



EMI TEST REPORT

Test Report No. : 23KE0041-YK-4

Applicant : NIHON KOHDEN CORPORATION

Type of Equipment : Telemetry Unit

Model No. : ZB-101AA


FCC ID : B6BZB-101AA


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: July 3 and 4, 2003

Tested by: 
Ichiro Isozaki

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

UL Apex Co., Ltd.

YAMAKITA EMC LAB.

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

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MF060b(10.04.03)

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1 GENERAL INFORMATION

Company Name : NIHON KOHDEN CORPORATION
Brand Name : NIHON KOHDEN
Address : 1-31-4 Nishiochiai Shinjuku-ku, Tokyo, 161-8560 Japan
Telephone Number : +81 3 5996 8066
Facsimile Number : +81 3 5996 8103
Contact Person : Kazuteru Yanagihara
Type of Equipment : Telemetry Unit
Model No. : ZB-101AA
Serial No. : 91002
Rating : DC9V (The EUT is operated by battery)
Country of Manufacture : Japan
Receipt Date of Sample : June 30, 2003
Condition of E.U.T. : Production prototype
Regulation(s) : FCC Part15 Subpart C, Section 15.247
Test Site : UL Apex Yamakita EMC Lab. 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.
(No.1 Open Test Site Registration No.: 95486)
NVLAP Lab. code : 200441-0

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2 PRODUCT DESCRIPTION

Model: ZB-101AA, (referred to as the EUT in this report), is a Telemetry Unit.

Clock frequency used in EUT : 2MHz, 16MHz, 44MHz

Frequency Characteristics : 2412 - 2462MHz
Channel Characteristics : 11 channel selectable by 5MHz spacing
Modulation : DBPSK, DQPSK, CCK
Antenna Type : C-coupling exciter circuit antenna
Antenna Gain : MAX2.15dBi
ITU Emission Code(s) : G1D
Power Supply : DC 3.3V±0.3V
Operation Temperature range : 10 - 40 deg. C.
Antenna Connector Type : none

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

The host device ZB-101AA provides the Wireless LAN module with stable power supply (DC3.3V), and the power is not changed when voltage of the Telemetry Unit is varied.
Therefore, the Telemetry Unit power supply regulation.

***FCC Part 15.203 Antenna requirement**

The EUT uses a transmitting antenna that is an integral part of the equipment, it is impossible for end users to replace the antenna without use of a special tool. Therefore, the equipment complies with the requirement of 15.203.

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3 SYSTEM TEST CONFIGURATION

3.1 Justification

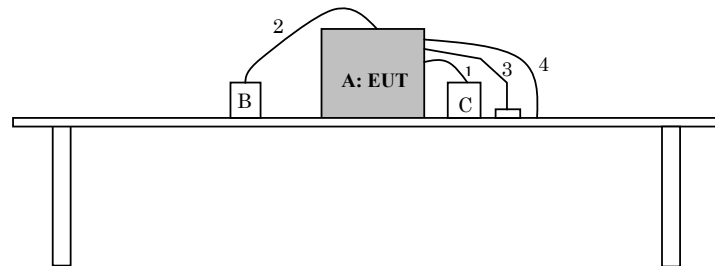
The system was configured in typical fashion (as a customer would normally use it) for testing.

Test mode:

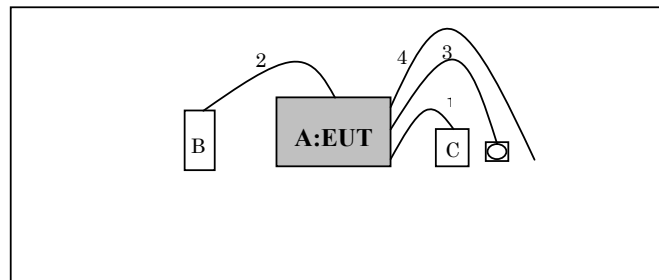
1. Transmitting 2412MHz (Low)
2. Transmitting 2437MHz (Middle)
3. Transmitting 2462MHz (High)

3.2 Configuration of Tested System

Front View



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	Telemetry Unit	ZB-101AA	91002	NIHON KOHDEN	B6BZB-101AA	EUT
B	ELECTRODE JUNCTION BOX	JE-011A	91002	NIHON KOHDEN	-	-
C	SpO2 ADAPTER	JL-101A	91002	NIHON KOHDEN	-	-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	SpO2 ADAPTER Cable	0.9	Shielded	Polyvinyl chloride
2	HDR-AS-0076-L(50CM)	0.7	Shielded	Polyvinyl chloride
3	EXTERNAL EVENT KEY	0.7	Shielded	Polyvinyl chloride
4	DC Cable	1.0	Shielded	Polyvinyl chloride

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4 MEASUREMENT UNCERTAINTY

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 result is within Yamakita EMC lab's uncertainty.

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5 SUMMARY OF TESTS

5.1 §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 13
Test result : Pass
Test instruments : KTR-01, KCC-D7

5.2 § 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 14
Test result : Pass
Test instruments : KPM-05, KPSS-01

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5.3 § 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.

In 30-1000MHz, X axis was worst under both vertical and horizontal polarization.

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

See the photographs in page 12.

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) (2037.99MHz, 2062.99MHz and 2087.99MHz) are >20dB lower than fundamental waves.

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

Test data : APPENDIX Page 15 to 17 (30 - 1000MHz)
 : APPENDIX Page 18 to 23 (1 - 26GHz)
 : APPENDIX Page 24 to 29
 (Out of Band Emission :2038MHz, 2063MHz and 2088MHz)
 : APPENDIX Page 30 to 33
 (Band Edges: 2390MHz/ 2483.5MHz, Restricted band Charts)

Photographs of test setup: Page 11

Test result : Pass

Test instruments: KAF-01, KAF-02, KAT10-S1, KAT6-01, KBA-03, KTR-01, KTR-02, KFL-01
 KCC-10/11/12/13/18, KCC-D3/D7, KHA-01, KLA-01, KOTS-01, KSA-01

5.4 § 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 34 to 39
Test result : Pass
Test instruments : KTR-01, KCC-D7

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5.5 § 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 40 to 41

Test result : Pass

Test instruments : KTR-01, KCC-D7

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APPENDIX 1: Photographs of test setup

- 1. Page 11 : Radiated emission
- 2. Page 12 : Pre check of worse-case position

APPENDIX 2: Test Data

- 1. Page 13 : 6dB Bandwidth (Antenna Port Conducted)
- 2. Page 14 : Maximum Peak Power (Antenna Port Conducted)
- 3. Page 15 - 33 : Out Band of Emissions (Radiated)
- 4. Page 34 - 39 : Out Band of Emissions (Antenna Port Conducted)
- 5. Page 40 - 41 : Power Density (Antenna Port Conducted)

APPENDIX 3: Test instruments

- Page 42 : Test instruments

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YAMAKITA EMC LAB.

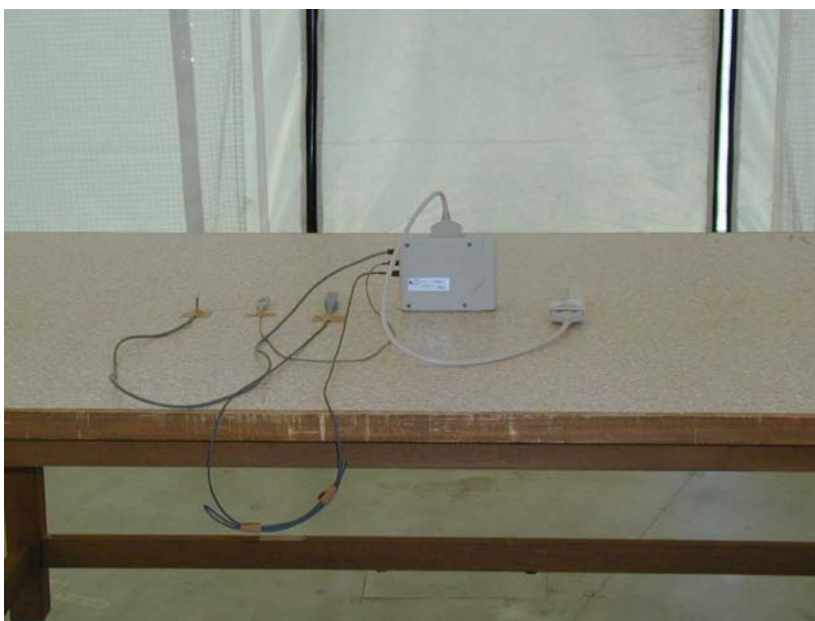
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Radiated emission



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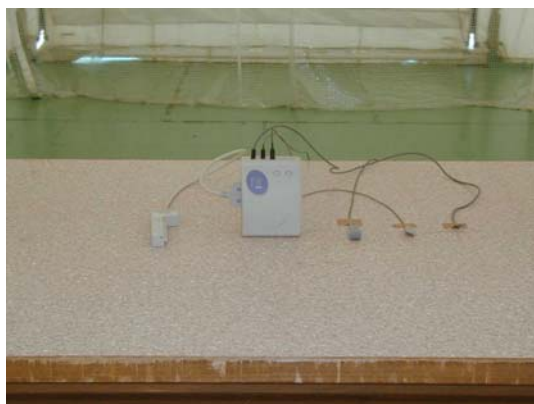
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Pre check of worse-case position

X axis



Y axis



Z axis



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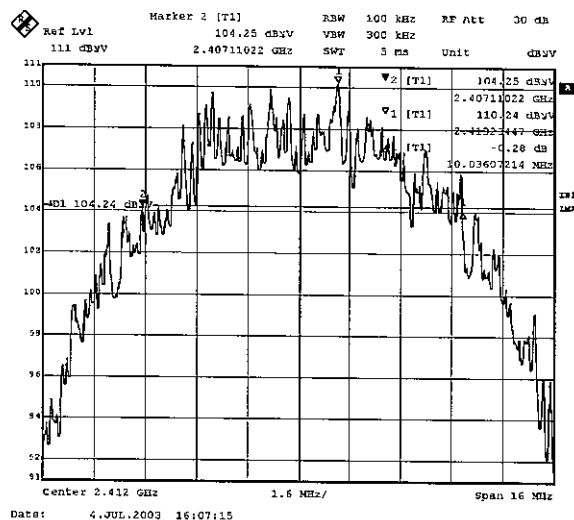
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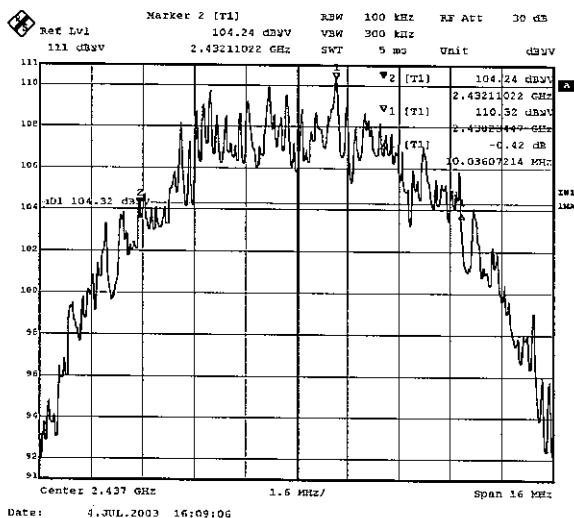
Facsimile: +81 465 77 2112

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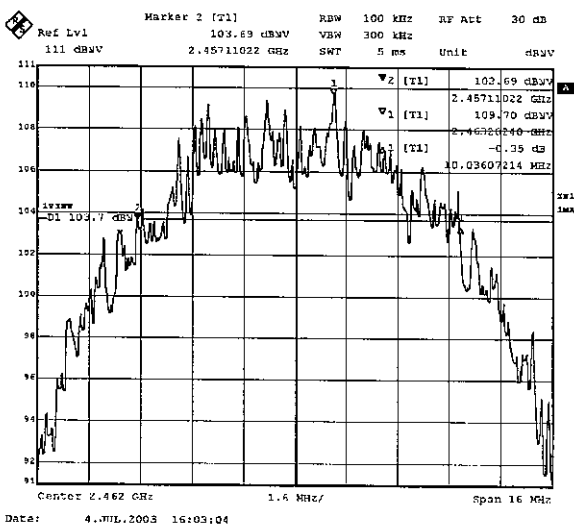
1. Ch Low:2412MHz

U. Suzuki

2. Ch Mid:2437MHz



3. Ch High:2462MHz



Peak Out Put Power(Conducted)

UL Apex Co., Ltd.

YAMAKITA EMC NO.1 OPEN SITE

COMPANY : NIHON KOHDEN CORPORATION

EQUIPMENT : Telemetry Unit

MODEL : ZB-101AA

FCC ID : B6BZB-101AA

POWER : DC9V

Mode : Transmitting

REPORT NO : 23KE0041-YK-4

REGULATION : Fcc Part15SubpartC 247(b)

DATE : 2003/ 07/04

Temp./Humi. : 24°C/59%


ENGINEER : Ichiro Isozaki

CH	FREQ [MHz]	PM Reading [dBm]	Cable Loss [dB]	Results [dBm]	Limit (1W) [dBm]	MARGIN [dB]
Low	2412.00	15.70	0.35	16.05	30.0	13.95
Mid	2437.00	15.70	0.35	16.05	30.0	13.95
High	2462.00	15.10	0.35	15.45	30.0	14.55

DATA OF RADIATION TEST

UL Apex Co., Ltd.

Yamakita No.1 Open Test Site

Report No. : 23KE0041-YK- 4

Applicant : NIHON KOHDEN CORPORATION
 Kind of Equipment : Telemetry Unit
 Model No. : ZB-101AA
 Serial No. : 91002
 Power : DC9V
 Mode : Transmitting (2412MHz)
 Remarks :
 Date : 7/3/2003
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 68 %
 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.	99.01	BB	38.1	40.6	10.0	28.4	2.6	6.0	28.3	30.8	43.5	15.2	12.7
2.	121.01	BB	46.2	41.8	13.6	28.4	2.8	6.1	40.3	35.9	43.5	3.2	7.6
3.	143.01	BB	35.5	38.6	14.7	28.3	3.1	6.1	31.1	34.2	43.5	12.4	9.3
4.	176.03	BB	44.6	30.6	16.1	28.1	3.4	6.1	42.1	28.1	43.5	1.4	15.4
5.	198.02	BB	42.9	28.4	16.4	28.1	3.6	6.1	40.9	26.4	43.5	2.6	17.1
6.	209.00	BB	42.5	32.8	16.5	28.1	3.8	6.1	40.8	31.1	43.5	2.7	12.4
7.	231.01	BB	41.6	33.9	16.8	28.0	4.0	6.1	40.5	32.8	46.0	5.5	13.2
8.	308.02	BB	42.9	34.5	14.7	27.9	4.7	6.1	40.5	32.1	46.0	5.5	13.9
9.	319.01	BB	45.0	34.0	15.1	27.9	4.8	6.1	43.1	32.1	46.0	2.9	13.9
10.	341.01	BB	41.6	31.1	15.7	28.0	5.0	6.1	40.4	29.9	46.0	5.6	16.1
11.	781.01	BB	29.6	28.2	21.3	29.2	8.1	6.1	35.9	34.5	46.0	10.1	11.5

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

■ANTENNA: KBA-03 (BBA9106) 30-299. 99MHz/KLA-01 (USLP9143) 300-1000MHz

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


DATA OF RADIATION TEST

UL Apex Co., Ltd.

Yamakita No.1 Open Test Site

Report No. : 23KE0041-YK- 4

Applicant : NIHON KOHDEN CORPORATION
 Kind of Equipment : Telemetry Unit
 Model No. : ZB-101AA
 Serial No. : 91002
 Power : DC9V
 Mode : Transmitting (2437MHz)
 Remarks :
 Date : 7/3/2003
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 68 %
 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.	99.01	BB	37.9	40.5	10.0	28.4	2.6	6.0	28.1	30.7	43.5	15.4	12.8
2.	121.01	BB	47.4	40.3	13.6	28.4	2.8	6.1	41.5	34.4	43.5	2.0	9.1
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4.	176.03	BB	44.9	31.5	16.1	28.1	3.4	6.1	42.4	29.0	43.5	1.1	14.5
5.	198.01	BB	44.6	32.4	16.4	28.1	3.6	6.1	42.6	30.4	43.5	0.9	13.1
6.	209.00	BB	42.0	31.4	16.5	28.1	3.8	6.1	40.3	29.7	43.5	3.2	13.8
7.	231.01	BB	42.9	34.9	16.8	28.0	4.0	6.1	41.8	33.8	46.0	4.2	12.2
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10.	341.01	BB	41.5	35.7	15.7	28.0	5.0	6.1	40.3	34.5	46.0	5.7	11.5
11.	781.01	BB	28.6	28.3	21.3	29.2	8.1	6.1	34.9	34.6	46.0	11.1	11.4

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

■ ANTENNA: KBA-03 (BBA9106) 30-299.99MHz/KLA-01 (USLP9143) 300-1000MHz

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

DATA OF RADIATION TEST

UL Apex Co., Ltd.

Yamakita No.1 Open Test Site

Report No. : 23KE0041-YK- 4

Applicant : NIHON KOHDEN CORPORATION
 Kind of Equipment : Telemetry Unit
 Model No. : ZB-101AA
 Serial No. : 91002
 Power : DC9V
 Mode : Transmitting (2462MHz)
 Remarks :
 Date : 7/3/2003
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 68 %
 Regulation : FCC Part15C § 15.209


 Engineer : Ichiro Isozaki

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR	AMP GAIN	CABLE LOSS	ATTEN.	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.	99.01	BB	37.0	40.6	10.0	28.4	2.6	6.0	27.2	30.8	43.5	16.3	12.7
2.	121.01	BB	40.1	41.6	13.6	28.4	2.8	6.1	34.2	35.7	43.5	9.3	7.8
3.	143.01	BB	36.2	37.2	14.7	28.3	3.1	6.1	31.8	32.8	43.5	11.7	10.7
4.	176.02	BB	43.2	30.9	16.1	28.1	3.4	6.1	40.7	28.4	43.5	2.8	15.1
5.	198.01	BB	45.3	34.5	16.4	28.1	3.6	6.1	43.3	32.5	43.5	0.2	11.0
6.	209.01	BB	43.2	32.3	16.5	28.1	3.8	6.1	41.5	30.6	43.5	2.0	12.9
7.	231.01	BB	41.6	34.1	16.8	28.0	4.0	6.1	40.5	33.0	46.0	5.5	13.0
8.	308.02	BB	42.8	37.5	14.7	27.9	4.7	6.1	40.4	35.1	46.0	5.6	10.9
9.	319.01	BB	42.3	37.7	15.1	27.9	4.8	6.1	40.4	35.8	46.0	5.6	10.2
10.	341.01	BB	40.7	33.8	15.7	28.0	5.0	6.1	39.5	32.6	46.0	6.5	13.4
11.	781.01	BB	29.8	29.3	21.3	29.2	8.1	6.1	36.1	35.6	46.0	9.9	10.4

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

■ ANTENNA: KBA-03 (BBA9106) 30-299.99MHz/KLA-01 (USLP9143) 300-1000MHz

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

DATA OF RADIATION TEST

UL Apex Co., Ltd.

Yamakita No.1 Open Test Site

Report No. : 23KE0041-YK- 4

Applicant : NIHON KOHDEN CORPORATION
 Kind of Equipment : Telemetry Unit
 Model No. : ZB-101AA
 Serial No. : 91002
 Power : DC9V
 Mode : Transmitting (2412MHz)
 Remarks :
 Date : 7/3/2003
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 68 %
 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.	2037.99	BB	59.5	57.9	30.6	36.9	3.9	10.0	67.1	65.5	74.0	6.9	8.5
2.	2301.97	BB	51.9	49.4	30.6	36.9	4.0	10.0	59.6	57.1	74.0	14.4	16.9
3.	2346.06	BB	52.6	48.6	30.6	36.9	4.1	10.0	60.4	56.4	74.0	13.6	17.6
4.	2390.00	BB	53.8	51.0	30.6	36.9	4.1	10.0	61.6	58.8	74.0	12.4	15.2
5.	4075.97	BB	48.8	46.8	33.0	36.2	5.4	0.7	51.7	49.7	74.0	22.3	24.3
6.	4824.00	BB	44.1	43.1	34.7	35.2	5.6	0.6	49.8	48.8	74.0	24.2	25.2
7.	7236.00	BB	43.6	44.1	37.7	36.8	6.5	0.5	51.5	52.0	74.0	22.5	22.0
8.	8151.93	BB	46.7	47.8	37.8	37.0	6.7	0.6	54.8	55.9	74.0	19.2	18.1
9.	9648.00	BB	45.2	46.3	39.0	36.9	7.2	0.5	55.0	56.1	74.0	19.0	17.9
10.	12060.00	BB	44.5	43.6	42.1	36.3	8.1	0.5	58.9	58.0	74.0	15.1	16.0
11.	14472.00	BB	43.5	43.3	41.2	35.2	7.3	0.2	57.0	56.8	74.0	17.0	17.2
12.	16884.00	BB	44.0	43.1	41.6	35.0	8.8	0.5	59.9	59.0	74.0	14.1	15.0
13.	19296.00	BB	39.8	40.0	39.1	34.7	9.4	0.0	53.6	53.8	74.0	20.4	20.2
14.	21708.00	BB	40.7	40.8	39.2	34.3	9.9	0.0	55.5	55.6	74.0	18.5	18.4
15.	24120.00	BB	39.1	39.0	40.3	35.5	10.9	0.0	54.8	54.7	74.0	19.2	19.3

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)18-26GHz

■CABLE:KCC-D3/D7■PREAMP:KAF-02(8449B)■EMI RECEIVER:KTR-01(ES140)

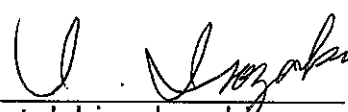
DATA OF RADIATION TEST

UL Apex Co., Ltd.

Yamakita No.1 Open Test Site

Report No. : 23KE0041-YK **4**

Applicant : NIHON KOHDEN CORPORATION
 Kind of Equipment : Telemetry Unit
 Model No. : ZB-101AA
 Serial No. : 91002
 Power : DC9V
 Mode : Transmitting (2412MHz)
 Remarks :
 Date : 7/3/2003
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 68 %
 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.	2037.99	BB	57.9	55.3	30.6	36.9	3.9	10.0	65.5	62.9	54.0	-11.5	-8.9
2.	2301.97	BB	41.7	39.3	30.6	36.9	4.0	10.0	49.4	47.0	54.0	4.6	7.0
3.	2346.06	BB	42.5	38.9	30.6	36.9	4.1	10.0	50.3	46.7	54.0	3.7	7.3
4.	2390.00	BB	42.7	39.3	30.6	36.9	4.1	10.0	50.5	47.1	54.0	3.5	6.9
5.	4075.97	BB	40.7	39.6	33.0	36.2	5.4	0.7	43.6	42.5	54.0	10.4	11.5
6.	4824.00	BB	32.0	31.8	34.7	35.2	5.6	0.6	37.7	37.5	54.0	16.3	16.5
7.	7236.00	BB	32.0	32.0	37.7	36.8	6.5	0.5	39.9	39.9	54.0	14.1	14.1
8.	8151.93	BB	37.6	39.9	37.8	37.0	6.7	0.6	45.7	48.0	54.0	8.3	6.0
9.	9648.00	BB	33.2	33.2	39.0	36.9	7.2	0.5	43.0	43.0	54.0	11.0	11.0
10.	12060.00	BB	33.2	33.0	42.1	36.3	8.1	0.5	47.6	47.4	54.0	6.4	6.6
11.	14472.00	BB	32.0	32.1	41.2	35.2	7.3	0.2	45.5	45.6	54.0	8.5	8.4
12.	16884.00	BB	32.9	32.7	41.6	35.0	8.8	0.5	48.8	48.6	54.0	5.2	5.4
13.	19296.00	BB	26.0	26.2	39.1	34.7	9.4	0.0	39.8	40.0	54.0	14.2	14.0
14.	21708.00	BB	28.0	27.8	39.2	34.3	9.9	0.0	42.8	42.6	54.0	11.2	11.4
15.	24120.00	BB	26.4	26.5	40.3	35.5	10.9	0.0	42.1	42.2	54.0	11.9	11.8

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) 18-26GHz

■ CABLE: KCC-D3/D7 ■ PREAMP: KAF-02 (8449B) ■ EMI RECEIVER: KTR-01 (ES140)


DATA OF RADIATION TEST

UL Apex Co., Ltd.

Yamakita No.1 Open Test Site

Report No. : 23KE0041-YK ⁴

Applicant : NIHON KOHDEN CORPORATION
 Kind of Equipment : Telemetry Unit
 Model No. : ZB-101AA
 Serial No. : 91002
 Power : DC9V
 Mode : Transmitting (2437MHz)
 Remarks :
 Date : 7/3/2003
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 68 %
 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.	2062.99	BB	57.0	58.7	30.6	36.9	3.9	10.0	64.6	66.3	74.0	9.4	7.7
2.	2326.99	BB	48.5	49.8	30.6	36.9	4.0	10.0	56.2	57.5	74.0	17.8	16.5
3.	2370.99	BB	52.2	49.2	30.6	36.9	4.1	10.0	60.0	57.0	74.0	14.0	17.0
4.	4126.00	BB	47.5	47.0	32.9	36.1	5.5	9.9	59.7	59.2	74.0	14.3	14.8
5.	4874.00	BB	44.1	44.1	35.0	35.2	5.6	0.6	50.1	50.1	74.0	23.9	23.9
6.	7311.00	BB	45.3	45.8	37.8	36.8	6.6	0.5	53.4	53.9	74.0	20.6	20.1
7.	9748.00	BB	45.6	44.2	39.0	37.0	7.2	0.6	55.4	54.0	74.0	18.6	20.0
8.	12185.00	BB	44.1	44.9	42.3	36.1	8.1	0.4	58.8	59.6	74.0	15.2	14.4
9.	14622.00	BB	43.6	44.2	41.7	35.2	7.7	0.3	58.1	58.7	74.0	15.9	15.3
10.	17059.00	BB	44.3	44.2	41.7	34.9	8.7	0.5	60.3	60.2	74.0	13.7	13.8
11.	19496.00	BB	39.6	39.5	39.0	34.7	9.5	0.0	53.4	53.3	74.0	20.6	20.7
12.	21933.00	BB	40.0	40.1	39.3	33.6	10.2	0.0	55.9	56.0	74.0	18.1	18.0
13.	24370.00	BB	38.9	39.4	40.4	36.3	10.8	0.0	53.8	54.3	74.0	20.2	19.7

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) 18-26GHz

■CABLE: KCC-D3/D7 ■PREAMP: KAF-02 (8449B) ■EMI RECEIVER: KTR-01 (ES140)


DATA OF RADIATION TEST

UL Apex Co., Ltd.

Yamakita No.1 Open Test Site

Report No. : 23KE0041-YK- 4

Applicant : NIHON KOHDEN CORPORATION
 Kind of Equipment : Telemetry Unit
 Model No. : ZB-101AA
 Serial No. : 91002
 Power : DC9V
 Mode : Transmitting (2437MHz)
 Remarks :
 Date : 7/3/2003
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 68 %
 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.	2062.99	BB	54.1	56.9	30.6	36.9	3.9	10.0	61.7	64.5	54.0	-7.7	-10.5
2.	2326.99	BB	38.3	39.3	30.6	36.9	4.0	10.0	46.0	47.0	54.0	8.0	7.0
3.	2370.99	BB	44.9	40.3	30.6	36.9	4.1	10.0	52.7	48.1	54.0	1.3	5.9
4.	4126.00	BB	41.4	37.1	32.9	36.1	5.5	0.7	44.4	40.1	54.0	9.6	13.9
5.	4874.00	BB	31.6	31.7	35.0	35.2	5.6	0.6	37.6	37.7	54.0	16.4	16.3
6.	7311.00	BB	33.0	33.8	37.8	36.8	6.6	0.5	41.1	41.9	54.0	12.9	12.1
7.	9748.00	BB	33.2	33.5	39.0	37.0	7.2	0.6	43.0	43.3	54.0	11.0	10.7
8.	12185.00	BB	32.5	32.6	42.3	36.1	8.1	0.4	47.2	47.3	54.0	6.8	6.7
9.	14622.00	BB	32.3	32.5	41.7	35.2	7.7	0.3	46.8	47.0	54.0	7.2	7.0
10.	17059.00	BB	32.8	32.8	41.7	34.9	8.7	0.5	48.8	48.8	54.0	5.2	5.2
11.	19496.00	BB	26.4	26.5	39.0	34.7	9.5	0.0	40.2	40.3	54.0	13.8	13.7
12.	21933.00	BB	27.9	27.8	39.3	33.6	10.2	0.0	43.8	43.7	54.0	10.2	10.3
13.	24370.00	BB	26.5	26.4	40.4	36.3	10.8	0.0	41.4	41.3	54.0	12.6	12.7

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) 18-26GHz

■CABLE:KCC-D3/D7 ■PREAMP:KAF-02 (8449B) ■EMI RECEIVER:KTR-01 (ES140)


DATA OF RADIATION TEST

UL Apex Co., Ltd.

Yamakita No.1 Open Test Site

Report No. : 23KE0041-YK- 4

Applicant : NIHON KOHDEN CORPORATION
 Kind of Equipment : Telemetry Unit
 Model No. : ZB-101AA
 Serial No. : 91002
 Power : DC9V
 Mode : Transmitting (2462MHz)
 Remarks :
 Date : 7/3/2003
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 68 %
 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.	2087.99	BB	62.7	58.8	30.6	36.9	3.9	10.0	70.3	66.4	74.0	3.7	7.6
2.	2351.99	BB	53.4	50.9	30.6	36.9	4.1	10.0	61.2	58.7	74.0	12.8	15.3
3.	2395.99	BB	56.6	52.0	30.6	36.9	4.1	10.0	64.4	59.8	74.0	9.6	14.2
4.	2483.50	BB	52.4	50.1	30.6	36.9	4.1	10.0	60.2	57.9	74.0	13.8	16.1
5.	2484.08	BB	53.5	49.9	30.6	36.9	4.1	10.0	61.3	57.7	74.0	12.7	16.3
6.	4175.97	BB	48.6	48.0	32.9	36.0	5.5	9.9	60.9	60.3	74.0	13.1	13.7
7.	4924.00	BB	43.5	44.8	35.3	35.2	5.6	0.5	49.7	51.0	74.0	24.3	23.0
8.	7386.00	BB	45.0	44.3	37.9	36.9	6.6	0.5	53.1	52.4	74.0	20.9	21.6
9.	9848.00	BB	44.5	44.3	39.0	37.0	7.2	0.7	54.4	54.2	74.0	19.6	19.8
10.	12310.00	BB	44.2	44.4	42.5	35.9	8.1	0.4	59.3	59.5	74.0	14.7	14.5
11.	14772.00	BB	44.5	44.3	42.2	35.1	8.1	0.4	60.1	59.9	74.0	13.9	14.1
12.	17234.00	BB	44.4	44.4	42.3	34.8	8.5	0.6	61.0	61.0	74.0	13.0	13.0
13.	19696.00	BB	39.8	39.7	39.5	35.0	9.6	0.0	53.9	53.8	74.0	20.1	20.2
14.	22158.00	BB	40.1	40.3	39.2	33.7	10.3	0.0	55.9	56.1	74.0	18.1	17.9
15.	24620.00	BB	40.0	40.1	40.4	36.0	10.9	0.0	55.3	55.4	74.0	18.7	18.6

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) 18-26GHz

■ CABLE: KCC-D3/D7 ■ PREAMP: KAF-02 (8449B) ■ EMI RECEIVER: KTR-01 (ES140)

DATA OF RADIATION TEST

UL Apex Co., Ltd.

Yamakita No.1 Open Test Site

Report No. : 23KE0041-YK- 4

Applicant : NIHON KOHDEN CORPORATION
 Kind of Equipment : Telemetry Unit
 Model No. : ZB-101AA
 Serial No. : 91002
 Power : DC9V
 Mode : Transmitting (2462MHz)
 Remarks :
 Date : 7/3/2003
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 68 %
 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.	2087.99	BB	62.1	57.2	30.6	36.9	3.9	10.0	69.7	64.8	54.0	-15.7	-10.8
2.	2351.99	BB	43.5	41.5	30.6	36.9	4.1	10.0	51.3	49.3	54.0	2.7	4.7
3.	2395.99	BB	44.7	43.2	30.6	36.9	4.1	10.0	52.5	51.0	54.0	1.5	3.0
4.	2483.50	BB	41.8	38.1	30.6	36.9	4.1	10.0	49.6	45.9	54.0	4.4	8.1
5.	2484.08	BB	44.0	39.8	30.6	36.9	4.1	10.0	51.8	47.6	54.0	2.2	6.4
6.	4175.97	BB	43.3	41.3	32.9	36.0	5.5	0.7	46.4	44.4	54.0	7.6	9.6
7.	4924.00	BB	32.1	33.2	35.3	35.2	5.6	0.5	38.3	39.4	54.0	15.7	14.6
8.	7386.00	BB	33.3	33.0	37.9	36.9	6.6	0.5	41.4	41.1	54.0	12.6	12.9
9.	9848.00	BB	32.5	33.1	39.0	37.0	7.2	0.7	42.4	43.0	54.0	11.6	11.0
10.	12310.00	BB	32.9	32.7	42.5	35.9	8.1	0.4	48.0	47.8	54.0	6.0	6.2
11.	14772.00	BB	33.1	33.0	42.2	35.1	8.1	0.4	48.7	48.6	54.0	5.3	5.4
12.	17234.00	BB	32.9	32.8	42.3	34.8	8.5	0.6	49.5	49.4	54.0	4.5	4.6
13.	19696.00	BB	26.8	26.8	39.5	35.0	9.6	0.0	40.9	40.9	54.0	13.1	13.1
14.	22158.00	BB	27.9	27.7	39.2	33.7	10.3	0.0	43.7	43.5	54.0	10.3	10.5
15.	24620.00	BB	26.4	26.2	40.4	36.0	10.9	0.0	41.7	41.5	54.0	12.3	12.5

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

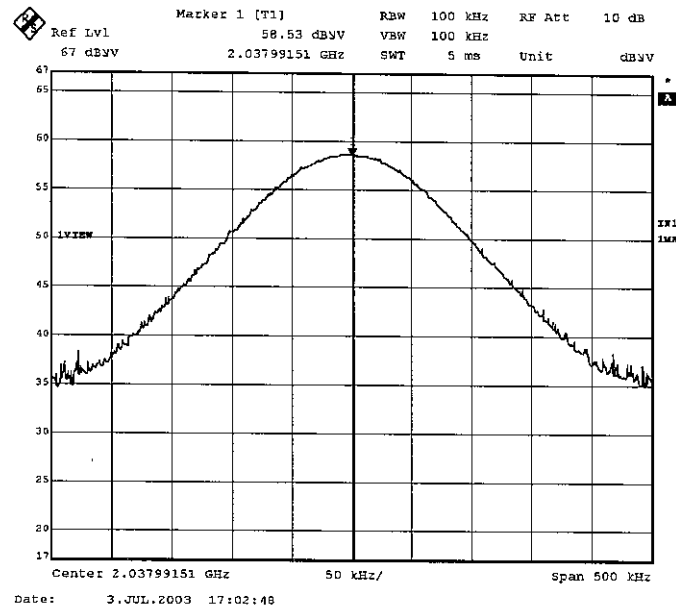
■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz/KHA-03 (3160-09) 18-26GHz

■ CABLE: KCC-D3/D7 ■ PREAMP: KAF-02 (8449B) ■ EMI RECEIVER: KTR-01 (ES140)

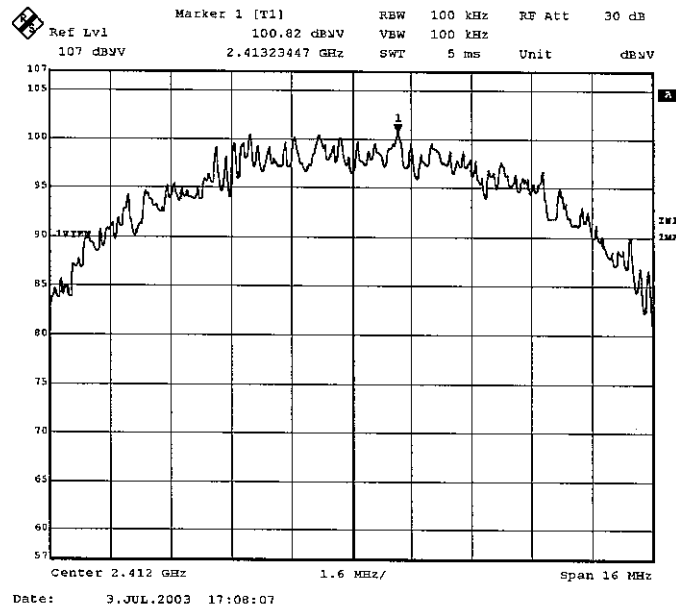
Ch 1:2412MHz

1. Spurious emission(2038MHz-Horizontal)

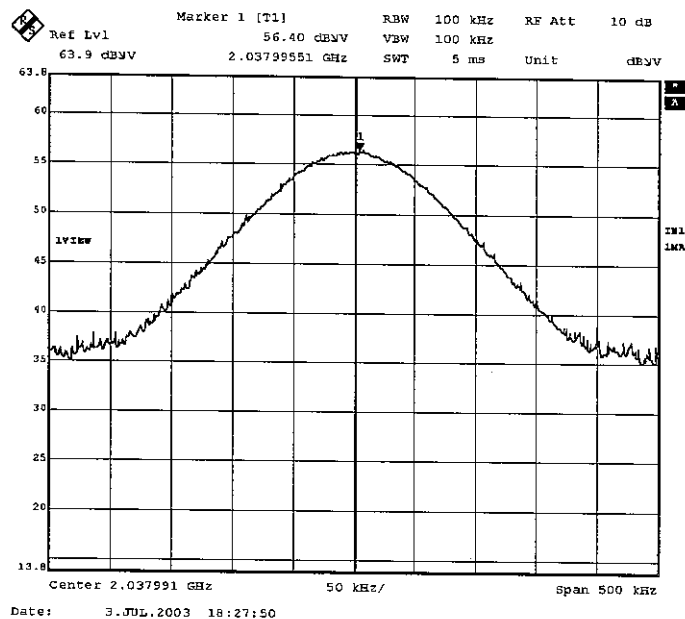
U. Suzuki



2. Fundamental(2412MHz-Horizontal)

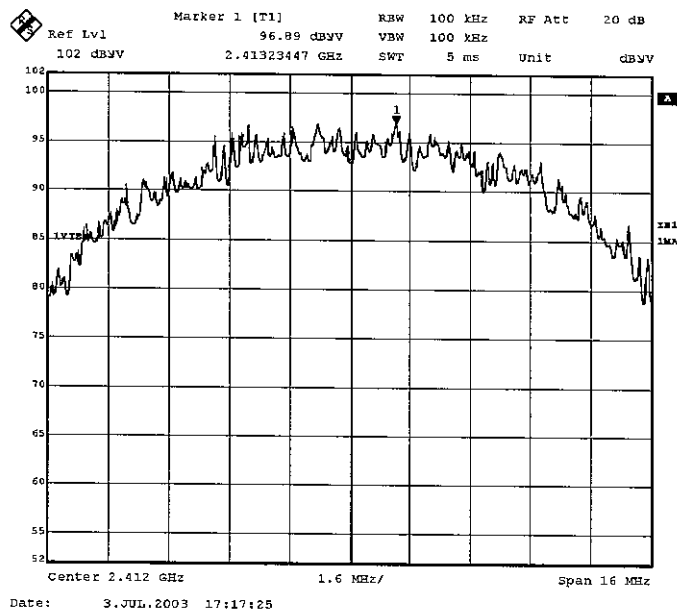


3. Spurious emission(2038MHz-Vertical)



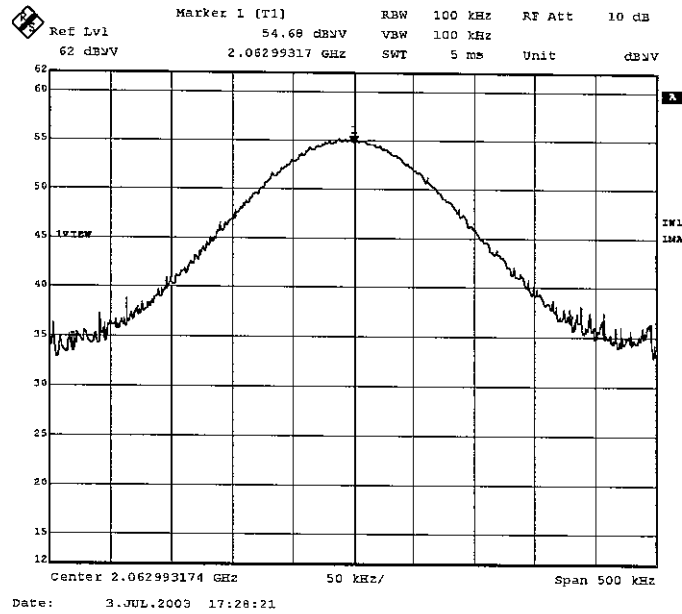
U. Suzuki

4. Fundamental(2412MHz-Vertical)

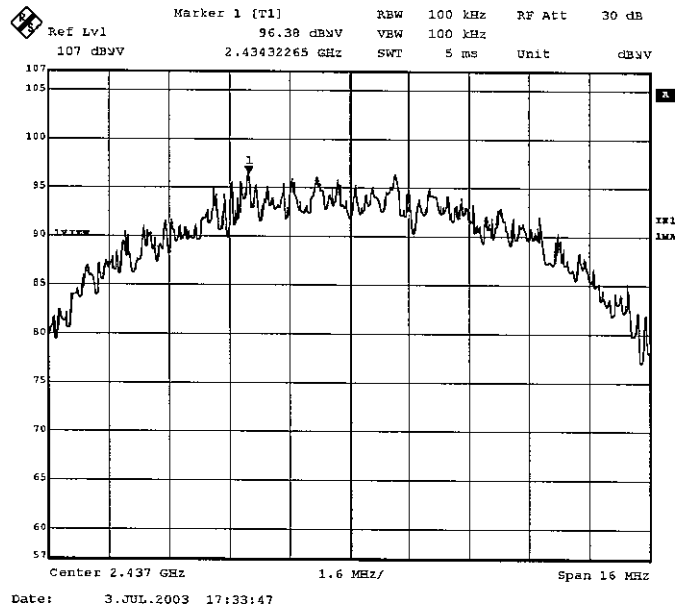


Ch 6:2437MHz

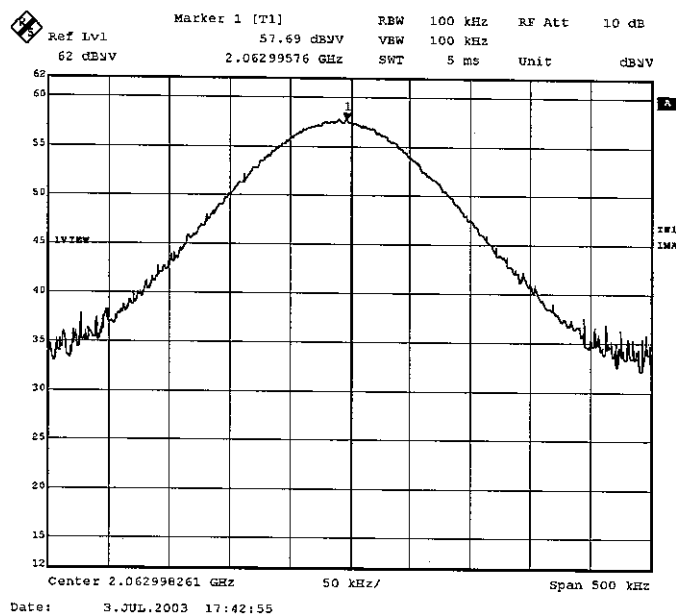
1. Spurious emission(2063MHz-Horizontal)



2. Fundamental(2437MHz-Horizontal)

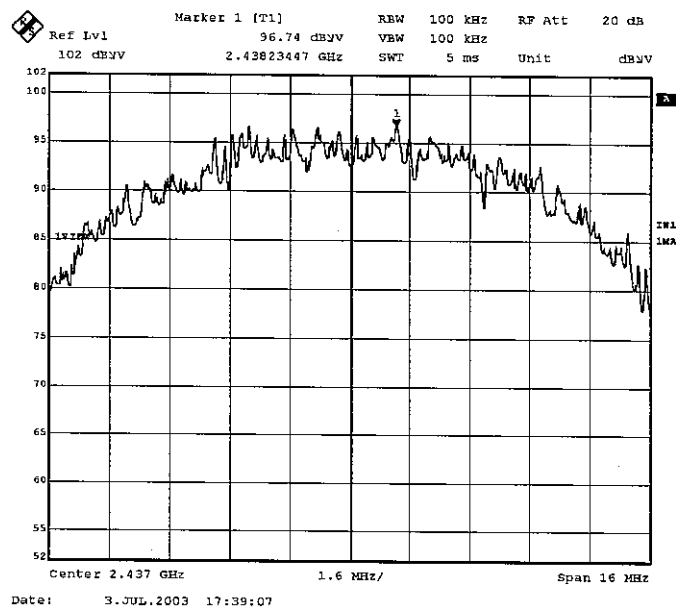


3. Spurious emission(2063MHz-Vertical)



U. Izaki

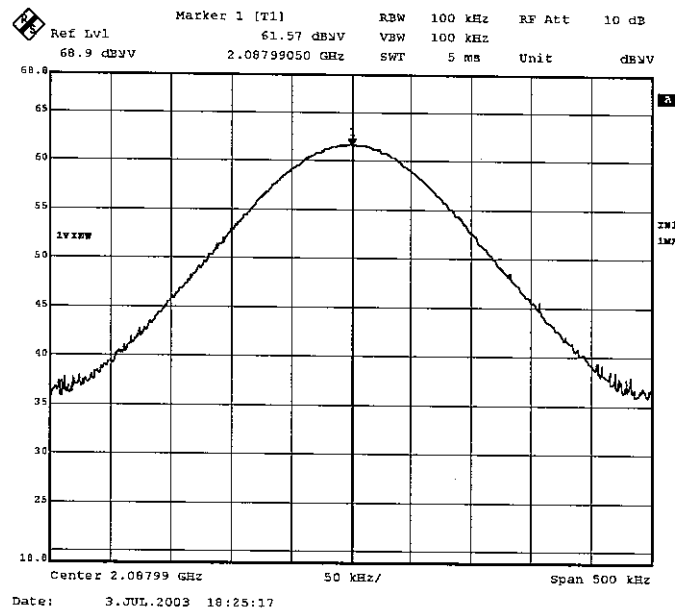
4. Fundamental(2437MHz-Vertical)



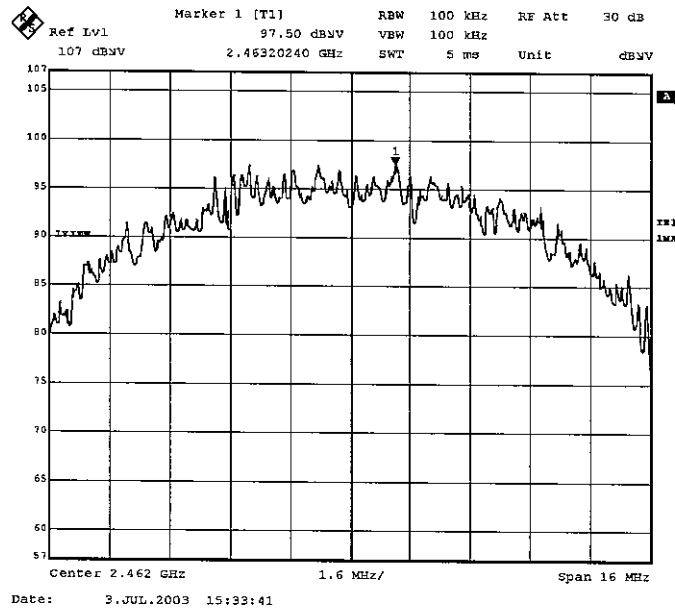
Ch 11:2462MHz

1. Spurious emission(2088MHz-Horizontal)

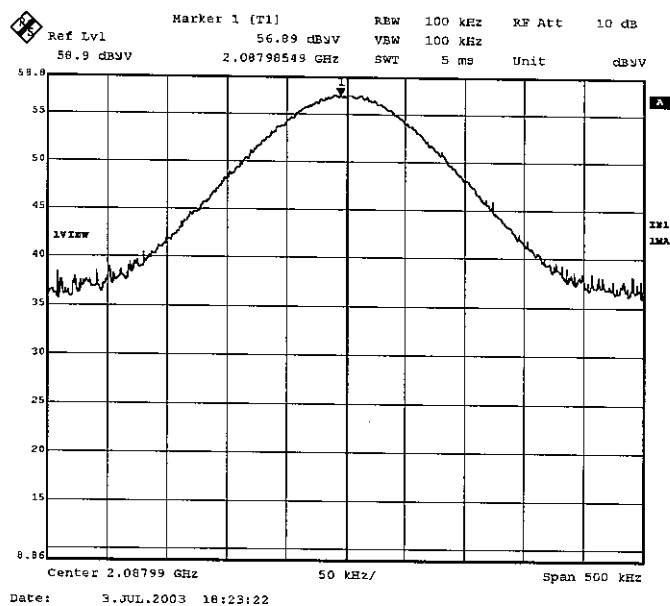
U. Suzuki



2. Fundamental(2462MHz-Horizontal)

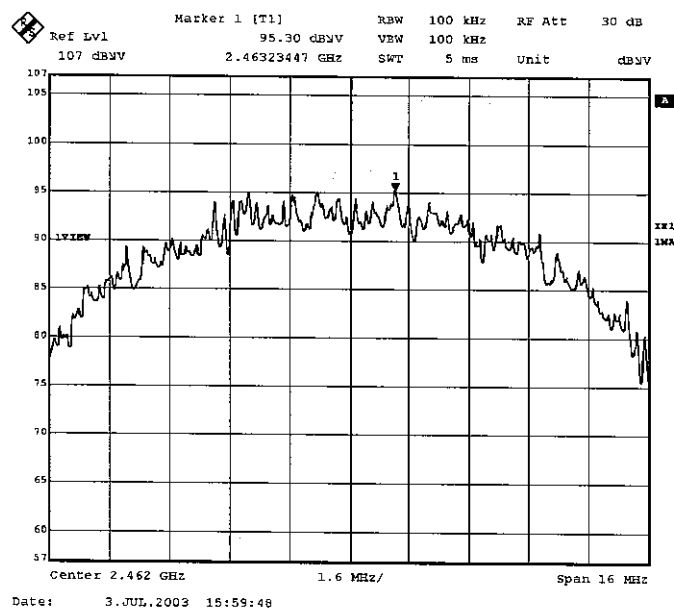


3. Spurious emission(2088MHz-Vertical)



U. Imzaki

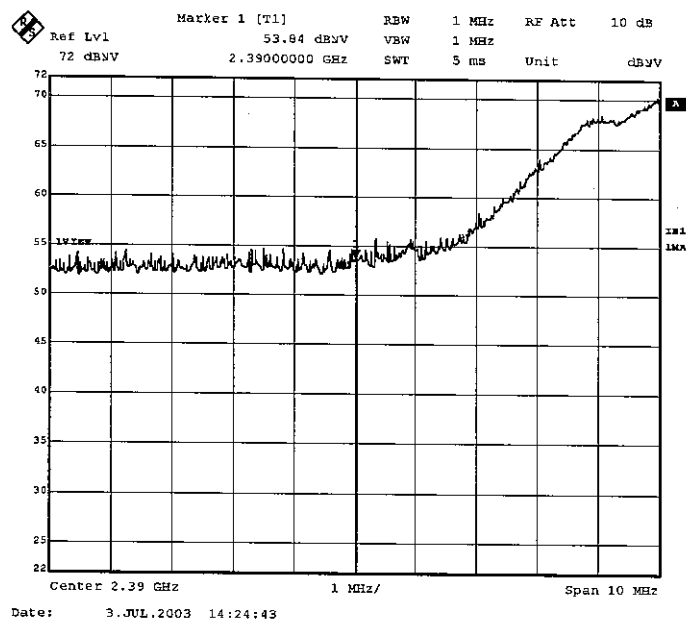
4. Fundamental(2462MHz-Vertical)



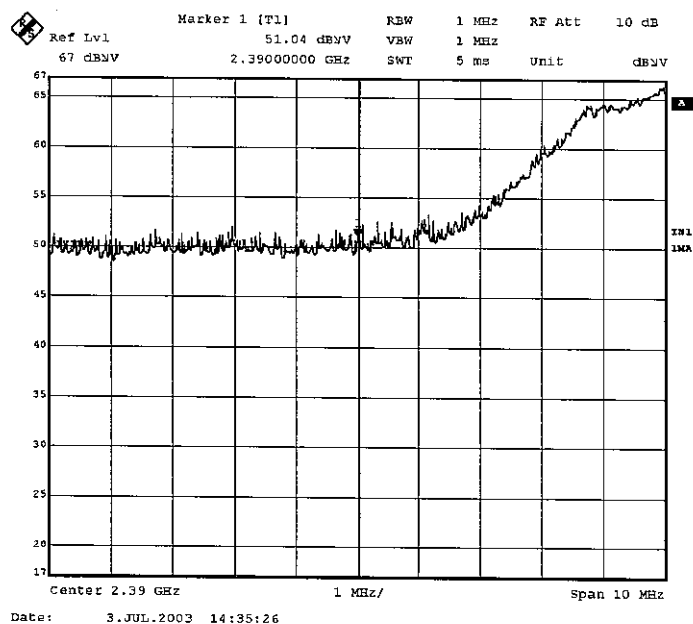
2.39GHz (Ch 1:2412MHz)

1. Horizontal/PK

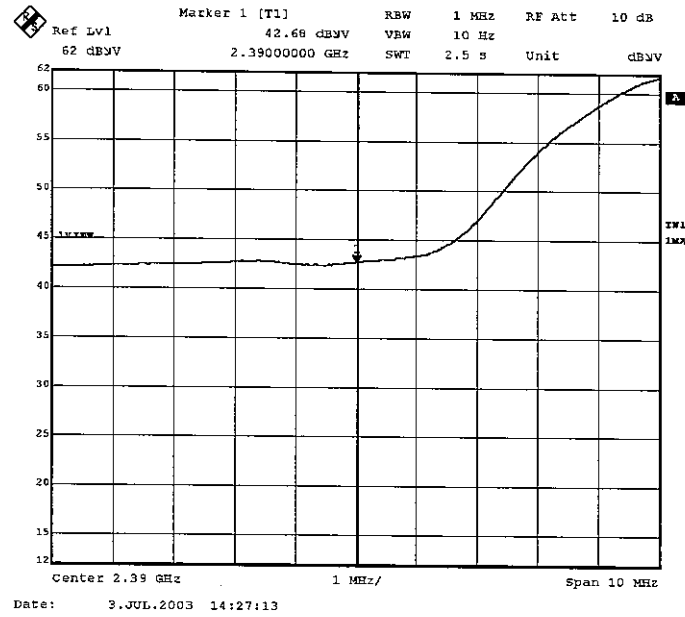
V. Suzuki



2. Vertical/PK

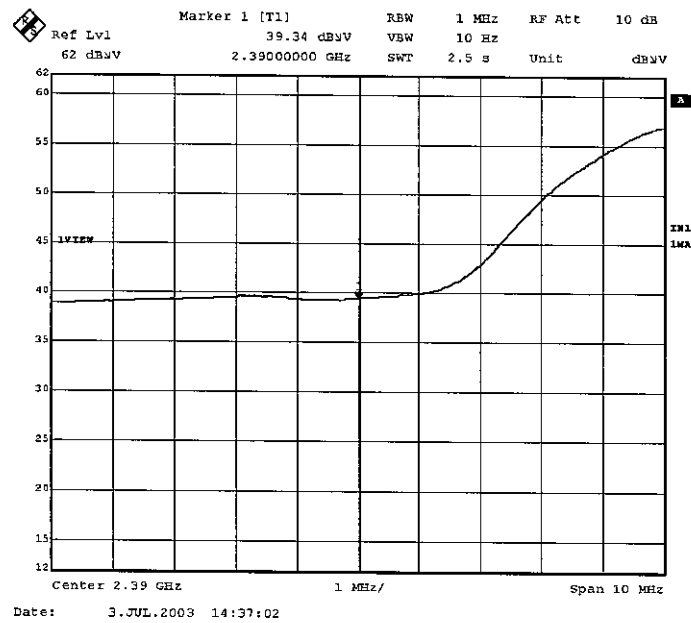


3. Horizontal/AV



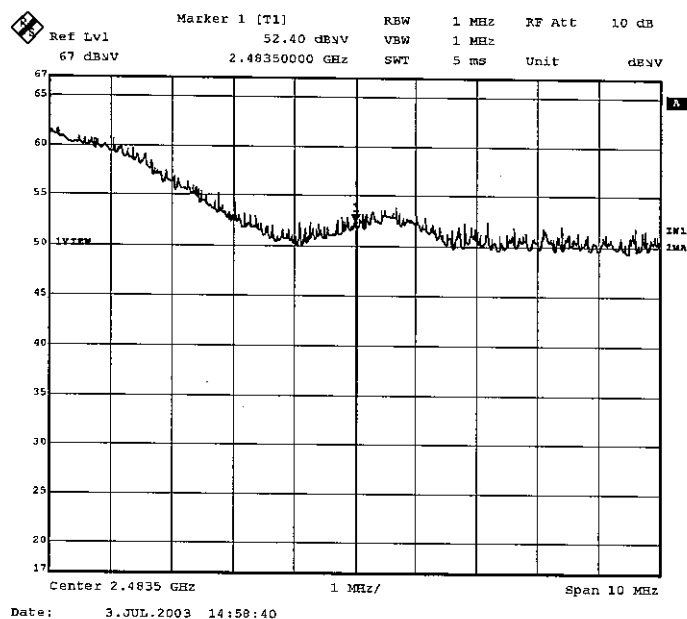
U. Inozaki

4. Vertical/AV



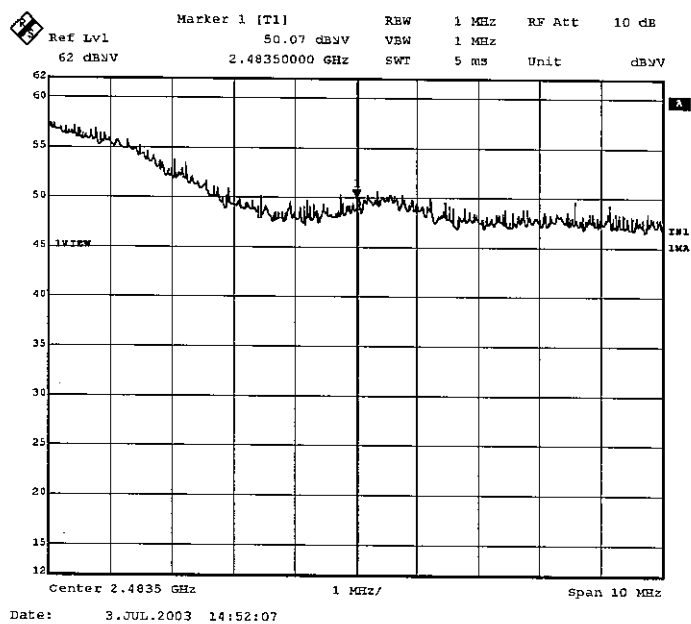
2.4835GHz (Ch 11:2462MHz)

1. Horizontal/ PK

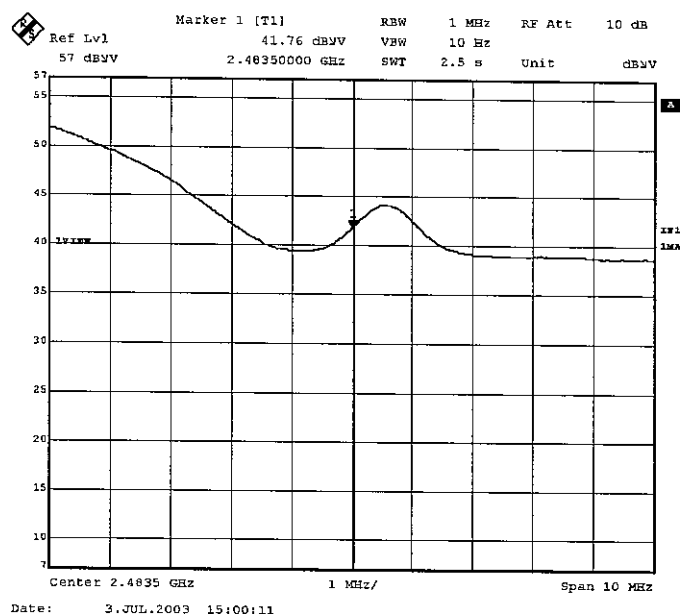


U. Imzaki

2. Vertical/ PK

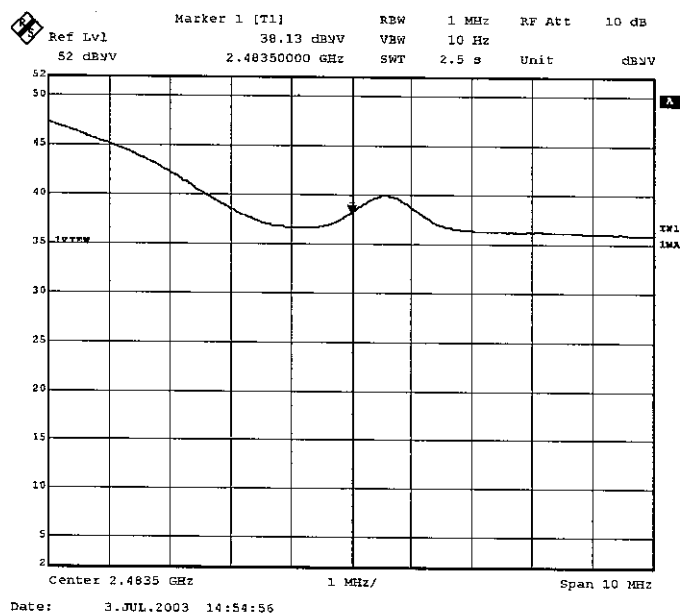


3. Horizontal/AV



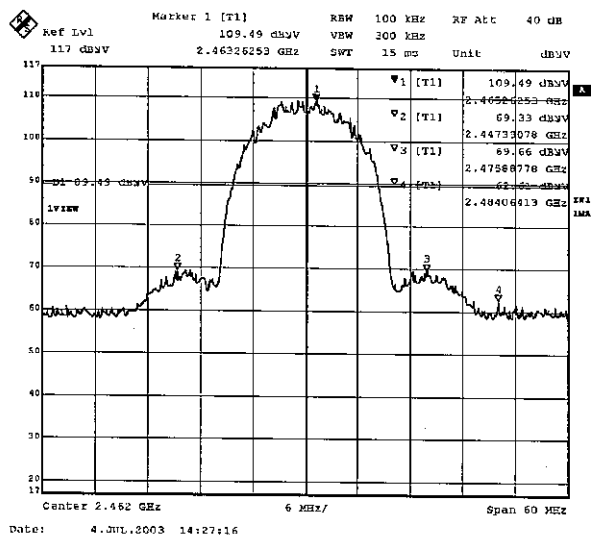
U. Suzuki

4. Vertical/AV



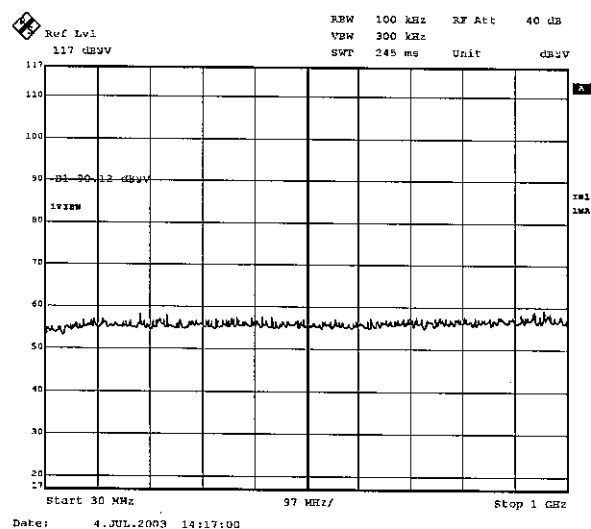
Ch 1: 2412MHz

1.

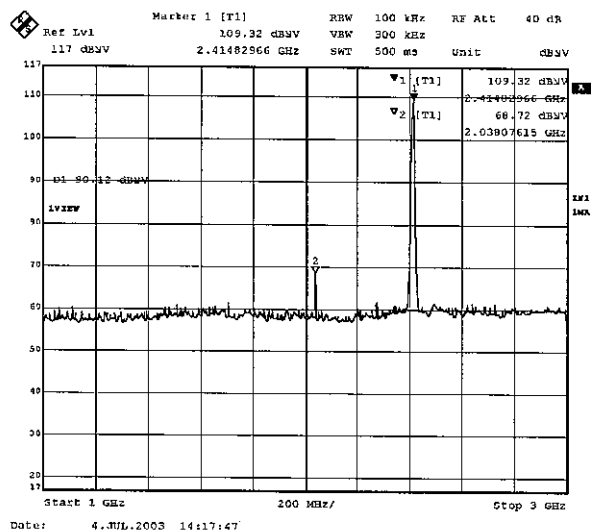


U. Suzuki

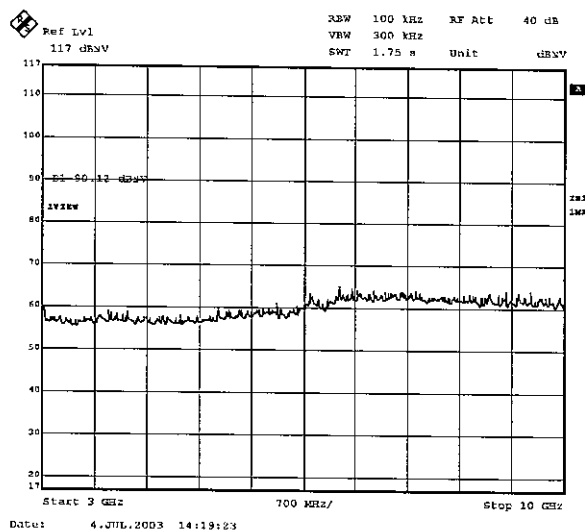
2.



3.

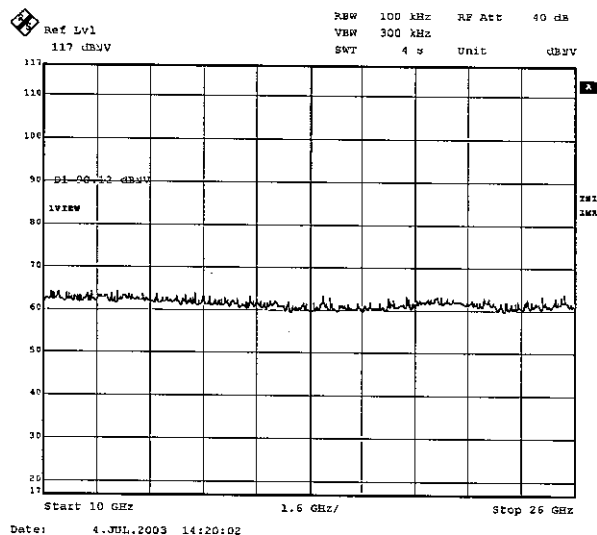


4.



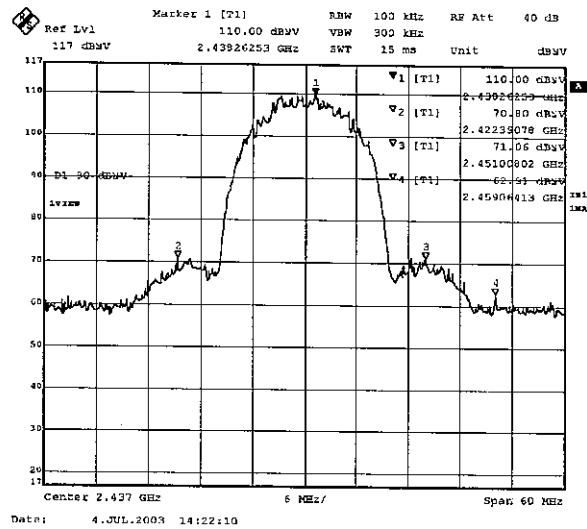
U. Suzuki

5.

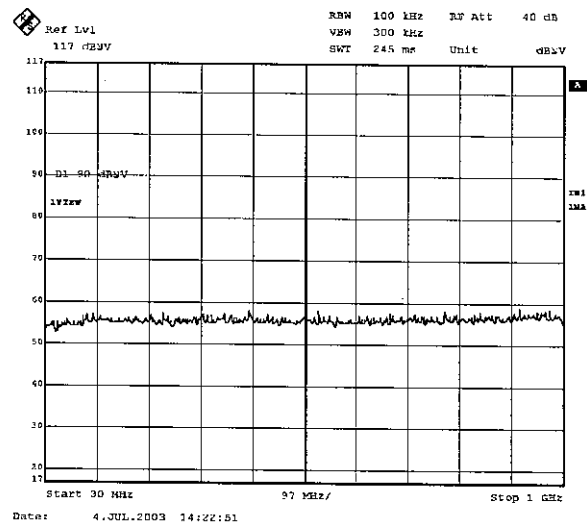


Ch 6: 2437MHz

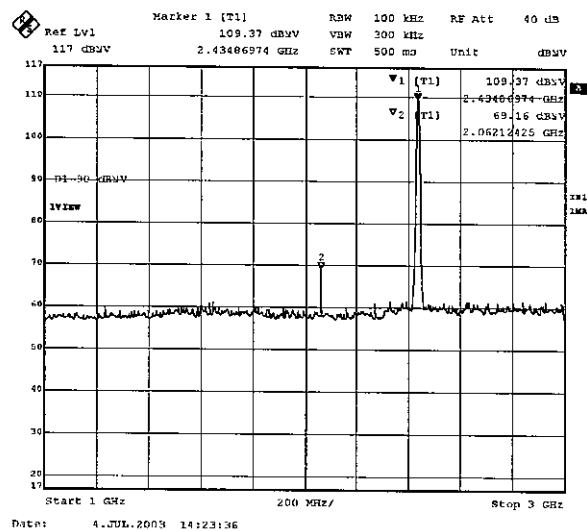
1.



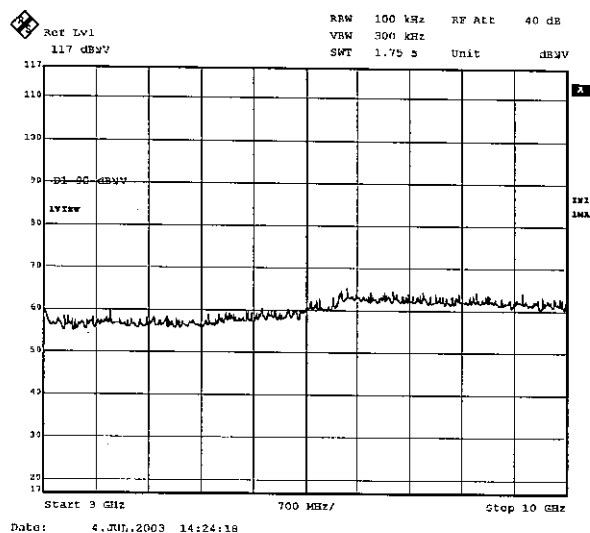
2.



3.

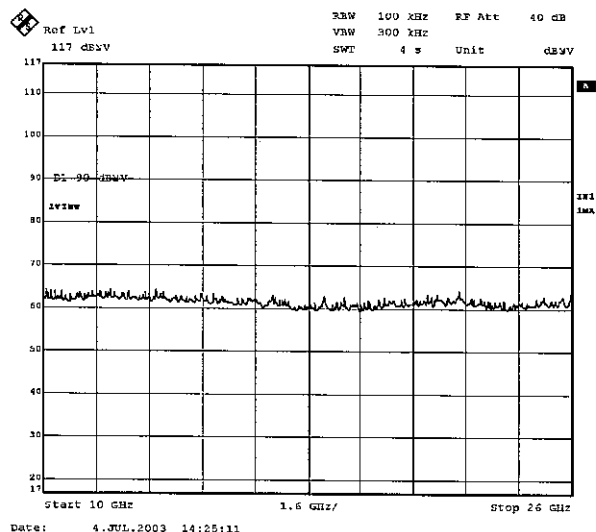


4.



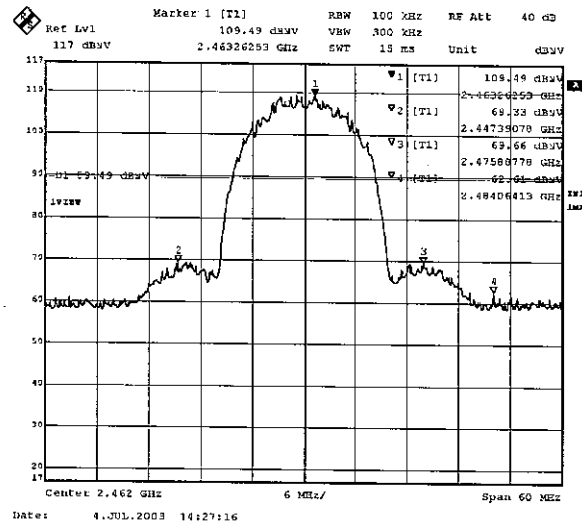
U. Suzuki

5.



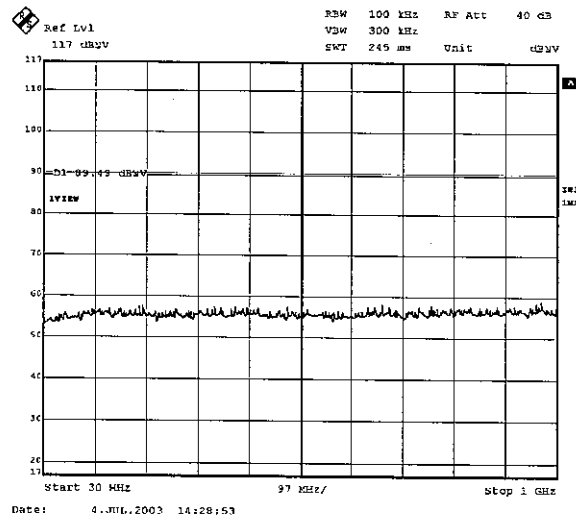
Ch 11: 2462MHz

1.

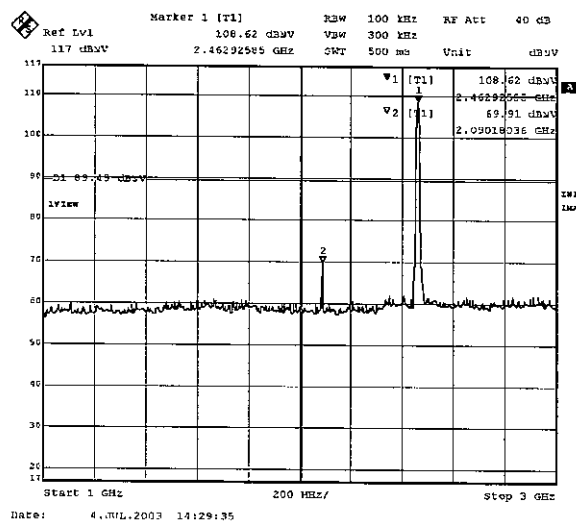


U. Szeki

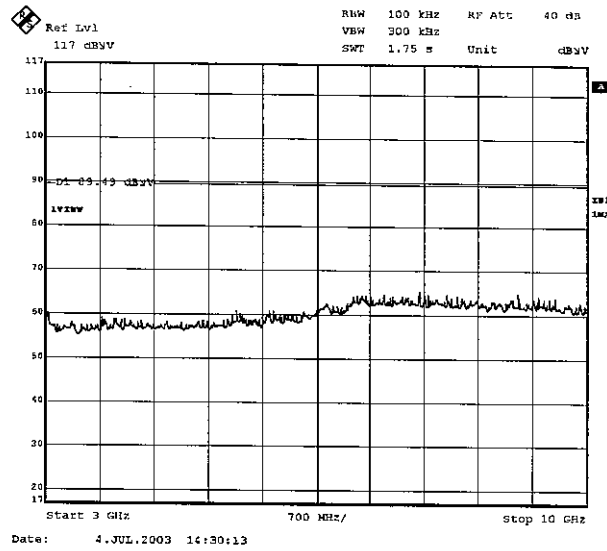
2.



3.

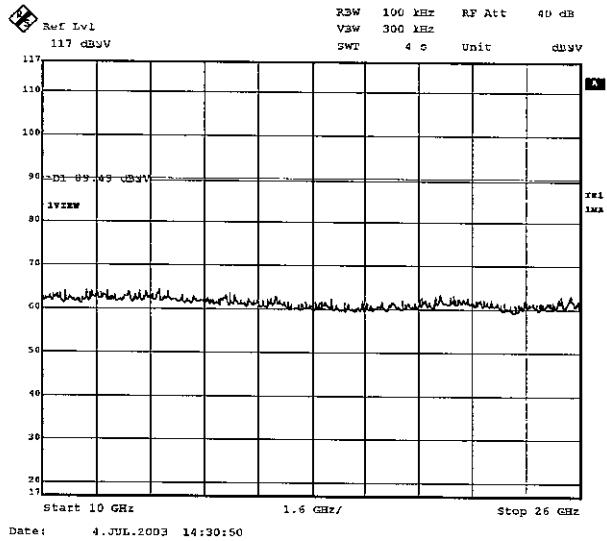


4.



U. Suzuki

5.



Power Density(Conducted)

UL Apex Co., Ltd.

YAMAKITA EMC NO.1 OPEN SITE

COMPANY : NIHON KOHDEN CORPORATION

EQUIPMENT : Telemetry Unit

MODEL : ZB-101AA

FCC ID :B6BZB-101AA

POWER : DC9V

Mode : Transmitting

REPORT NO : 23KE0041-YK-4

REGULATION : Fcc Part15SubpartC 247(d)

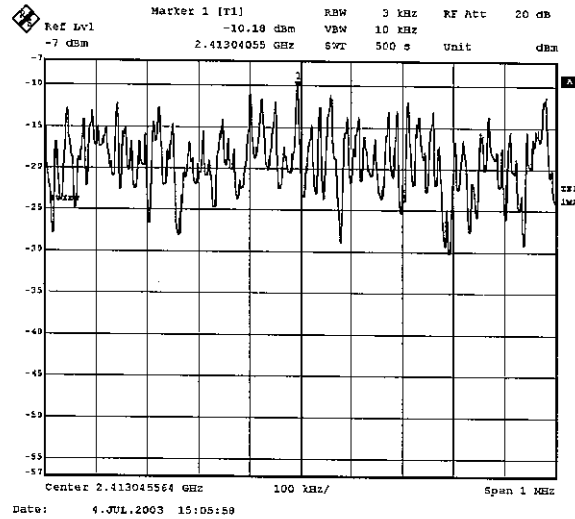
DATE : 2003/ 07/04

Temp./Humi. : 24°C/59%

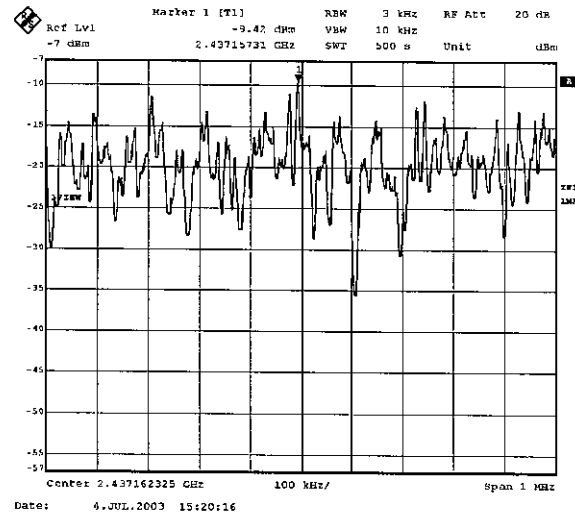

ENGINEER : Ichiro Isozaki

CH	FREQ	S/A Reading	Cable Loss	Results	Limit	MARGIN
	[GHz]	[dBm]	[dB]	[dBm]	[dBm]	[dB]
Low	2.413041	-10.18	0.85	-9.33	8.0	17.3
Mid	2.437157	-9.42	0.85	-8.57	8.0	16.6
High	2.462157	-9.85	0.85	-9.00	8.0	17.0

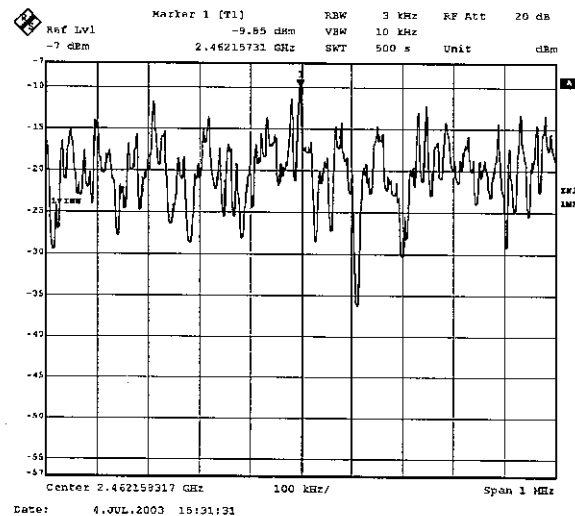
1. ch 1: 2412MHz



2. ch 6: 2437MHz



3. ch 11: 2462MHz

*J. Inzoki*

Test Report No :23KE0041-YK-4

APPENDIX 3 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
KTR-01	Test Receiver	Rohde & Schwarz	ES140	RE/AT	2002/07/22 * 12
KCC-D7	Coaxial Cable	Advantest	A01002	AT	2003/04/18 * 12
KPM-05	Power meter	Agilent	E4417A	AT	2003/02/17 * 12
KPSS-01	Power sensor	Agilent	E9327A	AT	2003/02/21 * 12
KAF-01	Pre Amplifier	Hewlett Packard	8447D	RE	2002/08/03 * 12
KAF-02	Pre Amplifier	Hewlett Packard	8449B	RE	2003/05/08 * 12
KAT10-S1	Attenuator	Agilent	8449D 010	RE	2003/04/18 * 12
KAT6-01	Attenuator	INMET	18N-6dB	RE	2003/05/12 * 12
KBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/02/06 * 12
KTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2002/11/25 * 12
KFL-01	Highpass Filter	Hewlett Packard	84300 80038	RE	2003/04/18 * 12
KCC-10/11/12/13/18	Coaxial Cable	Fujikura/Suhner	8D-2W/12D-SF A/S04272B/S0 4272B/S04272B	RE	2002/08/17 * 12
KCC-D3/D7	Coaxial Cable	Rosenberger/Advantest	2201/JUN-08-01-061	RE	2003/04/18 * 12
KHA-01	Horn Antenna	A.H.Systems	SAS-200/571	RE	2002/07/14 * 12
KLA-01	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/02/19 * 12
KOTS-01	Open Test Site	JSE	30m	RE	2002/08/18 * 12
KSA-01	Spectrum Analyzer	Advantest	R3365	RE	2003/06/09 * 12

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

Test Item:

RE: Radiated emission test

AT: Antenna terminal conducted test