



FCC Test Report

Test report no.: EMC_423FCC15.247_2003
FCC Part 15.247 for DSSS systems / CANADA RSS-210
(5092-0115)

FCC ID: B9450920115



TTI-P-G 081/94-A0

Accredited according to **ISO/IEC 17025**



Bluetooth Qualification
Test Facility
(BQTF)



FCC listed # 101450

IC recognized # 3925

CETECOM Inc.

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Table of Contents

- 1 General information**
 - 1.1 Notes**
 - 1.2 Testing laboratory**
 - 1.3 Details of applicant**
 - 1.4 Application details**
 - 1.5 Test item**
 - 1.6 Test standards**
- 2 Technical test**
 - 2.1 Summary of test results**
 - 2.2 Test report**
- 1 General information**
 - 1.1 Notes**

The test results of this test report relate exclusively to the test item specified in 1.5. 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.

TEST REPORT PREPARED BY:

EMC Engineer: Philip Kim

1.2 Testing laboratory

CETECOM Inc.

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E-mail: lothar.schmidt@cetecomusa.com

Internet: www.cetecom.com

1.3 Details of applicant

Name : Hewlet Packard
Street : 8000 Foothills Blvd., Bldg R3U, ms 5677
City / Zip Code : Roseville, CA 95747
Country : USA
Contact : Jim Henry
Telephone : 916-785-5417
Tele-fax : 916-785-2885
e-mail : jhenry@hp.com

1.4 Application details

Date of receipt of application : 2002-12-12
Date of receipt test item : 2003-01-23
Date of test : 2003-02-27 ~ 2003-02-28

1.5 Test item

Manufacturer : MITAC Computer (Kunshan) Ltd.
Street : Changjiang South Road, Export Processing Zone
City / Zip Code : Kunshan/Jiangsu
Country : Peoples Republic of China
Marketing Name : USB WLAN module
Model No. : 5092-0115
Description : [\(802.11b\) WLAN module fro use in printservers an similar applications](#)
FCC-ID : B9450920115

Additional information

Frequency : 2.4GHz ISM
Type of modulation :
Number of channels : 13
Antenna : Internal SMD
Power supply : Host (3.3Vdc)
Output power : Channels 1-12 Max output = 20Bm (Avg)
Channel 13 Max output = 13.5dBm(Avg)
Extreme temp. Tolerance : 0° ~ 35°

1.6 Test standards: FCC Part 15 §15.247 / CANADA RSS-210

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

2 Technical test**2.1 Summary of test results**

No deviations from the technical specification(s) were ascertained in the course of the tests
Performed

Final Verdict:
(only "passed" if all single measurements are "passed")

Passed

Technical responsibility for area of testing:

2003-03-10 EMC & Radio Lothar Schmidt (Manager)



Date

Section

Name

Signature

Responsible for test report and project leader:

2003-03-10 EMC & Radio Philip Kim (EMC Engineer)



Date

Section

Name

Signature

2.2 Test report

TEST REPORT

**Test report no.: EMC_423FCC15.247_2003
(5092-0115)**

TEST REPORT REFERENCE

LIST OF MEASUREMENTS		PAGE
ANTENNA GAIN	§ 15.204	7
SPECTRUM BANDWIDTH OF DSSS SYSTEM	§15.247(a) (2)	8
MAXIMUM PEAK OUTPUT POWER	§ 15.247 (b) (1)	12
POWER SPECTRAL DENSITY	§15.247 (d)	20
BAND EDGE COMPLIANCE	§15.247 (c)	28
EMISSION LIMITATIONS	§ 15.247 (c) (1)	32
CONDUCTED EMISSIONS	§ 15.107/207	51
RECEIVER SPURIOUS RADIATION	§ 15.209	52
TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS		57
BLOCK DIAGRAMS		58

ANTENNA GAIN**§ 15.204**

The antenna gain of the complete system is calculated by the difference of conducted power of the module and the radiated power in EIRP. The antenna with the highest gain was used for all measurements.

	Low channel	Mid channel	High channel
Conducted Power	23.91 dBm	24.17 dBm	18.24 dBm
Radiated Power (EIRP)	19.07 dBm	19.37 dBm	13.92 dBm
Antenna Gain	-4.84 dBi	-4.8 dBi	-4.32 dBi

The calculated antenna gain is between -4.84dBi and -4.32dBi .

SPECTRUM BANDWIDTH OF DSSS SYSTEM
6 dB bandwidth

§15.247(a) (2)

TEST CONDITIONS		6 dB BANDWIDTH (MHz)		
Frequency (MHz)		2412	2442	2472
$T_{nom}(23)^{\circ}C$	$V_{nom}(3.3) VDC$	9.96	10.17	10.67

LIMIT**SUBCLAUSE §15.247(a) (2)**

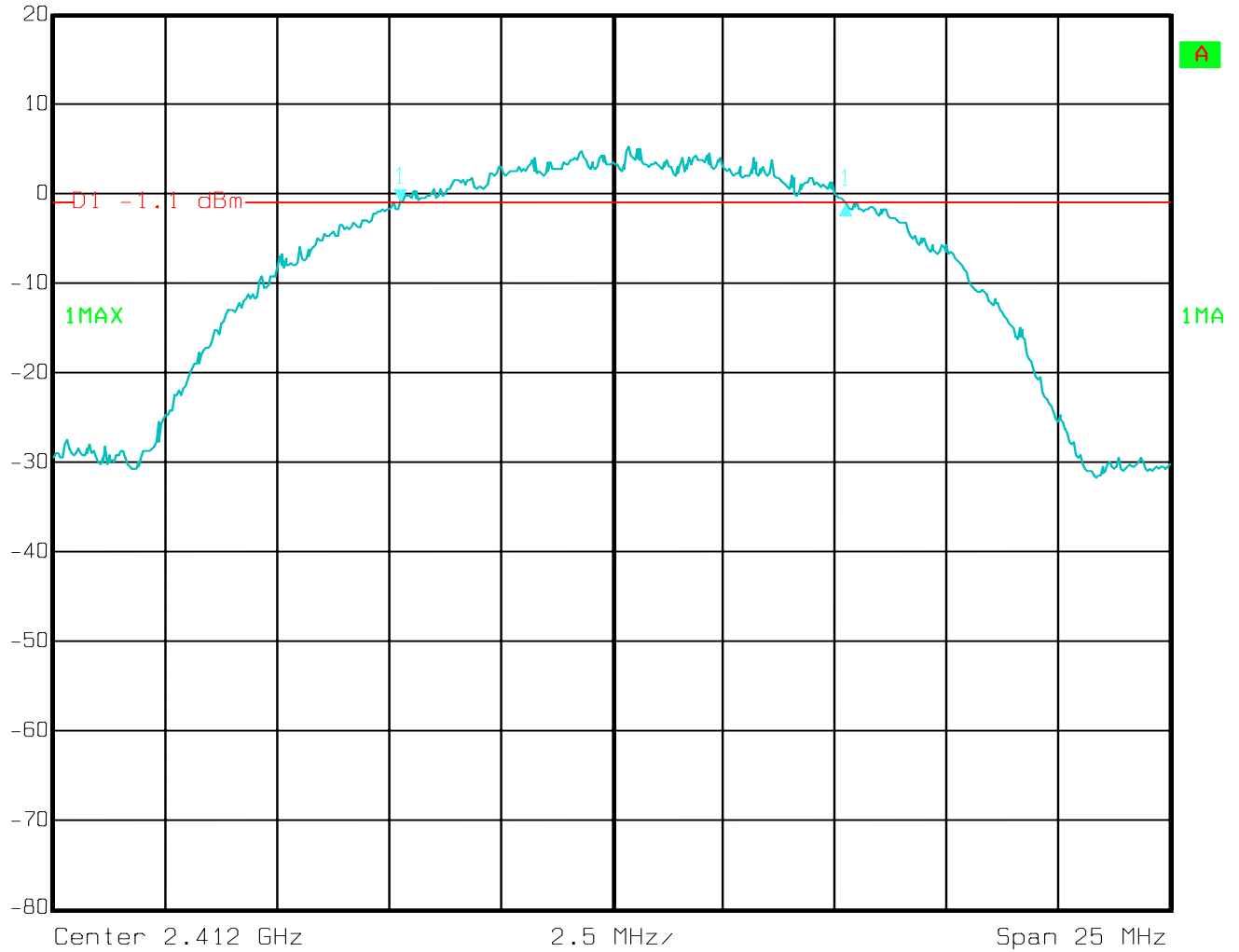
The minimum 6dB bandwidth shall be at least 500 KHz

SPECTRUM BANDWIDTH OF DSSS SYSTEM
6 dB bandwidth

§15.247(a) (2)

Lowest Channel: 2412MHz

	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
	Ref Lvl	-0.26 dB	VBW	1 MHz	
	20 dBm	9.96993988 MHz	SWT	6.5 ms	Unit



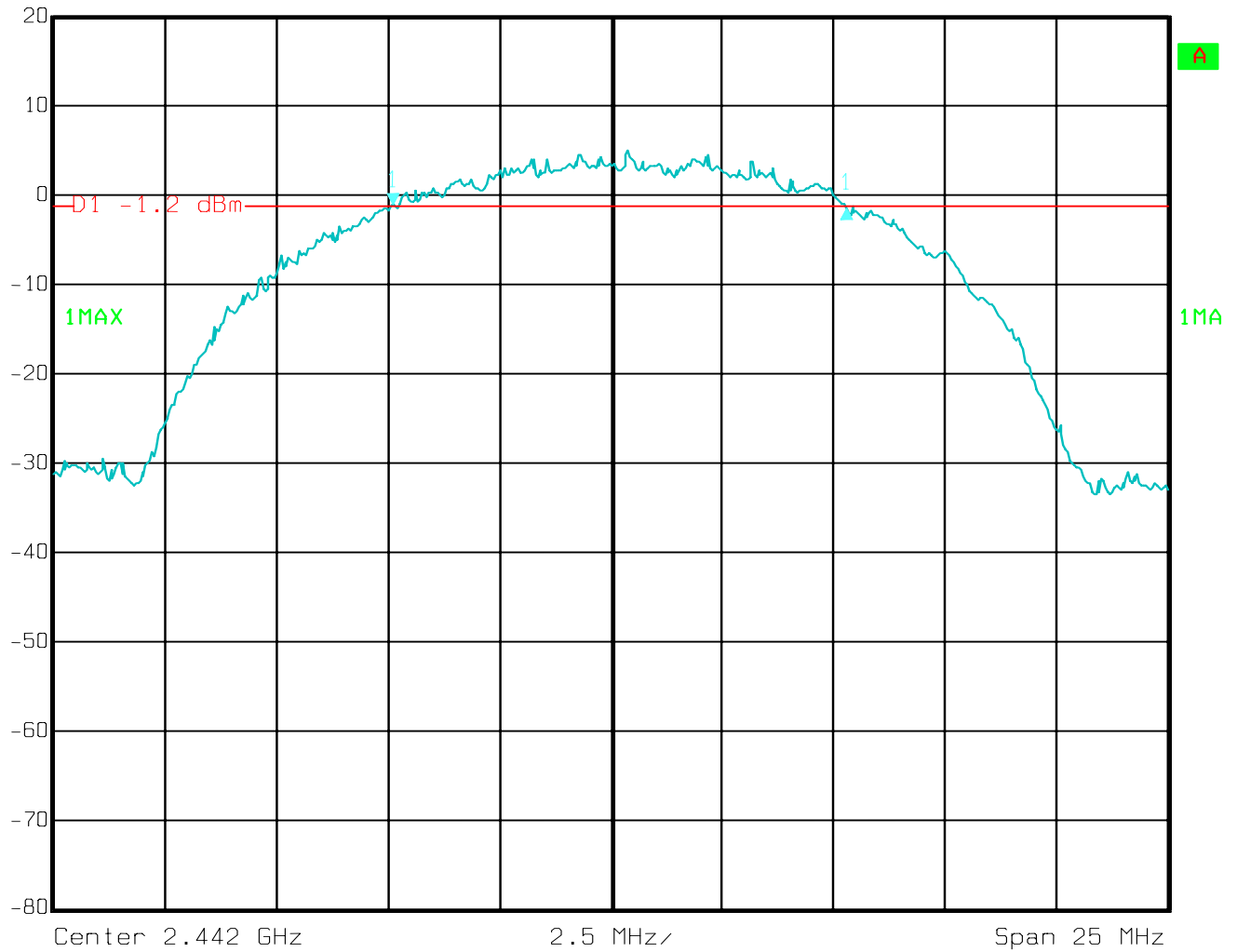
Date: 28.FEB.2003 10:00:34

SPECTRUM BANDWIDTH OF DSSSS SYSTEM 6 dB bandwidth

§15.247(a) (2)

Mid Channel: 2442MHz

	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
	Ref Lvl	-0.24 dB	VBW	1 MHz	
	20 dBm	10.17034068 MHz	SWT	6.5 ms	Unit dBm



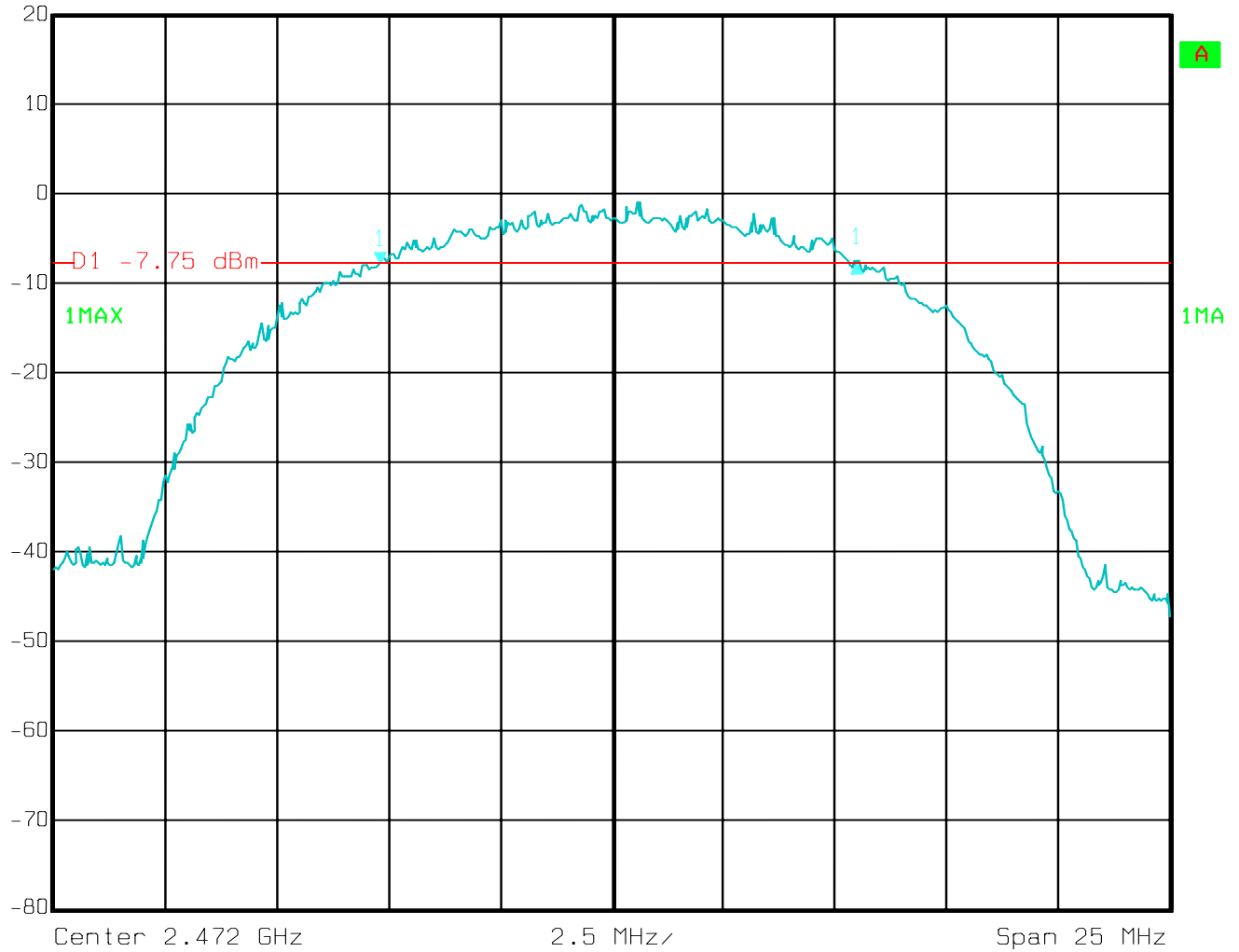
Date: 28.FEB.2003 10:03:29

SPECTRUM BANDWIDTH OF DSSS SYSTEM 6 dB bandwidth

§15.247(a) (2)

Highest Channel: 2472MHz

RS	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
	Ref Lvl	0.12 dB	VBW	1 MHz	
	20 dBm	10.67134269 MHz	SWT	6.5 ms	Unit dBm



Date: 28.FEB.2003 10:06:29

**MAXIMUM PEAK OUTPUT POWER
(Conducted)**

§ 15.247 (b) (1)

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)			
Frequency (MHz)		2412	2442	2472	
T _{nom} (23)°C	V _{nom} (3.3) VDC	Pk	23.91	24.17	18.24
		Av	19.73	20.11	13.54
Measurement uncertainty		±0.5dBm			

RBW / VBW: 10MHz

LIMIT

SUBCLAUSE § 15.247 (b) (1)

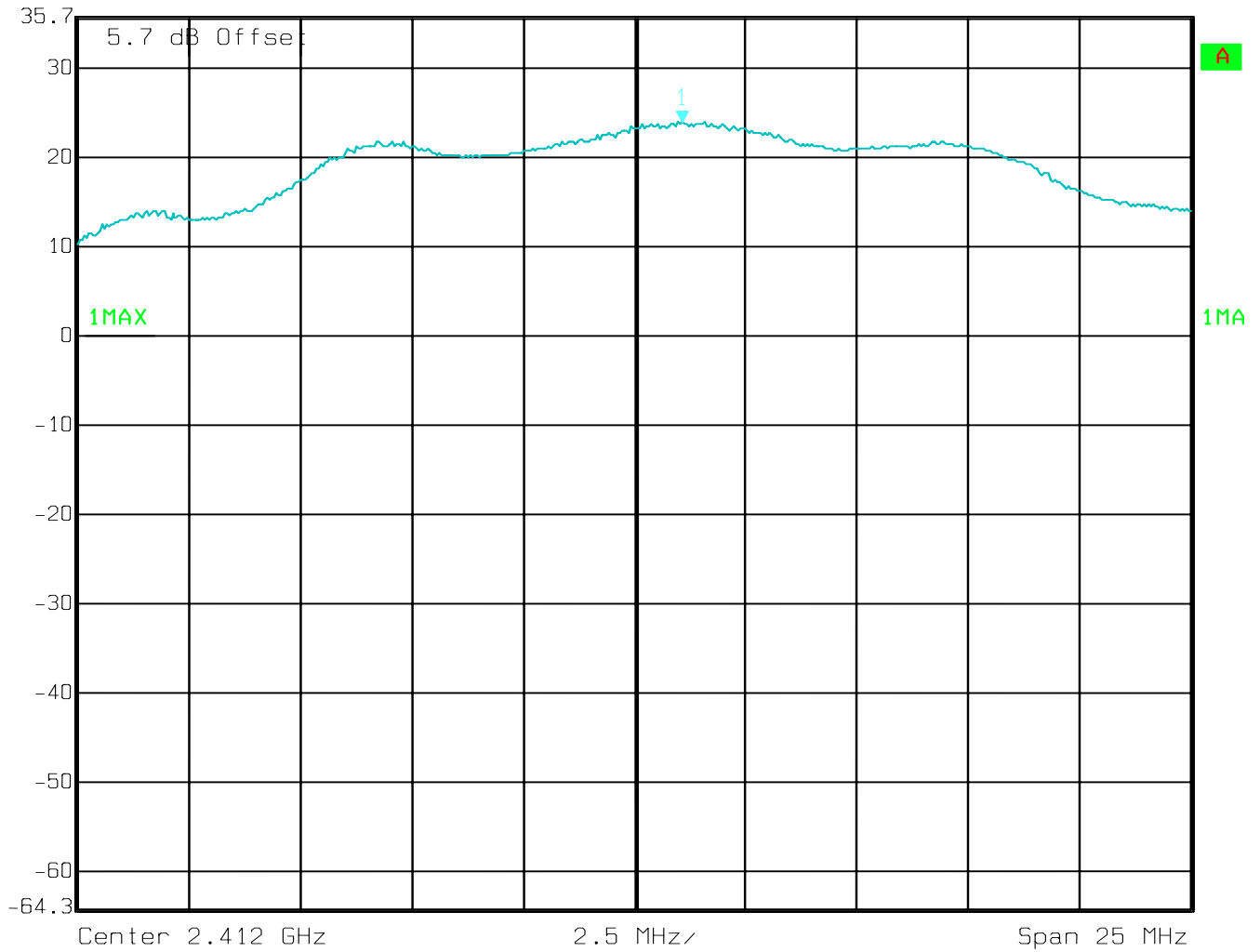
Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt / 30dBm

PEAK OUTPUT POWER (CONDUCTED)

§15.247 (b) (1)

Lowest Channel: 2412MHz

	Marker 1 [T1] Ref Lvl 35.7 dBm	23.91 dBm 2.41307715 GHz	RBW 10 MHz VBW 10 MHz SWT 5 ms	RF Att 40 dB Unit dBm
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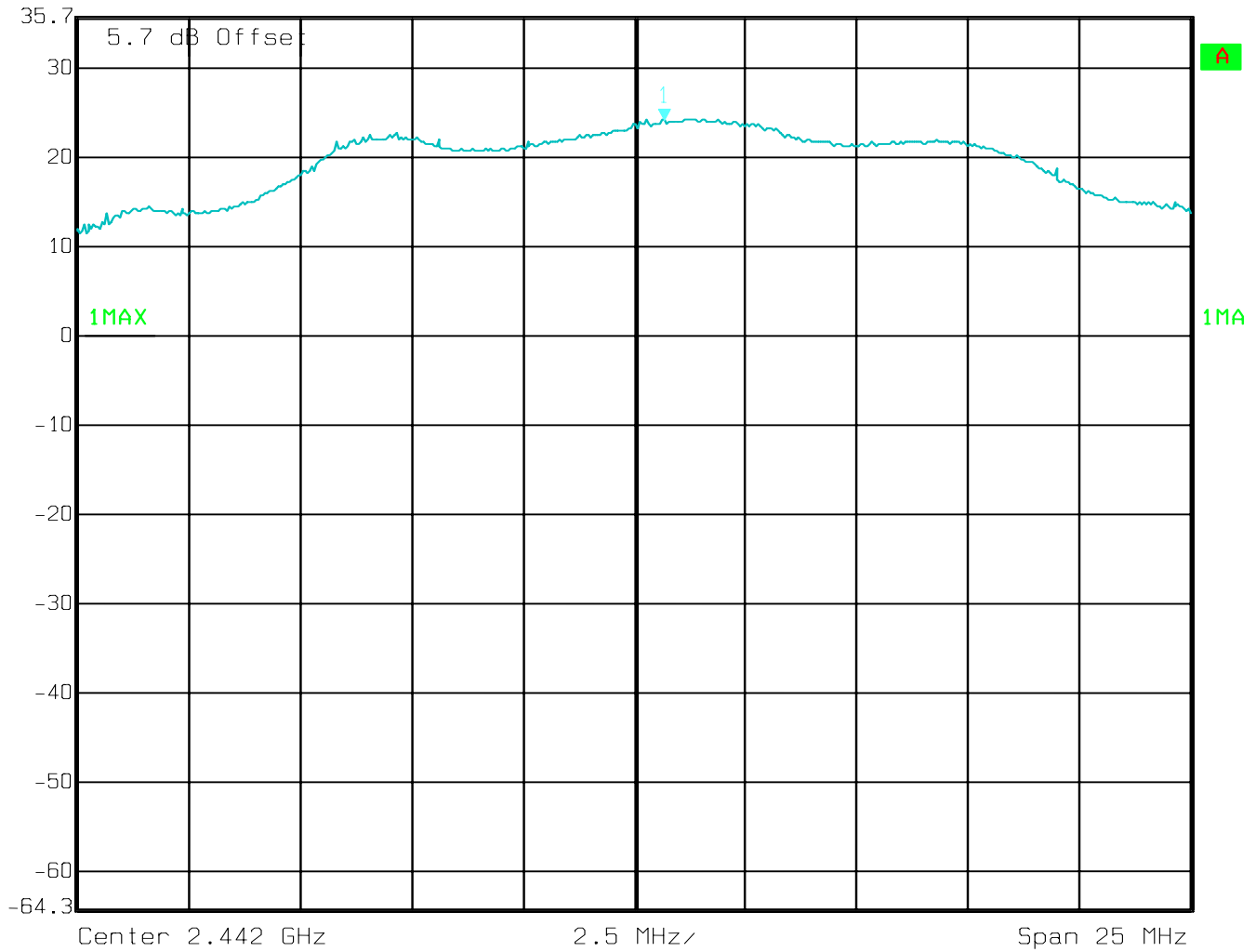
Date: 28.FEB.2003 11:54:10

PEAK OUTPUT POWER (CONDUCTED)

§15.247 (b)

Mid Channel: 2442MHz

 Marker 1 [T1] RBW 10 MHz RF Att 40 dB
Ref Lvl 24.17 dBm VBW 10 MHz
35.7 dBm 2.44267635 GHz SWT 5 ms Unit dBm



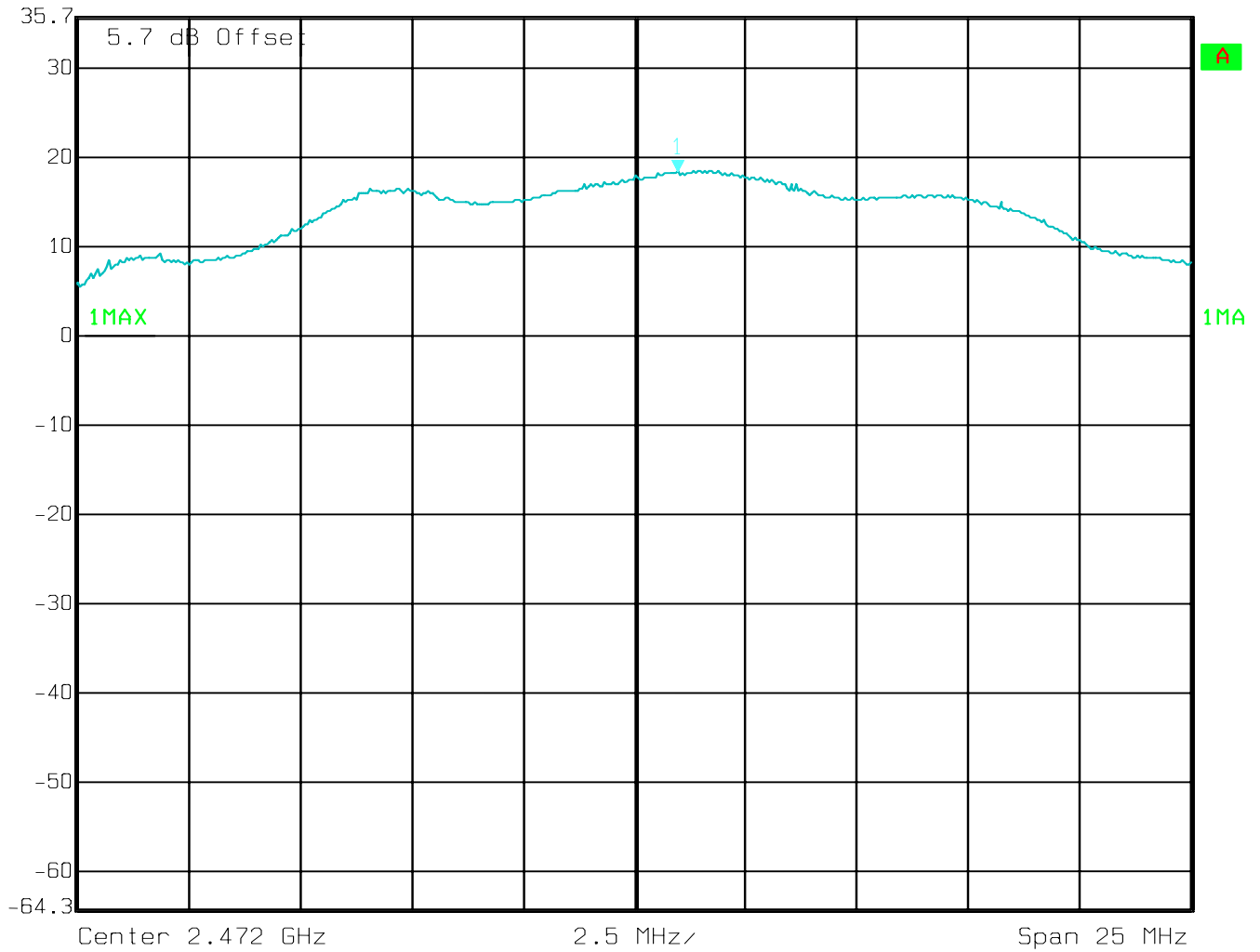
Date: 28.FEB.2003 11:55:54

PEAK OUTPUT POWER (CONDUCTED)

§15.247 (b)

Highest Channel: 2472MHz

 Ref Lvl 35.7 dBm Marker 1 [T1] 18.24 dBm RBW 10 MHz RF Att 40 dB
2.47297695 GHz VBW 10 MHz
SWT 5 ms Unit dBm



Date: 28.FEB.2003 11:57:32

**MAXIMUM PEAK OUTPUT POWER
(RADIATED)**

§ 15.247 (b) (1)

EIRP:

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
		2412	2442	2472
$T_{nom}(23)^{\circ}C$	$V_{nom}(3.3) VDC$	19.07	19.37	13.92
Measurement uncertainty		±0.5dBm		

RBW/VBW: 10MHz

LIMIT

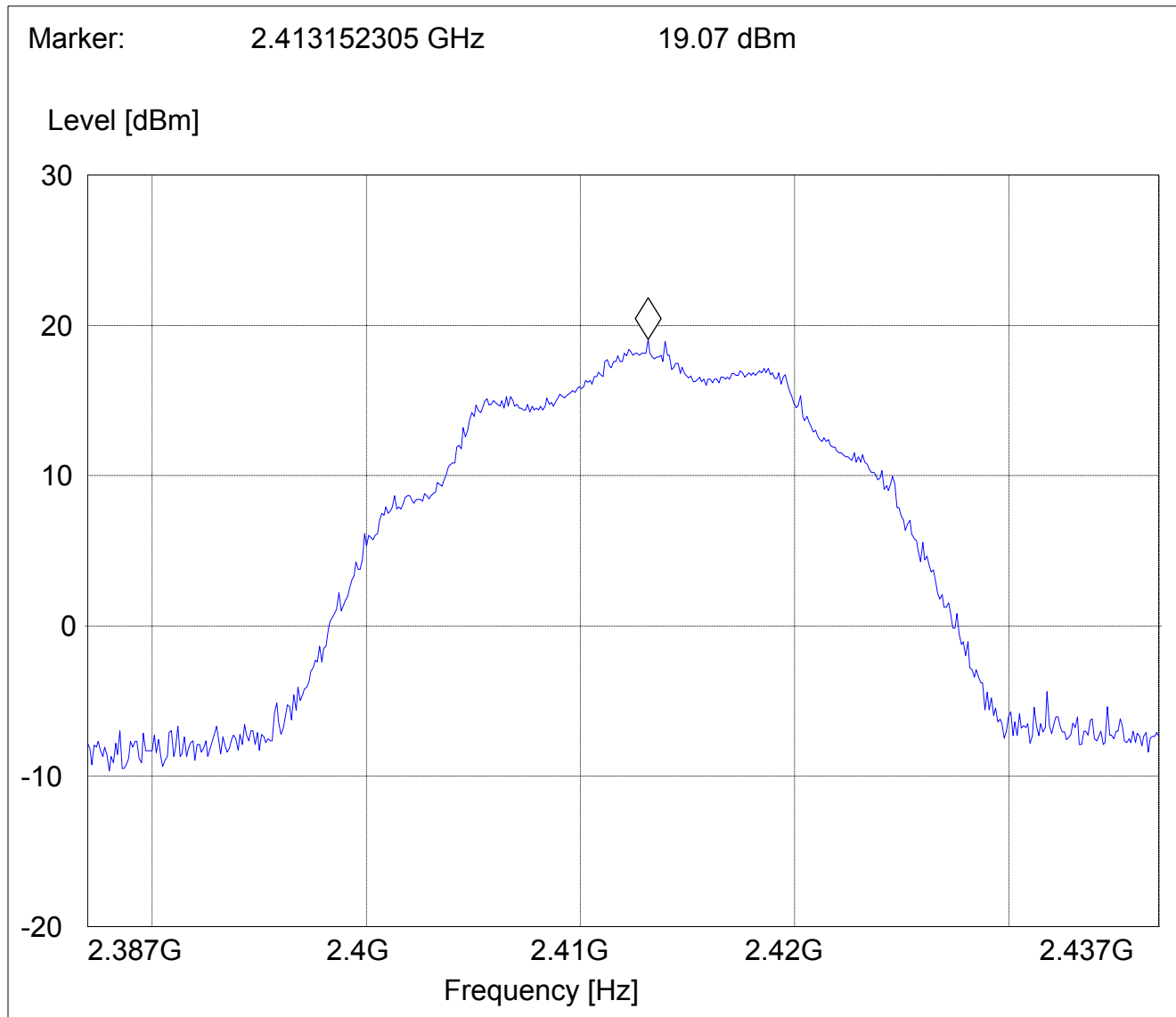
SUBCLAUSE § 15.247 (b) (1)

Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt / 30dBm

PEAK OUTPUT POWER (RADIATED)**§15.247 (b) (1)****Lowest Channel: 2412MHz**

SWEEP TABLE: "EIRP RLAN ch-1"

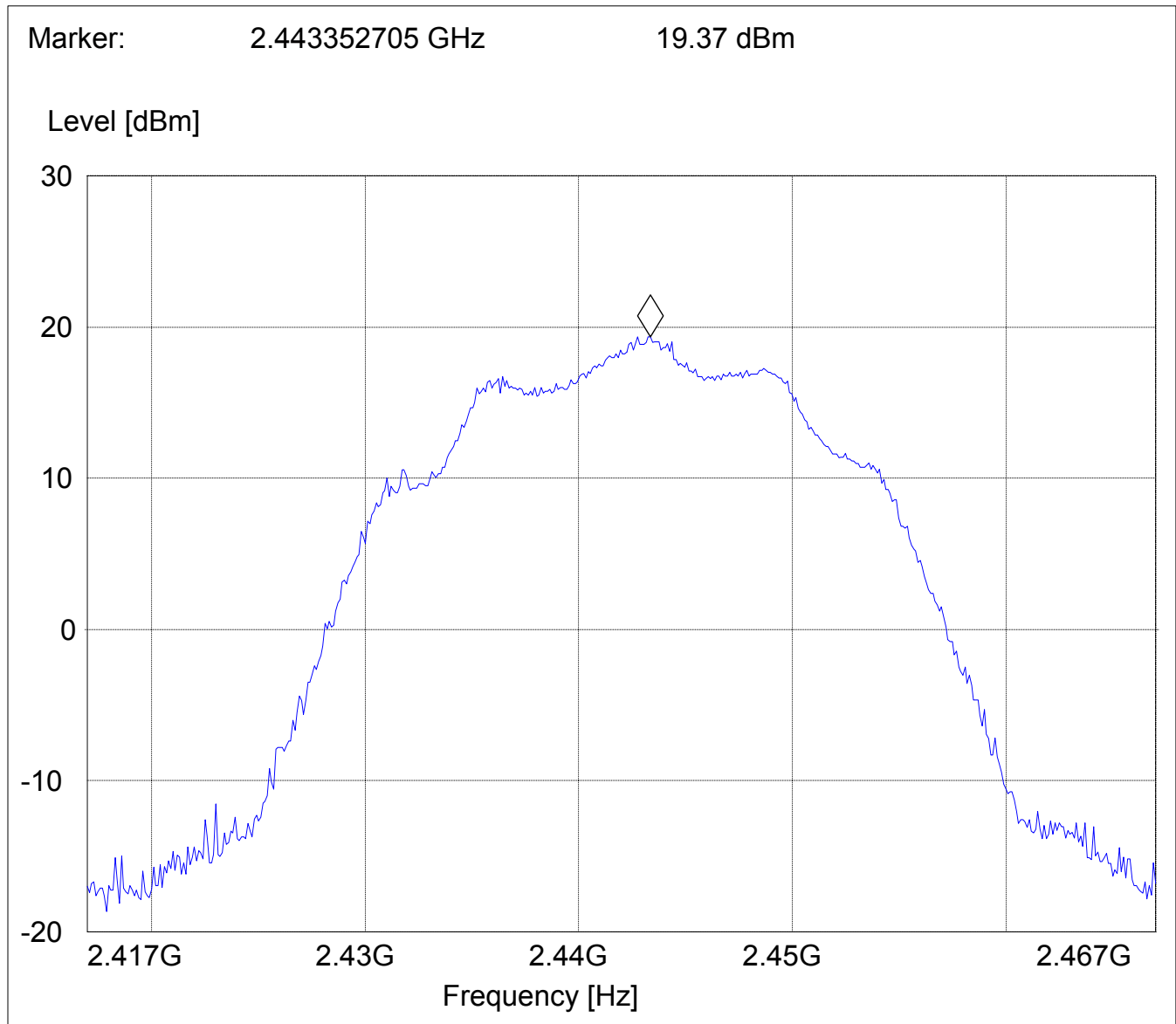
Short Description:		EIRP RLAN channel-2412MHz		
Start	Stop	Detector	Meas.	IF
Frequency	Frequency		Time	BW
2.387GHz	2.437GHz	MaxPeak	Coupled	10 MHz



PEAK OUTPUT POWER (RADIATED)**§15.247 (b) (1)****Mid Channel: 2442MHz**

SWEEP TABLE: "EIRP RLAN CH7"

Short Description:		EIRP RLAN channel-2442MHz		
Start	Stop	Detector	Meas.	IF
Frequency	Frequency	Time	BW	
2.417GHz	2.467GHz	MaxPeak	Coupled	10 MHz



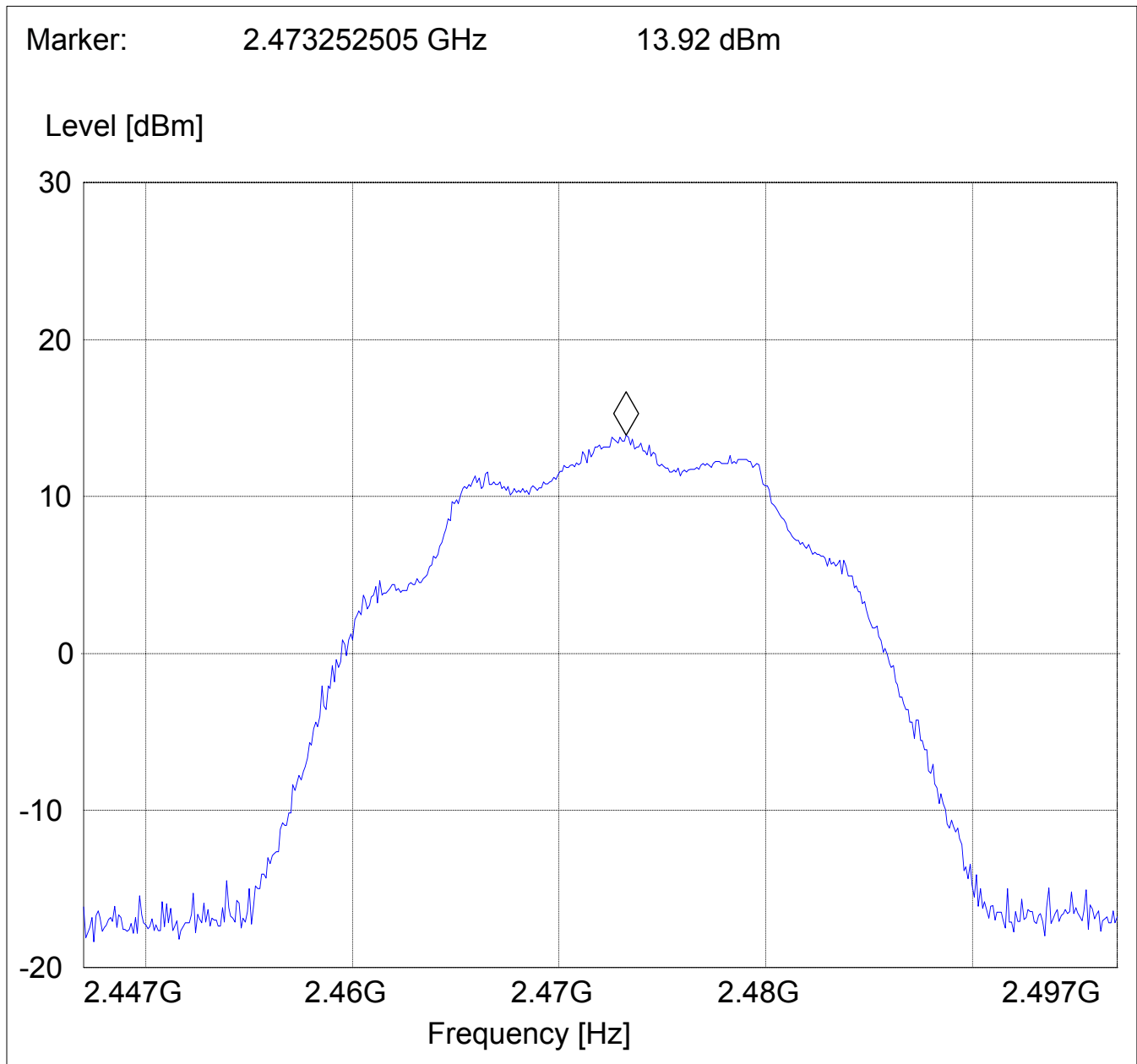
PEAK OUTPUT POWER (RADIATED)

§15.247 (b) (1)

Highest Channel: 2472MHz

SWEEP TABLE: "EIRP RLAN CH13"

Short Description:		EIRP RLAN channel-2472MHz		
Start	Stop	Detector	Meas.	IF
Frequency	Frequency		Time	BW
2.447GHz	2.497GHz	MaxPeak	Coupled	10 MHz



POWER SPECTRAL DENSITY

§15.247 (d)

TEST CONDITIONS		POWER SPECTRAL DENSITY (dBm)		
		2412	2442	2472
$T_{nom}(23)^{\circ}C$	$V_{nom}(3.3) VDC$	-4.99	-5.67	-11.57

LIMIT**SUBCLAUSE §15.247(d)**

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band

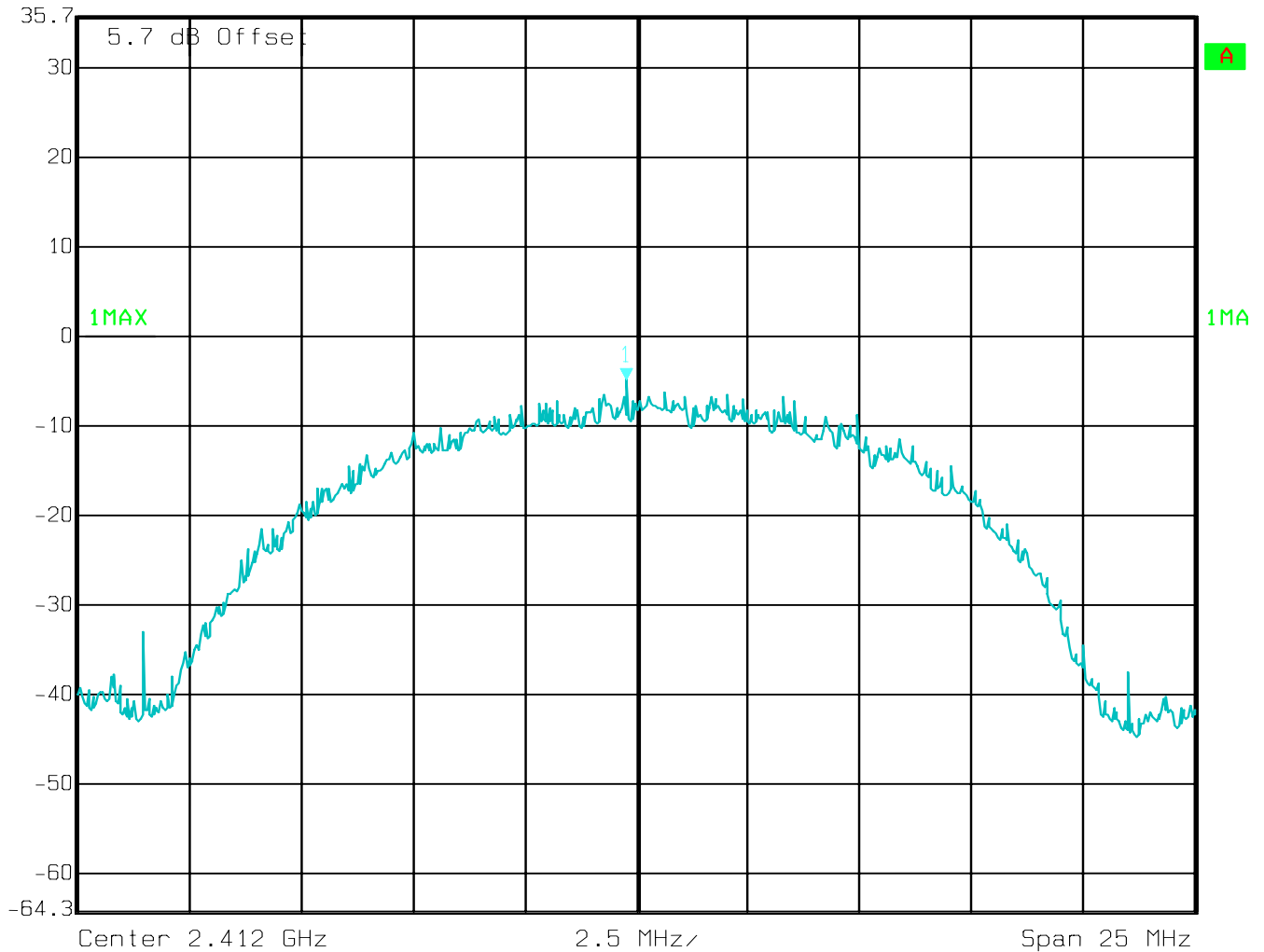
ANALYZER SETTINGS: RBW=3KHz, VBW=3KHz

POWER SPECTRAL DENSITY

§15.247(d)

Lowest Channel: 2412MHz

	Ref Lvl	Marker 1 [T1]	RBW	3 kHz	RF Att	40 dB
	35.7 dBm	-4.99 dBm	VBW	3 kHz		
		2.41177455 GHz	SWT	7 s	Unit	dBm



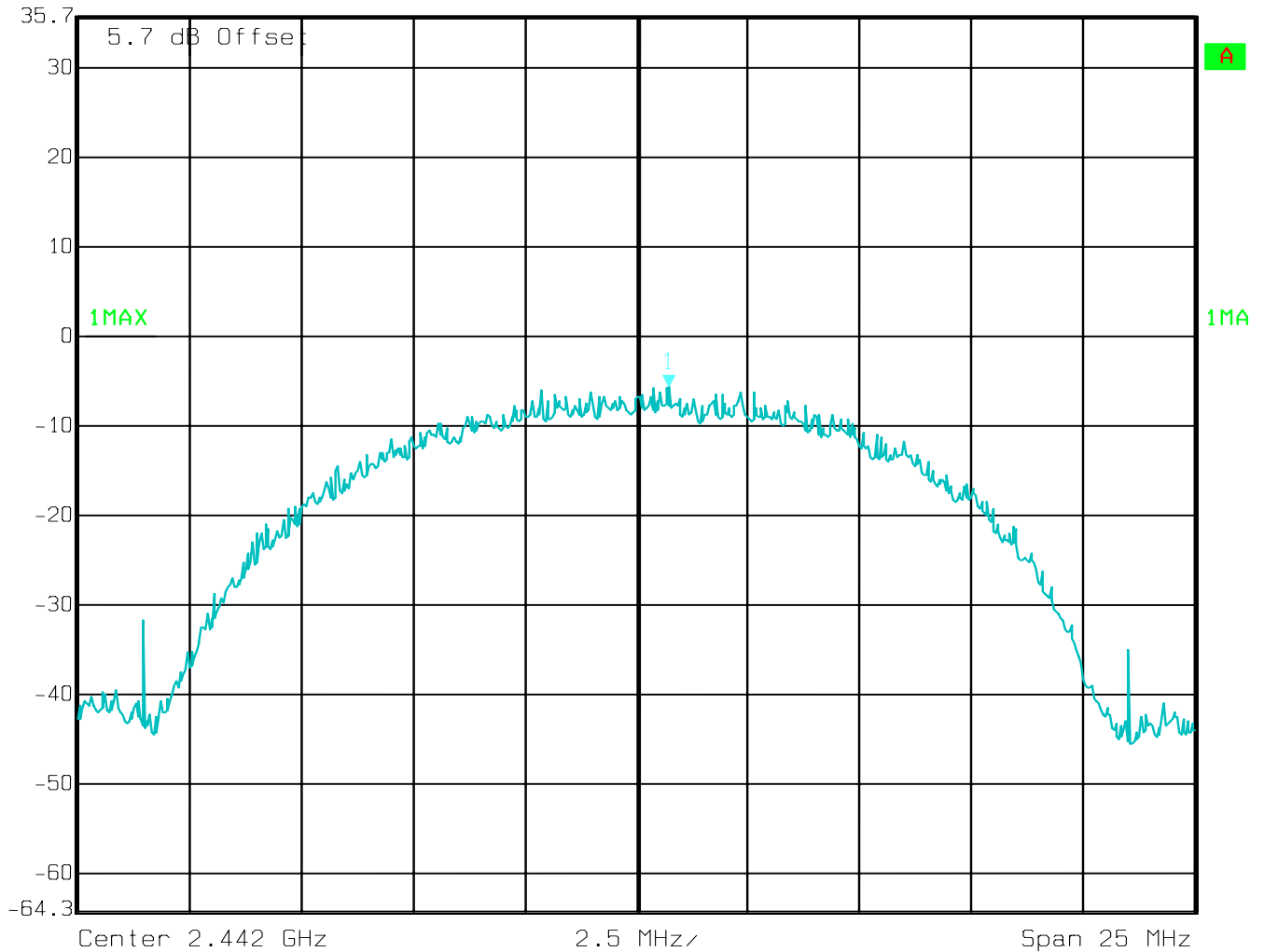
Date: 28.FEB.2003 12:01:30

POWER SPECTRAL DENSITY

§15.247(d)

Mid Channel: 2442MHz

	Ref Lvl	Marker 1 [T1]	RBW	3 kHz	RF Att	40 dB
	35.7 dBm	-5.64 dBm	VBW	3 kHz		
		2.44272645 GHz	SWT	7 s	Unit	dBm



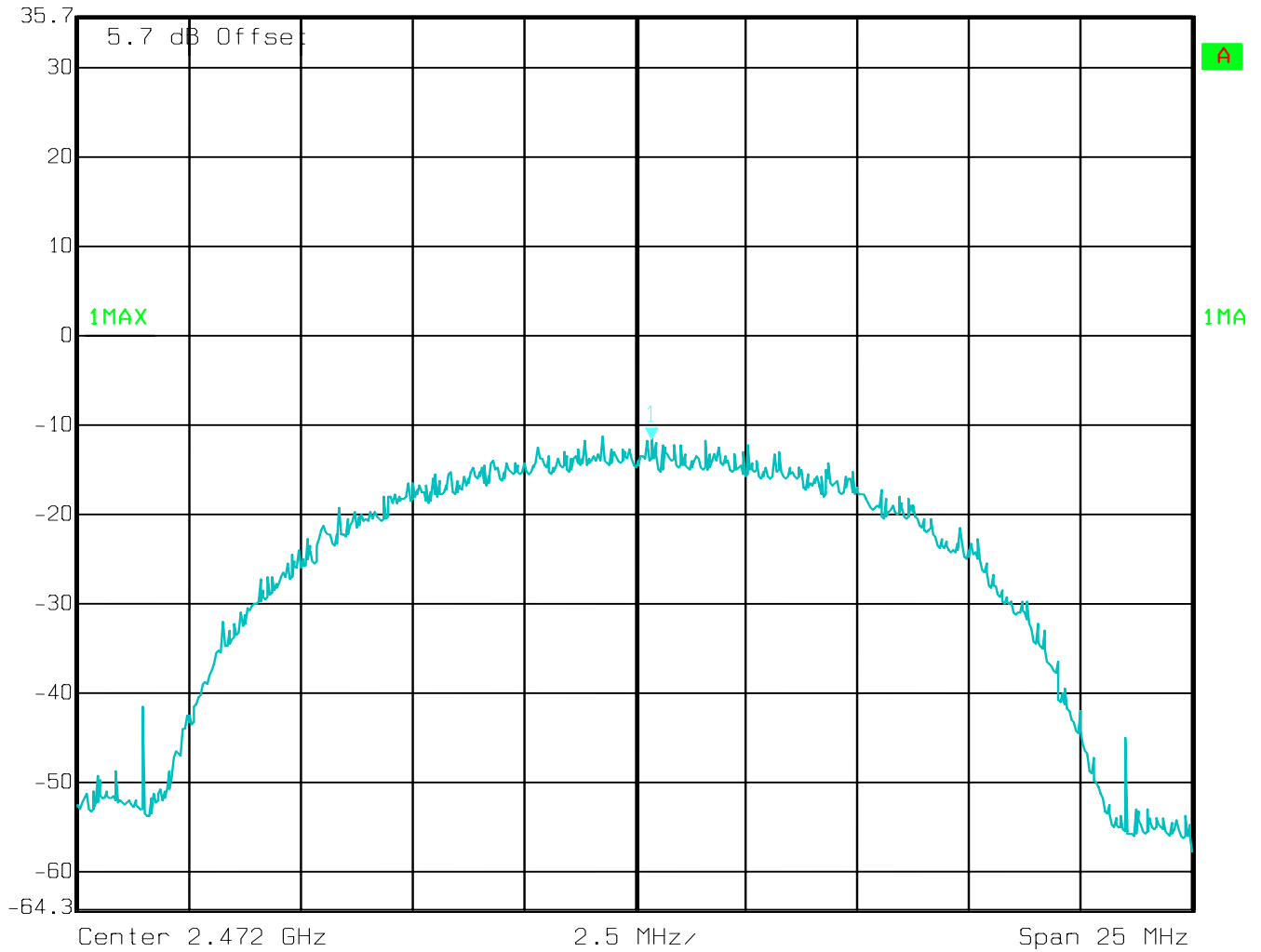
Date: 28.FEB.2003 12:00:11

POWER SPECTRAL DENSITY

§15.247(d)

Highest Channel: 2472MHz

	Ref Lvl	Marker 1 [T1]	RBW	3 kHz	RF Att	40 dB
	35.7 dBm	-11.57 dBm	VBW	3 kHz		
		2.47237575 GHz	SWT	7 s	Unit	dBm



Date: 28.FEB.2003 11:58:55

POWER SPECTRAL DENSITY**RSS-210**

TEST CONDITIONS		POWER SPECTRAL DENSITY (dBm/MHz)		
		2412	2442	2472
Frequency (MHz)				
T_{nom}(23)°C	V_{nom}(3.3) VDC	15.9	16.7	10.7

Correction factor of 60dBm is added to convert measured values from dBm/Hz to dBm/MHz

LIMIT**RSS-210**


The peak power spectral density shall be $\leq 50\text{mW/MHz}$ (17dBm/MHz)

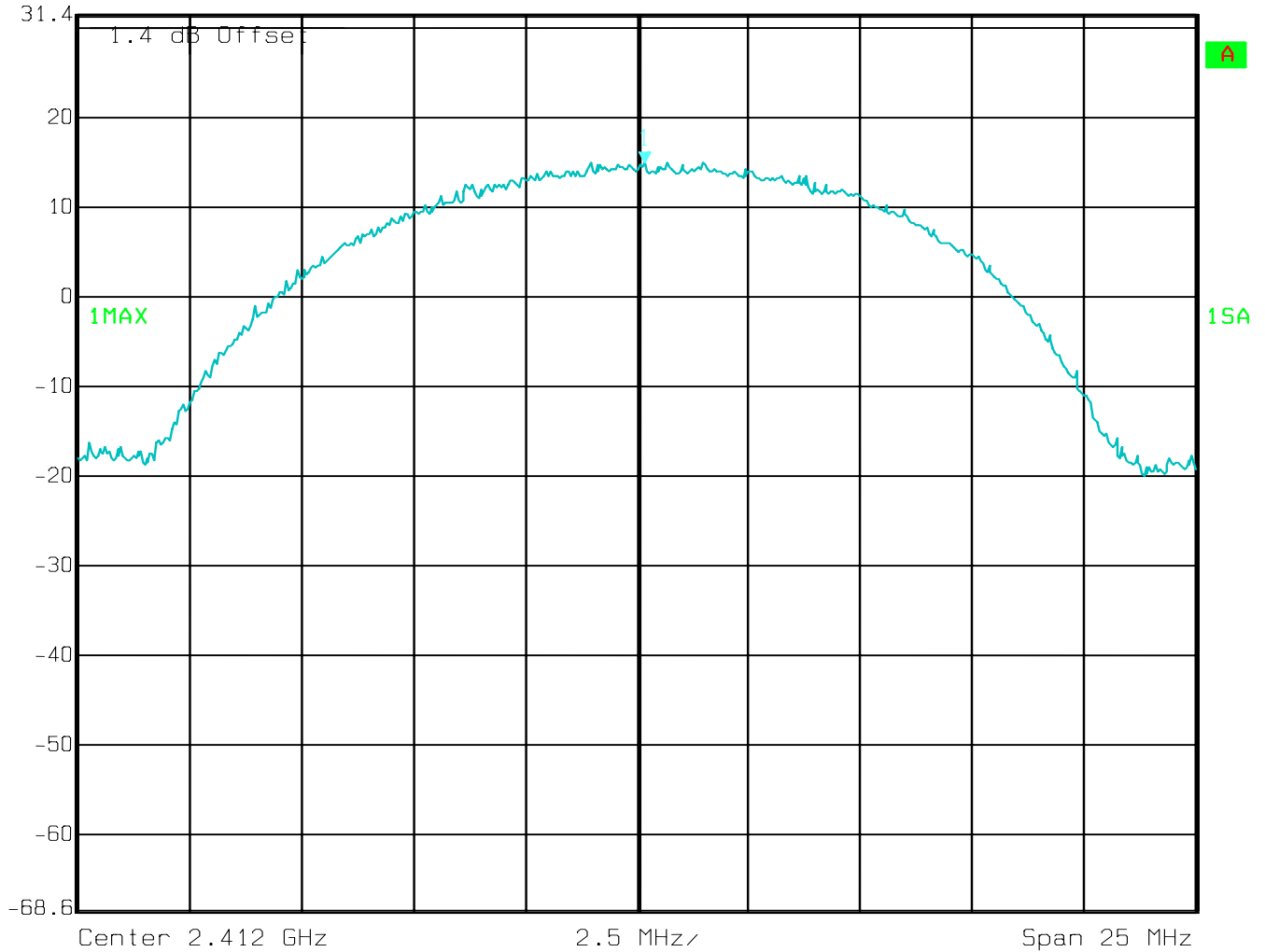
ANALYZER SETTINGS: RBW=1MHz, VBW=1MHz

POWER SPECTRAL DENSITY

RSS-210

Lowest Channel: 2412MHz

	Ref Lvl	Marker 1 [T1 NOI]	RBW	1 MHz	RF Att	40 dB
	31.4 dBm	-43.90 dBm/Hz	VBW	1 MHz		
		2.41217535 GHz	SWT	5 ms	Unit	dBm




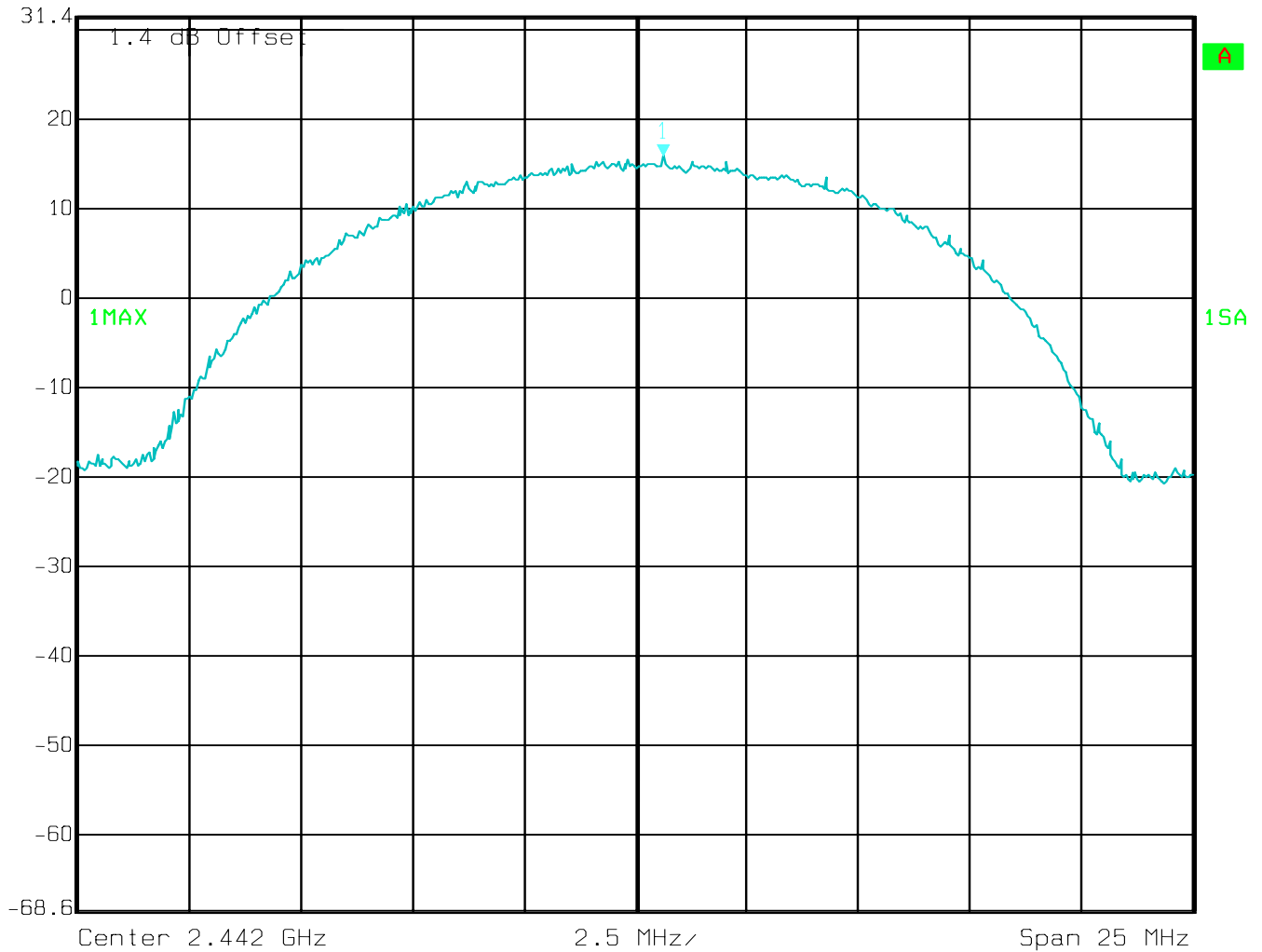
Date: 28.FEB.2003 16:07:17

POWER SPECTRAL DENSITY

RSS-210

Mid Channel: 2442MHz

		Marker 1 [T1 NOI]	RBW	1 MHz	RF Att	40 dB
	Ref Lvl	-43.34 dBm/Hz	VBW	1 MHz		
	31.4 dBm	2.44262625 GHz	SWT	5 ms	Unit	dBm



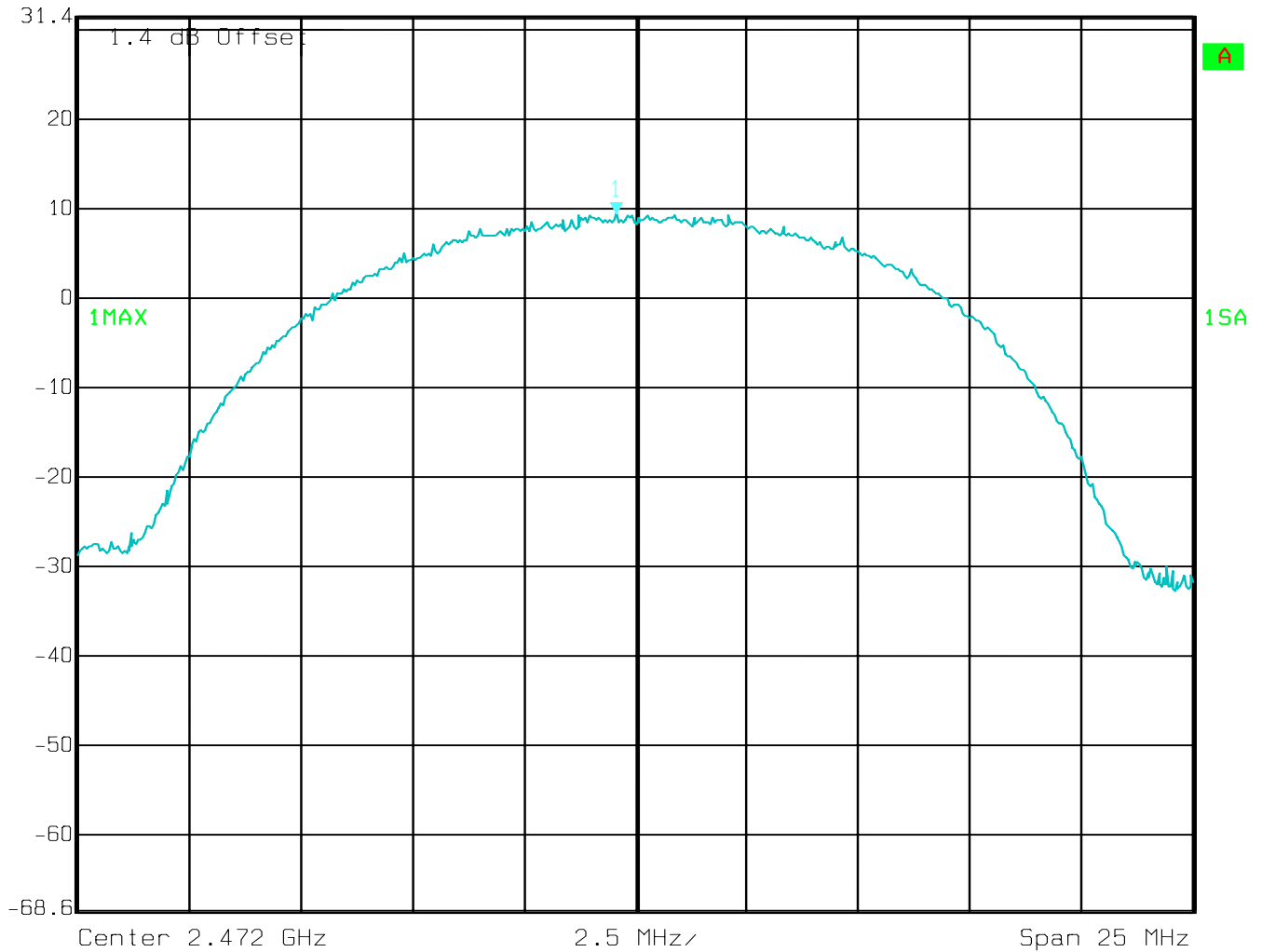
Date: 28.FEB.2003 16:08:50

POWER SPECTRAL DENSITY

RSS-210

Highest Channel: 2472MHz

	Ref Lvl	Marker 1 [T1 NOI]	RBW	1 MHz	RF Att	40 dB
	31.4 dBm	-49.34 dBm/Hz	VBW	1 MHz		
		2.47157415 GHz	SWT	5 ms	Unit	dBm



Date: 28.FEB.2003 16:10:48

BAND EDGE COMPLIANCE

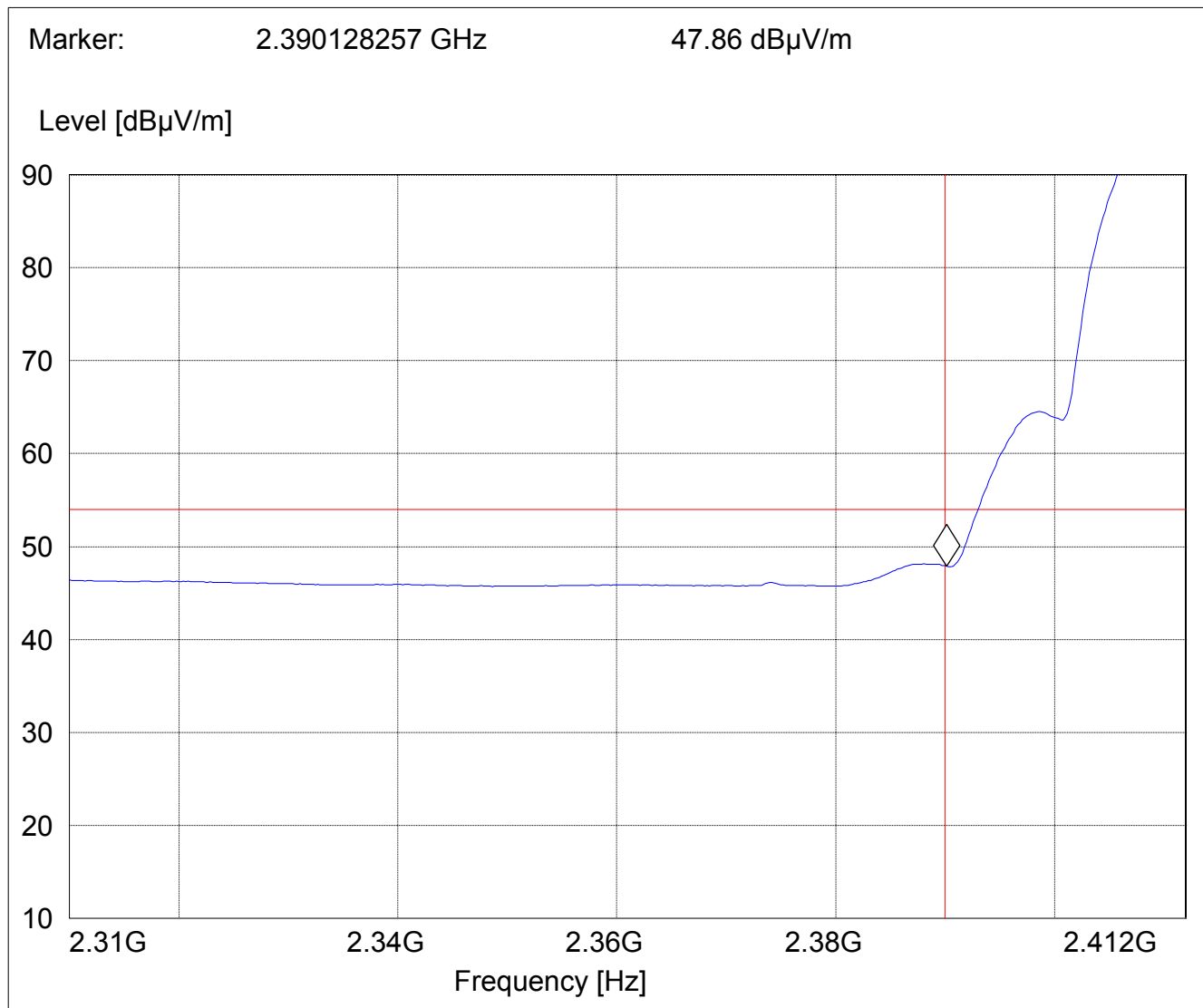
§15.247 (c)

Low frequency section (spurious in the restricted band 2310 – 2390 MHz)

(Average measurement)

Operating condition : Tx at 2412MHz
 SWEEP TABLE : "FCC15.247 LBE_AVG"
 Limit Line : 54dB μ V

Start Frequency	Stop Frequency	Detector	Meas. Bandw.	RBW	VBW	Transducer
2.31 GHz	2.412 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)



BAND EDGE COMPLIANCE

§15.247 (c)

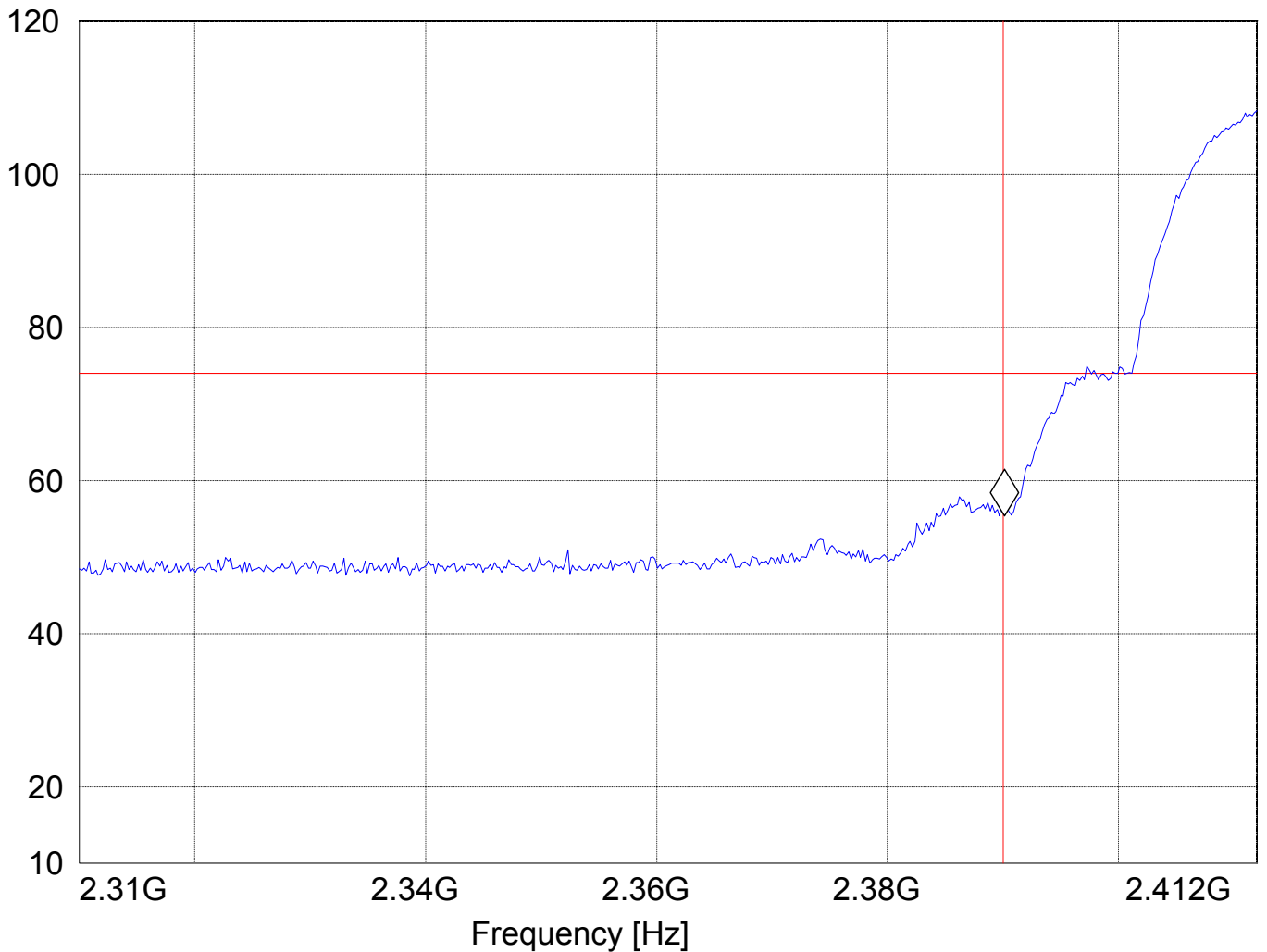
**Low frequency section (spurious in the restricted band 2310 – 2390 MHz)
(Peak measurement)**

Operating condition : Tx at 2412MHz
 SWEEP TABLE : "FCC15.247 LBE_Pk"
 Limit Line : 74dB μ V

Start Frequency	Stop Frequency	Detector	Meas. Bandw.	RBW	VBW	Transducer
2.31 GHz	2.412 GHz	MaxPeak	Coupled	1 MHz	1MHz	#326 horn (dBi)

Marker: 2.390128257 GHz 55.34 dB μ V/m

Level [dB μ V/m]



BAND EDGE COMPLIANCE

§15.247 (c)

High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)

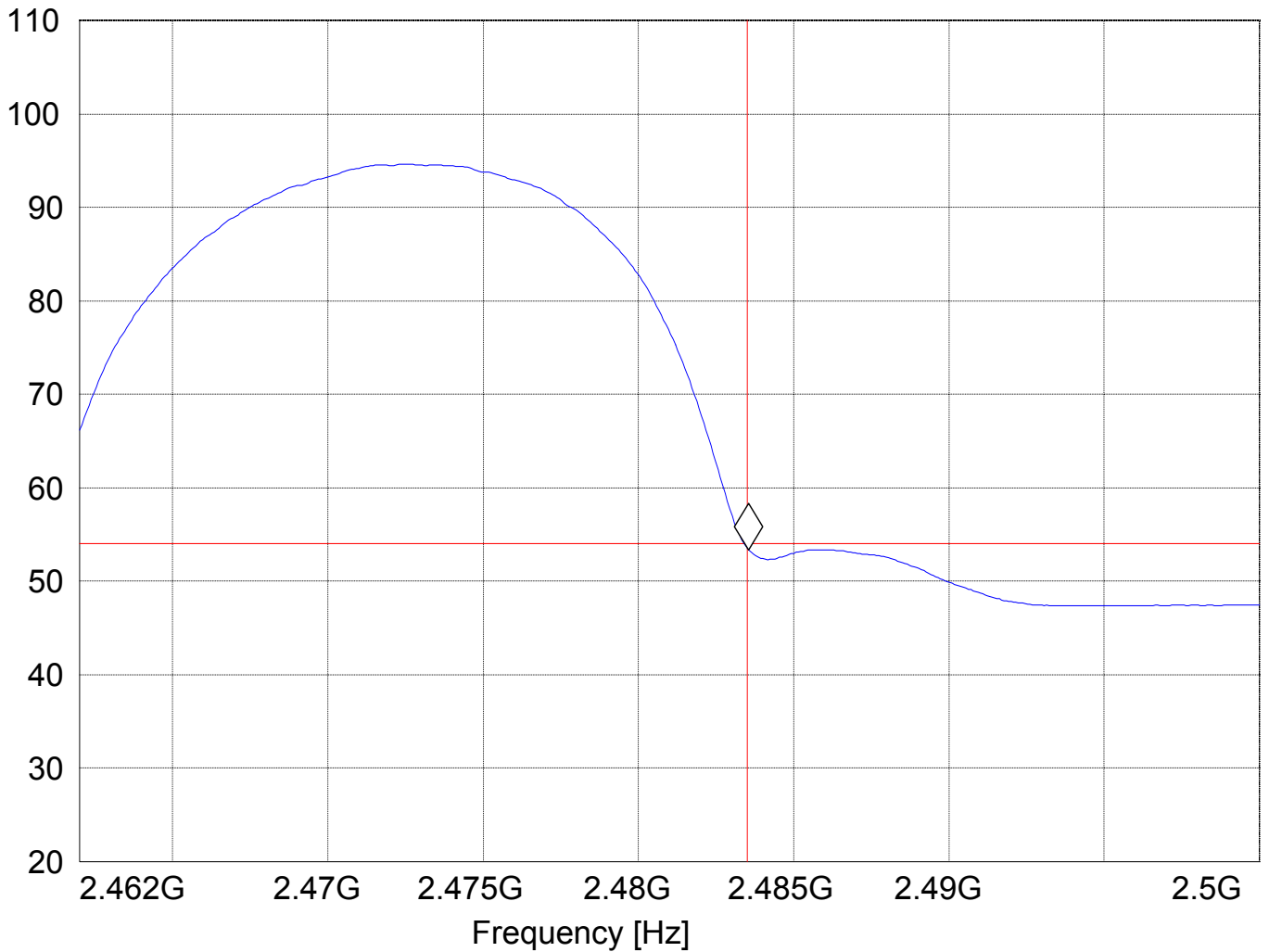
(Average measurement)

Operating condition : Tx at 2472MHz
 SWEEP TABLE : "FCC15.247 HBE_AVG"
 Limit Line : 54dBμV

Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
2.462 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)

Marker: 2.483551102 GHz 53.37 dBμV/m

Level [dBμV/m]



BAND EDGE COMPLIANCE

§15.247 (c)

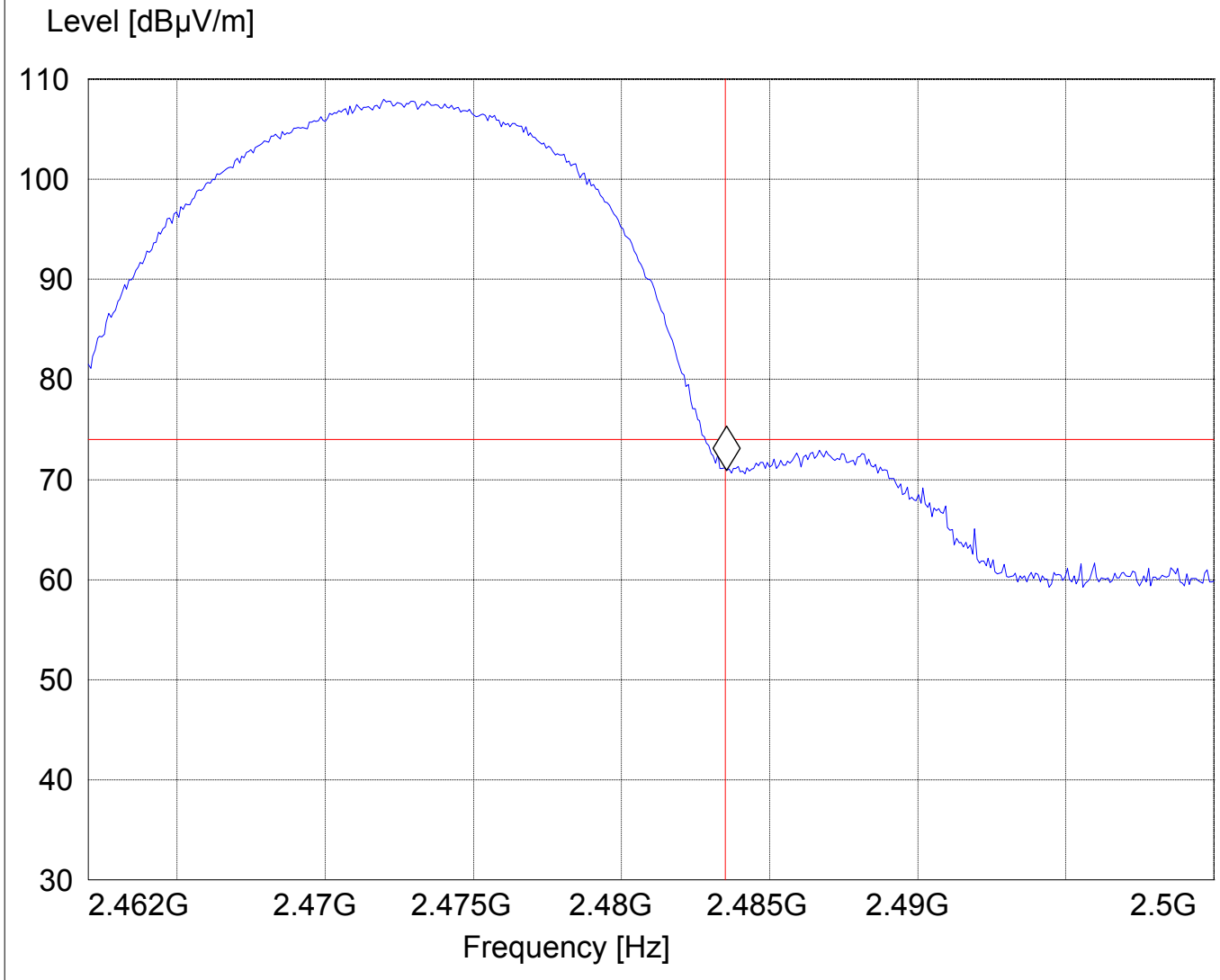
High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)

(Peak measurement)

Operating condition : Tx at 2472MHz
 SWEEP TABLE : "FCC15.247 HBE_PK"
 Limit Line : 74dBμV

Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
2.462 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	1MHz	#326 horn (dBi)

Marker: 2.483551102 GHz 70.93 dBμV/m



**EMISSION LIMITATIONS
Transmitter (Conducted)
LIMITS****§ 15.247 (c) (1)**

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)).

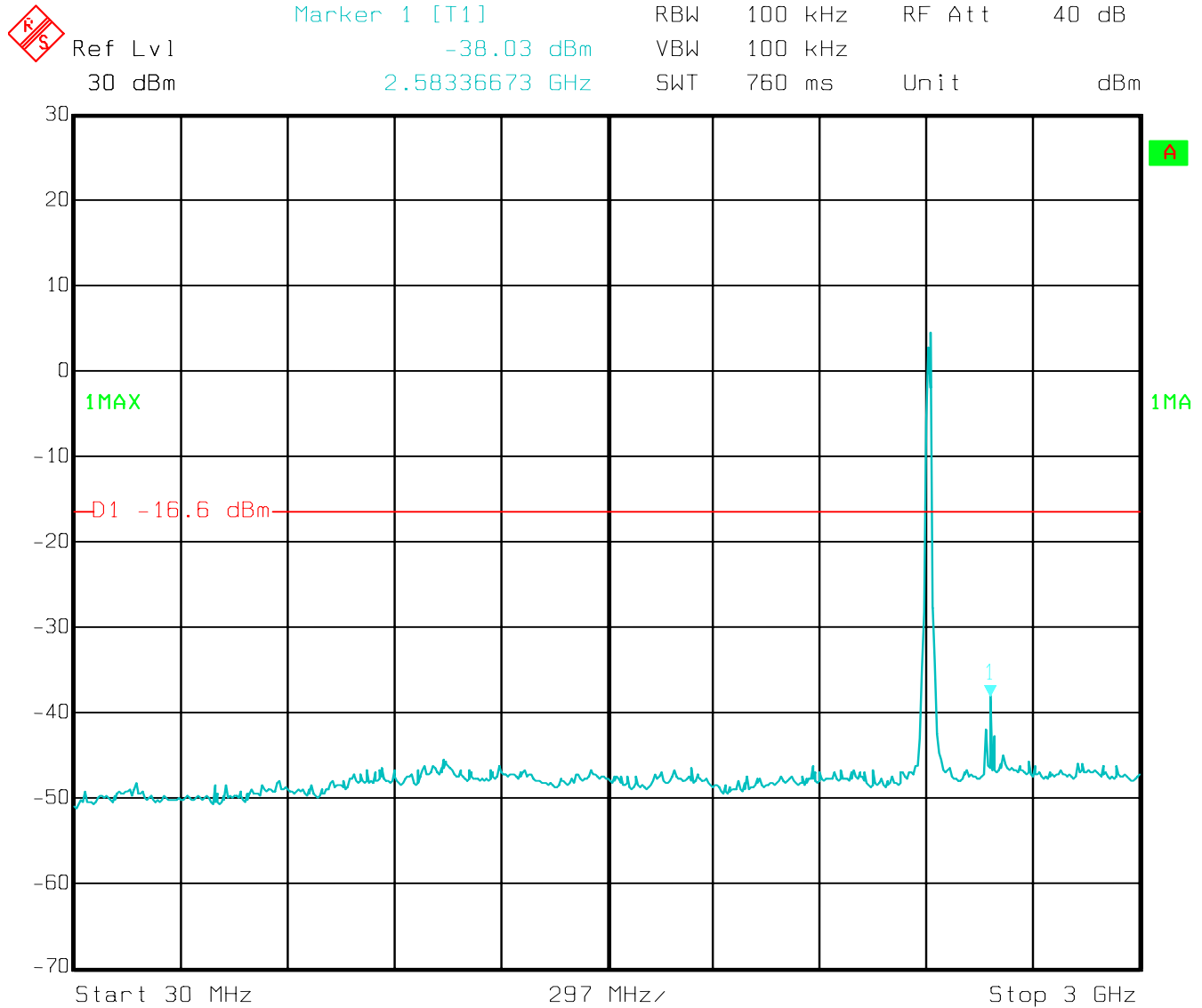
NOTE: Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.

EMISSION LIMITATIONS - Conducted (Transmitter)

§ 15.247 (c) (1)

Lowest Channel (2412MHz): 30MHz - 3GHz

NOTE: The peak above the limit line is the carrier frequency.



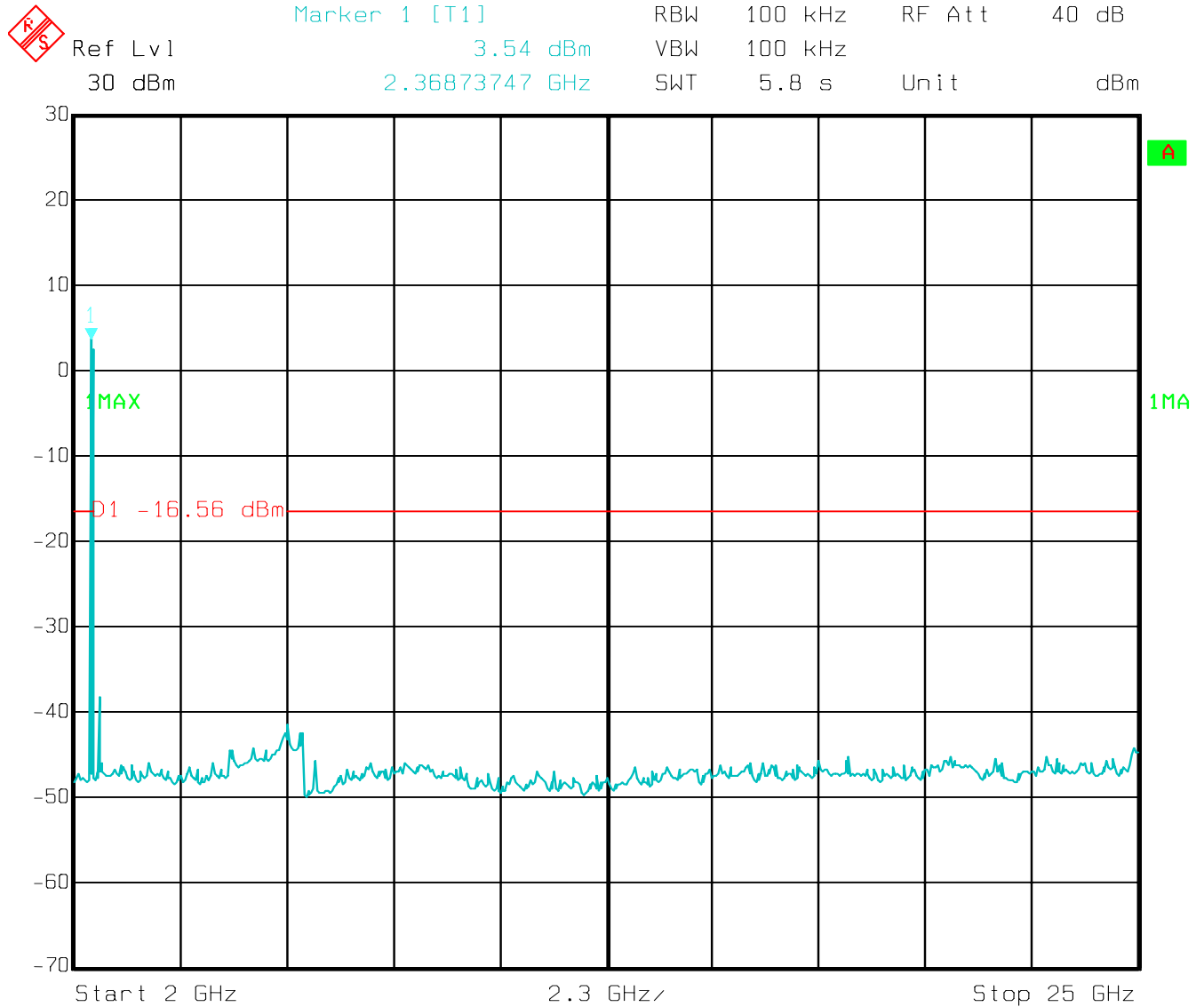
Date: 28.FEB.2003 10:32:41

EMISSION LIMITATIONS - Conducted (Transmitter)

§ 15.247 (c) (1)

Lowest Channel (2412MHz): 2GHz - 25GHz

NOTE: The peak above the limit line is the carrier frequency.



Date: 28.FEB.2003 10:34:27

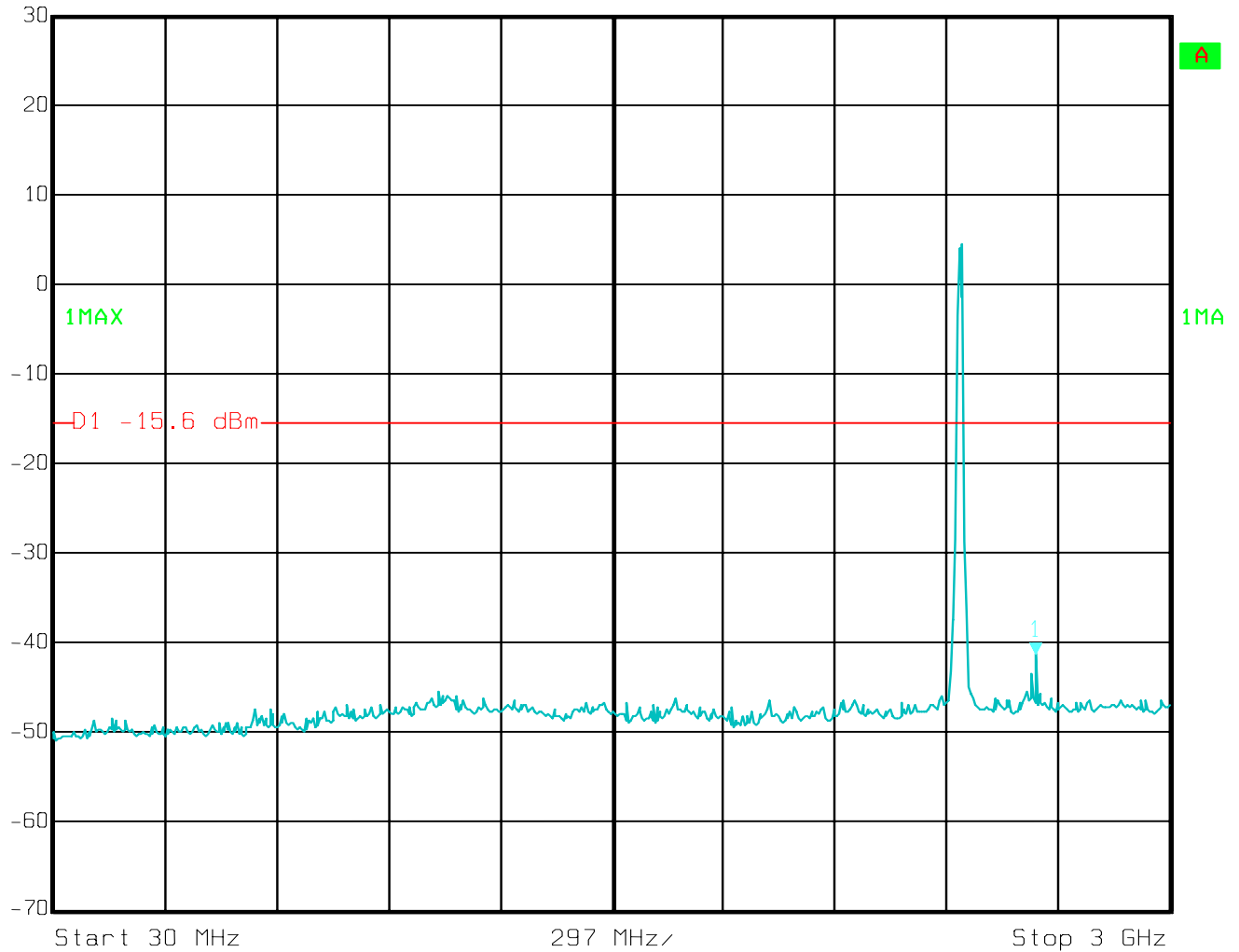
EMISSION LIMITATIONS - Conducted (Transmitter)

§ 15.247 (c) (1)

Mid Channel (2442MHz): 30MHz - 3GHz

NOTE: The peak above the limit line is the carrier frequency.

	Ref Lvl	Marker 1 [T1]	RBW	100 kHz	RF Att	40 dB
	30 dBm	-41.45 dBm	VBW	100 kHz		
		2.64288577 GHz	SWT	760 ms	Unit	dBm



Date: 28.FEB.2003 10:38:16

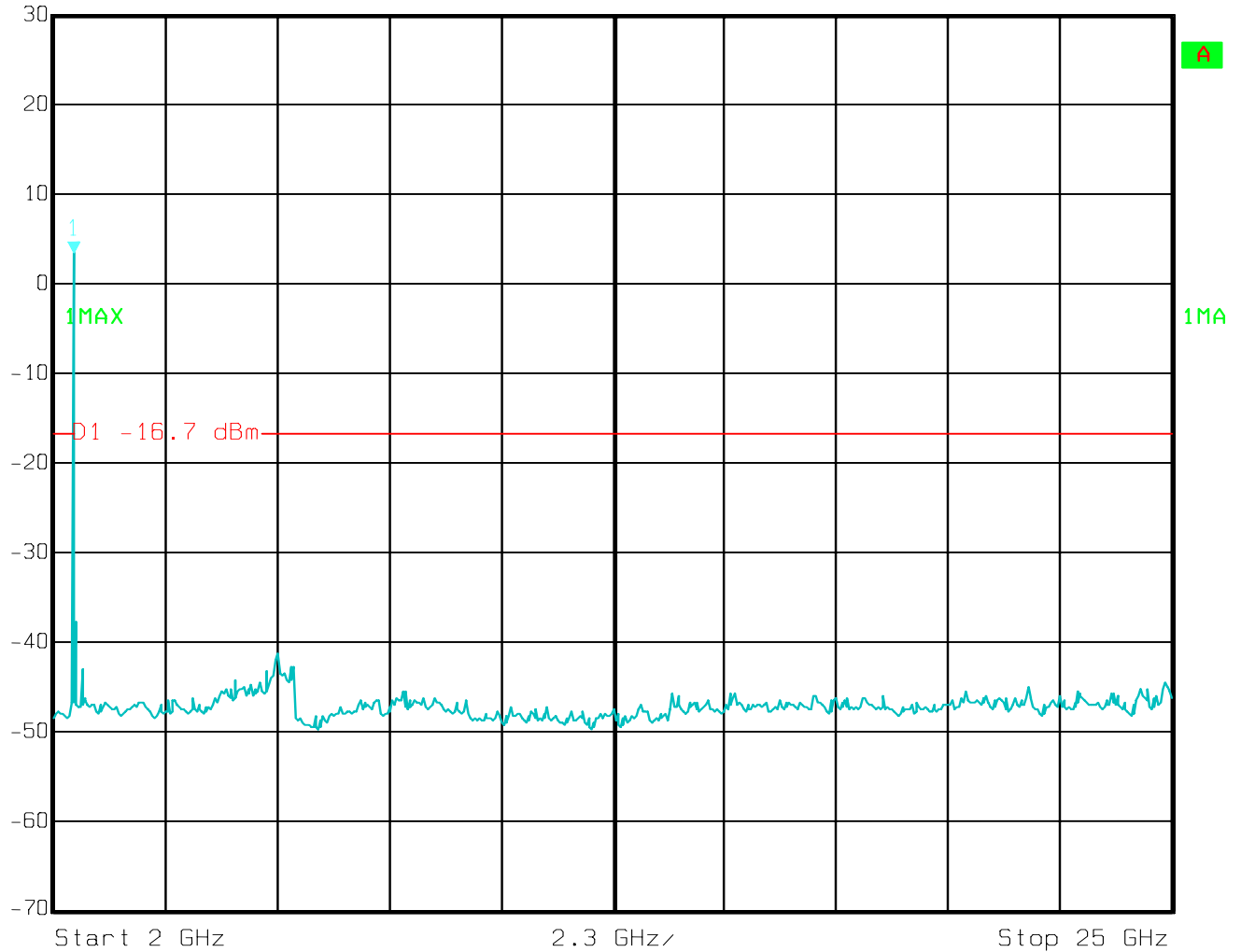
EMISSION LIMITATIONS - Conducted (Transmitter)

§ 15.247 (c) (1)

Mid Channel (2442MHz): 2GHz - 25GHz

NOTE: The peak above the limit line is the carrier frequency.

	Ref Lvl	Marker 1 [T1]	RBW	100 kHz	RF Att	40 dB
	30 dBm	3.30 dBm	VBW	100 kHz		
		2.41482966 GHz	SWT	5.8 s	Unit	dBm



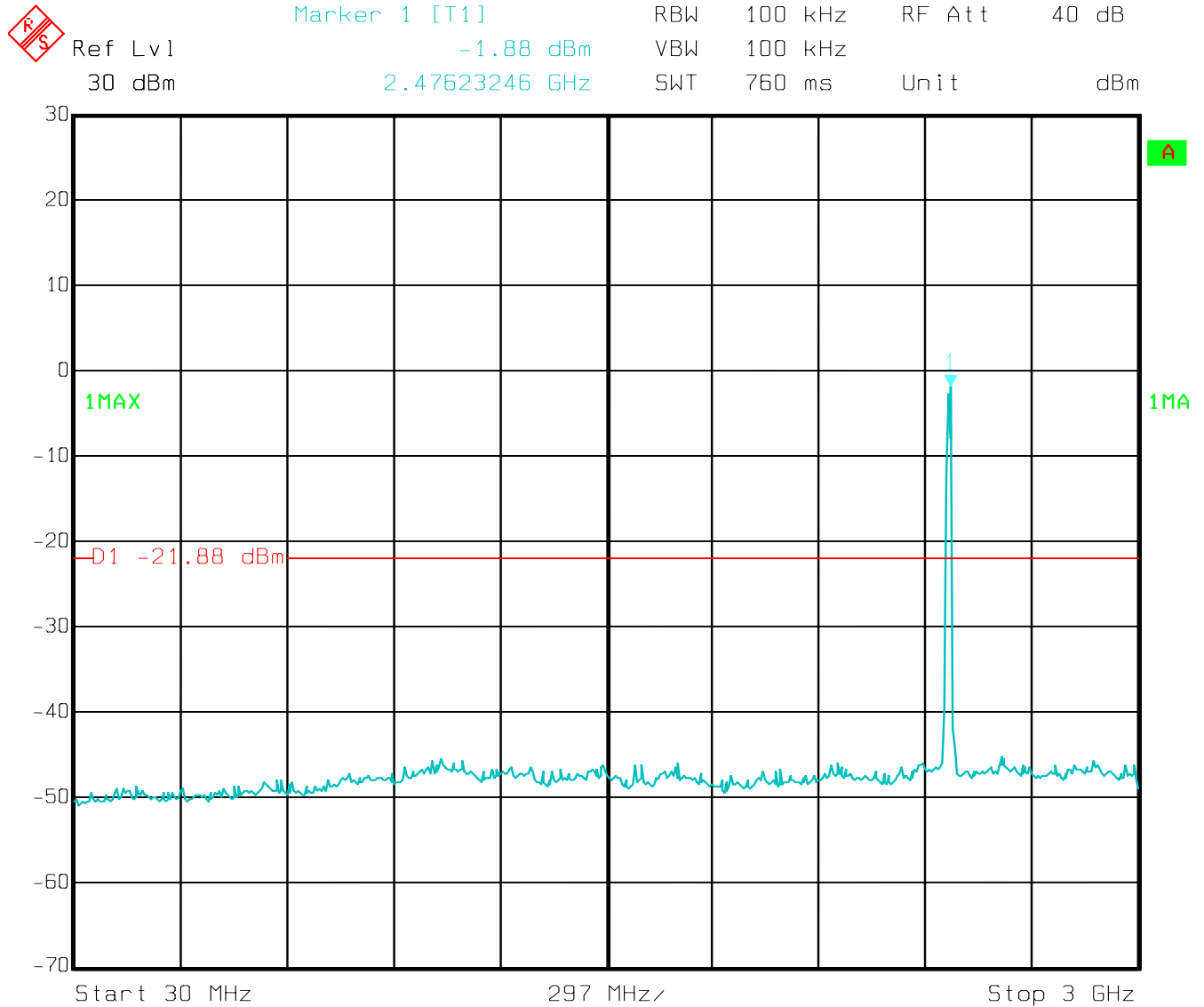
Date: 28.FEB.2003 10:36:11

EMISSION LIMITATIONS - Conducted (Transmitter)

§ 15.247 (c) (1)

Highest Channel (2472MHz): 30MHz - 3GHz

NOTE: The peak above the limit line is the carrier frequency.



Date: 28.FEB.2003 10:40:55

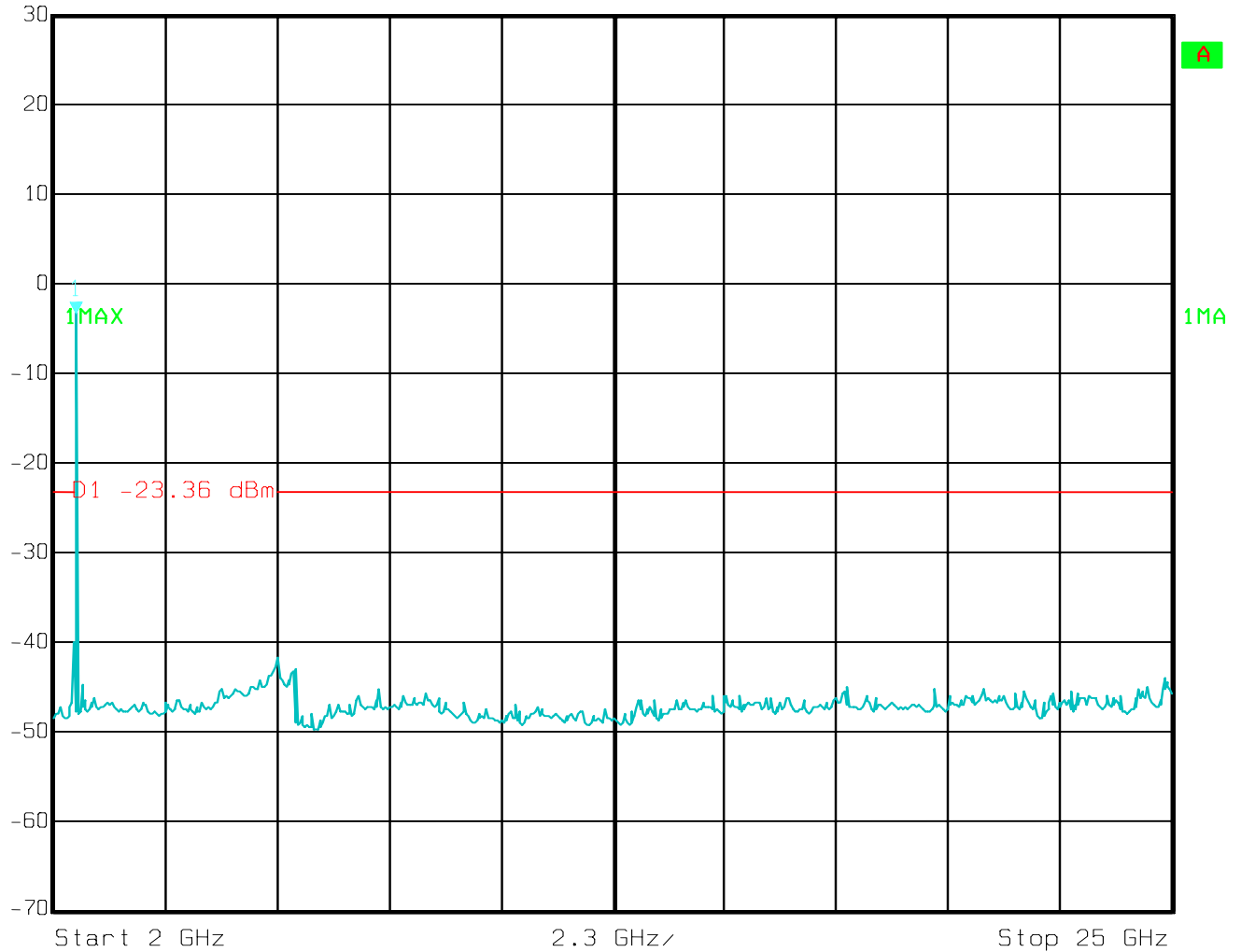
EMISSION LIMITATIONS - Conducted (Transmitter)

§ 15.247 (c) (1)

Highest Channel (2472MHz): 2GHz - 25GHz

NOTE: The peak above the limit line is the carrier frequency.

	Ref Lvl	Marker 1 [T1]	RBW	100 kHz	RF Att	40 dB
	30 dBm	-3.26 dBm	VBW	100 kHz		
		2.46092184 GHz	SWT	5.8 s	Unit	dBm



Date: 28.FEB.2003 10:43:03

EMISSION LIMITATIONS
Transmitter (Radiated)

§ 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)).

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 18 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.
2. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.
3. All measurements are done in peak mode 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

EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

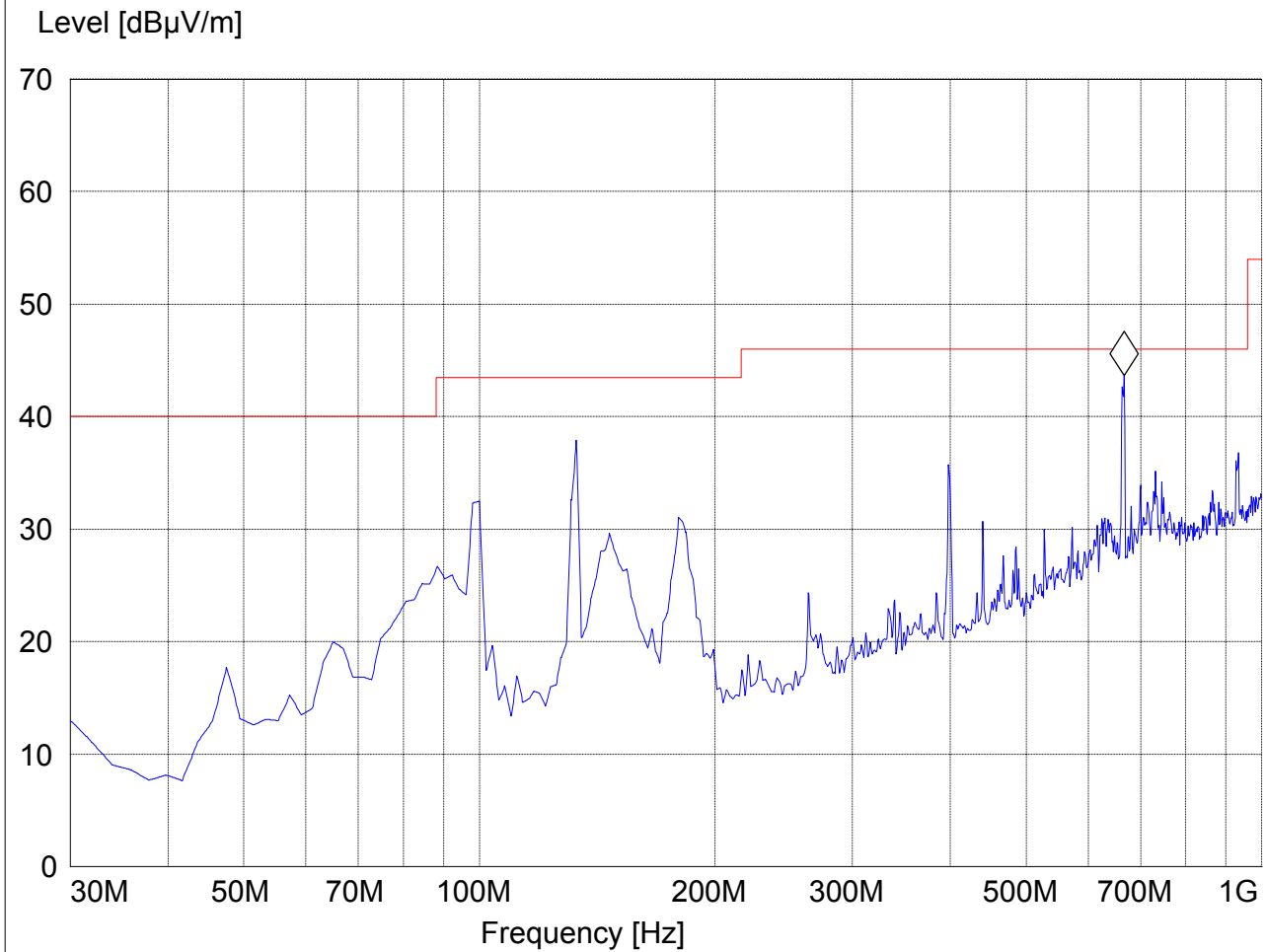
Transmit at Lowest channel Frequency 2402MHz			
Frequency (MHz)	Level (dBμV/m)		
	Peak	Quasi-Peak	Average
2619	48.85		
2583	47.49		
Transmit at Middle channel Frequency 2440MHz			
Frequency (MHz)	Level (dBμV/m)		
	Peak	Quasi-Peak	Average
2619	48.33		
4300	47.27		
7250	46.50		
9763	47.20		
Transmit at Highest channel Frequency 2480MHz			
Frequency (MHz)	Level (dBμV/m)		
	Peak	Quasi-Peak	Average
2619	47.67		

EMISSION LIMITATIONS - Radiated (Transmitter)
Lowest Channel (2412MHz): 30MHz – 1GHz

§ 15.247 (c) (1)

SWEEP TABLE:		"BT Spuri hi 30-1G"			
Short Description:		Bluetooth 30MHz-1GHz			
Start	Stop	Detector	Meas. Time	RBW	Transducer
Frequency	Frequency			VBW	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186

Marker: 667.59519 MHz 43.66 dBµV/m

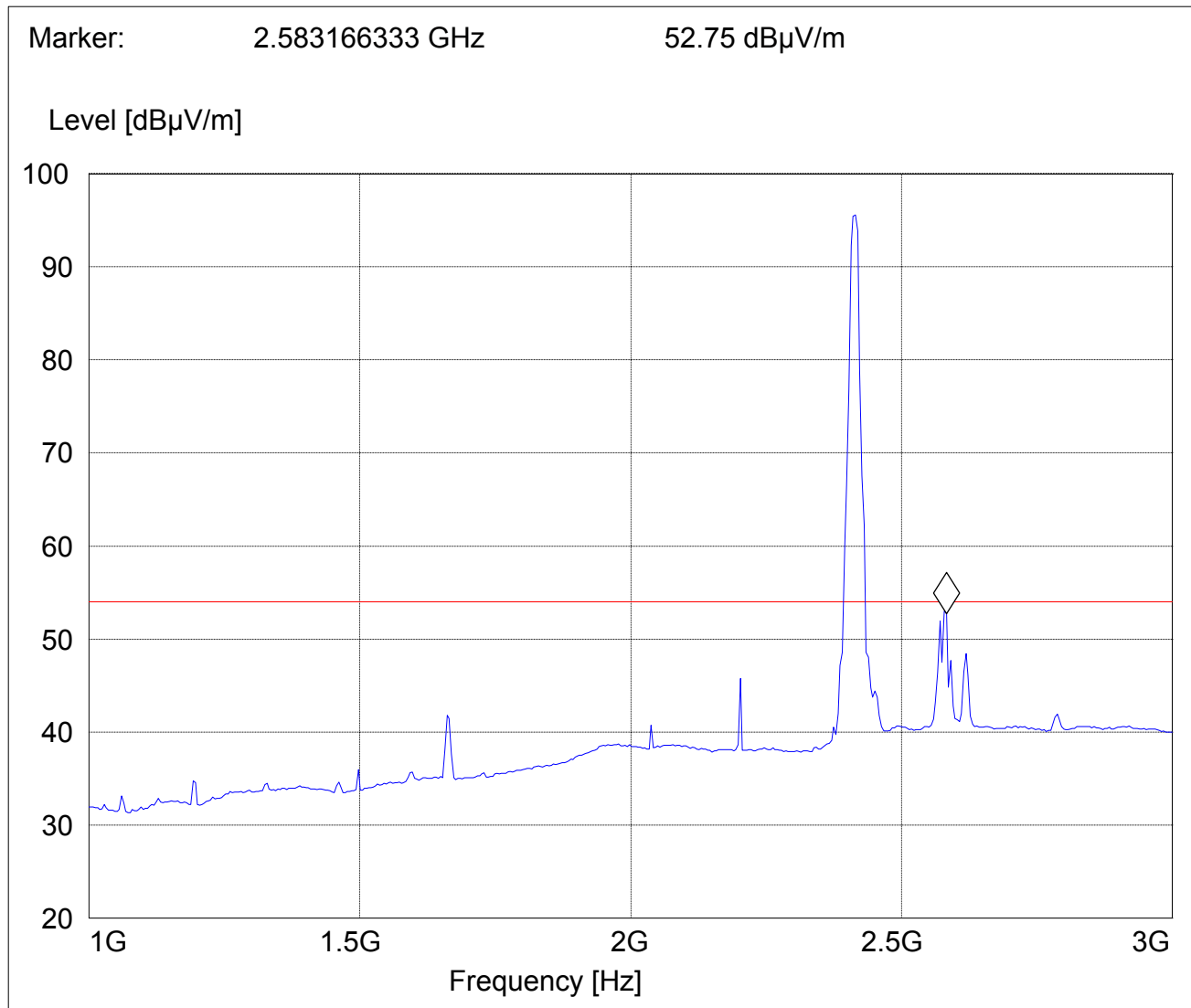


EMISSION LIMITATIONS - Radiated (Transmitter)
Lowest Channel(2412MHz): 1GHz – 3GHz

§ 15.247 (c) (1)

NOTE: The peak above the limit is the carrier frequency.

SWEEP TABLE:		"BT Spuri hi 1-8G"			
Short Description:		Bluetooth Spurious 1-8 GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
1.0 GHz	8.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



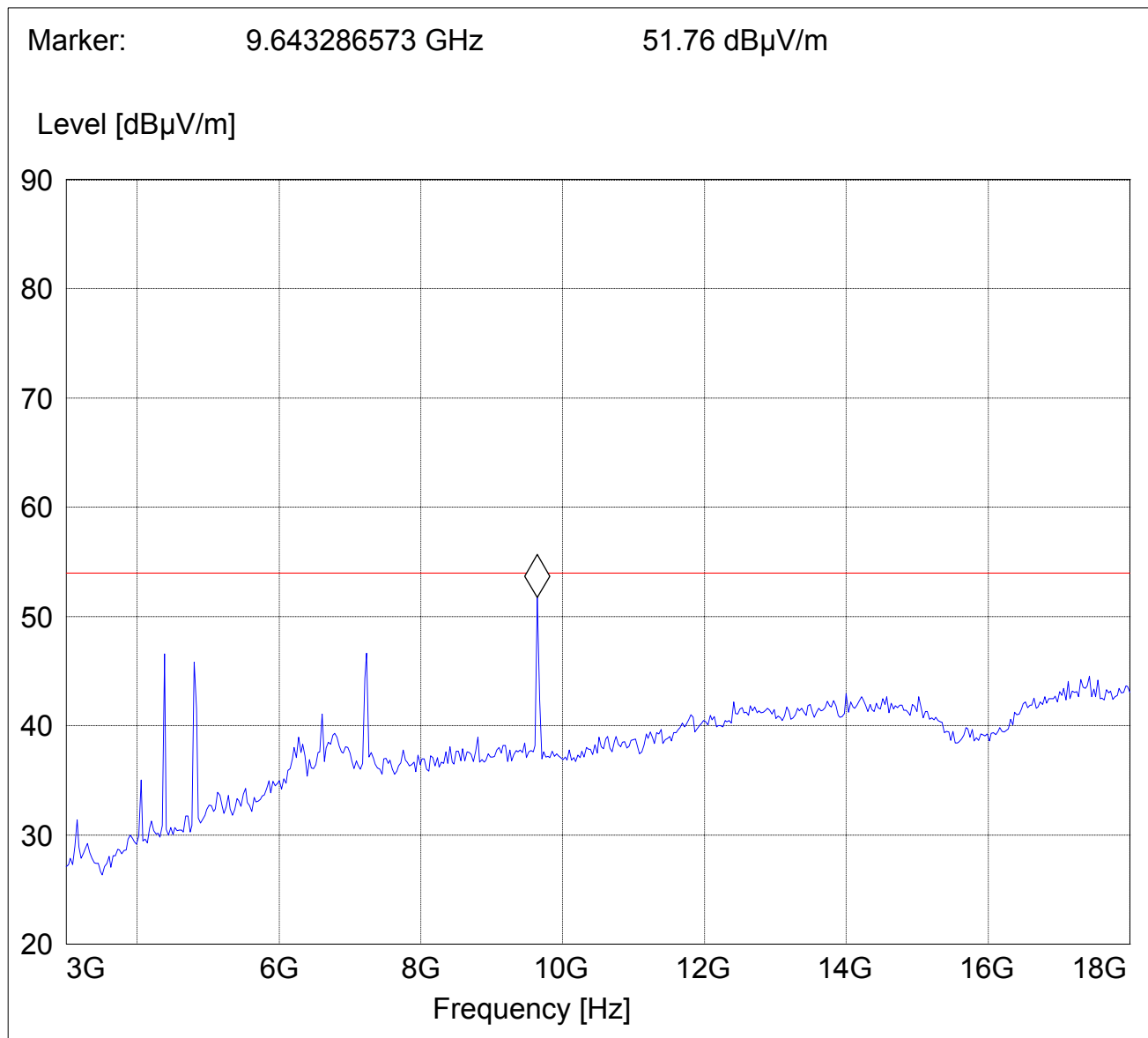
EMISSION LIMITATIONS - Radiated (Transmitter)
Lowest Channel(2412MHz): 3GHz – 18GHz

§ 15.247 (c) (1)

NOTE: The peak above the limit is the carrier frequency.

SWEEP TABLE:		"BT Spuri hi 1-8G"			
Short Description:		Bluetooth Spurious 1-8 GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
1.0 GHz	8.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)

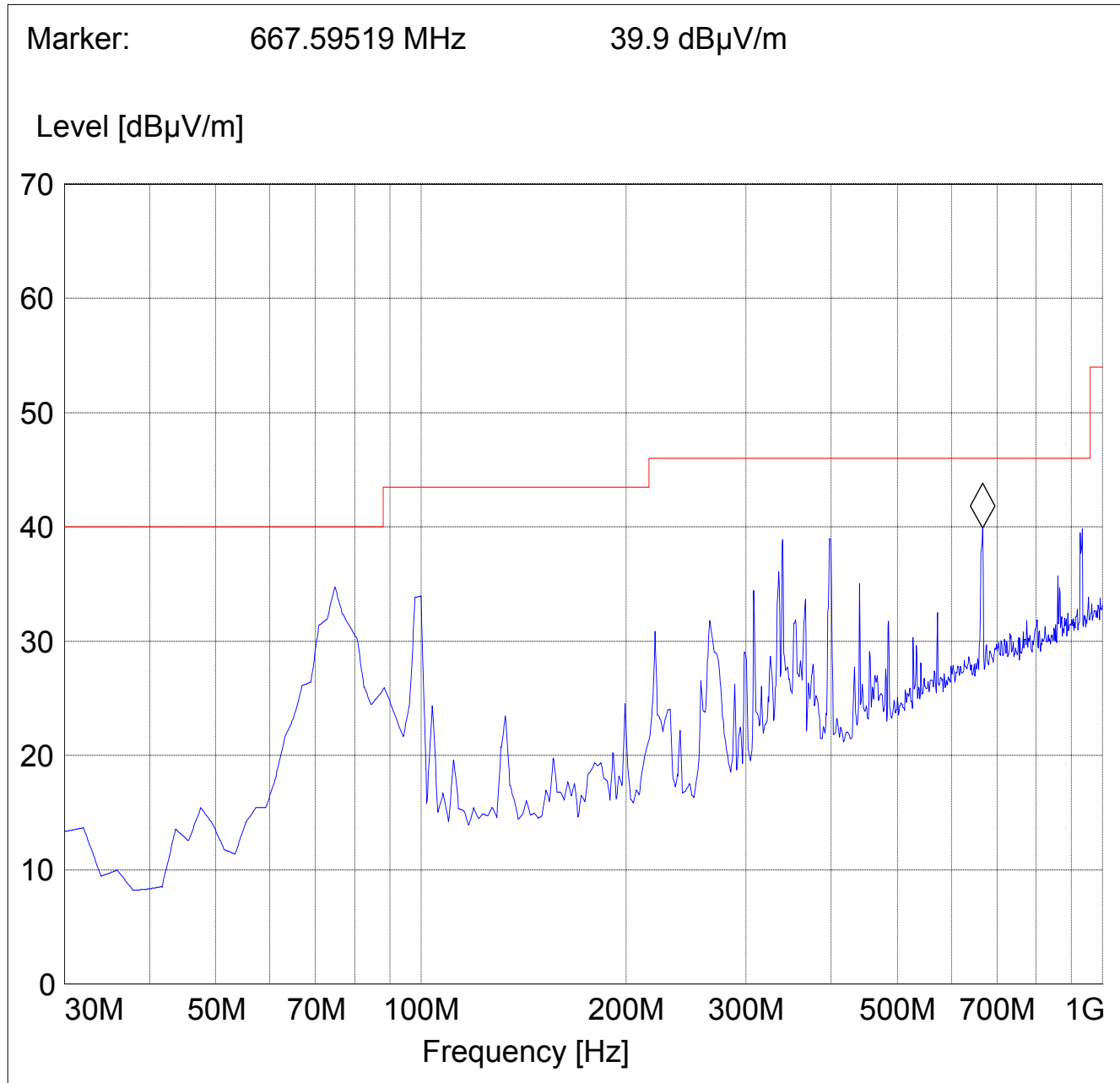
Note: due to the high noise floor measurement between 6GHz – 8GHz was repeated with different pre-amp and the emissions were found more than 6dB below the limit line.



EMISSION LIMITATIONS - Radiated (Transmitter)
Middle Channel(2442MHz): 30MHz – 1GHz

§ 15.247 (c) (1)

SWEEP TABLE:		"BT Spuri hi 30-1G"			
Short Description:		Bluetooth 30MHz-1GHz			
Start	Stop	Detector	Meas. Time	RBW	Transducer
Frequency	Frequency			VBW	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186

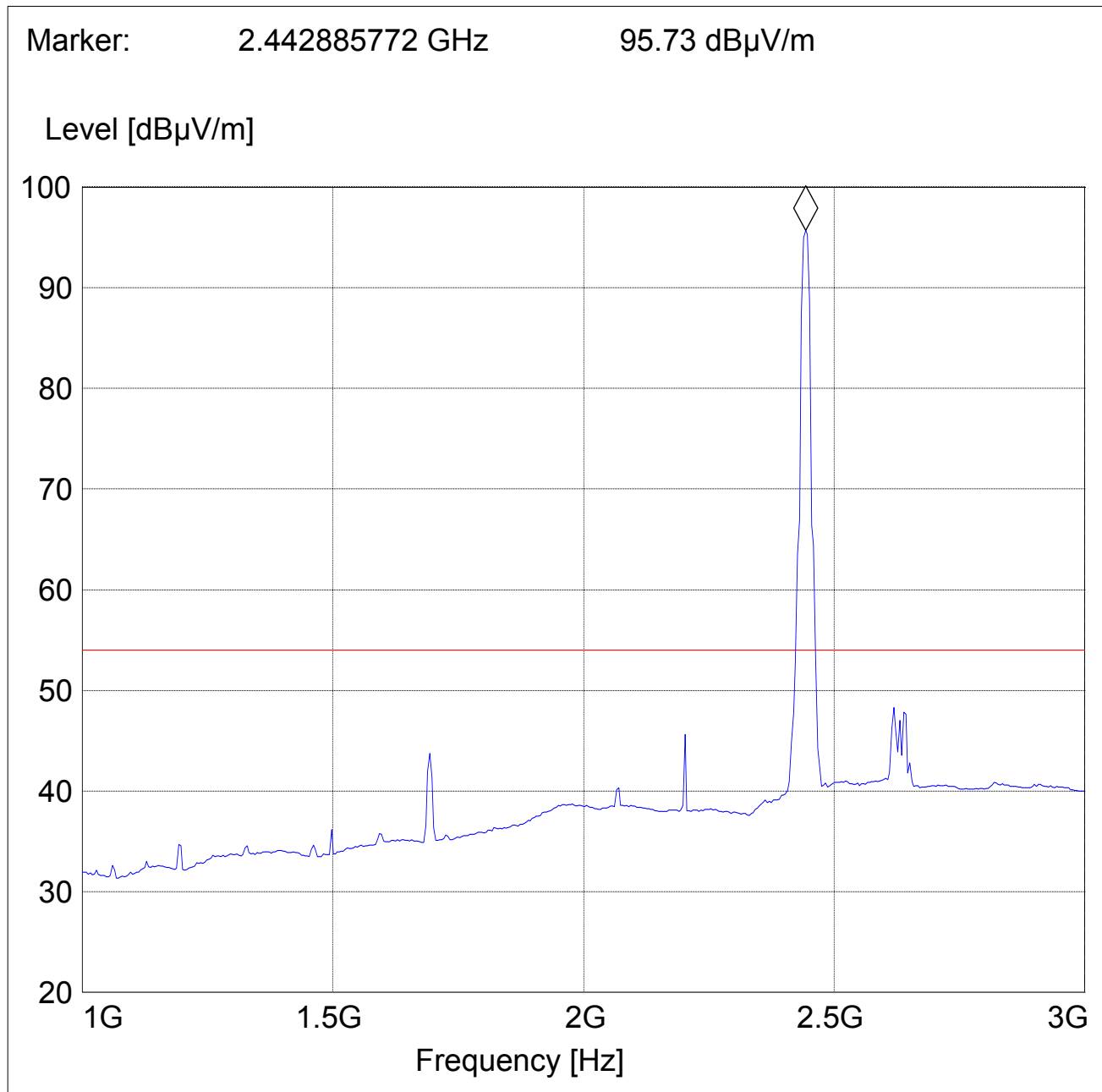


EMISSION LIMITATIONS - Radiated (Transmitter)
Middle Channel(2442MHz): 1GHz – 3GHz

§ 15.247 (c) (1)

NOTE: The peak above the limit is the carrier frequency.

SWEEP TABLE:		"BT Spuri hi 1-8G"			
Short Description:		Bluetooth Spurious 1-8GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
1.0 GHz	8.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)

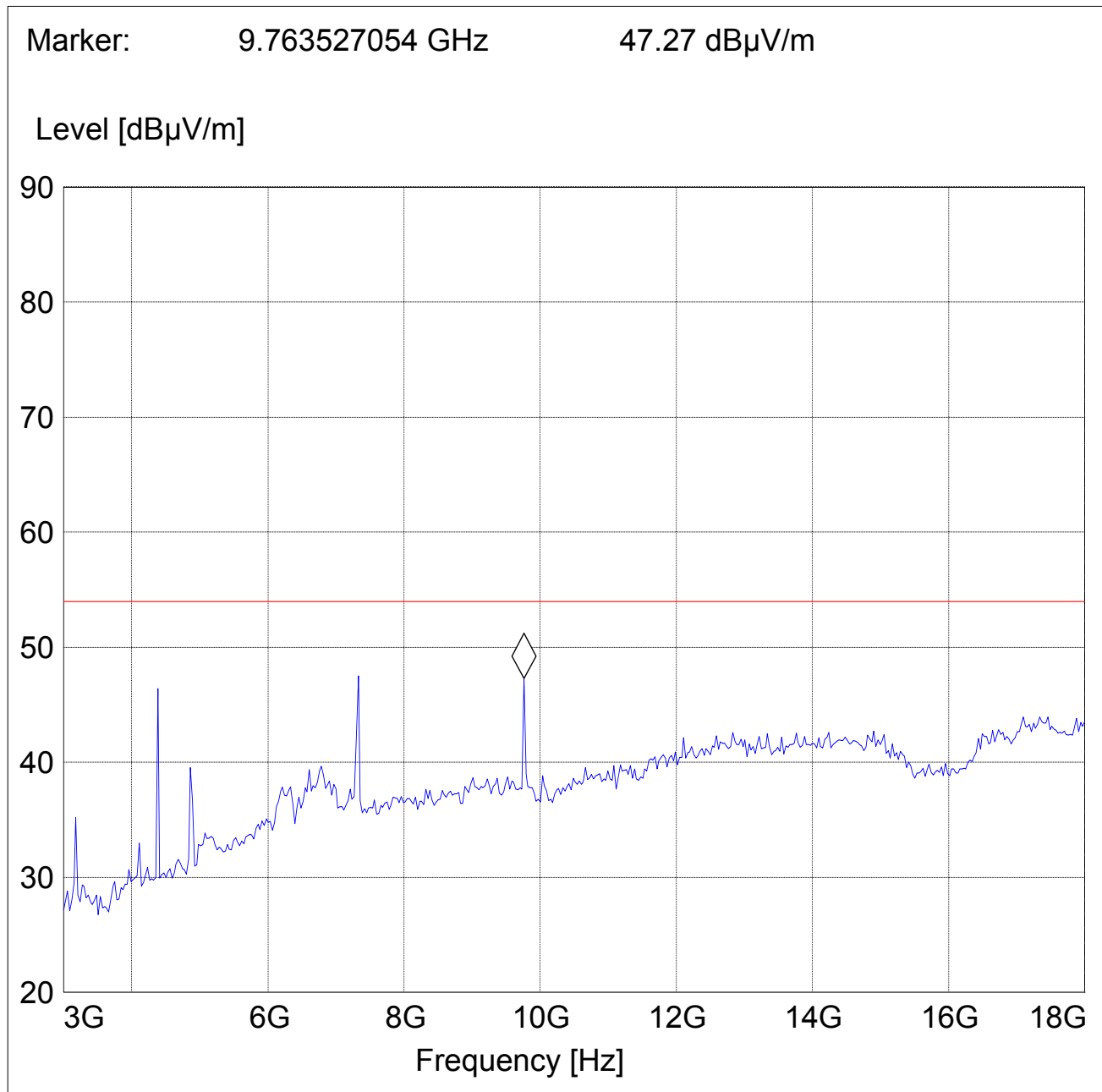


EMISSION LIMITATIONS - Radiated (Transmitter)
Middle Channel(2442MHz): 3GHz – 18GHz

§ 15.247 (c) (1)

NOTE: The peak above the limit is the carrier frequency.

SWEEP TABLE:		"BT Spuri hi 1-8G"			
Short Description:		Bluetooth Spurious 1-8GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
1.0 GHz	8.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)

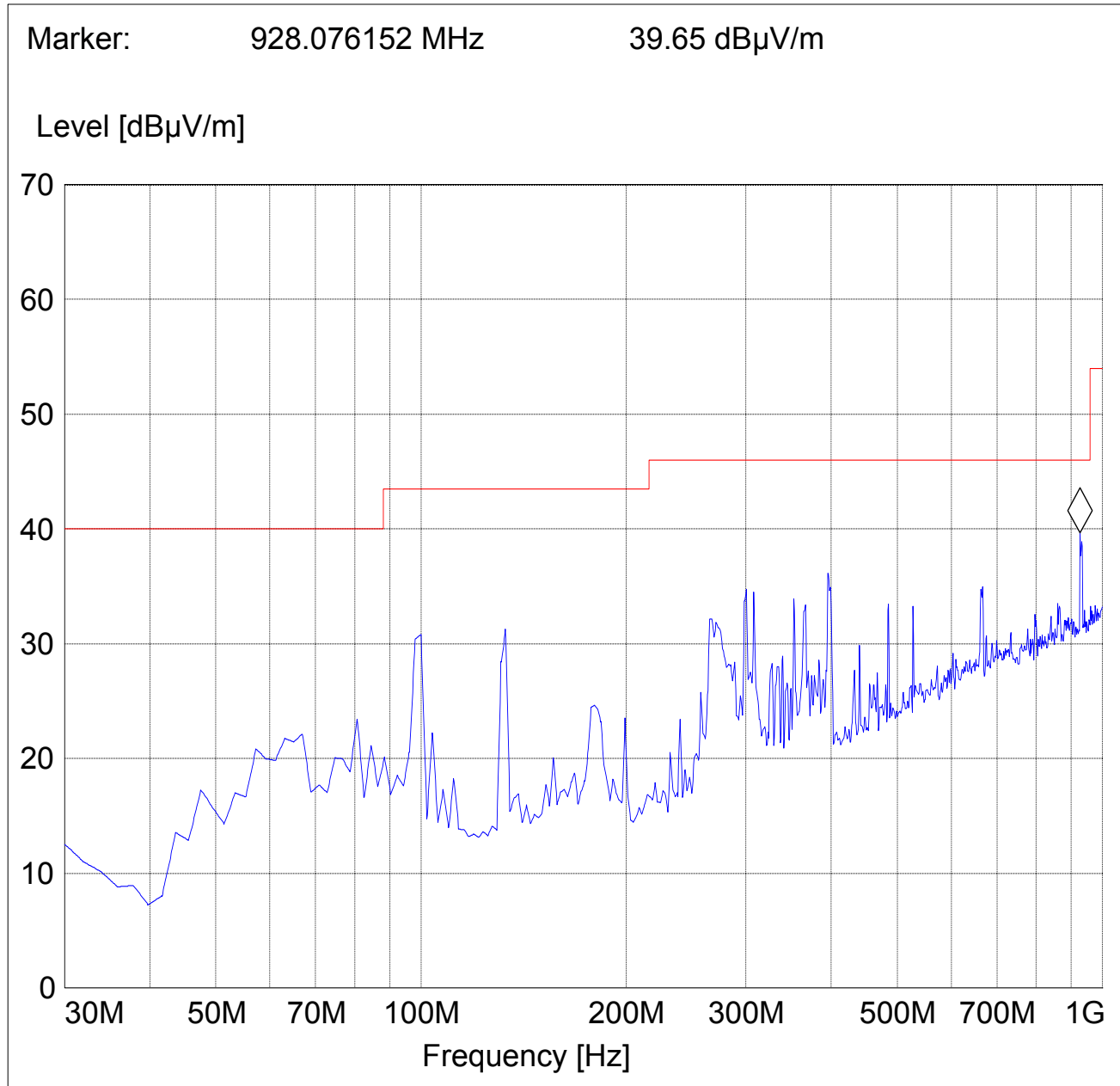


EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

Highest Channel(2472MHz): 30MHz – 1GHz

SWEEP TABLE:		"BT Spuri hi 30-1G"			
Short Description:		Bluetooth 30MHz-1GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency		Time	VBW	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186



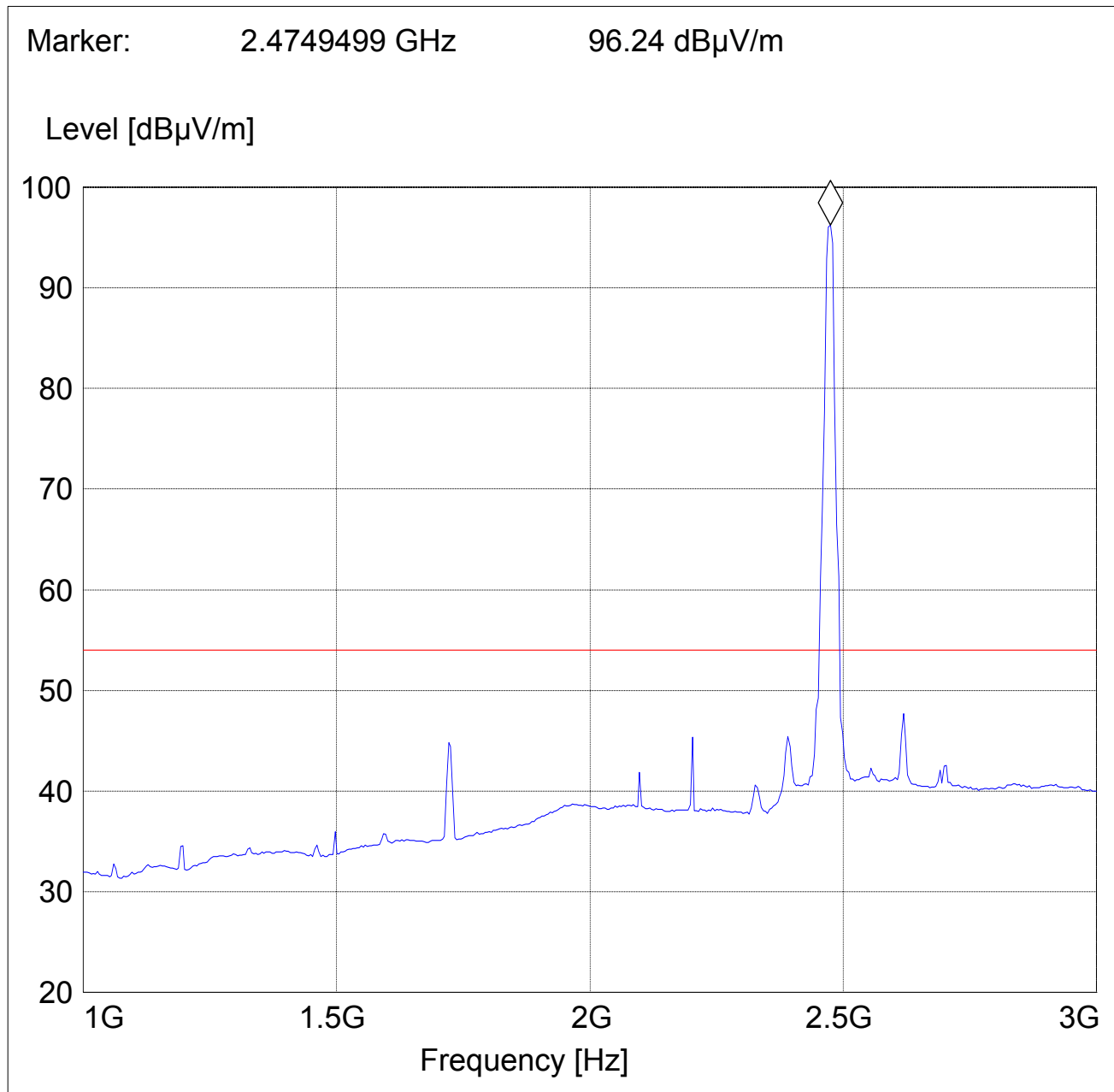
EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

Highest Channel(2472MHz): 1GHz – 3GHz

NOTE: The peak above the limit is the carrier frequency.

SWEEP TABLE:		"BT Spuri hi 1-8G"			
Short Description:		Bluetooth Spurious 1-8GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
1.0 GHz	8.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)

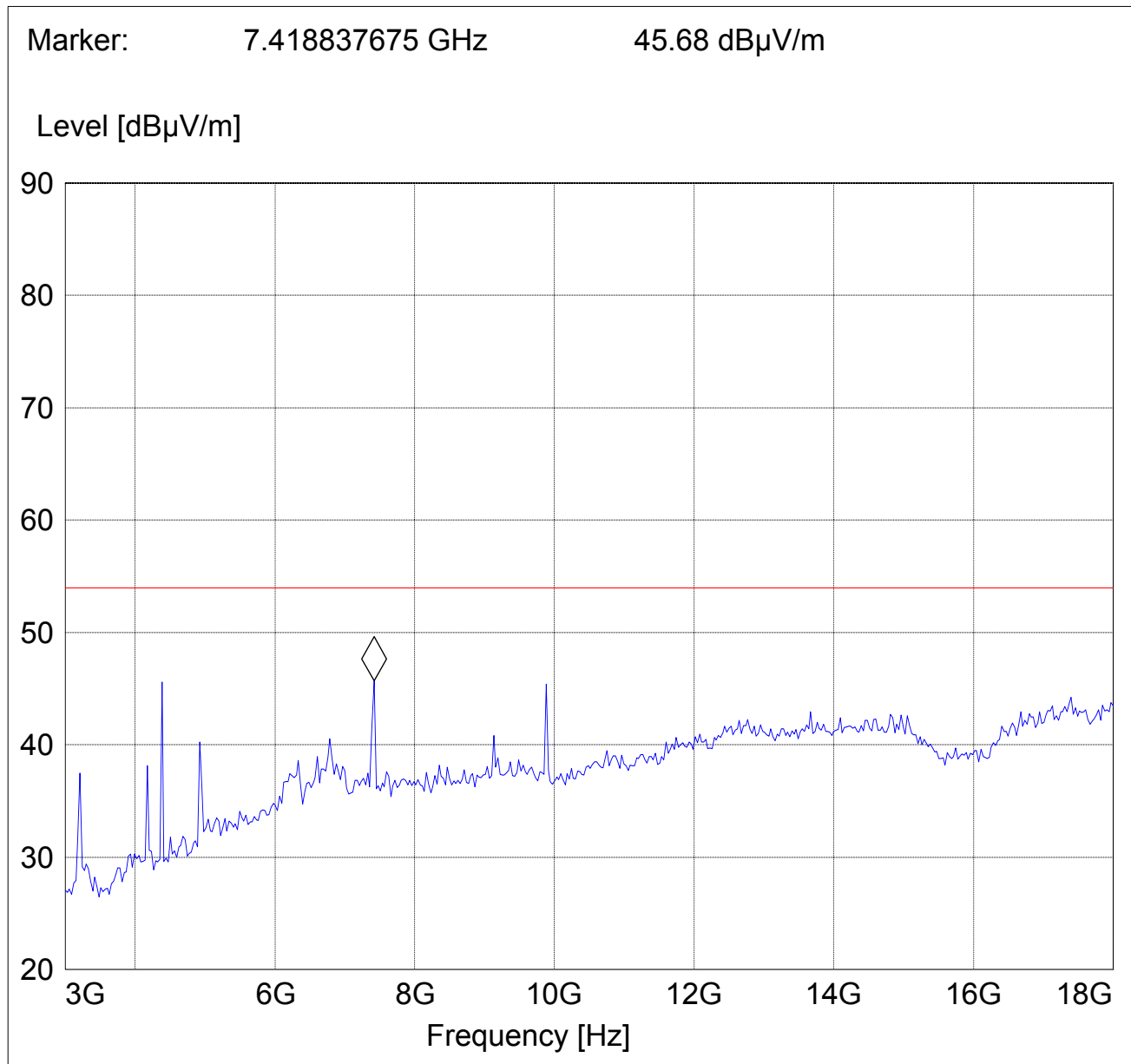


EMISSION LIMITATIONS - Radiated (Transmitter)
Highest Channel(2472MHz): 3GHz – 18GHz

§ 15.247 (c) (1)

NOTE: The peak above the limit is the carrier frequency.

SWEEP TABLE:		"BT Spuri hi 1-8G"			
Short Description:		Bluetooth Spurious 1-8GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
1.0 GHz	8.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

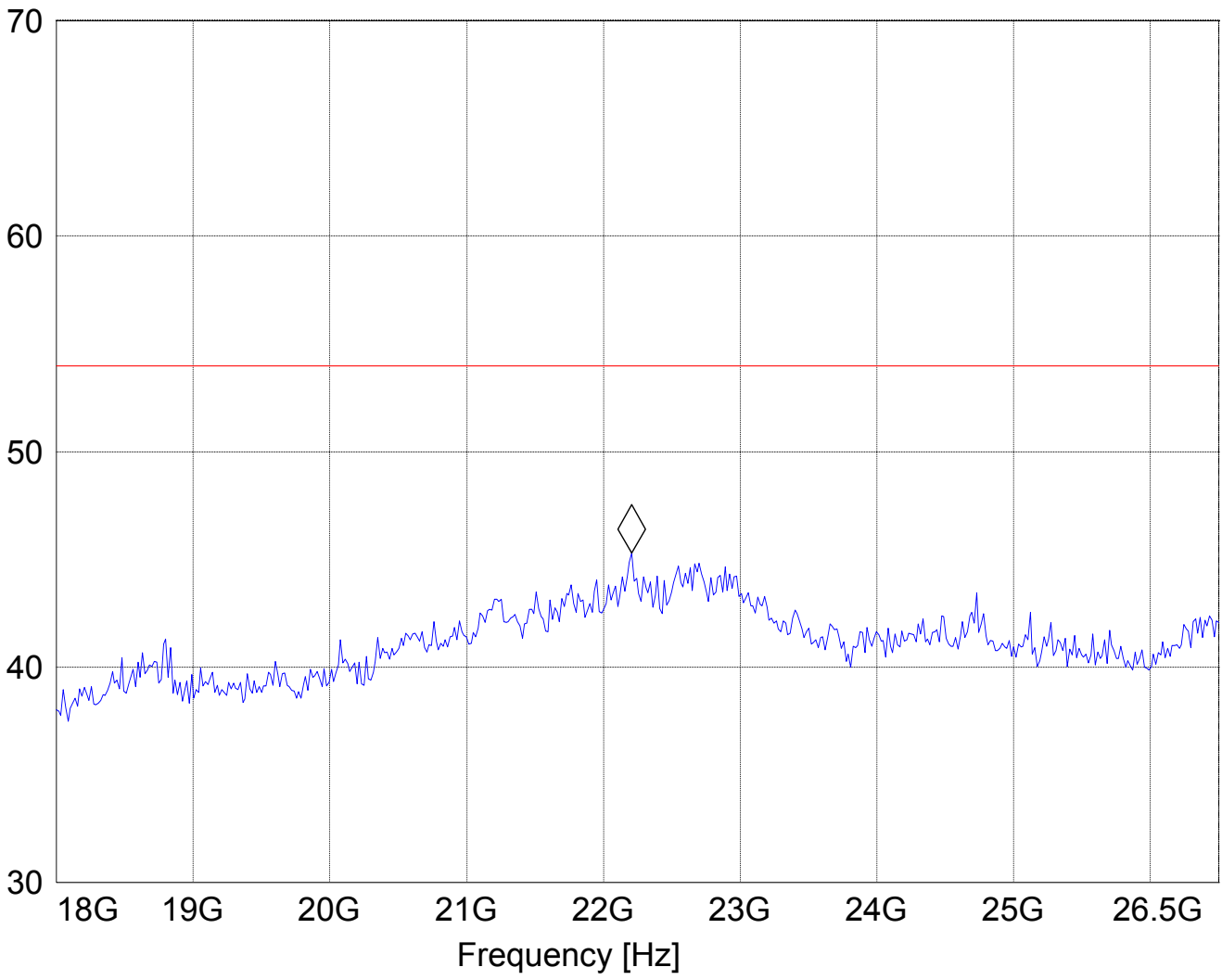
18GHz – 25GHz

(This plot is valid for all three channels)

SWEEP TABLE:		"BT Spuri hi 18-25G"			
Short Description:		Bluetooth Spurious 18-25GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
18 GHz	25 GHz	MaxPeak	Coupled	1 MHz	#141 horn (dBi)

Marker: 22.20741483 GHz 45.28 dB μ V/m

Level [dB μ V/m]



CONDUCTED EMISSIONS

§ 15.107/207

Measured with AC/DC power adapter

SWEEP TABLE: "55022 cond"

Short Description:	EN 55022 for 150KHz-30MHz				
Start	Stop	Detector	Meas	IF	Transducer
Frequency	Frequency		Time	Bandw.	
150.0 kHz	30.0 MHz	MaxPeak	Coupled	10 kHz	None

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

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

* Decreases with logarithm of the frequency

ANALYZER SETTINGS: RBW = 10KHz

VBW = 10KHz

RECEIVER SPURIOUS RADIATION**§ 15.209****Limits**

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/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:

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 18 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.

RECEIVER SPURIOUS RADIATION

§ 15.209

30MHz – 1GHz

SWEEP TABLE:

"BT Spuri hi 30-1G"

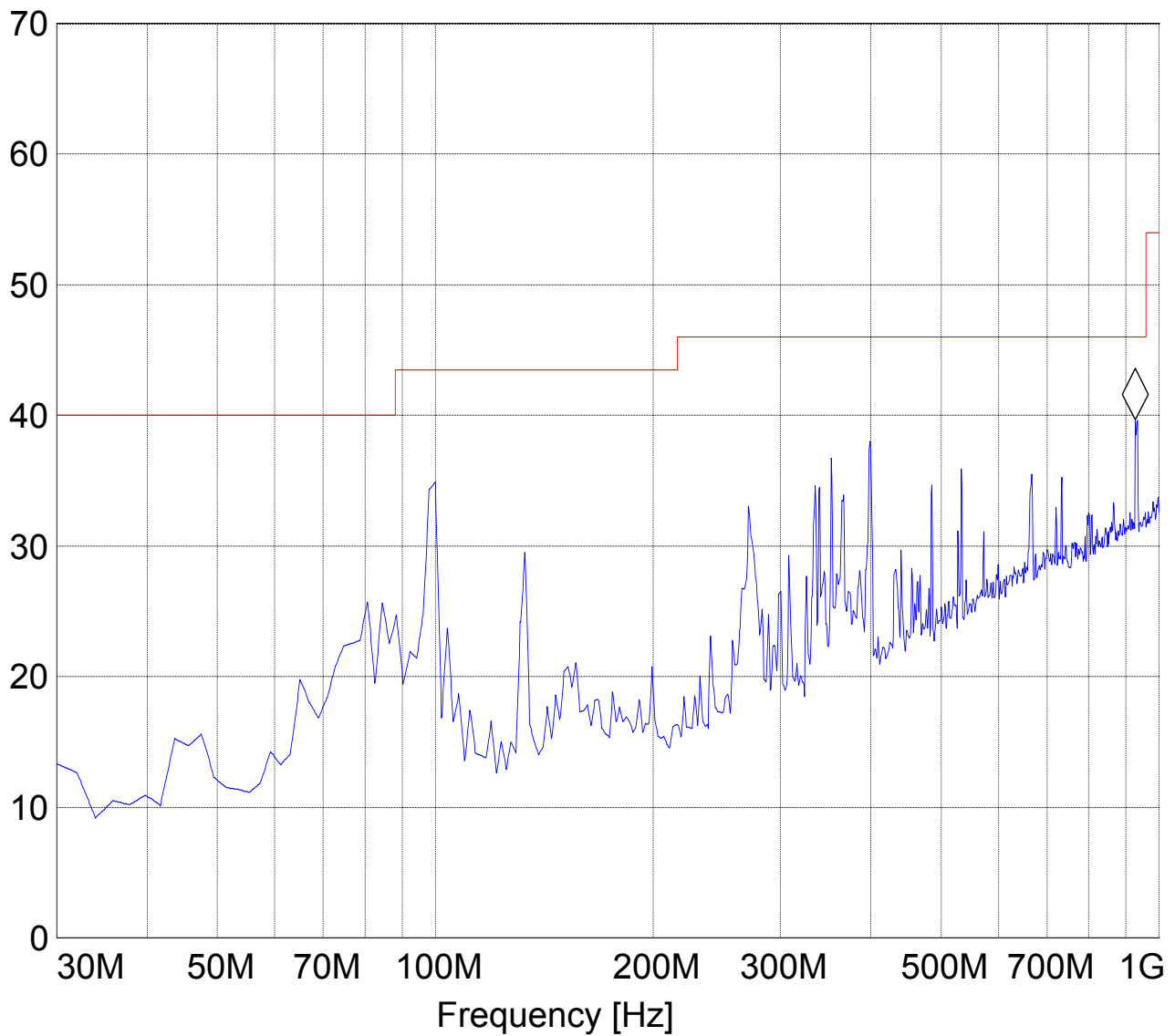
Short Description:

Bluetooth 30MHz-1GHz

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

Marker: 928.076152 MHz 39.66 dB μ V/m

Level [dB μ V/m]



RECEIVER SPURIOUS RADIATION

§ 15.209

1GHz – 3GHz

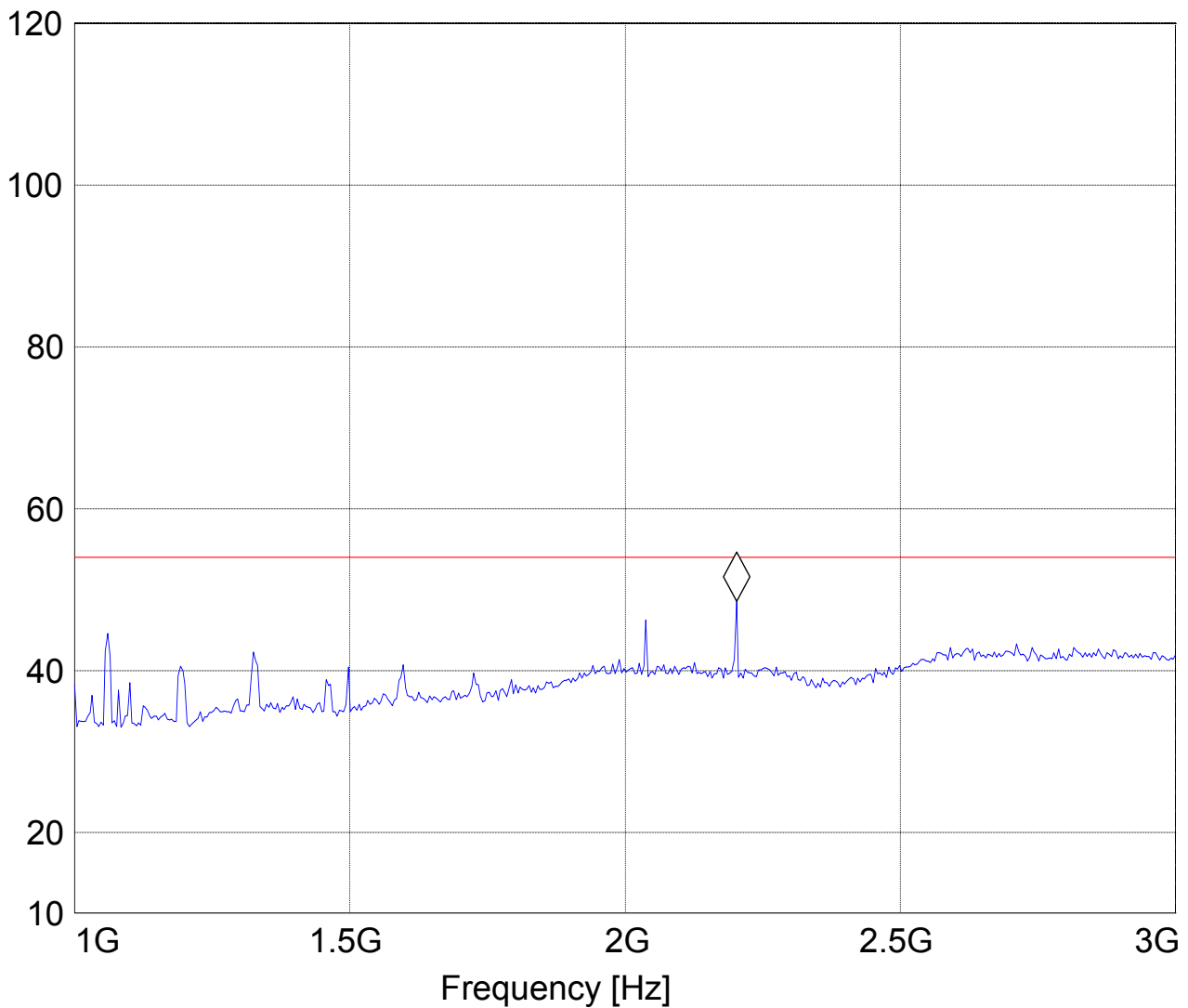
SWEEP TABLE:

"BT Spuri hi 1-8G"

Short Description:

Bluetooth Spurious 1-8 GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW	Transducer
1.0 GHz	8.0 GHz	MaxPeak	Coupled	1 MHz		#326 horn (dBi)

Marker: 2.20240481 GHz 48.53 dB μ V/mLevel [dB μ V/m]

RECEIVER SPURIOUS RADIATION

§ 15.209

3GHz – 18GHz

SWEEP TABLE:

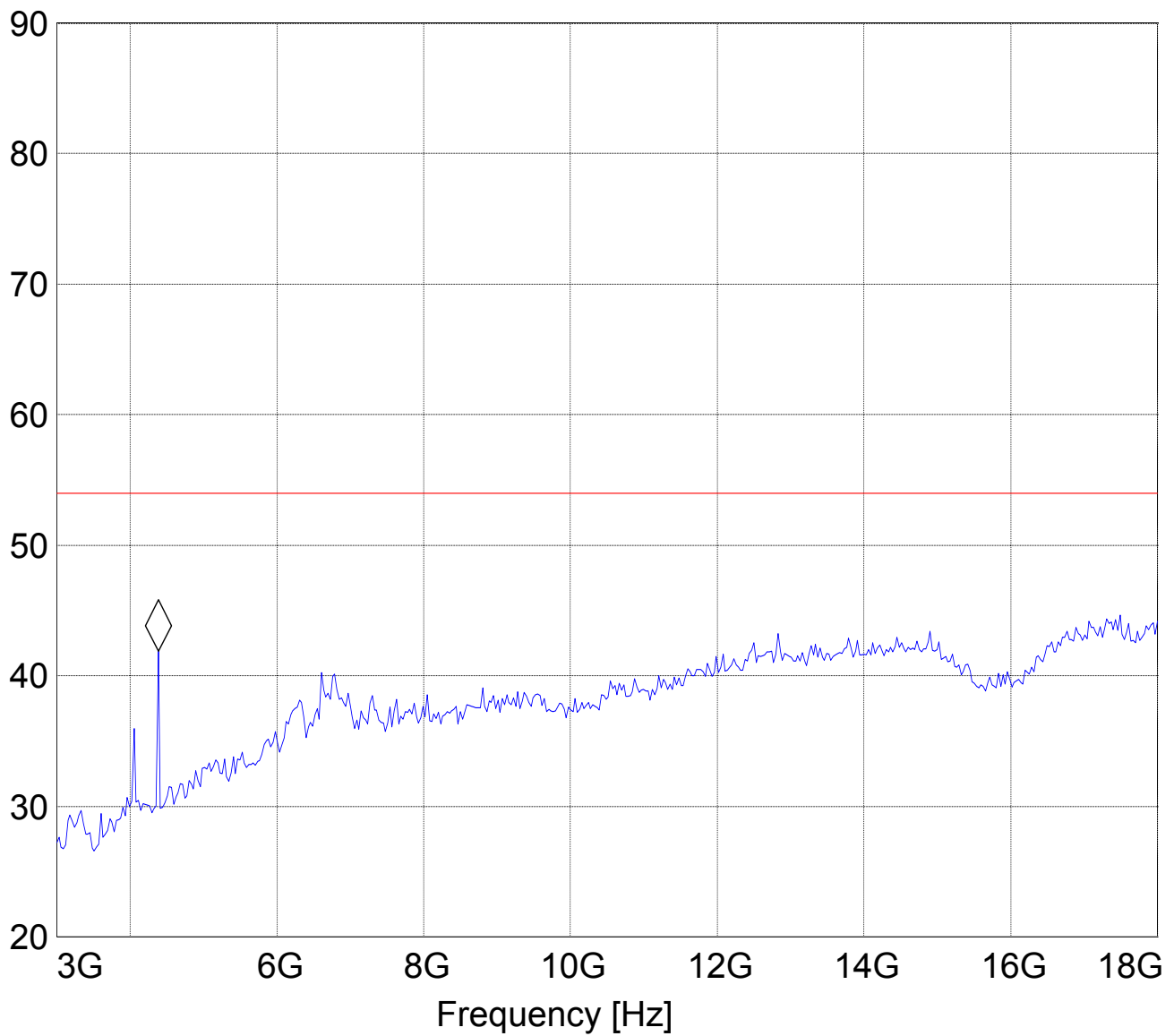
"BT Spuri hi 1-8G"

Short Description: Bluetooth Spurious 1-8 GHz

Start Frequency	Stop Frequency	Detector	Meas. Bandw.	RBW	VBW	Transducer
1.0 GHz	8.0 GHz	MaxPeak	Coupled	1 MHz		#326 horn (dBi)

Marker: 4.38276531 GHz 41.86 dB μ V/m

Level [dB μ V/m]



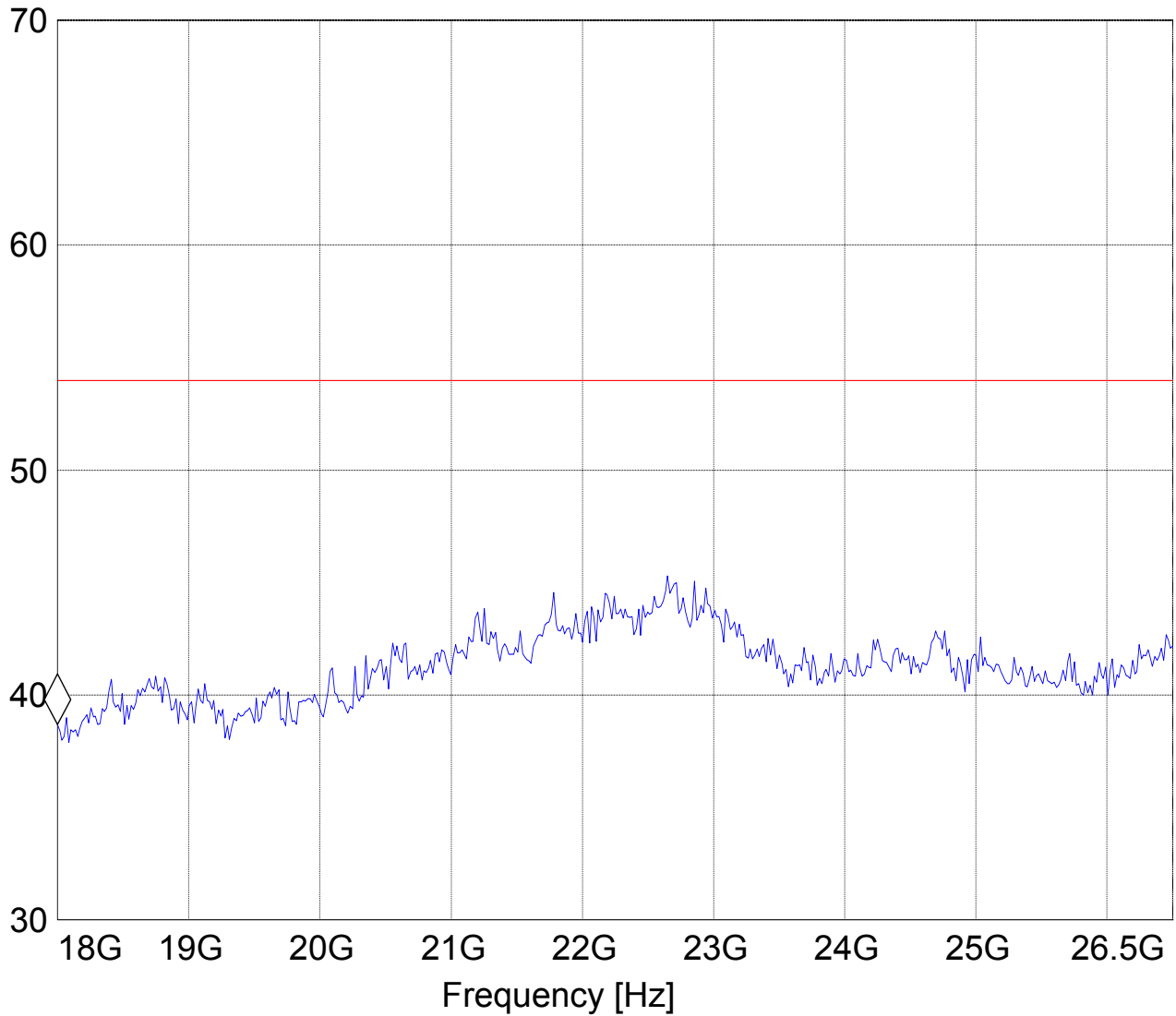
RECEIVER SPURIOUS RADIATION
18GHz – 25GHz

§ 15.209

SWEEP TABLE:		"BT Spuri hi 18-25G"			
Short Description:		Bluetooth Spurious 18-25GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
18 GHz	25 GHz	MaxPeak	Coupled	1 MHz	#141 horn (dBi)

Marker: 18 GHz 38.68 dB μ V/m

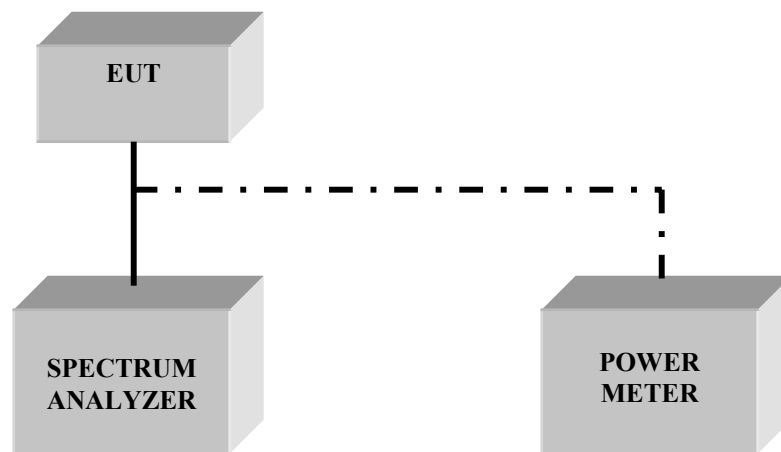
Level [dB μ V/m]



TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	826880/010
03	Signal Generator	SMY02	Rohde & Schwarz	836878/011
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02
05	Power Amplifier	250W1000	Amplifier Research	300031
06	Biconilog Antenna	3141	EMCO	0005-1186
07	Horn Antenna	SAS-200/571	AH Systems	325
08	Power Splitter	11667B	Hewlett Packard	645348
09	Climatic Chamber	VT4004	Votch	G1115
10	Pre-Amplifier	JS4-00102600	Miteq	00616
11	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807
12	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008

BLOCK DIAGRAMS
Conducted Testing



Radiated Testing

ANECHOIC CHAMBER

