



FCC Test Report

FCC Part 15.247 for FHSS systems

FOR:

CDMA CA001

FCC ID: TYKNX6450

TEST REPORT #: EMC_CET10_043_08501_CA001_15.247

DATE: 2008-10-29



Certificate # 2135.01



**FCC listed
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**IC recognized #
3462B**

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

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

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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 CA001

This report is reviewed by:

Marc Douat

2008-10-29 EMC & Radio (EMC Project Engineer)

Date	Section	Name	Signature
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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:

Ahmad Safdari

2008-10-29 EMC & Radio (EMC Project Engineer)

Date	Section	Name	Signature
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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 Milpitas, CA 95035 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:	CA001
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 CA001
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)	<input type="checkbox"/> FIXED <input type="checkbox"/> VEHICULAR <input checked="" type="checkbox"/> PORTABLE <input type="checkbox"/> MODULE
Equipment Classification: (POWER(AC MAINS))	<input type="checkbox"/> 110VAC (<i>GROUND</i>) <input checked="" type="checkbox"/> 110VAC (<i>NO GROUND</i>) <input type="checkbox"/> 12VDC <input checked="" type="checkbox"/> 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 CA001	SCADM000137	PWB-6420-MAIN-20S
2	EUT	CDMA CA001	SCADM000138	PWB-6420-MAIN-20S
3	EUT	CDMA CA001	SCADM000139	PWB-6420-MAIN-20S
4	EUT	CDMA CA001	SCADM000140	PWB-6420-MAIN-20S

SW version: V008

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	-2.65	-3.29	-3.39
Measurement uncertainty		±0.5dBm		

EIRP: $\pi / 4$ DQPSK

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402	2441	2480
T _{nom} (23)°C	V _{nom} VDC	-2.13	-1.88	-2.77
Measurement uncertainty		±0.5dBm		

EIRP: 8DPSK

4

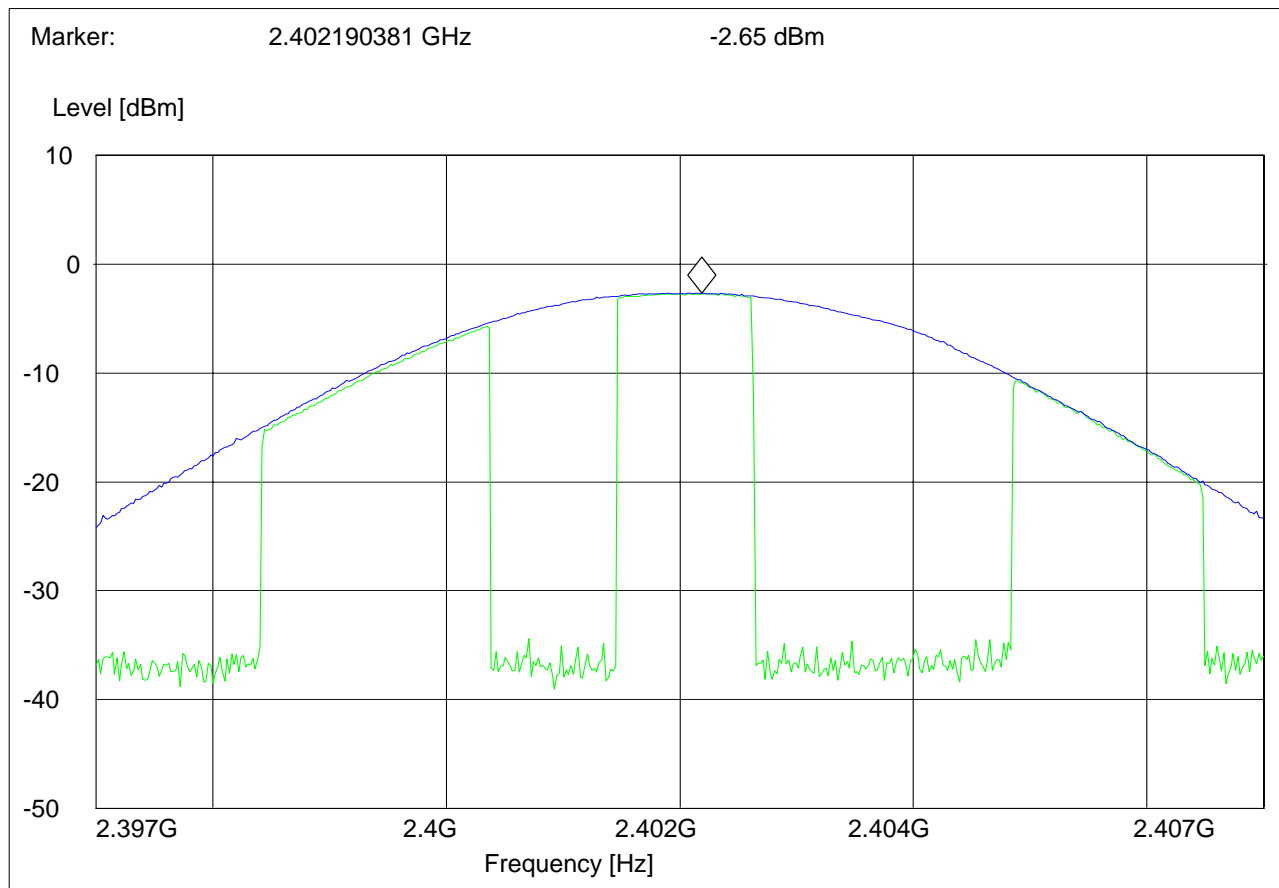
TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402	2441	2480
T _{nom} (23)°C	V _{nom} VDC	-1.99	-1.79	-2.46
Measurement uncertainty		±0.5dBm		



EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT GFSK Ch. 0
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

SWEEP TABLE: "EIRP BT low channel"

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

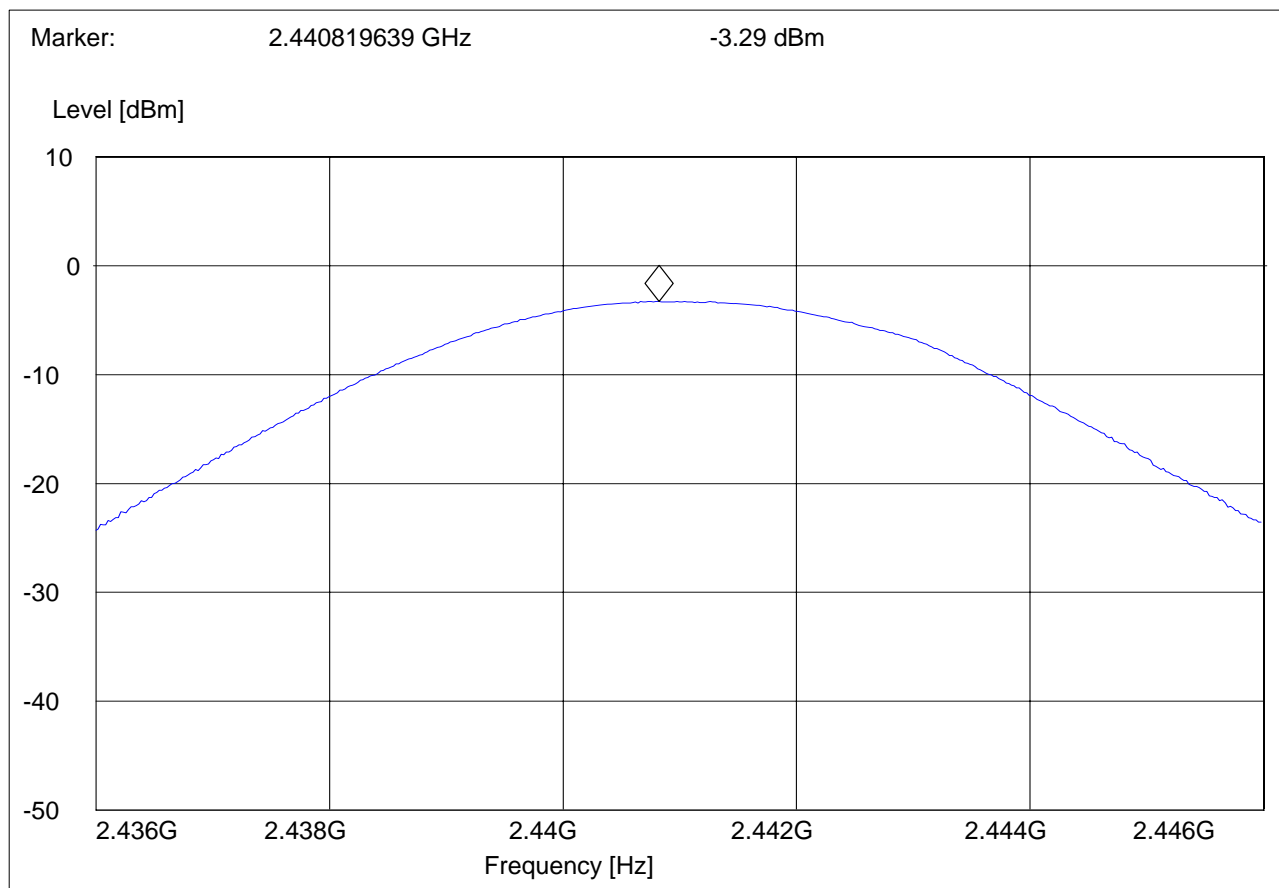




EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT GFSK Ch. 39
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

SWEEP TABLE: "EIRP BT mid channel"

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

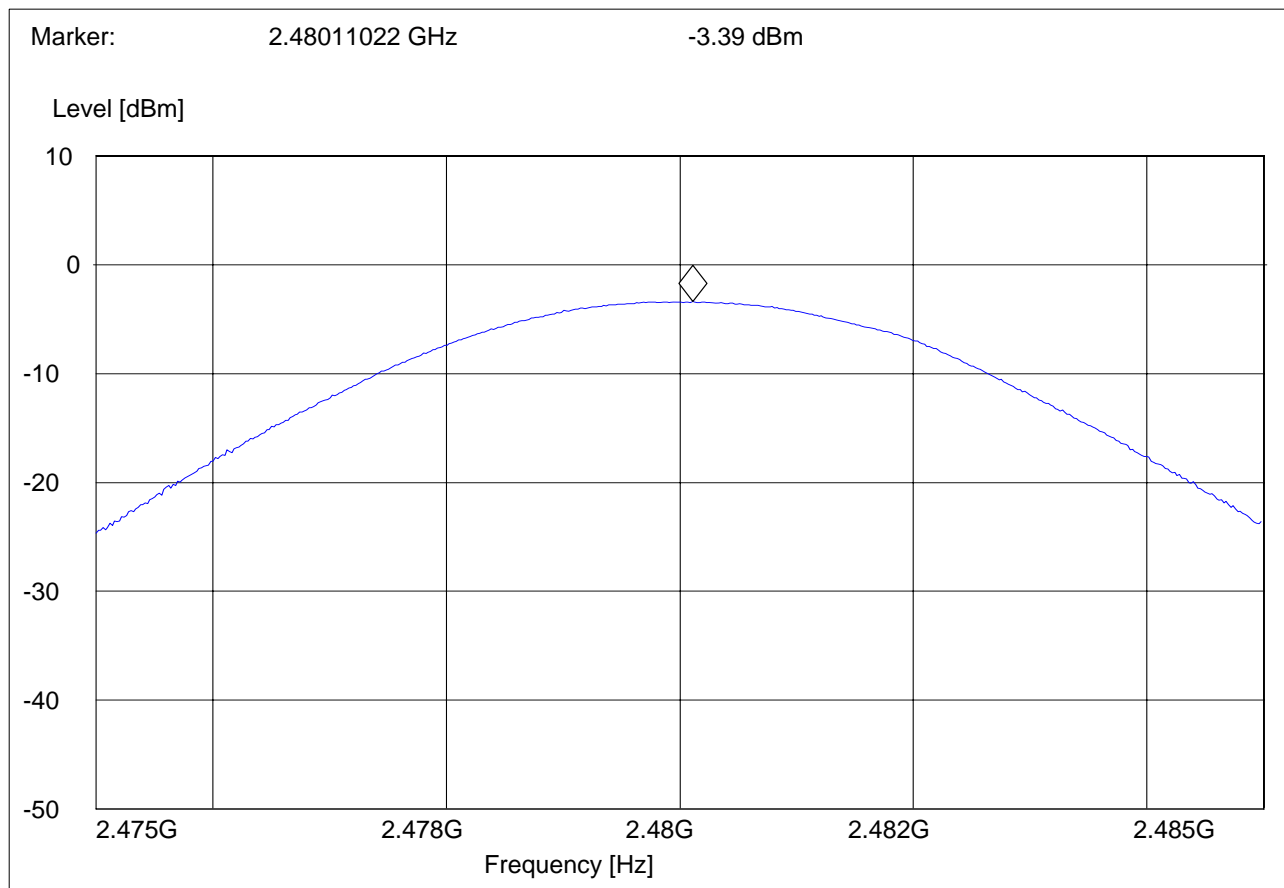




EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT GFSK Ch. 78
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

SWEEP TABLE: "EIRP BT high channel"

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

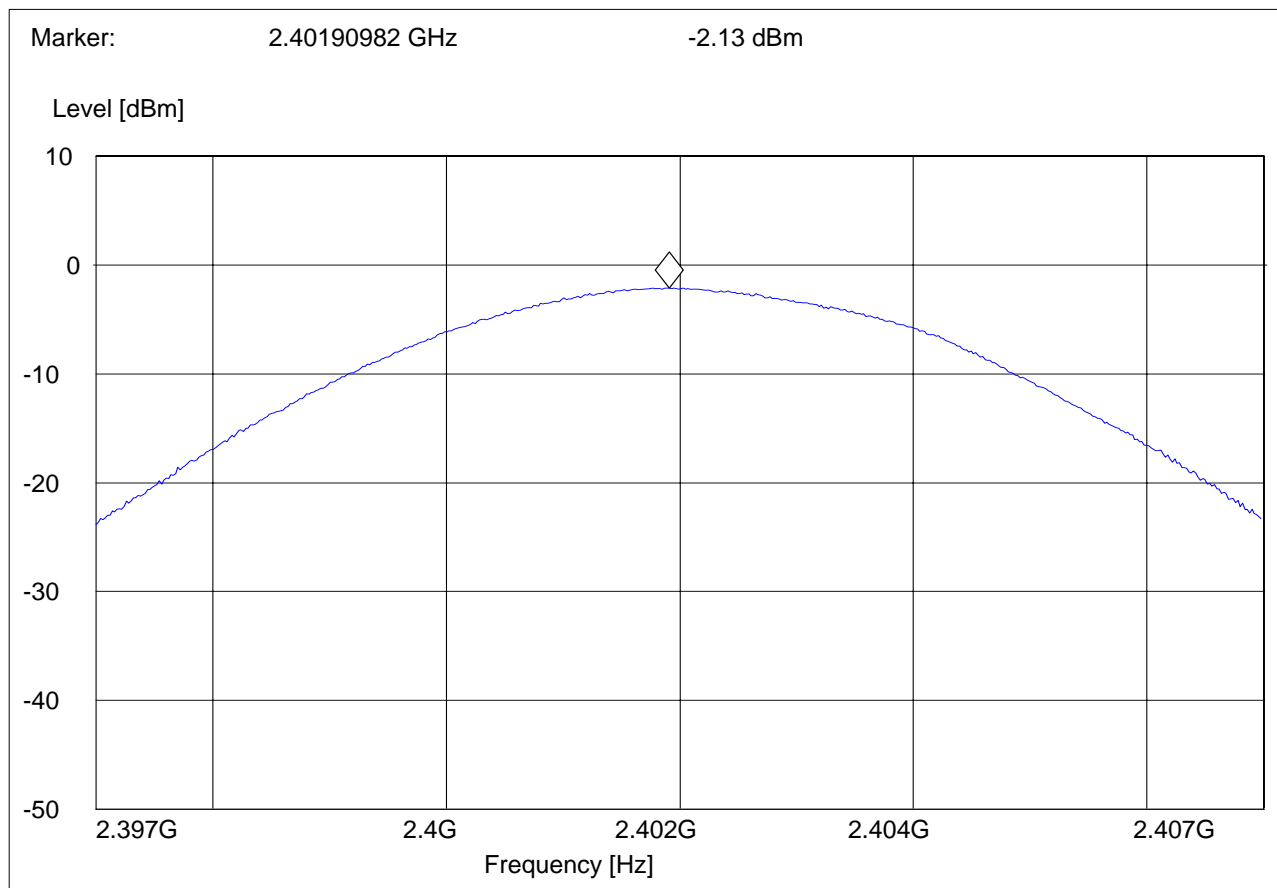




EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT DQPSK Ch. 0
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

SWEEP TABLE: "EIRP BT low channel"

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



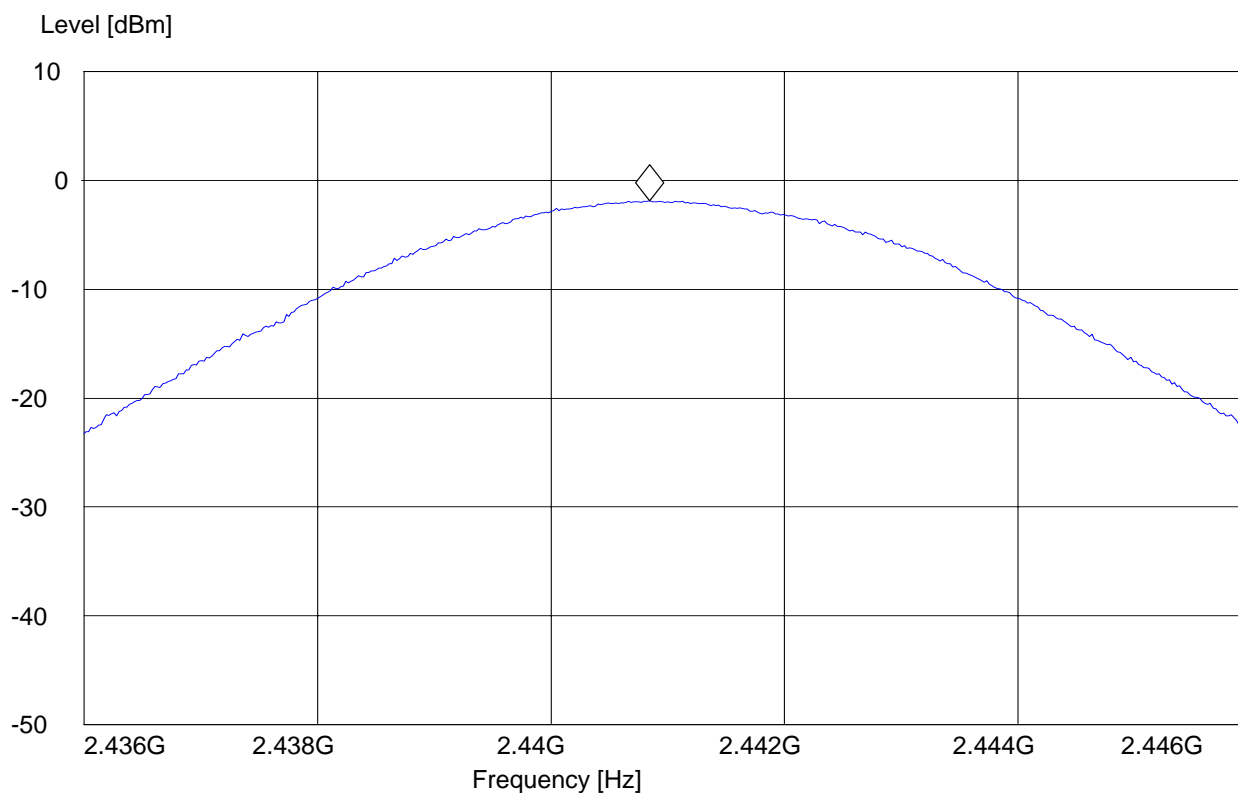


EUT: CDMA CA001
 Customer:: Casio Hitachi
 Test Mode: BT DQPSK Ch. 39
 ANT Orientation: V
 EUT Orientation: V
 Test Engineer: Chris
 Voltage: AC + Internal Battery
 Comments:

SWEEP TABLE: "EIRP BT mid channel"

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

Marker: **2.440841683 GHz** **-1.88 dBm**

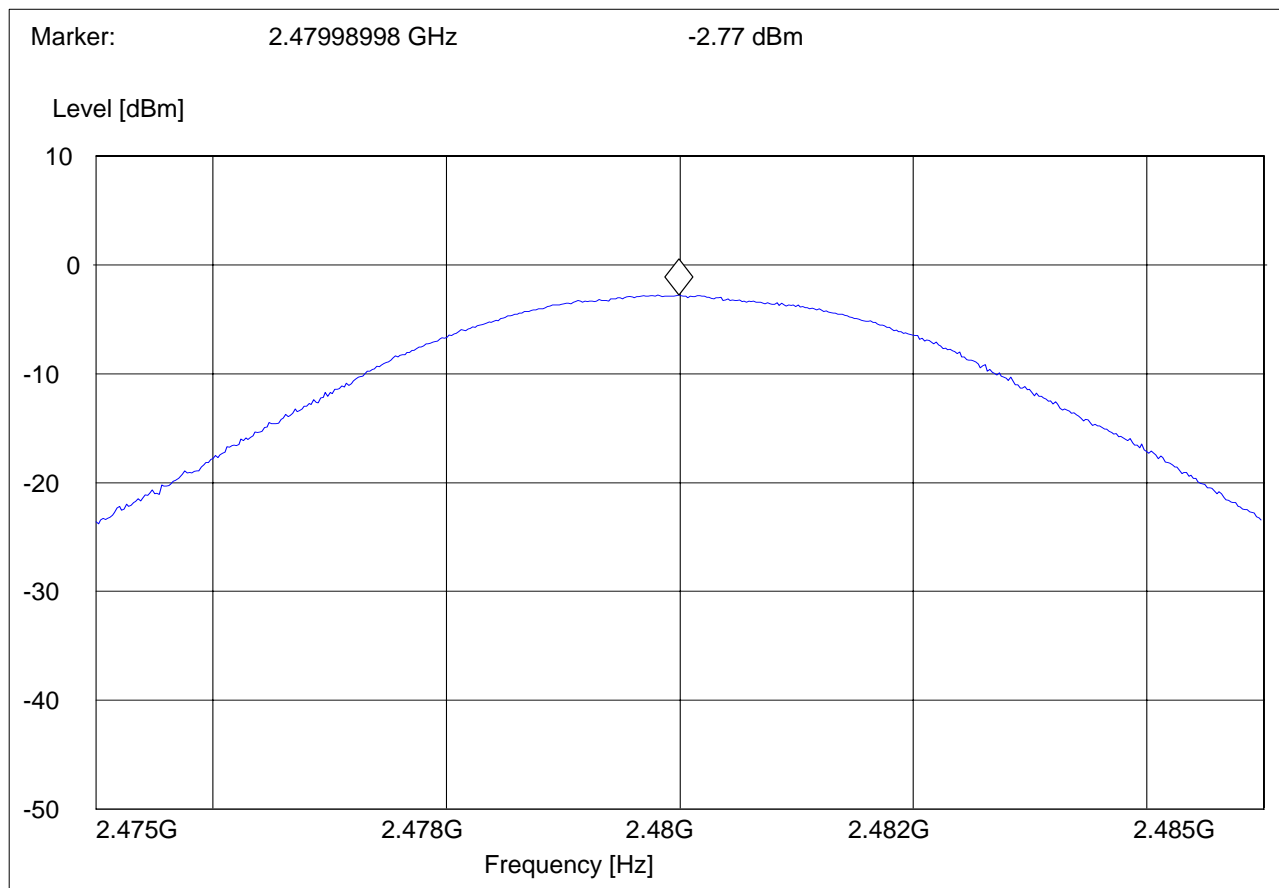




EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT DQPSK Ch. 78
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

SWEEP TABLE: "EIRP BT high channel"

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

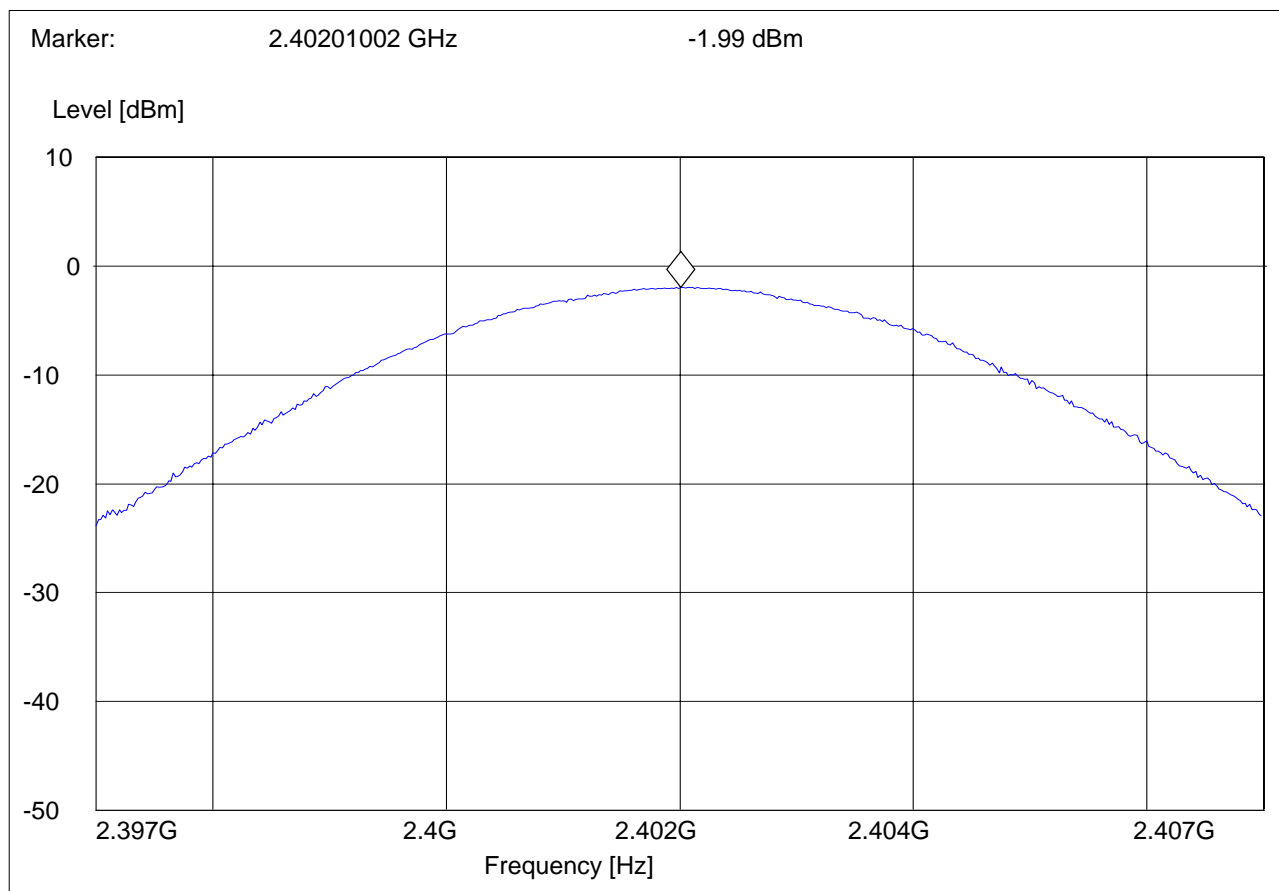




EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT 8DPSK Ch. 0
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

SWEEP TABLE: "EIRP BT low channel"

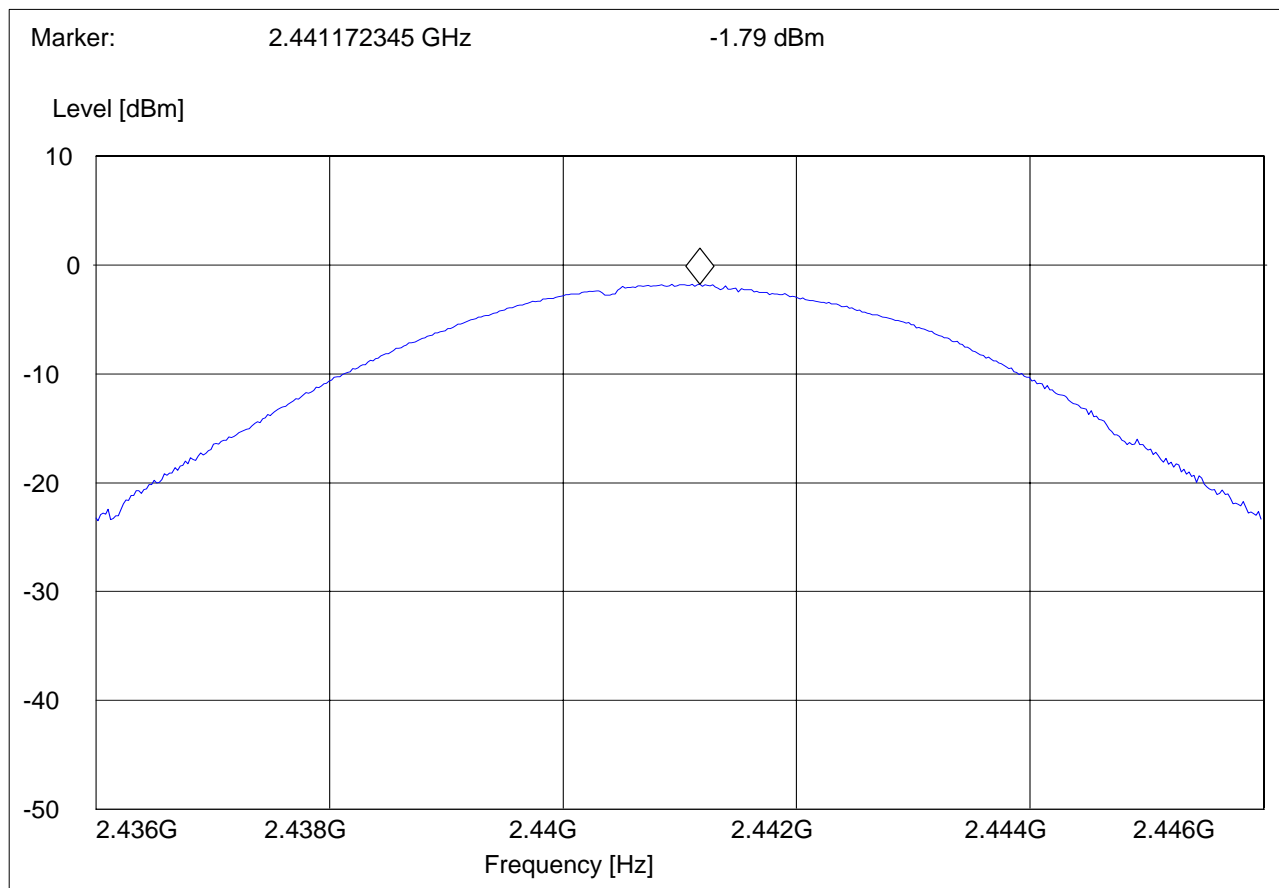
Short Description:		EIRP Bluetooth channel-2402MHz			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
2.4 GHz	2.4 GHz	MaxPeak	Coupled	3 MHz	DUMMY-DBM
		MaxPeak			



EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT 8DPSK Ch. 39
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

SWEEP TABLE: "EIRP BT mid channel"

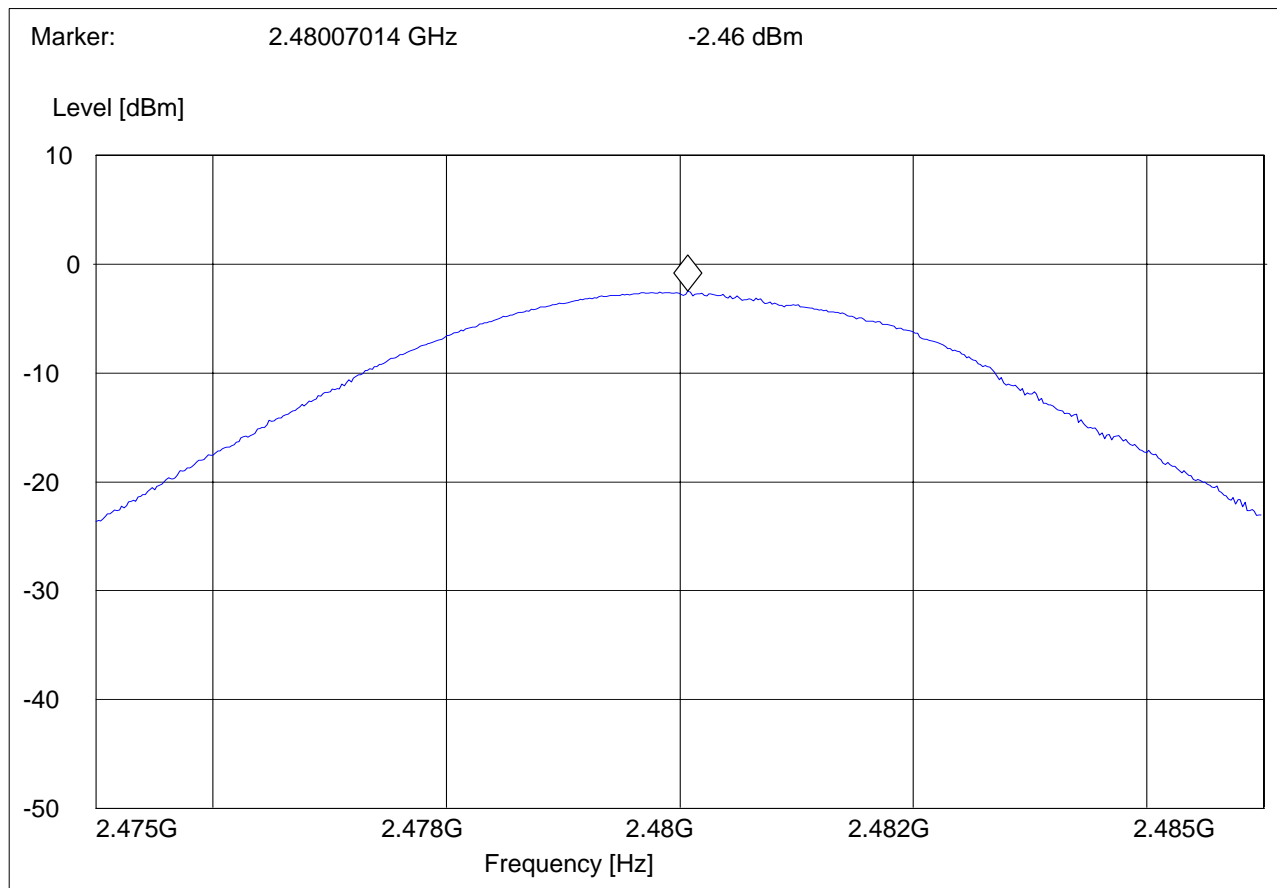
Short Description:		EIRP Bluetooth channel-2441MHz			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
2.4 GHz	2.4 GHz	MaxPeak	Coupled	3 MHz	DUMMY-DBM
		MaxPeak			



EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT 8DPSK Ch. 78
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

SWEEP TABLE: "EIRP BT high channel"

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



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

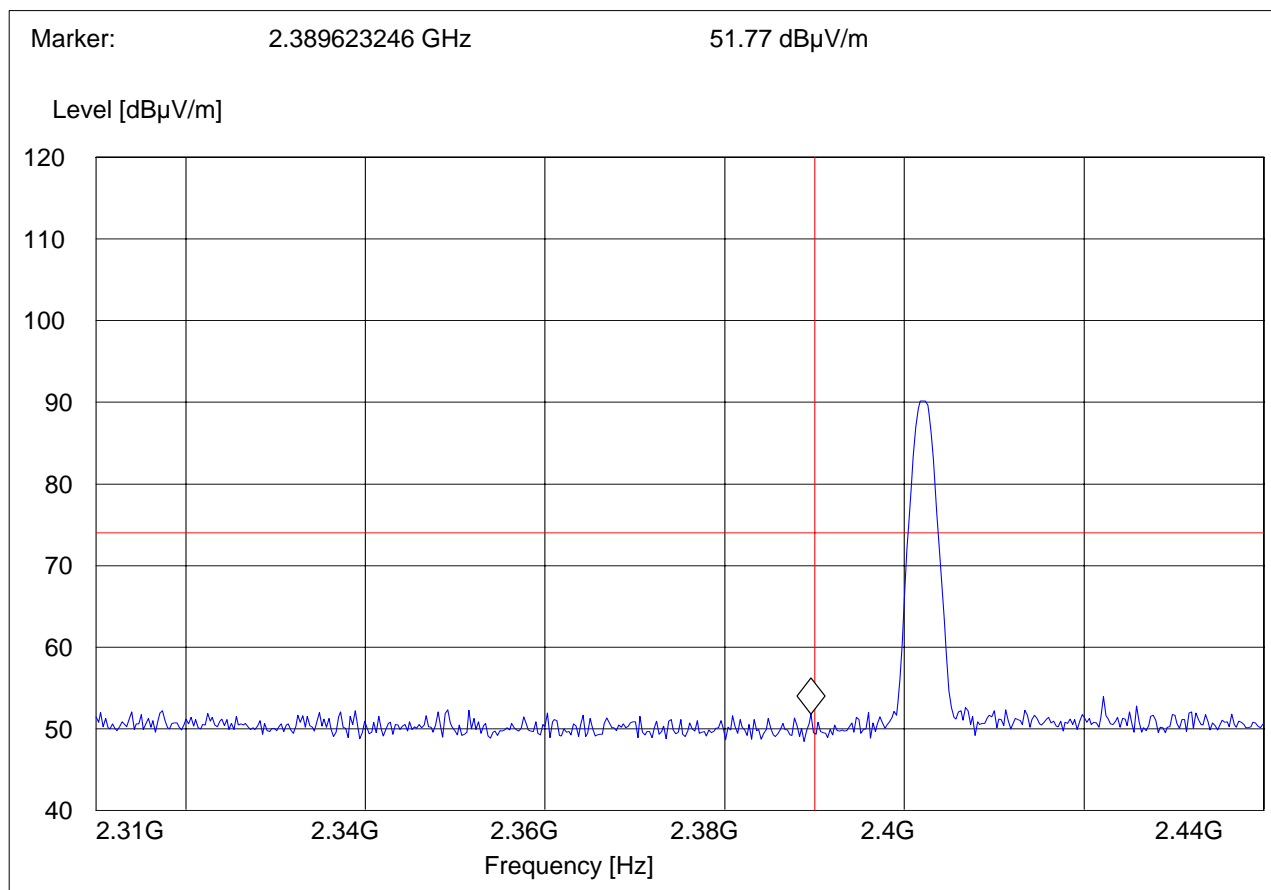
*AVG. LIMIT= 54dBuV/m

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

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT GFSK; CH.0
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "FCC15.247 LBE_PK"

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

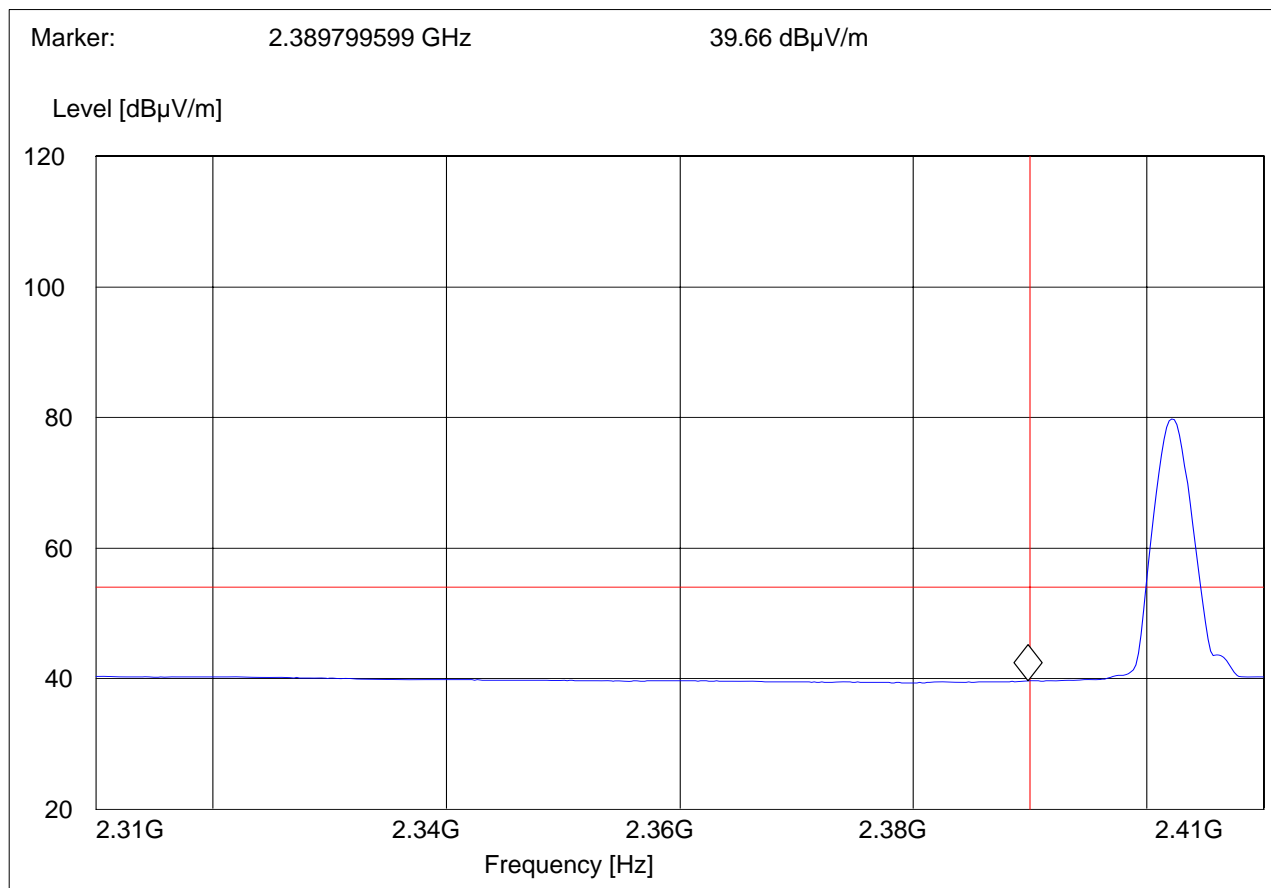


(2402MHz) LOWER BAND EDGE AVERAGE -GFSK MODULATION

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT GFSK; CH.0
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: Internal Battery
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

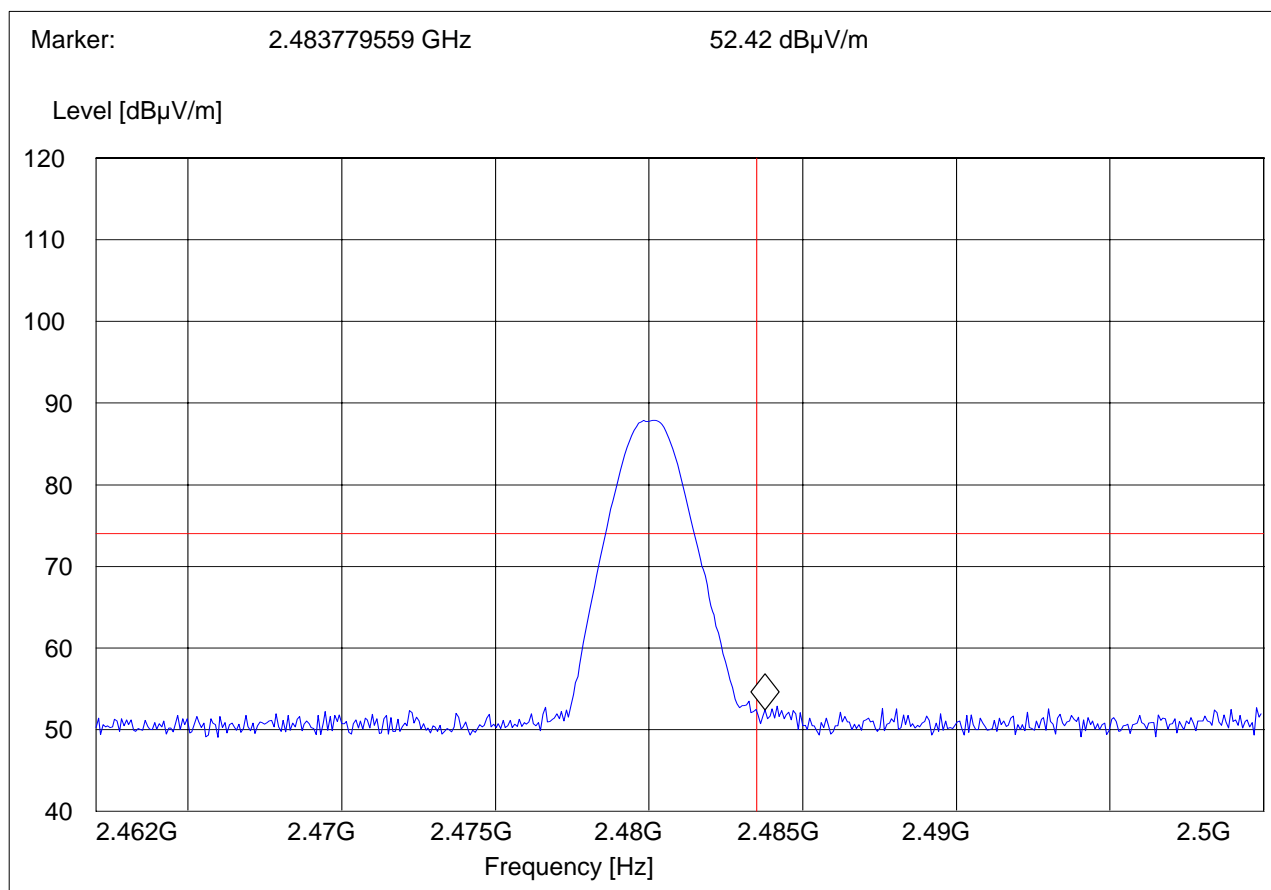


(2480MHz) HIGHER BAND EDGE PEAK -GFSK MODULATION

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT GFSK; CH.78
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: Internal Battery
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

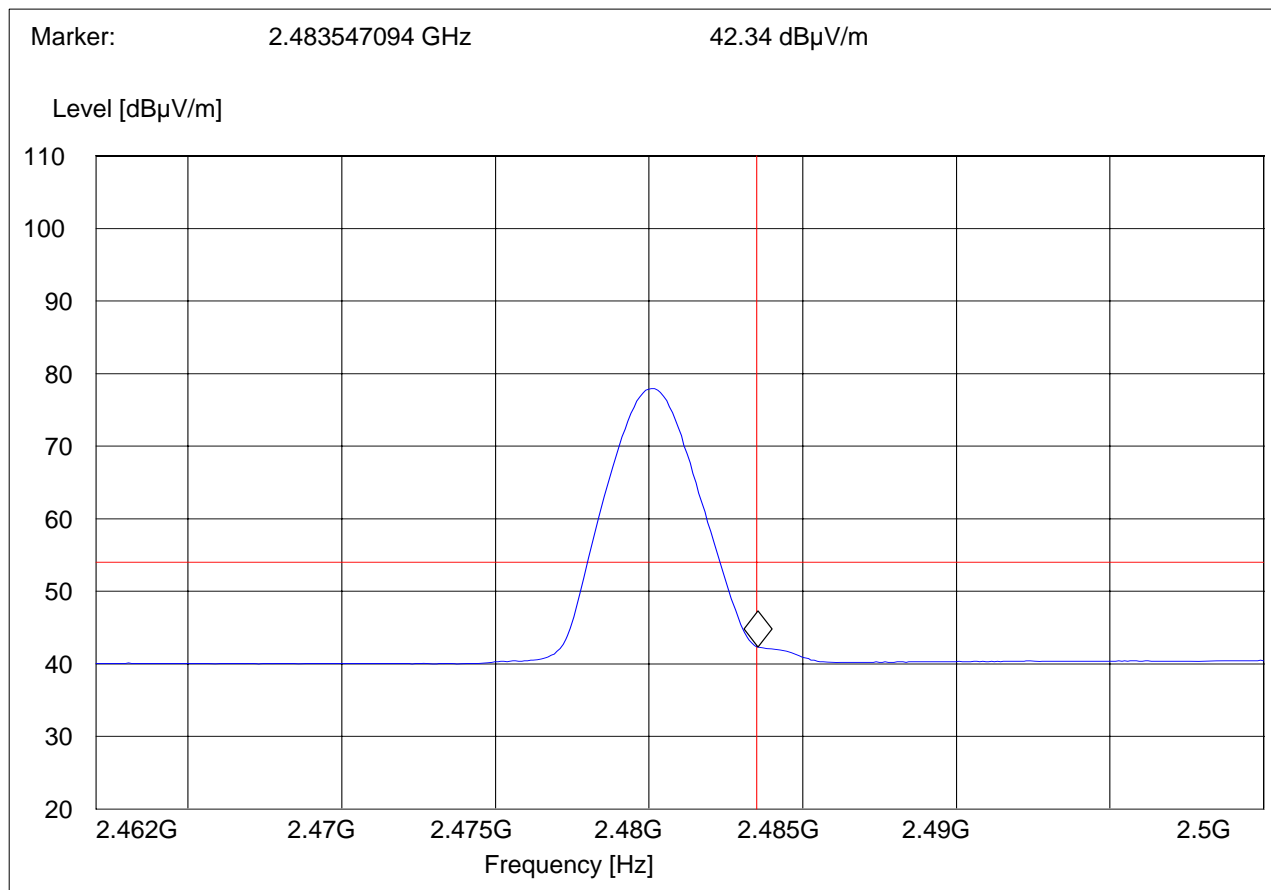


(2402MHz) HIGHER BAND EDGE AVERAGE-GFSK MODULATION

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT GFSK; CH.78
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: Internal Battery
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

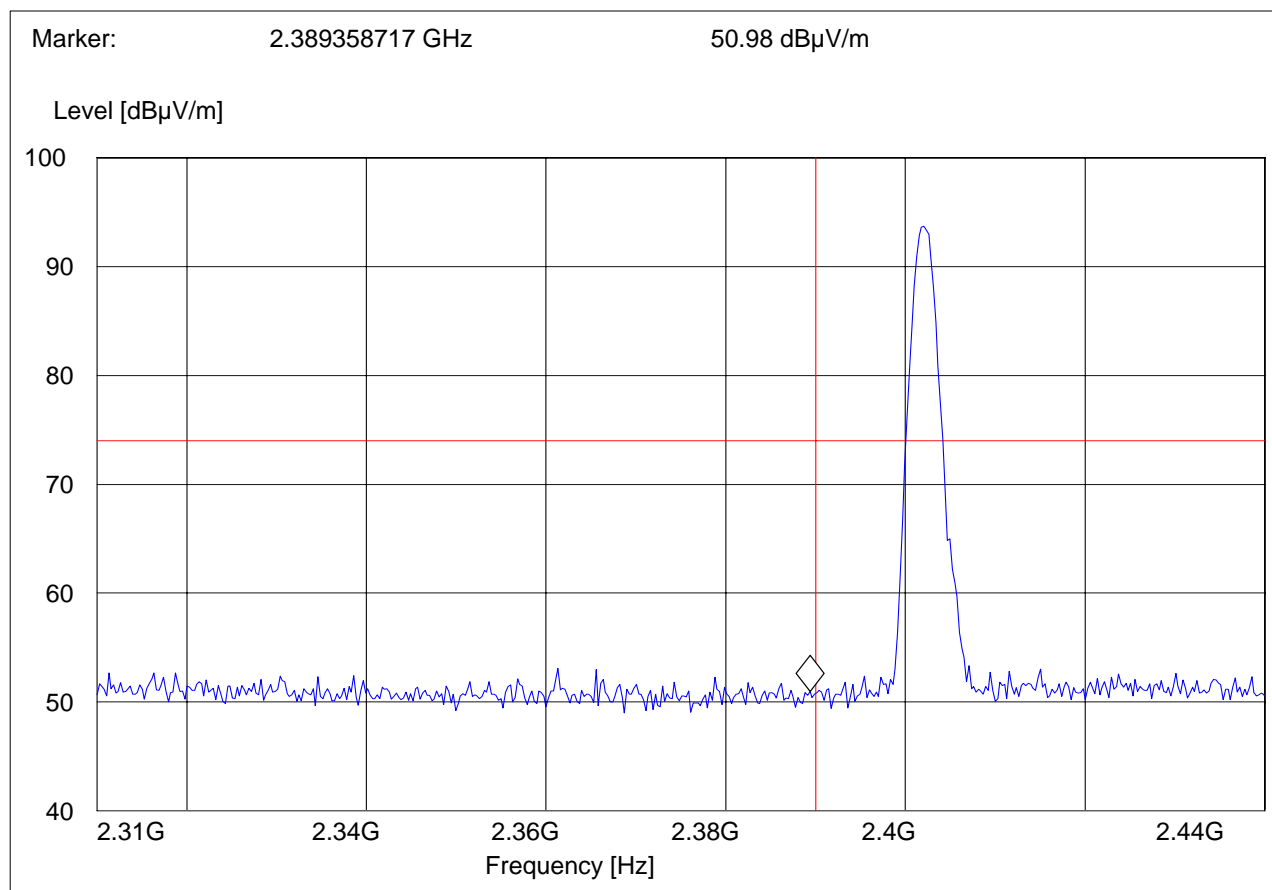


5.2.3 RESULTS: $\pi/4$ DQPSK (2402MHz) LOWER BAND EDGE PEAK - $\pi/4$ DQPSK MODULATION

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH.0
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "FCC15.247 LBE_PK"

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

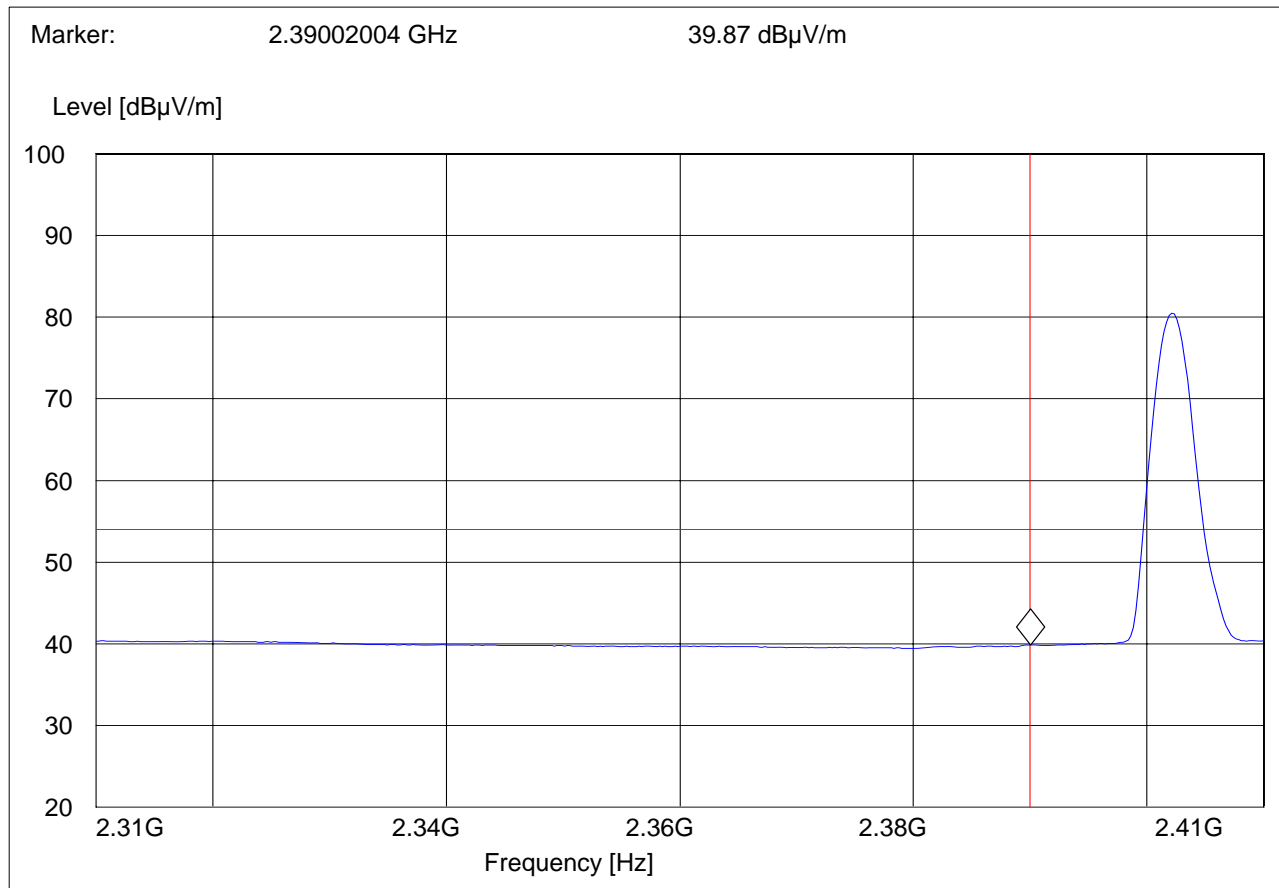


(2402MHz) LOWER BAND EDGE AVERAGE $-\pi/4$ DQPSK MODULATION

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH.0
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: Internal Battery
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

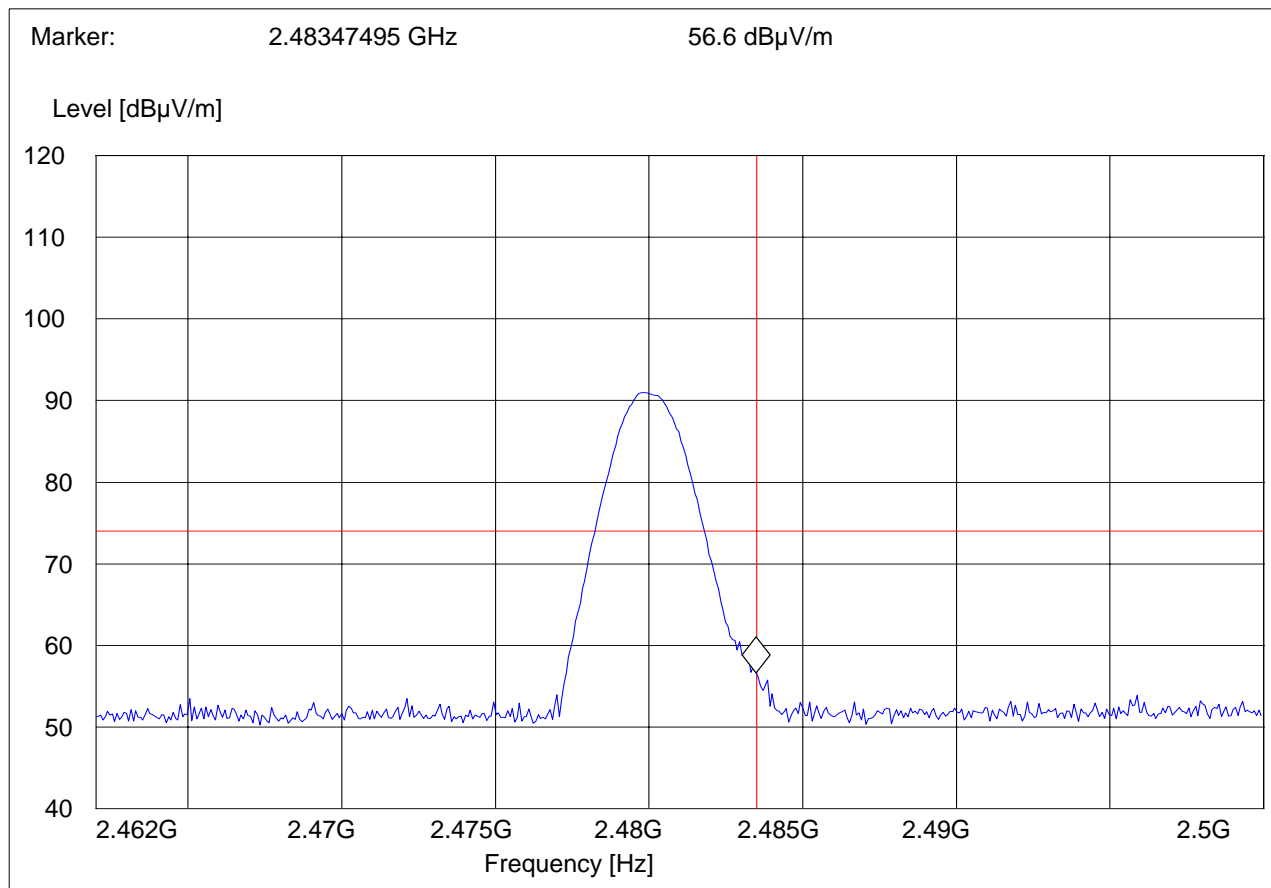


(2480MHz) HIGHER BAND EDGE PEAK $-\pi/4$ DQPSK MODULATION

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH.78
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "FCC15.247 HBE_PK"

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

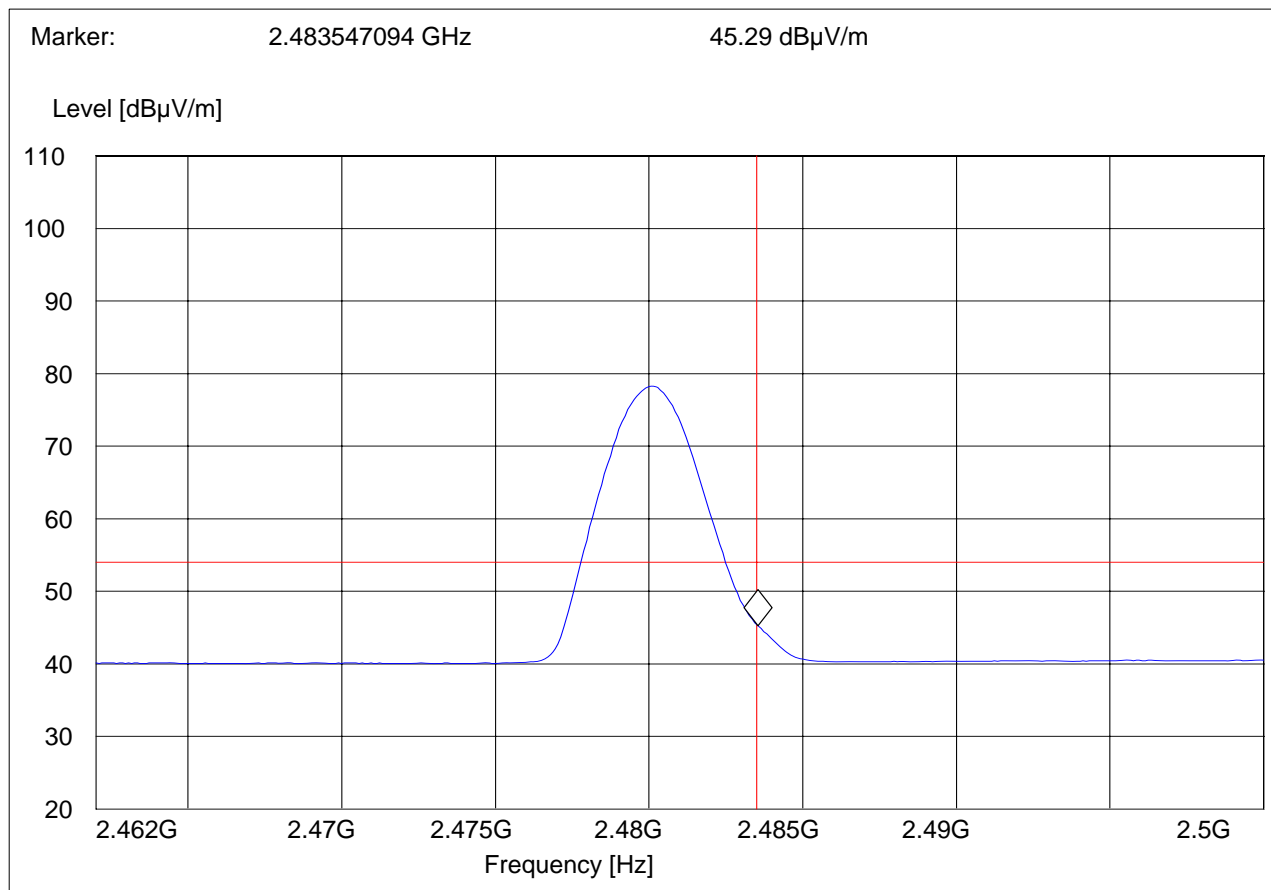


(2480MHz) HIGHER BAND EDGE AVERAGE- $\pi/4$ DQPSK MODULATION

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH.78
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: Internal Battery
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

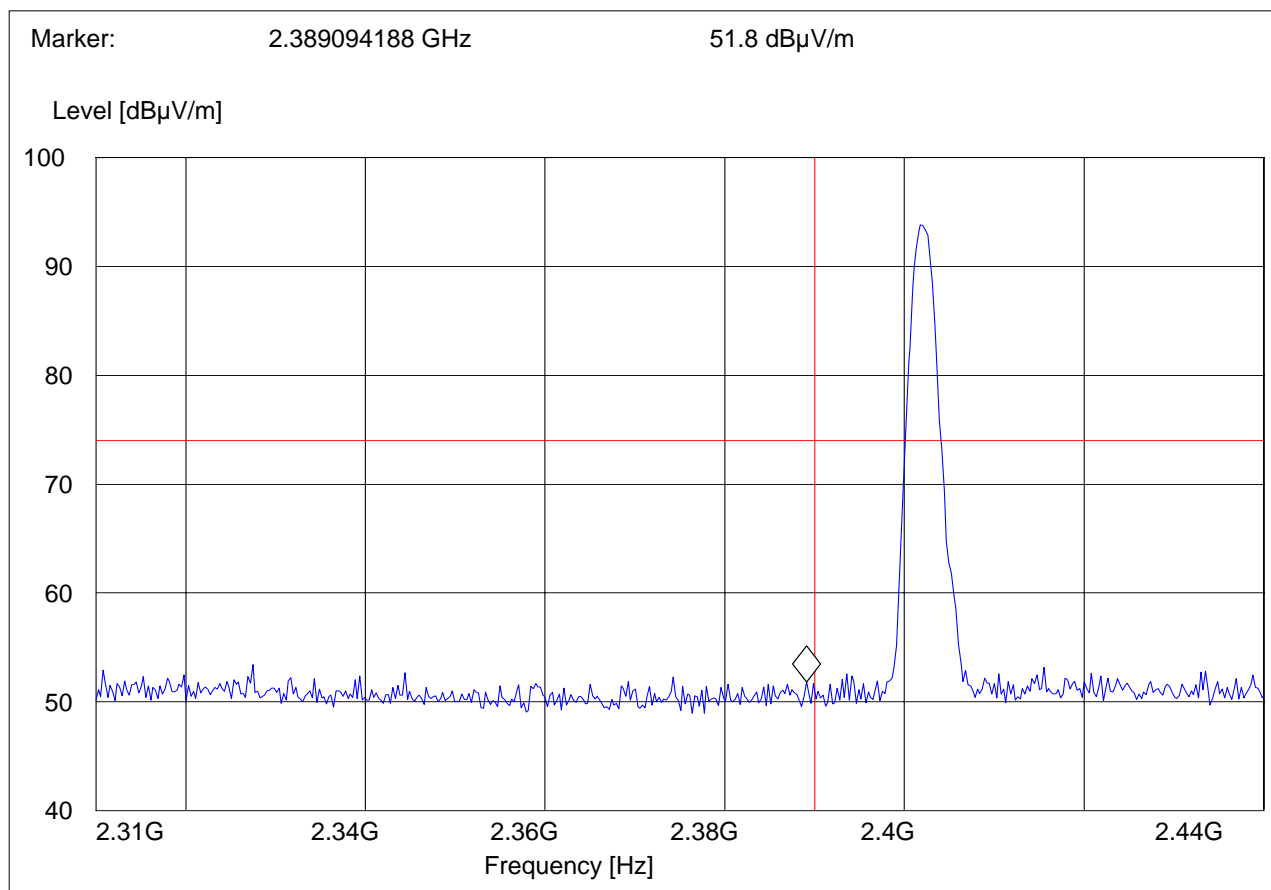


**RESULTS: 8DPSK
(2402MHz) LOWER BAND EDGE PEAK - 8DPSK MODULATION**

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT 8DPSK; CH.0
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "FCC15.247 LBE_PK"

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

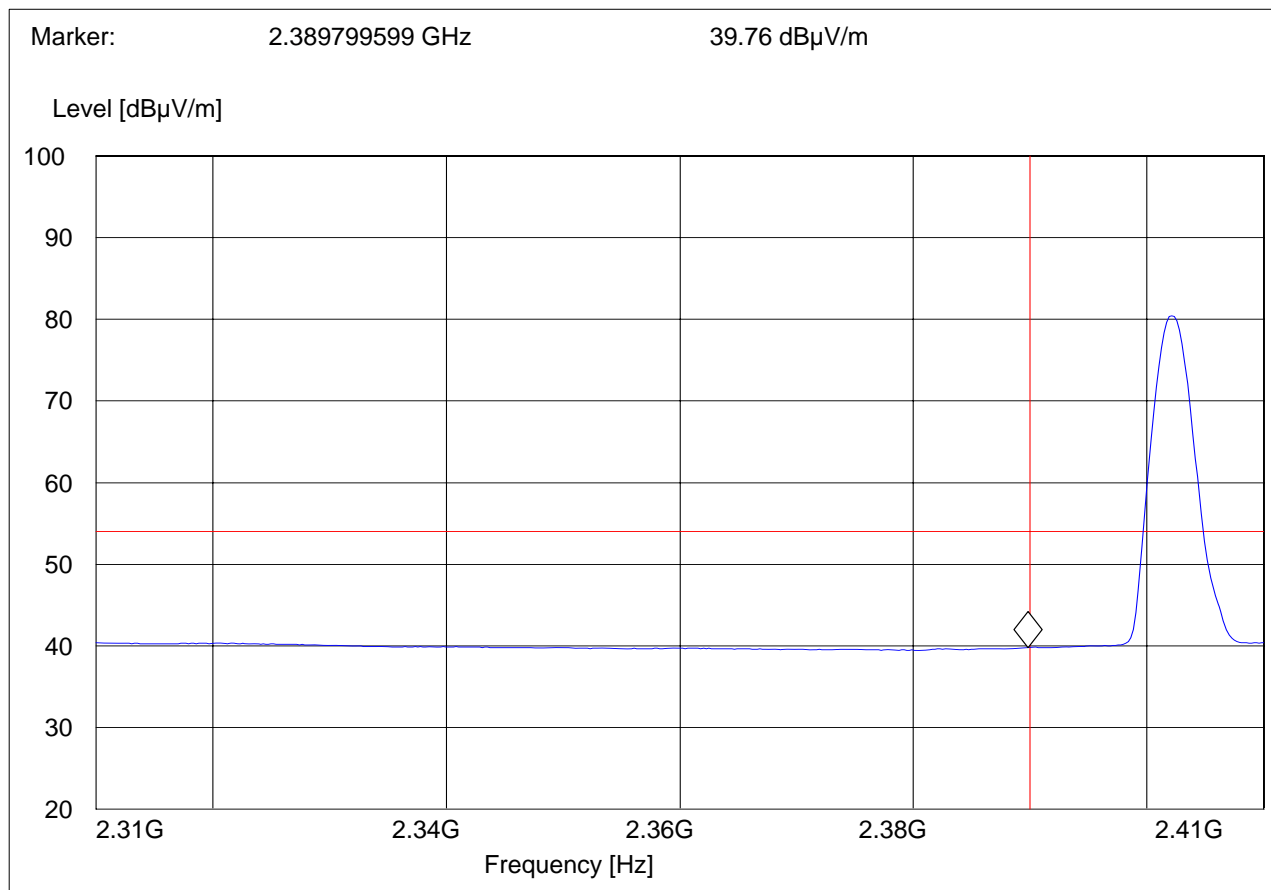


(2402MHz) LOWER BAND EDGE AVERAGE -8DPSK MODULATION

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT 8DPSK; CH.0
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: Internal Battery
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

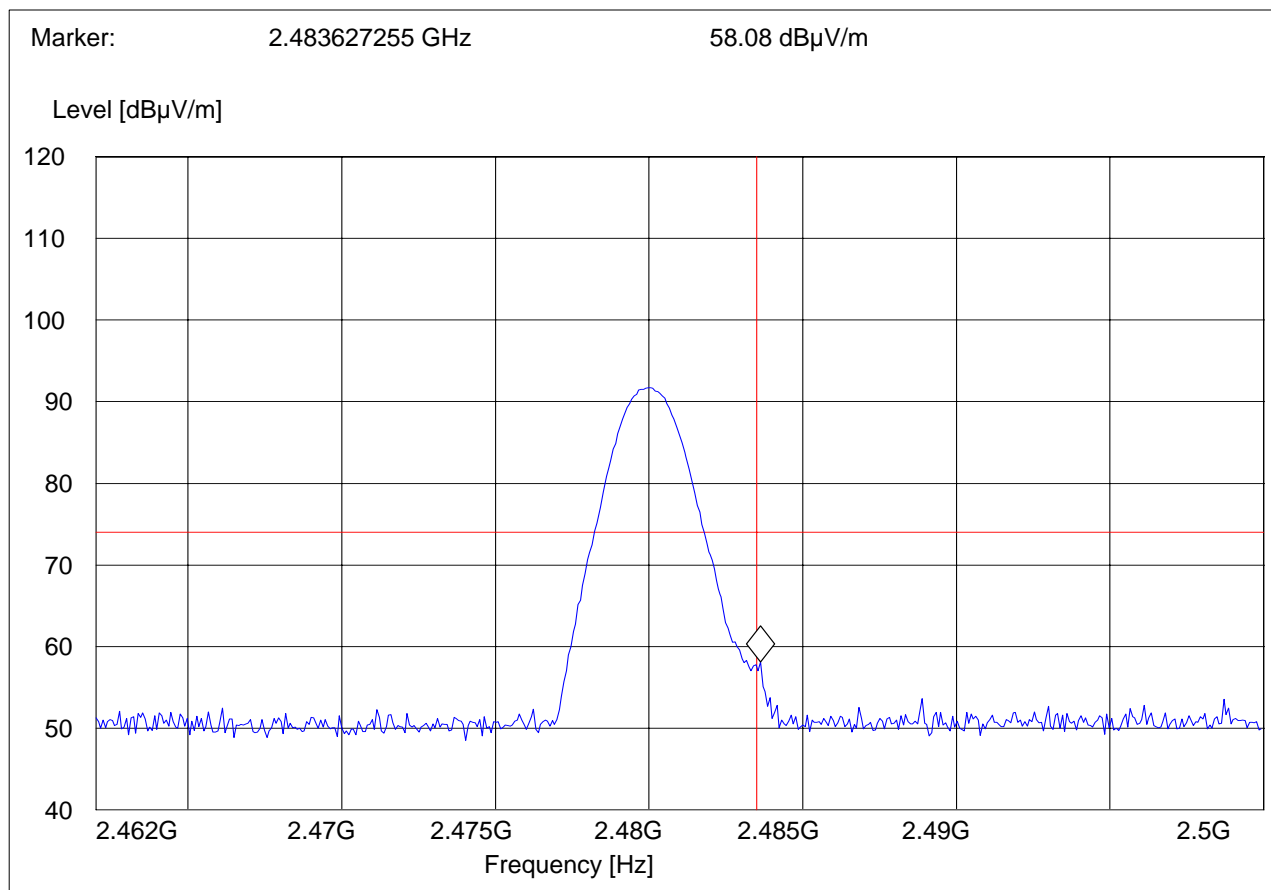


(2480MHz) HIGHER BAND EDGE PEAK - 8DPSK MODULATION

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT 8DPSK; CH.78
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "FCC15.247 HBE_PK"

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

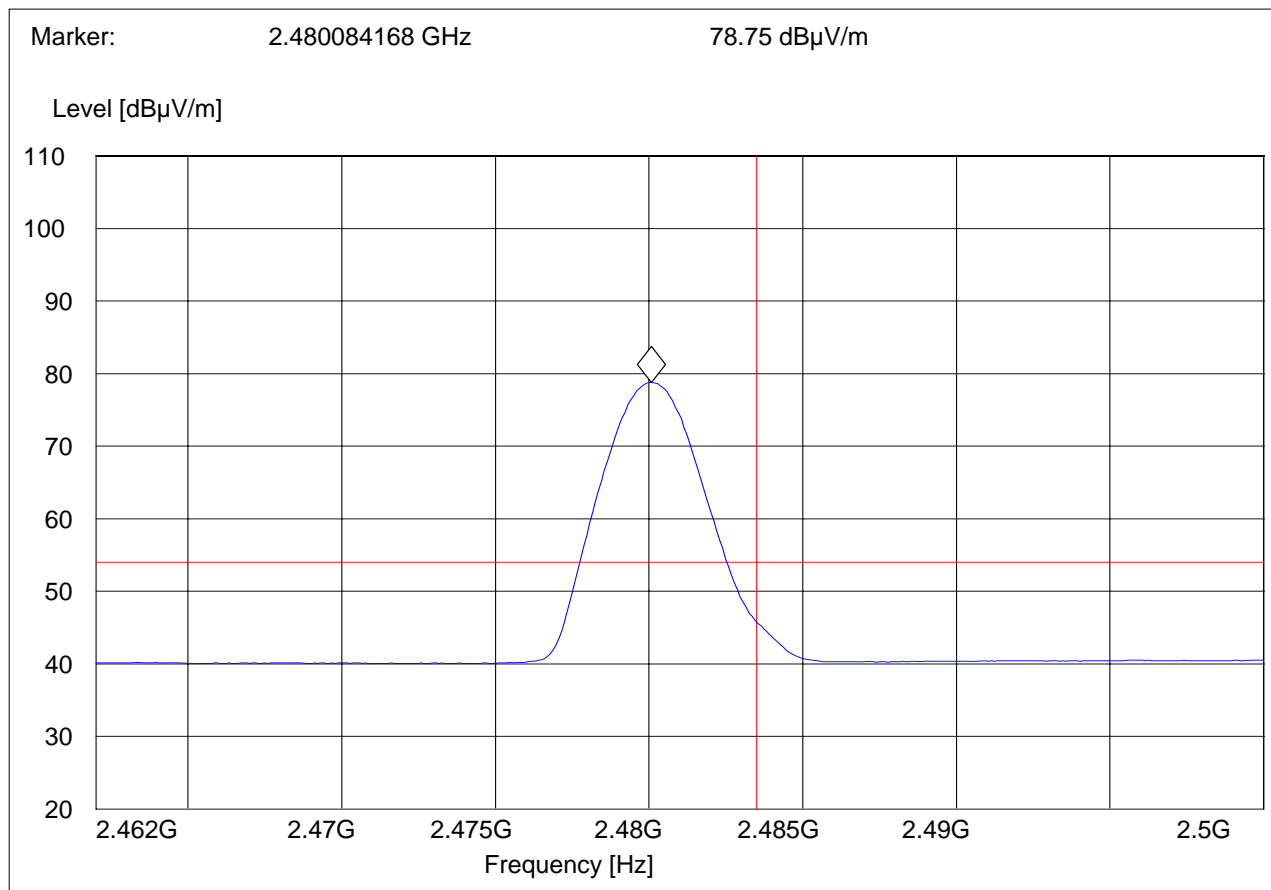


(2480MHz) HIGHER BAND EDGE AVERAGE-8DPSK MODULATION

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT 8DPSK; CH.78
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: Internal Battery
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

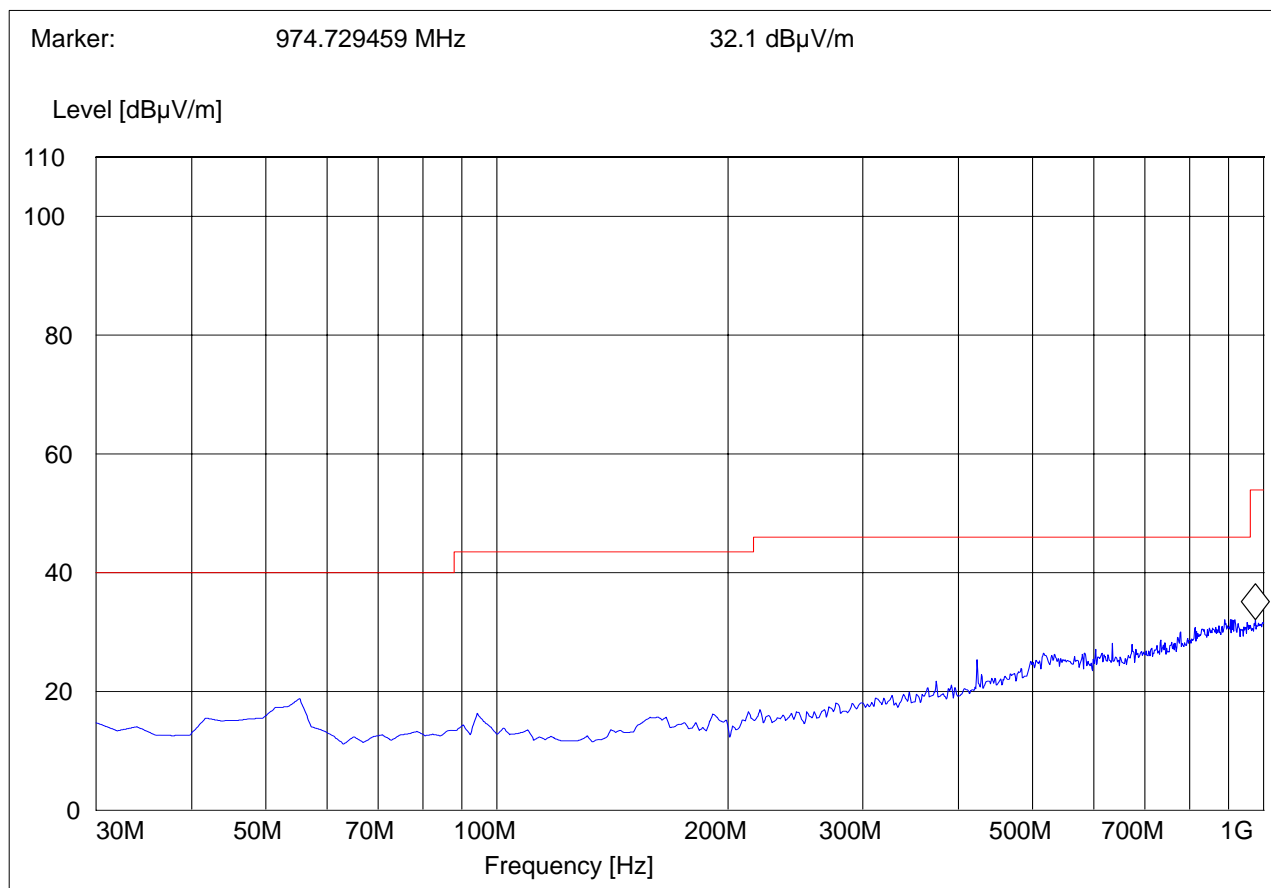
Antenna: vertical

Note: Worse case representation for all channels.

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT GFSK; CH 0
ANT Orientation: V
EUT Orientation: On Cradle
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

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

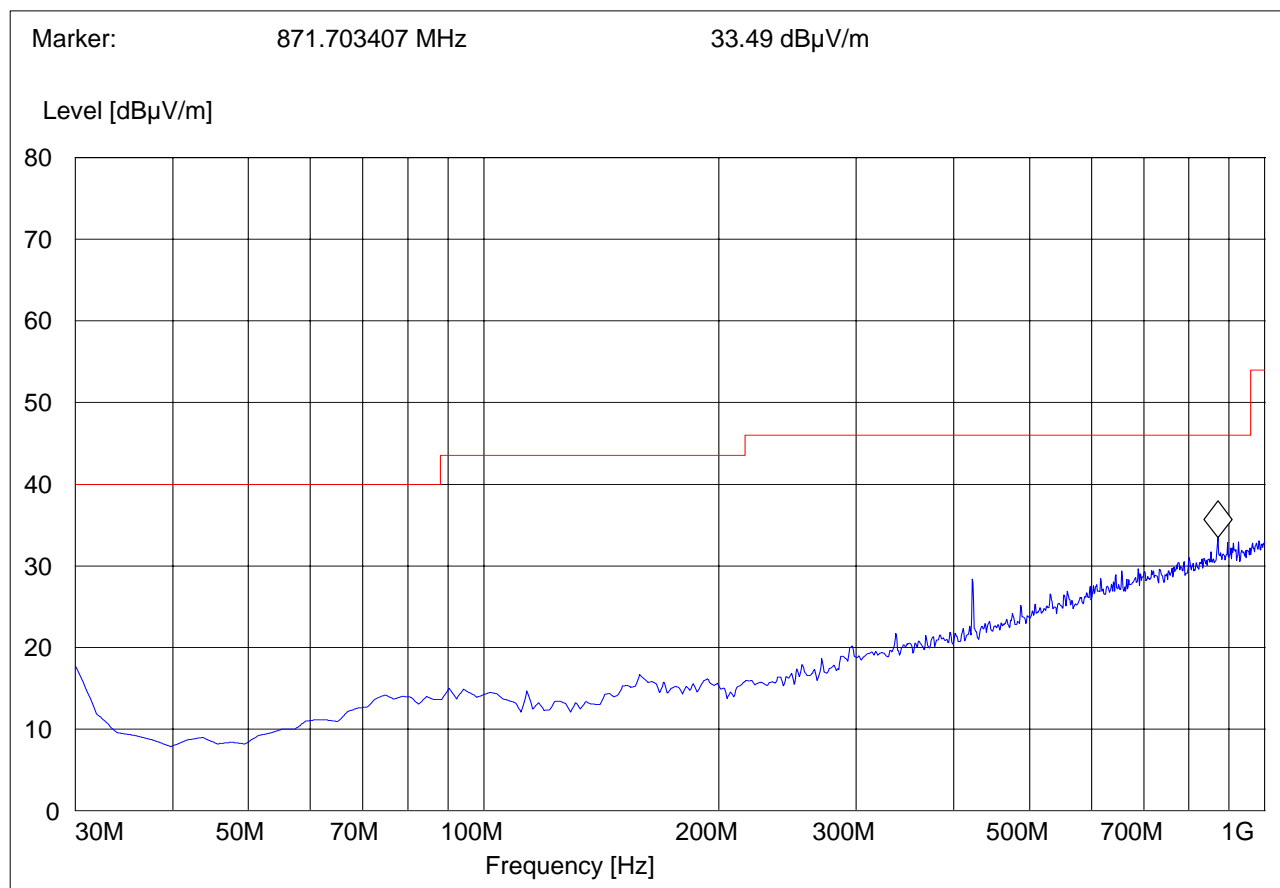
Antenna: horizontal

Note: Worse case representation for all channels.

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH 39
ANT Orientation: H
EUT Orientation: On Cradle
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

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)

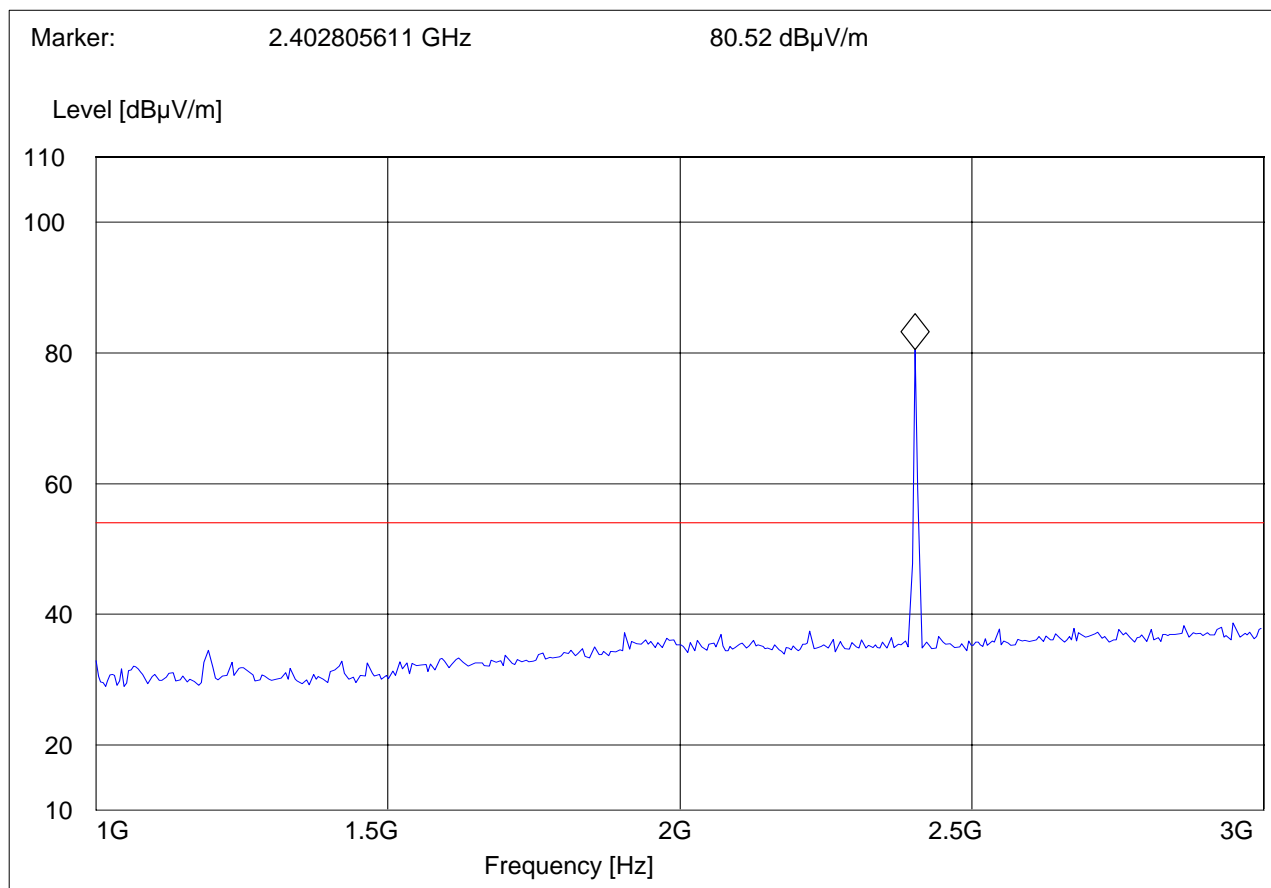
Note: The peak above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT QPSK; CH 0
ANT Orientation: H
EUT Orientation: On Cradle
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

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)

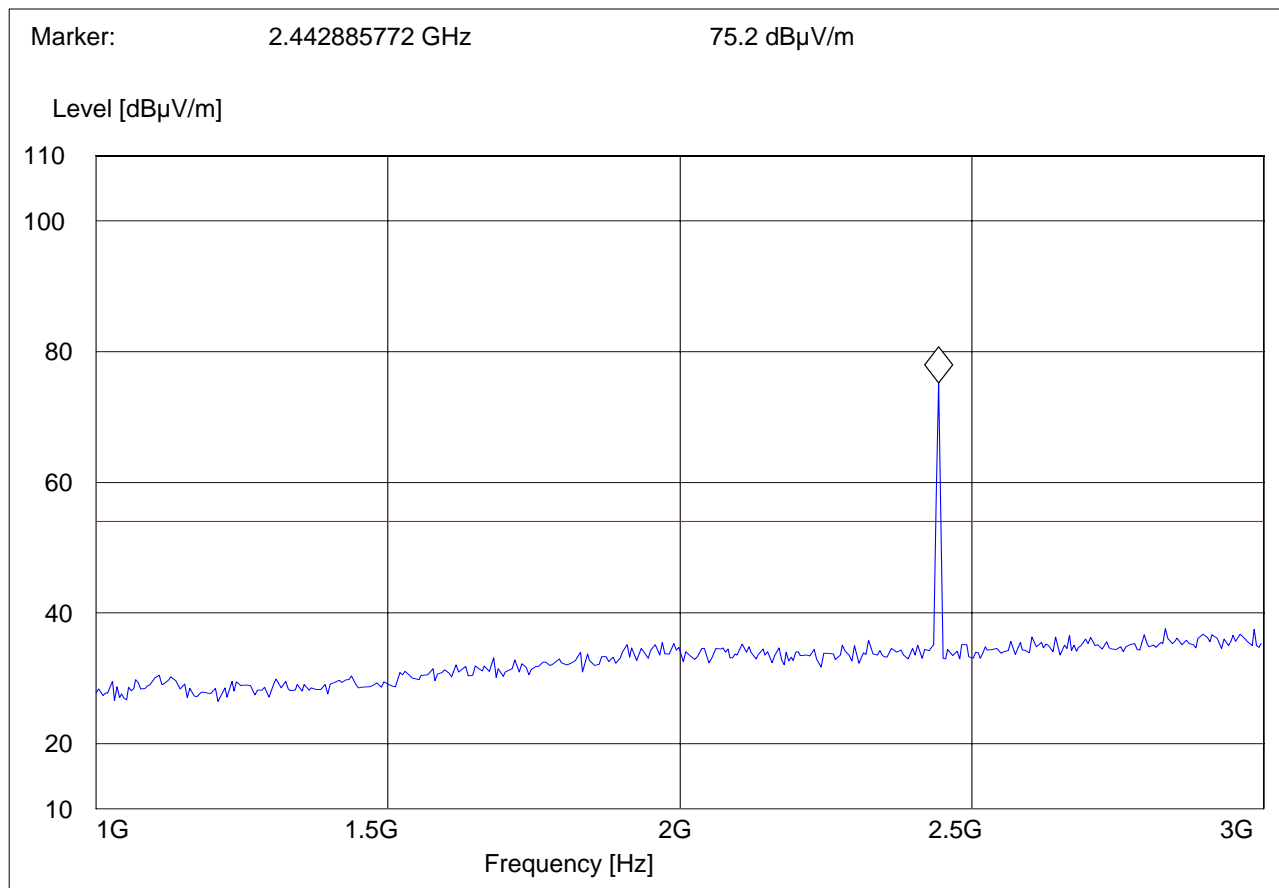
Note: The peaks above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH 39
ANT Orientation: H
EUT Orientation: On Cradle
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

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)

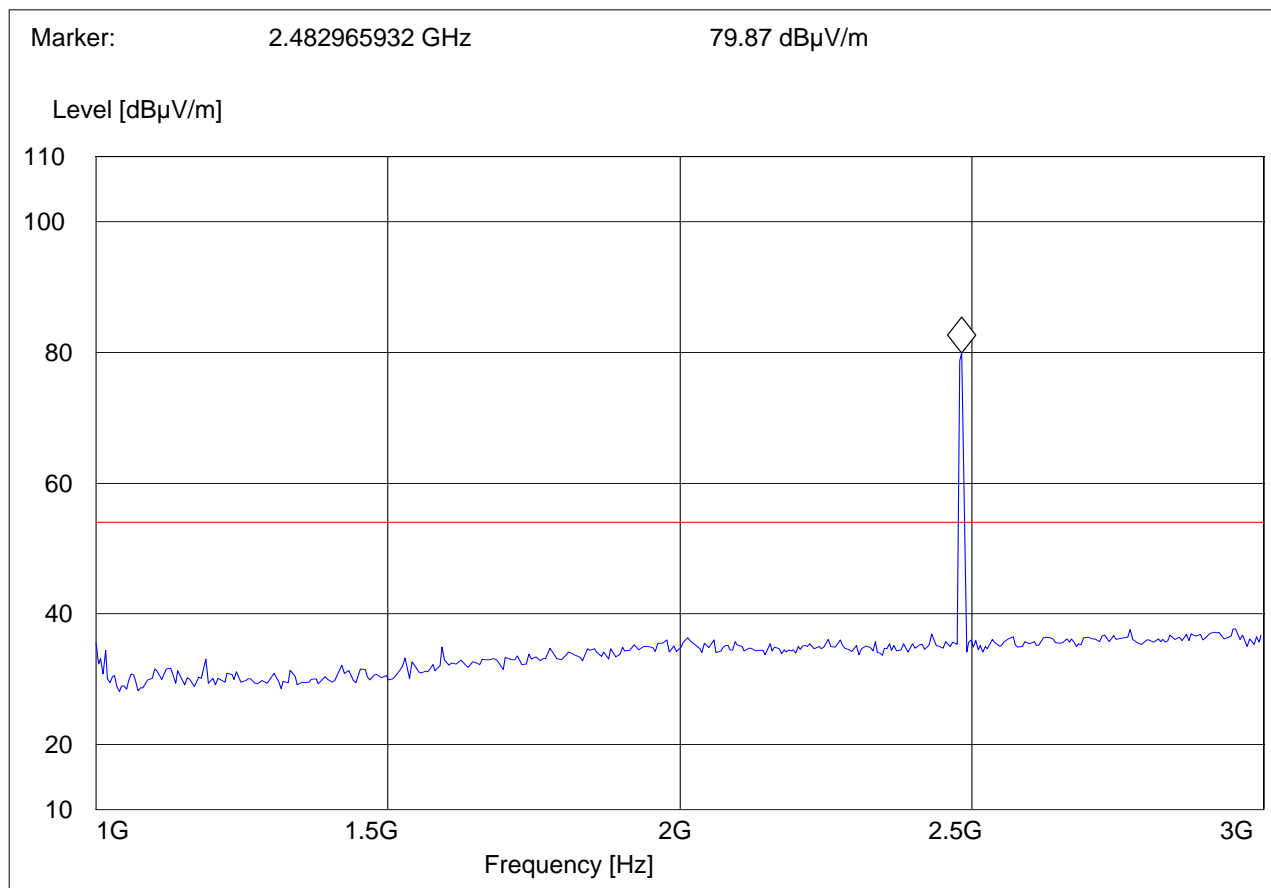
Note: The peaks above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH 78
ANT Orientation: H
EUT Orientation: On Cradle
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

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



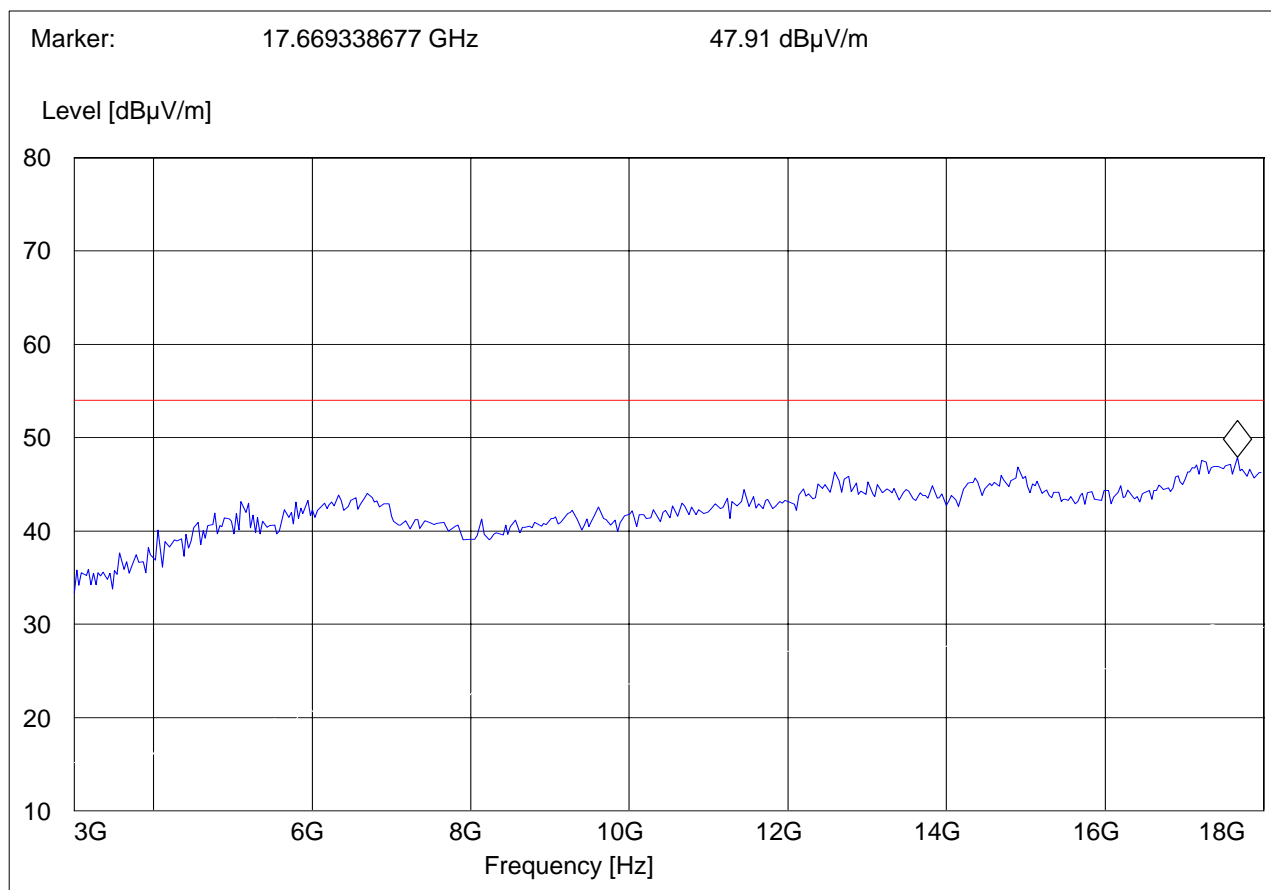
3-18GHz (2402MHz)

Note: Peak Reading vs. Average limit

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH 0
ANT Orientation: H
EUT Orientation: On Cradle
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments: With 2.4 GHz 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



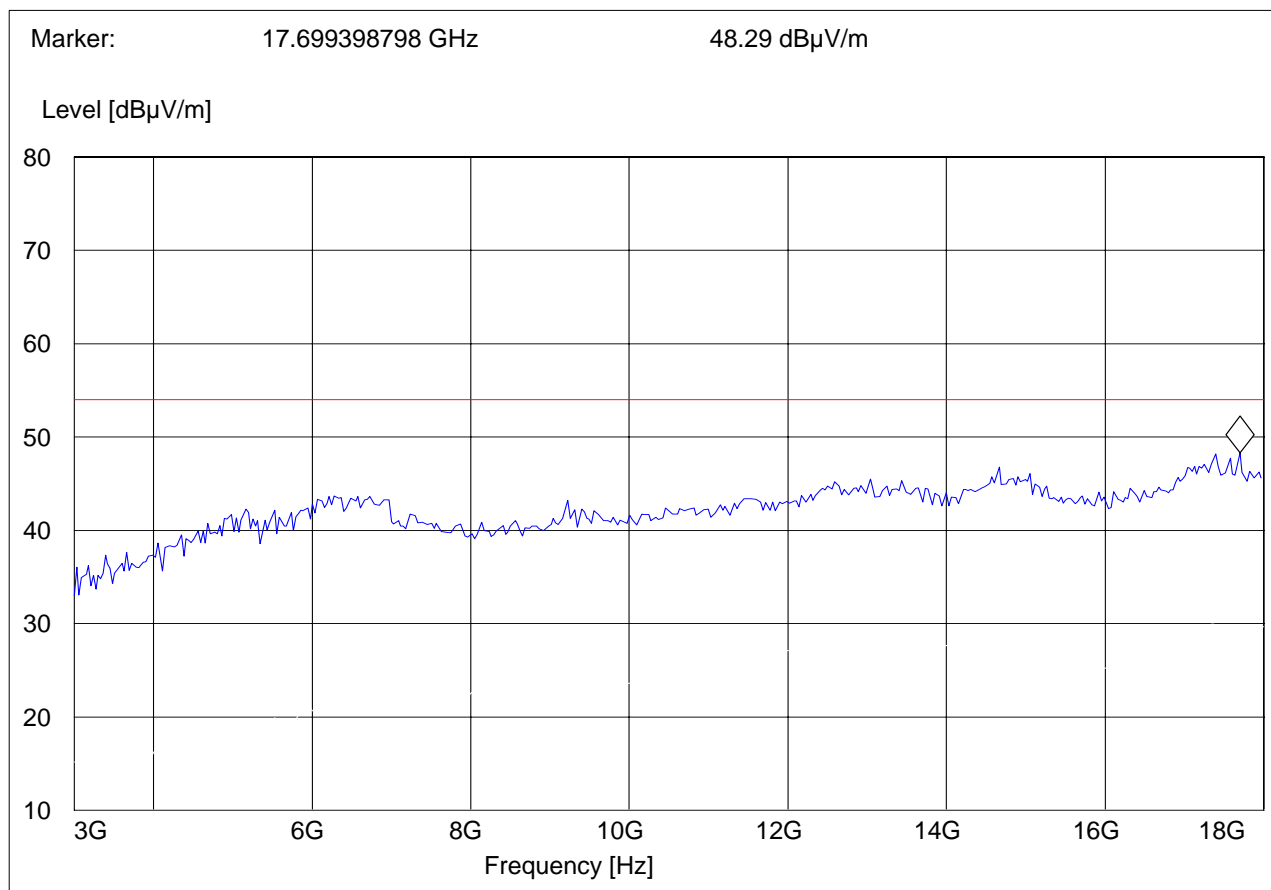
3-18GHz (2441MHz)

Note: Peak Reading vs. Average limit

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH 39
ANT Orientation: H
EUT Orientation: On Cradle
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments: With 2.4 GHz 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



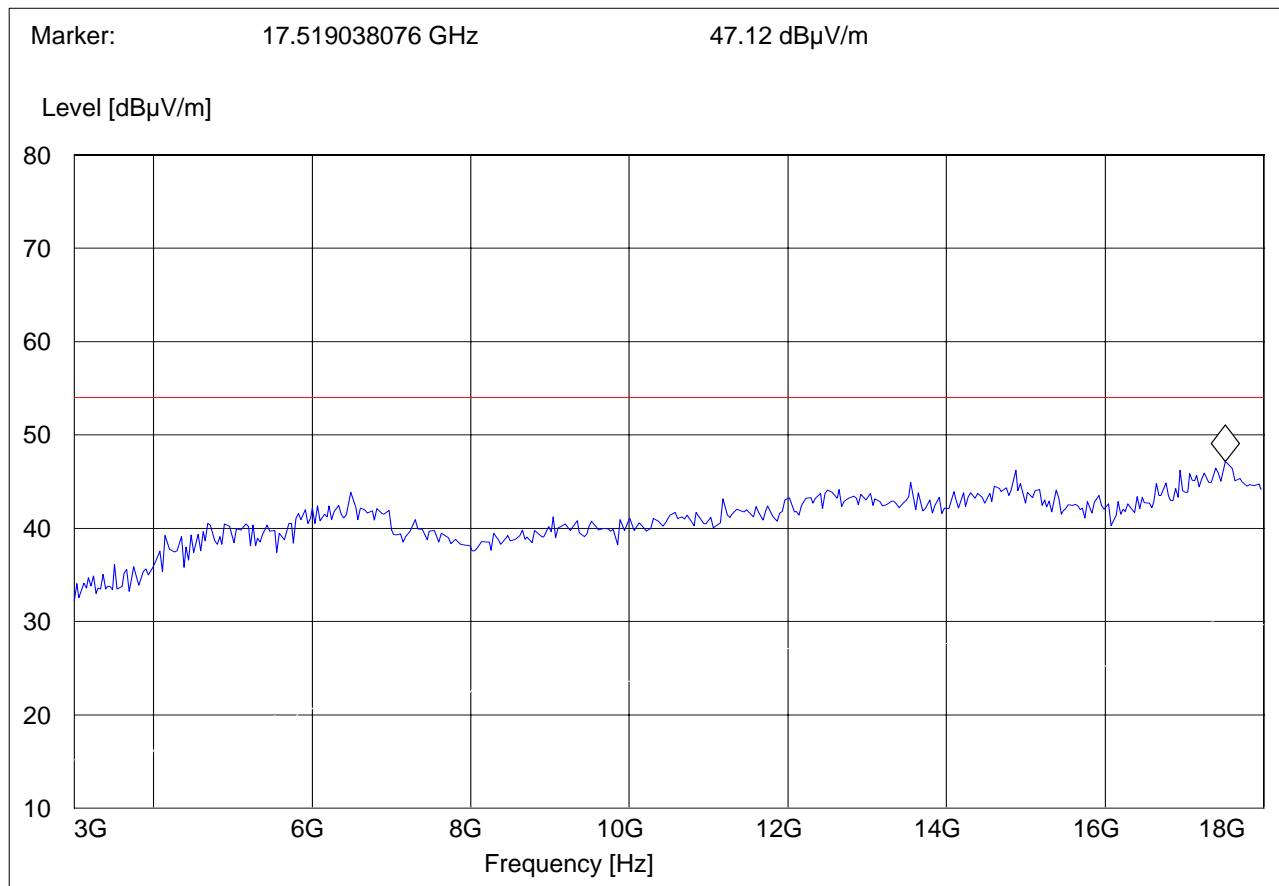
3-18GHz (2480MHz)

Note: Peak Reading vs. Average limit

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH 78
ANT Orientation: H
EUT Orientation: On Cradle
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

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

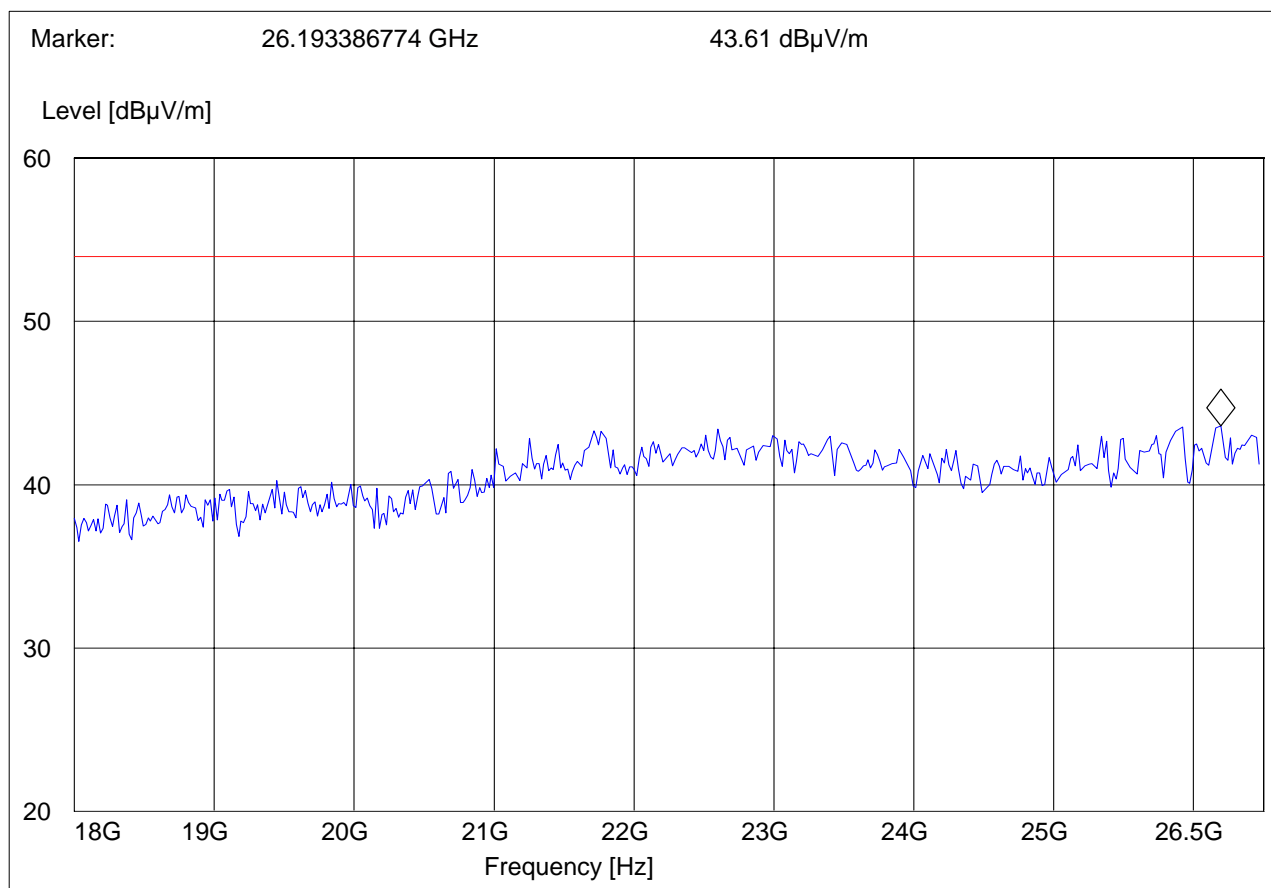
Note: This plot is valid for low, mid, high channels (worst-case plot)

Note: Peak Reading vs. Average limit

EUT: CDMA CA001
Customer:: Casio Hitachi
Test Mode: BT DQPSK; CH 39
ANT Orientation: H
EUT Orientation: On Cradle
Test Engineer: Chris
Voltage: AC + Internal Battery
Comments:

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	26.5 GHz	MaxPeak 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: $\pi / 4$ DQPSK

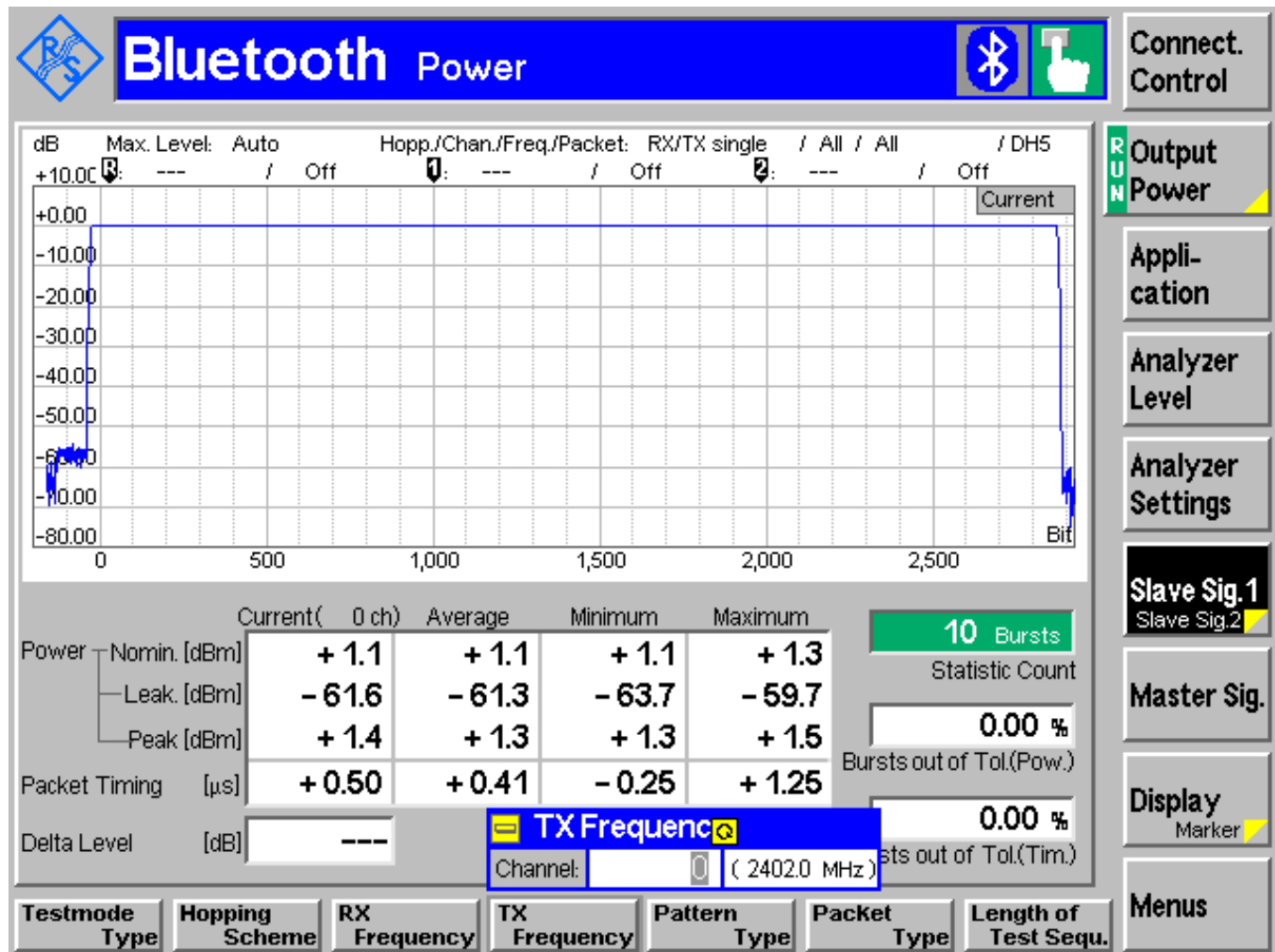
TEST CONDITIONS		Conducted Peak Power (dBm)		
Frequency (MHz)		2402	2441	2480
T _{nom} (23)°C	V _{nom} VDC	2.8	2.4	2.0
Measurement uncertainty		±0.5dBm		

Conducted Peak Power: 8DPSK

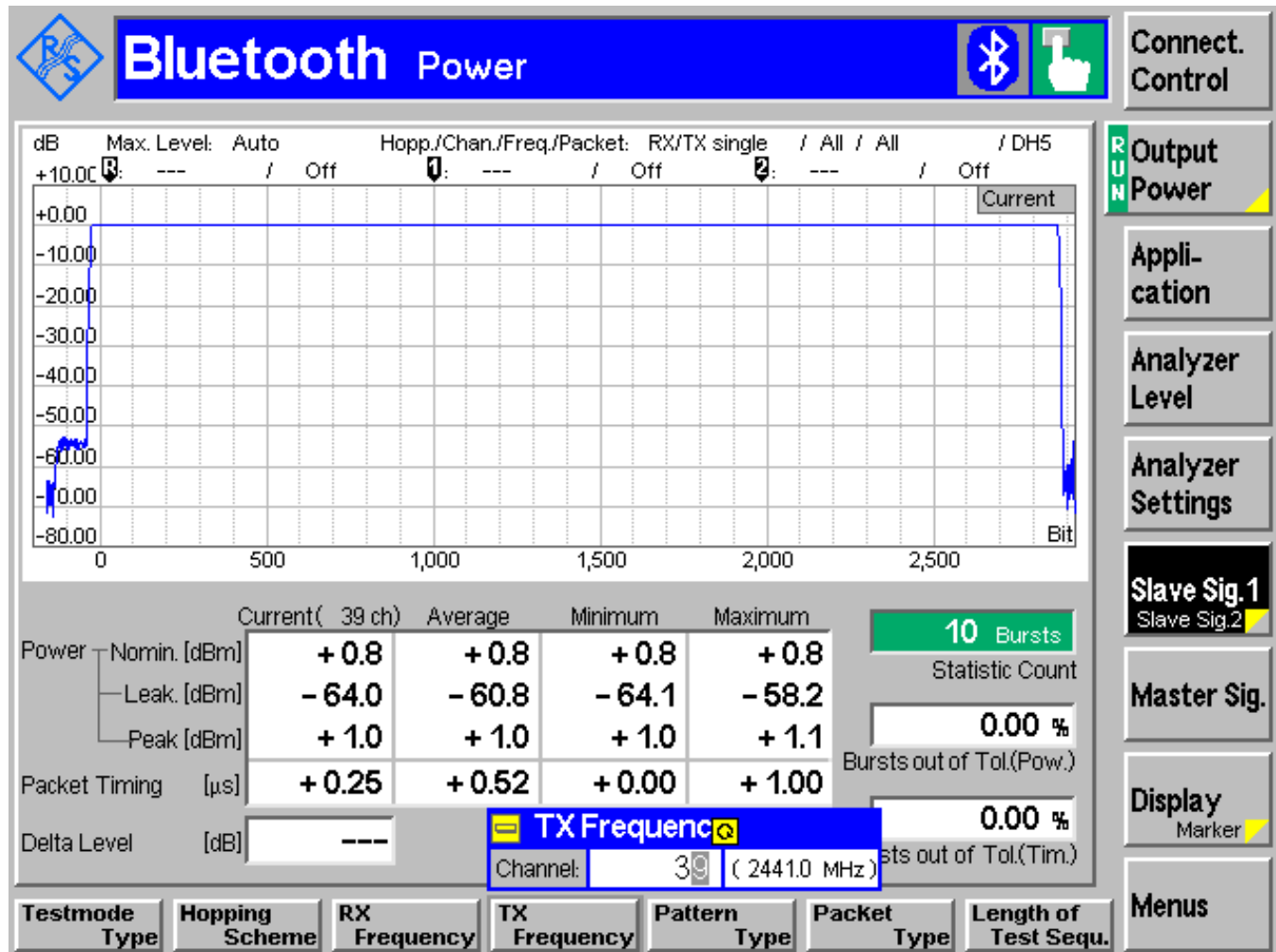
TEST CONDITIONS		Conducted Peak Power (dBm)		
Frequency (MHz)		2402	2441	2480
T _{nom} (23)°C	V _{nom} VDC	2.9	2.4	2.0
Measurement uncertainty		±0.5dBm		

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

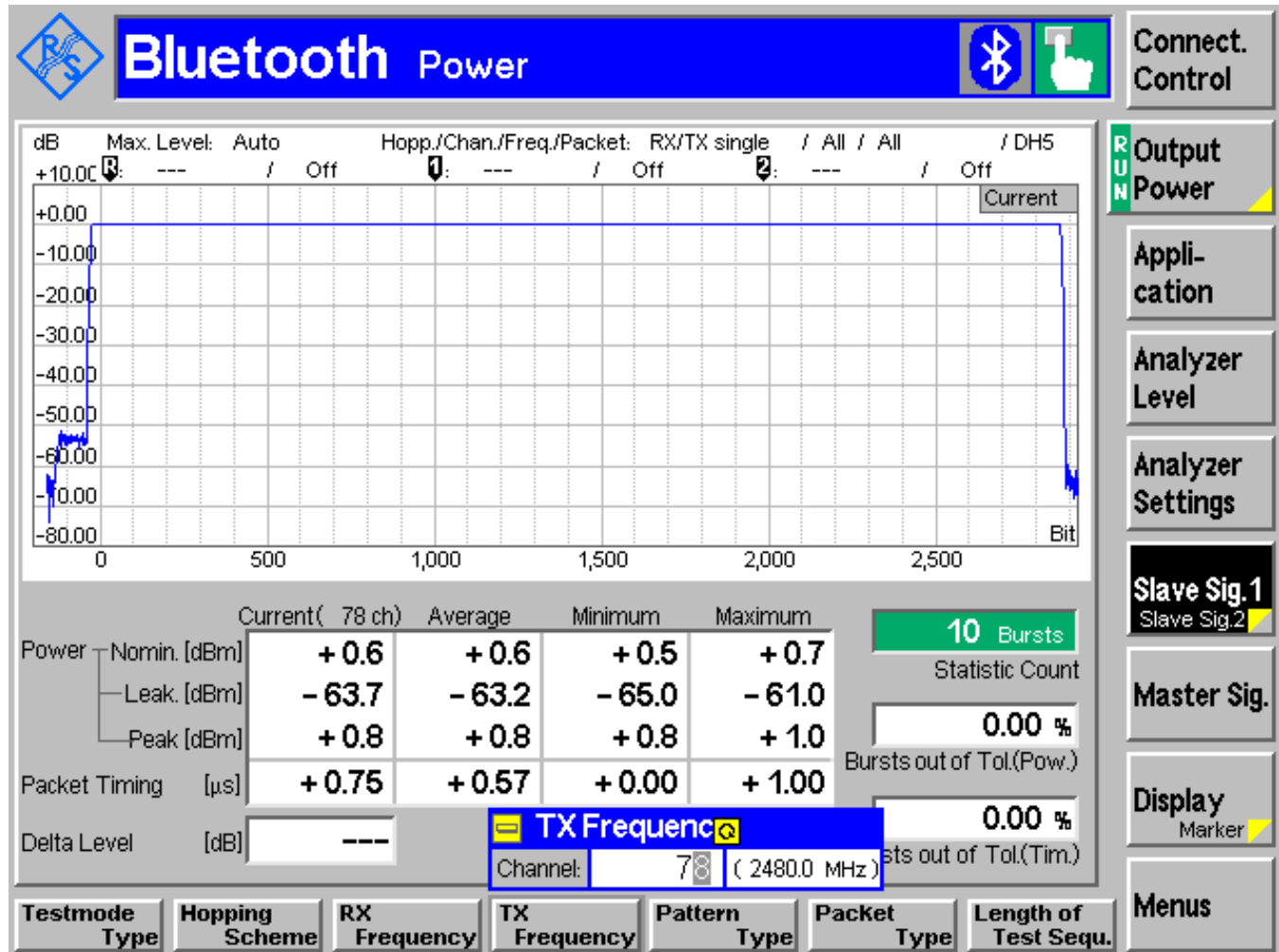
Conducted Peak Power GFSK 2402 MHz



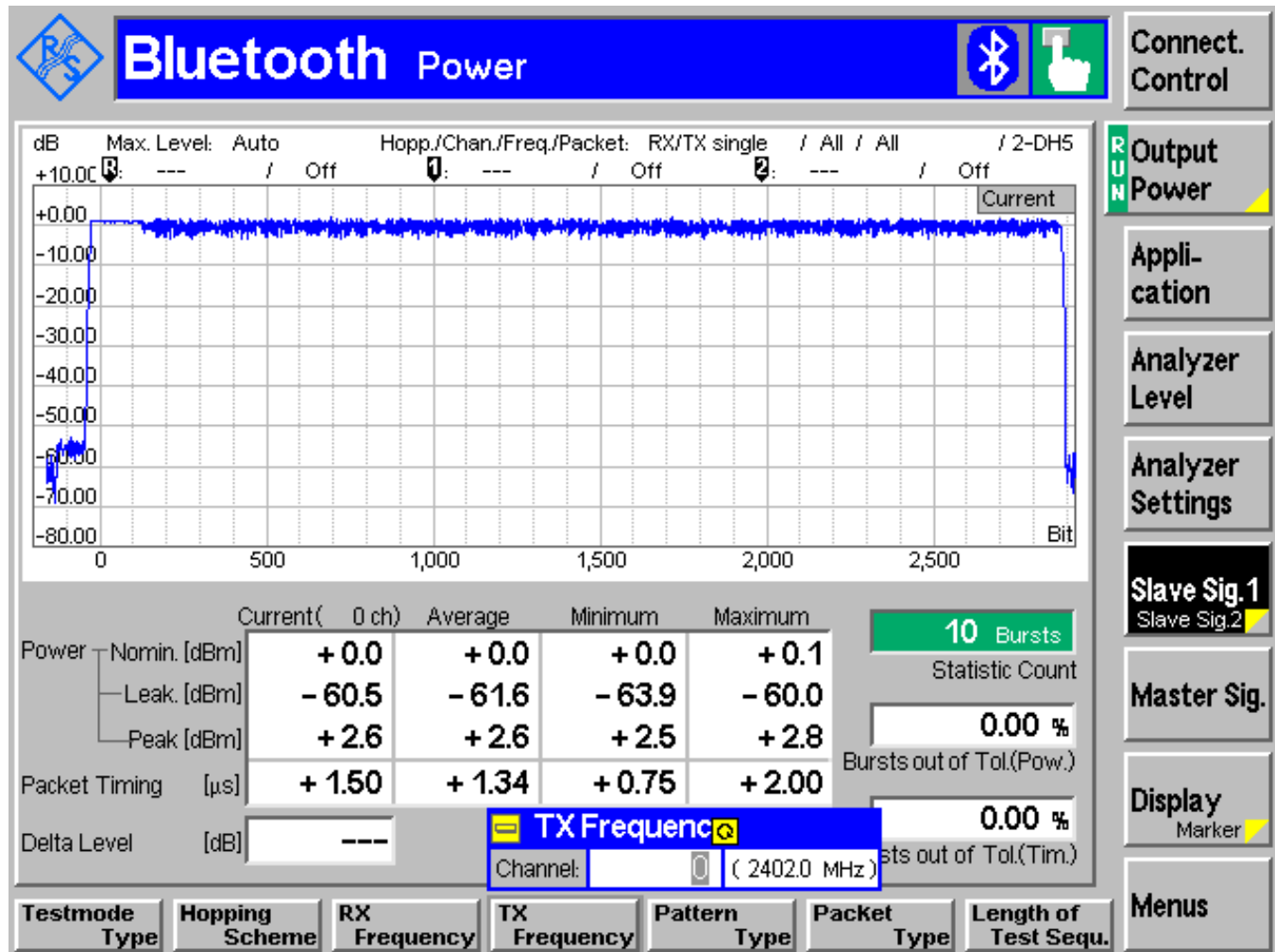
Conducted Peak Power GFSK 2441 MHz



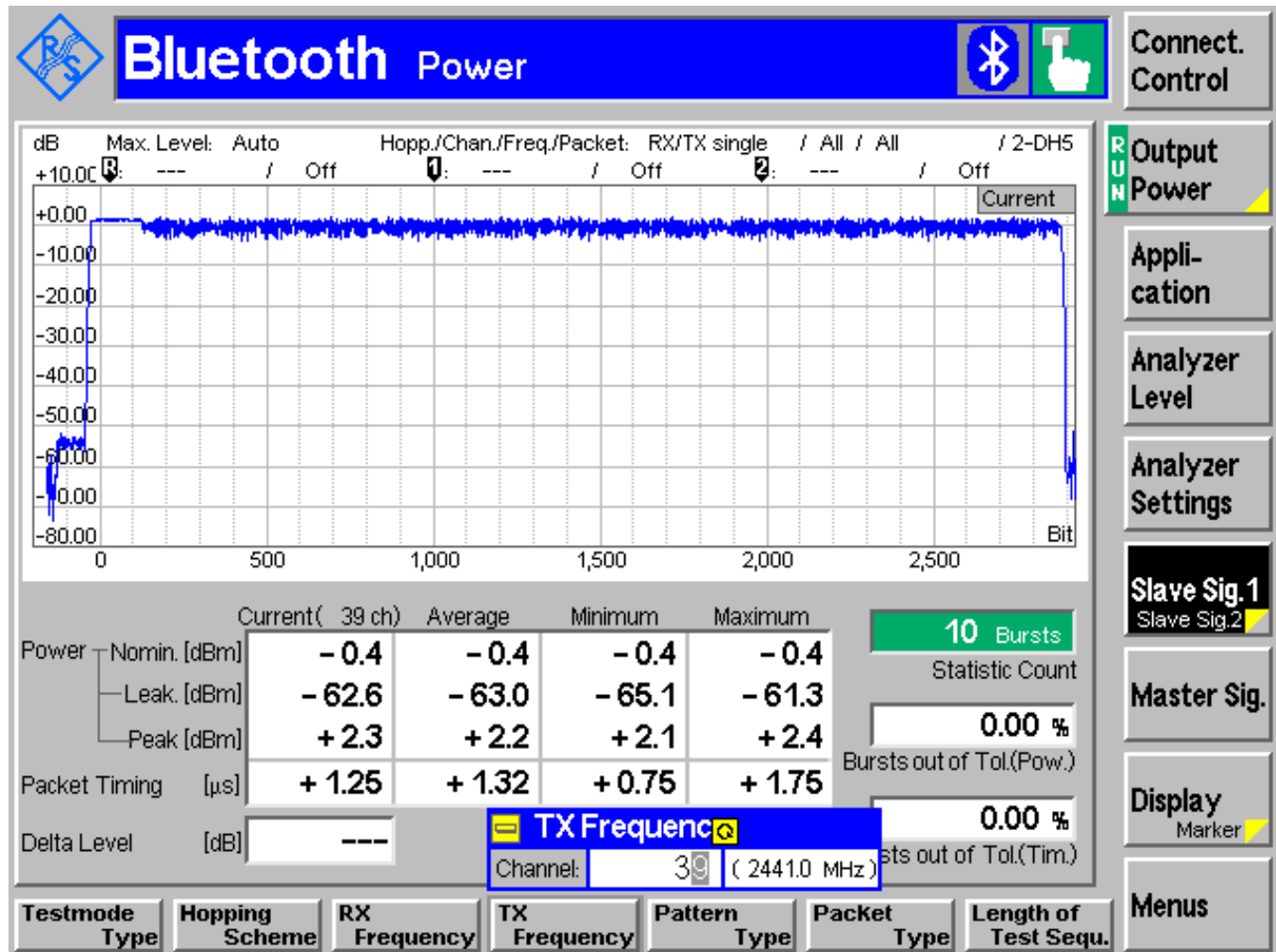
Conducted Peak Power GFSK 2480 MHz



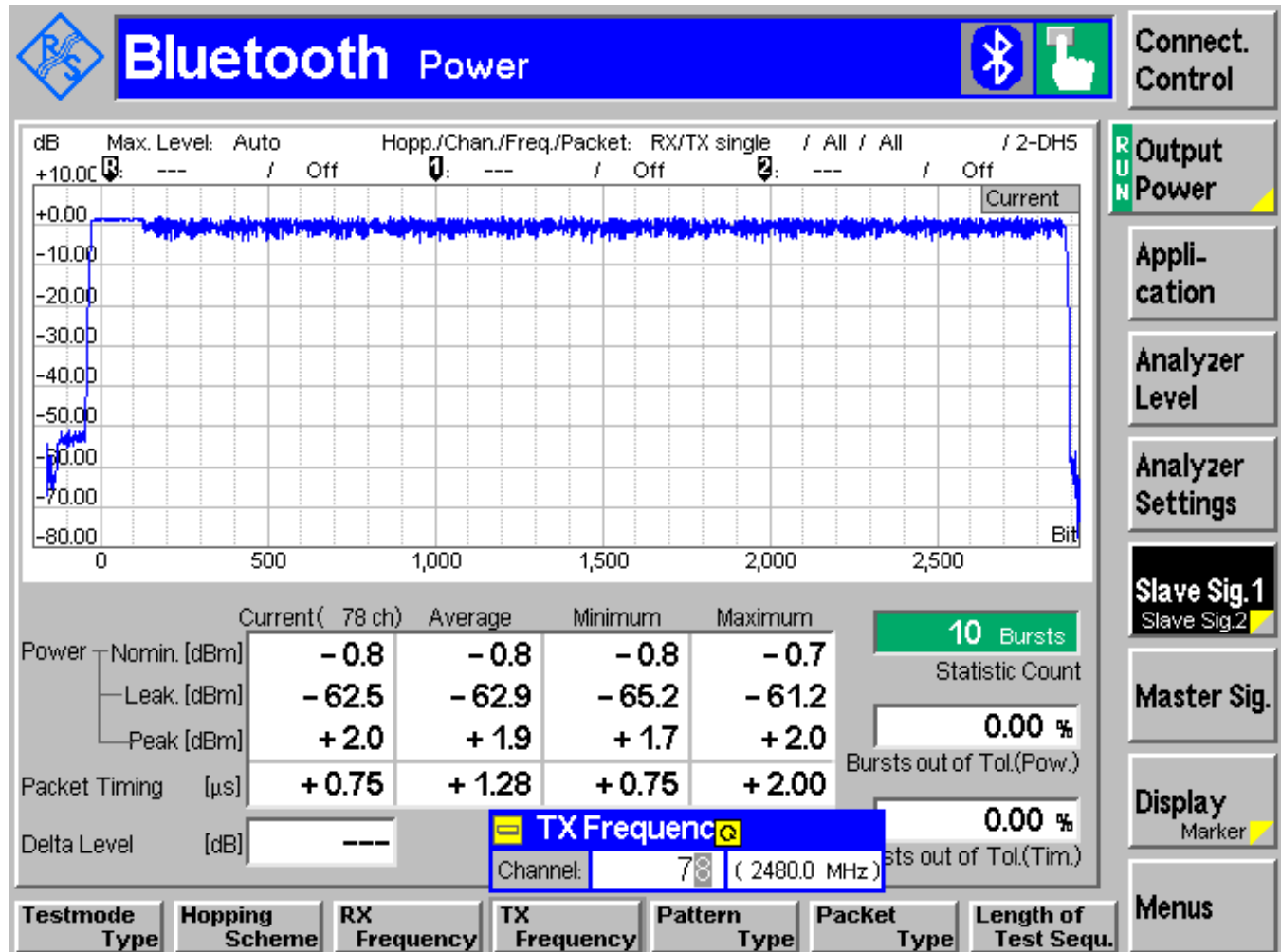
Conducted Peak Power π / 4 DQPSK 2402 MHz



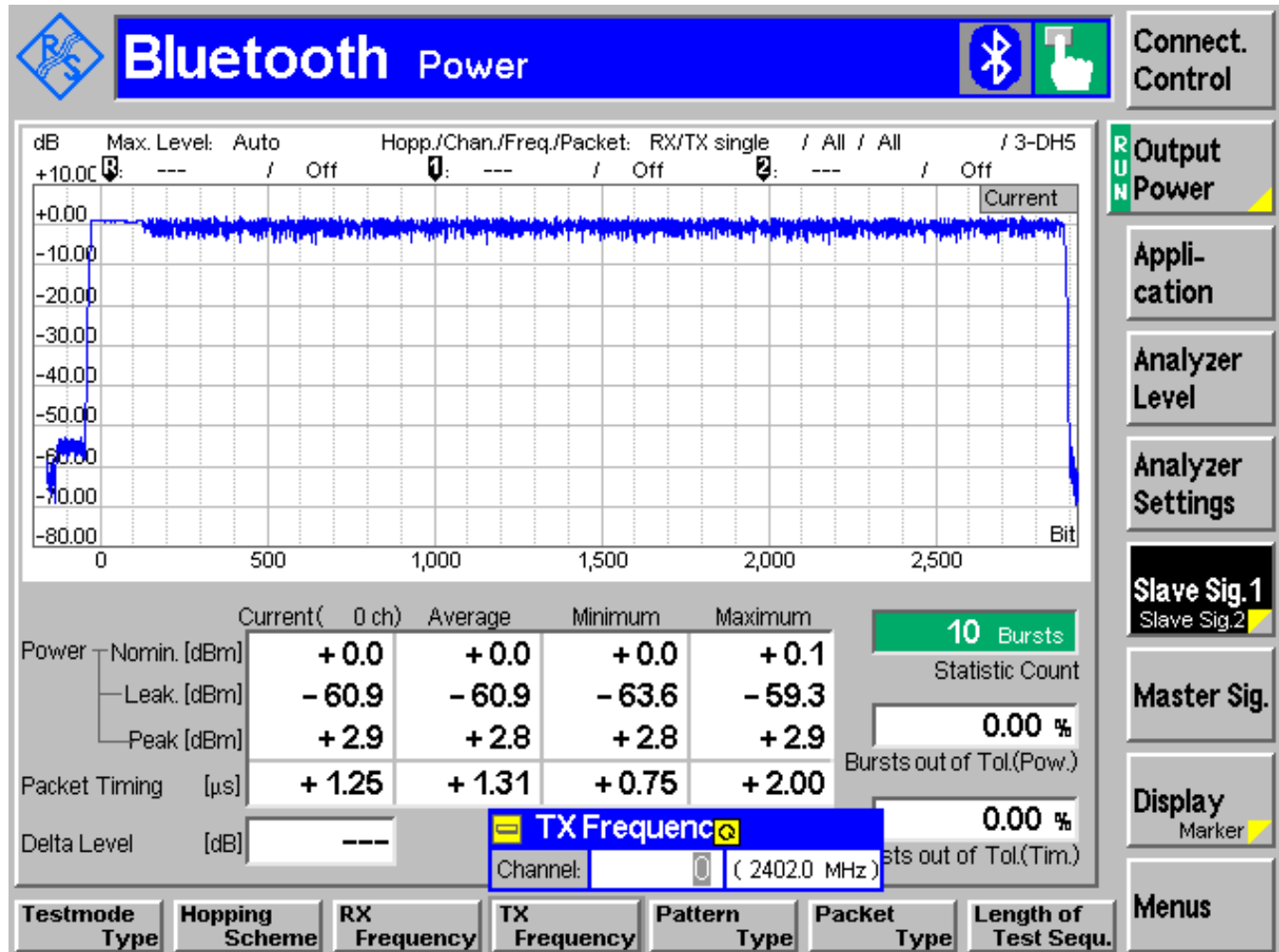
Conducted Peak Power π / 4 DQPSK 2441 MHz



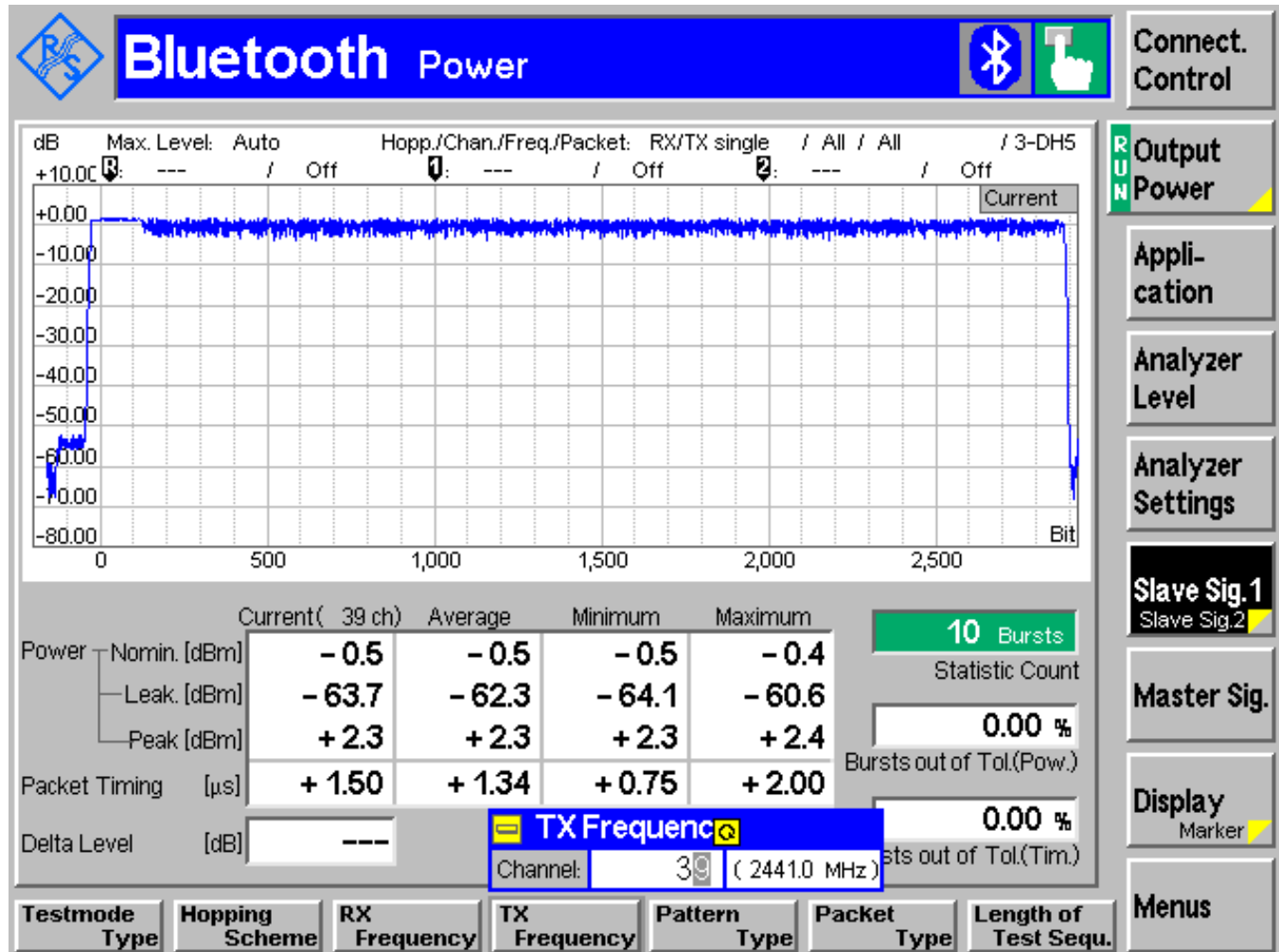
Conducted Peak Power π / 4 DQPSK 2480 MHz



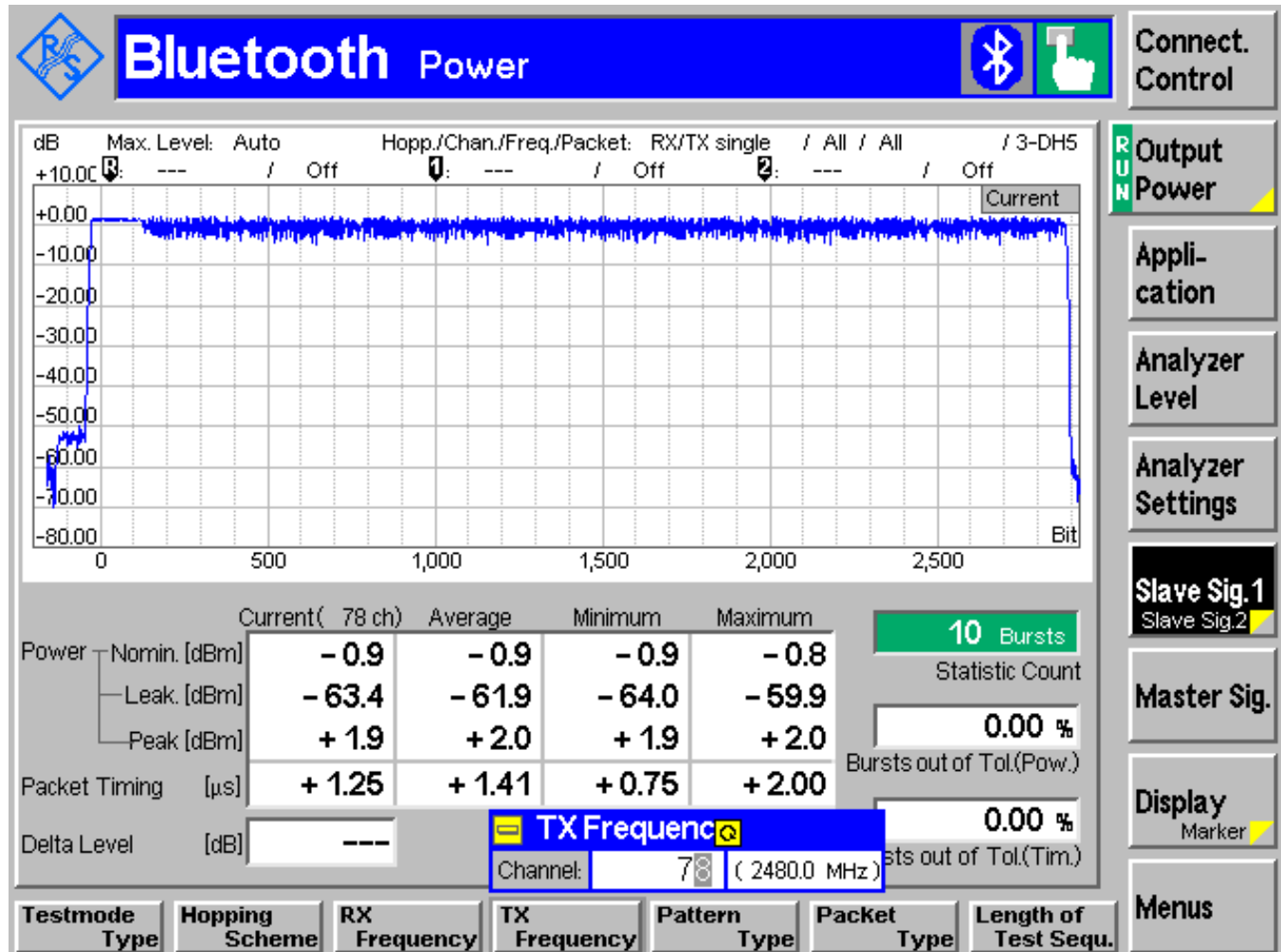
Conducted Peak Power 8DPSK 2402 MHz



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

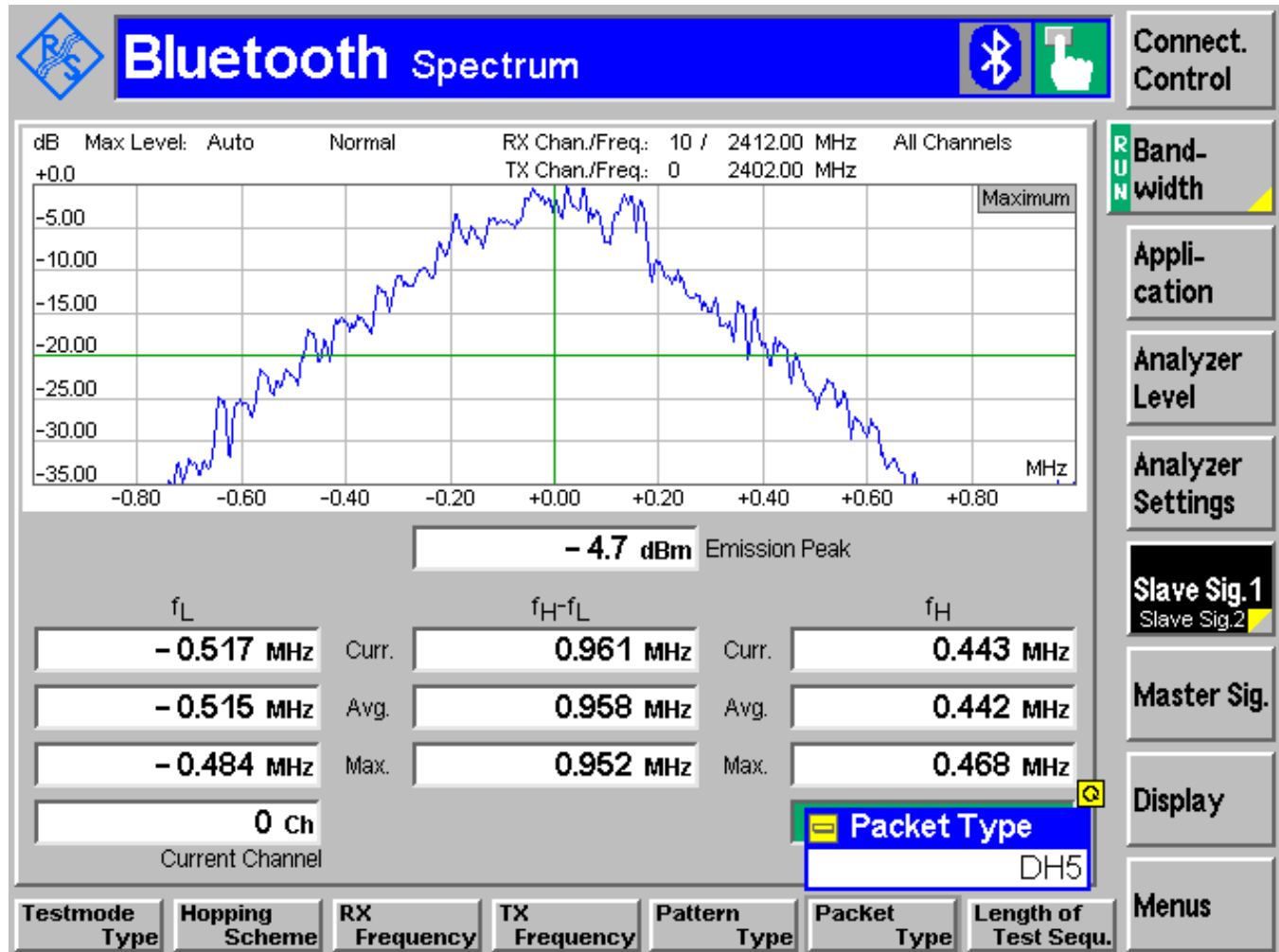
20dB Bandwidth: $\pi / 4$ DQPSK

TEST CONDITIONS		20dB Bandwidth (MHz)		
Frequency (MHz)		2402	2441	2480
T _{nom} (23)°C	V _{nom} VDC	1.341	1.310	1.342

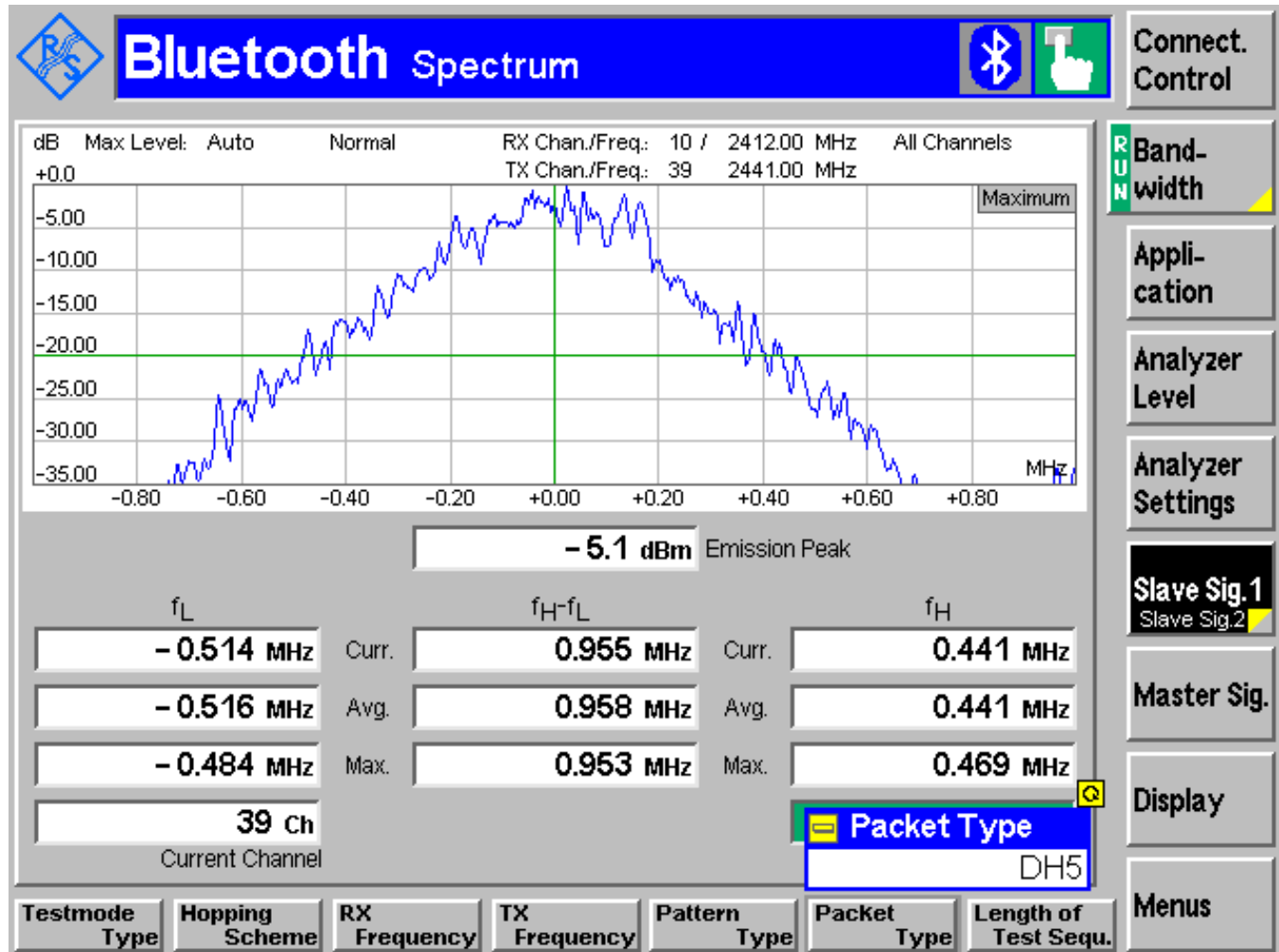
20dB Bandwidth: 8DPSK

TEST CONDITIONS		20dB Bandwidth (MHz)		
Frequency (MHz)		2402	2441	2480
T _{nom} (23)°C	V _{nom} VDC	1..311	1.309	1.310

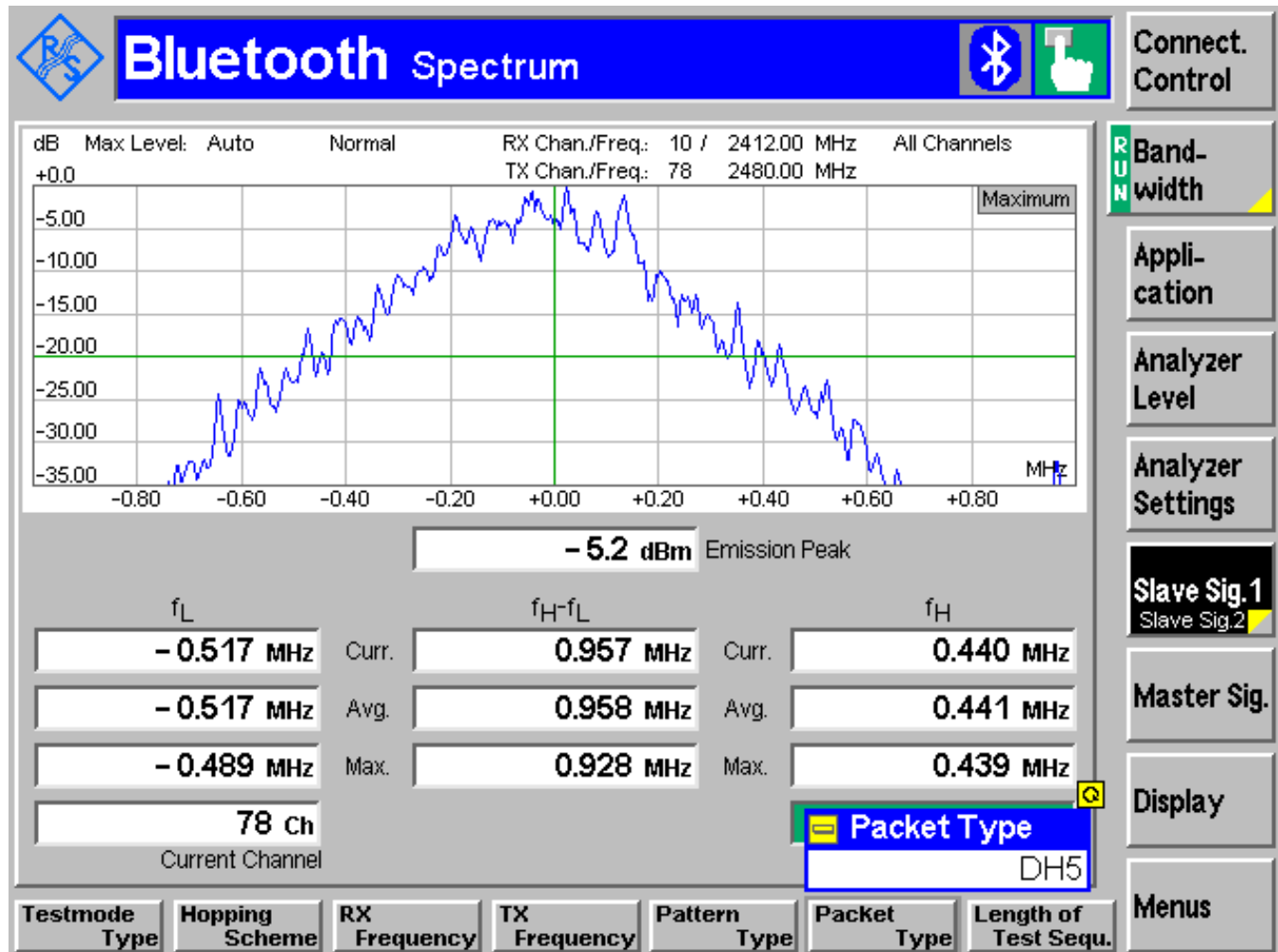
20dB Bandwidth GFSK 2402MHz



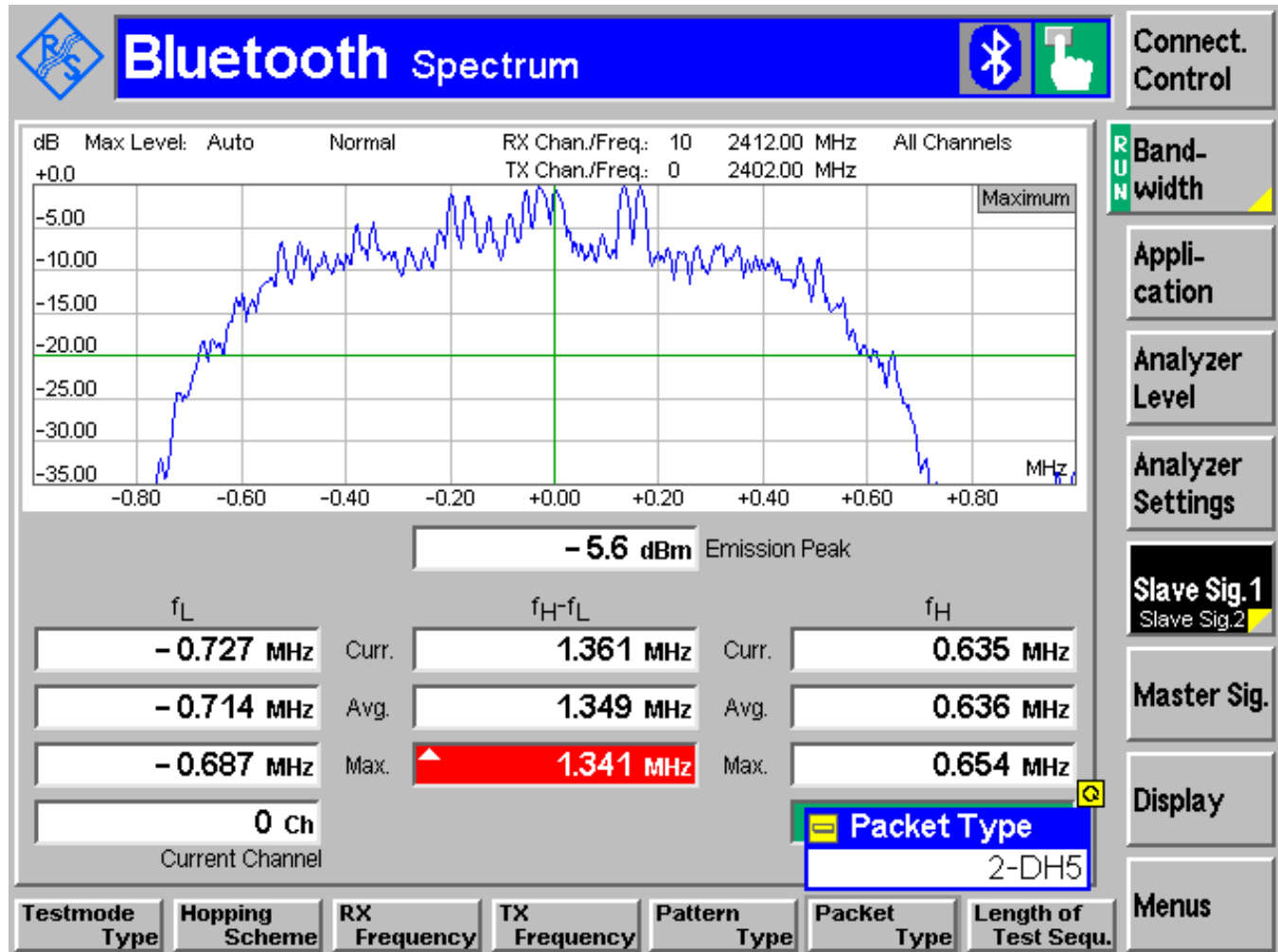
20dB Bandwidth GFSK 2441MHz



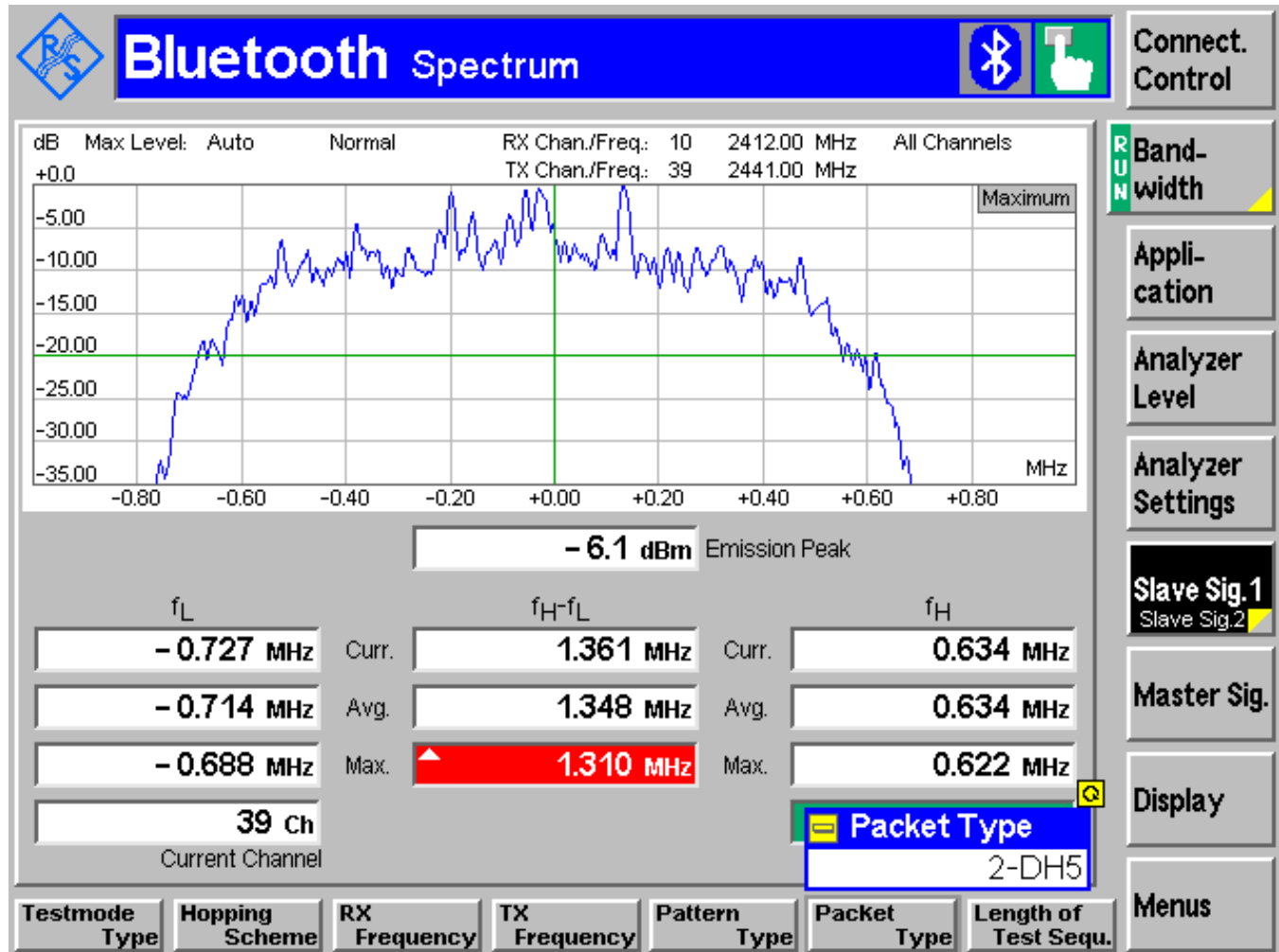
20dB Bandwidth GFSK 2480MHz



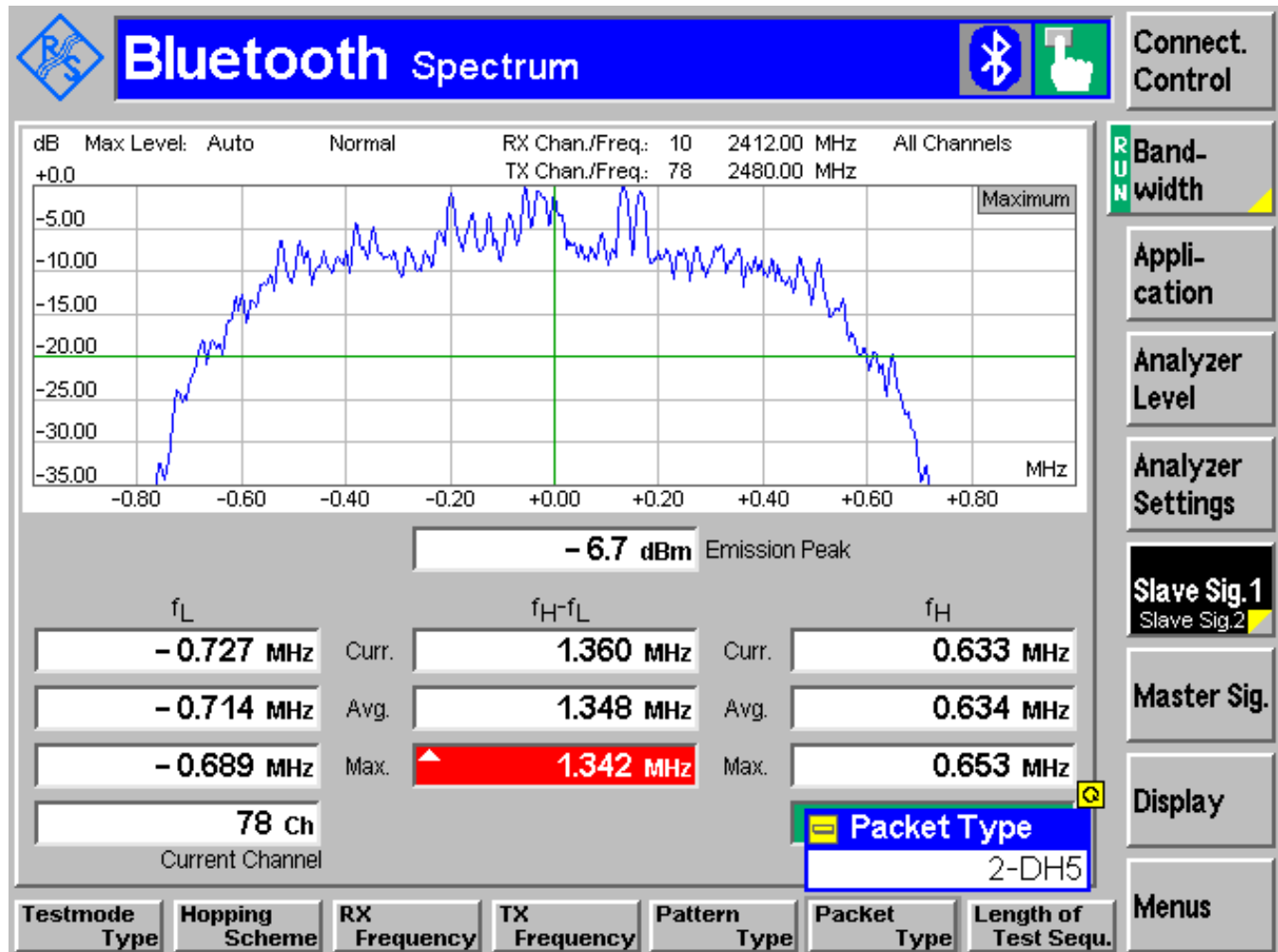
20dB Bandwidth π / 4 DQPSK 2402MHz



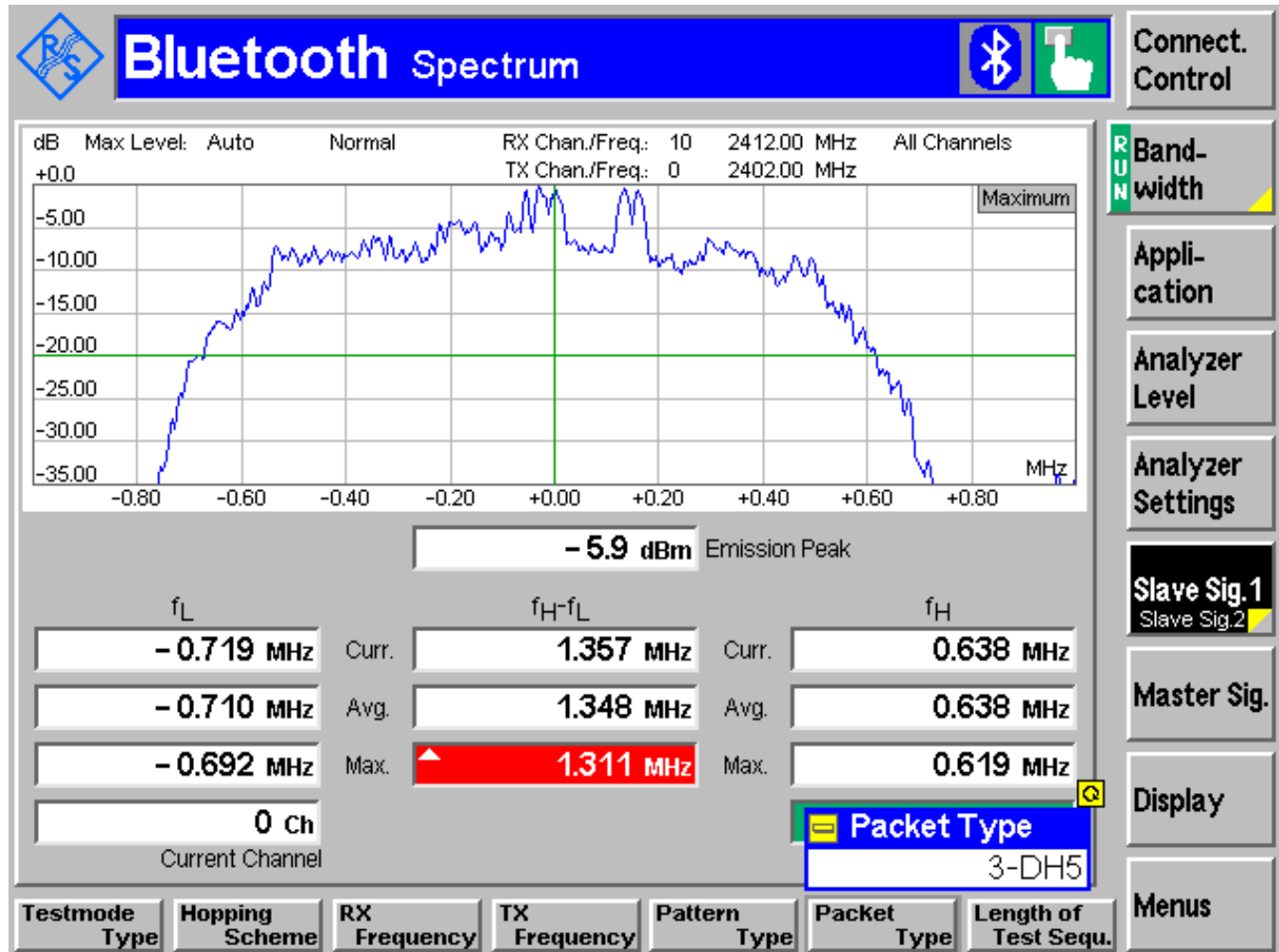
20dB Bandwidth π / 4 DQPSK 2441MHz



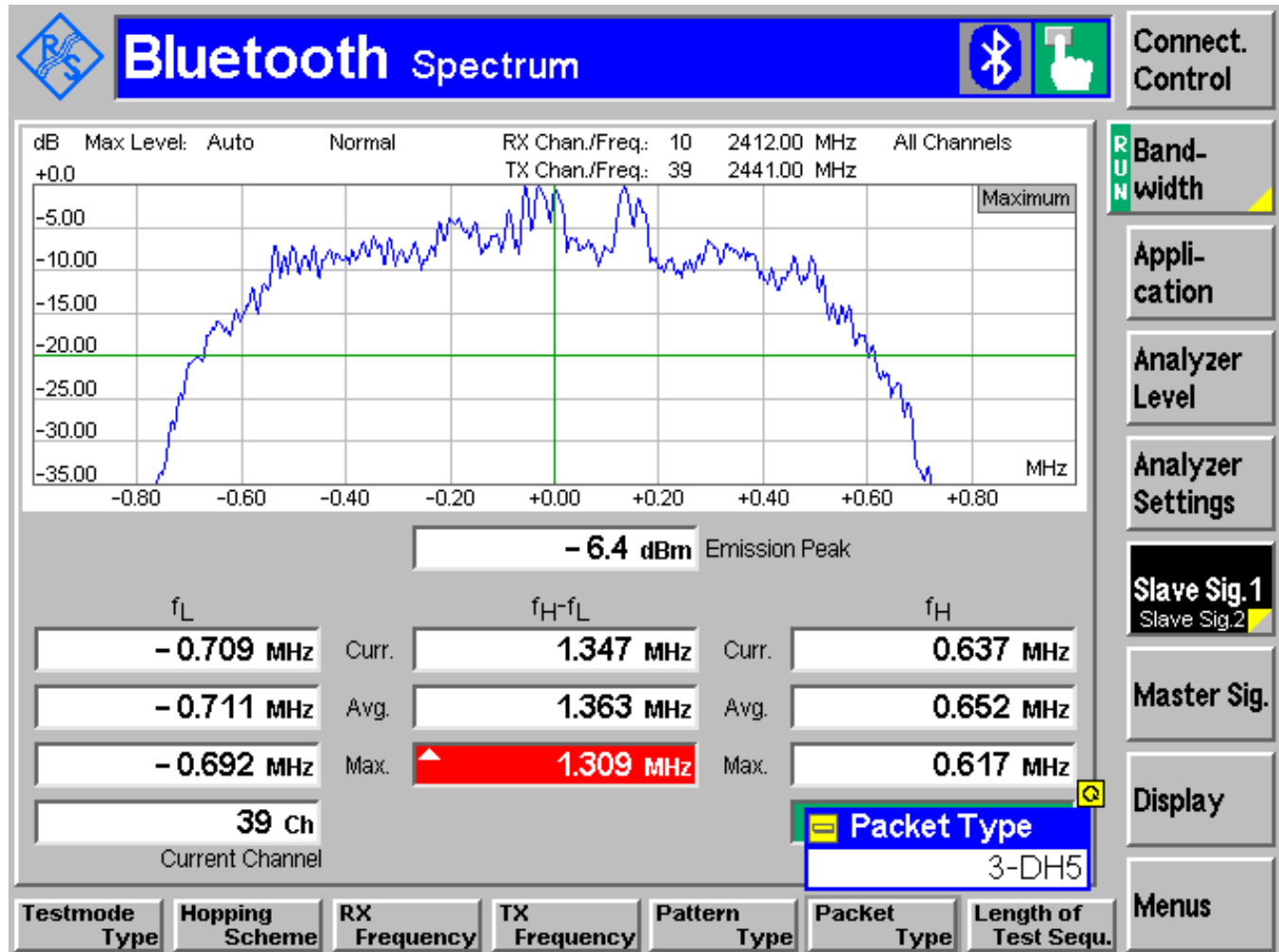
20dB Bandwidth π / 4 DQPSK 2480MHz



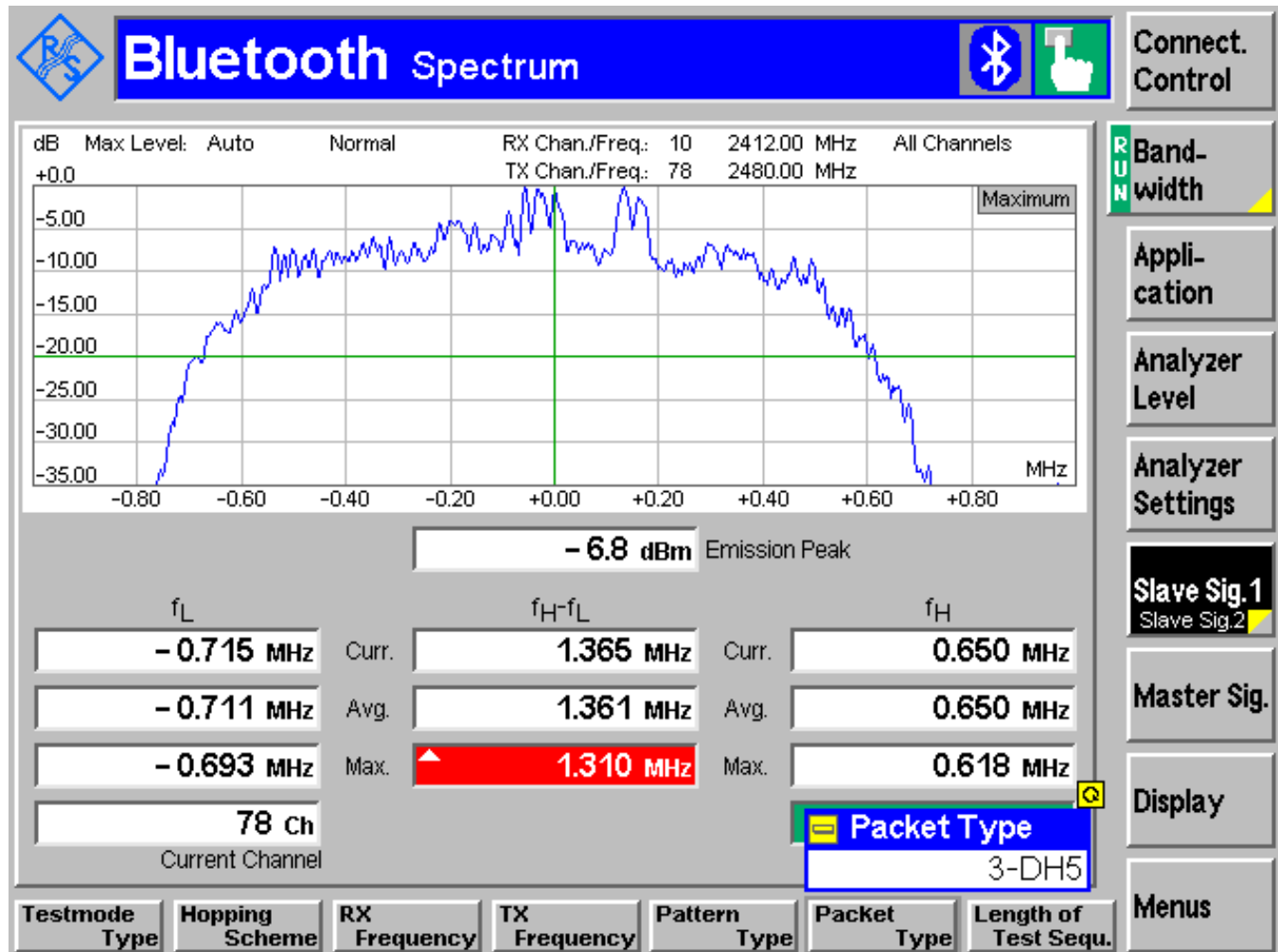
20dB Bandwidth 8PSK 2402MHz



20dB Bandwidth 8PSK 2441MHz



20dB Bandwidth 8PSK 2480MHz

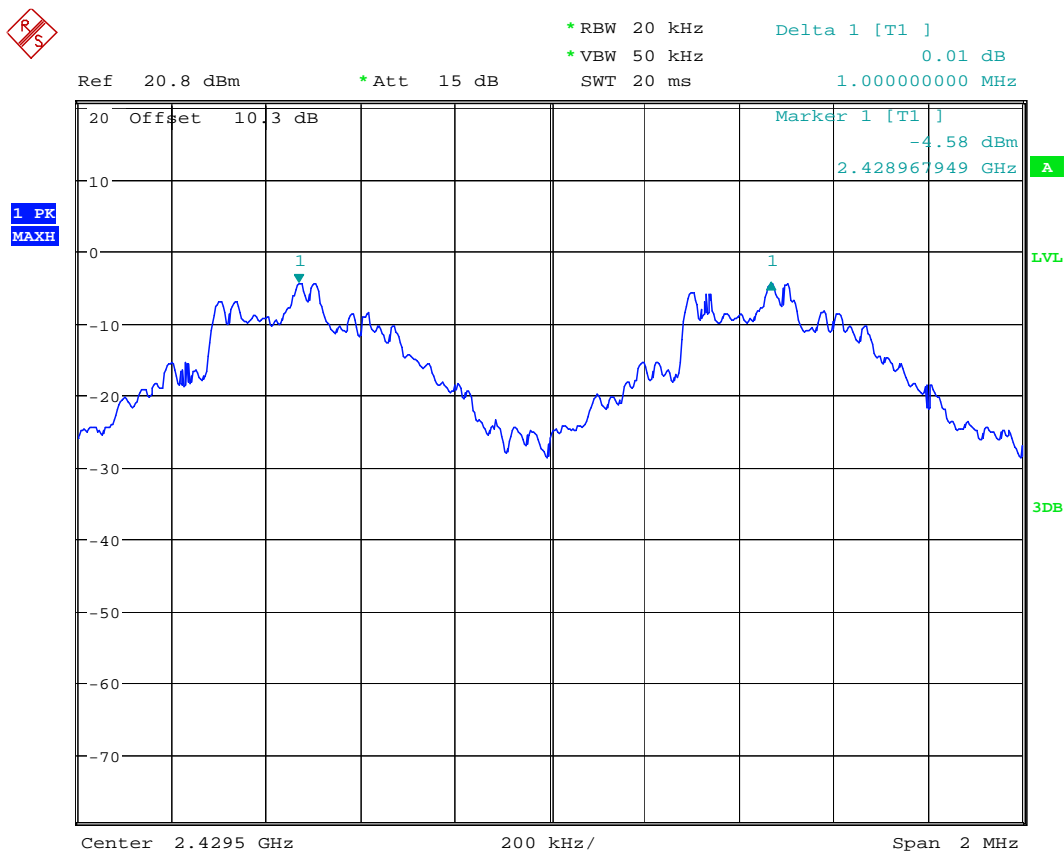


6.3 CARRIER FREQUENCY SEPARATION

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



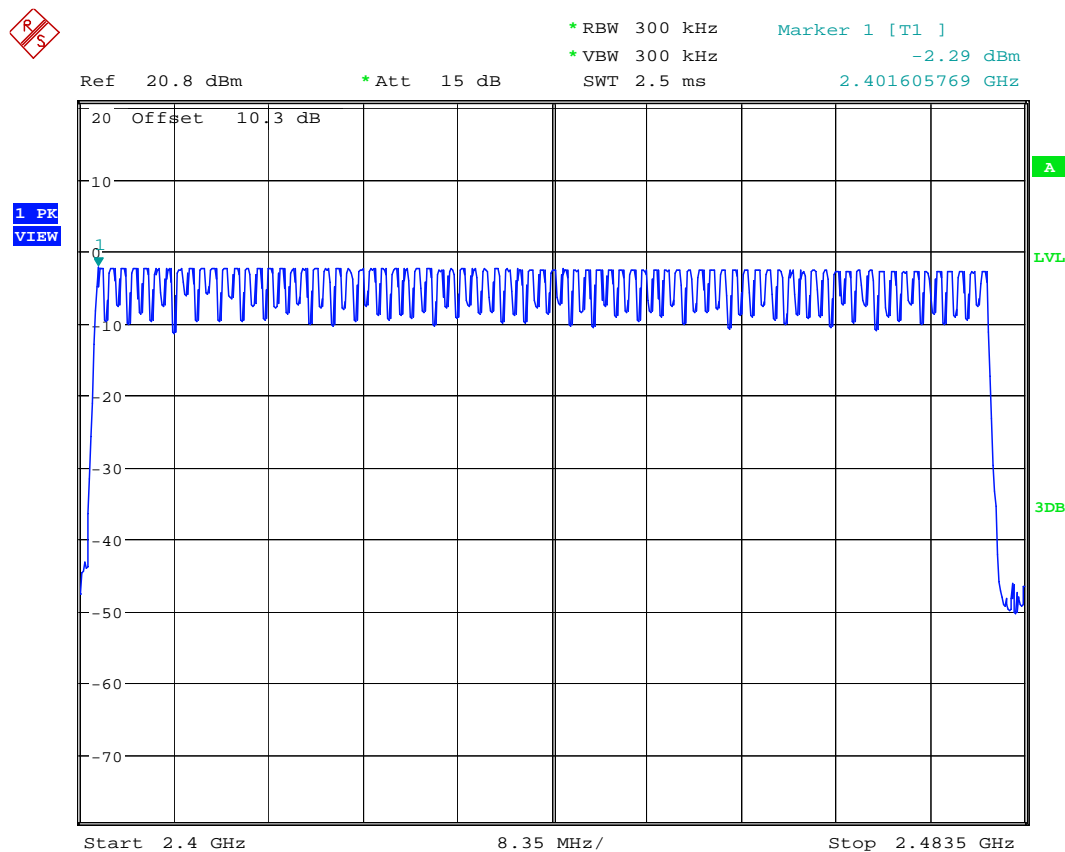
Date: 7.OCT.2008 15:44:53

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 as 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 = $625 \mu\text{s} * 1600 \text{ 1/s} / 79 * 31.6 \text{ s} = 0.4 \text{ s}$ (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 = $5 * 625 \mu\text{s} * 1600 * 1/5 * 1/s / 79 * 31.6 \text{ s} = 0.4 \text{ s}$ (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)

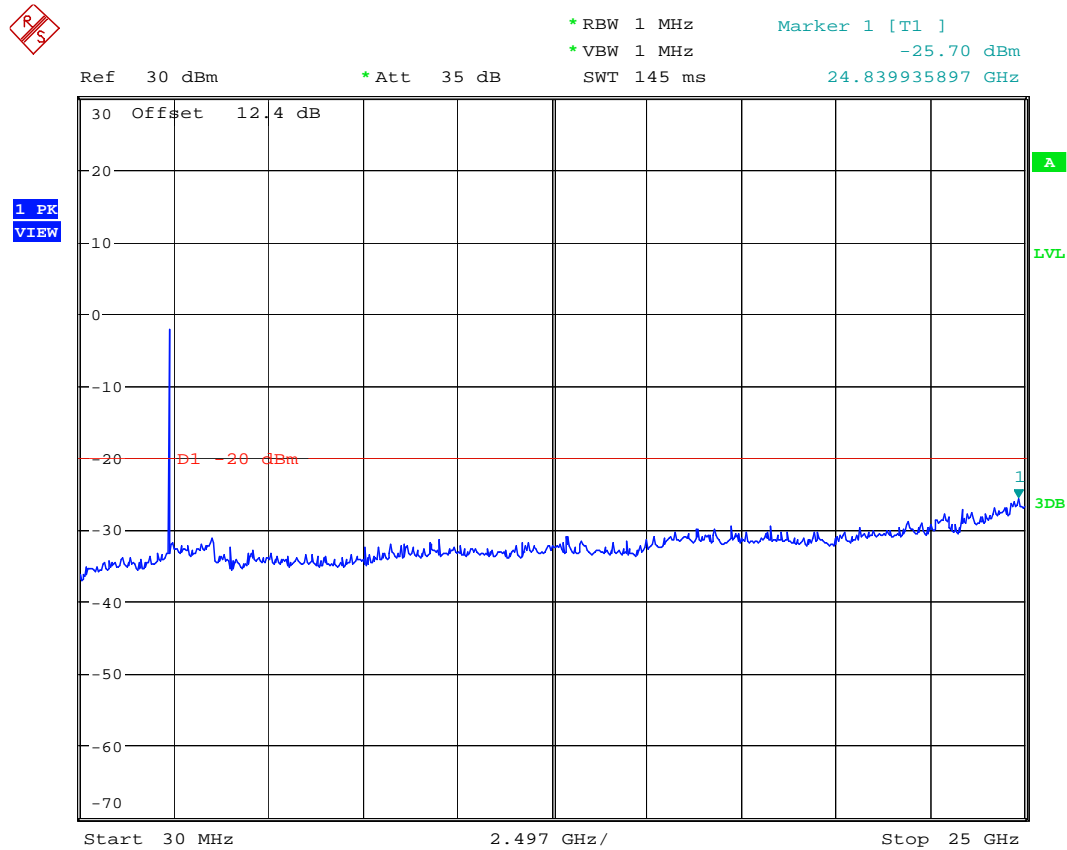
FREQUENCY RANGE	limit
30M-25GHz	-20dBc

6.6.2 RESULTS: Tnom(23)°C VnomVDC

All tests conducted in GFSK mode.

Verdict: PASS

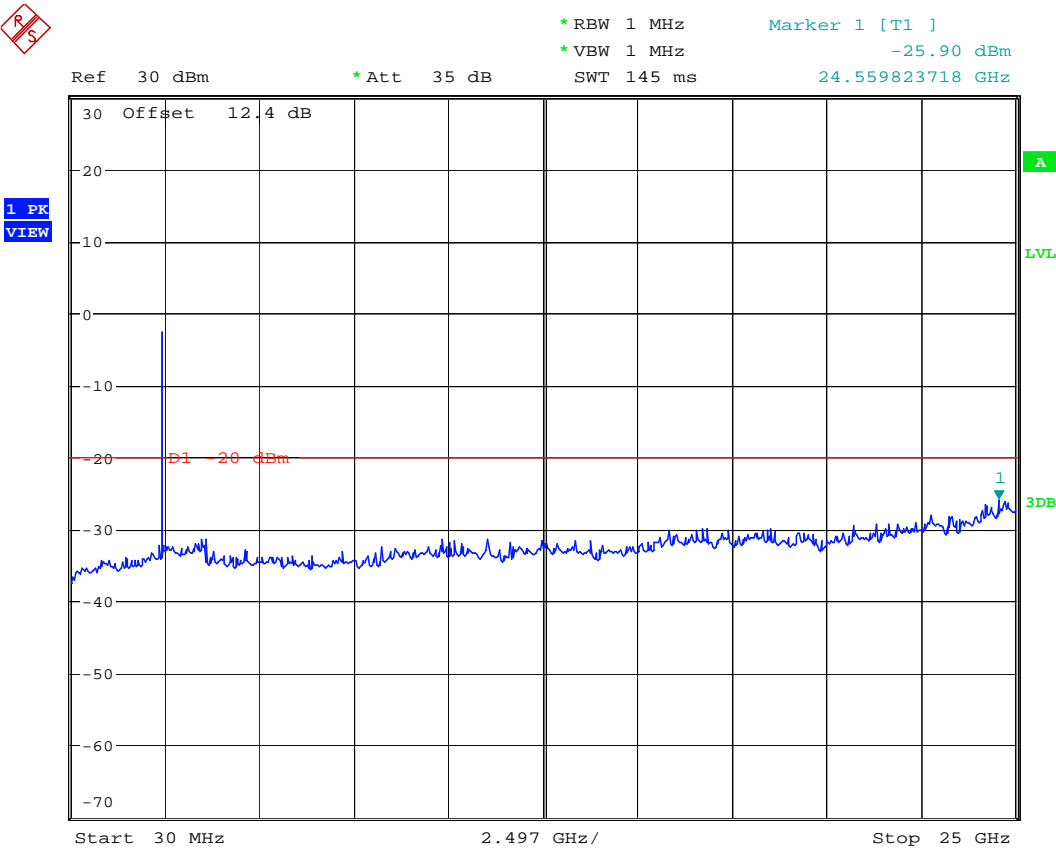
Conducted Spurious Emission 2402MHz



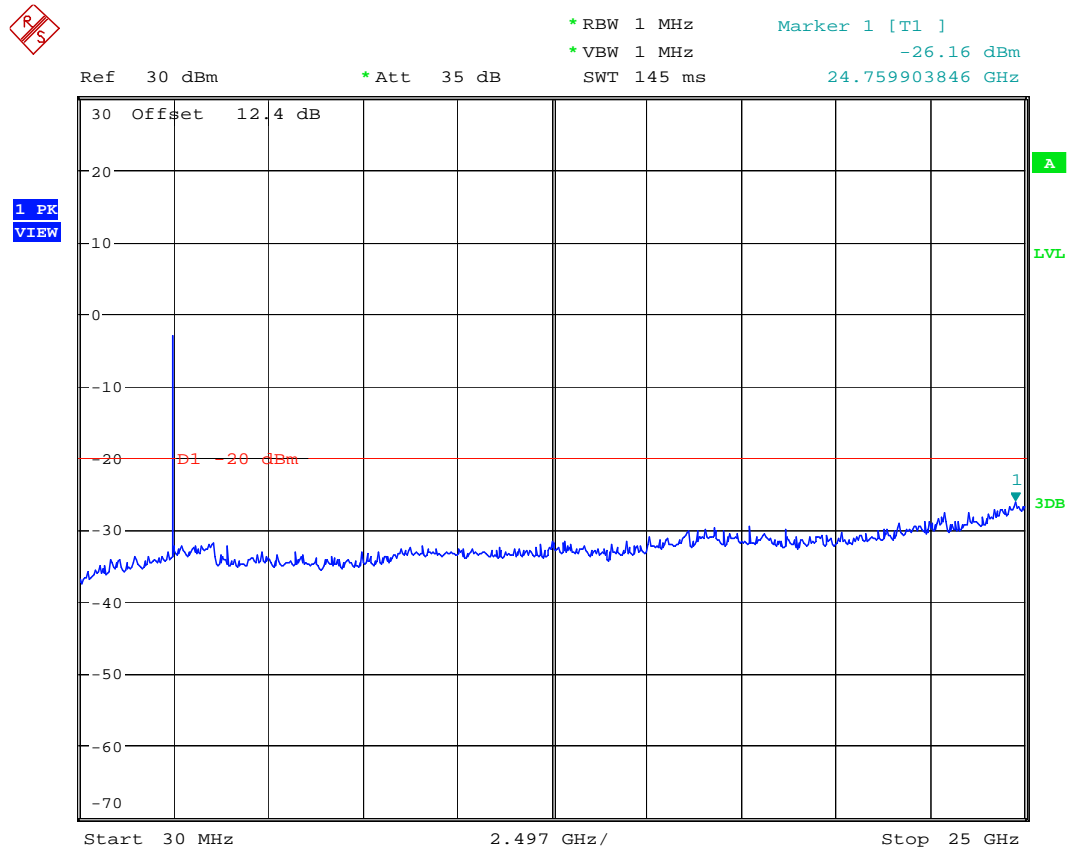
Date: 22.OCT.2008 09:50:30



Conducted Spurious Emission 2441 MHz



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 (dB μ V)	
	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

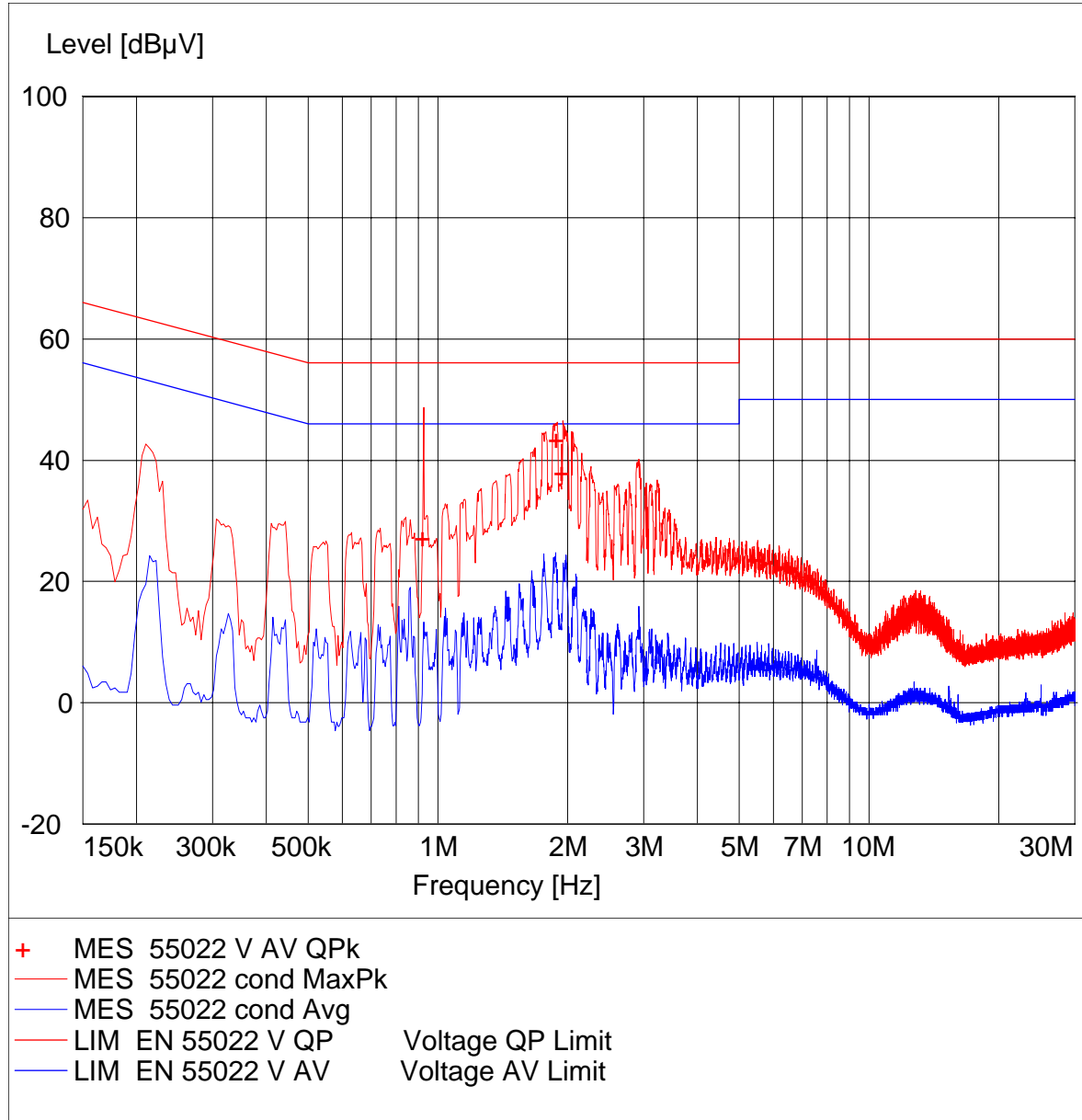
VBW = 10KHz

6.7.2 Test Results:

Pass, see plots.

Results TX Line

EUT: CDMA CA001
Customer: 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





MEASUREMENT RESULT: "55022 V AV QPk"

10/16/2008 10:04AM

Frequency	Level	Transd	Limit	Margin	Line	PE	AUX STATE
MHz	dBμV	dB	dBμV	dB			
0.926000	27.30	0.1	56	28.7	1	---	OFF
1.890000	43.50	0.2	56	12.5	1	---	OFF
1.950000	38.00	0.2	56	18.0	1	---	OFF

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"

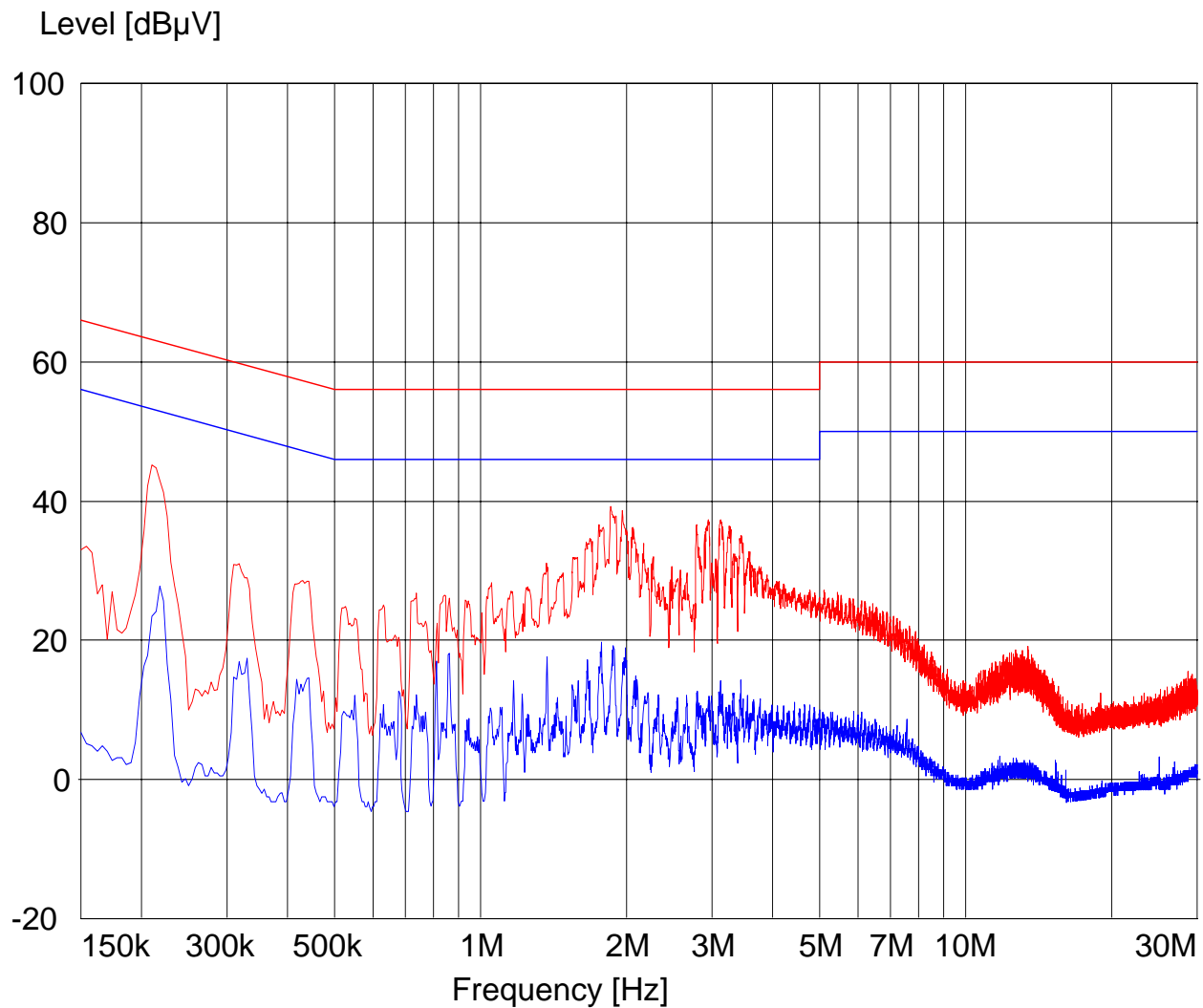
Short Description: Voltage QP Limit

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

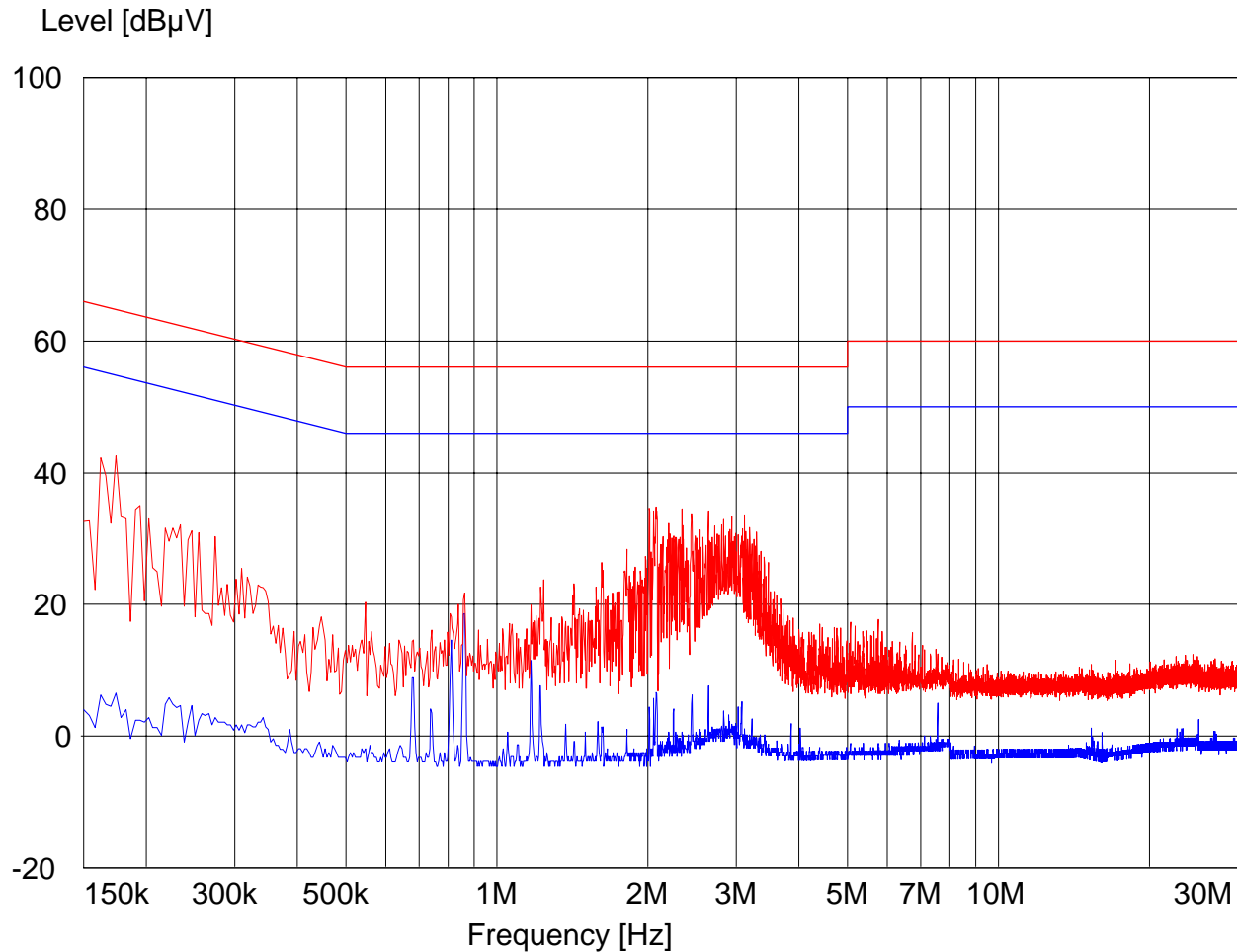
EUT: CDMA CA001
Customer: Casio Hitachi
Test Mode: BT; GFSK CH.39
ANT Orientation:: N/A
EUT Orientation:: H
Test Engineer:: Chris
Power Supply: : AC + Internal Battery
Comments: : Neutral



— MES 55022 cond MaxPk
— MES 55022 cond Avg
— LIM EN 55022 V QP Voltage QP Limit
— LIM EN 55022 V AV Voltage AV Limit

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



— MES 55022 cond MaxPk
— MES 55022 cond Avg
— LIM EN 55022 V QP Voltage QP Limit
— LIM EN 55022 V AV Voltage AV Limit



LIMIT LINE: "EN 55022 V AV"

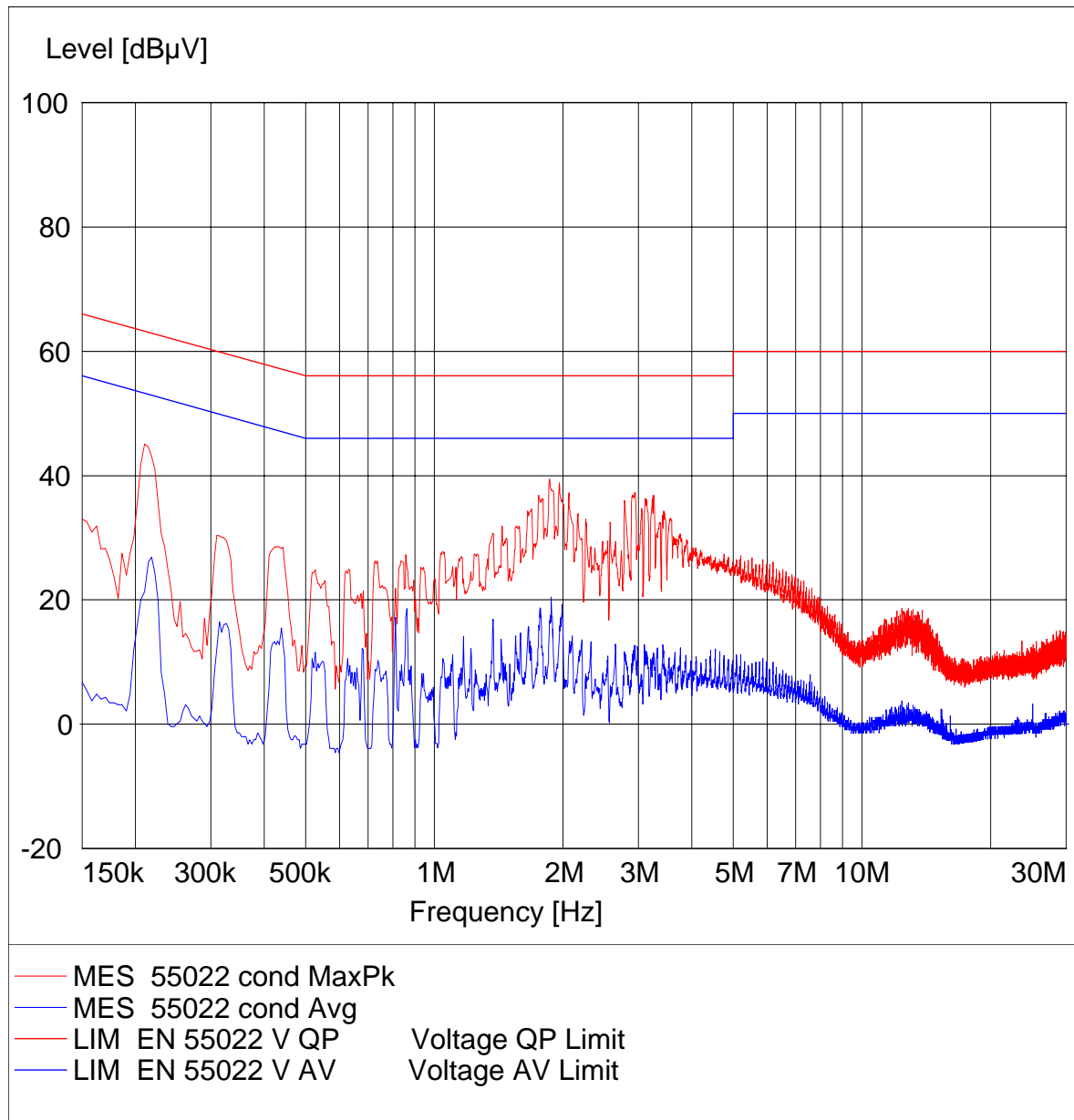
Short Description:		Voltage AV Limit
4/27/1998 2:24PM		
Frequency	Level	
MHz	dBµV	
0.150000	56.00	
0.500000	46.00	
5.000000	46.00	
5.000000	50.00	
30.000000	50.00	

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 CA001
Manufacturer: Casio Hitachi
Test Mode: BT; RX
ANT Orientation:: N/A
EUT Orientation:: H
Test Engineer:: Chris
Power Supply: : AC + Internal Battery
Comments: : Neutral



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"

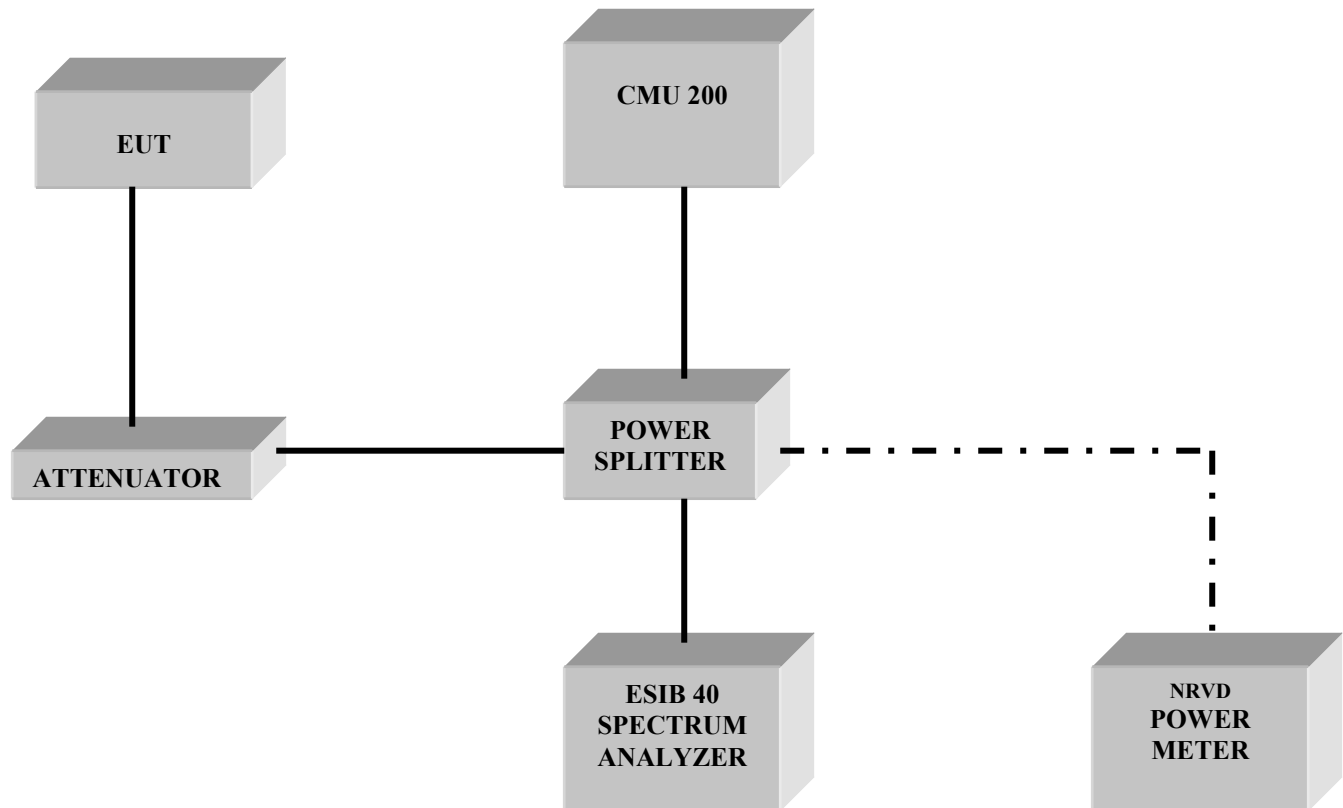
Short Description:		Voltage QP Limit
4/27/1998 2:24PM		
Frequency	Level	
MHz	dBµV	
0.150000	66.00	
0.500000	56.00	
5.000000	56.00	
5.000000	60.00	
30.000000	60.00	

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

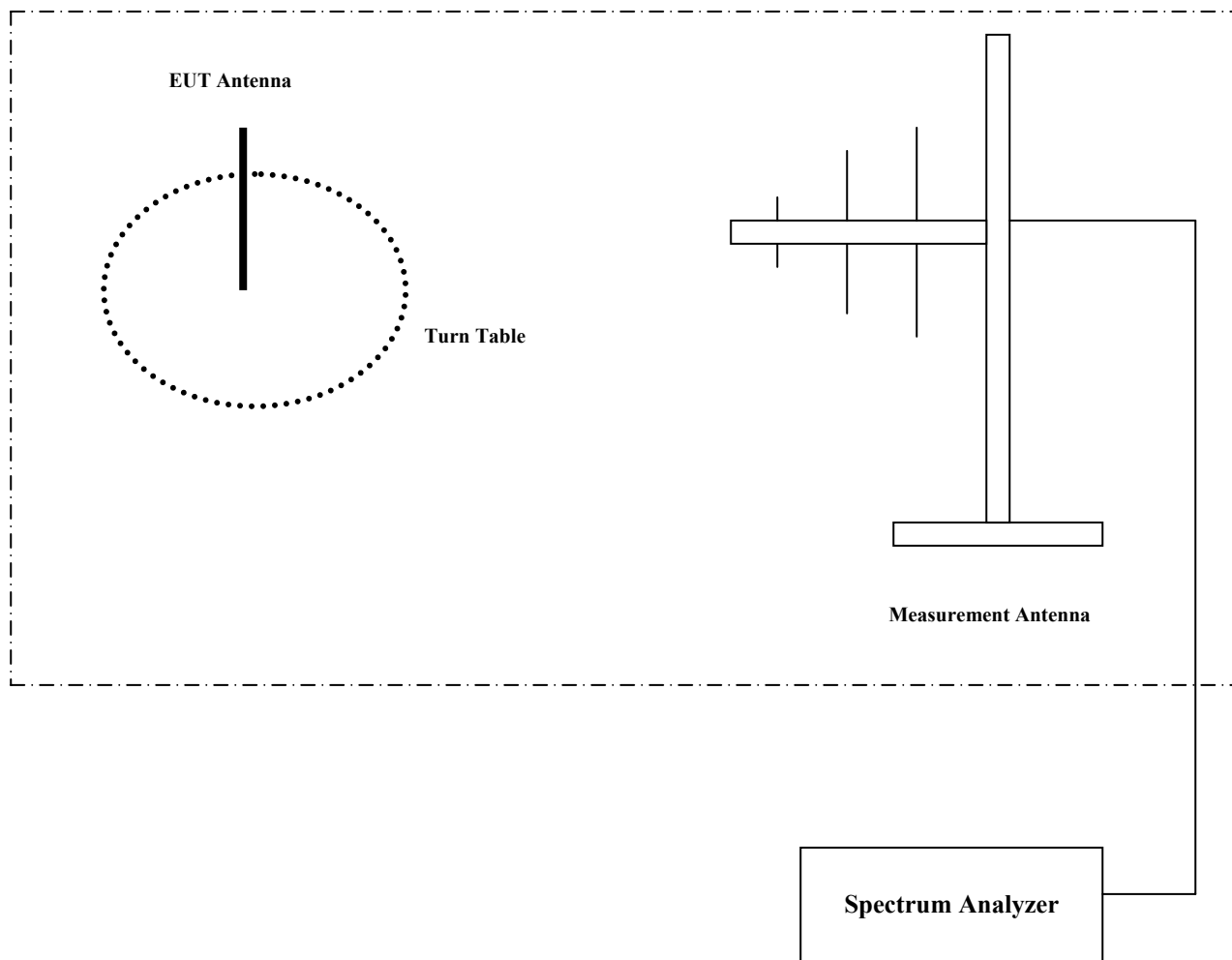
8 BLOCK DIAGRAMS

Conducted Testing



Radiated Testing

ANECHOIC CHAMBER





9 REPORT HISTORY

2008-11-5 Original Report