



# FCC Test Report

Test report no.: EMC\_703FCC15.247\_2004\_SK65

FCC Part 15.247 for FHSS systems / CANADA RSS-210

Model: SK65

FCC ID: PWX-SK65

IC: 267E-SK65



**TTI-P-G 081/94-A0**

Accredited according to **ISO/IEC 17025**



**Bluetooth Qualification  
Test Facility  
(BQTF)**



FCC listed # 101450

IC recognized # 3925

## **CETECOM Inc.**

411 Dixon Landing Road ♦ Milpitas, CA 95035 ♦ U.S.A.

Phone: + 1 (408) 586 6200 ♦ Fax: + 1 (408) 586 6299 ♦ E-mail: [info@cetecomusa.com](mailto:info@cetecomusa.com) ♦ <http://www.cetecom.com>

CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686

Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

**Table of Contents**

|            |                                |
|------------|--------------------------------|
| <b>1</b>   | <b>General information</b>     |
| <b>1.1</b> | <b>Notes</b>                   |
| <b>1.2</b> | <b>Testing laboratory</b>      |
| <b>1.3</b> | <b>Details of applicant</b>    |
| <b>1.4</b> | <b>Application details</b>     |
| <b>1.5</b> | <b>Test item</b>               |
| <b>1.6</b> | <b>Test standards</b>          |
| <b>2</b>   | <b>Technical test</b>          |
| <b>2.1</b> | <b>Summary of test results</b> |
| <b>2.2</b> | <b>Test report</b>             |
| <b>1</b>   | <b>General information</b>     |
| <b>1.1</b> | <b>Notes</b>                   |

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations 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 Inc USA.

**TEST REPORT PREPARED BY:****EMC Engineer: Harpreet Sidhu****1.2 Testing laboratory****CETECOM Inc.****411 Dixon Landing Road, Milpitas, CA-95035, USA****Phone: +1 408 586 6200 Fax: +1 408 586 6299****E-mail: [lothar.schmidt@cetecomusa.com](mailto:lothar.schmidt@cetecomusa.com)****Internet: [www.cetecom.com](http://www.cetecom.com)**

**1.3 Details of applicant**

**Name** : SIEMENS ICM  
**Street** : 16745 West Bernardo Drive  
**City / Zip Code** : San Diego CA 92127  
**Country** : U.S.A  
**Contact** : Kevin Wolentarski  
**Telephone** : +1 858-521-3352  
**Tele-fax** : +1 858-521-3105  
**e-mail** : [kevin.wolentarski@siemens.com](mailto:kevin.wolentarski@siemens.com)

**1.4 Application details**

Date of receipt test item : 2004-08-09  
Date of test : 2004-08-09/10/18/19

**1.5 Test item**

Manufacturer : SIEMENS  
Street Address : Suedstr. 9  
City / Zip Code : 47475 Kamp-Lintfort  
Country : Germany  
Marketing Name : SK65  
Model No. : **SK65**  
**Description** : **GSM 1900 Mobile Phone with BT**  
FCC-ID : PWX-SK65  
IC ID : 267E-SK65

**Additional information**

Test Sample for BT : IMEI: 00-4999-00-27 6571-6  
Frequency : 2402MHz – 2480MHz for BT  
Type of modulation : GFSK  
Number of channels : 79  
Antenna : Internal  
Power supply : Battery or Charger (AC Adaptor)  
Output power : -2.41dBm (0.574mW) max. conducted peak power  
Extreme vol. Limits : 3.6VDC to 4.5VDC (nominal: 3.7VDC)  
Extreme temp. Tolerance : -30°C to +50°C

**1.6 Test standards: FCC Part 15 §15.247 (DA00-705) / RSS 210**

**Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.**

**2 Technical test****2.1 Summary of test results**

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

Final Verdict:  
(only “passed” if all single measurements are “passed”)

**Passed**

**Technical responsibility for area of testing:**

2004-08-25    EMC & Radio    Lothar Schmidt (Manager)



Date

Section

Name

Signature

**Responsible for test report and project leader:**

2004-08-25    EMC & Radio    Harpreet Sidhu (EMC Engineer)



Date

Section

Name

Signature

## **2.2 Test report**

### **TEST REPORT**

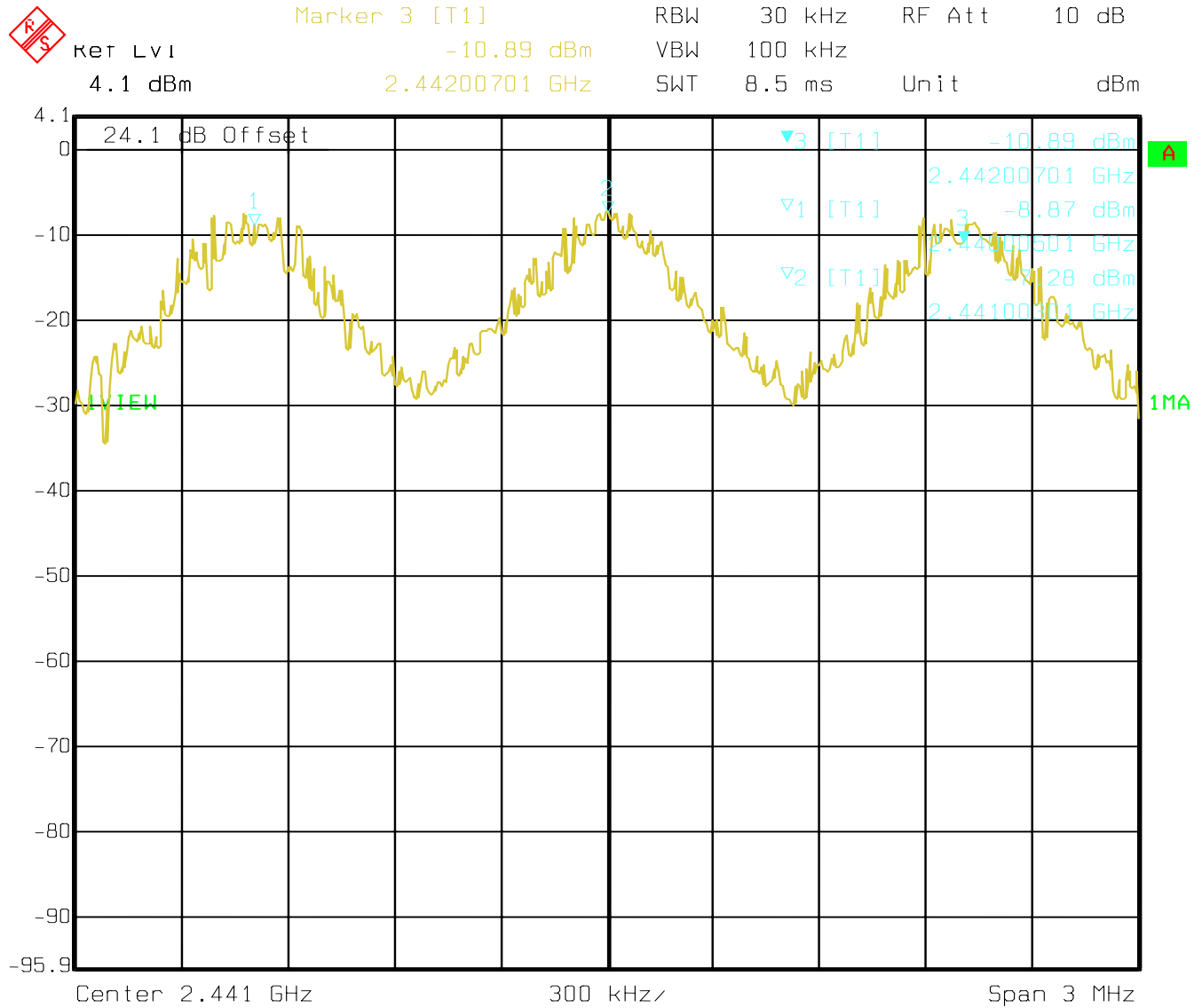
**Test report no.: EMC\_703FCC15.247\_2004\_SK65**

**TEST REPORT REFERENCE**

| <b>LIST OF MEASUREMENTS</b>                          |                         | <b>PAGE</b> |
|------------------------------------------------------|-------------------------|-------------|
| <b>CARRIER FREQUENCY SEPERATION</b>                  | <b>§15.247(a)</b>       | <b>7</b>    |
| <b>NUMBER OF HOPPING CHANNELS</b>                    | <b>§15.247(a)</b>       | <b>8</b>    |
| <b>TIME OF OCCUPANCY (DWELL TIME)</b>                | <b>§15.247(a)</b>       | <b>9</b>    |
| <b>SPECTRUM BANDWIDTH OF FHSS SYSTEM</b>             | <b>§15.247(a)</b>       | <b>12</b>   |
| <b>MAXIMUM PEAK OUTPUT POWER</b>                     | <b>§ 15.247 (b) (1)</b> | <b>16</b>   |
| <b>BAND EDGE COMPLIANCE</b>                          | <b>§15.247 (c)</b>      | <b>21</b>   |
| <b>EMISSION LIMITATIONS</b>                          | <b>§ 15.247 (c) (1)</b> | <b>25</b>   |
| <b>CONDUCTED EMISSIONS</b>                           | <b>§ 15.107/207</b>     | <b>39</b>   |
| <b>RECEIVER SPURIOUS RADIATION</b>                   | <b>§ 15.209</b>         | <b>41</b>   |
| <b>TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS</b> |                         | <b>46</b>   |
| <b>BLOCK DIAGRAMS</b>                                |                         | <b>47</b>   |

## CARRIER FREQUENCY SEPERATION

§15.247(a)



Date: 18.AUG.2004 14:53:50

**NUMBER OF HOPPING CHANNELS**

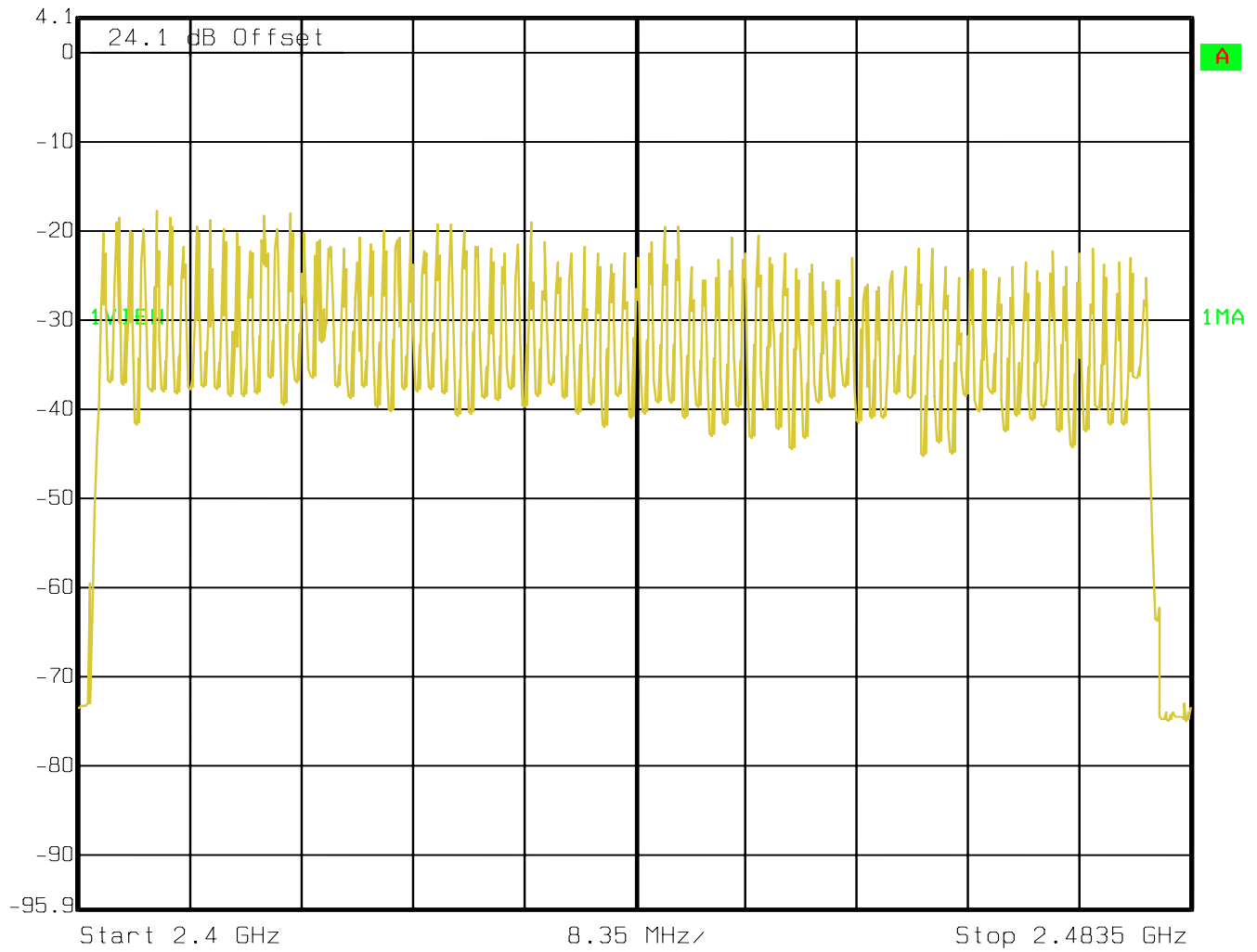
**§15.247(a)**

**The number of hopping channels is 79**



Ref Lvl  
4.1 dBm

RBW 1 kHz RF Att 10 dB  
VBW 1 MHz  
SWT 210 s Unit dBm



Date: 18.AUG.2004 15:21:16

## TIME OF OCCUPANCY (DWELL TIME)

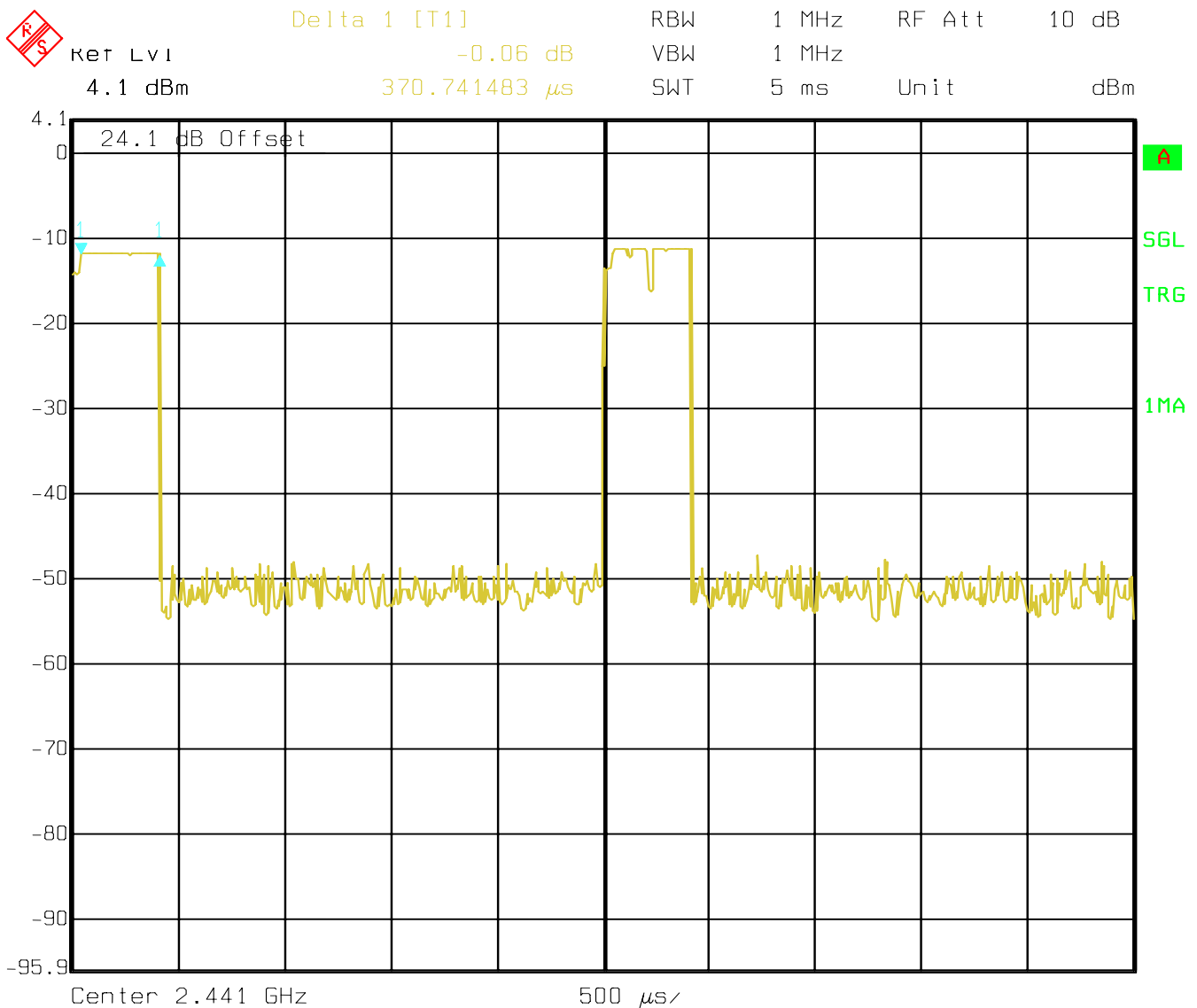
§15.247(a)

### DH1 – Packet

The system makes worst case 1600 hops per second or 1 time slot has a length of 625µs with 79 channels. A DH1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 800 hops per second with 79 channels. So you have each channel 10.13 times per second and so for 31.6 seconds you have 320.108 times of appearance.

Each Tx-time per appearance is 370.74µs.

So we have  $320.108 * 370.74\mu s = 118.67ms$  per 31.6 seconds.



Date: 18.AUG.2004 15:27:09

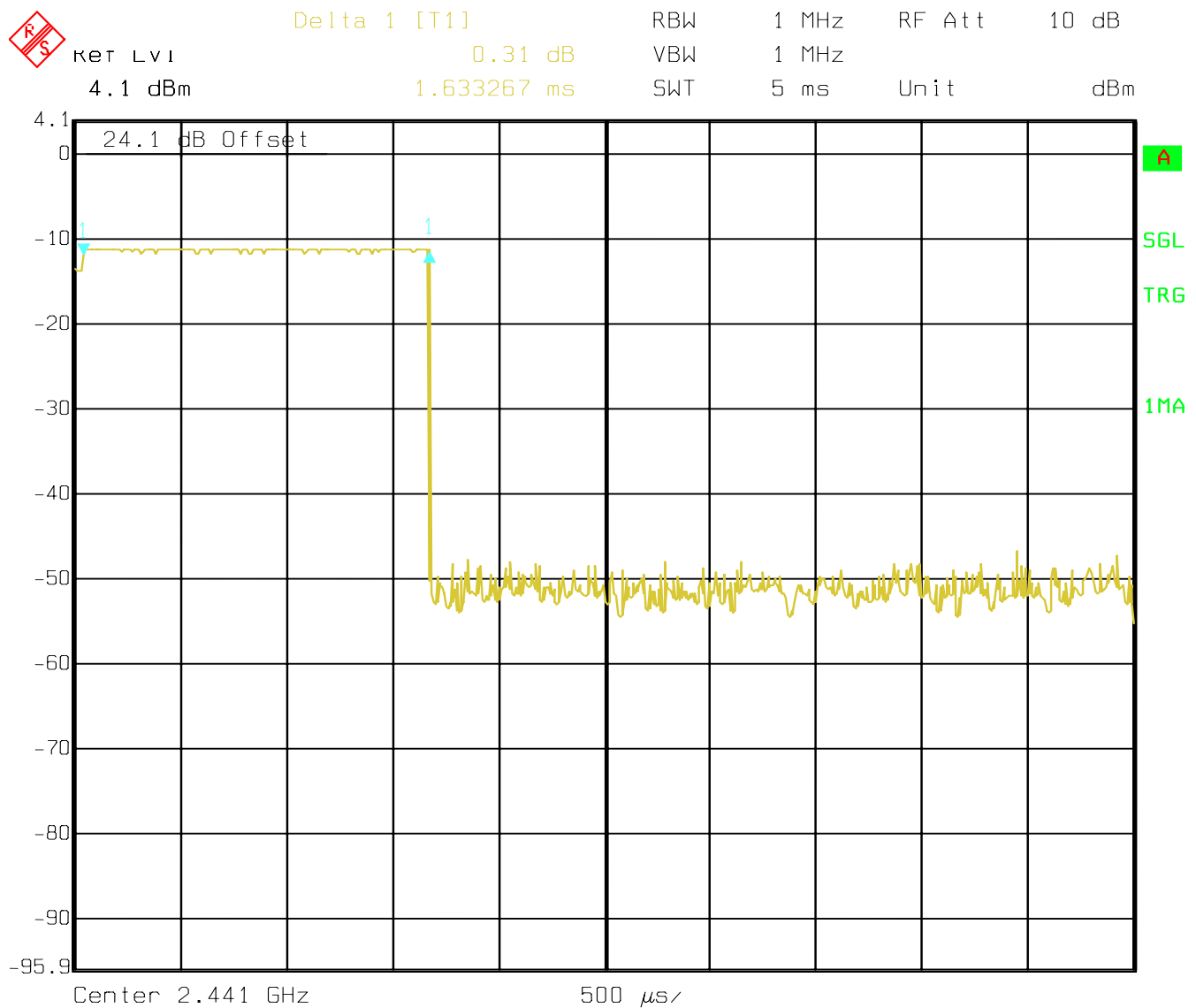
## TIME OF OCCUPANCY (DWELL TIME) DH3 – Packet

§15.247(a)

A DH3 Packets need 3 time slots for transmit and 1 for receiving, then the system makes worst case 400 hops per second with 79 channels. So you have each channel 5.1 times per second and so for 31.6 seconds you have 161.16 times of appearance.

Each Tx-time per appearance is 1.63ms.

So we have  $161.16 * 1.63\text{ms} = 262.69\text{ms}$  per 31.6 seconds.



Date: 18.AUG.2004 15:25:52

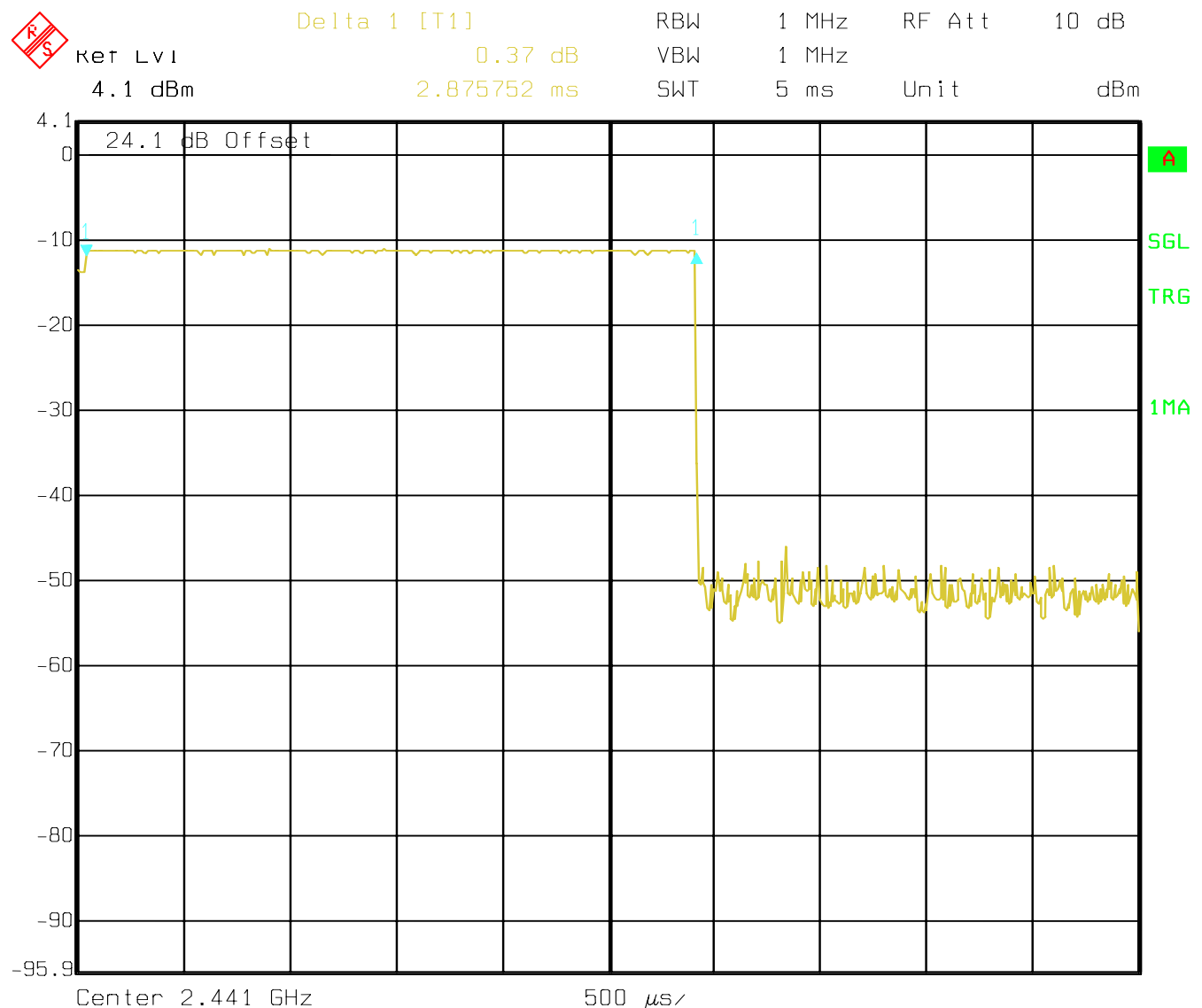
## TIME OF OCCUPANCY (DWELL TIME) DH5 – Packet

§15.247(a)

At DH5 Packets you need 5 time slots for transmit and 1 for receiving, then the system makes worst case 266,7 hops per second with 79 channels. So you have each channel 3.36 times per second and so for 30 seconds you have 106.176 times of appearance.

Each Tx-time per appearance is 2.875ms.

So we have  $106.176 * 2.875\text{ms} = 305.25\text{ms}$  per 31.6 seconds.



Date: 18.AUG.2004 15:24:32

**SPECTRUM BANDWIDTH OF FHSS SYSTEM**  
**20 dB bandwidth****§15.247(a)**

| TEST CONDITIONS        |           | 20 dB BANDWIDTH (kHz) |        |        |
|------------------------|-----------|-----------------------|--------|--------|
| Frequency (MHz)        |           | 2402                  | 2441   | 2480   |
| $T_{nom}(23)^{\circ}C$ | $V_{nom}$ | 929.85                | 929.85 | 929.85 |

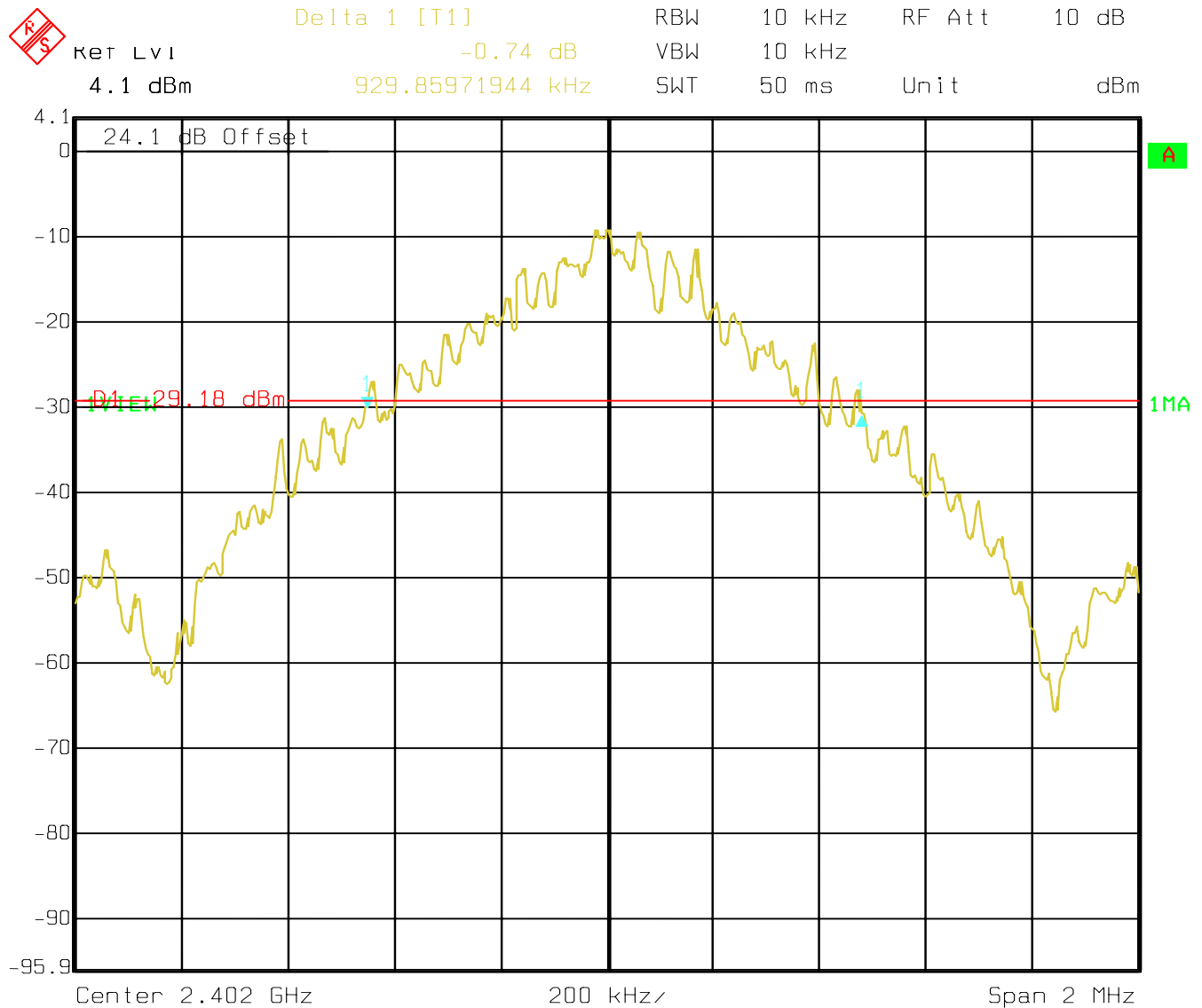
RBW / VBW as provided in the "Measurement Guidelines" (DA 00-705, March 30, 2000)

**LIMIT****SUBCLAUSE §15.247(a) (1)****The maximum 20dB bandwidth shall be at maximum 1000 KHz**

## SPECTRUM BANDWIDTH OF FHSS SYSTEM 20 dB bandwidth

§15.247(a)

Lowest Channel: 2402MHz

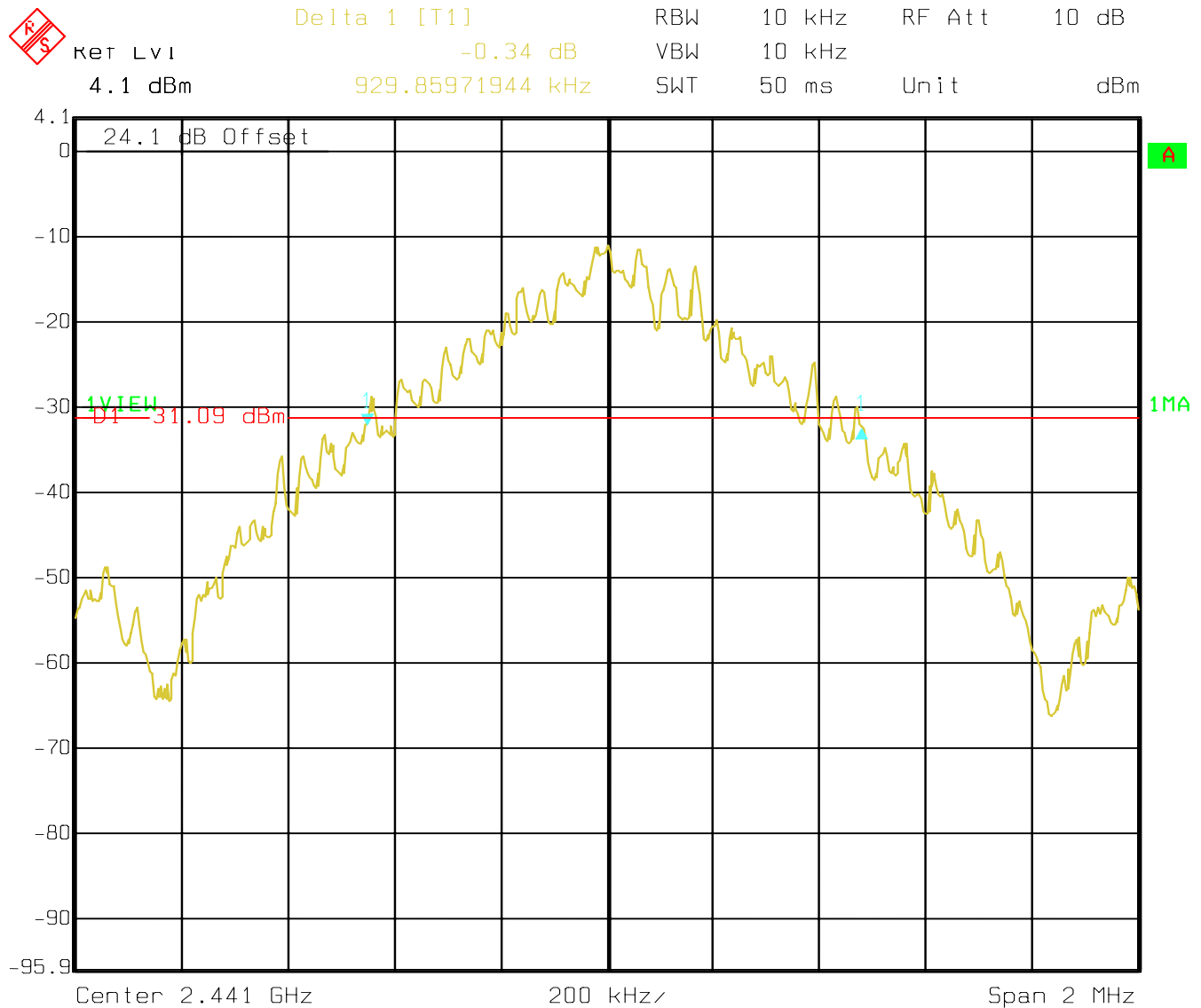


Date: 18.AUG.2004 14:23:28

## SPECTRUM BANDWIDTH OF FHSS SYSTEM 20 dB bandwidth

§15.247(a)

Mid Channel: 2441MHz

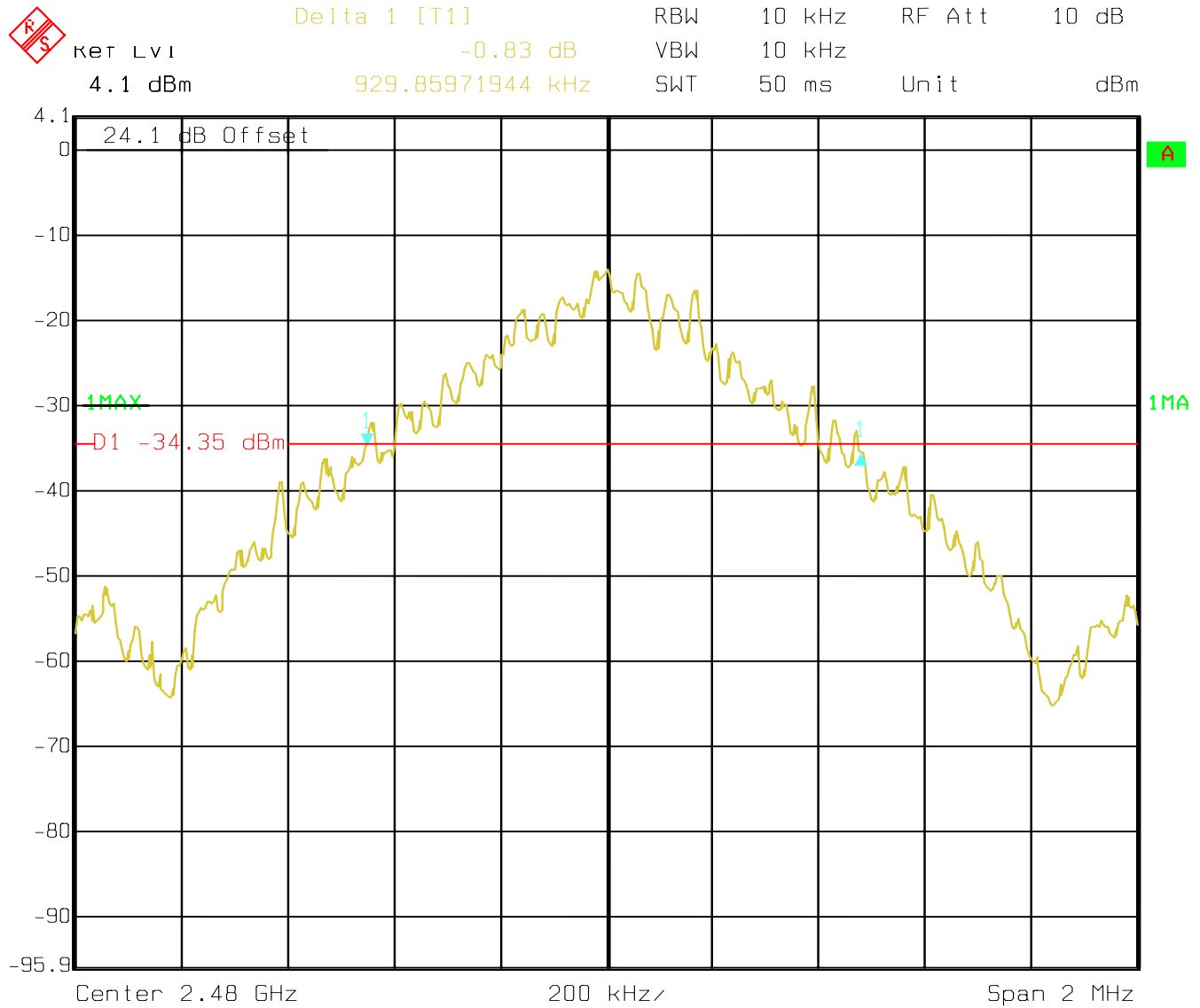


Date: 18.AUG.2004 14:21:20

## SPECTRUM BANDWIDTH OF FHSS SYSTEM 20 dB bandwidth

§15.247(a)

Highest Channel: 2480MHz



Date: 18.AUG.2004 14:19:43

**MAXIMUM PEAK OUTPUT POWER  
(Conducted)****§ 15.247 (b) (1)**

| TEST CONDITIONS         |                  | MAXIMUM PEAK OUTPUT POWER (dBm) |       |       |
|-------------------------|------------------|---------------------------------|-------|-------|
| Frequency (MHz)         |                  | 2402                            | 2441  | 2480  |
| T <sub>nom</sub> (23)°C | V <sub>nom</sub> | -2.41                           | -4.54 | -7.94 |
| Measurement uncertainty |                  | ±0.5dBm                         |       |       |

RBW / VBW: 3 MHz

**LIMIT****SUBCLAUSE § 15.247 (b) (1)**

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

**MAXIMUM PEAK OUTPUT POWER  
(RADIATED)**

§ 15.247 (b) (1)

**EIRP:**

| TEST CONDITIONS         |                  | MAXIMUM PEAK OUTPUT POWER (dBm) |       |       |
|-------------------------|------------------|---------------------------------|-------|-------|
| Frequency (MHz)         |                  | 2402                            | 2441  | 2480  |
| T <sub>nom</sub> (23)°C | V <sub>nom</sub> | -2.78                           | -3.54 | -2.07 |
| Measurement uncertainty |                  | ±0.5dBm                         |       |       |

RBW/VBW: 3 MHz

**LIMIT**

SUBCLAUSE § 15.247 (b) (1)

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

# PEAK OUTPUT POWER (RADIATED)

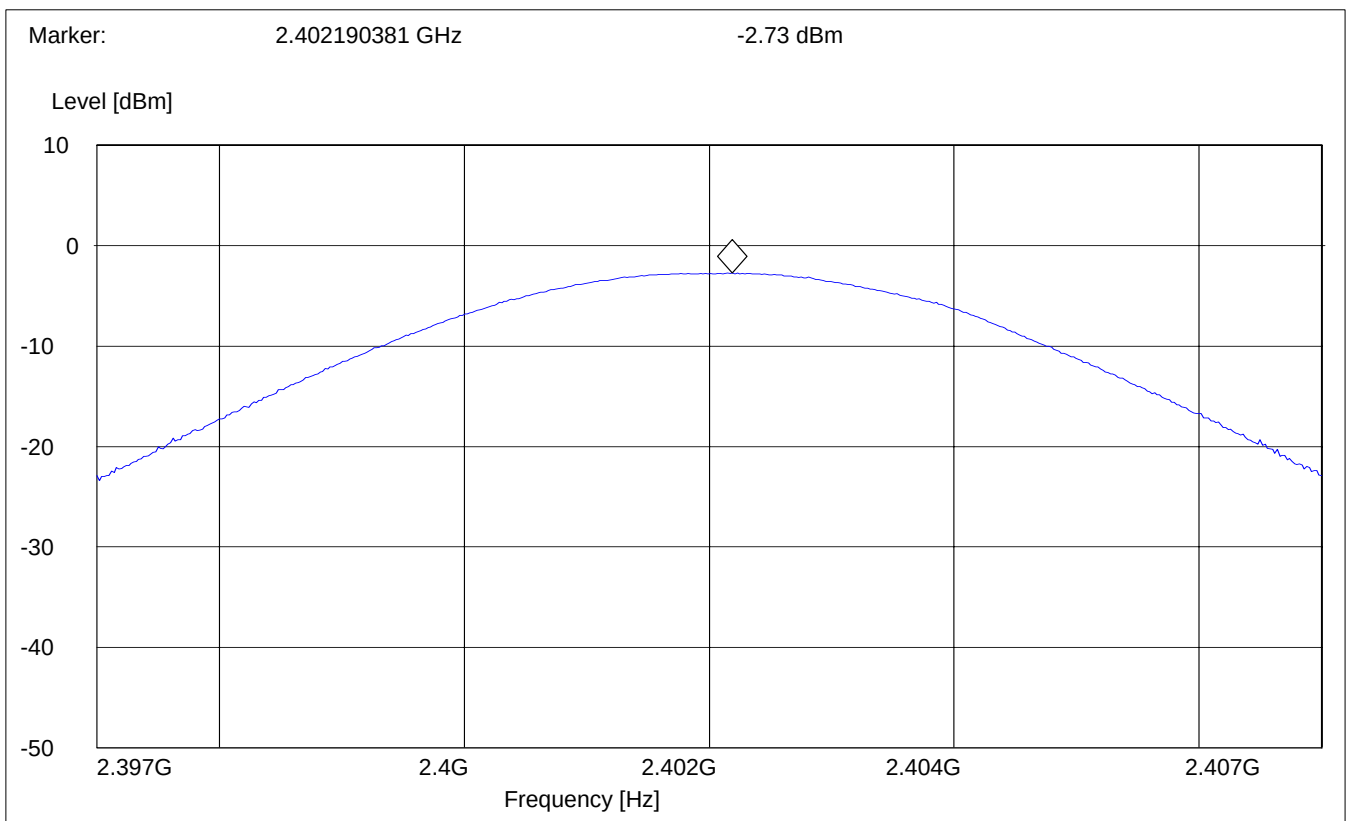
§15.247 (b) (1)

## Lowest Channel: 2402MHz

SWEEP TABLE: "EIRP BT low channel"

Short Description: EIRP Bluetooth channel-2402MHz

|           |           |          |         |       |
|-----------|-----------|----------|---------|-------|
| Start     | Stop      | Detector | Meas.   | IF    |
| Frequency | Frequency |          | Time    | BW    |
| 2.397GHz  | 2.407GHz  | MaxPeak  | Coupled | 3 MHz |



# PEAK OUTPUT POWER (RADIATED)

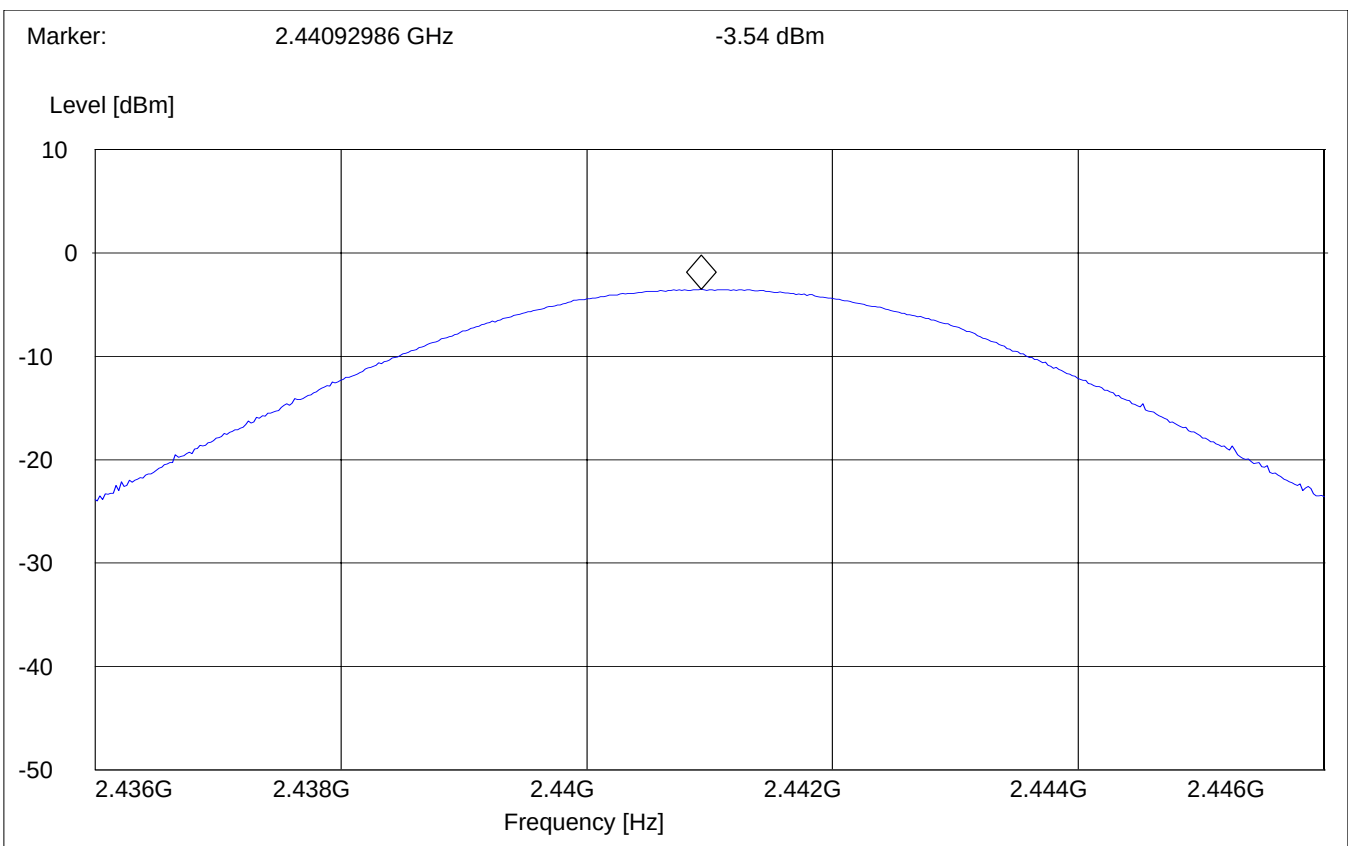
§15.247 (b) (1)

## Mid Channel: 2441MHz

SWEEP TABLE: "EIRP BT Mid channel"

Short Description: EIRP Bluetooth channel-2441MHz

|           |           |          |         |       |
|-----------|-----------|----------|---------|-------|
| Start     | Stop      | Detector | Meas.   | IF    |
| Frequency | Frequency | Time     | BW      |       |
| 2.436GHz  | 2.446GHz  | MaxPeak  | Coupled | 3 MHz |



# PEAK OUTPUT POWER (RADIATED)

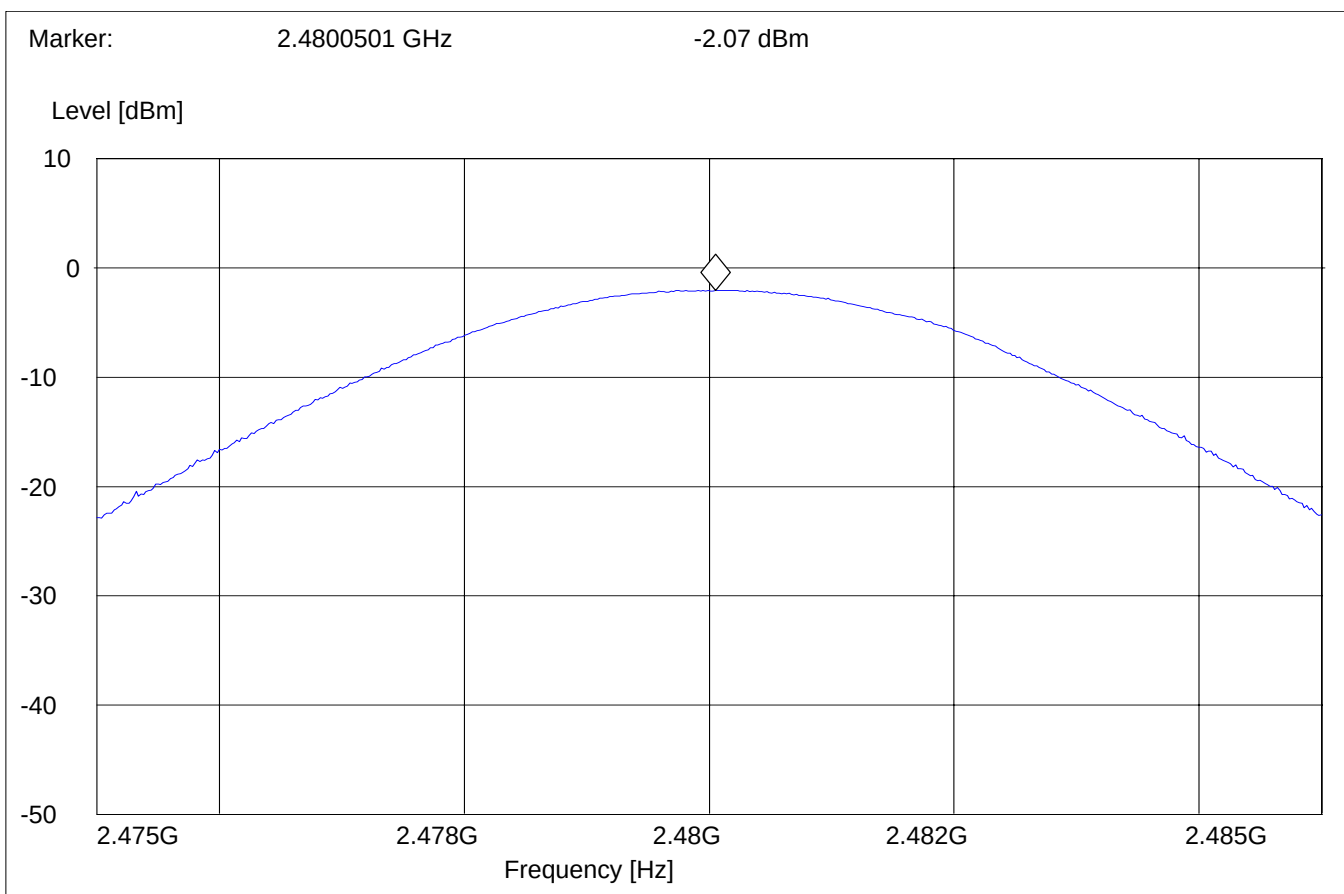
§15.247 (b) (1)

## Highest Channel: 2480MHz

SWEEP TABLE: "EIRP BT High channel"

Short Description: EIRP Bluetooth channel-2480MHz

| Start     | Stop      | Detector | Meas.   | IF    |
|-----------|-----------|----------|---------|-------|
| Frequency | Frequency |          | Time    | BW    |
| 2.475GHz  | 2.485GHz  | MaxPeak  | Coupled | 3 MHz |



# BAND EDGE COMPLIANCE

§15.247 (c)

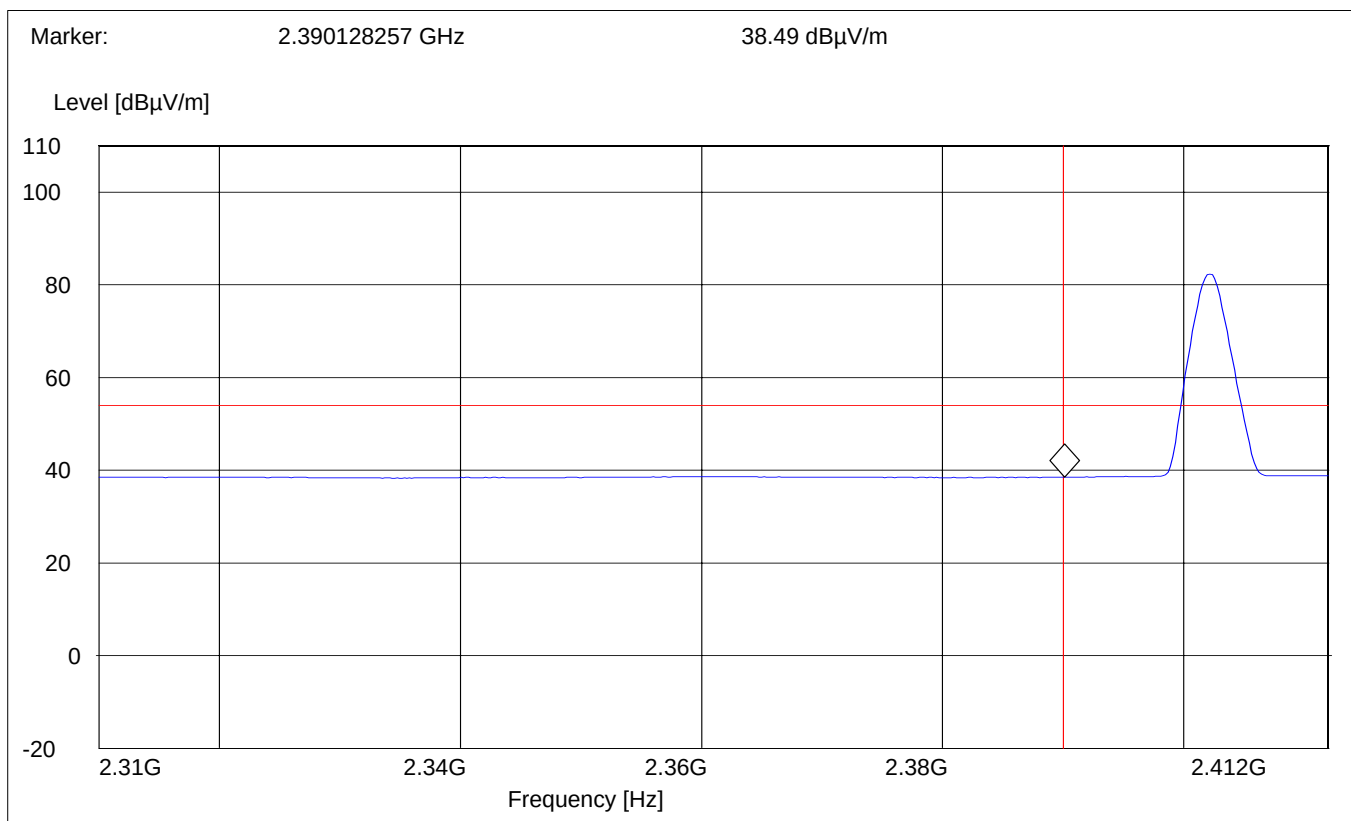
## Low frequency section (spurious in the restricted band 2310 – 2390 MHz)

### Average Measurement

(This plot is valid for both Hopping ON &amp; OFF)

Operating condition : Tx at 2402MHz  
SWEEP TABLE : "FCC15.247 LBE\_AVG"  
Short Description : FCC15.247 BT Low-band-edge  
Limit Line : 54dBμV

| Start Frequency | Stop Frequency | Detector | Meas. Bandw. | RBW   | VBW  | Transducer      |
|-----------------|----------------|----------|--------------|-------|------|-----------------|
| 2.31 GHz        | 2.412 GHz      | MaxPeak  | Coupled      | 1 MHz | 10Hz | #326 horn (dBi) |



# BAND EDGE COMPLIANCE

§15.247 (c)

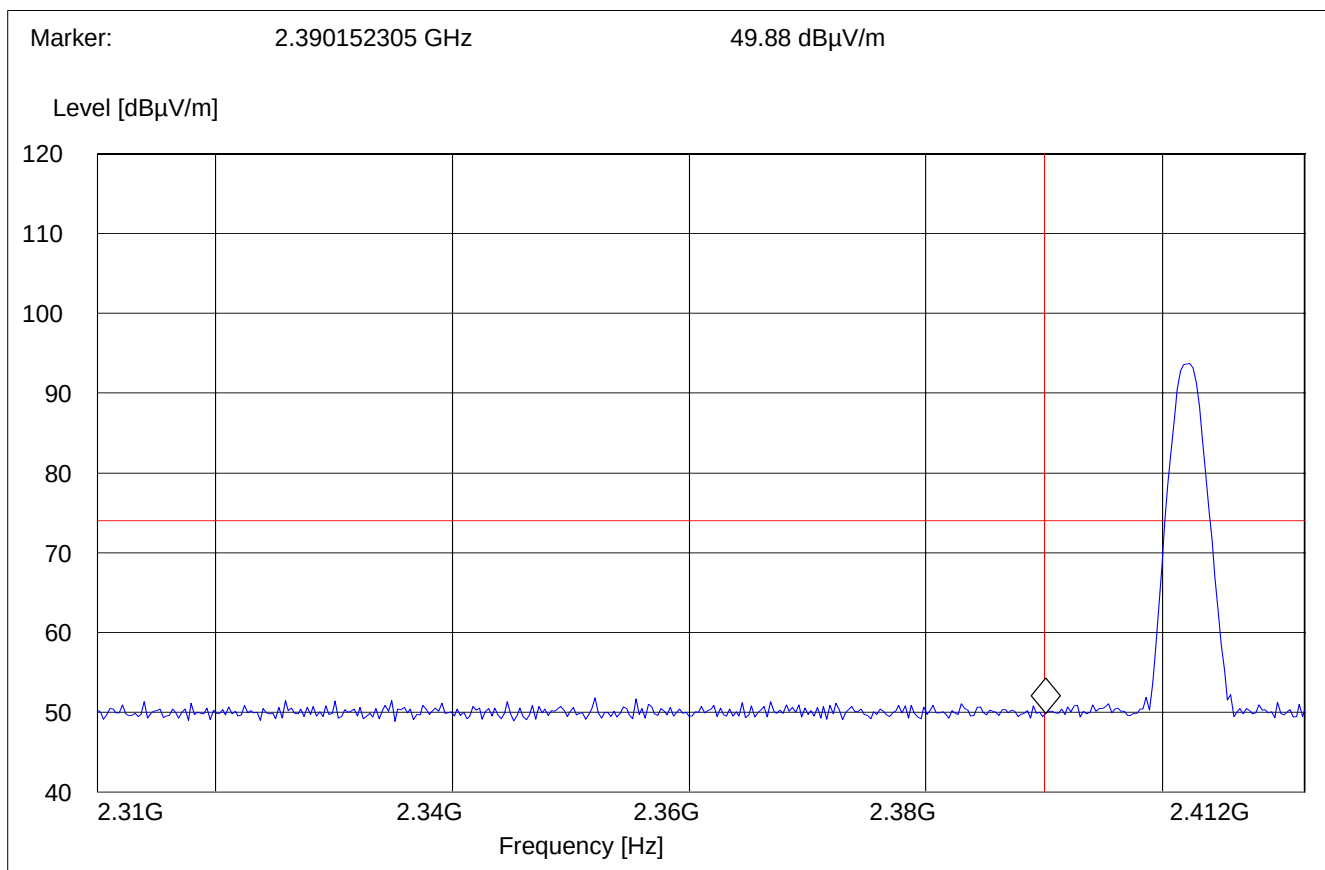
## Low frequency section (spurious in the restricted band 2310 – 2390 MHz)

### Peak Measurement

(This plot is valid for both Hopping ON & OFF)

Operating condition : Tx at 2402MHz  
 SWEEP TABLE : "FCC15.247 LBE\_Pk"  
 Short Description : FCC15.247 BT Low-band-edge  
 Limit Line : 74dBμV

| Start Frequency | Stop Frequency | Detector Time | Meas. Bandw. | RBW   | VBW  | Transducer      |
|-----------------|----------------|---------------|--------------|-------|------|-----------------|
| 2.31 GHz        | 2.412 GHz      | MaxPeak       | Coupled      | 1 MHz | 1MHz | #326 horn (dBi) |



# BAND EDGE COMPLIANCE

§15.247 (c)

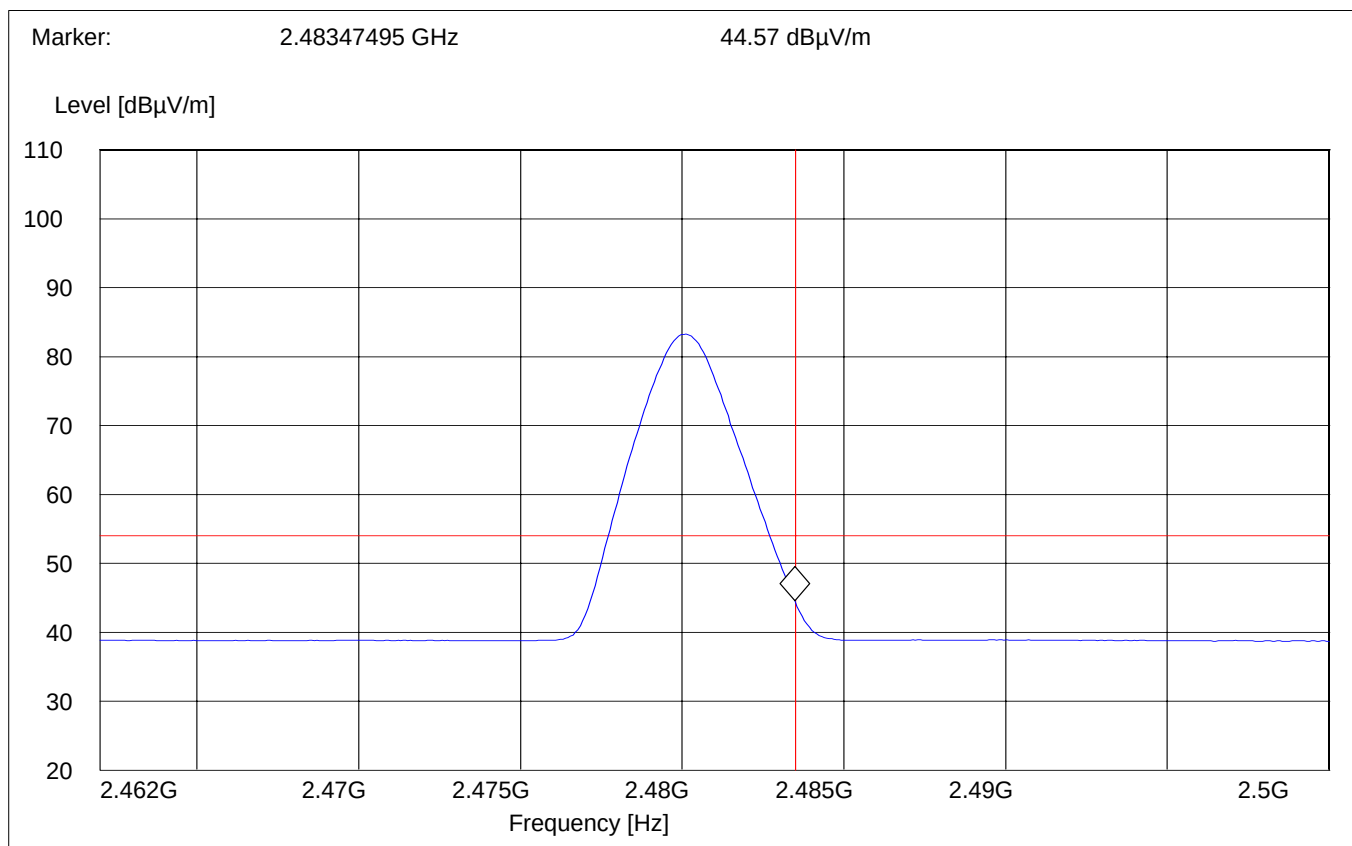
## High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)

### Average Measurement

(This plot is valid for both Hopping ON & OFF)

Operating condition : Tx at 2480MHz  
 SWEEP TABLE : "FCC15.247 HBE\_AVG"  
 Short Description : FCC15.247 BT High-band-edge  
 Limit Line : 54dB $\mu$ V

| Start Frequency | Stop Frequency | Detector Time | Meas. Bandw. | RBW   | VBW  | Transducer      |
|-----------------|----------------|---------------|--------------|-------|------|-----------------|
| 2.462 GHz       | 2.5 GHz        | MaxPeak       | Coupled      | 1 MHz | 10Hz | #326 horn (dBi) |



# BAND EDGE COMPLIANCE

§15.247 (c)

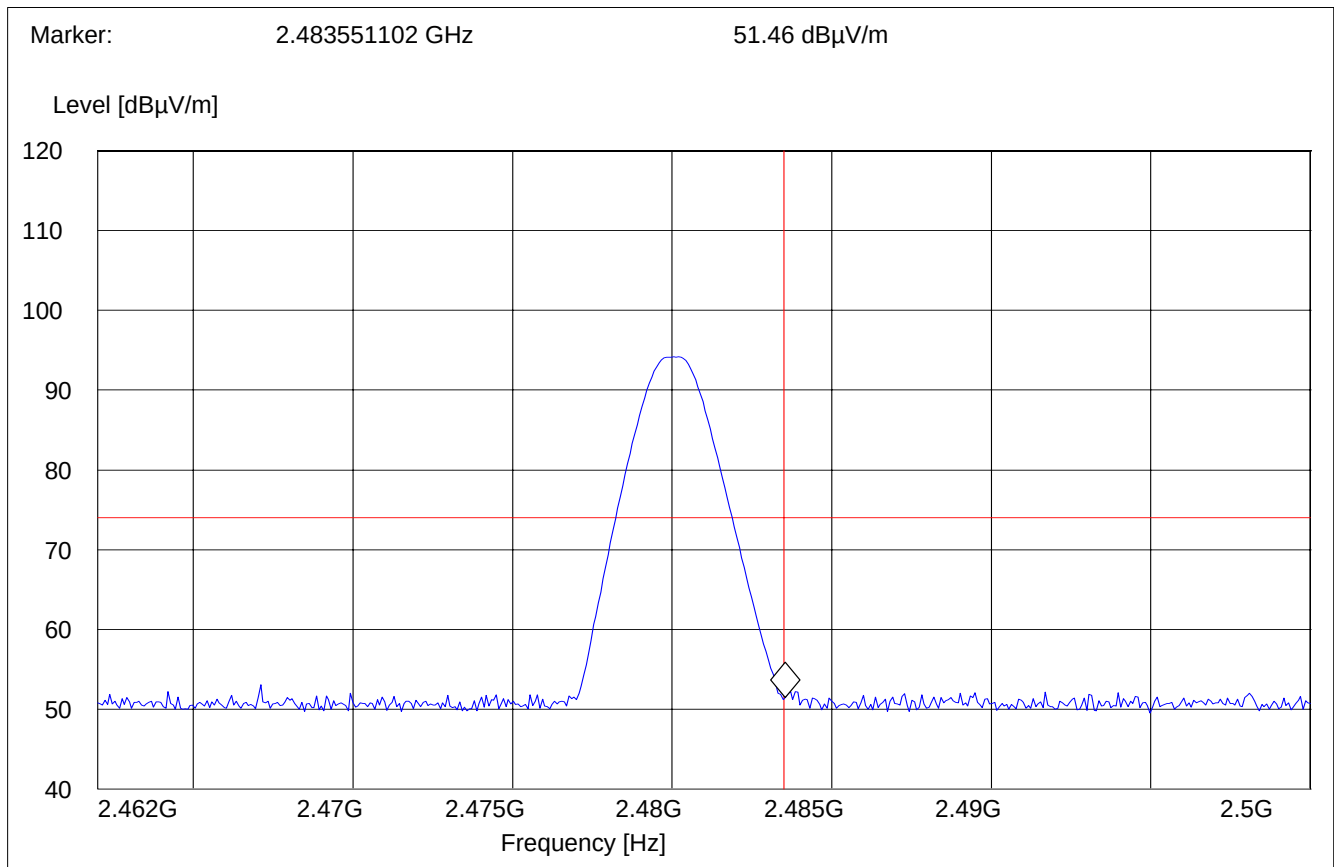
## High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)

### Peak Measurement

(This plot is valid for both Hopping ON & OFF)

Operating condition : Tx at 2480MHz  
 SWEEP TABLE : "FCC15.247 HBE\_PK"  
 Short Description : FCC15.247 BT High-band-edge  
 Limit Line : 74dB $\mu$ V

| Start Frequency | Stop Frequency | Detector Time | Meas. Bandw. | RBW   | VBW  | Transducer      |
|-----------------|----------------|---------------|--------------|-------|------|-----------------|
| 2.462 GHz       | 2.5 GHz        | MaxPeak       | Coupled      | 1 MHz | 1MHz | #326 horn (dBi) |



---

**EMISSION LIMITATIONS**  
**Transmitter (Conducted)**  
**LIMITS****§ 15.247 (c) (1)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions that 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)).

**NOTE:** Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.

## EMISSION LIMITATIONS - Conducted (Transmitter)

§ 15.247 (c) (1)

Lowest Channel (2402MHz): 30MHz - 25GHz



Ref Lvl  
4.1 dBm

Marker 1 [T1]

-4.22 dBm

2.38188377 GHz

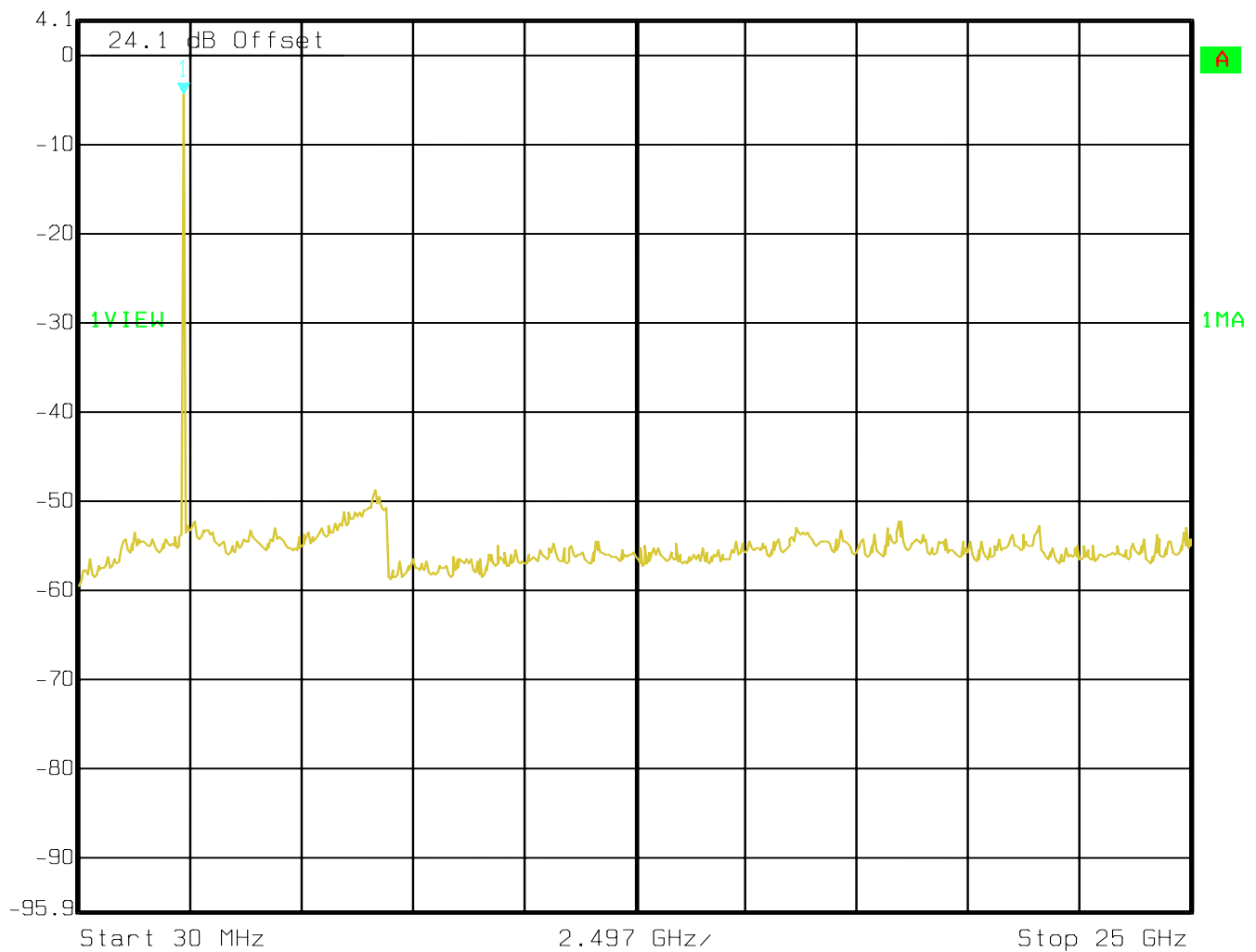
RBW 100 kHz

VBW 100 kHz

SWT 6.4 s

RF Att 10 dB

Unit dBm



Date: 18.AUG.2004 14:47:30

## EMISSION LIMITATIONS - Conducted (Transmitter)

§ 15.247 (c) (1)

Mid Channel (2441MHz): 30MHz - 25GHz



Ref Lvl  
4.1 dBm

Marker 1 [T1]

-6.39 dBm

2.43192385 GHz

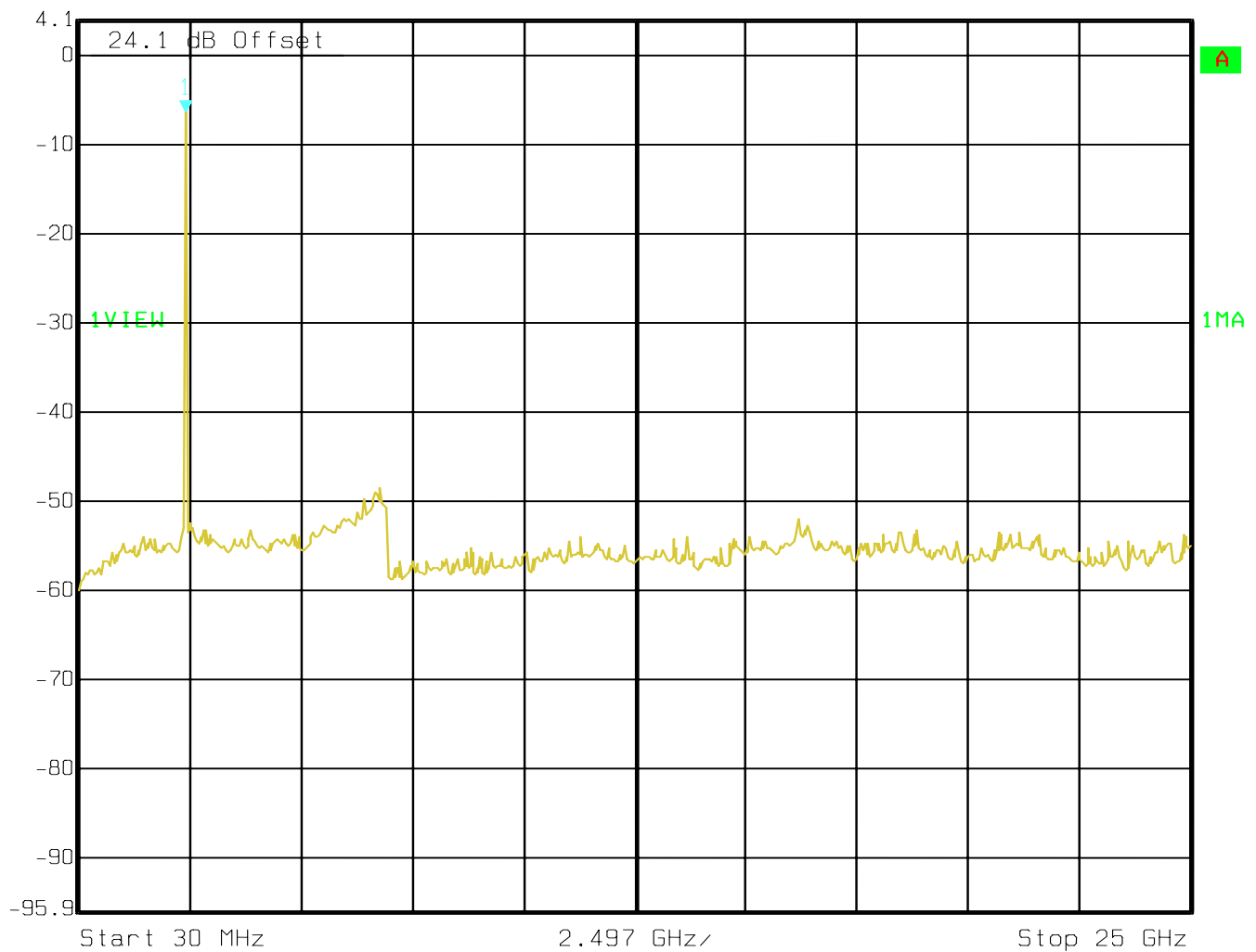
RBW 100 kHz

VBW 100 kHz

SWT 6.4 s

RF Att 10 dB

Unit dBm



Date: 18.AUG.2004 14:46:33

## EMISSION LIMITATIONS - Conducted (Transmitter)

§ 15.247 (c) (1)

Highest Channel (2480MHz): 30MHz - 25GHz



Ref Lvl  
4.1 dBm

Marker 1 [T1]

-9.01 dBm

2.48196393 GHz

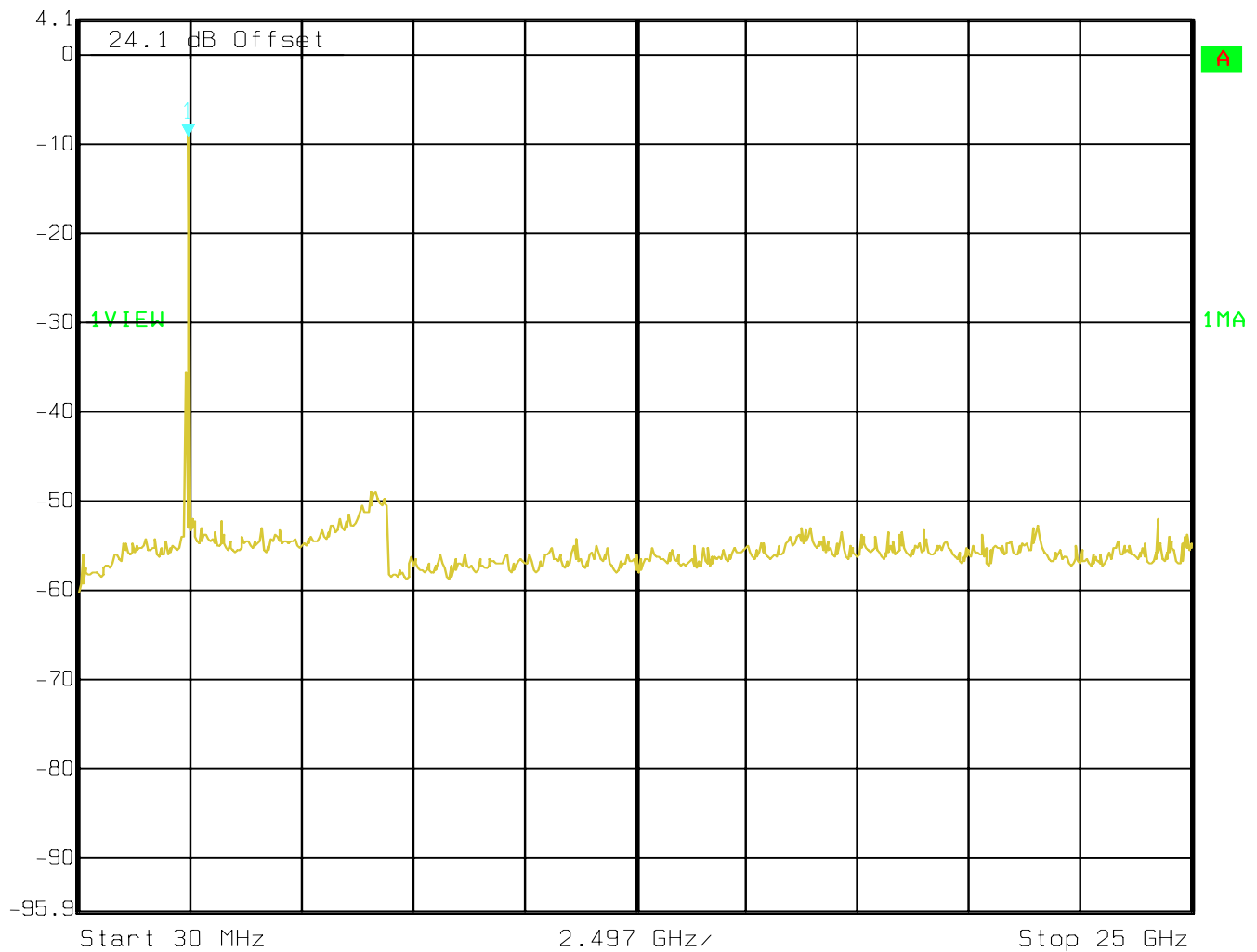
RBW 100 kHz

VBW 100 kHz

SWT 6.4 s

RF Att 10 dB

Unit dBm



Date: 18.AUG.2004 14:48:19

**EMISSION LIMITATIONS**  
**Transmitter (Radiated)**

§ 15.247 (c) (1)

**LIMITS**

**In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions that 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)).**

**NOTE:**

1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 26.5 GHz very short cable connections to the antenna was used to minimize the noise level.
2. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.
3. All measurements are done in peak mode unless specified with plots.

**Results for the radiated measurements below 30MHz according § 15.33**

| <b>Frequency</b> | <b>Measured values</b>                | <b>Remarks</b>                            |
|------------------|---------------------------------------|-------------------------------------------|
| 9KHz – 30MHz     | No emissions found, caused by the EUT | This is valid for all the tested channels |

**EMISSION LIMITATIONS - Radiated (Transmitter)****§ 15.247 (c) (1)**

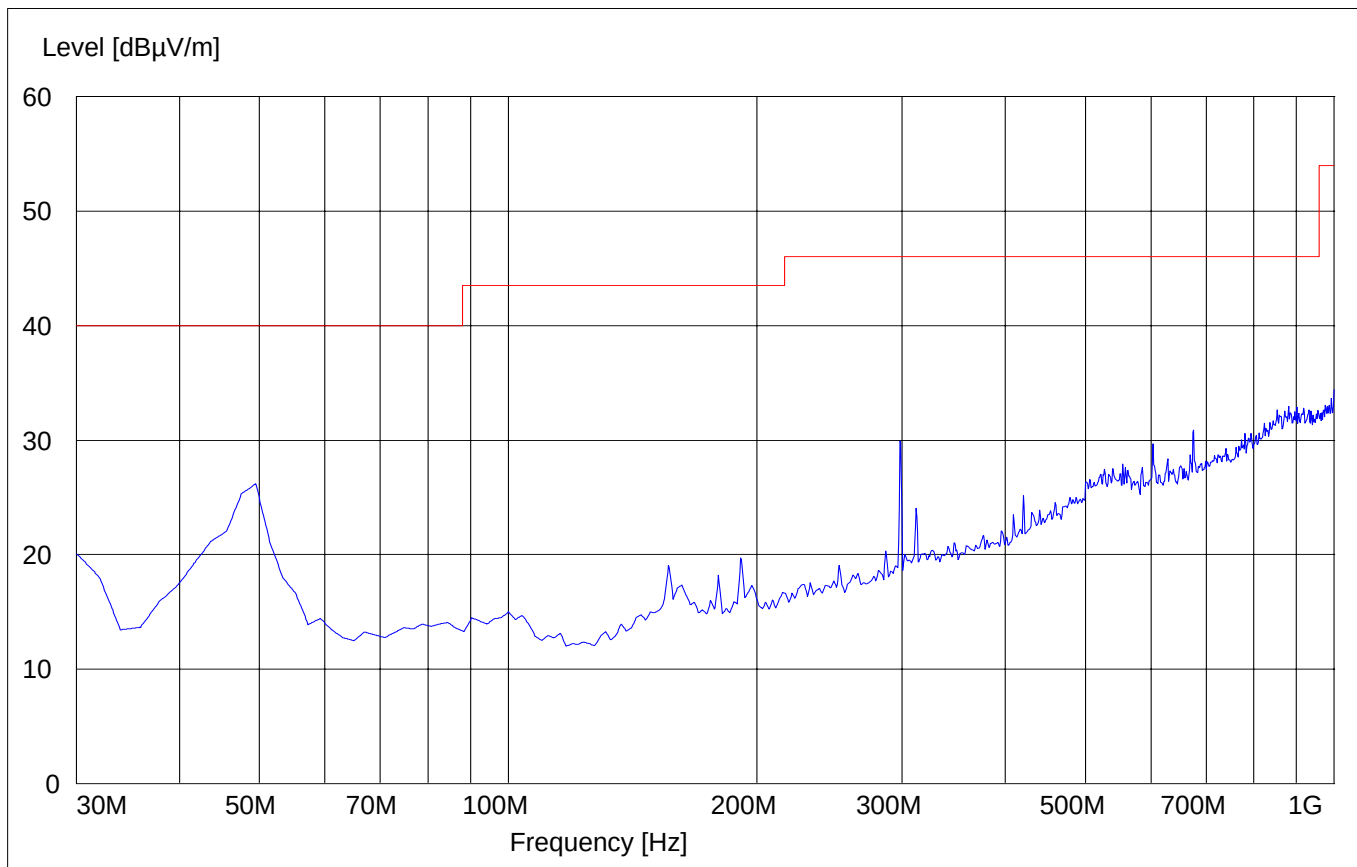
**Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.**

| Transmit at Lowest channel Frequency 2402MHz  |                |            |         |
|-----------------------------------------------|----------------|------------|---------|
| Frequency (MHz)                               | Level (dBµV/m) |            |         |
|                                               | Peak           | Quasi-Peak | Average |
| SEE PLOTS                                     |                |            |         |
|                                               |                |            |         |
| Transmit at Middle channel Frequency 2441MHz  |                |            |         |
| Frequency (MHz)                               | Level (dBµV/m) |            |         |
|                                               | Peak           | Quasi-Peak | Average |
| SEE PLOTS                                     |                |            |         |
|                                               |                |            |         |
|                                               |                |            |         |
| Transmit at Highest channel Frequency 2480MHz |                |            |         |
| Frequency (MHz)                               | Level (dBµV/m) |            |         |
|                                               | Peak           | Quasi-Peak | Average |
| SEE PLOTS                                     |                |            |         |
|                                               |                |            |         |

**EMISSION LIMITATIONS - Radiated (Transmitter)****§ 15.247 (c) (1)****30MHz – 1GHz****Antenna: vertical****Note: This plot is valid for low, mid & high channels (worst-case plot)**

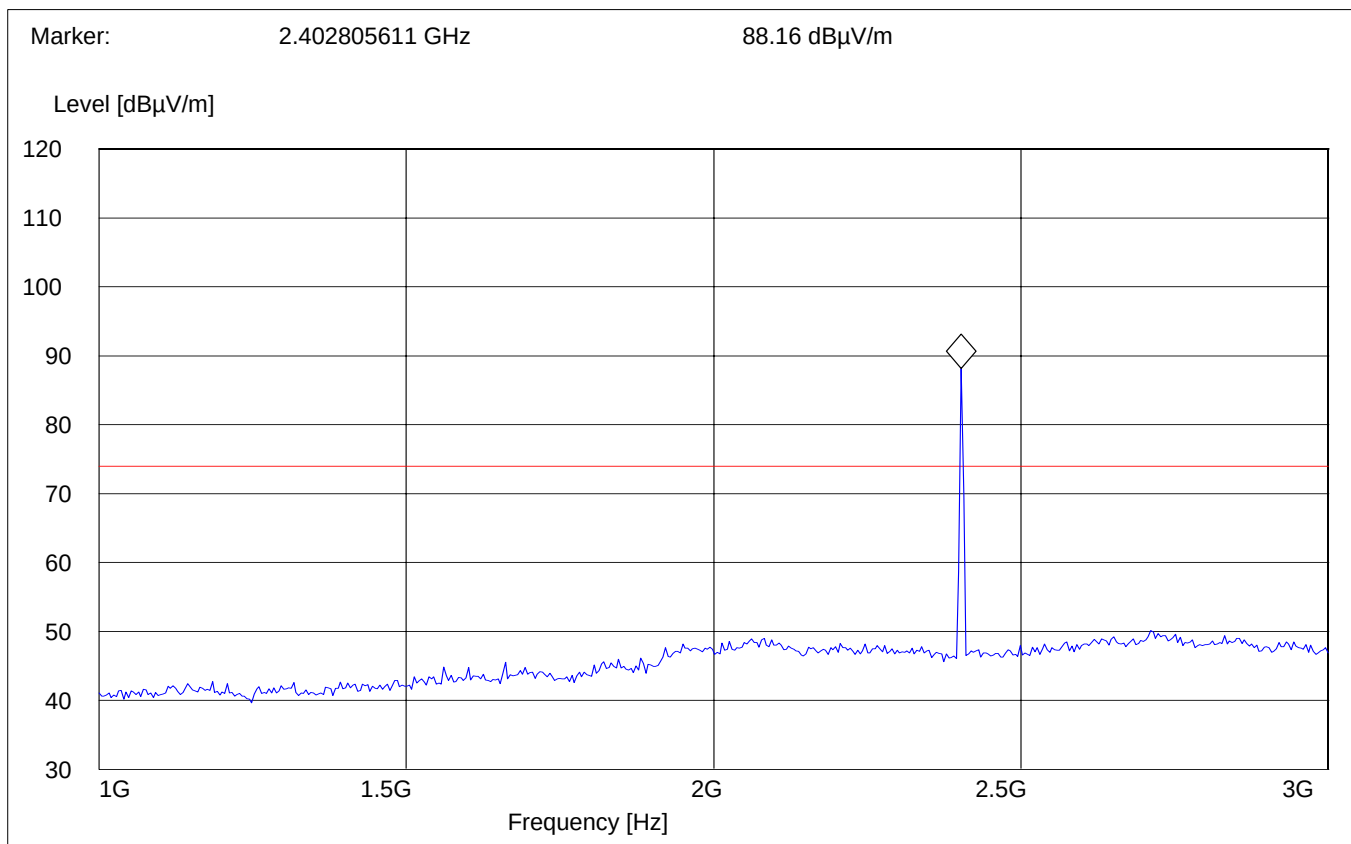
SWEEP TABLE: "BT Spuri hi 30-1G"  
Short Description: Bluetooth 30MHz-1GHz

| Start    | Stop    | Detector | Meas. Time | RBW     | VBW | Transducer |
|----------|---------|----------|------------|---------|-----|------------|
| 30.0 MHz | 1.0 GHz | MaxPeak  | Coupled    | 100 kHz |     | 3141-#1186 |



**EMISSION LIMITATIONS - Radiated (Transmitter)**
**§ 15.247 (c) (1)**
**Lowest Channel (2402MHz): 1GHz – 3GHz**
**NOTE: The peak above the limit is the carrier frequency.**

|                    |           |                           |         |       |                 |
|--------------------|-----------|---------------------------|---------|-------|-----------------|
| SWEEP TABLE:       |           | "BT Spuri hi 1-3G"        |         |       |                 |
| Short Description: |           | Bluetooth Spurious 1-3GHz |         |       |                 |
| Start              | Stop      | Detector                  | Meas.   | RBW   | Transducer      |
| Frequency          | Frequency | Time                      | Bandw.  | VBW   |                 |
| 1.0 GHz            | 3.0 GHz   | MaxPeak                   | Coupled | 1 MHz | #326 horn (dBi) |

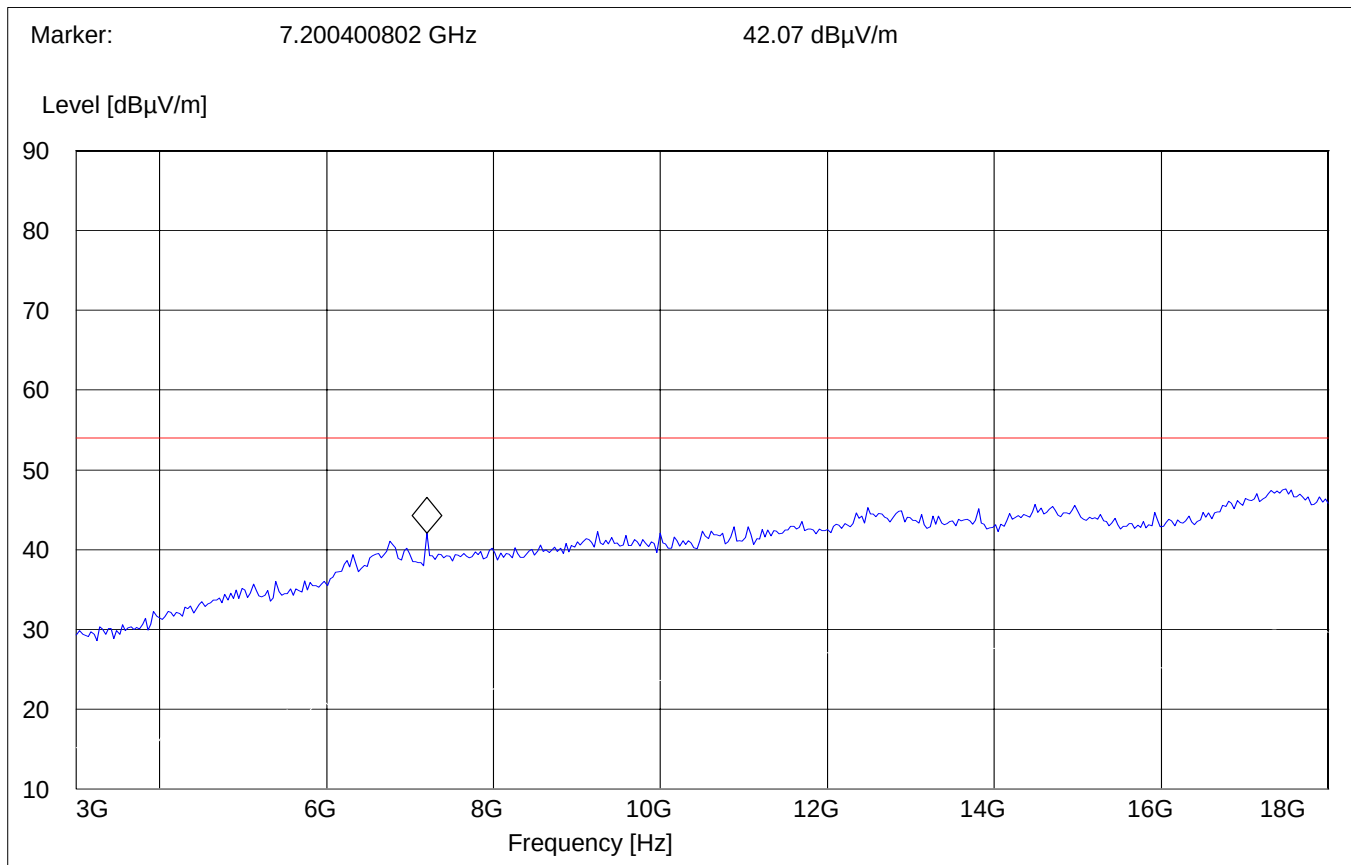


## EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

Lowest Channel (2402MHz): 3GHz – 18GHz

|                    |           |                             |         |       |                 |
|--------------------|-----------|-----------------------------|---------|-------|-----------------|
| SWEEP TABLE:       |           | "BT Spuri hi 3-18G"         |         |       |                 |
| Short Description: |           | Bluetooth Spurious 3-18 GHz |         |       |                 |
| Start              | Stop      | Detector                    | Meas.   | RBW   | Transducer      |
| Frequency          | Frequency | Time                        | Bandw.  | VBW   |                 |
| 3.0 GHz            | 18.0 GHz  | MaxPeak                     | Coupled | 1 MHz | #326 horn (dBi) |



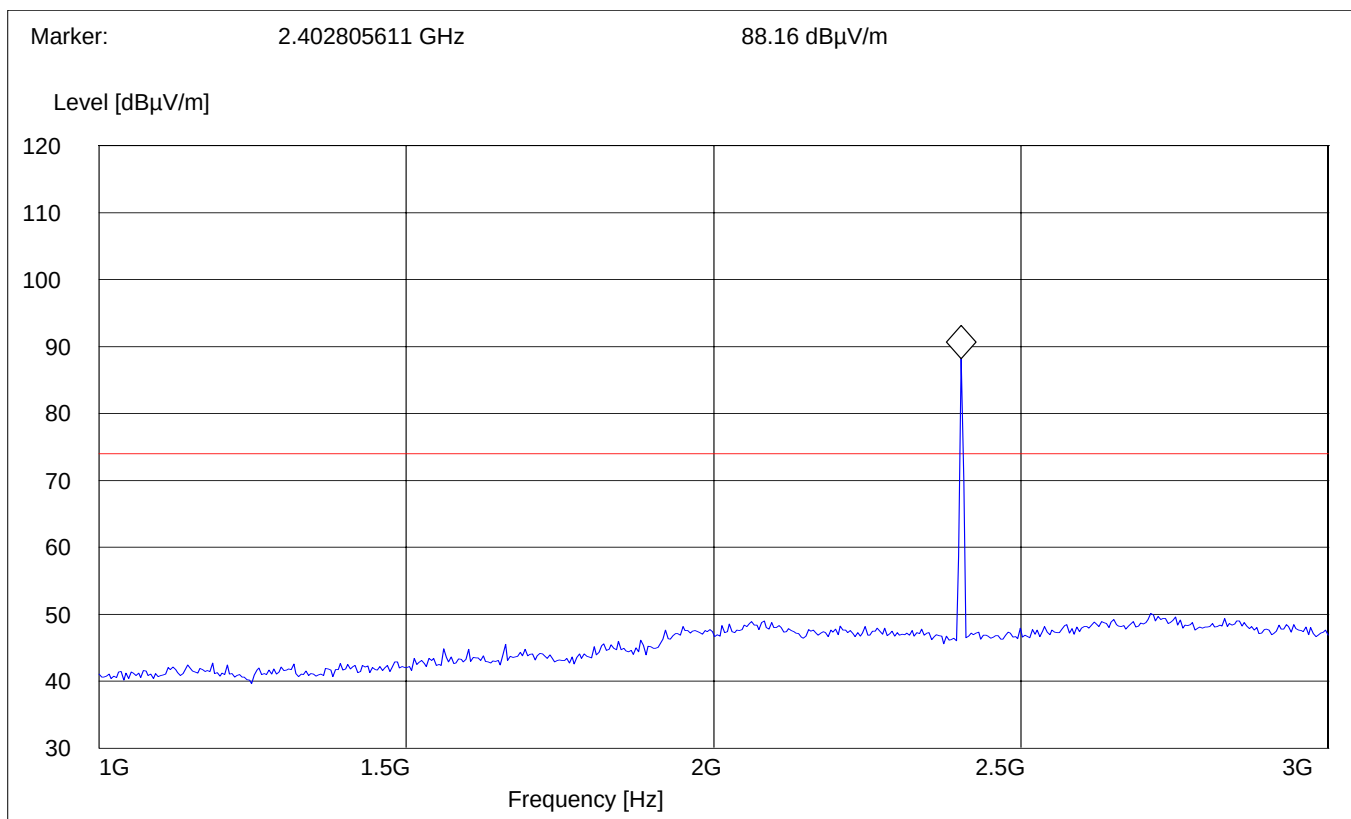
# EMISSION LIMITATIONS - Radiated (Transmitter)

## Middle Channel (2441MHz): 1GHz – 3GHz

§ 15.247 (c) (1)

**NOTE: The peak above the limit is the carrier frequency.**

|                    |           |                           |         |       |                 |
|--------------------|-----------|---------------------------|---------|-------|-----------------|
| SWEEP TABLE:       |           | "BT Spuri hi 1-3G"        |         |       |                 |
| Short Description: |           | Bluetooth Spurious 1-3GHz |         |       |                 |
| Start              | Stop      | Detector                  | Meas.   | RBW   | Transducer      |
| Frequency          | Frequency | Time                      | Bandw.  | VBW   |                 |
| 1.0 GHz            | 3.0 GHz   | MaxPeak                   | Coupled | 1 MHz | #326 horn (dBi) |

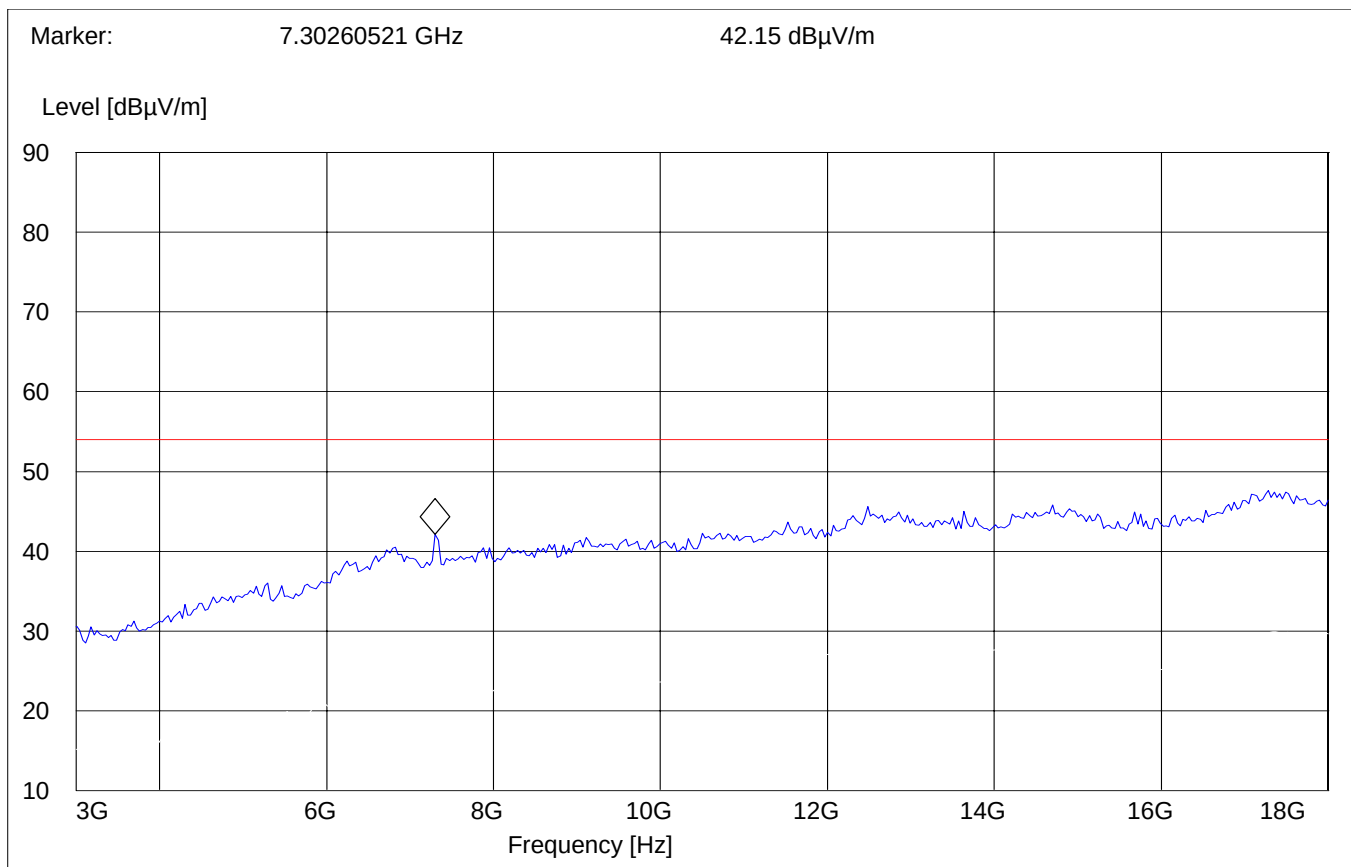


# EMISSION LIMITATIONS - Radiated (Transmitter)

## Middle Channel (2441MHz): 3GHz – 18GHz

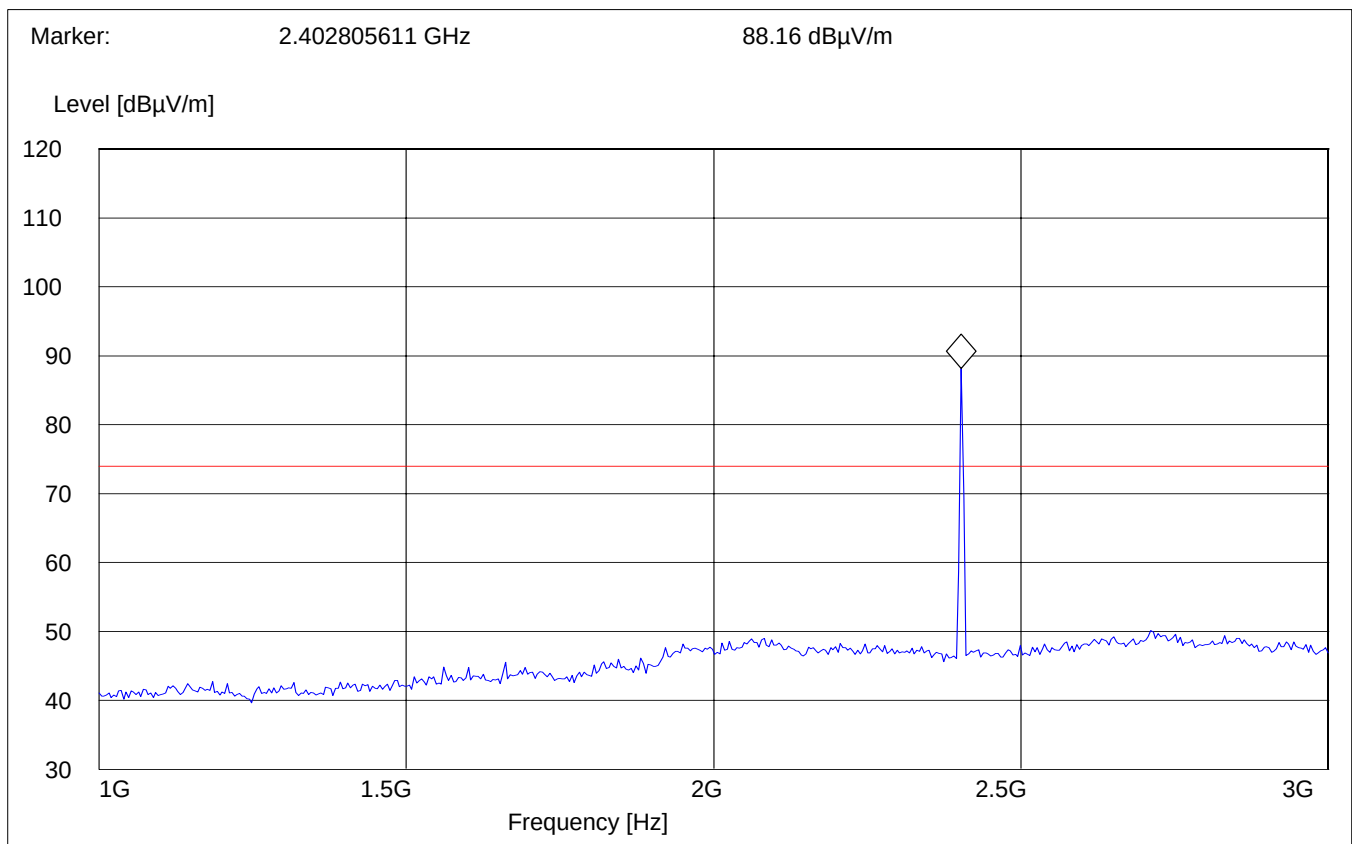
§ 15.247 (c) (1)

|                    |           |                            |         |       |                 |
|--------------------|-----------|----------------------------|---------|-------|-----------------|
| SWEEP TABLE:       |           | "BT Spuri hi 3-18G"        |         |       |                 |
| Short Description: |           | Bluetooth Spurious 3-18GHz |         |       |                 |
| Start              | Stop      | Detector                   | Meas.   | RBW   | Transducer      |
| Frequency          | Frequency | Time                       | Bandw.  | VBW   |                 |
| 3.0 GHz            | 18.0 GHz  | MaxPeak                    | Coupled | 1 MHz | #326 horn (dBi) |



**EMISSION LIMITATIONS - Radiated (Transmitter)**
**§ 15.247 (c) (1)**
**Highest Channel (2480MHz): 1GHz – 3GHz**
**NOTE: The peak above the limit is the carrier frequency.**

|                    |           |                           |         |       |                 |
|--------------------|-----------|---------------------------|---------|-------|-----------------|
| SWEEP TABLE:       |           | "BT Spuri hi 1-3G"        |         |       |                 |
| Short Description: |           | Bluetooth Spurious 1-3GHz |         |       |                 |
| Start              | Stop      | Detector                  | Meas.   | RBW   | Transducer      |
| Frequency          | Frequency | Time                      | Bandw.  | VBW   |                 |
| 1.0 GHz            | 3.0 GHz   | MaxPeak                   | Coupled | 1 MHz | #326 horn (dBi) |

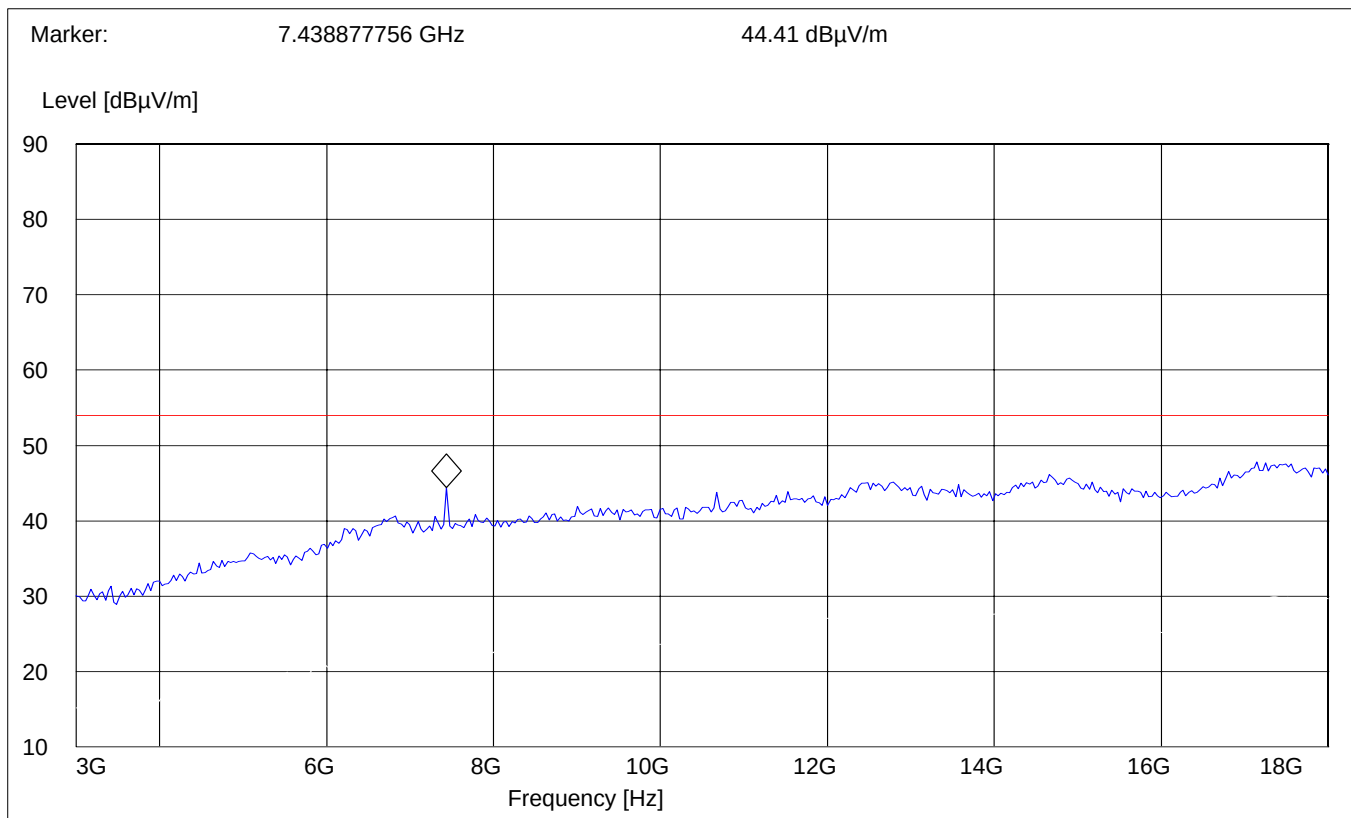


# EMISSION LIMITATIONS - Radiated (Transmitter)

## Highest Channel (2480MHz): 3GHz – 18GHz

§ 15.247 (c) (1)

|                    |           |                            |         |       |                 |
|--------------------|-----------|----------------------------|---------|-------|-----------------|
| SWEEP TABLE:       |           | "BT Spuri hi 3-18G"        |         |       |                 |
| Short Description: |           | Bluetooth Spurious 3-18GHz |         |       |                 |
| Start              | Stop      | Detector                   | Meas.   | RBW   | Transducer      |
| Frequency          | Frequency | Time                       | Bandw.  | VBW   |                 |
| 3.0 GHz            | 18.0 GHz  | MaxPeak                    | Coupled | 1 MHz | #326 horn (dBi) |



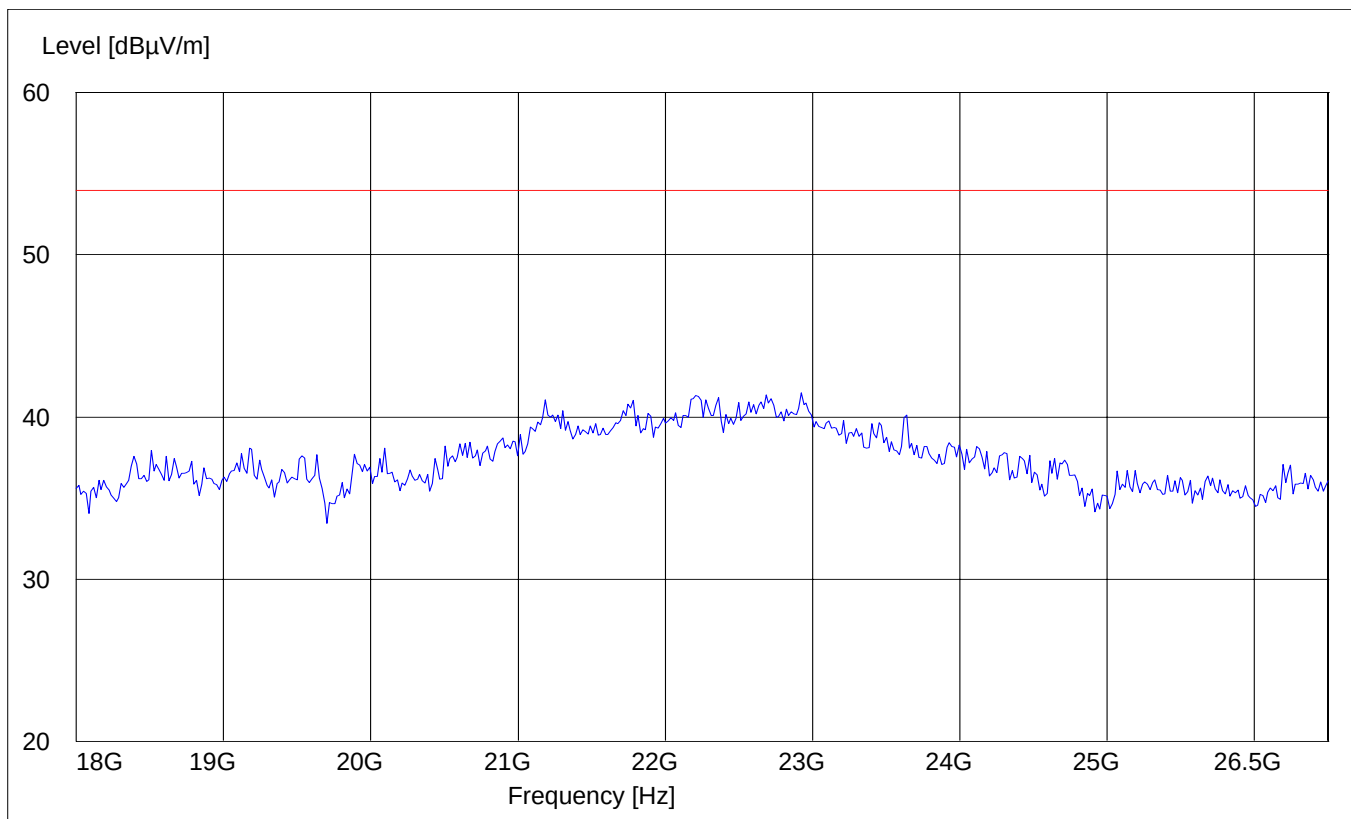
# EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

18GHz – 26.5GHz

**Note: This plot is valid for low, mid & high channels (worst-case plot)**

|                    |           |                               |         |       |                 |
|--------------------|-----------|-------------------------------|---------|-------|-----------------|
| SWEEP TABLE:       |           | "BT Spuri hi 18-26.5G"        |         |       |                 |
| Short Description: |           | Bluetooth Spurious 18-26.5GHz |         |       |                 |
| Start              | Stop      | Detector                      | Meas.   | RBW   | Transducer      |
| Frequency          | Frequency | Time                          | Bandw.  | VBW   |                 |
| 18 GHz             | 26.5 GHz  | MaxPeak                       | Coupled | 1 MHz | #141 horn (dBi) |



**CONDUCTED EMISSIONS**

§ 15.107/207

Measured with AC/DC power adapter model# Nokia ACP-7U

Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)

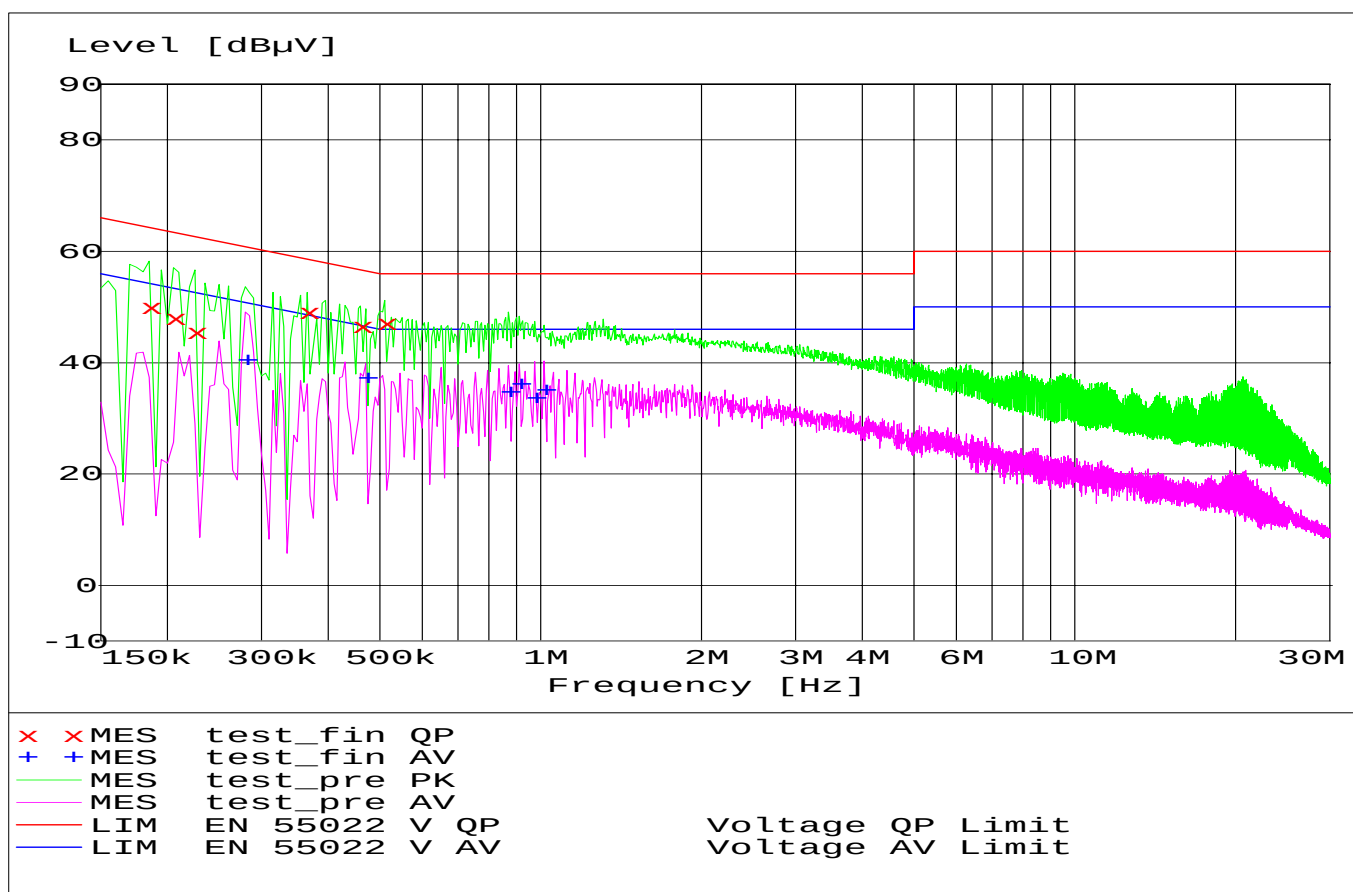
**Limit**

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

\* Decreases with logarithm of the frequency

ANALYZER SETTINGS: RBW = 10KHz

VBW = 10KHz



**MEASUREMENT RESULT: "test\_fin QP"**

| Frequency<br>MHz | Level<br>dBµV | Transd<br>dB | Limit<br>dBµV | Margin<br>dB | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|------|-----|
| 0.185000         | 49.90         | 0.0          | 64            | 14.4         | N    | GND |
| 0.205000         | 47.90         | 0.0          | 63            | 15.5         | N    | GND |
| 0.225000         | 45.40         | 0.0          | 63            | 17.2         | L1   | GND |
| 0.365000         | 49.00         | 0.0          | 59            | 9.6          | N    | GND |
| 0.460000         | 46.60         | 0.0          | 57            | 10.1         | N    | GND |
| 0.510000         | 47.00         | 0.0          | 56            | 9.0          | L1   | GND |

**MEASUREMENT RESULT: "test\_fin AV"**

| Frequency<br>MHz | Level<br>dBµV | Transd<br>dB | Limit<br>dBµV | Margin<br>dB | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|------|-----|
| 0.280000         | 40.50         | 0.0          | 51            | 10.3         | N    | GND |
| 0.470000         | 37.20         | 0.0          | 47            | 9.4          | N    | GND |
| 0.870000         | 34.60         | 0.0          | 46            | 11.4         | N    | GND |
| 0.910000         | 36.20         | 0.0          | 46            | 9.8          | N    | GND |
| 0.975000         | 33.50         | 0.0          | 46            | 12.5         | N    | GND |
| 1.015000         | 35.00         | 0.0          | 46            | 11.0         | L1   | GND |

**RECEIVER SPURIOUS RADIATION****§ 15.209****Limits**

| <b>Frequency (MHz)</b> | <b>Field strength (µV/m)</b> | <b>Measurement distance (m)</b> |
|------------------------|------------------------------|---------------------------------|
| <b>0.009 - 0.490</b>   | <b>2400/F(kHz)</b>           | <b>300</b>                      |
| <b>0.490 - 1.705</b>   | <b>24000/F(kHz)</b>          | <b>30</b>                       |
| <b>1.705 - 30.0</b>    | <b>30</b>                    | <b>30</b>                       |
| <b>30 - 88</b>         | <b>100</b>                   | <b>3</b>                        |
| <b>88 - 216</b>        | <b>150</b>                   | <b>3</b>                        |
| <b>216 - 960</b>       | <b>200</b>                   | <b>3</b>                        |
| <b>above 960</b>       | <b>500</b>                   | <b>3</b>                        |

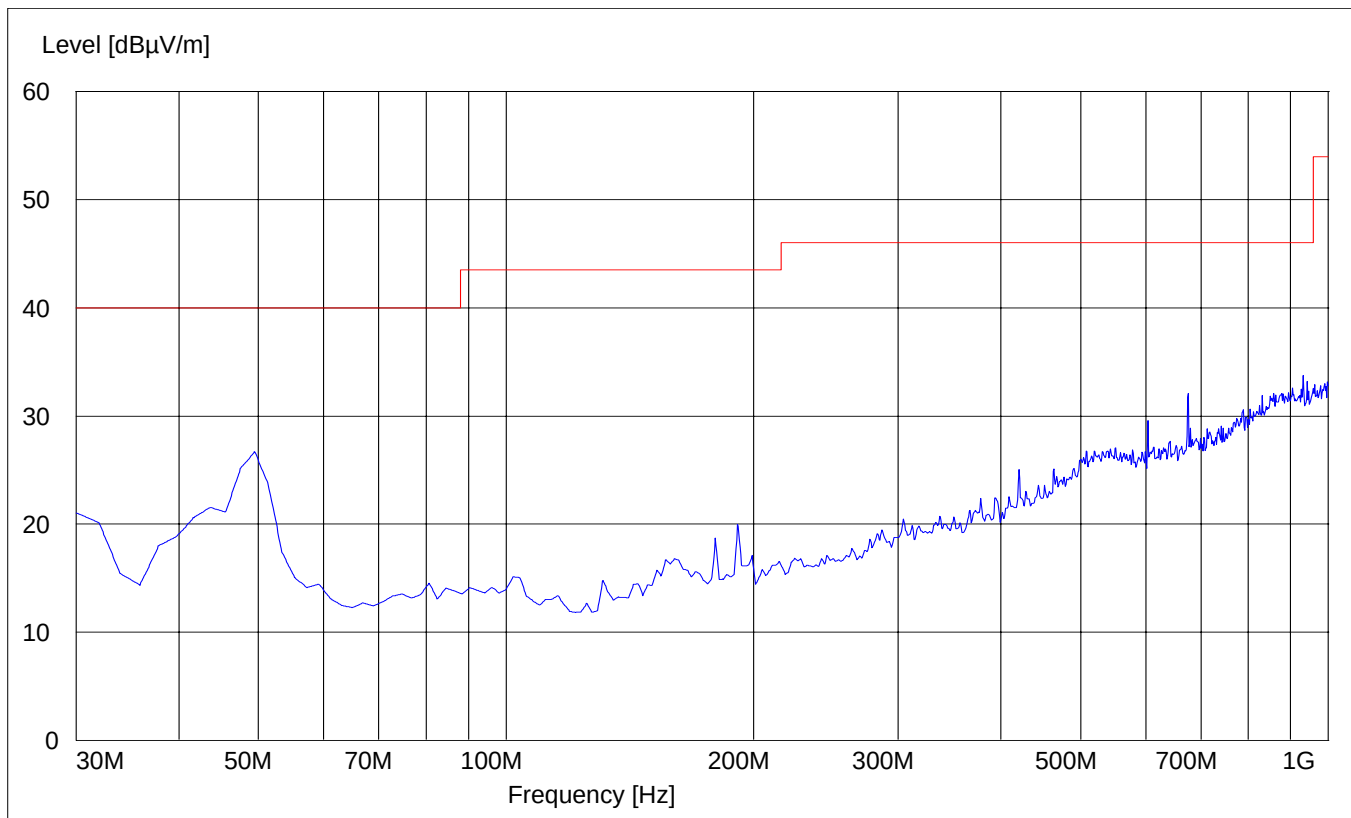
**NOTE:**

1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 26.5 GHz very short cable connections to the antenna was used to minimize the noise level.
2. All measurements are done in peak mode unless specified with the plots.

**RECEIVER SPURIOUS RADIATION****§ 15.209****30MHz – 1GHz****Antenna: vertical (worst-case plot)**

SWEEP TABLE: "BT Spuri hi 30-1G"  
Short Description: Bluetooth 30MHz-1GHz

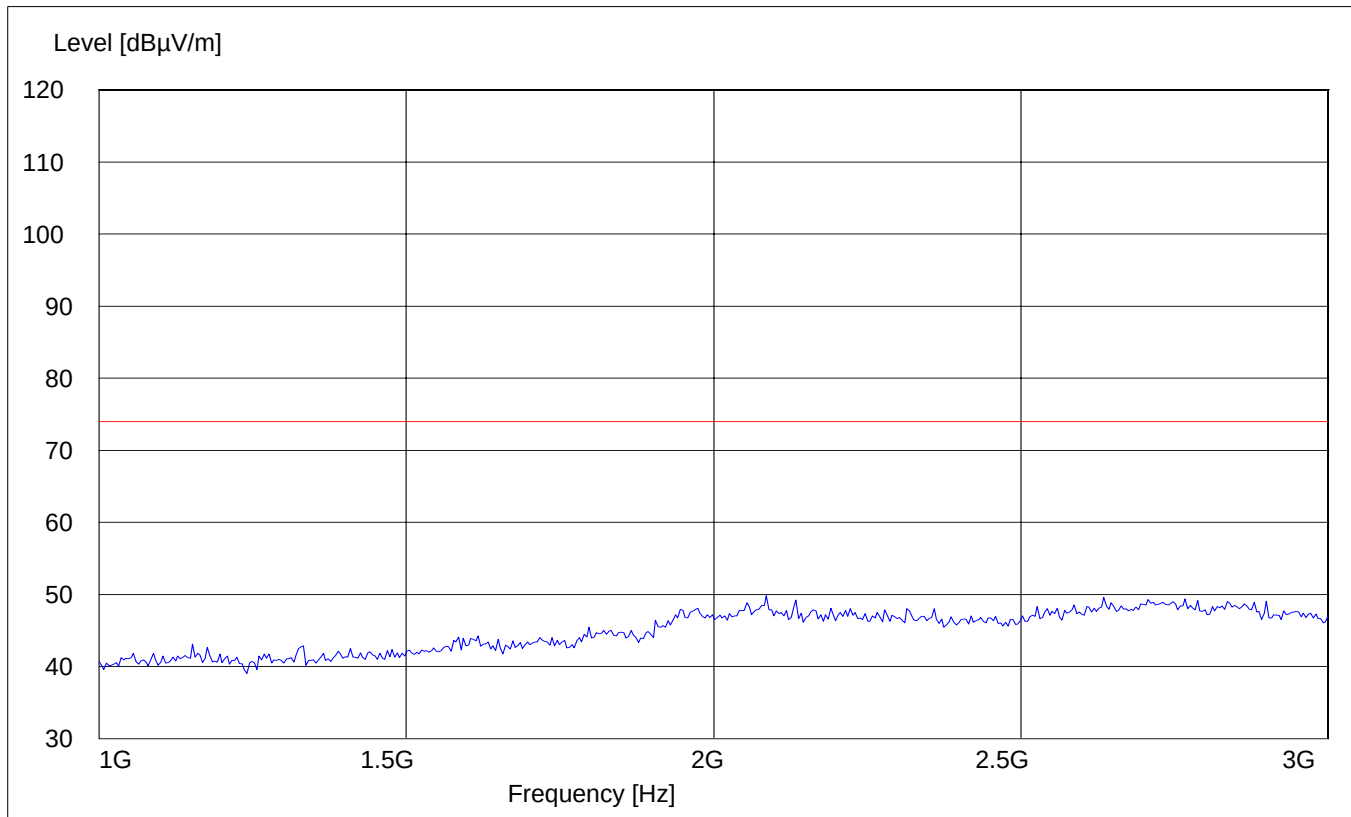
| Start     | Stop      | Detector | Meas.   | RBW     | Transducer |
|-----------|-----------|----------|---------|---------|------------|
| Frequency | Frequency |          | Time    | VBW     |            |
| 30.0 MHz  | 1.0 GHz   | MaxPeak  | Coupled | 100 kHz | 3141-#1186 |



**RECEIVER SPURIOUS RADIATION**  
**1GHz – 3GHz**

§ 15.209

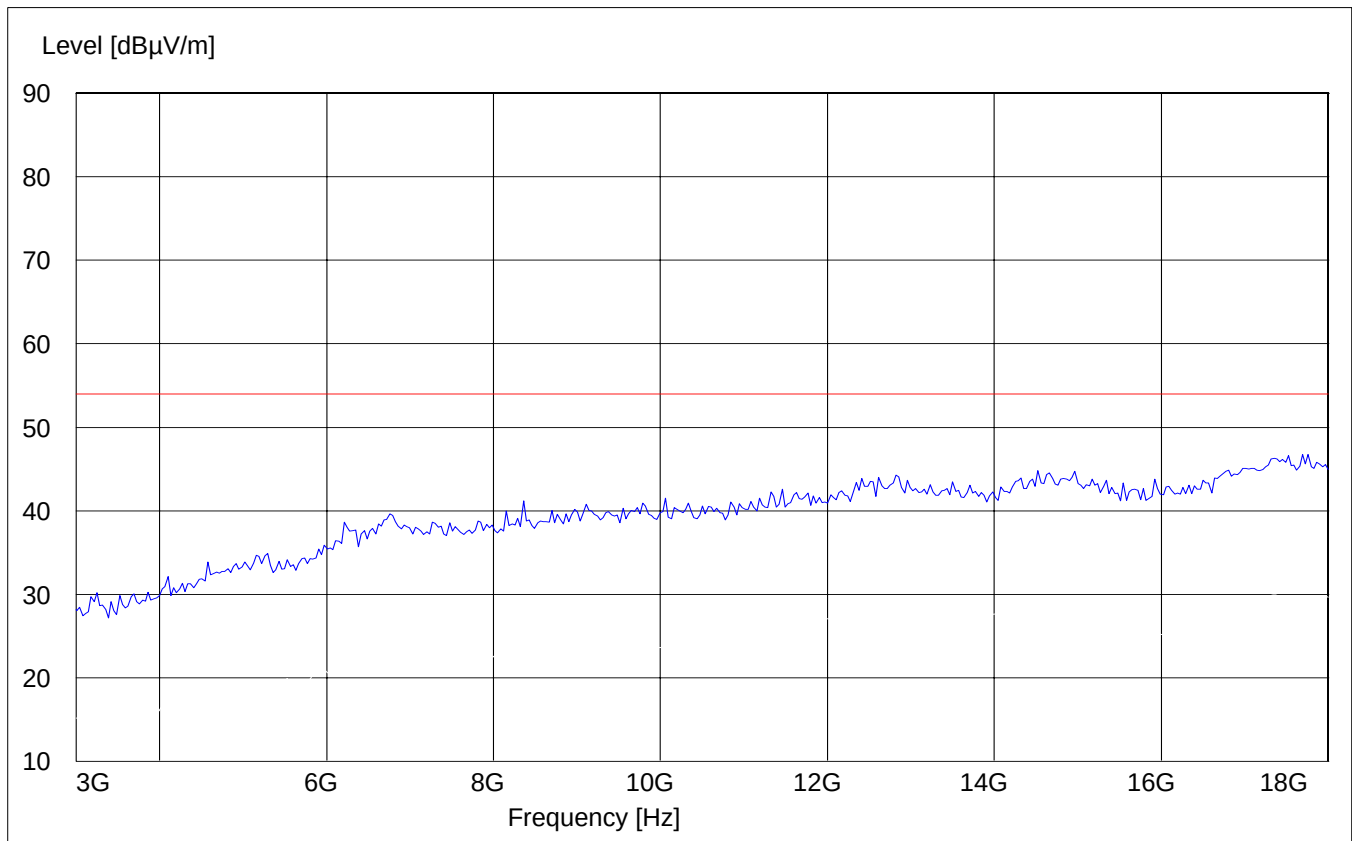
|                    |           |                           |         |       |                 |
|--------------------|-----------|---------------------------|---------|-------|-----------------|
| SWEEP TABLE:       |           | "BT Spuri hi 1-3G"        |         |       |                 |
| Short Description: |           | Bluetooth Spurious 1-3GHz |         |       |                 |
| Start              | Stop      | Detector                  | Meas.   | RBW   | Transducer      |
| Frequency          | Frequency | Time                      | Bandw.  | VBW   |                 |
| 1.0 GHz            | 3.0 GHz   | MaxPeak                   | Coupled | 1 MHz | #326 horn (dBi) |



**RECEIVER SPURIOUS RADIATION**  
**3GHz – 18GHz**

§ 15.209

|                    |           |                             |         |       |                 |
|--------------------|-----------|-----------------------------|---------|-------|-----------------|
| SWEEP TABLE:       |           | "BT Spuri hi 3-18G"         |         |       |                 |
| Short Description: |           | Bluetooth Spurious 3-18 GHz |         |       |                 |
| Start              | Stop      | Detector                    | Meas.   | RBW   | Transducer      |
| Frequency          | Frequency | Time                        | Bandw.  | VBW   |                 |
| 3.0 GHz            | 18.0 GHz  | MaxPeak                     | Coupled | 1 MHz | #326 horn (dBi) |

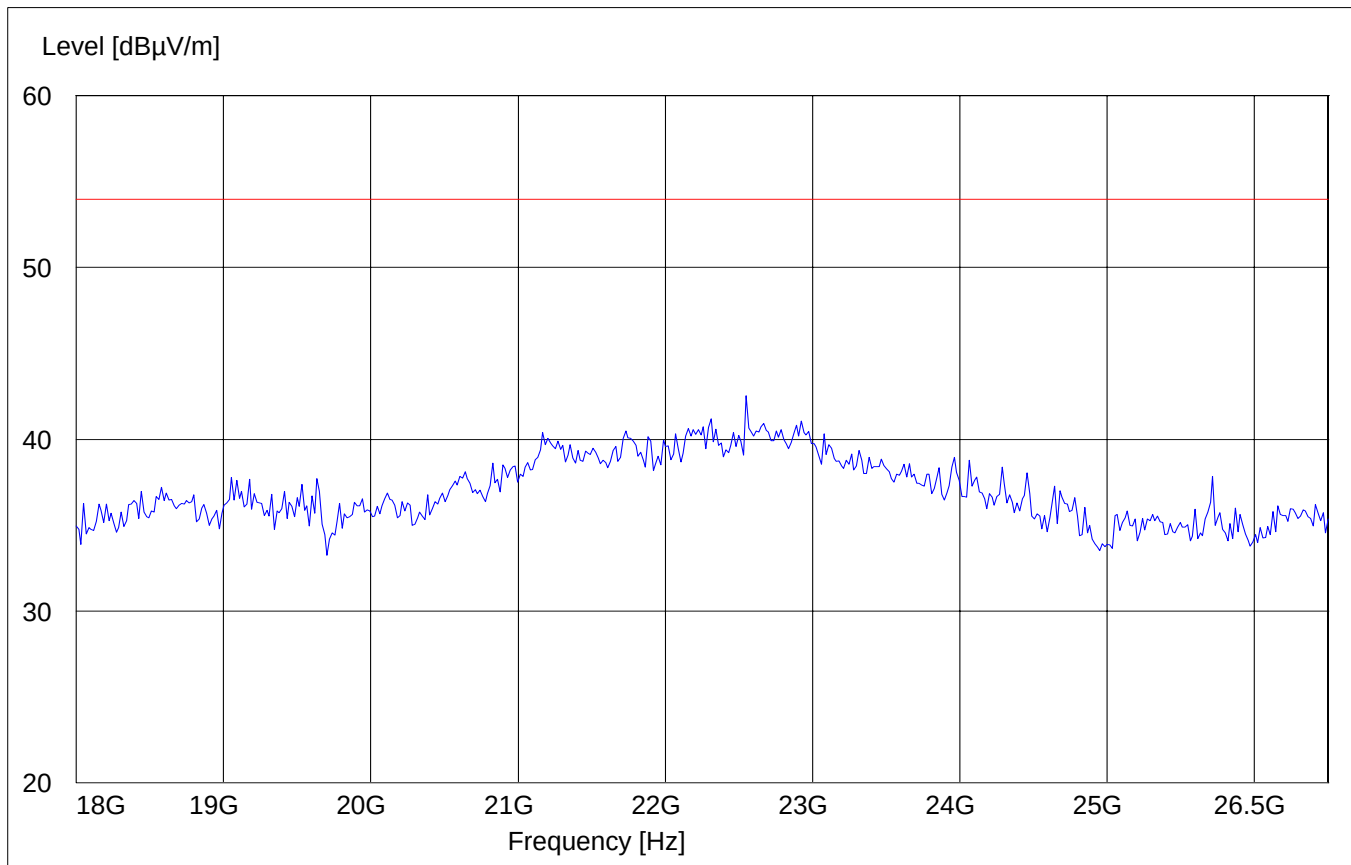


# RECEIVER SPURIOUS RADIATION

## 18GHz – 26.5GHz

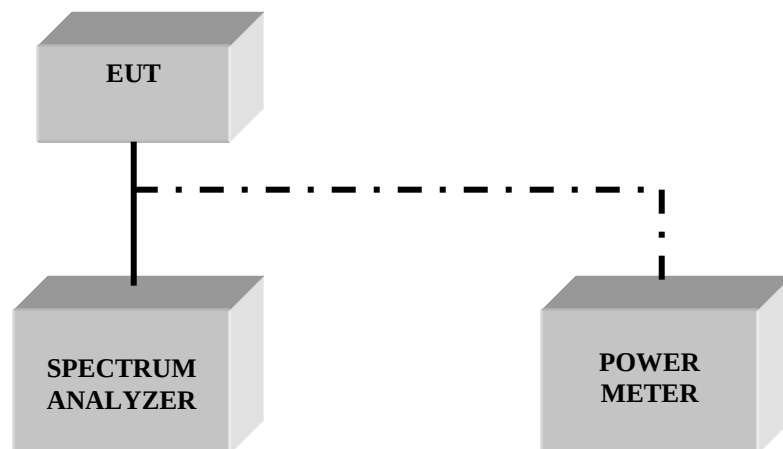
§ 15.209

|                    |           |                               |         |       |                 |
|--------------------|-----------|-------------------------------|---------|-------|-----------------|
| SWEEP TABLE:       |           | "BT Spuri hi 18-26.5G"        |         |       |                 |
| Short Description: |           | Bluetooth Spurious 18-26.5GHz |         |       |                 |
| Start              | Stop      | Detector                      | Meas.   | RBW   | Transducer      |
| Frequency          | Frequency | Time                          | Bandw.  | VBW   |                 |
| 18.0 GHz           | 26.5 GHz  | MaxPeak                       | Coupled | 1 MHz | #326 horn (dBi) |



**TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS**

| No | Instrument/Ancillary      | Type         | Manufacturer    | Serial No. |
|----|---------------------------|--------------|-----------------|------------|
| 01 | Spectrum Analyzer         | ESIB 40      | Rohde & Schwarz | 100107     |
| 02 | Spectrum Analyzer         | FSEM 30      | Rohde & Schwarz | 826880/010 |
| 03 | Biconilog Antenna         | 3141         | EMCO            | 0005-1186  |
| 04 | Horn Antenna (700M-18GHz) | SAS-200/571  | AH Systems      | 325        |
| 05 | Horn Antenna (18-26.5GHz) | 3160-09      | EMCO            | 1240       |
| 06 | 2-3GHz Band reject filter | BRM50701     | Microtronics    | 6          |
| 07 | Pre-Amplifier             | TS-ANA       | Rohde & Schwarz | --         |
| 08 | Pre-Amplifier             | JS4-00102600 | Miteq           | 00616      |

**BLOCK DIAGRAMS**  
**Conducted Testing**

## Radiated Testing

### ANECHOIC CHAMBER

