



FCC Test Report

FCC Part 15.247 for FHSS systems

FOR:

GSM Cellular Telephone with Bluetooth and Wifi

Model #: A1203

**Apple Inc.
1 Infinite Loop Mail Stop26A
Cupertino, California 95014
U.S.A**

FCC ID: BCGA1203

TEST REPORT #: EMC_ACIHO_010_06002_FCC15_247BT
DATE: February 6th, 2007



**FCC listed#
101450**

**IC recognized #
3925**

CETECOM Inc.

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

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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 #
Apple Inc.	GSM Cellular Telephone with Bluetooth and Wifi	A1203

Technical responsibility for area of testing:

2/6/2007

EMC & Radio

Lothar Schmidt
(Test Lab Manager)

A handwritten signature in blue ink, appearing to read "Lothar Schmidt", written over a horizontal line.

Date

Section

Name

Signature

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.



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:	Pete Krebill
Date of test:	1/26/2006 to 2/5/2007

2.2 Identification of the Client

Applicant's Name:	Apple Inc.
Street Address:	1 Infinite Loop Mail Stop26A
City/Zip Code	Cupertino, California 95014
Country	USA
Contact Person:	Robert Steinfeld
Phone No.	408-974-2618
Fax:	408-862-5061
e-mail:	steinfel@apple.com

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as applicant
----------------------	-------------------



3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name:	A1203
Description:	GSM Cellular Telephone with Bluetooth and Wifi
Model No:	A1203
Hardware Revision :	M68 DVT
Software Revision :	M68 DVT
FCC ID:	BCGA1203
Frequency Range:	2402-2480 MHz
Type(s) of Modulation:	GFSK, 8DPSK, Pi/4 DQPSK
Number of Channels:	79
Antenna Type:	Patch
Output Power:	0.64 dBm (0.001W) peak conducted power



4 Subject Of Investigation

All testing was performed on the product referred to in Section 3 as EUT.

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

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.



5 Measurements

5.1 RESTRICTED BAND EDGE COMPLIANCE RADIATED §15.247/15.205

5.1.1 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
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**

Notes:

1. Radiated emissions are maximized by rotating the EUT 360° at 0.5 meter height increments between 1 and 4 meters.
2. Measurements were performed with the EUT in X, Y and Z orientations with the measurement antenna in both horizontal and vertical polarity. The plots below show the results of the worst case orientation and polarity.



5.1.2 Results Lower Restricted Band 2310 MHz to 2390 MHz

GFSK (2402MHz) PEAK

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch0 GFSK

Ant Orientation: V

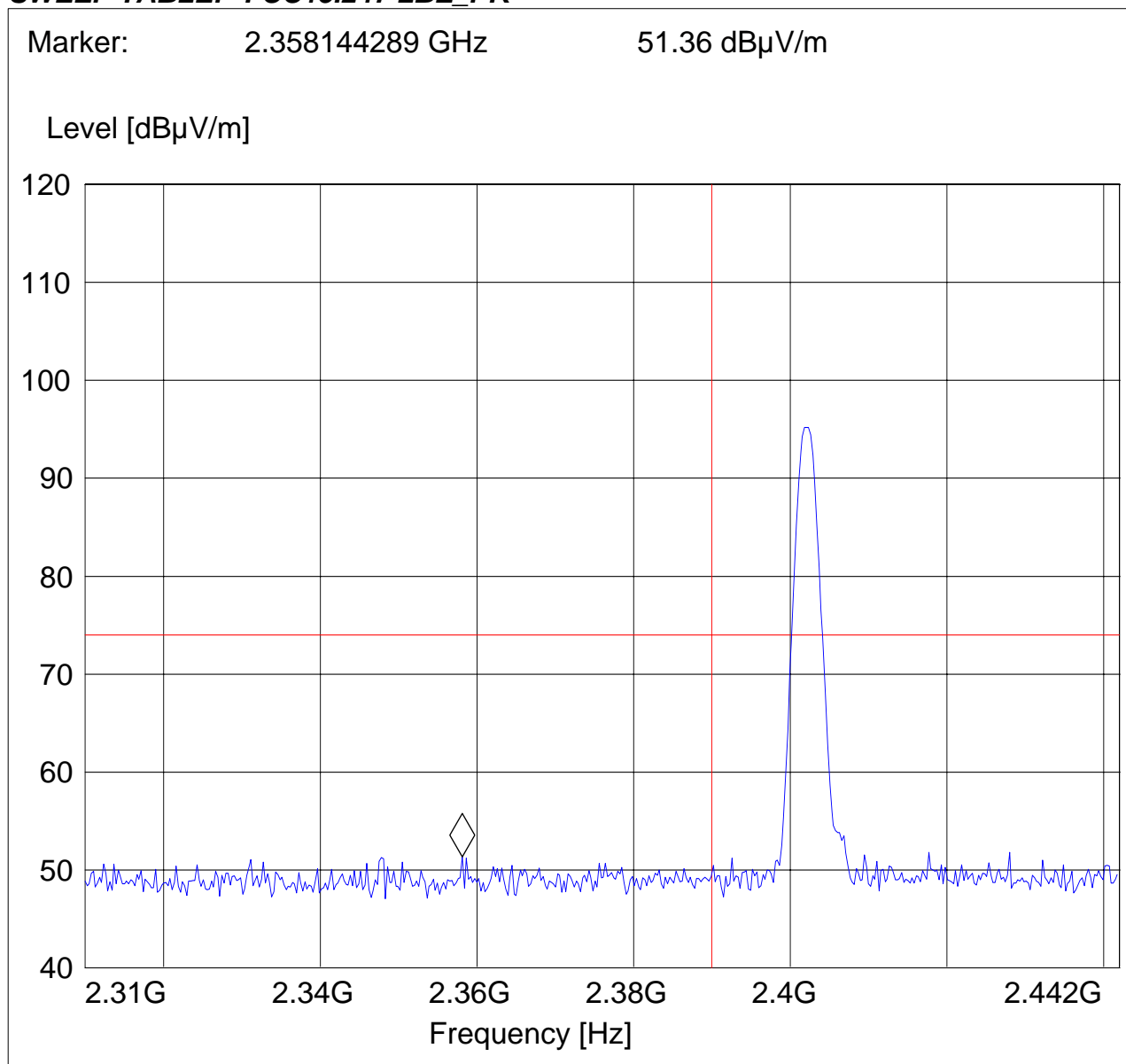
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized peak

SWEEP TABLE: "FCC15.247 LBE_PK"





GFSK (2402MHz) AVG

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch0 GFSK

Ant Orientation: V

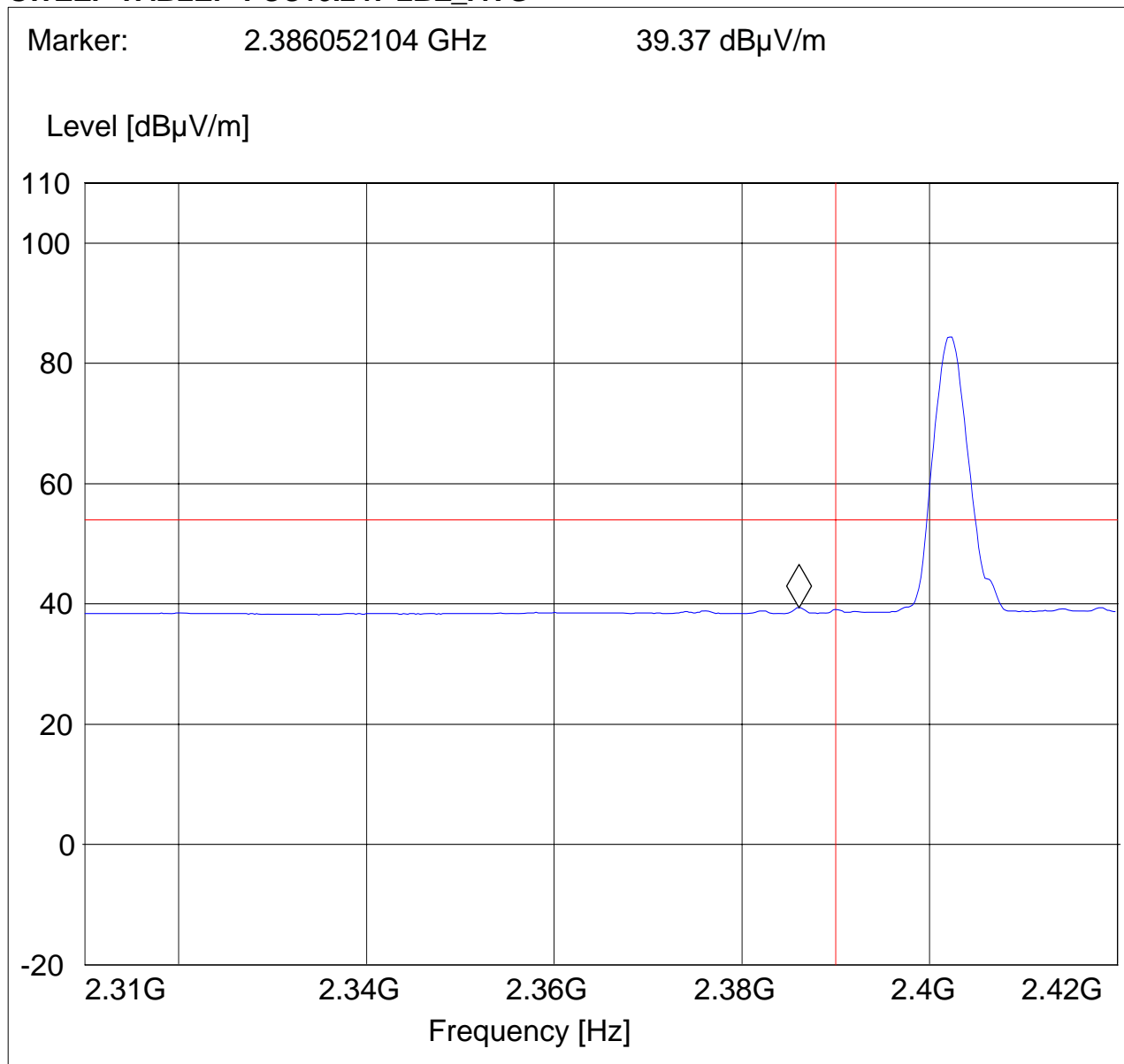
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized average

SWEEP TABLE: "FCC15.247 LBE_AVG"





Pi/4 DQPSK (2402MHz) PEAK

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch0 Pi/4 DQPSK

Ant Orientation: V

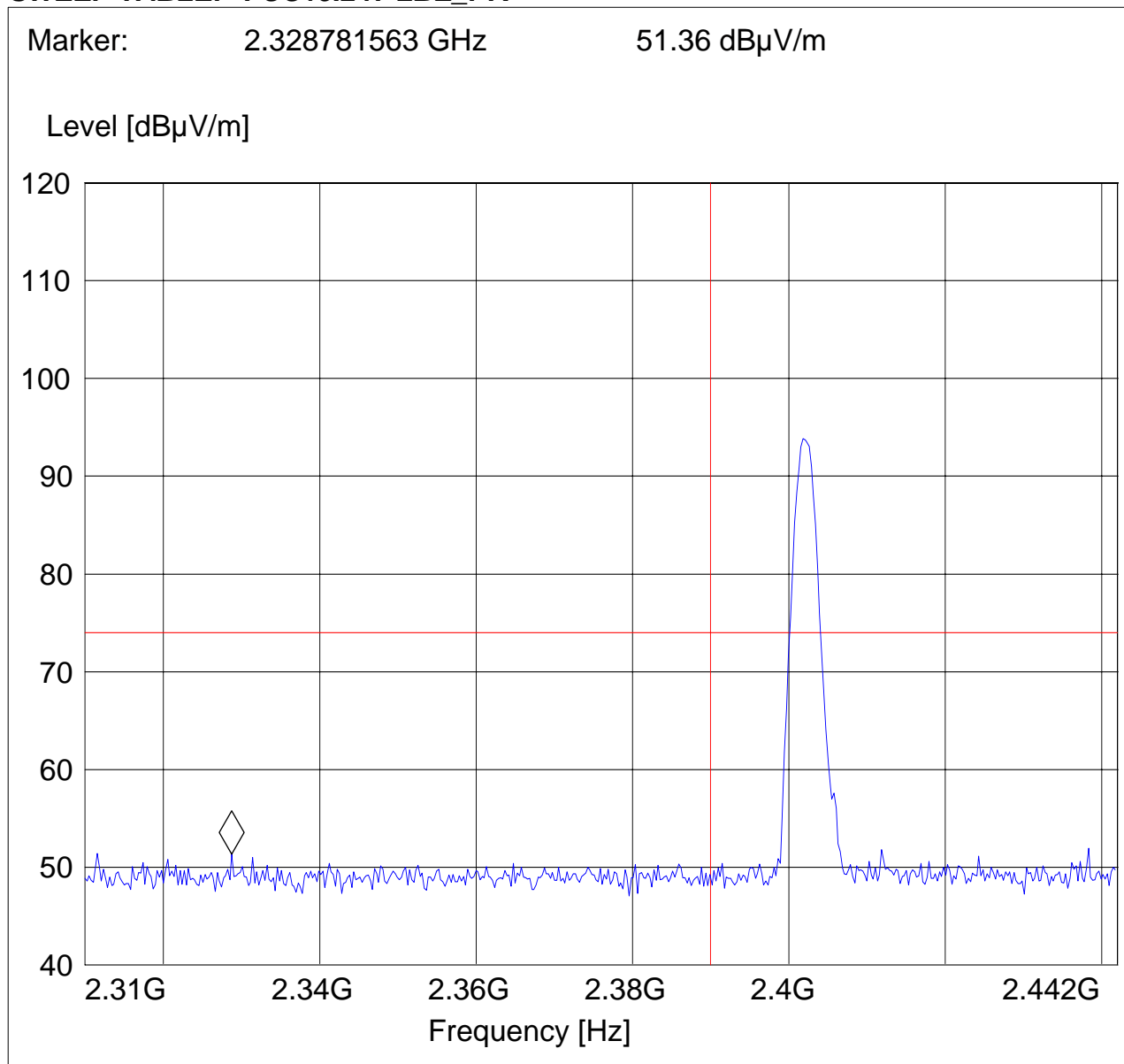
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized peak

SWEEP TABLE: "FCC15.247 LBE_PK"





Pi/4 DQPSK (2402MHz) AVG

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch0 Pi/4 DQPSK

Ant Orientation: V

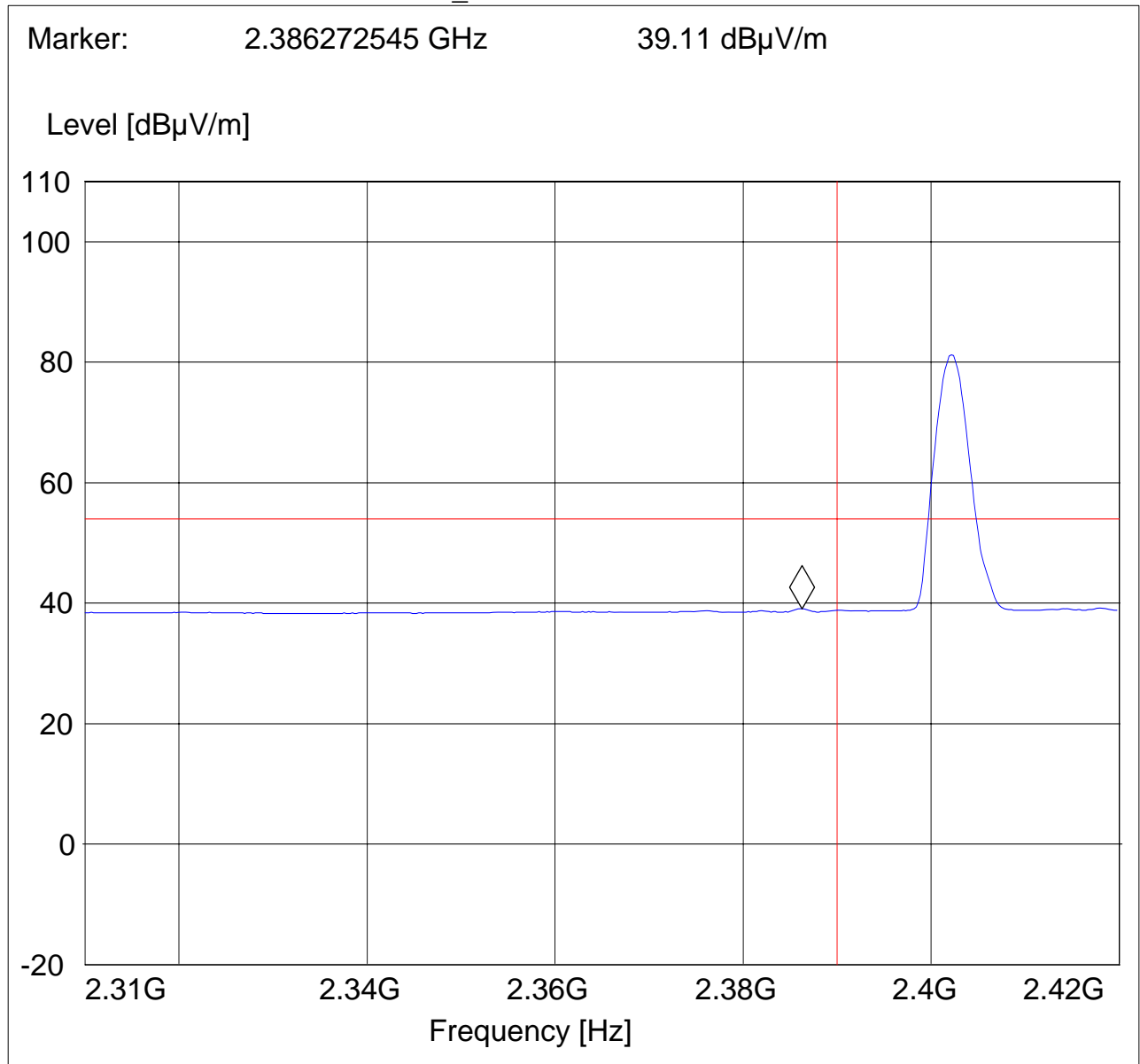
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized average

SWEEP TABLE: "FCC15.247 LBE_AVG"





8DPSK (2402MHz) PEAK

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch0 8DPSK

Ant Orientation: V

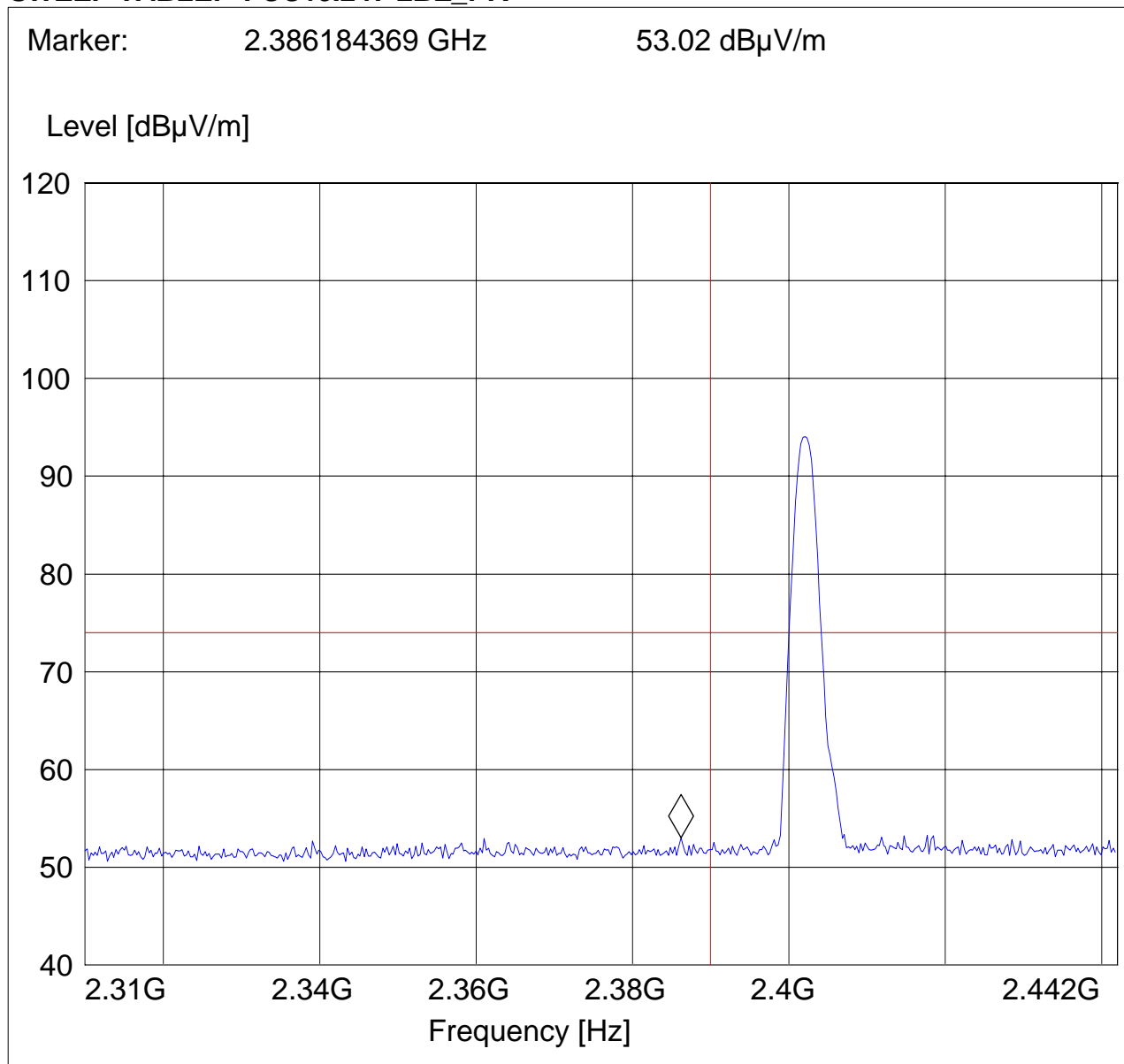
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized peak

SWEEP TABLE: "FCC15.247 LBE_PK"





8DPSK (2402MHz) AVG

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch0 8DPSK

Ant Orientation: V

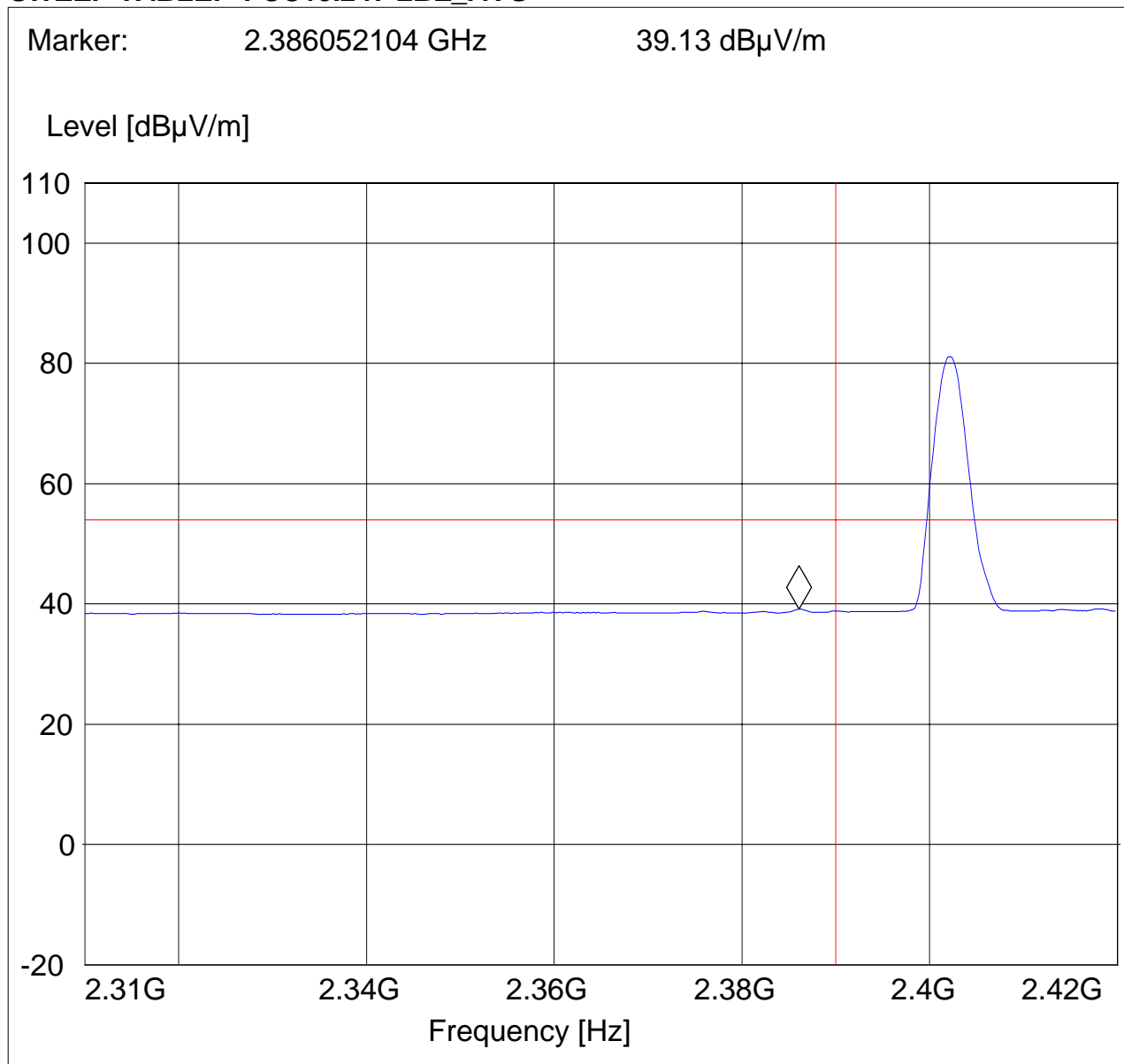
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized average

SWEEP TABLE: "FCC15.247 LBE_AVG"





5.1.3 Results Upper Restricted Band 2483.5 MHz to 2500 MHz

GFSK (2480MHz) PEAK

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch78 GFSK

Ant Orientation: V

EUT Orientation: +45° from horizontal

Test Engineer: Ed

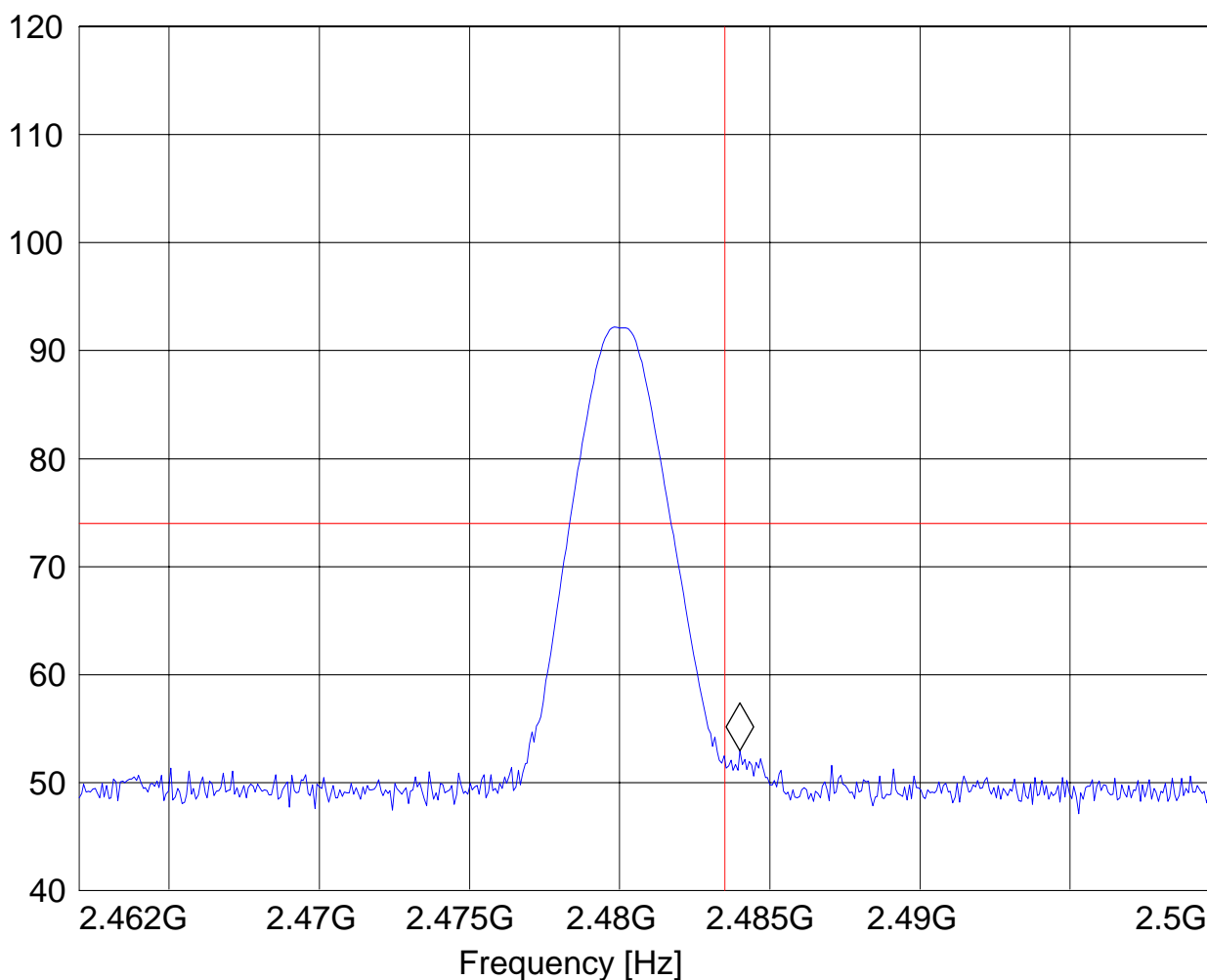
Voltage:: Battery

Comments:: maximized peak

SWEEP TABLE: "FCC15.247 HBE PK"

Marker: 2.484008016 GHz 52.96 dB μ V/m

Level [dB μ V/m]





GFSK (2480MHz) AVG

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch78 GFSK

Ant Orientation: V

EUT Orientation: +45° from horizontal

Test Engineer: Ed

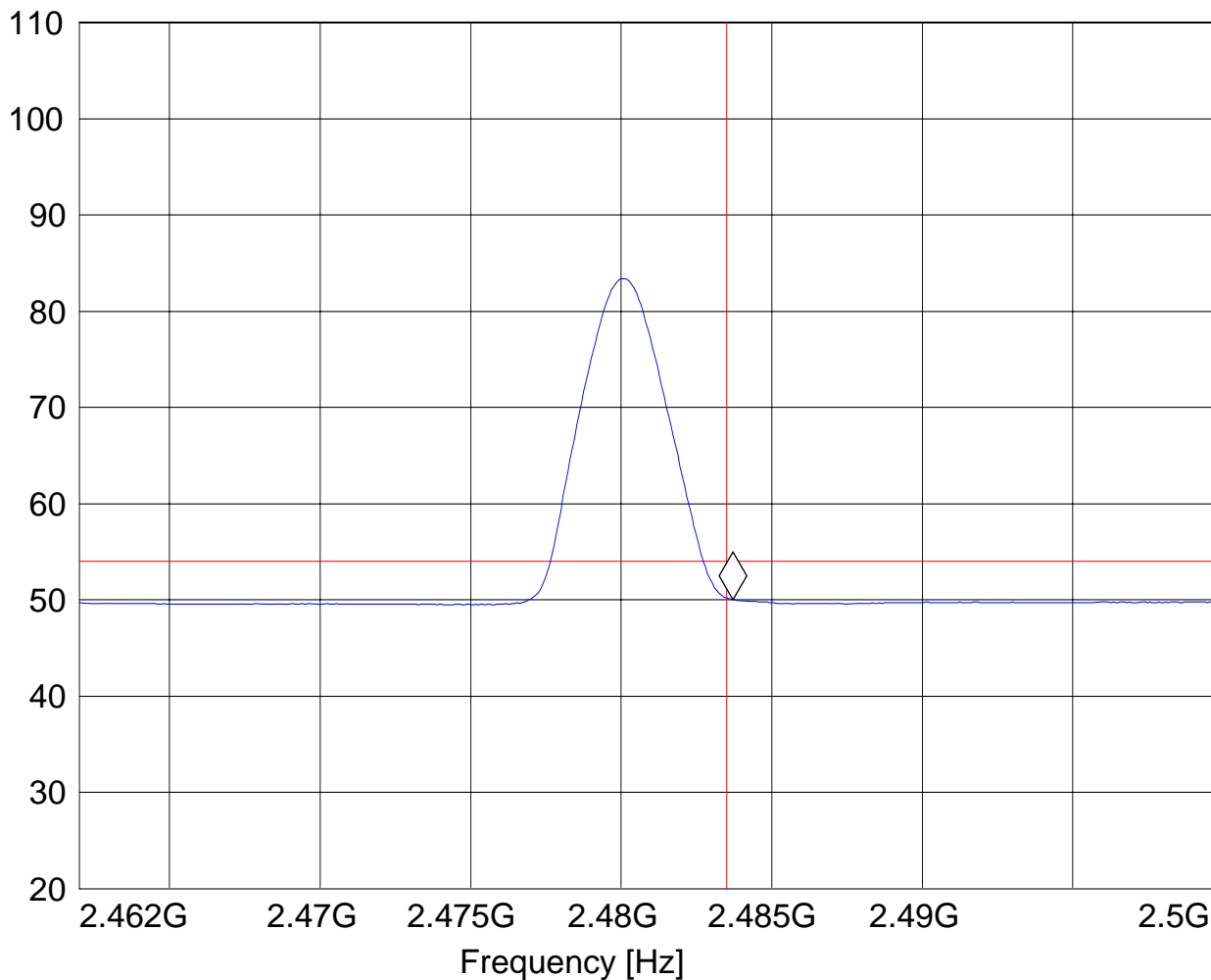
Voltage:: Battery

Comments:: maximized average

SWEEP TABLE: "FCC15.247 HBE_AVG"

Marker: 2.483703407 GHz 50.04 dBμV/m

Level [dBμV/m]





Pi/4 DQPSK (2480MHz) PEAK

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch78 Pi/4 DQPSK

Ant Orientation: V

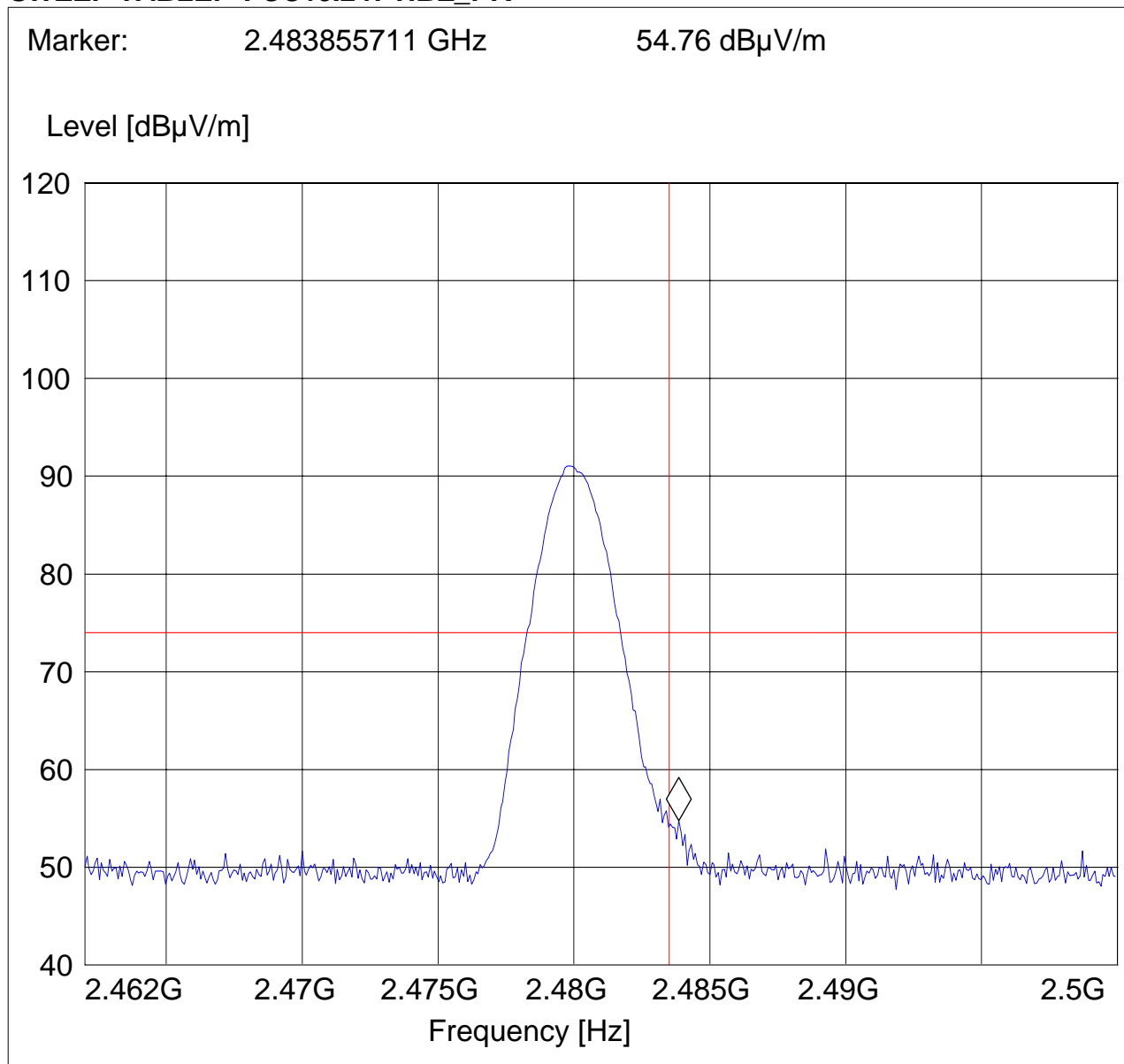
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized peak

SWEEP TABLE: "FCC15.247 HBE_PK"





Pi/4 DQPSK (2480MHz) AVG

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch78 Pi/4 DQPSK

Ant Orientation: V

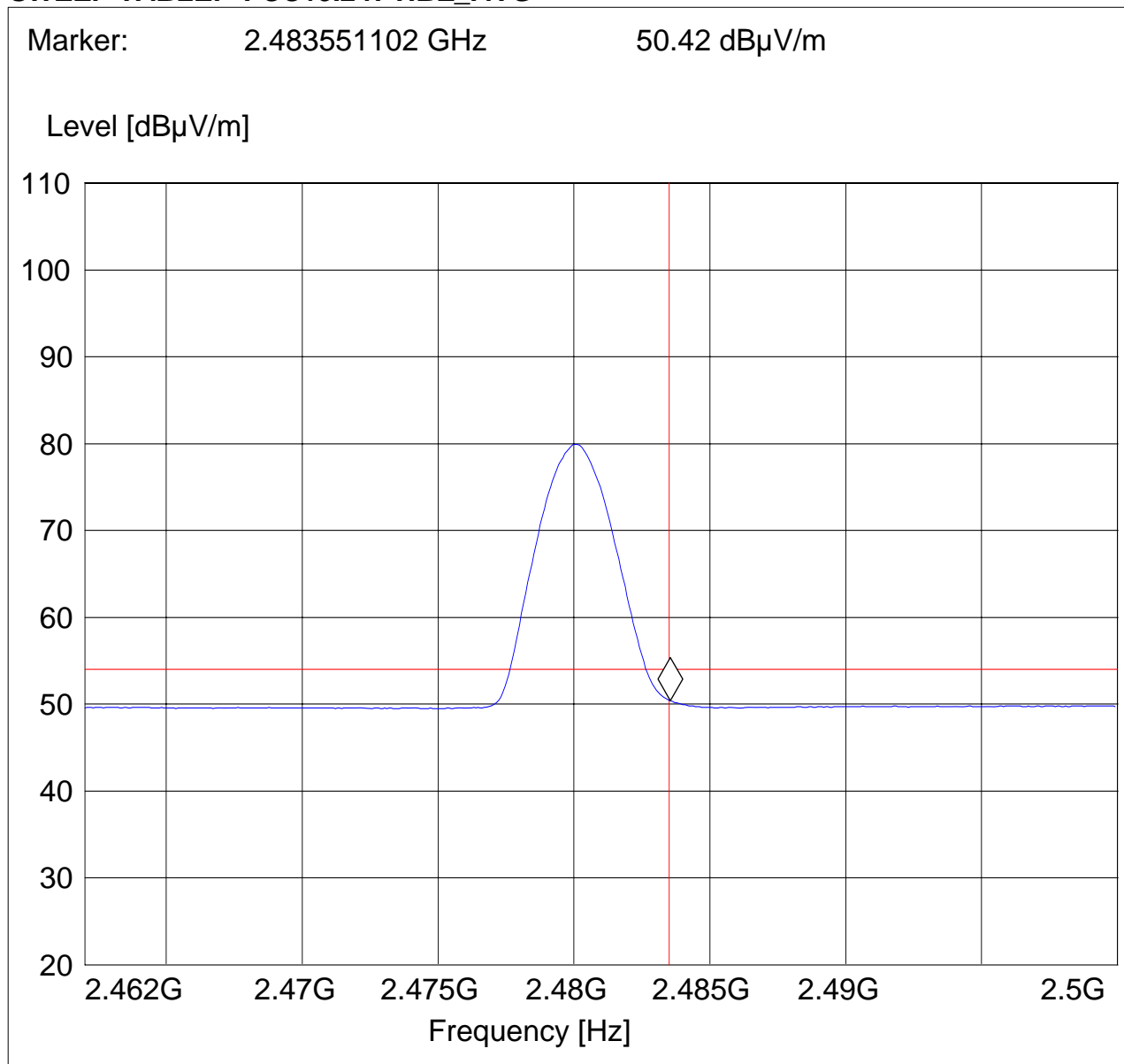
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized average

SWEEP TABLE: "FCC15.247 HBE_AVG"





8DPSK (2480MHz) PEAK

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch78 8DPSK

Ant Orientation: V

EUT Orientation: +45° from horizontal

Test Engineer: Ed

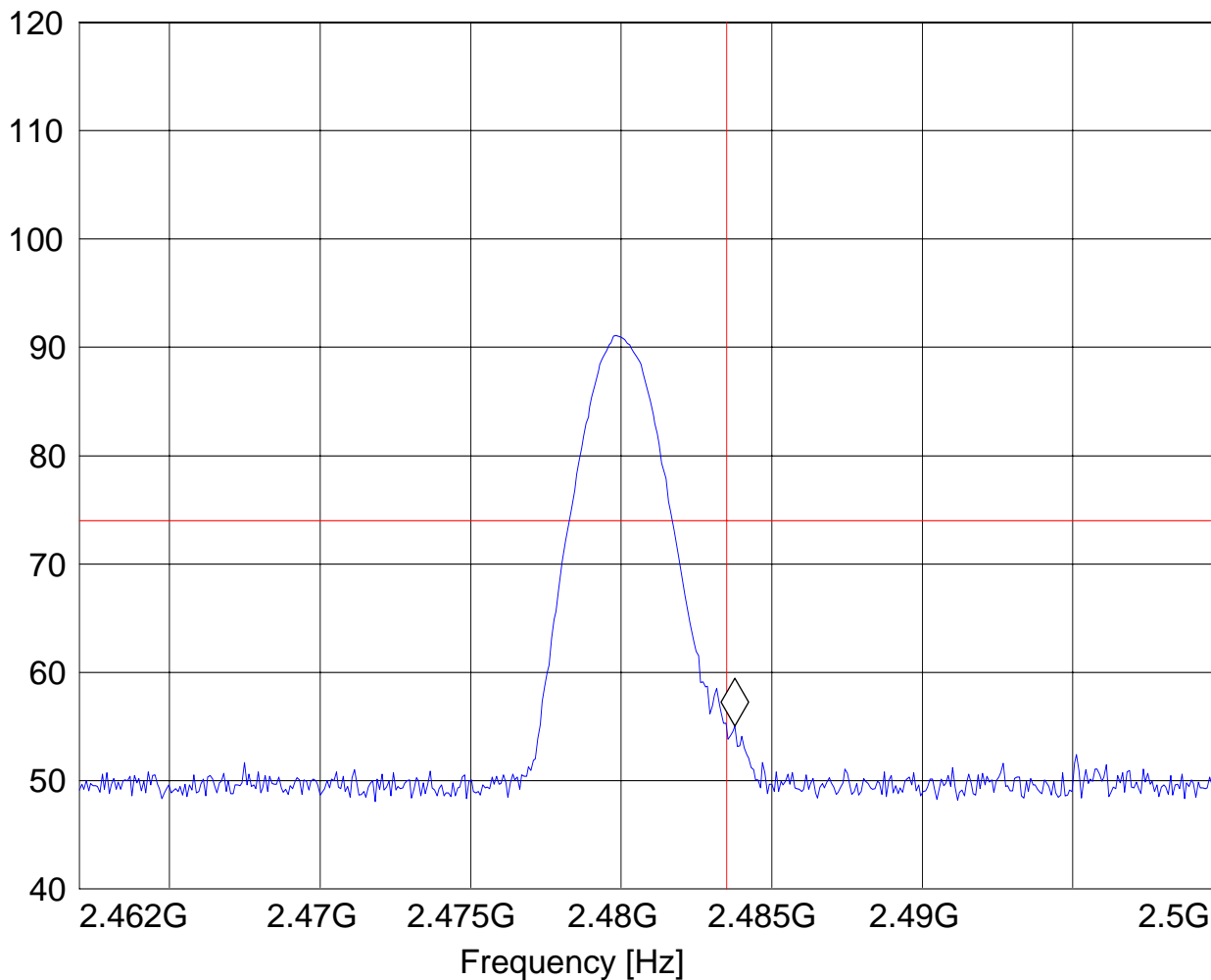
Voltage:: Battery

Comments:: maximized peak

SWEEP TABLE: "FCC15.247 HBE_PK"

Marker: 2.483779559 GHz 55.03 dBμV/m

Level [dBμV/m]





8DPSK (2480MHz) AVG

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch78 8DPSK

Ant Orientation: V

EUT Orientation: +45° from horizontal

Test Engineer: Ed

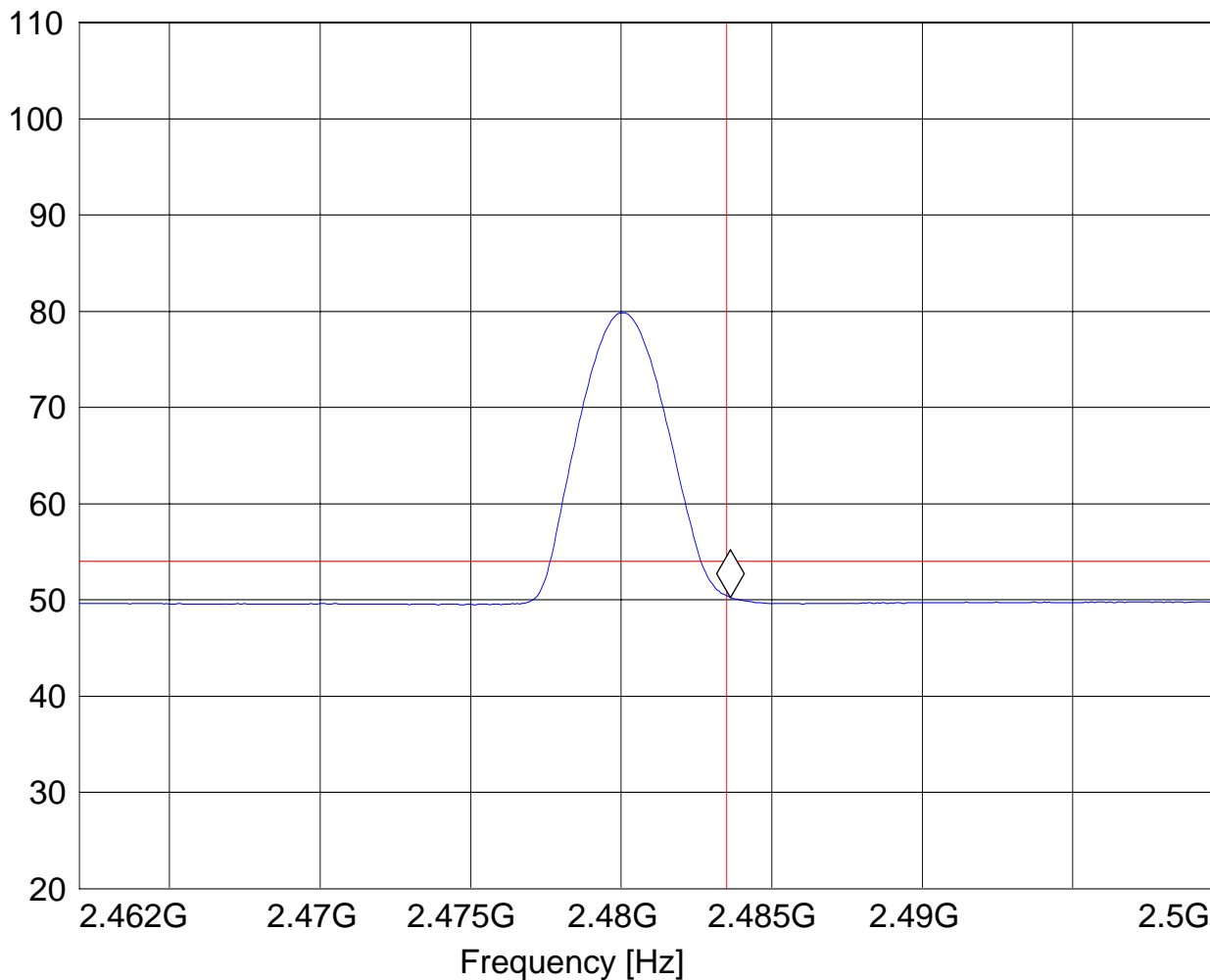
Voltage:: Battery

Comments:: maximized average

SWEEP TABLE: "FCC15.247 HBE_AVG"

Marker: 2.483627255 GHz 50.29 dB μ V/m

Level [dB μ V/m]



5.2 TRANSMITTER SPURIOUS EMISSIONS RADIATED § 15.247/15.205/15.209

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**

Notes:

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.
3. Radiated emissions are maximized by rotating the EUT 360° at 0.5 meter height increments between 1 and 4 meters.
4. Measurements were performed with the EUT in X, Y and Z orientations with the measurement antenna in both horizontal and vertical polarity. The plots below show the results of the worst case orientation and polarity

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



5.2.2 RESULTS

30MHz – 1GHz

Antenna: vertical

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

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT TX Ch0 GFSK

Ant Orientation: V

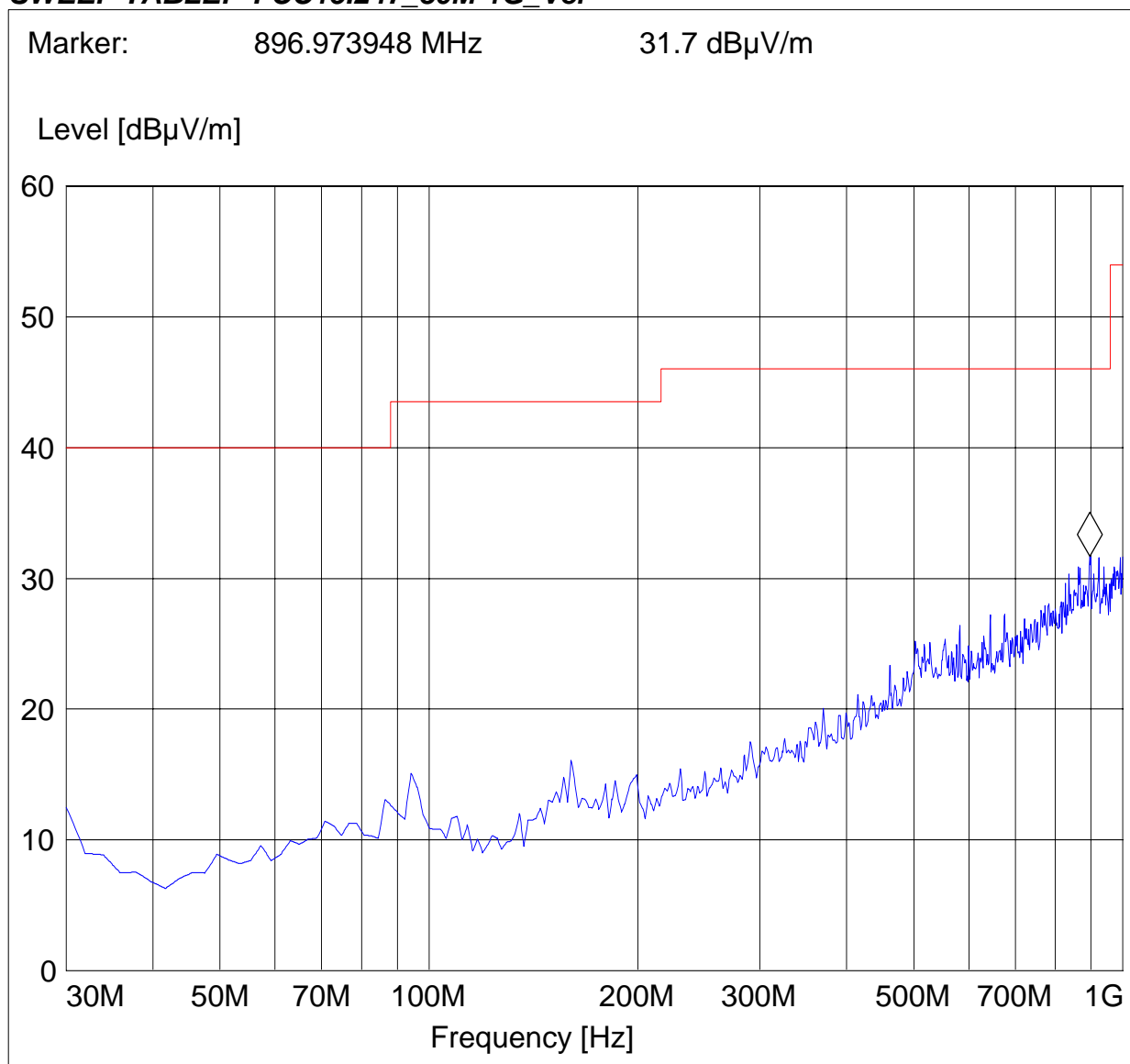
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized

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





30MHz – 1GHz

Antenna: horizontal

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

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT TX Ch0 GFSK

Ant Orientation: H

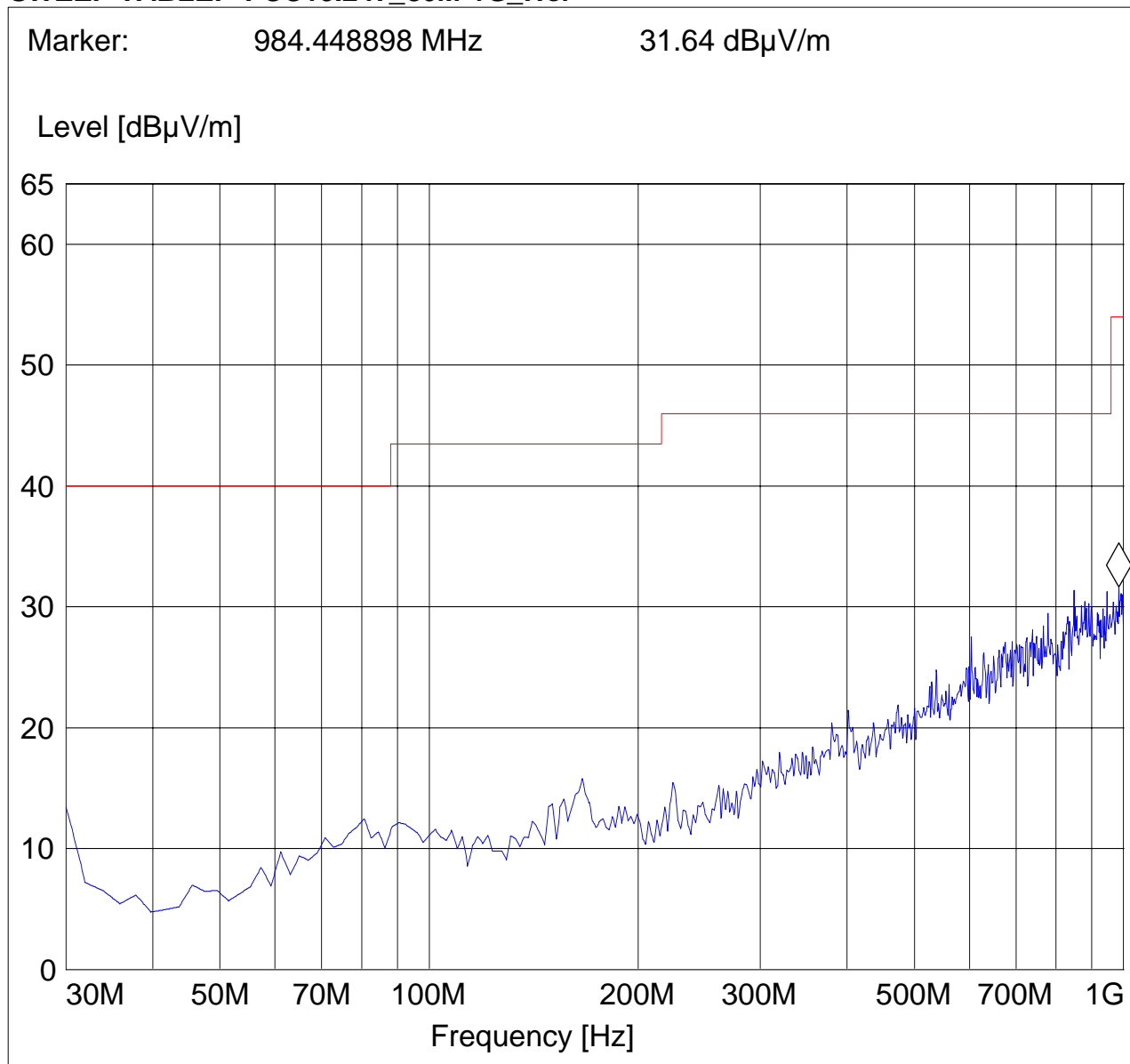
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized

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





1-3GHz (2402MHz)

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

Note: Peak Reading vs. Average limit

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch0 GFSK

Ant Orientation: V

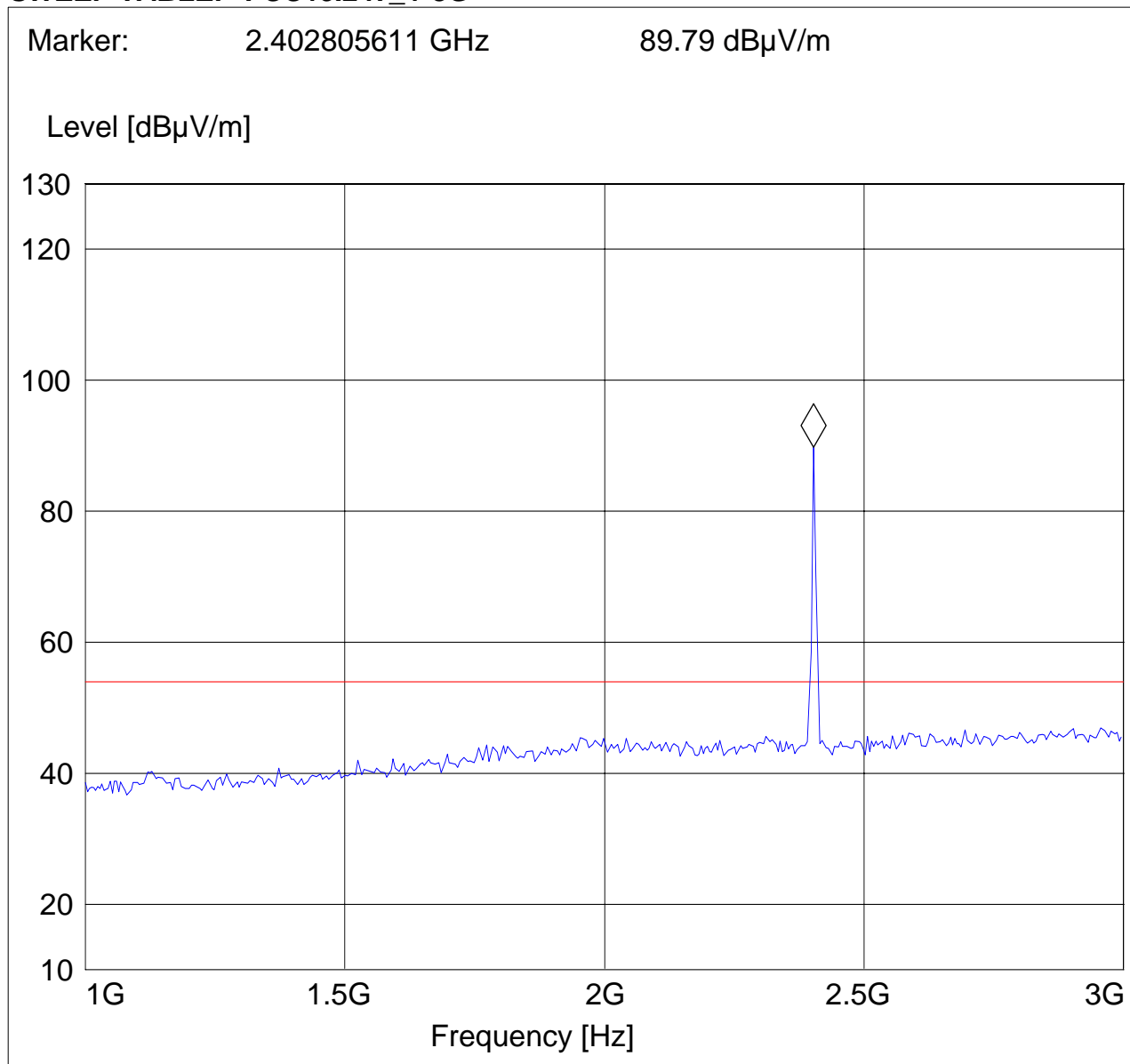
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized marked signal is fundamental

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





1-3GHz (2441MHz)

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

Note: Peak Reading vs. Average limit

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch39 GFSK

Ant Orientation: V

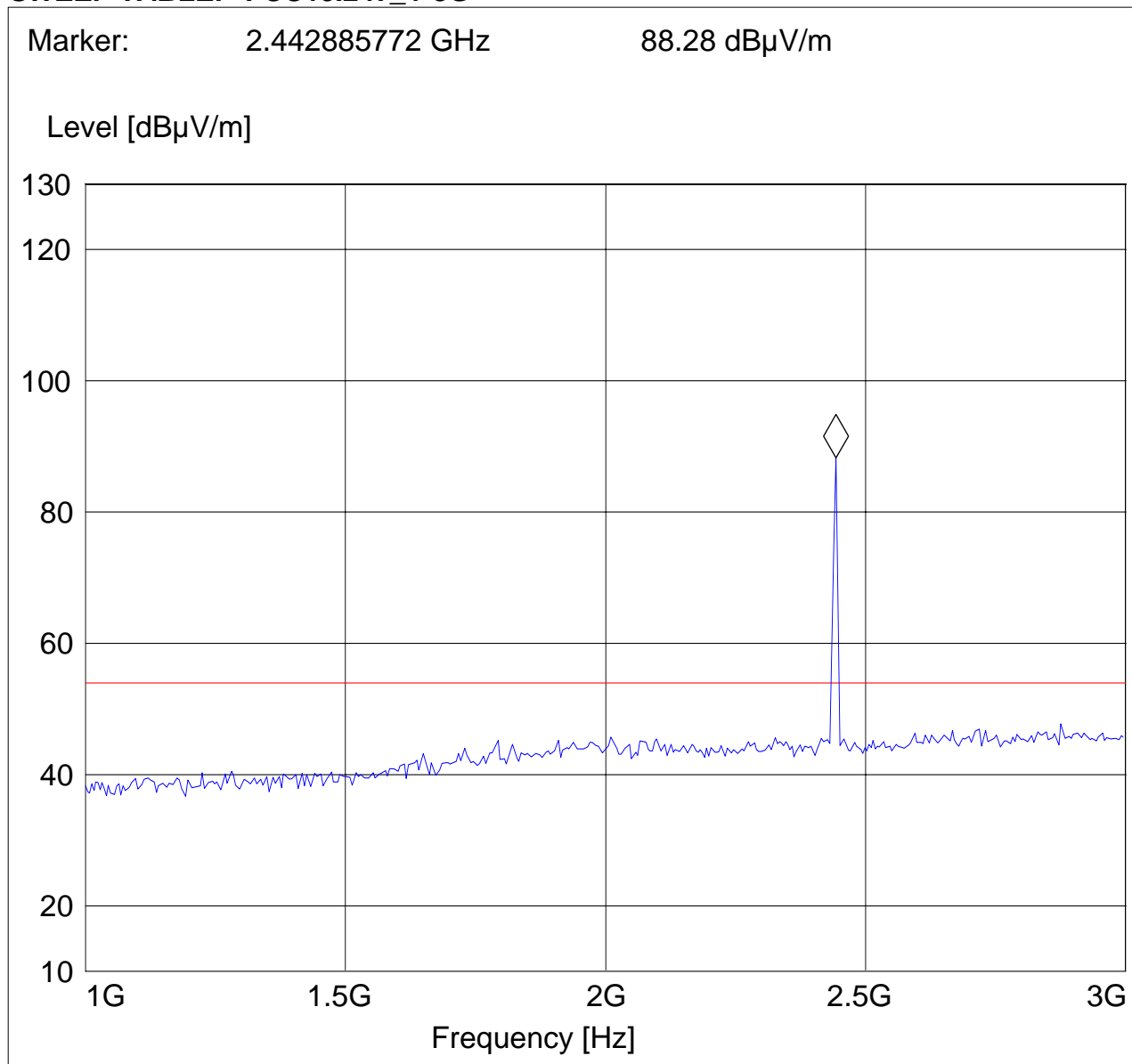
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized marked signal is fundamental

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





1-3GHz (2480MHz)

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

Note: Peak Reading vs. Average limit

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch78 GFSK

Ant Orientation: V

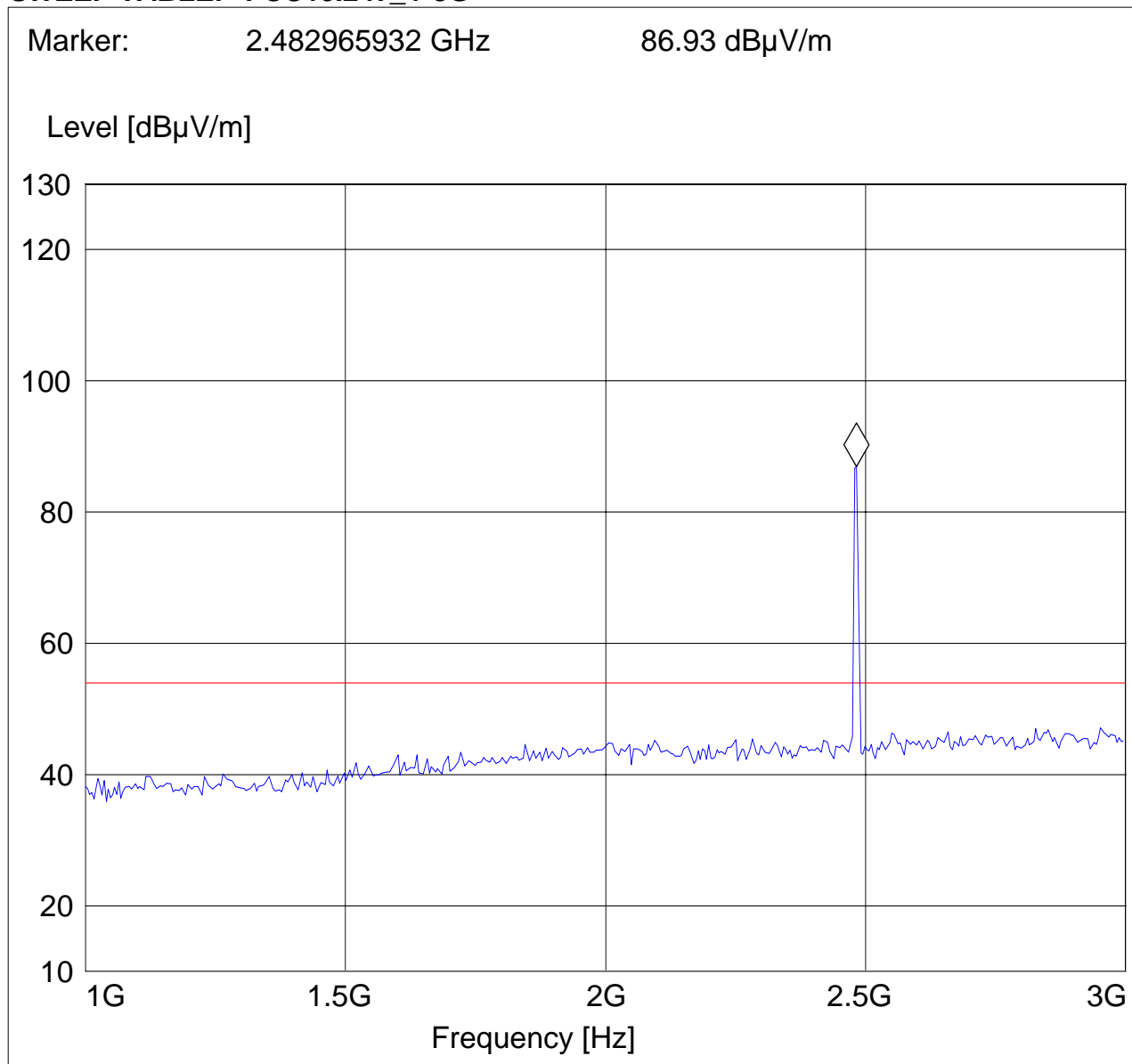
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized marked signal is fundamental

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





3-18GHz (2402MHz)

Note: Peak Reading vs. Average limit

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch0 GFSK

Ant Orientation: V

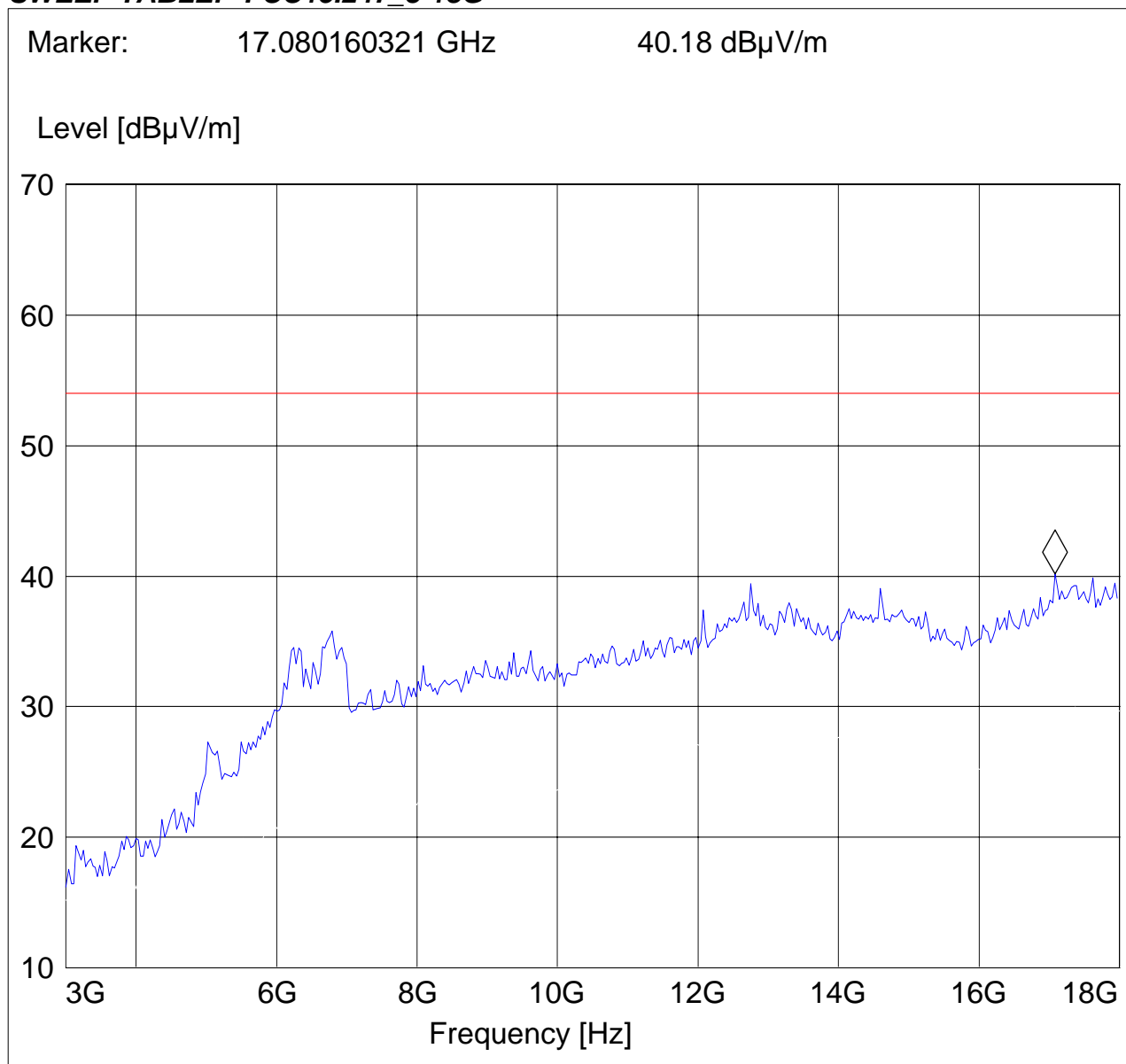
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized

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





3-18GHz (2441MHz)

Note: Peak Reading vs. Average limit

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch39 GFSK

Ant Orientation: V

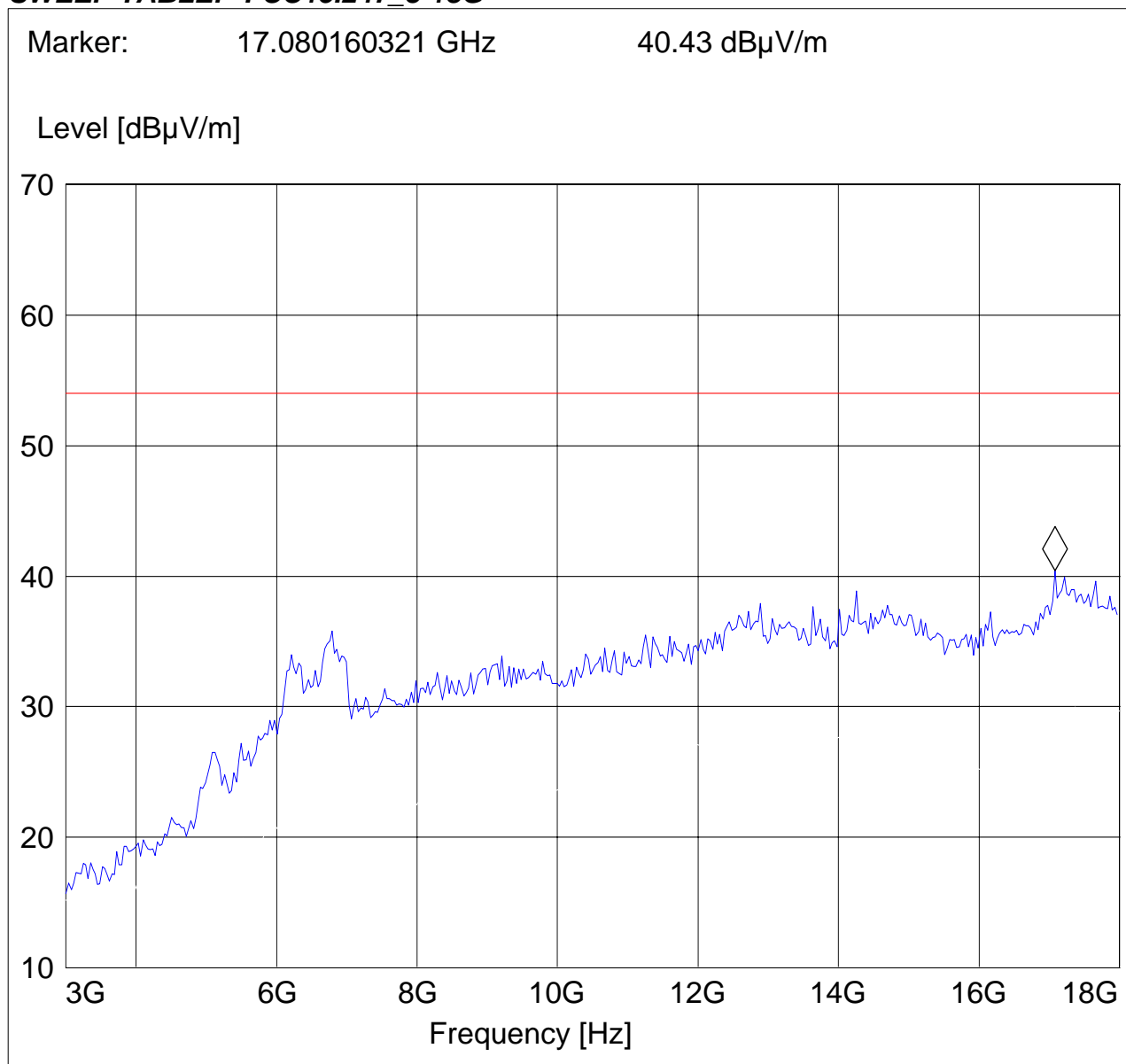
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized

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





3-18GHz (2480MHz)

Note: Peak Reading vs. Average limit

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch78 GFSK

Ant Orientation: V

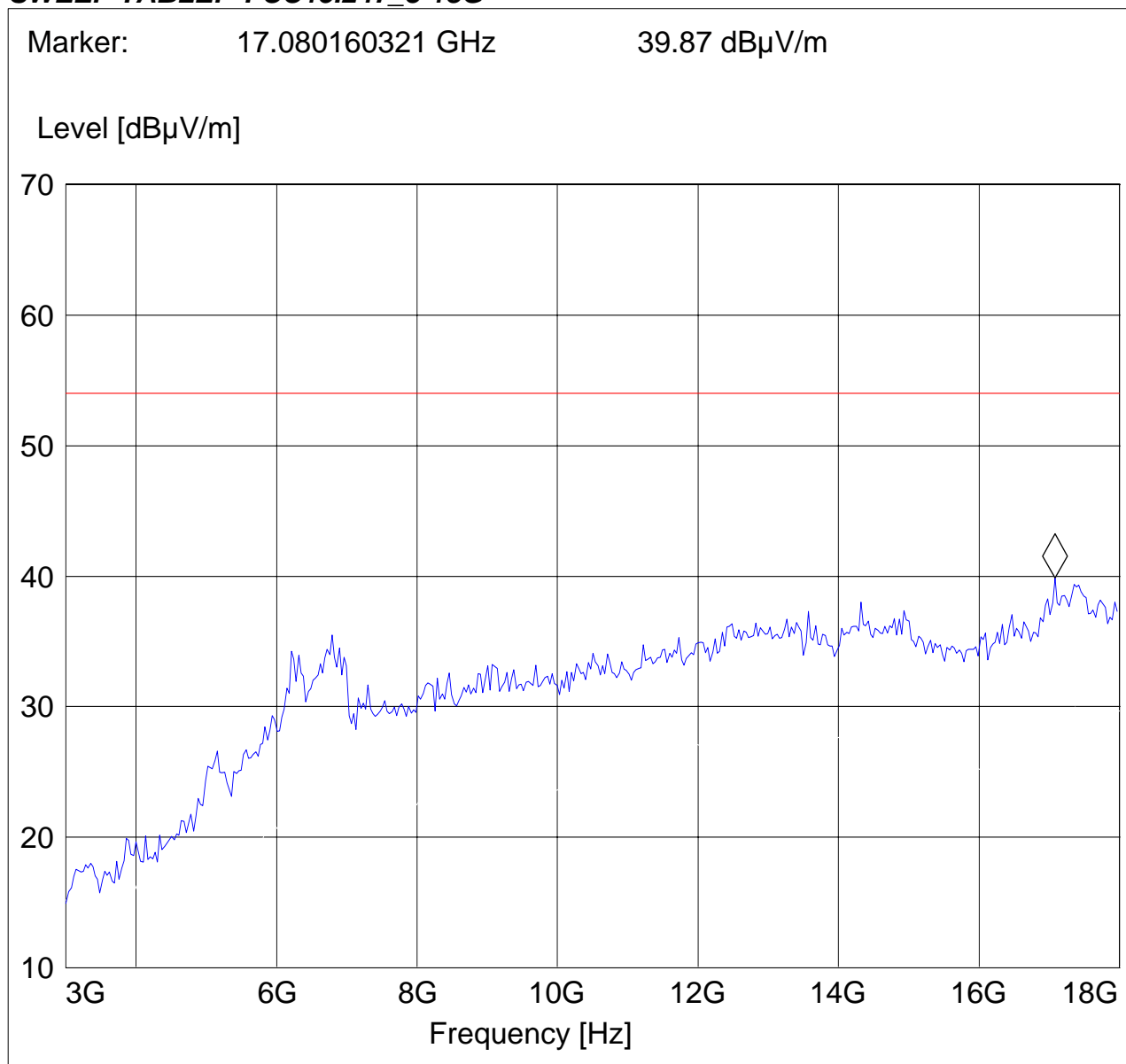
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized

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





18-25GHz

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

Note: Peak Reading vs. Average limit

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

Test Mode: BT Ch0 GFSK

Ant Orientation: V

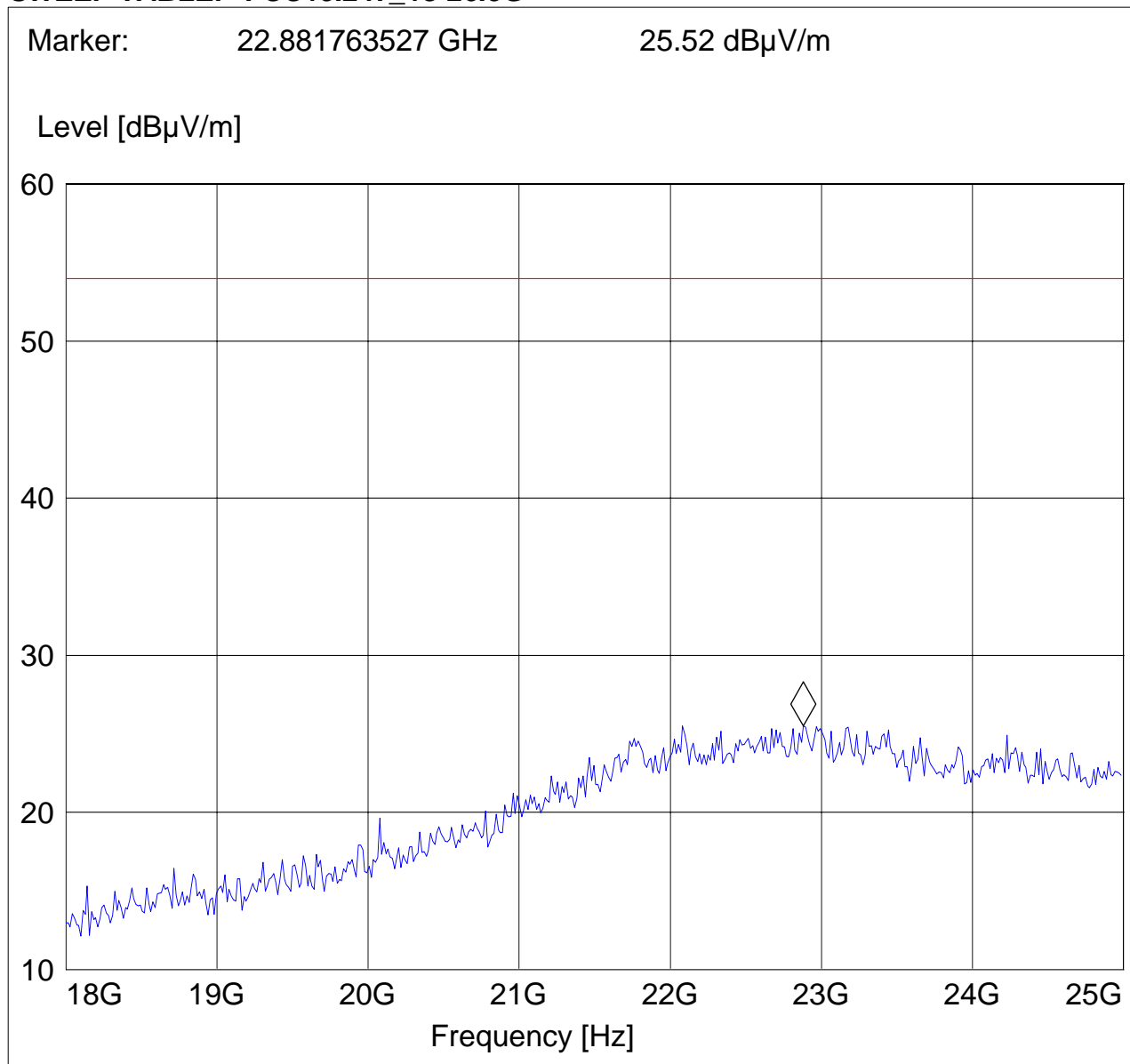
EUT Orientation: +45° from horizontal

Test Engineer: Ed

Voltage:: Battery

Comments:: maximized

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





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.

Notes:

1. Measurements were performed with a spectrum analyzer.
2. During GFSK measurements the equipment was configured as shown in the block diagram of section 8 of this report. During Pi/4 DQPSK and 8DPSK measurements the device was controlled via software and connected directly to the spectrum analyzer.

6.1.2 RESULTS:

GFSK

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	0.64	0.19	0.34

Pi/4 DQPSK

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	0.36	-0.22	-0.33

8DPSK

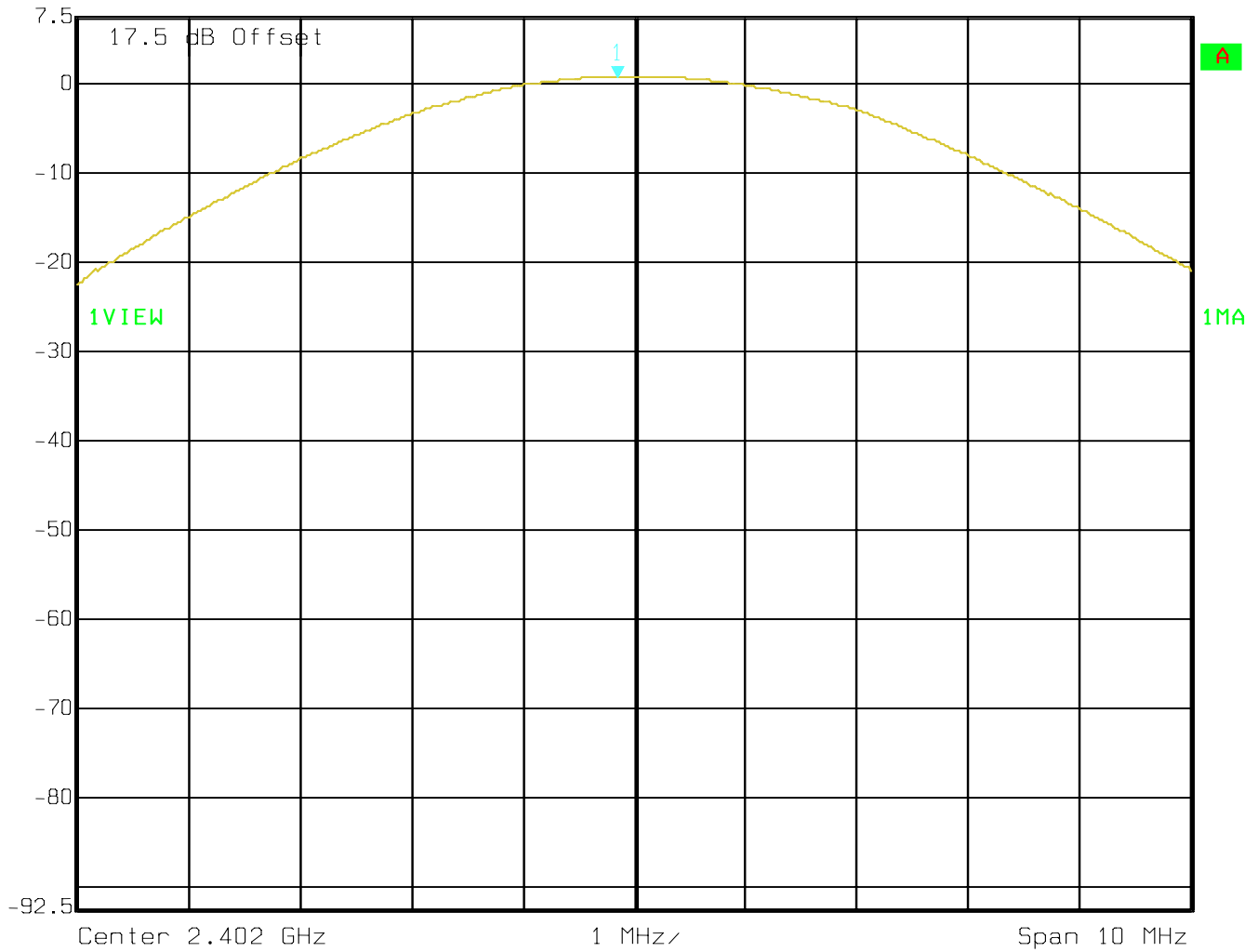
TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	0.61	0.06	-0.04



GFSK (2402 MHz)



Marker 1 [T1] RBW 3 MHz RF Att 20 dB
Ref Lvl 0.64 dBm VBW 3 MHz
7.5 dBm 2.40184970 GHz SWT 5 ms Unit dBm



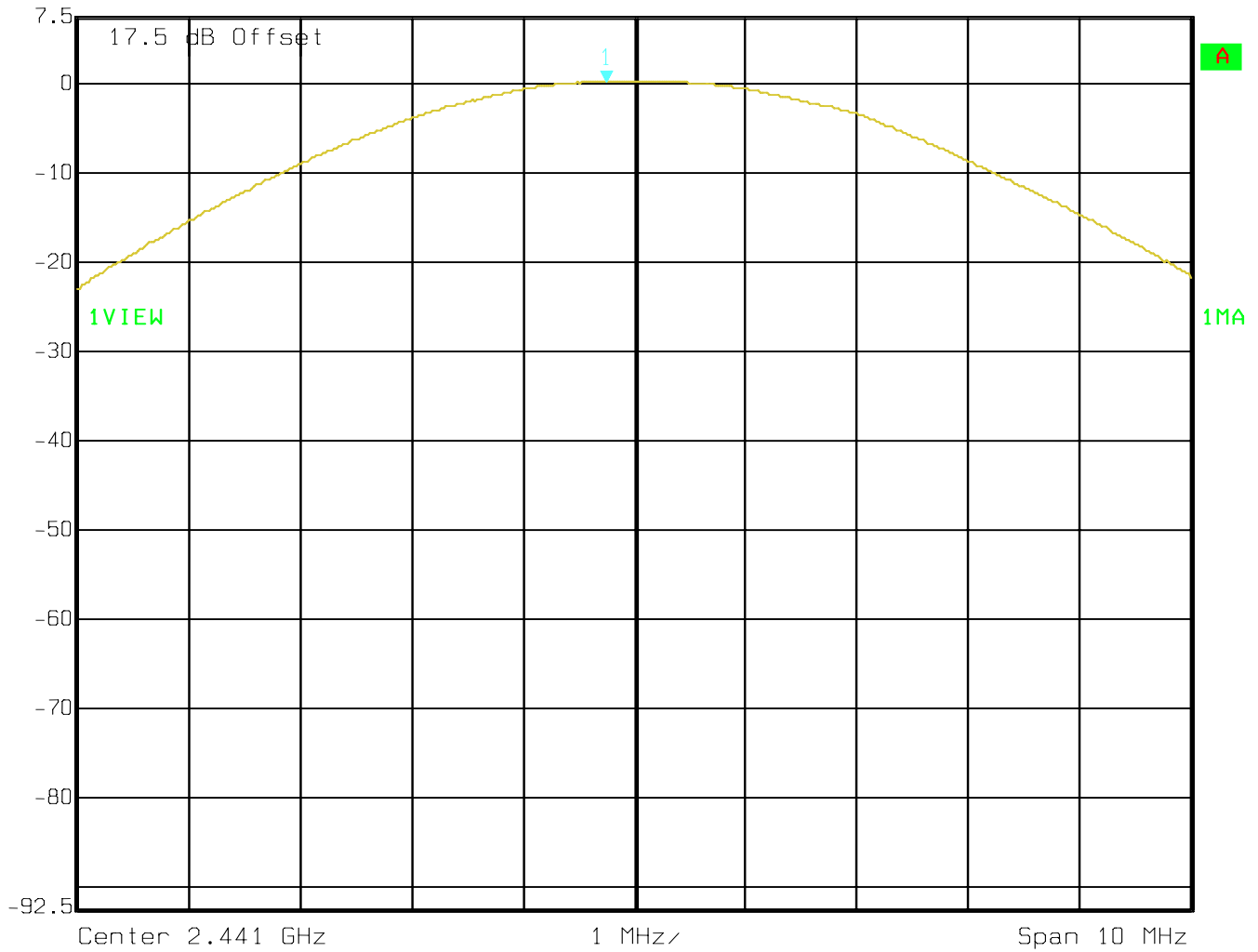
Date: 30.JAN.2007 11:35:59



GFSK (2441 MHz)



Marker 1 [T1] RBW 3 MHz RF Att 20 dB
Ref Lvl 0.19 dBm VBW 3 MHz
7.5 dBm 2.44074950 GHz SWT 5 ms Unit dBm



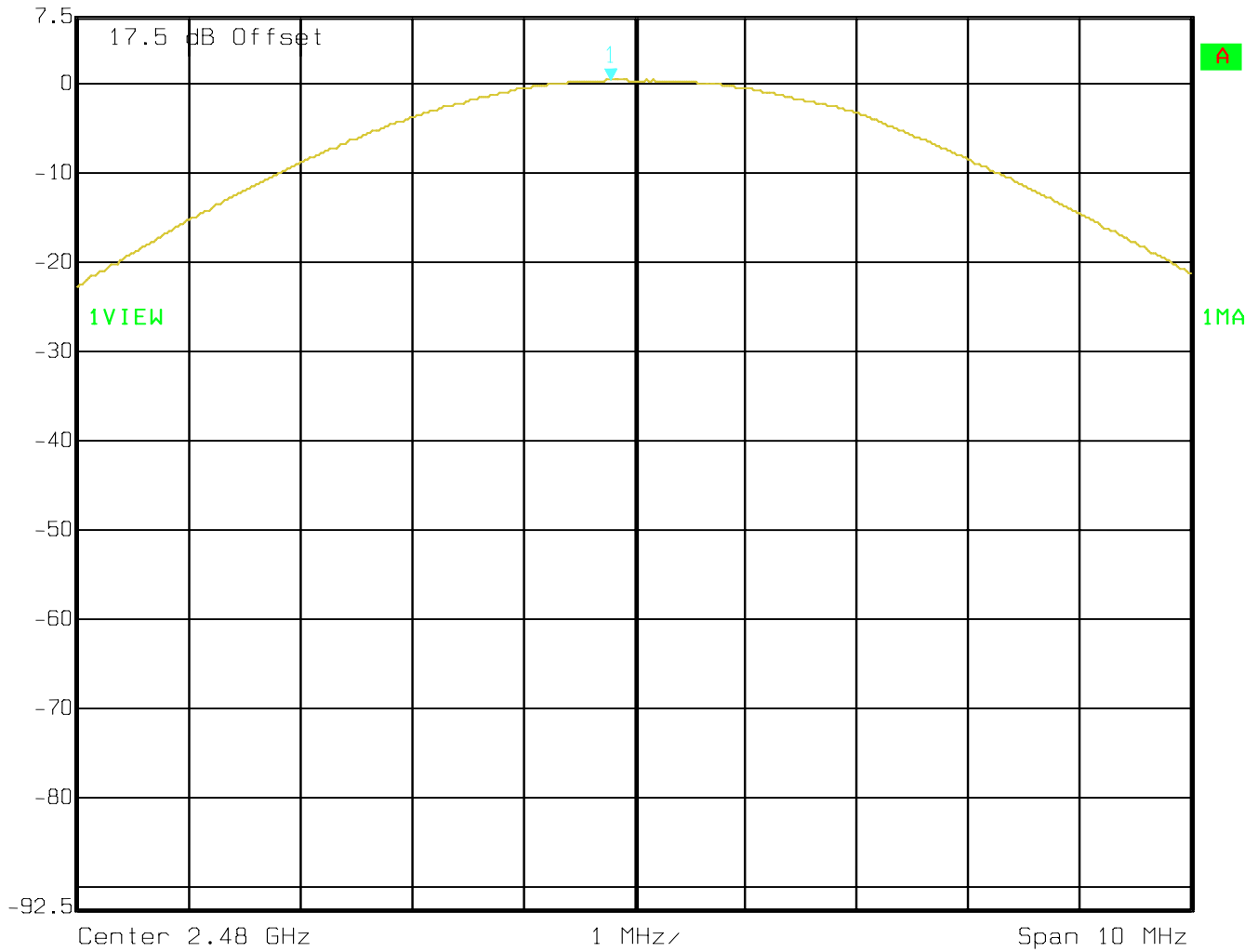
[



GFSK (2480 MHz)



Ref Lvl 7.5 dBm
Marker 1 [T1] 0.34 dBm
2.47978958 GHz
RBW 3 MHz
VBW 3 MHz
SWT 5 ms
RF Att 20 dB
Unit dBm

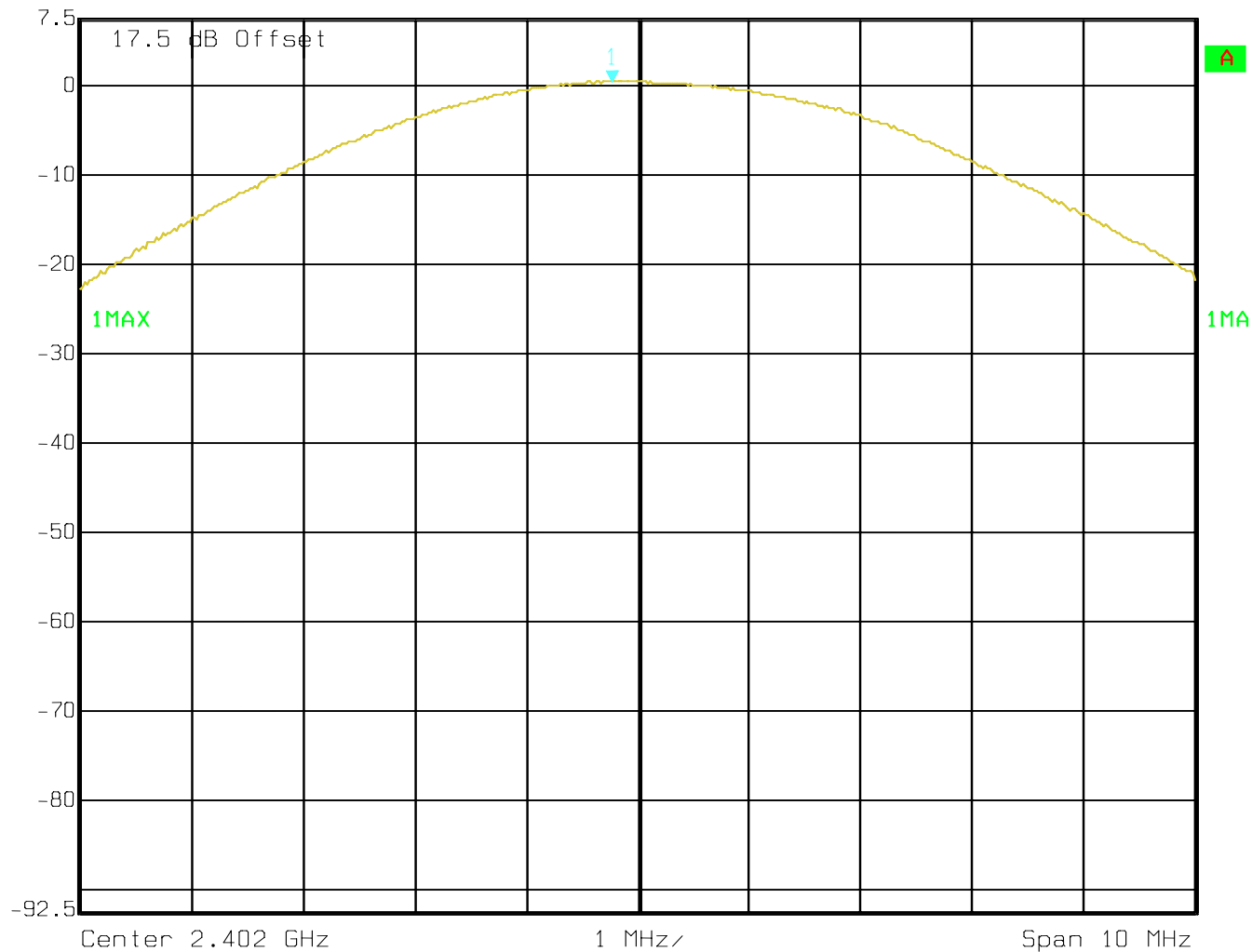


[



Pi/4 DQPSK (2402 MHz)

FS
 Marker 1 [T1] RBW 3 MHz RF Att 20 dB
 Ref Lvl 0.36 dBm VBW 3 MHz
 7.5 dBm 2.40176954 GHz SWT 5 ms Unit dBm

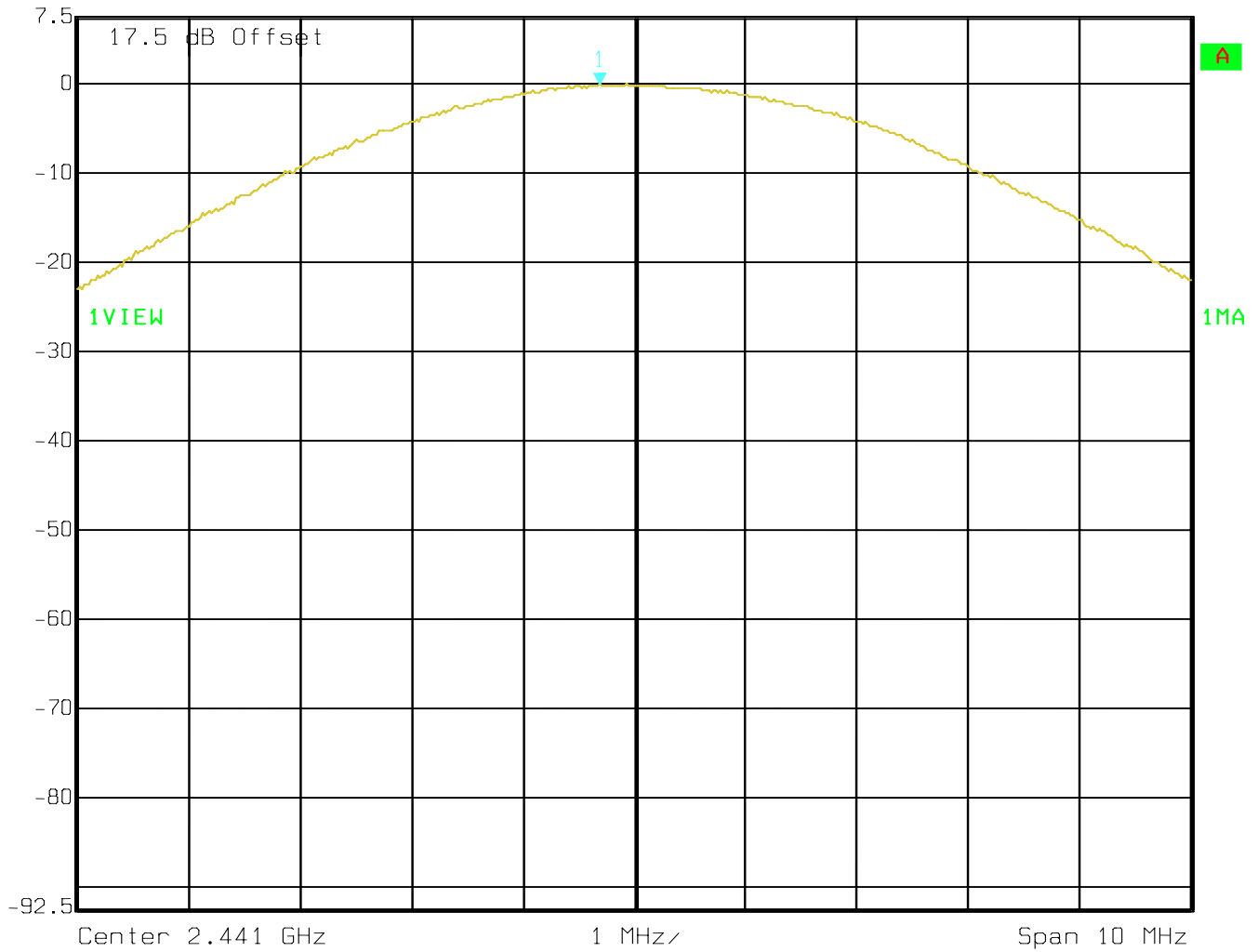


[



Pi/4 DQPSK (2441 MHz)

 Marker 1 [T1] RBW 3 MHz RF Att 20 dB
Ref Lvl -0.22 dBm VBW 3 MHz
7.5 dBm 2.44068938 GHz SWT 5 ms Unit dBm

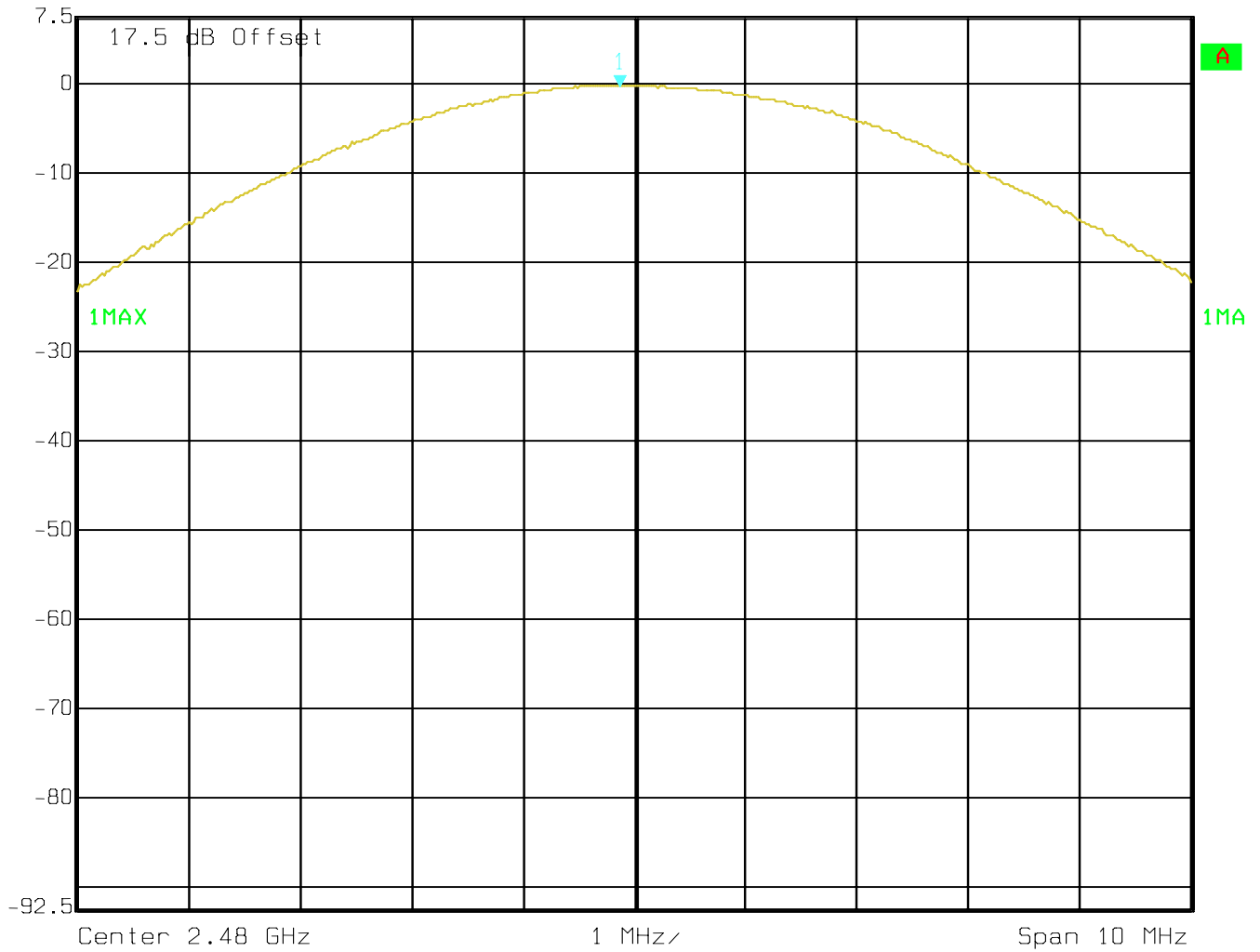


[



Pi/4 DQPSK (2480 MHz)


 Ref Lvl 7.5 dBm
 Marker 1 [T1] -0.33 dBm
 2.47986974 GHz
 RBW 3 MHz RF Att 20 dB
 VBW 3 MHz
 SWT 5 ms Unit dBm



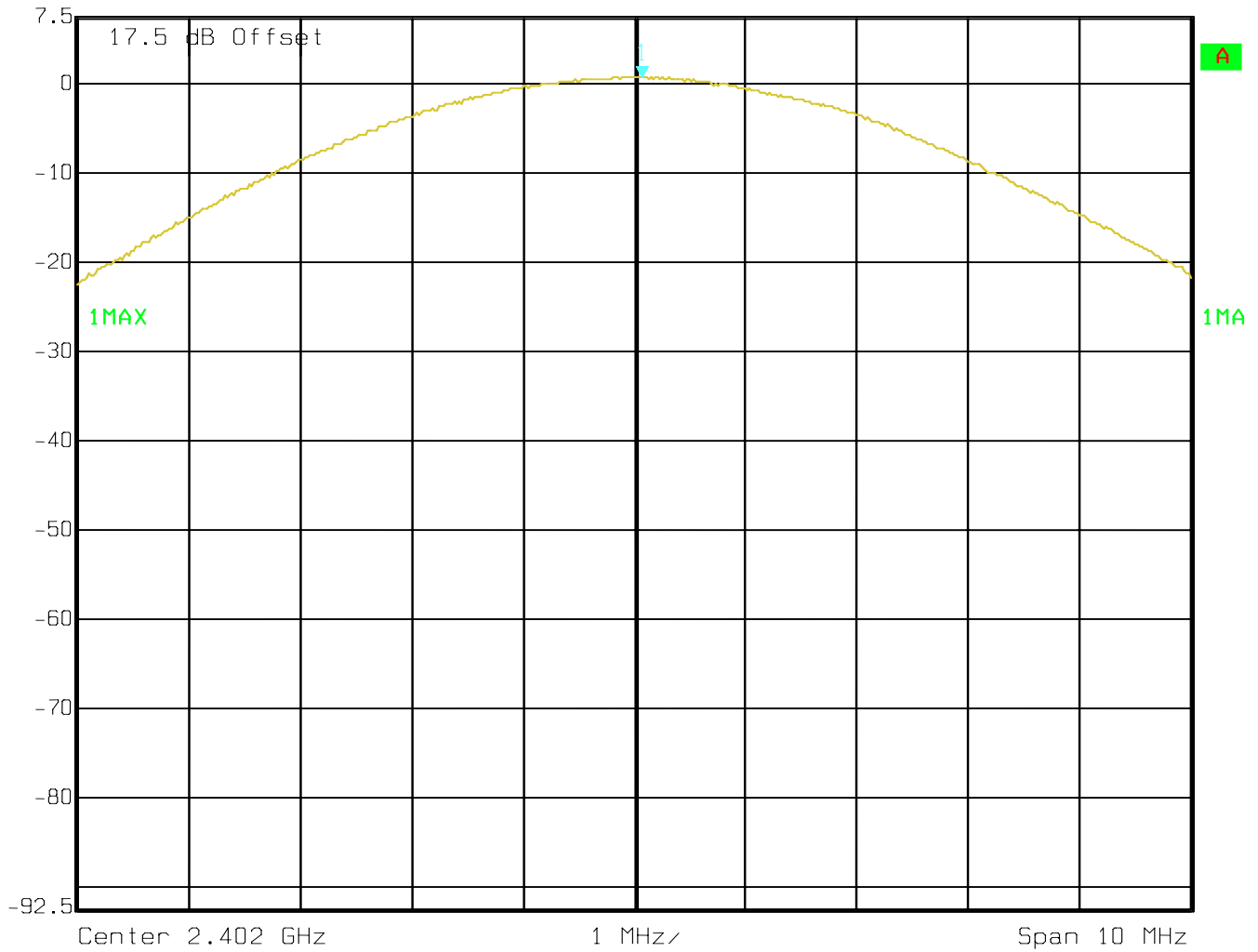
[



8DPSK (2402 MHz)



Ref Lvl 7.5 dBm
Marker 1 [T1] 0.61 dBm
2.40207014 GHz
RBW 3 MHz RF Att 20 dB
VBW 3 MHz
SWT 5 ms Unit dBm



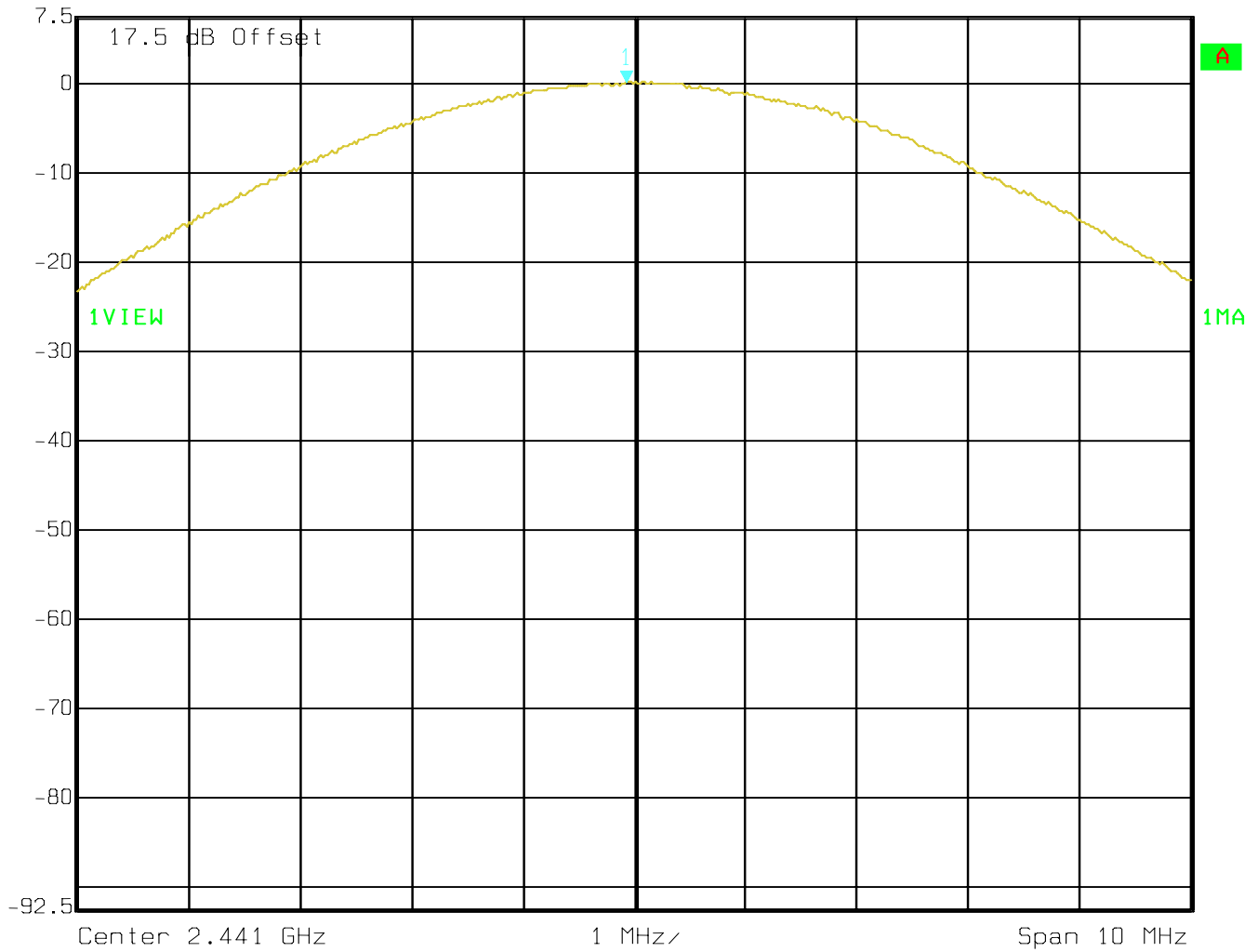
[



8DPSK (2441 MHz)



Ref Lvl 7.5 dBm
Marker 1 [T1] 0.06 dBm
2.44092986 GHz
RBW 3 MHz RF Att 20 dB
VBW 3 MHz
SWT 5 ms Unit dBm

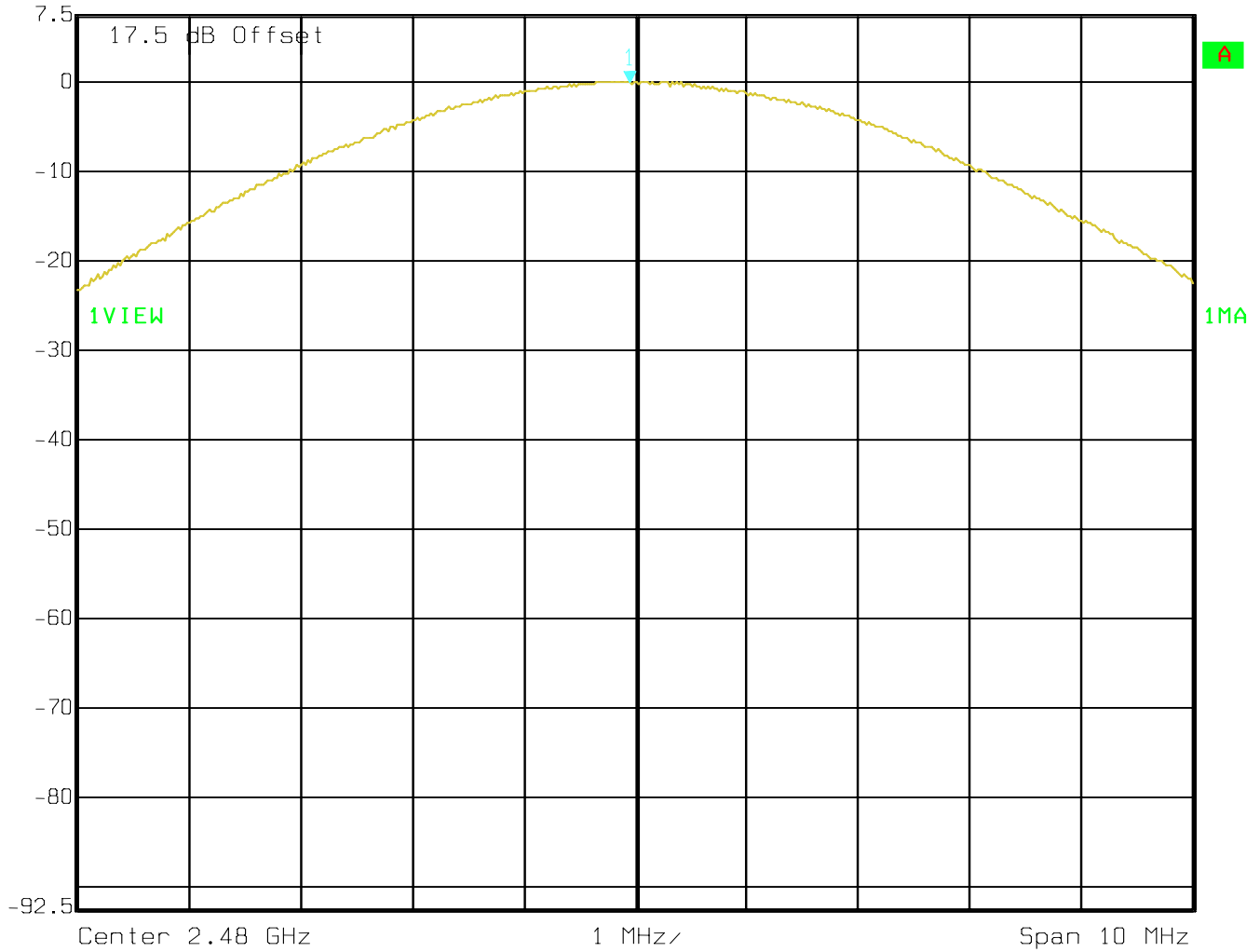




8DPSK (2480 MHz)



Ref Lvl 7.5 dBm
Marker 1 [T1] -0.04 dBm
2.47994990 GHz
RBW 3 MHz RF Att 20 dB
VBW 3 MHz
SWT 5 ms Unit dBm



[



6.2 20dB BANDWIDTH

Notes:

1. Measurements were performed with a spectrum analyzer.
2. During GFSK measurements the equipment was configured as shown in the block diagram of section 8 of this report. During Pi/4 DQPSK and 8DPSK measurements the device was controlled via software and connected directly to the spectrum analyzer.

6.2.1 RESULTS:

GFSK

TEST CONDITIONS		BANDWIDTH (MHz)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
$T_{nom}(23)^{\circ}C$	V_{nom} VDC	961.9	961.9	961.9

Pi/4 DQPSK

TEST CONDITIONS		BANDWIDTH (MHz)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
$T_{nom}(23)^{\circ}C$	V_{nom} VDC	1238.5	1234.5	1246.5

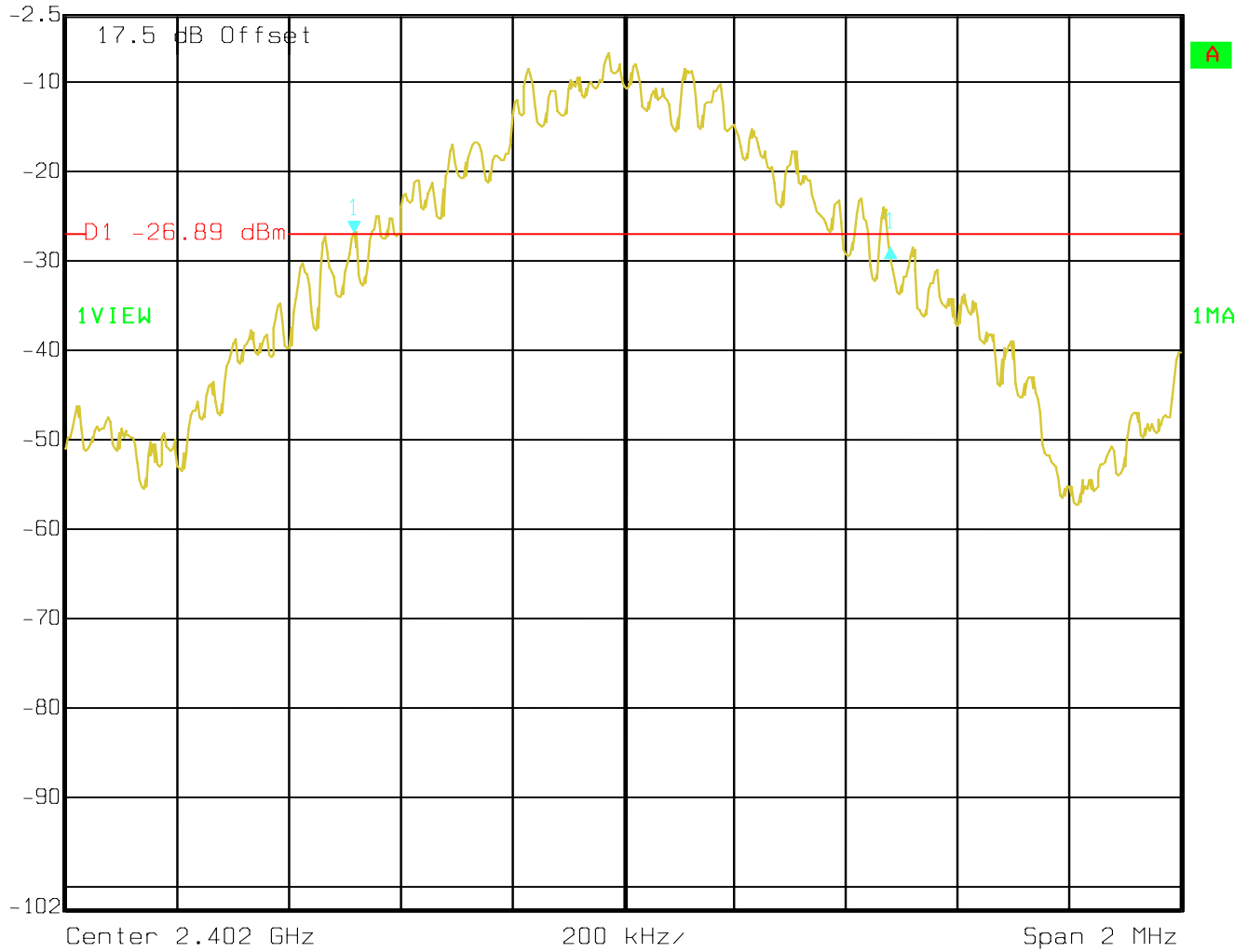
8DPSK

TEST CONDITIONS		BANDWIDTH (MHz)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
$T_{nom}(23)^{\circ}C$	V_{nom} VDC	1210.4	1210.4	1210.4



GFSK (2402 MHz)

 Delta 1 [T1] RBW 10 kHz RF Att 10 dB
Ref Lvl -2.5 dBm -1.61 dB VBW 10 kHz
961.92384769 kHz SWT 50 ms Unit dBm

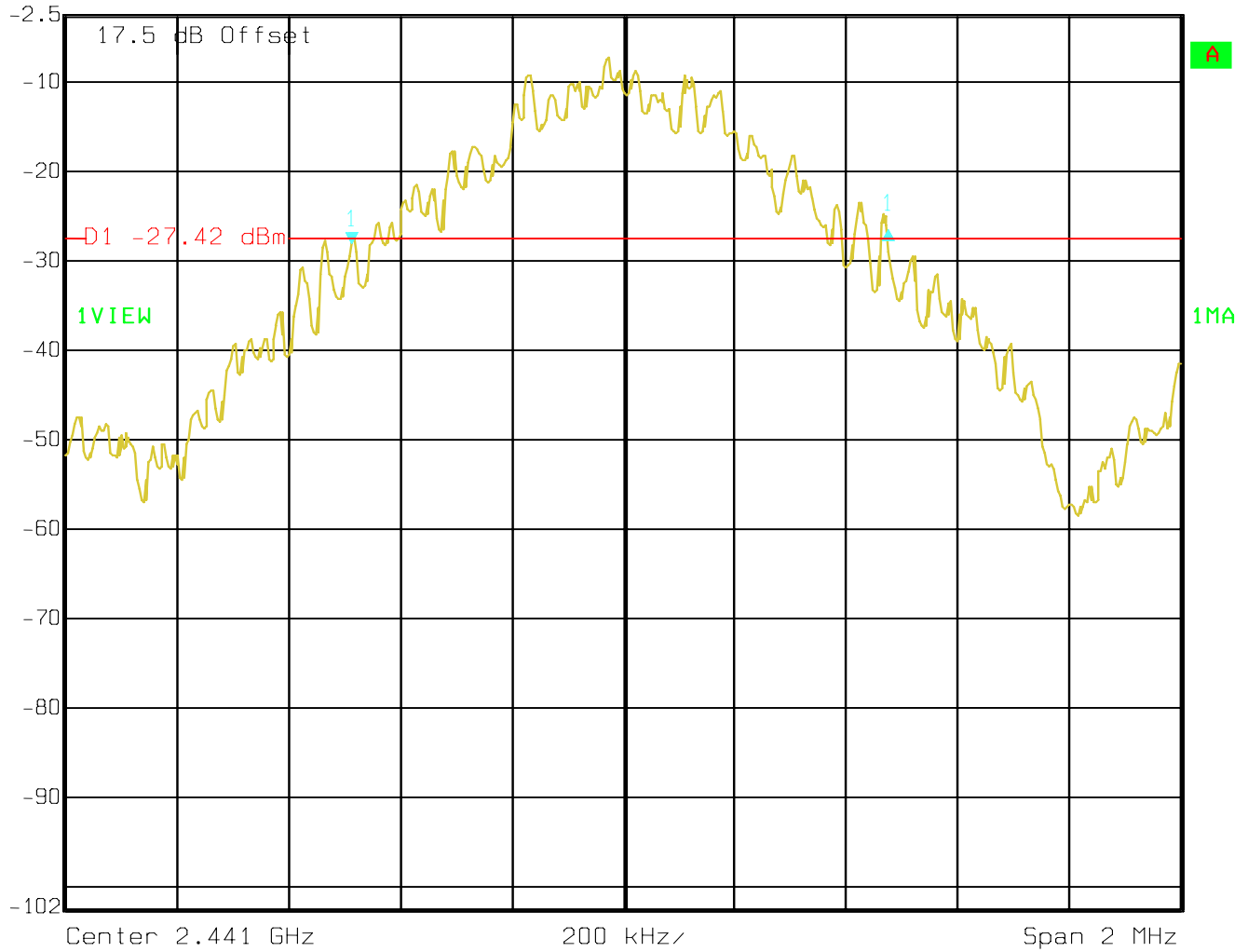


[



GFSK (2441 MHz)

 Delta 1 [T1] RBW 10 kHz RF Att 10 dB
Ref Lvl 1.95 dB VBW 10 kHz
-2.5 dBm 961.92384769 kHz SWT 50 ms Unit dBm

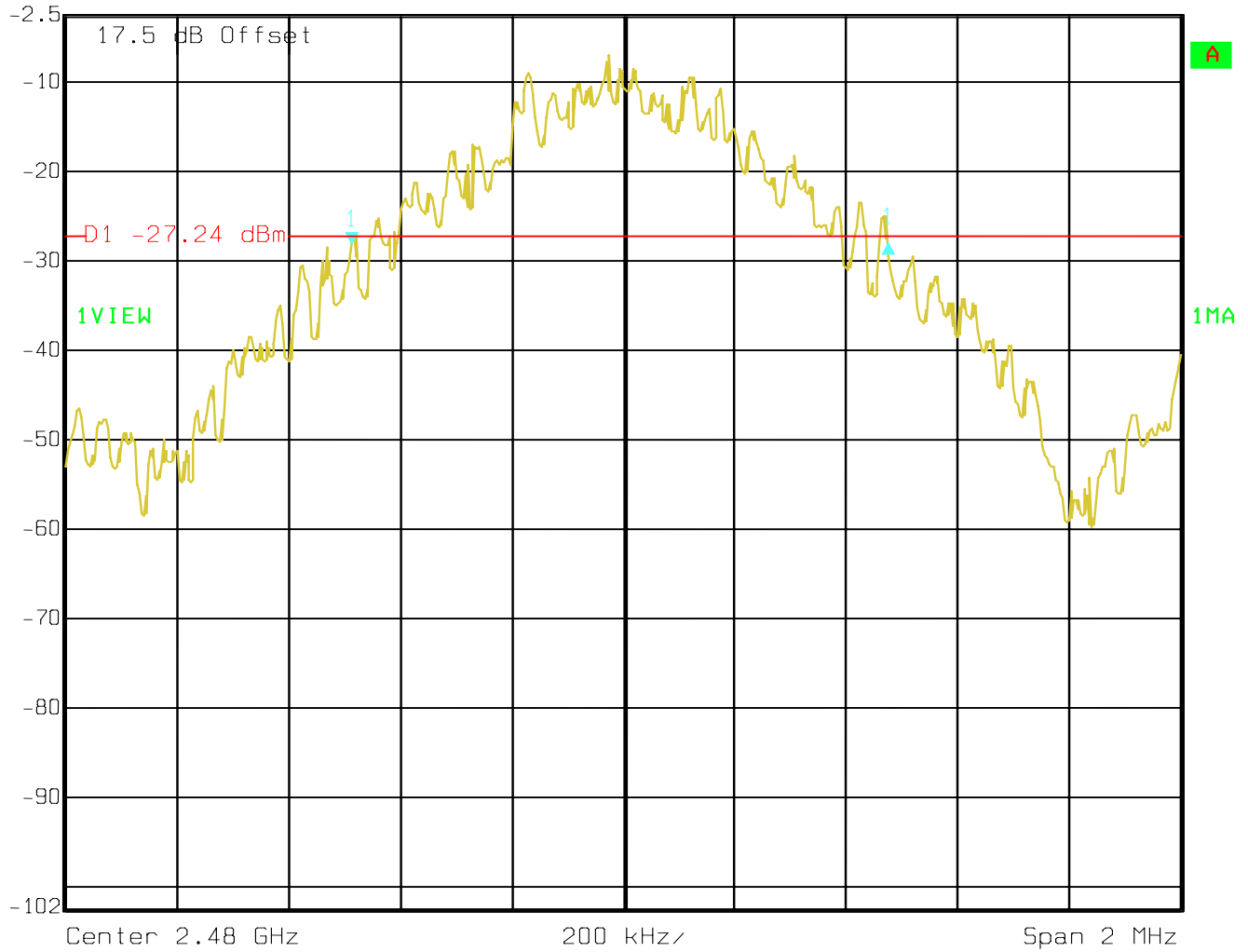


[



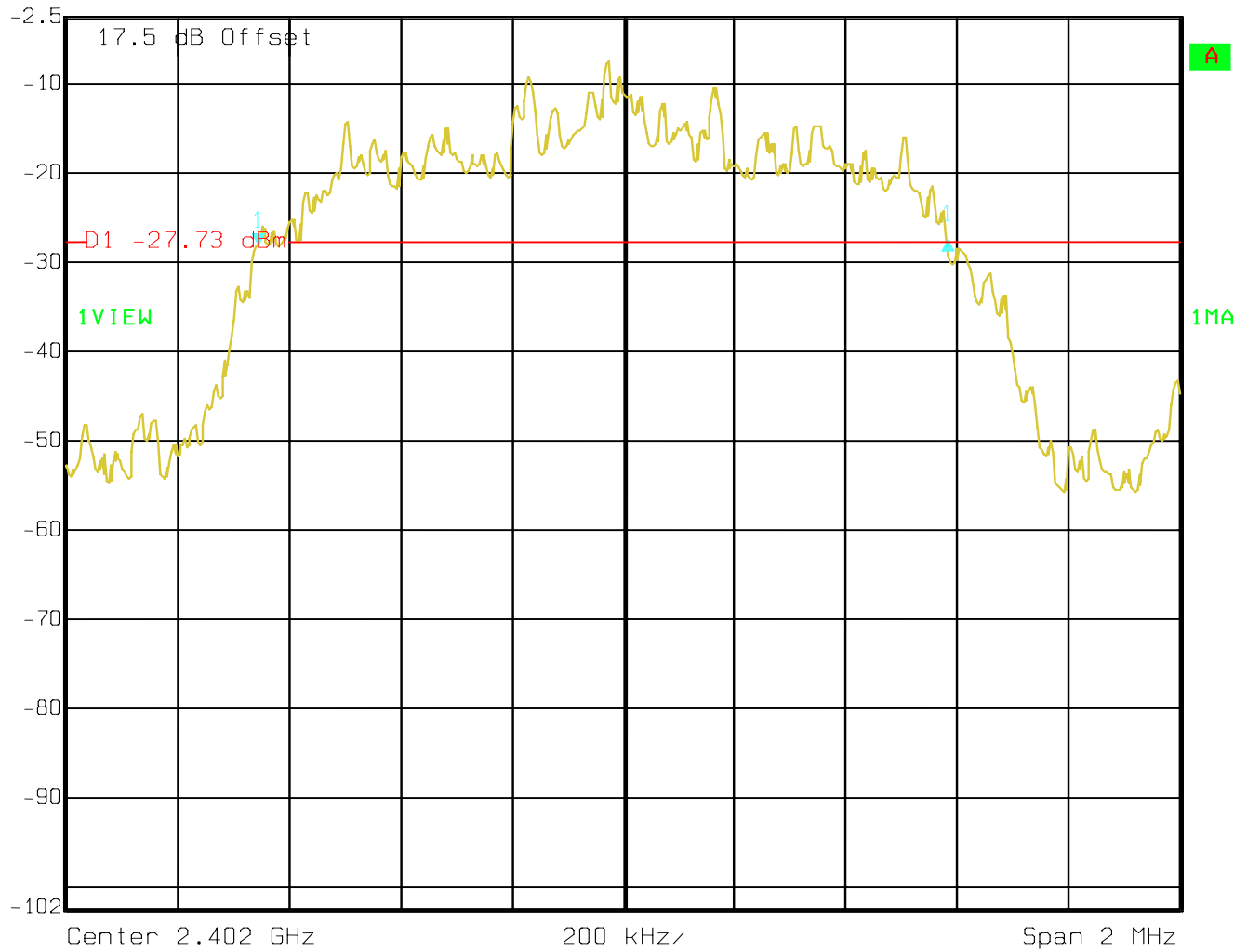
GFSK (2480 MHz)

 Delta 1 [T1] RBW 10 kHz RF Att 10 dB
Ref Lvl 0.22 dB VBW 10 kHz
-2.5 dBm 961.92384769 kHz SWT 50 ms Unit dBm



Pi/4 DQPSK (2402 MHz)

 Delta 1 [T1] RBW 10 kHz RF Att 10 dB
Ref Lvl 0.65 dB VBW 10 kHz
-2.5 dBm 1.23847695 MHz SWT 50 ms Unit dBm

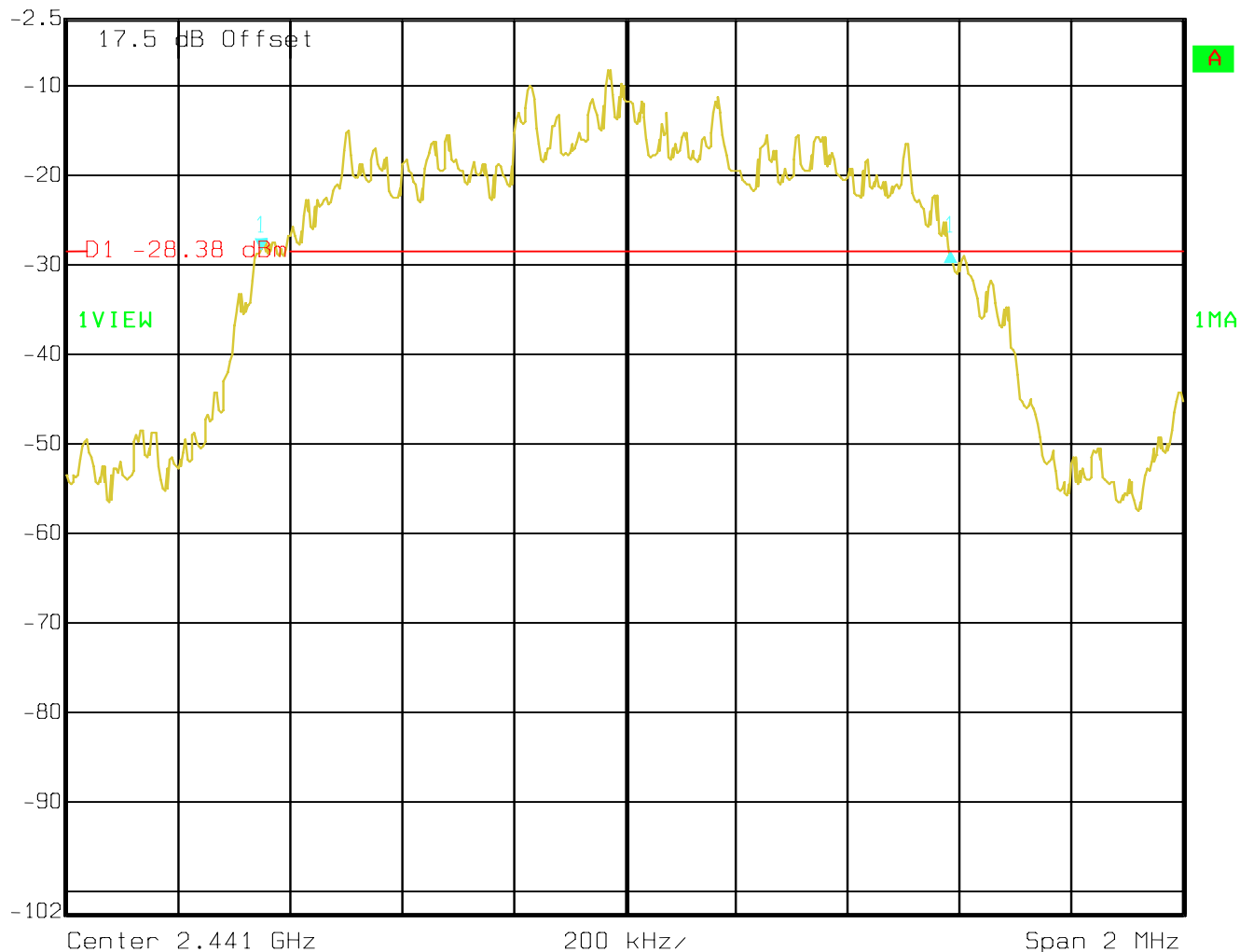




Pi/4 DQPSK (2441 MHz)



Delta 1 [T1] RBW 10 kHz RF Att 10 dB
Ref Lvl -0.02 dB VBW 10 kHz
-2.5 dBm 1.23446894 MHz SWT 50 ms Unit dBm

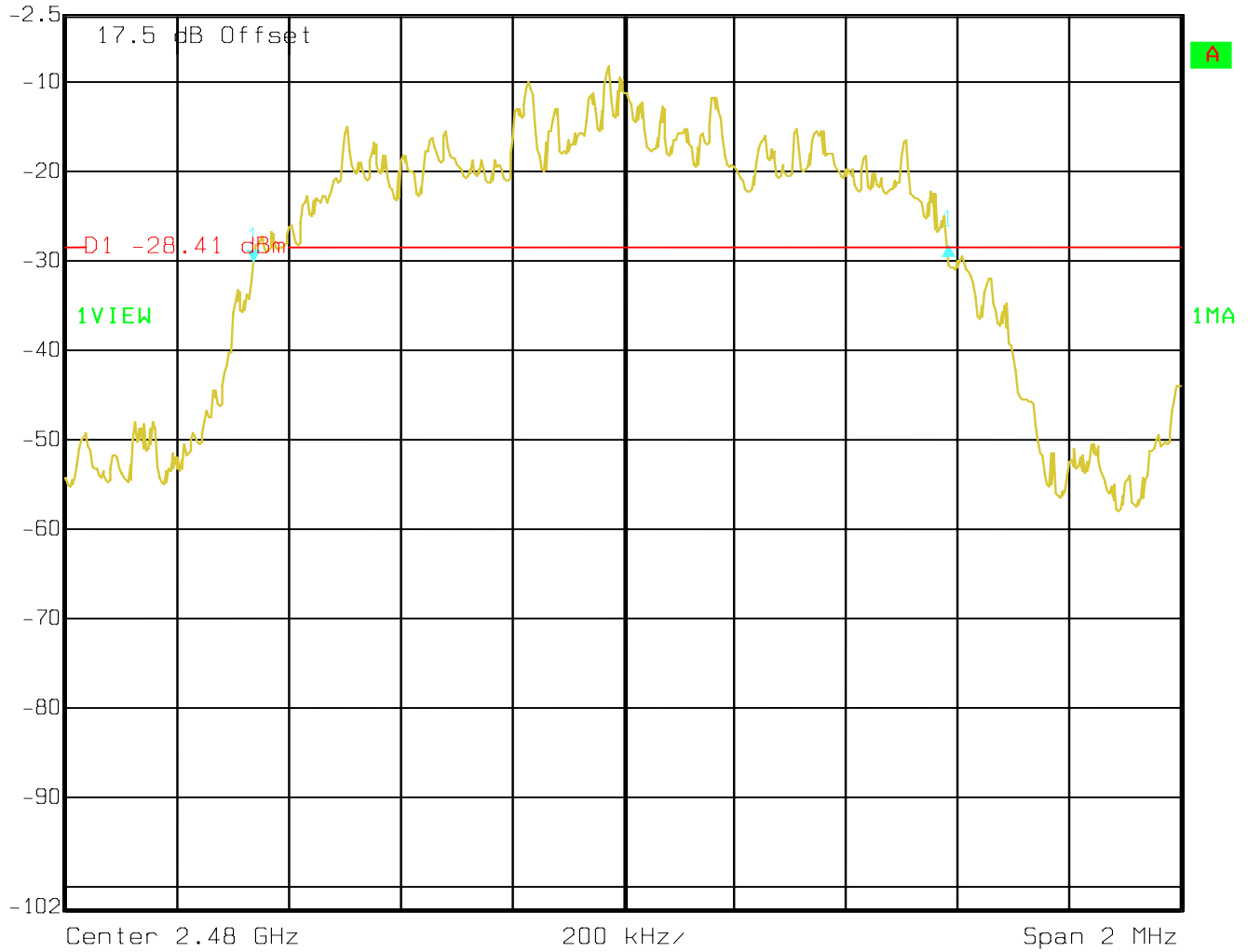




Pi/4 DQPSK (2480 MHz)



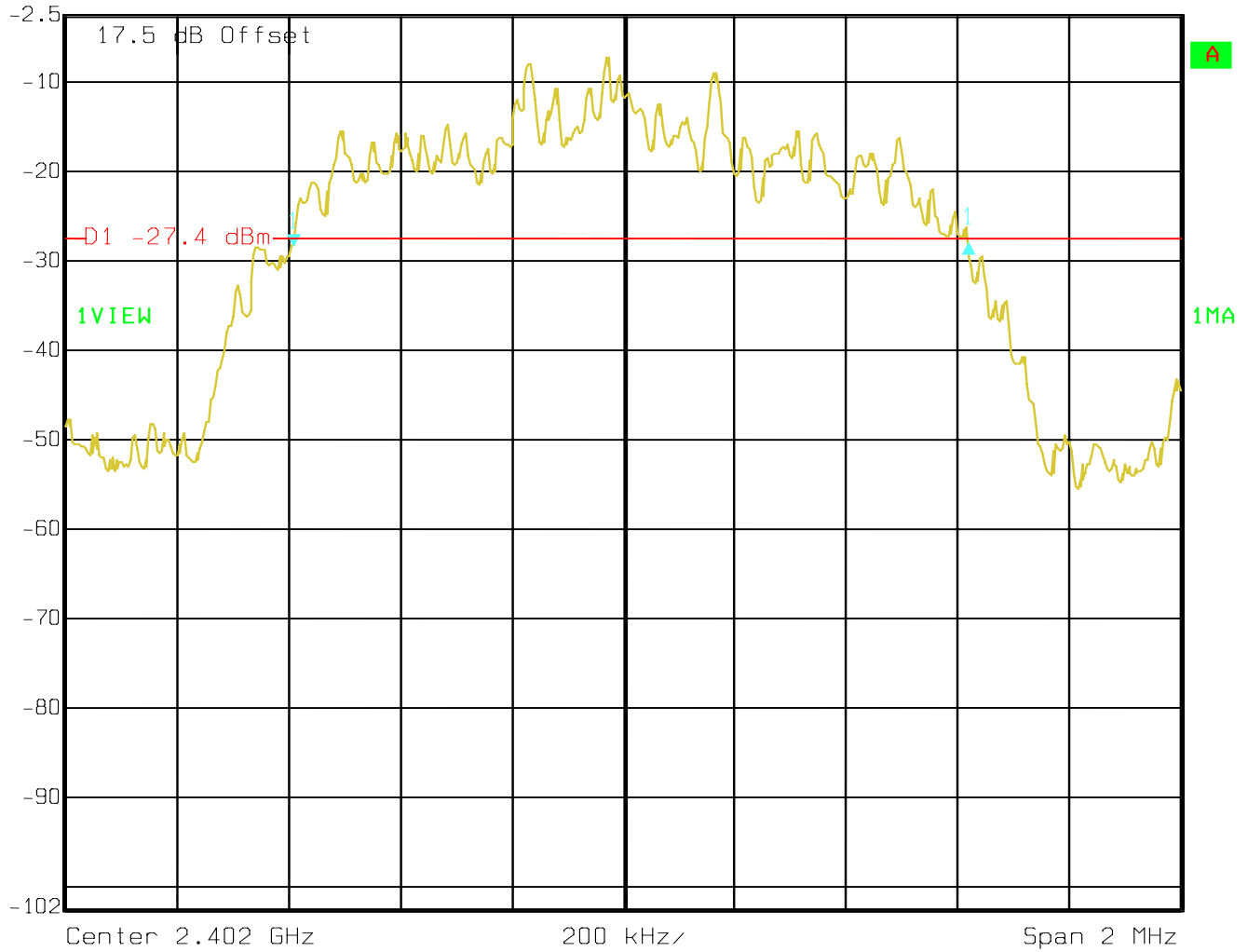
Delta 1 [T1] RBW 10 kHz RF Att 10 dB
Ref Lvl 2.11 dB VBW 10 kHz
-2.5 dBm 1.24649299 MHz SWT 50 ms Unit dBm





8DPSK (2402 MHz)

 Delta 1 [T1] RBW 10 kHz RF Att 10 dB
Ref Lvl 0.67 dB VBW 10 kHz
-2.5 dBm 1.21042084 MHz SWT 50 ms Unit dBm

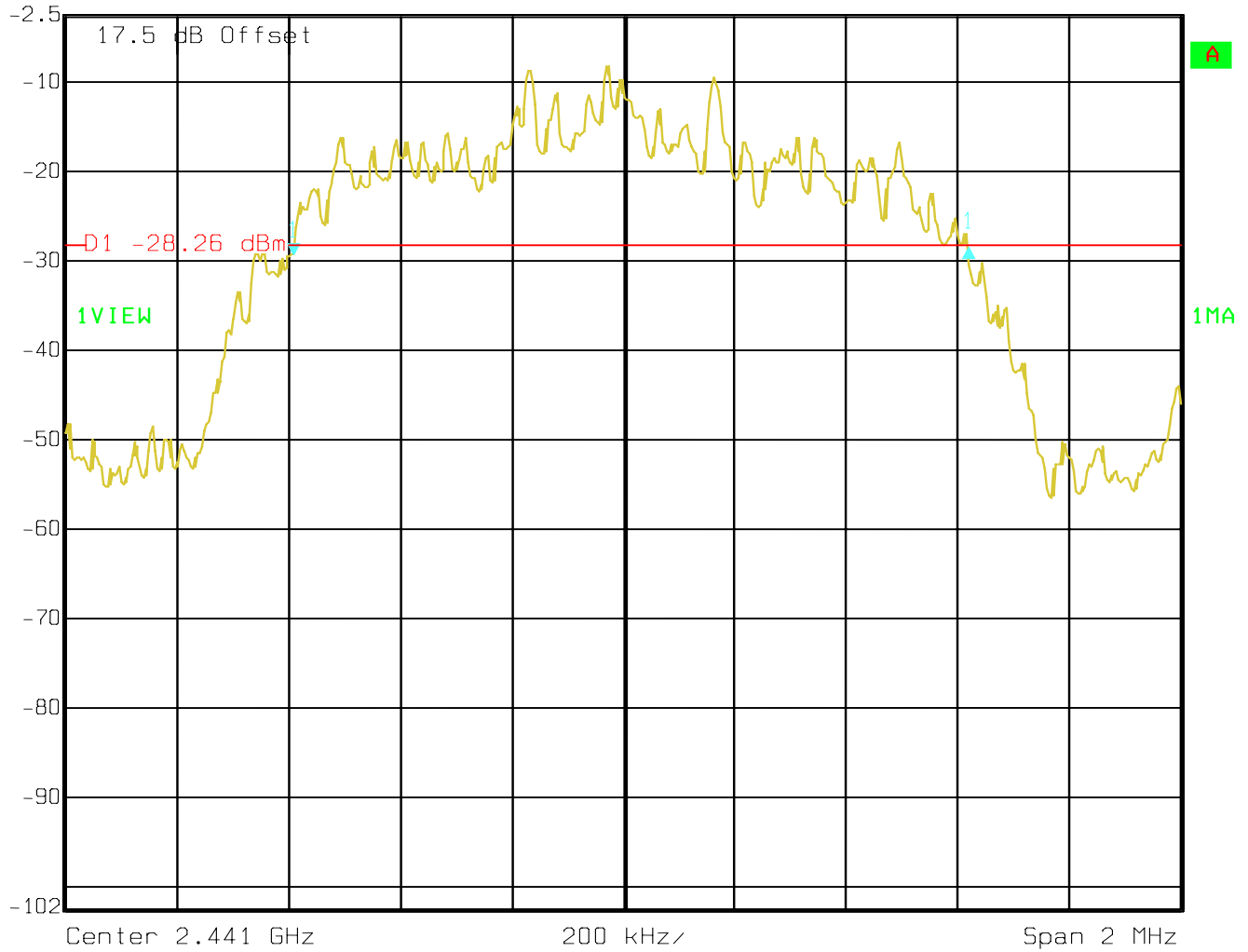


[



8DPSK (2441 MHz)

 Delta 1 [T1] RBW 10 kHz RF Att 10 dB
Ref Lvl 0.82 dB VBW 10 kHz
-2.5 dBm 1.21042084 MHz SWT 50 ms Unit dBm



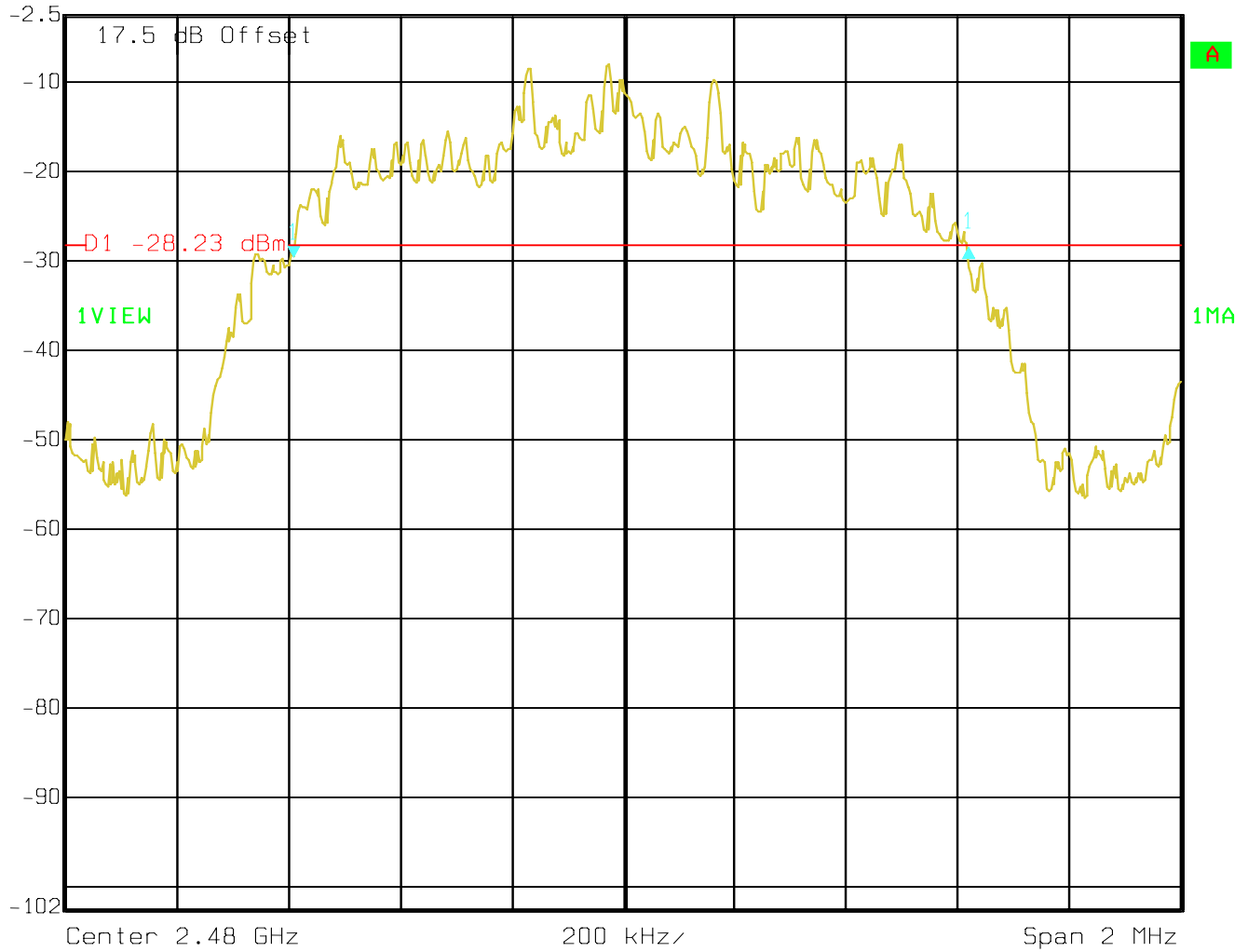
[



8DPSK (2480 MHz)



Delta 1 [T1] RBW 10 kHz RF Att 10 dB
Ref Lvl 1.34 dB VBW 10 kHz
-2.5 dBm 1.21042084 MHz SWT 50 ms Unit dBm





6.3 EMISSION LIMITATIONS

§ 15.247 (c) (1)

Transmitter (Conducted)

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, which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

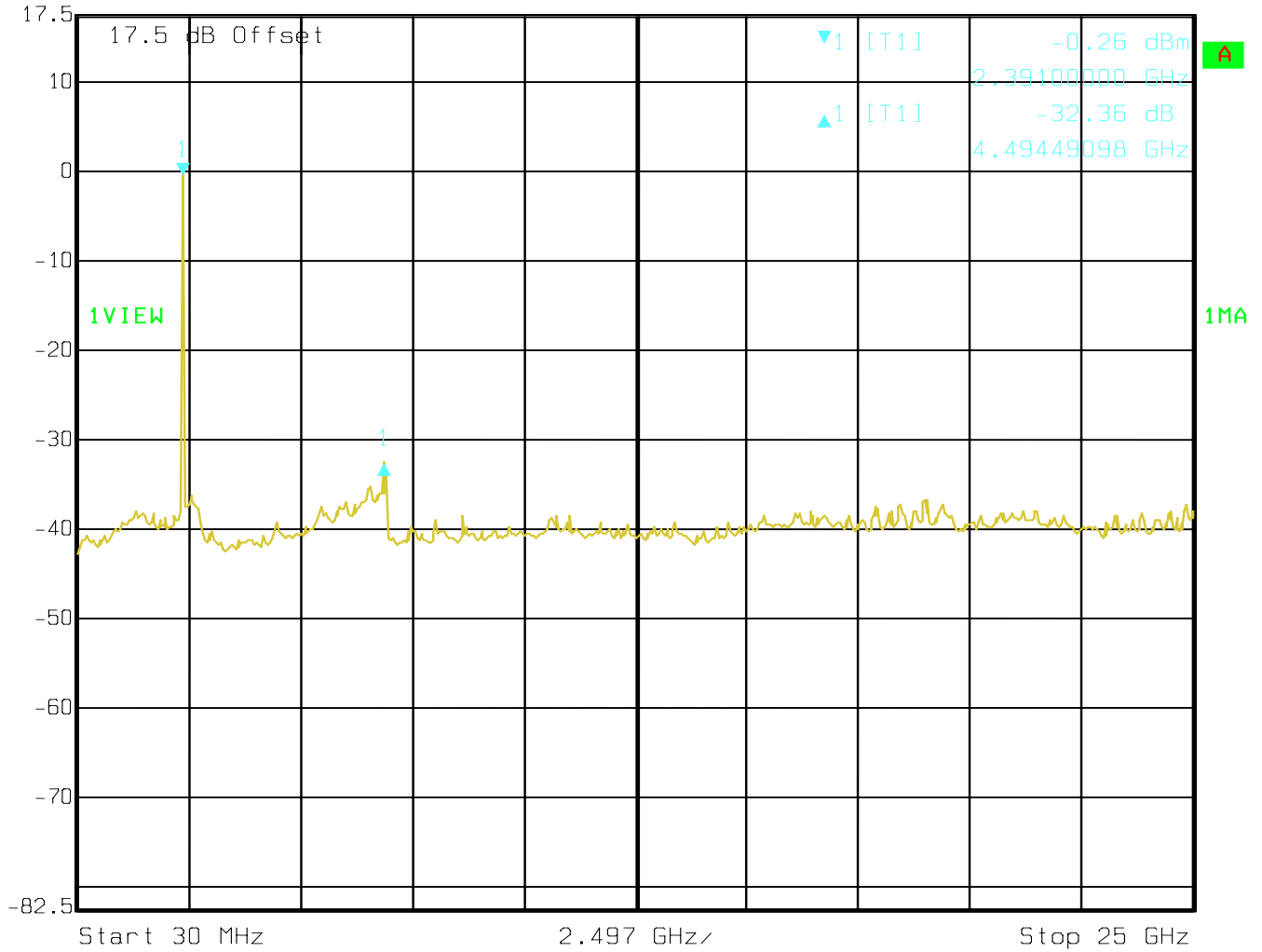
Notes:

1. Measurements were performed with a spectrum analyzer.
2. During measurements the equipment was configured as shown in the block diagram of section 8 of this report.



(2402 MHz)

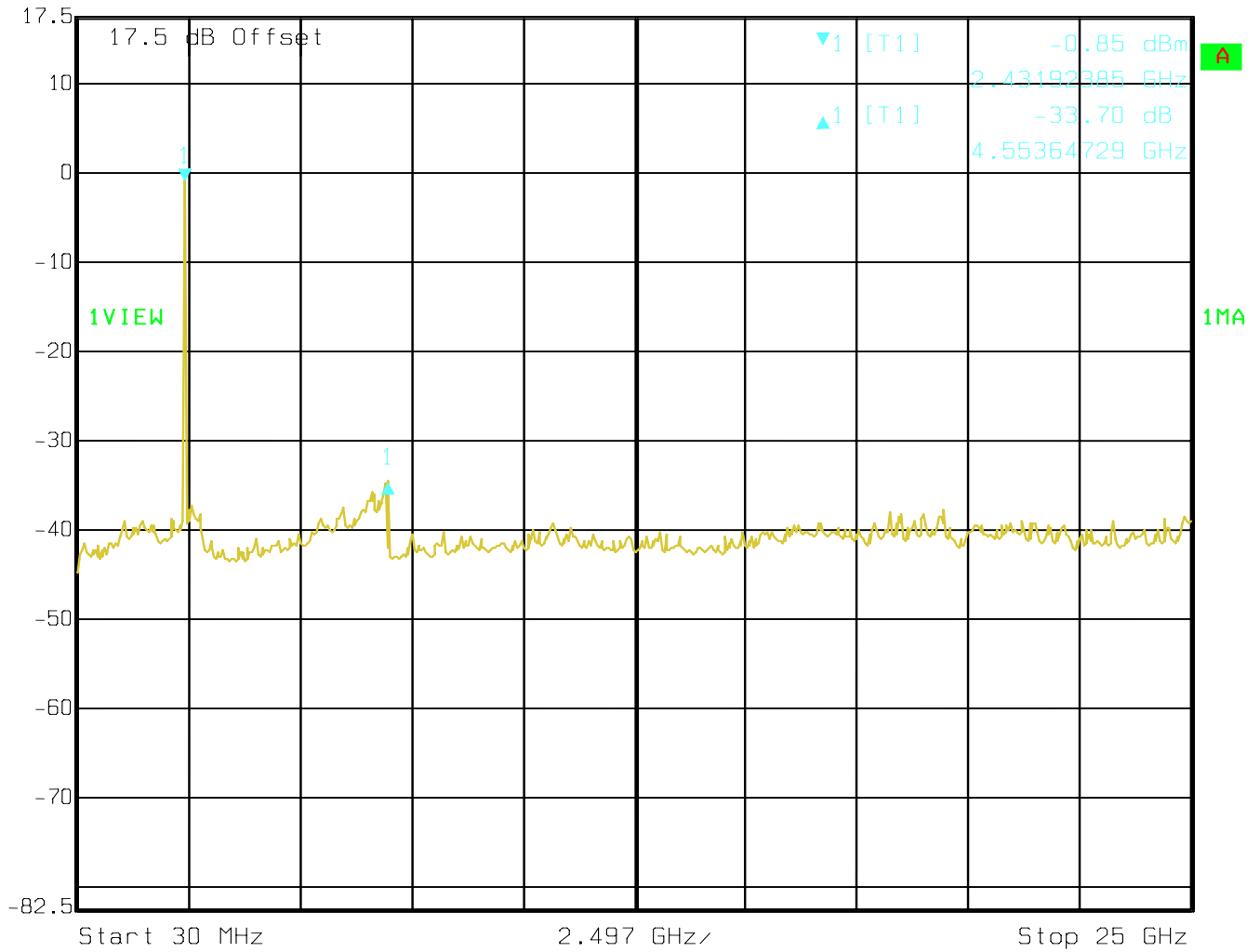
	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
	Ref Lvl	-32.36 dB	VBW	100 kHz	
	17.5 dBm	4.49449098 GHz	SWT	6.4 s	Unit dBm





(2441 MHz)

	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
	Ref Lvl	-33.70 dB	VBW	100 kHz	
	17.5 dBm	4.55364729 GHz	SWT	6.4 s	Unit dBm

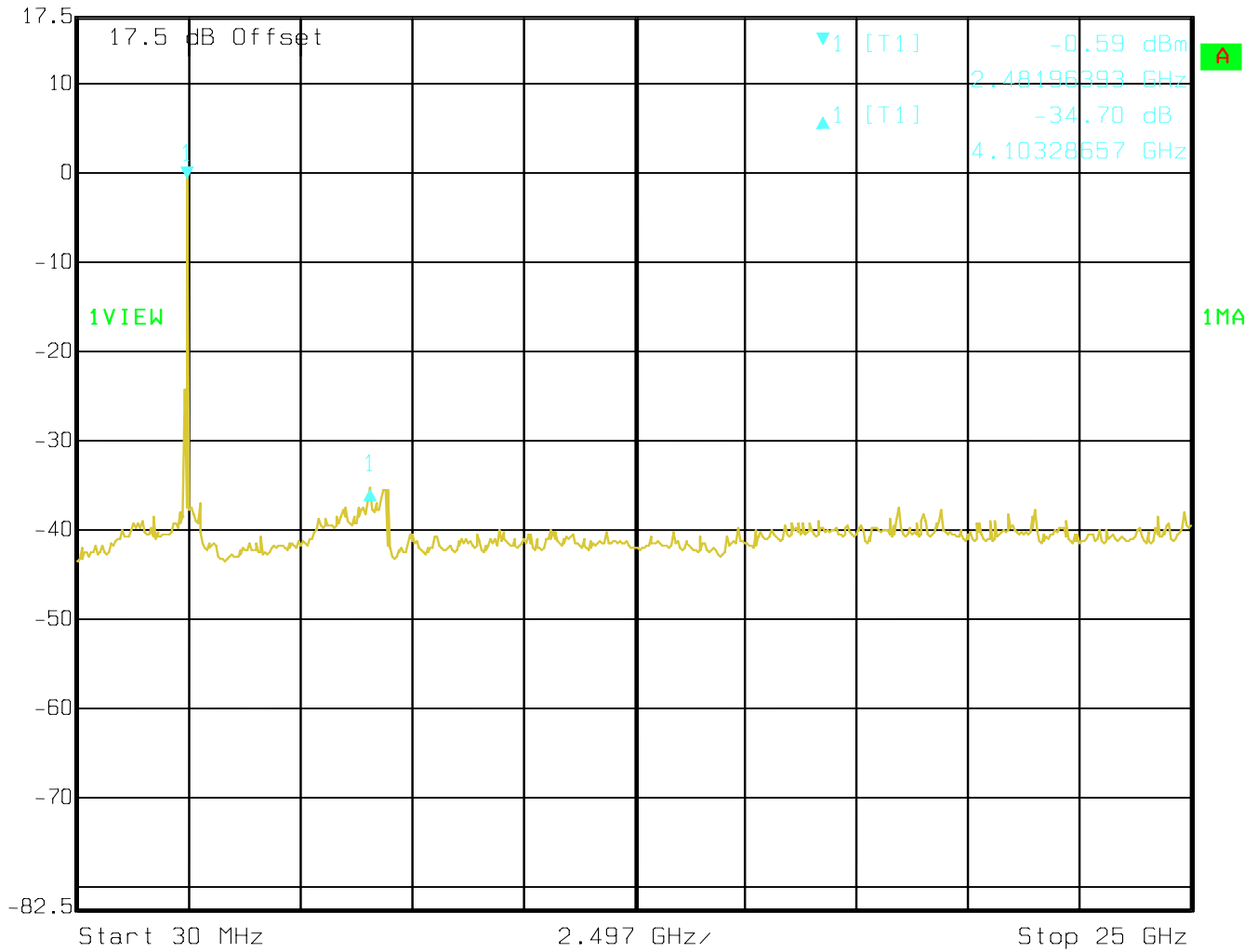


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(2480 MHz)

 Ref Lvl 17.5 dBm Delta 1 [T1] -34.70 dB RBW 100 kHz RF Att 30 dB
4.10328657 GHz VBW 100 kHz Unit dBm
SWT 6.4 s



6.4 CARRIER FREQUENCY SEPARATION

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

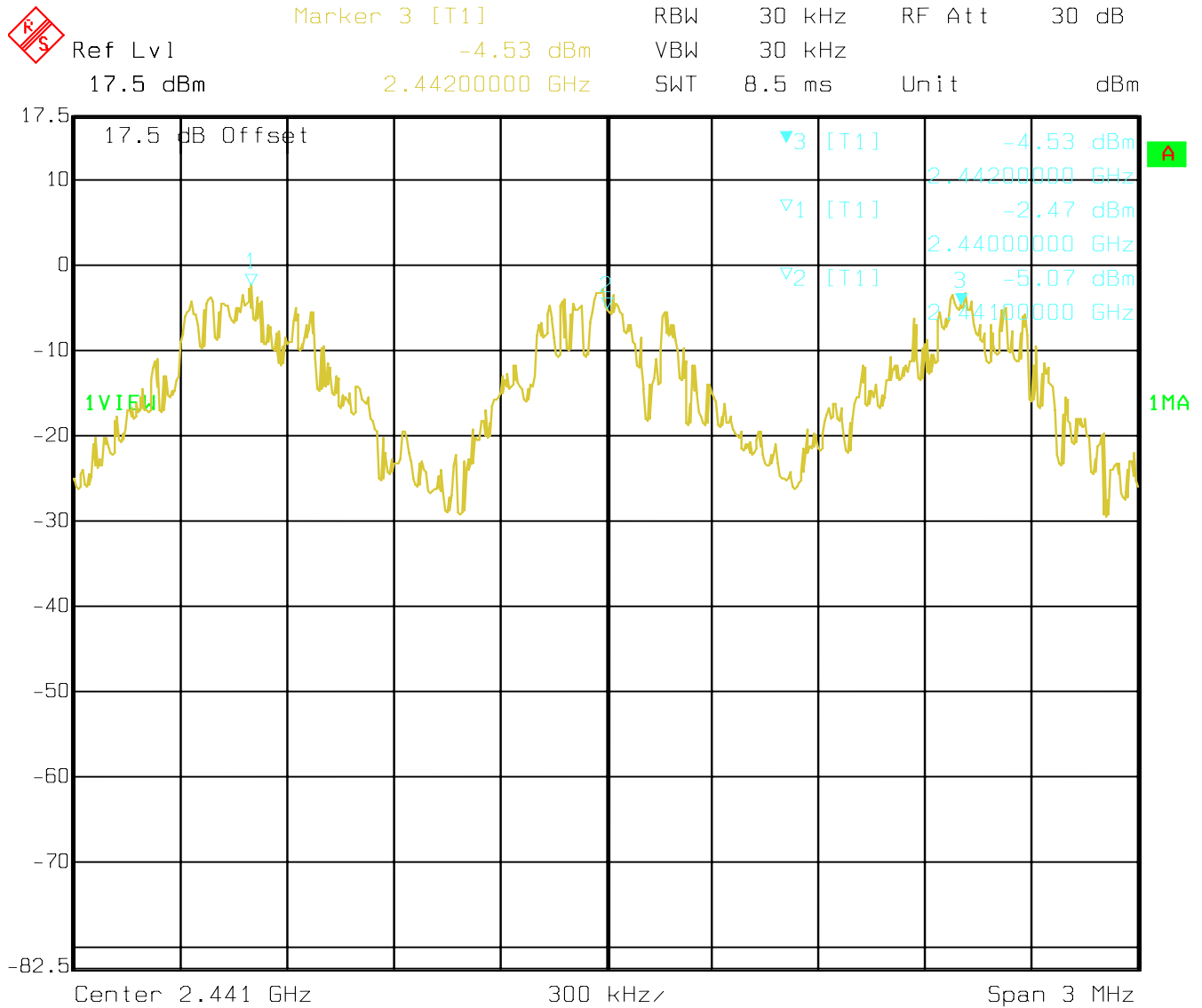
(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies 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.

Notes:

1. Measurements were performed with a spectrum analyzer.
2. During measurements the equipment was configured as shown in the block diagram of section 8 of this report.

6.4.2 RESULTS:

TEST CONDITIONS		SEPARATION (MHz)
$T_{nom}(23)^{\circ}C$	$V_{nom} VDC$	1.0



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6.5 NUMBER OF HOPPING CHANNELS

6.5.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (iii)

NUMBER OF CHANNELS
> 15

Notes:

1. Measurements were performed with a spectrum analyzer.
2. During measurements the equipment was configured as shown in the block diagram of section 8 of this report.

6.5.2 RESULTS:

TEST CONDITIONS		NUMBER OF CHANNELS
T _{nom} (23)°C	V _{nom} VDC	79

Test Report #: EMC_ACIHO_010_06002_FCC15_247BT

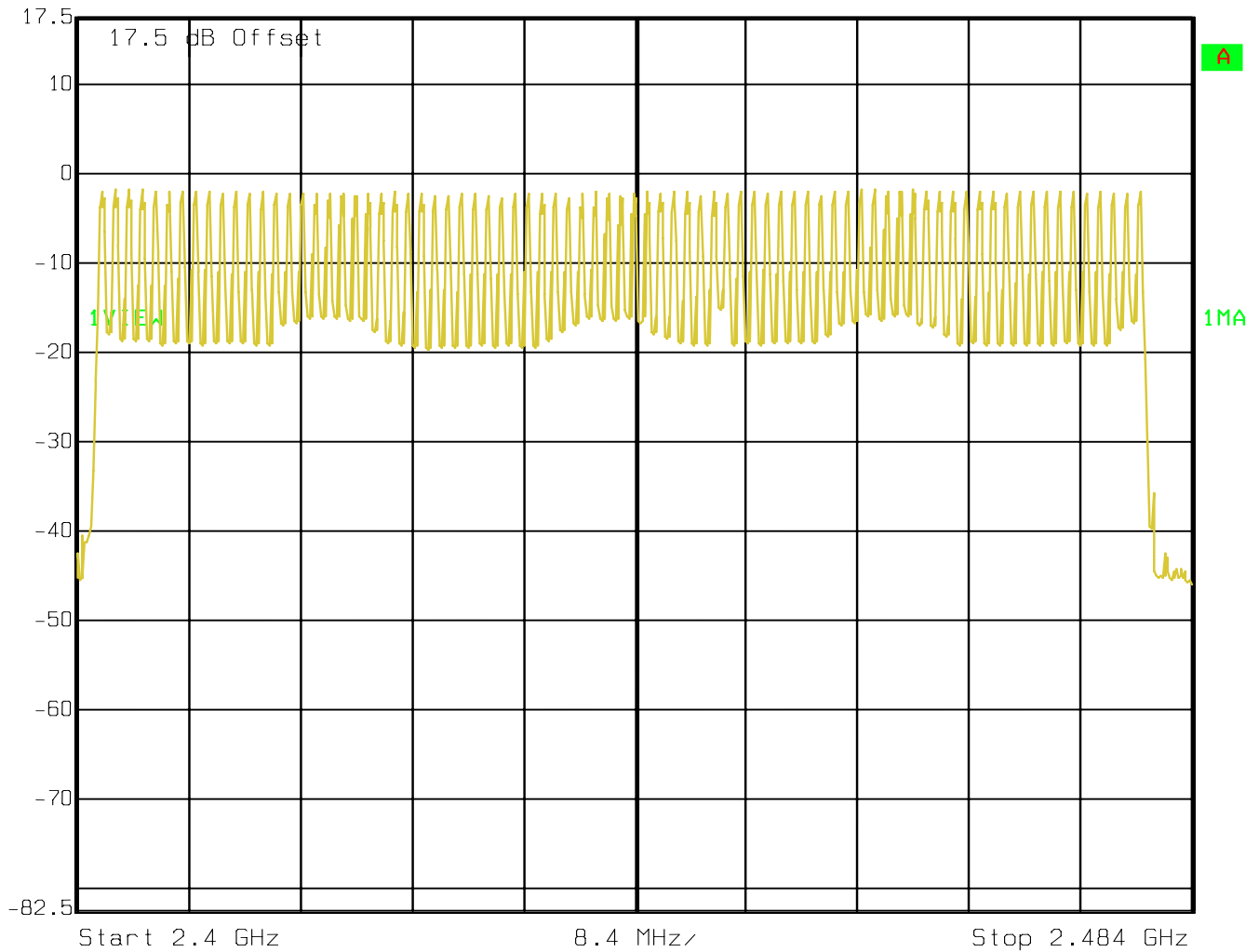
Date of Report : 2/6/2007

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Ref Lvl
17.5 dBm

RBW 30 kHz RF Att 30 dB
VBW 30 kHz
SWT 235 ms Unit dBm



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6.6 TIME OF OCCUPANCY (DWELL TIME)

6.6.1 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

Notes:

- Measurements were performed with a spectrum analyzer.
- During measurements the equipment was configured as shown in the block diagram of section 8 of this report.

6.6.2 RESULTS:

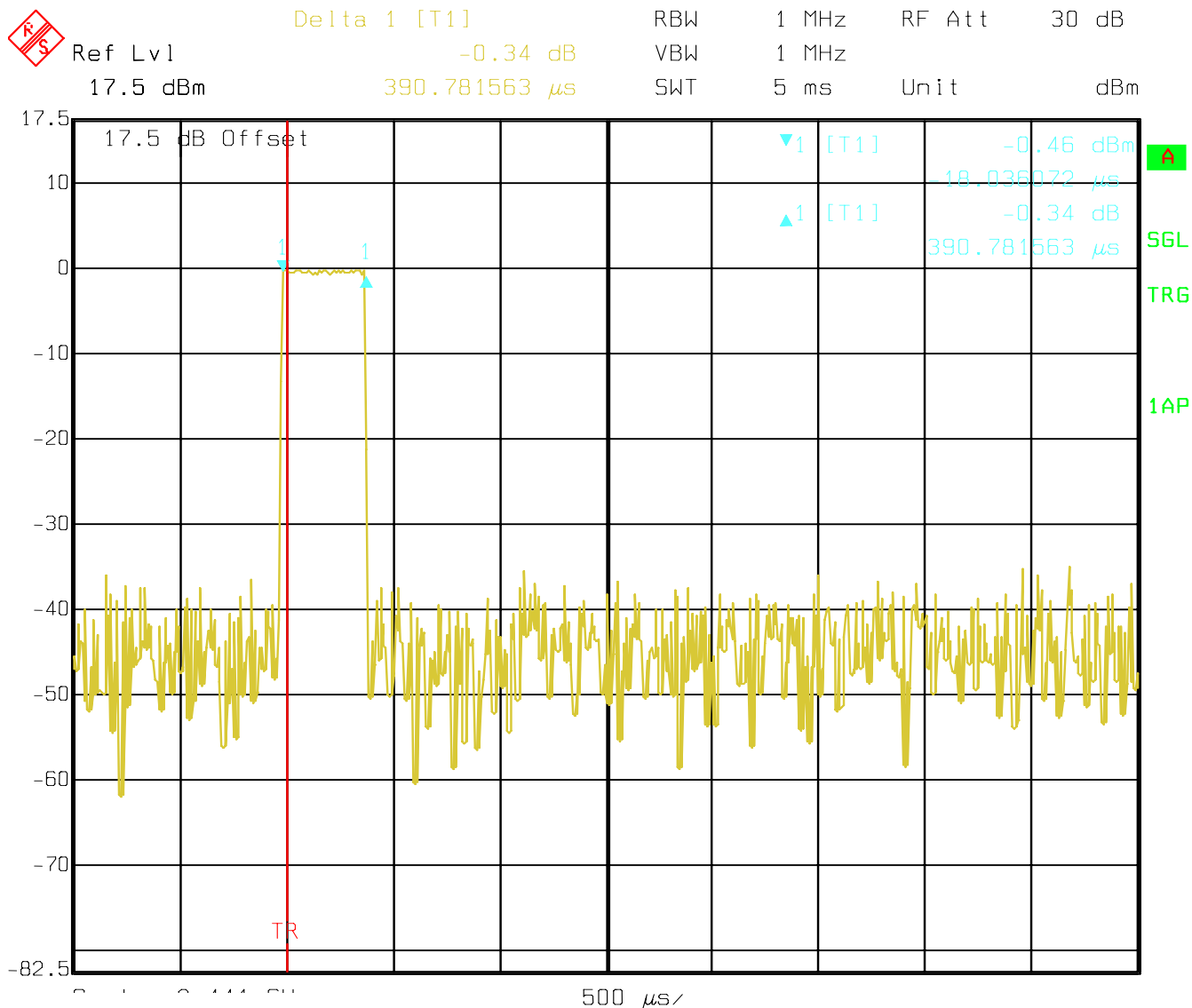
TEST CONDITIONS		TIME OF OCCUPANCY IN 31.6 SECONDS		
PACKET TYPE		DH1	DH3	DH5
T _{nom} (23)°C	V _{nom} VDC	109 mS	258mS	308mS

(DH1)

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

Each Tx-time per appearance is 361μs.

So we have $320.108 * 339.8\mu s = 109ms$ per 31.6 seconds.



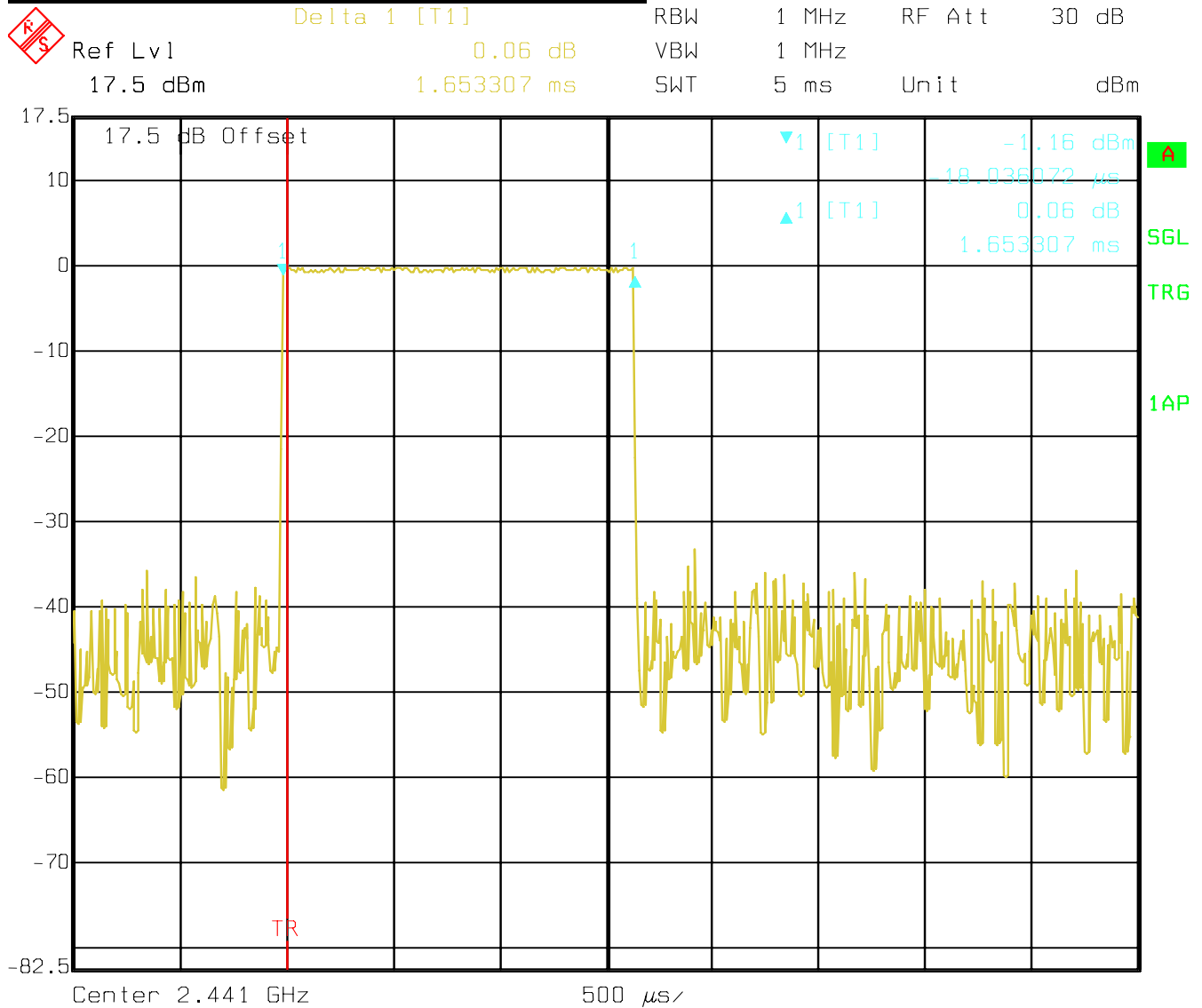
Date: 30.JAN.2007 14:22:53

(DH3)

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

Each Tx-time per appearance is 1.6ms.

So we have $161.16 * 1.6\text{ms} = 258\text{ms}$ per 31.6 seconds.



[

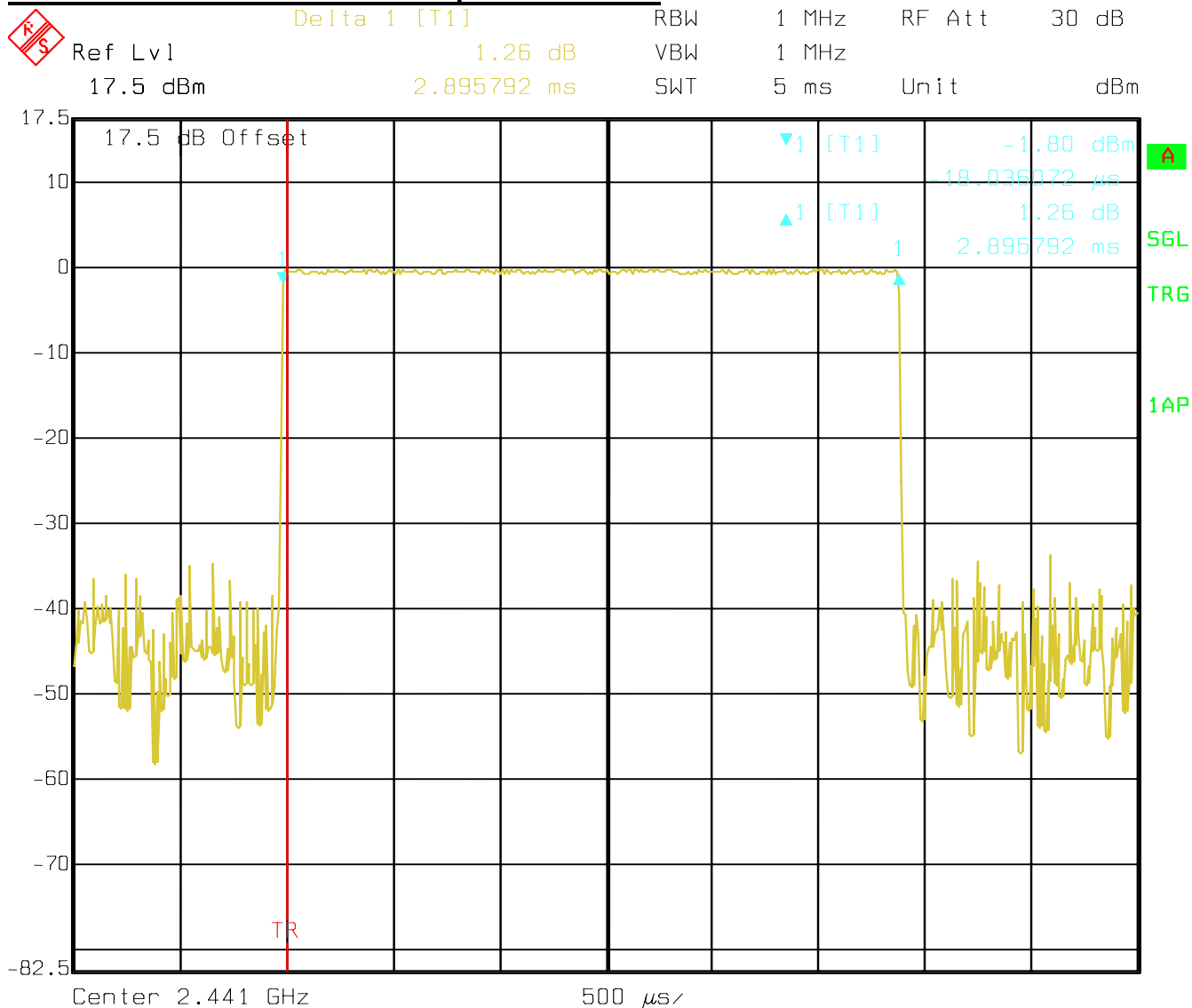


(DH5)

At DH5 Packets you need 5 time slots for transmit and 1 for receiving, then the system makes worst case 266.7 hops per second with 79 channels. So you have each channel 3.36 times per second and so for 30 seconds you have 106.176 times of appearance.

Each Tx-time per appearance is 2.9ms.

So we have $106.176 * 2.9\text{ms} = 308\text{ms}$ per 31.6 seconds.



Date: 30.JAN.2007 14:21:44

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)

§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

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

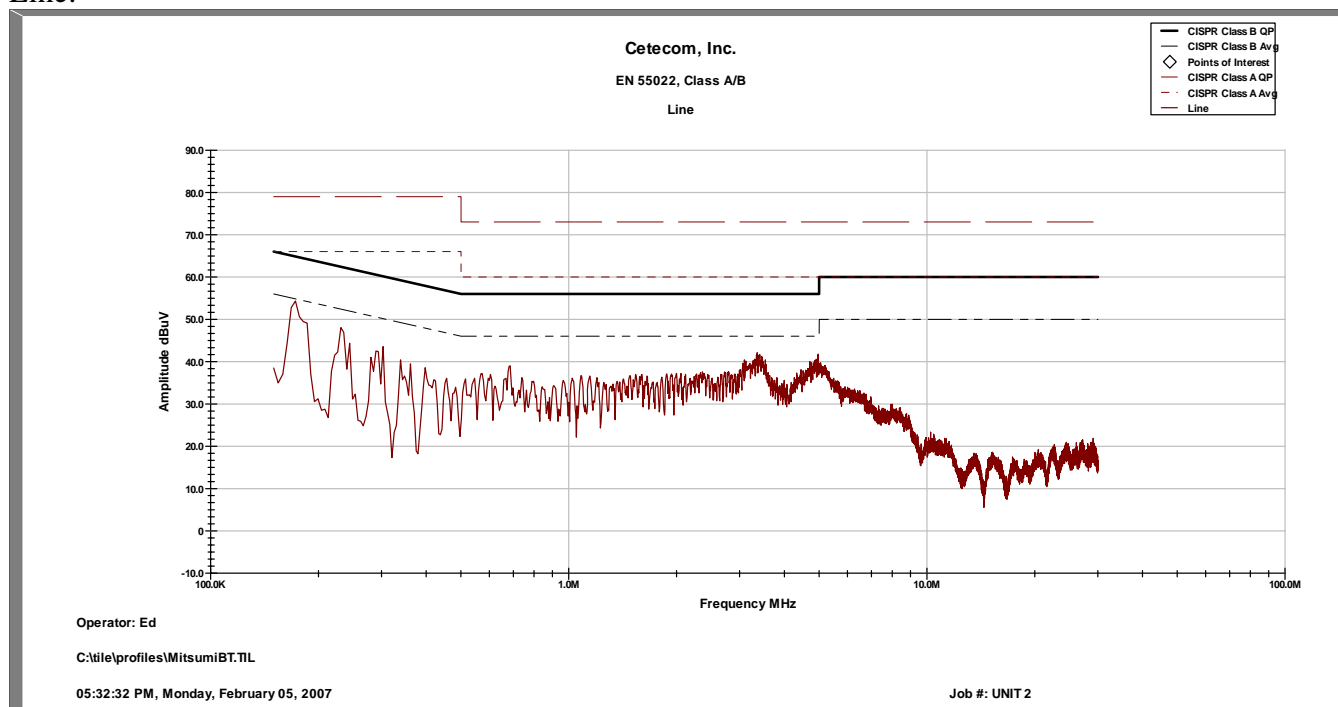
OPERATING MODE

Conducted AC emissions testing was performed with 110 VAC @ 60 Hz with the EUT in battery charging mode. During the testing an uncharged battery was installed in the EUT.

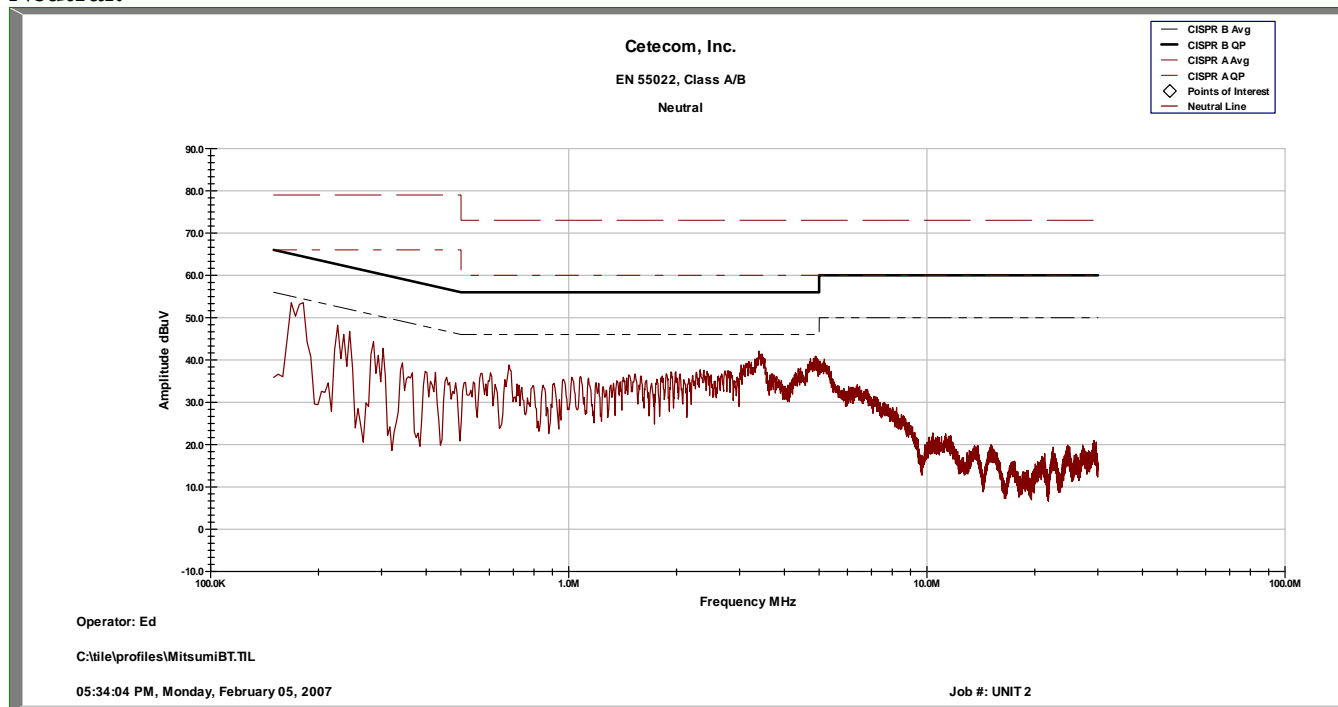


6.7.2 Results Mitsumi Charger

Line:



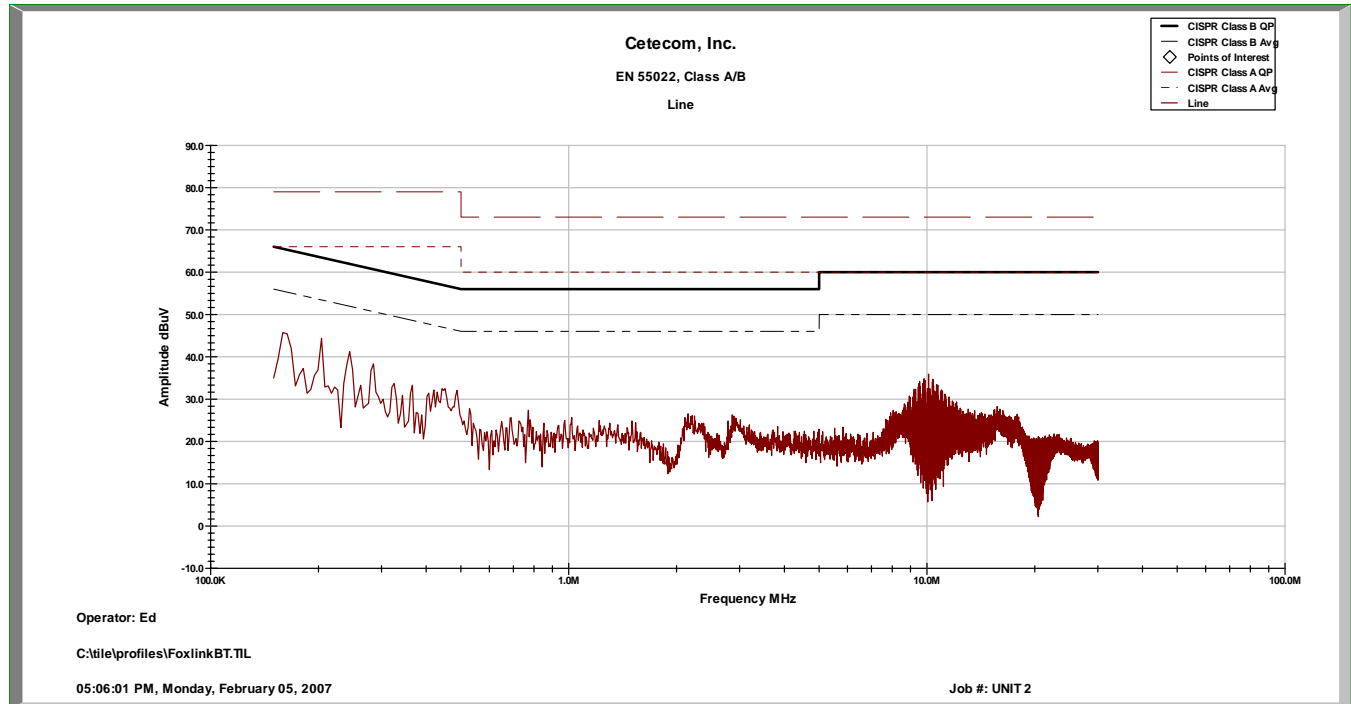
Neutral:



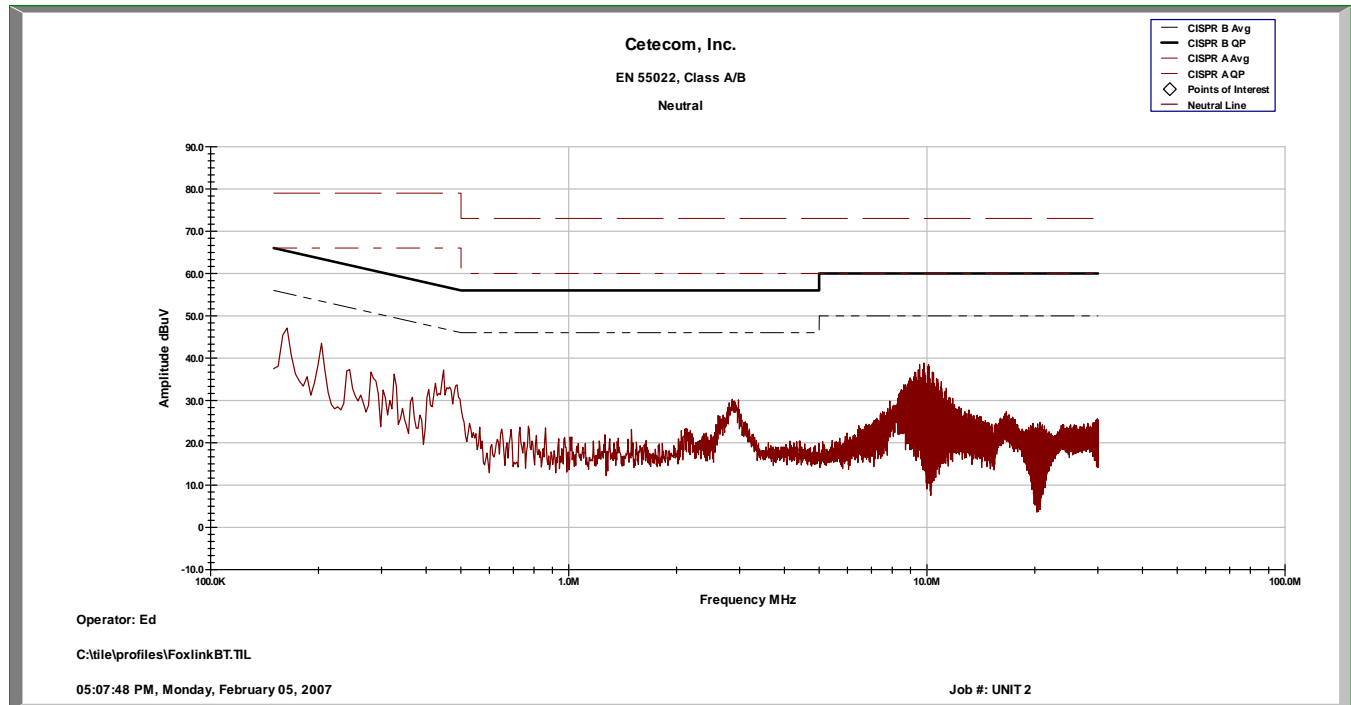


6.7.3 Results Foxlink Charger

Line:



Neutral:



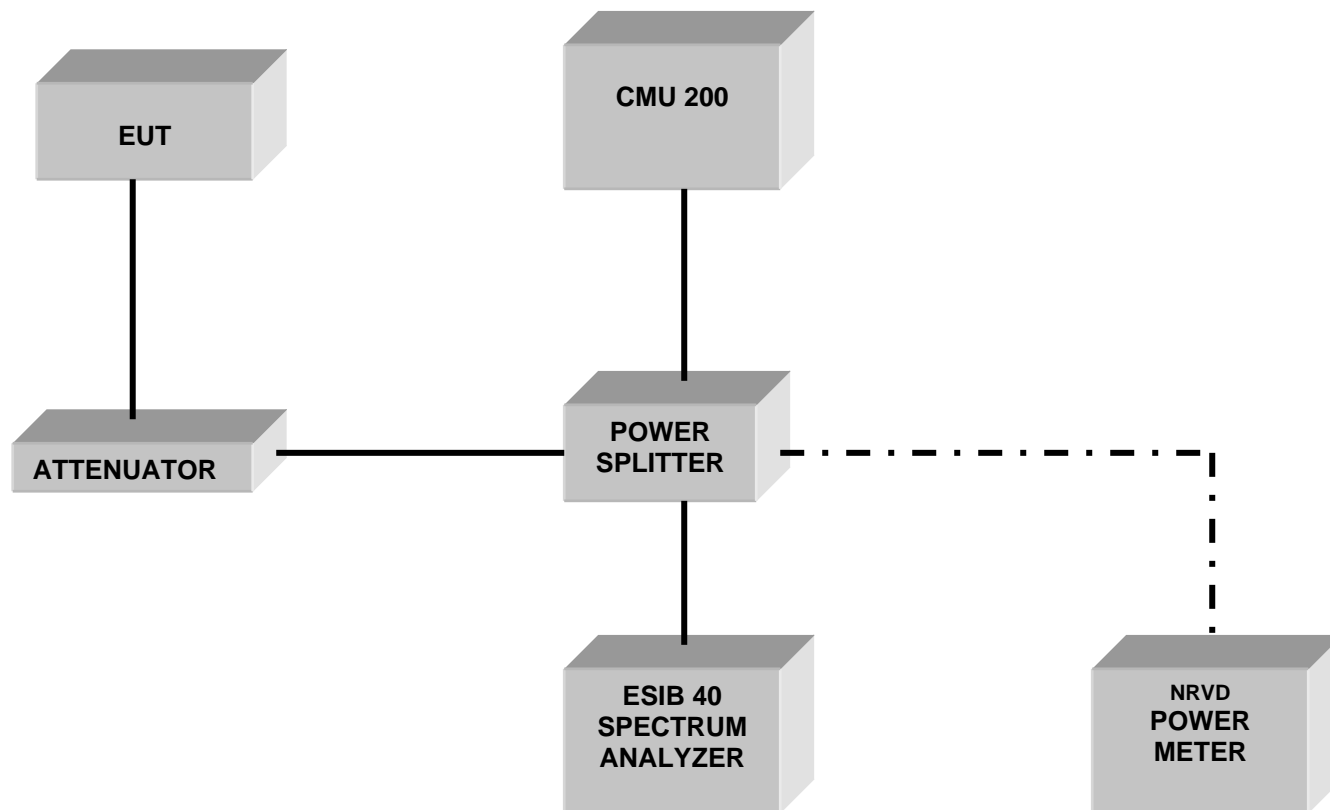


7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due	Interval
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2007	1 year
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	100017	August 2007	1 year
03	Signal Generator	SMY02	Rohde & Schwarz	836878/011	May 2007	1 year
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02	May 2007	1 year
05	Biconilog Antenna	3141	EMCO	0005-1186	June 2007	1 year
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325	June 2007	1 year
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240	June 2007	1 year
08	Power Splitter	11667B	Hewlett Packard	645348	n/a	n/a
09	Climatic Chamber	VT4004	Voltsch	G1115	May 2007	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 2007	1 year
13	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807	May 2007	1 year
14	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008	May 2007	1 year
15	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06	May 2007	1 year
16	LISN	ESH3-Z5	Rohde & Schwarz	836679/003	May 2007	1 year
17	Loop Antenna	6512	EMCO	00049838	July 2007	2 years

8 BLOCK DIAGRAMS

Conducted Testing



Radiated Testing

ANECHOIC CHAMBER

