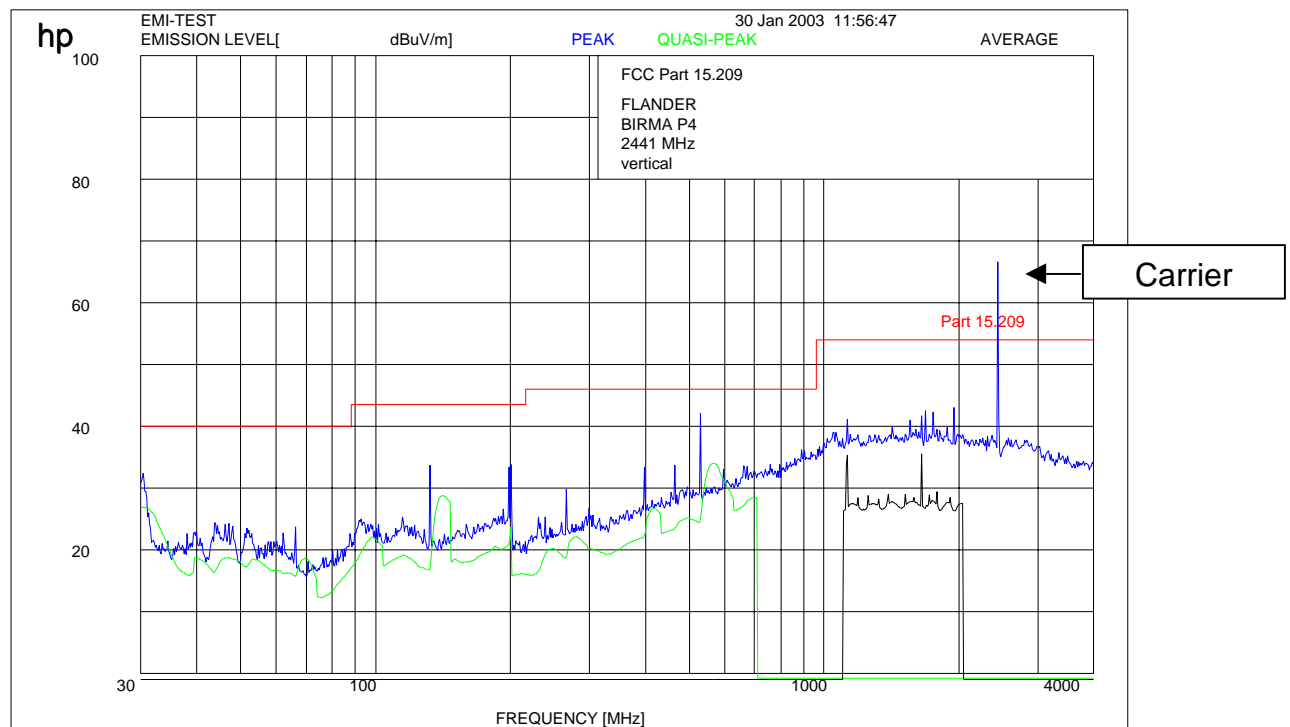
Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS 2441 MHz

## SUBCLAUSE § 15.247 (c) (1)



$f < 1 \text{ GHz}$  : RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$  : RBW/VBW: 1 MHz

## LIMITS

## SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17-24,64

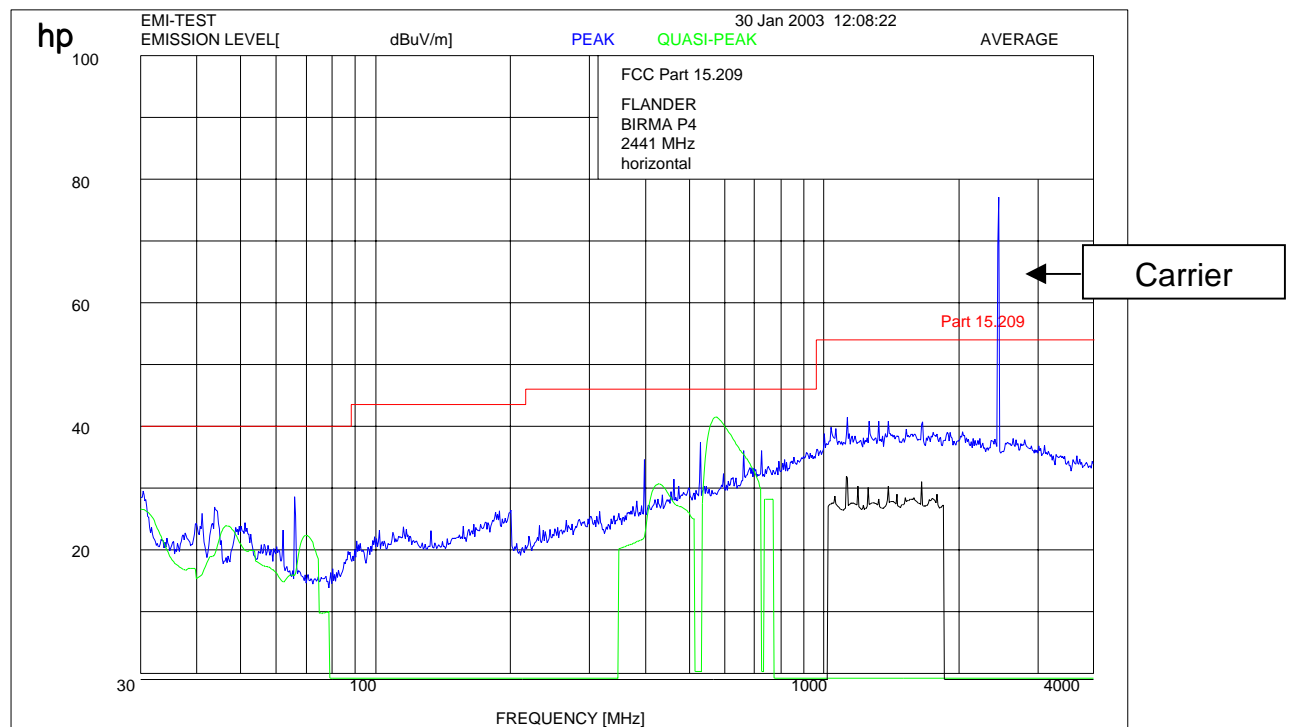
Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS 2441 MHz

## SUBCLAUSE § 15.247 (c) (1)



$f < 1 \text{ GHz}$  : RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$  : RBW/VBW: 1 MHz

## LIMITS

## SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

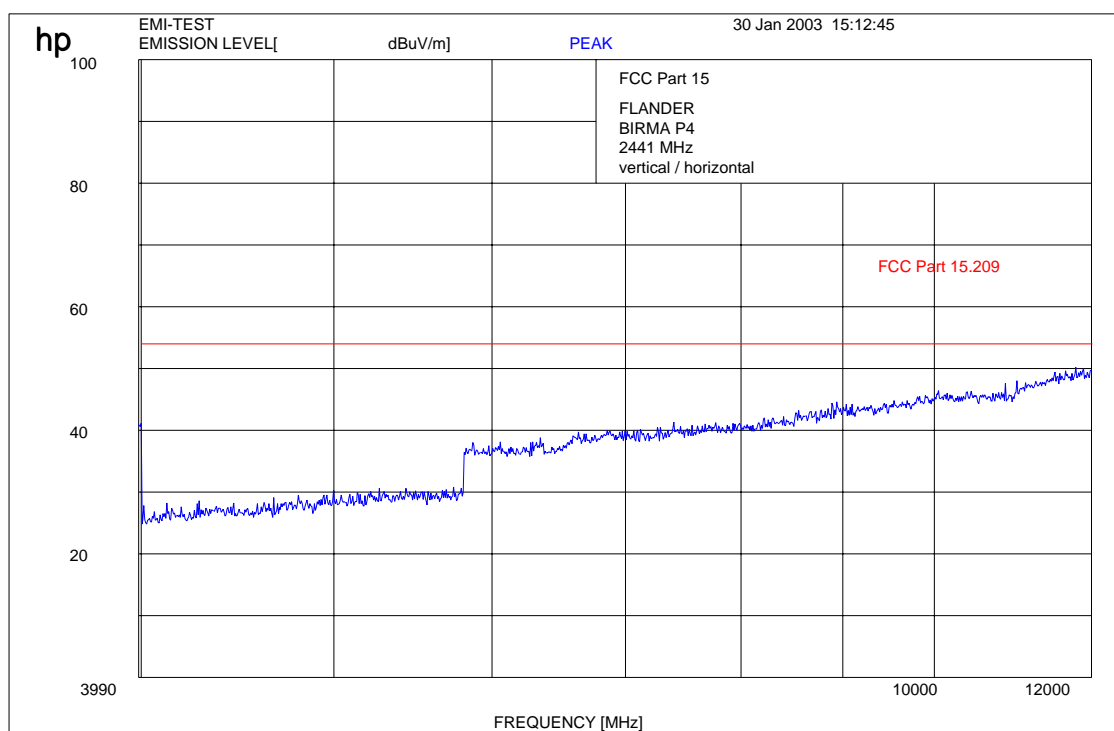
(for reference numbers see test equipment listing)

17-24,64

Equipment under test : BIRMA P4  
 Ambient temperature : 23.3°C  
 Relative humidity : 28%

## EMISSION LIMITATIONS 2441 MHz

## SUBCLAUSE § 15.247 (c) (1)



$f < 1 \text{ GHz}$  : RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$  : RBW/VBW: 1 MHz

## LIMITS

## SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
 (for reference numbers see test equipment listing)  
 17-24,64

Test Report No.: 2-2955-01-03/02 Issue Date: 2003-01-31 Page 45 (69)

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

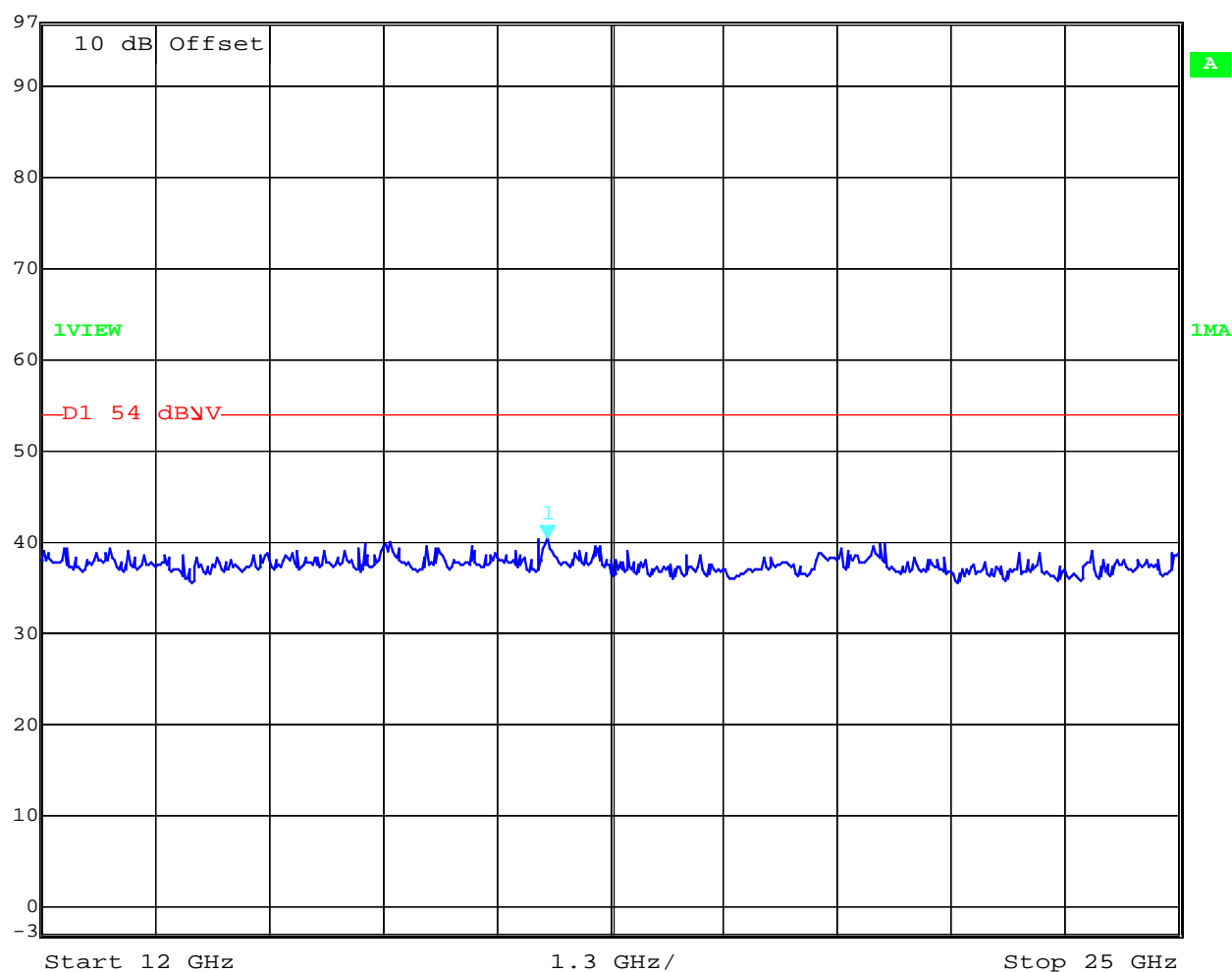
Relative humidity : 28%

## EMISSION LIMITATIONS

## SUBCLAUSE § 15.247 (c) (1)

2441 MHz

Marker 1 [T1] RBW 1 MHz RF Att 0 dB  
 Ref Lvl 40.47 dBμV VBW 1 MHz  
 97 dBμV 17.78356713 GHz SWT 74 ms Unit dBμV



Date: 31.JAN.2003 10:44:42

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

## LIMITS

## SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17-24,64

Equipment under test : BIRMA P4

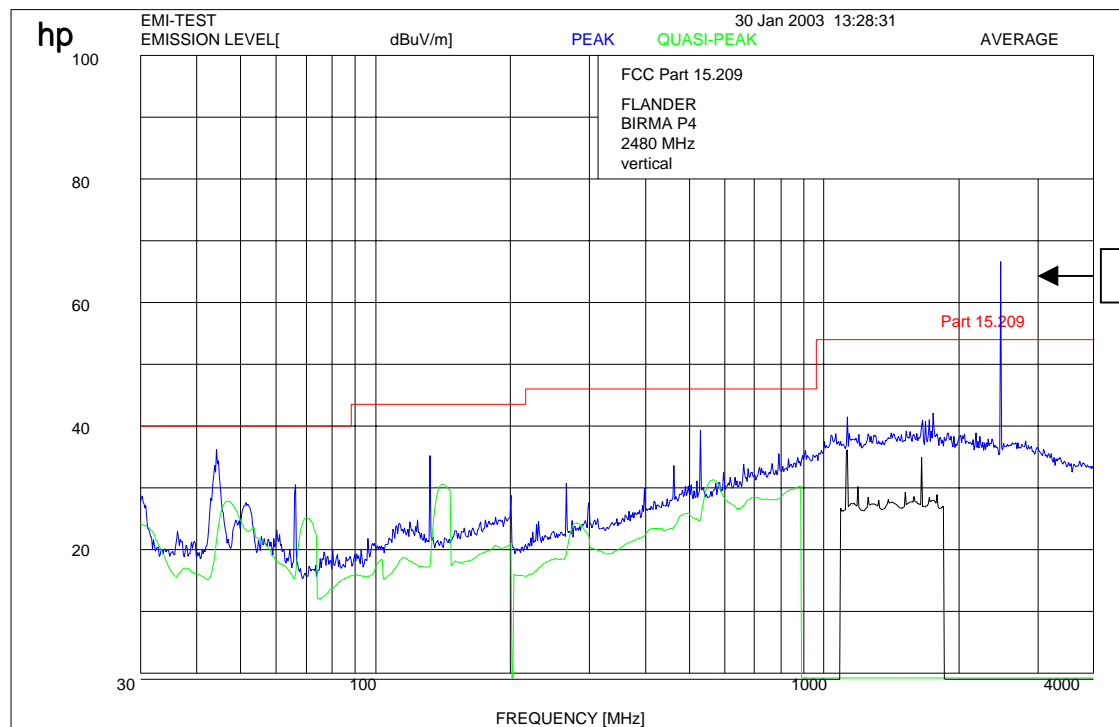
Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS

## SUBCLAUSE § 15.247 (c) (1)

2480 MHz



$f < 1 \text{ GHz}$  : RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$  : RBW/VBW: 1 MHz

## LIMITS

## SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17-24,64

Equipment under test : BIRMA P4

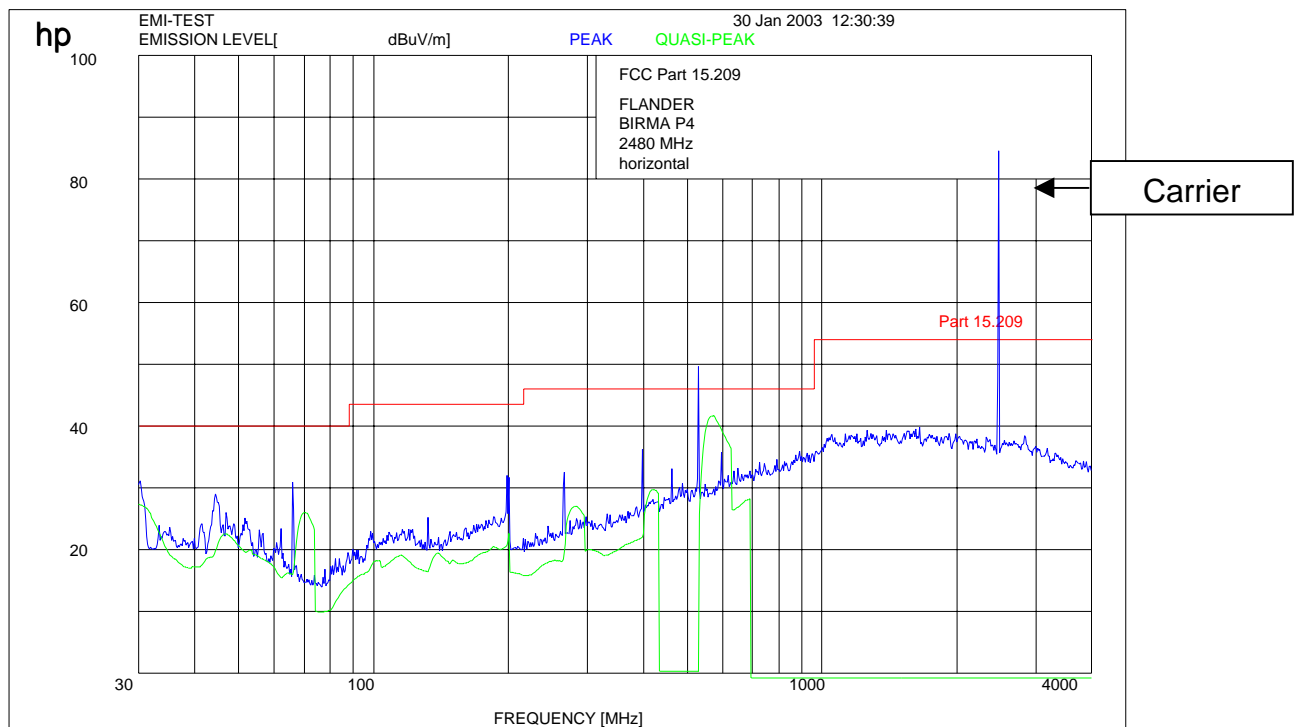
Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS

## SUBCLAUSE § 15.247 (c) (1)

2480 MHz



$f < 1 \text{ GHz}$  : RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$  : RBW/VBW: 1 MHz

## LIMITS

## SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

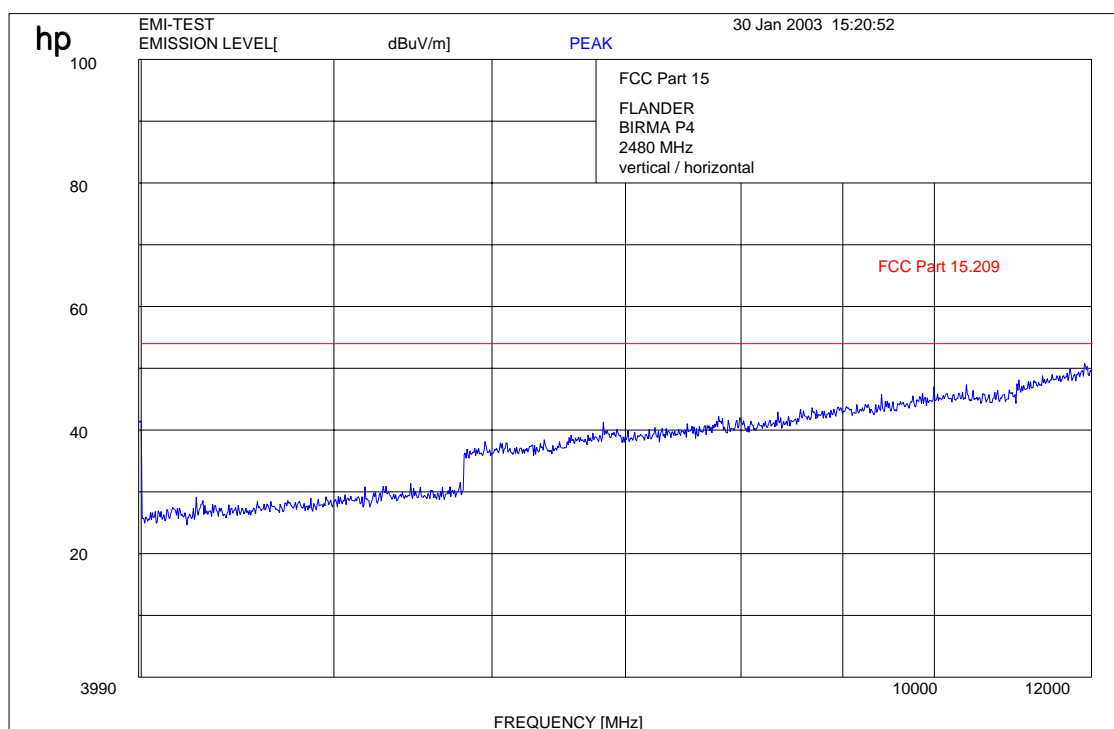
17-24,64

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS (Transmitter/Receiver) SUBCLAUSE § 15.247 (c) (1) 2480 MHz



$f < 1 \text{ GHz}$  : RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$  : RBW/VBW: 1 MHz

## LIMITS SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17-24,64



Equipment under test : BIRMA P4


Ambient temperature : 23.3°C

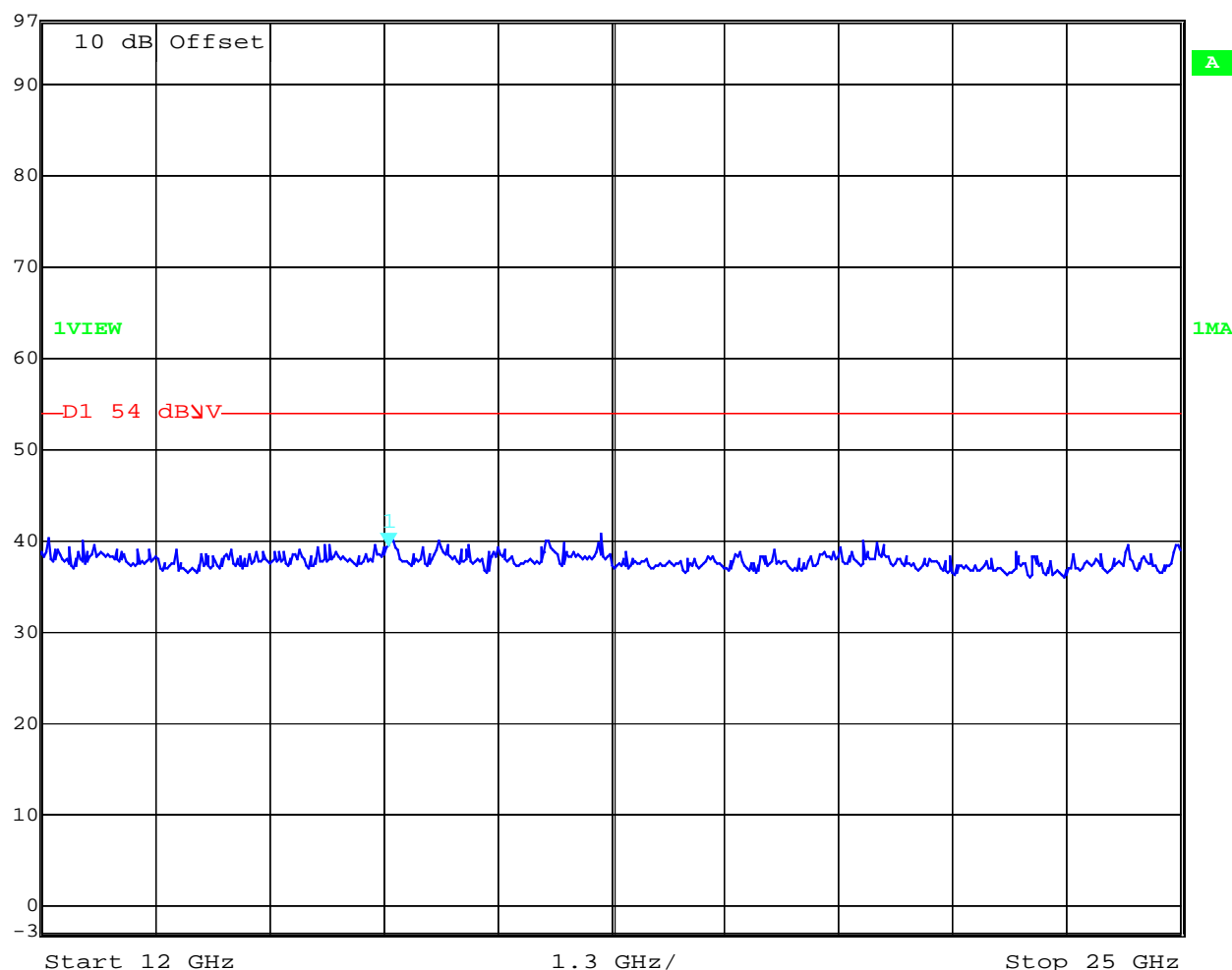
Relative humidity : 28%

## EMISSION LIMITATIONS

## SUBCLAUSE § 15.247 (c) (1)

2480 MHz

 Marker 1 [T1] RBW 1 MHz RF Att 0 dB  
 Ref Lvl 39.39 dBµV VBW 1 MHz  
 97 dBµV 15.95991984 GHz SWT 74 ms Unit dBµV



Date: 31.JAN.2003 10:42:43

$f < 1 \text{ GHz}$  : RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$  : RBW/VBW: 1 MHz

## LIMITS

## SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

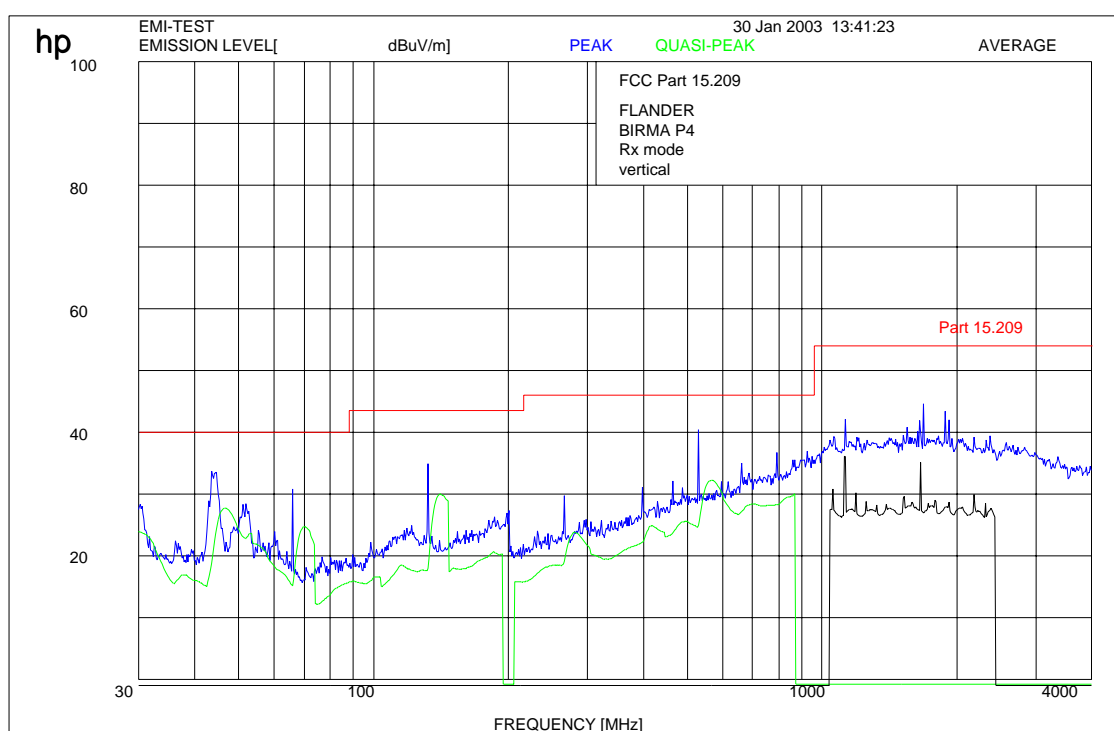
17-24,64

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS ( Receiver) SUBCLAUSE § 15.109



$f < 1 \text{ GHz}$  : RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$  : RBW/VBW: 1 MHz

### Limits

### SUBCLAUSE § 15.109

| Frequency (MHz) | Field strength ( $\mu\text{V/m}$ ) | Measurement distance (m) |
|-----------------|------------------------------------|--------------------------|
| 30 - 88         | 100 (40 dB $\mu\text{V/m}$ )       | 3                        |
| 88 - 216        | 150 (43.5 dB $\mu\text{V/m}$ )     | 3                        |
| 216 - 960       | 200 (46 dB $\mu\text{V/m}$ )       | 3                        |
| above 960       | 500 (54 dB $\mu\text{V/m}$ )       | 3                        |

### REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

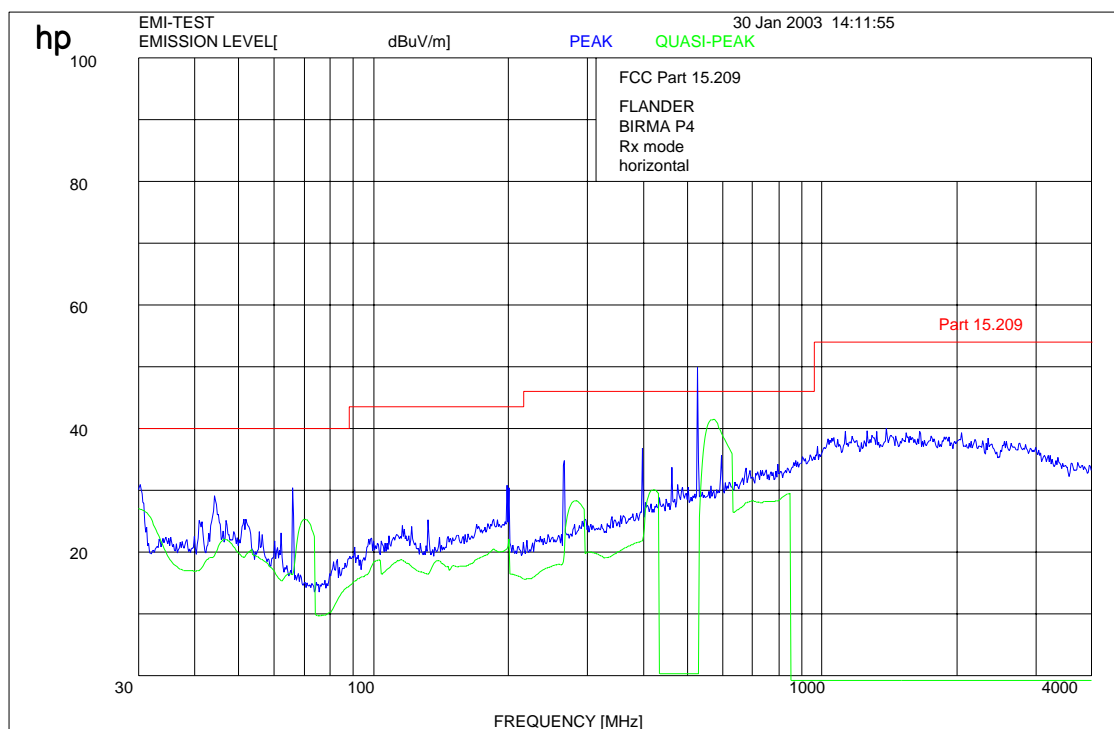
17-24,64

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS ( Receiver) SUBCLAUSE § 15.109



$f < 1 \text{ GHz}$  : RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$  : RBW/VBW: 1 MHz

### Limits

### SUBCLAUSE § 15.109

| Frequency (MHz) | Field strength ( $\mu\text{V/m}$ ) | Measurement distance (m) |
|-----------------|------------------------------------|--------------------------|
| 30 - 88         | 100 (40 dB $\mu\text{V/m}$ )       | 3                        |
| 88 - 216        | 150 (43.5 dB $\mu\text{V/m}$ )     | 3                        |
| 216 - 960       | 200 (46 dB $\mu\text{V/m}$ )       | 3                        |
| above 960       | 500 (54 dB $\mu\text{V/m}$ )       | 3                        |

### REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

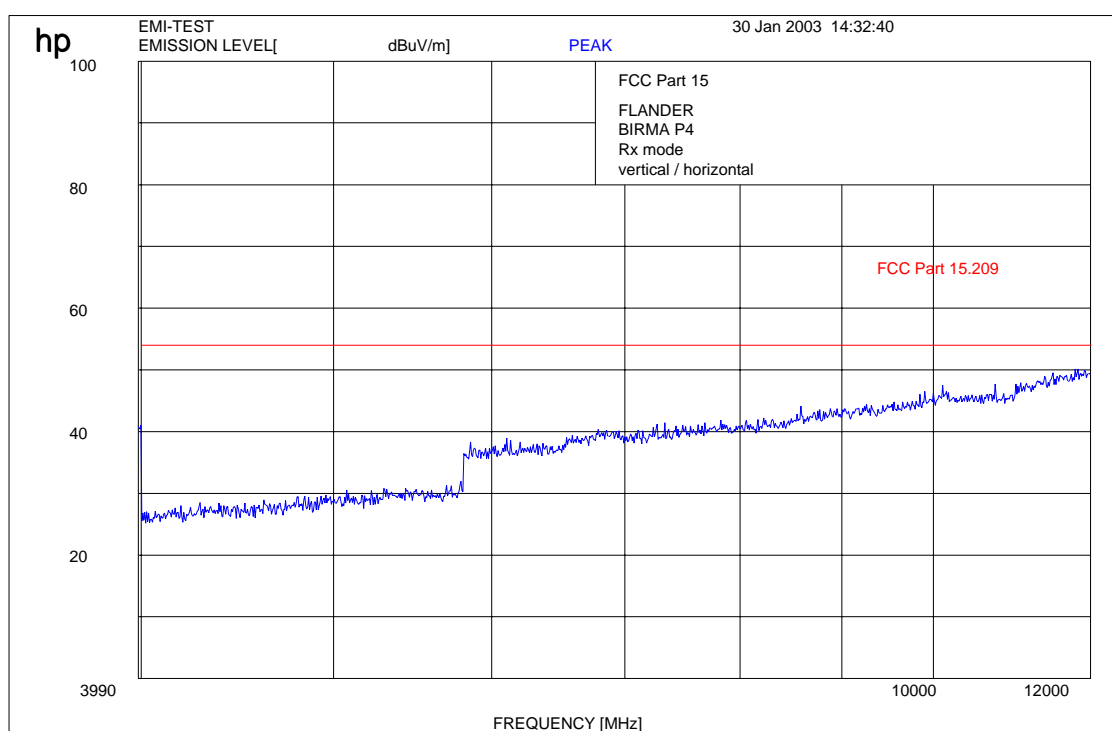
17-24,64

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS ( Receiver) SUBCLAUSE § 15.109



$f < 1 \text{ GHz}$  : RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$  : RBW/VBW: 1 MHz

## Limits

## SUBCLAUSE § 15.109

| Frequency (MHz) | Field strength ( $\mu\text{V/m}$ ) | Measurement distance (m) |
|-----------------|------------------------------------|--------------------------|
| 30 - 88         | 100 (40 dB $\mu\text{V/m}$ )       | 3                        |
| 88 - 216        | 150 (43.5 dB $\mu\text{V/m}$ )     | 3                        |
| 216 - 960       | 200 (46 dB $\mu\text{V/m}$ )       | 3                        |
| above 960       | 500 (54 dB $\mu\text{V/m}$ )       | 3                        |

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17-24,64


Test Report No.: 2-2955-01-03/02 Issue Date: 2003-01-31 Page 53 (69)

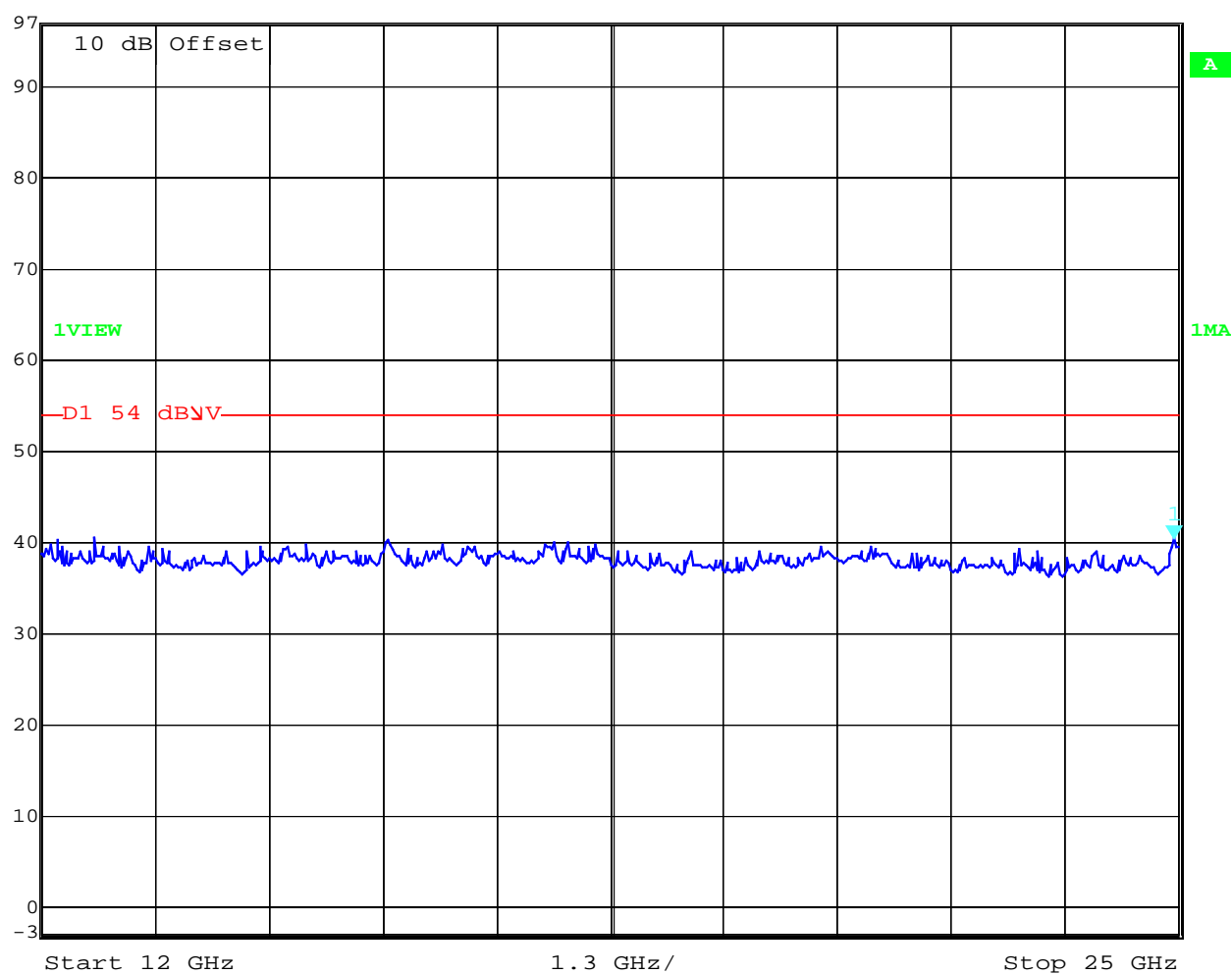
Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## EMISSION LIMITATIONS ( Receiver) SUBCLAUSE § 15.109


 Marker 1 [T1] RBW 1 MHz RF Att 0 dB  
 Ref Lvl 40.44 dBµV VBW 1 MHz  
 97 dBµV 24.94789579 GHz SWT 74 ms Unit dBµV



Date: 31.JAN.2003 10:46:14

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

Limits

SUBCLAUSE § 15.109

| Frequency (MHz) | Field strength (µV/m) | Measurement distance (m) |
|-----------------|-----------------------|--------------------------|
| 30 - 88         | 100 (40 dBµV/m)       | 3                        |
| 88 - 216        | 150 (43.5 dBµV/m)     | 3                        |
| 216 - 960       | 200 (46 dBµV/m)       | 3                        |
| above 960       | 500 (54 dBµV/m)       | 3                        |

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17-24,64

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

Relative humidity : 28%

## RECEIVER SPURIOUS RADIATION

§ 15.109

Radiated

| SPURIOUS EMISSIONS LEVEL (µV/m) |          |              |         |          |              |         |          |              |
|---------------------------------|----------|--------------|---------|----------|--------------|---------|----------|--------------|
| CH 1 / 2 / 3                    |          |              |         |          |              |         |          |              |
| f (MHz)                         | Detector | Level (µV/m) | f (MHz) | Detector | Level (µV/m) | f (MHz) | Detector | Level (µV/m) |
| 46.58                           | QP/V     | 27.7         | 1190.1  | AV/V     | 30.2         |         |          |              |
| 69.88                           | QP/H     | 25.3         | 1659.4  | AV/V     | 35.1         |         |          |              |
| 141.27                          | QP/V     | 30.0         | 2181.9  | AV/V     | 29.9         |         |          |              |
| 185.75                          | QP/V     | 20.7         |         |          |              |         |          |              |
| 200.86                          | QP/H     | 22.1         |         |          |              |         |          |              |
| 281.43                          | QP/H     | 28.3         |         |          |              |         |          |              |
| 422.25                          | QP/H     | 30.1         |         |          |              |         |          |              |
| 566.15                          | QP/H     | 41.5         |         |          |              |         |          |              |
| 849.43                          | QP/H     | 30.0         |         |          |              |         |          |              |
| 1058.4                          | AV/V     | 30.8         |         |          |              |         |          |              |
| 1122.3                          | AV/V     | 36.1         |         |          |              |         |          |              |
| Measurement uncertainty         |          |              | ±3 dB   |          |              |         |          |              |

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

see above plots

Measurement distance see table

Limits

SUBCLAUSE § 15.109

| Frequency (MHz) | Field strength (µV/m) | Measurement distance (m) |
|-----------------|-----------------------|--------------------------|
| 30 - 88         | 100 (40 dBµV/m)       | 3                        |
| 88 - 216        | 150 (43.5 dBµV/m)     | 3                        |
| 216 - 960       | 200 (46 dBµV/m)       | 3                        |
| above 960       | 500 (54 dBµV/m)       | 3                        |

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17-24,64

Equipment under test : BIRMA P4

Ambient temperature : 23.3°C

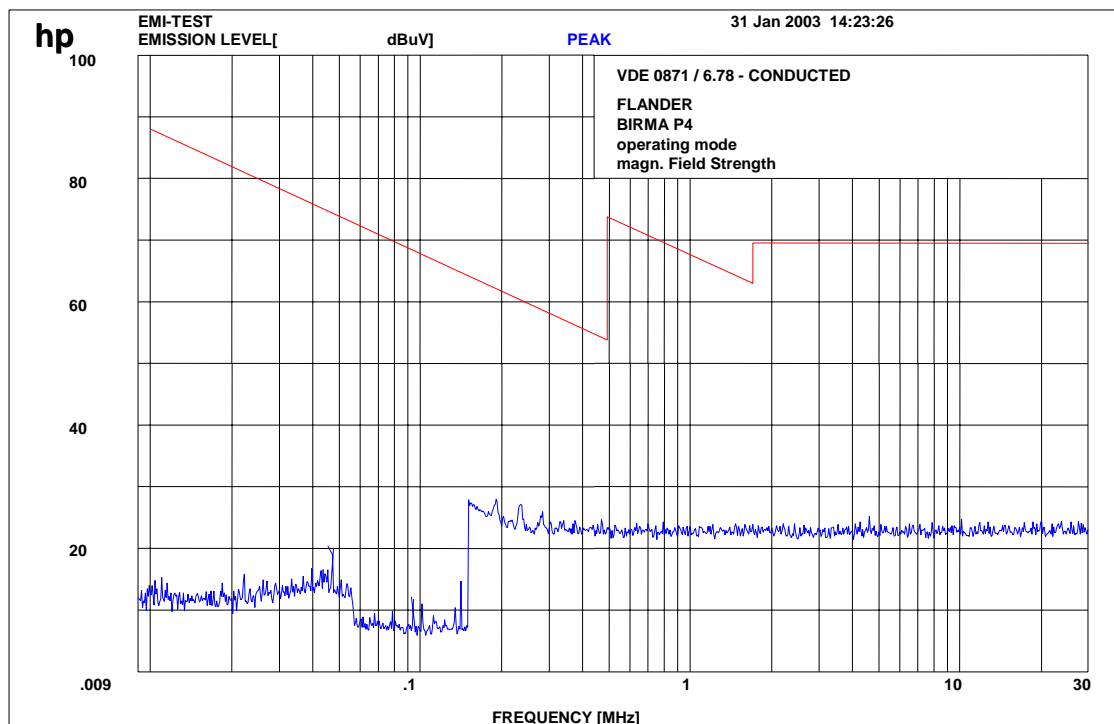
Relative humidity : 28%

## EMISSION LIMITATIONS (operating mode/normal mode) SUBCLAUSE § 15.109

< 30 MHz

measured at 10 m distance.

Values recalculated with 40 dB/decade according to FCC rules.



## Limits

## SUBCLAUSE § 15.109

| Frequency (MHz) | Field strength (µV/m) | Measurement distance (m) |
|-----------------|-----------------------|--------------------------|
| 0.009 – 0.490   | 2400/F(kHz)           | 300                      |
| 0.490 – 1.705   | 24000/F(kHz)          | 30                       |
| 1.705 – 30.0    | 30 / 29.5 dBµV/m      | 30                       |
| 30 - 88         | 100 / 40 dBµV/m       | 3                        |
| 88 - 216        | 150 / 43.5 dBµV/m     | 3                        |
| 216 - 960       | 200 / 46 dBµV/m       | 3                        |
| above 960       | 500 / 54 dBµV/m       | 3                        |

## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17-24,64

## Conducted emissions

§ 15.107/207

FCC Part 15 / CISPR 22

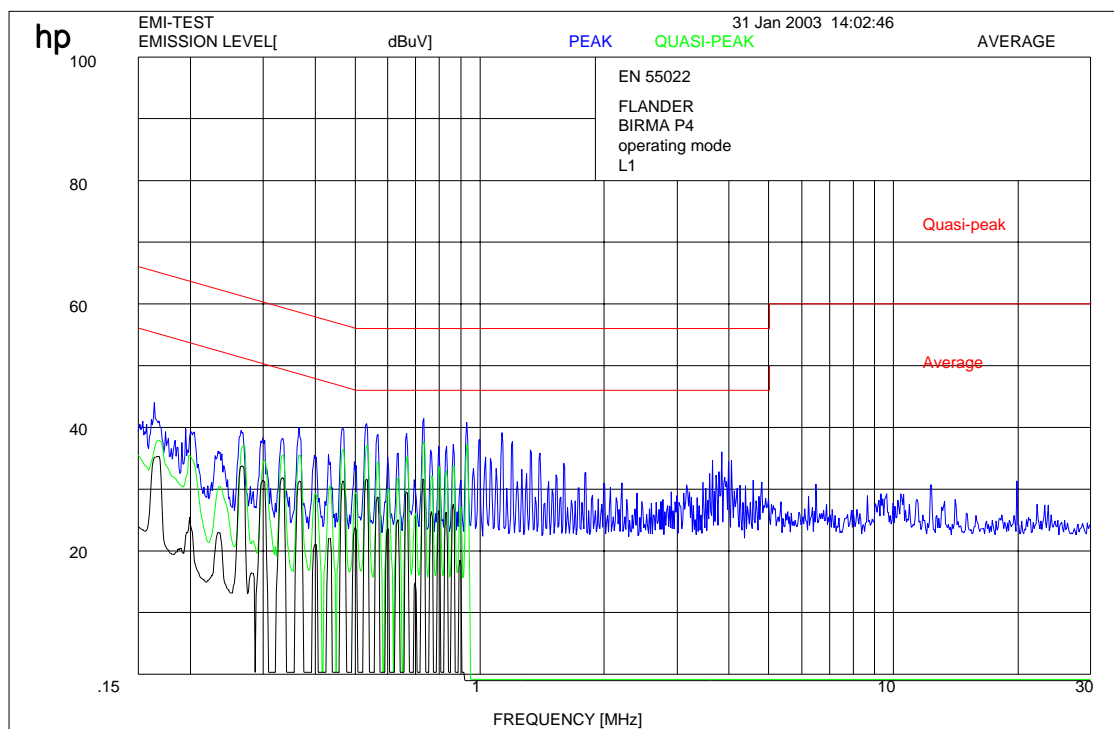
EN 55022

EUT: BIRMA P4  
 Manufacturer: FLANDER  
 Operation condition: operating mode  
 Test Site: Room 006  
 Operator: Berg  
 Power Supply: 115V AC / 60 Hz  
 Comment: ---  
 Start of Test: 31.01.03 / 14:25:11

### SCAN TABLE: "EN 55022 V"

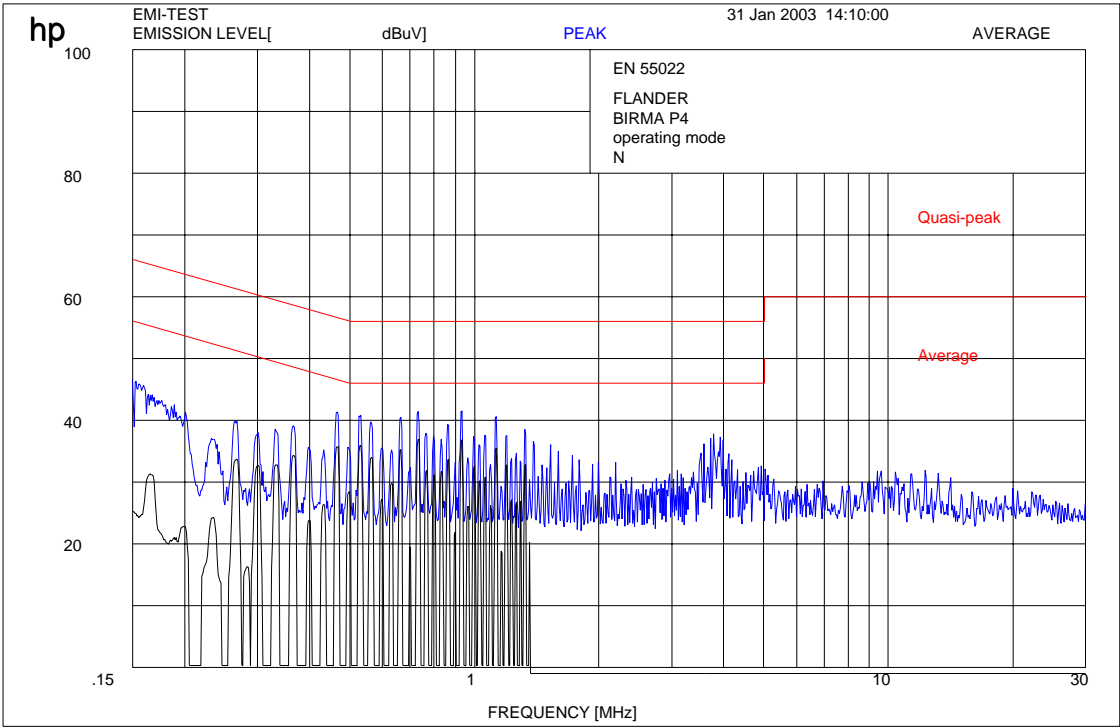
| Short Description: |           |         | Voltage Mains | 1.60     |        |            |      |
|--------------------|-----------|---------|---------------|----------|--------|------------|------|
| Start              | Stop      | Step    | Detector      | Meas.    | IF     | Transducer |      |
| Frequency          | Frequency | Width   |               | Time     | Bandw. |            |      |
| 150.0 kHz          | 30.0 MHz  | 7.5 kHz | MaxPeak       | 100.0 ms | 10 kHz | ESH3-Z5 L1 | 1458 |
|                    |           |         | Average       |          |        |            |      |

L1





N



**TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS**

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

| No | Instrument/Ancillary  | Type      | Manufacturer    | Serial No.  |
|----|-----------------------|-----------|-----------------|-------------|
| 01 | Spectrum Analyzer     | 8566 A    | Hewlett-Packard | 1925A00257  |
| 02 | Analyzer Display      | 8566 A    | Hewlett-Packard | 1925A00860  |
| 03 | Oscilloscope          | 7633      | Tektronix       | 230054      |
| 04 | Radio Analyzer        | CMTA 54   | Rohde & Schwarz | 894 043/010 |
| 05 | System Power Supply   | 6038 A    | Hewlett-Packard | 2848A07027  |
| 06 | Signal Generator      | 8111 A    | Hewlett-Packard | 2215G00867  |
| 07 | Signal Generator      | 8662 A    | Hewlett-Packard | 2224A01012  |
| 08 | Funktionsgenerator    | AFGU      | Rohde & Schwarz | 862 480/032 |
| 09 | Regeltrenntrafo       | MPL       | Erfi            | 91350       |
| 10 | Netznachbildung       | NNLA 8120 | Schwarzbeck     | 8120331     |
| 11 | Relais-Matrix         | PSU       | Rohde & Schwarz | 893 285/020 |
| 12 | Power-Meter           | 436 A     | Hewlett-Packard | 2101A12378  |
| 13 | Power-Sensor          | 8484 A    | Hewlett-Packard | 2237A10156  |
| 14 | Power-Sensor          | 8482 A    | Hewlett-Packard | 2237A00616  |
| 15 | Modulationsmeter      | 9008      | Racal-Dana      | 2647        |
| 16 | Frequenzzähler        | 5340 A    | Hewlett-Packard | 1532A03899  |
| 17 | Absorber Schirmkabine | ---       | MWB             | 87400/002   |
| 18 | Spectrum Analyzer     | 85660 B   | Hewlett-Packard | 2747A05306  |
| 19 | Analyzer Display      | 85662 A   | Hewlett-Packard | 2816A16541  |
| 20 | Quasi Peak Adapter    | 85650 A   | Hewlett-Packard | 2811A01131  |
| 21 | RF-Preselector        | 85685 A   | Hewlett-Packard | 2833A00768  |
| 22 | Biconical Antenne     | 3104      | Emco            | 3758        |
| 23 | Log. Per. Antenne     | 3146      | Emco            | 2130        |
| 24 | Double Ridge Horn     | 3115      | Emco            | 3088        |
| 25 | EMI-Testreceiver      | ESAI      | Rohde & Schwarz | 863 180/013 |
| 26 | EMI-Analyzer-Display  | ESAI-D    | Rohde & Schwarz | 862 771/008 |
| 27 | Biconical Antenne     | HK 116    | Rohde & Schwarz | 888 945/013 |
| 28 | Log. Per. Antenne     | HL 223    | Rohde & Schwarz | 825 584/002 |
| 29 | Relais-Switch-Unit    | RSU       | Rohde & Schwarz | 375 339/002 |
| 30 | Highpass              | HM985955  | FSY Microwave   | 001         |
| 31 | Amplifier             | P42-GA29  | Tron-Tech       | B 23602     |
| 32 | Absorber Schirmkabine |           | Frankonia       |             |
| 33 | Steuerrechner         | PSM 7     | Rohde & Schwarz | 834 621/004 |
| 34 | EMI Test Receiver     | ESMI      | Rohde & Schwarz | 827 063/010 |
| 35 | EMI Test Receiver     | Display   | Rohde & Schwarz | 829 808/010 |

| <b>No</b> | <b>Instrument/Ancillary</b>               | <b>Type</b> | <b>Manufacturer</b> | <b>Serial No.</b> |
|-----------|-------------------------------------------|-------------|---------------------|-------------------|
| 36        | Controler                                 | HD 100      | Deisel              | 100/322/93        |
| 37        | Relais Matrix                             | PSN         | Rohde & Schwarz     | 829 065/003       |
| 38        | Control Unit                              | GB 016 A2   | Rohde & Schwarz     | 344 122/008       |
| 39        | Relais Switch Unit                        | RSU         | Rohde & Schwarz     | 316 790/001       |
| 40        | Power Supply                              | 6032A       | Hewlett Packard     | 2846A04063        |
| 41        | Spektrum Monitor                          | EZM         | Rohde & Schwarz     | 883 720/006       |
| 42        | Meßempfänger                              | ESH 3       | Rohde & Schwarz     | 890 174/002       |
| 43        | Meßempfänger                              | ESVP        | Rohde & Schwarz     | 891 752/005       |
| 44        | Biconi Ant. 20-300MHz                     | HK 116      | Rohde & Schwarz     | 833 162/011       |
| 45        | Logper Ant. 0.3-1 GHz                     | HL 223      | Rohde & Schwarz     | 832 914/010       |
| 46        | Amplifier 0.1-4 GHz                       | AFS4        | Miteq Inc.          | 206461            |
| 47        | Logper Ant. 1-18 GHz                      | HL 024 A2   | Rohde & Schwarz     | 342 662/002       |
| 48        | Polarisationsnetzwerk                     | HL 024 Z1   | Rohde & Schwarz     | 341 570/002       |
| 49        | Double Ridge G Horn<br>Antenne 1-26.5 GHz | 3115        | EMCO                | 9107-3696         |
| 50        | Microw. Sys. Amplifier<br>0.5- 26.5 GHz   | 8317A       | Hewlett Packard     | 3123A00105        |
| 51        | Audio Analyzer                            | UPD         | Rohde & Schwarz     | 1030.7500.04      |
| 52        | Steuerrechner                             | PSM 7       | Rohde & Schwarz     | 883 086/026       |
| 53        | DC V-Netzwerk                             | ESH3-Z6     | Rohde & Schwarz     | 861 406/005       |
| 54        | DC V-Netzwerk                             | ESH3-Z6     | Rohde & Schwarz     | 893 689/012       |
| 55        | AC 2 Phasen V-<br>Netzwerk                | ESH3-Z5     | Rohde & Schwarz     | 861 189/014       |
| 56        | AC 2 Phasen V-<br>Netzwerk                | ESH3-Z5     | Rohde & Schwarz     | 894 981/019       |
| 57        | AC-3 Phasen V-<br>Netzwerk                | ESH2-Z5     | Rohde & Schwarz     | 882 394/007       |
| 58        | Stromversorgung                           | 6032A       | Rohde & Schwarz     | 2933A05441        |
| 59        | HF-Test Empfänger                         | ESVP.52     | Rohde & Schwarz     | 881 487/021       |
| 60        | Spectrum Monitor                          | EZM         | Rohde & Schwarz     | 883 086/026       |
| 61        | HF-Test Empfänger                         | ESH3        | Rohde & Schwarz     | 881 515/002       |
| 62        | Relais Matrix                             | PSU         | Rohde & Schwarz     | 882 943/029       |
| 63        | Relais Matrix                             | PSU         | Rohde & Schwarz     | 828 628/007       |
| 64        | Spectrum Analyzer                         | FSIQ 26     | Rohde & Schwarz     | 119.6001.27       |
| 65        | Spectrum Analyzer                         | HP 8565E    | Hewlett Packard     | 3473A00773        |
| 66        |                                           |             |                     |                   |

## Test setup



## Test setup





## Test setup



## Photographs of the equipment



## Photographs of the equipment





## Photographs of the equipment



## Photographs of the equipment

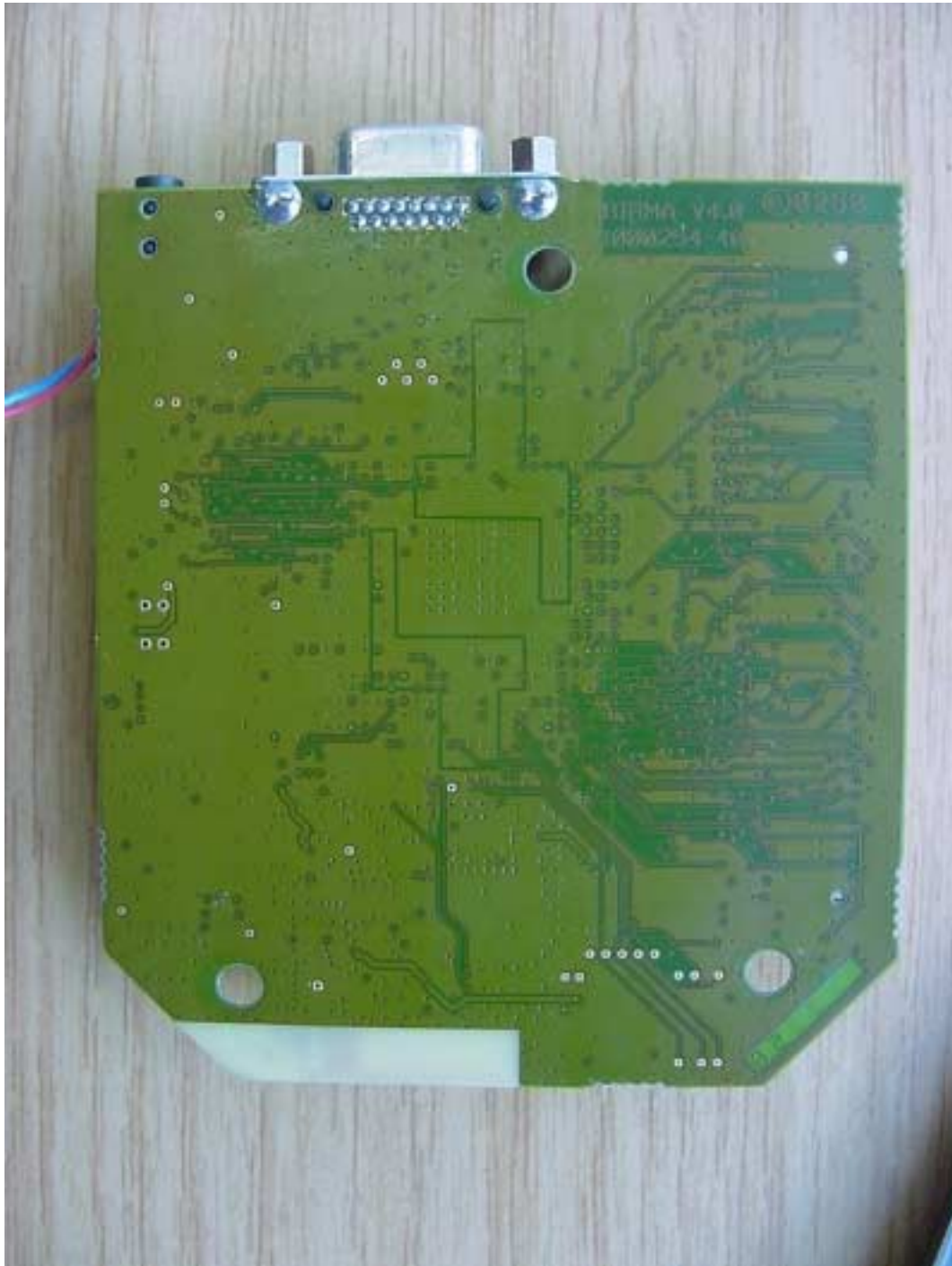


## Photographs of the equipment





## Photographs of the equipment



## Photographs of the equipment

