# FCC Test Report

## FCC Part 15.247 for FHSS systems

**FOR:**

**CDMA HI001**

**FCC ID: TYKNX6460**

**TEST REPORT #: EMC_CET10_043_08501_H001_15.247**

**DATE: 2008-10-14**

Certificate # 2135.01

**Bluetooth Qualification Test Facility (BQTF)**

CTIA Authorized Test Lab
LAB CODE 20020328-00

**FCC listed**
**A2LA Accredited**

**IC recognized #**
**3462B**


***CETECOM* Inc.**
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Phone: + 1 (408) 586 6200 ◆ Fax: + 1 (408) 586 6299 ◆ E-mail: 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

## 1 Assessment

**The following is in compliance with the applicable criteria specified in FCC rules Part 15.247 of the Code of Federal Regulations.**

| Company | Description | Model # |
|---|---|---|
| **Casio Hitachi Mobile Communications Co., Ltd.** | **The cellular phone for the global roaming of the CDMA method of 3G equipped with the Bluetooth function and the FeliCa function sold in Japan.** | **CDMA HI001** |

**This report is reviewed by:**

| Date | Section | Name | Signature |
|---|---|---|---|
| 2008-10-14 | EMC & Radio | Lothar Schmidt (Director Regulatory and Antenna Services) | Lothar Schmidt I am approving this document |

The test results of this test report relate exclusively to the test item specified in Identification of the Equipment under Test. 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.

**This report is prepared by:**

| Date | Section | Name | Signature |
|---|---|---|---|
| 2008-10-14 | EMC & Radio | Ahmad Safdari (EMC Project Engineer) | Ahmad Safdari Digitally signed by Ahmad Safdari Reason: I am the author of this document |

# 2 Administrative Data

## 2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

| | |
|---|---|
| Company Name: | **CETECOM Inc.** |
| Department: | **EMC** |
| Address: | **411 Dixon Landing Road<br>Milpitas, CA 95035<br>U.S.A.** |
| Telephone: | **+1 (408) 586 6200** |
| Fax: | **+1 (408) 586 6299** |
| Responsible Test Lab Manager: | **Lothar Schmidt** |
| Responsible Project Leader: | **Ahmad Safdari** |
| Date of test: | **2008-10-06 to 2008-10-08** |

## 2.2 Identification of the Client

| **APPLICANT** | |
|---|---|
| **Applicant (Company Name)** | **Casio Hitachi Mobile Communications Co., Ltd.** |
| **Street Address** | **2-229-1, Sakuragaoka** |
| **City/Zip Code** | **Higashiyamato-shi, Tokyo 207-8501** |
| **Country** | **Japan** |
| **Contact Person** | **Osamu Hasegawa** |
| **Telephone** | **+81-42-516-2184** |
| **Fax** | **+81-42-516-2505** |
| **e-mail** | **Osamu-hasegawa@ch-mobile.co.jp** |

# 3 Equipment under Test (EUT)

## 3.1 Specification of the Equipment under Test

| | |
|---|---|
| Marketing Name: | **H001** |
| Description: | **The cellular phone for the global roaming of the CDMA method of 3G equipped with the Bluetooth function and the FeliCa function sold in Japan.** |

| | |
|---|---|
| Model No: | **CDMA HI001** |
| Antenna Type: | **Integral** |
| Type(s) of Modulation: | **GFSK, DQPSK, 8DPSK** |
| Frequency Band(s) of Operation: | **2400~2483.5MHz** |
| Numbers of Channels: | **79** |
| Equipment Classification: (CLASS) | ☐FIXED ☐VEHICULAR ■PORTABLE ☐MODULE |
| Equipment Classification: (POWER(AC MAINS)) | ☐110VAC *(GROUND)* ■ 110VAC *(NO GROUND)* ☐12VDC ■ **3.0/3.8/4.2VDC Li battery** |

### 3.2 Identification of the Equipment Under Test (EUT)

| EUT # | TYPE | MODEL | SERIAL # | HW Version |
|---|---|---|---|---|
| 1 | EUT | CDMA HI001 | SHIDH000128 | PWB-6460-MAIN-20S |
| 2 | EUT | CDMA HI001 | SHIDH000129 | PWB-6460-MAIN-20S |
| 3 | EUT | CDMA HI001 | SHIDH000130 | PWB-6460-MAIN-20S |
| 4 | EUT | CDMA HI001 | SHIDH000131 | PWB-6460-MAIN-20S |

**SW version: V007**

### 3.3 Identification of Accessory equipment

| AE # | TYPE | MODEL |
|---|---|---|
| 1 | AC Adapter | 0203PQA |
| 2 | Cradle | N/A |
| 3 | USB Cable | N/A |
| 4 | Headset | N/A |

## 4 Subject Of Investigation

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations. The maximization of portable equipment is conducted in accordance with ANSI C63.4.

All testing was performed on the product referred to in Section 3 as EUT. This test report contains full radiated and conducted testing results as per FCC15.247.

During the testing process the EUT was tested on a single channel using PRBS9 payload using DH5, 2DH5 or 3DH5 packets, all data in this report shows the worst case between horizontal and vertical polarization for above 1GHz.

# 5 Measurements (Radiated)

## 5.1 MAXIMUM PEAK OUTPUT POWER

### 5.1.1 Test Result:

EIRP: GFSK

| TEST CONDITIONS | | MAXIMUM PEAK OUTPUT POWER (dBm) | | |
|---|---|---|---|---|
| Frequency (MHz) | | 2402 | 2441 | 2480 |
| $T_{nom}$(23)°C | $V_{nom}$VDC | -0.94 | -1.34 | -3.31 |
| Measurement uncertainty | | ±0.5dBm | | |

EIRP: π / 4 DQPSK

| TEST CONDITIONS | | MAXIMUM PEAK OUTPUT POWER (dBm) | | |
|---|---|---|---|---|
| Frequency (MHz) | | 2402 | 2441 | 2480 |
| $T_{nom}$(23)°C | $V_{nom}$VDC | -0.7 | -1.04 | -3.04 |
| Measurement uncertainty | | ±0.5dBm | | |

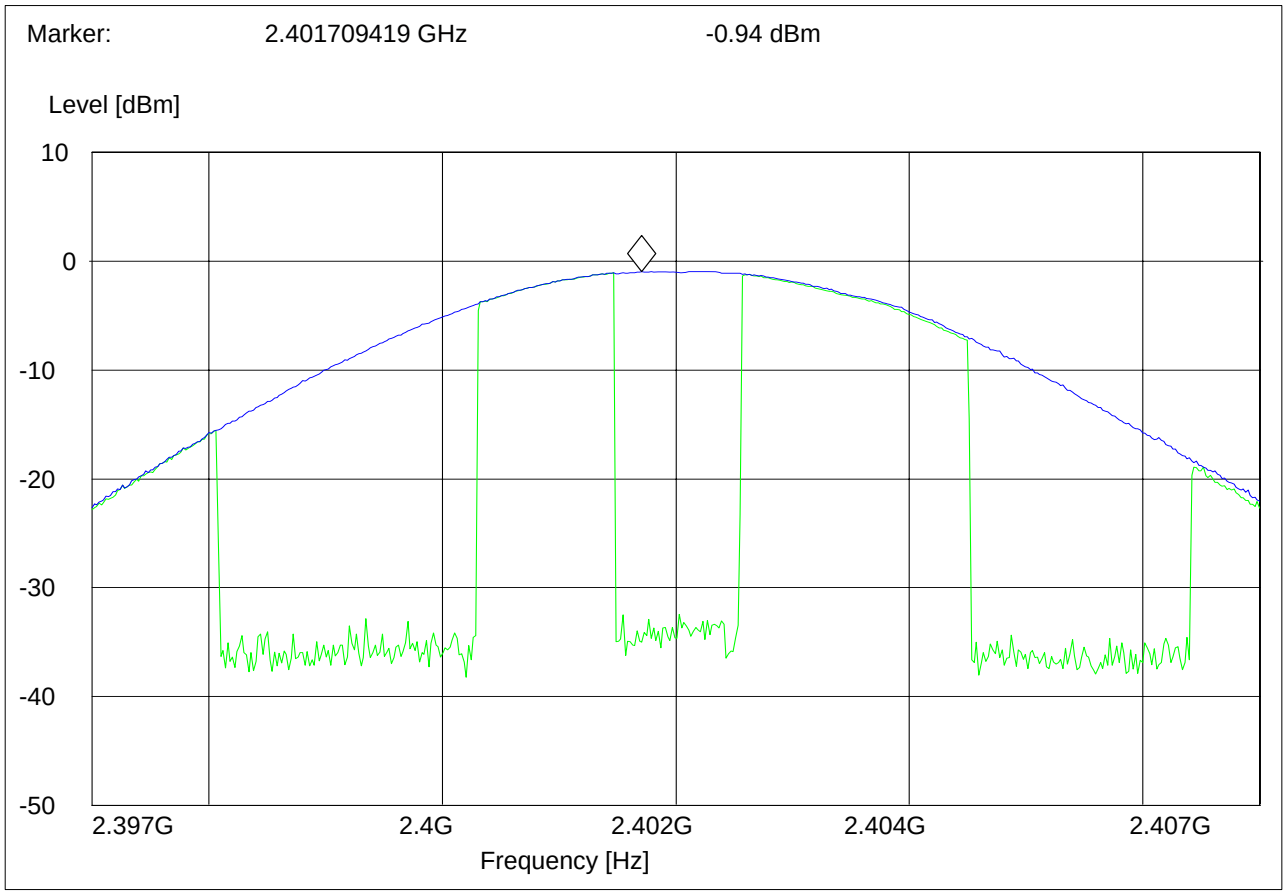
EIRP: 8DPSK
4

| TEST CONDITIONS | | MAXIMUM PEAK OUTPUT POWER (dBm) | | |
|---|---|---|---|---|
| Frequency (MHz) | | 2402 | 2441 | 2480 |
| $T_{nom}$(23)°C | $V_{nom}$VDC | -0.95 | -1.98 | -3.07 |
| Measurement uncertainty | | ±0.5dBm | | |

EUT: HI001
Customer:: Casio Hitachi
Test Mode: BT GFSK; CH 0
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC
Comments:

***SWEEP TABLE: "EIRP BT low channel"***

| Short Description: | | | EIRP Bluetooth channel-2402MHz | | |
|---|---|---|---|---|---|
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
| 2.4 GHz | 2.4 GHz | MaxPeak<br>MaxPeak | Coupled | 3 MHz | DUMMY-DBM |

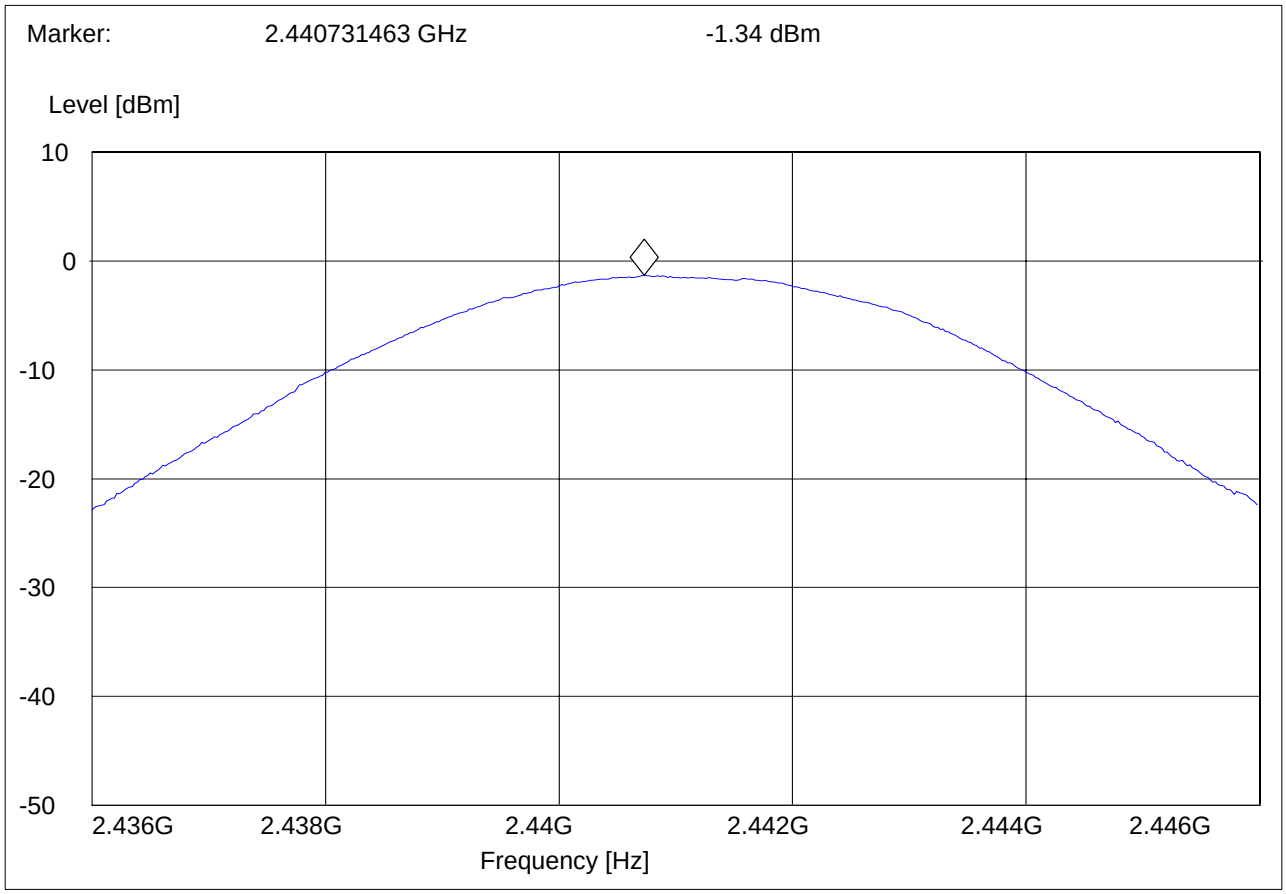


EUT: HI001
Customer:: Casio Hitachi
Test Mode: BT GFSK; CH 39
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC
Comments:

***SWEEP TABLE: "EIRP BT mid channel"***

Short Description: EIRP Bluetooth channel-2441MHz

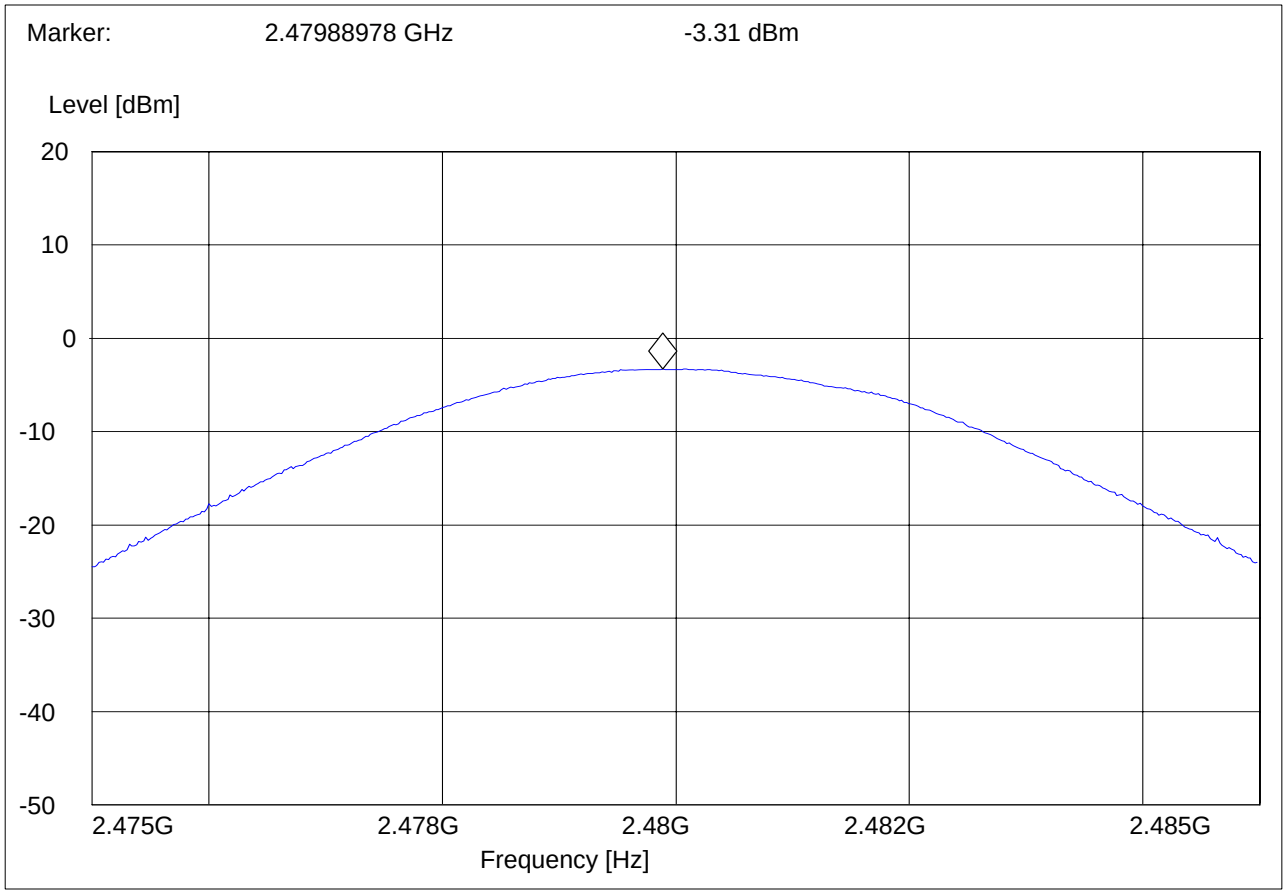
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.4 GHz | 2.4 GHz | MaxPeak<br>MaxPeak | Coupled | 3 MHz | DUMMY-DBM |



EUT: HI001
Customer:: Casio Hitachi
Test Mode: BT GFSK; CH 78
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC
Comments:

***SWEEP TABLE: "EIRP BT high channel"***

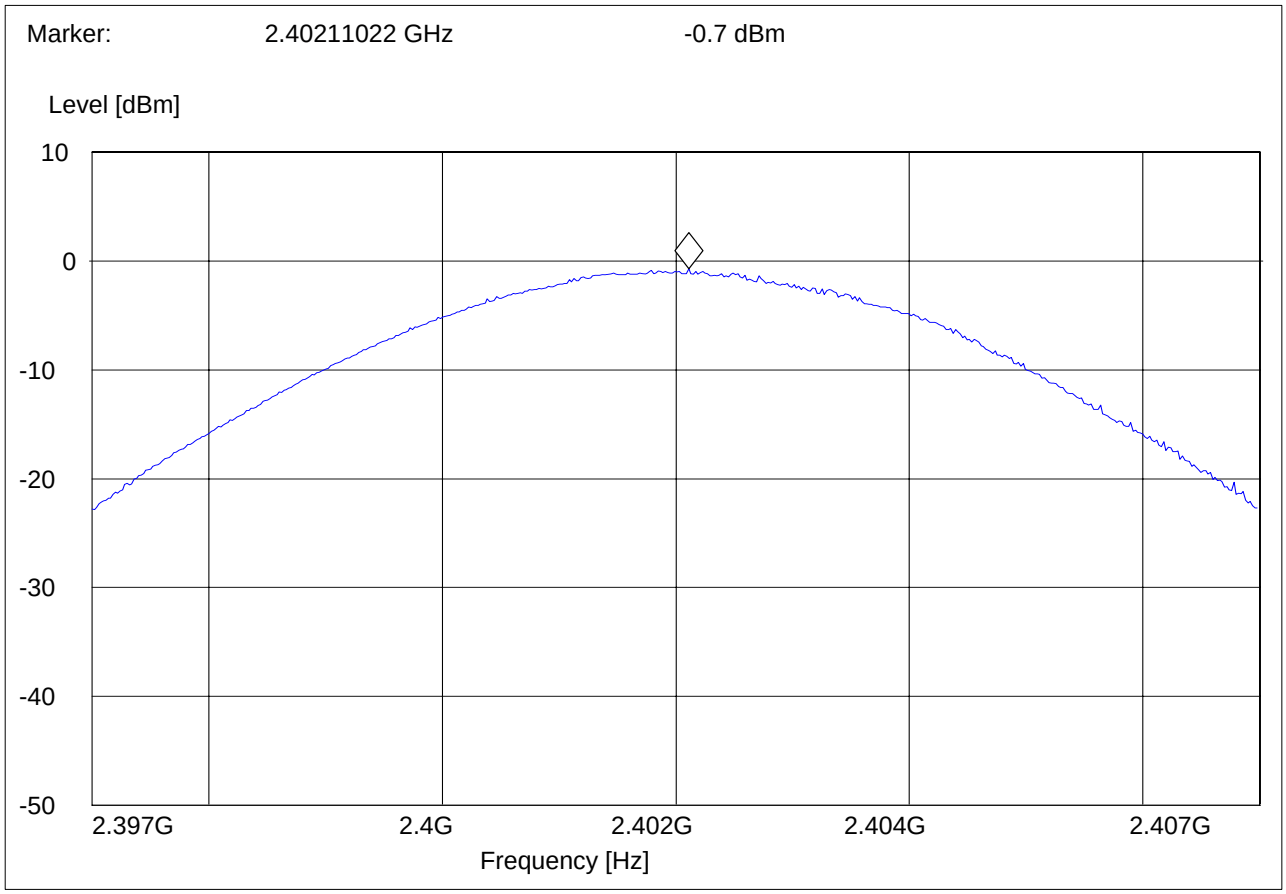
| Short Description: | | | EIRP Bluetooth channel-2480MHz | | |
|---|---|---|---|---|---|
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
| 2.5 GHz | 2.5 GHz | MaxPeak<br>MaxPeak | Coupled | 3 MHz | DUMMY-DBM |



EUT: HI001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH 0
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC
Comments:

***SWEEP TABLE: "EIRP BT low channel"***

| Short Description: | | | EIRP Bluetooth channel-2402MHz | | |
|---|---|---|---|---|---|
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
| 2.4 GHz | 2.4 GHz | MaxPeak<br>MaxPeak | Coupled | 3 MHz | DUMMY-DBM |

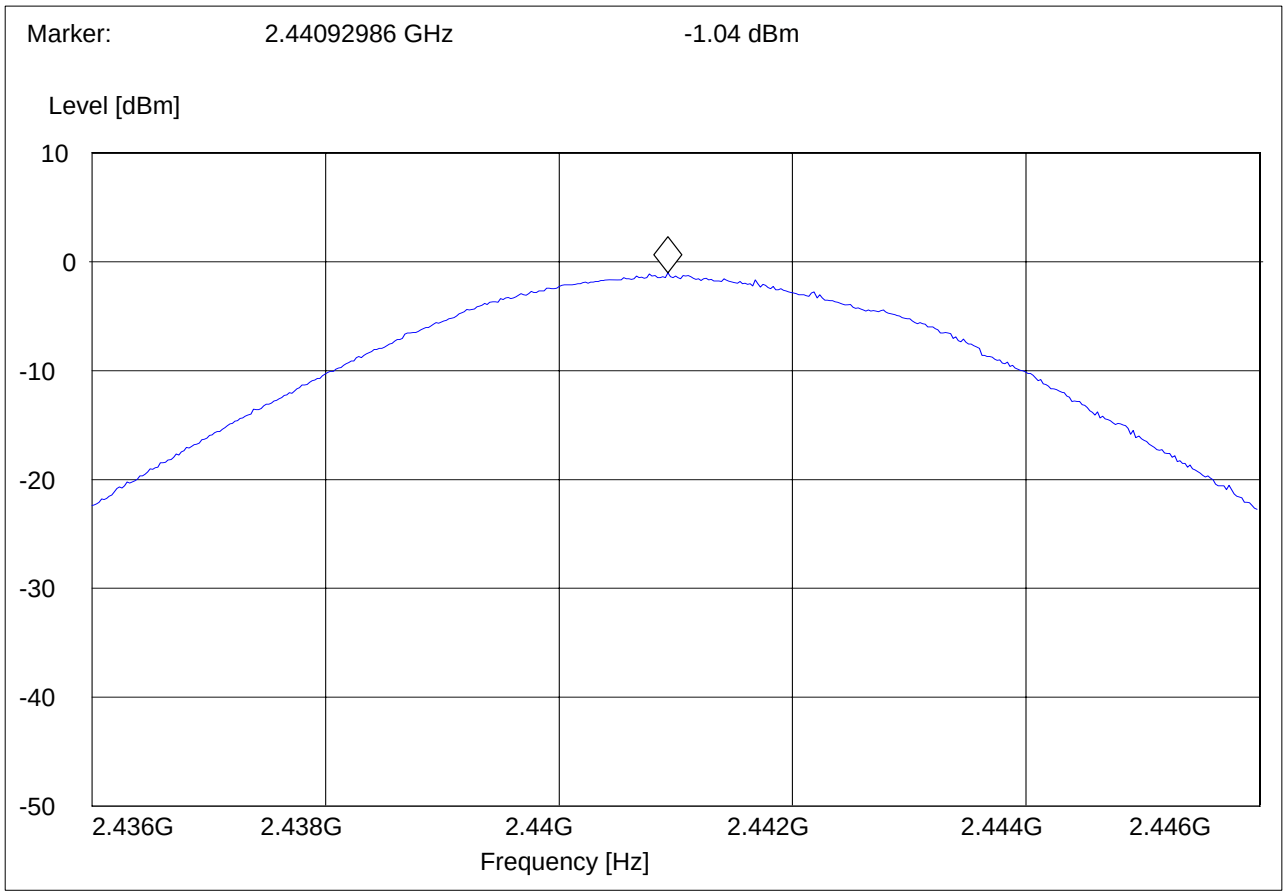


EUT: HI001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH 39
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC
Comments:

***SWEEP TABLE: "EIRP BT mid channel"***

Short Description: EIRP Bluetooth channel-2441MHz

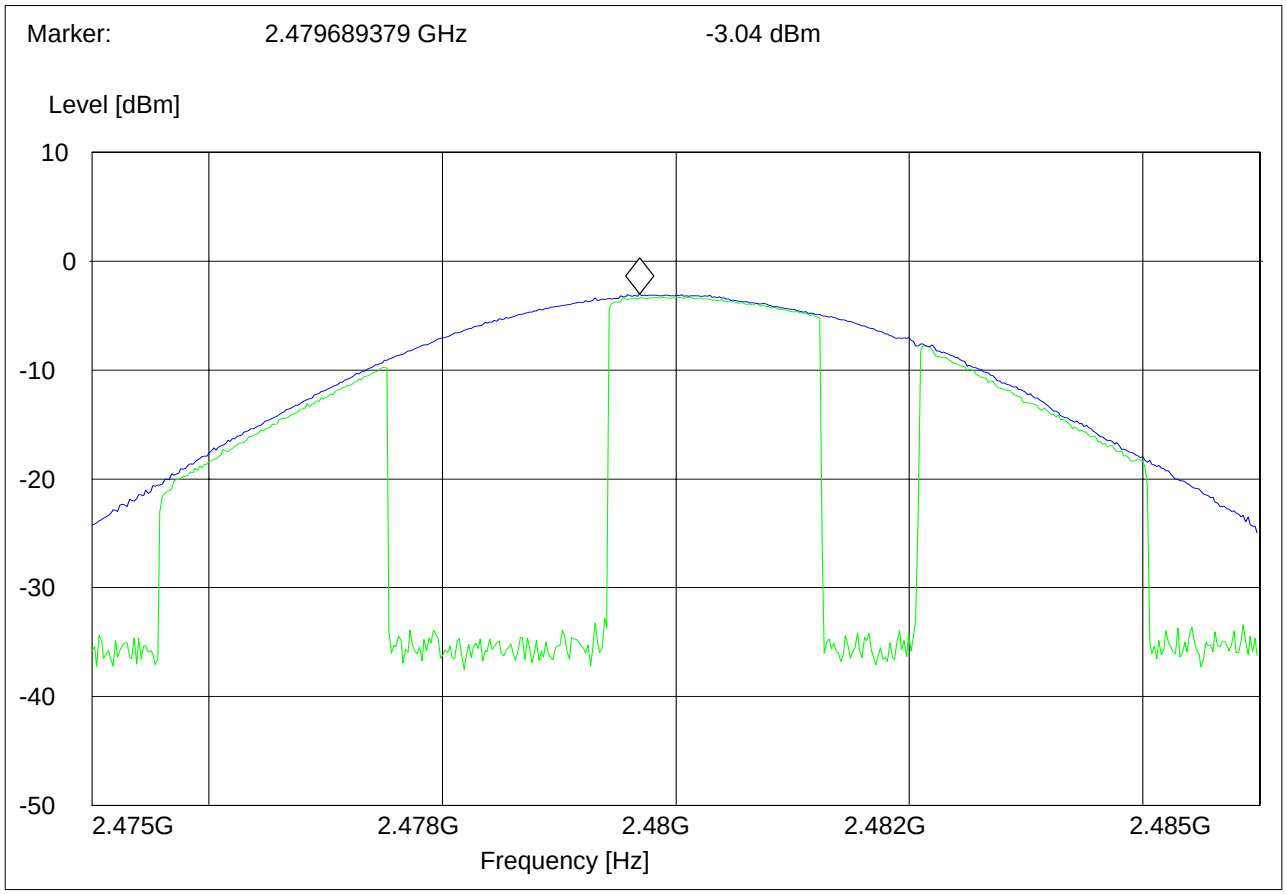
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.4 GHz | 2.4 GHz<br>MaxPeak | MaxPeak | Coupled | 3 MHz | DUMMY-DBM |



EUT: HI001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH 78
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC
Comments:

***SWEEP TABLE: "EIRP BT high channel"***

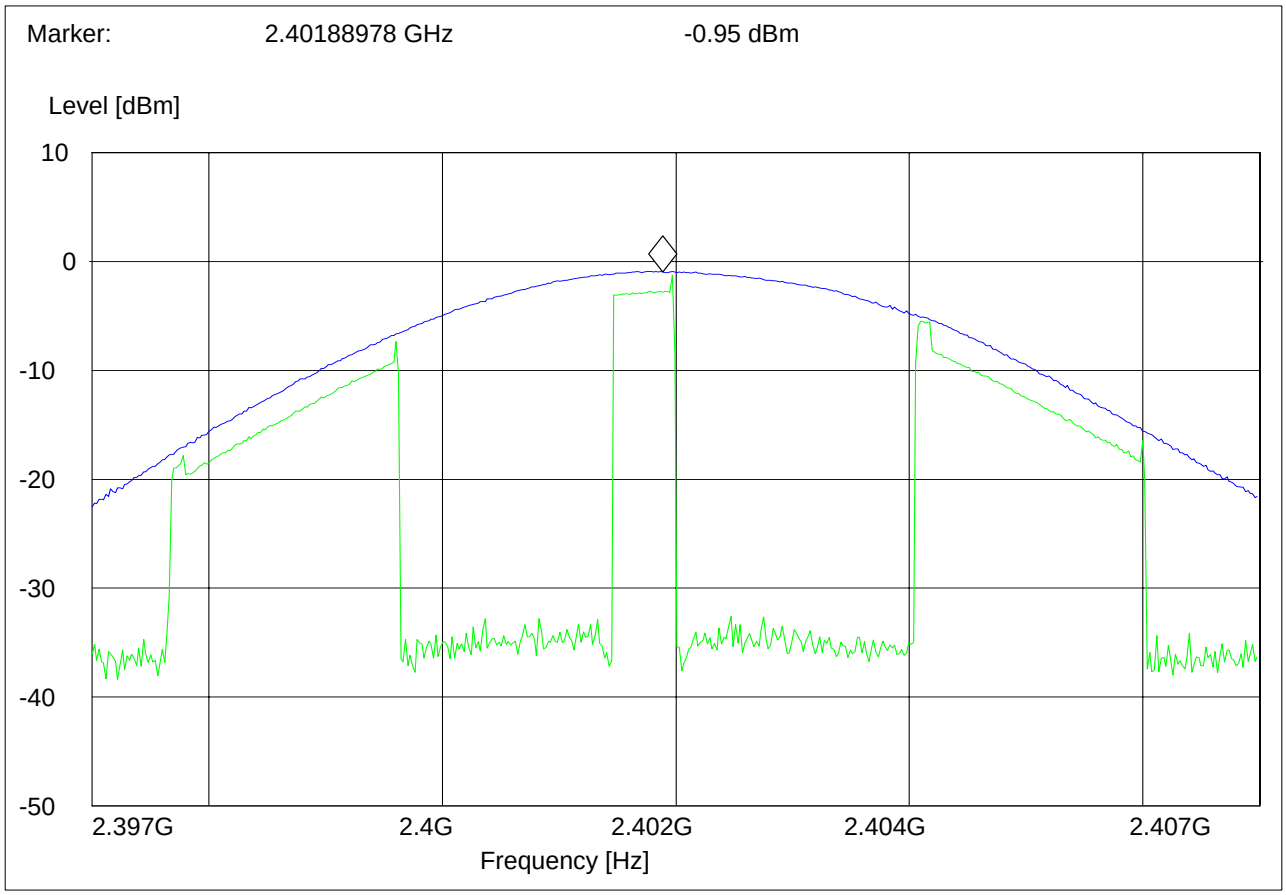
| Short Description: | | | EIRP Bluetooth channel-2480MHz | | |
|---|---|---|---|---|---|
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
| 2.5 GHz | 2.5 GHz | MaxPeak<br>MaxPeak | Coupled | 3 MHz | DUMMY-DBM |



EUT: HI001
Customer:: Casio Hitachi
Test Mode: BT 8DPSK; CH 0
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC
Comments:

***SWEEP TABLE: "EIRP BT low channel"***

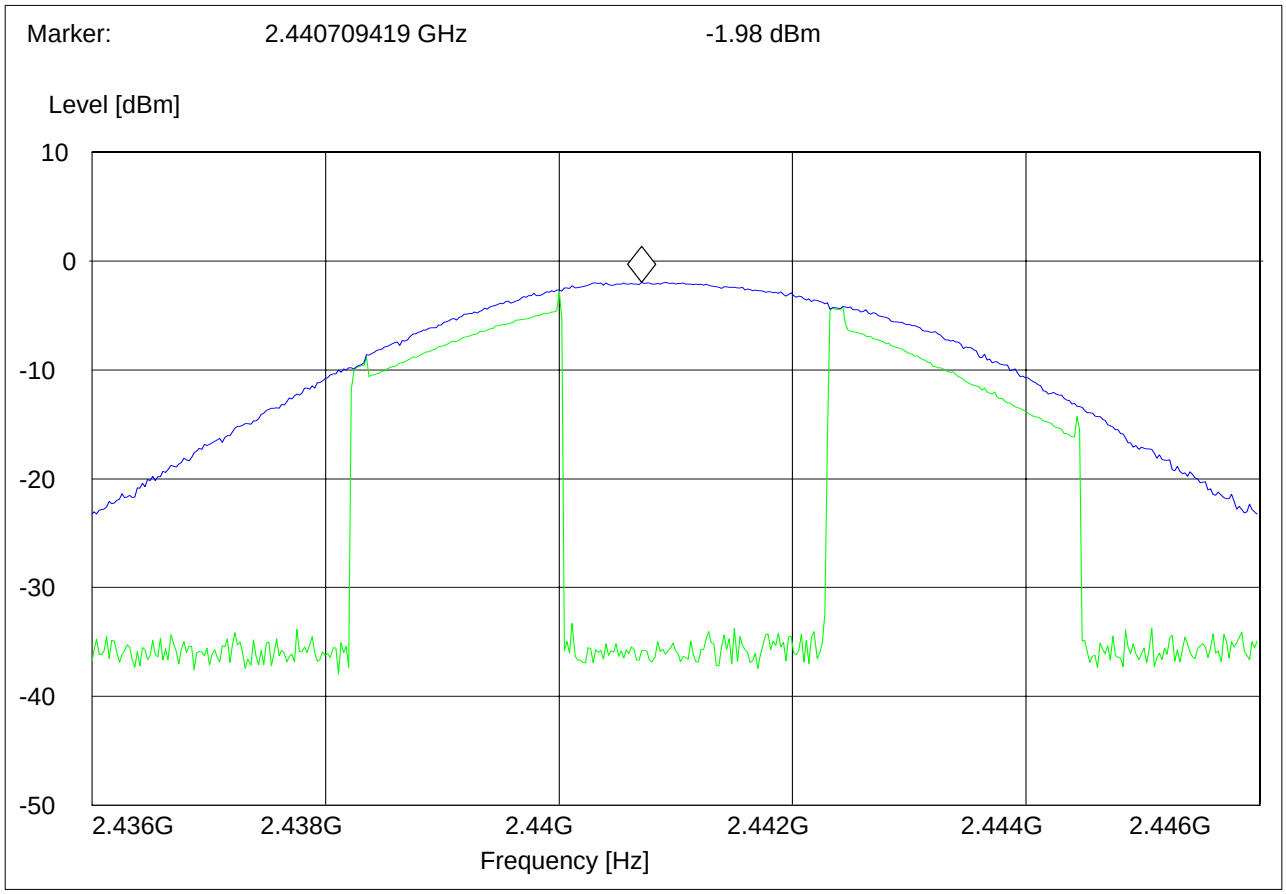
| Short Description: | | | EIRP Bluetooth channel-2402MHz | | |
|---|---|---|---|---|---|
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
| 2.4 GHz | 2.4 GHz | MaxPeak<br>MaxPeak | Coupled | 3 MHz | DUMMY-DBM |



EUT: HI001
Customer:: Casio Hitachi
Test Mode: BT 8DPSK; CH 39
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC
Comments:

***SWEEP TABLE: "EIRP BT mid channel"***

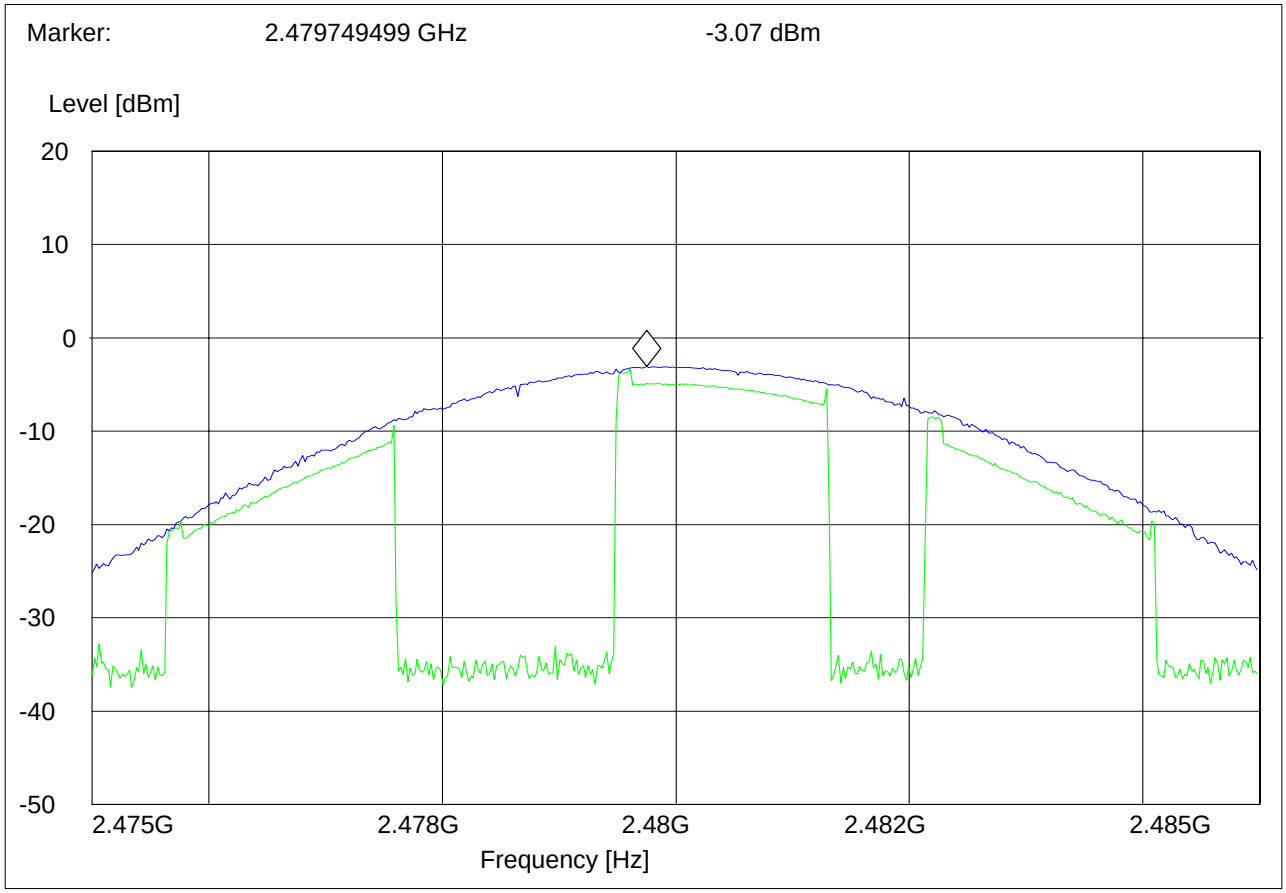
| Short Description: | | | EIRP Bluetooth channel-2441MHz | | |
|---|---|---|---|---|---|
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
| 2.4 GHz | 2.4 GHz | MaxPeak<br>MaxPeak | Coupled | 3 MHz | DUMMY-DBM |



EUT: HI001
Customer:: Casio Hitachi
Test Mode: BT 8DPSK; CH 78
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC
Comments:

***SWEEP TABLE: "EIRP BT high channel"***

| Short Description: | | | EIRP Bluetooth channel-2480MHz | | |
|---|---|---|---|---|---|
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
| 2.5 GHz | 2.5 GHz | MaxPeak<br>MaxPeak | Coupled | 3 MHz | DUMMY-DBM |



## 5.2 RESTRICTED BAND EDGE COMPLIANCE RADIATED §15.247/15.205

### 5.2.1 LIMITS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| [1]0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - 156.52525 | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.7 - 156.9 | 2690 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 162.0125 - 167.17 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 167.72 - 173.2 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 240 - 285 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 322 - 335.4 | 3600 - 4400 | ([2]) |
| 13.36 - 13.41 | | | |

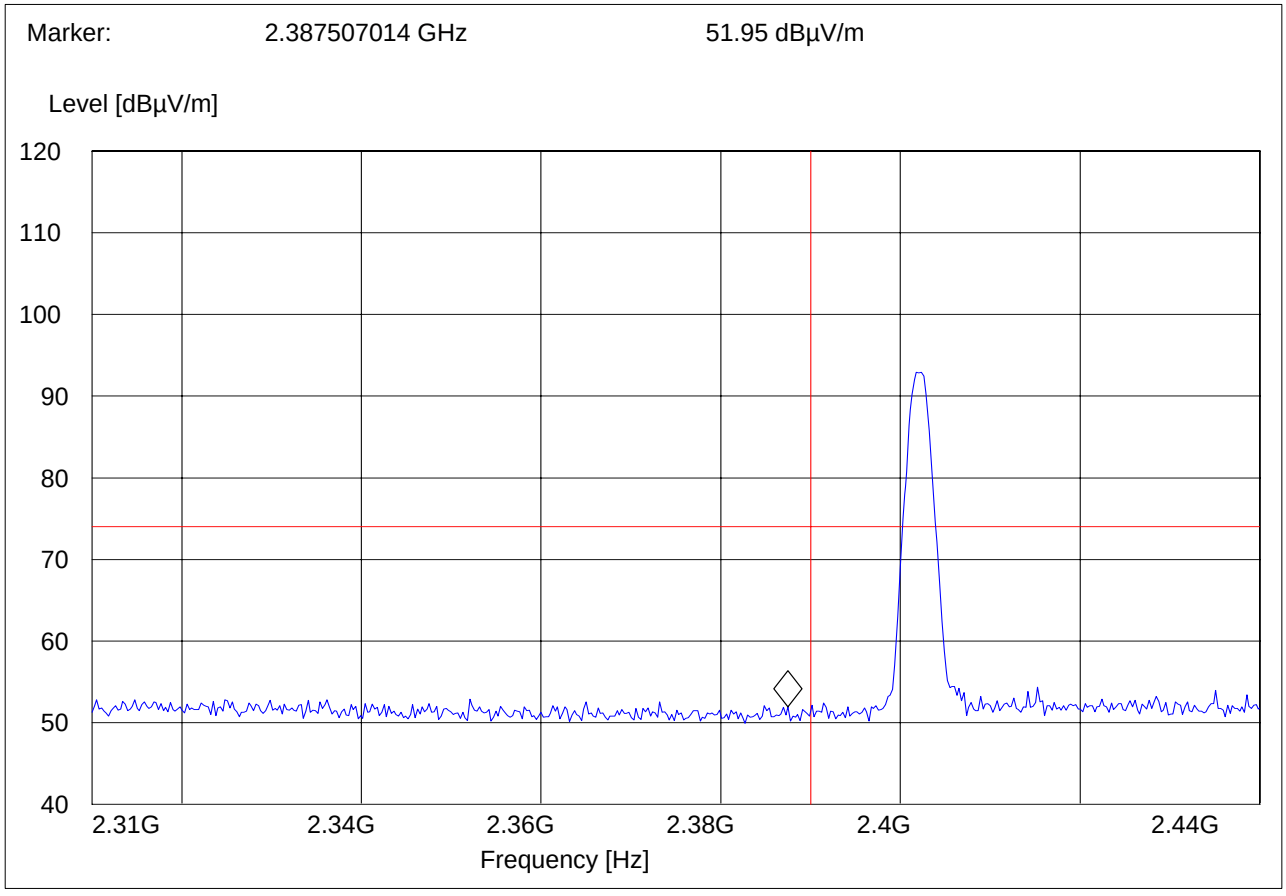
***PEAK LIMIT= 74dBuV/m**
***AVG. LIMIT= 54dBuV/m**

### 5.2.2 RESULTS: GFSK
### (2402MHz) LOWER BAND EDGE PEAK -GFSK MODULATION

```
EUT:              CDMA HI001
Customer::        Casio Hitachi
Test Mode:        BT GFSK CH0
ANT Orientation:  H
EUT Orientation:  H
Test Engineer:    Ahmad
Voltage:          AC
Comments:         on the cradle
```

***SWEEP TABLE: "FCC15.247 LBE_PK"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.3 GHz | 2.4 GHz | MaxPeak<br>MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

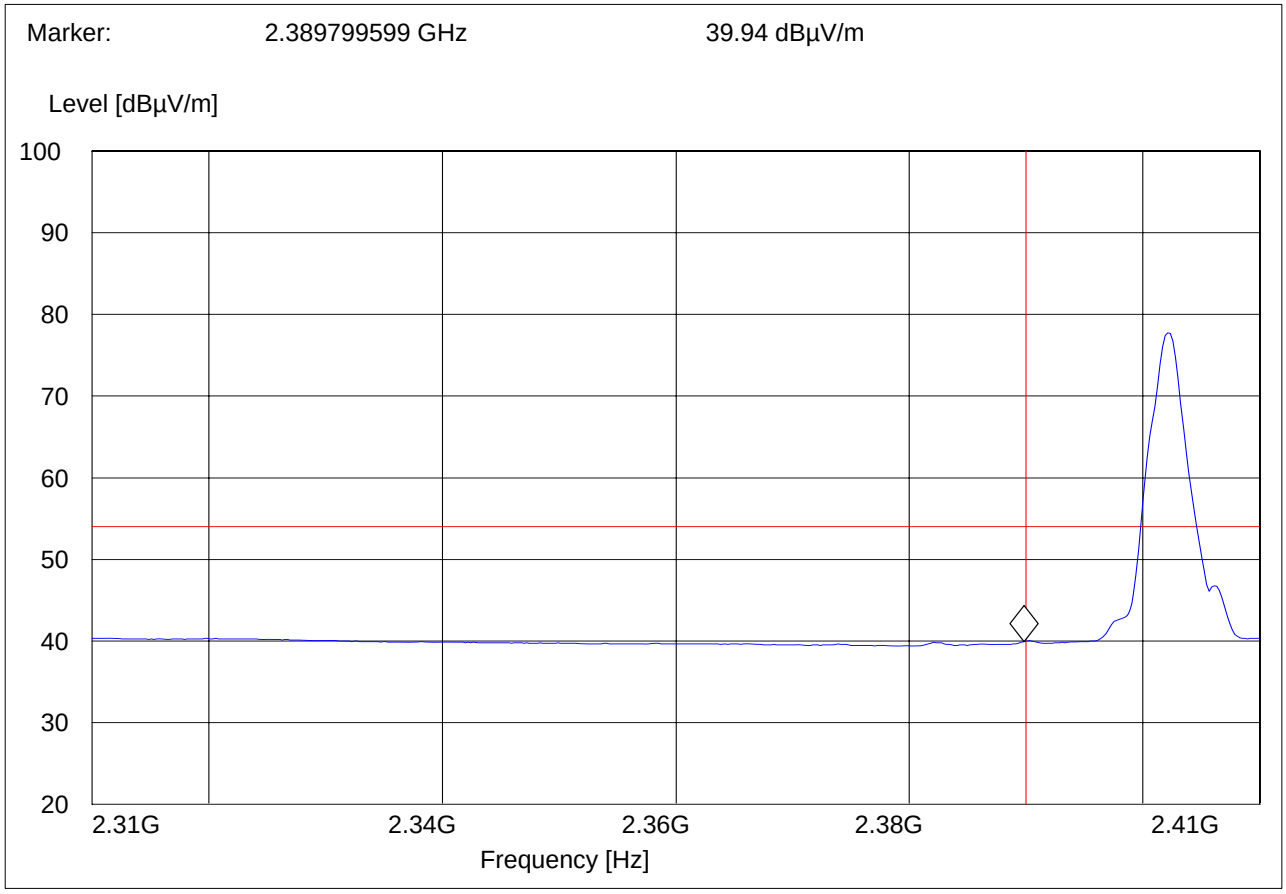


## (2402MHz) LOWER BAND EDGE AVERAGE -GFSK MODULATION

```
EUT:             HI001
Customer::       Casio Hitachi
Test Mode:       BT GFSK; CH 0
ANT Orientation: V
EUT Orientation: V
Test Engineer:   Chris
Voltage:         AC
Comments:
```

***SWEEP TABLE: "FCC15.247 LBE_AVG"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.3 GHz | 2.4 GHz | MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

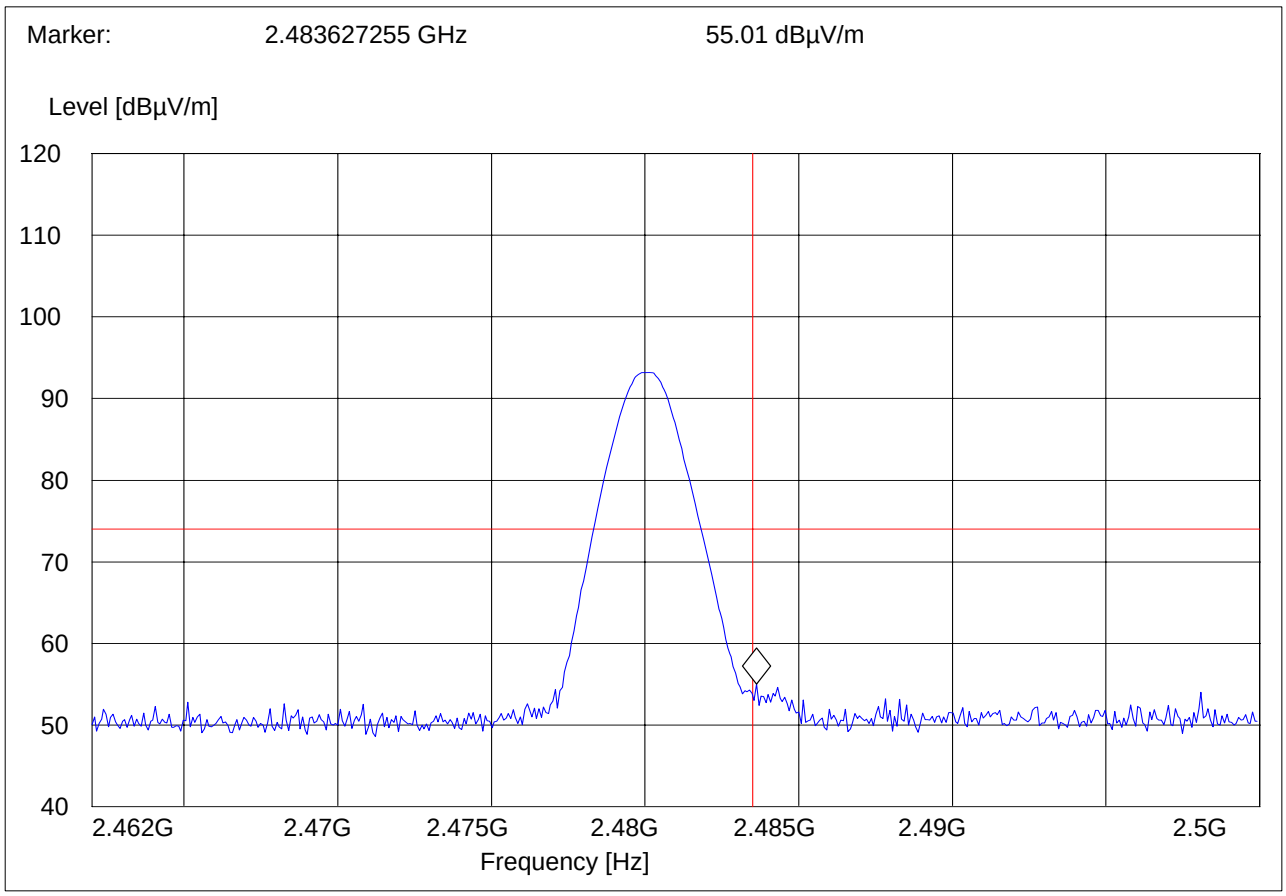


## (2480MHz) HIGHER BAND EDGE PEAK -GFSK MODULATION

```
EUT:              HI001
Customer::        Casio Hitachi
Test Mode:        BT GFSK; CH 78
ANT Orientation:  V
EUT Orientation:  V
Test Engineer:    Chris
Voltage:          AC
Comments:
```

***SWEEP TABLE: "FCC15.247 HBE_PK"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.5 GHz | 2.5 GHz | MaxPeak<br>MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

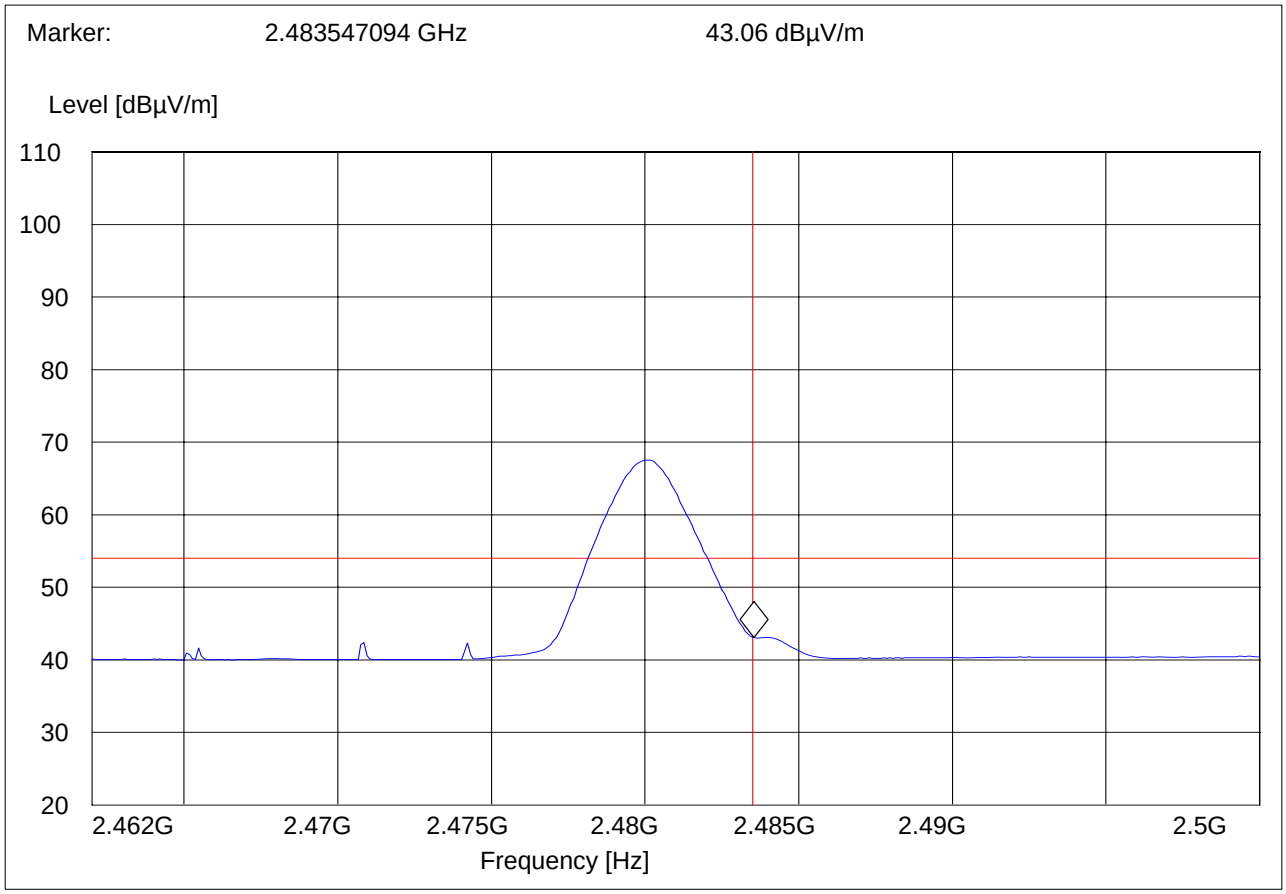


## HIGHER BAND EDGE AVERAGE-GFSK MODULATION

EUT: HI001
Customer:: Casio Hitachi
Test Mode: BT GFSK; CH 78
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC
Comments:

***SWEEP TABLE: "FCC15.247 HBE_AVG"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.5 GHz | 2.5 GHz | MaxPeak | Coupled | 1 MHz | #326horn_AF_horz |

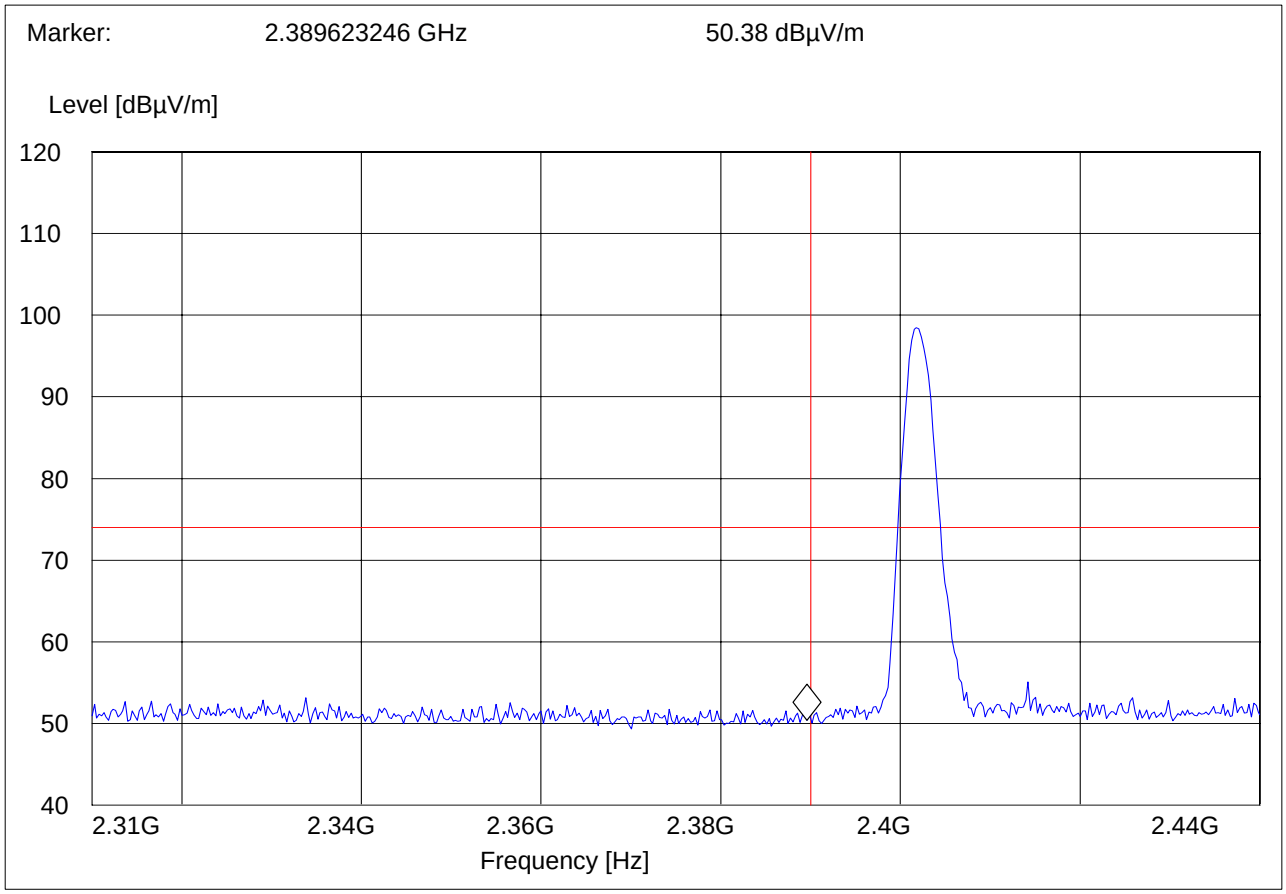


### 5.2.3 RESULTS: π/4 DQPSK
### (2402MHz) LOWER BAND EDGE PEAK - π/4 DQPSK MODULATION

```
EUT:              HI001
Customer::        Casio Hitachi
Test Mode:        BT DQPSK; CH 0
ANT Orientation:  V
EUT Orientation:  V
Test Engineer:    Chris
Voltage:          AC
Comments:
```

***SWEEP TABLE: "FCC15.247 LBE_PK"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.3 GHz | 2.4 GHz | MaxPeak<br>MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

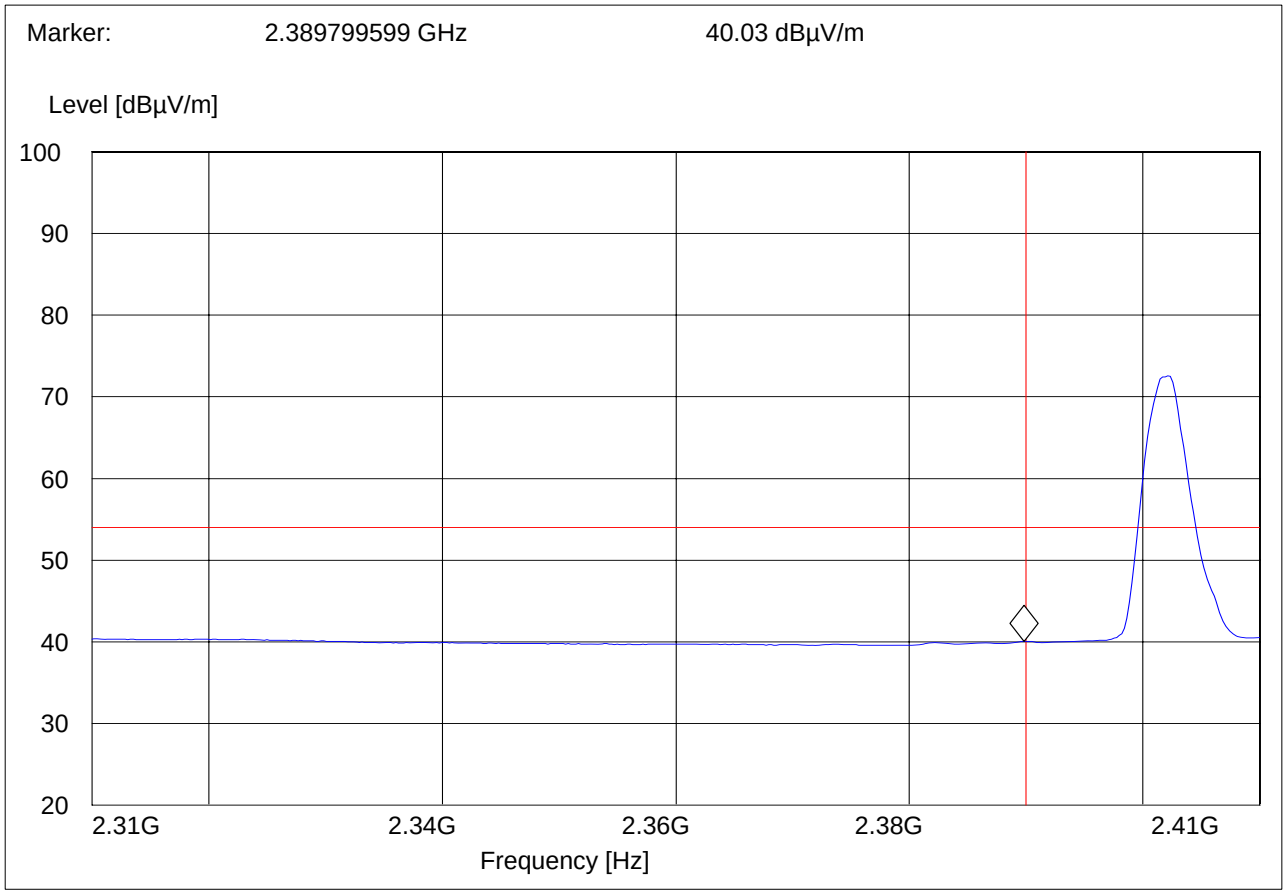


## (2402MHz) LOWER BAND EDGE AVERAGE -π/4 DQPSK MODULATION

```
EUT:             HI001
Customer::       Casio Hitachi
Test Mode:       BT DQPSK; CH 0
ANT Orientation: V
EUT Orientation: V
Test Engineer:   Chris
Voltage:         AC
Comments:
```

***SWEEP TABLE: "FCC15.247 LBE_AVG"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.3 GHz | 2.4 GHz | MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

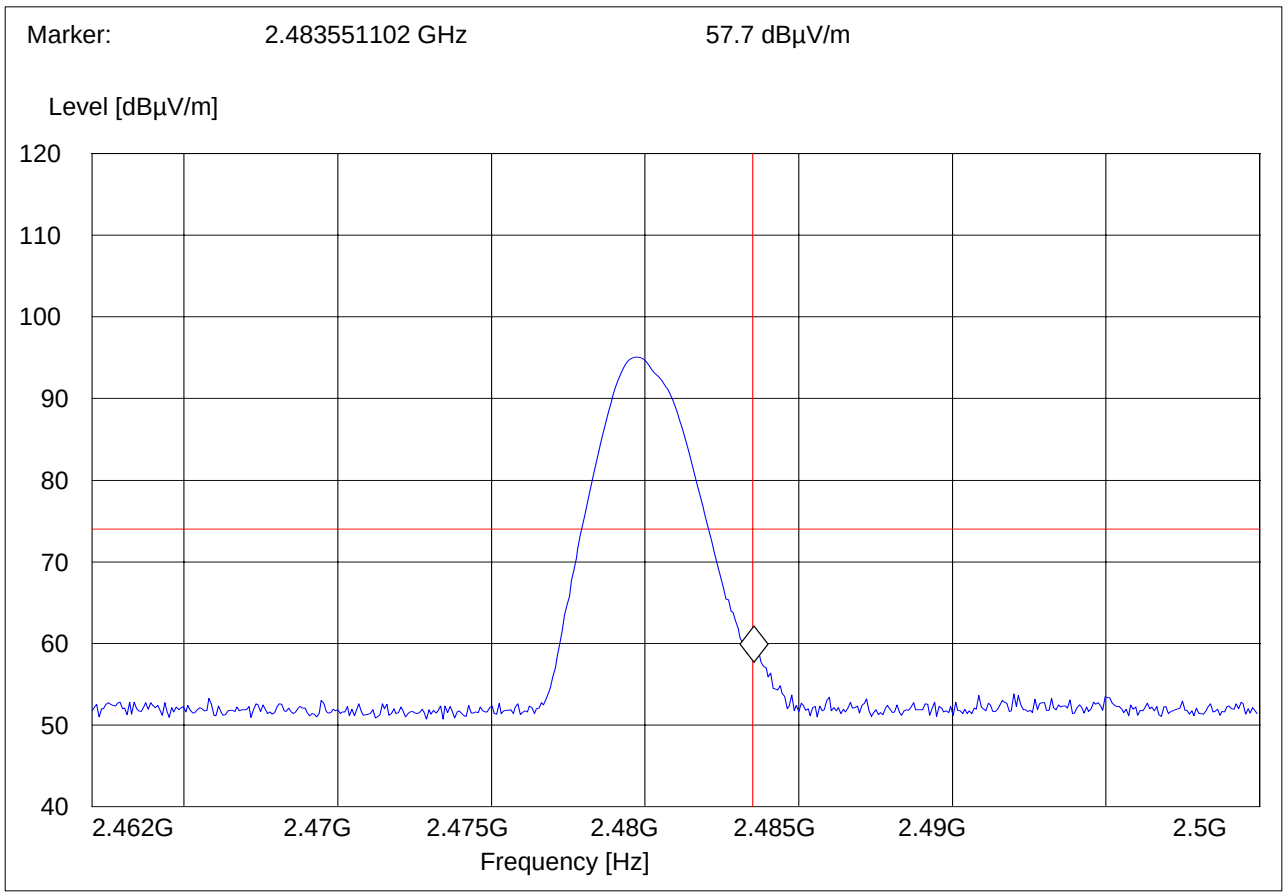


## (2480MHz) HIGHER BAND EDGE PEAK -π/4 DQPSK MODULATION

```
EUT:              HI001
Customer::        Casio Hitachi
Test Mode:        BT DQPSK; CH 78
ANT Orientation:  V
EUT Orientation:  V
Test Engineer:    Chris
Voltage:          AC
Comments:
```

***SWEEP TABLE: "FCC15.247 HBE_PK"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.5 GHz | 2.5 GHz | MaxPeak<br>MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

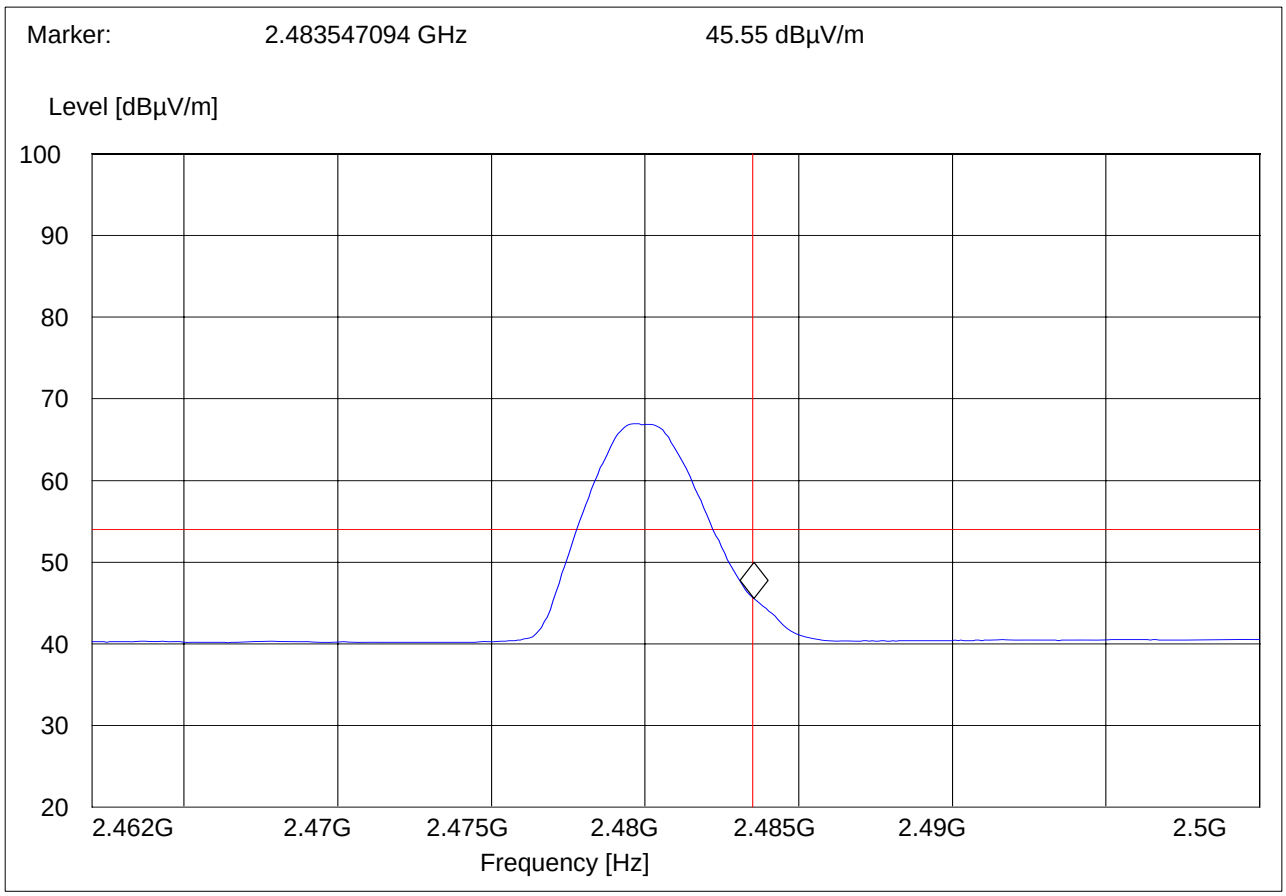


## HIGHER BAND EDGE AVERAGE- π/4 DQPSK MODULATION

```
EUT:             HI001
Customer::       Casio Hitachi
Test Mode:       BT DQPSK; CH 78
ANT Orientation: V
EUT Orientation: V
Test Engineer:   Chris
Voltage:         AC
Comments:
```

***SWEEP TABLE: "FCC15.247 HBE_AVG"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.5 GHz | 2.5 GHz | MaxPeak | Coupled | 1 MHz | #326horn_AF_horz |

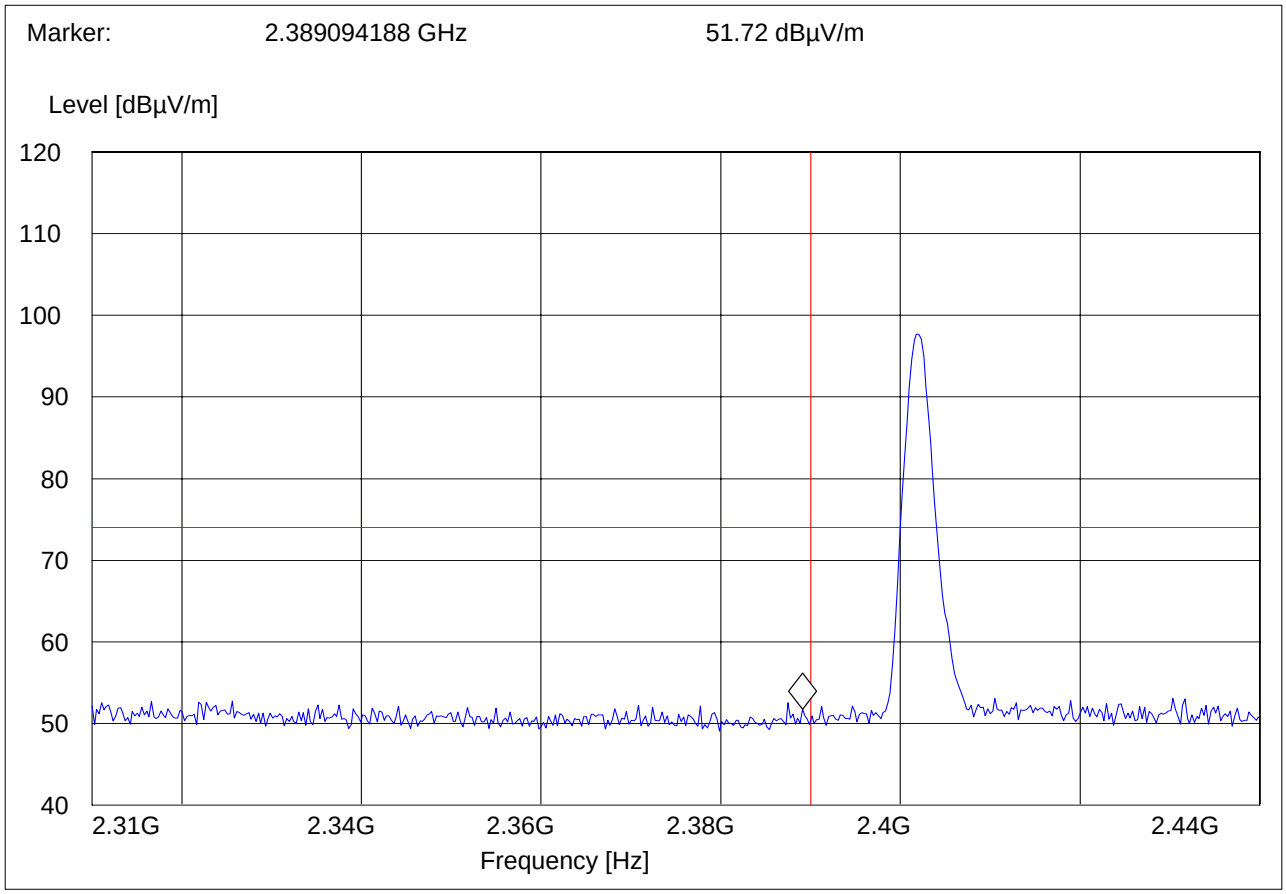


### 5.2.4 RESULTS: 8DPSK
### (2402MHz) LOWER BAND EDGE PEAK - 8DPSK MODULATION

```
EUT:              HI001
Customer::        Casio Hitachi
Test Mode:        BT 8DPSK; CH 0
ANT Orientation:  V
EUT Orientation:  V
Test Engineer:    Chris
Voltage:          AC
Comments:
```

***SWEEP TABLE: "FCC15.247 LBE_PK"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.3 GHz | 2.4 GHz | MaxPeak<br>MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

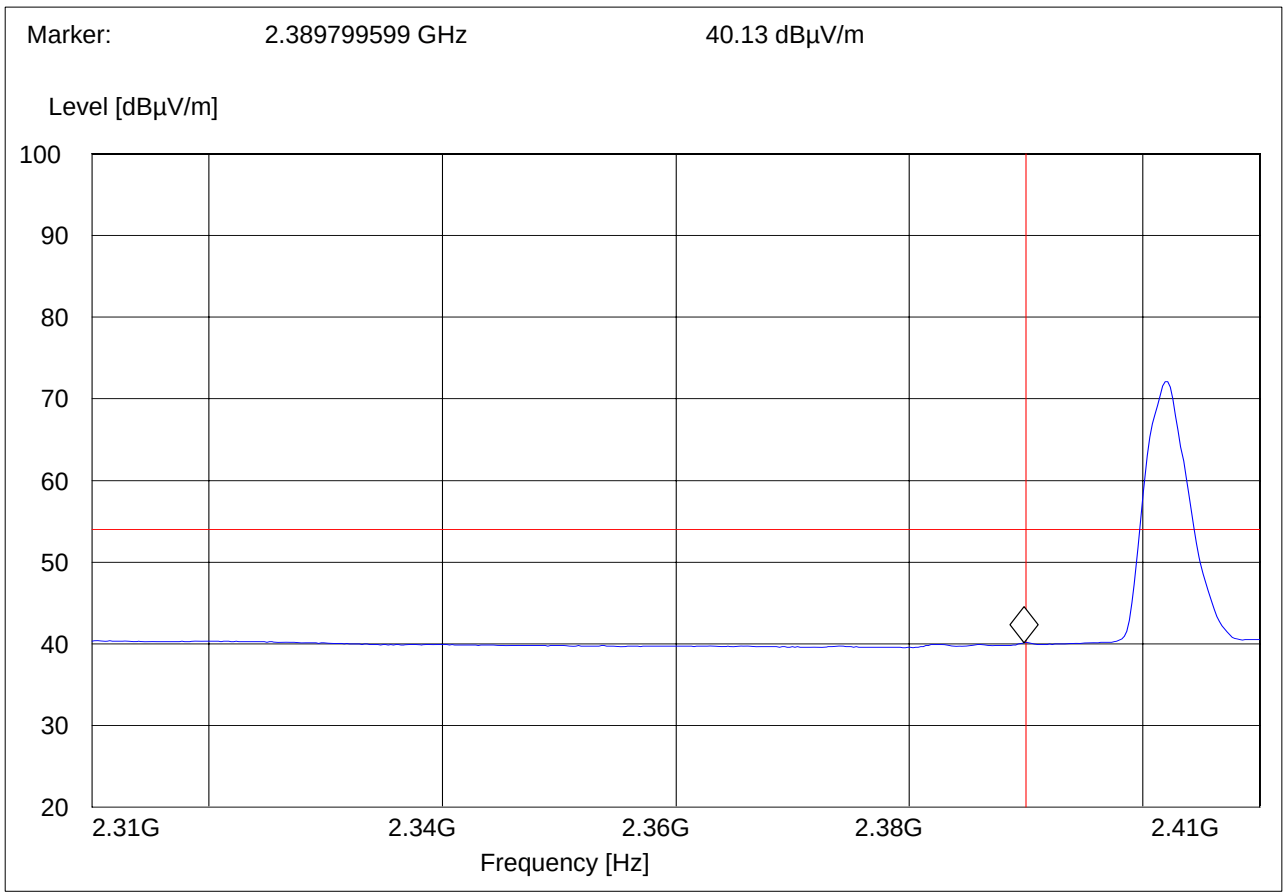


## (2402MHz) LOWER BAND EDGE AVERAGE -8DPSK MODULATION

```
EUT:             HI001
Customer::       Casio Hitachi
Test Mode:       BT 8DPSK; CH 0
ANT Orientation: V
EUT Orientation: V
Test Engineer:   Chris
Voltage:         AC
Comments:
```

***SWEEP TABLE: "FCC15.247 LBE_AVG"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.3 GHz | 2.4 GHz | MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

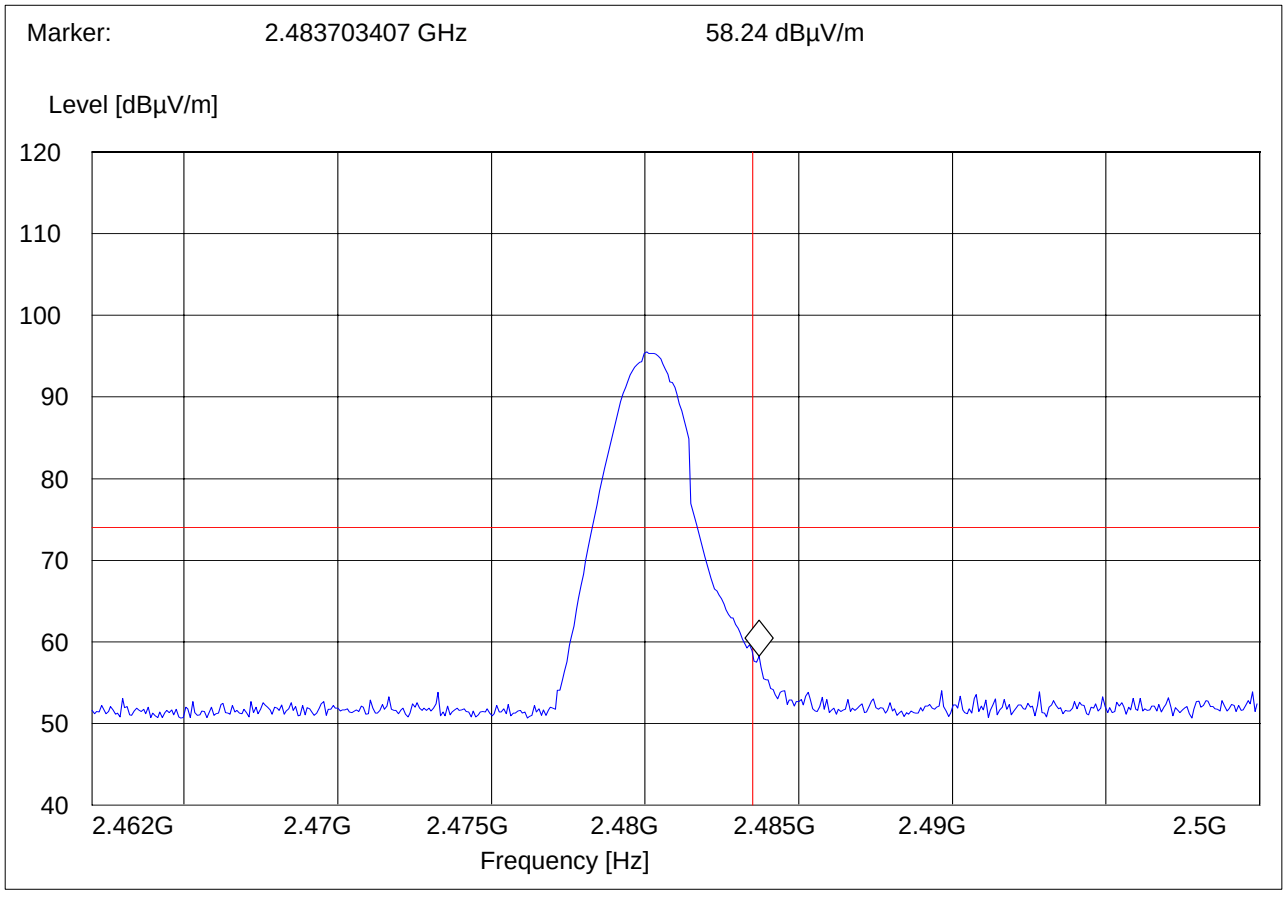


## RESULTS (2480MHz) HIGHER BAND EDGE PEAK - 8DPSK MODULATION

```
EUT:              HI001
Customer::        Casio Hitachi
Test Mode:        BT 8DPSK; CH 78
ANT Orientation:  V
EUT Orientation:  V
Test Engineer:    Chris
Voltage:          AC
Comments:
```

***SWEEP TABLE: "FCC15.247 HBE_PK"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.5 GHz | 2.5 GHz | MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |
| | | MaxPeak | | | |

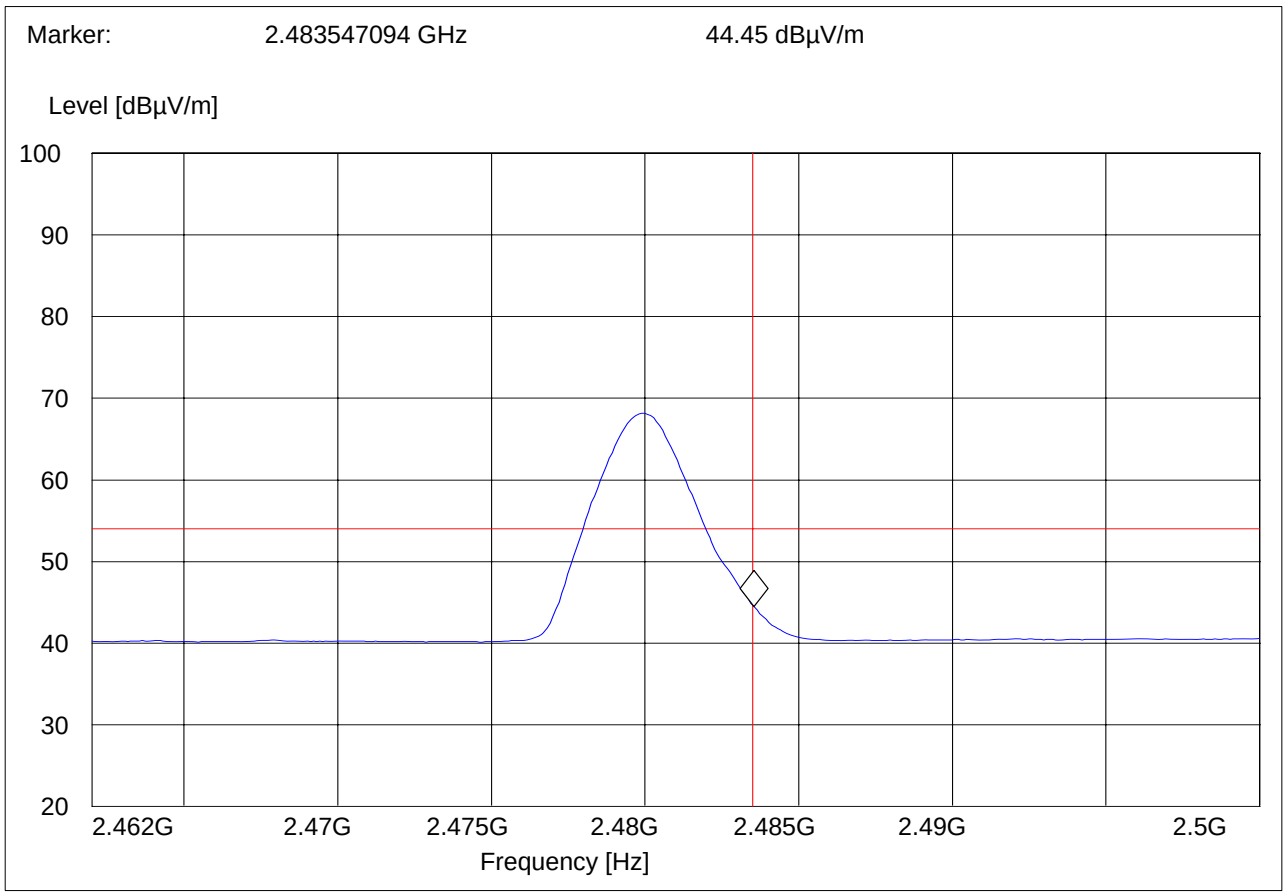


## HIGHER BAND EDGE AVERAGE-8DPSK MODULATION

EUT: HI001
Customer:: Casio Hitachi
Test Mode: BT 8DPSK; CH 78
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC
Comments:

***SWEEP TABLE: "FCC15.247 HBE_AVG"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 2.5 GHz | 2.5 GHz | MaxPeak | Coupled | 1 MHz | #326horn_AF_horz |



## 5.3 TRANSMITTER SPURIOUS EMISSIONS RADIATED § 15.247/15.205/15.209

### 5.3.1 LIMITS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| [1]0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - 156.52525 | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.7 - 156.9 | 2690 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 162.0125 - 167.17 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 167.72 - 173.2 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 240 - 285 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 322 - 335.4 | 3600 - 4400 | ([2]) |
| 13.36 - 13.41 | | | |

***PEAK LIMIT= 74dBuV/m**
***AVG. LIMIT= 54dBuV/m**

**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 25 GHz very short cable connections to the antenna was used to minimize the noise level.

2. All measurements are done in peak mode using an average limit , unless specified with the 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 |

### 5.3.2 RESULTS

**30MHz – 1GHz**

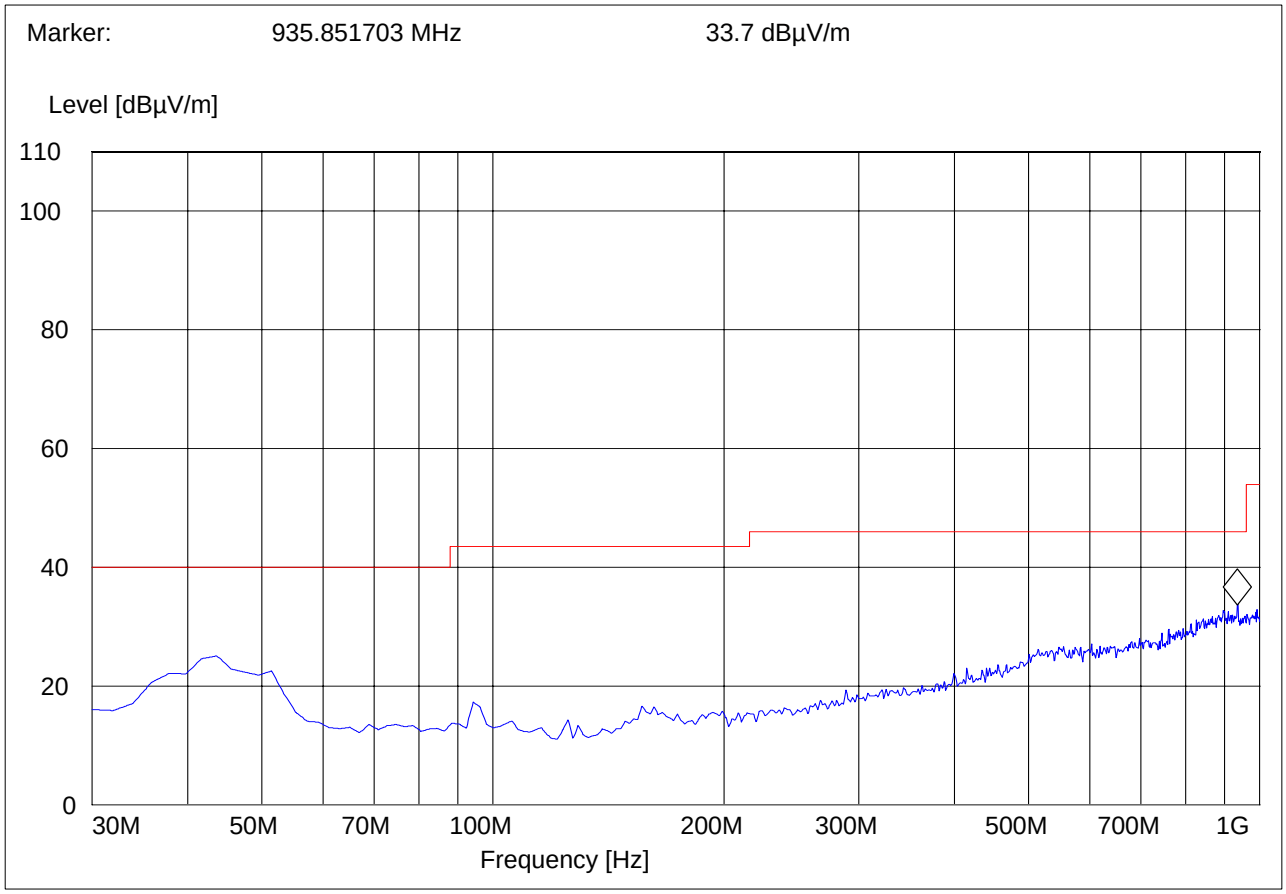
**Antenna: vertical**

**Note: Worse case representation for all channels.**

```
EUT:              CDMA HI001
Customer::        Casio Hitachi
Test Mode:        BT DQPSK CH39
ANT Orientation:  V
EUT Orientation:  H
Test Engineer:    Chris
Voltage:          AC
Comments:         on the cradle;
```

***SWEEP TABLE: "FCC15.247_30M-1G_Ver"***

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

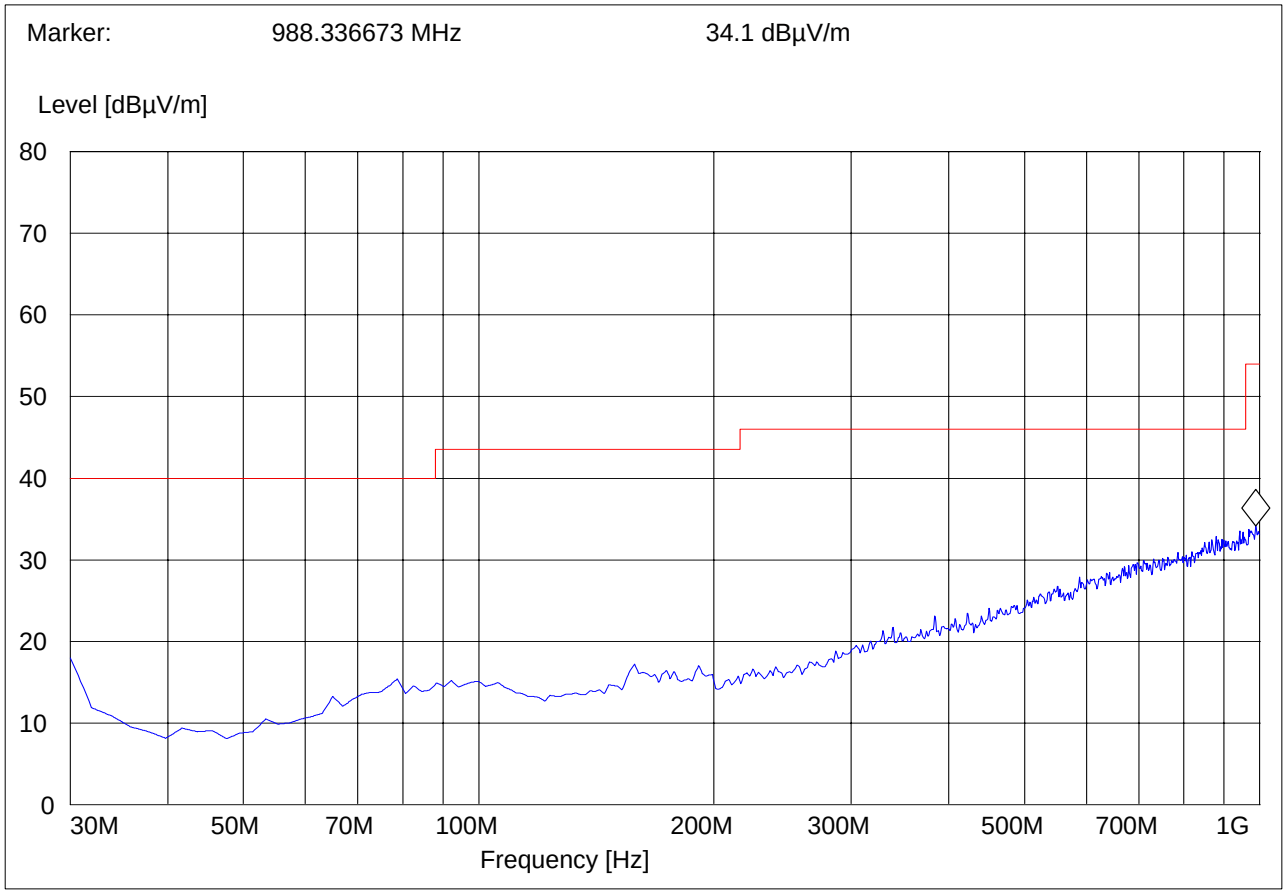


**30MHz – 1GHz**
**Antenna: horizontal**
**Note: Worse case representation for all channels.**

```
EUT:              CDMA HI001
Customer::        Casio Hitachi
Test Mode:        BT DQPSK CH39
ANT Orientation:  H
EUT Orientation:  H
Test Engineer:    Chris
Voltage:          AC
Comments:         on the cradle;
```

***SWEEP TABLE: "FCC15.247_30M-1G_Hor"***

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

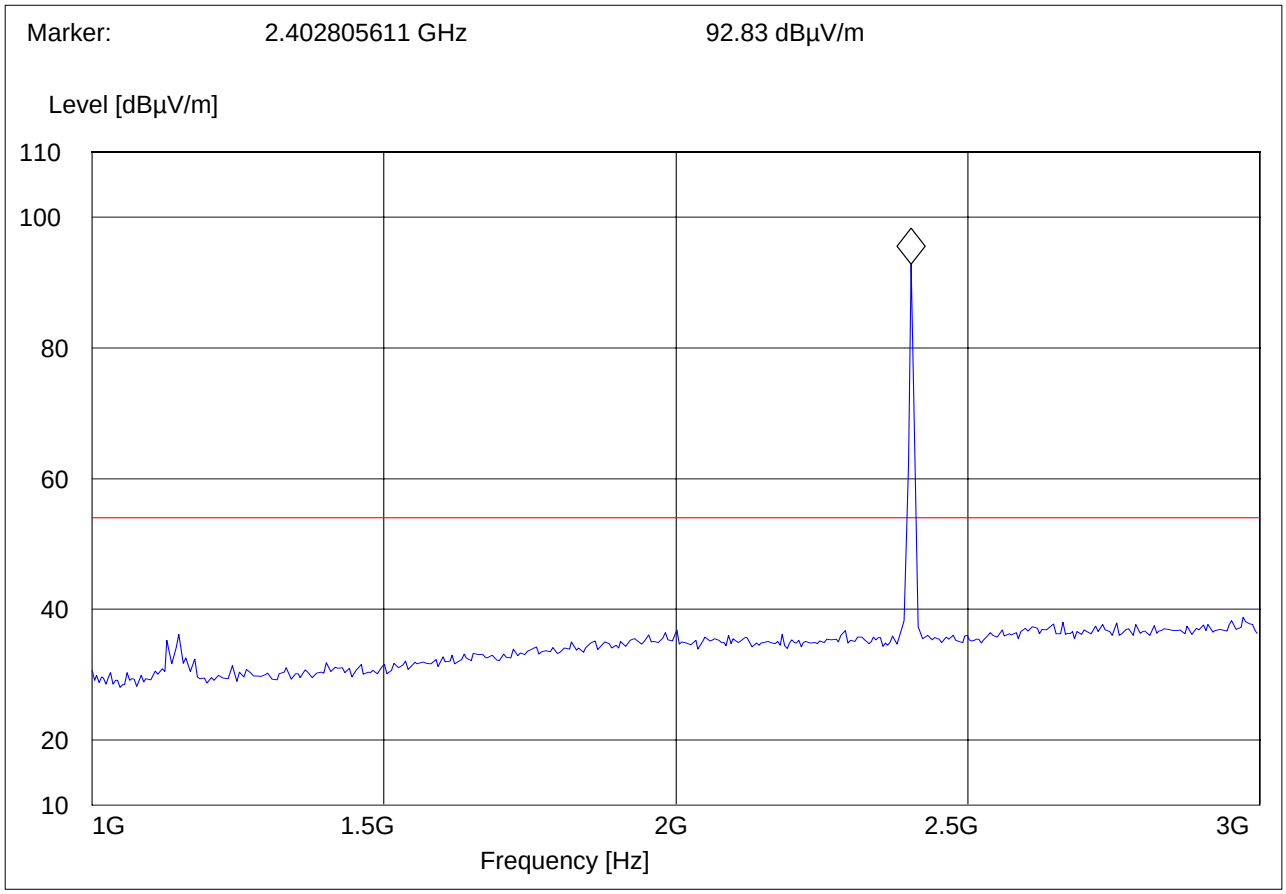


**1-3GHz (2402MHz)**
**Note: The peak above the limit line is the carrier freq.**
**Note: Peak Reading vs. Average limit**

```
EUT:              CDMA HI001
Customer::        Casio Hitachi
Test Mode:        BT DQPSK CH0
ANT Orientation:  H
EUT Orientation:  H
Test Engineer:    Chris
Voltage:          AC
Comments:         on the cradle
```

***SWEEP TABLE: "FCC15.247_1-3G"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 1.0 GHz | 3.0 GHz | MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

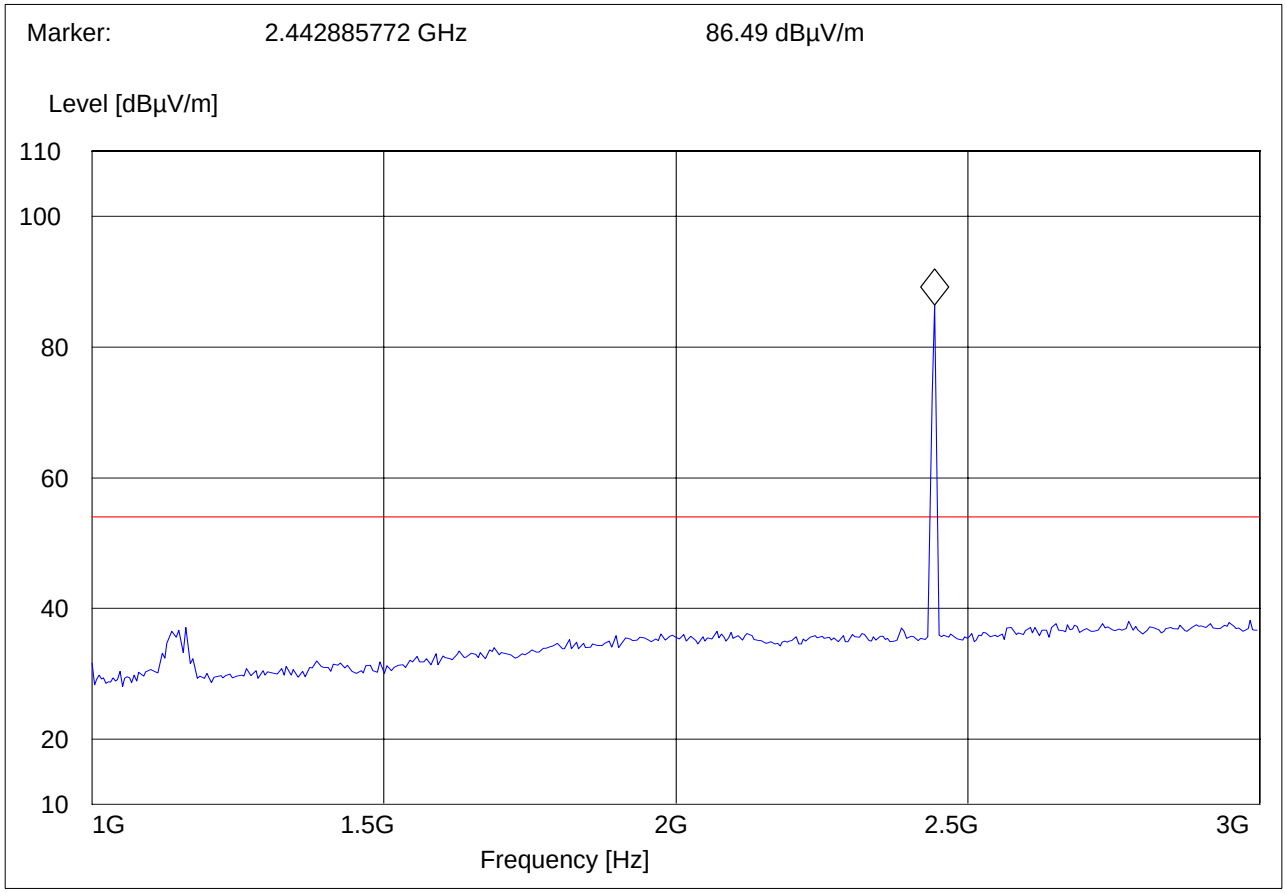


**1-3GHz (2441MHz)**
**Note: The peaks above the limit line is the carrier freq.**
**Note: Peak Reading vs. Average limit**

```
EUT:              CDMA HI001
Customer::        Casio Hitachi
Test Mode:        BT DQPSK CH39
ANT Orientation:  H
EUT Orientation:  H
Test Engineer:    Chris
Voltage:          AC
Comments:         on the cradle
```

***SWEEP TABLE: "FCC15.247_1-3G"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 1.0 GHz | 3.0 GHz | MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

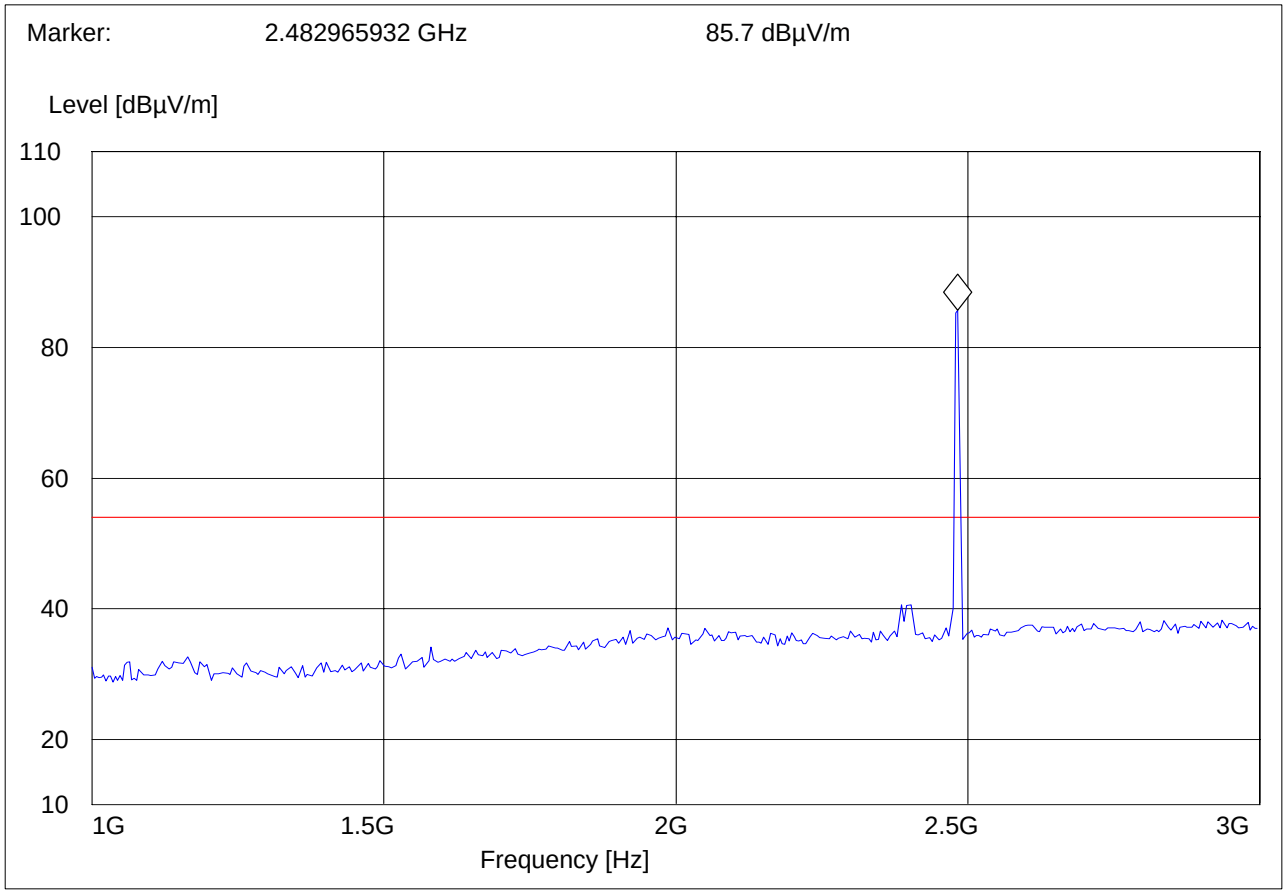


**1-3GHz (2480MHz)**
**Note: The peaks above the limit line is the carrier freq.**
**Note: Peak Reading vs. Average limit**

```
EUT:              CDMA HI001
Customer::        Casio Hitachi
Test Mode:        BT DQPSK CH78
ANT Orientation:  H
EUT Orientation:  H
Test Engineer:    Ahmad
Voltage:          AC
Comments:         on the cradle
```

***SWEEP TABLE: "FCC15.247_1-3G"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 1.0 GHz | 3.0 GHz | MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

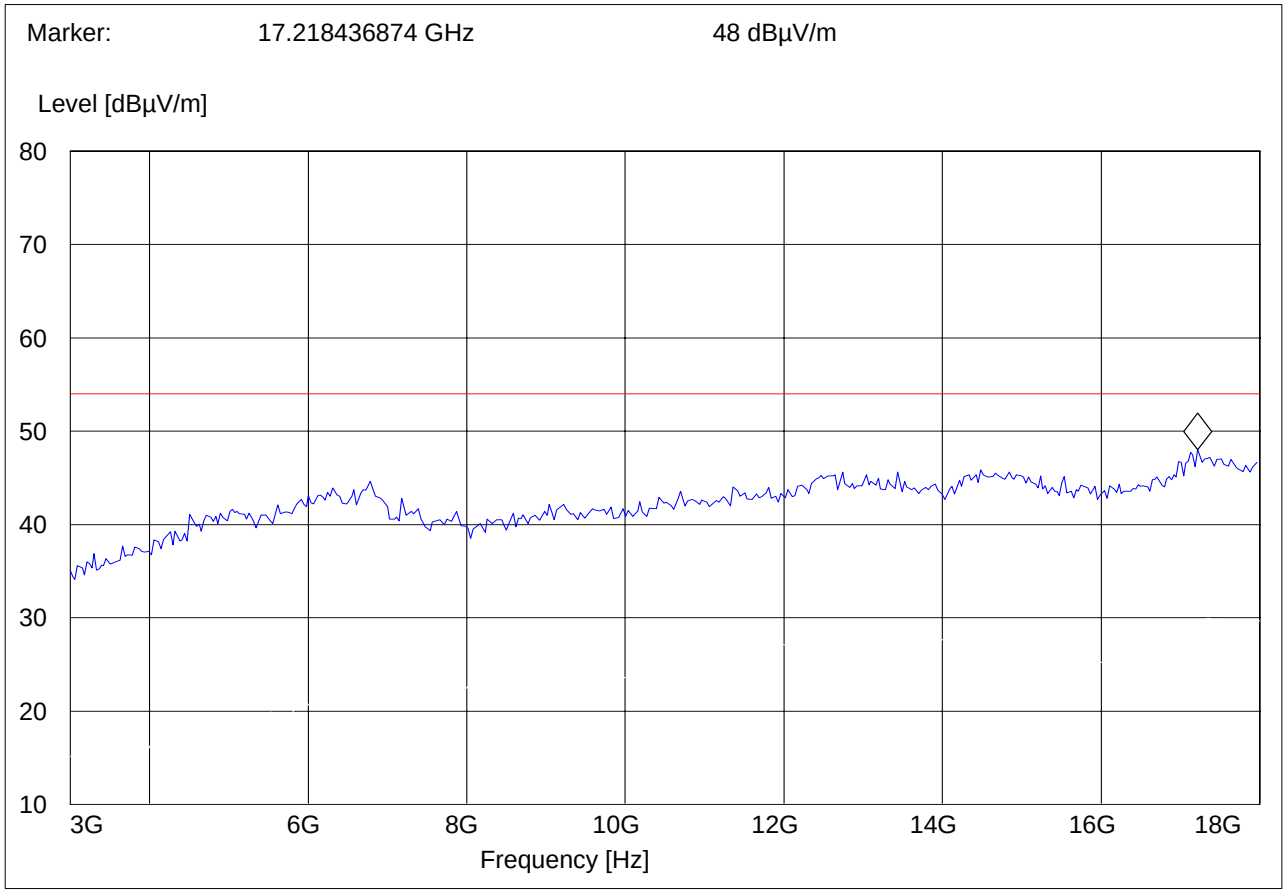


### 3-18GHz (2402MHz)
### Note: Peak Reading vs. Average limit

```
EUT:              CDMA HI001
Customer::        Casio Hitachi
Test Mode:        BT DQPSK CH0
ANT Orientation:  H
EUT Orientation:  H
Test Engineer:    Chris
Voltage:          AC
Comments:         on the cradle; With 2.4GHz notch filter
```

***SWEEP TABLE: "FCC15.247_3-18G"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 3.0 GHz | 18.0 GHz | MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

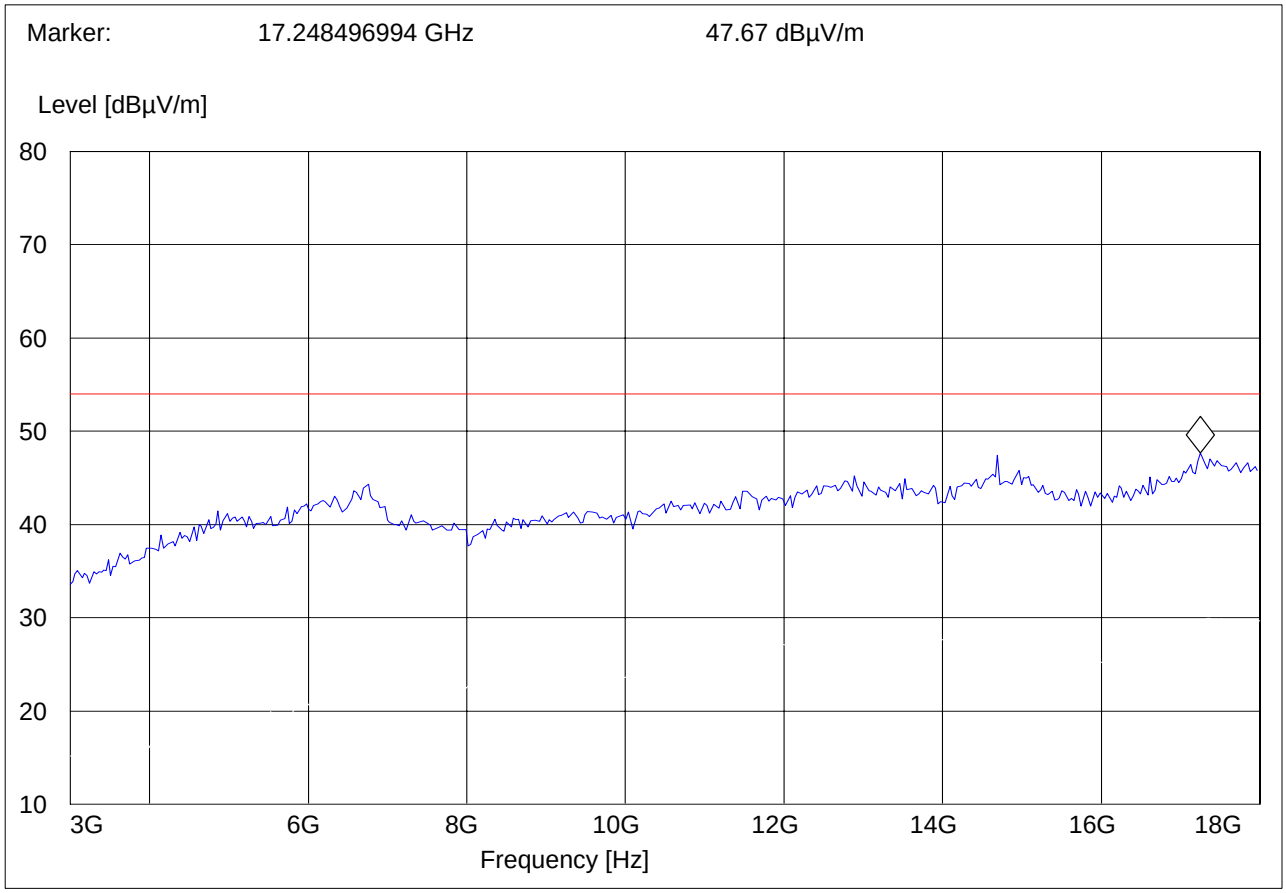


**3-18GHz (2441MHz)**
**Note: Peak Reading vs. Average limit**

```
EUT:              CDMA HI001
Customer::        Casio Hitachi
Test Mode:        BT DQPSK CH39
ANT Orientation:  H
EUT Orientation:  H
Test Engineer:    Chris
Voltage:          AC
Comments:         on the cradle; With 2.4GHz notch filter
```

***SWEEP TABLE: "FCC15.247_3-18G"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 3.0 GHz | 18.0 GHz | MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

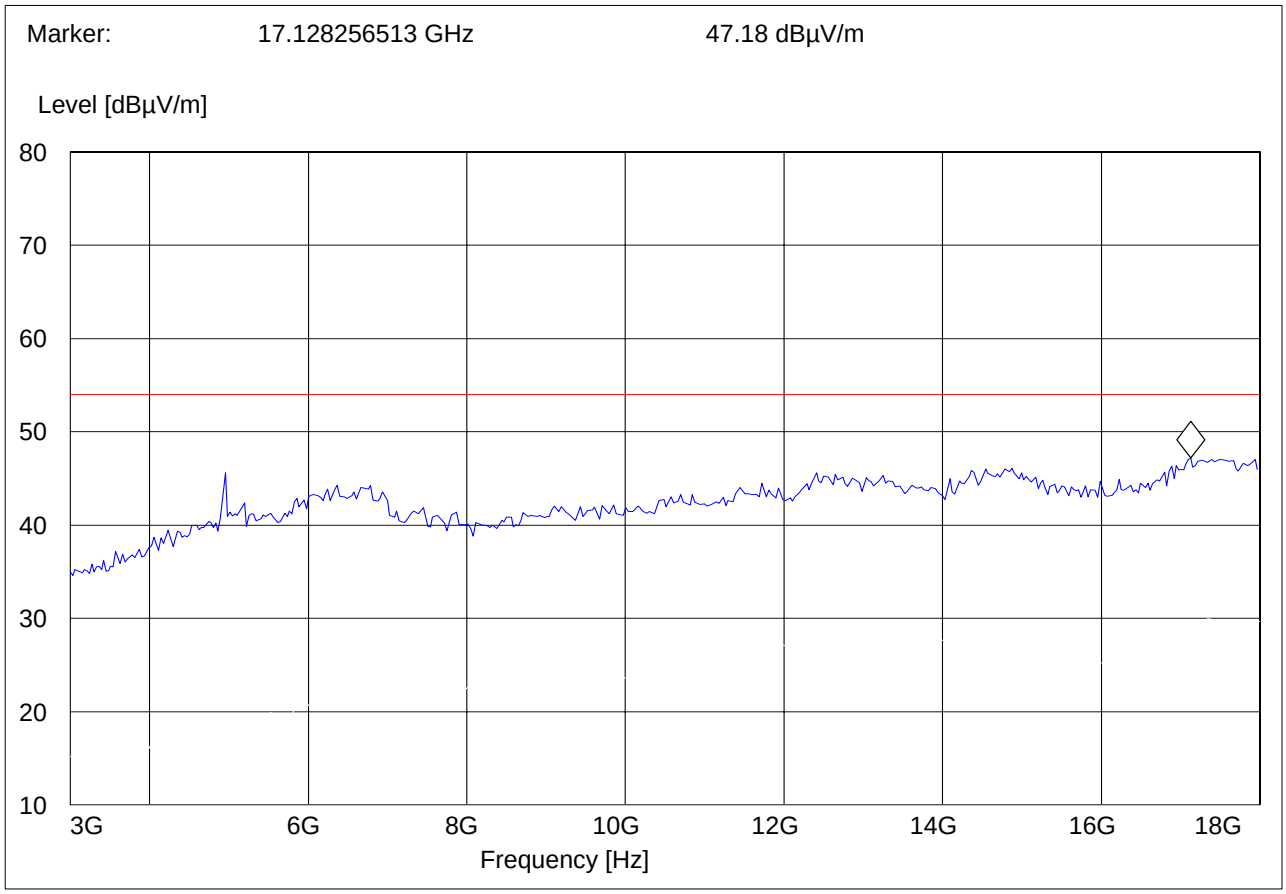


**3-18GHz (2480MHz)**
**Note: Peak Reading vs. Average limit**

```
EUT:              CDMA HI001
Customer::        Casio Hitachi
Test Mode:        BT DQPSK CH78
ANT Orientation:  H
EUT Orientation:  H
Test Engineer:    Chris
Voltage:          AC
Comments:         on the cradle; With 2.4GHz notch filter
```

***SWEEP TABLE: "FCC15.247_3-18G"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 3.0 GHz | 18.0 GHz | MaxPeak | Coupled | 1 MHz | #326horn_AF_vert |

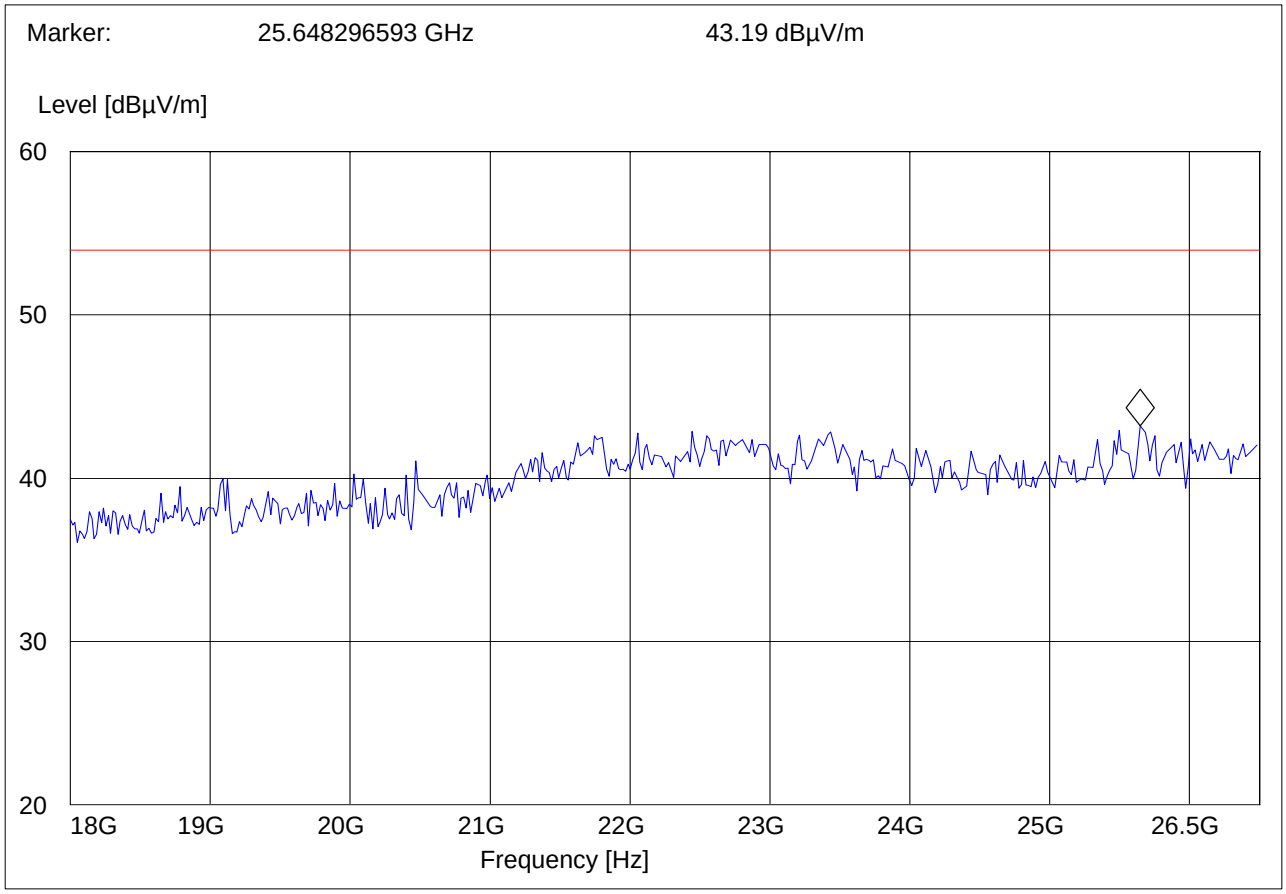


**18-25GHz**
**Note: This plot is valid for low, mid, high channels (worst-case plot)**
**Note: Peak Reading vs. Average limit**

```
EUT:              CDMA HI001
Customer::        Casio Hitachi
Test Mode:        BT DQPSK CH39
ANT Orientation:  H
EUT Orientation:  H
Test Engineer:    Chris
Voltage:          AC
Comments:         on the cradle;
```

***SWEEP TABLE: "FCC15.247_18-26.5G"***

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
|---|---|---|---|---|---|
| 18.0 GHz | 26.5 GHz | MaxPeak | Coupled | 100 kHz | Horn # 3116_18-40G |



# 6 Measurements (Conducted)

## 6.1 MAXIMUM PEAK OUTPUT POWER § 15.247 (CONDUCTED)

### 6.1.1 LIMIT SUB CLAUSE § 15.247 (b) (1)

| Frequency range | RF power output |
|---|---|
| 2400-2483.5 MHz | 30dBm |

***limit is based upon antenna gain of less than or equal to 6dBi.**

### 6.1.2 RESULTS:

Conducted Peak Power: GFSK

| TEST CONDITIONS | | Conducted Peak Power (dBm) | | |
|---|---|---|---|---|
| Frequency (MHz) | | 2402 | 2441 | 2480 |
| $T_{nom}$(23)°C | $V_{nom}$VDC | 1.5 | 1.1 | 1.0 |
| Measurement uncertainty | | ±0.5dBm | | |

Conducted Peak Power: π / 4 DQPSK

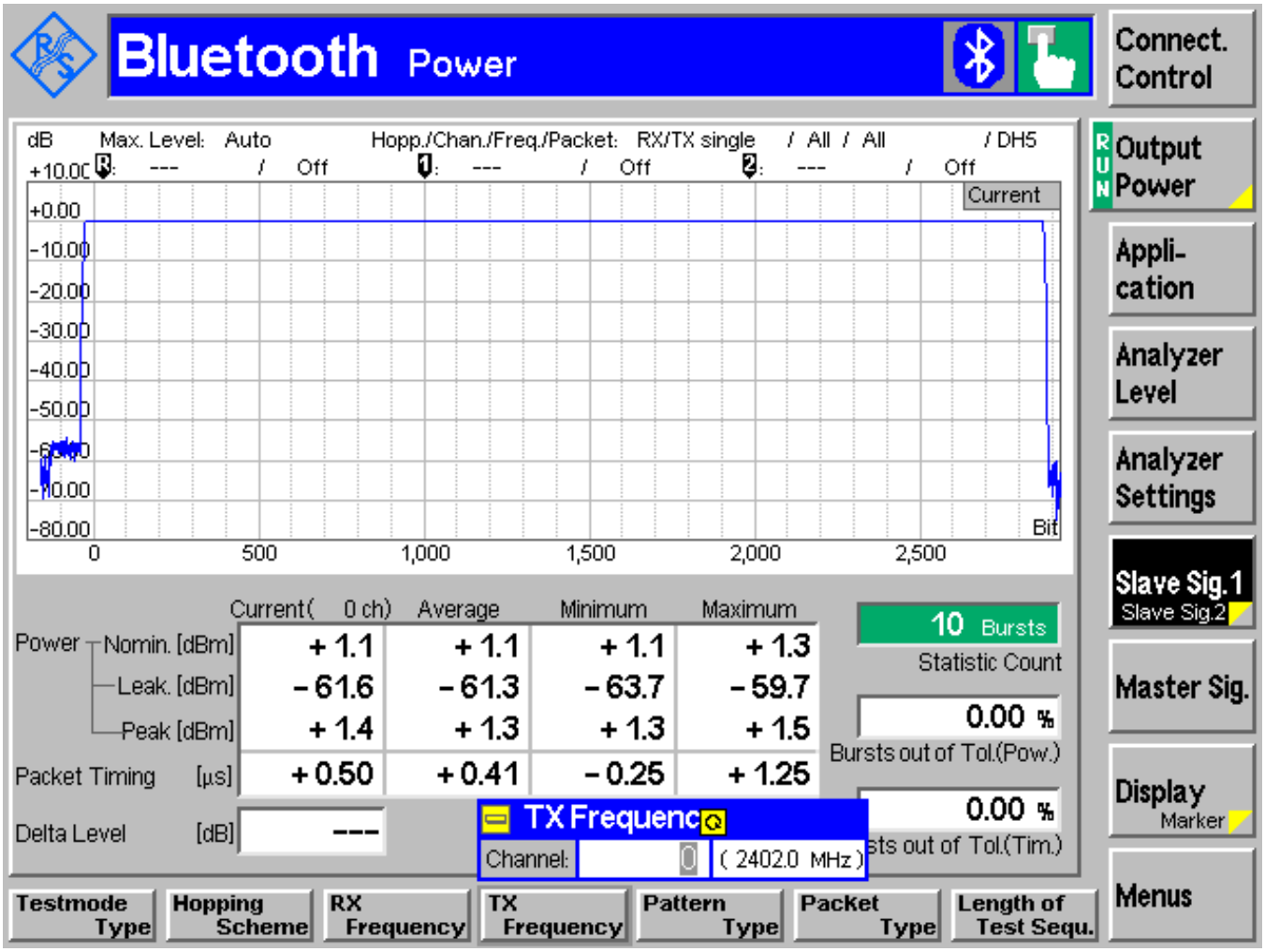
| TEST CONDITIONS | | Conducted Peak Power (dBm) | | |
|---|---|---|---|---|
| Frequency (MHz) | | 2402 | 2441 | 2480 |
| $T_{nom}$(23)°C | $V_{nom}$VDC | 2.8 | 2.4 | 2.0 |
| Measurement uncertainty | | ±0.5dBm | | |

Conducted Peak Power: 8DPSK

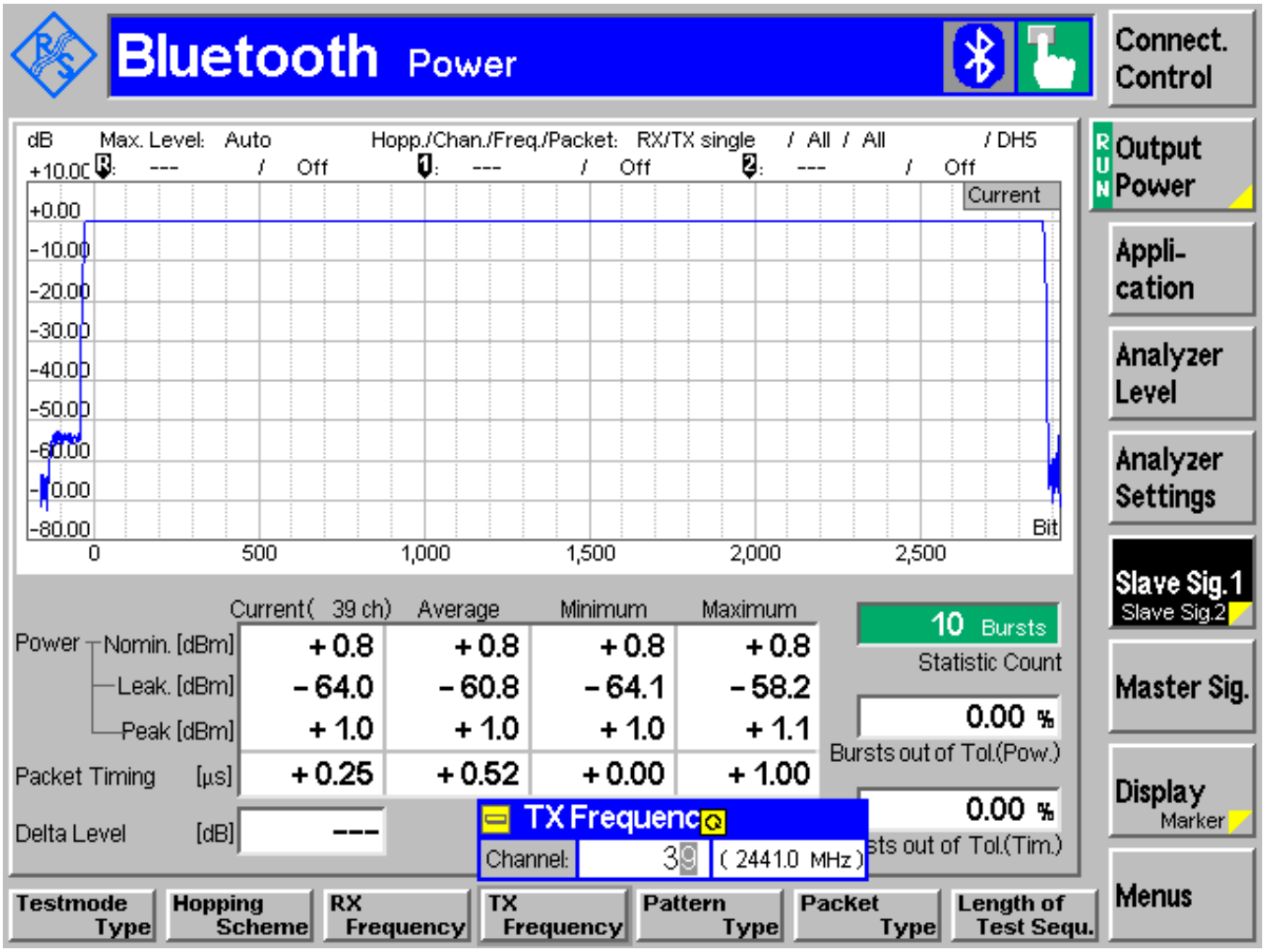
| TEST CONDITIONS | | Conducted Peak Power (dBm) | | |
|---|---|---|---|---|
| Frequency (MHz) | | 2402 | 2441 | 2480 |
| $T_{nom}$(23)°C | $V_{nom}$VDC | 2.9 | 2.4 | 2.0 |
| Measurement uncertainty | | ±0.5dBm | | |

**NOTE: all conducted power measurements were done with 3MHz RBW/VBW**

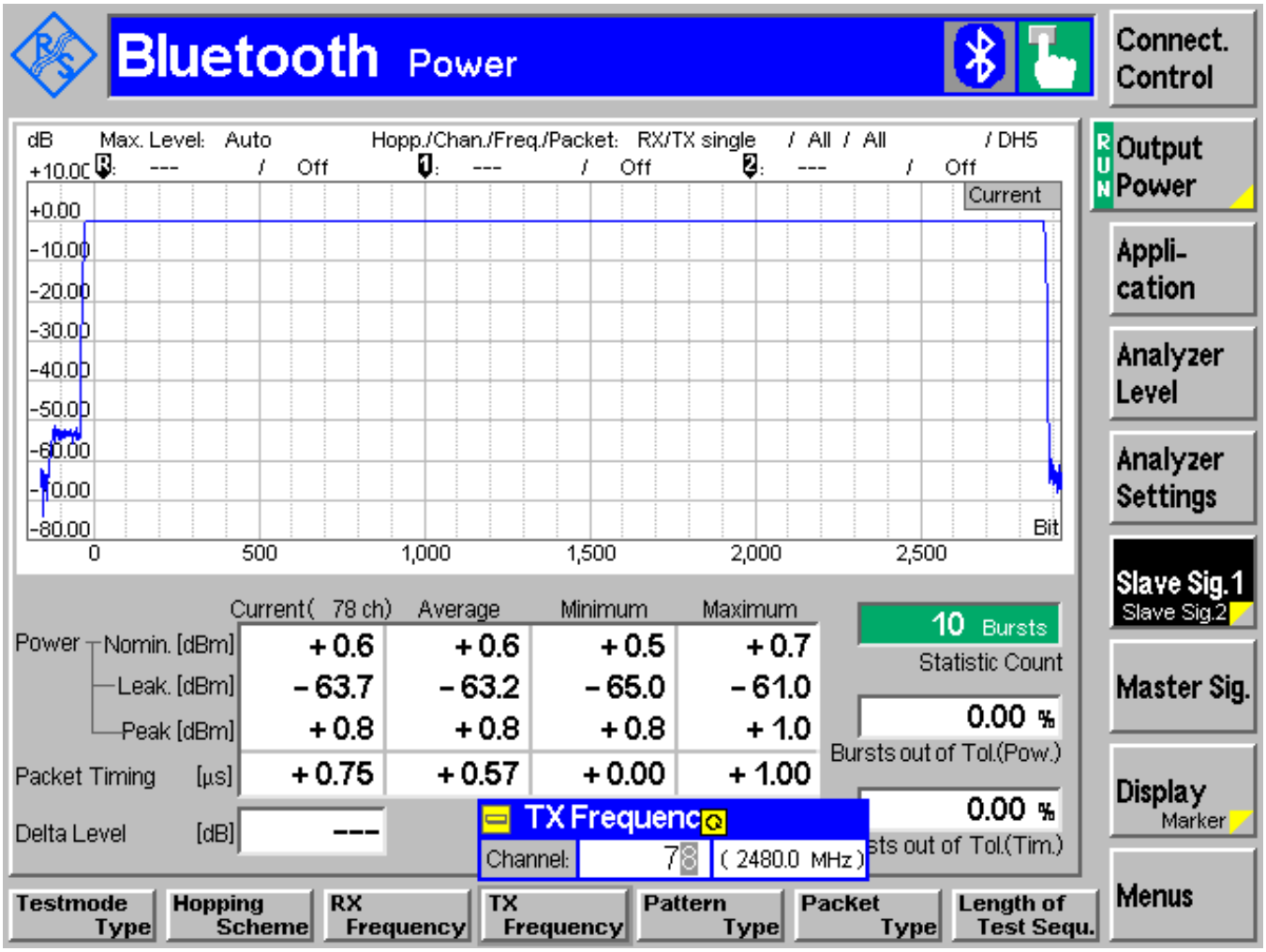
**Conducted Peak Power GFSK 2402 MHz**



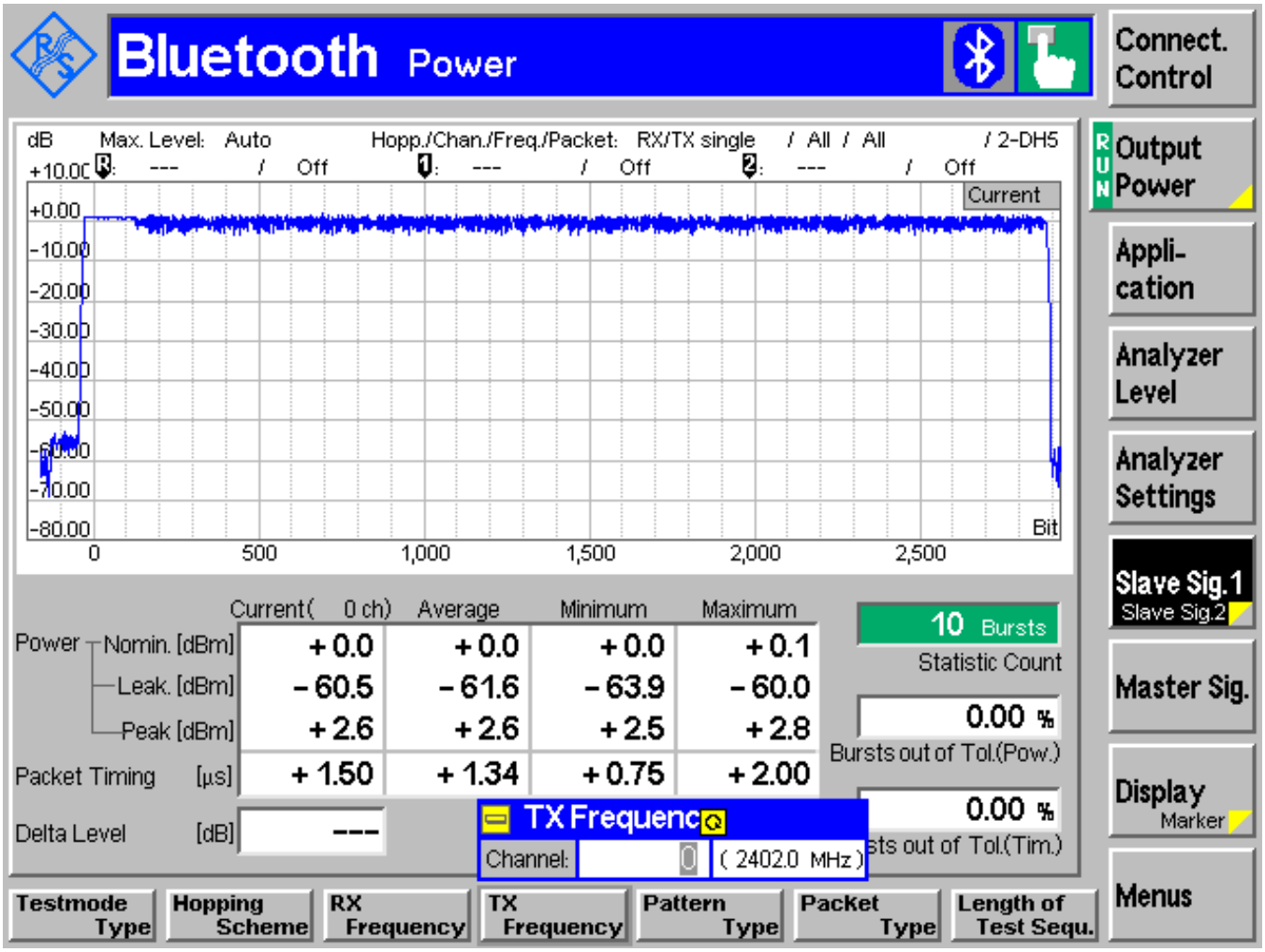
**Conducted Peak Power GFSK 2441 MHz**



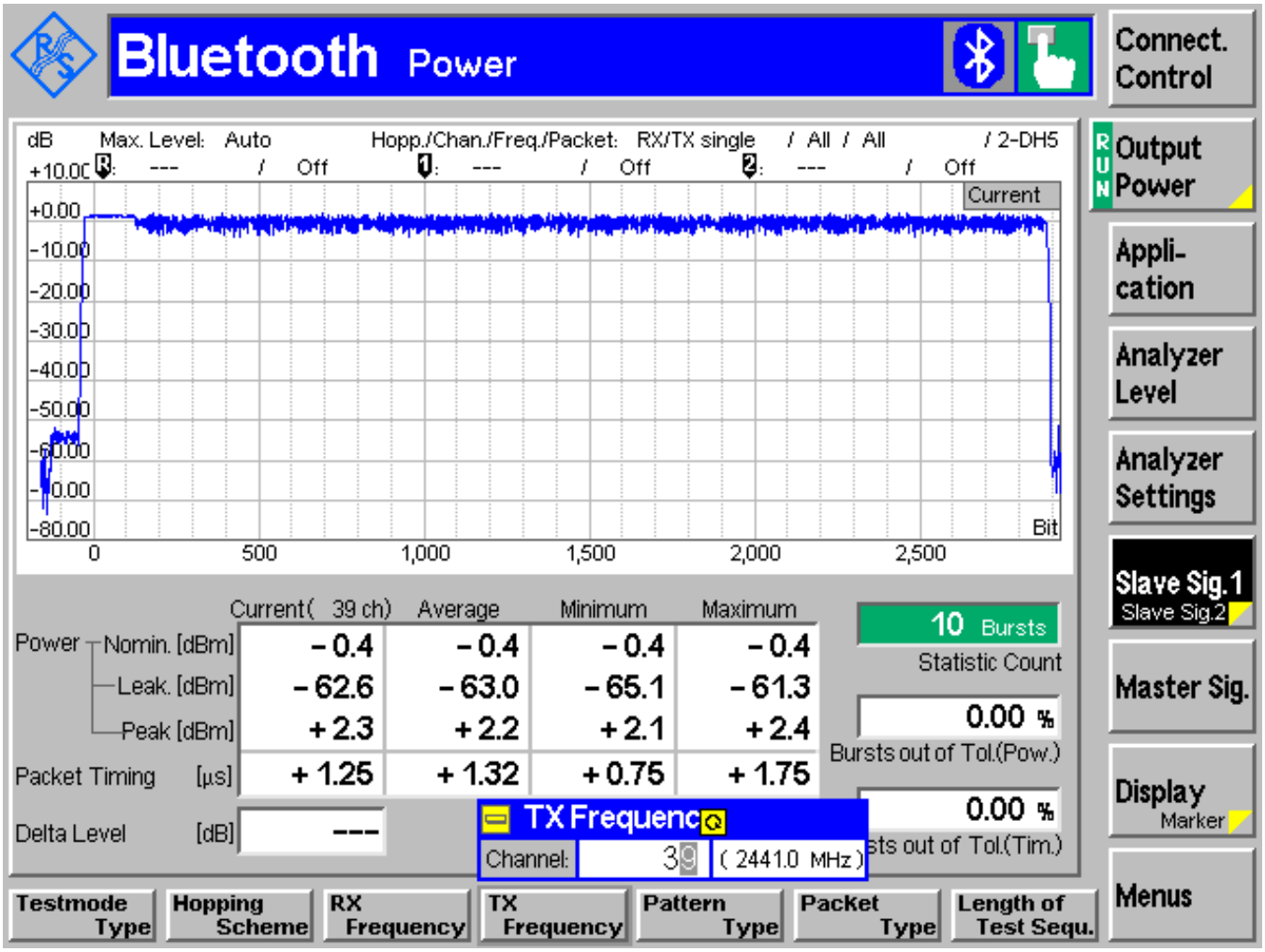
**Conducted Peak Power GFSK 2480 MHz**



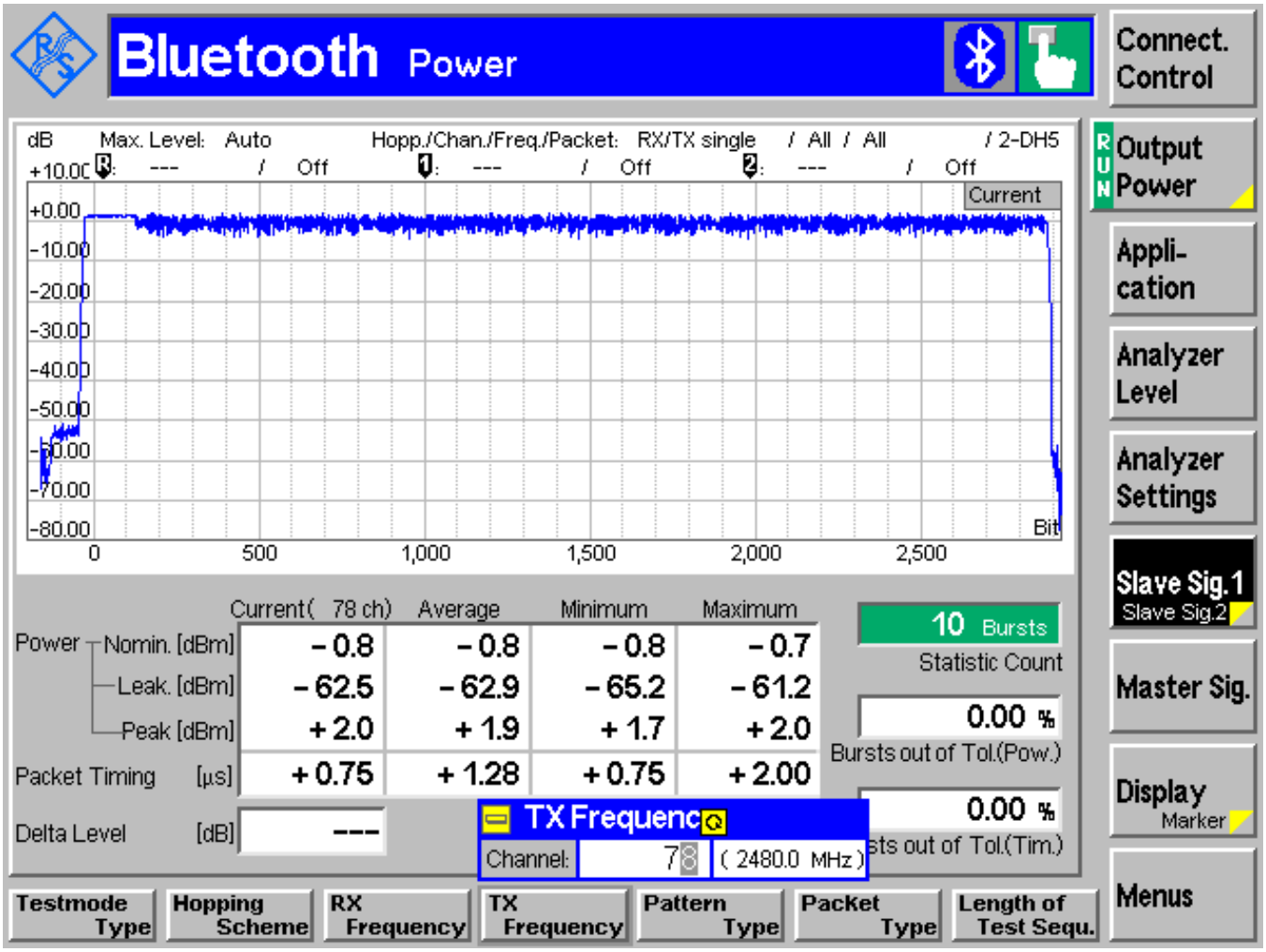
**Conducted Peak Power π / 4 DQPSK 2402 MHz**



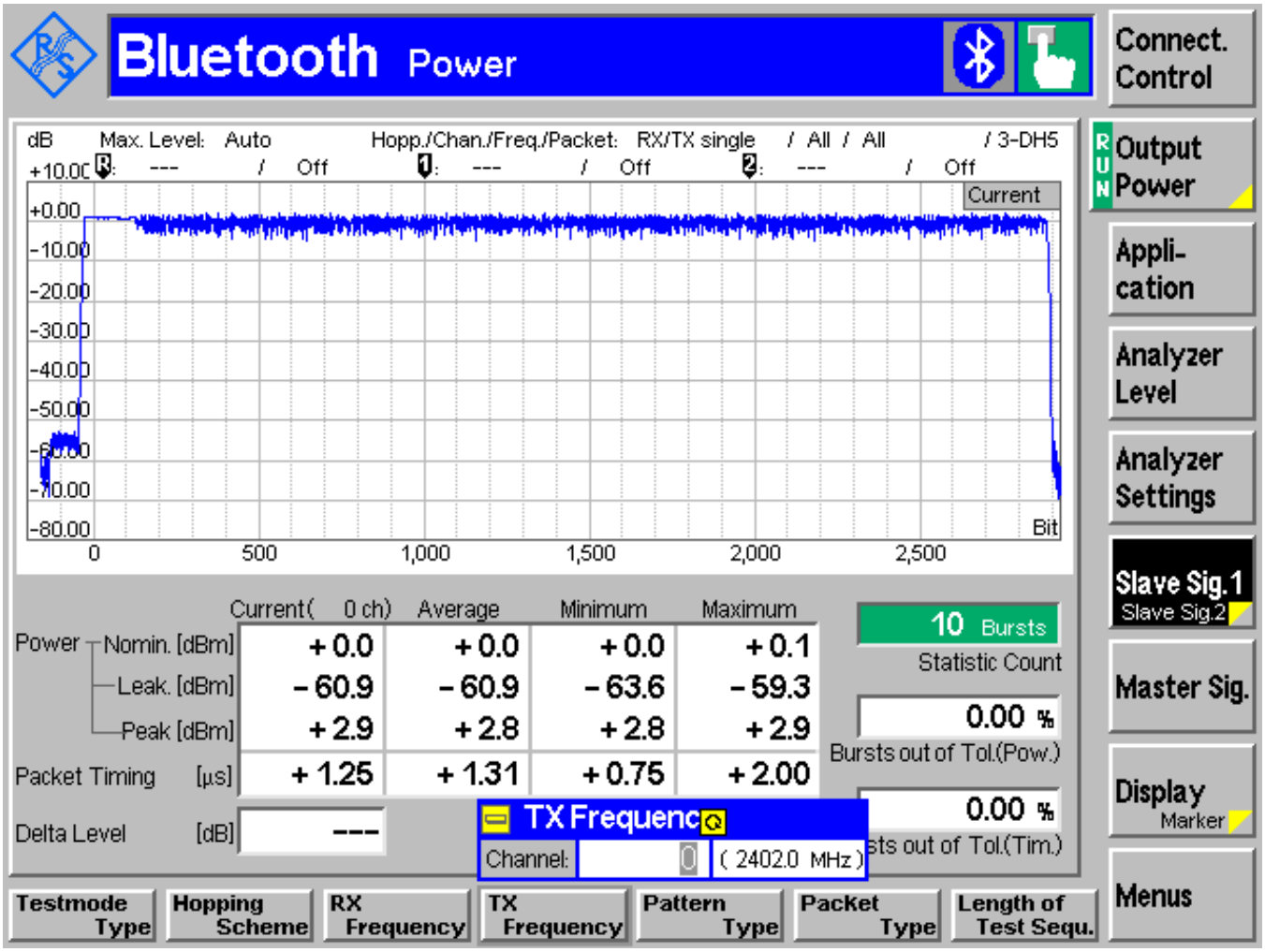
**Conducted Peak Power π / 4 DQPSK 2441 MHz**



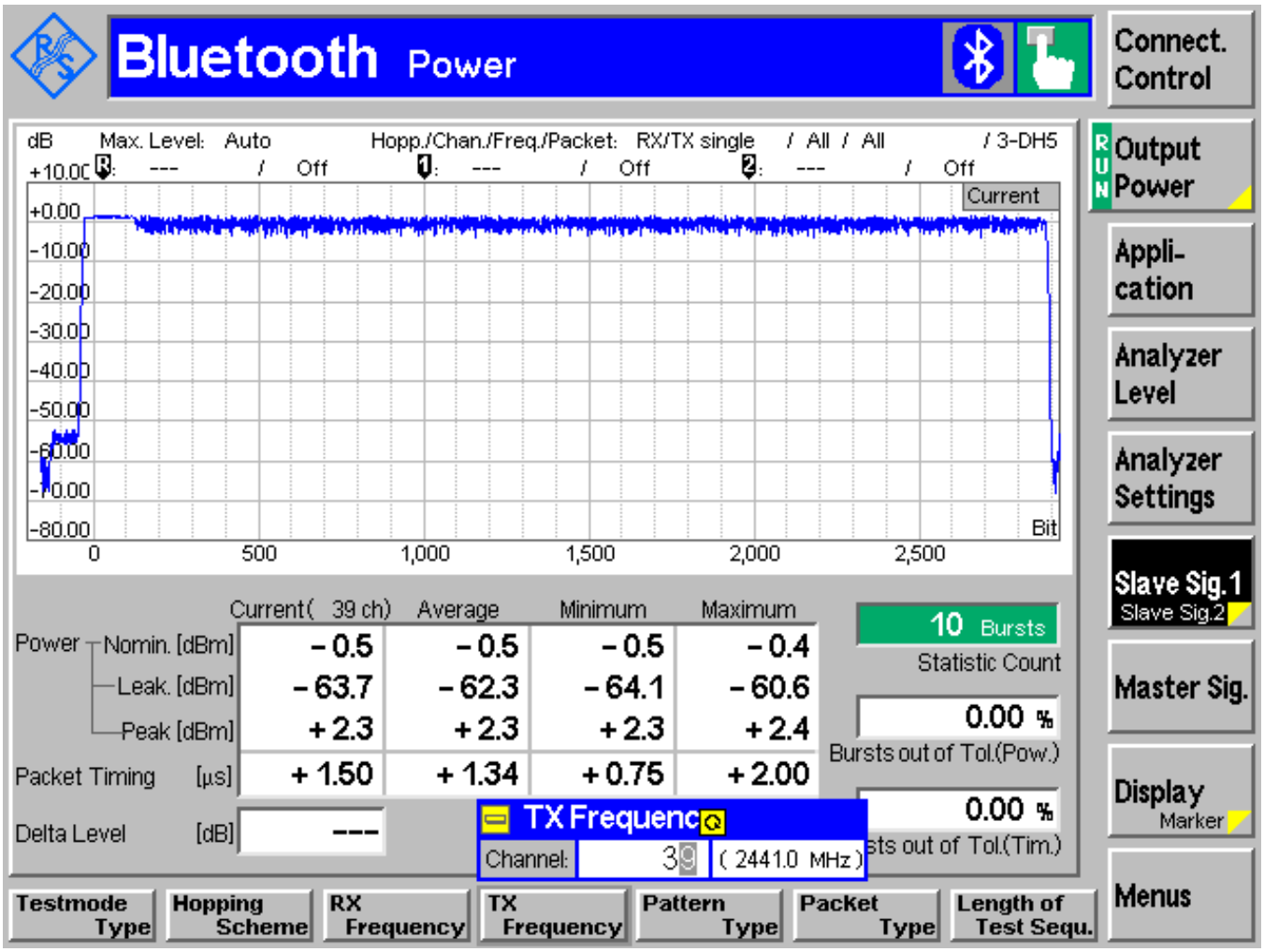
**Conducted Peak Power π / 4 DQPSK 2480 MHz**



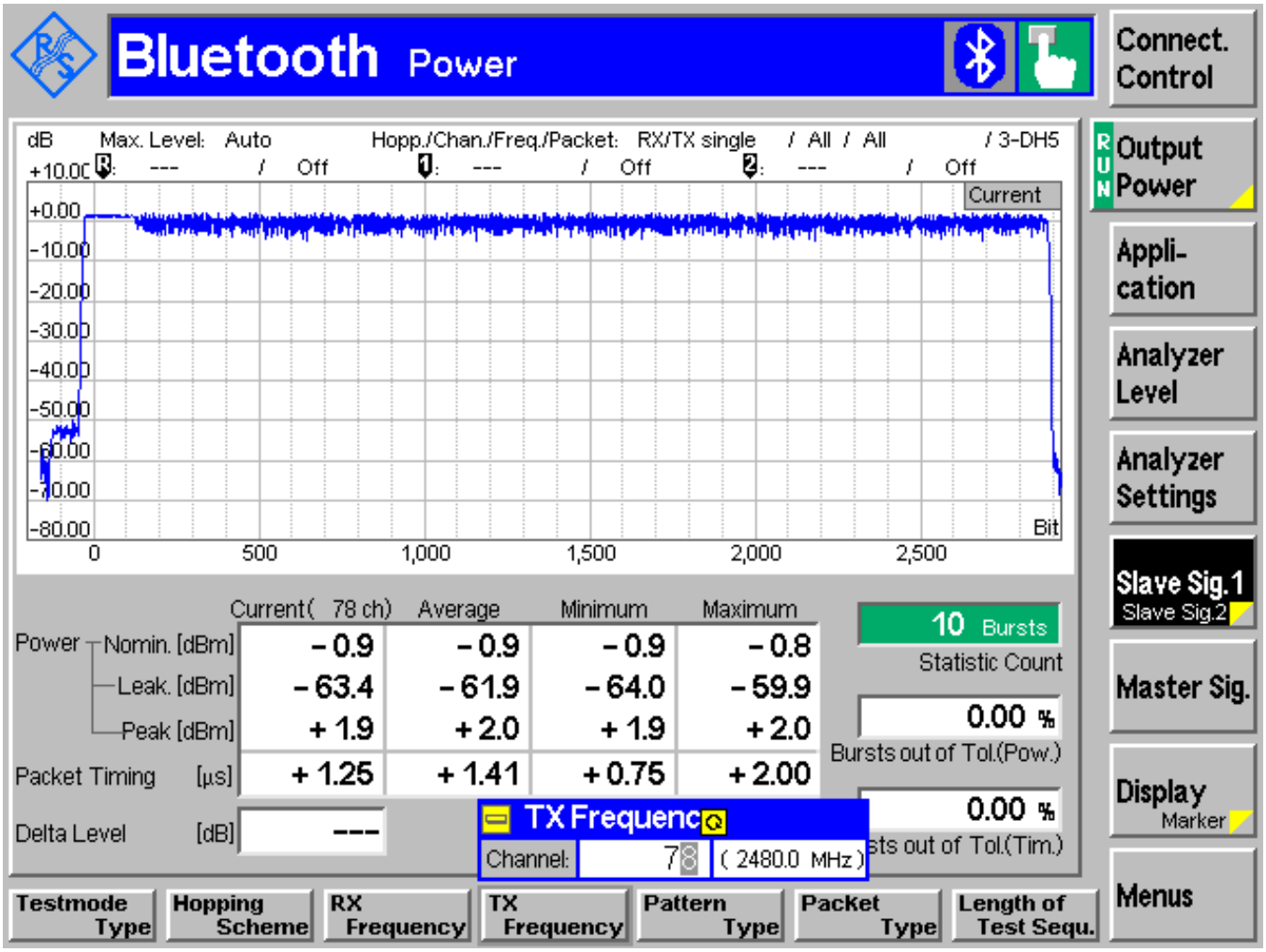
**Conducted Peak Power 8DPSK 2402 MHz**



**Conducted Peak Power 8DPSK 2441 MHz**



**Conducted Peak Power 8DPSK 2480 MHz**



## 6.2 20dB BANDWIDTH

### 6.2.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### 6.2.2 RESULTS:

20dB Bandwidth: GFSK

| TEST CONDITIONS | | 20dB Bandwidth (kHz) | | |
|---|---|---|---|---|
| Frequency (MHz) | | 2402 | 2441 | 2480 |
| $T_{nom}$(23)°C | $V_{nom}$VDC | 952 | 953 | 928 |

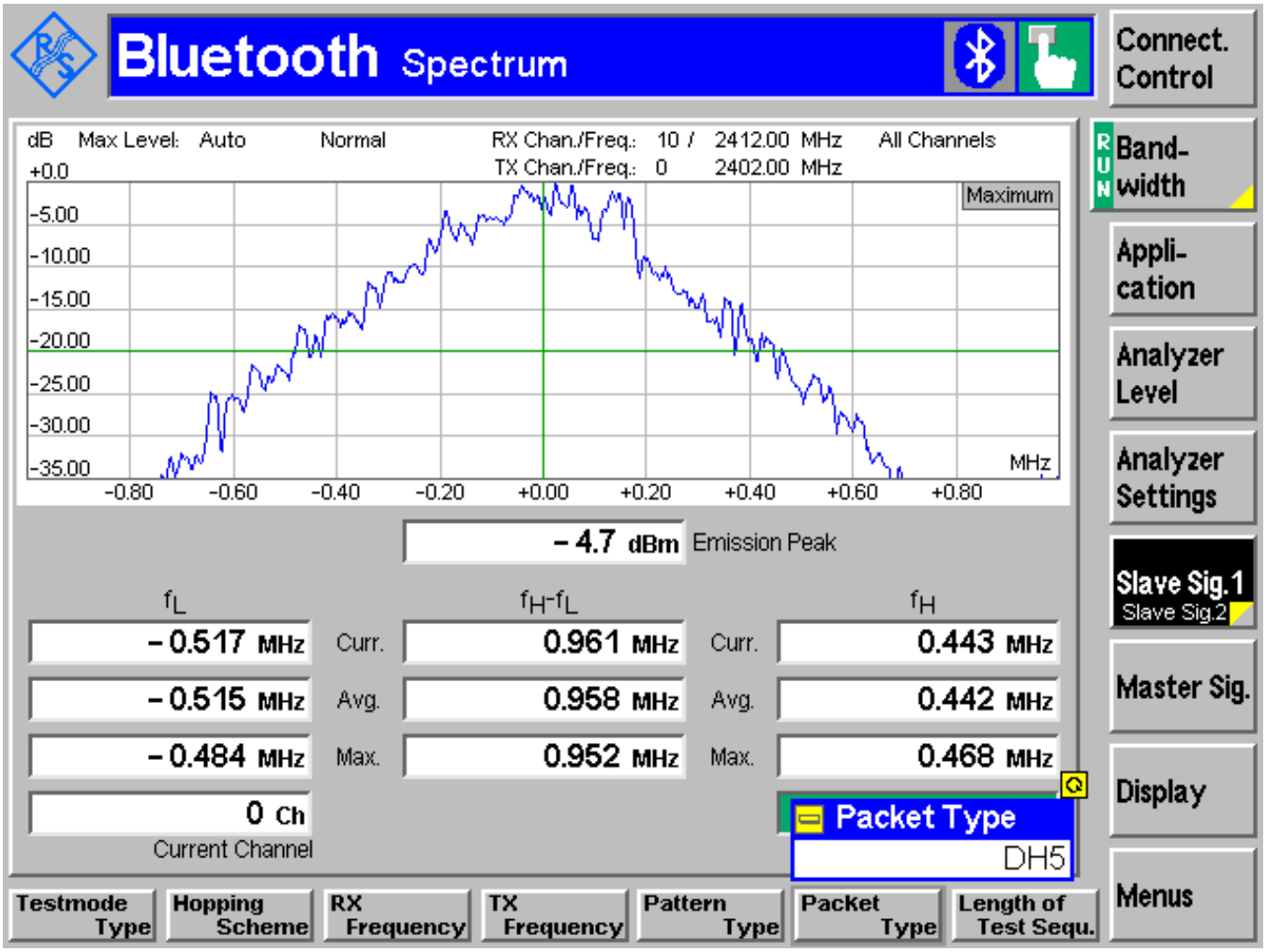
20dB Bandwidth: π / 4 DQPSK

| TEST CONDITIONS | | 20dB Bandwidth (MHz) | | |
|---|---|---|---|---|
| Frequency (MHz) | | 2402 | 2441 | 2480 |
| $T_{nom}$(23)°C | $V_{nom}$VDC | 1.341 | 1.310 | 1.342 |

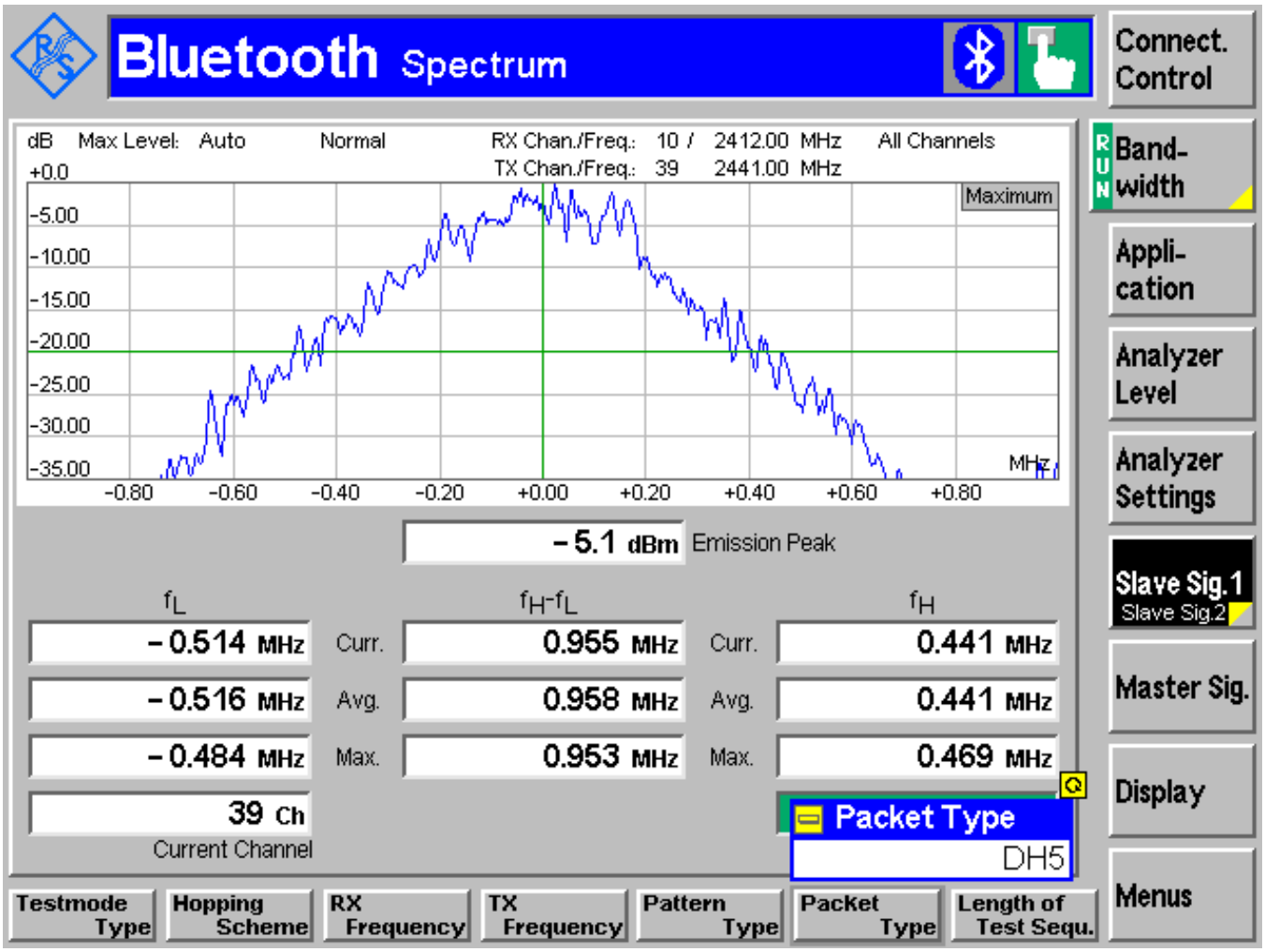
20dB Bandwidth: 8DPSK

| TEST CONDITIONS | | 20dB Bandwidth (MHz) | | |
|---|---|---|---|---|
| Frequency (MHz) | | 2402 | 2441 | 2480 |
| $T_{nom}$(23)°C | $V_{nom}$VDC | 1..311 | 1.309 | 1.310 |

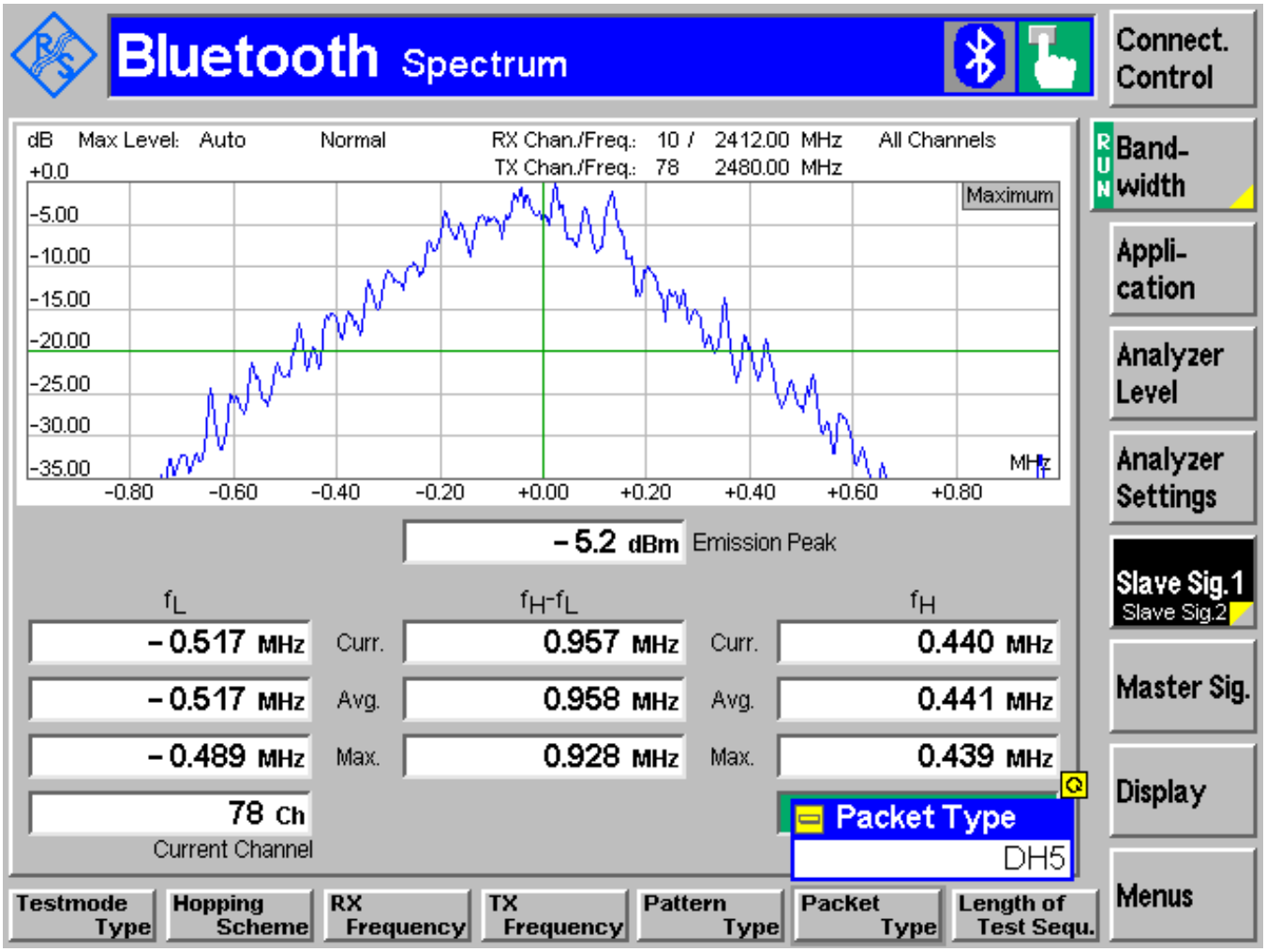
**20dB Bandwidth GFSK 2402MHz**



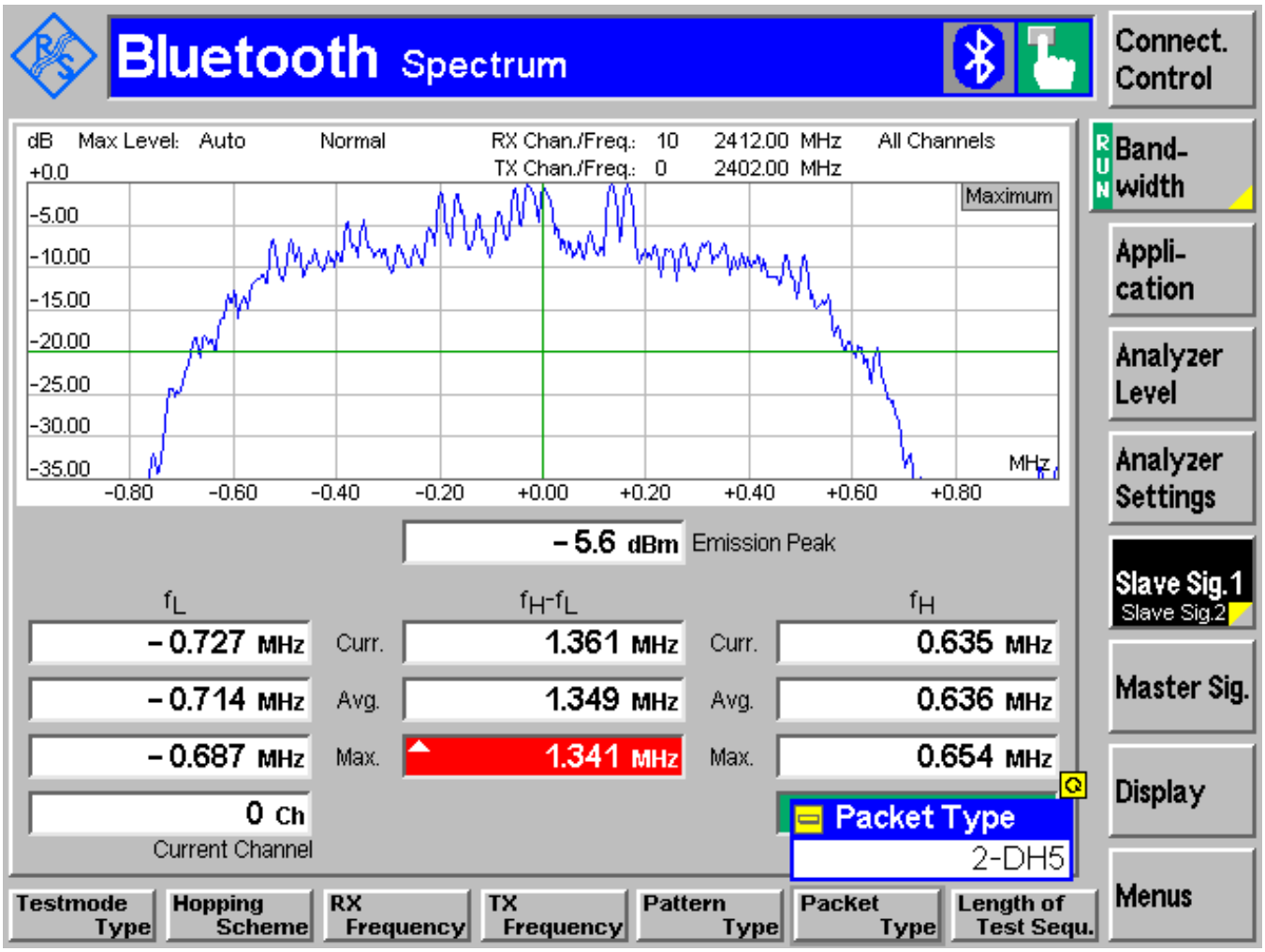
**20dB Bandwidth GFSK 2441MHz**



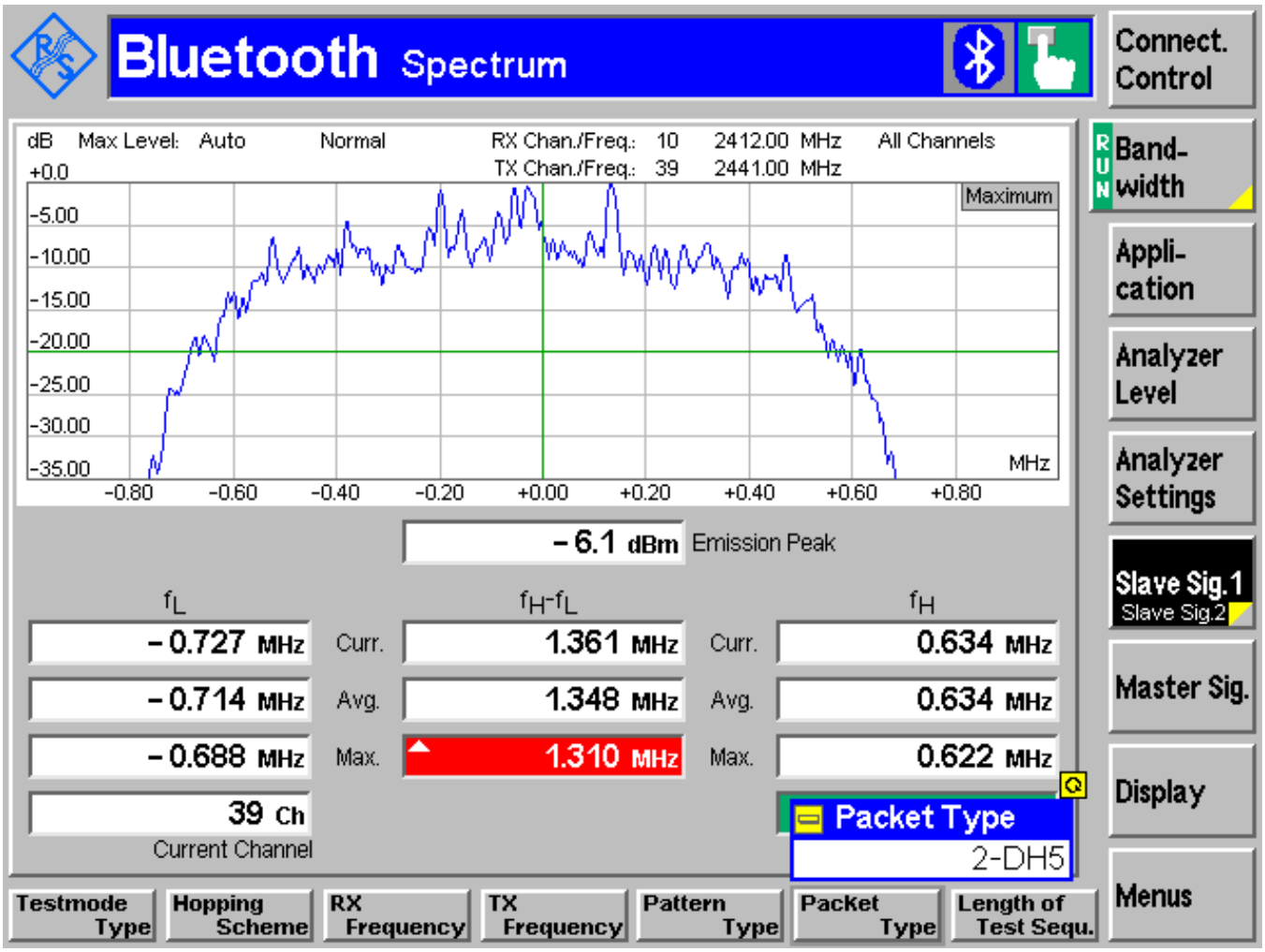
**20dB Bandwidth GFSK 2480MHz**



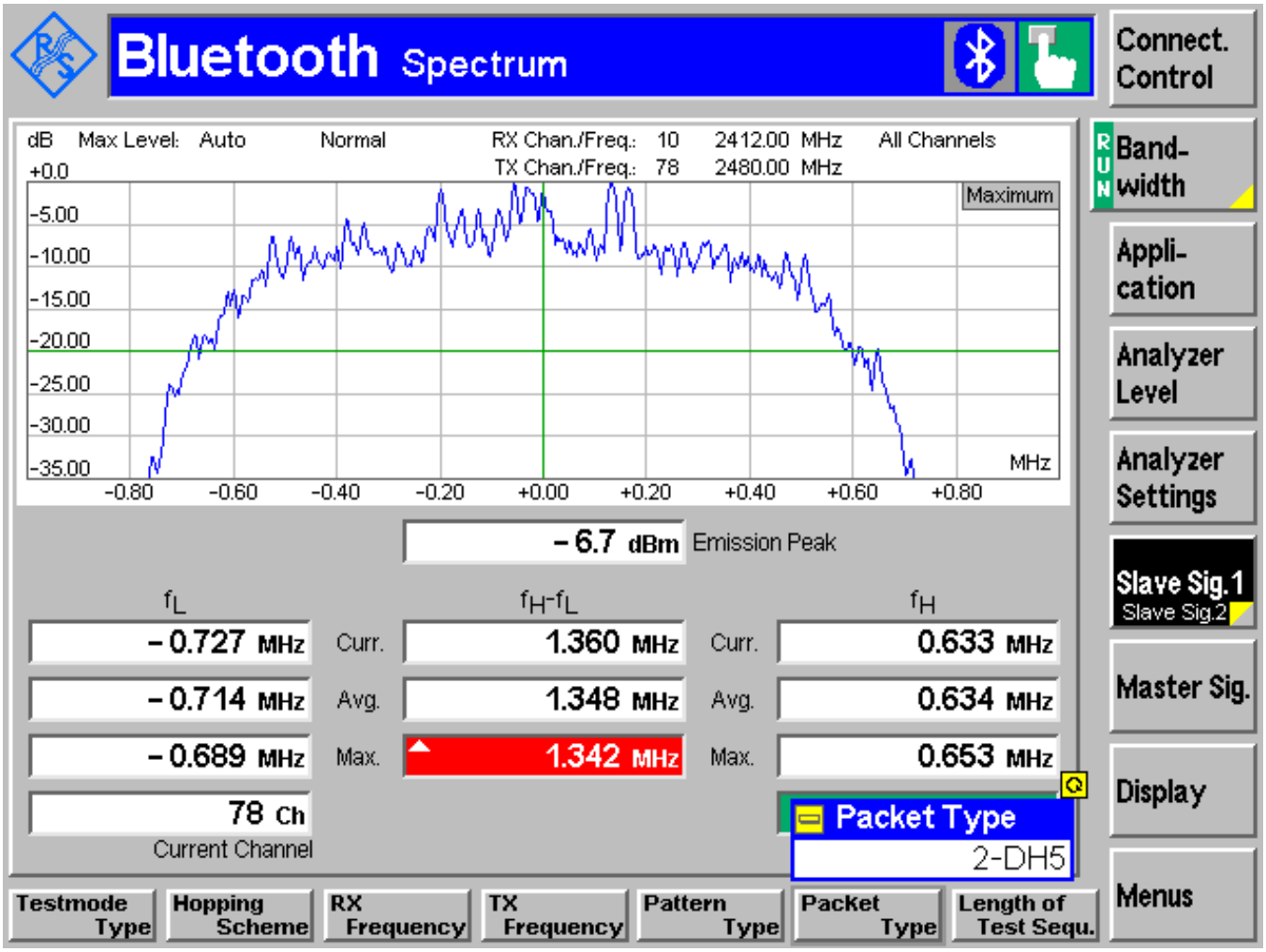
**20dB Bandwidth π / 4 DQPSK 2402MHz**



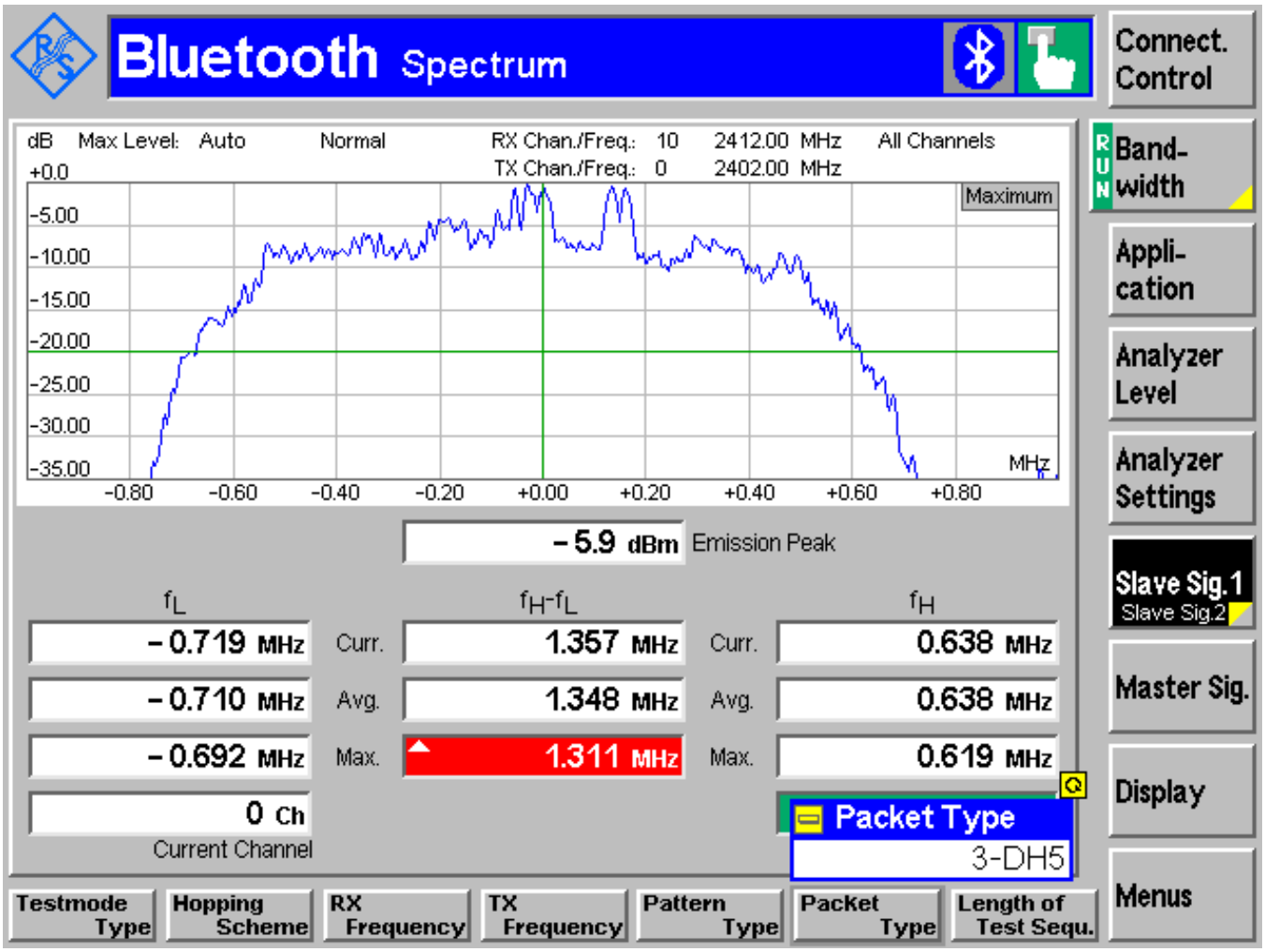
**20dB Bandwidth π / 4 DQPSK 2441MHz**



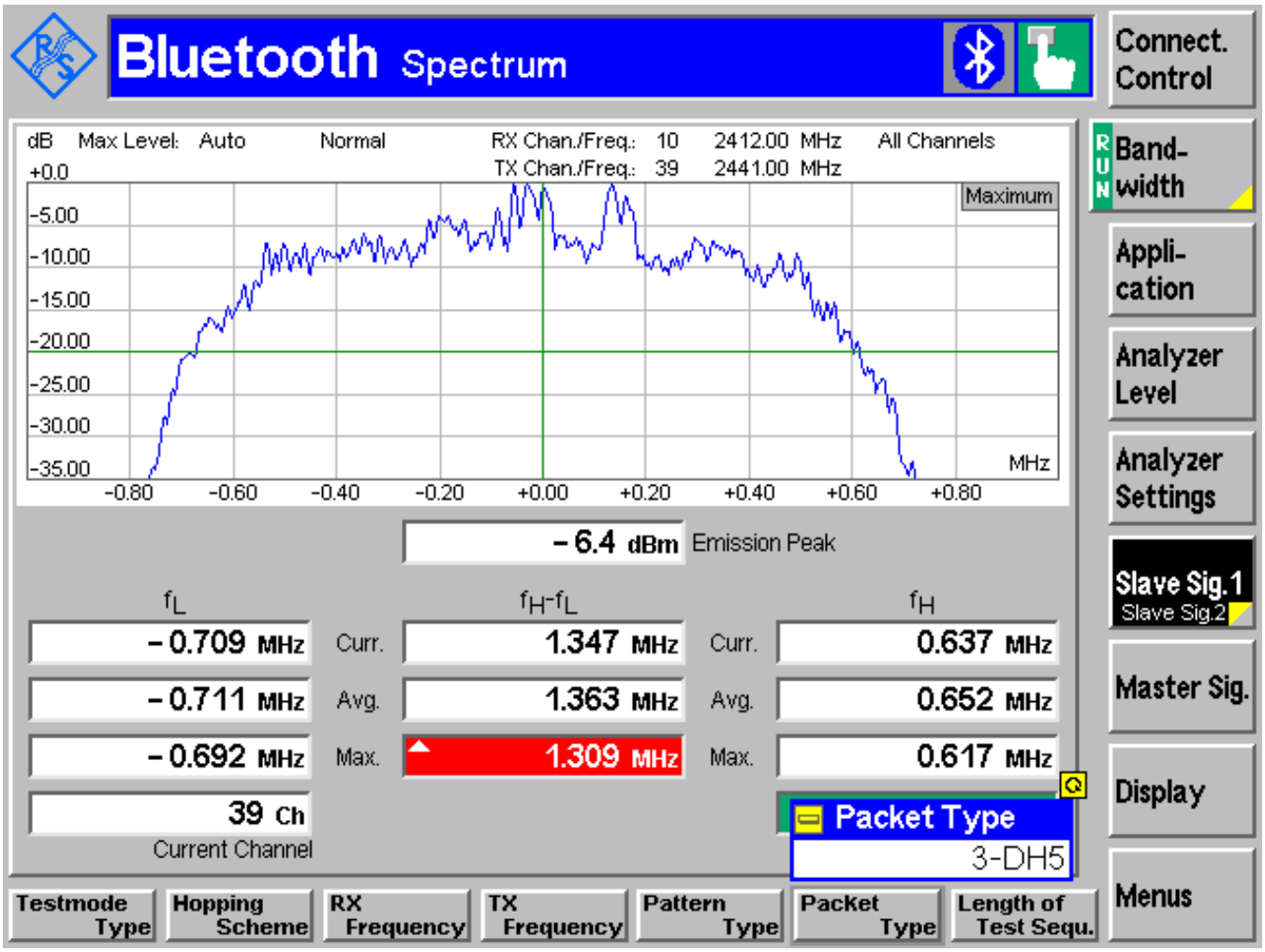
**20dB Bandwidth π / 4 DQPSK 2480MHz**



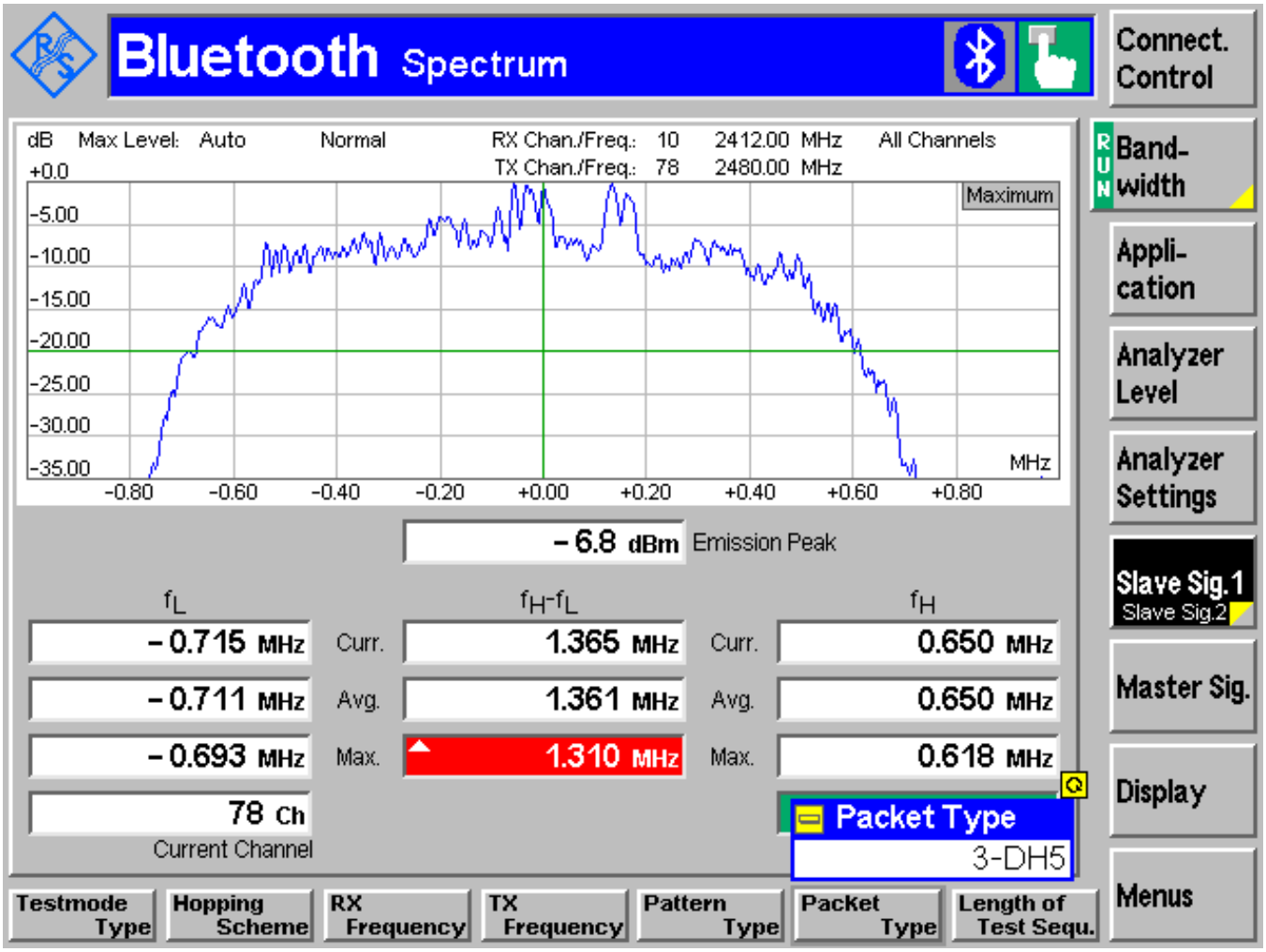
**20dB Bandwidth 8PSK 2402MHz**



**20dB Bandwidth 8PSK 2441MHz**



**20dB Bandwidth 8PSK 2480MHz**

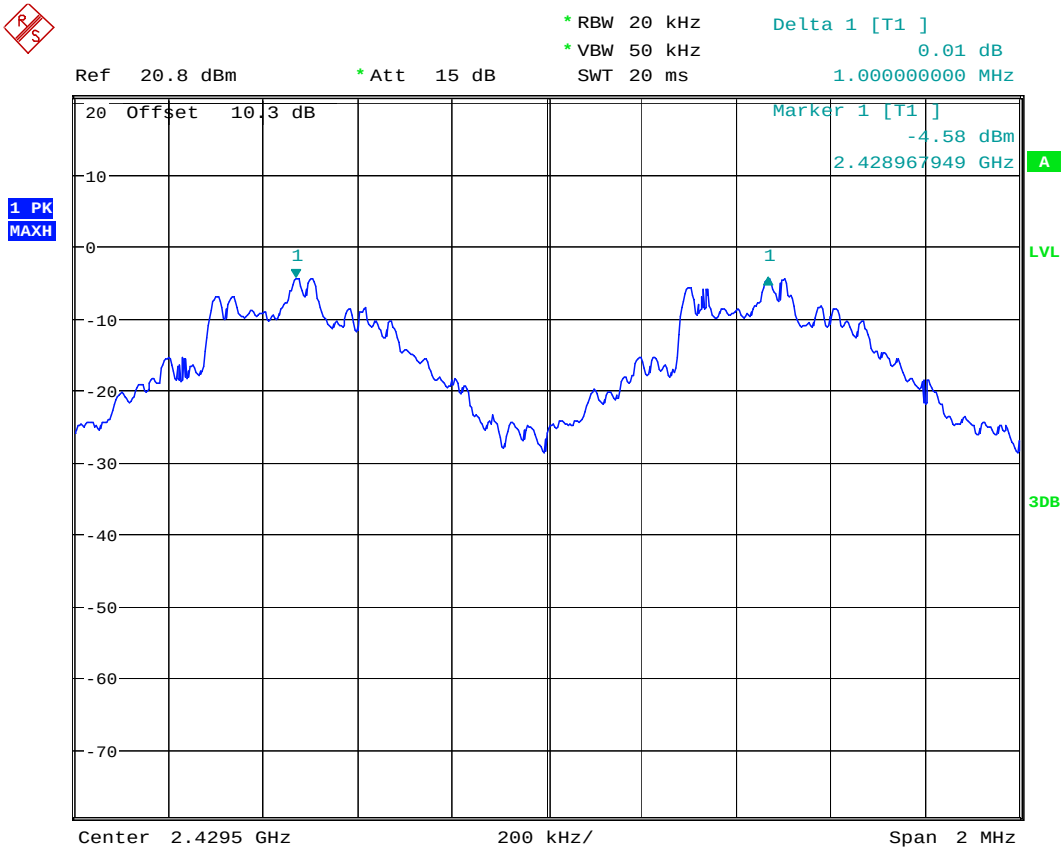


## 6.3 CARRIER FREQUENCY SEPARATION

### 6.3.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)

| SEPARATION |
|---|
| > 25 KHz or > 2/3 * 20 dB BANDWIDTH = 839kHz |

### 6.3.2 RESULTS: 1.000 MHz



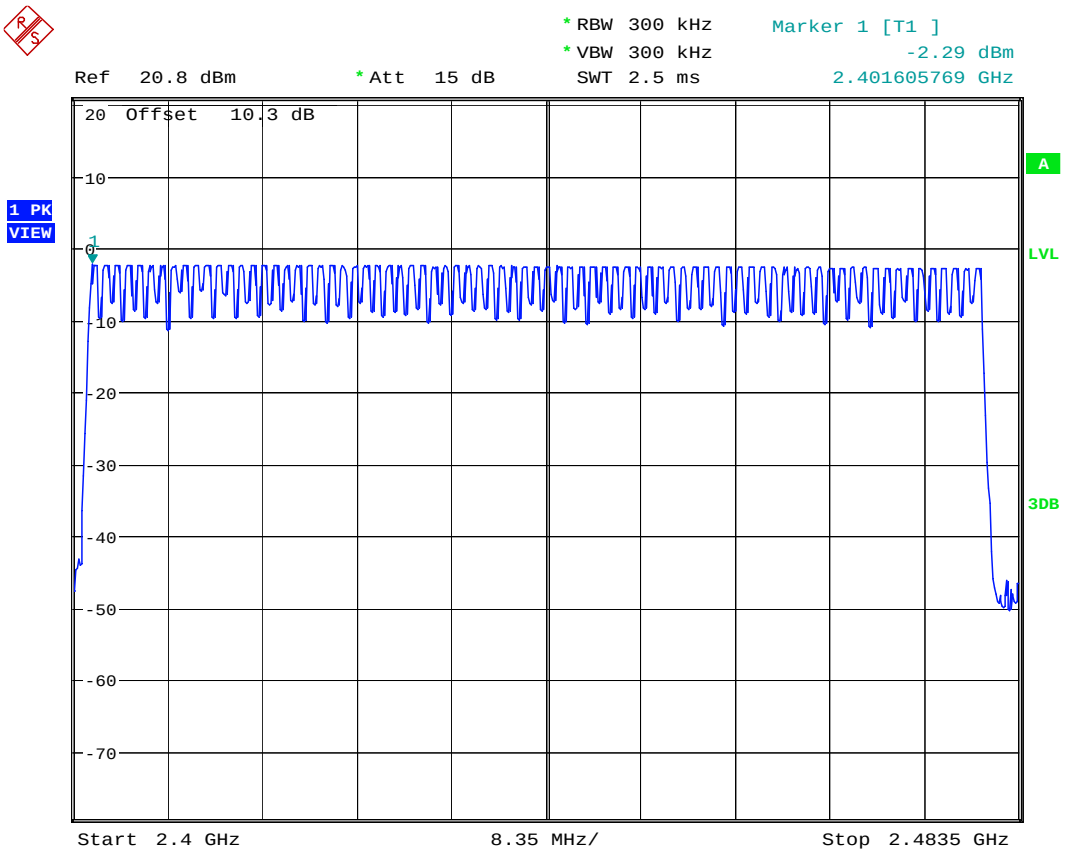

Date: 7.OCT.2008 15:44:53

## 6.4 NUMBER OF HOPPING CHANNELS

### 6.4.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (iii)

| NUMBER OF CHANNELS |
|---|
| > 15 |

### 6.4.2 RESULTS: 79




Date: 8.OCT.2008 08:26:27

## 6.5 TIME OF OCCUPANCY (DWELL TIME)

### 6.5.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)

| FREQUENCY RANGE | AVERAGE TIME OF OCCUPANCY PER 31.6 SECONDS (LIMIT) |
|---|---|
| 2400-2483.5 | 0.4 SECONDS |

### 6.5.2 RESULTS:

| $T_{nom}$(23)°C | $V_{nom}$VDC |
|---|---|

**For Bluetooth devices:**

**The dwell time of 0.4 s within a 31.6 second period in data mode is independent from the packet type (packet length). The calculation for a 31.6 second period is a follows:**

**Dwell time = time slot length * hop rate / number of hopping channels *31.6 s**

**Example for a DH1 packet (with a maximum length of one time slot)**
**Dwell time = 625 µs * 1600 1/s / 79 * 31.6 s = 0.4 s (in a 31.6 s period)**

**For multi-slot packet the hopping is reduced according to the length of the packet.**
**Example for a DH5 packet (with a maximum length of five time slots)**
**Dwell time = 5 * 625 µs * 1600 * 1/5 *1/s / 79 * 31.6 s = 0.4 s (in a 31.6 s period)**

**This is the same for all BT devices and therefore all BT devices satisfy FCC requirement on time of occupancy (dwell time).**

## 6.6 CONDUCTED SPURIOUS EMISSION

### 6.6.1 LIMIT SUB CLAUSE § 15.247 (d)

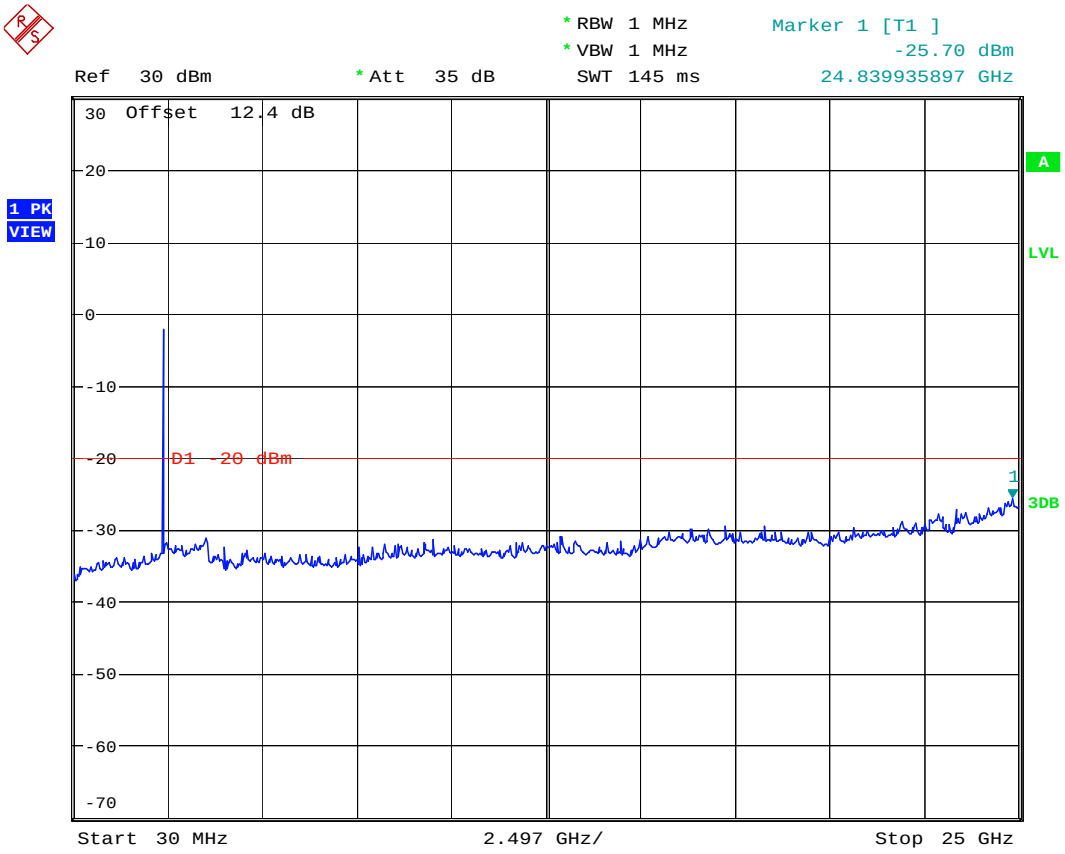
| FREQUENCY RANGE | limit |
|---|---|
| 30M-25GHz | -20dBc |

### 6.6.2 RESULTS: Tnom(23)°C VnomVDC

All tests conducted in GFSK mode.

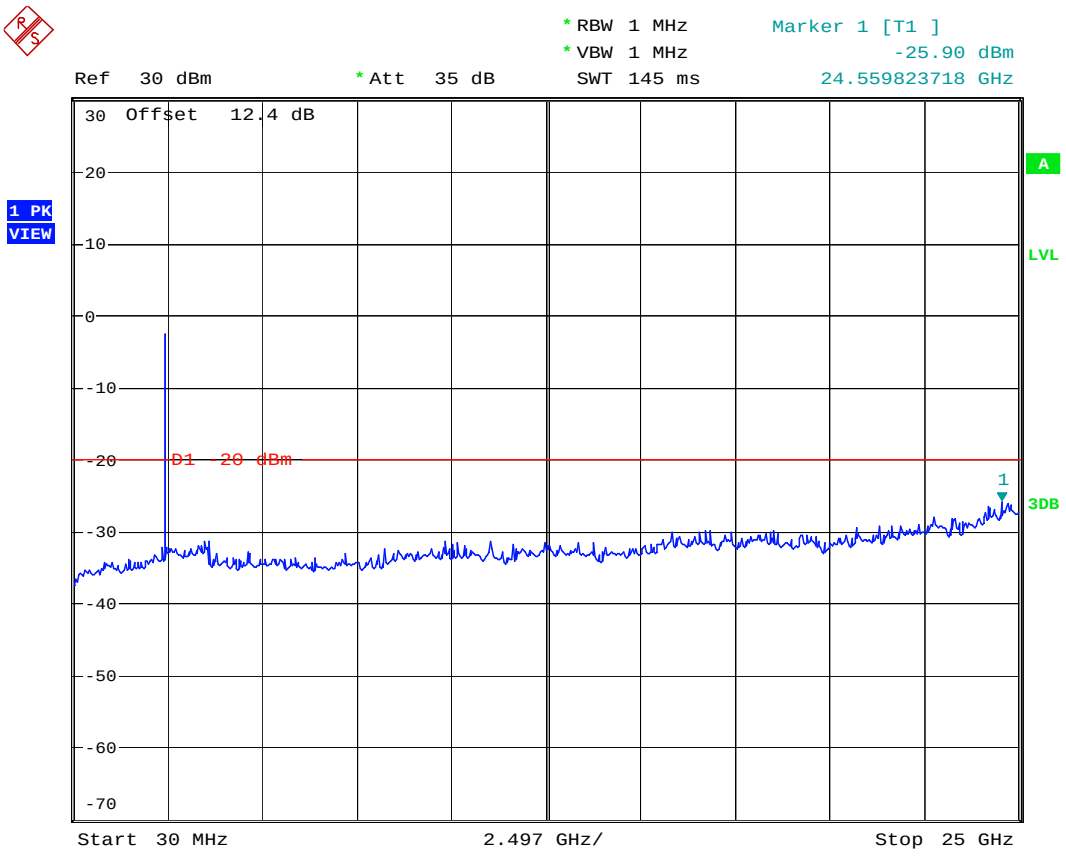
**Verdict: PASS**

Conducted Spurious Emission 2402MHz



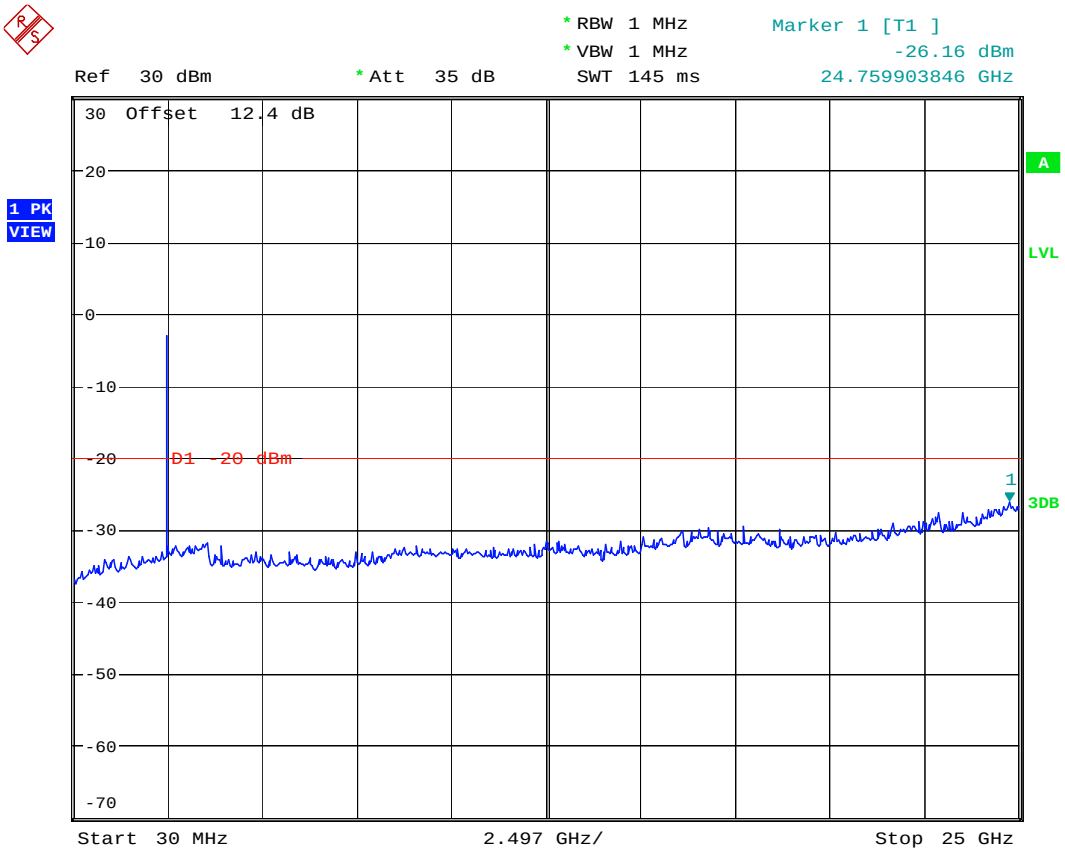

Date: 22.OCT.2008 09:50:30

Conducted Spurious Emission 2441 MHz




Date: 22.OCT.2008 09:54:04

Conducted Spurious Emission 2480MHz




Date: 22.OCT.2008 09:56:12

## 6.7 AC POWER LINE CONDUCTED EMISSIONS § 15.107/207

### 6.7.1 LIMITS

**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 | | |

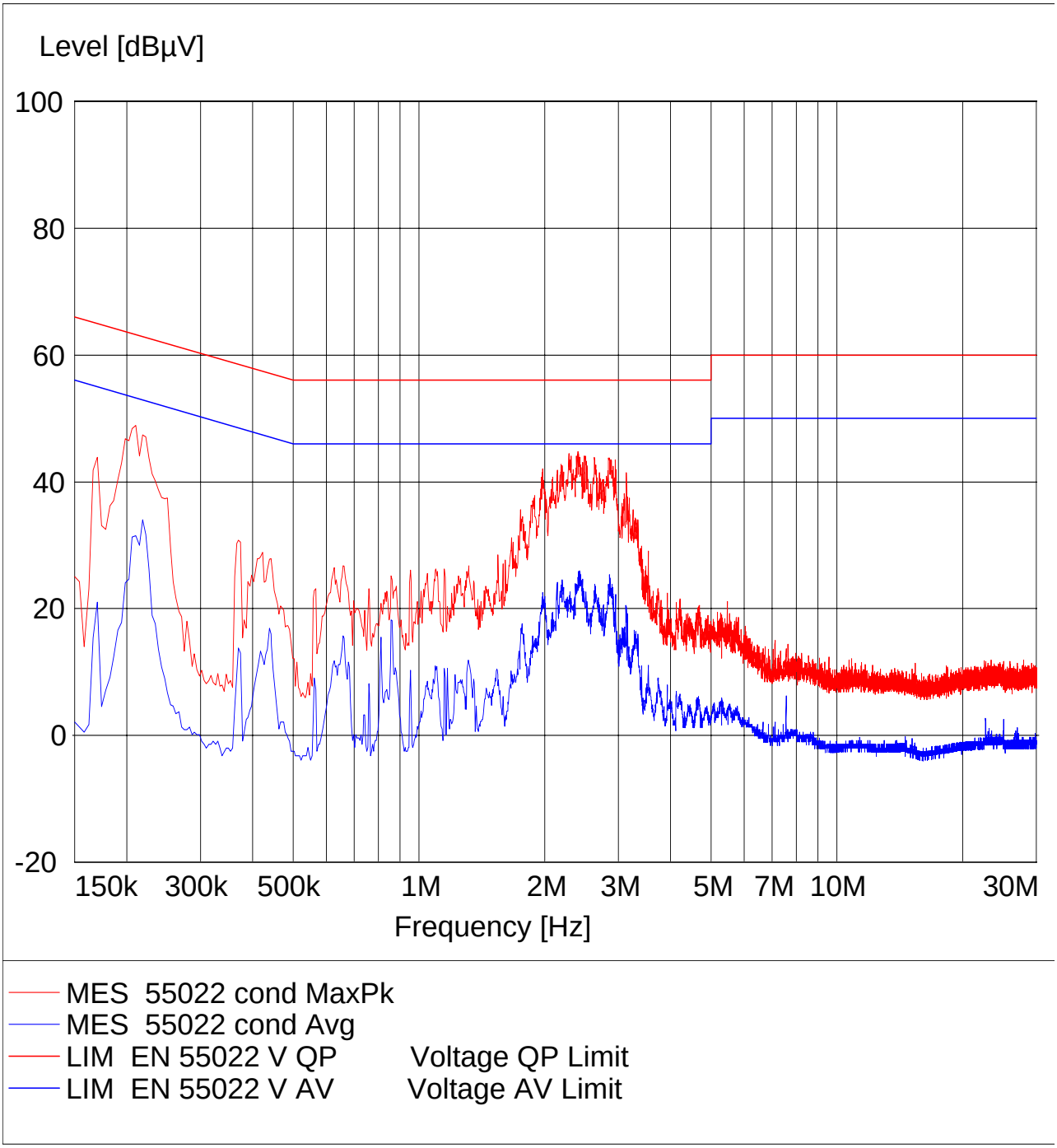
**ANALYZER SETTINGS: RBW = 10KHz VBW = 10KHz**

### 6.7.2 Test Results:

**Pass, see plots.**

**Results TX Line**

```
EUT:               CDMA HI001
Manufacturer:      Casio Hitachi
Test Mode:         BT; GFSK CH.39
ANT Orientation:: N/A
EUT Orientation:: H
Test Engineer::    Chris
Power Supply: :    AC + Internal Battery
Comments:  :       Line
```



***LIMIT LINE: "EN 55022 V AV"***

```
  Short Description:            Voltage AV Limit
4/27/1998  2:24PM
   Frequency    Level
         MHz     dBµV

    0.150000    56.00
    0.500000    46.00
    5.000000    46.00
    5.000000    50.00
   30.000000    50.00
```

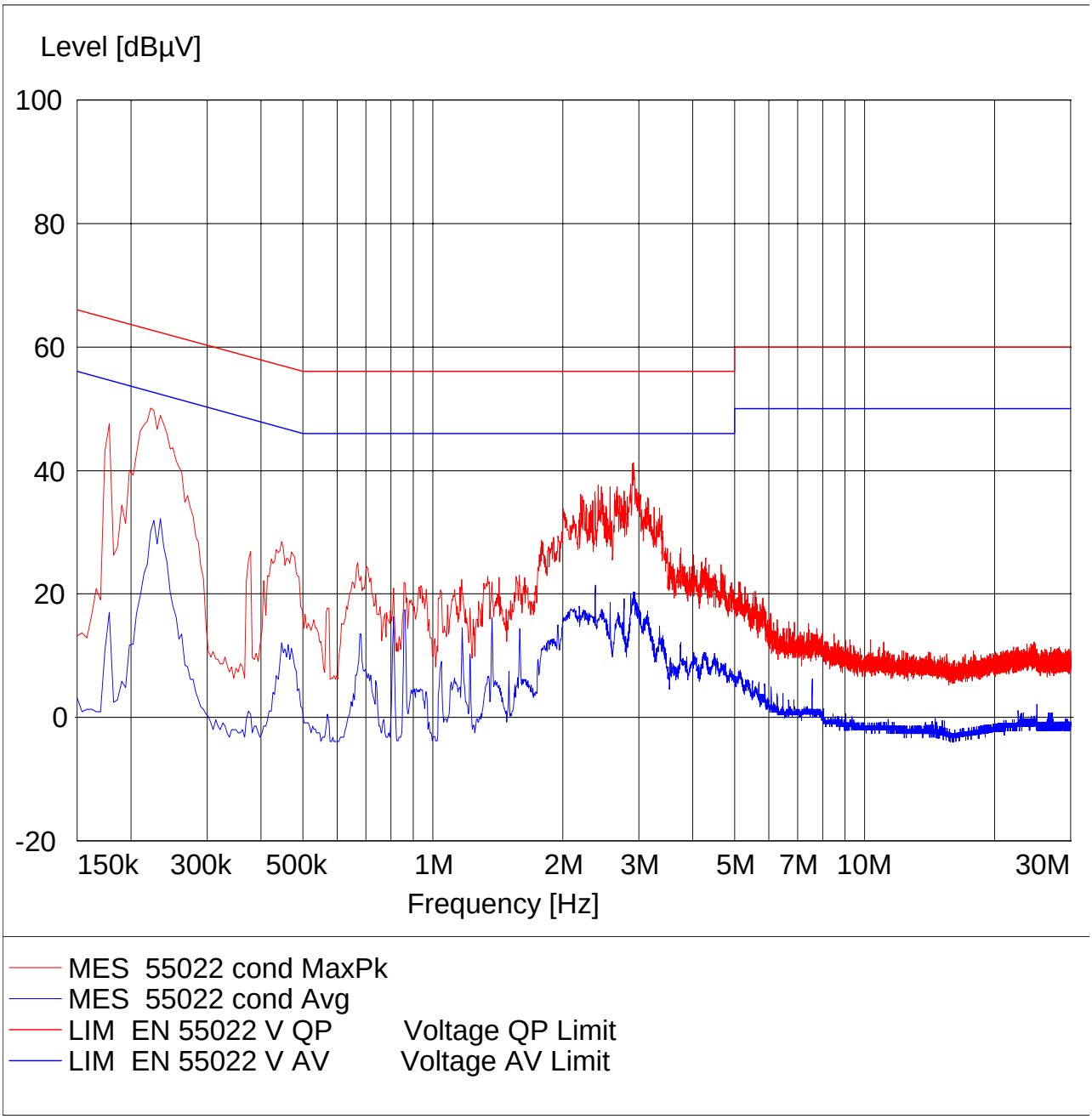
***LIMIT LINE: "EN 55022 V QP"***

```
  Short Description:            Voltage QP Limit
4/27/1998  2:24PM
   Frequency    Level
         MHz     dBµV

    0.150000    66.00
    0.500000    56.00
    5.000000    56.00
    5.000000    60.00
   30.000000    60.00
```

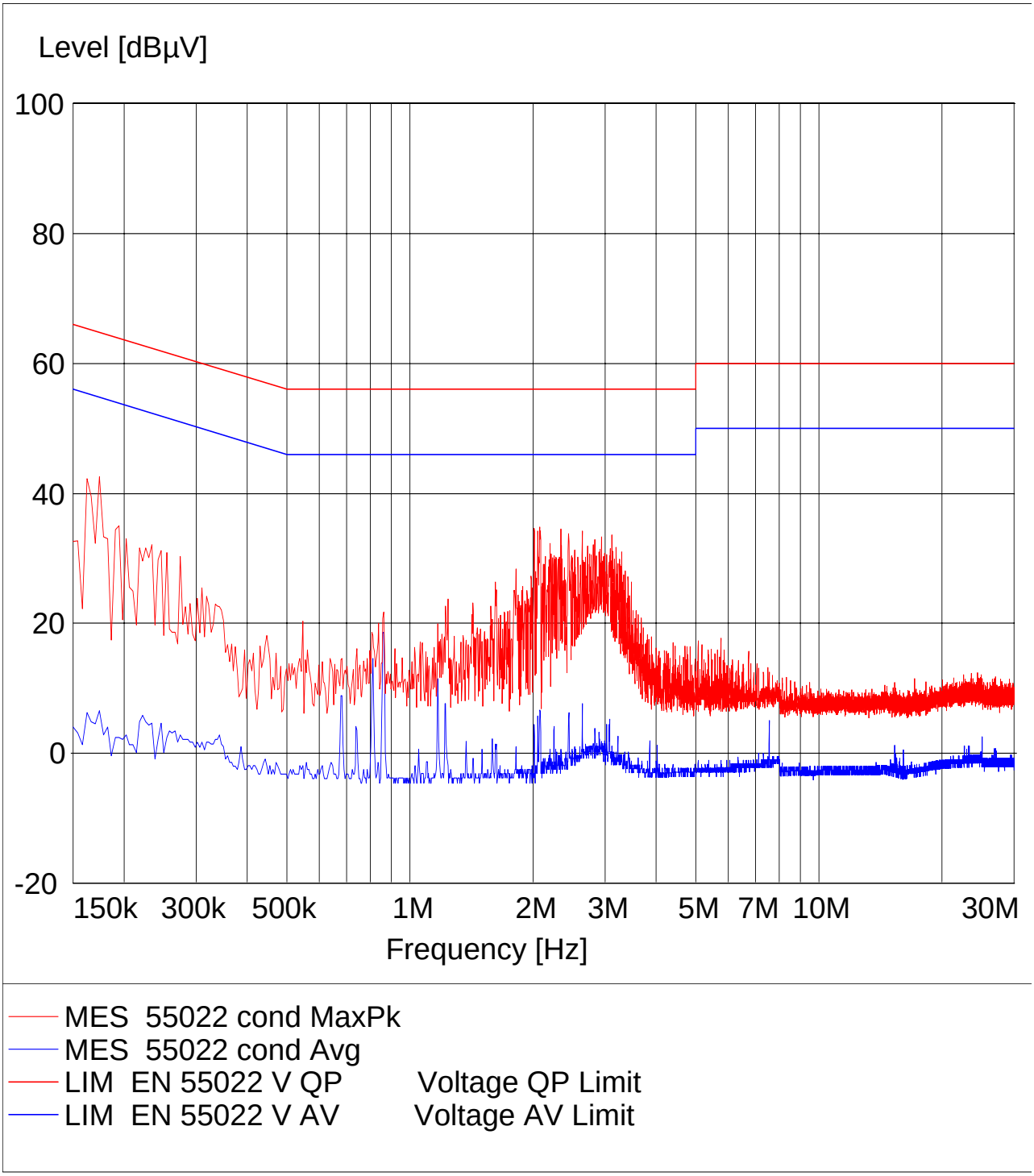
**Results TX Neutral**

EUT: CDMA HI001
Manufacturer: Casio Hitachi
Test Mode: BT; GFSK CH.39
ANT Orientation:: N/A
EUT Orientation:: H
Test Engineer:: Chris
Power Supply: : AC + Internal Battery
Comments: : Neutral



**Results RX Line**

EUT: CDMA HI001
Manufacturer: Casio Hitachi
Test Mode: BT; RX
ANT Orientation:: N/A
EUT Orientation:: H
Test Engineer:: Chris
Power Supply: : AC + Internal Battery
Comments: : Line



***LIMIT LINE: "EN 55022 V AV"***

```
  Short Description:           Voltage AV Limit
4/27/1998  2:24PM
   Frequency    Level
         MHz     dBµV

    0.150000    56.00
    0.500000    46.00
    5.000000    46.00
    5.000000    50.00
   30.000000    50.00
```

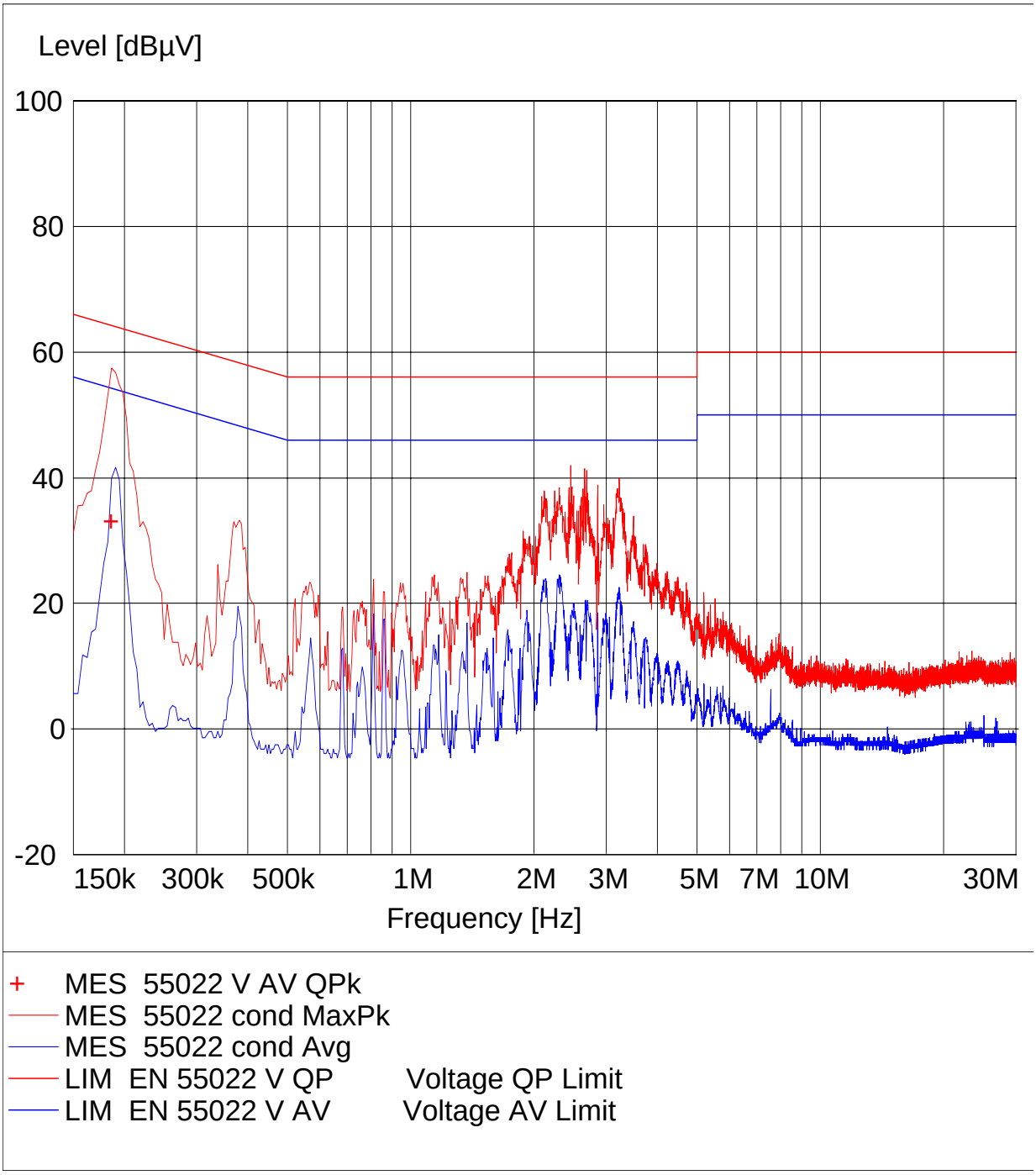
***LIMIT LINE: "EN 55022 V QP"***

```
  Short Description:           Voltage QP Limit
4/27/1998  2:24PM
   Frequency    Level
         MHz     dBµV

    0.150000    66.00
    0.500000    56.00
    5.000000    56.00
    5.000000    60.00
   30.000000    60.00
```

**Results RX Neutral**

EUT: CDMA HI001
Manufacturer: Casio Hitachi
Test Mode: BT; RX
ANT Orientation:: N/A
EUT Orientation:: H
Test Engineer:: Chris
Power Supply: : AC + Internal Battery
Comments: : Neutral



***MEASUREMENT RESULT: "55022 V AV QPk"***

10/16/2008 11:46AM

| Frequency | Level | Transd | Limit | Margin | Line | PE | AUX STATE |
|---|---|---|---|---|---|---|---|
| MHz | dBµV | dB | dBµV | dB | | | |
| 0.186000 | 33.10 | 0.1 | 64 | 31.1 | 1 | --- | OFF |

***LIMIT LINE: "EN 55022 V AV"***

Short Description: Voltage AV Limit

4/27/1998 2:24PM

| Frequency MHz | Level dBµV |
|---|---|
| 0.150000 | 56.00 |
| 0.500000 | 46.00 |
| 5.000000 | 46.00 |
| 5.000000 | 50.00 |
| 30.000000 | 50.00 |

***LIMIT LINE: "EN 55022 V QP"***

Short Description: Voltage QP Limit

4/27/1998 2:24PM

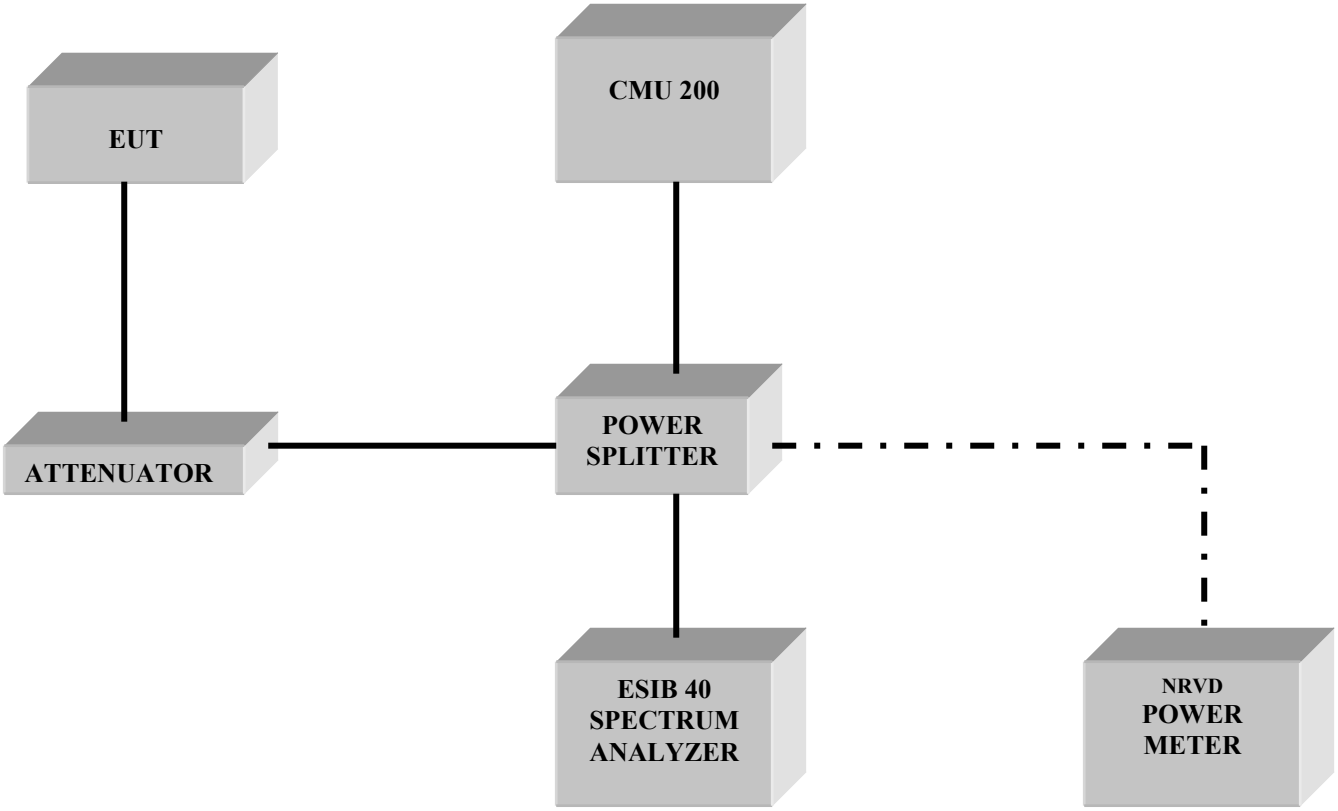
| Frequency MHz | Level dBµV |
|---|---|
| 0.150000 | 66.00 |
| 0.500000 | 56.00 |
| 5.000000 | 56.00 |
| 5.000000 | 60.00 |
| 30.000000 | 60.00 |

## 7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

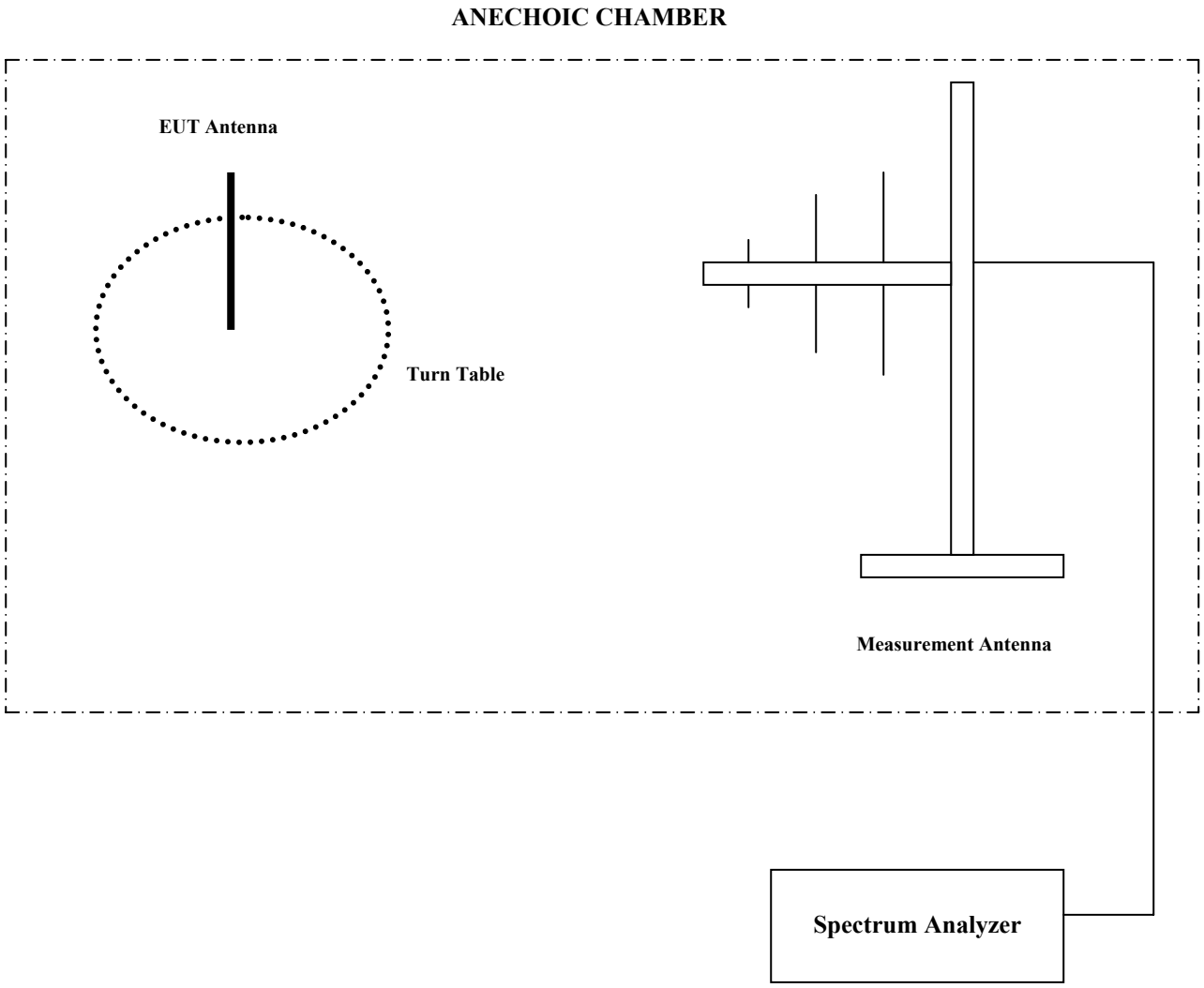
| No | Instrument/Ancillary | Type | Manufacturer | Serial No. | Cal Due | Interval |
|---|---|---|---|---|---|---|
| **01** | Spectrum Analyzer | ESIB 40 | Rohde & Schwarz | 100107 | May 2009 | 1 year |
| **02** | Spectrum Analyzer | FSEM 30 | Rohde & Schwarz | 100017 | May 2009 | 1 year |
| **03** | Signal Generator | SMY02 | Rohde & Schwarz | 836878/011 | May 2009 | 1 year |
| **04** | Power-Meter | NRVD | Rohde & Schwarz | 0857.8008.02 | May 2009 | 1 year |
| **05** | Biconilog Antenna | 3141 | EMCO | 0005-1186 | June 2009 | 1 year |
| **06** | Horn Antenna (1-18GHz) | SAS-200/571 | AH Systems | 325 | June 2009 | 1 year |
| **07** | Horn Antenna (18-26.5GHz) | 3160-09 | EMCO | 1240 | June 2009 | 1 year |
| **08** | Power Splitter | 11667B | Hewlett Packard | 645348 | n/a | n/a |
| **09** | Climatic Chamber | VT4004 | Voltsch | G1115 | May 2009 | 1 year |
| **10** | High Pass Filter | 5HC2700 | Trilithic Inc. | 9926013 | n/a | n/a |
| **11** | High Pass Filter | 4HC1600 | Trilithic Inc. | 9922307 | n/a | n/a |
| **12** | Pre-Amplifier | JS4-00102600 | Miteq | 00616 | May 2009 | 1 year |
| **13** | Power Sensor | URV5-Z2 | Rohde & Schwarz | DE30807 | May 2009 | 1 year |
| **14** | Digital Radio Comm. Tester | CMD-55 | Rohde & Schwarz | 847958/008 | May 2009 | 1 year |
| **15** | Universal Radio Comm. Tester | CMU 200 | Rohde & Schwarz | 832221/06 | May 2009 | 1 year |
| **16** | LISN | ESH3-Z5 | Rohde & Schwarz | 836679/003 | May 2009 | 1 year |
| **17** | Loop Antenna | 6512 | EMCO | 00049838 | July 2010 | 2 years |

## 8 BLOCK DIAGRAMS

**Conducted Testing**



**Radiated Testing**

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## 9 REPORT HISTORY

2008-10-15 Original Report