FCC Test Report

FCC Part 15.247 for FHSS systems/ CANADA RSS-210

FOR:

Portable Data Terminal with
BT BGB203

MODEL #: Dolphin7850

Honeywell International Inc.
9680 Old Bailes Road
Fort Mill, SC 29715
U.S.A

FCC ID: HD57850PGE
IC ID: 1693B-7850GE

TEST REPORT #: EMC_HANDH_061_08001_7850_FCC
DATE: 03/05/2008

ilac-MRA A2LA ACCREDITED Certificate # 2135.01

Bluetooth™ **Bluetooth Qualification Test Facility (BQTF)**

CTIA Authorized Test Lab LAB CODE 20020328-00

FCC listed A2LA accredited

IC recognized # 3462B

***CETECOM* Inc.**
411 Dixon Landing Road ◆ Milpitas, CA 95035 ◆ U.S.A.
Phone: + 1 (408) 586 6200 ◆ Fax: + 1 (408) 586 6299 ◆ E-mail: info@cetecomusa.com ◆ http://www.cetecom.com
CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686
Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

APPENDIX B

Test Report Cover Sheet

TEST REPORT NUMBER: EMC_HANDH_061_07002-02_FCC

COMPANY NUMBER: 1639B

EQUIPMENT MODEL NUMBER: 7850

MANUFACTURER : Honeywell International.

TESTED TO RADIO STANDARDS SPECIFICATION (RSS) No. : RSS 201, Issue 7

OPEN AREA TEST SITE INDUSTRY CANADA NUMBER: **3462B**

FREQUENCY RANGE (or fixed frequency): 2400 – 2483.5 MHz

R.F. POWER IN WATTS: 0.001 W

OCCUPIED BANDWIDTH (99% BW): 881.8 KHz

TYPE OF MODULATION: GFSK

EMISSION DESIGNATOR (TRC-43): 882KFXD

ANTENNA INFORMATION: Integral SMD

TRANSMITTER SPURIOUS (worst case): 42.43 dBuV/m @ 677.314 MHz

RECEIVER SPURIOUS (worst case): 48.2 dBuV/m @ 2 879.595 MHz

ATTESTATION:
DECLARATION OF COMPLIANCE: I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the radio equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Signature: Ivaylo Tankov
CETECOM Inc.
411 Dixon Landing Rd
Milpitas, CA 95035
USA

Date: 2008-03-05

TABLE OF CONTENTS

1 Assessment

The following is in compliance with the applicable criteria specified in FCC rules Part 15.247 of the Code of Federal Regulations and in compliance with the applicable criteria specified in Industry Canada rules RSS210.

Company	Description	Model #
Honeywell International Inc.	**Portable Data Terminal with BT BGB0203**	**Dolphin 7850**

Technical responsibility for area of testing:

Date	Section	Name	Signature
03/06/2008	EMC & Radio	Lothar Schmidt (Director Regulatory and Antenna Services)	Lothar Schmidt I am approving this document

Project Leader:

Date	Section	Name	Signature
03/06/2008	EMC & Radio	Val Tankov (Project Engineer)	Ivaylo Tankov I am the author of this document

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	**CETECOM Inc.**
Department:	**EMC**
Address:	**411 Dixon Landing Road 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:	**Val Tankov**

2.2 Identification of the Client

Applicant's Name:	**Honeywell International Inc.**
Street Address:	**9680 Old Bailes Road**
City/Zip Code	**Fort Mill, SC 29715**
Country	**U S A**
Contact Person:	**Mandana Mobasher**
Phone No.	**803-835-8190**
Fax:	**803-835-8097**
e-mail :	**Mandana.Mobasher@handheld.com**

2.3 Identification of the Manufacturer

Manufacturer's Name:	**Honeywell International Inc.**
Manufacturers Address:	**9680 Old Bailes Road**
City/Zip Code	**Fort Mill, SC 29715**
Country	**U S A**

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name:	**Dolphin 7850g**
Description:	**Portable Data Terminal with BT BGB0203**
Model No:	**Dolphin 7850**
Hardware Revision:	**2.0**
Software Revision :	**Windows Mobile 5.0 Operating System**
FCC ID:	**HD57850PGE**
IC ID:	**1693B-7850GE**
Frequency Range:	**2402-2480MHz**
Type(s) of Modulation:	**GFSK**
Number of Channels:	**79**
Antenna Type:	**Diversity pc board, Centurion Blue chip/typically > 2dB**
Output Power:	**1mW conducted and 0.161 mW EIRP@ 2441 MHz**

3.2 Identification of the Equipment Under Test (EUT)

EUT #	TYPE	MANF.	MODEL	SERIAL #
1	Portable Data Terminal	Hand Held Products	7850	UNIT 1 06153A1803
2	Portable Data Terminal	Hand Held Products	7850	UNIT 2 06129A1C11

3.3 Identification of Accessory equipment

AE #	TYPE	MANF.	MODEL	SERIAL #
1	AC/DC ADAPTER	DVL	DSA-0151D-09.5	41206346-01
2	AC/DC ADAPTER	DVL	DSA-0421S-09 3 38	n/a
3	Charging Cradle	Hand Held Products	7850-HB	B1000102

4 Subject of Investigation

All testing was performed on the Portable Data Terminal model Dolphin 7850, with BT module BGB203 and WLAN module BGW200 certified under FCC ID: HD57850LPE and IC ID: 1693B-7850E as most equipped of the Dolphin 7850 family.
The described under section 3 as EUT is electrically identical as mentioned above only without the WLAN module.

This test report contains full radiated and conducted testing for the **Bluetooth Module** as per FCC15.247.

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	30dBm EIRP

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

5.1.2 EIRP:

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402	2441	2480
T_{nom}(23)°C	V_{nom}VDC	-8.32	-7.93	-10.5
Measurement uncertainty		±0.5dBm		

MAXIMUM PEAK OUTPUT POWER § 15.247 (RADIATED)
EIRP (2402 MHz)

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

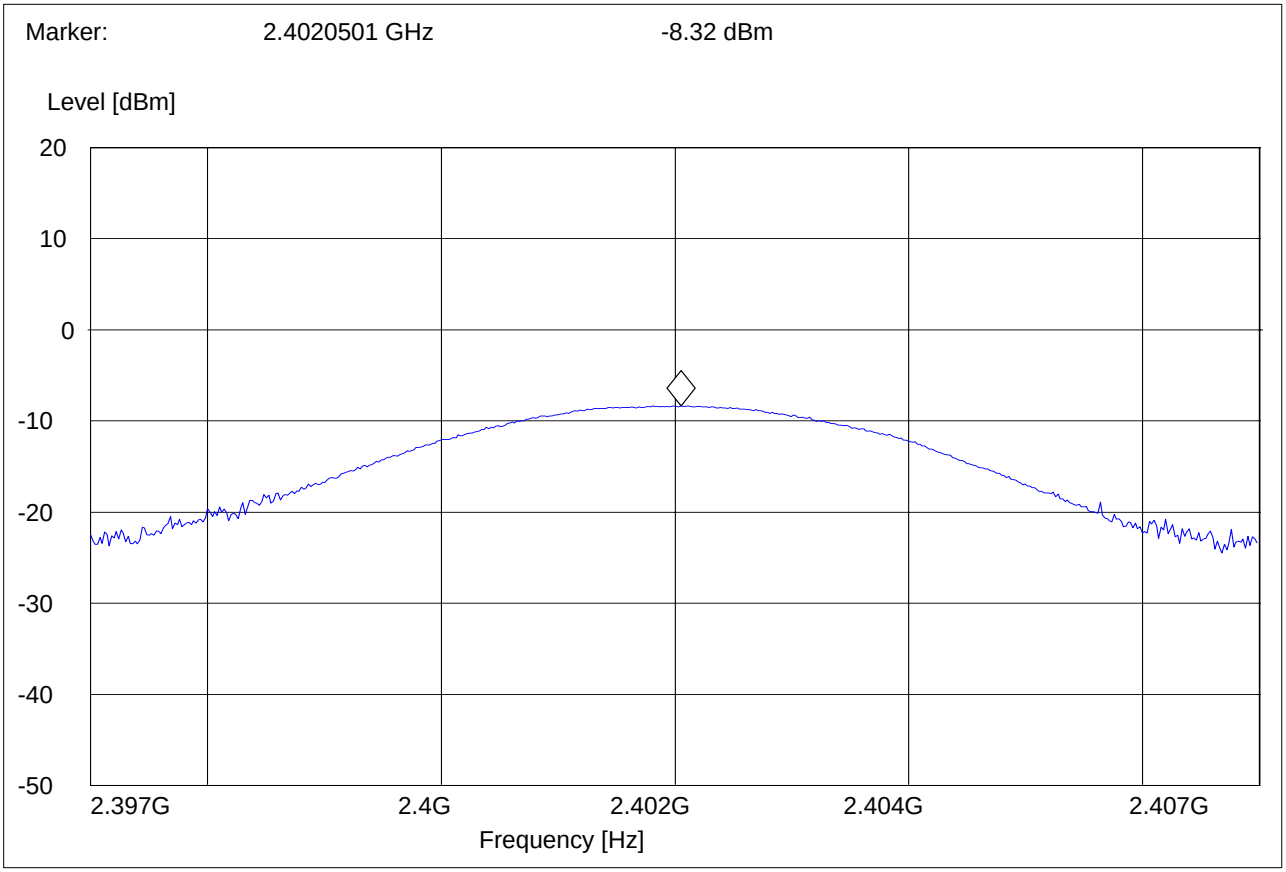
EUT / Description: DOLPHIN 7850
Customer: HHP
Operating Mode: BT; CHAN 0, max sig at 160° rotation
Antenna: V
EUT: H
Test Engineer: Ed
Voltage: Battery mode
Sweep: EIRP BT low channel

SWEEP TABLE: "EIRP BT low channel"

Short Description: EIRP Bluetooth channel-2402MHz

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

MaxPeak



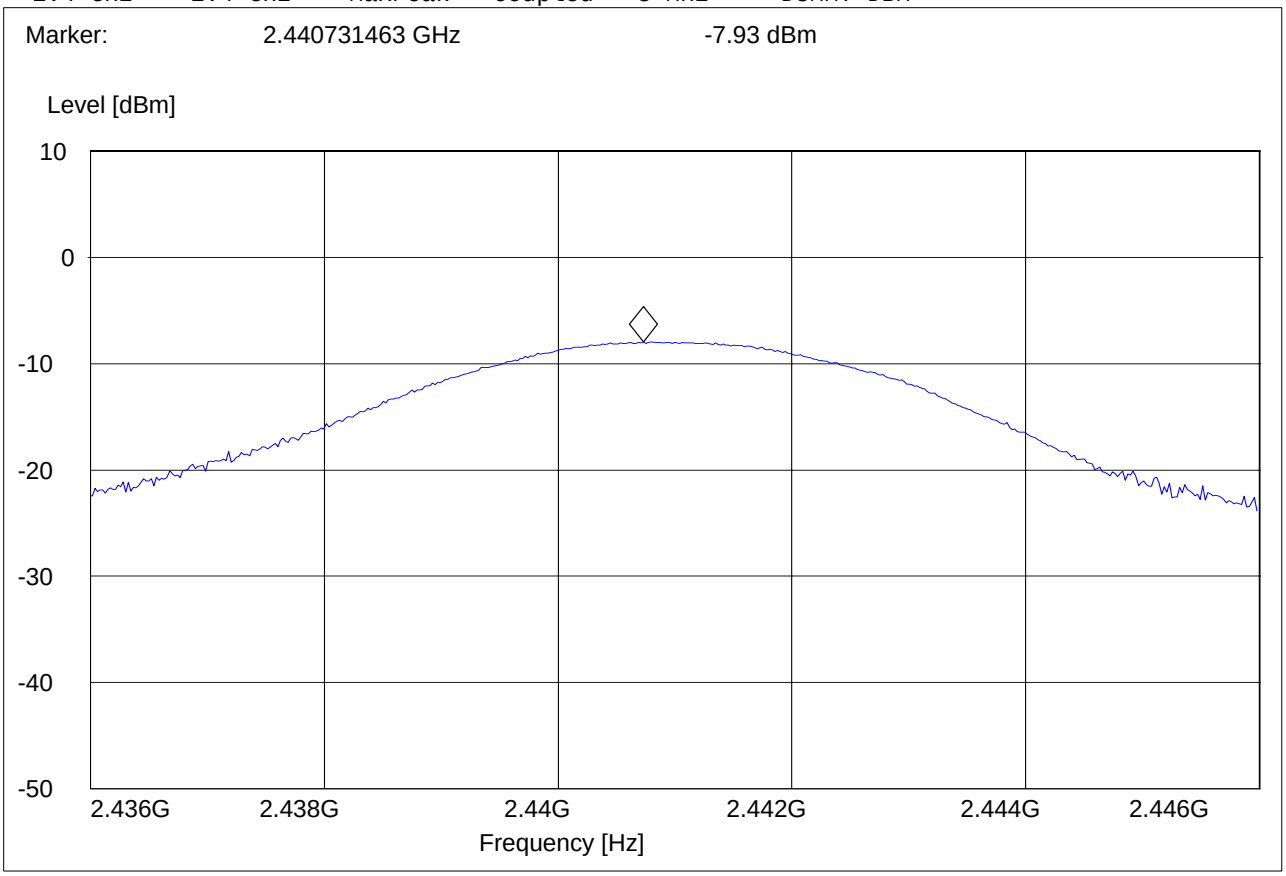
MAXIMUM PEAK OUTPUT POWER § 15.247 (RADIATED)
EIRP (2441 MHz)

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    BT; CHAN 39, max sig at 160° rotation
Antenna:           V
EUT:               H
Test Engineer:     Ed
Voltage:           Battery mode
Sweep:             EIRP BT mid channel
```

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
```



MAXIMUM PEAK OUTPUT POWER § 15.247 (RADIATED)
EIRP (2480 MHz)

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

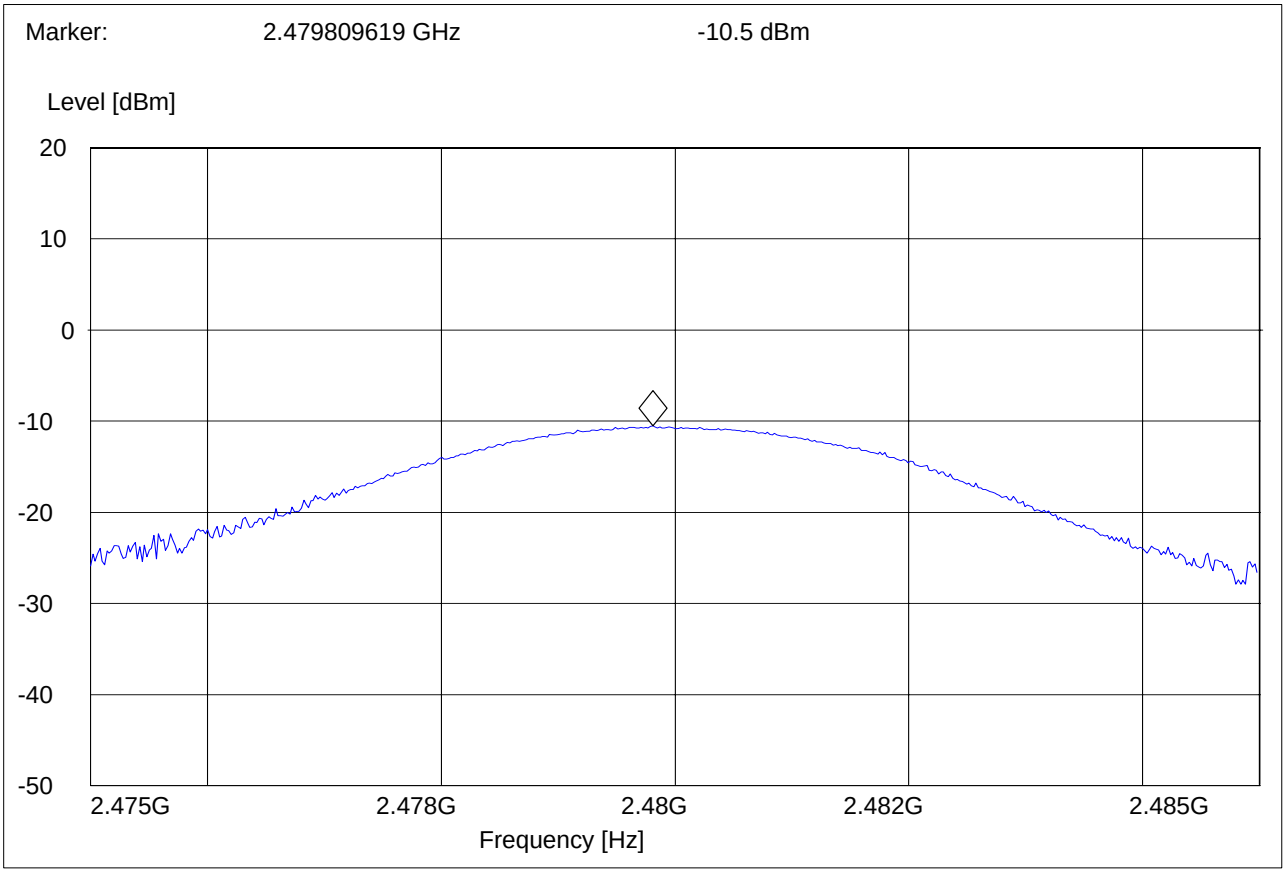
EUT / Description: DOLPHIN 7850
Customer: HHP
Operating Mode: BT; CHAN 78, max sig at 160° rotation
Antenna: V
EUT: H
Test Engineer: Ed
Voltage: Battery mode
Sweep: EIRP BT high channel

SWEEP TABLE: "EIRP BT high channel"

Short Description: EIRP Bluetooth channel-2480MHz

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.5 GHz	2.5 GHz	MaxPeak	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)

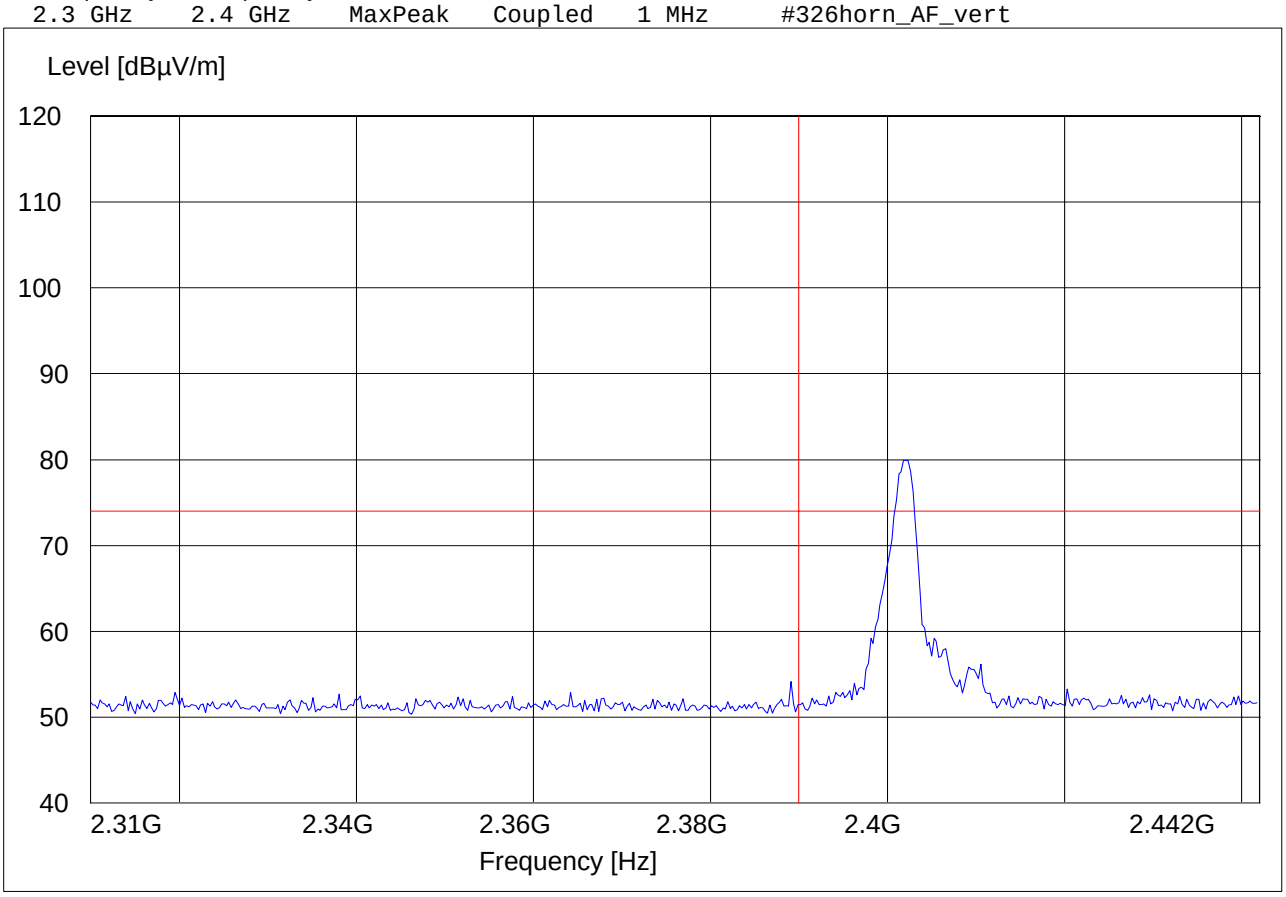
PEAK

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    BT; CHAN 0
Antenna:           V
EUT:               V
Test Engineer:     Ed
Voltage:           AC Adapter w/ USB cable
Sweep:             FCC 15.247 LBE_PK
```

SWEEP TABLE: "FCC15.247 LBE_PK"

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



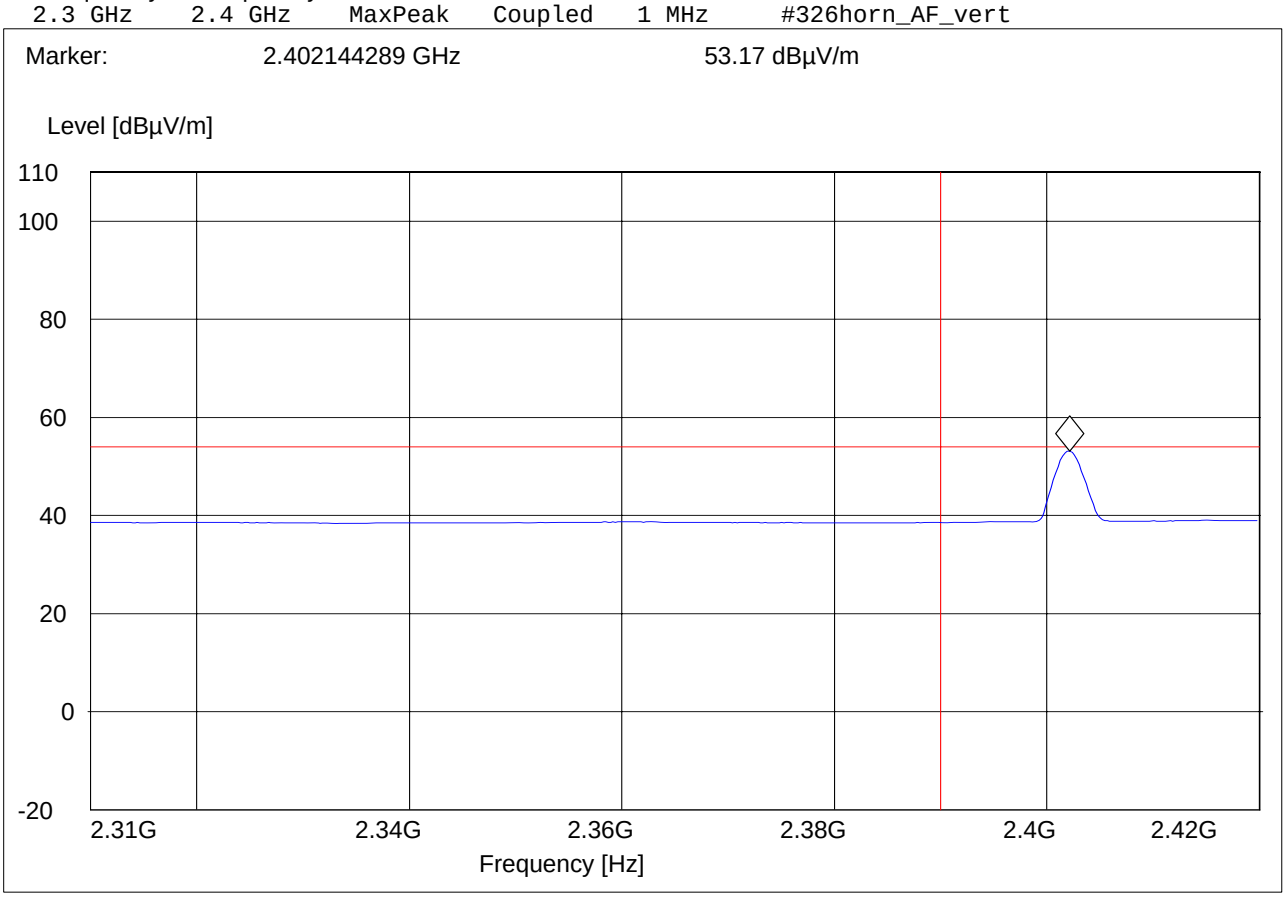
AVG

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    BT; CHAN 0
Antenna:           V
EUT:               V
Test Engineer:     Ed
Voltage:           AC Adapter w/ USB cable
Sweep:             FCC 15.247 LBE_AVG
```

SWEEP TABLE: "FCC15.247 LBE_AVG"

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



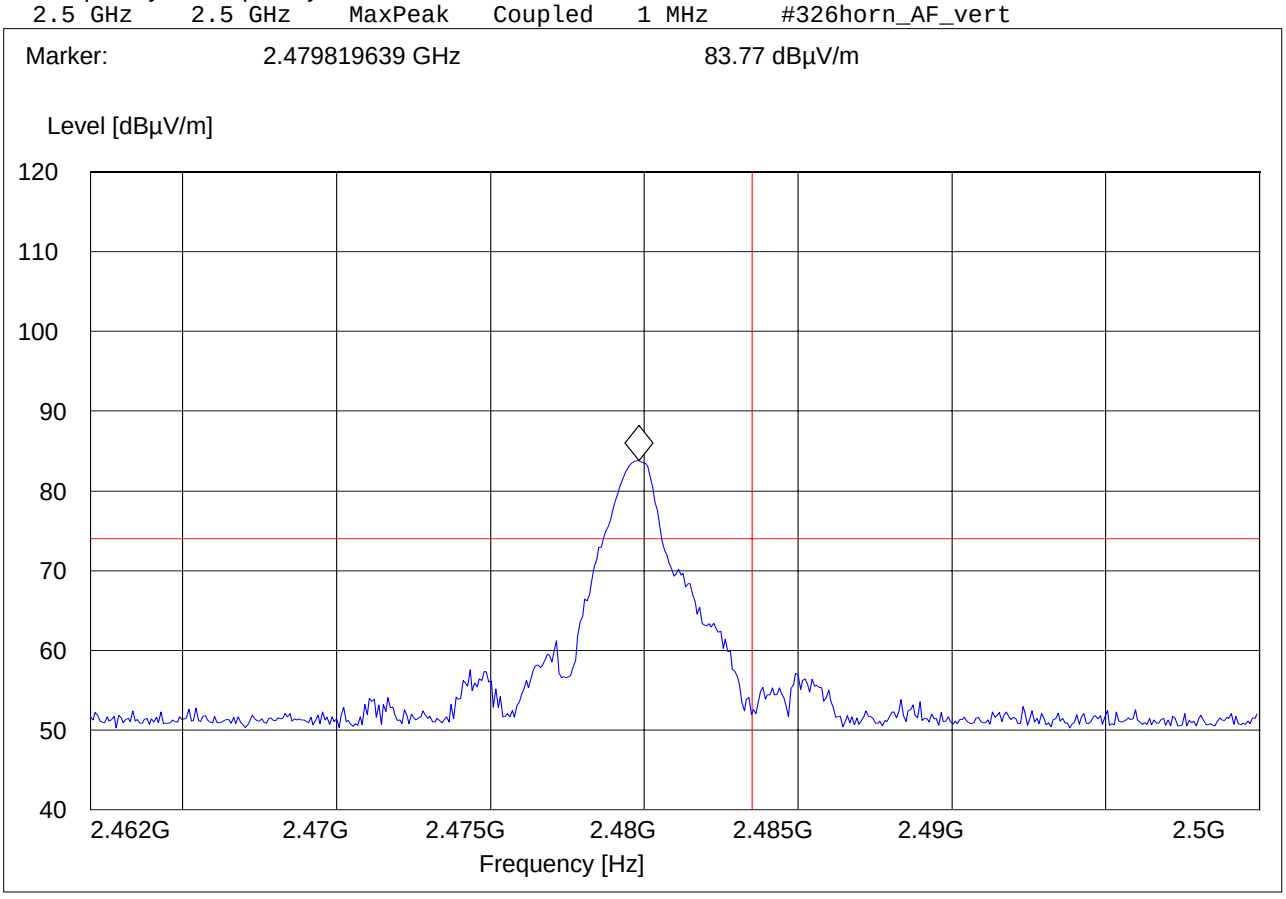
5.2.3 RESULTS (2480MHz)
PEAK

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    BT; CHAN 0, WLAN OFF
Antenna:           V
EUT:               V
Test Engineer:     Ed
Voltage:           AC Adapter w/ USB cable
Sweep:             FCC 15.247 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



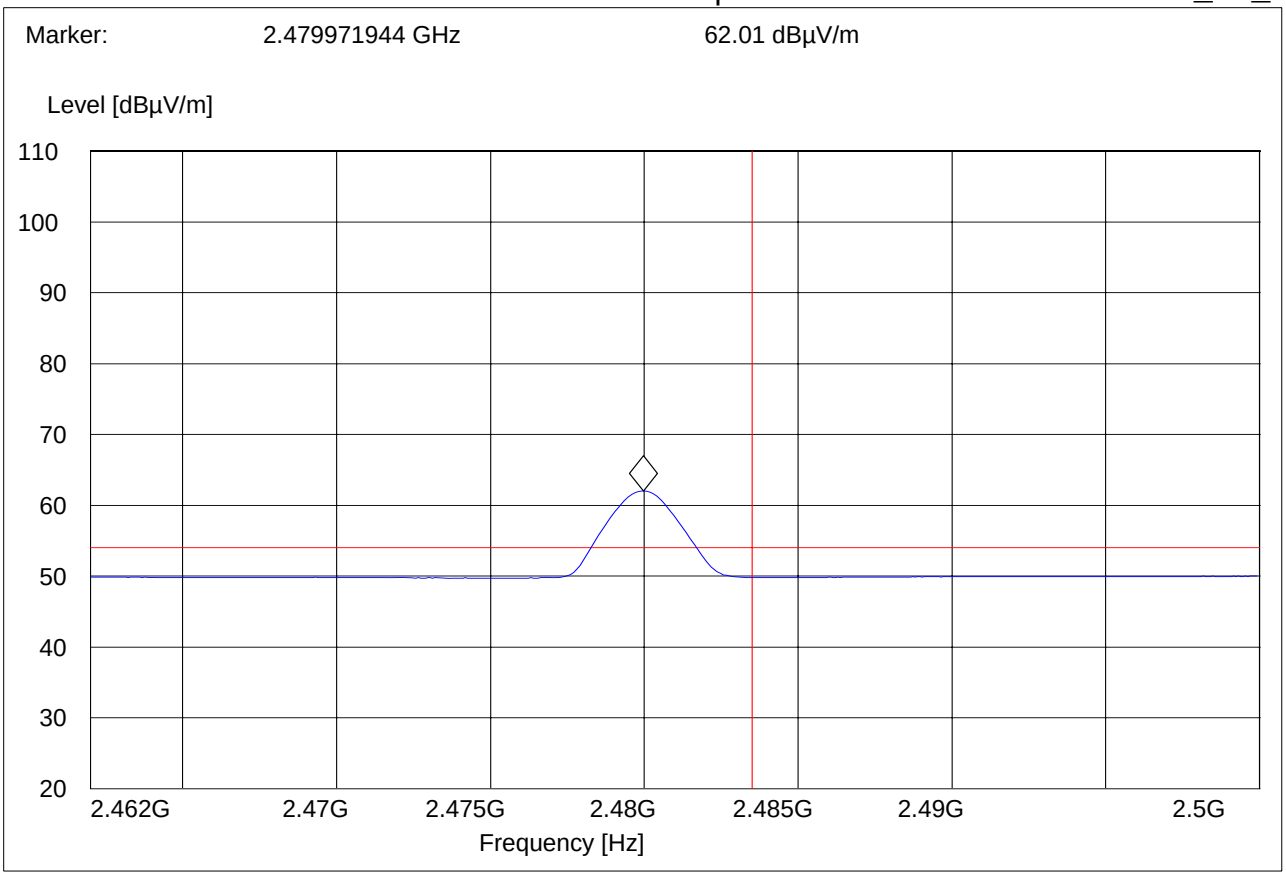
AVG

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    BT; CHAN 0, WLAN OFF, 360 rotation in 90° incr.
Antenna:           V
EUT:               V
Test Engineer:     Ed
Voltage:           AC Adapter w/ USB cable
Sweep:             FCC 15.247 HBE_AVG
```

SWEEP TABLE: "FCC15.247 HBE_AVG"

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



5.3 TRANSMITTER SPURIOUS EMISSIONS RADIATED § 15.247/15.205/15.209

5.3.1 LIMITS

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

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

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

NOTE:
1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.

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

Results for the radiated measurements below 30MHz according § 15.33

Frequency	Measured values	Remarks
9KHz – 30MHz	No emissions found, caused by the EUT	This is valid for all the tested channels

5.3.2 RESULTS

30MHz – 1GHz

Antenna: vertical

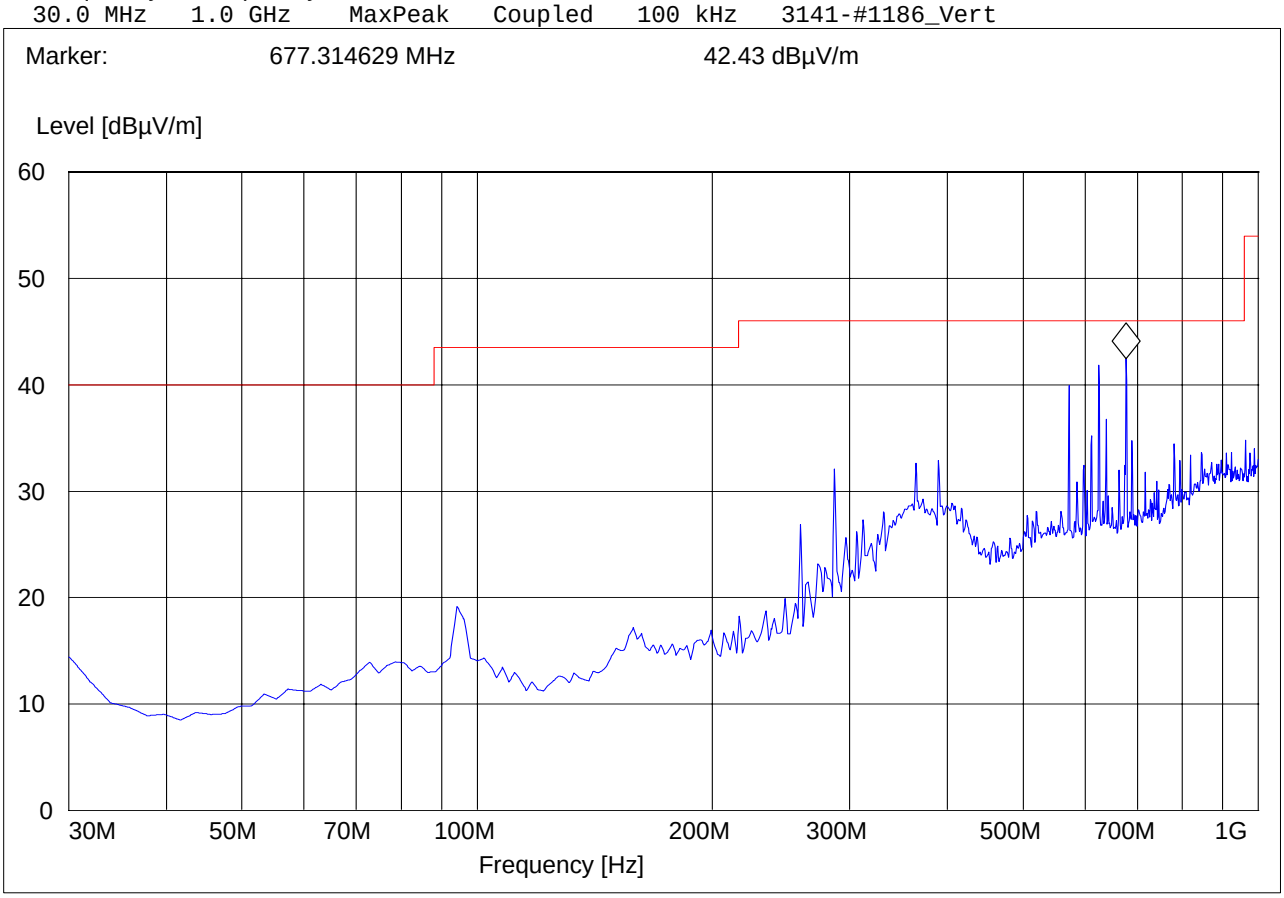
Note: This plot is valid for low, mid, high channels (worst-case plot)

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    BT (ch. 39) + WLAN ch. 6
Antenna:           V
EUT:               V
Test Engineer:     SATYA
Voltage:           Battery
Sweep:             FCC15.247_30M-1G_Ver
```

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

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



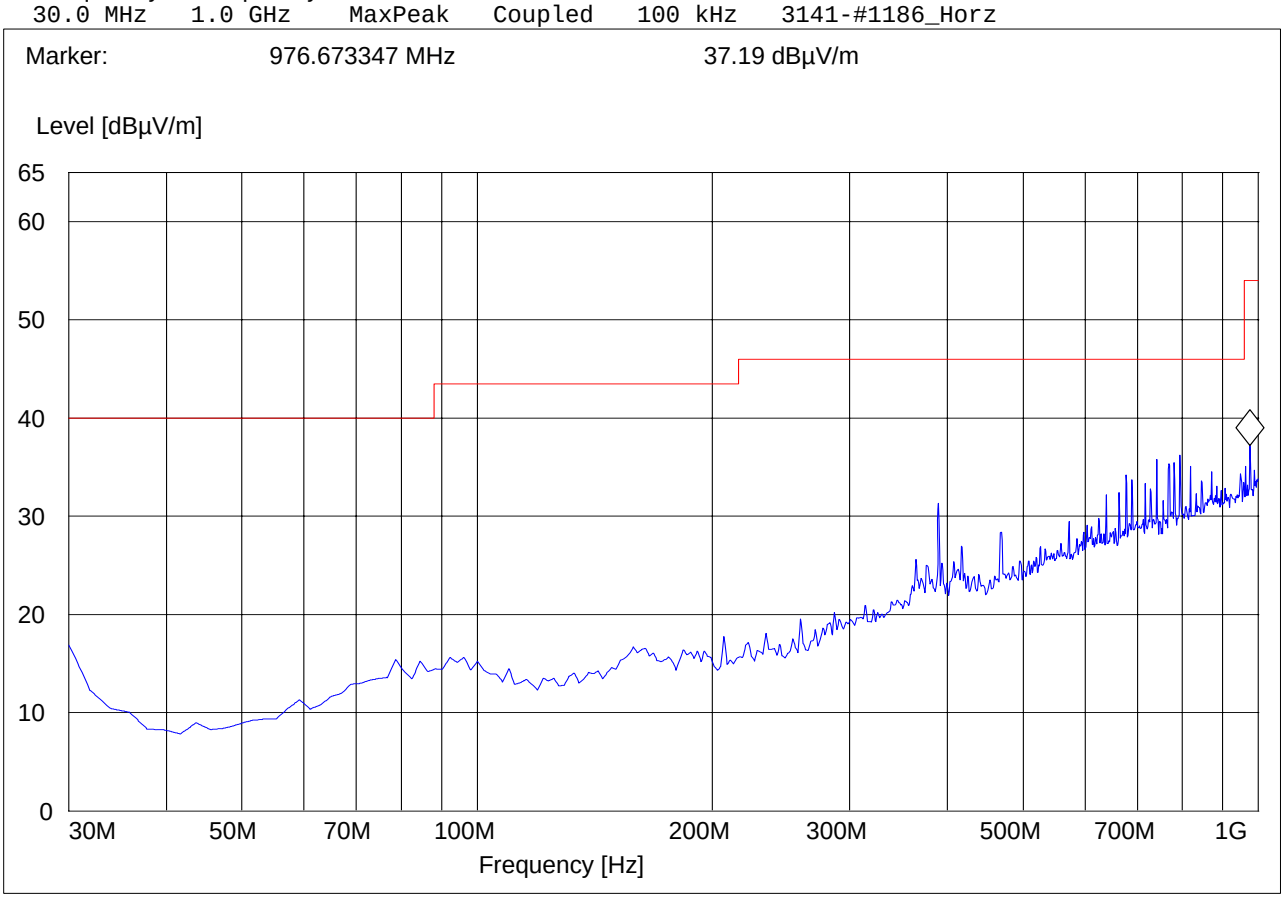
30MHz – 1GHz
Antenna: horizontal
Note: This plot is valid for low, mid, high channels (worst-case plot)

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    BT (ch 39) + WLAN ch. 6
Antenna:           H
EUT:               V
Test Engineer:     SATYA
Voltage:           Battery
Sweep:             FCC15.247_30M-1G_H0R
```

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



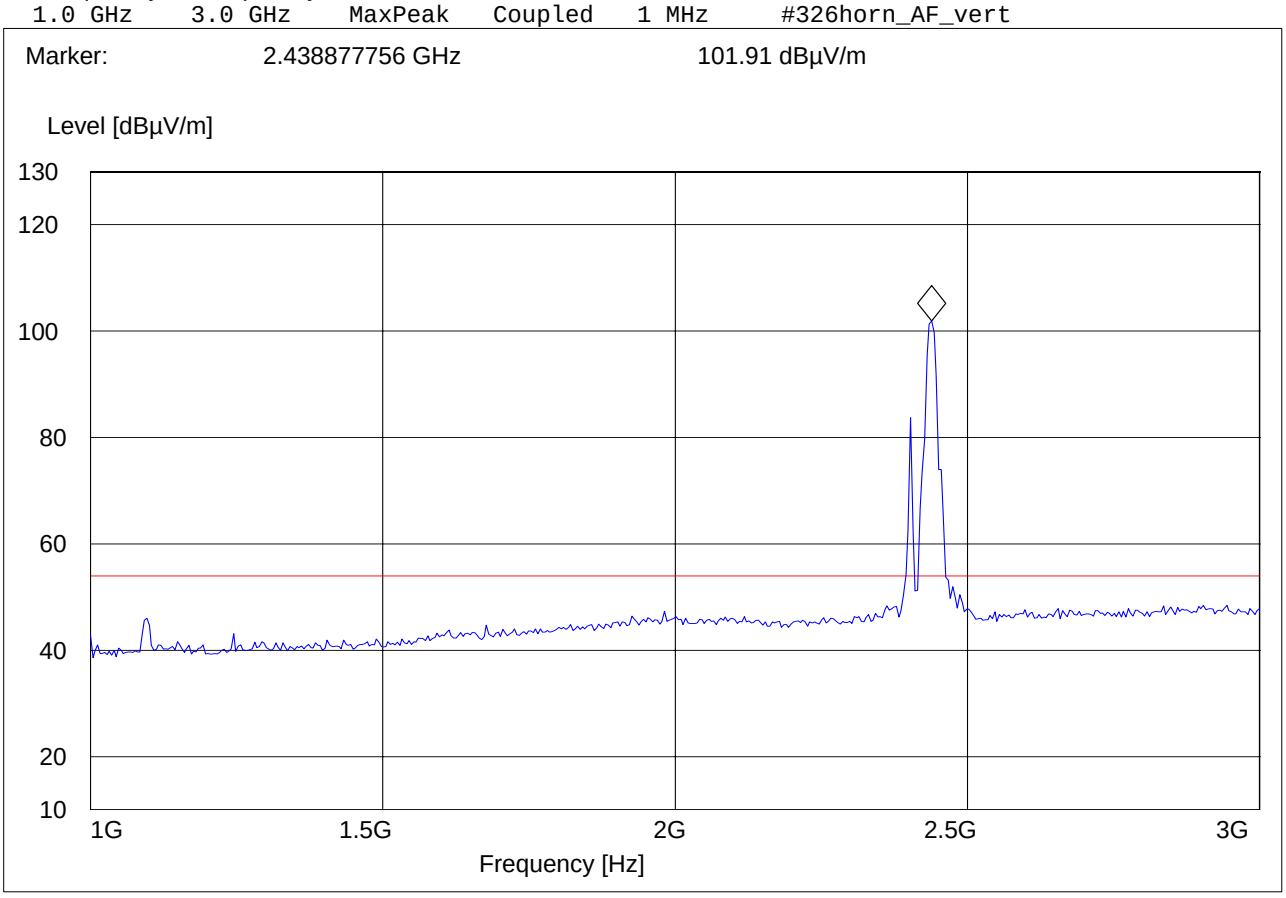
1-3GHz (2402MHz)
Note: The peaks above the limit line is the carrier freq.
Note: Peak Reading vs. Average limit

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    BT (chan. 0)   + WLAN (marker on WLAN ch.6)
Antenna:           V
EUT:               V
Test Engineer:     Ed
Voltage:           AC Adapter
Sweep:             FCC15.247_1-3G
```

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

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



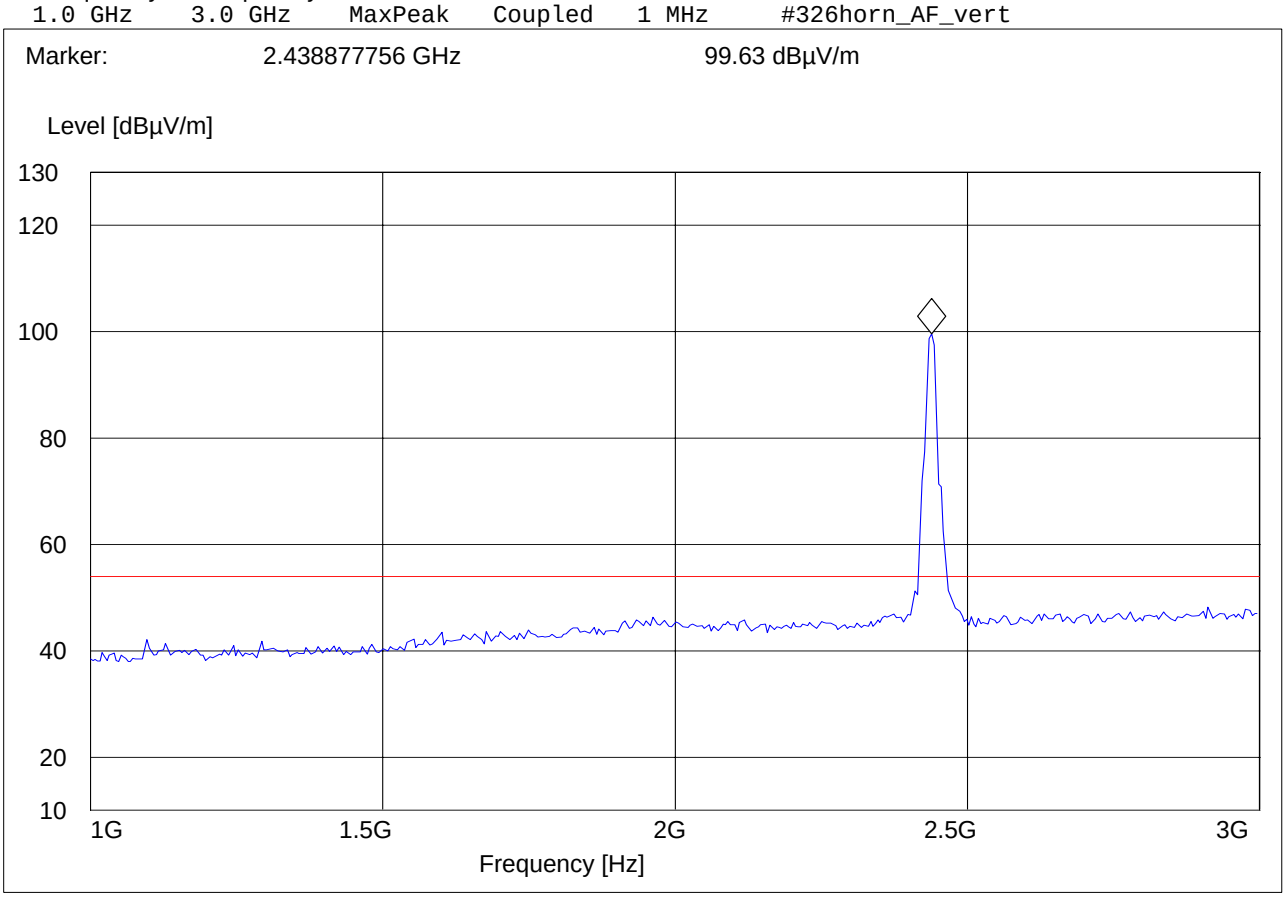
1-3GHz (2441MHz)
Note: The peaks above the limit line is the carrier freq.
Note: Peak Reading vs. Average limit

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    BT(chan. 39) + WLAN (marker on WLAN ch6 + BT)
Antenna:           V
EUT:               V
Test Engineer:     Ed
Voltage:           AC Adapter
Sweep:             FCC15.247_1-3G
```

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

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



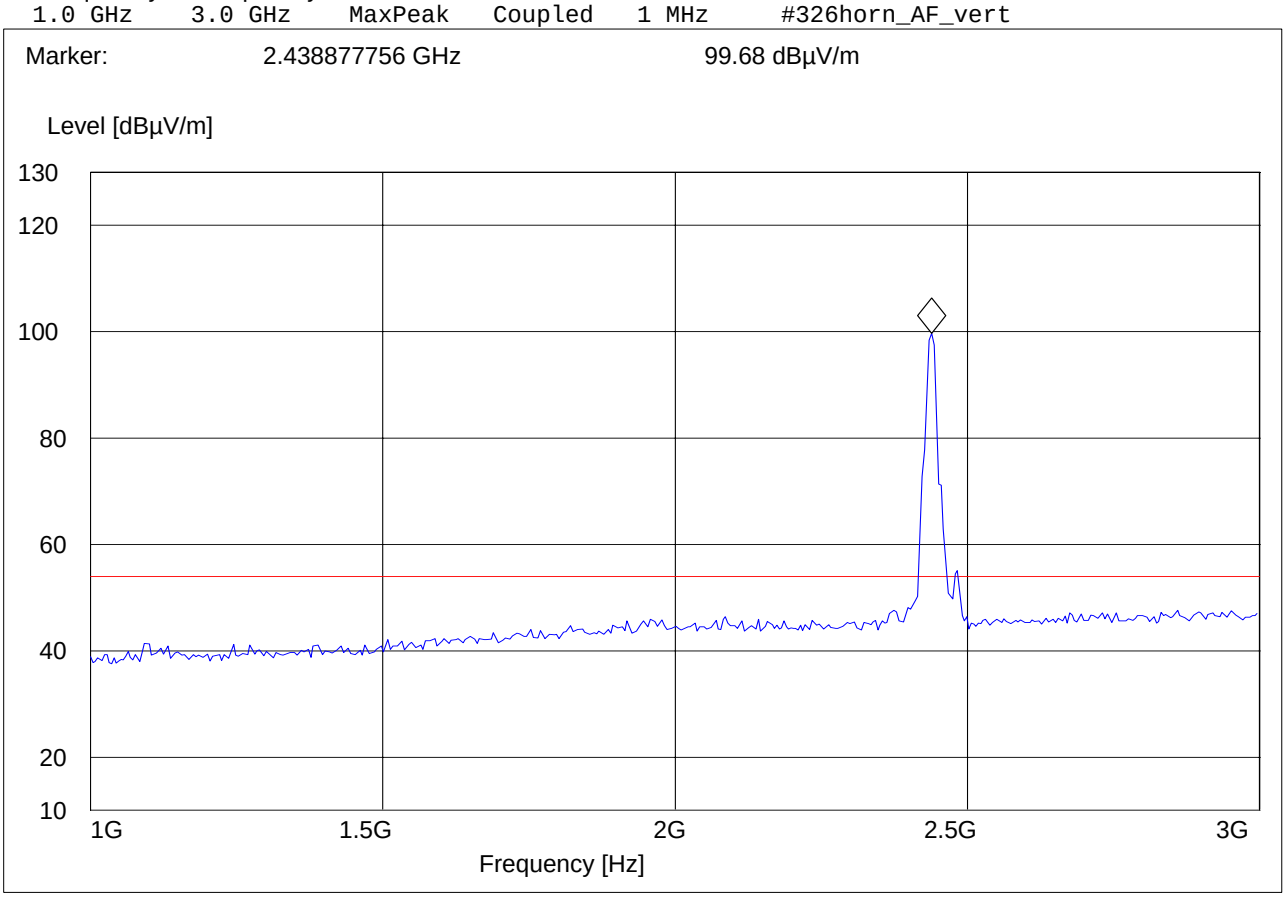
1-3GHz (2480MHz)
Note: The peaks above the limit line is the carrier freq.
Note: Peak Reading vs. Average limit

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

```
EUT / Description:  DOLPHIN 7850
Customer:           HHP
Operating Mode:     BT (chan. 78) + WLAN (marker on WLAN ch. 6, second peak is BT)
Antenna:            V
EUT:                V
Test Engineer:      Ed
Voltage:            AC Adapter
Sweep:              FCC15.247_1-3G
```

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

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



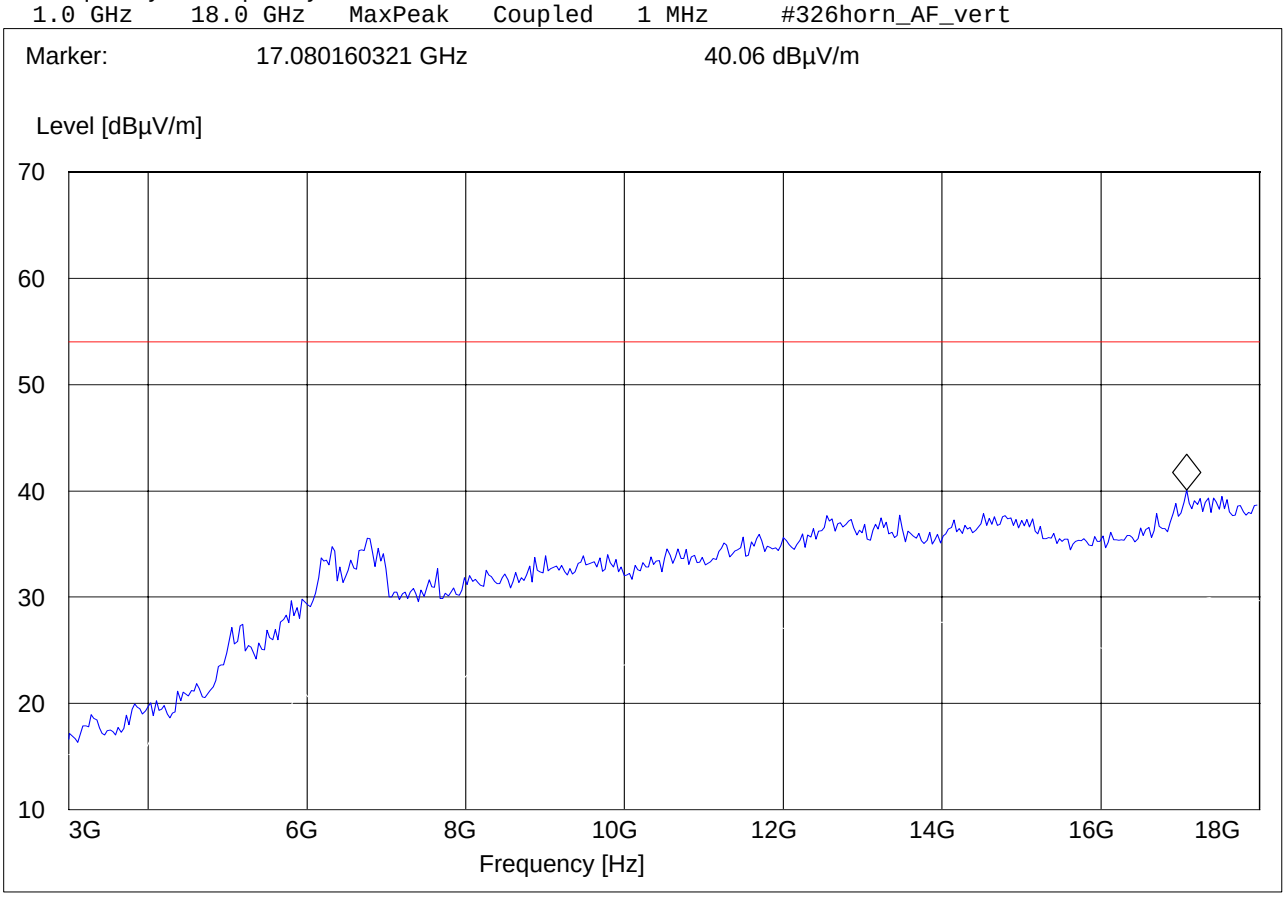
3-18GHz (2402MHz)
Note: Peak Reading vs. Average limit

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    BT (chan. 0) + WLAN (chan. 6)
Antenna:           V
EUT:               V
Test Engineer:     Ed
Voltage:           AC Adapter
Sweep:             FCC15.247_3-18G
```

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

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



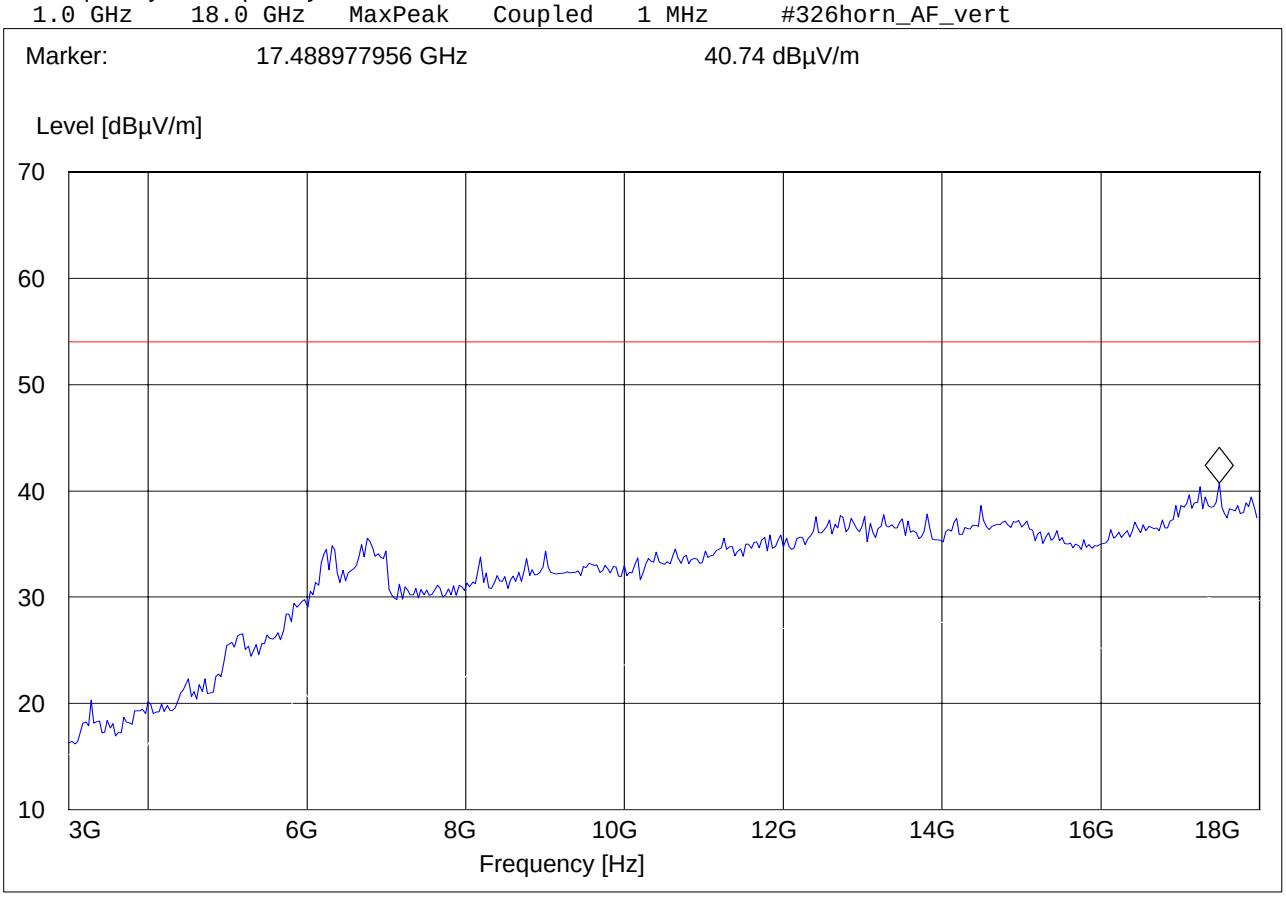
3-18GHz (2441MHz)
Note: Peak Reading vs. Average limit

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    BT (chan. 39) + WLAN (chan. 6)
Antenna:           V
EUT:               V
Test Engineer:     Ed
Voltage:           AC Adapter
Sweep:             FCC15.247_3-18G
```

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

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



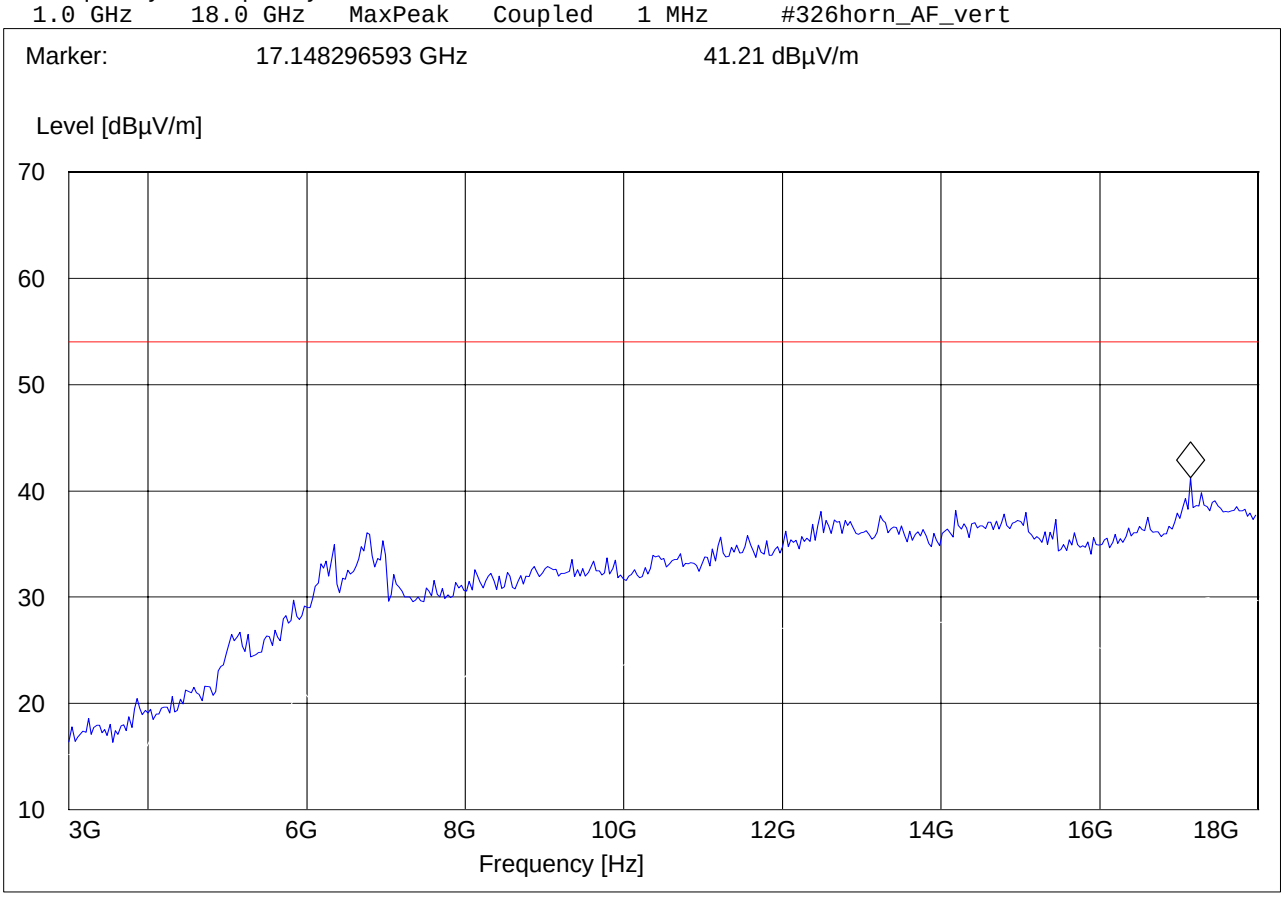
3-18GHz (2480MHz)
Note: Peak Reading vs. Average limit

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

```
EUT / Description:  DOLPHIN 7850
Customer:           HHP
Operating Mode:     BT (chan. 78) + WLAN (chan. 6)
Antenna:            V
EUT:                V
Test Engineer:      Ed
Voltage:            AC Adapter
Sweep:              FCC15.247_3-18G
```

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

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



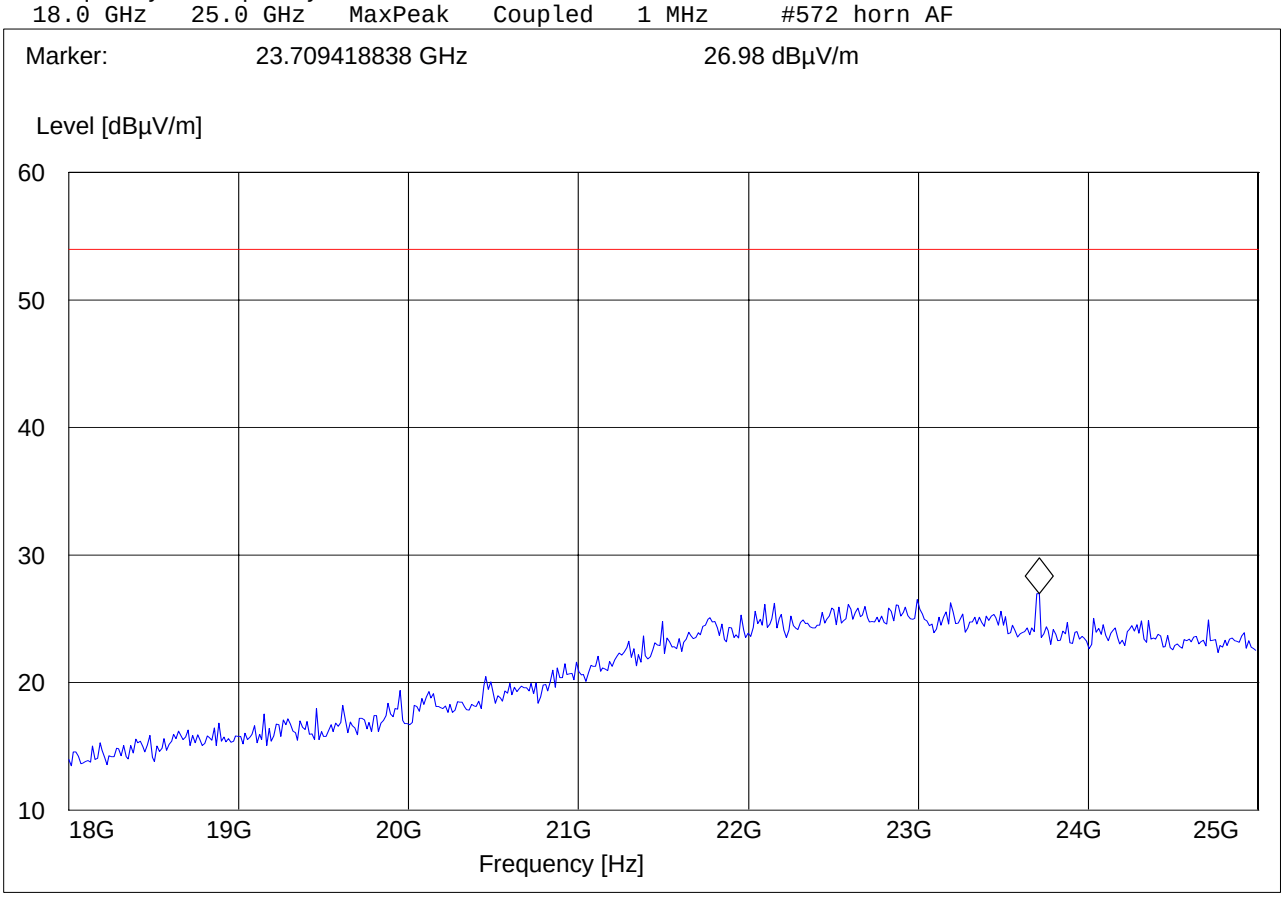
18-25GHz
Note: This plot is valid for low, mid, high channels (worst-case plot)
Note: Peak Reading vs. Average limit

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

```
EUT / Description:  DOLPHIN 7850
Customer:           HHP
Operating Mode:     BT (chan. 0) + WLAN (chan. 6)
Antenna:            V
EUT:                V
Test Engineer:      Ed
Voltage:            AC Adapter
Sweep:              FCC15.247_18-26.5G
```

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
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 (µV/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: horizontal

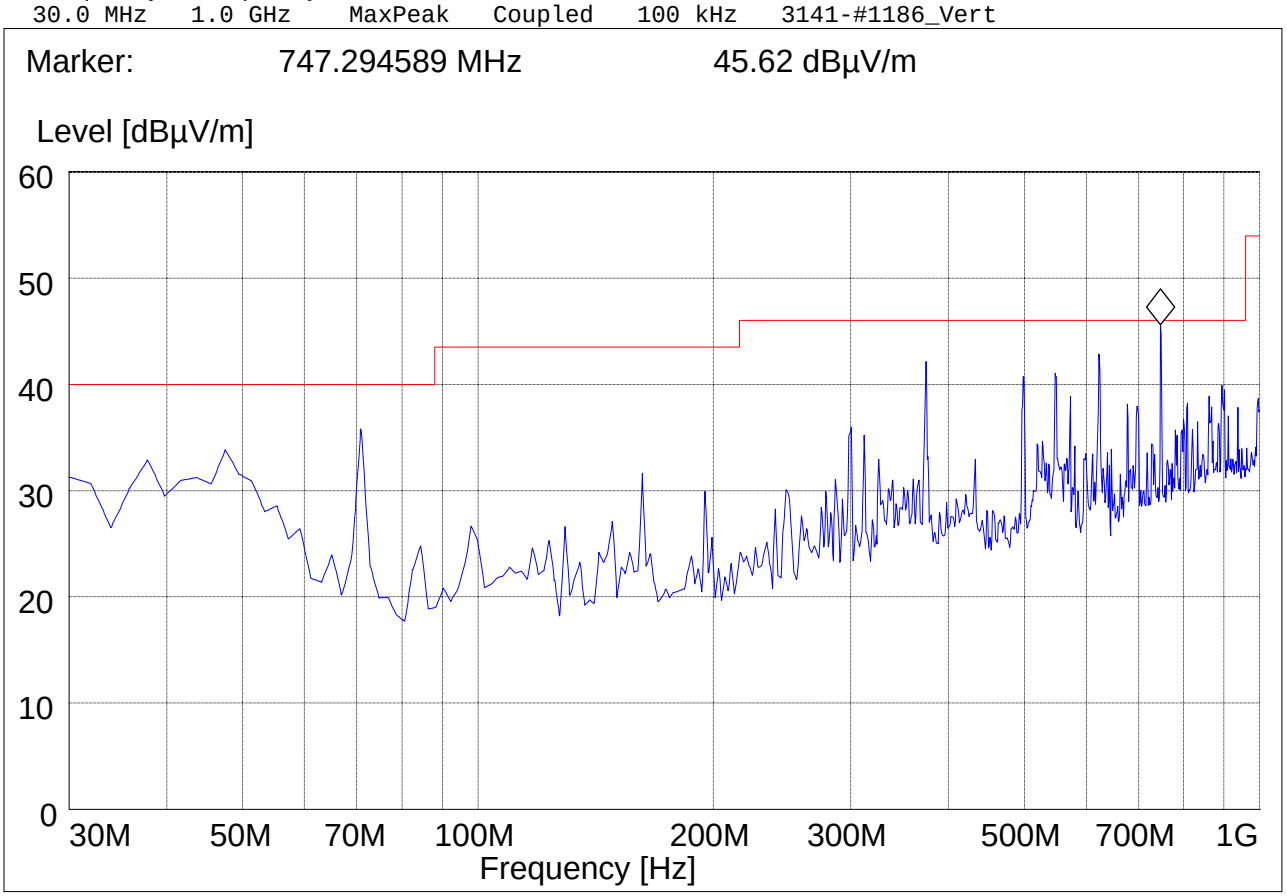
Note: Peak Reading vs. Quasi-peak limit

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    WLAN + BT; Receive mode, 360° rotation
Antenna:           V
EUT:               V
Test Engineer:     Ed
Voltage:           AC Adapter w/ USB cable
Sweep:             Canada RE_30M-1G_Ver
```

SWEEP TABLE: "CANADA RE_30M-1G_Ver"

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

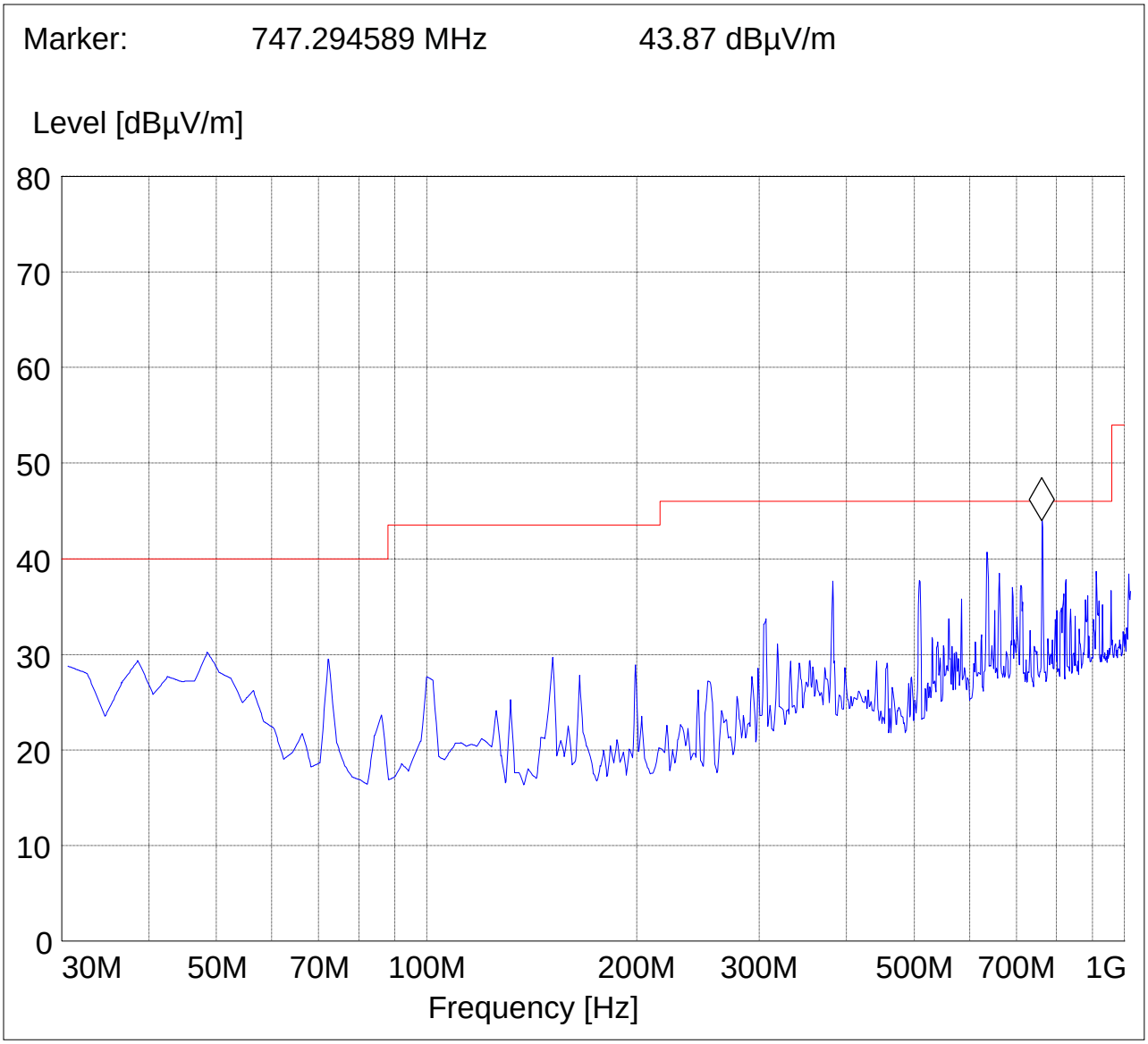


CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT / Description: DOLPHIN 7850
Customer: HHP
Operating Mode: WLAN + BT; Receive mode, 360° rotation
Antenna: H
EUT: V
Test Engineer: Ed
Voltage: AC Adapter w/ USB cable
Sweep: Canada RE_30M-1G_hOR

SWEEP TABLE: "CANDA RE_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_Hor



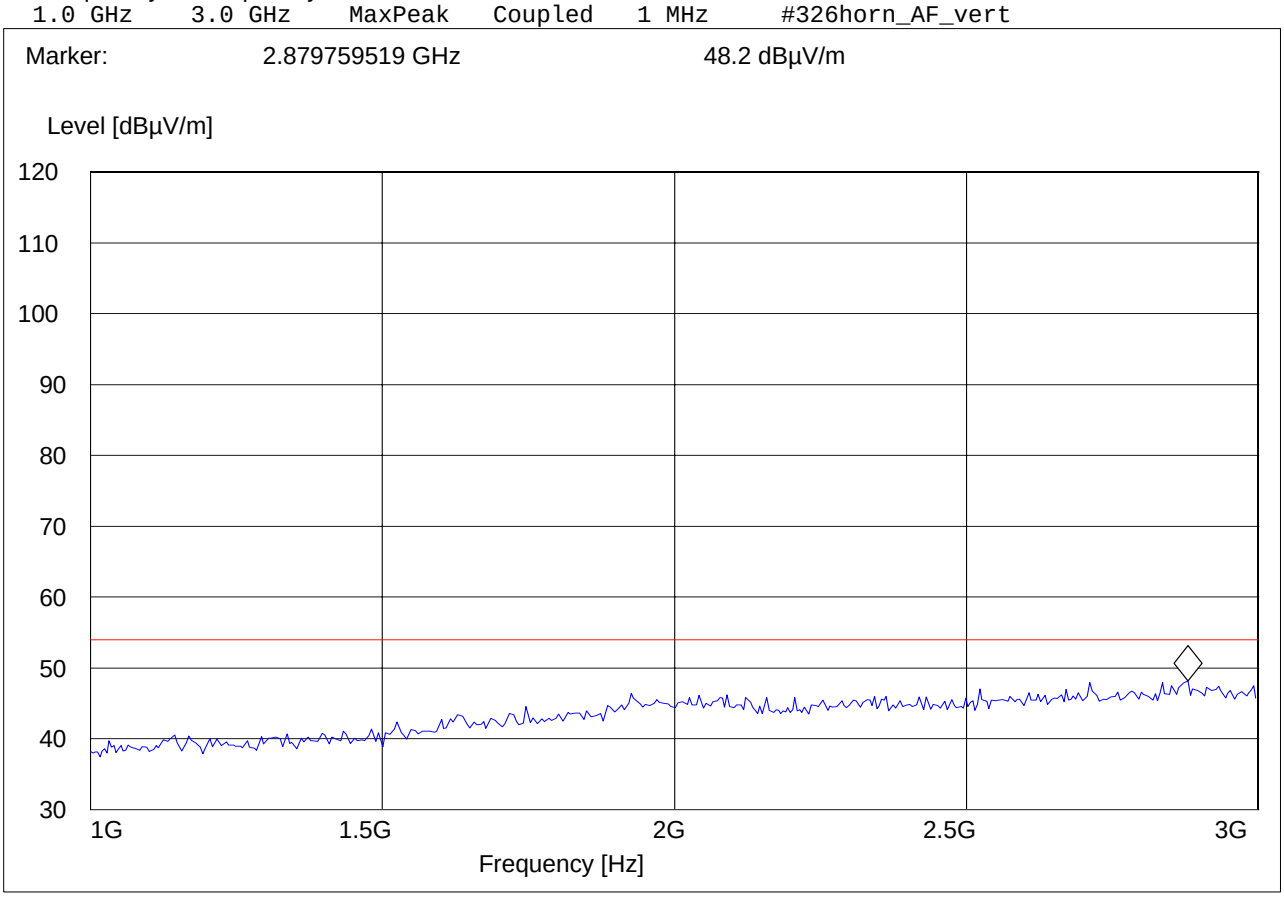
1-3GHz
Note: Peak Reading vs. Average limit

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    WLAN + BT; Receive mode
Antenna:           H
EUT:               V
Test Engineer:     Ed
Voltage:           AC Adapter w/ USB cable
Sweep:             Canada RE_1-3G
```

SWEEP TABLE: "CANADA RE_1-3G"

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

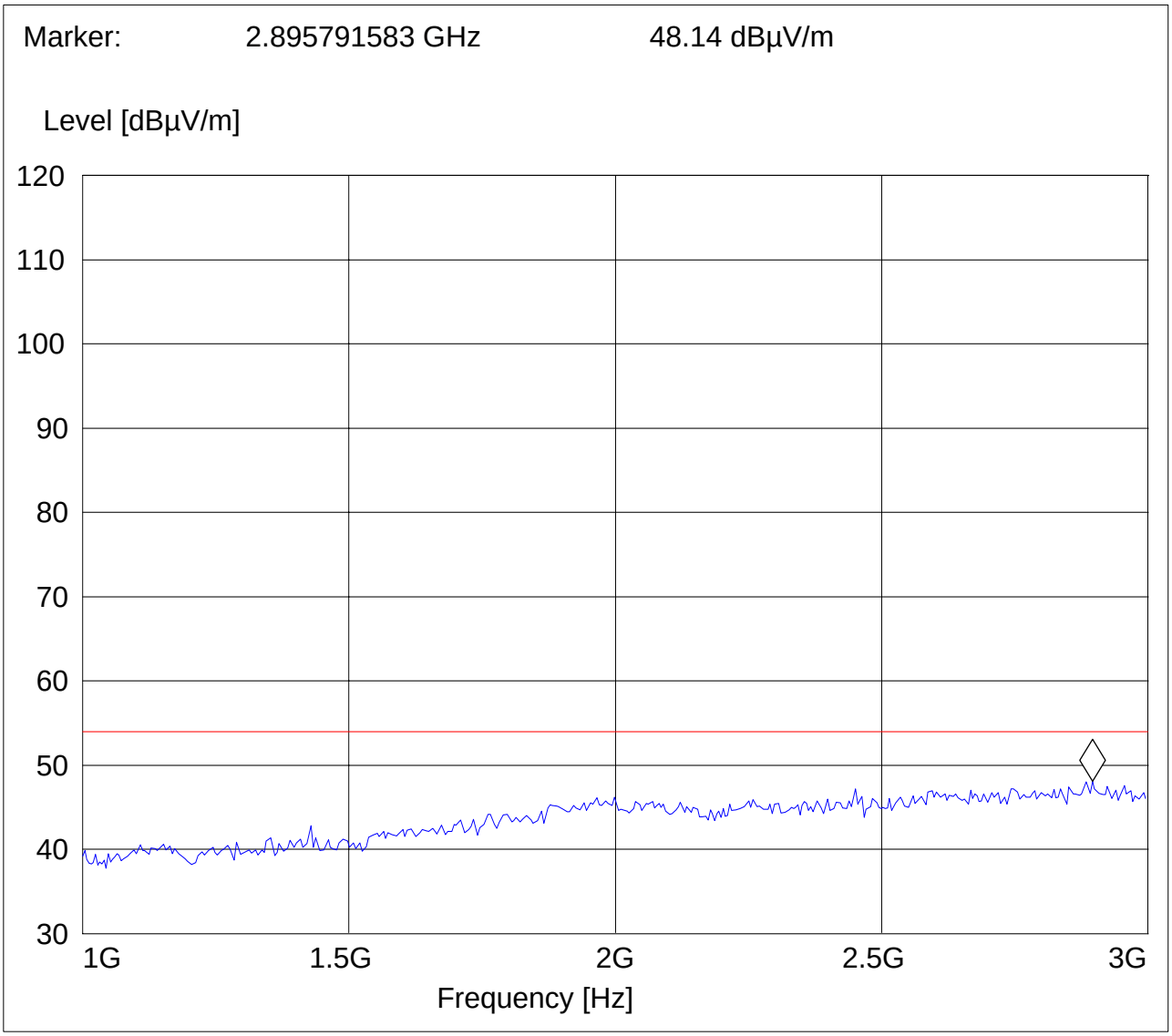


CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT / Description: DOLPHIN 7850
Customer: HHP
Operating Mode: WLAN + BT; Receive mode
Antenna: V
EUT: V
Test Engineer: Ed
Voltage: AC Adapter w/ USB cable
Sweep: Canada RE_3-18G

SWEEP TABLE: "CANADA RE_3-18G"

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



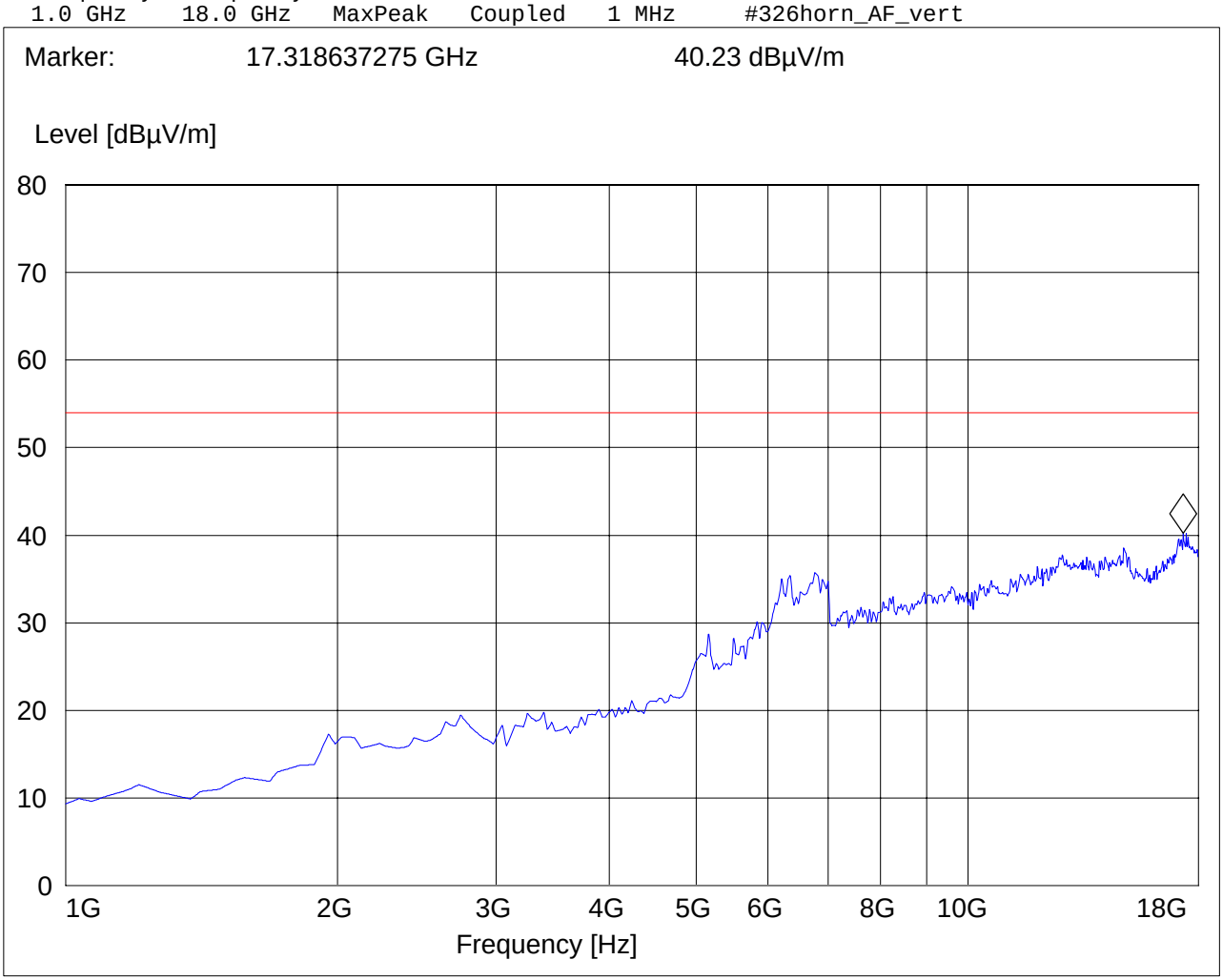
3-18GHz
Note: Peak Reading vs. Average limit

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    WLAN + BT; Receive mode
Antenna:           H
EUT:               V
Test Engineer:     Ed
Voltage:           AC Adapter w/ USB cable
Sweep:             Canada RE_3-18G
```

SWEEP TABLE: "CANADA RE_3-18G"

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

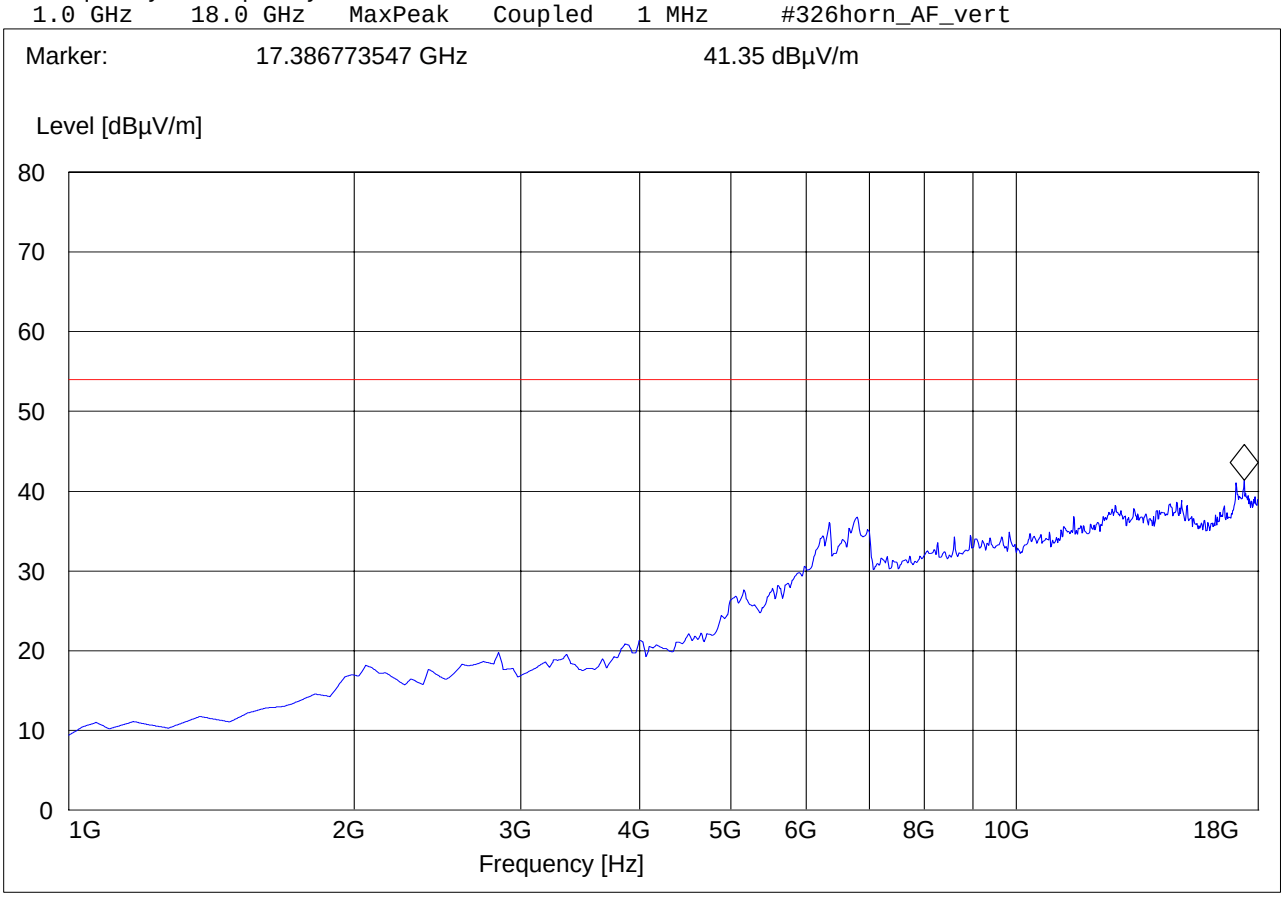


CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT / Description: DOLPHIN 7850
Customer: HHP
Operating Mode: WLAN + BT; Receive mode
Antenna: V
EUT: V
Test Engineer: Ed
Voltage: AC Adapter w/ USB cable
Sweep: Canada RE_3-18G

SWEEP TABLE: "CANADA RE_3-18G"

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



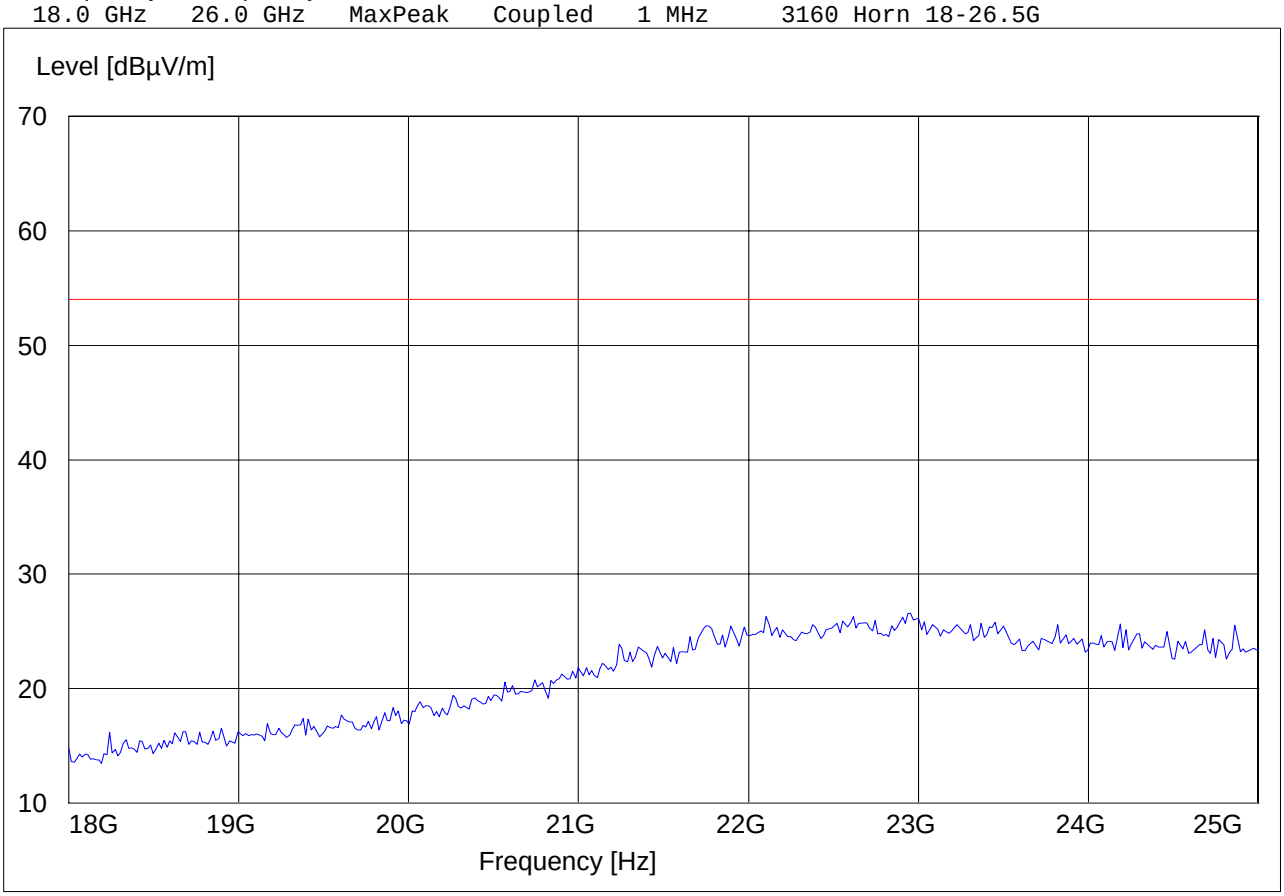
18-25GHz
Note: Peak Reading vs. Average limit

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

```
EUT / Description: DOLPHIN 7850
Customer:          HHP
Operating Mode:    WLAN + BT; Receive mode
Antenna:           V
EUT:               V
Test Engineer:     Ed
Voltage:           AC Adapter w/ USB cable
Sweep:             Canada RE_18-26.5G
```

SWEEP TABLE: "CANADA RE_18-26.5G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	26.0 GHz	MaxPeak	Coupled	1 MHz	3160 Horn 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)

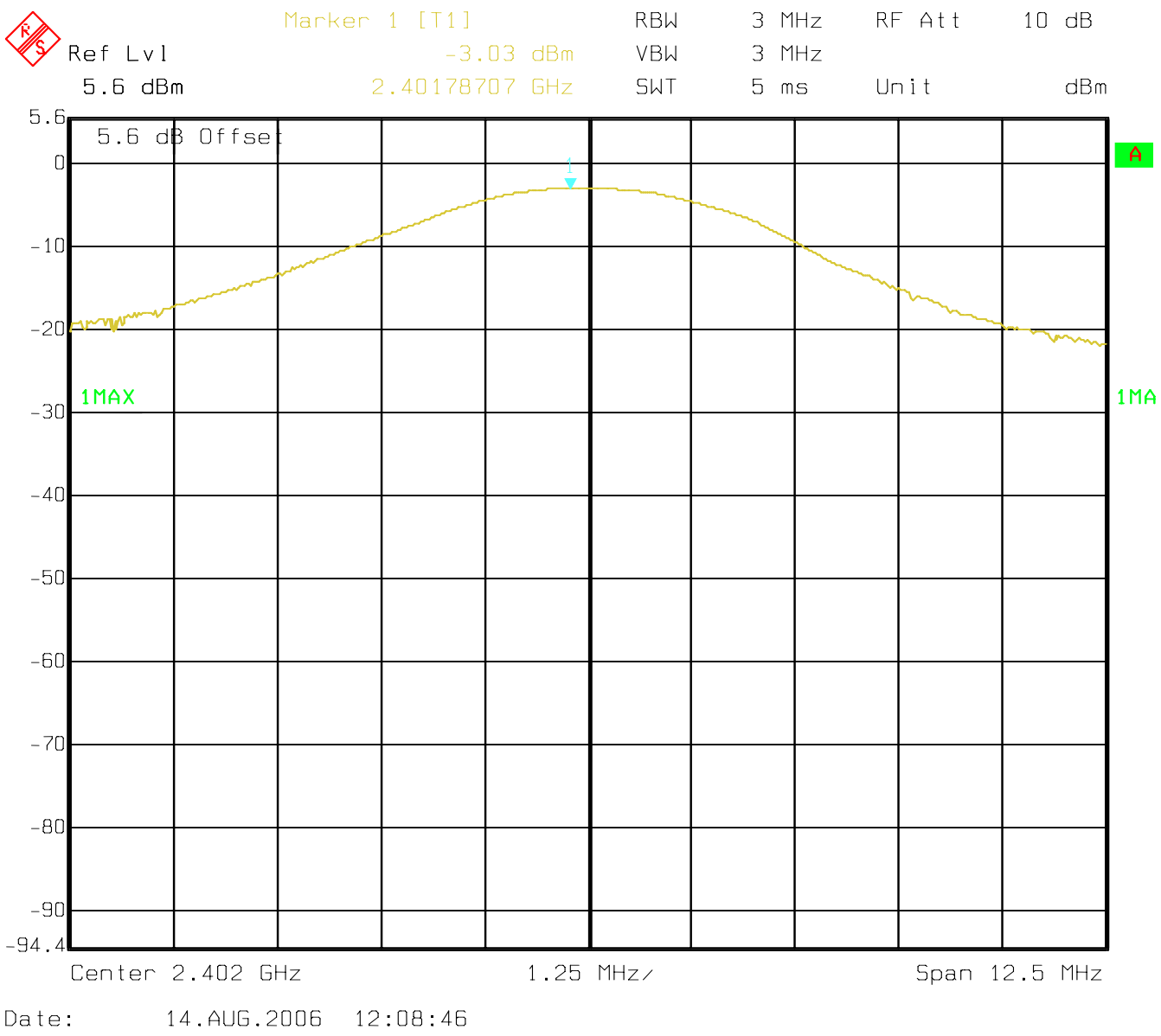
Frequency range	RF power output
2400-2483.5 MHz	30dBm

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

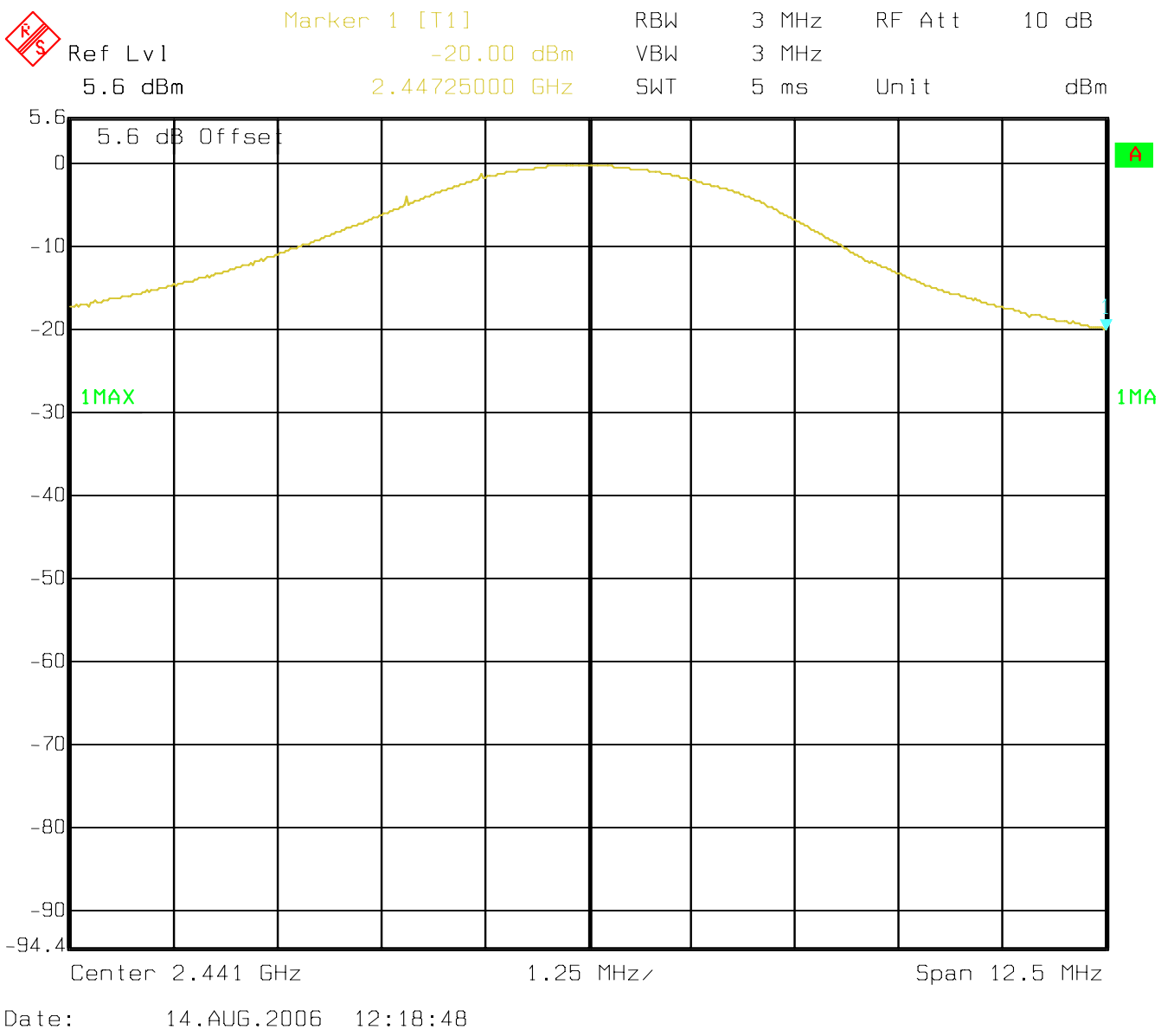
6.1.2 RESULTS:

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T_{nom}(23)°C	V_{nom}VDC	-3.03	0	-4.33

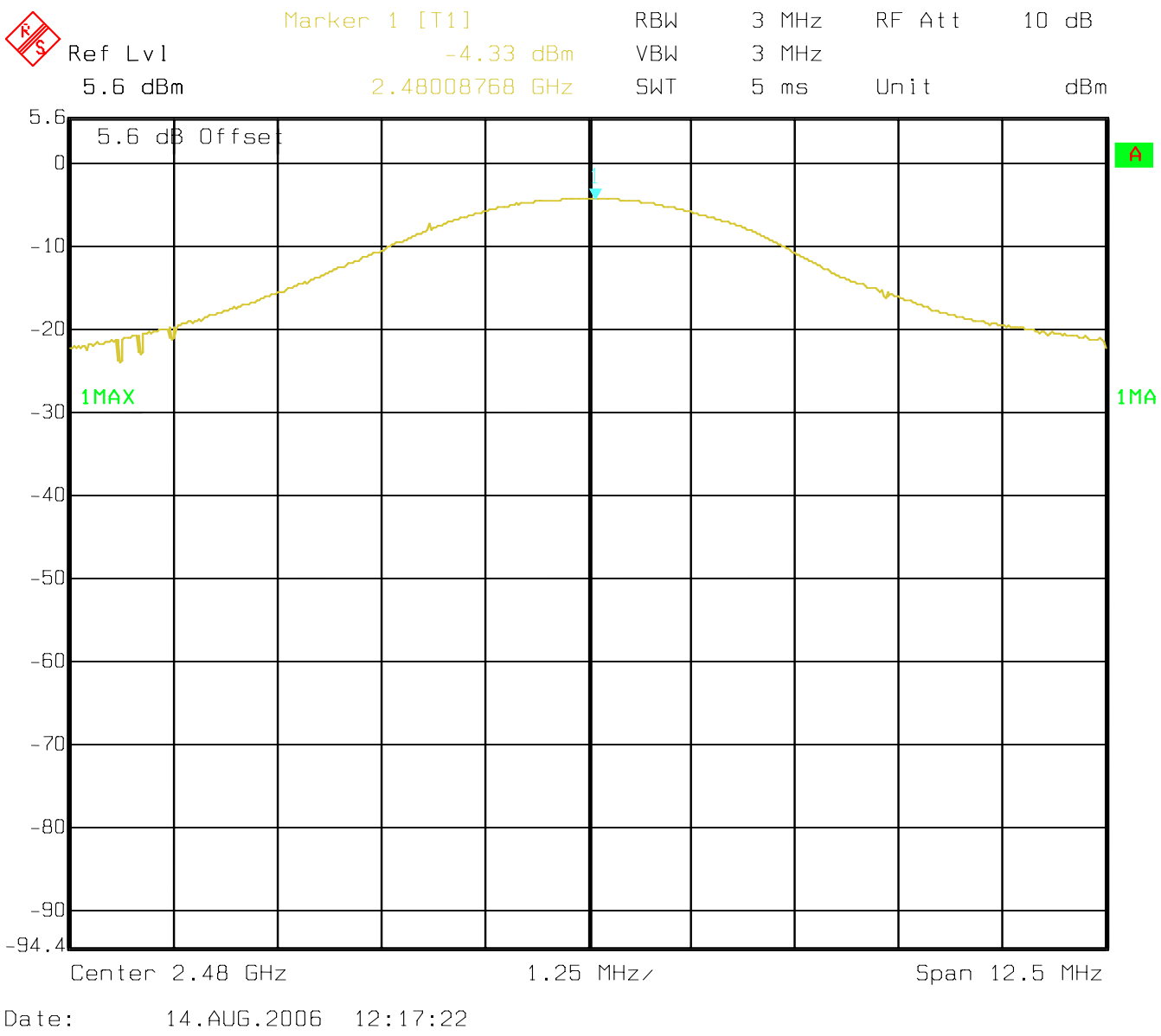
(2402 MHz)


Marker 1 [T1]
-3.03 dBm
2.40178707 GHz
RBW 3 MHz
VBW 3 MHz
SWT 5 ms
RF Att 10 dB
Unit dBm
Ref Lvl
5.6 dBm
5.6 dB Offset
5.6
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-94.4
1MAX
1MA
A
Center 2.402 GHz
1.25 MHz/
Span 12.5 MHz
Date: 14.AUG.2006 12:08:46

(2441 MHz)


Marker 1 [T1]
-20.00 dBm
2.44725000 GHz
RBW 3 MHz
VBW 3 MHz
SWT 5 ms
RF Att 10 dB
Unit dBm
Ref Lvl
5.6 dBm
5.6 dB Offset
5.6
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-94.4
1MAX
1MA
A
Center 2.441 GHz
1.25 MHz/
Span 12.5 MHz
Date: 14.AUG.2006 12:18:48

(2480 MHz)


Marker 1 [T1]
-4.33 dBm
2.48008768 GHz
RBW 3 MHz
VBW 3 MHz
SWT 5 ms
RF Att 10 dB
Unit dBm
Ref Lvl
5.6 dBm
5.6 dB Offset
5.6
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-94.4
1MAX
1MA
A
Center 2.48 GHz
1.25 MHz/
Span 12.5 MHz
Date: 14.AUG.2006 12:17:22

6.2 20dB BANDWIDTH

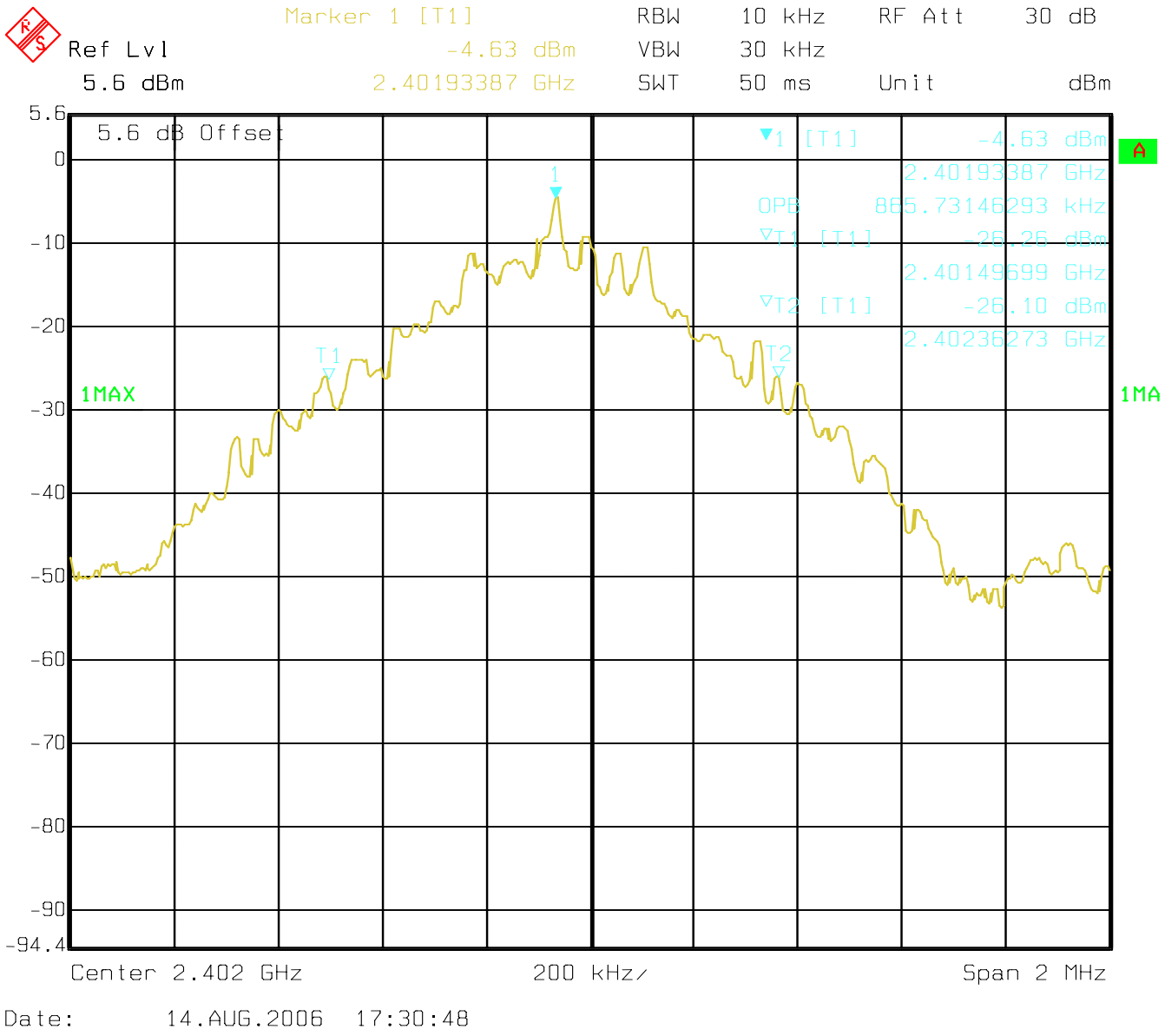
6.2.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)

NUMBER OF CHANNELS	BANDWIDTH
79	<1MHz

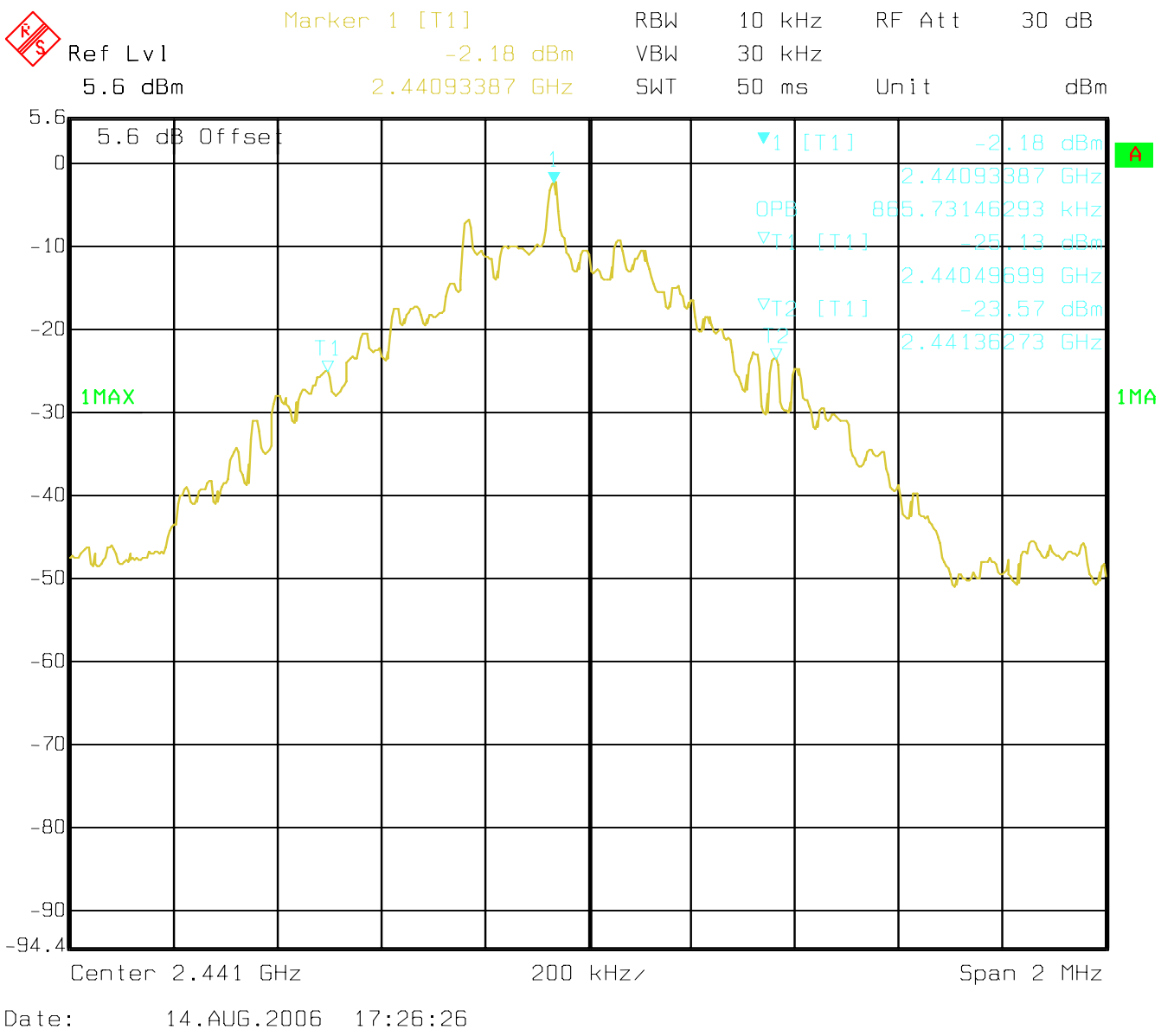
6.2.2 RESULTS:

TEST CONDITIONS		BANDWIDTH (KHz)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T_{nom}(23)°C	V_{nom}VDC	865.7	865.7	881.8

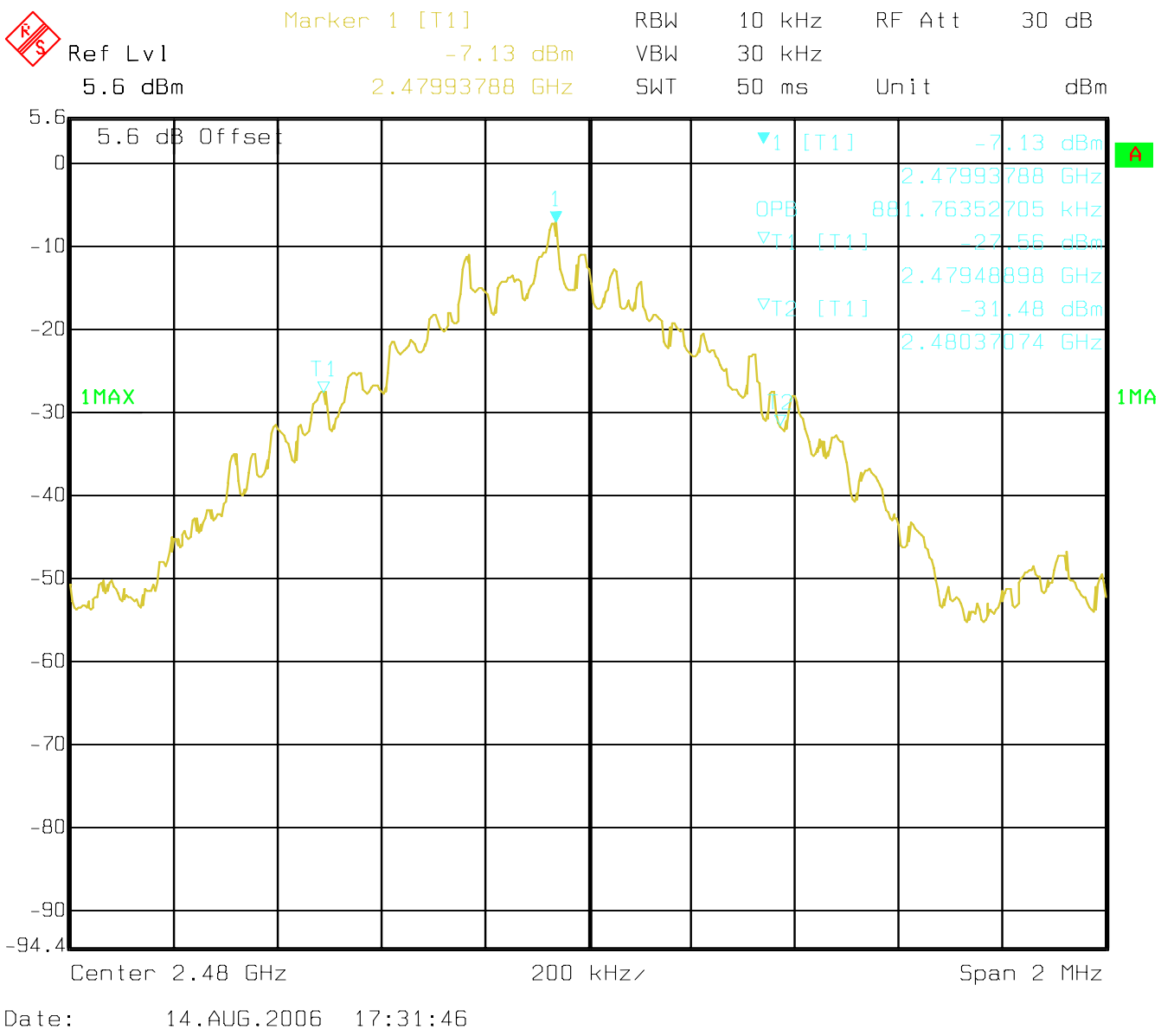
(2402 MHz)


Marker 1 [T1]
Ref Lvl
5.6 dBm
-4.63 dBm
2.40193387 GHz
RBW 10 kHz
VBW 30 kHz
SWT 50 ms
RF Att 30 dB
Unit dBm
5.6 dB Offset
1 [T1] -4.63 dBm
2.40193387 GHz
OPB 865.73146293 kHz
T1 [T1] -26.26 dBm
2.40149699 GHz
T2 [T1] -26.10 dBm
2.40236273 GHz
1MAX
1MA
A
5.6
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-94.4
Center 2.402 GHz
200 kHz/
Span 2 MHz
Date: 14.AUG.2006 17:30:48

(2441 MHz)


Marker 1 [T1]
Ref Lvl
5.6 dBm
-2.18 dBm
2.44093387 GHz
RBW 10 kHz
VBW 30 kHz
SWT 50 ms
RF Att 30 dB
Unit dBm
5.6 dB Offset
1 [T1] -2.18 dBm
2.44093387 GHz
OPB 865.73146293 kHz
T1 [T1] -25.13 dBm
2.44049699 GHz
T2 [T1] -23.57 dBm
2.44136273 GHz
1MAX
1MA
A
5.6
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-94.4
Center 2.441 GHz
200 kHz/
Span 2 MHz
Date: 14.AUG.2006 17:26:26

(2480 MHz)


Marker 1 [T1]
Ref Lvl
5.6 dBm
-7.13 dBm
2.47993788 GHz
RBW 10 kHz
VBW 30 kHz
SWT 50 ms
RF Att 30 dB
Unit dBm
5.6 dB Offset
1 [T1] -7.13 dBm
2.47993788 GHz
OPB 881.76352705 kHz
T1 [T1] -27.56 dBm
2.47948898 GHz
T2 [T1] -31.48 dBm
2.48037074 GHz
1MAX
1MA
A
5.6
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-94.4
Center 2.48 GHz
200 kHz/
Span 2 MHz
Date: 14.AUG.2006 17:31:46

6.3 CARRIER FREQUENCY SEPARATION

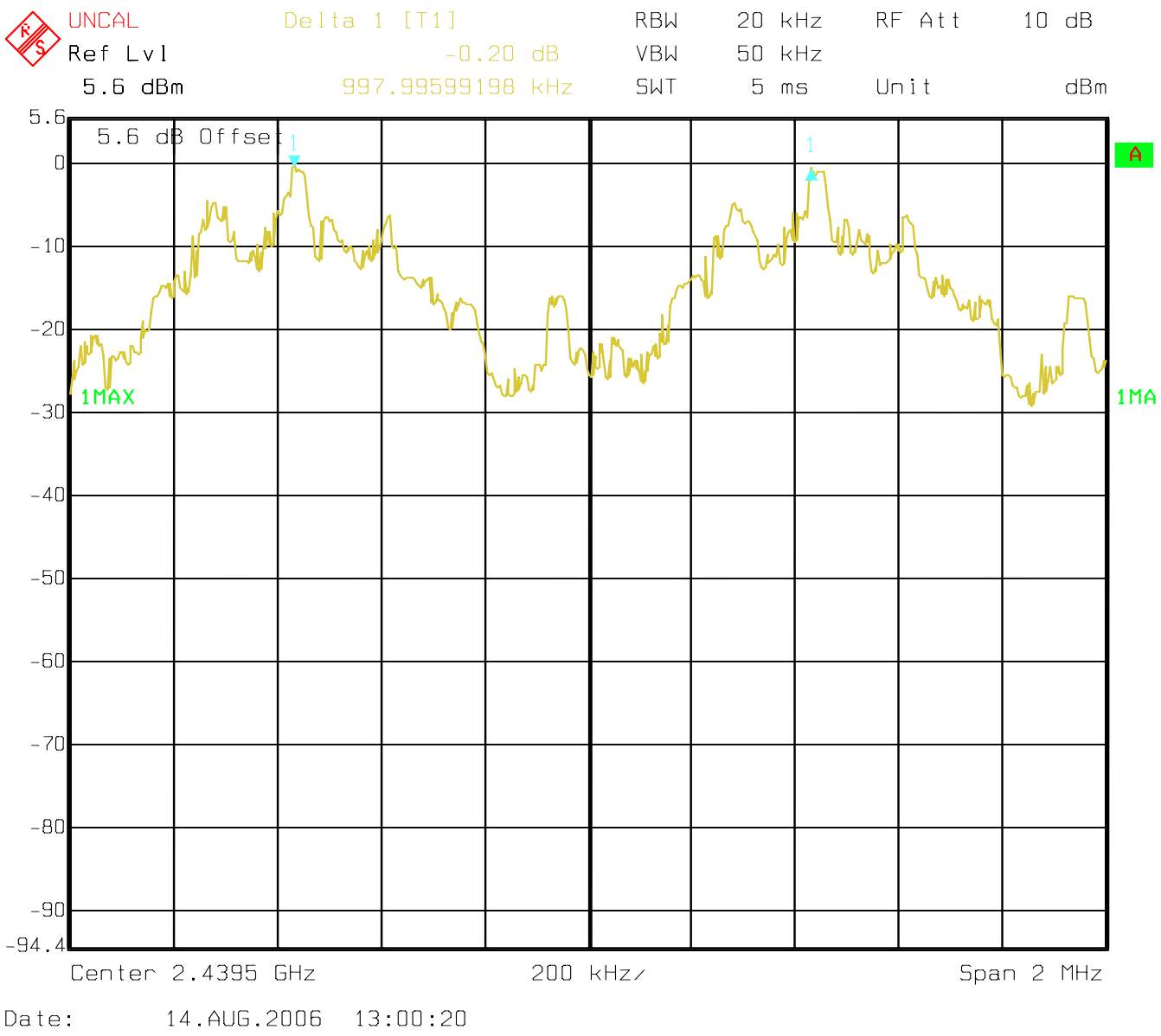
6.3.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)

SEPARATION
> 25 KHz or > 20 dB BANDWIDTH

6.3.2 RESULTS:

TEST CONDITIONS		SEPARATION (MHz)
T_{nom}(23)°C	V_{nom}VDC	0.998

(plot)


UNCAL
Delta 1 [T1]
RBW 20 kHz
RF Att 10 dB
Ref Lvl
-0.20 dB
VBW 50 kHz
5.6 dBm
997.99599198 kHz
SWT 5 ms
Unit dBm
5.6 dB Offset
5.6
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-94.4
1MAX
1MA
A
Center 2.4395 GHz
200 kHz/
Span 2 MHz
Date: 14.AUG.2006 13:00:20

6.4 NUMBER OF HOPPING CHANNELS

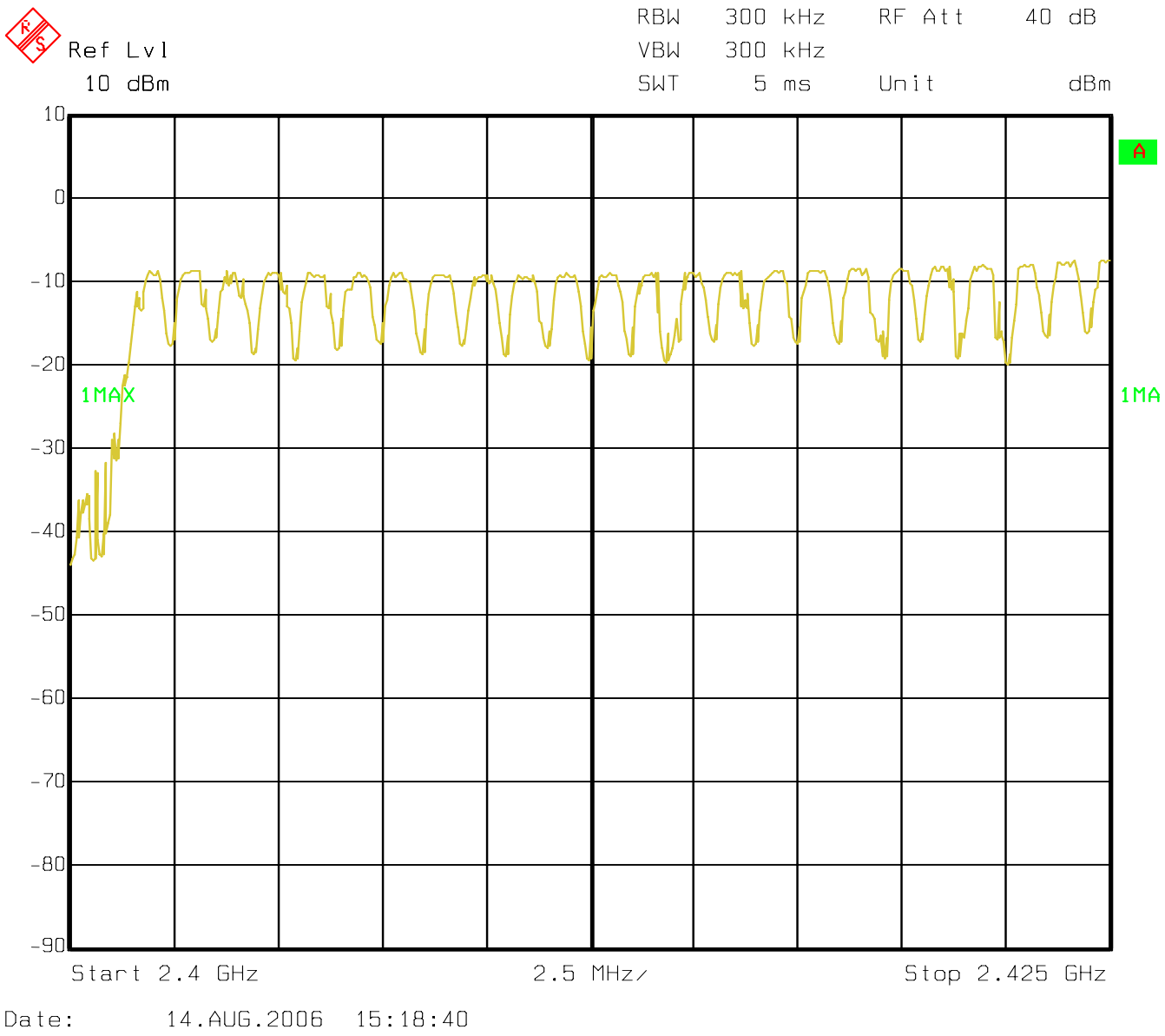
6.4.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (iii)

NUMBER OF CHANNELS
> 15

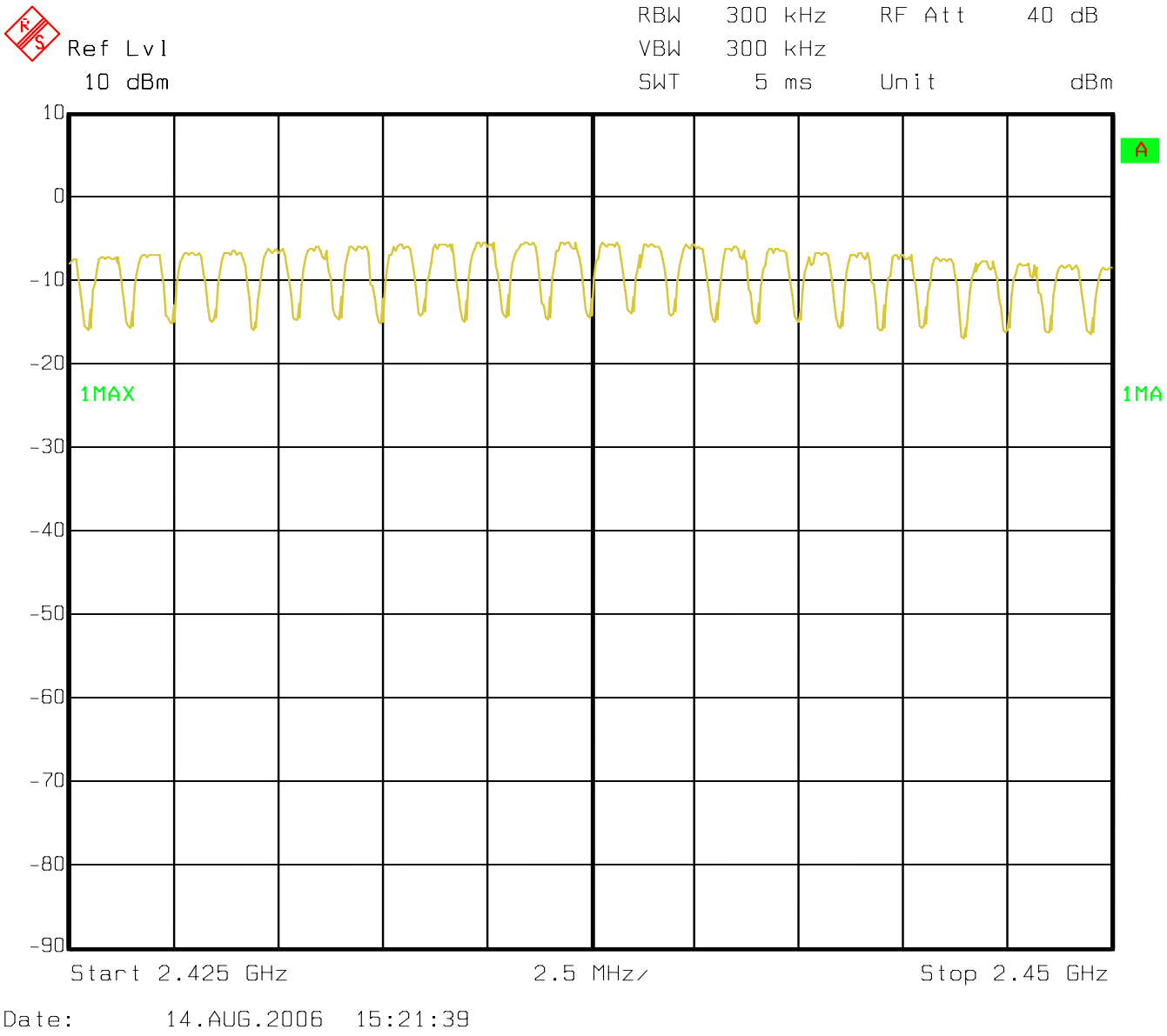
6.4.2 RESULTS:

TEST CONDITIONS		NUMBER OF CHANNELS
T_{nom}(23)°C	V_{nom}VDC	79

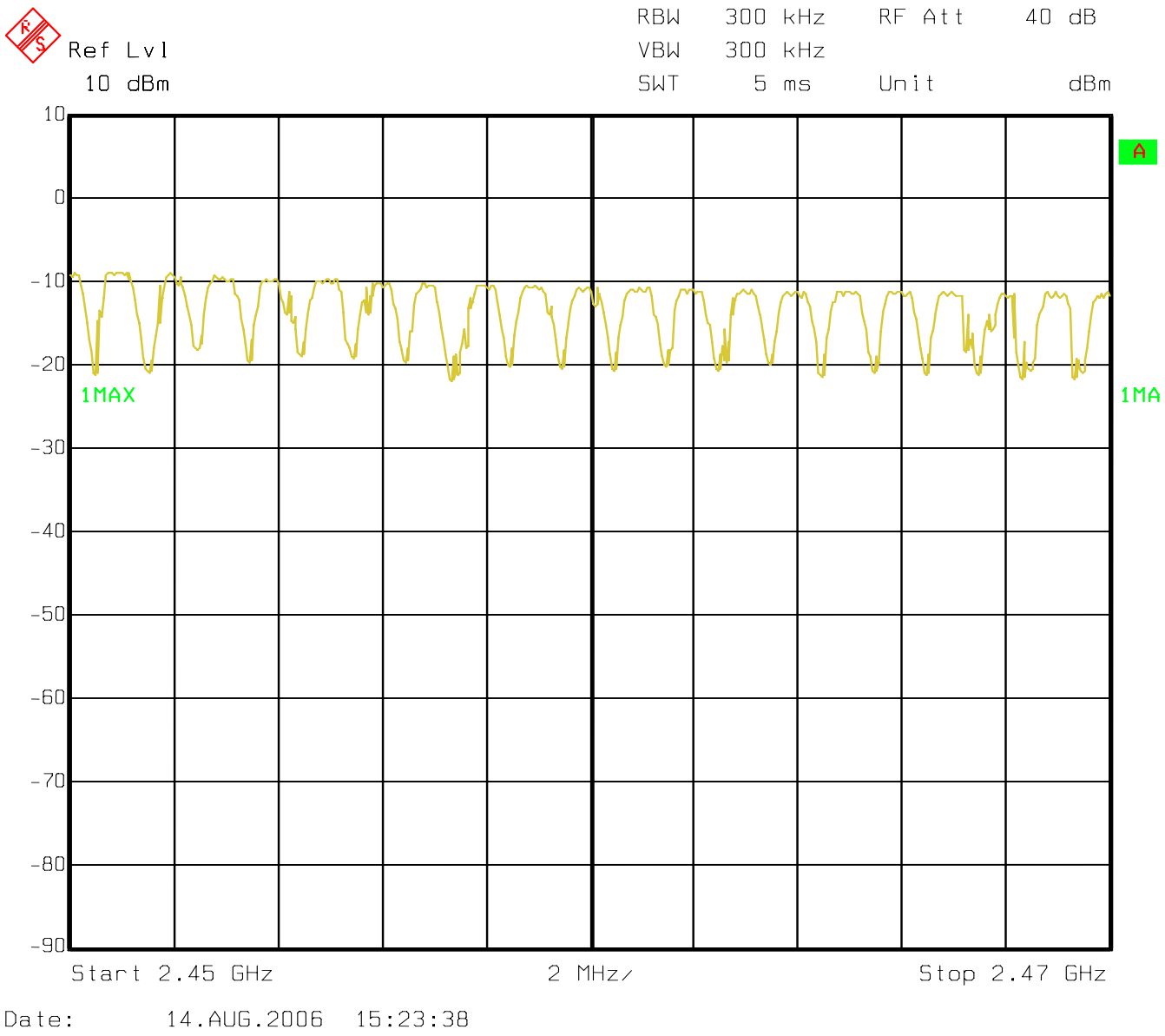
(PLOT 1)
(F1-F2=2402MHz to 2425MHz)



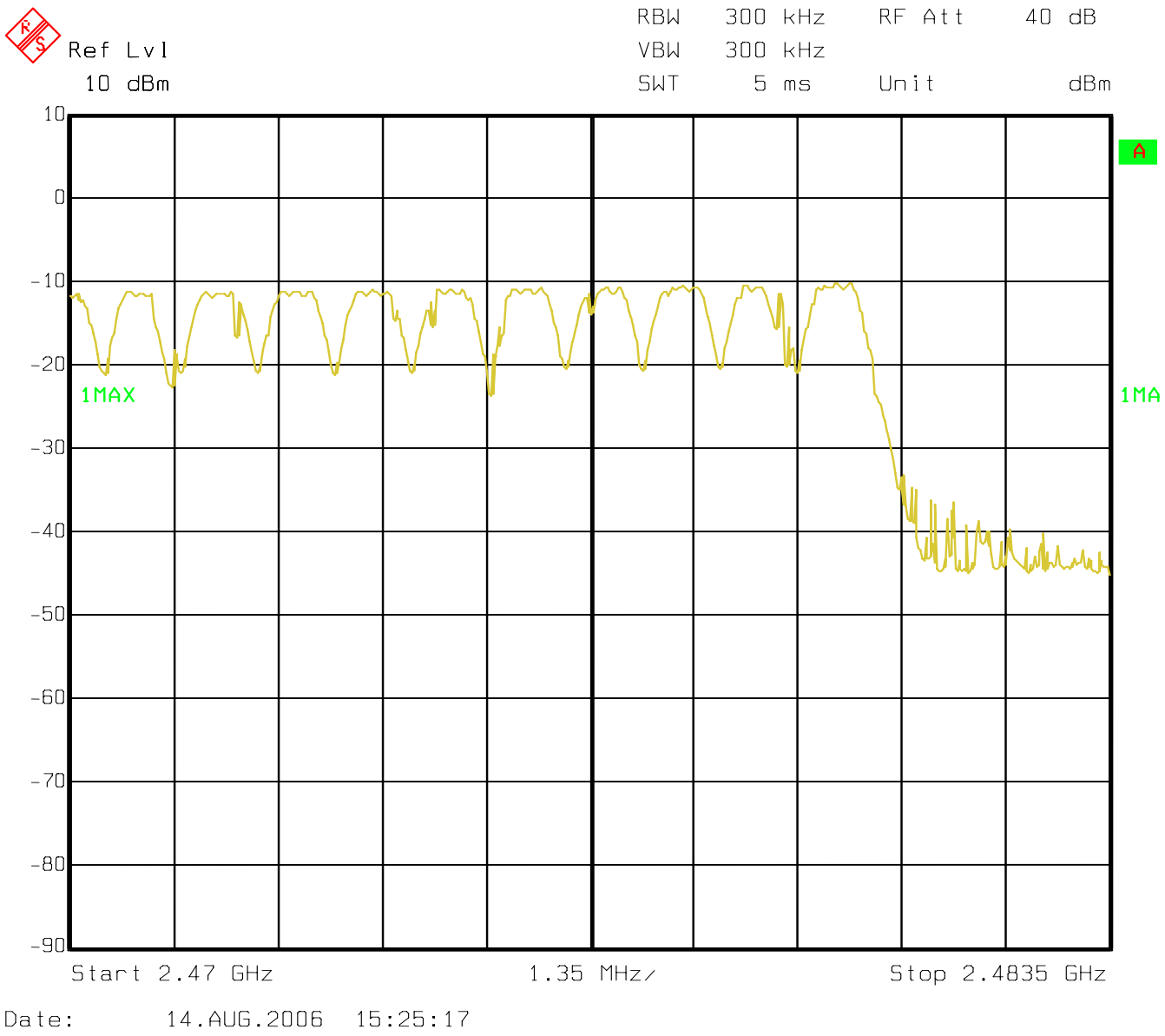
(PLOT 2)
(F1-F2=2425MHz to 2450MHz)



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



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



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		
PACKET TYPE	DH1	DH3	DH5

For Bluetooth devices:

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

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

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

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

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

6.6 EMISSIONS LIMITATIONS - TRANSMITTER

6.6.1 LIMIT SUB CLAUSE § 15.247 (c) (1)

LIMITS

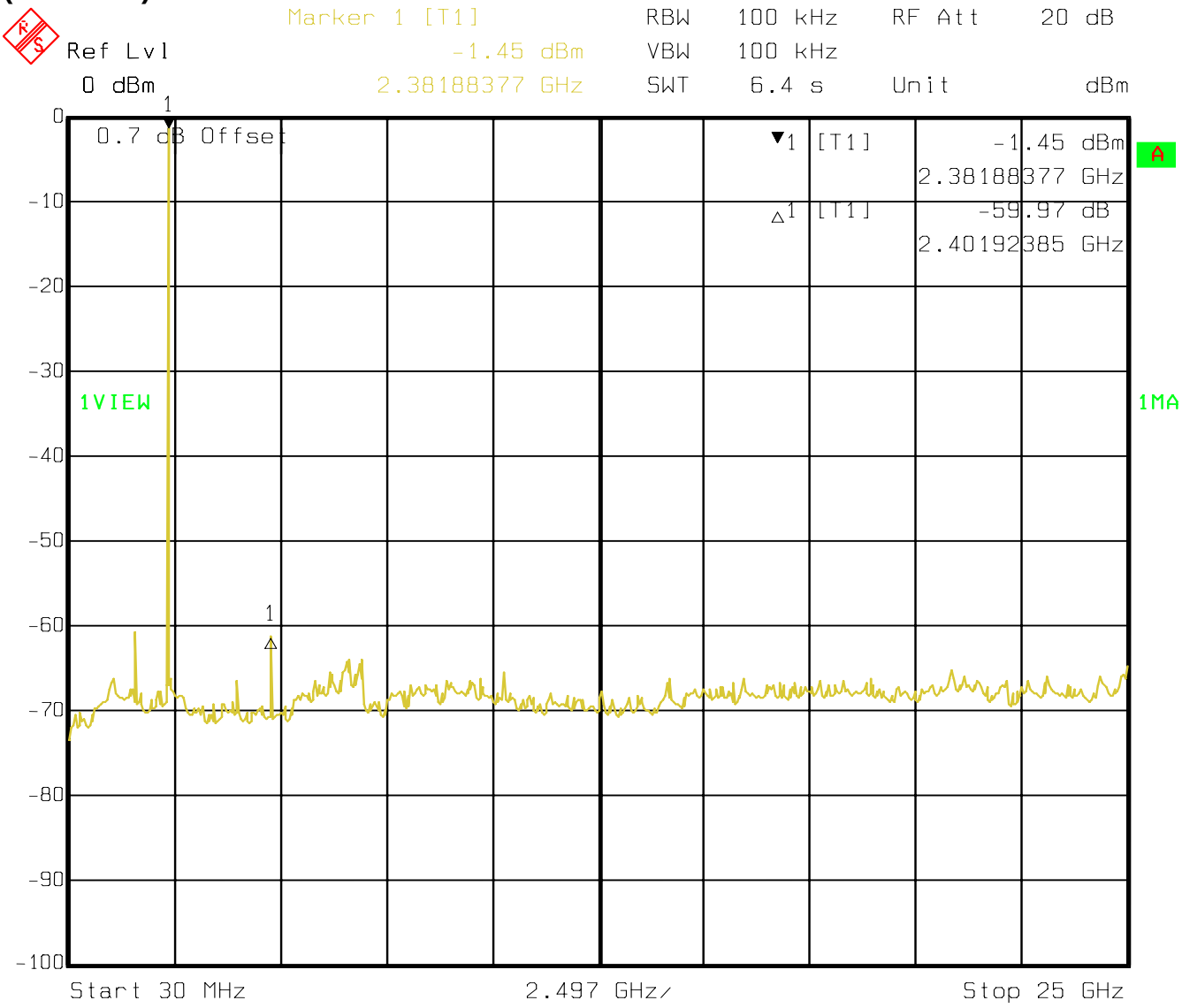
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions, which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Notes:

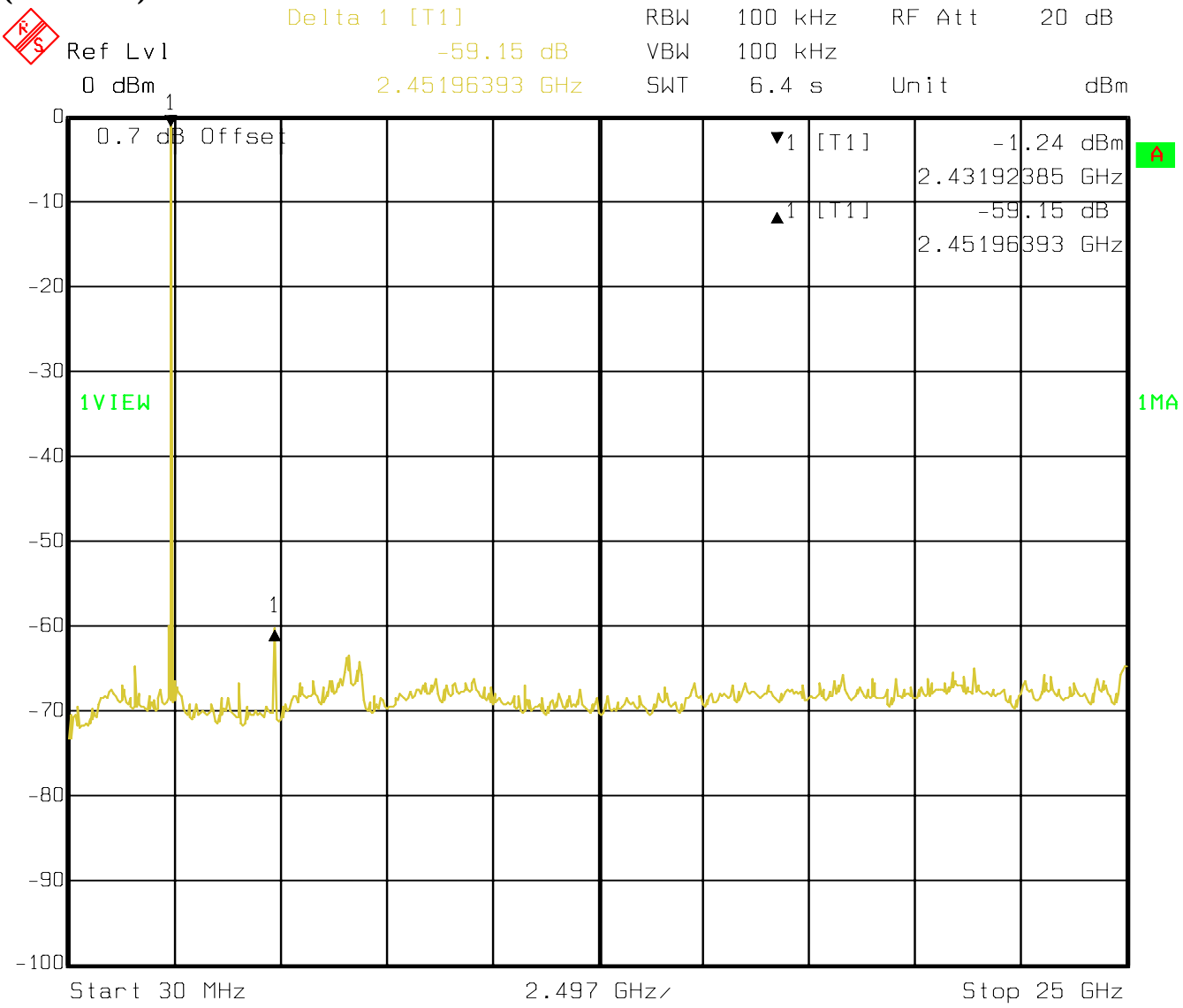
1. Measurements were performed with a spectrum analyzer.
2. During measurements the equipment was configured as shown in the block diagram of section 8 of this report.

6.6.2 RESULTS:

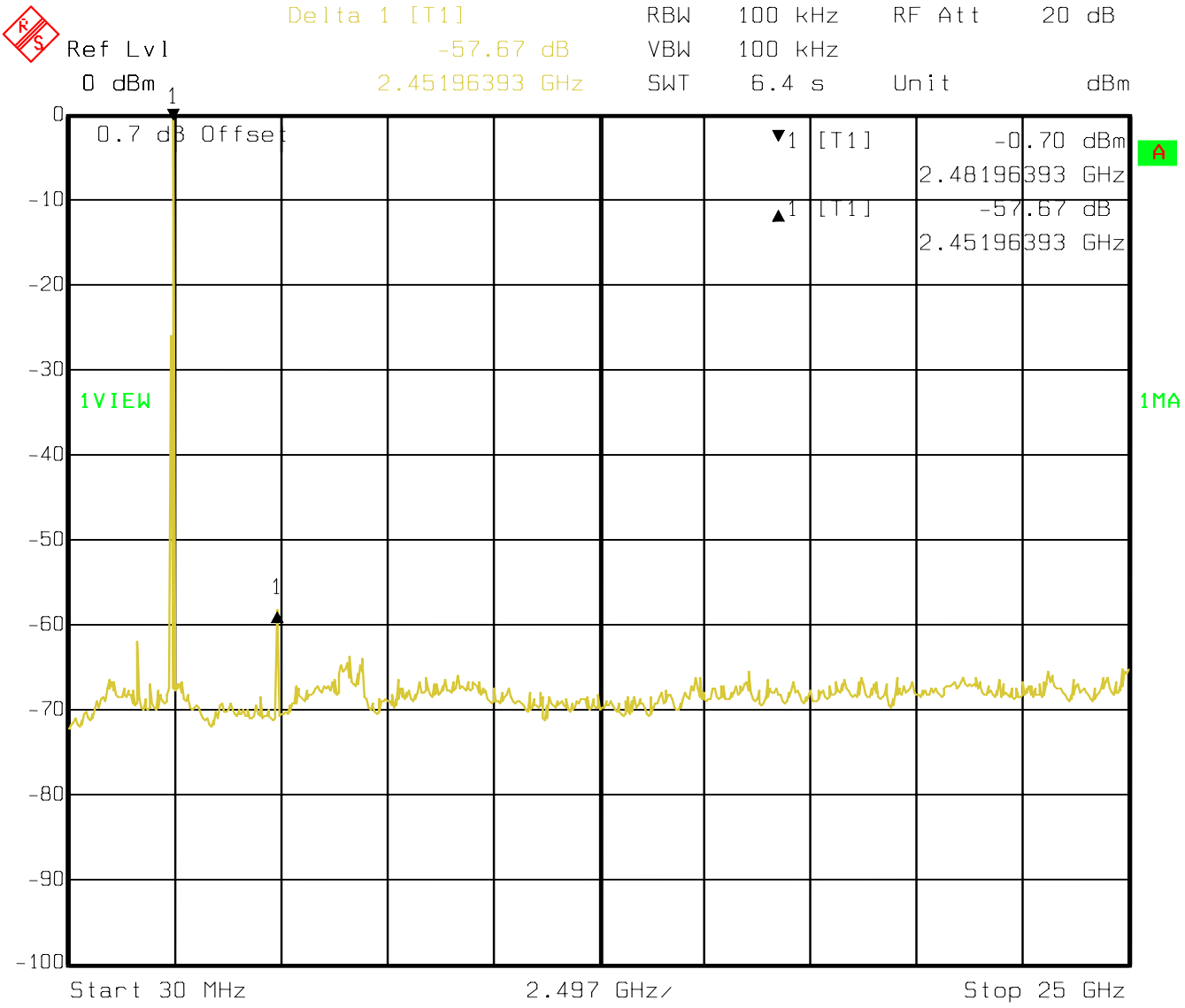
(2402 MHz)


Marker 1 [T1]
-1.45 dBm
2.38188377 GHz
RBW 100 kHz
VBW 100 kHz
SWT 6.4 s
RF Att 20 dB
Unit dBm
Ref Lvl
0 dBm
0.7 dB Offset
▼1 [T1]
-1.45 dBm
2.38188377 GHz
Δ1 [T1]
-59.97 dB
2.40192385 GHz
1VIEW
1MA
A
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 30 MHz
2.497 GHz/
Stop 25 GHz

(2441 MHz)


Delta 1 [T1]
-59.15 dB
2.45196393 GHz
RBW 100 kHz
VBW 100 kHz
SWT 6.4 s
RF Att 20 dB
Unit dBm
Ref Lvl
0 dBm
0.7 dB Offset
1 [T1] -1.24 dBm
2.43192385 GHz
1 [T1] -59.15 dB
2.45196393 GHz
1VIEW
1MA
A
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 30 MHz
2.497 GHz/
Stop 25 GHz

(2480 MHz)


Delta 1 [T1]
-57.67 dB
2.45196393 GHz
RBW 100 kHz
VBW 100 kHz
SWT 6.4 s
RF Att 20 dB
Unit dBm
Ref Lvl
0 dBm
0.7 dB Offset
1 [T1] -0.70 dBm
2.48196393 GHz
1 [T1] -57.67 dB
2.45196393 GHz
1VIEW
1MA
A
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 30 MHz
2.497 GHz/
Stop 25 GHz

6.7 AC POWER LINE CONDUCTED EMISSIONS

6.7.1 LIMIT SUB CLAUSE § 15.107 / 15.207

Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)

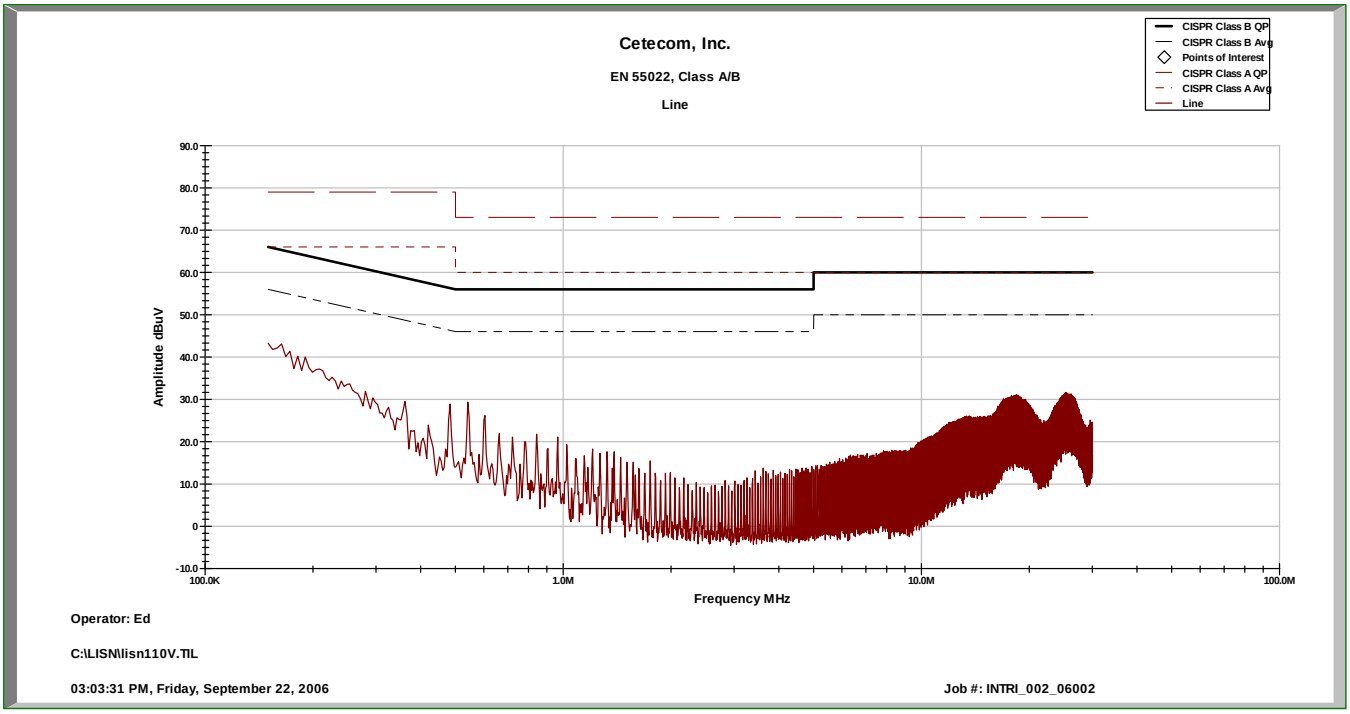
§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/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.

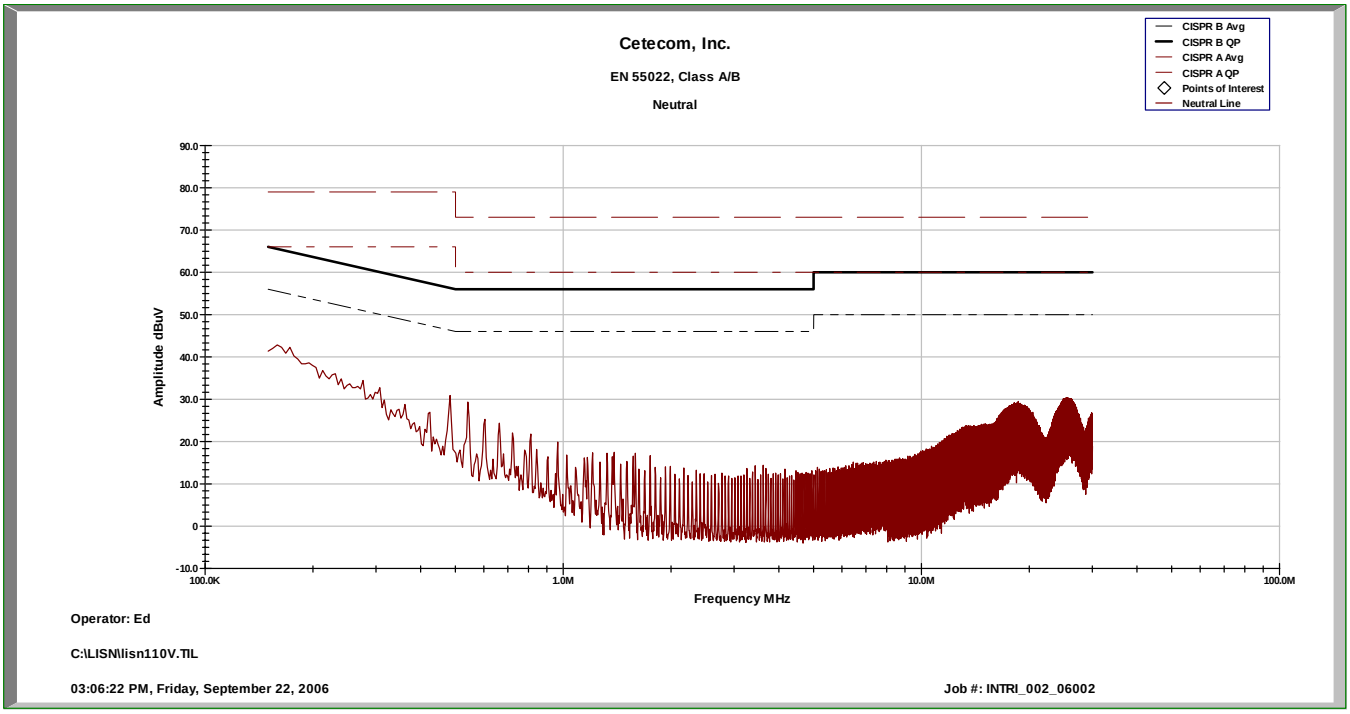
Limit

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50
* Decreases with logarithm of the frequency		

ANALYZER SETTINGS: RBW = 10KHz VBW = 10KHz

6.7.2 RESULTS:


Cetecom, Inc.
EN 55022, Class A/B
Line
CISPR Class B QP
CISPR Class B Avg
Points of Interest
CISPR Class A QP
CISPR Class A Avg
Line
Amplitude dBuV
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
100.0K
1.0M
10.0M
100.0M
Frequency MHz
Operator: Ed
C:\LISN\lisn110V.TIL
03:03:31 PM, Friday, September 22, 2006
Job #: INTRI_002_06002

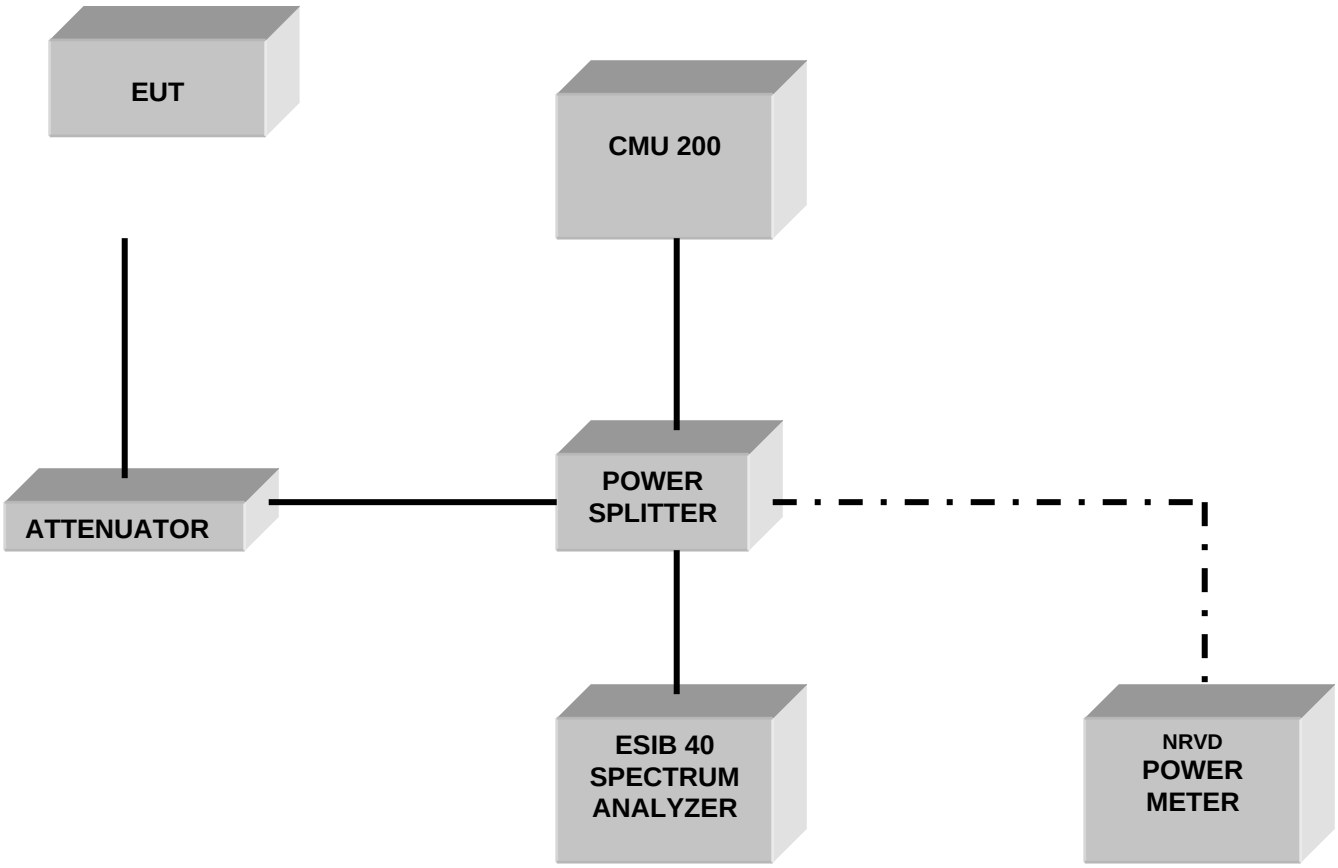

Cetecom, Inc.
EN 55022, Class A/B
Neutral
CISPR B Avg
CISPR B QP
CISPR A Avg
CISPR A QP
Points of Interest
Neutral Line
Amplitude dBuV
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
100.0K
1.0M
10.0M
100.0M
Frequency MHz
Operator: Ed
C:\LISN\lisn110V.TIL
03:06:22 PM, Friday, September 22, 2006
Job #: INTRI_002_06002

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