

EMI TEST REPORT

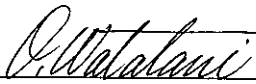
Test Report No. : 23CE0007-YK-1

Applicant: Seiko Instruments Inc.
Type of Equipment: triax Elite (Watch)
Model No.: WA00
FCC ID: C4ZAAWA0000
Test standard: FCC Part15 Subpart C, Section 15.249
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: October 25, 2002

Tested by: 
Toyokazu Imamura
EMC section

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 : Seiko Instruments Inc.

Address : 8, Nakase, 1-chome, Mihama-ku, Chiba-shi, Chiba-ken 261-8507 JAPAN

Telephone Number : +81 43 211 1251

Facsimile Number : +81 43 211 8044

Contact Person : Kunio Tsukahara (General Manager)
Quality Assurance Department
Wearable Business Unit

Telephone Number : +81 43 211 1269

Facsimile Number : +81 43 211 8046

Type of Equipment : triax Elite (Watch)

Model No. : WA00

Rating : DC3V

Country of Manufacture : Japan

Receipt Date of Sample : October 25, 2002

Condition of EUT : Production prototype

Regulation(s) : FCC Part15 Subpart C, Section 15.249

Test Site : A-Pex Yamakita No.2 Open Test Site

1.1 Tested Methodology

The measurement was performed according to the procedures in ANSI C63.4 (2000).

1.2 Test Facility

This site has been fully described in a report dated November 24, 1999 submitted to FCC office, and accepted in a letter dated December 8, 2000 (No.2 Open Test Site: 99354).

NVLAP Lab. code : 200441-0

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2 PRODUCT DESCRIPTION

Seiko Instruments Inc., Model: WA00 (referred to as the EUT in this report) is a Watch, triax Elite.
The clock frequencies used in EUT are 32kHz, 2MHz and 1.8MHz.

Frequency characteristics:	916.5MHz
No. of channels/ channel spacing:	1 channel
Modulation:	ASK 100% modulation depth (OOK)
Antenna type :	monopole Antenna
Antenna gain :	-20dBi
Operating Voltage:	DC3V(Lithium Battery :CR2025)

***FccPart15.203 Antenna requirement**

triax Elite and its antenna comply with this requirement since this antenna is built in triax Elite when they are put up for sale and they are used with a particular antenna connector.

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3 SYSTEM TEST CONFIGURATION

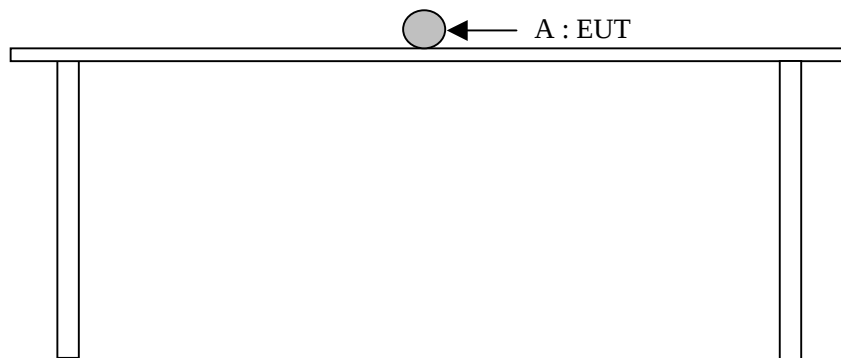
3.1 Justification

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

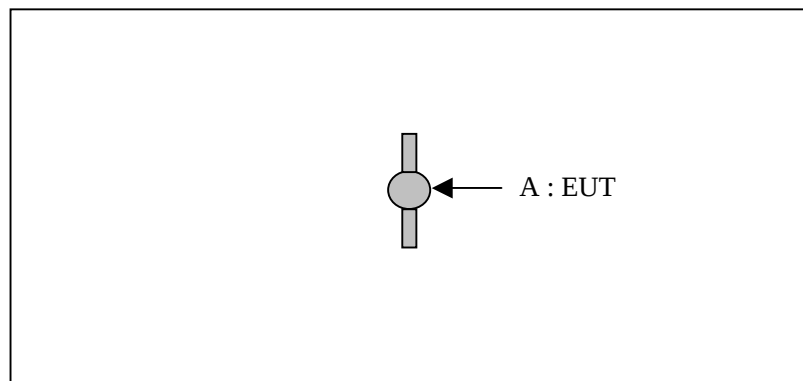
Test mode : Transmitting mode

3.2 Configuration of Tested System

Front View



Top View



Description of EUT

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	triax Elite (Watch)	WA00	290006	Seiko Instruments Inc.	C4ZAAWA0000

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

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5 SUMMARY OF TESTS

5.1 § 15.249(a) Filed Strength (Radiated Emissions)

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 axis X, Y and Z.

At >1GHz, Z was worst in these positions under the antenna polarization of both vertical and horizontal.

At <1GHz, Y was worst in these positions under the horizontal antenna polarization and Z was worst in these positions under the vertical antenna polarization.

The position in which the maximum noise occurred was chosen to put into measurement.

See the photographs in page 12 to 13.

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

Maximum Filed Strength of Fundamental

Measurement range : CISPR QP Detector, IF BW 120kHz

Test data : APPENDIX Page 13

Test result : Pass

Test instruments : KCC-20/21/22/23/29,KLA-02,KAF-03,KAT6-03,KSA-02,KTR-04,KOTS-02

Filed Strength of Spurious emissions

Measurement range : 30MHz to 1000MHz CISPR QP Detector, IF BW 120kHz

: 1GHz to 10GHz PK and AV Detector, IF BW 1MHz

Test data : APPENDIX Page 14 to 19

Test result : Pass

Test instruments : KCC-20/21/22/23/29,KBA-02,KLA-02,KHA-02,KAF-03,KAF-04,KAT6-03,
KSA-02,KTR-01,KTR-04,KOTS-02,KCC-D8/D9/D10

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5.2 26dB Bandwidth

Test Procedure

The minimum 26dB bandwidth was measured with a spectrum analyzer connected to the antenna port.
The measurement was performed according to the procedures in ANSI C63.4-13.1.7(2000).

26dB Bandwidth 916.5MHz : 107.214kHz

Test data : APPENDIX Page 20
Test result : Pass
Test instruments : KCC-D7,KTR-01

A-Pex International Co., Ltd.

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APPENDIX 1: Photographs of test setup

- 1. Page 10 : Filed Strength (Radiated emission)
- 2. Page 11-12 : Pre check of worse-case position

APPENDIX 2: Test Data

- 1. Page 13 : Filed Strength of Fundamental (Radiated)
- 2. Page 14-19 : Filed Strength of Spurious Emission (Radiated)
- 3. Page 20 : 26dB Bandwidth (Antenna Port Conducted)

APPENDIX 3: Test instruments

- Page 21 : Test instruments

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Filed Strength of Fundamental and Spurious Emission (Radiated emission)



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Pre check of worse-case position

X axis



Y axis



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Pre check of worse-case position

Z axis



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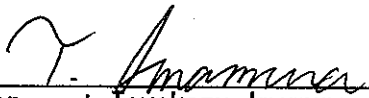
DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.

Yamakita No.2 Open Test Site

Report No. : 23CE0007-YK-1

Applicant : Seiko Instruments Inc
Kind of Equipment : triax Elite
Model No. : WA00
Serial No. : 290006
Power : DC3V
Mode : Transmitting (916.5MHz)
Remarks : -
Date : 10/25/2002
Test Distance : 3 m
Temperature : 24 °C
Humidity : 65 %
Regulation : FCC Part15C § 15.249(a) Fundamental (D:3m)


Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	916.50	BB	70.7	70.5	22.8	29.2	7.5	5.8	77.6	77.4	93.9	16.3	16.5

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

■ ANTENNA: 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. : 23CE0007-YK-1

Applicant : Seiko Instruments Inc
Kind of Equipment : triax Elite
Model No. : WA00
Serial No. : 290006
Power : DC3V
Mode : Transmitting (916.5MHz)
Remarks : -
Date : 10/25/2002
Test Distance : 3 m
Temperature : 24 °C
Humidity : 65 %
Regulation : FCC Part15C § 15.209


Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	130.97	BB	21.0	21.0	13.6	28.7	2.5	5.8	14.2	14.2	43.5	29.3	29.3
2.	152.77	BB	20.3	20.2	14.4	28.4	2.7	5.8	14.8	14.7	43.5	28.7	28.8
3.	183.29	BB	19.2	21.2	15.6	28.4	3.0	5.8	15.2	17.2	43.5	28.3	26.3
4.	229.13	BB	19.3	19.1	16.4	28.2	3.3	5.8	16.6	16.4	46.0	29.4	29.6
5.	305.50	BB	19.2	19.2	14.7	28.1	3.9	5.8	15.5	15.5	46.0	30.5	30.5
6.	458.26	BB	20.2	20.4	17.7	29.3	5.0	5.8	19.4	19.6	46.0	26.6	26.4

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-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. : 23CE0007-YK-1

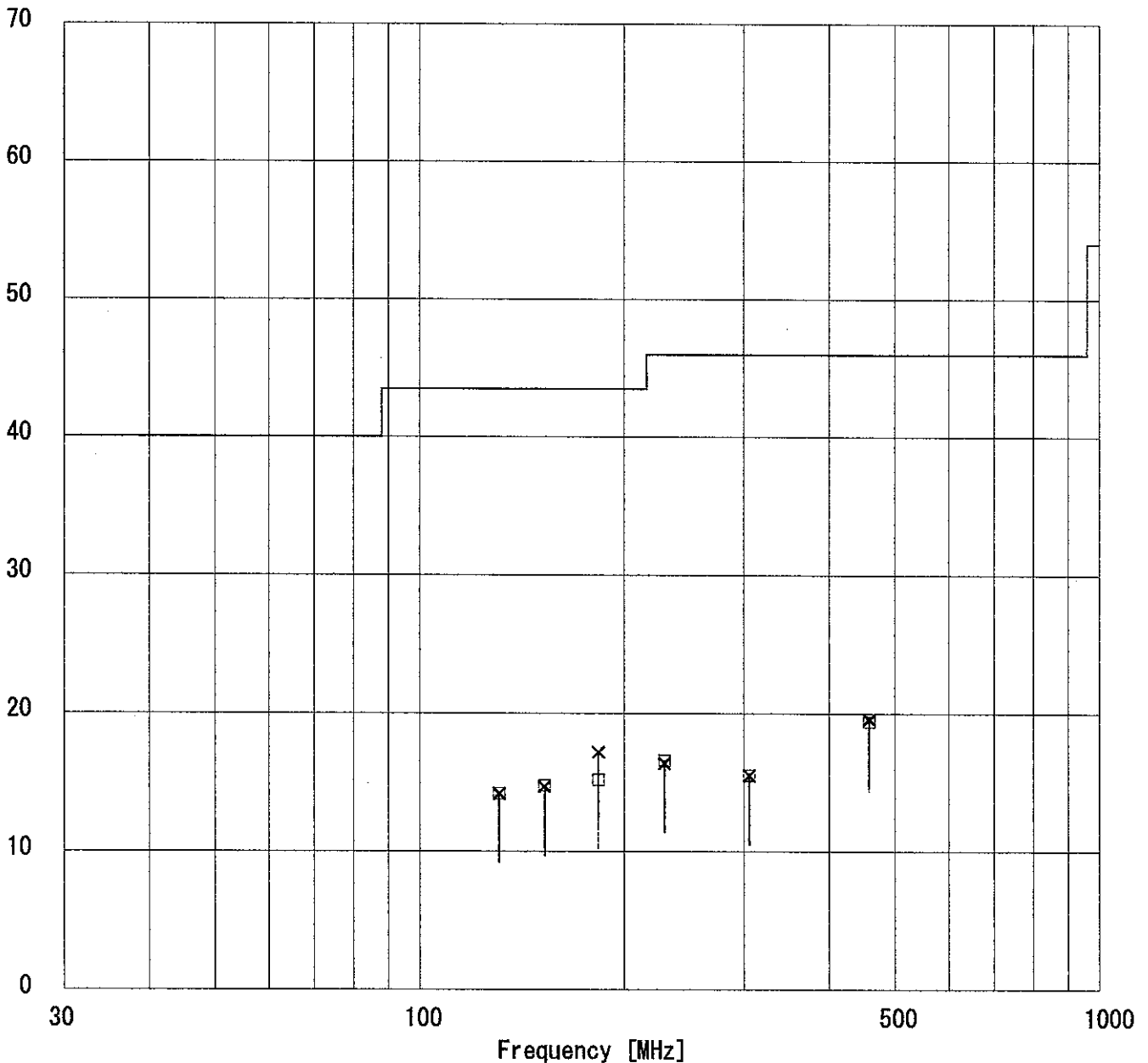
Applicant : Seiko Instruments Inc
Kind of Equipment : triax Elite
Model No. : WA00
Serial No. : 290006
Power : DC3V
Mode : Transmitting (916.5MHz)
Remarks : -
Date : 10/25/2002
Test Distance : 3 m
Temperature : 24 °C
Humidity : 65 %
Regulation : FCC Part15C § 15.209


Engineer : Toyokazu Imamura

Emission Level [dB μ V/m]

□ Horizontal

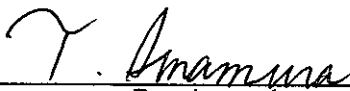
× Vertical



DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23CE0007-YK-1

Applicant : Seiko Instruments Inc
Kind of Equipment : triax Elite
Model No. : WA00
Serial No. : 290006
Power : DC3V
Mode : Transmitting(916.5MHz)
Remarks : 1-10GHz
Date : 10/25/2002
Test Distance : 3 m
Temperature : 24 °C
Humidity : 65 %
Regulation : FCC Part15C §15.209(AV Detection)


Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	1833.00	BB	34.6	37.5	27.9	35.1	4.9	0.0	32.3	35.2	54.0	21.7	18.8
2.	2749.50	BB	28.0	30.4	30.1	34.9	5.9	0.0	29.1	31.5	54.0	24.9	22.5
3.	3666.00	BB	27.9	27.9	30.6	35.3	6.9	0.0	30.1	30.1	54.0	23.9	23.9
4.	4582.50	BB	27.5	27.5	32.6	35.2	7.7	0.0	32.6	32.6	54.0	21.4	21.4
5.	5499.00	BB	27.7	27.7	33.9	34.5	8.6	0.0	35.7	35.7	54.0	18.3	18.3
6.	6415.50	BB	27.6	27.6	36.1	34.2	9.3	0.0	38.8	38.8	54.0	15.2	15.2
7.	7332.00	BB	27.6	27.5	38.7	34.7	10.0	0.0	41.6	41.5	54.0	12.4	12.5
8.	8248.50	BB	27.7	27.7	37.7	34.5	10.8	0.0	41.7	41.7	54.0	12.3	12.3
9.	9165.00	BB	28.1	28.0	40.0	34.6	11.3	0.0	44.8	44.7	54.0	9.2	9.3

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

■ ANTENNA: KHA-01 (1-18GHz)

■ AMP: KAF-04 (8449B) ■ RECEIVER: KTR-01 ■ CABLE: KCC-D8/D9/D10

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.

Yamakita No.2 Open Test Site

Report No. : 23CE0007-YK-1

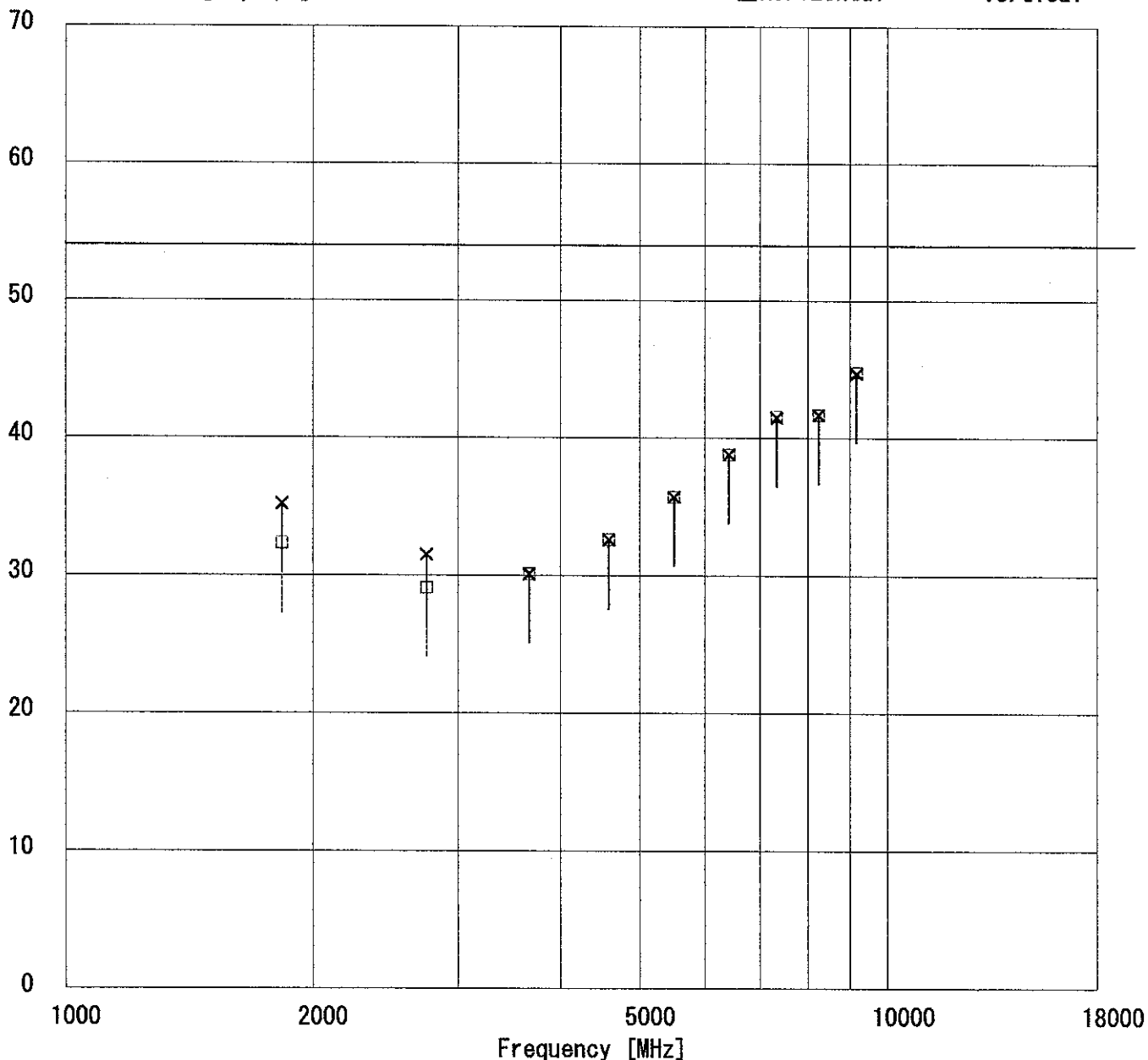
Applicant : Seiko Instruments Inc
Kind of Equipment : triax Elite
Model No. : WA00
Serial No. : 290006
Power : DC3V
Mode : Transmitting (916.5MHz)
Remarks : 1-10GHz
Date : 10/25/2002
Test Distance : 3 m
Temperature : 24 °C
Humidity : 65 %
Regulation : FCC Part15C §15.209 (AV Detection)

T. Imamura
Engineer : Toyokazu Imamura

Emission Level [dB μ V/m]

□ Horizontal

× Vertical



DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.2 Open Test Site
Report No. : 23CE0007-YK-1

Applicant : Seiko Instruments Inc
Kind of Equipment : triax Elite
Model No. : WA00
Serial No. : 290006
Power : DC3V
Mode : Transmitting (916.5MHz)
Remarks : 1-10GHz
Date : 10/25/2002
Test Distance : 3 m
Temperature : 24 °C
Humidity : 65 %
Regulation : FCC Part15C § 15.209 (PK Detection)


Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	1833.00	BB	46.4	48.1	27.9	35.1	4.9	0.0	44.1	45.8	74.0	29.9	28.2
2.	2749.50	BB	41.6	44.9	30.1	34.9	5.9	0.0	42.7	46.0	74.0	31.3	28.0
3.	3666.00	BB	40.6	40.7	30.6	35.3	6.9	0.0	42.8	42.9	74.0	31.2	31.1
4.	4582.50	BB	40.4	40.6	32.6	35.2	7.7	0.0	45.5	45.7	74.0	28.5	28.3
5.	5499.00	BB	40.4	40.9	33.9	34.5	8.6	0.0	48.4	48.9	74.0	25.6	25.1
6.	6415.50	BB	40.6	40.3	36.1	34.2	9.3	0.0	51.8	51.5	74.0	22.2	22.5
7.	7332.00	BB	40.3	40.2	38.7	34.7	10.0	0.0	54.3	54.2	74.0	19.7	19.8
8.	8248.50	BB	40.9	40.3	37.7	34.5	10.8	0.0	54.9	54.3	74.0	19.1	19.7
9.	9165.00	BB	40.9	41.3	40.0	34.6	11.3	0.0	57.6	58.0	74.0	16.4	16.0

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

■ ANTENNA: KHA-01 (1-18GHz)

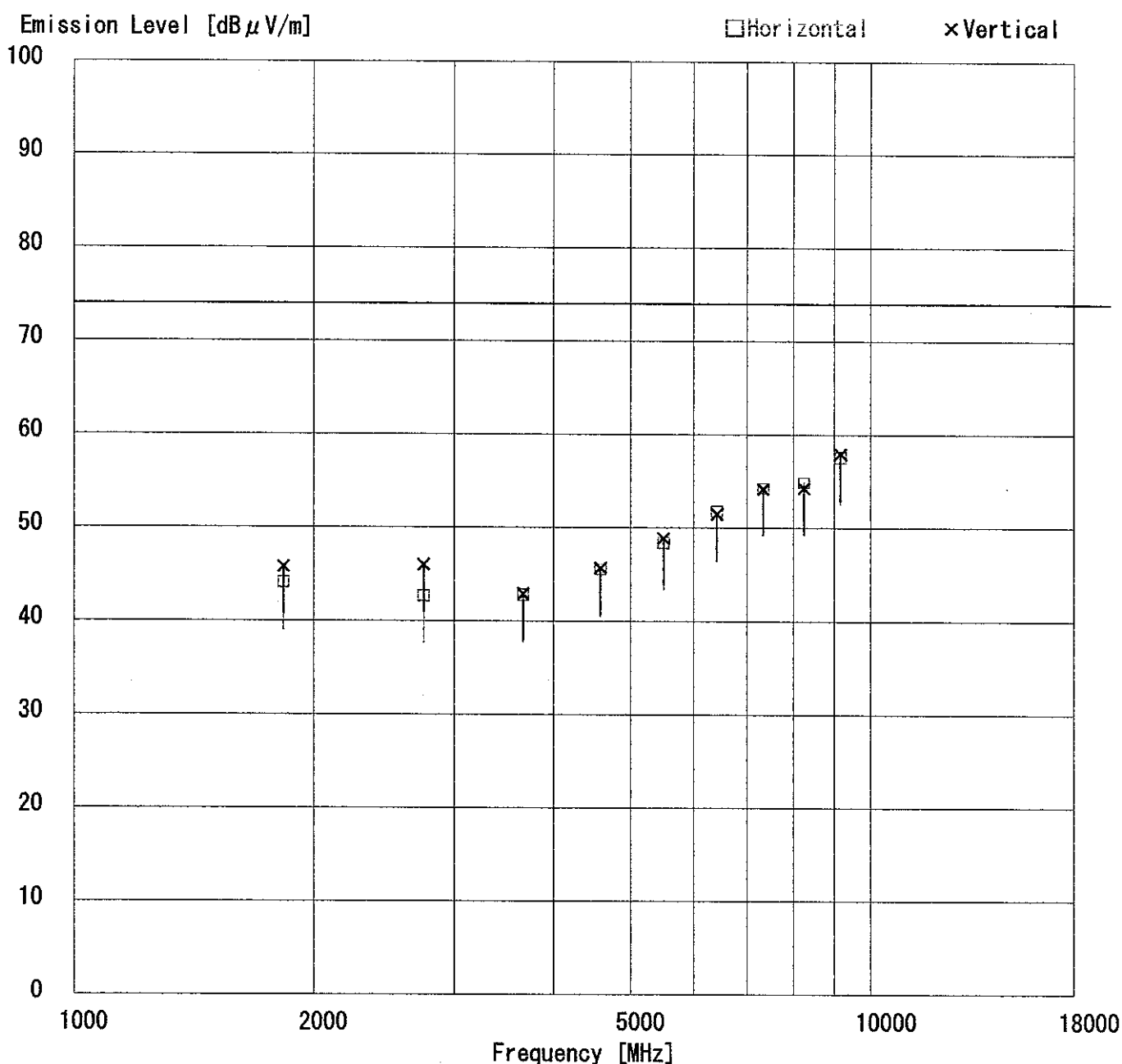
■ AMP: KAF-04 (8449B) ■ RECEIVER: KTR-01 ■ CABLE: KCC-D8/D9/D10

DATA OF RADIATION TEST

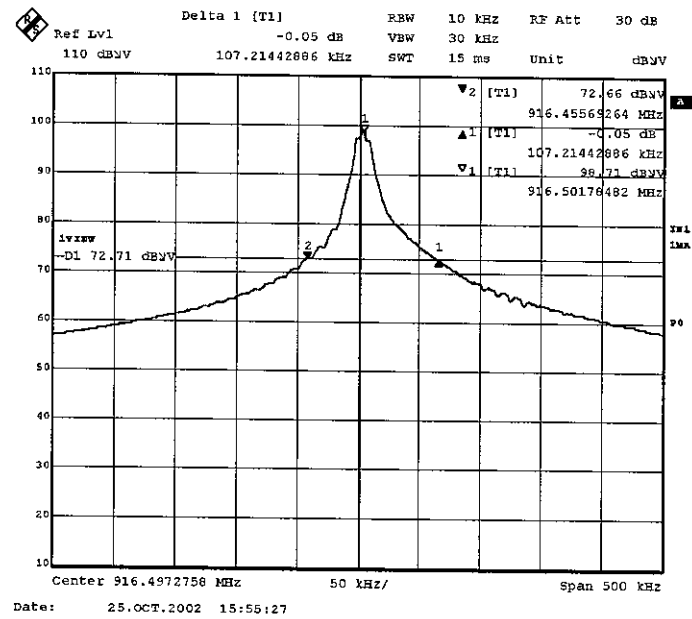
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Yamakita No.2 Open Test Site
Report No. : 23CE0007-YK-1

Applicant : Seiko Instruments Inc
Kind of Equipment : triax Elite
Model No. : WA00
Serial No. : 290006
Power : DC3V
Mode : Transmitting (916.5MHz)
Remarks : 1-10GHz
Date : 10/25/2002
Test Distance : 3 m
Temperature : 24 °C
Humidity : 65 %
Regulation : FCC Part15C § 15.209 (PK Detection)

T. Imamura
Engineer : Toyokazu Imamura



Tx:916.5MHz



Test Report No : 23CE0007-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
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-SF A/S04272B/S0 4272B	RE	2002/09/17 * 12
KHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2002/08/17 * 12
KLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2002/08/17 * 12
KOTS-02	Open Test Site	JSE	10m	RE	2002/08/20 * 12
KSA-02	Spectrum Analyzer	Advantest	R3265A	AT/RE	2002/11/29 * 12
KTR-01	Test Receiver	Rohde & Schwarz	ESI40	AT/RE	2002/07/22 * 12
KTR-04	Test Receiver	Rohde & Schwarz	ESVS10	RE	2002/10/09 * 12
KCC-D7	Coaxial Cable	Advantest	A01002	AT	Pre Check
KCC-D8/D9/D10	Coaxial Cable	Astrolab Inc.	32055-2-29080 -8M/32055-2-2 9080-5M/ 32081-29094-2 9081-40CM	RE	2002/09/11 * 12

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

Test Item:

RE: Radiated emission,

AT: Antenna terminal test