FCC Test Report

Test report no.: EMC_488FCC15.247_2003_WLAN

FCC Part 15.247 for DSSS systems / CANADA RSS-210

EUT: WLAN Model: BCM94306MP / BCM94306MPSG
(Co-located with Bluetooth Radio Module Model# BTM200)
HOST: HP Laptop Model: PP2080
FCC ID: QDS-BRCM1005-HC

Deutscher Akkreditierungs Rat

TTI-P-G 081/94-A0

Accredited according to **ISO/IEC 17025**

Bluetooth Qualification Test Facility (BQTF)

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

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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: Harpreet Sidhu

1.2 Testing laboratory

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Phone: +1 408 586 6200 Fax: +1 408 586 6299
E-mail: lothar.schmidt@cetecomusa.com
Internet: 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**

1.4 Application details

Date of receipt test item	:	2003-05-31
Date of test	:	2002-11-21, 2003-06-11/21

1.5 Test item

Manufacturer	:	Applicant
Model No. (EUT)	:	BCM94306MP / BCM94306MPSG
Model No. (Host)	:	PP2080 (HP Laptop)
Description	:	54g wireless LAN mini PCI card
FCC ID	:	QDS-BRCM1005-HC

Additional information

Frequency	:	2412MHz – 2462MHz
Type of modulation	:	DSSS / OFDM (orthogonal frequency division multiplexing)
Number of channels	:	11
Antenna	:	3.15dBi max. gain antenna
Power supply	:	3.3 VDC from Host
Output power	:	25.55dBm (359mW) conducted peak power **(For EIRP and Source-based time-averaged output please see page no.7)**
Extreme temp. Tolerance	:	0^{o}C to +70^{o}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**

Technical responsibility for area of testing:

Date	Section	Name	Signature
2003-08-07	EMC & Radio	Lothar Schmidt (Manager)	

Responsible for test report and project leader:

Date	Section	Name	Signature
2003-08-07	EMC & Radio	Harpreet Sidhu (EMC Engineer)	

2.2 Test report

TEST REPORT

Test report no.: EMC_488FCC15.247_2003_WLAN

FCC Part 15.247 for DSSS systems / CANADA RSS-210

EUT: WLAN Model: BCM94306MP / BCM94306MPSG
HOST: HP Laptop Model: PP2080
FCC ID: QDS-BRCM1005-HC

TEST REPORT REFERENCE

SPECTRUM BANDWIDTH OF DSSS SYSTEM §15.247(a) (2)
6 dB bandwidth

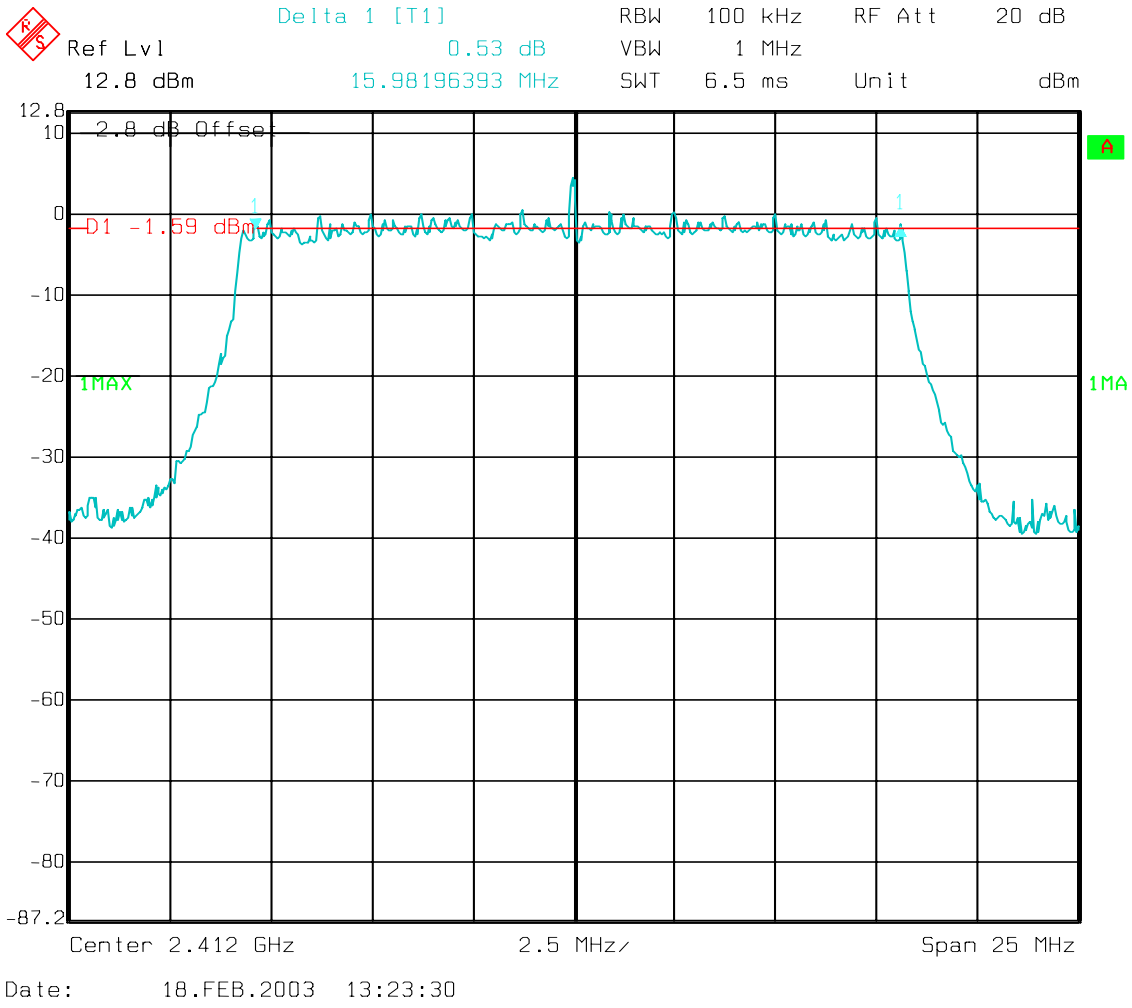
TEST CONDITIONS		6 dB BANDWIDTH (MHz)		
Frequency (MHz)		2412	2437	2462
T_{nom}(23)°C	V_{nom}(3.3) VDC	15.98	15.43	15.38

LIMIT SUBCLAUSE §15.247(a) (2)

The minimum 6dB bandwidth shall be at least 500 KHz

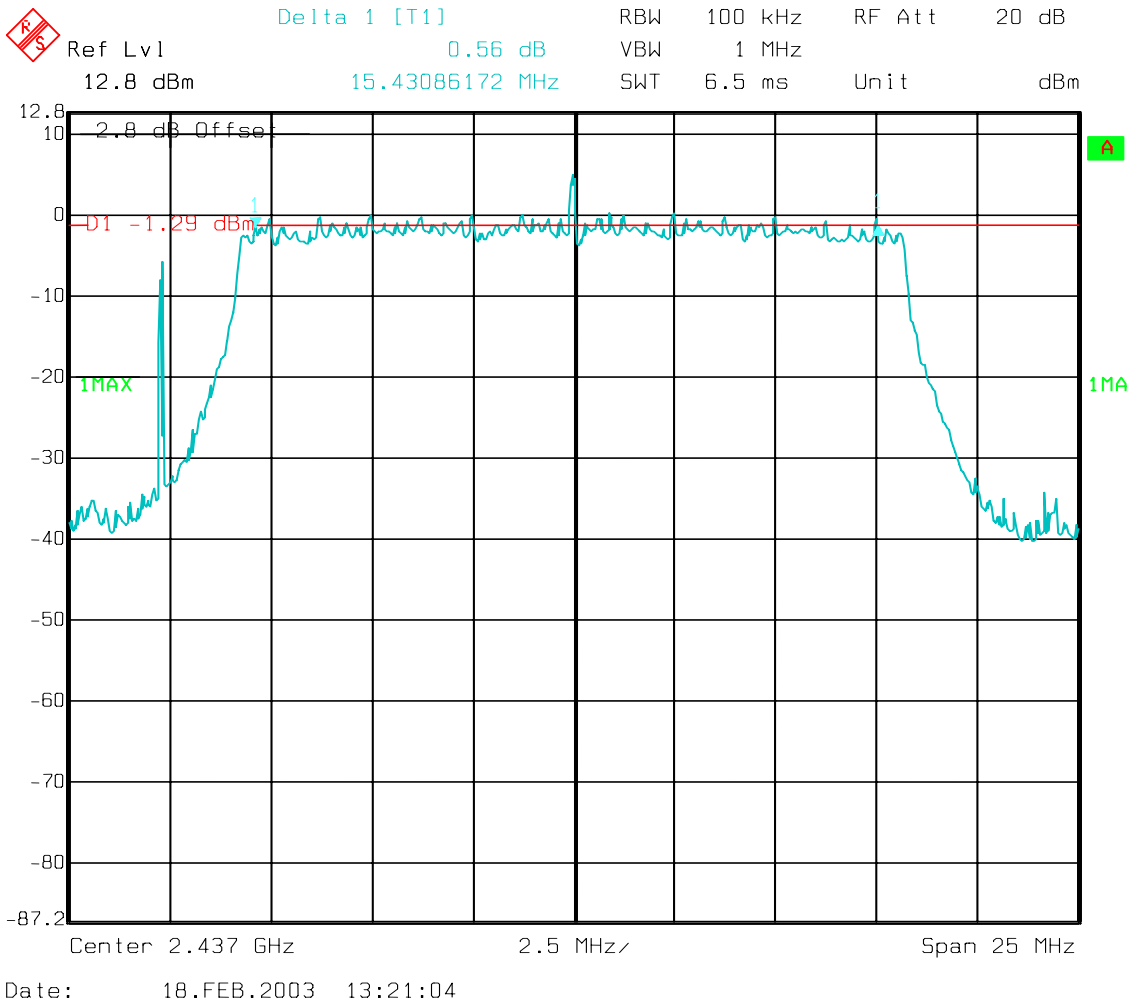
SPECTRUM BANDWIDTH OF DSSS SYSTEM **§15.247(a) (2)**
6 dB bandwidth

Lowest Channel: 2412MHz



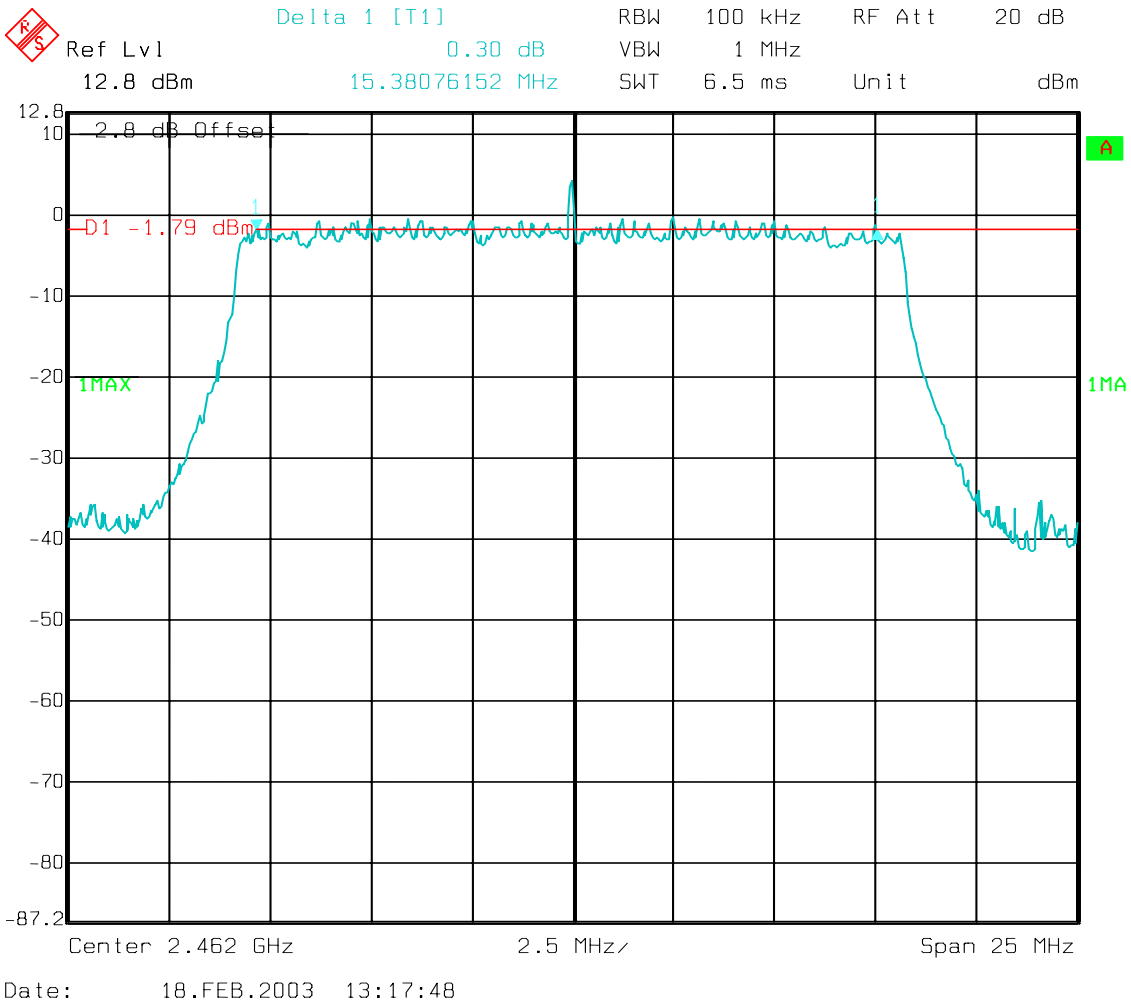
SPECTRUM BANDWIDTH OF DSSSS SYSTEM **§15.247(a) (2)**
6 dB bandwidth

Mid Channel: 2437MHz



SPECTRUM BANDWIDTH OF DSSS SYSTEM **§15.247(a) (2)**
6 dB bandwidth

Highest Channel: 2462MHz



OUTPUT POWER § 15.247 (b) (1)

WLAN Model# BCM94306MP

(Note: Conducted output power for WLAN Model# BCM94306MPSG was found lower than WLAN Model# BCM94306MP, refer to page 17 for details)

	Low channel	Mid channel	High channel
*Conducted Peak Power	25.55dBm	24.48dBm	24.11dBm
*Radiated Power (EIRP)	28.7dBm	27.63dBm	27.26dBm
**Source-based time averaged output	21.93dBm	20.86dBm	20.49dBm

***For details please refer to pages 8(Conducted output power results), 12(EIRP calculation) & 13(duty cycle measurements) respectively.**

****The source-based time-averaged output power is calculated using the duty cycle (measurement result see page 13-16, These values are used to determine if the TCB route can be used)**

MAXIMUM PEAK OUTPUT POWER **§ 15.247 (b) (1)**
(Conducted)
WLAN Model# BCM94306MP

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)			
Frequency (MHz)			2412	2437	2462
T_{nom}(23)°C	V_{nom}(3.3) VDC	Pk	*25.55	*24.48	*24.11
Measurement uncertainty		±0.5dBm			

***To comply with following;**
RBW / VBW should be equal to or greater than the 6dB BW
All measured values are corrected by 10log (6dB BW / used BW)

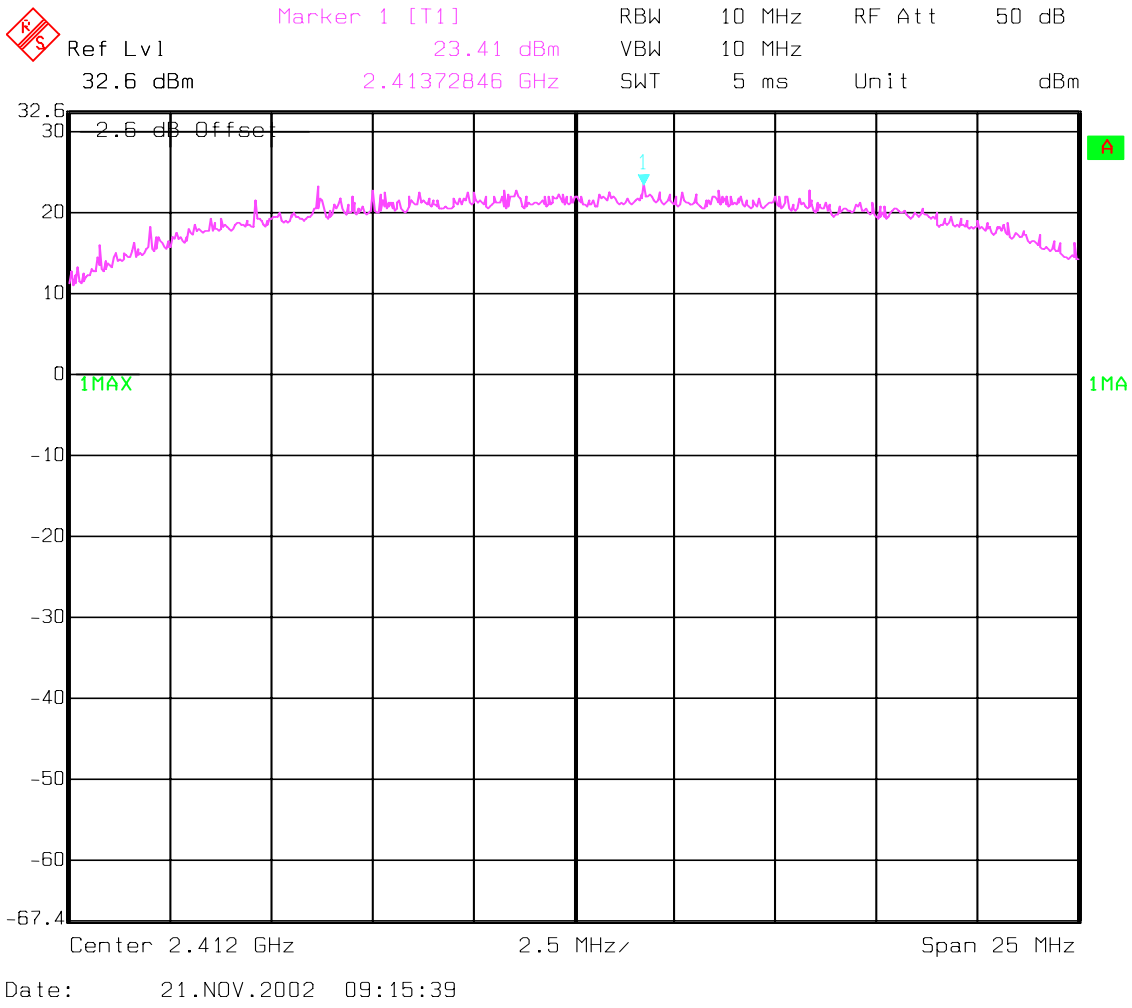
(Therefore correction factor of 2.14, 2.18 & 2.15 is added to low, mid& high channel measurements respectively)

LIMIT **SUBCLAUSE § 15.247 (b) (1)**

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

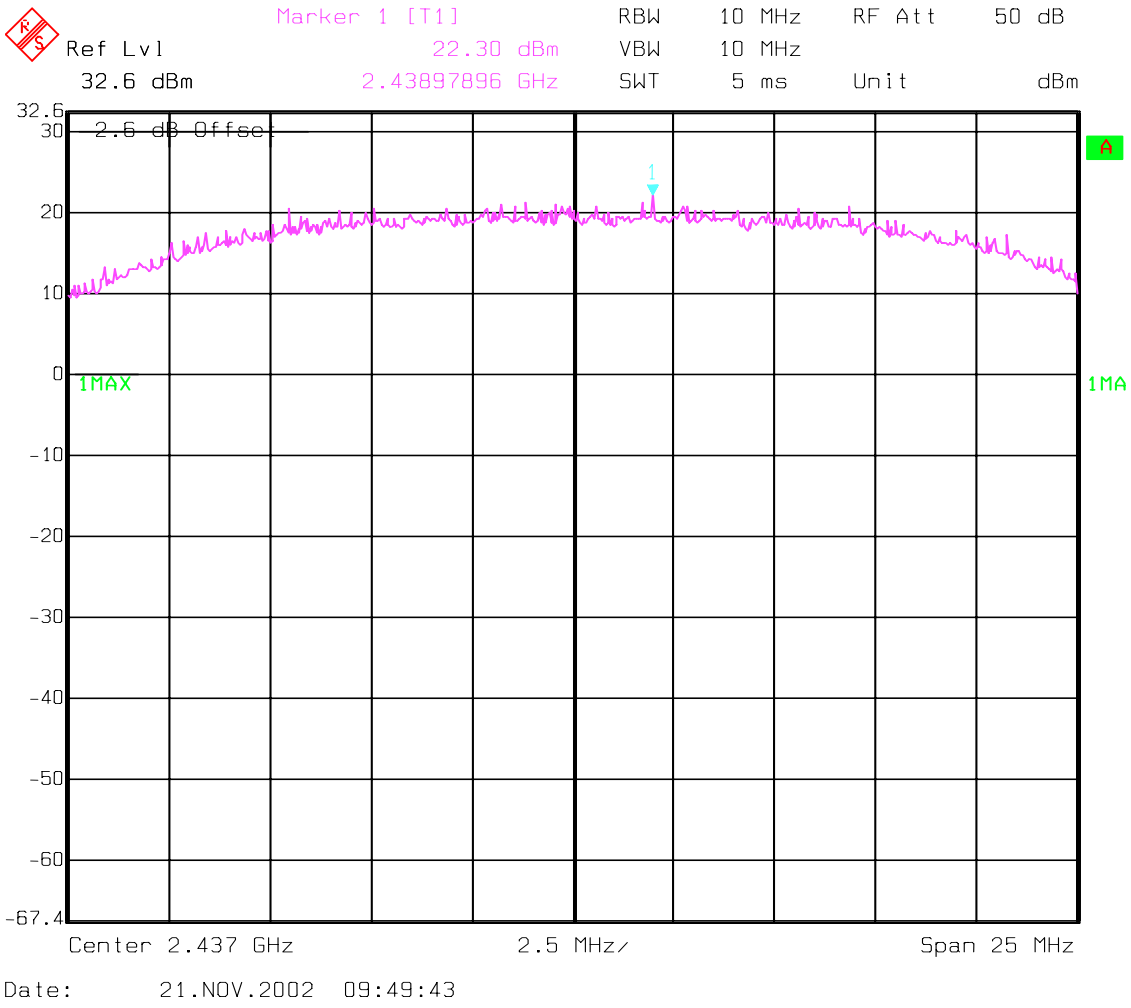
PEAK OUTPUT POWER (CONDUCTED) §15.247 (b) (1)

Lowest Channel: 2412MHz



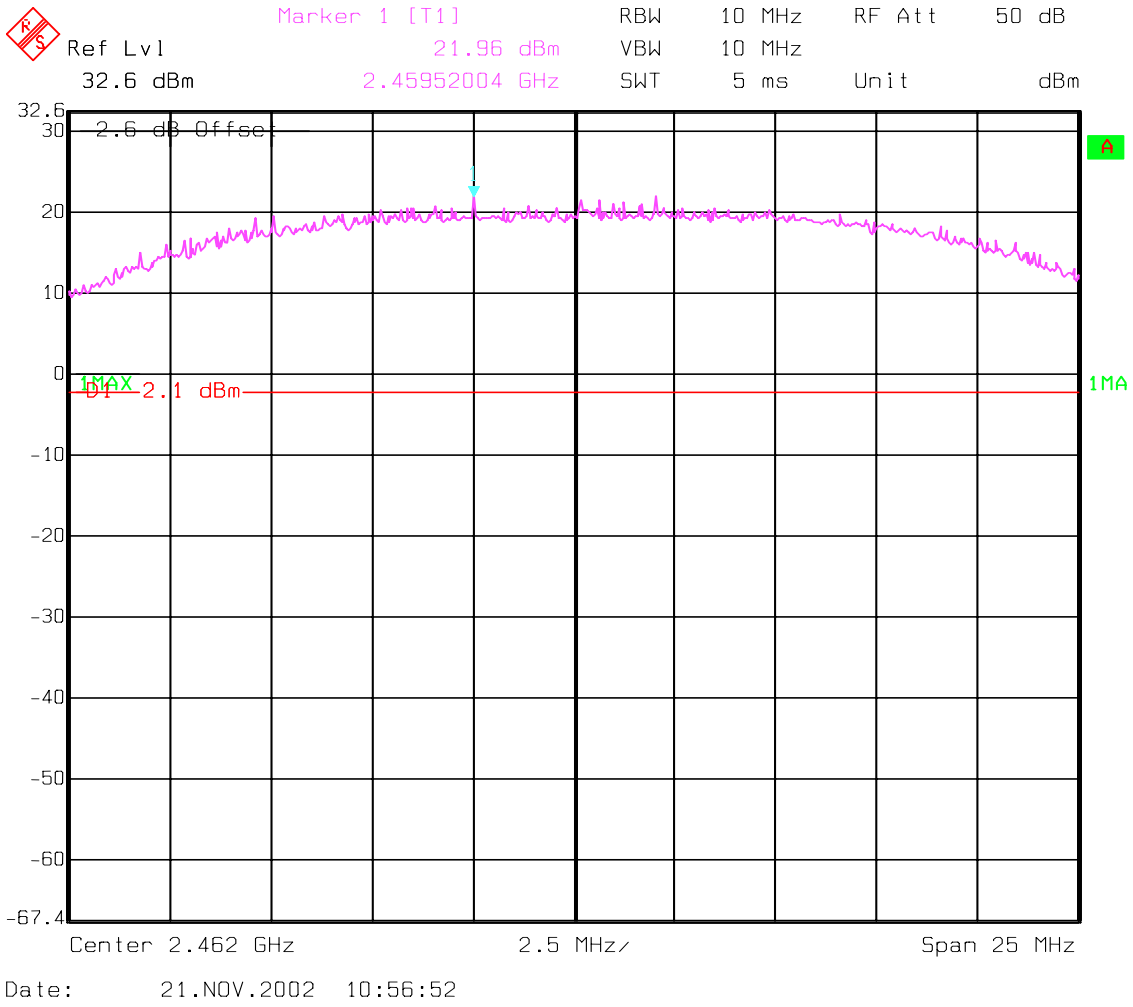
PEAK OUTPUT POWER (CONDUCTED) §15.247 (b)

Mid Channel: 2437MHz



PEAK OUTPUT POWER (CONDUCTED) §15.247 (b)

Highest Channel: 2462MHz



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

WLAN Model# BCM94306MP

EIRP:

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2412	2437	2462
T_{nom}(23)°C	V_{nom}(3.3) VDC	*28.7	*27.63	*27.26
Measurement uncertainty		±0.5dBm		

***Note: EIRP is calculated based on 3.15dBi antenna and conducted peak power measurements.**

LIMIT **SUBCLAUSE § 15.247 (b) (1)**

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

SOURCE-BASED TIME-AVERAGED OUTPUT

WLAN Model# BCM94306MP

Tx_{on} = 140.2 µs

$Tx_{on}+Tx_{off}$ = 661.32 µs

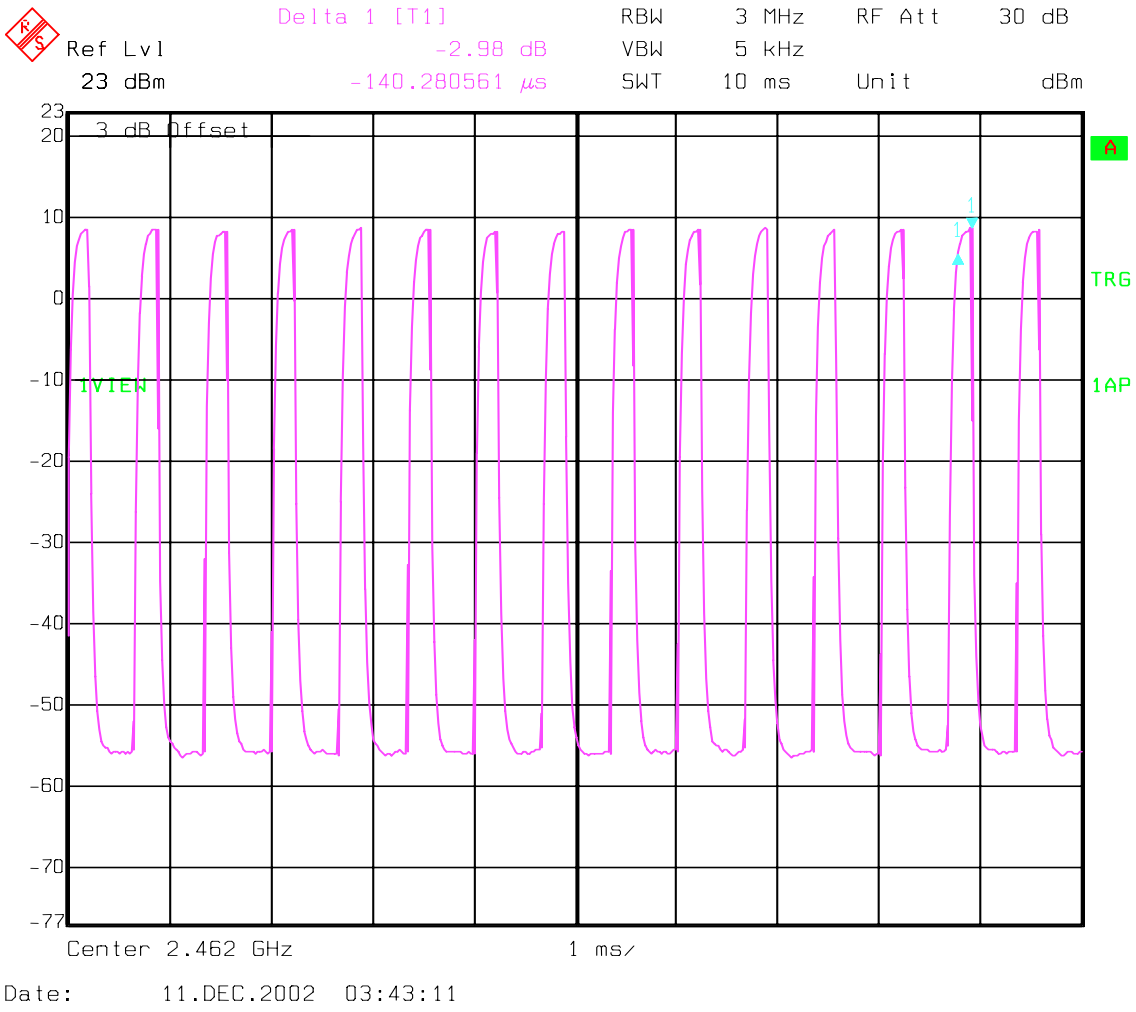
Duty factor = Tx_{on} / $Tx_{on}+Tx_{off}$ = 140.2 / 661.32 = 0.21

Therefore;
(Example for Low channel)
Source-based time averaged output = Max. EIRP + 10log(duty factor)
= 28.7 – 6.77 = **21.93dBm**

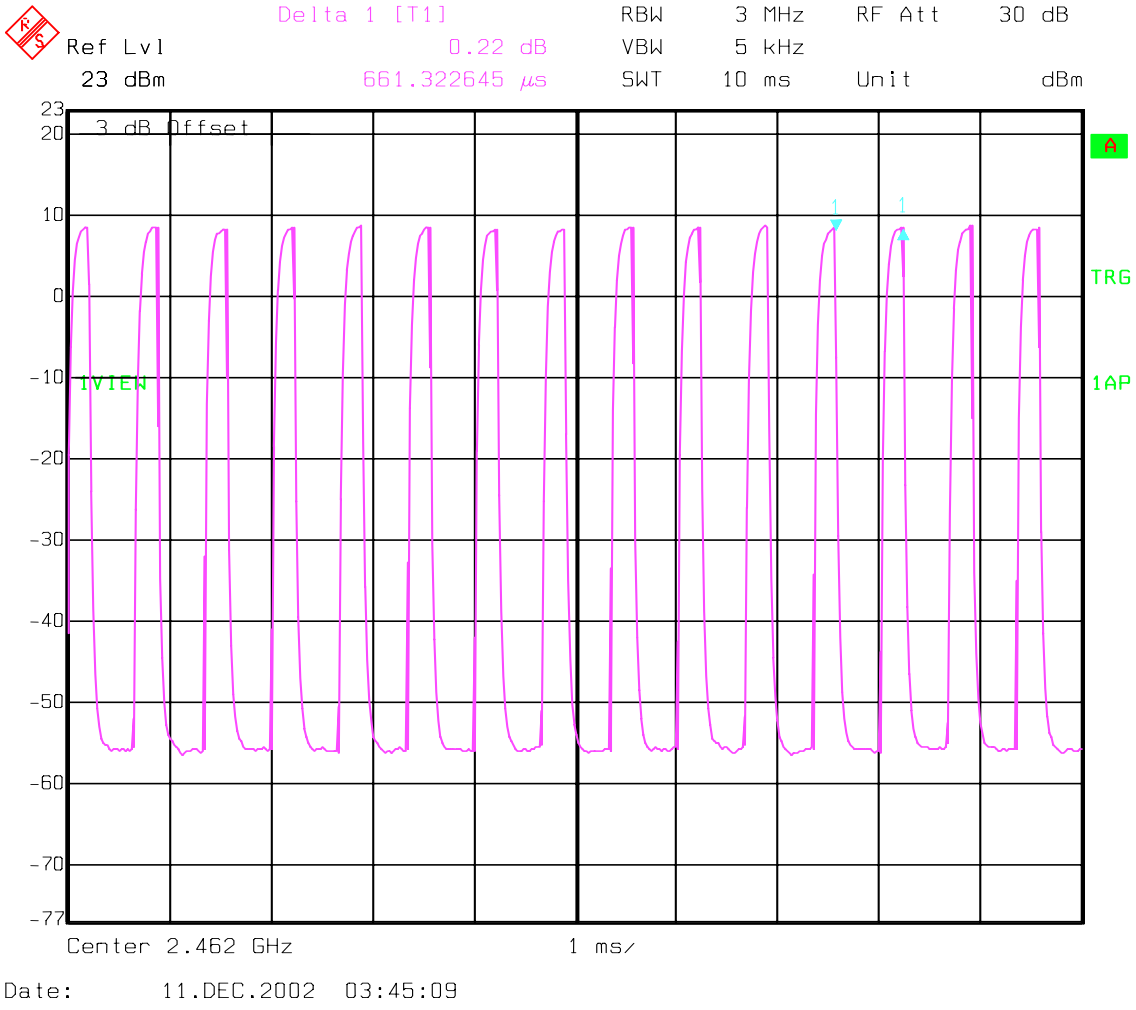
TEST CONDITIONS		SOURCE-BASED TIME AVERAGED OUTPUT (dBm)		
Frequency (MHz)		2412	2437	2462
T_{nom}(23)°C	V_{nom}(3.3) VDC	21.93	20.86	20.49

Please refer to the plots on next pages

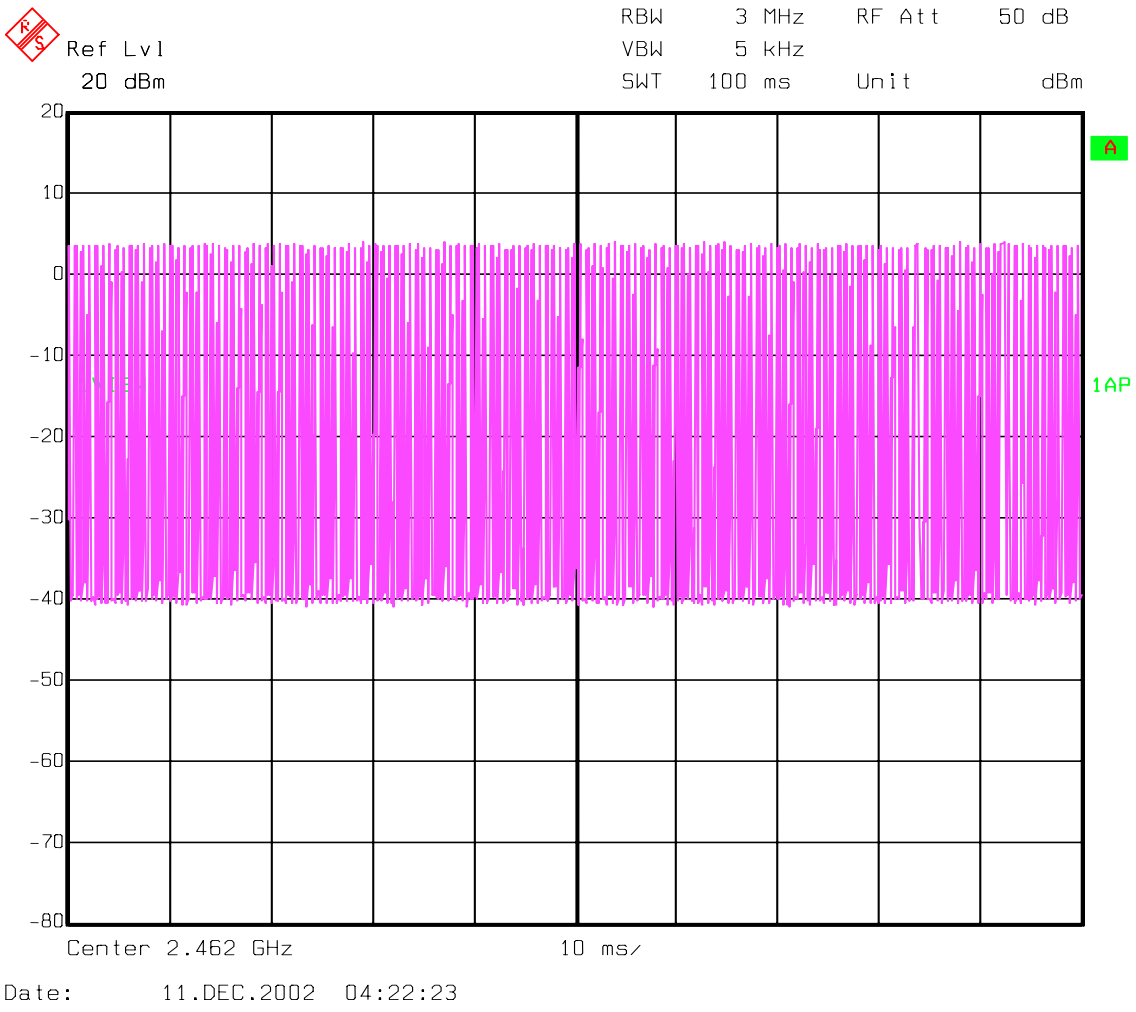
Transmitter ON time – Tx_{on}



Transmitter ON+OFF time – Tx_{on} + Tx_{off}



100ms plot – to show repetition of pattern



MAXIMUM PEAK OUTPUT POWER **§ 15.247 (b) (1)**
(Conducted)
WLAN Model# BCM94306MPSG

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)			
Frequency (MHz)			2412	2437	2462
T_{nom}(23)°C	V_{nom}(3.3) VDC	Pk	*25.10	*24.74	*24.12
Measurement uncertainty		±0.5dBm			

***To comply with following;**
RBW / VBW should be equal to or greater than the 6dB BW
All measured values are corrected by 10log (6dB BW / used BW)

(Therefore correction factor of 2.18 is added to low, mid& high channel measurements respectively)

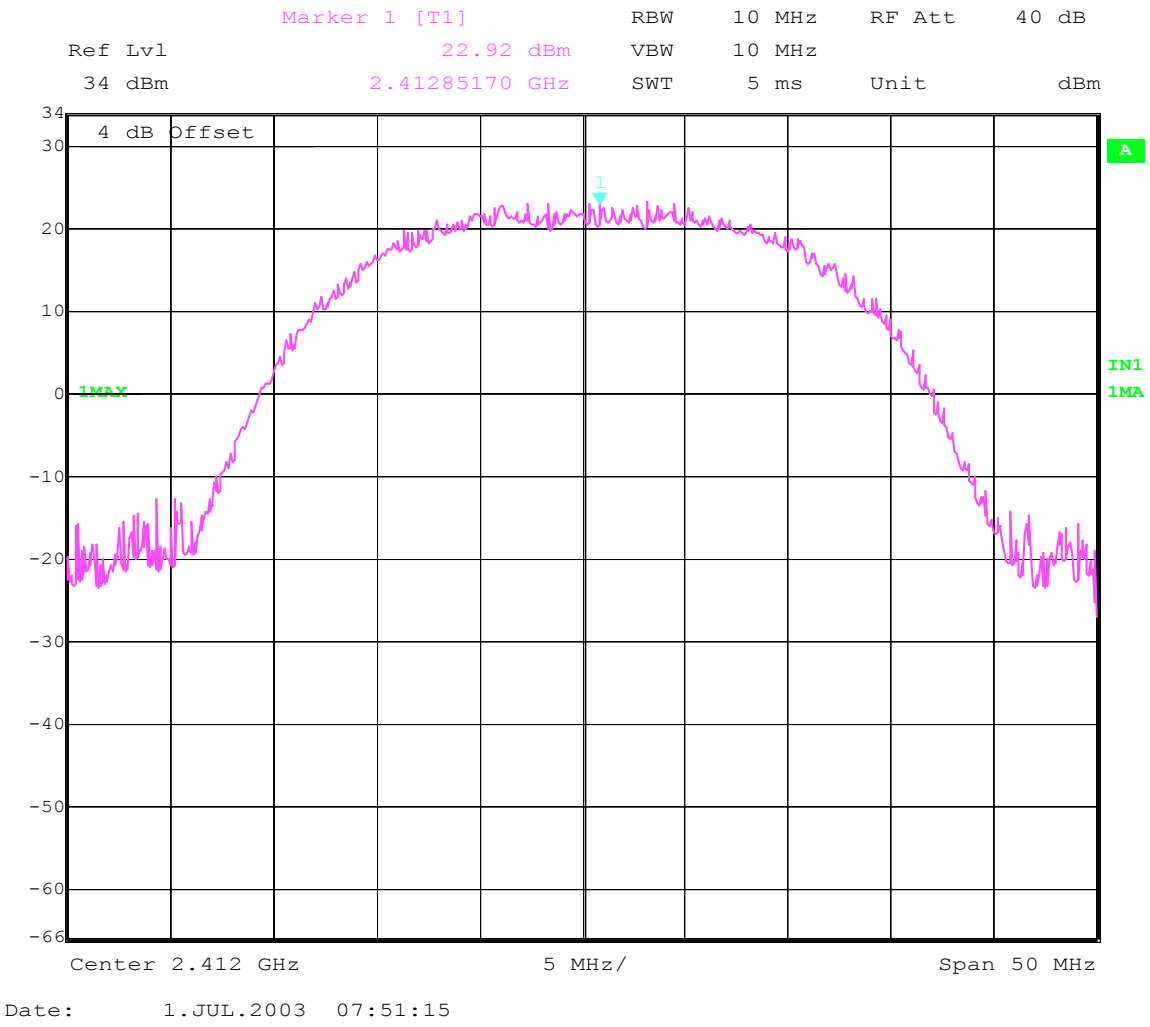
LIMIT **SUBCLAUSE § 15.247 (b) (1)**

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

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

WLAN Model# BCM94306MPSG

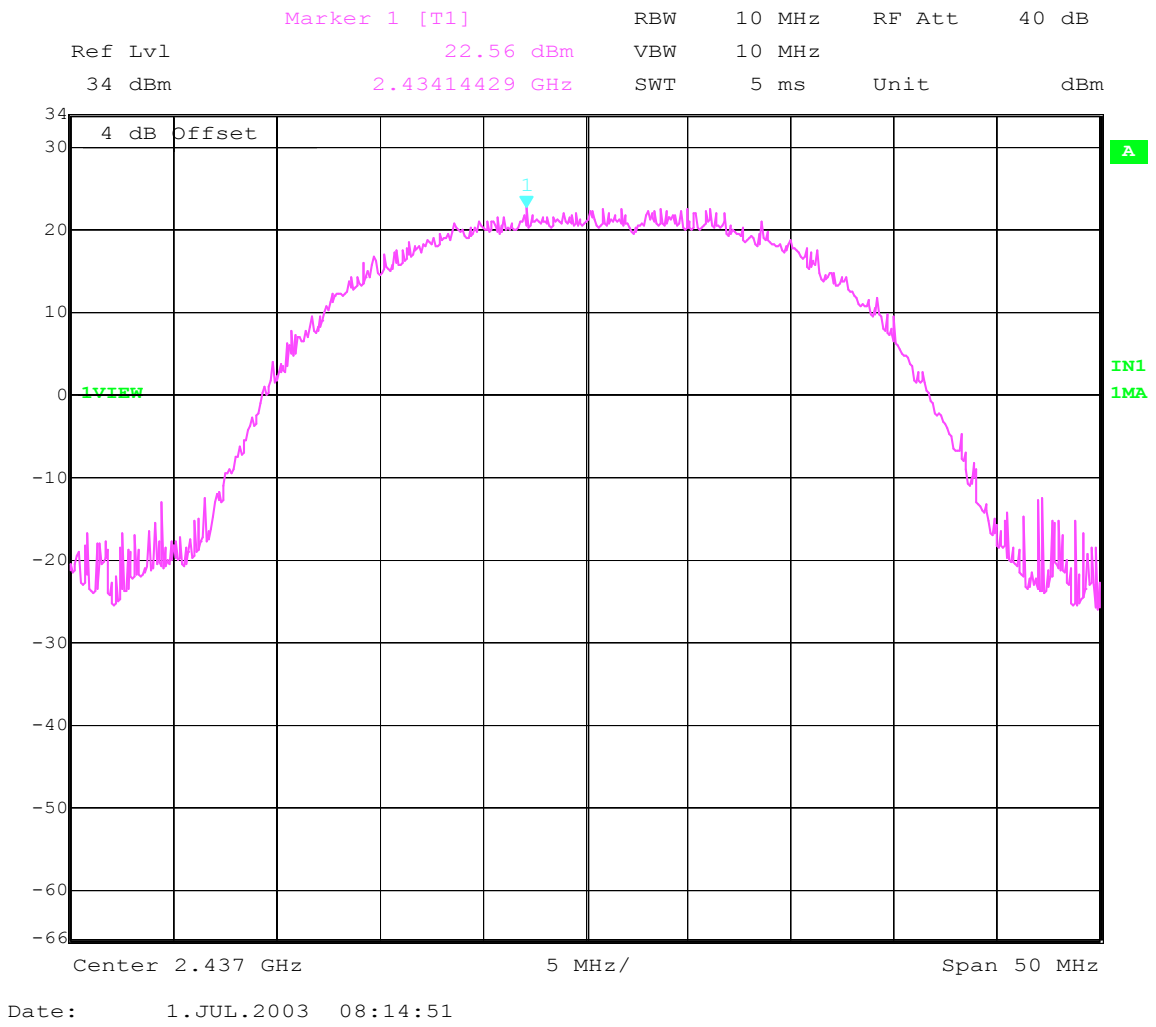
Lowest Channel: 2412MHz



PEAK OUTPUT POWER (CONDUCTED) §15.247 (b)

WLAN Model# BCM94306MPSG

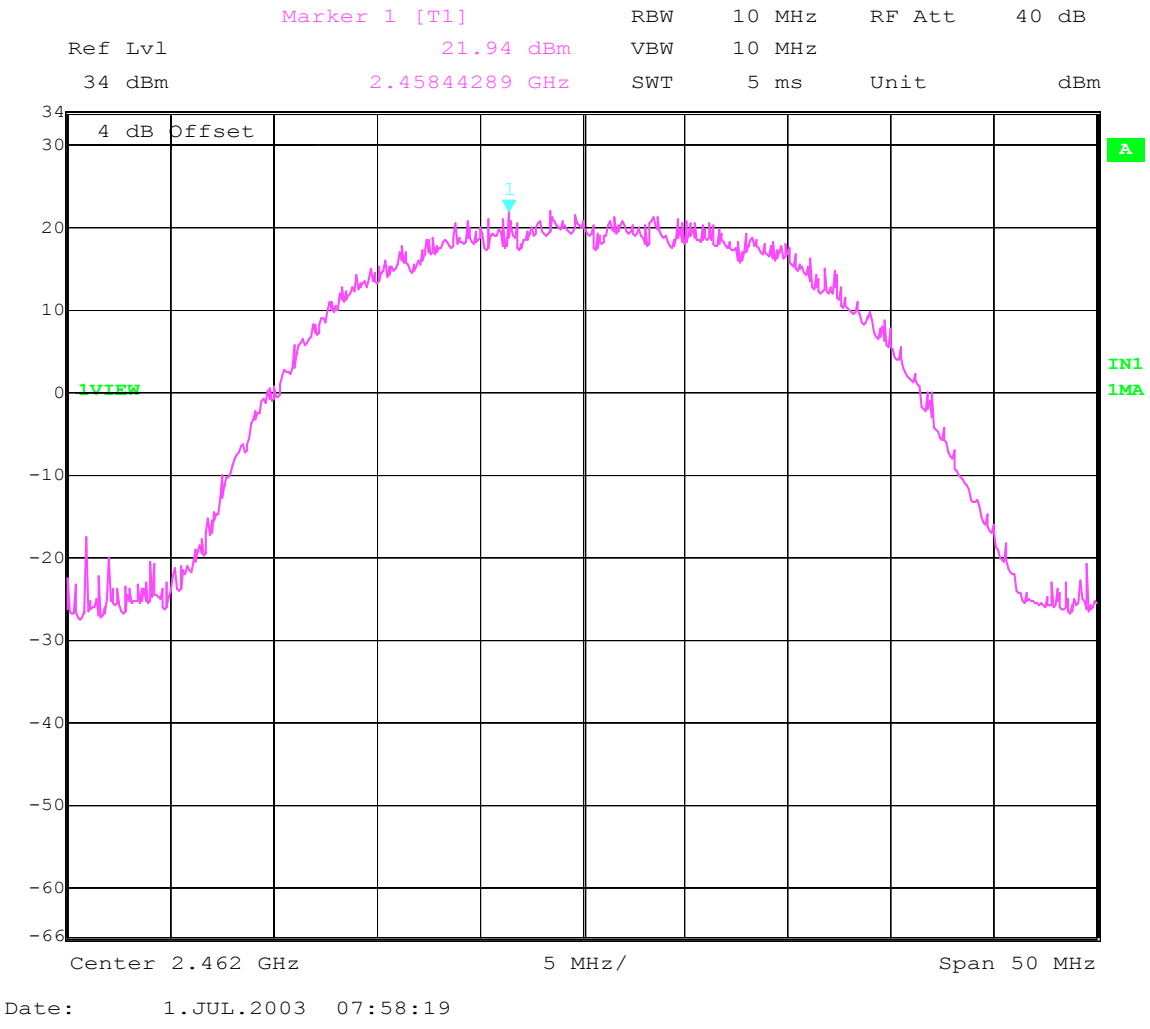
Mid Channel: 2437MHz



PEAK OUTPUT POWER (CONDUCTED) §15.247 (b)

WLAN Model# BCM94306MPSG

Highest Channel: 2462MHz



POWER SPECTRAL DENSITY §15.247 (d)

TEST CONDITIONS		POWER SPECTRAL DENSITY (dBm)		
Frequency (MHz)		2412	2437	2462
$T_{nom}(23)°C$	$V_{nom}(3.3)$ VDC	1.13	1.64	1.28

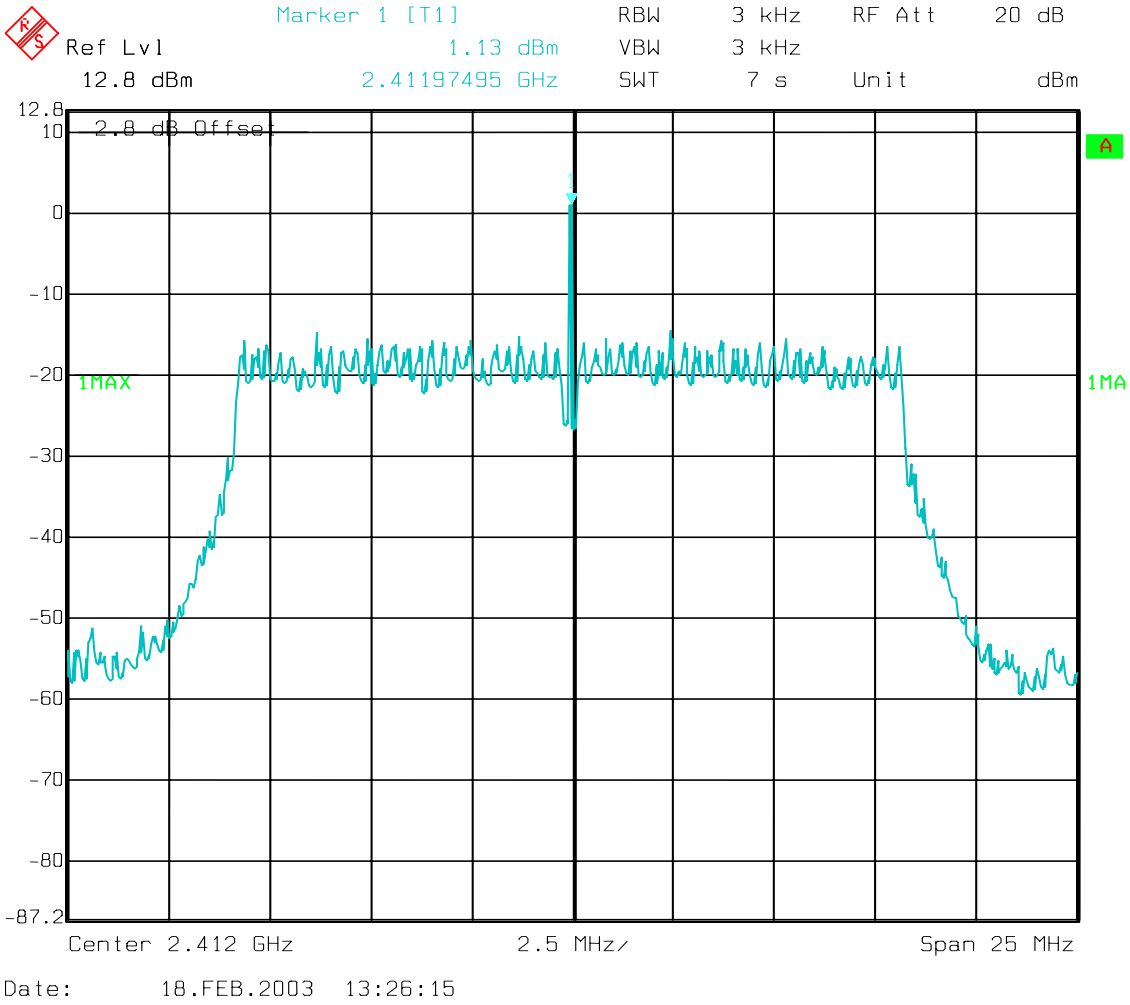
LIMIT **SUBCLAUSE §15.247(d)**

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

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

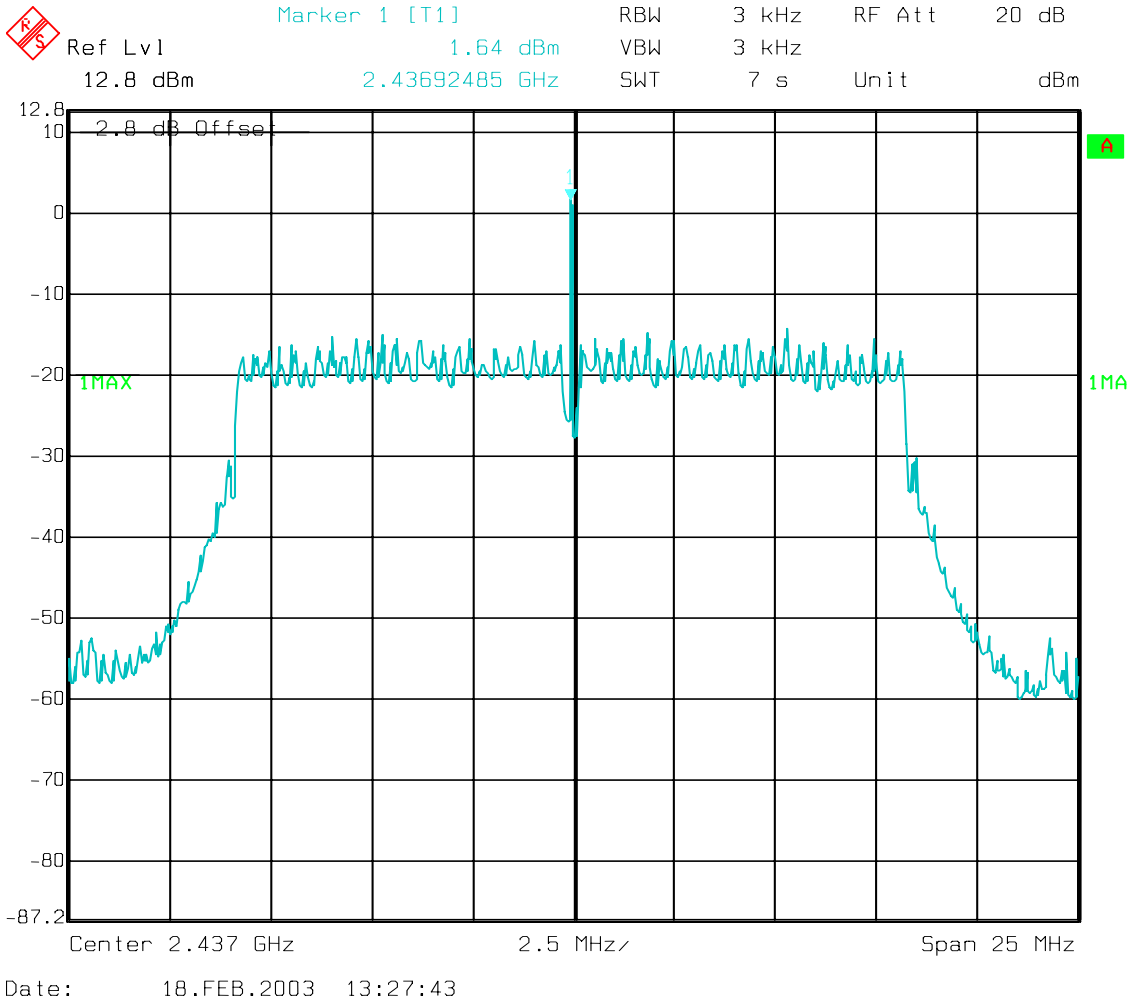
POWER SPECTRAL DENSITY §15.247(d)

Lowest Channel: 2412MHz



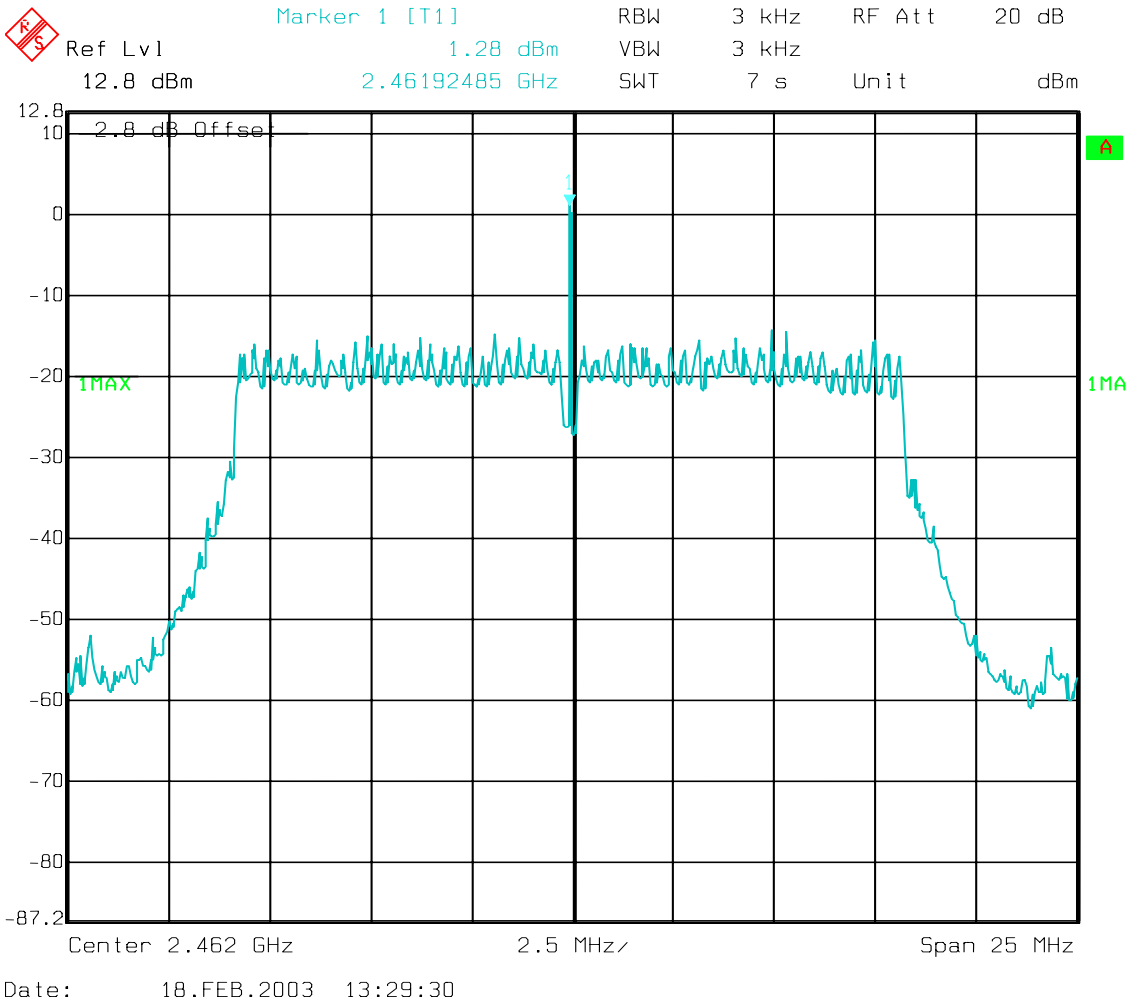
POWER SPECTRAL DENSITY §15.247(d)

Mid Channel: 2437MHz



POWER SPECTRAL DENSITY §15.247(d)

Highest Channel: 2462MHz



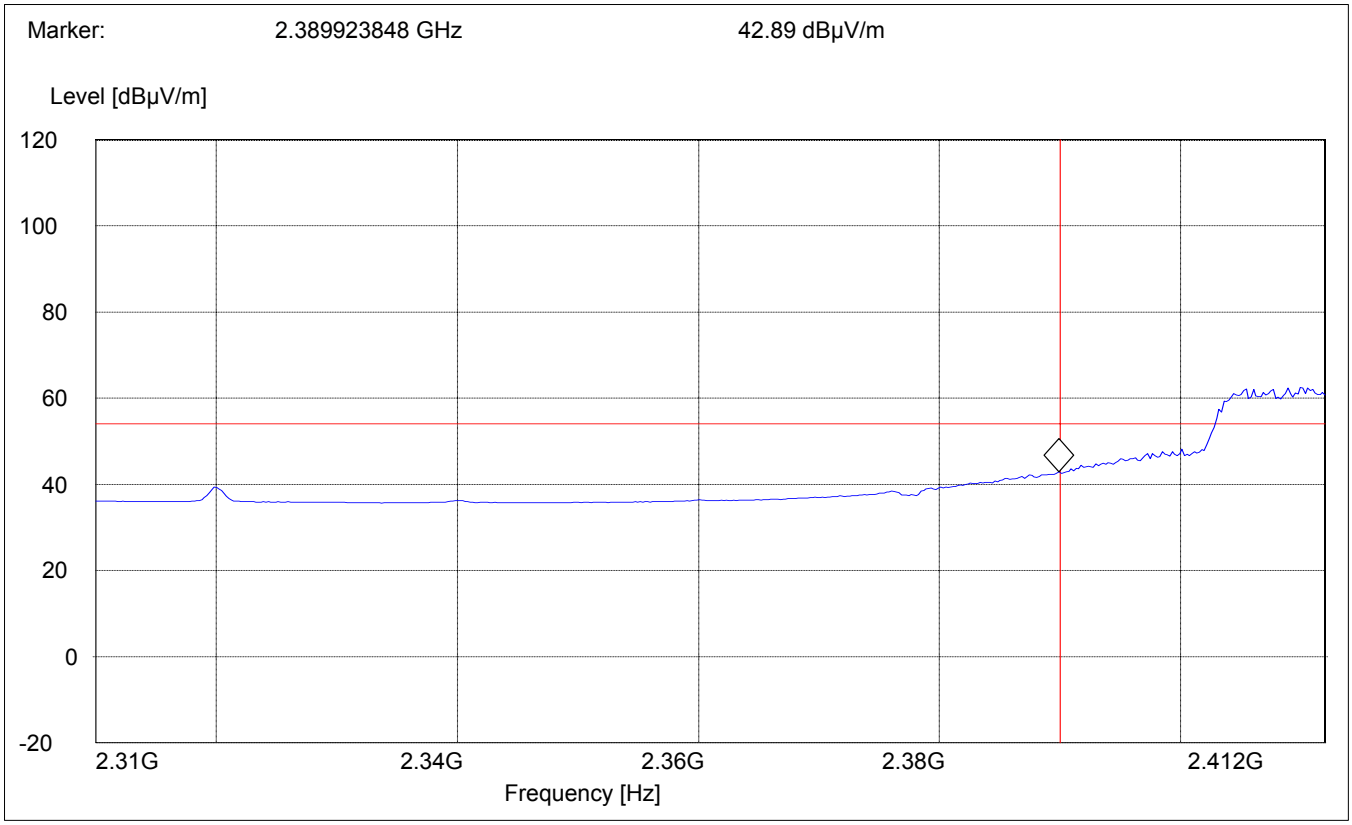
BAND EDGE COMPLIANCE §15.247 (c)

WLAN Model# BCM94306MP

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)



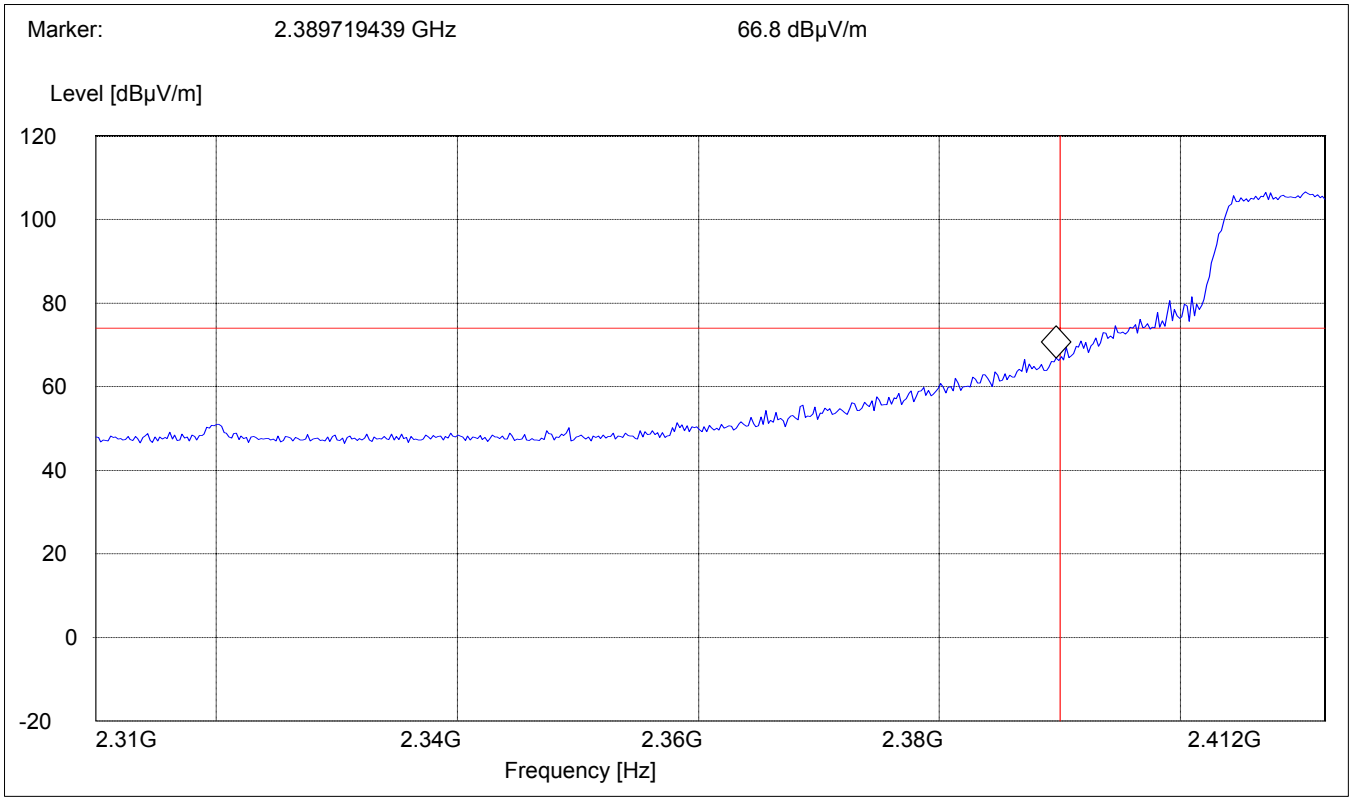
BAND EDGE COMPLIANCE §15.247 (c)

WLAN Model# BCM94306MP

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)



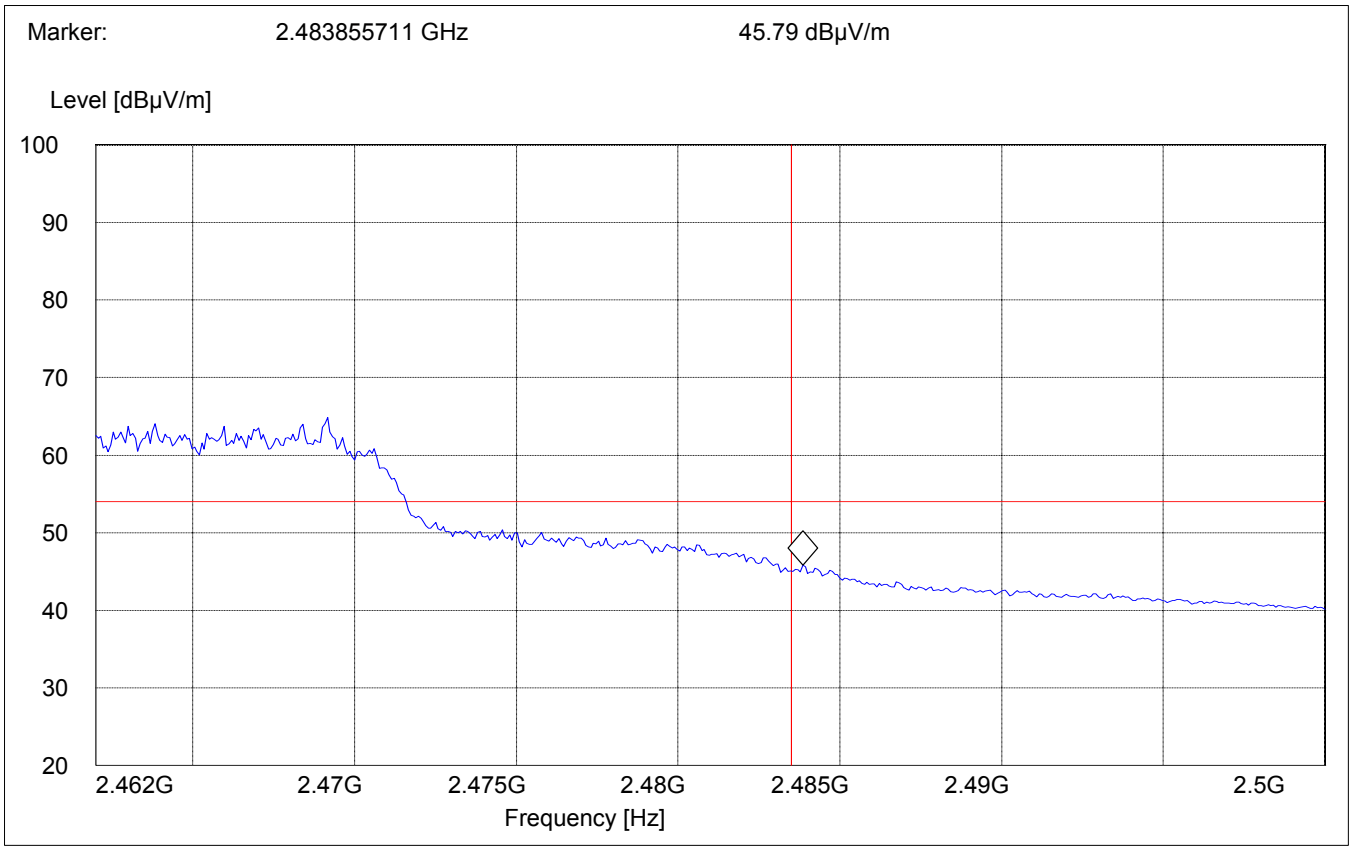
BAND EDGE COMPLIANCE §15.247 (c)

WLAN Model# BCM94306MP

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)



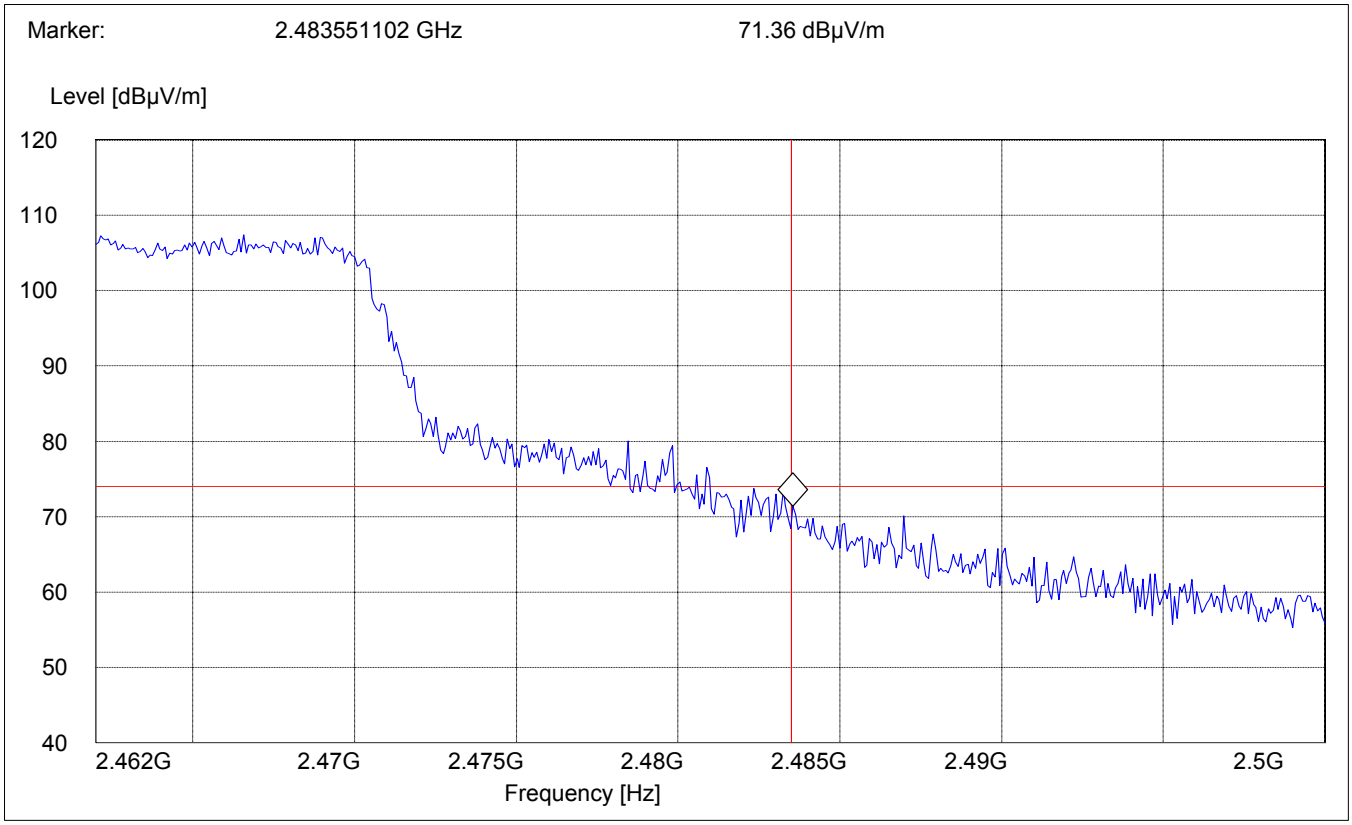
BAND EDGE COMPLIANCE §15.247 (c)

WLAN Model# BCM94306MP

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)



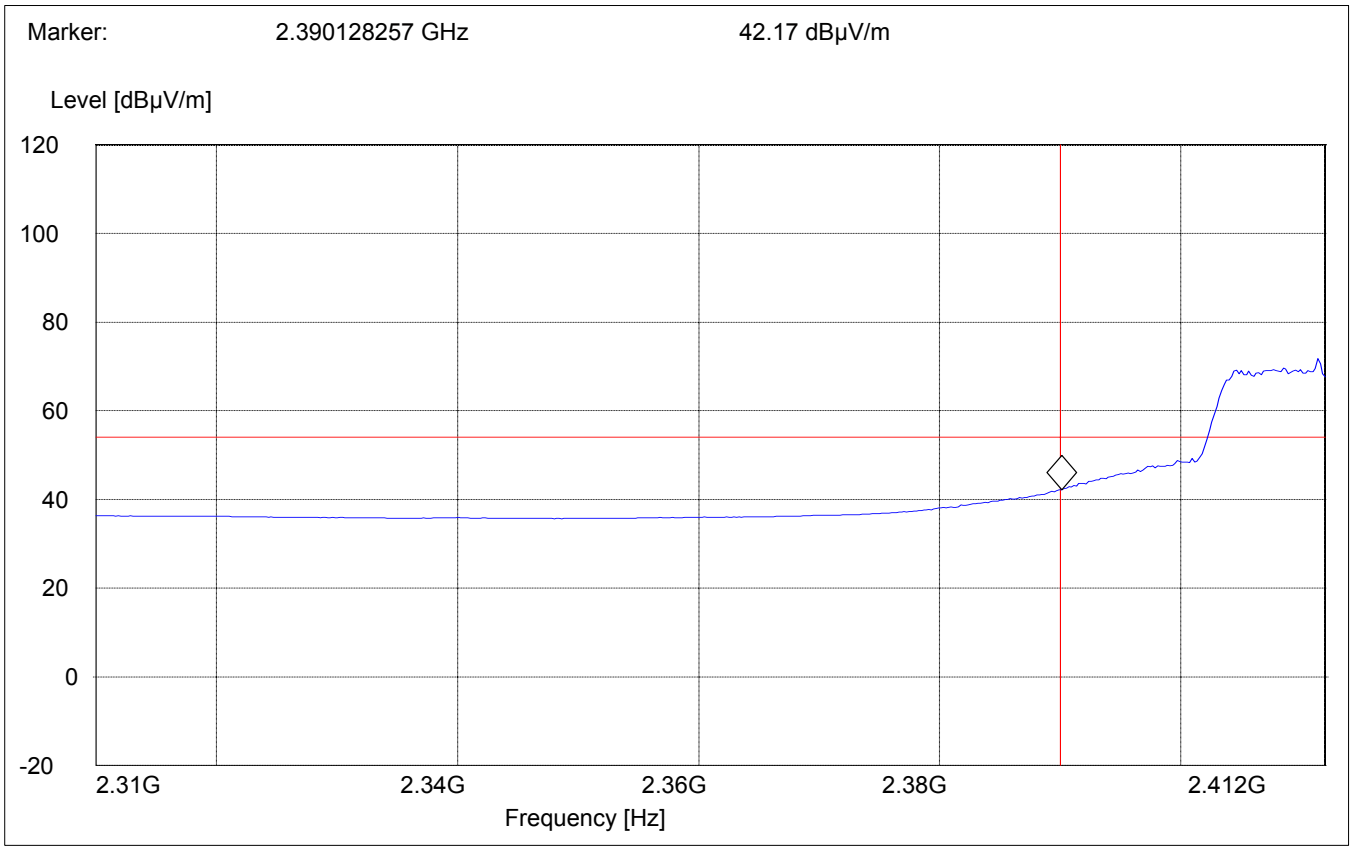
BAND EDGE COMPLIANCE §15.247 (c)

WLAN Model# BCM94306MPSG

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)



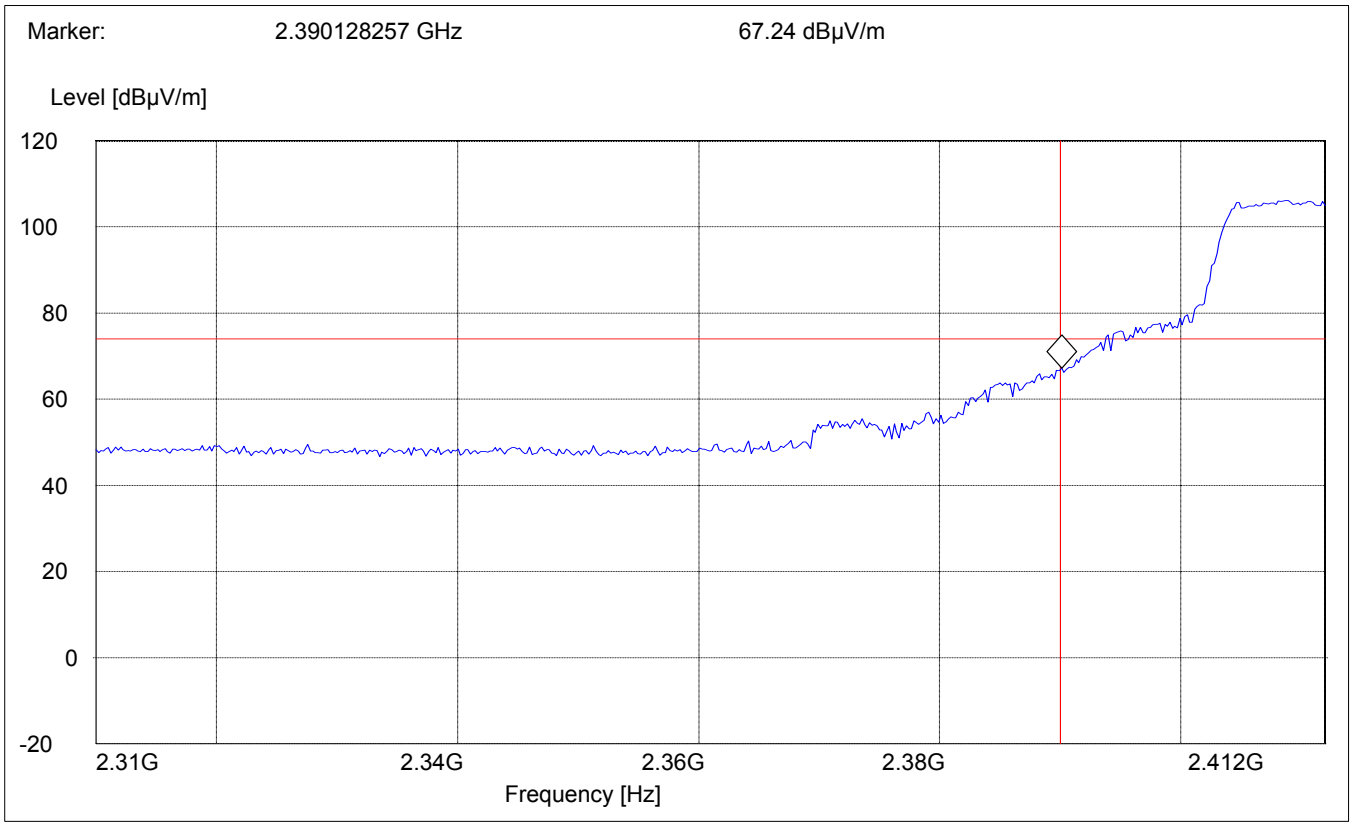
BAND EDGE COMPLIANCE §15.247 (c)

WLAN Model# BCM94306MPSG

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)



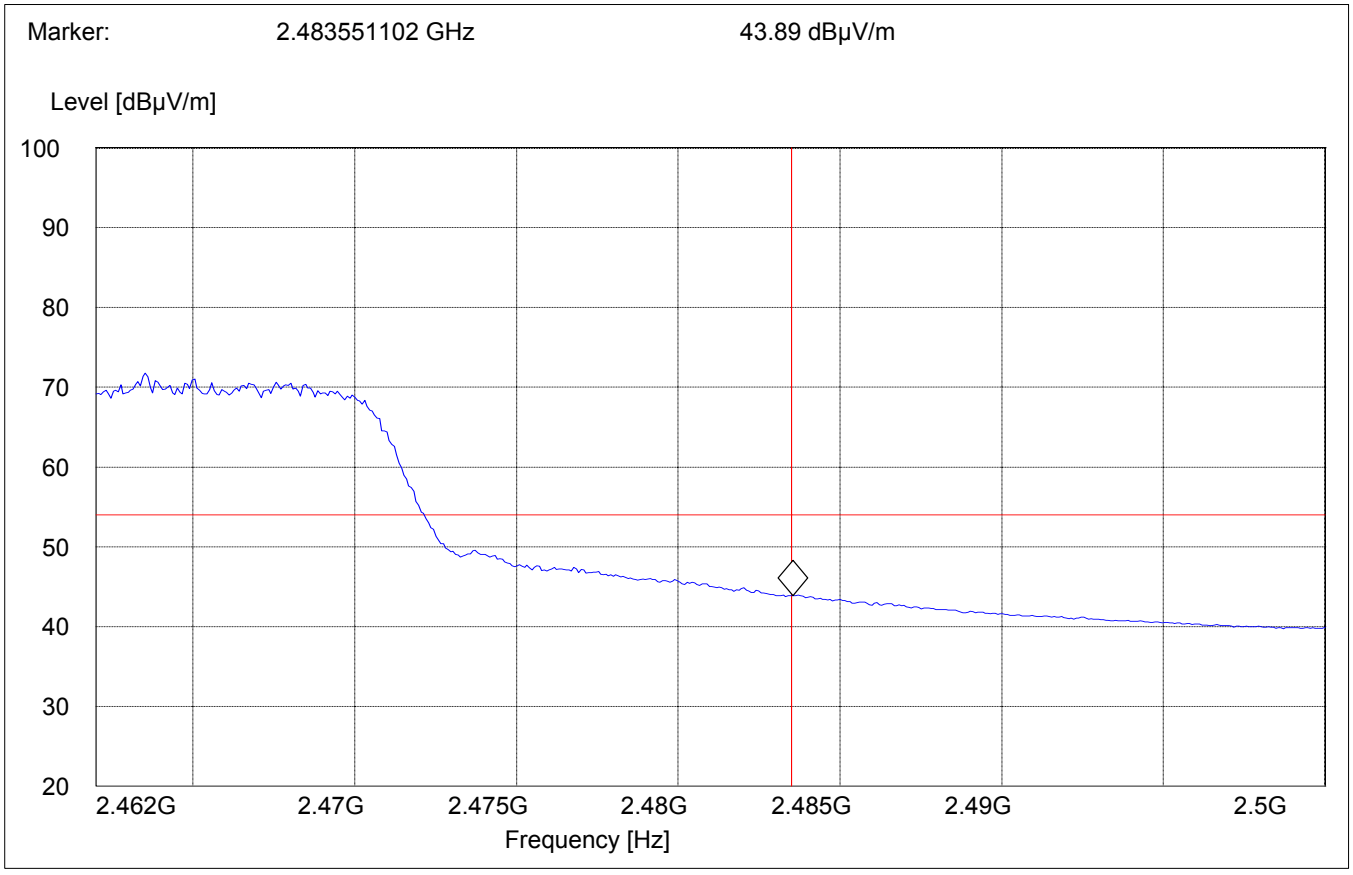
BAND EDGE COMPLIANCE §15.247 (c)

WLAN Model# BCM94306MPSG

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)



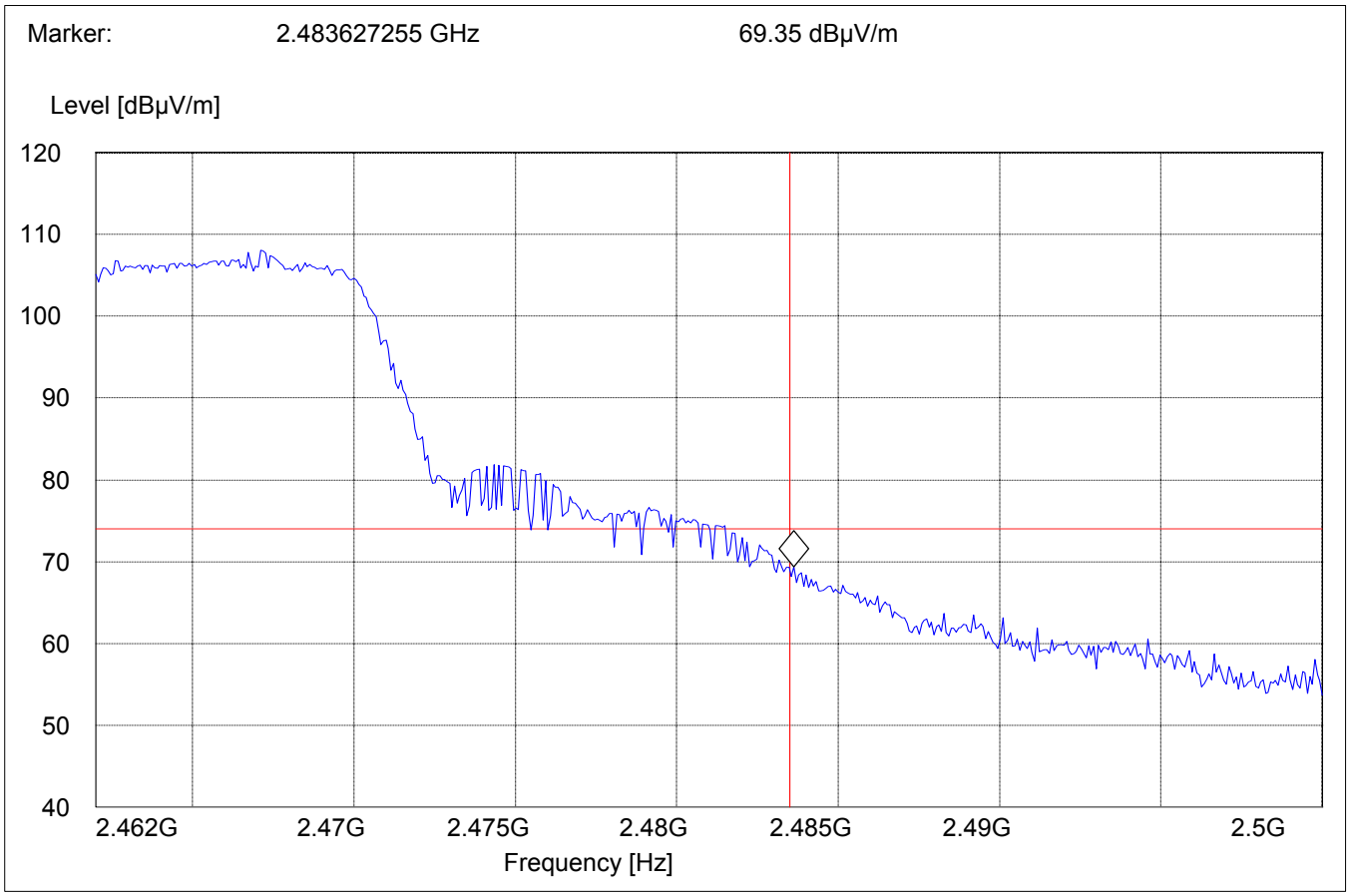
BAND EDGE COMPLIANCE §15.247 (c)

WLAN Model# BCM94306MPSG

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 (Conducted)
LIMITS

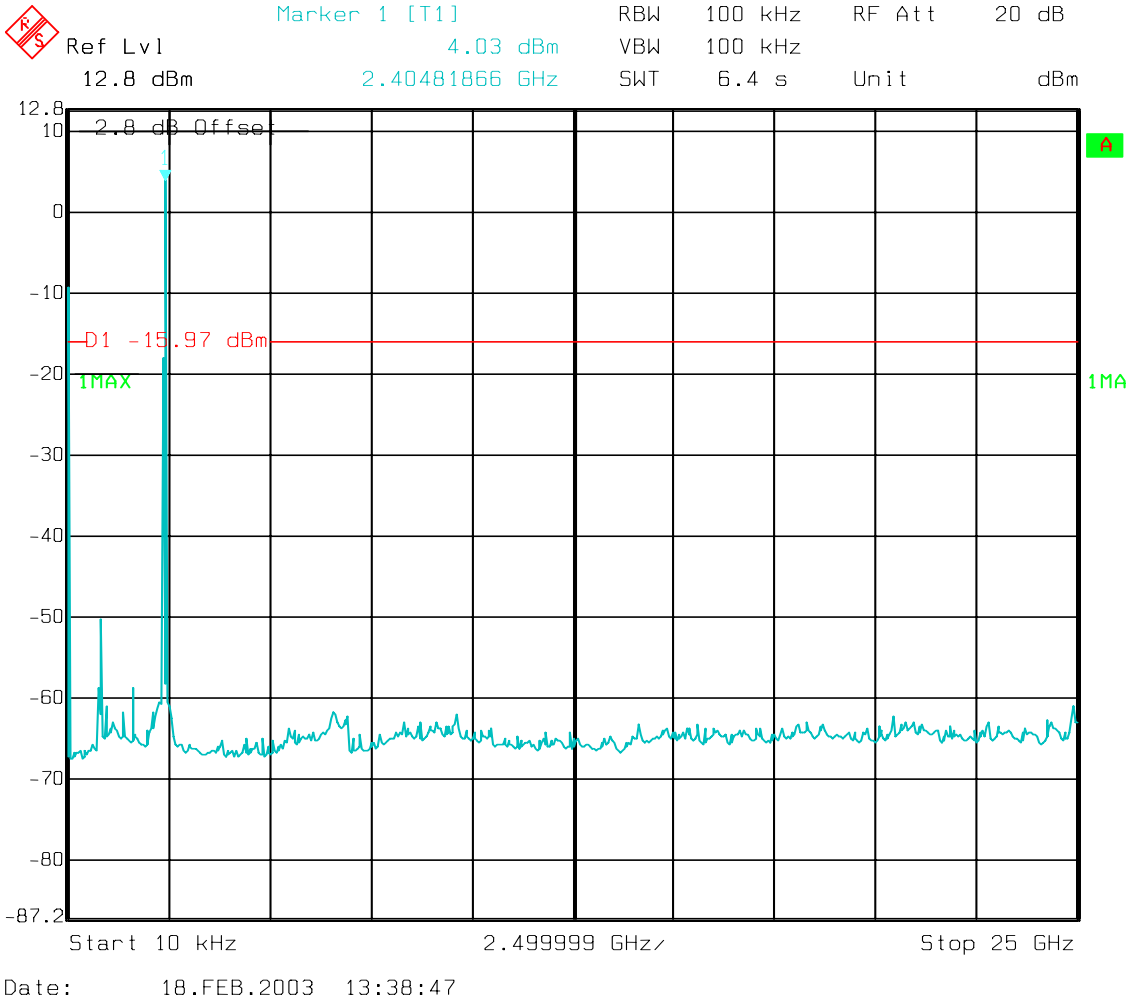
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions, which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

NOTE: Frequency resolution is not fine enough to show the exact frequency of the carrier.

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

Lowest Channel (2412MHz): 10kHz - 25GHz

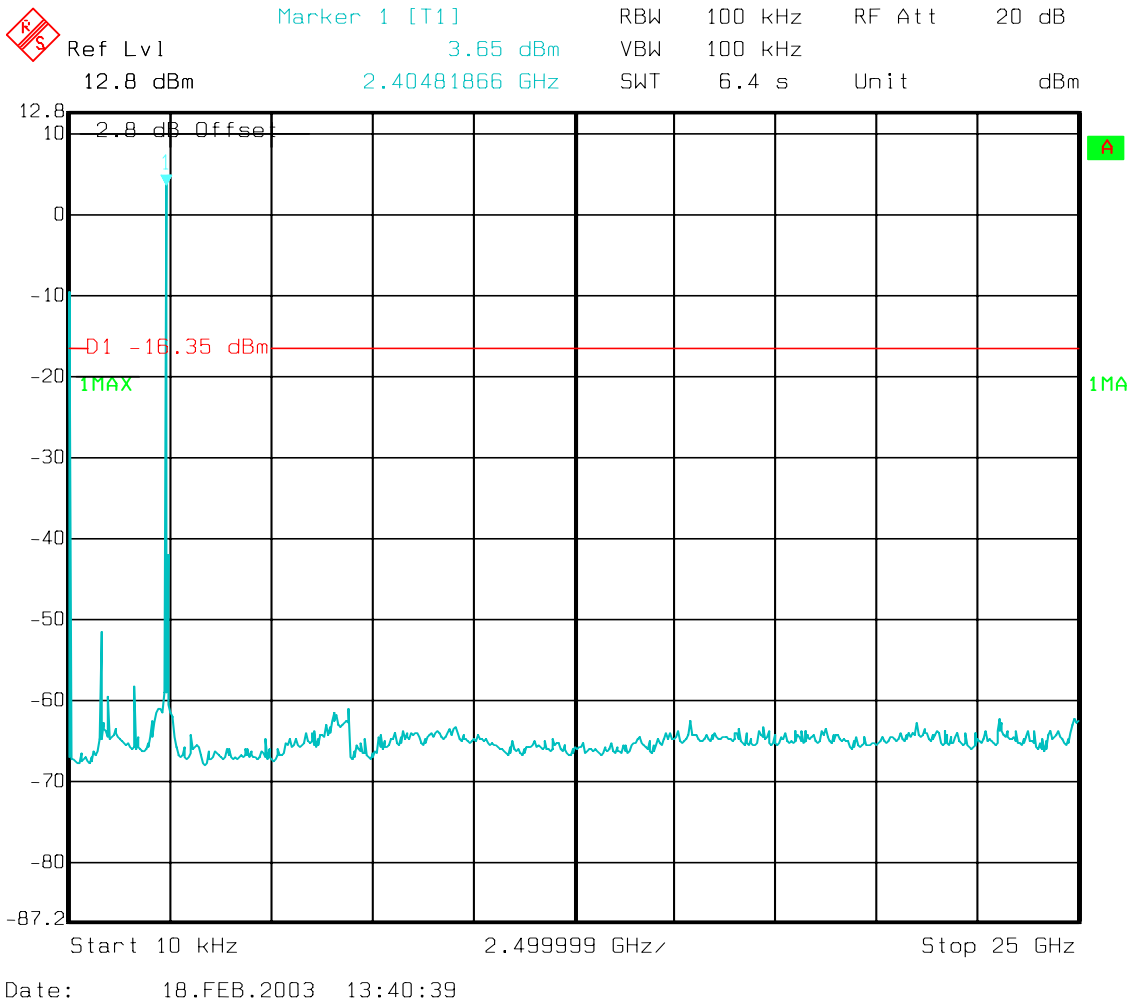
NOTE: The peak above the limit line is the carrier frequency.



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

Mid Channel (2437MHz): 10kHz - 25GHz

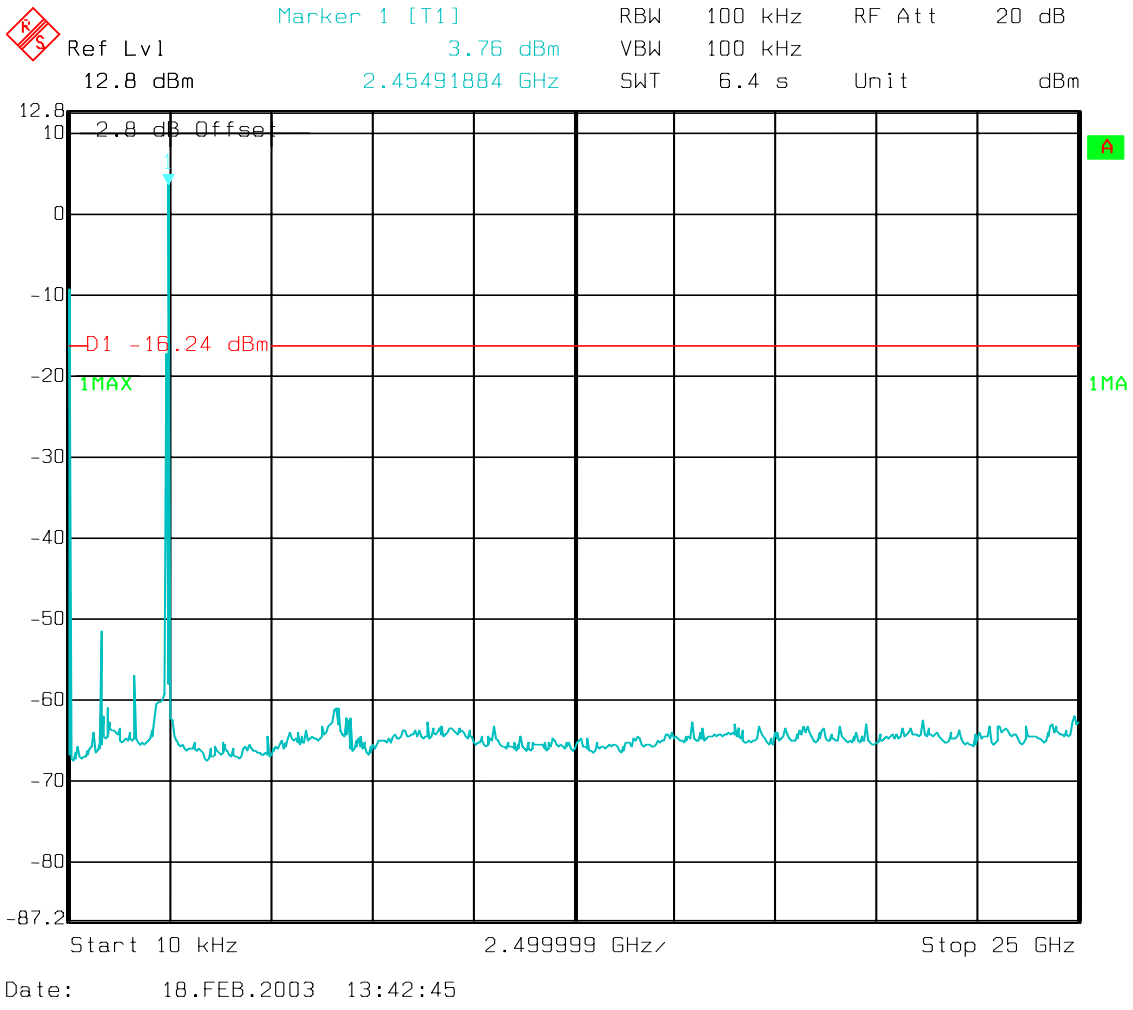
NOTE: The peak above the limit line is the carrier frequency.



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

Highest Channel (2462MHz): 10MHz - 25GHz

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



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 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.

3. All radiated spurious emissions are done with Bluetooth Transmitter ON.

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)

WLAN Model# BCM94306MP

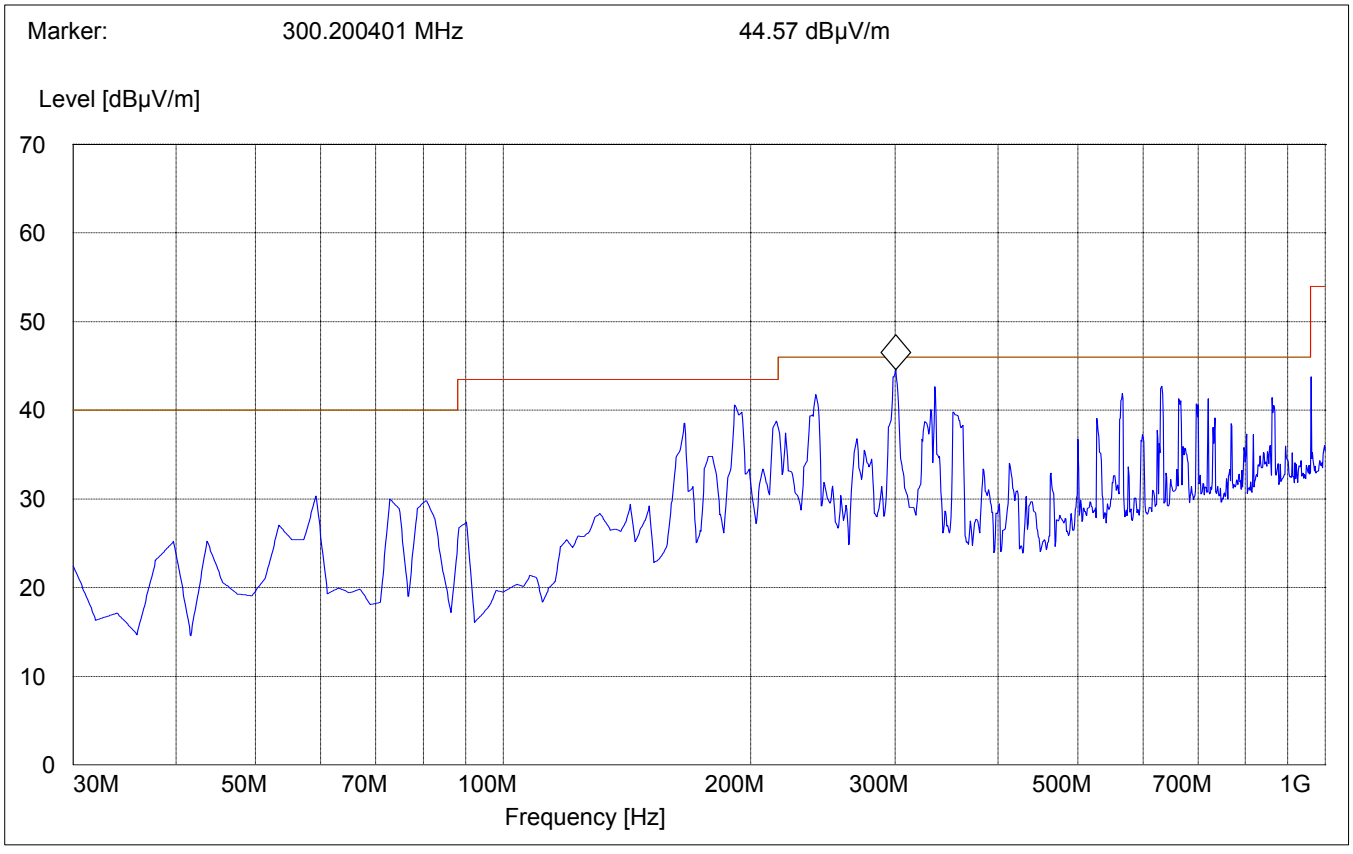
Note: All radiated measurements were done with Bluetooth Transmitter ON.
The values reported are the maximum values.

Transmit at Lowest channel Frequency 2412MHz			
Frequency (MHz)	Level (dBµV/m)		
	Peak	Quasi-Peak	Average
191.34	40.60		
239.93	41.78		
300.20	44.57		
335.19	42.67		
566.51	41.92		
630.66	42.42		
667.59	41.08		
700.64	40.60		
720.08	41.29		
861.98	41.40		
961.12	43.76		
3210.4	39.16		
4803.6	44.87		
7238.4	42.42		
Transmit at Middle channel Frequency 2437MHz			
Frequency (MHz)	Level (dBµV/m)		
	Peak	Quasi-Peak	Average
3240.4	41.07		
4863.7	45.30		
7298.5	47.69		
Transmit at Highest channel Frequency 2462MHz			
Frequency (MHz)	Level (dBµV/m)		
	Peak	Quasi-Peak	Average
3270.54	44.28		
4923.8	42.45		
7388.77	49.24		

EMISSION LIMITATIONS - Radiated (Transmitter) **§ 15.247 (c) (1)**
Lowest Channel (2412MHz): 30MHz – 1GHz
WLAN Model# BCM94306MP

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

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

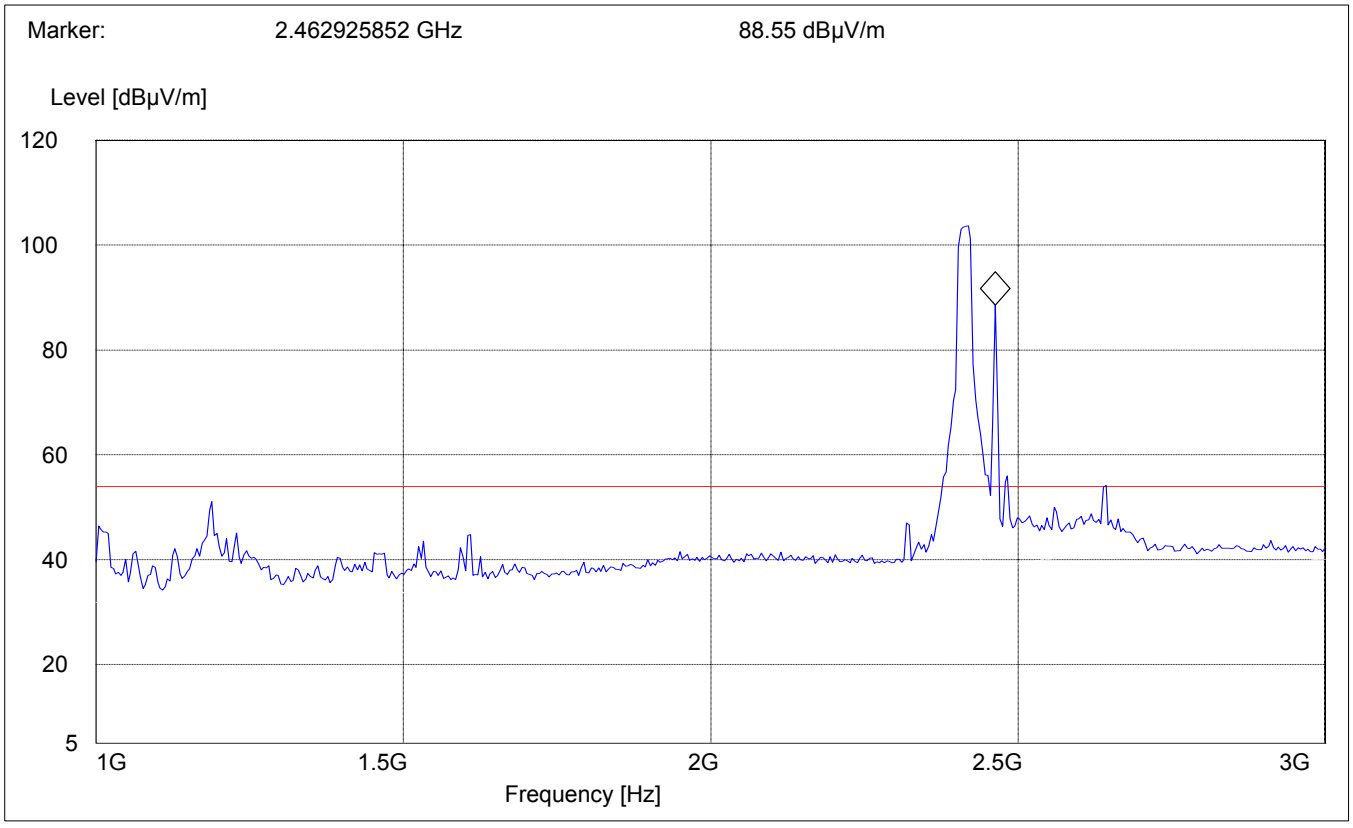


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Lowest Channel (2412MHz): 1GHz – 3GHz
WLAN Model# BCM94306MP

Peak Measurement

Note: The higher peak above the limit line is the carrier freq. & marked peak is Bluetooth TX.

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

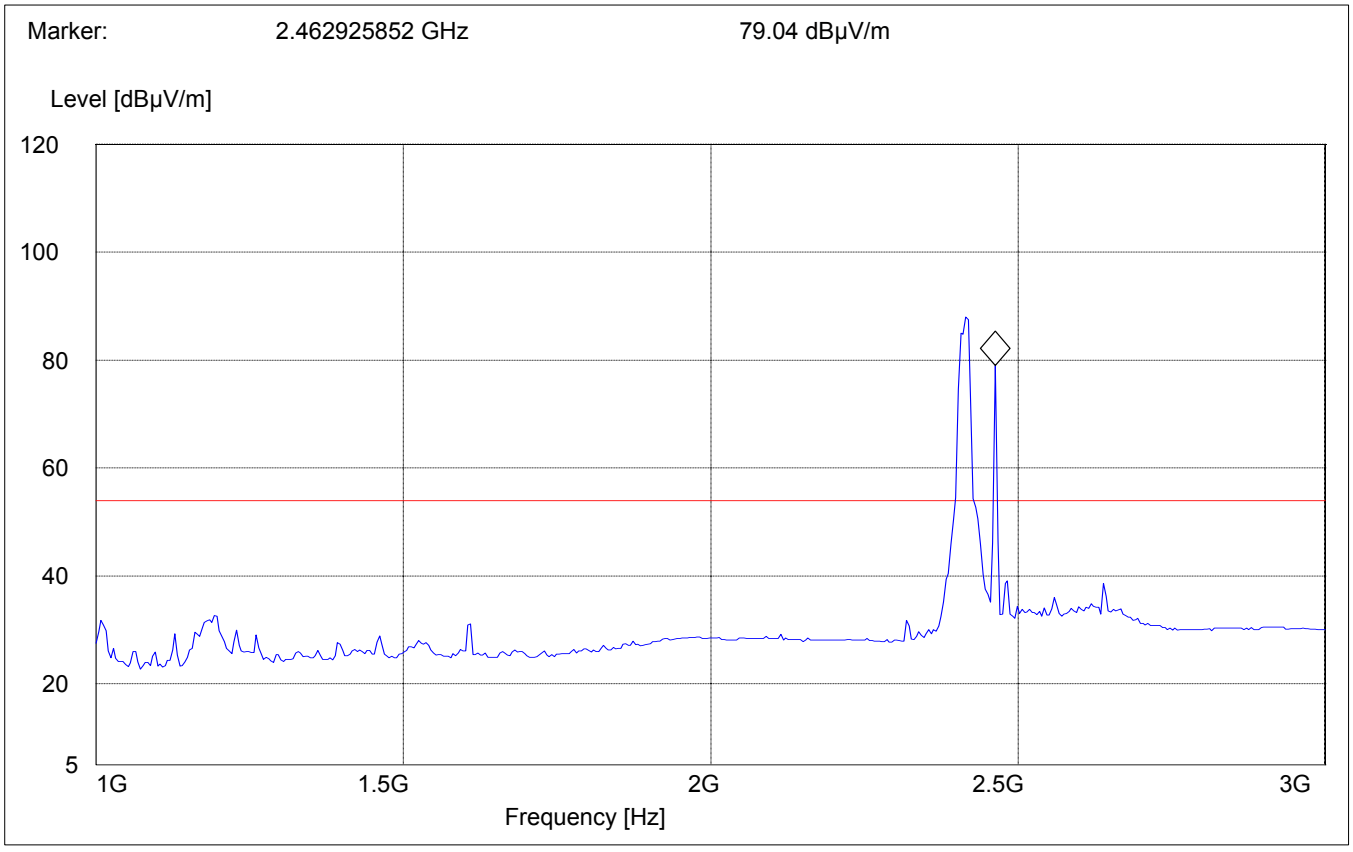


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Lowest Channel (2412MHz): 1GHz – 3GHz
WLAN Model# BCM94306MP

Average Measurement

Note: The higher peak above the limit line is the carrier freq. & marked peak is Bluetooth TX.

SWEEP TABLE:		"BT Spuri hi 1-3G"				
Short Description:		Bluetooth Spurious 1-3GHz				
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)

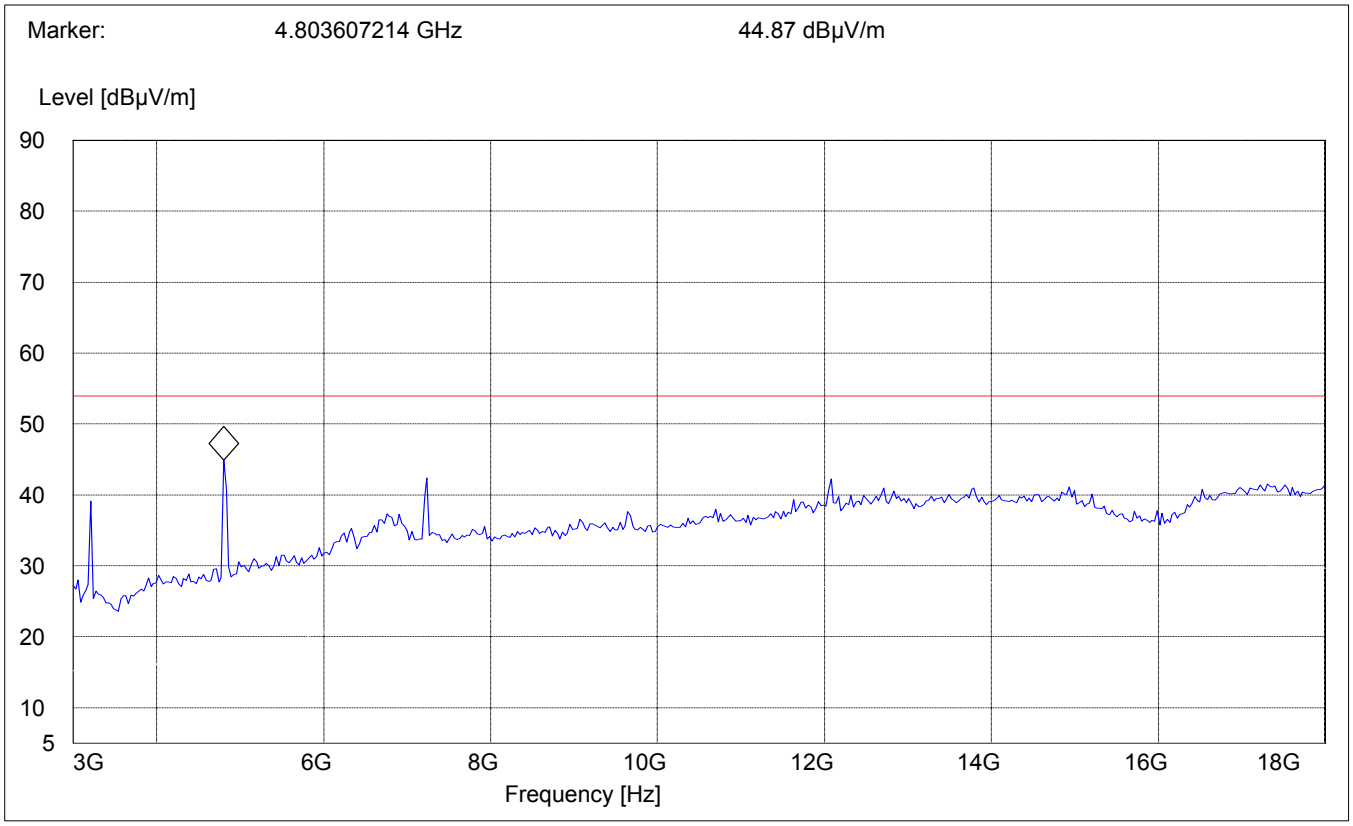


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)

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

WLAN Model# BCM94306MP

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

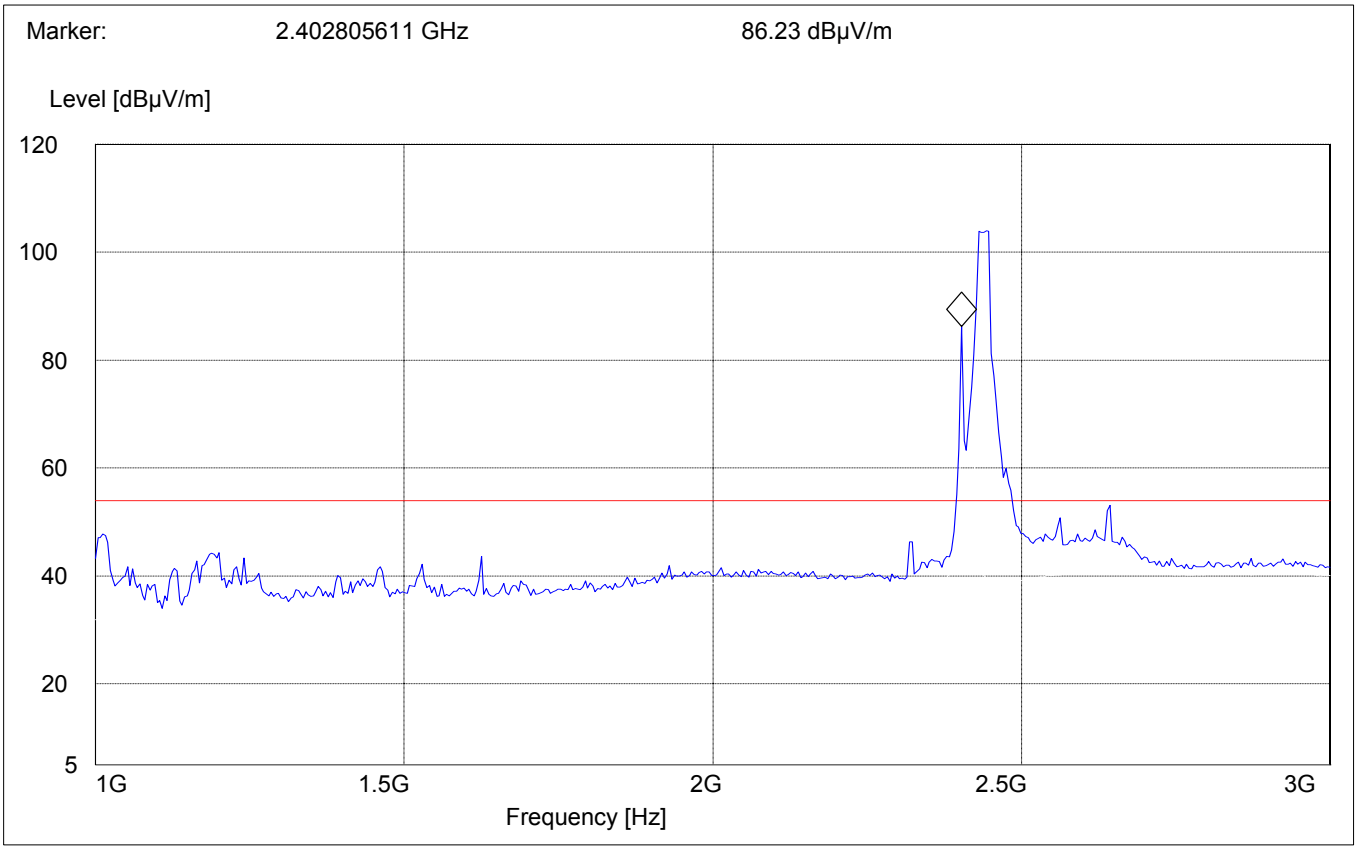


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Mid Channel (2437MHz): 1GHz – 3GHz
WLAN Model# BCM94306MP

Peak Measurement

Note: The higher peak above the limit line is the carrier freq. & marked peak is Bluetooth TX.

SWEEP TABLE:		"BT Spuri hi 1-3G"				
Short Description:		Bluetooth Spurious 1-3GHz				
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)

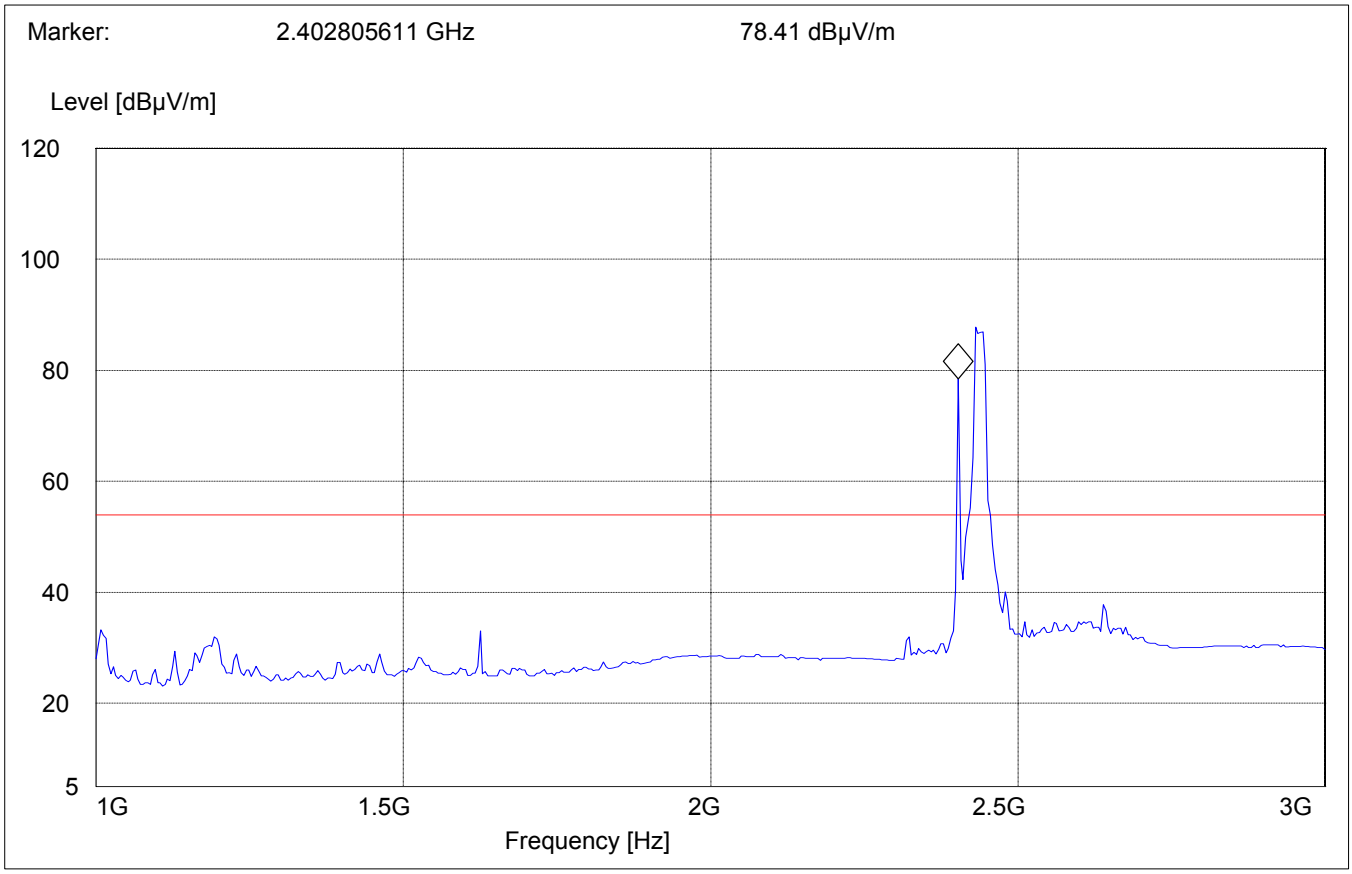


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Mid Channel (2437MHz): 1GHz – 3GHz
WLAN Model# BCM94306MP

Average Measurement

Note: The higher peak above the limit line is the carrier freq. & marked peak is Bluetooth TX.

SWEEP TABLE:		"BT Spuri hi 1-3G"				
Short Description:		Bluetooth Spurious 1-3GHz				
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)

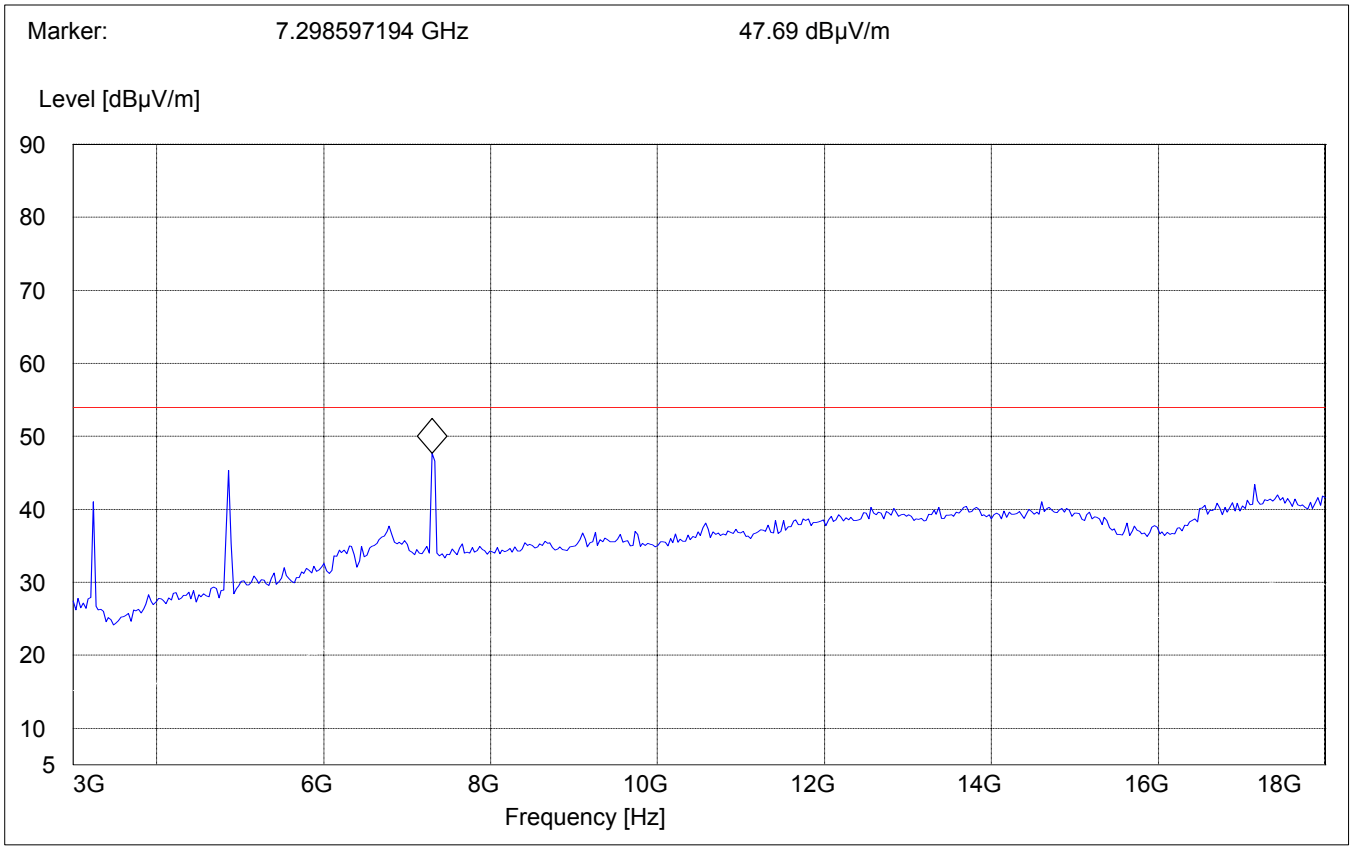


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)

Mid Channel (2437MHz): 3GHz – 18GHz

WLAN Model# BCM94306MP

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

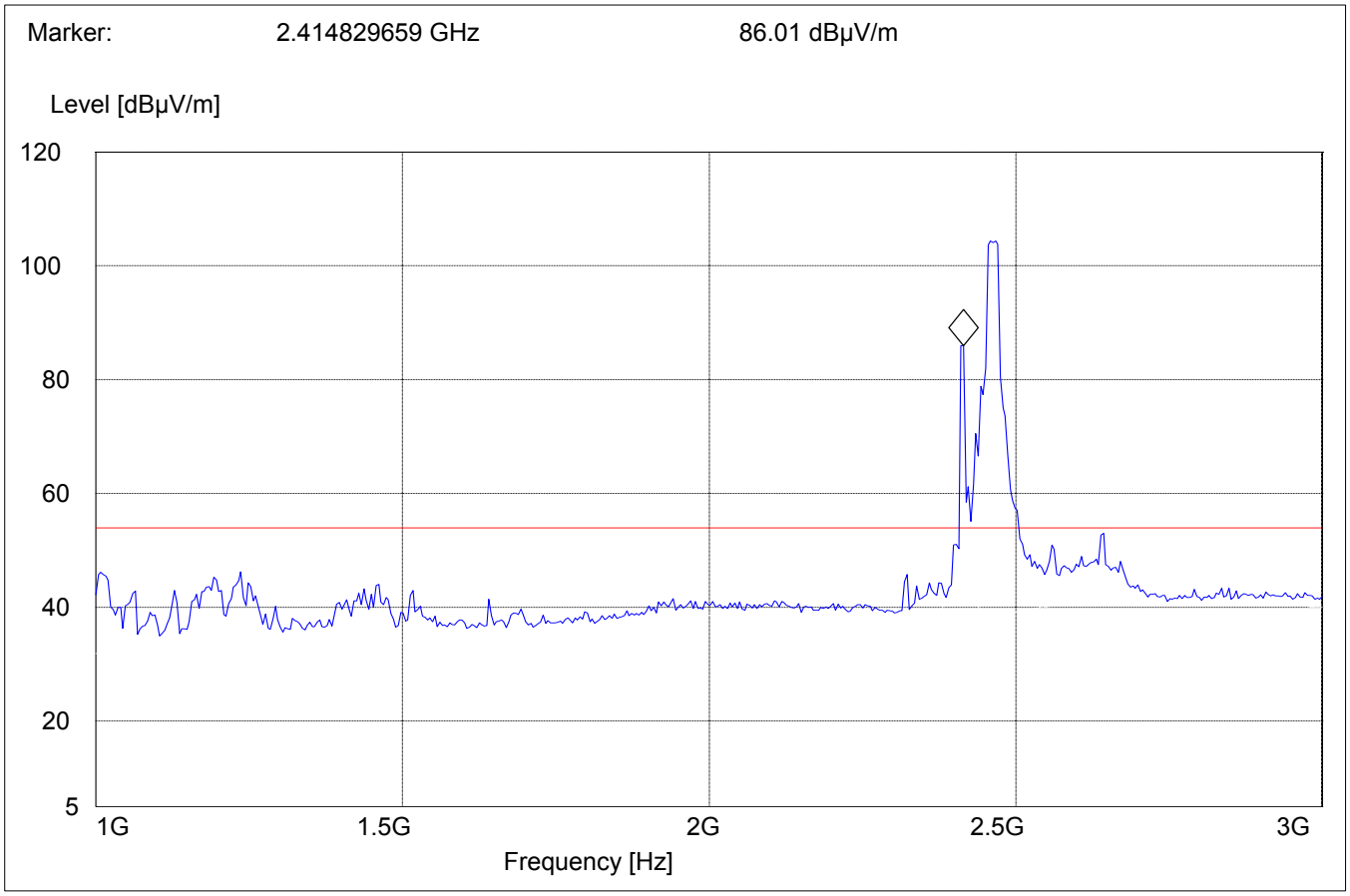


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Highest Channel (2462MHz): 1GHz – 3GHz
WLAN Model# BCM94306MP

Peak Measurement

Note: The higher peak above the limit line is the carrier freq. & marked peak is Bluetooth TX.

SWEEP TABLE:		"BT Spuri hi 1-3G"				
Short Description:		Bluetooth Spurious 1-3GHz				
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)

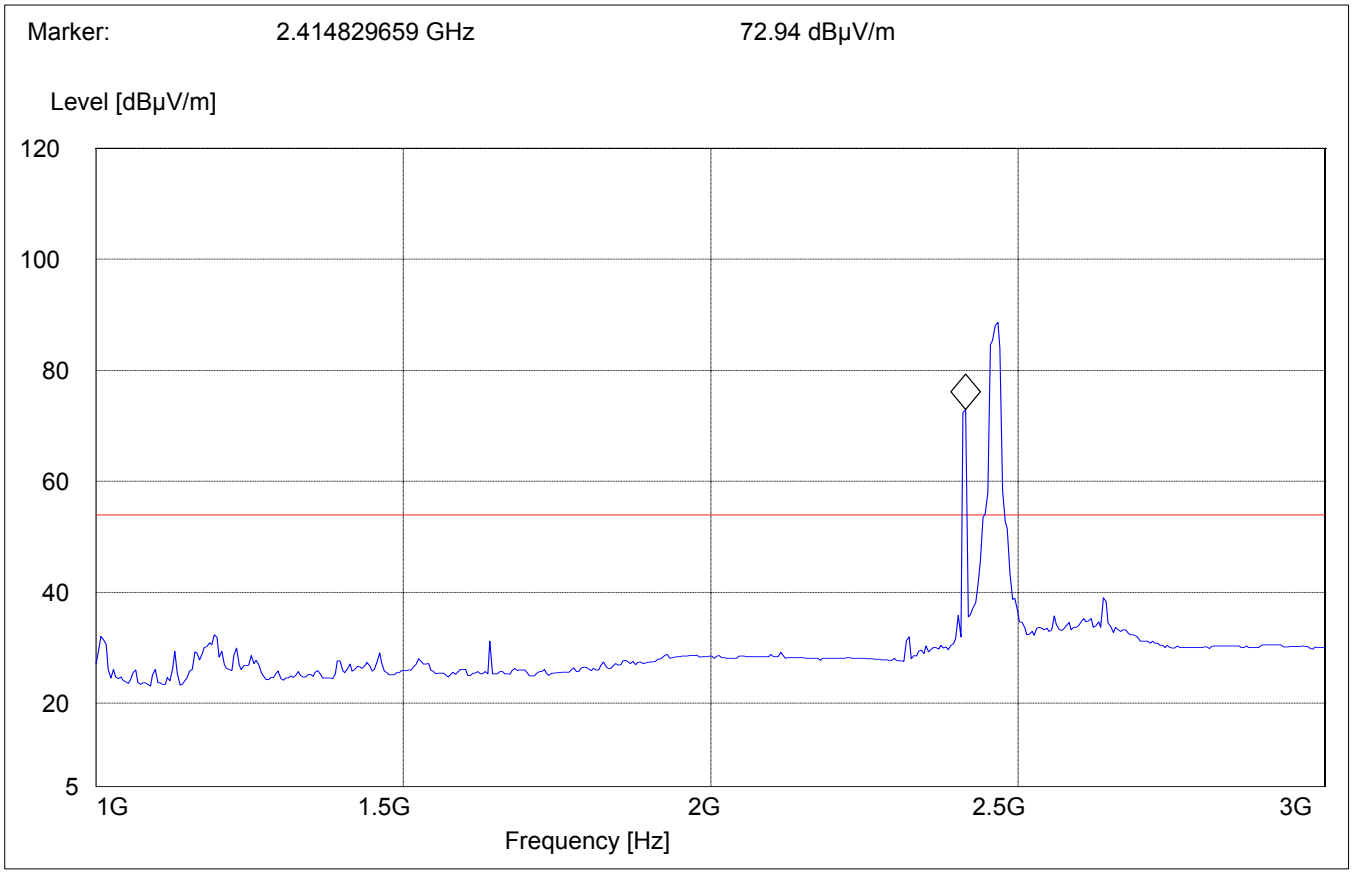


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Highest Channel (2462MHz): 1GHz – 3GHz
WLAN Model# BCM94306MP

Average Measurement

Note: The higher peak above the limit line is the carrier freq. & marked peak is Bluetooth TX.

SWEEP TABLE:		"BT Spuri hi 1-3G"				
Short Description:		Bluetooth Spurious 1-3GHz				
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)



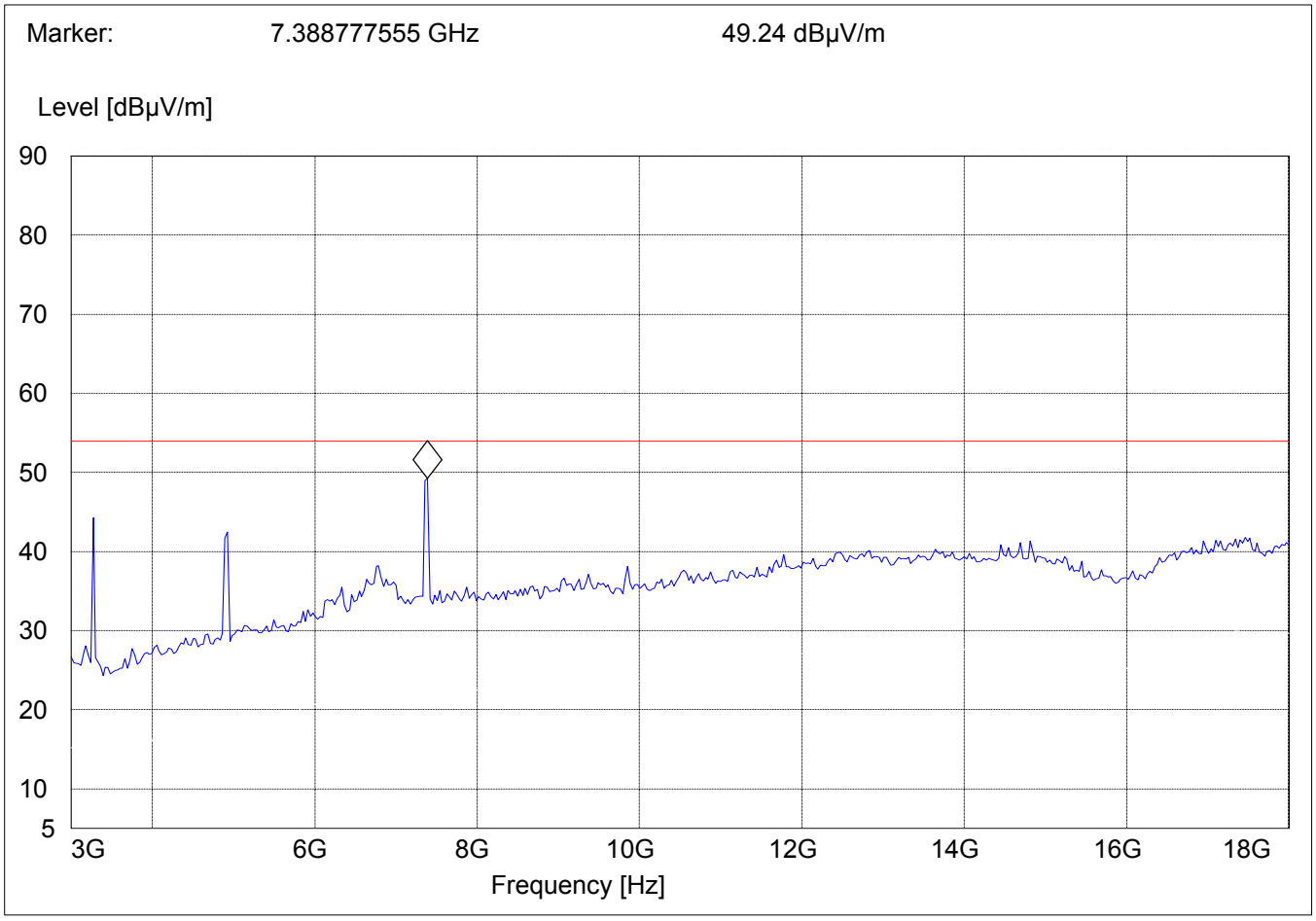
EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)

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

WLAN Model# BCM94306MP

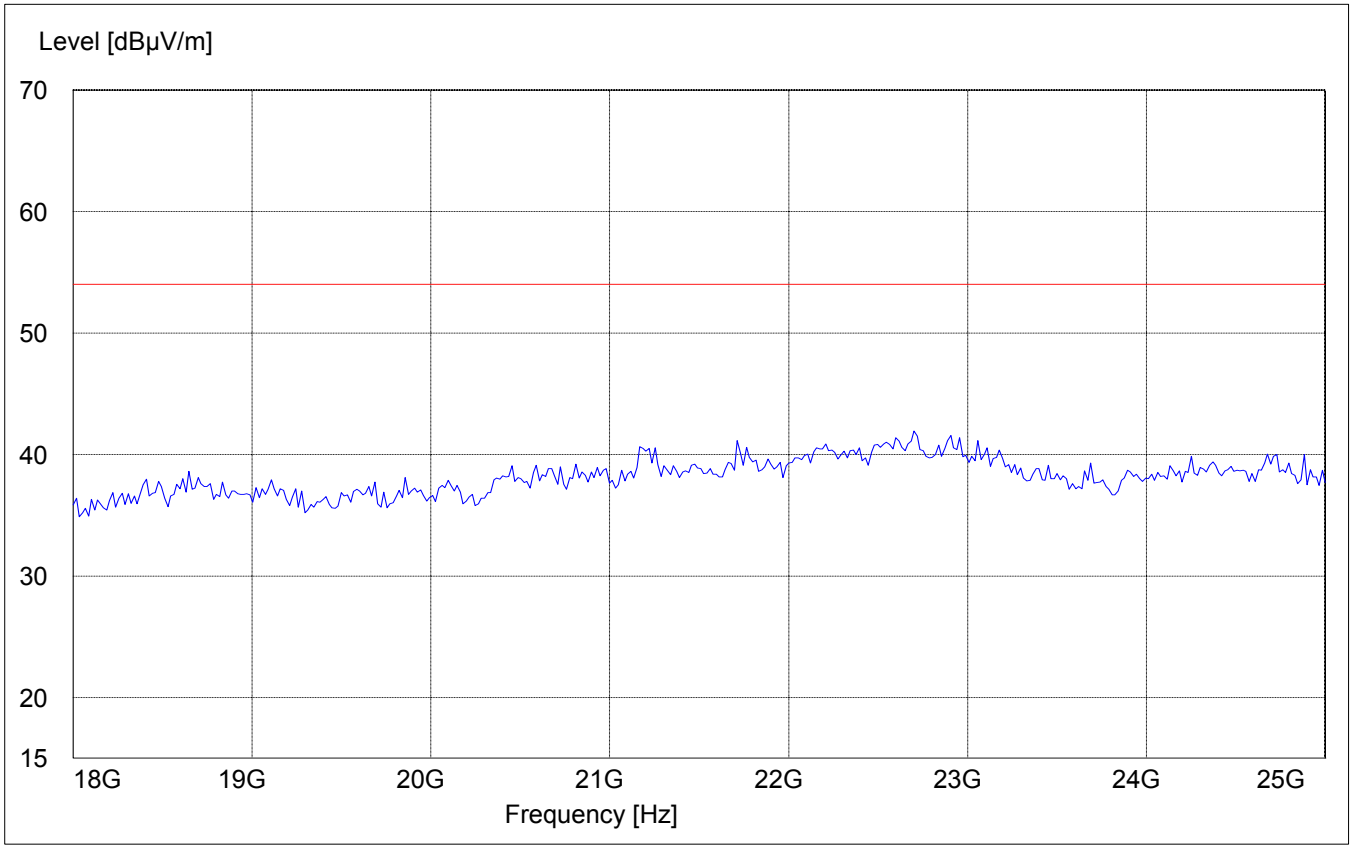
SWEEP TABLE: "BT Spuri hi 3-18G"
Short Description: Bluetooth Spurious 3-18GHz

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



EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
18GHz – 25GHz
WLAN Model# BCM94306MP
Note: This plot is valid for low, mid, high channels (worst-case plot)

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	#326 horn (dBi)



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

WLAN Model# BCM94306MPSG

Note: All radiated measurements were done with Bluetooth Transmitter ON.
The values reported are the maximum values.

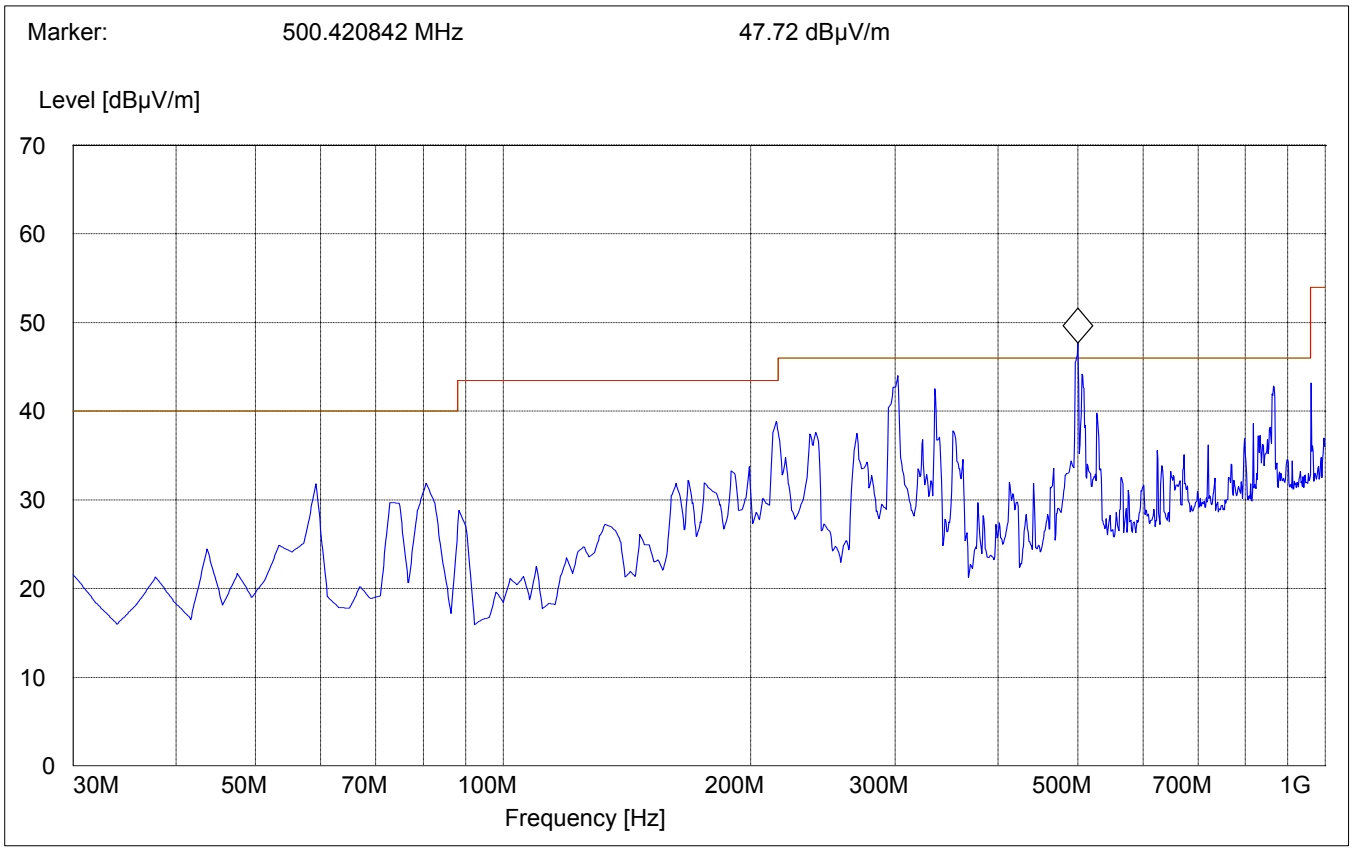
Transmit at Lowest channel Frequency 2412MHz			
Frequency (MHz)	Level (dBµV/m)		
	Peak	Quasi-Peak	Average
500.42	47.72	41.31	
3270.54	43.74		21.75
4803.6	46.5		31.19
7238.47	62.38		34.95
9643.28	41.75		30.37
12048.0	42.73		
Transmit at Middle channel Frequency 2437MHz			
Frequency (MHz)	Level (dBµV/m)		
	Peak	Quasi-Peak	Average
3240.48	37.45		18.53
4863.72	43.60		30.37
7298.59	42.68		29.03
9763.52	38.58		25.48
Transmit at Highest channel Frequency 2462MHz			
Frequency (MHz)	Level (dBµV/m)		
	Peak	Quasi-Peak	Average
3270.54	34.39		17.50
4923.84	42.48		25.65
7388.77	41.00		28.55
9853.70	37.26		

EMISSION LIMITATIONS - Radiated (Transmitter) **§ 15.247 (c) (1)**
Lowest Channel (2412MHz): 30MHz – 1GHz
WLAN Model# BCM94306MPSG

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

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

Frequency	**MaxPeak**	**Quasi-Peak**
500.42MHz	47.72dBµV/m	41.31dBµV/m

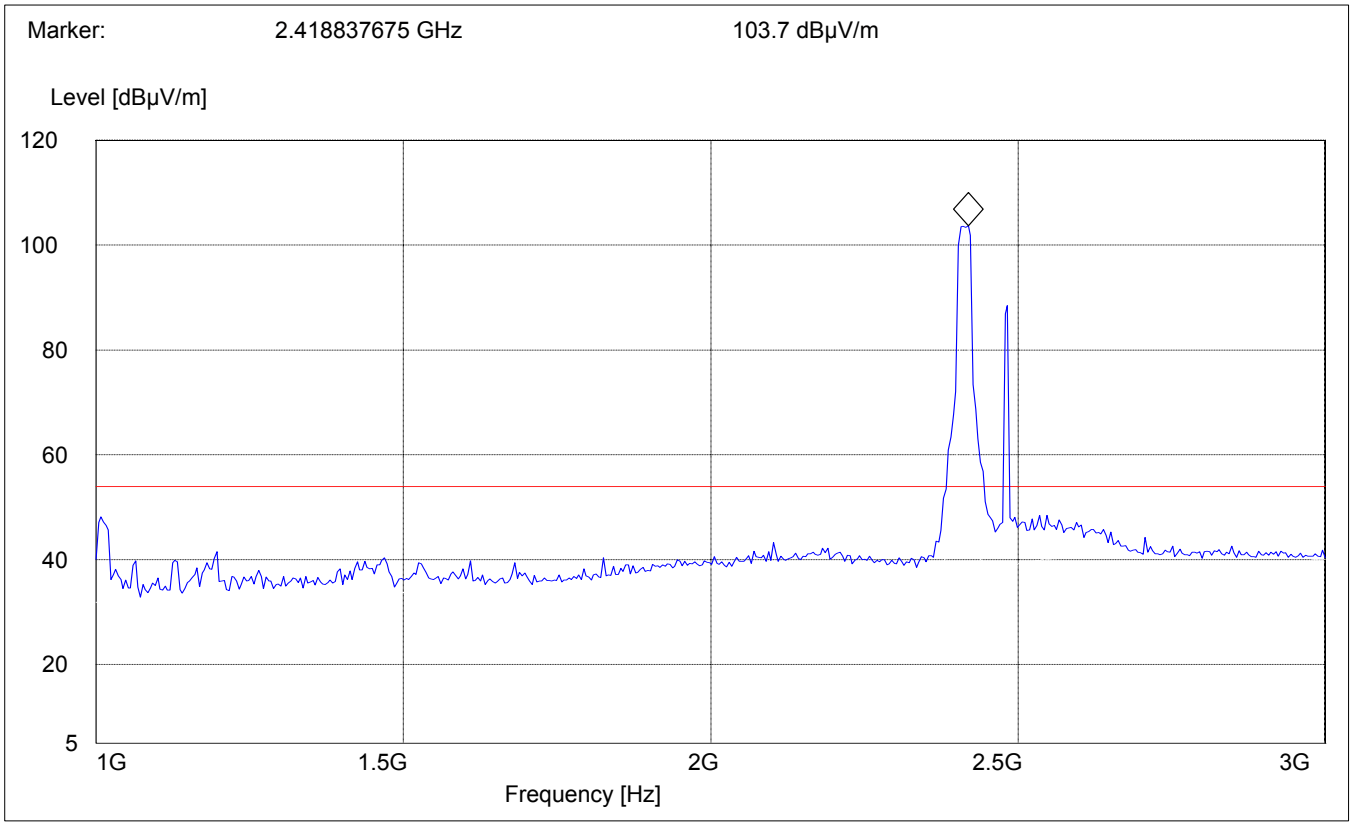


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Lowest Channel (2412MHz): 1GHz – 3GHz
WLAN Model# BCM94306MPSG

Peak Measurement

Note: The higher peak above the limit line is the carrier freq. & marked peak is Bluetooth TX.

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

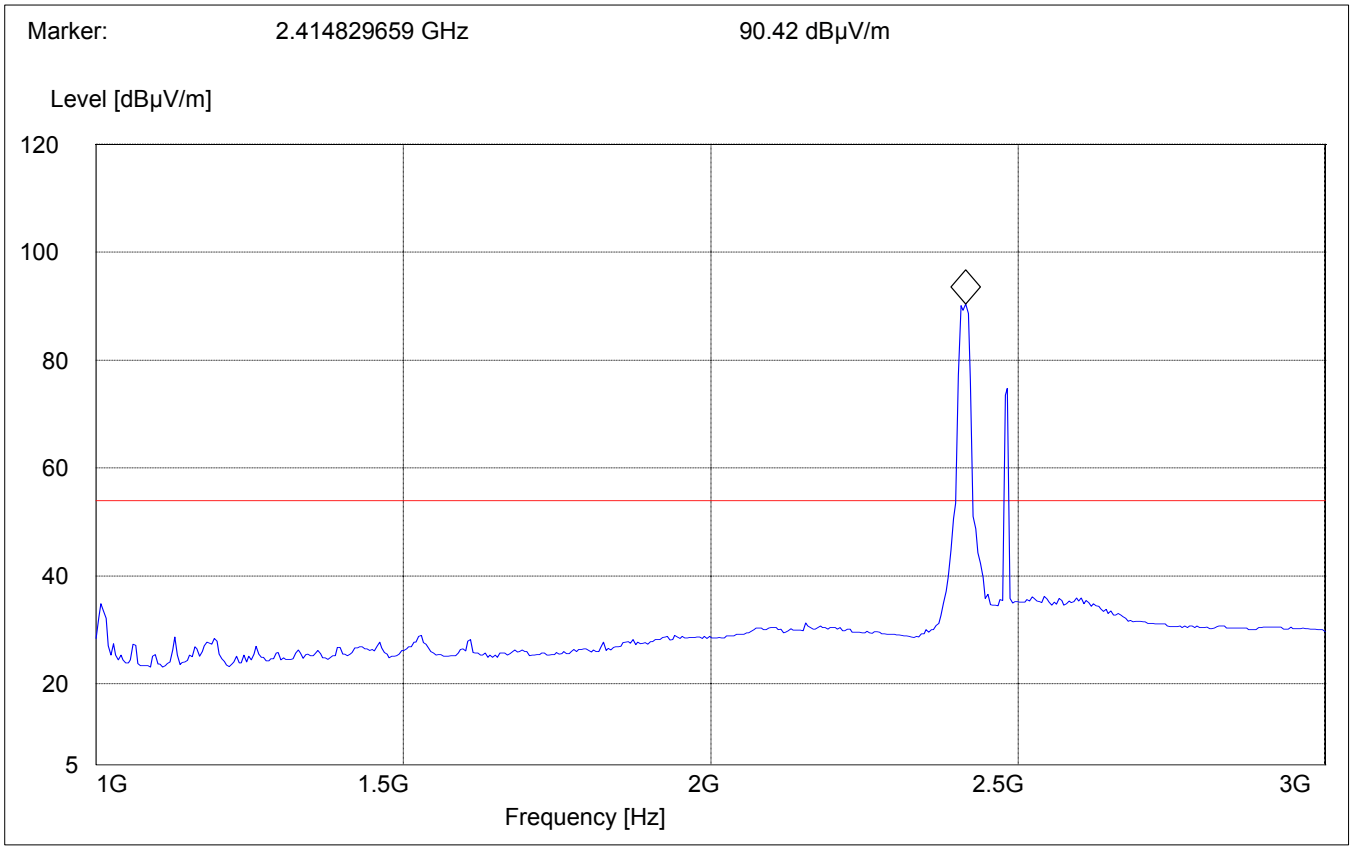


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Lowest Channel (2412MHz): 1GHz – 3GHz
WLAN Model# BCM94306MPSG

Average Measurement

Note: The higher peak above the limit line is the carrier freq. & marked peak is Bluetooth TX.

SWEEP TABLE:		"BT Spuri hi 1-3G"				
Short Description:		Bluetooth Spurious 1-3GHz				
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)



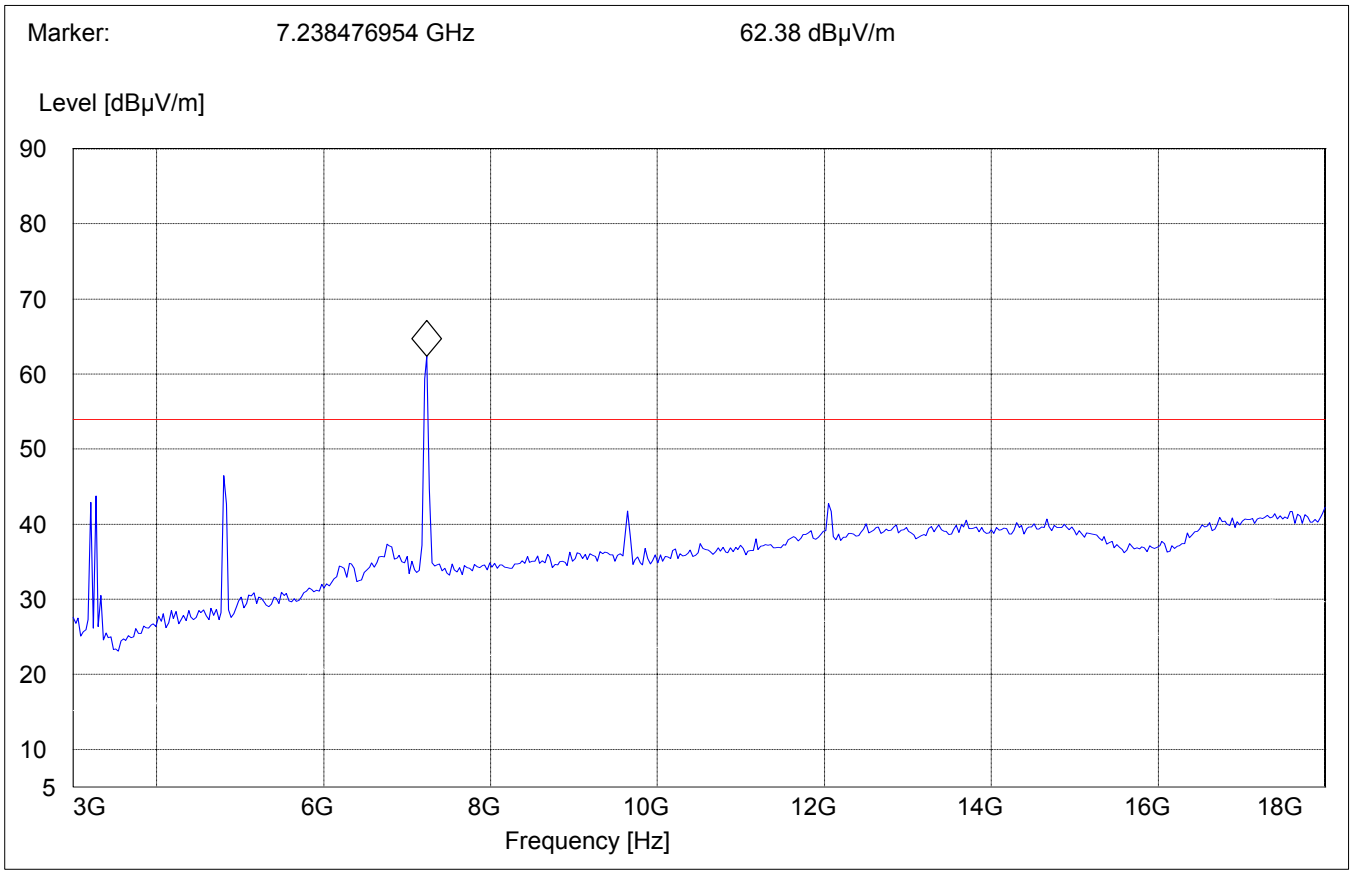
EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)

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

WLAN Model# BCM94306MPSG

Peak measurement

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



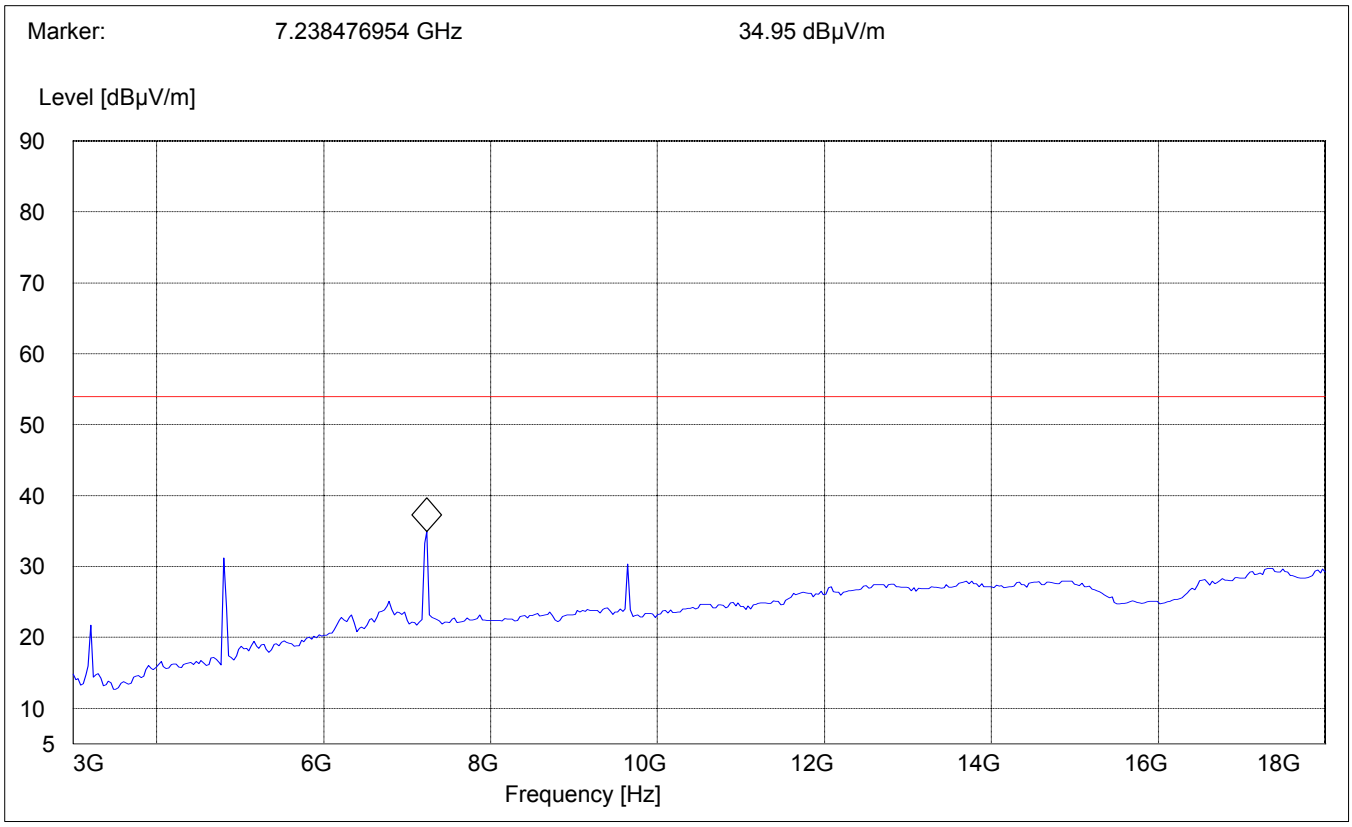
EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)

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

WLAN Model# BCM94306MPSG

Average measurement

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

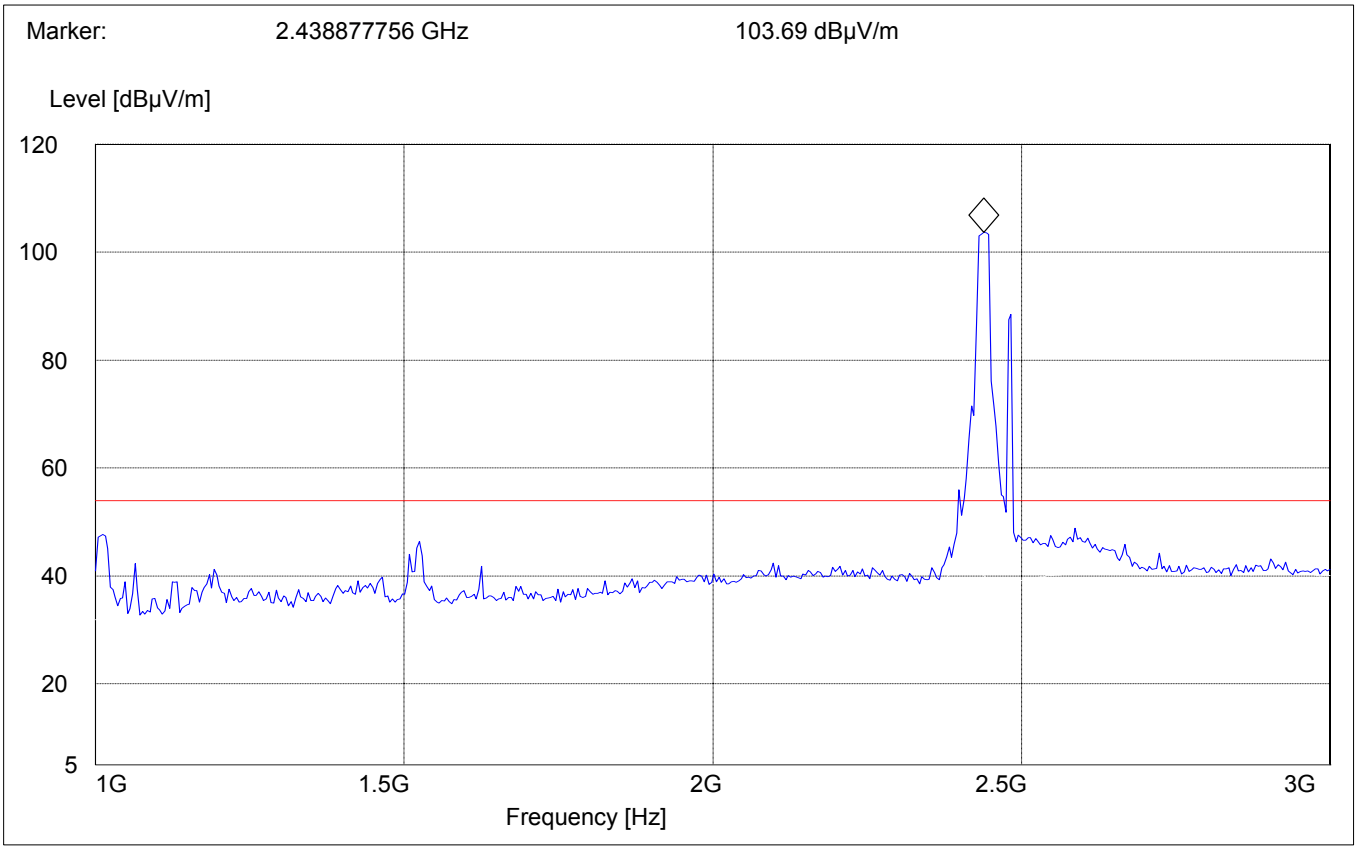


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Mid Channel (2437MHz): 1GHz – 3GHz
WLAN Model# BCM94306MPSG

Peak Measurement

Note: The higher peak above the limit line is the carrier freq. & marked peak is Bluetooth TX.

SWEEP TABLE:		"BT Spuri hi 1-3G"				
Short Description:		Bluetooth Spurious 1-3GHz				
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)

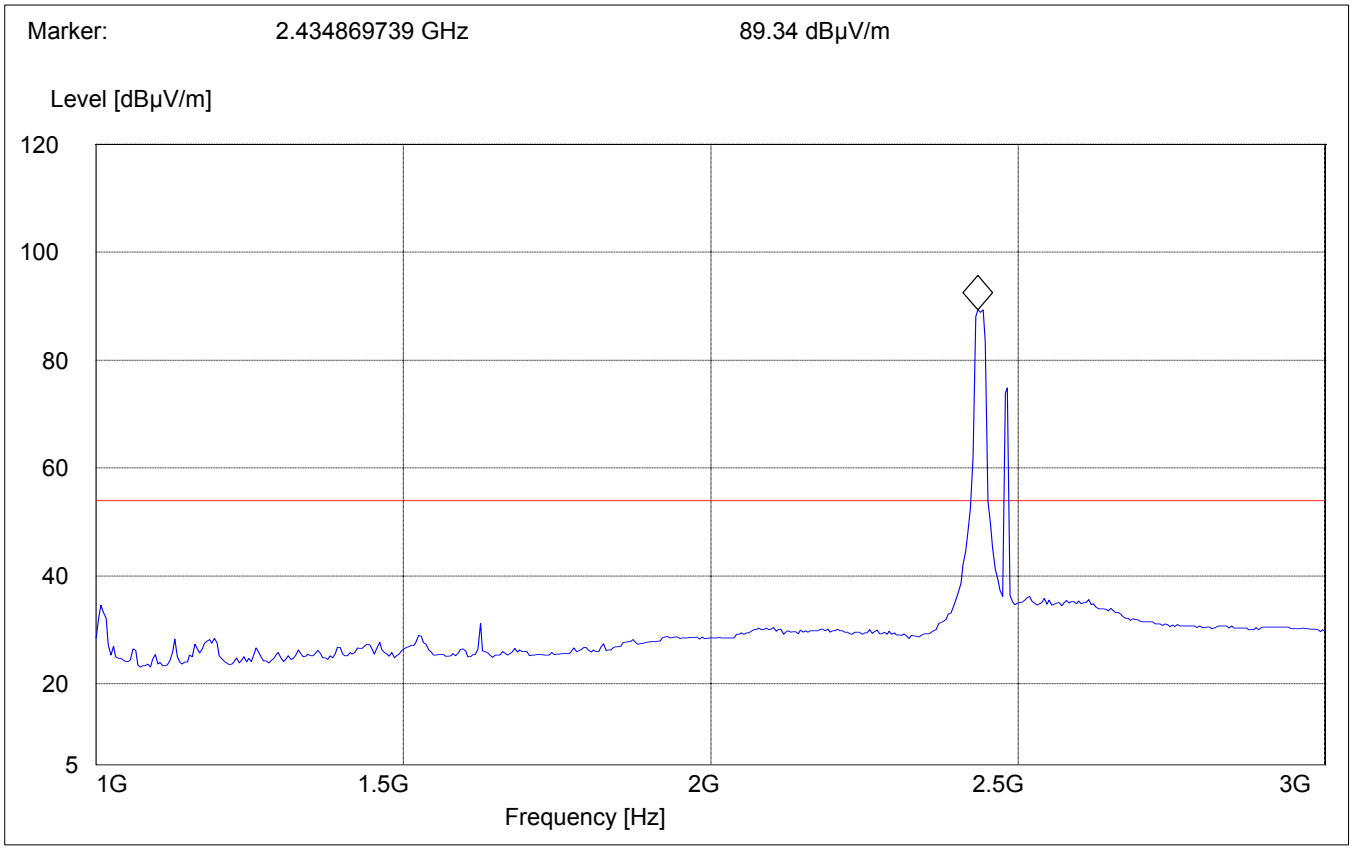


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Mid Channel (2437MHz): 1GHz – 3GHz
WLAN Model# BCM94306MPSG

Average Measurement

Note: The higher peak above the limit line is the carrier freq. & marked peak is Bluetooth TX.

SWEEP TABLE:		"BT Spuri hi 1-3G"				
Short Description:		Bluetooth Spurious 1-3GHz				
Start	Stop	Detector	Meas.	RBW		Transducer
Frequency	Frequency	Time	Bandw.		VBW	
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)



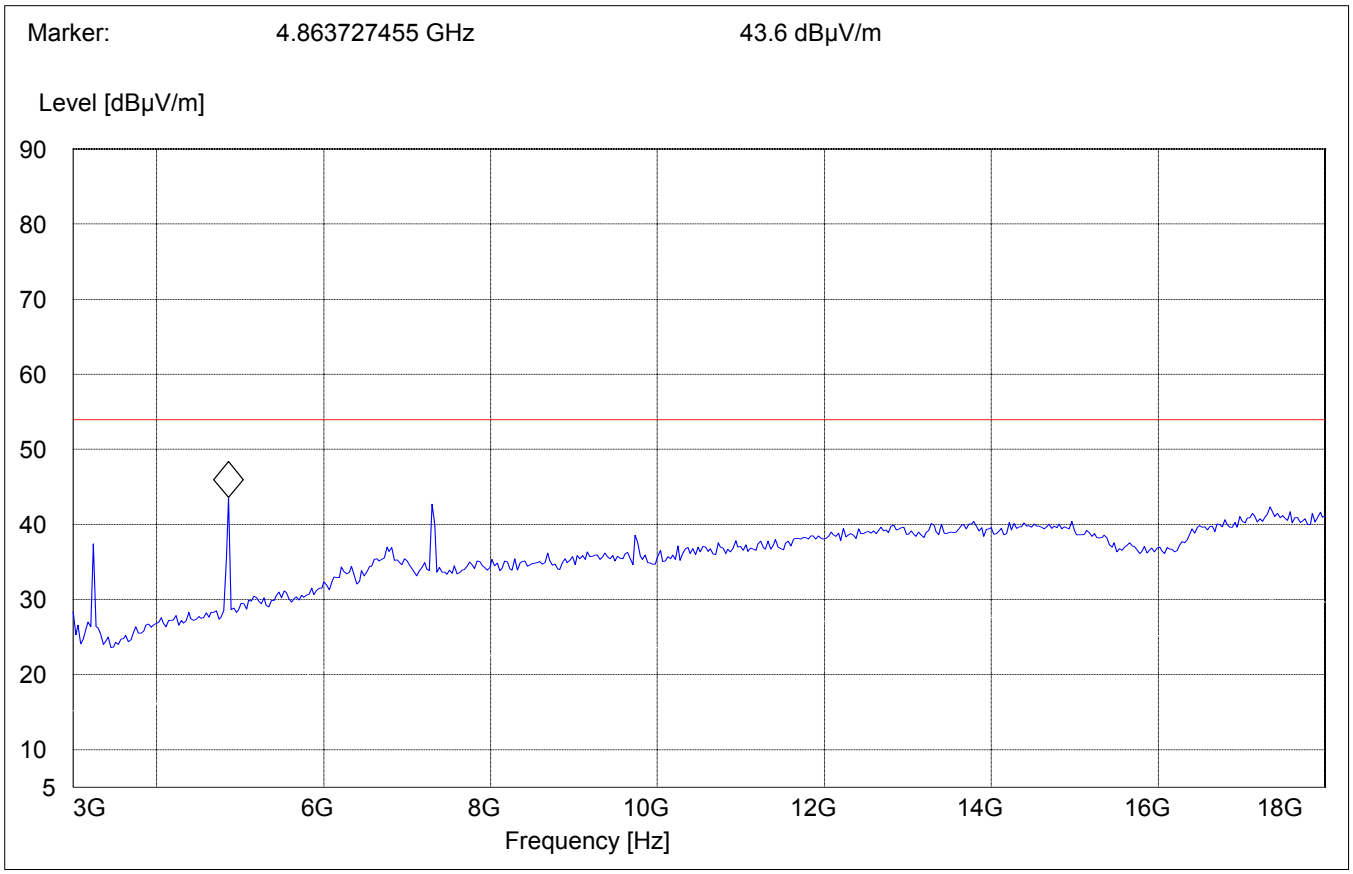
EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)

Mid Channel (2437MHz): 3GHz – 18GHz

WLAN Model# BCM94306MPSG

Peak measurement

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



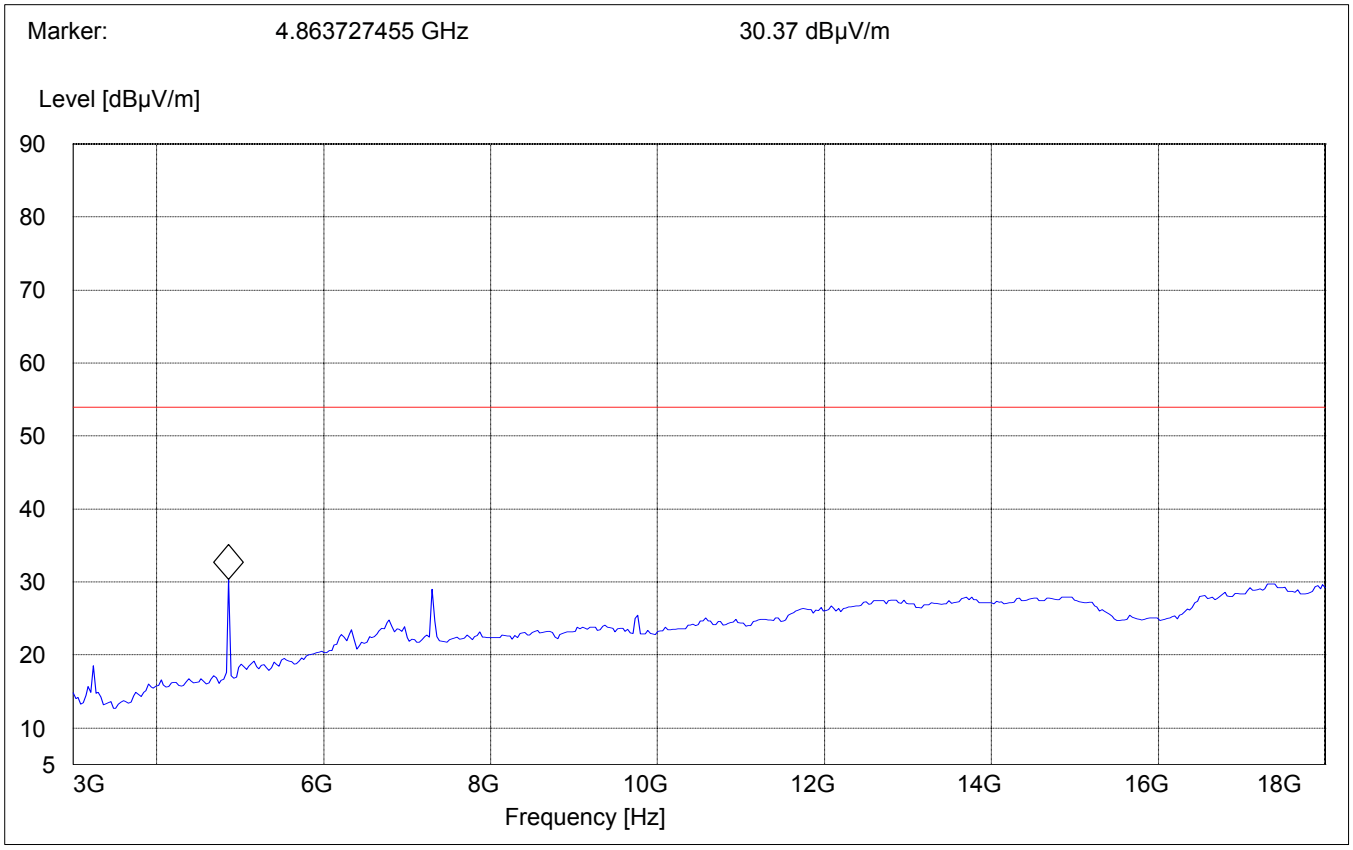
EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)

Mid Channel (2437MHz): 3GHz – 18GHz

WLAN Model# BCM94306MPSG

Average measurement

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

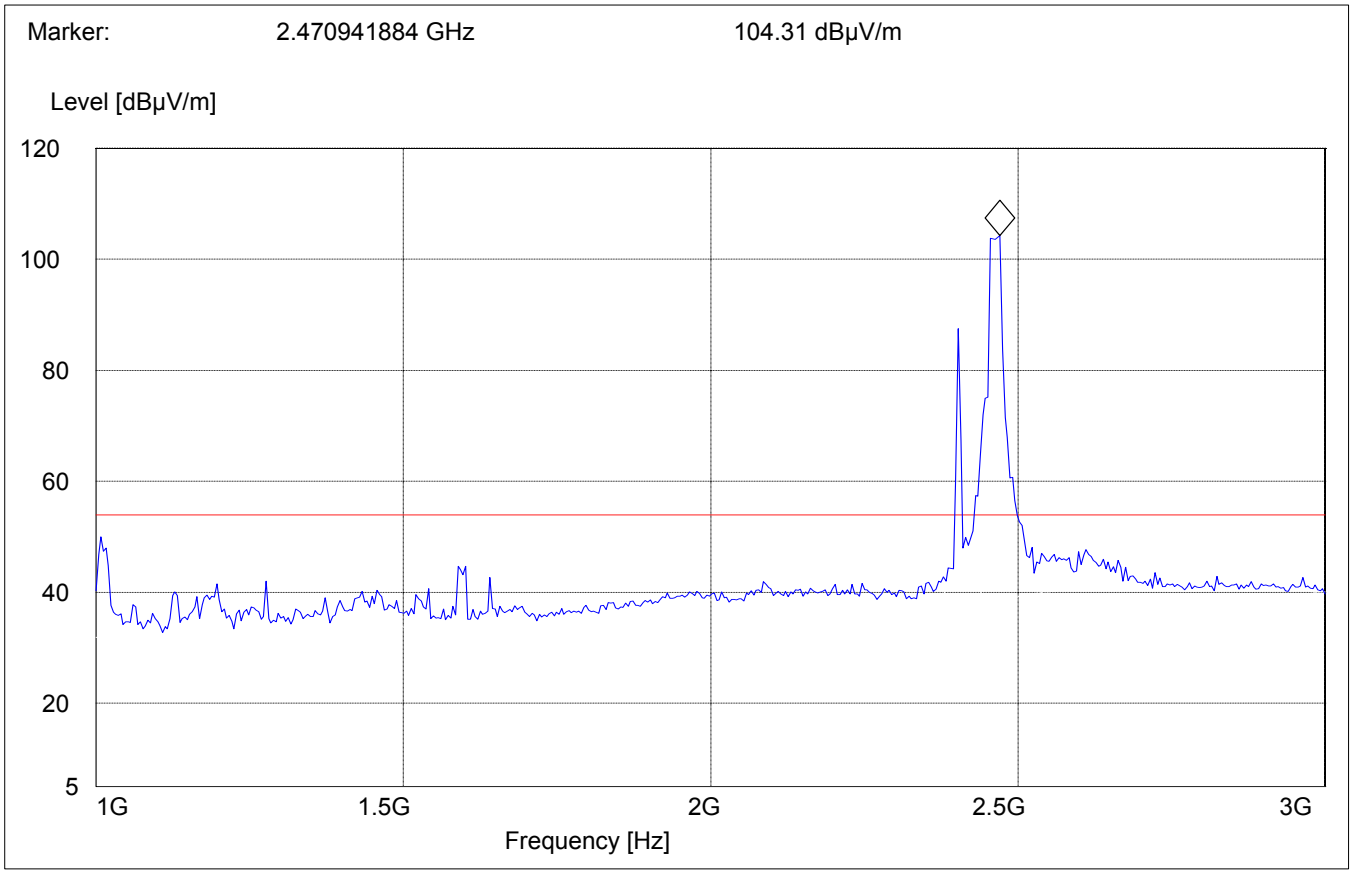


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Highest Channel (2462MHz): 1GHz – 3GHz
WLAN Model# BCM94306MPSG

Peak Measurement

Note: The higher peak above the limit line is the carrier freq. & marked peak is Bluetooth TX.

SWEEP TABLE:		"BT Spuri hi 1-3G"				
Short Description:		Bluetooth Spurious 1-3GHz				
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)

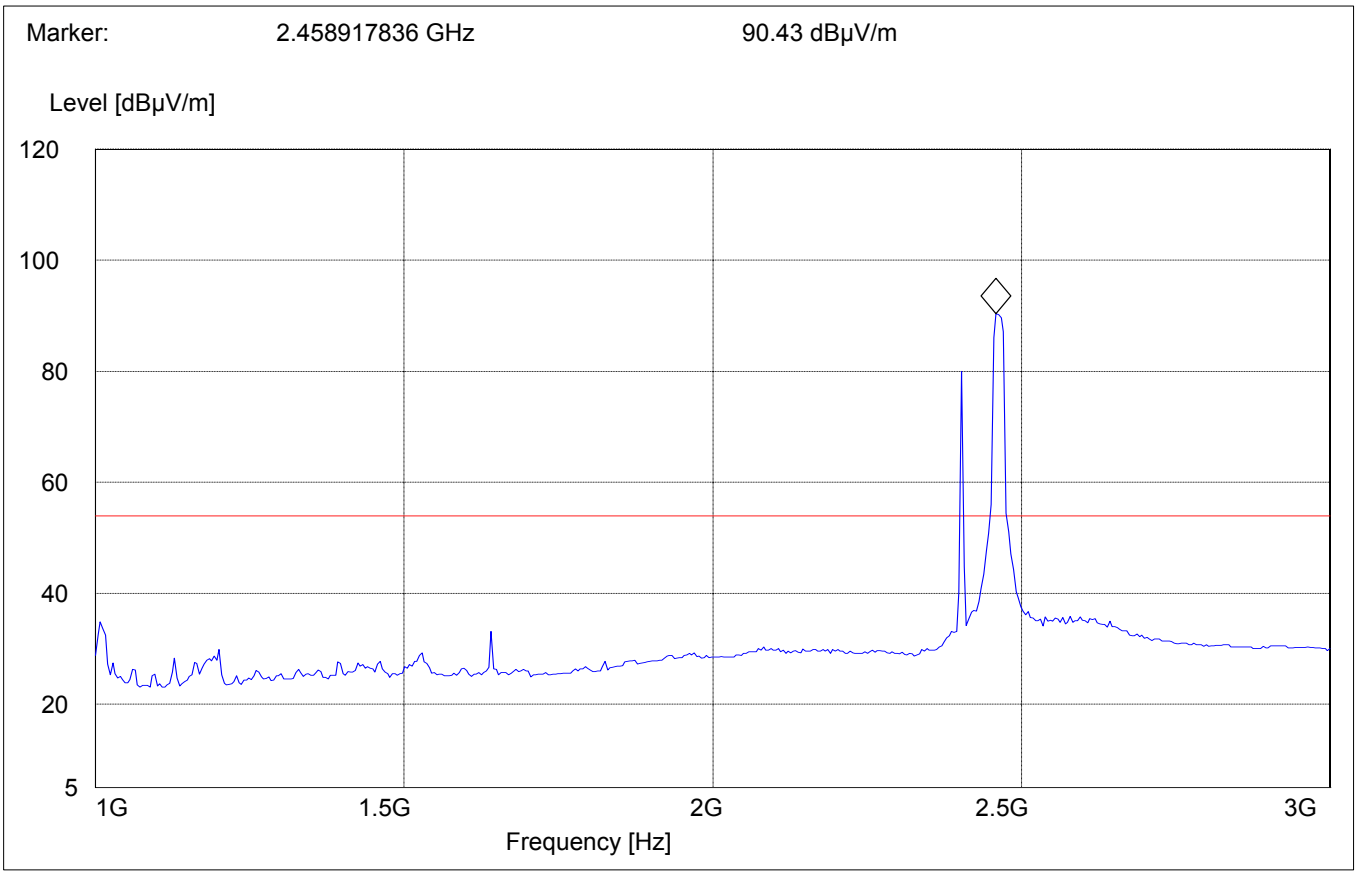


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)
Highest Channel (2462MHz): 1GHz – 3GHz
WLAN Model# BCM94306MPSG

Average Measurement

Note: The higher peak above the limit line is the carrier freq. & marked peak is Bluetooth TX.

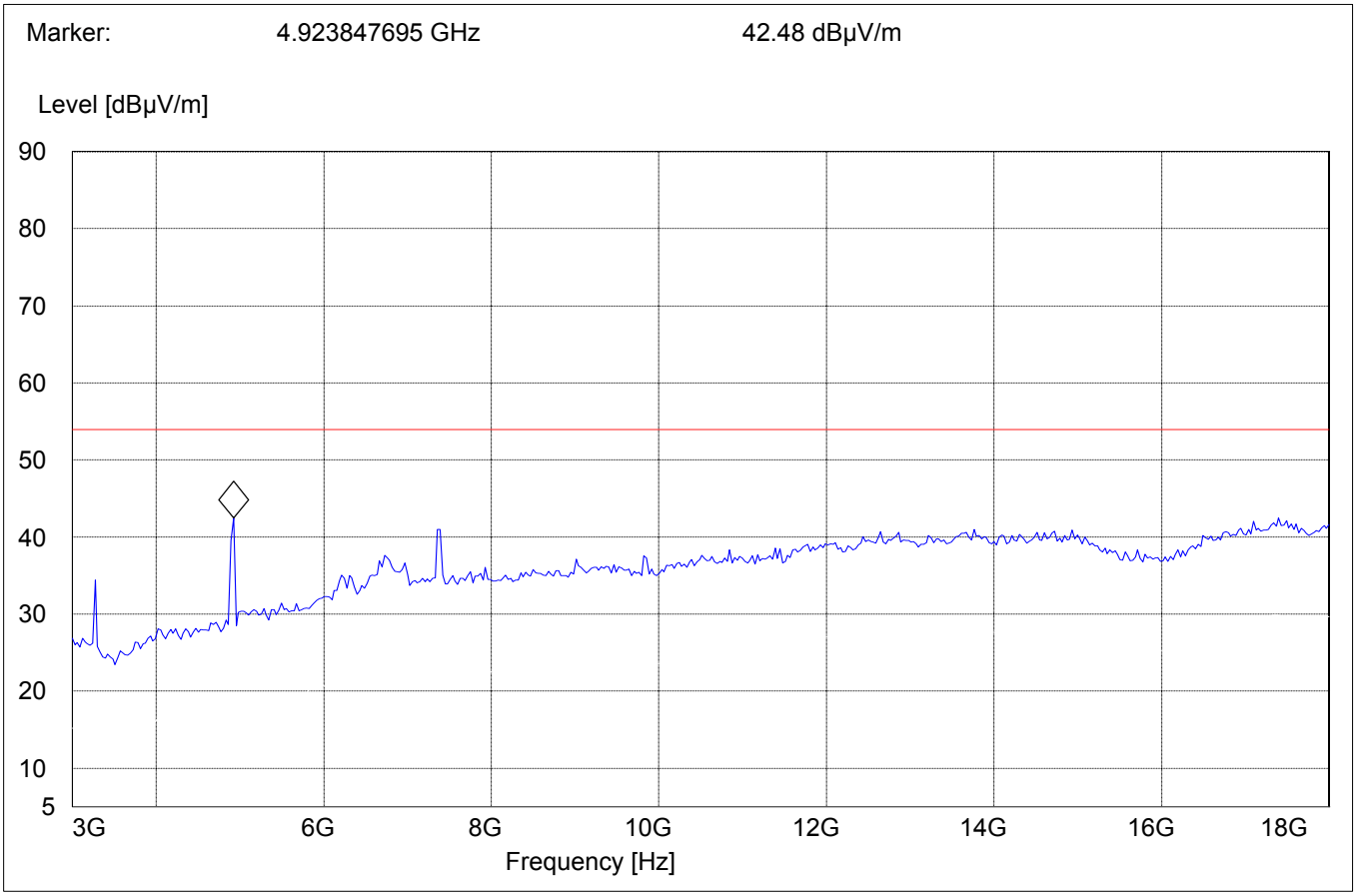
SWEEP TABLE:		"BT Spuri hi 1-3G"				
Short Description:		Bluetooth Spurious 1-3GHz				
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)



EMISSION LIMITATIONS - Radiated (Transmitter) **§ 15.247 (c) (1)**
Highest Channel (2462MHz): 3GHz – 18GHz
WLAN Model# BCM94306MPSG

Peak measurement

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



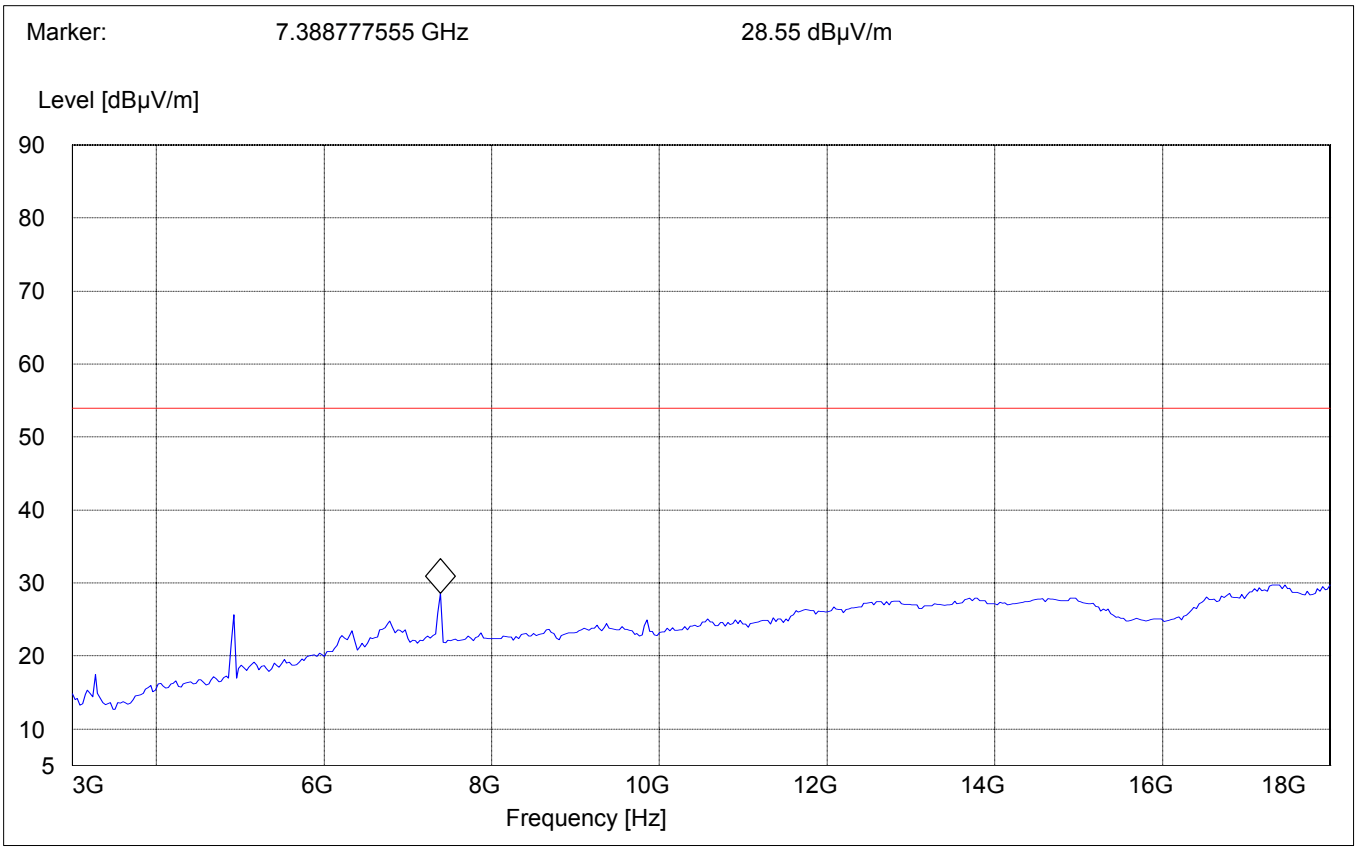
EMISSION LIMITATIONS - Radiated (Transmitter) § 15.247 (c) (1)

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

WLAN Model# BCM94306MPSG

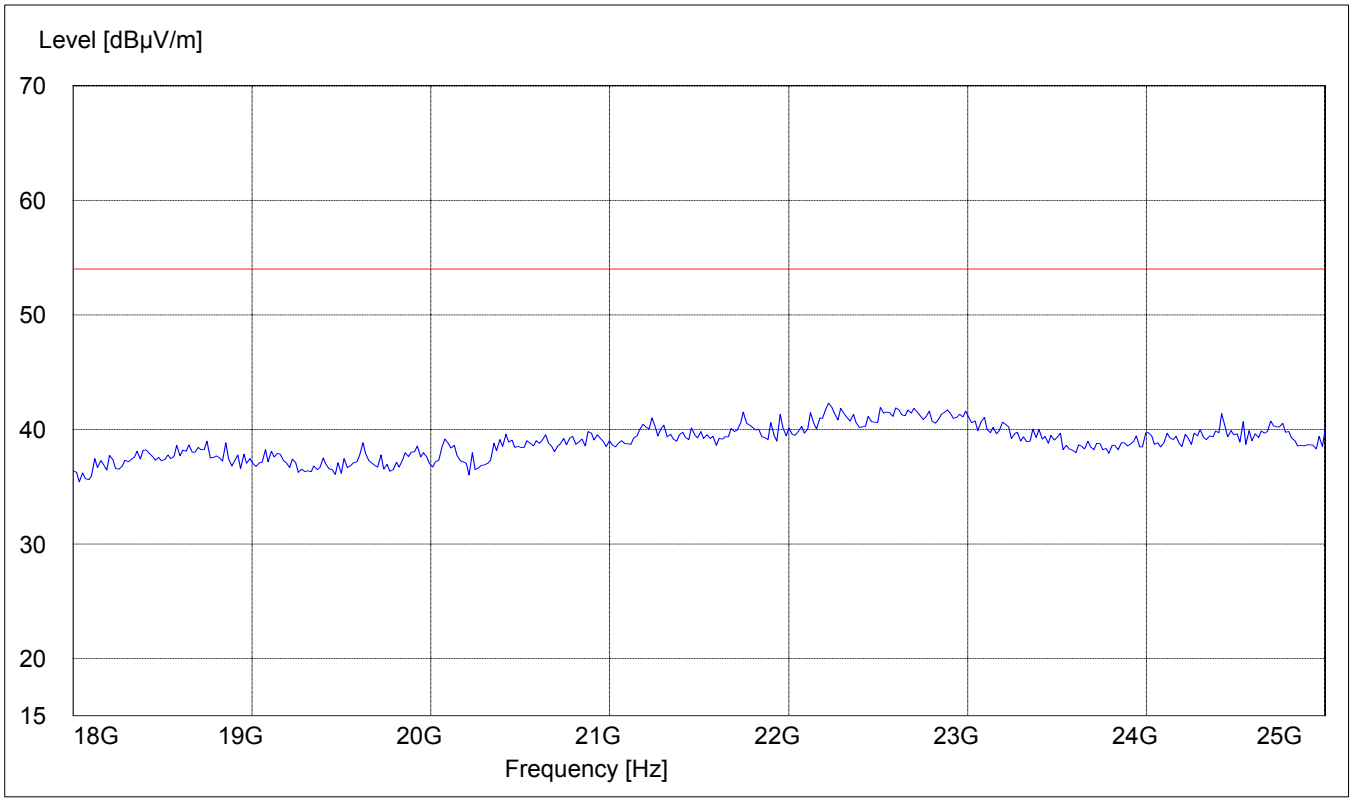
Average measurement

SWEEP TABLE:		"BT Spuri hi 3-18G"				
Short Description:		Bluetooth Spurious 3-18GHz				
Start Frequency	Stop Frequency	Detector Time	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 (c) (1)
18GHz – 25GHz
WLAN Model# BCM94306MPSG
Note: This plot is valid for low, mid, high channels (worst-case plot)

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	#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

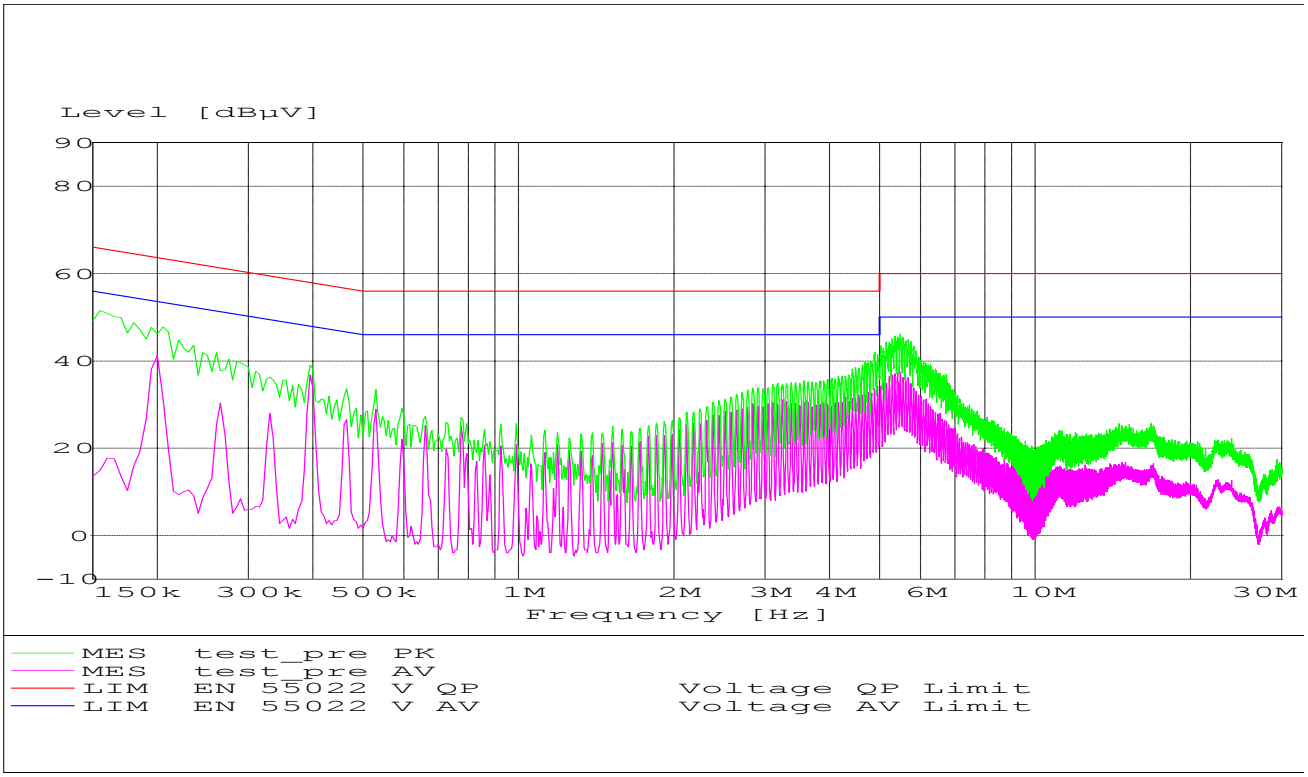
Start Frequency	Stop Frequency	Detector	Meas Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	MaxPeak	Coupled	10 kHz	None

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

Worst-case of both models BCM94306MP & BCM94306MPSG

Limits

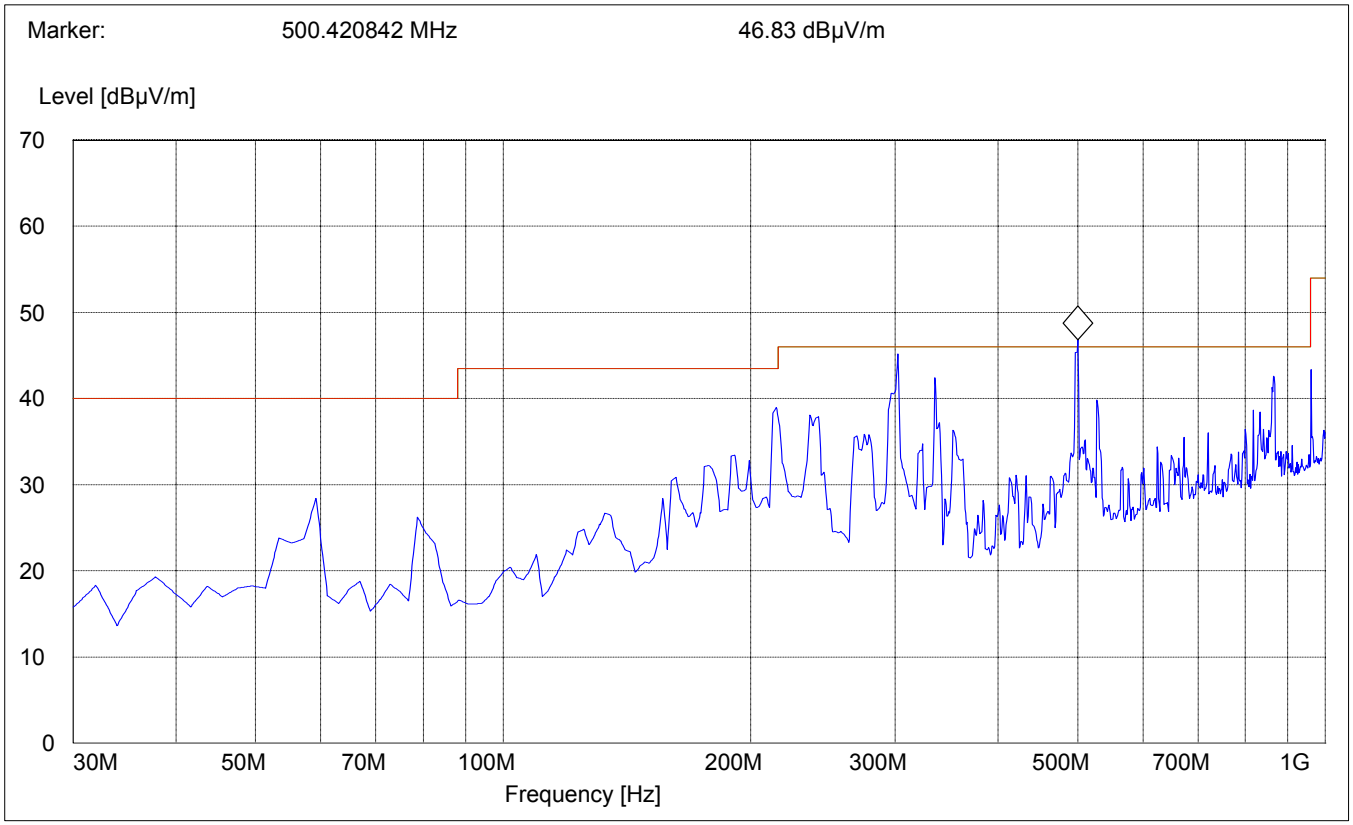
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

NOTE:
The radiated emissions were done with different settings, using the relevant pre-amplifiers 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

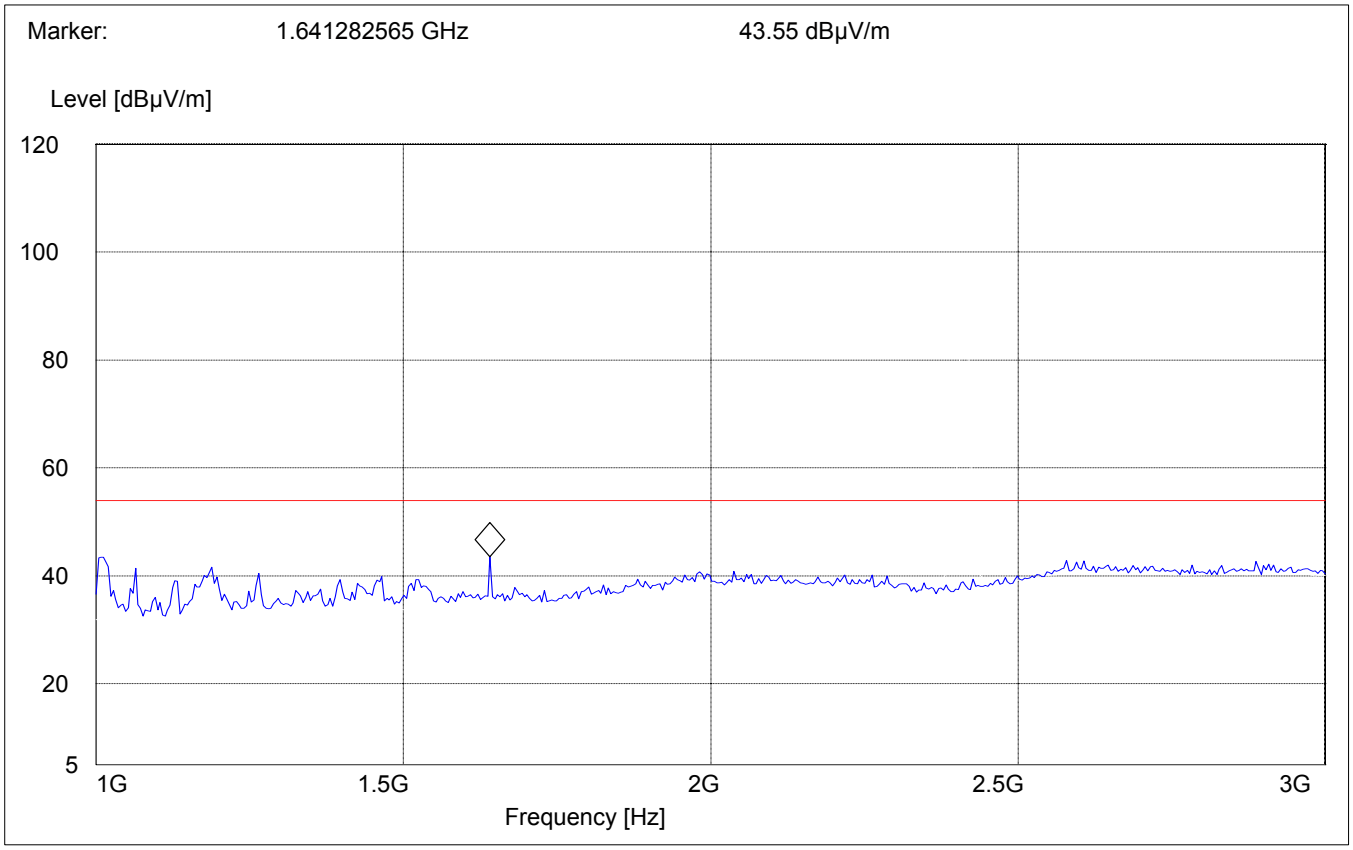
SWEEP TABLE:		"BT Spuri hi 30-1G"			
Short Description:		Bluetooth 30MHz-1GHz			
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW VBW	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186

Freq.(MHz)	Pk (dBµv)	QPk (dBµv)
302.14	45.17	39.57
500.42	46.83	42.68



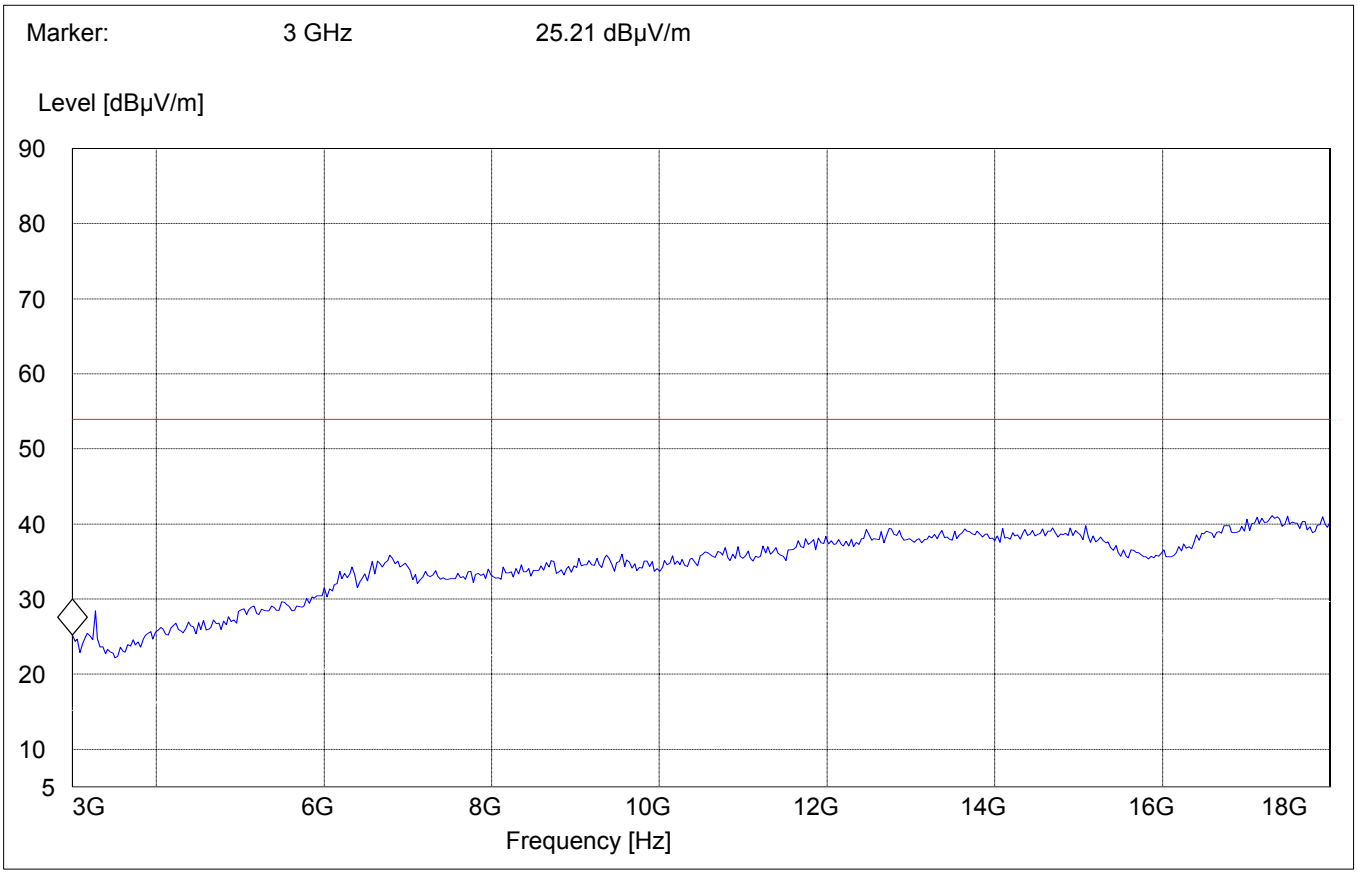
RECEIVER SPURIOUS RADIATION § 15.209
1GHz – 3GHz
Peak Measurement

SWEEP TABLE:		"BT Spuri hi 1-3G"				
Short Description:		Bluetooth Spurious 1-3GHz				
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)



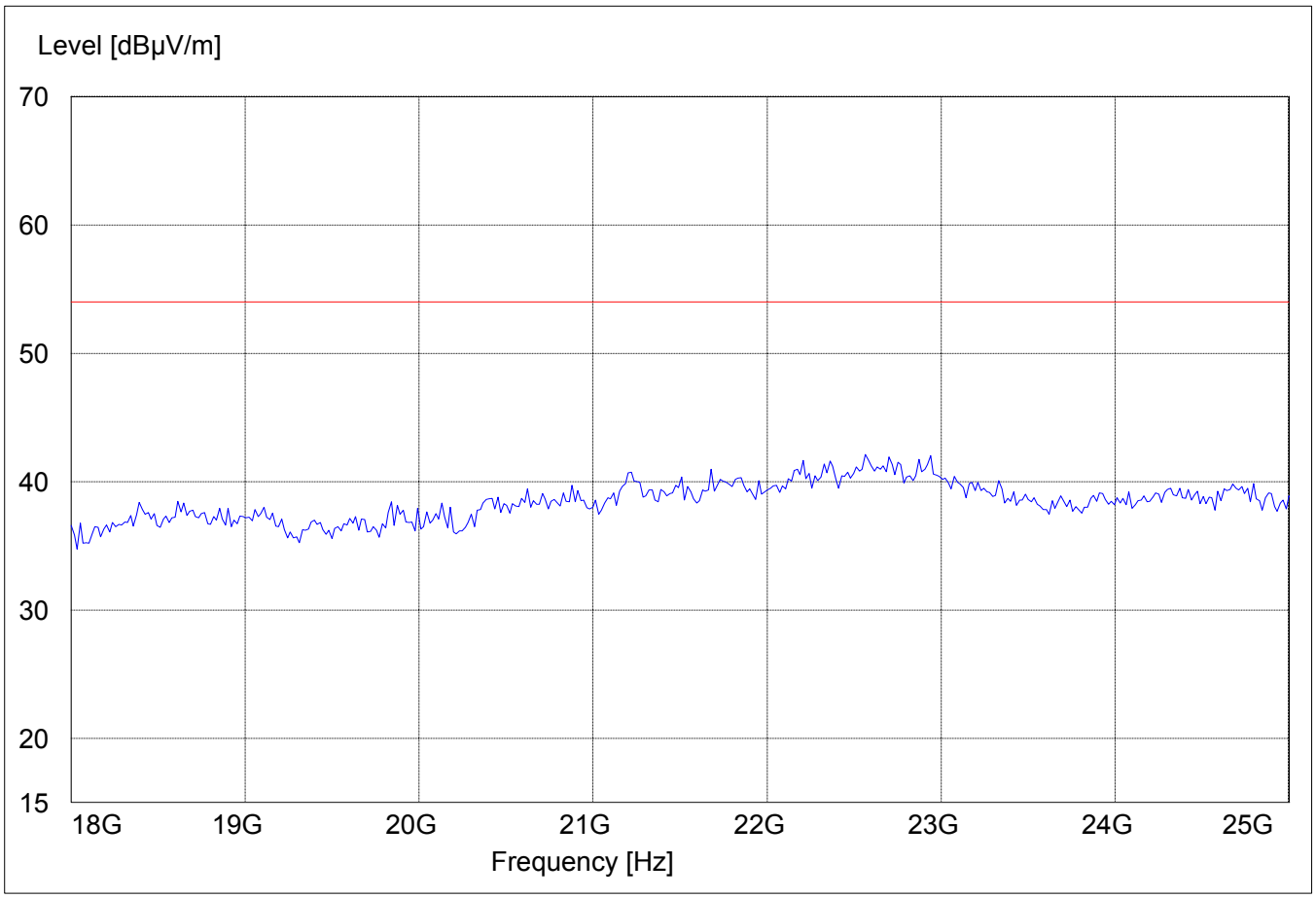
RECEIVER SPURIOUS RADIATION § 15.209
3GHz – 18GHz

SWEEP TABLE:		"BT Spuri hi 3-18G"			
Short Description:		Bluetooth Spurious 3-18GHz			
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW VBW	Transducer
3.0 GHz	18 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



RECEIVER SPURIOUS RADIATION § 15.209
18GHz – 25GHz

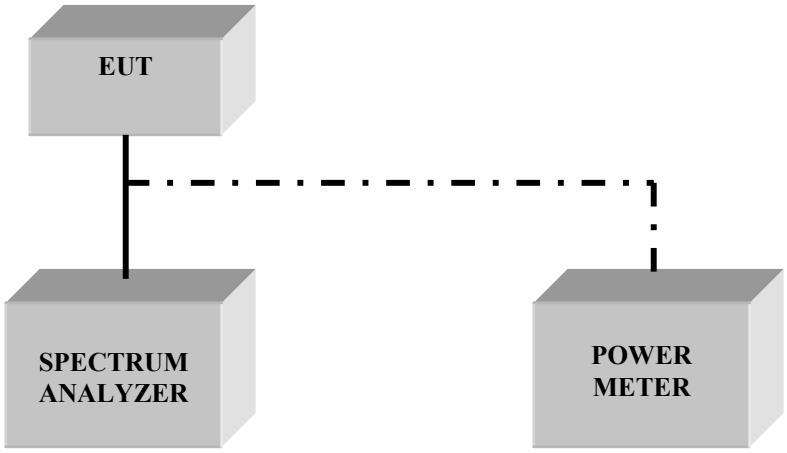
SWEEP TABLE:		"BT Spuri hi 18-25G"			
Short Description:		Bluetooth Spurious 18-25GHz			
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW VBW	Transducer
18 GHz	25 GHz	MaxPeak	Coupled	1 MHz	#141 horn (dBi)



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	Biconilog Antenna	3141	EMCO	0005-1186
04	Horn Antenna (700M-18GHz)	SAS-200/571	AH Systems	325
05	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240
06	2-3GHz Band reject filter	BRM50701	Microtronics	6
07	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02
08	Pre-Amplifier	TS-ANA	Rohde & Schwarz	--
09	Pre-Amplifier	JS4-00102600	Miteq	00616

BLOCK DIAGRAMS
Conducted Testing



Radiated Testing