



# FCC Test Report

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

**Model #: PCG-4R1L**

**FCC ID: AK8PCG4R1L**

**IC ID: 409B-PCG4R1L**

**SONY Corporation  
1-7-1 Konan, Minato-ku,  
Tokyo, 108-0075  
Japan**

**TEST REPORT #: EMC\_SONYE\_025\_08001\_15.247\_FHSS\_PCG4R1L  
DATE: 2008-11-06**



**FCC listed:  
A2LA  
accredited**

**IC recognized #  
3462B**

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CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686

Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May



**TABLE OF CONTENTS**

<b>1</b>	<b>Assessment</b>	<b>4</b>
<b>2</b>	<b>Administrative Data</b>	<b>5</b>
2.1	Identification of the Testing Laboratory Issuing the EMC Test Report	5
2.2	Identification of the Client	5
2.3	Identification of the Manufacturer	5
<b>3</b>	<b>Equipment Under Test (EUT)</b>	<b>6</b>
3.1	Specification of the Equipment under Test	6
3.2	Identification of the Equipment under Test (EUT)	6
3.3	Identification of Accessory equipment	6
<b>4</b>	<b>Subject Of Investigation</b>	<b>7</b>
<b>5</b>	<b>Measurements (RADIATED)</b>	<b>8</b>
5.1	<b>MAXIMUM PEAK OUTPUT POWER § 15.247 (RADIATED)</b>	<b>8</b>
5.1.1	LIMIT SUB CLAUSE § 15.247 (b) (1) (2) (3) (4)	8
5.1.2	Test Results	8
5.2	<b>RESTRICTED BAND EDGE COMPLIANCE RADIATED §15.247/15.205</b>	<b>9</b>
5.2.1	LIMITS	9
5.2.2	RESULTS: GFSK	10
5.2.3	RESULTS: $\pi/4$ DQPSK	14
5.2.4	RESULTS: 8DPSK	18
5.3	<b>TRANSMITTER SPURIOUS EMISSIONS RADIATED § 15.247/15.205/15.209</b>	<b>22</b>
5.3.1	LIMITS	22
5.3.2	RESULTS	23
5.4	<b>RECEIVER SPURIOUS RADIATION RSS-Gen(4.10)</b>	<b>32</b>
5.4.1	LIMITS	32
5.4.2	Results	33
<b>6</b>	<b>Measurements (CONDUCTED)</b>	<b>37</b>
6.1	<b>MAXIMUM PEAK OUTPUT POWER § 15.247 (CONDUCTED)</b>	<b>37</b>
6.1.1	LIMIT SUB CLAUSE § 15.247 (b) (1)	37
6.1.2	RESULTS: GFSK	37
6.2	<b>20dB BANDWIDTH</b>	<b>37</b>
6.2.1	LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)	37
6.2.2	RESULTS: GFSK	37
6.3	<b>CARRIER FREQUENCY SEPARATION</b>	<b>37</b>
6.3.1	LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)	37
6.3.2	RESULTS:	37
6.4	<b>NUMBER OF HOPPING CHANNELS</b>	<b>38</b>
6.4.1	LIMIT SUB CLAUSE § 15.247 (a) (1) (iii)	38
6.4.2	RESULTS:	38
6.5	<b>TIME OF OCCUPANCY (DWELL TIME)</b>	<b>38</b>



6.5.1	LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)	38
6.5.2	RESULTS:	38
<b>6.6</b>	<b>CONDUCTED SPURIOUS EMISSION</b>	<b>38</b>
6.6.1	LIMIT SUB CLAUSE § 15.247 (d)	38
6.6.2	RESULTS: Tnom(23)°C VnomVDC	38
<b>6.7</b>	<b>AC POWER LINE CONDUCTED EMISSIONS § 15.107/207</b>	<b>39</b>
6.7.1	LIMITS	39
6.7.2	RESULTS TX Line:	40
6.7.3	RESULTS TX Neutral	42
6.7.4	RESULTS RX Line:	44
6.7.5	RESULTS RX Neutral	46
<b>7</b>	<b>TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS</b>	<b>48</b>
<b>8</b>	<b>BLOCK DIAGRAMS</b>	<b>49</b>
<b>9</b>	<b>Revision History.</b>	<b>51</b>



**1 Assessment**

**The following is in compliance with the applicable criteria specified in FCC rules Part 15.247 of the Code of Federal Regulations and in compliance with the applicable criteria specified in Industry Canada rules RSS210.**

Company	Description	Model #
SONY Corporation	Notebook PC	PCG-4R1L

**Technical responsibility for area of testing:**

**Lothar Schmidt**  
 (Director Regulatory and  
 Antenna Services)

**2008-11-06 EMC & Radio**

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Date	Section	Name	Signature
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The test results of this test report relate exclusively to the test item specified in Identification of the Equipment under Test. 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.

**This report is prepared by:**

**Peter Mu**  
 (EMC Project Engineer)

**2008-11-06 EMC & Radio**

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Date	Section	Name	Signature
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**2 Administrative Data**

**2.1 Identification of the Testing Laboratory Issuing the EMC Test Report**

Company Name:	<b>CETECOM Inc.</b>
Department:	<b>EMC</b>
Address:	<b>411 Dixon Landing Road Milpitas, CA 95035 U.S.A.</b>
Telephone:	<b>+1 (408) 586 6200</b>
Fax:	<b>+1 (408) 586 6299</b>
Responsible Test Lab Manager:	<b>Lothar Schmidt</b>
Responsible Project Leader:	<b>Peter Mu</b>
Date of test:	<b>2008-7-21 to 2008-7-29</b>

**2.2 Identification of the Client**

<b>APPLICANT</b>	
<b>Applicant (Company Name)</b>	<b>SONY Corporation</b>
<b>Street Address</b>	<b>1-7-1 Konan, Minato-ku,</b>
<b>City/Zip Code</b>	<b>Tokyo, 108-0075</b>
<b>Country</b>	<b>Japan</b>
<b>Contact Person</b>	<b>Michio Kobayashi</b>
<b>Telephone</b>	<b>+81-263-72-5696</b>
<b>Fax</b>	<b>+81-263-72-9755</b>
<b>e-mail</b>	<b><u>Michio.Kobayashi@jp.sony.com</u></b>

**2.3 Identification of the Manufacturer**

<b>MANUFACTURER (If different from Applicant)</b>	
<b>Applicant (Firm Name):</b>	<b>Sony EMCS Corporation</b>
<b>Contact Person:</b>	<b>Michio Kobayashi</b>
<b>Telephone:</b>	<b>+81-263-72-5696</b>
<b>Fax:</b>	<b>+81-263-72-9755</b>
<b>Address Line 1:</b>	<b>5432 Toyoshima,</b>
<b>City:</b>	<b>Azumino-shi, Nagano</b>
<b>Postal Code:</b>	<b>399-8282,</b>
<b>Country:</b>	<b>Japan</b>
<b>e-mail:</b>	<b><u>Michio.Kobayashi@jp.sony.com</u></b>



### 3 Equipment Under Test (EUT)

#### 3.1 Specification of the Equipment under Test

EUT	
Marketing Name of EUT (if not same as Model No.)	<b>PCG-4R1L</b>
Description	<b>Notebook PC</b>
Model No.	<b>PCG-4R1L</b>
FCC-ID:	<b>AK8PCG4R1L</b>
IC-ID (Industry Canada):	<b>409B-PCG4R1L</b>

Frequency Range:	<b>2400MHz – 2483.5MHz</b>
Type(s) of Modulation:	<b>GFSK, DQPSK, 8PSK</b>
Number of Channels:	<b>79</b>
Antenna Type:	<b>Inverted F, peak gain 2.21dBi</b>
Output Power:	<b>Conducted GFSK: 1.67dBm, 1.47mW</b> <b>Conducted EDR: 4.36dBm, 2.73mW</b> <b>Radiated GFSK: 3.88dBm, 2.44mW</b> <b>Radiated DQPSK: 6.57dBm, 4.54mW</b>

#### 3.2 Identification of the Equipment under Test (EUT)

EUT #	TYPE	MANF.	MODEL	SERIAL #
1	EUT	SONY Corporation	PCG-4R1L	5865C0A7

#### 3.3 Identification of Accessory equipment

AE #	TYPE	MANF.	MODEL	SERIAL #
1	AC/DC ADAPTER	SONY Corporation	VGP-AC16V13	148015421 0110574



#### **4 Subject Of Investigation**

All testing was performed on the product referred to in Section 3 as EUT. This test report contains full radiated and contacted testing as per FCC15.247 on the EUT with the Bluetooth module.

The EUT integrates an FCC approved Bluetooth module with FCC ID: QDS-BRCM1026. This report contains findings from radiated measurements only. All the conducted measurements are referenced from the original report of the module.

During the testing process the EUT was tested on low, mid, and high channels using PRBS9 payload using DH5, 2DH5, and 3DH5 packets, all data in this report shows the worst case between horizontal and vertical polarization for above 1GHz.

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations and Industry Canada rules RSS210. The maximization of portable equipment is conducted in accordance with ANSI C63.4.



5 Measurements (RADIATED)

5.1 MAXIMUM PEAK OUTPUT POWER § 15.247 (RADIATED)

5.1.1 LIMIT SUB CLAUSE § 15.247 (b) (1) (2) (3) (4)

Frequency range	RF power output
2400-2483.5 MHz	36dBm EIRP

\*limit is based upon antenna gain of less than or equal to 6dBi.

5.1.2 Test Results

EIRP = Conducted Peak Power + Antenna Gain (2.21dBi)

EIRP: GFSK

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402	2441	2480
T <sub>nom</sub> (23)°C	V <sub>nom</sub> VDC	2.98	3.88	3.62
Measurement uncertainty		±0.5dBm		

EIRP: EDR

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402	2441	2480
T <sub>nom</sub> (23)°C	V <sub>nom</sub> VDC	5.37	6.57	5.92
Measurement uncertainty		±0.5dBm		



**5.2 RESTRICTED BAND EDGE COMPLIANCE RADIATED §15.247/15.205**

**5.2.1 LIMITS**

30.□ Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any

of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

\*PEAK LIMIT= 74dBuV/m

\*AVG. LIMIT= 54dBuV/m

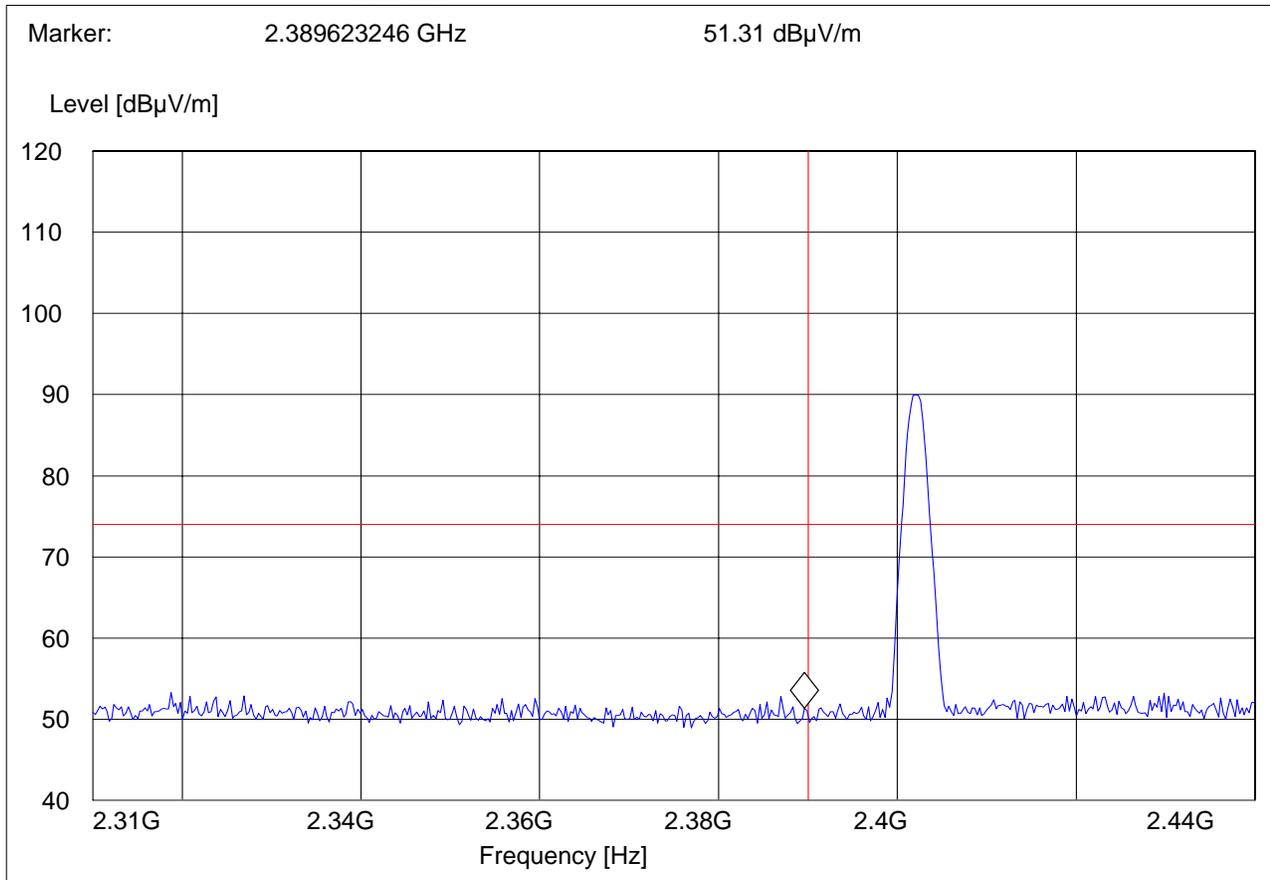


**5.2.2 RESULTS: GFSK  
 (2402MHz) LOWER BAND EDGE PEAK –GFSK MODULATION**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT GFSK CH 0  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247 LBE\_PK"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.3 GHz	2.4 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert
		MaxPeak			



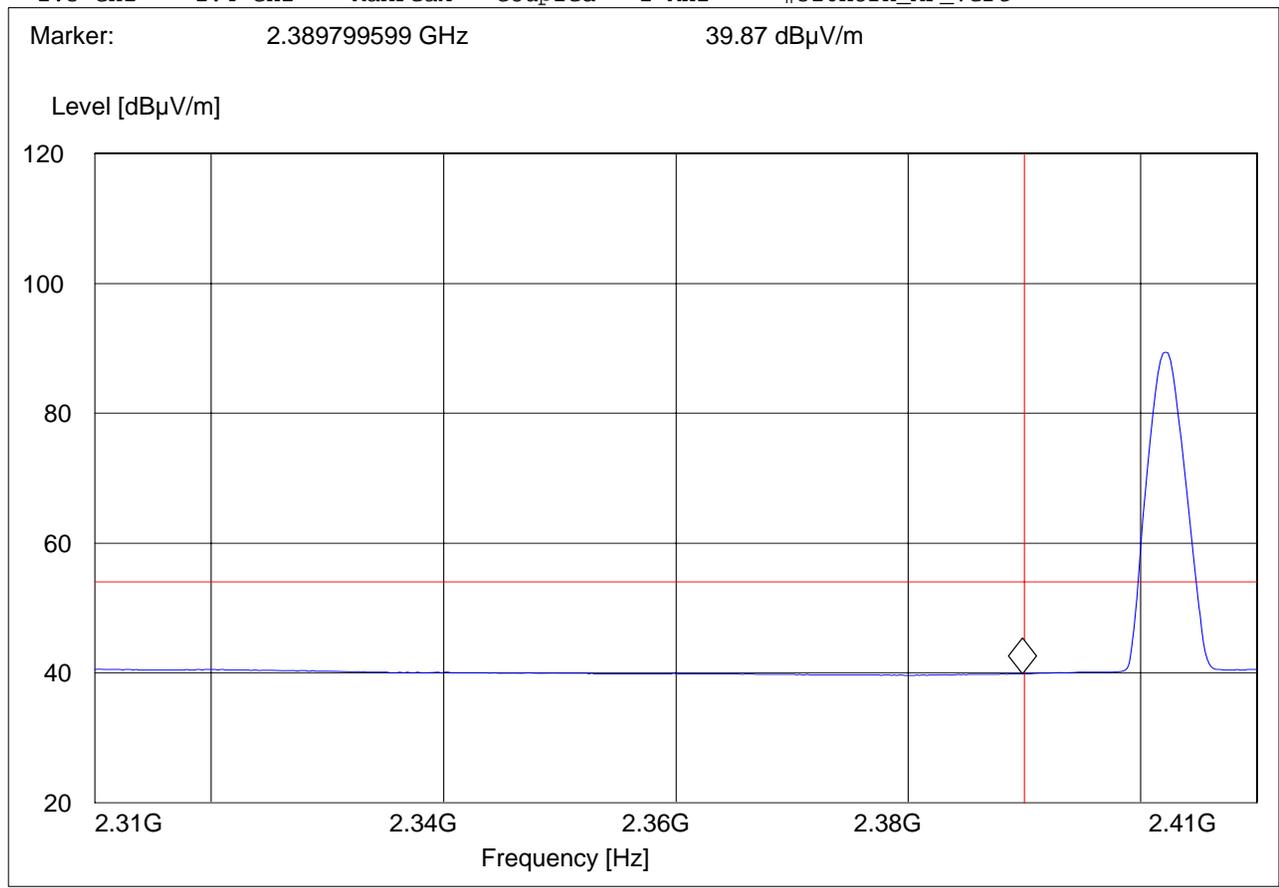


**(2402MHz) LOWER BAND EDGE AVERAGE –GFSK MODULATION**

EUT: Laptop  
Customer:: Sony  
Test Mode: BT GFSK CH 0  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC  
Comments: TT@40°

**SWEEP TABLE: "FCC15.247 LBE\_AVG"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.3 GHz	2.4 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert





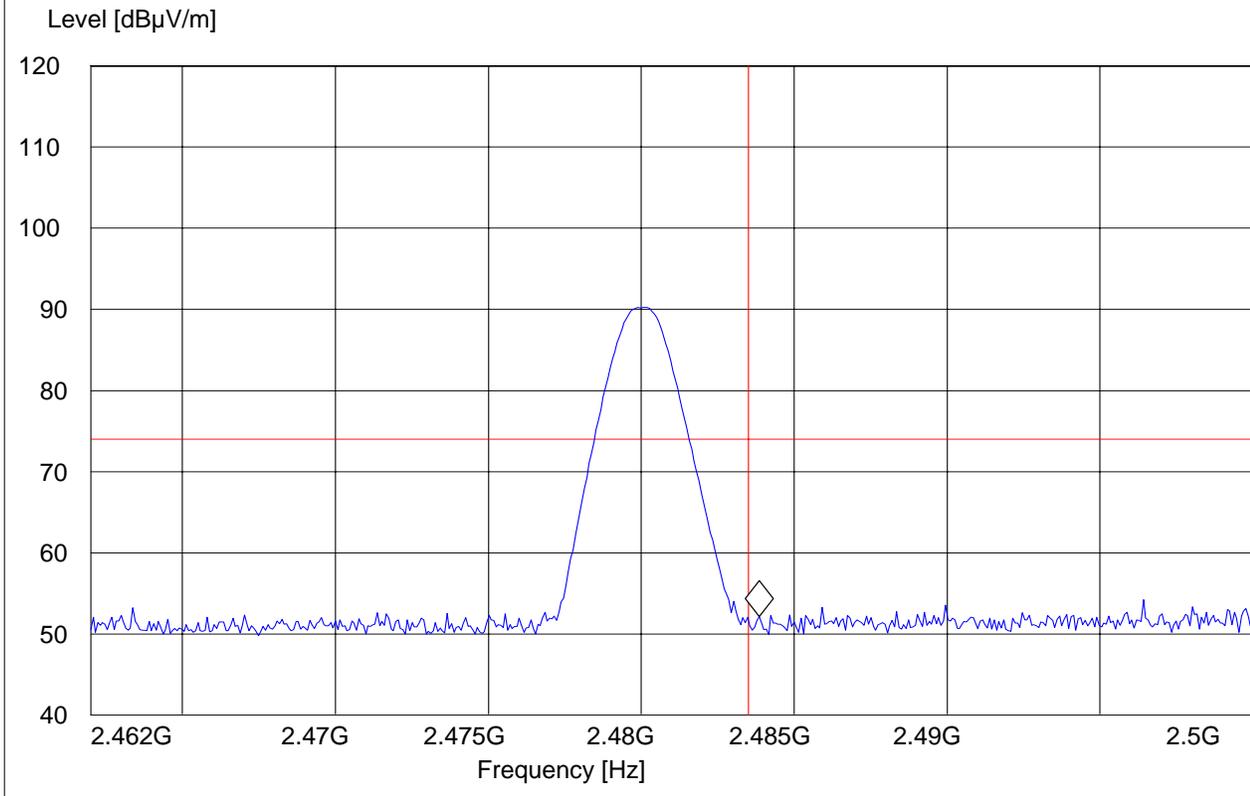
**(2480MHz) HIGHER BAND EDGE PEAK –GFSK MODULATION**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT GFSK CH 78  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247 HBE\_PK"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.5 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: 2.48385711 GHz 52.13 dBµV/m





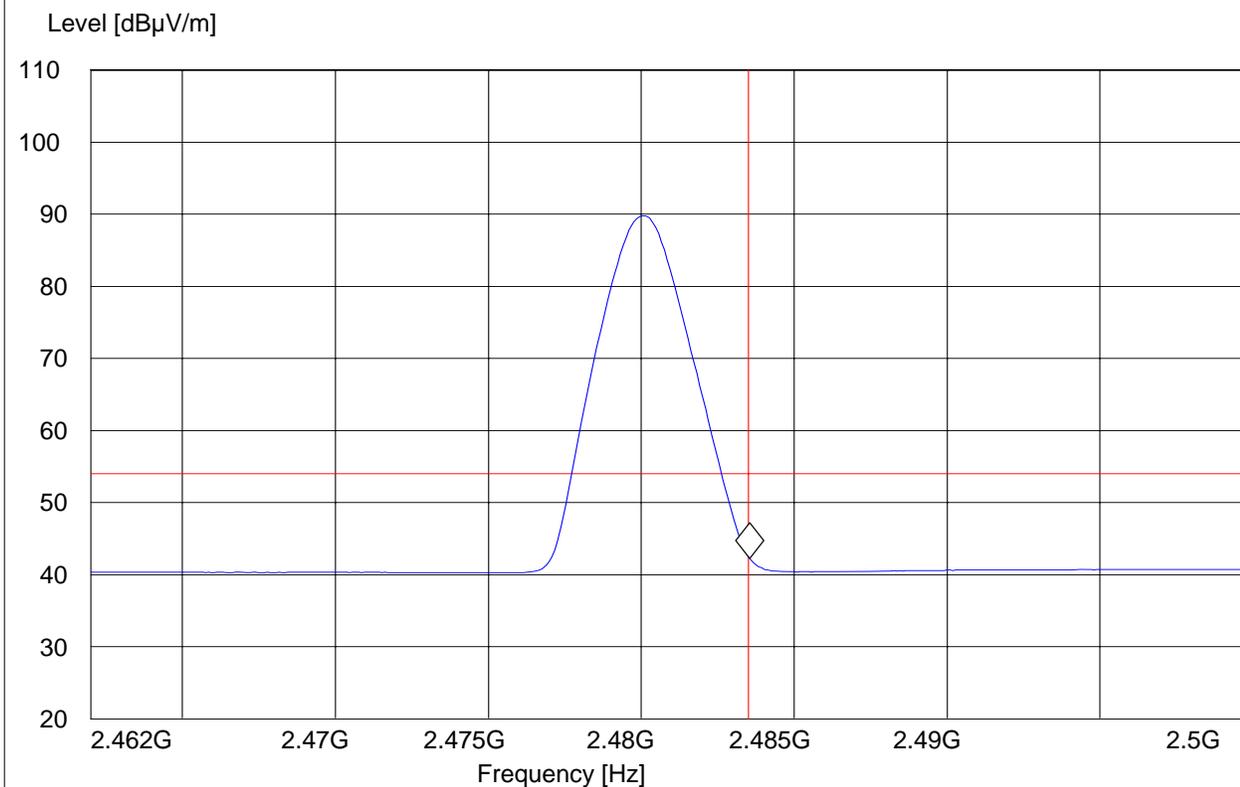
**(2480MHz) HIGHER BAND EDGE AVERAGE-GFSK MODULATION**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT GFSK CH 78  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247 HBE\_AVG"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.5 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

Marker: 2.483547094 GHz 42.29 dBµV/m





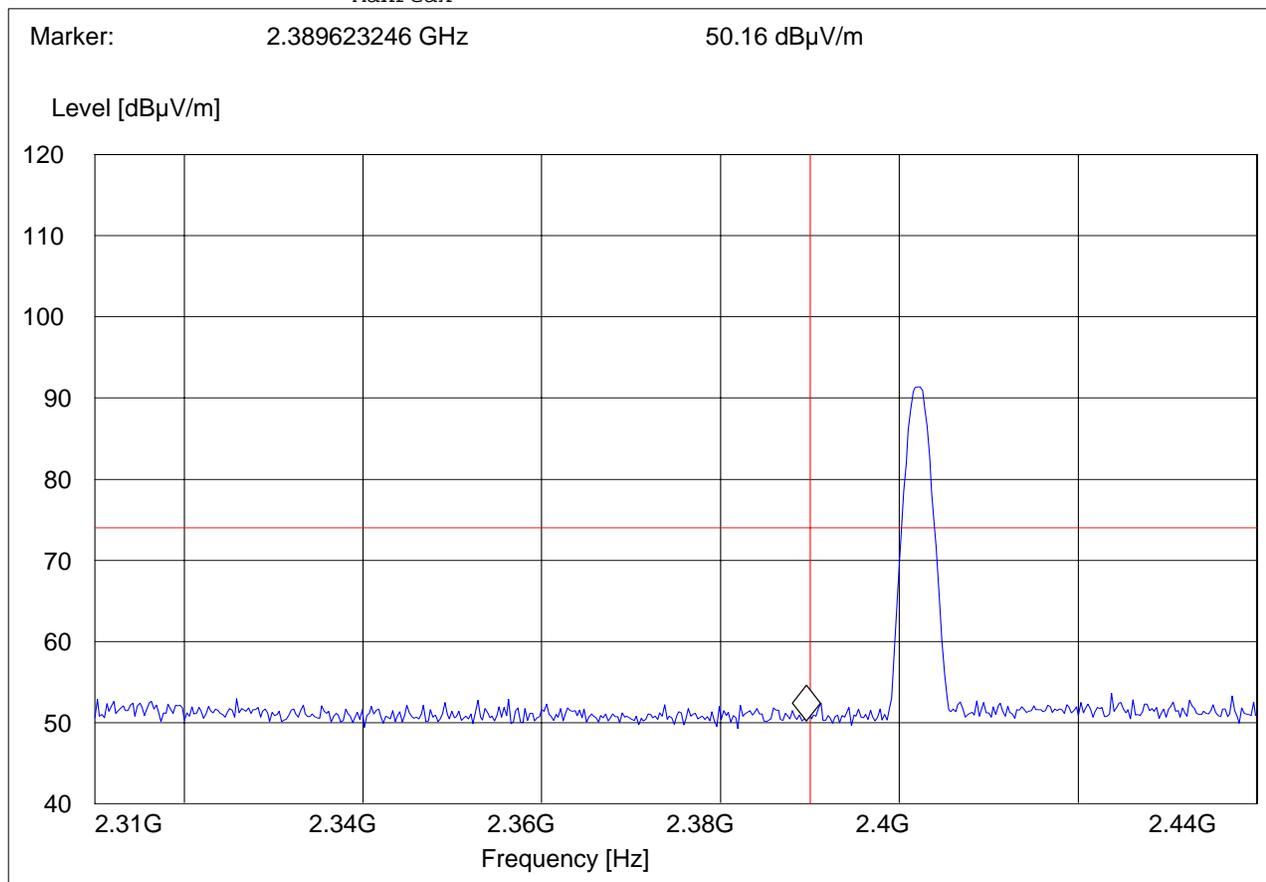
**5.2.3 RESULTS:  $\pi/4$  DQPSK**

**(2402MHz) LOWER BAND EDGE PEAK –  $\pi/4$  DQPSK MODULATION**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT DQPSK CH 0  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

***SWEEP TABLE: "FCC15.247 LBE\_PK"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.3 GHz	2.4 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert
		MaxPeak			



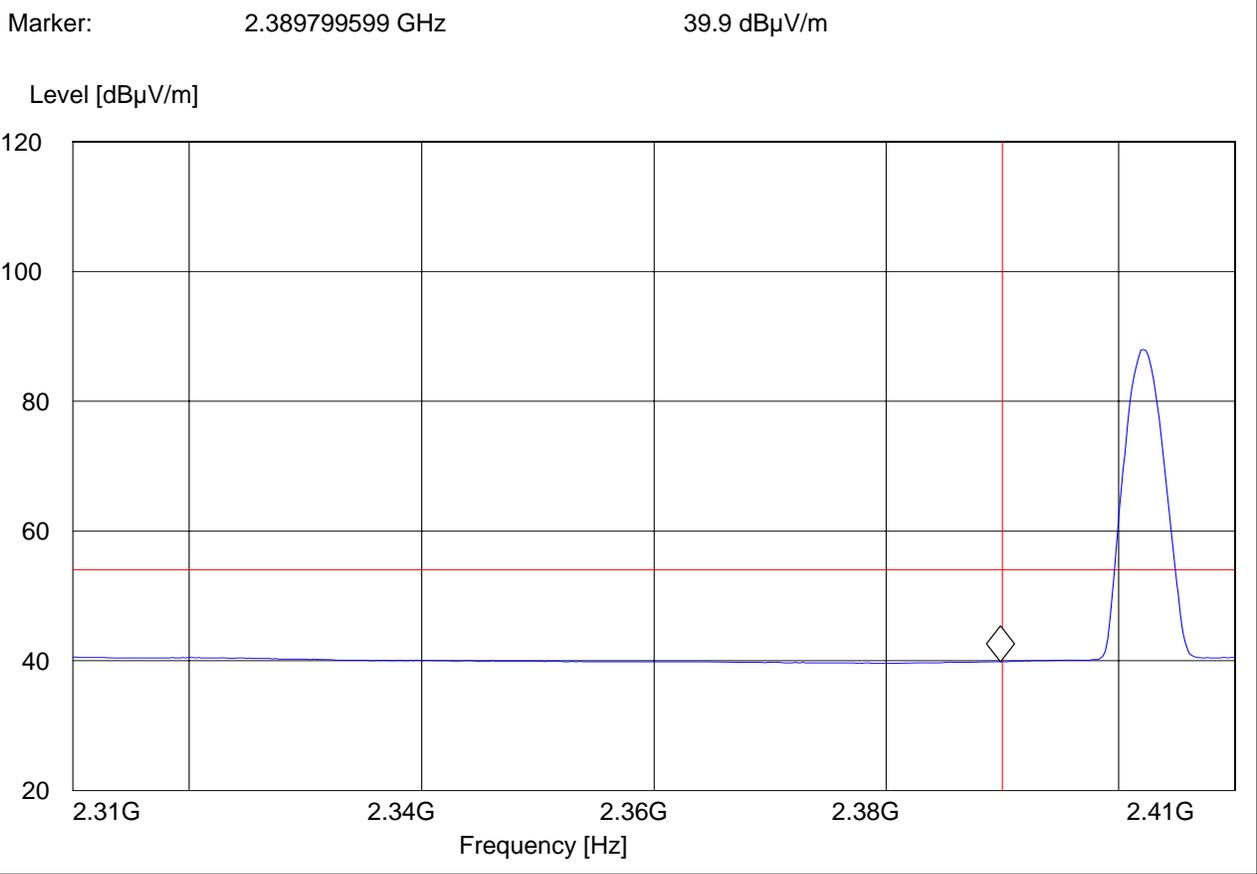


**(2402MHz) LOWER BAND EDGE AVERAGE  $-\pi/4$  DQPSK MODULATION**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT DQPSK CH 0  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247 LBE\_AVG"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.3 GHz	2.4 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert



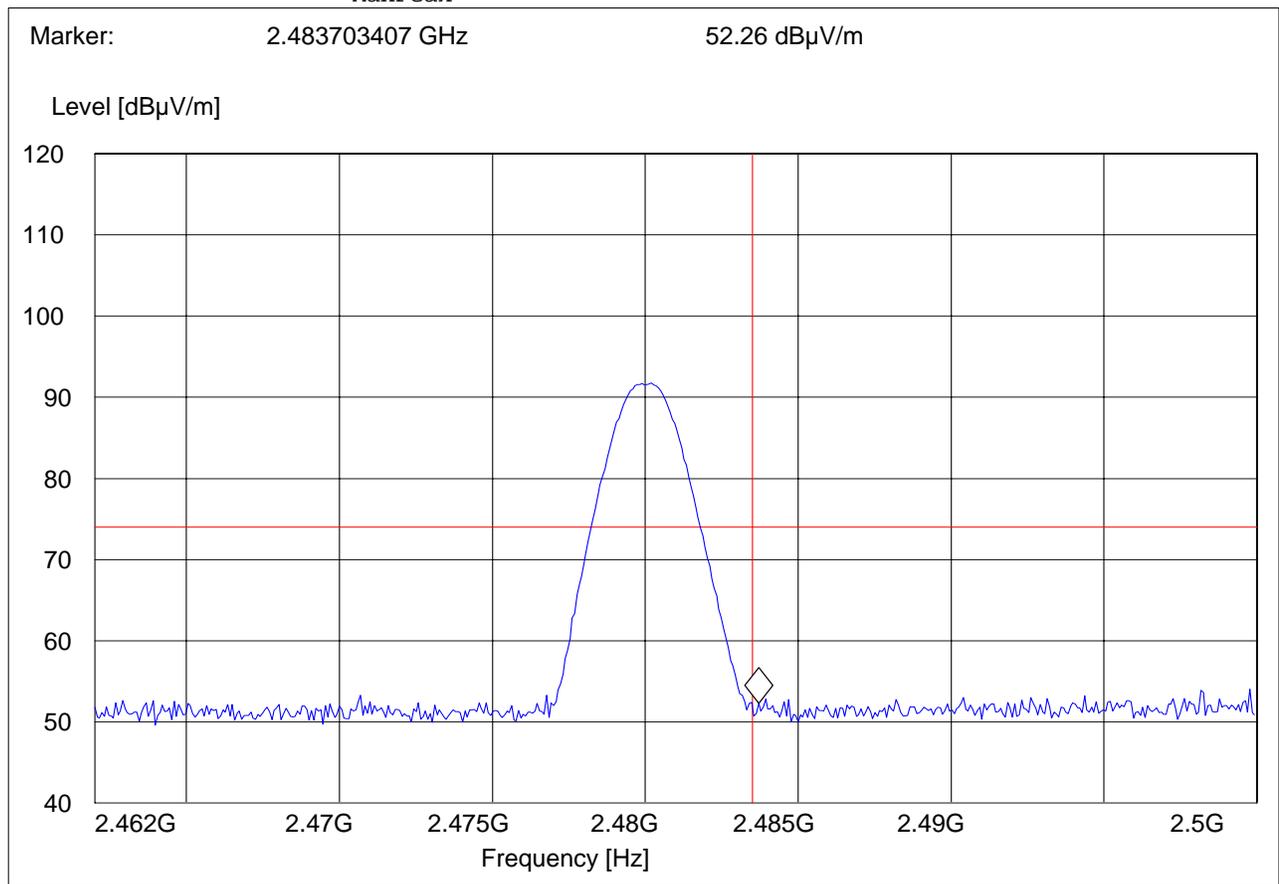


**(2480MHz) HIGHER BAND EDGE PEAK  $-\pi/4$  DQPSK MODULATION**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT DQPSK CH 78  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

***SWEEP TABLE: "FCC15.247 HBE\_PK"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.5 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert
		MaxPeak			



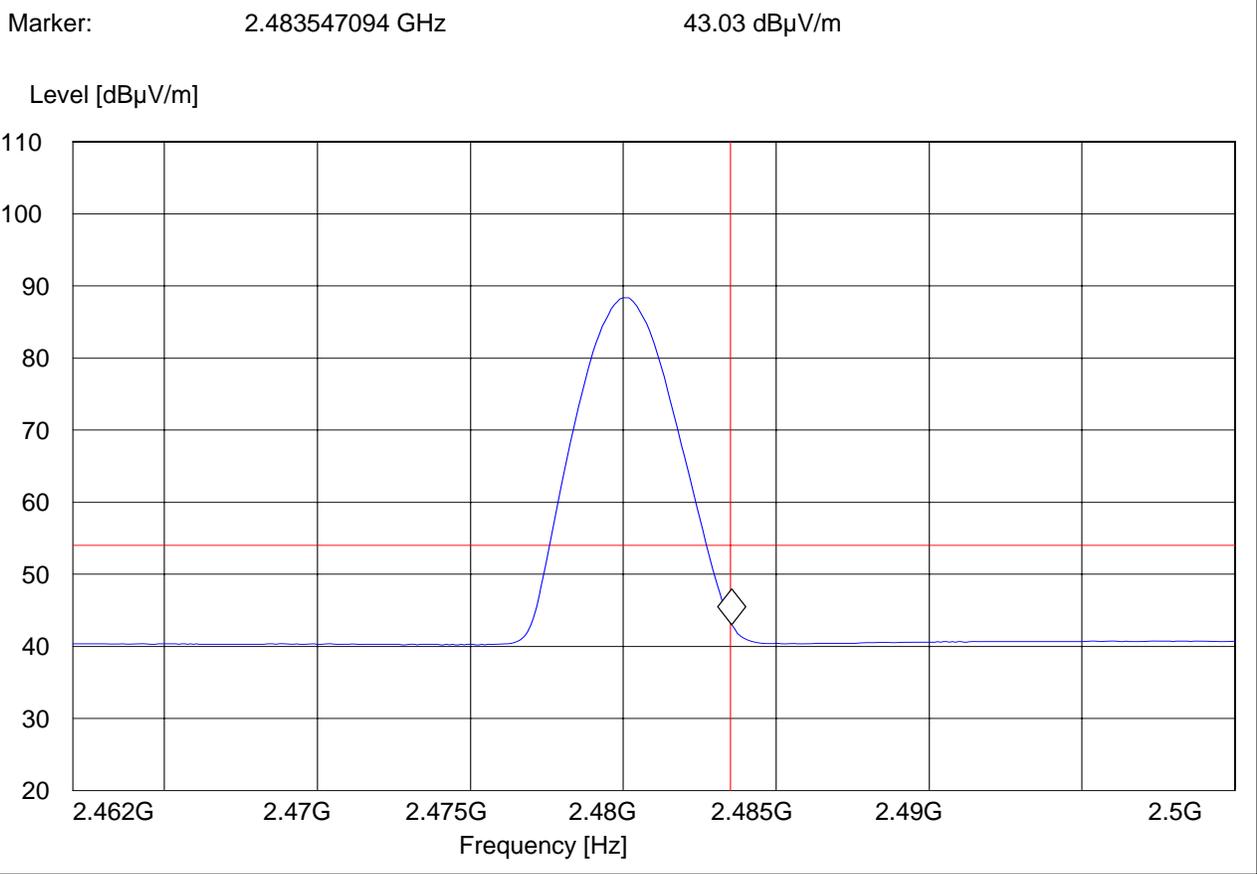


**(2480MHz) HIGHER BAND EDGE AVERAGE-  $\pi/4$  DQPSK MODULATION**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT DQPSK CH 78  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

***SWEEP TABLE: "FCC15.247 HBE\_AVG"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.5 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz





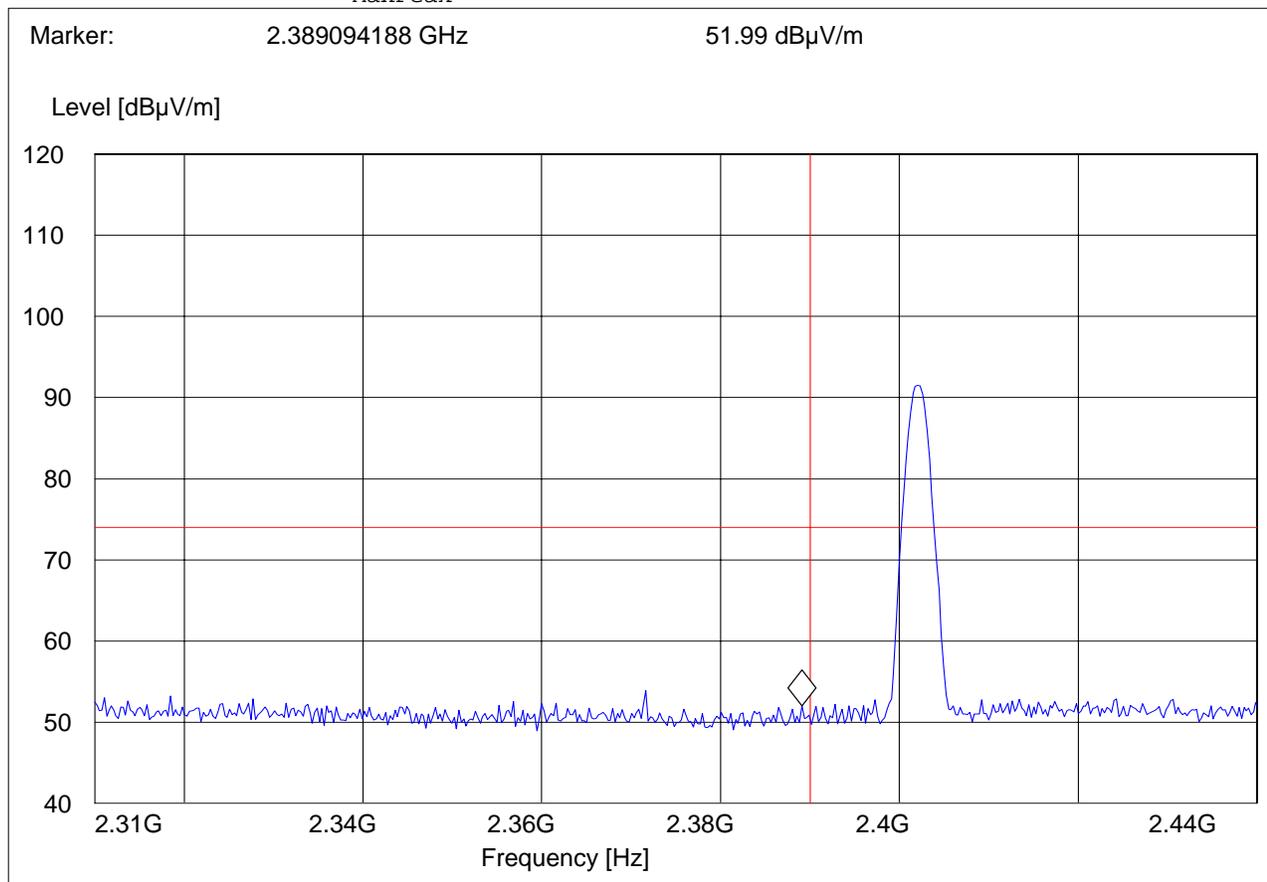
**5.2.4 RESULTS: 8DPSK**

**(2402MHz) LOWER BAND EDGE PEAK – 8DPSK MODULATION**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT 8DPSK CH 0  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247 LBE\_PK"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.3 GHz	2.4 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert



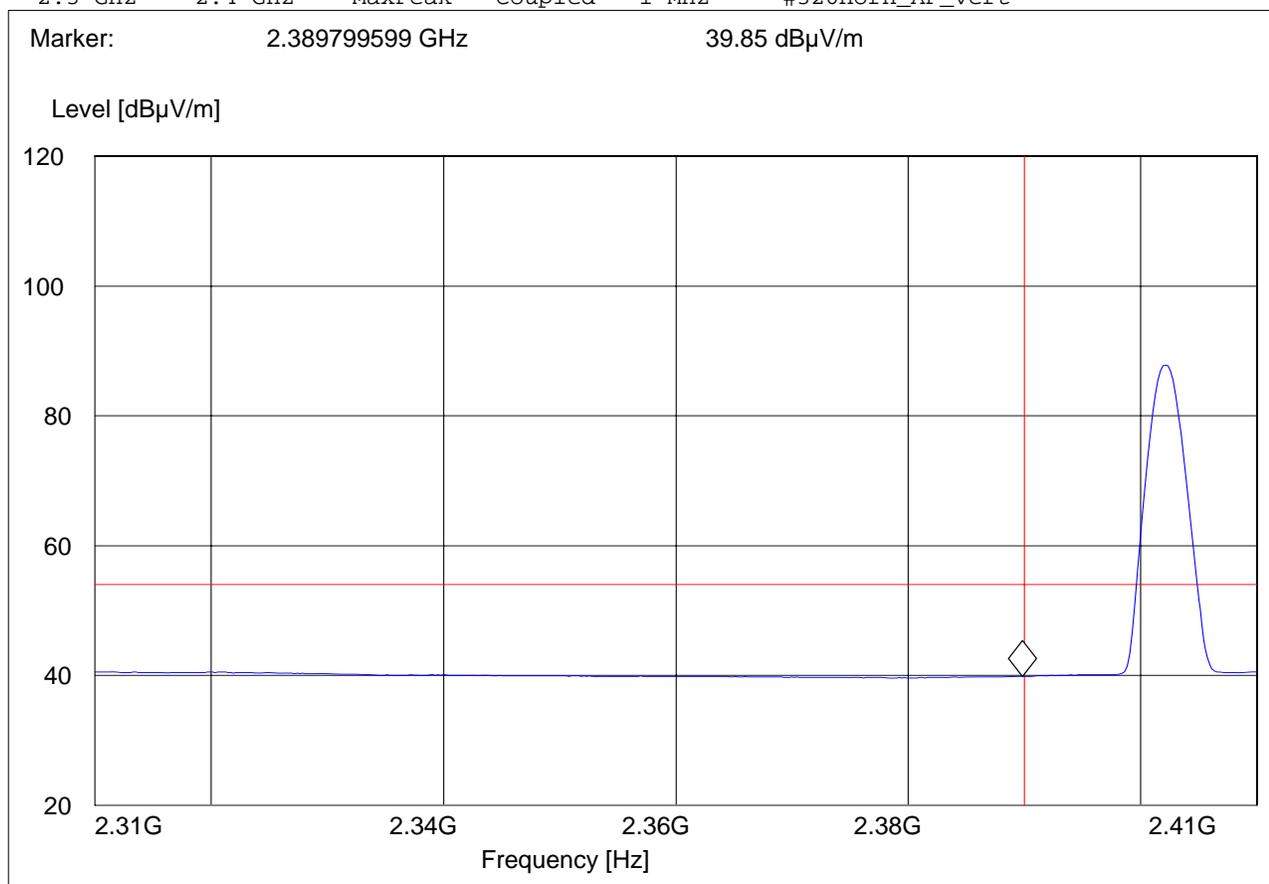


**(2402MHz) LOWER BAND EDGE AVERAGE -8DPSK MODULATION**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT 8DPSK CH 0  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247 LBE\_AVG"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.3 GHz	2.4 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert



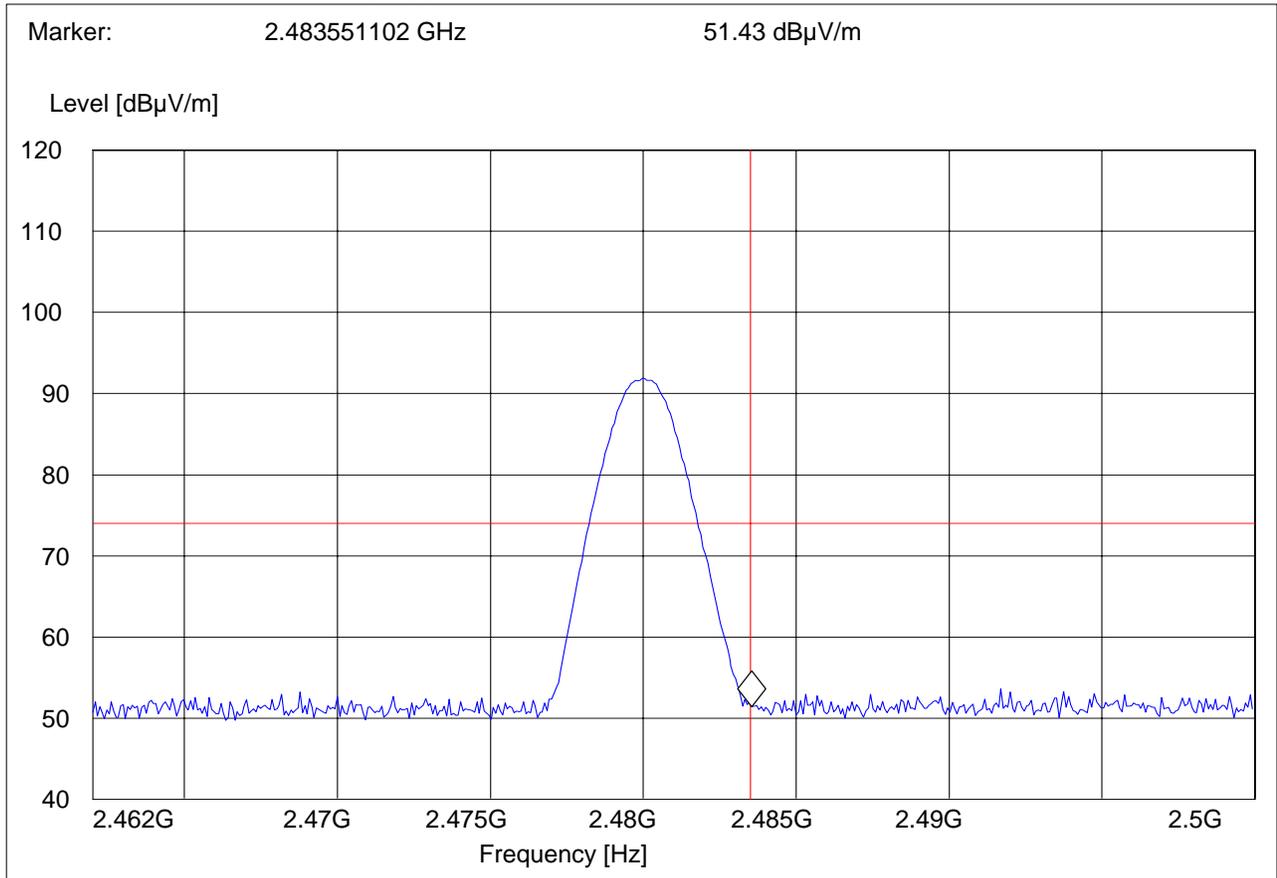


**(2480MHz) HIGHER BAND EDGE PEAK – 8DPSK MODULATION**

EUT: Laptop  
Customer:: Sony  
Test Mode: BT 8DPSK CH 78  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC  
Comments: TT@40°

**SWEEP TABLE: "FCC15.247 HBE\_PK"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.5 GHz	2.5 GHz	MaxPeak MaxPeak	Coupled	1 MHz	#326horn_AF_vert



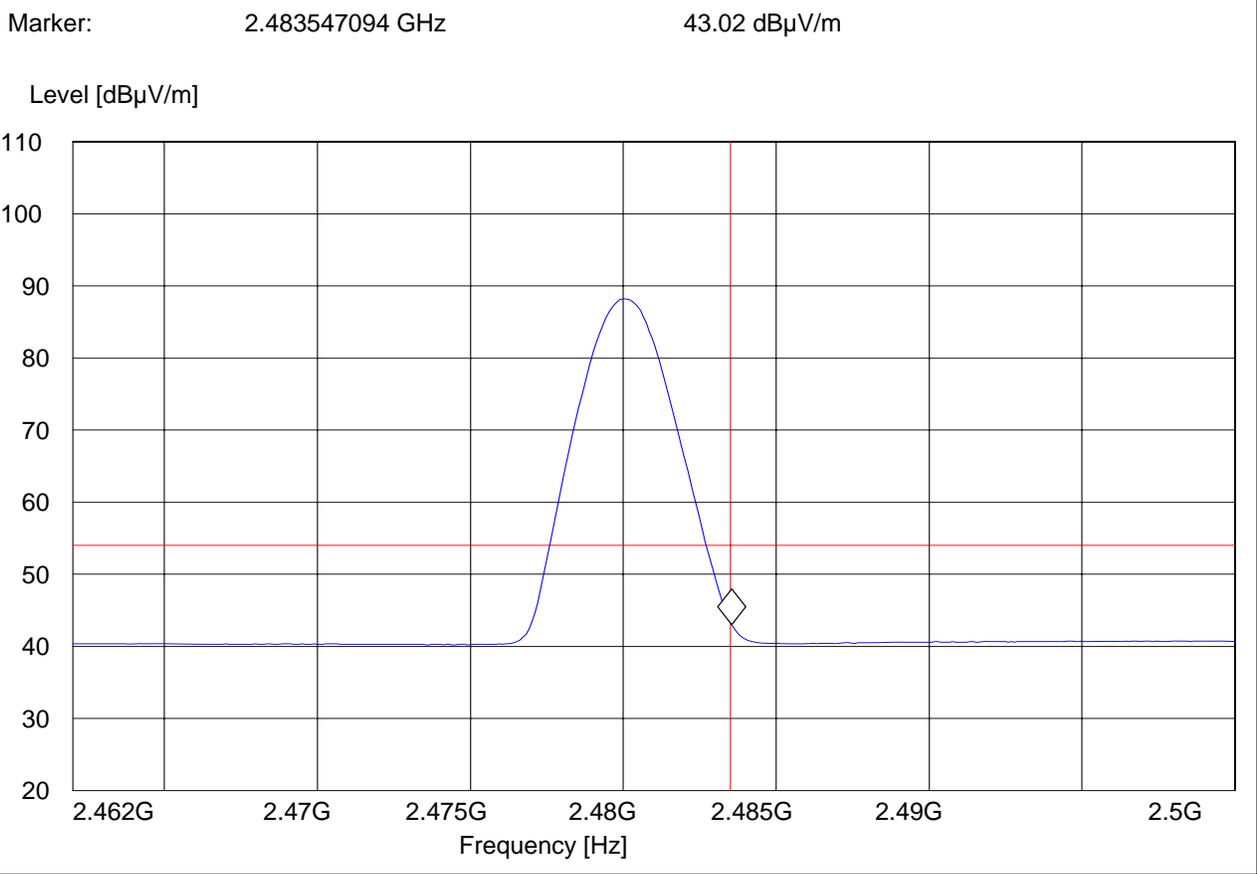


**(2480MHz) HIGHER BAND EDGE AVERAGE-8DPSK MODULATION**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT 8DPSK CH 78  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

***SWEEP TABLE: "FCC15.247 HBE\_AVG"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.5 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz





**5.3 TRANSMITTER SPURIOUS EMISSIONS RADIATED § 15.247/15.205/15.209**

**5.3.1 LIMITS**

Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

\*PEAK LIMIT= 74dBuV/m

\*AVG. LIMIT= 54dBuV/m

**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 using an average limit , 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

All Spurious Emission measurements are done in GFSK mode and represent the worse case emission from the device.



**5.3.2 RESULTS**

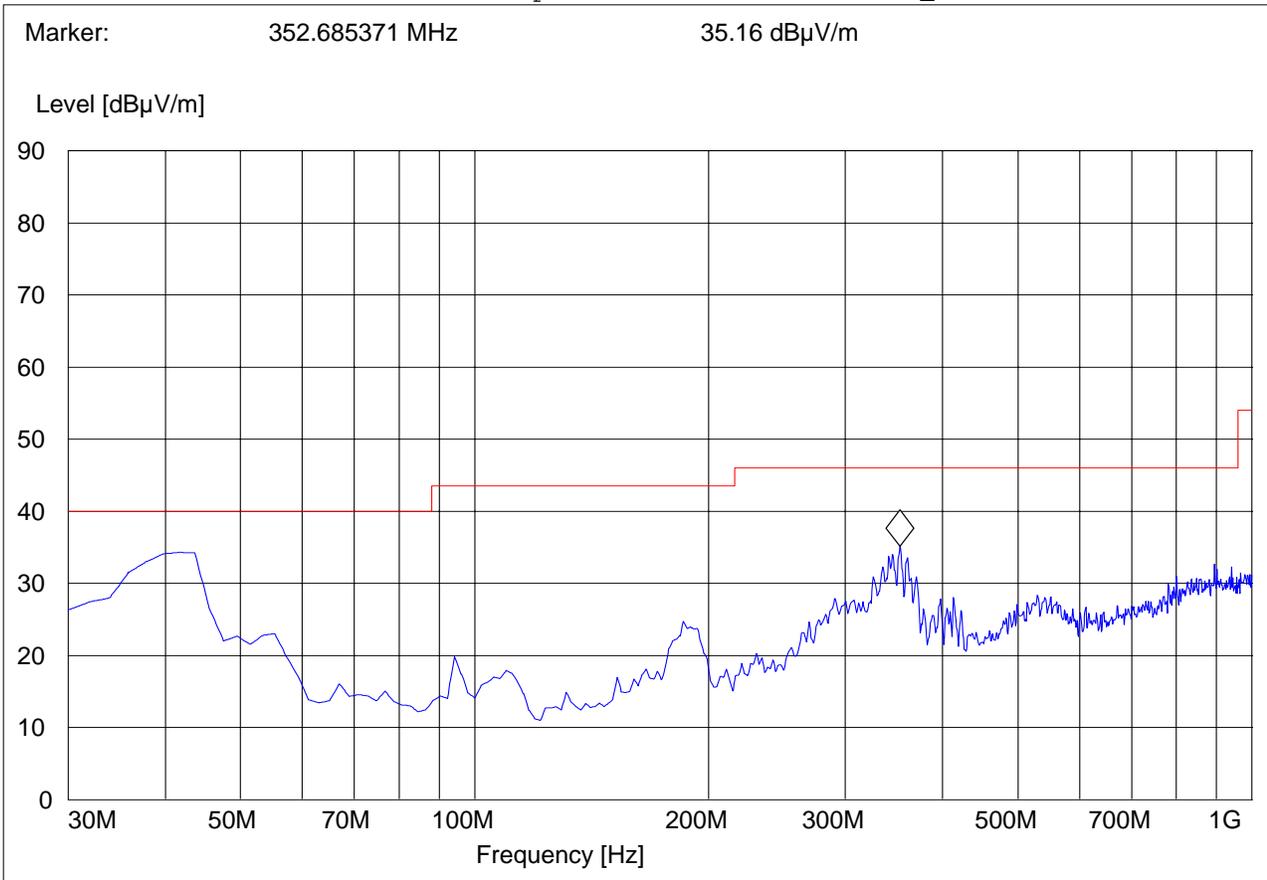
30MHz – 1GHz Antenna: vertical.

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT 8DPSK CH 0  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247\_30M-1G\_Ver"**

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

Marker: 352.685371 MHz 35.16 dBµV/m





30MHz – 1GHz Antenna: horizontal

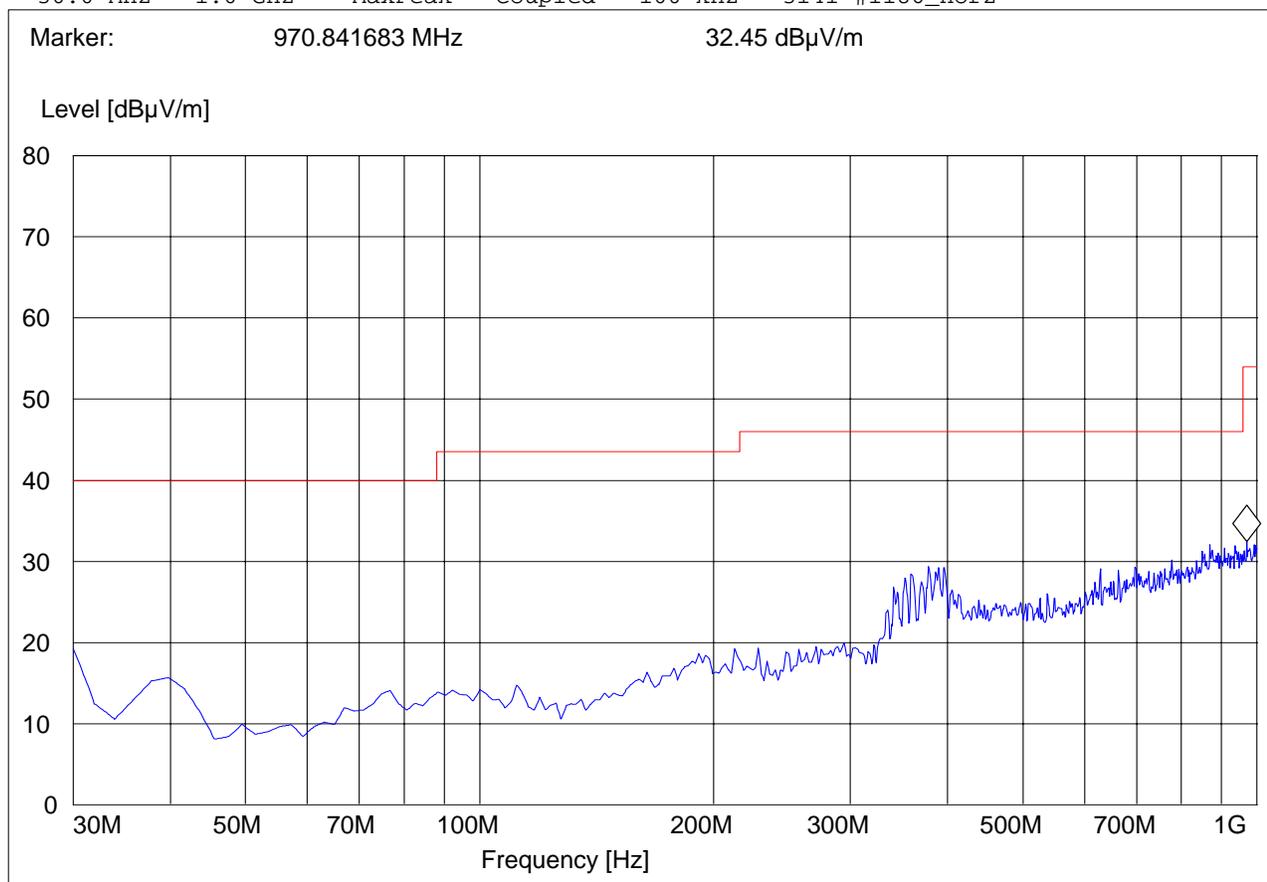
**Note: This plot is valid for low, mid, high channels (worst-case plot)**

EUT: Laptop  
Customer:: Sony  
Test Mode: BT 8DPSK CH 0  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC  
Comments: TT@40°

**SWEEP TABLE: "FCC15.247\_30M-1G\_Horz"**

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

Marker: 970.841683 MHz 32.45 dBµV/m





1-3GHz (2402MHz)

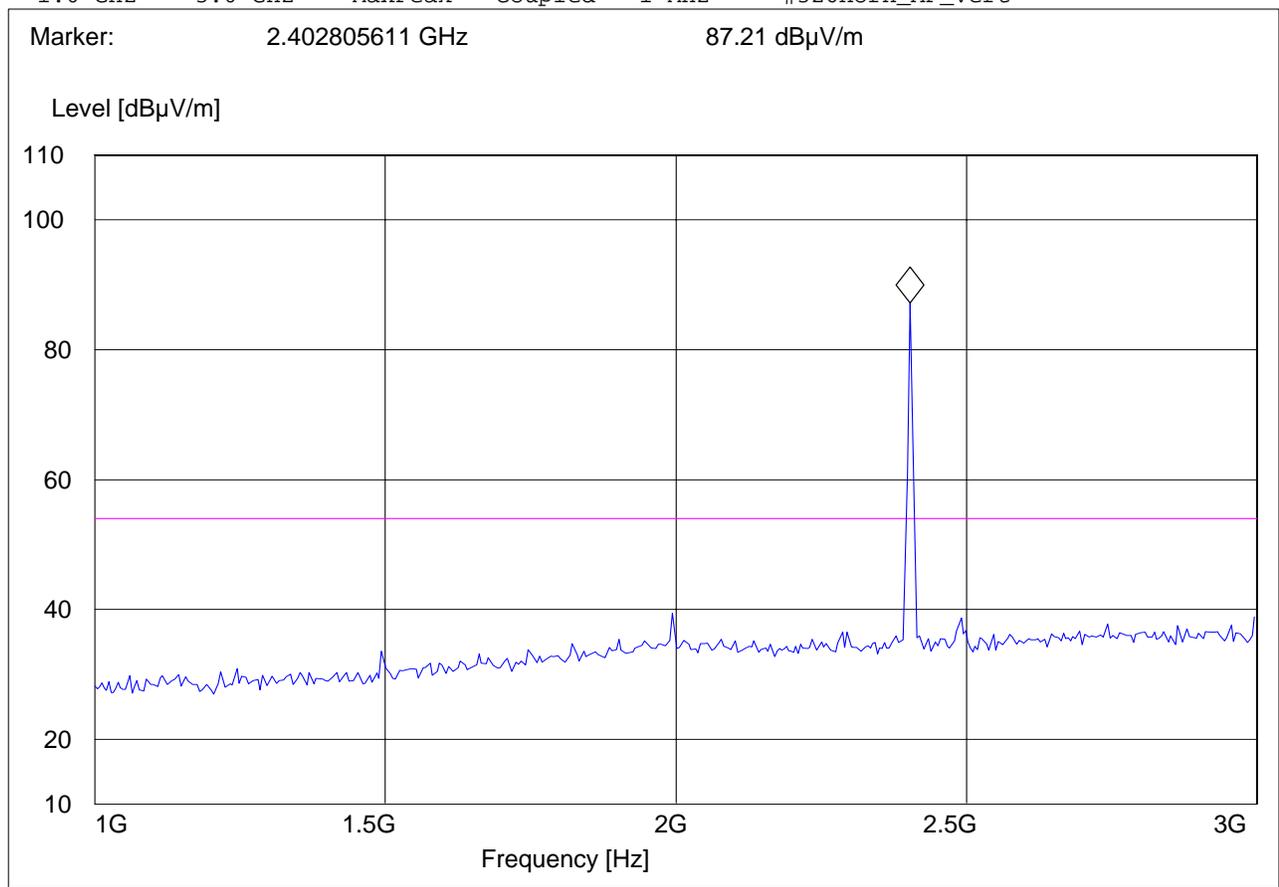
Note: The peak above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

EUT: Laptop  
Customer:: Sony  
Test Mode: BT 8DPSK CH 0  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC  
Comments: TT@40°

SWEEP TABLE: "FCC15.247\_1-3G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert





### 1-3GHz (2441MHz)

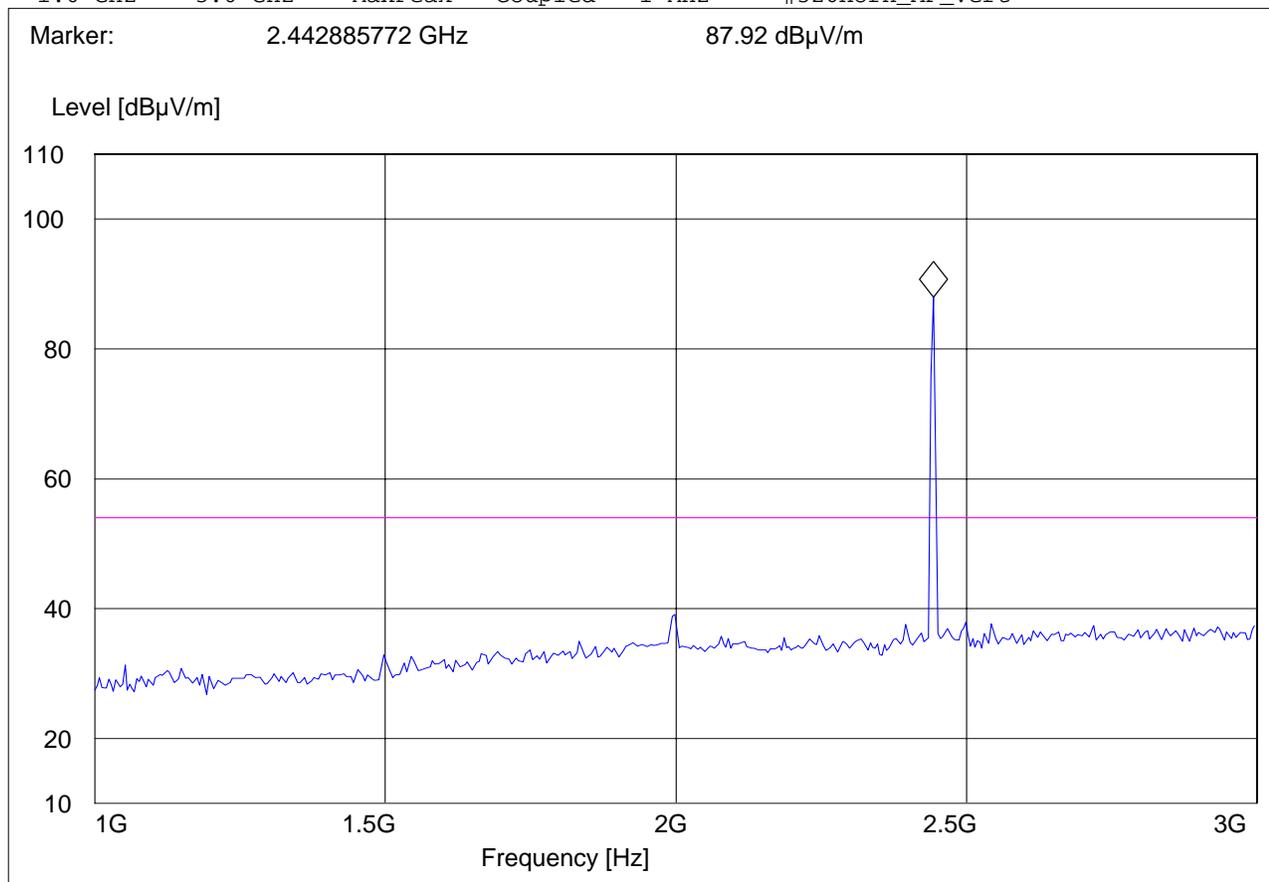
**Note: The peak above the limit line is the carrier freq.**

**Note: Peak Reading vs. Average limit**

EUT: Laptop  
Customer:: Sony  
Test Mode: BT 8DPSK CH 39  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC  
Comments: TT@40°

**SWEEP TABLE: "FCC15.247\_1-3G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert





### 1-3GHz (2480MHz)

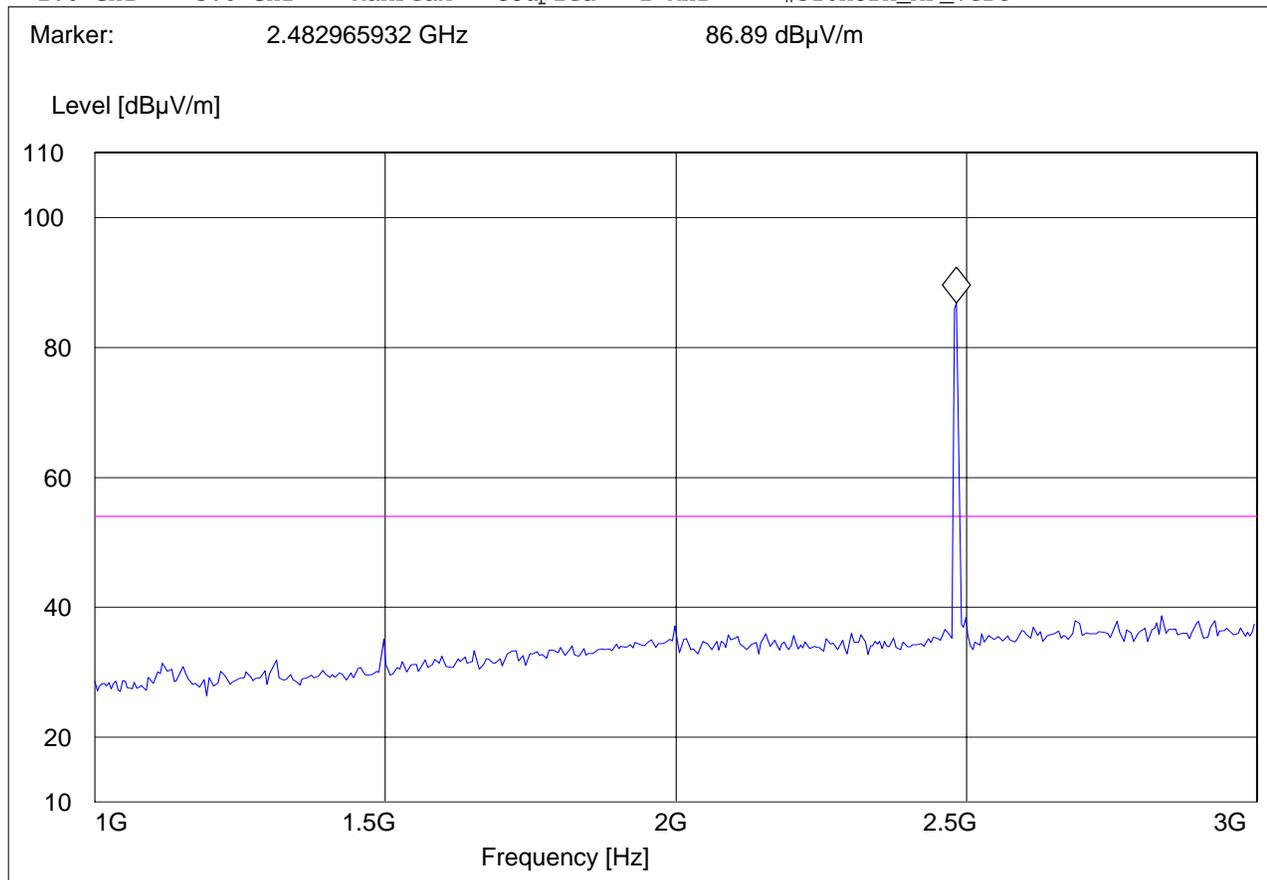
**Note: The peak above the limit line is the carrier freq.**

**Note: Peak Reading vs. Average limit**

EUT: Laptop  
Customer:: Sony  
Test Mode: BT 8DPSK CH 78  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC  
Comments: TT@40°

#### **SWEEP TABLE: "FCC15.247\_1-3G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert





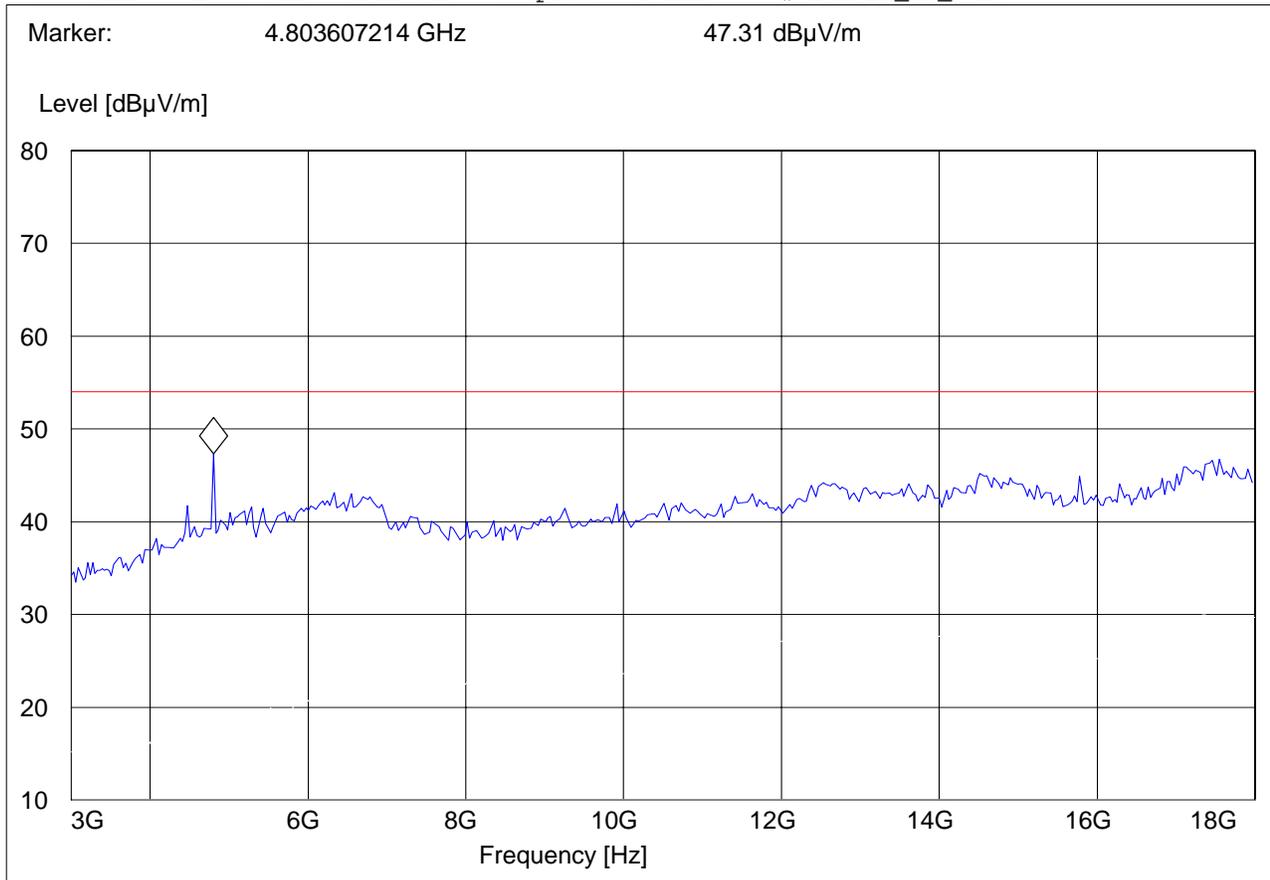
### 3-18GHz (2402MHz)

**Note: Peak Reading vs. Average limit**

EUT: Laptop  
Customer:: Sony  
Test Mode: BT 8DPSK CH 0  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC  
Comments: TT@40°

**SWEEP TABLE: "FCC15.247\_3-18G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert





**3-18GHz (2441MHz)**

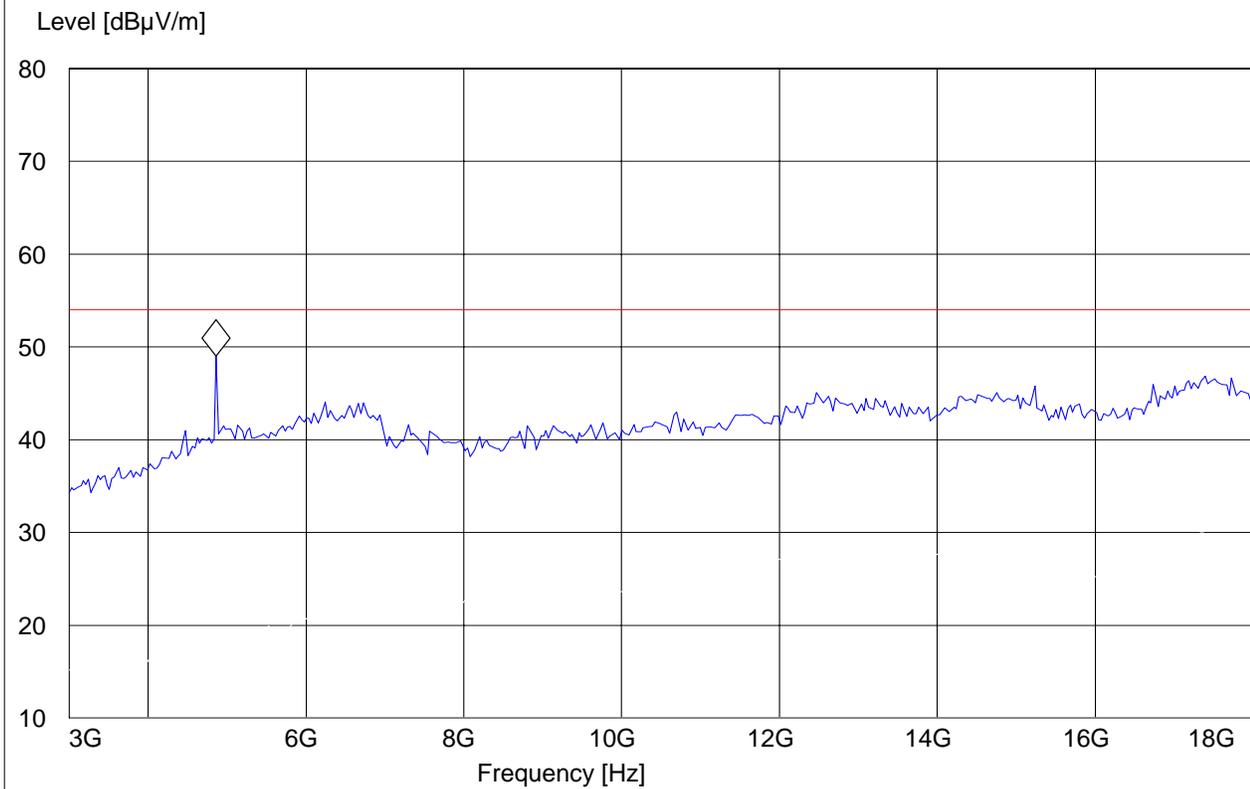
**Note: Peak Reading vs. Average limit**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT 8DPSK CH 39  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247\_3-18G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: 4.863727455 GHz 49.02 dBµV/m





**3-18GHz (2480MHz)**

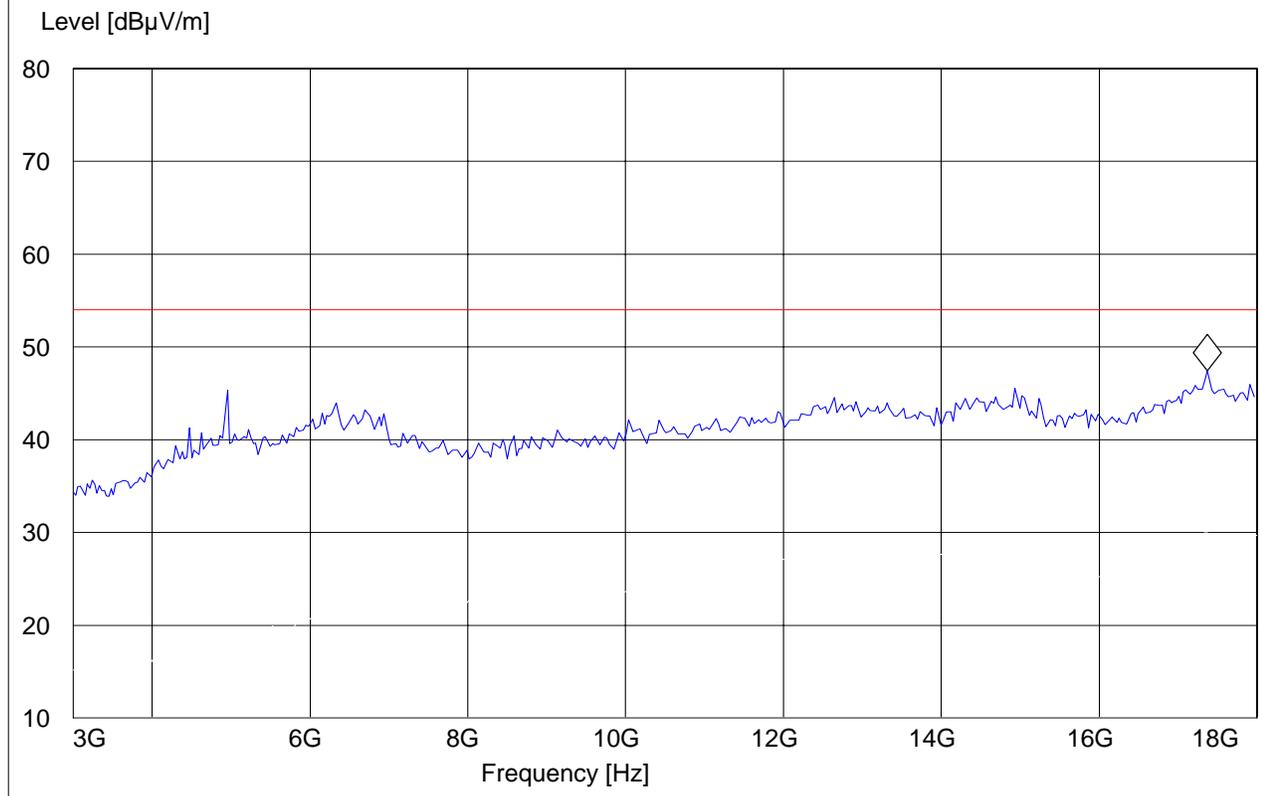
**Note: Peak Reading vs. Average limit**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT 8DPSK CH 78  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247\_3-18G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: 17.368737475 GHz 47.45 dBµV/m





**18-25GHz**

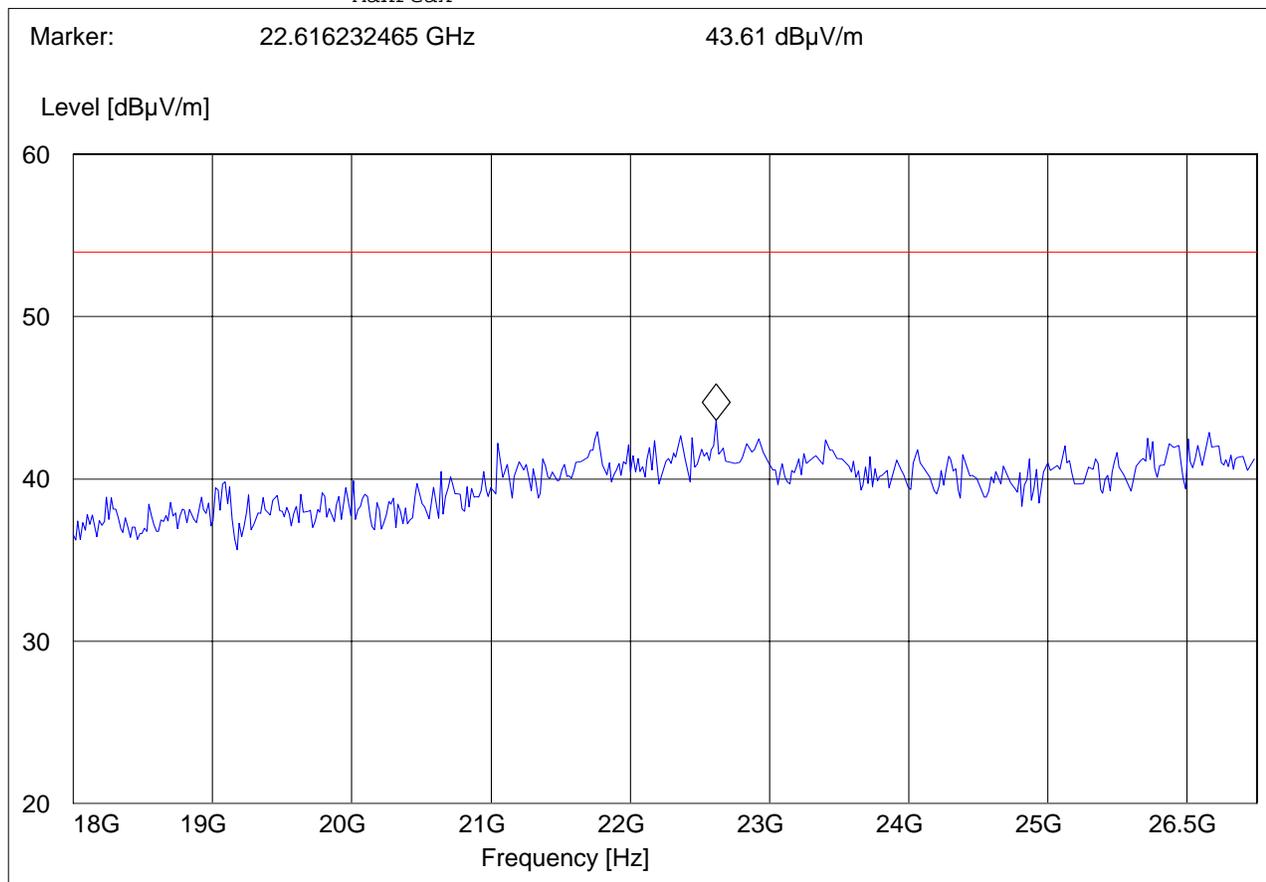
**Note: This plot is valid for low, mid, high channels (worst-case plot)**

**Note: Peak Reading vs. Average limit**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT 8DPSK CH 39  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247\_18-26.5G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	26.5 GHz	MaxPeak	Coupled	100 kHz	Horn # 3116_18-40G
		MaxPeak			





## 5.4 RECEIVER SPURIOUS RADIATION RSS-Gen(4.10)

### 5.4.1 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:**

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 using an average limit, unless specified with the plots.



### 5.4.2 Results

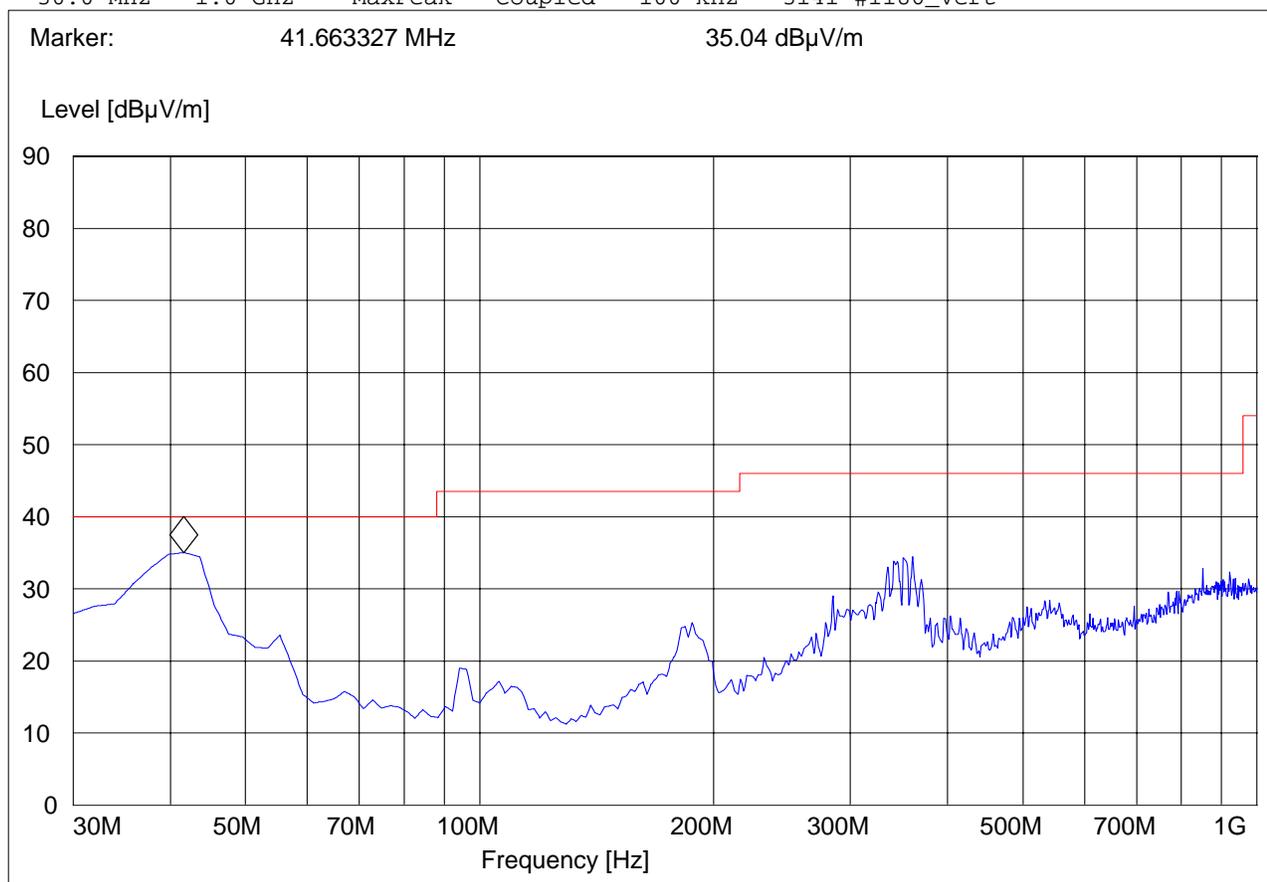
30MHz – 1GHz Antenna: Vertical.

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

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT IDLE  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247\_30M-1G\_Ver"**

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





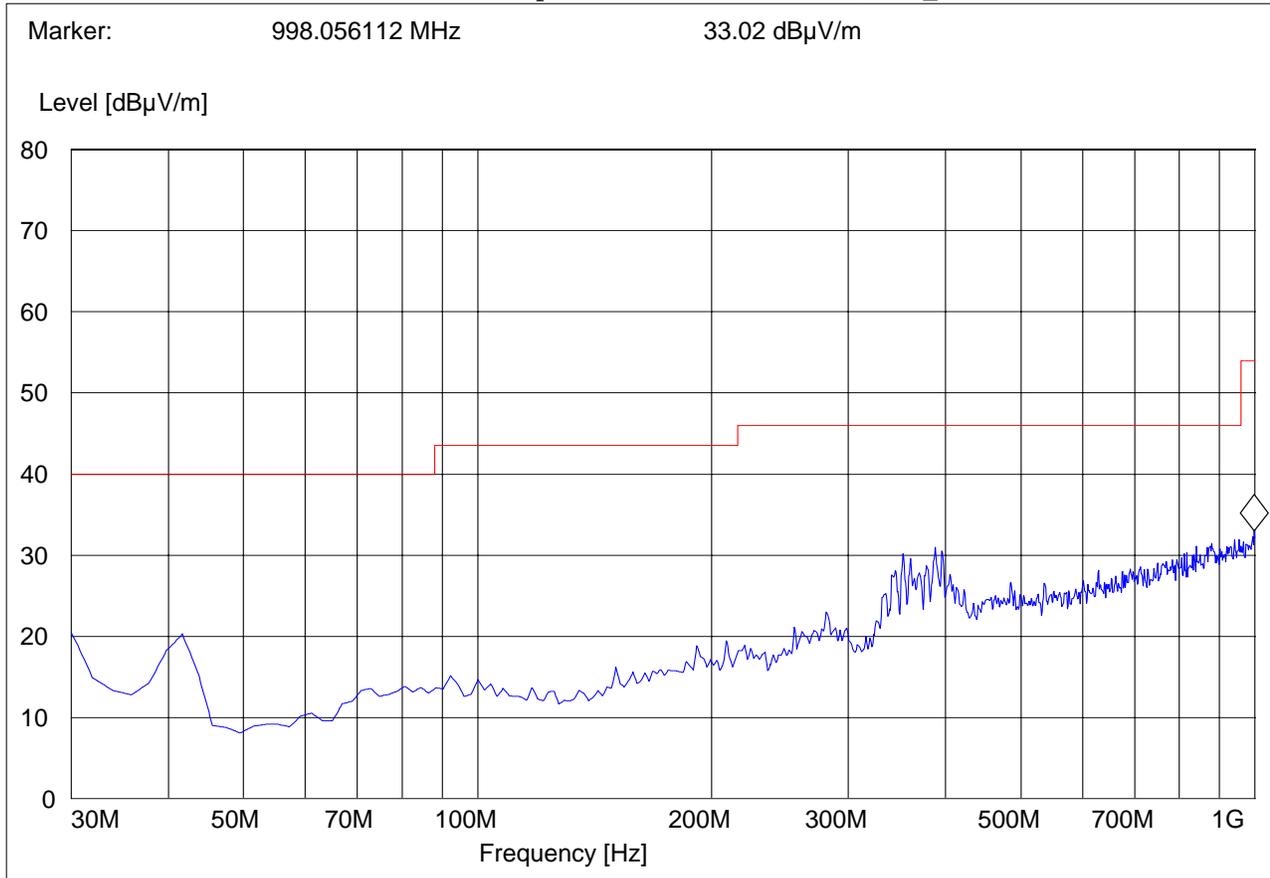
30MHz – 1GHz Antenna: horizontal.

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

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT IDLE  
 ANT Orientation: H  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247\_30M-1G\_Hor"**

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



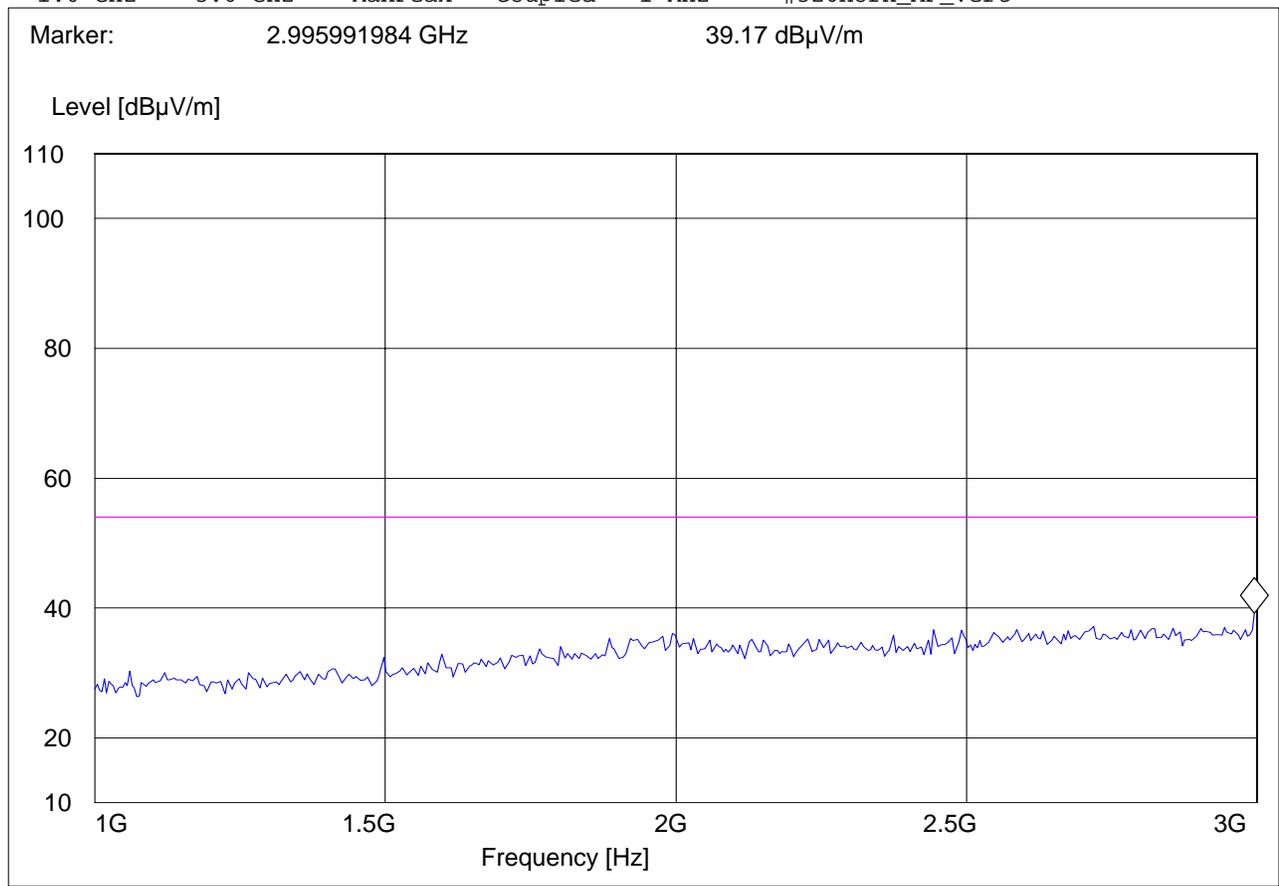


**1-3GHz**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT IDLE  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247\_1-3G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert





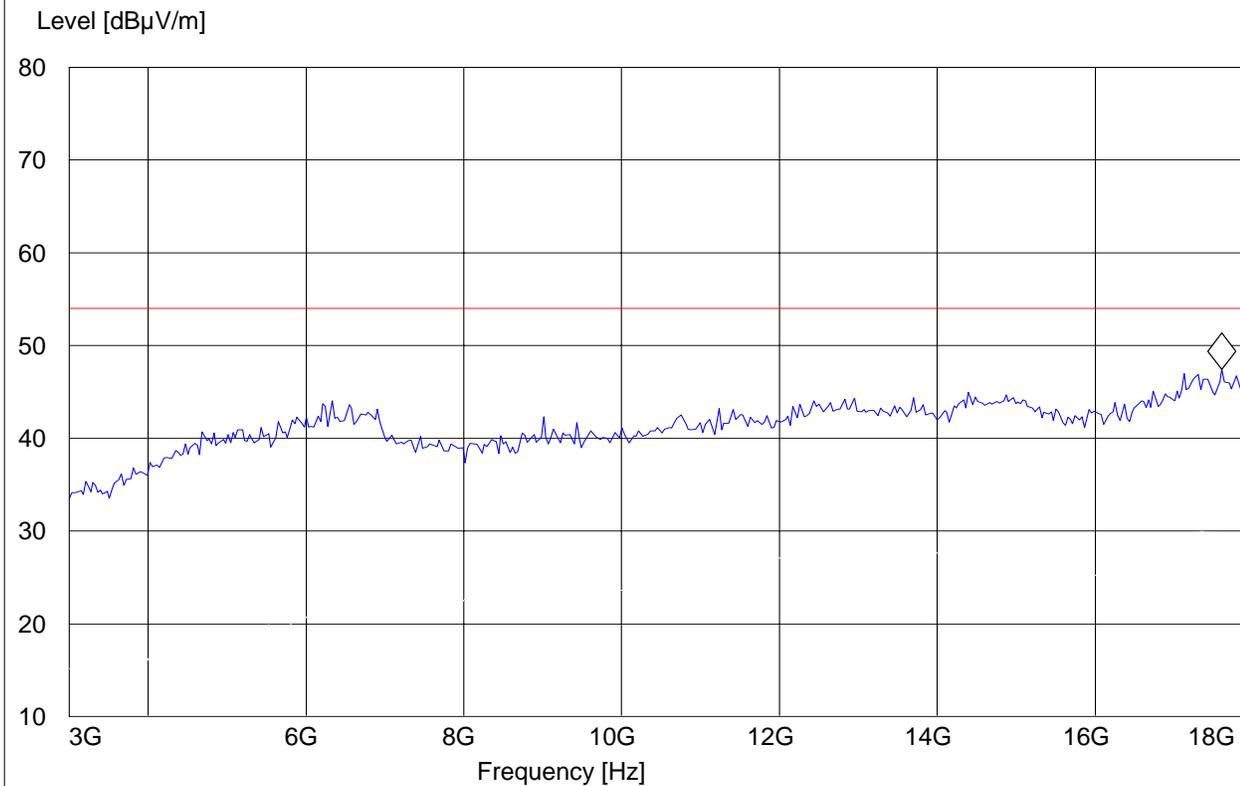
**3-18GHz**

EUT: Laptop  
 Customer:: Sony  
 Test Mode: BT IDLE  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 Voltage: AC  
 Comments: TT@40°

**SWEEP TABLE: "FCC15.247\_3-18G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: 17.609218437 GHz 47.45 dBµV/m





**6 Measurements (CONDUCTED)**

**6.1 MAXIMUM PEAK OUTPUT POWER § 15.247 (CONDUCTED)**

**6.1.1 LIMIT SUB CLAUSE § 15.247 (b) (1)**

Frequency range	RF power output
2400-2483.5 MHz	30dBm

\*limit is based upon antenna gain of less than or equal to 6dBi.

**6.1.2 RESULTS: GFSK**

Test not conducted. This report is for radiated measurements only.

**6.2 20dB BANDWIDTH**

**6.2.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)**

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

**6.2.2 RESULTS: GFSK**

Test not conducted. This report is for radiated measurements only.

**6.3 CARRIER FREQUENCY SEPARATION**

**6.3.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)**

SEPARATION
> 25 KHz or > 20 dB BANDWIDTH

**6.3.2 RESULTS:**

Test not conducted. This report is for radiated measurements only.



**6.4 NUMBER OF HOPPING CHANNELS**

**6.4.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (iii)**

<b>NUMBER OF CHANNELS</b>
<b>&gt; 15</b>

**6.4.2 RESULTS:**

Test not conducted. This report is for radiated measurements only.

**6.5 TIME OF OCCUPANCY (DWELL TIME)**

**6.5.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)**

<b>FREQUENCY RANGE</b>	<b>AVERAGE TIME OF OCCUPANCY PER 31.6 SECONDS (LIMIT)</b>
<b>2400-2483.5</b>	<b>&lt; 0.4 Seconds</b>

**6.5.2 RESULTS:**

Test not conducted. This report is for radiated measurements only.

**6.6 CONDUCTED SPURIOUS EMISSION**

**6.6.1 LIMIT SUB CLAUSE § 15.247 (d)**

<b>FREQUENCY RANGE</b>	<b>limit</b>
<b>30M-25GHz</b>	<b>-20dBc</b>

**6.6.2 RESULTS: Tnom(23)°C VnomVDC**

Test not conducted. This report is for radiated measurements only.



**6.7 AC POWER LINE CONDUCTED EMISSIONS § 15.107/207**

**6.7.1 LIMITS**

**Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)**

§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

**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

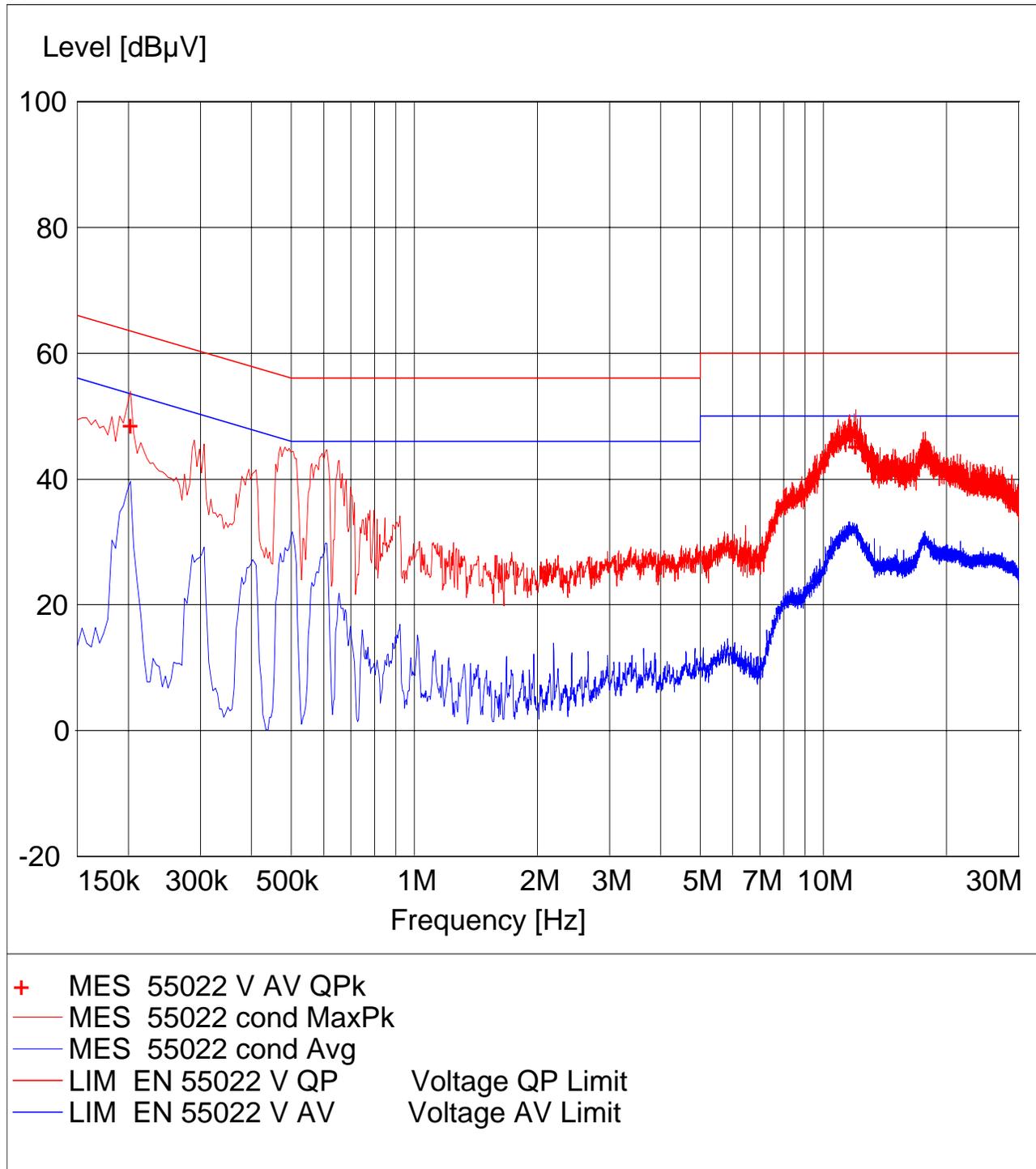
\* Decreases with logarithm of the frequency

**ANALYZER SETTINGS: RBW = 10KHz VBW = 10KHz**



**6.7.2 RESULTS TX Line:**

EUT: Laptop  
 Manufacturer: Sony  
 Test Mode: BT Ch.39, 2441MHz  
 ANT Orientation:: LISN  
 EUT Orientation:: H  
 Test Engineer:: Chris  
 Power Supply: : AC Adapter  
 Comments: : Line





**MEASUREMENT RESULT: "55022 V AV QPk"**

7/25/2008 12:03AM

Frequency	Level	Transd	Limit	Margin	Line	PE	AUX STATE
MHz	dBµV	dB	dBµV	dB			
0.202000	48.70	0.1	64	14.8	1	---	OFF
11.998000	45.40	0.7	60	14.6	1	---	OFF

**LIMIT LINE: "EN 55022 V AV"**

Short Description: Voltage AV Limit  
 4/27/1998 2:24PM

Frequency	Level
MHz	dBµV
0.150000	56.00
0.500000	46.00
5.000000	46.00
5.000000	50.00
30.000000	50.00

**LIMIT LINE: "EN 55022 V QP"**

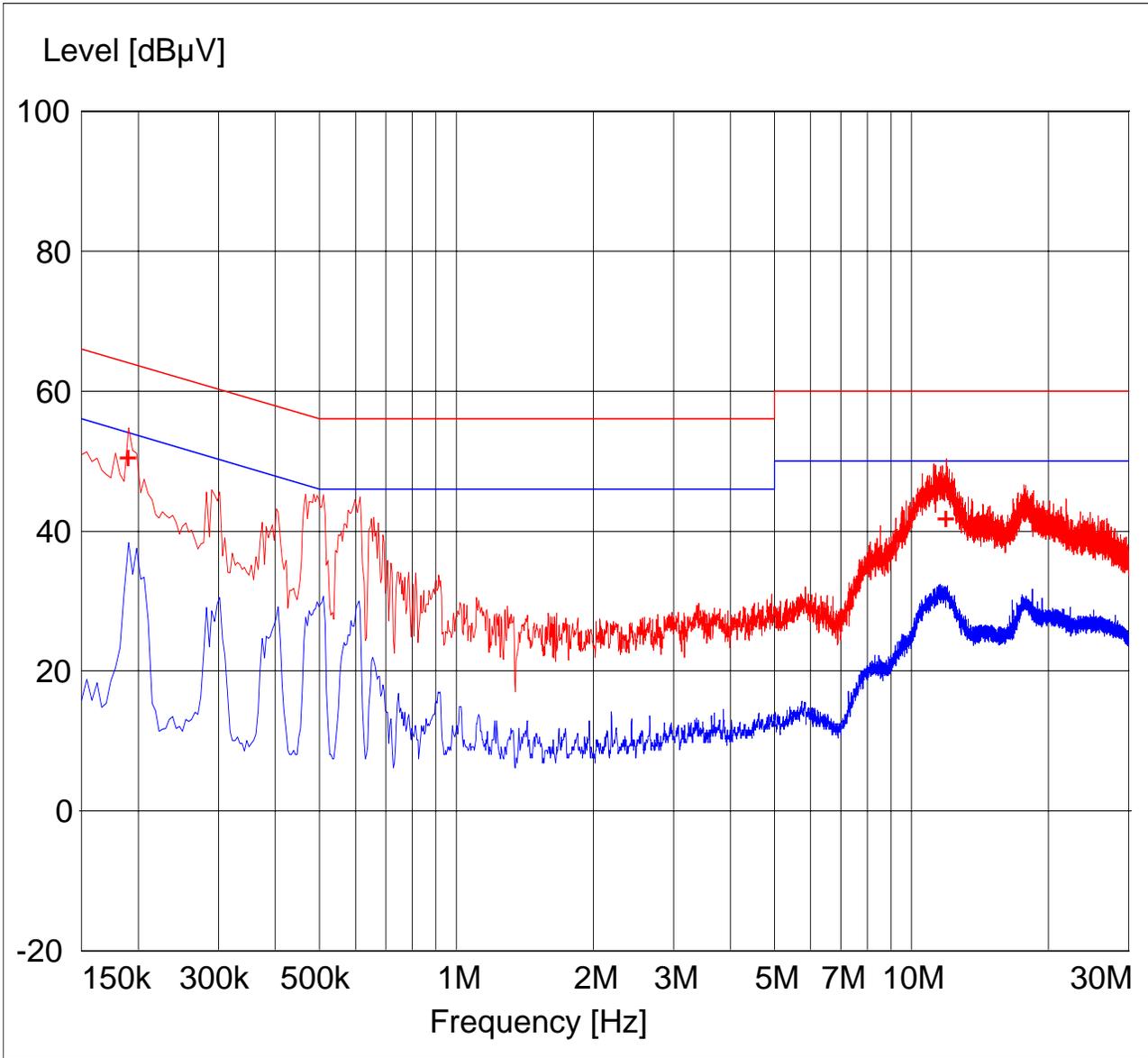
Short Description: Voltage QP Limit  
 4/27/1998 2:24PM

Frequency	Level
MHz	dBµV
0.150000	66.00
0.500000	56.00
5.000000	56.00
5.000000	60.00
30.000000	60.00



**6.7.3 RESULTS TX Neutral**

EUT: Laptop  
 Manufacturer: Sony  
 Test Mode: BT Ch.39, 2441MHz  
 ANT Orientation:: LISN  
 EUT Orientation:: H  
 Test Engineer:: Chris  
 Power Supply: : AC Adapter  
 Comments: : Neutral



- + MES 55022 V AV QPk
- MES 55022 cond MaxPk
- MES 55022 cond Avg
- LIM EN 55022 V QP      Voltage QP Limit
- LIM EN 55022 V AV      Voltage AV Limit



**MEASUREMENT RESULT: "55022 V AV QPk"**

7/24/2008 11:58PM

Frequency	Level	Transd	Limit	Margin	Line	PE	AUX STATE
MHz	dBµV	dB	dBµV	dB			
0.190000	50.70	0.1	64	13.4	1	---	OFF
11.926000	42.10	0.7	60	17.9	1	---	OFF

**LIMIT LINE: "EN 55022 V AV"**

Short Description: Voltage AV Limit  
 4/27/1998 2:24PM

Frequency	Level
MHz	dBµV
0.150000	56.00
0.500000	46.00
5.000000	46.00
5.000000	50.00
30.000000	50.00

**LIMIT LINE: "EN 55022 V QP"**

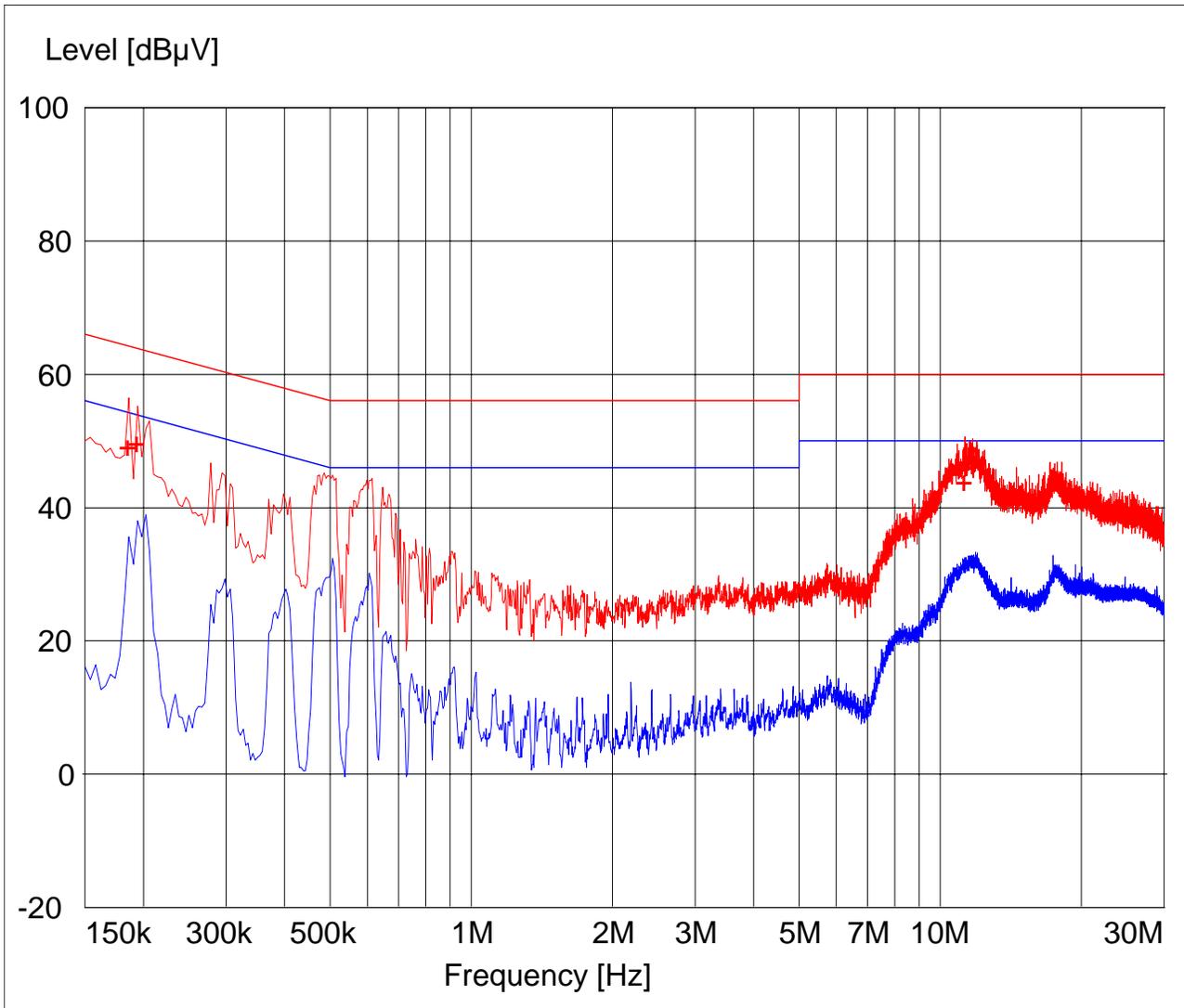
Short Description: Voltage QP Limit  
 4/27/1998 2:24PM

Frequency	Level
MHz	dBµV
0.150000	66.00
0.500000	56.00
5.000000	56.00
5.000000	60.00
30.000000	60.00



**6.7.4 RESULTS RX Line:**

EUT: Laptop  
 Manufacturer: Sony  
 Test Mode: BT Ch.39, 2441MHz; RX  
 ANT Orientation:: LISN  
 EUT Orientation:: H  
 Test Engineer:: Chris  
 Power Supply: : AC Adapter  
 Comments: :  
 Line



+ MES 55022 V AV QPk  
 — MES 55022 cond MaxPk  
 — MES 55022 cond Avg  
 — LIM EN 55022 V QP      Voltage QP Limit  
 — LIM EN 55022 V AV      Voltage AV Limit



**MEASUREMENT RESULT: "55022 V AV QPk"**

7/25/2008 12:09AM

Frequency	Level	Transd	Limit	Margin	Line	PE	AUX STATE
MHz	dBµV	dB	dBµV	dB			
0.186000	49.30	0.1	64	15.0	1	---	OFF
0.194000	49.80	0.1	64	14.1	1	---	OFF
11.282000	44.00	0.6	60	16.0	1	---	OFF

**LIMIT LINE: "EN 55022 V AV"**

Short Description: Voltage AV Limit

4/27/1998 2:24PM

Frequency	Level
MHz	dBµV
0.150000	56.00
0.500000	46.00
5.000000	46.00
5.000000	50.00
30.000000	50.00

**LIMIT LINE: "EN 55022 V QP"**

Short Description: Voltage QP Limit

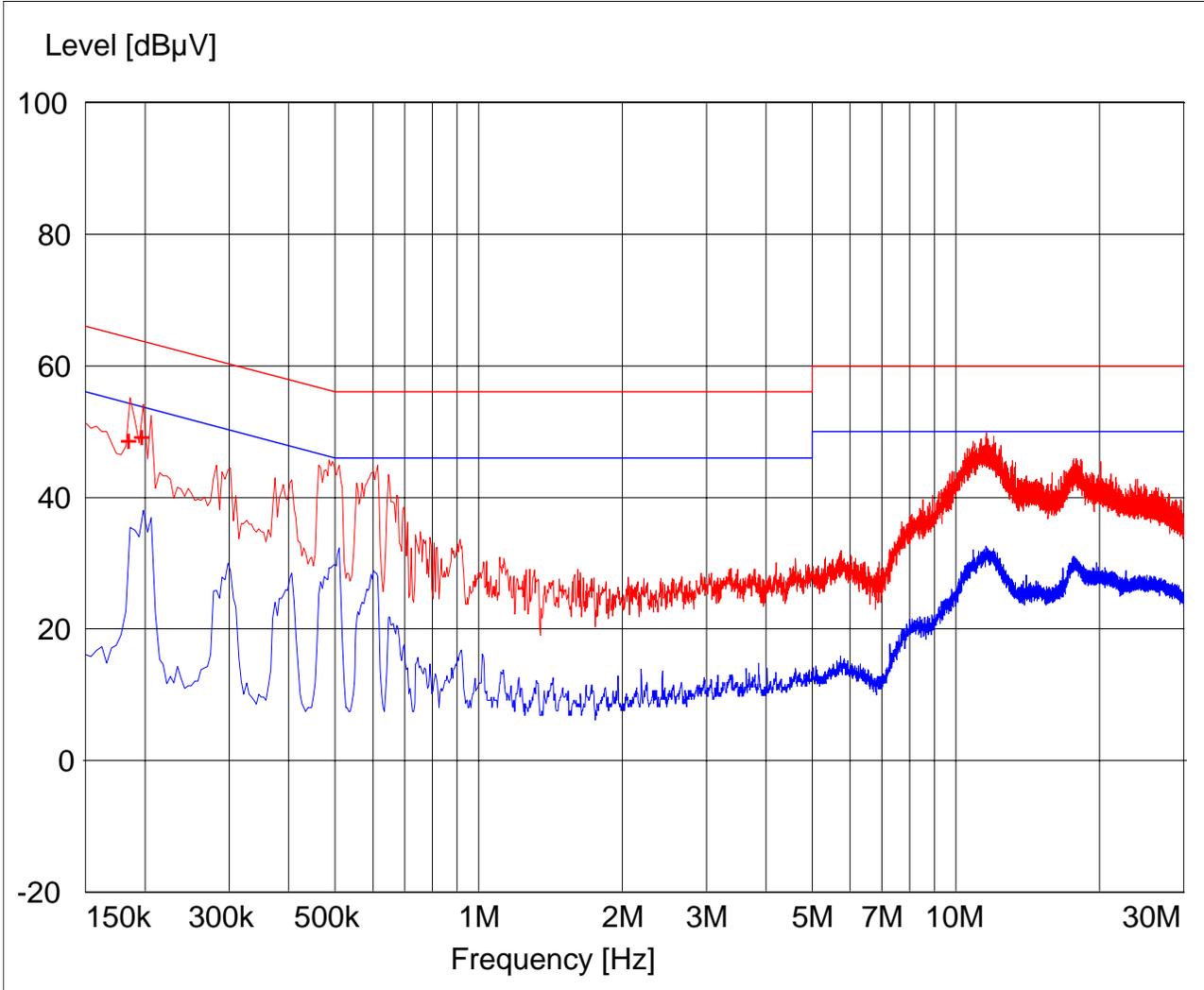
4/27/1998 2:24PM

Frequency	Level
MHz	dBµV
0.150000	66.00
0.500000	56.00
5.000000	56.00
5.000000	60.00
30.000000	60.00



**6.7.5 RESULTS RX Neutral**

EUT: Laptop  
 Manufacturer: Sony  
 Test Mode: BT Ch.39, 2441MHz; RX  
 ANT Orientation:: LISN  
 EUT Orientation:: H  
 Test Engineer:: Chris  
 Power Supply: : AC Adapter  
 Comments: :  
 Neutral



- + MES 55022 V AV QPk
- MES 55022 cond MaxPk
- MES 55022 cond Avg
- LIM EN 55022 V QP Voltage QP Limit
- LIM EN 55022 V AV Voltage AV Limit



**MEASUREMENT RESULT: "55022 V AV QPk"**

7/25/2008 12:16AM

Frequency	Level	Transd	Limit	Margin	Line	PE	AUX STATE
MHz	dBµV	dB	dBµV	dB			
0.186000	48.90	0.1	64	15.3	1	---	OFF
0.198000	49.40	0.1	64	14.3	1	---	OFF

**LIMIT LINE: "EN 55022 V AV"**

Short Description: Voltage AV Limit  
 4/27/1998 2:24PM

Frequency	Level
MHz	dBµV
0.150000	56.00
0.500000	46.00
5.000000	46.00
5.000000	50.00
30.000000	50.00

**LIMIT LINE: "EN 55022 V QP"**

Short Description: Voltage QP Limit  
 4/27/1998 2:24PM

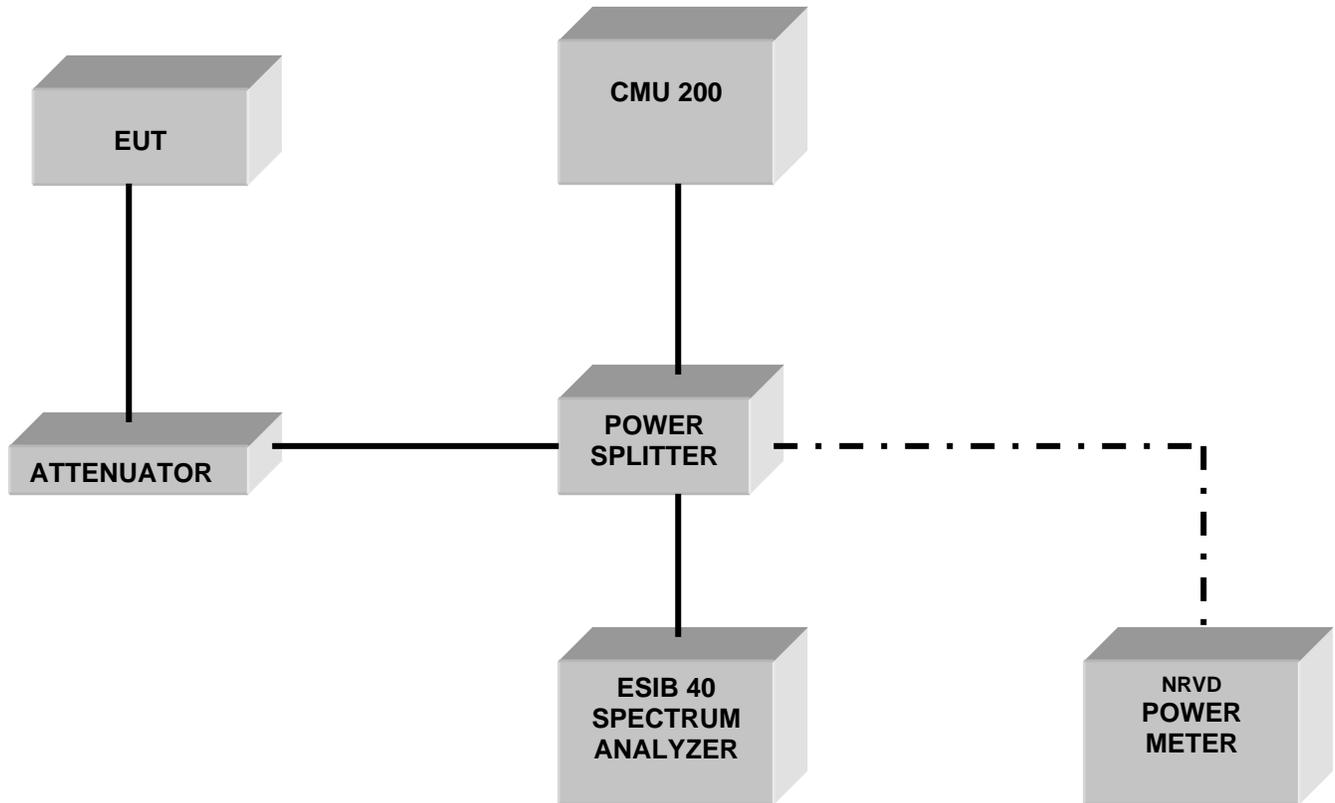
Frequency	Level
MHz	dBµV
0.150000	66.00
0.500000	56.00
5.000000	56.00
5.000000	60.00
30.000000	60.00

## 7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due	Interval
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2009	1 year
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	100017	August 2009	1 year
03	Signal Generator	SMY02	Rohde & Schwarz	836878/011	May 2009	1 year
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02	May 2009	1 year
05	Biconilog Antenna	3141	EMCO	0005-1186	June 2009	1 year
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325	June 2009	1 year
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240	June 2009	1 year
08	Power Splitter	11667B	Hewlett Packard	645348	n/a	n/a
09	Climatic Chamber	VT4004	Voltsch	G1115	May 2009	1 year
10	High Pass Filter	5HC2700	Trilithic Inc.	9926013	n/a	n/a
11	High Pass Filter	4HC1600	Trilithic Inc.	9922307	n/a	n/a
12	Pre-Amplifier	JS4-00102600	Miteq	00616	May 2009	1 year
13	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807	May 2009	1 year
14	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008	May 2009	1 year
15	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06	May 2009	1 year
16	LISN	ESH3-Z5	Rohde & Schwarz	836679/003	May 2009	1 year
17	Loop Antenna	6512	EMCO	00049838	July 2009	2 years

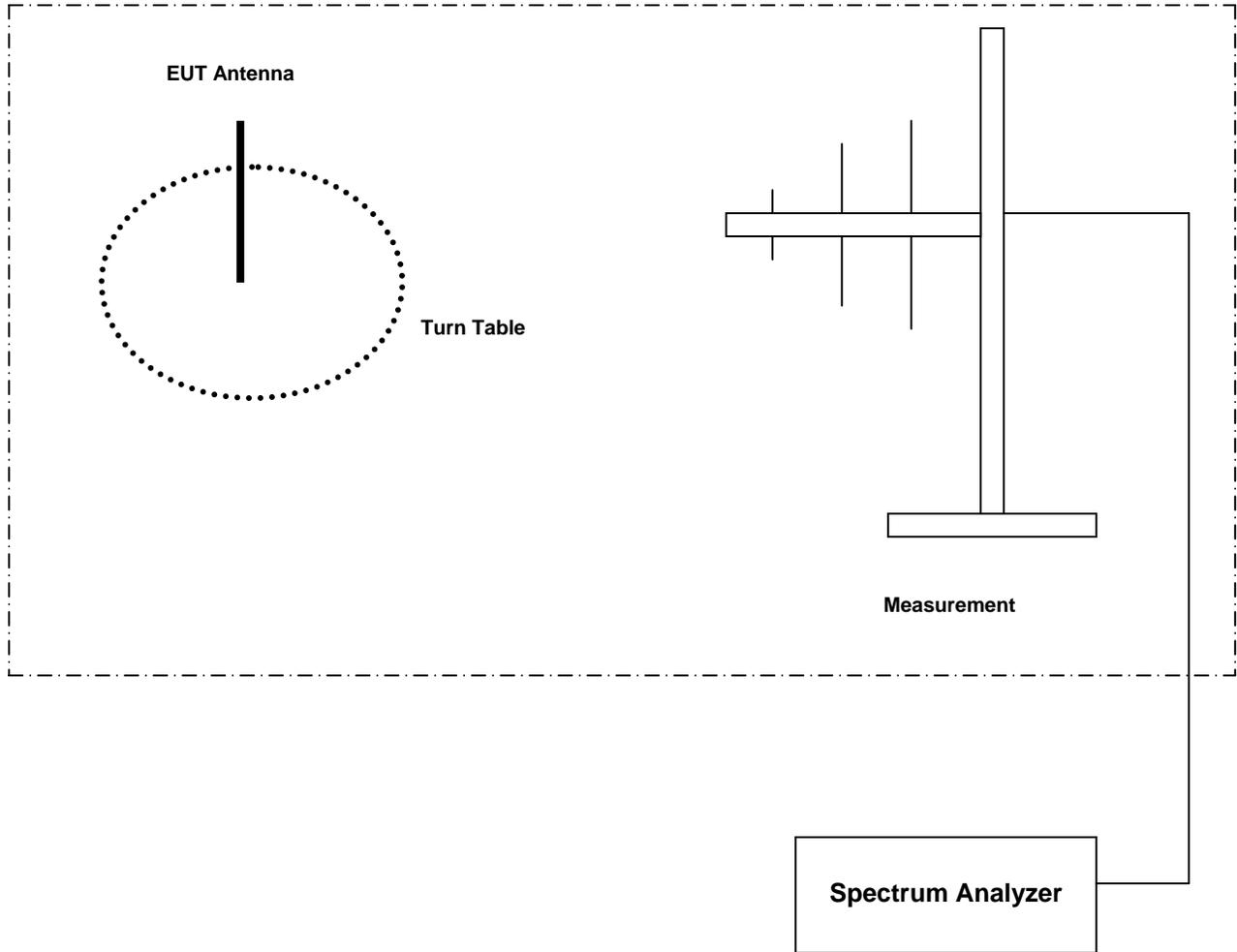
## 8 BLOCK DIAGRAMS

### Conducted Testing



### Radiated Testing

#### ANECHOIC CHAMBER





**9 Revision History.**

2008-7-29: First Issue