



# Test Report

## FCC Part 15.247

## Industry Canada RSS210

**DTS Devices Operating in range 2400-2483.5MHz and  
5725–5850 MHz**

**Model #: PCG-5Q1L**

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

**FCC ID: AK8PCG5Q1L  
IC ID: 409B-PCG5Q1L**

**TEST REPORT #: EMC\_SONYE\_028\_08001\_15\_247  
DATE: 2008-11-13**



**Bluetooth Qualification  
Test Facility  
(BQTF)**



**FCC listed:  
A2LA  
accredited**

**IC recognized #  
3462B**

**CETECOM Inc.**

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

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**1 Assessment**

The following is in compliance with the applicable criteria specified in FCC rules Part 15.247 of the Code of Federal Regulations.

Company	Description	Model #
SONY Corporation	Notebook PC	PCG-5Q1L

This report is reviewed by:

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

**2008-11-13 EMC & Radio**

Date	Section	Name	Signature
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This report is prepared by:

**Peter Mu**  
 (EMC Project Engineer)

**2008-11-13 EMC & Radio**

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.

**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>2008-11-10 to 2008-11-13</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>
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<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>
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<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-5Q1L</b>
Description:	<b>Notebook PC</b>
Model No:	<b>PCG-5Q1L</b>
FCC ID:	<b>AK8PCG5Q1L</b>
IC ID:	<b>409B-PCG5Q1L</b>

Frequency Range:	<b>2400-2483.5MHz</b> <b>Channel 1, 6, 11 for 802.11b/g and 802.11n HT20 mode</b> <b>Channel 2, 6, 10 for 802.11n HT40 mode</b> <b>5725-5850 MHz</b> <b>Channel 149, 157, 165 for 802.11a and 802.11n HT20 mode</b> <b>Channel 151, 159, 167 for 802.11n HT40 mode</b>
Type(s) of Modulation:	<b>OFDM</b>
Antenna Type:	<b>Inverted F antenna</b> <b>Peak Gain 2400-2483.5MHz: 1.83dBi.</b> <b>Peak Gain 5725-5850MHz: 3.42dBi.</b>
Max Output Power:	<b>Sub-band 1, 2400-2483.5MHz 802.11b:</b> <b>    Radiated: 20.43dBm (110.41mW) EIRP</b> <b>    Conducted: 18.6dBm (72.4mW)</b> <b>Sub-band 1, 2400-2483.5MHz 802.11g:</b> <b>    Radiated: 20.03dBm (100.69mW) EIRP</b> <b>    Conducted: 18.2dBm (65.8mW)</b> <b>Sub-band 1, 2400-2483.5MHz 802.11n HT20:</b> <b>    Radiated: 17.93dBm (62.09mW) EIRP</b> <b>    Conducted: 16.1dBm (40.8mW)</b> <b>Sub-band 1, 2400-2483.5MHz 802.11n HT40:</b> <b>    Radiated: 17.63dBm (57.94mW) EIRP</b>

	<p style="text-align: center;"><b>Conducted: 15.8dBm (38.0mW)</b></p> <p><b>Sub-band 2, 5725-5850MHz 802.11a:</b></p> <p style="text-align: center;"><b>Radiated: 18.72dBm (74.47mW) EIRP</b></p> <p style="text-align: center;"><b>Conducted: 15.3dBm (34.0mW)</b></p> <p><b>Sub-band 2, 5725-5850MHz 802.11n HT20:</b></p> <p style="text-align: center;"><b>Radiated: 18.52dBm (71.12mW) EIRP</b></p> <p style="text-align: center;"><b>Conducted: 15.1dBm (32.4mW)</b></p> <p><b>Sub-band 2, 5725-5850MHz 802.11n HT40:</b></p> <p style="text-align: center;"><b>Radiated: 21.32dBm (135.52mW) EIRP</b></p> <p style="text-align: center;"><b>Conducted: 17.9dBm (61.5mW)</b></p>
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**3.2 Identification of the Equipment under Test (EUT)**

EUT #	TYPE	MANF.	MODEL	SERIAL #
1	EUT	SONY Corporation	PCG-5Q1L	FCC1
2	EUT	SONY Corporation	PCG-5Q1L	FCC2

**3.3 Identification of Accessory equipment**

AE #	TYPE	MANF.	MODEL	SERIAL #
1	AC/DC ADAPTER	SONY Corporation	VGP-AC16V11	0237485

**4 Subject Of Investigation**

All testing was performed on the product referred to in Section 3 as EUT. EUT operates in the band 2400-2483.5MHz in legacy 802.11b/g and 802,11n mode, and in 5725-5850 MHz in legacy 802.11a and 802.11n mode.

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT operating under all operating modes as specified by Sony per requirements listed in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations. The maximization of portable equipment is conducted in accordance with ANSI C63.4

## 5 Radiated Measurements

### 5.1 Maximum Peak Output Power § 15.247 (b)(1) (Radiated)

#### 5.1.1 Limits

FCC15.247 (b) (1): 4W (36dBm), with antenna gain < 6dBi.

RSS-210 A8.4 (4): 4W (36dBm)

#### 5.1.2 Results:

EIRP is calculated as EIRP = Conducted Peak Power (dBm) + Peak Antenna Gain (dBi)

EIRP 802.11 a/b/g Mode:

TEST CONDITIONS T <sub>nom</sub> (23)°C, V <sub>nom</sub> VDC	Channel Frequency	EIRP (dBm)	EIRP (mW)	Verdict
Sub-band 1: 2400-2483.5MHz (802.11b)	2412	<b>18.83</b>	<b>76.38</b>	PASS
	2437	<b>20.43</b>	<b>110.41</b>	PASS
	2462	<b>17.63</b>	<b>57.94</b>	PASS
Sub-band 1: 2400-2483.5MHz (802.11g)	2412	<b>15.03</b>	<b>31.84</b>	PASS
	2437	<b>20.03</b>	<b>100.69</b>	PASS
	2462	<b>16.23</b>	<b>41.98</b>	PASS
Sub-band 2: 5725-5850MHz (802.11a)	5745	<b>18.12</b>	<b>64.86</b>	PASS
	5785	<b>18.72</b>	<b>74.47</b>	PASS
	5825	<b>16.72</b>	<b>46.99</b>	PASS

EIRP 802.11n HT20 MODE:

TEST CONDITIONS T <sub>nom</sub> (23)°C, V <sub>nom</sub> VDC	Channel Frequency	EIRP (dBm)	EIRP (mW)	Verdict
Sub-band 1: 2400-2483.5MHz	2412	<b>14.13</b>	<b>25.88</b>	PASS
	2437	<b>17.93</b>	<b>62.09</b>	PASS
	2462	<b>14.73</b>	<b>29.72</b>	PASS
Sub-band 2: 5725-5850MHz	5745	<b>18.12</b>	<b>64.86</b>	PASS
	5785	<b>18.52</b>	<b>71.12</b>	PASS
	5825	<b>16.72</b>	<b>46.99</b>	PASS

EIRP 802.11n HT40 MODE:

TEST CONDITIONS T <sub>nom</sub> (23)°C, V <sub>nom</sub> VDC	Channel Frequency	EIRP (dBm)	EIRP (mW)	Margin (mW)
Sub-band 1: 2400-2483.5MHz	2422	<b>11.13</b>	<b>12.97</b>	PASS
	2437	<b>17.63</b>	<b>57.94</b>	PASS
	2452	<b>10.93</b>	<b>12.39</b>	PASS
Sub-band 2: 5725-5850MHz	5755	<b>19.32</b>	<b>85.51</b>	PASS
	5795	<b>21.32</b>	<b>135.52</b>	PASS

**5.2 Restricted Band Edge Compliance §15.247/15.205**

**5.2.1 Limits**

(a) 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
<sup>1</sup> 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**

**Notes:**

1. Radiated emissions are maximized by rotating the EUT 360° at 0.5 meter height increments between 1 and 4 meters.
2. Measurements were performed with the EUT in X, Y and Z orientations with the measurement antenna in both horizontal and vertical polarity. The plots below show the results of the worst case orientation and polarity.

### 5.2.2 Sub-band 1 802.11n20 MODE

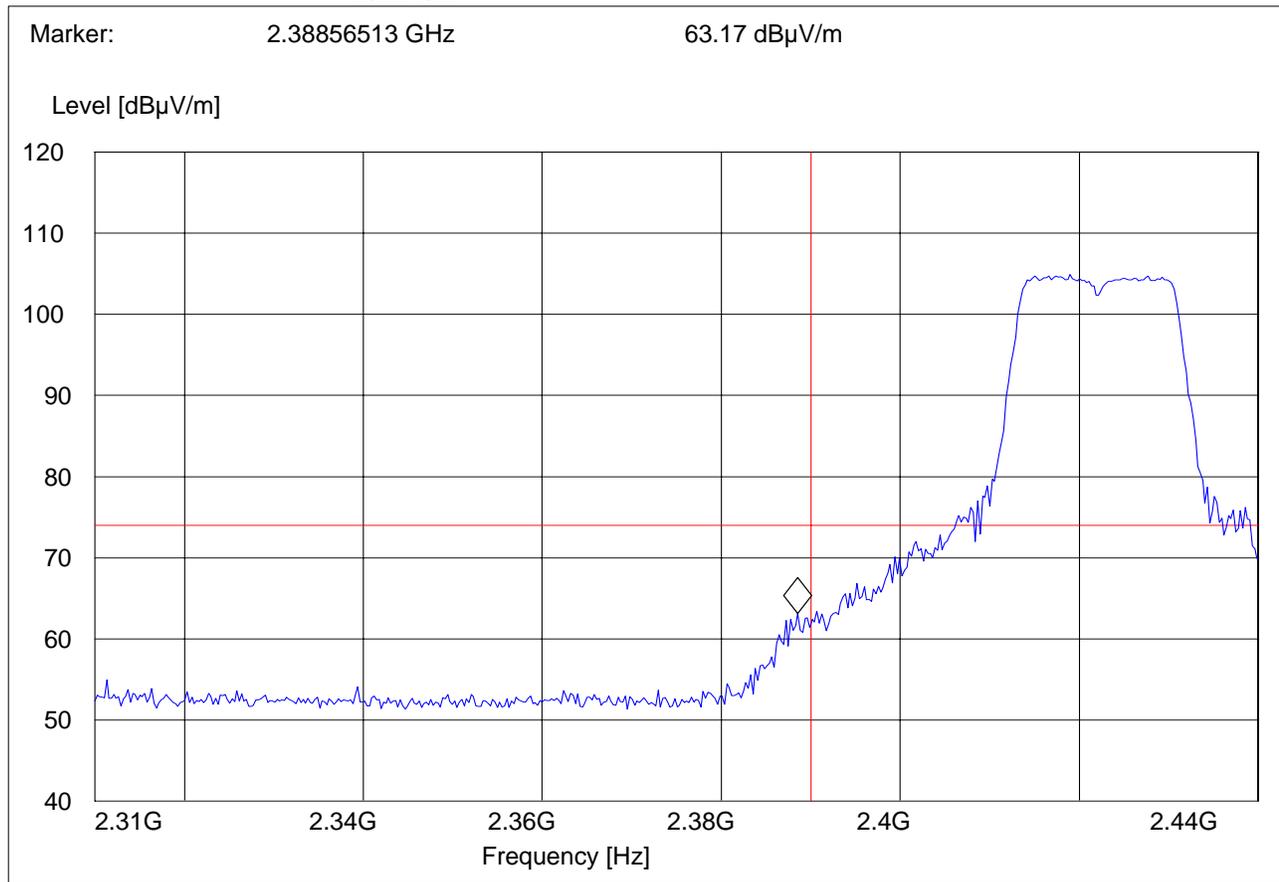
This mode represent worse case emission among b, g, and n20 mode of operation in this band.

#### Lower band edge PEAK

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n20 @ 2422 MHz  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

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

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

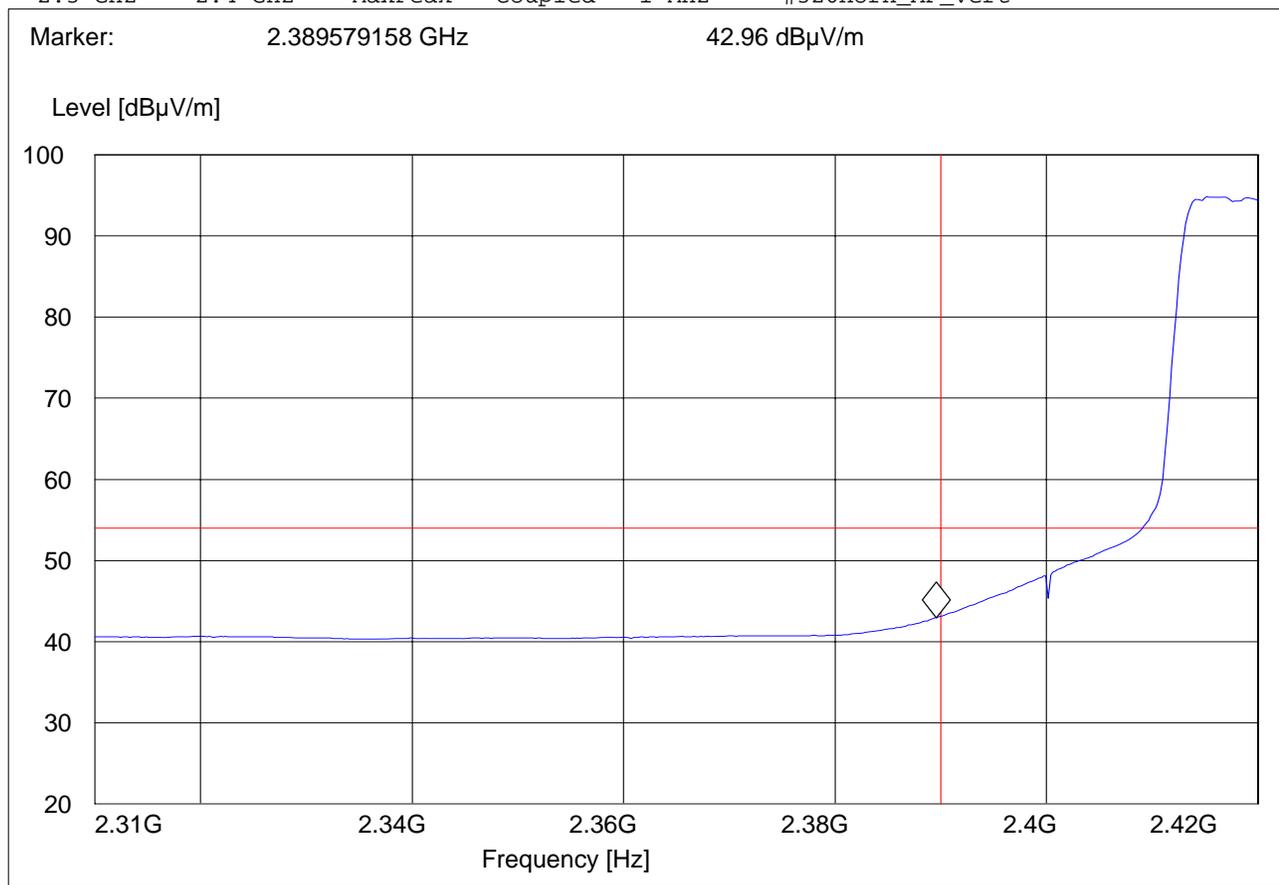


### Lower band edge Average

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n20 @ 2422 MHz  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

**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

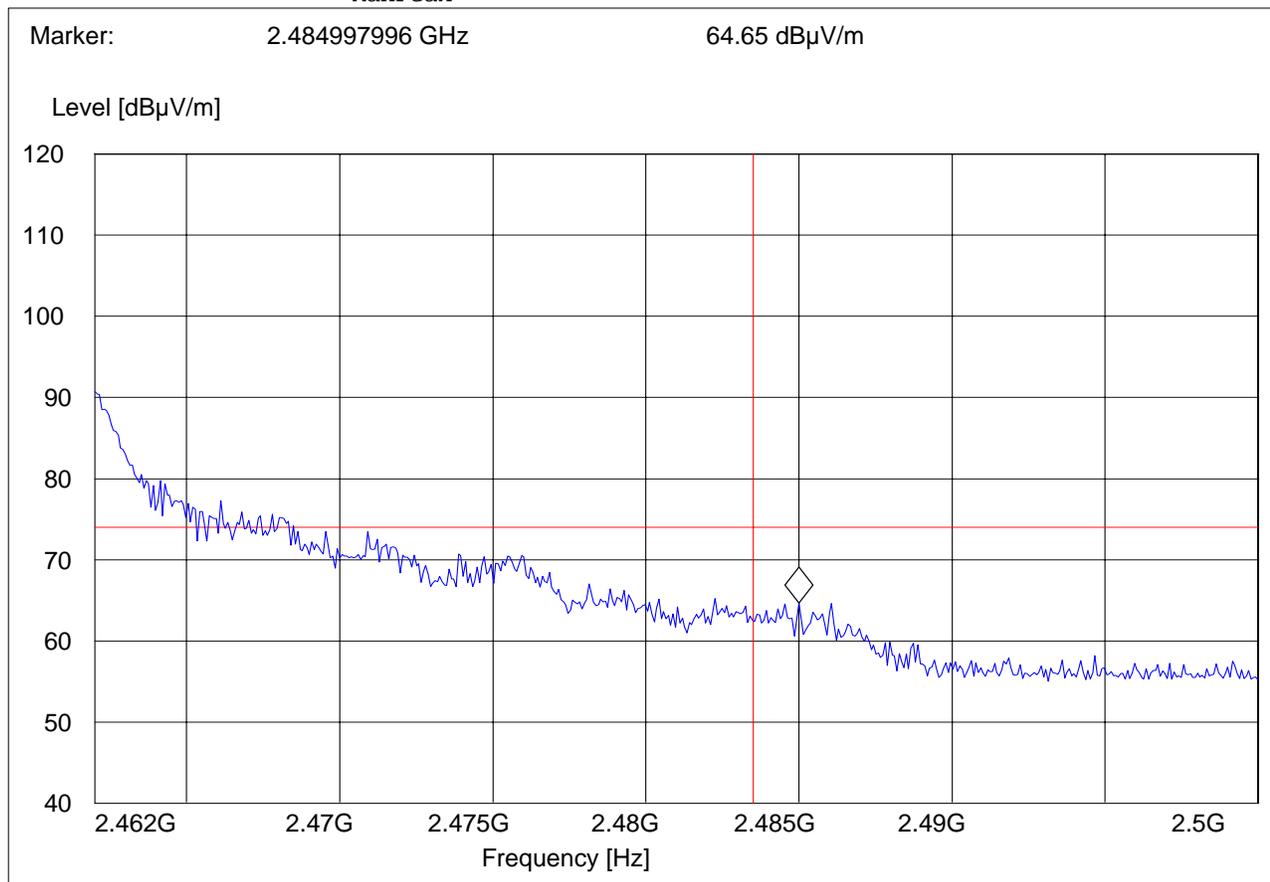


### High band edge PEAK

EUT: FCC2  
 Customer:: Sony Electronics  
 Test Mode: 802.11n20 @ 2452 MHz  
 ANT Orientation: H  
 EUT Orientation: H  
 Test Engineer: Chris  
 Voltage: AC Adaptor  
 Comments:

**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			



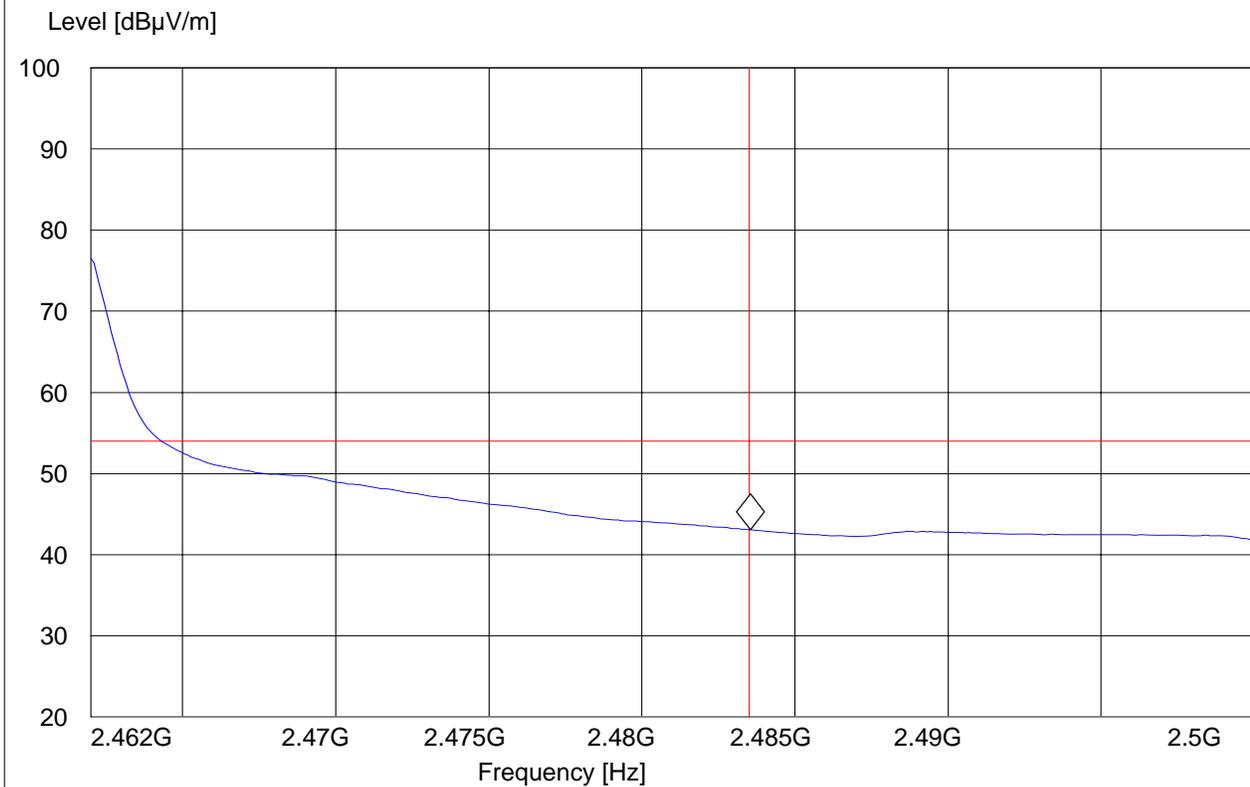
### High band edge Average

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n20 @ 2452 MHz  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

**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 43.05 dBμV/m



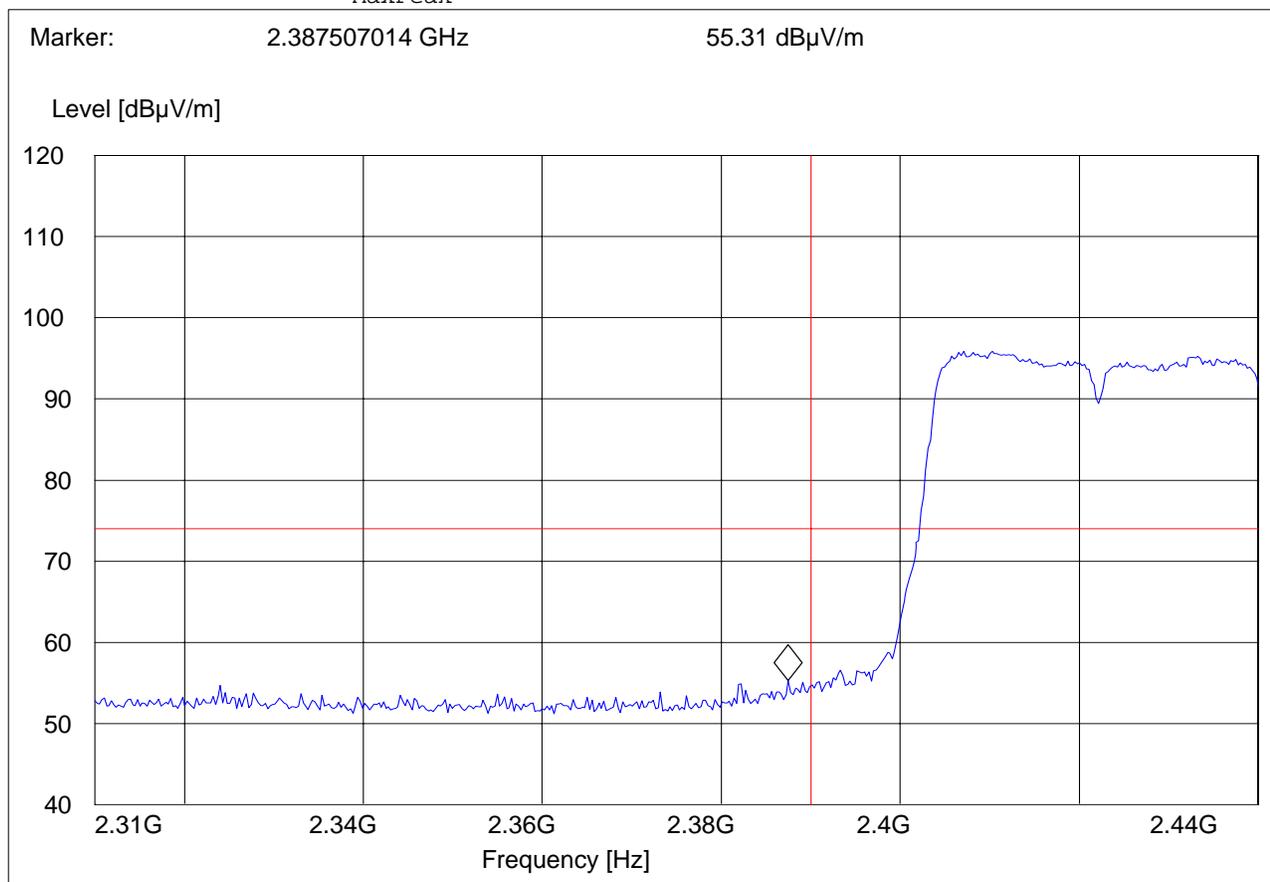
### 5.2.3 Sub-band 1 802.11n HT40 MODE

#### Lower band edge PEAK

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40 @ 2422 MHz  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

**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

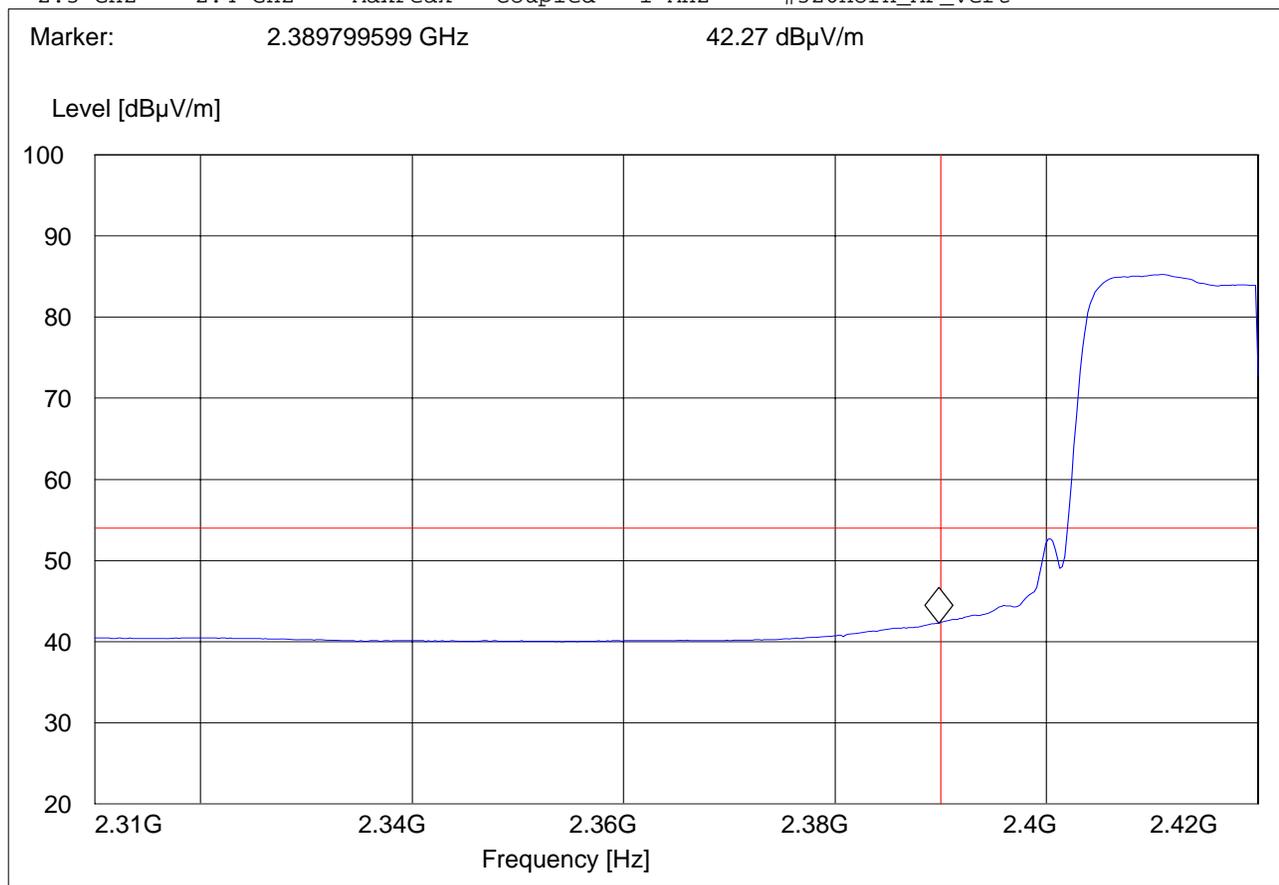


### Lower band edge Average

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40 @ 2422 MHz  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

**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

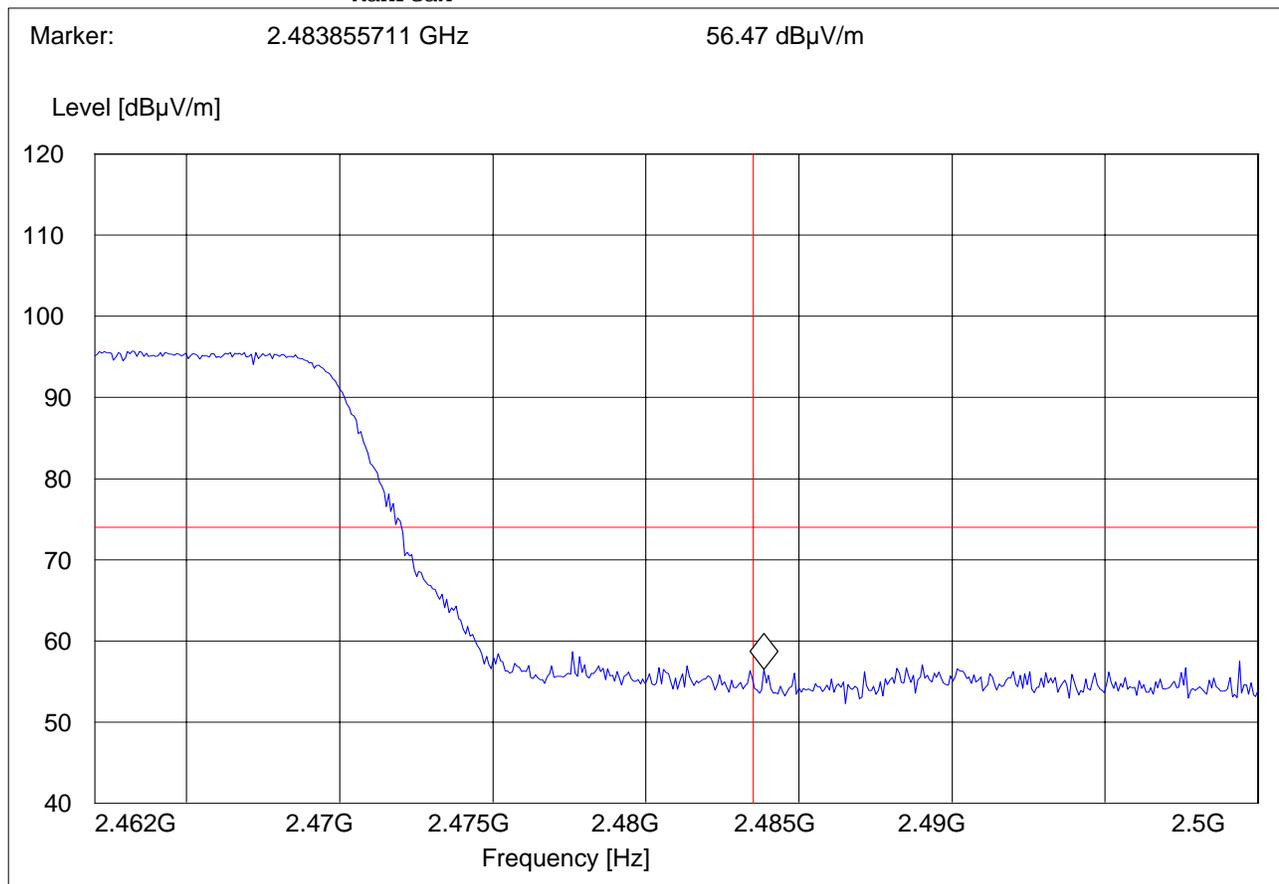


### High band edge PEAK

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40 @ 2452 MHz  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

**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



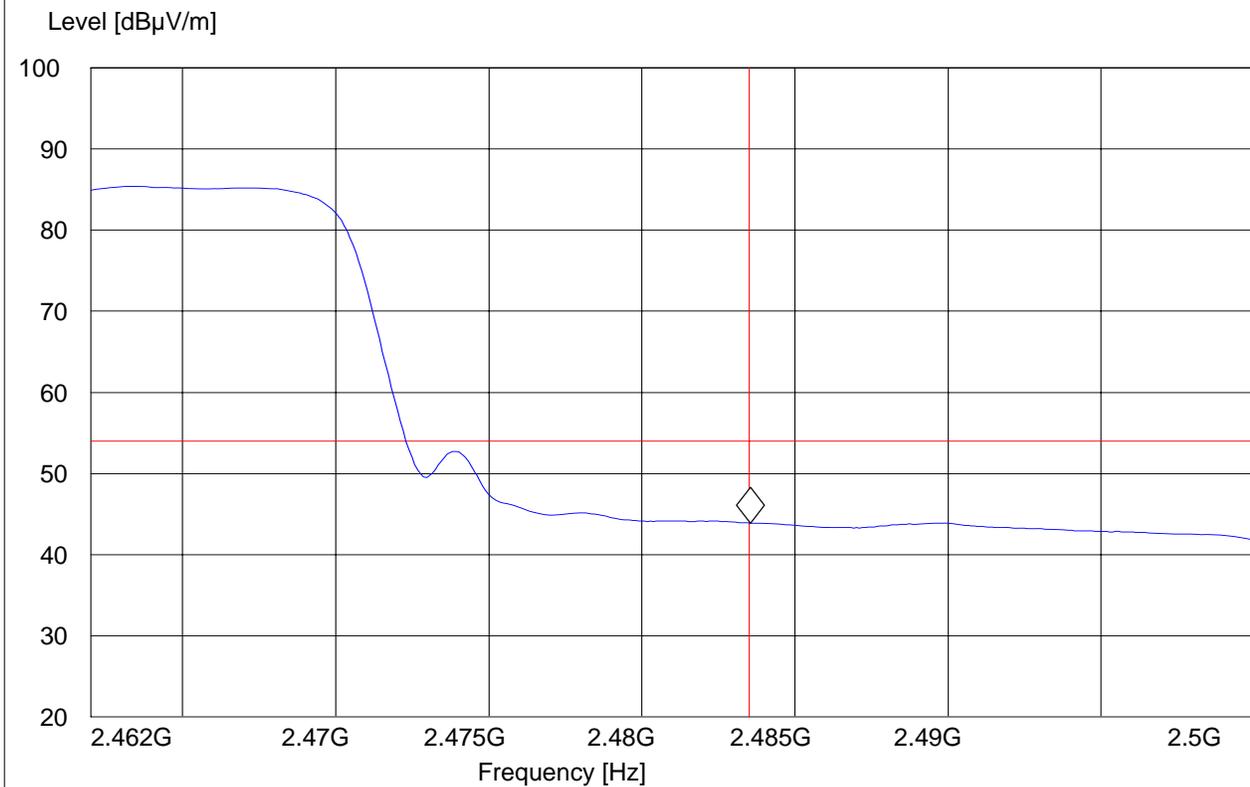
### High band edge Average

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40 @ 2452 MHz  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

**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 43.89 dB $\mu$ V/m



### 5.3 Transmitter Spurious Emission § 15.247/15.205/15.209

#### 5.3.1 Limits

(a) 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

**Notes:**

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.
3. Radiated emissions are maximized by rotating the EUT 360° at 0.5 meter height increments between 1 and 4 meters.
4. Measurements were performed with the EUT in X, Y and Z orientations with the measurement antenna in both horizontal and vertical polarity. The plots below show the results of the worst case orientation and polarity

#### 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

### 5.3.2 RESULTS Sub-band 1 802.11b/g MODE

Emissions reported here are worse cases emissions for all operation modes.

#### 30MHz – 1GHz, Antenna: Vertical

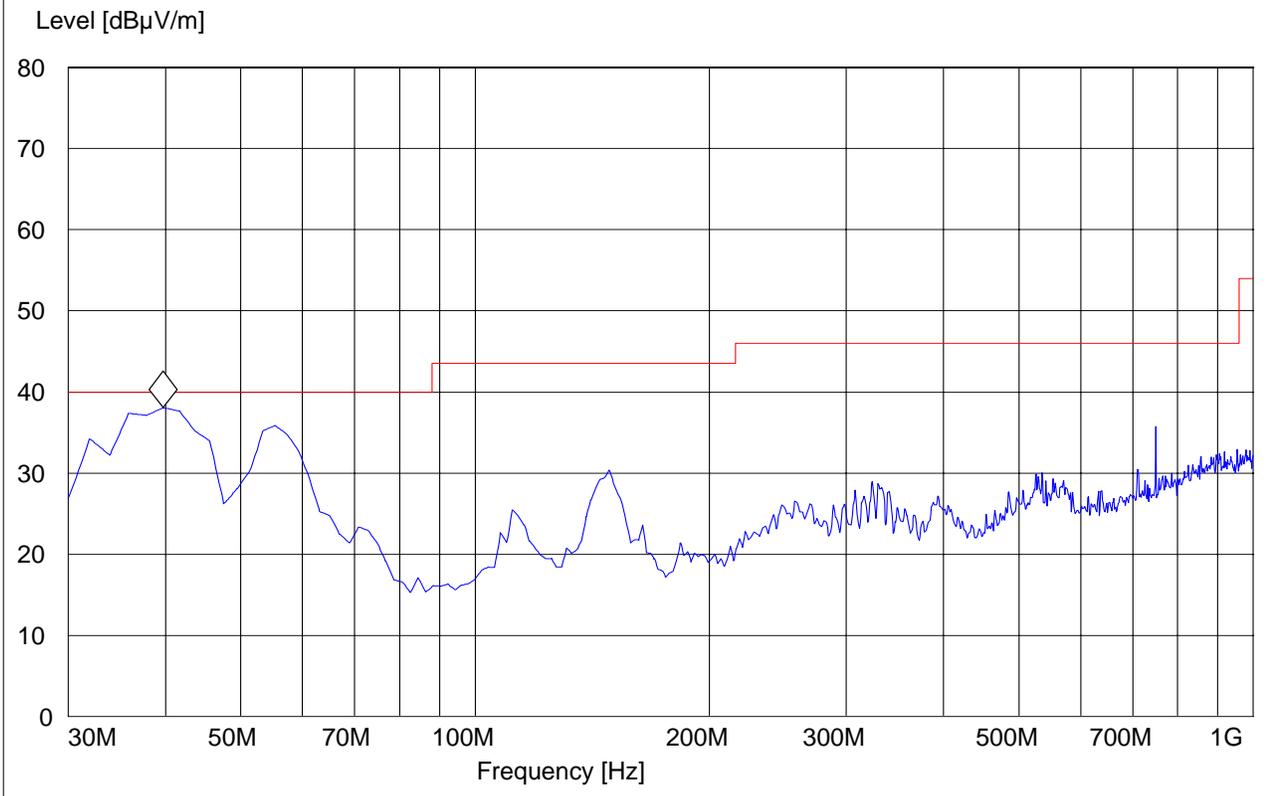
Note: This plot is valid for low, mid, high channels (worst-case plot).

EUT: FCC2  
 Customer:: Sony Electronics  
 Test Mode: 802.11n40  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: Chris  
 Voltage: AC Adaptor  
 Comments:

**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: 39.719439 MHz 38.06 dBµV/m



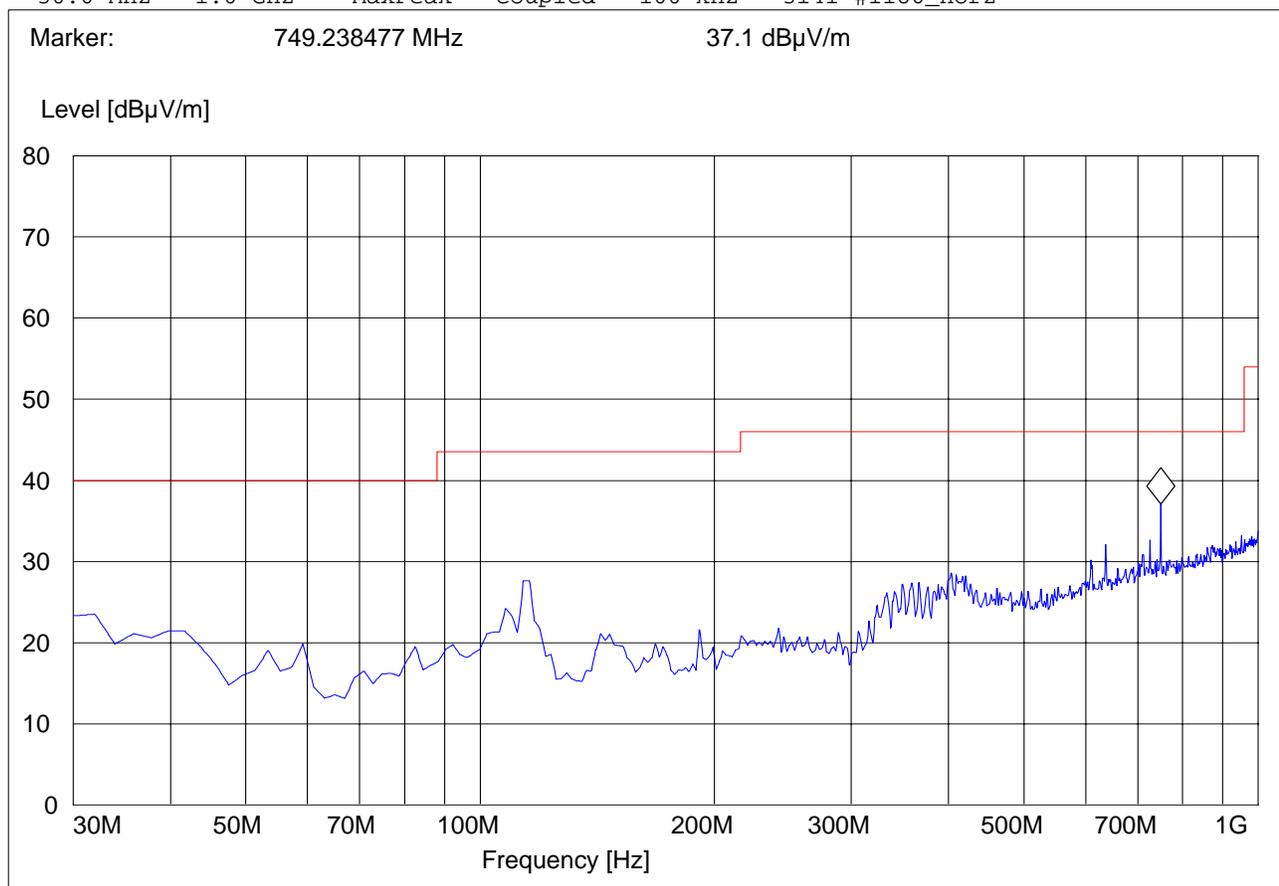
**30MHz – 1GHz, Antenna: Horizontal**

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

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

**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 (2422MHz)**

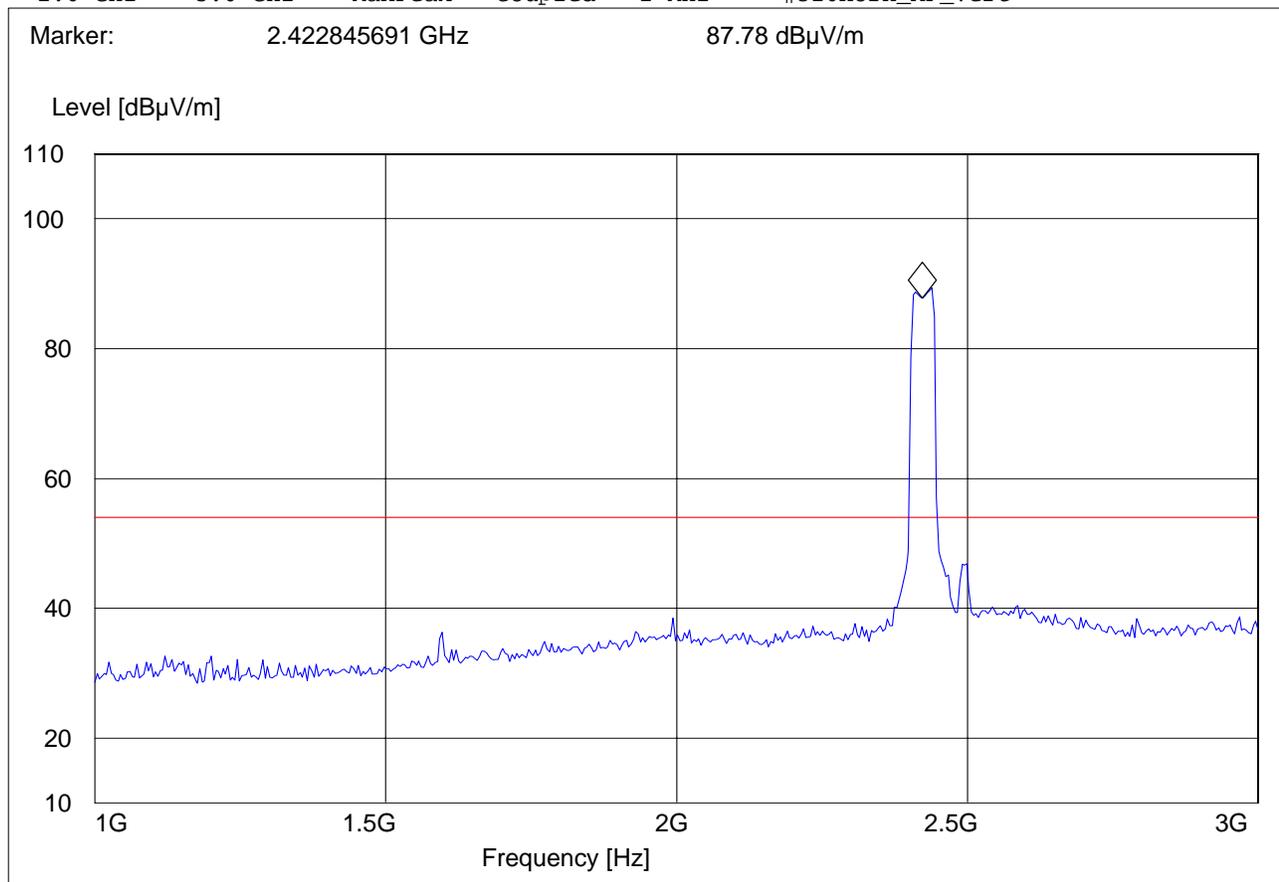
Note: The peak above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40 @ 2422 MHz  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

**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 (2437MHz)

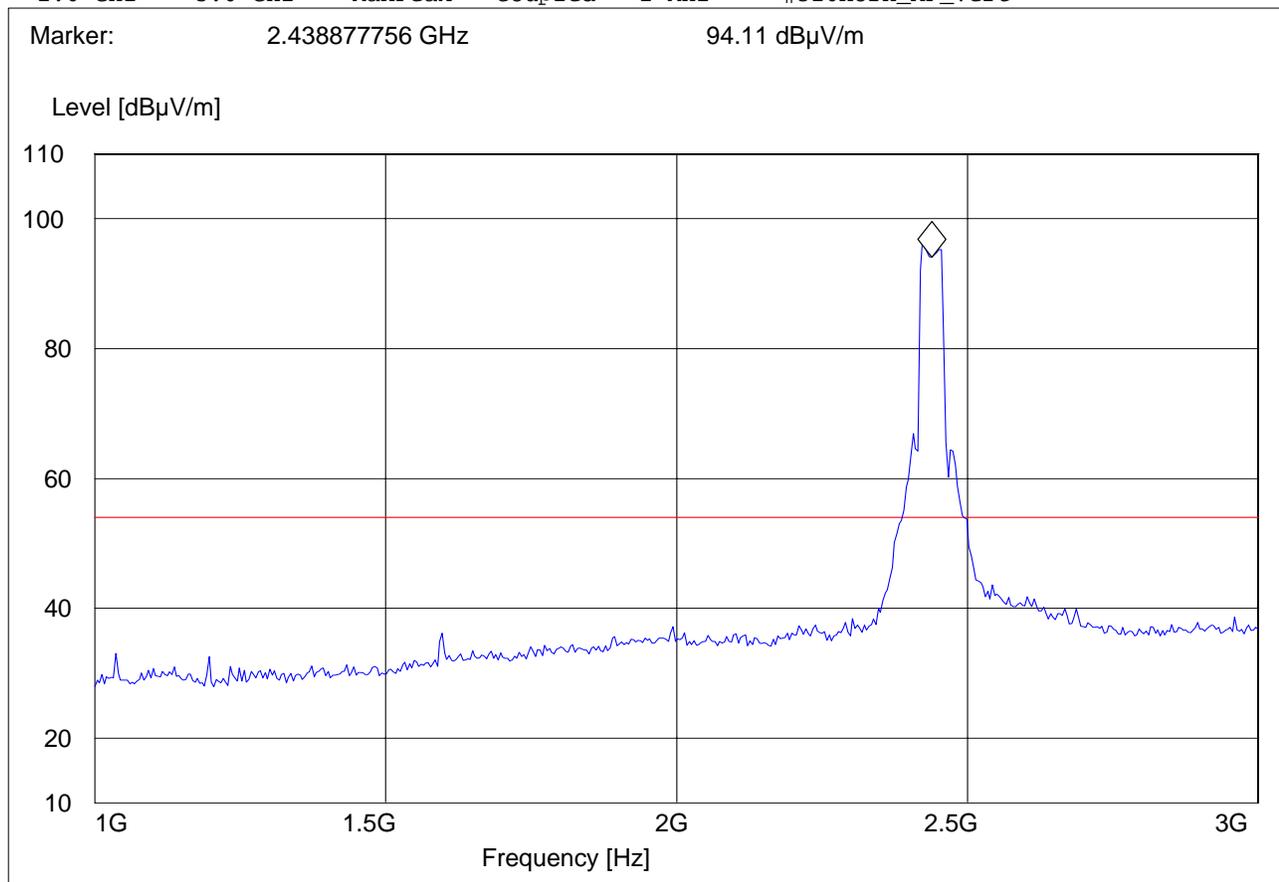
Note: The peak above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40 @ 2437 MHz  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

#### 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 (2452MHz)

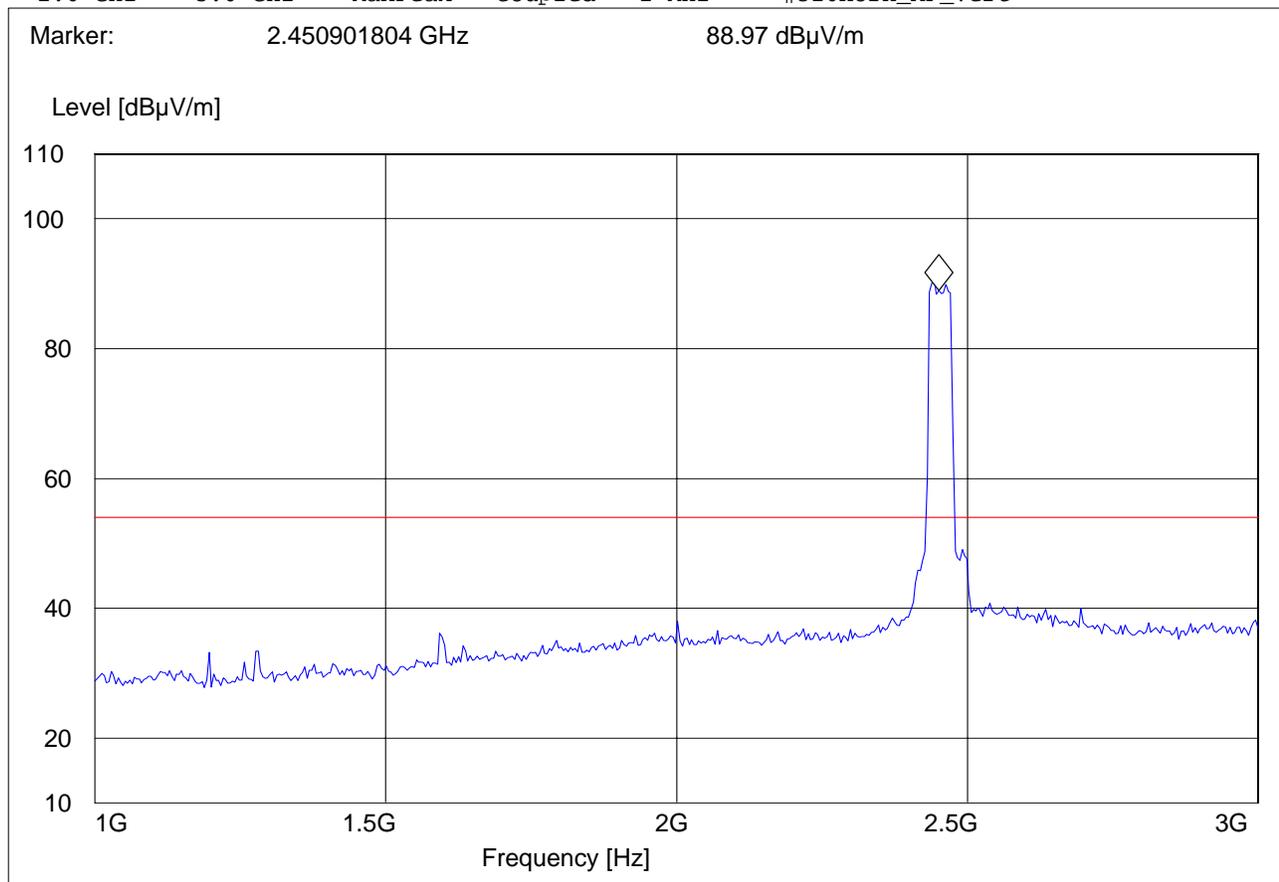
Note: The peak above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40 @ 2452 MHz  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

#### 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



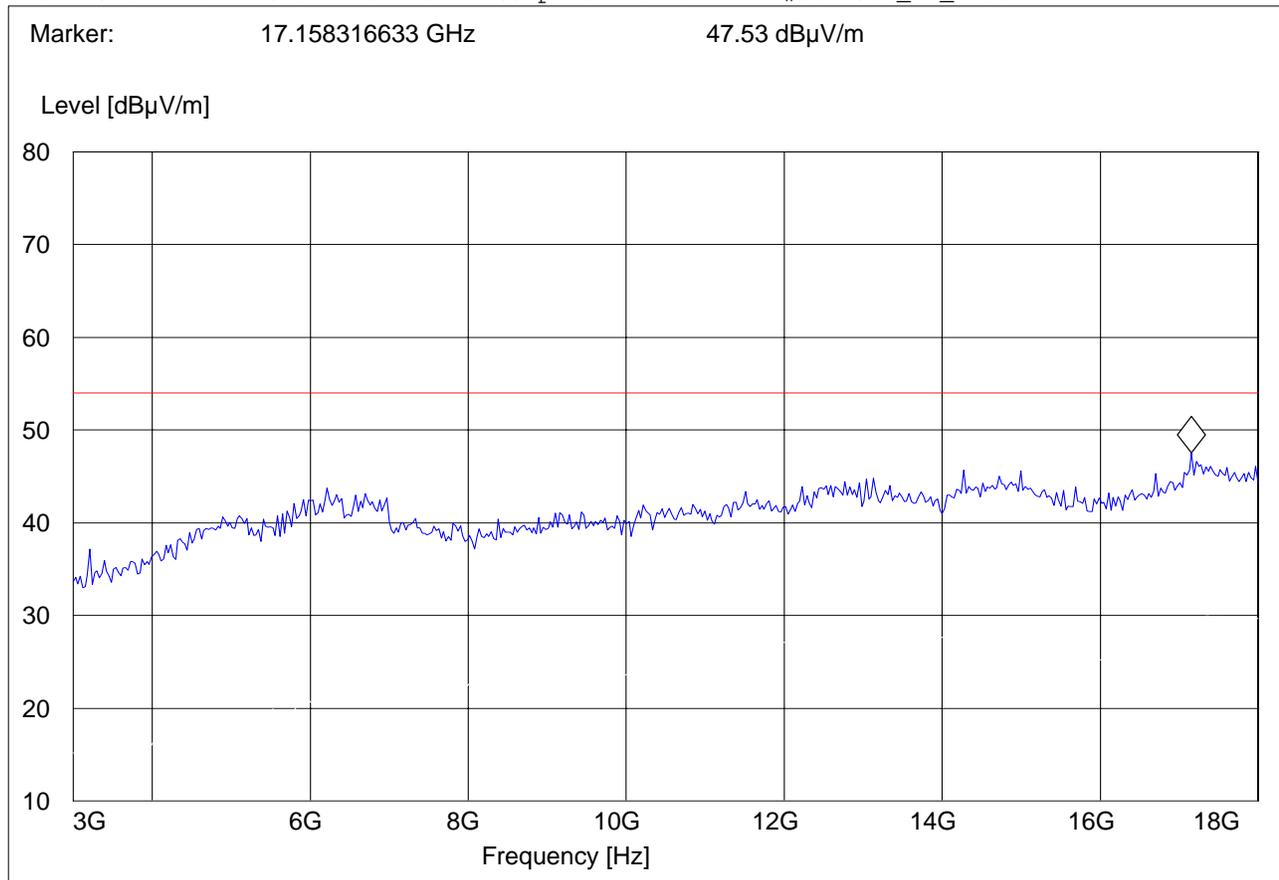
### 3-18GHz (2422MHz)

Note: Peak Reading vs. Average limit

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40 @ 2422 MHz  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments: With 2.4 GHz notch filter

#### 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



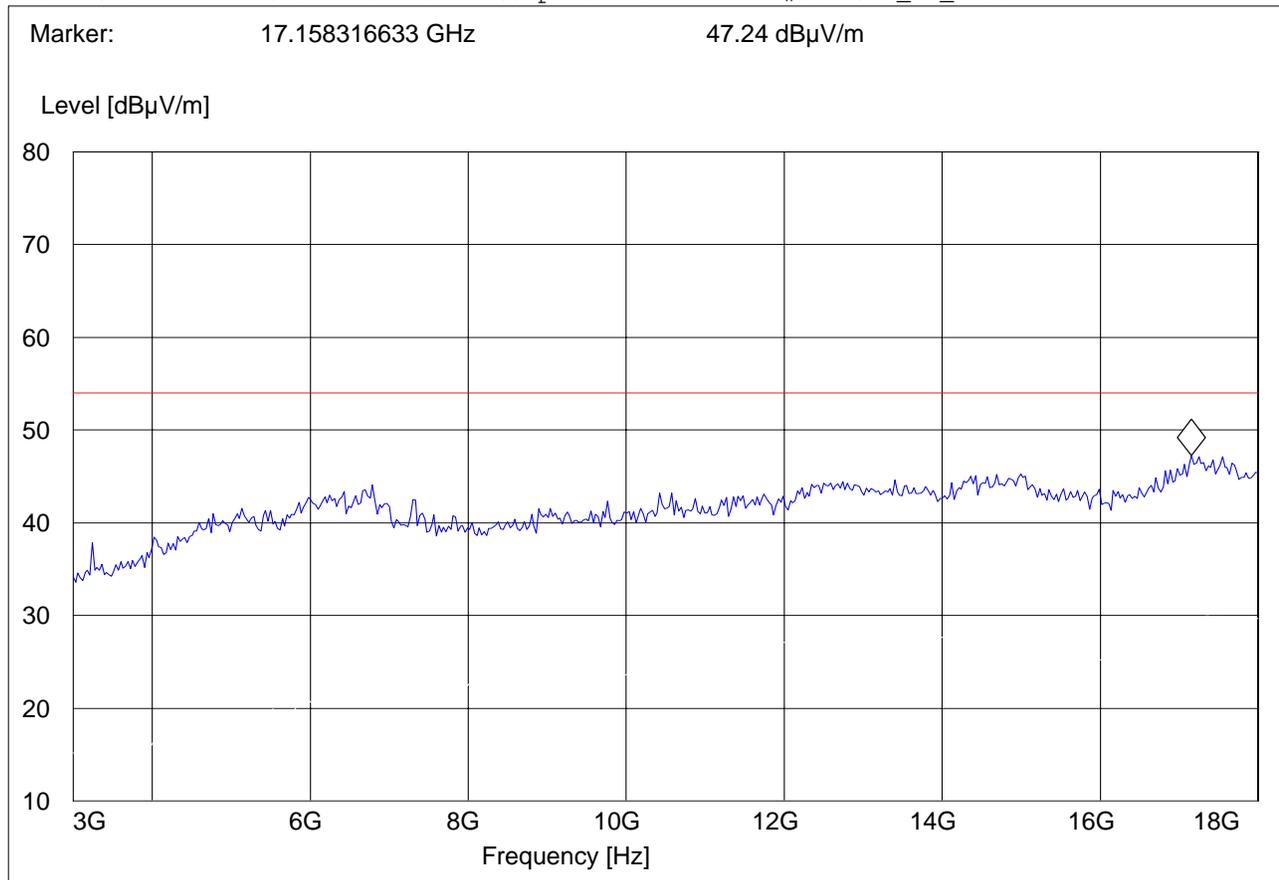
### 3-18GHz (2437MHz)

Note: Peak Reading vs. Average limit

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40 @ 2437 MHz  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments: With 2.4 GHz notch filter

#### 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



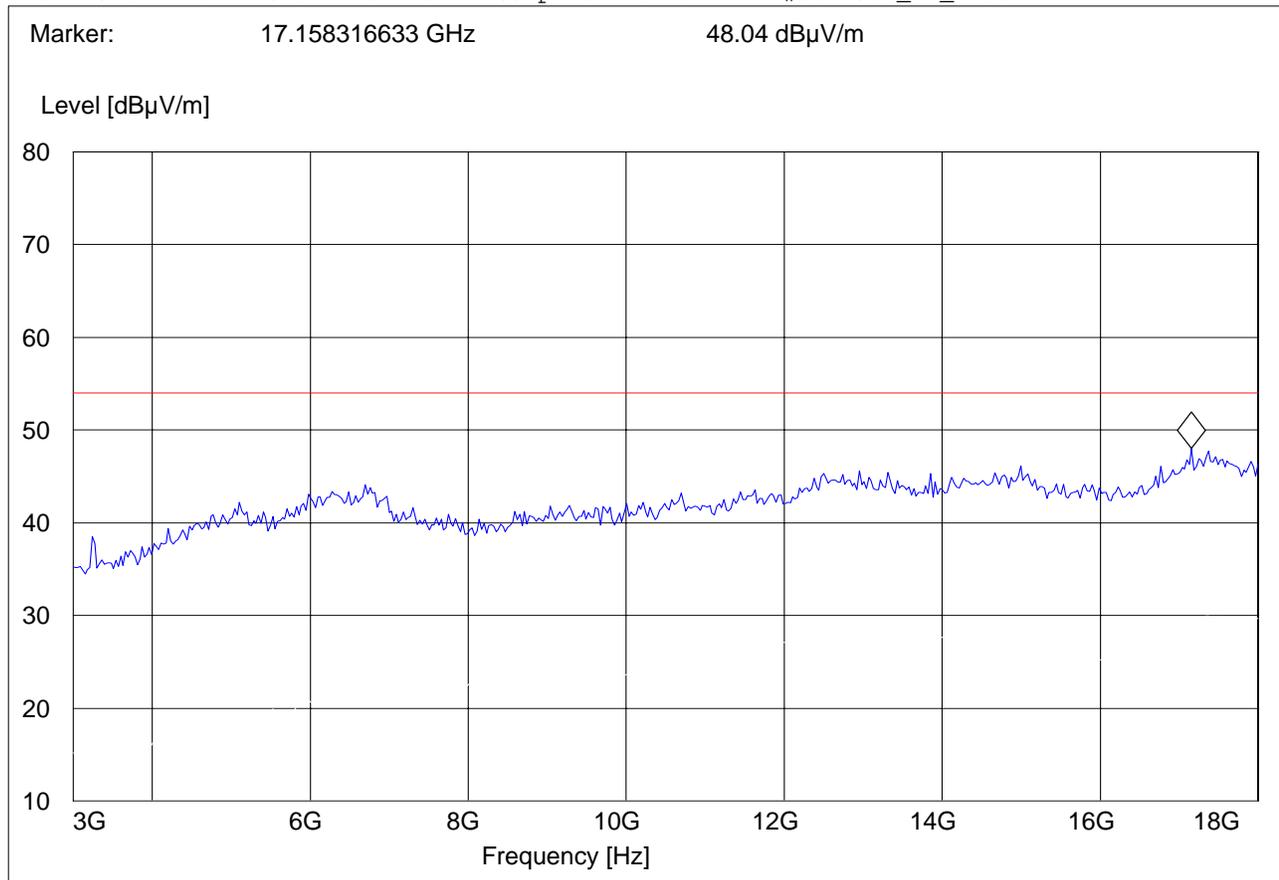
### 3-18GHz (2452MHz)

Note: Peak Reading vs. Average limit

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40 @ 2452 MHz  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments: With 2.4 GHz notch filter

#### 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



### 18-25GHz

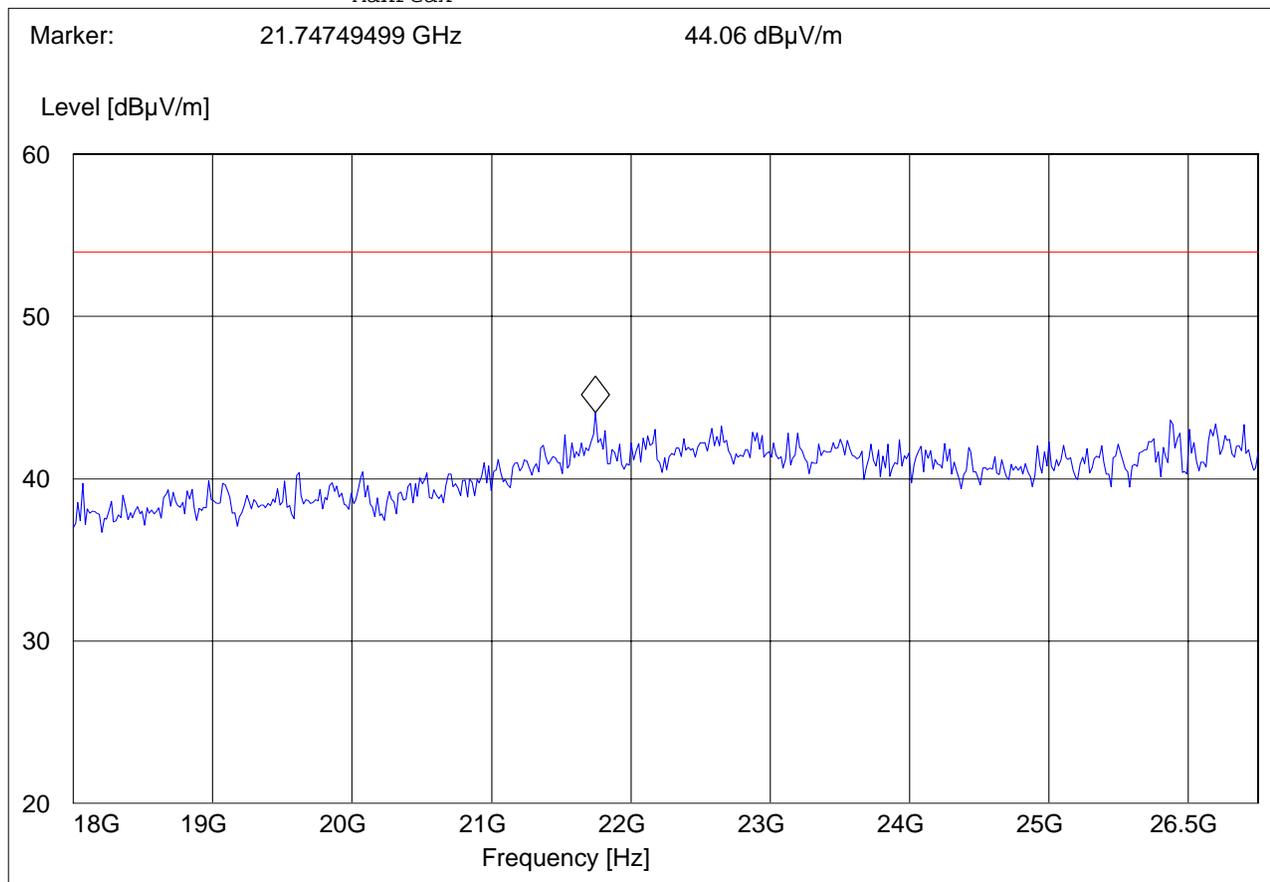
Note: This plot is valid for low, mid, high channels (worst-case plot).

Note: Peak Reading vs. Average limit

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

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

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



### 5.3.3 RESULTS Sub-band 2 802.11n HT40 MODE

#### 30MHz – 1GHz, Antenna: Vertical

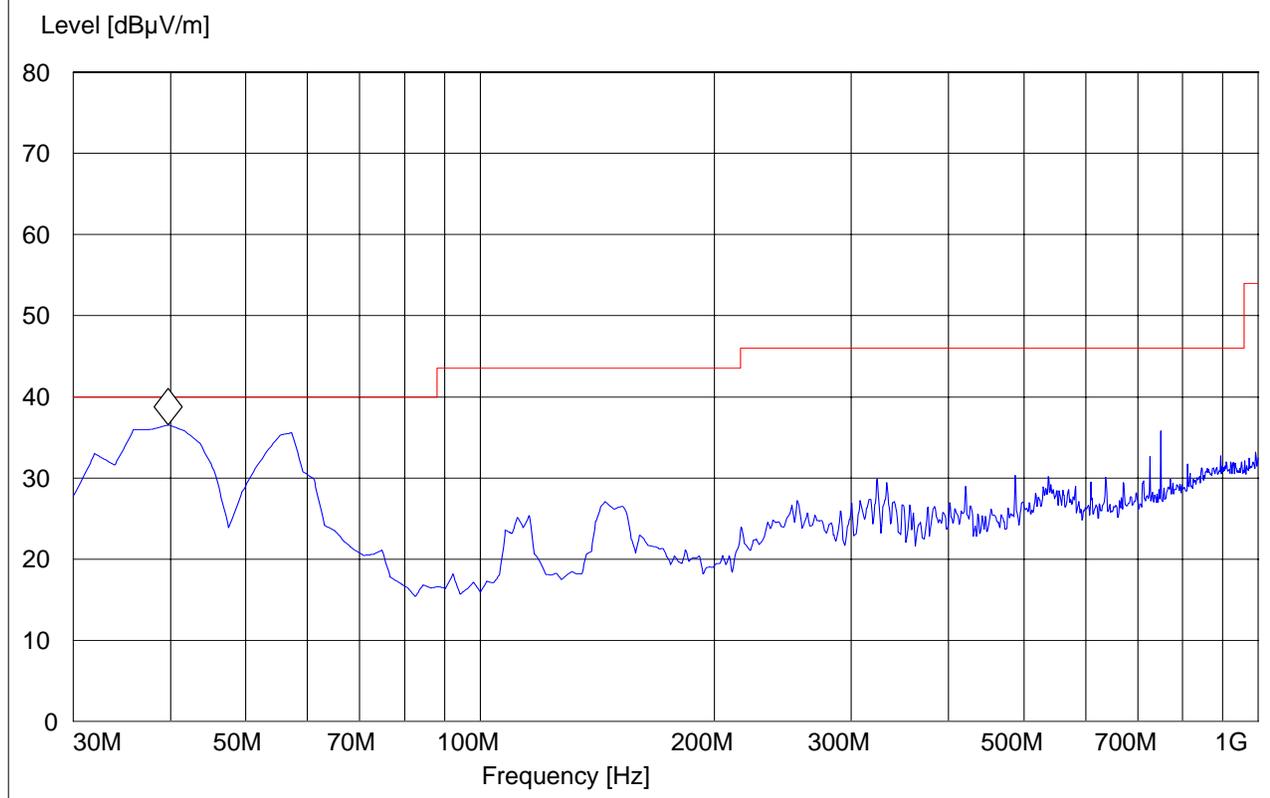
Note: This plot is valid for low, mid, high channels (worst-case plot).

EUT: FCC2  
 Customer:: Sony Electronics  
 Test Mode: 802.11n40  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: Chris  
 Voltage: AC Adaptor  
 Comments:

**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: 39.719439 MHz 36.55 dBµV/m



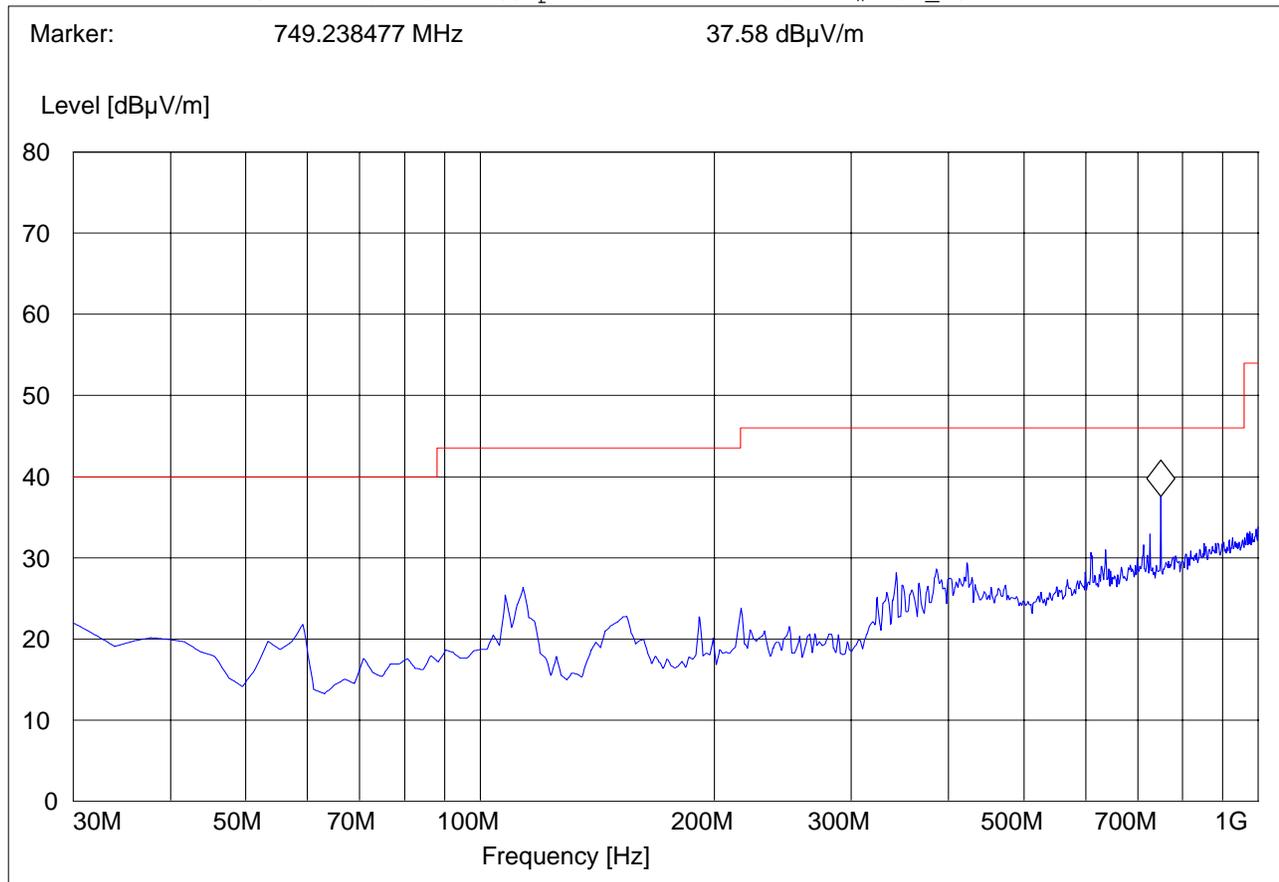
### 30MHz – 1GHz, Antenna: Horizontal

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

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

#### 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



### 1-18GHz (5755MHZ)

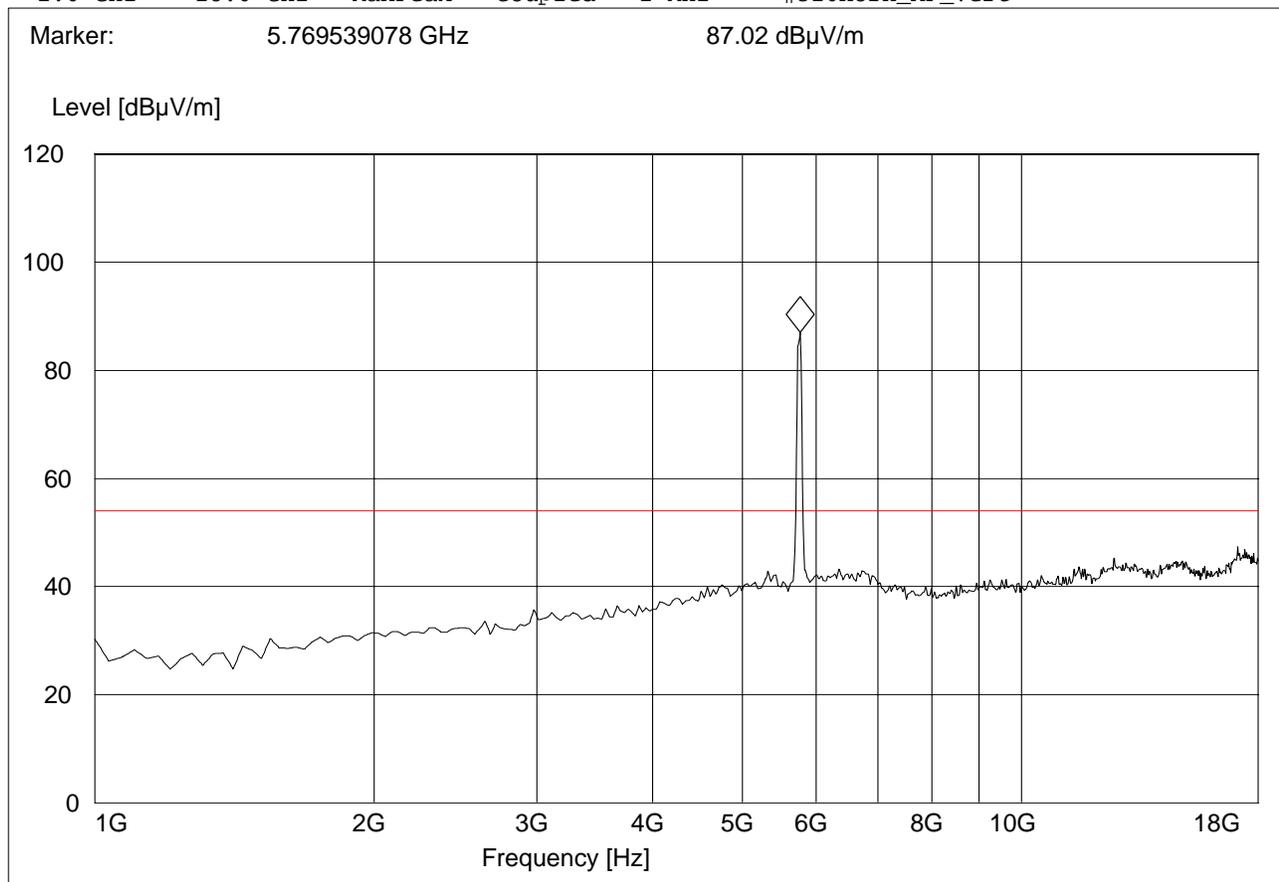
Note: The peak above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40 @ 5755 MHz  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

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

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



**1-18GHz (5795MHZ)**

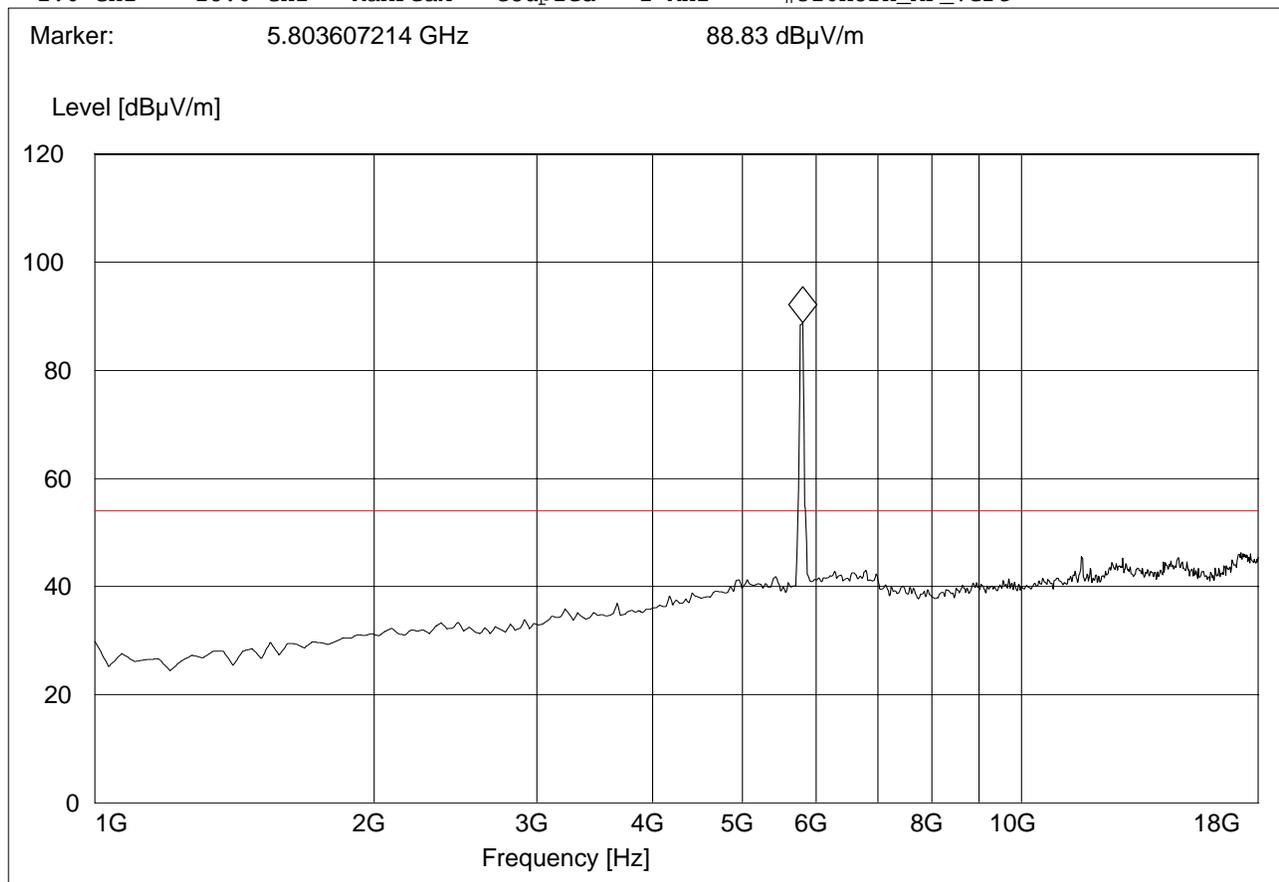
Note: The peak above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40 @ 5795 MHz  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

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

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



### 18-26.5GHz

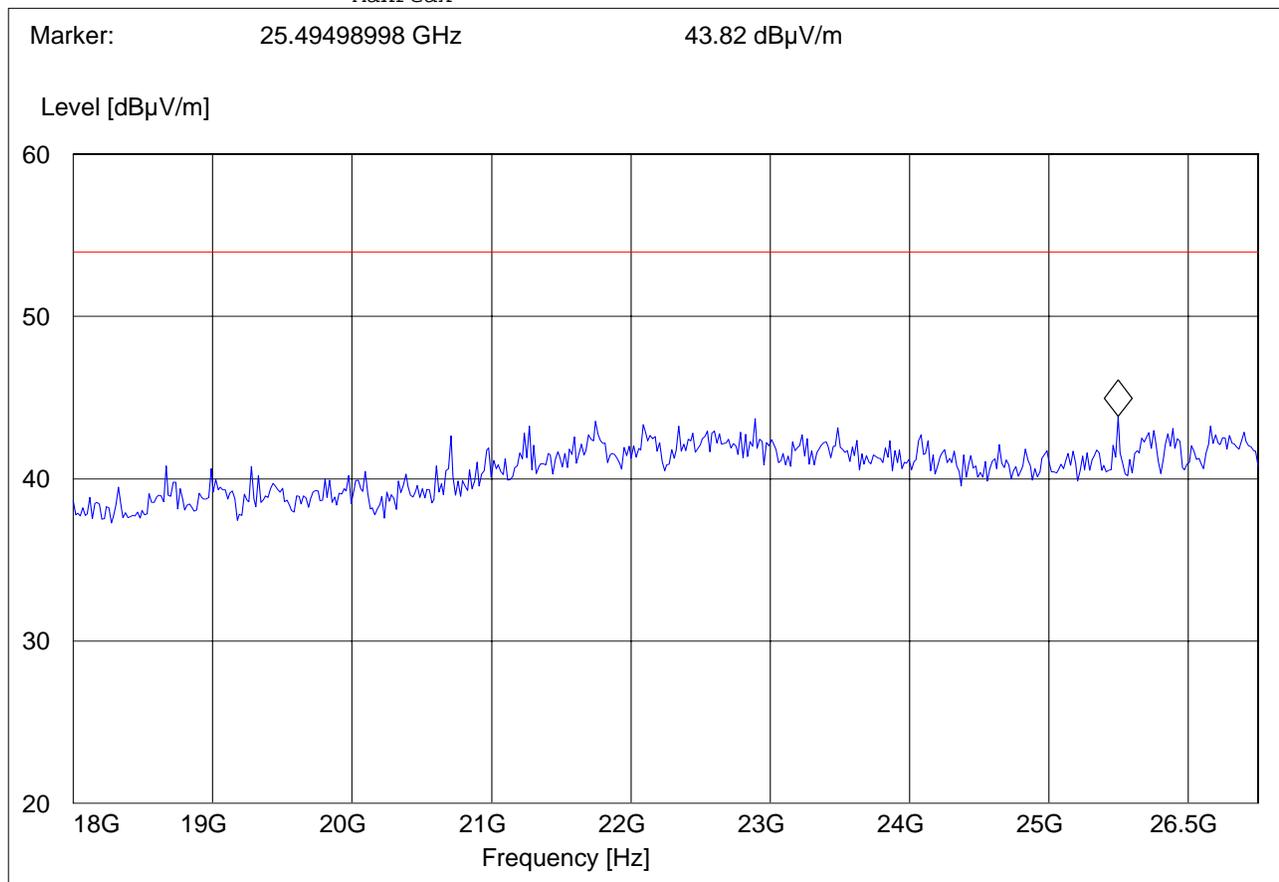
Note: This plot is valid for low, mid, high channels (worst-case plot).

Note: Peak Reading vs. Average limit

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

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

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



### 26.5-40GHz

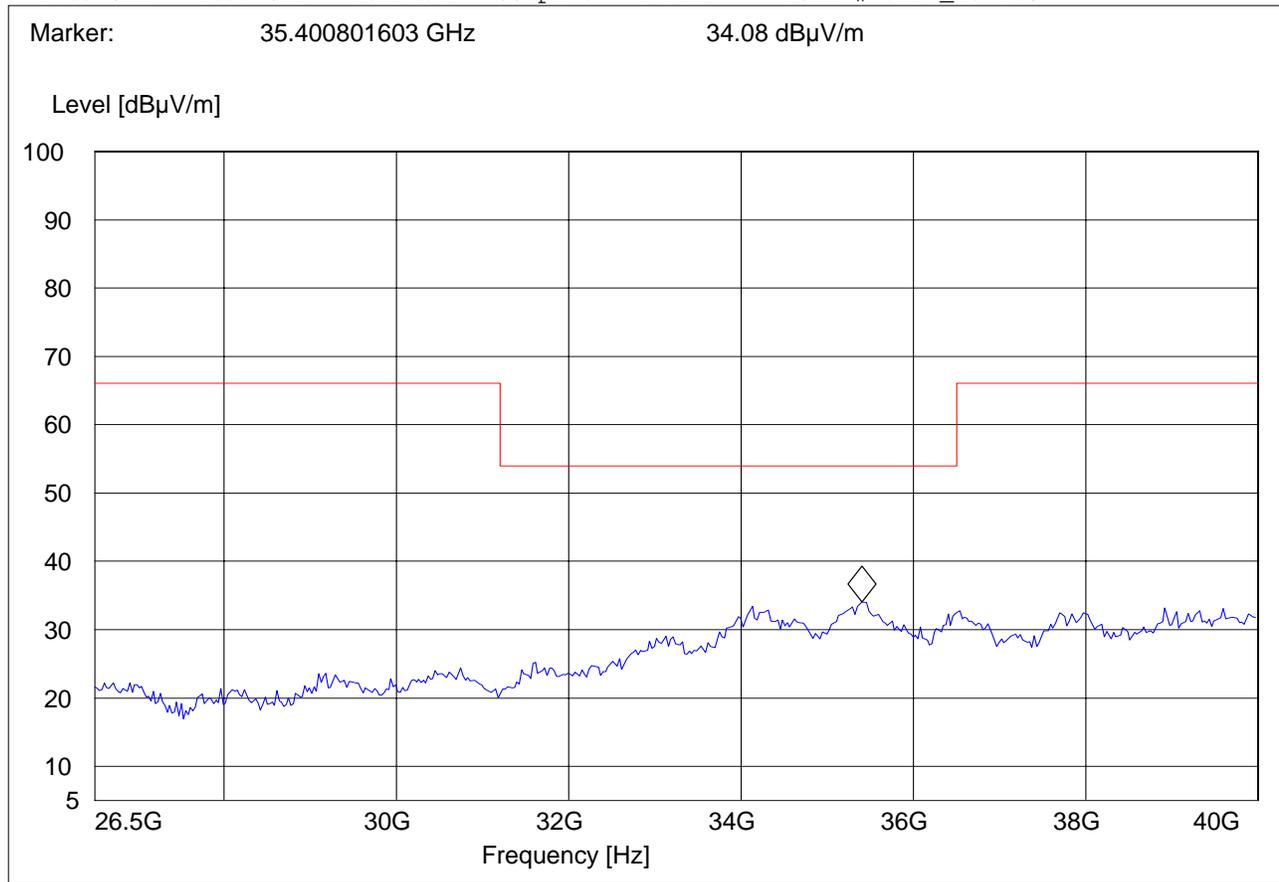
**Note:** This plot is valid for low, mid, high channels (worst-case plot).

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

EUT: FCC2  
Customer:: Sony Electronics  
Test Mode: 802.11n40  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adaptor  
Comments:

**SWEEP TABLE: "FCC 15.407 26.5-40G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
26.5 GHz	40.0 GHz	MaxPeak	Coupled	1 MHz	Horn # 3116_18-40G



**5.4 Receiver Spurious Emission § 15.209/RSS210**

**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.
3. There are no measurable emissions up to 18GHz in Rx mode.
4. Receiver spurious emissions reported here are the worse case emissions for all receiver modes and between two receiving chains.

**5.4.2 RESULTS Chain AB**  
**30MHz – 1GHz, Antenna: Vertical**

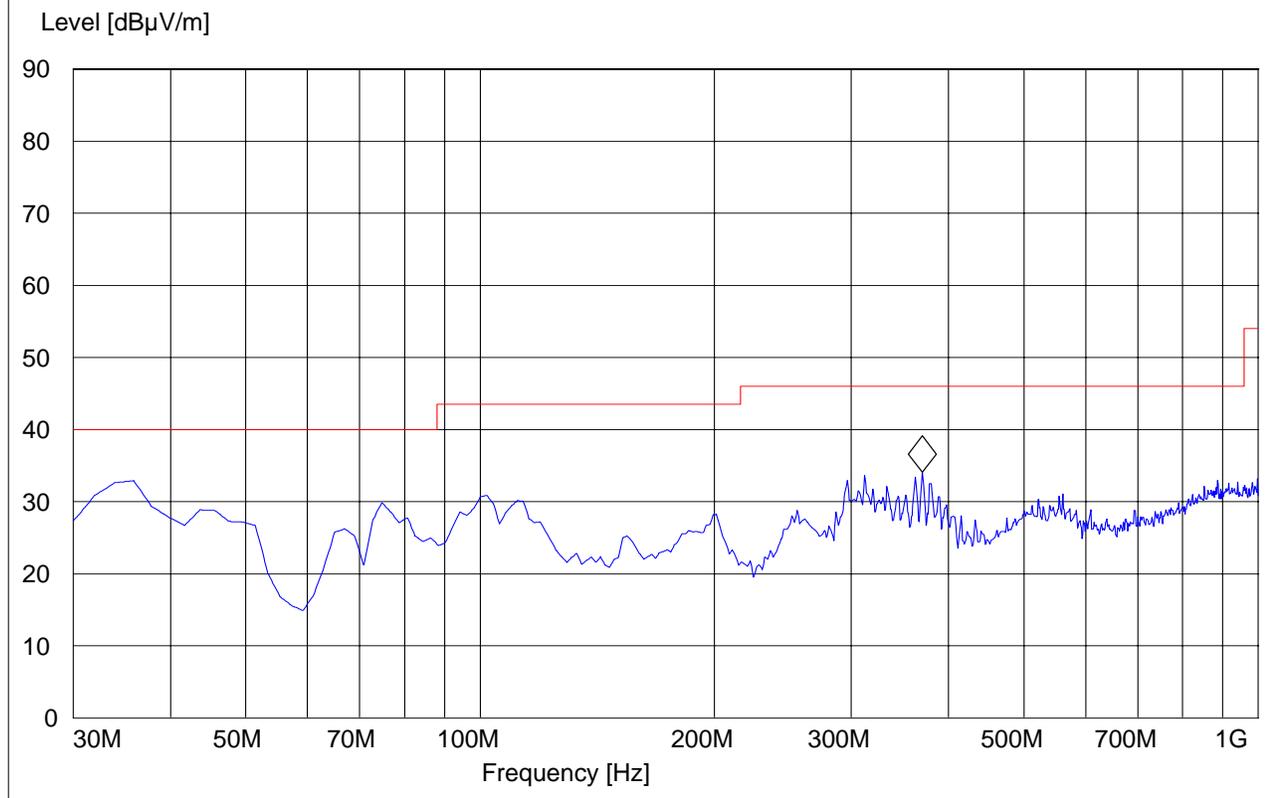
Note: This plot is valid for low, mid, high channels (worst-case plot).

EUT: Laptop  
 Customer:: Sony  
 Test Mode: 802.11n40 RX  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: Chris  
 Voltage: AC Adapter  
 Comments:

**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: 370.180361 MHz 34.08 dBµV/m



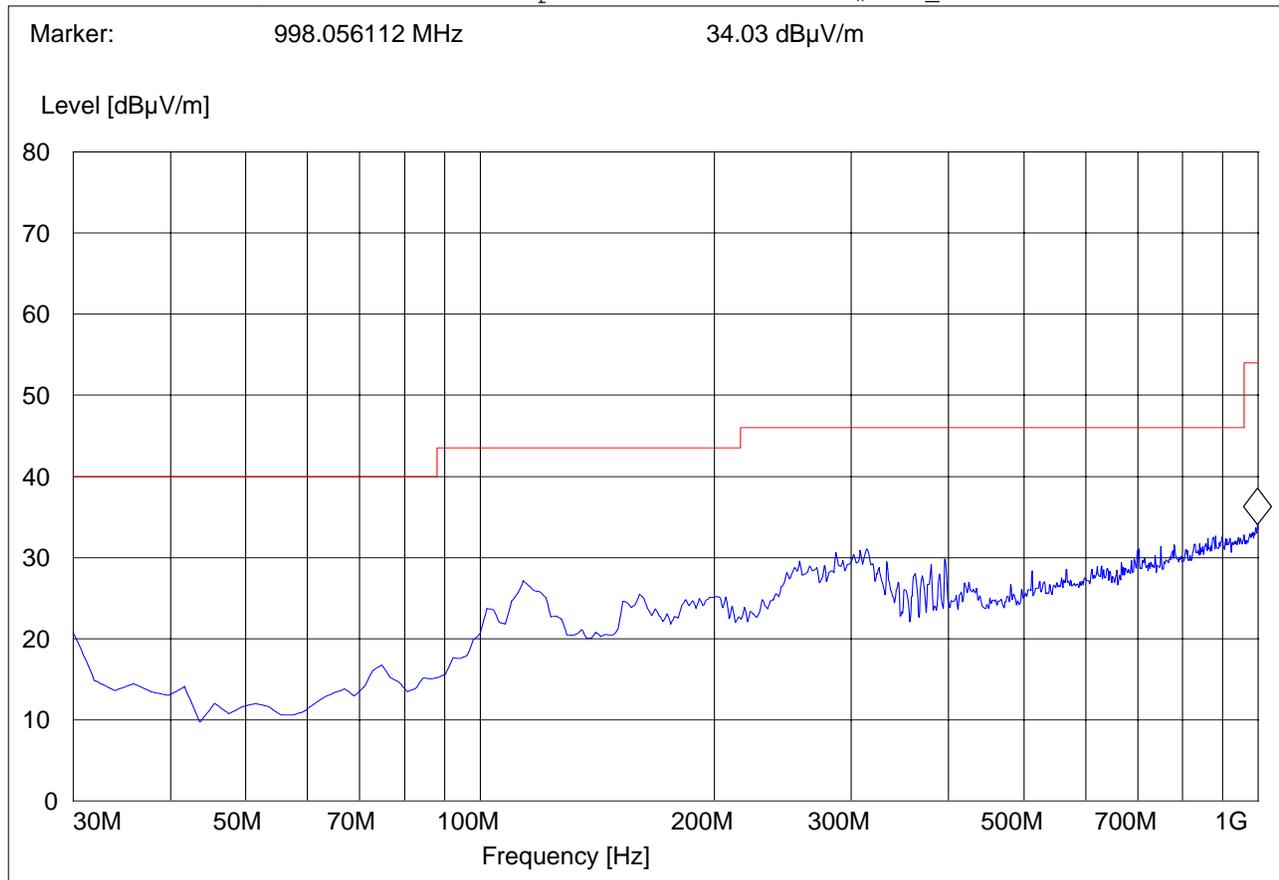
### 30MHz – 1GHz, Antenna: Horizontal

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

EUT: Laptop  
Customer:: Sony  
Test Mode: 802.11n40 RX  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter  
Comments:

#### 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



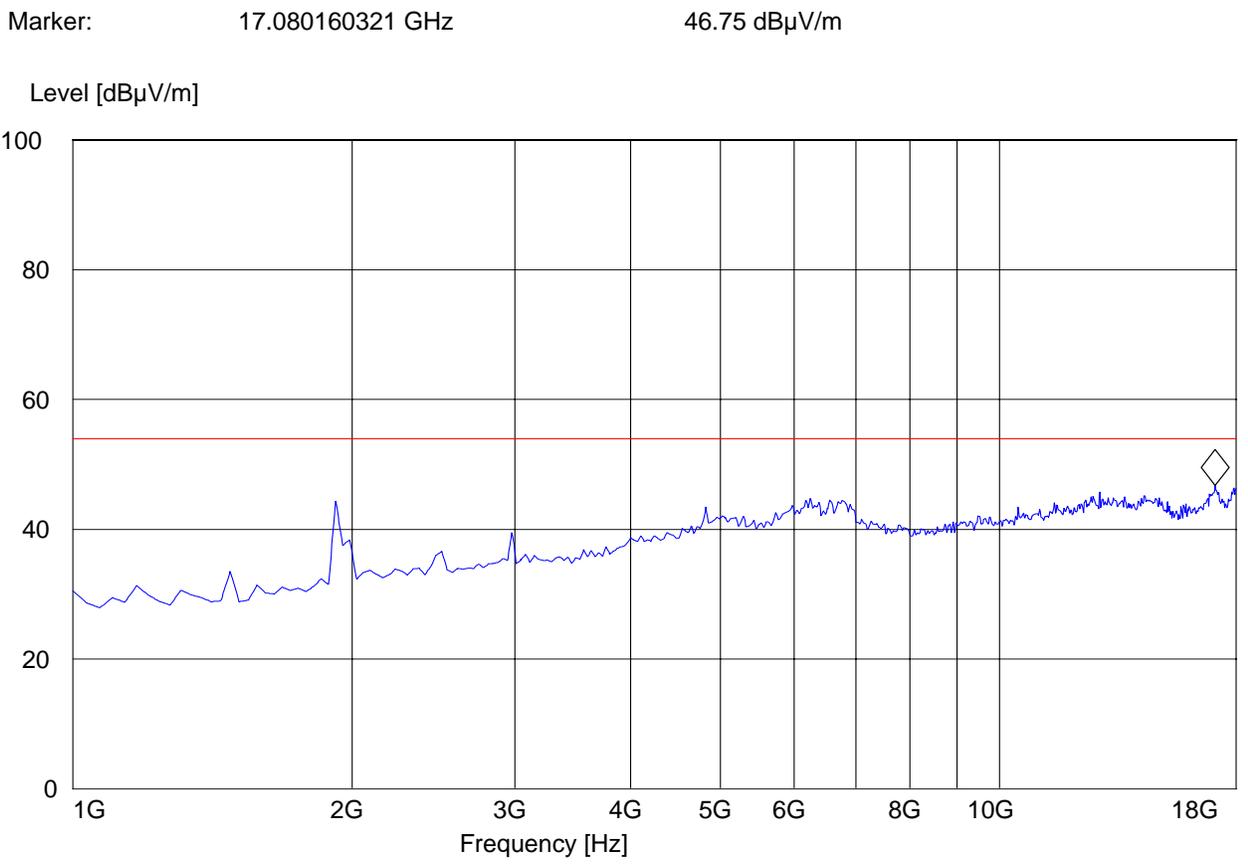
### 1-18GHz

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

EUT / Description: Laptop  
Manufacturer: Sony  
Operation Mode: 802.11n40 RX  
ANT Orientation: : H  
EUT Orientation:: H  
Test Engineer: Chris  
Voltage: AC Adapter  
Comments::

**SWEEP TABLE: "FCC15.247\_1-18G"**

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



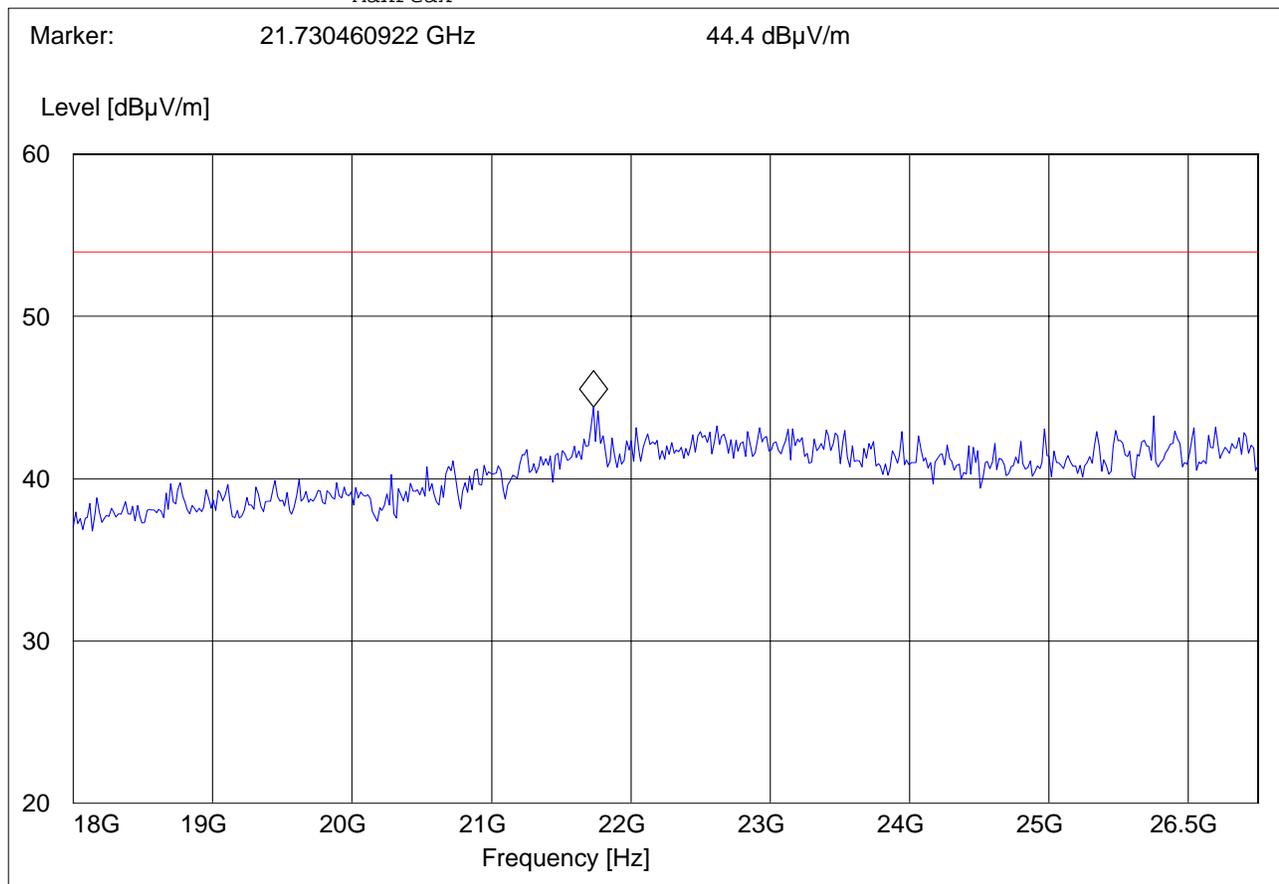
### 18-26.5GHz

Note: Peak Reading vs. Average limit

EUT: Laptop  
Customer:: Sony  
Test Mode: 802.11n40 RX  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter  
Comments:

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

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



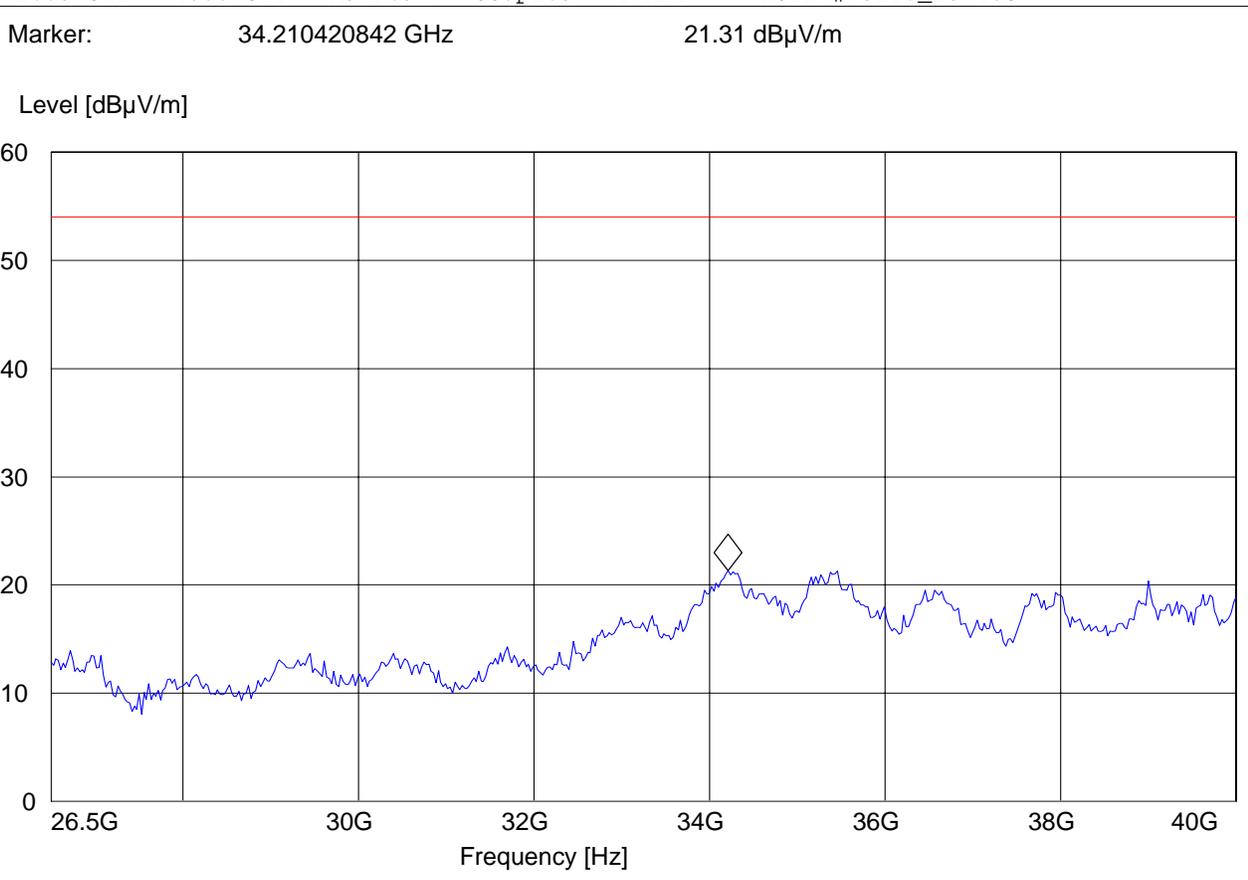
### 26.5-40GHz

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

EUT / Description: Laptop  
Manufacturer: Sony  
Operation Mode: 802.11n40 RX  
ANT Orientation: : H  
EUT Orientation:: H  
Test Engineer: Chris  
Voltage: AC Adapter  
Comments::

**SWEEP TABLE: "FCC15.247\_26.5-40G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
26.5 GHz	40.0 GHz	MaxPeak	Coupled	1 MHz	Horn # 3116_18-40G



## **6 Conducted Measurements**

### **6.1 6dB bandwidth and 99% bandwidth.**

#### **6.1.1 Limit**

FCC15.247(a)(2) Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

RSS210 A8.2 (a): The minimum 6 dB bandwidth shall be at least 500 kHz.

#### **6.1.2 Measurement Result:**

**Test Not conducted. The EUT integrates an FCC approved module. All conducted measurements are referenced from the original report for the module.**

## 6.2 Conducted Power Measurement

### 6.2.1 Limit

FCC15.247 (b)(3): For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt

RSS210 A8.4(4): For systems employing digital modulation techniques operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz, the maximum peak conducted output power shall not exceed 1 W. Except as provided in Section A8.4(5), the e.i.r.p. shall not exceed 4 W.

### 6.2.2 Results

**Test Not conducted. The EUT integrates an FCC approved module. All conducted measurements are referenced from the original report for the module.**

## 6.3 Power Spectral Density

### 6.3.1 Limit

FCC 15.247 (e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### 6.3.2 Results

**Test Not conducted. The EUT integrates an FCC approved module. All conducted measurements are referenced from the original report for the module.**

## **6.4 Conducted Spurious Emission**

### **6.4.1 Limit**

§15.247(d) & RSS-210 (A8.5): -30dBc

### **6.4.2 Results:**

**Test Not conducted. The EUT integrates an FCC approved module. All conducted measurements are referenced from the original report for the module.**

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

**6.5.1 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

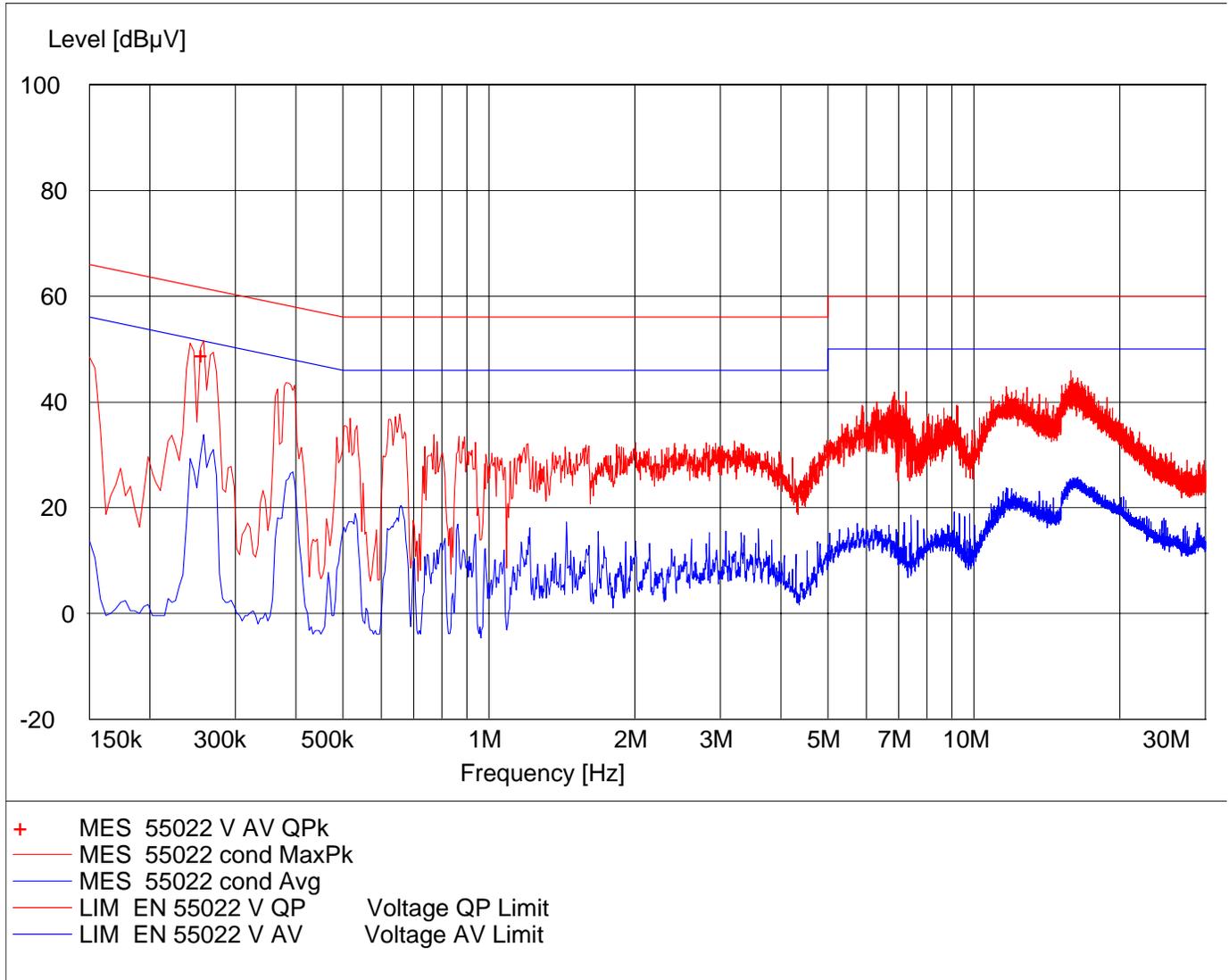
**ANALYZER SETTINGS: RBW = 10KHz VBW = 10KHz**

Note: AC Line Conducted Emission reported here are the worse cases among all operating modes.

**6.5.2 RESULTS Sub-band 1 802.11g Line:**

**Notes: Emissions reported here represents the worse case emissions for all operation modes.**

EUT: FCC2  
 Manufacturer: Sony Electronics  
 Test Mode: 802.11g @ 2437 MHz  
 ANT Orientation:: N/A  
 EUT Orientation:: H  
 Test Engineer:: Chris  
 Power Supply: : AC  
 Comments: : Line



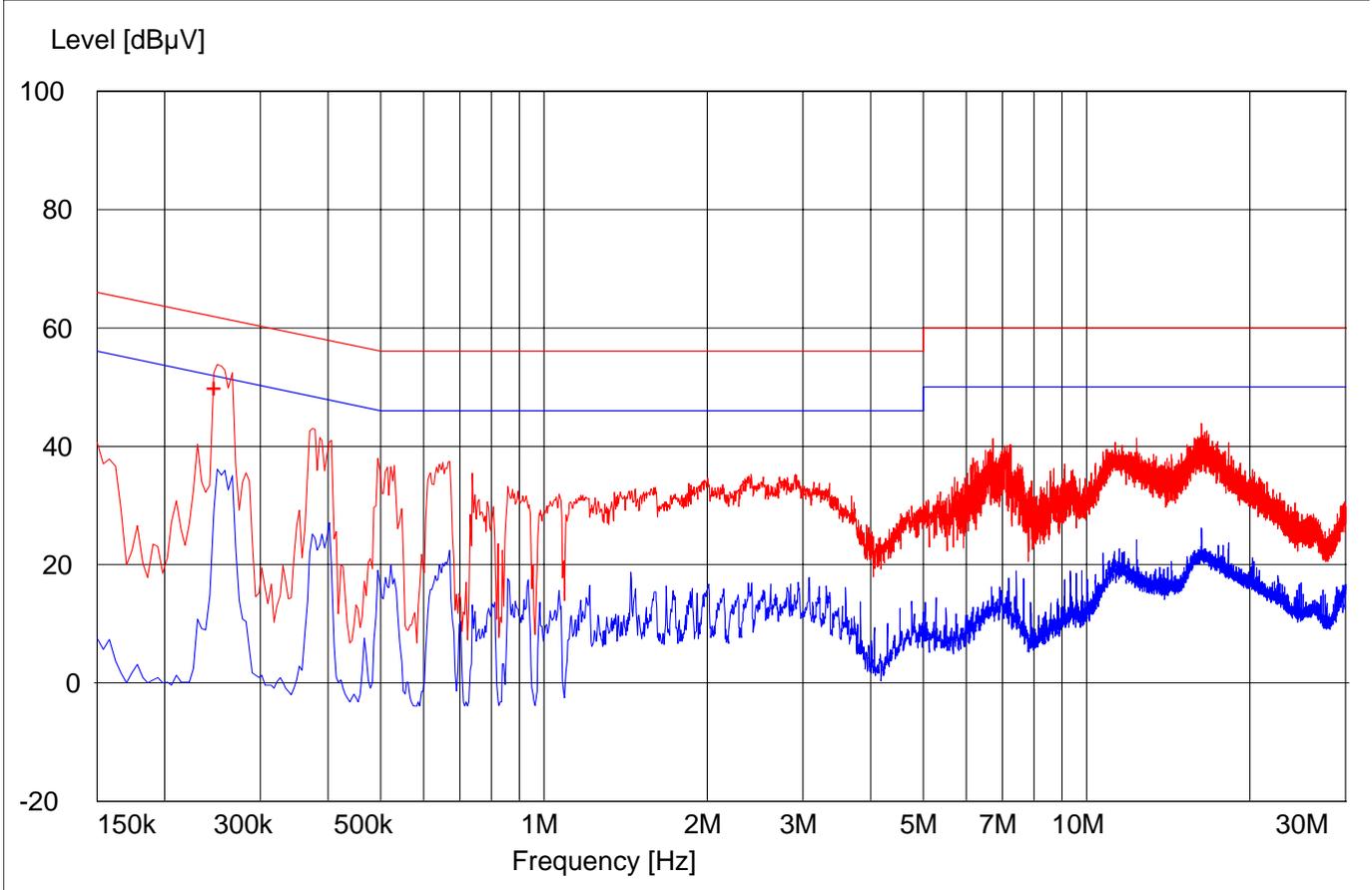
**MEASUREMENT RESULT: "55022 V AV QPk"**

11/13/2008 4:48AM

Frequency	Level	Transd	Limit	Margin	Line	PE	AUX STATE
MHz	dBµV	dB	dBµV	dB			
0.258000	49.00	0.1	62	12.5	1	---	OFF

**6.5.3 RESULTS Sub-band 1 802.11g Neutral:**

EUT: FCC2  
 Manufacturer: Sony Electronics  
 Test Mode: 802.11g @ 2437 MHz  
 ANT Orientation:: N/A  
 EUT Orientation:: H  
 Test Engineer:: Chris  
 Power Supply: : AC  
 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"**

11/13/2008 4:43AM

Frequency	Level	Transd	Limit	Margin	Line	PE	AUX STATE
MHz	dBµV	dB	dBµV	dB			
0.250000	50.10	0.1	62	11.6	1	---	OFF

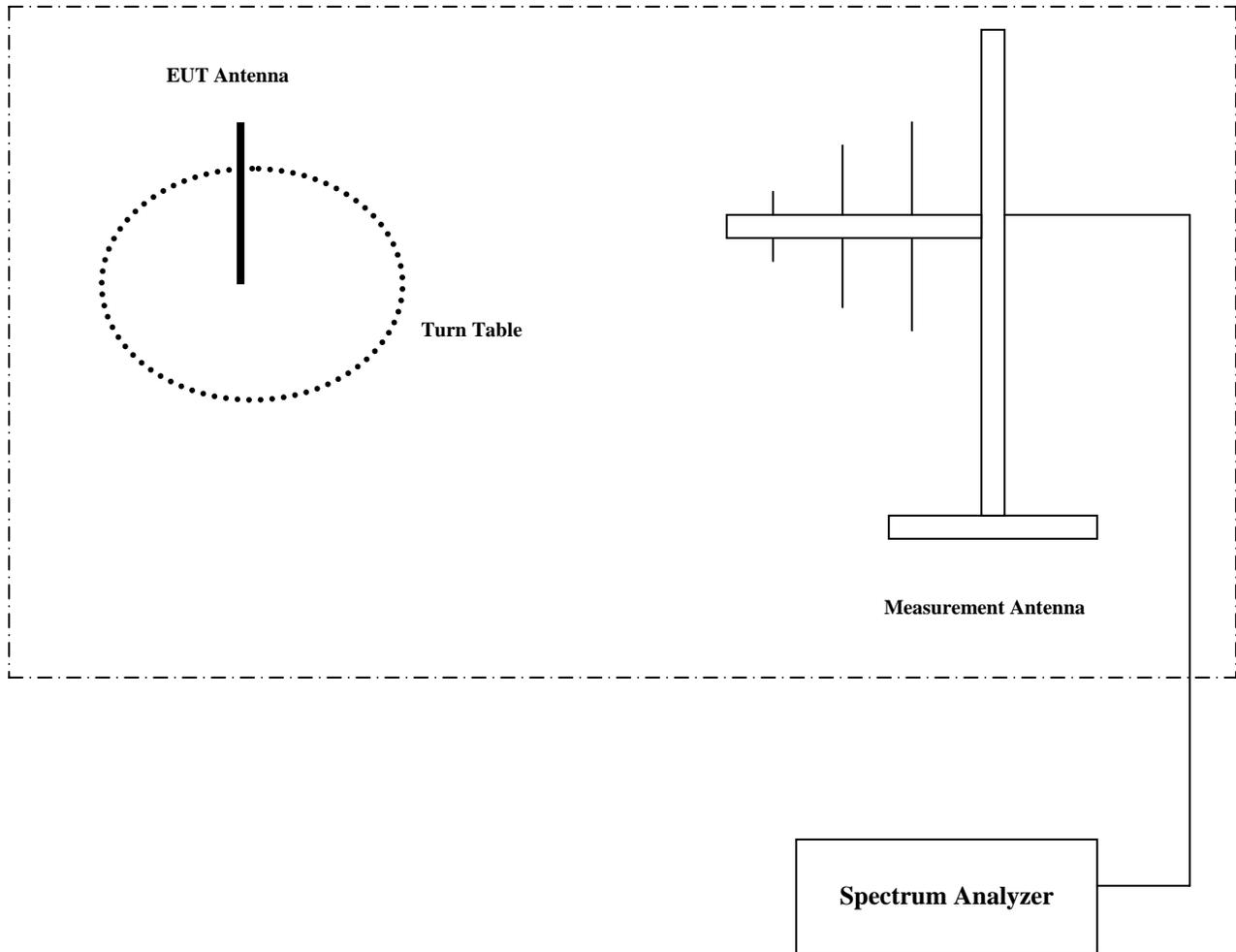
**7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS**

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

### Radiated Testing

#### ANECHOIC CHAMBER



Test Report #: EMC\_SONYE\_028\_08001\_15\_247



Date of Report: 2008-11-13

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## 9 Revision History

2008-11-13: First Issue