

EMI TEST REPORT

Test Report No. : 23GE0024-YK-1

Applicant : Sony Corporation
Type of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
FCC ID : AK8PEGAWL110
Test standard : FCC Part15 Subpart C, Section 15.247
Test Result : Complied

1. This test report shall not be reproduced except in full or partial, without the written approval of A-Pex International Co., Ltd.
2. The results in this report apply only to the sample tested.

Date of test: February 17 and 19, 2003

Tested by: 
Toyokazu Imamura
EMC section

Approved by: 
Osamu Watatani
Site Assistant Manager of Yamakita Lab.

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YAMAKITA LAB.

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MF060b(23.04.02)

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1 GENERAL INFORMATION

Company Name : Sony Corporation
Brand Name : SONY
Address : 6-7-35 Kitashinagawa, Shinagawa-ku, Tokyo-to, 141-0001 JAPAN
Telephone Number : +81 3 5795 8712
Facsimile Number : +81 3 5795 8981
Contact Person : Masaharu Abe
Type of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
Serial No. : S1
Rating : DC 3.3V
Country of Manufacture : Japan
Receipt Date of Sample : February 17, 2003
Condition of EUT : Production prototype
Regulation(s) : FCC Part15 Subpart C, Section 15.247
Test Site : A-Pex Yamakita No.2 Open Test Site

1.1 Tested Methodology

The measurements were performed according to the procedures in ANSI C63.4 (2001).
These tests were also referred to FCC 97-114 "Guidance on Measurement for Direct Spread Spectrum Systems".

1.2 Test Facility

This site has been fully described in a report submitted to FCC office, and accepted on December 8, 2000
(Registration No.: 99354).
NVLAP Lab. code : 200441-0

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2 PRODUCT DESCRIPTION

Sony Corporation, Model: PEGA-WL110 (referred to as the EUT in this report) is a WIRELESS LAN CARD.
The clock frequency used in EUT : 44MHz

Frequency characteristics	:	2412MHz through 2462MHz
Number of channels/ channel spacing	:	11 channels/ 5MHz spacing
Modulation	:	DSSS: Direct sequence spread spectrum (IEEE802.11b)
Antenna type	:	Monopole
Antenna Gain	:	0.14dBi
Operating Voltage	:	DC 3.3V(AC Adapter of PC, 100V-240V)

*The Wireless LAN Card (PEGA-WL110) is only for Clie (PDA, Model: PEG-NX70V/U).

*FccPart15.31(e)

The host device PEG-NX70V/U provide the Wireless LAN Card with stable power supply (DC: 3.3V), and the Wireless LAN Card complies power supply regulation.

*FccPart15.203

The Wireless LAN Card and its antenna comply with this requirement since this antenna is built in Wireless LAN Card when they are put up for sale and they are used with a particular antenna connector.

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3 SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured in typical fashion (as a customer would normally use it) for testing.

Test mode:

Transmitting mode

Low channel : 2412MHz
Middle channel : 2437MHz
High channel : 2462MHz

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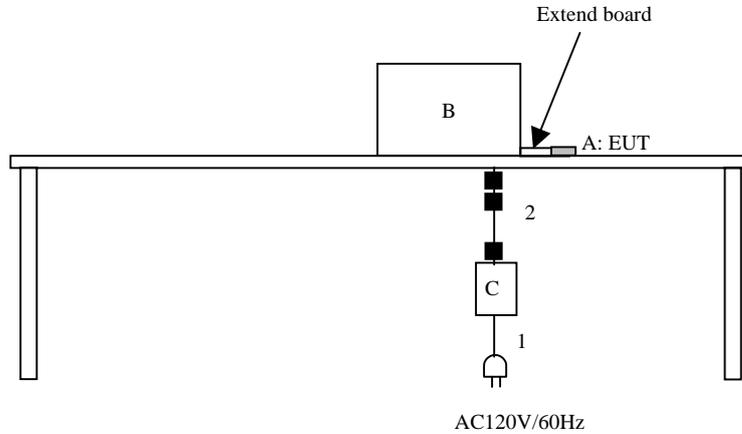
Telephone: +81 465 77 1011

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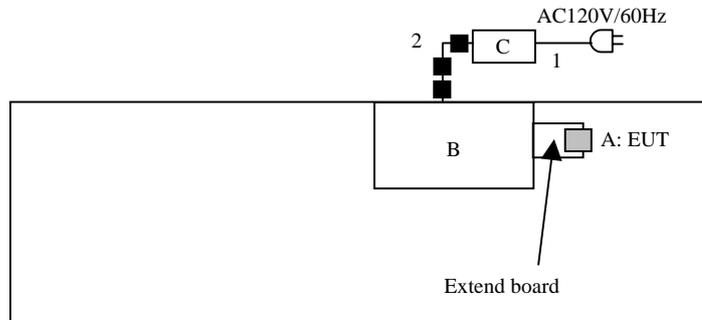
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3.2 Configuration of Tested System

Front View ■: Ferrite core



Top View



*Cabling was taken into consideration and test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID	Remarks
A	WIRELESS LAN CARD	PEGA-WL110	S1	Sony Corporation	AK8PEGAWL110	EUT
B	Note PC	FMV-270LS	043485315	Fujitsu	-	-
C	AC Adapter	FMV-AC305A	00804443	Fujitsu	-	-

List of cables used

No.	Name	Length (m)	Shield	Backshell material
1	AC Power Cable	1.7	Unshielded	Polyvinyl chloride
2	DC Power Cable	1.6	Unshielded	Polyvinyl chloride

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4 MEASUREMENT UNCERTAINTY

Conducted emission test

The measurement uncertainty (with a 95% confidence level) for this test was ± 1.3 dB.

The data listed in this test report has enough margin, more than site margin.

Radiated emission test

The measurement uncertainty (with 95% confidence level) for this test using Biconical antenna is ± 4.8 dB.

The measurement uncertainty (with 95% confidence level) for this test using Logperiodic antenna is ± 5.2 dB.

The measurement uncertainty (with 95% confidence level) for this test using Horn antenna is ± 6.6 dB.

The data listed in this test report may exceed the test limit because it does not have enough margin.

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5 SUMMARY OF TESTS

5.1 §15.207 Conducted Emissions (Limits by CISPR Pub.22 Class B)

Test Procedure

EUT was placed on a platform of nominal size, 1m by 1.8m, raised 80cm above the conducting ground plane.

The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripheral was aligned and flushed with rear of tabletop.

All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from LISN, and excess AC cable was bundled in center. It was folded back and forth forming a bundle 30cm to 40cm long. DC cable that was connected to the AC adapter was bundled in center. It was folded back and forth forming a bundle 30cm to 40cm long and was hanged at 40cm height to the ground plane.

Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT on a shielded room.

The EUT was connected to a Line Impedance Stabilization Network (LISN).

An overview sweep with peak detection has been performed.

The measurements have been performed with a CISPR quasi-peak detector (IF BW 10kHz).
(Measurement range: 150kHz to 30MHz)

Test data : APPENDIX Page 15 to 18
Photographs of test setup : Page 12
Test result : Pass
Test instruments : KCC-24/25/26/28/KPL-02, KLS-05, KSA-02, KTR-01

5.2 §15.247(a)(2) 6dB Bandwidth (Antenna Port Conducted)

Test Procedure

The minimum 6dB bandwidth was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX Page 19
Test result : Pass
Test instruments : KTR-01

5.3 § 15.247(b) (3) Maximum Peak Out Put Power (Antenna Port Conducted)

Test Procedure

The Maximum Peak Output power was measured with a power meter connected to the antenna port.

* Antenna Gain dose not exceed 6dBi.

Test data : APPENDIX Page 20
Test result : Pass
Test instruments : PM-02, PS-03

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5.4 § 15.247(c) Out of Band Emissions (Radiated)

Test Procedure

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.

The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

The Radiated Electric Field Strength intensity has been measured on an open test site with a ground plane and at a distance of 3m.

The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization.

EUT emission levels were compared when the EUT antenna position was vertical polarization and horizontal polarization.

The equipment was also previously checked at each position of three axes X, Y and Z.

In 30-1000MHz, Y axis was worst under vertical antenna polarization and Z axis was worst under horizontal antenna polarization.

In above 1GHz, as the same results, Y axis was worst under vertical antenna polarization and Z axis was worst under horizontal antenna polarization.

See the photographs in page 14.

Radiated Spurious emissions

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

The result was also satisfied the general limits specified in Sec.15.209 (a).

Measurement range : 30MHz to 1000MHz CISPR QP Detector, IF BW 120kHz
: 1GHz to 26GHz PK and AV Detector

It was confirmed that spurious emission frequencies which are over the limits in 15.209(a) (2037.7MHz, 2062.7MHz and 2087.7MHz) are >20dB lower than fundamental waves.

These spurious emission frequencies are not the restricted band regulated in 15.205(a).

Test data : APPENDIX Page 21 to 23 (30 - 1000MHz)
: APPENDIX Page 24 to 29 (1 - 26GHz)
: APPENDIX Page 30 to 35
(Out of Band Emission :2037.7MHz,2062.7MHz and 2087.7MHz)
: APPENDIX Page 36 to 39
(Band Edges: 2390MHz/ 2483.5MHz, Restricted band Charts)

Photographs of test setup : Page 13

Test result : Pass

Test instruments : KAF-03, KAF-04, KAT10-S1, KAT6-03, KBA-02, KTR-01, KFL-01
KCC-20/21/22/23/29, KCC-D3, KCC-D11/D12, KHA-02, KHA-04
KLA-02, KOTS-02, KSA-02

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5.5 § 15.247(c) Out of Band Emissions (Antenna Port Conducted)

Test Procedure

The Out of Band Emissions was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX Page 40 to 45
Test result : Pass
Test instruments : KTR-01

5.6 § 15.247(d) Power Density (Antenna Port Conducted)

Test Procedure

The Power Density was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX Page 46 to 47
Test result : Pass
Test instruments : KTR-01

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APPENDIX 1: Photographs of test setup

1. Page 12	:	Conducted emission
2. Page 13	:	Radiated emission
3. Page 14	:	Pre check of worse-case position

APPENDIX 2: Test Data

1. Page 15 – 18	:	Conducted emission
2. Page 19	:	6dB Bandwidth (Antenna Port Conducted)
3. Page 20	:	Maximum Peak Power (Antenna Port Conducted)
4. Page 21 – 39	:	Out Band of Emissions (Radiated)
5. Page 40 – 45	:	Out Band of Emissions (Antenna Port Conducted)
6. Page 46 – 47	:	Power Density (Antenna Port Conducted)

APPENDIX 3: Test instruments

Page 48	:	Test instruments
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Conducted emission



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Radiated emission



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Pre check of worse-case position



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DATA OF CONDUCTION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.3 Shielded Room
Report No. : 23GE0024-YK-1

Applicant : Sony Corporation
Kind of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
Serial No. : S1
Power : AC120V/60Hz
Mode : Transmitting:2412MHz (Ch1)
Remarks : -
Date : 2/19/2003
Phase : Single Phase
Temperature : 28 °C
Humidity : 35 %
Regulation : FCC Part15C § 15. 207. (CISPR Pub. 22)


Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	READING (N)		READING (L1)		LISN FACTOR [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
		QP [dBuV]	AV	QP [dBuV]	AV				QP [dBuV]	AV	QP [dBuV]	AV	QP [dB]	AV
1.	0.1691	44.9	-	43.8	-	0.3	0.1	0.0	45.3	-	65.0	55.0	19.7	-
2.	0.2446	33.2	-	38.0	-	0.3	0.1	0.0	38.4	-	61.9	51.9	23.5	-
3.	0.3303	36.4	-	36.6	-	0.3	0.2	0.0	37.1	-	59.4	49.4	22.3	-
4.	0.4161	34.6	-	35.0	-	0.2	0.2	0.0	35.4	-	57.5	47.5	22.1	-
5.	0.4988	38.3	-	38.0	-	0.2	0.2	0.0	38.7	-	56.0	46.0	17.3	-
6.	0.8525	37.9	-	37.4	-	0.3	0.2	0.0	38.4	-	56.0	46.0	17.6	-
7.	1.7000	18.9	-	21.2	-	0.3	0.3	0.0	21.8	-	56.0	46.0	34.2	-

CALCULATION: READING[dB μV] + LISN FACTOR[dB] + CABLE LOSS[dB] + ATTEN[dB].

■ LISN:KLS-05 (NSLK8126) ■ COAXIAL CABLE:KCC-24/25/26/28
■ PULSE LIMITER:KPL-02 ■ EMI RECEIVER:KTR-01 (ES140)

DATA OF CONDUCTION TEST CHART

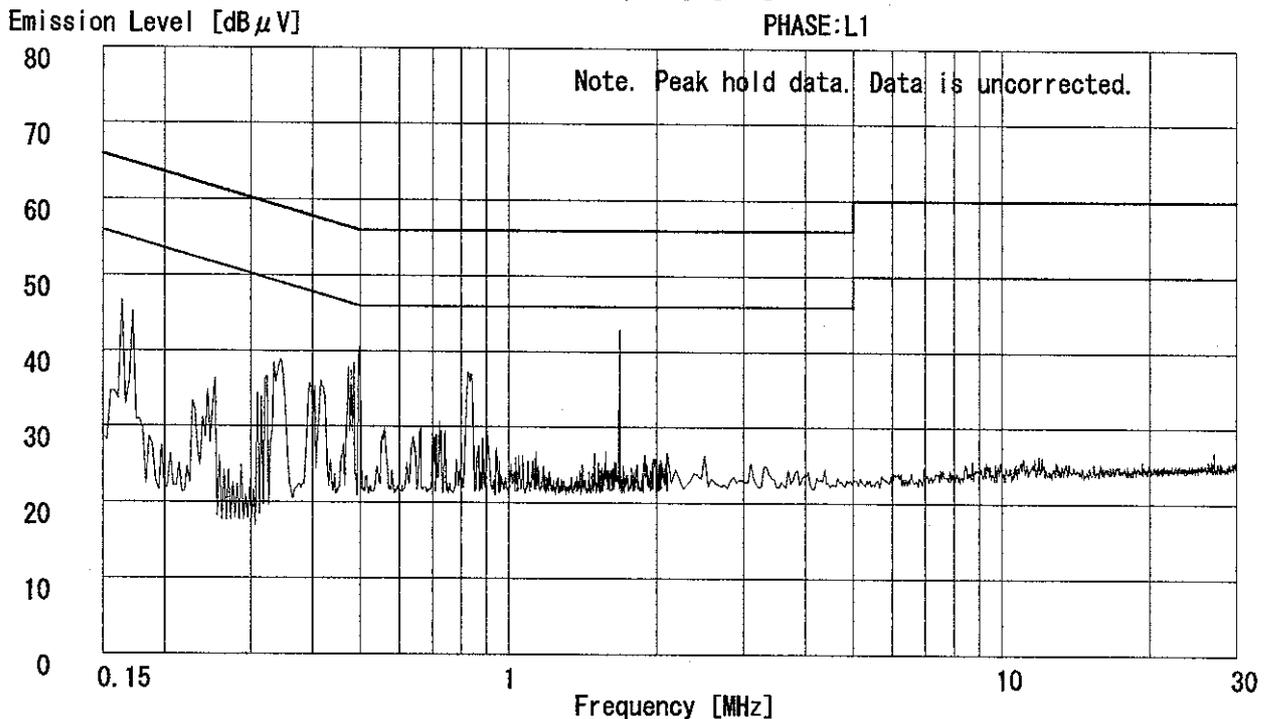
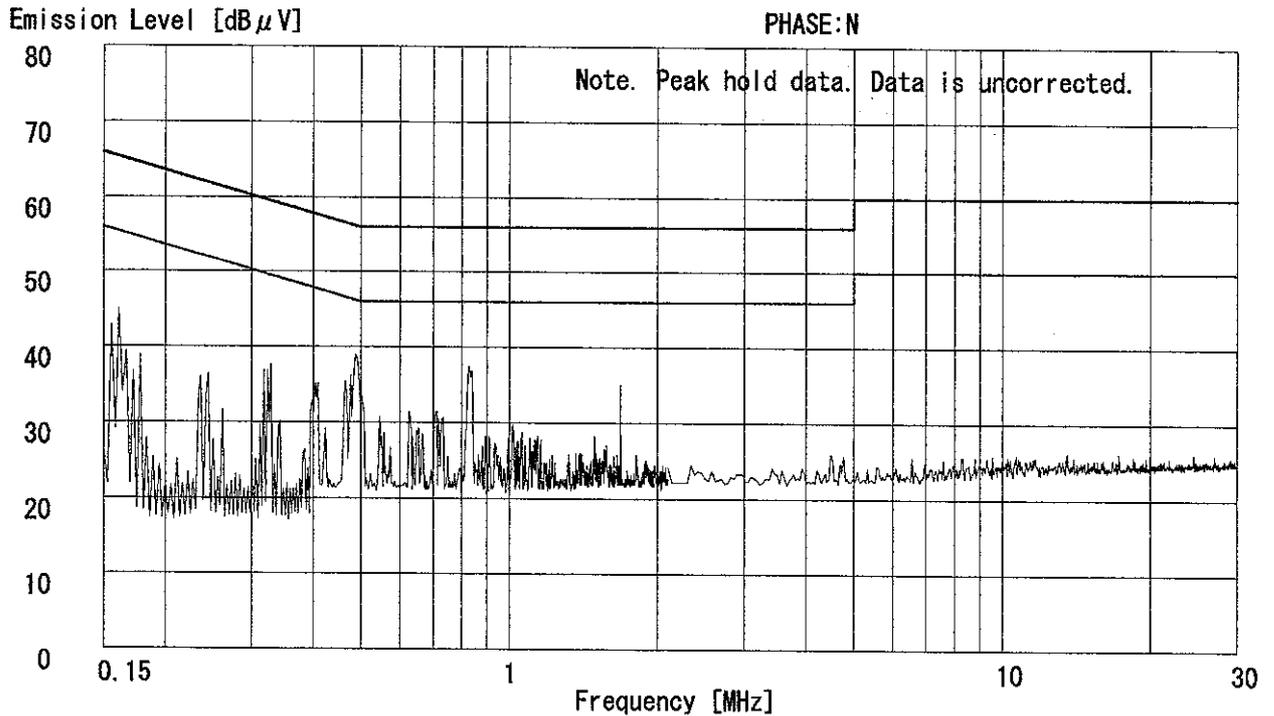
A-PEX INTERNATIONAL CO., LTD.

Yamakita No.3 Shielded Room

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Applicant : Sony Corporation
Kind of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
Serial No. : S1
Power : AC120V/60Hz
Mode : Transmitting:2412MHz (Ch1)
Remarks : -
Date : 2/19/2003
Phase : Single Phase
Temperature : 28 °C
Humidity : 35 %
Regulation 1 : FCC Part15C § 15.207. (CISPR Pub. 22)
Regulation 2 : None


Engineer : Toyokazu Imamura



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DATA OF CONDUCTION TEST CHART

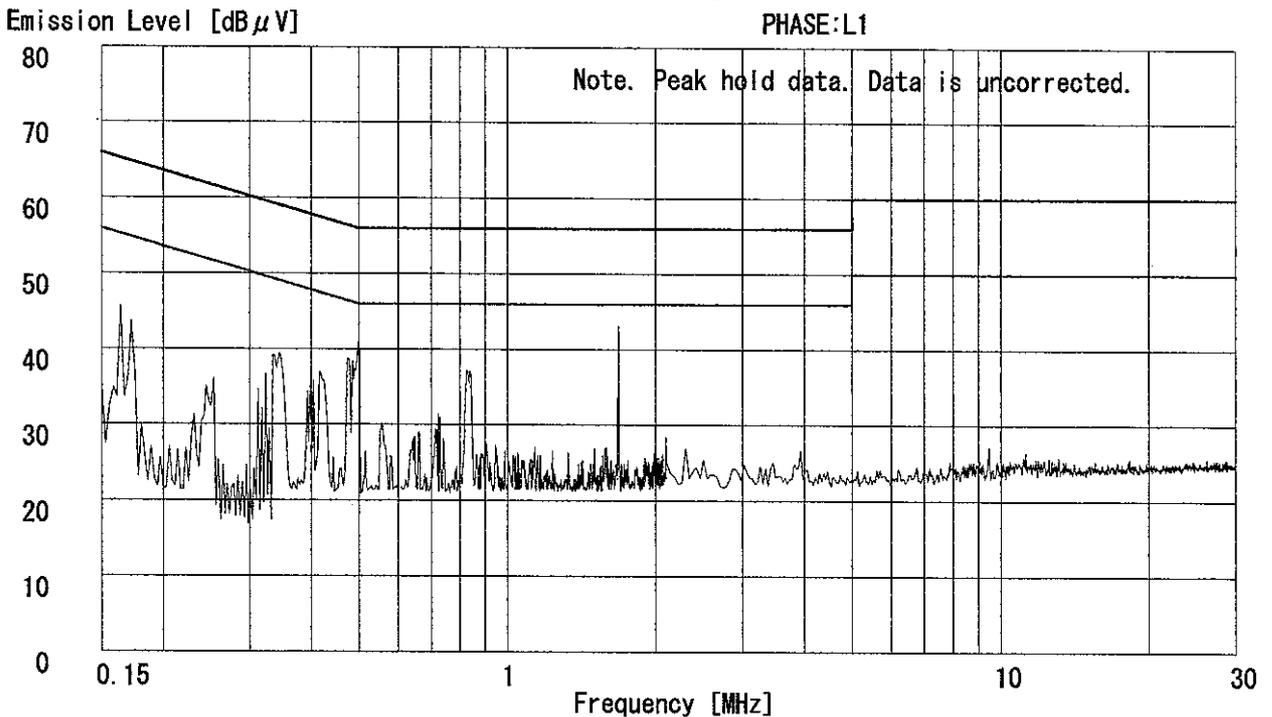
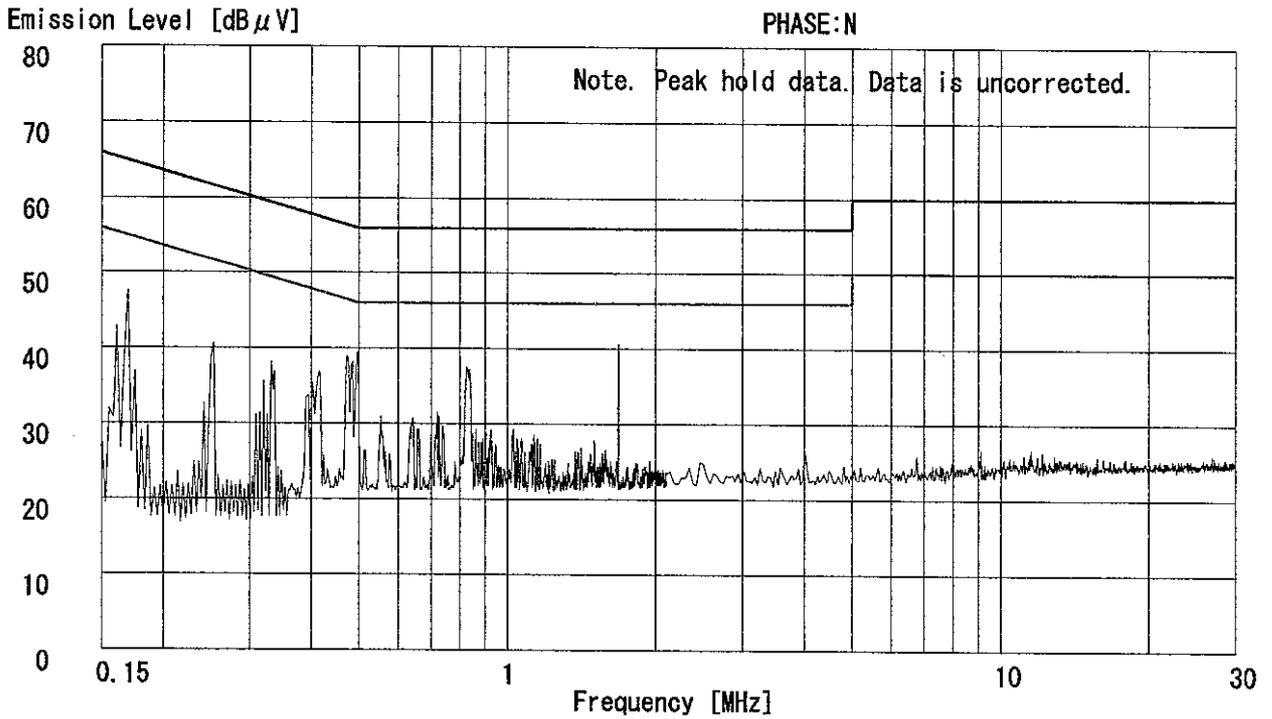
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Yamakita No.3 Shielded Room

Report No. : 23GE0024-YK-1

Applicant : Sony Corporation
Kind of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
Serial No. : S1
Power : AC120V/60Hz
Mode : Transmitting:2437MHz (Ch6)
Remarks : -
Date : 2/19/2003
Phase : Single Phase
Temperature : 28 °C
Humidity : 35 %
Regulation 1 : FCC Part15C §15.207. (CISPR Pub. 22)
Regulation 2 : None


Engineer : Toyokazu Imamura



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DATA OF CONDUCTION TEST CHART

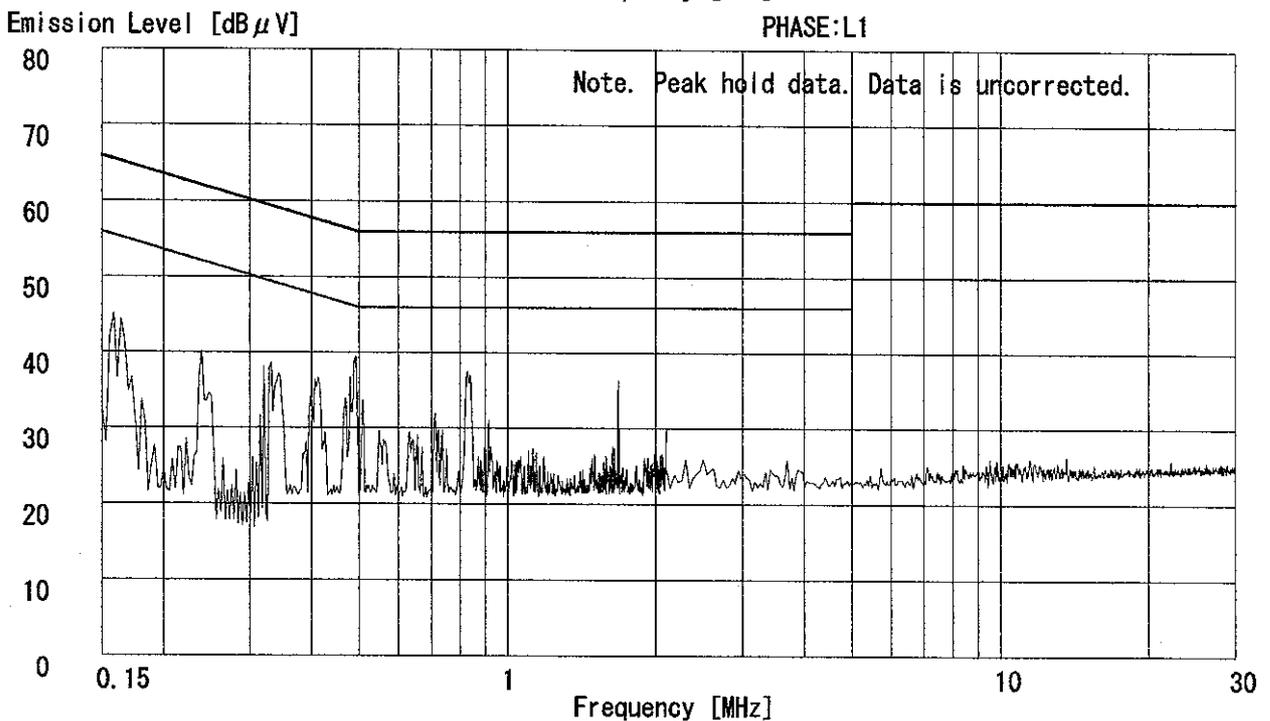
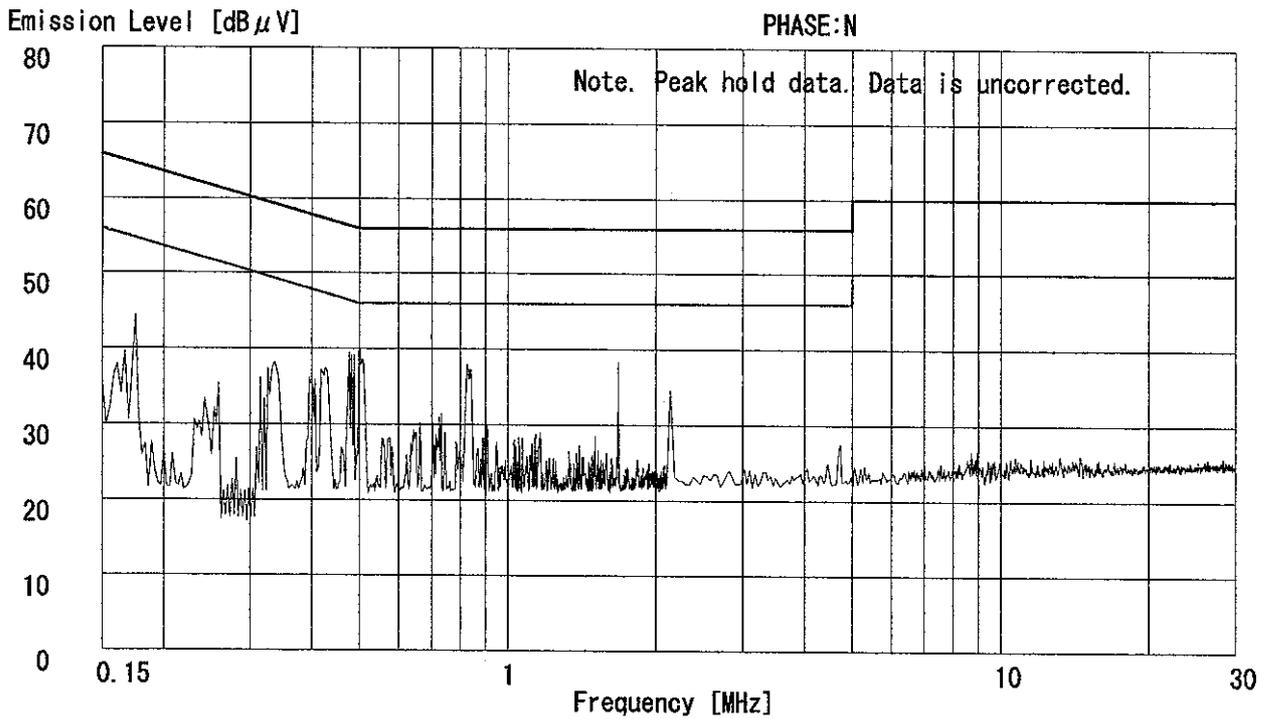
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Yamakita No.3 Shielded Room

Report No. : 23GE0024-YK-1

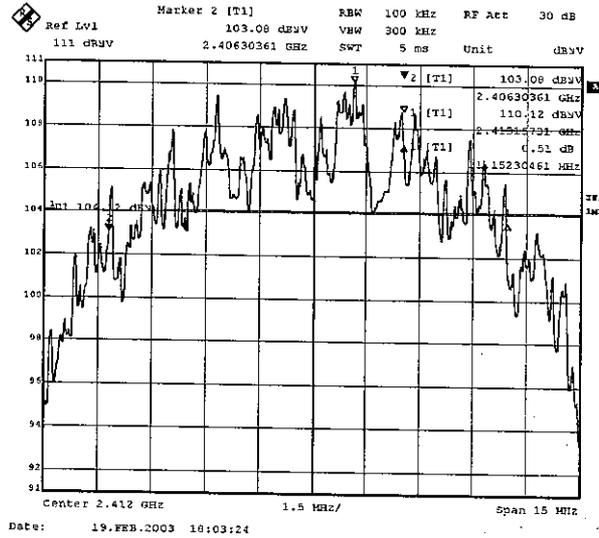
Applicant : Sony Corporation
Kind of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
Serial No. : S1
Power : AC120V/60Hz
Mode : Transmitting: 2462MHz (Ch11)
Remarks : -
Date : 2/19/2003
Phase : Single Phase
Temperature : 28 °C
Humidity : 35 %
Regulation 1 : FCC Part15C § 15. 207. (CISPR Pub. 22)
Regulation 2 : None


Engineer : Toyokazu Imamura

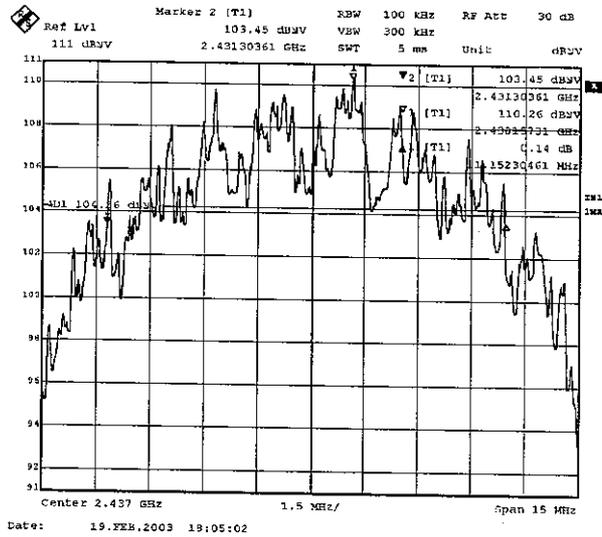


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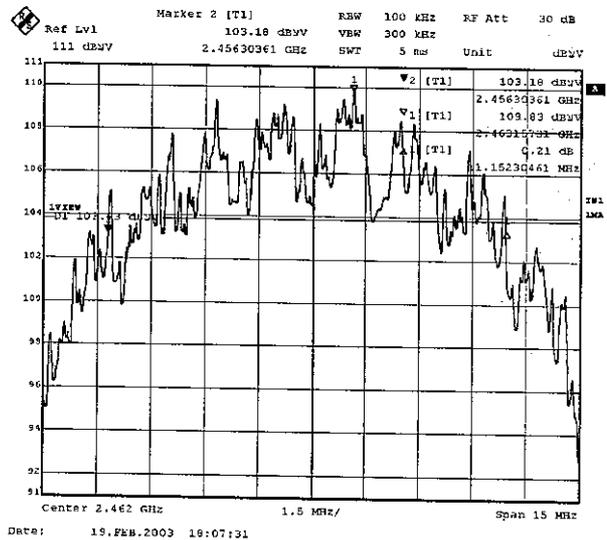
1. Ch Low:2406MHz



2. Ch Mid:2442MHz



3. Ch High:2470MHz



Peak Out Put Power (Conducted)

A-PEX INTERNATIONAL CO., LTD.
YAMAKITA NO. 2 OPEN SITE

COMPANY : SONY Corporation.
EQUIPMENT : WIRELESS LAN CARD
MODEL : PEGA-WL110
FCC ID : AK8PEGAWL110
POWER : DC3.3V (PC:AC120V/60Hz)
Mode : Transmitting

REPORT NO : 23GE0024-YK-1
REGULATION : Fcc Part15SubpartC 247 (b) (3)
DATE : 2003/ 02/19
Temp. /Humi. : 22°C/35%

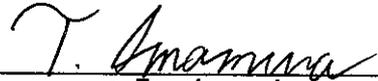

ENGINEER : Toyokazu Imamura

CH	FREQ [GHz]	PM Reading [dBm]	Cable Loss [dB]	Results [dBm]	Limit (1W) [dBm]	MARGIN [dB]
Low	2412.00	14.6	1.3	15.9	30.0	14.1
Mid	2437.00	14.7	1.3	16.0	30.0	14.0
High	2462.00	14.9	1.3	16.2	30.0	13.8

DATA OF RADIATION TEST

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Yamakita No.2 Open Test Site
Report No. : 23GE0024-YK-1

Applicant : Sony Corporation
Kind of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
Serial No. : S1
Power : AC120V/60Hz
Mode : Transmitting:2412MHz (Ch1)
Remarks : -
Date : 2/19/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 60 %
Regulation : FCC Part15C §15.209


Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]	HOR [dB]	VER [dB]		
1.	132.43	BB	35.0	34.0	13.7	27.6	2.5	5.8	29.4	28.4	43.5	14.1	15.1	
2.	198.99	BB	37.8	33.3	16.3	27.2	3.1	5.8	35.8	31.3	43.5	7.7	12.2	
3.	265.49	BB	40.1	35.0	17.5	27.1	3.6	5.8	39.9	34.8	46.0	6.1	11.2	
4.	297.10	BB	36.8	31.2	19.4	27.1	3.9	5.8	38.8	33.2	46.0	7.2	12.8	
5.	461.99	BB	33.7	33.3	17.7	28.4	5.0	5.8	33.8	33.4	46.0	12.2	12.6	
6.	495.02	BB	34.0	35.0	18.0	28.5	5.2	5.8	34.5	35.5	46.0	11.5	10.5	
7.	506.01	BB	36.1	37.1	18.1	28.5	5.2	5.8	36.7	37.7	46.0	9.3	8.3	
8.	528.07	BB	41.9	42.0	18.5	28.7	5.4	5.8	42.9	43.0	46.0	3.1	3.0	
9.	550.01	BB	35.7	38.2	19.0	28.5	5.5	5.8	37.5	40.0	46.0	8.5	6.0	
10.	560.99	BB	34.9	37.1	19.2	28.6	5.6	5.8	36.9	39.1	46.0	9.1	6.9	
11.	594.01	BB	36.8	38.9	19.8	28.7	5.8	5.8	39.5	41.6	46.0	6.5	4.4	

CALCULATION: READING[dB μ V] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB].

■ ANTENNA: KBA-02 (BBA9106) 30-299MHz/KLA-02 (USLP9143) 300-1000MHz
■ AMP: KAF-03 (8447D) ■ RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-20/21/22/23/29

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23GE0024-YK-1

Applicant : Sony Corporation
Kind of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
Serial No. : S1
Power : AC120V/60Hz
Mode : Transmitting:2437MHz (Ch6)
Remarks : -
Date : 2/19/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 60 %
Regulation : FCC Part15C § 15.209


Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	132.43	BB	35.3	35.3	13.7	27.6	2.5	5.8	29.7	29.7	43.5	13.8	13.8
2.	198.98	BB	36.4	33.0	16.3	27.2	3.1	5.8	34.4	31.0	43.5	9.1	12.5
3.	265.49	BB	34.8	36.3	17.5	27.1	3.6	5.8	34.6	36.1	46.0	11.4	9.9
4.	297.10	BB	36.4	30.2	19.4	27.1	3.9	5.8	38.4	32.2	46.0	7.6	13.8
5.	461.99	BB	34.0	33.0	17.7	28.4	5.0	5.8	34.1	33.1	46.0	11.9	12.9
6.	495.02	BB	36.1	35.0	18.0	28.5	5.2	5.8	36.6	35.5	46.0	9.4	10.5
7.	506.01	BB	36.9	36.7	18.1	28.5	5.2	5.8	37.5	37.3	46.0	8.5	8.7
8.	528.07	BB	42.0	41.5	18.5	28.7	5.4	5.8	43.0	42.5	46.0	3.0	3.5
9.	550.01	BB	36.2	38.0	19.0	28.5	5.5	5.8	38.0	39.8	46.0	8.0	6.2
10.	560.99	BB	35.0	37.9	19.2	28.6	5.6	5.8	37.0	39.9	46.0	9.0	6.1
11.	594.01	BB	37.1	38.0	19.8	28.7	5.8	5.8	39.8	40.7	46.0	6.2	5.3

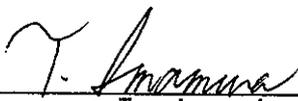
CALCULATION: $READING [dB \mu V] + ANT. FACTOR [dB/m] + CABLE LOSS [dB] - AMP. GAIN [dB] + ATTEN [dB]$.

■ ANTENNA: KBA-02 (BBA9106) 30-299MHz/KLA-02 (USLP9143) 300-1000MHz
 ■ AMP: KAF-03 (8447D) ■ RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-20/21/22/23/29

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23GE0024-YK-1

Applicant : Sony Corporation
Kind of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
Serial No. : S1
Power : AC120V/60Hz
Mode : Transmitting:2462MHz (Ch11)
Remarks : -
Date : 2/19/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 60 %
Regulation : FCC Part15C § 15.209


Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]	HOR [dB]	VER [dB]		
1.	132.43	BB	29.4	33.5	13.7	27.6	2.5	5.8	23.8	27.9	43.5	19.7	15.6	
2.	198.99	BB	33.3	33.2	16.3	27.2	3.1	5.8	31.3	31.2	43.5	12.2	12.3	
3.	265.48	BB	41.3	34.5	17.5	27.1	3.6	5.8	41.1	34.3	46.0	4.9	11.7	
4.	297.11	BB	30.7	29.3	19.4	27.1	3.9	5.8	32.7	31.3	46.0	13.3	14.7	
5.	461.99	BB	36.3	34.9	17.7	28.4	5.0	5.8	36.4	35.0	46.0	9.6	11.0	
6.	495.02	BB	33.7	34.8	18.0	28.5	5.2	5.8	34.2	35.3	46.0	11.8	10.7	
7.	506.01	BB	36.2	36.2	18.1	28.5	5.2	5.8	36.8	36.8	46.0	9.2	9.2	
8.	528.07	BB	41.8	40.2	18.5	28.7	5.4	5.8	42.8	41.2	46.0	3.2	4.8	
9.	550.01	BB	37.1	38.3	19.0	28.5	5.5	5.8	38.9	40.1	46.0	7.1	5.9	
10.	561.04	BB	35.2	35.3	19.2	28.6	5.6	5.8	37.2	37.3	46.0	8.8	8.7	
11.	594.02	BB	37.3	36.1	19.8	28.7	5.8	5.8	40.0	38.8	46.0	6.0	7.2	

CALCULATION: READING[dB μ V] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB].

■ ANTENNA: KBA-02 (BBA9106) 30-299MHz/KLA-02 (USLP9143) 300-1000MHz
 ■ AMP: KAF-03 (8447D) ■ RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-20/21/22/23/29

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23GE0024-YK-1

Applicant : Sony Corporation
Kind of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
Serial No. : S1
Power : AC120V/60Hz
Mode : Transmitting:2412MHz (Ch1)
Remarks : -
Date : 2/17/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 60 %
Regulation : FCC Part15C §15.209(AV Detection)



Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
			HOR [dB μV]	VER					HOR [dB μV/m]	VER	HOR [dB]	VER		
1.	2037.70	BB	53.8	50.9	28.6	34.9	4.5	10.0	62.0	59.1	54.0	-8.0	-5.1	
2.	2390.00	BB	31.1	30.8	29.7	34.9	4.8	10.0	40.7	40.4	54.0	13.3	13.6	
3.	4075.50	BB	47.3	44.5	32.2	35.6	6.5	0.6	51.0	48.2	54.0	3.0	5.8	
4.	4824.00	BB	28.5	28.2	33.5	34.8	6.9	1.0	35.1	34.8	54.0	18.9	19.2	
5.	7236.00	BB	29.7	29.7	38.2	34.8	8.7	0.5	42.3	42.3	54.0	11.7	11.7	
6.	9648.00	BB	28.6	28.6	39.9	34.6	10.1	1.0	45.0	45.0	54.0	9.0	9.0	
7.	12060.00	BB	28.7	28.7	42.7	34.5	11.5	0.5	48.9	48.9	54.0	5.1	5.1	
8.	14472.00	BB	28.1	28.1	41.1	33.6	12.8	0.9	49.3	49.3	54.0	4.7	4.7	
9.	16884.00	BB	28.1	28.1	41.1	33.2	13.9	1.3	51.2	51.2	54.0	2.8	2.8	
10.	19296.00	BB	26.8	26.8	41.2	33.0	7.2	0.0	42.2	42.2	54.0	11.8	11.8	
11.	21708.00	BB	28.1	28.1	41.5	32.4	7.4	0.0	44.6	44.6	54.0	9.4	9.4	
12.	24120.00	BB	27.0	27.1	40.8	31.2	8.1	0.0	44.7	44.8	54.0	9.3	9.2	

CALCULATION: $READING[dB \mu V] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB]$.

■ ANTENNA: KHA-02 (1-18GHz) / KHA-04 (18-26GHz) ■ AMP: KAF-04 (8447D)
■ RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-D11/D12 (1-18GHz), KCC-D3 (18-26GHz)

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23GE0024-YK-1

Applicant : Sony Corporation
Kind of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
Serial No. : S1
Power : AC120V/60Hz
Mode : Transmitting:2412MHz (Ch1)
Remarks : -
Date : 2/17/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 60 %
Regulation : FCC Part15C § 15.209(PK Detection)


Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER					HOR [dB μV/m]	VER		HOR [dB]	VER
1.	2037.70	BB	56.3	53.8	28.6	34.9	4.5	10.0	64.5	62.0	74.0	9.5	12.0
2.	2390.00	BB	43.6	41.6	29.7	34.9	4.8	10.0	53.2	51.2	74.0	20.8	22.8
3.	4075.50	BB	50.7	49.1	32.2	35.6	6.5	0.6	54.4	52.8	74.0	19.6	21.2
4.	4824.00	BB	41.5	41.2	33.5	34.8	6.9	1.0	48.1	47.8	74.0	25.9	26.2
5.	7236.00	BB	42.8	42.8	38.2	34.8	8.7	0.5	55.4	55.4	74.0	18.6	18.6
6.	9648.00	BB	41.1	42.4	39.9	34.6	10.1	1.0	57.5	58.8	74.0	16.5	15.2
7.	12060.00	BB	41.5	42.5	42.7	34.5	11.5	0.5	61.7	62.7	74.0	12.3	11.3
8.	14472.00	BB	40.7	40.2	41.1	33.6	12.8	0.9	61.9	61.4	74.0	12.1	12.6
9.	16884.00	BB	41.0	41.0	41.1	33.2	13.9	1.3	64.1	64.1	74.0	9.9	9.9
10.	19296.00	BB	39.9	39.3	41.2	33.0	7.2	0.0	55.3	54.7	74.0	18.7	19.3
11.	21708.00	BB	40.7	40.3	41.5	32.4	7.4	0.0	57.2	56.8	74.0	16.8	17.2
12.	24120.00	BB	40.1	39.4	40.8	31.2	8.1	0.0	57.8	57.1	74.0	16.2	16.9

CALCULATION: $READING[dB \mu V] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB]$.

■ ANTENNA: KHA-02 (1-18GHz) / KHA-04 (18-26GHz) ■ AMP: KAF-04 (8447D)
■ RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-D11/D12 (1-18GHz), KCC-D3 (18-26GHz)

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23GE0024-YK-1

Applicant : Sony Corporation
Kind of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
Serial No. : S1
Power : AC120V/60Hz
Mode : Transmitting:2437MHz (Ch6)
Remarks : -
Date : 2/17/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 60 %
Regulation : FCC Part15C § 15.209 (AV Detection)


Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER					HOR [dB μV/m]	VER		HOR [dB]	VER
1.	2062.73	BB	54.5	52.8	28.7	34.9	4.5	10.0	62.8	61.1	54.0	-8.8	-7.1
2.	4125.46	BB	47.1	46.2	32.2	35.6	6.5	0.7	50.9	50.0	54.0	3.1	4.0
3.	4874.00	BB	29.1	28.7	33.7	34.7	7.0	1.0	36.1	35.7	54.0	17.9	18.3
4.	7311.00	BB	29.6	29.6	38.6	34.7	8.7	0.5	42.7	42.7	54.0	11.3	11.3
5.	9748.00	BB	28.6	28.6	39.8	34.5	10.2	1.0	45.1	45.1	54.0	8.9	8.9
6.	12185.00	BB	28.7	28.7	42.5	34.4	11.7	0.5	49.0	49.0	54.0	5.0	5.0
7.	14622.00	BB	27.9	27.9	41.3	33.7	12.8	0.9	49.2	49.2	54.0	4.8	4.8
8.	17059.00	BB	27.8	27.8	41.5	33.1	14.0	1.3	51.5	51.5	54.0	2.5	2.5
9.	19496.00	BB	26.7	26.7	41.2	33.3	7.2	0.0	41.8	41.8	54.0	12.2	12.2
10.	21933.00	BB	28.9	28.9	41.7	32.5	7.1	0.0	45.2	45.2	54.0	8.8	8.8
11.	24370.00	BB	27.4	27.4	41.0	30.6	8.1	0.0	45.9	45.9	54.0	8.1	8.1

CALCULATION: READING[dB μV] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB].

■ ANTENNA: KHA-02 (1-18GHz) / KHA-04 (18-26GHz) ■ AMP: KAF-04 (8447D)
■ RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-D11/D12 (1-18GHz), KCC-D3 (18-26GHz)

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23GE0024-YK-1

Applicant : Sony Corporation
Kind of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
Serial No. : S1
Power : AC120V/60Hz
Mode : Transmitting:2437MHz (Ch6)
Remarks : -
Date : 2/17/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 60 %
Regulation : FCC Part15C § 15.209 (PK Detection)



Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
			HOR [dB μV]	VER					HOR [dB μV/m]	VER	HOR [dB]	VER		
1.	2062.73	BB	56.7	55.3	28.7	34.9	4.5	10.0	65.0	63.6	74.0	9.0	10.4	
2.	4125.46	BB	50.4	49.7	32.2	35.6	6.5	0.7	54.2	53.5	74.0	19.8	20.5	
3.	4874.00	BB	42.2	42.0	33.7	34.7	7.0	1.0	49.2	49.0	74.0	24.8	25.0	
4.	7311.00	BB	42.3	42.6	38.6	34.7	8.7	0.5	55.4	55.7	74.0	18.6	18.3	
5.	9748.00	BB	41.2	41.1	39.8	34.5	10.2	1.0	57.7	57.6	74.0	16.3	16.4	
6.	12185.00	BB	41.9	41.5	42.5	34.4	11.7	0.5	62.2	61.8	74.0	11.8	12.2	
7.	14622.00	BB	40.2	41.2	41.3	33.7	12.8	0.9	61.5	62.5	74.0	12.5	11.5	
8.	17059.00	BB	40.7	40.5	41.5	33.1	14.0	1.3	64.4	64.2	74.0	9.6	9.8	
9.	19496.00	BB	39.4	39.3	41.2	33.3	7.2	0.0	54.5	54.4	74.0	19.5	19.6	
10.	21933.00	BB	41.7	41.4	41.7	32.5	7.1	0.0	58.0	57.7	74.0	16.0	16.3	
11.	24370.00	BB	40.2	40.8	41.0	30.6	8.1	0.0	58.7	59.3	74.0	15.3	14.7	

CALCULATION: READING[dB μV] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB].

■ ANTENNA : KHA-02 (1-18GHz) / KHA-04 (18-26GHz) ■ AMP : KAF-04 (8447D)
■ RECEIVER : KTR-01 (ES140) ■ CABLE : KCC-D11/D12 (1-18GHz), KCC-D3 (18-26GHz)

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23GE0024-YK-1

Applicant : Sony Corporation
Kind of Equipment : WIRELESS LAN CARD
Model No. : PEGA-WL110
Serial No. : S1
Power : AC120V/60Hz
Mode : Transmitting:2462MHz(Ch11)
Remarks : -
Date : 2/17/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 60 %
Regulation : FCC Part15C § 15.209(AV Detection)


Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]	HOR [dB]	VER [dB]		
1.	2087.73	BB	54.6	54.6	28.8	34.9	4.5	10.0	63.0	63.0	54.0	-9.0	-9.0	
2.	2483.50	BB	31.2	31.2	30.0	34.9	4.9	10.0	41.2	41.2	54.0	12.8	12.8	
3.	4175.46	BB	47.8	47.8	32.2	35.6	6.5	0.7	51.6	51.6	54.0	2.4	2.4	
4.	4924.00	BB	29.6	29.1	33.9	34.6	7.0	1.0	36.9	36.4	54.0	17.1	17.6	
5.	7386.00	BB	29.7	29.7	38.9	34.6	8.7	0.5	43.2	43.2	54.0	10.8	10.8	
6.	9848.00	BB	28.8	28.6	39.7	34.5	10.3	1.0	45.3	45.1	54.0	8.7	8.9	
7.	12310.00	BB	28.8	28.8	42.3	34.3	11.8	0.5	49.1	49.1	54.0	4.9	4.9	
8.	14772.00	BB	28.0	28.1	41.5	33.7	12.9	0.9	49.6	49.7	54.0	4.4	4.3	
9.	17234.00	BB	27.1	27.1	42.3	33.2	14.3	1.1	51.6	51.6	54.0	2.4	2.4	
10.	19696.00	BB	26.9	26.9	41.0	33.5	7.4	0.0	41.8	41.8	54.0	12.2	12.2	
11.	22158.00	BB	28.3	28.3	41.7	32.7	7.1	0.0	44.4	44.4	54.0	9.6	9.6	
12.	24620.00	BB	27.4	27.7	41.1	30.3	8.2	0.0	46.4	46.7	54.0	7.6	7.3	

CALCULATION: $READING[dB \mu V] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB]$.

■ ANTENNA: KHA-02 (1-18GHz) / KHA-04 (18-26GHz) ■ AMP: KAF-04 (8447D)
■ RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-D11/D12 (1-18GHz), KCC-D3 (18-26GHz)

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23GE0024-YK-1

Applicant : Sony Corporation
 Kind of Equipment : WIRELESS LAN CARD
 Model No. : PEGA-WL110
 Serial No. : S1
 Power : AC120V/60Hz
 Mode : Transmitting:2462MHz(Ch11)
 Remarks : -
 Date : 2/17/2003
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 60 %
 Regulation : FCC Part15C §15.209(PK Detection)


 Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
			HOR [dB μV]	VER					HOR [dB μV/m]	VER	HOR [dB]	VER		
1.	2087.73	BB	56.5	56.8	28.8	34.9	4.5	10.0	64.9	65.2	74.0	9.1	8.8	
2.	2483.50	BB	43.4	43.6	30.0	34.9	4.9	10.0	53.4	53.6	74.0	20.6	20.4	
3.	4175.46	BB	50.6	50.8	32.2	35.6	6.5	0.7	54.4	54.6	74.0	19.6	19.4	
4.	4924.00	BB	42.5	42.0	33.9	34.6	7.0	1.0	49.8	49.3	74.0	24.2	24.7	
5.	7386.00	BB	42.5	42.9	38.9	34.6	8.7	0.5	56.0	56.4	74.0	18.0	17.6	
6.	9848.00	BB	42.2	41.4	39.7	34.5	10.3	1.0	58.7	57.9	74.0	15.3	16.1	
7.	12310.00	BB	41.7	42.0	42.3	34.3	11.8	0.5	62.0	62.3	74.0	12.0	11.7	
8.	14772.00	BB	40.6	41.2	41.5	33.7	12.9	0.9	62.2	62.8	74.0	11.8	11.2	
9.	17234.00	BB	40.1	39.9	42.3	33.2	14.3	1.1	64.6	64.4	74.0	9.4	9.6	
10.	19696.00	BB	39.6	39.3	41.0	33.5	7.4	0.0	54.5	54.2	74.0	19.5	19.8	
11.	22158.00	BB	40.8	41.5	41.7	32.7	7.1	0.0	56.9	57.6	74.0	17.1	16.4	
12.	24620.00	BB	40.6	40.0	41.1	30.3	8.2	0.0	59.6	59.0	74.0	14.4	15.0	

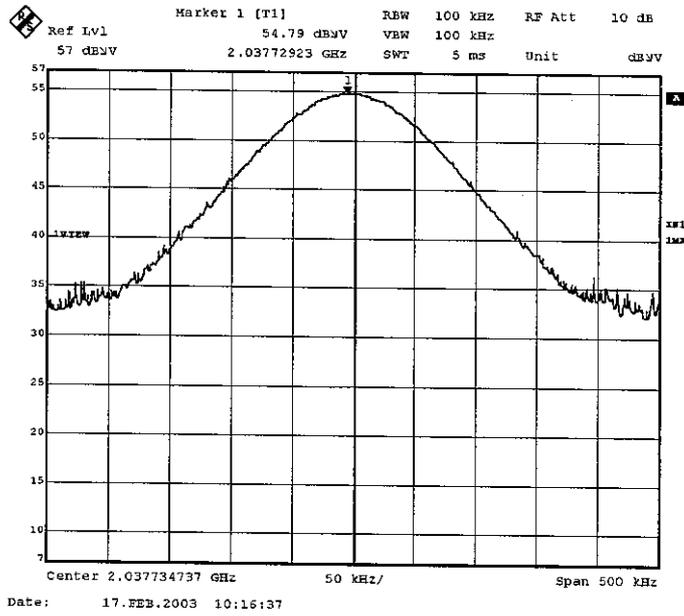
CALCULATION: $READING[dB \mu V] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB]$.

■ ANTENNA: KHA-02 (1-18GHz) / KHA-04 (18-26GHz) ■ AMP: KAF-04 (8447D)
 ■ RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-D11/D12 (1-18GHz), KCC-D3 (18-26GHz)

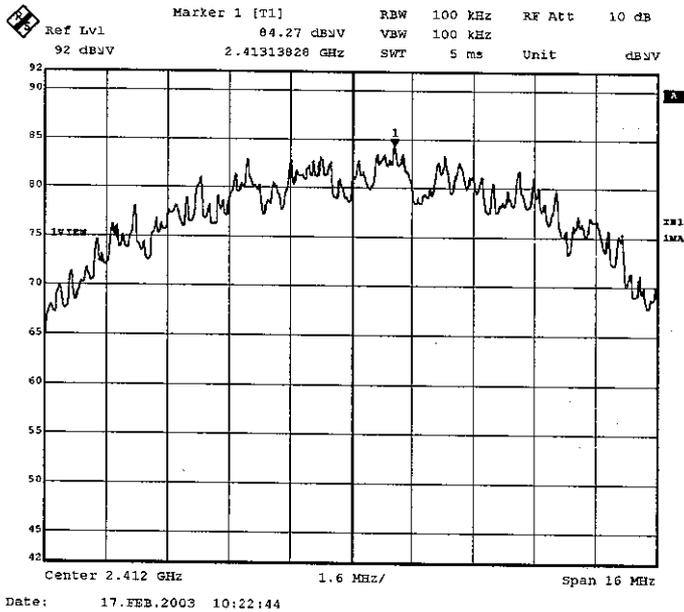
Ch 1: 2412MHz

T. Amamura

1. Spurious emission (2037.7MHz-Horizontal)

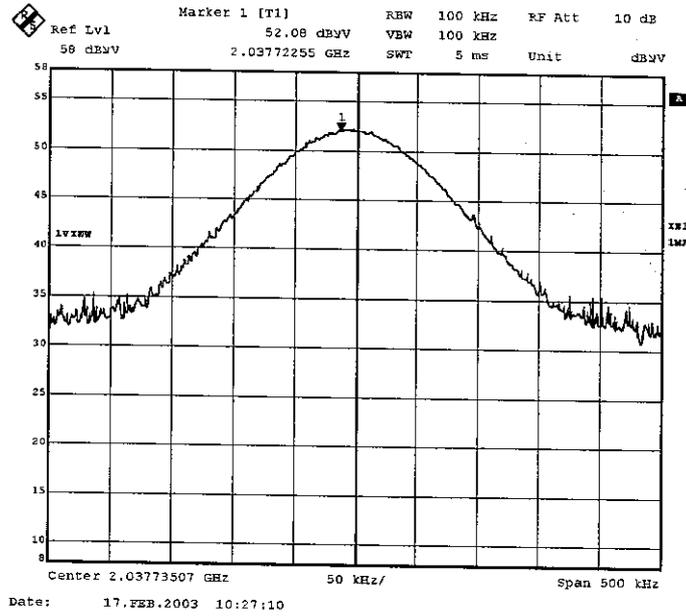


2. Fundamental (2412MHz-Horizontal)

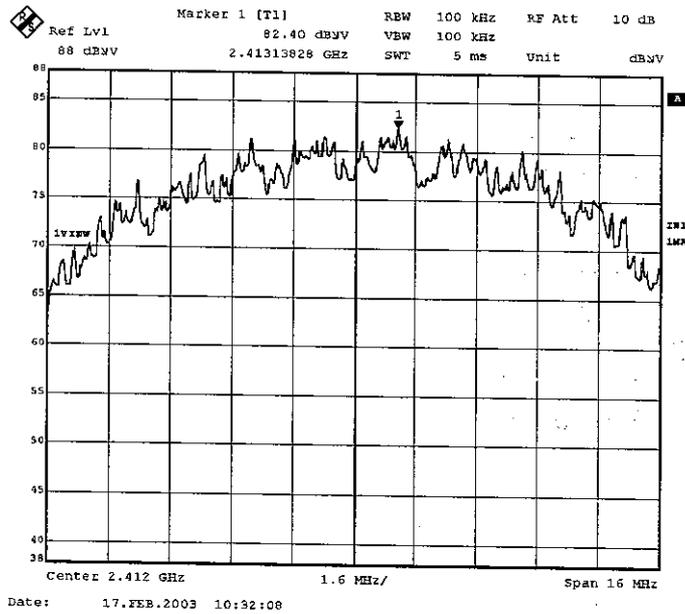


3. Spurious emission (2037.7MHz-Vertical)

T. Imamura



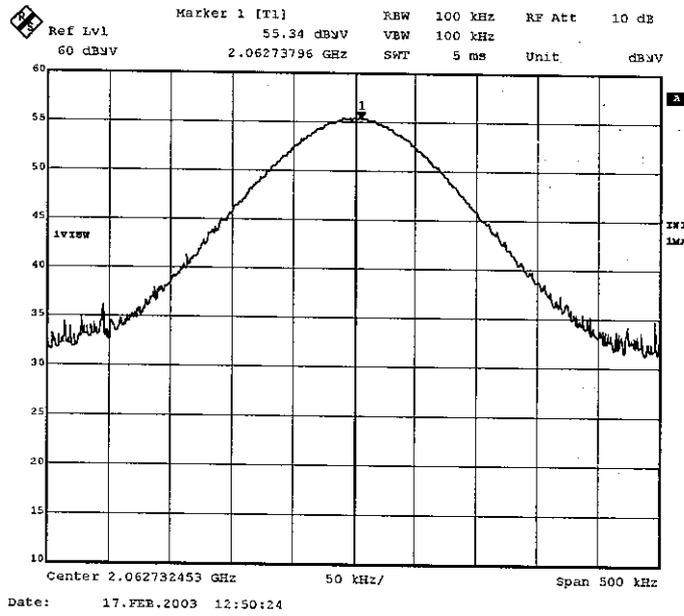
4. Fundamental (2412MHz-Vertical)



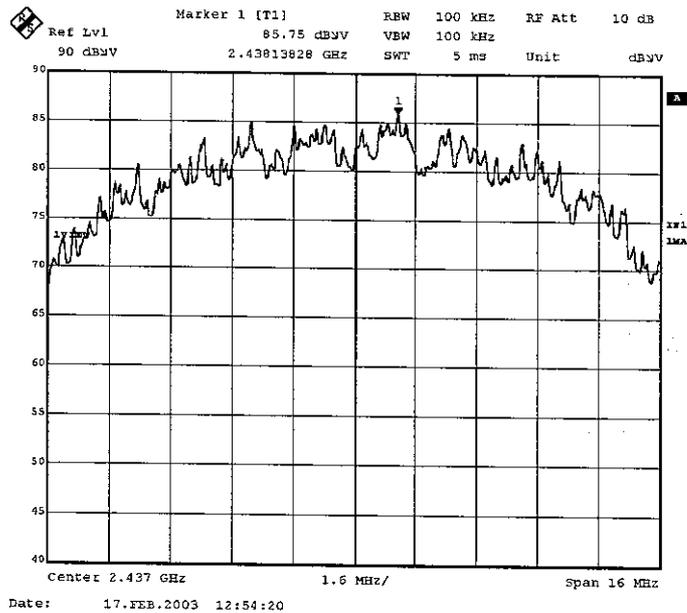
Ch 6: 2437MHz

T. Imanawa

1. Spurious emission (2062.7MHz-Horizontal)

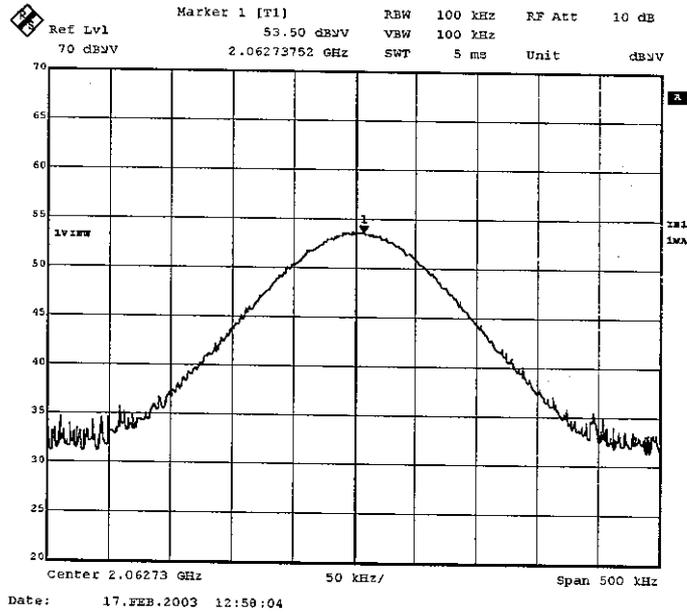


2. Fundamental (2437MHz-Horizontal)

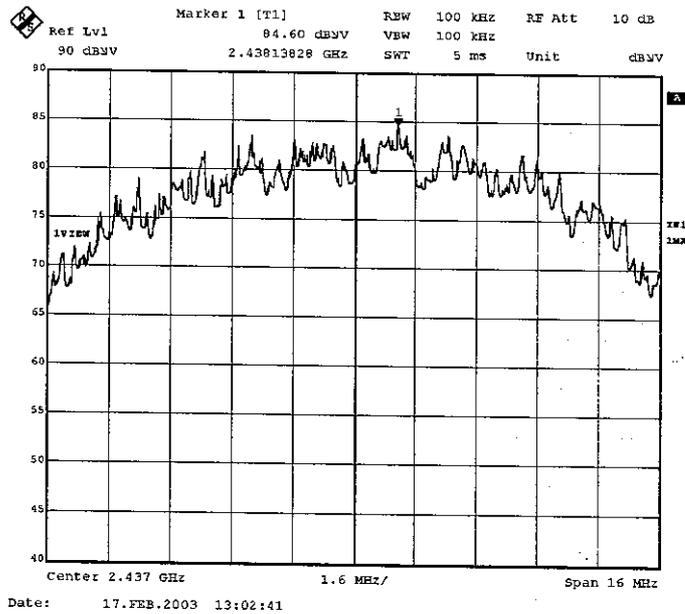


3. Spurious emission (2062.7MHz-Vertical)

T. Inamura



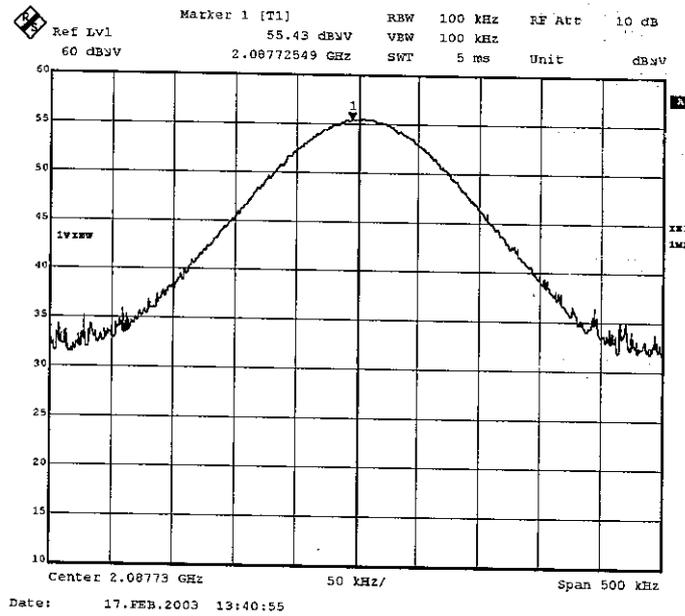
4. Fundamental (2437MHz-Vertical)



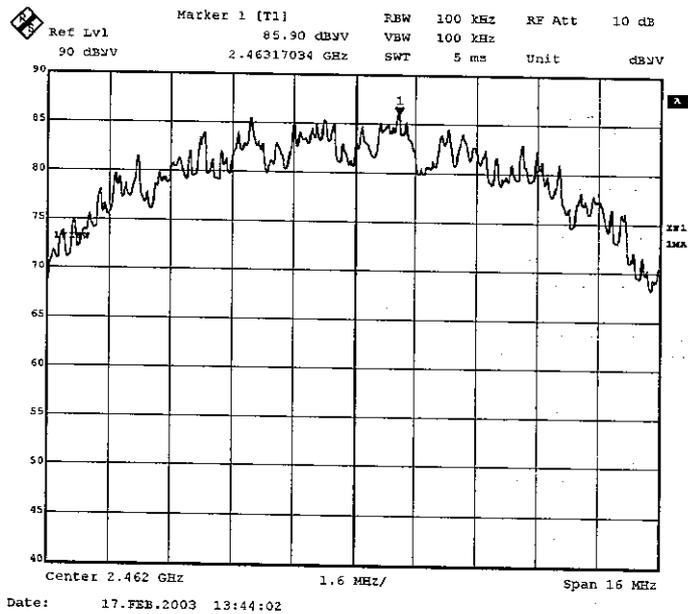
Ch 11: 2462MHz

Y. Amamura

1. Spurious emission (2087.7MHz-Horizontal)

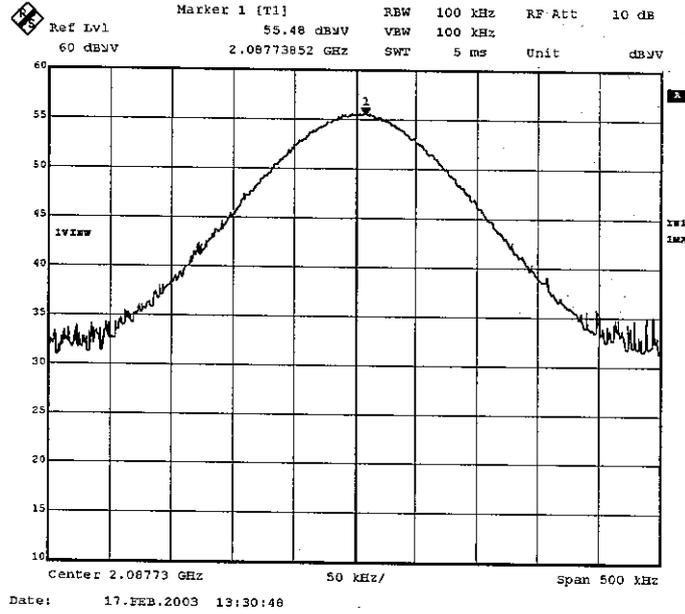


2. Fundamental (2462MHz-Horizontal)

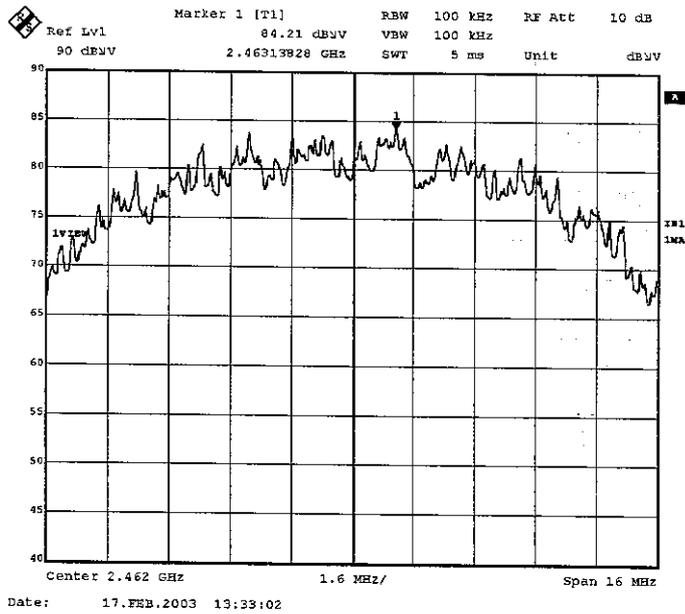


T. Imamura

3. Spurious emission (2087.7MHz-Vertical)



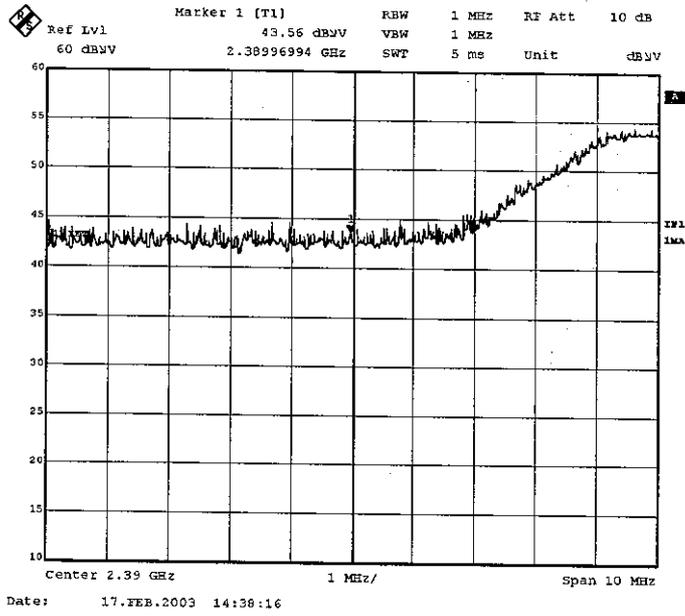
4. Fundamental (2462MHz-Vertical)



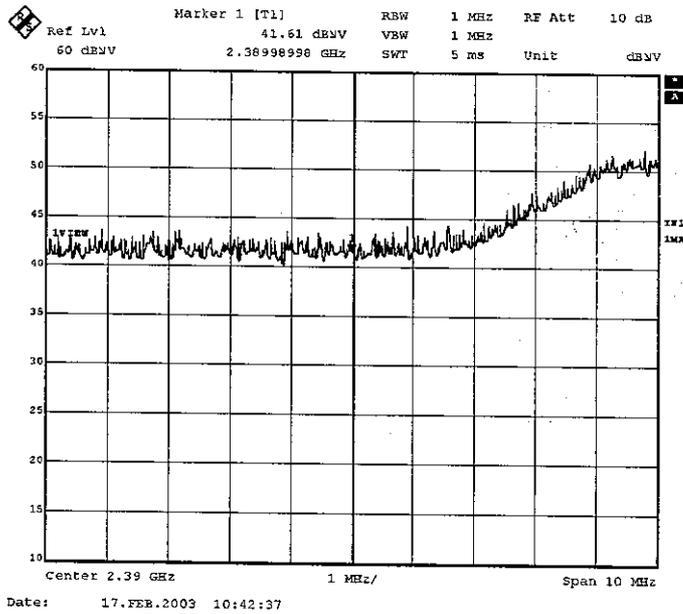
2.39GHz (Ch 1:2412MHz)

1. Horizontal/ PK

T. Inamura

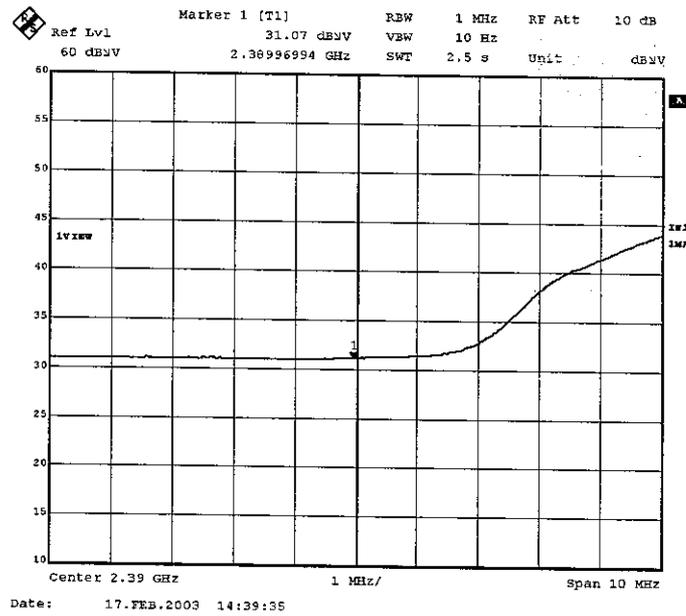


2. Vertical/ PK

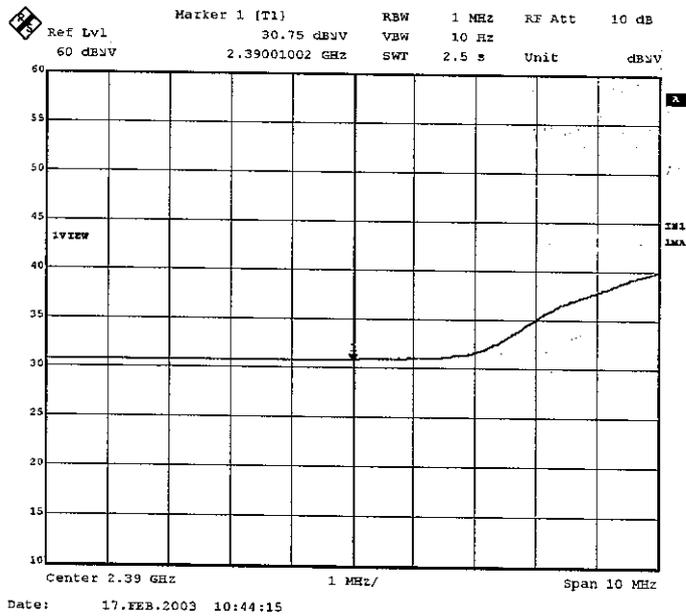


T. Imamura

3. Horizontal/ AV



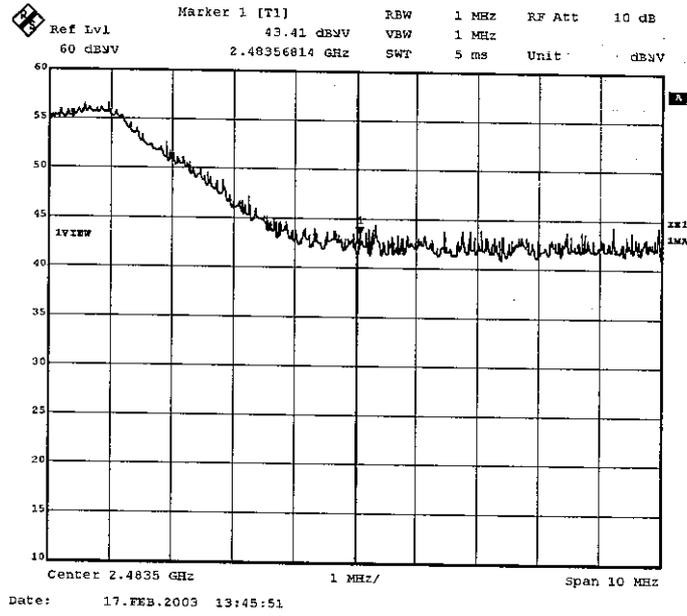
4. Vertical/ AV



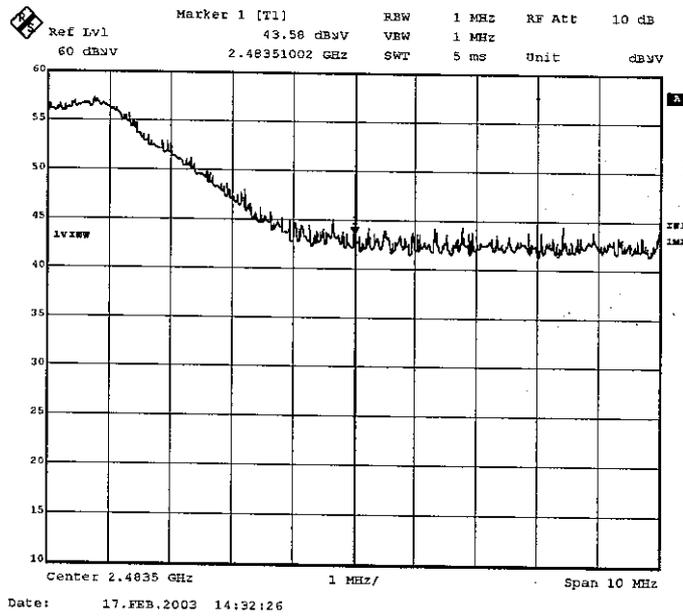
2.4835GHz (Ch 11:2462MHz)

1. Horizontal/PK

T. Imamura

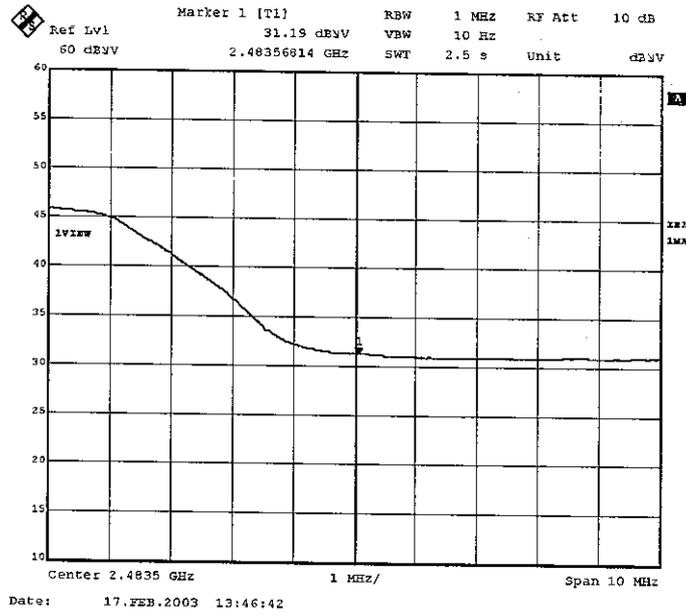


2. Vertical/PK

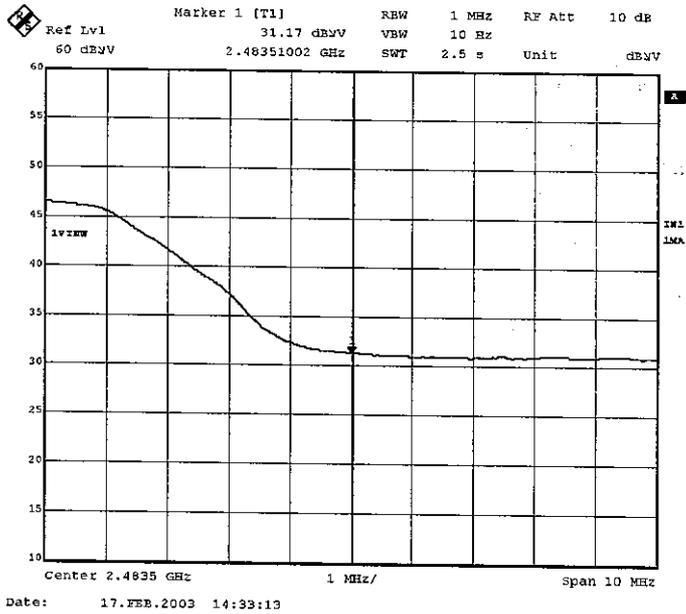


T. Imamura

3. Horizontal/ AV



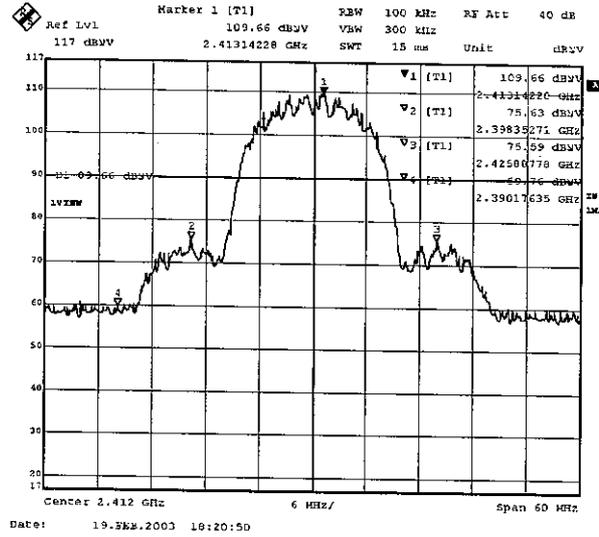
4. Vertical/ AV



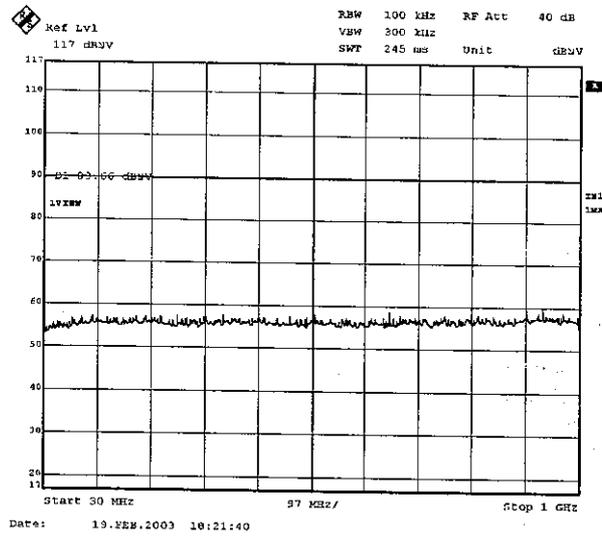
Ch 1: 2412MHz

1.

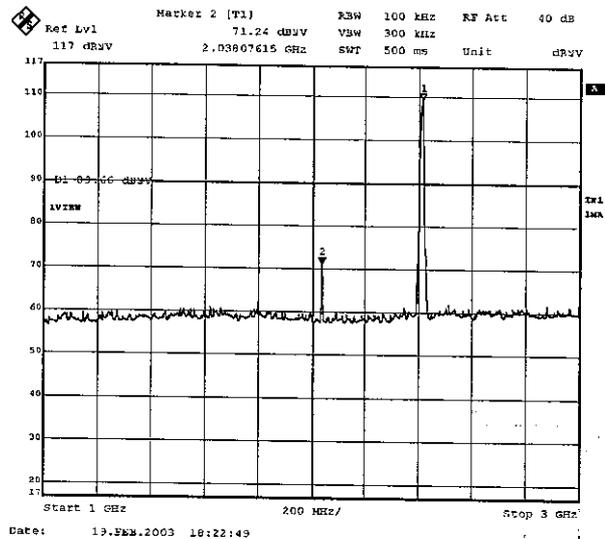
T. Amanna



2.

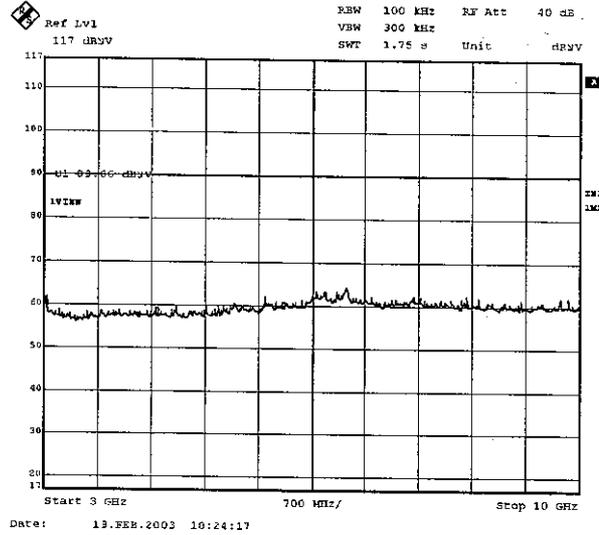


3.

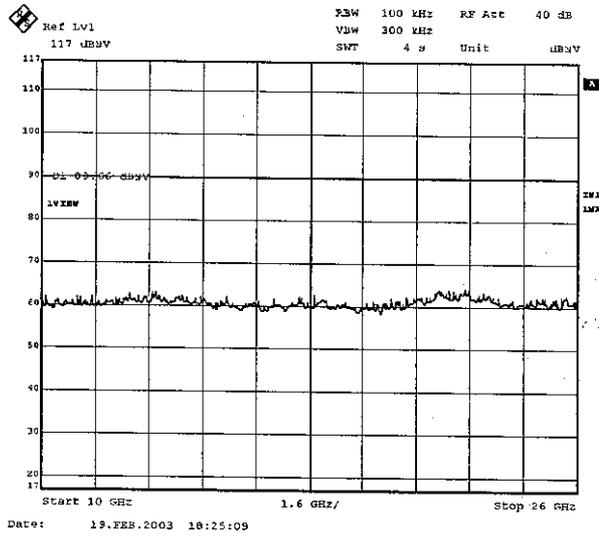


T. Imamura

4.



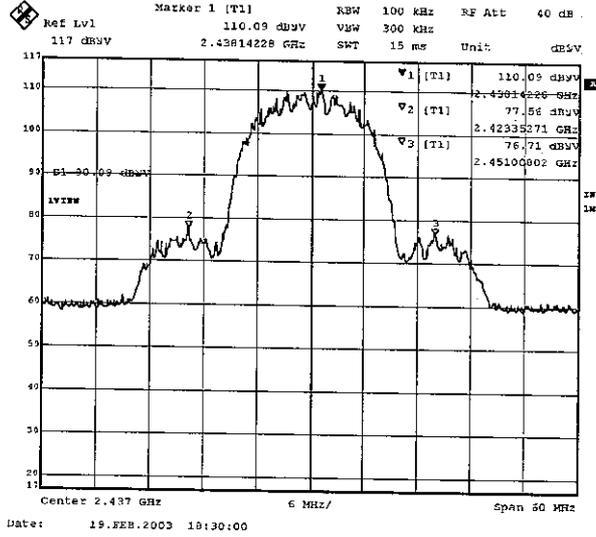
5.



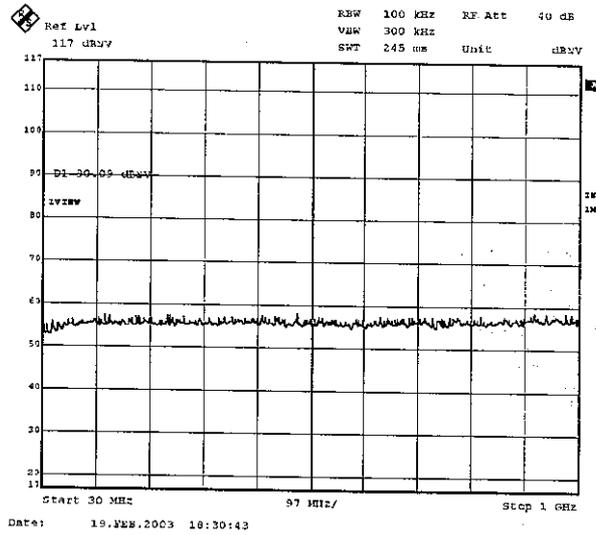
Ch 6: 2437MHz

1.

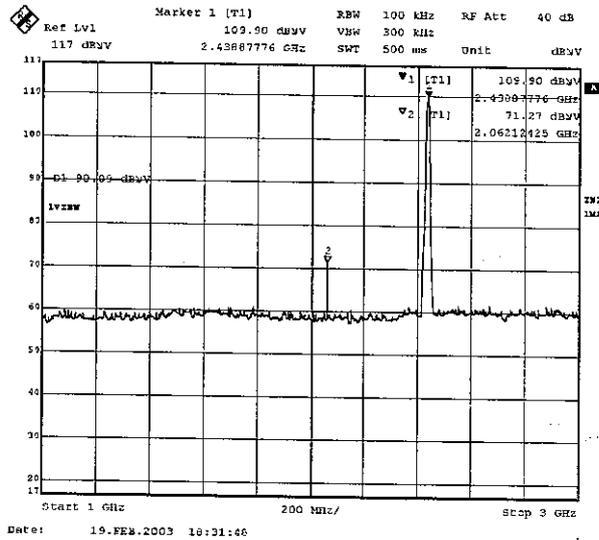
T. Amanna



2.

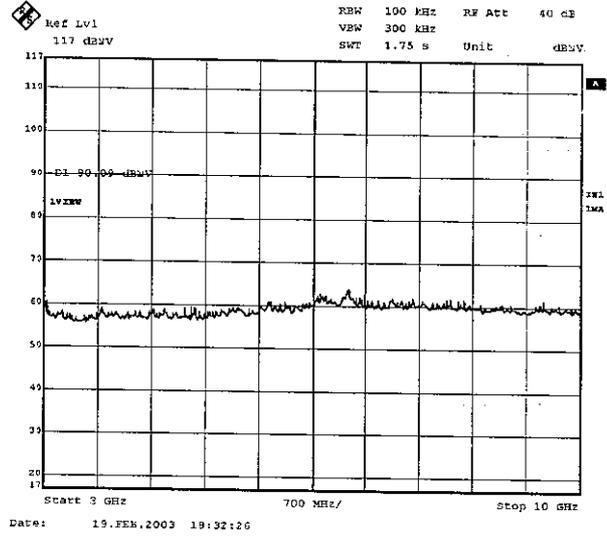


3.

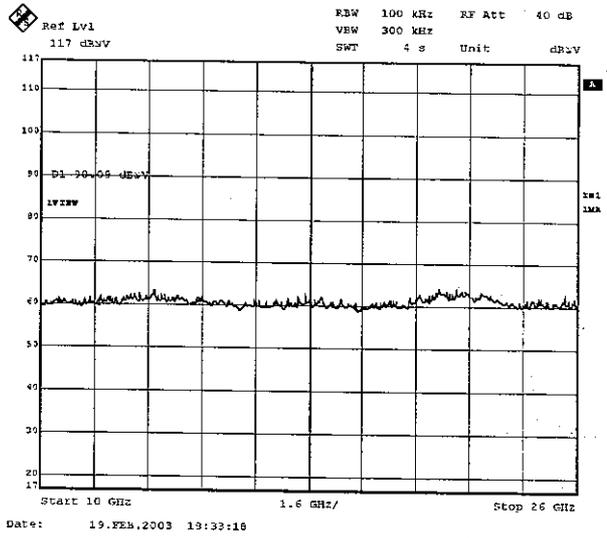


T. Imamura

4.



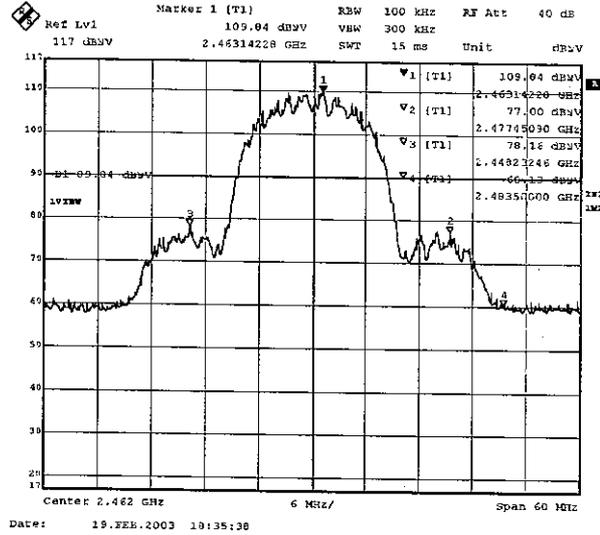
5.



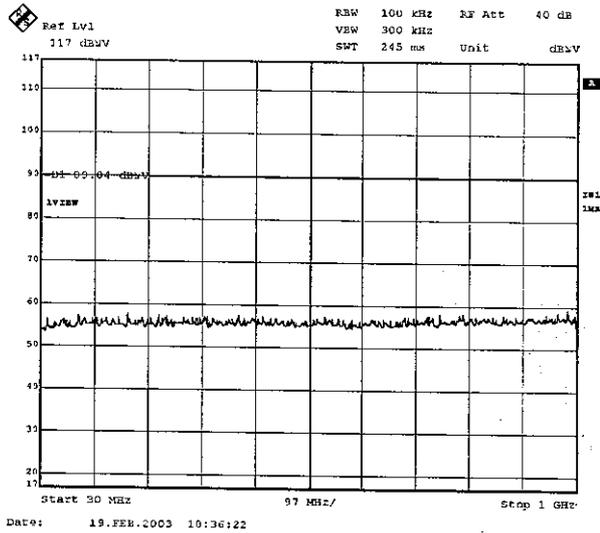
Ch 11: 2462MHz

1.

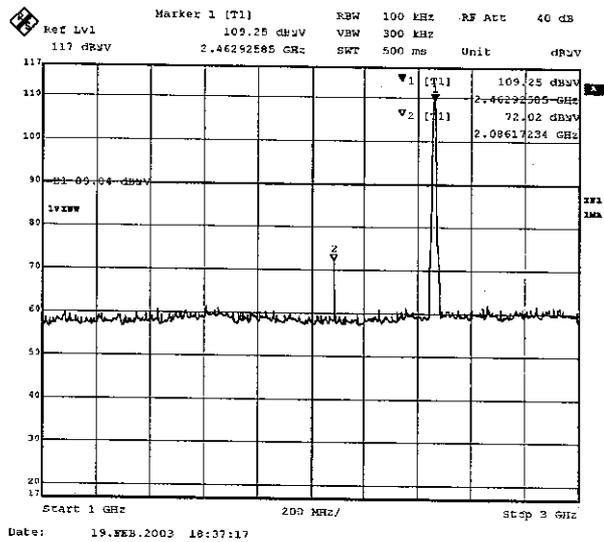
Y. Amanna



2.

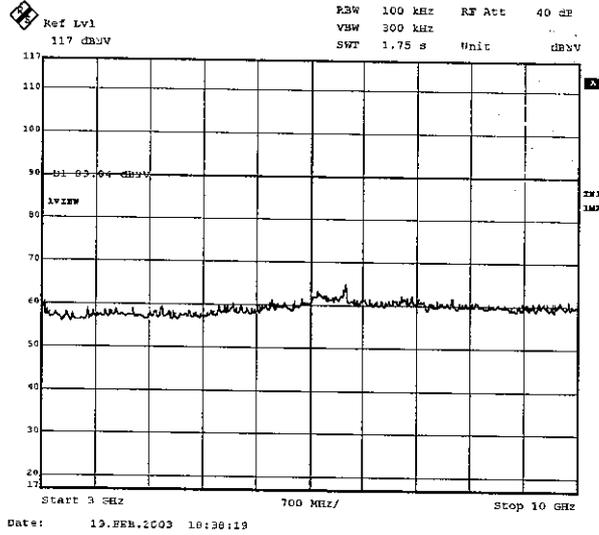


3.

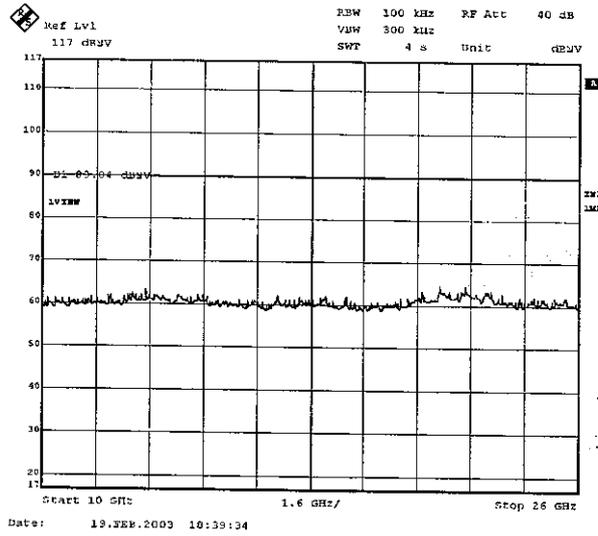


T. Imamura

4.



5.

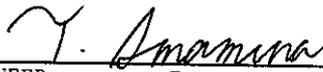


Power Density (Conducted)

A-PEX INTERNATIONAL CO., LTD.
YAMAKITA NO. 2 OPEN SITE

COMPANY : SONY Corporation.
EQUIPMENT : WIRELESS LAN CARD
MODEL : PEGAWL110
FCC ID : AK8PEGA-WL110
POWER : DC3.3V (PC:AC120V/60Hz)
Mode : Transmitting

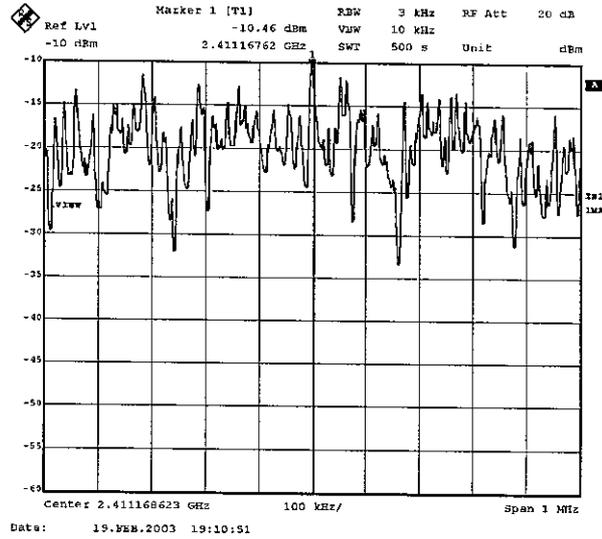
REPORT NO : 23GE0024-YK-1
REGULATION : Fcc Part15SubpartC 247 (d)
DATE : 2003/ 02/19
Temp. /Humi. : 22°C/35%


ENGINEER : Toyokazu Imamura

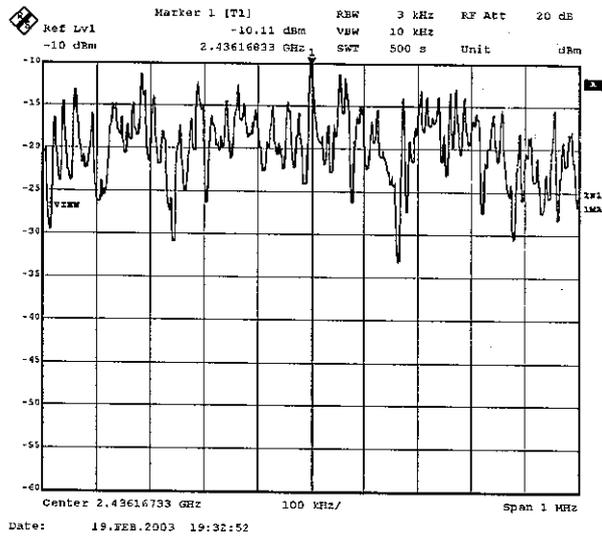
CH	FREQ [GHz]	S/A Reading [dBm]	Cable Loss [dB]	Results [dBm]	Limit [dBm]	MARGIN [dB]
Low	2.411167	-10.46	1.3	-9.16	8.0	17.2
Mid	2.436168	-10.11	1.3	-8.81	8.0	16.8
High	2.461166	-10.36	1.3	-9.06	8.0	17.1

T. Amamura

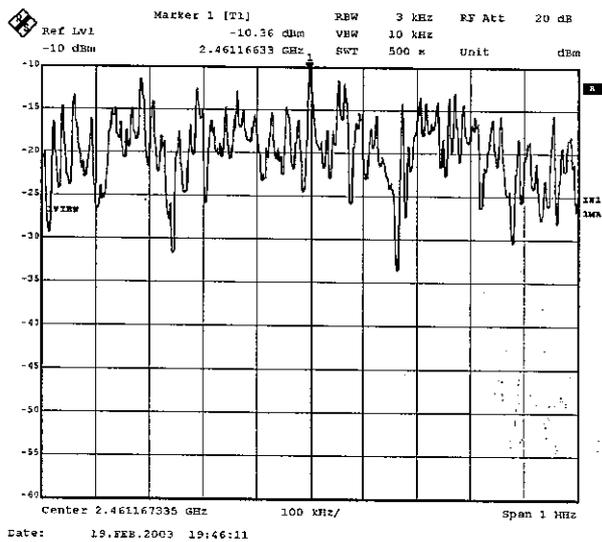
1. ch 1: 2412MHz



2. ch 6: 2437MHz



3. ch 11: 2462MHz



Test Report No :23GE0024-YK-1

APPENDIX 3 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
KAF-03	Pre Amplifier	Hewlett Packard	8447D	RE	2002/09/19 * 12
KAF-04	Pre Amplifier	Agilent	8449B	RE	2002/05/07 * 12
KAT10-S1	Attenuator	Agilent	8449D 010	RE	2002/04/16 * 12
KAT6-03	Attenuator	INMET	18N-6dB	RE	2002/06/20 * 12
KBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2002/08/25 * 12
KCC-20/21/22/2 3/29	Coaxial Cable	Fujikura/Suhner	8D-2W/12D-SF A/S04272B/S0 4272B	RE	2002/09/17 * 12
KCC-24/25/26/2 8/KPL-02	Coaxial Cable/Pulse Limiter	Fujikura/Suhner/PMM	5D-2W/5D-2W/ S04272B/S0427 2B/PL01	CE	2002/09/17 * 12
KCC-D3	Coaxial Cable	Rosenberger	2201	RE	2002/06/28 * 12
KFL-01	Highpass Filter	Hewlett Packard	84300 80038	RE	2002/05/02 * 12
KHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2002/08/17 * 12
KHA-04	Horn Antenna	EMCO	3160-09	RE	2002/04/27 * 12
KLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2002/08/17 * 12
KLS-05	LISN(AMN)	Schwarzbeck	NSLK8126	CE	2002/09/17 * 12
KOTS-02	Open Test Site	JSE	10m	RE	2002/08/20 * 12
KSA-02	Spectrum Analyzer	Advantest	R3265A	CE/RE	2002/11/29 * 12
KTR-01	Test Receiver	Rohde & Schwarz	ES140	CE/RE/AT	2002/07/22 * 12
KCC-D11/D12	Coaxial cable	Suhner/storm	SCOFLEX103/ 90-388-020	RE	2002/11/25 * 12
PM-02	Power Meter	Agilent	E4416A	AT	2002/03/22 * 12
PS-03	Power sensor	Agilent	E9327A	AT	2002/03/12 * 12

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

Test Item:

CE: Conducted emission test

RE: Radiated emission test

AT: Antenna terminal conducted test