



# FCC Test Report

Test report no.: EMC\_797FCC15.247\_2004\_PP09L

**FCC Part 15.247 / CANADA RSS-210**

**EUT: WLAN            Model: BCM94309MP**  
**HOST: Dell Laptop    Model: PP09L**  
**FCC ID: QDS-BRCM1015**  
**IC ID: 4324B-94309MP**  
**(This test report covers freq. band 2412 – 2462MHz)**



**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.**

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](mailto: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

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### TEST REPORT PREPARED BY:

EMC Engineer: Harpreet Sidhu

1.2 Testing laboratory  
CETECOM Inc.  
411 Dixon Landing Road, Milpitas, CA-95035, USA  
Phone: +1 408 586 6200 Fax: +1 408 586 6299  
E-mail: [lothar.schmidt@cetecomusa.com](mailto:lothar.schmidt@cetecomusa.com)  
Internet: [www.cetecom.com](http://www.cetecom.com)

**1.3 Details of applicant**

**Name** : **Broadcom corporation**  
**Street** : **190 Mathilda Place**  
**City / Zip Code** : **Sunnyvale, CA 94086**  
**Country** : **USA**  
**Contact** : **Dan Lawless**  
**Telephone** : **408-922-5870**  
**Tele-fax** : **408-543-3399**  
**e-mail** : [dlawless@broadcom.com](mailto:dlawless@broadcom.com)

**1.4 Application details**

Date of receipt test item : 2004-11-15  
Date of test : 2003-11-19, 2004-11-15, 2005-02-01

**1.5 Test item**

**Manufacturer** : Applicant  
**Model No. (EUT)** : BCM94309MP  
**Model No. (Host)** : PP09L (Dell Laptop)  
**Description** : WLAN MiniPCI Multiband card incorporating 2.4GHz and 5GHz radios  
**FCC ID** : QDS-BRCM1015  
**IC ID** : 4324B-94309MP

**Additional information**

**Frequency** : 2412MHz – 2462MHz for 2.4GHz band  
**Type of modulation** : DSSS / OFDM (orthogonal frequency division multiplexing)  
**Number of channels** : 11 for 2.4GHz band  
**Antenna** : Hitachi stamped metal sheet aux. antenna 2.9dBi (PP09L)  
**Power supply** : 3.3 VDC from Host  
**Output power** : 19.8dBm (0.095W) conducted peak power for 2.4GHz band  
**Extreme temp. Tolerance** : 0°C to +70°C

**1.6 Test standards:** **FCC Part 15 §15.247 / CANADA RSS-210**  
**Output power Measurements done as per DA 02-2138**

**PROJECT OVERVIEW:**

BCM94309MP is WLAN MiniPCI Multiband card incorporating 2.4GHz and 5GHz radios. This test report carries all measurements required as per FCC 15.247 on WLAN mini PCI card tested in **PP09L with Hitachi stamped metal sheet antenna max gain 2.9dBi in 2.4GHz band.**

WLAN was tested for spurious emissions in both DSSS & OFDM modes at different data rates (1, 2, 5.5, 6, 11, and 54) to ensure compliance of the whole device. Test report shows only worst-case test results of all data rates.


BCM94309MP antenna list						
No	Dell Model (Internal Name)	Supplier	Antenna Type	Model number	Max Peak gain 2.4GHz/dBi	Max Peak Gain 5GHz/dBi
1	Dell PP09L	Hitachi	PIFA stamped Metal	HFT08-DL-AS (Antenna side) HFT08-DL-MS (Module side)	2.9 (Aux)	2.8 (Main)
2	Dell PP14L	Hitachi	PIFA stamped Metal	HFT17-DL03	Main 1.5 (H)	Main 5.1 (V)

**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")	<b>Passed</b>

**Technical responsibility for area of testing:**

2005-02-02	EMC & Radio	Lothar Schmidt (Manager)	
Date	Section	Name	Signature

**Responsible for test report and project leader:**

2005-02-02	EMC & Radio	Harpreet Sidhu (EMC Engineer)	
Date	Section	Name	Signature

**2.2 Test report**

**TEST REPORT**

**Test report no.: EMC\_797FCC15.247\_2004**

**TEST REPORT REFERENCE**

<b>LIST OF MEASUREMENTS</b>		<b>PAGE</b>
<b>SPECTRUM BANDWIDTH OF DSSS SYSTEM</b>	§15.247(a) (2)	8
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**SPECTRUM BANDWIDTH OF DSSS SYSTEM**

**§15.247(a) (2)**

**6 dB bandwidth**

**(Data rate – 54Mbps)**

<b>TEST CONDITIONS</b>		<b>6 dB BANDWIDTH (MHz)</b>		
<b>Frequency (MHz)</b>		<b>2412</b>	<b>2437</b>	<b>2462</b>
<b>T<sub>nom</sub>(23)°C</b>	<b>V<sub>nom</sub>(3.3) VDC</b>	<b>16.53</b>	<b>16.48</b>	<b>16.48</b>

**LIMIT**

**SUBCLAUSE §15.247(a) (2)**

**The minimum 6dB bandwidth shall be at least 500 KHz**



SPECTRUM BANDWIDTH OF DSSS SYSTEM

§15.247(a) (2)

6 dB bandwidth  
(Data rate – 54Mbps)

Lowest Channel: 2412MHz



Delta 1 [T1]

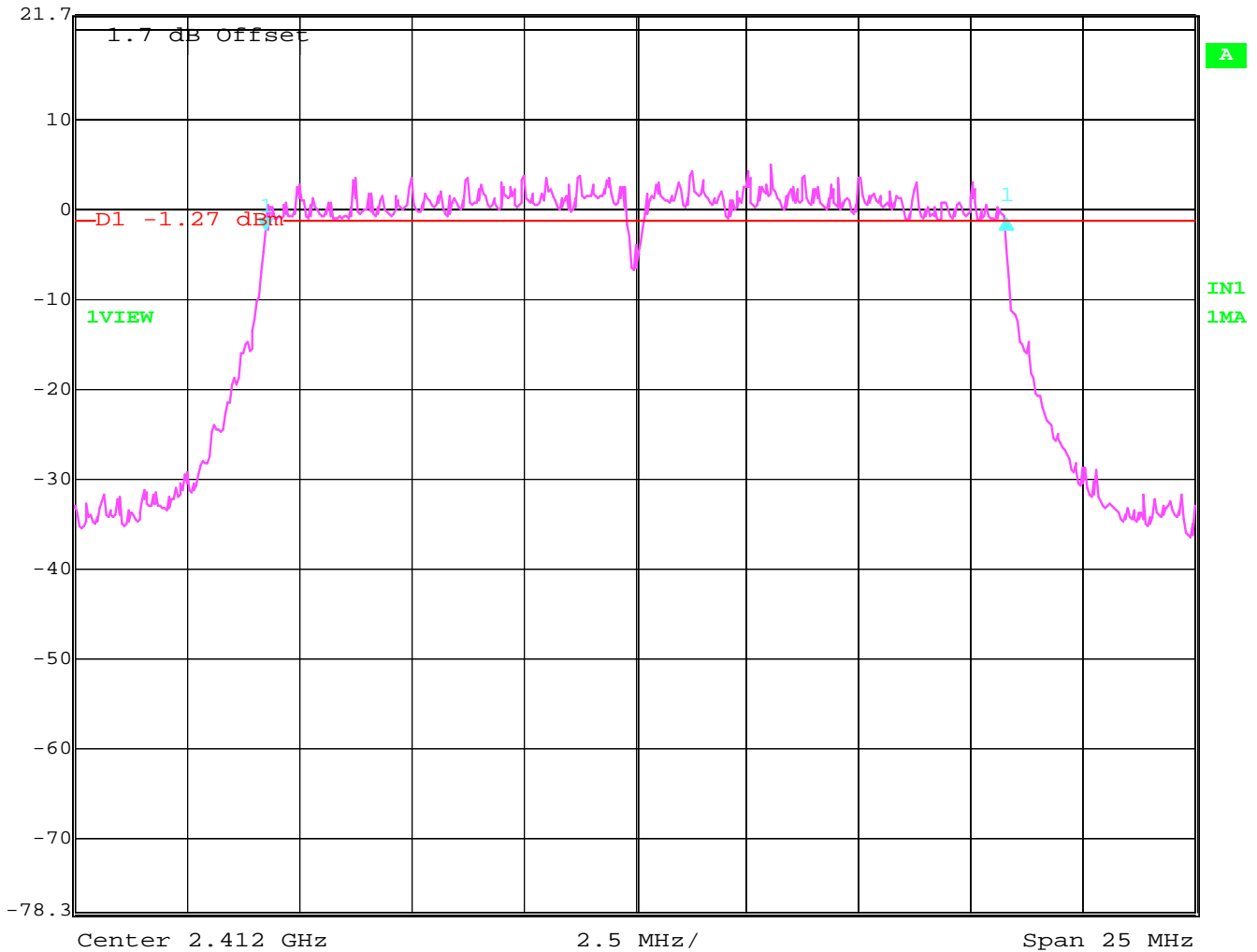
RBW 100 kHz RF Att 30 dB

Ref Lvl 1.49 dB

VBW 1 MHz

21.7 dBm 16.53306613 MHz

SWT 6.5 ms Unit dBm



Date: 19.NOV.2003 10:40:36

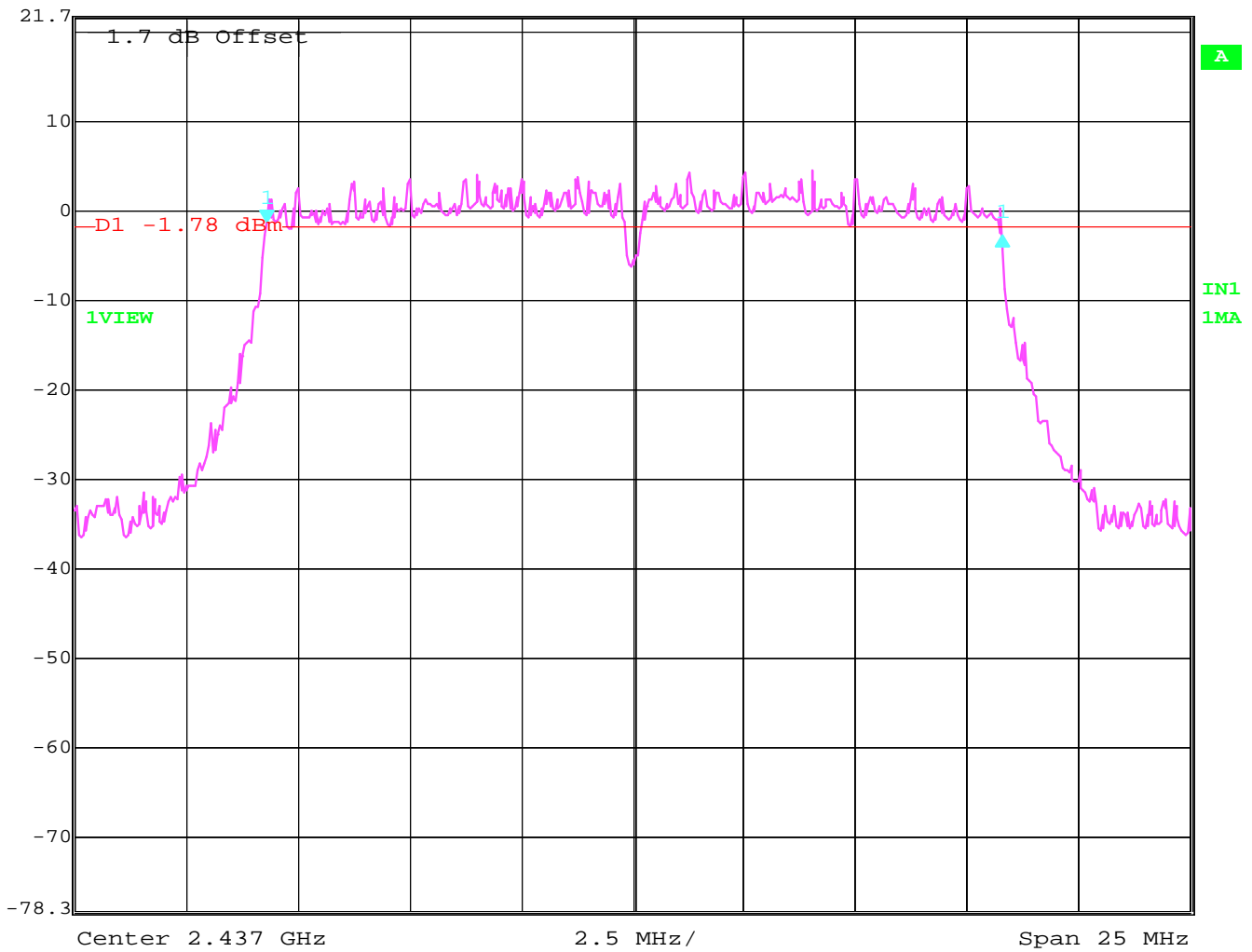
**SPECTRUM BANDWIDTH OF DSSSS SYSTEM §15.247(a) (2)**

**6 dB bandwidth  
(Data rate – 54Mbps)**

**Mid Channel: 2437MHz**



	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	-1.36 dB	VBW	1 MHz		
21.7 dBm	16.48296593 MHz	SWT	6.5 ms	Unit	dBm



Date: 19.NOV.2003 10:42:03

SPECTRUM BANDWIDTH OF DSSS SYSTEM

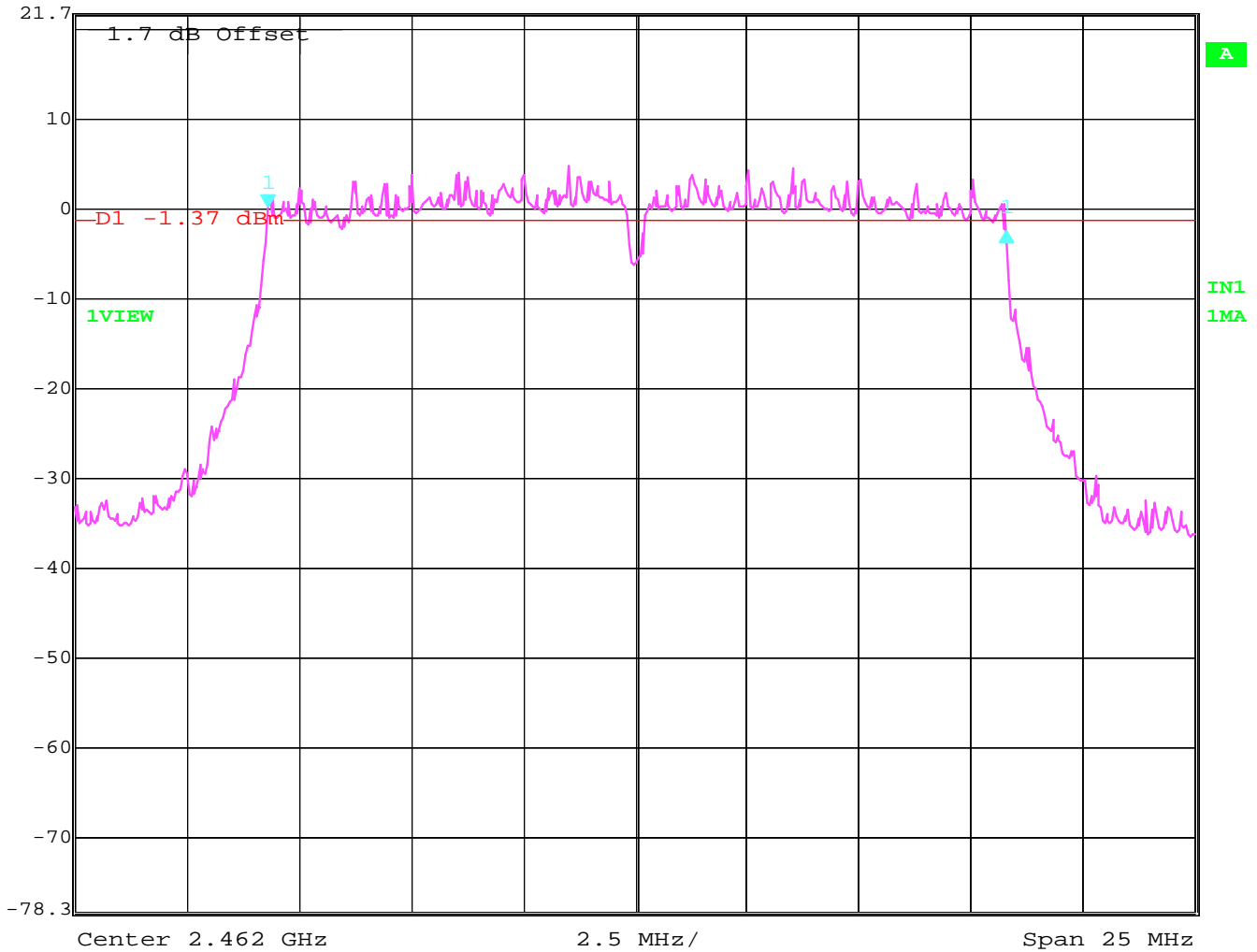
§15.247(a) (2)

6 dB bandwidth  
(Data rate – 54Mbps)

Highest Channel: 2462MHz



	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	-2.97 dB	VBW	1 MHz		
21.7 dBm	16.48296593 MHz	SWT	6.5 ms	Unit	dBm



Date: 19.NOV.2003 10:43:33

**OUTPUT POWER**  
 (Conducted)  
 (Data rate – 54Mbps)

§ 15.247 (b) (3)

TEST CONDITIONS		CONDUCTED OUTPUT POWER (dBm)			
Frequency (MHz)		2412	2437	2462	
T <sub>nom</sub> (23)°C	V <sub>nom</sub> (3.3) VDC	Pk	*19.4	*19.8	*19.5
Measurement uncertainty		±0.5dBm			

\*Measurements done using power meter.

**LIMIT**

**SUBCLAUSE § 15.247 (b) (3)**

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

**OUTPUT POWER  
(RADIATED)  
(Data rate – 54Mbps)**

**§ 15.247 (b) (3)**

**EIRP:**

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
		2412	2437	2462
Frequency (MHz)				
T <sub>nom</sub> (23)°C	V <sub>nom</sub> (3.3) VDC	*22.3	*22.7	*22.4
Measurement uncertainty		±0.5dBm		

\*Note: EIRP is calculated based on 2.9dBi antenna gain and conducted power measurements.

**LIMIT**

**SUBCLAUSE § 15.247 (b) (3)**

Frequency range	RF power output
2400-2483.5 MHz	30dBm on Conducted

**POWER SPECTRAL DENSITY**  
**(Data rate – 1Mbps, DSSS)**

§15.247 (e)

TEST CONDITIONS		POWER SPECTRAL DENSITY (dBm)		
		2412	2437	2462
T <sub>nom</sub> (23)°C	V <sub>nom</sub> (3.3) VDC	-8.20	-9.40	-9.01

**LIMIT**

**SUBCLAUSE §15.247(e)**

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

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

**POWER SPECTRAL DENSITY**  
**(Data rate – 6Mbps, OFDM)**

§15.247 (e)

TEST CONDITIONS		POWER SPECTRAL DENSITY (dBm)		
		2412	2437	2462
T <sub>nom</sub> (23)°C	V <sub>nom</sub> (3.3) VDC	-10.19	-10.84	-10.51

**LIMIT**

**SUBCLAUSE §15.247(e)**

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

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

**BAND EDGE COMPLIANCE**  
**(Data rate – 54Mbps)**

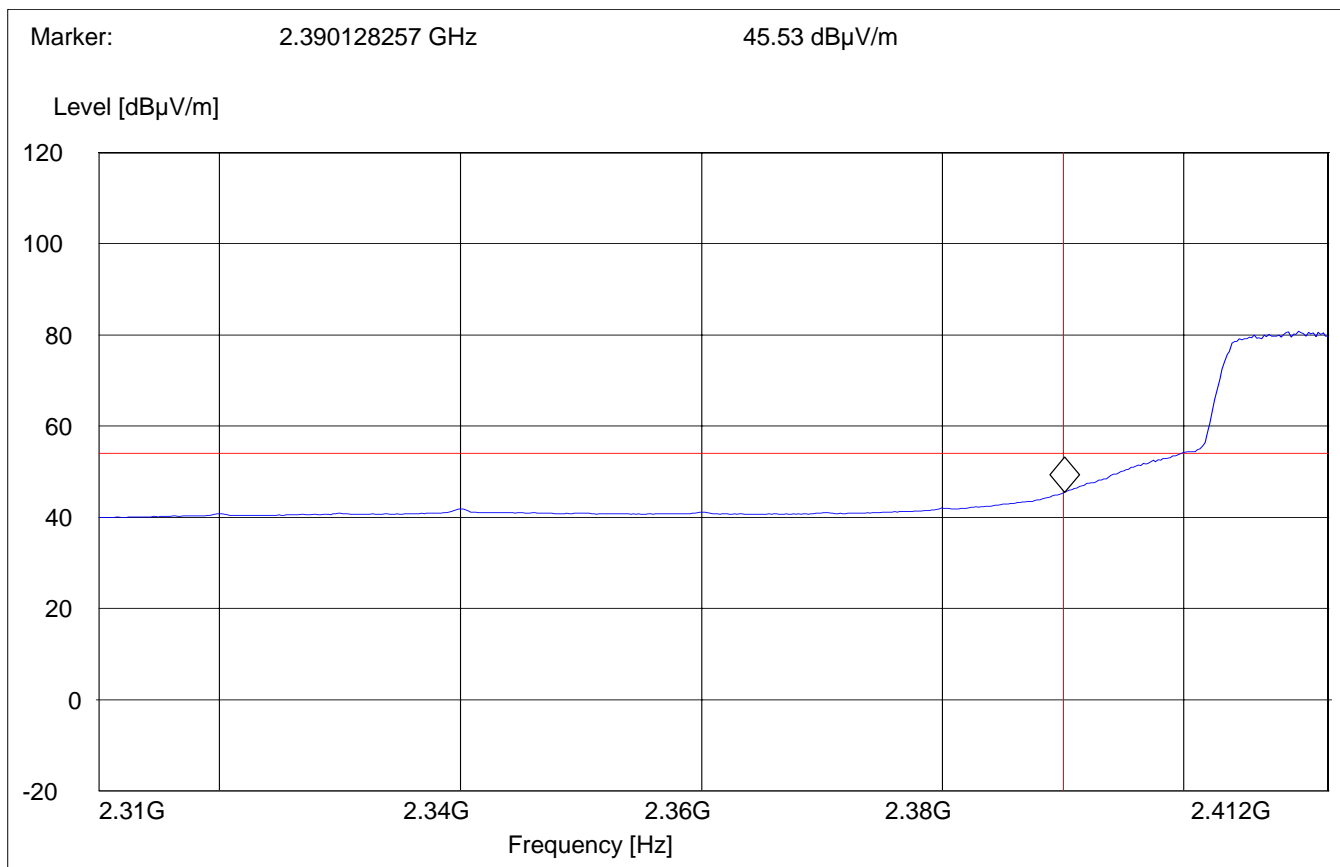
§15.247 (d)

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

**Antenna:** Horizontal  
**EUT plane:** Horizontal with screen vertical @ 90°

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 (d)

(Data rate – 54Mbps)

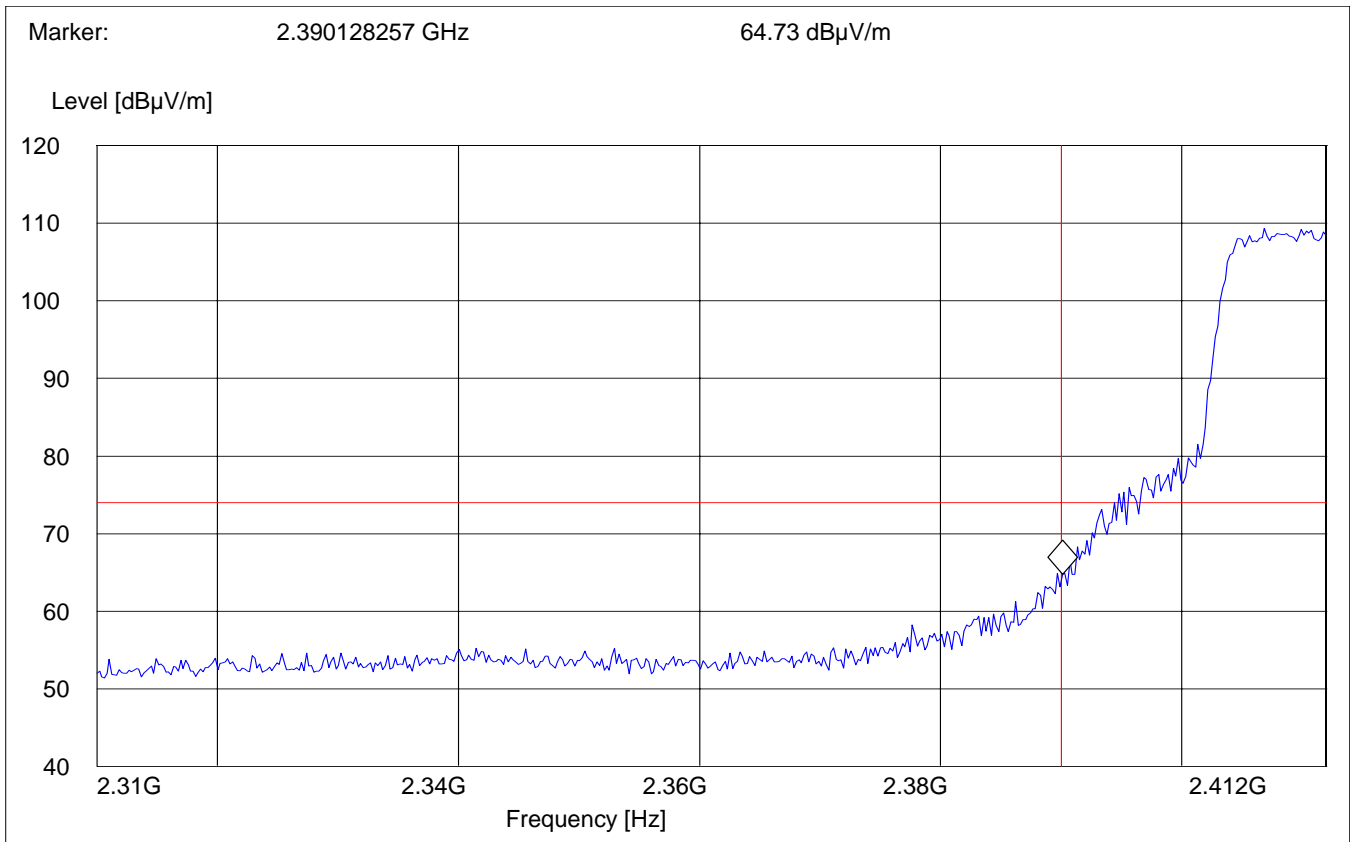
Low frequency section (spurious in the restricted band 2310 – 2390 MHz)

(Peak measurement)

Antenna: **Horizontal**  
 EUT plane: **Horizontal with screen vertical @ 90°**

Operating condition : Tx at 2412MHz  
 SWEEP TABLE : "FCC15.247 LBE\_Pk"  
 Limit Line : 74dBμV

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



**BAND EDGE COMPLIANCE**

**§15.247 (d)**

**(Data rate – 54Mbps)**

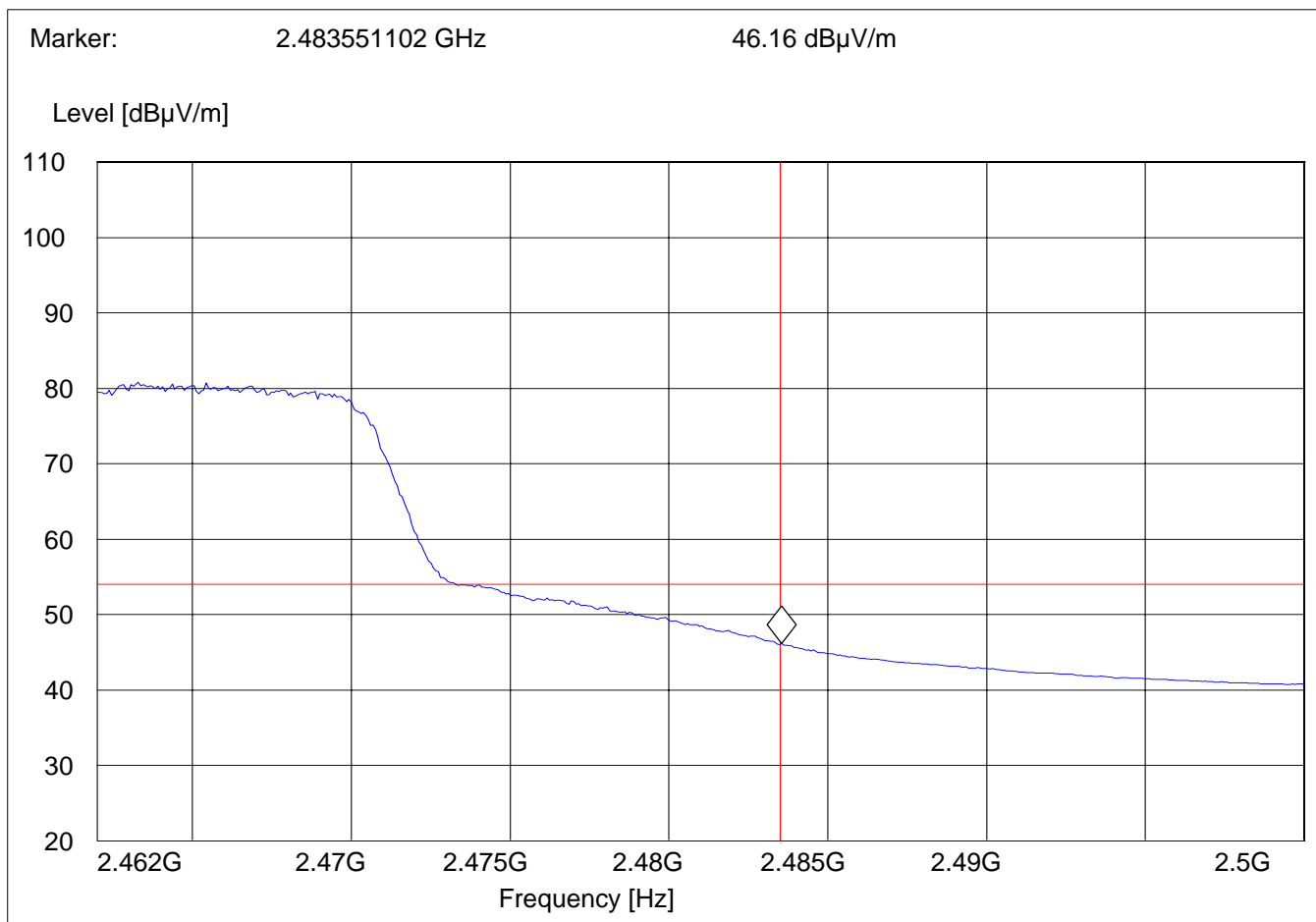
**High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)**

**(Average measurement)**

**Antenna:** Horizontal  
**EUT plane:** Horizontal with screen vertical @ 90°

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 (d)**

**(Data rate – 54Mbps)**

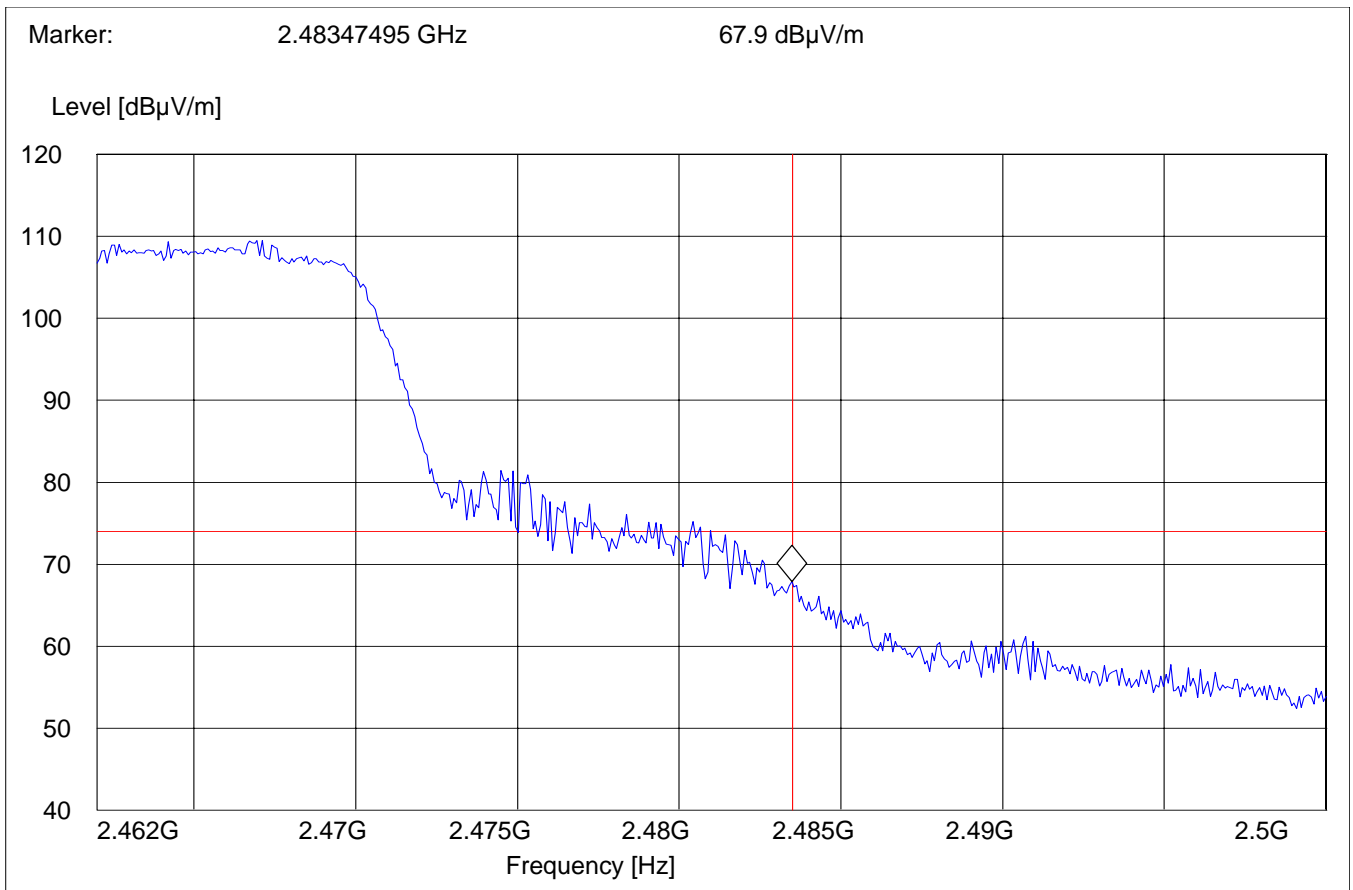
**High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)**

**(Peak measurement)**

**Antenna: Horizontal**  
**EUT plane: Horizontal with screen vertical @ 90°**

Operating condition : Tx at 2472MHz  
 SWEEP TABLE : "FCC15.247 HBE\_PK"  
 Limit Line : 74dB $\mu$ V

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  
Transmitter (Radiated)**

**§ 15.247 (d)**

**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 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 unless specified with the plots.

**Results for the radiated measurements below 30MHz according § 15.33**

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

**EMISSION LIMITATIONS - Radiated (Transmitter)**

**§ 15.247 (d)**

<b>Transmit at Lowest channel Frequency 2412MHz</b>			
<b>Frequency (MHz)</b>	<b>Level (dBµV/m)</b>		
	<b>Peak</b>	<b>Quasi-Peak</b>	<b>Average</b>
3214.42	35.46		
4815.63	45.44		
7234.46	44.11		
9653.30	47.86		
<b>Transmit at Middle channel Frequency 2437MHz</b>			
<b>Frequency (MHz)</b>	<b>Level (dBµV/m)</b>		
	<b>Peak</b>	<b>Quasi-Peak</b>	<b>Average</b>
4781.56	45.72		
7302.6	42.26		
9755.51	45.31		
<b>Transmit at Highest channel Frequency 2462MHz</b>			
<b>Frequency (MHz)</b>	<b>Level (dBµV/m)</b>		
	<b>Peak</b>	<b>Quasi-Peak</b>	<b>Average</b>
4781.56	44.52		
4917.83	41.44		

## EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (d)

Lowest Channel (2412MHz): 30MHz – 1GHz

(Data rate – 54Mbps)

(Peak Measurement)

Antenna: vertical

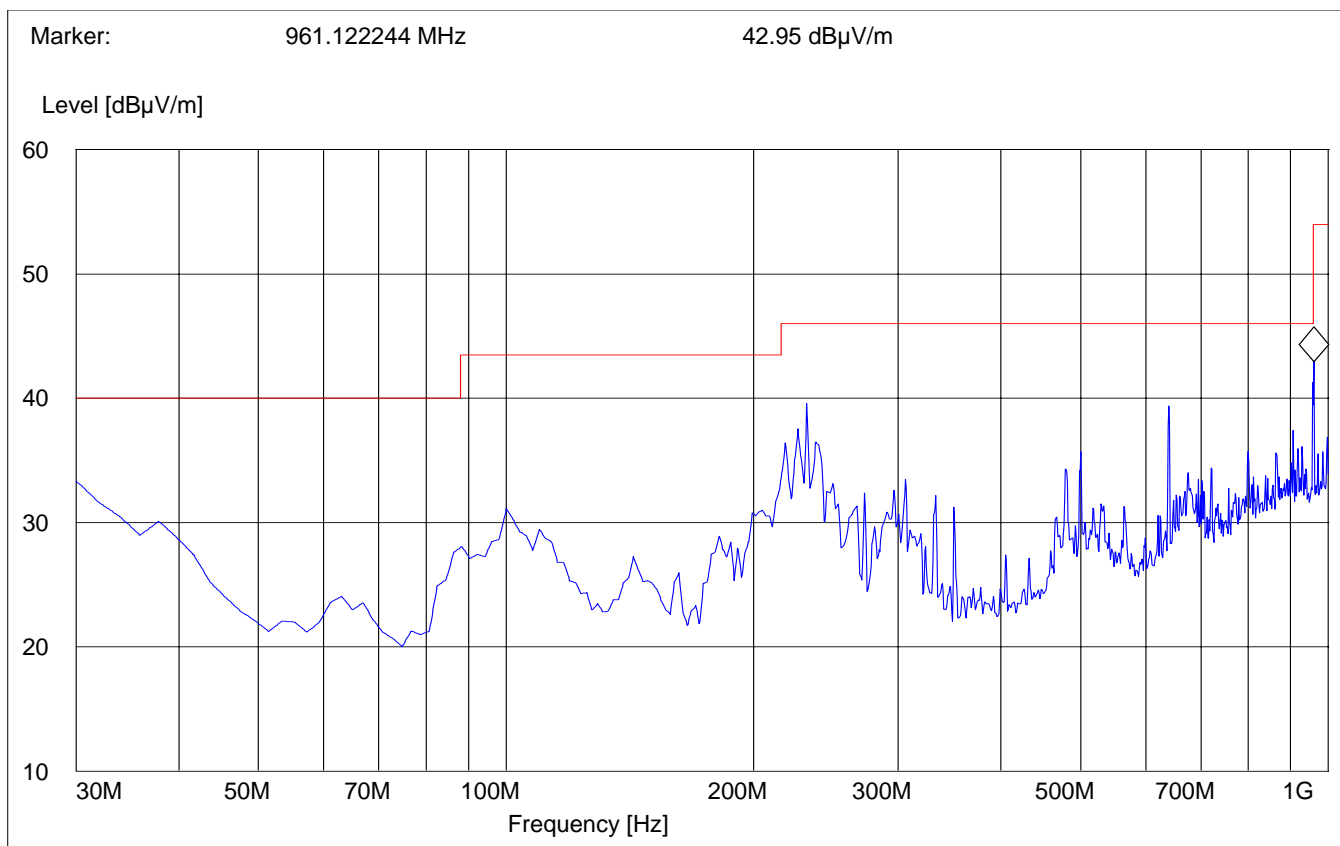
EUT plane: Horizontal with screen vertical @ 90°

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

SWEEP TABLE:

"WLAN Spuri hi 30-1G"

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



**EMISSION LIMITATIONS - Radiated (Transmitter)**

**§ 15.247 (d)**

**Lowest Channel (2412MHz): 30MHz – 1GHz**

**(Data rate – 54Mbps)**

**Antenna: Horizontal**

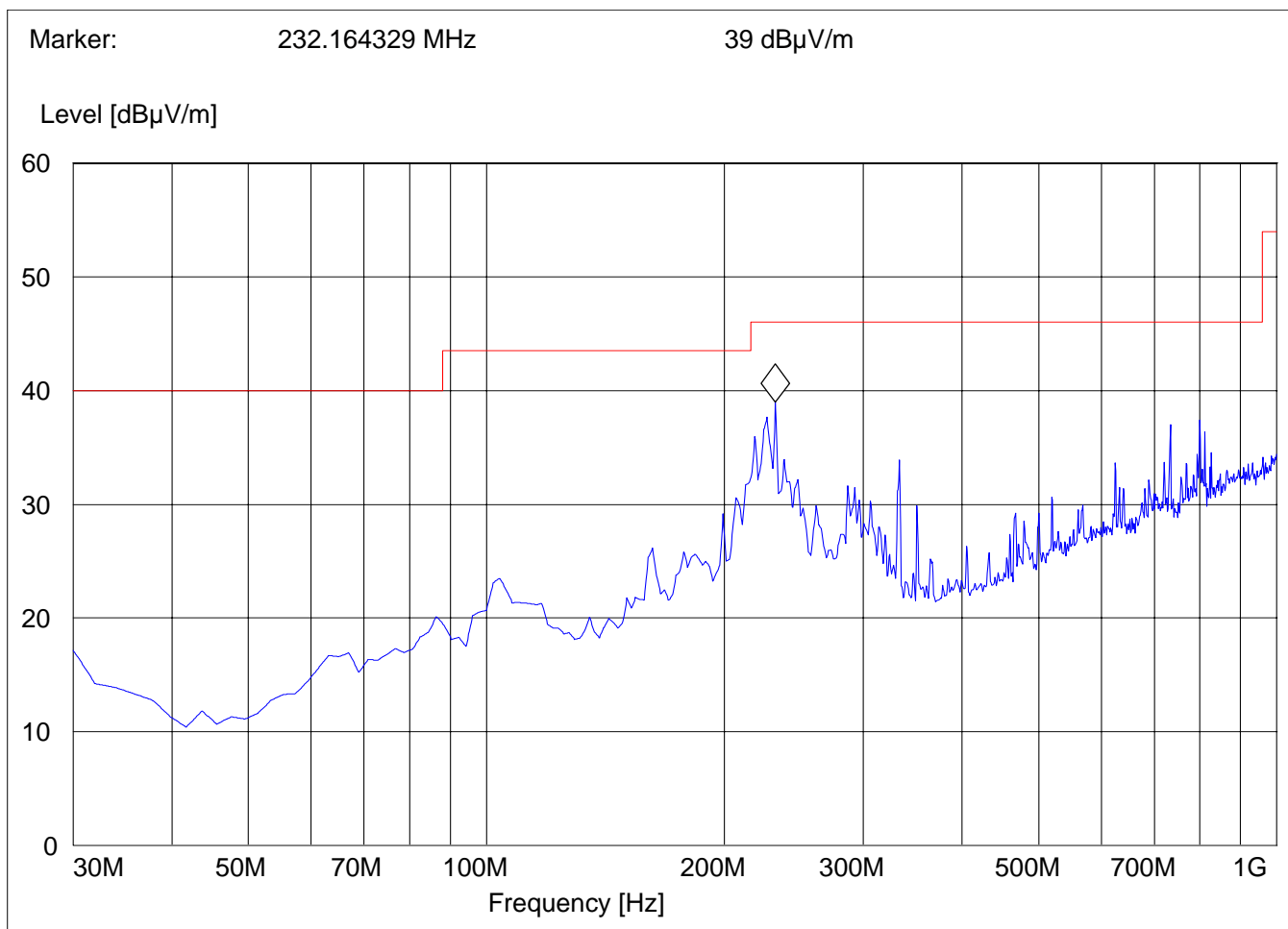
**EUT plane: Horizontal with screen vertical @ 90°**

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

**SWEEP TABLE:**

"WLAN Spuri hi 30-1G"

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



**EMISSION LIMITATIONS - Radiated (Transmitter)**

**§ 15.247 (d)**

**Lowest Channel (2412MHz): 1GHz – 3GHz**

**(Data rate – 54Mbps)**

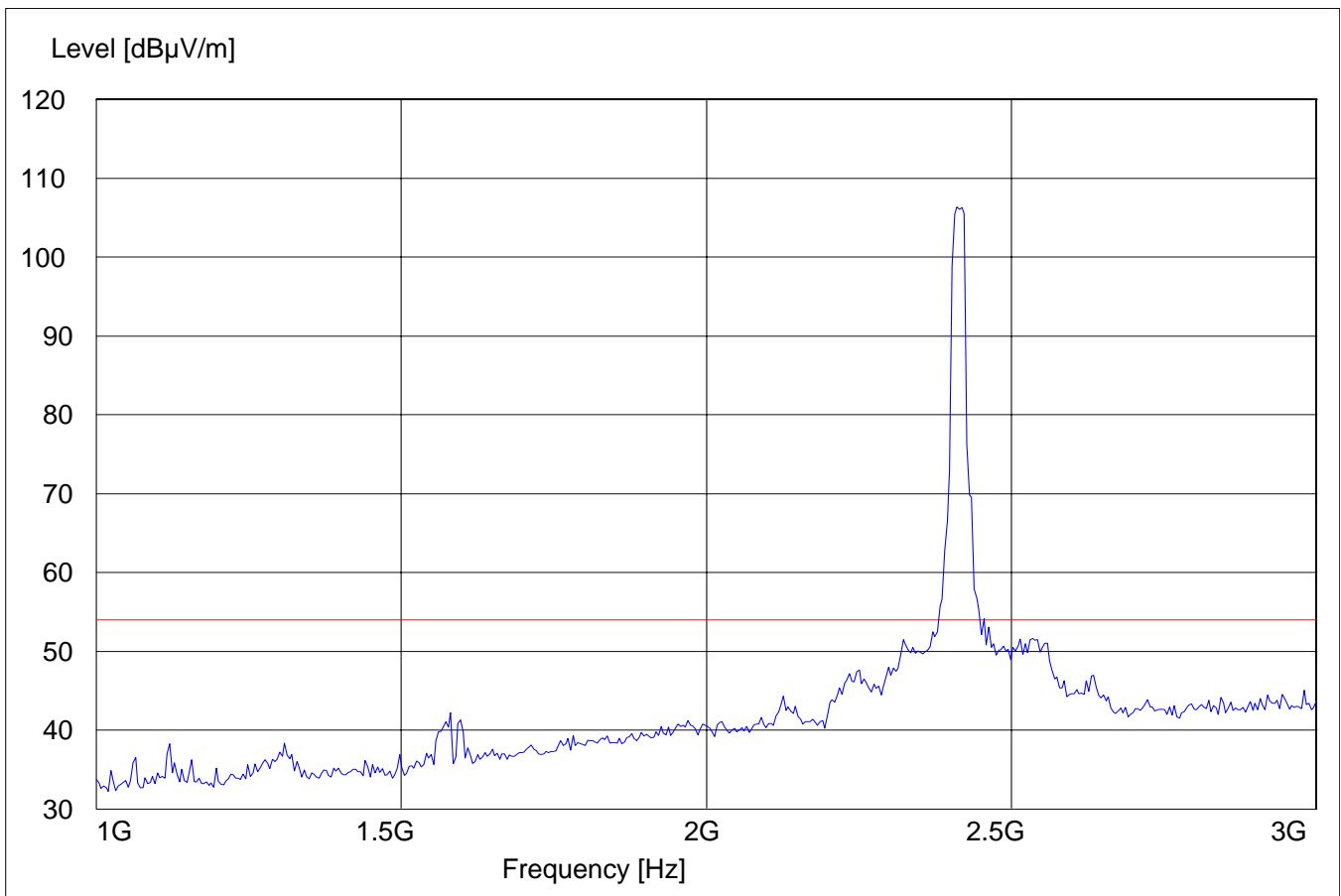
**Antenna: Horizontal**

**EUT plane: Horizontal with screen vertical @ 90°**

**Note: The peak above the limit line is the carrier freq.**

**SWEEP TABLE: "WLAN Spuri hi 1-3G"**

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





**EMISSION LIMITATIONS - Radiated (Transmitter)**

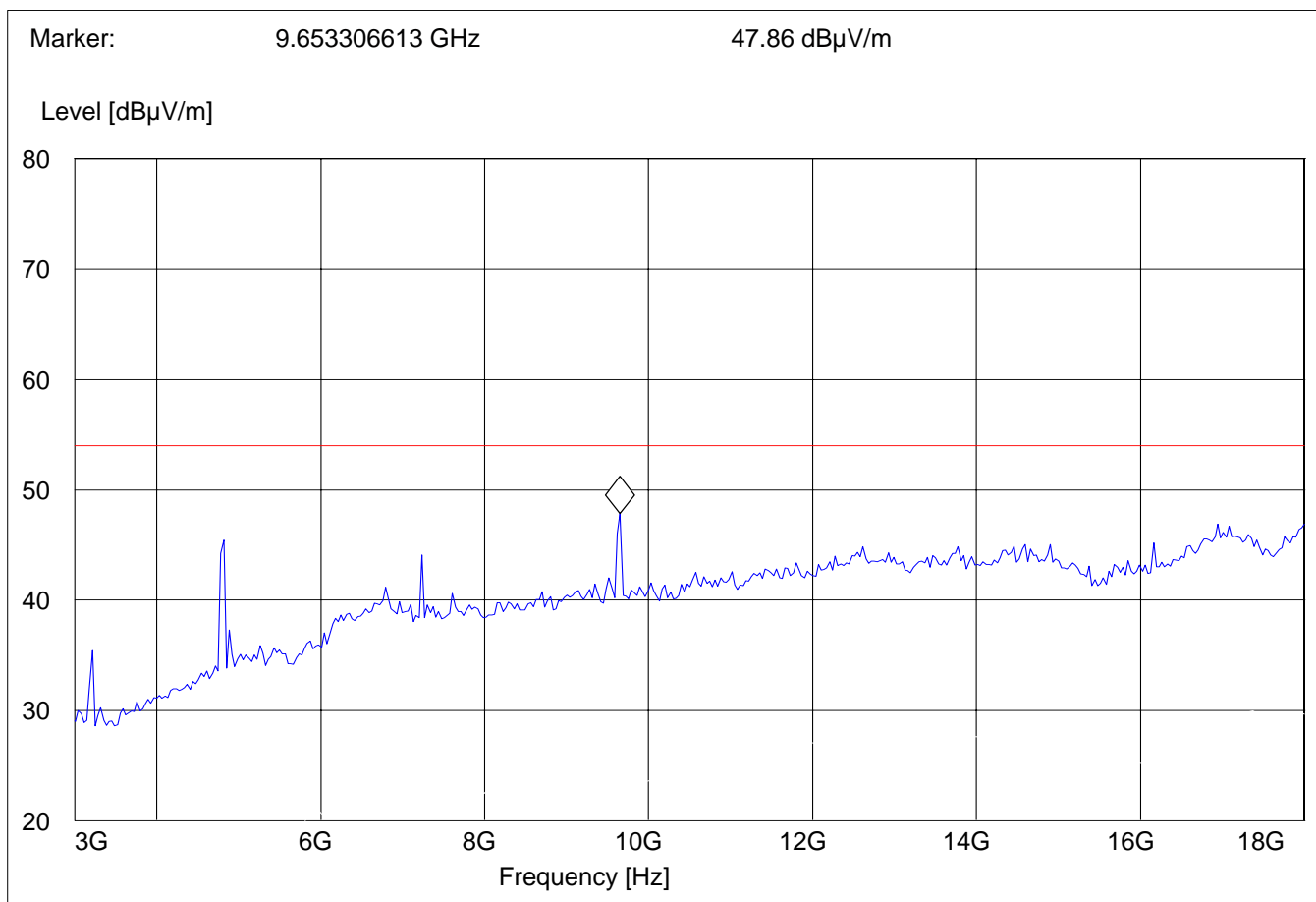
**§ 15.247 (d)**

**Lowest Channel (2412MHz): 3GHz – 18GHz**

**(Data rate – 54Mbps)**

**Antenna: Horizontal**  
**EUT plane: Horizontal with screen vertical @ 90°**

SWEEP TABLE:		" WLAN Spuri hi 3-18G"					
Start	Stop	Detector	Meas.	RBW	VBW	Transducer	
Frequency	Frequency	Time	Bandw.				
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)	



**EMISSION LIMITATIONS - Radiated (Transmitter)**

**§ 15.247 (d)**

**Mid Channel (2437MHz): 1GHz – 3GHz**

**(Data rate – 54Mbps)**

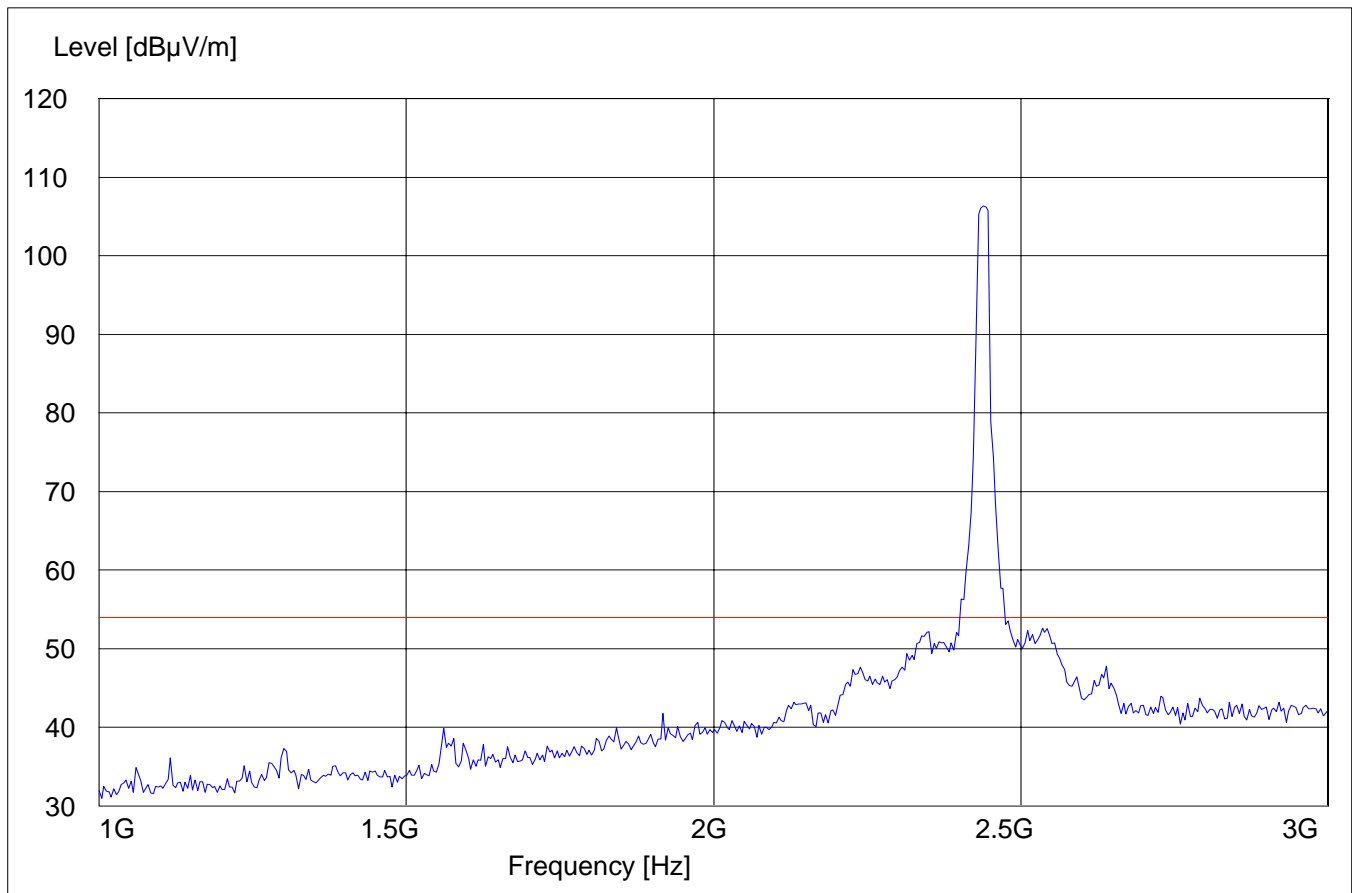
**Antenna: Horizontal**

**EUT plane: Horizontal with screen vertical @ 90°**

**Note: The peak above the limit line is the carrier freq.**

SWEEP TABLE: " WLAN Spuri hi 1-3G"

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



**EMISSION LIMITATIONS - Radiated (Transmitter)**

**§ 15.247 (d)**

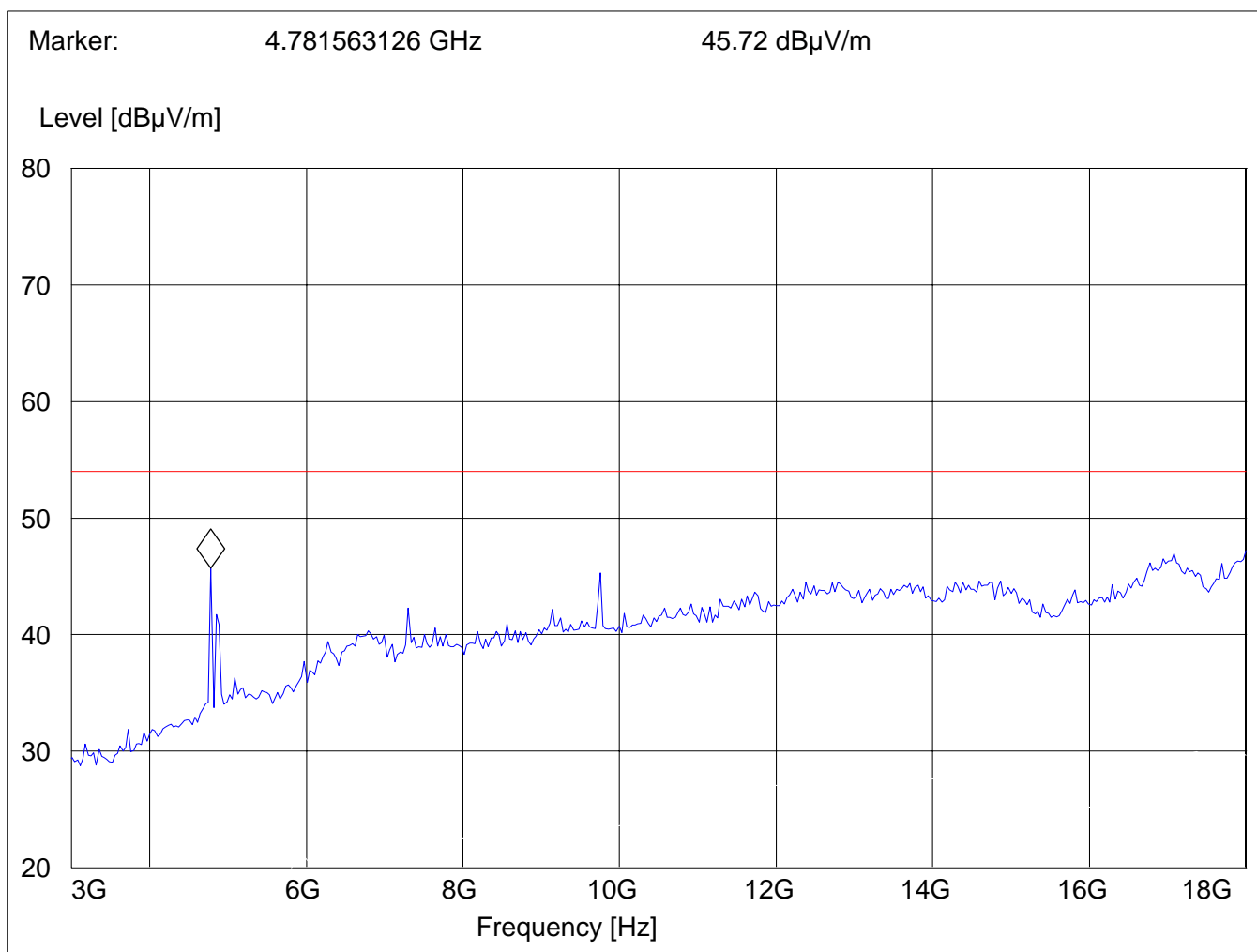
**Mid Channel (2437MHz): 3GHz – 18GHz**

**(Data rate – 54Mbps)**

**Antenna: Horizontal**  
**EUT plane: Horizontal with screen vertical @ 90°**

SWEEP TABLE: " WLAN Spuri hi 3-18G"

Start Frequency	Stop Frequency	Detector	Meas. Bandw.	RBW	VBW	Transducer
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)



**EMISSION LIMITATIONS - Radiated (Transmitter)**

**§ 15.247 (d)**

**Highest Channel (2462MHz): 1GHz – 3GHz**

**(Data rate – 54Mbps)**

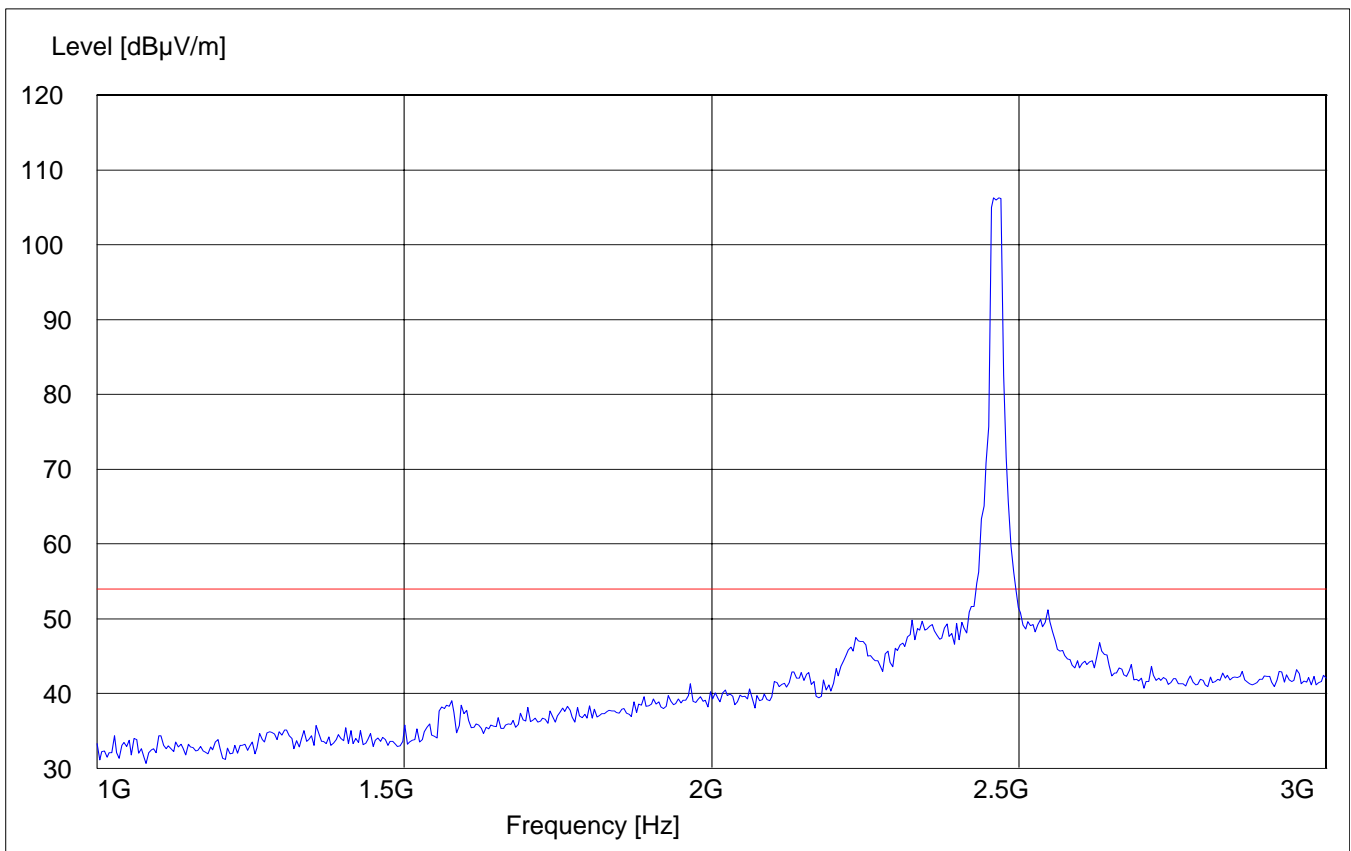
**Antenna: Horizontal**

**EUT plane: Horizontal with screen vertical @ 90°**

**Note: The peak above the limit line is the carrier freq.**

**SWEEP TABLE: " WLAN Spuri hi 1-3G"**

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



**EMISSION LIMITATIONS - Radiated (Transmitter)**

§ 15.247 (d)

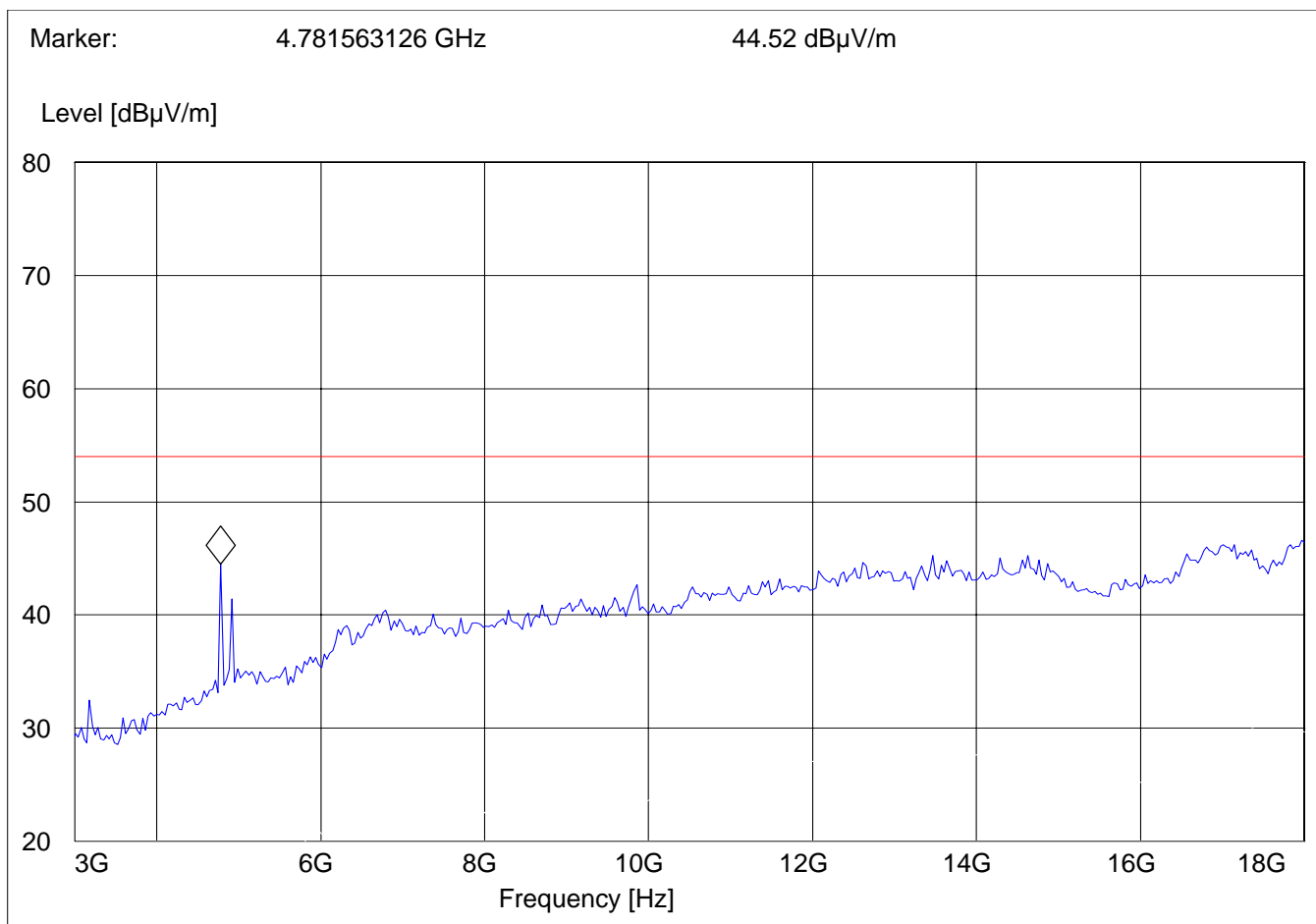
**Highest Channel (2462MHz): 3GHz – 18GHz**

**(Data rate – 54Mbps)**

**Antenna: Horizontal**  
**EUT plane: Horizontal with screen vertical @ 90°**

SWEEP TABLE: " WLAN Spuri hi 3-18G"

Start Frequency	Stop Frequency	Detector	Meas. Bandw.	RBW	VBW	Transducer
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)



**EMISSION LIMITATIONS - Radiated (Transmitter)**

**§ 15.247 (d)**

**18GHz – 26.5GHz**

**(Data rate – 54Mbps)**

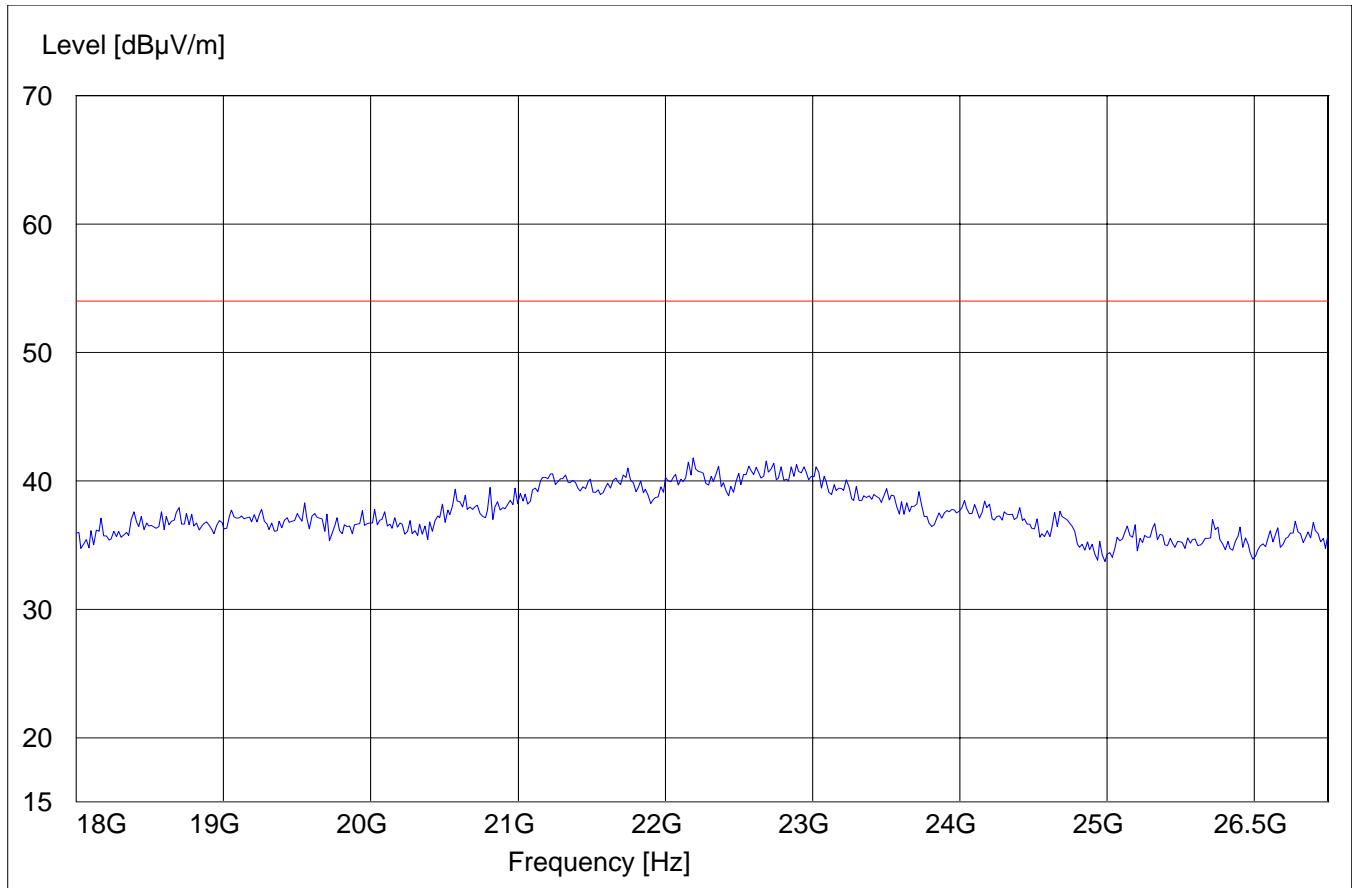
**Antenna: Horizontal**

**EUT plane: Horizontal with screen vertical @ 90°**

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

SWEEP TABLE: "WLAN Spuri hi 18-26.5G"

Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
18 GHz	26.5 GHz	MaxPeak	Coupled	1 MHz	#326 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	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)

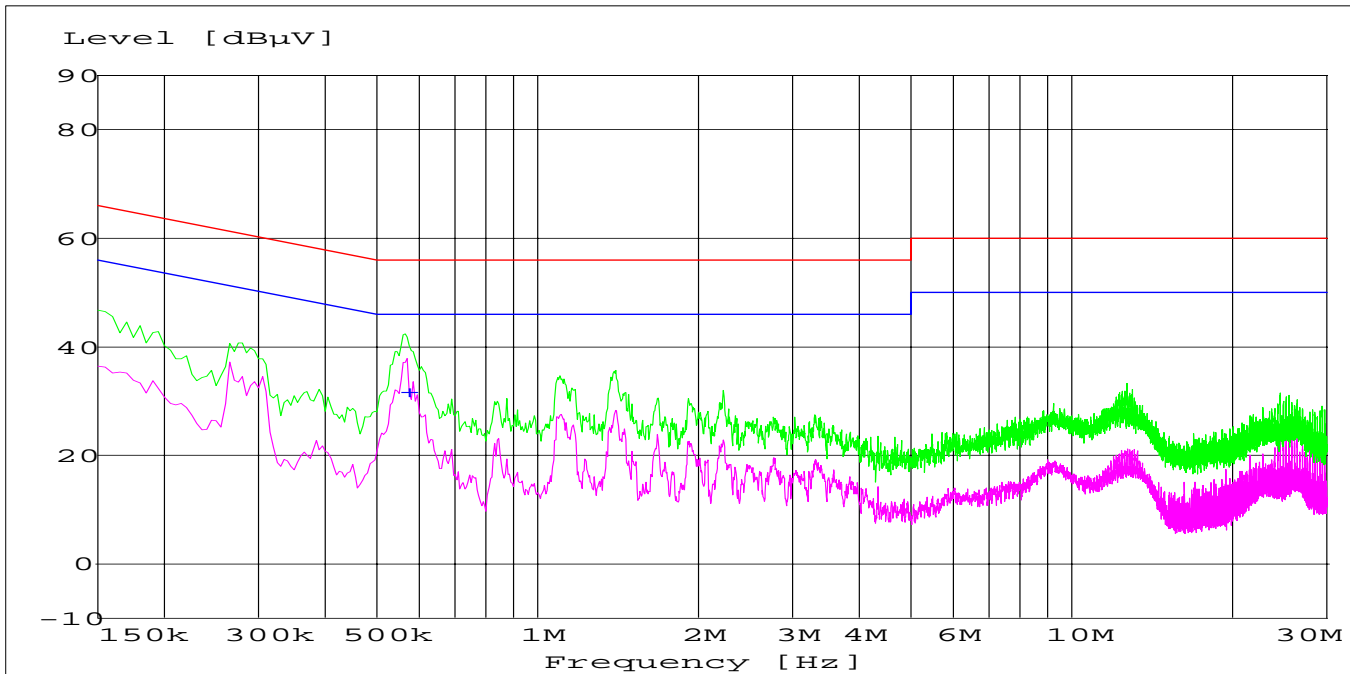
**Limit**

Frequency of Emission (MHz)	Conducted Limit (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



+	+	MES	test_fin	AV	
—	—	MES	test_pre	PK	
—	—	MES	test_pre	AV	
—	—	LIM	EN 55022	V QP	Voltage QP Limit
—	—	LIM	EN 55022	V AV	Voltage AV Limit

*MEASUREMENT RESULT: "test\_fin AV"*

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.570000	31.80	0.0	46	14.2	N	GND



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

**RECEIVER SPURIOUS RADIATION**

§ 15.209

**30MHz – 1GHz**

Worst-case plot for both polarities

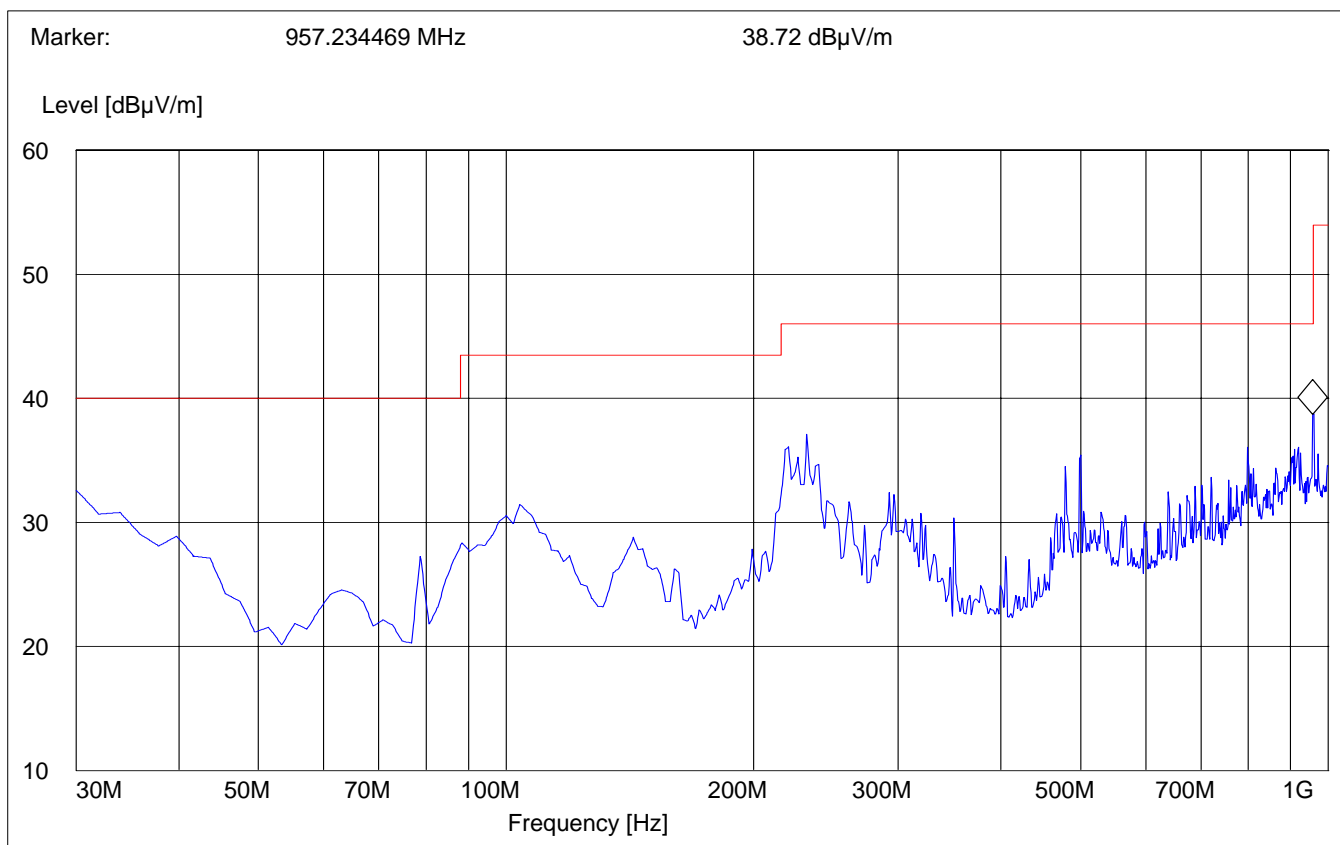
Antenna: Vertical

EUT plane: Horizontal with screen vertical @ 90°

SWEEP TABLE:

"WLAN Spuri hi 30-1G"

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



**RECEIVER SPURIOUS RADIATION**

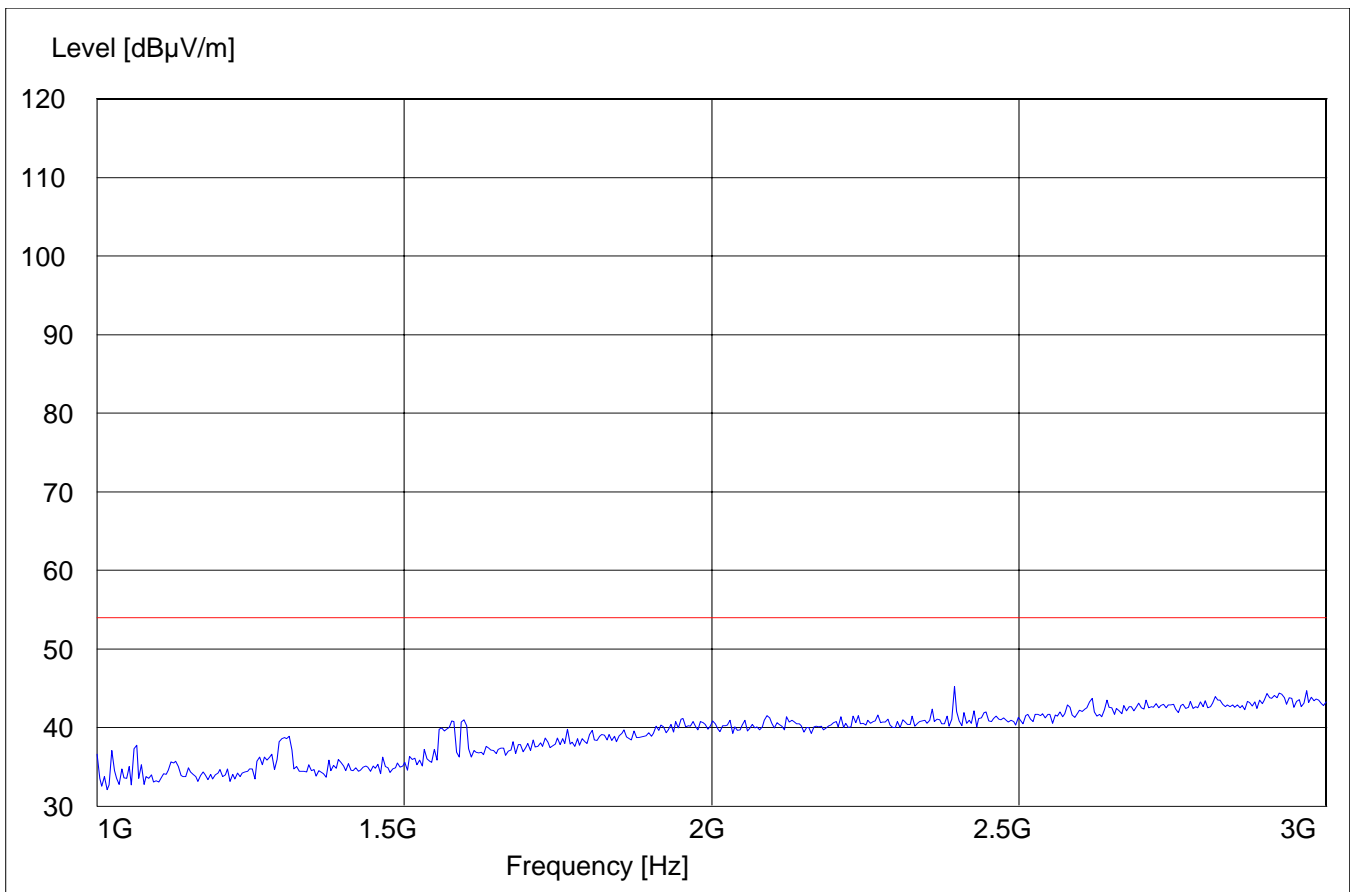
**§ 15.209**

**1GHz – 3GHz**

**Peak Measurement**

**Antenna:** Horizontal  
**EUT plane:** Horizontal with screen vertical @ 90°

SWEEP TABLE:		"WLAN Spuri hi 1-3G"				
Start	Stop	Detector	Meas.	RBW	VBW	Transducer
Frequency	Frequency	Time	Bandw.			
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	1MHz	#326 horn (dBi)



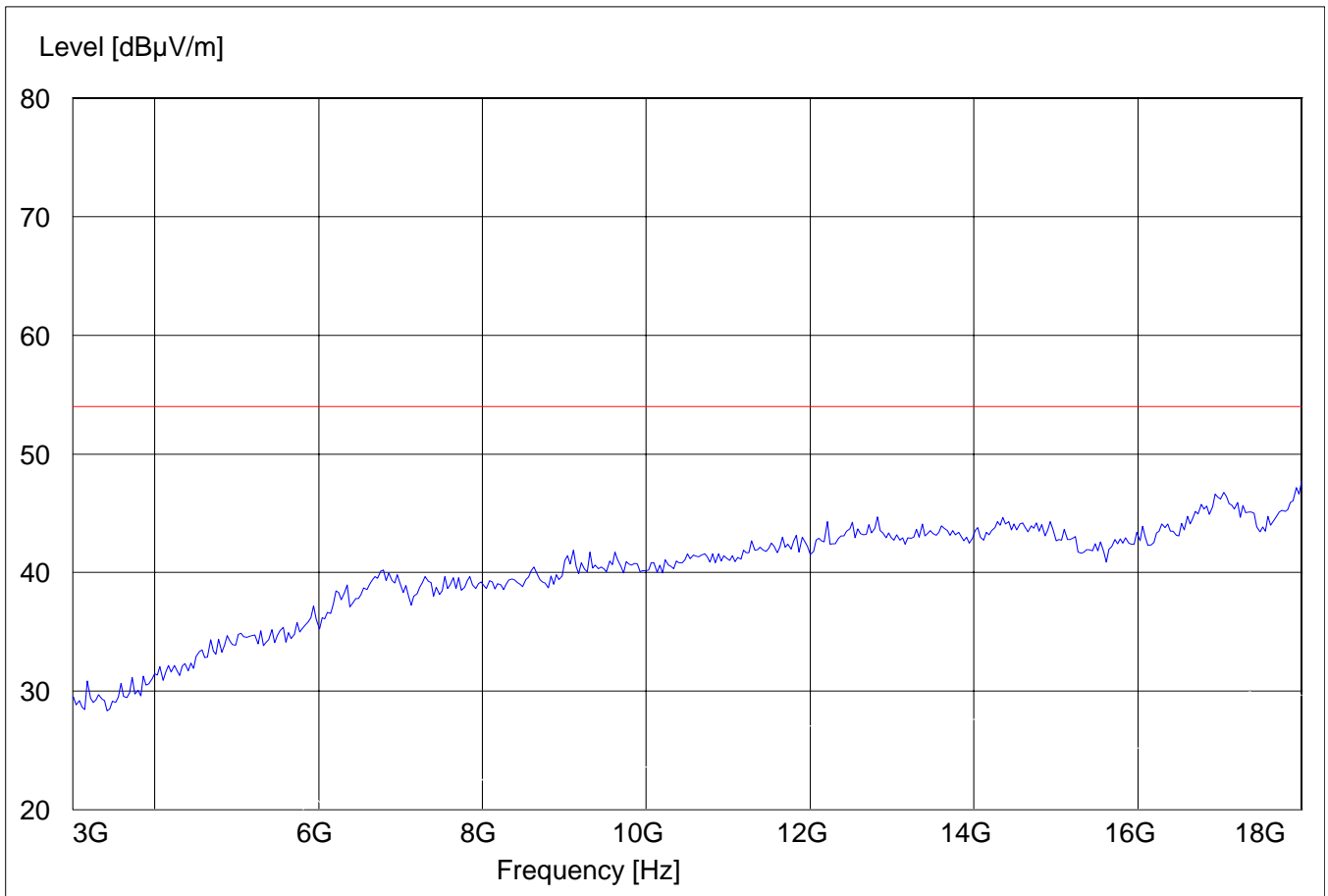
**RECEIVER SPURIOUS RADIATION**  
**3GHz – 18GHz**

§ 15.209

**Antenna:** Horizontal  
**EUT plane:** Horizontal with screen vertical @ 90°

SWEEP TABLE: "WLAN Spuri hi 3-18G"

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



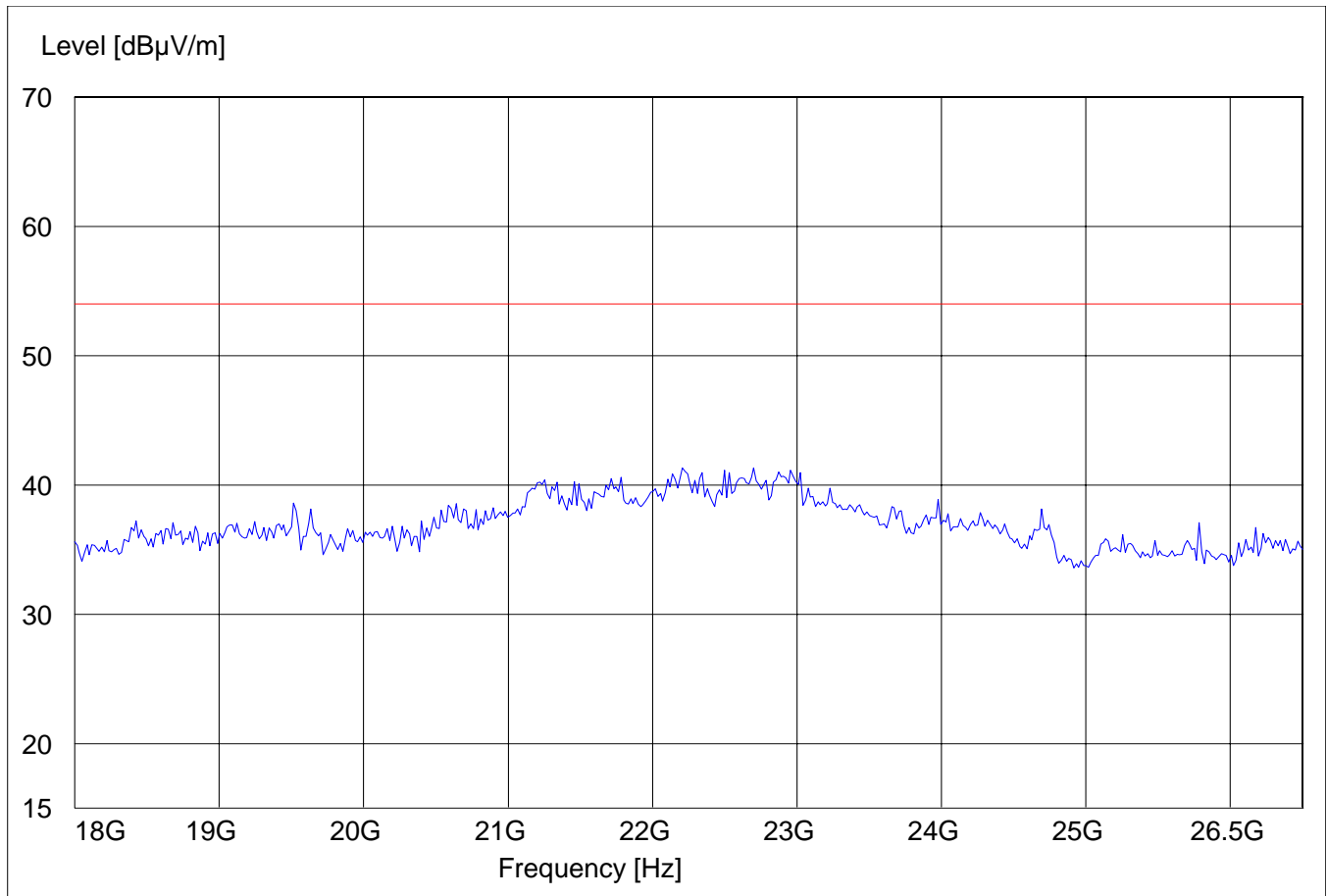
**RECEIVER SPURIOUS RADIATION  
18GHz – 26.5GHz**

**§ 15.209**

**Antenna:** Horizontal  
**EUT plane:** Horizontal with screen vertical @ 90°

SWEEP TABLE: "WLAN Spuri hi 18-26.5G"

Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
18 GHz	26.5 GHz	MaxPeak	Coupled	1 MHz	#141 horn (dBi)



**TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS**

<b>No</b>	<b>Instrument/Ancillary</b>	<b>Type</b>	<b>Manufacturer</b>	<b>Serial No.</b>
<b>01</b>	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107
<b>02</b>	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	826880/010
<b>03</b>	Biconilog Antenna	3141	EMCO	0005-1186
<b>04</b>	Horn Antenna (700M-18GHz)	SAS-200/571	AH Systems	325
<b>05</b>	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240
<b>06</b>	2-3GHz Band reject filter	BRM50701	Microtronics	6
<b>07</b>	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02
<b>08</b>	Pre-Amplifier	TS-ANA	Rohde & Schwarz	--
<b>09</b>	Pre-Amplifier	JS4-00102600	Miteq	00616

**BLOCK DIAGRAMS**  
**Radiated Testing**

**ANECHOIC CHAMBER**

