EMI TEST REPORT

Test Report No. : 23GE0035-YK-1

Applicant	:	**Sony Corporation**
Type of Equipment	:	**Bluetooth USB adapter**
Model No.	:	**PCGA-BA1**
FCC ID	:	**AK8PCGABA1**
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 UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.

Date of test: February 26 and 28, 2003

Tested by: Toyokazu Imamura, Ichiro Isozaki

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

UL Apex Co., Ltd.
YAMAKITA EMC LAB.
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Telephone: +81 465 77 1011
Facsimile: +81 465 77 2112

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1 GENERAL INFORMATION

Company Name	: Sony Corporation
Brand Name	: Sony
Address	: 6-7-35 Kitashinagawa, Shinagawa-ku, Tokyo, 141-0001 JAPAN
Telephone Number	: +81 3 5795 8033
Facsimile Number	: +81 3 5795 8346
Contact Person	: Kaoru Ichimura
Type of Equipment	: Bluetooth USB adapter
Model No.	: PCGA-BA1
Rating	: DC3.3V
Country of Manufacture	: Japan
Receipt Date of Sample	: February 25, 2003
Condition of EUT	: Production model
Regulation(s)	: FCC Part15 Subpart C, Section 15.247
Test Site	: UL Apex Yamakita EMC Lab. 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 Public Notice DA 00-705 “Guidance on Measurement for Frequency Hopping 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.: 99354).
NVLAP Lab. code : 200441-0

*Our company name and laboratory name were changed as following since A-Pex International Co., Ltd. merged with UL Japan Co., Ltd. In April 10, 2003.
Company name A-Pex International Co., Ltd → UL Apex Co., Ltd.
Laboratory name Yamakita Lab. → Yamakita EMC Lab.

2 PRODUCT DESCRIPTION

Sony Corporation, Model: PCGA-BA1 (referred to as the EUT in this report) is a Bluetooth USB adapter.
The clock frequency used in EUT is 16MHz (X'tal).

Frequency characteristics	:	2402MHz through 2480MHz
Number of channels/ channel spacing	:	79 channels/ 1MHz channel spacing
Modulation	:	GFSK (Low power Frequency Hopping Spread Spectrum (FHSS))
Antenna type	:	1/4λ Monopole
Antenna model	:	YCE-5207
Antenna Gain	:	-0.82dBi (Max)
Operating Voltage	:	DC3.3V
Operating Temperature Range	:	5 deg. C. – 35 deg. C.

*FCC Part15.31 (e)

The host device PC-PJ120H provides the Bluetooth USB adapter with stable power supply (DC3.3V), and the power is not changed when voltage of the personal computer is varied.
Therefore, the Bluetooth USB adapter complies power supply regulation.

*FCC Part 15.203 Antenna requirement

The standard type of antenna connector is applied: however, the Bluetooth USB adapter complies this requirement since this radio equipment is for professional installation.

3 SYSTEM TEST CONFIGURATION

3.1 Justification

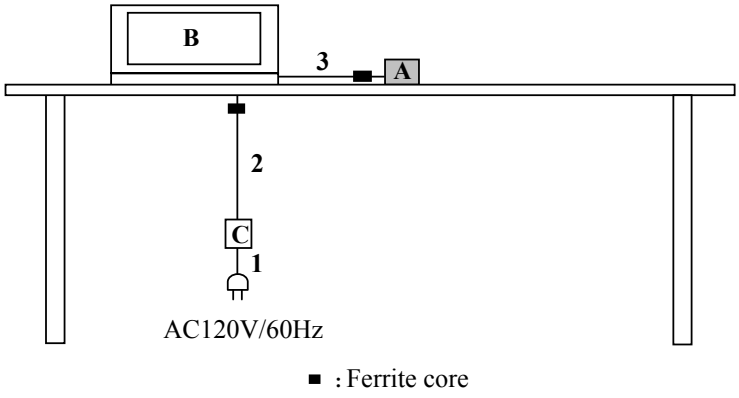
The system was configured in typical fashion (as a customer would normally use it) for testing.

Test mode:

1. Transmitting mode (DH5) : Radiated and Antenna Port Conducted tests
   Performed the test about channels 2402MHz (Low) and 2480MHz (High) channels of all Carrier frequencies.
2. Hopping mode : Antenna Port Conducted tests
3. Inquiry mode : Antenna Port Conducted tests
4. Page mode : Antenna Port Conducted tests

3.2 Configuration of Tested System

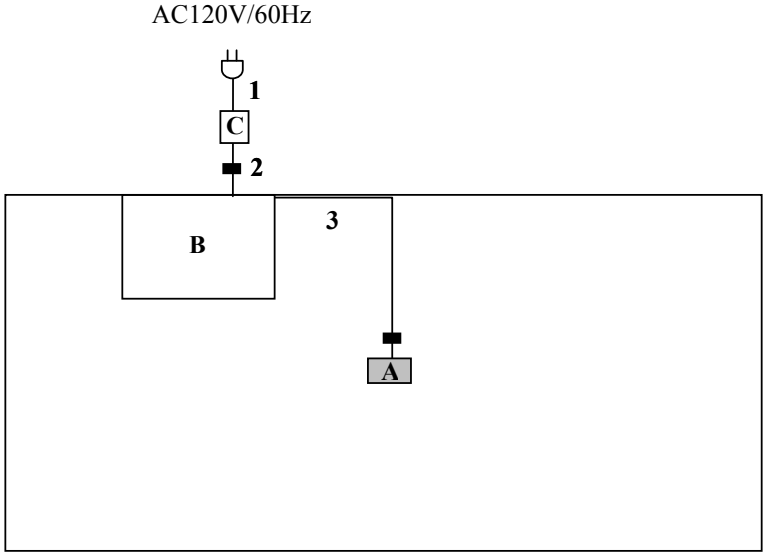
Front View



■ : Ferrite core

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

Top View



■ : Ferrite core

*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
A	Bluetooth USB adapter	PCGA-BA1	030210-46	Sony Corporation	AK8PCGABA1
B	Personal Computer	PC-PJ120H	69029817	SHARP	-
C	AC Adaptor	EA-J03V	LTD0022031941	SHARP	-

List of cables used

No.	Name	Length (m)	Shield	Backshell material
1	AC Main Cable	1.8	Unshielded	Polyvinyl chloride
2	DC Cable	1.2	Unshielded	Polyvinyl chloride
3	USB Cable	0.9	Shielded	Polyvinyl chloride

4 MEASUREMENT UNCERTAINTY

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

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 ±4.8dB.
The measurement uncertainty (with 95% confidence level) for this test using Logperiodic antenna is ±5.2dB.
The measurement uncertainty (with 95% confidence level) for this test using Horn antenna is ±6.6dB.

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

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 10kHz).
(Measurement range : 150kHz to 30MHz)

Test data : APPENDIX Page 16 to 18
Photographs of test setup: Page 13
Test result : Pass
Test instruments : KCC-24/25/26/28/KPL-02, KLS-05, KSA-02, KTR-03

5.2 §15.247 (a)(1) Frequency Hopping Systems

Bluetooth USB adapter uses 79channels, each 1MHz wide.
On Average, each channel is used equally.

Test data : APPENDIX Page 19
Test result : Pass
Test instruments : KTR-01, KCC-D4

5.3 §15.247 (a)(1)(ii) Channel Utilization

The total number of channel is 79.

Test data : APPENDIX Page 20 to 23
Test result : Pass
Test instruments : KTR-01, KCC-D4

20dB Band Width

1. 2402MHz (Low) : 0.8417MHz < 1MHz
2. 2480MHz (High): 0.9259MHz < 1MHz

Test data : APPENDIX Page 24
Test result : Pass
Test instruments : KTR-01, KCC-D4

Dwell Time
Spectrum analyzer was set as center frequency 2402MHz, dwell time 30sec. (Hopping mode)
Spectrum analyzer was set as center frequency 2402MHz, dwell time 1sec. (Inquiry and page mode)

1. Hopping mode
As a result of observation with Bluetooth USB adapter was on hopping condition,
101.4 Average times Hopping were appeared per 1channel.
Maximum transmit ON time per appeared hopping is 2.92ms (DH5)
101.4*2.92ms = 296.09ms < 400ms
2. Inquiry mode
As a result of observation with Bluetooth USB adapter was on hopping condition,
100 Average times Inquiry were appeared per 1channel.
Maximum transmit ON time per appeared hopping is 120μs (Inquiry mode: 32ch).
100*(0.4*32)*120μs = 153.6ms < 400ms
3. Page mode
As a result of observation with Bluetooth USB adapter was on hopping condition,
100 Average times Page were appeared per 1channel.
Maximum transmit ON time per appeared hopping is 120μs (Page mode: 32ch).
100*(0.4*32)*120μs = 153.6ms < 400ms

Test data : APPENDIX Page 25 to 30
Test result : Pass
Test instruments : KTR-01, KCC-D4, KST-01, KDT-01

5.4 § 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 31
Test result : Pass
Test instruments : KPM-05, PS-03

5.5 § 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, X axis was worst under vertical polarization and Y axis was worst under horizontal polarization.
In above 1GHz, Y axis was worst under the vertical antenna polarization. Under the horizontal antenna polarization, X axis was worst.
The positions in which the maximum noise occurred were chosen to put into measurement.
See the photographs in page 15.

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 Page 32 to 33 (30 - 1000MHz)
: APPENDIX Page 34 to 37 (1 - 26GHz)
: APPENDIX Page 38 to 41
(Band Edges: 2390MHz/ 2483.5MHz, Restricted band Charts)
Photographs of test setup : Page 14
Test result : Pass
Test instruments : KAF-03, KAF-04, KAT6-03, KBA-02, KAT10-S1,KCC-20/21/22/23/29, KFL-01, KHA-02, KHA-04, KLA-02, KOTS-02, KSA-02, KTR-01, KTR-04, KCC-D3

5.6 § 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.

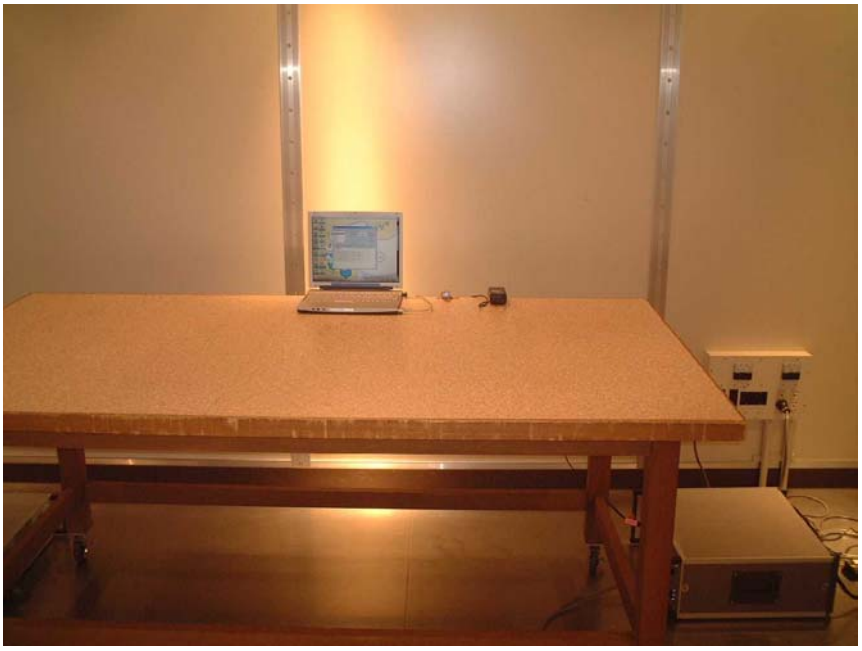
Test data : APPENDIX Page 42 to 47
Test result : Pass
Test instruments : KTR-01, KCC-D4

APPENDIX 1: Photographs of test setup

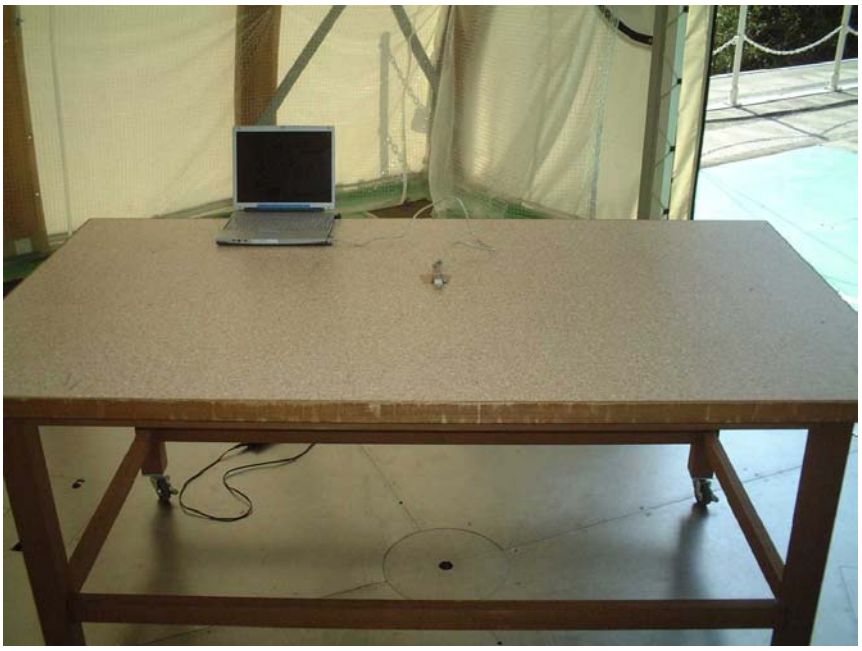
APPENDIX 2: Test Data

APPENDIX 3: Test instruments

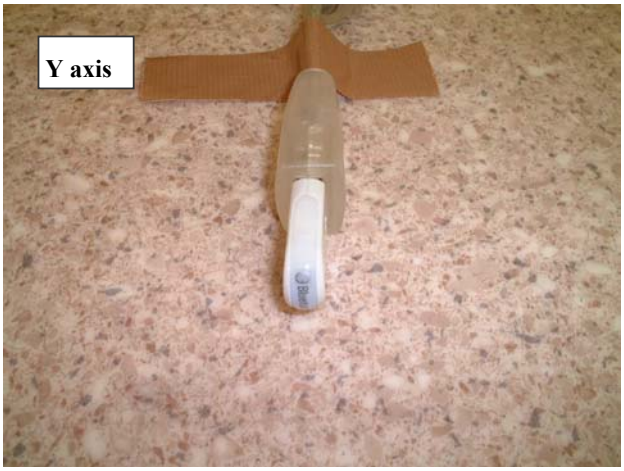
Conducted emission

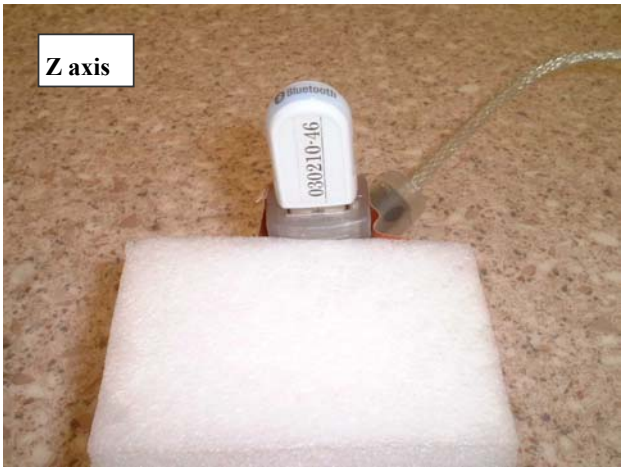


Radiated emission



Pre check of worse-case position





DATA OF CONDUCTION TEST

UL Apex Co.,Ltd.
Yamakita No.3 Shielded Room
Report No.: 23GE0035-YK-1

Applicant	:	SONY Corporation
Kind of Equipment	:	Bluetooth USB adapter
Model No.	:	PCGA-BA1
Serial No.	:	030210-46
Power	:	AC120V/60Hz
Mode	:	Transmitting(2402MHz)
Remarks	:	-
Date	:	2/28/2003
Phase	:	Single Phase
Temperature	:	26 ℃
Humidity	:	35 %
Regulation	:	FCC Part15C §15.207.(CISPR Pub.22)

Engineer : Toyokazu Imamura

No.	FREQ.	READING(N) QP	READING(N) AV	READING(L1) QP	READING(L1) AV	LISN FACTOR	AMP GAIN	CABLE LOSS	ATTEN.	RESULT QP	RESULT AV	LIMITS QP	LIMITS AV	MARGIN QP	MARGIN AV
	[MHz]	[dBuV]		[dBuV]		[dB]	[dB]	[dB]	[dB]	[dBuV]		[dBuV]		[dB]	
1.	0.1501	29.2	-	28.6	-	0.1	0.0	0.1	0.0	29.4	-	66.0	56.0	36.6	-
2.	0.2029	44.7	33.7	44.7	33.1	0.1	0.0	0.1	0.0	44.9	33.9	63.5	53.5	18.6	19.6
3.	0.2684	35.8	-	34.7	-	0.1	0.0	0.1	0.0	36.0	-	61.2	51.2	25.2	-
4.	0.3379	31.3	-	29.0	-	0.1	0.0	0.2	0.0	31.6	-	59.3	49.3	27.7	-
5.	0.4062	28.8	-	31.9	-	0.1	0.0	0.2	0.0	32.2	-	57.7	47.7	25.5	-
6.	1.7565	19.6	-	26.0	-	0.1	0.0	0.3	0.0	26.4	-	56.0	46.0	29.6	-

CALCULATION: READING[dBμV] + LISN FACTOR[dB] + CABLE LOSS[dB] - AMP.GAIN[dB] + ATTEN[dB].

■LISN:KLS-05(NSLK8126) ■COAXIAL CABLE:KCC-24/25/26/28
■PULSE LIMITTER:KPL-02(PL01) ■EMI RECEIVER:KTR-03(ESHS10)

DATA OF CONDUCTION TEST

UL Apex Co.,Ltd.
Yamakita No.3 Shielded Room
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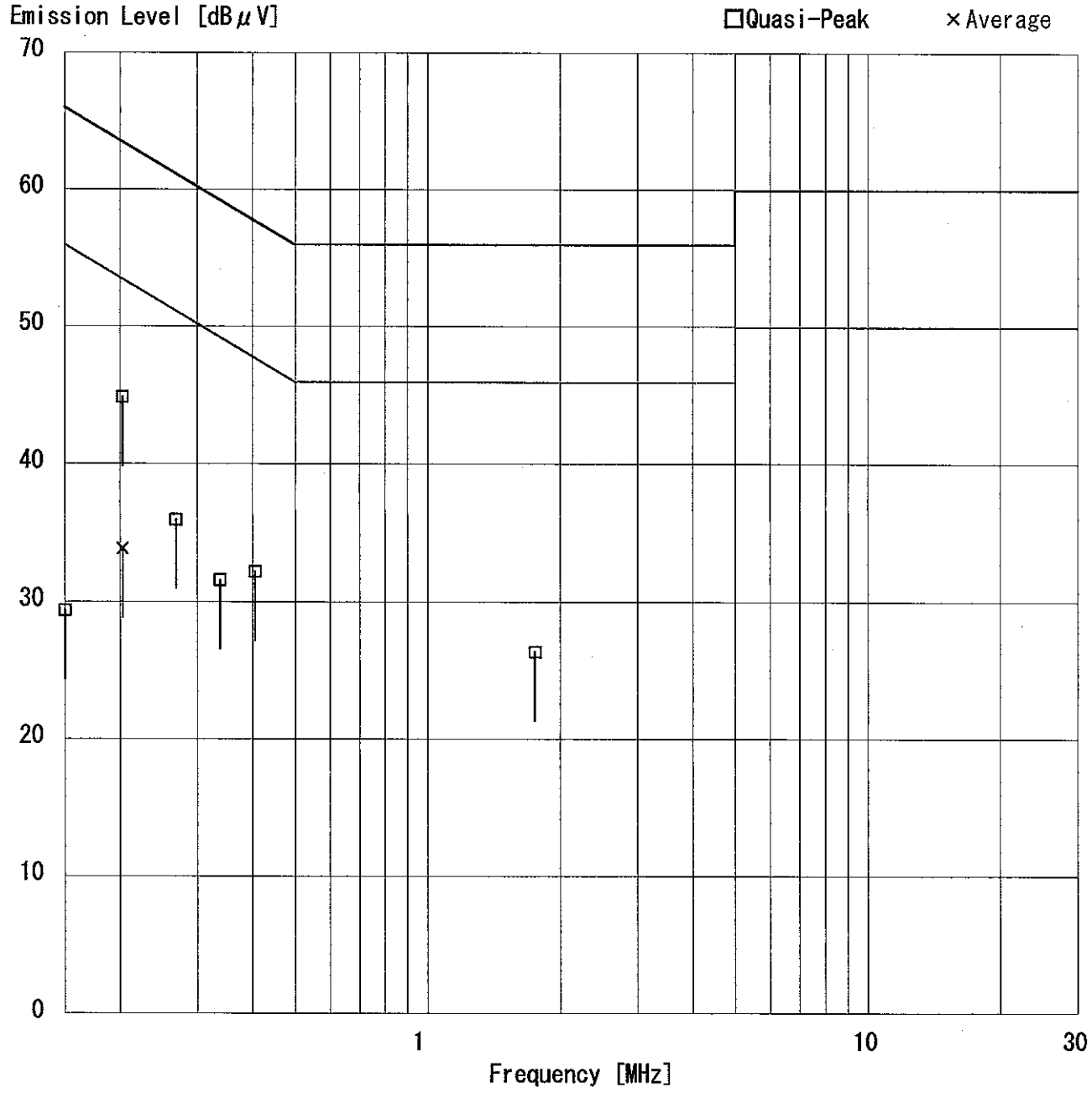
Kind of Equipment	:	Bluetooth USB adapter
Model No.	:	PCGA-BA1
Serial No.	:	030210-46
Power	:	AC120V/60Hz
Mode	:	Transmitting(2402MHz)
Remarks	:	-
Date	:	2/28/2003
Phase	:	Single Phase
Temperature	:	26 ℃
Humidity	:	35 %
Regulation	:	FCC Part15C §15.207.(CISPR Pub.22)

Engineer : Toyokazu Imamura

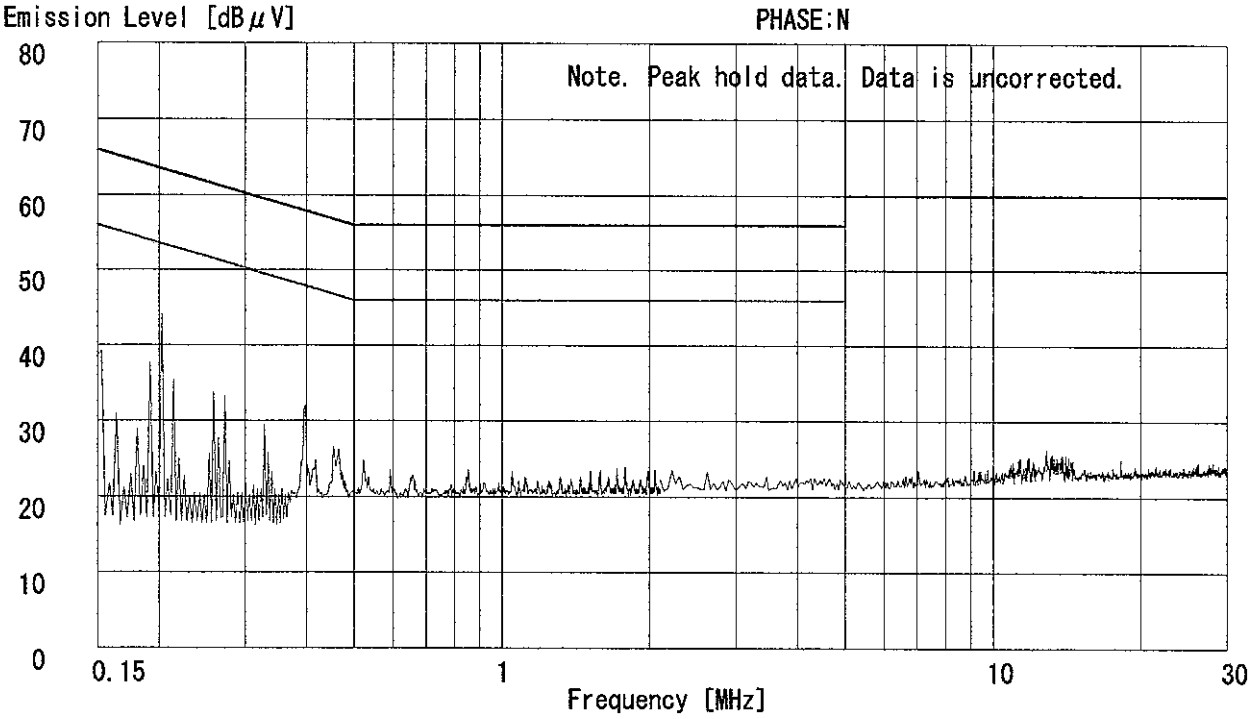


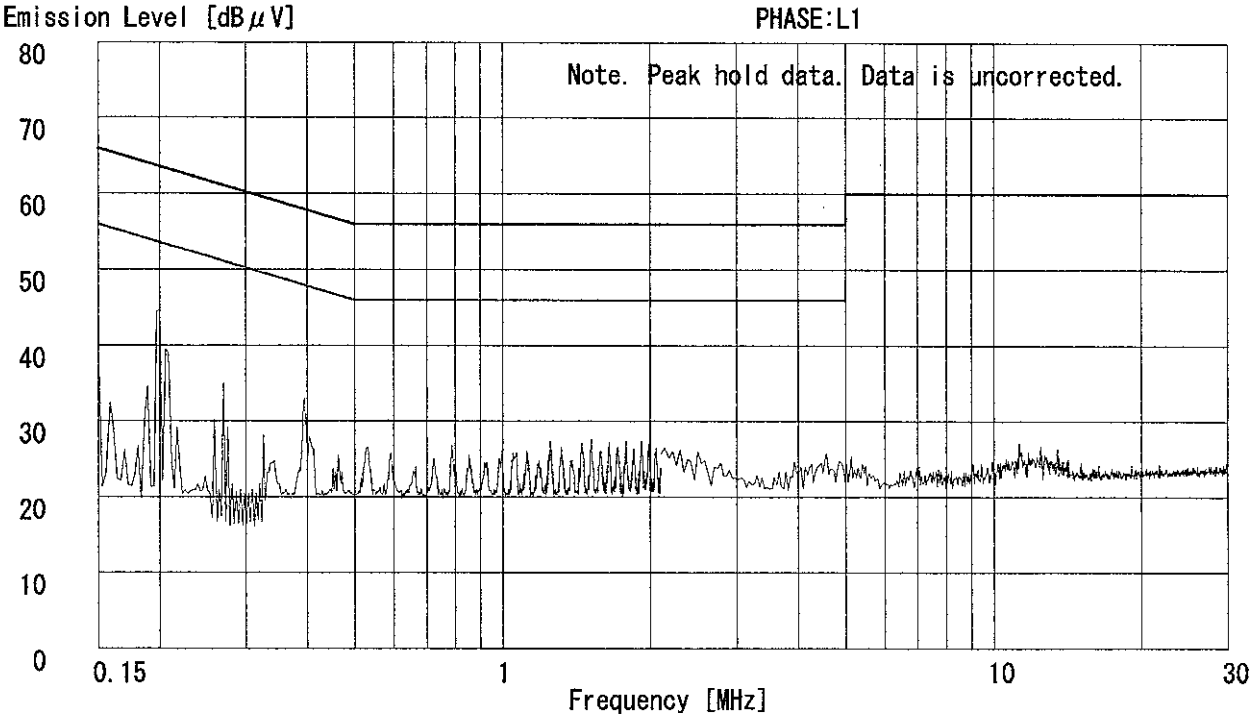
DATA OF CONDUCTION TEST CHART

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.3 Shielded Room
Report No.: 23GE0035-YK-1

Applicant	:	Sony Corporation
Kind of Equipment	:	Bluetooth USB adapter
Model No.	:	PCGA-BA1
Serial No.	:	030210-46
Power	:	AC120V/60Hz
Mode	:	Transmitting(2402MHz)
Remarks	:	-
Date	:	2/28/2003
Phase	:	Single Phase
Temperature	:	26 ℃
Humidity	:	35 %
Regulation 1	:	FCC Part15C §15.207. (CISPR Pub.22)
Regulation 2	:	None

Engineer : Toyokazu Imamura





DATA OF CONDUCTION TEST CHART

A-PEX INTERNATIONAL CO., LTD.
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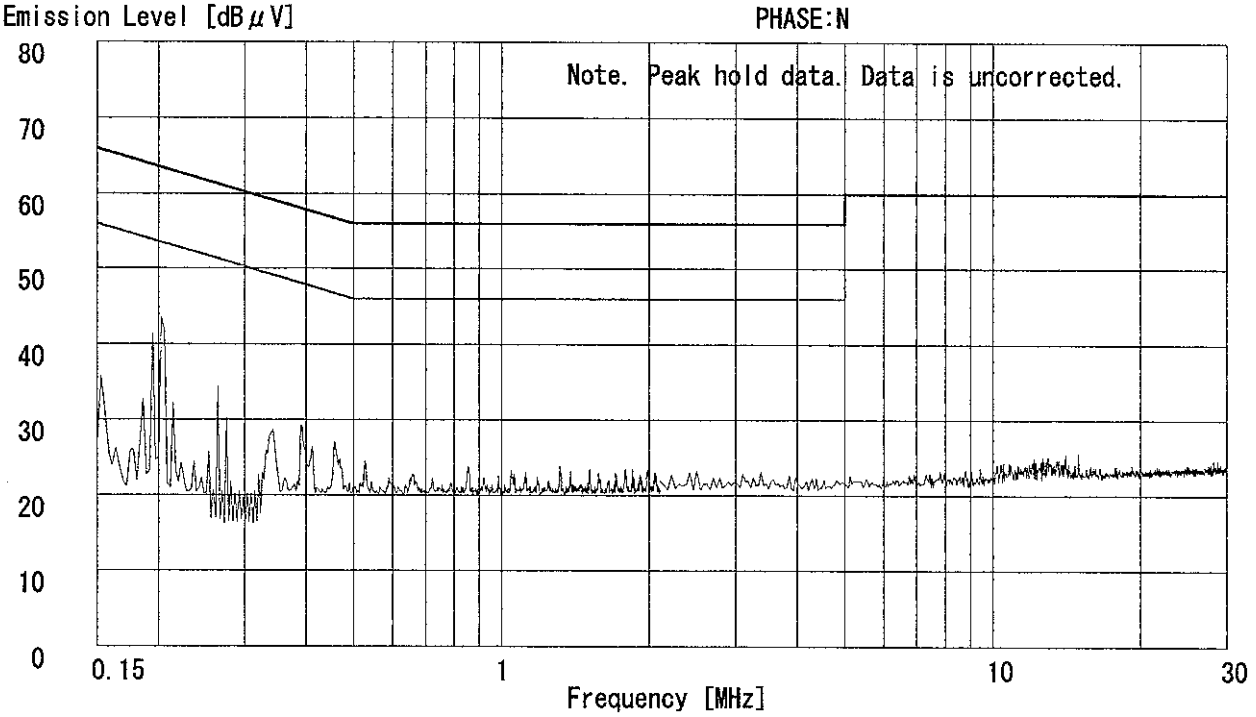
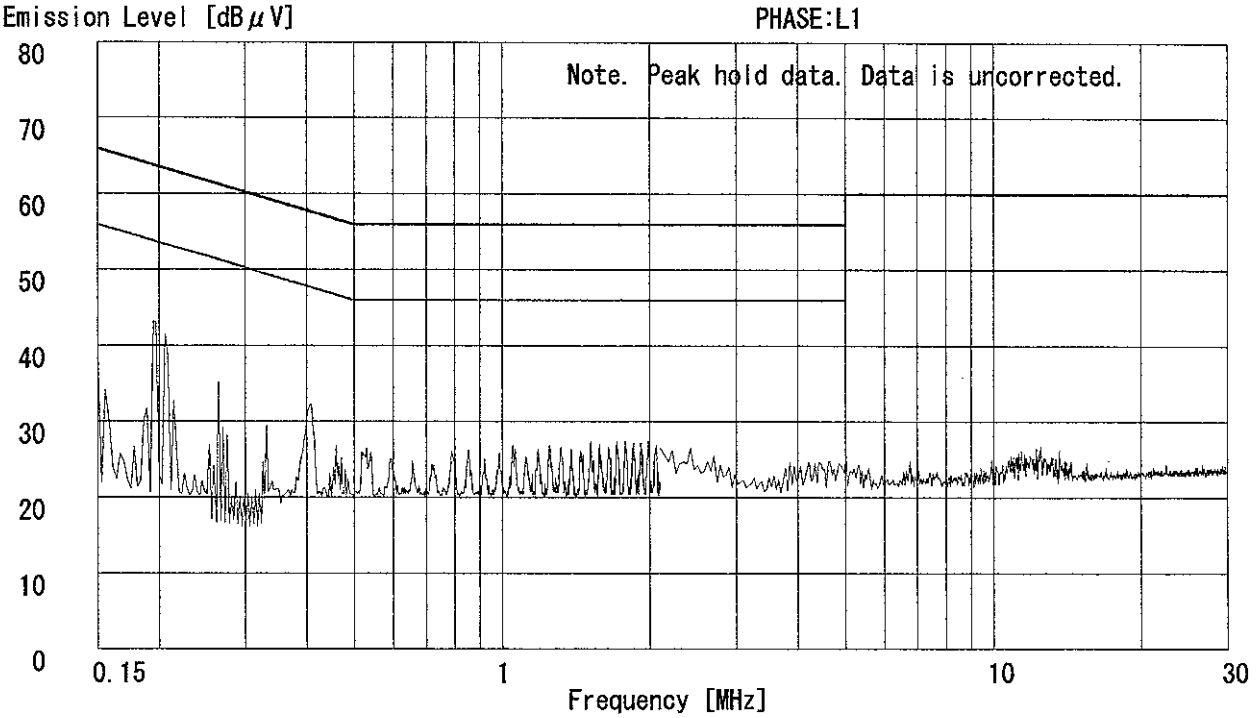
Remarks	: -
Date	: 2/28/2003
Phase	: Single Phase
Temperature	: 26 ℃
Humidity	: 35 %
Regulation 1	: FCC Part15C §15.207. (CISPR Pub.22)
Regulation 2	: None

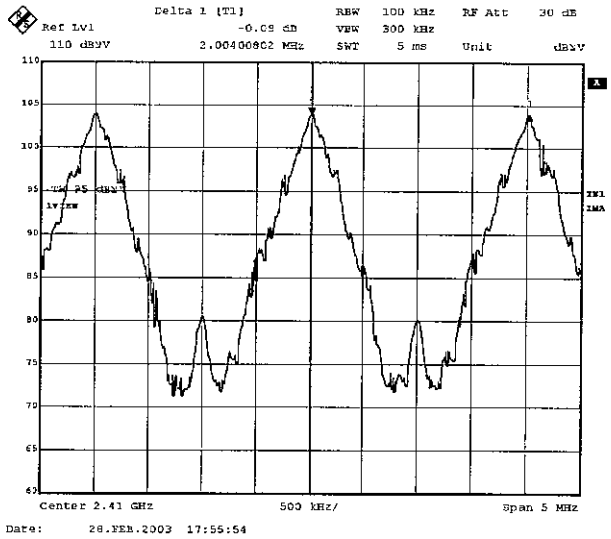
Engineer : Toyokazu Imamura



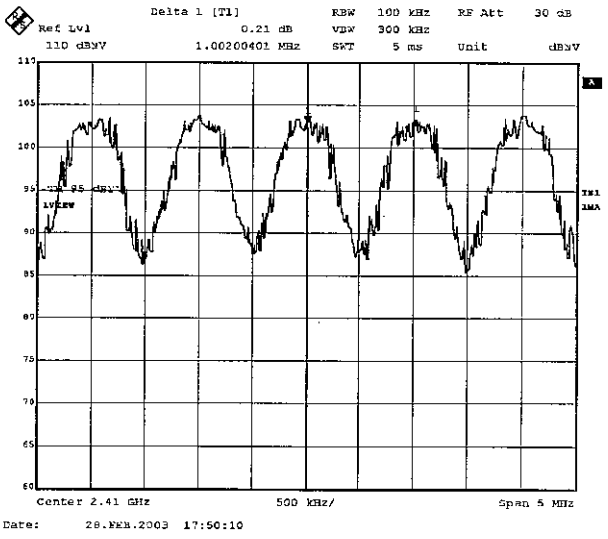


T. Imamura

Hopping



Inquiry



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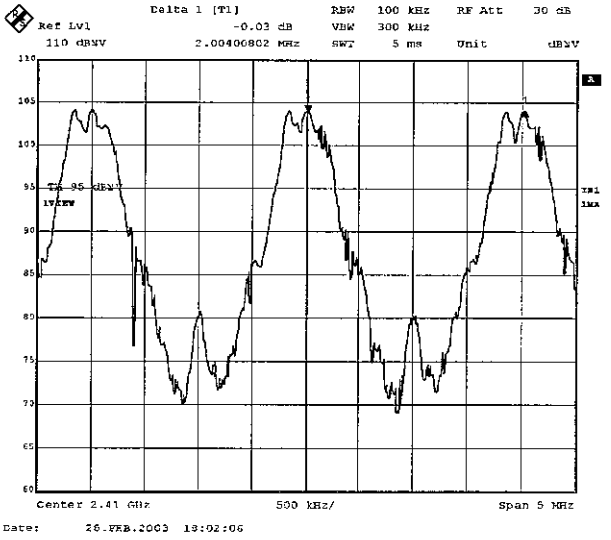

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Hopping

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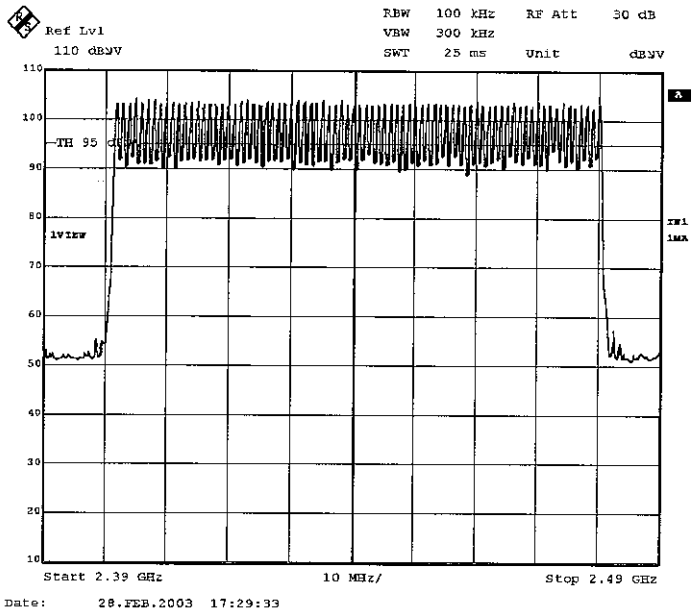

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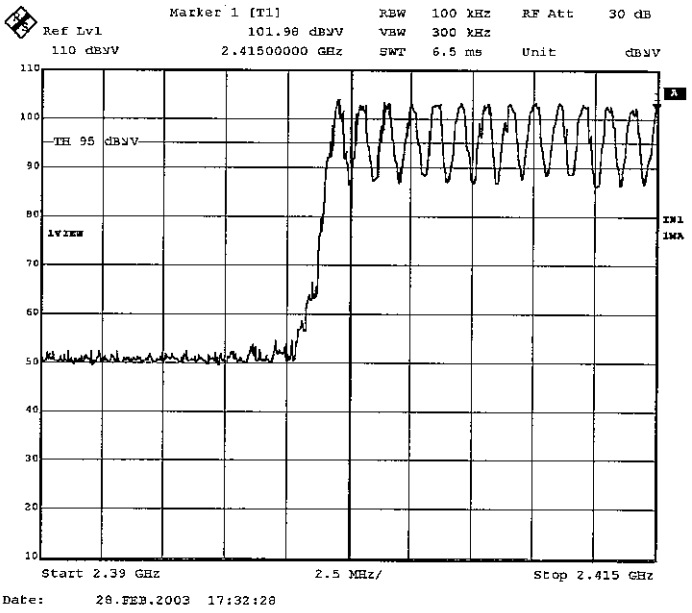

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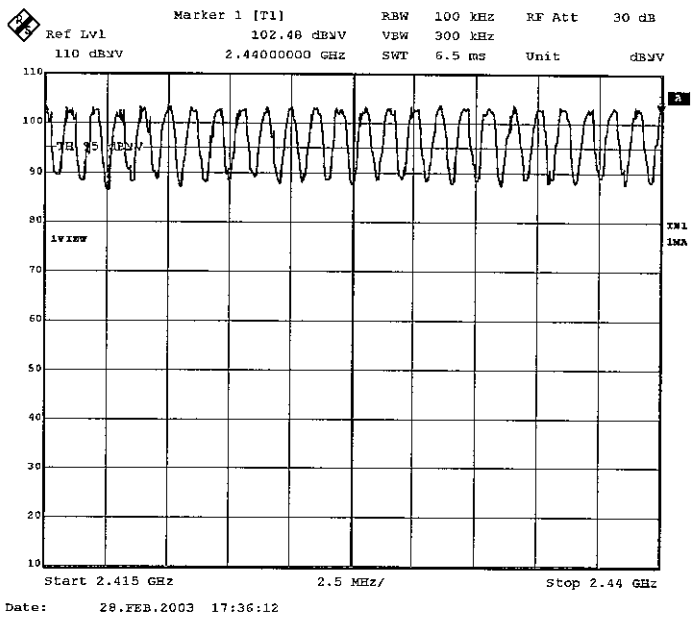
Marker 1 [T1]
RBW 100 kHz
RF Att 30 dB
Ref Lvl
102.48 dBµV
VBW 300 kHz
110 dBµV
2.44000000 GHz
SWT 6.5 ms
Unit dBµV
TH 75 dBµV
1VIEW
Start 2.415 GHz
2.5 MHz/
Stop 2.44 GHz
Date: 28.FEB.2003 17:36:12

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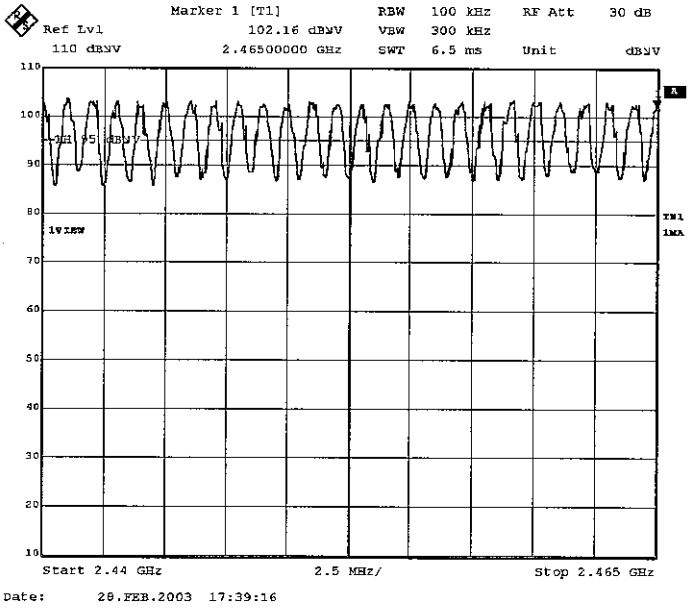
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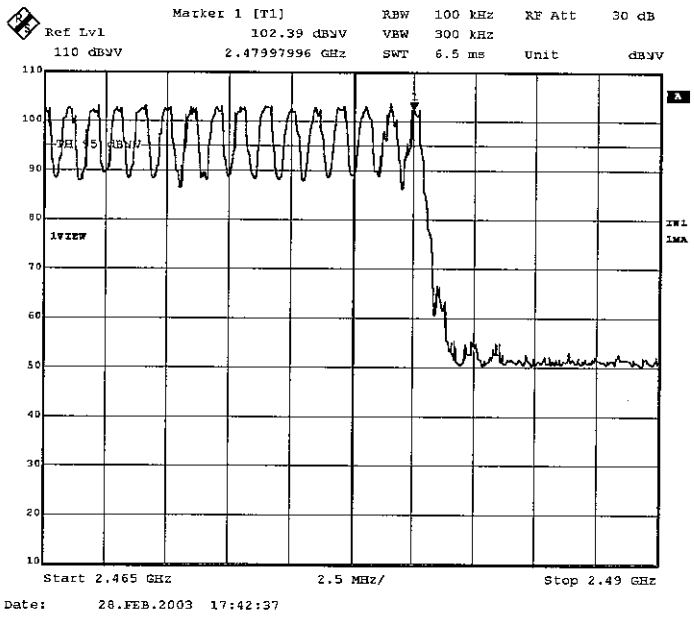
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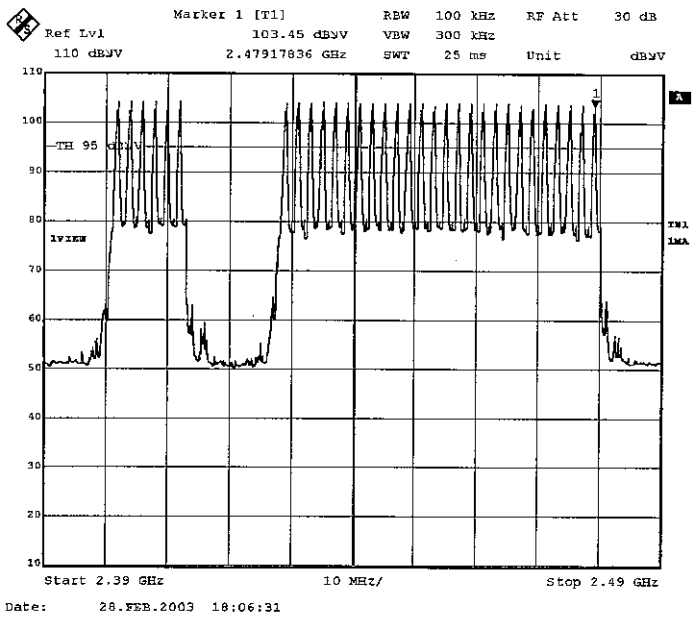
T. Imamura

Inquiry



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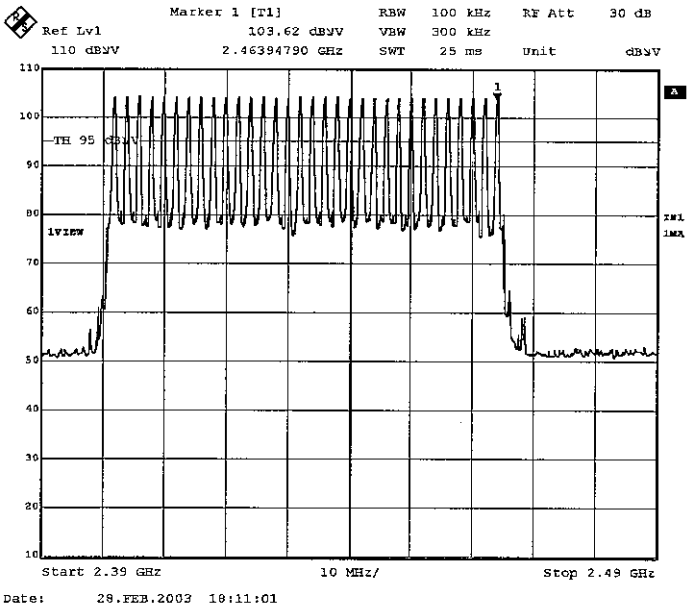
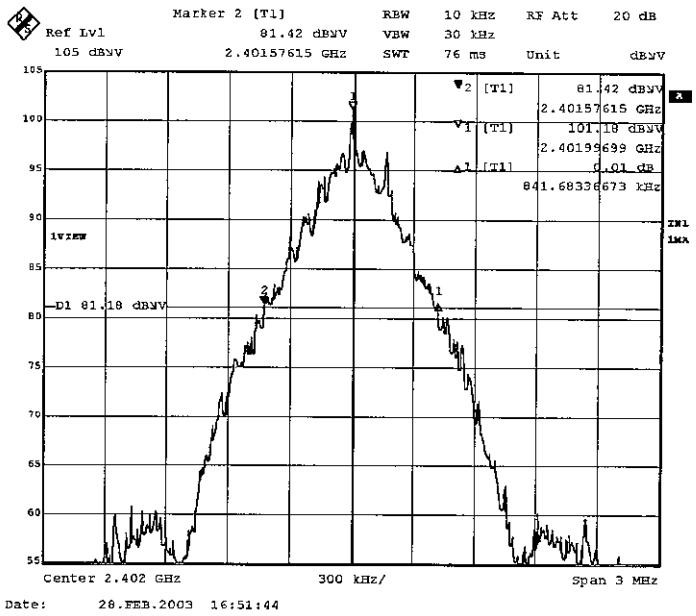
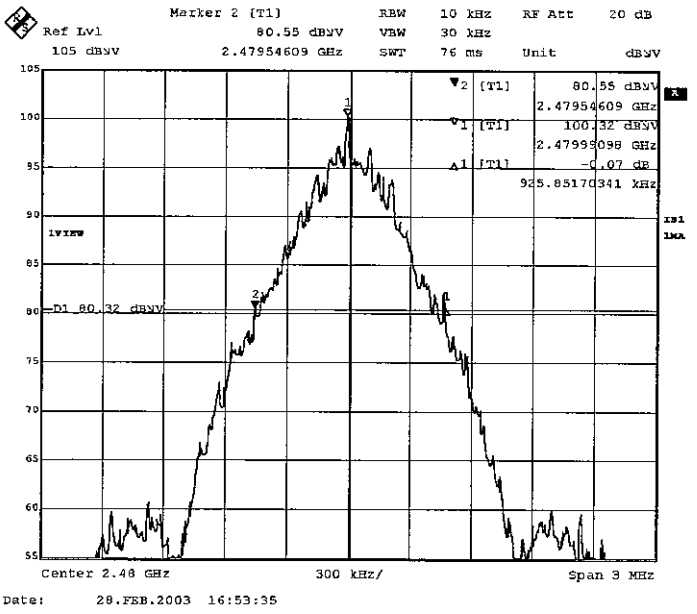


T. Imamura

1. ch Low: 2402MHz



2. ch High: 2480MHz



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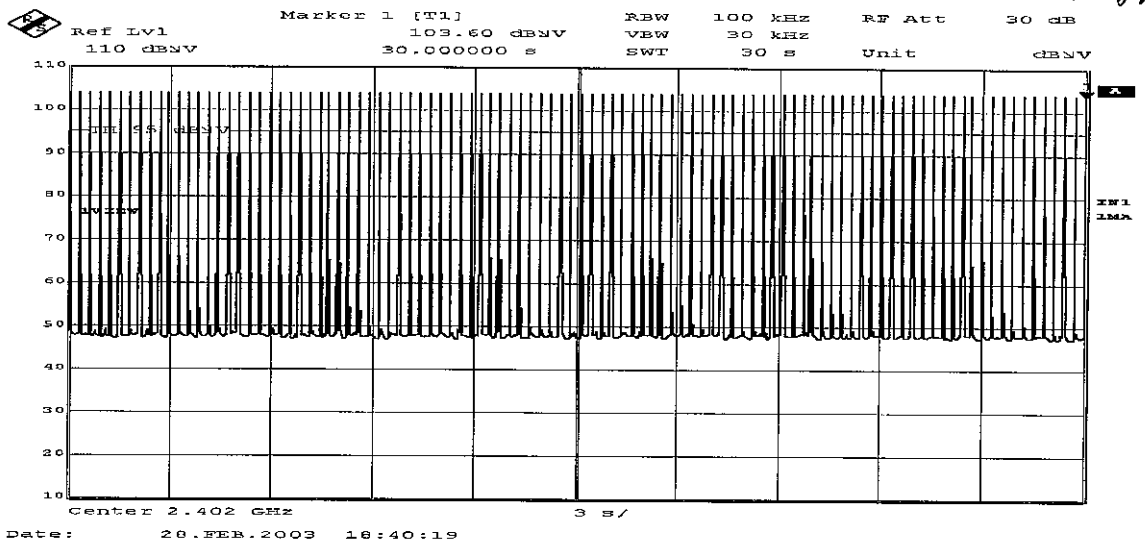
Dwell Time(Hopping)

Count 1



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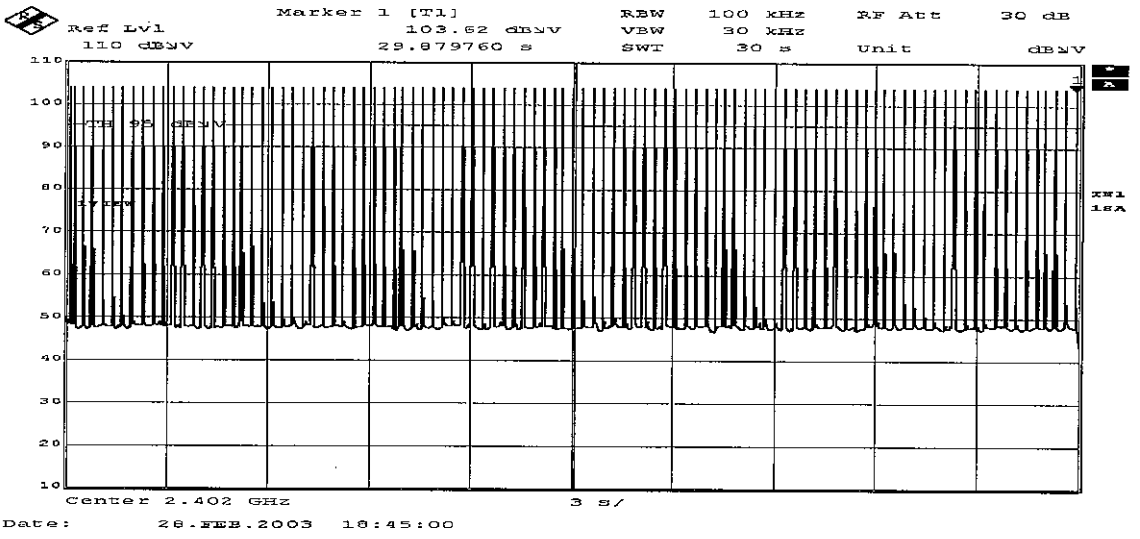
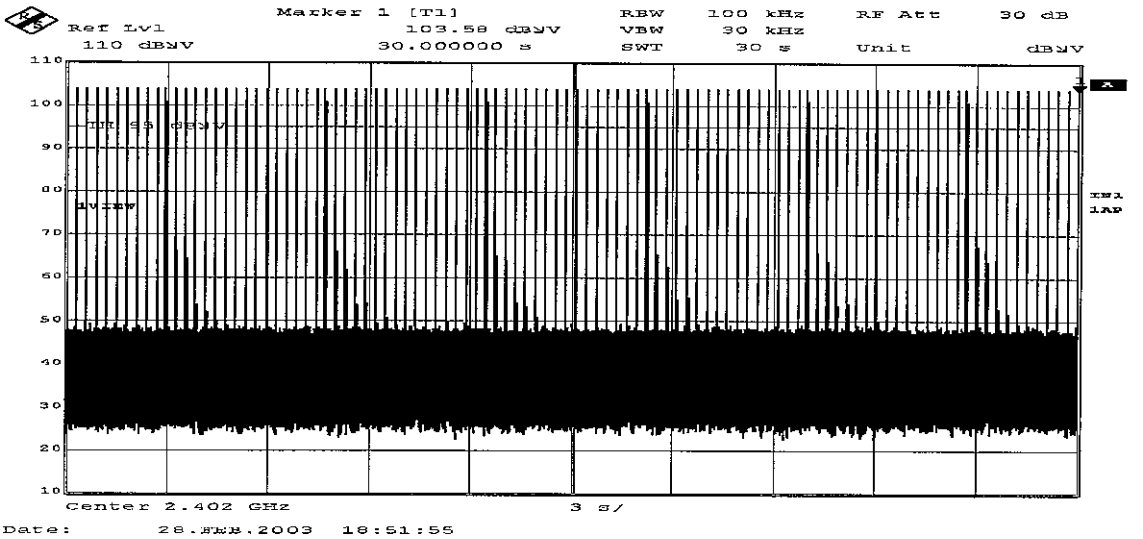


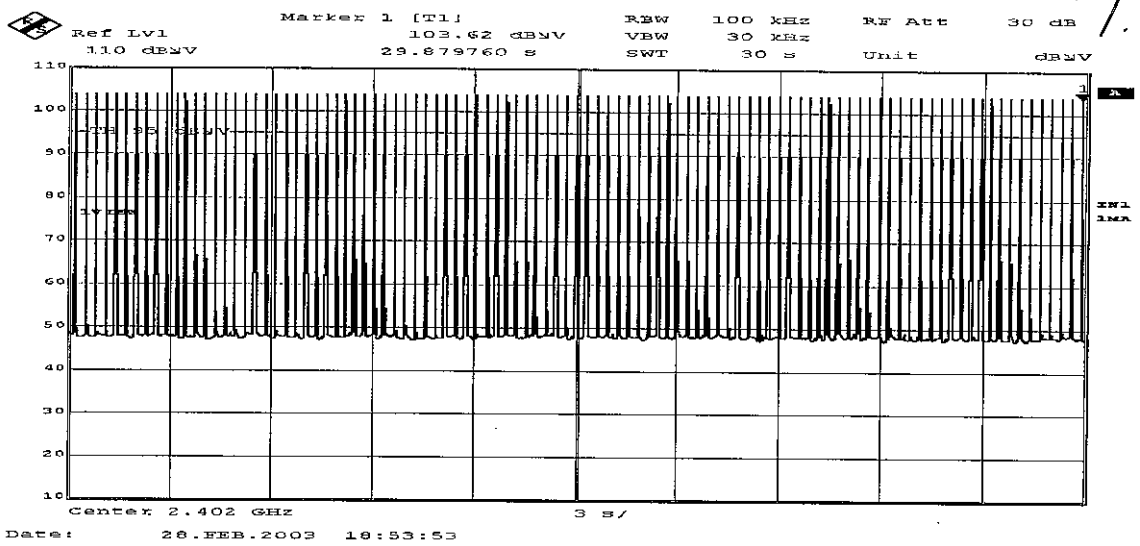
Count 3



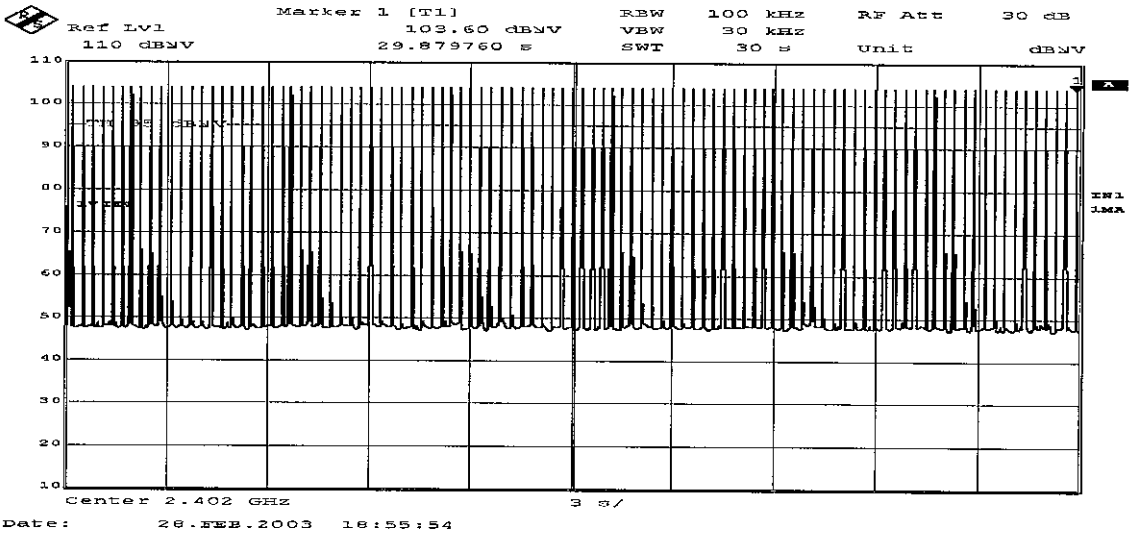
Dwell Time and Duty Cycle: FCC 15.247(a)

T. Imamura

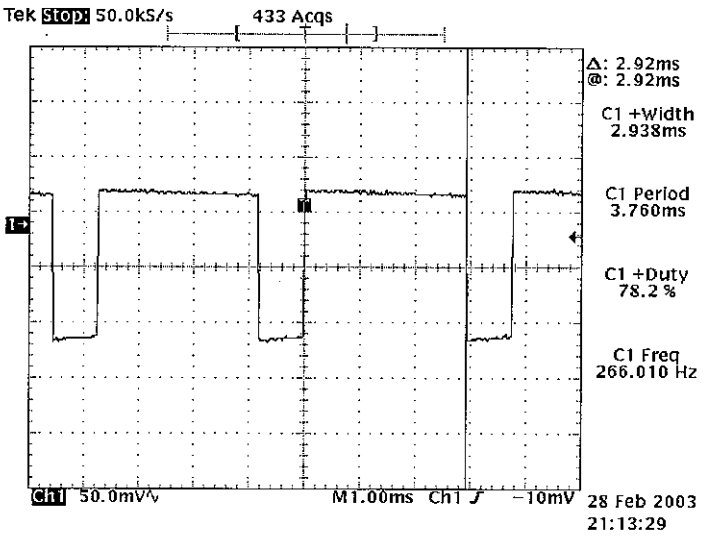
Count 4



Count 5



Duty cycle(Hopping)

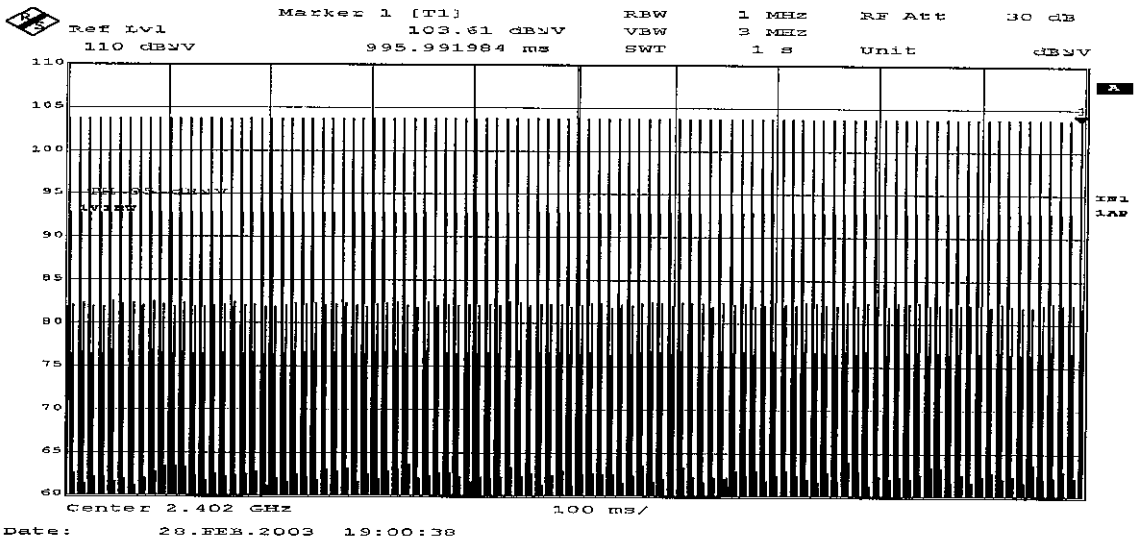


Dwell time = (Count 1 + Count1 2 + Count 3 + Count 4 + Count5) / 5 * Ton
= (102 + 102 + 100 + 101 + 102) / 5 * 2.92[ms]
= 296.09 [ms]

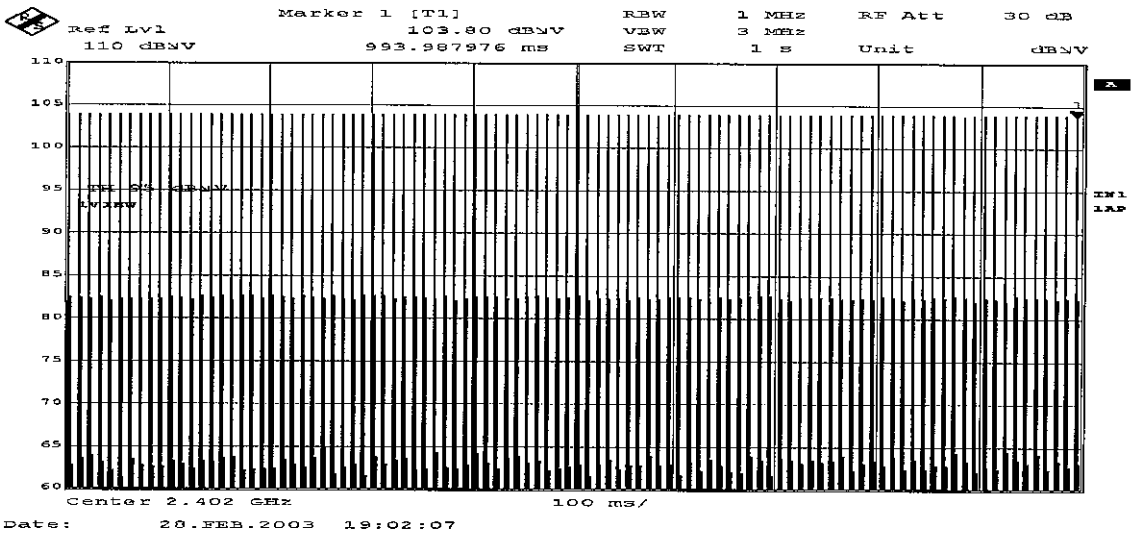
T. Imamura

Dwell Time(Inquiry)

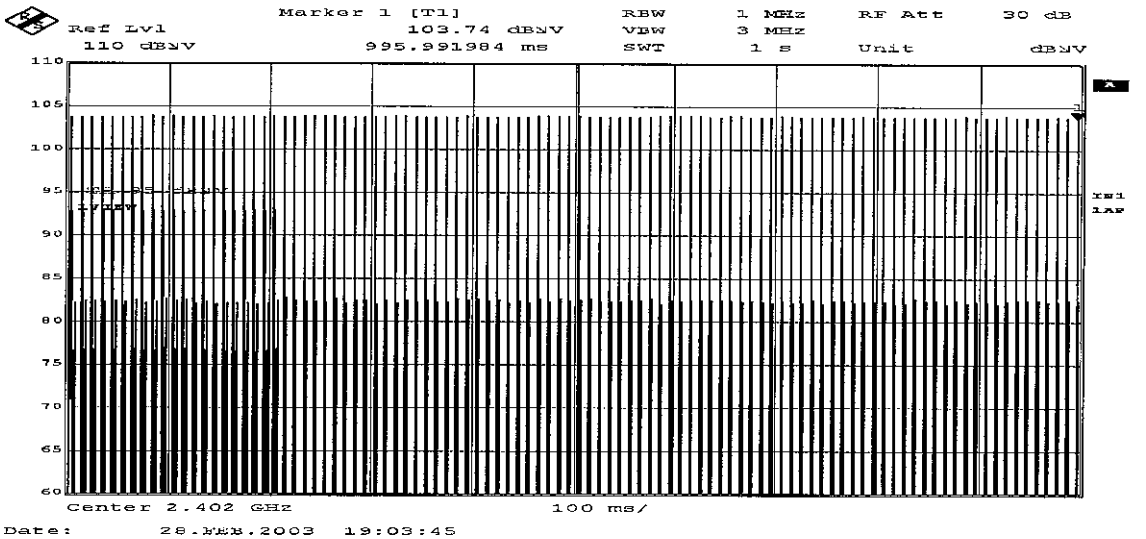
Count 1



Count 2



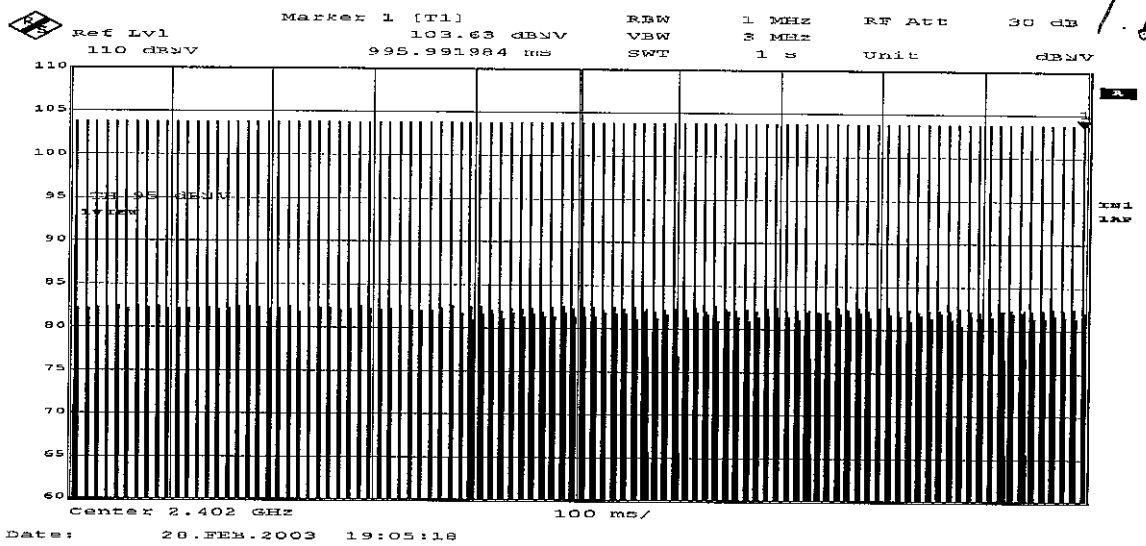
Count 3



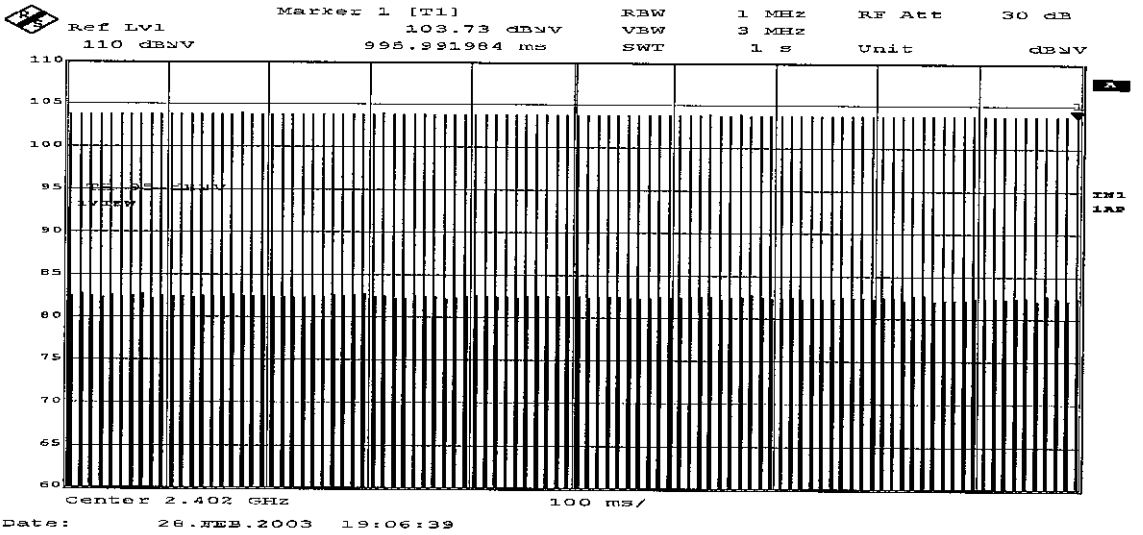
T. Imamura

Dwell Time and Duty Cycle: FCC 15.247(a)

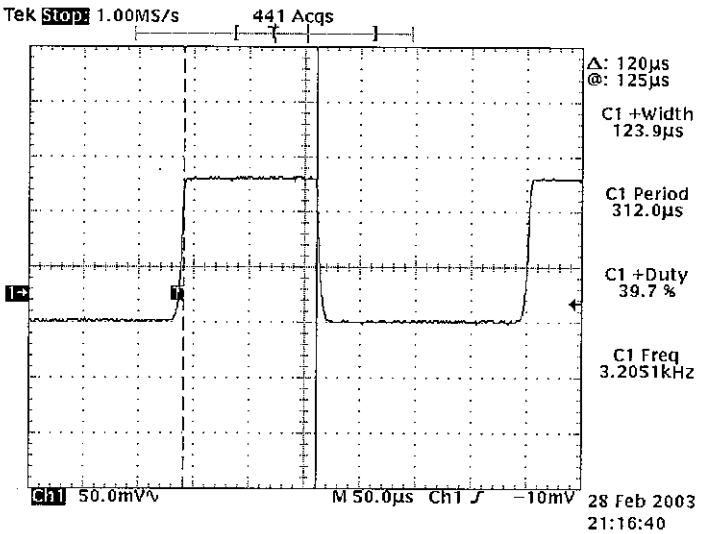
Count 4



Count 5



Duty cycle(Inquiry)

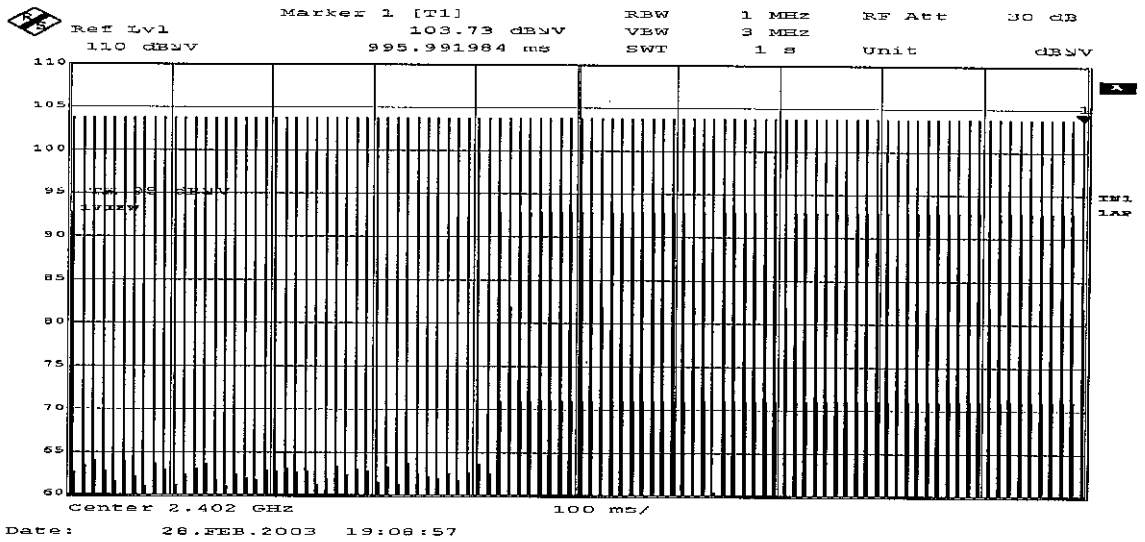


Dwell time = (Count 1 + Count1 2 + Count 3 + Count 4 + Count5) / 5 * 0.4x * Ton
= (100 + 100 + 100 + 100 + 100) / 5 * 12.8[s] * 120 [µs]
= 153.6 [ms]

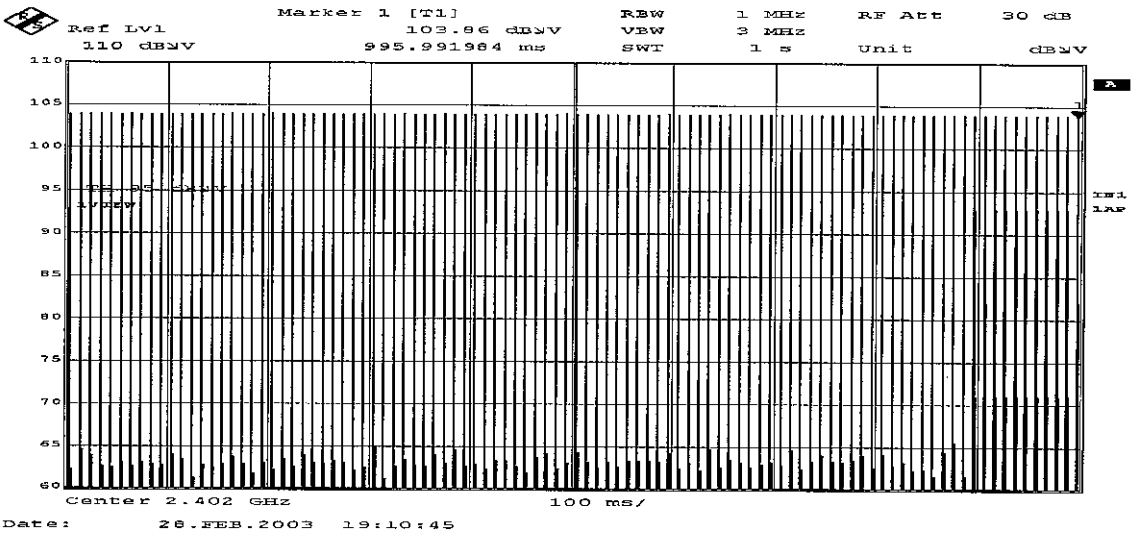
Note.0.4x = 0.4 * 32ch = 12.8[s]

T. Amamura

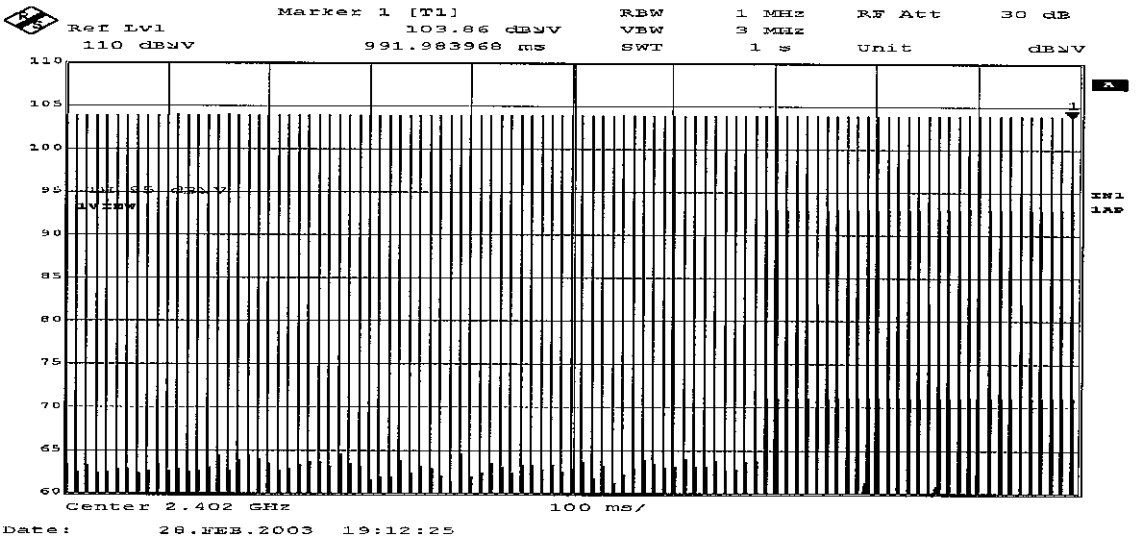
Dwell Time(Page)
Count 1



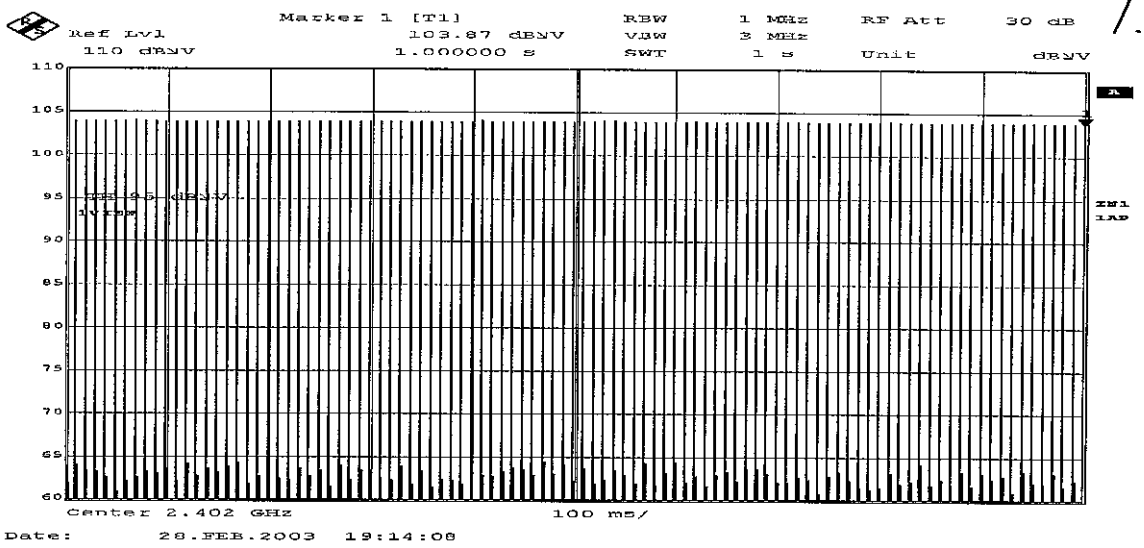
Count 2



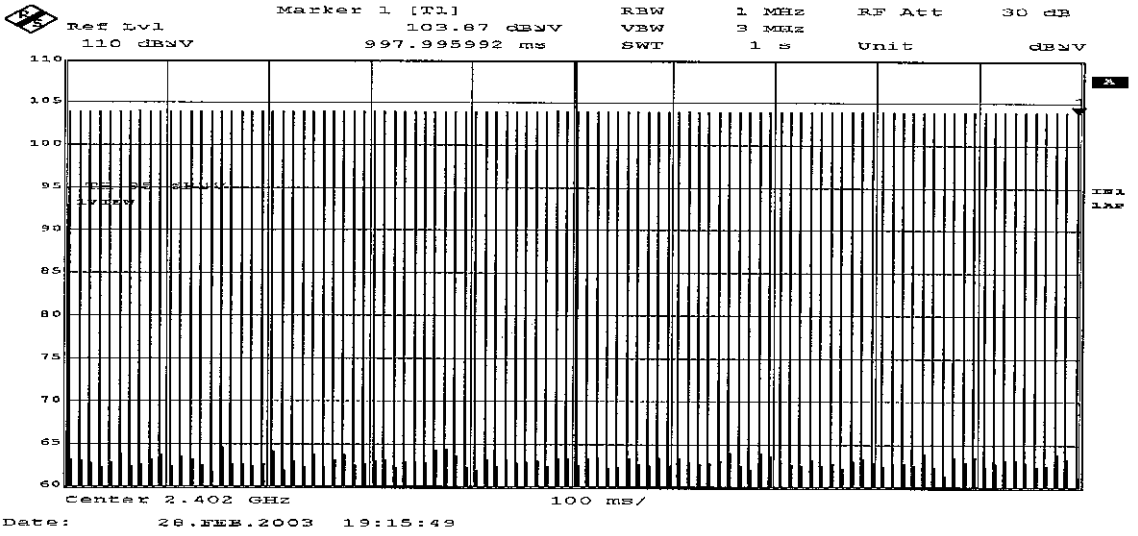
Count 3



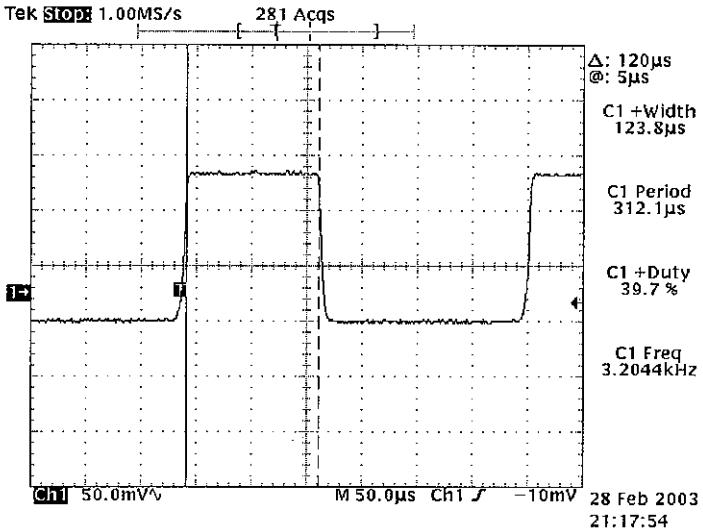
Count 4



Count 5



Duty cycle(Page)



Dwell time = (Count 1 + Count1 2 + Count 3 + Count 4 + Count5) / 5 * 0.4x * Tbn
= (100 + 100 + 100 + 100 + 100 + 100) / 5 * 12.8[s] * 120 [µs]
= 153.6 [ms]

Note. 0.4x = 0.4 * 32ch = 12.8[s]

Peak Out Put Power (Conducted)

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

COMPANY : Sony Corporation
EQUIPMENT : Bluetooth USB adapter
MODEL : PCGA-BA1
FCC ID : AK8PCGABA1
POWER : DC3.3V (PC:AC120V/60Hz)
Mode : Transmitting

REPORT NO : 23GE0035-YK-1
REGULATION : Fcc Part15SubpartC 247 (b) (1)
DATE : 2002/ 02/28
Temp./Humi. : 18℃/35%

ENGINEER : Toyokazu Imamura

CH or Mode	FREQ [GHz]	PM Reading [dBm]	Cable Loss [dB]	Results [dBm]	Limit [dBm]	MARGIN [dB]
Low	2402.00	0.32	0.20	0.52	30.0	29.48
High	2480.00	0.40	0.20	0.60	30.0	29.40
Inquiry	-	0.49	0.20	0.69	30.0	29.31
Page	-	0.57	0.20	0.77	30.0	29.23
Hopping	-	0.41	0.20	0.61	20.96	20.35

Limit:1W=30dBm
Limit (Hopping) :125mW=20.96dBm

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23GE0035-YK 1

Applicant	:	Sony Corporation
Kind of Equipment	:	Bluetooth USB adapter
Model No.	:	PCGA-BA1
Serial No.	:	
Power	:	AC120V/60Hz
Mode	:	Transmitting(2402MHz)
Remarks	:	
Date	:	2/26/2003
Test Distance	:	3 m
Temperature	:	21 ℃
Humidity	:	45 %
Regulation	:	FCC Part15C §15.209

Engineer : Ichiro Isozaki

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	61.90	BB	28.4	30.3	7.6	27.8	1.7	5.8	15.7	17.6	40.0	24.3	22.4
2.	160.99	BB	27.4	34.6	14.5	27.6	2.8	5.8	22.9	30.1	43.5	20.6	13.4
3.	250.01	BB	31.1	24.3	16.5	27.2	3.5	5.8	29.7	22.9	46.0	16.3	23.1
4.	497.81	BB	36.8	37.3	18.0	28.5	5.2	5.8	37.3	37.8	46.0	8.7	8.2
5.	516.11	BB	35.7	31.8	18.3	28.6	5.3	5.8	36.5	32.6	46.0	9.5	13.4
6.	522.25	BB	38.3	33.7	18.4	28.7	5.3	5.8	39.1	34.5	46.0	6.9	11.5
7.	546.82	BB	35.1	30.6	18.9	28.5	5.5	5.8	36.8	32.3	46.0	9.2	13.7

CALCULATION: READING[dBμV] + 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-04(ESVS10) ■CABLE:KCC-20/21/22/23/29

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23GE0035-YK

Applicant	:	Sony Corporation
Kind of Equipment	:	Bluetooth USB adapter
Model No.	:	PCGA-BA1
Serial No.	:	
Power	:	AC120V/60Hz
Mode	:	Transmitting(2480MHz)
Remarks	:	
Date	:	2/26/2003
Test Distance	:	3 m
Temperature	:	21 ℃
Humidity	:	45 %
Regulation	:	FCC Part15C §15.209

Engineer : Ichiro Isozaki

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	61.90	BB	29.1	31.0	7.6	27.8	1.7	5.8	16.4	18.3	40.0	23.6	21.7
2.	160.99	BB	27.1	31.2	14.5	27.6	2.8	5.8	22.6	26.7	43.5	20.9	16.8
3.	250.01	BB	31.2	24.8	16.5	27.2	3.5	5.8	29.8	23.4	46.0	16.2	22.6
4.	497.82	BB	34.2	39.0	18.0	28.5	5.2	5.8	34.7	39.5	46.0	11.3	6.5
5.	516.11	BB	35.2	32.1	18.3	28.6	5.3	5.8	36.0	32.9	46.0	10.0	13.1
6.	522.25	BB	37.7	33.8	18.4	28.7	5.3	5.8	38.5	34.6	46.0	7.5	11.4
7.	546.82	BB	35.0	30.6	18.9	28.5	5.5	5.8	36.7	32.3	46.0	9.3	13.7

CALCULATION: READING[dBμV] + 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-04(ESVS10) ■CABLE:KCC-20/21/22/23/29

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23GE0035-YK☞1

Applicant	:	Sony Corporation
Kind of Equipment	:	Bluetooth USB adapter
Model No.	:	PCGA-BA1
Serial No.	:	
Power	:	AC120V/60Hz
Mode	:	Transmitting(2402MHz)
Remarks	:	
Date	:	2/26/2003
Test Distance	:	3 m
Temperature	:	21 ℃
Humidity	:	45 %
Regulation	:	FCC Part15C §15.209(AV Detection)

Engineer : Ichiro Isozaki

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	2390.00	BB	31.2	31.2	29.7	34.9	2.4	10.0	38.4	38.4	54.0	15.6	15.6
2.	4804.00	BB	29.4	30.9	33.5	34.8	3.5	0.9	32.5	34.0	54.0	21.5	20.0
3.	7206.00	BB	29.5	29.7	38.0	34.8	4.2	0.6	37.5	37.7	54.0	16.5	16.3
4.	9608.00	BB	28.5	28.6	39.9	34.6	5.2	0.9	39.9	40.0	54.0	14.1	14.0
5.	12010.00	BB	28.5	28.6	42.8	34.5	5.6	0.5	42.9	43.0	54.0	11.1	11.0
6.	14412.00	BB	27.7	27.9	41.0	33.5	6.3	0.9	42.4	42.6	54.0	11.6	11.4
7.	16814.00	BB	27.3	27.4	41.1	33.3	6.5	1.2	42.8	42.9	54.0	11.2	11.1
8.	19216.00	BB	26.5	26.6	41.3	32.8	7.2	0.0	42.2	42.3	54.0	11.8	11.7
9.	21618.00	BB	28.1	28.1	41.5	32.4	7.5	0.0	44.7	44.7	54.0	9.3	9.3
10.	24020.00	BB	26.9	26.9	40.7	31.4	8.1	0.0	44.3	44.3	54.0	9.7	9.7

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

■ANTENNA:KHA-02(BBHA9120D)1-18GHz/KHA-04(3160-09)18-26.5GHz
■AMP:KAF-04(8449B) ■RECEIVER:KTR-01(ES140) ■CABLE:KCC-D3

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23GE0035-YK-1

Applicant	:	Sony Corporation
Kind of Equipment	:	Bluetooth USB adapter
Model No.	:	PCGA-BA1
Serial No.	:	
Power	:	AC120V/60Hz
Mode	:	Transmitting(2402MHz)
Remarks	:	
Date	:	2/26/2003
Test Distance	:	3 m
Temperature	:	21 ℃
Humidity	:	45 %
Regulation	:	FCC Part15C §15.209(PK Detection)

Engineer : Ichiro Isozaki

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	2390.00	BB	42.6	43.1	29.7	34.9	2.4	10.0	49.8	50.3	74.0	24.2	23.7
2.	4804.00	BB	42.3	43.4	33.5	34.8	3.5	0.9	45.4	46.5	74.0	28.6	27.5
3.	7206.00	BB	41.6	41.7	38.0	34.8	4.2	0.6	49.6	49.7	74.0	24.4	24.3
4.	9608.00	BB	39.7	39.1	39.9	34.6	5.2	0.9	51.1	50.5	74.0	22.9	23.5
5.	12010.00	BB	39.7	40.8	42.8	34.5	5.6	0.5	54.1	55.2	74.0	19.9	18.8
6.	14412.00	BB	38.8	38.9	41.0	33.5	6.3	0.9	53.5	53.6	74.0	20.5	20.4
7.	16814.00	BB	38.4	38.0	41.1	33.3	6.5	1.2	53.9	53.5	74.0	20.1	20.5
8.	19216.00	BB	36.6	37.9	41.3	32.8	7.2	0.0	52.3	53.6	74.0	21.7	20.4
9.	21618.00	BB	38.0	40.6	41.5	32.4	7.5	0.0	54.6	57.2	74.0	19.4	16.8
10.	24020.00	BB	36.8	38.0	40.7	31.4	8.1	0.0	54.2	55.4	74.0	19.8	18.6

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

■ANTENNA:KHA-02(BBHA9120D)1-18GHz/KHA-04(3160-09)18-26.5GHz
■AMP:KAF-04(8449B) ■RECEIVER:KTR-01(ESI40) ■CABLE:KCC-D3

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No.: 23GE0035-YK-1

Applicant	:	Sony Corporation
Kind of Equipment	:	Bluetooth USB adapter
Model No.	:	PCGA-BA1
Serial No.	:	
Power	:	AC120V/60Hz
Mode	:	Transmitting(2480MHz)
Remarks	:	
Date	:	2/26/2003
Test Distance	:	3 m
Temperature	:	21 ℃
Humidity	:	45 %
Regulation	:	FCC Part15C §15.209(AV Detection)

Engineer : Ichiro Isozaki

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	2483.50	BB	35.0	33.0	30.0	34.9	2.4	10.0	42.5	40.5	54.0	11.5	13.5
2.	4960.00	BB	29.1	29.2	34.0	34.6	3.5	1.0	33.0	33.1	54.0	21.0	20.9
3.	7440.00	BB	29.6	19.6	39.2	34.5	4.3	0.5	39.1	29.1	54.0	14.9	24.9
4.	9920.00	BB	28.4	28.4	39.6	34.4	5.4	1.1	40.1	40.1	54.0	13.9	13.9
5.	12400.00	BB	28.8	28.8	42.2	34.2	5.7	0.6	43.1	43.1	54.0	10.9	10.9
6.	14880.00	BB	28.9	27.8	41.7	33.8	6.5	0.9	44.2	43.1	54.0	9.8	10.9
7.	17360.00	BB	26.8	27.9	42.9	33.4	6.7	0.9	43.9	45.0	54.0	10.1	9.0
8.	19840.00	BB	26.6	26.6	40.9	33.6	7.5	0.0	41.4	41.4	54.0	12.6	12.6
9.	22320.00	BB	28.0	28.0	41.6	32.9	7.2	0.0	43.9	43.9	54.0	10.1	10.1
10.	24800.00	BB	27.2	27.1	41.0	30.4	8.3	0.0	46.1	46.0	54.0	7.9	8.0

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

■ANTENNA:KHA-02(BBHA9120D)1-18GHz/KHA-04(3160-09)18-26.5GHz
■AMP:KAF-04(8449B) ■RECEIVER:KTR-01(ESI40) ■CABLE:KCC-D3

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23GE0035-YK-1

Applicant	:	Sony Corporation
Kind of Equipment	:	Bluetooth USB adapter
Model No.	:	PCGA-BAI
Serial No.	:	
Power	:	AC120V/60Hz
Mode	:	Transmitting(2480MHz)
Remarks	:	
Date	:	2/26/2003
Test Distance	:	3 m
Temperature	:	21 ℃
Humidity	:	45 %
Regulation	:	FCC Part15C §15.209(PK Detection)

Engineer : Ichiro Isozaki

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	2483.50	BB	52.1	44.8	30.0	34.9	2.4	10.0	59.6	52.3	74.0	14.4	21.7
2.	4960.00	BB	41.0	41.8	34.0	34.6	3.5	10.0	53.9	54.7	74.0	20.1	19.3
3.	7440.00	BB	41.7	40.6	39.2	34.5	4.3	0.5	51.2	50.1	74.0	22.8	23.9
4.	9920.00	BB	40.3	40.4	39.6	34.4	5.4	1.1	52.0	52.1	74.0	22.0	21.9
5.	12400.00	BB	39.8	40.5	42.2	34.2	5.7	0.6	54.1	54.8	74.0	19.9	19.2
6.	14880.00	BB	38.7	38.5	41.7	33.8	6.5	0.9	54.0	53.8	74.0	20.0	20.2
7.	17360.00	BB	38.6	38.1	42.9	33.4	6.7	0.9	55.7	55.2	74.0	18.3	18.8
8.	19840.00	BB	37.6	38.8	40.9	33.6	7.5	0.0	52.4	53.6	74.0	21.6	20.4
9.	22320.00	BB	38.6	39.9	41.6	32.9	7.2	0.0	54.5	55.8	74.0	19.5	18.2
10.	24800.00	BB	37.4	38.2	41.0	30.4	8.3	0.0	56.3	57.1	74.0	17.7	16.9

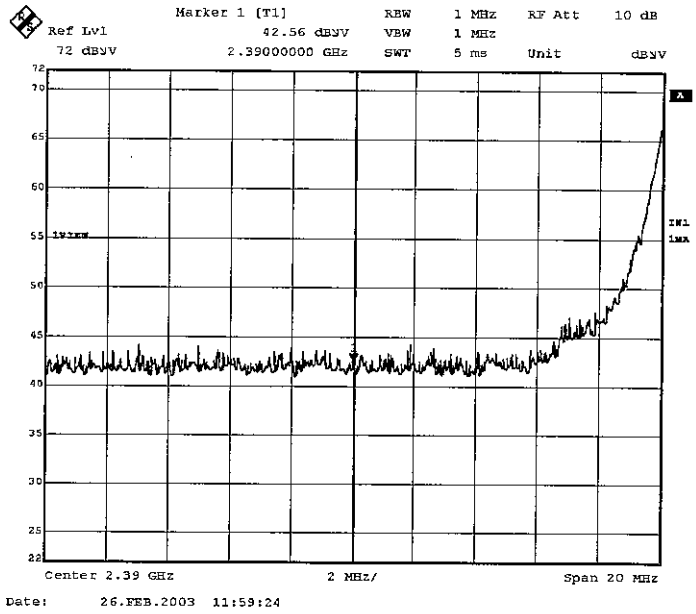
CALCULATION: READING[dBμV] + ANT.FACTOR[dB/m] + CABLE LOSS[dB] - AMP.GAIN[dB] + ATTEN[dB].

■ANTENNA:KHA-02(BBHA9120D)1-18GHz/KHA-04(3160-09)18-26.5GHz
■AMP:KAF-04(8449B) ■RECEIVER:KTR-01(ESI40) ■CABLE:KCC-D3

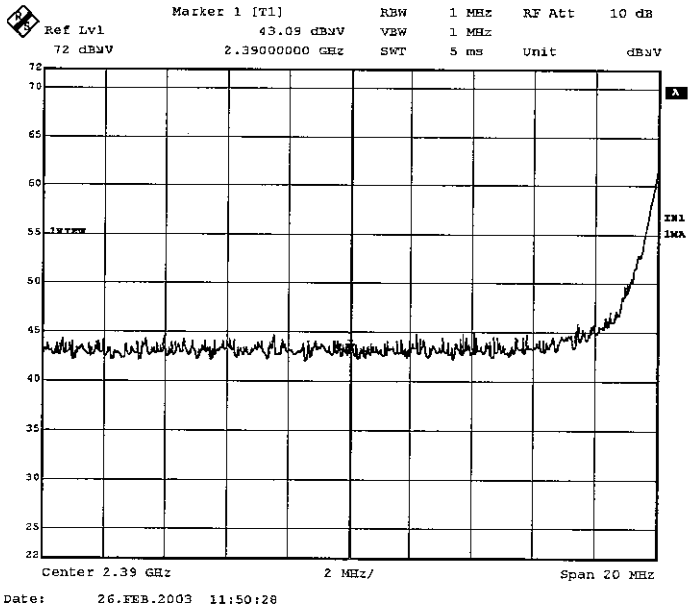
T. Imamura

2.39GHz (Ch :2402MHz)

1. Horizontal/ PK

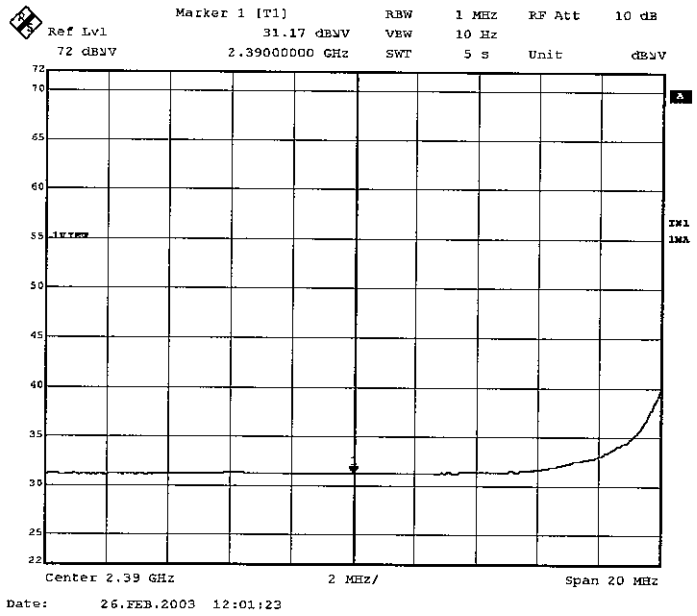


2. Vertical/ PK

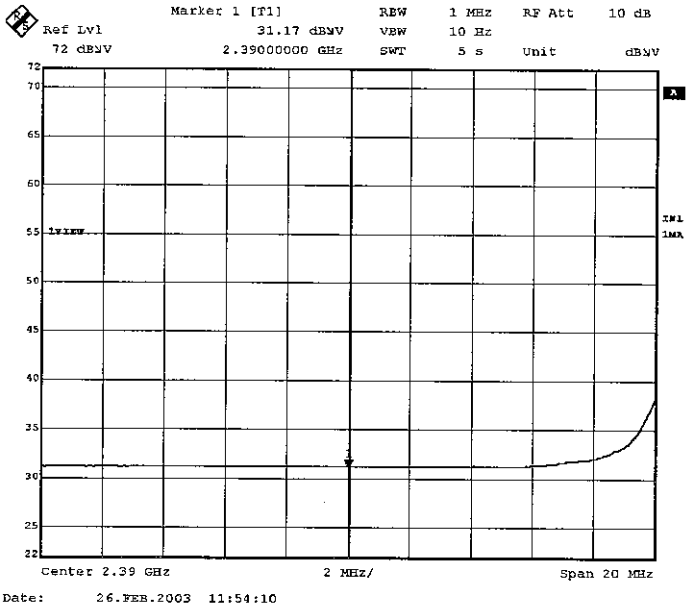


T. Imamura

3. Horizontal/ AV



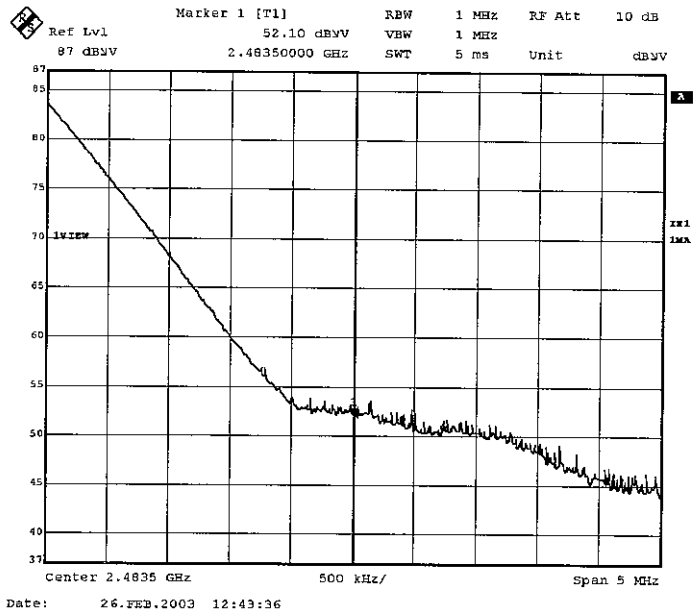
4. Vertical/ AV



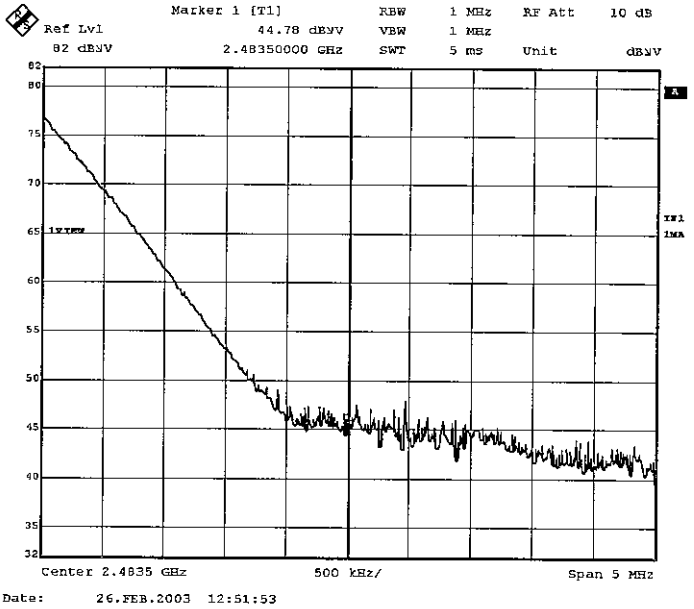
T. Imamura

2.4835GHz (Ch :2480MHz)

1. Horizontal/ PK

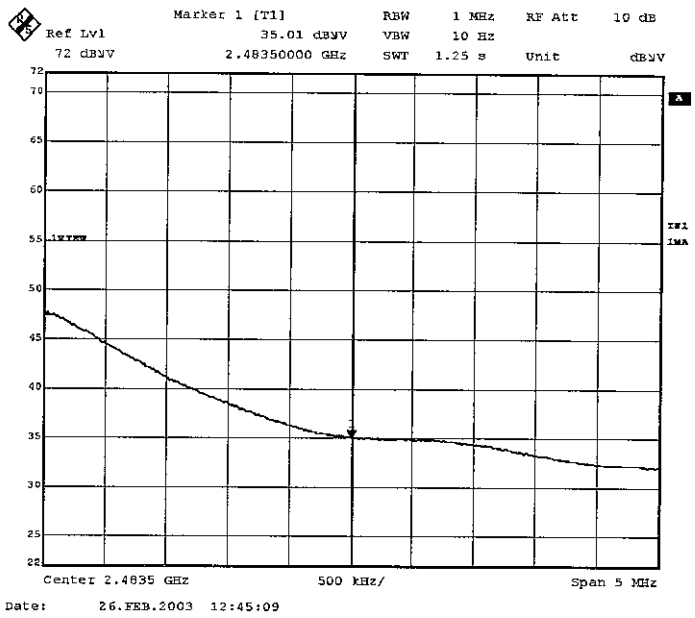


2. Vertical/ PK

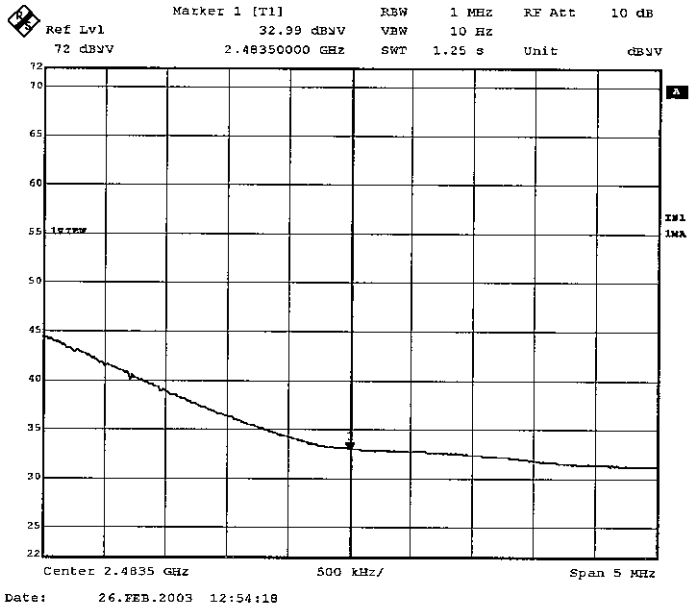


T. Imamura

3. Horizontal/ AV



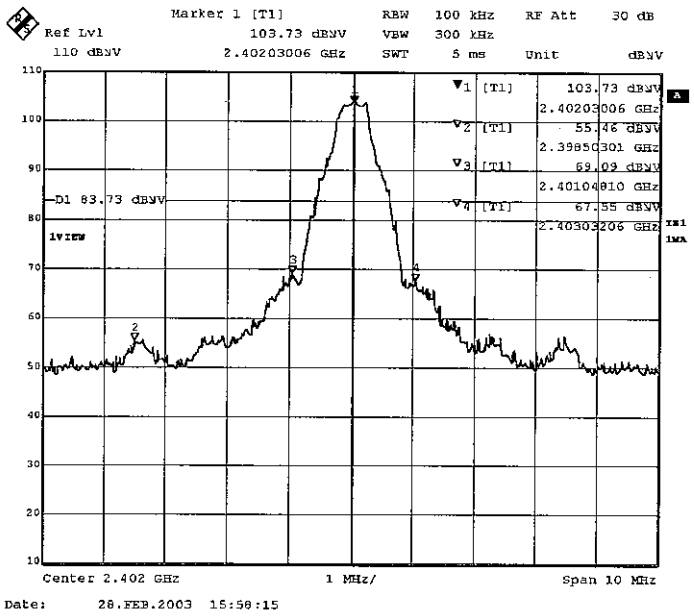
4. Vertical/ AV



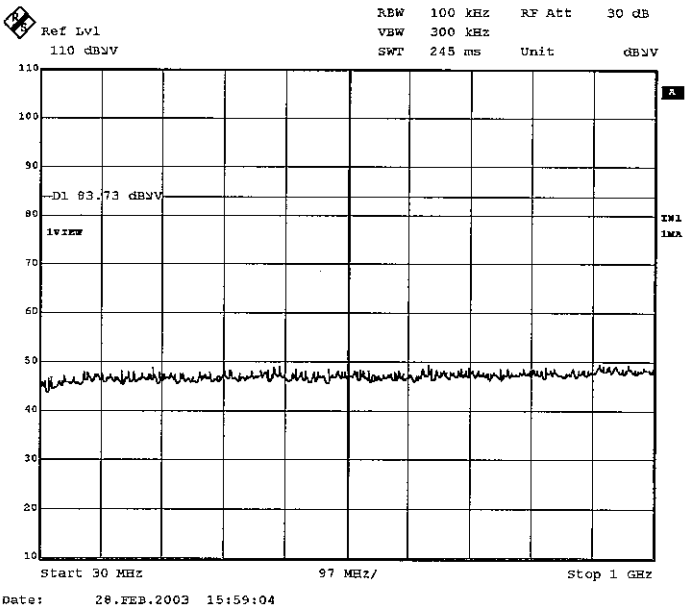
Ch Low: 2402MHz

1.

T. Imamura

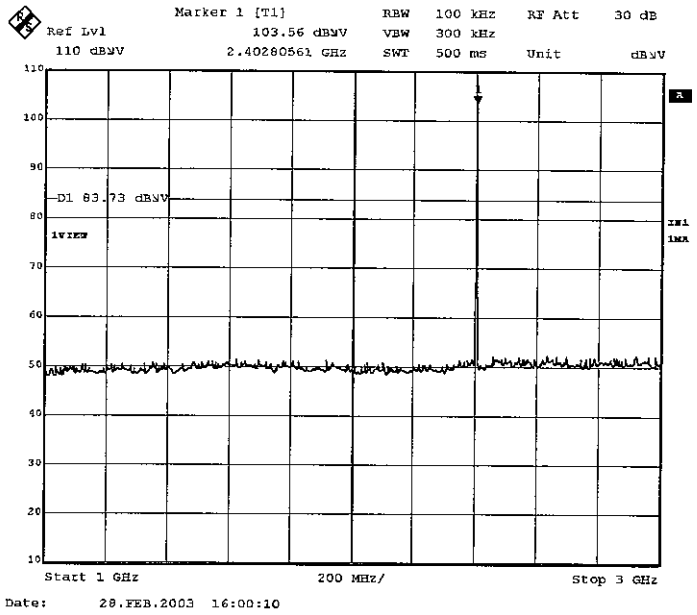


2.

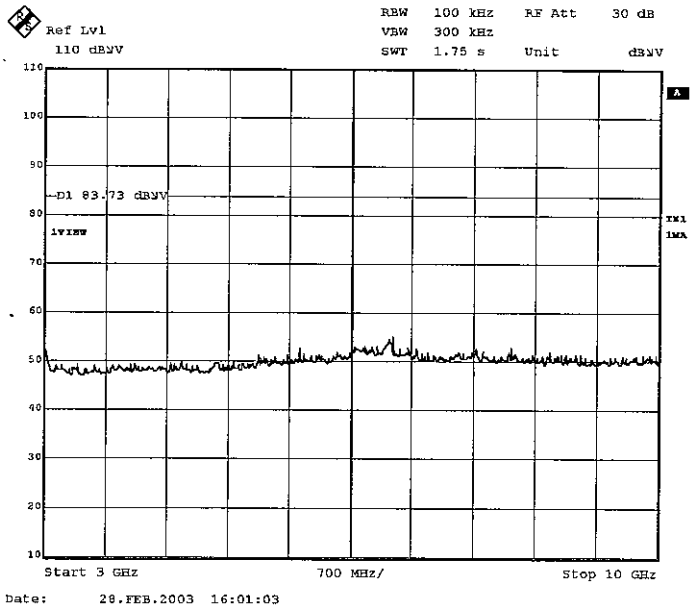


3.

T. Imamura

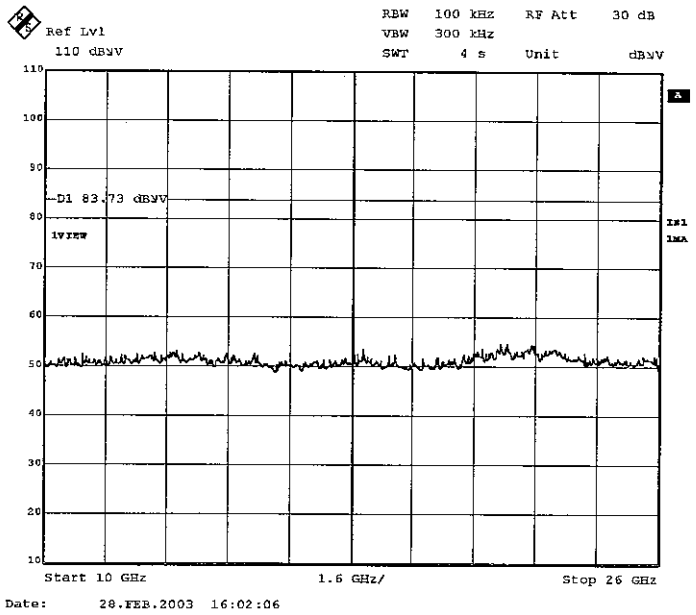

Marker 1 [T1]
Ref Lvl
110 dBµV
103.56 dBµV
2.40280561 GHz
RBW 100 kHz
VBW 300 kHz
SWT 500 ms
RF Att 30 dB
Unit dBµV
D1 83.73 dBµV
1VIEW
Start 1 GHz
200 MHz/
Stop 3 GHz
Date: 28.FEB.2003 16:00:10

4.


Ref Lvl
110 dBµV
RBW 100 kHz
VBW 300 kHz
SWT 1.75 s
RF Att 30 dB
Unit dBµV
D1 83.73 dBµV
1VIEW
Start 3 GHz
700 MHz/
Stop 10 GHz
Date: 28.FEB.2003 16:01:03

5.

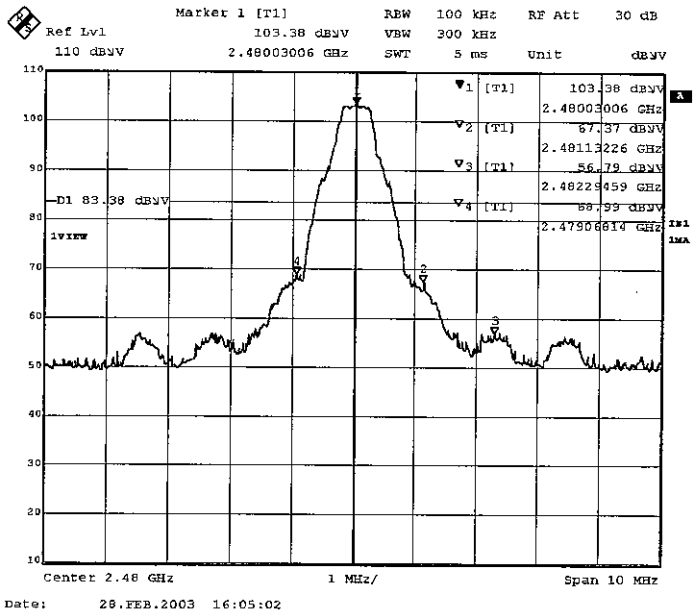
T. Imamura


RBW 100 kHz
RF Att 30 dB
VBW 300 kHz
SWT 4 s
Unit dBµV
Ref Lvl
110 dBµV
D1 83.73 dBµV
1VIEW
1MA
Start 10 GHz
1.6 GHz/
Stop 26 GHz
Date: 28.FEB.2003 16:02:06

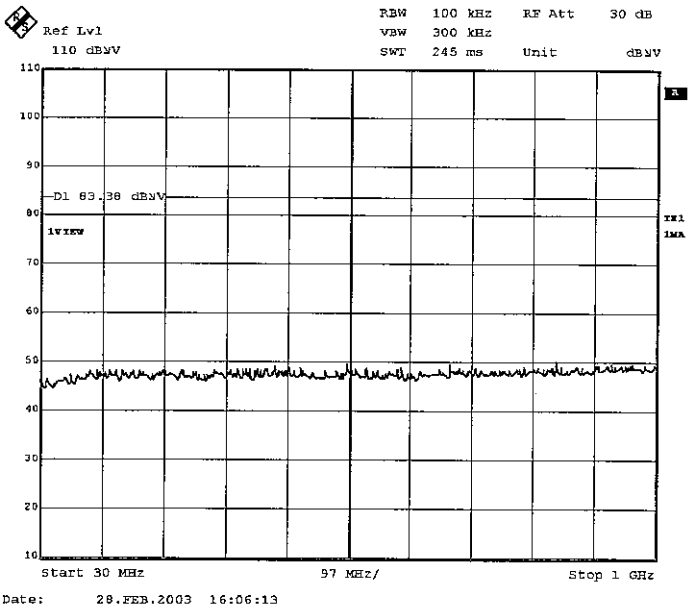
Ch High: 2480MHz

1.

T. Imamura

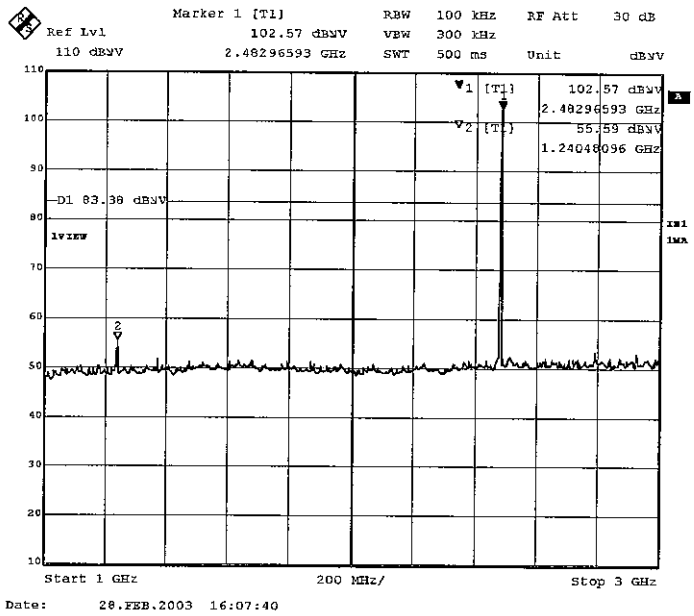


2.

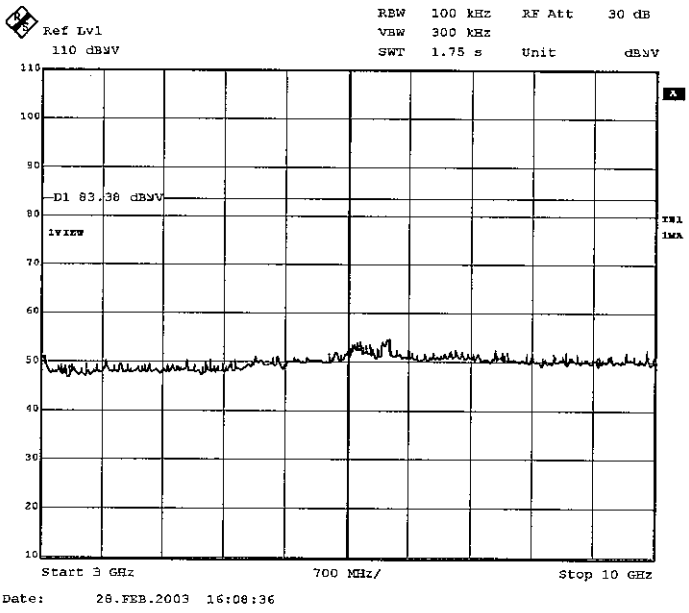


3.

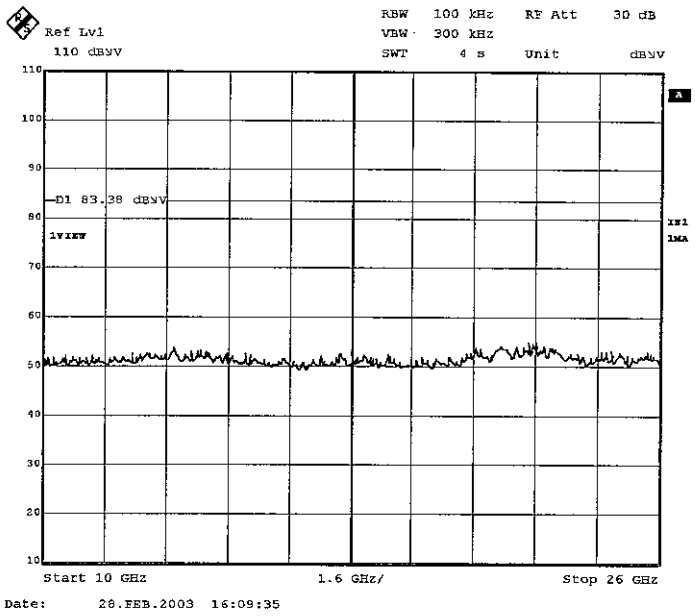
T. Imamura


Marker 1 [T1]
RBW 100 kHz
RF Att 30 dB
Ref Lvl
102.57 dBµV
VBW 300 kHz
110 dBµV
2.48296593 GHz
SWT 500 ms
Unit dBµV
1 [T1] 102.57 dBµV
2.48296593 GHz
2 [T2] 55.59 dBµV
1.24048096 GHz
D1 83.38 dBµV
1VIEW
Start 1 GHz
200 MHz/
Stop 3 GHz
Date: 28.FEB.2003 16:07:40

4.


RBW 100 kHz
RF Att 30 dB
Ref Lvl
VBW 300 kHz
110 dBµV
SWT 1.75 s
Unit dBµV
D1 83.38 dBµV
1VIEW
Start 3 GHz
700 MHz/
Stop 10 GHz
Date: 28.FEB.2003 16:08:36

5.


RBW 100 kHz
RF Att 30 dB
VBW 300 kHz
Ref Lvl
110 dBµV
SWT 4 s
Unit dBµV
D1 83.38 dBµV
1VIEW
Start 10 GHz
1.6 GHz/
Stop 26 GHz
Date: 28.FEB.2003 16:09:35

Test Report No : 23GE0035-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-20/21/22/23/29	Coaxial Cable	Fujikura/Suhner	8D-2W/12D-SFA/S04272B/S04272B	RE	2002/09/17 * 12
KCC-24/25/26/28/KPL-02	Coaxial Cable/Pulse Limitter	Fujikura/Suhner/PMM	5D-2W/5D-2W/S04272B/S04272B/PL01	CE	2002/09/17 * 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
KDT-01	Coaxial Crystal Detector	Agilent	8473C	AT	2002/04/22 * 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
KPM-05	Power meter	Agilent	E4417A	AT	2003/02/17 * 12
KSA-02	Spectrum Analyzer	Advantest	R3265A	CE/RE	2002/11/29 * 12
KTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE/AT	2002/07/22 * 12
KTR-03	Test Receiver	Rohde & Schwarz	ESHS10	CE	2002/05/14 * 12
KTR-04	Test Receiver	Rohde & Schwarz	ESVS10	RE	2002/10/09 * 12
PS-03	Power sensor	Agilent	E9327A	AT	2002/03/12 * 12
KST-01	Digitizing Oscilloscope	Tektronix	TDS420A	AT	2002/08/21 * 12

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

Test Item:

CE: Conducted emission,
RE: Radiated emission,
AT: Antenna terminal.