FCC Test Report

Test report no.: EMC_448-2003FCC15.247_IX104-11
FCC Part 15.247 for DSSS systems / CANADA RSS-210
(IX104)

FCC ID: Q2GIX104-002S

Deutscher Akkreditierungs Rat DAR

TTI-P-G 081/94-A0

Accredited according to **ISO/IEC 17025**

Bluetooth™

Bluetooth Qualification Test Facility (BQTF)

CTIA Authorized Testing Laboratory

FCC listed # 101450

IC recognized # 3925

***CETECOM* Inc.**

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CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686

Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

Table of Contents

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

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Internet: www.cetecom.com

1.3 Details of applicant

Name	**:**	**Xplore Technologies**
Street	**:**	**11675 Jollyville Road, Suite 150**
City / Zip Code	**:**	**Austin, TX 78759**
Country	**:**	**USA**
Contact	**:**	**Douglas L. Fowler**
Telephone	**:**	**512-336-7797**
Tele-fax	**:**	**512-336-7791**
e-mail	**:**	**dfowler@xploretech.com**

1.4 Application details

Date of receipt of application	:	2003-03-24
Date of receipt test item	:	2003-03-24
Date of test	:	2003-03-24~2003-03-28

1.5 Test item

Manufacturer	:	Winston Corporation
Street	:	21F, 88, Sec. 1, Hsin Tai Wu Rd, Hsichih
City / Zip Code	:	Taipei Hsien 221
Country	:	Taiwan, R.O.C.
Marketing Name	:	iX104
Model No.	:	iX104
Description	:	Tablet PC with Wireless LAN
FCC-ID	:	Q2GIX104-002S

Additional information

Frequency	:	2412-2462MHz (WLAN)
Type of modulation	:	
Number of channels	:	2400: 11 Channels
Antenna	:	Internal
Power supply	:	9-18Vdc
Output power	:	WLAN = 24.87 dBm
Extreme temp. Tolerance	:	Lower:-20°C Upper: 60°C

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

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**

Note: Please refer to test reports AIR-LMC350_LDK102040 for conducted results, except for conducted peak output power, which is provided in this report and used for the calculation of the antenna gain. Otherwise, this report contains only radiated results for Tablet PC with embedded PCMCIA card and antenna.

Test Reports:

Technical responsibility for area of testing:

Date	Section	Name	Signature
2003-04-24	EMC & Radio	Lothar Schmidt (Manager)	

Responsible for test report and project leader:

Date	Section	Name	Signature
2003-04-03	EMC & Radio	Philip Kim(EMC Engineer)	

3.60 Test report

TEST REPORT

Test report no.: EMC_448-2003FCC15.247_IX104-11
IX104

TEST REPORT REFERENCE

LIST OF MEASUREMENTS PAGE

ANTENNA GAIN **§ 15.204**

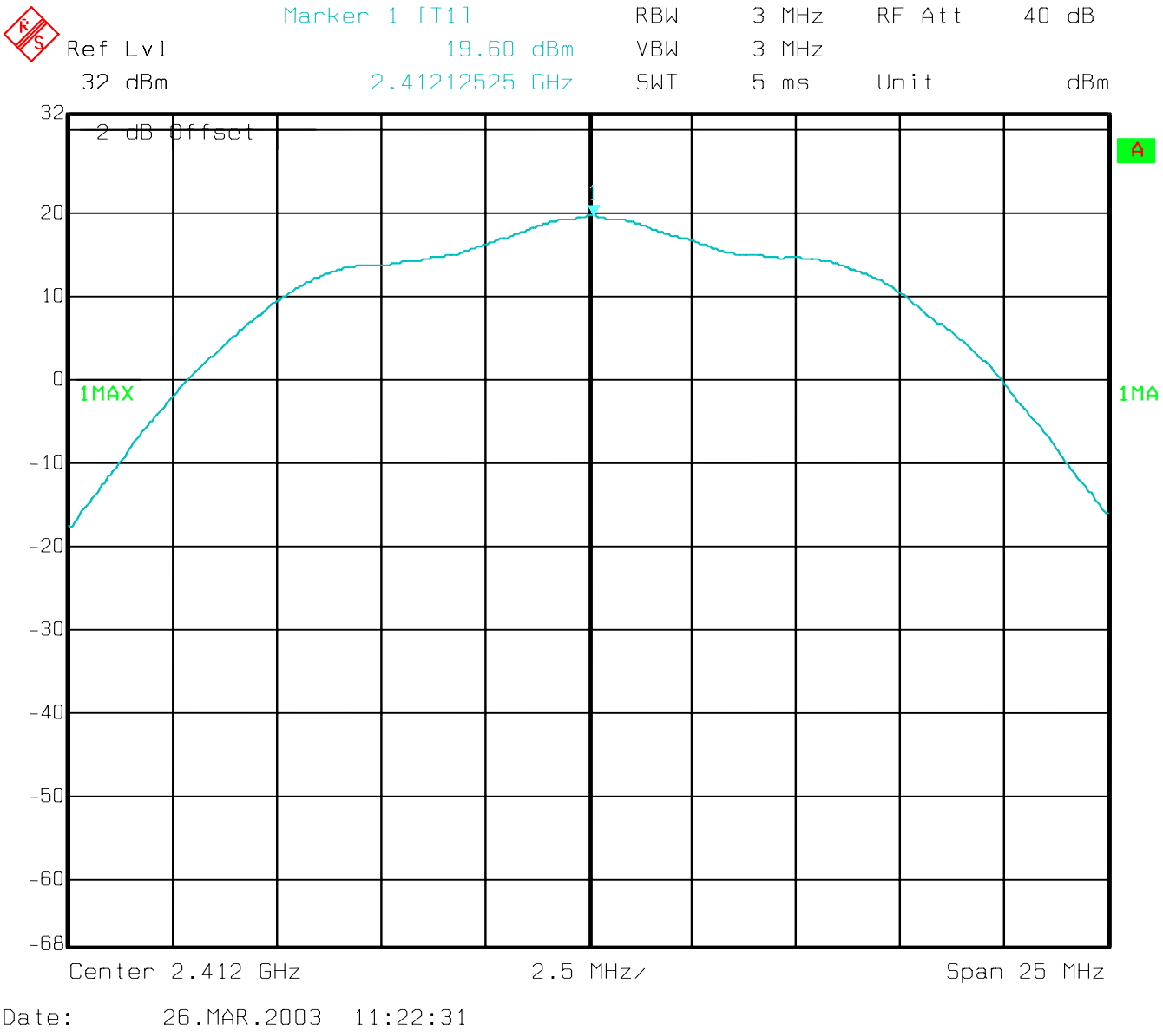
Note: Conduted Power plots are in 3MHz RBW, therefore, we need to add a correction factor with the following equation according to FCC Chapter 3 for 10MHz RBW:

Correction = 10 * log ($^{RBW}_{need}$/$^{RBW}_{used}$)
Correction = 10 * log(10MHz/3MHz) = 5.23dB

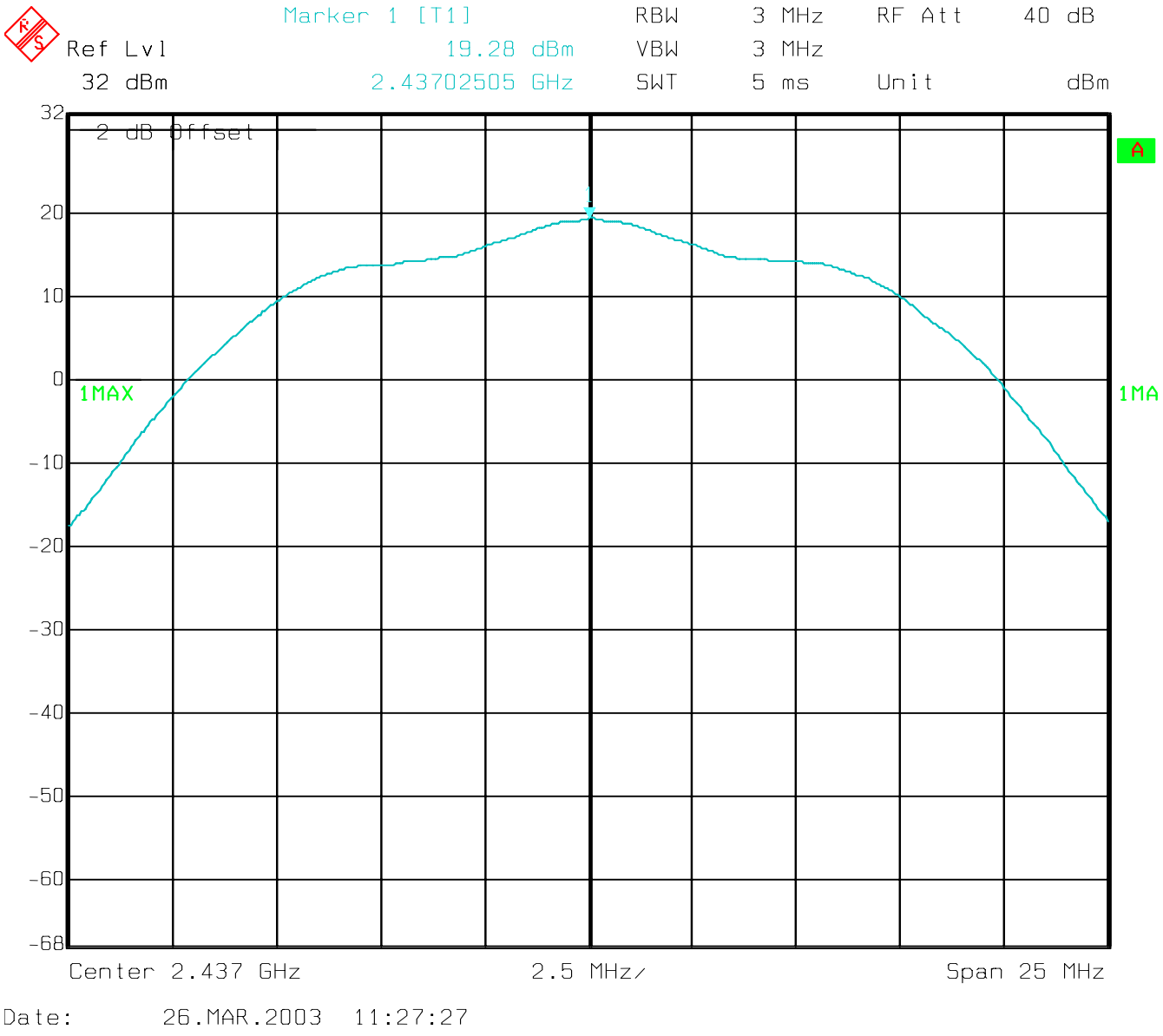
	Low channel (2412MHz)	Mid channel (2437MHz)	High channel (2462MHz)
Conducted Power	**24.83dBm**	**24.51dBm**	**24.87dBm**
Radiated Power (EIRP)	**23.73dBm**	**22.55dBm**	**23.14dBm**
Antenna Gain	**-1.1dBi**	**-1.96dBi**	**-1.73dBi**
Average Antenna Gain	-1.6**dBi**		

The Antenna gain is given as -1.6**dBi and EIRP is calculated from Conducted power.**

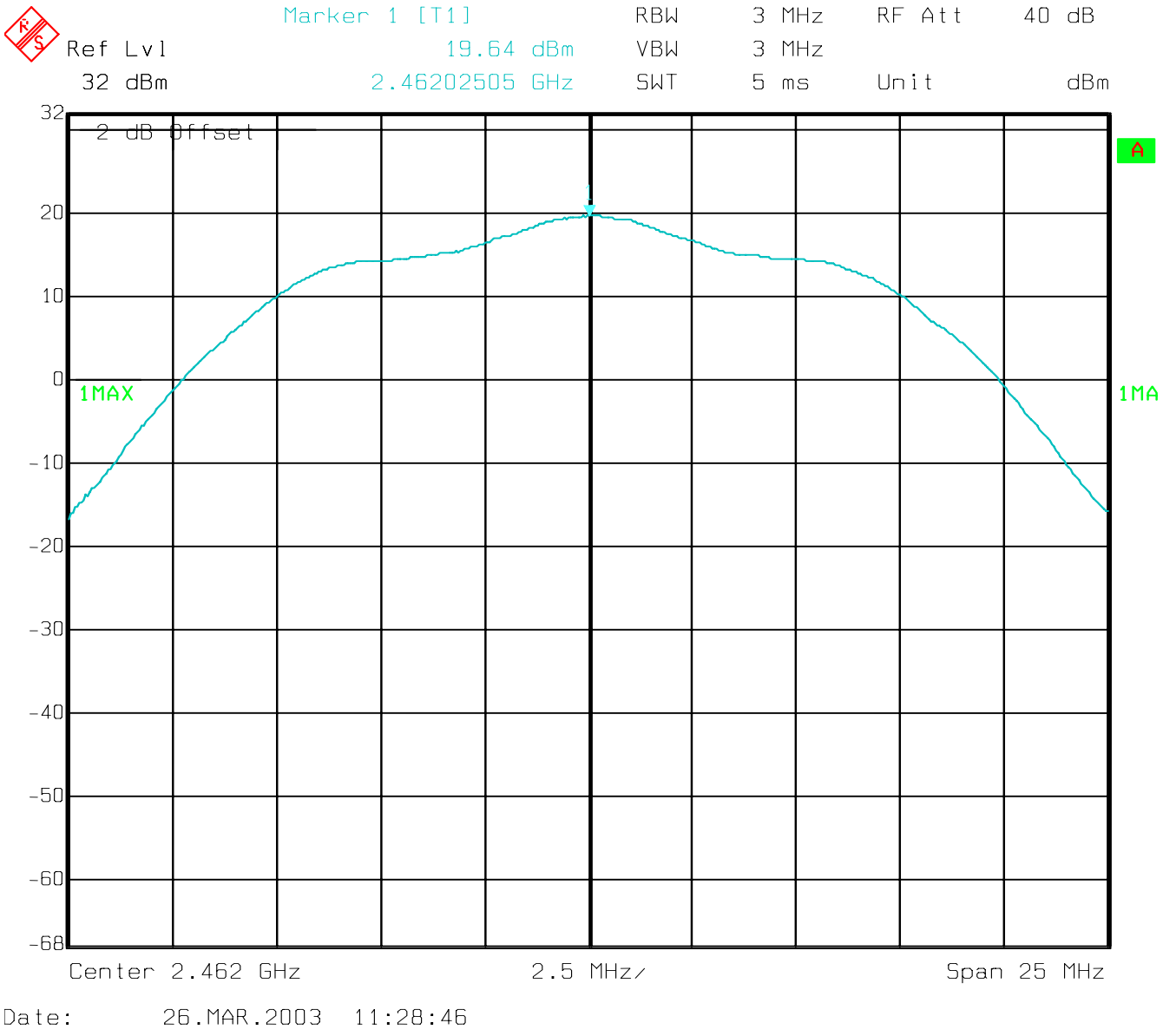
Conducted Peak Power
Low Channel (2412MHz)



Conducted Peak Power
Low Channel (2437MHz)



Conducted Peak Power
Low Channel (2462MHz)



MAXIMUM PEAK OUTPUT POWER § 15.247 (b) (1)

(RADIATED)

EIRP:

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2412	2437	2462
T_{nom}(23)°C	V_{nom}(5.0) VDC	23.73dBm	22.55dBm	23.14dBm
Measurement uncertainty		±0.5dBm		

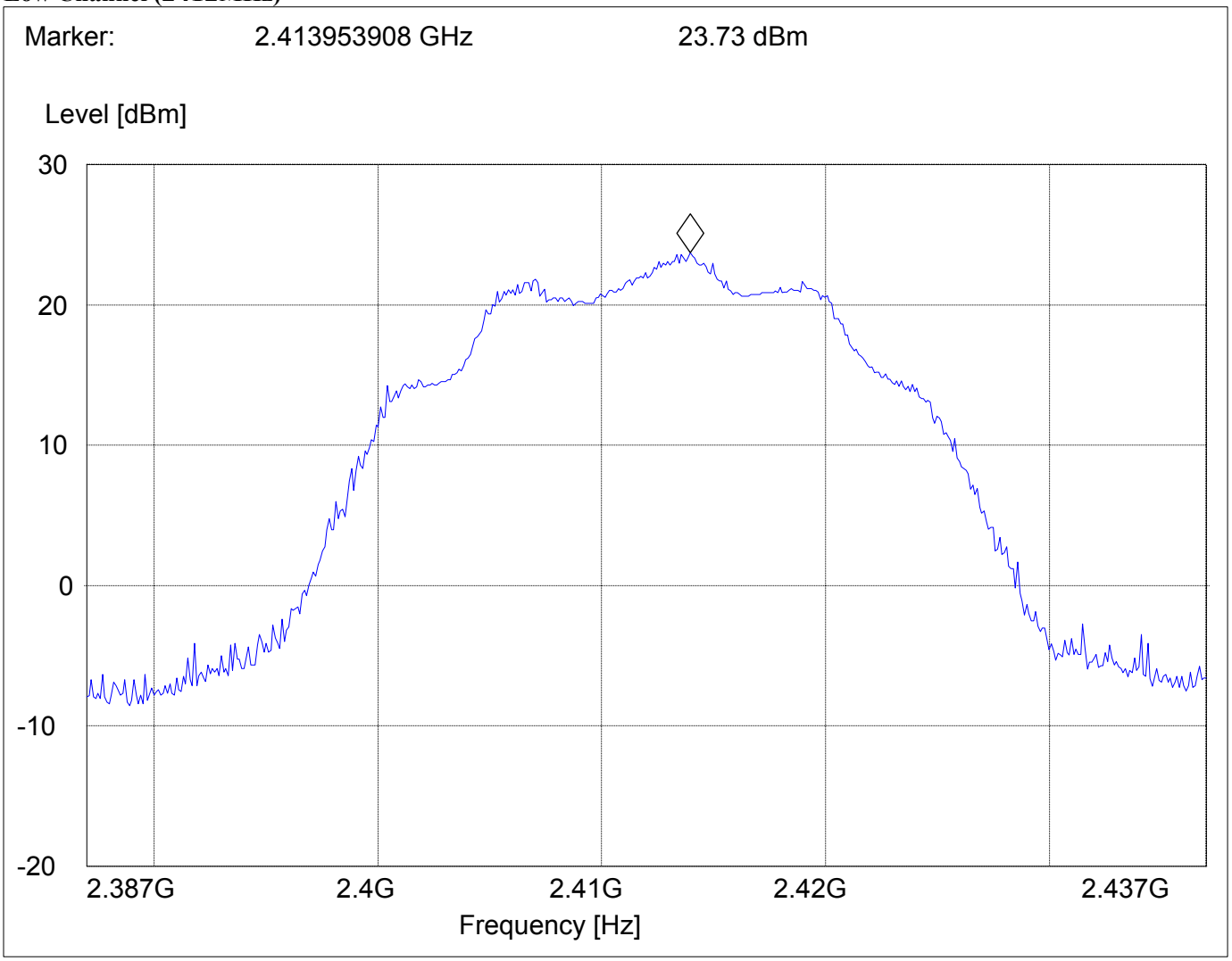
RBW/VBW: 10MHz

LIMIT **SUBCLAUSE § 15.247 (b) (1)**

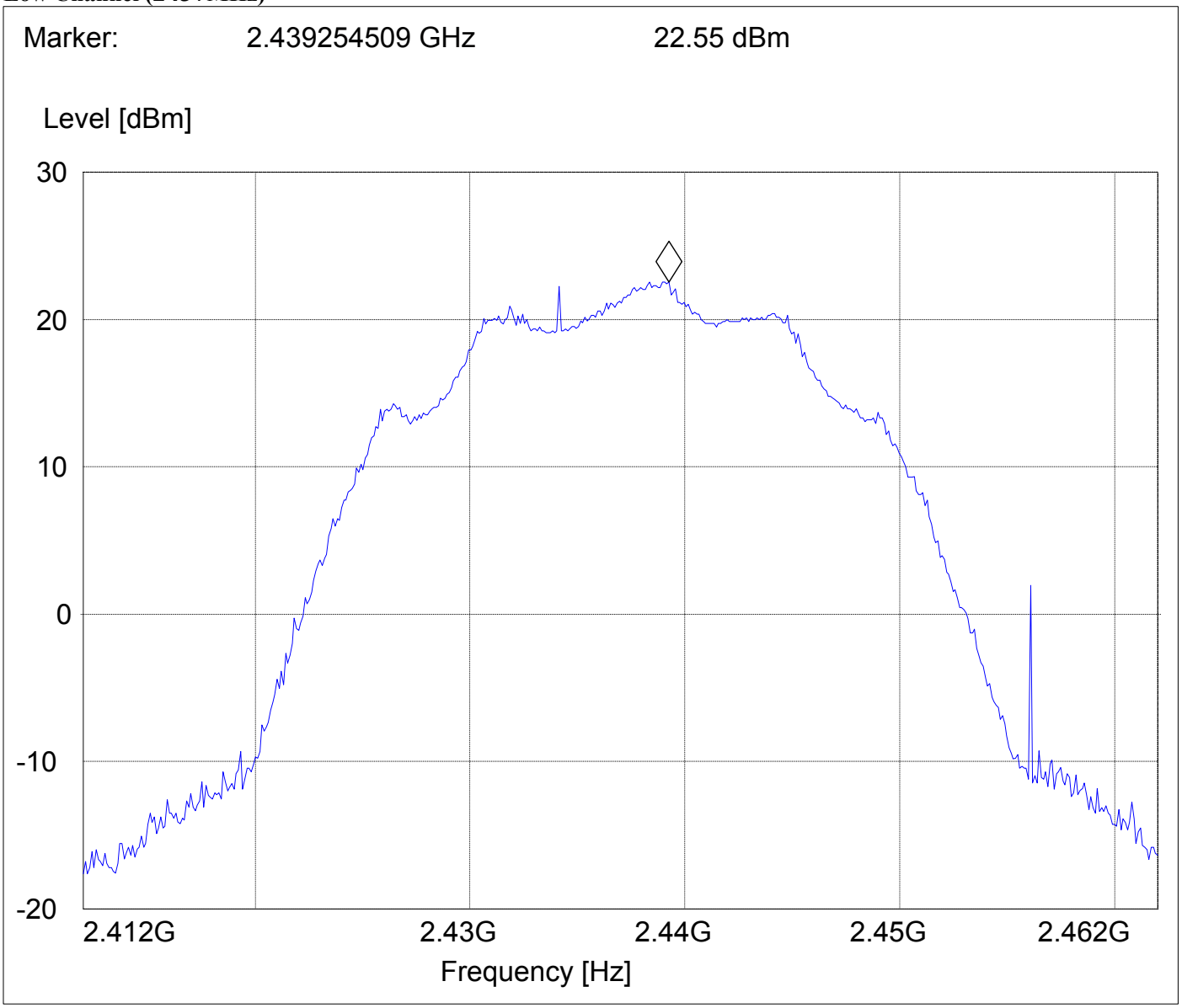
Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt / 30dBm

EIRP Measurement

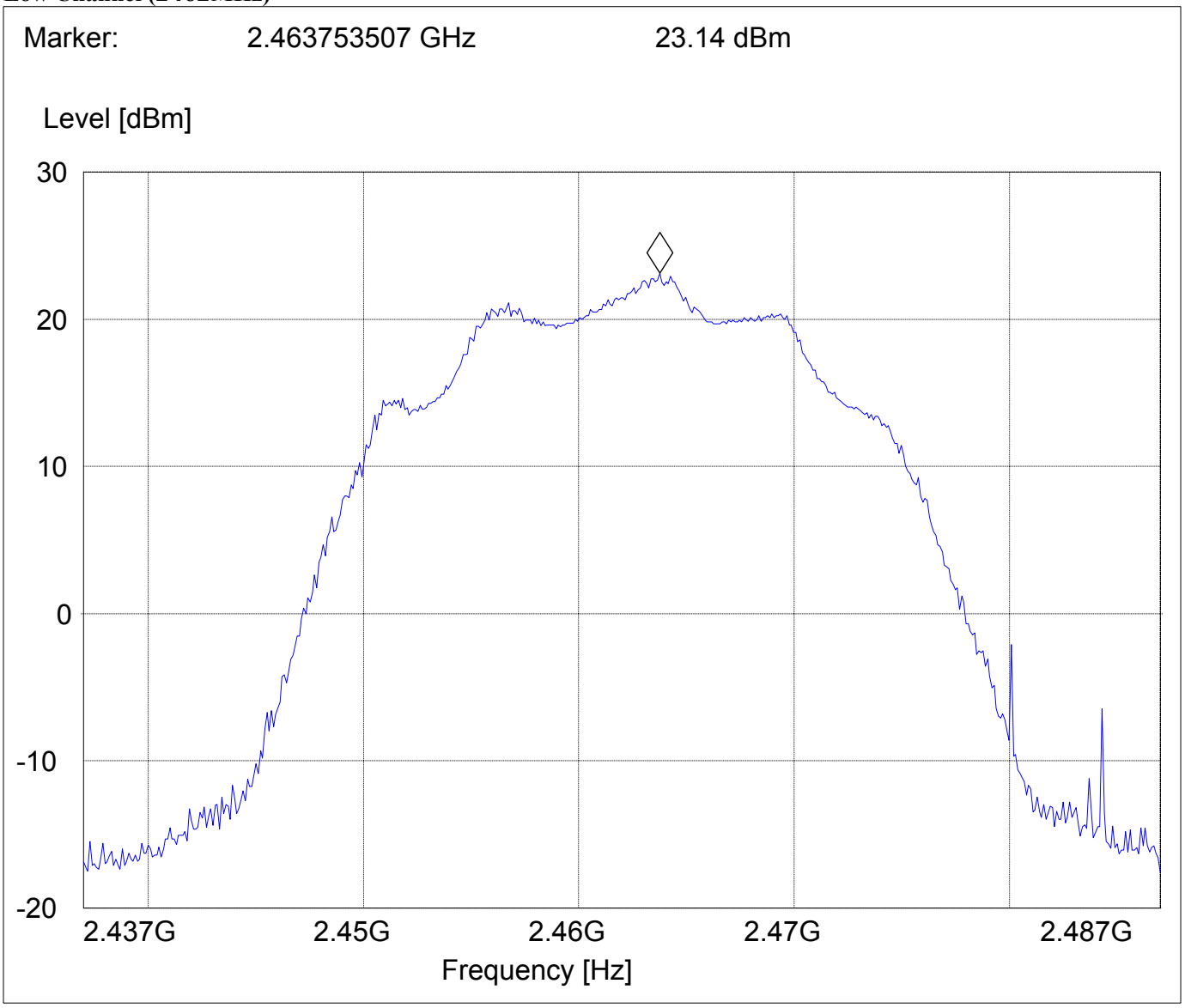
Low Channel (2412MHz)



EIRP Measurement
Low Channel (2437MHz)



EIRP Measurement
Low Channel (2462MHz)

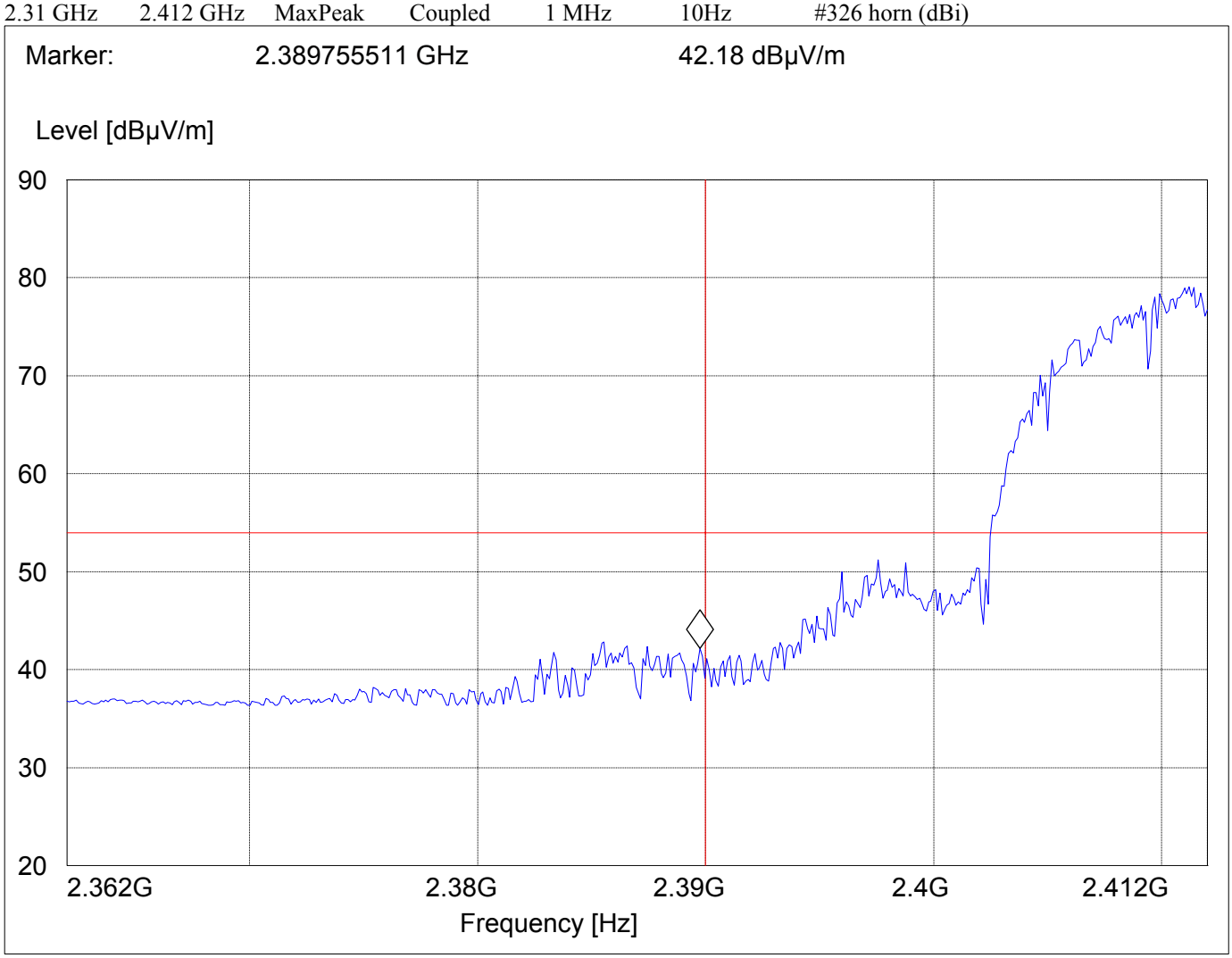


BAND EDGE COMPLIANCE §15.247 (c)

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 : 54dBµV

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

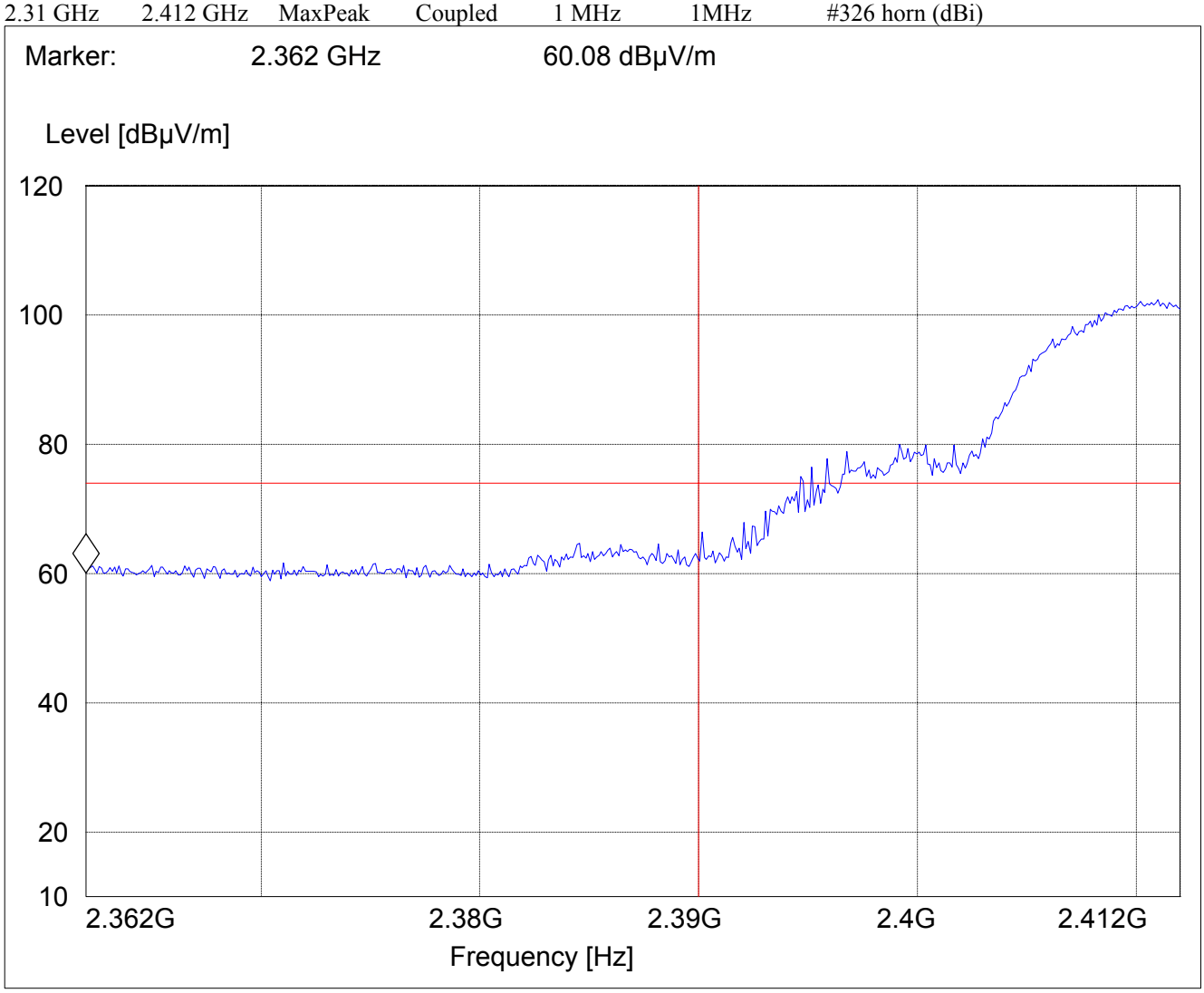


BAND EDGE COMPLIANCE §15.247 (c)

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 : 74dBµV

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

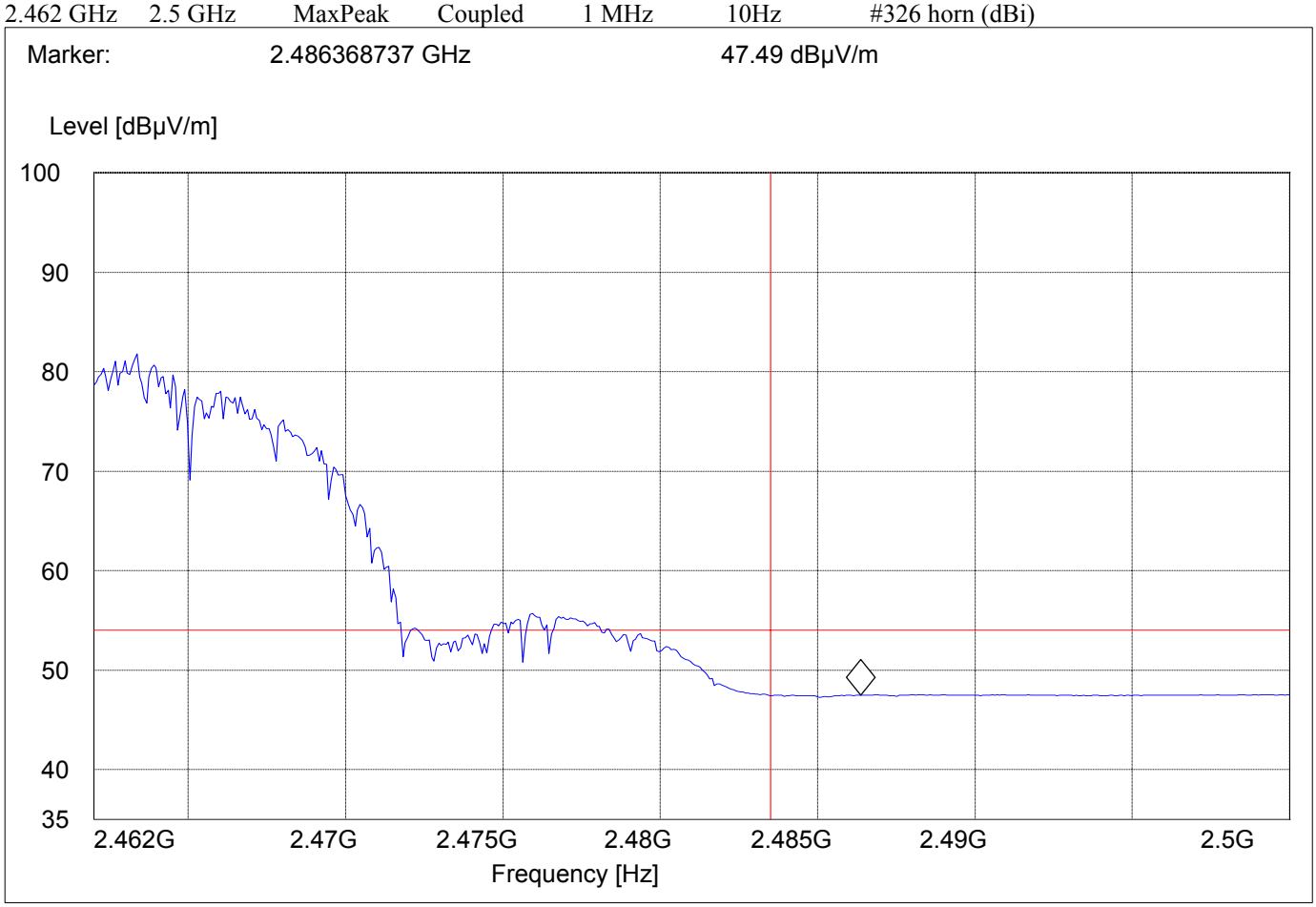


BAND EDGE COMPLIANCE §15.247 (c)

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)

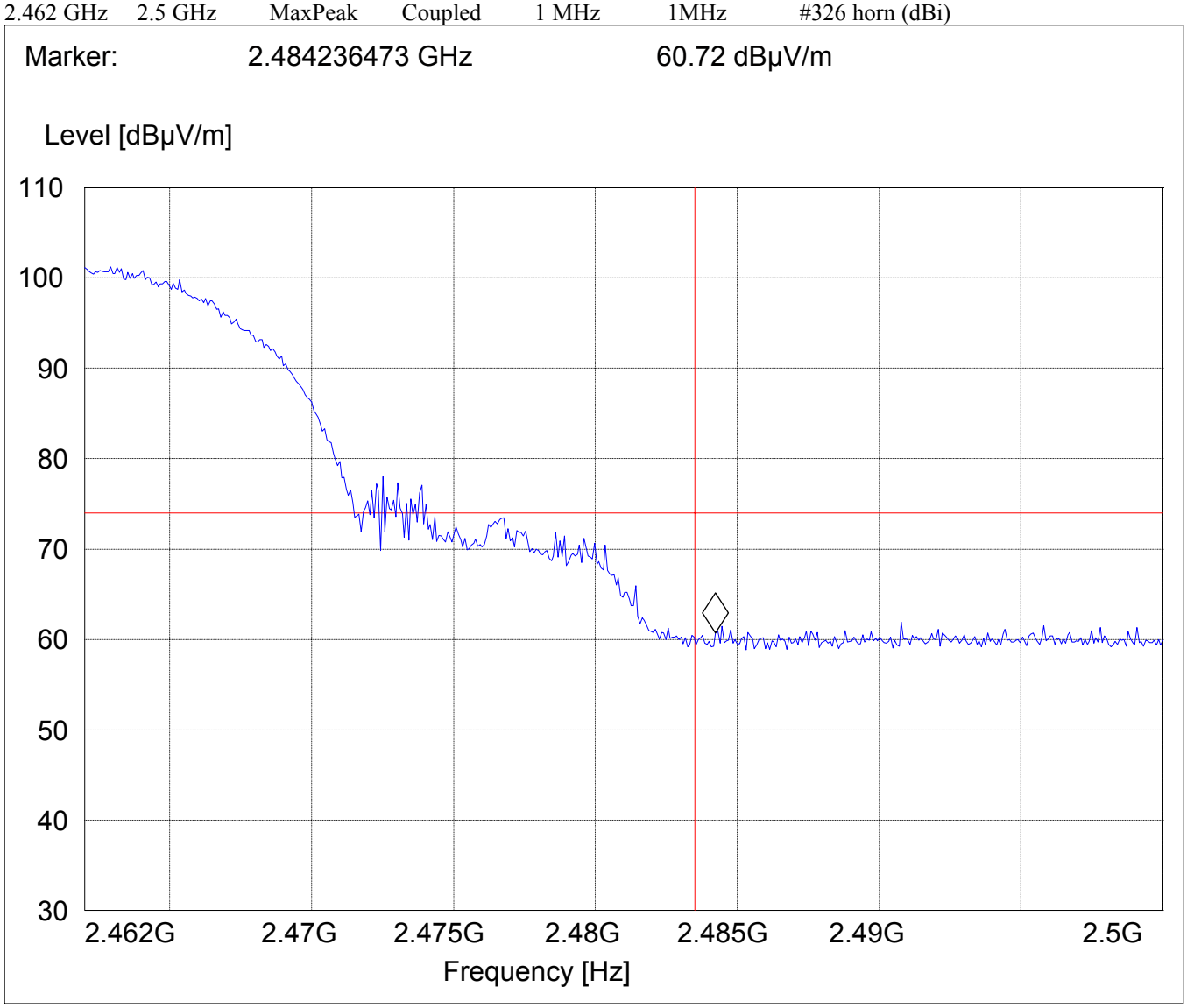


BAND EDGE COMPLIANCE §15.247 (c)

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)



EMISSION LIMITATIONS § 15.247 (c) (1)

Transmitter (Radiated)

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)

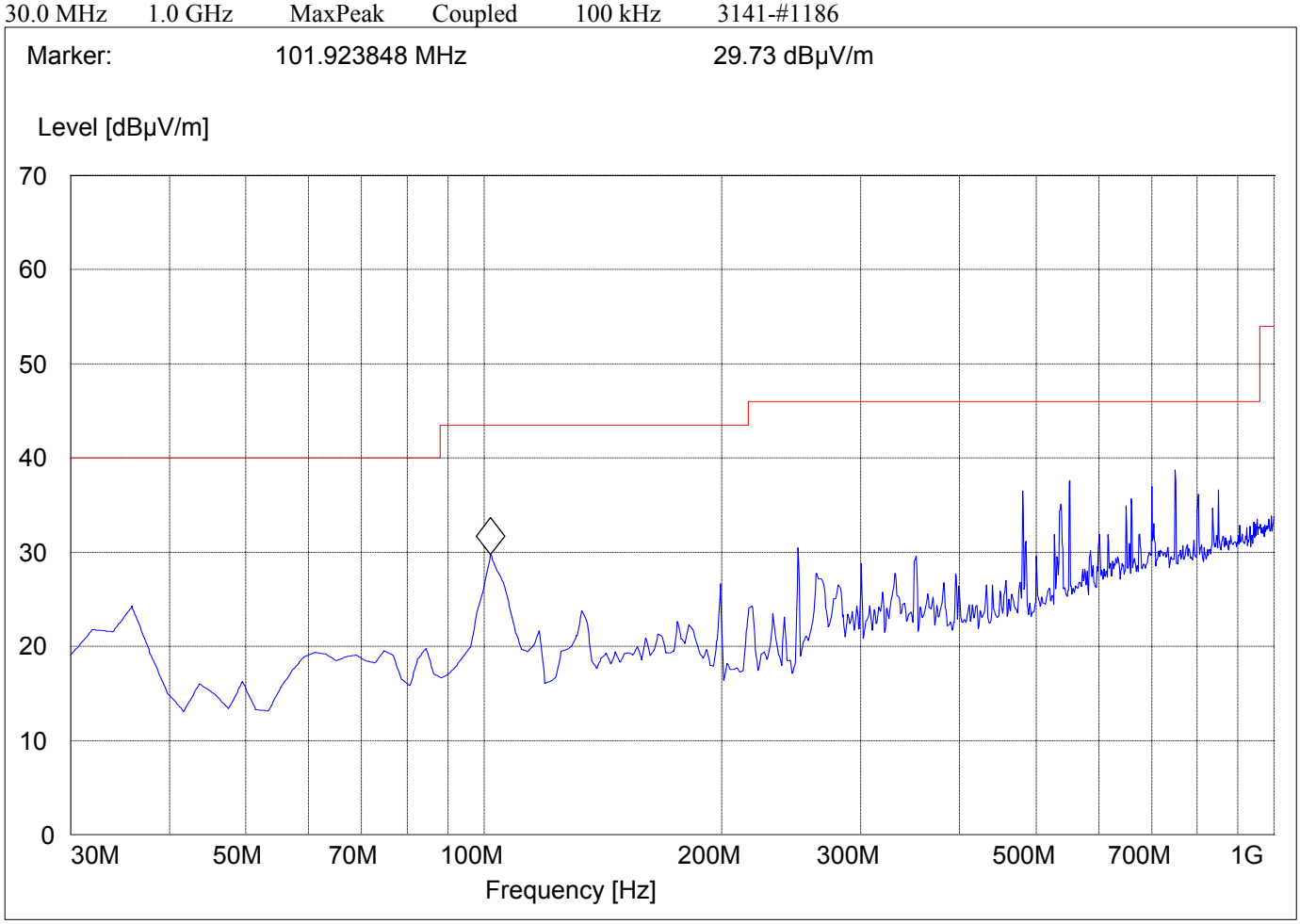
Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

Transmit at Lowest channel Frequency 2402MHz			
Frequency (MHz)	Level (dBµV/m)		
	Peak	Quasi-Peak	Average
	NF	NF	NF
	NF	NF	NF
	NF	NF	NF
	NF	NF	NF
Transmit at Middle channel Frequency 2440MHz			
Frequency (MHz)	Level (dBµV/m)		
	Peak	Quasi-Peak	Average
	NF	NF	NF
	NF	NF	NF
	NF	NF	NF
	NF	NF	NF
Transmit at Highest channel Frequency 2480MHz			
Frequency (MHz)	Level (dBµV/m)		
	Peak	Quasi-Peak	Average
	NF	NF	NF
	NF	NF	NF
	NF	NF	NF
	NF	NF	NF

Note: NF = No Significant Peak found.

EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Lowest Channel (2412MHz): 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

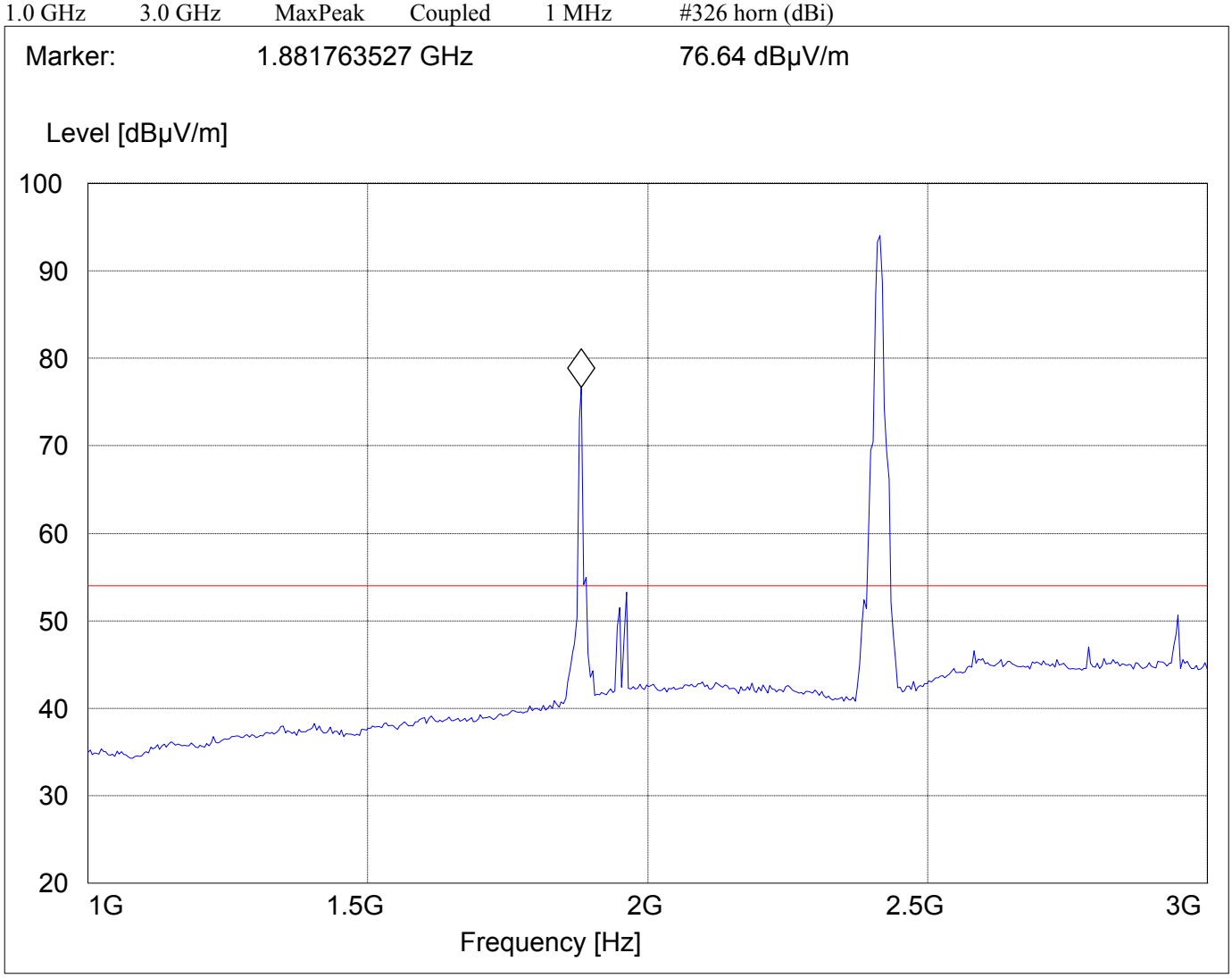


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Lowest Channel(2412MHz): 1GHz – 3GHz

NOTE: The peak above the limit is the carrier frequency. Marked frequency is the carrier of the GPRS.

SWEEP TABLE: "BT Spuri hi 1-8G"
Short Description: Bluetooth Spurious 1-8 GHz

Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW VBW	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)

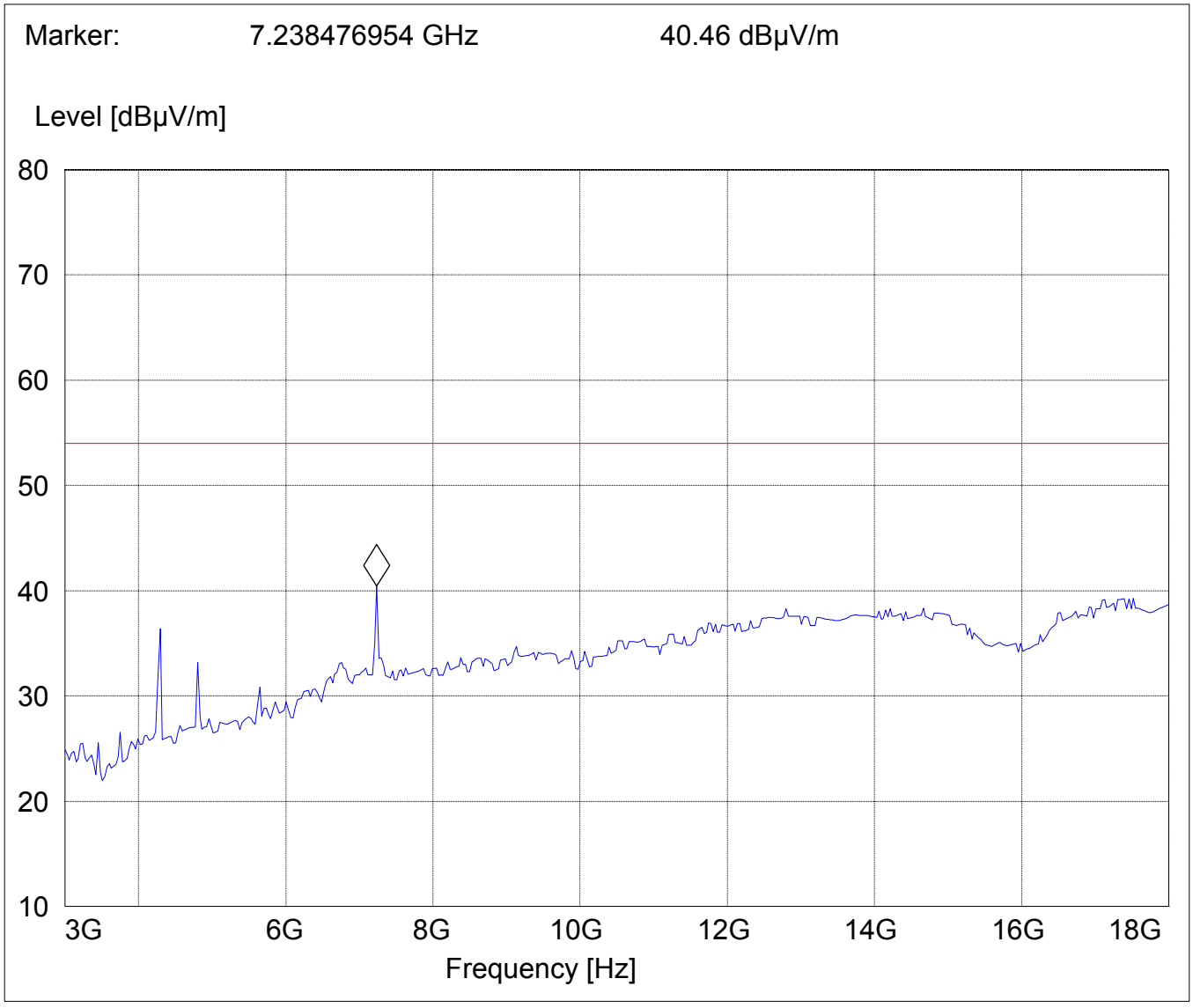


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Lowest Channel(2412MHz): 3GHz – 18GHz

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

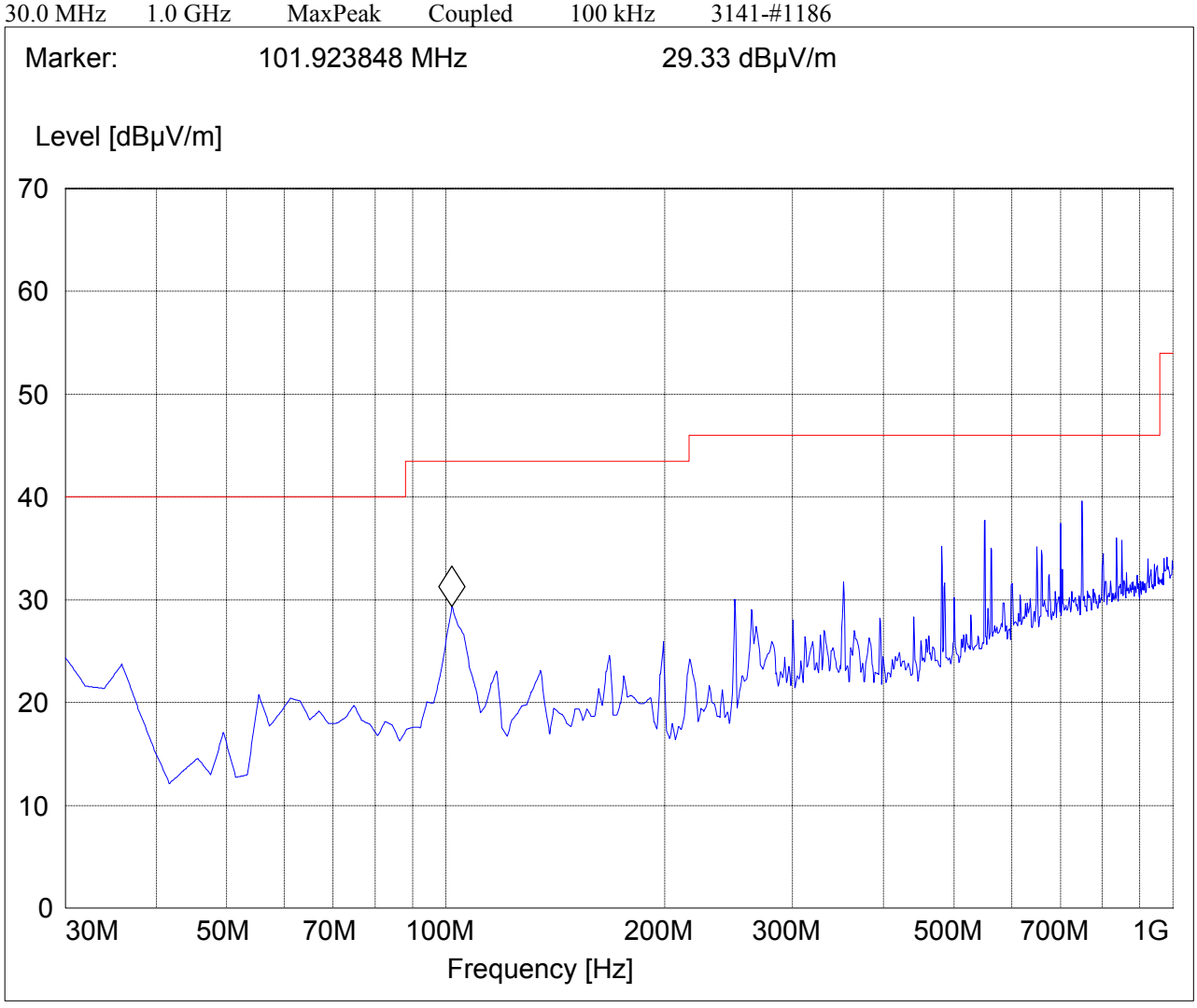
SWEEP TABLE: "BT Spuri hi 1-8G"
Short Description: Bluetooth Spurious 1-8 GHz

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



EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Middle Channel(2437MHz): 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

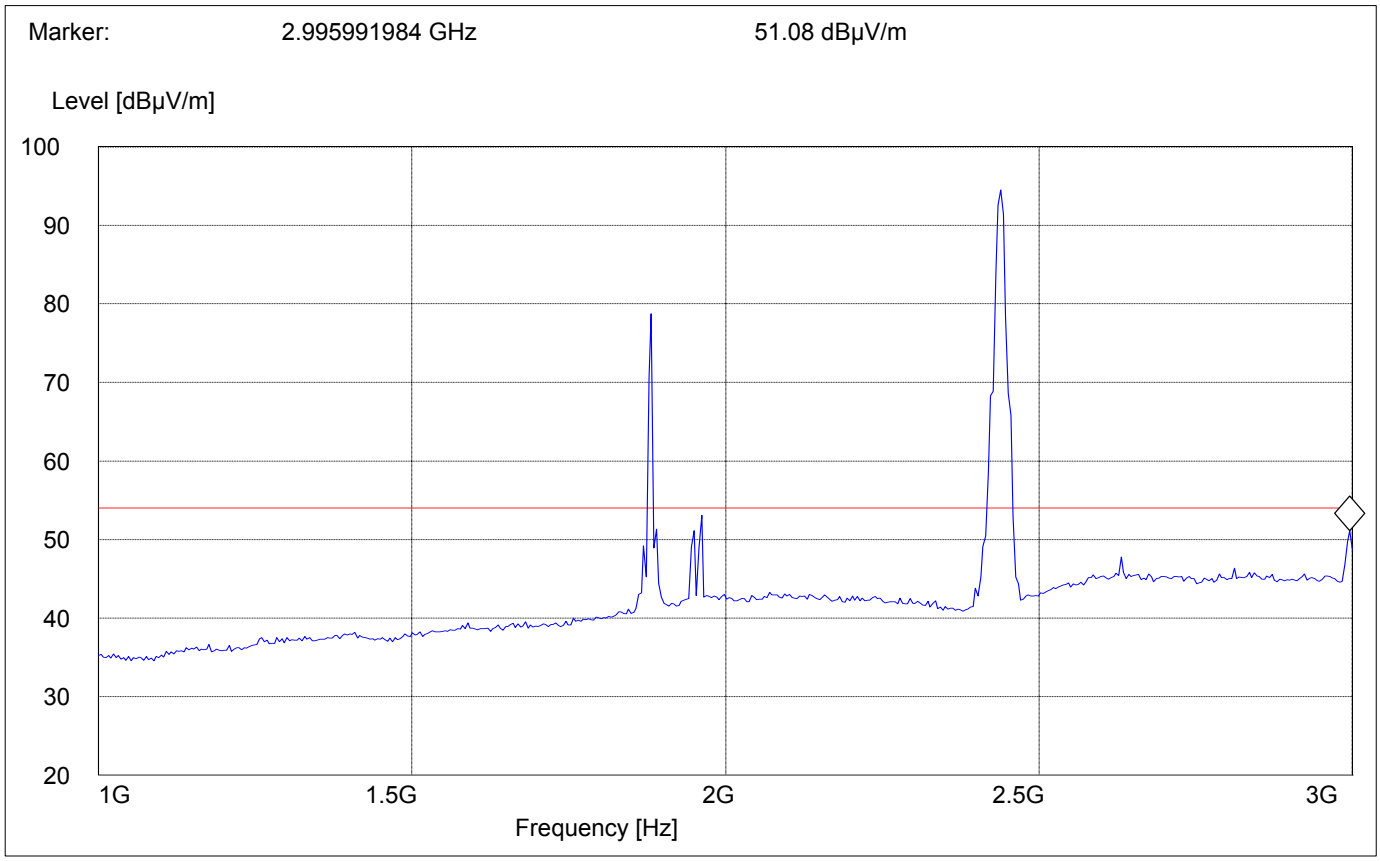


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Middle Channel(2437MHz): 1GHz – 3GHz

NOTE: The peak above the limit is the carrier frequency. And other peak is frequency of GPRS.

SWEEP TABLE: "BT Spuri hi 1-8G"
Short Description: Bluetooth Spurious 1-8GHz

Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW VBW	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)

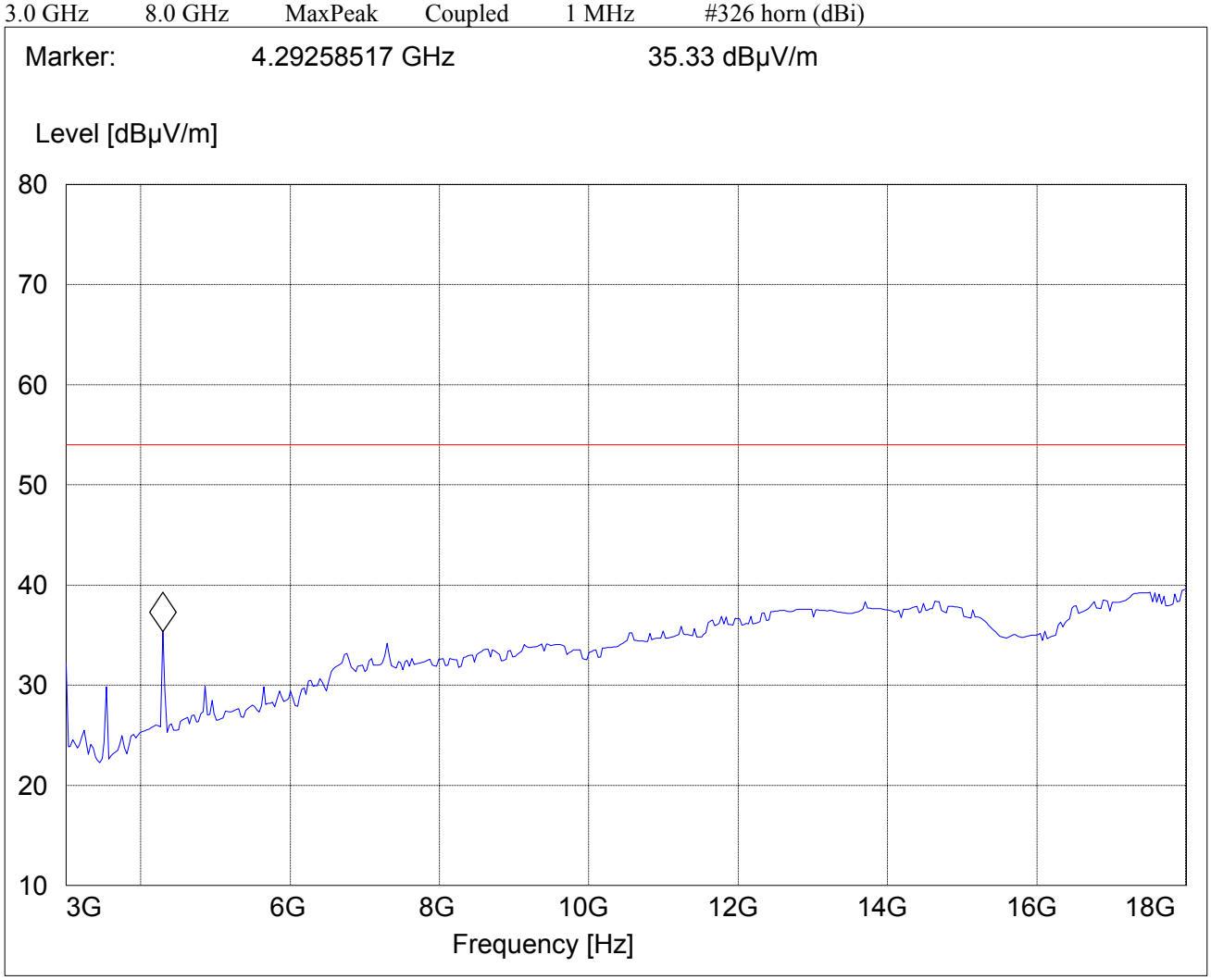


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Middle Channel(2437MHz): 3GHz – 18GHz

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

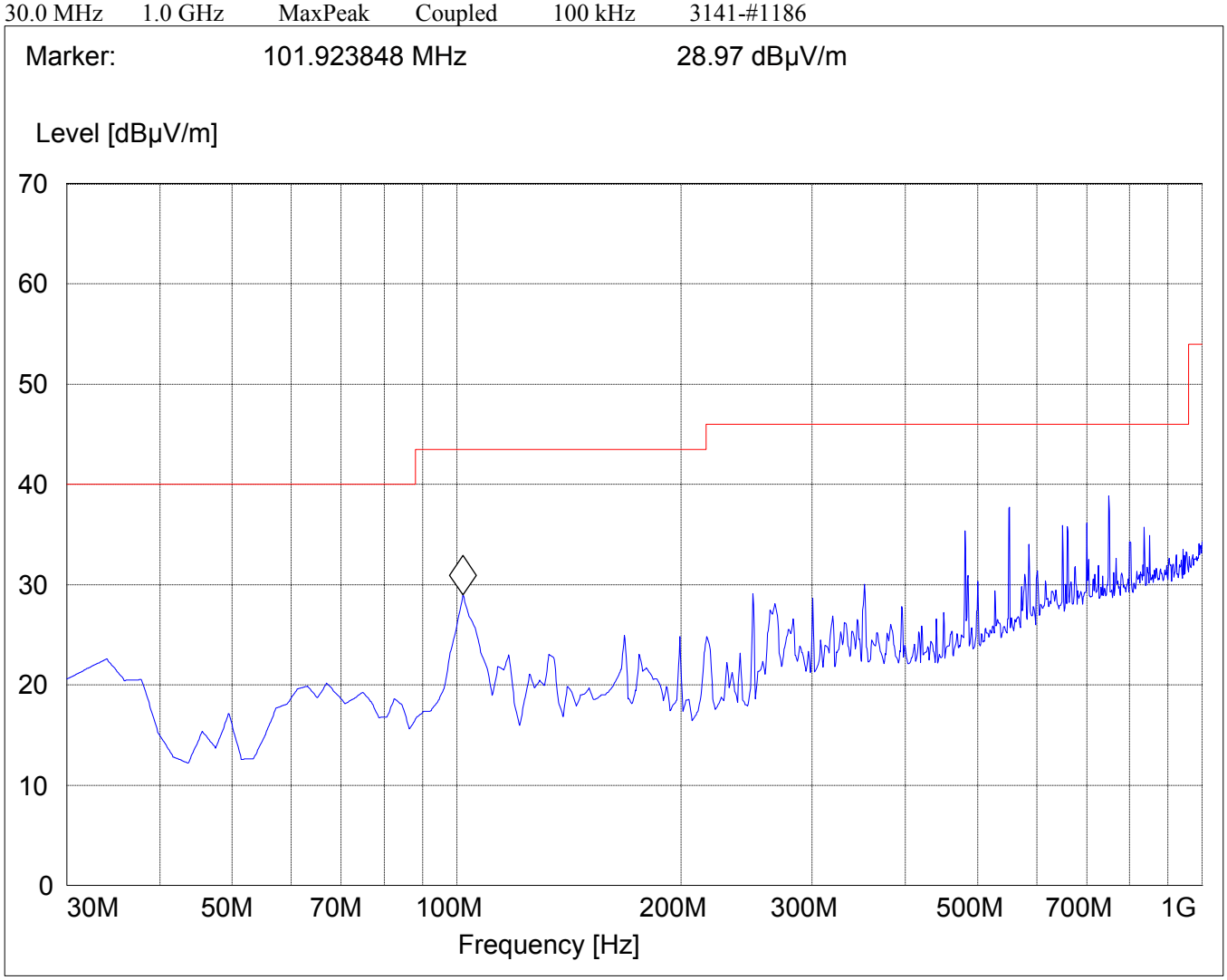
SWEEP TABLE: "BT Spuri hi 1-8G"
Short Description: Bluetooth Spurious 1-8GHz

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



EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Highest Channel(2462MHz): 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

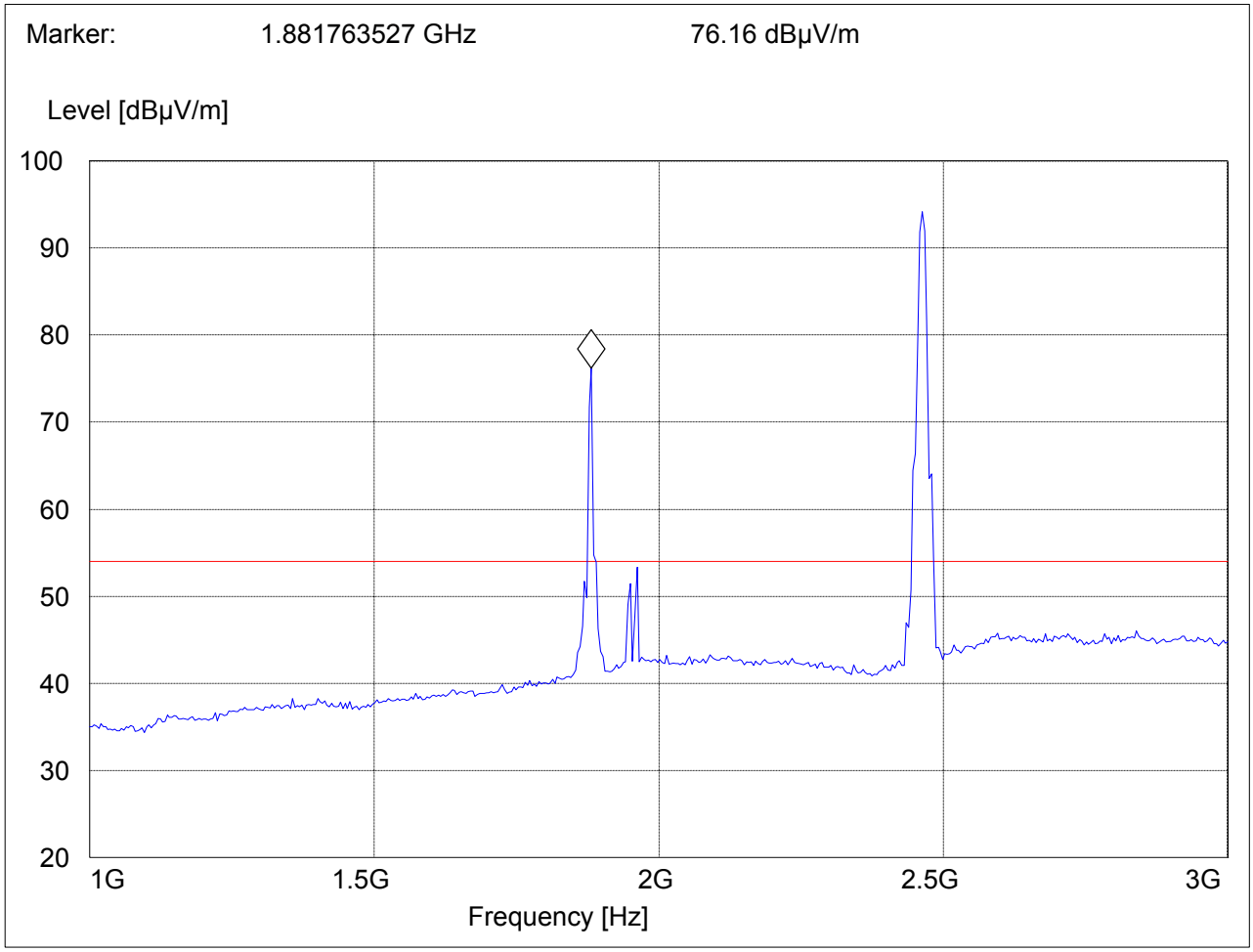


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Highest Channel(2462MHz): 1GHz – 3GHz

NOTE: The peak above the limit is the carrier frequency. Marked frequency is the carrier of GPRS.

SWEEP TABLE: "BT Spuri hi 1-8G"
Short Description: Bluetooth Spurious 1-8GHz

Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW VBW	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)

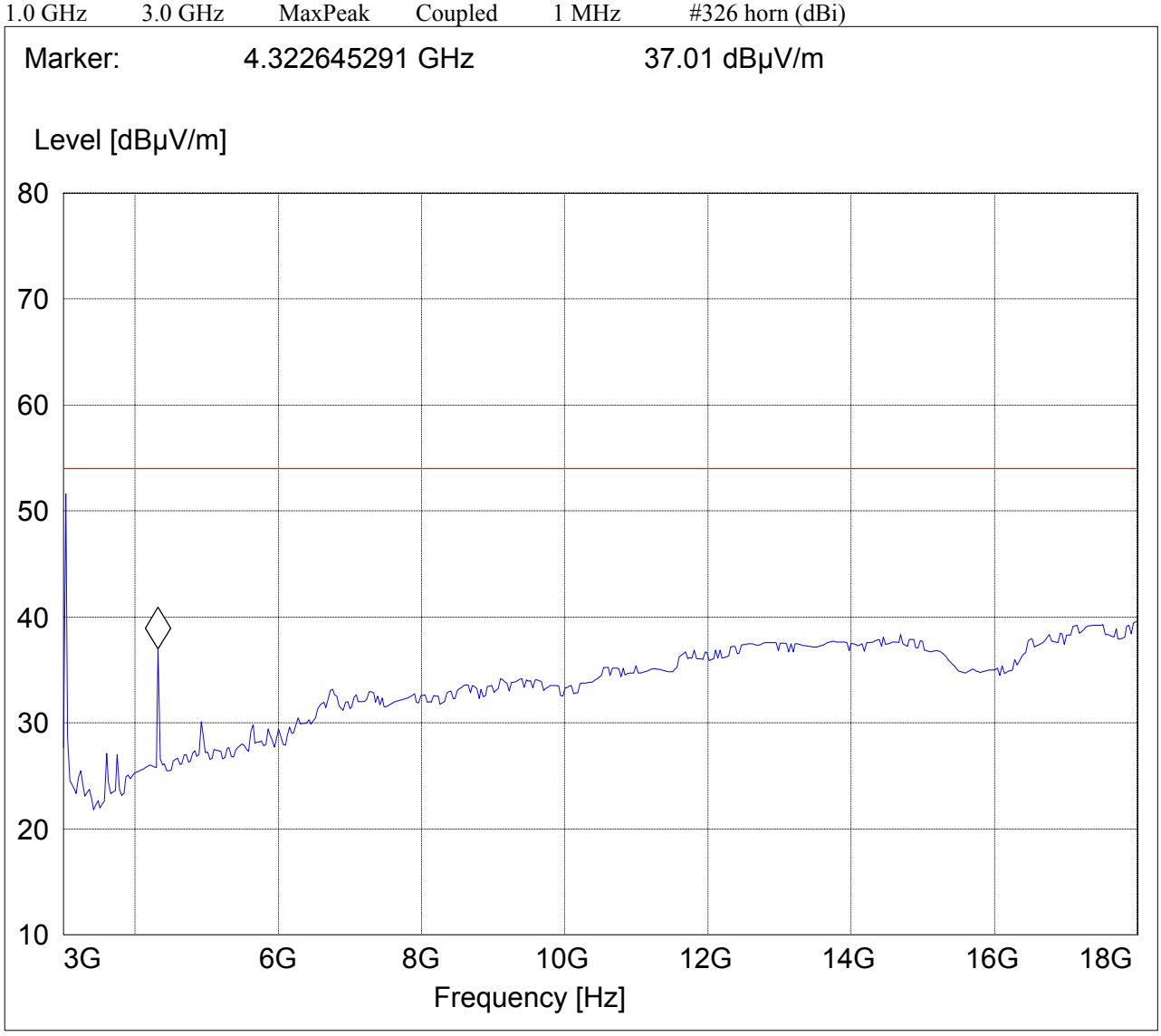


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Highest Channel(2462MHz): 3GHz – 18GHz

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

SWEEP TABLE: "BT Spuri hi 1-8G"
Short Description: Bluetooth Spurious 1-8GHz

Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW VBW	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)

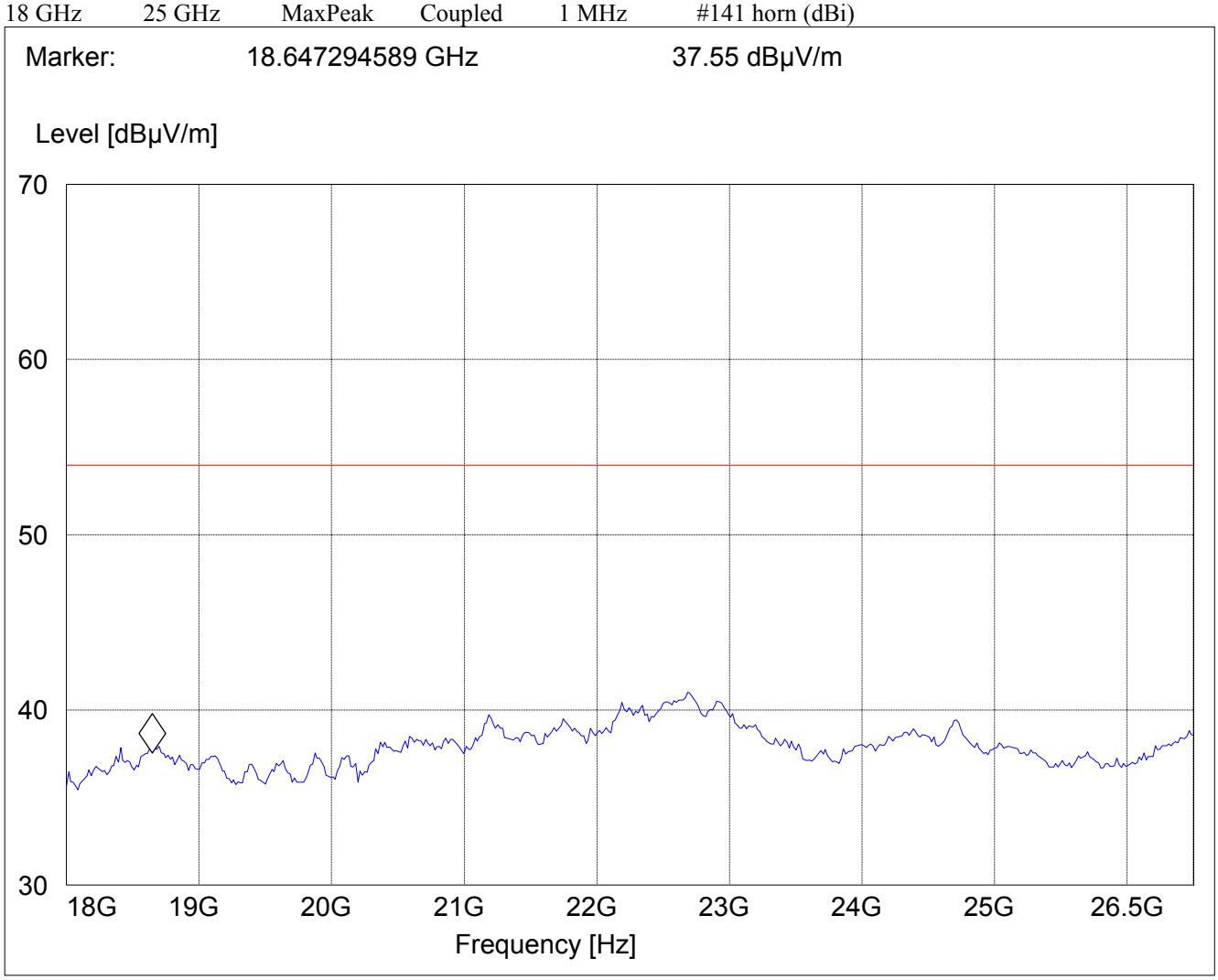


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)

18GHz – 25GHz

(This plot is valid for all three channels)

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



CONDUCTED EMISSIONS § 15.107/207

Measured with AC/DC power adapter

SWEEP TABLE: "55022 cond"

Short Description: EN 55022 for 150KHz-30MHz

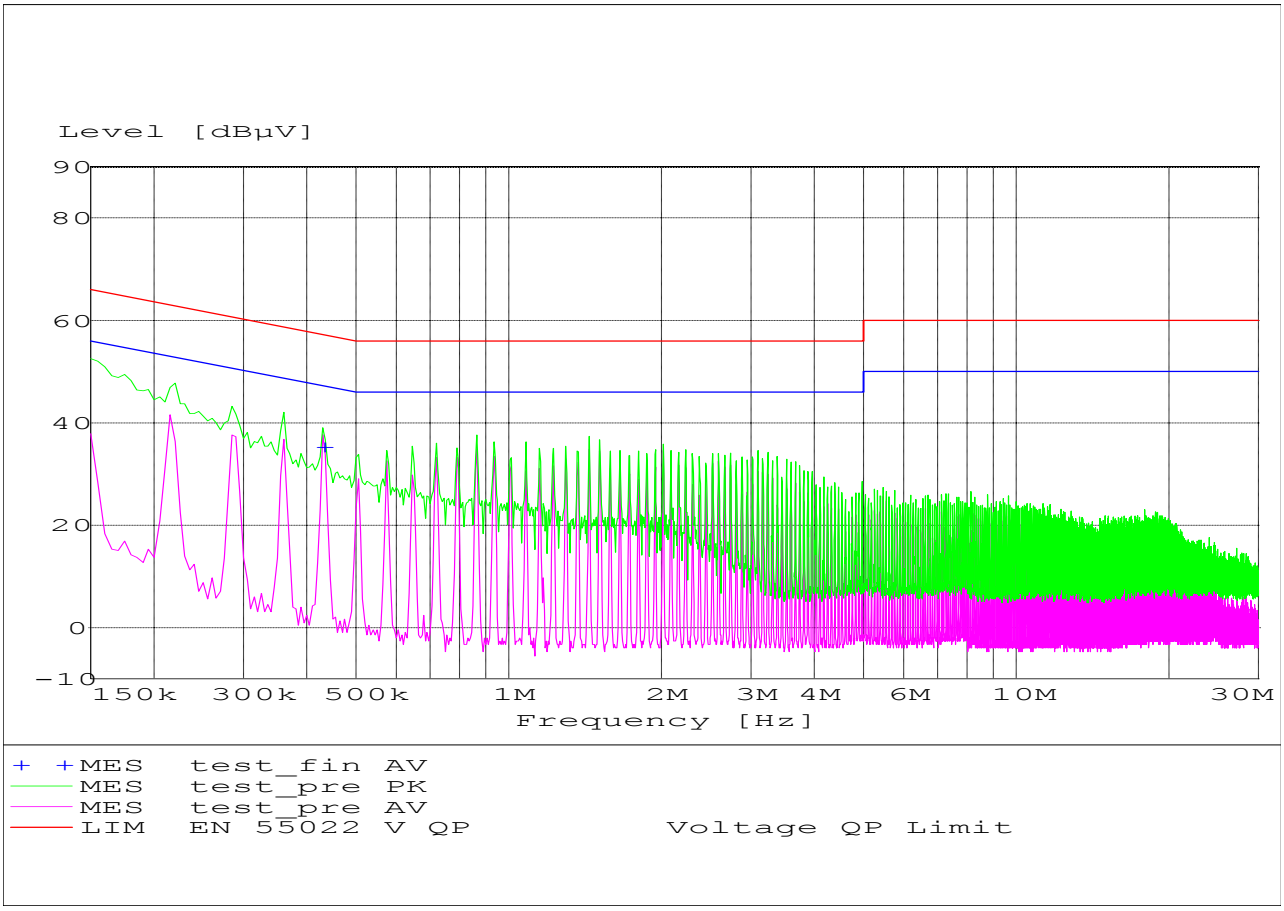
Start Frequency	Stop Frequency	Detector	Meas Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	MaxPeak	Coupled	10 kHz	None

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

Limit

Frequency of Emission (MHz)	Conducted Limit (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



RECEIVER SPURIOUS RADIATION § 15.209

Limits

Frequency (MHz)	Field strength (µV/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

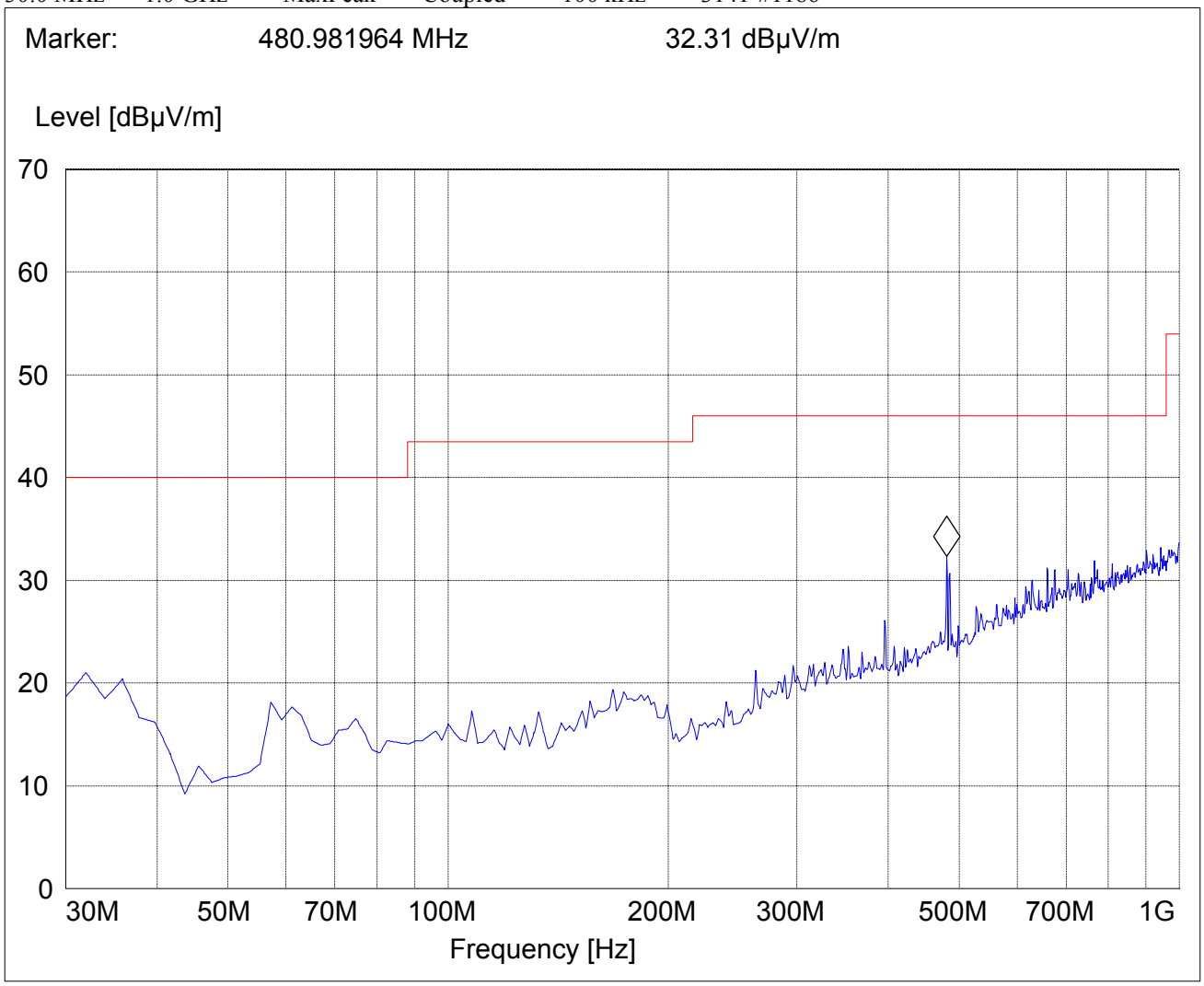
NOTE:
The radiated emissions were done with different settings, using the relevant pre-amplifiers forthe relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 18 and 25 GHz very short cable connections to the antenna was used to minimize the noise 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



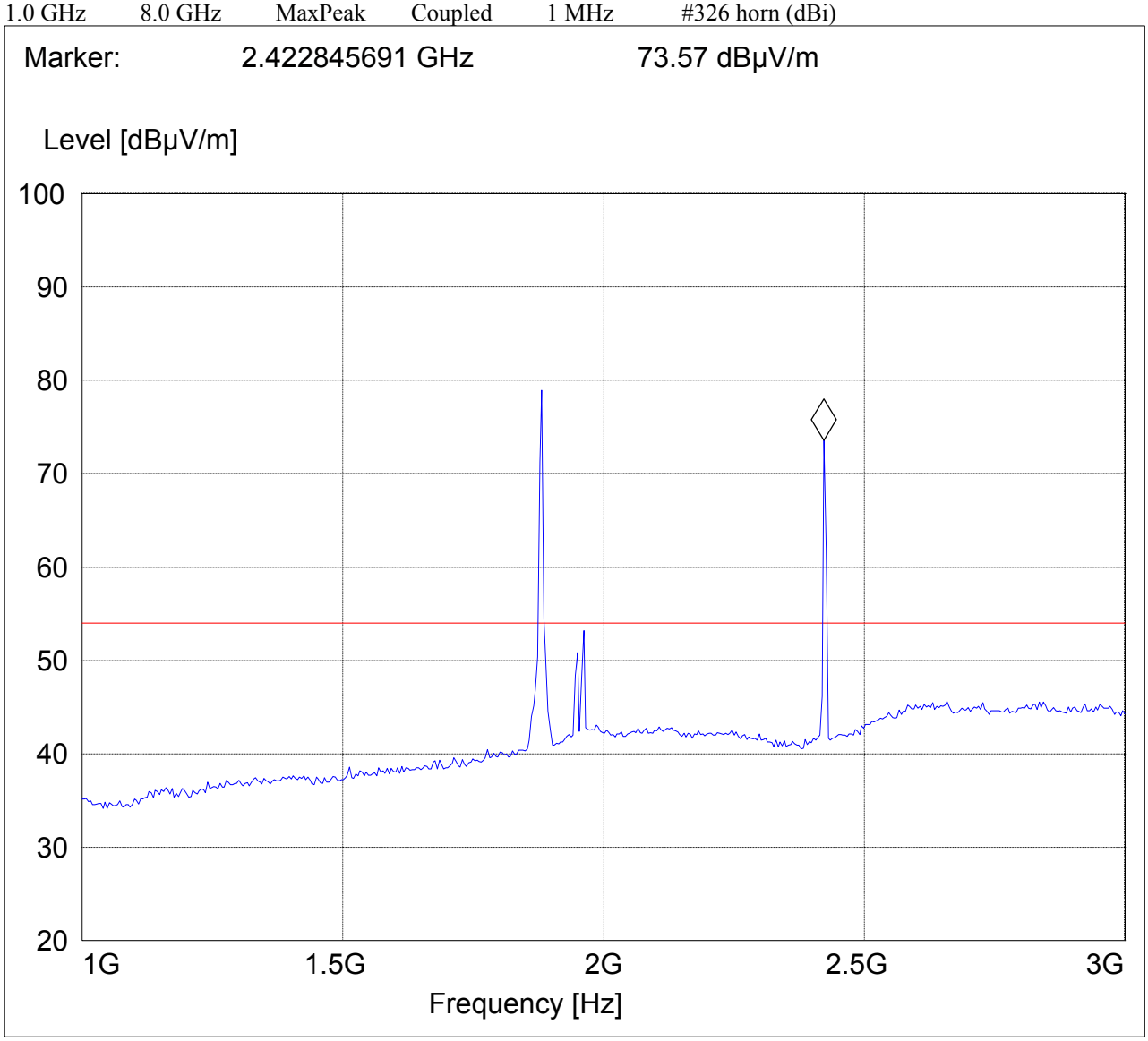
RECEIVER SPURIOUS RADIATION § 15.209

1GHz – 3GHz

Note: Marked frequency is the carrier and other peak above the limit is the carrier of GPRS.

SWEEP TABLE: "BT Spuri hi 1-8G"
Short Description: Bluetooth Spurious 1-8 GHz

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

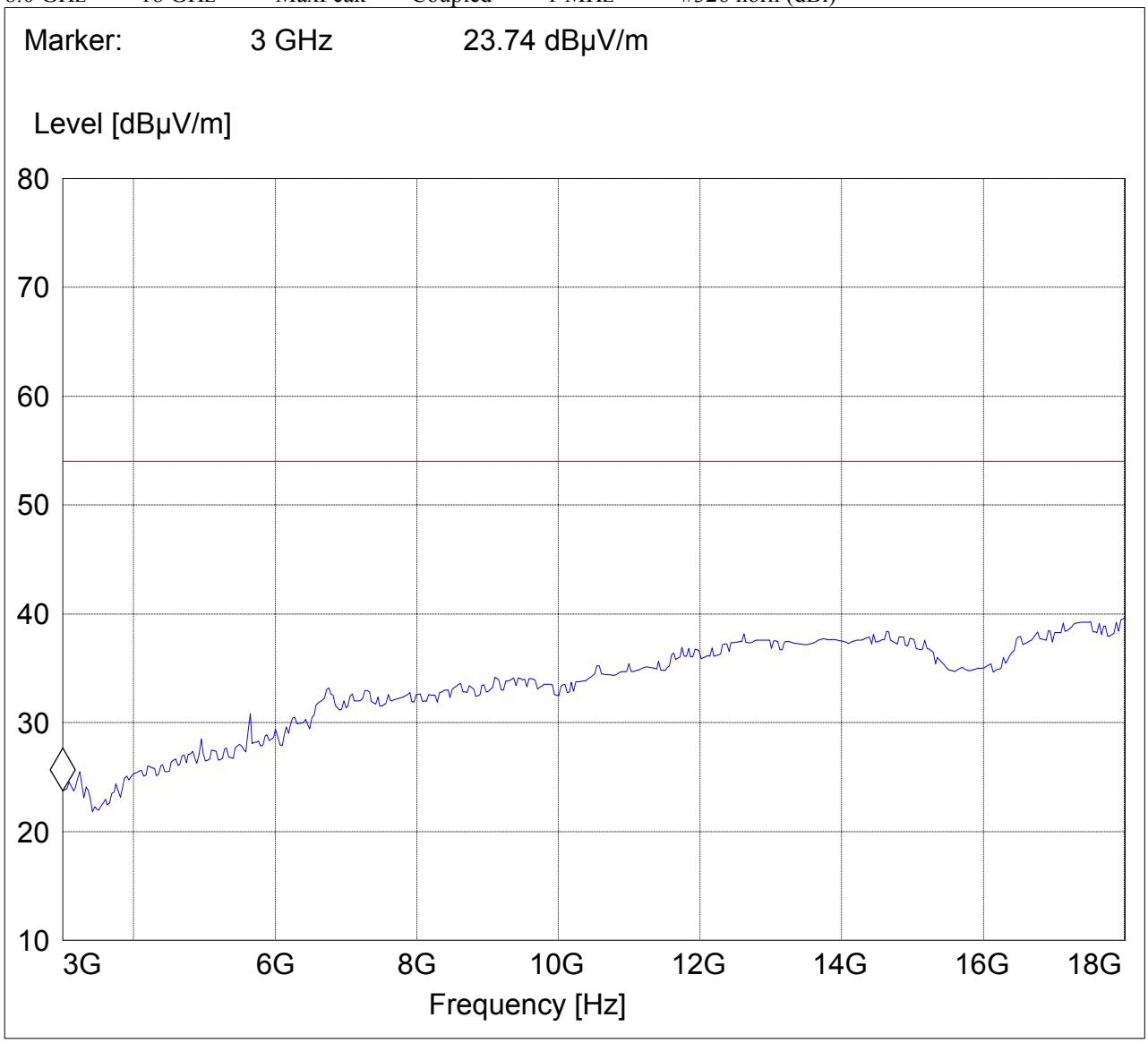


RECEIVER SPURIOUS RADIATION § 15.209

3GHz – 18GHz

SWEEP TABLE: "BT Spuri hi 8-18G"
Short Description: Bluetooth Spurious 8-18GHz

Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW VBW	Transducer
8.0 GHz	18 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)

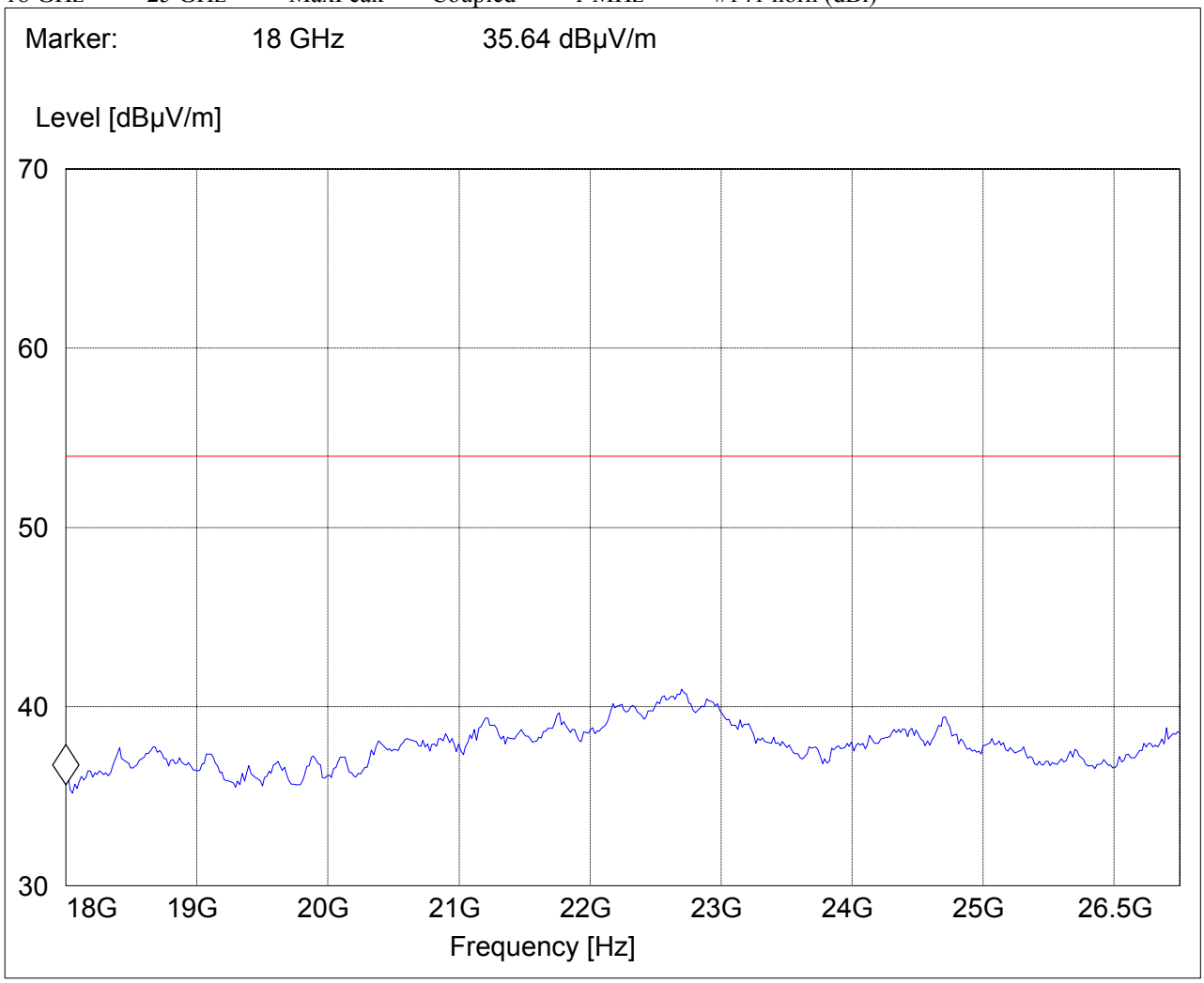


RECEIVER SPURIOUS RADIATION § 15.209

18GHz – 25GHz

SWEEP TABLE: "BT Spuri hi 18-25G"
Short Description: Bluetooth Spurious 18-25GHz

Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW VBW	Transducer
18 GHz	25 GHz	MaxPeak	Coupled	1 MHz	#141 horn (dBi)

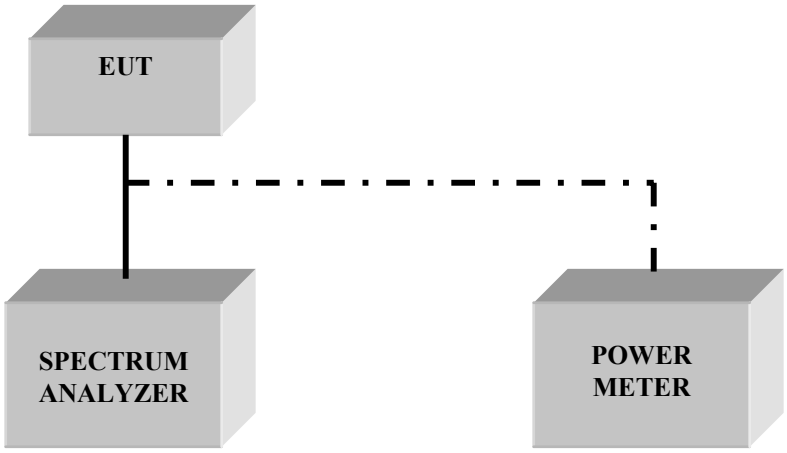


TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

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 Amlifier	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