



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

FOR:

GSM/UMTS/HSDPA Mobile Phone

MODEL #: RG4-E01
Toshiba Information Systems (UK) Ltd., Mobile Communications Division

Riverside Way
Camberley, Surrey, GU15 3YA UK

FCC ID: SP2-RG4-E01

TEST REPORT #: EMC_CETEC_009_06502_15.247BT
DATE: 2006-12-06



FCC listed#
101450
IC recognized #
3925

CETECOM Inc.

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TABLE OF CONTENTS

1	Assessment	4
	Technical responsibility for area of testing:	4
	EMC & Radio	4
2	Administrative Data	5
2.1	Identification of the Testing Laboratory Issuing the EMC Test Report	5
2.2	Identification of the Client	5
2.3	Identification of the Manufacturer	5
3	Equipment under Test (EUT)	6
3.1	Specification of the Equipment under Test	6
3.2	Identification of the Equipment Under Test (EUT)	6
3.3	Identification of Accessory equipment	6
4	Subject Of Investigation	7
5	Measurements (RADIATED)	8
5.1	MAXIMUM PEAK OUTPUT POWER § 15.247 (RADIATED)	8
5.1.1	LIMIT SUB CLAUSE § 15.247 (b) (1) (2) (3) (4)	8
5.1.2	EIRP: GFSK	8
5.1.3	EIRP: $\pi / 4$ DQPSK	8
5.1.4	EIRP: 8DPSK	8
5.2	RESTRICTED BAND EDGE COMPLIANCE RADIATED §15.247/15.205	12
5.2.1	LIMITS	12
5.2.2	RESULTS (2402MHz)	13
5.2.3	RESULTS (2480MHz)	15
5.3	TRANSMITTER SPURIOUS EMISSIONS RADIATED § 15.247/15.205/15.209	17
5.3.1	LIMITS	17
5.3.2	RESULTS	18
5.4	RECEIVER SPURIOUS RADIATION § 15.209/RSS210	27
5.4.1	LIMITS	27
5.4.2	RESULTS	28
6	Measurements (CONDUCTED)	32
6.1	MAXIMUM PEAK OUTPUT POWER § 15.247 (CONDUCTED)	32
6.1.1	LIMIT SUB CLAUSE § 15.247 (b) (1)	32
6.1.2	RESULTS: DFSK	32
6.1.3	RESULTS: $\pi / 4$ DQPSK	32
6.1.4	RESULTS: 8DPSK	32
6.2	20dB BANDWIDTH	33
6.2.1	LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)	33
6.2.2	RESULTS: GFSK	33
6.2.3	RESULTS: $\pi / 4$ DQPSK	33
6.2.4	RESULTS: 8DPSK	33
6.3	CARRIER FREQUENCY SEPARATION	43



6.3.1	LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)	43
6.3.2	RESULTS:	43
6.4	NUMBER OF HOPPING CHANNELS	44
6.4.1	LIMIT SUB CLAUSE § 15.247 (a) (1) (iii)	44
6.4.2	RESULTS:	44
6.5	TIME OF OCCUPANCY (DWELL TIME)	49
6.5.1	LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)	49
6.5.2	RESULTS:	49
6.6	CONDUCTED SPURIOUS EMISSION	53
6.6.1	LIMIT SUB CLAUSE § 15.247 (d)	53
6.6.2	RESULTS: Tnom(23)°C VnomVDC	53
7	TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS	56
8	BLOCK DIAGRAMS	57

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:	2006-10-27 to 2006-11-14

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-E01
Description	GSM/UMTS/HSDPA Mobile Phone
Model No.	RG4-E01
Serial No.	
H/W & S/W	HW version: SP1 SW version: TF_QCT2340C_SHARK_VER_01.25_20061130
FCC-ID	SP2-RG4-E01
IC-ID (Industry Canada)	N/A

Frequency Range:	2400-2483.5MHz
Type(s) of Modulation:	GFSK, $\pi / 4$ DQPSK, 8DPSK
Number of Channels:	79
Antenna Type:	PIFA/average Gain is about -5dBi
Output Power:	0.000558 W EIRP@ 2480 MHz

3.2 Identification of the Equipment Under Test (EUT)

EUT #	TYPE	MANF.	MODEL	SERIAL #
1	EUT	Toshiba Corporation	RG4-E01	004401120210105

3.3 Identification of Accessory equipment

AE #	TYPE	MANF.	MODEL	SERIAL #
1	AC/DC ADAPTER	TAMURA	AWW0515KA (SP)	0640



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 pre-certified 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.



5 Measurements (RADIATED)

5.1 MAXIMUM PEAK OUTPUT POWER § 15.247 (RADIATED)

5.1.1 LIMIT SUB CLAUSE § 15.247 (b) (1) (2) (3) (4)

Frequency range	RF power output
2400-2483.5 MHz	36dBm EIRP

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

5.1.2 EIRP: GFSK

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402	2441	2480
T _{nom} (23)°C	V _{nom} VDC	-6.13	-5.11	-2.53
Measurement uncertainty		±0.5dBm		

5.1.3 EIRP: $\pi / 4$ DQPSK

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402	2441	2480
T _{nom} (23)°C	V _{nom} VDC	-7.47*	-6.47*	-3.89*
Measurement uncertainty		±0.5dBm		

5.1.4 EIRP: 8DPSK

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402	2441	2480
T _{nom} (23)°C	V _{nom} VDC	-7.43*	-6.46*	-3.88*
Measurement uncertainty		±0.5dBm		

* Calculated values based on antenna gain and measured conducted peak power. Measurements were done with the Anritsu BT tester MT8852B to activate EDR mode.



EIRP (2402 MHz)

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

EUT:: 9901910000009276, 004401120210105

Customer: Toshiba

Test Mode: BT TestMode

Ant Orientation: H, TT200°

EUT Orientation: H

Test Engineer: Peter Mu

Voltage:: AC Adaptor

Sweep: EIRP BT Low Chan

SWEEP TABLE: "EIRP BT low channel"

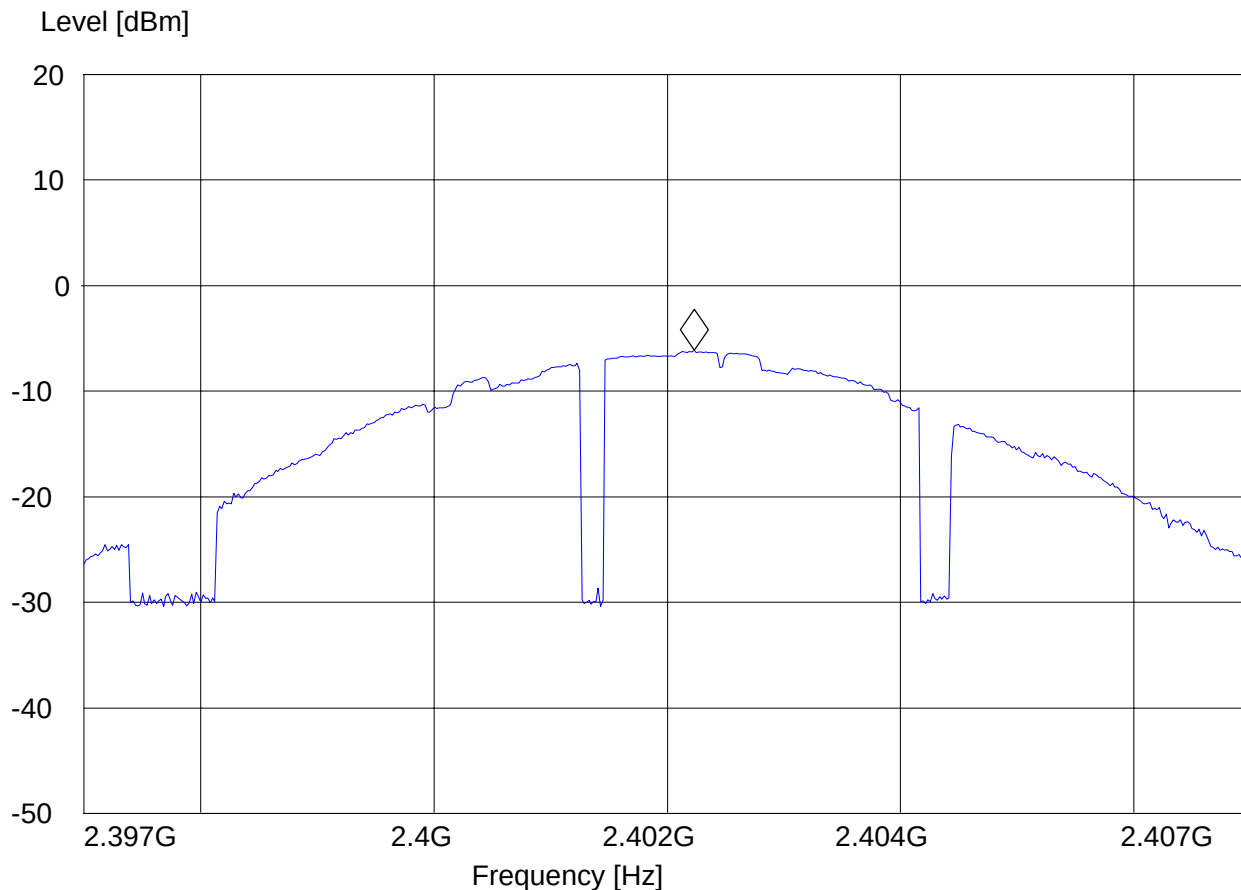
Short Description: EIRP Bluetooth channel-2402MHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

2.4 GHz 2.4 GHz MaxPeak Coupled 3 MHz DUMMY-DBM
MaxPeak

Marker: 2.402230461 GHz -6.13 dBm





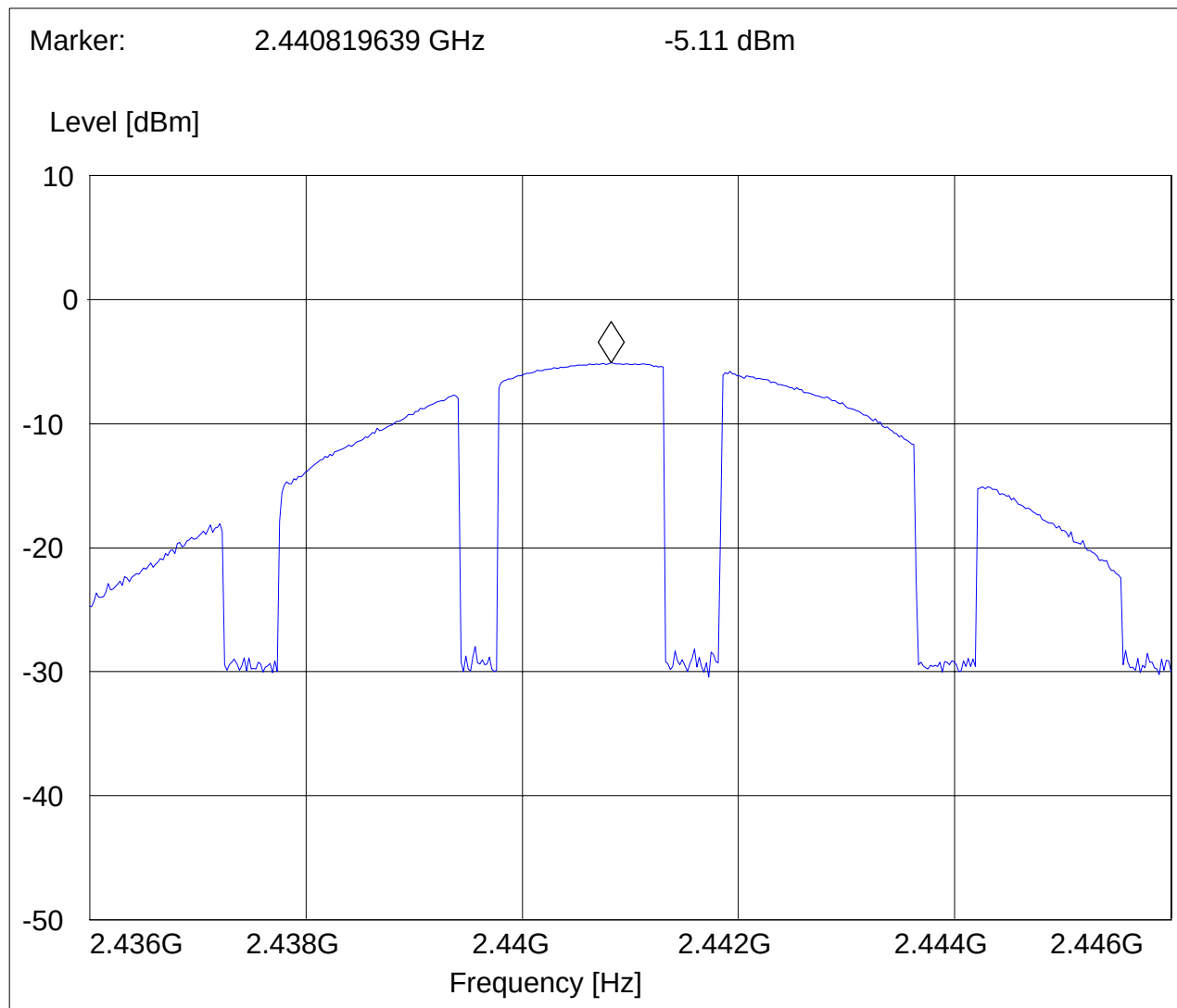
EIRP (2441 MHz)

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

EUT:: 9901910000009276, 004401120210105
Customer: Toshiba
Test Mode: BT TestMode
Ant Orientation: H, TT200°
EUT Orientation: H
Test Engineer: Peter Mu
Voltage:: AC Adaptor
Sweep: EIRP BT MID Chan

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





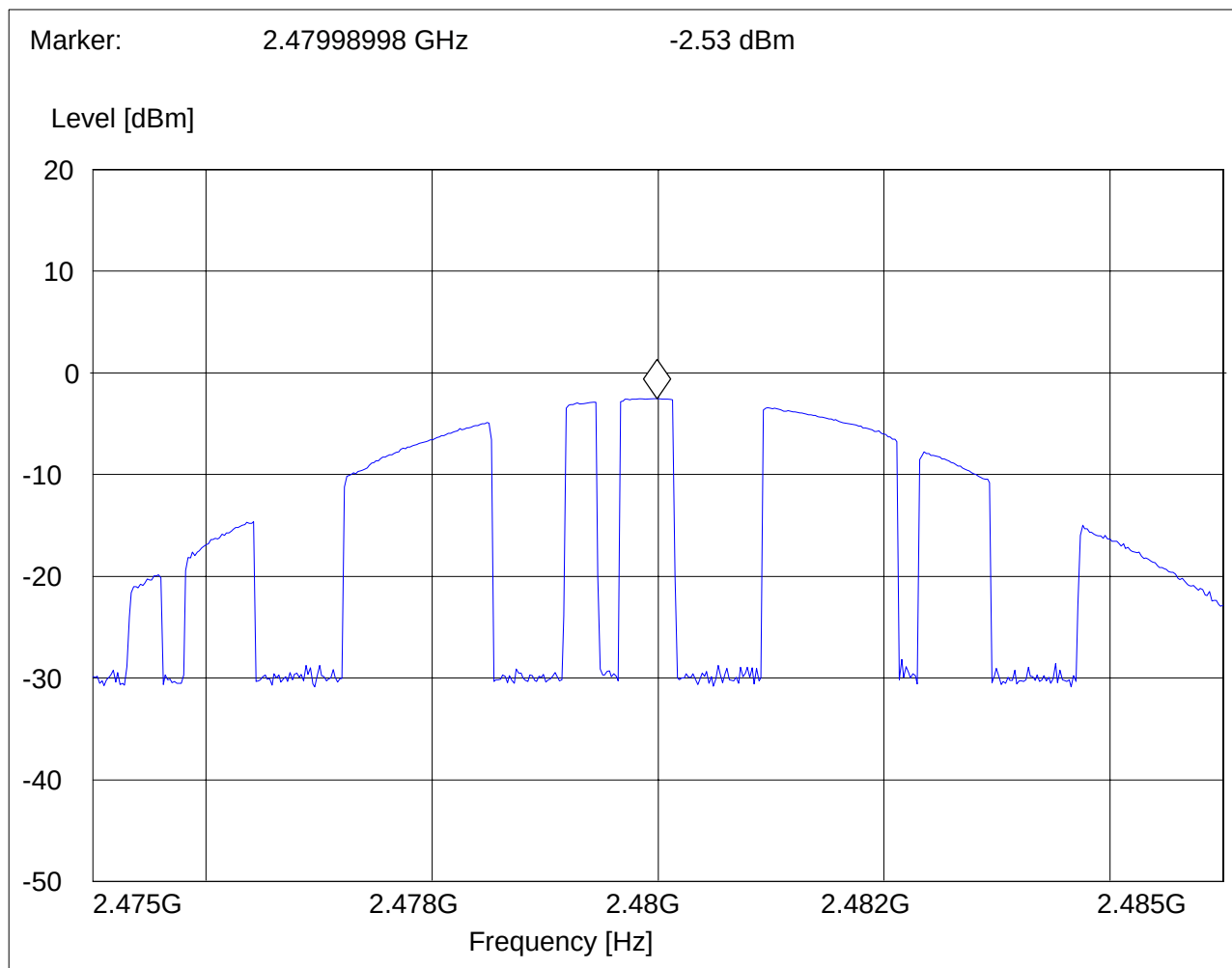
EIRP (2480 MHz)

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

EUT:: 9901910000009276
Customer: Toshiba
Test Mode: BT TestMode
Ant Orientation: H, TT200°
EUT Orientation: H
Test Engineer: Peter Mu
Voltage:: AC Adaptor
Sweep: EIRP BT HIGH Chan

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 (2402MHz)

PEAK

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

EUT:: 9901910000009276, 004401120210105

Customer: Toshiba

Test Mode: BT TestMode CH0

Ant Orientation: H, TT200°

EUT Orientation: H

Test Engineer: Peter Mu

Voltage:: AC Adaptor

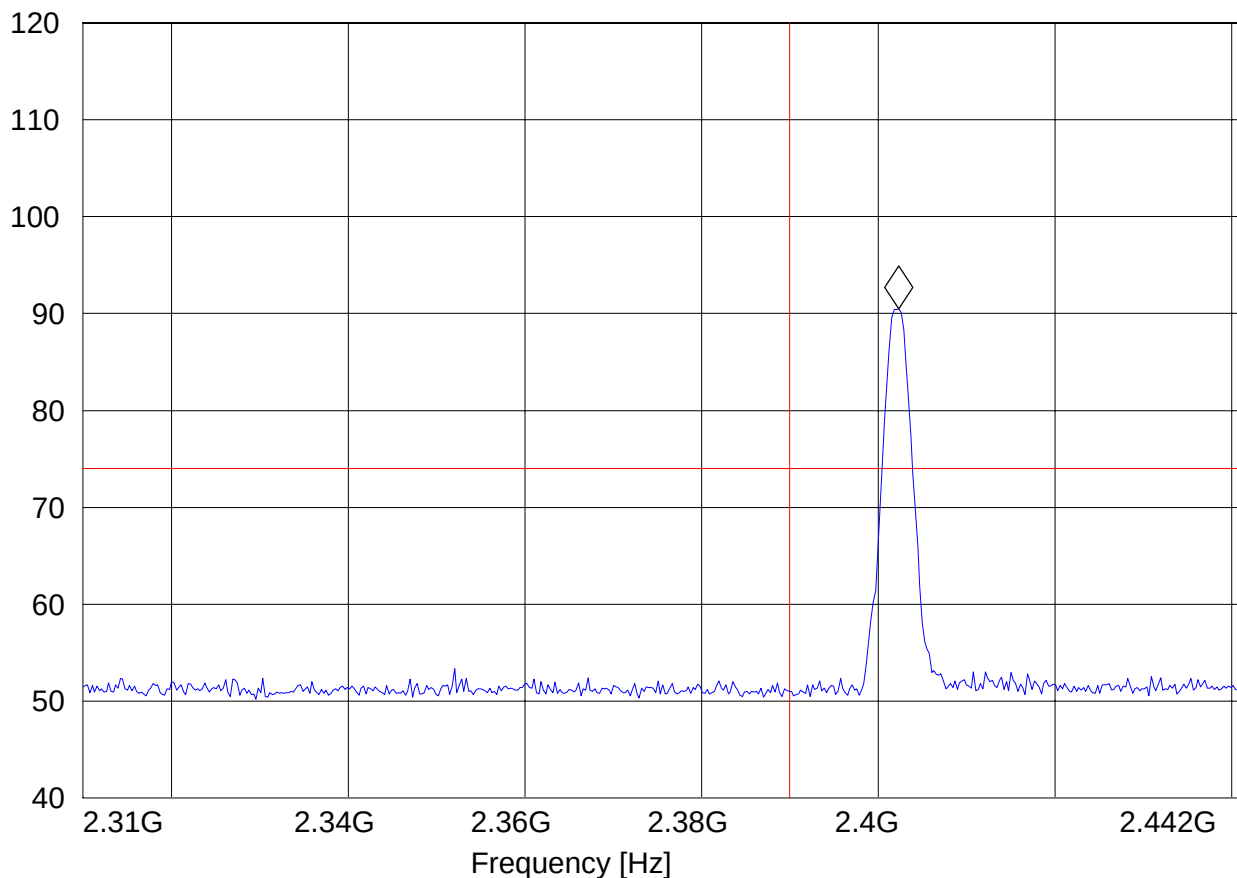
Sweep: FCC15.247 LBE_PK

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

Marker: 2.402320641 GHz 90.47 dBμV/m

Level [dBμV/m]





AVG

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

EUT:: 9901910000009276, 004401120210105

Customer: Toshiba

Test Mode: BT TestMode CH0

Ant Orientation: H, TT200°

EUT Orientation: H

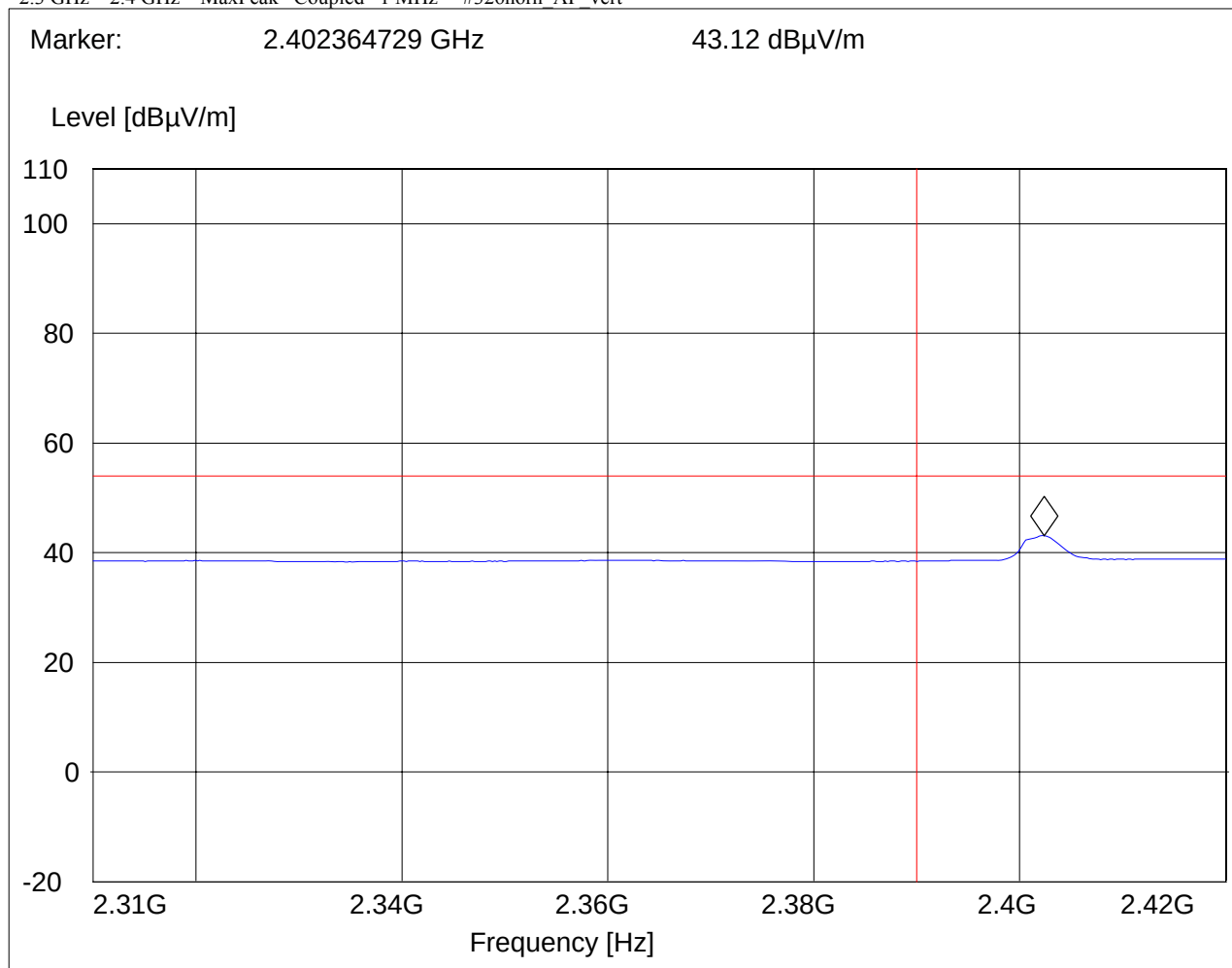
Test Engineer: Peter Mu

Voltage: AC Adaptor

Sweep: FCC15.247 LBE_AVG

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





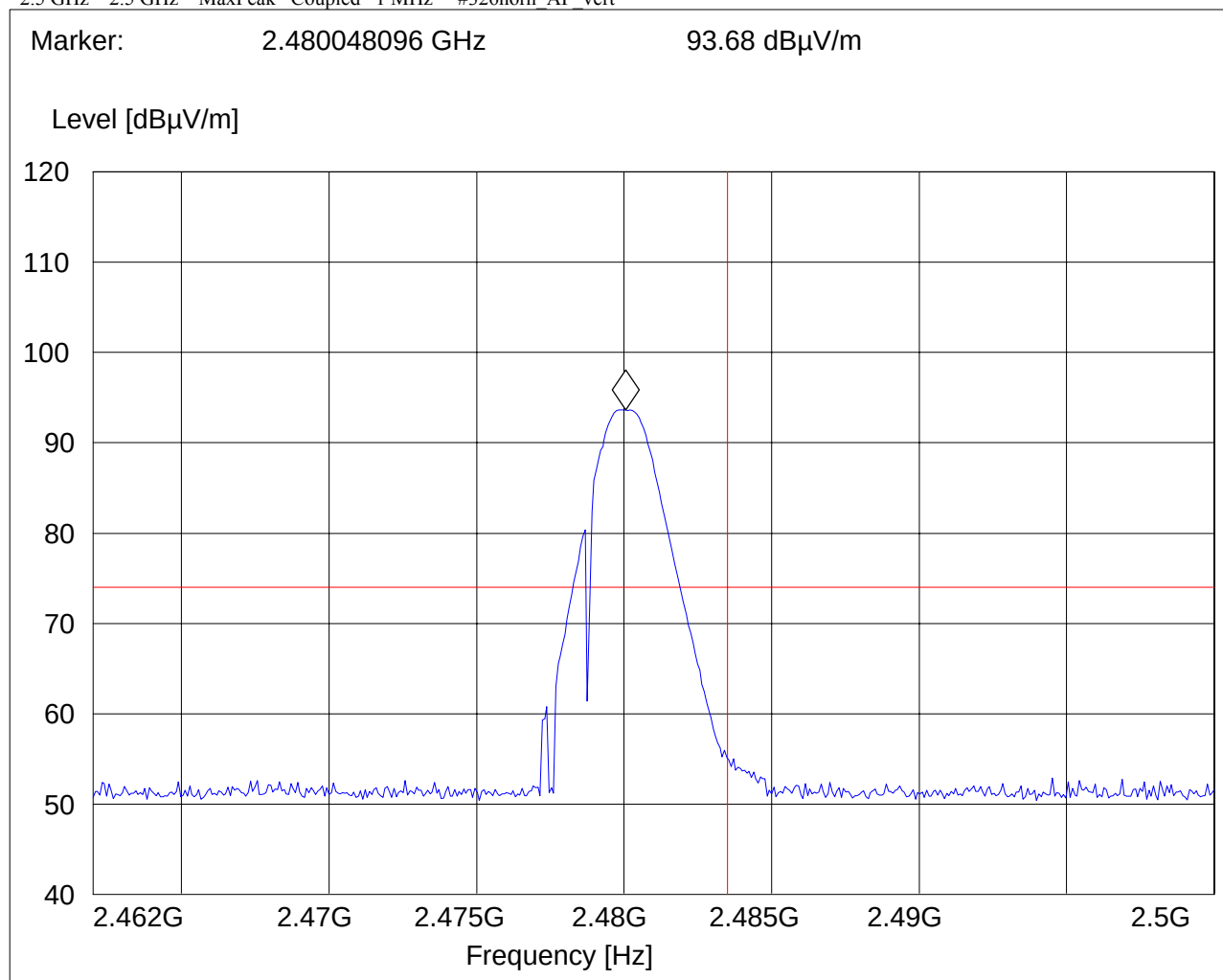
5.2.3 RESULTS (2480MHz) PEAK

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

EUT:: 9901910000009276
Customer: Toshiba
Test Mode: BT TestMode CH78
Ant Orientation: H, TT200°
EUT Orientation: H
Test Engineer: Peter Mu
Voltage:: AC Adaptor
Sweep: FCC15.247 HBE_PK

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





AVG

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

EUT:: 9901910000009276, 004401120210105

Customer: Toshiba

Test Mode: BT TestMode CH78

Ant Orientation: H, TT200°

EUT Orientation: H

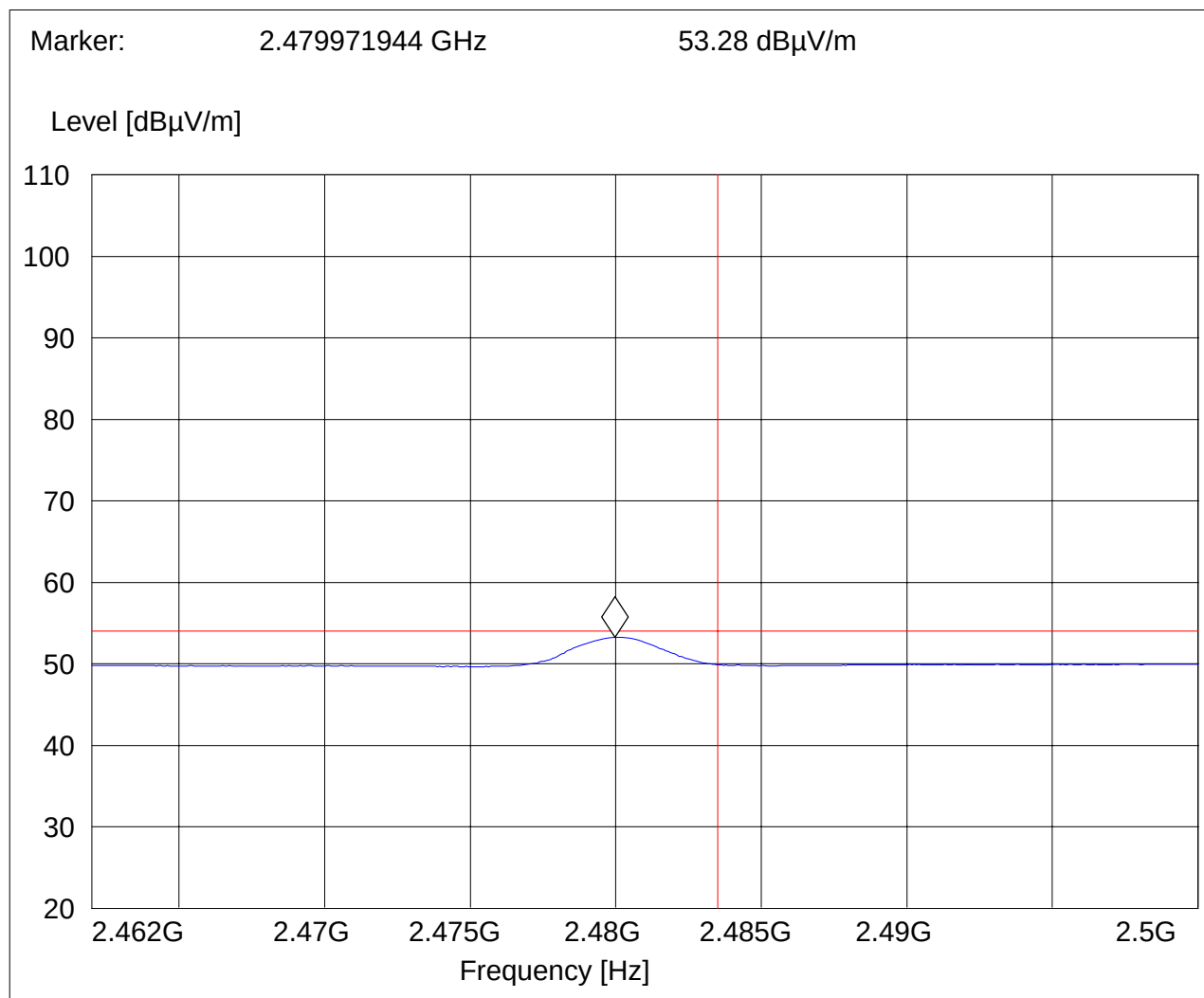
Test Engineer: Peter Mu

Voltage:: AC Adaptor

Sweep: FCC15.247 HBE_AVG

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



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

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

EUT:: 990191000009276, 004401120210105

Customer: Toshiba

Test Mode: BT Test Mode, tch 78, 360° rotation

Ant Orientation: V

EUT Orientation: H

Test Engineer: Ed

Voltage:: AC Adapter

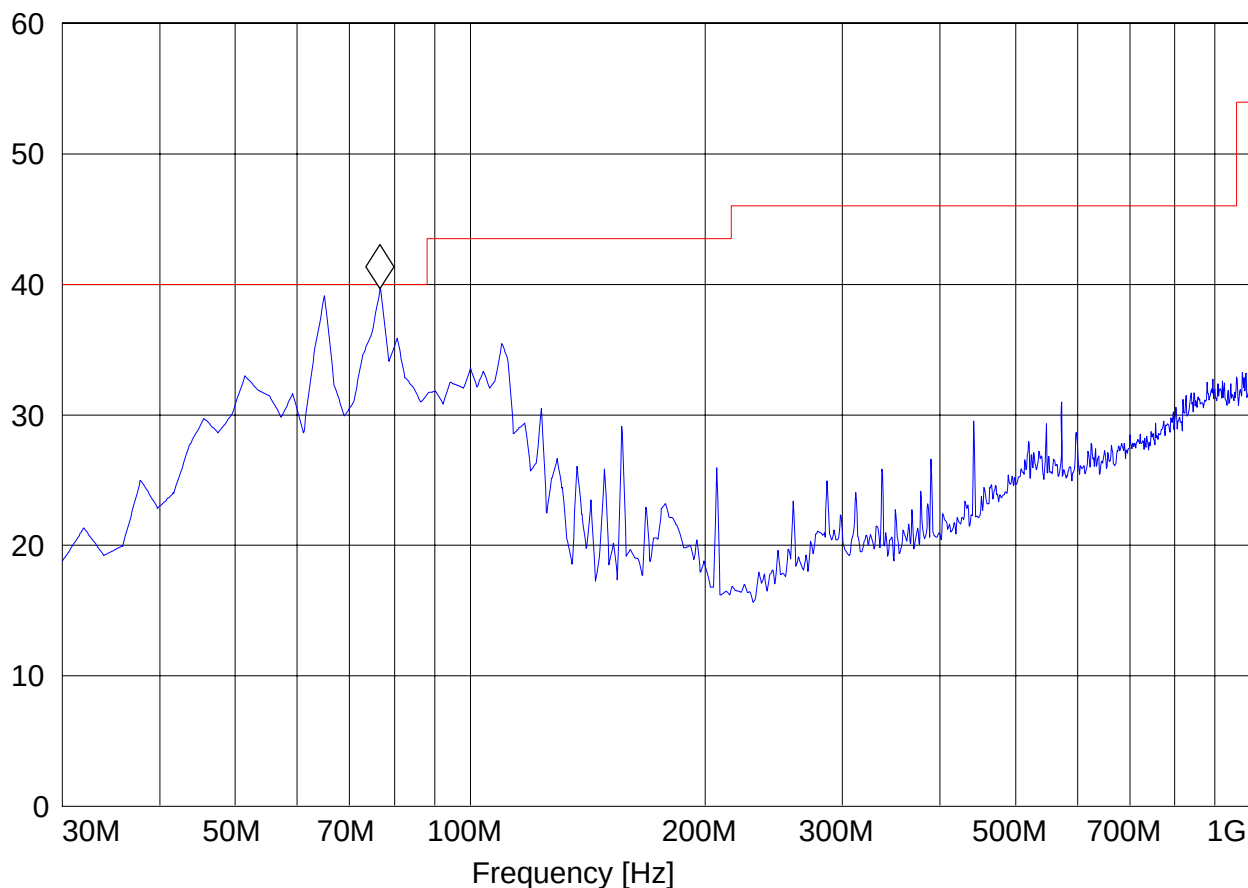
Sweep: FCC 15.247_30M-1G_V

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_Ver

Marker: 76.653307 MHz 39.68 dB μ V/m

Level [dB μ V/m]





30MHz – 1GHz

Antenna: horizontal

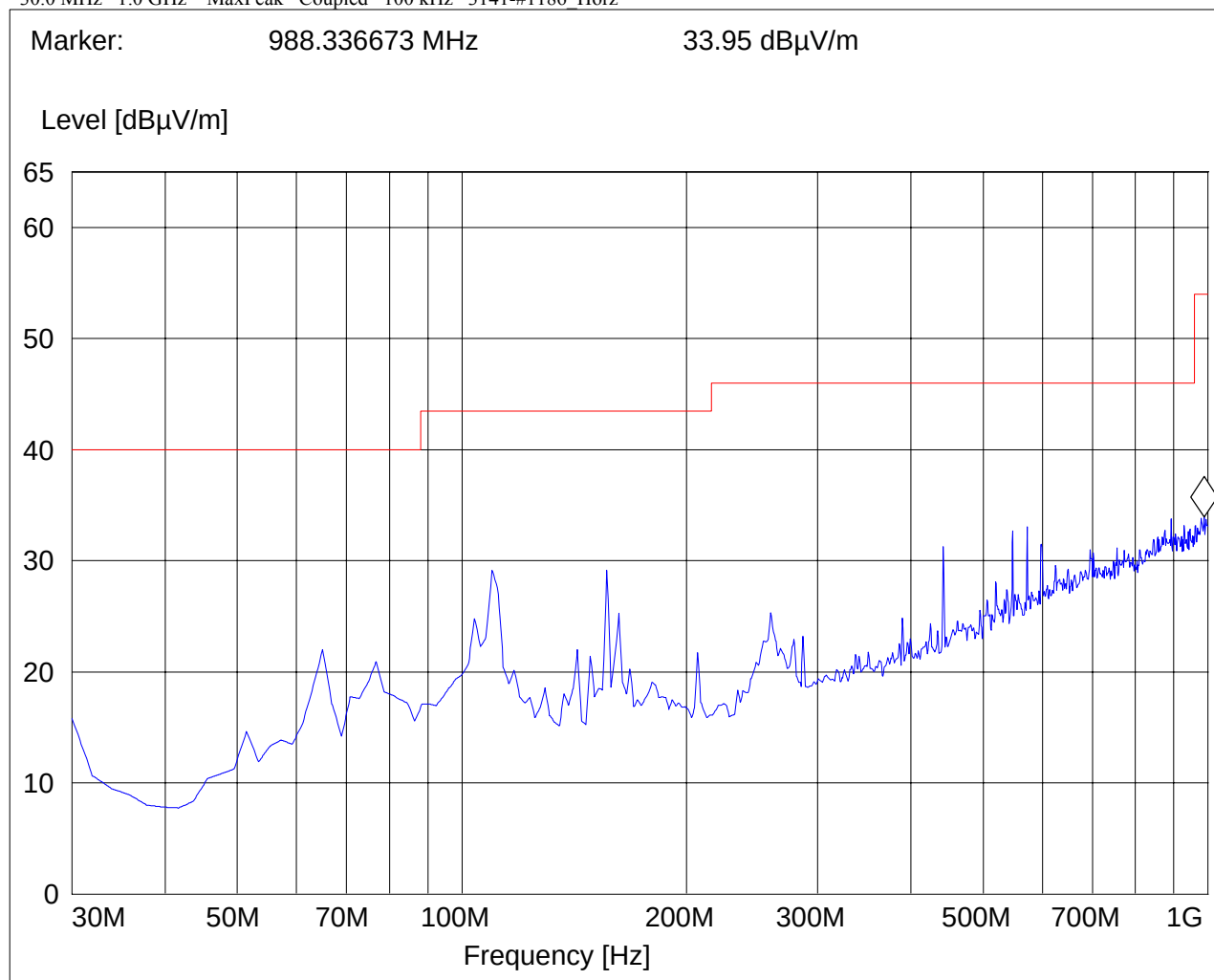
Note: This plot is valid for low, mid, high channels (worst-case plot)

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

EUT:: 9901910000009276
Customer: Toshiba
Test Mode: BT Test Mode, tch 0, 360° rotation
Ant Orientation: H
EUT Orientation: H
Test Engineer: Ed
Voltage:: AC Adapter
Sweep: FCC 15.247_30M-1G_H

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 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

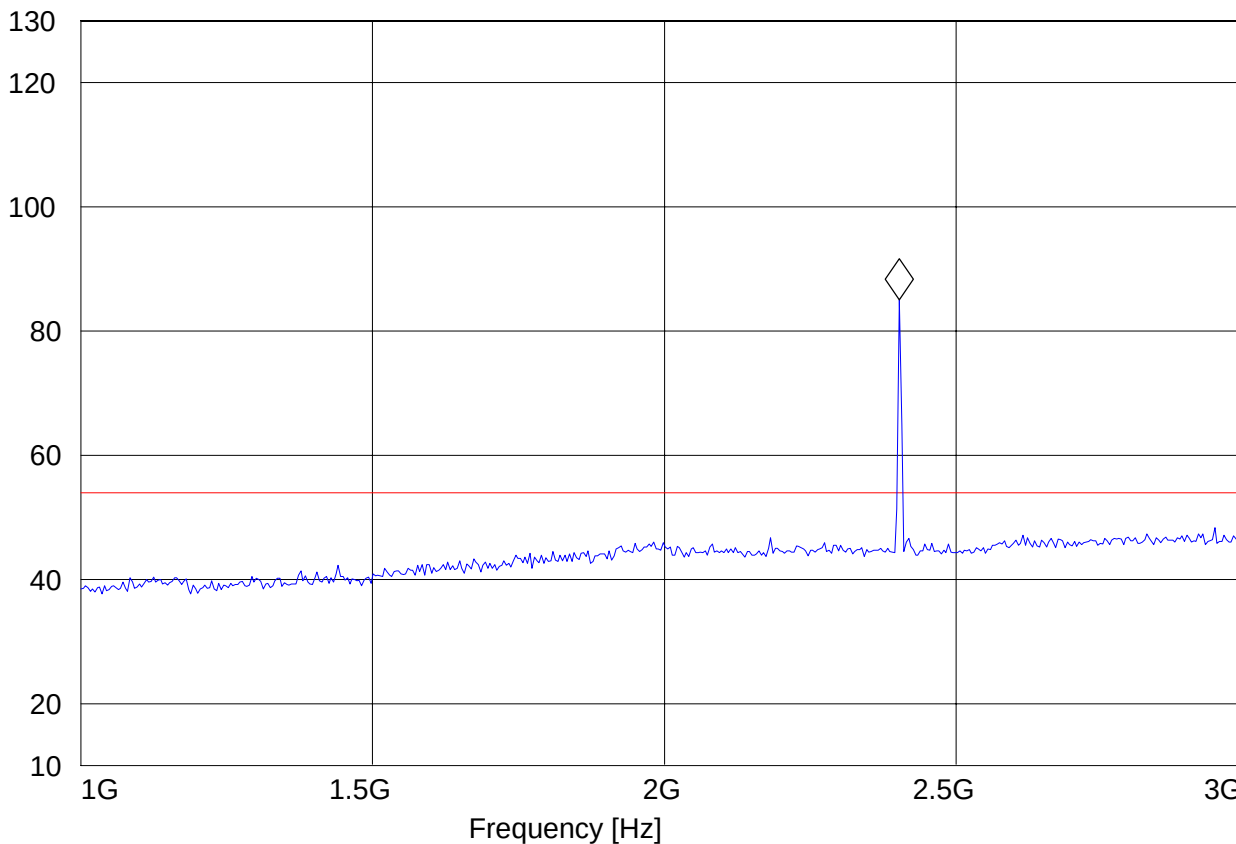
EUT:: 004401120210105
Customer: Toshiba
Test Mode: BT TestMode CH0
Ant Orientation: H, TT200°
EUT Orientation: H
Test Engineer: Peter Mu
Voltage:: AC Adaptor
Sweep: FCC15.247 1_3G

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

Marker: 2.402805611 GHz 85.01 dBμV/m

Level [dBμV/m]





1-3GHz (2441MHz)

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

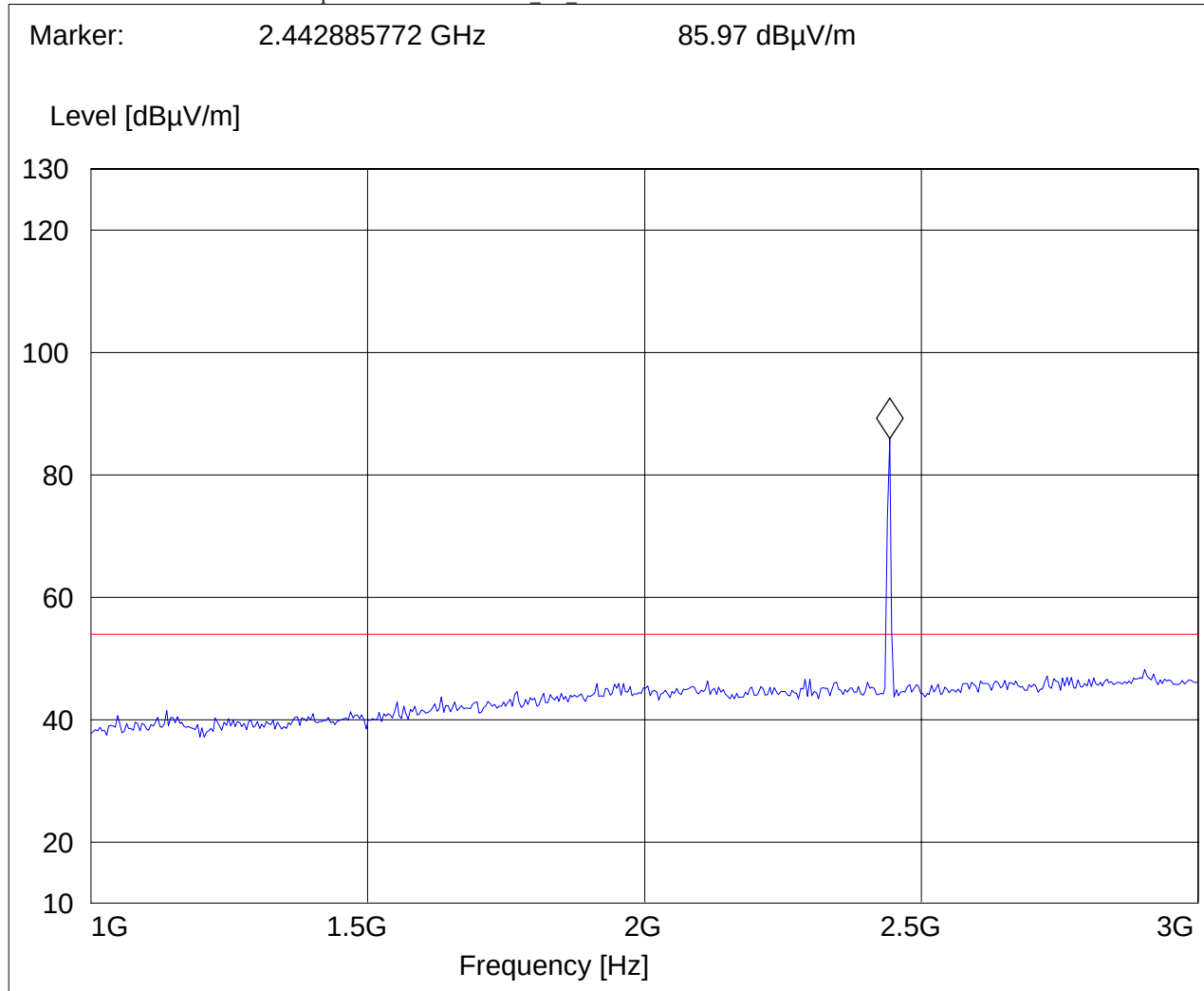
Note: Peak Reading vs. Average limit

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

EUT:: 9901910000009276, 004401120210105
Customer: Toshiba
Test Mode: BT TestMode CH39, MARKED PEAK IS BT UPLINK
Ant Orientation: H, TT200°
EUT Orientation: H
Test Engineer: Peter Mu
Voltage:: AC Adaptor
Sweep: FCC15.247 1-3G

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.

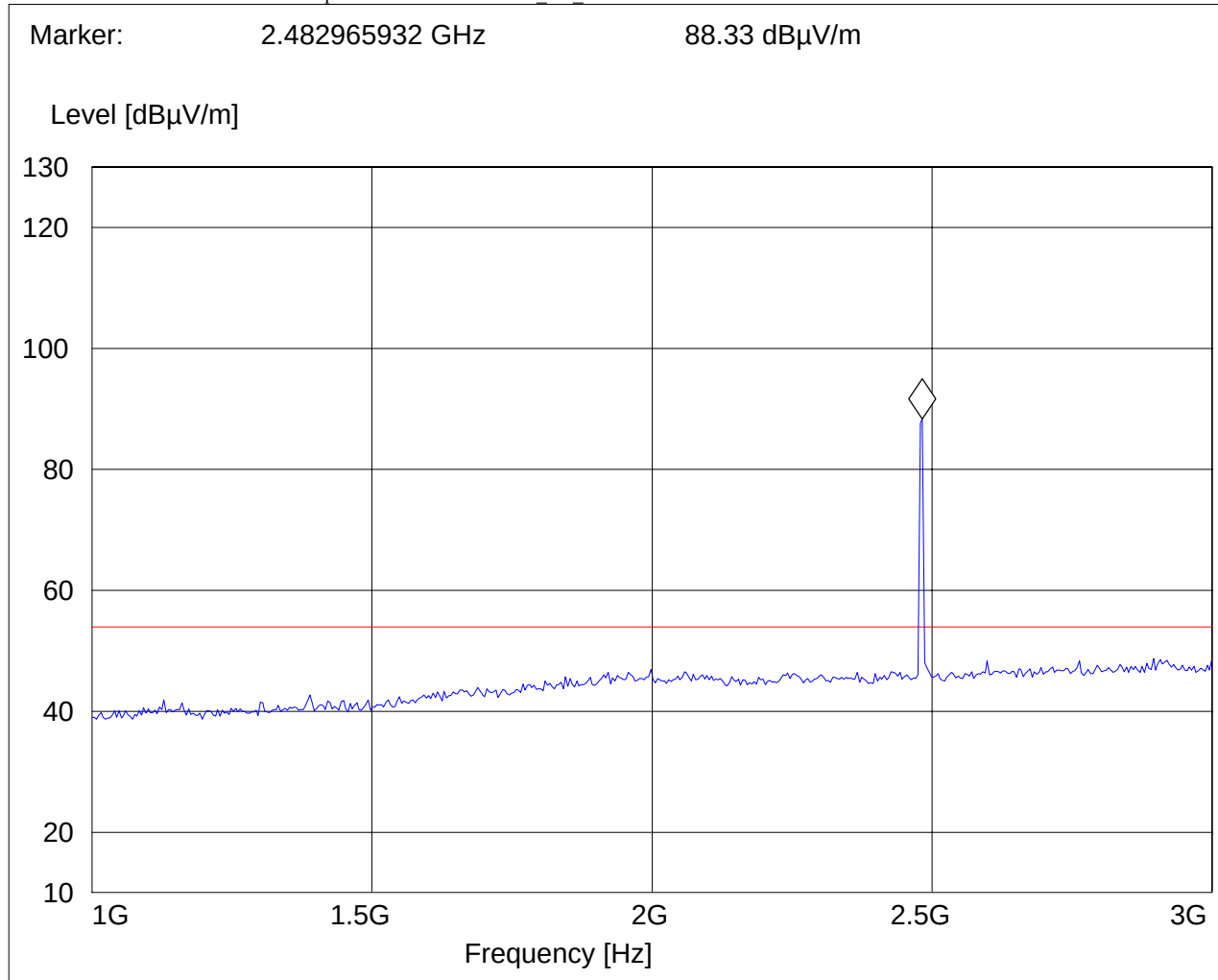
Note: Peak Reading vs. Average limit

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

EUT:: 9901910000009276, 004401120210105
Customer: Toshiba
Test Mode: BT TestMode CH78, MARKED PEAK IS BT UPLINK
Ant Orientation: H, TT200°
EUT Orientation: H
Test Engineer: Peter Mu
Voltage:: AC Adaptor
Sweep: FCC15.247 1-3G

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:: 9901910000009276, 004401120210105

Customer: Toshiba

Test Mode: BT TestMode CH0

Ant Orientation: H, TT200°

EUT Orientation: H

Test Engineer: Peter Mu

Voltage:: AC Adaptor

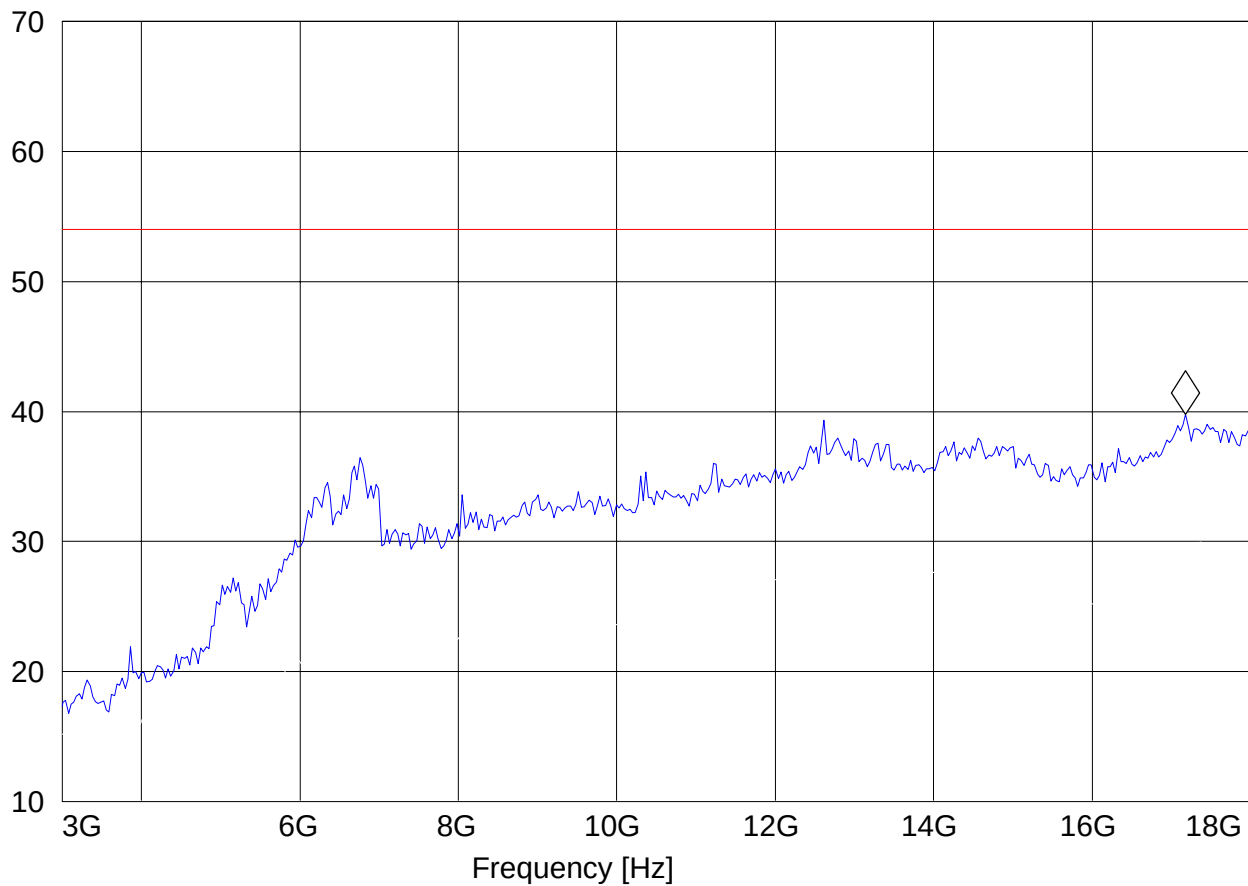
Sweep: FCC15.247 3-18G

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

Marker: 17.182364729 GHz 39.79 dBμV/m

Level [dBμV/m]





3-18GHz (2441MHz)

Note: Peak Reading vs. Average limit

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

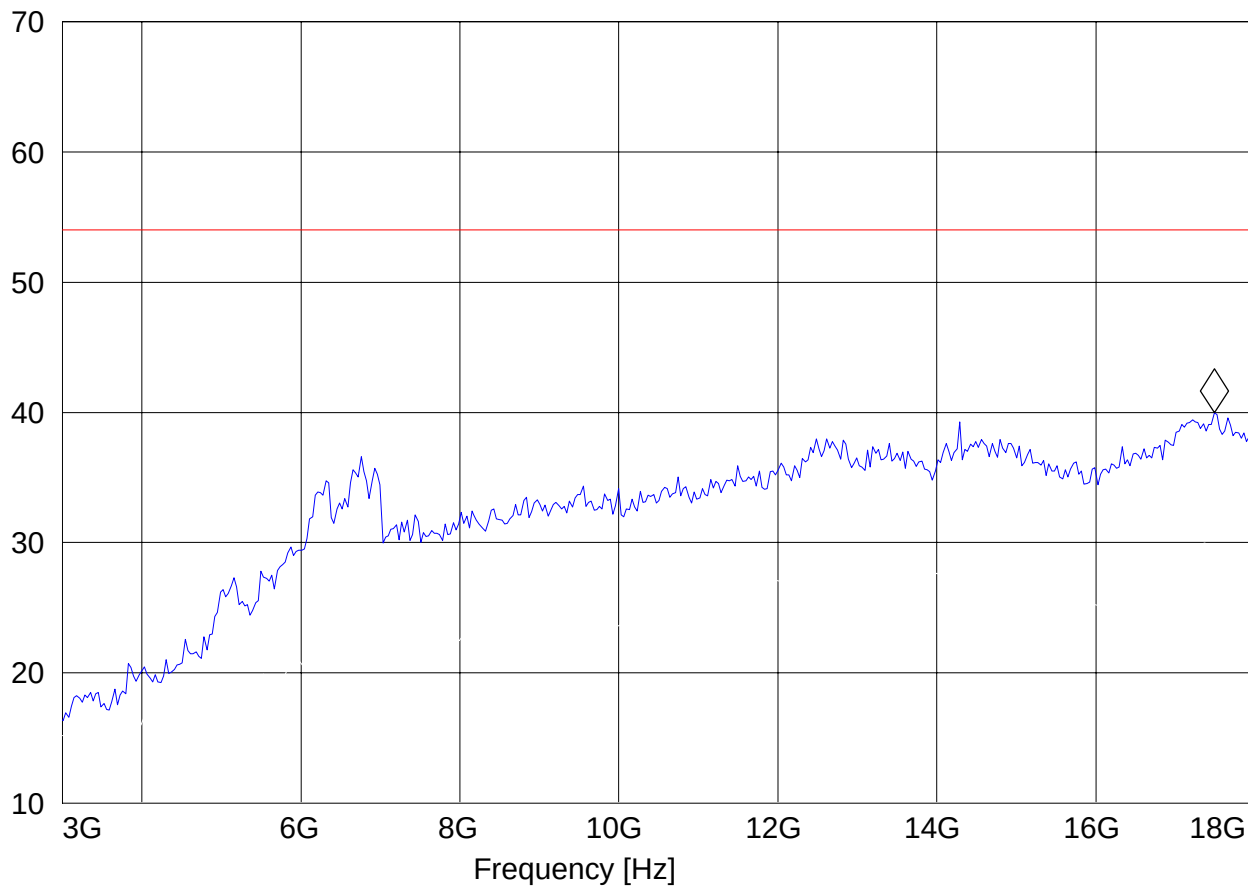
EUT:: 9901910000009276
Customer: Toshiba
Test Mode: BT TestMode CH39
Ant Orientation: H, TT200°
EUT Orientation: H
Test Engineer: Peter Mu
Voltage:: AC Adaptor
Sweep: FCC15.247 3-18G

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

Marker: 17.488977956 GHz 39.97 dBμV/m

Level [dBμV/m]





3-18GHz (2480MHz)

Note: Peak Reading vs. Average limit

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

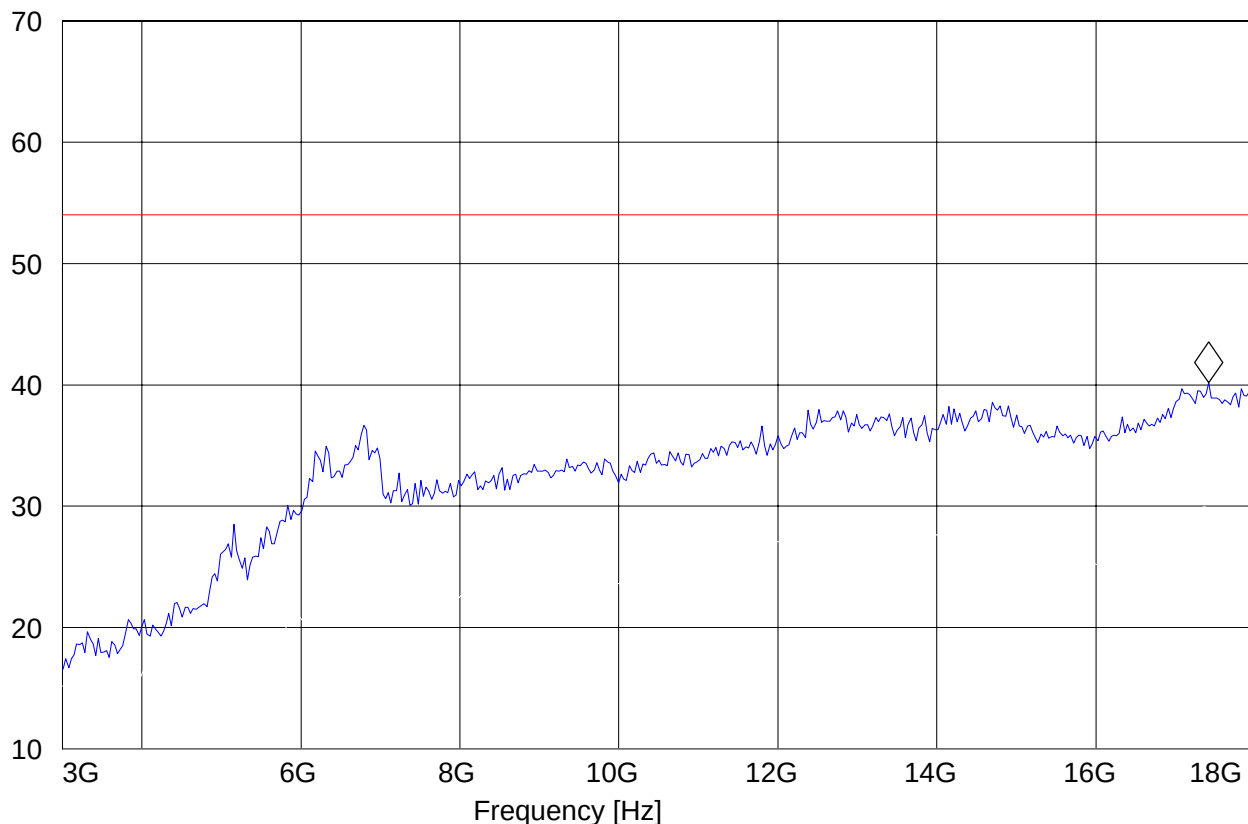
EUT:: 9901910000009276
Customer: Toshiba
Test Mode: BT TestMode CH78
Ant Orientation: H, TT200°
EUT Orientation: H
Test Engineer: Peter Mu
Voltage:: AC Adaptor
Sweep: FCC15.247 3-18G

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

Marker: 17.420841683 GHz 40.17 dB μ V/m

Level [dB μ V/m]





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:: 9901910000009276, 004401120210105

Customer: Toshiba

Test Mode: BT TestMode tch 0

Ant Orientation: V

EUT Orientation: H

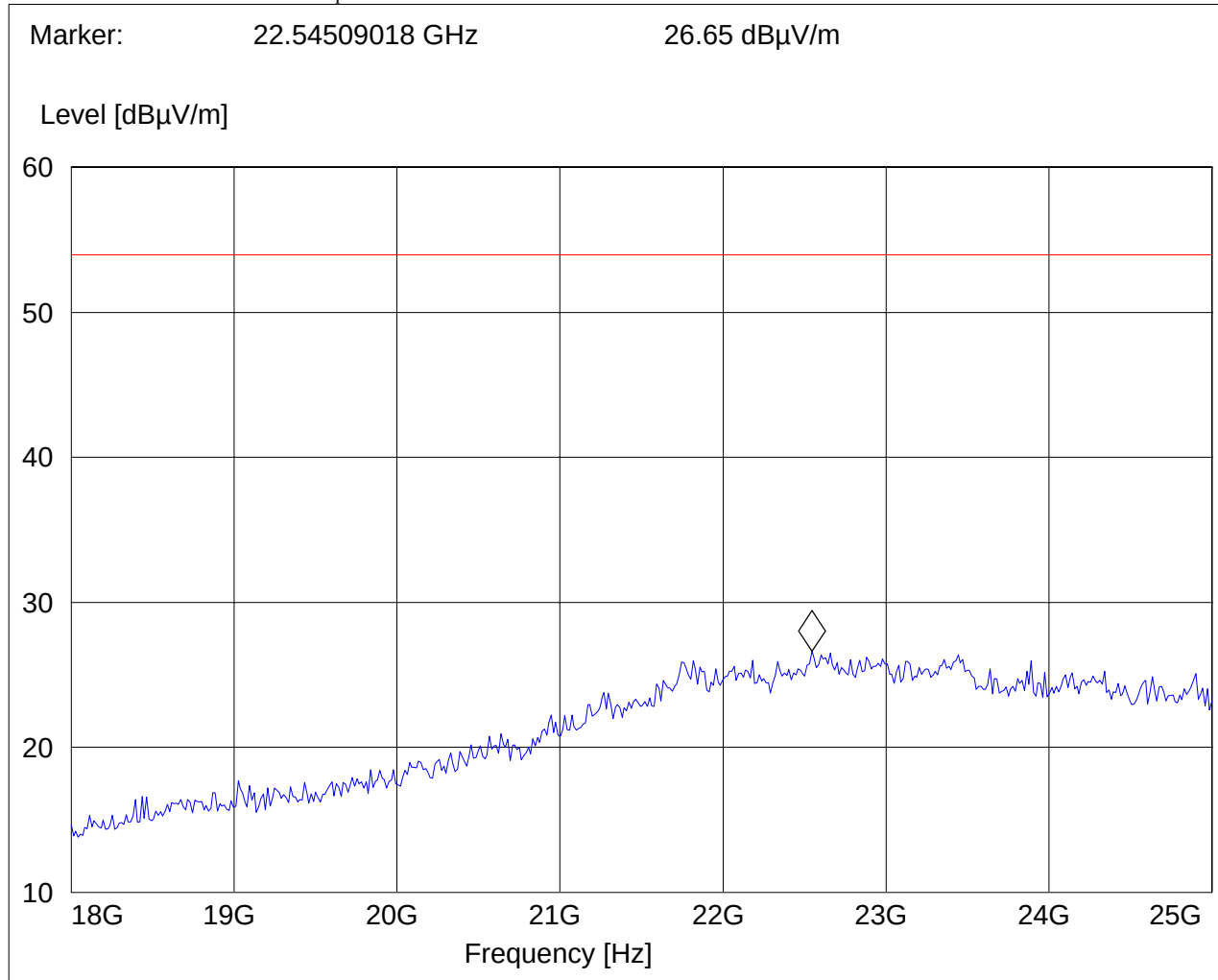
Test Engineer: Ed

Voltage:: AC Adaptor

Sweep: FCC 15.247_18-26.6

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



5.4 RECEIVER SPURIOUS RADIATION § 15.209/RSS210

5.4.1 LIMITS

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	2400/F (kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

NOTE:

1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 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 a quasi peak or average limit , unless specified with the plots.



5.4.2 RESULTS

30MHz – 1GHz

Antenna: Vertical

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

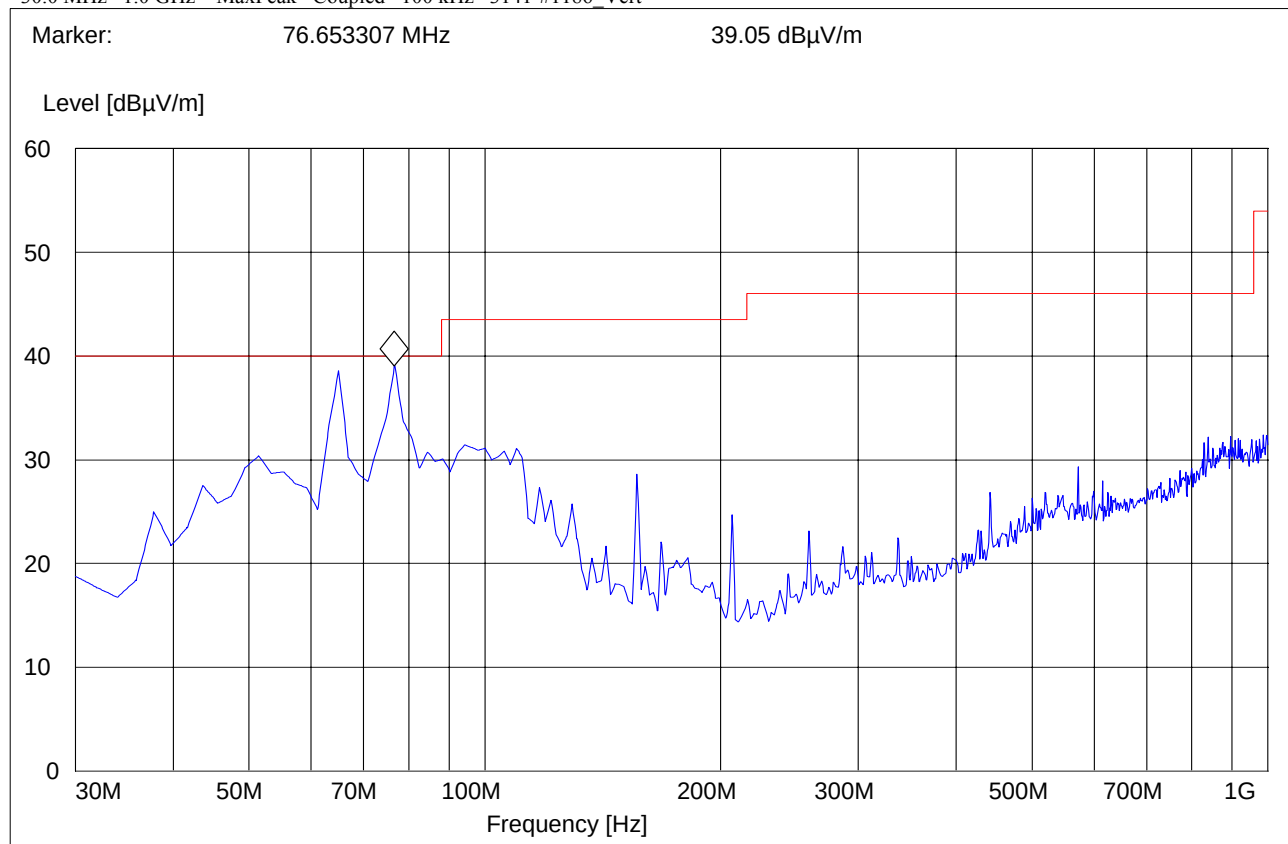
Note: Peak Reading vs. Quasi-peak limit

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

EUT:: 9901910000009276
Customer: Toshiba
Test Mode: BT Idle Mode
Ant Orientation: V
EUT Orientation: H
Test Engineer: Ed
Voltage:: AC Adapter
Sweep: Canada RE_30M-1G_V

SWEEP TABLE: "CANADA RE_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





1-3GHz

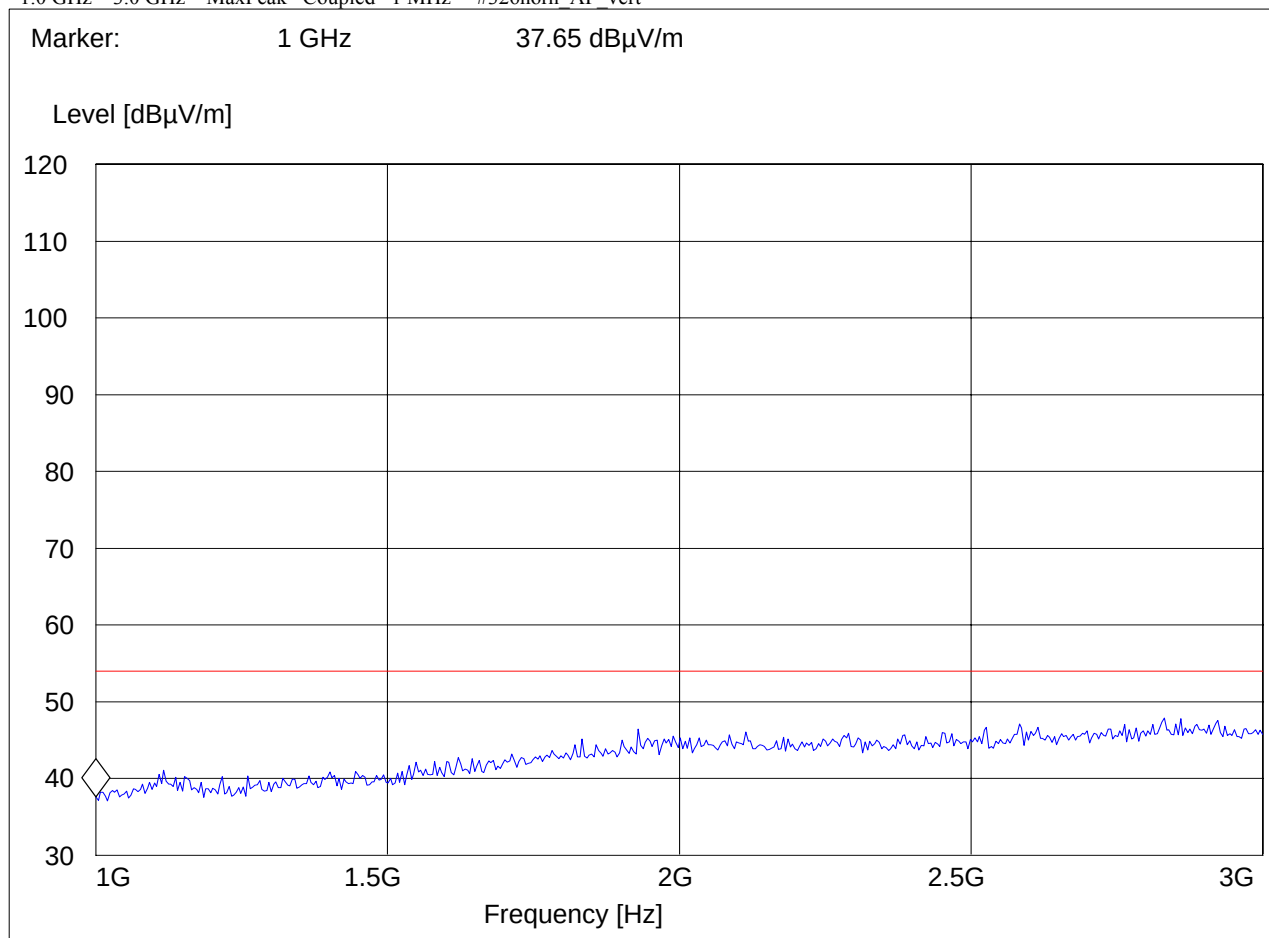
Note: Peak Reading vs. Average limit

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

EUT:: 004401120210105
Customer: Toshiba
Test Mode: BT TestMode IDLE
Ant Orientation: H
EUT Orientation: H
Test Engineer: Peter Mu
Voltage:: AC Adaptor
Sweep: CANADA RE_1-3G

SWEEP TABLE: "CANADA RE_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

Note: Peak Reading vs. Average limit

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

EUT:: 004401120210105
Customer: Toshiba
Test Mode: BT TestMode IDLE
Ant Orientation: H
EUT Orientation: H
Test Engineer: Peter Mu
Voltage:: AC Adaptor
Sweep: CANADA RE_3-18G

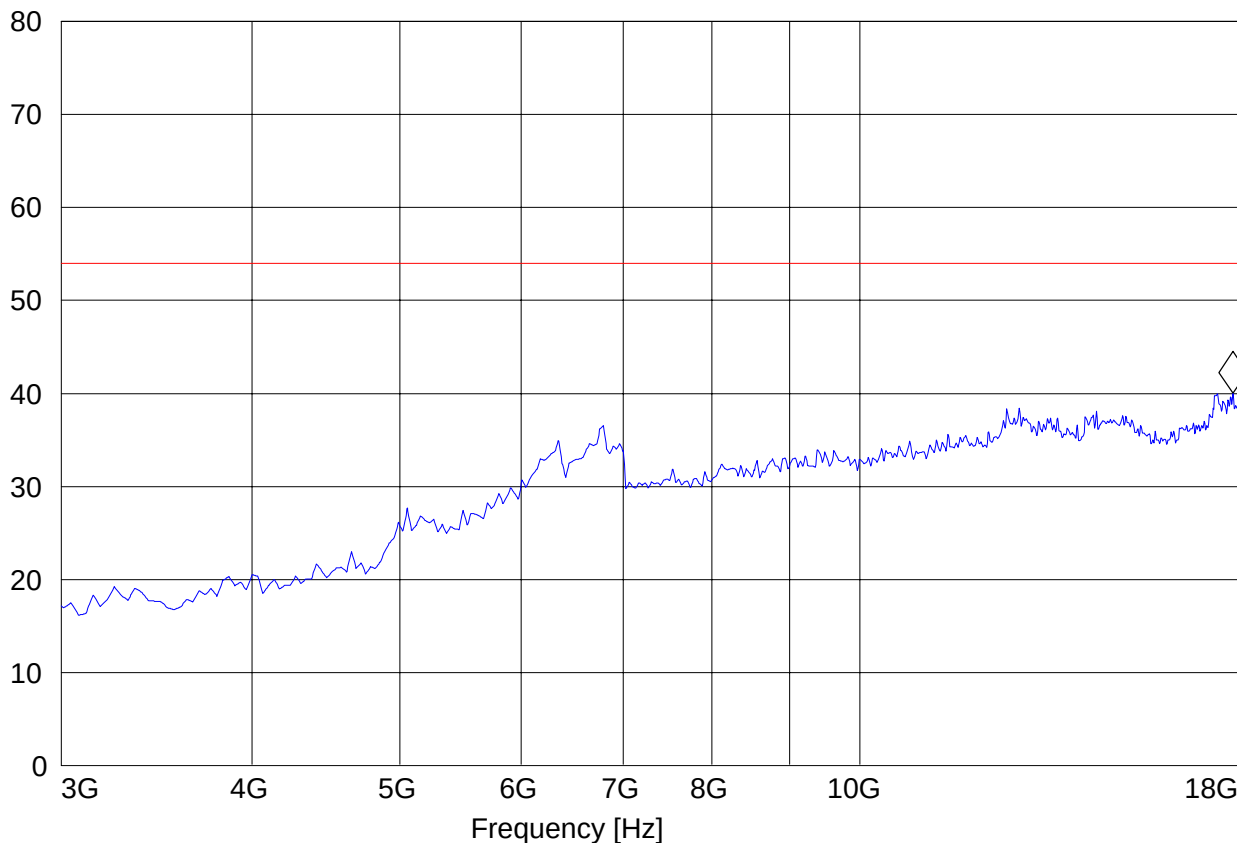
SWEEP TABLE: "CANADA RE_3-18G"

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

1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert
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Marker: 17.557114228 GHz 40.03 dB μ V/m

Level [dB μ V/m]





18-25GHz

Note: Peak Reading vs. Average limit

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

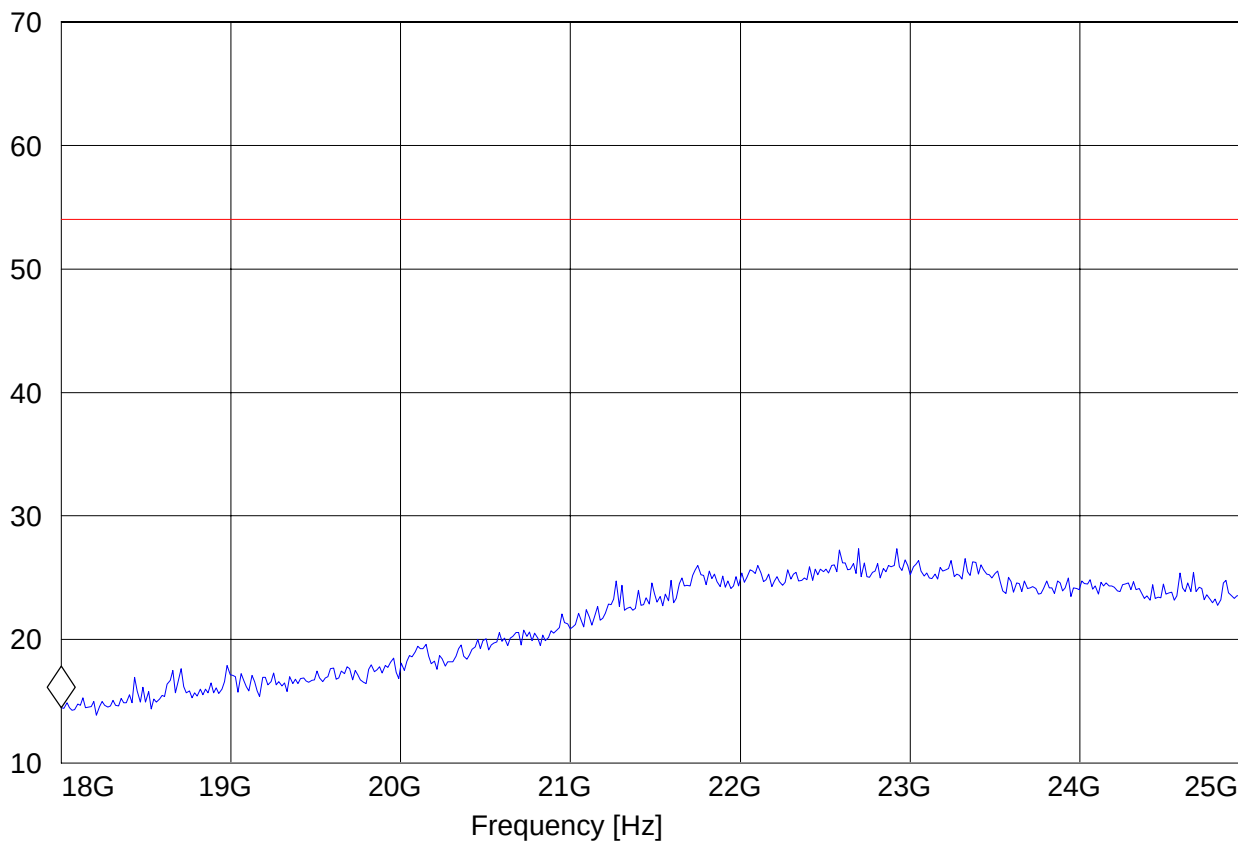
EUT:: 004401120210105
Customer: Toshiba
Test Mode: BT Idle Mode
Ant Orientation: V
EUT Orientation: H
Test Engineer: Ed
Voltage:: AC Adaptor
Sweep: Canada RE_18-26.5G

SWEEP TABLE: "CANADA RE_18-26.5G"

Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency	Time	Bandw.		
18.0 GHz	26.0 GHz	MaxPeak	Coupled	1 MHz	3160 Horn 18-26.5G

Marker: 18 GHz 14.5 dBμV/m

Level [dBμV/m]





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: DFSK

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	0.78	0.96	0.10

6.1.3 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	-0.56	-0.4	-1.26

6.1.4 RESULTS: 8DPSK

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	-0.52	-0.39	-1.25

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

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: GFSK

TEST CONDITIONS		BANDWIDTH (KHz)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	869.7	869.7	865.7

6.2.3 RESULTS: $\pi / 4$ DQPSK

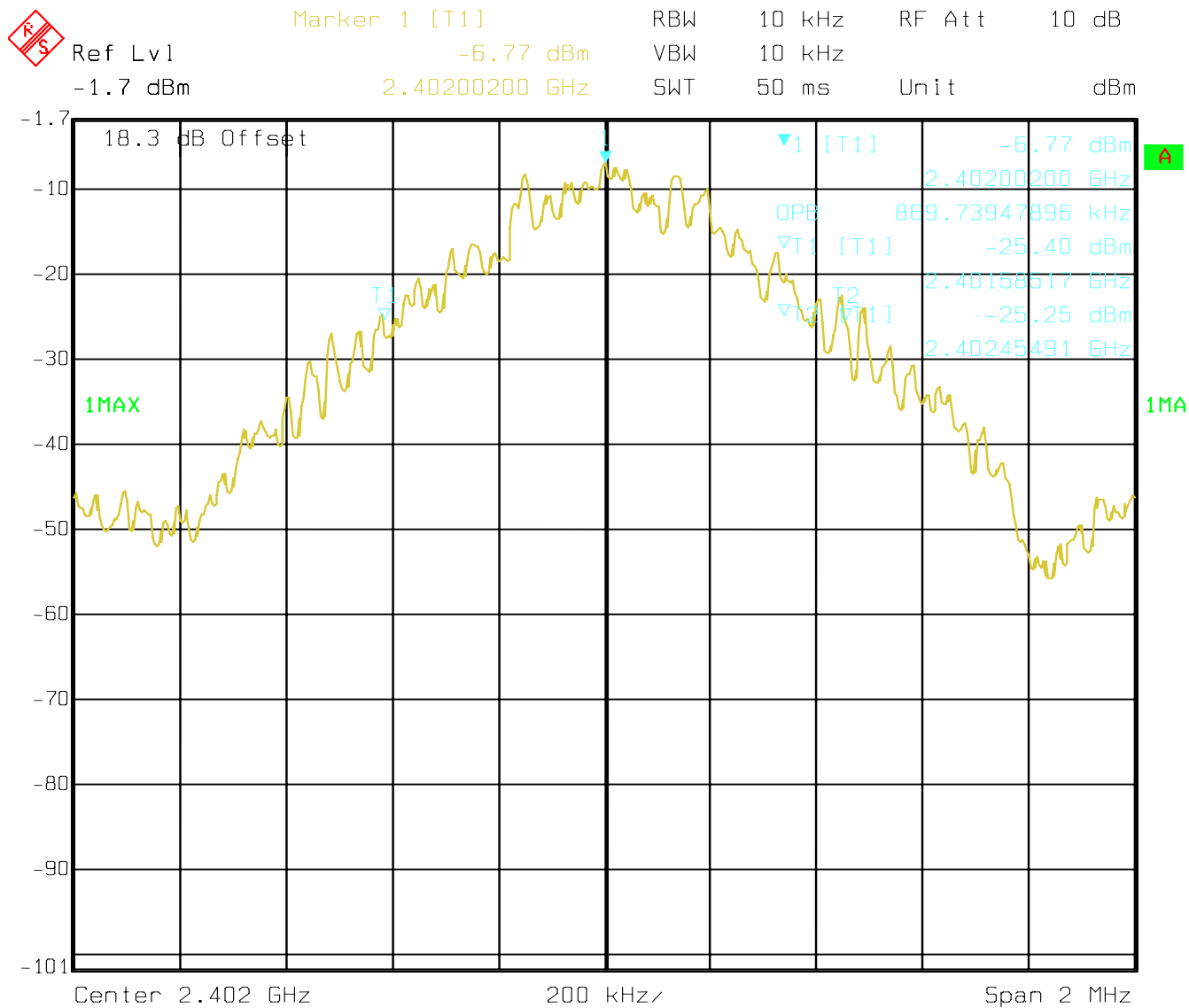
TEST CONDITIONS		BANDWIDTH (KHz)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	1154	1154	1154

6.2.4 RESULTS: 8DPSK

TEST CONDITIONS		BANDWIDTH (KHz)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} VDC	1146	1146	1146



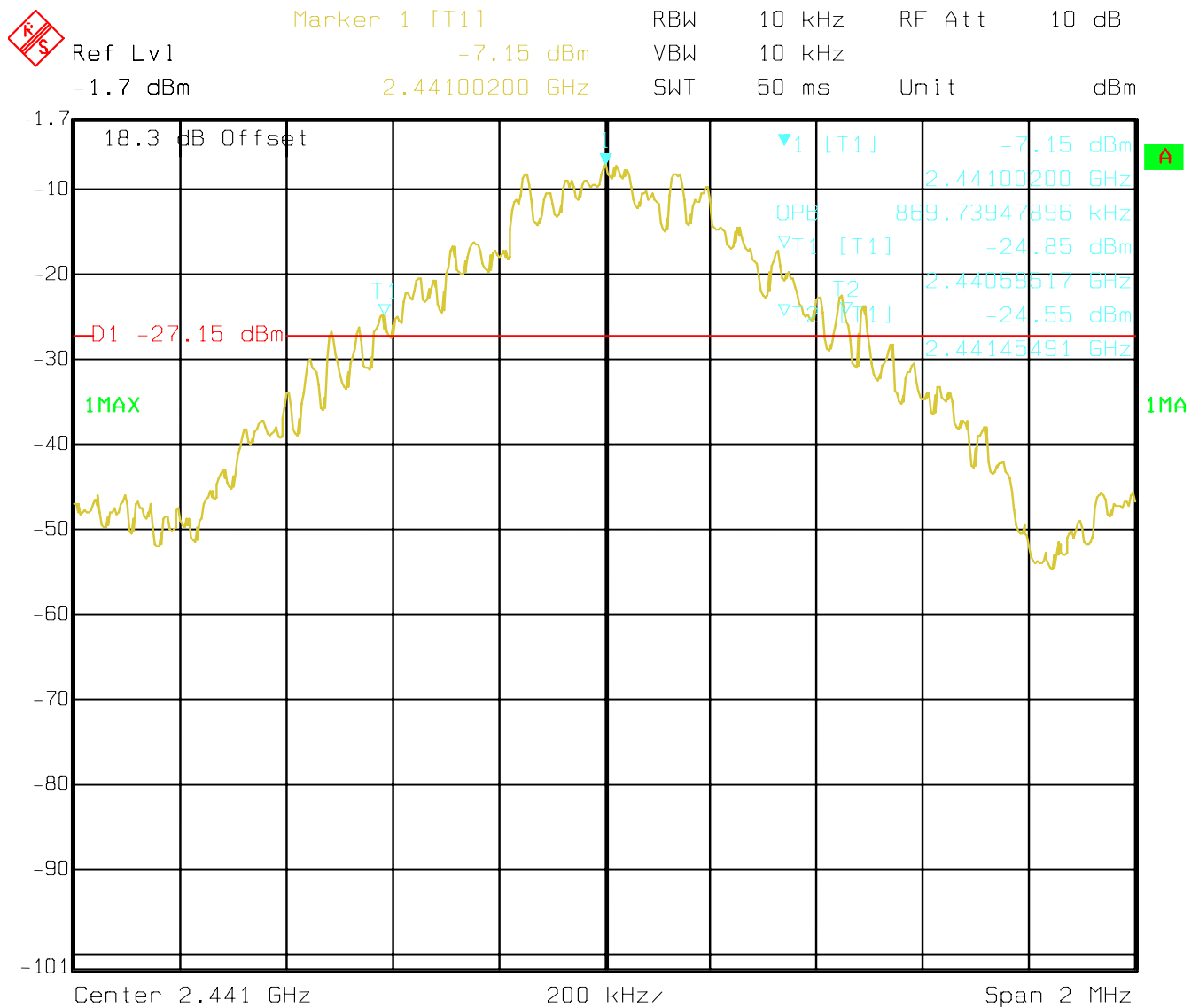
(2402 MHz) GFSK



Date: 21.NOV.2006 12:46:35



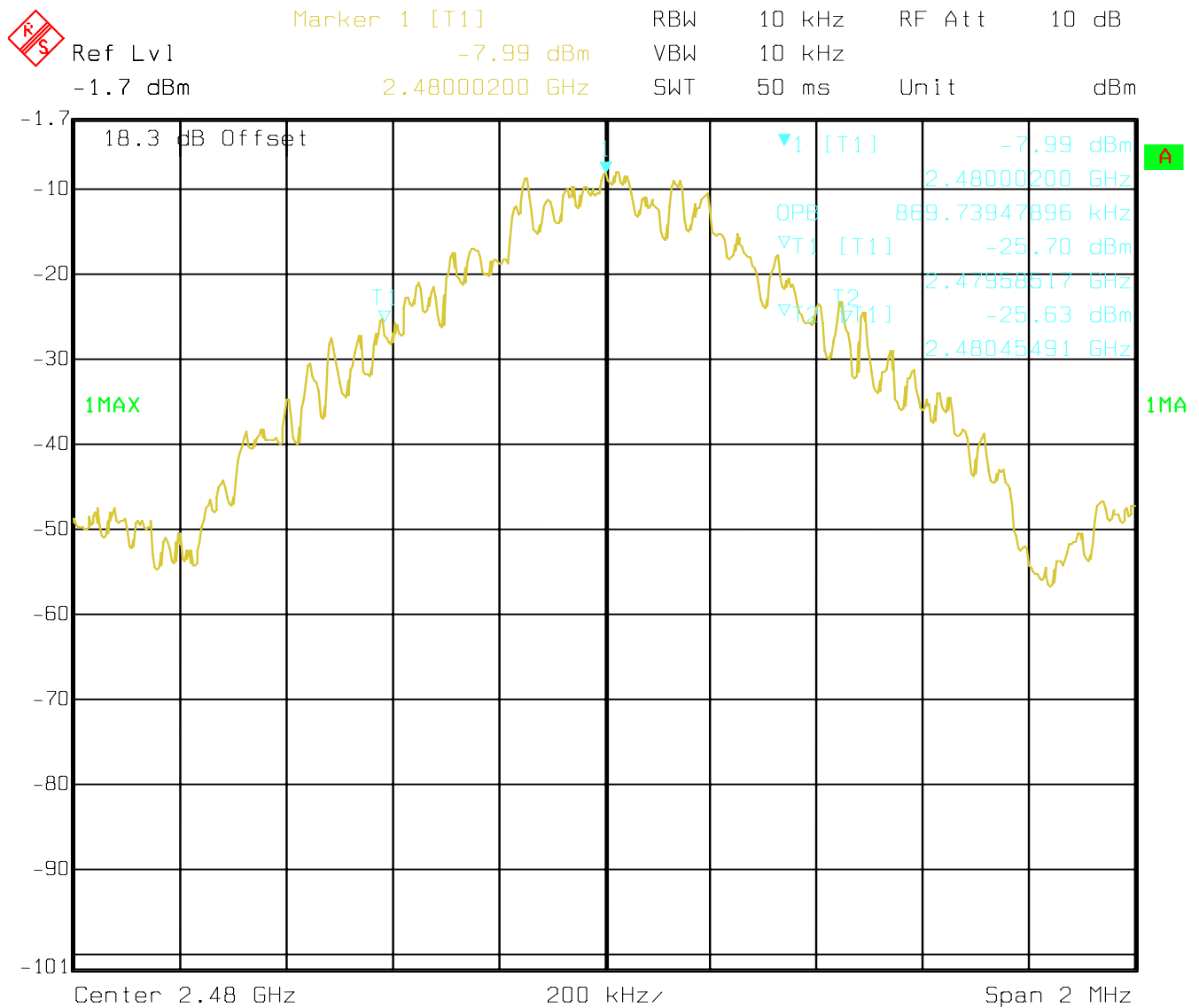
(2441 MHz) GFSK



Date: 21.NOV.2006 12:28:35



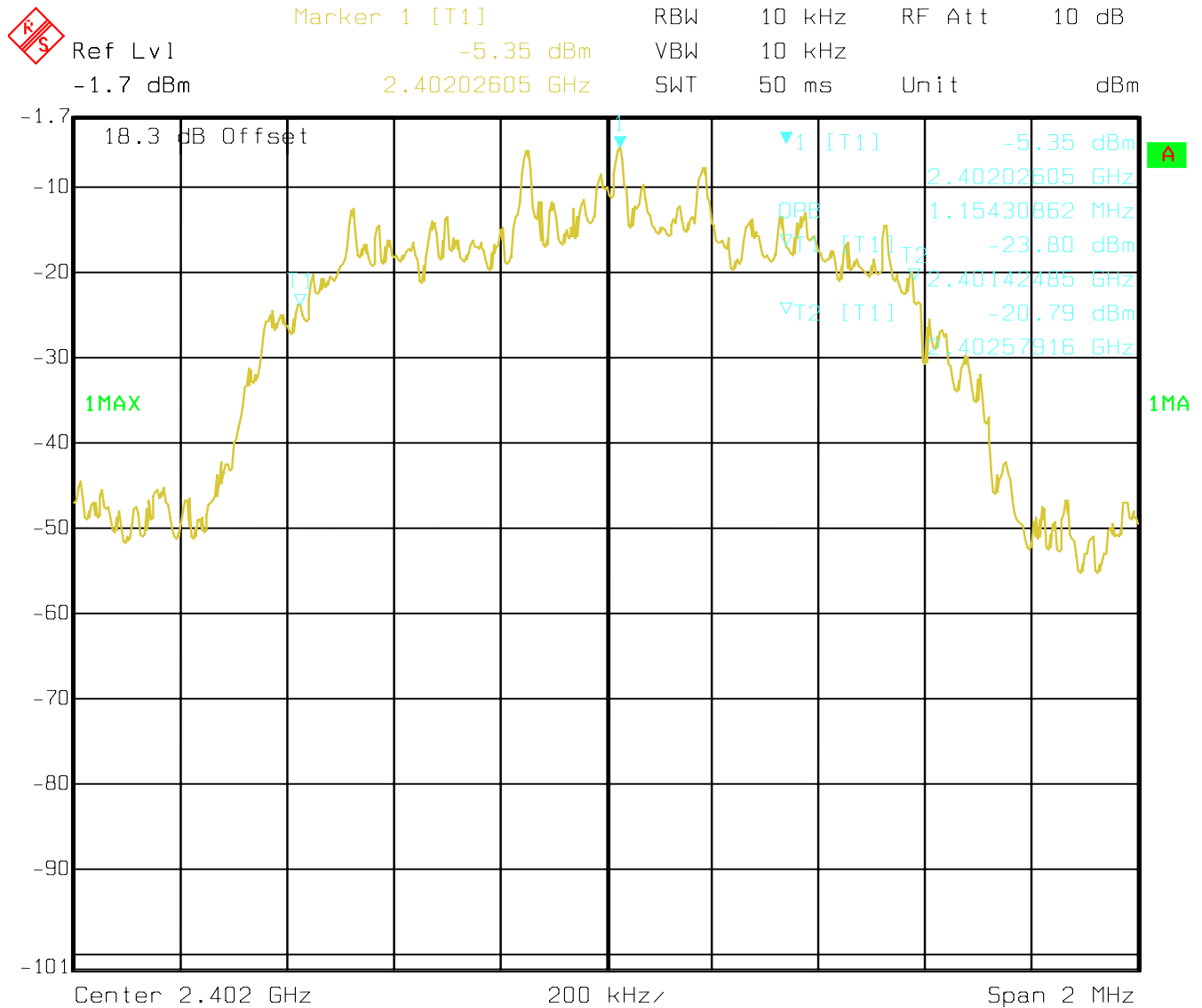
(2480 MHz) GFSK



Date: 21.NOV.2006 12:48:05

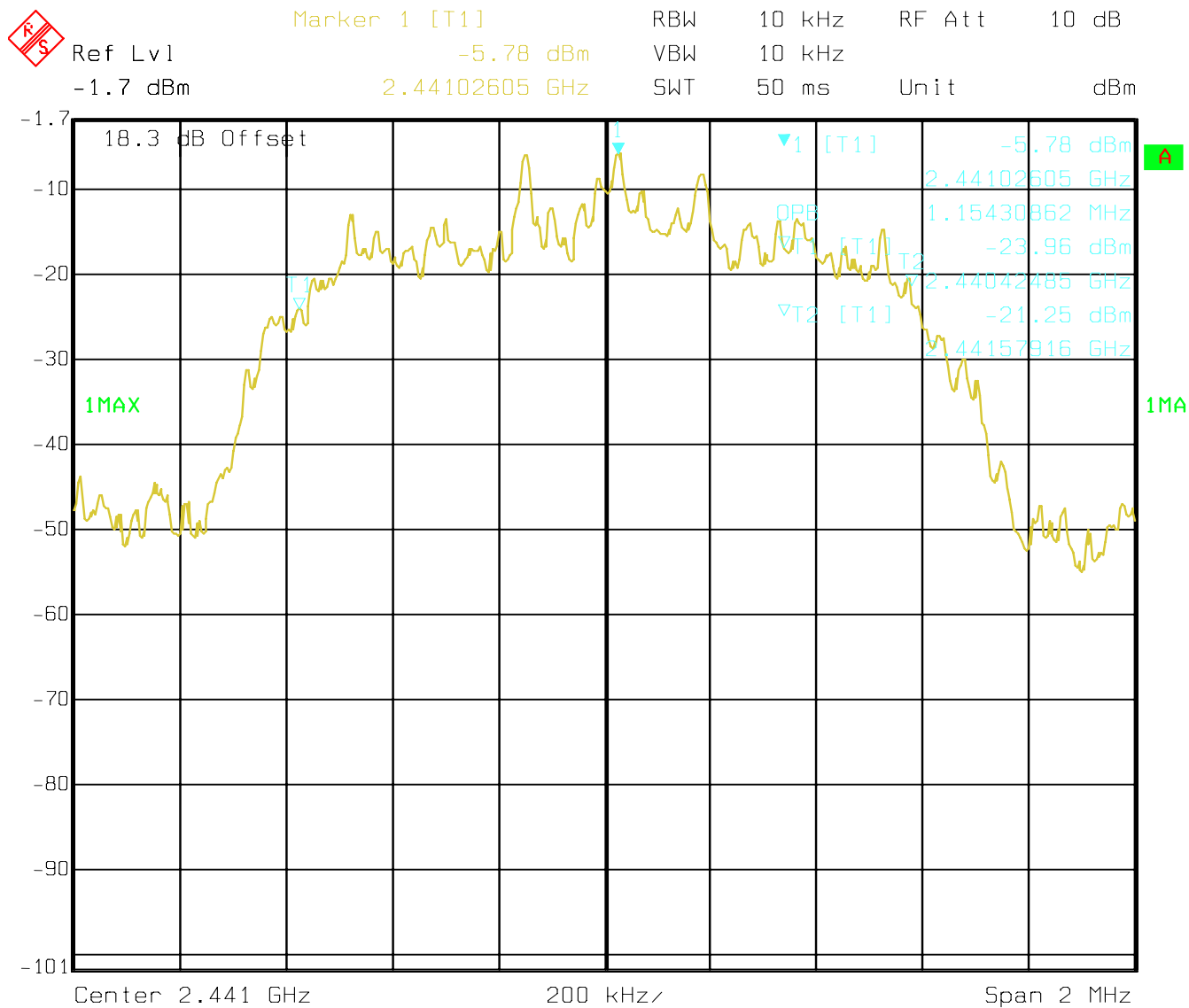


(2402 MHz) $\pi / 4$ DQPSK



Date: 21.NOV.2006 13:28:01

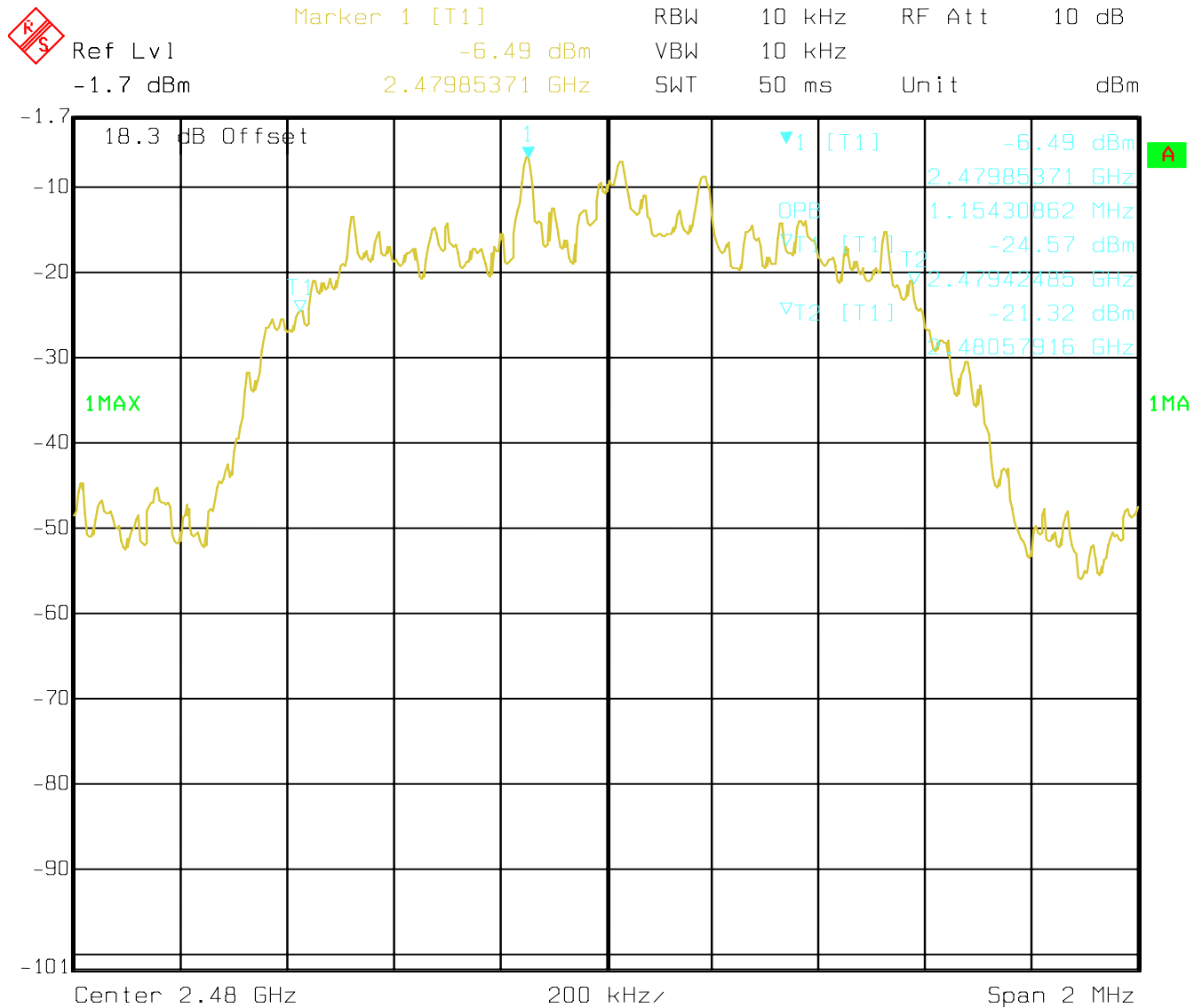
(2441 MHz) $\pi / 4$ DQPSK



Date: 21.NOV.2006 13:25:46



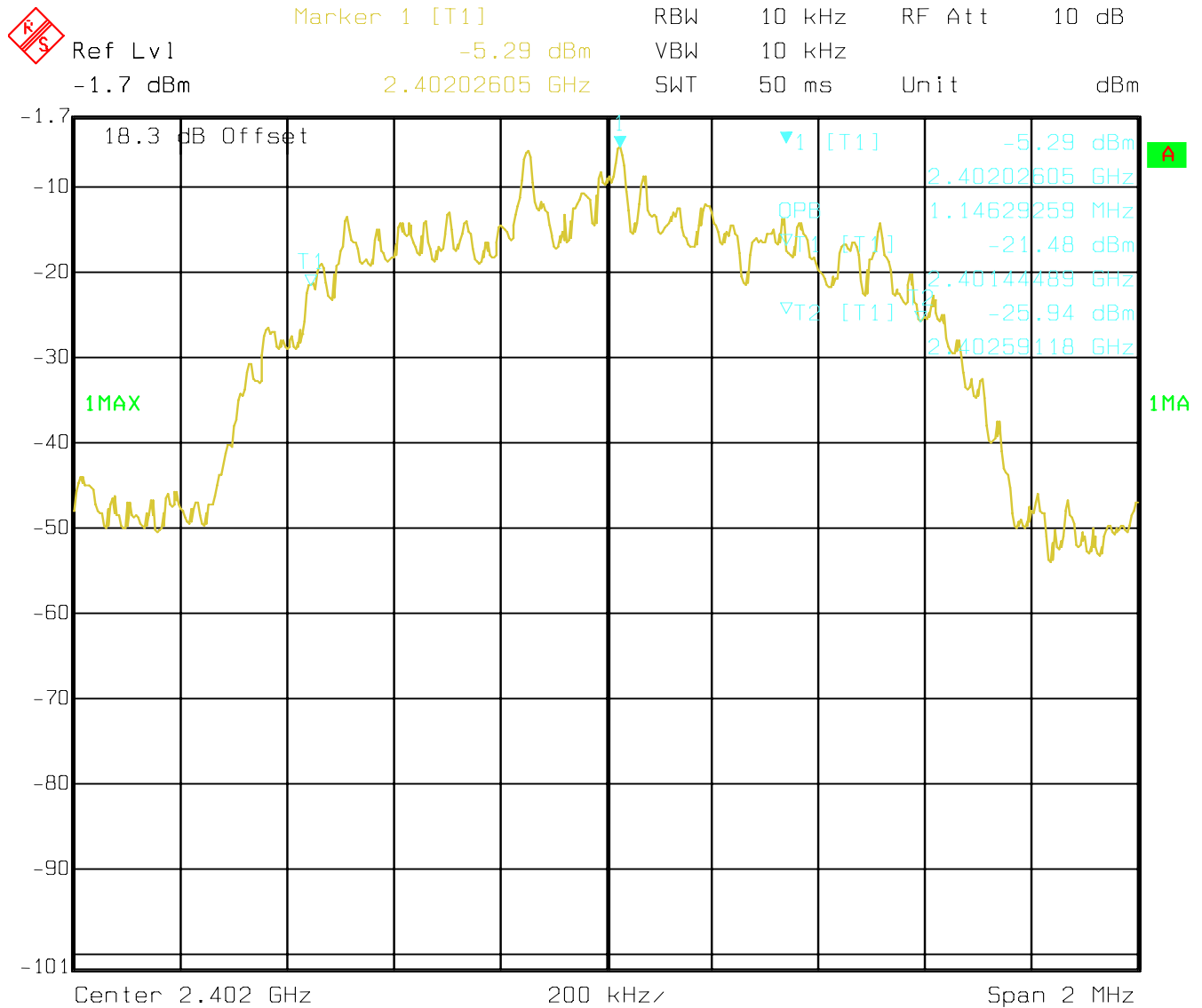
(2480 MHz) $\pi / 4$ DQPSK



Date: 21.NOV.2006 13:23:10



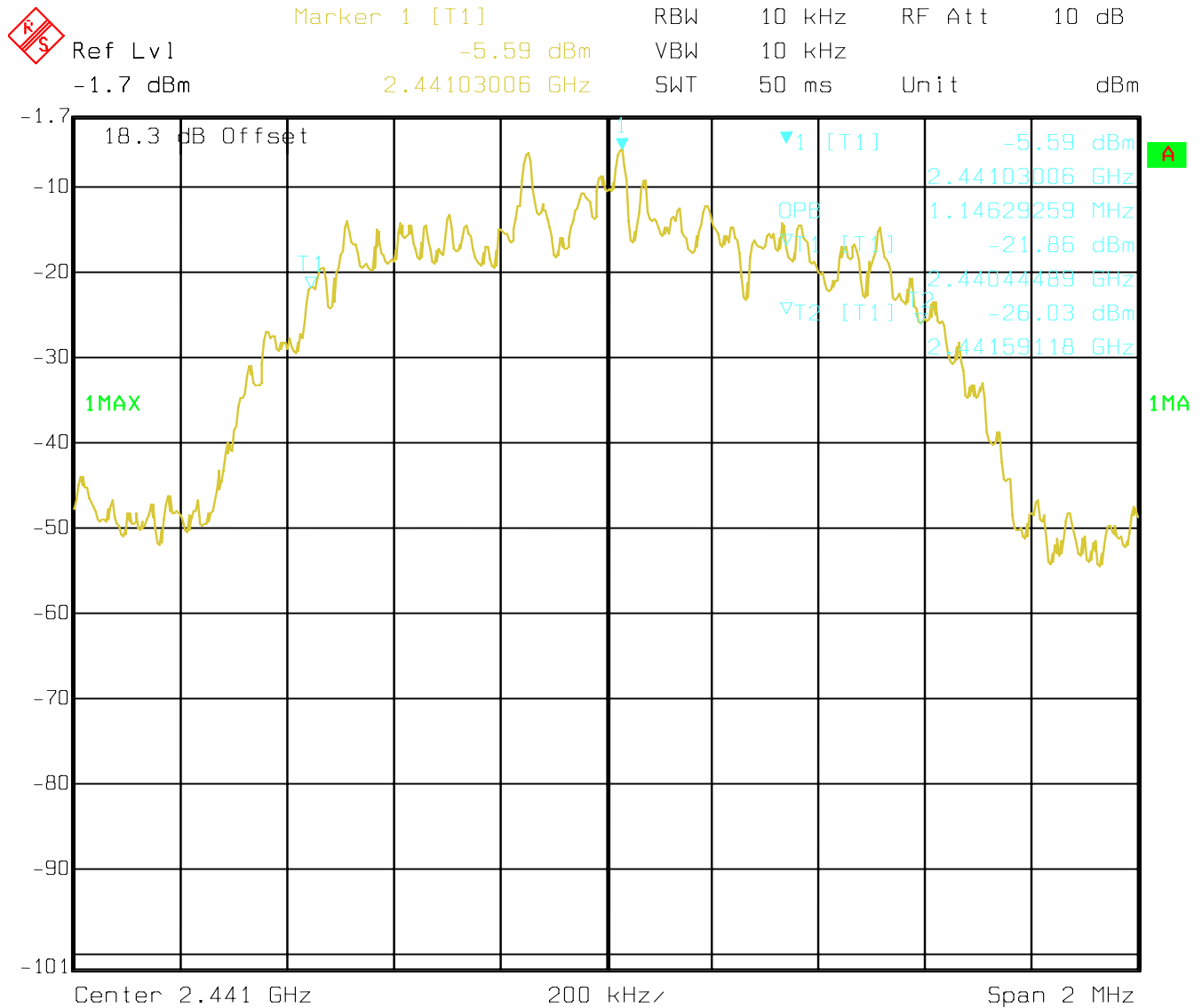
(2402 MHz) 8DPSK



Date: 21.NOV.2006 15:34:30



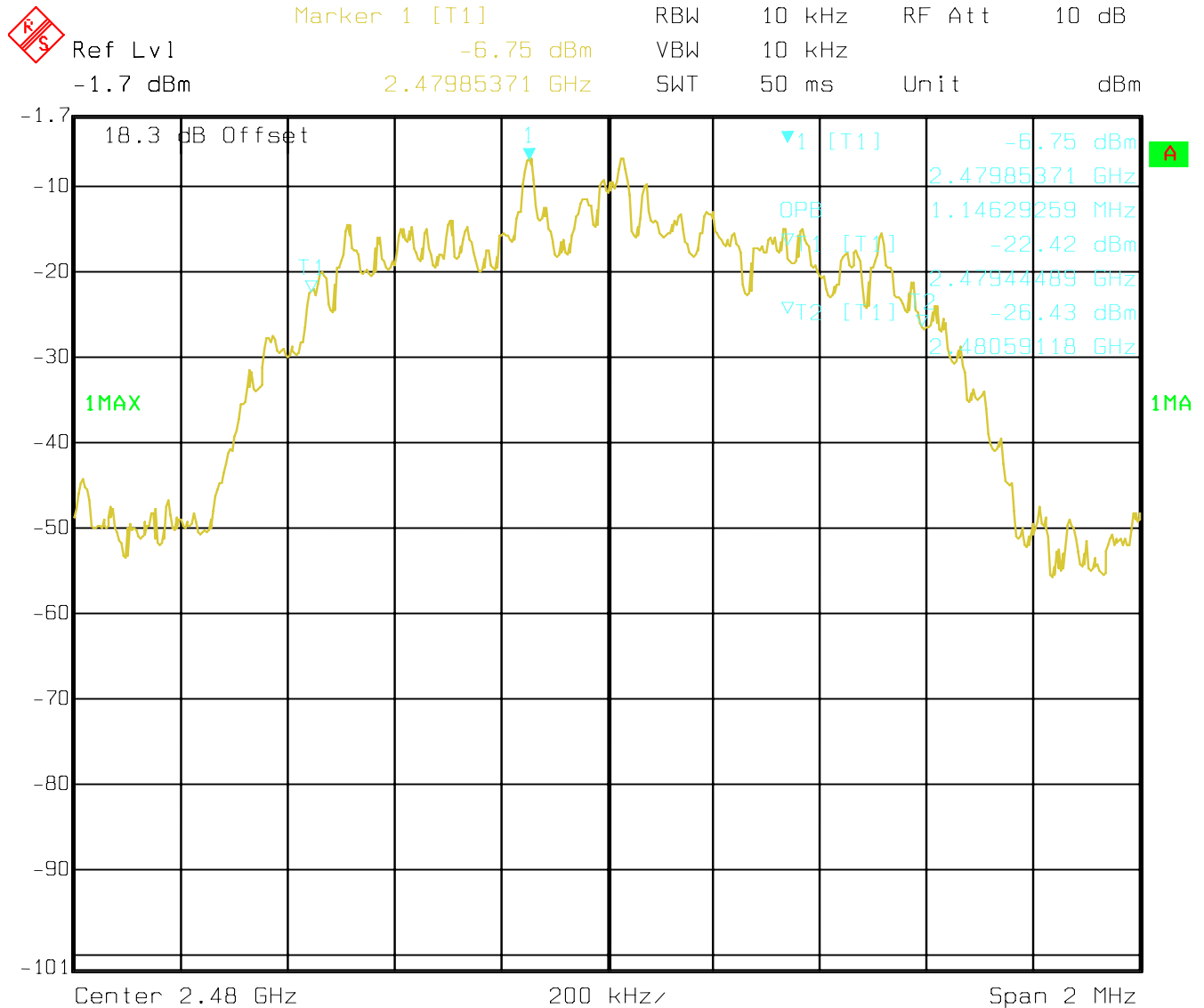
(2441 MHz) 8DPSK



Date: 21.NOV.2006 15:35:40



(2480 MHz) 8DPSK



Date: 21.NOV.2006 15:36:58

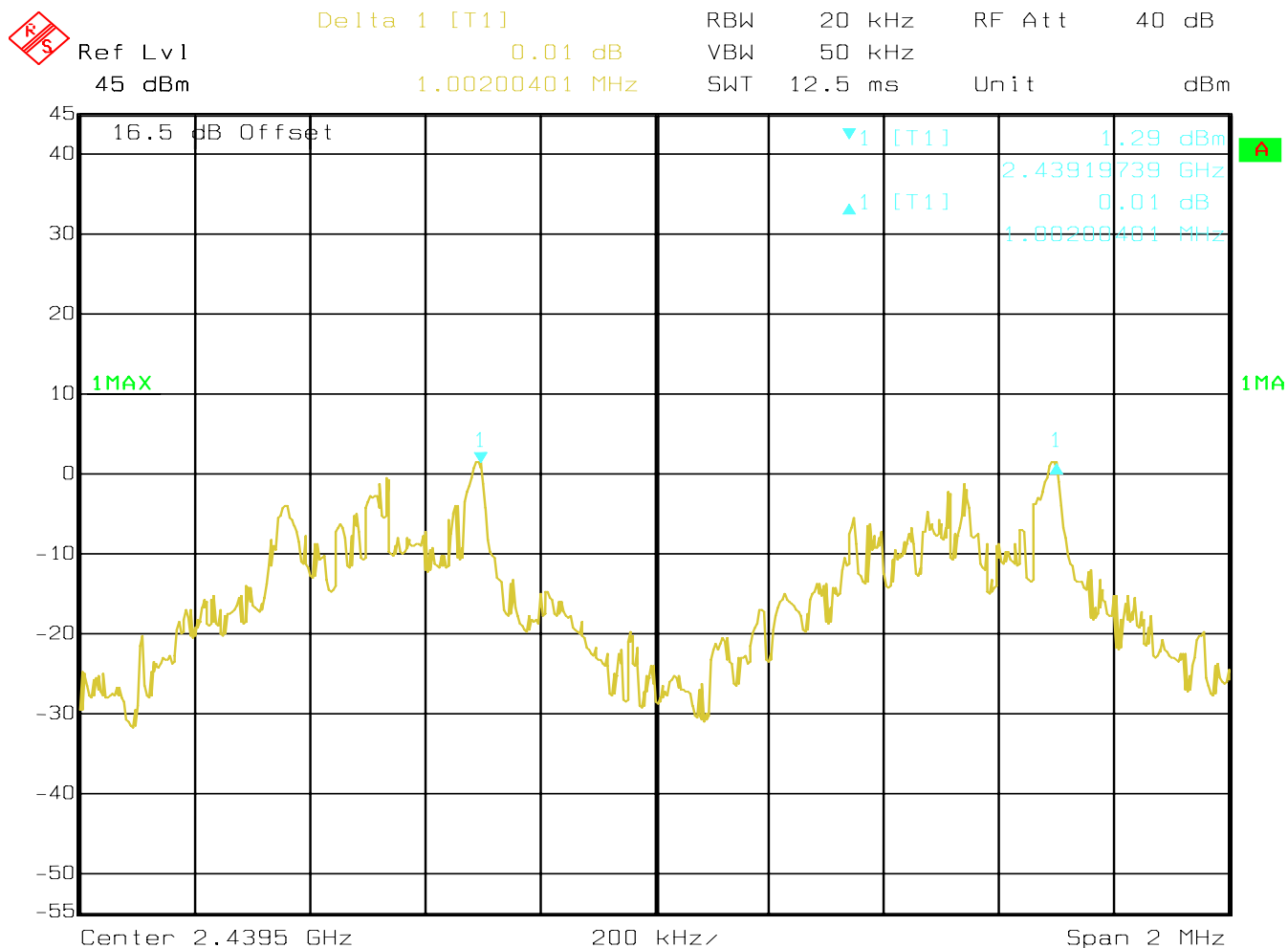
6.3 CARRIER FREQUENCY SEPARATION

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

SEPARATION
> 25 KHz or > 20 dB BANDWIDTH

6.3.2 RESULTS:

TEST CONDITIONS		SEPARATION (MHz)
T _{nom} (23)°C	V _{nom} VDC	1.002





6.4 NUMBER OF HOPPING CHANNELS

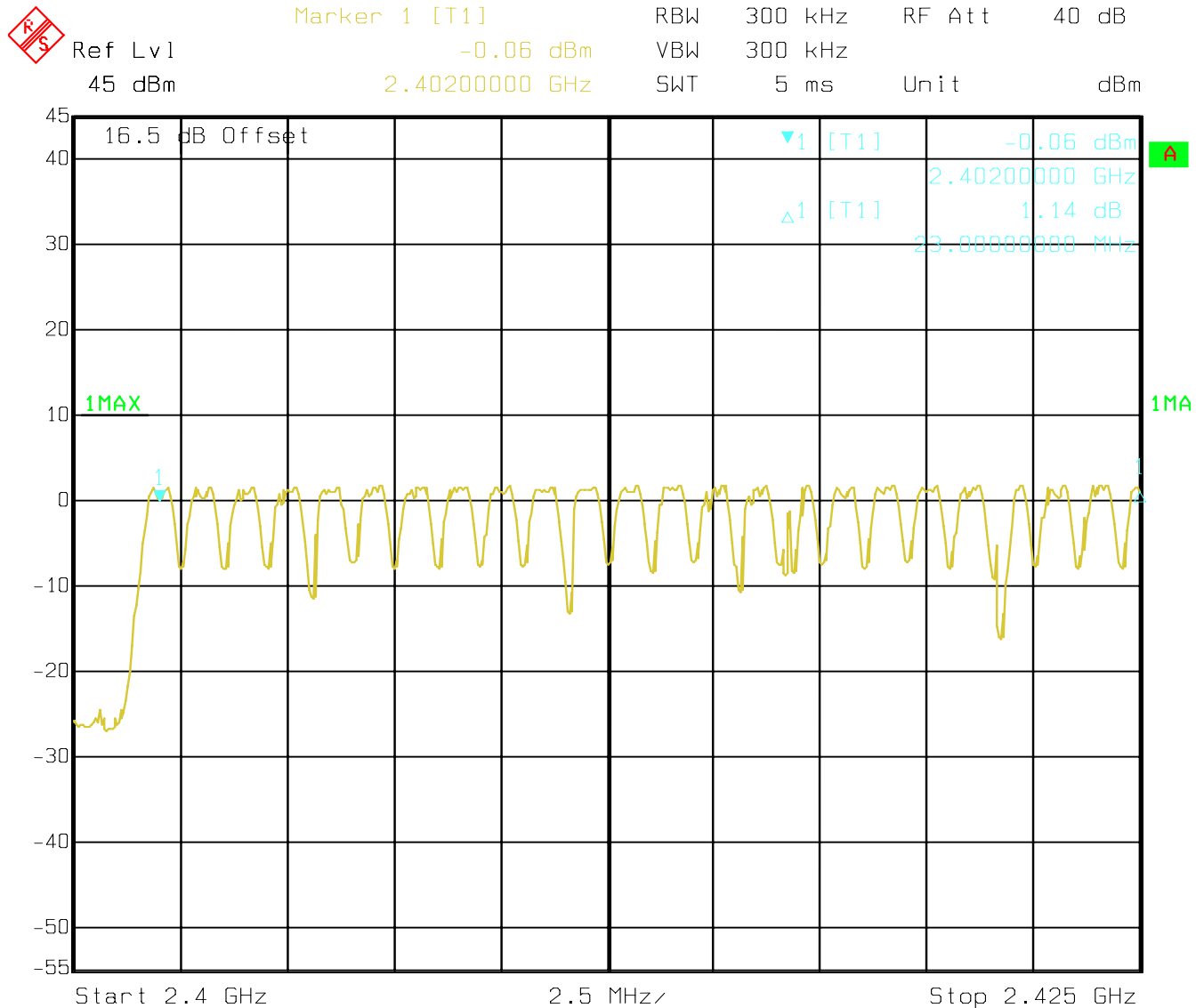
6.4.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (iii)

NUMBER OF CHANNELS
> 15

6.4.2 RESULTS:

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

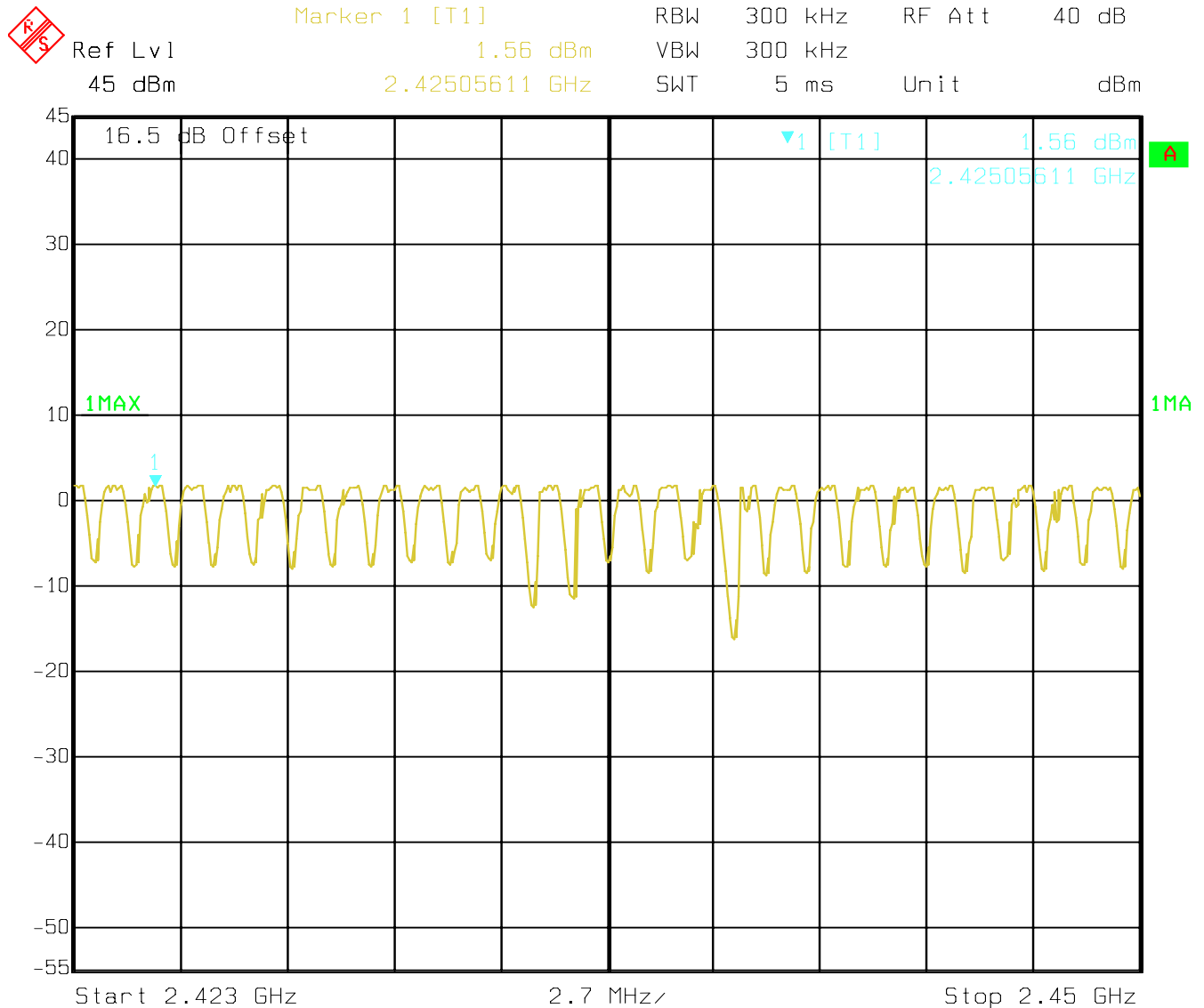
(PLOT 1)
 (F1-F2=2402MHz to 2425MHz)



Date: 07.NOV.2006 17:22:57



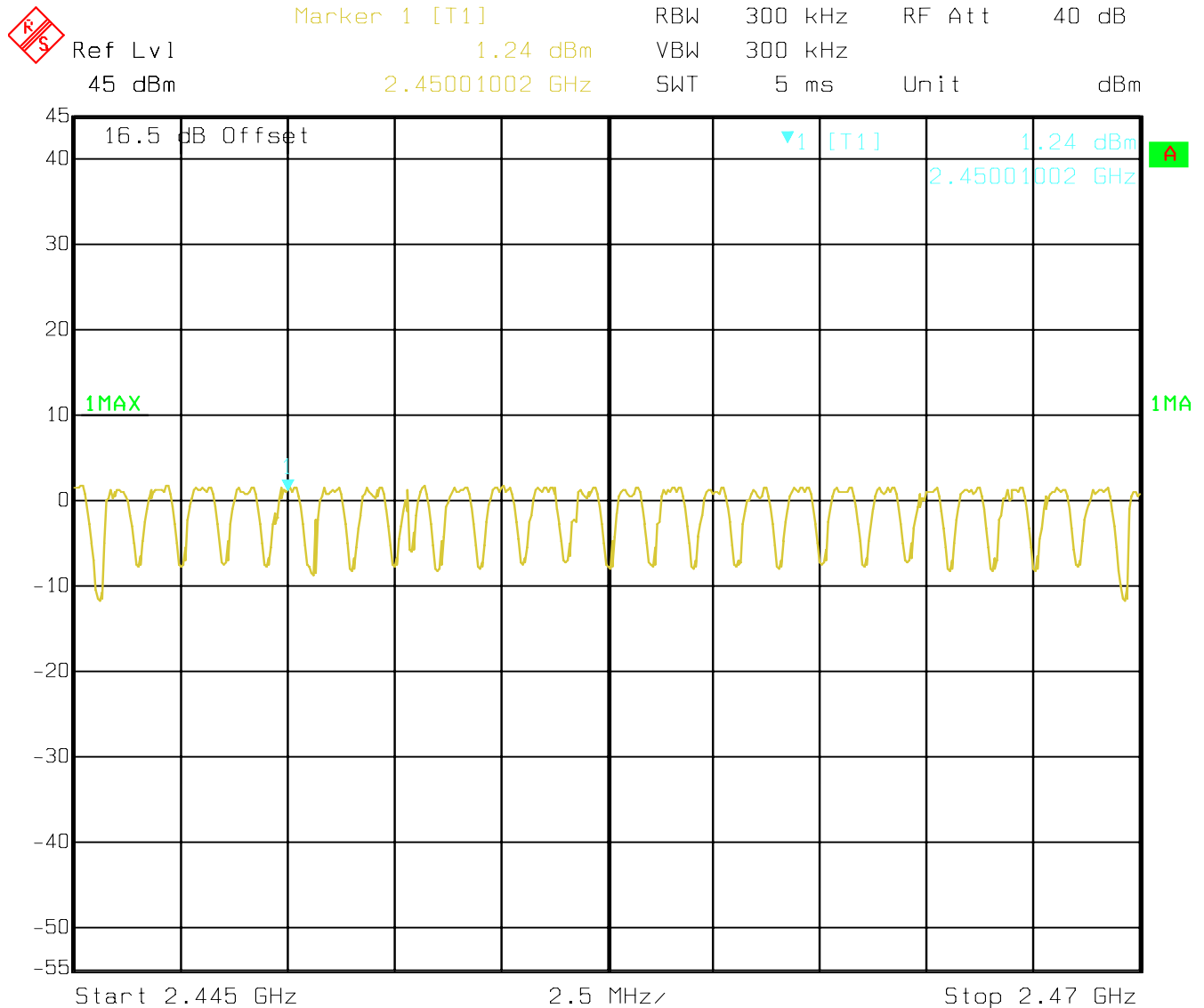
(PLOT 2)
 (F1-F2=2425MHz to 2450MHz)



Date: 07.NOV.2006 17:30:19



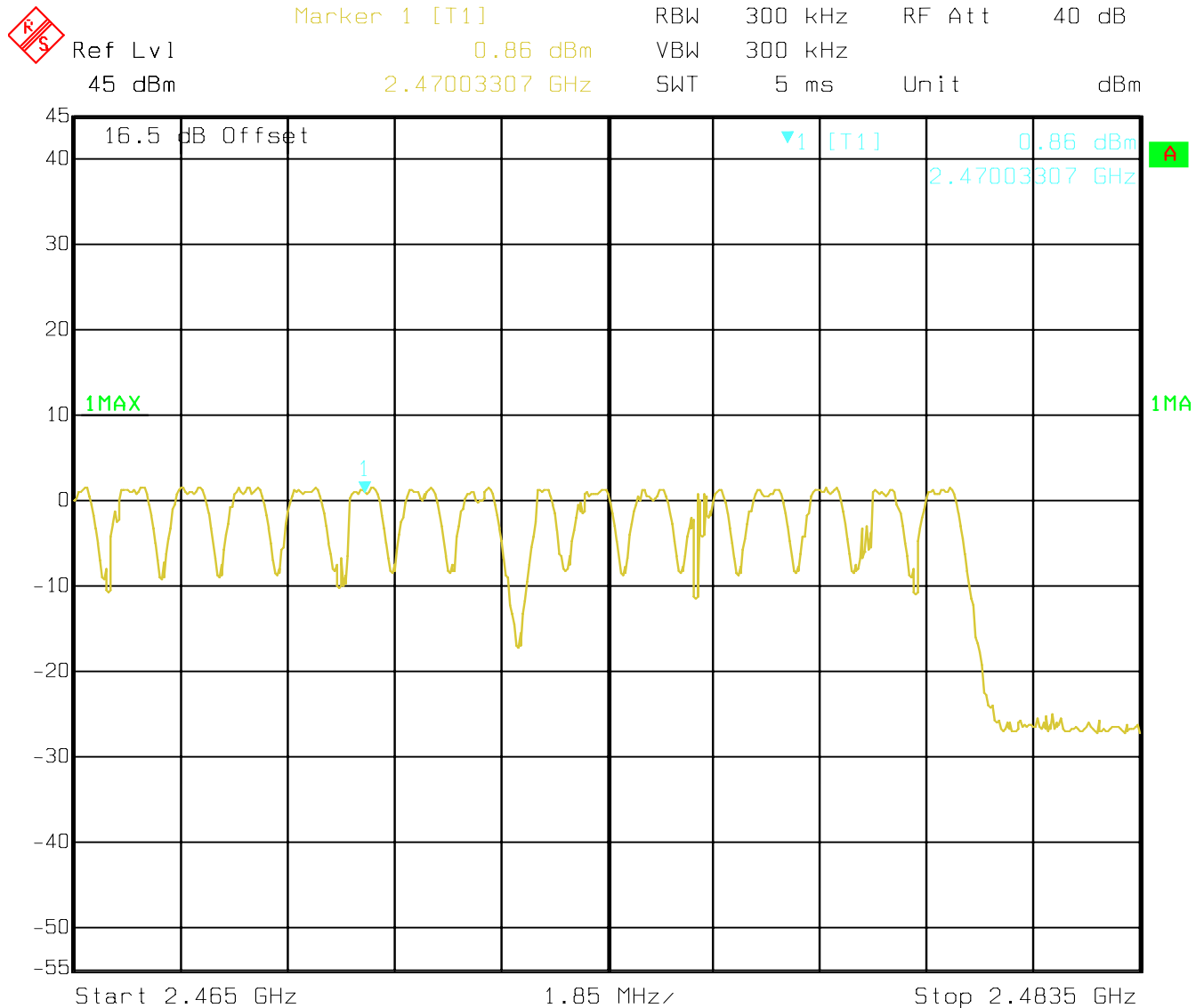
(PLOT 3)
 (F1-F2=2450MHz to 2470MHz)



Date: 07.NOV.2006 17:40:27



(PLOT 4)
(F1-F2=2470MHz to 2480MHz)



Date: 07.NOV.2006 17:47:44



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:

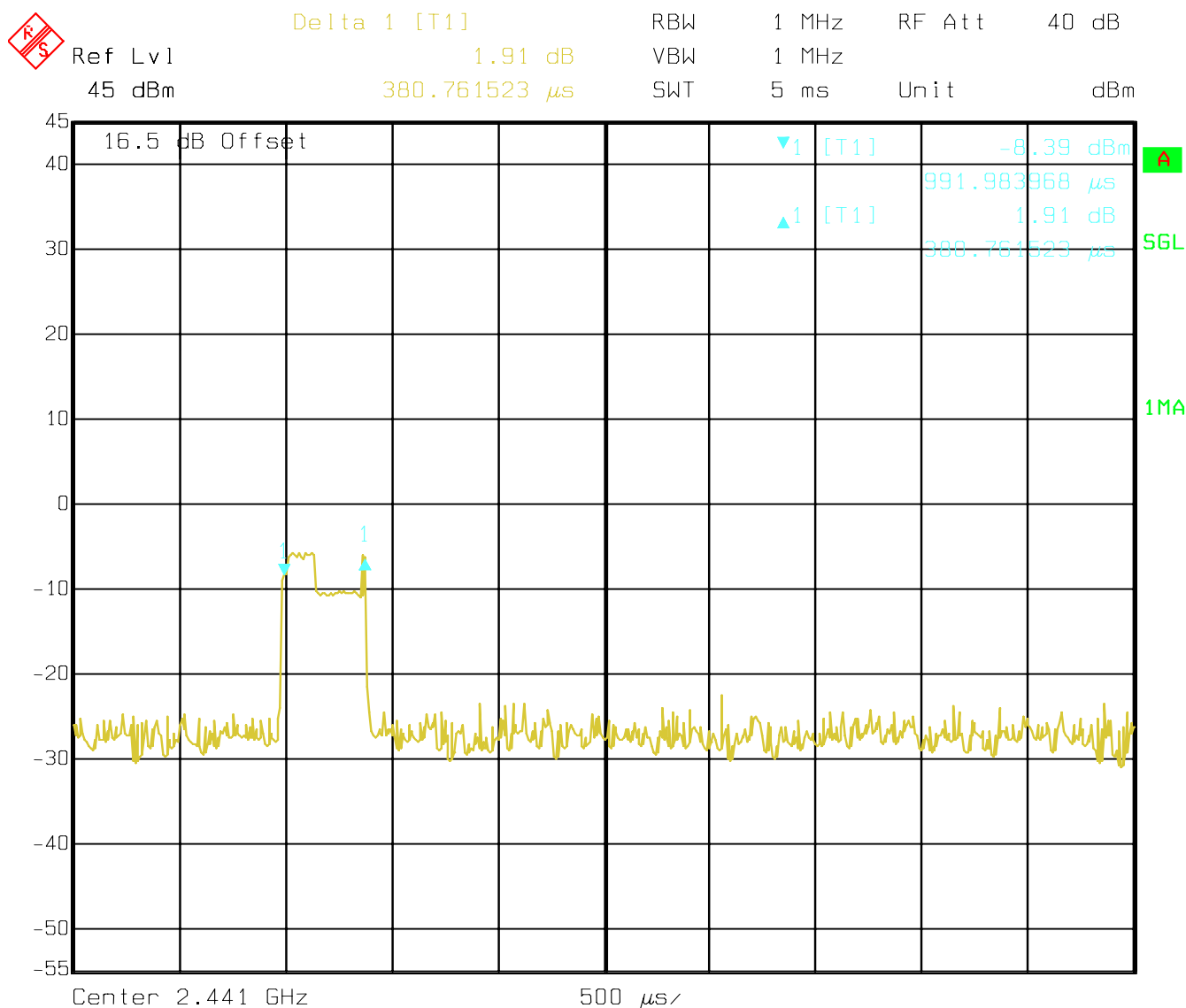
TEST CONDITIONS		TIME OF OCCUPANCY IN 31.6 SECONDS (ms)		
PACKET TYPE		DH1	DH3	DH5
T _{nom} (23)°C	V _{nom} VDC	121.851	266.44	307.46

(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 417.38μs.

So we have $320.108 * 417.38\mu s = 133.6ms$ per 31.6 seconds.

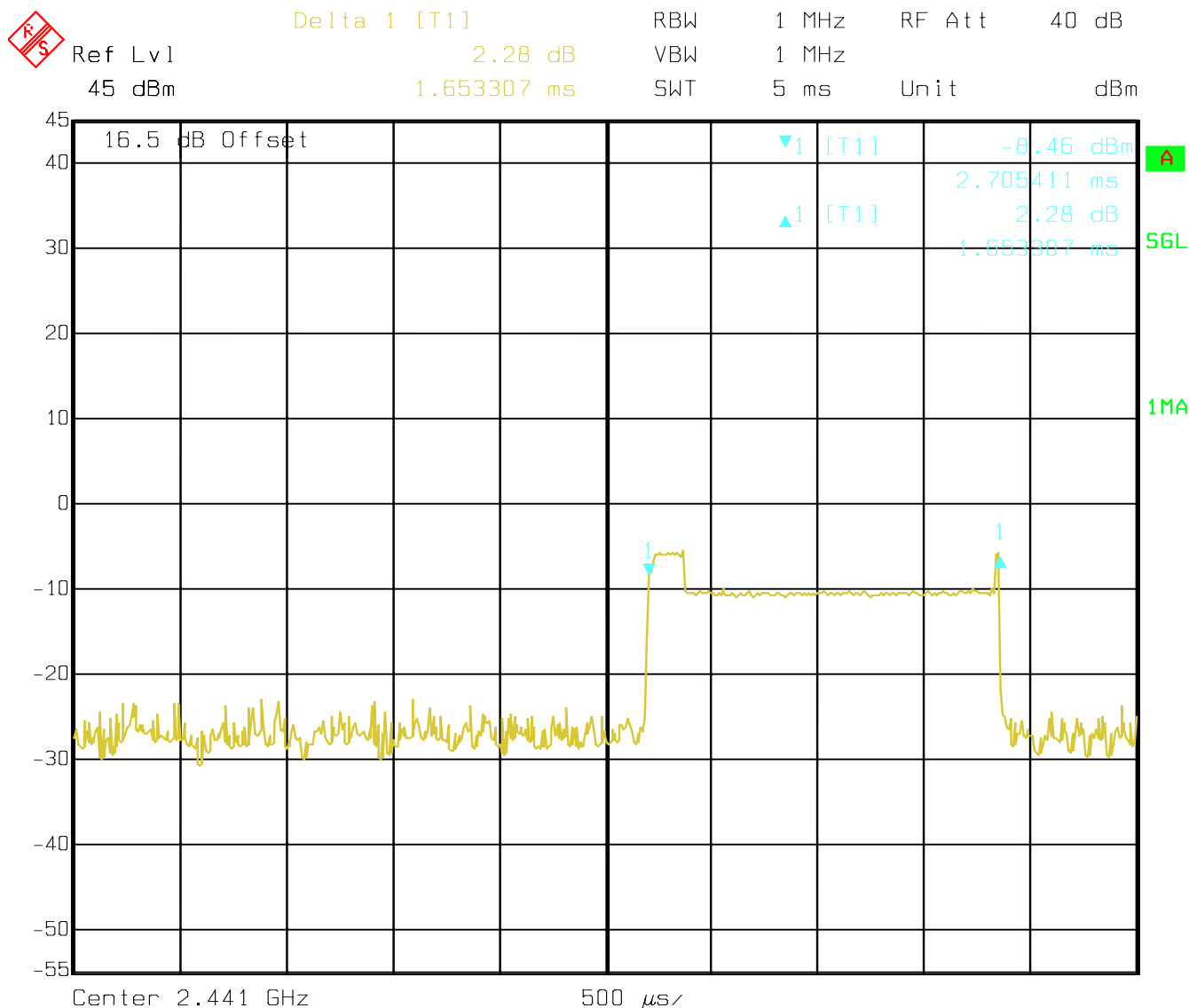


(DH3)

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 $161.16 * 1.676\text{ms} = 270.10\text{ms}$ per 31.6 seconds.



Date: 07.NOV.2006 18:14:32

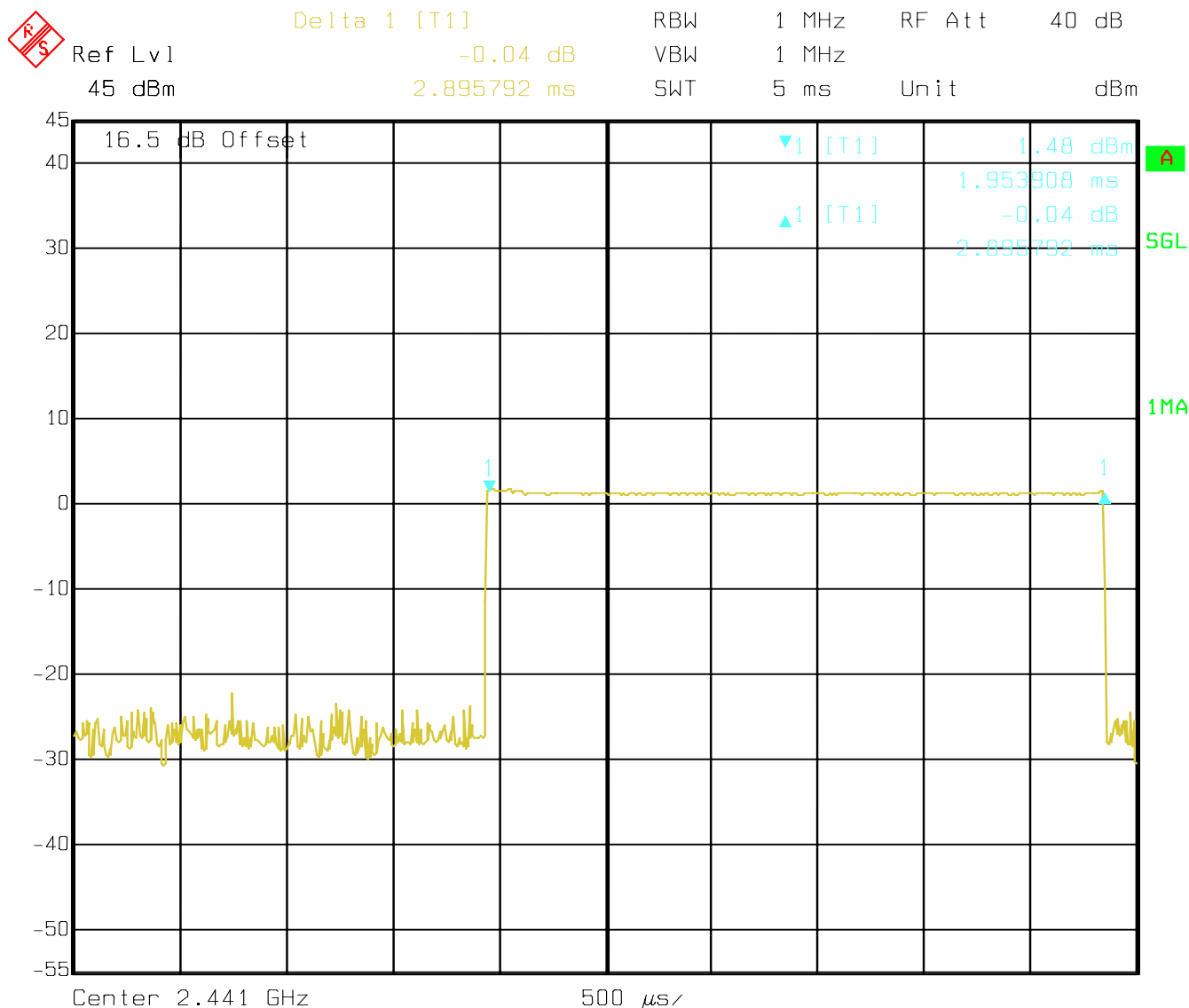


(DH5)

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 2.925ms.

So we have $106.176 * 2.925\text{ms} = 310.65\text{ms}$ per 31.6 seconds.



Date: 07.NOV.2006 18:17:11



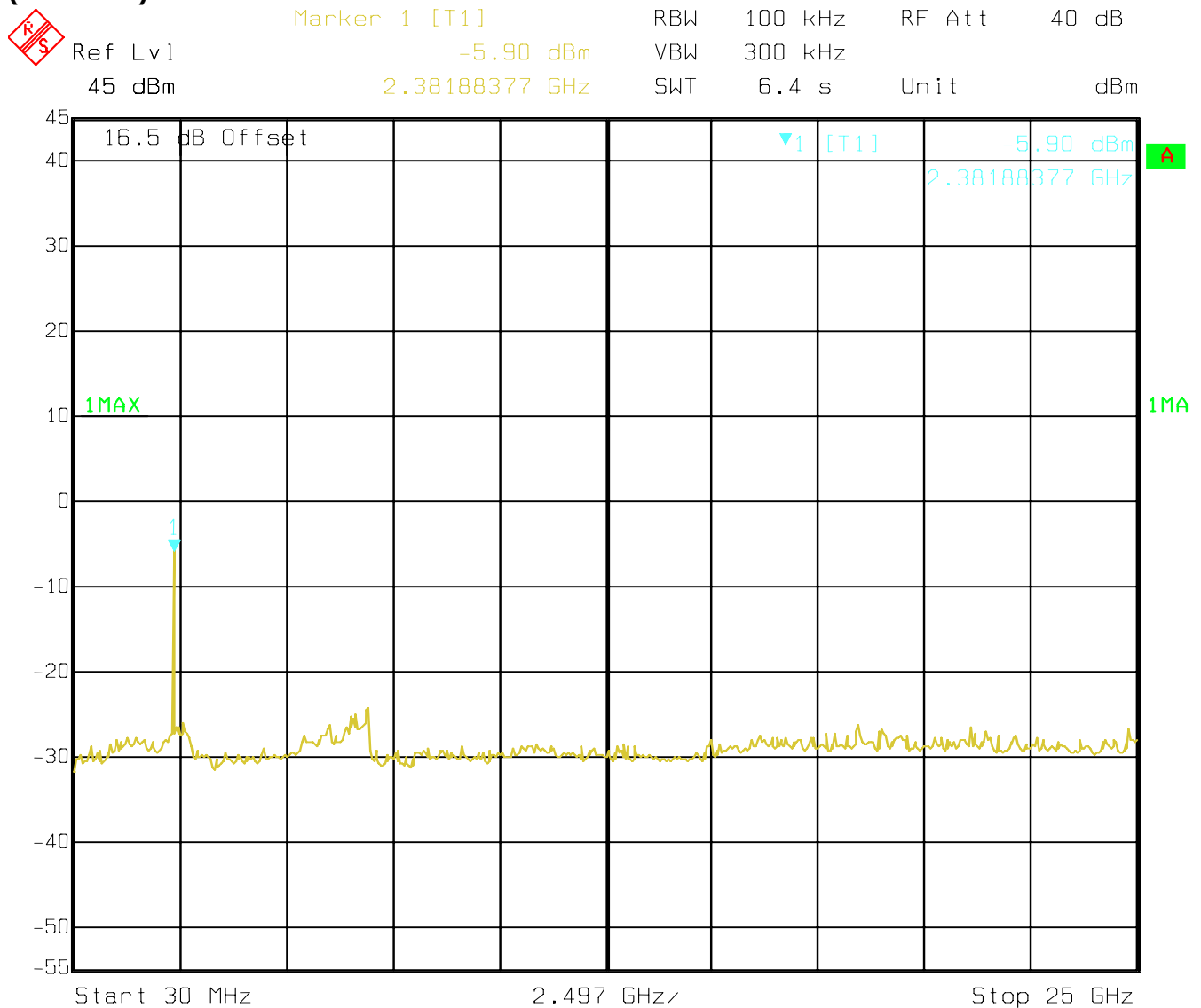
6.6 CONDUCTED SPURIOUS EMISSION

6.6.1 LIMIT SUB CLAUSE § 15.247 (d)

FREQUENCY RANGE	limit
30M-25GHz	-20dBc

6.6.2 RESULTS: Tnom(23)°C VnomVDC

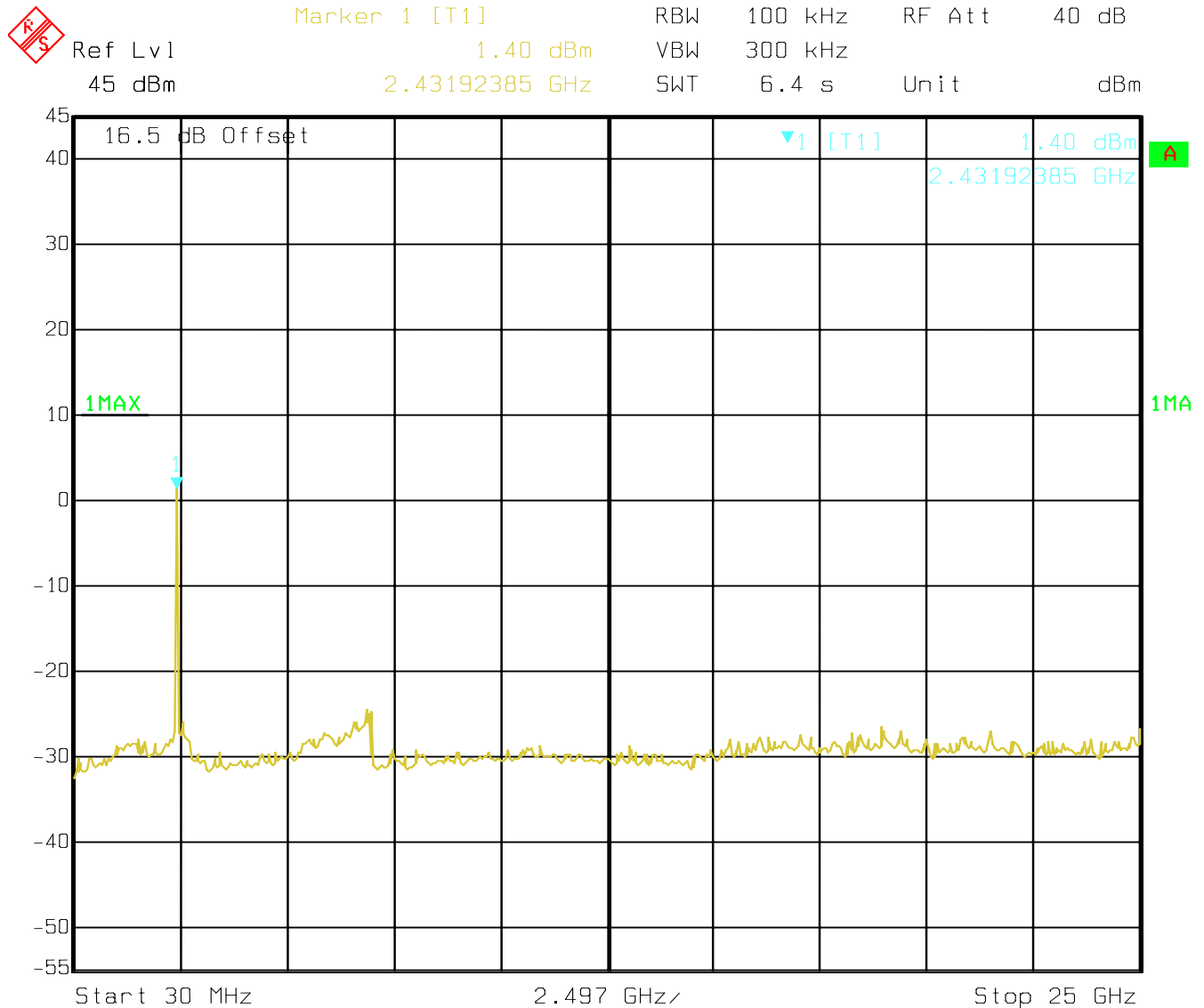
(2402MHz)



Date: 07.NOV.2006 17:11:13



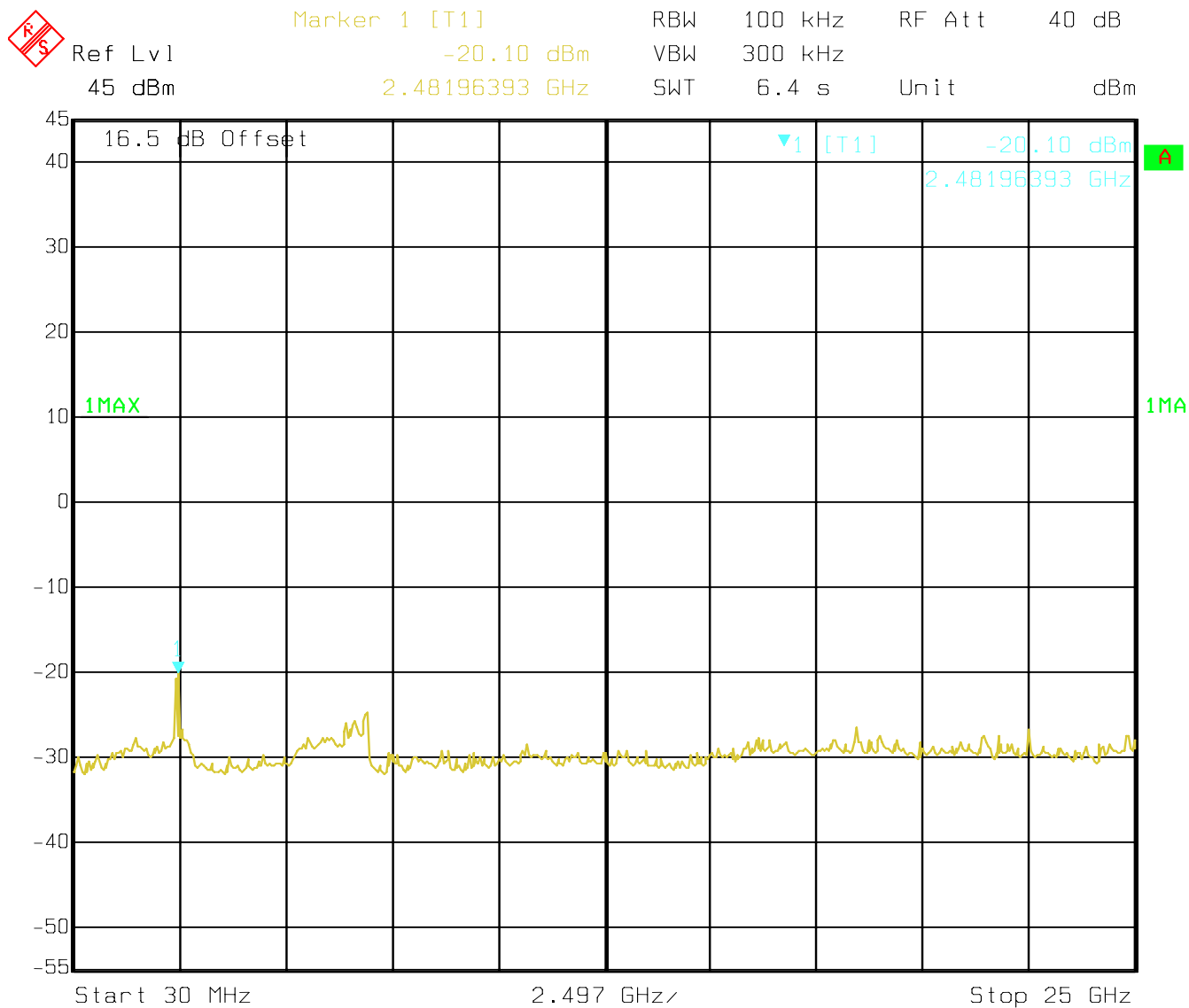
(2441MHz)



Date: 07.NOV.2006 17:13:29



(2480MHz)



Date: 07.NOV.2006 17:14:45

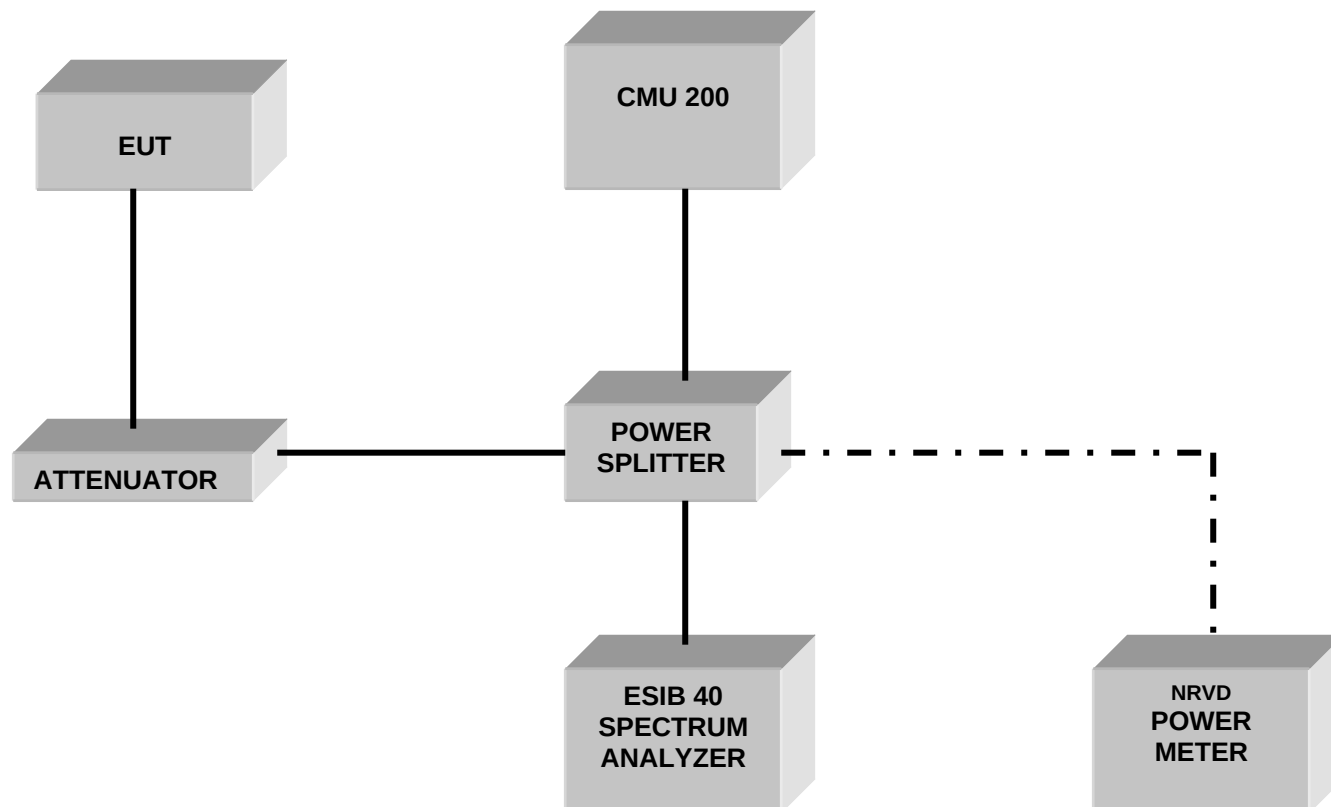


7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

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

