

EMI TEST REPORT

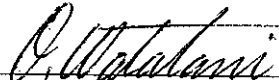
Test Report No. : 23HE0003-YK-2

Applicant : Sony Corporation
Type of Equipment : Notebook Personal Computer
Model No. : PCG-481L
FCC ID : AK8PCG481L
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: March 27 and 28, 2003

Tested by:  & 
Toyokazu Imamura Ichiro Isozaki

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

A-Pex International Co., Ltd.

YAMAKITA LAB.

907 Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken, 258-0124 JAPAN

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MF060b(23.04.02)

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1 GENERAL INFORMATION

Company Name : Sony Corporation
Address : 6-7-35 Kita-shinagawa, Shinagawa-ku, Tokyo, 141- 0001 JAPAN
Telephone Number : +81 3 5795 8033
Facsimile Number : +81 3 5795 8346
Contact Person : Genshi Yoshioka
Type of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Rating : AC100-240V, 50/60Hz
Country of Manufacture : Japan
Receipt Date of Sample : March 31, 2003
Condition of E.U.T. : Engineering prototype
Regulation(s) : FCC Part15 Subpart C, Section 15.247
Test Site : A-Pex Yamakita No.1 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 Sequence Spread Spectrum Systems".

1.2 Test Facility

This site has been fully described in a report submitted to FCC office, and accepted on September 20, 2002 (Registration No.: 95486).

NVLAP Lab. code : 200441-0

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2 PRODUCT DESCRIPTION

Model: PCG-481L, referred to as the EUT in this report, is a Notebook Personal Computer.
The EUT has a built-in Wireless LAN module.

Clock frequencies used in EUT : 900MHz, 133MHz, 66MHz, 48MHz, 33.3MHz, 65MHz, 25MHz, 24.5MHz, 14.3MHz, 12.3MHz and 10MHz

Frequency Characteristics	: 2412 - 2462MHz
Channel Characteristics	: 11 channel selectable by 5MHz spacing
Modulation	: DSSS [DBPSK (1M), DQPSK (2M), CCK (5.5M-11M)]
Antenna Type	: Internal $\lambda/4$ Monopole antenna
Antenna Gain	: -2.6dBi
ITU Emission Code(s)	: 26M0G2D
Power Supply	: DC 3.3V (± 0.1)
Operation Temperature range	: 5 – 35 deg. C.
Antenna Connector Type	: U.FL connector (Hirose)

***FCC Part15.31 (e)**

The host device PCG-481L provides the Wireless LAN module with stable power supply (DC3.3V), and the power is not changed when voltage of the personal computer is varied.
Therefore, the Notebook Personal Computer complies power supply regulation.

***FCC Part 15.203 Antenna requirement**

The standard type of antenna connector is applied: however, the Notebook Personal Computer complies this requirement since this radio equipment is for professional installation.

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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:

1. Transmitting 2412MHz (Low) mode
2. Transmitting 2437MHz (Middle) mode
3. Transmitting 2462MHz (High) mode

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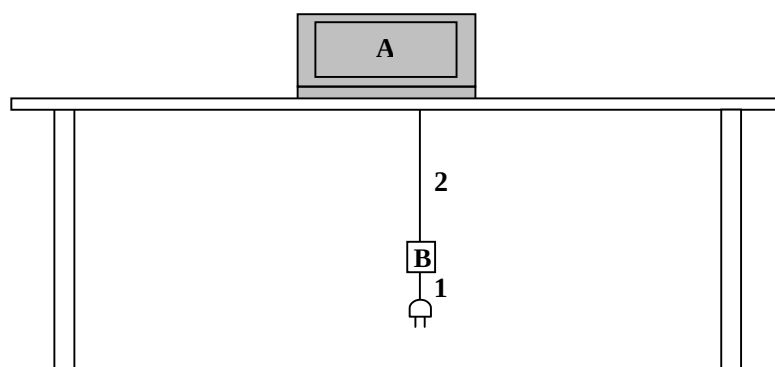
Telephone: +81 465 77 1011

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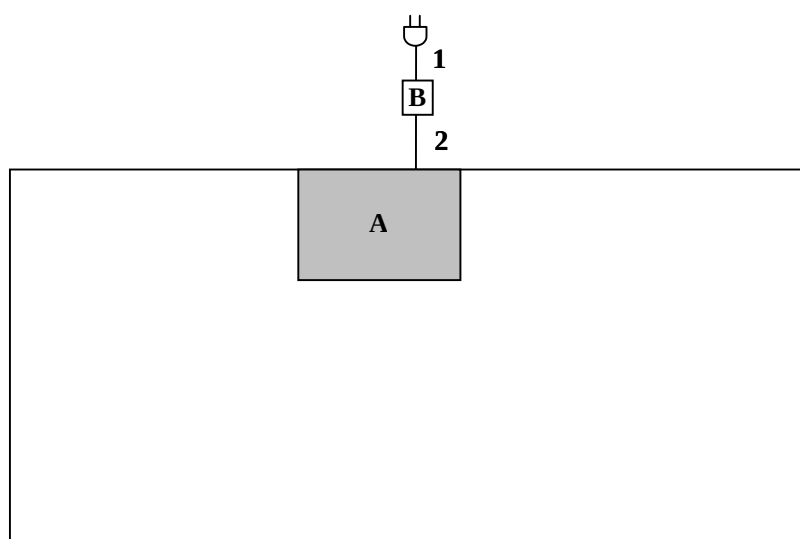
3.2 Configuration of Tested System

Front View



Top View

AC120V/60Hz



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

Description of EUT and Support equipment

No.	Item	Model No.	Serial No.	Manufacturer	Remark	FCC ID
A	Notebook Personal Computer	PCG-481L	JA003	SONY	EUT	AK8PCG481L
B	AC Adaptor	PCGA-16V6	0302GA	SONY	-	

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	AC Power Cable	0.8	Unshielded	Polyvinyl chloride
2	DC Cable	2.0	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 $\pm 1.3\text{dB}$.

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 $\pm 4.8\text{dB}$.

The measurement uncertainty (with 95% confidence level) for this test using Logperiodic antenna is $\pm 5.2\text{dB}$.

The measurement uncertainty (with 95% confidence level) for this test using Horn antenna is $\pm 6.6\text{dB}$.

The data listed in this test report has enough margin, more than site 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 1.5m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals 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.

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 9kHz).

(Measurement range : 150kHz to 30MHz)

Test data : APPENDIX Page 13 to 17
Photographs of test setup: Page 11
Test result : Pass
Test instruments : KCC-14/15/16/18/KPL-01, KLS-01, KSA-01, KTR-02

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 18
Test result : Pass
Test instruments : KTR-01, KCC-D4

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 19
Test result : Pass
Test instruments : KPM-05, KAT10-S1, 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.

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

Test data : APPENDIX 2 Page 20 to 22 (30 - 1000MHz)
: APPENDIX 2 Page 23 to 28 (1 - 26GHz)
: APPENDIX 2 Page 29 to 32
(Band Edges: 2390MHz/ 2483.5MHz, Restricted band Charts)

Photographs of test setup: Page 12

Test result : Pass

Test instruments : KAF-01, KAF-02, KAT10-S1, KAT6-01, KBA-01, KTR-01, KTR-02, KFL-01
KCC-10/11/12/13/18, KCC-D3, KHA-01, KHA-03, KLA-01, KOTS-01, KSA-01
(Refer to APPENDIX 3)

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 33 to 38
Test result : Pass
Test instruments : KTR-01, KCC-D4

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 39 to 40
Test result : Pass
Test instruments : KTR-01, KCC-D4

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APPENDIX 1: Photographs of test setup

- 1. Page 11 : Conducted emission
- 2. Page 12 : Radiated emission

APPENDIX 2: Test Data

- 1. Page 13 – 17 : Conducted emission
- 2. Page 18 : 6dB Bandwidth (Antenna Port Conducted)
- 3. Page 19 : Maximum Peak Power (Antenna Port Conducted)
- 4. Page 20 – 32 : Out Band of Emissions (Radiated)
- 5. Page 33 – 38 : Out Band of Emissions (Antenna Port Conducted)
- 6. Page 39 – 40 : Power Density (Antenna Port Conducted)

APPENDIX 3: Test instruments

- Page 41 : Test instruments

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Conducted emission



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Radiated emission



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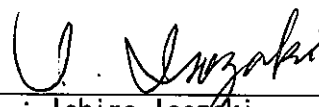
DATA OF CONDUCTION TEST

A-PEX INTERNATIONAL CO., LTD.

Yamakita No.1 Shielded Room

Report No. : 23HE0003-YK - 2

Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : Tx Lowch (W-LAN)
Remarks : -
Date : 3/27/2003
Phase : Single Phase
Temperature : 24 °C
Humidity : 49 %
Regulation : FCC Part15C § 15.207. (CISPR Pub. 22)


Engineer : Ichiro Isozaki

No.	FREQ. [MHz]	READING (N)		READING (L1)		LISN FACTOR [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]				QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]
1.	0.1500	55.3	40.0	57.4	40.9	0.0	0.1	0.0	57.5	41.0	66.0	56.0	8.5	15.0
2.	0.2918	44.1	-	43.9	-	0.0	0.1	0.0	44.2	-	60.5	50.5	16.3	-
3.	0.4364	37.6	-	36.8	-	0.0	0.2	0.0	37.8	-	57.1	47.1	19.3	-
4.	4.3572	32.9	-	33.4	-	0.2	0.6	0.0	34.2	-	56.0	46.0	21.8	-
5.	5.8408	30.2	-	32.9	-	0.2	0.7	0.0	33.8	-	60.0	50.0	26.2	-
6.	16.5893	26.2	-	26.9	-	0.8	1.5	0.0	29.2	-	60.0	50.0	30.8	-

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

■ LISN : KLS-01 (NSLK8126) ■ COAXIAL CABLE : KCC-14/15/16/18
■ PULSE LIMITER : KPL-01 (PL01) ■ EMI RECEIVER : KTR-02 (ESCS30)

DATA OF CONDUCTION TEST

A-PEX INTERNATIONAL CO., LTD.

Yamakita No.1 Shielded Room

Report No. : 23HE0003-YK - 2

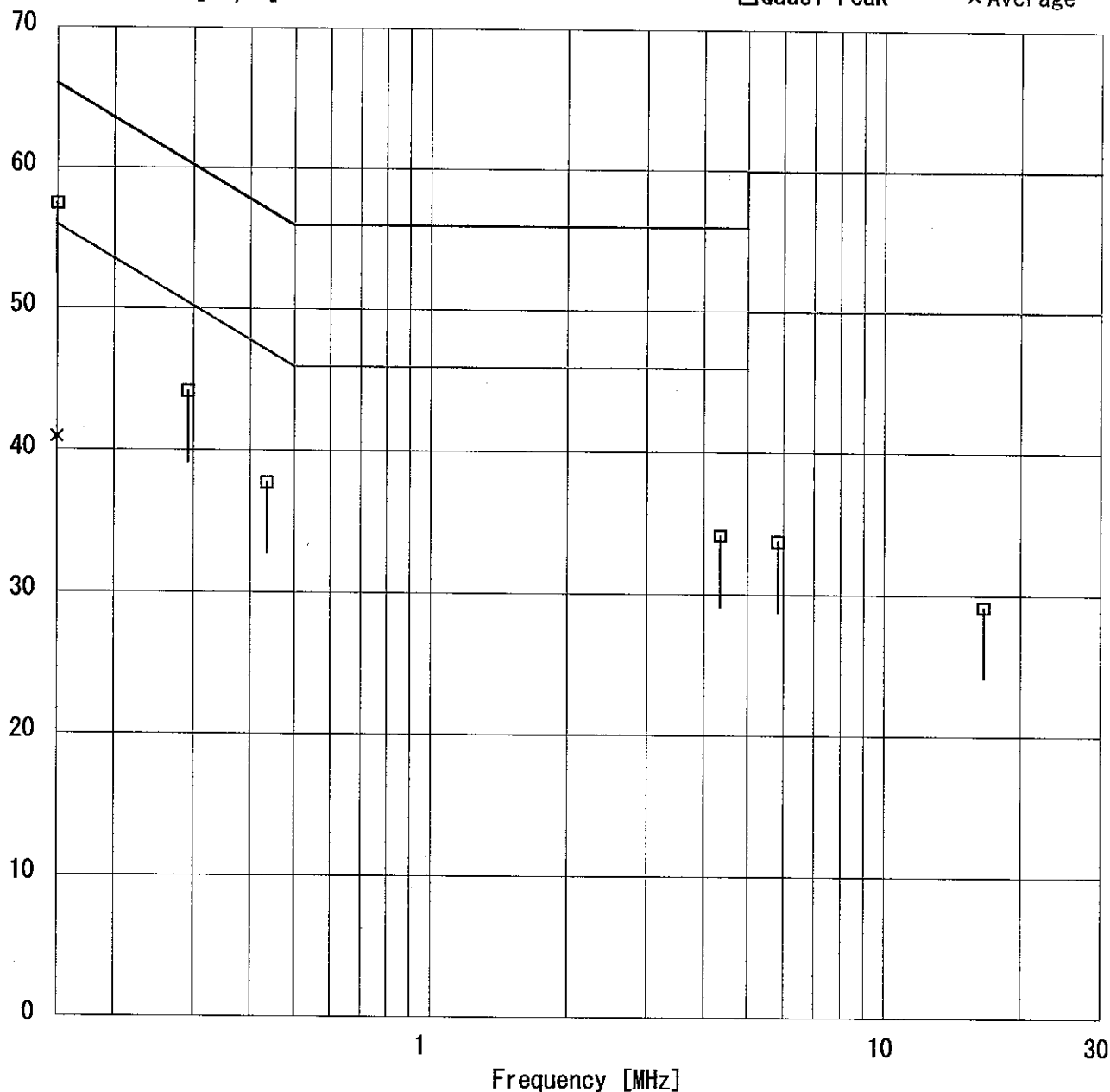
Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : Tx Lowch (W-LAN)
Remarks : -
Date : 3/27/2003
Phase : Single Phase
Temperature : 24 °C
Humidity : 49 %
Regulation : FCC Part15C § 15.207. (CISPR Pub. 22)

Engineer : Ichiro Isozaki

Emission Level [dB μ V]

□ Quasi-Peak

× Average



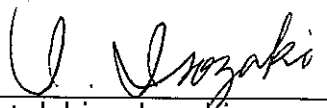
DATA OF CONDUCTION TEST CHART

A-PEX INTERNATIONAL CO., LTD.

Yamakita No.1 Shielded Room

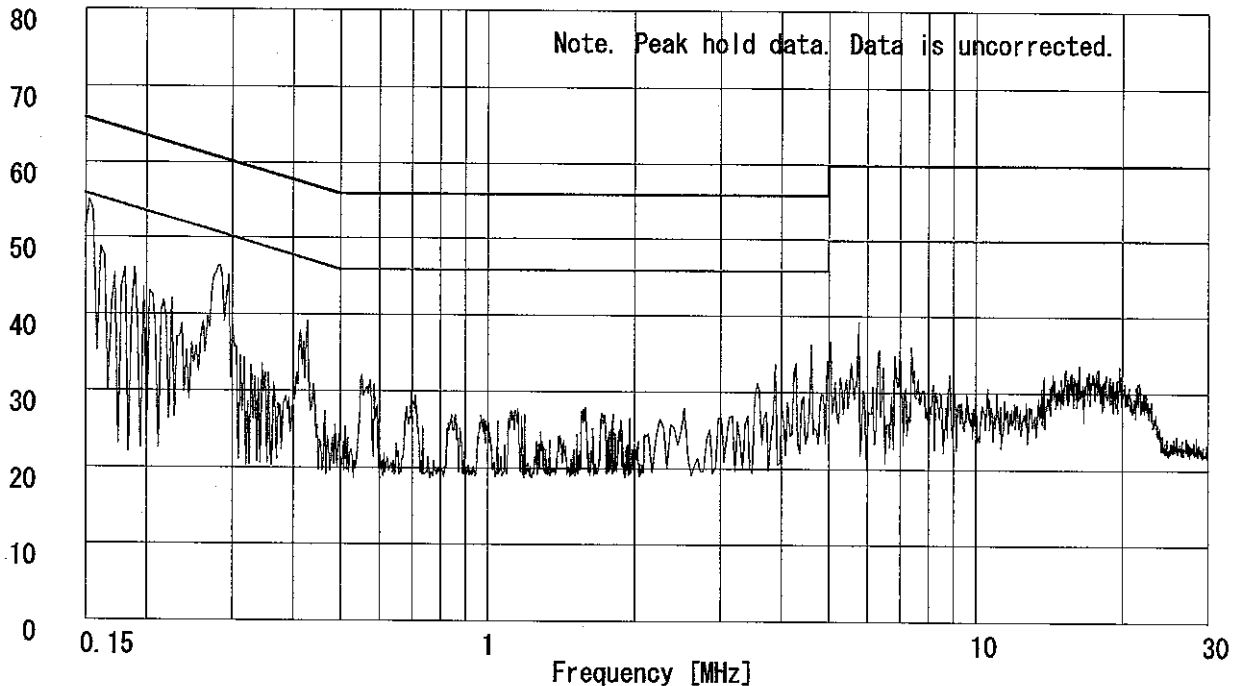
Report No.: 23HE0003-YK ∞ 2

Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : Tx Lowch (W-LAN)
Remarks : -
Date : 3/27/2003
Phase : Single Phase
Temperature : 24 °C
Humidity : 49 %
Regulation 1 : FCC Part15C § 15.207. (CISPR Pub. 22)
Regulation 2 : None


Engineer : Ichiro Isozaki

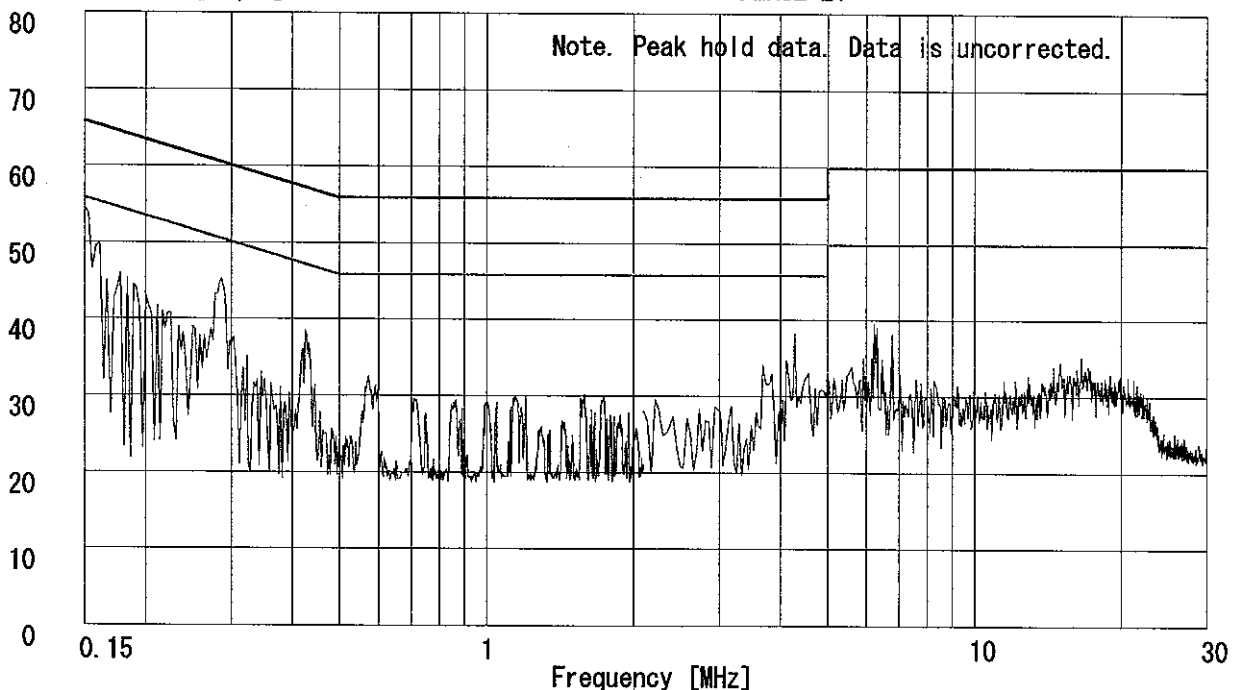
Emission Level [dB μ V]

PHASE:N



Emission Level [dB μ V]

PHASE:L1



DATA OF CONDUCTION TEST CHART

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Yamakita No.1 Shielded Room

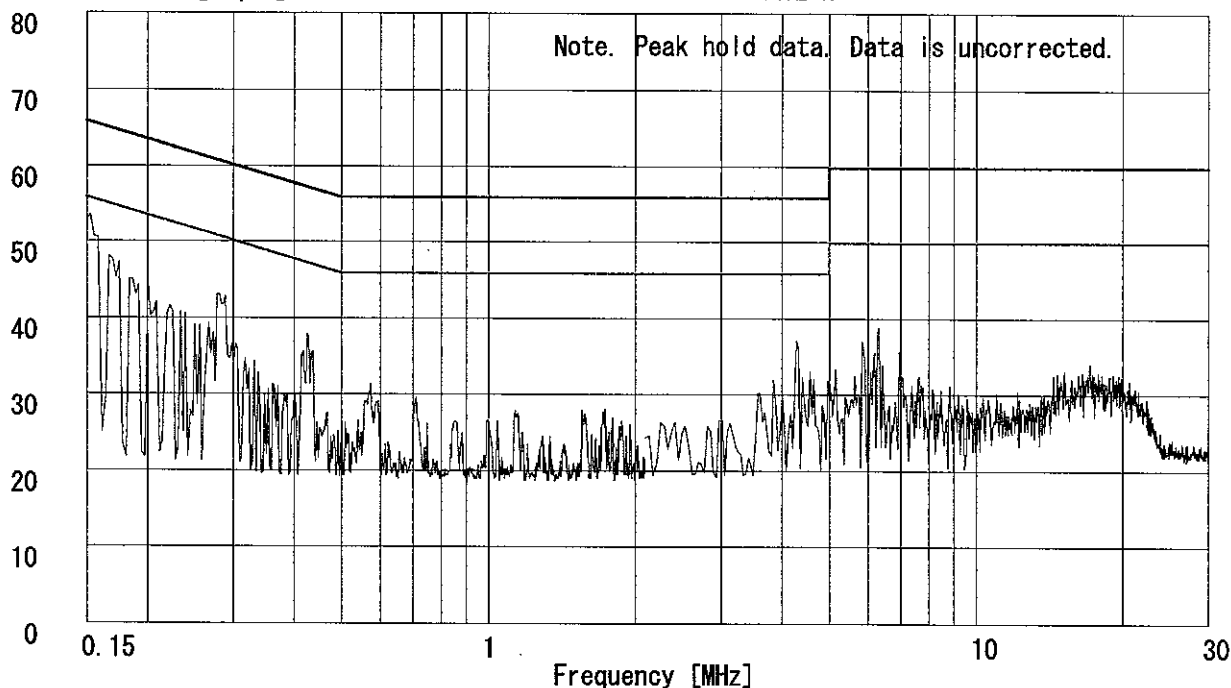
Report No. : 23HE0003-YK **2**

Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : TX Midch (W-LAN)
Remarks : -
Date : 3/27/2003
Phase : Single Phase
Temperature : 24 °C
Humidity : 49 %
Regulation 1 : FCC Part15C § 15.207. (CISPR Pub. 22)
Regulation 2 : None

U. Isozaki
Engineer : Ichiro Isozaki

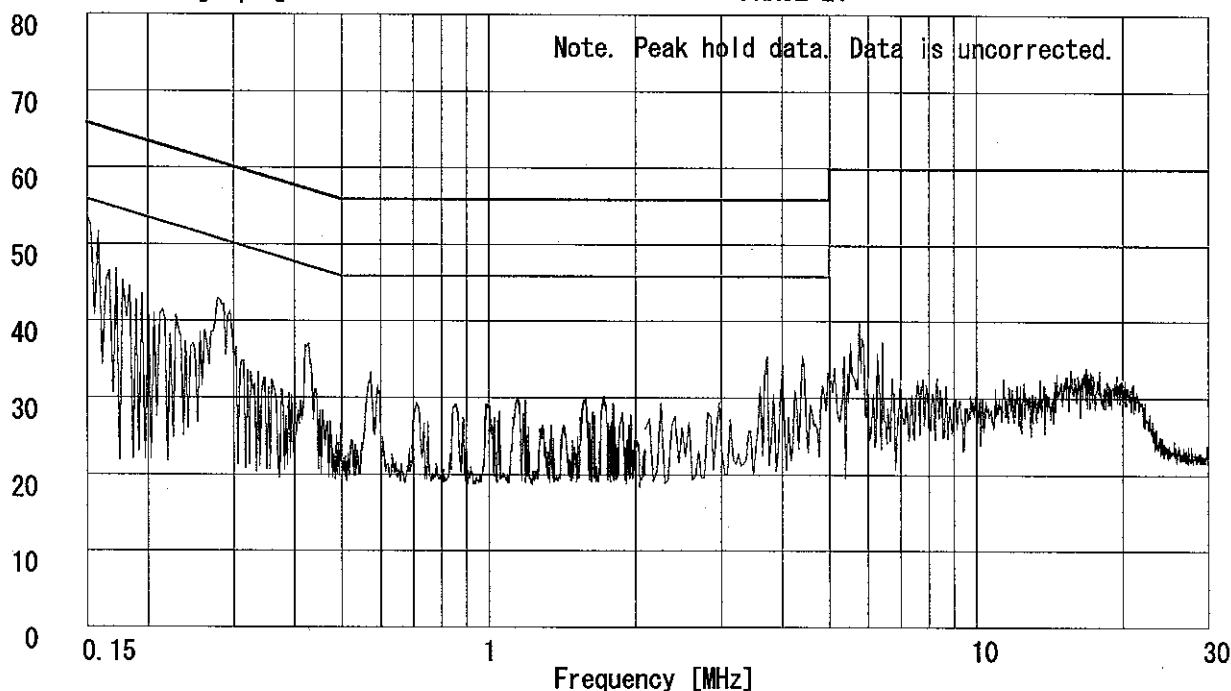
Emission Level [dB μ V]

PHASE:N



Emission Level [dB μ V]

PHASE:L1



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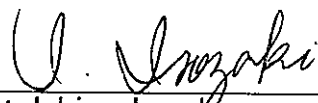
DATA OF CONDUCTION TEST CHART

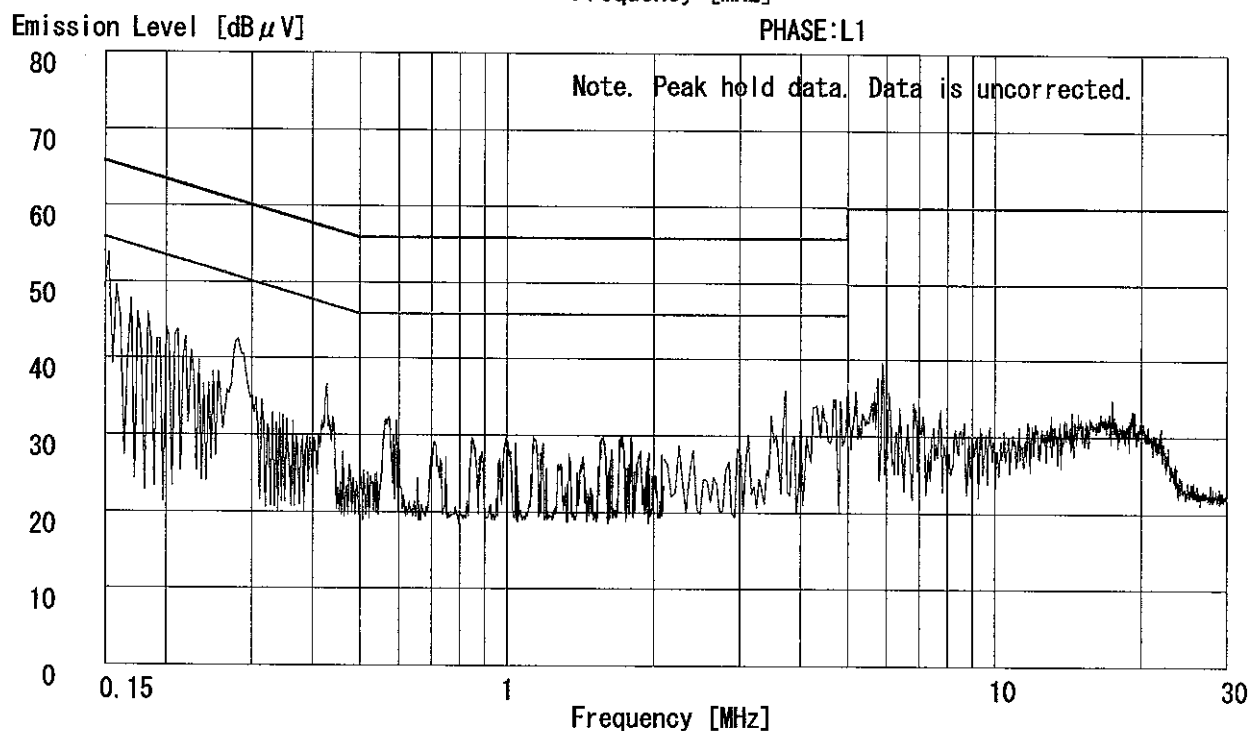
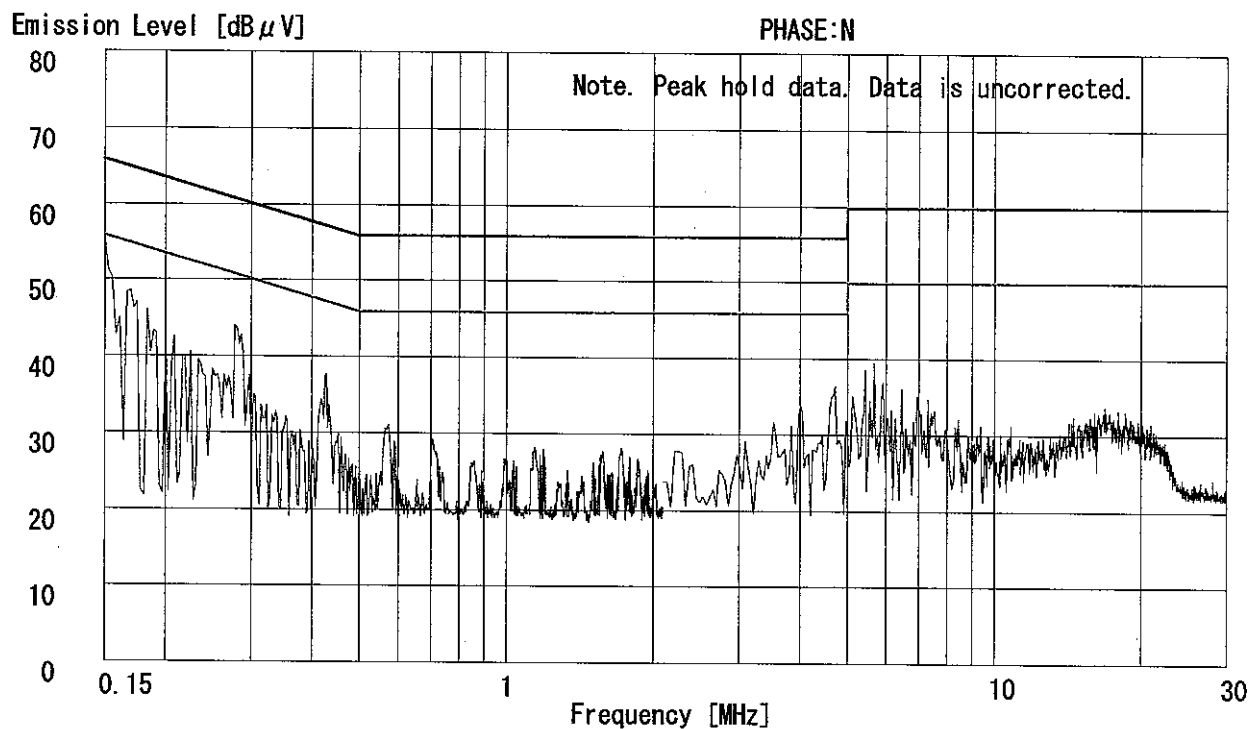
A-PEX INTERNATIONAL CO., LTD.

Yamakita No.1 Shielded Room

Report No. : 23HE0003-YK ^{REV} 2

Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : Tx High (W-LAN)
Remarks : -
Date : 3/27/2003
Phase : Single Phase
Temperature : 24 °C
Humidity : 49 %
Regulation 1 : FCC Part15C § 15.207. (CISPR Pub. 22)
Regulation 2 : None

Engineer :  Ichiro Isozaki

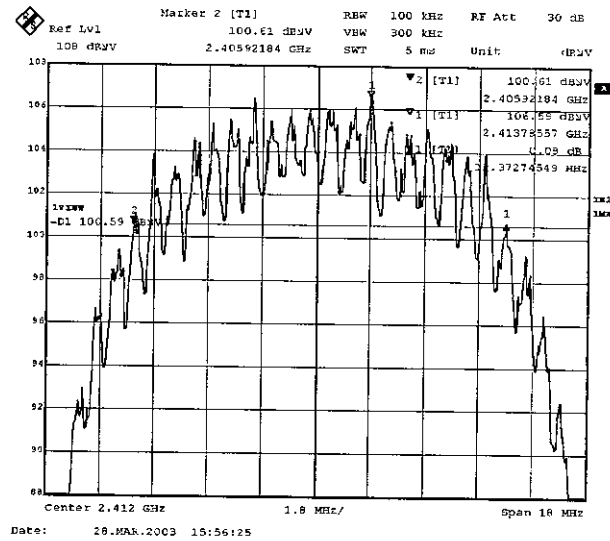


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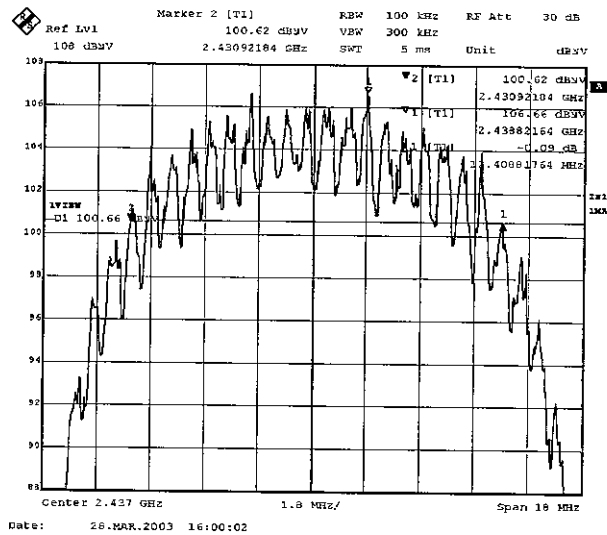
17 of 41

T. Amamura

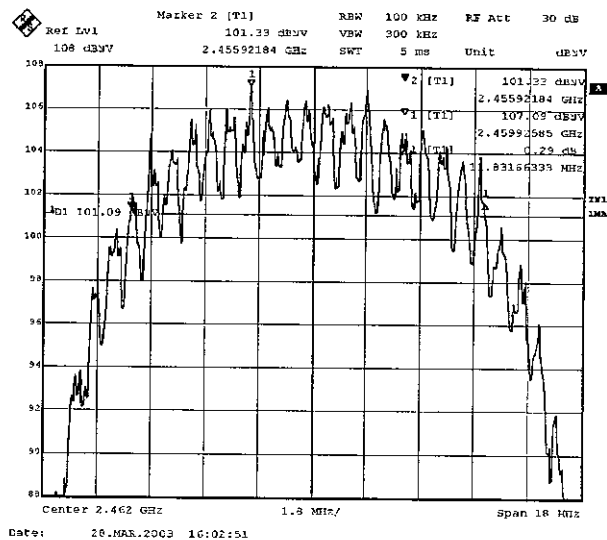
1. Ch Low:2412MHz



2. Ch Mid:2437MHz



3. Ch High:2462MHz



Peak Out Put Power (Conducted)

A-PEX INTERNATIONAL CO., LTD.
YAMAKITA NO. 1 OPEN SITE

COMPANY : SONY Corporation.
EQUIPMENT : Notebook Personal Computer
MODEL : PCG-481L
FCC ID : AK8PCG481L
POWER : AC120V/60Hz
Mode : Transmitting

REPORT NO : 23HE0003-YK-2
REGULATION : Fcc Part15SubpartC 247 (d)
DATE : 2003/ 03/28
Temp./Humi. : 24°C/36%


ENGINEER : Toyokazu Imamura

CH	FREQ [GHz]	PM Reading [dBm]	Cable Loss [dB]	Results [dBm]	Limit (1W) [dBm]	MARGIN [dB]
Low	2412.00	15.00	0.45	15.45	30.0	14.55
Mid	2437.00	15.00	0.45	15.45	30.0	14.55
High	2462.00	15.50	0.45	15.95	30.0	14.05

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.

Yamakita No.1 Open Test Site

Report No. : 23HE0003-YK-2

Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : Tx Lowch (W-LAN)
Remarks : -
Date : 3/27/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 37 %
Regulation : FCC Part15C § 15.209


Engineer : Ichiro Isezaki

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 [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	544.10	BB	30.4	31.8	18.7	29.3	6.5	6.1	32.4	33.8	46.0	13.6	12.2
2.	572.74	BB	31.4	32.5	19.0	29.2	6.8	6.1	34.1	35.2	46.0	11.9	10.8
3.	601.37	BB	29.4	33.5	19.4	29.6	7.0	6.1	32.3	36.4	46.0	13.7	9.6
4.	630.01	BB	30.5	34.8	19.7	29.3	7.1	6.1	34.1	38.4	46.0	11.9	7.6
5.	701.60	BB	29.5	34.6	20.3	29.4	7.6	6.1	34.1	39.2	46.0	11.9	6.8
6.	730.24	BB	29.3	34.0	20.7	29.0	7.8	6.1	34.9	39.6	46.0	11.1	6.4

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

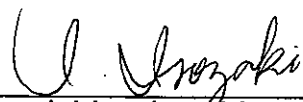
■ ANTENNA: KBA-01 (BBA9106) 30-299MHz/KLA-01 (USLP9143) 300-1000MHz

■ AMP: KAF-01 (8447D) ■ EMI RECEIVER: KTR-02 (ESCS30) ■ CABLE: KCC-10/11/12/13/18

DATA OF RADIATION TEST

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Yamakita No.1 Open Test Site
Report No. : 23HE0003-YK **2**

Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : TX Midch (W-LAN)
Remarks : -
Date : 3/27/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 37 %
Regulation : FCC Part15C § 15.209


Engineer : Ichiro Isozaki

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 [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	544.11	BB	30.4	32.5	18.7	29.3	6.5	6.1	32.4	34.5	46.0	13.6	11.5
2.	572.74	BB	31.2	32.0	19.0	29.2	6.8	6.1	33.9	34.7	46.0	12.1	11.3
3.	601.37	BB	29.2	33.6	19.4	29.6	7.0	6.1	32.1	36.5	46.0	13.9	9.5
4.	630.01	BB	30.0	35.0	19.7	29.3	7.1	6.1	33.6	38.6	46.0	12.4	7.4
5.	701.60	BB	29.6	35.0	20.3	29.4	7.6	6.1	34.2	39.6	46.0	11.8	6.4
6.	730.24	BB	29.0	34.1	20.7	29.0	7.8	6.1	34.6	39.7	46.0	11.4	6.3

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

■ ANTENNA: KBA-01 (BBA9106) 30-299MHz/KLA-01 (USLP9143) 300-1000MHz

■ AMP: KAF-01 (8447D) ■ EMI RECEIVER: KTR-02 (ESCS30) ■ CABLE: KCC-10/11/12/13/18

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.

Yamakita No.1 Open Test Site

Report No. : 23HE0003-YK-2

Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : Tx High (W-LAN)
Remarks : -
Date : 3/27/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 37 %
Regulation : FCC Part15C § 15.209

Engineer : Ichiro Isozaki

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.	544.10	BB	30.5	32.0	18.7	29.3	6.5	6.1	32.5	34.0	46.0	13.5	12.0
2.	572.74	BB	31.3	32.7	19.0	29.2	6.8	6.1	34.0	35.4	46.0	12.0	10.6
3.	601.37	BB	29.3	33.9	19.4	29.6	7.0	6.1	32.2	36.8	46.0	13.8	9.2
4.	630.01	BB	30.2	35.2	19.7	29.3	7.1	6.1	33.8	38.8	46.0	12.2	7.2
5.	701.60	BB	28.8	36.3	20.3	29.4	7.6	6.1	33.4	40.9	46.0	12.6	5.1
6.	730.24	BB	28.7	34.2	20.7	29.0	7.8	6.1	34.3	39.8	46.0	11.7	6.2

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

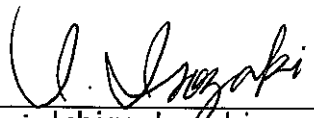
■ ANTENNA: KBA-01 (BBA9106) 30-299MHz/KLA-01 (USLP9143) 300-1000MHz

■ AMP: KAF-01 (8447D) ■ EMI RECEIVER: KTR-02 (ESCS30) ■ CABLE: KCC-10/11/12/13/18

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.1 Open Test Site
Report No. : 23HE0003-YK-2

Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : Tx Lowch (W-LAN)
Remarks : -
Date : 3/27/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 37 %
Regulation : FCC Part15C § 15.209 (PK Detection)


Engineer : Ichiro Isozaki

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 [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	1053.11	BB	55.1	55.3	24.4	38.3	1.7	10.0	52.9	53.1	74.0	21.1	20.9
2.	1134.26	BB	56.1	60.7	24.8	38.1	1.7	10.0	54.5	59.1	74.0	19.5	14.9
3.	2390.00	BB	50.3	49.2	30.6	36.7	2.4	10.0	56.6	55.5	74.0	17.4	18.5
4.	4824.00	BB	45.4	45.2	34.7	37.0	3.5	1.0	47.6	47.4	74.0	26.4	26.6
5.	7236.00	BB	41.3	40.1	37.7	37.0	4.2	0.5	46.7	45.5	74.0	27.3	28.5
6.	9648.00	BB	40.1	40.5	39.0	37.0	5.2	1.0	48.3	48.7	74.0	25.7	25.3
7.	12060.00	BB	40.7	39.8	42.1	36.1	5.6	0.5	52.8	51.9	74.0	21.2	22.1
8.	14472.00	BB	39.4	39.3	41.2	35.2	6.4	0.9	52.7	52.6	74.0	21.3	21.4
9.	16884.00	BB	39.1	38.6	41.6	34.9	6.5	1.3	53.6	53.1	74.0	20.4	20.9
10.	19296.00	BB	37.3	38.3	41.3	34.9	7.2	0.0	50.9	51.9	74.0	23.1	22.1
11.	21708.00	BB	39.4	38.8	41.3	35.0	7.4	0.0	53.1	52.5	74.0	20.9	21.5
12.	24120.00	BB	38.9	37.8	40.6	34.6	8.1	0.0	53.0	51.9	74.0	21.0	22.1

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

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz + KHA-03 (3160-09) 18-26.5GHz
■ AMP: KAF-02 (8449B) ■ EMI RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-D3

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.1 Open Test Site
Report No. : 23HE0003-YK- 2

Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : Tx Lowch (W-LAN)
Remarks : -
Date : 3/27/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 37 %
Regulation : FCC Part15C § 15.209 (AV Detection)


Engineer : Ichiro Isozaki

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.	1053.11	BB	38.7	38.1	24.4	38.3	1.7	10.0	36.5	35.9	54.0	17.5	18.1
2.	1134.26	BB	37.0	38.4	24.8	38.1	1.7	10.0	35.4	36.8	54.0	18.6	17.2
3.	2390.00	BB	39.0	37.8	30.6	36.7	2.4	10.0	45.3	44.1	54.0	8.7	9.9
4.	4824.00	BB	36.3	34.8	34.7	37.0	3.5	1.0	38.5	37.0	54.0	15.5	17.0
5.	7236.00	BB	29.7	29.7	37.7	37.0	4.2	0.5	35.1	35.1	54.0	18.9	18.9
6.	9648.00	BB	28.7	28.6	39.0	37.0	5.2	1.0	36.9	36.8	54.0	17.1	17.2
7.	12060.00	BB	28.7	28.7	42.1	36.1	5.6	0.5	40.8	40.8	54.0	13.2	13.2
8.	14472.00	BB	28.0	28.0	41.2	35.2	6.4	0.9	41.3	41.3	54.0	12.7	12.7
9.	16884.00	BB	28.1	28.1	41.6	34.9	6.5	1.3	42.6	42.6	54.0	11.4	11.4
10.	19296.00	BB	26.7	26.7	41.3	34.9	7.2	0.0	40.3	40.3	54.0	13.7	13.7
11.	21708.00	BB	28.1	28.1	41.3	35.0	7.4	0.0	41.8	41.8	54.0	12.2	12.2
12.	24120.00	BB	27.0	27.0	40.6	34.6	8.1	0.0	41.1	41.1	54.0	12.9	12.9

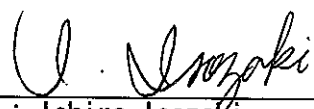
CALCULATION: READING[dB μ V] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB].

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz + KHA-03 (3160-09) 18-26.5GHz
■ AMP: KAF-02 (8449B) ■ EMI RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-D3

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.1 Open Test Site
Report No. : 23HE0003-YK-2

Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : TX Midch (W-LAN)
Remarks : -
Date : 3/27/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 37 %
Regulation : FCC Part15C § 15. 209 (PK Detection)


Engineer : Ichiro Isozaki

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.	1053.11	BB	54.8	55.3	24.4	38.3	1.7	10.0	52.6	53.1	74.0	21.4	20.9
2.	1134.26	BB	56.1	60.5	24.8	38.1	1.7	10.0	54.5	58.9	74.0	19.5	15.1
3.	4874.00	BB	43.9	44.6	35.0	36.9	3.5	1.0	46.5	47.2	74.0	27.5	26.8
4.	7311.00	BB	41.9	41.0	37.8	36.9	4.2	0.5	47.5	46.6	74.0	26.5	27.4
5.	9748.00	BB	40.1	39.5	39.0	37.0	5.3	1.0	48.4	47.8	74.0	25.6	26.2
6.	12185.00	BB	39.4	39.6	42.3	35.9	5.6	0.5	51.9	52.1	74.0	22.1	21.9
7.	14622.00	BB	38.4	38.6	41.7	35.3	6.4	0.9	52.1	52.3	74.0	21.9	21.7
8.	17059.00	BB	39.5	39.6	41.7	34.8	6.5	1.3	54.2	54.3	74.0	19.8	19.7
9.	19496.00	BB	37.3	37.2	41.2	34.9	7.2	0.0	50.8	50.7	74.0	23.2	23.3
10.	21933.00	BB	40.2	40.9	41.3	35.2	7.1	0.0	53.4	54.1	74.0	20.6	19.9
11.	24370.00	BB	37.8	38.0	40.8	34.7	8.1	0.0	52.0	52.2	74.0	22.0	21.8

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

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz+KHA-03 (3160-09) 18-26.5GHz
■ AMP: KAF-02 (8449B) ■ EMI RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-D3

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.1 Open Test Site
Report No. : 23HE0003-YK-2

Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : TX Midch (W-LAN)
Remarks : -
Date : 3/27/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 37 %
Regulation : FCC Part15C § 15.209 (AV Detection)


Engineer : Ichiro Isozaki

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 [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	1053.11	BB	37.7	37.9	24.4	38.3	1.7	10.0	35.5	35.7	54.0	18.5	18.3
2.	1134.26	BB	37.1	38.1	24.8	38.1	1.7	10.0	35.5	36.5	54.0	18.5	17.5
3.	4874.00	BB	34.9	34.6	35.0	36.9	3.5	1.0	37.5	37.2	54.0	16.5	16.8
4.	7311.00	BB	29.6	29.5	37.8	36.9	4.2	0.5	35.2	35.1	54.0	18.8	18.9
5.	9748.00	BB	28.6	28.5	39.0	37.0	5.3	1.0	36.9	36.8	54.0	17.1	17.2
6.	12185.00	BB	28.6	28.5	42.3	35.9	5.6	0.5	41.1	41.0	54.0	12.9	13.0
7.	14622.00	BB	27.9	27.8	41.7	35.3	6.4	0.9	41.6	41.5	54.0	12.4	12.5
8.	17059.00	BB	27.8	27.7	41.7	34.8	6.5	1.3	42.5	42.4	54.0	11.5	11.6
9.	19496.00	BB	26.6	26.6	41.2	34.9	7.2	0.0	40.1	40.1	54.0	13.9	13.9
10.	21933.00	BB	29.0	29.0	41.3	35.2	7.1	0.0	42.2	42.2	54.0	11.8	11.8
11.	24370.00	BB	27.3	27.3	40.8	34.7	8.1	0.0	41.5	41.5	54.0	12.5	12.5

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

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz + KHA-03 (3160-09) 18-26.5GHz
■ AMP: KAF-02 (8449B) ■ EMI RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-D3

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.1 Open Test Site
Report No. : 23HE0003-YK **2**

Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : Tx High (W-LAN)
Remarks : -
Date : 3/27/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 37 %
Regulation : FCC Part15C § 15.209(PK Detection)


Engineer : Ichiro Isozaki

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 [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	1053.11	BB	55.2	55.4	24.4	38.3	1.7	10.0	53.0	53.2	74.0	21.0	20.8
2.	1134.26	BB	56.7	60.9	24.8	38.1	1.7	10.0	55.1	59.3	74.0	18.9	14.7
3.	2483.50	BB	50.8	46.9	30.6	36.7	2.4	10.0	57.1	53.2	74.0	16.9	20.8
4.	4924.00	BB	45.2	45.4	35.3	36.9	3.5	1.0	48.1	48.3	74.0	25.9	25.7
5.	7386.00	BB	41.1	41.0	37.9	36.9	4.3	0.5	46.9	46.8	74.0	27.1	27.2
6.	9848.00	BB	40.1	39.8	39.0	36.9	5.3	1.0	48.5	48.2	74.0	25.5	25.8
7.	12310.00	BB	40.1	39.1	42.5	35.7	5.7	0.5	53.1	52.1	74.0	20.9	21.9
8.	14772.00	BB	39.3	39.9	42.2	35.4	6.5	0.9	53.5	54.1	74.0	20.5	19.9
9.	17234.00	BB	38.5	38.1	42.3	34.9	6.6	1.1	53.6	53.2	74.0	20.4	20.8
10.	19696.00	BB	38.5	38.8	41.0	35.1	7.4	0.0	51.8	52.1	74.0	22.2	21.9
11.	22158.00	BB	39.3	39.5	41.6	35.2	7.1	0.0	52.8	53.0	74.0	21.2	21.0
12.	24620.00	BB	42.7	42.4	40.9	34.5	8.2	0.0	57.3	57.0	74.0	16.7	17.0

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

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz + KHA-03 (3160-09) 18-26.5GHz
■ AMP: KAF-02 (8449B) ■ EMI RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-D3

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.

Yamakita No.1 Open Test Site

Report No. : 23HE0003-YK-2

Applicant : Sony Corporation
Kind of Equipment : Notebook Personal Computer
Model No. : PCG-481L
Serial No. : JA003
Power : AC120V/60Hz
Mode : Tx High (W-LAN)
Remarks : -
Date : 3/27/2003
Test Distance : 3 m
Temperature : 24 °C
Humidity : 37 %
Regulation : FCC Part15C § 15.209 (AV Detection)

Engineer : Ichiro Isozaki

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 [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	1053.11	BB	38.0	38.3	24.4	38.3	1.7	10.0	35.8	36.1	54.0	18.2	17.9
2.	1134.26	BB	37.4	38.6	24.8	38.1	1.7	10.0	35.8	37.0	54.0	18.2	17.0
3.	2483.50	BB	38.2	36.7	30.6	36.7	2.4	10.0	44.5	43.0	54.0	9.5	11.0
4.	4924.00	BB	32.8	34.2	35.3	36.9	3.5	1.0	35.7	37.1	54.0	18.3	16.9
5.	7386.00	BB	29.5	29.6	37.9	36.9	4.3	0.5	35.3	35.4	54.0	18.7	18.6
6.	9848.00	BB	28.5	28.5	39.0	36.9	5.3	1.0	36.9	36.9	54.0	17.1	17.1
7.	12310.00	BB	28.6	28.6	42.5	35.7	5.7	0.5	41.6	41.6	54.0	12.4	12.4
8.	14772.00	BB	27.8	27.8	42.2	35.4	6.5	0.9	42.0	42.0	54.0	12.0	12.0
9.	17234.00	BB	26.9	26.9	42.3	34.9	6.6	1.1	42.0	42.0	54.0	12.0	12.0
10.	19696.00	BB	26.9	26.9	41.0	35.1	7.4	0.0	40.2	40.2	54.0	13.8	13.8
11.	22158.00	BB	28.2	28.2	41.6	35.2	7.1	0.0	41.7	41.7	54.0	12.3	12.3
12.	24620.00	BB	31.7	31.7	40.9	34.5	8.2	0.0	46.3	46.3	54.0	7.7	7.7

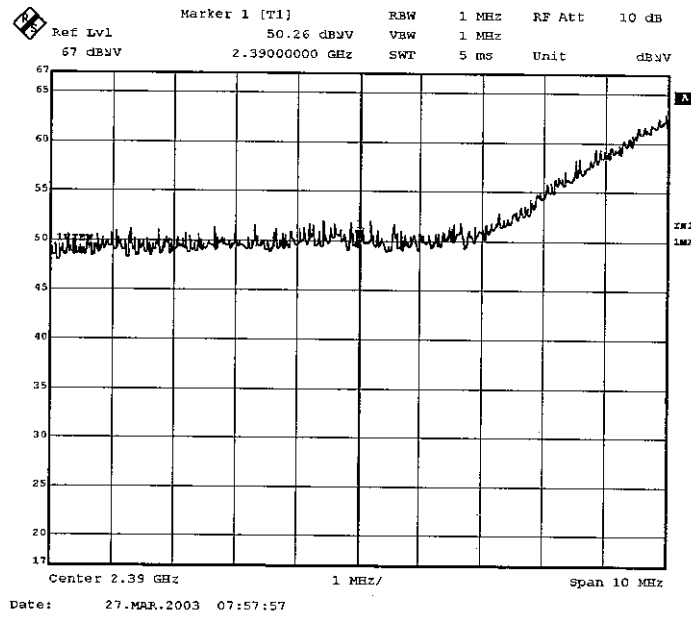
CALCULATION: READING[dB μV] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB].

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz + KHA-03 (3160-09) 18-26.5GHz
■ AMP: KAF-02 (8449B) ■ EMI RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-D3

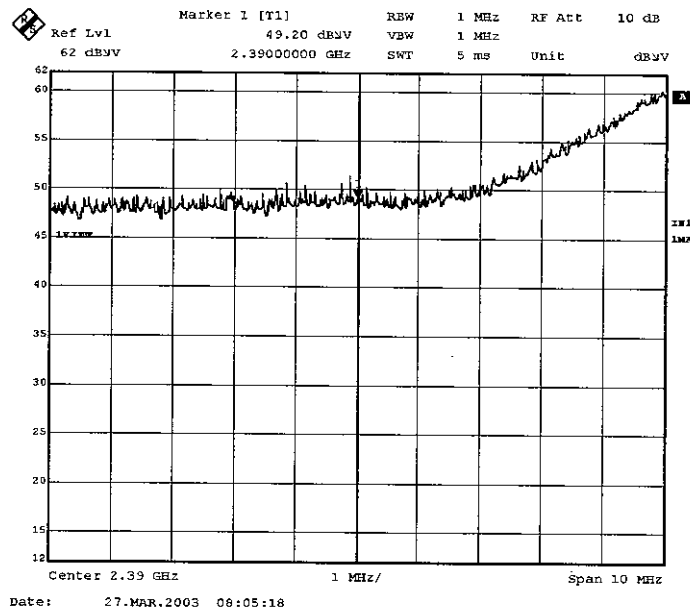
2.39GHz (Ch 1:2412MHz)

1. Horizontal/ PK

T. Mammia

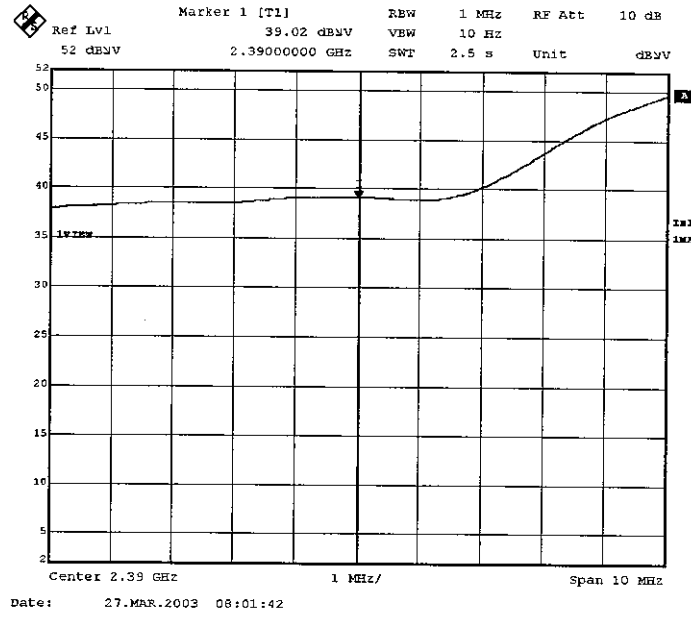


2. Vertical/ PK

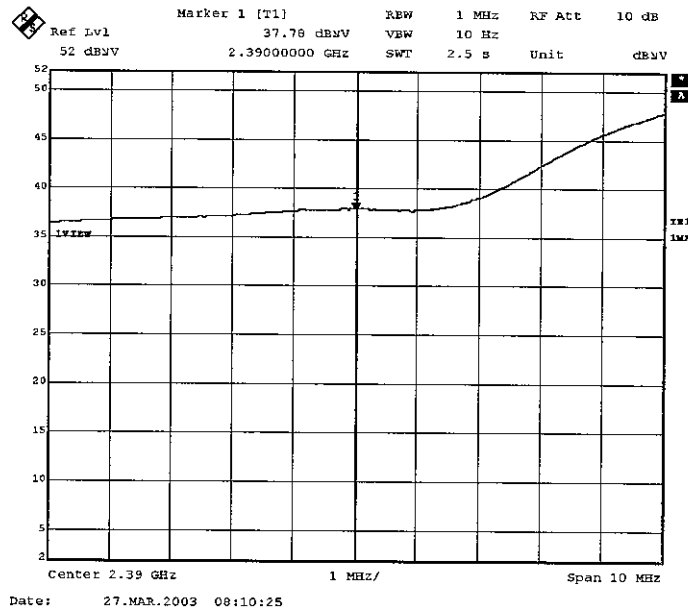


3. Horizontal/ AV

T. Amanna



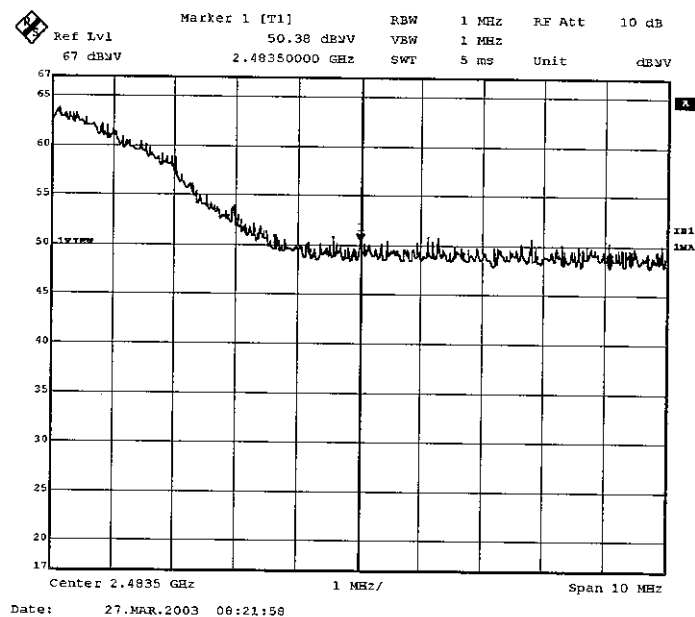
4. Vertical/ AV



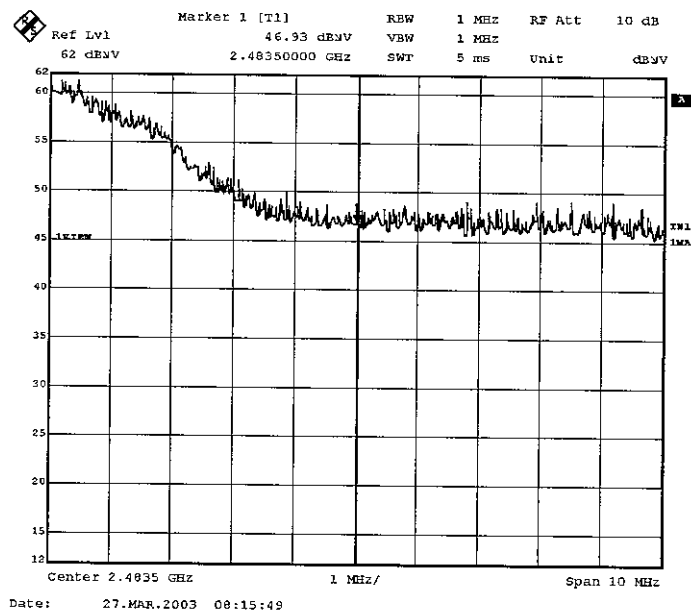
2.4835GHz (Ch 11:2462MHz)

1. Horizontal/ PK

T. Amamura

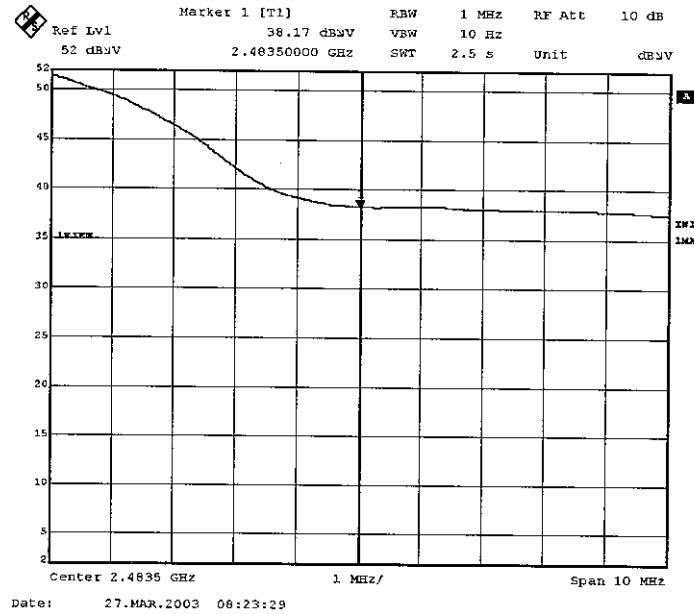


2. Vertical/ PK

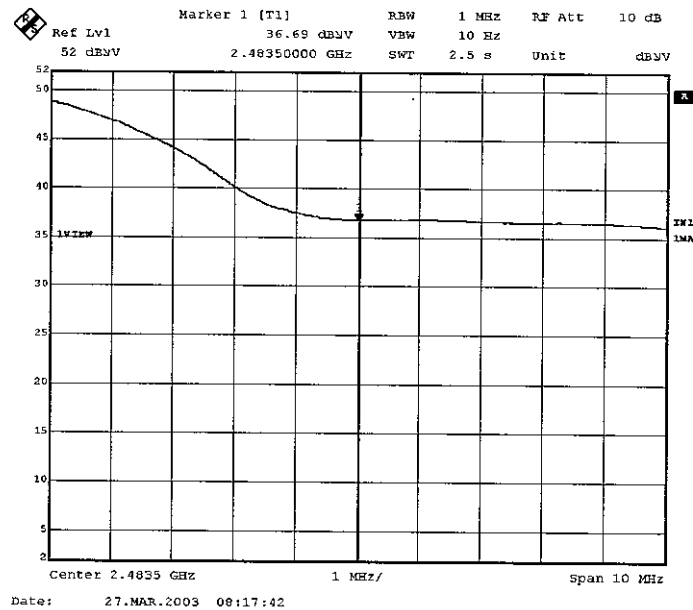


3. Horizontal/ AV

T. Amamura



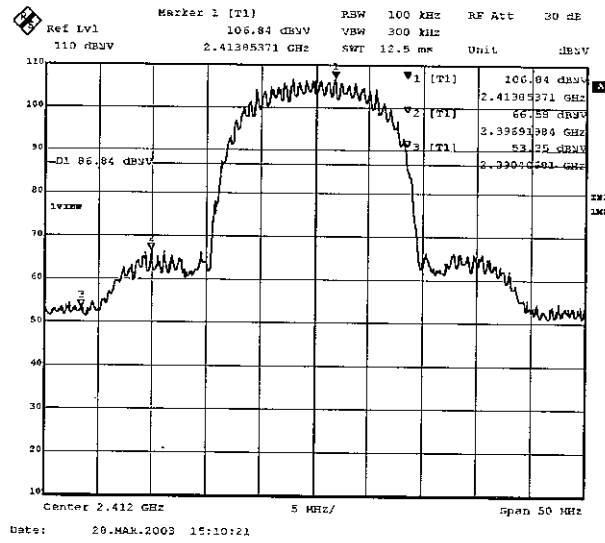
4. Vertical/ AV



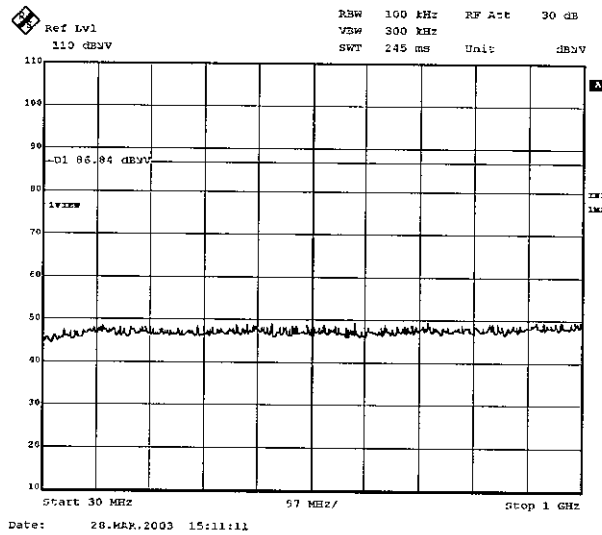
Ch 1: 2412MHz

1.

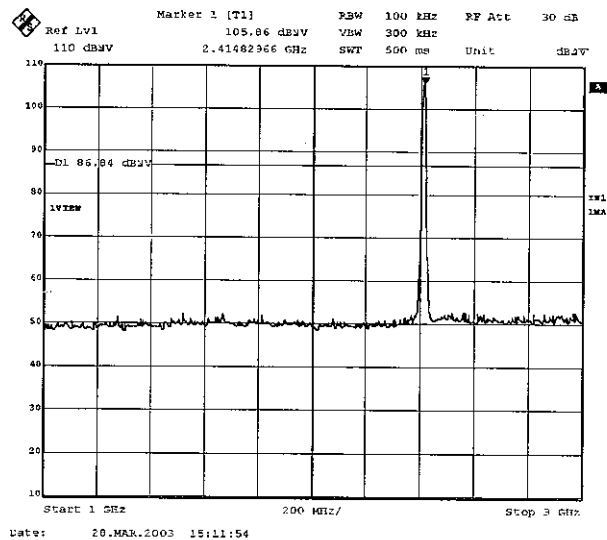
T. Imamura



2.

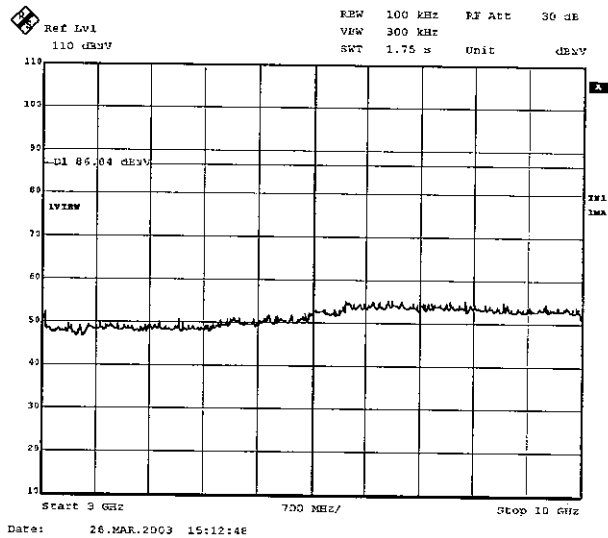


3.

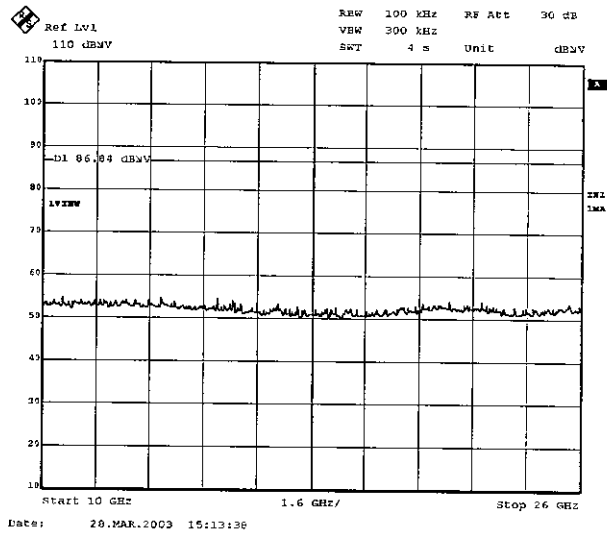


T. Imamura

4.



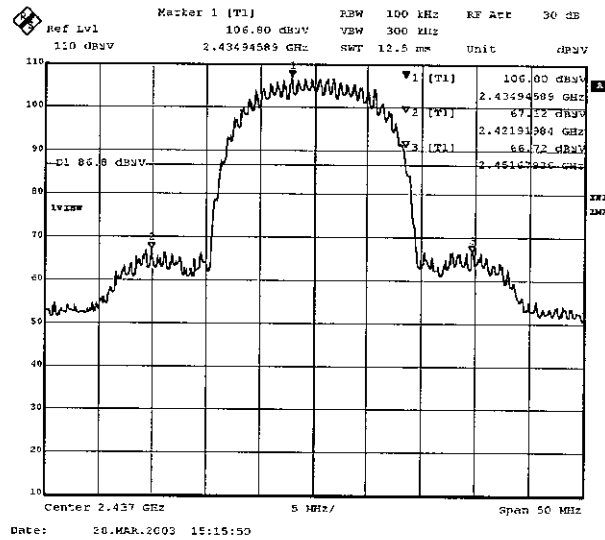
5.



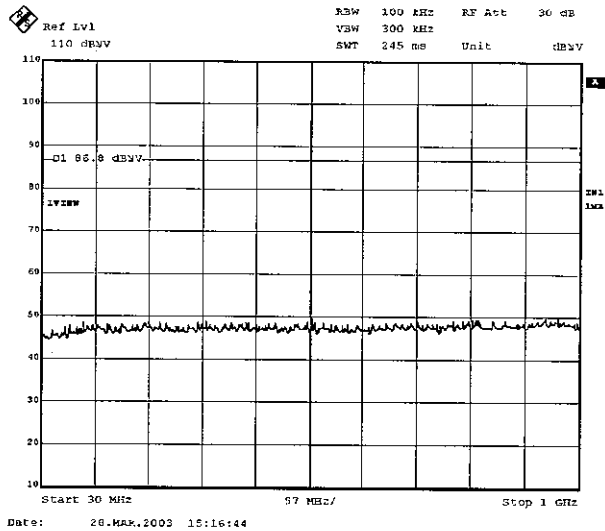
Ch 6: 2437MHz

1.

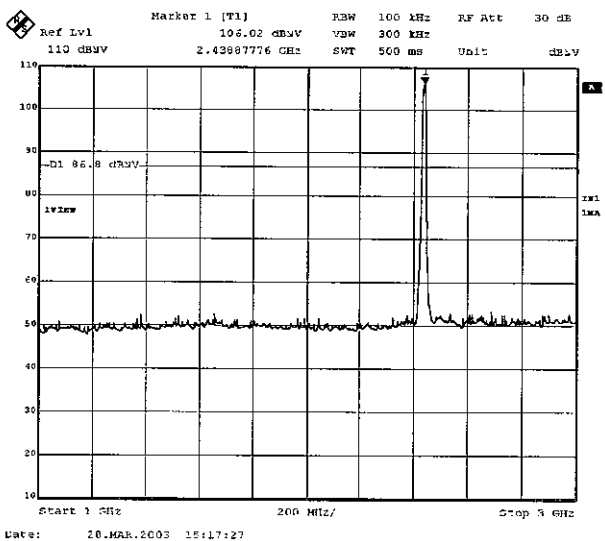
T. Inamura



2.

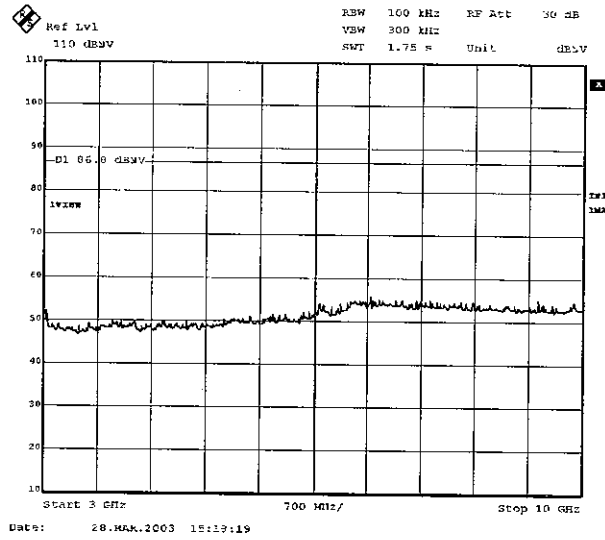


3.

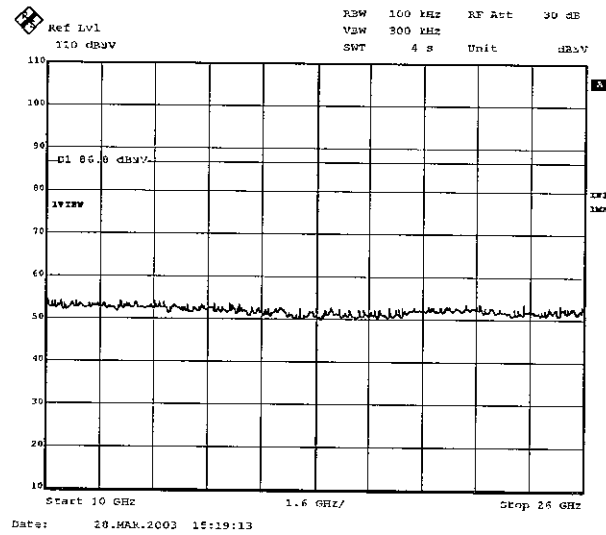


4.

T. Imamura

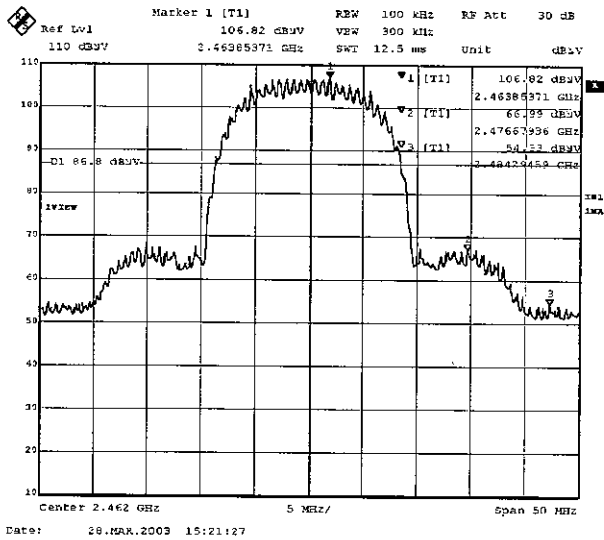


5.

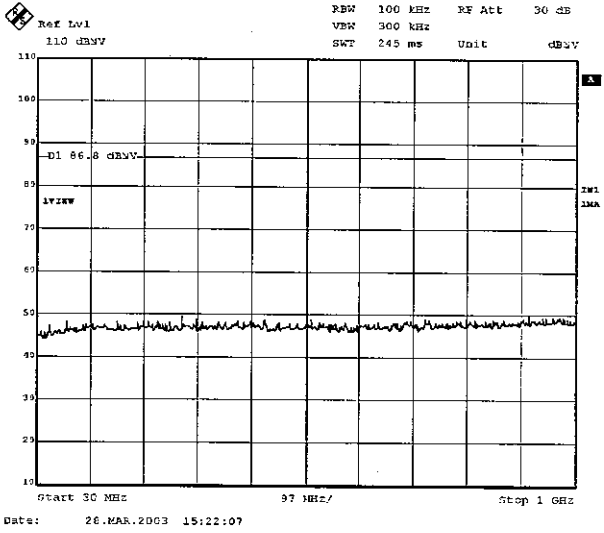


Ch 11: 2462MHz
1.

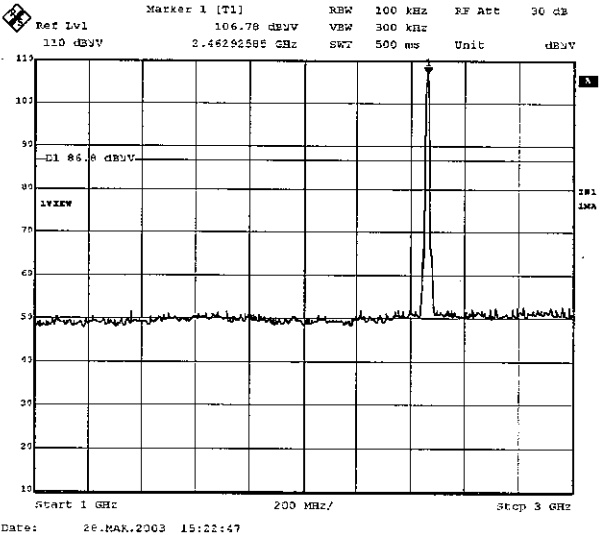
T. Amamura



2.

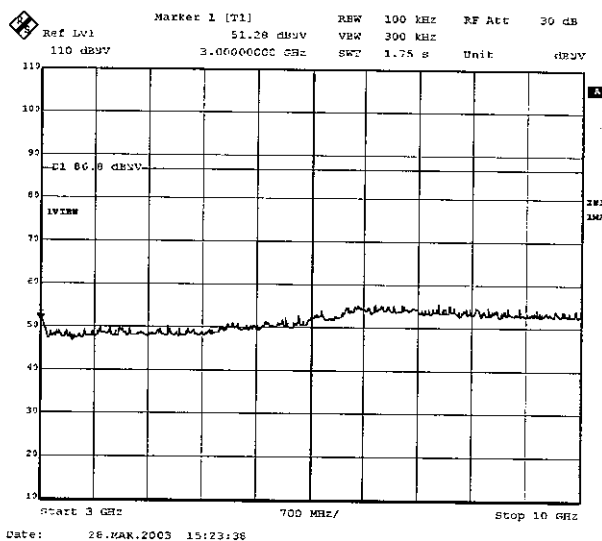


3.

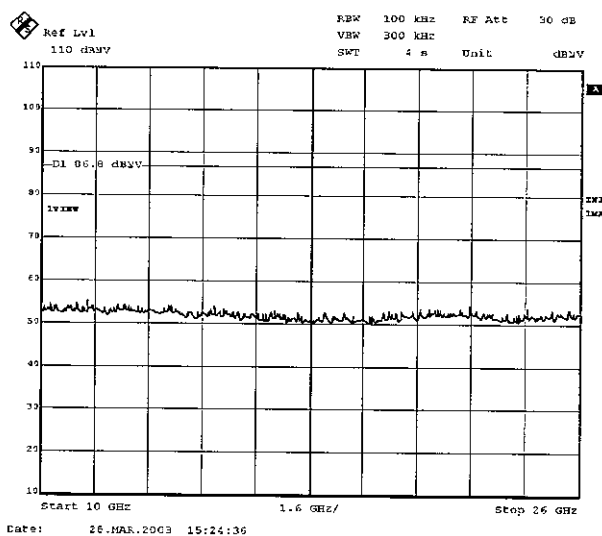


4.

T. Inamura



5.



Power Density (Conducted)

A-PEX INTERNATIONAL CO., LTD.
YAMAKITA NO. 1 OPEN SITE

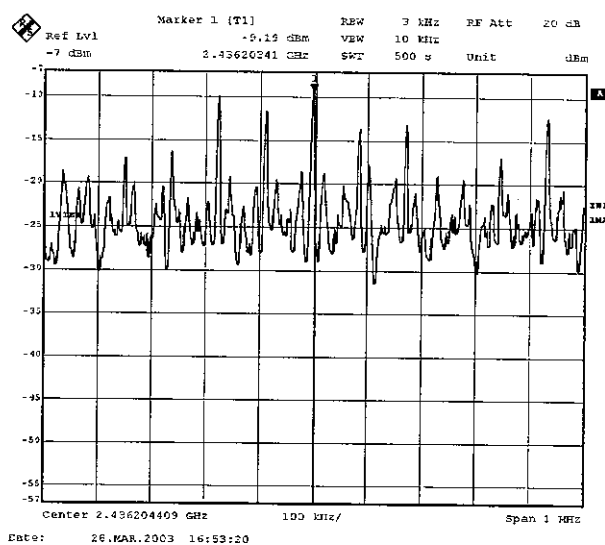
COMPANY : SONY Corporation.
EQUIPMENT : Notebook Personal Computer
MODEL : PCG-481L
FCC ID : AK8PCG481L
POWER : AC120V/60Hz
Mode : Transmitting

REPORT NO : 23HE0003-YK-2
REGULATION : Fcc Part15SubpartC 247 (d)
DATE : 2003/ 03/28
Temp. /Humi. : 24°C/36%

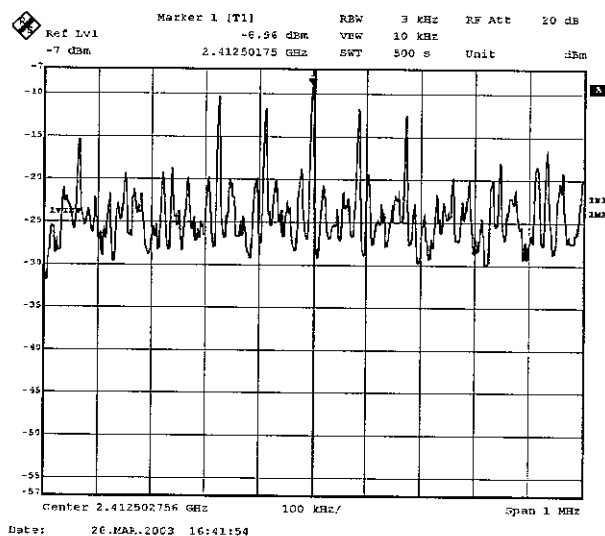

ENGINEER : Toyokazu Imamura

CH	FREQ	S/A Reading	Cable Loss	Results	Limit	MARGIN
	[GHz]	[dBm]	[dB]	[dBm]	[dBm]	[dB]
Low	2.412502	-8.96	4.05	-4.91	8.0	12.9
Mid	2.436203	-9.19	4.05	-5.14	8.0	13.1
High	2.462502	-8.46	4.06	-4.4	8.0	12.4

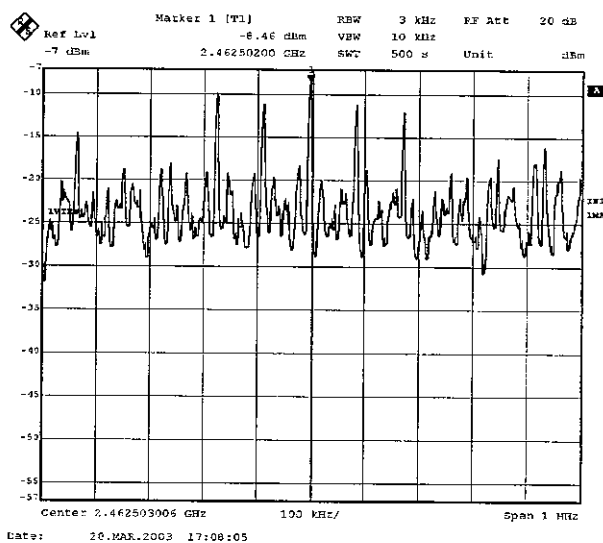
1. ch 1: 2412MHz

T. Amamura

2. ch 6: 2437MHz



3. ch 11: 2462MHz



Test Report No : 23HE0003-YK-2

APPENDIX 3 Test Instruments

EMI test equipment

Control No	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
KAF-01	Pre Amplifier	Hewlett Packard	8447D	RE	2002/08/03 * 12
KAF-02	Pre Amplifier	Hewlett Packard	8449B	RE	2002/05/07 * 12
KAT10-S1	Attenuator	Agilent	8449D 010	RE	2002/04/16 * 12
KAT6-01	Attenuator	INMET	18N-6dB	RE	2002/06/20 * 12
KBA-01	Biconical Antenna	Schwarzbeck	BBA9106	RE	2002/08/17 * 12
KCC-10/11/12/13/18	Coaxial Cable	Fujikura/Suhner	8D-2W/12D-SF A/S04272B/S04272B/S04272B	RE	2002/08/17 * 12
KCC-14/15/16/18/KPL-01	Coaxial Cable/Pulse Limiter	Fujikura/Suhner/PMM	5D-2W/8D-2W/S04272B/S04272B/PL01	CE	2002/08/17 * 12
KCC-D3	Coaxial Cable	Rosenberger	2201	RE	2002/06/28 * 12
KCC-D4	Coaxial Cable	Storm	421-011(4m)	AT	2002/04/16 * 12
KFL-01	Highpass Filter	Hewlett Packard	84300 80038	RE	2002/05/02 * 12
KHA-01	Horn Antenna	A.H.Systems	SAS-200/571	RE	2002/07/14 * 12
KHA-03	Horn Antenna	EMCO	3160-09	RE	2002/04/27 * 12
KLA-01	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/02/19 * 12
KLS-01	LISN(AMN)	Schwarzbeck	NSLK8126	CE	2002/08/16 * 12
KOTS-01	Open Test Site	JSE	30m	RE	2002/08/18 * 12
KPM-05	Power meter	Agilent	E4417A	AT	2003/02/17 * 12
KPSS-01	Power sensor	Agilent	E9327A	AT	2003/02/21 * 12
KSA-01	Spectrum Analyzer	Advantest	R3365	CE/RE	2002/06/20 * 12
KTR-01	Test Receiver	Rohde & Schwarz	ES140	RE	2002/07/22 * 12
KTR-02	Test Receiver	Rohde & Schwarz	ESCS30	CE	2002/11/25 * 12
APSSG03	Signal Generator	Wiltron	68247B	RE	2002/10/15 * 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 test