

FCC Test Report

FCC Part 15.247 for DSSS systems/ CANADA RSS-210

FOR:

NOTEBOOK PC

MODEL #: PCG-9W6L

SONY CORPORATION 6-7-35, KITASHINAGAWA, SHINAGAWA-KU TOKYO 141-0001 JAPAN

FCC ID: AK8PCG9W6L IC ID: 409B-PCG9W6L

TEST REPORT #: EMC_1088_2005_WLAN DATE: NOVEMBER 4, 2005



Bluetooth

Bluetooth Qualification

Test Facility

(BQTF)



FCC listed # 101450

IC recognized # 3925

CETECOM Inc.

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

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

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1 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-9W6L

2005-11-04

Neelesh Raj

Project Leader

2005-11-04 Lothar Schmidt

Test Lab Manager

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.

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2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name: CETECOM Inc.

Department: EMC

Address: 411 Dixon Landing Road

Milpitas, CA 95035

U.S.A.

Telephone: +1 (408) 586 6200 Fax: +1 (408) 586 6299 Responsible Test Lab Manager: Lothar Schmidt

Responsible Project Leader: Neelesh Raj

Date of test: 2005-10-31 to 2005-11-04

2.2 Identification of the Client

Applicant's Name:	SONY Corporation
Street Address:	6-7-35, Kitashinagawa, Shinagawa-ku,
City/Zip Code	Tokyo 141-0001
Country	Japan
Contact Person:	Takumi Ozawa
Phone No.	81-3-5795-8716
Fax:	81-3-5795-8981
e-mail:	ozawa@sm.sony.co.jp

2.3 Identification of the Manufacturer

Manufacturer's Name:	Tech-Pro (Shanghai) Computer Co.,Ltd	
Manufacturers Address:	No.6 Lane 58, San-Zhuang Road, Songjiang Expor	
	Processing Zone	
City/Zip Code	Shanghai 201613	
Country	P.R. China	

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3 Equipment under Test (EUT)

3.1 Identification of the Equipment under Test

Marketing Name: VGN-BX

Description: Notebook PC

Model No: PCG-9W6L

FCC ID: AK8PCG9W6L

IC ID: 409B-PCG9W6L

Frequency Range: **2400-2483.5**

Type(s) of Modulation: CCK(b MODE), OFDM (g MODE)

Number of Channels: 11

Antenna Type: WLAN: λ/monopole (Film Antenna)

Output Power: b MODE: 69.8mW EIRP@2412MHz

g MODE: 67.8mW EIRP@2412MHz

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4 Subject Of Investigation

All testing was performed on the PCG-9W6L referred to as EUT. The EUT carries a pre-certified WLAN module with FCC ID# PD9WM3B2200BG. This test report contains full radiated testing as per FCC15.247 on the EUT with the pre-certified WLAN module. All conducted measurements are covered under *test report# INTEL-031111*.

During the testing process all data rates vs. modes were checked, the worst case was found to be the following; all testing was performed using the following data rates on the highest gain antenna.

802.11b	DATA	POWER
CHANNEL	RATE	(dBm)
2412	1	16
2437	1	16
2462	1	16

802.11g	DATA	POWER
CHANNEL	RATE	(dBm)
2412	6	11
2437	6	11
2462	6	11

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.

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5 **Measurements**

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 EIRP b MODE:

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequenc	Frequency (MHz)		2437	2462
T _{nom} (23)°C	V _{nom} VDC	18.44	17.42	17.10
Measurement uncertainty		±0.5dBm		

5.1.3 EIRP g MODE:

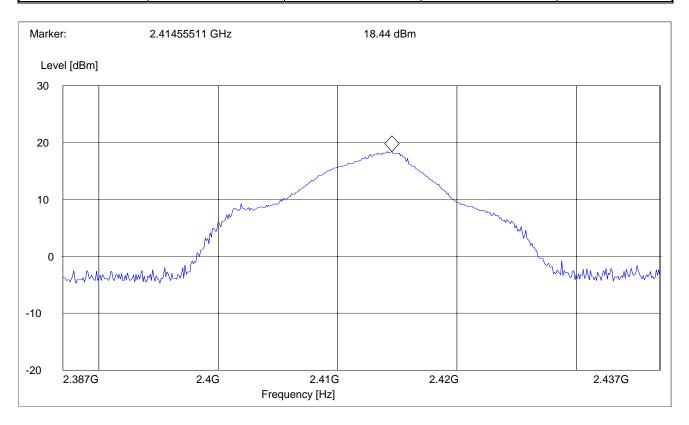
TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequenc	Frequency (MHz)		2437	2462
T _{nom} (23)°C	V _{nom} VDC	18.31	17.41	17.10
Measurement uncertainty			±0.5dBm	

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EIRP b Mode (2412MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
2387 MHz	2437 MHz	Max Peak	Coupled	10 MHz

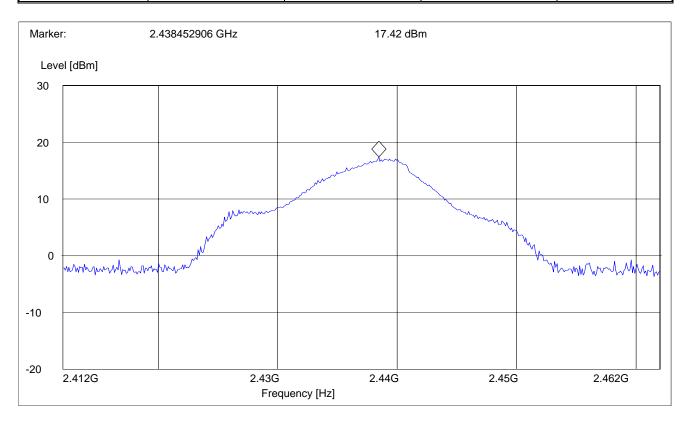


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EIRP b Mode (2437MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
2312 MHz	2462 MHz	Max Peak	Coupled	10 MHz

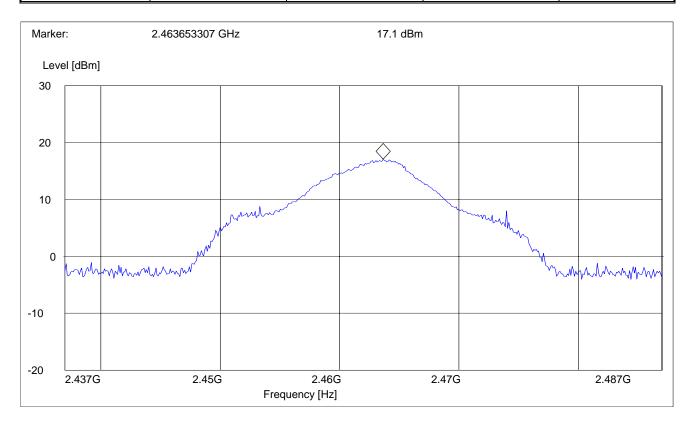


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EIRP b Mode (2462MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
2437 MHz	2487 MHz	Max Peak	Coupled	10 MHz

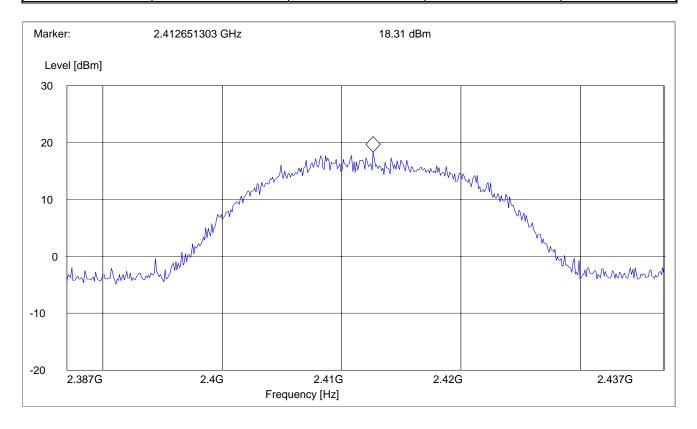


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EIRP g Mode (2412MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
2387 MHz	2437 MHz	Max Peak	Coupled	10 MHz

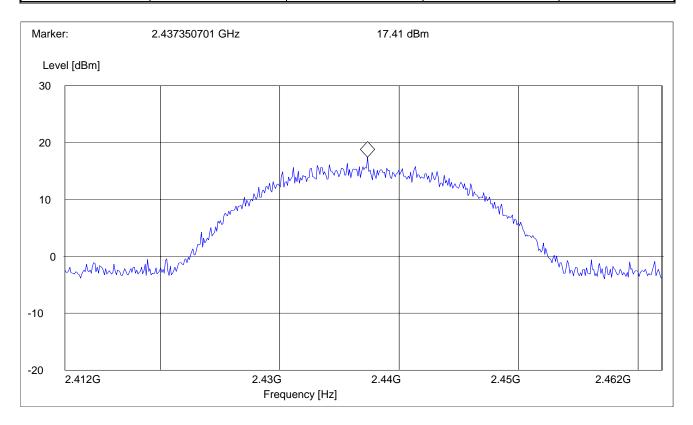


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EIRP g Mode (2437MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
2312 MHz	2462 MHz	Max Peak	Coupled	10 MHz

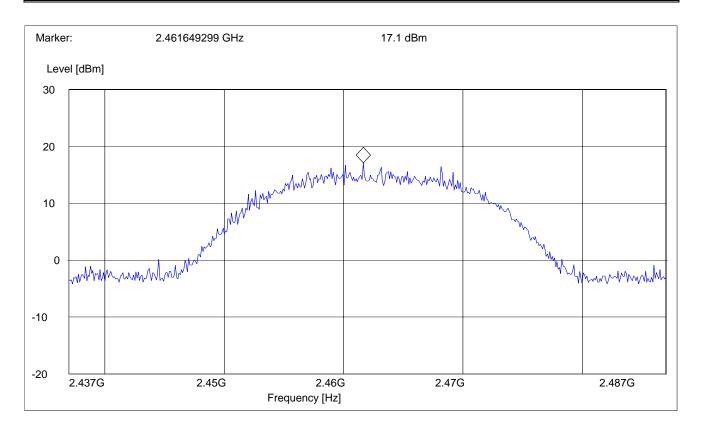


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EIRP g Mode (2462MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
2437 MHz	2487 MHz	Max Peak	Coupled	10 MHz



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5.2 RESTRICTED BAND EDGE COMPLIANCE RADIATED §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
¹ 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	(2)
13.36 - 13.41			

^{*}PEAK LIMIT= 74dBuV

^{*}AVG. LIMIT= 54dBuV

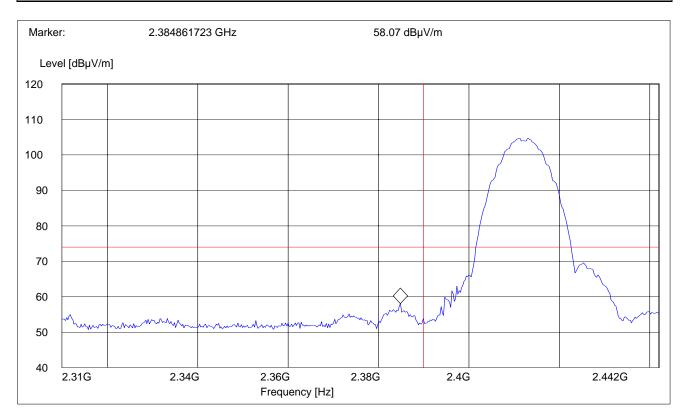
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5.2.2 b MODE (2412MHz)

PEAK

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2310 MHz	2412 MHz	Max Peak	Coupled	1 MHz	1 MHz

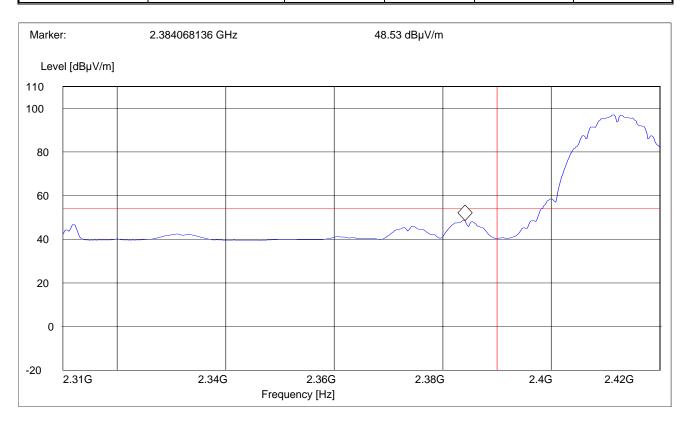


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AVG

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2310 MHz	2412 MHz	Max Peak	Coupled	1 MHz	10 Hz



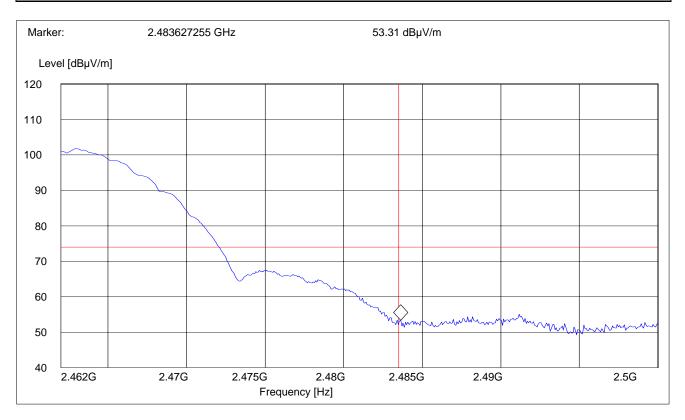
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5.2.3 **b MODE (2462MHz)**

PEAK

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2462 MHz	2500 MHz	Max Peak	Coupled	1 MHz	1 MHz

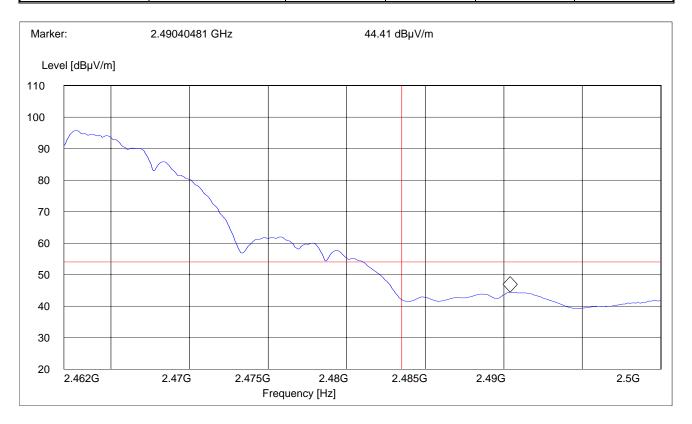


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AVG

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2462 MHz	2500 MHz	Max Peak	Coupled	1 MHz	10 Hz



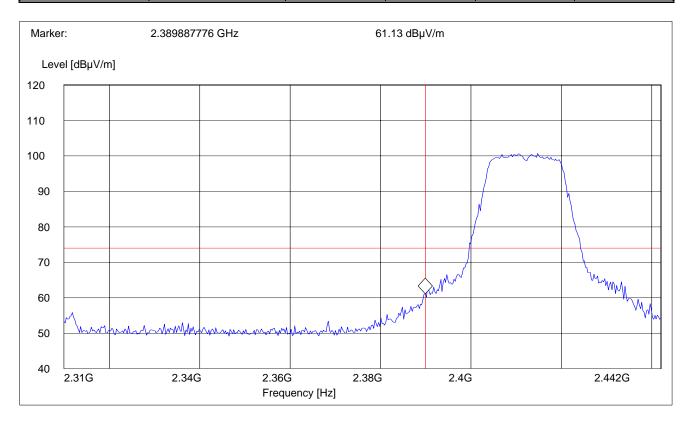
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5.2.4 g MODE (2412MHz)

PEAK

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2310 MHz	2412 MHz	Max Peak	Coupled	1 MHz	1 MHz

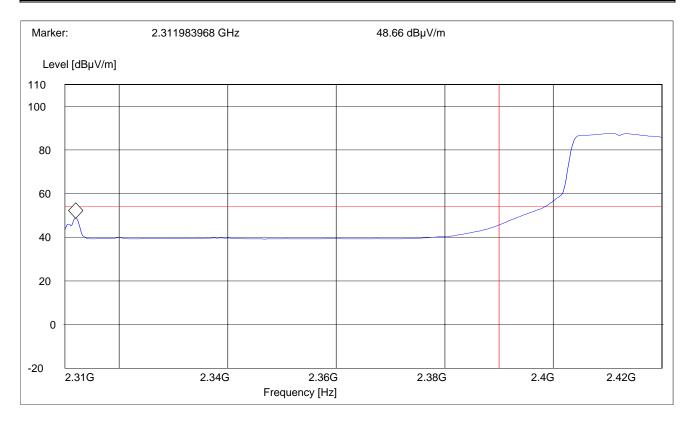


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AVG

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2310 MHz	2412 MHz	Max Peak	Coupled	1 MHz	10 Hz



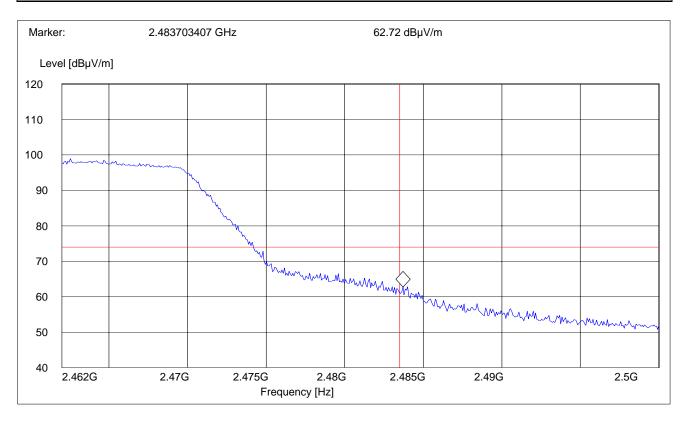
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5.2.5 g MODE (2462MHz)

PEAK

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2462 MHz	2500 MHz	Max Peak	Coupled	1 MHz	1 MHz

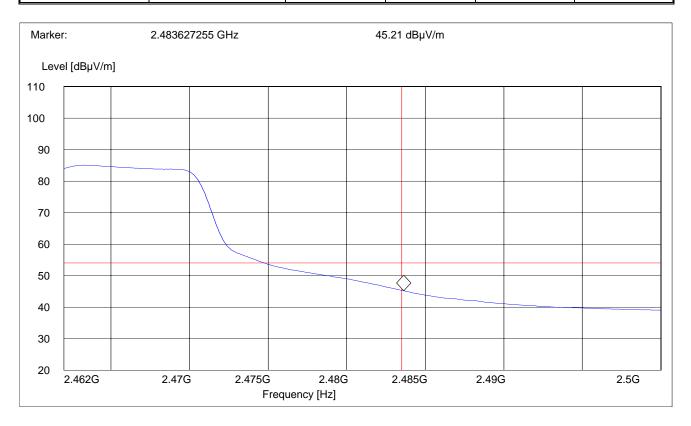


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AVG

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2462 MHz	2500 MHz	Max Peak	Coupled	1 MHz	10 Hz



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5.3 TRANSMITTER SPURIOUS EMISSIONS RADIATED § 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
¹ 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	(²)
13.36 - 13.41			

^{*}PEAK LIMIT= 74dBuV

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
9KHZ – 30MHZ	Two emissions found, caused by the EOT	channels

^{*}AVG. LIMIT= 54dBuV

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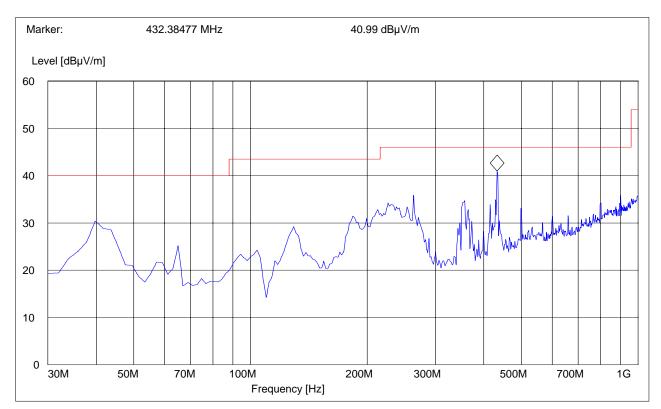
5.3.2 RESULTS b MODE

30MHz – 1GHz Antenna: vertical

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

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

Note: Peak reading vs. Quasi-peak limit



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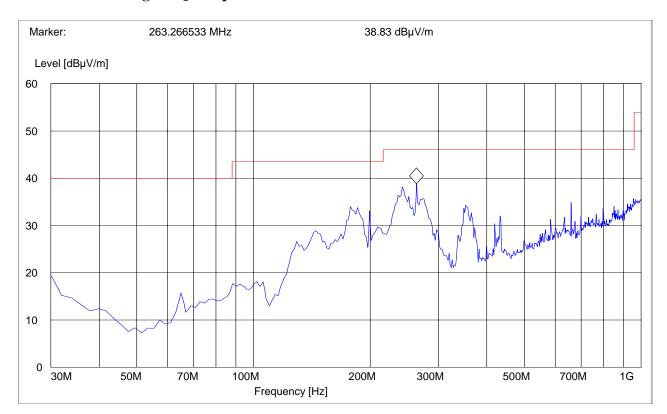


30MHz – 1GHz Antenna: horizontal

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

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

Note: Peak reading vs. Quasi-peak limit



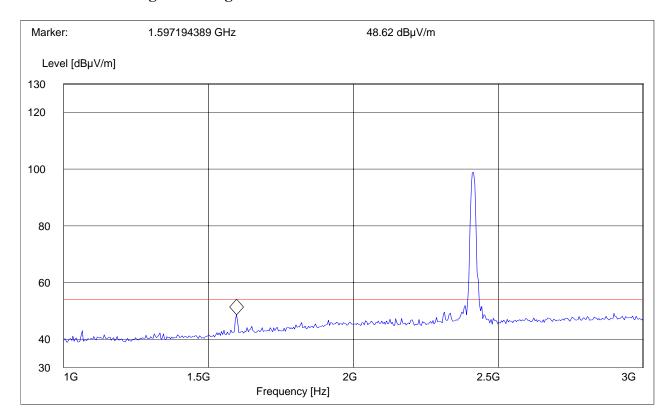
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1-3GHz (2412MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

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



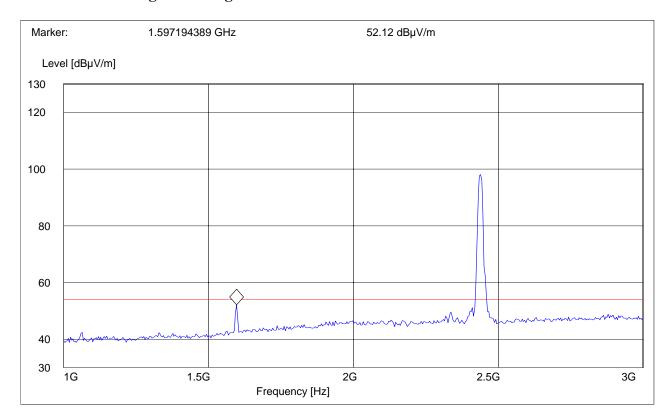
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1-3GHz (2437MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

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



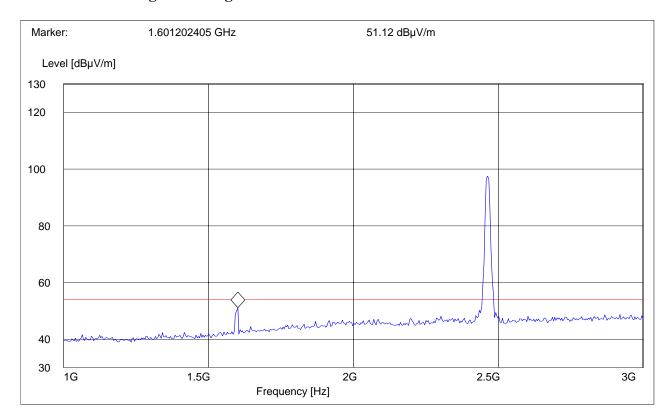
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1-3GHz (2462MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

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

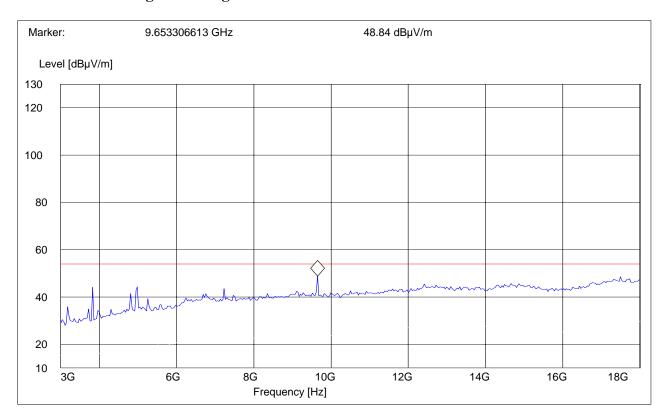


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3-18GHz (2412MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

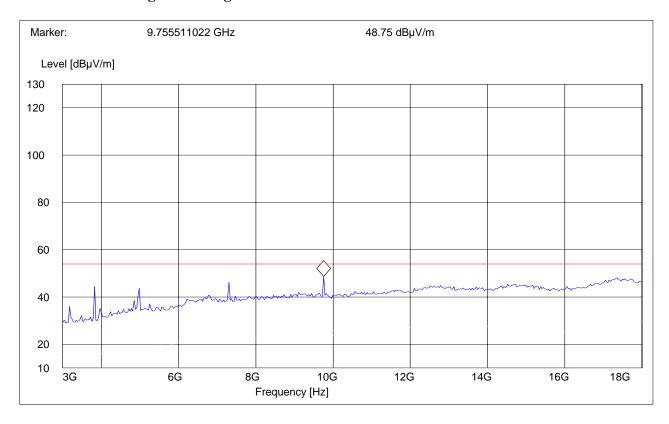


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3-18GHz (2437MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

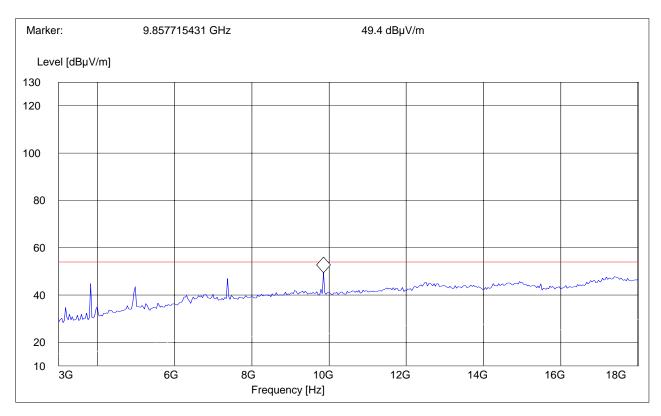


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3-18GHz (2462MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz



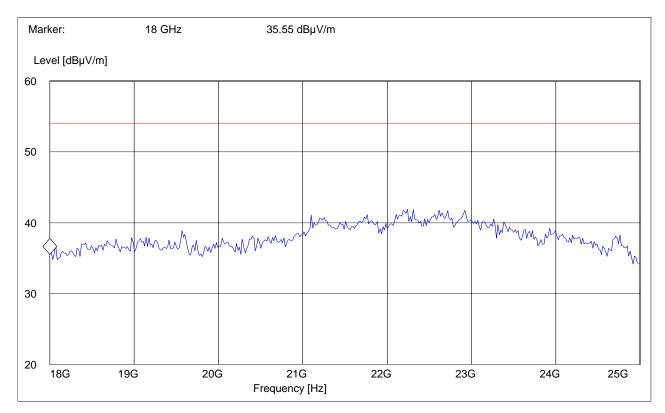
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18-25GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
18GHz	25GHz	Max Peak	Coupled	1 MHz	1 MHz

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



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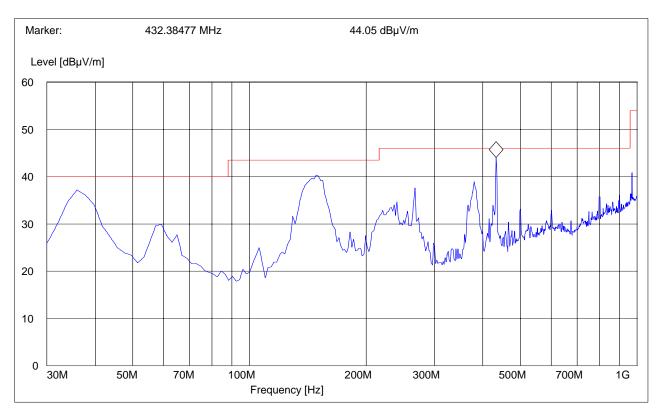
5.3.3 RESULTS g MODE

30MHz – 1GHz Antenna: vertical

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

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

Note: Peak reading vs. Quasi-peak limit



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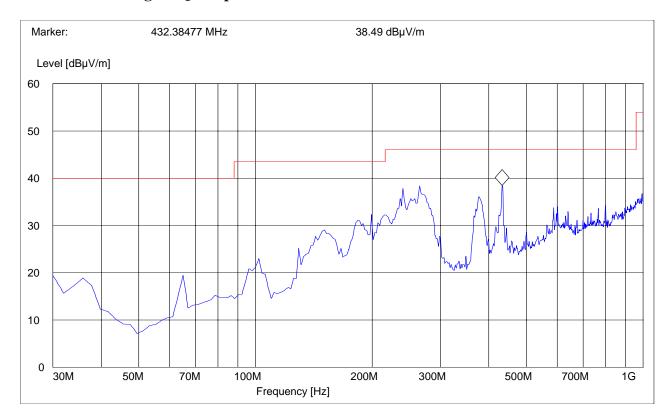


30MHz – 1GHz Antenna: horizontal

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

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

Note: Peak reading vs. Quasi-peak limit



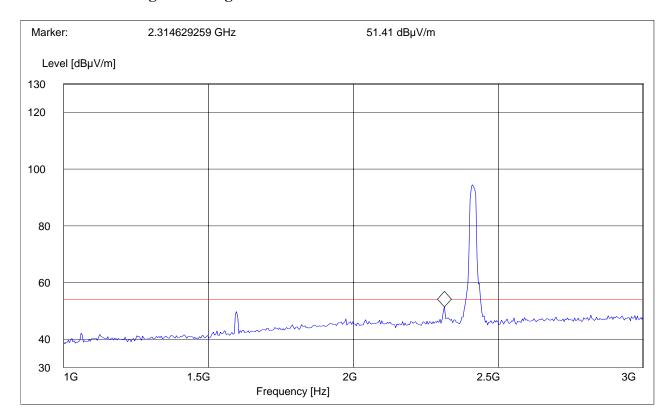
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1-3GHz (2412MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

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



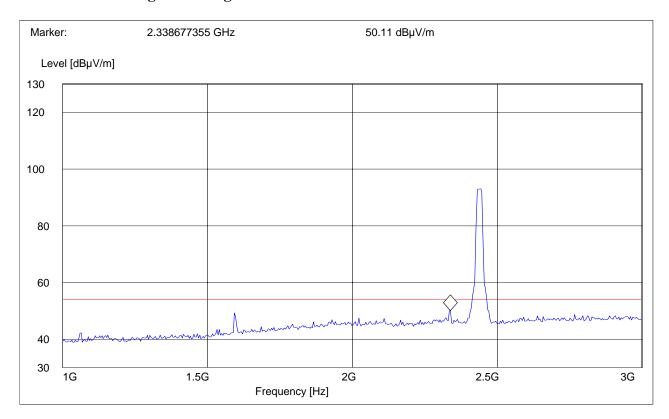
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1-3GHz (2437MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

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



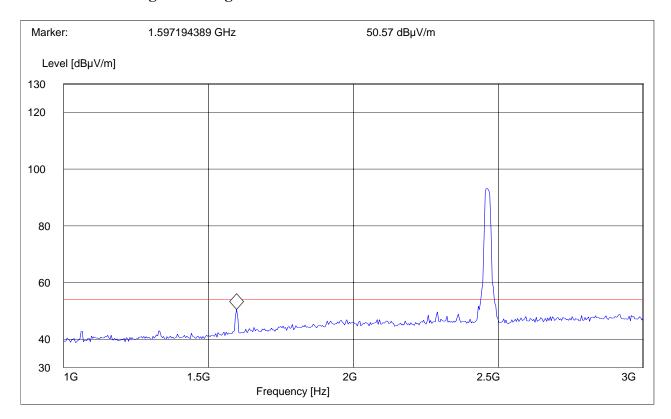
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1-3GHz (2462MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

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

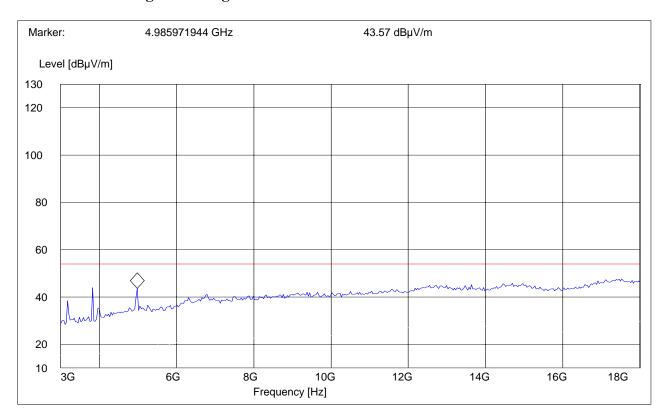


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3-18GHz (2412MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

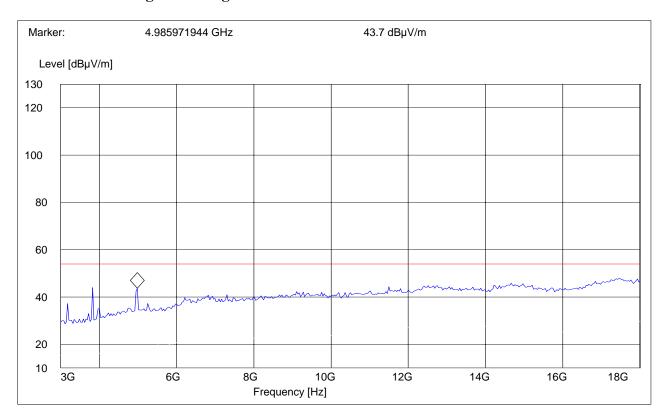


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3-18GHz (2437MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

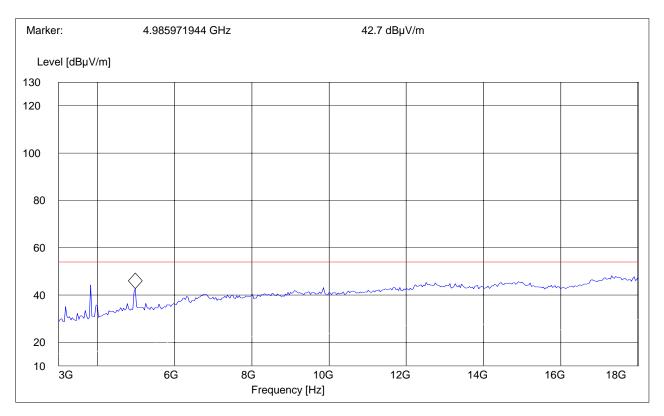


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3-18GHz (2462MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz



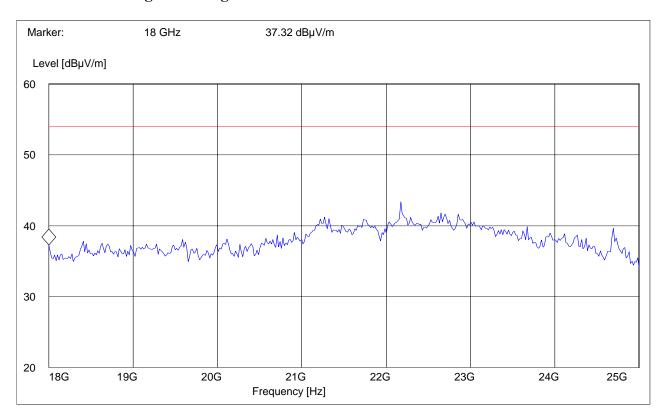
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18-25GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
18GHz	25GHz	Max Peak	Coupled	1 MHz	1 MHz

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



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5.4 RECEIVER SPURIOUS RADIATION § 15.209/RSS210

5.4.1 LIMITS

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

NOTE:

- 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 a quasi-peak/average limit , unless specified with the plots.

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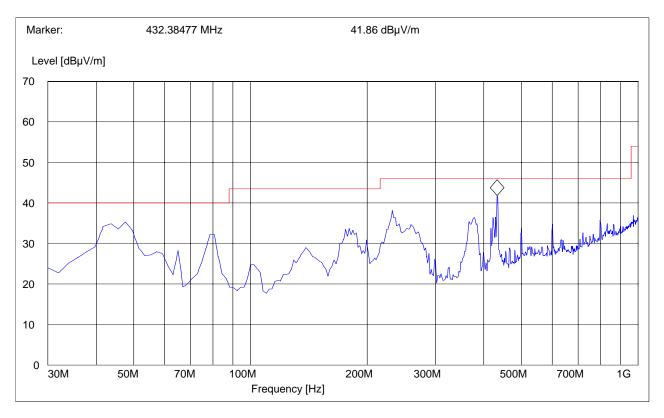


5.4.2 RESULTS

30MHz – 1GHz Antenna: vertical

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

Note: Peak Reading vs. Quasi-peak limit



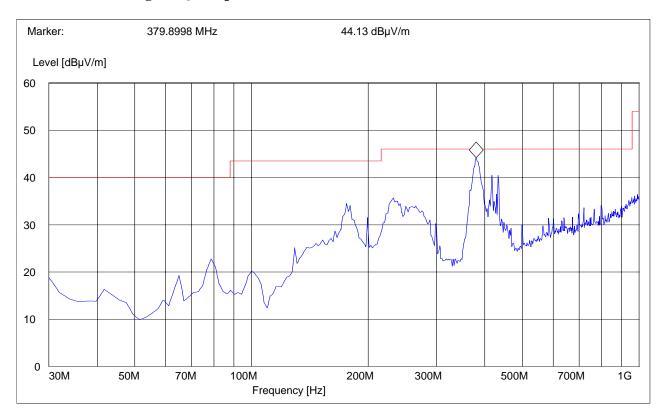
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30MHz – 1GHz Antenna: horizontal

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

Note: Peak Reading vs. Quasi-peak limit

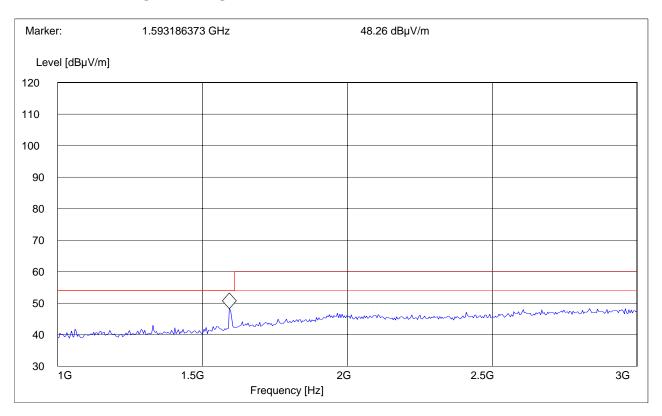


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1-3**GHz**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

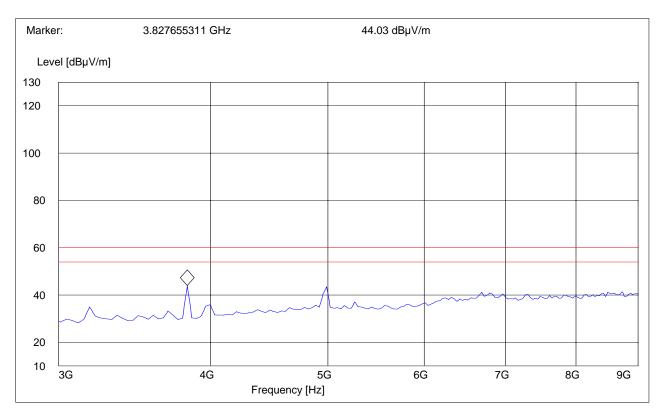


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3-18GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

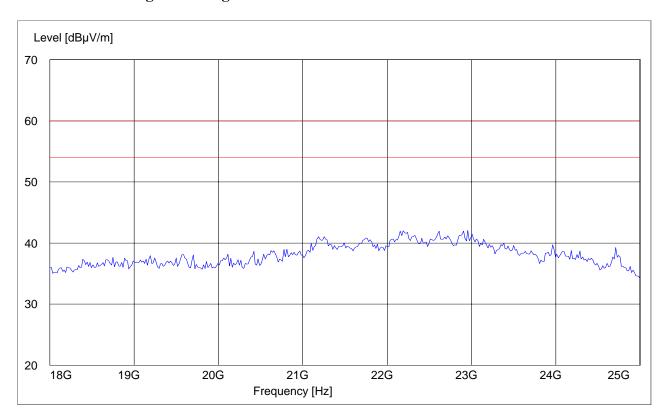


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18-25GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
18GHz	25GHz	Max Peak	Coupled	1 MHz	1 MHz



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5.5 CO-LOCATION

All Co-location testing was performed with the EUT transmitting in WLAN b mode (2412 MHz) and the EUT transmitting in Bluetooth mode(2441 MHz). These channels were deemed worst case due to there EIRP readings. All testing was performed using FCC 15.247 procedures/limits.

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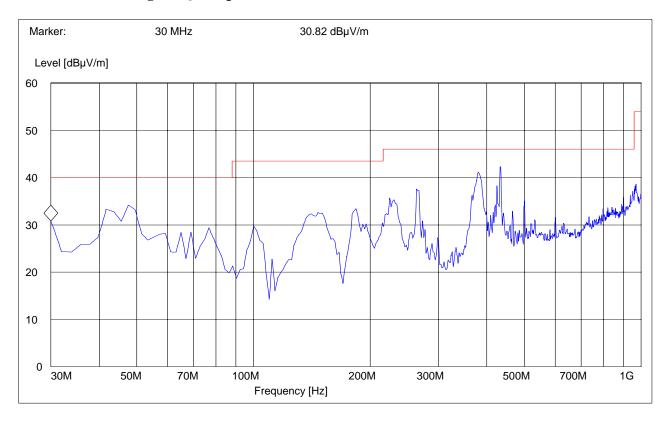


5.5.1 RESULTS

30MHz – 1GHz Antenna: vertical

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

Note: Peak Reading vs. Quasi-peak limit



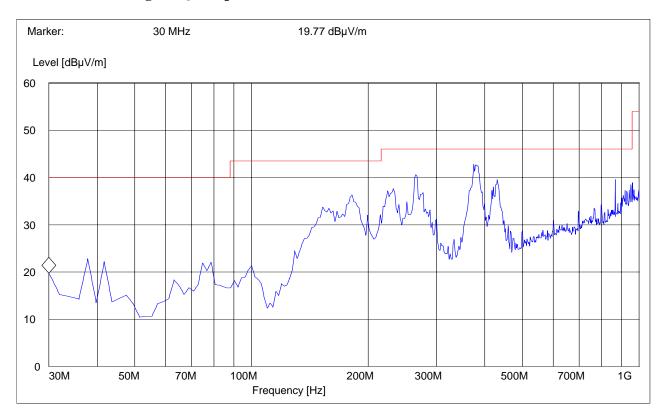
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30MHz – 1GHz Antenna: horizontal

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

Note: Peak Reading vs. Quasi-peak limit



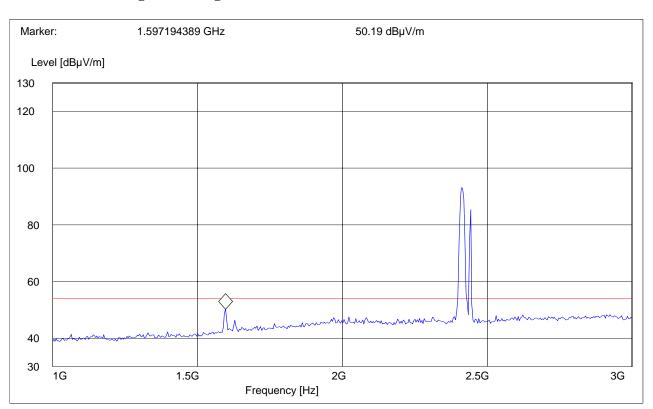
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1-3**GHz**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

Note: The peaks above the limit line is the carrier freq of the Bluetooth and WLAN transmitter. Note: Peak Reading vs. Average limit



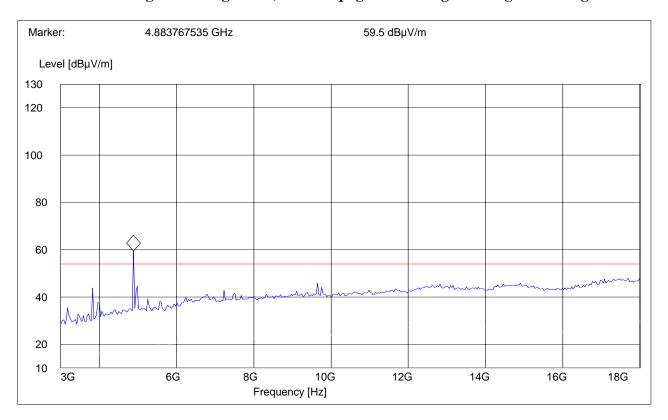
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3-18GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

Note: Peak Reading vs. Average limit, see next page for Average reading vs. Average limit.

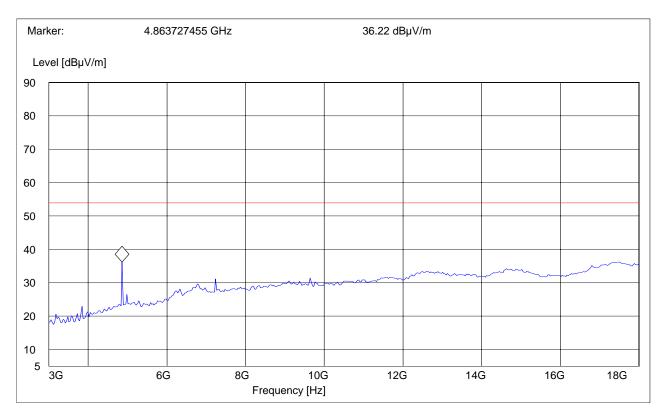


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3-18GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	10 Hz

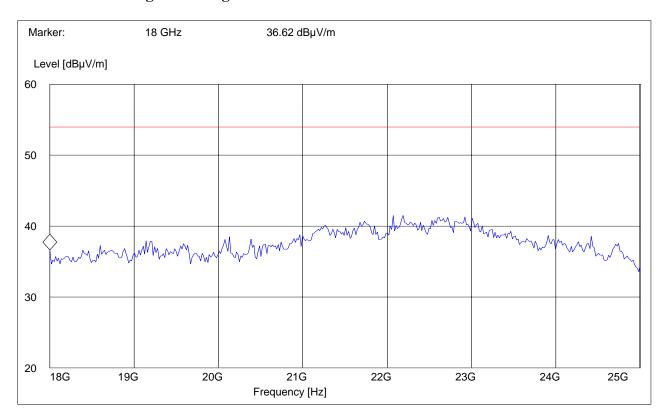


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18-25GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
18GHz	25GHz	Max Peak	Coupled	1 MHz	1 MHz



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5.6 AC POWER LINE CONDUCTED EMISSIONS § 15.107/207

5.6.1 LIMITS

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

Limit

Frequency of Emission (MHz)	Conducted Limit (dBµV)				
	Quasi-Peak	Average			
0.15 - 0.5	66 to 56*	56 to 46*			
0.5 - 5	56	46			
5 – 30	60	50			
* Decreases with logarithm of the frequency					

ANALYZER SETTINGS: RBW = 10KHz

VBW = 10KHz

^{*} The following results were done with the WLAN and Bluetooth transmitters operating simultaneously.

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5.6.2 RESULTS

Measured with AC/DC power adapter VGP-AC19V10

LISN

411 Dixon Landing Road, CA 95035

EUT / Description: PCG-9W6L

Manufacturer: SONY

Test mode: TX WLAN AND BLUETOOTH

Test Engineer: Neelesh
Phase: L & N
Comment: 110 volt

Start of Test: 11/3/2005 / 12:38:19PM

SCAN TABLE: "EN 55022 Voltage"

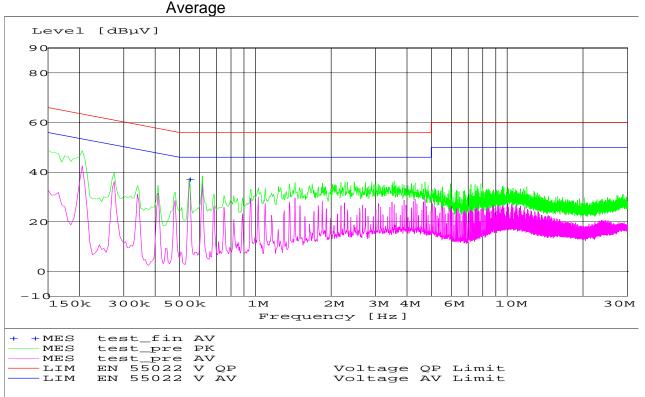
Short Description: EN 55022 Voltage

Start Stop Step Detector Meas. IF

Transducer

Frequency Frequency Width Time Bandw.

150.0 kHz 30.0 MHz 5.0 kHz MaxPeak 10.0 ms 9 kHz None



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MEASUREMENT RESULT: "test_fin AV"

11/3/2005 12:41PM

Frequency MHz	Level dBµV	_	Limit dBµV	Margin dB	Line	PE
0.545000	37.20	0.0	46	8.8	L1	GND

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5.7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	826880/010
03	Biconilog Antenna	3141	EMCO	0005-1186
04	Horn Antenna (700M-18GHz)	SAS-200/571	AH Systems	325
05	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240
06	2-3GHz Band reject filter	BRM50701	Microtronics	6
07	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02
08	Pre-Amplifier	TS-ANA	Rohde & Schwarz	
09	Pre-Amplifier	JS4-00102600	Miteq	00616

Test Report #:

EMC_1088_2005_WLAN

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5.8 BLOCK DIAGRAMS

Radiated Testing

ANECHOIC CHAMBER

