



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: Q2GIX104-112



TTI-P-G 081/94-A0

Accredited according to **ISO/IEC 17025**



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 • <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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1	General information
1.1	Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM Inc USA.

TEST REPORT PREPARED BY:**EMC Engineer: Philip Kim**

1.2 Testing laboratory
CETECOM Inc.
411 Dixon Landing Road, Milpitas, CA-95035, USA
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 : 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 : Q2GIX104-112

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 and ADDENDUM PAGE 09-25_AIRLMC350_LDK102040 for conducted results, except for conducted peak output power, which is provided in this report for calculation of 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:**

2003-04-23 EMC & Radio Lothar Schmidt (Manager)



Date

Section

Name

Signature

Responsible for test report and project leader:

2003-04-03 EMC & Radio Philip Kim(EMC Engineer)



Date

Section

Name

Signature

3.60 Test report**TEST REPORT**

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

TEST REPORT REFERENCE

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ANTENNA GAIN**§ 15.204**

Note: Conducted 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:

$$\text{Correction} = 10 * \log \left(\frac{\text{RBW}_{\text{need}}}{\text{RBW}_{\text{used}}} \right)$$

$$\text{Correction} = 10 * \log(10\text{MHz}/3\text{MHz}) = \underline{\underline{5.23\text{dB}}}$$

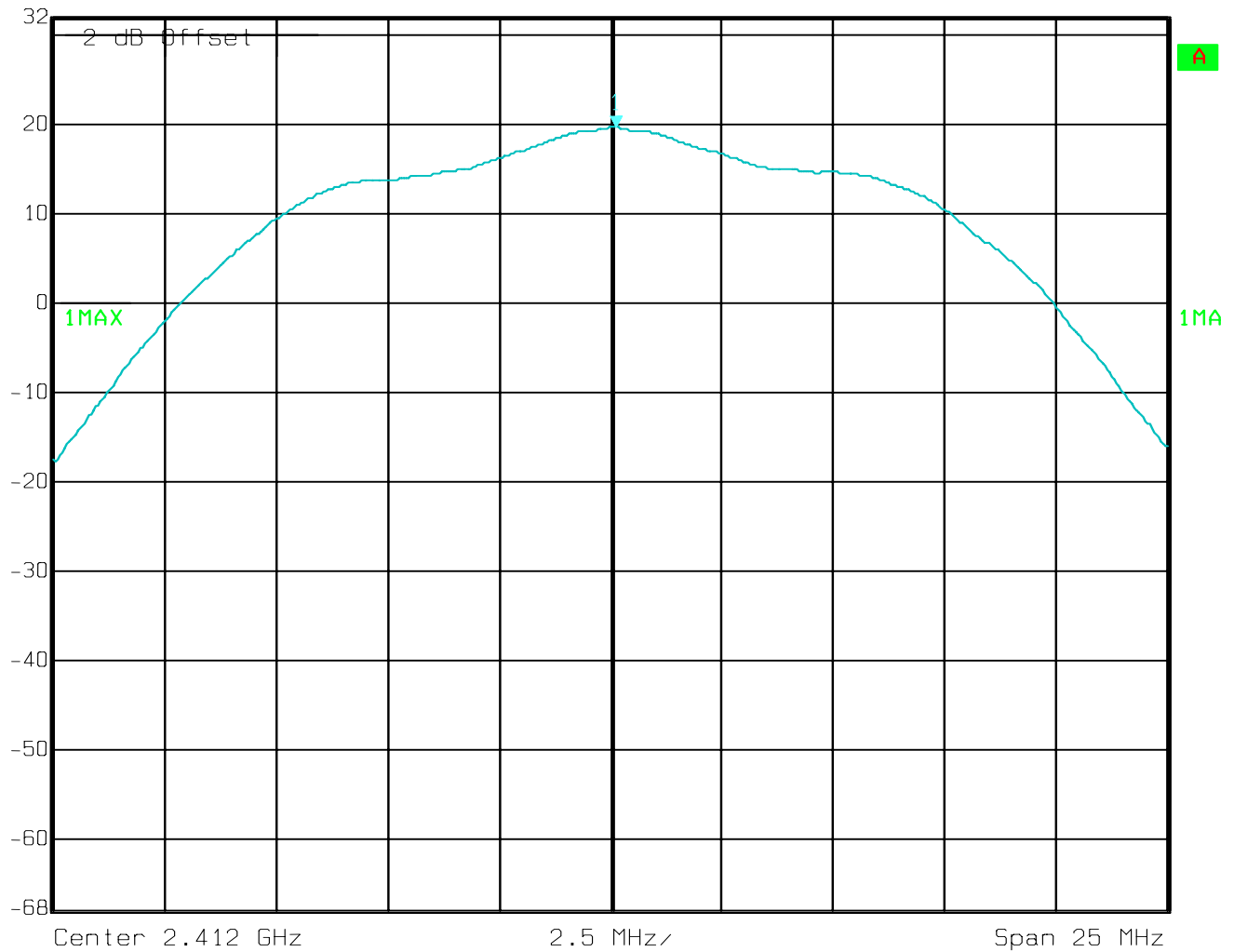
	Low channel (2412MHz)	Mid channel (2437MHz)	High channel (2462MHz)
Conducted Power	24.83dBm	24.51dBm	24.87dBm
Radiated Power (EIRP)	23.73dBm	22.55dBm	23.14dBm
Antenna Gain	-1.1dBi	-1.96dBi	-1.73dBi
Average Antenna Gain	-1.6dBi		

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

Conducted Peak Power Low Channel (2412MHz)



Marker 1 [T1] RBW 3 MHz RF Att 40 dB
 Ref Lvl 19.60 dBm VBW 3 MHz
 32 dBm 2.41212525 GHz SWT 5 ms Unit dBm

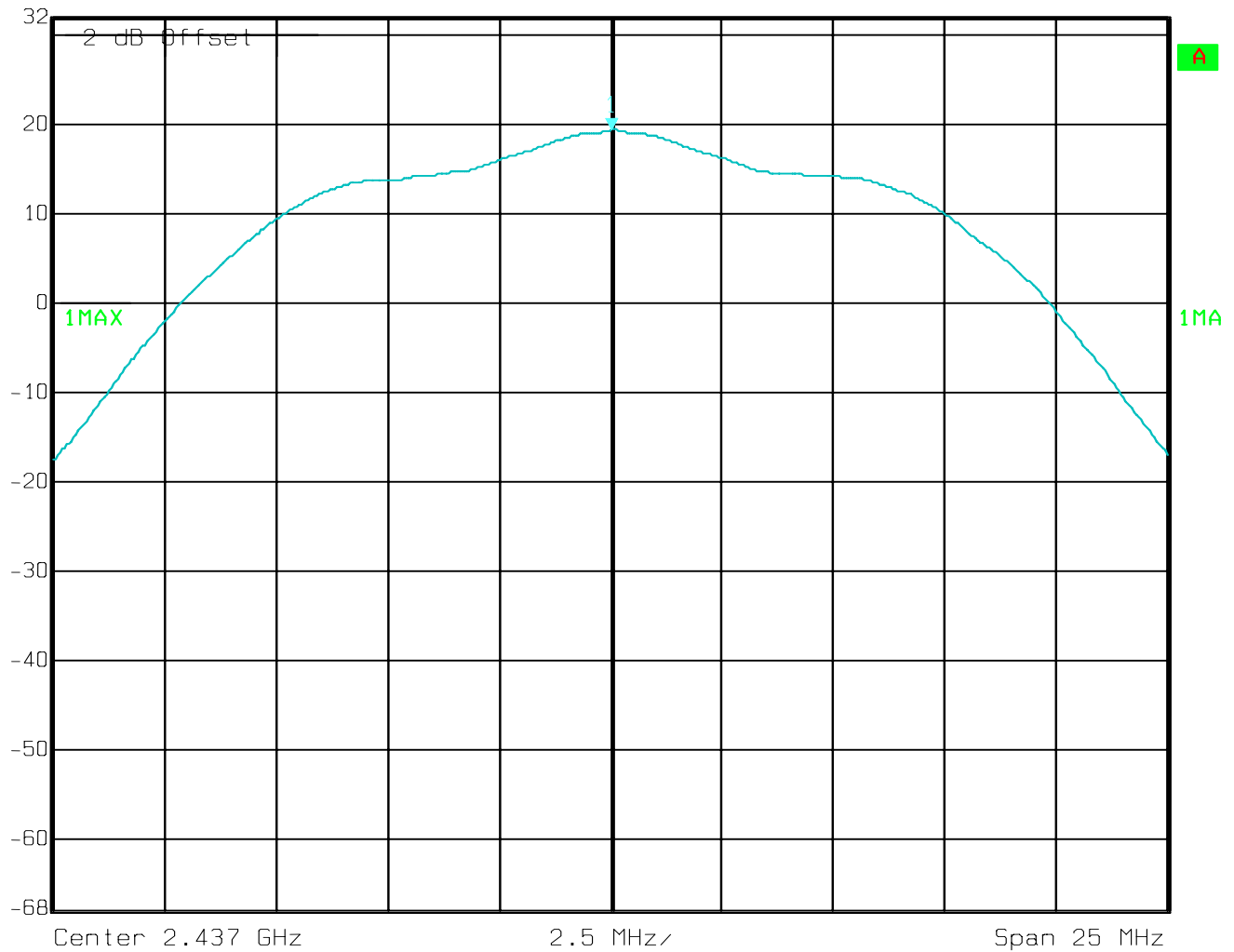


Date: 26.MAR.2003 11:22:31

Conducted Peak Power Low Channel (2437MHz)



Marker 1 [T1] RBW 3 MHz RF Att 40 dB
 Ref Lvl 19.28 dBm VBW 3 MHz
 32 dBm 2.43702505 GHz SWT 5 ms Unit dBm

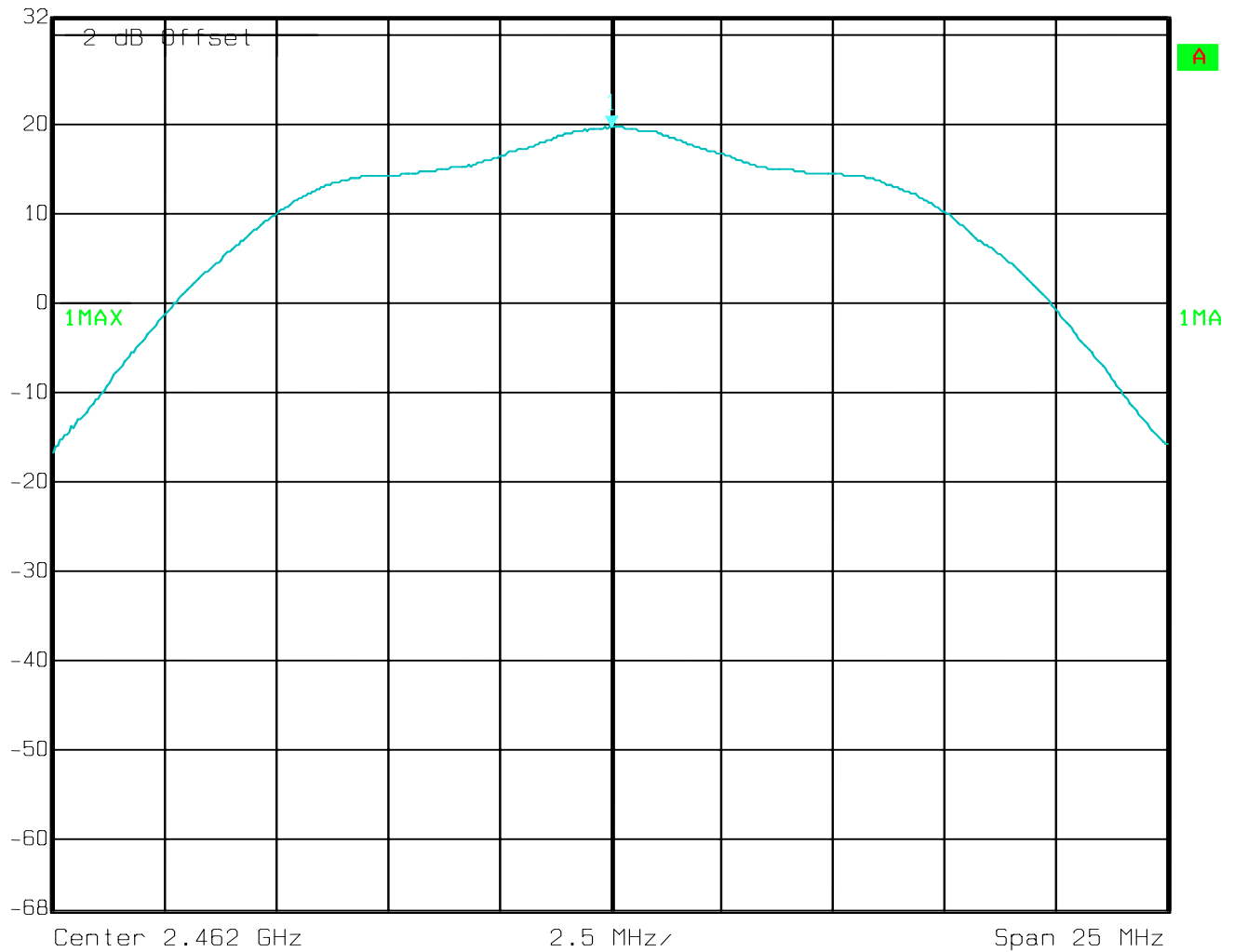


Date: 26.MAR.2003 11:27:27

Conducted Peak Power Low Channel (2462MHz)



Marker 1 [T1] RBW 3 MHz RF Att 40 dB
 Ref Lvl 19.64 dBm VBW 3 MHz
 32 dBm 2.46202505 GHz SWT 5 ms Unit dBm



Date: 26.MAR.2003 11:28:46

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		

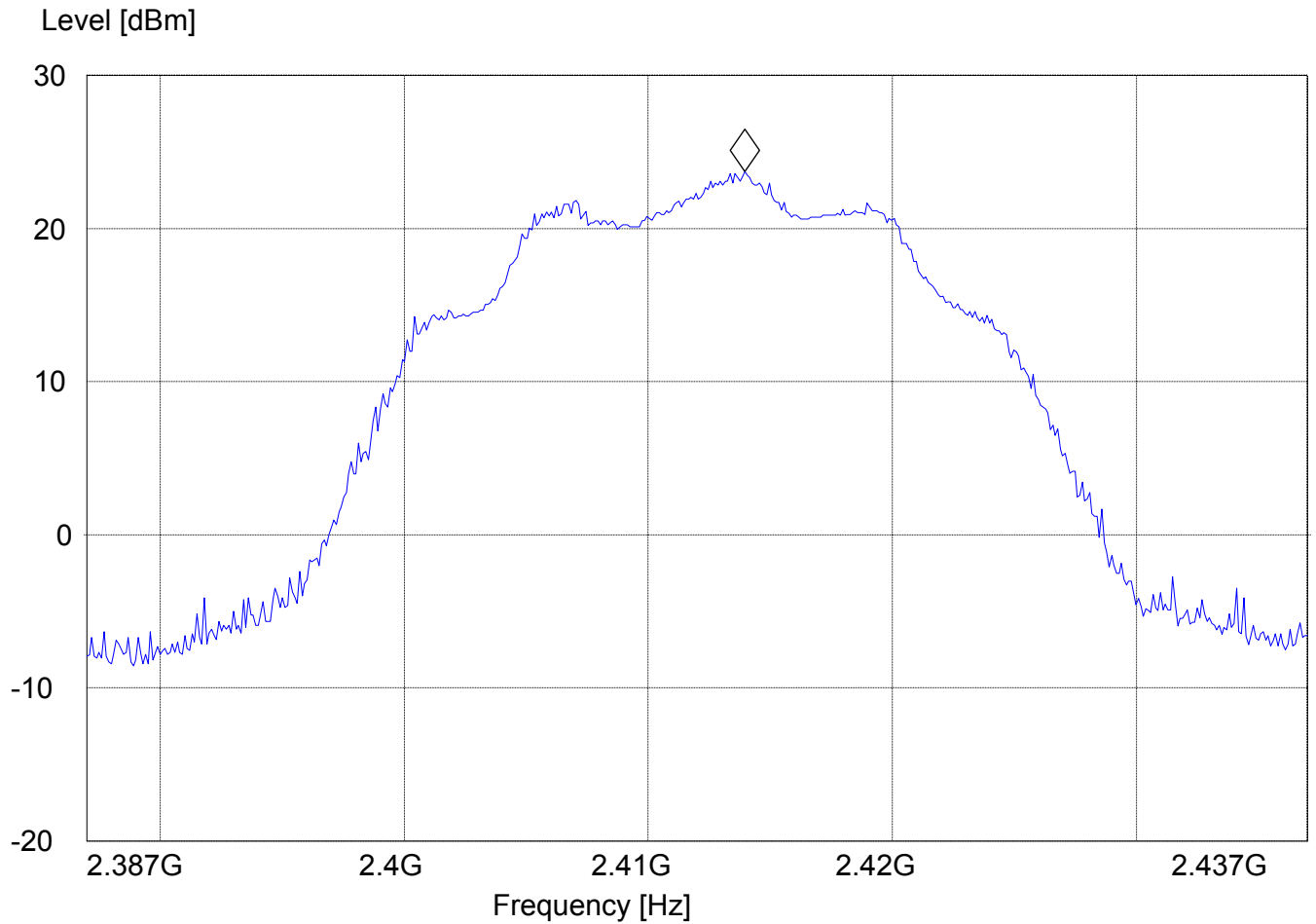
RBW/VBW: 10MHz

LIMIT**SUBCLAUSE § 15.247 (b) (1)**

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

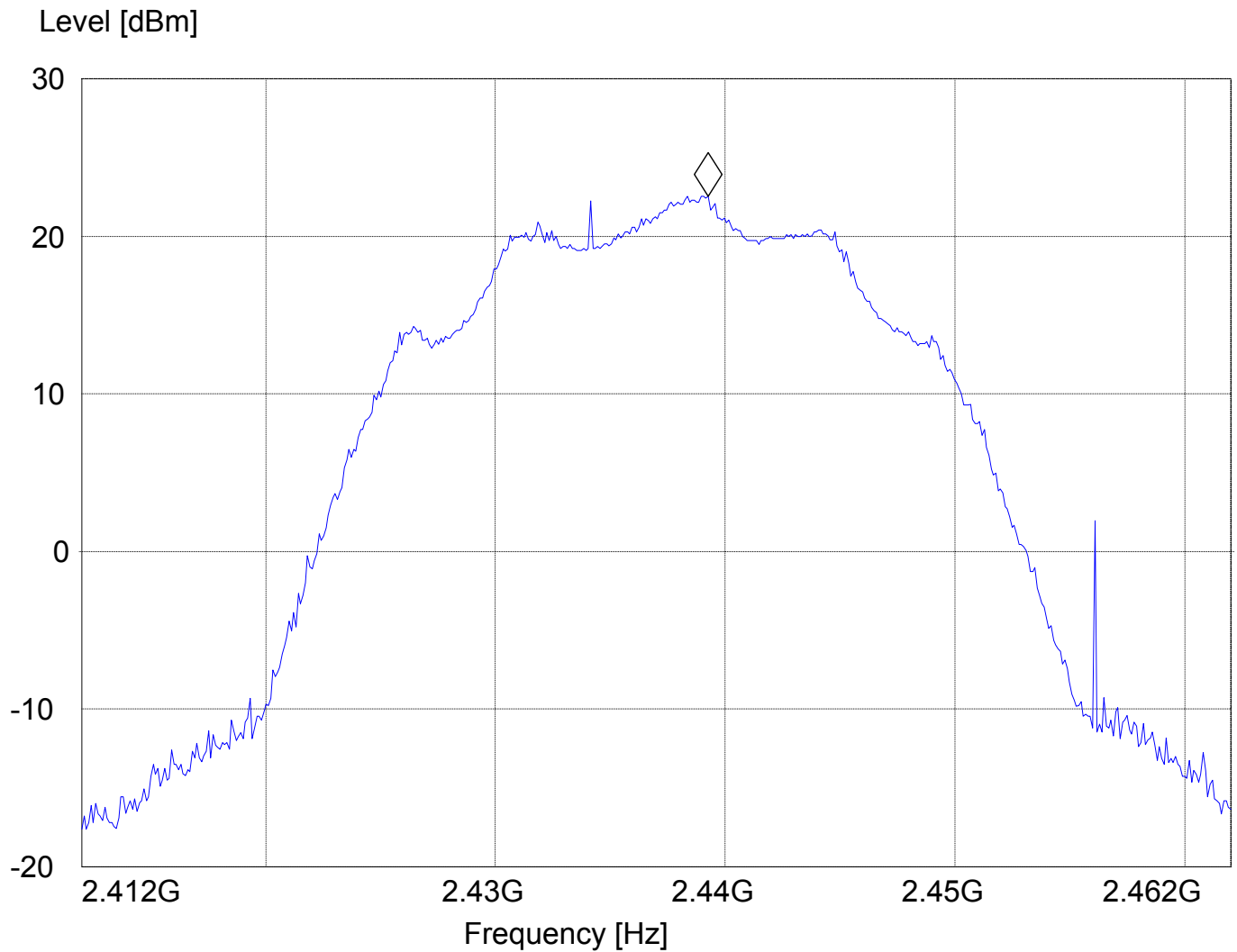
EIRP Measurement**Low Channel (2412MHz)**

Marker: 2.413953908 GHz 23.73 dBm



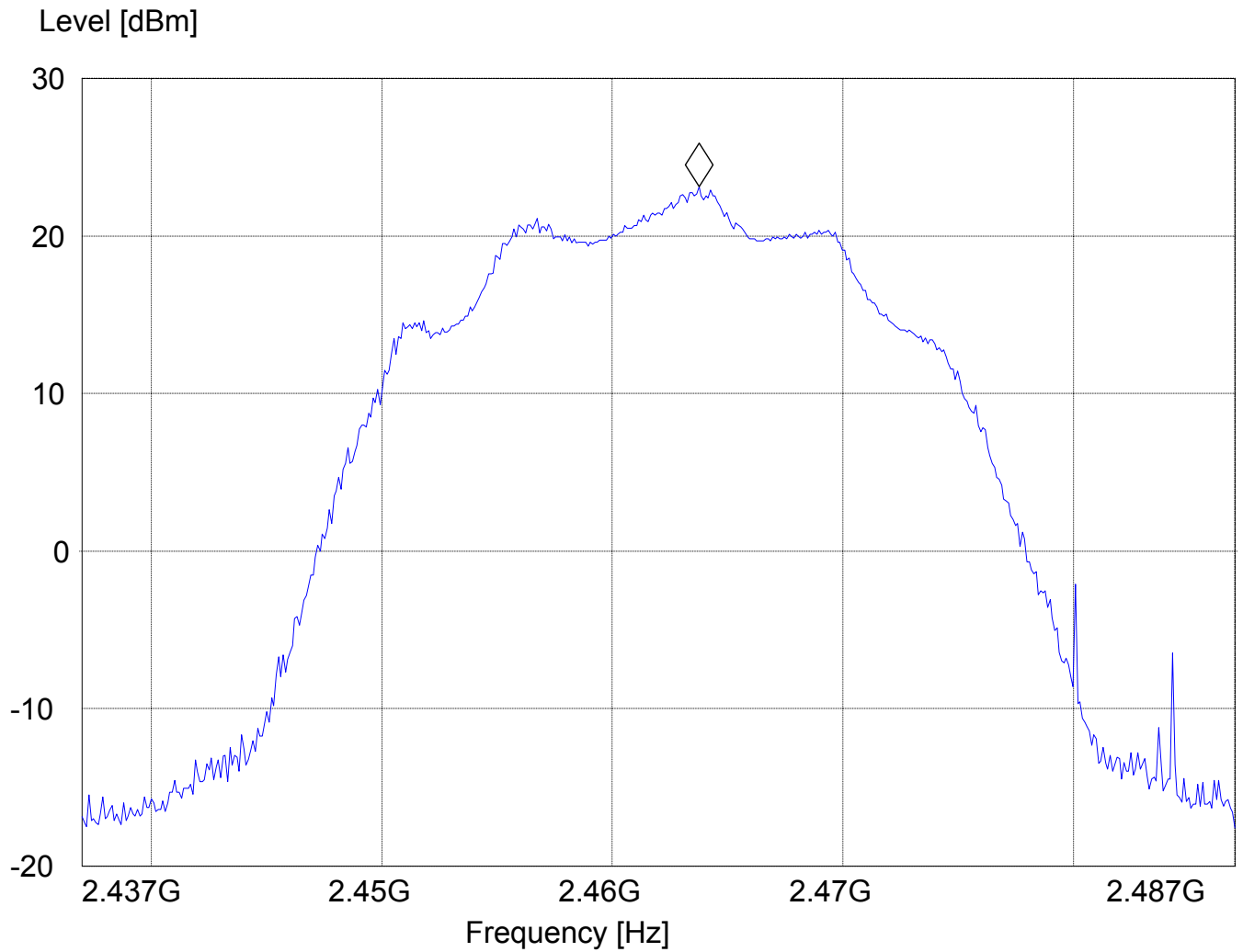
EIRP Measurement**Low Channel (2437MHz)**

Marker: 2.439254509 GHz 22.55 dBm



EIRP Measurement**Low Channel (2462MHz)**

Marker: 2.463753507 GHz 23.14 dBm



BAND EDGE COMPLIANCE

§15.247 (c)

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

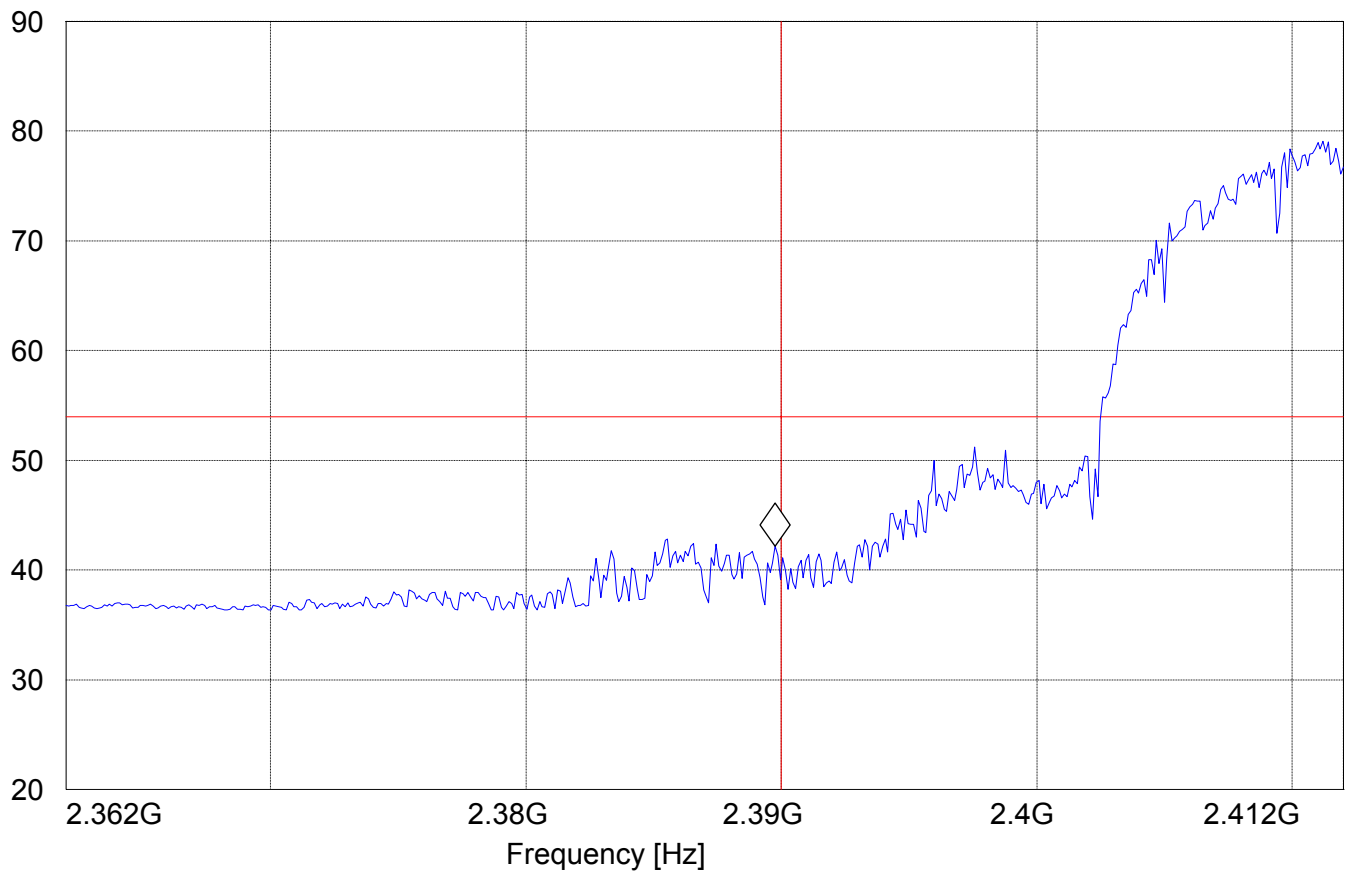
(Average measurement)

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

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

Marker: 2.389755511 GHz 42.18 dBμV/m

Level [dBμV/m]



BAND EDGE COMPLIANCE

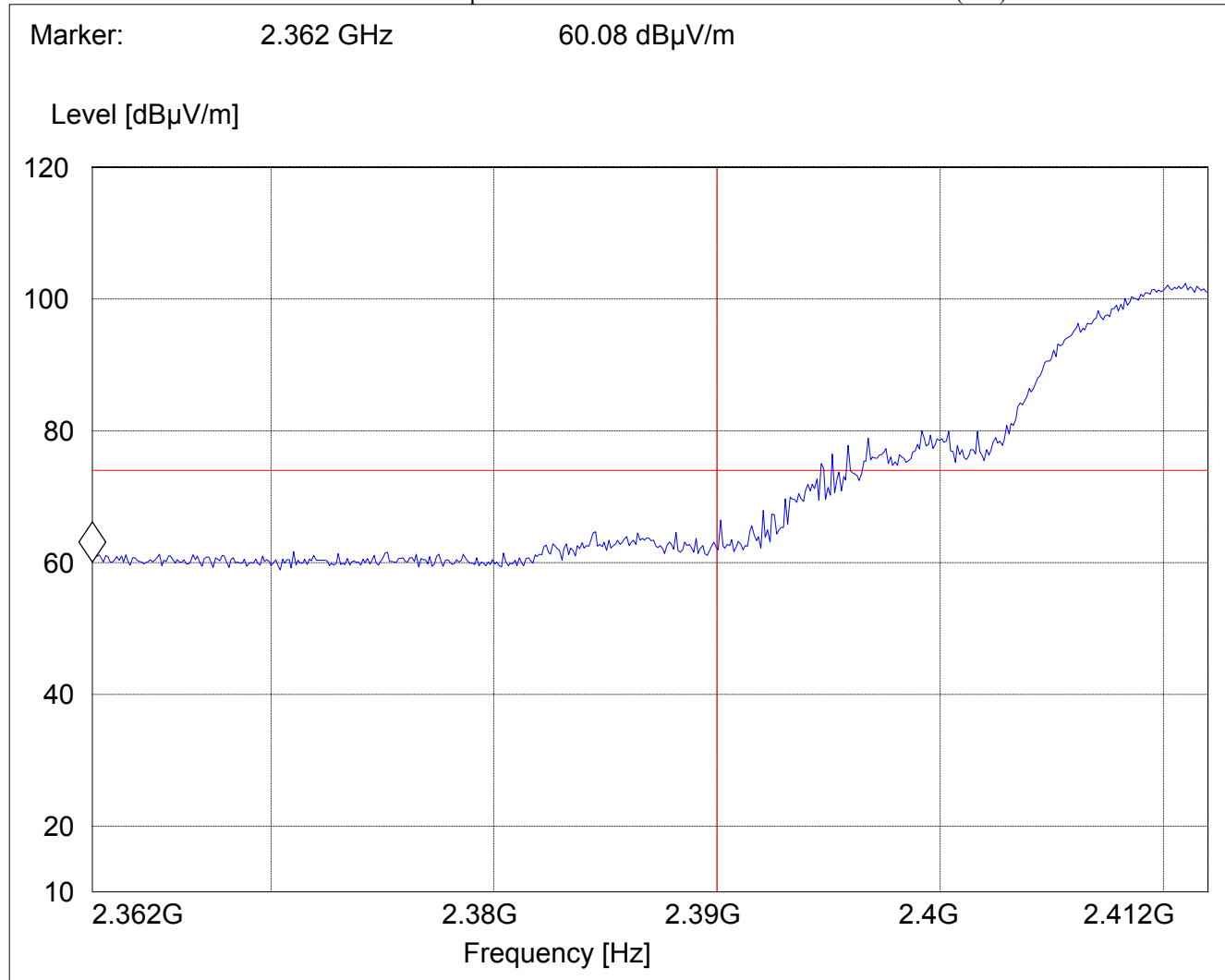
§15.247 (c)

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)

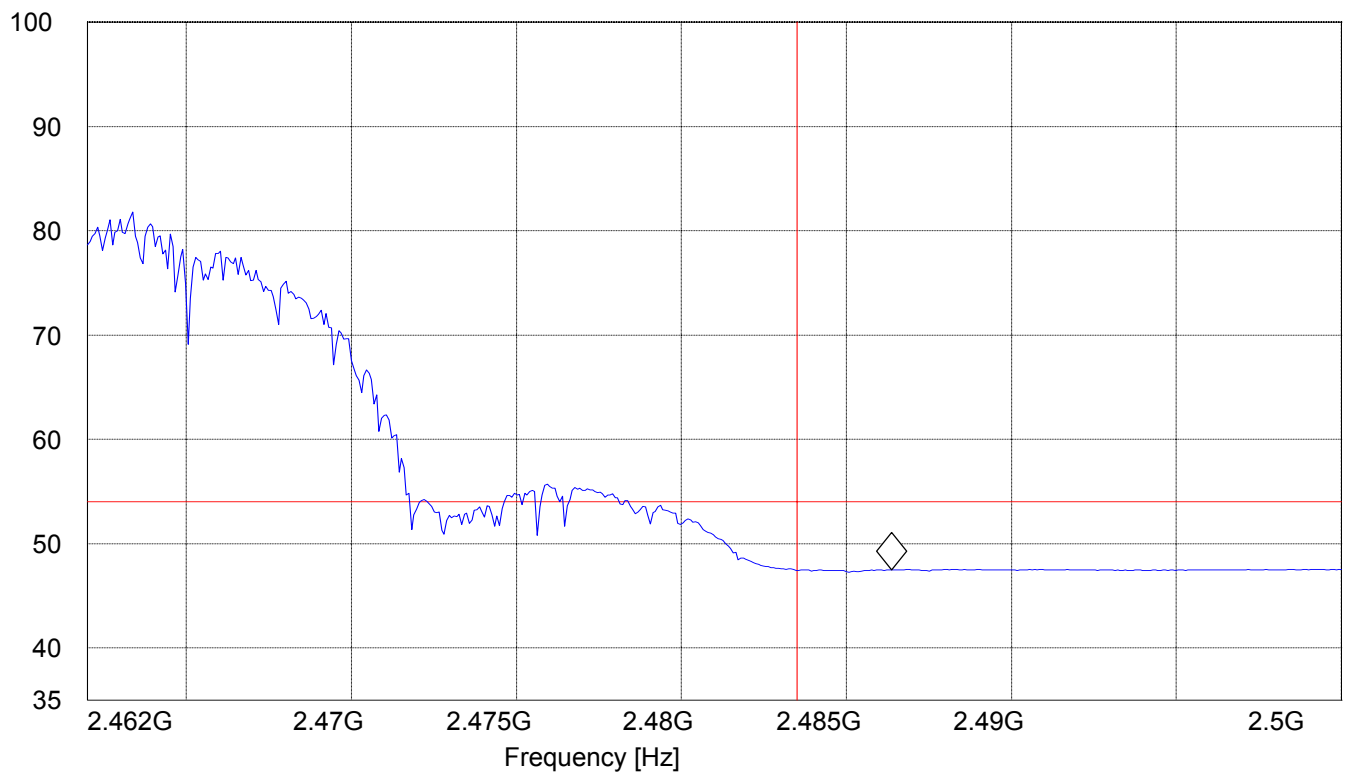
(Average measurement)

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)

Marker: 2.486368737 GHz 47.49 dBμV/m

Level [dBμV/m]



BAND EDGE COMPLIANCE

§15.247 (c)

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

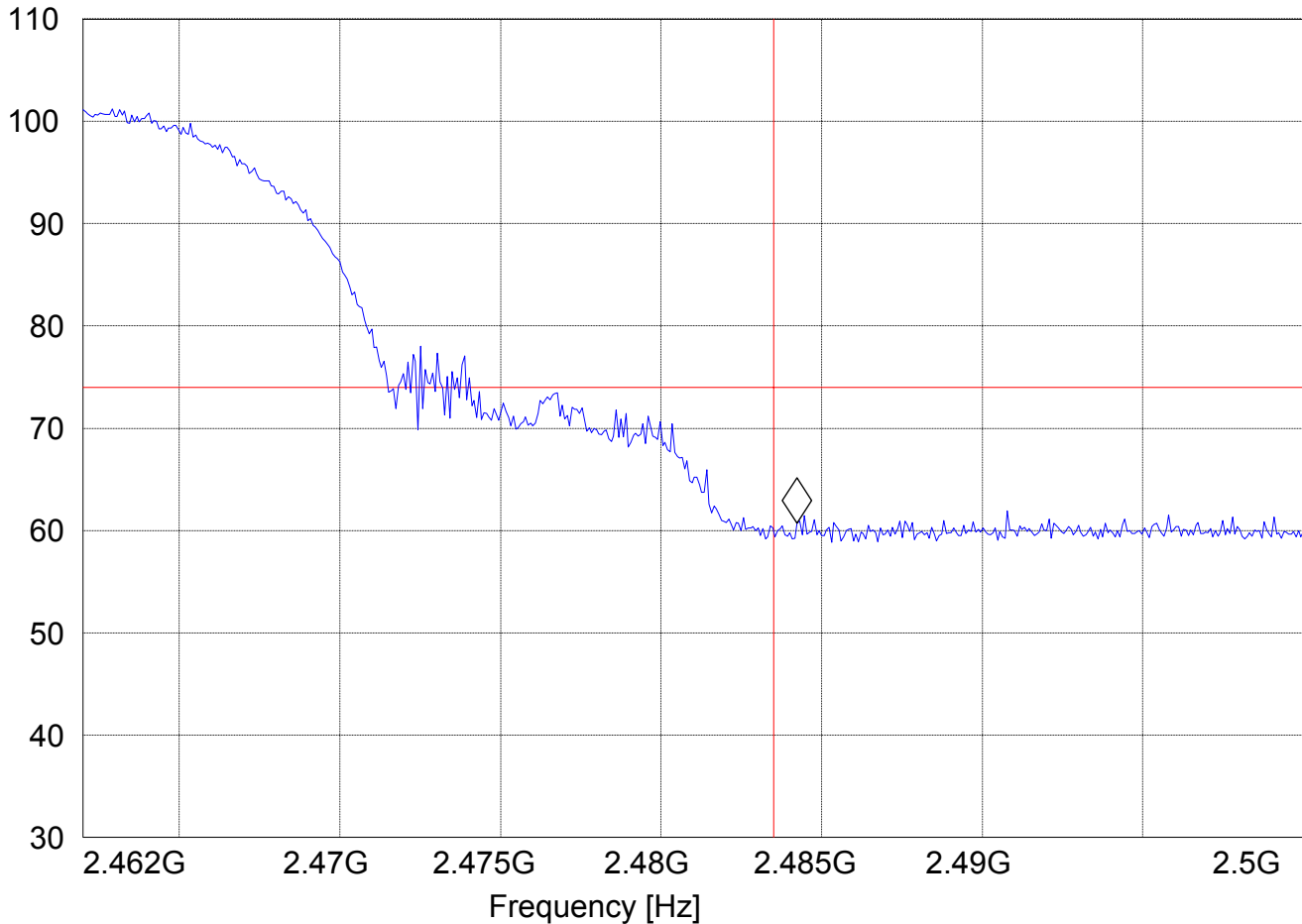
(Peak measurement)

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

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

Marker: 2.484236473 GHz 60.72 dBμV/m

Level [dBμV/m]



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 (dB μ V/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 (dB μ V/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 (dB μ V/m)		
	Peak	Quasi-Peak	Average
	NF	NF	NF
	NF	NF	NF
	NF	NF	NF
	NF	NF	NF

Note: NF = No Significant Peak found.

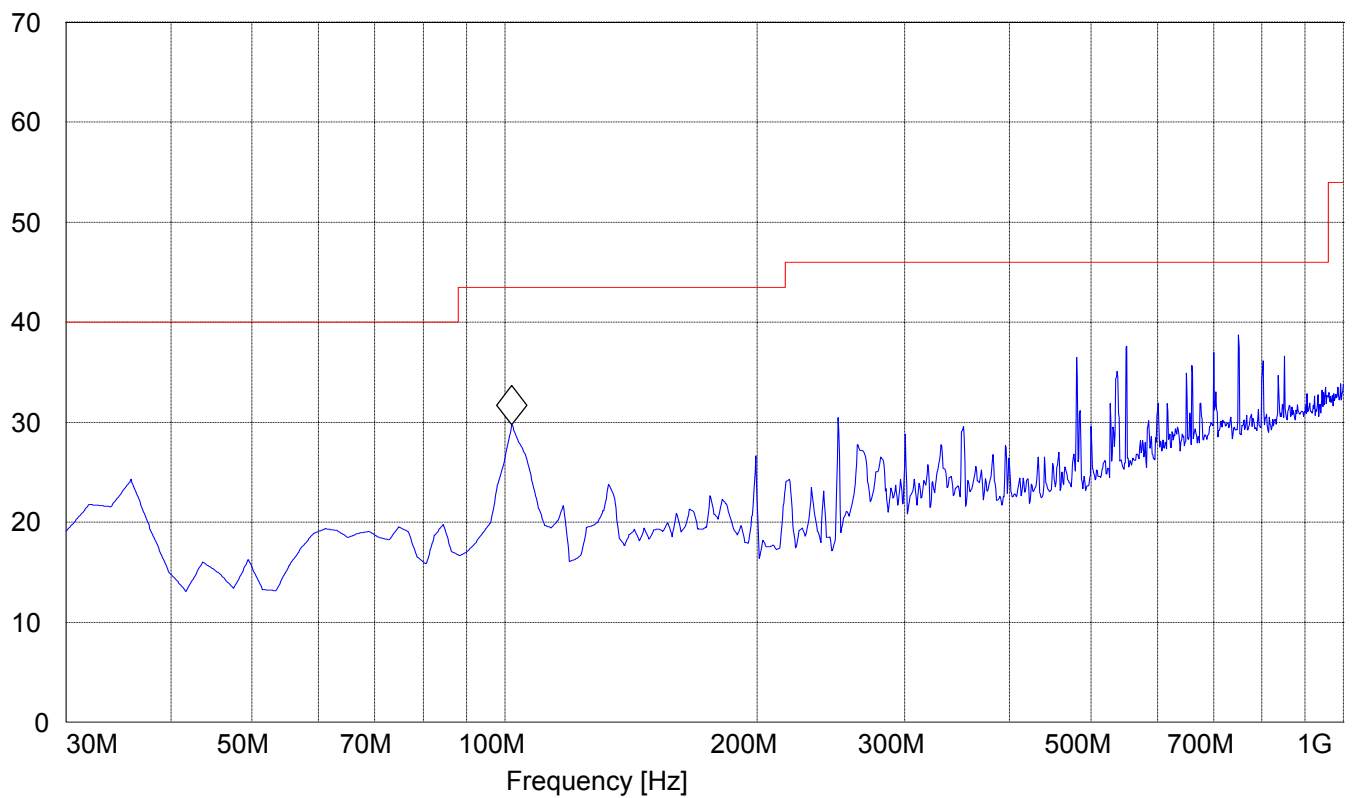
EMISSION LIMITATIONS - Radiated (Transmitter) Lowest Channel (2412MHz): 30MHz – 1GHz

§ 15.247 (c) (1)

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

Marker: 101.923848 MHz 29.73 dBµV/m

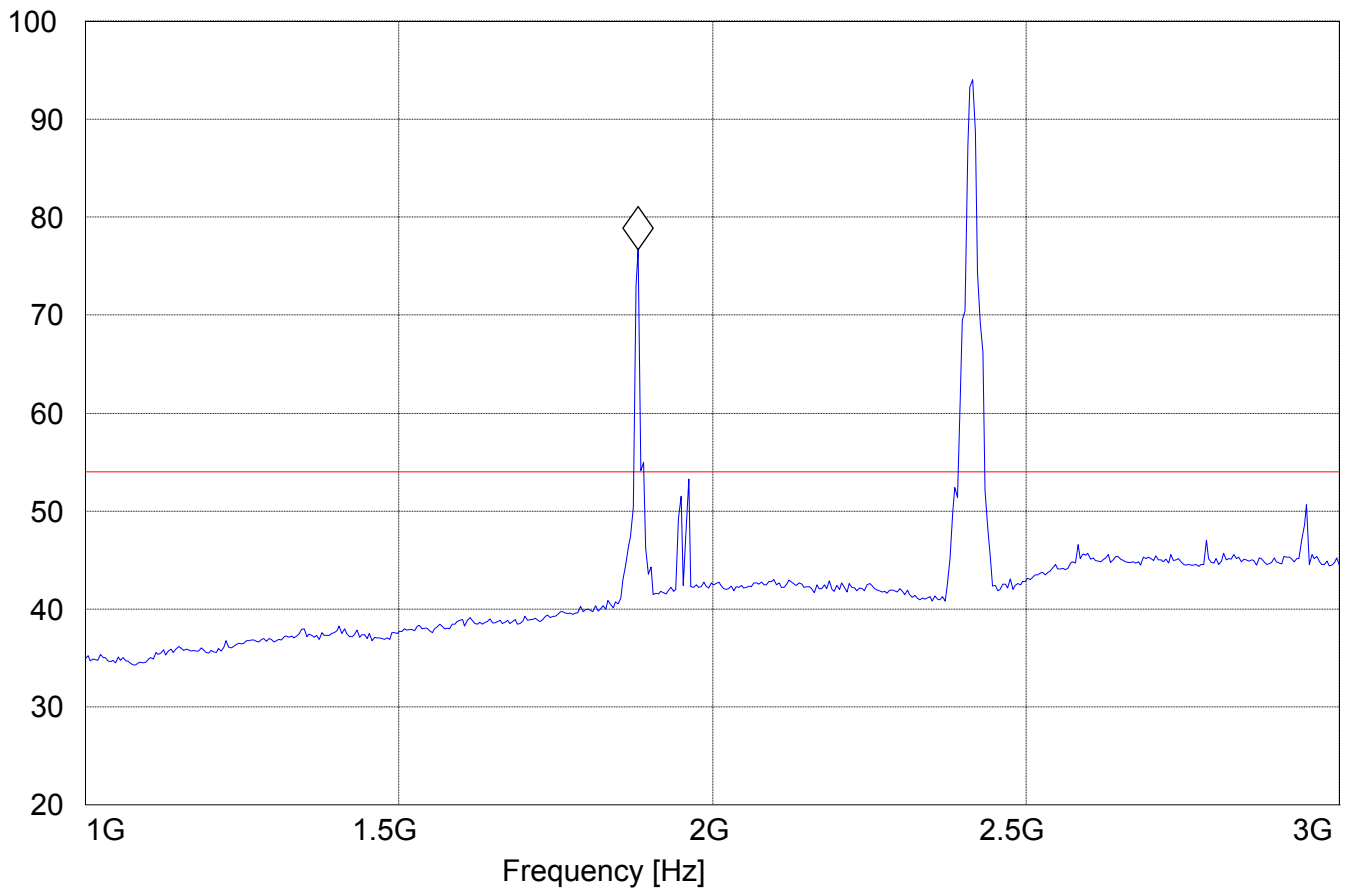
Level [dBµV/m]



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

Marker: 1.881763527 GHz 76.64 dB μ V/m

Level [dB μ V/m]


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

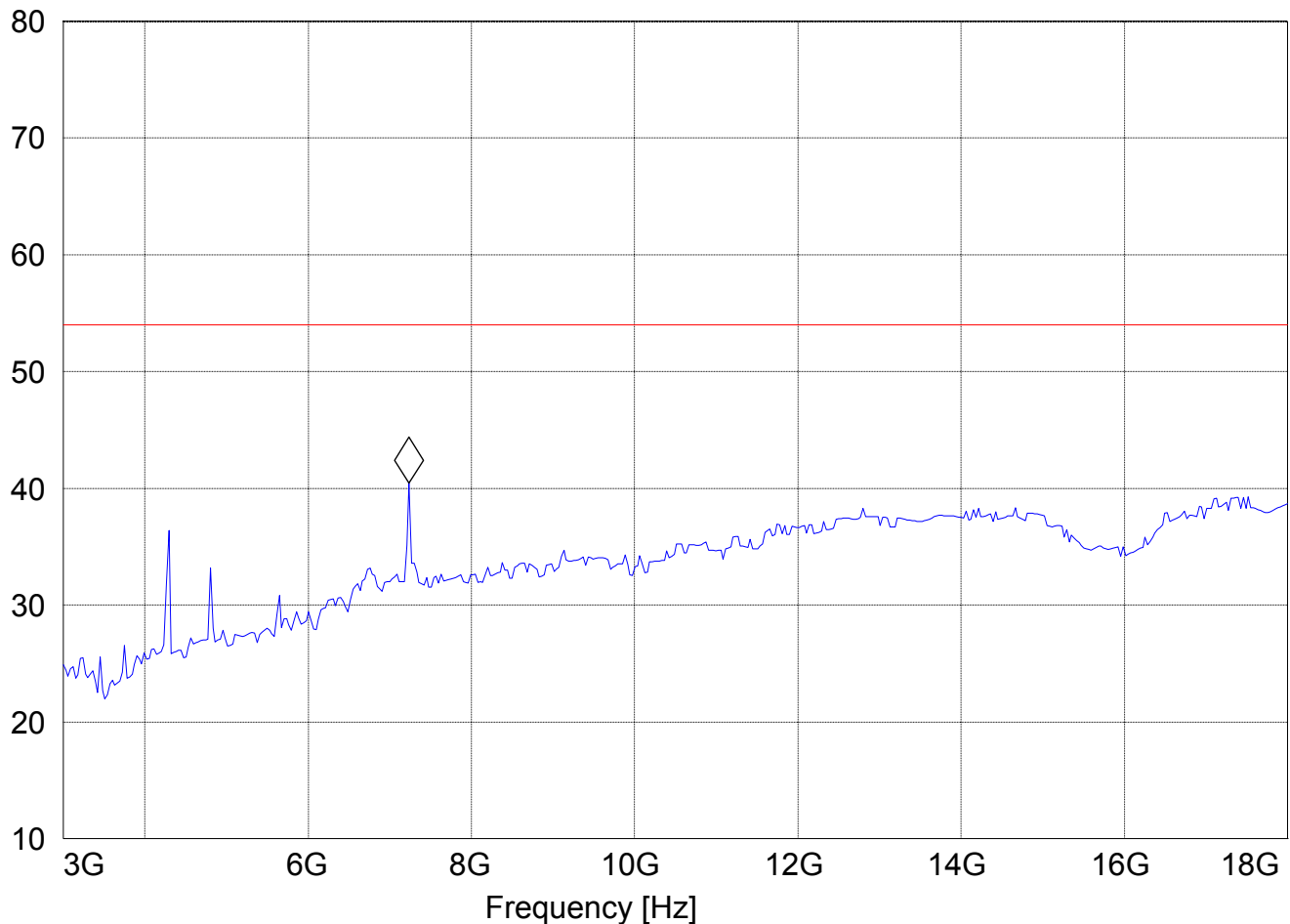
§ 15.247 (c) (1)

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

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

Marker: 7.238476954 GHz 40.46 dBμV/m

Level [dBμV/m]



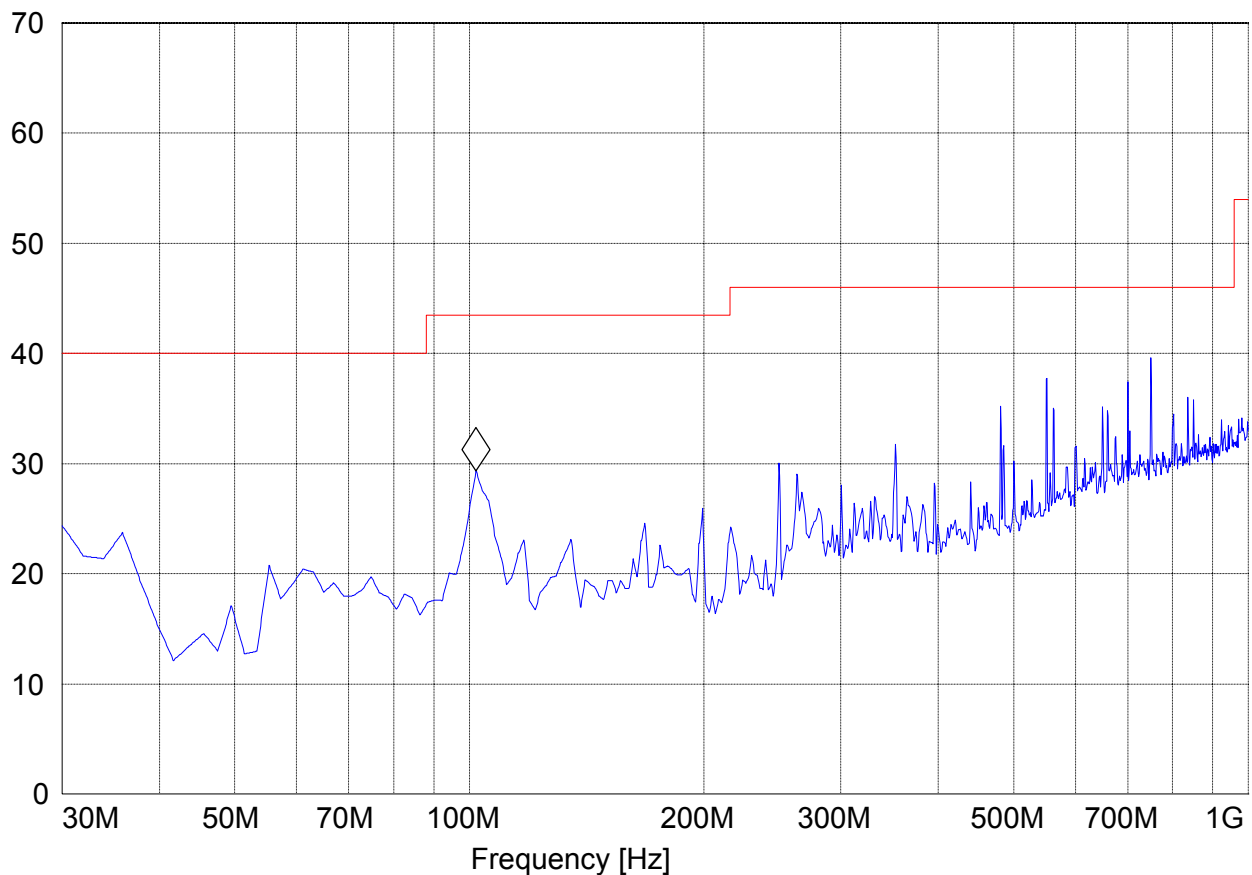
EMISSION LIMITATIONS - Radiated (Transmitter)
Middle Channel(2437MHz): 30MHz – 1GHz

§ 15.247 (c) (1)

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

Marker: 101.923848 MHz 29.33 dBµV/m

Level [dBµV/m]



EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

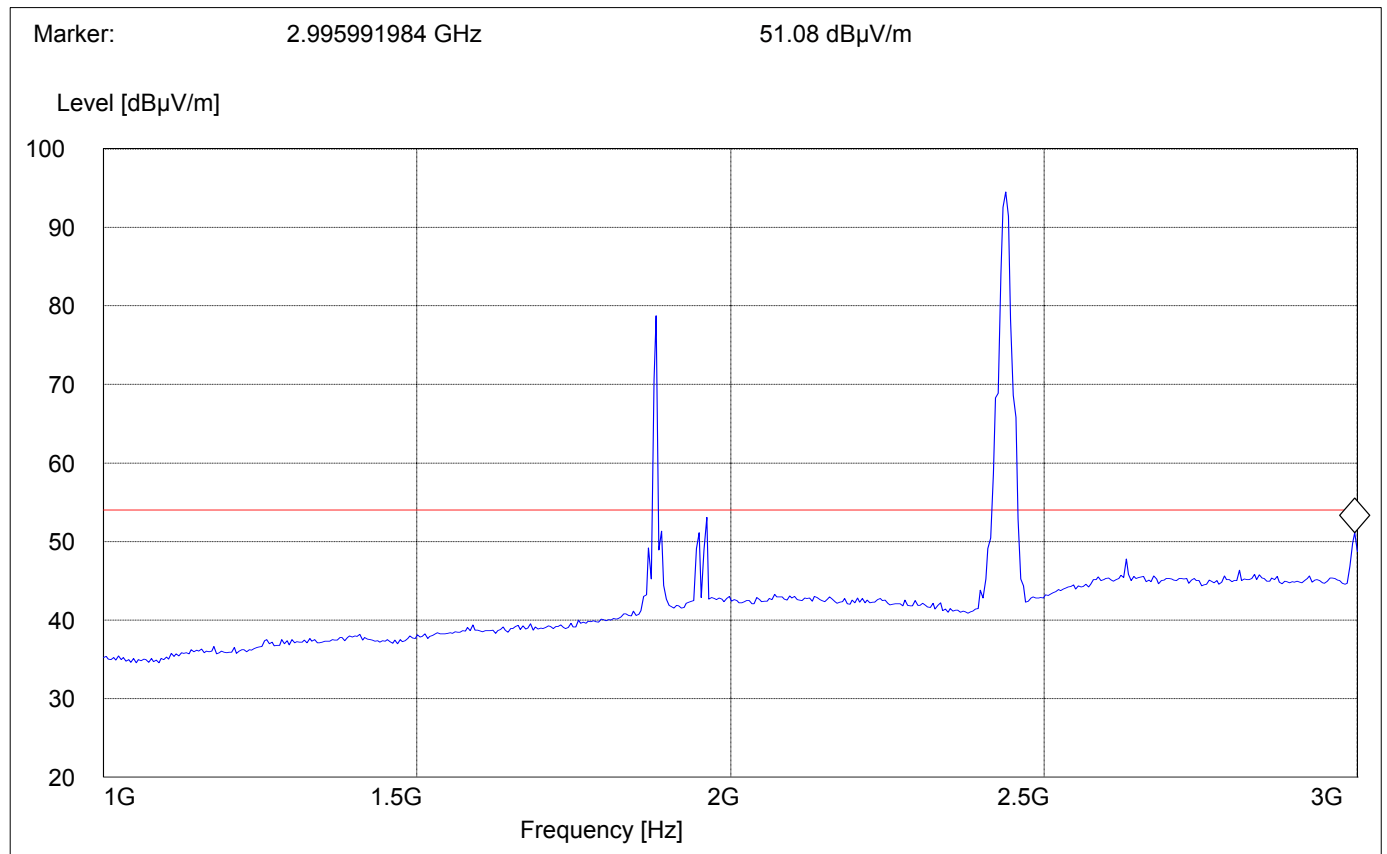
Middle Channel(2437MHz): 1GHz – 3GHz

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



EMISSION LIMITATIONS - Radiated (Transmitter)

Middle Channel(2437MHz): 3GHz – 18GHz

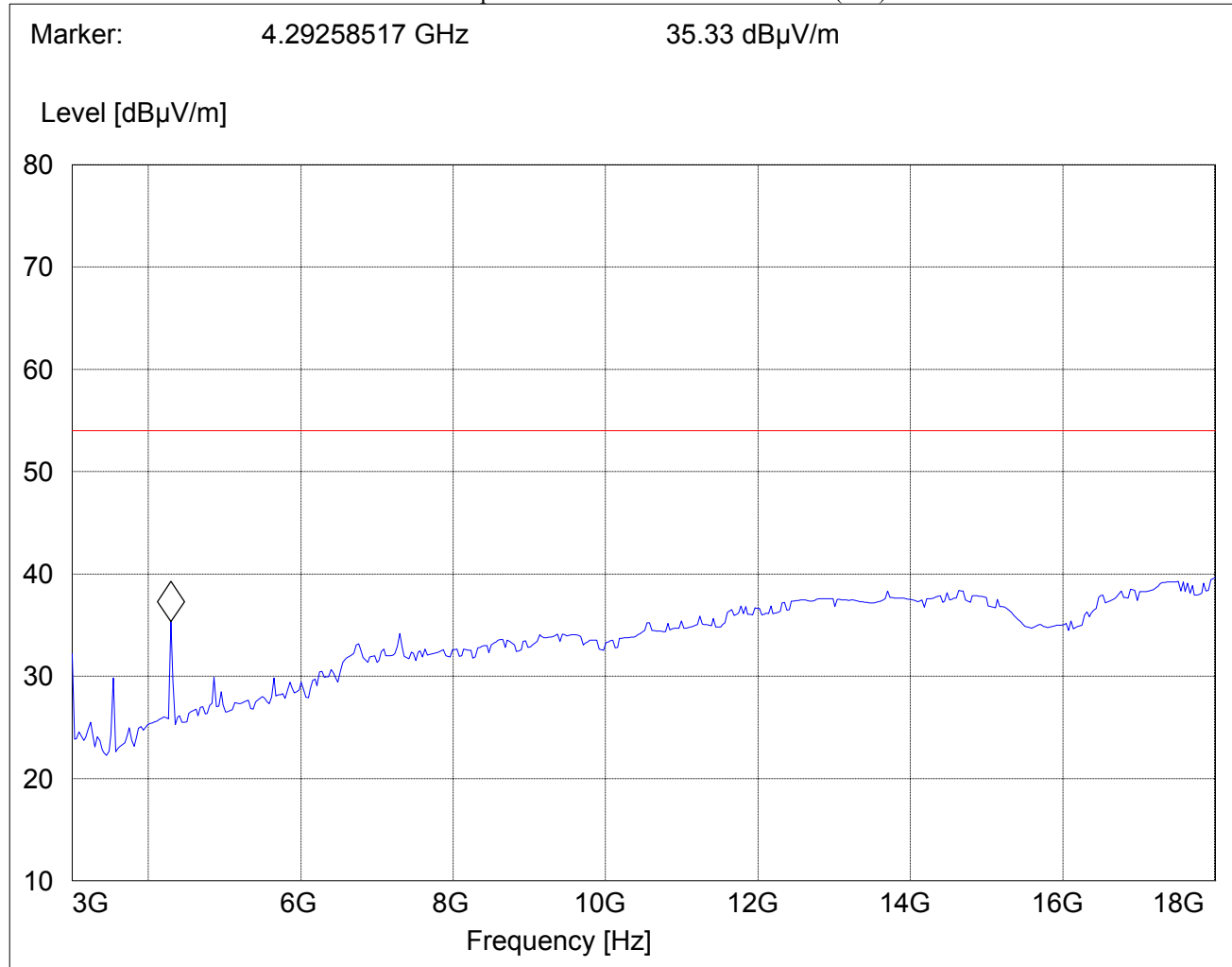
§ 15.247 (c) (1)

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

SWEEP TABLE: "BT Spuri hi 1-8G"

Short Description: Bluetooth Spurious 1-8GHz

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



EMISSION LIMITATIONS - Radiated (Transmitter)

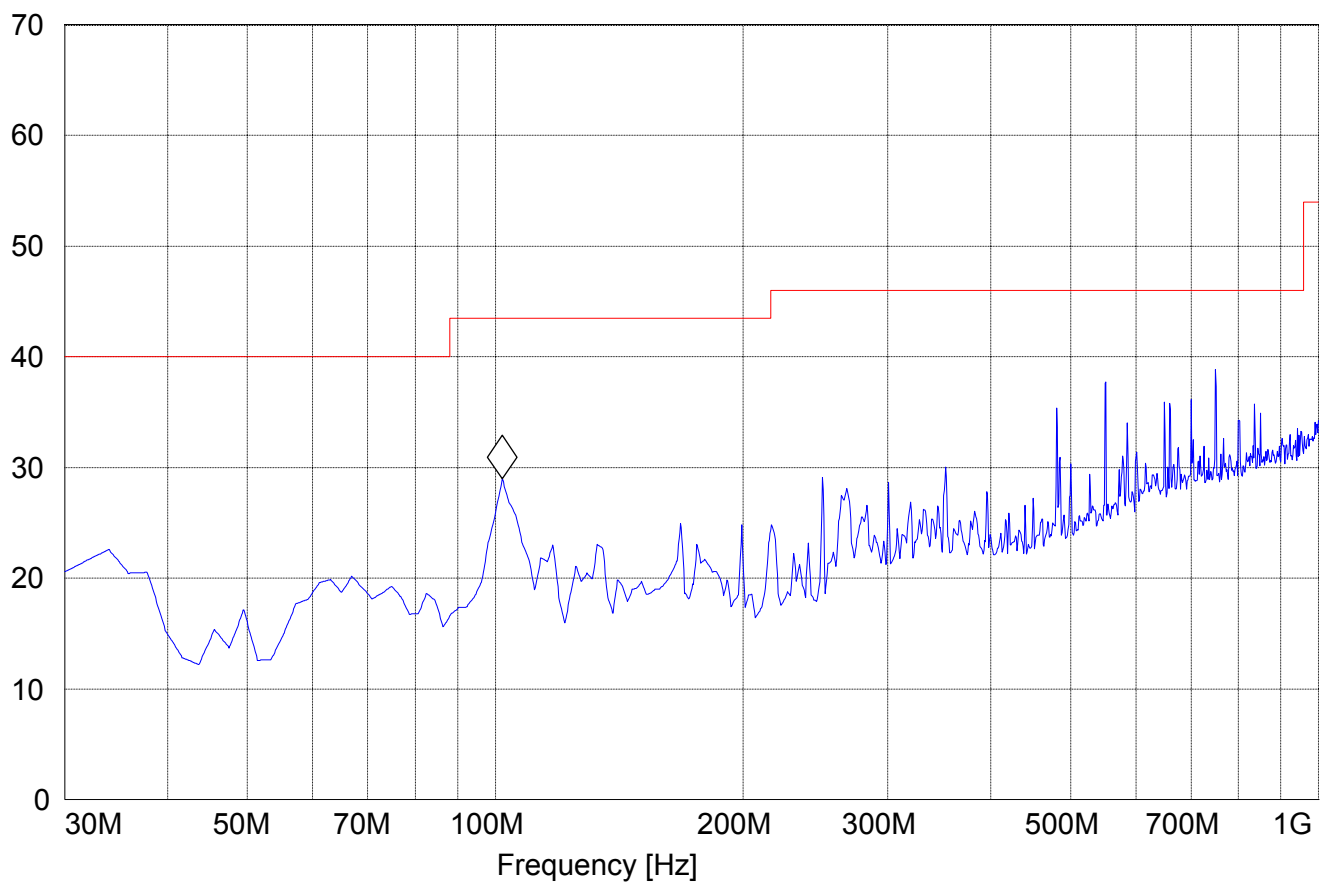
§ 15.247 (c) (1)

Highest Channel(2462MHz): 30MHz – 1GHz

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

Marker: 101.923848 MHz 28.97 dBµV/m

Level [dBµV/m]



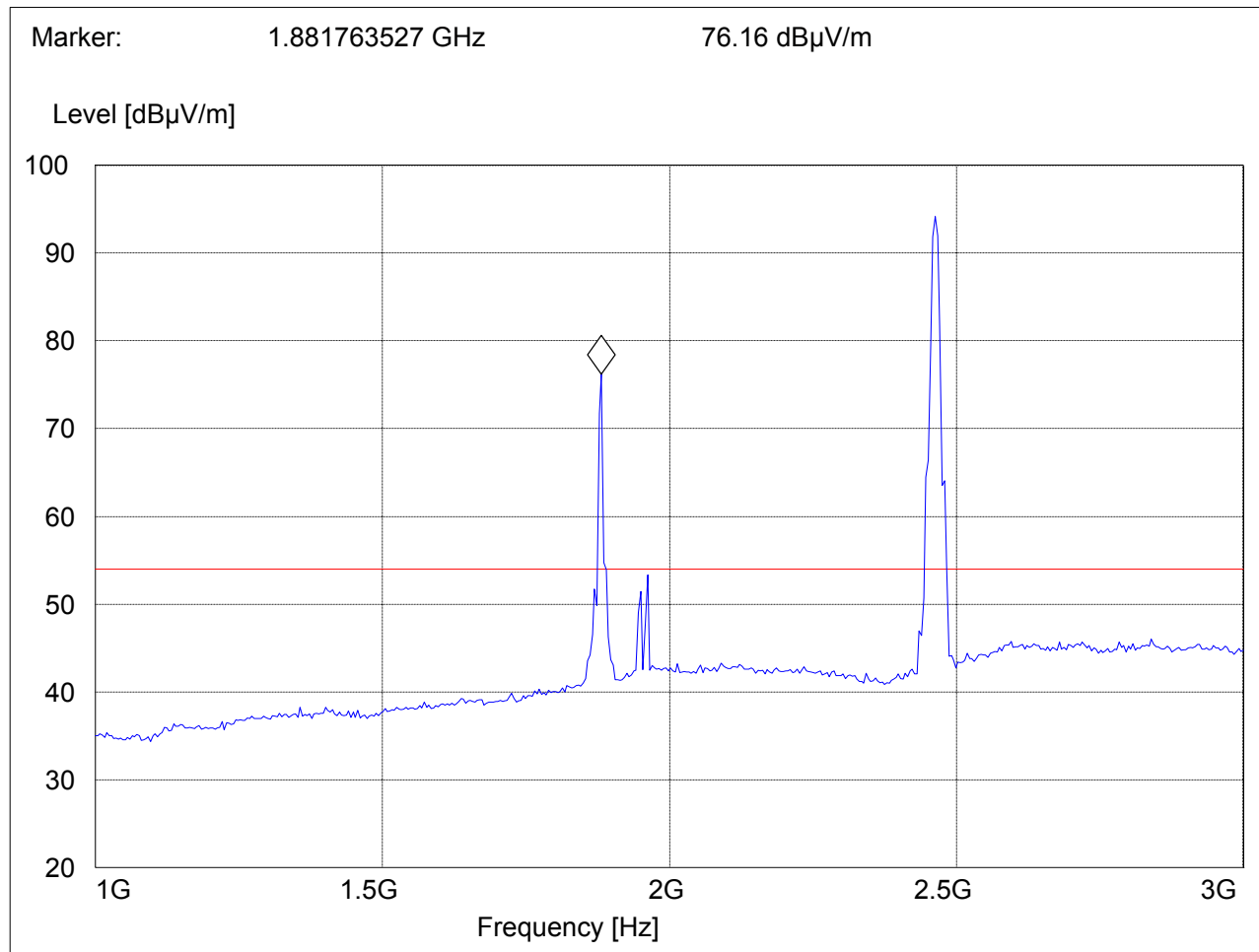
EMISSION LIMITATIONS - Radiated (Transmitter)

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



EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

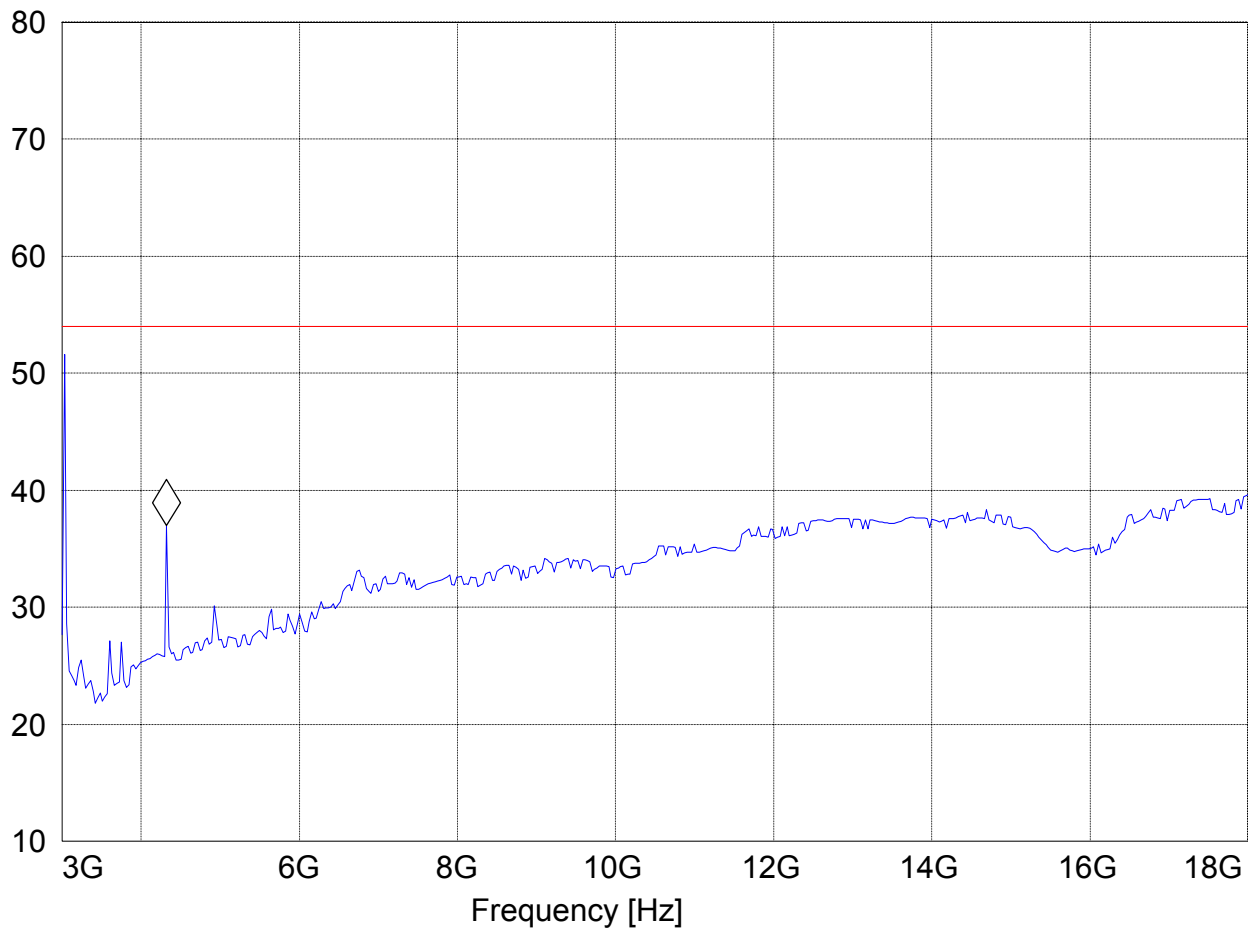
Highest Channel(2462MHz): 3GHz – 18GHz

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

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

Marker: 4.322645291 GHz 37.01 dBμV/m

Level [dBμV/m]



EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

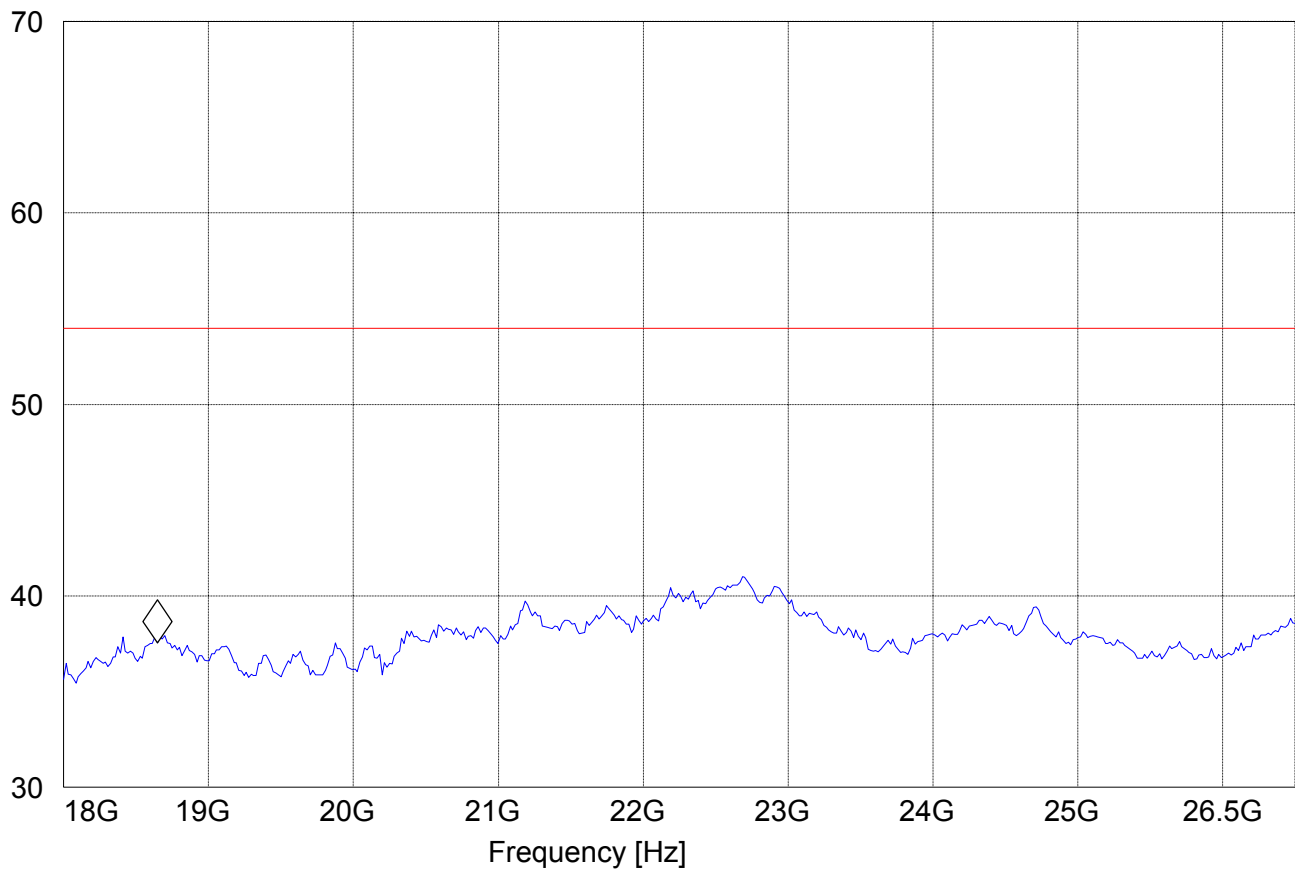
18GHz – 25GHz

(This plot is valid for all three channels)

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

Marker: 18.647294589 GHz 37.55 dBµV/m

Level [dBµV/m]



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)

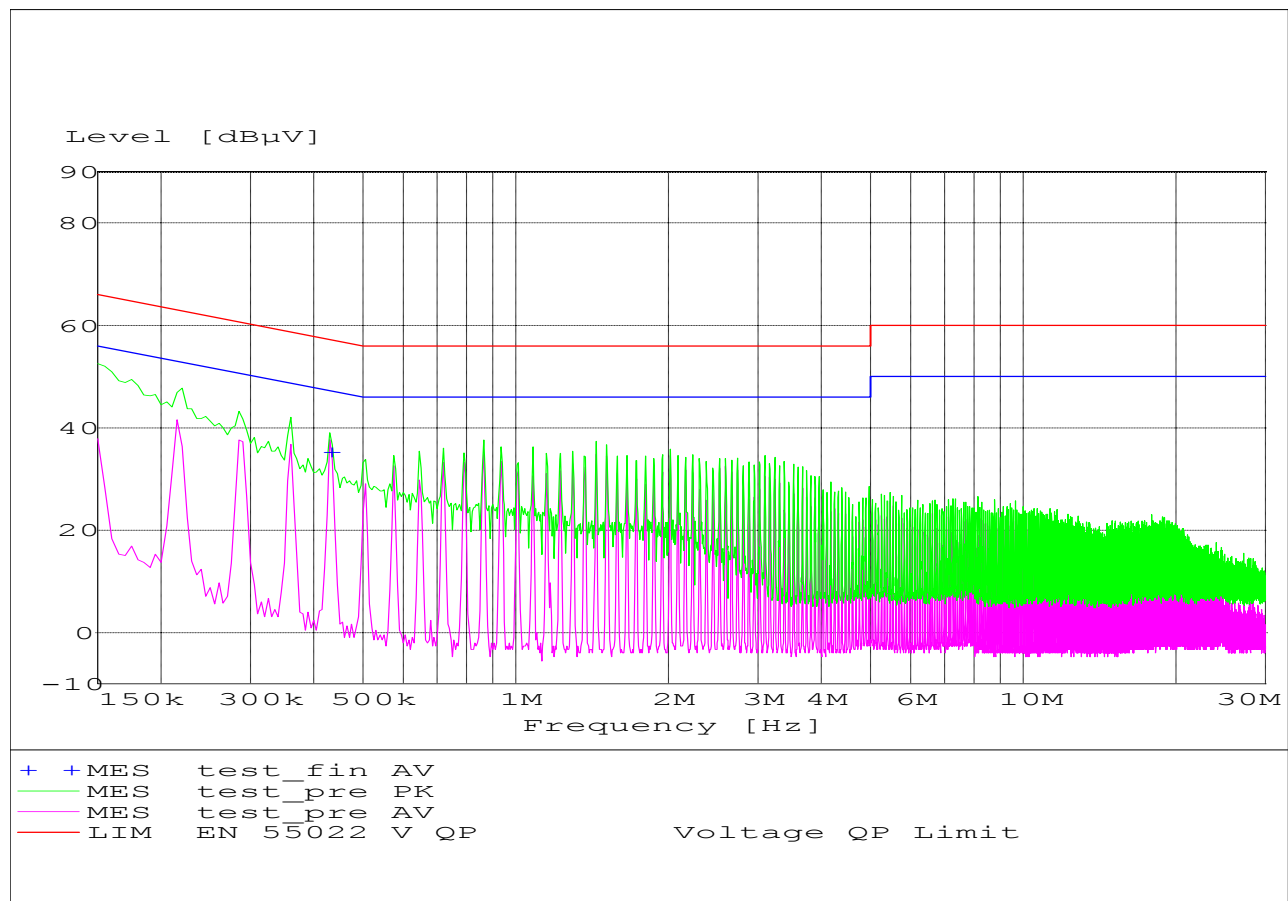
Limit

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 ($\mu\text{V/m}$)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

NOTE:

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

RECEIVER SPURIOUS RADIATION

§ 15.209

30MHz – 1GHz

SWEEP TABLE:

"BT Spuri hi 30-1G"

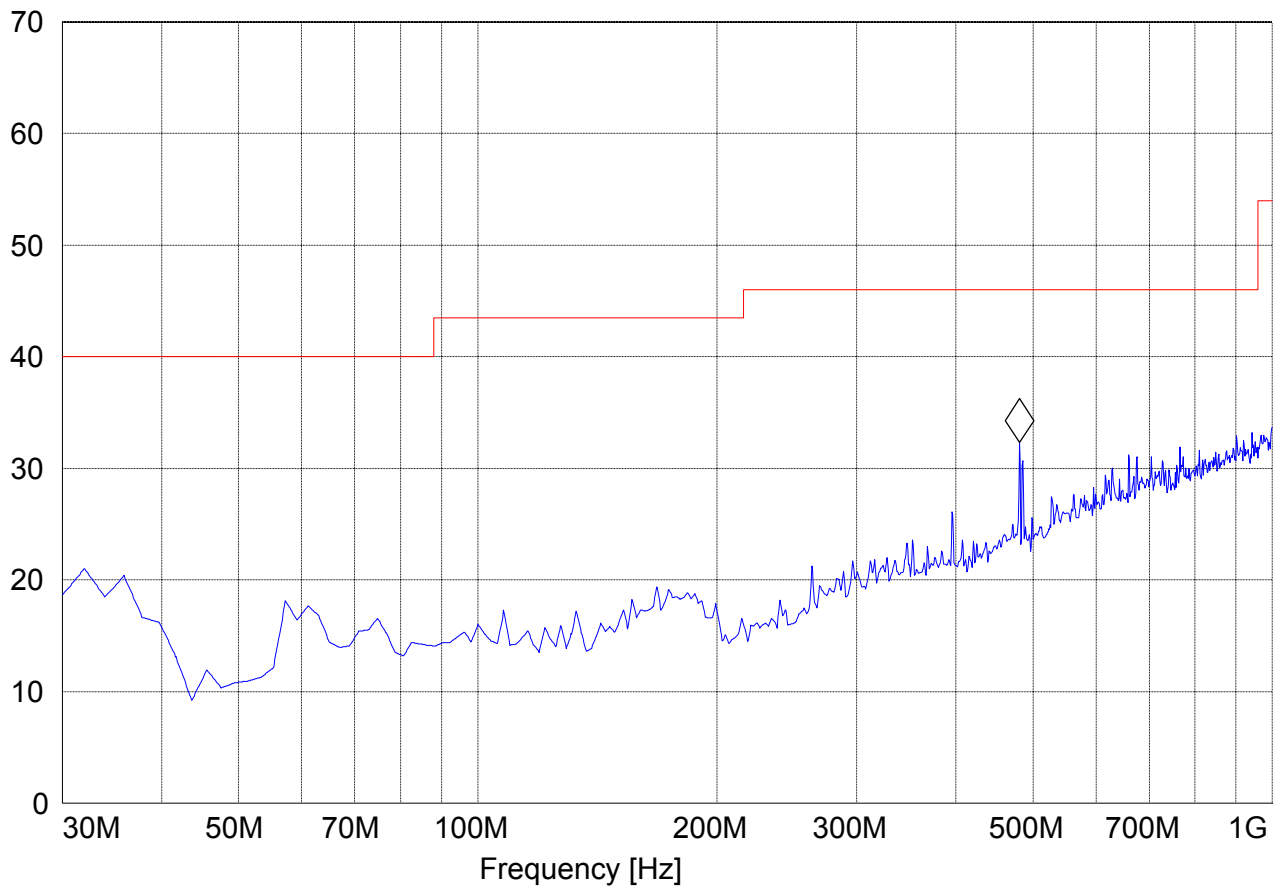
Short Description:

Bluetooth 30MHz-1GHz

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

Marker: 480.981964 MHz 32.31 dBµV/m

Level [dBµV/m]



RECEIVER SPURIOUS RADIATION

§ 15.209

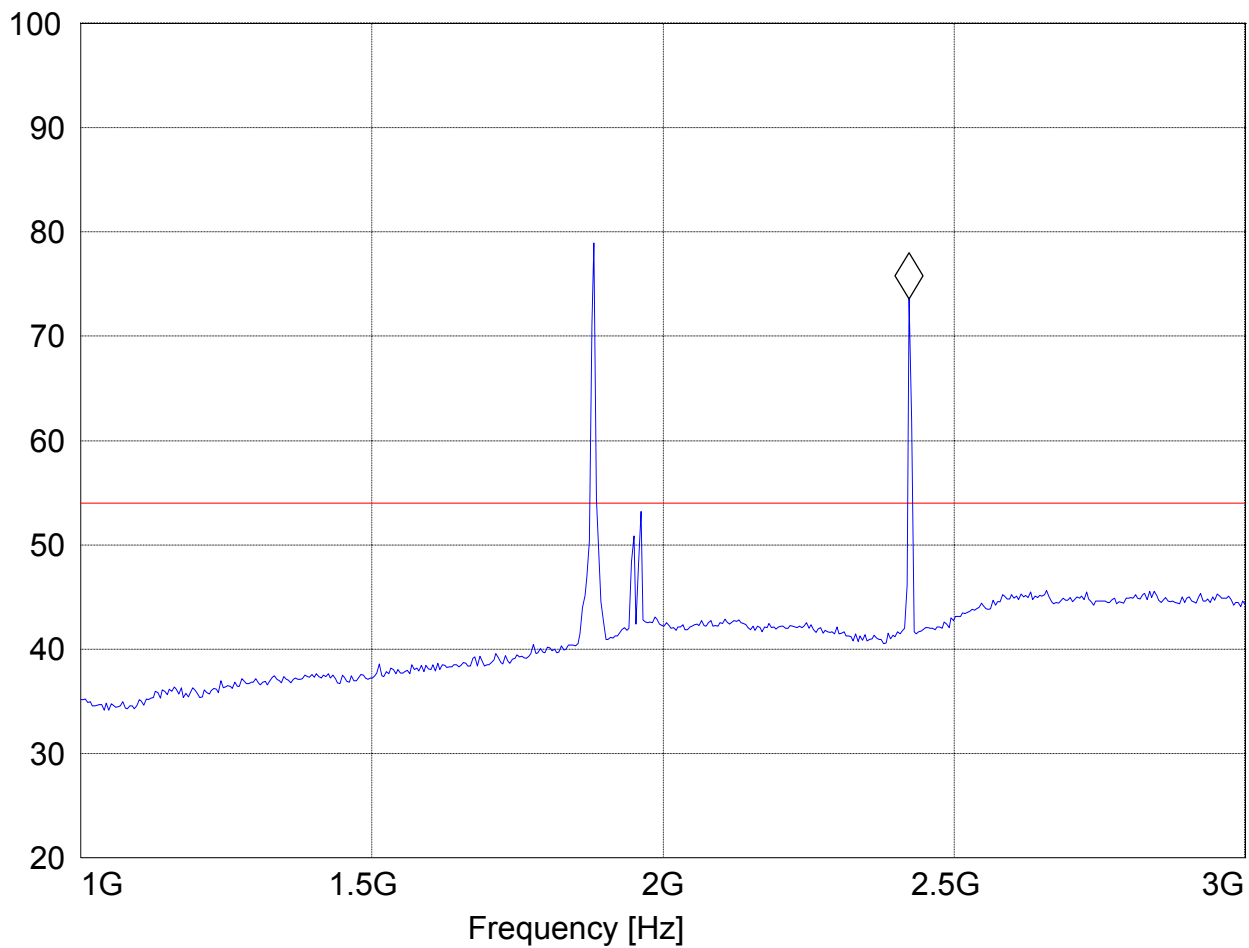
1GHz – 3GHz

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

Marker: 2.422845691 GHz 73.57 dB μ V/m

Level [dB μ V/m]



RECEIVER SPURIOUS RADIATION

§ 15.209

3GHz – 18GHz

SWEEP TABLE:

"BT Spuri hi 8-18G"

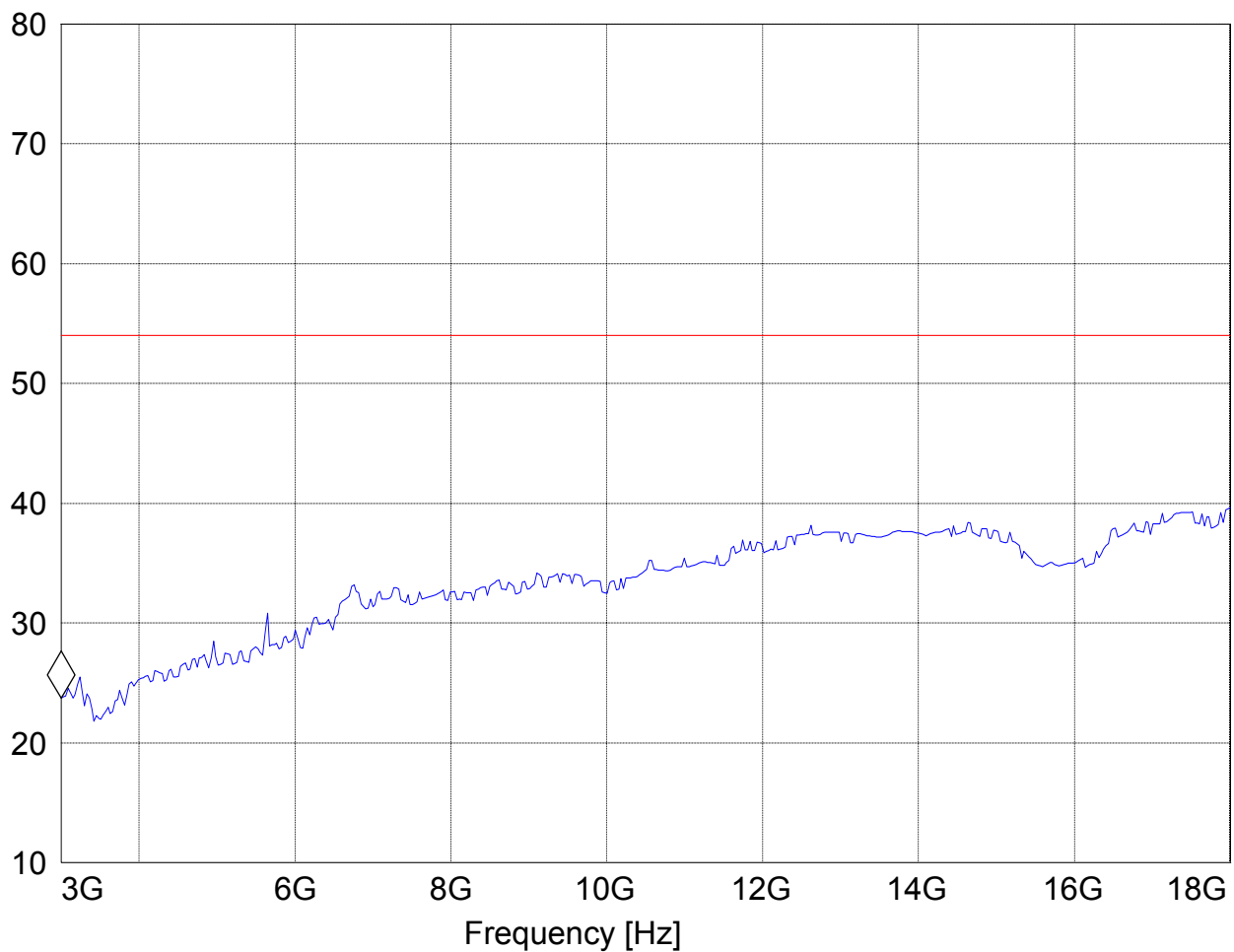
Short Description:

Bluetooth Spurious 8-18GHz

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

Marker: 3 GHz 23.74 dBμV/m

Level [dBμV/m]



RECEIVER SPURIOUS RADIATION

§ 15.209

18GHz – 25GHz

SWEEP TABLE:

"BT Spuri hi 18-25G"

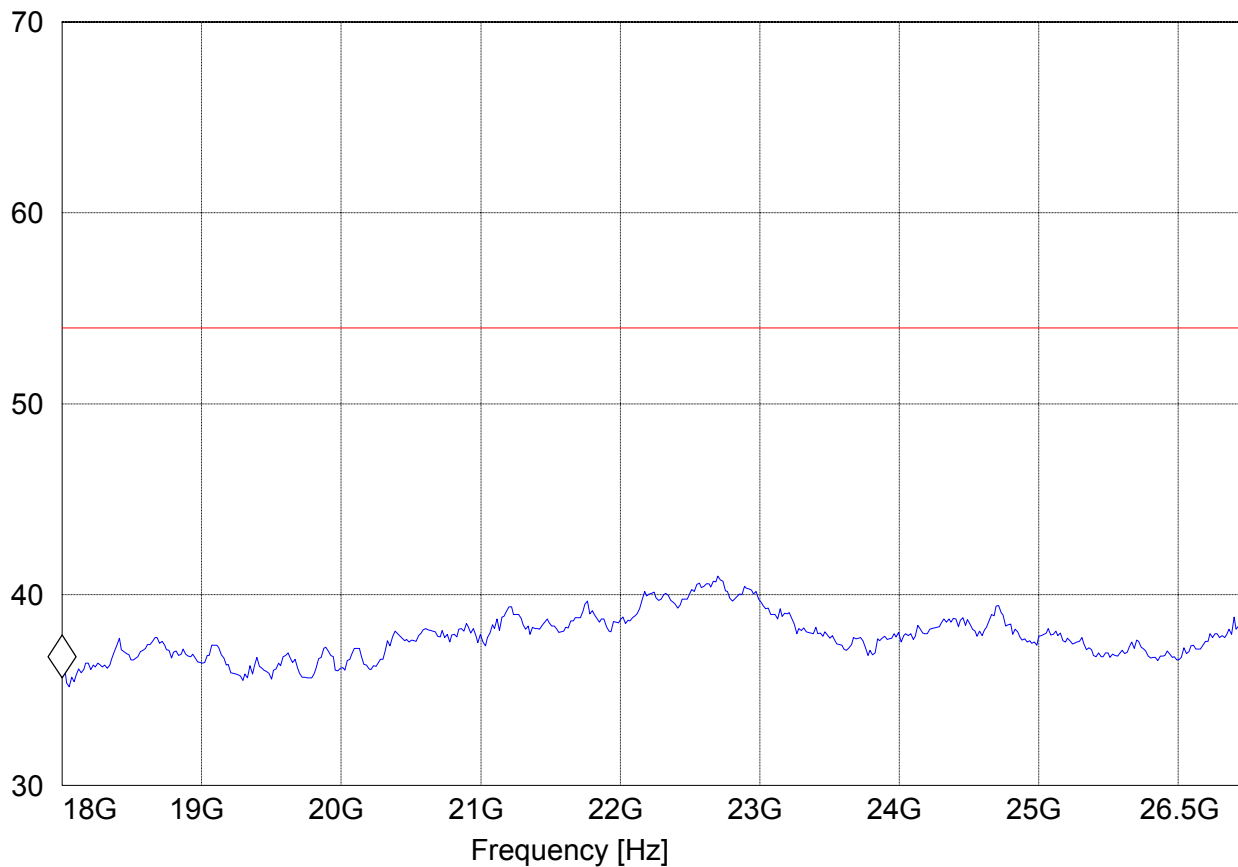
Short Description:

Bluetooth Spurious 18-25GHz

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

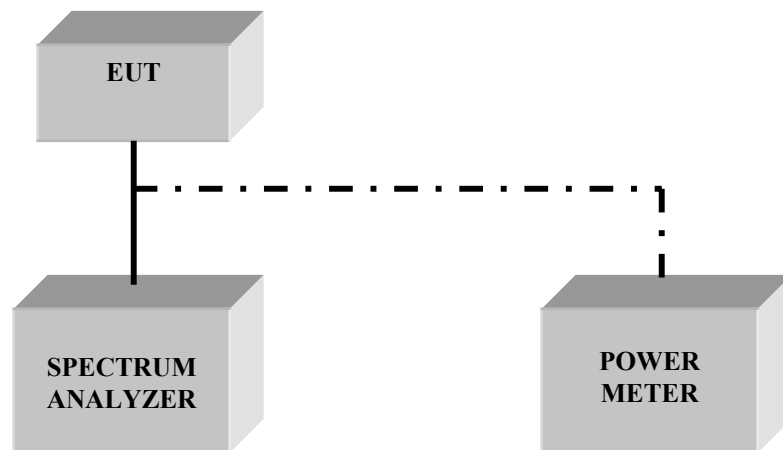
Marker: 18 GHz 35.64 dBμV/m

Level [dBμV/m]



TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

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

BLOCK DIAGRAMS**Conducted Testing**

Radiated Testing

ANECHOIC CHAMBER

