FCC Test Report

Test report no.: EMC_448-2003FCC15.247_IX104-12
FCC Part 15.247 for FHSS systems / CANADA RSS-210
(iX104-12)

FCC ID: Q2GIX104-001

Deutscher Akkreditierungs Rat

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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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.	:	iX104-12
Description	:	Tablet PC with Wireless LAN
FCC-ID	:	Q2GIX104-001

Additional information

Frequency	:	2400MHz (WLAN)
Type of modulation	:	FHSS
Number of channels	:	2400: 79 Channels
Antenna	:	Internal
Power supply	:	9-18Vdc
Output power	:	WLAN = 112mW (Max)
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 the test reports J99013298B **for conducted results. Otherwise, this report contains only radiated results for the Tablet PC with embedded PCMCIA card and antenna. The PCMCIA card is unchanged from the tested configuration in report** J99013298B.

Technical responsibility for area of testing:

Date	Section	Name	Signature
2003-04-28	EMC & Radio	Lothar Schmidt (Manager)	

Responsible for test report and project leader:

Date	Section	Name	Signature
2003-04-08	EMC & Radio	Philip Kim(EMC Engineer)	

2.2 Test report

TEST REPORT

Test report no.: EMC_448-2003FCC15.247_IX104-12
(iX104-12)

TEST REPORT REFERENCE

LIST OF MEASUREMENTS PAGE

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

(RADIATED)

Note: EIRP is calculated from the following equation:

EIRP = Conducted power (Measured) + Antenna Gain (Measured)
Antenna Gain was measured with a different WLAN card using the same tablet PC and antenna (results from Report *EMC_448-2003FCC15.247_IX104-11).*

EIRP:

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402MHz	2441MHz	2480MHz
T_{nom}(23)°C	V_{nom}(5.0) VDC	19.4	18.34	18.27
Measurement uncertainty		±0.5dBm		

RBW/VBW: 10MHz

LIMIT **SUBCLAUSE § 15.247 (b) (1)**

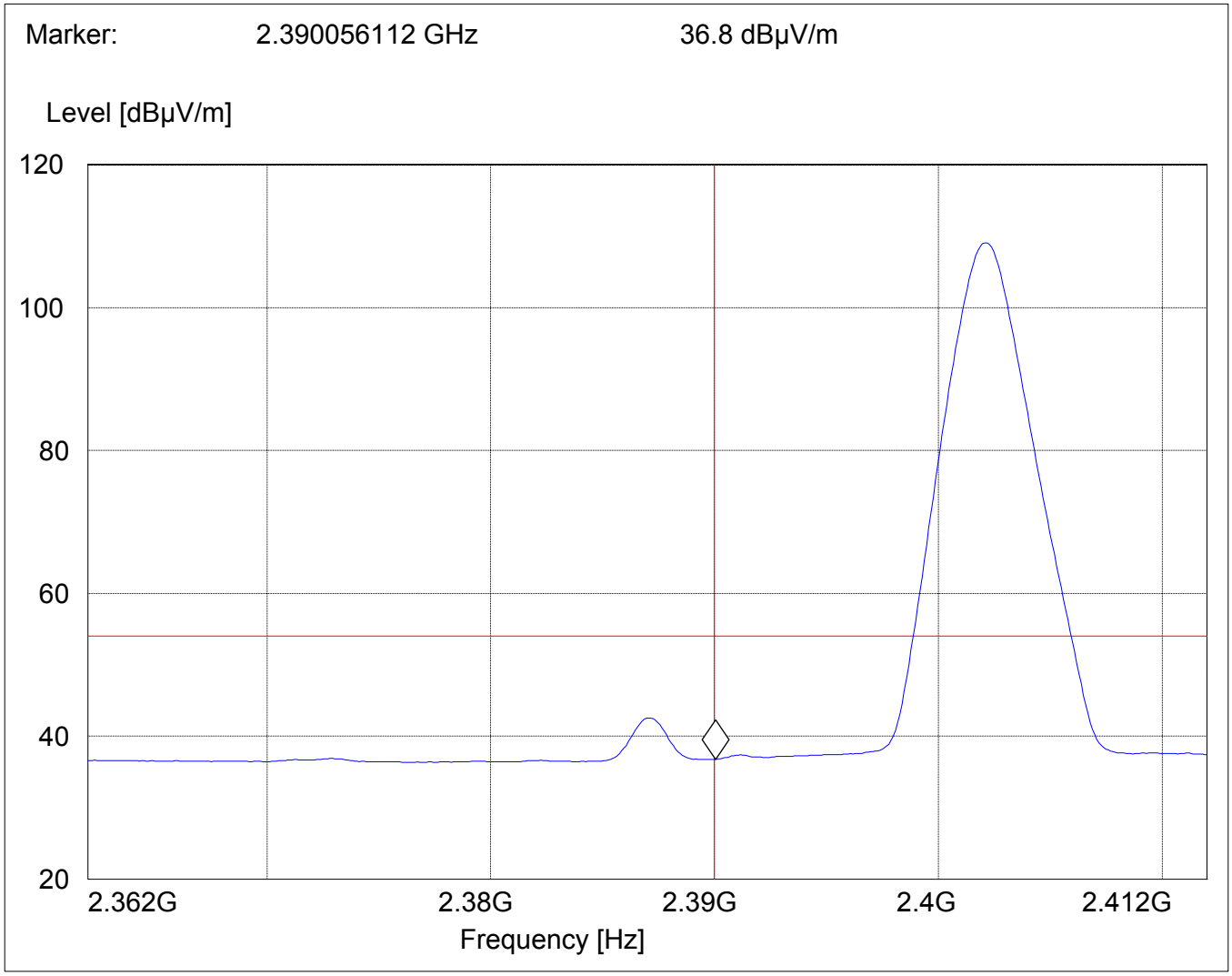
Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt / 30dBm

BAND EDGE COMPLIANCE §15.247 (c)

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

Operating condition : Tx at 2402MHz
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)

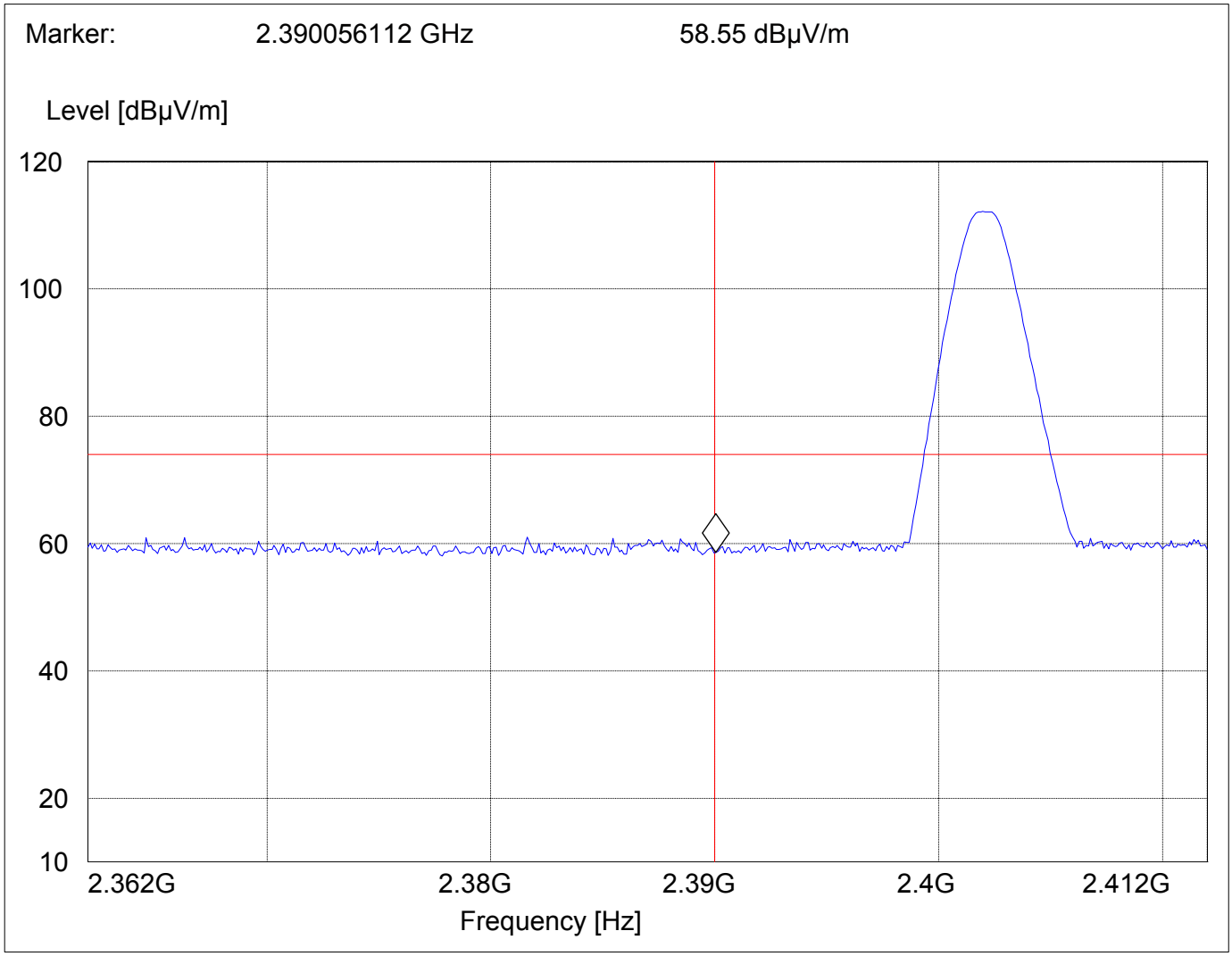


BAND EDGE COMPLIANCE §15.247 (c)

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

Operating condition	:	Tx at 2402MHz
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)

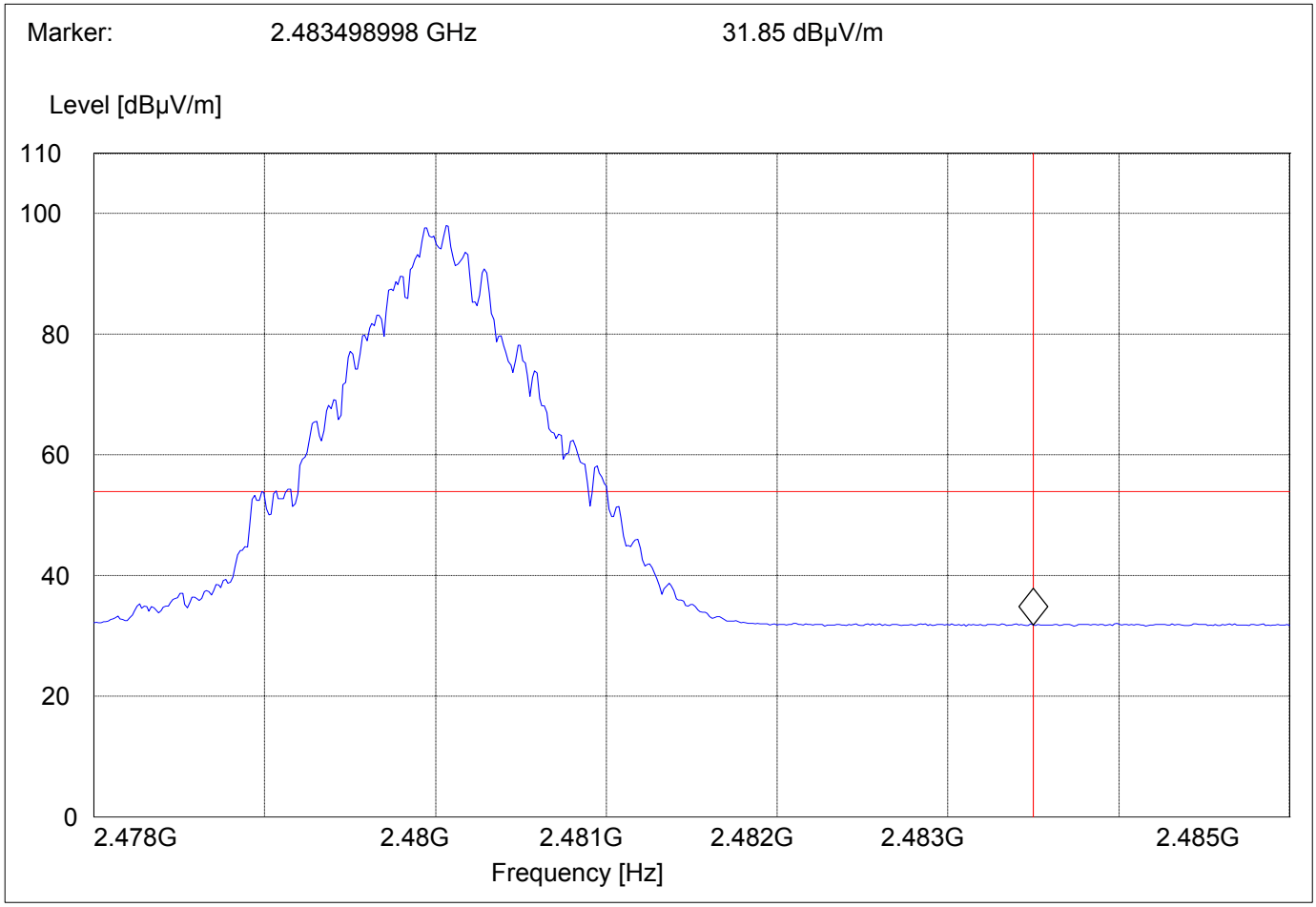


BAND EDGE COMPLIANCE §15.247 (c)

High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)
(Average measurement)
Note: Delta Marker method was applied in this test. Plot only displays the 30KHz RBW.
Calculations are explained under Marker-Delta Method page 16.

Operating condition	:	Tx at 2480MHz
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	30 KHz	10Hz	#326 horn (dBi)

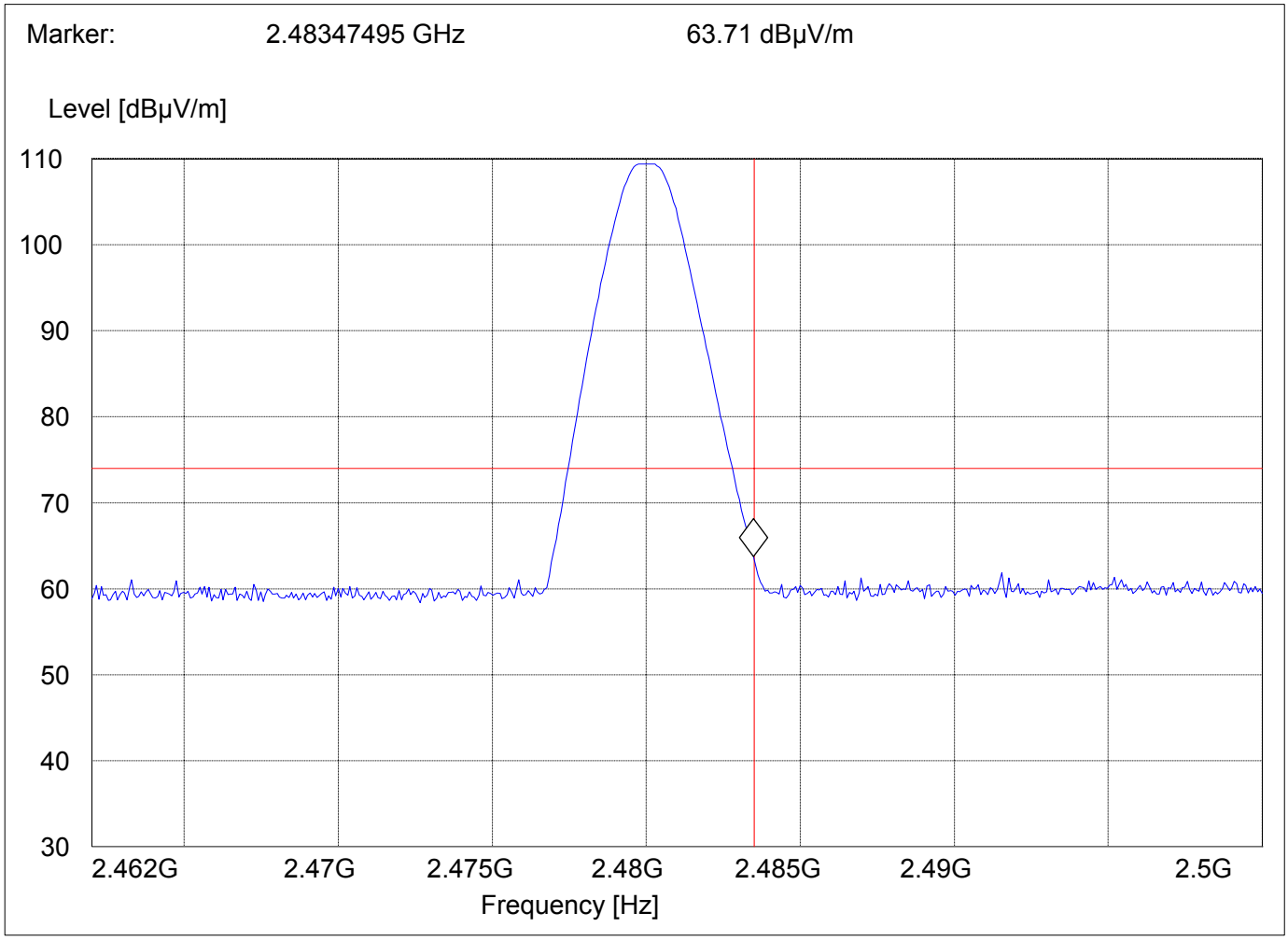


BAND EDGE COMPLIANCE §15.247 (c)

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

Operating condition	:	Tx at 2480MHz
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)



Calculation for Marker-Delta Method

1) In-band field strength measurement of the fundamental emission using the RBW and detector function required by C63.4 and FCC Rules for the frequency being measured: 106.49dBuV/m
2) Analyzer RBW to 1% of the total span (but never less than 30kHz) with a video bandwidth equal to or greater than the RBW. The peak levels of the fundamental emission is 98.02dBuV and relevant band-edge emission is 31.85dBuV.

Delta from step 2 is 98.02-31.85 = 66.17dB

3) Subtract the delta measured in step 2 (66.17dB) from the field strengths measured in step 1 (106.49dBuV/m) therefore (106.49dBuV/m – 66.17dB = 40.32dBuV/m).
FCC Limit from §15.205.
54dBuV/m (Avg)
Margin
54dBuV/m – 40.32dBuV/m = 13.68dB

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)

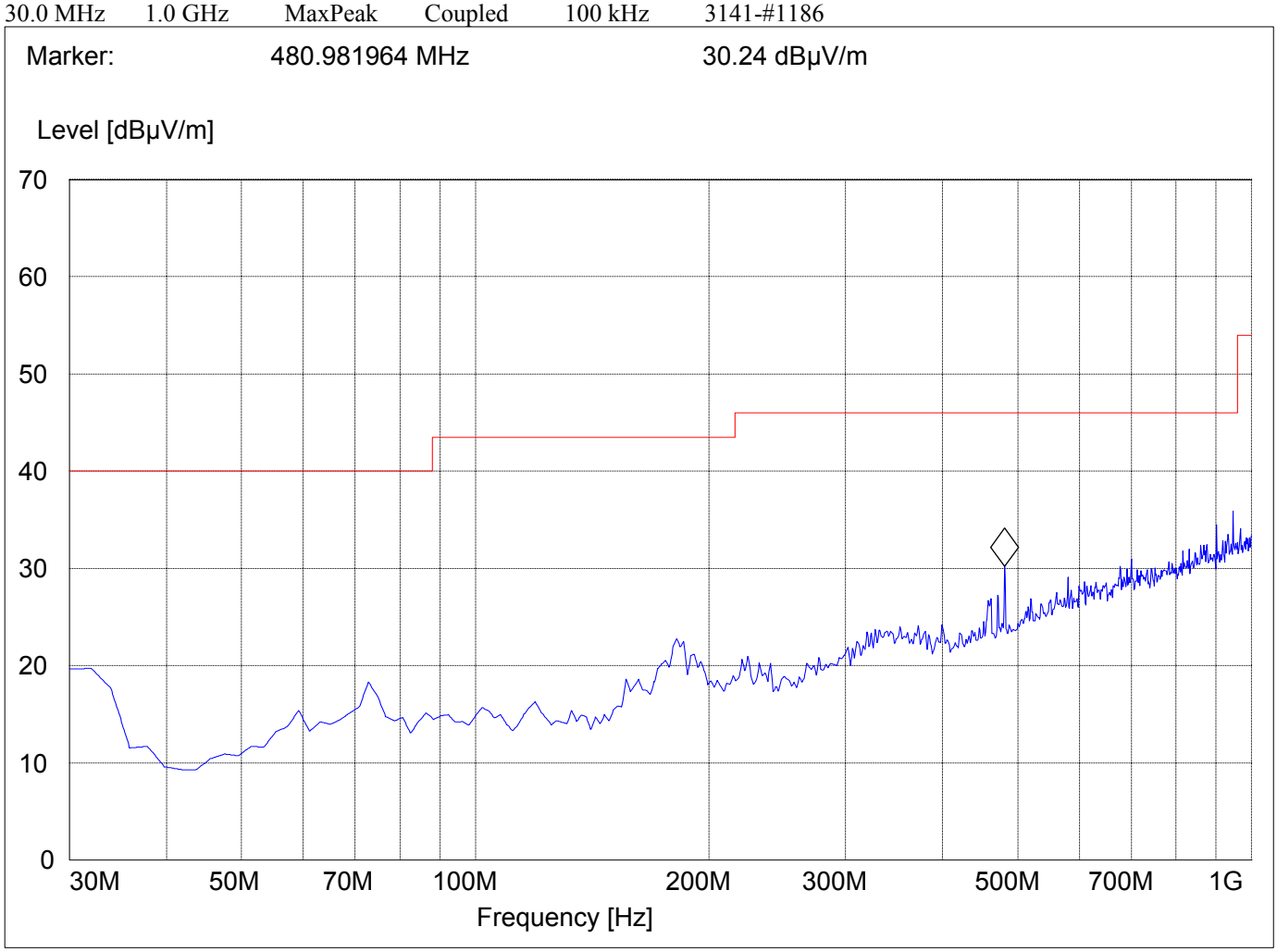
Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

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 (2402MHz): 30MHz – 1GHz

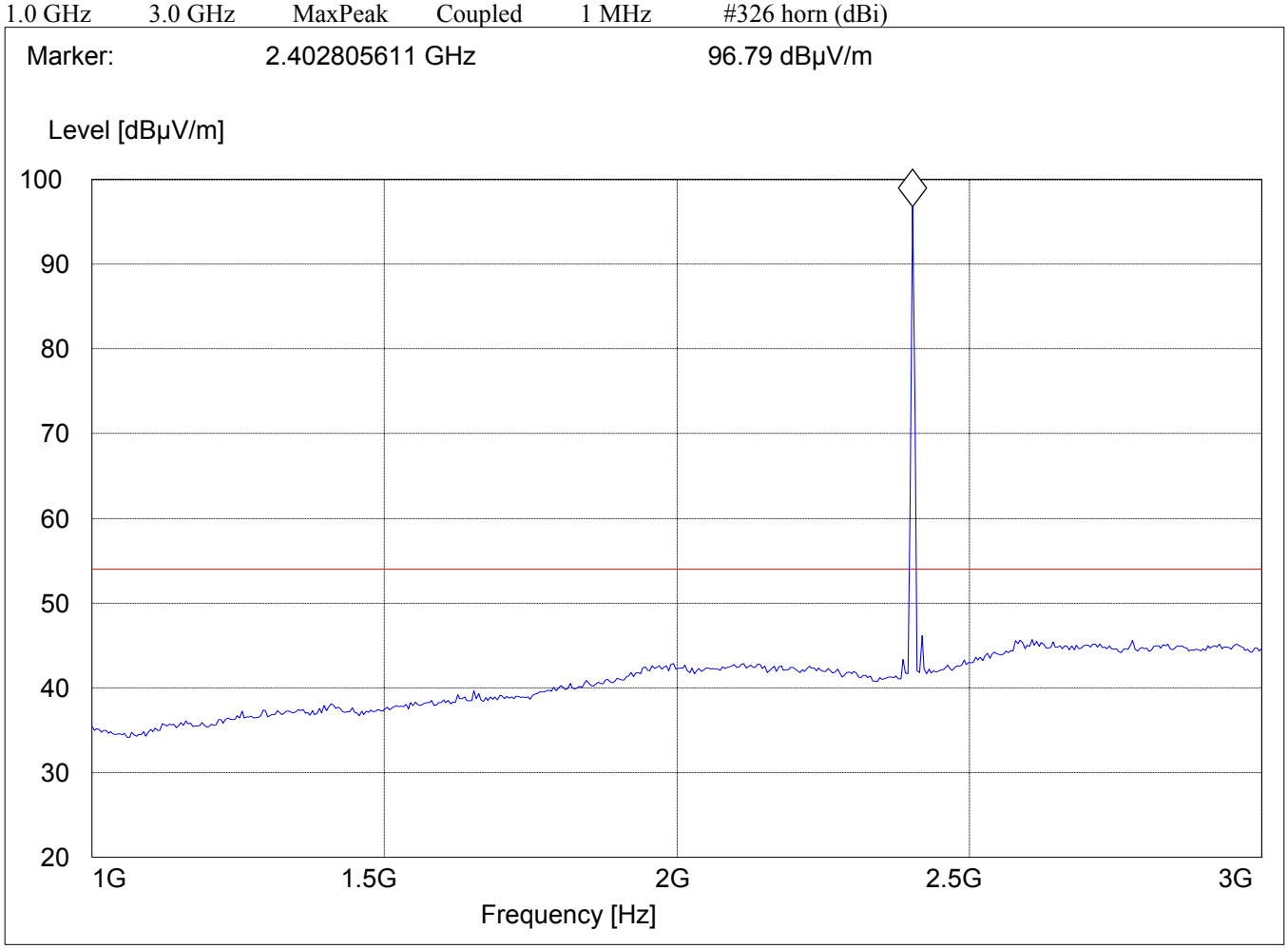
SWEEP TABLE:		"BT Spuri hi 30-1G"			
Short Description:		WLAN 30MHz-1GHz			
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW VBW	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186



EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Lowest Channel(2402MHz): 1GHz – 3GHz

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

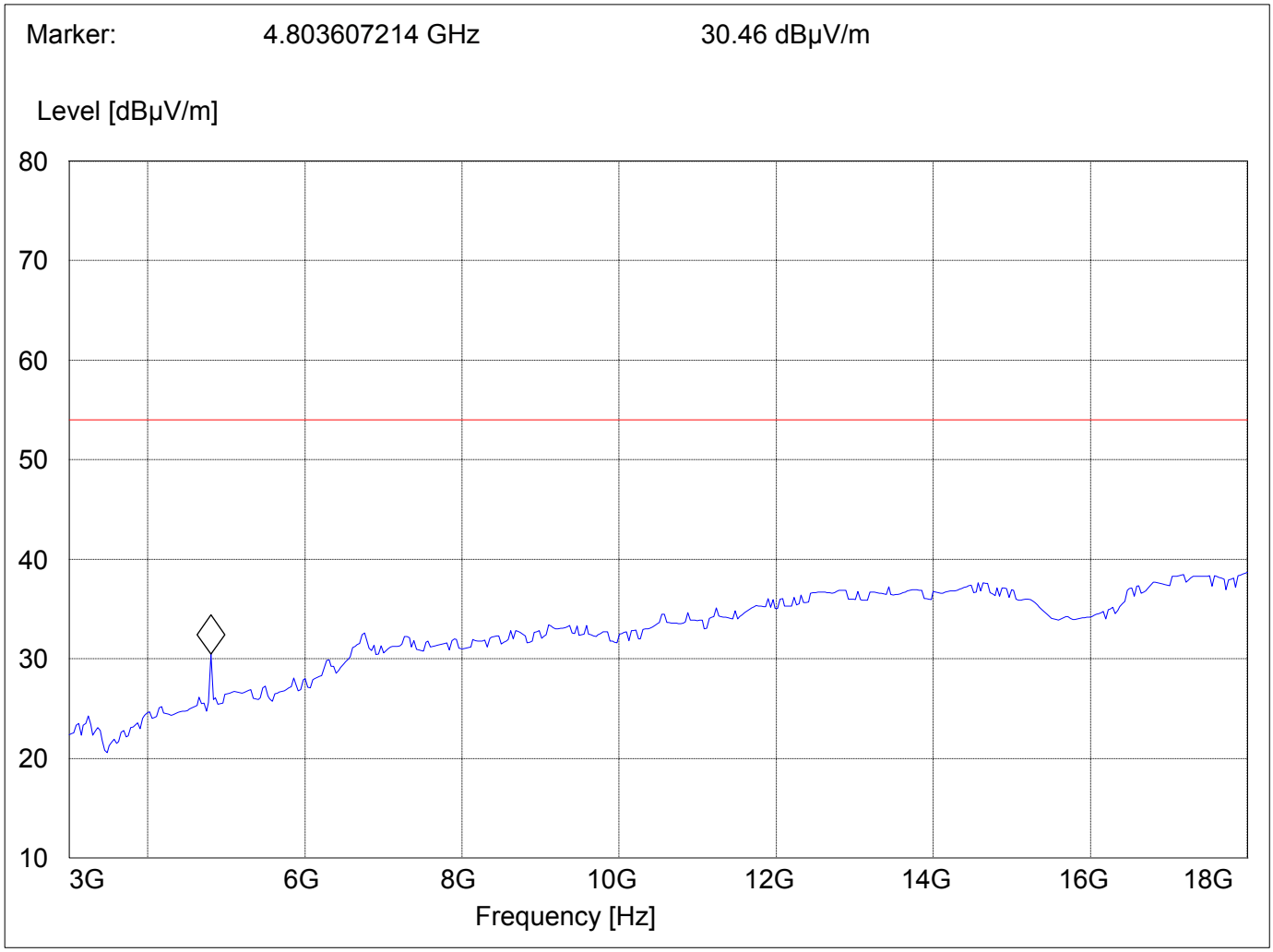
SWEEP TABLE:		"BT Spuri hi 1-8G"			
Short Description:		WLAN Spurious 1-8 GHz			
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW VBW	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Lowest Channel(2402MHz): 3GHz – 18GHz

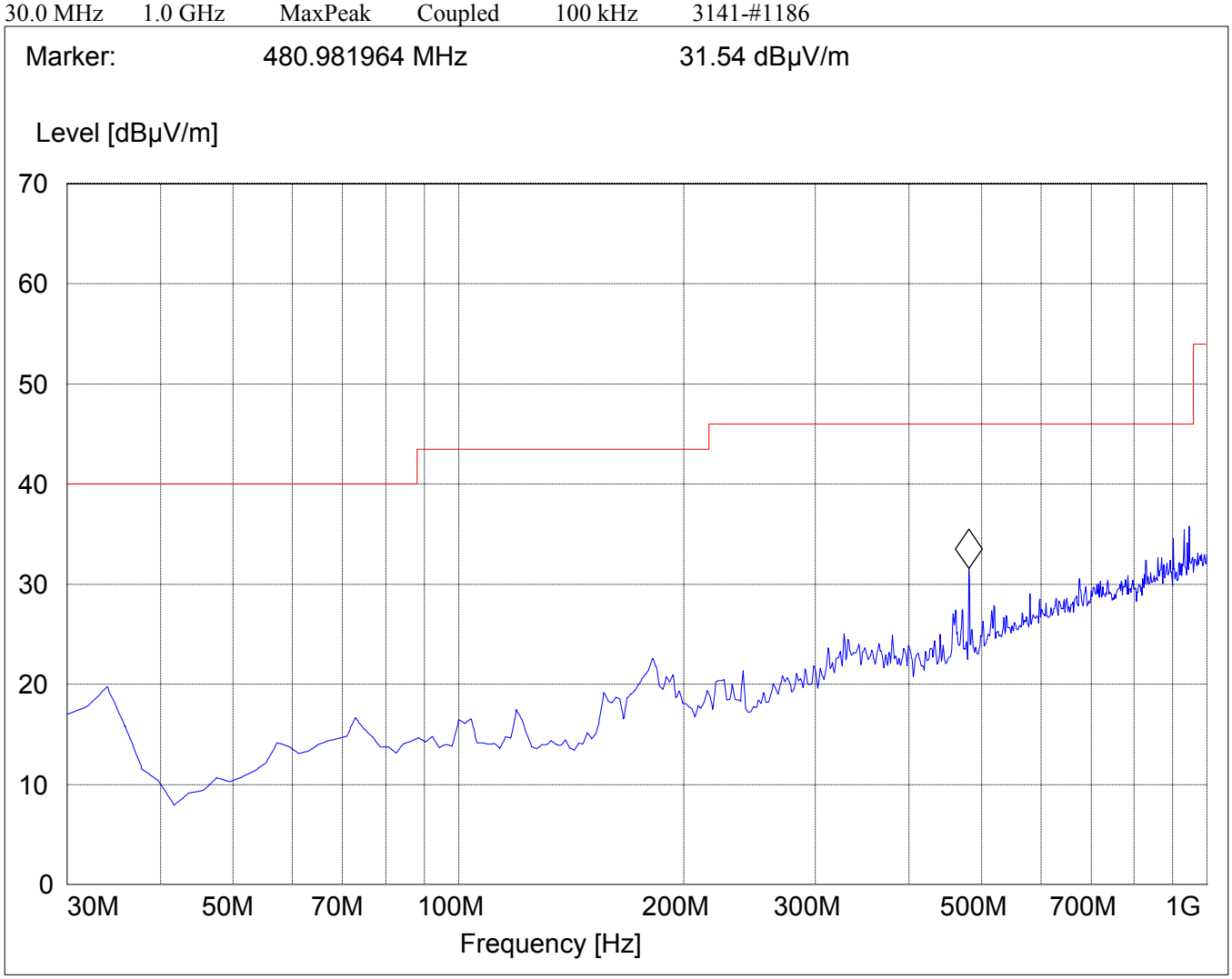
NOTE: The peak above the limit is the carrier frequency.

SWEEP TABLE:		"BT Spuri hi 1-8G"			
Short Description:		WLAN 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(2441MHz): 30MHz – 1GHz

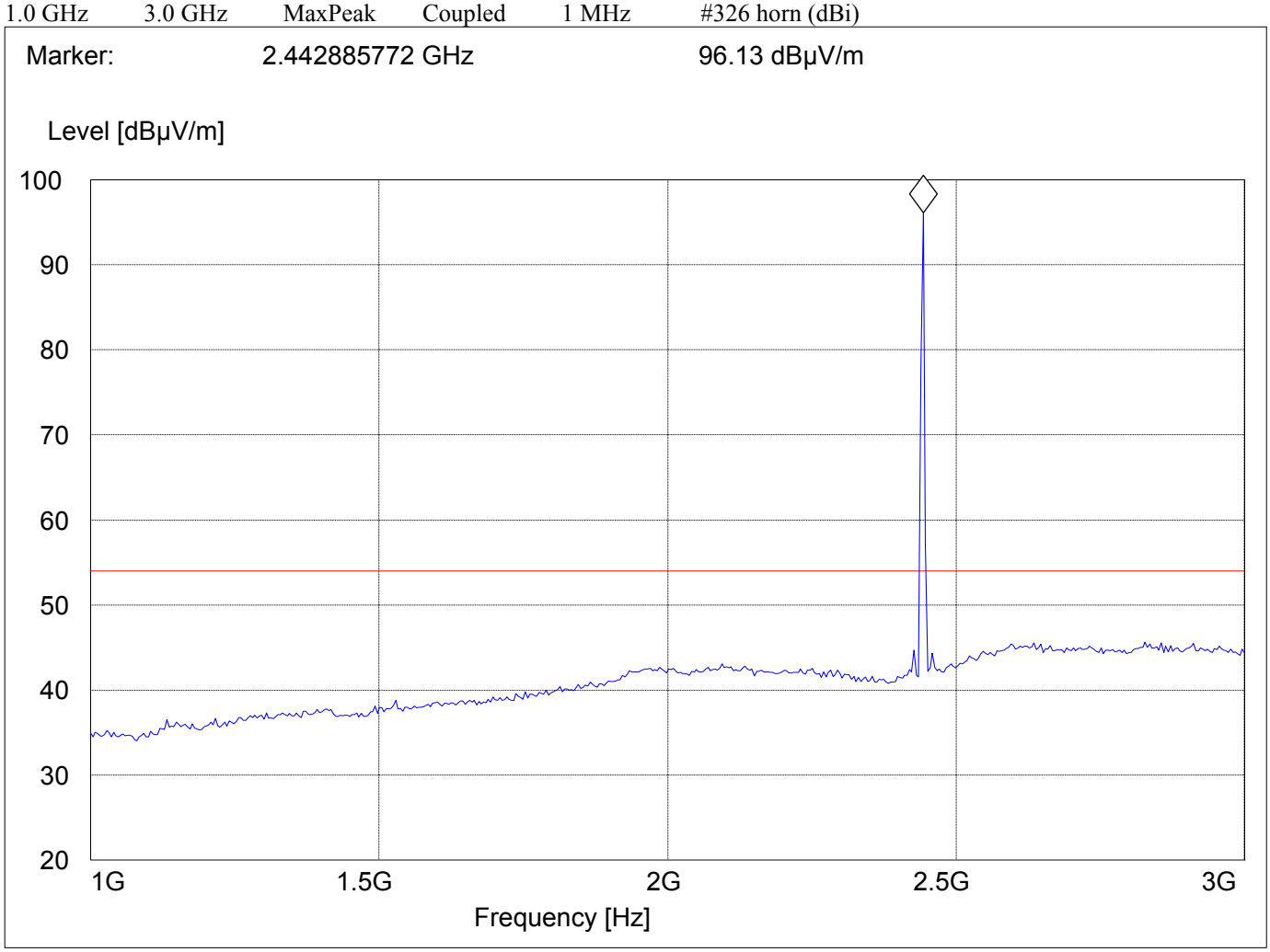
SWEEP TABLE:		"BT Spuri hi 30-1G"			
Short Description:		WLAN 30MHz-1GHz			
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW VBW	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186



EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Middle Channel(2441MHz): 1GHz – 3GHz

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

SWEEP TABLE:		"BT Spuri hi 1-8G"			
Short Description:		WLAN 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)

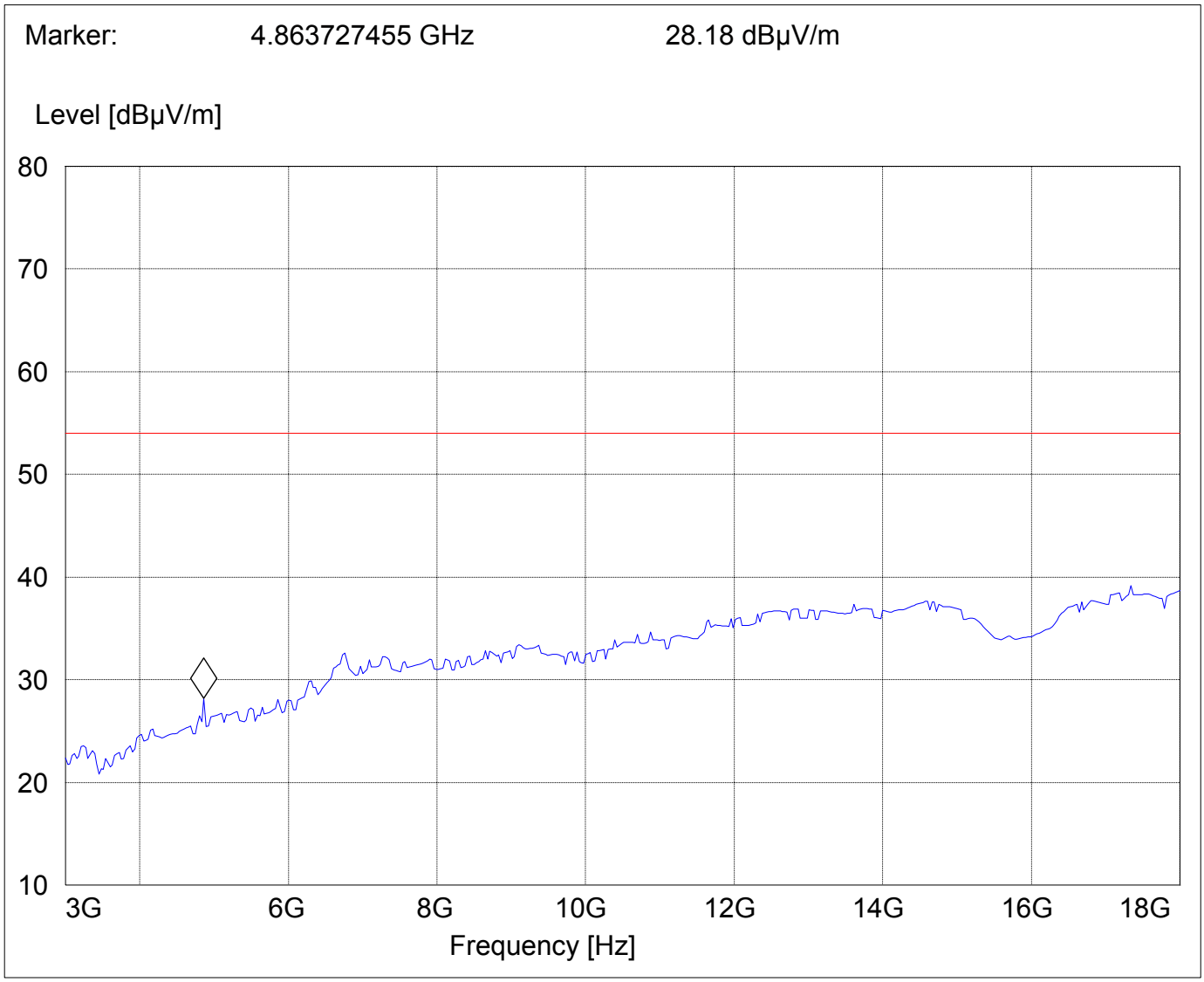


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Middle Channel(2441MHz): 3GHz – 18GHz

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

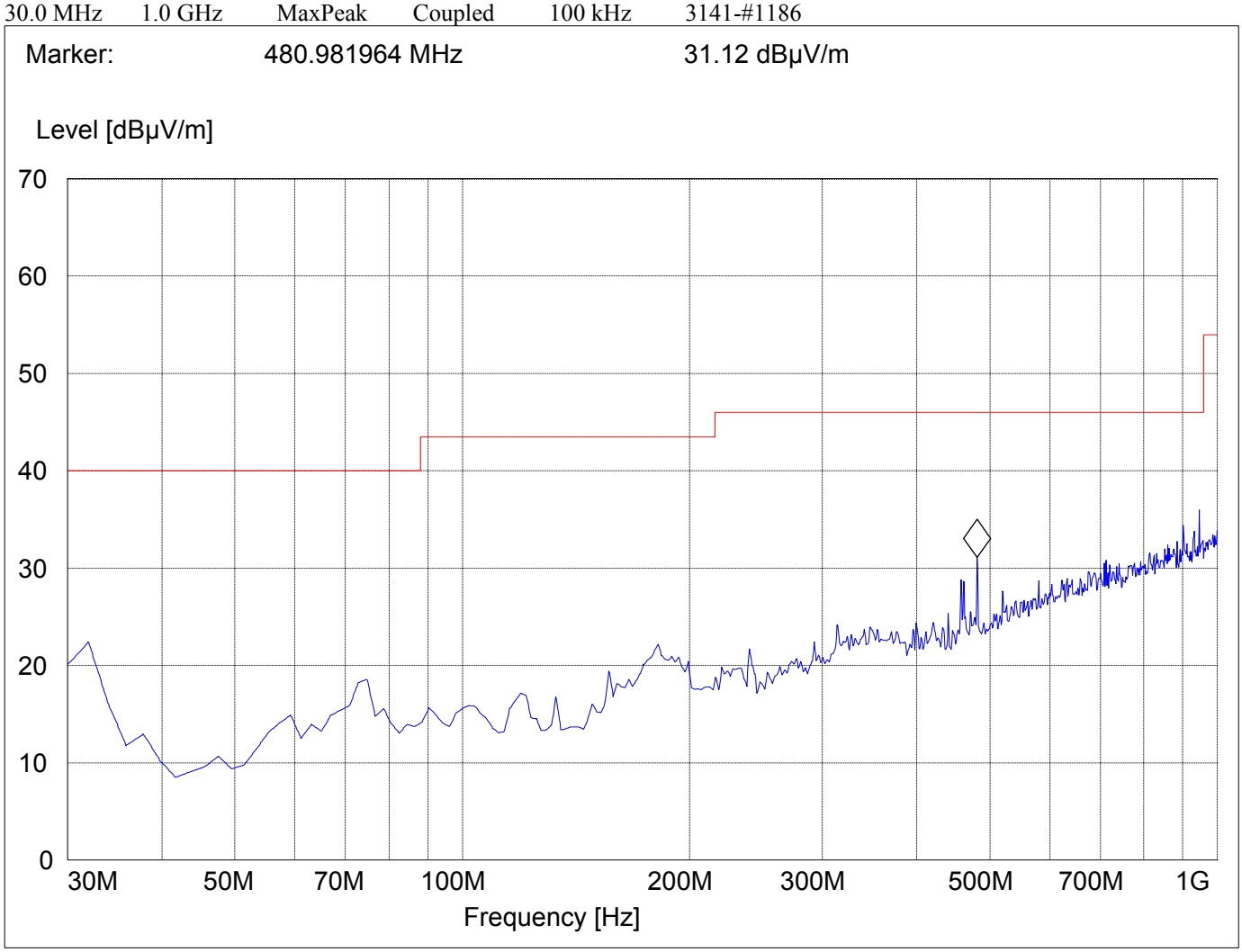
SWEEP TABLE: "BT Spuri hi 1-8G"
Short Description: WLAN Spurious 1-8GHz

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(2480MHz): 30MHz – 1GHz

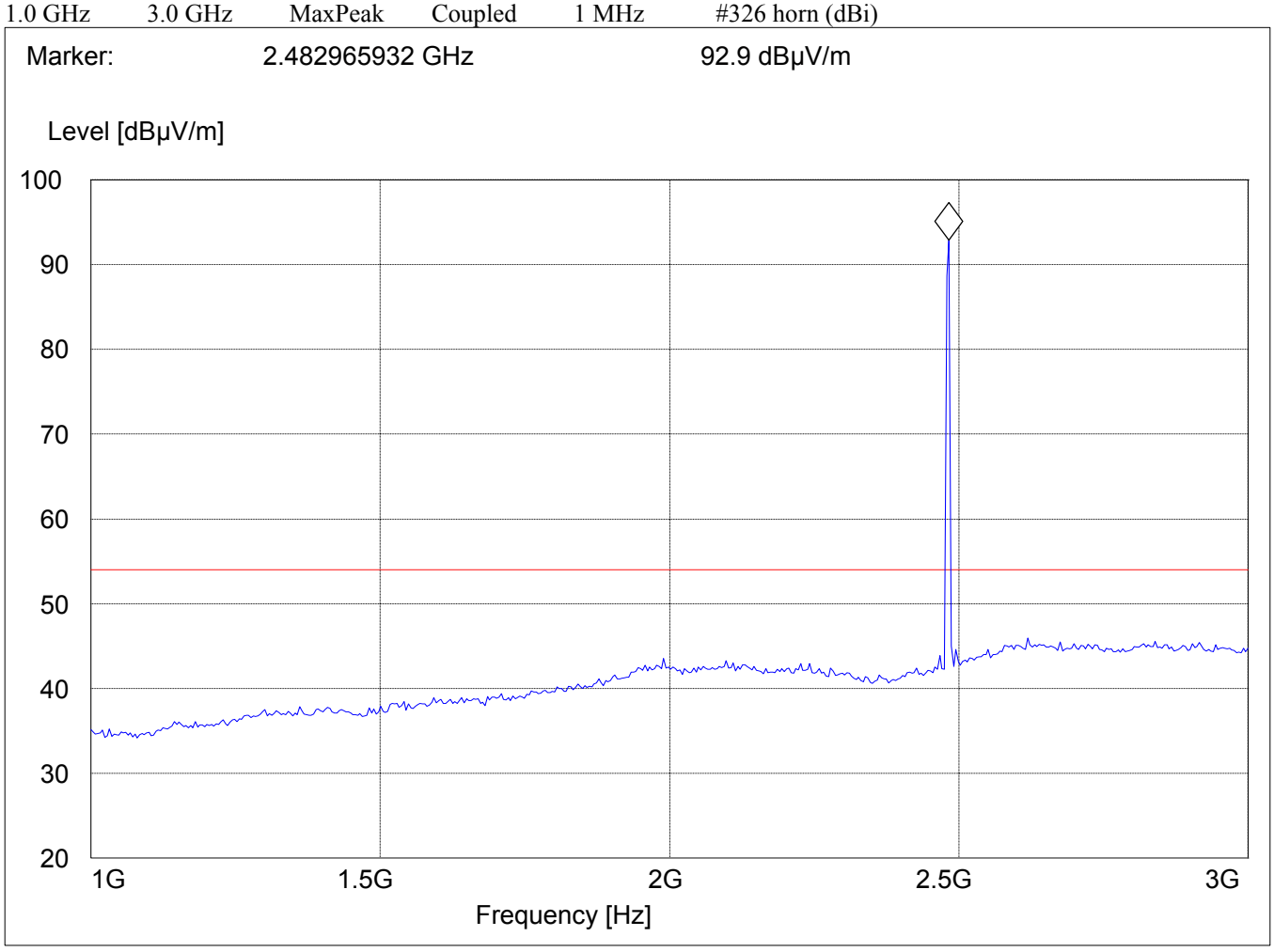
SWEEP TABLE:		"BT Spuri hi 30-1G"			
Short Description:		WLAN 30MHz-1GHz			
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW VBW	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186



EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Highest Channel(2480MHz): 1GHz – 3GHz

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

SWEEP TABLE:	"BT Spuri hi 1-8G"				
Short Description:	WLAN 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)

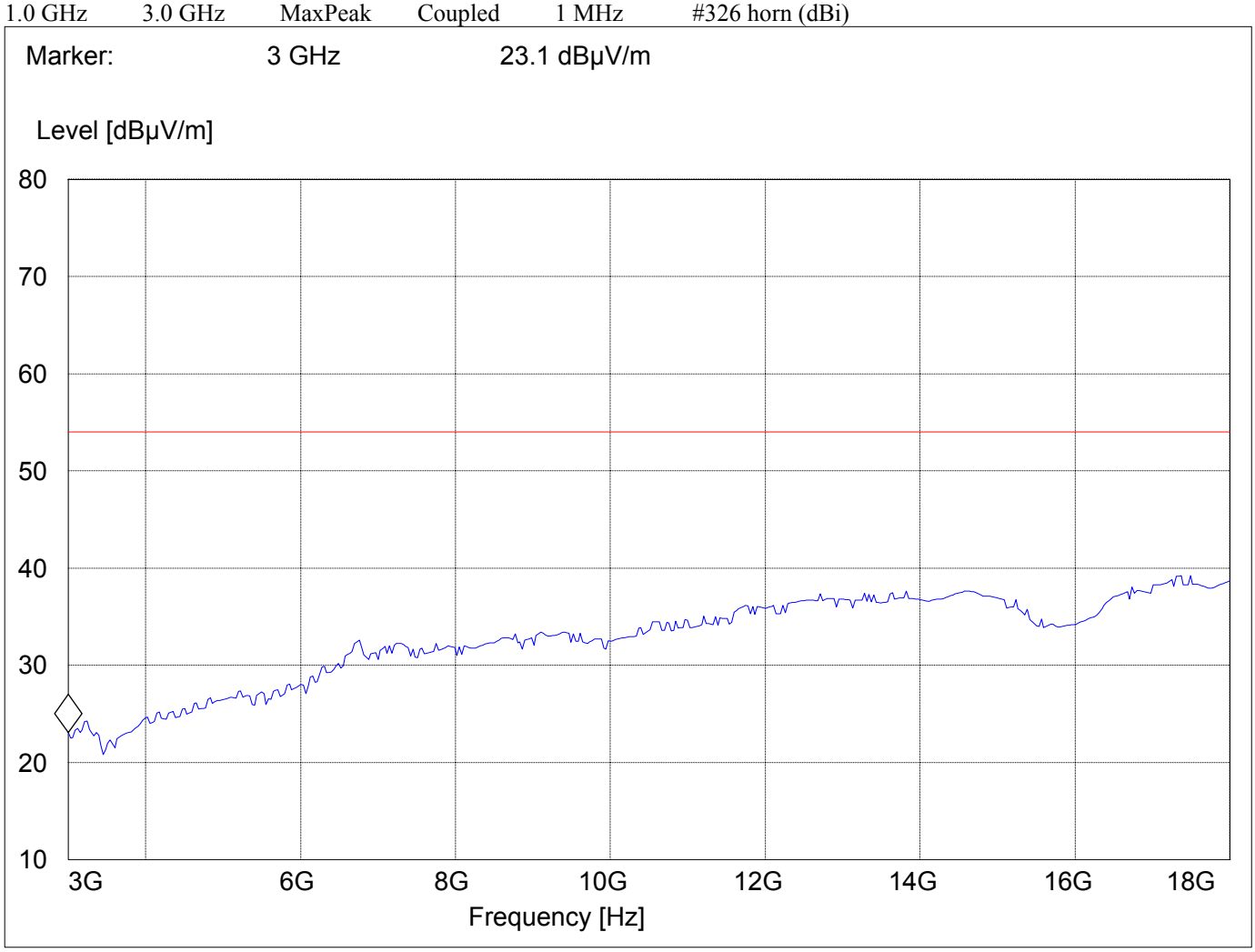


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Highest Channel(2480MHz): 3GHz – 18GHz

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

SWEEP TABLE: "BT Spuri hi 1-8G"
Short Description: WLAN 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)

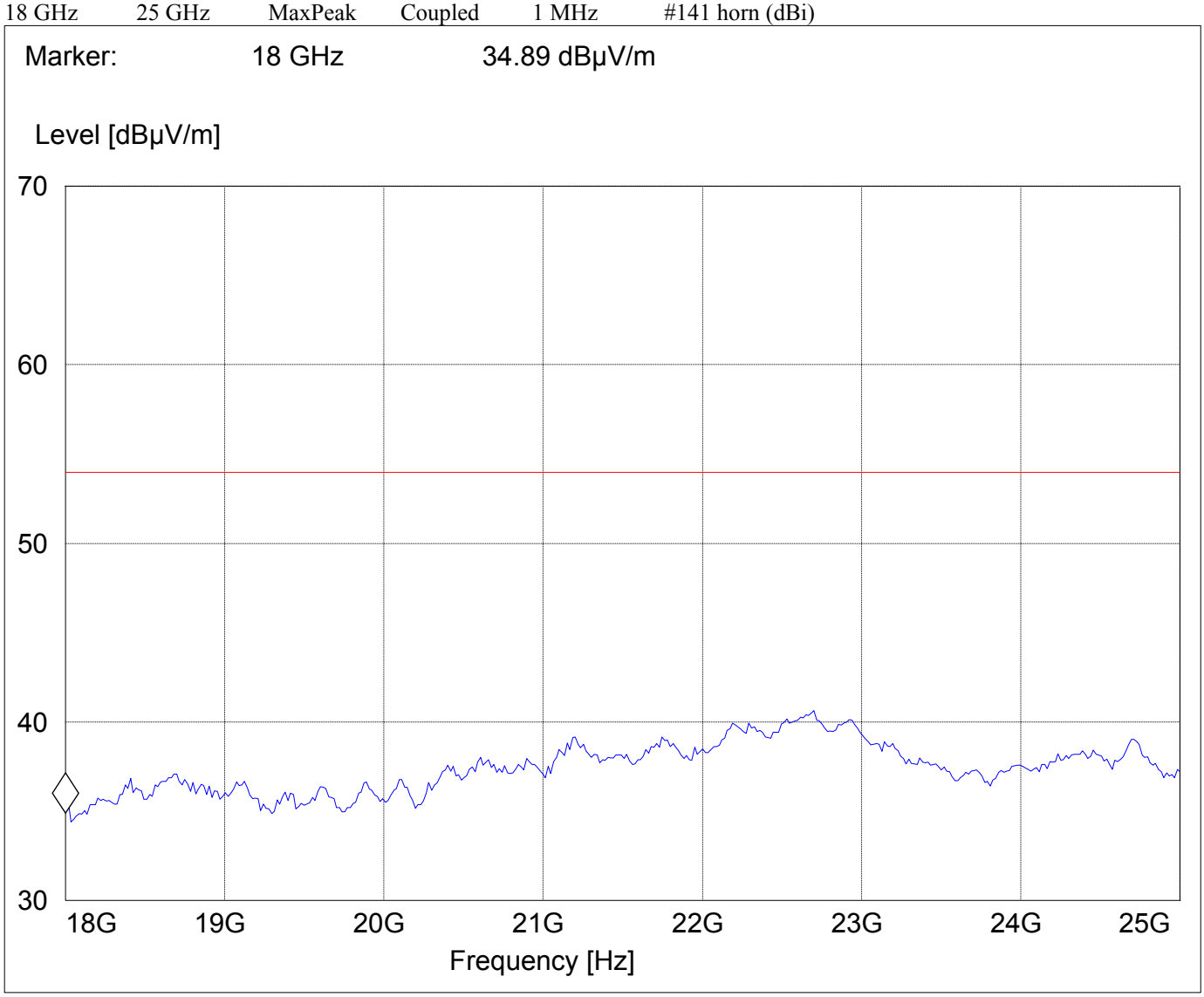


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)

18GHz – 25GHz

(This plot is valid for all three channels)

SWEEP TABLE:		"BT Spuri hi 18-25G"			
Short Description:		WLAN 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

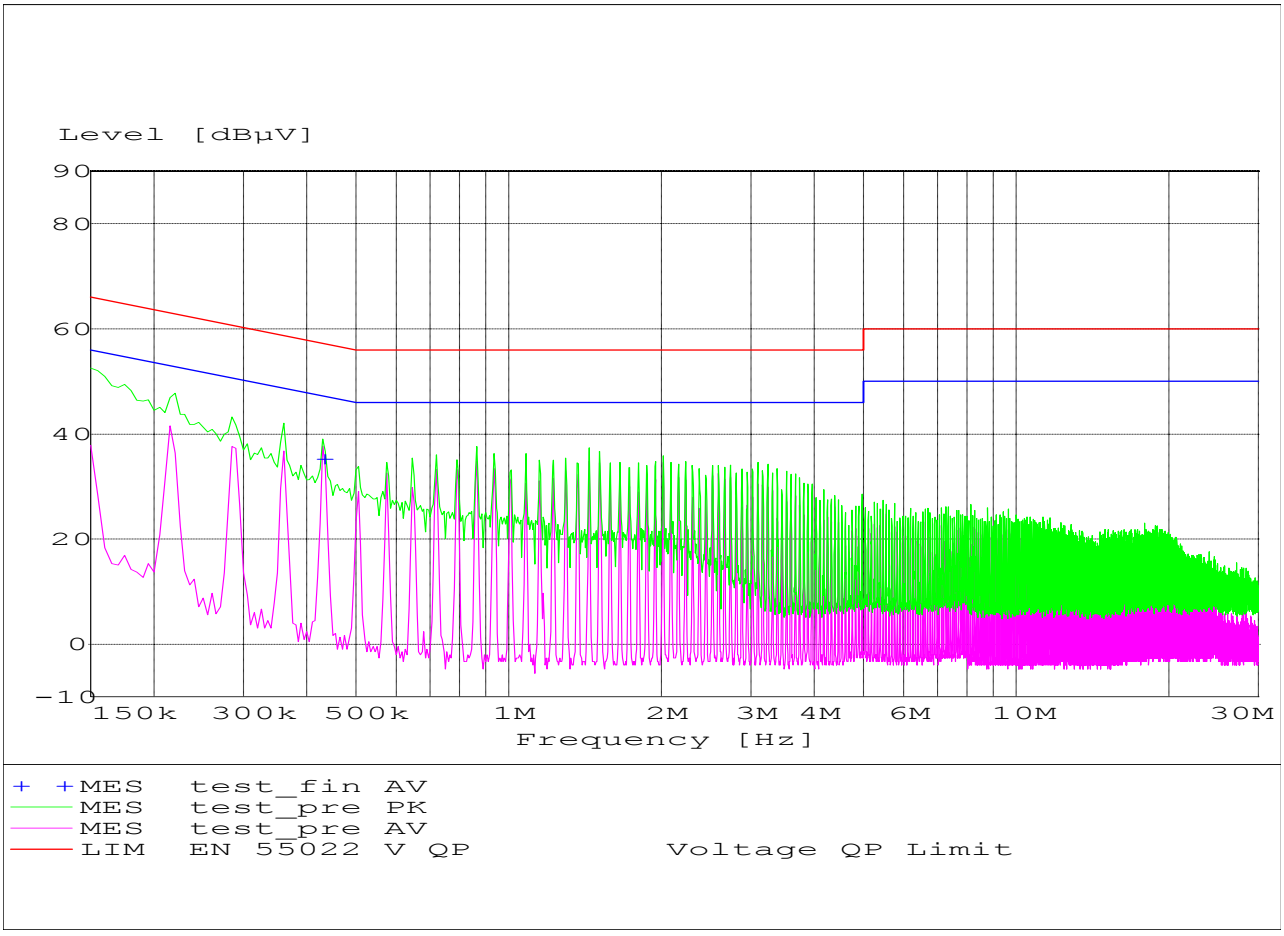
Start Frequency	Stop Frequency	Detector	Meas Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	MaxPeak	Coupled	10 kHz	None

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

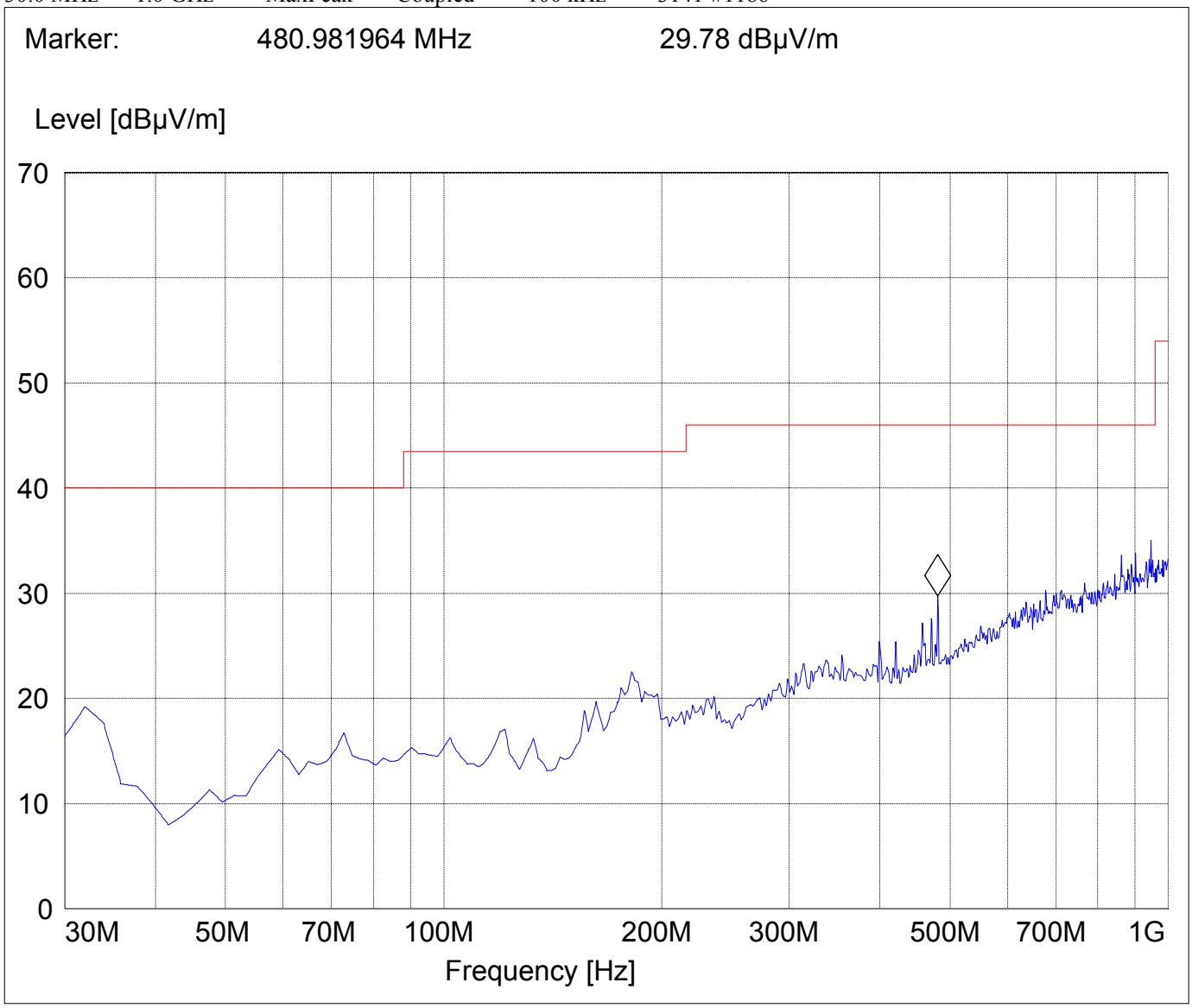
NOTE:
The radiated emissions were done with different settings, using the relevant pre-amplifiers forthe relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 18 and 25 GHz very short cable connections to the antenna was used to minimize the noise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

RECEIVER SPURIOUS RADIATION § 15.209

30MHz – 1GHz

SWEEP TABLE: "BT Spuri hi 30-1G"
Short Description: WLAN 30MHz-1GHz

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

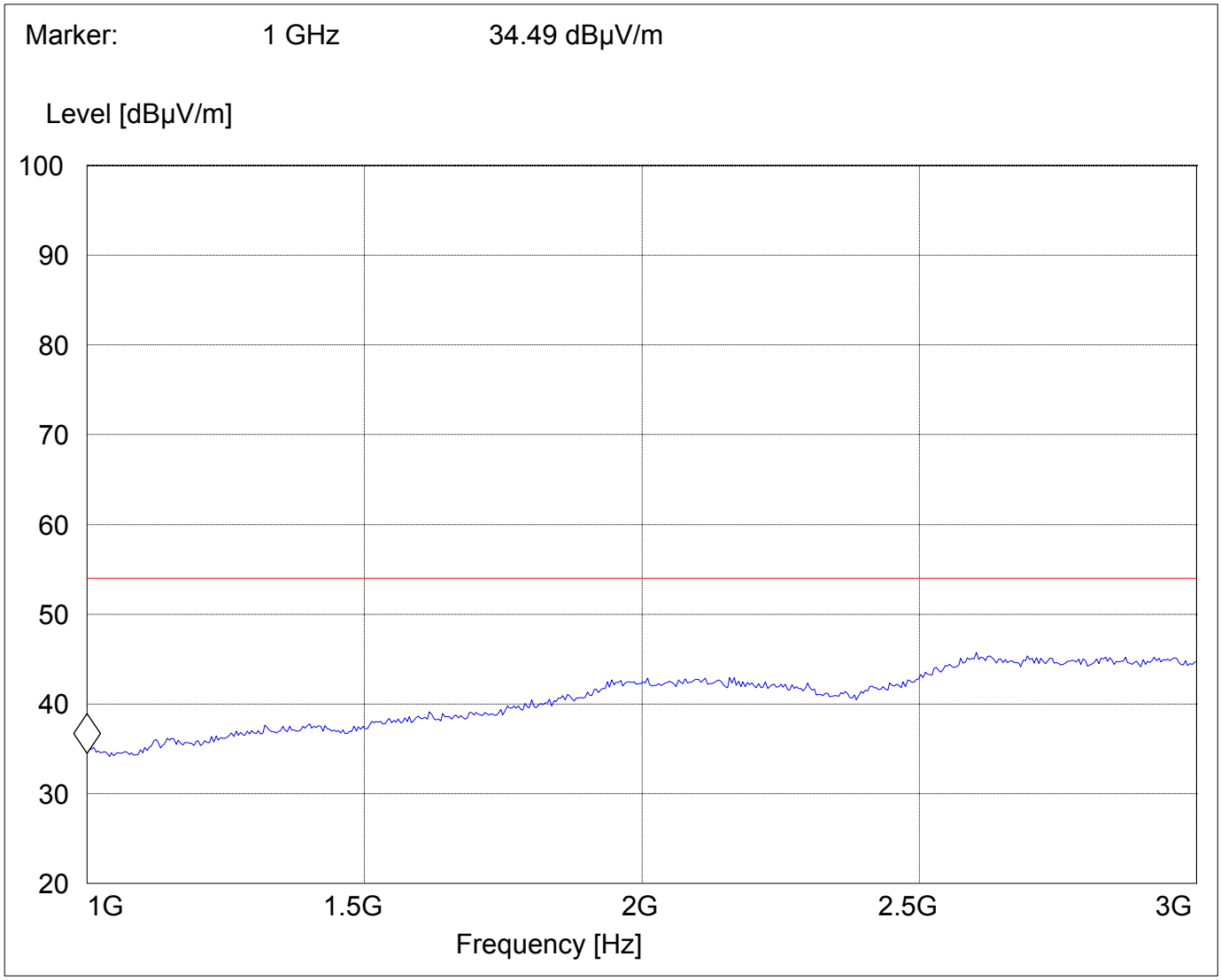


RECEIVER SPURIOUS RADIATION § 15.209

1GHz – 3GHz

SWEEP TABLE: "BT Spuri hi 1-8G"
Short Description: WLAN 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)

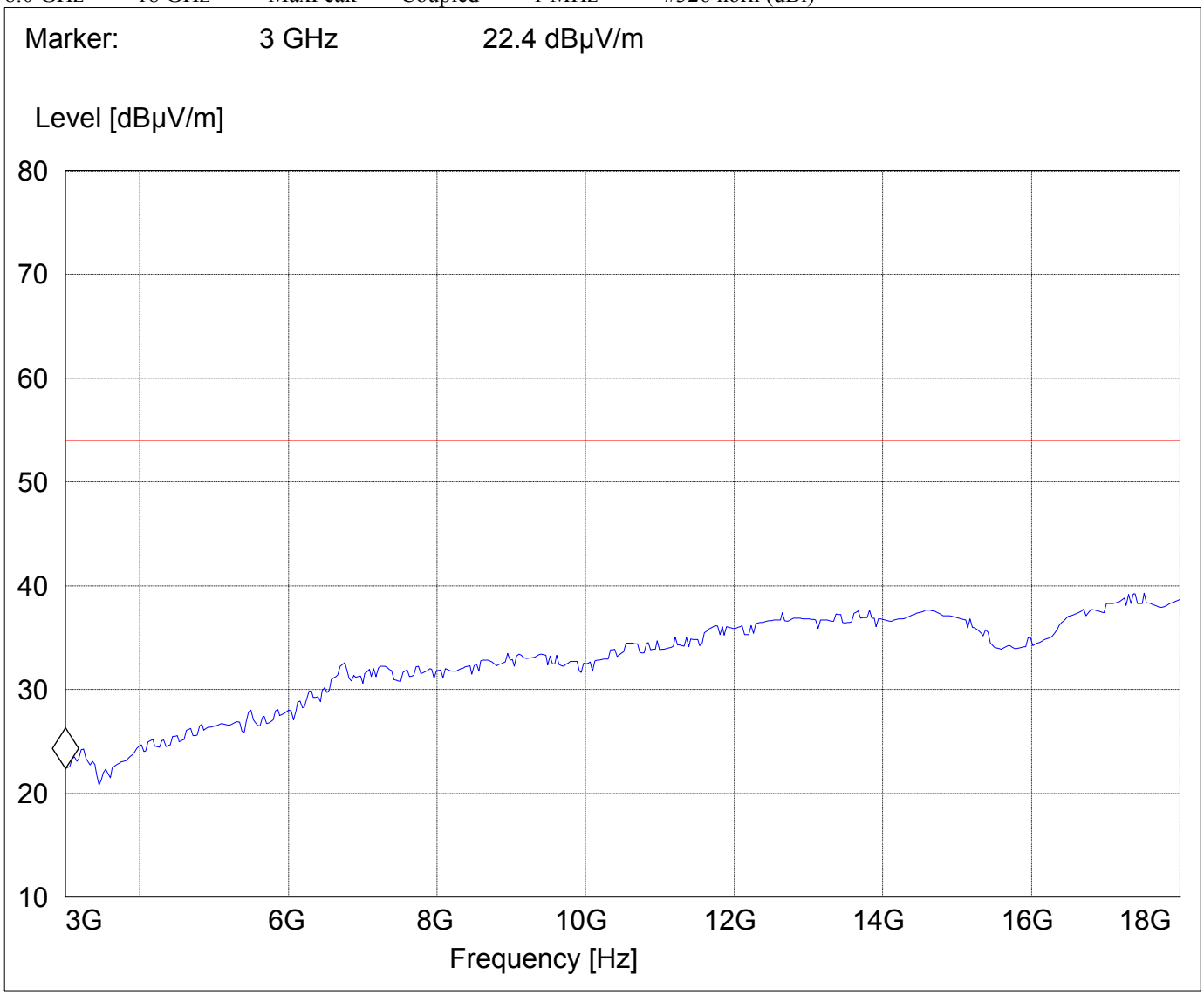


RECEIVER SPURIOUS RADIATION § 15.209

8GHz – 18GHz

SWEEP TABLE: "BT Spuri hi 8-18G"
Short Description: WLAN 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)

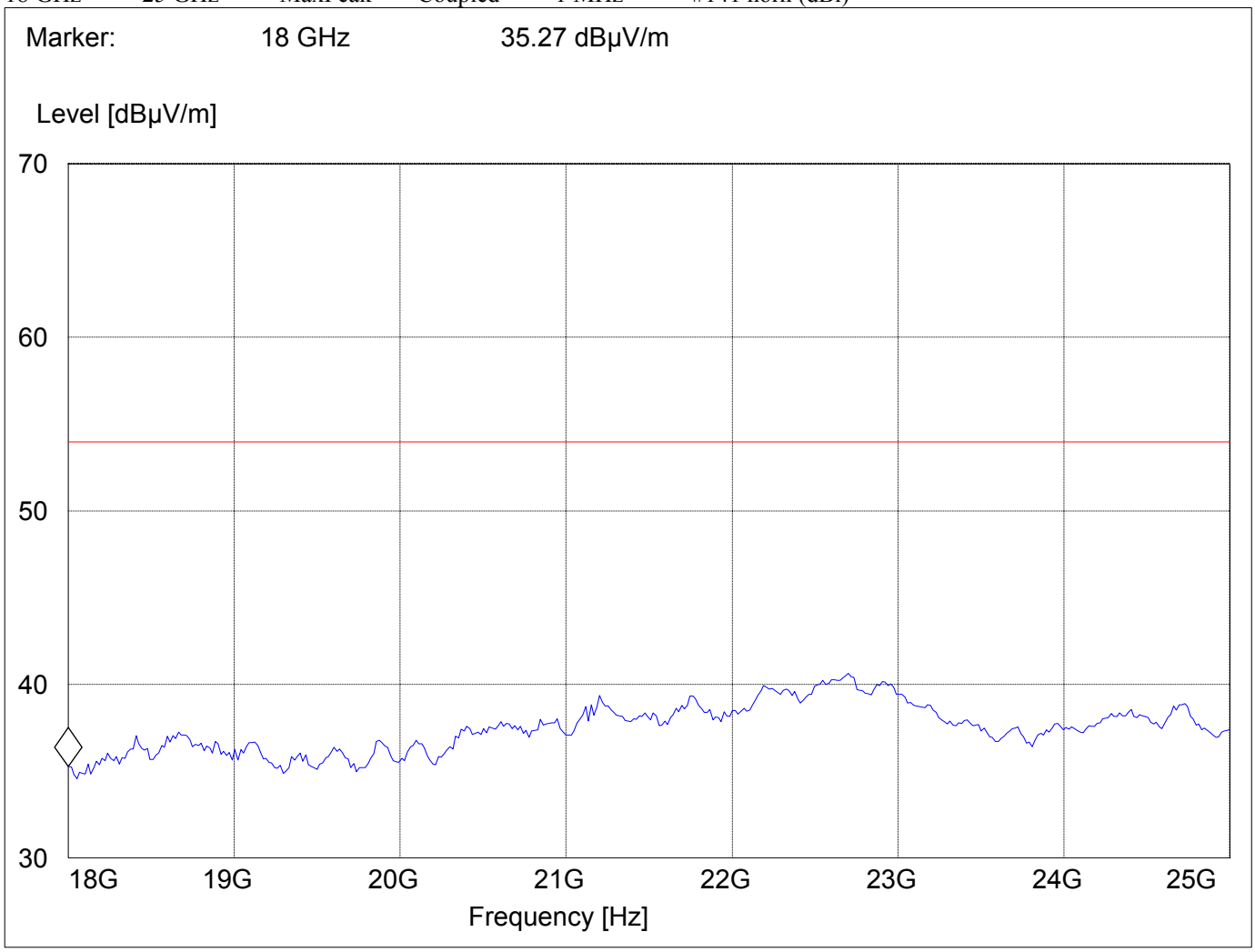


RECEIVER SPURIOUS RADIATION § 15.209

18GHz – 25GHz

SWEEP TABLE: "BT Spuri hi 18-25G"
Short Description: WLAN 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)

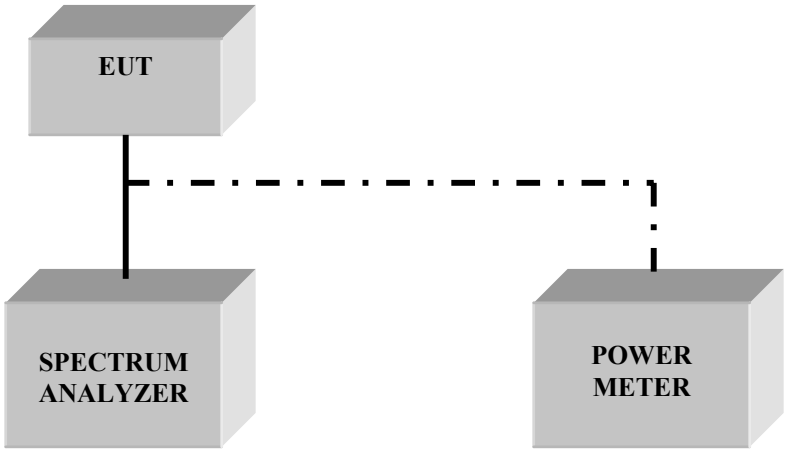


TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

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