# FCC Test Report

**Test report no.: EMC_843FCC15.247_2005_BUP_BT**

**FCC Part 15.247 for FHSS systems / CANADA RSS-210**
**Model: D7900BUP**
**FCC ID: HD57900BUP**
**IC: 1693B-79BUP**

Deutscher Akkreditierungs Rat DAR

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

Accredited according to **ISO/IEC 17025**

Bluetooth

**Bluetooth Qualification Test Facility (BQTF)**

CTIA Authorized Test Lab
LAB CODE 20020328-00

**FCC listed # 101450**

**IC recognized # 3925**


***CETECOM* Inc.**

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

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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 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

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**Phone: +1 408 586 6200 Fax: +1 408 586 6299**
**E-mail: lothar.schmidt@cetecomusa.com**
**Internet: www.cetecom.com**

## 1.3 Details of applicant

| | | |
|---|---|---|
| **Name** | **:** | Hand Held Products, Inc. |
| **Street** | **:** | 700 Vision Drive |
| **City / Zip Code** | **:** | Skaneateles Falls, NY 13153 |
| **Country** | **:** | U.S.A |
| **Contact** | **:** | Naveen Velagapudi |
| **Telephone** | **:** | +1 315 685 2931 |
| **Tele-fax** | **:** | +1 315 685 1210 |
| **e-mail** | **:** | velagapudin@hhp.com |

## 1.4 Application details

| | | |
|---|---|---|
| Date of receipt test item | : | 2004-08-16 |
| Date of test | : | 2004-08-16/17/18 |

## 1.5 Test item

| | | |
|---|---|---|
| Manufacturer | : | Applicant |
| Marketing Name | : | Dolphin 7900BUP |
| Model No. | : | **D7900BUP** |
| Description | : | Dolphin 7900 is a ruggedized handheld computer which can read Barcodes and other Auto ID codes. It contains two different wireless transmitters (BT and GSM/GPRS) to send and receive data.. |
| FCC-ID | : | HD57900BUP |
| IC ID | : | 1693B-79BUP |

**Additional information**

| | | |
|---|---|---|
| Test Sample for BT | : | s/n 32598 |
| Frequency | : | 2402MHz – 2480MHz for BT |
| Type of modulation | : | GFSK |
| Number of channels | : | 79 |
| Antenna | : | Internal |
| Power supply | : | Battery or Charger (AC Adaptor) |
| Output power | : | -11.4dBm (0.00007W) max. conducted peak power |

**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.**

**PROJECT OVERVIEW:**

**NOTE: This test report covers all radiated measurements as per FCC15.247 for BT module in HHP handheld computer model#D7900BUP. For all conducted measurements please refer to *test report# BT_cond_Socket.***

# 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:<br>(only “passed” if all single measurements are “passed”) | **Passed** |

**Technical responsibility for area of testing:**

| Date | Section | Name | Signature |
|---|---|---|---|
| 2005-04-25 | EMC & Radio | Lothar Schmidt (Manager) | |

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

| Date | Section | Name | Signature |
|---|---|---|---|
| 2005-04-25 | EMC & Radio | Harpreet Sidhu (EMC Engineer) | |

## 2.2 Test report

**TEST REPORT**

**Test report no.: EMC_843FCC15.247_2005_BUP_BT**

## TEST REPORT REFERENCE

## MAXIMUM PEAK OUTPUT POWER (CONDUCTED) § 15.247 (b) (1)

| TEST CONDITIONS | | MAXIMUM PEAK OUTPUT POWER (dBm) | | |
|---|---|---|---|---|
| Frequency (MHz) | | 2402 | 2441 | 2480 |
| $T_{nom}$(23)°C | $V_{nom}$ | -13.6 | -12.7 | -11.4 |
| 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 conducted |

## MAXIMUM PEAK OUTPUT POWER (RADIATED) § 15.247 (b) (1)

**EIRP:**

| TEST CONDITIONS | | MAXIMUM PEAK OUTPUT POWER (dBm) | | |
|---|---|---|---|---|
| Frequency (MHz) | | 2402 | 2441 | 2480 |
| $T_{nom}$(23)°C | $V_{nom}$ | -19.99 | -21.63 | -22.65 |
| Measurement uncertainty | | ±0.5dBm | | |

**RBW/VBW: 3 MHz**

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

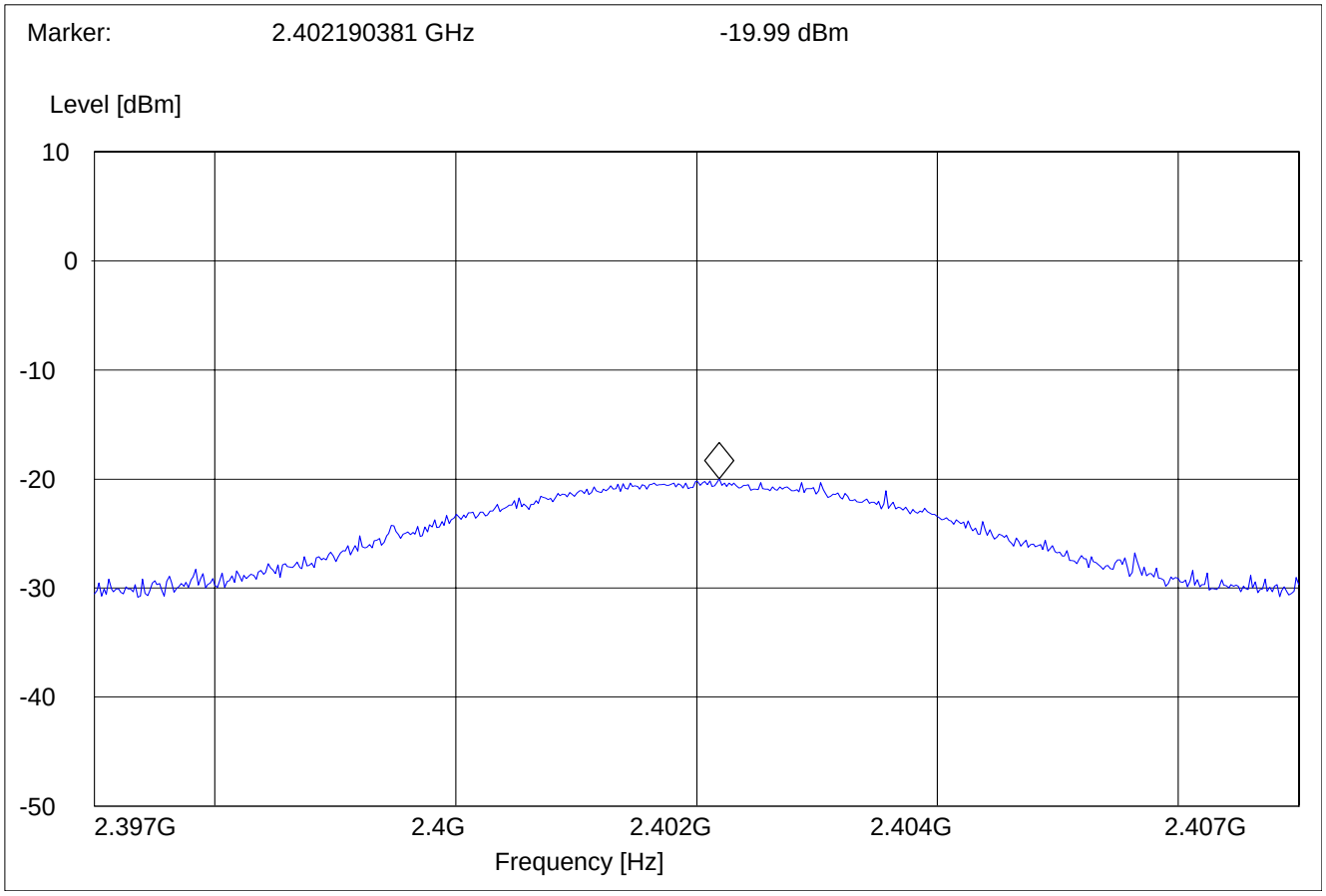
| Frequency range | RF power output |
|---|---|
| 2400-2483.5 MHz | 1.0 Watt conducted |

## PEAK OUTPUT POWER (RADIATED) §15.247 (b) (1)

### Lowest Channel: 2402MHz

SWEEP TABLE: "EIRP BT low channel"

| Short Description: | | EIRP Bluetooth channel-2402MHz | | |
|---|---|---|---|---|
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF BW |
| 2.397GHz | 2.407GHz | MaxPeak | Coupled | 3 MHz |

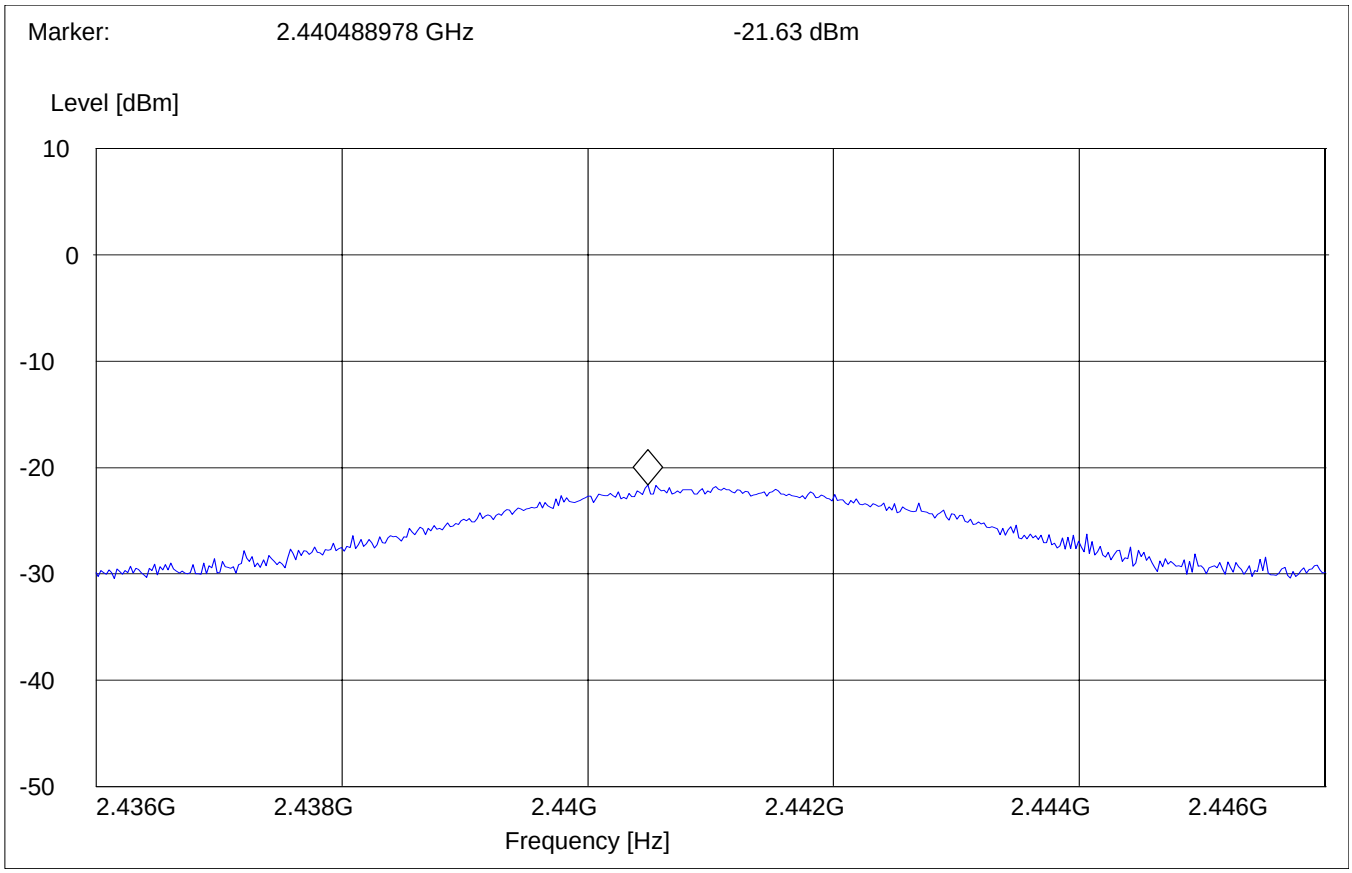


## PEAK OUTPUT POWER (RADIATED) §15.247 (b) (1)

### Mid Channel: 2441MHz

SWEEP TABLE: "EIRP BT Mid channel"

| Short Description: | | EIRP Bluetooth channel-2441MHz | | |
|---|---|---|---|---|
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF BW |
| 2.436GHz | 2.446GHz | MaxPeak | Coupled | 3 MHz |

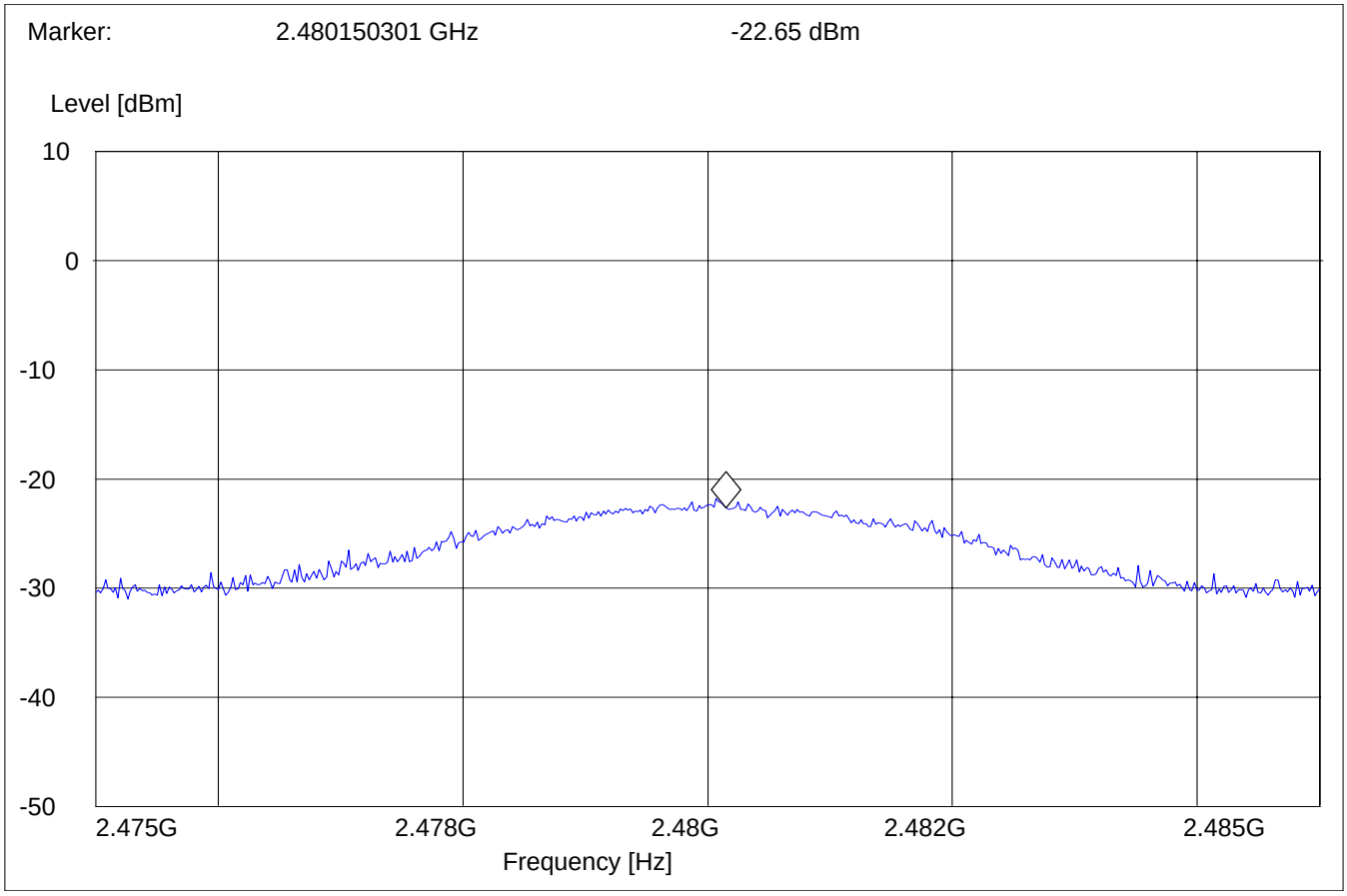


## PEAK OUTPUT POWER (RADIATED) §15.247 (b) (1)

### Highest Channel: 2480MHz

SWEEP TABLE: "EIRP BT High channel"

| Short Description: | | EIRP Bluetooth channel-2480MHz | | |
|---|---|---|---|---|
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF BW |
| 2.475GHz | 2.485GHz | MaxPeak | Coupled | 3 MHz |

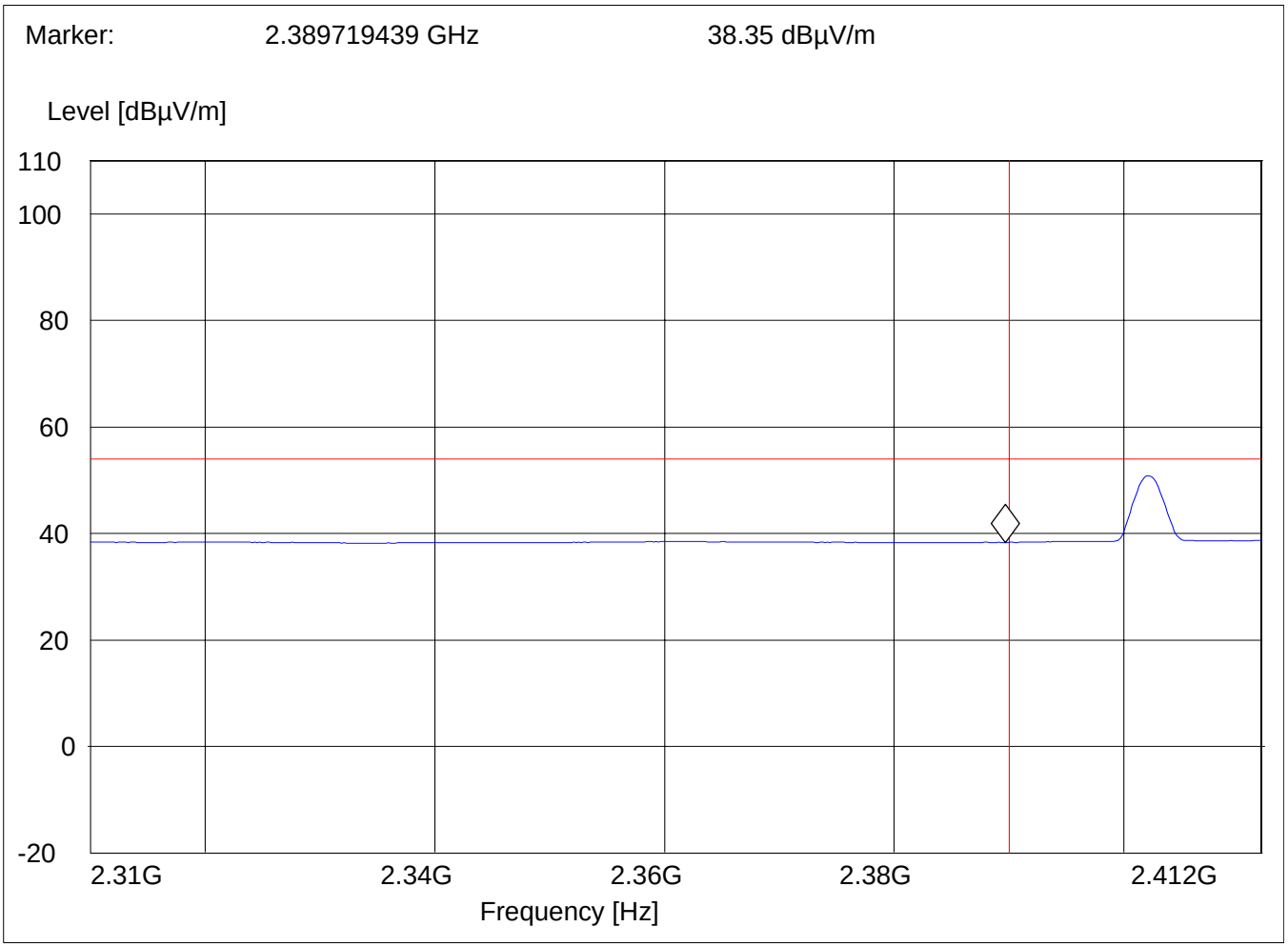


## BAND EDGE COMPLIANCE §15.247 (c)

### Low frequency section (spurious in the restricted band 2310 – 2390 MHz)
### Average Measurement
### (This plot is valid for both Hopping ON & 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 Time | Meas. Bandw. | RBW | VBW | Transducer |
|---|---|---|---|---|---|---|
| 2.31 GHz | 2.412 GHz | MaxPeak | Coupled | 1 MHz | 10Hz | #326 horn (dBi) |

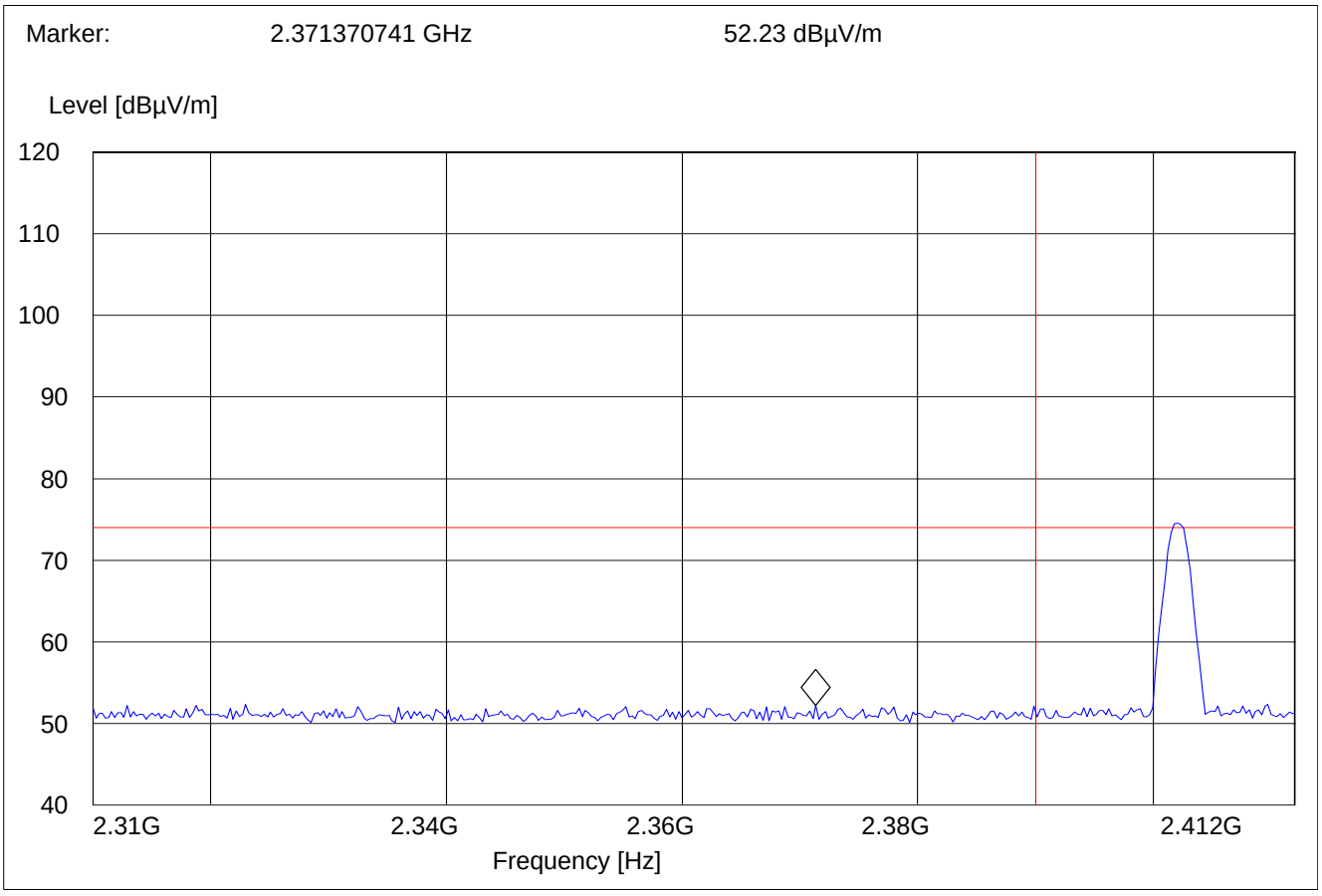


## BAND EDGE COMPLIANCE §15.247 (c)

### 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) |

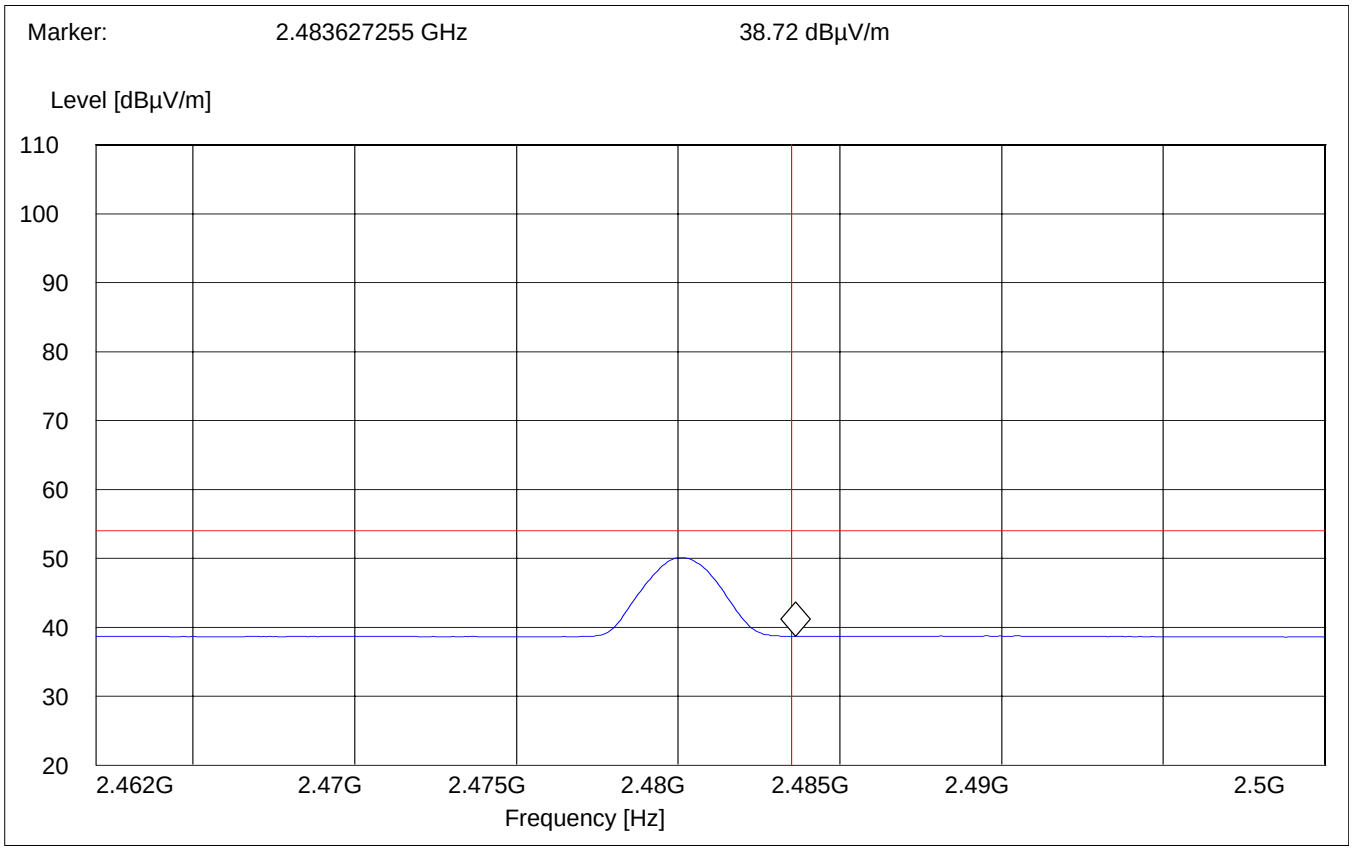


## BAND EDGE COMPLIANCE §15.247 (c)

### 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 | : | 54dBµV |

| 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) |

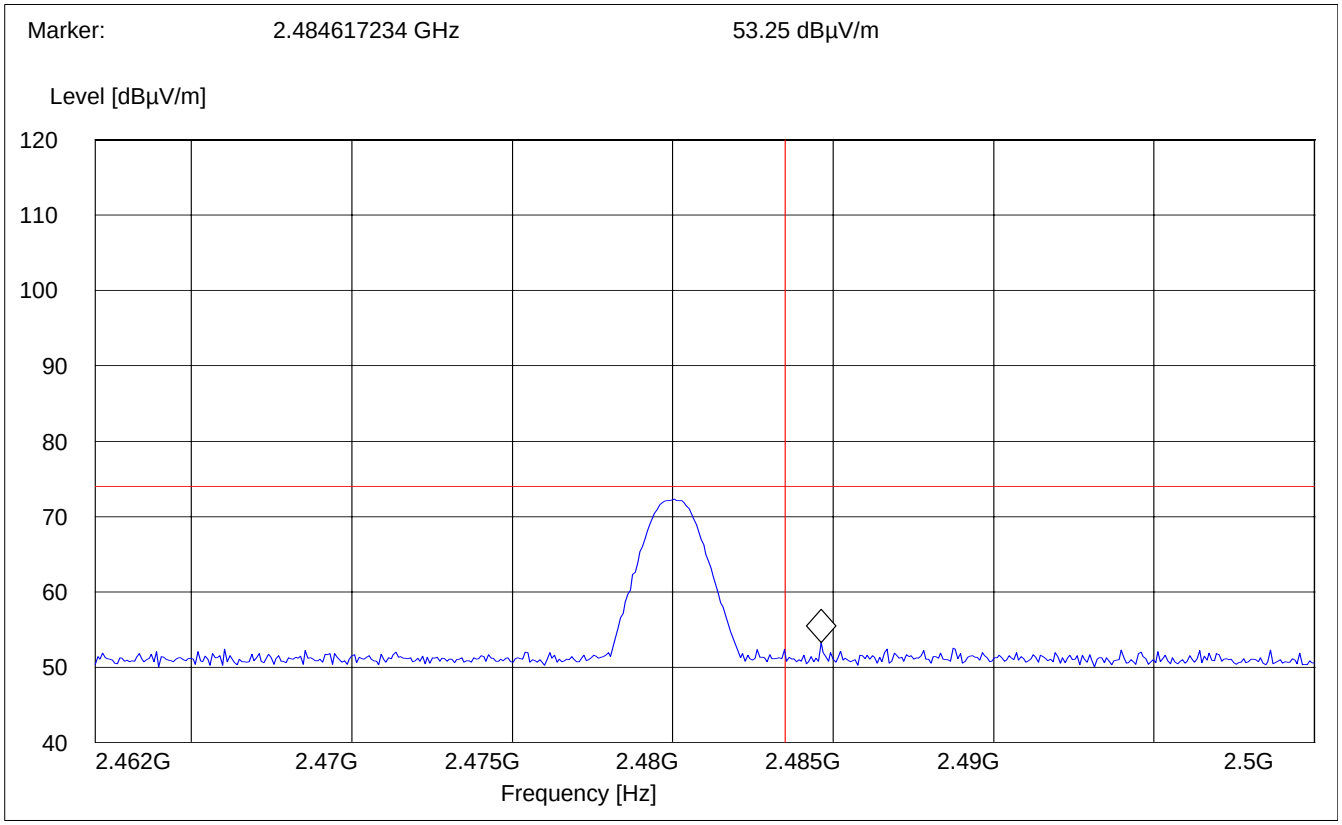


## BAND EDGE COMPLIANCE §15.247 (c)

### 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 | : | 74dBµV |

| 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** **§ 15.247 (c) (1)**
**Transmitter (Radiated)**

**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**

| Frequency | Measured values | Remarks |
|---|---|---|
| 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 | | | |
| | | | |

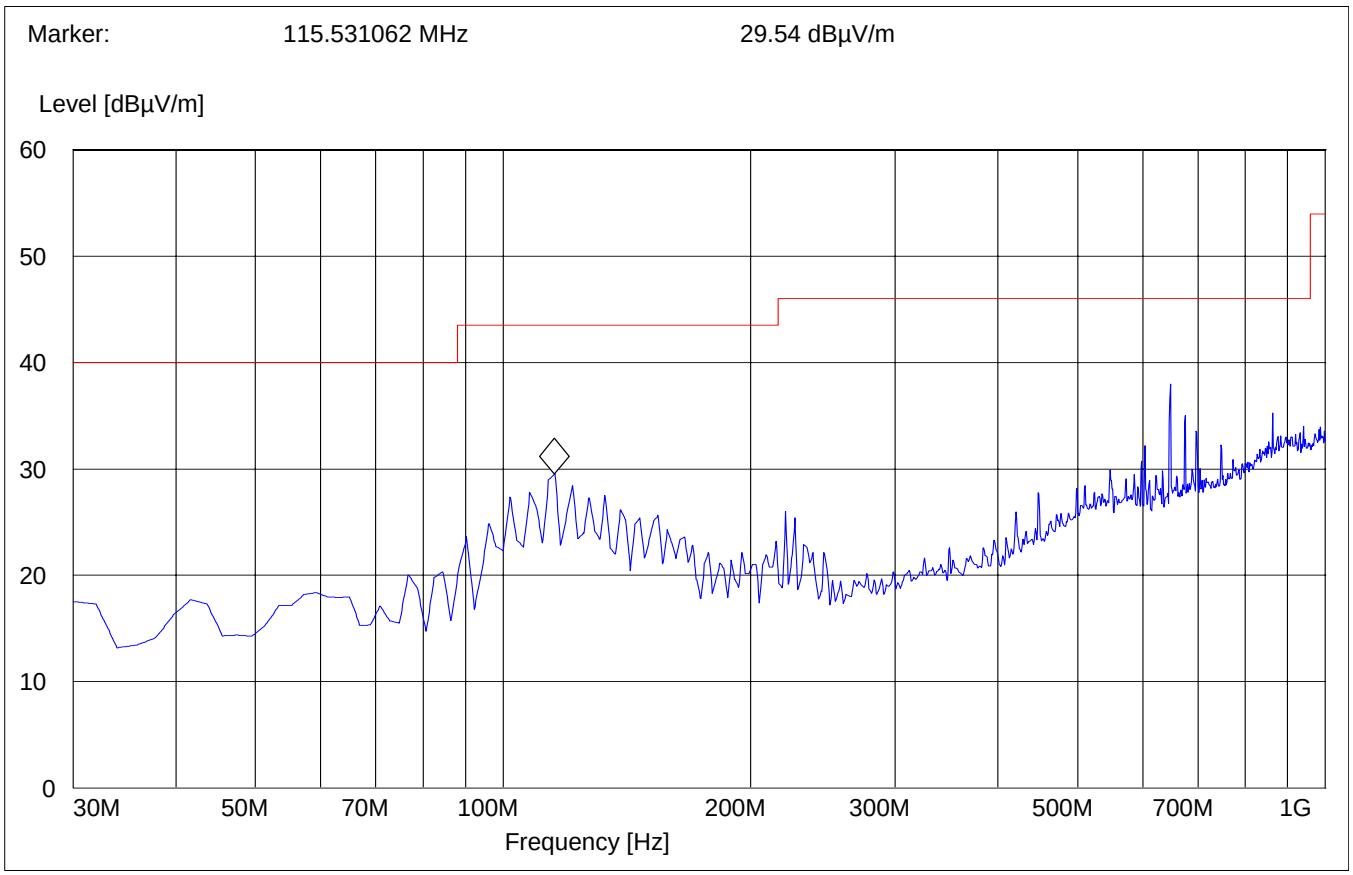
| **Transmit at Middle channel Frequency 2441MHz** | | | |
|---|---|---|---|
| **Frequency (MHz)** | **Level (dBµV/m)** | | |
| | **Peak** | **Quasi-Peak** | **Average** |
| SEE PLOTS | | | |
| | | | |
| | | | |

| **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)**

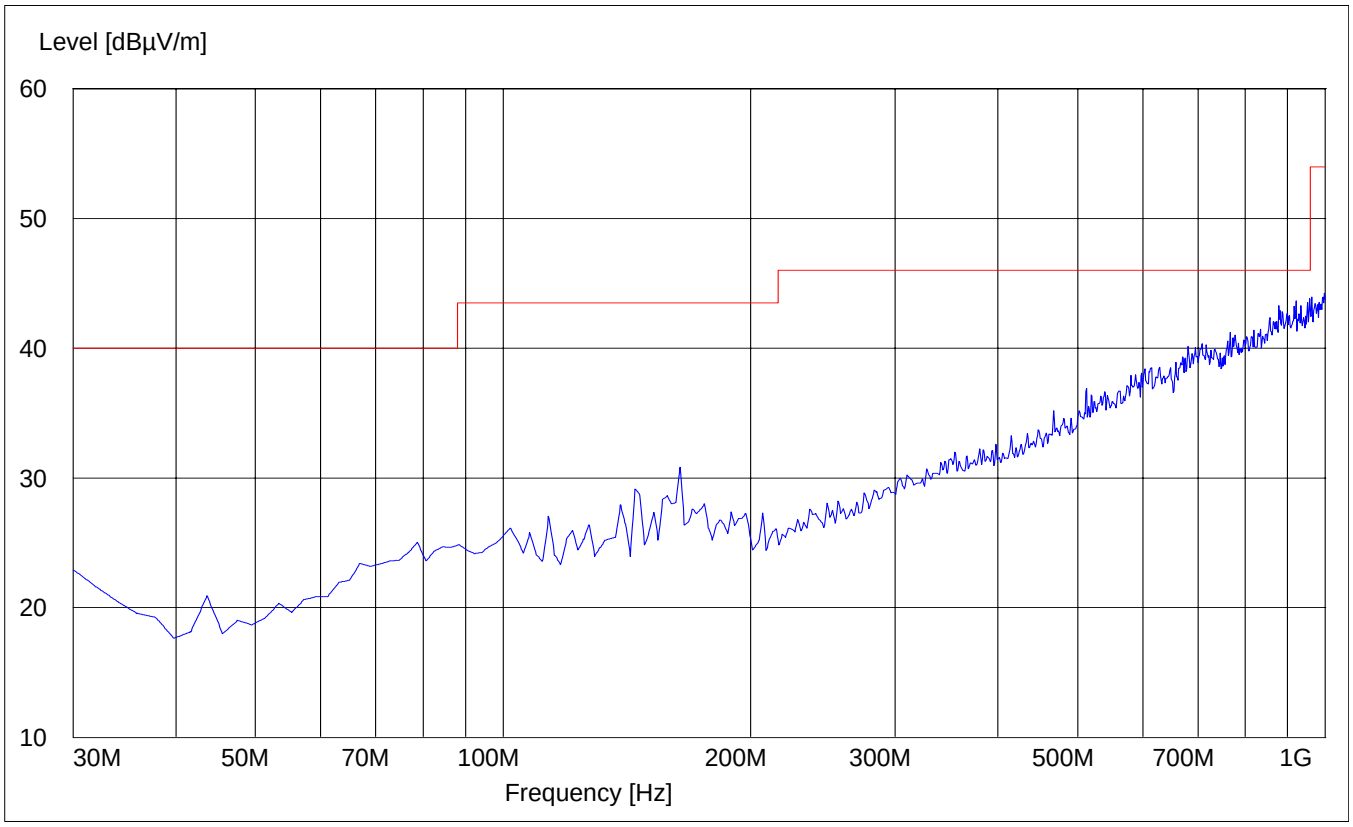
| | | | | | |
|---|---|---|---|---|---|
| SWEEP TABLE: | | "BT Spuri hi 30-1G" | | | |
| Short Description: | | Bluetooth 30MHz-1GHz | | | |
| Start Frequency | Stop Frequency | Detector | Meas. Time | RBW VBW | Transducer |
| 30.0 MHz | 1.0 GHz | MaxPeak | Coupled | 100 kHz | 3141-#1186 |



**EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)**
**30MHz – 1GHz**
**Antenna: horizontal**

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

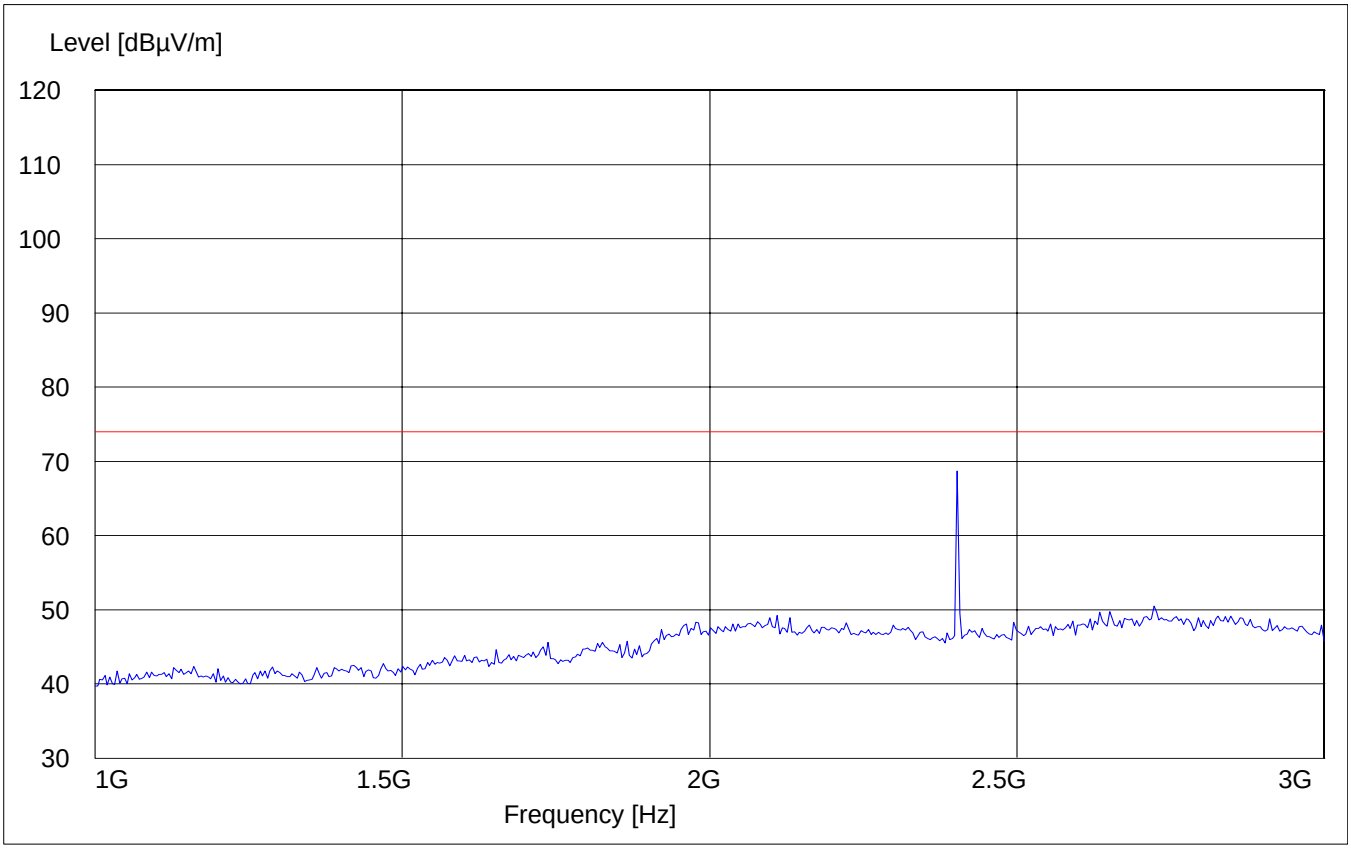


## EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
## Lowest Channel (2402MHz): 1GHz – 3GHz

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

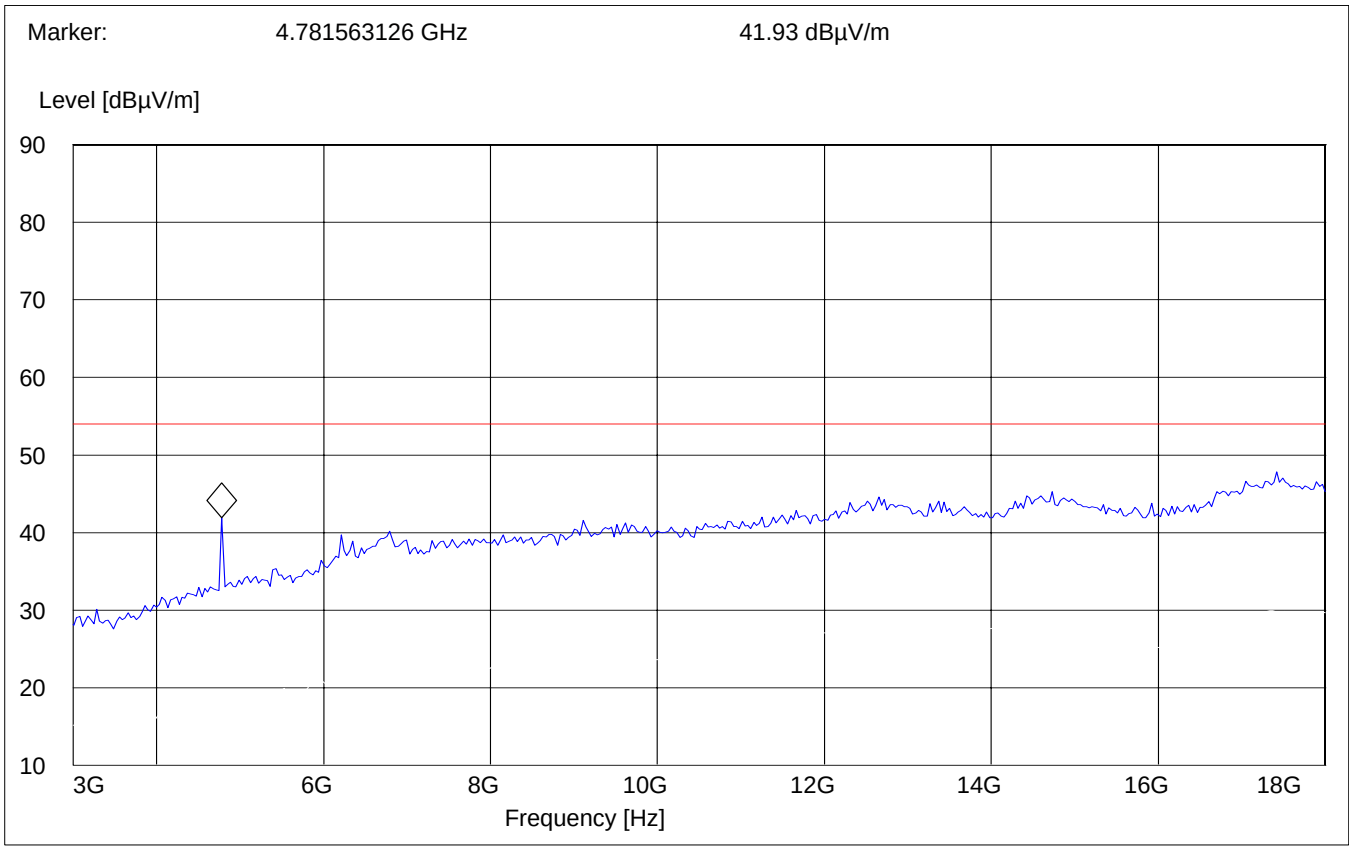
SWEEP TABLE: "BT Spuri hi 1-3G"
Short Description: Bluetooth Spurious 1-3GHz

| Start Frequency | Stop Frequency | Detector Time | Meas. Bandw. | RBW VBW | Transducer |
|---|---|---|---|---|---|
| 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

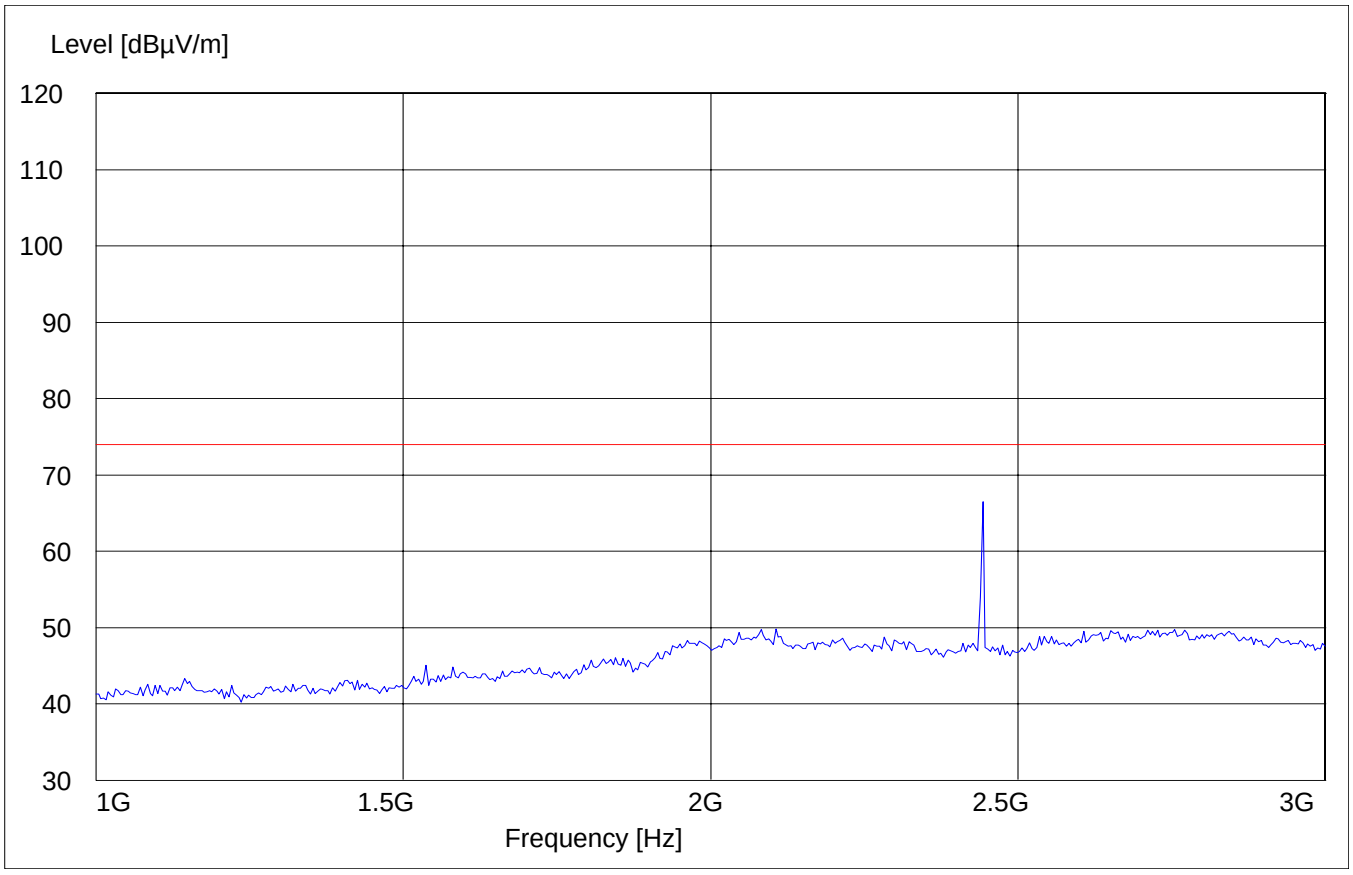
| | | | | | |
|---|---|---|---|---|---|
| SWEEP TABLE: | | "BT Spuri hi 3-18G" | | | |
| Short Description: | | Bluetooth Spurious 3-18 GHz | | | |
| Start Frequency | Stop Frequency | Detector Time | Meas. Bandw. | RBW VBW | Transducer |
| 3.0 GHz | 18.0 GHz | MaxPeak | Coupled | 1 MHz | #326 horn (dBi)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



## EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
## Middle Channel (2441MHz): 1GHz – 3GHz

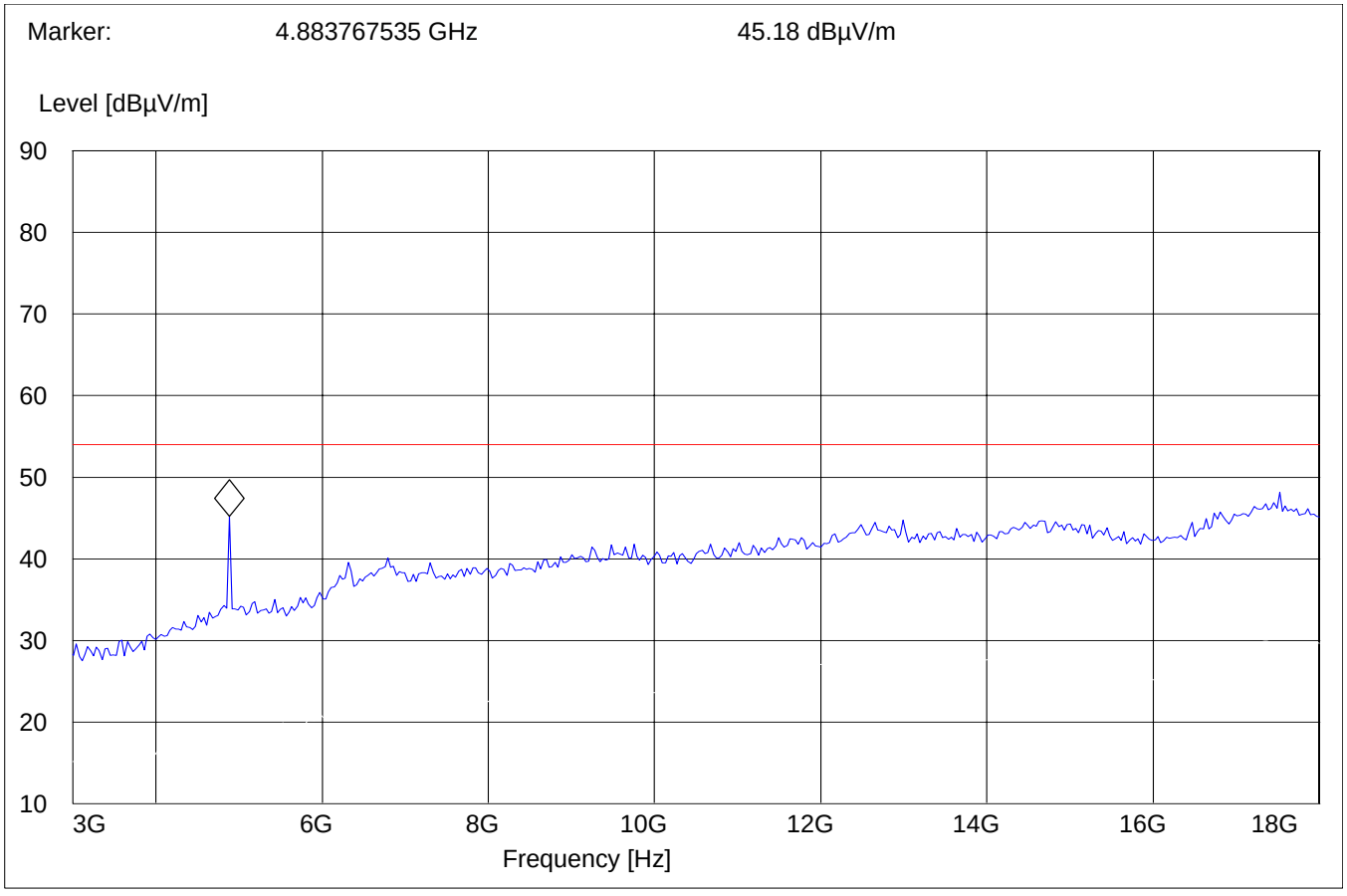
**NOTE: The peak is the carrier frequency.**

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



## EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
## Middle Channel (2441MHz): 3GHz – 18GHz

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

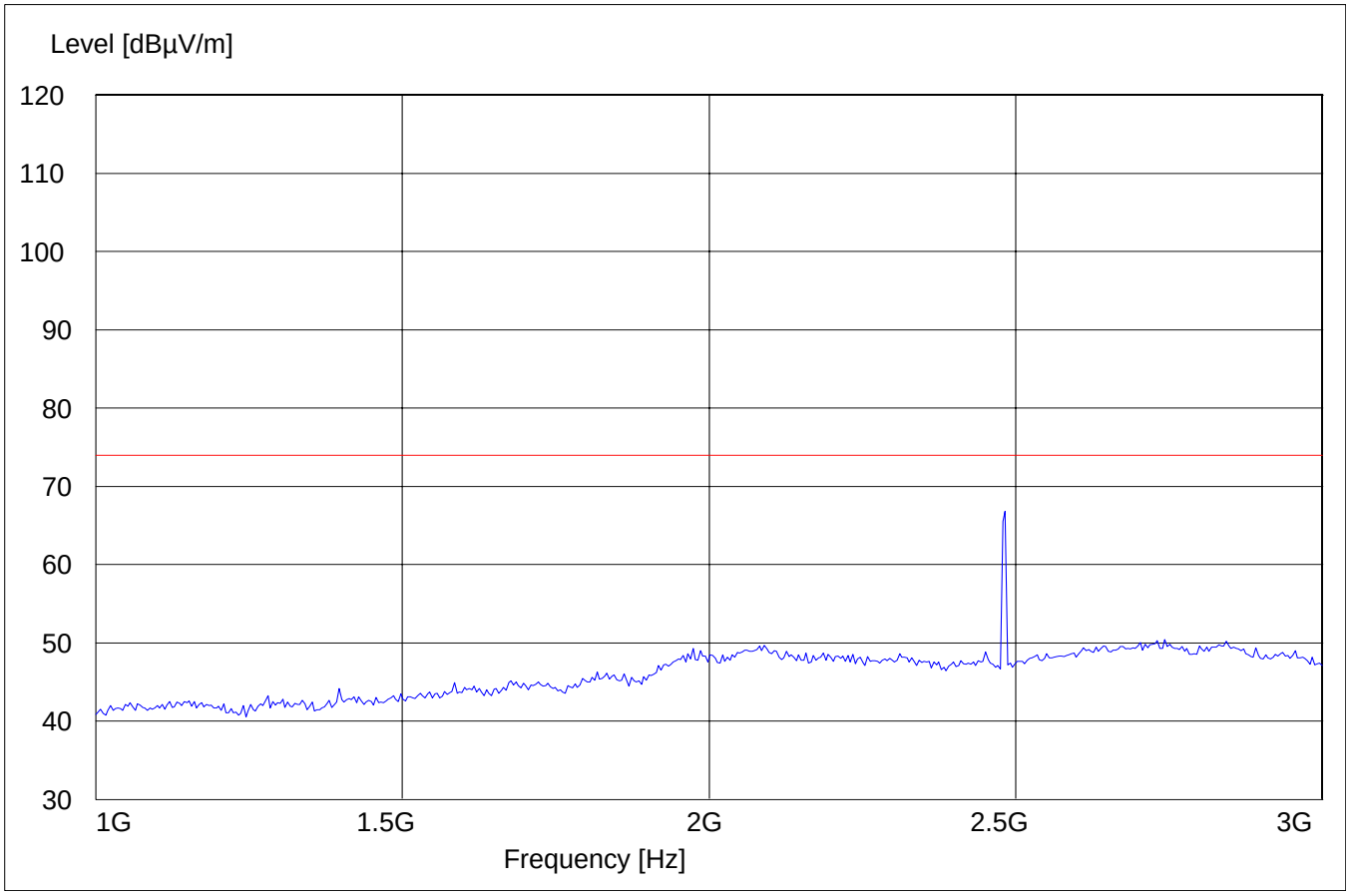


## EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
## Highest Channel (2480MHz): 1GHz – 3GHz

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

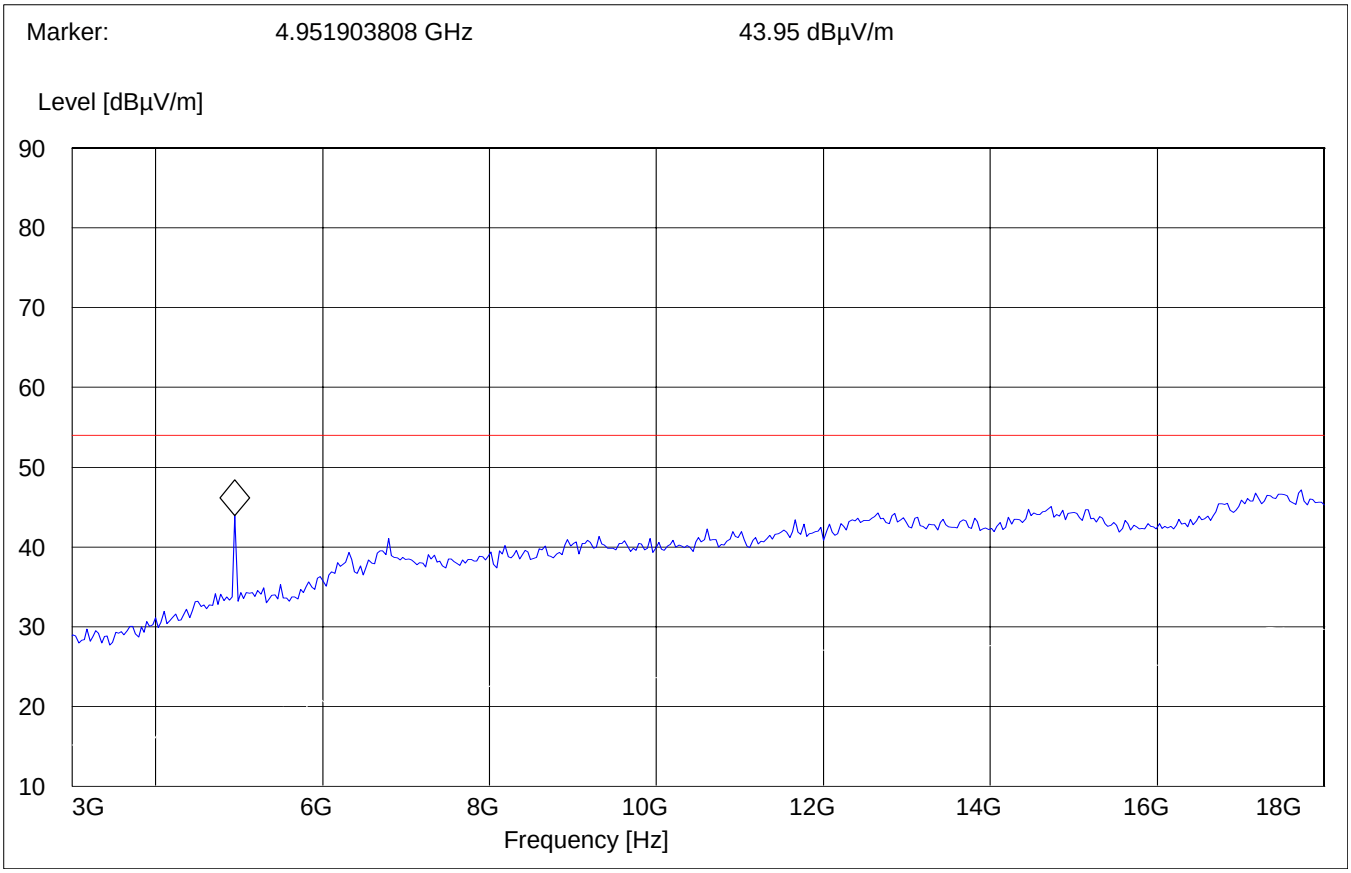
SWEEP TABLE: "BT Spuri hi 1-3G"
Short Description: Bluetooth Spurious 1-3GHz

| Start Frequency | Stop Frequency | Detector Time | Meas. Bandw. | RBW VBW | Transducer |
|---|---|---|---|---|---|
| 1.0 GHz | 3.0 GHz | MaxPeak | Coupled | 1 MHz | #326 horn (dBi) |



## EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
## Highest Channel (2480MHz): 3GHz – 18GHz

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

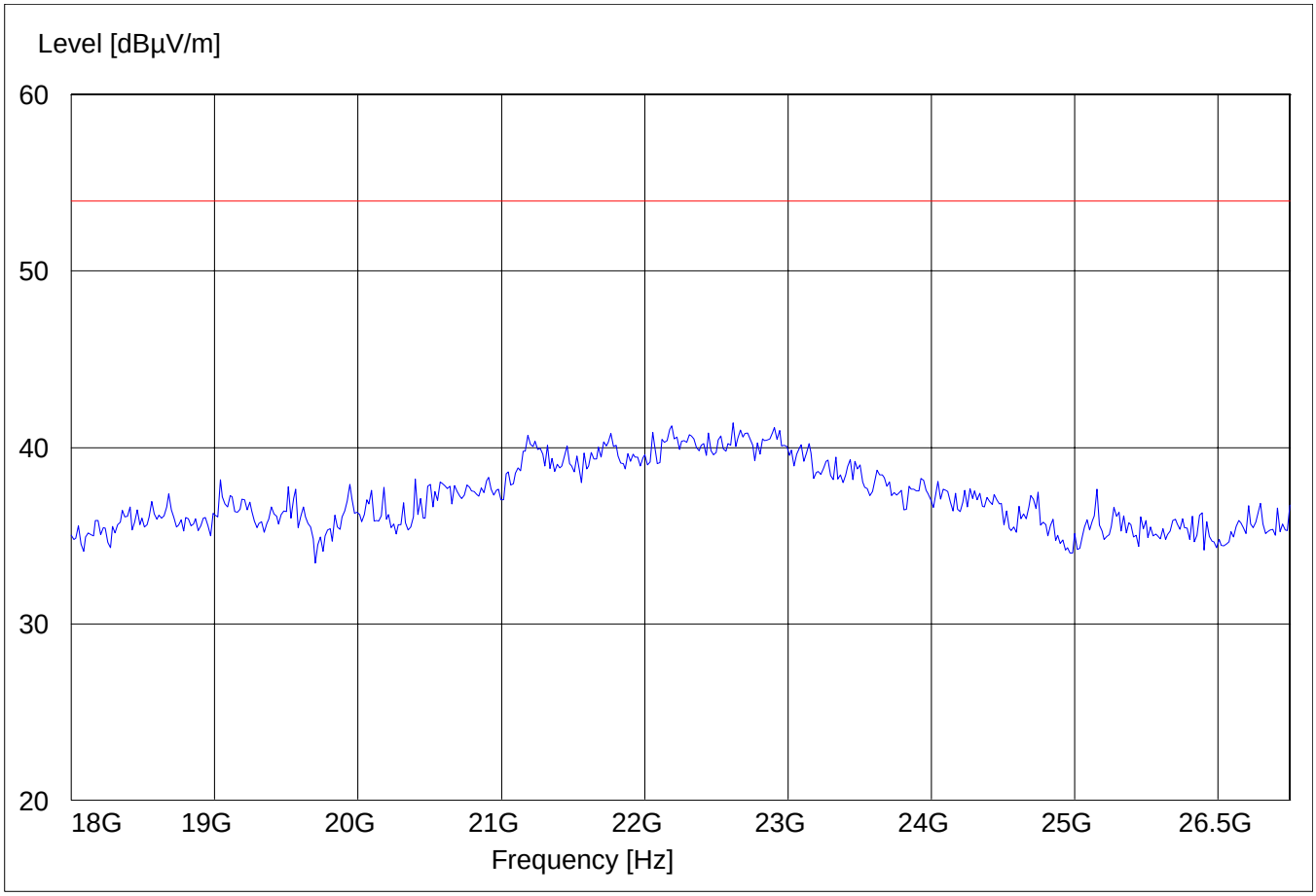


## EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)

**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 Frequency | Stop Frequency | Detector Time | Meas. Bandw. | RBW VBW | Transducer |
| 18 GHz | 26.5 GHz | MaxPeak | Coupled | 1 MHz | #141 horn (dBi) |

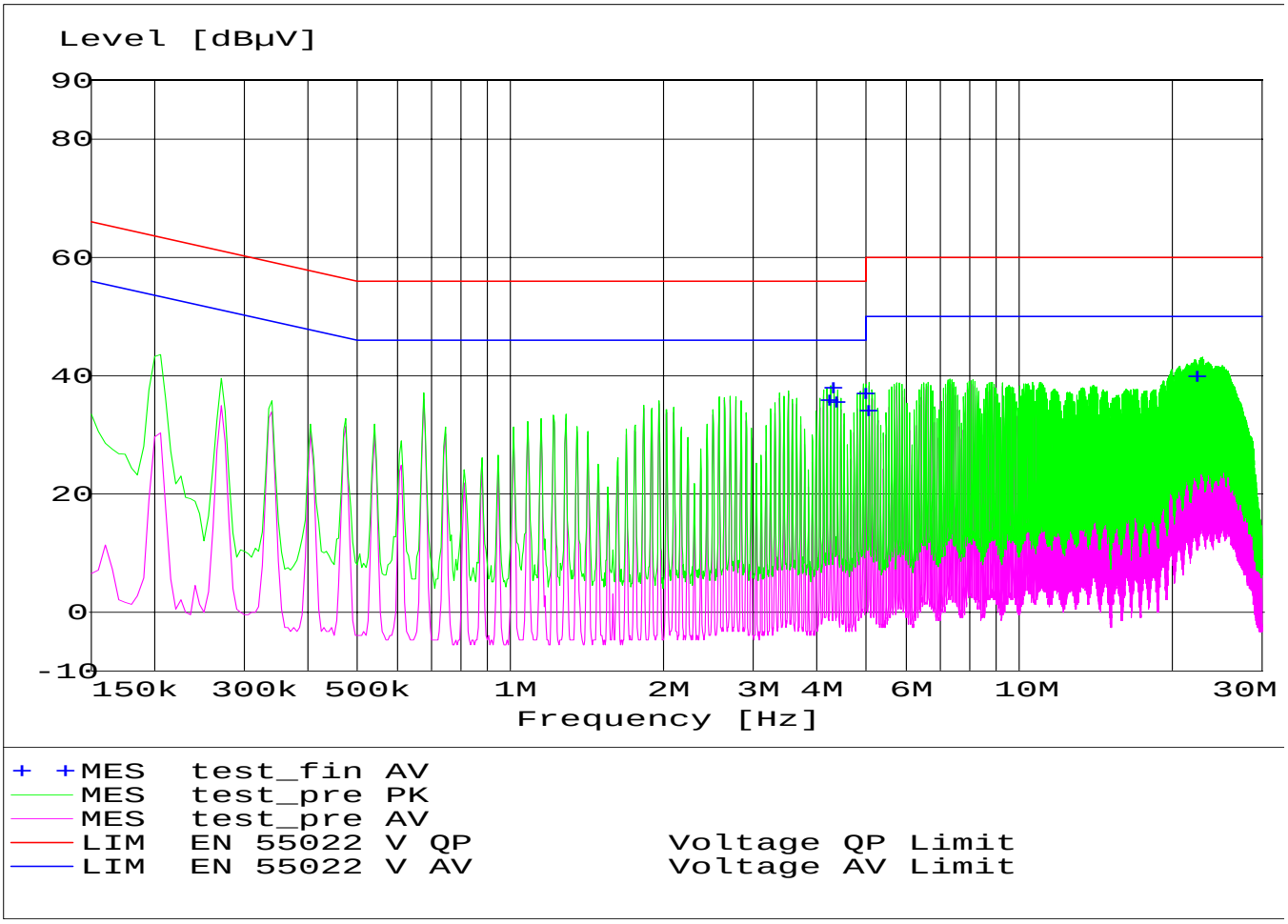


## CONDUCTED EMISSIONS § 15.107/207

**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 AV"***

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Line | PE |
|---|---|---|---|---|---|---|
| 4.190000 | 35.80 | 0.0 | 46 | 10.2 | N | GND |
| 4.260000 | 37.90 | 0.0 | 46 | 8.1 | N | GND |
| 4.325000 | 35.40 | 0.0 | 46 | 10.6 | N | GND |
| 4.935000 | 36.90 | 0.0 | 46 | 9.1 | N | GND |
| 5.000000 | 34.00 | 0.0 | 46 | 12.0 | N | GND |
| 22.110000 | 39.90 | 0.0 | 50 | 10.1 | N | GND |

## RECEIVER SPURIOUS RADIATION § 15.209

**Limits**

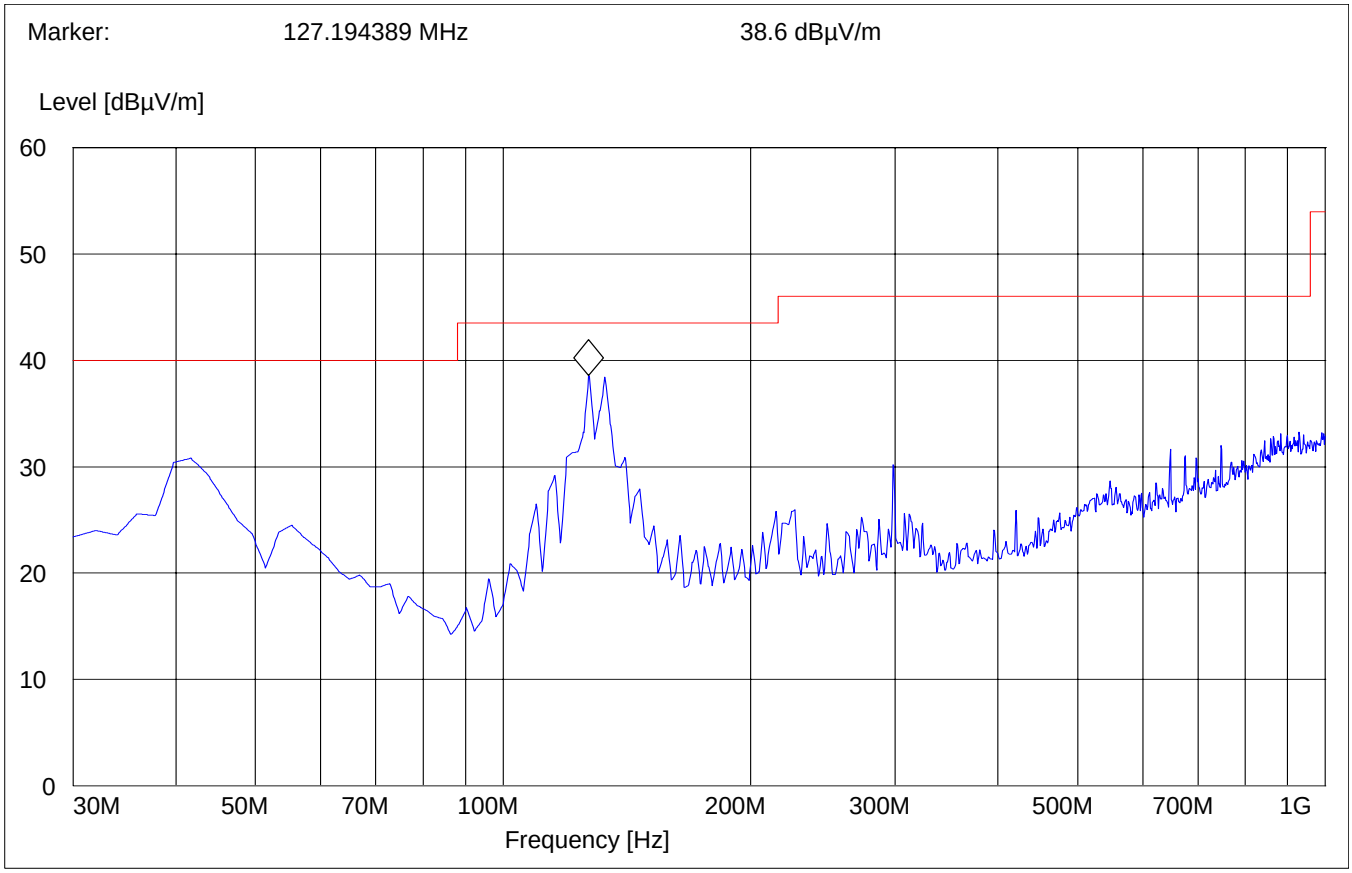
| Frequency (MHz) | Field strength (µV/m) | Measurement distance (m) |
|---|---|---|
| 0.009 - 0.490 | 2400/F(kHz) | 300 |
| 0.490 - 1.705 | 24000/F(kHz) | 30 |
| 1.705 - 30.0 | 30 | 30 |
| 30 - 88 | 100 | 3 |
| 88 - 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| above 960 | 500 | 3 |

**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)

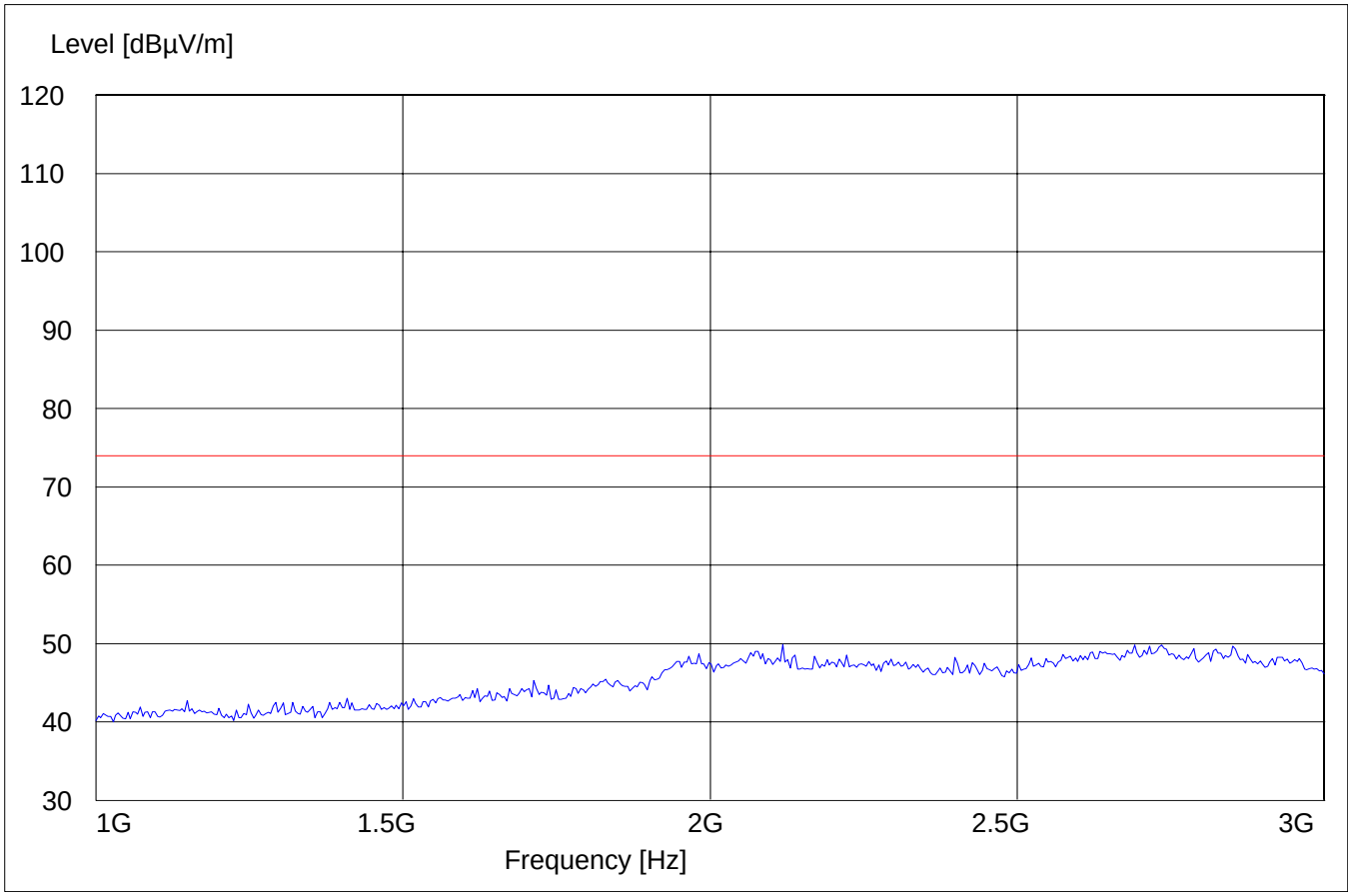
| | | | | | |
|---|---|---|---|---|---|
| SWEEP TABLE: | | "BT Spuri hi 30-1G" | | | |
| Short Description: | | Bluetooth 30MHz-1GHz | | | |
| Start Frequency | Stop Frequency | Detector | Meas. Time | RBW VBW | Transducer |
| 30.0 MHz | 1.0 GHz | MaxPeak | Coupled | 100 kHz | 3141-#1186 |



## RECEIVER SPURIOUS RADIATION § 15.209
## 1GHz – 3GHz

SWEEP TABLE: "BT Spuri hi 1-3G"
Short Description: Bluetooth Spurious 1-3GHz

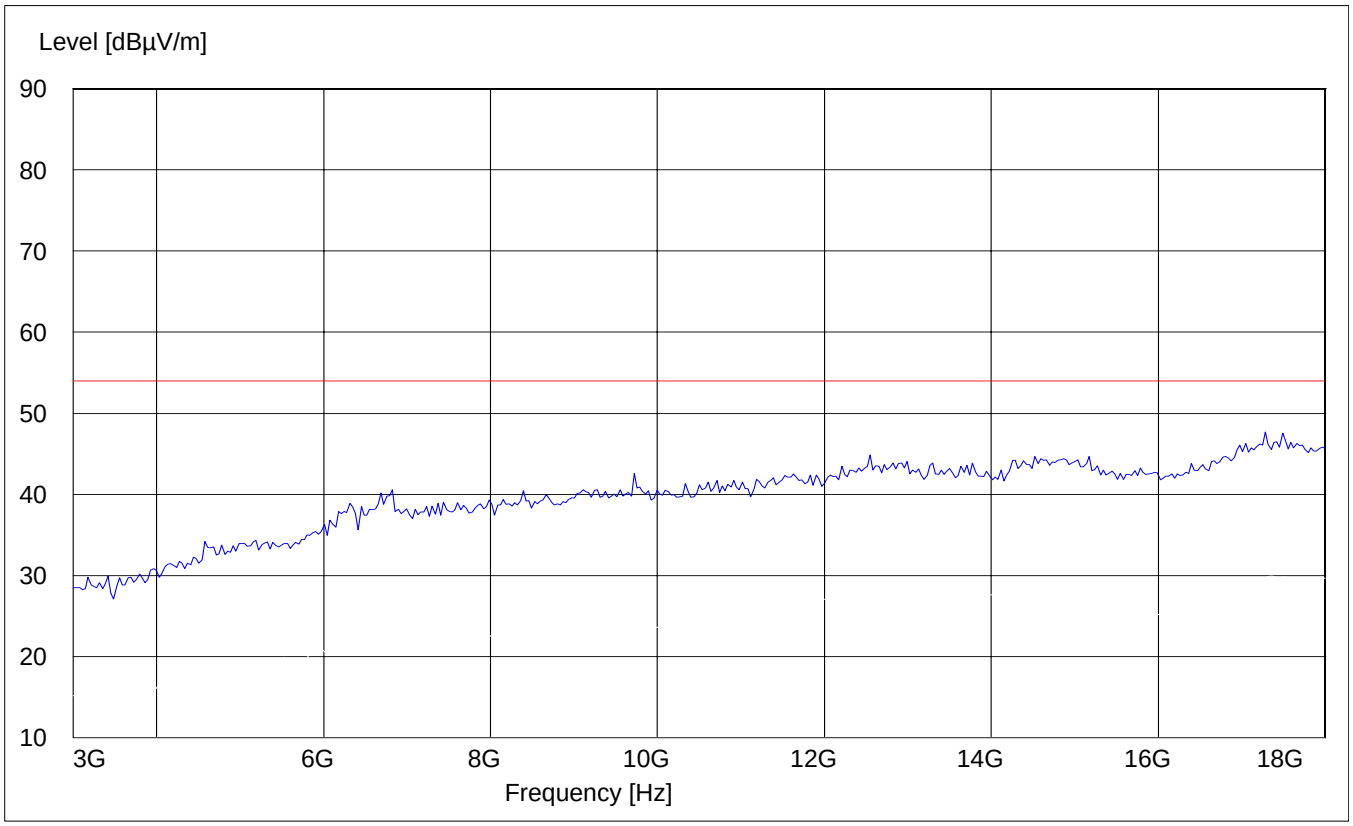
| Start Frequency | Stop Frequency | Detector Time | Meas. Bandw. | RBW VBW | Transducer |
|---|---|---|---|---|---|
| 1.0 GHz | 3.0 GHz | MaxPeak | Coupled | 1 MHz | #326 horn (dBi) |



## RECEIVER SPURIOUS RADIATION § 15.209
## 3GHz – 18GHz

SWEEP TABLE: "BT Spuri hi 3-18G"
Short Description: Bluetooth Spurious 3-18 GHz

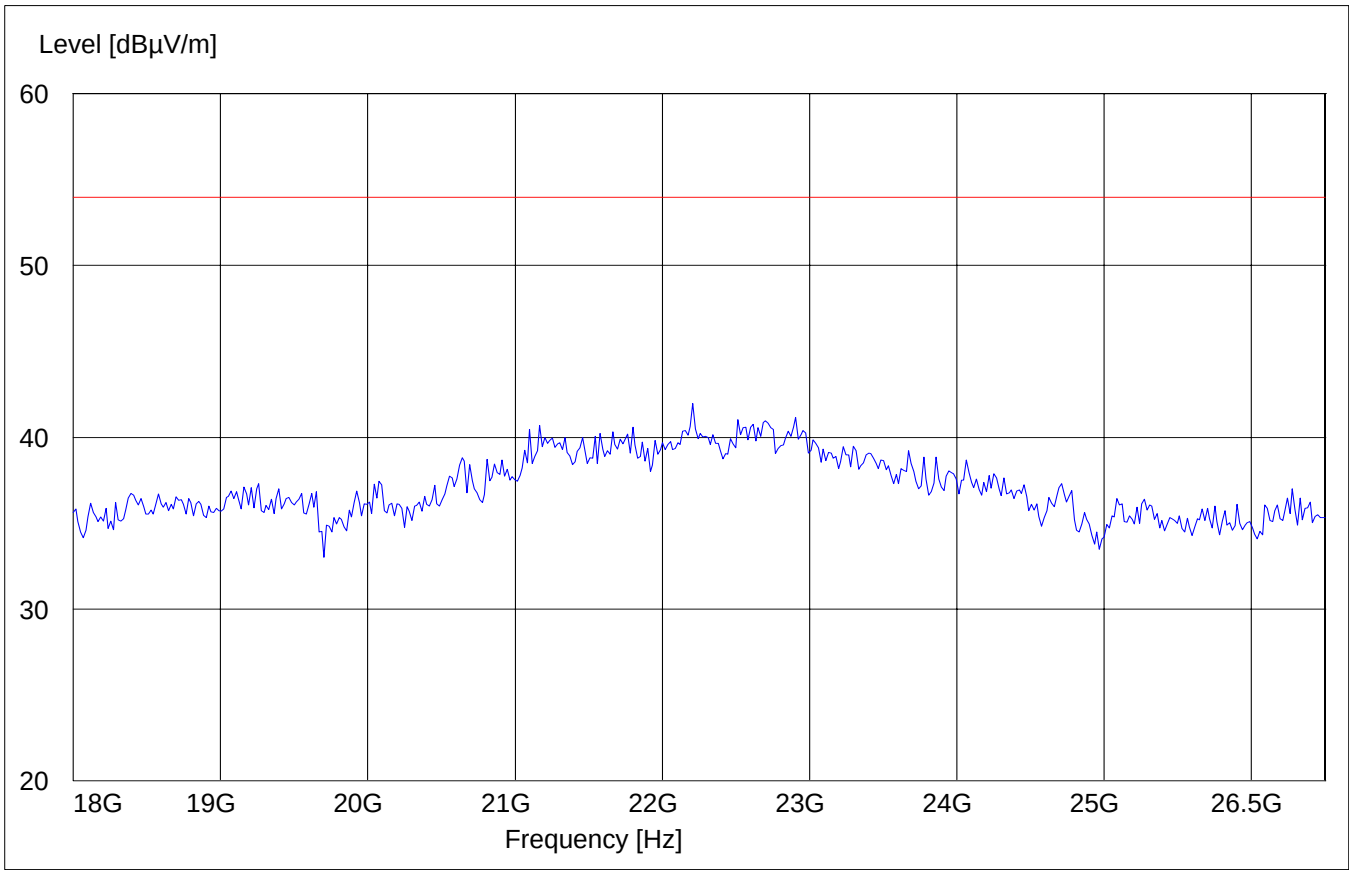
| Start Frequency | Stop Frequency | Detector Time | Meas. Bandw. | RBW VBW | Transducer |
|---|---|---|---|---|---|
| 3.0 GHz | 18.0 GHz | MaxPeak | Coupled | 1 MHz | #326 horn (dBi) |



## RECEIVER SPURIOUS RADIATION § 15.209
## 18GHz – 26.5GHz

SWEEP TABLE: "BT Spuri hi 18-26.5G"
Short Description: Bluetooth Spurious 18-26.5GHz

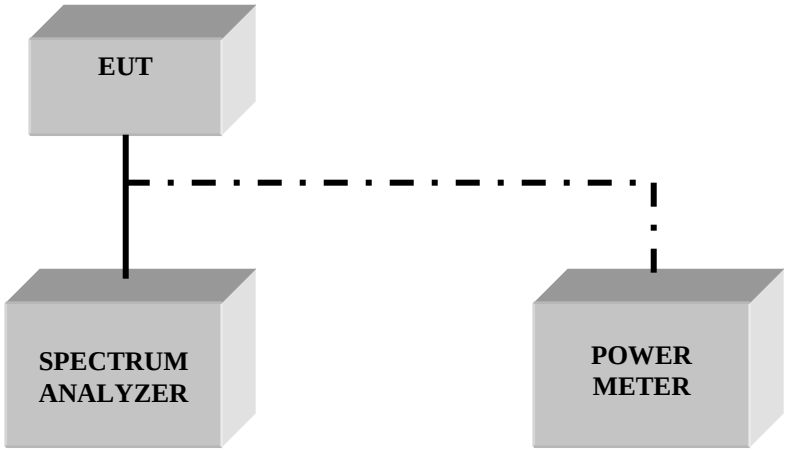
| Start Frequency | Stop Frequency | Detector Time | Meas. Bandw. | RBW VBW | Transducer |
|---|---|---|---|---|---|
| 18.0 GHz | 26.5 GHz | MaxPeak | Coupled | 1 MHz | #326 horn (dBi) |



## 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