



TTI-P-G166/98-30

## Accredited Testing Laboratory

DAR-Registration number:

TTI-P-G 166/98-20

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

**Test Report No.: 5-4215-01-03/02**  
**FCC Part 15.247/CANADA RSS-210**  
**SIEMENS WDCT-PHONE**  
**GIGASET SL 30 (Handset)**  
**FCC ID : L82-SL3501**

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## 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:

2003-29-01 RSC8414 Ames H.

Date

Section

Name



Signature

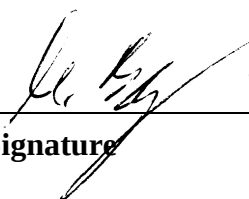
#### Technical Responsibility for Area of Testing:

2003-29-01 RSC8411 Berg M.

Date

Section

Name



Signature

## 1.2 Testing laboratory

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**Accredited testing laboratory**

**DAR-registration number : TTI-P-G 166/98-20**

## 1.3 Details of applicant

**Name : SIEMENS AG**

**Street : Frankenstrasse 2**

**City : D-46395 Bocholt**

**Country : Germany**

**Telephone : +49 2871 91 0**

**Telefax : +49 2871 91 2495**

**Contact : Mr. Uwe Alt**

**Telephone: +49 2871 91 2948**

## 1.4 Application details

Date of receipt of application : 2003-01-16

Date of receipt of test item : 2003-01-16

Date of test : 2003-01-21

## 1.5 Test item

|                               |   |                                                           |
|-------------------------------|---|-----------------------------------------------------------|
| Type of equipment             | : | <b>WDCT - Phone , Handset</b>                             |
| Type designation              | : | <b>GIGASET SL 30</b>                                      |
| Manufacturer                  | : | applicant                                                 |
| Street                        | : |                                                           |
| City                          | : |                                                           |
| Country                       | : |                                                           |
| Serial number                 | : |                                                           |
| <b>Additional information</b> | : |                                                           |
| Frequency                     | : | 2401.06 – 2482.28 MHz                                     |
| Type of modulation            | : | 800KFXD / 79M8FXD (FHSS)                                  |
| Number of channels            | : | 95                                                        |
| Antenna                       | : | integratedl antenna                                       |
| Power supply                  | : | NiMH Battery 3.6V DC                                      |
| Output power max              | : | rad. 128.5 mW EIRP(21.09 dBm), cond. 267.9 mW (24.28 dBm) |
| Type of equipment             | : |                                                           |

## 1.6 Test standards: 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 20 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 analyzers 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.

9 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 Hz, wave-guide horn

All measurements are done in accordance with the Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems DA 00-705.

The product fulfills also the requirements for CANADA RSS-210.

**Final verdict : PASS**

## **2.2 Test Report**

### **TEST REPORT**

**Test Report No. : 5-4215-01-03/02**

## TEST REPORT REFERENCE

## LIST OF MEASUREMENTS

| Paragraph       | PARAMETER TO BE MEASURED            | PAGE |
|-----------------|-------------------------------------|------|
|                 | Transmitter parameters              |      |
| § 15.204        | Antenna gain                        | 9    |
| § 15.247 (a)    | Carrier frequency separation        | 10   |
| § 15.247 (a)    | Number of hopping channels          | 11   |
| § 15.247 (a)    | Time of occupancy (dwell time)      | 12   |
| § 15.247 (a)(1) | Spectrum bandwidth of a FHSS System | 14   |
| § 15.247 (b)(2) | Maximum peak output power           | 18   |
| §15.247         | Band edge compliance                | 23   |
| § 15.247 (c)(1) | Emission limitations                | 31   |
| § 15.107/207    | low frequency emissions             | 49   |
|                 | Receiver parameters                 |      |
| § 15.209        | Spurious radiations - Radiated      | 51   |
|                 | Test equipment listing              | 55   |
|                 | Photographs of the equipment        | 57   |

**Antenna Gain (calculated)****SUBCLAUSE § 15.204****GIGASET SL 30 Handset**

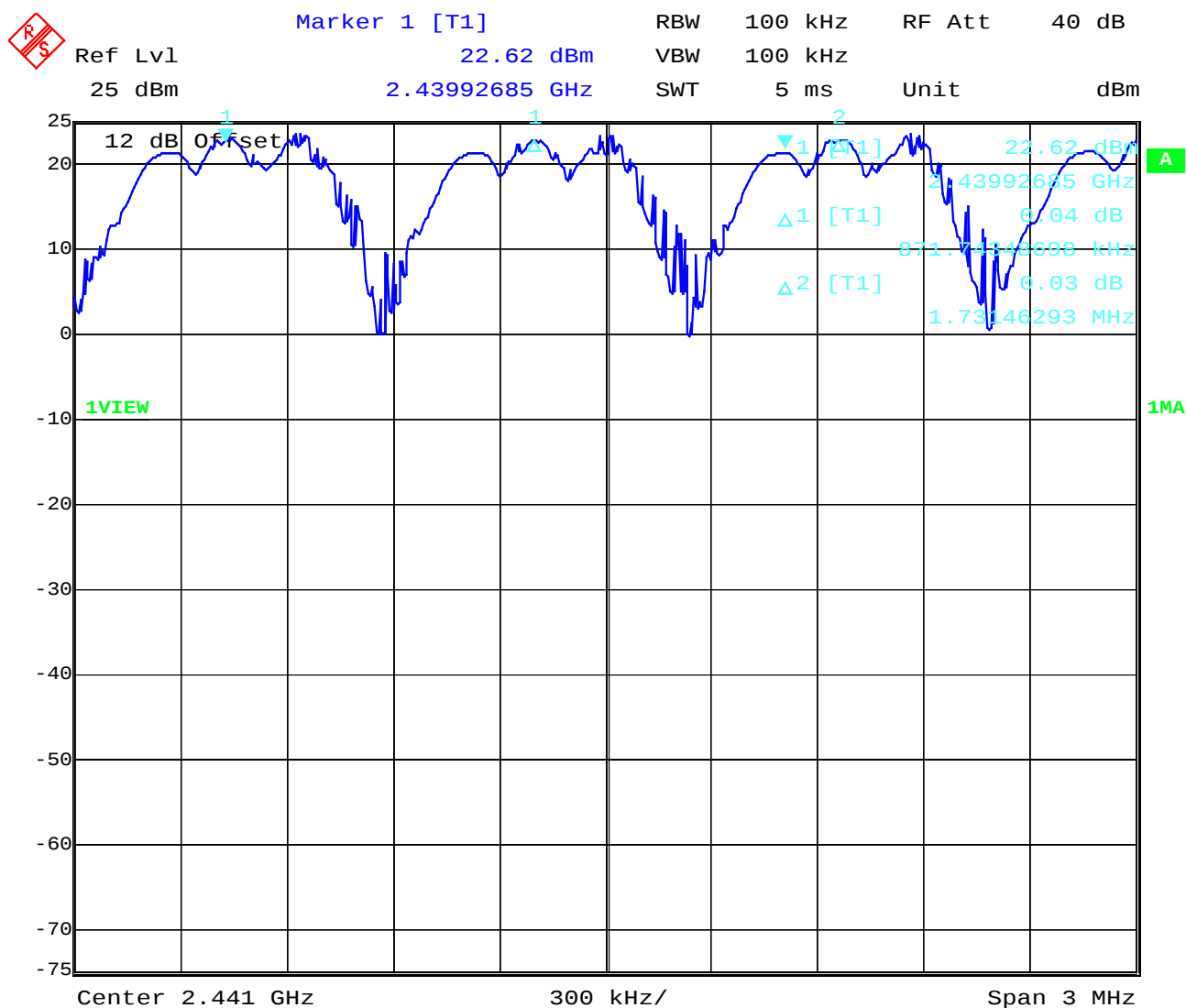
The antenna gain of the complete system is calculated by the difference of conducted power of the module and the radiated power in EIRP.

|                 | low channel | mid channel | high channel |
|-----------------|-------------|-------------|--------------|
| Conducted power | 24.28 dBm   | 23.98 dBm   | 23.30 dBm    |
| Radiated power  | 20.83 dBm   | 20.94 dBm   | 21.09 dBm    |
| Gain            | -3.45 dB    | -3.04 dB    | -2.21 dB     |

## Carrier frequency separation

§15.247(a)(1)

Cursor 1 to cursor 2 ~ 871 kHz; cursor 2 to cursor 3 ~ 860 kHz



Date: 22. JAN. 2003 12:48:10

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

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

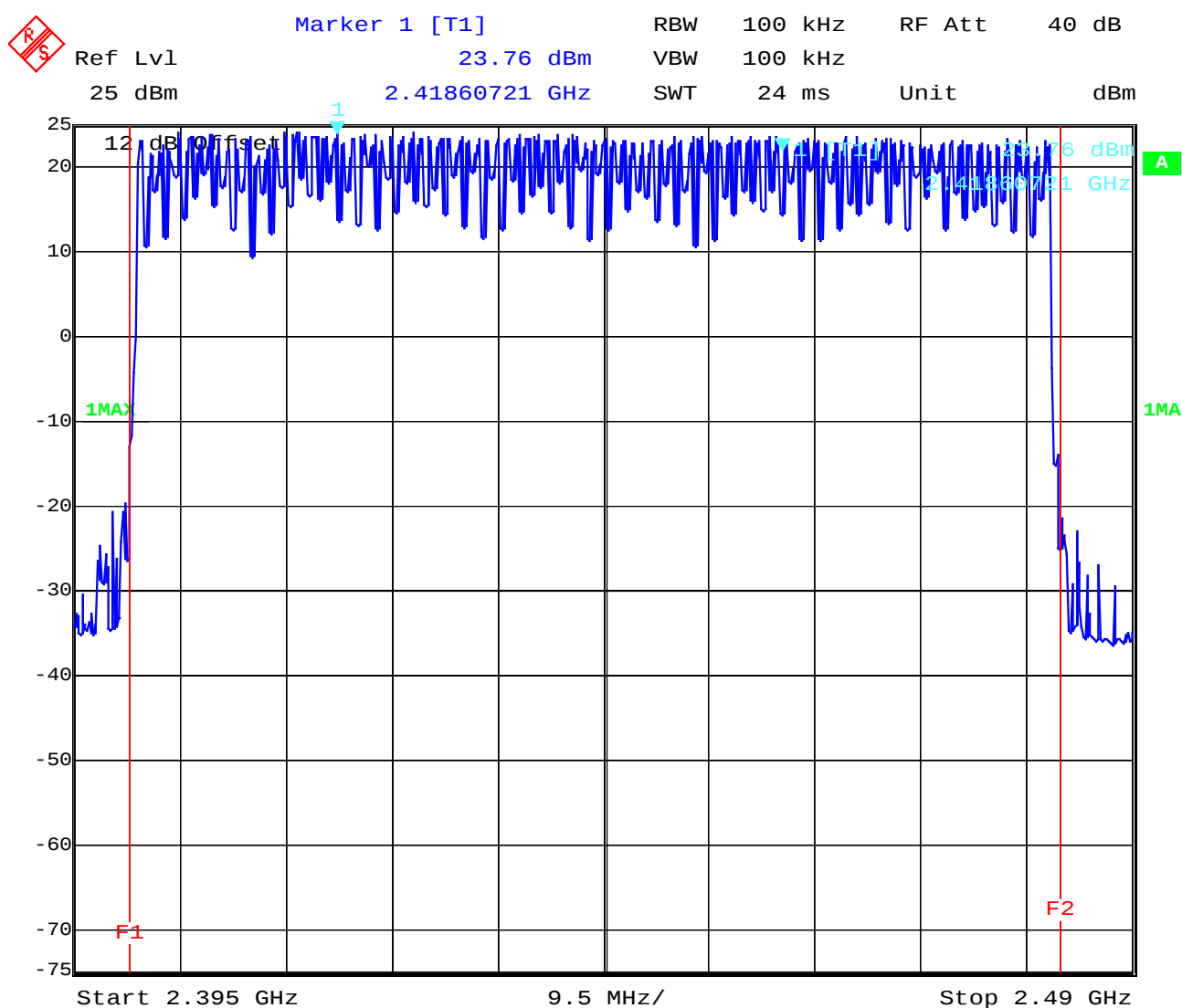
(for reference numbers see test equipment listing)

Number of hopping channels

§15.247(a)(1) iii

The number of hopping channels is 95.

The red frequency lines show the limit of the band.



Date: 22. JAN. 2003 13:11:26

Limit: at least 15 non-overlapping channels

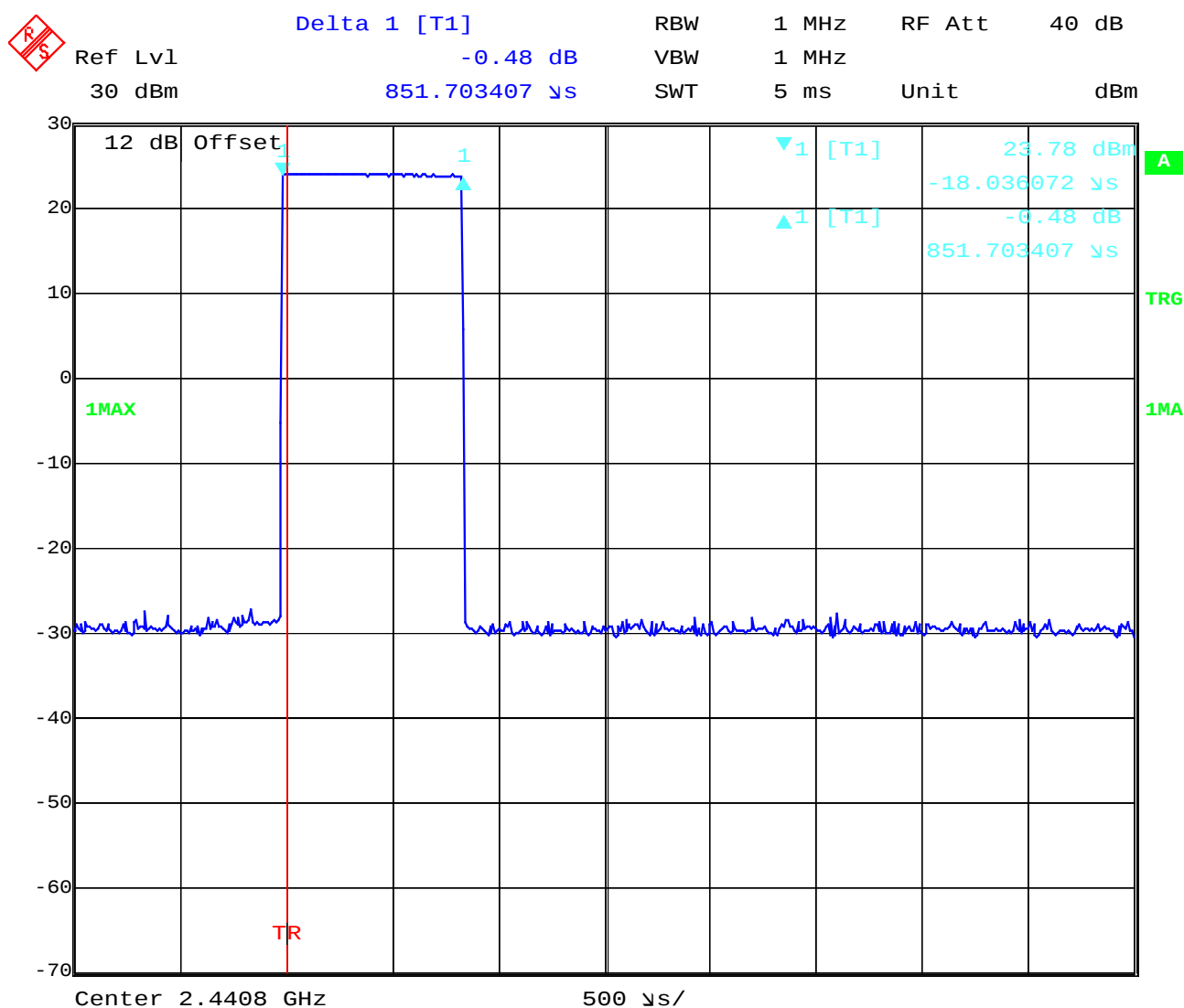
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Time of occupancy (dwell time)

§15.247(a)(1)iii

The max. duration of signal is 0.852 ms.



Date: 22. JAN. 2003 13:16:01

**Limit: the average time of occupancy on any channel shall not be greater than 0.4s within a period of 0.4s x number of hopping channels**

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Time of occupancy (dwell time)

§15.247(a)(1) iii

## Dwell time

Dwell time = time slot length \* hop rate / number of hopping channels \* 0.4s \* number of hopping channels

**Manufacturer declaration: 100 hops/1s**

$$[852 \mu\text{s}] * [100(1/\text{s}) / 95 \text{ channels}] * [0.4 \text{ s}] * [95 \text{ channels}] = 34.08 \text{ ms}$$

**Limit: the average time of occupancy on any channel shall not be greater than 0.4s within a period of 0.4s x number of hopping channels**

Spectrum Bandwidth of a FHSS System

§15.247(a)

20 dB bandwidth

| TEST CONDITIONS           |                           | 20 dB BANDWIDTH ( kHz ) |         |         |
|---------------------------|---------------------------|-------------------------|---------|---------|
| Frequency (MHz)           |                           | 2401.06                 | 2441.66 | 2482.28 |
| T <sub>nom</sub> ( 22 )°C | V <sub>nom</sub> ( 3.6 )V | 758                     | 625     | 673     |
| Measurement uncertainty   |                           | ±1kHz                   |         |         |

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

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

**Spectrum Bandwidth of a FHSS System**      §15.247(a)  
**20 dB bandwidth**

**Channel 1 (lowest Channel)**



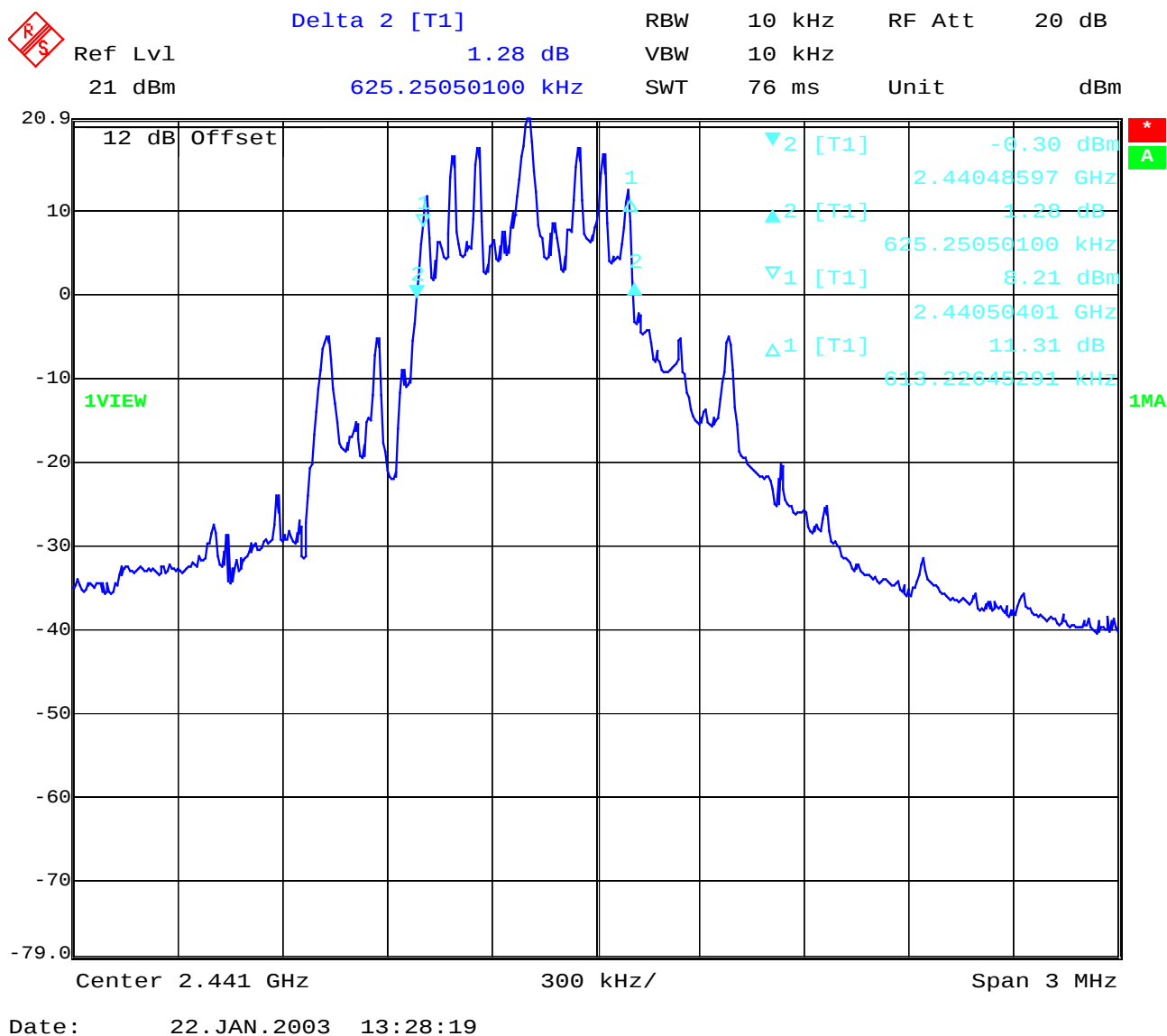
Date: 22. JAN. 2003 13:26:06

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

## Spectrum Bandwidth of a FHSS System 20 dB bandwidth

§15.247(a)

### Channel 2 (middle Channel)

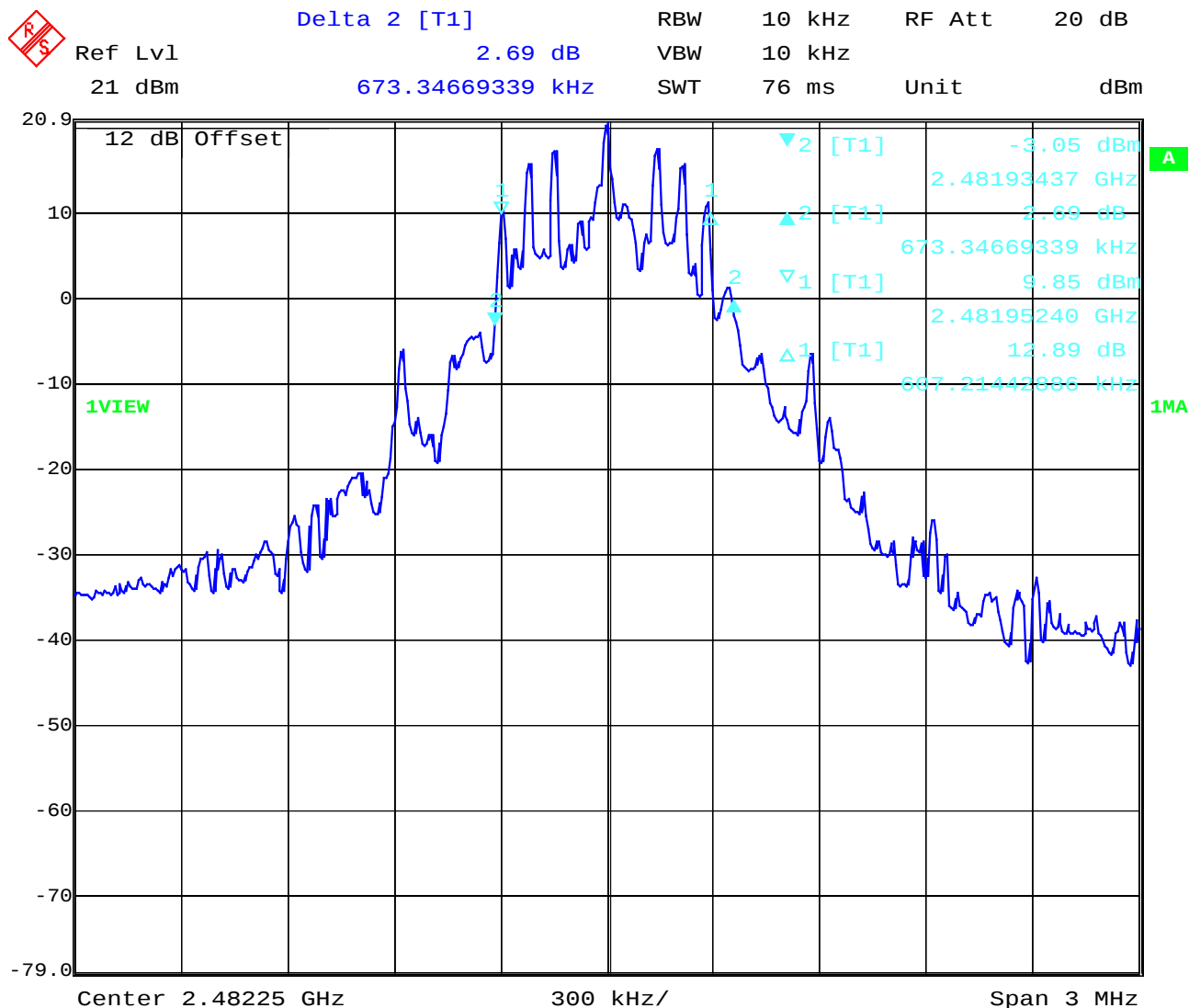


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
(for reference numbers see test equipment listing)

## Spectrum Bandwidth of a FHSS System 20 dB bandwidth

§15.247(a)

### Channel 3 (highest Channel)



Date: 22. JAN. 2003 13:31:38

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

**MAXIMUM PEAK OUTPUT POWER  
(conducted)****SUBCLAUSE § 15.247 (b) (1)**

The conducted measurements were performed with a temporary coax connector.

| TEST CONDITIONS           |                          | MAXIMUM PEAK OUTPUT POWER (dBm)<br>GIGASET SL 30 Handset |                     |                     |                     |
|---------------------------|--------------------------|----------------------------------------------------------|---------------------|---------------------|---------------------|
| Frequency (MHz)           |                          | 2401.06                                                  |                     | 2441.66             | 2482.28             |
| T <sub>nom</sub> ( 22 )°C | V <sub>nom</sub> ( 3.6)V | PK                                                       | 24.28<br>(267.9 mW) | 23.98<br>(250.0 mW) | 23.30<br>(213.8 mW) |
|                           |                          |                                                          |                     |                     |                     |
| Measurement uncertainty   |                          | ±3dB                                                     |                     |                     |                     |

**RBW / VBW : 1 MHz****LIMIT****SUBCLAUSE § 15.247 (b) (1)**

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

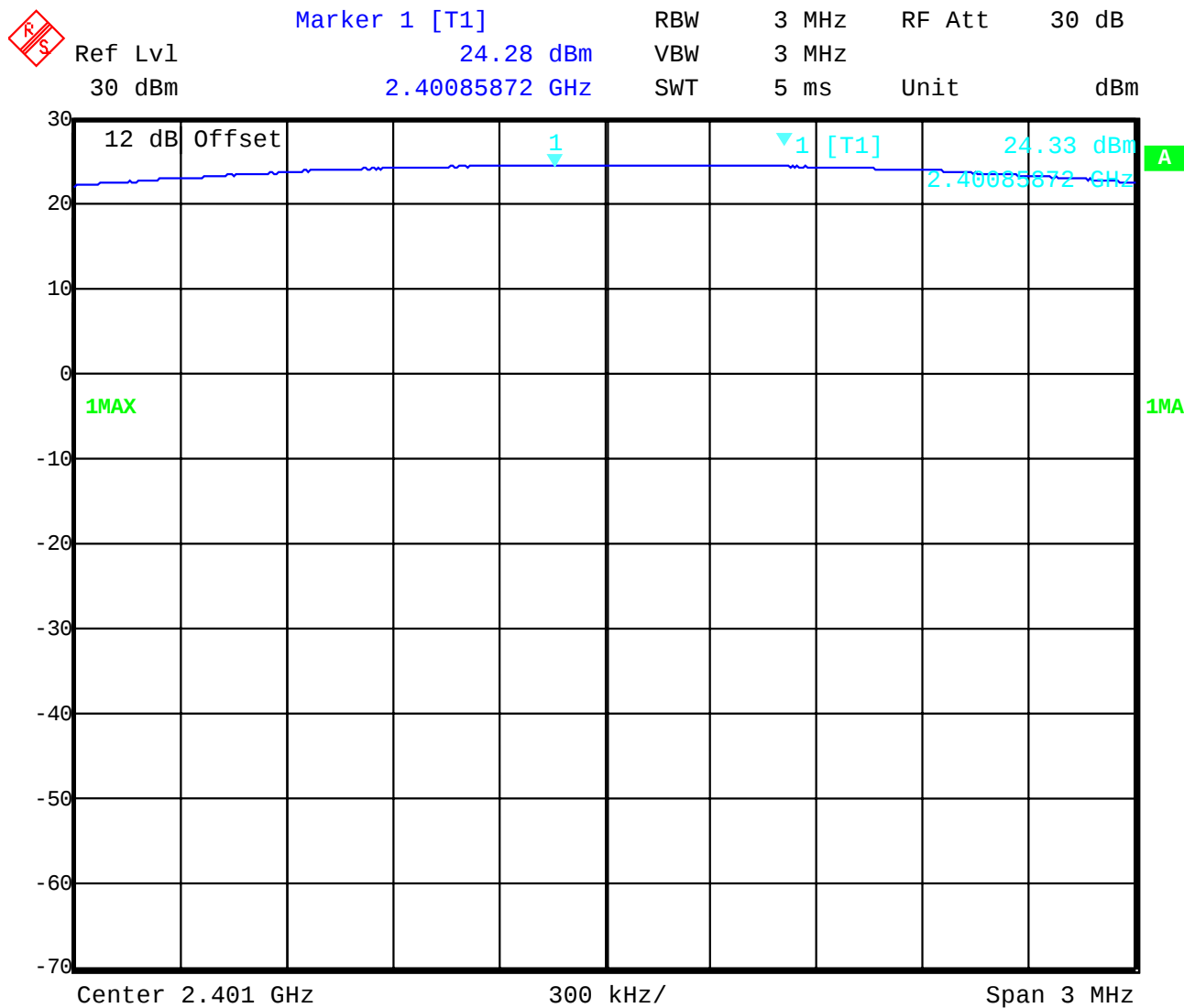
**REFERENCE NUMBER(S) OF TEST EQUIPMENT USED**  
(for reference numbers see test equipment listing)

Peak output power (conducted)

§15.247 (b) (1)

Channel 1 (lowest Channel): 24.28 dBm

De facto EIRP with -3.45 dBi max. antenna gain is +20.83 dBm



Date: 22. JAN. 2003 13:41:08

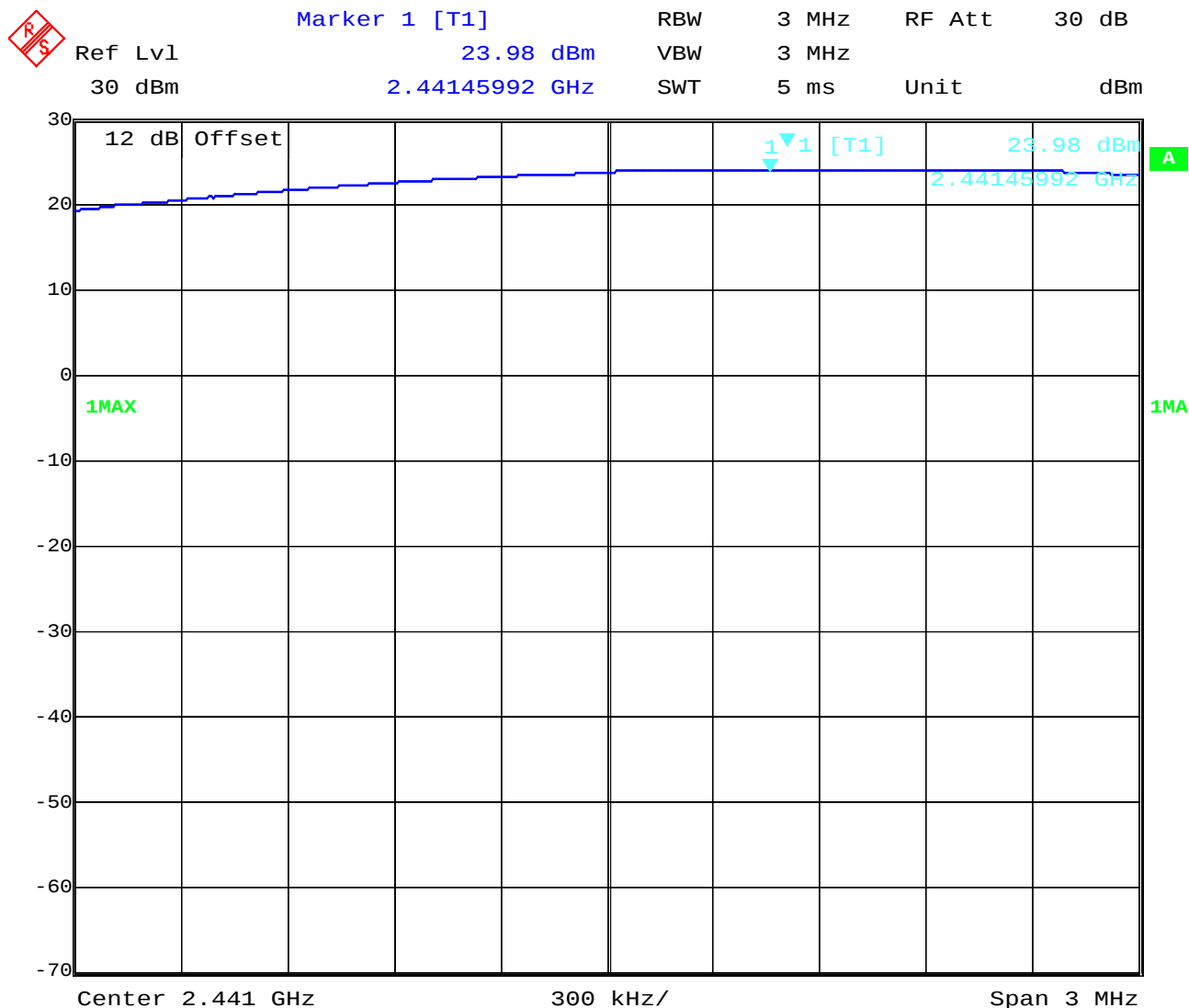
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
(for reference numbers see test equipment listing)

Peak output power (conducted)

§15.247 (b) (1)

Channel 2 (middle Channel): 23.98Bm

De facto EIRP with -3.04 dbi max. antenna gain is +20.94 dBm



Date: 22. JAN. 2003 13:38:52

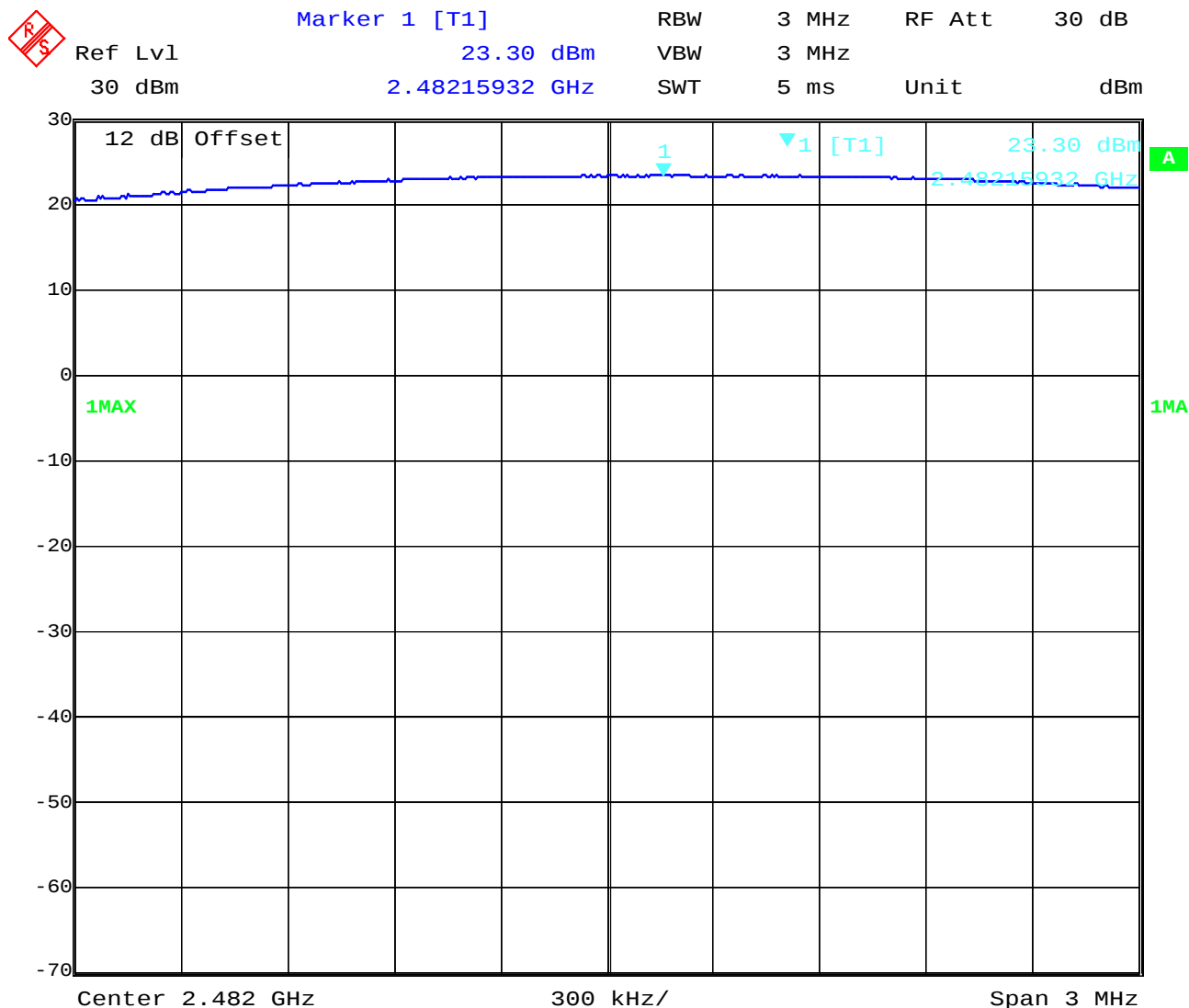
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
(for reference numbers see test equipment listing)

Peak output power (conducted)

§15.247 (b) (1)

Channel 3 (highest Channel): 23.30 dBm

De facto EIRP with -2.21 db max. antenna gain is +21.09dBm



Date: 22. JAN. 2003 13:42:13

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

**MAXIMUM PEAK OUTPUT POWER  
(RADIATED)****SUBCLAUSE § 15.247 (b) (1)**

| TEST CONDITIONS           |                           | MAXIMUM PEAK OUTPUT POWER (dBm)<br>GIGASET SL 30 |                     |                     |
|---------------------------|---------------------------|--------------------------------------------------|---------------------|---------------------|
| Frequency (MHz)           |                           | 2401                                             | 2441                | 2482                |
| T <sub>nom</sub> ( 22 )°C | V <sub>nom</sub> ( 3.6 )V | 20.83<br>(121.1 mW)                              | 20.94<br>(124.2 mW) | 21.09<br>(128.5 mW) |
| Measurement uncertainty   |                           | ±3dB                                             |                     |                     |

**RBW/VBW : 3 MHz****Measured at a distance of 3m****LIMIT****SUBCLAUSE § 15.247 (b) (1)**

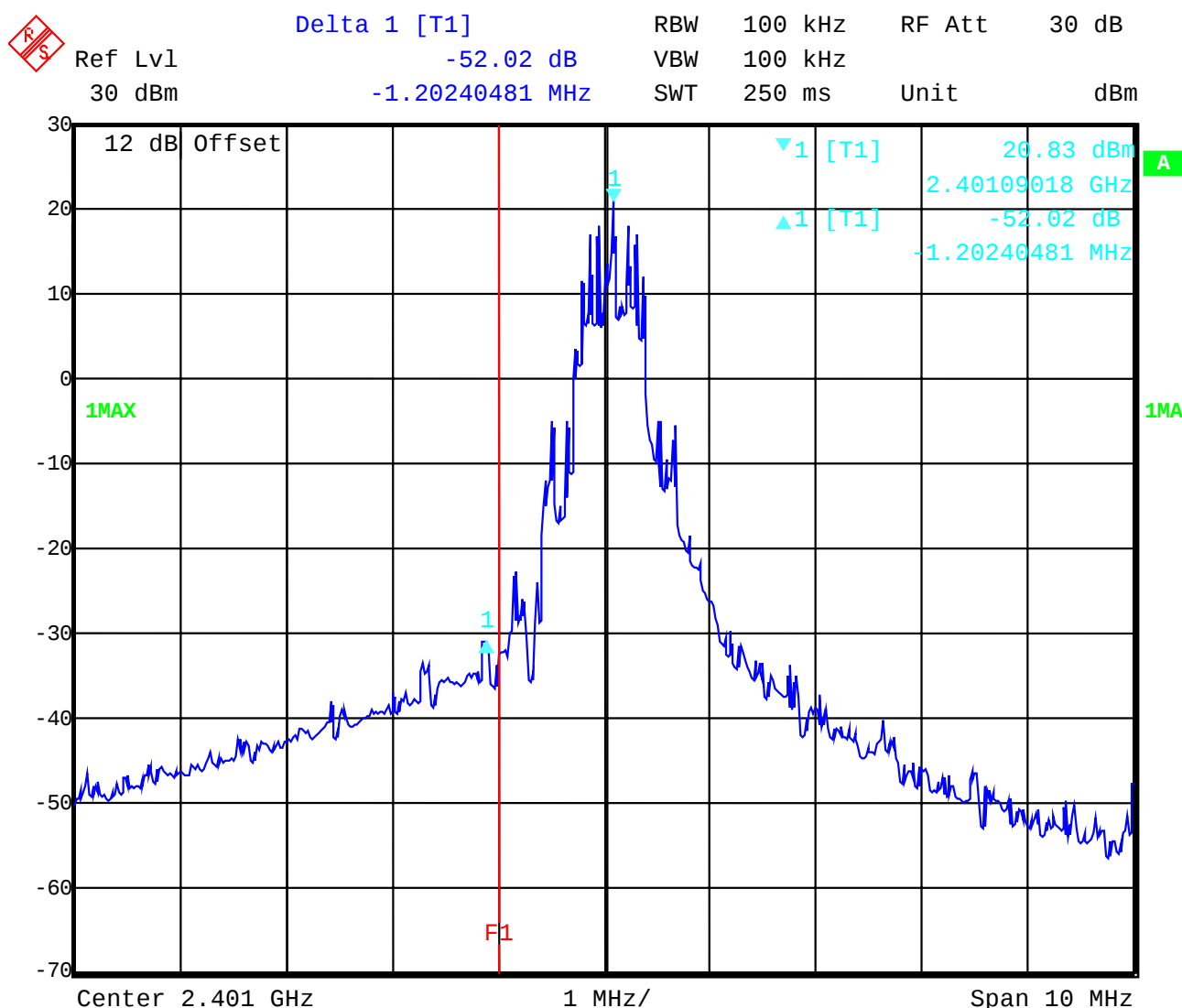
| Frequency range | RF power output |
|-----------------|-----------------|
| 2400-2483.5 MHz | 1.0 Watt        |

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

## Band-edge compliance of conducted emissions

§15.247 (c)

### Low frequency section (hopping off) :



Date: 22.JAN.2003 13:50:33

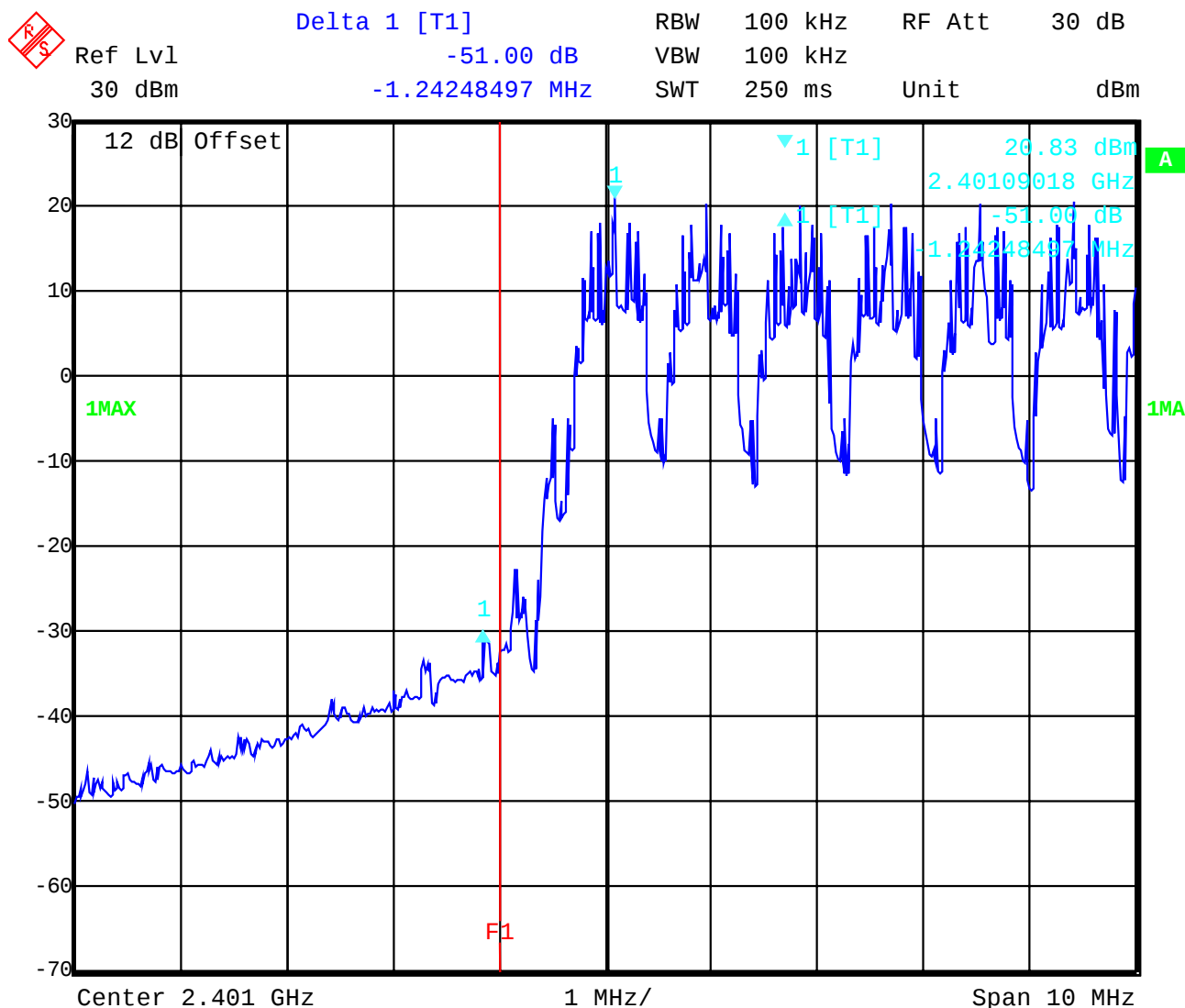
Limit: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains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

## Band-edge compliance of conducted emissions

§15.247 (c)

### Low frequency section (hopping on):



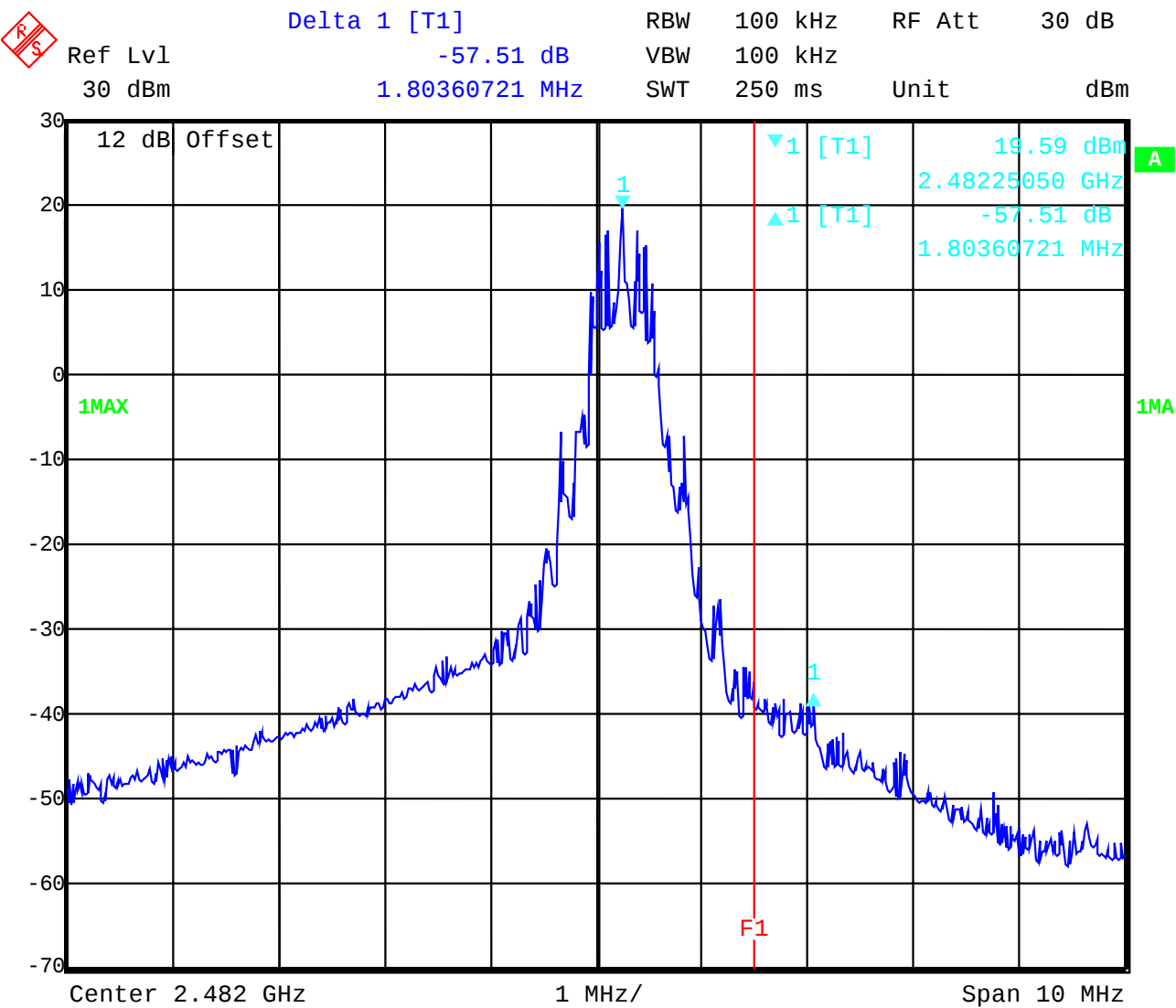
Date: 22. JAN. 2003 13:56:54

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)

Band-edge compliance of conducted emissions §15.247 (c)

high frequency section (hopping off):



Date: 22.JAN.2003 13:59:46

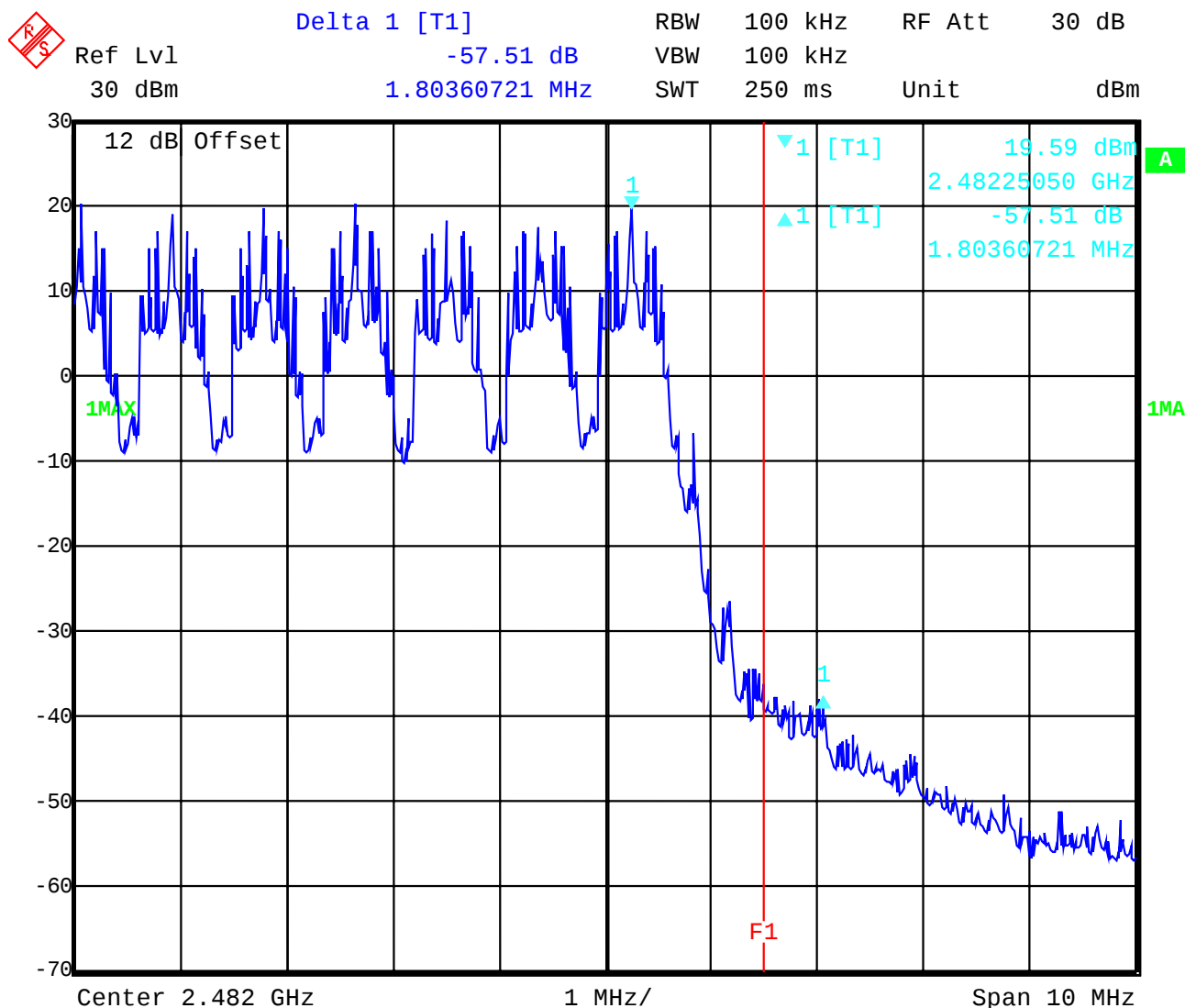
Limit: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains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

## Band-edge compliance of conducted emissions

§15.247 (c)

### high frequency section (hopping on):



Date: 22. JAN. 2003 14:02:01

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)

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.

The correction factor is the summation of antenna factor, cable loss and amplifier gain.

| high channel                                               | setup                                                          | measured value (3m)                   | correction factor | calculated value (3m)                                       |
|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------|-------------------|-------------------------------------------------------------|
| Peak value                                                 | 1 MHz RBW<br>1 MHz VBW                                         | 115.7 dB $\mu$ V/m                    | +0.6 dB           | 116.3 dB $\mu$ V/m                                          |
| Average value (calculated)                                 | 1 MHz RBW<br>10 Hz VBW                                         | Duty cycle<br>0.08266<br>=> -21.6 dB  | -21.6 dB          | 94.7 dB $\mu$ V/m                                           |
| Delta value                                                | Peak<br>100 kHz<br>RBW/VBW<br>30 kHz<br><br>hopping<br>100 kHz | 45.7 dB<br><br>55.8 dB<br><br>45.3 dB | -                 | -                                                           |
| Value at band edge<br>100 kHz RBW<br>30 kHz RBW<br>hopping | limit 54<br>dB $\mu$ V/m                                       |                                       |                   | 49.0 dB $\mu$ V/m<br>38.9 dB $\mu$ V/m<br>49.4 dB $\mu$ V/m |
| Statement:                                                 |                                                                |                                       |                   | Complies                                                    |

The product complies with the limit of the restricted bands.

Delta marker plots see next pages

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

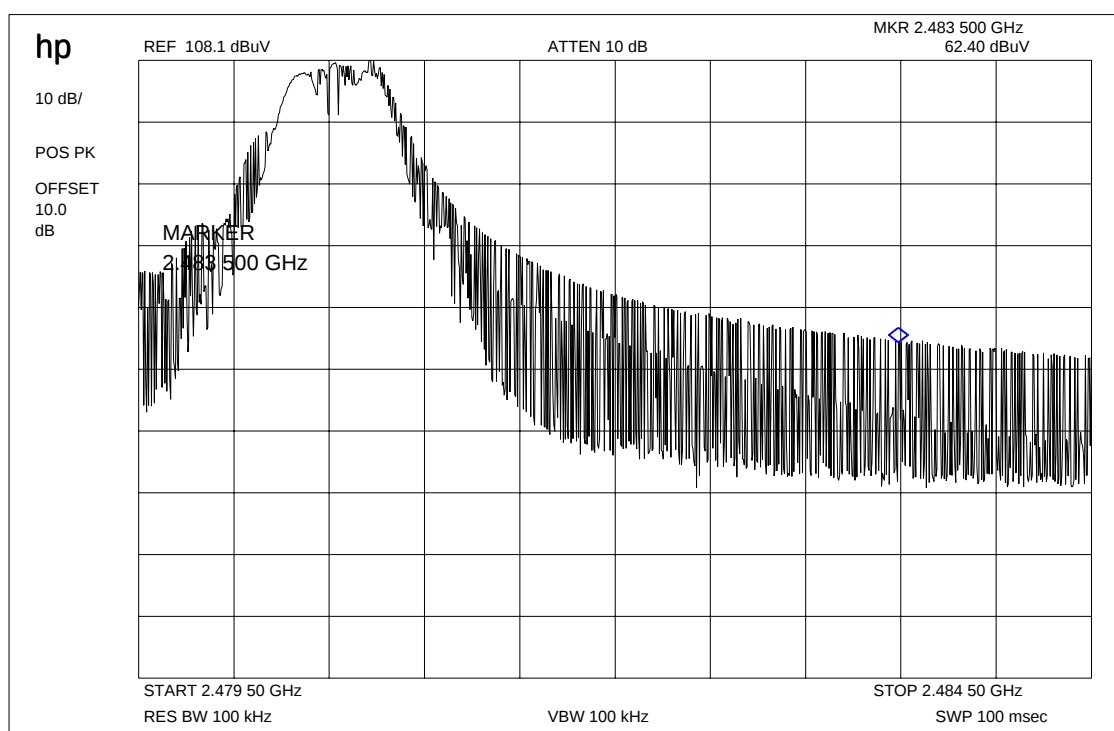
17-24

## Band-edge compliance of radiated emissions

§15.205

This measurement was made to show, that the radiated emissions complies to the rules.

RBW/VBW 100 kHz



The marker shows the highest level in the restricted band.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

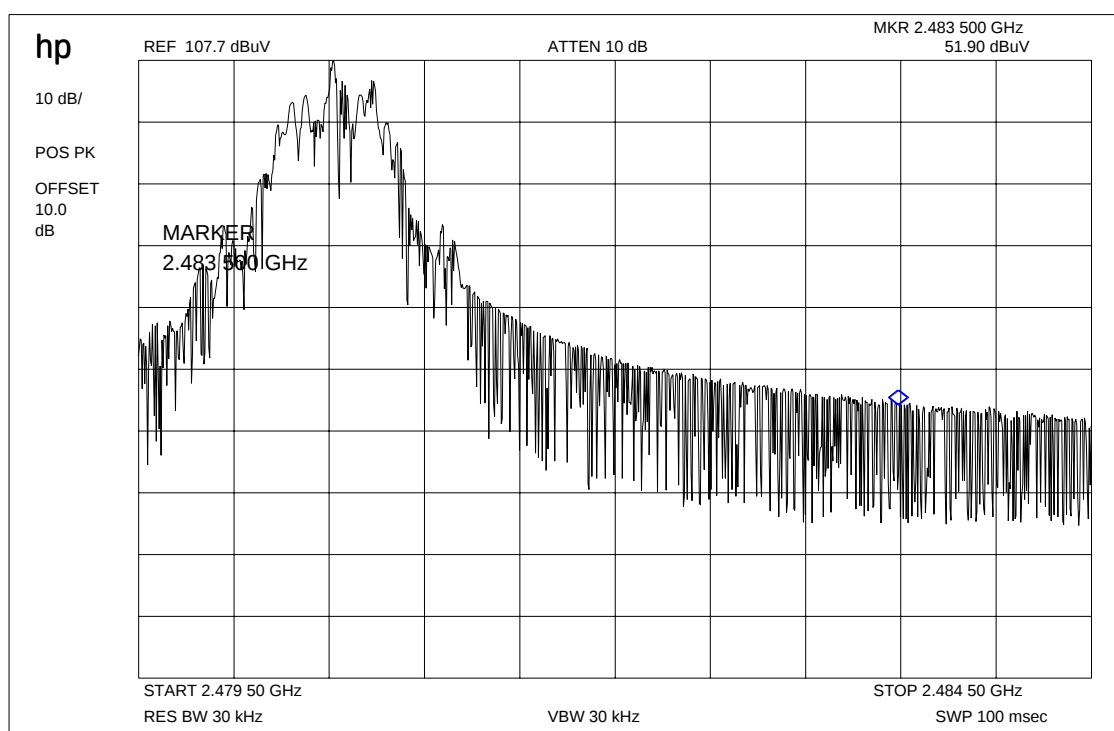
17-24

## Band-edge compliance of radiated emissions

§15.205

This measurement was made to show, that the radiated emissions complies to the rules.

RBW/VBW 30 kHz



The marker shows the highest level in the restricted band.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

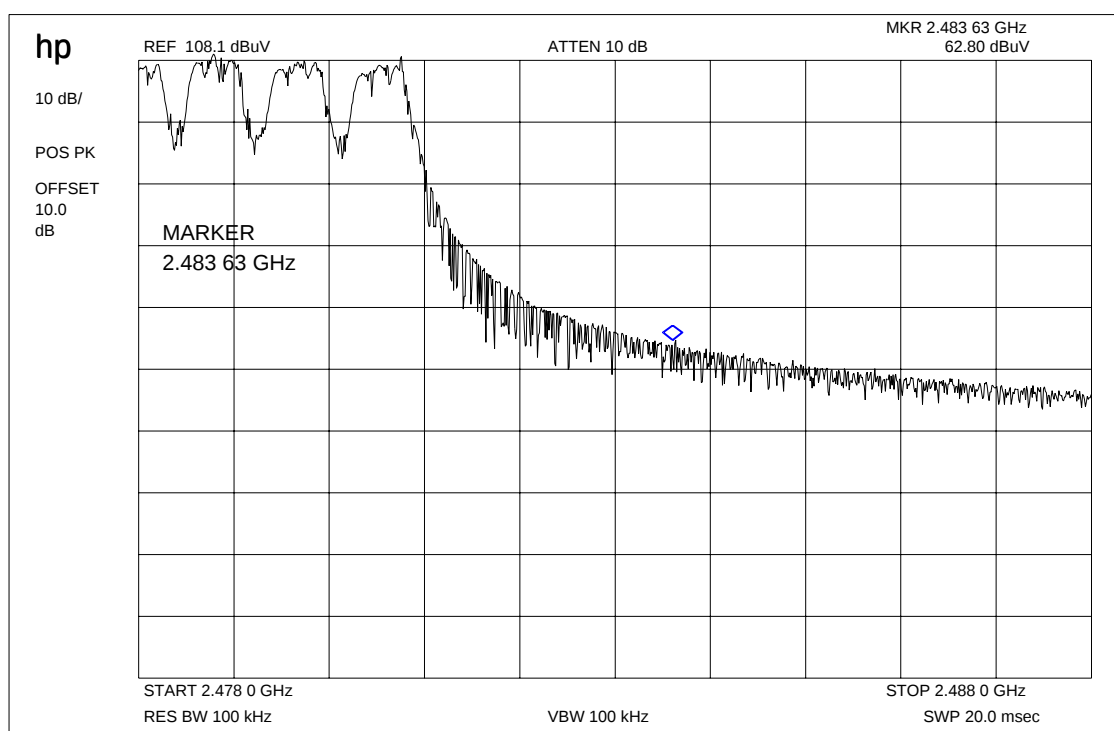
17-24

## Band-edge compliance of radiated emissions

§15.205

This measurement was made to show, that the radiated emissions complies to the rules.

RBW/VBW 100 kHz hopping



The marker shows the highest level in the restricted band.

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

17-24

## EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

| EMISSION LIMITATIONS    |  |                                   |                                             |                                                                  |                        |
|-------------------------|--|-----------------------------------|---------------------------------------------|------------------------------------------------------------------|------------------------|
| f<br>(MHz)              |  | amplitude<br>of emission<br>(dBm) | limit<br>max. allowed<br>emmission<br>power | actual<br>attenuation<br>below<br>frequency of<br>operation (dB) | results                |
| 2401                    |  | +24.28                            | 30 dBm                                      | -                                                                | Operating<br>frequency |
| all peaks <<limit       |  |                                   | -20 dBc                                     | see plots                                                        | complies               |
|                         |  |                                   |                                             |                                                                  |                        |
|                         |  |                                   |                                             |                                                                  |                        |
| 2441                    |  | +23.98                            | 30 dBm                                      | -                                                                | Operating<br>frequency |
| all peaks <<limit       |  |                                   | -20 dBc                                     | see plots                                                        | complies               |
|                         |  |                                   |                                             |                                                                  |                        |
|                         |  |                                   |                                             |                                                                  |                        |
| 2482                    |  | +23.30                            | 30 dBm                                      |                                                                  | Operating<br>frequency |
| all peaks <<limit       |  |                                   | -20 dBc                                     | see plot                                                         | complies               |
|                         |  |                                   |                                             |                                                                  |                        |
|                         |  |                                   |                                             |                                                                  |                        |
| Measurement uncertainty |  | ± 3dB                             |                                             |                                                                  |                        |

RBW : 100 kHz VBW: 1 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)

## EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 1 (lowest Channel): 30 MHz - 1 GHz peak

The ref-line is referenced to the max. output at 2401 MHz in the next plot.



Date: 22. JAN. 2003 14:06:16

The peak at 832.3 MHz is at -34.8 dBm, > 20 dB below carrier

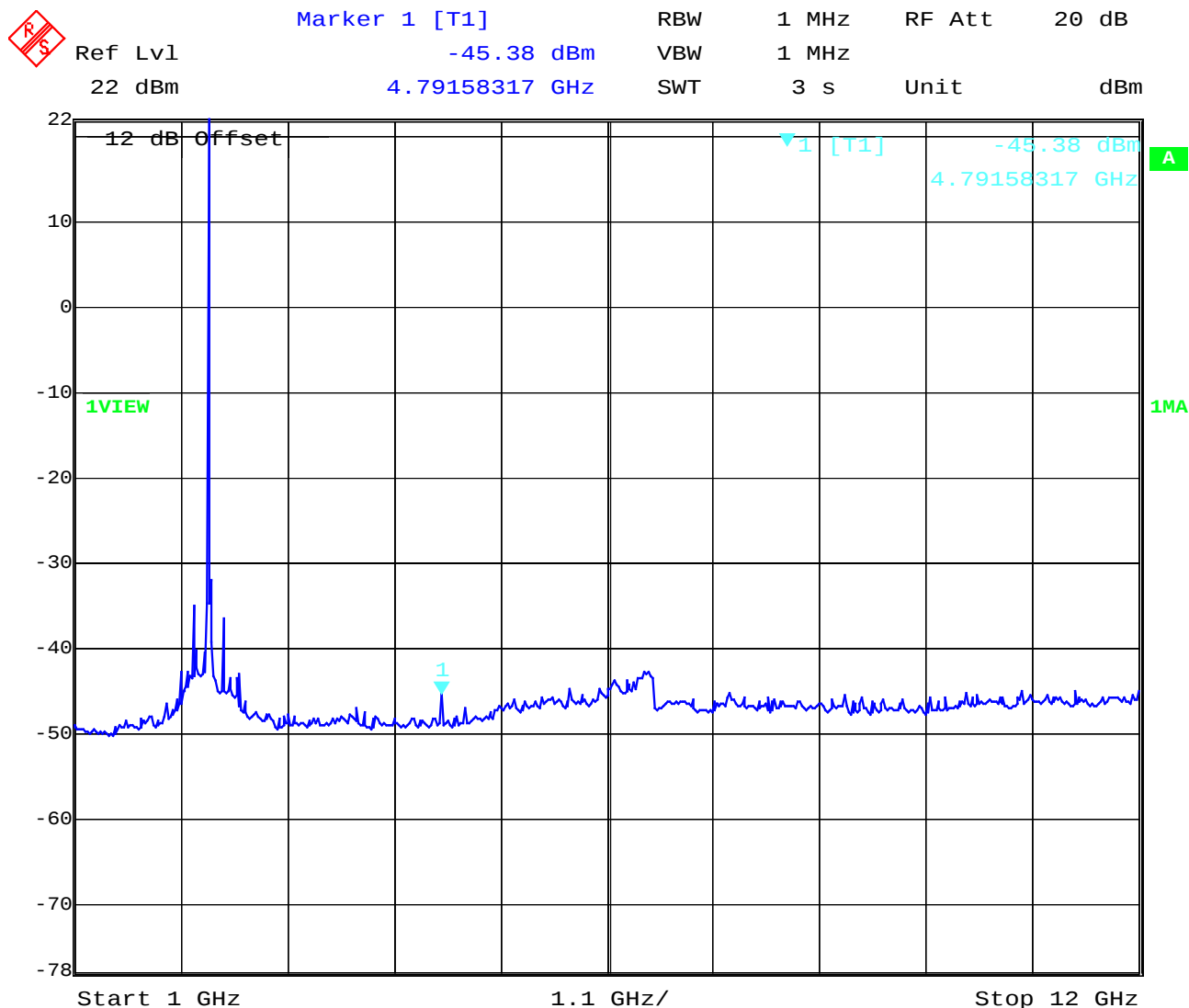
## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

## EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 1 (lowest Channel): 1 – 12 GHz peak

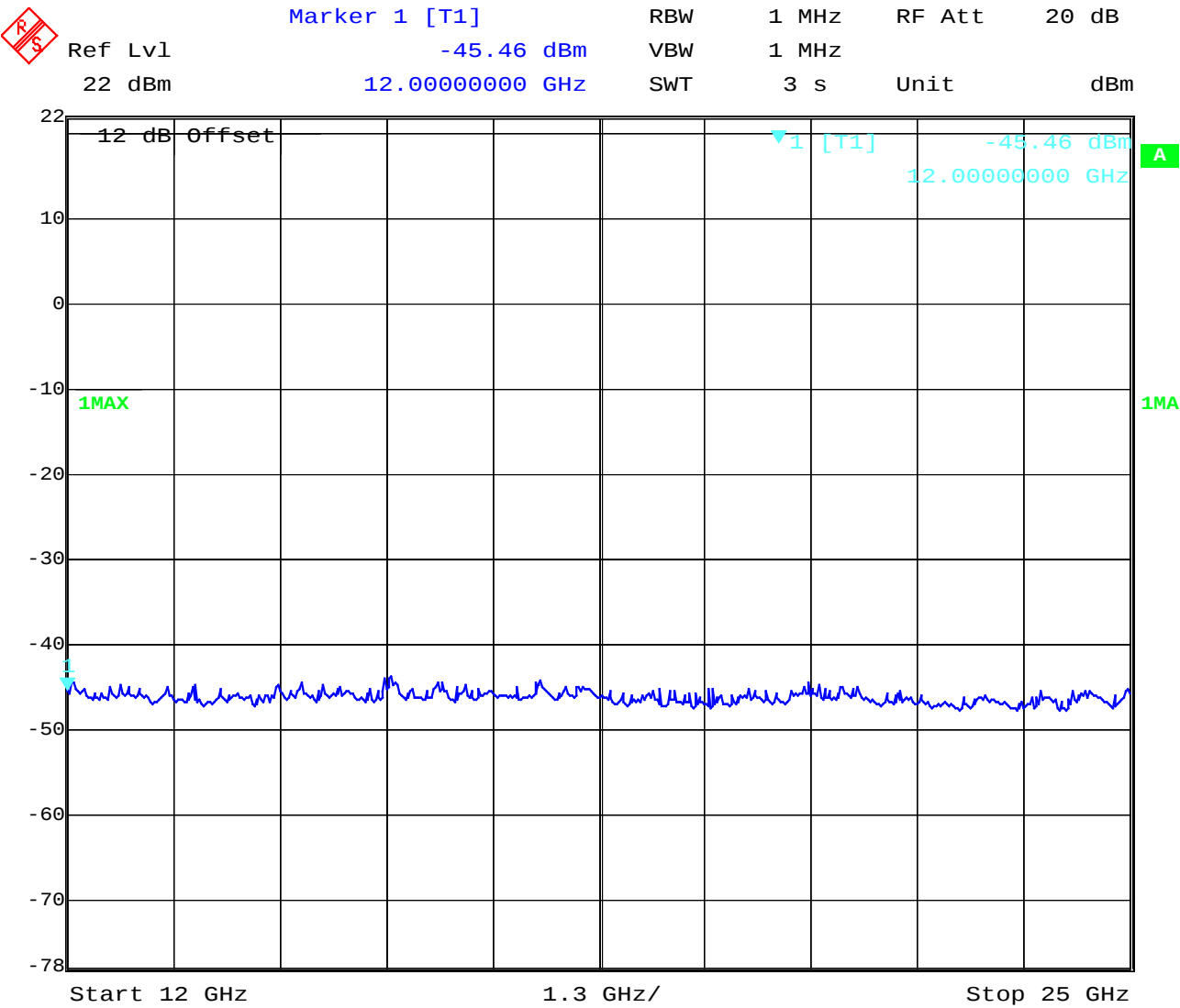


Date: 22. JAN. 2003 14:12:49

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

**EMISSION LIMITATIONS- Conducted (Transmitter)**  
**Channel 1 (lowest Channel): 12 - 25 GHz peak**

§ 15.247 (c) (1)



Date:              22. JAN. 2003    14:14:12

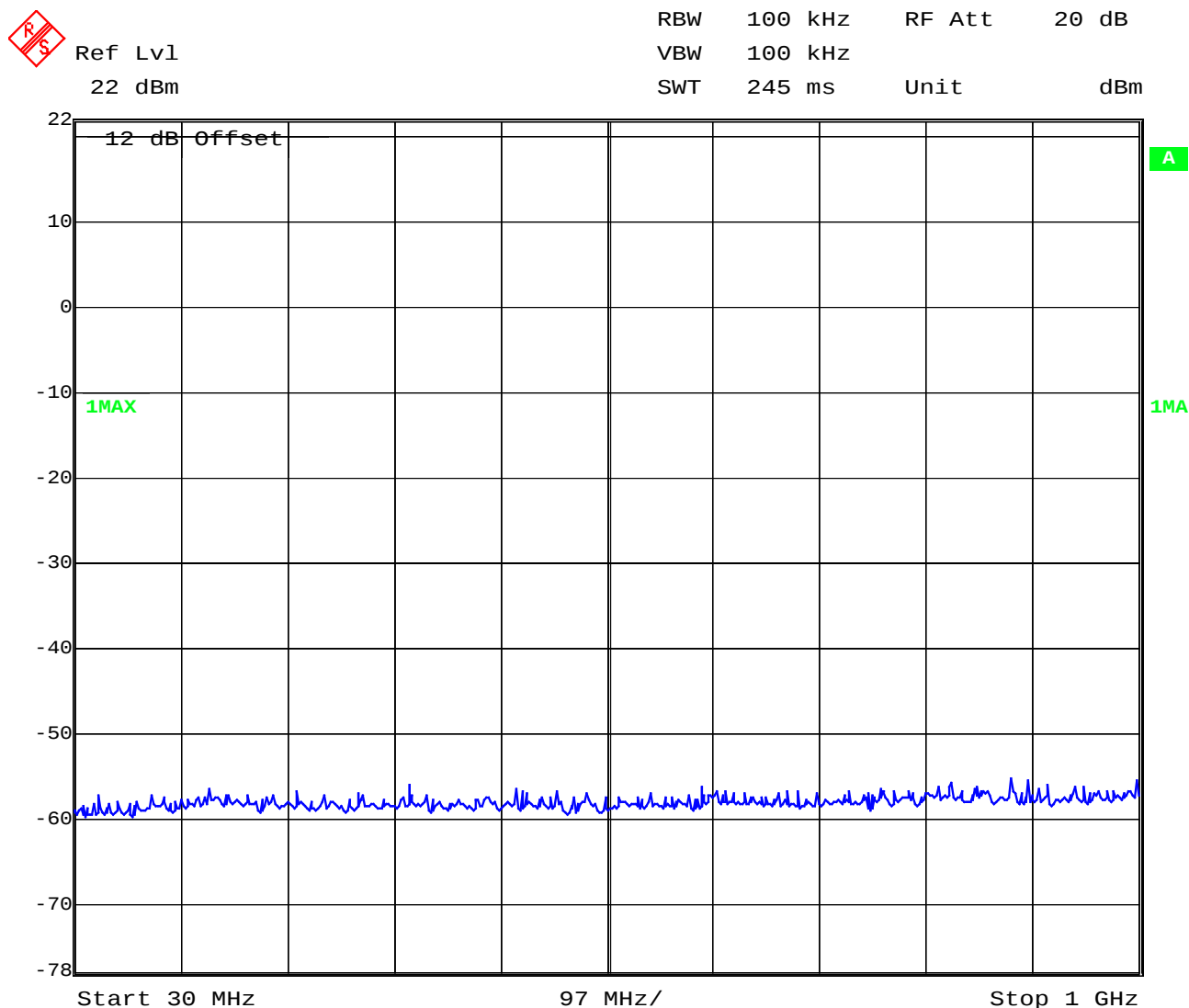
**REFERENCE NUMBER(S) OF TEST EQUIPMENT USED**  
**(for reference numbers see test equipment listing)**

## EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 2 (middle Channel): 30 MHz - 1GHz peak

The ref-line is referenced to the max. output at 2441 MHz in the next plot.



Date: 22. JAN. 2003 14:44:49

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

## EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 2 (middle Channel): 1 –12 GHz peak



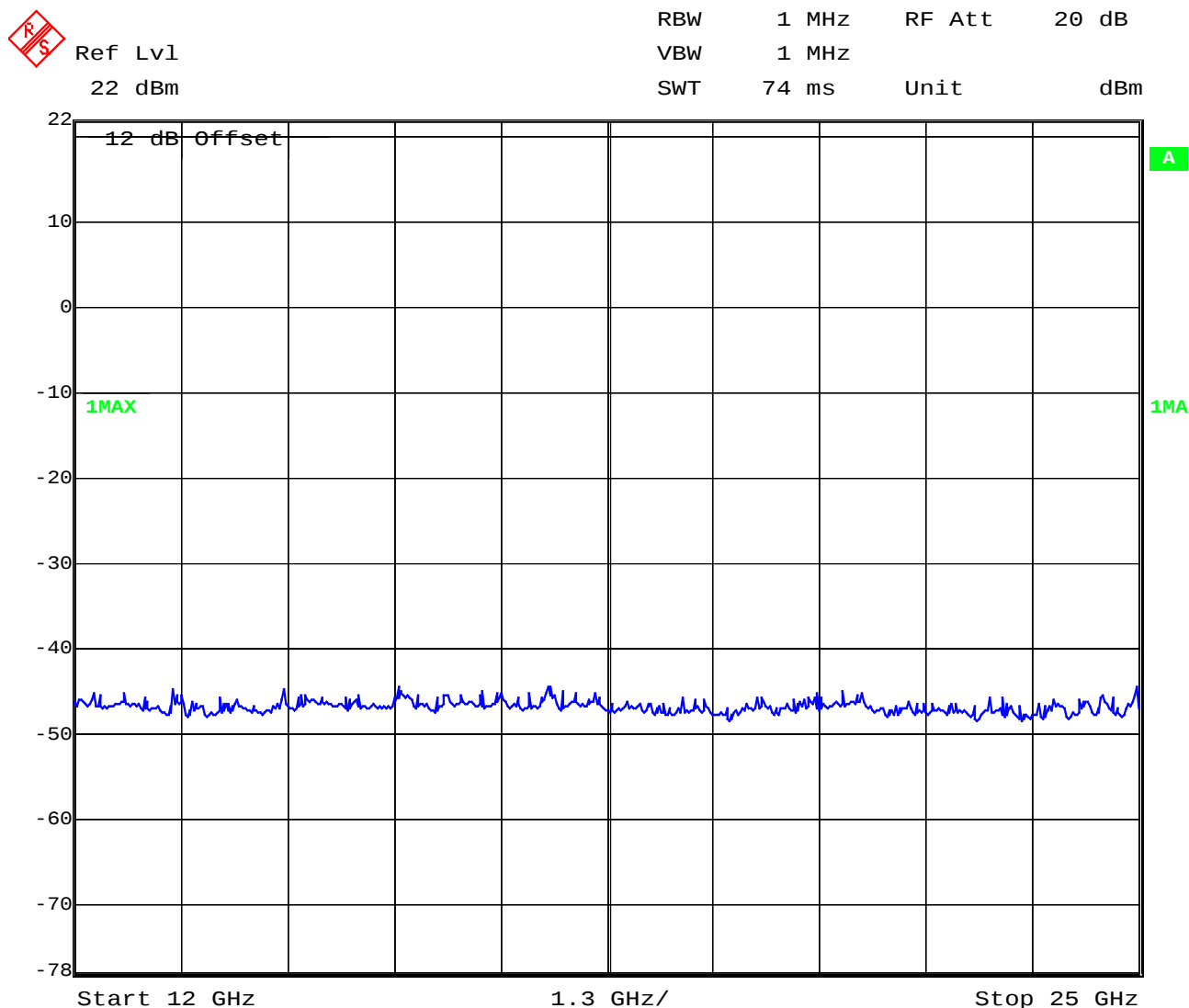
Date: 22. JAN. 2003 14:46:38

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

## EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 2 (middle Channel): 12 – 25 GHz peak



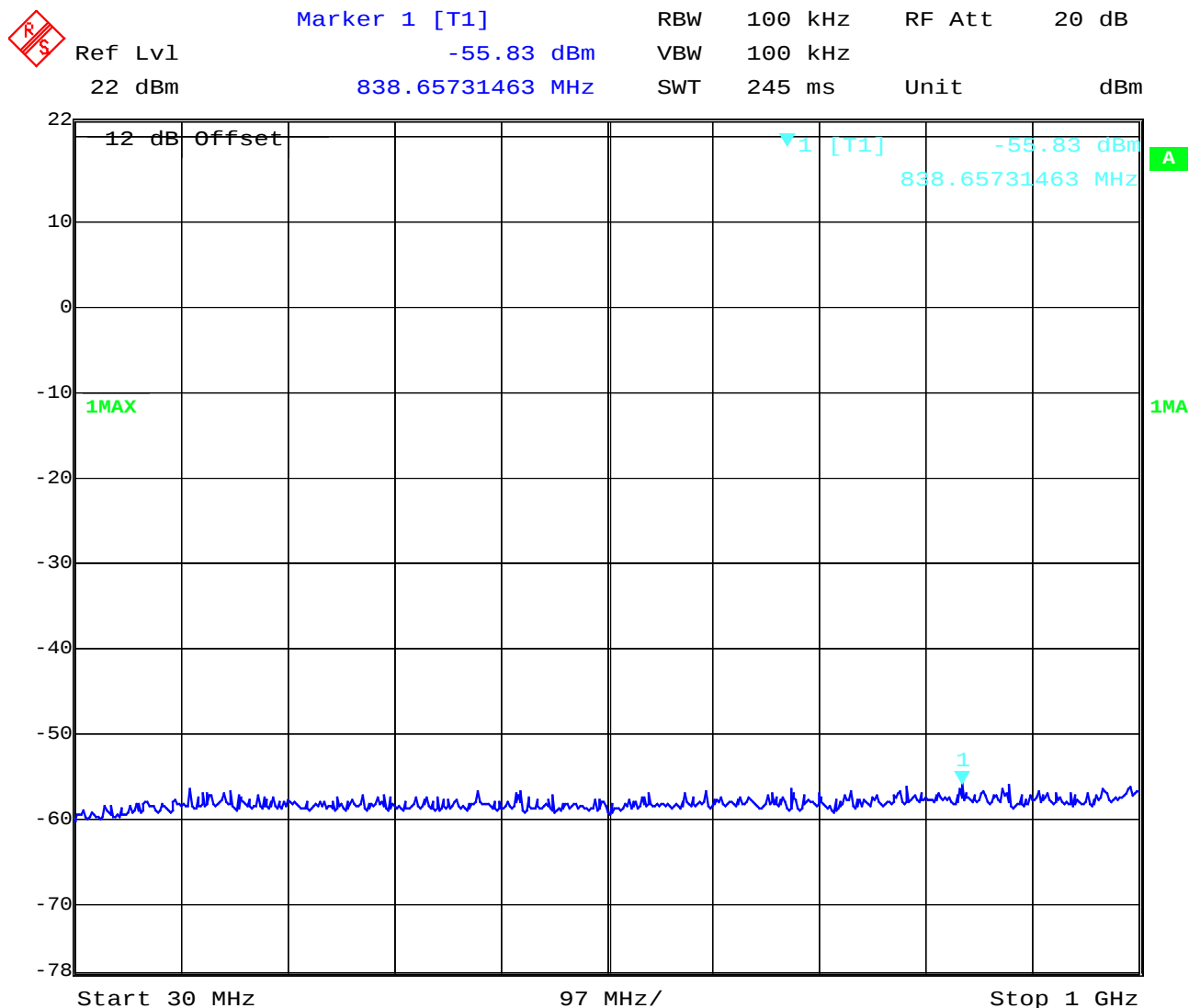
Date: 22. JAN. 2003 14:47:28

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

## EMISSION LIMITATIONS- Conducted (Transmitter) Channel 3 (highest Channel): 30 MHz - 1 GHz peak

§ 15.247 (c) (1)

The upper line is referenced to the max. output at 2482 MHz in the next plot.



Date: 22. JAN. 2003 14:51:15

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

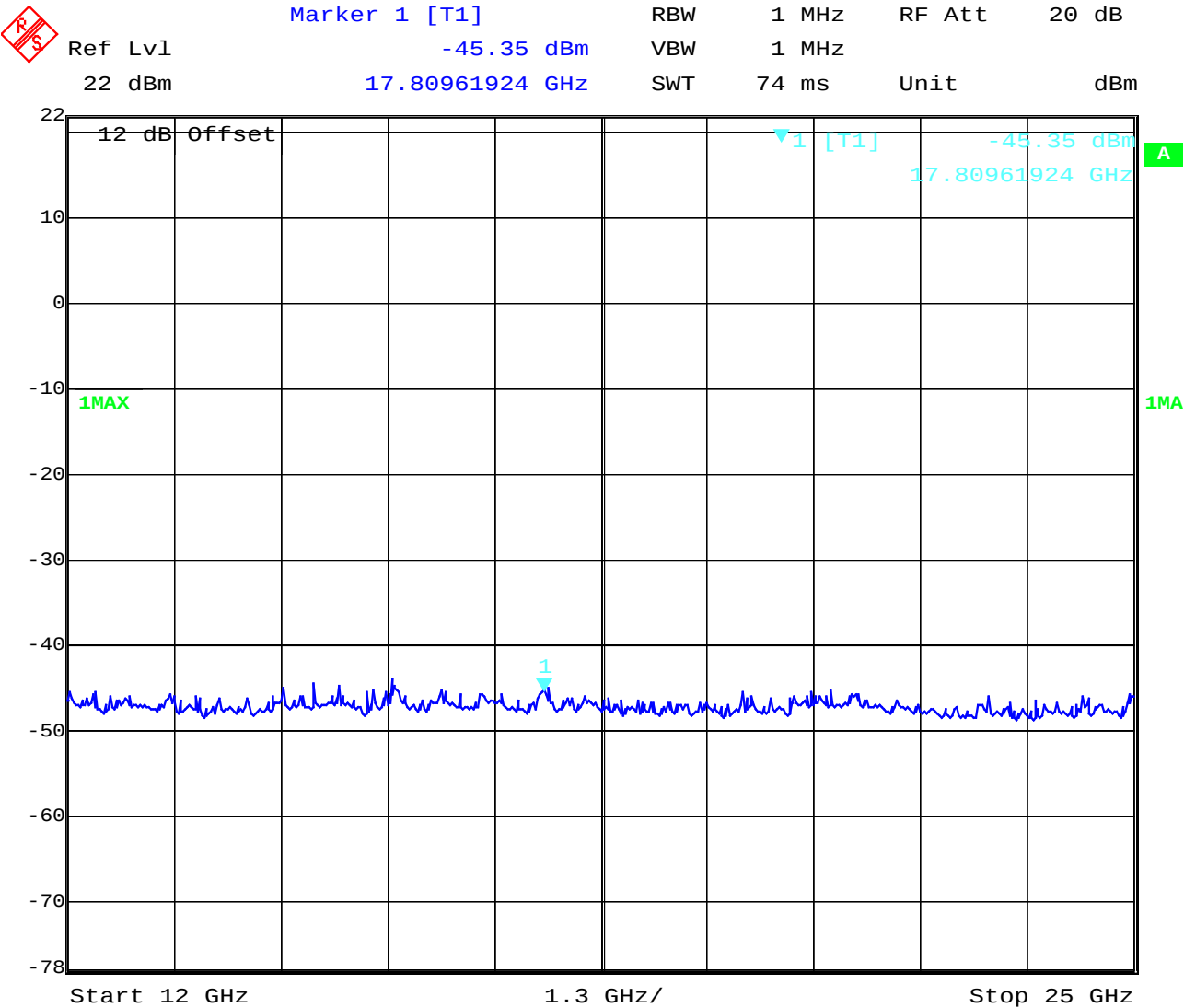
**§ 15.247 (c) (1)**



64

**EMISSION LIMITATIONS- Conducted (Transmitter)**  
**Channel 3 (highest Channel): 12 - 25 GHz peak**

§ 15.247 (c) (1)



Date:            22. JAN. 2003    14:49:21

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

## SPURIOUS RADIATED EMISSION

§ 15.247 (c) (1)

The measurements below 1 GHz were performed with an CISPR Quasi Peak Adapter.  
We did manual measurements on the harmonics.

| EMISSION LIMITATIONS    |              |                                                 |                                                 |                                                      |          |
|-------------------------|--------------|-------------------------------------------------|-------------------------------------------------|------------------------------------------------------|----------|
| f<br>(MHz)              | polarization | amplitude of<br>emission<br>(dBµV/m)<br>QP/Peak | amplitude of<br>emission<br>(dBµV/m)<br>average | limit<br>max. allowed<br>emmission power<br>(dBµV/m) | results  |
| <b>2401 MHz</b>         |              |                                                 |                                                 |                                                      |          |
| 1201                    | vertical     |                                                 | 30.9                                            | 54.0                                                 | complies |
| 4802                    | vertical     |                                                 | 23.2                                            | 54.0                                                 | complies |
|                         |              |                                                 |                                                 |                                                      |          |
|                         |              |                                                 |                                                 |                                                      |          |
|                         |              |                                                 |                                                 |                                                      |          |
| <b>2441 MHz</b>         |              |                                                 |                                                 |                                                      |          |
|                         |              |                                                 |                                                 |                                                      |          |
| no                      | peaks        | found                                           | < 20 dB                                         | below                                                | limit    |
|                         |              |                                                 |                                                 |                                                      |          |
|                         |              |                                                 |                                                 |                                                      |          |
|                         |              |                                                 |                                                 |                                                      |          |
|                         |              |                                                 |                                                 |                                                      |          |
| <b>2482 MHz</b>         |              |                                                 |                                                 |                                                      |          |
| 4964                    | vertical     |                                                 | 20.0                                            | 54.0                                                 | complies |
| 7446                    | vertical     |                                                 | 29.5                                            | 54.0                                                 | complies |
|                         |              |                                                 |                                                 |                                                      |          |
|                         |              |                                                 |                                                 |                                                      |          |
|                         |              |                                                 |                                                 |                                                      |          |
| Measurement uncertainty |              | ± 3dB                                           |                                                 |                                                      |          |

Horizontal measurements were more then 7 dB lower

## LIMITS

SUBCLAUSE § 15.247 (c)

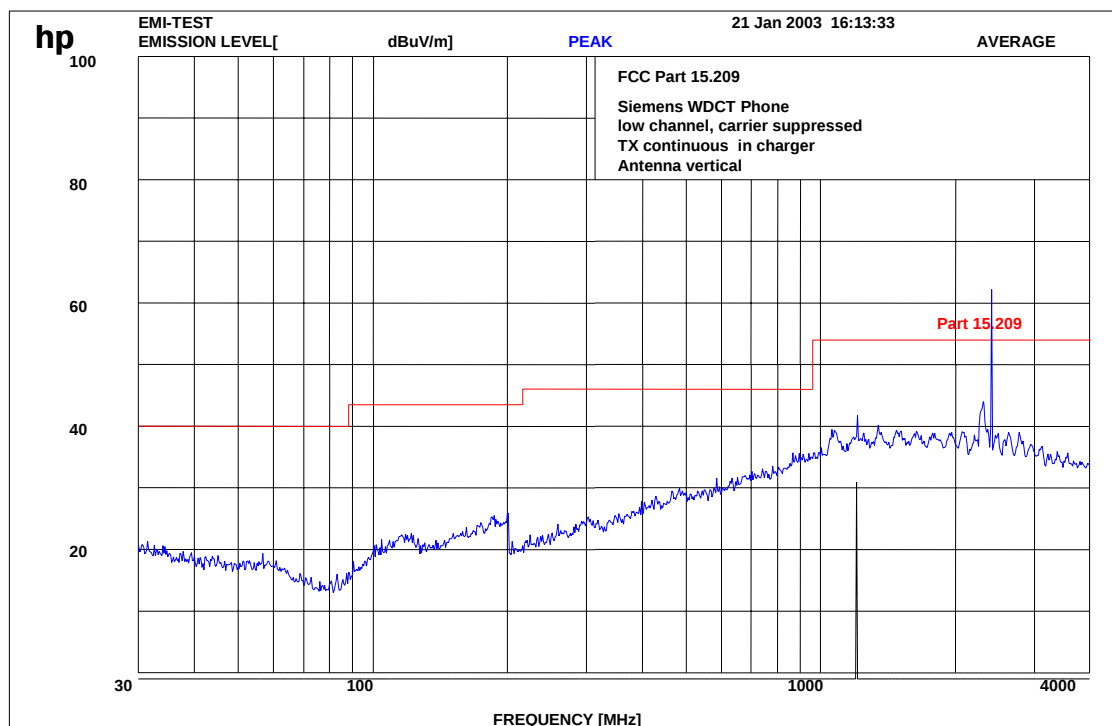
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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

## EMISSION LIMITATIONS (Transmitter)

## SUBCLAUSE § 15.247 (c) (1)

30-4000 MHz, vertical, lowest channel



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

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

Carrier was suppressed by a stubb tuner to avoid overload of the system.

## 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)).

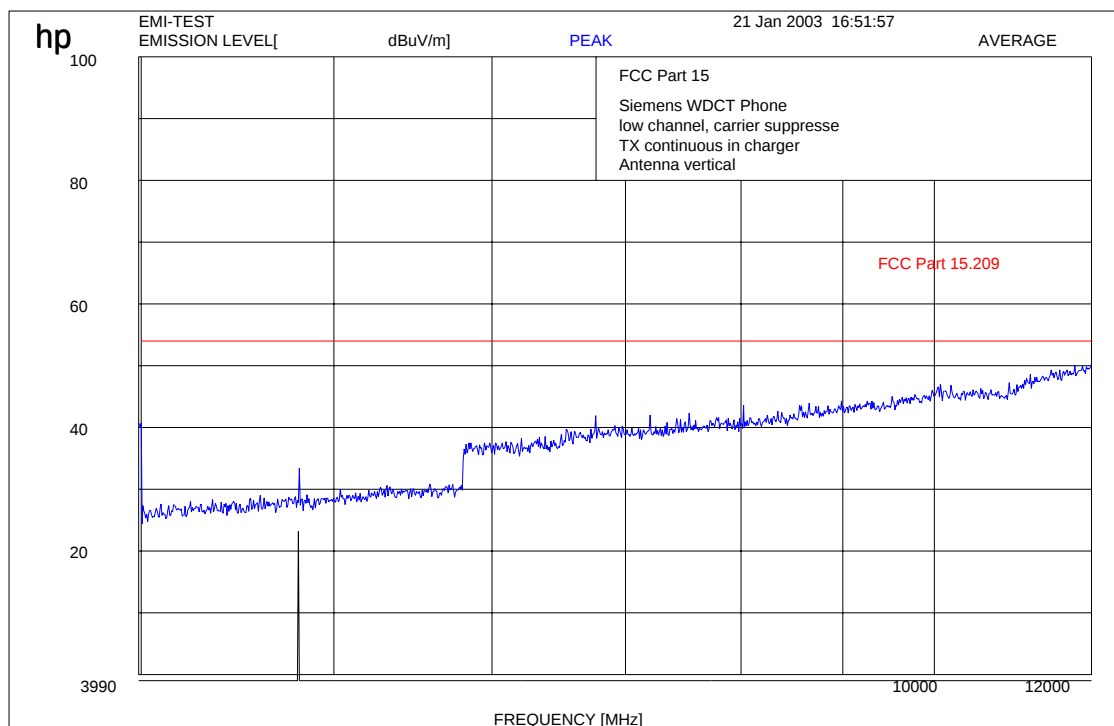
## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

## EMISSION LIMITATIONS (Transmitter)

## SUBCLAUSE § 15.247 (c) (1)

4000 - 12000 MHz, vertical, lowest channel



$f < 1 \text{ GHz}$  : 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)).

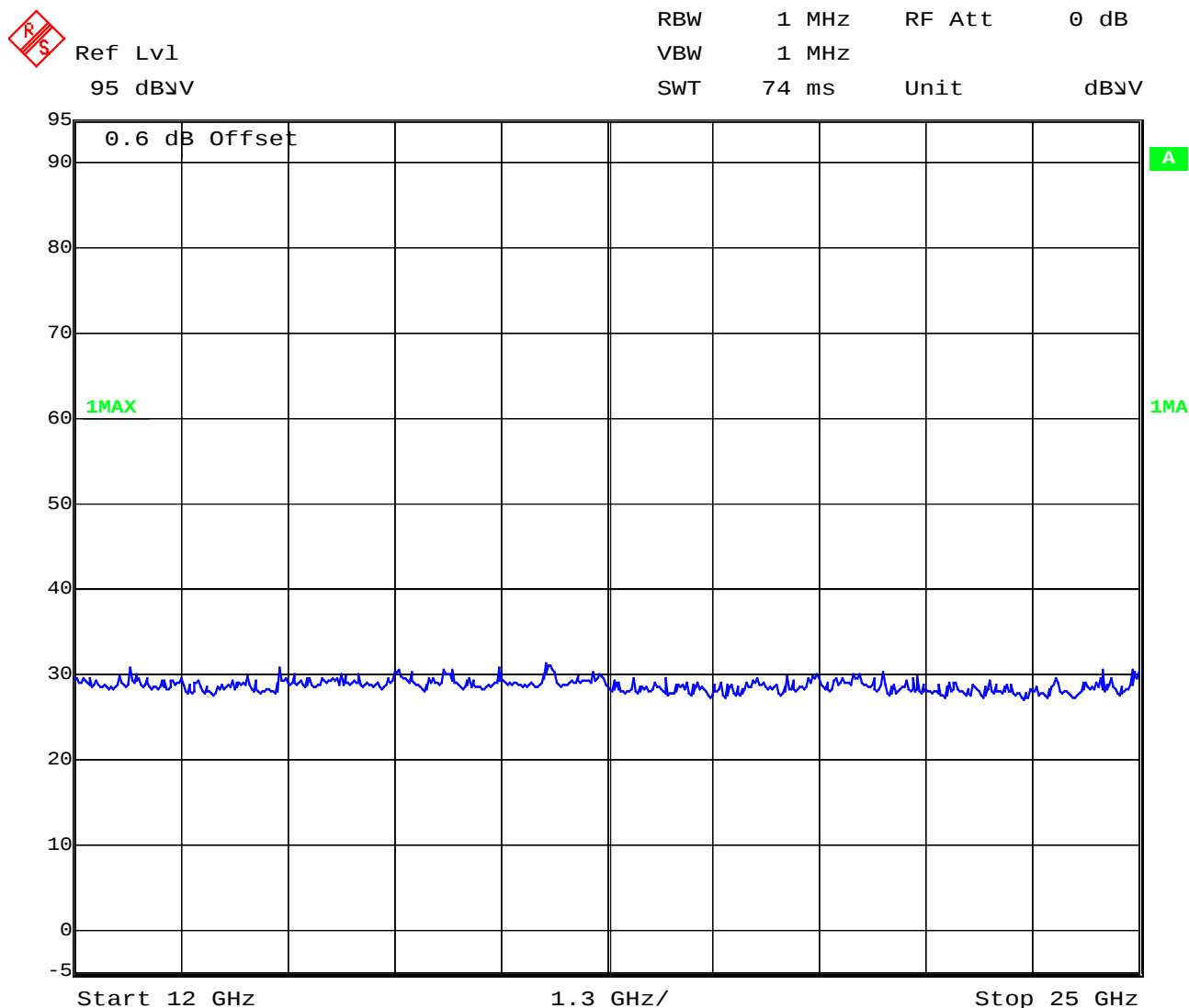
## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

## EMISSION LIMITATIONS (Transmitter)

## SUBCLAUSE § 15.247 (c) (1)

12000 - 25000 MHz, vertical, peak, valid for all three channels



Date: 23. JAN. 2003 09:31:00

$f < 1 \text{ GHz}$  : 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

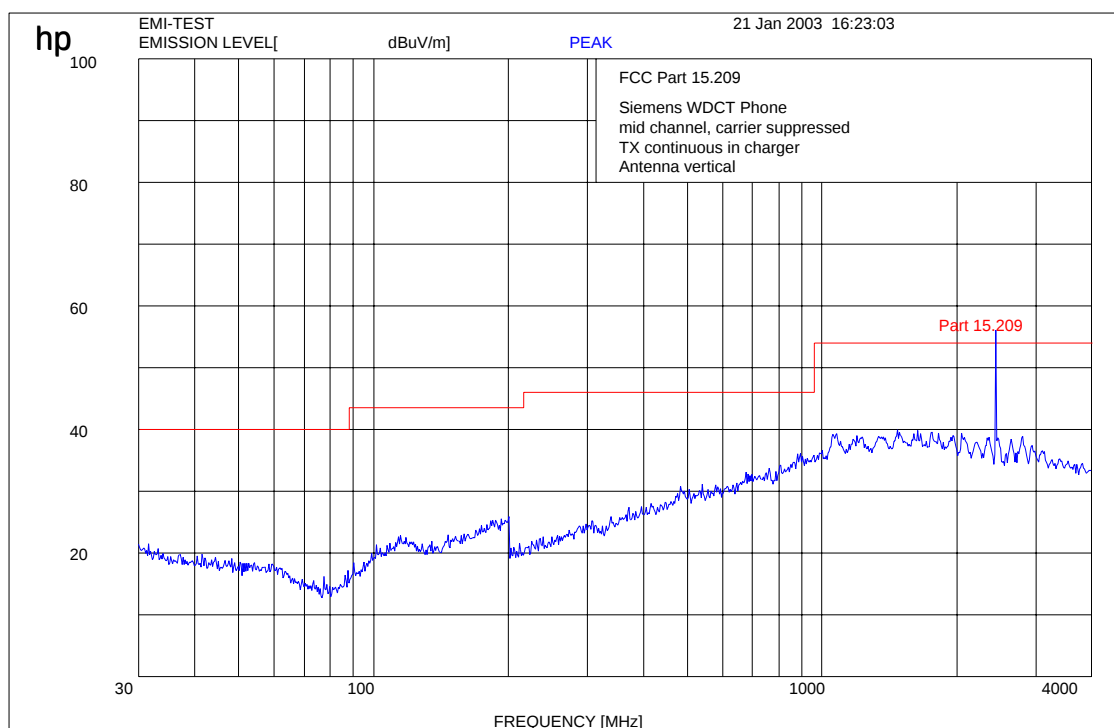
(for reference numbers see test equipment listing)

17-24

## EMISSION LIMITATIONS (Transmitter)

## SUBCLAUSE § 15.247 (c) (1)

30-4000 MHz, vertical, middle channel



$f < 1 \text{ GHz}$  : 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)).

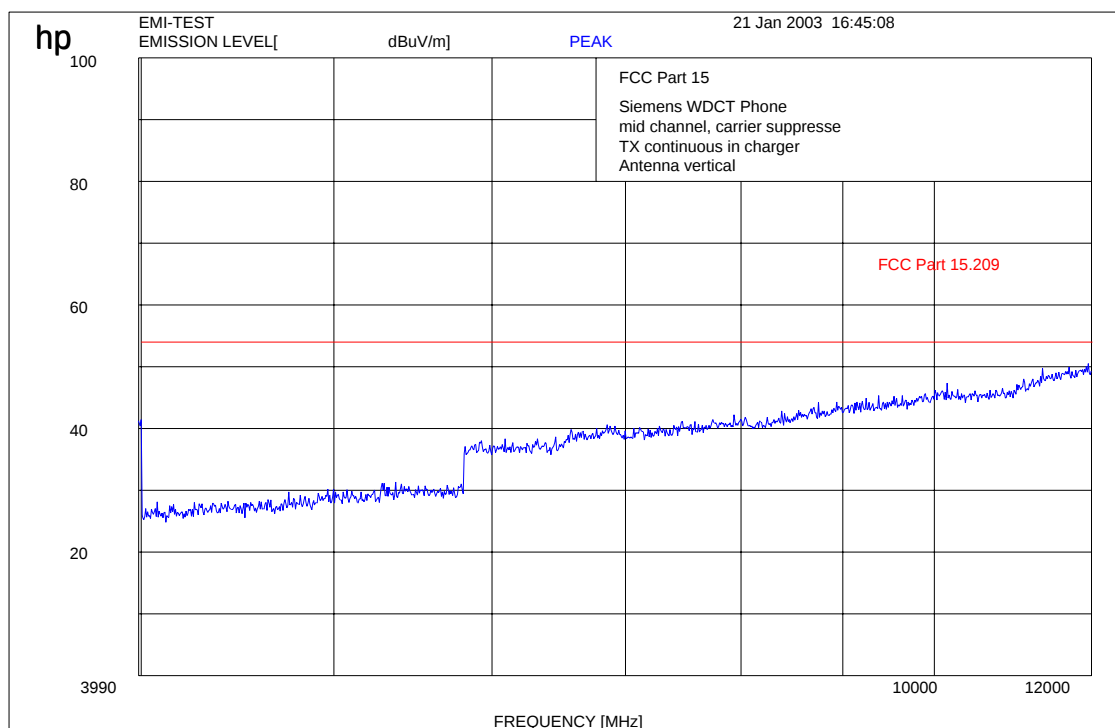
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
(for reference numbers see test equipment listing)

17-24

## EMISSION LIMITATIONS (Transmitter)

## SUBCLAUSE § 15.247 (c) (1)

4000 - 12000 MHz, vertical, middle channel



$f < 1 \text{ GHz}$  : 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)).

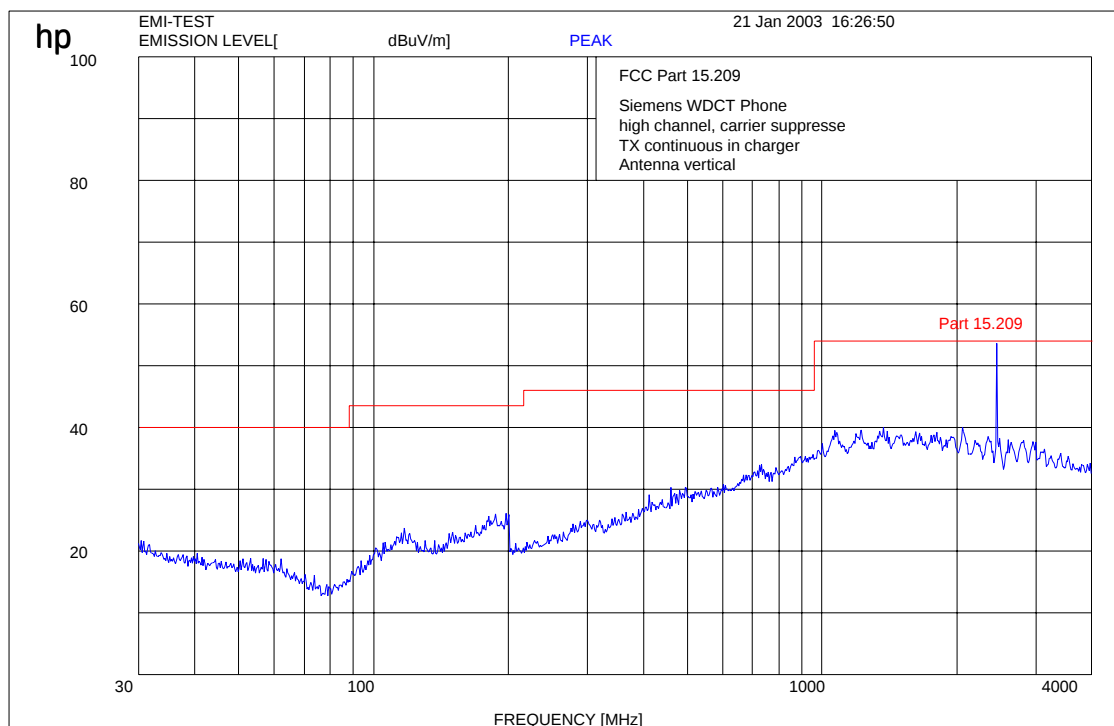
## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

## EMISSION LIMITATIONS (Transmitter)

## SUBCLAUSE § 15.247 (c) (1)

30-4000 MHz, vertical, highest channel



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

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

Carrier was suppressed by a stub tuner to avoid overload of the system.

## 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)).

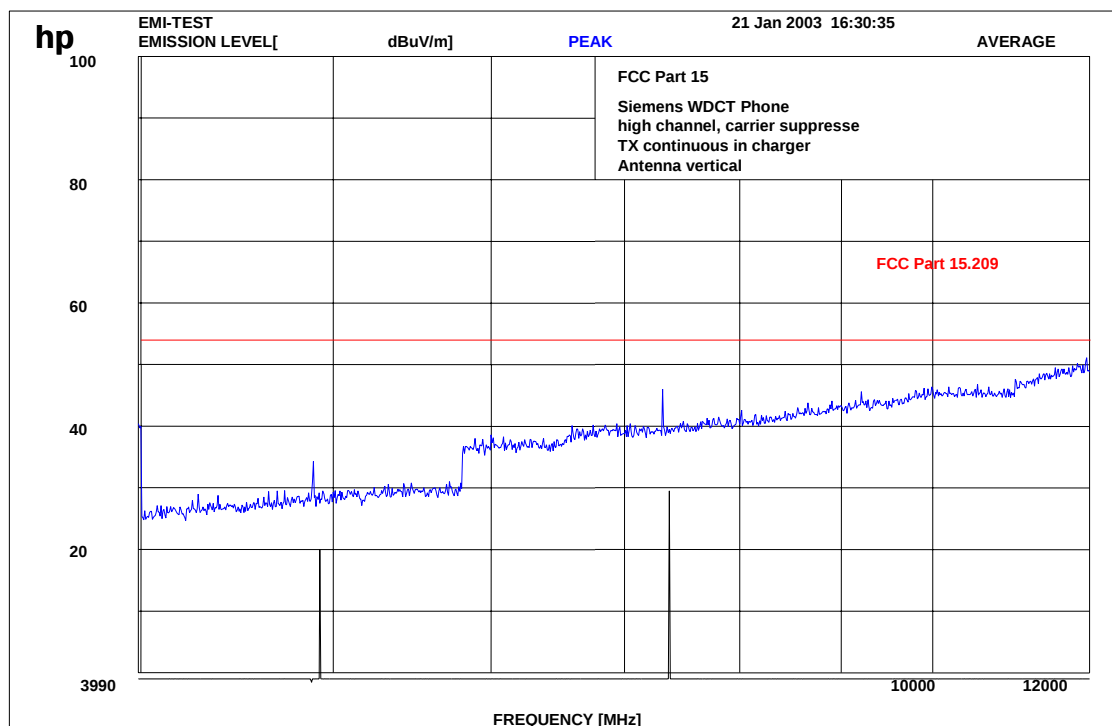
## REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

## EMISSION LIMITATIONS (Transmitter)

## SUBCLAUSE § 15.247 (c) (1)

4000-12000 MHz, vertical, highest channel



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

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

Carrier was suppressed by a stub tuner to avoid overload of the system.

## 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)

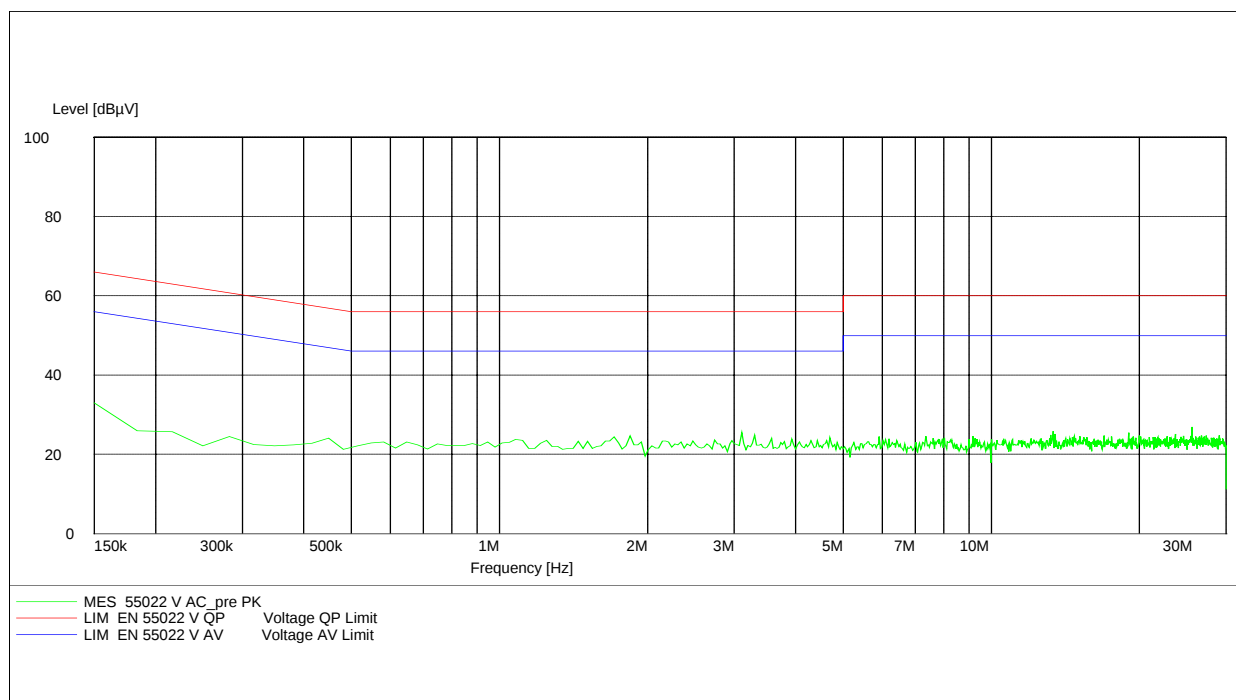
## Low frequency emissions (conducted)

§ 15.107/207

EUT: WDCT Phone Mobile station  
 Manufacturer: Siemens  
 Operating Condition: Traffic mode  
 Test Site: Room 006  
 Operator: Ames  
 Comment: 110 V AC / 60 Hz L1 and N

### 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



### Limit § 15.207

| Frequency of Emission (MHz) | Conducted Limit (dBuV) |            |
|-----------------------------|------------------------|------------|
|                             | Quasi-peak             | Average    |
| 0.15-0.5                    | 66 to 56 *             | 56 to 46 * |
| 0.5-5                       | 56                     | 46         |
| 5-30                        | 60                     | 50         |

\* Decreases with the logarithm of the frequency.

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

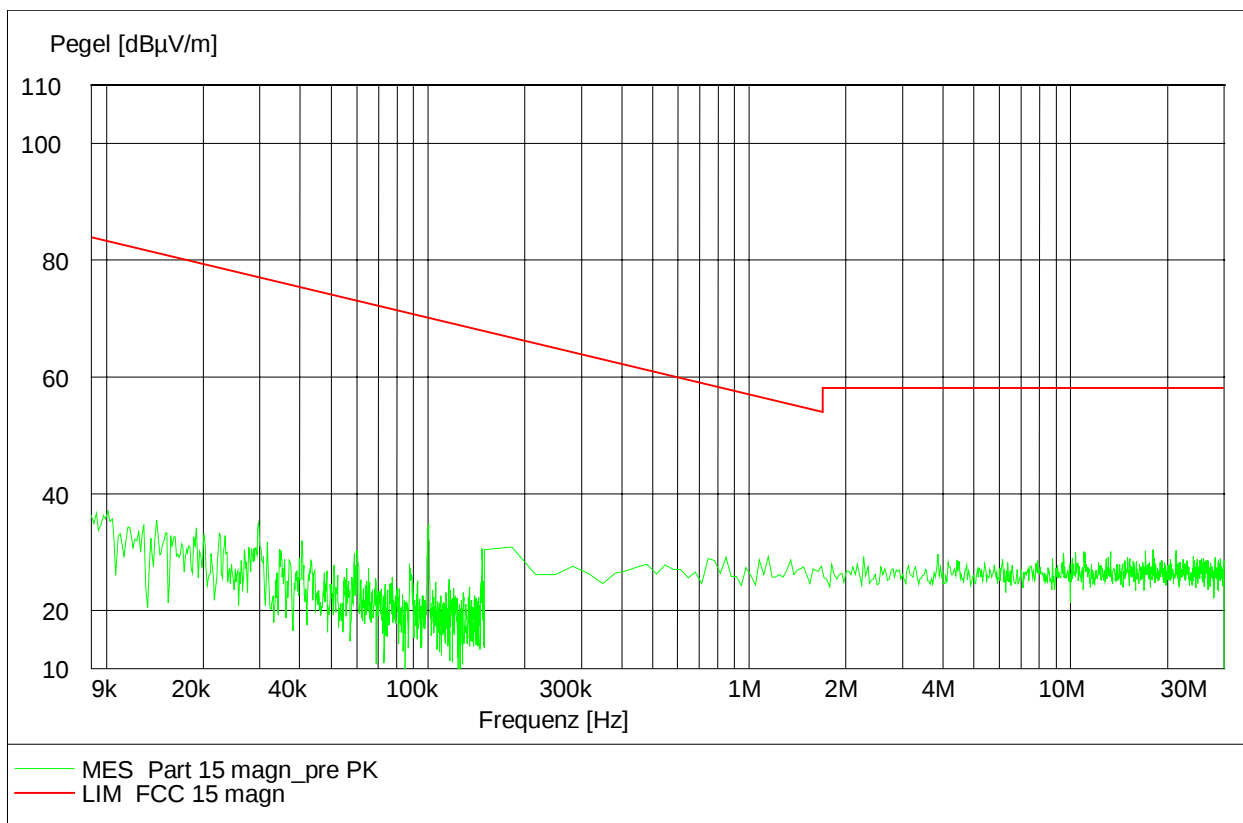
(for reference numbers see test equipment listing)

52-63

## Low frequency emissions (radiated)

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)

52-63

## RECEIVER SPURIOUS RADIATION

§ 15.209

| SPURIOUS EMISSIONS LEVEL (µV/m) |          |                       |            |          |                       |            |          |                       |
|---------------------------------|----------|-----------------------|------------|----------|-----------------------|------------|----------|-----------------------|
| f<br>(MHz)                      | Detector | Level<br>(dBµV/<br>m) | f<br>(MHz) | Detector | Level<br>(dBµV/<br>m) | f<br>(MHz) | Detector | Level<br>(dBµV/<br>m) |
|                                 |          |                       |            |          |                       |            |          |                       |
| no                              | peaks    | found                 |            |          |                       |            |          |                       |
|                                 |          |                       |            |          |                       |            |          |                       |
|                                 |          |                       |            |          |                       |            |          |                       |
|                                 |          |                       |            |          |                       |            |          |                       |
|                                 |          |                       |            |          |                       |            |          |                       |
|                                 |          |                       |            |          |                       |            |          |                       |
|                                 |          |                       |            |          |                       |            |          |                       |
|                                 |          |                       |            |          |                       |            |          |                       |
| Measurement uncertainty         |          |                       | ±3 dB      |          |                       |            |          |                       |

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

Measurement distance see table

Limits

SUBCLAUSE § 15.209

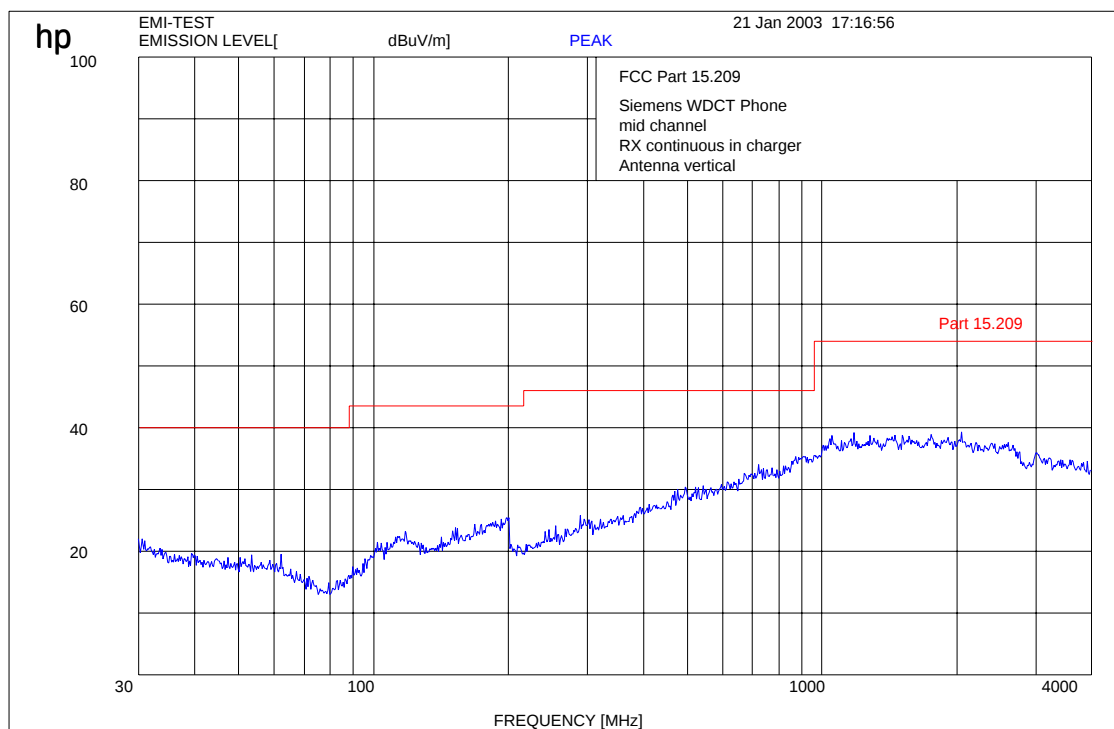
| Frequency (MHz) | Field strength (µV/m) | Measurement distance (m) |
|-----------------|-----------------------|--------------------------|
| 30 - 88         | 100                   | 3                        |
| 88 - 216        | 150                   | 3                        |
| 216 - 960     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

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

17-24; 64

## RECEIVER SPURIOUS RADIATION

§ 15.209



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

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

### Limits

SUBCLAUSE § 15.209

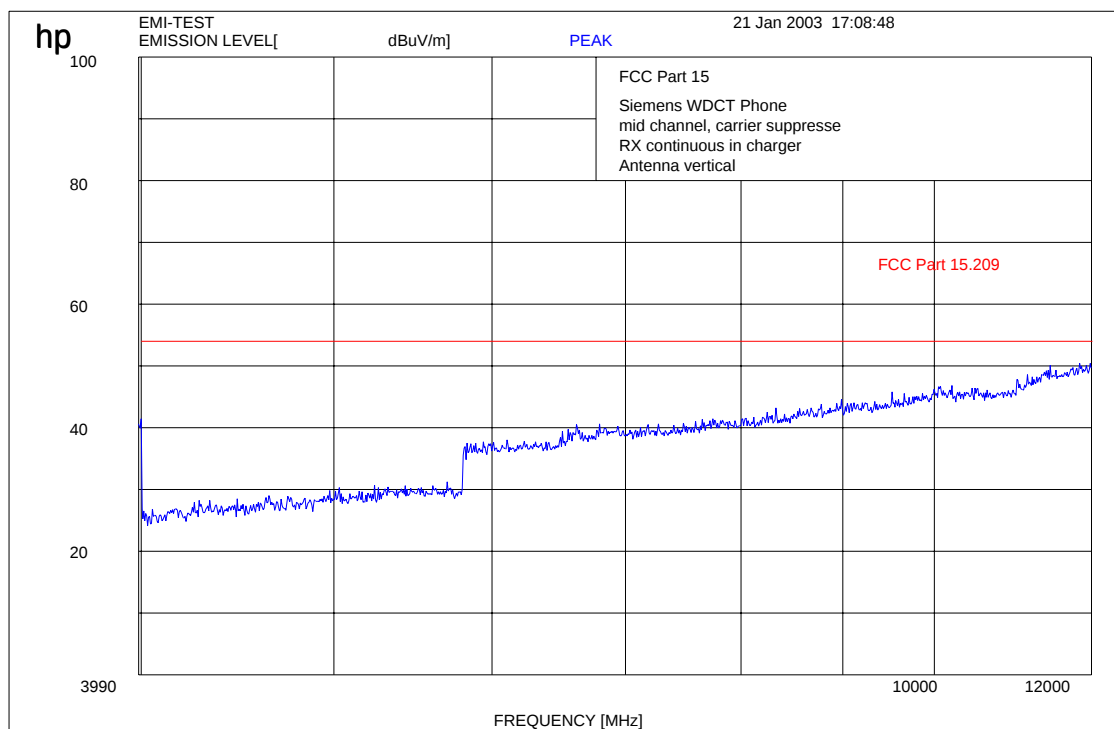
| Frequency (MHz) | Field strength ( $\mu\text{V/m}$ ) | Measurement distance (m) |
|-----------------|------------------------------------|--------------------------|
| 30 - 88         | 100                                | 3                        |
| 88 - 216        | 150                         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

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

(for reference numbers see test equipment listing)

## RECEIVER SPURIOUS RADIATION

§ 15.209



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

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

### Limits

SUBCLAUSE § 15.209

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

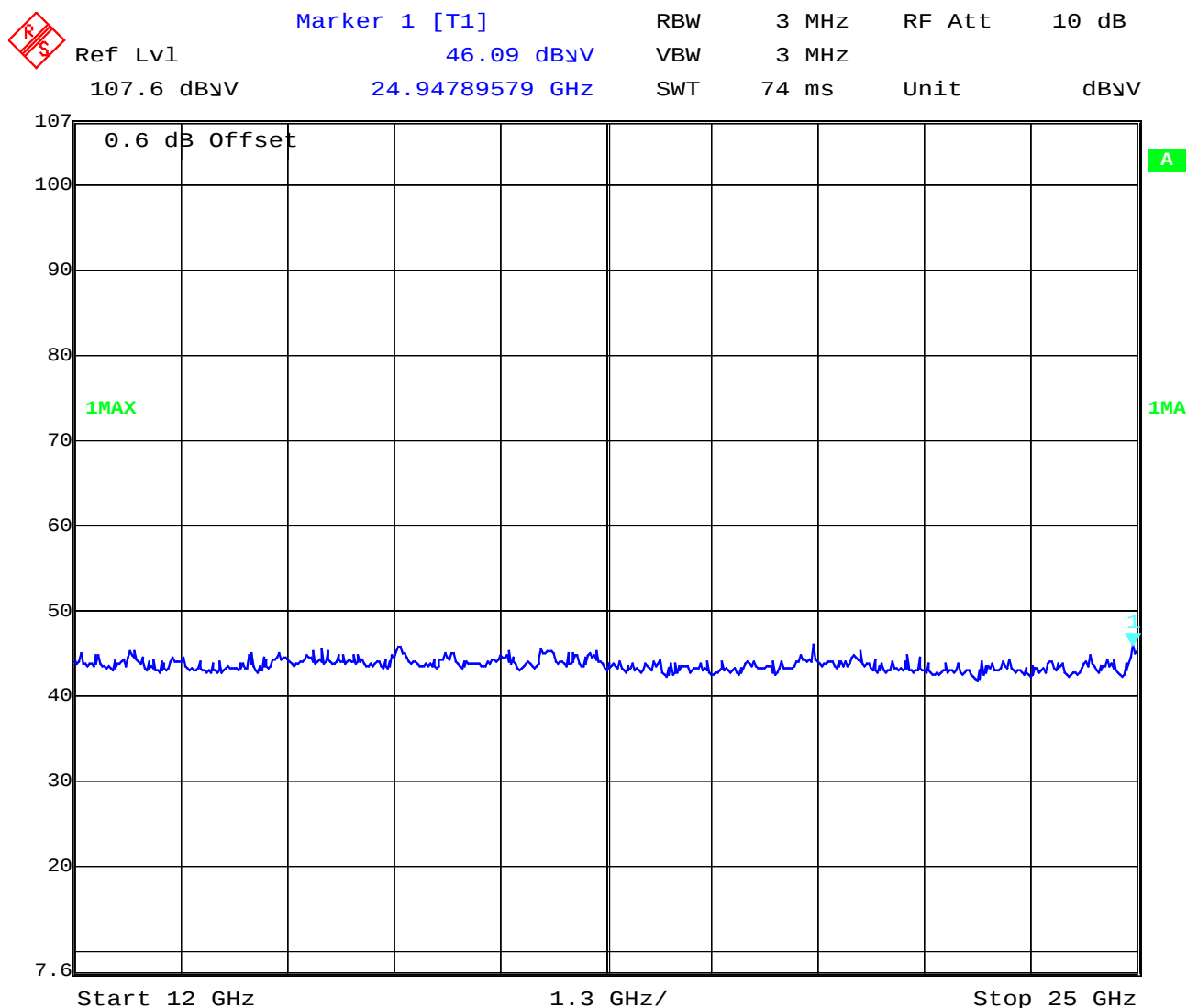
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
(for reference numbers see test equipment listing)

17-24

## RECEIVER SPURIOUS RADIATION

§ 15.209

This measurement was made with a low noise analyzer FSIQ from R&S with an additional lownoise amplifier to reduce system noise.



Date: 24. JAN. 2003 08:01:06

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

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

### Limits

SUBCLAUSE § 15.209

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

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

**TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS**

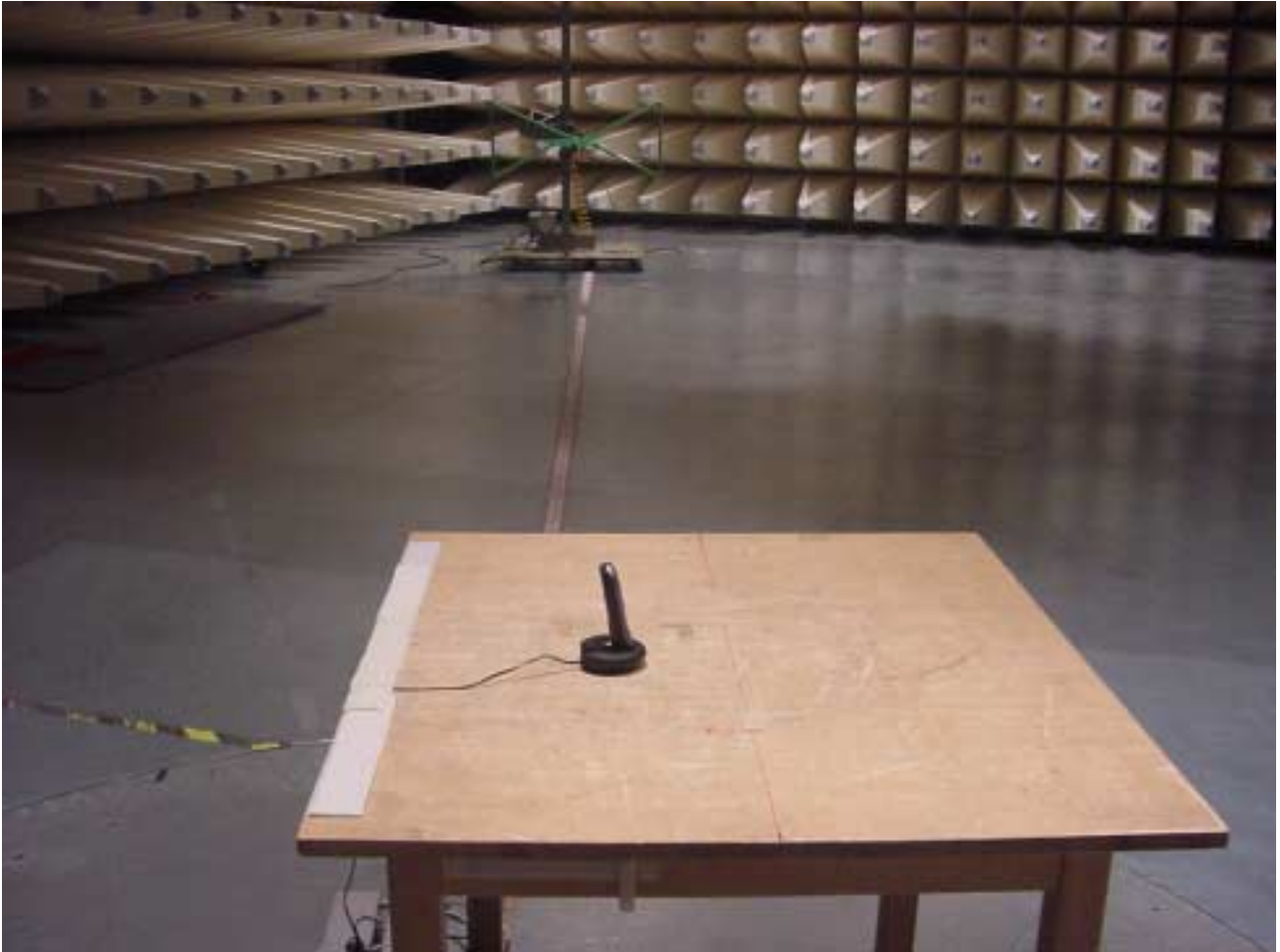
To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

| 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 | Signal Generator     | AFGU      | Rohde & Schwarz | 862 480/032 |
| 09 | Transformer          | MPL       | Erfi            | 91350       |
| 10 | AC-Line Simulator    | 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 | Deviation meter      | 9008      | Racal-Dana      | 2647        |
| 16 | Frequency counter    | 5340 A    | Hewlett-Packard | 1532A03899  |
| 17 | Anechoic chamber     | ---       | 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 | Anechoic chamber     |           | Frankonia       |             |
| 33 | Controler            | 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 |

| No | Instrument/Ancillary                   | Type      | Manufacturer    | Serial No.   |
|----|----------------------------------------|-----------|-----------------|--------------|
| 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 | Spectrum Monitor                       | EZM       | Rohde & Schwarz | 883 720/006  |
| 42 | Receiver                               | ESH 3     | Rohde & Schwarz | 890 174/002  |
| 43 | Reiciver                               | 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 | Polarisationsnetwork                   | HL 024 Z1 | Rohde & Schwarz | 341 570/002  |
| 49 | Double Ridge G Horn Antenn0 1-26.5 GHz | 3115      | EMCO            | 9107-3696    |
| 50 | Microw. Sys. Amplifier 0.5- 26.5 GHz   | 8317A     | Hewlett Packard | 3123A00105   |
| 51 | Audio Analyzer                         | UPD       | Rohde & Schwarz | 1030.7500.04 |
| 52 | Controler                              | PSM 7     | Rohde & Schwarz | 883 086/026  |
| 53 | DC V-Network                           | ESH3-Z6   | Rohde & Schwarz | 861 406/005  |
| 54 | DC V-Network                           | ESH3-Z6   | Rohde & Schwarz | 893 689/012  |
| 55 | AC 2 Phasen V-Network                  | ESH3-Z5   | Rohde & Schwarz | 861 189/014  |
| 56 | AC 2 Phasen V-Network                  | ESH3-Z5   | Rohde & Schwarz | 894 981/019  |
| 57 | AC-3 Phasen V-Network                  | ESH2-Z5   | Rohde & Schwarz | 882 394/007  |
| 58 | Power supply                           | 6032A     | Rohde & Schwarz | 2933A05441   |
| 59 | Receiver                               | ESVP.52   | Rohde & Schwarz | 881 487/021  |
| 60 | Spectrum Monitor                       | EZM       | Rohde & Schwarz | 883 086/026  |
| 61 | Receiver                               | 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 site

RADIATED EMISSIONS



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

Test site

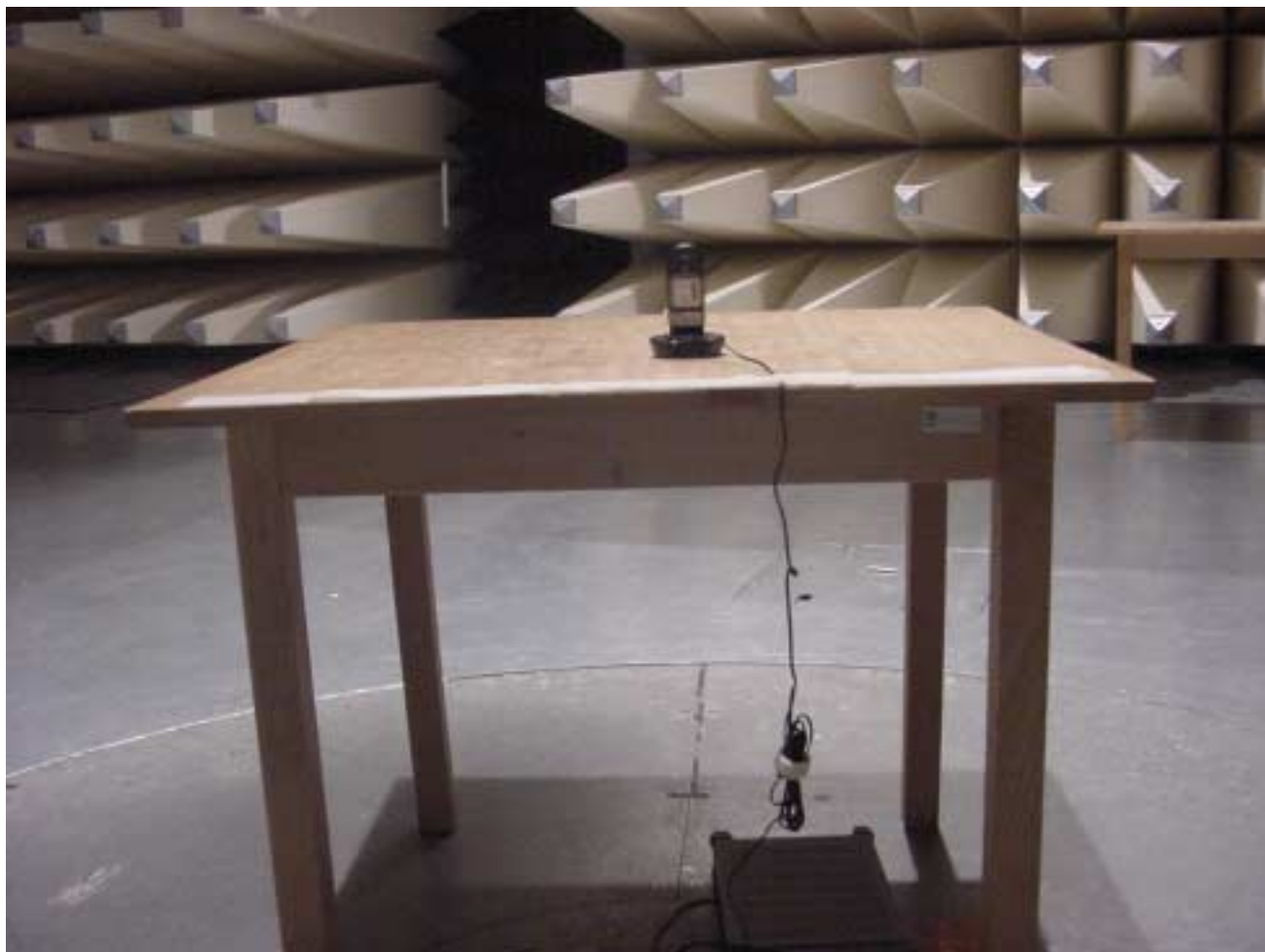
RADIATED EMISSIONS



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

Test site

RADIATED EMISSIONS



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

Test site

CONDUCTED EMISSIONS



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

## Photographs of the equipment

Photograph no.: 1



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

## Photographs of the equipment

Photograph no.: 2



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

**Photographs of the equipment**

**Photograph no.: 3**



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

## Photographs of the equipment

Photograph no.: 4



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