



FCC Test Report
**FCC Part 15.247 for FHSS systems/
CANADA RSS-210**

FOR:

GSM/UMTS/HSDPA Mobile Phone

MODEL #: RG4-E02, RG4-J01
Toshiba Information Systems (UK) Ltd., Mobile Communications Division

Riverside Way
Camberley, Surrey, GU15 3YA UK

FCC ID: SP2-RG4-E02, SP2-RG4-J01

TEST REPORT #: EMC_CETEC_010_06502_15.247BT
DATE: 2007-04-12



FCC listed#
101450
IC recognized #
3925

CETECOM Inc.

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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 and in compliance with the applicable criteria specified in Industry Canada rules RSS210.

Company	Description	Model #
Toshiba Information Systems (UK) Ltd., Mobile Communications Division	GSM/UMTS/HSDPA Mobile Phone	RG4-E02, RG4-J01

Technical responsibility for area of testing:

2007-04-12 EMC & Radio **Lothar Schmidt**
(Test Lab Manager)

Date	Section	Name	Signature
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This report is prepared by:

2007-04-12 EMC & Radio **Satya Radhakrishna**
(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.

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:	Peter Mu
Date of test:	2007-03-23 to 2007-04-11

2.2 Identification of the Client

APPLICANT	
Applicant (Company Name)	Toshiba Information Systems (UK) Ltd., MobileCommunications Division
Street Address	Riverside Way
City/Zip Code	Camberley, Surrey, GU15 3YA
Country	UK
Contact Person	Adrian Coyle
Telephone	+44 1276 405100
Fax	+44 1276 405111
e-mail	adrian.coyle@toshiba.co.uk

2.3 Identification of the Manufacturer

MANUFACTURER	
Manufacturer	Toshiba Corporation
Street Address	1-1, Shibaura 1-Chome, Minato-ku
City/Zip Code	Tokyo, 105-8001
Country	Japan

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

EUT	
Marketing Name of EUT (if not same as Model No.)	RG4-E02
Description	GSM/UMTS/HSDPA Mobile Phone
Model No.	RG4-E02, RG4-J01
Serial No.	
H/W & S/W	HW version: EP2.1 SW version: TF_WM6_ORCA_VER_02.01_R0702060857
FCC-ID	SP2-RG4-E02, SP2-RG4-J01
IC-ID (Industry Canada)	N/A

Frequency Range:	2400-2483.5MHz
Type(s) of Modulation:	GSMK, GFSK, $\pi/4$ DQPSK, 8DPSK, WCDMA
Number of Channels:	GSM900: 0~124, DCS1800: 512~885, PCS1900:512~810, WCDMA TX:9612~9888, WCDMA RX: 10562~10838
Antenna Type:	PIFA/average Gain is about -4dBi
Output Power:	0.001114 W maximum conducted peak power measured @ 2402 MHz with 8DPSK modulation

3.2 Identification of the Equipment Under Test (EUT)

EUT #	TYPE	MANF.	MODEL	SERIAL #
1	EUT	Toshiba Corporation	RG4-E02	004401120327032

3.3 Identification of Accessory equipment

AE #	TYPE	MANF.	MODEL	SERIAL #
1	AC/DC ADAPTER	Toshiba	TS-ADP001	0648



4 Subject Of Investigation

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

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 and Industry Canada rules RSS210. The maximization of portable equipment is conducted in accordance with ANSI C63.4.

4.1 RESTRICTED BAND EDGE COMPLIANCE RADIATED §15.247/15.205

4.1.1 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



4.1.2 RESULTS: GFSK

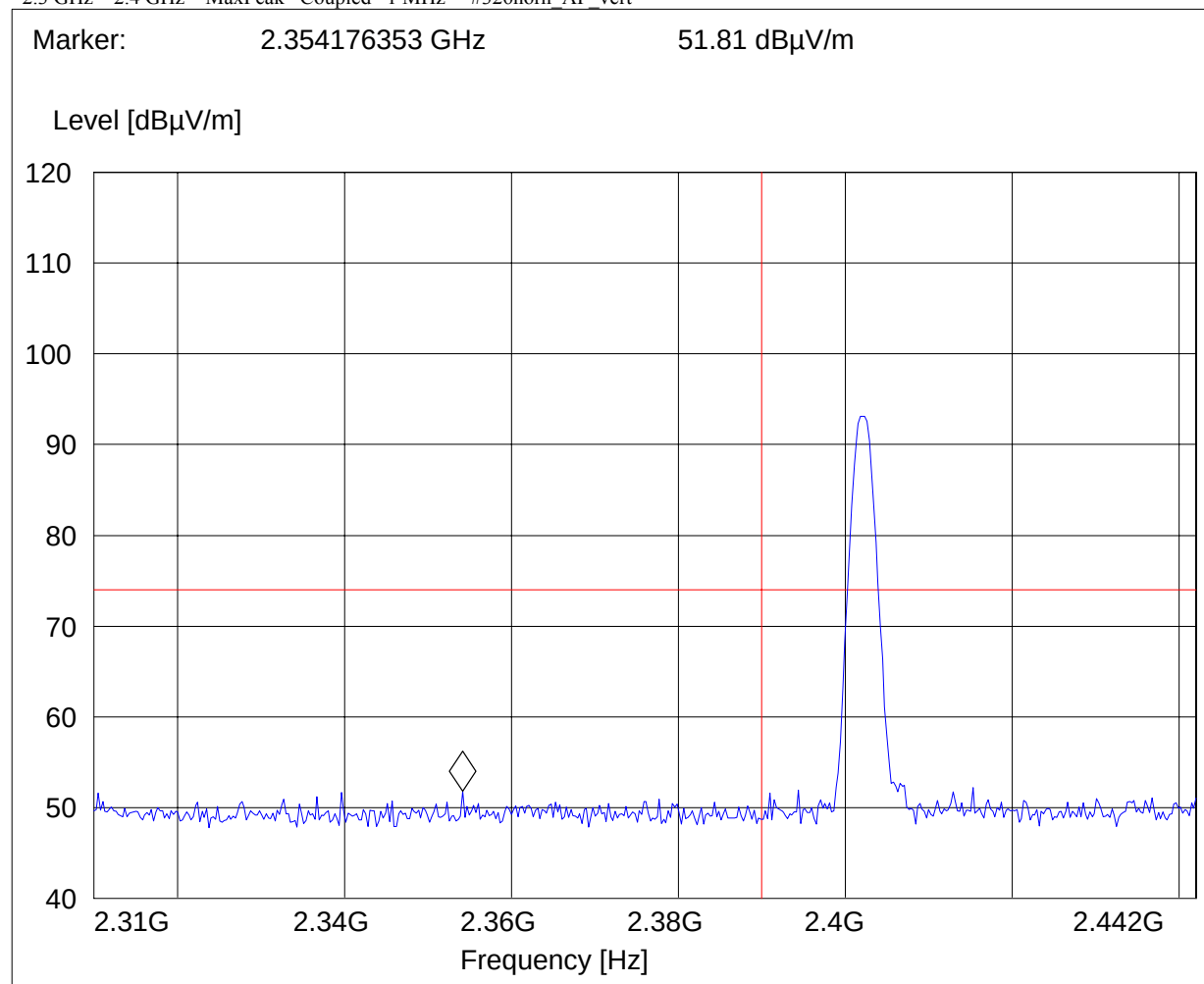
(2402MHz) LOWER BAND EDGE PEAK -GFSK MODULATION

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch0 GFSK
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: Rotation 360° Peak
Sweep: FCC15.247 LBE_PK

SWEEP TABLE: "FCC15.247 LBE_PK"

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





(2402MHz) LOWER BAND EDGE AVERAGE -GFSK MODULATION

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

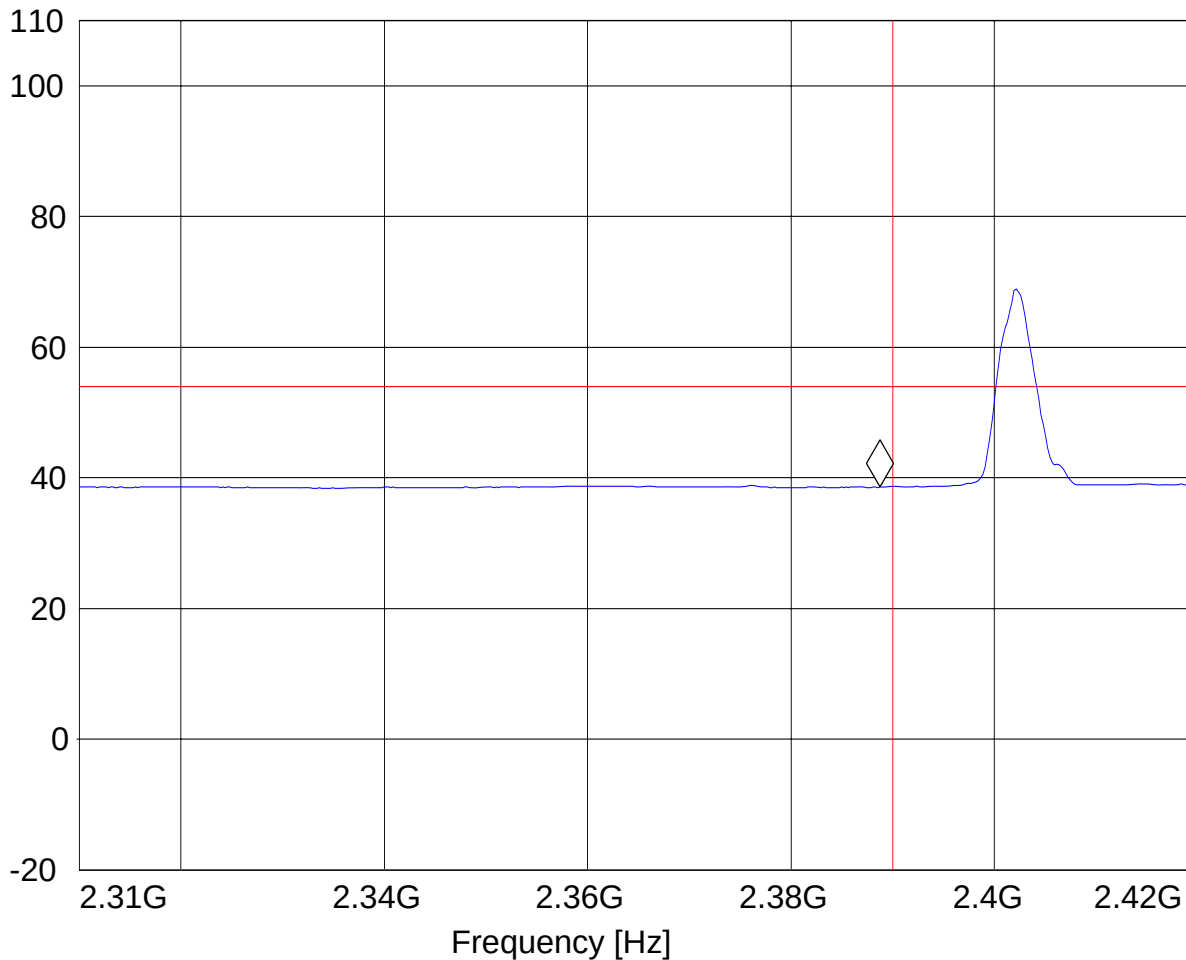
EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch0 GFSK
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: Rotation 360° Average

SWEEP TABLE: "FCC15.247 LBE_AVG"

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

Marker: 2.388697395 GHz 38.62 dBμV/m

Level [dBμV/m]





(2480MHz) HIGHER BAND EDGE PEAK -GFSK MODULATION

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

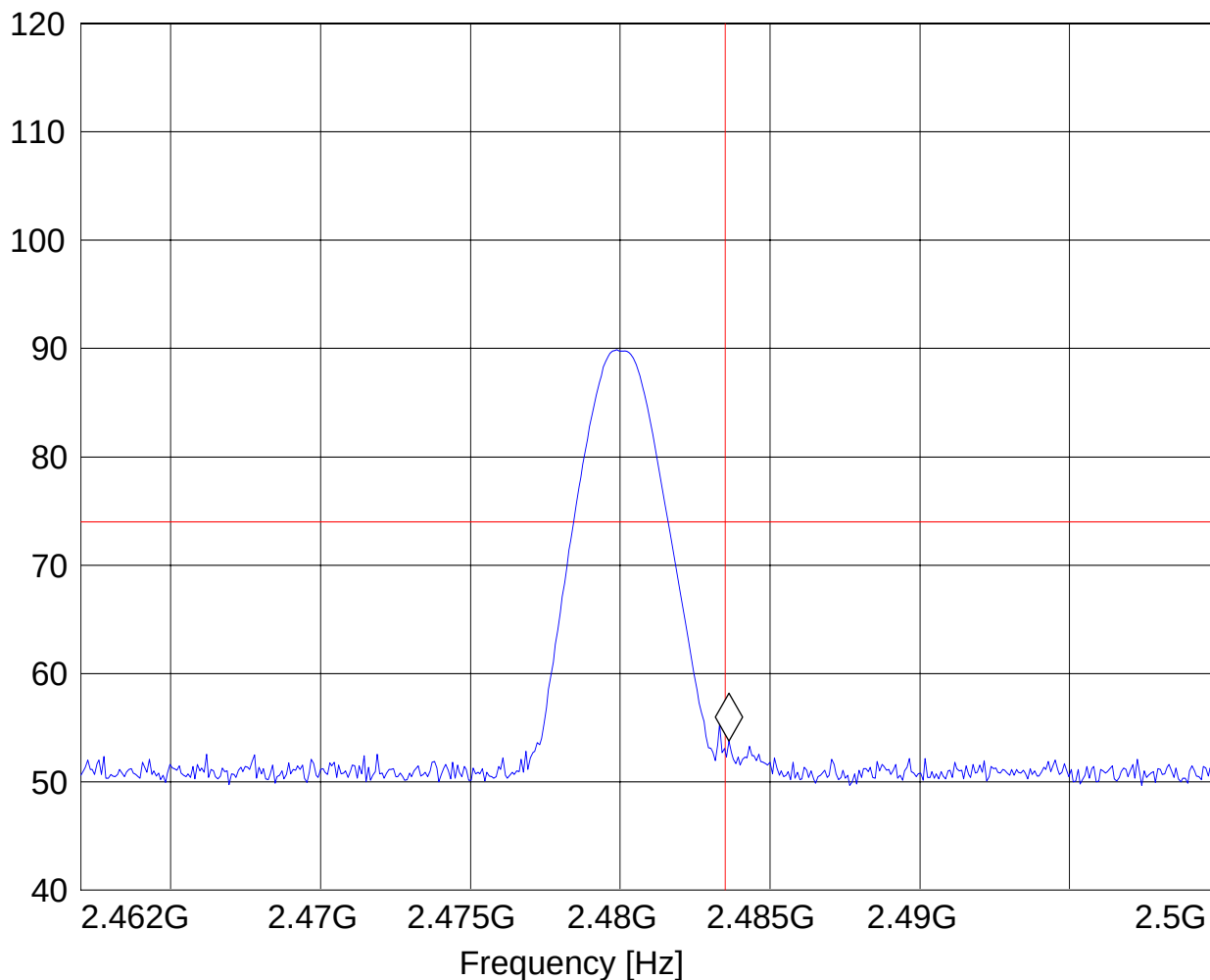
EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch78 GFSK
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: Rotation 360° Peak

SWEEP TABLE: "FCC15.247 HBE_PK"

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

Marker: 2.483627255 GHz 53.72 dBμV/m

Level [dBμV/m]





HIGHER BAND EDGE AVERAGE-GFSK MODULATION

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

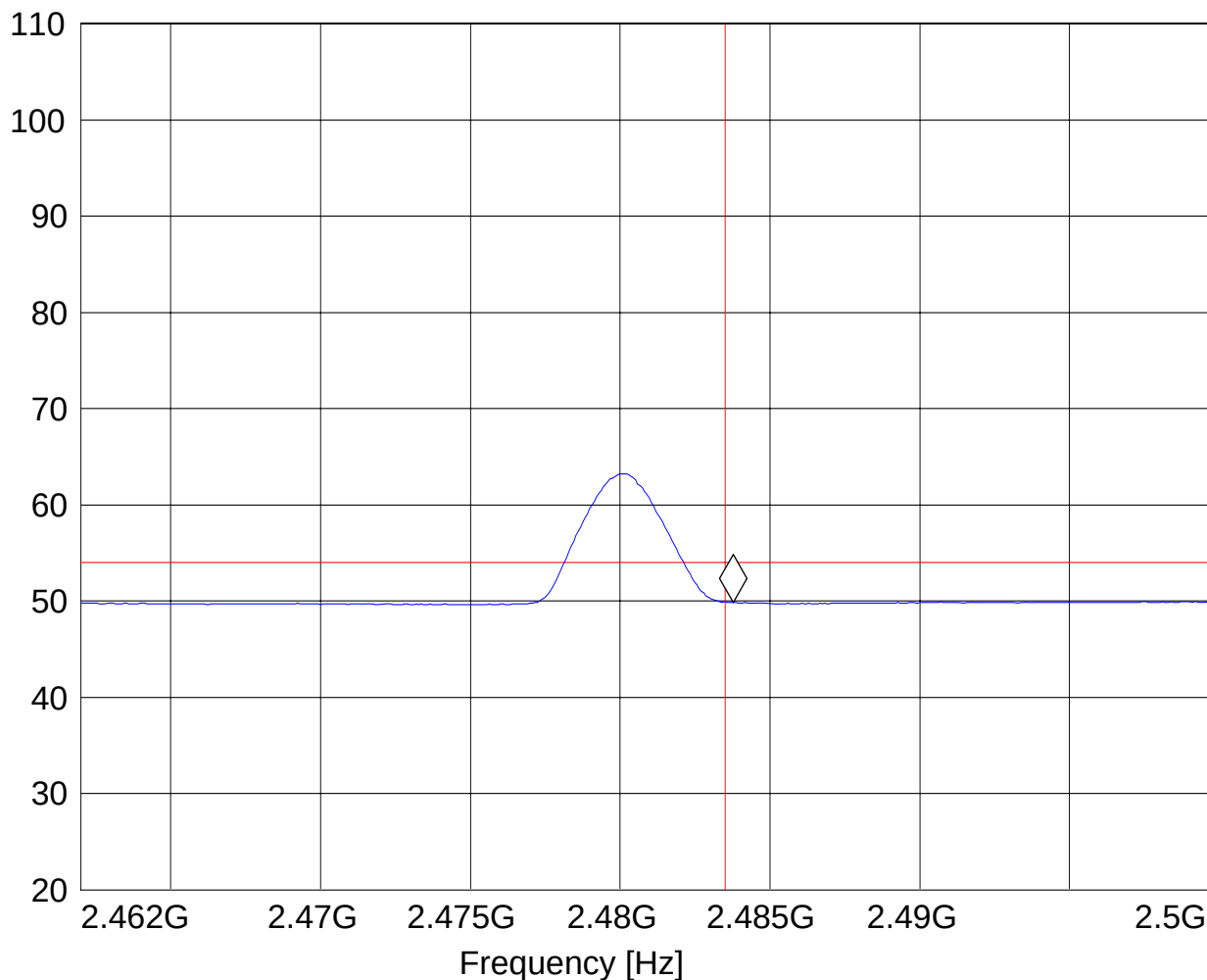
EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch78 GFSK
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: Rotation 360° Average

SWEEP TABLE: "FCC15.247 HBE_AVG"

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

Marker: 2.483779559 GHz 49.86 dBμV/m

Level [dBμV/m]





4.1.3 RESULTS: $\pi/4$ DQPSK

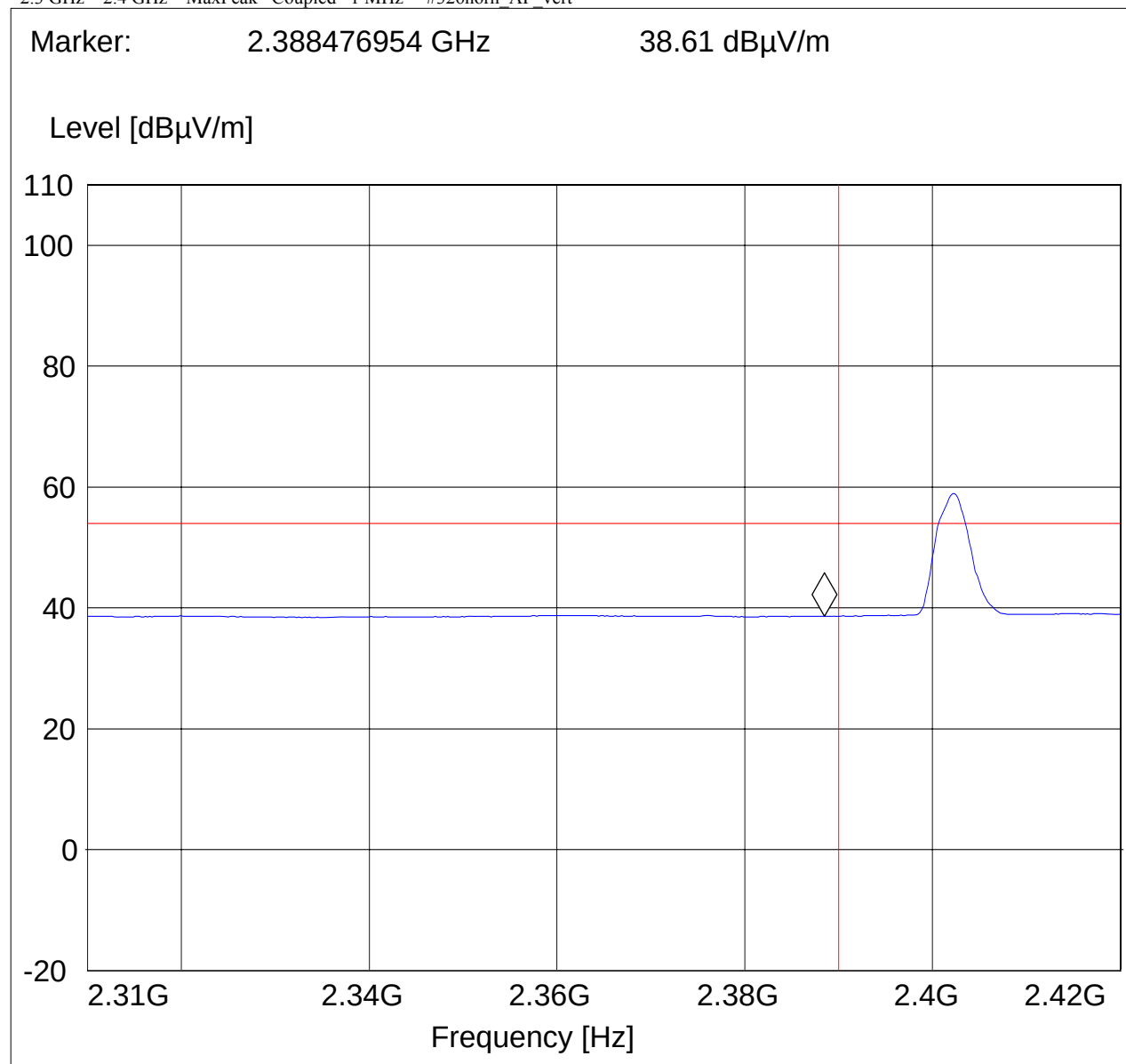
(2402MHz) LOWER BAND EDGE PEAK - $\pi/4$ DQPSK MODULATION

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch0 $\pi/4$ DQPSK
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: Rotation 360° Average

SWEEP TABLE: "FCC15.247 LBE_PK"

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





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

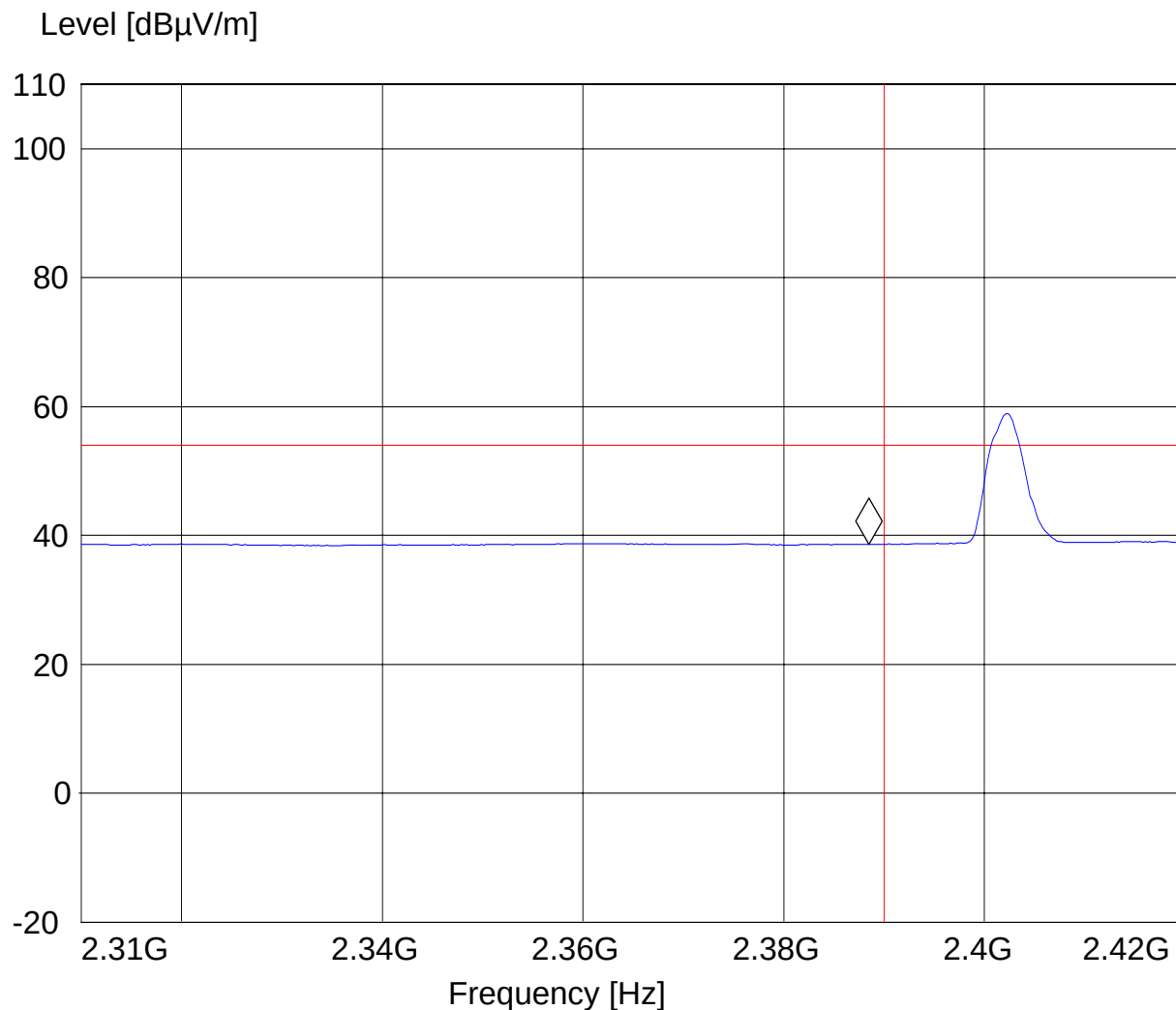
CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch0 Pi/4 DQPSK
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: Rotation 360° Average

SWEEP TABLE: "FCC15.247 LBE_AVG"

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

Marker: 2.388476954 GHz 38.61 dB μ V/m





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

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

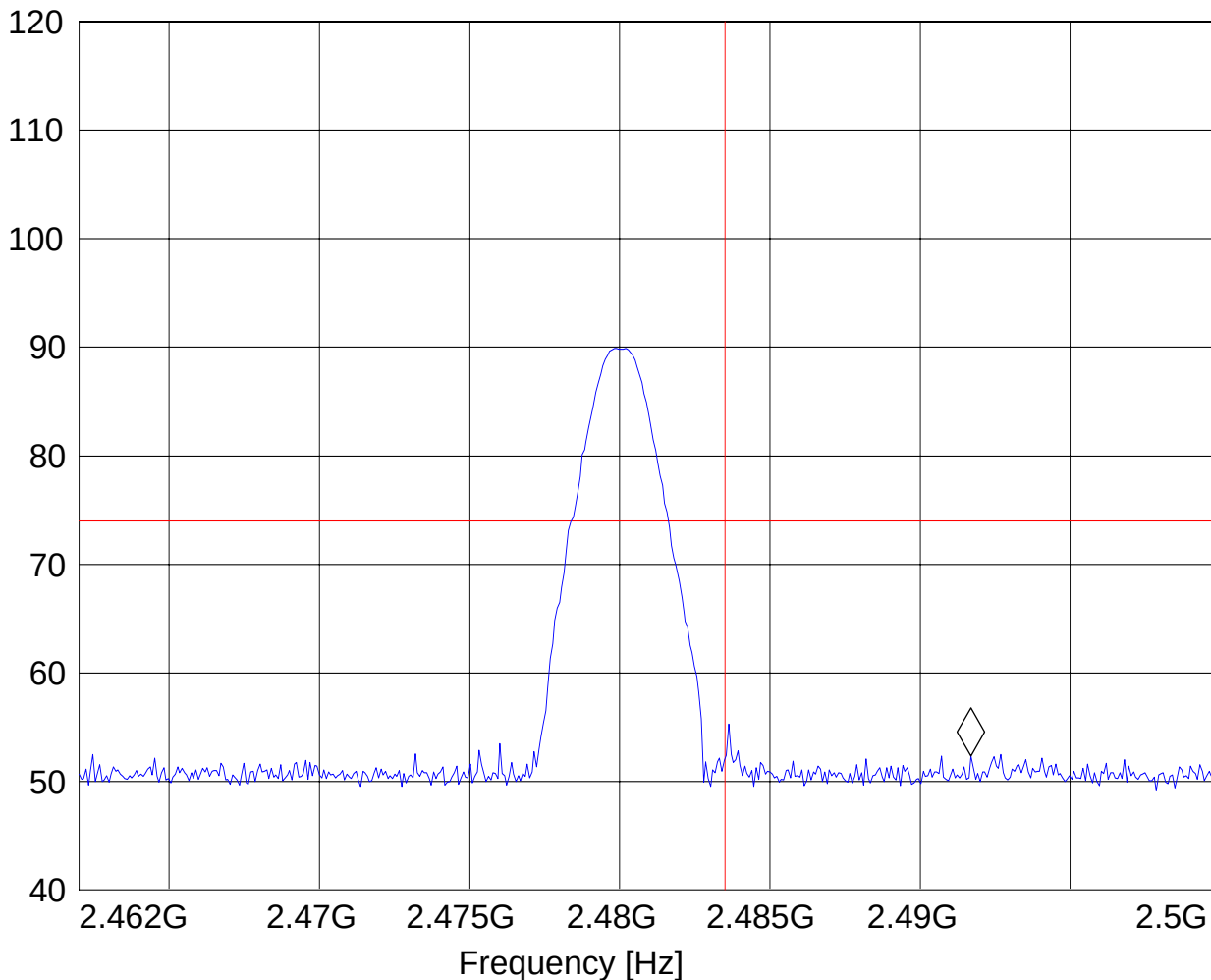
EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch78 Pi/4 DQPSK
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: Rotation 360° Peak

SWEEP TABLE: "FCC15.247 HBE_PK"

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

Marker: 2.491699399 GHz 52.36 dB μ V/m

Level [dB μ V/m]





HIGHER BAND EDGE AVERAGE- $\pi/4$ DQPSK MODULATION

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

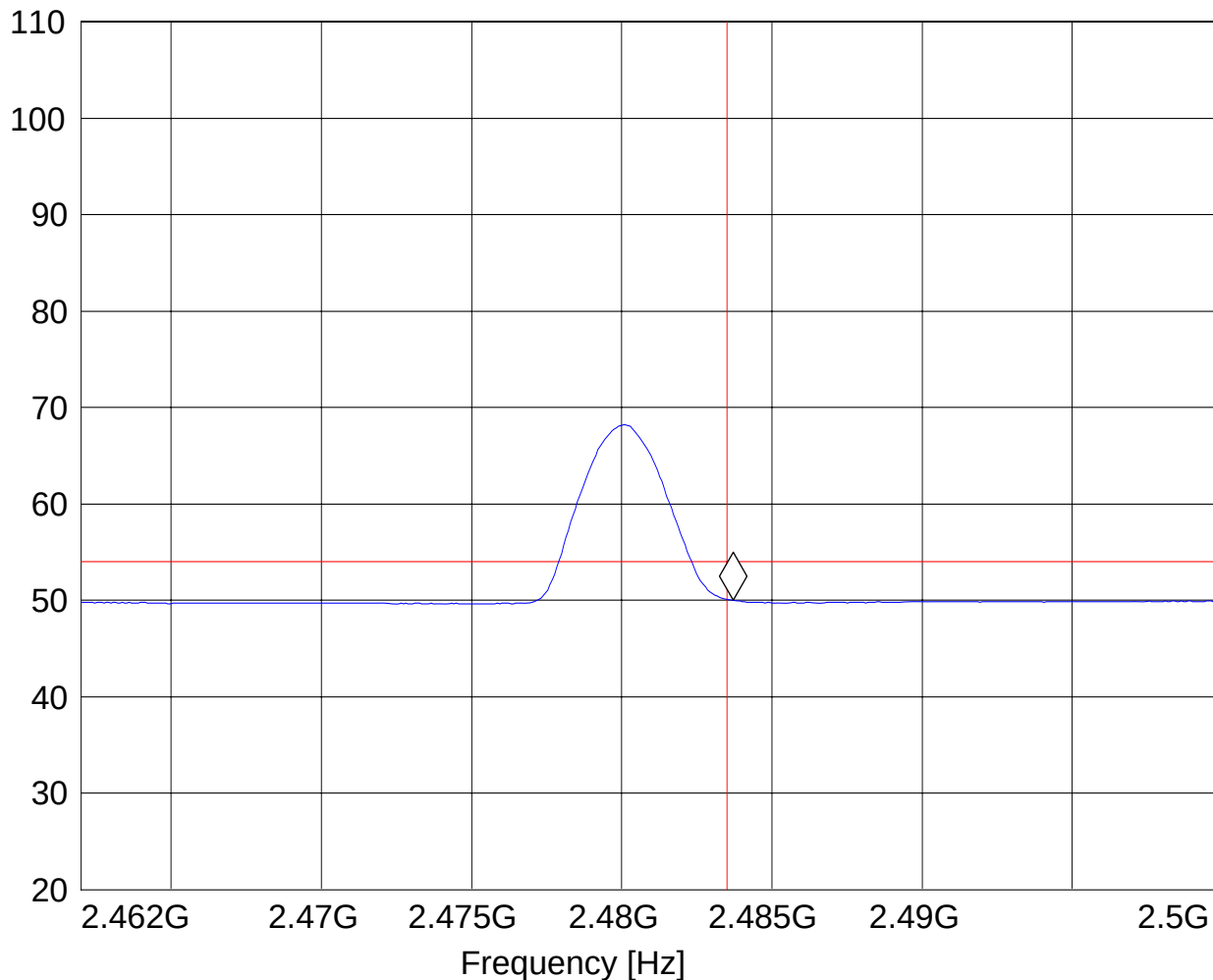
EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch78 Pi/4 DQPSK
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: Rotation 360° Average

SWEEP TABLE: "FCC15.247 HBE_AVG"

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

Marker: 2.483703407 GHz 50.01 dB μ V/m

Level [dB μ V/m]





4.1.4 RESULTS: 8DPSK

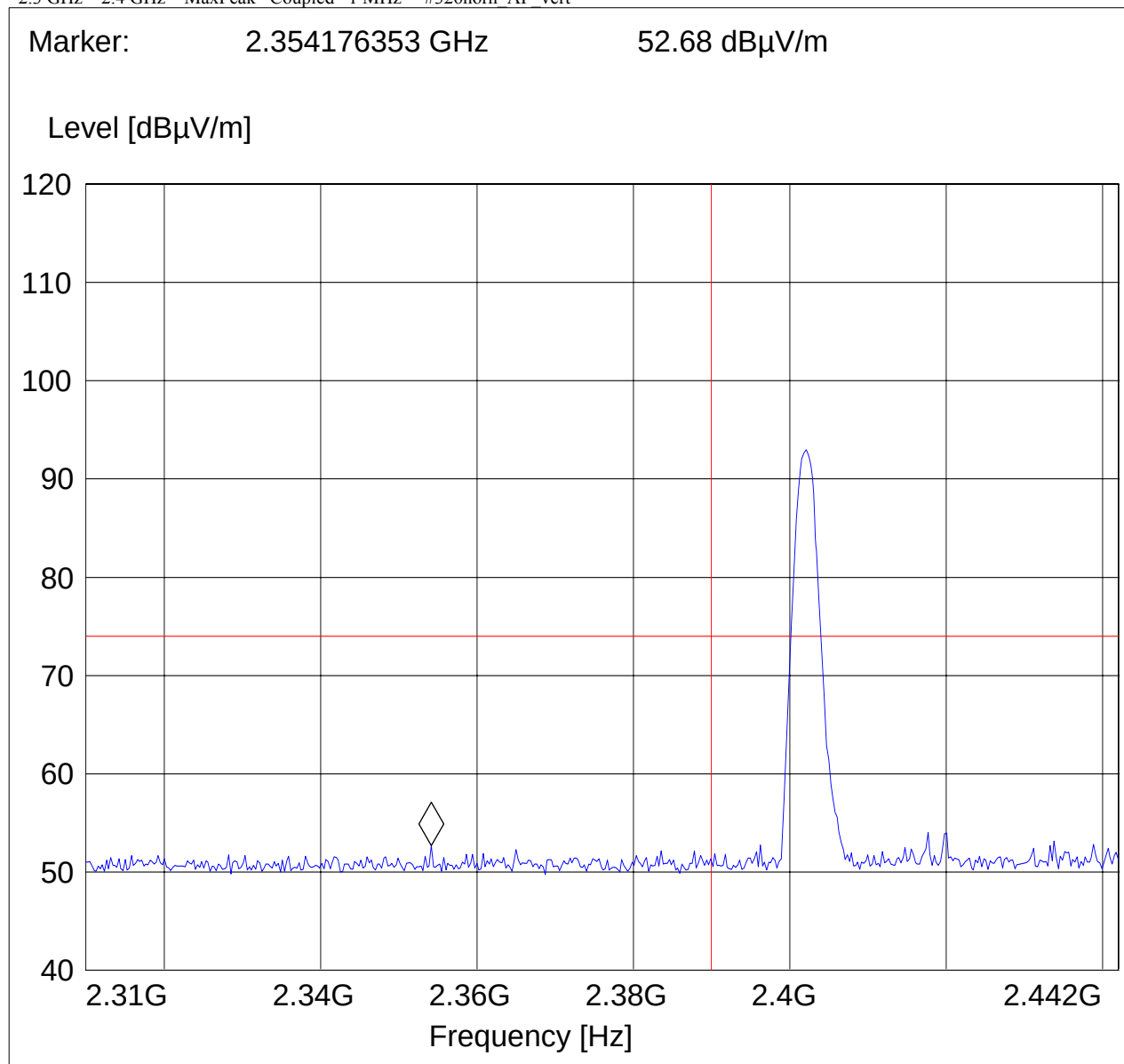
(2402MHz) LOWER BAND EDGE PEAK - 8DPSK MODULATION

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch0 8DPSK
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: Rotation 360° Peak

SWEEP TABLE: "FCC15.247 LBE_PK"

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





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

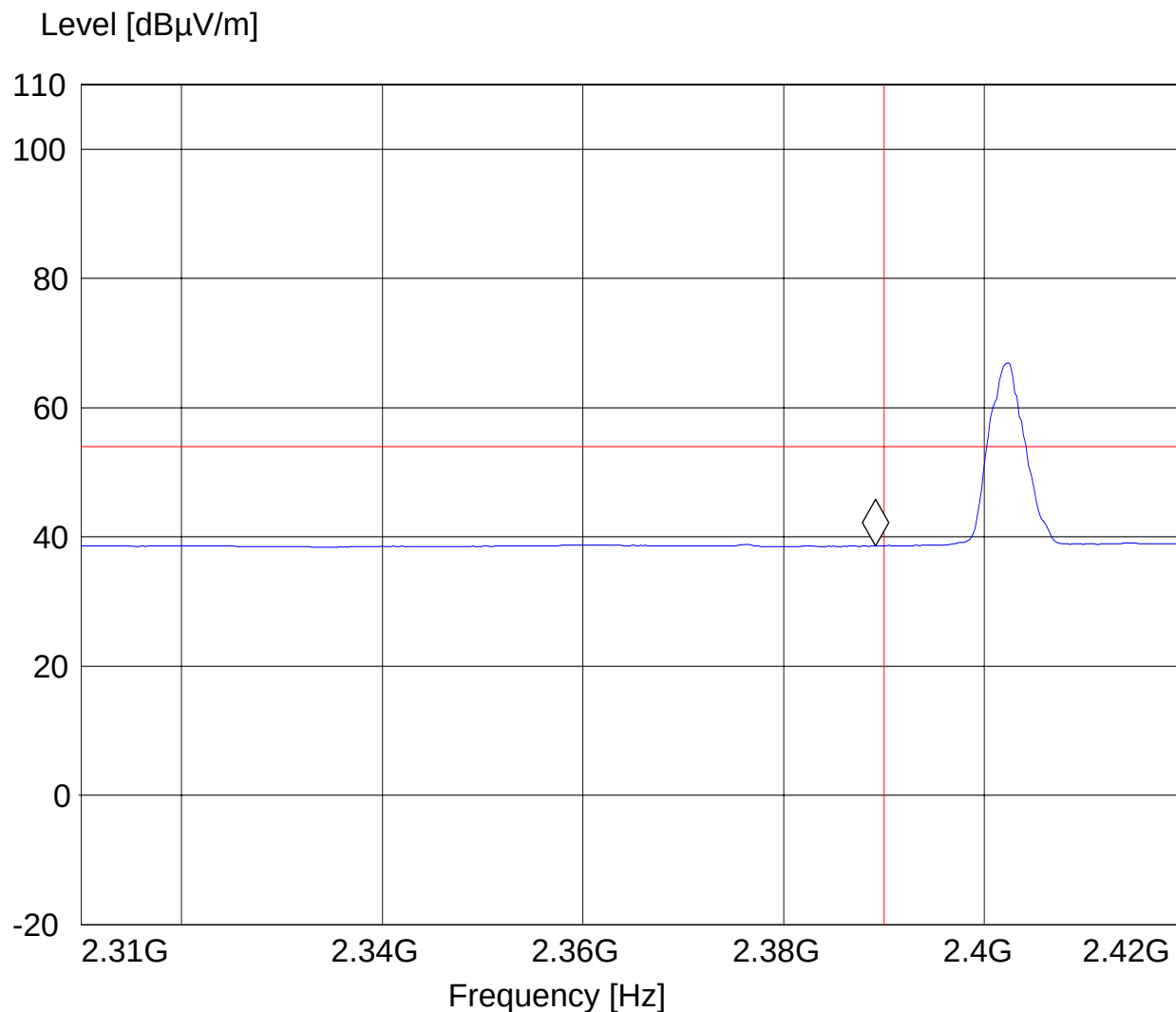
CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch0 8DPSK
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: Rotation 360° Average

SWEEP TABLE: "FCC15.247 LBE_AVG"

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

Marker: 2.389138277 GHz 38.62 dBμV/m





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

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

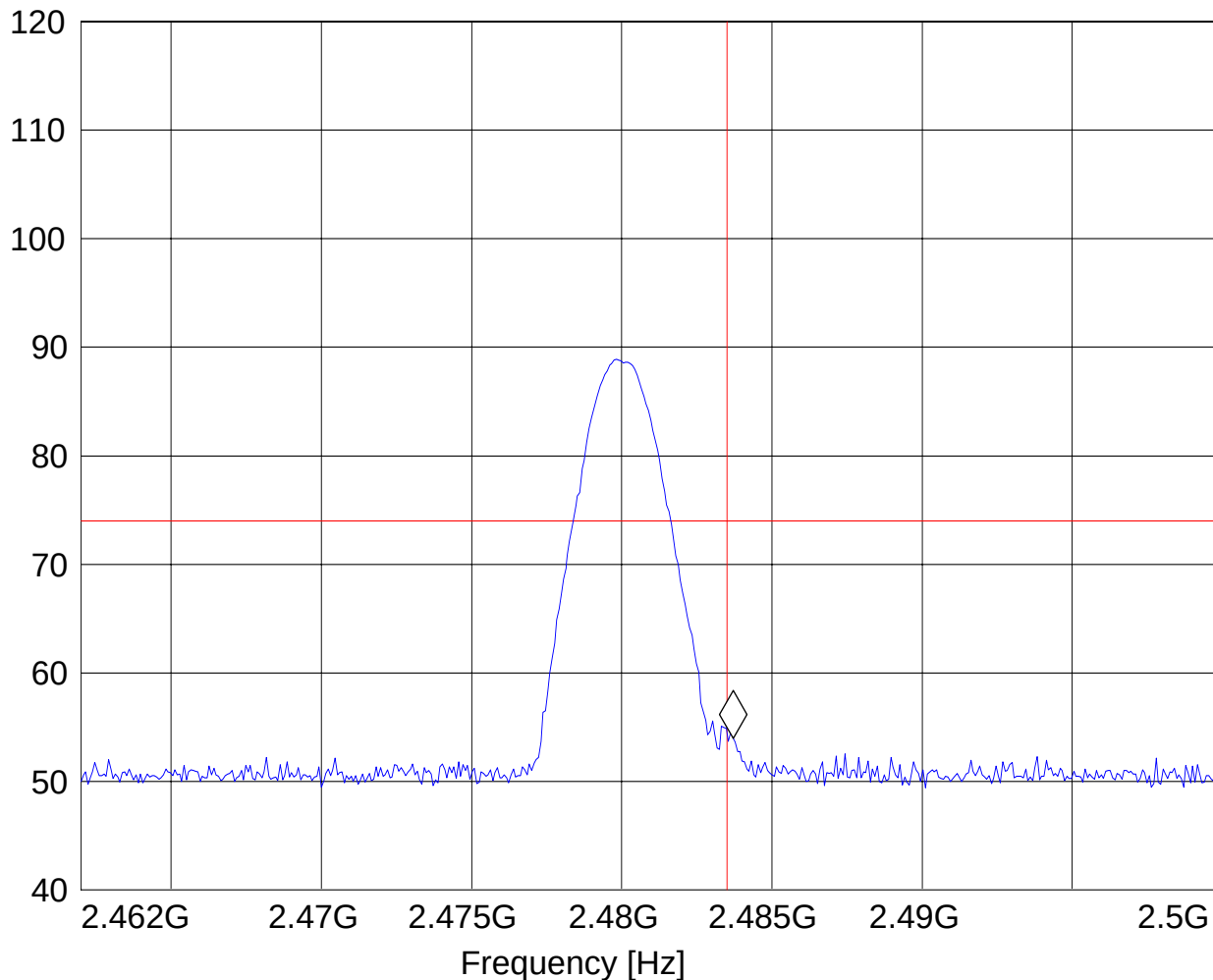
EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch78 8DPSK
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: Rotation 360° Peak

SWEEP TABLE: "FCC15.247 HBE_PK"

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

Marker: 2.483703407 GHz 53.94 dBμV/m

Level [dBμV/m]





HIGHER BAND EDGE AVERAGE-8DPSK MODULATION

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

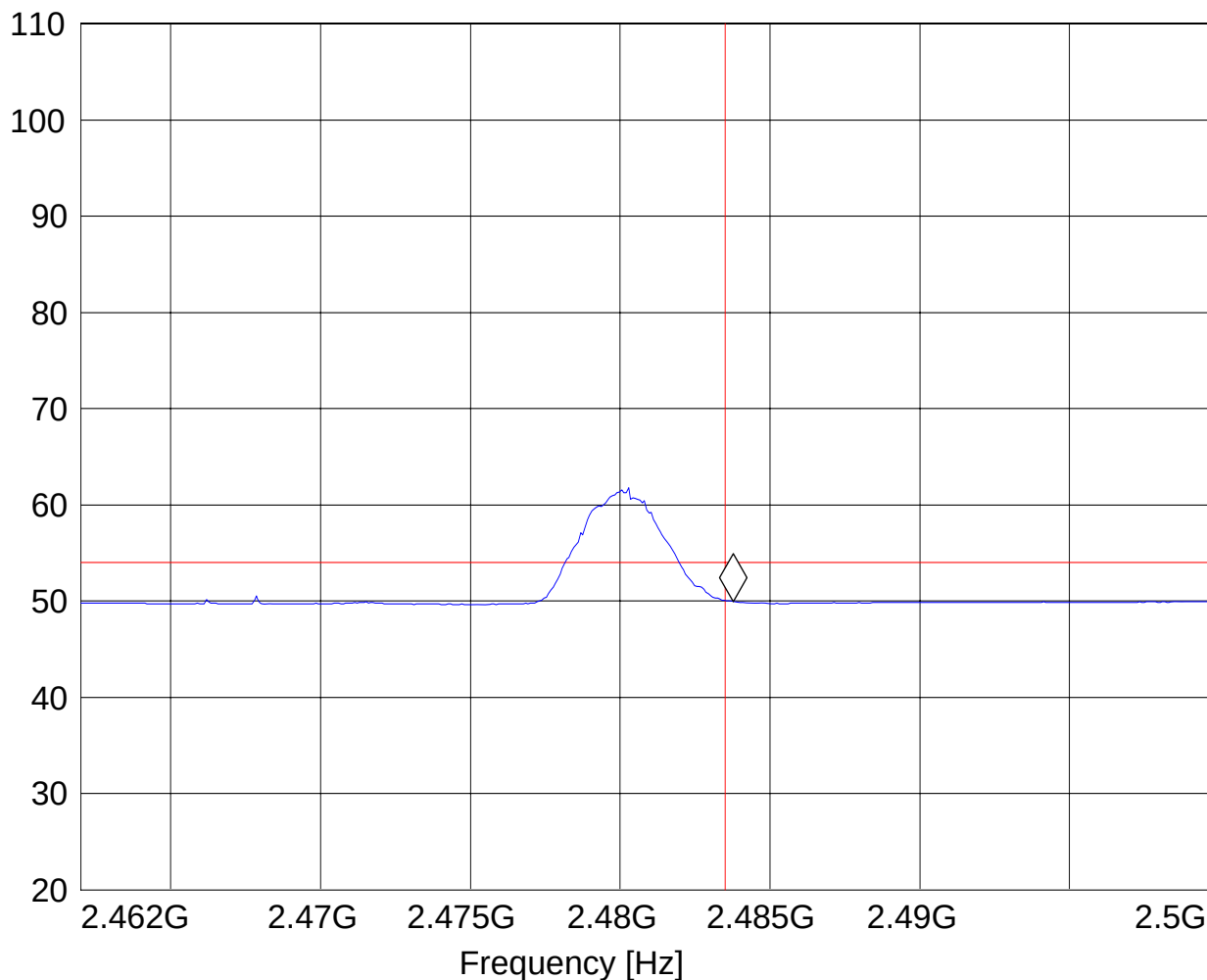
EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch78 8DPSK
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: Rotation 360° Average

SWEEP TABLE: "FCC15.247 HBE_AVG"

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

Marker: 2.483779559 GHz 49.97 dBμV/m

Level [dBμV/m]



4.2 TRANSMITTER SPURIOUS EMISSIONS RADIATED § 15.247/15.205/15.209

4.2.1 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

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



4.2.2 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

EUT:: DT1

Customer:: Toshiba

Test Mode: BT TX Ch0

Ant Orientation: V

EUT Orientation: V

Test Engineer: Ed

Voltage:: Battery

Comments:: ROTATION 360°, height 1-4m

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

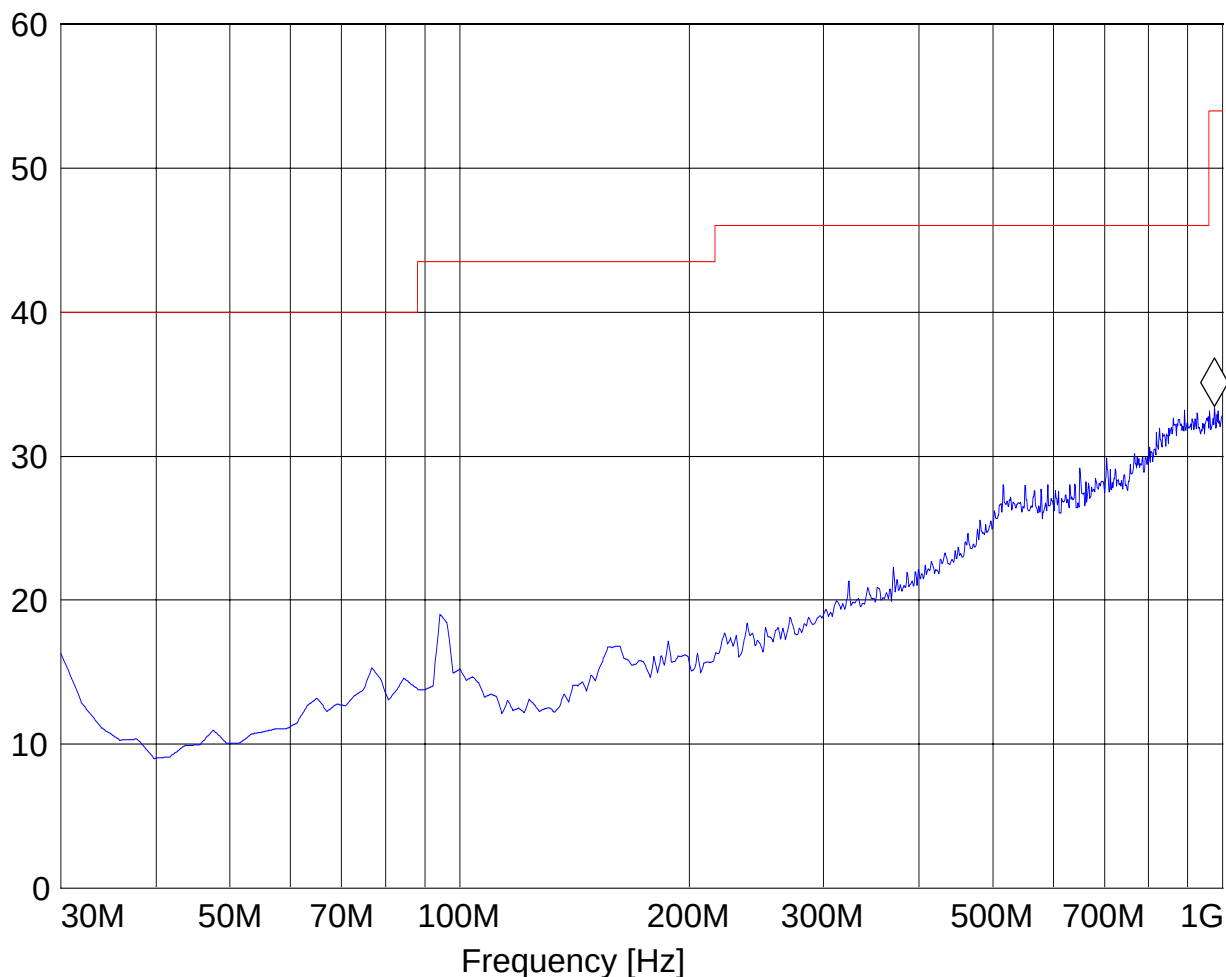
Start	Stop	Detector	Meas.	IF	Transducer
-------	------	----------	-------	----	------------

Frequency	Frequency	Time	Bandw.
-----------	-----------	------	--------

30.0 MHz	1.0 GHz	MaxPeak	Coupled 100 kHz 3141-#1186 Vert
----------	---------	---------	---------------------------------

Marker: 976.673347 MHz 33.42 dB μ V/m

Level [dB μ V/m]





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

EUT:: DT1

Customer:: Toshiba

Test Mode: BT TX Ch0

Ant Orientation: H

EUT Orientation: V

Test Engineer: Ed

Voltage:: Battery

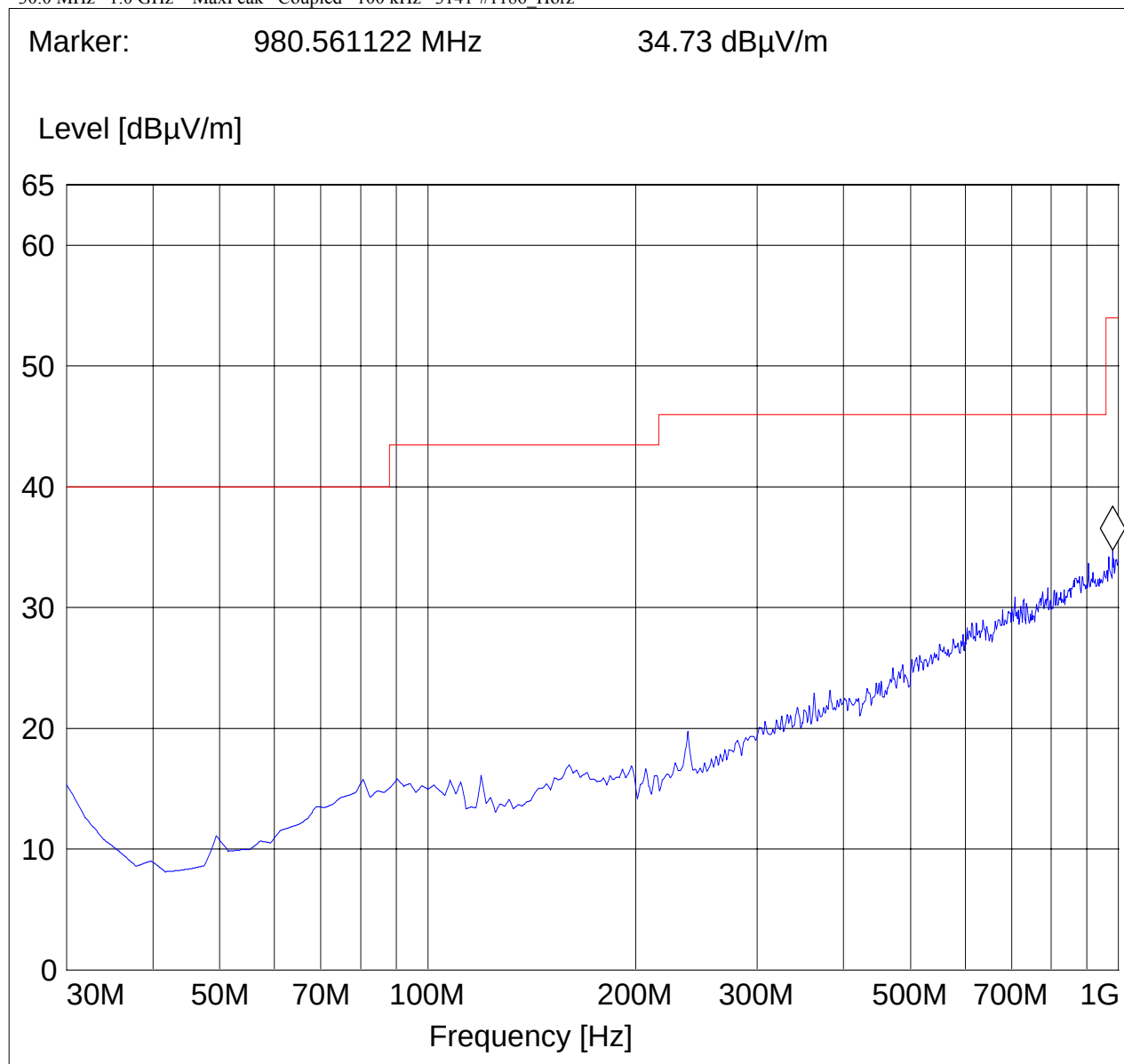
Comments:: ROTATION 360°, height 1-4m

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

Start	Stop	Detector	Meas.	IF	Transducer
-------	------	----------	-------	----	------------

Frequency	Frequency	Time	Bandw.
-----------	-----------	------	--------

30.0 MHz	1.0 GHz	MaxPeak	Coupled 100 kHz 3141-#1186_Horz
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1-3GHz (2402MHz)

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

Note: Peak Reading vs. Average limit

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: DT1

Customer:: Toshiba

Test Mode: BT TX Ch0

Ant Orientation: H

EUT Orientation: V

Test Engineer: Pete Krebill

Voltage:: Battery

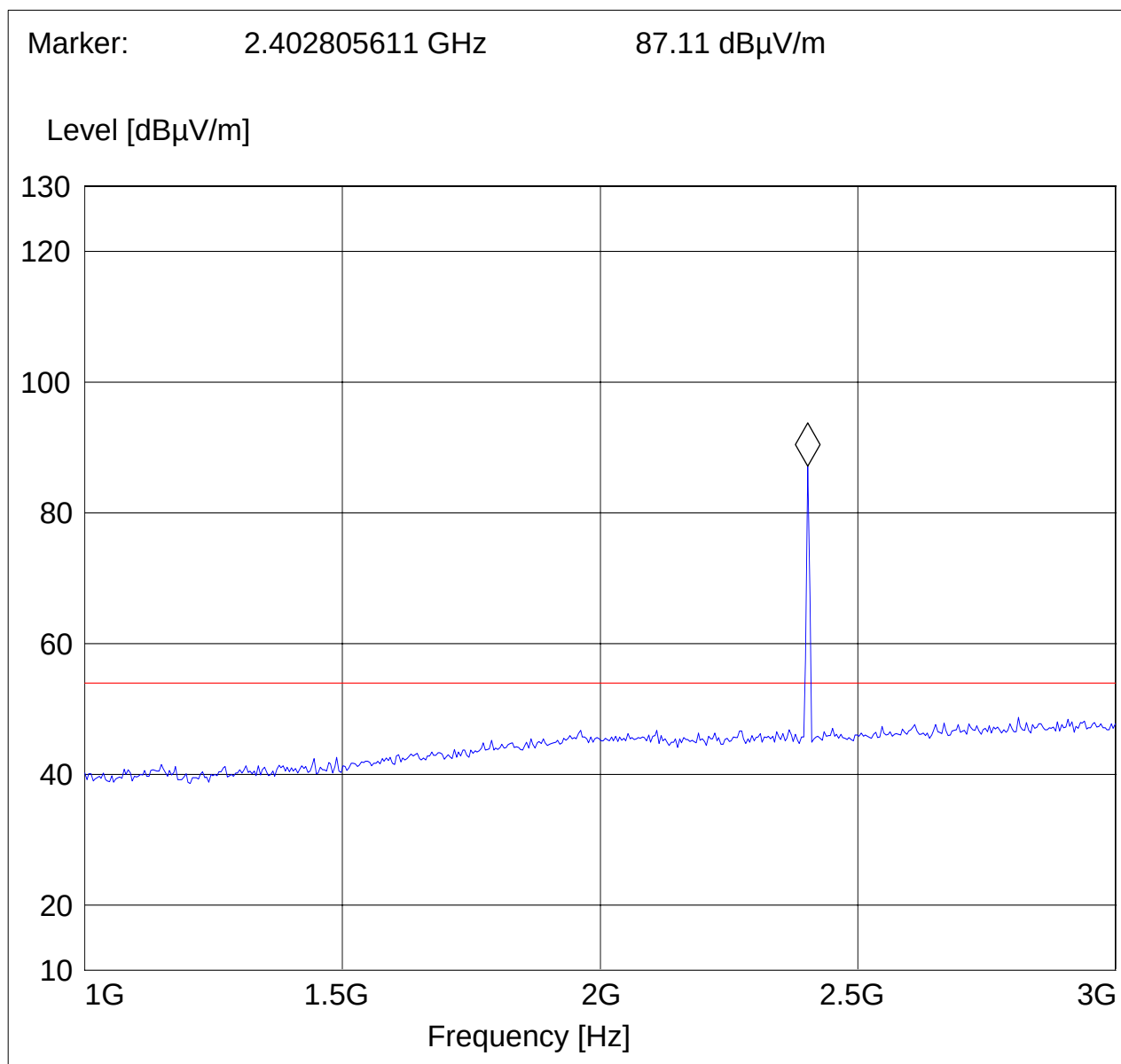
Comments:: Rotation 360° (marked emission is the fundamental)

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

Start	Stop	Detector	Meas.	IF	Transducer
-------	------	----------	-------	----	------------

Frequency	Frequency	Time	Bandw.
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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

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: DT1

Customer:: Toshiba

Test Mode: BT TX Ch39

Ant Orientation: H

EUT Orientation: V

Test Engineer: Pete Krebill

Voltage:: Battery

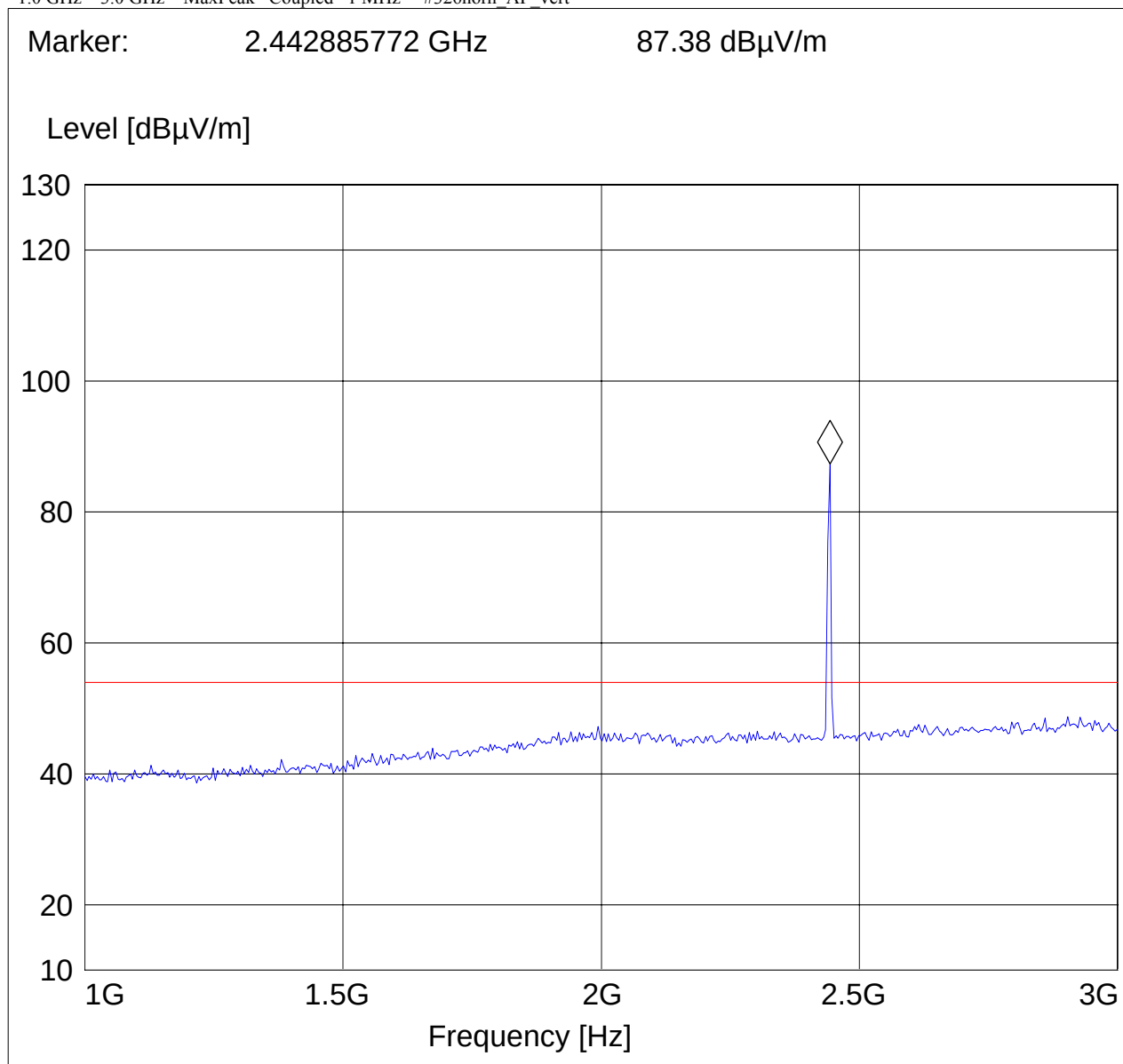
Comments:: Rotation 360°(marked emission is the fundamental

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

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

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

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: DT1

Customer:: Toshiba

Test Mode: BT TX Ch78

Ant Orientation: H

EUT Orientation: V

Test Engineer: Pete Krebill

Voltage:: Battery

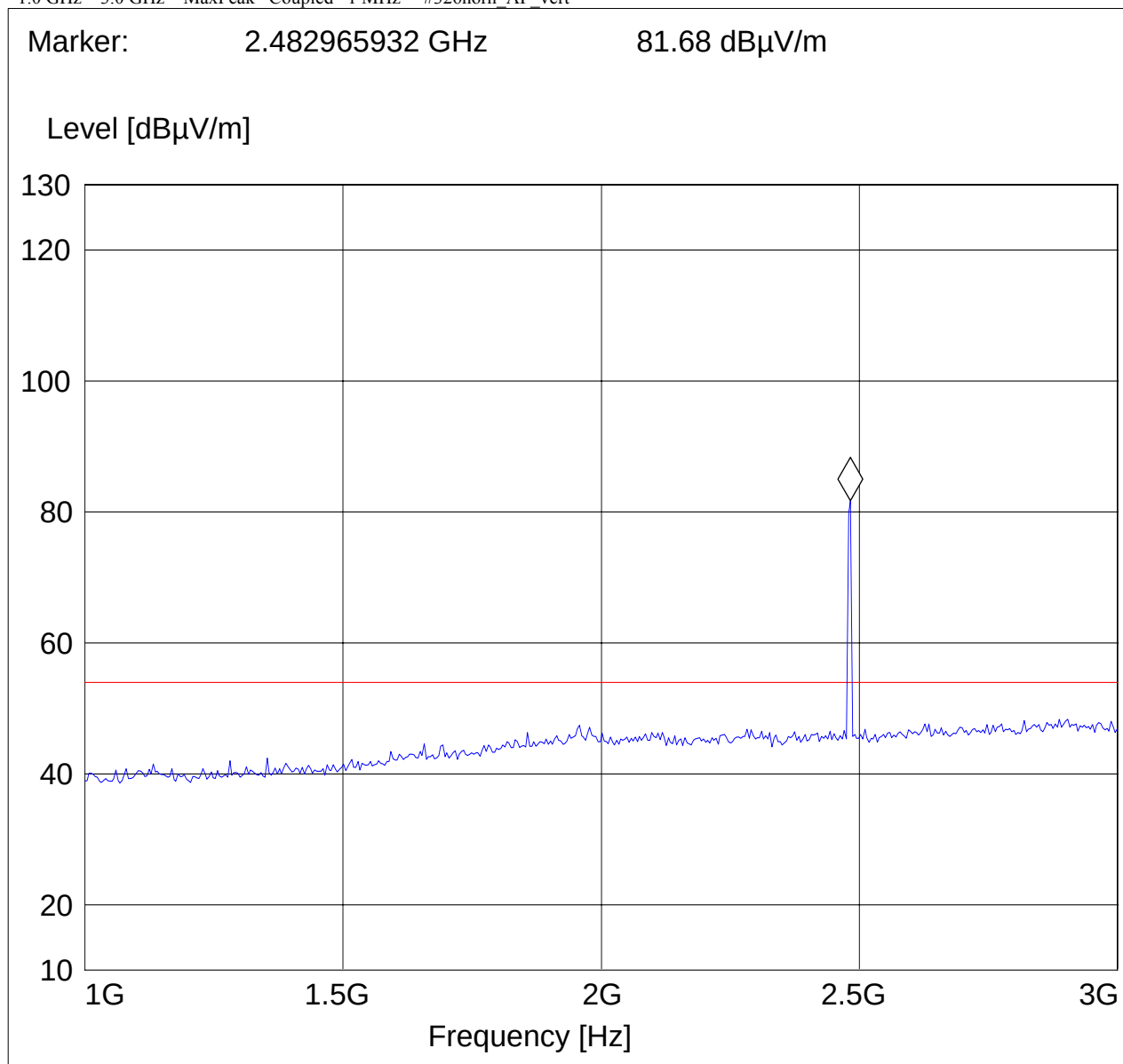
Comments:: Rotation 360° (marked emission is the fundamental)

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

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

1.0 GHz 3.0 GHz MaxPeak Coupled 1 MHz #326horn_AF_vert





3-18GHz (2402MHz)

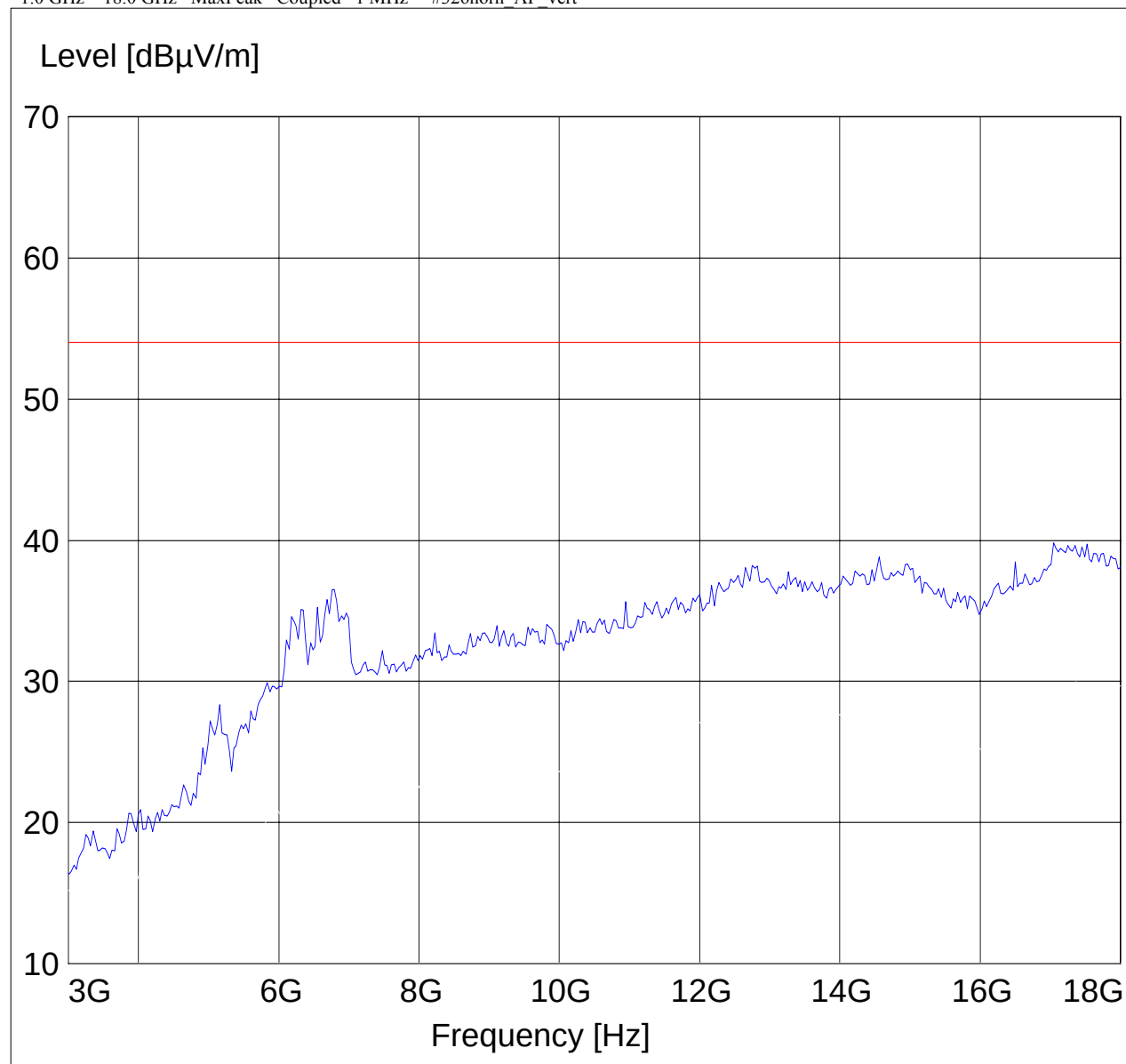
Note: Peak Reading vs. Average limit

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch0
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: ROTATION 360

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

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







3-18GHz (2441MHz)

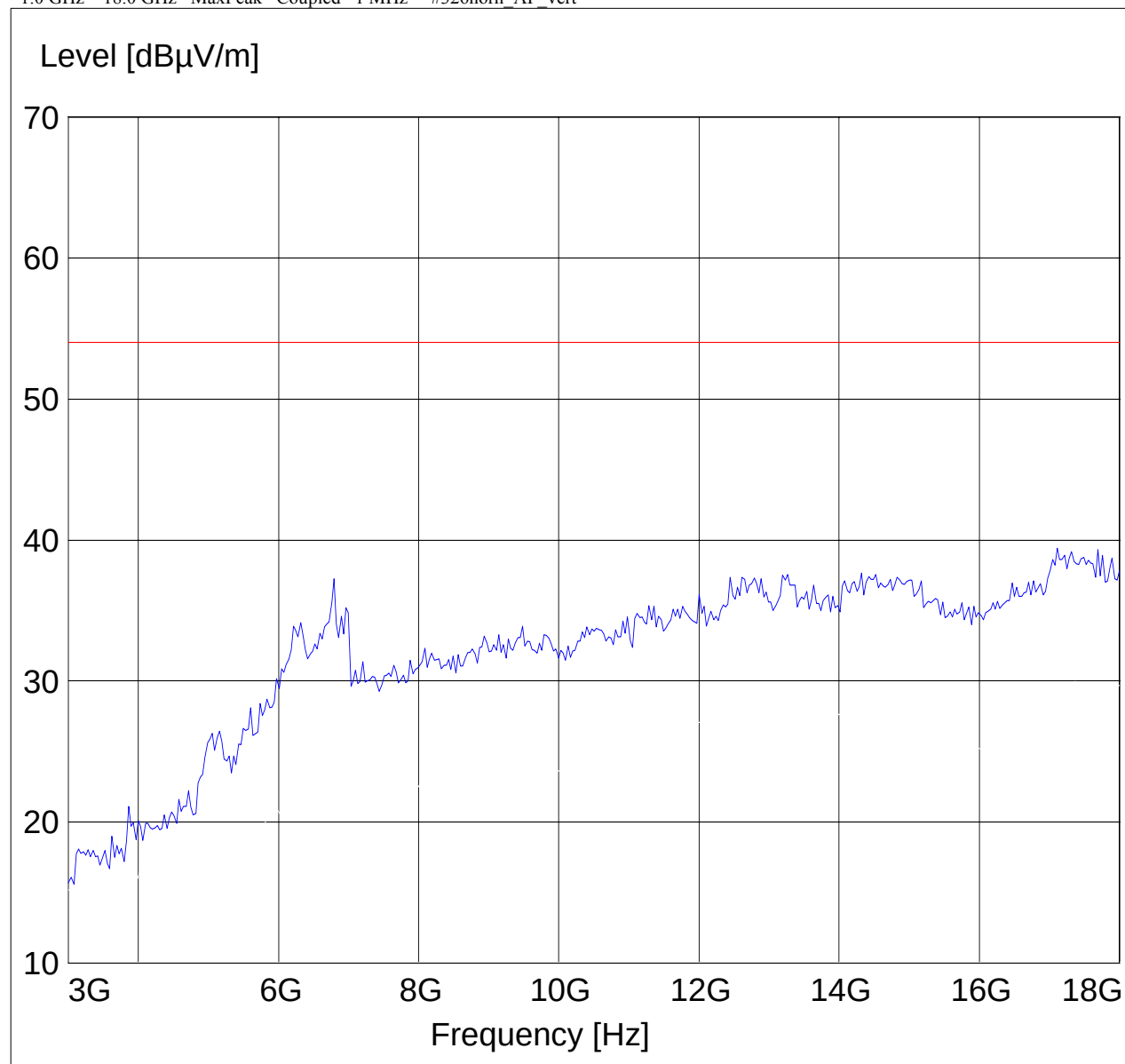
Note: Peak Reading vs. Average limit

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch39
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: ROTATION 360°

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

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





3-18GHz (2480MHz)

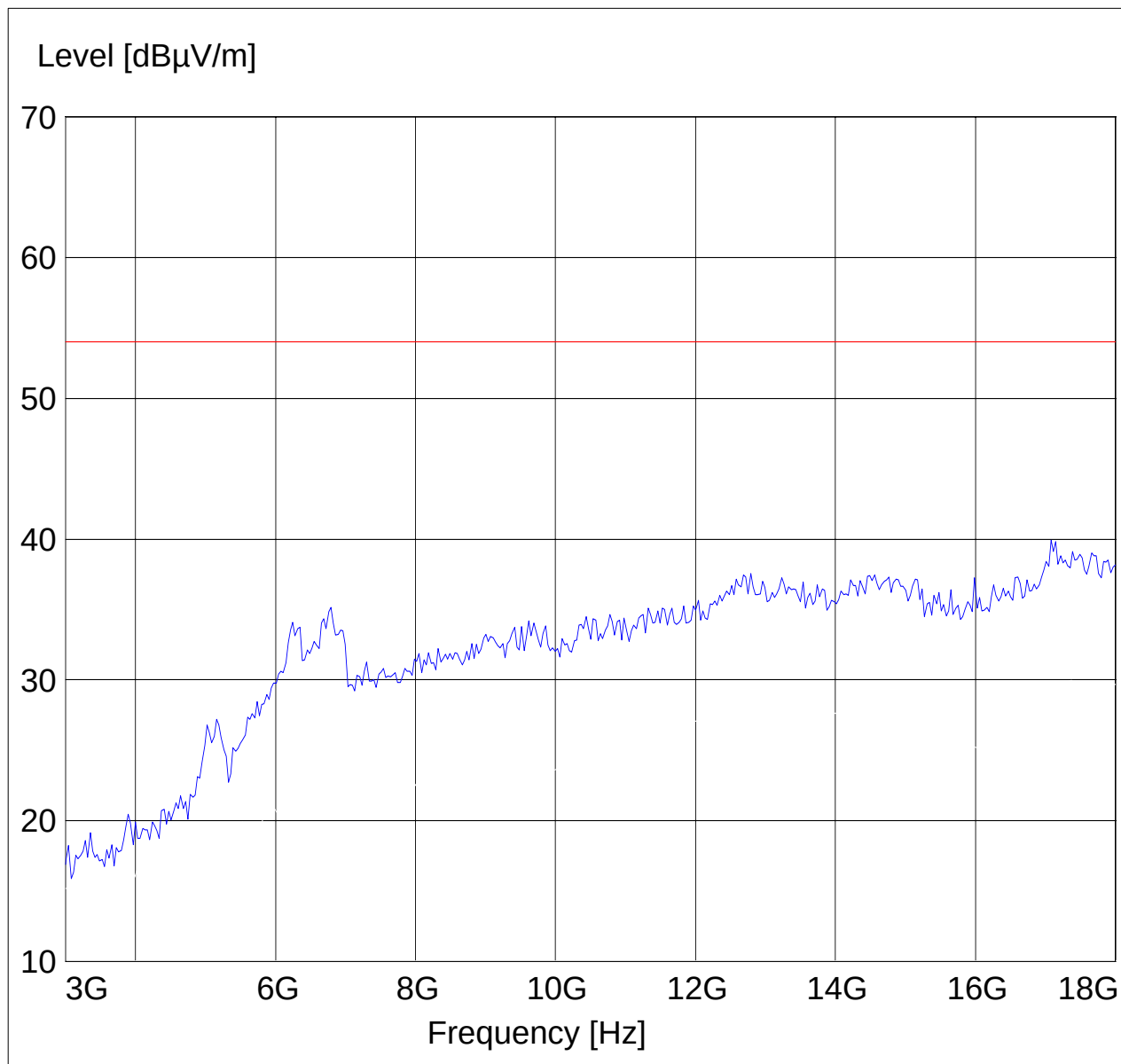
Note: Peak Reading vs. Average limit

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: DT1
Customer:: Toshiba
Test Mode: BT TX Ch78
Ant Orientation: H
EUT Orientation: V
Test Engineer: Pete Krebill
Voltage:: Battery
Comments:: ROTATION 360°

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

Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.0 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

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: DT1

Customer:: Toshiba

Test Mode: BT TX Ch78

Ant Orientation: H

EUT Orientation: V

Test Engineer: Pete Krebill

Voltage:: Battery

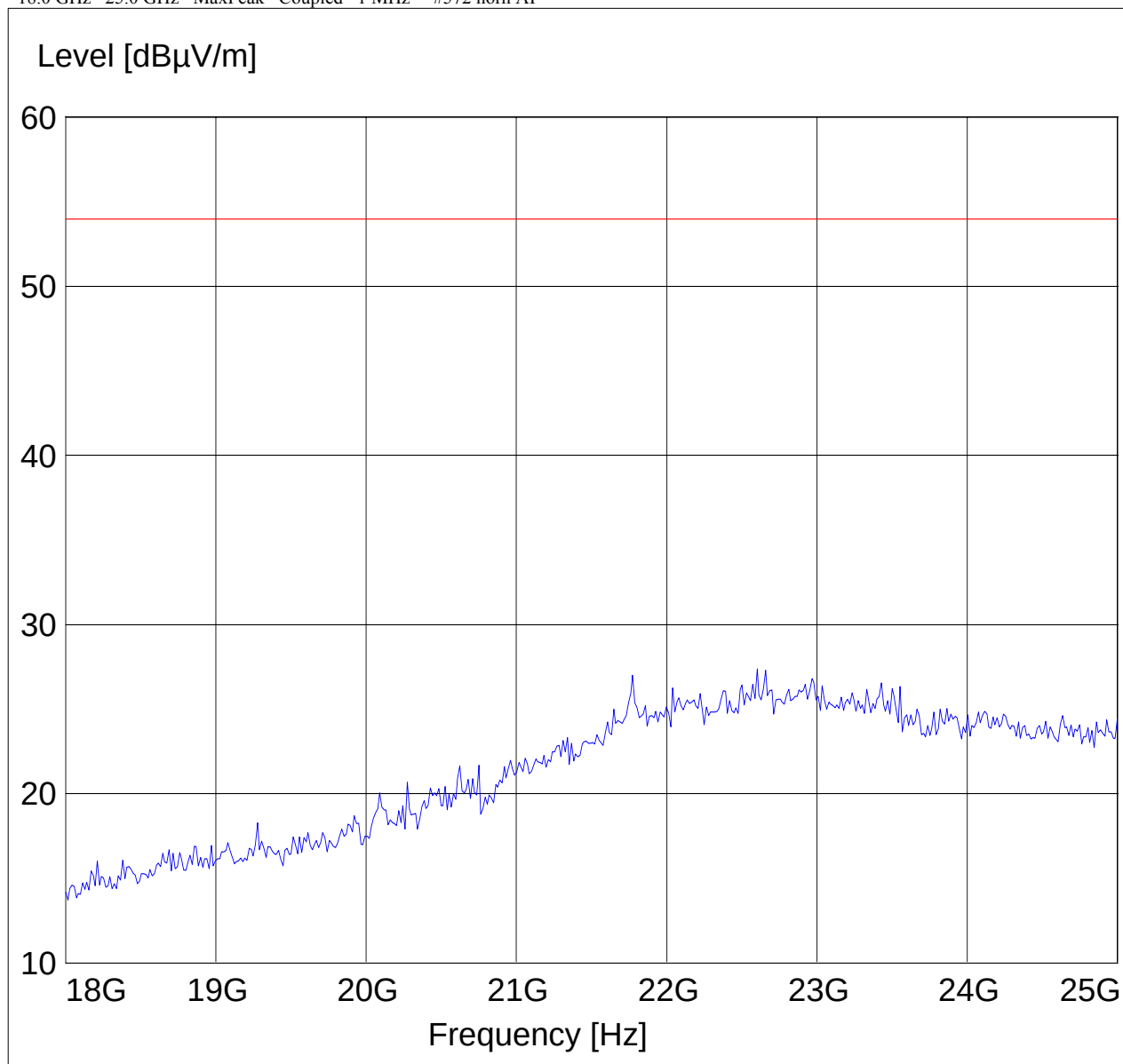
Comments:: Rotation 360° height 1-4m(marked emission is the fundamental)

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

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

18.0 GHz 25.0 GHz MaxPeak Coupled 1 MHz #572 horn AF



5 Measurements (CONDUCTED)

5.1 MAXIMUM PEAK OUTPUT POWER § 15.247 (CONDUCTED)

5.1.1 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.

5.1.2 RESULTS: GFSK

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	0.07	-0.85	-1.03

5.1.3 RESULTS: $\pi / 4$ DQPSK

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	0.28	-0.72	-1.04

5.1.4 RESULTS: 8DPSK

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	0.47	-0.43	-0.85

Measurements were done with the Anritsu BT tester MT8852B to activate EDR mode.

5.2 20dB BANDWIDTH

5.2.1 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.

5.2.2 RESULTS: GFSK

TEST CONDITIONS		BANDWIDTH (KHz)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	933.87	933.87	933.87

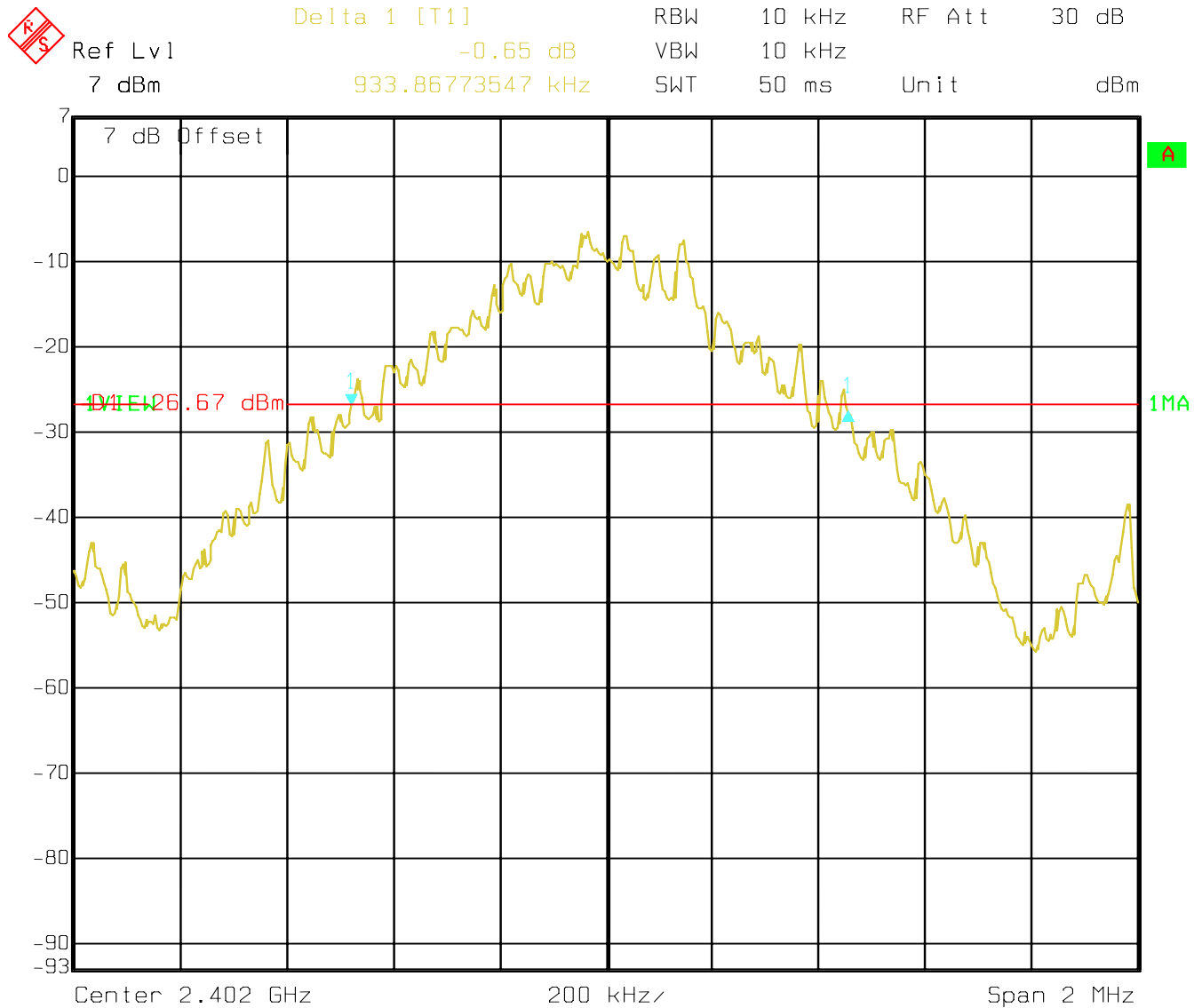
5.2.3 RESULTS: $\pi / 4$ DQPSK

TEST CONDITIONS		BANDWIDTH (KHz)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	1314.63	1314.63	1314.63

5.2.4 RESULTS: 8DPSK

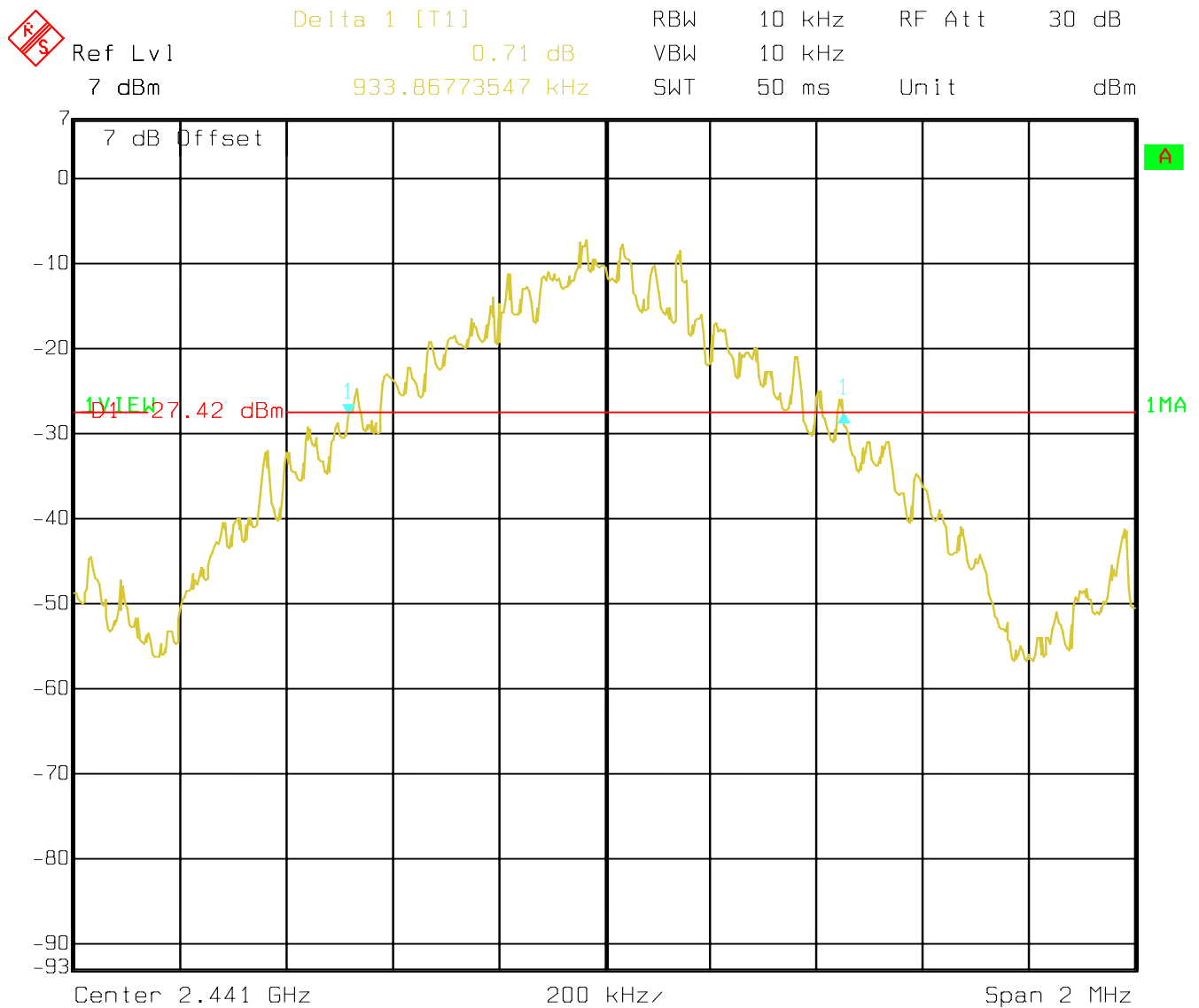
TEST CONDITIONS		BANDWIDTH (KHz)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	1266.53	1266.53	1266.53

(2402 MHz) GFSK



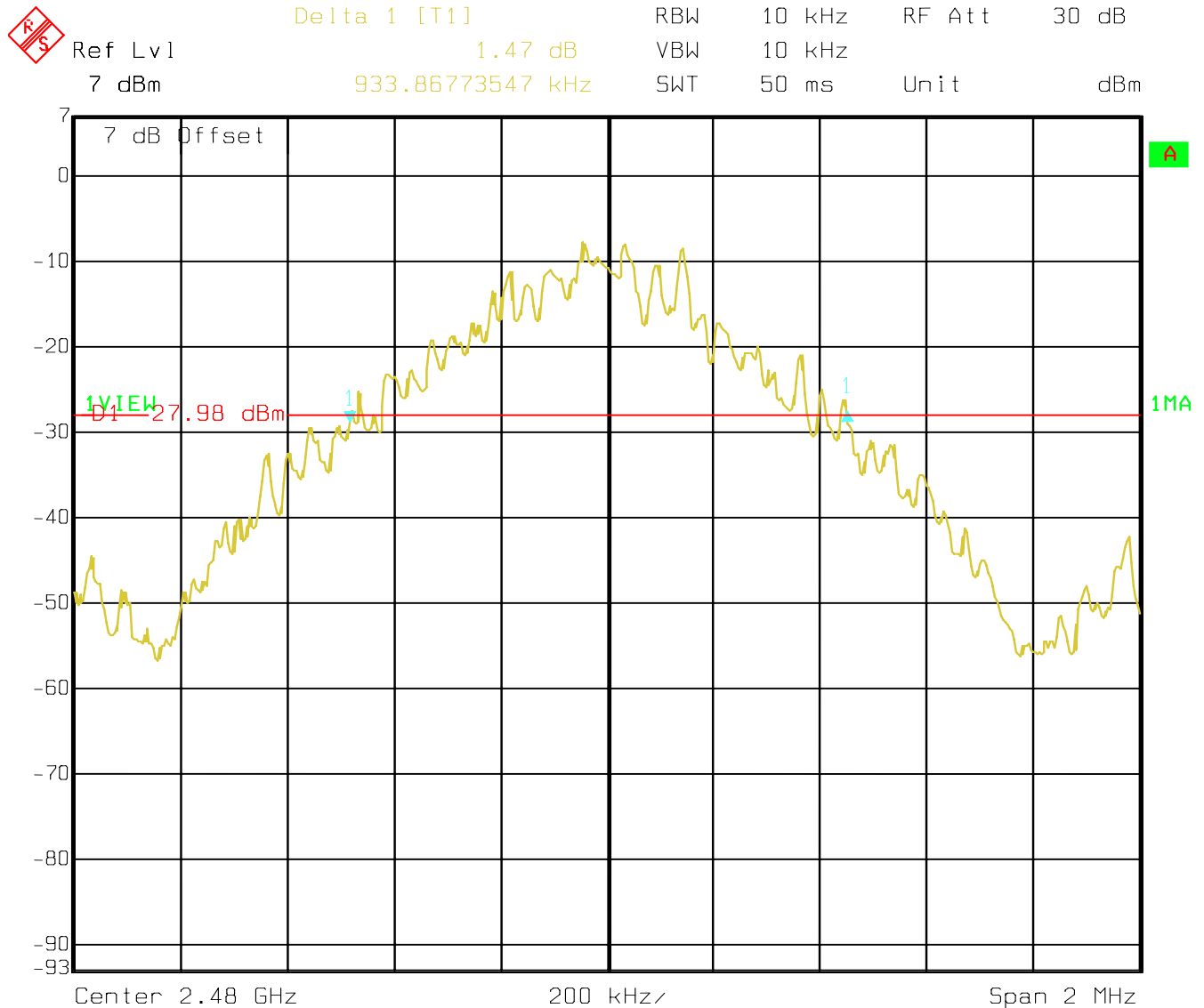
Date: 21.FEB.2007 11:16:48

(2441 MHz) GFSK



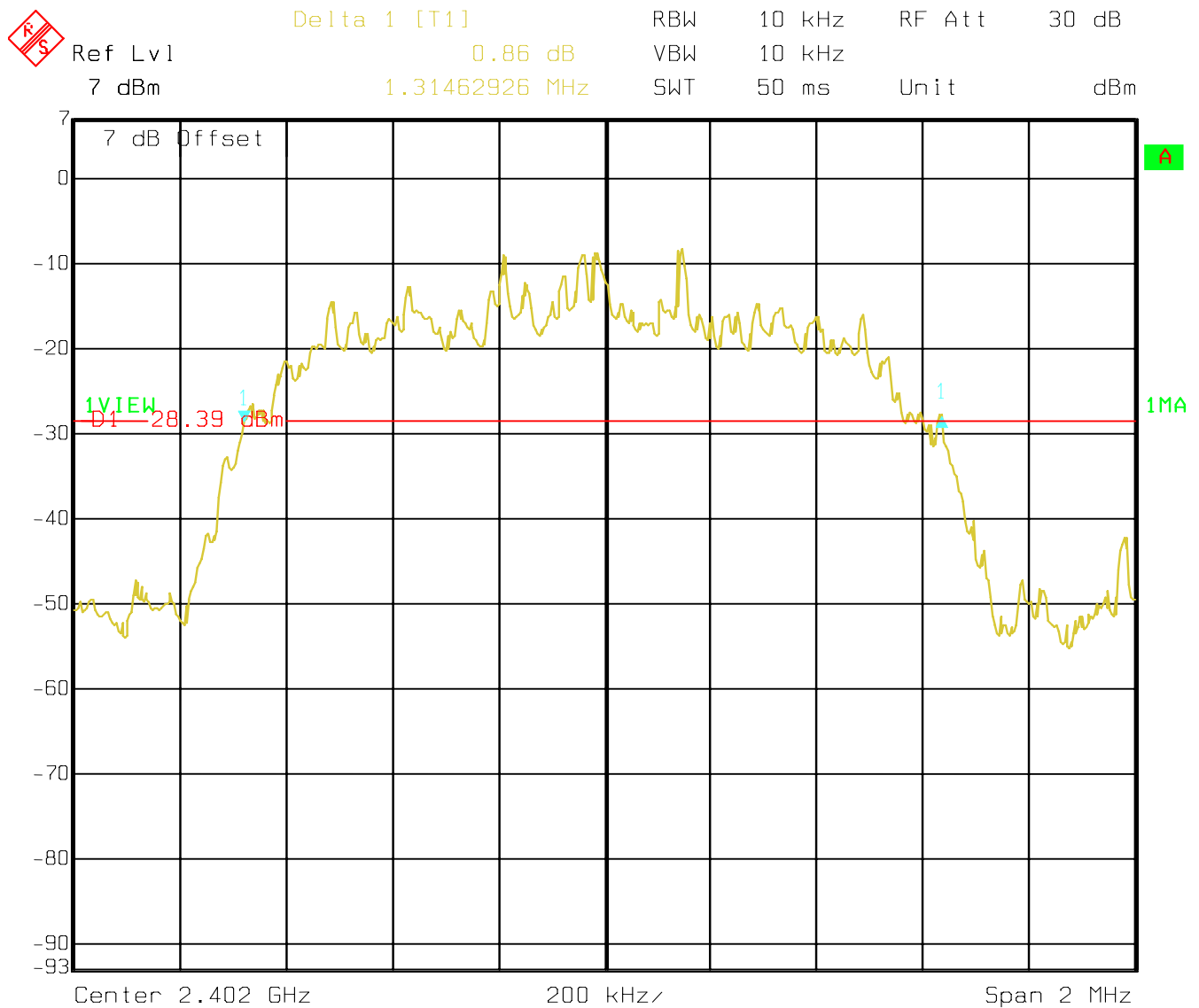
Date: 21.FEB.2007 11:32:39

(2480 MHz) GFSK



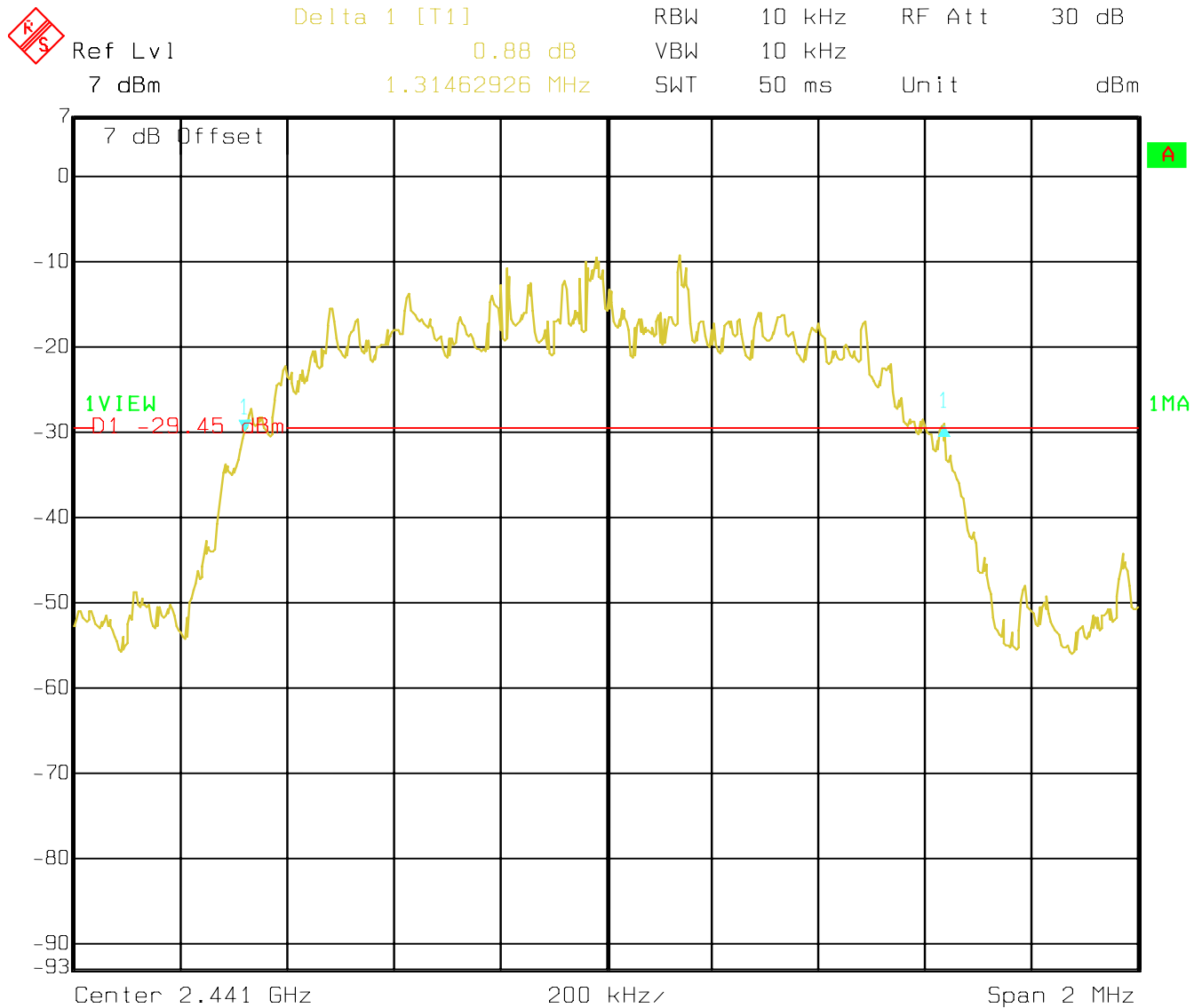
Date: 21.FEB.2007 11:34:24

(2402 MHz) $\pi / 4$ DQPSK



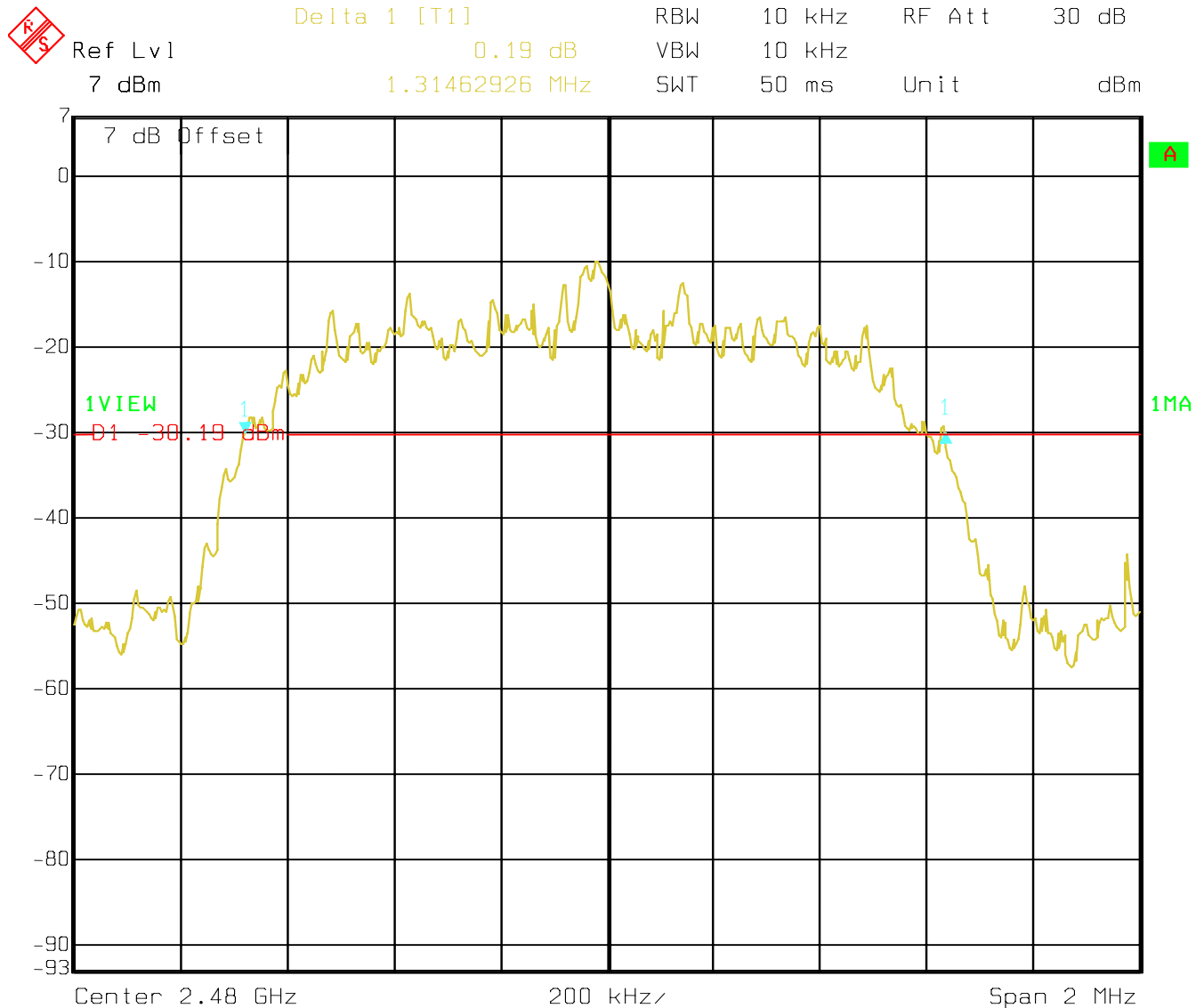
Date: 21.FEB.2007 11:19:04

(2441 MHz) $\pi / 4$ DQPSK



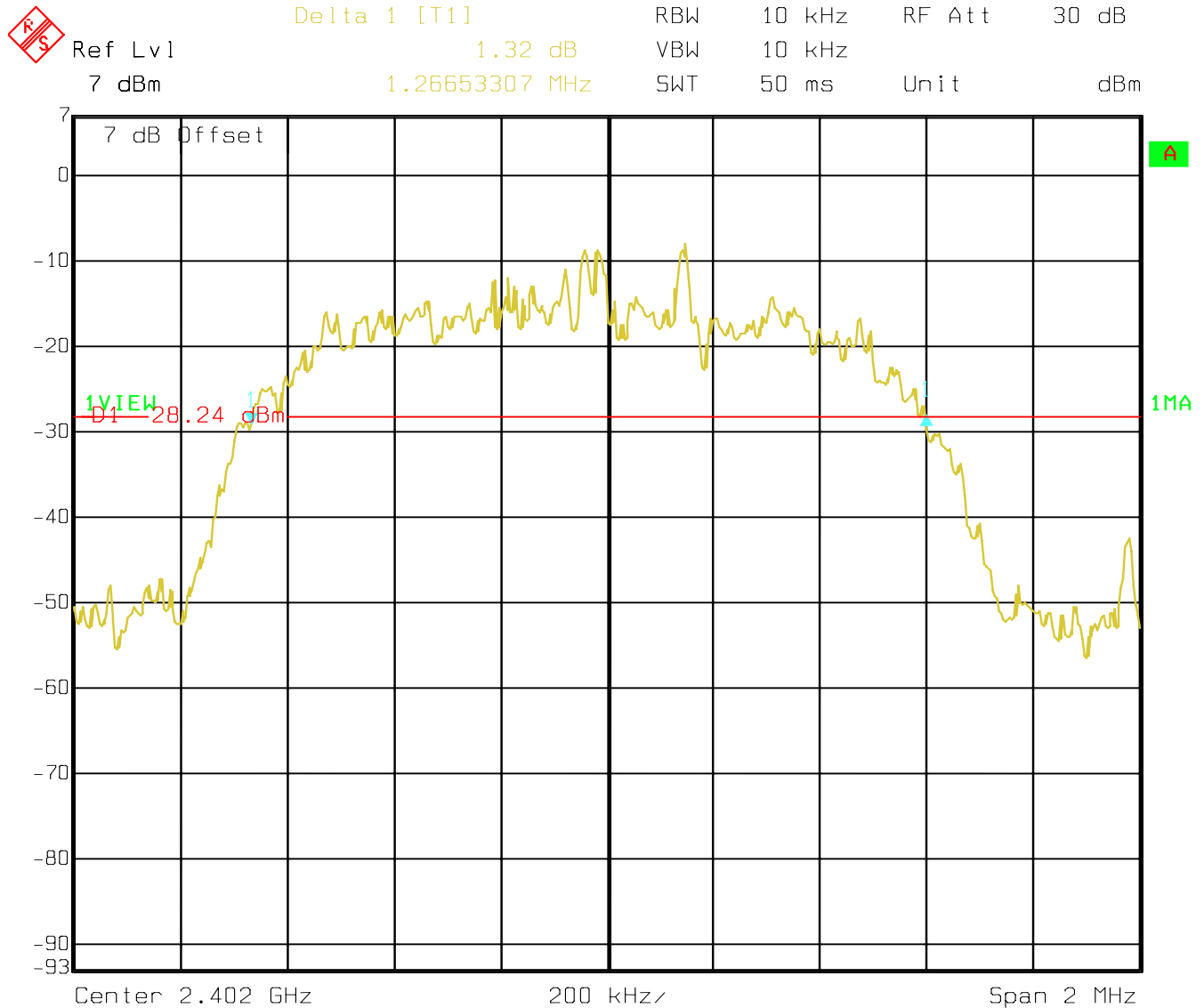
Date: 21.FEB.2007 11:23:39

(2480 MHz) $\pi / 4$ DQPSK



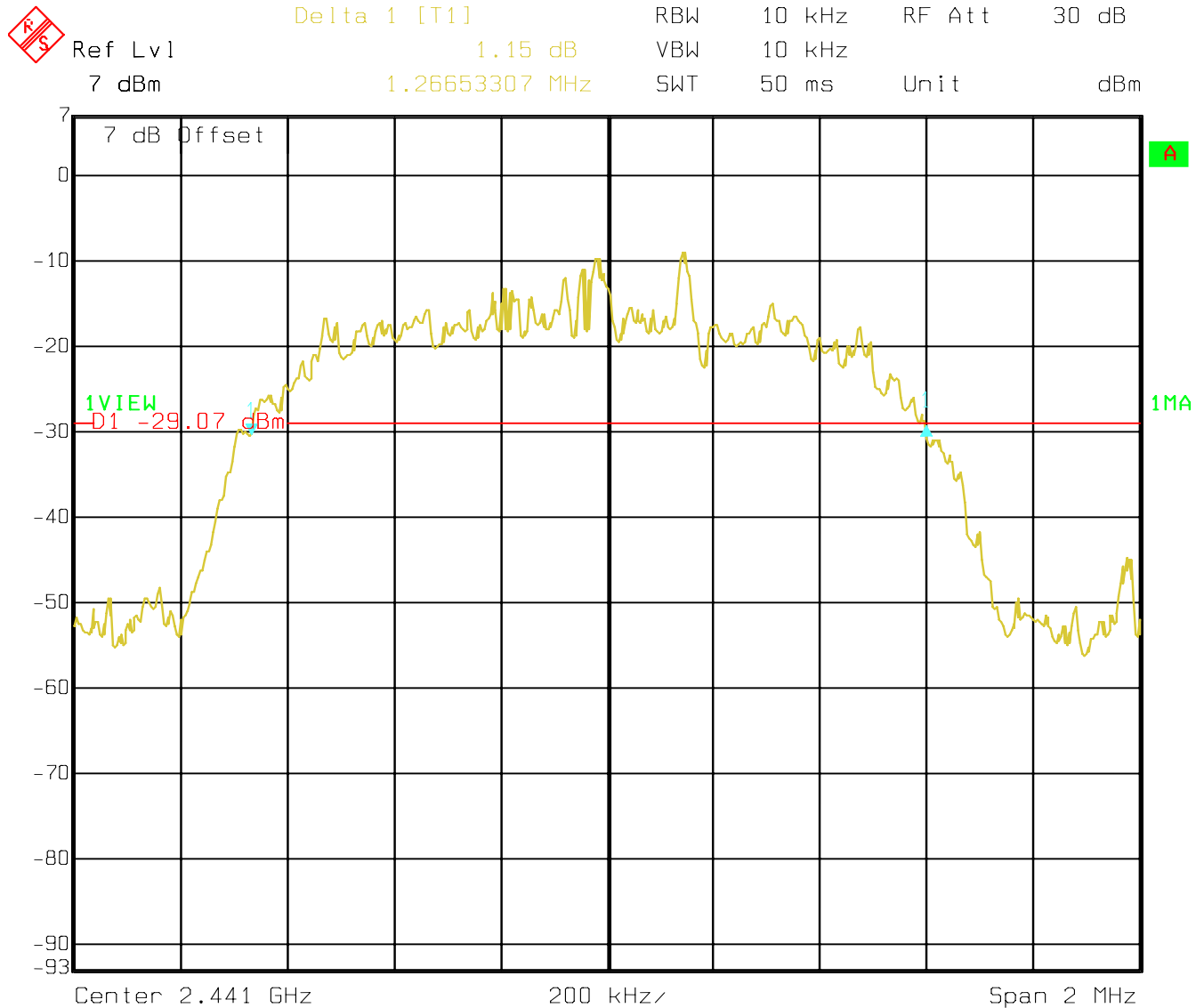
Date: 21.FEB.2007 11:35:23

(2402 MHz) 8DPSK



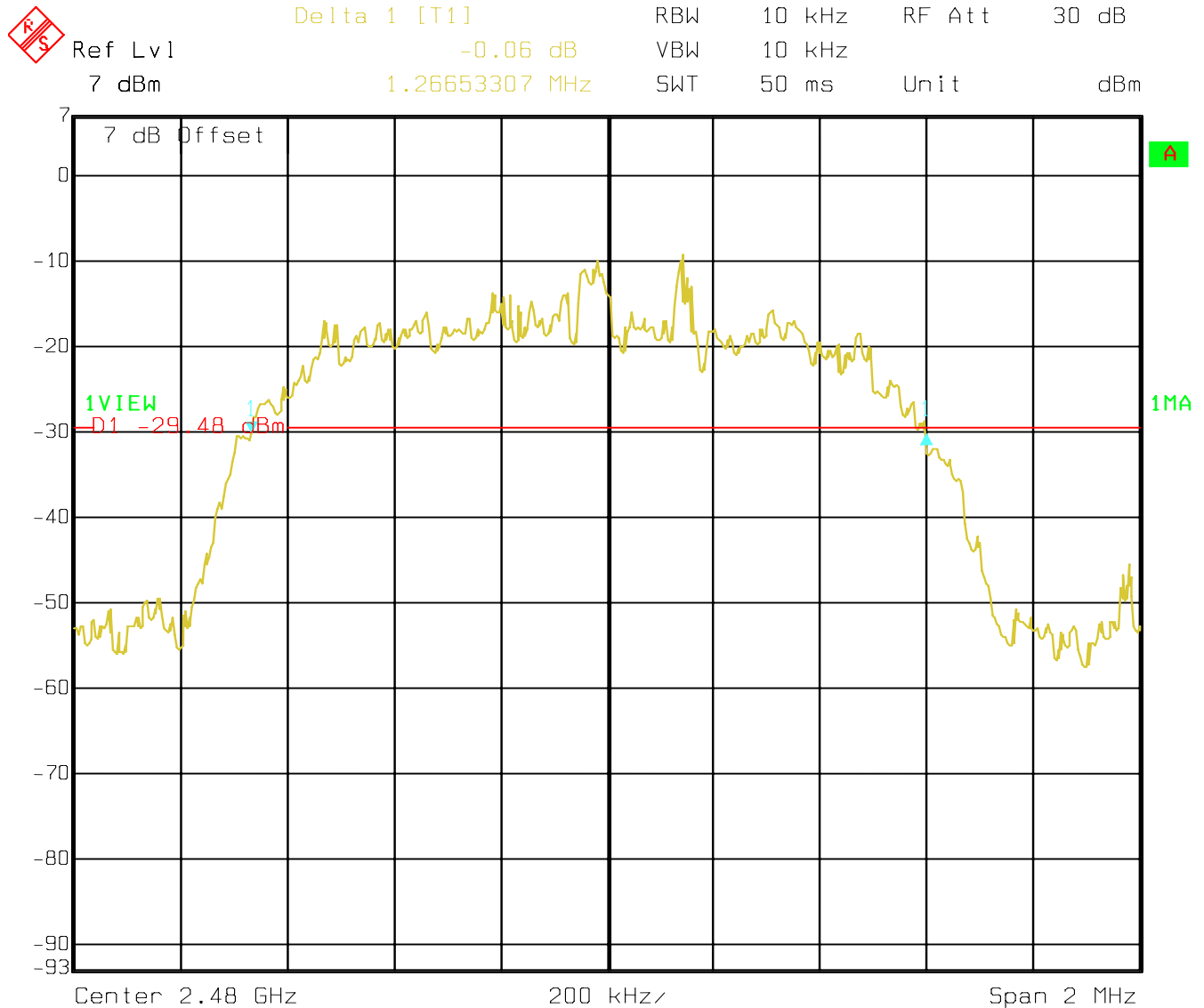
Date: 21.FEB.2007 11:20:56

(2441 MHz) 8DPSK



Date: 21.FEB.2007 11:22:20

(2480 MHz) 8DPSK



Date: 21.FEB.2007 11:36:14

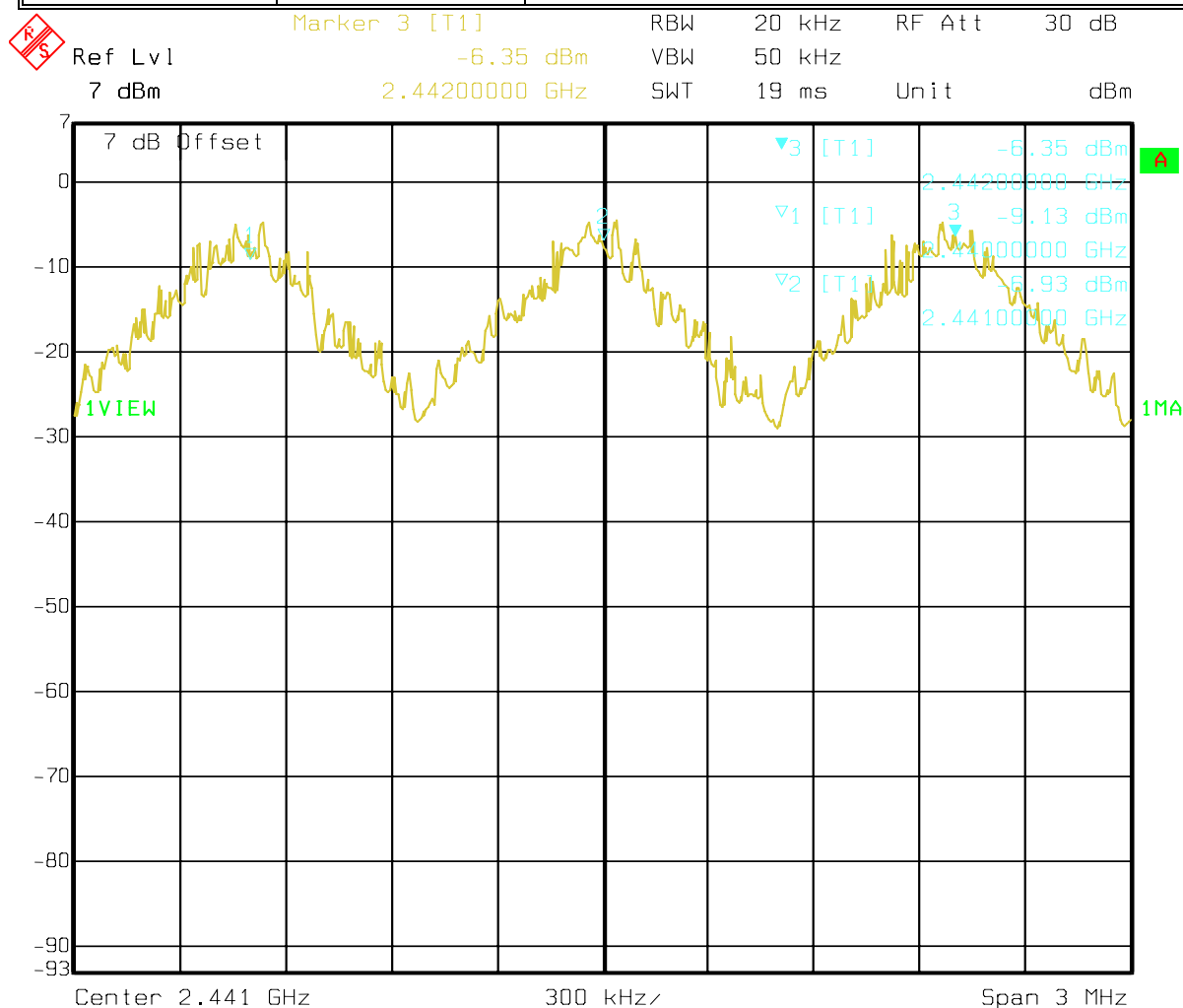
5.3 CARRIER FREQUENCY SEPARATION

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

SEPARATION
> 25 KHz or > 20 dB BANDWIDTH

5.3.2 RESULTS:

TEST CONDITIONS		SEPARATION (MHz)	
T _{nom} (23)°C	V _{nom} VDC	1.000	



5.4 NUMBER OF HOPPING CHANNELS

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

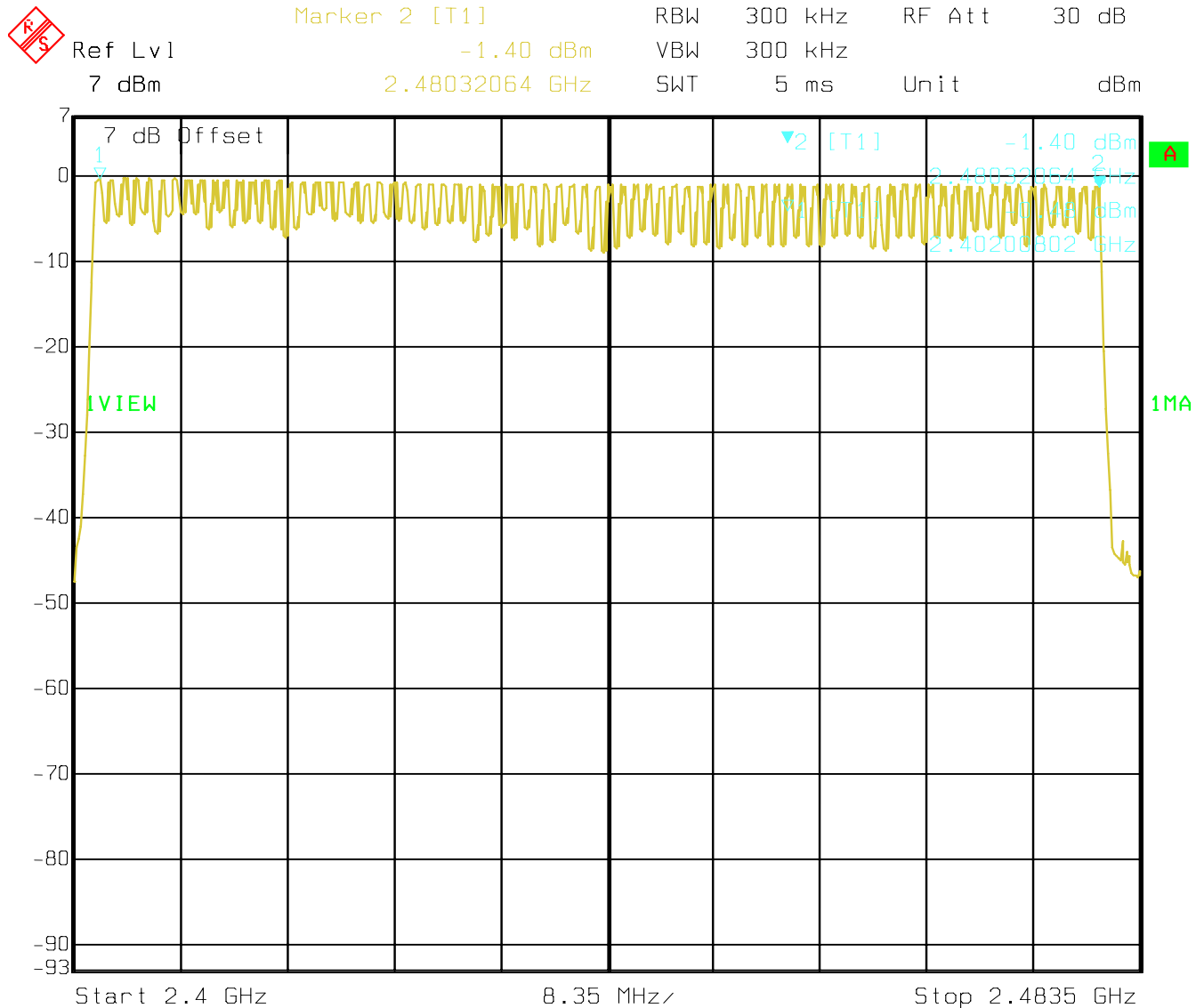
NUMBER OF CHANNELS
> 15

5.4.2 RESULTS:

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

PLOT

(F1-F2=2402MHz to 2480MHz)



Date: 21.FEB.2007 11:50:49

5.5 TIME OF OCCUPANCY (DWELL TIME)

5.5.1 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

5.5.2 RESULTS:

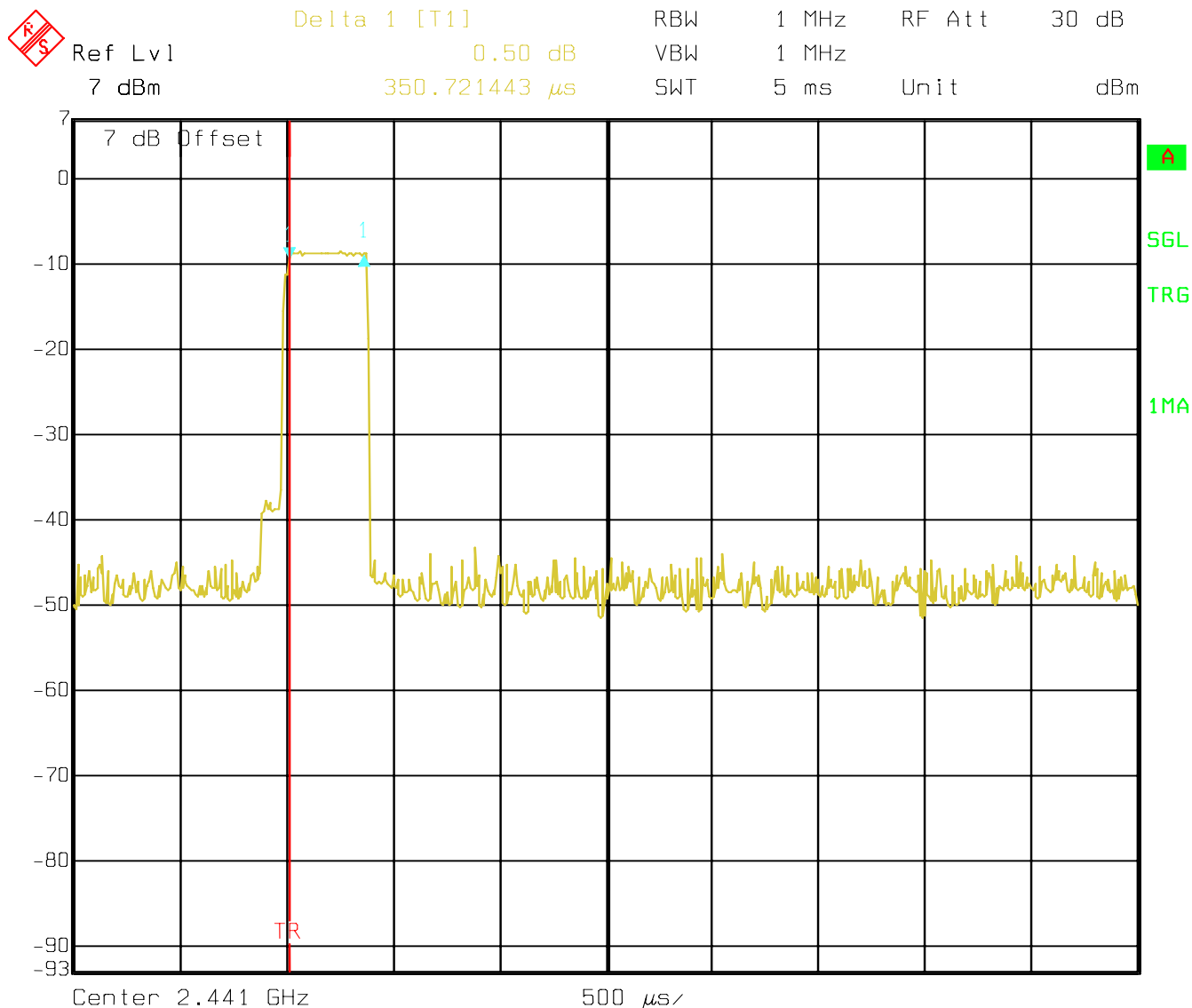
TEST CONDITIONS		TIME OF OCCUPANCY IN 31.6 SECONDS (ms)		
PACKET TYPE		DH1	DH3	DH5
T _{nom} (23)°C	V _{nom} VDC	112.266	261.61	307.46

(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 380.76μs.

So we have $320.1 \times 350.721\mu s = 112.266ms$ per 31.6 seconds.



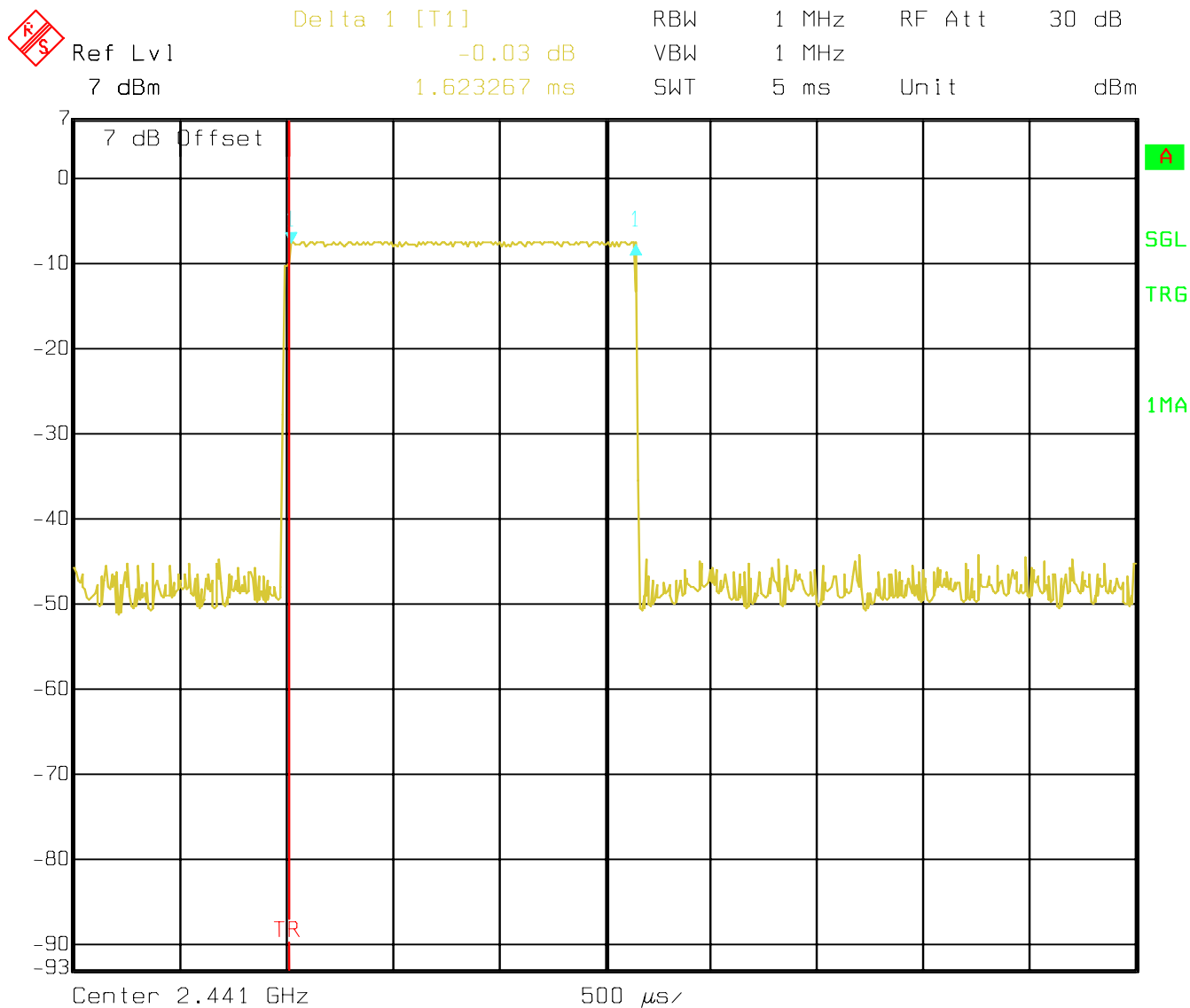
Date: 21.FEB.2007 12:06:31

(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 1.676ms.

So we have $161.16 * 1.623\text{ms} = 266.44\text{ms}$ per 31.6 seconds.



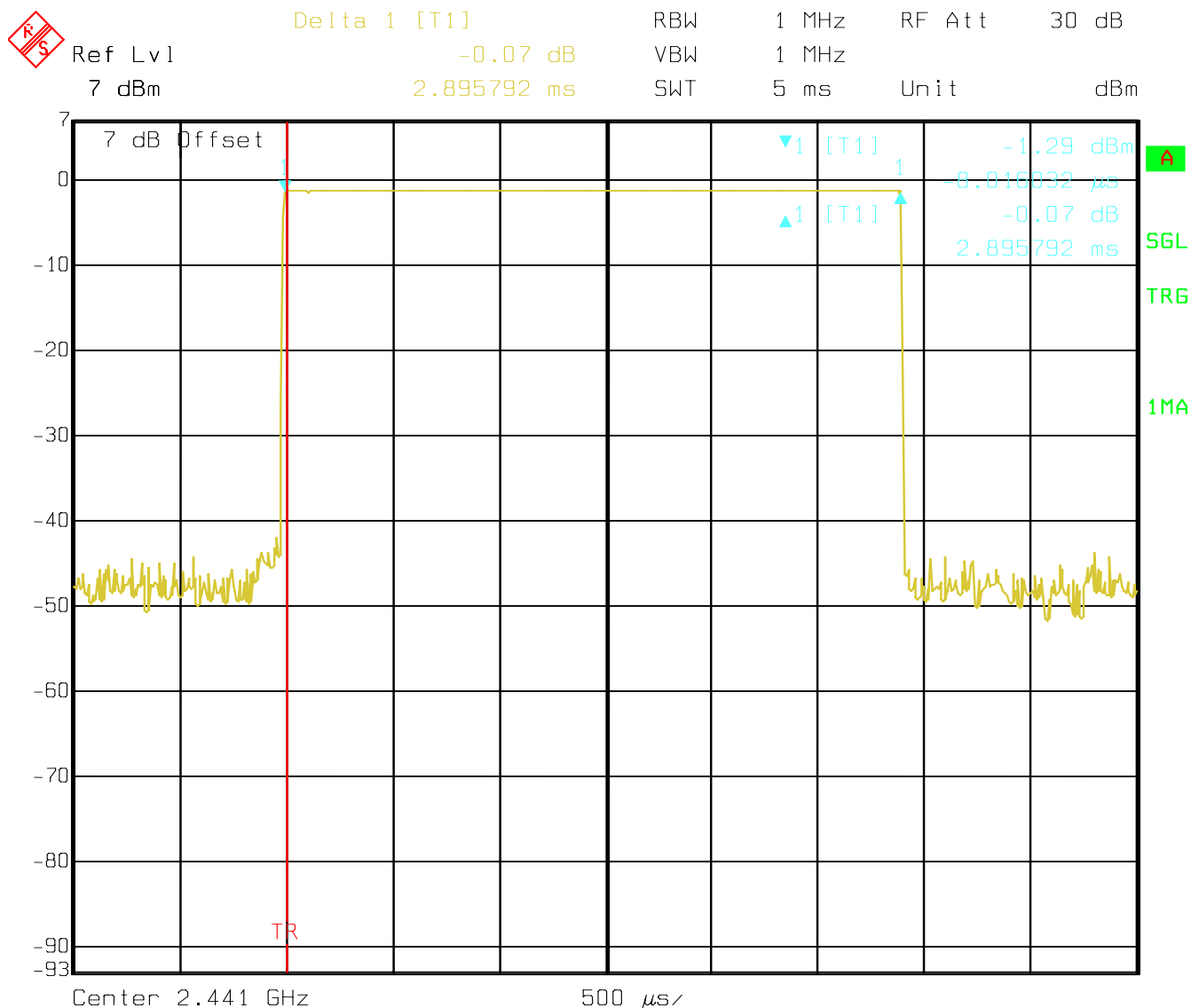
Date: 21.FEB.2007 12:04:46

(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 2.896ms.

So we have $106.176 * 2.896\text{ms} = 307.46\text{ms}$ per 31.6 seconds.



Date: 21.FEB.2007 12:01:16

5.6 CONDUCTED SPURIOUS EMISSION

5.6.1 LIMIT SUB CLAUSE § 15.247 (d)

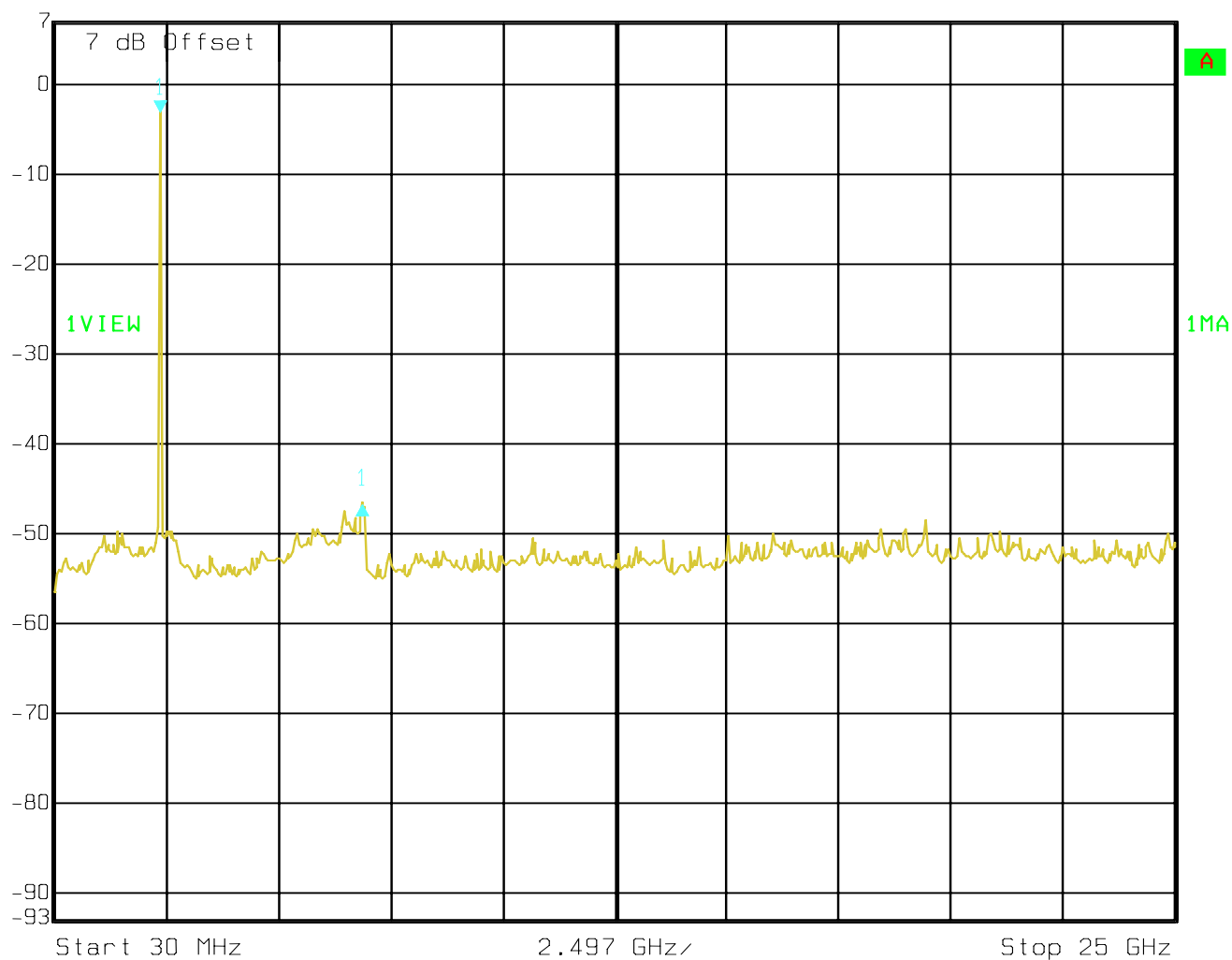
FREQUENCY RANGE	limit
30M-25GHz	-20dBc

5.6.2 RESULTS: Tnom(23)°C VnomVDC

(2402MHz)

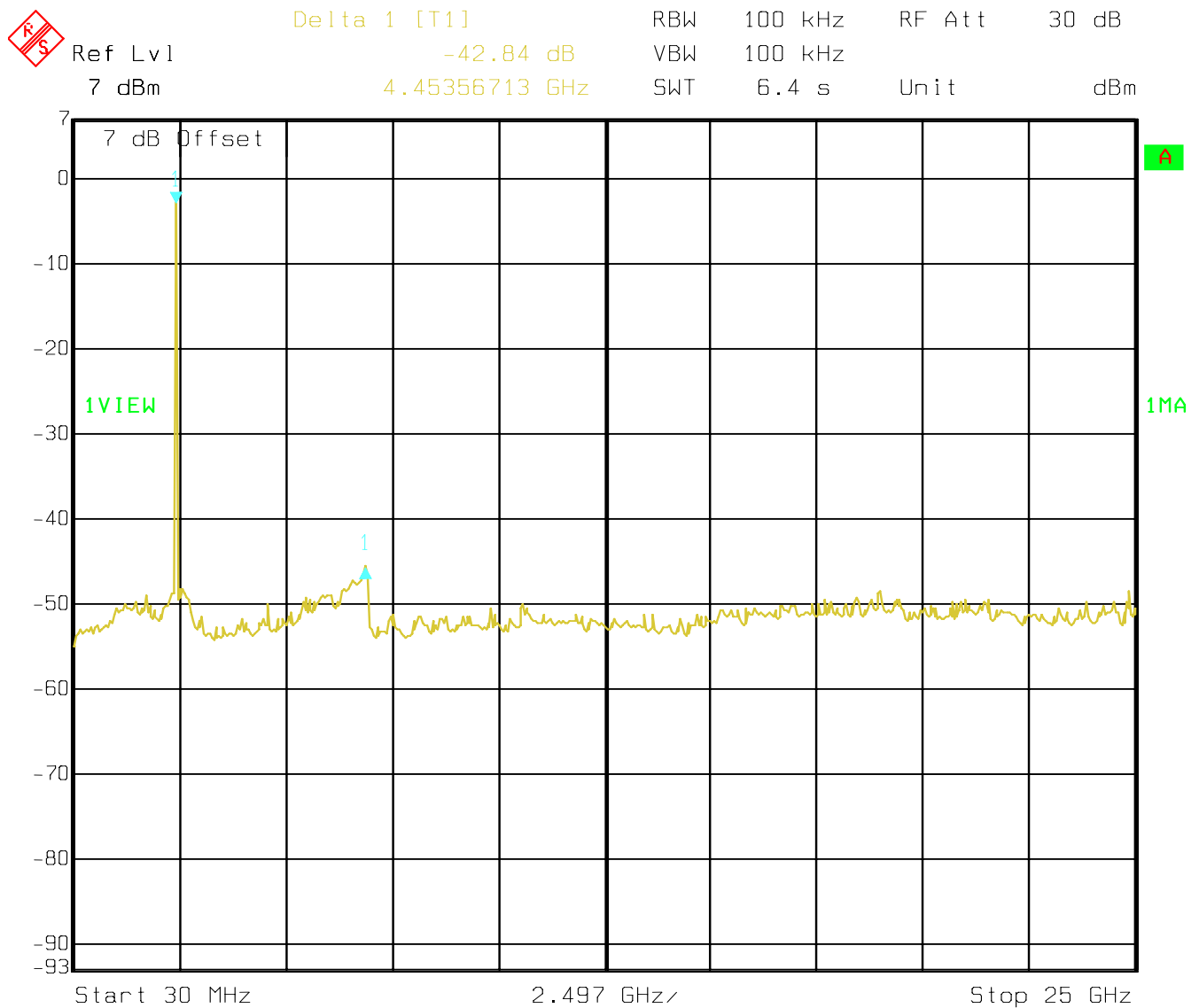


Ref Lvl 7 dBm
Delta 1 [T1] -43.47 dB
4.48349098 GHz
RBW 100 kHz RF Att 30 dB
VBW 100 kHz
SWT 6.4 s Unit dBm



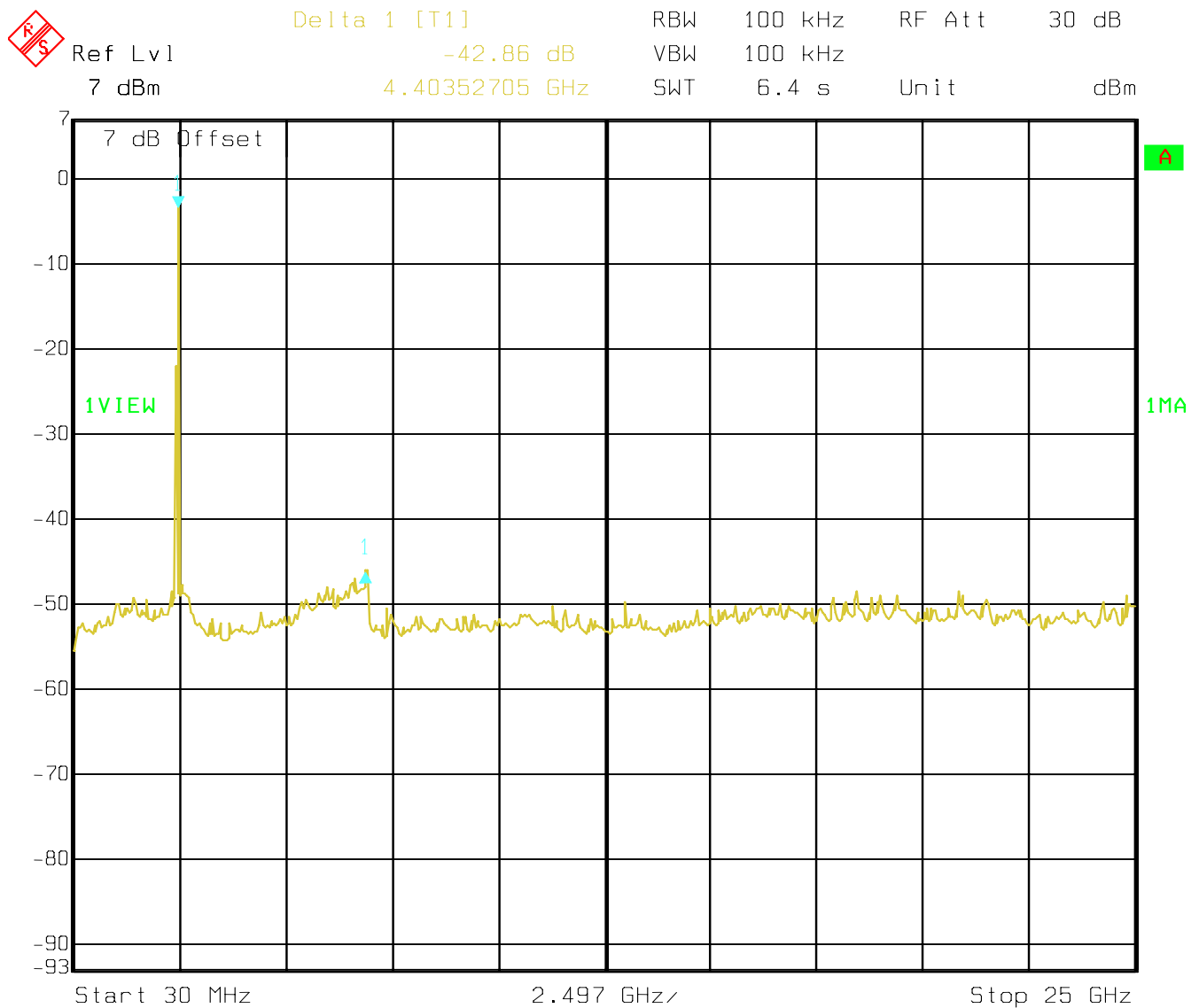
Date: 21.FEB.2007 12:36:42

(2441MHz)



Date: 21.FEB.2007 12:37:58

(2480MHz)



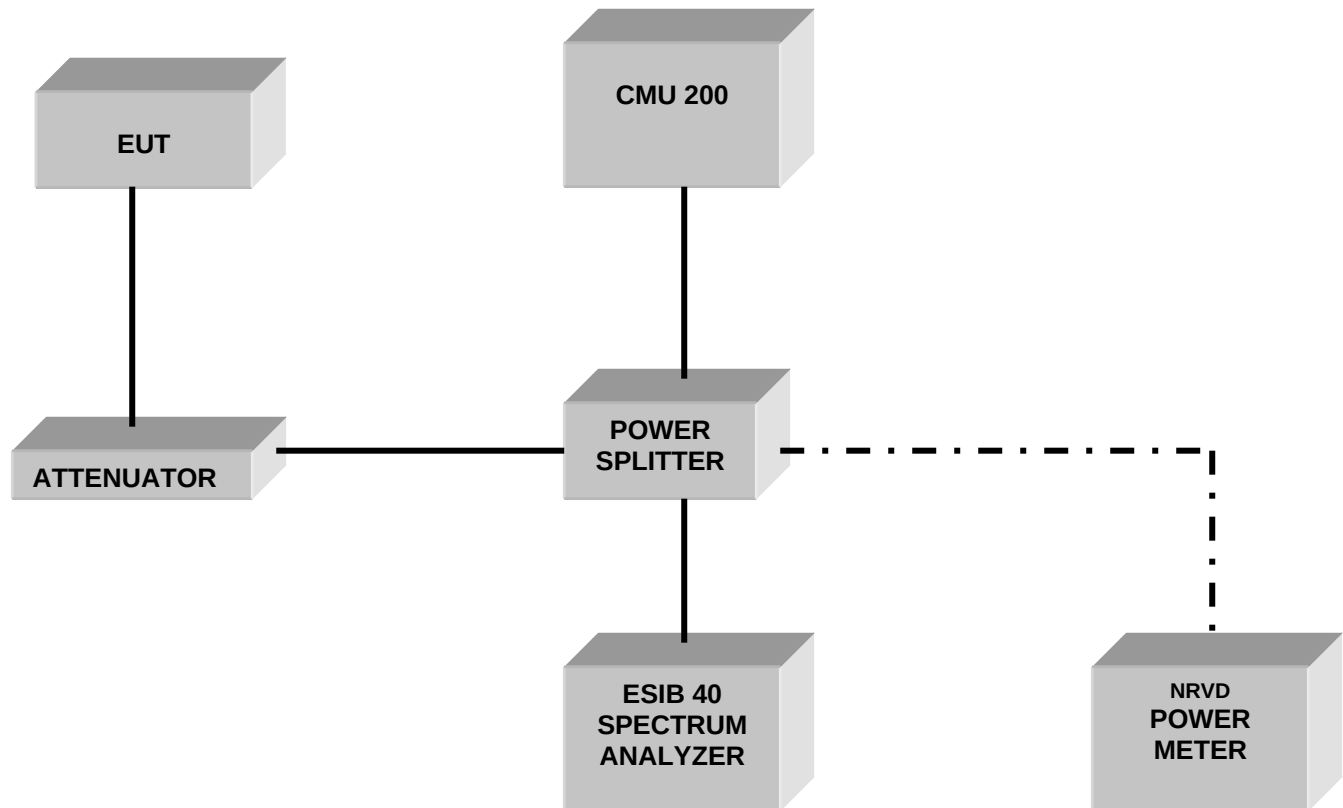
Date: 21.FEB.2007 12:39:05

6 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

7 BLOCK DIAGRAMS

Conducted Testing



Radiated Testing

ANECHOIC CHAMBER

