



# FCC Test Report

Test report no.: EMC\_826FCC15.247\_2004\_BT

**FCC Part 15.247 for FHSS systems / CANADA RSS-210**

**Model: D9500LUP**

**FCC ID: HD59500LUP**



Accredited according to **ISO/IEC 17025**



CTIA Authorized Test Lab  
LAB CODE 20020328-00

**FCC listed # 101450**

**IC recognized # 3925**

## **CETECOM Inc.**

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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****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**

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Street : 700 Vision Drive  
City / Zip Code : Skaneateles Falls, NY 13153  
Country : U.S.A  
Contact : Naveen Velagapudi  
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e-mail : [velagapudin@hhp.com](mailto:velagapudin@hhp.com)

**1.4 Application details**

Date of receipt test item : 2004-12-15  
Date of test : 2004-12-15/16

**1.5 Test item**

Manufacturer : Applicant  
Marketing Name : Dolphin 9500LUP  
Model No. : **D9500LUP**  
Description : Dolphin 9500 is a ruggedized handheld computer which can read barcodes and other auto ID codes. It contains three different transmitters (BT, WLAN and GSM) to send and receive data.  
FCC-ID : D9500LUP

**Additional information**

Test Sample for BT : s/n 0046785, 0046792 (used only for 30M-1GHz)  
Frequency : 2402MHz – 2480MHz for BT  
Type of modulation : GFSK  
Number of channels : 79  
Antenna : Internal  
Power supply : Battery or Charger (AC Adaptor)  
Output power : -11.4dBm (0.00007W) max. conducted peak power

**1.6 Test standards:**

**FCC Part 15 §15.247 (DA00-705) / RSS 210**

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

**PROJECT OVERVIEW:**

**NOTE: This test report covers all radiated measurements as per FCC15.247 for BT module in HHP handheld computer model#D9500LUP. For all conducted measurements please refer to test report# BT\_cond\_Socket.**

**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>
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**Technical responsibility for area of testing:**2004-12-20 EMC & Radio      Lothar Schmidt (Manager)

Date	Section	Name	Signature
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**Responsible for test report and project leader:**2004-12-20 EMC & Radio      Harpreet Sidhu (EMC Engineer)

Date	Section	Name	Signature
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## 2.2 Test report

### TEST REPORT

Test report no.: EMC\_826FCC15.247\_2004\_BT

**TEST REPORT REFERENCE**

<b>LIST OF MEASUREMENTS</b>		<b>PAGE</b>
MAXIMUM PEAK OUTPUT POWER	§15.247 (b) (1)	8
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**MAXIMUM PEAK OUTPUT POWER  
(CONDUCTED)****§ 15.247 (b) (1)**

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402	2441	2480
T <sub>nom</sub> (23)°C	V <sub>nom</sub>	-13.6	-12.7	-11.4
Measurement uncertainty		±0.5dBm		

RBW/VBW: 3 MHz

**LIMIT****SUBCLAUSE § 15.247 (b) (1)**

Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt conducted

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

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402	2441	2480
T <sub>nom</sub> (23)°C	V <sub>nom</sub>	-14.33	-15.44	-18.79
Measurement uncertainty		±0.5dBm		

RBW/VBW: 3 MHz

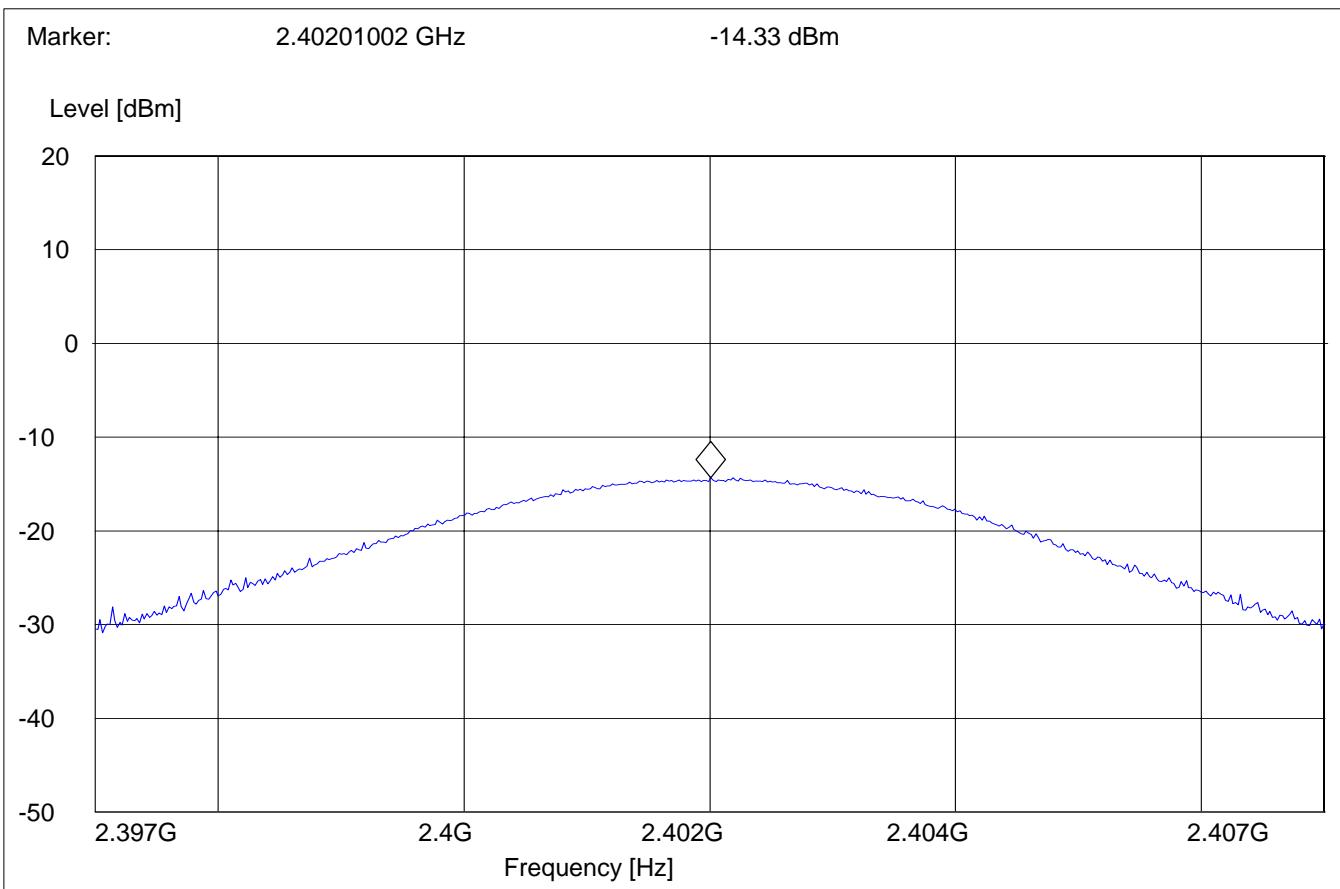
**LIMIT****SUBCLAUSE § 15.247 (b) (1)**

Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt conducted

**PEAK OUTPUT POWER (RADIATED)****§15.247 (b) (1)****Lowest Channel: 2402MHz**

## SWEEP TABLE: "EIRP BT low channel"

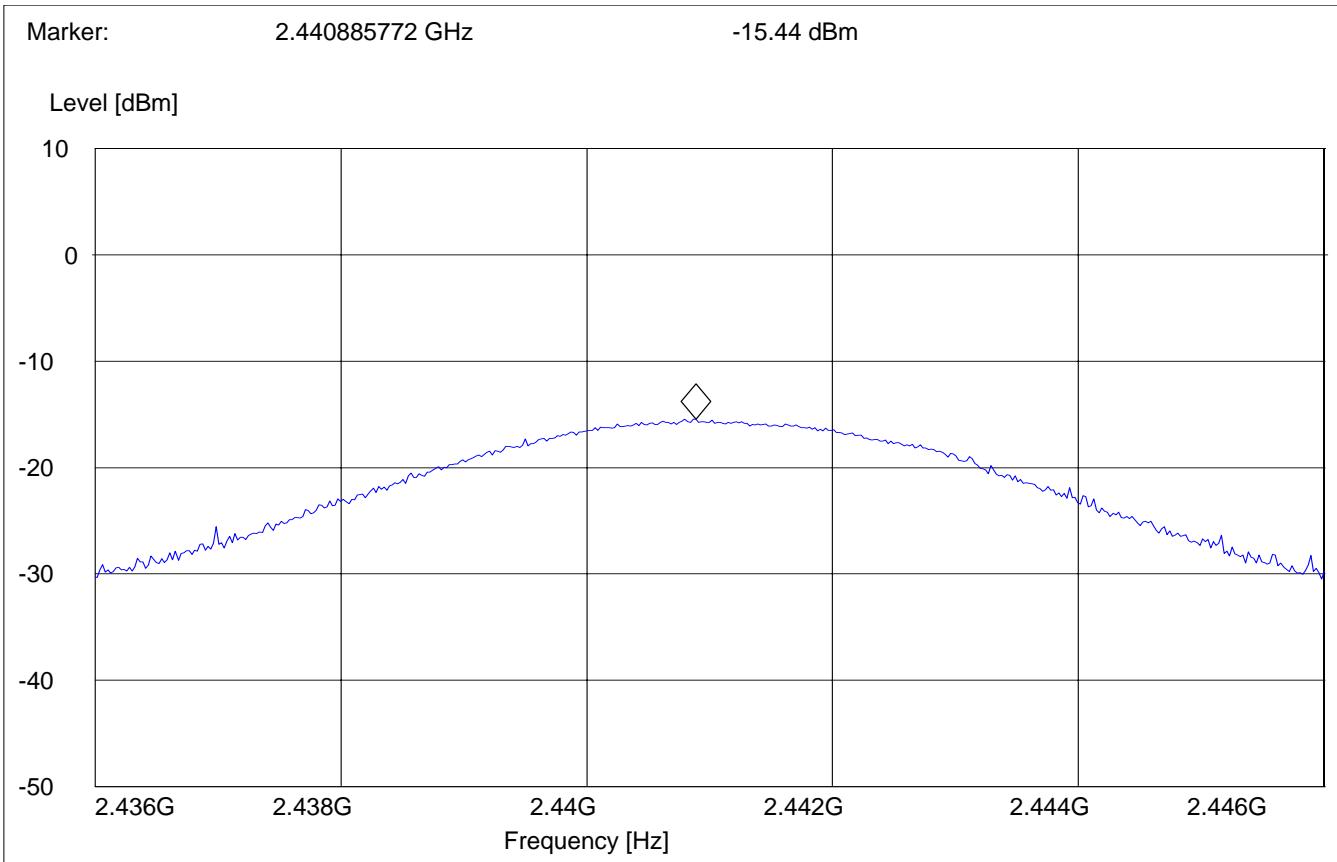
Short Description: EIRP Bluetooth channel-2402MHz  
Start Stop Detector Meas. IF  
Frequency Frequency Time BW  
2.397GHz 2.407GHz MaxPeak Coupled 3 MHz



**PEAK OUTPUT POWER (RADIATED)****§15.247 (b) (1)****Mid Channel: 2441MHz**

## SWEEP TABLE: "EIRP BT Mid channel"

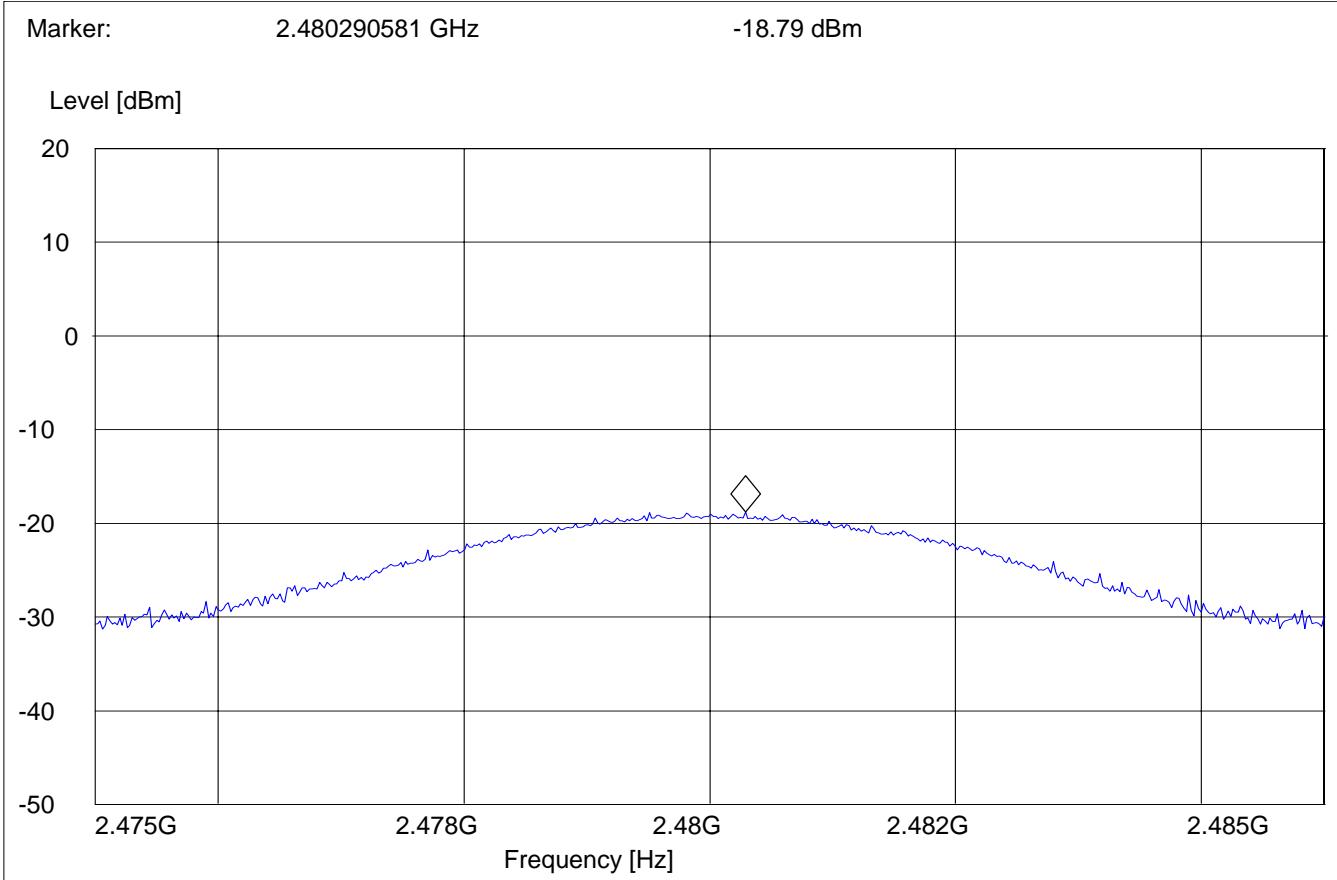
Start Frequency	Stop Frequency	Detector	Meas.	IF
2.436GHz	2.446GHz	MaxPeak	Time Coupled	BW 3 MHz



**PEAK OUTPUT POWER (RADIATED)****§15.247 (b) (1)****Highest Channel: 2480MHz**

SWEEP TABLE: "EIRP BT High channel"

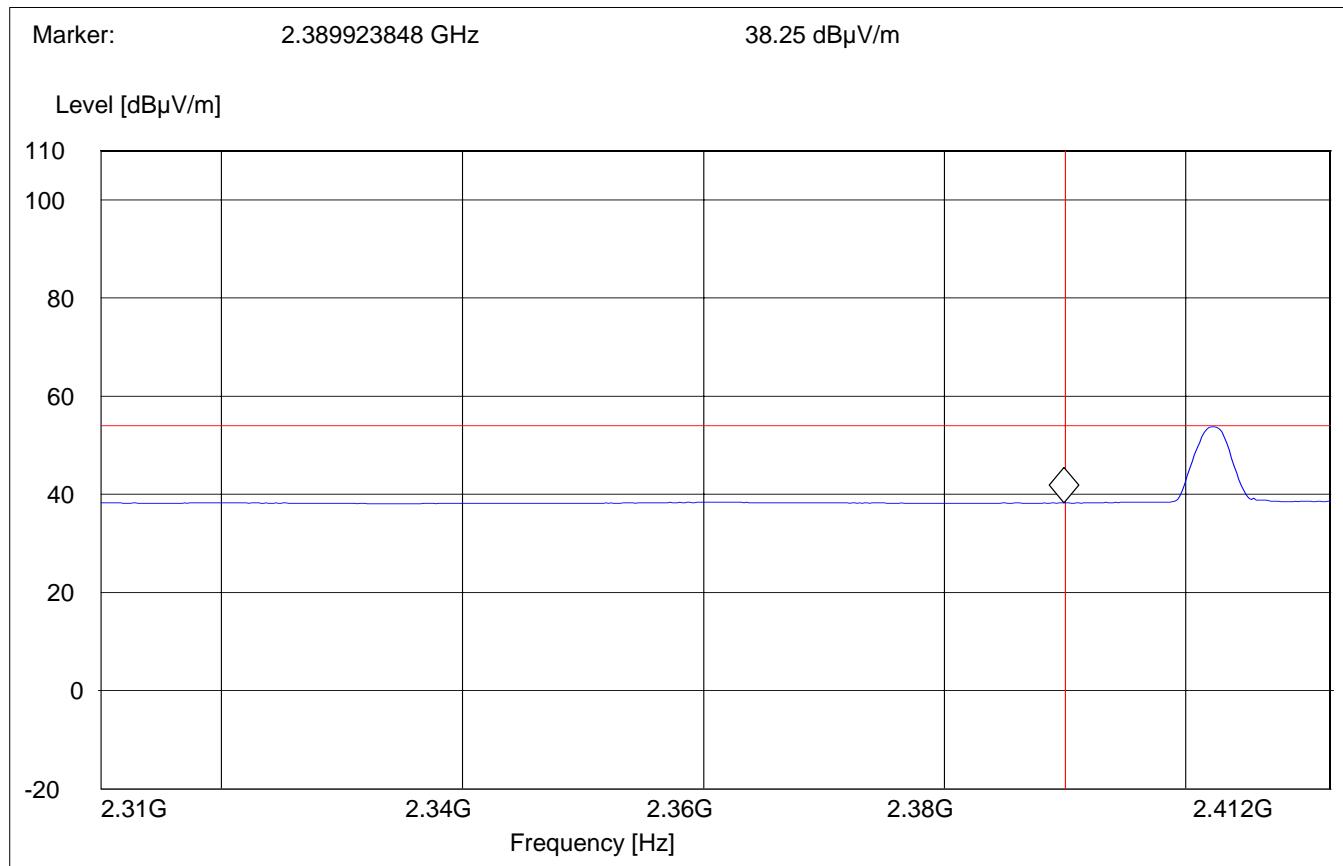
Short Description:	EIRP Bluetooth channel-2480MHz			
Start Frequency	Stop Frequency	Detector	Meas.	IF
2.475GHz	2.485GHz	MaxPeak	Time Coupled	BW 3 MHz



**BAND EDGE COMPLIANCE****§15.247 (c)****Low frequency section (spurious in the restricted band 2310 – 2390 MHz)****Average Measurement****(This plot is valid for both Hopping ON & OFF)**

Operating condition : Tx at 2402MHz  
SWEEP TABLE : "FCC15.247 LBE\_AVG"  
Short Description : FCC15.247 BT Low-band-edge  
Limit Line : 54dB $\mu$ V

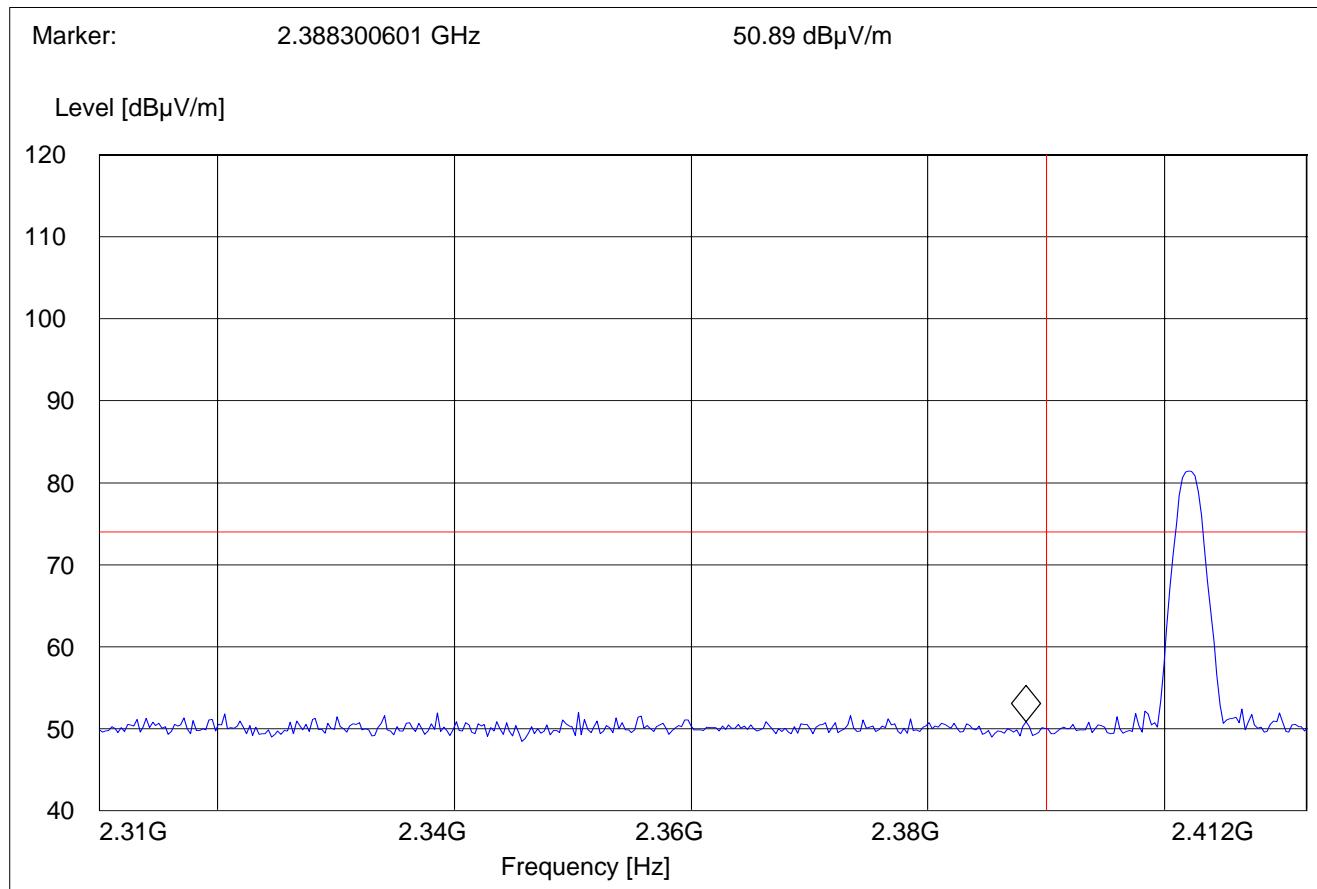
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
2.31 GHz	2.412 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)



**BAND EDGE COMPLIANCE****§15.247 (c)****Low frequency section (spurious in the restricted band 2310 – 2390 MHz)****Peak Measurement****(This plot is valid for both Hopping ON & OFF)**

Operating condition : Tx at 2402MHz  
SWEEP TABLE : "FCC15.247 LBE\_Pk"  
Short Description : FCC15.247 BT Low-band-edge  
Limit Line : 74dB $\mu$ V

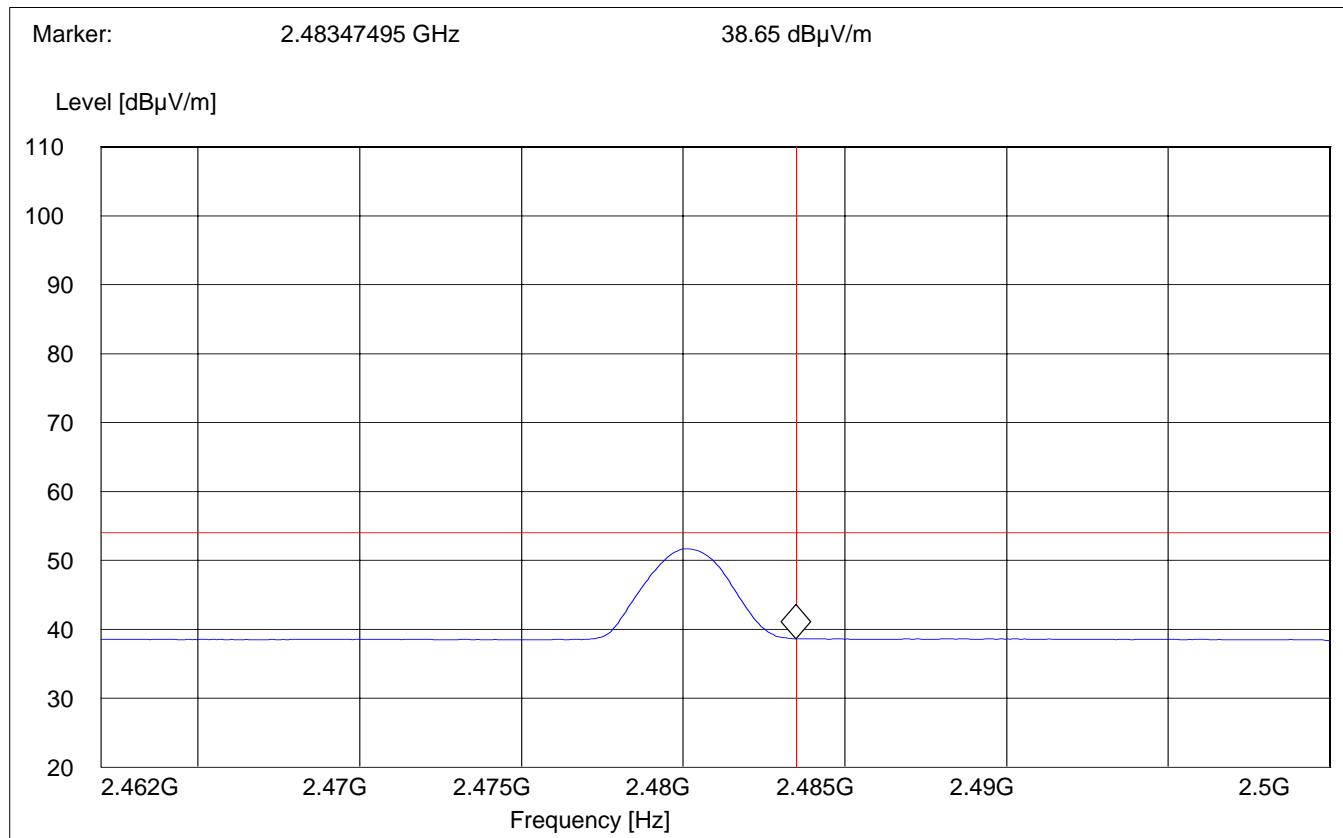
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
2.31 GHz	2.412 GHz	MaxPeak	Coupled	1 MHz	1MHz	#326 horn (dBi)



**BAND EDGE COMPLIANCE****§15.247 (c)****High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)****Average Measurement****(This plot is valid for both Hopping ON & OFF)**

Operating condition : Tx at 2480MHz  
SWEEP TABLE : "FCC15.247 HBE\_AVG"  
Short Description : FCC15.247 BT High-band-edge  
Limit Line : 54dB $\mu$ V

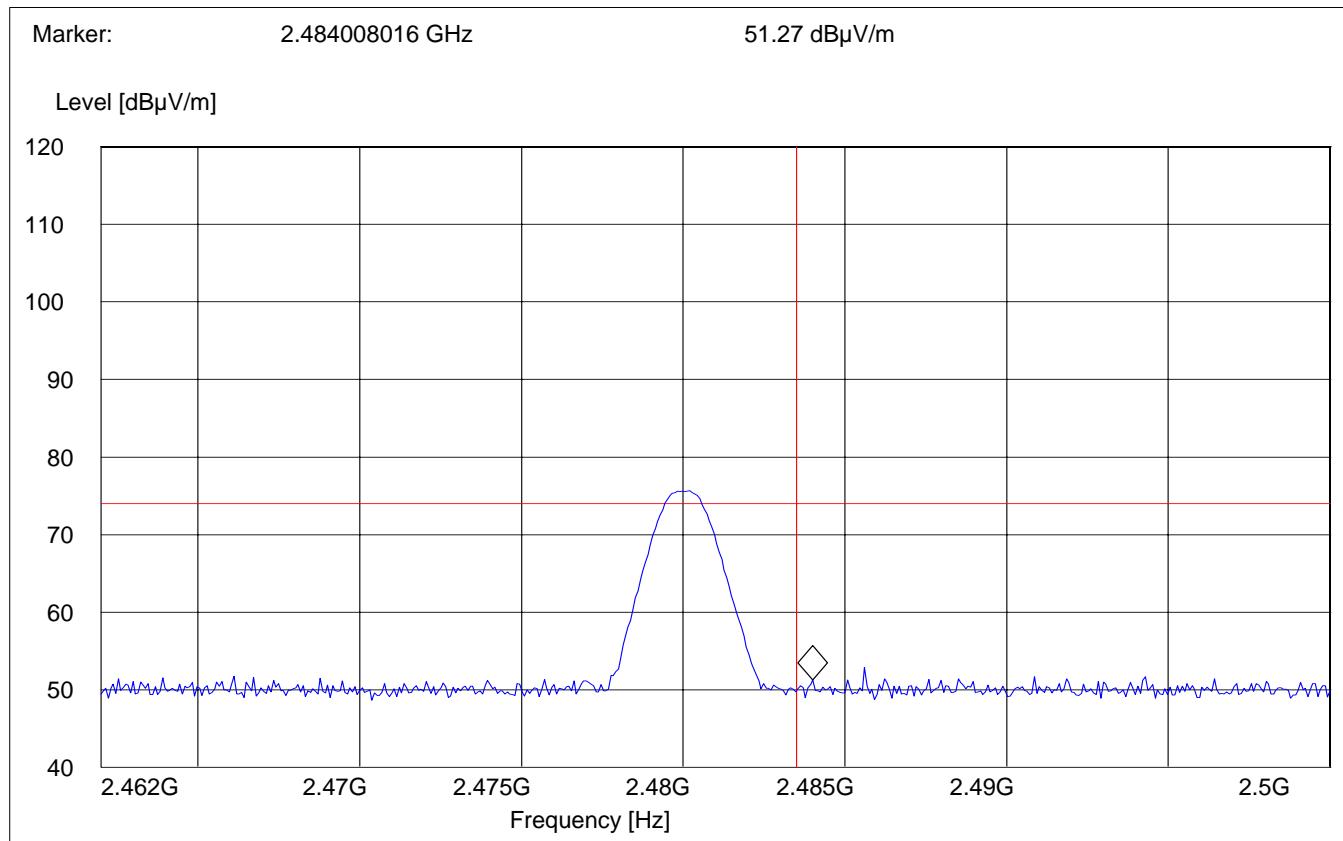
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
2.462 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)



**BAND EDGE COMPLIANCE****§15.247 (c)****High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)****Peak Measurement****(This plot is valid for both Hopping ON & OFF)**

Operating condition : Tx at 2480MHz  
SWEEP TABLE : "FCC15.247 HBE\_PK"  
Short Description : FCC15.247 BT High-band-edge  
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 (c) (1)****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 that 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 26.5 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 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.**

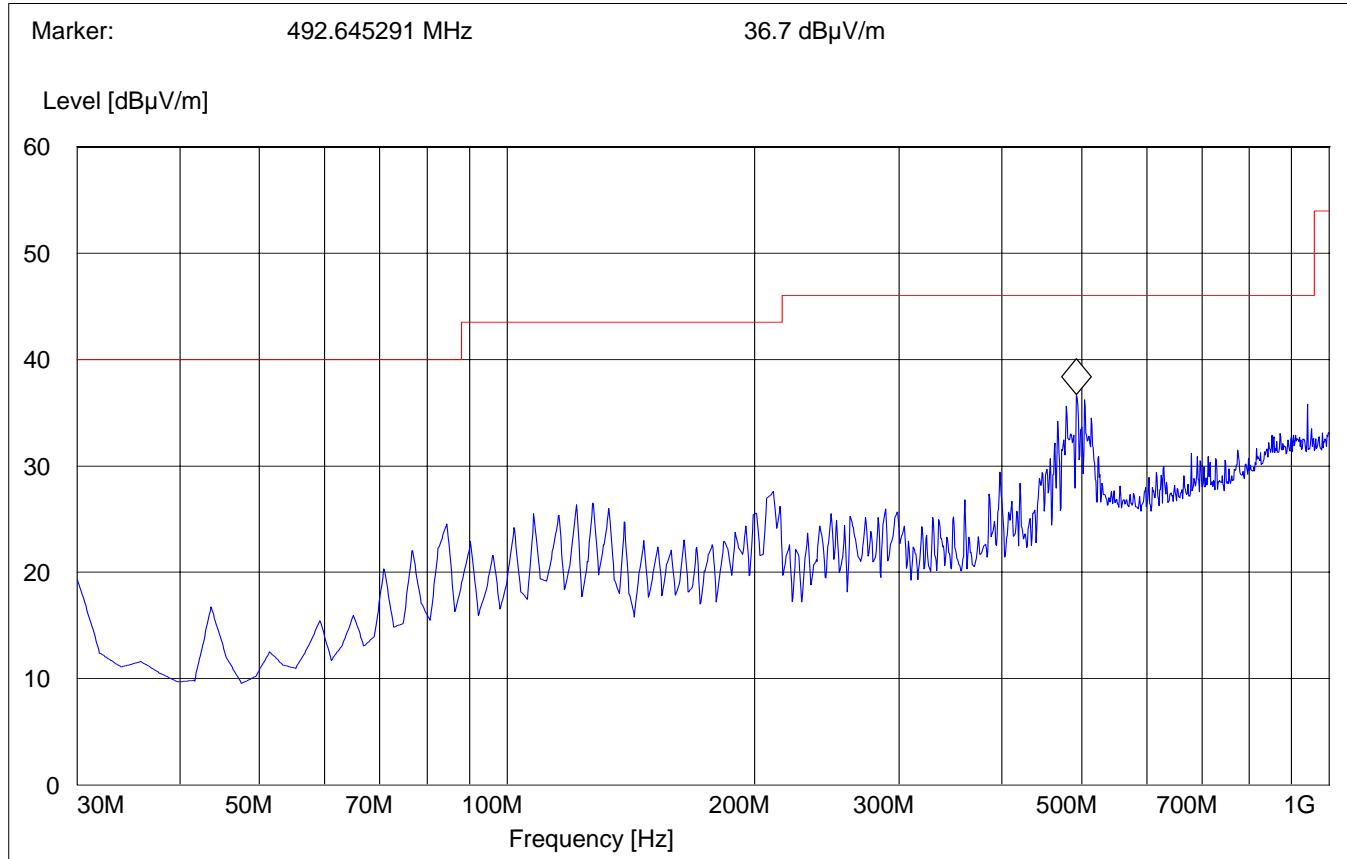
Transmit at Lowest channel Frequency 2402MHz			
Frequency (MHz)	Level (dB $\mu$ V/m)		
	Peak	Quasi-Peak	Average
SEE PLOTS			
Transmit at Middle channel Frequency 2441MHz			
Frequency (MHz)	Level (dB $\mu$ V/m)		
	Peak	Quasi-Peak	Average
SEE PLOTS			
Transmit at Highest channel Frequency 2480MHz			
Frequency (MHz)	Level (dB $\mu$ V/m)		
	Peak	Quasi-Peak	Average
SEE PLOTS			

**EMISSION LIMITATIONS - Radiated (Transmitter)****§ 15.247 (c) (1)****30MHz – 1GHz****Antenna: vertical****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

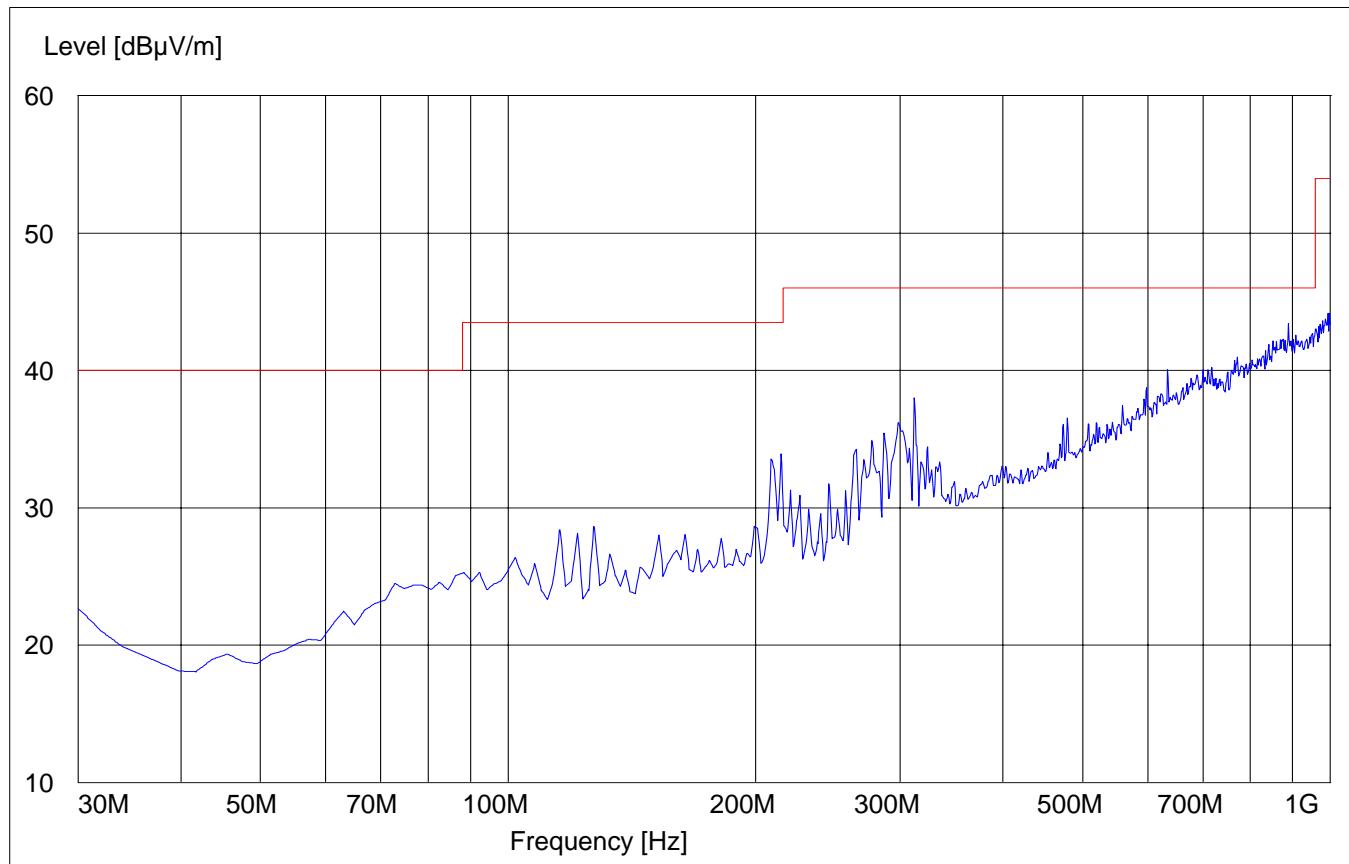
Start Frequency	Stop Frequency	Detector	Meas.	RBW	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186



**EMISSION LIMITATIONS - Radiated (Transmitter)****§ 15.247 (c) (1)****30MHz – 1GHz****Antenna: horizontal****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.	RBW	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186

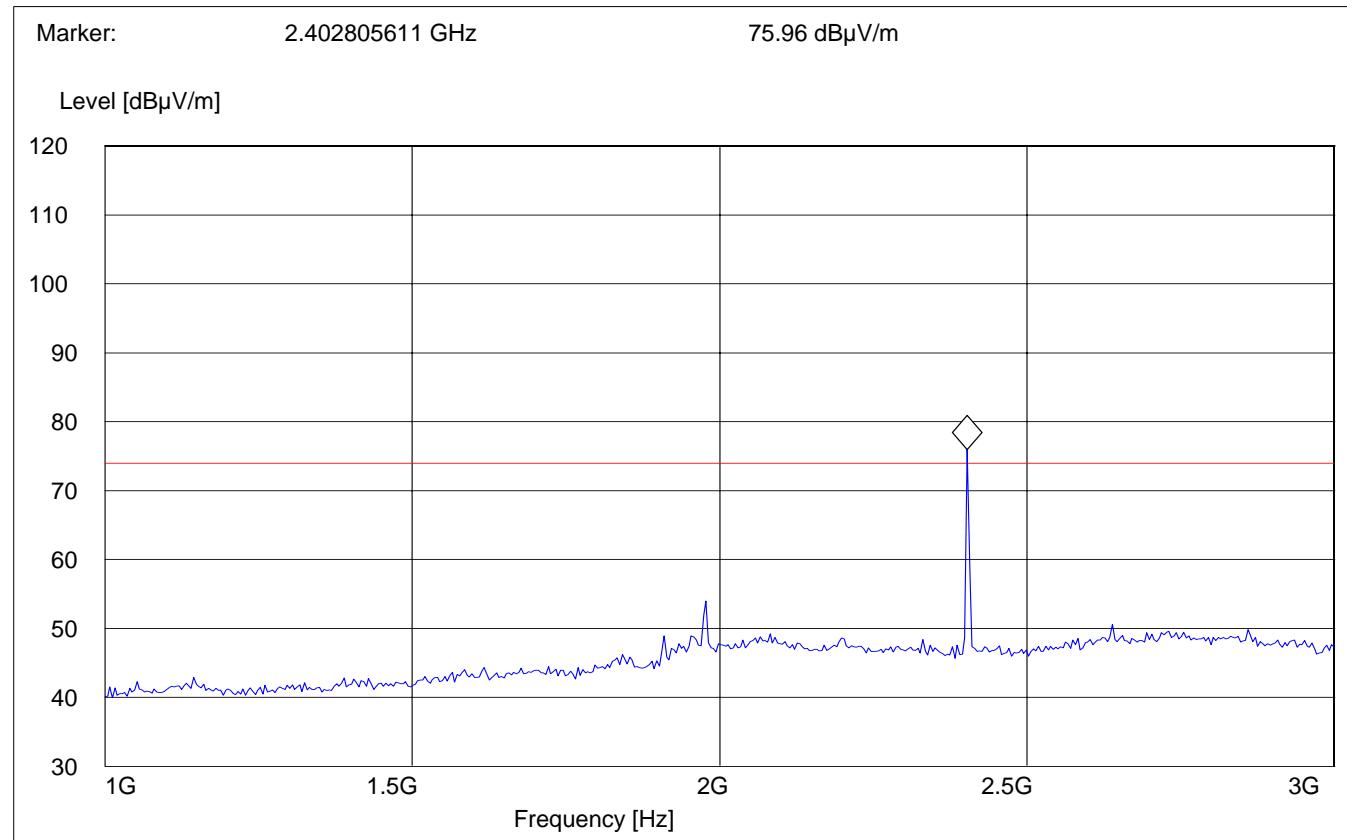


**EMISSION LIMITATIONS - Radiated (Transmitter)**  
**Lowest Channel (2402MHz): 1GHz – 3GHz****§ 15.247 (c) (1)****NOTE: The peak is the carrier frequency.**

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

Short Description: Bluetooth Spurious 1-3GHz

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

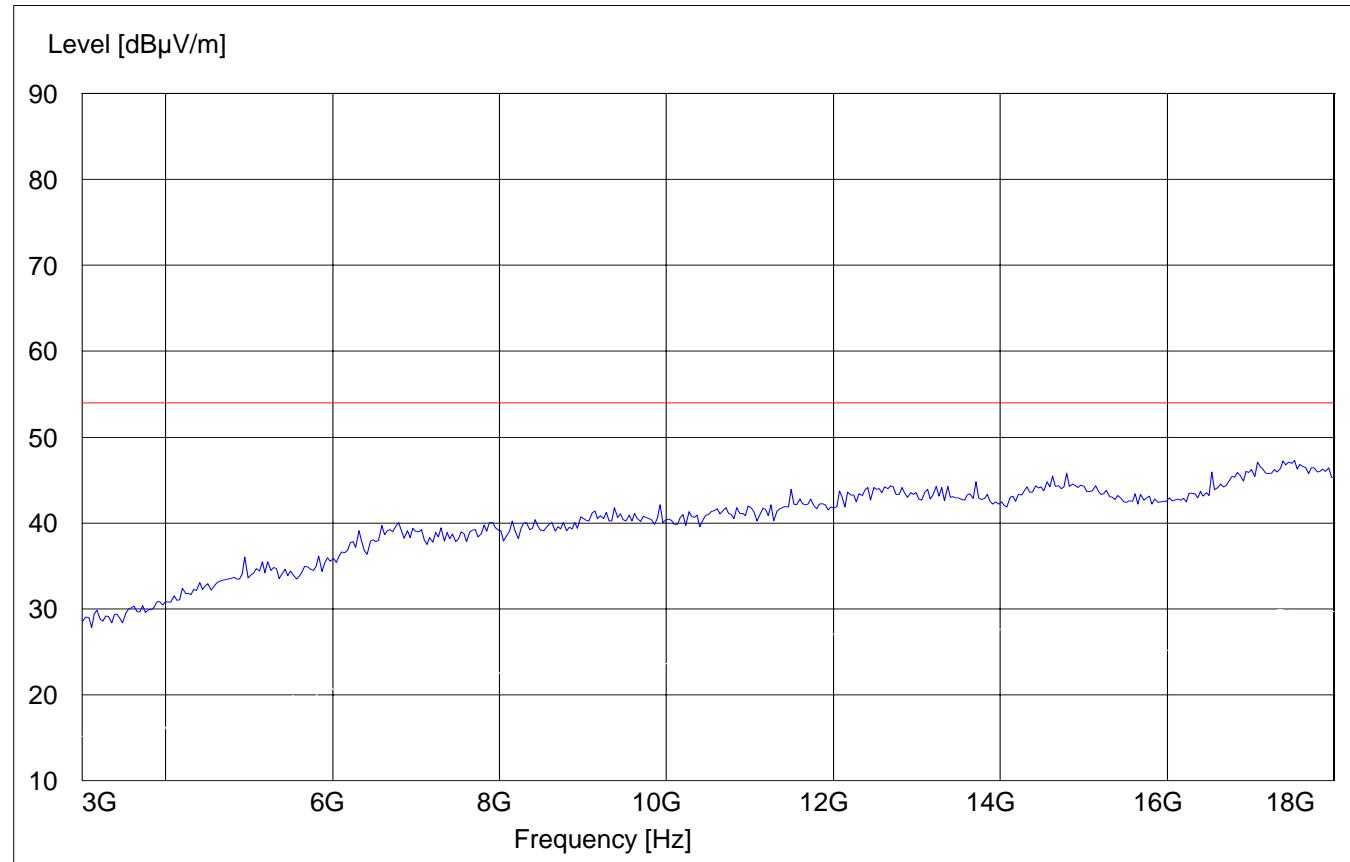


**EMISSION LIMITATIONS - Radiated (Transmitter)****§ 15.247 (c) (1)****Lowest Channel (2402MHz): 3GHz – 18GHz**

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

Short Description: Bluetooth Spurious 3-18 GHz

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

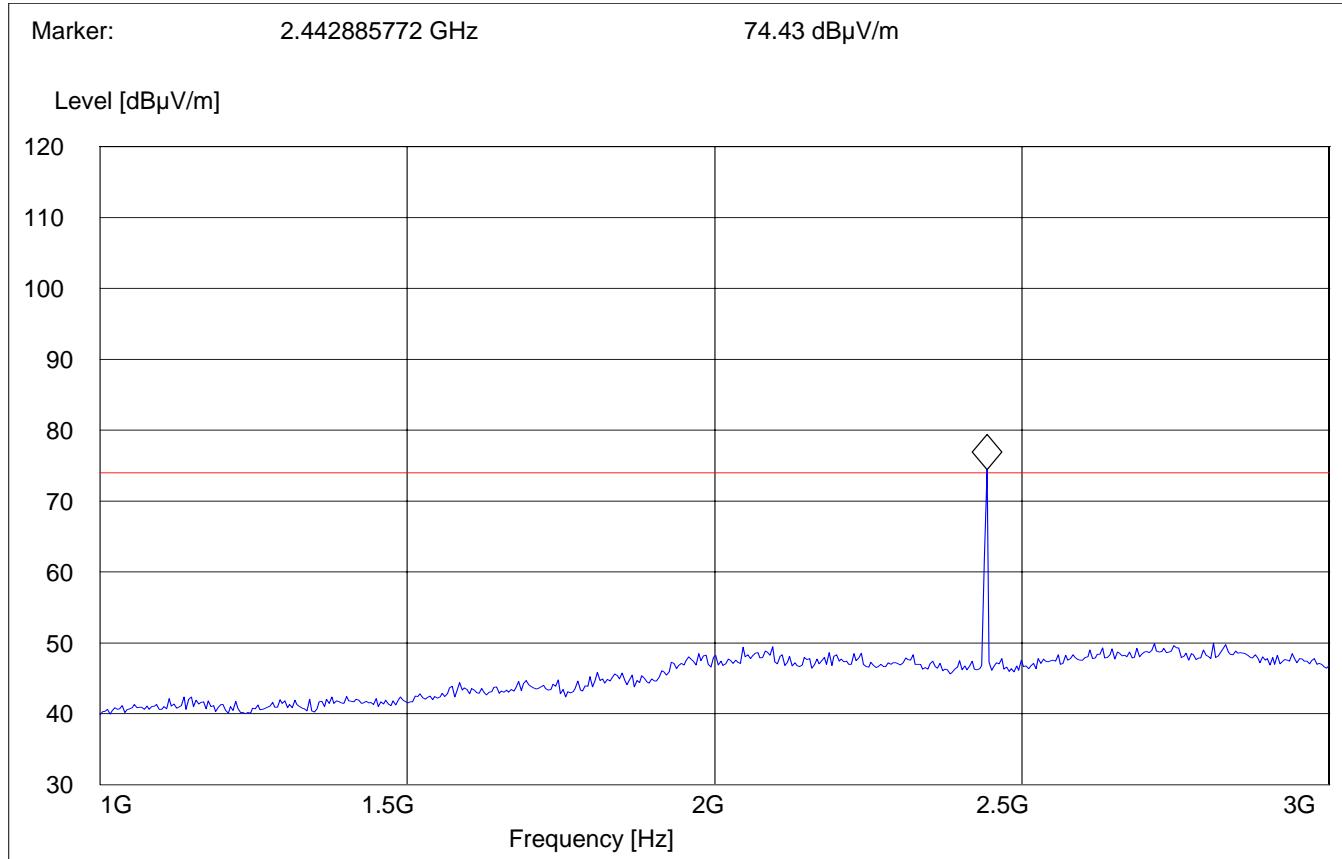


**EMISSION LIMITATIONS - Radiated (Transmitter)**  
**Middle Channel (2441MHz): 1GHz – 3GHz****§ 15.247 (c) (1)****NOTE: The peak is the carrier frequency.**

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

Short Description: Bluetooth Spurious 1-3GHz

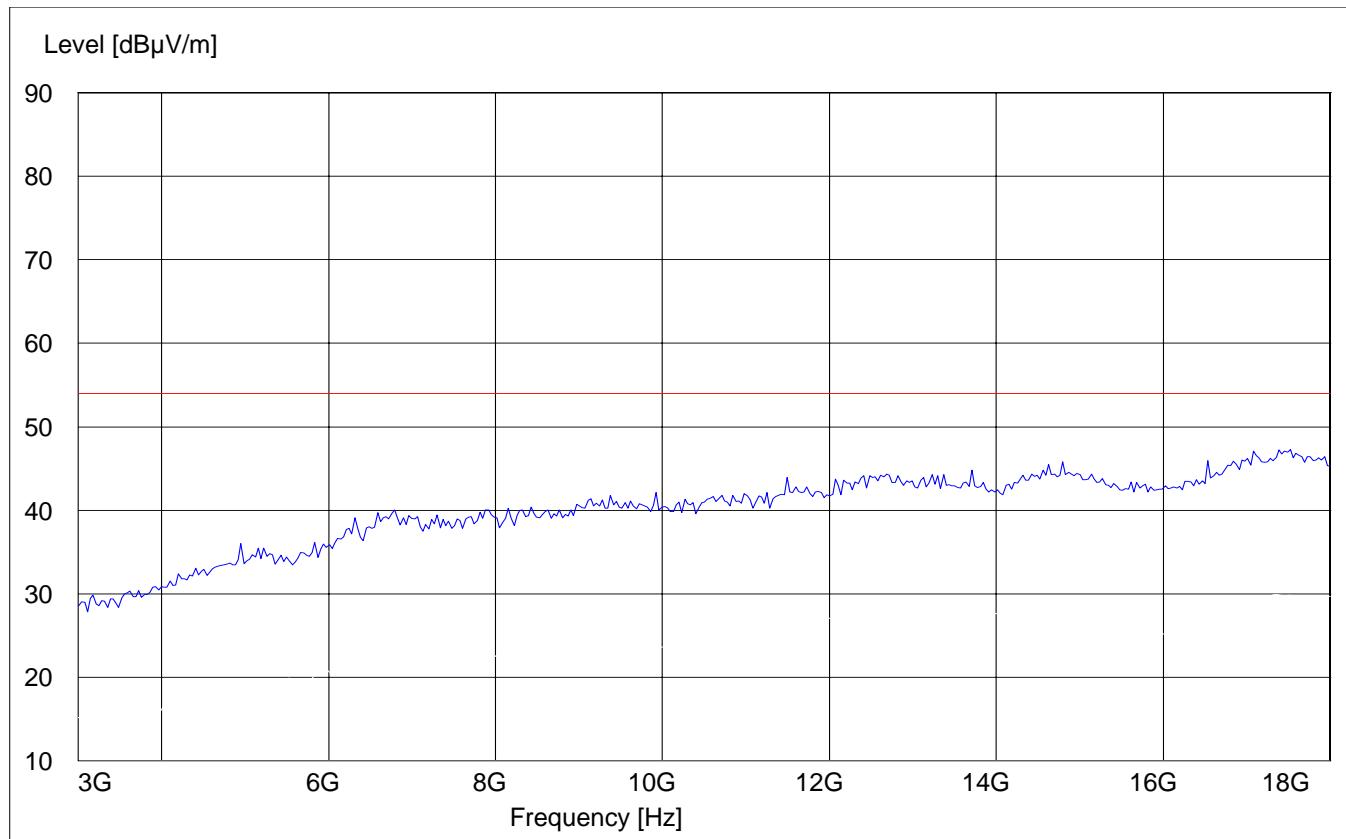
Start Frequency	Stop Frequency	Detector	Meas.	RBW	Transducer
1.0 GHz	3.0 GHz	Time	Bandw.	VBW	
		MaxPeak	Coupled	1 MHz	#326 horn (dBi)



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

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

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

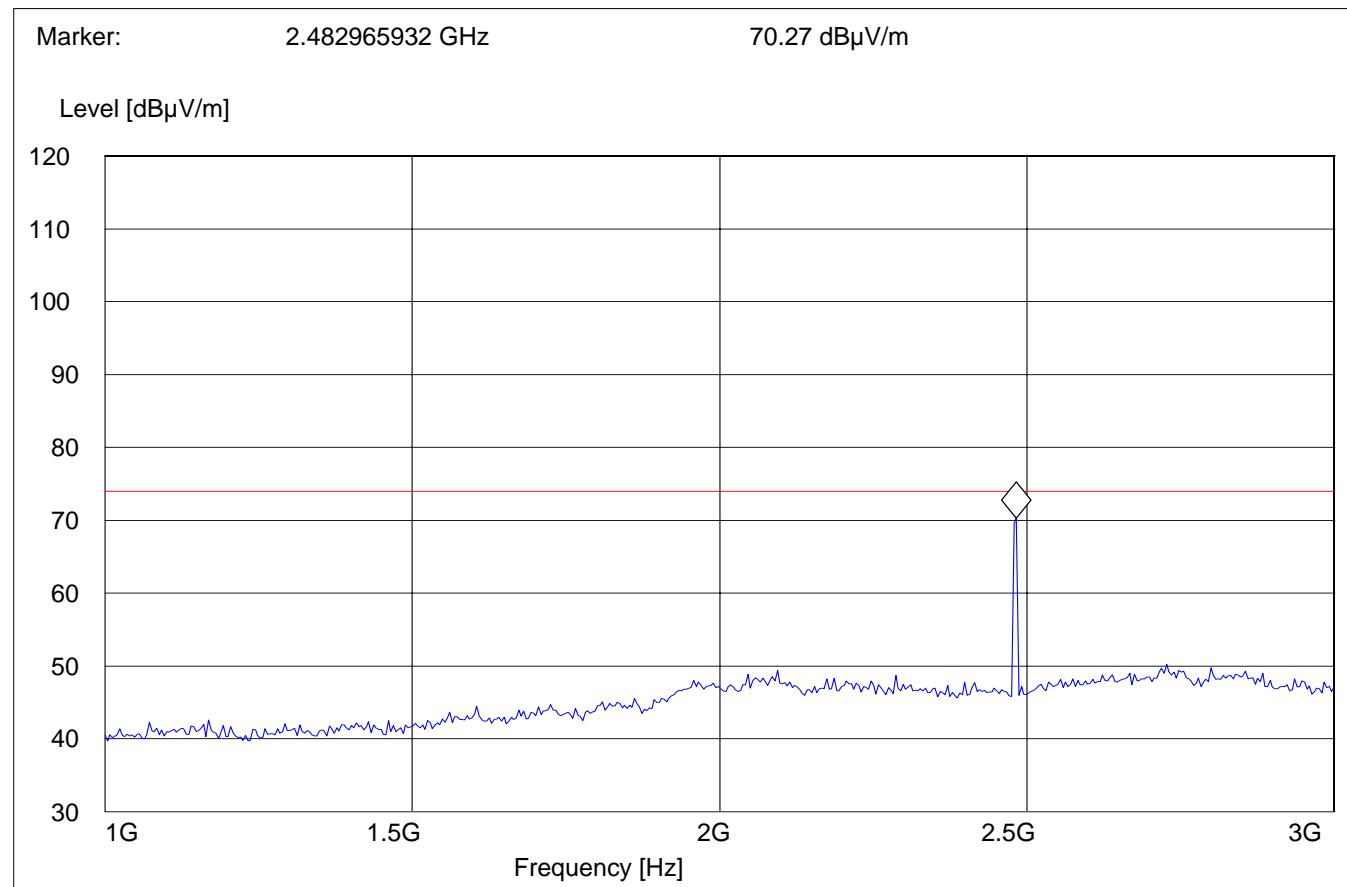


**EMISSION LIMITATIONS - Radiated (Transmitter)****§ 15.247 (c) (1)****Highest Channel (2480MHz): 1GHz – 3GHz****NOTE: The peak is the carrier frequency.**

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

Short Description: Bluetooth Spurious 1-3GHz

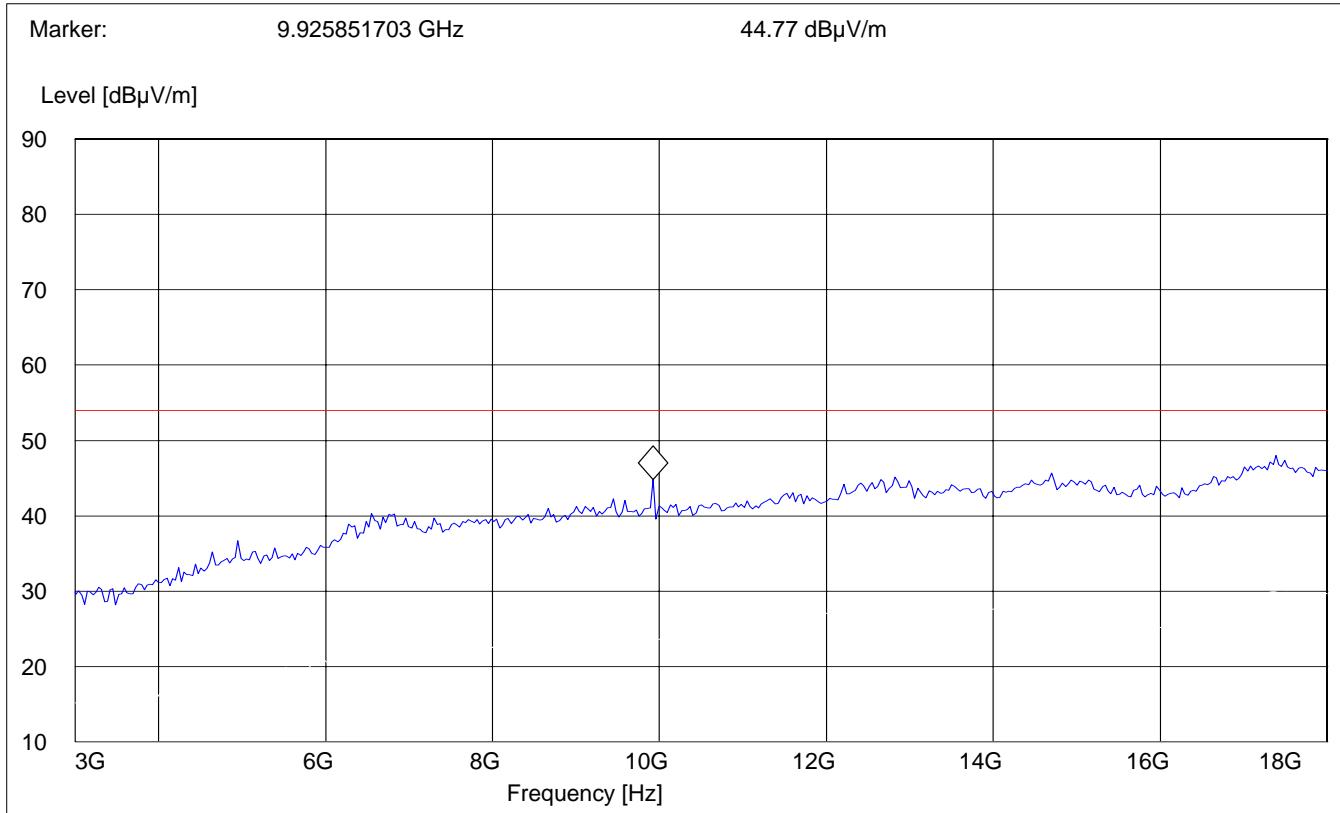
Start Frequency	Stop Frequency	Detector	Meas.	RBW	Transducer
1.0 GHz	3.0 GHz	Time	Bandw.	VBW	
		MaxPeak	Coupled	1 MHz	#326 horn (dBi)



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

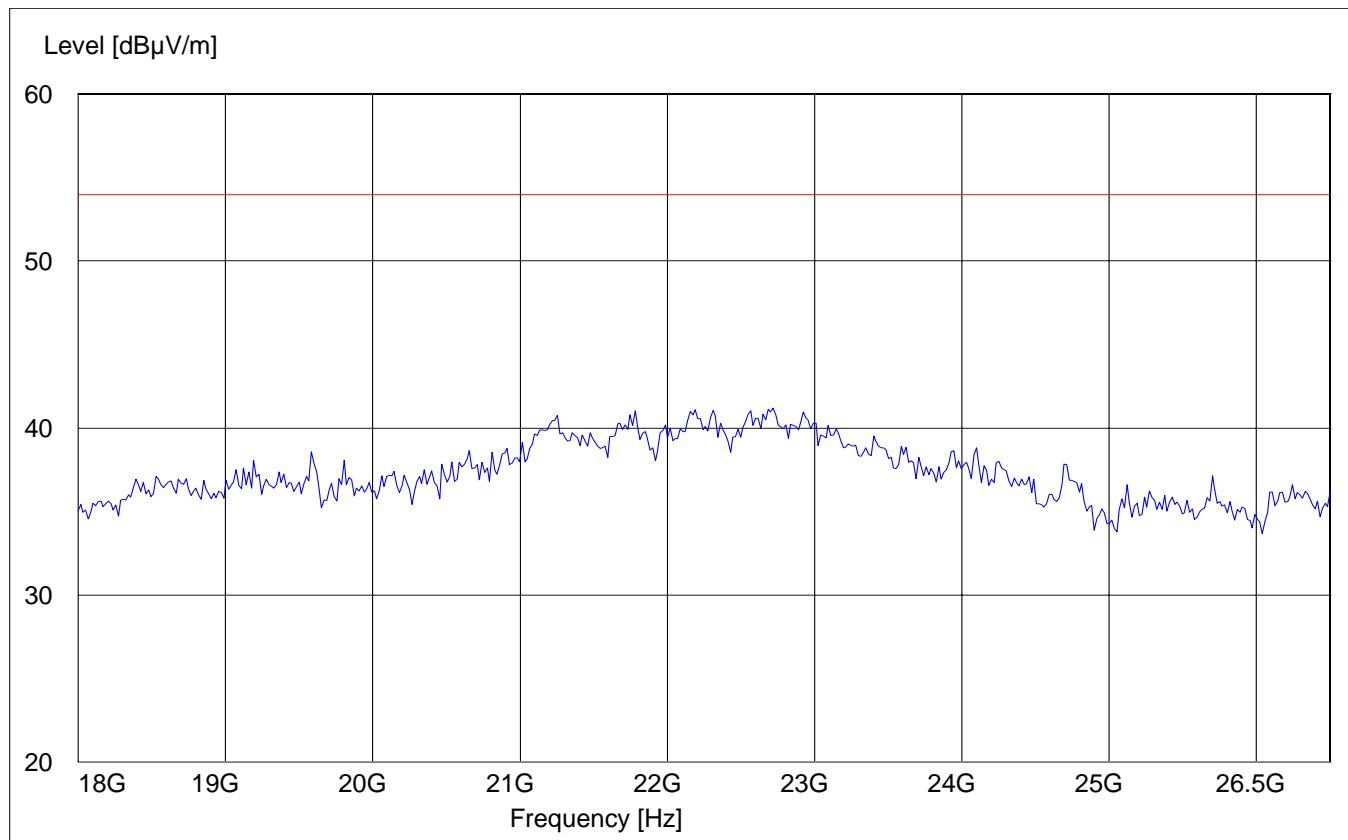
**SWEEP TABLE:** "BT Spuri hi 3-18G"  
**Short Description:** Bluetooth Spurious 3-18GHz

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



**EMISSION LIMITATIONS - Radiated (Transmitter)****§ 15.247 (c) (1)****18GHz – 26.5GHz****Note: This plot is valid for low, mid & high channels (worst-case plot)****SWEEP TABLE:****"BT Spuri hi 18-26.5G"****Short Description:****Bluetooth Spurious 18-26.5GHz**

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



**CONDUCTED EMISSIONS****§ 15.107/207****Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)****Limit**

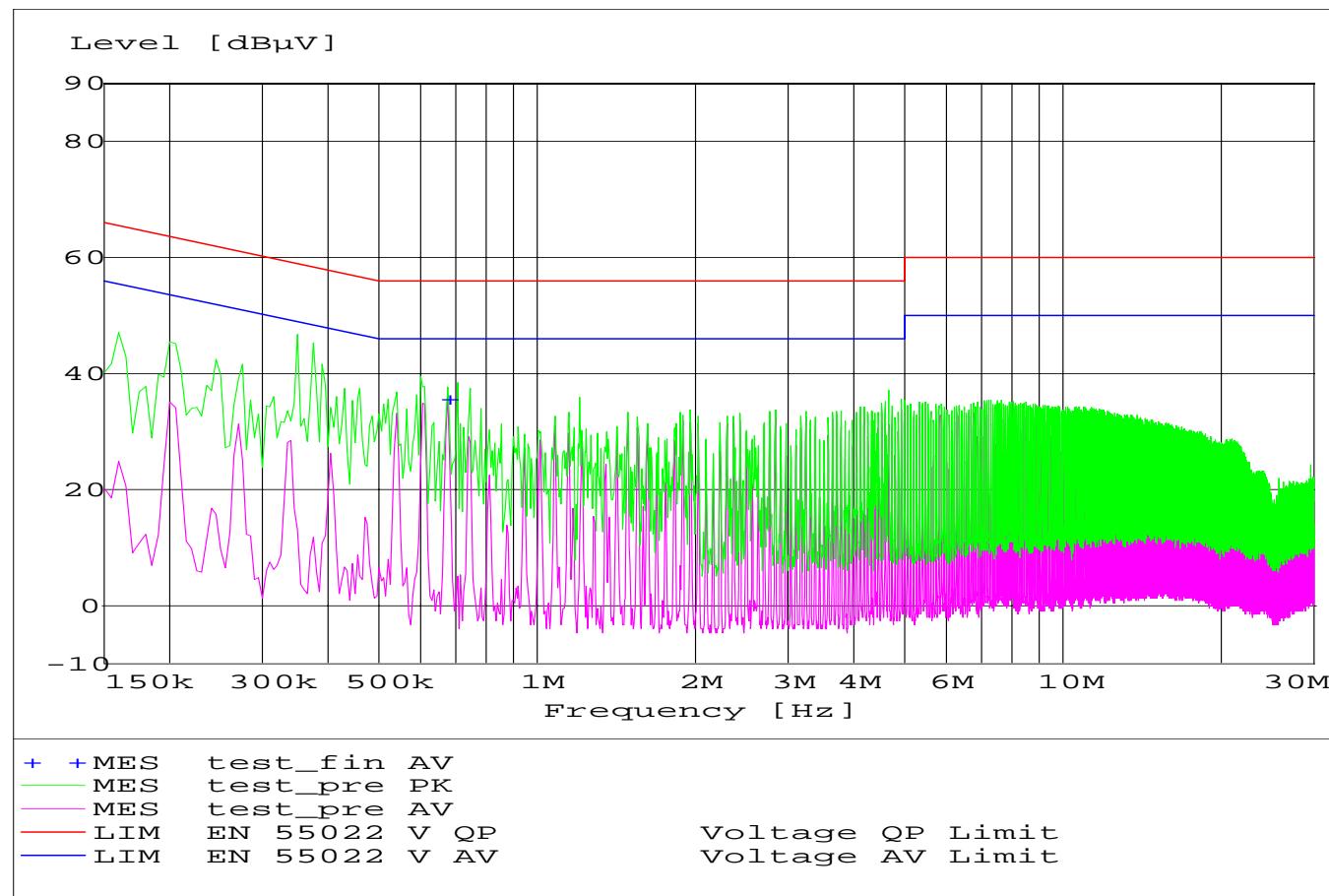
Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

\* Decreases with logarithm of the frequency

ANALYZER SETTINGS: RBW = 10KHz      VBW = 10KHz

**MEASUREMENT RESULT: "test\_fin AV"**

Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dB $\mu$ V	dB	dB $\mu$ V	dB		
0.675000	35.70	0.0	46	10.3	N	GND

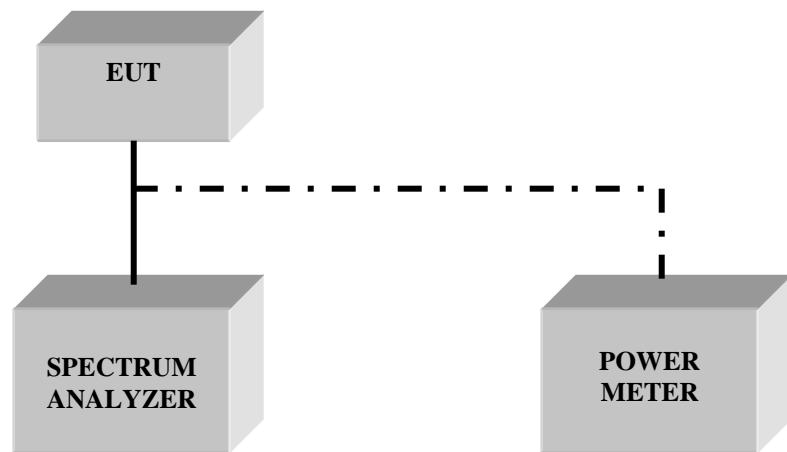


**TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS**

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	Pre-Amplifier	TS-ANA	Rohde & Schwarz	--
08	Pre-Amplifier	JS4-00102600	Miteq	00616

**BLOCK DIAGRAMS**

Conducted Testing



**Radiated Testing****ANECHOIC CHAMBER**